Pennsylvania Turnpike Commission

REQUEST FOR PROPOSALS FOR

Cashless Tolling System Implementation and Maintenance

ISSUING OFFICE

Pennsylvania Turnpike Commission

Contracts Administration Department on behalf of the
ETC Operations Department

RFP NUMBER

18-10495-8121

DATE OF ISSUANCE

May 30, 2018

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PART 1 GENERAL INFORMATION FOR PROPOSERS

1.1 Purpose.

This request for proposals (RFP) provides interested Proposers with sufficient information to enable them to prepare and submit Proposals for consideration by the Pennsylvania Turnpike Commission (herein after referred to as "the Commission" or "PTC") to satisfy a need for Cashless Tolling System Implementation and Maintenance Services.

1.2 Issuing Office.

This RFP is issued for the Commission by the Contracts Administration Department on behalf of the Electronic Toll Collection (ETC) Systems Technology Group.

1.3 Scope.

This RFP contains instructions governing the Proposals to be submitted and the material to be included therein; a description of the Services to be provided; requirements which must be met to be eligible for consideration; general evaluation criteria; and other requirements to be met by each Proposal. A Procurement Schedule of Events is detailed in Section 1.12 of this RFP. The dates are an estimate and the Commission is not committed to executing the schedule exactly as shown. Any changes to the schedule up to and including the due date for Proposals will be administered through an addendum to this RFP.

1.4 Problem Statement.

Proposers are to provide an efficient, cost-effective, revenue secure Cashless Tolling System that includes Design, development, testing, installation and Maintenance Services for the Cashless Tolling System as further set forth in **Exhibit A Scope of Work**.

The Scope of Work for this Contract will include services for the implementation of cashless tolling between the Clarks Summit interchange and the Keyser Ave interchange in Northeastern Pa. and will be the baseline for this RFP. This will include one (1) tolling location in each direction for a total of two (2) cashless toll zones using a maintenance from below gantry design.

Full conversion to mainline open road cashless tolling may occur as future implementations at various Turnpike highways at dates and locations to be determined as shown in *Attachment 1 – Cashless Toll Zone Locations*. The initial locations will include the eastern portion of the mainline ticket system (east of the Reading interchange, including the northeastern extension) tentatively scheduled for opening in October 2022 followed by the remaining locations in the central and western portions of the mainline ticket system (west of the Reading interchange) tentatively scheduled for opening as early as October 2024. Beyond the baseline Contract, all potential future facilities listed below will be considered optional additions to this Scope of Work, as will be indicated throughout this document.

- Mainline Turnpike– Additional thirty-two (32) tolling locations for sixty (60) cashless toll zones.
- North Eastern Extension – Additional nine (9) tolling locations for eighteen (18) cashless toll zones.

- Beaver Valley Expressway - Additional five (5) tolling locations for ten (10) cashless toll zones;
- Mon-Fayette Expressway - Additional twelve (12) tolling locations for twenty-four (24) cashless toll zones;
- Amos K. Hutchinson Bypass - Additional five (5) tolling locations for ten (10) cashless toll zones; and
- Other facilities to be determined (TBD) by PTC.

In addition to the optional tolling locations, PTC has also included the option for a future Cashless Toll Host system replacement. A replacement Toll Host system is not required in the base contract.

The Cashless Tolling System shall use the latest proven technology and shall be able to achieve the functional, technical and performance requirements as further set forth in **Exhibit A Scope of Work.**

In summary the Services shall include:

- All in-lane components and systems at each toll zone;
- Systems required to interface to existing PTC host systems;
- Image transfer and reconciliation with the CSC/VPC system;
- Digital Video Audit System (DVAS);
- Maintenance Online Management System (MOMS);
- Interface to the Commission CSC/VPC system;
- Maintenance and Software Support Services;
- Interface to existing PTC monitoring system; and
- Interface to existing PTC Toll Host.

The Cashless Tolling System procured under this Contract *does not* include:

- A back office transaction processing system. The required modifications and upgrades at the Commission E-ZPass Customer Service Center/Violations Processing System (CSC/VPC) is being provided under a separate contract; however, the Contractor is expected to interface to the CSC/VPS and provide the necessary coordination with CSC/VPS contractor sufficient to properly integrate, test and operate the back-office video billing system at the PTC CSC/VPC.
- Any support and maintenance functionality related to any aspect of existing toll systems at existing toll plazas, which will continue to be provided by the applicable current contractor.
- The implementation and maintenance of roadway infrastructure, including overhead structures/toll gantries, toll equipment building, generators, and pavement at the tolling points, which will be provided by others.
- Communications from the toll equipment building to other PTC facilities which will be provided by the PTC.

- Demolition and removal of existing toll plazas impacted by this Work, which will be provided by others.

For additional details on Contractor responsibilities and those of interfacing third parties please refer to **Exhibit A Scope of Work** and associated attachments.

1.5 Type of Contract.

If a contract is entered into as a result of this RFP, it will be on a fixed fee basis where the amount of payment does not depend on the amount of resources or time expended. A Draft Contract is included in **Exhibit G Draft Contract.** Payments are distributed in two phases: The first phase is the Implementation Phase. The schedule of payments under the Implementation Phase is provided in **Exhibit D Payment Schedule**. This is followed by the Maintenance Phase. The Commission may in its sole discretion undertake negotiations with Proposers whose Proposals as to price and other factors show them to be qualified, responsible, responsive and capable of performing the Work.

1.6 Contractor Integrity Provisions.

Contractor Integrity Provisions will apply to this contract upon award and the awarded vendor may be required to complete a Background Qualifications Questionnaire prior to entering into an Agreement with the Commission and attend annual ethics training provided by the Commission. Proposers can find the Integrity Provisions and other related documents on the Commissions website at www.paturnpike.com (Doing Business, General Information, and Integrity Provisions).

Include full disclosure of any potential conflict as described in the State Adverse Interest Act by the prime or any subconsultant. If there is no adverse interest you shall include the following statement: "I have reviewed the State Adverse Interest Statute and determined that there is no adverse interest for anyone on this Agreement team." This information should be included in your transmittal letter/cover page or executive summary.

1.7 Rejection of Proposals.

The Commission reserves the right to reject any and all Proposals received as a result of this request, or to negotiate separately with competing Proposers.

1.8 Subcontracting.

Any use of Subcontractors by a Proposer must be identified in the Proposal as instructed below, including in **Exhibit F-2 List of Subcontractors**. During the Contract period, use of any Subcontractors by the selected Proposer, which were not previously identified in the Proposal, must be Approved in advance in writing by the Commission as set forth in the Contract.

A firm that responds to this solicitation as a prime Proposer may not be included as a designated Subcontractor to another firm that responds to the same solicitation. Further, a prime Proposer shall submit no more than one (1) Proposal to this solicitation. Multiple responses under any of the foregoing situations may cause the rejection of all responses of the firm or firms involved. This does not preclude a firm from being set forth as a designated Subcontractor to more than one prime Proposer responding to the project advertisement.

1.9 Diverse Business Requirements.

Proposer will comply with the DB Requirements as described in **Exhibit I Diverse Business (DB) Requirements**. Details on DB submission requirements are provided in Section 2.5.

1.10 Minimum Experience Requirements.

The Proposer must meet the following minimum requirements with regard to each of Implementation and Maintenance Phases:

- The Proposer shall have successfully completed at least two (2) cashless or open road tolling ORT (or a combination thereof) multi-travel lane system implementation projects. At least one (1) of the two (2) projects shall have been in operation for a minimum of one (1) year at the time of Proposal submission.
- The Proposer also shall have successfully completed at least two (2) cashless tolling or ORT (or a combination thereof) multi-travel lane Maintenance projects. Projects may be currently in operation (Maintenance still being performed) or completed; however, at least one (1) of the two (2) projects shall have been in operation for a minimum of one (1) year at the time of Proposal submission.
- The Commission will consider equivalent experience of firms acquired by the Proposer prior to proposal submission in the event a Proposer presents experience based on firm acquisition.

1.11 Incurring Costs.

The Commission is not liable for any costs the Proposer incurs in preparation and submission of its Proposal, in participating in the RFP process or in anticipation of award of Contract.

1.12 Procurement Schedule of Events.

The current Schedule for Key Procurement Dates for this procurement process leading to an award of the Contract is provided in Table 1-1 below. The Commission reserves the right to make changes or alterations to this schedule as the Commission determines is in its best interest. All changes to these dates and/ or times up to and including the due date for Proposals will be issued as an addendum to this RFP and will become part of this RFP and will be posted to the Commission's website at www.paturnpike.com/procurement.

Unless otherwise notified in writing by the Commission, the dates indicated below for submission of items or for other required actions on the part of a Proposer shall constitute absolute deadlines for those activities and failure to fully comply by the time and date stated shall cause a Proposer to be disqualified. All times stated are in Harrisburg, PA local time and are subject to change.

Table1- 1: Key Procurement Dates

ACTIVITY	DATE	TIME
Request for Proposal Issued	May 30, 2018	N/A
Deadline for submission of written questions for the Pre-Proposal Conference via email to RFP-Q@paturnpike.com	June 8, 2018	5 p.m.
Pre-Proposal Conference	June 14, 2018	1:00 p.m.
Deadline for Proposers to Submit Final Questions via email to RFP-Q@paturnpike.com	June 29, 2018	1:00 p.m.
Answers to Proposers questions posted to the Commission website at https://www.paturnpike.com/Procurement/Bidlist.aspx?RTYPE=O *(Estimate Only)*	July 18, 2018 (Estimate Only)	N/A
Due Date for Proposals	August 8, 2018	2 p.m.
PTC Site Visits of Deployments	TBD	TBD
Oral Clarifications/Presentations *(If necessary)*	TBD	TBD
Anticipated Notice to Proceed *(Estimate Only)*	April 2019	N/A

1.13 Pre-Proposal Conference.

A Pre-Proposal conference will be held at the Commission's Central Administration Building, 700 S. Eisenhower Blvd., Middletown, PA on the date and time provided in Table 1-1 Key Procurement Dates. The purpose of this conference is to clarify any points in the RFP which may not have been clearly understood. Questions should be forwarded prior to the conference to ensure sufficient analysis can be made before an answer is supplied. The Commission does not guarantee that every question submitted will be answered either before or at the Pre-Proposal conference. Written questions shall be submitted by email to RFP-Q@paturnpike.com with **RFP18-10495-8121** in the Subject Line to be received no later than the date and time provided in Section 1.12 Procurement Schedule of Events, Table 1-1 Key Procurement Dates. Proposers shall use the form provided in **Exhibit F-8 Proposal Question Form** to submit the questions.

In view of the limited facilities available for the conference, it is requested representation be limited to two (2) individuals per Proposer. The Pre-Proposal conference is for information only. Answers furnished during the conference will not be official until verified, in writing, by the Issuing Office. All questions and written answers will be issued as an addendum to and become part of this RFP and will be posted to the Commission's website at www.paturnpike.com/procurement.

1.14 Questions and Answers.

No negotiations, decisions or actions shall be initiated or executed by a Proposer as a result of any oral discussions with any Commission member, employee, consultant/contractor. Written questions may be submitted to clarify any points in the RFP which may not have been clearly understood. Written questions shall be submitted by email to RFP-Q@paturnpike.com with **RFP18-10495-8121** in the Subject Line to be received no later than the date and time provided in Section 1.12 Procurement Schedule of Events, Table 1-1 Key Procurement Dates. All questions and written answers will be issued as an addendum to and become part of this RFP and will be posted to the Commission's website at http://www.paturnpike.com/procurement/Bidlist.aspx?rtype=o. Proposers shall use the form provided in **Exhibit F-8 Proposal Question Form** to submit the questions.

1.15 Addenda to the RFP.

If it becomes necessary to revise any part of this RFP before the Proposal response date, addenda will be posted to the Commission's website at www.paturnpike.com/procurement under the original RFP document name and number (Cashless Tolling System Implementation and Maintenance / **RFP18-10495-8121**). It is the responsibility of the Proposer to periodically check the website for any new information or addenda to the RFP.

The Commission may revise a published advertisement through an addendum. If the Commission revises a published advertisement less than ten (10) days before the RFP due date, the due date will be extended to maintain the minimum ten-day advertisement duration if the revision alters the project scope or selection criteria. Firms are responsible to monitor advertisements/addenda to ensure the submitted Proposal complies with any changes in the published advertisement.

1.16 Response.

To be considered, Proposals must be delivered to the Pennsylvania Turnpike Commission's Contracts Administration Department, Attention: **Wanda Metzger**, on or before the date and time provided in Section 1.12 Procurement Schedule of Events, Table 1-1 Key Procurement Dates. The Commission will **not** accept Proposals via email or facsimile transmission.

Overnight Delivery Address:
Contracts Administration Department
Attn: Wanda Metzger
PA Turnpike Commission
700 South Eisenhower Blvd.
Middletown, PA 17057
Phone: (717) 831-7429

US Mail Delivery Address:
Contracts Administration Department
Attn: Wanda Metzger
PA Turnpike Commission
P.O. Box 67676
Harrisburg, PA 17106

Please note that use of U.S. Mail, FedEx, UPS, or other delivery method, does not guarantee delivery to the Contracts Administration Department by the above listed time for submission. Proposers mailing Proposals should allow sufficient delivery time to ensure timely receipt of their Proposals. If the Commission office location to which Proposals are to be delivered is closed on the Proposal response date, due to inclement weather, natural disaster, or any other cause, the deadline for submission shall be automatically extended until the next Commission Business Day on which the office is open. Unless the

Proposers are otherwise notified by the Commission, the time for submission of Proposals shall remain the same.

1.17 Proposals.

To be considered, Proposers shall submit a complete response to this RFP, using the format provided in PART 2 and following the instructions in PART 2. The Proposer shall submit copies of its Proposal to the Commission Contract Administration person identified in Section 1.16 Response on or before the due date and time for Proposals set forth in Section 1.12 Procurement Schedule of Events, Table 1-1 Key Procurement dates and in the quantities specified in PART 2.

The Proposer shall present the Proposal to the Contracts Administration Department only. No other distribution of Proposals shall be made by the Proposer. An official authorized to bind the Proposer to its provisions must sign the Proposal. If the official signs the Proposal Cover Sheet (provided herein as **Exhibit F-1 Forms**) and the Proposal Cover Sheet is attached to the Proposal, this requirement will be met. For this RFP, the Proposal must remain valid for at least one (1) year. Moreover, the contents of the Proposal of the selected Proposer will become contractual obligations if a Contract is entered into, subject to the order of precedence identified in **Exhibit G Draft Contract**.

Each and every Proposer submitting a Proposal specifically waives any right to withdraw or modify it, except as hereinafter provided. Proposals may be withdrawn by written or fax notice (fax number (717) 986-8714) received at the Commission's address for Proposal delivery provided in Section 1.16 Response, prior to the exact hour and date specified for Proposal delivery.

However, if the Proposer chooses to attempt to provide such written notice by fax transmission, the Commission shall not be held responsible or liable for errors in fax transmission. A Proposal may also be withdrawn in person by a Proposer or its authorized representative, provided his/her identity is made known and he/she signs a receipt for the Proposal, but only if the withdrawal is made prior to the exact hour and date set for proposal delivery. A Proposal may only be modified by the submission of a new sealed Proposal or submission of a sealed modification, which complies with the requirements of this solicitation.

1.18 Written Clarification, Oral Presentations and Site Visits.

Proposers who submit Proposals may be required to make written clarification and/or oral clarification and presentation of their Proposals to the Issuing Office through the Contract Administration Department to ensure thorough mutual understanding and Proposer responsiveness to the solicitation requirements. The Issuing Office, through the Contract Administration Department, will initiate requests for clarification and Oral presentations. Oral presentations, if they are used, are currently scheduled to be conducted within the timeframe provided in Section 1.12 Procurement Schedule of Events, Table1-1 Key Procurement dates, should such oral presentations be required.

The PTC may conduct site visits of Proposers' toll facilities provided as reference projects. The Issuing Office will limit any visits to one or more responsible Proposers whose Proposals the Issuing Office has determined to be reasonably susceptible of being selected for award. If site visits are conducted they will take place in a timeframe to be determined by the PTC with reasonable notice provided to the Proposer.

1.19 Best and Final Offers.

The Issuing Office reserves the right to conduct discussions with Proposers for the purpose of obtaining "best and final offers" (BAFO). To obtain best and final offers from Proposers, the Issuing Office may do one or more of the following: a) enter into pre-selection negotiations; b) schedule oral presentations; and/or c) request revised Proposals. The Issuing Office will limit any discussions to one or more responsible Proposers whose Proposals the Issuing Office has determined to be reasonably susceptible of being selected for award.

1.20 Prime Proposer Responsibilities.

The selected Proposer will be required to assume responsibility for all Services set forth in the RFP and resulting Contract whether or not it produces them. Further, the Commission will consider the selected Proposer to be the sole point of contact with regard to contractual matters.

1.21 Proposal Contents.

Proposals will be held in confidence and will not be revealed or discussed with competitors, unless disclosure is required to be made (i) under the provisions of any Commonwealth or United States statute or regulation; or (ii) by rule or order of any court of competent jurisdiction. All material submitted with the Proposal becomes the property of the Pennsylvania Turnpike Commission and may be returned only at the Commission's option. Proposals submitted to the Commission may be reviewed and evaluated by any person other than competing Proposers at the discretion of the Commission. The Commission has the right to use any or all ideas presented in any Proposal. Selection or rejection of the Proposal does not affect this right.

In accordance with the Pennsylvania Right-to-Know Law (RTKL), 65 P.S. § 67.707 (Production of Certain Records), Proposers shall identify any and all portions of their Proposal that contains confidential proprietary information or is protected by a trade secret. Proposals shall include a written statement signed by a representative of the company/firm identifying the specific portion(s) of the Proposal that contains the trade secret or confidential proprietary information.

Proposers should note that "trade secrets" and "confidential proprietary information" are exempt from access under Section 708(b) (11) of the RTKL. Section 102 defines both "trade secrets" and "confidential proprietary information" as follows:

Confidential proprietary information: Commercial or financial information received by an agency: (1) which is privileged or confidential; **and** (2) the disclosure of which would cause substantial harm to the competitive position of the person that submitted the information.

Trade secret: Information, including a formula, drawing, pattern, compilation, including a customer list, program, device, method, technique or process that: (1) derives independent economic value, actual or potential, from not being generally known to and not being readily ascertainable by proper means by other persons who can obtain economic value from its disclosure or use; **and** (2) is the subject of efforts that are reasonable under the circumstances to maintain its secrecy. The term includes data processing software by an agency under a licensing agreement prohibiting disclosure.

65 P.S. §67.102 (emphasis added).

The Office of Open Records has determined that a third party must establish a trade secret based upon factors established by the appellate courts, which include the following:

- the extent to which the information is known outside of his business;
- the extent to which the information is known by employees and others in the business;
- the extent of measures taken to guard the secrecy of the information;
- the value of the information to his business and to competitors;
- the amount of effort or money expended in developing the information, and
- the ease of difficulty with which the information could be properly acquired or duplicated by others.

See Crum v. Bridgestone/Firestone North Amer. Tire., 907 A.2d 578, 585 (Pa. Super. 2006).

The Office of Open Records also notes that with regard to "confidential proprietary information the standard is equally high and may only be established when the party asserting protection shows that the information at issue is either 'commercial' or 'financial' and is privileged or confidential, and the disclosure ***would*** cause substantial competitive harm." (emphasis in original).

For more information regarding the RTKL, visit the Office of Open Records' website at www.openrecords.state.pa.us.

1.22 Debriefing Conferences.

Proposers whose Proposals are not selected will be notified of the name of the selected Proposer and given the opportunity to be debriefed, at the Proposer's request. The Issuing Office will schedule the time and location of the debriefing. The Proposer will not be compared with other Proposers.

1.23 News Releases.

News releases pertaining to this Project will not be made without prior Commission approval, and then only in coordination with the Issuing Office.

1.24 Commission Participation.

Unless specifically noted in this section, Proposers must provide all Services to complete the identified Work. Please refer to **Exhibit A Scope of Work** and attachments for additional details on the Work.

1.25 Price Proposal.

The Price Proposal shall be placed in a separately sealed envelope within the sealed Proposal and kept separate from the Technical Proposal as further instructed in PART 2: Information Required From Proposers.

1.26 Term of Contract.

The term of the Contract will commence on the Effective Date with a base term of ten (10) years, followed by two (2) five-year optional Maintenance Phase extensions, including the following Phases:

- Implementation Phase – The Implementation Phase shall begin on the Effective Date and shall continue until System Acceptance.
- Maintenance Phase – The Maintenance Phase shall begin upon Acceptance of the Implementation Phase and shall continue through the end of the base Contract term of ten (10) years.
- Options to Extend – The Optional Extension Phase includes two (2) optional, five-year Maintenance extensions with each to be executed at the sole discretion of the Commission, and with the first extension commencing upon the end of the base Contract term.

Any additional facilities or roadways considered as additions to this Scope of Work will not change the overall duration of the base term and options to extend, as described above.

The Commission shall fix the Effective Date after the Contract has been fully executed by the Contractor and by the Commission and all approvals required by Commission contracting procedures have been obtained.

1.27 Proposer's Representations and Authorizations.

Each Proposer by submitting its Proposal understands, represents, and acknowledges that:

a) All information provided by, and representations made by, the Proposer in the Proposal are material and important and will be relied upon by the Issuing Office in awarding the contract(s). Any misstatement, omission or misrepresentation shall be treated as fraudulent concealment from the Issuing Office of the true facts relating to the submission of this Proposal. A misrepresentation shall be punishable under 18 Pa. C.S. 4904.

b) The price(s) and amount of this Proposal have been arrived at independently and without consultation, communication or agreement with any other Proposer or potential Proposer.

c) Neither the price(s) nor the amount of the Proposal, and neither the approximate price(s) nor the approximate amount of this Proposal, have been disclosed to any other firm or person who is a Proposer or potential Proposer, and they will not be disclosed on or before the Proposal submission deadline specified in the response section of this RFP.

d) No attempt has been made or will be made to induce any firm or person to refrain from submitting a Proposal on this contract, or to submit a Proposal higher in cost than this Proposal, or to submit any intentionally high or noncompetitive Proposal or other form of complementary Proposal.

e) The Proposal is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary or other noncompetitive Proposal.

f) To the best knowledge of the person signing the Proposal for the Proposer, the Proposer, its affiliates, subsidiaries, officers, directors, and employees are not currently under investigation by any governmental agency and have not in the last four (4) years been convicted or found liable for any act prohibited by State or Federal law in any jurisdiction, involving conspiracy or collusion with respect to bidding or proposing on any public contract, except as disclosed by the Proposer in its Proposal.

g) To the best of the knowledge of the person signing the Proposal for the Proposer and except as otherwise disclosed by the Proposer in its Proposal, the Proposer has no outstanding, delinquent obligations to the Commonwealth including, but not limited to, any state tax liability not being contested on appeal or other obligation of the Proposer that is owed to the Commonwealth.

h) The Proposer is not currently under suspension or debarment by the Commonwealth, or any other state, or the federal government, and if the Proposer cannot certify, then it shall submit along with the Proposal a written explanation of why such certification cannot be made.

i) The Proposer has not, under separate contract with the Issuing Office, made any recommendations to the Issuing Office concerning the need for the Services described in the Proposal or the specifications for the Services described in the Proposal.

j) Each Proposer, by submitting its Proposal, authorizes all Commonwealth agencies to release to the Commission information related to liabilities to the Commonwealth including, but not limited to, taxes, unemployment compensation, and workers' compensation liabilities.

1.28 Prevailing Wage Rates.

The Provisions of the Pennsylvania Prevailing Wage Act of August 15, 1961, P.L. 987 as amended, together with the rates and regulations promulgated by the Secretary of Labor and Industry, will apply to this Project. Reference **Exhibit J Prevailing Wage Rate Requirements** for detailed information. For the purpose of pricing the base Work at Clarks Summit, the Proposer should consider the prevailing wages in Lackawanna County. For the purposes of pricing Optional Future Facilities Costs, since no location is specified, Proposer should assume rates for Berks County will apply.

1.29 Performance/Payment Bond.

When awarded the Contract, the Proposer shall furnish one (1) signed original of the Performance Bond and Payment Bond, each in the amount of 100 percent of the total Implementation Phase costs, as identified on **Sheet 1 Project Summary, Line 7** of the Contractor's Price Proposal.

The Proposer shall furnish in its Price Proposal Envelope marked “Original” one (1) signed original of a Performance and Payment Bond Commitment Letter. The Performance and Payment Bond Commitment Letter shall be in a form acceptable to the Commission with sufficient surety or sureties, in an amount equal to 100% of the total amount of the price of the Implementation Phase as identified on **Sheet 1 Project Summary, Line 7** of the Proposer’s Price Proposal.

The commitment letter shall be signed by an authorized representative of a corporate surety, legally authorized to transact business in the Commonwealth, on the U.S. Treasury Department List of Approved Sureties and otherwise meets the requirements set forth in the Section 24 Surety Bonds, Exhibit G, Draft Contract.

1.30 Indemnification.

The Proposer shall be responsible for, and shall indemnify, defend, and hold harmless the Commission and its Commissioners, officers, employees, and agents from any claim, liability, damages, losses, causes of action, and expenses, including reasonable attorneys’ fees, arising from damage to life or bodily injury or real or tangible personal property caused by the negligence or other tortious acts, errors, and omissions of Proposer, its employees, or its subcontractors while engaged in performing the Work of the Agreement or while present on the Commission’s premises, and for breach of the Agreement regarding the use or disclosure of proprietary and confidential information where it is determined that Proposer is responsible for any use of such information not permitted by the Agreement. The indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for Contractor or its subcontractors under Workmen’s Compensation Acts, Disability Benefits Acts, or other Employee Benefit Act.

1.31 Insurance.

Proposer will comply with the Insurance requirements as described in **Exhibit H Insurance Requirements**.

PART 2 INFORMATION REQUIRED FROM PROPOSERS

2.1 General.

Proposals must be submitted in the format, including sections and heading descriptions, as outlined below. To be considered, the Proposal must respond as instructed to all requirements in this part of the RFP. All cost data relating to this Proposal and all Diverse Business cost data should be kept separate from and not included in the Technical Submittal. Each Proposal shall consist of three (3) separately sealed submittals. The submittals are as follows: (i) Technical Proposal, in response to and in accordance with Sections 2.2. Content of Technical Proposal and 2.3 Submission of Technical Proposal; (ii) Price Proposal, in accordance with and in response to Section 2.4 Submission of Price Proposal, and (iii) DB Requirements Documentation, in response to Section 2.5 Submission of DB Documentation. The cover sheet for the completed Proposal **Exhibit F-1 Forms** shall be included within the Technical Proposal package submitted to the Commission.

The Commission reserves the right to request additional information which, in the Commission's opinion, is necessary to assure that the Proposer's competence; technical solution; number of qualified employees; business organization; financial resources, and other Proposal elements are adequate to perform according to the RFP.

The Commission may make such investigations as deemed necessary to determine the ability of the Proposer to perform the Work, and the Proposer shall furnish to the Issuing Office all such information and data for this purpose as requested by the Commission. The Commission reserves the right to reject any Proposal if the evidence submitted by, or investigation of, such Proposer fails to satisfy the Commission that such Proposer is properly qualified to carry out the obligations of the Contract and to complete the Work specified in **Exhibit A Scope of Work**.

2.2 Content of Technical Proposal.

2.2.1 Economy of Preparation and Page Limitations.

Proposals shall be prepared simply and economically, providing a straightforward, concise description of the Proposer's ability to meet the requirements of the RFP. To that end, Technical Proposal Sections 1-5 shall be limited to a combined total of 150 pages. Portions of the Proposal that are excluded from these page limitations are shown below in Table 2-1 Proposal Page Limitations.

Table 2-1 Proposal Page Limitations

Proposal Sections to be Completed by a Proposer	Page Count Limitations
Proposal Cover Sheet	• No limitations
Proposal Executive Summary	• 2 to 5 pages
Proposal Section 1: Firm Qualifications	Limited to a combined total of 150 pages
Proposal Section 2: Key Team Qualifications	
Proposal Section 3: Approach to Scope of Work and Technical Requirements	
Proposal Section 4: Approach to Project Plan and Implementation	
Proposal Section 5: Approach to Maintenance	
Proposal Section 6: Adherence to the Scope of Work and Requirements Conformance Matrix	• No limitations
Proposal Section 7: Forms and Submittals	• No limitations
Price Proposal	• No limitations
Proposal Appendix 1: Product Cut Sheets	• No limitations
Proposal Appendix 2: Preliminary Bill of Materials and Sample Reports	• No limitations
Proposal Appendix 3: Audited Financial Statements	• No limitations
Proposal Appendix 4: Civil Infrastructure Package	• No limitations

2.2.2 Technical Proposal Format and Contents.

The Technical Proposal shall be submitted in the format shown below. Each bulleted item designates a specific and separate section to be included in the Proposal:

- **Proposal Cover Sheet** – Provide the completed signed cover sheet provided as **Exhibit F-1 Forms.** Show the name of your firm; Federal I.D. number; address; name of contact person; contact person's email and telephone number; and the subject: Cashless Tolling System Implementation and Maintenance**, RFP18-10495-8121.** In addition, it is required that all information requested in **Exhibit F-1 Forms** be provided including information pertaining to location of office performing the Work; contact information; listing of all Pennsylvania offices and total number of Pennsylvania employees, and location of company headquarters

- **Executive Summary** - Provide a two (2) to five (5) page overview of the entire Proposal, describing the most important elements of the Proposal. Identify any Subcontractors and discuss their proposed roles on the Project. Include in this section or in a transmittal letter/cover page a statement regarding full disclosure of any potential conflict with the State Adverse Interest of State Advisor or Consultant Statute as instructed in Proposal Section 1.6 Contractor Integrity Provisions.

- **Proposal Section 1: Firm Qualifications** – Provide the following information regarding the Proposer's qualifications, including Subcontractors. Number and provide the information in the specific format provided below:

  1) Provide a brief history and description of the Proposer's organizational structure, including size, number of employees, capability and area(s) of specialization.
  2) Provide a detailed discussion of the Proposer's qualifications and experience related to the Scope of Work required by this RFP, including Subcontractor firms' relevant experience.
  3) Provide years of experience the firm has in open road tolling (ORT), cashless tolling and video-based tolling, including E-ZPass Group experience relevant to this Project.
  4) Provide years of experience with any non-E-ZPass Group interoperable agencies and/or any multi-protocol experience.
  5) Provide firm's experience in toll system maintenance, including ORT and cashless tolling, and identify where this maintenance work has been previously performed.
  6) Provide annual revenues for the firm and for the subsidiary, division or group responsible for this Project.
  7) State the location of the office(s) from which the Work on this engagement is to be performed for both the Implementation and Maintenance Phases.
  8) Provide a Recent Client List using **Exhibit F-3 Forms**, including a detailed description of the size, total dollar value and specific services provided for each client to which the Proposer provided similar services within the past five (5) years. Specify the name, address and telephone number of the individual responsible at the client organization for the supervision of such services. Include in Proposal Section 7 and note in your response to this item that it has been provided in Proposal Section 7.
  9) Complete the Proposer Company Reference Forms Part 1 using **Exhibit F-4 Forms**. Include in Proposal Section 7 and note in your response to this item that it is provided in Proposal Section 7. The completed forms must include at least two (2) references to

demonstrate that the Proposer meets the minimum requirements for each of the Implementation and Maintenance Phases identified in Section 1.10.

10) Include a copy of the Proposer's audited financial statements for the past two years as Appendix 3 to the Proposal and note in your response to this item that it is provided in Appendix 3. If a Proposer does not produce audited financial statements, the Proposer shall submit any financial statements that it does have (e.g. lines of credit, statements compiled by an outside accounting firm, etc.) and any other information Proposer feels is pertinent in establishing the financial stability of its business/organization. The PTC reserves the right to review other publicly available information with regard to the Proposer's financial stability, as part of the evaluation. If a Proposer has questions about what evidence of the Proposer's financial stability will be acceptable to the Commission, the Proposer should communicate with Commission as set forth in Section 1.14 Questions and Answers.

- **Proposal Section 2: Key Team Member Qualifications** – Provide responses to the questions below regarding the Proposer's Key Team Member qualifications, including Subcontractors as applicable. Please number and provide the information in the specific format provided below.

    1) Identify Key Team Members on this Project. PTC has indicated the desired level of experience for each Key Team Member below, following the Key Team Member position name. Key Team Members who must be identified in the Proposal are as follows:

        a) Project Principal: A full-time employee of the Proposer or its parent company for at least one (1) year at the time of Proposal submission with a minimum of ten (10) years of experience in the toll industry, with five (5) years of senior management responsibility for toll projects. Senior management responsibility for at least one (1) toll project of twenty million dollars ($20,000,000) or more in value.

        b) Project Manager: At least five (5) years of experience in the toll industry, with three (3) years as project manager of a roadway tolling project(s) similar to the Work in this Project. Project manager for at least one (1) project of ten million dollars ($10,000,000) or more in value.

        c) Deputy Project Manager: At least three (3) years of experience in the toll industry, with one (1) year as a deputy/project manager of a roadway tolling project(s) similar to the Work in this Project.

        d) Technical Manager, Lane Systems: At least five (5) years of software development experience, including at least three (3) years of experience in software development of lane functionality for roadway projects similar to the Work on this Project.

        e) Technology Manager, Toll Concentrator/Host System: At least five (5) years of software development experience, including at least three (3) years of experience in software development of central systems that consolidate roadside data prior to interface with existing PTC Toll Host for roadway projects similar to the Work on this Project.

f) Installation Manager: At least five (5) years of experience in the installation of toll systems, with at least two (2) years of experience in a responsible installation management role on projects similar to the Work on this Project.

g) Quality Assurance/Test Manager: At least five (5) years of experience in quality assurance and testing on similar projects in the toll collection industry or related industry with at least two (2) years' experience as quality manager on a roadway tolling project.

2) Describe the experience of each Key Team Member and how it relates specifically to this Project.

3) Provide resumes (not to exceed two (2) pages per team member), for each of the Key Project Team Members. (Include in Proposal Section 7 and note in your response to this item that it has been provided in Proposal Section 7.)

4) Proposers must complete at least one (1) Key Team References form (Reference Form Part 2) provided in **Exhibit F-5 Forms** for each Key Team Member. (Include in Proposal Section 7 and note in your response to this item that it has been provided in Proposal Section 7.)

5) Complete the List of Subcontractors Form from **Exhibit F-2 List of Subcontractors** which includes Subcontractor name; address; work to be performed, and estimated percentage of total Work value to be performed. (Include in Proposal Section 7 and note in your response to this item that it has been provided in Proposal Section 7.)

- **Proposal Section 3: Approach to Scope of Work and Technical Requirements** – Provide responses to the questions below regarding the Proposer's approach to the Scope of Work and requirements. Please number and provide the information in the specific format provided below.

1) Discuss Proposer's technical approach to satisfying all of the functional requirements for the Cashless Tolling System architecture with focus on redundancy and reliability. With the aid of drawings, describe how the Proposer's solution and choice of Equipment meet the availability requirements.

2) Specifically address how the Proposer's solution and approach will accommodate changes in technology given the potential extended duration of the Implementation Phase, considering the optional facilities.

3) Identify all Software and vendor with version number including operating system; database; security software; monitoring tools and software and freeware for the In-lane Systems and Cashless Toll Systems and include product cut sheets in Proposal Appendix 1. Also identify other Proposer projects where such Software is deployed.

4) Describe the Contractor's System security Design that prevents virus attacks and unauthorized access and identify detection and alerting mechanisms in place in the event of attempted or successful intrusions.

5) Identify all In-lane System Equipment and servers and their connectivity, with the aid of diagrams. Include details of each of the subsystems and include product cut sheets in Proposal Appendix 1.

6) Provide the Equipment layouts and the sensor placements for the Cashless Tolling System lanes, including travel lanes, shoulders lanes that are eight (8) feet or greater and shoulder lanes that are less than eight (8) feet, in accordance with **Exhibit A Scope of Work**. Wherever possible provide supporting drawings to explain the equipment layouts and sensor spacing using the concepts provided in Scope of Work Attachment 5 Concept Plans for Overhead Structures/Toll gantries.

7) The Proposer will be provided with up to two (2) standard gantries to be constructed at each tolling zone within a work envelope to install their overhead toll equipment. Each gantry will provide for mounting the toll equipment within the maximum distances from the center line of each gantry type as defined in *Scope of Work Attachment 5: Concept Plan for Overhead Structures and Toll Gantries*. The Proposer may propose a single or dual gantry solution and shall provide the following information in Appendix 4: Civil Infrastructure Package as part of its Proposal in support of the design of the Cashless Tolling System civil infrastructure:

    a) In support of each of the proposed overhead gantry designs:

        i. Provide the spacing requirements from center line to center line of the standard gantries if a dual gantry system per toll zone is required. Provide physical location requirements (transversely, longitudinally and vertically) for all Cashless Tolling System components to be located on the overhead structure(s). Spatial location requirements for each component shall be provided relative to the whole of the proposed Cashless Tolling System and at least one element of the physical roadway for transverse and vertical dimensions (such as edge of shoulder, edge of travelway, pavement surface). Longitudinal dimensions shall reference the first element of the Cashless Tolling System in the direction of travel or some other similar, readily referenced feature of the proposed Cashless Tolling System. Include any differences between equipment location requirements between the base AVI requirement for dual protocol and AVI option for tri-protocol scope items.

        ii. Provide the range and typical physical mounting requirements for all Cashless Tolling System components and any supplemental lighting required as part of the proposed solution to be mounted on the overhead structure. Physical mounting requirements shall include the type, size and configuration of hard mounting points on the mounting arms/overhead structure to which the proposed toll system component would typically mount either directly or via a typical mounting bracket. An example of a typical hard mounting point would be a metal pipe of a specified diameter. In association with the mounting requirements, provide details on how the Equipment will satisfy the Commission's tethering requirements by providing details of the tether attachments on proposed Equipment and the requirements for the anchoring ends such that these can be coordinated with the overhead structure design along with the Equipment mounting requirement.

b) In support of roadway design: provide requirements for in-pavement sensors and any other subsurface requirements, including requirements for pavement materials, extents, or similar. Examples of other subsurface requirements may include but are not limited to, restrictions on metallic features within proximity of pavement sensors and positioning of roadway joints.

c) In support of the toll equipment building civil design: Provide direction to civil designer for space requirements for Equipment racks and cabinets mounted within the toll equipment building in accordance with the mounting requirements set forth in **Exhibit A Scope of Work**. Include drawings of all Equipment and servers that will be installed within the equipment racks/toll equipment building.

d) In general support for civil design:

    i. Provide physical environmental requirements for all Cashless Tolling System components in accordance with the environmental requirements set forth in **Exhibit A Scope of Work**. Physical requirements shall include, but are not limited to, temperature; humidity; vibration frequencies; deflection limitations, and any other constraints of the proposed Cashless Tolling System that will need to be considered more specifically as part of the design of the overhead structure and toll equipment building.

    ii. Provide general requirements for cabling and conduits (or similar conveyance) for power and data from the toll equipment building to the gantry for the purposes of confirming the type, size and number of conduits required. Provide any limitations on the maximum length of cabling between components that may dictate the location of Equipment relative to each other. Address any issues with constraints on location of the AVI readers in the toll equipment building.

    iii. Provide general power and data requirements to the toll equipment building that will support the Cashless Tolling System.

iv. Provide any specific mounting requirements and restrictions for affixing all overhead components to the overhead structure, including any required supplemental lighting.

8) Provide a preliminary bill of materials (BOM) in Proposal Appendix 2A that meets the requirements set forth in **Exhibit A Scope of Work**. (Note in your response to this item that it has been provided in Proposal Appendix 2A). The BOM shall fully match the Equipment and third-party products in the Price Proposal. (Do not include any pricing in this version of the BOM). Identify a second source for each type of equipment where possible.

9) Provide a description of the proposed System bandwidth requirements with back-up details and a diagram of the proposed System network architecture that presents all the Cashless Tolling In-lane and related central systems (if applicable) Local Area Network (LAN), including Proposer's Design for redundancy to meet the network requirements in accordance with **Exhibit A Scope of Work**. Provide the minimum and recommended bandwidth requirements for normal operations including transaction and image data functions and system updates. Provide additional bandwidth requirements on a per user basis to view remotely and audit license plate images and DVAS video viewing, either live or recorded to perform.

10) Discuss the Proposer's detailed approach for implementing a cloud solution for the replacement Cashless Toll Host System (if exercised) installation as opposed to a physical location, as described in **Exhibit A Scope of Work**. The description should include details of how the solution would meet appropriate architecture and security measures. Maintenance and Software Support Service details for all elements of the Cashless Toll Host System in a cloud solution environment shall also be described.

11) Describe clearly and with the aid of diagrams and flow charts the proposed System transaction processing logic. Explain how the Proposer's System processes and frames vehicle transactions. Provide a diagram that identifies framing logic, timing and event processing with specific emphasis on vehicle spacing and the associated performance requirements of **Exhibit A Scope of Work**. Details of the System's ability to handle a single point of failures within each subsystem and handling of degraded mode operations and their impact on transaction processing and toll revenue shall be explained.

12) Discuss the Proposer's Design approach and reporting to ensuring and confirming: a) that there are no missing transactions and all vehicles are accurately captured and reported; b) receipt of all transactions at the Cashless Toll Concentrator or related central systems (if applicable); c) subsequent transmission of all transactions to the PTC host system; d) subsequent guaranteed transmission of all AVI transactions to the existing CSC/VPC systems; e) successful transmission of all video transactions and images to the existing CSC/VPC systems; and f) that all errors, exceptions, and missing and failed transactions are identified and reported as set forth in **Exhibit A Scope of Work**. Provide details of the

Proposer's solution to the transaction reconciliation and audit process described in **Exhibit A Scope of Work**.

13) Discuss the Proposer's approach to designing and integrating the Automatic Vehicle Identification (AVI) system to meet performance requirements set forth in **Exhibit A Scope of Work**. Describe any logic incorporated into the AVI system to prevent cross lane reads and false reads and to account for multiple transponders in vehicles. Include details on how the Proposer plans to address both the base requirements for dual protocol AVI as well as the option for a tri-protocol solution.

14) Discuss the Proposer's Automatic Vehicle Classification (AVC) system solution that meets the requirements of **Exhibit A Scope of Work**. Address the AVC solution and Proposer's Design for the following:

    a) Handling of stop and go and bumper-to-bumper traffic with vehicles that are spaced as closely as three (3) feet apart.

    b) Handling of lane straddling and lane changing.

    c) Providing redundancy in vehicle classification, vehicle framing, and camera triggers.

    d) Vehicle classification during degraded mode operations.

    e) Handling the environmental conditions in Pennsylvania, specifically heavy rain, fog and snow, and their impacts on vehicle detection, framing, and camera trigger. Explain how the Proposer's Equipment selection and logic will prevent false detection and triggers in the extreme weather conditions that are common to the area.

    f) Describe how processing rules will be implemented to provide vehicle classification that meets the PTC Class structure for axle/profile based classification as described in Scope of Work Attachment 4A PTC Proposed AVC Class Structure and Silhouette and 4B E-ZPass Group Matched Classes.

15) Discuss Proposer's solution for a license plate image capture and processing system (LPICPS) from the point of identification of a video transaction at the lane-level to the automatic extraction of the license plate data, if provided. Proposer should also specifically address:

    a) How the Proposer's solution and placement of cameras provide the redundancy and meet the image processing requirements of **Exhibit A Scope of Work**.

    b) The LPICPS camera and server architecture redundancy and reliability; specifically, how the solution ensures images are never lost when there are single points of failure, and how images are successfully saved, correlated to the video transaction and subsequently transmitted to the existing CSC/VPC system along with the video transaction.

c) Reconciliation and audit of images related to successful capture of images for all video transactions; statusing of the successful transmission of the video transactions and images to the existing CSC/VPC system to the Cashless Tolling Systems, and validation of the reconciliation process with the support of reports to meet the requirements of the Scope of Work.

d) Address your technical approach to performing automatic extraction of vehicle license plate number, jurisdictions and plate type, as required in **Exhibit A Scope of Work** to meet the accuracy required in **Exhibit A Scope of Work**. Specifically discuss:

   i. Provision of an image review screen for auditing and validating the OCR/ALPR performance requirements and image quality, if provided.

   ii. The technical approach to providing notification to enforcement personnel, as described in **Exhibit A Scope of Work**, when license plates and transponders on the Violation Enforcement List (VEL) are identified.

e) Provide detailed characteristics pertaining to quality of the image captured by the ALPR camera:

   i. Number of pixels per horizontal and vertical stroke-width of the plate numbers

   ii. Number of pixels per lane image

   iii. Number of pixels per plate width

   iv. Contrast to noise ratio

   v. Size of each image set

   vi. Number of images per camera (image set).

16) Detail the proposed logic for transmission of the Transponder Status List (TSL) from the Cashless Toll Concentrator or central systems to each of the zone controllers to meet the requirements described in **Exhibit A Scope of Work**. Explain how the Design will ensure the TSL for all E-ZPass Agencies and Interoperable agencies will be sent to the lanes expeditiously without impacting lane operations and performance. Provide sample reports that support the System's compliance to requirements.

17) Discuss Proposer's provision of a MOMS that supports the Maintenance requirements of **Exhibit A Scope of Work**. Identify all third-party monitoring software and tools used and their integration into the MOMS. Provide sample reports that are used to validate Maintenance performance requirements specified in Scope of Work Section 7. Describe the asset management functions of the MOMS for work order creation and disposition data and Equipment inventory data.

18) Discuss Proposer's provision of a Dashboard for real-time monitoring of the Cashless Tolling System locations and specifically how this Dashboard will help the Commission's Network Control staff to identify and monitor Equipment problems and System issues. Provide samples, if available, of the Dashboard screen shots that demonstrate pictorial aspects and ease of access to DVAS, images and detailed event data as examples, that support your statements.

19) Discuss with the aid of diagrams the Proposer's DVAS solution and the Design approach to meeting the requirements of **Exhibit A Scope of Work**. Describe the user selection criteria for review of playback video and lane event data. Provide actual images and screen shots, if available, to support your statements.

20) Discuss Proposer's adherence to the performance requirements and explain how Proposer will meet or exceed key specific performance requirements set forth in **Exhibit A Scope of Work**. Provide actual examples, if available, of how each of the performance requirements was met or exceeded on other similar projects and how the performance was measured.

21) Discuss Proposer's approach to designing an interface to various Commission systems; provide specifics on approach to the Interface to each of the systems identified in Attachment 9 Cashless Tolling Concept Plan, addressing each of the Interface items identified in the flow. Describe the processes in place to detect and Interface issues. Include further details on the proposed approach to designing and interfacing with the existing PTC Toll Host, providing examples if available for similar projects involving new roadside systems interfacing to an existing host system.

22) Discuss Proposer's approach to satisfying the specific reporting requirements of the Project, highlighting any unique features of Proposer's reporting system relating to performance reporting and other types of reports. Also, specifically address limiting parameters to lane numbering and Plaza reporting structure(s), if any. Provide examples of the Proposer's flexibility in mapping toll zones by district, highway, tolling point and milepost. Provide examples of key reports and graphs to support your statements in Proposal Appendix 2B.

23) Detail the Proposer's Cashless Toll Concentration or Toll Host solution (if applicable) at the primary and secondary facilities focusing on redundancy, data resiliency and high availability.

24) Discuss Proposer's approach to testing and System Acceptance, as described in **Exhibit A Scope of Work** to support the Project. Please address:

    a) Proposer's overall test plan approach

    b) Phased approach to testing the lane solutions

    c) Plans for factory acceptance test (FAT) and location of the test site, including test site configuration

    d) Plans for conduct of the Onsite First Installation Test (OFIT) in live traffic

   e) Approach to Operational/Acceptance Test of the Project and how Proposer plans to conduct the AVI accuracy testing within the constraints of live traffic

   f) Approach to commissioning testing.

- **Proposal Section 4: Approach to Project Plan and Implementation** – Provide responses to the questions below regarding the Proposer's approach to the Project Plan and Implementation. Please number and provide the information in the specific format provided below.

  The Commission has established tentative milestone dates for the Project that are subject to change at the sole determination of the Commission. These milestones are provided in **Exhibit E Project Implementation Schedule**. This list of milestones is not intended to include all Project milestones of the Project, but to present planned major milestones to allow the Proposer sufficient detail to develop a meaningful preliminary Project Schedule as a part of its Proposal. Proposers may modify certain interim milestone dates on the Project Schedule; however, it is critical that the milestone dates in bold italics are achieved on the dates shown in the schedule. With these points in mind, Proposers shall provide the following information:

  1) Provide a Preliminary Project Implementation Schedule in MS Project format that meets the schedule guidelines set forth above and is based on the **Exhibit E Project Implementation Schedule**. The schedule shall be resource loaded. Do not include Gantt chart bars in the schedule. All major elements of the Project requirements shall be addressed in the Preliminary Implementation Project Implementation Schedule, including draft submissions, review cycles and final Approvals.
  2) Discuss the approach for delivering the Cashless Tolling System in the timeframe specified, highlighting the major challenges and issues to meeting the Project milestones established in **Exhibit E Project Implementation Schedule**. Identify key elements to your approach. Identify and describe any anticipated potential problems or issues associated with the current schedule provided in **Exhibit E Project Implementation Schedule**; the Proposer's approach to resolving these problems and any special assistance that will be requested from the Commission to meet the schedule.
  3) Discuss the Proposer's approach to project management, addressing the Project Management Plan requirements of **Exhibit A Scope of Work**. Please specifically discuss your approach to the following project management elements:
     a) Proposed management of the Project schedule
     b) Project communications plan
     c) Planned formal meetings schedule
     d) Project issues identification and escalation processes
     e) Risk management plan.
  4) Specifically address Proposer's approach to coordination of the Design with the civil contractor responsible for the provision of the overhead structure, pavement and shelters

in accordance with **Exhibit A Scope of Work**, given that the civil design work will be in progress at the time of Contract execution on this Project. Provide examples of similar experience and lessons learned to enhance communication and coordination that will be applied to the benefit of the Commission.

5) Provide an Implementation Phase organization chart that shows planned staffing for all levels of the Project, which is consistent and coordinated with the pricing and staffing provided in the Price Proposal.
6) Discuss how the Implementation Phase will be staffed and the intended level of effort. Include location of staff, headcounts and full-time equivalents (FTEs). Provide details on staffing at least one level below the Key Team Members. The information provided must be consistent and coordinated with the pricing and staffing provided in the Price Proposal, as well as with the organizational chart provided in item 5 above.
7) Provide a plan for staffing on the Commission site from installation through Acceptance. The Commission desires a local project office with a dedicated on-site Project Manager during Implementation Phase. In your plan identify which staff will be on-site in this time period and for what percentage of time.
8) Discuss the installation process and how Proposer intends to meet the installation requirements of **Exhibit A Scope of Work** and meet the schedule requirements. Also, specifically address:
    a) The order that the Cashless Tolling System Equipment items and Software are to be installed and the estimated phases and duration of installation.
    b) Required floor space and power for all systems that will be installed at the Commission facilities.
9) Specifically address what elements will be in place during the installation process to ensure timely communication and resolution of problems with the Commission's civil designer and contractor without the intervention of the Commission.
10) Discuss Proposer's approach to meeting the transition requirements identified in **Exhibit A Scope of Work** and identify what major transition issues are anticipated by Proposer and how these issues shall be addressed. The approach to transition should include discussion of the following:
    a) Transition to cashless tolling with the goal of minimizing operational impacts and cost.
    b) Standard two (2) gantry solution.

- **Proposal Section 5: Approach to Maintenance –** Provide responses to the questions below regarding the Proposer's approach to Maintenance. Please number and provide the information in the specific format provided below.

1) Discuss the Proposer's approach to Maintenance that will meet or exceed all Maintenance services and warranty requirements as specified in **Exhibit A Scope of Work**.
2) Provide an organizational chart that details how all required Maintenance functions will be staffed with intended level of effort (broken down by facility for potential future implementations). The organization chart must be consistent with the pricing and staffing assumed and provided in the Price Proposal.
3) Discuss Proposer's staffing model and how all required Maintenance functions will be staffed with the intended level of effort identified. Include location of staff, headcounts and full-time equivalents (FTEs). Provide detail regarding daily work hours and coverage schedules. The information must be consistent with the pricing and staffing provided in the Price Proposal, as well as with the organizational chart provided as a part of Item 2 above.
4) Discuss the Proposer's plan for coordination with the Commission to allow for the Contractor to perform Maintenance responsibilities.
5) Discuss the Proposer's plan to coordinate the delivery of Maintenance Services with the CSC/VPC provider and operator and other interfacing third parties. Specifically address the applications and tools that facilitate identification of problems with interfacing systems and the ability to communicate effectively with the Commission and third-party providers on a long-term basis.
6) Discuss and illustrate the ability of MOMS to facilitate Maintenance activities and effectively monitor System performance.
7) Discuss and illustrate how Maintenance staffing would be increased to address current and potential future implementations, which would occur across a broad geographic region. Please provide specific information including how Maintenance staffing might increase and be impacted by geographic diversity. Identify what the drivers might be for efficiencies in Maintenance costs as the number of facilities increase. Do not include any pricing or cost information in response to this question.
8) The Commission desires a local Maintenance Office to be in place continuously beginning at the start of the Maintenance Phase. Discuss how this will be addressed in a cost-effective manner.
9) Discuss the Proposer's training approach for the Proposer's Maintenance staff and for Commission staff.
10) Identify specifically what cost items are included in the Maintenance Services and what items would represent additional costs to be charged to the Commission. Do not include any information regarding actual cost or price.
11) Provide Proposer's anticipated schedule for upgrades, patches and updates, upon which pricing is based. Specifically address what Software and application upgrades and updates are included in the Maintenance Services pricing (e.g. operating system and relational data

base management systems) and on what frequency. Do not include any information regarding actual cost or price.

- **Proposal Section 6: Adherence to the Scope of Work, Terms and Conditions and Requirements Conformance Matrix**

    1) The Proposer must complete and submit the Excel version of the Requirements Conformance Matrix which is provided in PDF form in **Exhibit F-6 Forms**. The matrix covers each of the functional and technical requirements set forth in **Exhibit A Scope of Work**. The Excel version of the Workbook is attached to the posted PDF of the RFP and can be downloaded from the Commission's Website at: www.paturnpike.com/procurement.
    2) Proposers are not to alter the technical requirements listed in the Requirements Conformance Matrix in any way and must use the worksheets provided. The Proposer shall submit a PDF version of the completed matrix in this Proposal Section 6, in addition to submitting the Excel version of the matrix on CD/DVD, as directed in Section 2.3 Submission of Technical Proposal.
    3) If a Proposer indicates in the Requirements Conformance Matrix that a Technical Requirement is not provided ("N"), the specific requirement(s) to which exception is taken must also be separately identified and explained in this Proposal Section 6. In these cases, please indicate a description of the exception taken in the comments column of the Requirements Conformance Matrix and provide a more detailed explanation in this Proposal Section 6 for each of the "N" items.
    4) The Proposer must submit its Proposal, including the Price Proposal, based on the terms and conditions set out in **Exhibit G Draft Contract**. The Issuing Office may reject any Proposal that is conditioned on the negotiation of terms and conditions set out in **Exhibit G Draft Contract** or to other provisions of the RFP as specifically identified above.
    5) In Proposal Section 6, Proposers may identify and describe any key assumptions made related only to **Exhibit A Scope of Work**. No assumptions regarding the terms and conditions of the Contract shall be included in the Proposal. Scope of Work assumptions may be considered during the Proposal evaluation process at the sole discretion of the Commission.

- **Proposal Section 7: Forms and Submittals** – Proposers shall provide all Proposal forms required to be submitted as part of the RFP in Section 7 of the Proposal, unless otherwise specifically directed. Proposers shall submit properly completed forms that have been provided in **Exhibit F Forms**. Please refer to Table 2-2 below for a Forms and Submittals Checklist. The checklist identifies the location of the form or the submittal requirement in the RFP and also where the form or submittal is to be included in the Proposal.

Proposers shall not modify any of the forms unless specifically instructed by the Commission to do so.

Table 2-2: Forms and Submittal Checklist

Form #	Form/Submittal Name	Location in RFP	Location of Form/Submittal in Proposal
Forms to be Submitted			
F-1	Proposal Cover Sheet	Exhibit F-1	Technical Proposal Envelope with Original Proposal
F-2	List of Subcontractors	Exhibit F- 2	Technical Proposal Section 7
F-3	Recent Client List	Exhibit F-3	Technical Proposal Section 7
F-4	Reference Forms Part 1	Exhibit F-4	Technical Proposal Section 7
F-5	Reference Forms Part 2	Exhibit F-5	Technical Proposal Section 7
F-6	Requirements Conformance Matrix	Exhibit F-6	Technical Proposal Section 6
F-7	Price Proposal	Exhibit F-7	Price Proposal Envelope
F-8	Proposer Questions Forms	See Section 1.14	N/A: To be used for submission of Proposer questions to PTC
Other Proposal Submittals			
N/A	Resumes	See Section 2.2.2	Technical Proposal Section 7
N/A	Preliminary Project Implementation Schedule	See Section 2.2.2	Technical Proposal Section 4
N/A	Implementation Phase Organization Chart	See Section 2.2.2	Technical Proposal Section 4
N/A	Maintenance Phase Organization Chart	See Section 2.2.2	Technical Proposal Section 5
N/A	Payment and Performance Bond Commitment Letter	See Section 1.29	Price Proposal Envelope
N/A	Confidential/Proprietary Materials Statement (if applicable)	See Section 1.21	Technical Proposal Section 7
N/A	DB Documentation	See Section 2.5	DB Documentation Envelope

- **Proposal Appendices -** The Proposer shall submit the following materials in the form of Proposal Appendices:
  - Proposal Appendix 1: Product Cut Sheets for key System components based on the System described in Proposal Section 3: Project Approach to Technical Requirements.
  - Proposal Appendix 2:

  - 2A: Preliminary Bill of Materials (BOM) that details all Equipment and third-party products provided and will become the basis for the complete, Approved parts list, including spare parts.
  - 2B: Sample Reports (if available)
- Proposal Appendix 3: Audited Financial Statements (Two Years)
- Proposal Appendix 4: Civil Infrastructure Package

2.3 Submission of Technical Proposal.

The following are instructions for submission of the Technical Proposal:

1) The Technical Proposal shall be organized as instructed above in Section 2.2.2 Technical Proposal Format and Contents. Type size shall be no less than 11-point font-type; however, charts and tables may be in a font no less than 10 point. Fold-outs up to 11X17 inches for drawings, schedule and organization charts are permitted. Each Proposal page shall be numbered for ease of reference.
2) 2) One (1) original and six (6) copies of the Technical Proposal shall be submitted by the Proposer. In addition to the hard copies of the proposal, two complete and exact copies of the entire proposal (Technical, Cost and DB submittals, along with all requested documents) on CD/DVD or Flash Drive in Microsoft Office or Microsoft Office-compatible format. The electronic copy must be a mirror image of the hard copy. Six total electronic submissions are required, two copies of the Price Proposal with the Implementation Payment and Performance Bond commitment letter, two copies of the DB submittal and two copies of the technical submittal and all other required information. Proposer should ensure that there is no costing information in the technical submittal. Each CD/DVD or Flash drive should clearly identify the Proposer, which part of the proposal is included and include the name and version number of the virus scanning software that was used to scan the CD/DVD or Flash drive before it was submitted.
3) All boxes, packages, and envelopes containing Technical Proposals shall be clearly labeled with Proposer's name, "Technical Proposal" and this RFP title and number (Cashless Tolling System Implementation and Maintenance, RFP**18-10495-8121**) along with the package number (e.g., 1 of 5, 2 of 5). The original Technical Proposal shall be marked "Original".
4) Two copies of a CD/DVD or flash drive also shall be provided by the Proposer with the Technical Proposal. The CD/DVD or flash drive shall contain the Technical Proposal in its entirety, including all completed forms and Proposal appendices in PDF or scanned format, ***but excluding the Implementation Payment and Performance Bond commitment letter and the Price Proposal.***
5) The Technical Proposal marked "Original" shall include the original of the signed cover sheet. **(Exhibit F-1 Forms)**
6) Two copies of the Requirements Conformance Matrix shall also be submitted in a separate CD/DVD or flash drive in Microsoft Excel 2016 with the Technical Proposal. Each CD/DVD or

flash drive containing the Requirements Conformance Matrix shall be clearly labeled as "Requirements Conformance Matrix". Refer to Section 2.2.2 Technical Proposal Content (Proposal Section 6) and **Exhibit F-6 Forms** for further detail and completion instructions on the Conformance Matrix.

2.4 Submission of Price Proposal.

The following are instructions for submission of the Price Proposal:

1) Price Proposals shall be submitted using the Price Proposal Workbook included as **Exhibit F-7 Forms.**
2) Proposers shall complete the Price Proposal Workbook in accordance with **Exhibit C Price Proposal Instructions**.
3) Price Proposals must be submitted in a separately sealed envelope from the Technical Proposal.
4) One (1) original and six (6) copies of the Price Proposal shall be submitted by the Proposer. In addition to the hard copies of the proposal, two complete and exact copies of the entire proposal (Technical, Cost and DB submittals, along with all requested documents) on CD/DVD or Flash Drive in Microsoft Office or Microsoft Office-compatible format. The electronic copy must be a mirror image of the hard copy. Proposer should ensure that there is no costing information in the technical submittal. The CD/DVD or Flash drive should clearly identify the Proposer and include the name and version number of the virus scanning software that was used to scan the CD/DVD or Flash drive before it was submitted.
5) All boxes, packages, and envelopes containing Price Proposals shall be clearly labeled with Proposer's name, "Price Proposal" and this RFP title and number (Cashless Tolling System Implementation and Maintenance, RFP**18-10495-8121**) along with the package number (e.g., 1 of 5, 2 of 5). The original Price Proposal envelope shall be marked "Original".
6) Two copies of a CD/DVD or flash drive containing the Price Proposal in electronic format shall be provided with the Price Proposal. The file format for the electronic copy of the Price Proposal shall be Microsoft Excel 2016. The CD/DVD or flash drive containing the Price Proposal shall be clearly labeled with the same nomenclature identified for the outside of the sealed Price Proposal package.
7) Proposers shall not include any assumptions in their Price Proposals. If the Proposer includes assumptions in its Price Proposal, the Issuing Office may reject the Proposal. Assumptions should be provided only in the manner set forth in Section 2.2.2 Technical Proposal Form and Content (Proposal Section 6).
8) **Any costs for Work that is not provided in the Price Proposal will be assumed as no charge to the Commission.**
9) The Contractor shall only perform Work on the Contract after the Effective Date is affixed and the fully-executed contract sent to the selected Proposer. The Commission shall issue a written Notice

to Proceed to the selected Proposer authorizing the Work to begin on a date which is on or after the Effective Date. The Contractor shall not start the performance of any Work prior to the date set forth in the Notice to Proceed and the Commission shall not be liable to pay the Contractor for any Service or Work performed or expenses incurred before the date set forth in the Notice to Proceed. No Commission employee has the authority to verbally direct the commencement of any work under the Contract.

2.5 Submission of Diverse Business (DB) Participation Documentation.

The following are instructions for submission of the DB participation documentation:

1) The Proposer must demonstrate in its DB participation submittal that it meets the Commission's requirements set forth in **Exhibit I Diverse Business (DB) Requirements.** There is a 10% minimum participation level (MPL) for DBs established for within the base Contract and any additional options thereafter. The utilization of DBs is encouraged and will be considered as criteria in the evaluation of proposals and may be considered as a factor in the Commission's selection of a firm for this Contract. In particular, the Proposer shall address the section of the DB Requirements labeled, "Actions Required by Proposer during the procurement/consultant selection phase".
2) The DB participation submittal shall also indicate the amount of DB participation incurred in the Proposal in terms of dollars committed and percentage of total contract amount.
3) The DB documentation must be submitted in a separately sealed envelope from the Technical and Price Proposals as further set forth below.
4) One (1) original and six (6) copies of the DB Documentation shall be submitted by the Proposer.
5) The envelope containing the DB participation documentation shall be clearly labeled with Proposer's name, "DB Documentation" and this RFP title and number (Cashless Tolling System Implementation and Maintenance, **RFP18-10495-8121**).
6) Two copies of a CD/DVD or flash drive containing the DB Documentation in electronic format shall be provided within the DB Documentation envelope. The file format for the electronic copy of the DB Documentation shall be PDF or scanned format. The CD/DVD or flash drive containing the DB Documentation shall be clearly labeled with the same nomenclature identified for the outside of the sealed DB Documentation package.

PART 3 CRITERIA FOR SELECTION

3.1 Mandatory Responsiveness Requirements.

To be eligible for selection, a Proposal shall be (a) timely received from a Proposer at the date and time set forth in Section 1.12 Procurement Schedule of Events, Table 1-1; and (b) properly signed by the Proposer; and c) meet the minimum experience requirements for cashless tolling/ORT Implementation and Maintenance set forth in Section 1.10 Minimum Experience Requirements.

3.2 Technical Nonconforming Proposals.

The three (3) Mandatory Responsiveness Requirements set forth in Section 3.1 above (a), b), and c)) are the only RFP requirements that the Commission will consider to be non-waivable. The Issuing Office reserves the right, in its sole discretion, to (1) waive any other technical or immaterial nonconformities in the Proposal, (2) allow the Proposer to cure the nonconformity, or (3) consider the nonconformity in the evaluation of the Proposal.

3.3 Proposal Evaluation.

Proposals will be reviewed, evaluated, and rated by a Technical Evaluation Team (TET) of qualified personnel based on the evaluation criteria listed below. The TET reserves the right to check the References provided in the Proposal, but the TET is not required to do so. If the Proposer's references are checked or a site visit of a Proposer's installation is conducted, this information will be considered as part of the TET's Evaluation. The TET will present the evaluations to the Professional Services Procurement Committee (PSPC). The PSPC will review the TET's evaluation and provide the Commission with the firm(s) determined to be highly recommended for this assignment.

The Commission will select the most highly qualified firm for the assignment or the firm whose Proposal is determined to be most advantageous to the Commission by considering the TET's evaluation and the PSPC's determination as to each firm's rating. In making the PSPC's determination and the Commission's decision, additional selection factors may be considered taking into account the estimated value, scope, complexity and professional nature of the Services to be rendered and any other relevant circumstances. Additional selection factors may include, when applicable, the following: geographic location and proximity of the firm, firm's Pennsylvania presence or utilization of Pennsylvania employees for the assignment; equitable distribution of work; diversity inclusion; and any other relevant factors as determined as appropriate by the Commission.

Award will only be made to a Proposer determined to be responsive and responsible in accordance with Commonwealth Management Directive 215.9, Contractor Responsibility Program.

3.4 Evaluation Criteria.

The following criteria will be used, in order of relative importance from the highest to the lowest, in evaluating each Proposal:

1) **Proposal Section 3: Approach to Scope of Work and Technical Requirements, and Proposal Section 6: Adherence to Scope of Work, Terms and Conditions and Requirements Conformance Matrix.**
    a) *Technical Solution*
        i. System Design – Logic, advantages and proven approach.
        ii. System performance and reliability – Documented performance of installed systems on similar projects.
        iii. Evidence of ability to meet and exceed technical requirements based on the Technical Proposal, including Proposal responses to RFP questions.
        iv. Degree to which technical solution addresses Project user needs.
    b) *Completion of the Requirements Conformance Matrix*
        i. Degree of adherence to requirements
        ii. Overall maturity and risk of solution, evidenced by the degree of technical requirements already in place and proven in production.
    c) *Adherence to Proposal Layout, Format and Content Requirements*

2) **Proposal Section 1: Firm Qualifications**
    a) *Corporate Resources and Organization of the Firm* – Evidence of overall corporate resources available to ensure completion of Project.
    b) *Financial Resources* – Financial stability and strength of the firm.
    c) *Project Experience* – Nature, quality, and relevance of ongoing and completed projects.
    d) *Firm Commitments* – Other on-going commitments and priorities that could impact this Project.
    e) *Adherence to Proposal Layout, Format and Content Requirements*

3) **Proposal Section 2: Key Team Qualifications**
    a) *Qualifications and Experience of Key Project Team* – Demonstrated relevant experience of the Project Manager and other Key Team Members.
    b) *Key Personnel Role* – Key Project Team Members' experience compared to their role on this Project.
    c) *Subcontractors* – Experience, technical competence and role of Subcontractors.
    d) *Adherence to Proposal Layout, Format and Content Requirements*

4) **Proposal Section 4: Approach to Project Plan and Implementation**

   a) *Project Plan*
      i. Implementation organization and staffing
      ii. Logic, clarity and specificity of Work plan.
      iii. Approach to training, including level of training resources offered and the approach to training the Commission resources.
      iv. Approach to installation, phasing and transition.
      v. Approach to civil construction coordination
   b) *Project Schedule* – Completeness and detail in the schedule provided and demonstration of ability to meet or exceed the scheduling requirements of the Project.
   c) *Time Commitment* – Time commitment of Key Team Members in the Implementation Phase.
   d) *Local Presence* – Degree of local presence commitment during the Implementation Phase.
   e) *Adherence to Proposal Layout, Format and Content Requirements*

5) **Proposal Section 5: Approach to Maintenance**
   a) *Maintenance Requirements* – Evidence of an approach to Maintenance that meets or exceeds all Maintenance services and warranty requirements as specified in **Exhibit A Scope of Work**.
   b) *Maintenance Coordination* – Demonstrated ability to coordinate the delivery of Maintenance Services with the existing CSC/VPC and PTC Toll Host provider and operator and other interfacing third parties. The evaluation will also consider items such as:
      i. Provision of applications and tools that facilitate identification of problems with interfacing systems.
      ii. Evidence of demonstrated ability to communicate effectively with the customer on a long-term basis.
      iii. Evidence of a successful plan for coordination of Commission and Contractor Maintenance responsibilities.
   c) *Effectiveness of MOMS* – Evidence of ability of MOMS to facilitate Maintenance and efficiently monitor System performance.
   d) *Degree of local presence of Contractor during the Maintenance Phase*
   e) *Adherence to Proposal Layout, Format and Content Requirements*

6) *Price* – While this area may be weighted heavily, it will not normally be the deciding factor in the selection process. The Commission reserves the right to select a Proposal based upon all the factors

listed above, and will not necessarily choose the firm offering the best price. The Commission will select the firm with the Proposal that best meets its needs, at the sole discretion of the Commission.

7) *Commitment to Diversity and Inclusion* – This refers to the inclusion of DB firms, as described in Section 2.5 and the extent to which they are expected to participate in the Contract.

Exhibit A
Scope of Work

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TABLES AND FIGURES

I. SCOPE OF WORK

1.1 Background

The Pennsylvania Turnpike Commission (PTC) operates and maintains approximately five hundred and seventy (570) miles of turnpike along six (6) highways. These highways include the full length of I-76 (the Mainline) through the Commonwealth, as well as portions of I-476 (the Northeastern Extension), PA 43 (Mon-Fayette Expressway), PA 66 (Amos K. Hutchison Bypass), PA 576 (Findlay Connector), and I-376 (Beaver Valley Expressway). The Turnpike Mainline and Northeastern Extension operate as a ticket system in which toll rates are based primarily on vehicle weight and the distance traveled from their origin to destination. The Western extensions (which include Amos K. Hutchinson Bypass, Beaver Valley Expressway and Mon-Fayette Expressway), two (2) plazas on the Mainline ticket system (Gateway and Delaware River Bridge), and two (2) plazas on the Northeastern Extension (Keyser Ave and Clarks Summit) operate on a barrier system, where customers pay tolls based on weight, number of axles or both at each plaza they encounter along their route.

Within the turnpike system, toll points are located in four (4) basic configurations: on the mainline, on trumpet interchanges, on the ramps of diamond interchanges and on slip ramps. Mainline plazas exist between the interchanges, spanning the width of the highway and tolling both directions of travel. Sixteen (16) locations along the various Turnpike highways use this layout. Along the Mainline and Northeastern Extension highways, most other toll points are designed as trumpet interchanges in order to allow the lanes to converge at a single point at the toll plazas. On Pennsylvania's Turnpike, these locations are typically staffed. At four (4) locations along the Mainline and Northeastern Extension, un-staffed toll points are located on slip ramps which accommodate E-ZPass customers only. The remaining toll points along the Turnpike Western extensions are designed as diamond interchanges, with un-staffed toll booths along the interchange ramps (two per toll location). Table I-1 details the number and type of toll points by highway.

Table I–1: Summary of Existing PTC Toll Locations

Highways	Un-staffed Diamond Interchange Ramp Plazas	Staffed Trumpet Interchange Ramp Toll Plazas	Slip Ramp Plazas	Mainline Barrier Plazas	Total Toll Plazas
Findlay Connector (Converted to Cashless 06/2018)	0	0	0	1	1
Amos K. Hutchinson	8	0	0	1	9
Beaver Valley Expressway (Converted Cashless Tolling In-place 04/2017)	6	0	0	2	8
Mon-Fayette Expressway	16	0	0	4	20
Northeastern Extension	0	7	1	2	10

Turnpike Mainline	**0**	**28**	**3**	**2**	**33**
Total	**30**	**35**	**4**	**12**	**81**

Traffic on the system has grown from approximately 160 million vehicles annually in 2000 to approximately 199 million annually in fiscal year 2017 (or 30 percent). This equates to over 545,000 motorists per day, generating more than $1 billion in revenue annually. Currently, the Commission employs a variety of methods of toll collection across the system. The cash options include the original method of stopping at a booth to pay a collector the cash amount due or, on some Turnpike facilities (including Amos K. Hutchinson Bypass and Mon-Fayette Expressway) depositing coins into a machine.

In 2000, the Turnpike made a shift from an all cash collection system, to offering motorists the option of using E-ZPass, an electronic toll collection option by which transponders mounted on vehicles register tolls electronically. E-ZPass customers have the option to use regular cash lanes or E-ZPass Only lanes at any toll plaza, with the added benefit of not having to stop to pull a ticket or pay a toll collector. Additionally, at six (6) toll plazas, the Commission has implemented E-ZPass Express Lanes, where E-ZPass holders can travel in barrier separated, open road tolling (ORT) lanes at a higher speed through the plaza.

As part of a staged approach to the implementation of cashless tolling, the Commission introduced the first cashless tolling location at the new Delaware River Bridge toll plaza in the east beginning in early 2016. In April 2017 the Beaver Valley Expressway was converted to Cashless tolling with "in-place" implementation (toll plazas remaining, but new equipment installed allowing for cashless tolling in the existing lanes). Implementation started in 2017 with the conversion of the Beaver Valley Expressway (BVE), continues in 2018 with the conversion of the Findlay Connector and Clarks Summit and Keyser Avenue barrier plazas then Amos K. Hutchison Bypass (AKH) and Gateway in 2019 followed by Mon-Fayette Expressway (MFE) in 2022. The Commission may then choose to implement "in-place" cashless tolling on the Mainline Ticket System and Northeastern Extension using the existing infrastructure (tentatively by 2022) before or in conjunction with implementing a full highway speed mainline conversion. The mainline conversion to cashless tolling is anticipated to be implemented in 2 year increments based on geographical region beginning with the Eastern Region as early as 2022 and progressing to the deployment of the Central and Western Regions.

The annual number of new account openings has increased since E-ZPass was implemented in 2000, from around 80,000 accounts (in 2001, the first full year of service) to over 259,000 new accounts in 2017, bringing the total number of accounts to nearly 2.2 million. The total number of E-ZPass transactions and revenue collected from E-ZPass customers total nearly 80 percent for the system.

The Commission toll plazas and the host systems were installed by TransCore and are currently maintained by TransCore.

1.2 Overview of Scope of Work

In the future, all tolls will be collected via non-stop cashless tolling. This will be accomplished via the installation of new gantries (using one of the two standard (2) gantry designs shown in *Attachment 5: Concept Plan for Overhead Structures/Toll Gantries.*) over the mainline of the various Turnpike highways. The mainline toll points will consist of sites with a standard single (1) or dual (2) span gantry design, while the existing slip ramp location(s) may use the existing gantries and infrastructure. The baseline Contract for this Scope of Work will be between the Clarks Summit interchange and the Keyser Ave interchange in Northeastern Pa. and will be the baseline for this RFP. This will include one (1) tolling location in each direction for a total of two (2) cashless toll zones using a maintenance from below gantry design.

Full conversion to mainline open road cashless tolling may occur as future implementations at various Turnpike highways at dates and locations to be determined as shown in *Attachment 1 – Cashless Toll Zone Locations*. The initial locations will include the eastern portion of the mainline ticket system (east of the Reading interchange, including the northeastern extension) tentatively scheduled for opening in October 2022 followed by the remaining locations in the central and western portions of the mainline ticket system (west of the Reading interchange) tentatively scheduled for opening as early as October 2024. Beyond the baseline Contract, all potential future facilities listed below will be considered optional additions to this Scope of Work, as will be indicated throughout this document.

Potential Facilities (with example estimated numbers of locations):

- Mainline Turnpike– Additional thirty-two (32) tolling locations for sixty (60) cashless toll zones.
- North Eastern Extension – Additional nine (9) tolling locations for eighteen (18) cashless toll zones.
- Beaver Valley Expressway – Additional five (5) tolling locations for ten (10) cashless toll zones.
- Mon-Fayette Expressway – Additional twelve (12) tolling locations for twenty four (24) cashless toll zones.
- Amos K. Hutchinson Bypass – Additional five (5) tolling locations for ten (10) cashless toll zones.
- Other Facilities– Additional locations to be determined (TBD) by PTC.

In total, one projection of the number of tolling locations could potentially include sixty-three (63) locations with one hundred twenty-two (122) directional tolling points throughout the Commonwealth of Pennsylvania. The locations would span the I-76 Mainline from the New Jersey border in the East to the Ohio border in the west, the Northeastern Extension from the Philadelphia region in the south to the Scranton area in the north with the option for any of the extensions from the West Virginia border to the Pittsburg area. The Contractor should consider geographic and staffing requirements to install and maintain a system of the proposed magnitude should any or all of the optional implementation scope be exercised by the Commission.

The requirements described in this Scope of Work include the System concepts, technical, and Maintenance, requirements for the Design; development; fabrication; assembly; programming; integration; testing; installation; Commissioning; transition, and Implementation of the PTC Cashless Tolling System, including without limitation in-lane Cashless Tolling Systems, Cashless Toll Concentrator System, Cashless Toll Host System (if exercised), Digital Video Audit System (DVAS), Maintenance Online Management System (MOMS) and Maintenance Services for the Cashless Tolling System. *Attachment 1: Cashless Toll Zone Locations* provides a listing of the toll zones that are planned for implementation for this Scope of Work (including optional facilities).

The Contractor shall be responsible for furnishing and mobilizing all required equipment, facilities and resources to carry out this Scope of Work and to meet Contract requirements. This includes but is not limited to:

- mobilization;
- local office space;
- installation equipment storage;
- demobilization and site clean-up;
- all permits;
- licenses;
- fees;
- insurance and bonds;
- coordination and cooperation with the different civil contractors;
- coordination and cooperation with the different civil designers;
- coordination and cooperation with existing contractors;
- development and production of documentation;
- Design drawings, Plans and schedules;
- Installation;
- training;
- testing;
- safety;
- security and
- Quality assurance and quality control.

The Project shall include, but not be limited to, the Design; development; configuration; customization; procurement; manufacturing; testing, installation and Commissioning of Cashless Tolling System Hardware and Software, which includes interfaces to the existing Customer Service Center (CSC)/Violation Processing Center (VPC) system, the existing PTC Toll Host system(s) and SAP (if Toll Host replacement exercised). The System shall meet the specifications as further detailed in this Scope of Work. All equipment and Hardware furnished under this Contract shall be readily available to the Commission. The Commission reserves the right to procure all third-party hardware for the Cashless Tolling System and the Contractor shall take delivery and responsibility for the Commission purchased hardware.

The following items are included in this Scope of Work:

- Implementation of Cashless Tolling In-lane Systems at the Plazas identified in *Attachment 1: Cashless Toll Zone Locations*.

- The Cashless Tolling In-lane Systems consist of the primary subsystems and functionality listed below:
  - Automatic Vehicle Identification (AVI) system;
  - Automatic Vehicle Classification (AVC) system;
  - License Plate Image Capture and Processing System (LPICPS), including Optical Character Recognition (OCR)/ Automatic License Plate Recognition (ALPR) (optional);
  - zone controller;
  - facility servers (if provided);
  - Digital Video Audit System (DVAS) for detailed transaction audit;
  - consolidation of video images and transactions and reconciliation of their transmission status;
  - interface to the Cashless Toll Concentrator or Cashless Toll Host (if provided) for the transmission of transactions/messages and alarms, and receipt of toll rate tables, Transponder Status List (TSL), user identification list (UIL) and Violation Enforcement List (VEL) (if exercised) and
  - Interface to the existing CSC/VPC system for the transmission of, images and license plate results (optional).

- For the base Contract the existing PTC Toll Host will be the Host of record for traffic and financial reporting and a new Cashless Toll Host is not required but may be provided to meet the requirements of this scope of work. The option of a fully functional Cashless Toll Host to replace the existing PTC Toll Host for reporting may be exercised by the PTC in the future as the open road cashless tolling system is deployed throughout the entire system. Based on the proposed design by the Contractor the Cashless Toll Concentrator, Cashless Toll Host (if provided) or Systems that consist of the primary subsystems and functionality listed below:
  - Dashboard for monitoring transactions, alarms and system operational status.
  - management function to support the lane operations such as the ability to change the lane operating mode and manage toll rate schedules;
  - fully integrated MOMS for tracking inventory, alarms, work orders and Maintenance activities;
  - communication with the Cashless Tolling In-lane Systems for the transfer of transactions, messages, alarms, toll rate tables, transponder status file and VEL (if exercised);
  - communication with the existing PTC Toll Host system for the transfer of transactions and alarm data;
  - communication with the existing CSC/VPC system for the transfer of images and video transactions, TSL, VEL (if exercised), Exception List, toll rate tables and GL files;
  - communication with SAP for the transfer of GL files, work order creation and disposition and Equipment inventory data (if full Host option exercised), and
  - communication with the In-lane Systems for the reconciliation of video transactions and images and their transmission to the existing CSC/VPC system.

- At each tolling point the Contractor shall procure, furnish and install equipment racks inside the toll equipment building provided by the civil contractor. The civil contractor will also provide the generator, the Uninterruptable Power Supply (UPS) and conduits/raceway required from the toll equipment building to the toll gantry. The Contractor's installation responsibilities at the tolling points are as specified in *Attachment 2: Cashless Tolling Installation Responsibility Matrix*. All equipment racks/cabinets that house Cashless Tolling System electronics shall be provided by the Contractor and installed inside the toll equipment building.

- The communications network for the entire PTC Wide Area Network (WAN) is provided by the Commission as shown in *Attachment 3a: Existing PTC Communications System Architecture*. The Contractor shall be responsible for providing the Local Area Network (LAN) and the required network interface Equipment to connect the Cashless Tolling In-lane Systems as shown in *Attachment 3b: PTC Communications Network Responsibilities*. The Commission shall make available a designated number of ports, as specified during the Design phase, to the Contractor to allow access to the Commission WAN through the Commission administered firewall to establish the connection from each tolling point to the primary and secondary Cashless Toll Concentrator or Cashless Toll Host (if provided) locations and/or existing PTC systems and the existing CSC/VPC systems. The Contractor shall work with the Commission to make the connection to the WAN.

- The Contractor shall be responsible for providing Maintenance, Software Support Services and Information Security for the Cashless Tolling System as further specified in this Scope of Work.

- The Contractor shall support all E-ZPass Group and interoperable activities as required by the Commission as change order work where not applicable within this Scope of Work. Activities may include but are not limited to:
    - attend technical meetings;
    - review and provide comments on E-ZPass Group documents;
    - support E-ZPass Group Agency testing as requested;
    - support changes to the System to meet modifications to E-ZPass Group specifications, and
    - be compliant with the latest published E-ZPass Group specifications for the duration of the Contract.

II. FUNCTIONAL REQUIREMENTS

2.1 In-lane Systems Functional Requirements

This section defines the In-lane requirements of the Contractor Scope of Work. Each Segment of the Highway has a tolling point which could have one or two toll zones and tolls are collected in each direction of travel at the toll zones. At the toll zones identified, the Cashless Tolling Equipment and electronics shall be installed on toll gantries and in the toll equipment building provided by the civil contractor. The toll gantry conceptual details at each of the toll zones are provided in *Attachment 5: Concept Plan for Overhead Structures/Toll Gantries*. The Contractor shall work with the Commission, the civil designer and civil contractor on requirements for all civil design and construction work to be performed by others on the Project, including the design and location of equipment mounting locations and retractable mounting arm(s).

2.1.1 Cashless Tolling System Hardware

2.1.1.1 General Requirements

1	All Hardware and Equipment supplied under this Contract, including consumable material (material that requires periodic replacement/replenishment), shall be new and certified to have a ten (10) year minimum service life. Materials and products that have been previously used for development work or the Contractor's internal testing, or items that have been salvaged or rebuilt shall not be permitted to be used in connection with this Contract.
2	All components, supplies and materials furnished under this Contract for the Cashless Tolling System shall be new, Commercial Off-the-Shelf (COTS) and to the extent possible, field proven, and in revenue operations to the extent possible.
3	All components procured, furnished, and installed by the Contractor shall be available through multiple sources identified by the Contractor to the extent possible and the names of such sources shall be readily available to the Commission. The Commission shall have the right to purchase third-party Equipment directly from the Equipment vendor.
4	All Hardware and Software provided under this Contract shall be supported by their manufacturer, upgradeable, maintained, updated, patched and secured throughout the term of the Contract.
5	Proof of purchase in the form of purchase orders, dated invoices and shipping bills shall be retained by the Contractor and furnished to the Commission in accordance with the requirements of this Scope of Work and Contract.
6	All Commission standards in accordance with the requirements of this Scope of Work shall be maintained throughout the term of the Contract. Standards include but are not limited to, IT security, data retention, Software and Database design and development, installation, change management, testing, maintenance and protection of traffic (MPT) and safety.

2.1.1.2 FCC License

7	The AVI system shall comply with all applicable Federal Communications Commission (FCC) regulations.
8	It is the Contractor's responsibility to prepare the required application and the Commission will obtain the required FCC licenses for all AVI equipment provided under this Scope of Work and Agreement. The Commission has the FCC licenses for the existing AVI systems.
9	The Contractor shall, as part of this effort, identify and accommodate any site conditions that may potentially degrade the performance of the AVI system.
10	Under all circumstances it is the Contractor's responsibility to comply with the AVI performance requirements of this Scope of Work and Agreement and no relief in such performance shall be provided.

2.1.1.3 Maintainability

11	The Cashless Tolling System Hardware shall be designed with the following specifications:
	• modular, replaceable and repairable components to allow for efficient Maintenance;
	• all replacements shall be plug compatible with no changes required;
	• all components that perform the same function shall be interchangeable;
	• all zone controllers shall be designed such that they are identical and can be configured to operate the specific number of lanes at each toll zone as shown in *Attachment 1: Cashless Toll Zone Locations* through the addition of Hardware pluggable modules and setting of appropriate Software parameters;
	• where possible, there shall be a second source for all parts and components and it shall be identified in the Bill of Materials (BOM) unless otherwise Approved by the Commission;
	• all electronic components shall be installed in equipment racks and installed inside the toll equipment building at each toll zone/toll point as applicable;
	• zone controllers shall be expandable at a minimum to add two (2) additional in-lane devices;
	• Contractor's electronic Design and installation shall prevent electrical disturbances and noise in the electronics;
	• ISO standard I/O interface modules shall be used in the Design and all serial, discrete and network interface boards shall have at minimum two (2) spare slots to support the addition of components;
	• all exposed junction boxes, pull boxes and other hardware shall be either zinc coated and epoxy painted or stainless steel;
	• all field wiring shall be terminated on screw lugs or connectors and all connectors shall be keyed or polarized to prevent incorrect connections;
	• all wiring and connectors shall be labeled and strain relief shall be provided to protect the conductors;

	• surge suppression shall be provided for all field wiring susceptible to lightning or similar surges;
	• all lane Equipment shall be fused and protected against over current, over voltage, under voltage and lightning;
	• redundant power supplies shall be provided for all required internal DC voltages, and
	• all Equipment shall be properly grounded to ensure the safety of Maintenance personnel.

2.1.1.4 Diagnostics

12	Equipment mounting and installation design shall support the maintenance of Equipment from above and from below on toll gantries as applicable to each cashless toll zone.
13	Maintenance personnel shall have easy access to major subsystem components, and removal, testing, and replacement shall not require tools. Components mounted on overhead structures shall also be capable of tethering to secure points during removal or placement during replacement activities such that items cannot be dropped. All test points necessary to diagnose the Equipment while in operation shall be easily accessible and light emitting diode (LED) indicators shall be provided to assist technicians to identify and diagnose problems.
14	Technicians shall have the ability to connect a laptop authorized by the Commission in accordance with Commission policies to troubleshoot the components. Technicians shall have secured remote access to the device to monitor its status and to perform diagnostics when the lane is in operation.
15	For easy diagnostic and trouble shooting, all error and event logs shall be consolidated such that all events and errors associated to a transaction are in a single log sequential order based on receipt of the event or error. The consolidated error and event logs shall be retained online for a configurable period of time and shall be easily accessible to the technicians and Authorized PTC staff.
16	The consolidated error and event logs shall contain but not be limited to all sensor events, triggers and logic decisions associated with a transaction in time order from which they were received from the lane sensors, subsystems or generated by the lane systems.
17	The consolidated error and event logs shall also be transmitted to the MOMS and available to Authorized Users in viewable form. Search and filter capability shall be provided to display and review data in the consolidated log.
18	All diagnostics performed shall be recorded and automatically reported to the MOMS, including the technician ID, the time the Maintenance was performed, and all status and recovery messages.
19	All diagnostic Software and specialty tools required for support of Maintenance activities shall be supplied by the Contractor and the Commission shall have full rights and access as further defined in the Contract. All Software and operating systems shall meet the Commission's most current technology standards; all such Software and equipment shall meet Commission IT security standards.

2.1.1.5 Customized Hardware

20	If customized components or controllers are used, the Contractor shall provide detailed documentation on the Design, production and testing of these units and shall provide usage rights to the Commission. Documentation shall include electronic diagrams, component layouts and the detailed Bill of Material listing manufacturers/vendors. The Contractor shall identify all customized components and controllers and indicate their plan to make them available for the term of the Contract, including the option for placing in escrow.

2.1.1.6 Equipment Racks

21	All in-lane Equipment controllers and Cashless Tolling System electronics, devices, servers and associated communications Equipment shall be installed inside dedicated toll equipment racks that are housed within the toll equipment building according to a layout Approved by the Commission IT Department. The Contractor shall purchase and install the equipment racks in accordance with the requirements of this section.
22	It is the Contractor's responsibility to provide the equipment racks of the correct size that meets the requirements of this Scope of Work. Equipment racks shall have adequate space (twenty five {25} percent extra) for added boards, servers and components for future expansion.
23	The equipment racks shall support the Cashless Tolling System components for a minimum of ten (10) years. The equipment racks shall not be used to support peripheral non-toll related equipment.

2.1.1.7 Environmental

24	The Cashless Tolling System Equipment to be supplied will be installed in areas exposed to the range of climatic conditions found in Pennsylvania. In addition to the climatic conditions, the Equipment will also be subjected to harsh environmental factors normally found in the operation of a toll lane, such as, but not limited to: car, truck, and bus emissions; deicing materials, industrial exhausts; industrial cleaners; gasoline and car lubricants; Electromagnetic Interference (EMI) and Radio Frequency Interference (RFI), and vibrations. These conditions shall be taken into account in the Design and selection of Equipment used on this Project and the Contractor shall ensure that the System works accurately and reliably in such environment.
25	Lane electronics, zone controllers, LPICPS controllers/servers and other components shall be able to operate in the sealed and enclosed environment of the equipment racks installed within the toll equipment building.
26	All Hardware provided under this Contract shall be corrosion resistant and remain corrosion resistant for the term of the Contract.
27	The in-lane Equipment not in environmentally controlled conditions shall operate with no degradation of performance in ambient air temperature of negative thirty (-30) to seventy (70) degrees Celsius, with and without direct sunlight, and relative humidity of five (5) to one hundred (100) percent for Equipment installed in an outside environment and five (5) to ninety-five (95) percent non-condensing for Equipment installed inside equipment racks.

28	During the Design phase, the Contractor shall provide specification sheets that prove the zone controller and other lane electronics meet the environmental specifications given above. Results of all environmental tests conducted and certification of compliance shall be provided to the Commission for Approval.
29	All exposed or in-lane Equipment, when in its fully assembled configuration, shall not be damaged, nor shall operational performance or expected lifetime be degraded. During Design phase, the Contractor shall provide specifications for the in-lane Equipment for Commission Approval.

2.1.1.8 Assembly

30	All customized Hardware shall be assembled and tested in the Contractor's fabrication/assembly facilities before being installed in the lane in accordance with the Commission's Approved test plan for customized Hardware. All chassis, attachments, and Hardware shall be fabricated stainless steel, hot dipped galvanized or other materials resistant to salt exposure and corrosion.
31	All customized Hardware shall be identified and shall undergo a seventy-two (72) hour burn-in test before they are installed in the lanes, in accordance with the Commission's Approved test plan.
32	Customized Hardware assembly shall facilitate replacement of failed components in accordance with requirements of this Scope of Work.

2.1.1.9 Bill of Materials

33	The Contractor shall include the BOM for all Equipment and Hardware supplied for the Cashless Tolling System. Each component shall also include the second manufacturer source and any exceptions shall be noted and explained. During the Design phase the BOM shall be finalized and all changes shall be subject to the approval of the Commission.
34	Prior to purchase of any Equipment and as part of its Design the Contractor shall submit the final BOM to the Commission for Approval. No equipment shall be purchased by the Contractor prior to Approval of the BOM and the Design, unless otherwise authorized in writing by the Commission.
35	All Hardware and Software procured under this Scope of Work shall be confirmed to be the latest model/version at the time of purchase with the required warranty, security, Maintenance and support Services.
36	Updates to the BOM shall be provided by the Contractor whenever changes occur and at a minimum on a semi-annual basis over the term of this Contract.

2.1.1.10 Spare Parts and Support

37	The Cashless Tolling System procured, furnished, and installed under this Contract shall allow the Contractor to Maintain and replace parts for the term of the Contract. The Contractor shall provide a spare parts list the cost to the Commission (inclusive of shipping) and recommended quantities for all Hardware supplied for the Cashless Tolling System for each year of the Contract.

38	This Contract shall include the initial purchase quantities of spare parts required for the operation of the tolling points during the Warranty period as recommended by the Contractor. Costs for the replacement of spare parts during the Warranty period shall be the responsibility of the Contractor.
39	At the end of the Maintenance term, all spare parts inventory shall be turned over to the Commission at one hundred (100) percent of the required inventory level. The Contractor shall identify (via the MOMS) the warranty status for each piece of Hardware and warranty period remaining, if applicable.

2.1.2 Cashless Tolling System Software

40	The operating system, database, other third-party Software, and Cashless Tolling System Software procured, furnished, and installed by the Contractor shall support real time operations of the lane and shall be field proven.
41	The operating systems shall have a future upgrade path and shall be supported for a minimum of ten (10) years. The Contractor shall ensure that the risk of obsolescence to the Hardware is minimized through the selection of the operating system Software and the peripheral Hardware.
42	All Cashless Tolling System Software developed, furnished, and installed under this Contract shall be warrantied against Software defects, security vulnerabilities and deficiencies for the term of the Contract and as described within the Contract and associated attachments.
43	The vendor shall have an annual information security risk assessment and a vulnerability scan performed by a third party, in consultation with Commission IT Security, and provide the results to the Commission.

2.1.3 Cashless Tolling System Lane Configurations

44	The Cashless Tolling System shall support the toll zone types, lane configurations and dimensions detailed in *Attachment 1: Cashless Toll Zone Locations*.
45	Travel lane widths shall be assumed to be either eleven (11) feet four (4) inches or twelve (12) feet in all lanes from stripe to stripe per standard PTC lane markings shown in *Attachment 14 – PTC Standard Pavement Markings*. Shoulders widths for each toll zone are detailed in *Attachment 1: Cashless Toll Zone Locat*ions. Shoulder lanes that are eight (8) feet or greater shall be fully equipped as a travel lane. Shoulder lanes that are less than eight (8) feet shall have vehicle detection and image capture Equipment to detect and capture vehicles straddling the shoulder.
46	During the detailed Design, the Contractor shall make the required adjustments to the System Design to accommodate for variations in the actual lane widths and PTC standard lane markings.

2.1.4 Toll System Access Requirements

2.1.4.1 Toll System Software Security

47	Access to information on the Cashless Tolling System and network shall be password controlled. The access shall be role based and limited to the authorized Contractor staff and designated Commission personnel.
48	Accounts for user access to the System shall require a strong password and be compliant with Commission IT security standards and requirements.
49	The Cashless Tolling System shall use ADFS (SAML 2.0) for user access authentication if the Cashless Toll Concentrator or optional Cashless Toll Host (if implemented) solution is located offsite or Cloud based.
50	User access security, including sign-on facilities, permission control and access privileges for different levels shall be provided for the files, directories and application Software and shall be fully configurable by a system administrator. Access to all systems needs to be controlled through a central repository with each user having an unique log-in.
51	User sign-on, access and access failures, both local and remote, to any element of the Cashless Tolling System shall be recorded and tracked for security audit proposes and reported to the MOMS. The System shall continuously and automatically monitor for unauthorized access; violations shall be reported to the MOMS as priority 1 Alert. These reports should be provided to Commission IT Security within twelve (12) hours of discovery.
52	The Contractor shall develop the access levels, user roles and privileges matrix during System Design with the Commission input, including review by Commission IT Security, and Approval. The System shall allow for additions, deletions and changes to the access levels, user roles and the addition of personnel in a secure manner. Users who have separated from the Commission or the vendor shall have their access removed within 24 hours after the date of separation.
53	A system level account shall be provided for Commission security systems to perform vulnerability scans using a tool such as Tenable/Nessus, Qualys or other commercial vulnerability scanning tool. Additionally, Commission IT Security can request the Contractor to perform any scans and ensuing reports through the term of the Contract. A user access review is to be done annually with final approval by Commission business owners.
54	The Contractor shall not circumvent the Commission Approved System security. All access to the System and Approved changes made shall be recorded, monitored, reviewed and audited by the Commission. Specific requirements shall be developed by the Contractor during System Design.
55	Authorized Users shall have access to the zone controller user access logs to audit the system access.
56	The Contractor shall provide at a minimum read-only access for Authorized PTC staff to all databases and system log files including but not limited to transaction tables, MOMS tables, stored procedures, auditing, archiving, database views, database logs and scheduled jobs.

2.1.5 Cashless Tolling In-lane Subsystems

2.1.5.1 Automatic Vehicle Identification (AVI) System Base Requirements

57	The Contractor shall provide an AVI system that is compliant with the E-ZPass Group interoperability requirements and at a minimum support a dual protocol to include the E-ZPass (PS111 TDM/IAG E-ZPass Group) and 6C (ISOC (ISO 18000-63/6C)) protocols at the tolling points specified in this Scope of Work.
58	The Commission will procure the antennas and the readers as specified by the Contractor through a certified E-ZPass Group vendor. The Contractor shall take delivery of the equipment and the Contractor shall be responsible for the AVI equipment installation and maintenance upon delivery.
59	The Contractor shall furnish and install all other Hardware, cabling and associated mounting fixtures to form a fully functioning AVI system that meets the requirements of this Scope of Work.
60	The Contractor shall be responsible for the physical tuning of the certified AVI Equipment, and integrating the AVI system into the Contractor in-lane Design. In addition, the AVI vendor shall certify in writing that the lanes are tuned to the Approved AVI specifications. All AVI installation, configuration and tuning shall be in compliance with the certified E-ZPass Group vendor requirements.
61	The Contractor is responsible for synchronizing all AVI readers that are in close proximity to the tolling points as required by the certified AVI manufacturer.
62	The AVI system shall provide full coverage in all areas of the toll zone to read and report transponders. Transponders on vehicles straddling the shoulders that are less than eight (8) feet shall be read and reported to the zone controller. The Contractor shall support adjustments to the antenna quantity and placement based on the final shoulder configuration.
63	The Contractor shall maximize any inherent redundancy built into the AVI readers whereby the failure of the master or primary reader will result in the reporting of the transponder reads via the slave or secondary reader.
64	The AVI system shall be able to read the transponder, write to the transponder and report all E-ZPass Group interoperable transponders on vehicles traveling through any area of the toll zone, including but not limited to shoulder, center of lane, traversing lanes and straddling lanes with no interference or degradation of performance. Non-E-ZPass Group interoperable transponder reads shall also be reported and flagged if the AVI system is capable of reading such transponders.
65	The AVI system shall have the ability to process transponders mounted on vehicles traveling in stop and go and bumper-to-bumper traffic and vehicles traveling at speeds of up to one hundred (100) miles per hour.
66	The read zones in the lanes at a toll zone shall be tuned such that transponders in vehicles traveling through the lanes in the opposite direction of travel are not reported by the AVI system.

67	The AVI system shall buffer transponder reads when it is unable to communicate to the zone controller. When communications are restored, the Buffered Transponder Reads shall be reported to the zone controller.
68	If more than one transponder is present in a vehicle, the AVI system shall have the ability to accurately read, write to and report all transponders that are compliant with the E-ZPass Group and current National Interoperability (NIOP) candidate protocols. The zone controller shall properly associate the first read Commission transponder that has a valid status at the time of the transaction to the vehicle and report the additional transponders in the transaction. If both transponders have a valid status the zone controller shall associate the first read to the vehicle and report any additional transponders in the transaction. Additional transponder reads shall be reported to the existing PTC systems according to the Business Rules.
69	The Contractor shall use the full capability of the selected AVI system to obtain AVI system status in accordance with the manufacturer specifications and report such status to the MOMS. Loss of communication to any element of the AVI system shall be immediately detected by the zone controller and reported to the MOMS. The Contractor-provided monitoring logic shall specifically detect any failures and generate alarms when failures are detected.
70	The Contractor shall provide maintenance tools to support remote lane tuning, diagnostics and other configuration changes. Setup and configuration of the AVI system shall be achieved remotely and shall not require lane closure except for major lane tuning, when initially installed or when a reader or antenna is replaced.

2.1.5.2 Automatic Vehicle Identification (AVI) System Tri-Protocol Implementation *(Optional)*

71	The Contractor shall provide an AVI system that is compliant with the E-ZPass Group interoperability requirements at the tolling points specified in this Scope of Work.
72	The Contractor shall provide an AVI System comprised of tri-protocol readers, antennas and ancillary Equipment that is compliant with the base AVI system requirements plus the SeGo protocol (ISOB_80K).
73	Tri-protocol readers shall be Configurable with the option to select active protocols to support the transition to the new interoperable solution.
74	If requested, the Contractor shall support the transition of the current E-ZPass Group protocols to include the protocols required within this section when and if applicable and such support shall include but not be limited to installation adjustments, configuration, tuning, testing and verifying compliance to applicable interoperable requirements including accuracy requirements.
75	The Commission will procure the antennas and the readers as specified by the Contractor through a certified E-ZPass Group vendor. The Contractor shall take delivery of the equipment and the Contractor shall be responsible for the AVI equipment installation and maintenance upon delivery.
76	The Contractor shall furnish and install all other Hardware, cabling and associated mounting fixtures to form a fully functioning AVI system that meets the requirements of this Scope of Work.

77	The Contractor shall be responsible for the physical tuning of the certified AVI Equipment, and integrating the AVI system into the Contractor in-lane Design. In addition, the AVI vendor shall certify in writing that the lanes are tuned to the Approved AVI specifications. All AVI installation, configuration and tuning shall be in compliance with the certified E-ZPass Group vendor requirements.
78	The Contractor is responsible for synchronizing all AVI readers that are in close proximity to the tolling points as required by the certified AVI manufacturer.
79	The AVI system shall provide full coverage in all areas of the toll zone to read and report transponders. Transponders on vehicles straddling the shoulders that are less than eight (8) feet shall be read and reported to the zone controller. The Contractor shall support adjustments to the antenna quantity and placement based on the final shoulder configuration.
80	The Contractor shall maximize any inherent redundancy built into the AVI readers whereby the failure of the master or primary reader will result in the reporting of the transponder reads via the slave or secondary reader.
81	The AVI system shall be able to read the transponder, write to the transponder and report all E-ZPass Group interoperable transponders on vehicles traveling through any area of the toll zone, including but not limited to shoulder, center of lane, traversing lanes and straddling lanes with no interference or degradation of performance. Non-E-ZPass Group interoperable transponder reads shall also be reported and flagged if the AVI system is capable of reading such transponders.
82	The AVI system shall have the ability to process transponders mounted on vehicles traveling in stop and go and bumper-to-bumper traffic and vehicles traveling at speeds of up to one hundred (100) miles per hour.
83	The read zones in the lanes at a toll zone shall be tuned such that transponders in vehicles traveling through the lanes in the opposite direction of travel are not reported by the AVI system.
84	The AVI system shall buffer transponder reads when it is unable to communicate to the zone controller. When communications are restored, the Buffered Transponder Reads shall be reported to the zone controller.
85	If more than one transponder is present in a vehicle, the AVI system shall have the ability to accurately read, write to and report all transponders that are compliant with the E-ZPass Group and future National Interoperability (NIOP) requirements. Additional transponder reads shall be reported to the existing PTC systems according to the Business Rules.
86	The Contractor shall use the full capability of the selected AVI system to obtain AVI system status in accordance with the manufacturer specifications and report such status to the MOMS. Loss of communication to any element of the AVI system shall be immediately detected by the zone controller and reported to the MOMS. The Contractor-provided monitoring logic shall specifically detect any failures and generate alarms when failures are detected.

87	The Contractor shall provide maintenance tools to support remote lane tuning, diagnostics and other configuration changes. Setup and configuration of the AVI system shall be achieved remotely and shall not require lane closure except for major lane tuning, when initially installed or when a reader or antenna is replaced.

2.1.5.3 Automatic Vehicle Classification (AVC) System

88	The Contractor shall analyze the site conditions and Design, procure, furnish and install the required sensors and Hardware on all lanes at the specified Cashless Toll Zones as part of the AVC system that performs in accordance with performance requirements set forth in this Scope of Work under all weather conditions. The AVC system shall accurately detect, classify and separate vehicles spaced as close as three (3) feet apart traveling in stop and go and bumper-to-bumper traffic and vehicles traveling at speeds up to one hundred 100 miles per hour.
89	The AVC system shall determine vehicle axle count or axle count and vehicle dimensions, and classify vehicles in accordance with the Commission vehicle classification structure described in *Attachment 4a: PTC Proposed AVC Class Structure and Silhouette* based on the type of toll location. Classification of vehicles traveling on the shoulders of less than eight (8) feet width is not required; however, the System shall detect vehicles that travel on the shoulder and trigger the LPICPS.
90	The AVC system shall have the ability to detect trailer hitches and ensure that vehicles with a trailer in tow are reported as one unit to the zone controller as part of the vehicle transaction data.
91	The AVC system shall determine the speed of the vehicle and report the speed to the zone controller as part of the vehicle transaction data.
92	The Contractor shall ensure that there is sensor coverage at all areas of the toll zone to accurately detect and report vehicles traveling the shoulder and vehicles straddling lanes.
93	The AVC system shall provide vehicle event messages and signals, and vehicle classification data to the zone controller. Exception conditions processed by the AVC system shall be included in the transaction data, for example vehicle straddling the lane.
94	The Contractor's proposed AVC system shall have redundancy whereby AVC continues to function in the event any element of the AVC system fails or is degraded. The failure of a single sensor shall not prevent the lanes from processing vehicles or impact the System's capability to accurately associate transponders and to capture and process images.
95	The AVC system shall report its health to the zone controller and shall provide status when polled. Loss of communication to any element of the AVC system shall be immediately detected and reported. All health and failure status messages shall be transmitted and reported to the MOMS. In the event the primary AVC sensor fails, then the secondary sensors shall be used to capture and process images in accordance with the Commission Business Rules.

96	In the event there is a Class Mismatch between the AVC system and the transponder class, as defined by the Commission Business Rules during the Design phase, an image of the vehicle shall be captured and processed. The ability to enable or disable image capture for a Class Mismatch shall be configurable.

2.1.5.4 License Plate Image Capture and Processing Systems (LPICPS)

97	The Contractor shall Design, procure, furnish, and install all necessary front and rear LPICPS Hardware and Software required to support the video tolling and video processing requirements as set forth in this Scope of Work.
98	High resolution front and rear cameras shall be utilized for performing the OCR/ALPR.
99	Contractor shall install high resolution front and rear color ALPR cameras to meet the requirements of the Scope of Work. The Contractor shall install high resolution front and rear color cameras to provide one hundred (100) percent image capture during individual camera failures and excessive glare conditions.
100	The LPICPS shall capture and process vehicles traveling in stop and go and “bumper-to-bumper” traffic, vehicles traveling at speeds up to one hundred (100) miles per hour, and vehicles with separation as close as three (3) feet apart.
101	The Contractor shall ensure that there is shoulder coverage and vehicles traveling through any area of the toll zone, including but not limited to shoulder, center of lane, traversing lanes and straddling lanes, shall be accurately detected and their images captured and processed in accordance with the Commission Business Rules.
102	The LPICPS shall buffer images (retaining an image until its disposition is known) such that no image is lost in order to support multiple vehicles in the lane and in accordance with the Commission Business Rules.
103	The Contractor shall procure, furnish, and install cameras, lighting, necessary image triggers, backup triggers and the necessary camera control Software to automatically adjust the cameras to accommodate varying light and weather conditions to maintain adequate brightness and contrast settings, with or without traffic, to ensure optimum license plate information capture under all conditions and time of day.
104	The system shall associate all images captured for a single vehicle to the vehicle transaction including multiple images captured by a camera.
105	Lights installed in support of the cameras shall not distract motorists traveling in either direction in the lanes. Contractor shall make no assumption of ambient light and the system shall function without any degradation regardless of the ambient light.
106	The Contractor shall procure, furnish, and install the necessary redundant controllers/servers to support the in-lane LPICPS Equipment and such servers shall be separate of the zone controller servers.

107	The Contractor shall provide robust industrialized computers and operating systems (PC's or workstation-type operating systems are not permitted) sufficient processor speed and memory to process vehicles in real time to meet the speed and traffic volumes as specified in this Scope of Work. The following traffic volumes are provided as projections for planning purposes only and subject to change. The projected Average Annual Daily Traffic (AADT) various tolling locations identified in this Scope of Work can be found in *Attachment 13 -Annual Traffic Volumes*.
108	The LPICPS controllers/servers shall support standalone operations and be sized to store a minimum of thirty (30) days of images and data per lane at each of the toll zones under normal operating conditions.
109	The LPICPS shall perform with no degradation under conditions where every vehicle is considered a video transaction (100 percent video transaction). Under these conditions the System shall store images at the lane level for minimum of seven (7) consecutive days per lane. The System shall provide a configurable setting for the processing of one hundred percent (100) percent of video transactions.
110	When the storage utilization on the LPICPS controllers/servers reaches a configurable percentage (for example 80 percent), a message shall be transmitted to the MOMS. Images shall be deleted only after it is confirmed/acknowledged that the images have been successfully transmitted to the image server(s). Any deletion of images shall be automatic, without user intervention, and shall generate a message to be transmitted to the MOMS (configurable).
111	The LPICPS controllers/servers architecture shall have full redundancy such that failure of a processor, board, power supply, disk, communications or other critical component does not result in loss of images and data.
112	In the event communications to the LPICPS are lost or any LPICPS Hardware becomes non-operational, the Contractor's Design shall ensure that no images and/or data are lost and that all images and associated data are saved to a backup controller/server and transmitted to the image server(s) upon restoration of communications.
113	The Contractor's Design shall guarantee transmission of the video transactions, images and license plate results (optional) from the lanes to the image server(s) and from the image server(s) to the existing CSC/VPC system.
114	The System shall provide the capability to reconcile images to the transaction data and verify one hundred (100) percent transmission of video transactions and images to the existing CSC/VPC system.
115	If the Contractor solution includes toll rate determination within the In-lane Systems, then the video transactions may have the toll rates assigned to each transaction as specified in the Approved interface control document (ICD).
116	The Contractor's architecture shall support the image throughput requirements specified in the Scope of Work.

117	The LPICPS shall be capable of continuously performing diagnostics and reporting its health to the zone controller and the MOMS. Loss of communication to any element of the LPICPS shall be immediately detected. All health, failure and recovery status messages shall be transmitted and reported to the MOMS.
118	The LPICPS shall be capable of transferring video transaction data, images and license plate data to the image server(s) or the existing CSC/VPC systems in real-time or in batch mode as determined by the Commission to efficiently utilize the limited network bandwidth.
119	Software tools shall be provided that allow Authorized Users to verify the image quality in real-time and adjust and tune the images remotely.

2.1.5.5 Optical Character Recognition (OCR)/Automatic License Plate Recognition (ALPR) – Optional

If the option to provide OCR/ALPR Software is exercised, then the Contractor shall provide OCR/ALPR Software for determining the license plate data (number, jurisdiction and plate type) that results in the System meeting the requirements specified in the Scope of Work.

120	The OCR/ALPR Software may reside at the toll zone level, plaza level or the Highway level, as long as it meets the performance and functional requirements specified in this Scope of Work.
121	The System shall correctly identify the jurisdiction, plate type, special characters and stacked characters, and accurately determine the license plate number.
122	There shall be no backlog or failure in the processing of images for obtaining the license plate data (number, jurisdiction and plate type) and there shall be server redundancy whereby standby servers are available immediately and fully operational in the event of a failure.
123	The OCR/ALPR Software procured, furnished, and installed under this Contract can include Software that enhances and improves the accuracy and efficiency of the OCR/ALPR process. The System shall meet the OCR/ALPR performance requirements specified in this Scope of Work for license plates from States of PA, NJ, OH, FL, NY, MD, TX, DE, VA and NC. Each tolling location can be independently tuned to optimize performance based on the mixture of plates for each given toll zone.
124	The LPICPS shall provide the capability of detecting image quality degradation in near real-time and generate alarms that are reported to MOMS when image quality impacts OCR/ALPR performance.
125	If a vehicle has two license plates or cameras capture multiple front and rear images for a vehicle, the region of interest (ROI) for all license plates shall be obtained and the license plate number from all plates shall be extracted and associated to the vehicle transaction.
126	Vehicles with two rear license plates shall be identified to allow the back-office to apply separate Business Rules for such transactions.

127	The images transferred to the existing CSC/VPC system shall include, at a minimum, the front and rear full uncompressed image(s) and the ROI.
128	Based on the OCR/ALPR results, the System shall identify the best license plate image that was used by the OCR/ALPR to obtain the license plate data including identification of front and rear images.
129	The data transmitted along with the image shall meet the Approved ICD and shall include, but not be limited to:
	• transaction data;
	• license plate data, including license plate number, jurisdiction and plate type;
	• confidence level of the OCR/ALPR results for individual characters and overall license plate number;
	• confidence level of the jurisdiction, and
	• enforcement notification status and action (if exercised).
130	For audit and Maintenance purposes, Authorized Users shall have the capability to view all the images in real time on any device connected to the Cashless Tolling System network and verify the OCR/ALPR performance.
131	For audit and testing purposes Authorized Users shall have the ability to perform image review, utilize image enhancement tools, and enter license plate data independent of the normal image processing workflow. A flexible user interface shall be provided that allows Authorized Users to select the image review criteria. Data entered through this process shall be transmitted to the Cashless Toll Concentrator or optional Cashless Toll Host System for reporting.
132	All data entered through the independent image review process for testing and audit described above shall be saved separate from the normal production environment and shall be available to Authorized Users through reports. Such an audit process shall not impact normal operations and in most cases will occur after the images are transmitted to the existing CSC/VPC system.

2.1.6 Enforcement Notification – *Optional*

If the option to provide Enforcement Notification functionality is exercised, then the Contractor shall provide Enforcement Notification that results in the System meeting the requirements specified in the Scope of Work.

133	The Cashless Tolling System shall support the Maintenance and update of VEL that contains transponder numbers and license plate numbers that the Commission requires notification on. This could include repeat violators.
134	The VEL will be transmitted from the existing CSC/VPC system or existing PTC Toll Host to the Cashless Toll Concentrator, Cashless Toll Host (optional) or facility server(s) and from the Cashless Toll Concentrator, Cashless Toll Host (optional) or facility server(s) to the lanes at frequent configurable increments and when changes take place.

135	The Cashless Tolling System shall provide the capability to alert applicable personnel if the System detects a transponder or license plate passing through the cashless toll zone that is identified for enforcement notification. The criteria for notification shall include the status of the transponder and presence of the license plate on the VEL.
136	Notification methods shall include but not be limited to text message, email or system to system interface.
137	The System shall alert applicable personnel within twenty (20) seconds of the vehicle passing through the toll zone if a vehicle on the VEL is identified. The transponder ID, transponder status, license plate number and jurisdiction shall be included in the Alert.
138	If an enforcement notification was successfully transmitted to applicable personnel, the transaction shall have a flag denoting the transmission of the enforcement notification. This enforcement transmission status shall be transmitted to the existing CSC/VPC system.
139	The System shall support the transmission of images (configurable) to the applicable personnel and shall include the image of the vehicle or just the ROI.

2.1.7 Zone Controller

2.1.7.1 Zone Controller Hardware

140	A fully redundant zone controller shall be Designed, procured, furnished, and installed at each of the toll zones. The redundant zone controllers shall have the identical configuration.
141	The zone controllers shall be installed in equipment racks and housed in the toll equipment building whether there is a single or dual toll equipment building at each tolling point.
142	When any Hardware and/or process on the primary zone controller fails preventing it from processing vehicles and creating transactions, the secondary zone controller shall automatically and immediately assume the functions of the primary zone controller. The failover from the primary zone controller to the secondary zone controller shall be transparent to the rest of the System and shall not require human intervention or the restart of any subsystems. Only one zone controller at a time shall generate revenue transactions.
143	Alarm messages shall be generated and reported to the MOMS when such a failover event occurs. The Contractor's failover Design shall ensure that there is no loss of revenue or transactions when one of the zone controllers fails.
144	The System shall provide Authorized Users the capability to manually and remotely failover the active zone controller to and from the primary zone controller to the secondary zone controller. All such events shall be recorded and transmitted to the MOMS.

145	The zone controllers shall be Hardened, industrial grade servers and the processor speed and memory shall be sufficient to process vehicles in real time to meet the traffic speed and volumes as specified in this Scope of Work. The following traffic volumes are provided as projections for planning purposes only and subject to change. The projected Average Annual Daily Traffic (AADT) for the various tolling locations identified in this Scope of Work can be found in *Attachment 13 - Annual Traffic Volumes*.
146	Storage shall be sized to store a minimum of thirty (30) days of transaction and event data for each lane at the toll zone supported by the zone controller.
147	Proprietary zone controller Hardware will be considered for use, subject to the Commission's Approval. All drawings and instructions that enable construction and assembly, installation, repair, and modification of the Hardware, as well as sufficient property and use rights shall be provided to the Commission.

2.1.7.2 Zone Controller Software

148	The zone controller Software shall interface to the various devices and subsystems for each of the toll zone types specified in *Attachment 1: Cashless Toll Zone Locations* and perform all the functions as described in this Scope of Work for all Commission toll facilities.
149	The zone controller located at each toll zone shall process all of the data obtained from the other subsystems as described in this Scope of Work to generate a transaction record for each vehicle passage through the toll zone. The zone controller shall:
	• manage the TSL for all E-ZPass Group interoperable agencies used to validate the status of a transponder received from the AVI system;
	• use the data obtained from the AVI and AVC systems to assign the transponder read to the correct vehicle and frame the vehicle transaction accurately;
	• notify the LPICPS to capture and process vehicle images if no Valid Transponder read is obtained from a vehicle or if the Commission Business Rules require the capture of an image;
	• transmit the transaction record to the facility server (if provided) or to the Cashless Toll Concentrator or optional Cashless Toll Host, including but not limited to the following data: vehicle detection and classification data, transponder data (including raw transponder data as reported by the reader), Equipment status data, and all other pertinent information regarding the transaction as specified during the Design phase;
	• transmit to the MOMS all alarm messages relating to the health of each subsystem, including the health of the primary and secondary (redundant) zone controller. Recovery messages shall also be transmitted and reported;
	• ensure that vehicle event data and transaction data shall be accessible to the DVAS, and
	• transmit to the facility server (if provided) or Cashless Toll Concentrator or optional Cashless Toll Host for further processing all other messages/events in accordance with Approved ICDs.

150	The zone controller Software shall be configurable and shall be able to support the Commission Cashless Tolling operational needs without requiring changes to Software. The configurable parameters shall be defined and documented during the Design process. All parameters shall have default values that shall be established during the Design process.
151	The Contractor shall propose appropriate Protocols and data structures to accomplish the communications required between various peripherals. These Protocols and data structures shall be fully detailed and documented, in Consultation with the Commission, by the Contractor during the Design process and Approved by the Commission.
152	Guaranteed transmission protocols shall be used for all messages exchanged between systems, including but not limited to:
	• zone controller;
	• LPICPS;
	• AVI system;
	• AVC system;
	• facility servers (if provided);
	• Cashless Toll Concentrator;
	• Cashless Toll Host (optional);
	• image server(s);
	• existing CSC/VPC;
	• DVAS;
	• MOMS, and
	• the existing PTC Toll Host
153	The Cashless Tolling System shall support the various lane configurations shown in *Attachment 1: Cashless Toll Zone Locations*. The zone controller application Software shall support all lane functions required to meet the Commission Cashless Tolling operational requirements.

2.1.7.3 Zone Controller Start-Up

154	Upon start-up or initialization the zone controller shall perform a self-diagnostics test to ensure full System operations. Alarm messages shall be reported for all failure conditions and a notification of the diagnostic check completion shall be displayed on the MOMS Dashboard. The failure of a critical system shall result in the toll zone operating under degraded operations in accordance with the Commission Business Rules.
155	Upon start-up, the zone controller shall verify with the facility server (if provided), the Cashless Toll Concentrator or optional Cashless Toll Host that it has the latest configuration files; VEL (if exercised); TSL; and any other files required to support the lane operations. If the latest files are not present on the zone controller, it shall request the latest data from the facility server (if provided), Cashless Toll Concentrator or optional Cashless Toll Host. If a zone controller is unable to get the latest files, an Alert shall be generated and sent to MOMS.

156	The zone controller shall also synchronize its time with the Commission time source and an Approved secondary source upon start-up and at established configurable intervals. The zone controller shall also support a secondary source for time synchronization.

2.1.7.4 Lane Operations

157	The Cashless Tolling System shall support various modes of operation that are managed and initiated by Authorized Users through the Cashless Toll Concentrator, the facility server (if provided), optional Cashless Toll Host or other means as approved by the PTC.
158	Transactions shall be processed according to different Business Rules either at the lane level or the host level based on the mode of operation. The Contractor shall be responsible for ensuring that the AVI and video transactions are processed according to Commission Business Rules and transmitted correctly to the existing PTC Toll Host and/or CSC/VPC system.
159	The Cashless Tolling System shall support the following modes of operations:
	• Open Mode: All transactions shall be processed normally in an open mode;
	• Maintenance Mode: Transactions created in Maintenance mode are processed and transmitted as normal transaction but are identified as Maintenance mode transactions. Transactions that occur during Maintenance mode are not reported as traffic or revenue transactions.
	• Emergency Mode: Transactions created during emergency mode shall be identified as emergency mode transactions and processed in accordance with Commission Business Rules to be determined during the Design phase.
	• Save Image Mode: Capability shall be provided whereby Authorized Users can enable and disable a zone controller to save one hundred (100) percent of vehicle images processed through the LPICPS based on various selection criteria. Transactions under such condition shall be processed normally; however, these transactions and images shall be flagged with the save image mode and processed according to the Commission Business Rules (for example audit purposes).
160	When a lane is operating in a mode other than normal open mode, an Alert shall be generated and sent to MOMS at regular (configurable) intervals.
161	Authorized Users shall have the ability (local and remote) to configure the next operating mode and to gracefully shutdown the zone controller. Each time a mode change is requested an alert message shall be sent to the MOMS.

2.1.7.5 Transaction Processing

162	The zone controller shall detect, classify, and frame vehicles; assign the transponder accurately to the correct vehicle and capture and process the image of the correct vehicle in accordance with the Commission Business Rules and with the performance requirements specified in this Scope of Work.
163	The detailed transaction processing rules shall be defined and finalized during the Design phase; however, the following basic rules shall apply:

	• the System shall have the ability to process and record multiple transponders in a vehicle and associate each transponder to the vehicle transaction;
	• any non-E-ZPass Group interoperable transponder reads shall be reported to the Cashless Toll Host System;
	• a minimum of one revenue bearing transaction shall be created for each vehicle that travels through the toll zone and the zone controller shall ensure that the transaction is complete prior to transmitting it;
	• the zone controller shall be able to accurately identify, process, and track multiple vehicles in the toll zone;
	• the zone controller shall ensure that duplicate transponder transactions (same transponder ID) are not reported from the same lane or toll zone within a configurable period of time or consecutively;
	• Buffered Transponder Reads that are transmitted to the zone controller shall be processed but not be assigned to a vehicle by the zone controller and shall be flagged and reported to the facility server, Cashless Toll Concentrator or optional Cashless Toll Host for further processing and vehicle assignment;
	• the zone controller shall automatically synchronize with the various subsystems to ensure the events in the lane correspond to the transaction generated, and
	• the System shall incorporate self-correcting logic to adjust for lane anomalies and event synchronization issues.
164	The transaction message details shall be defined and finalized during the Design phase; however, the following basic rules shall apply:
	• The In-lane System shall transmit the video transaction to the existing CSC/VPC system for processing and billing.
	• the In-lane System shall transmit AVI and video transactions to the Cashless Toll Concentrator or optional Cashless Toll Host for processing, reporting, and reconciliation with the existing PTC Toll Host and CSC/VPC;
	• the transaction message shall contain all data required by the existing PTC Toll Host and CSC/VPC systems to process the AVI and video transaction;
	• each transaction shall contain various event times to help with transaction pre-processing and synchronizing events to a transaction including but not limited to: “vehicle entry” time; “LPICPS trigger” time; “transponder read” time; “transponder write” time, and “vehicle exit” time. Such event times shall allow transponder reads, images and transaction to be associated correctly with the vehicle, and
	• the System shall assign a lane number as approved by the PTC to each transaction and report the lane in which the vehicle was detected within the toll zone.
	• the System shall assign a sequential sequence number by lane to each transaction detected within the toll zone.

2.1.7.6 E-ZPass Group Mapped Class

165	The System shall utilize the raw E-ZPass Group class obtained from the transponder data and map that raw class to the Commission E-ZPass Group proposed axle+dimension mapped class in accordance with *Attachment 4b: E-ZPass Group Mapped Classes* to be finalized during the Design Phase.
166	The System shall retain the raw E-ZPass Group class and include that in the transaction data along with the E-ZPass Group mapped axle+dimension class for Commission.
167	If a transponder has a raw E-ZPass Group class that is not mapped to the Commission E-ZPass Group axle+dimension class then the transaction shall be assigned a default class (configurable).

2.1.7.7 Revenue Vehicle Class (PTC Class)

168	The assignment of the Revenue Vehicle Class in normal operations and in degraded mode of operations shall be in accordance with the Commission Business Rules. If no classification data is obtained, a configurable default revenue class shall be assigned to the transaction and the transaction shall be flagged.
169	The Revenue Vehicle Class shall be used to determine the fare amount for a transaction as defined by the Commission Business Rules. Flags in the transaction shall identify which class was used as the Revenue Vehicle Class.
170	The System shall have the capability to cap the maximum and minimum (configurable) axles and class and to charge a set toll rate per additional axle count.
171	Transactions shall include the raw E-ZPass Group class, AVC class, mapped E-ZPass Group class and Revenue Vehicle Class. The Revenue Vehicle Class assigned in accordance with the Commission Business Rules shall be used to determine the toll amount.

2.1.7.8 Fare Determination

Fare determination is not required at the In-lane Systems, and can be performed at the Cashless Tolling Concentrator, facility server(s), Cashless Toll Host (optional) or existing PTC Toll Host. The Contractor solution shall include fare determination at the Cashless Toll Concentrator, facility server(s), Cashless Toll Host (optional) or the In-lane Systems for AVI transactions and shall meet the following requirements. Currently the existing CSC/VPC system assesses the toll for violation transactions and will continue to do so for video transactions; however, the Contractor can assign the toll to video transactions if the Contractor solution provides this capability.

172	Fare determination shall be performed at the In-lane Systems, the Cashless Toll Concentrator or optional Cashless Toll Host systems or the existing PTC Toll Host for all AVI transactions.
173	The Contractor solution shall include fare determination at the Cashless Toll Concentrator, optional Cashless Toll Host System or the In-lane Systems for AVI transactions.

174	Fare determination may be performed at the In-lane Systems for all video transactions and may later be adjusted at the PTC CSC/VPC based on the transaction categorization, for example Video Image Toll (VToll).
175	The assignment of tolls shall be assigned based on the final Design and shall be assessed using the toll rates and schedules established for each tolling point for barrier type locations such as DRB and Gateway or may be assessed based on a completed trip that would be built based on the number of gantries the customer passed under while traveling on the Mainline and/or Northeastern Extension (if Toll Host option exercised). The toll rate and class structure for the various toll facilities are not developed yet but the System shall support the toll rates and class structure for the classifications in *Attachment 4a: PTC Proposed AVC Class Structure and Silhouette* based on the toll location.
176	The System shall support the assessment of toll by payment type for example video, E-ZPass, and Non-Revenue; vehicle class and location.
177	Home Agency (Commission issued) non-revenue transponders shall be charged $0.00 (configurable) fare but Away Agency non-revenue transponders shall be charged the normal fare.
178	Class 1 motorcycles with valid E-ZPass transactions that use a Home Agency (Commission issued) transponder shall be charged a configurable discounted fare.
179	Motorcycles and other vehicles that qualify for discounted fare shall be identified by using the E-ZPass Group vehicle Type 2 which is comprised of E-ZPass Group class 136, 140 and 144. The category of E-ZPass Group class that qualifies for discounted fare shall be configurable.
180	Motorcycle discount fares shall be rounded to the nearest penny (configurable) but shall be no less than the minimum fare (configurable). Currently the minimum fare is fifty (50) cents.
181	The toll charged for E-ZPass transactions shall be based on Commission Business Rules developed during the Design phase and shall consider the operational status of the AVC.
182	Tolls charged for video transactions shall be based on AVC (if it is operational) or the default class and shall be defined during the Design phase.
183	Transactions shall be flagged if the vehicle class is estimated by the AVC system (for example, when the class is based on the vehicle profile or AVC data is incomplete or degraded).

2.1.7.9 Saving of Images

184	Images shall be captured and saved for the following conditions and as further defined during the Design process, including but not limited to:
	• in all cases where there is no transponder read (including when the AVI system is down or degraded), the transponder is not "valid", or a non- interoperable read is detected;
	• in all cases where there is a vehicle classification condition as determined by the Commission Business Rules, for example in conditions where the AVC class is estimated by the System;
	• if the LPICPS loses communications with the zone controller in accordance with the Commission Business Rules;

	• in all cases where there is a Class Mismatch between the transponder class and the AVC, as determined by the Commission Business Rules, and
	• in conditions where the "save image mode" is enabled.
185	Images saved during a LPICPS loss of communication event shall be flagged and subsequently matched with the correct transaction data when communication with the zone controller resumes. This matching can occur at the Cashless Toll Concentrator or optional Cashless Toll Host but shall take place in a manner that does not interfere with or degrade real time zone controller operations.
186	If the AVC system is not operational but the LPICPS trigger is functioning, images shall be saved such that all non-valid transponder transactions that occur during the AVC malfunction can be subsequently pursued for collection. Sufficient data shall be provided in the transactions to allow the PTC CSC/VPC to process such transactions so that customers are not charged in error when lane operation is degraded.

2.1.7.10 Configuration Files

187	All parameters and settings required to run the zone controller application and the lane equipment shall be maintained in configuration files. Access to configuration files required to support the zone controller operations shall be limited to Authorized Users.
188	The configuration files shall be maintained at the toll zone and the Cashless Toll Concentrator or optional Cashless Toll Host for configuration and version control. All zone controllers shall have default configuration files that allow the lane to start-up automatically.
189	Authorized Users shall be able to make changes to parameters and settings that are defined as configurable in this Scope of Work and in the Approved Design documents. Authorized Users shall be able to make changes to the configuration files in the field. Changes to configuration shall result in an alert message to the MOMS. All changes made to the configuration files in the field shall be synchronized to the master configuration file that is maintained at the Cashless Toll Concentrator or optional Cashless Toll Host.
190	Each zone controller shall automatically back up its critical configuration files to a backup server once a day to be used to rebuild the master drive in the event of hard disk failures.

2.1.7.11 Zone Controller Interfaces

191	The zone controller shall interface to various devices and subsystems to transmit and obtain data and synchronize the time.
192	The zone controller shall provide checks on all data it receives from each of the devices and subsystems it interfaces to and generate alarm messages that are reported to the MOMS.

Interface to AVI System

193	The zone controller shall interface with the designated AVI system in accordance with the Approved ICD and transmit all relevant transponder data received from the AVI system as programmed on the transponder, as defined and Approved by the Commission during the Design

	phase, and reported as part of the vehicle transaction data to the Cashless Toll Concentrator or optional Cashless Toll Host.

Interface to AVC System

194	The zone controller shall interface with the AVC system to obtain vehicle events that shall permit accurate detection, classification, tracking and processing of vehicles. Vehicle class and speed information shall also be obtained from the AVC system and reported as part of the vehicle transaction data reported to the Cashless Toll Concentrator or optional Cashless Toll Host.

Interface to LPICPS

195	The zone controller shall interface with the LPICPS to capture and process images of vehicles in accordance with the Commission Business Rules to be developed during the Design phase. The vehicle data, OCR/ALPR results (if the option to implement OCR/ALPR is exercised) and images obtained from the LPICPS shall be transmitted to the image server(s) to support the Commission's video tolling and processing requirements and PTC E-ZPass CSC operations requirements.

Interface to DVAS

196	The zone controller shall interface with the DVAS to transmit event data for display on the DVAS. The event data shall include transponder reads and AVC event messages that are received as the vehicle travels through the lane.

Interface to Facility Server/ Cashless Toll Concentrator or Cashless Toll Host (if provided) Systems

197	The zone controller shall interface with the facility server (if one is deemed necessary) or directly to the Cashless Toll Concentrator or Toll Host Systems to transmit lane data and to receive files, commands, messages and other data required for lane operations. Error detection checks shall be instituted on both systems to ensure incorrect or corrupt data is not inserted into the System. The Contractor shall work with Commission IT Security to develop a secure method of allowing this flow of data through a Commission firewall into the network.
198	The Cashless Tolling System shall include automated methods to determine when there is a loss of communications between the zone controller and the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems; any failures detected shall be reported to the MOMS.
199	The Cashless Tolling System shall include automated methods to determine when there is a loss of communications between the zone controller and the image server(s); any failure detected shall be reported to the MOMS.
200	Receipt of all files and data shall be acknowledged; any transmission failures shall be reported to the MOMS.
201	The Contractor shall provide an automated means of synchronizing the zone controller and facility server (if provided) or Cashless Toll Concentrator or Toll Host System messages in the event that the zone controllers are replaced, communications are down, or if data on the zone controller is not retrievable due to a catastrophic failure.

2.1.7.12 Transmitting Data

202	All messages generated at the zone controllers shall be transmitted to the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems in real-time using a transport mechanism that performs error detection and correction to guarantee data transmission. All messages shall be uniquely identified and validated at the Cashless Toll Concentrator or Toll Host Systems to ensure there are no missing or duplicate messages.
203	The System shall support exception handling in accordance with the Commission Business Rules Approved during the Design phase. An alarm shall be generated and reported to the MOMS for all failed transactions, exceptions and errors.
204	Failure of transmission of data to the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems shall result in the generation and transmission of alarm message to the MOMS.
205	All messages shall be confirmed as received by the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems before they are flagged for purging or overwritten. In the event of a communication failure the messages shall be retained on the zone controller until successful transmission is complete and verified.
206	The zone controller shall transmit all data to the facility server (if provided) or Cashless Toll l Concentrator or Toll Host Systems, including but not limited to the following:
	• all transaction messages generated in the lanes;
	• all alarm and status messages generated in the lanes;
	• all lane operational communication status messages and system health messages;
	• all events generated in the lanes that are displayed on the Dashboard or are required at the Cashless Toll Concentrator or Toll Host Systems, and
	• all events required by the DVAS for real-time review or playback.

2.1.7.13 Receiving Data

207	The zone controller shall support the E-ZPass Group TSL and other interoperable agency lists and shall have the capability to support every Agency and its assigned transponder number range as described in the E-ZPass Group specifications.
208	The zone controller shall accept comprehensive (complete list once a day) and incremental (changes updated on a configurable interval, but not more frequently than every sixty (60) minutes) TSLs in accordance with the established Business Rules and shall activate the lists upon validation of the files.
209	The Contractor shall utilize data compression, encoding or other means to efficiently store and transmit the E-ZPass Group TSL and other interoperable agency lists, such that the new lists are available at the zone controllers within thirty (30) minutes of the Cashless Toll Concentrator, Toll Host Systems or facility server(s) receiving the new lists.

210	If tolls are determined by the In-lane Systems, then the toll rates, toll schedules and the effective date/time shall be downloaded to the zone controller and new toll rates initiated when the toll rate structure changes.
211	All configuration files and tables needed to support the lane operations shall be downloaded to the zone controllers from the Cashless Toll Concentrator or Toll Host Systems or facility server(s) upon confirmed change or at scheduled intervals and activated as required. Versions of the configurable files on each zone controller shall be maintained, tracked, and recorded.
212	All zone controller Software shall be downloaded to the zone controllers from the Cashless Toll Concentrator or Toll Host Systems or facility server(s). Software versions on each zone controller shall be maintained, tracked, and recorded.
213	The Cashless Tolling System shall provide checks to detect issues with the data it receives from the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems, including but not limited to:
	• incorrect versions of the data received;
	• corrupted data received, and
	• missing files when a file was expected.
214	An alarm shall be generated and reported to the MOMS for all exceptions/errors.

2.1.7.14 Monitor All Lane Equipment for Device Status

215	Each zone controller shall monitor the status and system health of its internal components and all associated in-lane Equipment. All Cashless Tolling Systems, including the AVI system, AVC system and the LPICPS shall be continuously polled for status. The health of digital devices that do not provide status shall be inferred from events (for example simple loops or an AVI antenna).
216	The System shall generate a recovery message and restore the operational status of a device that recovers after reporting a failure. Recovery messages shall be recorded against the original work ordered through the MOMS and shall be available to Authorized Users. Recovery messages shall not cause the associated work order to close, but shall serve as supporting evidence of an Equipment recovery.
217	If communications from the zone controller to the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems are unavailable, an alarm message shall be generated and reported to the MOMS.
218	If communications to the image server(s) are unavailable, an alarm message shall be generated and reported to the MOMS.
219	If a lane is operating in any mode other than normal open mode an alert message shall be generated at configurable intervals and reported to the MOMS.

2.1.7.15 Diagnostics and Equipment Malfunction

220	The zone controller Software shall execute periodic diagnostic checks on internal processes, the in-lane Equipment and interfaces. Peripheral devices shall be interrogated for device status on a regular basis (configurable per device).
221	A device's failure to respond to a status inquiry after a configurable number of retries shall be regarded by the zone controller Software as an Equipment failure.
222	An alarm shall be generated and reported to the MOMS for all failures that are detected.
223	Diagnostic checks shall be performed in all modes of lane operation. Results shall be stored in the appropriate zone controller's event log and easily accessible to technicians. The System shall include "sanity checks" for fault conditions and shall report any detection of such conditions to the MOMS.
224	Degraded modes of operation shall be supported based on the Commission Business Rules developed during the Design process and Approved by the Commission. The Contractor shall ensure the Cashless Tolling System continues to operate with minimal loss of revenue or visible impact to the patron in the event that some components of the Cashless Tolling System fail and degraded mode operations occur.

2.1.7.16 Stand-alone Mode of Operation

225	The zone controller shall operate in a stand-alone mode for a minimum of thirty (30) days if communications to the Cashless Toll Concentrator or Toll Host Systems (if provided) and existing PTC systems are down. When operating in stand-alone mode, the last files downloaded to the zone controller shall be used for processing vehicles.
226	The zone controller shall have an available data port to permit onsite manual uploading of Software, TSL or other data required for continued operation until communications with the Cashless Toll Concentrator or Toll Host Systems (if provided) and existing PTC systems is re-established. Devices utilized to download the TSL and rate tables to the lanes shall have the capability of synchronizing current file versions such that a new TSL is updated on the device within an hour of receipt.
227	The System shall provide the capability for Authorized Users to download transactions from the zone controller and to transfer such transactions to the Cashless Toll Concentrator or Toll Host Systems (if provided) or to the existing PTC Toll Host and CSC/VPC system.
228	The System shall provide the capability for Authorized Users to download event/transaction data for manual and stand-alone playback of the DVAS.
229	Upon re-establishing communications with the Cashless Toll Concentrator or Toll Host Systems (if provided) and existing PTC systems all back-logged messages, including manually transferred messages, shall be flagged and transmitted to the appropriate system without affecting the real time operations or degrading lane operations.
230	Upon re-establishment of communications and successful transmission of all messages, a recovery message shall be generated and reported to the MOMS.

2.1.8 Digital Video Audit System (DVAS)

231	The Contractor shall provide a Digital Video Audit System (DVAS) that provides the Commission the capability to investigate lane performance issues and support the Commission in customer dispute resolution.
232	The Contractor shall develop, procure, furnish and install two or more IP addressable, color video cameras as part of the DVAS at each toll zone sufficient to meet the requirements of this section. The cameras installed shall be the same at all Toll Zones.
233	Authorized Users shall have the ability to individually setup, configure and control the cameras remotely through the application. Configurable settings shall be available on a per-camera basis to allow for tuning for site conditions.
234	As part of the Design phase, the Contractor and the Commission shall determine the optimum location for the installation of the DVAS Equipment to allow for the complete monitoring of each toll lane.
235	The location and number of cameras shall permit the capture of video that allows Authorized Users to identify the vehicle class and number of axles based on the ambient lighting conditions.
236	The Contractor is responsible for the installation of the DVAS Equipment, including mounting Hardware to the designated structure (either toll gantry or separate mounting pole) as well as power and signal cabling between the DVAS Equipment and the storage media as described in *Attachment 2: Cashless Tolling Installation Responsibility Matrix*.
237	The DVAS cameras shall have pan-tilt-zoom (PTZ) functionality that allows Authorized Users to remotely control each camera. When no PTZ commands are received within a configurable time the DVAS cameras shall revert to their default settings. Alarm messages shall be generated and reported to the MOMS when remote controls are activated or settings other than the defaults are detected.
238	The Contractor shall provide the lighting requirements to the civil contractor during the Design phase, as needed to ensure that the quality of the video of each toll lane, based on ambient lighting and/or weather conditions, is sufficient to meet the requirements. The lighting requirements shall include but not limited to the minimum light levels required within the toll zone and the preferred placement or restrictions of light fixtures as to not interfere with the tolling equipment, either known based on design requirements or as coordinated with the civil designer and contractor in advance of installation. The Contractor shall be responsible to furnish and install toll zone specific lighting including sensors to control the lighting based on time of day or lighting conditions.
239	The DVAS shall include all Equipment and Software necessary to provide the audit capability described herein, including but not limited to:
	• digital cameras and any associated lenses, lighting and sensors;
	• interfaces to the zone controllers to capture event data;
	• storage media, and
	• an application to view real-time video and events and playback the information.

240	The continuous DVAS video stream and audit data shall be provided to the Cashless Tolling System independently of the transaction data stream; however, the DVAS shall be integrated into the System application and the video stream shall be linked to the transaction to meet the requirements specified in this section.
241	The Contractor shall provide Authorized Users the ability to access to the DVAS through the Cashless Tolling System application using any device authorized by the Commission with access to the Commission System network.
242	The DVAS video and event data shall be available from the Dashboard to Maintenance staff when investigating anomalies.
243	The DVAS solution for each tolling point shall provide continuous video coverage with the capability to monitor the overall configuration of the toll lanes with the ability to see each lane and the vehicle traveling that lane, and shall display detailed events for each lane as they occur in real-time.
244	At a minimum the DVAS shall display the highway, plaza ID, lane number, transaction number, transaction date and time, transponder ID, transponder class and the AVC class. The DVAS video and data shall be accessible in read-only mode; no changes or alterations to the video or data shall be allowed.
245	All detailed data obtained from various subsystems shall be available and shall be displayed to assist auditors and Maintenance staff with the investigation of discrepancies and problems. The DVAS shall perform and display video and data in real-time and shall have the ability to playback event data.
246	The DVAS shall also have the capacity to record and store up to a minimum of twelve (12) months (configurable) of continuous video and data to an electronic media for each toll zone.
247	DVAS video and the corresponding event and transaction data shall be saved together such that when the data is moved to a different environment outside the production environment, the video can be replayed with the corresponding event and transaction data as long as the DVAS replay software is available.
248	The health of the DVAS shall be displayed and monitored. Any problems or failures detected shall be reported to the MOMS.
249	The DVAS shall be time synchronized to the same source as the zone controllers and shall interface to the zone controllers to obtain event data in accordance with the Approved ICD.
250	The DVAS screens shall allow the Authorized User to obtain and sort the video/data events through various query criteria or configurable report templates finalized during the Design phase, including but not limited to:
	• Plaza/ZoneID;
	• lane ID;

	• vehicle class;
	• Transaction date and time;
	• payment type;
	• Transaction date and time range;
	• alarm condition;
	• class mismatch condition;
	• unusual event conditions;
	• transponder ID;
	• transponder status;
	• transponder class;
	• vehicle height;
	• vehicle speed;
	• axle counts, and
	• transaction number

251	Identification displayed on the screen shall allow the reviewers to clearly differentiate the lane under review and its associated event data. The data on the DVAS display for each vehicle shall include but not limited to: • Plaza/Zone ID; • lane ID; • vehicle class; • transaction date and time; • alarm condition (if applicable); • class mismatch condition (if applicable); • unusual event conditions (if applicable); • transponder ID; • transponder status; • transponder class; • vehicle height; • vehicle speed; • axle counts, and • transaction number.
252	The DVAS shall provide the capability to save the displayed contents of a screen (images and data) and electronically distribute such information as needed.
253	Controls shall be provided to allow reviewers to step forward and backward through video data, by frame and to display the associated event data. All digitized video and corresponding event data shall be tightly synchronized and stored in accordance with these requirements.

2.1.9 Cashless Tolling Facility Server *(Optional)*

The provision of a facility server is optional but if the Contractor's solution includes a facility server, then the requirements in this section shall be met. The Contractor has the option to use the facility server as an image server as long as the Design complies with the requirements of the Scope of Work.

254	The Contractor shall provide one or more facility servers located at a tolling point if it is deemed necessary to meet the requirements specified in this Scope of Work. A facility server or set of servers can support multiple toll zones.

255	The Contractor shall furnish and install a complete Hardware configuration for each facility server to support the redundancy and performance requirements of this Contract, including but not limited to:
	• multiple processors;
	• dual, redundant, hot-swappable power supplies;
	• redundant storage devices; and
	• backup library (using a media such as Cloud or Network Attached Storage (NAS) based backup that does not require storage devices such as backup tapes or CDs.
256	The Hardware solution shall provide high-speed intra system network fabric between all storage, databases, servers, and backup systems.
257	The facility server shall interface to the zone controller and shall serve as a store and forward server for transactions and messages.
258	Each facility server shall communicate with the primary and secondary Cashless Toll Concentrator or existing PTC Toll Host.
259	Each facility server shall be capable of storing transactions and images (if used as a local image server) from the in-lane subsystems for a period of minimum sixty (60) days, in the event of a communications failure.
260	The facility server shall be capable of operating in a stand-alone mode for a minimum of sixty (60) days if communications to the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host are down. When operating in stand-alone mode, the last files downloaded from the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host shall be used for processing vehicles.
261	The facility server shall have an available data port to permit onsite manual uploading of Software, TSL, or other pertinent data required for continued lane operation until communications with the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host are re-established. Devices utilized to download the TSL and rate tables (if applicable) to the facility server shall have the capability of synchronizing the current versions whereby a new TSL is updated on the device within an hour of receipt.
262	The System shall provide the capability for Authorized Users to download transactions from the facility server and transfer such transactions to the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host.
263	Upon re-establishing communications with the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host all back-logged messages, including manually transferred messages, shall be flagged and transmitted to the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host without affecting the real time operations or degrading the lane operations.
264	Upon re-establishment of communications and successful transmission of all messages, a recovery message shall be transmitted to the MOMS.

265	Failure of any component of the facility server shall be detected and reported to the MOMS.

2.1.10 Roadway Pavement, Overhead Structures/Toll Gantries, and Toll Equipment Building Design Support

2.1.10.1 General Design Requirements

266	At the tolling points the Contractor shall install the toll collection equipment on the infrastructure provided by the civil contractor as identified further in *Attachment 2: Cashless Tolling Installation Responsibility Matrix*.
267	The Contractor shall work with the Commission, the civil designer and civil contractor on requirements for all civil construction work to be performed by others on the Project, including overhead platforms/toll gantries, toll equipment buildings, roadway/pavement, lighting requirements, power requirements and conduit relative to the aspects that integrate with the Design and installation of the Cashless Tolling System.
268	During civil design, Contractor shall provide review, comment and approval of civil design drawings or similar within the context of the toll system functional and performance requirements. For documents containing less than fifty (50) pages, the Contractor shall review and provide comment on preliminary draft documents within ten (10) Business Days. For documents containing more than fifty (50) pages, the Contractor shall review and provide comment on preliminary draft documents within fifteen (15) Business Days. The Contractor shall review and provide comment on all final draft and final documents within ten (10) Business Days.
269	The Contractor shall cooperate and provide support as needed to the civil Design and construction efforts. During civil design, Contractor support is anticipated to include responses to information requests for clarification on proposed designs.
270	During construction, Contractor shall provide review and approval of civil contractor shop drawings or similar within the context of the toll system functional and performance requirements.
271	During installation, the Contractor shall provide verification and approval of toll system related elements that the civil contractor is responsible for installing.
272	Upon approval of shop drawings or similar design elements by the Contractor within the context of System function and performance, Contractor shall assume responsibility for those elements to the extent that if the civil work is installed as designed and does not meet the performance requirements of this Scope of Work, the Contractor shall be responsible for the costs of redesign, civil rework and additional Equipment costs as further set forth in the Contract.
273	Contractor shall also coordinate, attend meetings and be available onsite as needed during the installation of the civil elements related to the Cashless Tolling System to ensure that the civil work is performed in accordance with the Contractor's requirements.

2.1.10.2 Overhead Structures/Toll Gantries

274	The Contractor's Equipment mounting and installation Design for any AVC overhead Equipment, AVI Equipment and LPICPS Equipment shall take into consideration its accessibility from the walkways on the overhead structure at the tolling points. The Design of the mounting structures and mounting arm shall allow technicians to replace Equipment and restore it to normal operations without additional tuning and without impacting performance.
275	The Contractor's cable routing Design shall include sufficient service loops to facilitate the retrieval of Equipment from the walkway providing sufficient retractable capability.
276	The Contractor shall provide in-lane Equipment Design, installation specifications, structural requirements and drawings for mounting the Equipment to the overhead structures/toll gantries at each toll zone as it relates to the Contractor's Equipment requirements to the civil contractor(s), including but not limited to Equipment mounting locations and installation instructions, mounting structure and mounting arms, conduit, cable separation and tie offs, required clearances, junction boxes, and electrical requirements, wind load, Equipment load and power calculations, as well as Contractor requirements related to special electrical grounding and isolated circuit integrity by Equipment.
277	The Contractor shall also review and Approve all aspects of toll overhead structures/toll gantries design drawings submitted by the civil contractors that are related to the toll system Equipment, including but not limited to, the items identified in the requirements above in this section.
278	The Contractor shall be responsible for all necessary mounting Hardware required to install the toll Equipment on each overhead structure/toll gantry as specified in this Scope of Work and shall ensure installation is in compliance with Commission specifications.
279	The Contractor's Equipment installation Design shall have all overhead Equipment tethered to the platform structure at all times during installation and removal. The Equipment mounting devices shall also be tethered such that no loose bolts, nuts or pins shall fall into live traffic during Maintenance activities.
280	The Contractor shall be responsible for all Equipment installations, terminations, and connections of Equipment located on the overhead structures/toll gantries and for connecting such Equipment to the electronics in the equipment racks within the toll equipment building.

2.1.10.3 Uninterruptible Power Supply (UPS)

281	All Cashless Tolling System Hardware and equipment shall be on UPS. The UPS will be supplied by the civil contractor.
282	The civil contractor will furnish and install automatic transfer switch (ATS) and smart Power Distribution Units (PDUs) to manage the roadside power distribution.
283	The Contractor shall furnish and install an electronic interface to the UPS to monitor the UPS performance. The MOMS shall detect the status of the UPS and alert technicians when the System is on UPS.

284	Software drivers shall be developed, furnished, and installed to acquire, display, store and report all parameters provided as outputs from the UPS.
285	When the System is on the UPS and when it is off the UPS a notification shall be reported to the MOMS.

2.1.10.4 Toll Equipment Building

A toll equipment building with UPS, backup generator and Heating, Ventilation and Air Conditioning (HVAC) will be provided by the civil contractor at each tolling point indicated in *Attachment 1: Cashless Toll Zone Locations*. The emergency backup generators are contained in a separate room with outside access as shown in *Attachment 5: Concept Plan for Overhead Structure/Toll Gantries*.

286	The toll equipment building shall house the Cashless Tolling System equipment racks provided by the Contractor.
287	The Contractor shall provide the equipment rack space requirements to the civil contractor for each toll equipment building at each tolling point.
288	The Contractor shall install equipment racks within the toll equipment building in accordance with applicable Pennsylvania State building codes and Pennsylvania State DOT design standards, if and where applicable.
289	The Contractor shall adhere to all specifications of the latest PennDOT Standard Specifications at time of construction unless the Contractor receives written notification by the Commission which overrides the Standard Specifications. The PennDOT Standard Specifications can be found at: http://www.dot.state.pa.us/Internet/Bureaus/pdDesign.nsf/ConstructionSpecs408and7?OpenForm
290	At locations where tolling points are in close proximity to one another, a single toll equipment building with backup power generator will be used to support the toll Equipment requirements for multiple toll zones. At locations where a single toll equipment building is used for the Equipment at multiple toll zones, the Contractor shall procure, furnish, and install the interconnecting signal and power cables, and the necessary equipment racks and Equipment required for the multiple toll zones. The civil contractor is responsible for the provision of power and the raceway. The Contractor shall ensure that the lane performance is not degraded at locations where a single toll equipment building is utilized for multiple toll zones and that cable lengths are within manufacturer specifications.
291	The Contractor shall also review and Approve all aspects of the toll equipment building design drawings, power specifications, electrical and cabling design, circuit breaker and switches, and grounding design submitted by the civil designer and civil contractors that are related to the Cashless Tolling System Equipment.

292	The civil contractors will install the conduits between the toll equipment building and the demarcation point on the overhead structures/toll gantries as shown in *Attachment 6: Installation Demarcation Diagram*. The Contractor shall procure, furnish and install any conduit required from the demarcation point to the Equipment and between the various components on the overhead structures/toll gantries.
293	The Contractor shall procure, furnish, and install the cables necessary for terminating and connecting the Cashless Tolling System Equipment on the overhead structures/toll gantries to the electronics in the toll equipment building. Cable lengths shall include sufficient service loops to facilitate maintenance.
294	The Commission is responsible for the WAN communications and the Commission will furnish and install networking equipment at the toll equipment building and test the communications to the network at the PTC Data Centers. The Commission shall make available a number of ports, as specified during the Design phase, to the Contractor to allow access to the Commission network through the Commission administered firewall. The Contractor shall be responsible for all LAN communications related to the Cashless Tolling In-lane System and the Cashless Toll System outside the Commission firewall as shown in *Attachment 3b: PTC Communications Network Responsibilities*.
295	Each location will be allotted an IP v4 Class C range of addresses and all networking addressing will be coordinated with the Commission. LAN equipment shall be capable of supporting IPv6 addresses.

2.1.10.5 Roadway Pavement

296	During the Design phase the Contractor shall provide the in-pavement sensor requirements to the civil designers and civil contractors, if such sensors are to be used. Additionally, the Contractor shall review and approve the pavement Design, including roadway material to be utilized and construction methods to be used in the construction of the pavement.
297	The Contractor is responsible for the Design and installation of all elements of the Cashless Tolling System that embedded into the pavement.
298	The Contractor shall coordinate with the civil designer and civil contractors for the installation of the sensors in the lanes and identify the pull boxes and conduits. The location and Design of the pull boxes shall minimize the impact of Maintenance activities on the affected lane.

2.2 Cashless Toll Concentrator or Toll Host System *(Optional)* Functional Requirements

For this base Contract the existing PTC Toll Host will be the Host of record for traffic and financial reporting and a new Cashless Toll Host is not required but may be provided to meet the requirements of this scope of work. The provision of a Cashless Toll Concentrator or Toll Host System (if provided) shall meet the requirements set forth in this section. The Contractor has the option to use the Concentrator or Toll Host System to meet any specified functionality as long as the Design complies with the requirements of the Scope of Work.

The option of a fully functional Cashless Toll Host to replace the existing PTC Toll Host for reporting may be exercised by the PTC in the future as the open road cashless tolling systems is deployed throughout the entire system. Should the PTC exercise the option to implement a new full function Cashless Toll Host the additional requirements identified (if exercised) in section shall be met as applicable.

2.2.1 Cashless Toll Concentrator or Toll Host (if provided) System – General Requirements

299	The Contractor's central processing system architecture shall include a fully redundant highly available primary and secondary Cashless Toll Concentrator or Toll Host System that meets the functional and performance requirements of the Scope of Work and is accessible to Authorized Users of the Commission System network.
300	The functions of the Central Image Servers (if provided) and the MOMS shall be part of the Cashless Toll Concentrator or Toll Host System.
301	The cashless toll collection process shall be administered and controlled by the Cashless Toll Concentrator or Toll Host System provided by the Contractor.
302	The Contractor shall work with the Commission to procure, furnish, and install all servers, storage and communications Hardware needed to support the Software that meets the Commission Cashless Tolling System requirements. While choosing the Cashless Toll Concentrator or Toll Host System Hardware and third-party Software, the Contractor shall consider the staged implementation of the Cashless Tolling System in order to ensure the products are supported for the entire duration of the PTC Cashless Tolling Project.
303	The primary Cashless Toll Concentrator or Toll Host System shall be installed in the PTC Data Center, a different physical location in the vicinity of the PTC Data Center, or a privately hosted Cloud location Approved by the Commission. The secondary solution can be hosted anywhere within the contiguous United States or an Approved, privately hosted, Cloud location. All infrastructure required to support the servers, including but not limited to UPS, air conditioning, security and backup generators shall be the responsibility of the Contractor. The primary and secondary Cashless Toll Concentrator or Toll Host System configuration shall meet the Commission resiliency and Business Continuity plans.
304	The secondary Cashless Toll Concentrator or Toll Host System shall be configured as a "hot stand-by" in an active-active state to allow continuous operations in the event of a failure of the primary Cashless Toll Concentrator or Toll Host System.
305	The secondary Cashless Toll Concentrator or Toll Host System environment shall mirror the primary system in all Hardware and Software configurations, be kept up to date and be capable of performing all functions of the primary Cashless Toll Concentrator or Toll Host System as described in this Scope of Work.
306	All Hardware and third-party Software procured under this Scope of Work shall be confirmed to be the latest model or version at the time of purchase and shall be Approved by the Commission.

307	All servers and Hardware procured, furnished, and installed under this Contract shall have current anti-virus, firewall, spam protection and other security Software that protects from virus attacks and unauthorized access. All such third-party products shall meet the Commission IT security requirements described in *Attachment 7: PTC Cashless Tolling Security Standards*.
308	The System shall detect intrusion attempts and prevent all unauthorized access and intrusions at all levels and report such events to the MOMS. Any intrusion, compromise or breach must be reported to Commission IT Security with 12 hours of detection.
309	The Commission shall be notified in writing within 24 hours of the earliest indication or report of a breach or unintended disclosure of confidential information or a system that supports it. If requested by the Commission, or if required by law, the vendor shall notify in writing all persons affected by the incident, at its own cost and expense. The Commission shall have the right to view all incident response evidence, reports, communications, and related materials upon request.
310	Virus protection and other Software shall automatically obtain updates according to a recommended (configurable) Maintenance schedule and report such events to the MOMS.
311	Redundancy shall be built into the System to support high availability requirements defined in table II-2.
312	The Cashless Toll Concentrator or Toll Host System shall support the following general functions:
	• communicate with all the zone controllers in receiving transaction, alarm and other messages and transmitting TSLs, UIL and VEL (if exercised);
	• communicate with facility servers (if provided) in receiving transaction, alarm and other messages and transmitting TSLs, UIL and VEL (if exercised);
	• communicate with the applicable image server(s) for tracking and reconciliation image transmission and transfer status;
	• provide Dashboards to assist Maintenance and supervisory staff observation of transaction and event data in real-time, including reviewing DVAS image/video, images and data through these screens;
	• provide the capability to remotely operate the cashless tolling lanes through real time screens;
	• interface with the existing PTC Toll Host system to transmit transaction details and alarms;
	• interface with the existing CSC/VPC system to transmit transactions and receive TSL and VEL (if exercised);
	• perform Maintenance management functions of the System, including alarm notification and tracking, Equipment inventory, Maintenance history and other Maintenance related functions, incorporated into the MOMS;
	• provide an independent audit of successful receipt of all transactions from the zone controllers to the Cashless Toll Concentrator;
	• provide the capability transmit the toll rates/toll schedules to the zone controllers;

	• provide the capability to obtain employee information defined in the Design phase such as employee ID, role and access privileges from Active Directory and, if required, to transmit the UIL to the zone controllers;
	• provide various management reports that assess the operational performance of the System, and
	• provide transaction reconciliation reports as determined by the Commission during Design.

Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional system functions:

313	Provide the capability to import detailed and summarized data from the existing PTC Toll Host for historical reporting purposes.
314	Interface with SAP for the transmission of monthly toll transaction GL files and GL files received from the CSC.
315	Provide the capability to manage toll rate/toll schedule and transmit the toll rates/toll schedules to the zone controllers and the existing CSC/VPC system.
316	Interface with the existing CSC/VPC system to transmit transactions and toll rates and receive TSL and VEL (if exercised).

2.2.2 Cashless Toll Concentrator or Toll Host (if provided) System Hardware and Third-party Products

317	The Work under this section shall include all labor, materials, and support Services to complete the Design; fabrication; assembly; integration; packaging; delivery; testing, and Acceptance of the primary Cashless Toll Concentrator or Host System Hardware and third-party Software in accordance with the requirements of this Scope of Work.
318	The Commission shall have ownership of all Hardware, third-party Software and firmware procured, developed, furnished, and installed as part of the Cashless Toll Concentrator.
319	The Contractor is responsible for obtaining all required licenses in the name of the Commission. All licenses and media shall be provided to the Commission for all Hardware, third-party Software and firmware. The Contractor shall retain authorized copies (backups) for all Software media to use for periodic system Maintenance, upgrades, or restore, as required.
320	The Contractor shall furnish and install a complete, fully redundant, Cashless Toll Concentrator or Toll Host System Hardware configuration needed to support the redundancy and performance requirements of this Contract, including but not limited to:
	• multi-processors
	• dual, redundant, hot-swappable power supplies;

	• storage devices, and
	• storage devices, backup library.
321	The Cashless Toll Concentrator or Toll Host Hardware solution shall provide high-speed intra system network fabric between all storage, databases, servers, and backup systems.
322	The System Design and Implementation shall ensure the Cashless Tolling System continues to operate without data loss even if any unit of the server configuration fails.
323	All components, supplies, Software and materials furnished under this Contract shall be new, commercial off-the-shelf (COTS) and field proven, and in revenue operations for two (2) years.
324	The Cashless Toll Concentrator or Toll Host System server configuration, including all major Hardware elements, shall be of the latest design and incorporate standard commercial products currently in production.
325	All components procured, furnished, and installed by the Contractor should have the capability of sourcing from multiple Suppliers. The intent is to increase compatibility and reduce maintainability problems.
326	Proof of purchase in the form of dated invoice and shipping bills shall be retained and furnished to the Commission in accordance with the requirements of this Scope of Work and Contract for all hardware purchased by the Contractor.
327	The Cashless Toll Concentrator or Toll Host System Hardware shall have a minimum manufacturer warranty for five (5) years.
328	The Cashless Toll Concentrator or Toll Host System Hardware shall be supported for the duration of the Contract after the date of Operational and Acceptance Test Acceptance. During the life of the Contract the Contractor is responsible for ensuring the system is operational in accordance with the performance requirements.
329	The Contractor shall use proven server configurations that support future upgrades to processors, memory, storage, operating system, database, and other system components. All third-party Hardware and Software and Contractor Software shall be hardware neutral and shall perform without intervention on any hardware platform.
330	The System architecture shall have expansion capability to support a ten (10) year growth in traffic volumes in its installed Hardware which includes support of video tolling at the tolling points. For the purposes of calculation, an average E-ZPass penetration of seventy (70) percent and video transaction rate of thirty (30) percent, with ranges from 60-85% E-ZPass depending on locations throughout the system shall be assumed for the tolling point. The following traffic volumes are provided as projections for planning purposes only and subject to change. The projected Average Annual Daily Traffic (AADT) for the various tolling locations identified in this Scope of Work can be found in *Attachment 13 -Annual Traffic Volumes*.

331	The operating system for the Cashless Toll Concentrator or Toll Host System servers shall be a proven system used widely throughout the United States for intensive database operations and shall be compatible with the Relational Database Management System (RDBMS) and other tools employed.
332	The operating system for the Cashless Toll Concentrator or Host System servers shall be a multi-user, multi-tasking operating system.
333	The operating system shall support the redundant Cashless Toll Concentrator or Toll Host System server architecture and all peripherals defined in these specifications.
334	The operating system shall also support the proposed communications topology, redundant Cashless Toll Concentrator or Toll Host System configuration and Contractor's application Software.
335	The Contractor shall warranty the operating system for a minimum of five (5) years from the date of Operational and Acceptance Test Acceptance.
336	The operating system shall have a future upgrade path and shall be supported for the term of the Contract.
337	The Contractor shall provide and maintain supported versions of the operating system for the term of the Contract and all upgrades of the Cashless Tolling System operating system shall be the Contractor responsibility.
338	The Contractor shall keep all Software instances throughout all environments at the same configuration and patch level.
339	The Contractor shall provide a highly reliable and secure RDBMS for the storage of images, video, transaction data, violation data, audit data, and all other data, as applicable, for the retention period specified in the Scope of Work.
340	Contractor shall provide the latest version of the RDBMS that is field-proven to operate in a transaction intensive environment and shall meet the standards as defined in *Attachment 11: Database Standards for the Pennsylvania Turnpike Commission*, where applicable.
341	The RDBMS shall be compatible with the operating system and application Software, and shall support the redundant Cashless Toll Concentrator or Toll Host System server architecture and shall meet the standards as defined in *Attachment 11: Database Standards for the Pennsylvania Turnpike Commission*, where applicable.
342	The RDBMS shall have an upgrade path and shall support upgrades to operating system, application, memory, processors, and other components.
343	The RDBMS shall have Maintenance and Upgrade Services for the term of the Contract.
344	The Contractor shall provide and maintain supported versions of the RDBMS for the term of the Contract and shall be responsible for upgrading the Cashless Tolling System RDBMS to the latest supported version.

2.2.2.1 Central Image Server (Optional)

The provision for a central image server is optional; however, Contractor's image processing solution shall meet the functional and performance requirements of the Scope of Work. The Design shall support latency in the transfer of images to the existing CSC/VPC system and prevent loss of images and video transactions if there are communications or server issues. If the Contractor's solution includes the provision for a central image server, then the central image server shall be located at a Commission Approved location.

345	The image processing solution shall support, but not be limited to the following general functions:
	• communicate with all the in-lane LPICPS for the transmission, tracking, reconciliation and processing of all vehicle images and video transactions;
	• communicate with facility servers (if provided) for the transmission, tracking, reconciliation and processing of all vehicle images and video transactions;
	• interface with Cashless Toll Concentrator or Toll Host System for the processing and reconciliation of all vehicles images and video transactions;
	• interface with existing CSC/VPC system for the processing and reconciliation of all vehicles images and video transactions;
	• support the transfer of images and video transaction to the existing CSC/VPC system without loss of any image or video transaction, and
	• provide reconciliation reports as determined by the Commission during Design.

2.2.2.2 System and Data Backup

346	During the installation of the Cashless Toll Concentrator or Toll Host servers, the Contractor shall create an image of the completed server configurations, as well as maintain regular local and remote backups. If there is a catastrophic failure that results in the loss of data, means shall be provided to reconfigure the servers without disruption to Cashless Toll Concentrator or Toll Host System operations.

Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional system backup functions:

347	The Cashless Toll Host System shall include data backup software and hardware that allows remote incremental and full back up of data without manual intervention. Events from the backup software and status notifications from the backup process shall be reported to the MOMS.
348	The backup software shall be capable of displaying the backup data in a user-friendly and readable form as defined during the Design phase.
349	The Contractor shall provide a solution for data backup storage locally and off-site.

2.2.2.3 Archive and Purge Control Mechanisms

350	Provide the capability for fully automated and configurable data purging in accordance with the Commission's data retention requirements as defined in *Attachment 8A: PTC Records Management Manual, Attachment 8B: PTC Records Retention Schedule* and during the Design phase.
351	Purge routines shall be configurable for each impacted data elements, including but not limited to:
	• transaction data;
	• System logs;
	• MOMS data, and
	• interface files.
352	Servers shall retain transaction and summarized data, images, MOMS data and system logs, in accordance with the retention procedures, including but not limited to:
	• Cashless toll transactions shall be retained online for a minimum of twenty four (24) months and then purged;
	• compressed images associated with class mismatch transactions shall be retained online for a minimum of ninety (90) days
	• video transactions and images (compressed video transaction image and region of interest {if implemented}) online for a minimum of one (1) year;
	• DVAS video shall be retained online in accordance with the requirements of this Scope of Work;
	• system logs shall be retained online on the System for at least one (1) year and then purged;
	• All security logs shall be retained online for at least one (1) year and then purged;
	• MOMS detailed data shall be retained online for a minimum duration to ensure MTBF requirements are being met or at least twenty-four (24) months, whichever is greater;
	• MOMS summary data shall be retained online for the term of the Contract, and
	• all other data shall be retained on the System for ninety (90) days and then purged.
353	Status and other events from the archival process shall be reported to the MOMS. No transactions shall be deleted unless confirmed to be successfully transmitted to the existing PTC systems (PTC Toll Host and CSC/VPC).
354	Authorized Users shall be able to report on restored data.

Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional archive and purge functions:

355	Archive toll collection related data shall be retained for the life of the Contract with archived data transferred to the PTC at completion of the Contract. Details of archiving methods and handover process to be detailed in Design phase;
356	summarized data shall be retained online for the term of the Contract;

357	compressed images associated with class mismatch transactions shall be retained online for a minimum of ninety (90) days and then archived and purged;
358	video transactions and images (compressed video transaction image and region of interest {if implemented}) online for a minimum of six (6) months and then archived and purged.
359	Storage shall be sized to accommodate all data to be retained online as specified in this Scope of Work and for the restoration of selected archived data (two months minimum).

2.2.2.4 Maintenance Access and Application Access

360	The Cashless Toll Concentrator or Toll Host Systems applications shall run on existing workstations and laptops and Commission Authorized Users shall use their workstations/laptops to access the System. The Contractor is not required to procure, furnish, and install Commission workstations/laptops as part of the Cashless Toll Concentrator or Toll Host System.

2.2.2.5 Maintenance Access

361	The Contractor shall procure, furnish, and install the required laptops, keyboards, video monitors, mouse(s), and KVM switches at the In-lane and Cashless Toll Concentrator or Toll Host Systems locations to allow the Contractor technical staff to access all servers, controllers, computers, and devices in order to perform diagnostics and other Maintenance activities.
362	All maintenance hardware and software installed on the In-lane and Concentrator or Toll Host Systems shall comply with Commission security requirements defined in *Attachment 7: PTC Cashless Tolling Security Standards*.

2.2.2.6 Commission Access

363	Any Commission authorized workstation/laptop connected to the Commission System network shall be able to access to the System application.

2.2.2.7 Printers

364	The Commission shall have the ability to print to any printer connected to the Commission System network. The Contractor is not required to procure, furnish, and install any printers for the Commission as part of the Cashless Toll System.

2.2.2.8 Communications Equipment

365	The LAN within a toll equipment building shall be connected by CAT6 (or higher) cabling and the LAN between Site toll equipment buildings shall be fiber. The WAN connectivity between the toll equipment buildings at each Cashless Toll Site and PTC Data Centers shall be provided by others. The Contractor shall be responsible for providing and obtaining the connectivity from any primary or secondary Cashless Toll Concentrator or Toll Host (if provided) locations to the PTC Data Center.

366	The Cashless System at the toll zones shall be connected and communicate to the primary and secondary Cashless Toll Concentrator or Toll Host (if provided) System and the existing CSC/VPC system.
367	The Contractor shall procure, furnish and install all required Tier 1 communication Equipment at the toll equipment building to support the Cashless System LAN. All LAN communications Equipment procured, furnished, and installed under this Contract shall be able to communicate with the Commission firewall and router.
368	The Commission is responsible for providing a WAN demarcation point (Ethernet hand off) at each Cashless Toll Site. The Contractor shall work with Commission IT staff to make the necessary connections and validate the connectivity between the Cashless Toll Site Systems and the Cashless Toll Concentrator or Toll Host (if provided) Systems. The LAN equipment at a Cashless Toll Site, its configuration, and the connection of the LAN equipment to the WAN demarcation point as shown in *Attachment 3b: PTC Communications Network Responsibilities* shall be the responsibility of the Contractor. Network addressing and connectivity will be coordinated with Commission IT staff.
369	The Commission is responsible for providing a demarcation point (Ethernet hand off) in the Commission's Data Center to the primary Cashless Toll Concentrator or Toll Host (if provided) System site. The Contractor shall work with Commission IT staff to make the necessary connections and validate the connectivity between the PTC Data Center and the Cashless Toll Concentrator or Toll Host System site. The LAN equipment at the primary Cashless Toll Concentrator or Toll Host System site, its configuration, and connection to the demarcation point as shown in *Attachment 3b: PTC Communications Network Responsibilities* shall be the responsibility of the Contractor. Network addressing and connectivity will be coordinated with Commission IT staff.
370	The Contractor may install the secondary Cashless Toll Concentrator or Toll Host Systems at a Contractor location within the contiguous states of the United States as Approved by the Commission. The secondary Cashless Toll Concentrator or Toll Host System can be housed in a Commission Approved privately hosted Cloud site. The Contractor is responsible for securing the connectivity from such secondary location to the PTC Data Center. If a cloud environment is desired, the Contractor must work with the Commission to determine appropriate architecture and security measures.
371	The Contractor shall work with the Commission in designing the interfaces between the Cashless Toll Concentrator or Toll Host (if provided) System, the existing CSC/VPC system, the existing PTC Toll Host system.
372	The Contractor shall work with PTC in designing the interfaces between the In-Lane Systems, the existing PTC Toll Host and the existing CSC/VPC system.
373	The Contractor shall be responsible to procure and establish any public Internet domains and/or services to provide connectivity between the Toll lanes, Toll Zone Plaza servers and the Cashless Toll Host outside the PTC firewall and the user workstations inside the PTC firewall. Public domain names procured for the Cashless Tolling project shall be approved by the PTC.

374	Network monitoring Software shall be procured, furnished, and installed on the MOMS server to monitor the System LAN status and communications, including the connections to the existing PTC Toll Host system, the In-lane Systems, and the CSC/VPC system. All network alarms shall be reported to the MOMS.
375	If communications to any element of the Cashless Tolling System is degraded or down an alarm shall be generated and reported to the MOMS.

2.2.3 Cashless Toll Concentrator or Toll Host System Software (if provided)

The Cashless Toll Concentrator or Toll Host System Software (if provided) shall support the functionality detailed in this section and shall meet the Commission operational requirements set forth in this Scope of Work and Contract for the Term of the Contract.

2.2.3.1 Data Communications and Interface Requirements

376	All transactions, images and messages transferred between all subsystems shall be guaranteed and have the required data validation protocols to confirm the accuracy and validity of data transfer.
377	The Cashless Toll Concentrator or Toll Host System shall support the interfaces specified in this Scope of Work including, but not limited to:
	• Interface to the zone controllers: If the Contractor's solution does not include a facility server, the Cashless Toll Concentrator or Toll Host System shall receive and store all the messages from the zone controllers in real-time. It shall transmit all data required by the zone controllers to support its operation, including the UIL and TSL. All data sent to and received from each zone controller and the Cashless Toll Concentrator or Toll Host System shall be acknowledged and confirmed.
	• the VEL shall be transmitted from the Cashless Toll Concentrator or Toll Host System to the In-lane System to support on-site enforcement (if exercised).
	• Interface to the facility servers (if provided): If the Contractor's solution includes a facility server, the Cashless Toll Concentrator or Toll Host System shall have the capability to transmit all data to and receive data from the facility servers as required in this Scope of Work to support lane operations. All data sent to and received from each facility server at the Cashless Toll Concentrator or Toll Host System shall be acknowledged and confirmed.
	• Interface to the existing PTC Toll Host system: The Cashless Toll Concentrator or Toll Host System shall have the capability to transmit detailed transactions and alarms to the existing PTC Toll Host system in batch mode (at configurable intervals/transactions) in accordance with the Approved ICD developed during the Design phase interface workshops described in Section 5.3.3.
	• Interface to the existing CSC/VPC system: The Cashless Toll Concentrator or Toll Host System shall have the capability to transmit Video transactions and images to the existing CSC/VPC system in real time and in batch mode (at configurable intervals/transactions) in accordance with the Approved ICD developed during the Deisgn phase interface workshops described in Section 5.3.3.
	• Interface to the image server(s): The Cashless Toll Concentrator or Toll Host System shall track and reconcile image transmission and transfer status.

	• Interface to the MOMS: The Cashless Toll Concentrator or Toll Host System shall interface with the MOMS to transmit alarms and Cashless Toll Concentrator or Toll Host System operational status including recovery messages.
	• Interface between the MOMS and the current Commission diagnostic monitoring system, based on the Approved ICD developed during the Design phase interface workshops described in Section 5.5.3.
378	The Cashless Toll Concentrator or Toll Host System shall receive a comprehensive TSL from the existing CSC/VPC system once a day and incremental TSL/updates not more frequently than every sixty (60) minutes (configurable).
379	The Cashless Toll Concentrator or Toll Host System. shall have the ability to receive toll rate files from the existing PTC Toll Host.
380	Interface to SAP: The Cashless Toll Host System (if exercised) shall transmit monthly toll transaction, account, and other GL files received from the CSC/VPC system. Interface to SAP shall be further defined during the Design phase.

2.2.3.2 Version Tracking Requirements

381	The Cashless Toll Concentrator or Toll Host System shall maintain records of the last 20 versions of the TSL, toll rates, VEL (if exercised), UIL, and lane configuration files that it received and/or created and that were successfully downloaded to the lanes. Receipt of files from the existing CSC/VPC system, their version, time of receipt and processing status shall also be tracked.
382	Reports and screens shall be made available to verify the versions and the file download status. Failure in the transmission of any data to a lane shall result in a failure message being logged and reported to the MOMS.
383	The system shall provide the capability to track the versions of lane executable programs installed at each toll zone location.

2.2.3.3 Transaction Audit and Verification

384	The Cashless Tolling System shall have the capability to perform an independent audit that confirms all vehicles traveling through a toll zone are detected, as well as an automatic audit and verification process that confirms all vehicles traveling through the toll lane are reported as transactions; all transaction transmissions between the zone controller and Cashless Toll Concentrator or Toll Host System are successful. The System shall have screens and reports to validate the audit trail.
385	If the validation process fails for any reason, failure messages shall be created and reported to the MOMS. If the audit process determines that vehicles or transactions are missing, the missing information shall be identified and reported to the MOMS.
386	If the audit process is successful then the audit for the location for the Revenue Day shall be deemed "complete" and System shall track this status of the audit on reports.

387	Once the Revenue Day is "complete" the data reported for that day should not change. Any condition for example toll waiving that result in changes to the data shall be identified and Authorized Users alerted.

2.2.3.4 Data Summarization

388	During the Design process and based on Commission Business Rules and reporting requirements, the system shall perform data summarization.

2.2.3.5 Diagnostics

389	The Cashless Toll Concentrator or Toll Host System shall provide self-diagnosis functions to detect and report on the status and functioning of the Cashless Toll Concentrator or Toll Host System Hardware devices; third party Software; communications; processes; tasks, and Software applications, as defined in the Commission Approved Design Document.
390	All Hardware and Software failures detected shall be reported to the MOMS.

2.2.3.6 Data Security

391	The Contractor shall ensure that any transactional data records, once entered into the System, cannot be deleted or changed.
392	Data records and files shall only be appended to and not edited or deleted as determined by the Commission during the Design phase.
393	All System access/entry, logins, and modifications (for example, flagging actions) shall be recorded and unauthorized access shall be prevented, logged and reported to Commission IT Security within 12 hours of detection.

2.2.3.7 Transaction Pre-processing

394	The Cashless Toll Concentrator or Toll Host System shall ensure all transactions transmitted to the existing PTC Toll Host and existing CSC/VPC system comply with the ICD specifications and Commission Business Rules.
395	The Cashless Toll Concentrator shall identify exceptions, anomalies and other conditions determined during the Design phase in the event they have not been filtered at the zone controller, for example, same transponder read within configurable conditions.
396	In scenarios where multiple transponders with valid status are reported, all transponders can be transmitted to the existing CSC/VPC system via the existing PTC Toll Host and the existing CSC/VPC will post the transaction in accordance with Commission Business Rules.
397	Alarm messages shall be created and reported to the MOMS in the event such exceptions identified in this section exceed a configurable threshold.

Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional transaction pre-processing functions:

398	The Cashless Toll Host System shall pre-process all transactions in accordance with the Approved Business Rules in order to filter incorrect transactions that may result from Equipment failures and lane logic issues.
399	Transactions that should not be processed further at the PTC Host and existing CSC/VPC system shall be identified and flagged prior to transmission and then transmitted to the PTC Host and existing CSC/VPC system as defined during the Design phase.
400	In cases where there is a Transponder read data and a video transaction created for a vehicle (in case of Buffered Transponder Reads or lane logic issues) the Cashless Toll Host System shall identify the transaction that needs to be terminated based upon configurable parameters Approved during the Design phase. In case of Buffered Transponder Read transactions, the Transponder read time shall be used as the transaction time.
401	Based on the results of the pre-processing, an Exception List shall be generated and transmitted to the PTC Host and existing CSC/VPC system in accordance with the Approved ICD that identifies video transactions that needs to be terminated at the existing CSC/VPC system and further processing on these transactions stopped.

2.2.4 Cashless Toll Concentrator or Toll Host (if provided) System Application Software

402	The Contractor shall develop, furnish, and install a single, role-based, GUI application Software for the Cashless System that supports all user functions for the Cashless Toll Concentrator or Toll Host System, including the MOMS and DVAS.
403	Based on the user's access privileges obtained from Active Directory the appropriate menus, screens, tabs, reports and other system functionality shall be made available.
404	Changes to the System data and parameters shall be through screens and only Authorized Users shall have access to these screens.
405	All access to the application and changes to the data shall be recorded and tracked, and the System shall provide an audit trail for all data modifications and parameter changes.
406	Authorized Users shall have access to the data modifications and parameter changes initiated by users.

2.2.4.1 Graphical User Interface (GUI) Requirements

The GUI design must include accepted industry design standards for ease of readability, understanding and appropriate use of menu-driven operations, user customization and intuitive operation.

407	The Contractor shall meet all Commission IT Security standards and practices in the design of the GUI for the Cashless Toll Concentrator or Toll Host application.
408	All components of the client GUI, including but not limited to browsers, Java, Adobe Flash Player, etc., shall be able to be patched/updated to the latest security level recommended by the component's manufacturer.

409	The GUI design and development shall incorporate human factors and usability engineering and be optimized for speed, as well as provide the following controls, including but not limited to:
	• menus (such as pull down, popup, cascading, leveling, etc.);
	• windows (allowing for multiple windows within the application, such as to navigate back without having to re-enter information)
	• informational messages;
	• positive feedback;
	• exception handling and error dialogs, including logging the error;
	• control icons, links and action buttons;
	• data entry fields, combo boxes, check boxes;
	• display (read-only) fields, and
	• general and context-specific help menus.
410	Data entry screens shall have configurable mandatory fields that require data entry prior to continuing through the process.
411	Provide field-level validation (server-side enforced) and format verification upon exiting data fields applicable to pre-defined formats or standards, including but not limited to:
	• alpha-numeric;
	• date;
	• time;
	• special characters;
	• length;
	• lane and plaza ID, and
	• Transponder numbers.
412	Provide other formatting masks (server-side enforced) as configured by the System administrator (visible to certain users but masked for other users), which can be applied to any other field in the GUI.
413	Provide field-level “tooltips” or other interactive help, Configurable by the System administrator, that provide specific guidance on any field presented, including but not limited to:
	• alpha-numeric fields;
	• date fields;
	• time fields;
	• special characters;
	• username and password;
	• length restrictions;
	• lane and plaza ID, and

	• Transponder fields.
414	Online help shall be provided for each screen, each editable field and each selectable option within each screen.

2.2.4.2 Screens and Report Access

415	Provide the capability to assign users access privileges to System reports based on user level/role, as determined by the Commission during the Design phase, to the Cashless Tolling System application.
416	Provide the capability to assign read-only rights to roles so that users belonging to that role will not be allowed to enter any data.
417	Provide the capability for Authorized Users to maintain roles and permission access to the System.

2.2.4.3 Cashless Tolling System Screens and Reports

418	All data entered or generated in the System shall be retrievable (on-demand and scheduled) through reports and screens.
419	Reports menu shall be organized by category of reports and shall be intuitive to users and easily accessible based on user access.
420	Data shall be summarized to improve report generation performance and to track changes in data for as-of-date reporting.
421	Reports and screens available through the System shall have various selection, group by, and sort criteria, and shall be easily configurable.
422	The location selection criteria shall include but not be limited to District, Highway, tolling point, lane, and direction of travel to be defined during the Design phase.
423	Provide the capability to generate the same report by hour, day, date range, weekly, monthly, quarterly, yearly (fiscal and calendar), year-to-date and comparative.
424	Provide the capability to present report data as an accumulation or individually for the selected criteria. This capability shall be configurable and applicable to District, Highway, Cashless Toll Plaza, and different transaction types whereby the user can choose the data to be presented as an accumulation of, for example grouped by all Cashless Toll Plazas and/or payment types or as individual Cashless Toll Plazas and/or payment types.
425	Reports developed shall allow the Commission to audit and reconcile data transmitted between various subsystems within the Cashless Tolling System, and with the existing PTC Toll Host system and existing CSC/VPC system in accordance with this Scope of Work.
426	All reports shall show the status of the validation/audit process, as defined by the Commission and other relevant statuses that indicate items, including but not limited to whether:
	• all data has been obtained from the lanes;
	• the data has been re-summarized;
	• the transactions have been transmitted to the existing PTC Toll Host and existing CSC/VPC system, and
	• the report is complete.

427	The time of the last transaction processed shall be included in all applicable reports to assist with the reconciliation and audit.
428	All reports shall include individual totals, sub-totals, and grand-totals as appropriate.
429	Reports shall have the capability to select the date type, including but not limited to:
	• revenue date;
	• transmission date;
	• as-of date;
	• process date;
	• transaction date, or
	• a combination thereof, as designated by the Commission.
430	Reports shall use conditional formatting to identify exceptions and data that are outside the normal trend.
431	Provide reporting output in various formats (both compressed and uncompressed), including but not limited to:
	• Portable Document Format (PDF);
	• plain text format (TXT);
	• rich text format (RTF);
	• Microsoft Excel (2010 version and later);
	• delimiter-separated values;
	• hypertext markup language (HTML), and
	• extensible markup language (XML).
432	A report generation feature shall be available for configuration and shall permit Authorized Users to request selected reports for auto delivery by email or to a designated server according to a routine or custom interval, such as the start of the Business Day or at other appropriate times as designated or requested by the user as determined in the Design phase.
433	Data from summary reports scheduled to run daily shall be automatically exported daily to a specified file format and made available on the Commission designated server as defined during the Design phase.
434	Capability shall be provided to drill down all high-level reports to the next level of detail and to event level details as required as defined in the Design phase.
435	Authorized Users shall have the capability to display and review the LPICPS images and DVAS video and event details associated with the selected transaction from the drilled down details.
436	Authorized Users shall have the capability to view the contents of files that are received by the Cashless Toll Concentrator or Toll Host System (if provided) and transmitted by the Cashless Toll Concentrator or Toll Host System in a readable format. If files are compressed or encrypted, the necessary Software tools shall be provided to view their contents. If the user selects a specific file, the contents of the file shall be displayed and the user shall have the ability to save the contents at minimum as a .csv file, xml, txt and in a useable Excel format as Approved.

437	Capability shall be provided to present data in graph forms and chart types and the user shall be able to select presentation form from a variety of graphic styles.
438	Data shall be organized and summarized in a manner to allow for report generation within no more than two (2) seconds for daily reports, and no more than twenty (20) seconds for monthly and annual reports, of a report generation request.
439	The Contractor shall support the creation of additional reports and/or the modification of implemented reports, as needed after the initial deployment and Implementation of the System. It is anticipated that no more than one hundred (100) additional reports will be required for the term of the Contract.

Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional screen and report functions:

440	Provide ad-hoc reporting tool capabilities to Authorized Users to allow the creation and execution of custom reports, including but not limited to: • drag-and-drop field functionality; • drill down functionality; • filtering; • parameter prompting; • formula support; • grouping; • sorting, and • stored procedure and function support.
441	The ad-hoc reporting tool shall be COTS software and be the latest version at the time of Acceptance testing and field-proven to operate in a transaction intensive environment.
442	The ad-hoc software shall be compatible with operating system standards and shall be patched and upgradeable to new versions of the Software and operating system.
443	Ad-hoc report templates created by Authorized Users shall be saved and made available to all Authorized Users.
444	Once the audit process is completed and Revenue Day is closed, the data on reports for the day shall not change unless data is re-summarized.

2.2.4.4 Cashless Tolling Reports

445	The Cashless Tolling System shall provide reports to audit and reconcile the System, provide traffic trends and validate System performance.
446	Report Designs and templates shall be presented by the Contractor and reviewed by the Commission during the Design phase and Approved.

Transaction Reports

447	Transaction Summary Reports: These reports show daily, weekly, monthly, quarterly, yearly, and comparative transaction, by vehicle class and payment type. Transaction reports shall be summarized and detailed. The summary data shall drill down to the Transaction Detail Report.
448	Transaction Detail Report: The transaction details shall be provided in this report including lane status, equipment status, transaction status and various lane flags. Users shall be able to access the bit descriptions in all cases where information is coded. The report shall be used to investigate discrepancies and issues.
449	Class Report: This report shows information related to traffic by vehicle class by transaction types, for example E-ZPass, Video and Non-Revenue This report is used by management and operations to report on traffic by vehicle class.

Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional functions and transaction and revenue reports:

450	Accounting Revenue and Associate Traffic Report: This report shows accounting revenue and traffic counts by Revenue Dates for the vehicle class categories.
451	Executive Summary Traffic and Revenue Report: This report shows daily traffic counts and revenue amounts by revenue category, for example E-ZPass and Video by vehicle class category, grouped by shift, selected day totals, previous day totals, percentage of increase/decrease and month to selected day totals. This report is used to show the increase and/or decrease in traffic counts and revenue compared to the previous days' totals using the breakdown by revenue types. Data in this report shall also be represented graphically to include selected day traffic and revenue statistics; daily revenue and traffic comparisons by vehicle class and revenue type including selected day; previous day; month to selected day average and prior week day. Backup of the summary data by District and tolling point shall be included.
452	Finance Traffic and Revenue Details Report: This report shows traffic and revenue counts by tolling point and is grouped by vehicle class categories for the specified highway(s) selected. This report provides operations and management with traffic and revenue totals for each tolling point by vehicle class categories for a specified date range.
453	Traffic and Revenue Report: This report shows transaction by transaction type, for example E-ZPass, Video and Non-Revenue for tolling points in each District for the selected highway(s). The data is grouped by vehicle class categories and tolling point. A summary is provided at the end of the report by vehicle class category and transaction type.
454	Traffic and Revenue Comparison Report: This report shall provide a comparison of current year monthly traffic and revenue data with the previous year with percentage increase/decrease and includes selected highway(s) by district and tolling point. Similar to the traffic and revenue report above, the report includes a breakdown by vehicle class category. The report is further divided into sub-groups by revenue category, for example E-ZPass and Video.

Traffic Reports

455	Average Lane Throughput Report: This report shall display hourly traffic volumes for each lane grouped for each tolling point within the selected District. Hourly traffic volumes shall be totaled by lane for the day for each tolling point to calculate the average lane throughput at each tolling point.
456	Counts and Percentages Report: This report shall display vehicle counts and percentages of each count grouped by vehicle class category and vehicle class for each revenue category for example E-ZPass and Video for each tolling point. This is a daily report and is grouped by tolling point for the selected highway(s) and district. This report shall drill down to the Counts and Percentages by Direction Report.
457	Counts and Percentages by Direction Report: This report shall display vehicle counts and percentages of each count grouped by vehicle class category and vehicle class for each revenue category for example E-ZPass and Video for each tolling point. This is a daily report and is grouped by tolling point and direction for the selected highway(s) and district.
458	Lane Traffic Counts and Statistics Reports: This report shall provide AM and PM traffic counts and statistics by hour for each Highway and tolling point by revenue category for example E-ZPass and Video. The report shall also include AM and PM peak hour statistics and provide a grand total by revenue category for all peak hour. The total percentage of E-ZPass transactions with the AM/PM breakdown and identification on the E-ZPass high hour and lane shall be included.
459	Plaza By Lane Report: This report shows traffic counts by lane for each tolling point by vehicle class categories and vehicle classes. This report includes the summary by tolling point for the selected District. This report is used by operations staff in analyzing traffic volumes by lane and vehicle class.
460	Speed Reports: This report shows the traffic count information per lane by speed segments. This report is used by operations staff to monitor traffic flows and speeds.
461	Traffic Counts Report: This report shows traffic count information grouped by revenue category for example E-ZPass and Video with breakdown by transaction types and sub-totaled by tolling point and vehicle class categories. The combined counts include a breakdown by revenue and nonrevenue transactions. This report shall drill down to the Traffic Counts by Direction Report.
462	Traffic Counts by Direction Report: This report shows traffic count information grouped by c revenue category for example E-ZPass and Video with breakdown by transaction types and sub-totaled by tolling point, direction and vehicle class categories. The combined counts include a breakdown by revenue and nonrevenue transactions.
463	Vehicle Count Through Closed Lanes Report: This report shall display tolling point, lane and detailed transaction information for vehicles that travel through a closed lane based on the date range, tolling point and lane.
464	Vehicles and Mileage Report: This report shows traffic counts for all vehicle classes in addition to vehicle class category for each revenue category between tolling points and total distance traveled for the selected criteria. The report includes a summary page with traffic between tolling points and total miles traveled. Each summary shall be grouped by vehicle class category and revenue category, for example E-ZPass and Video.

Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional functions and traffic reports:

465	Finance Traffic Details Report: This report shall display traffic counts grouped by tolling point and vehicle class category and include grand totals for each vehicle class category
466	Market Penetration Report: This report shows traffic counts by revenue category, for example E-ZPass and Video for AM/PM peak hours and includes the E-ZPass penetration percentage.

<u>System Audit Reports</u>

467	Transaction Audit Report: This report shows the status of the transaction transmission from the zone controllers to the cashless tolling concentrator, the audit status, the failed transactions, duplicate transactions, all exceptions, and missing transaction sequence numbers at each of the tolling points. The communication status between the zone controllers to all of the subsystems shall be displayed. The report shall also include the date the transactions were received at the Cashless Toll Concentrator and the days lagging. It also shows the transmission status of the transactions to the existing PTC Toll Host system with the date/time of the transmission was completed.
468	System Audit Trail Reports: Weekly and monthly reports shall be made available that show the modifications made by the users to system parameters and ability shall be provided to obtain the details of the modifications.
469	System Exceptions Report: The System Exceptions report shall display transactions that are considered exceptions, including but not limited to duplicate transactions; dual transponders; Cashless Toll Concentrator filtered transactions and non-interoperable transponder reads. Exception handling errors and the disposition of these exceptions shall also be displayed along with the transaction.
470	Image Reconciliation Report: The Image Reconciliation report shall provide the ability to match transactions by type to images and to help identify missing images. These reports shall not only reconcile the actual images saved to what was expected but also verify that the images were successfully transmitted from the lanes to the image server(s) and on to the CSC/VPC system. Data on this report shall match other transactions summary reports. This report shall drill down to the Image Reconciliation Detail Report.
471	Image Reconciliation Detail Report: This operational report list the information on the video transaction for a user defined transaction date/time range. Capability shall be provided to show only records where an image is expected and if the image is expected if the image has arrived yet. The report also shows the transmission status of the images to the CSC/VPC system.
472	Transactions Reconciliation Reports: Yearly, quarterly, monthly, weekly, and daily reports that show AVI and video transaction transmission reconciliation for all of the tolling points. These reports shall validate that all of the AVI and video transactions received from the lanes were posted to the Cashless Toll Concentrator System and transmitted to the existing PTC Toll Host system. Reports shall be available by transaction day and transmit day, and transmit day reports shall show the files transmitted and acknowledged by the receiving system.
473	Hardware Status Report: This report shows the hardware status codes and descriptions based on the selected date range, Highway, District, Plaza, Lane and type of hardware failure. This report allows maintenance staff to audit the state of all hardware components in the lanes.

474	Transaction Number Gap Report: This report shall provide information on gaps in transaction numbers based on tolling point and lane for the specified date range.
475	Unusual Occurrence Report: This report shall be used to provide operations and maintenance staff with information regarding unusual occurrences with lane data to identify potential hardware issues, software issues or other system anomalies. The report shall include the Highway(s), and tolling point and may be filtered by unusual occurrence (UO) code. This report includes lane number, transactions date and time, lane status transaction number and a description of the UO.
476	Lane Operations Report: This operational report lists and summarizes vehicle transactions and equipment messages that are generated in the lanes. This report is an audit tool that presents all lane activity for a specified location and desired transaction date and time period. Numerous selection and filter criteria shall be provided to help identify problems. Detailed information regarding the transaction and event shall be included.
477	Transponder Audit Report: This report verifies that transponders are properly read at each cashless tolling location

Performance Reports

478	Transponder Status List Transmission Report: The TSL Transmission report shows the status of the TSL transmissions to the Cashless Toll Concentrator or Toll Host System and to all of the zone controllers. Summary information related to the number of transponders, time acknowledged by the zone controller and other data shall be provided to verify results and performance requirements. Time of receipt from the existing CSC/VPC system, time of transmission to the zone controllers and the status of the transmission shall be displayed. Lanes not compliant to the requirements shall be identified.
479	Image Transmission Summary Report: This operational report counts the number of images created in the lanes for a user defined image created date range and other criteria. Data displayed include the number of triggered, non-triggered and total images from the lanes and the date the images were received at the image server(s). For each received date, the total images, number of lag days, the percentage of transactions received each day and a cumulative percentage shall be included.
480	Image Transmission Detail Report: This operational report lists information on images from the lanes for a user defined lane created date. Capability shall be included to show image records where it took longer than a user defined number of hours for the image to arrive at the image server(s).
481	File Transfer Performance: This operational report lists files that have been created and sent from the Cashless Toll Concentrator or Toll Host System by component for either the created date range or sent date range selected by the user. Information displayed include, file information, created date and time, sent date and time and process time. This report verifies System compliance to performance requirements. File/data transmissions to the lanes shall include confirmation of successful delivery at each lane.
482	OCR/ALPR Performance Report (if the option to implement OCR/ALPR is exercised): The OCR/ALPR Performance Report shall display OCR/ALPR performance statistics by jurisdiction. Problematic cashless tolling lanes, Plazas and jurisdictions shall be identified. The report shall include a breakdown of the OCR/ALPR performance by confidence levels.

2.2.4.5 Cashless Tolling Dashboards

483	The Contractor shall provide Dashboards developed during the Design phase to monitor the Cashless Tolling System. The Dashboards shall include but not be limited to real-time monitoring of tolling point traffic, maintenance data and system performance monitoring.
484	The Contractor shall provide the capability for Authorized Users to monitor the real-time activity at all tolling points in a pictorial and Dashboard view. There shall be an overview representation of all the highways from which individual highways can be accessed.
485	The Contractor shall provide Authorized Users the capability to view real time DVAS video and also playback recorded video via the Dashboard. The event data pertaining to the vehicle in the video shall be displayed on the video.
486	Authorized Users shall have access to the detailed data directly from the pictorial and Dashboard view.
487	Authorized Users shall have the capability to drill down to each lane to review and monitor detailed events as they occur for each transaction.
488	Authorized Users shall be able to easily maneuver through screens and view data, and different colors and pictures shall be used to bring critical events to the user's attention.
489	Summary data by payment type for all Commission toll facilities and by tolling point shall be displayed and users shall have the ability to drill down to the details. If a specific tolling point is selected, transaction and event level data by lane shall be made available and users shall have the ability to view the DVAS real-time video and video transaction images through this screen.
490	All priority 1 alarms shall be displayed in color and shall be audible to direct attention to the failure.
491	Authorized Users shall be able to easily identify problems (traffic or Equipment) on the cashless tolling lanes and initiate MOMS work order from this interface.
492	In addition, the Dashboard shall provide detailed real-time information about the AVI system performance (including handshakes by protocol), the AVC system performance, and the LPICPS performance to assist in diagnosing and investigating problems. Data pertinent to traffic monitoring and Maintenance shall be displayed in real-time.

2.2.4.6 Remote Operations

493	The System shall provide the ability to allow Authorized Users to remotely operate the cashless tolling lanes to support the Commission operations, including but not limited to:
	• remote update of security patches and Software updates;
	• download TSL, VEL (if exercised), and any files required to selected zone controllers when there are issues, and
	• restart a specific zone controller node.

2.2.4.7 User Setup and Maintenance Screen

User setup and maintenance is a critical task since the employee access levels/roles created through the System determines what privileges and access rights each employee is granted.

494	Access to the zone controllers and Cashless Toll Concentrator or Toll Host System including the MOMS and DVAS functions shall be controlled through the user setup interface.
495	The user list shall be obtained from the Commission Active Directory maintained by Commission IT or from an Approved source at regular intervals as defined during the Design phase.
496	An operations Alert shall be generated each time a new user is detected so that their user roles can added and access to the System defined.
497	Authorized Users shall have the capability to also create new users through the System.
498	Through a user setup and maintenance screen, the users shall be designated various access levels/roles based on their responsibilities (job description).
499	In the Design phase access levels/roles shall be created and the System shall allow the input and editing of generic job access levels/roles.
500	The access rights of each role and the ability to add roles and users shall be defined by the Commission during the Design phase.
501	The user setup and maintenance screen shall be also used to activate and inactivate employees and also terminate them from the System.
502	The same screen shall also be used to assign and update User ID and PIN/password for access to applications.
503	Passwords assigned to employees and the password management process shall meet current Commission policy standards.
504	As soon as the information is saved, the UIL shall be transmitted in near real-time to the various Systems for immediate user access.

2.2.4.8 Toll Rates and Schedule (if Toll Host exercised)

505	The System shall provide Authorized Users the capability to create and manage toll rates and schedules.
506	At a minimum, capability shall be provided to establish toll rates based on Highway, tolling point, vehicle class, and payment type and shall support time of day and Holiday toll rates as defined during the Design phase.
507	The assignment of tolls shall be assigned based on the final Design and shall be assessed using the toll rates and schedules established for each tolling point for barrier type locations such as DRB and Gateway.
508	The assignment of tolls shall be assigned based on the final Design and shall be assessed based on a completed trip that would be built based on the number of gantries the customer passed under while traveling on the Mainline and/or Northeastern Extension (if exercised).
509	Authorized Users shall have the capability to pre-establish the effective date/time the toll rates will be enabled. The System shall permit the Commission to schedule toll rates and changes in toll schedules in advance of the new rates becoming effective.

510	Authorized Users shall have the capability to establish a default toll rate to be used in the event of data unavailability or other conditions as determined by the Commission that would warrant the use of the default toll rate.
511	The System shall record and track the toll rate ID and toll schedule ID and their transmission status for audit purposes.

2.2.4.9 Configurable Parameters

All parameters changes shall be Approved by the Commission in accordance with the Commission Engineering Change Order (ECO) Process.

512	The System shall provide the capability for Authorized Users to modify the configurable System parameters.
513	Any change shall result in the creation of a new configurable parameter set and each change shall be identified by a unique identifier.
514	Changes to configurable parameters can be scheduled to take effect immediately or at a scheduled time as determined by the user.
515	The System shall record and track all changes to configurable parameters for audit purposes.
516	When a new parameter takes effect, a notification shall be generated and reported to the MOMS.

2.2.4.10 Zone Controller Executable Download

All Software changes shall be Approved by the Commission in accordance with the Commission Engineering Change Order Process.

517	The System shall have the capability to download zone controller executable files and all other files required by the lane for its operations. All Software updates shall be coordinated with the Commission.
518	Successful download of the files shall be verified and alarm messages generated if any file was not received by any zone controllers.
519	Where possible, once the Commission has Approved a Software release, all System application updates shall be automated requiring no action by Maintenance personnel.

2.2.5 General Requirements for Interfaces

The Contractor is responsible for working with the Commission and the existing Contractors in Designing, developing, documenting, testing and implementing all required interfaces. Electronic interfaces are required to provide connectivity between the existing PTC Systems (PTC Toll Host and CSC/VPC), the Cashless Toll Concentrator or Toll Host System (if provided) and In-lane Systems. The Contractor shall be responsible for developing the ICDs, and where changes to existing ICDs are required, these documents shall be modified by the Contractor as part of this Scope of Work based on the Contractor solution during the Design phase. The ICDs shall include requirements for data format and transmission, criteria for acknowledgement and validation of transmitted data and procedures for recording and reconciliation, as appropriate for each interface. It is expected that the latest version of the ICDs will be implemented at go-live and that the Contractor shall continue to update the ICDs as appropriate for the life of the Contract.

520	Provide electronic automated interfaces to the existing systems in accordance with these requirements.
521	Provide for guaranteed transmission of data for all interfaces.
522	Provide for one hundred (100) percent reconciliation of the transmitted data and files.
523	Provide the capability for Authorized Users to access and view the contents of files, including compressed or encrypted files, which are received and transmitted by the Cashless Toll Concentrator or Toll Host System (if provided) in a readable format. Authorized Users shall have the capability to save the contents of such files.
524	Provide the capability for real-time alerting to the MOMS of interface and data transmission failures, including but not limited to:
	• MOMS Dashboard for managing and monitoring interfaces;
	• workflow user interface for managing and monitoring steps within each interface;
	• status and history of executions;
	• comprehensive scheduling of file transmissions;
	• comprehensive reporting for inbound and outbound transmissions;
	• tight integration with the MOMS and notification of failed transmissions;
	• notification of file transmission and receipt status, and
	• capability to manually execute a failed transmission.
525	The Contractor shall utilize secure protocols Approved by the Commission for the transfer of data and/or files via interfaces defined during the Design phase.
526	Provide the capability to transmit and receive multiple files during each scheduled batch.
527	Provide the capability to transmit and receive multiple files in a day.
528	Utilize file naming conventions that prevent the overwrite of data and/or files. For example, include the date and time of transmission and provide for unique identifiers.
529	Utilize file handling and processing methods that provide a complete log of the data and/or file transfer process. For example, files that are successfully processed are moved to a processed folder.
530	Validate records and identify errors in the received data and/or files, including but not limited to:
	• mandatory fields;

	• data formats;
	• data validity (such as tolling points and lane numbers);
	• duplicate records;
	• unexpected response;
	• checksum/record count verification and
	• incorrect status.
531	Provide the capability to correct and re-transmit data and/or files.
532	Provide the capability to process re-transmitted data and/or files automatically or manually by Authorized Users as determined during the Design phase.
533	Provide the capability to transmit the error details to the transmitting entity, as well as record it in the MOMS.
534	Provide the ability to identify missing records/transactions/images and request the transmission of such missing records/transactions/images.
535	Reconcile the transmitted records to the records received and accepted by the receiving entity.
536	Provide the means to identify interface issues by validating the file transmission process, including but not limited to:
	• creation and transmission of data and/or a file at the scheduled time, even if there are no records to transmit;
	• determination if the data and/or a file was transmitted or received at the scheduled time;
	• creation of Alerts to the MOMS if data and/or a file was not created or received at the scheduled time;
	• creation of Alerts to the MOMS if received data and/or a file was not acknowledged;
	• creation of Alerts to the MOMS if records in the received data and/or file had errors when processed;
	• provide details in real-time to the MOMS of each failed record and
	• creation of Alerts to the MOMS when a response has not been received for individual records within the expected duration.
537	Provide data and/or file transmission and reconciliation reports as described in these requirements.
538	Provide a Dashboard that tracks the progress of data and/or file transmissions through each stage and their acknowledgements by the receiving entity, including but not limited to:

	• transactions eligible for transmission;
	• file and/or data created with file name;
	• file and/or data transmitted;
	• file and/or data received;
	• file and/or data accepted;
	• file and /or data rejected;
	• file and/or data re-transmitted;
	• number of records in the file and/or data set and
	• number of failed records.
539	Provide the capability for Authorized Users to configure the relevant parameters related to file and/or data transmission for each interface.
540	Monitor the disk capacity where files and/or data are deposited and send an Alert to the MOMS and interfaces entities (if applicable) if folders are near capacity (configurable) or full.
541	Provide the capability to automatically archive successfully processed data and/or files after a configurable number of days.
542	Provide the data to reconcile file transmissions.
543	Conform to any existing ICDs, including any updates required at the time of Design and develop all new ICDs that have been identified as "to be developed". It is the Contractor's responsibility to ensure all ICDs (including existing) are accurate, updated and meet the requirements of the Scope of Work before developing the interfaces.

2.2.5.1 Cashless Toll Host System to SAP Interface (if exercised)

544	The Contractor shall design and develop an interface from the Cashless Toll Host System (if exercised) to SAP to transfer financial files received from the existing CSC/VPC system.
545	The Contractor shall provide the capability to validate that the received files were successfully transmitted to SAP.

2.2.5.2 Cashless Toll Concentrator or Toll Host (if provided) System Interface to the Existing PTC CSC/VPC System

546	The Contractor shall design and develop an interface from the Cashless Toll Concentrator or Toll Host System to the existing CSC/VPC system to transmit receive and acknowledge one hundred (100) percent of all transactional and financial data in accordance with the Approved ICD developed during the Design phase.

547	The interface shall be capable of transmitting AVI transactions, Exception List, and Non-Revenue License Plate List to the existing CSC/VPC system.
548	The interface shall be capable of receiving TSL and VEL (if option is exercised) files from the existing CSC/VPC system.
549	The Contractor shall provide the capability to positively acknowledge (ACK) message receipt, negatively acknowledge or reject a message (NACK) and reconcile data transmissions to/from the Cashless Toll Concentrator or Toll Host System.

Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional functions and data feeds:

550	The Cashless Toll Host (if exercised) shall interface shall be capable of receiving the following financial data from the existing CSC/VPC system for transfer including but not limited to:
	• monthly GL data feeds sent from the CSC/VPC;
	• monthly CSC Surety Files, and
	• monthly CSC tag and account files.

2.2.5.3 Cashless Toll Systems Interfaces to the Existing PTC Toll Host Systems

551	The Contractor shall design and develop an interface from the Cashless Tolling System to the existing PTC Toll Host system to transmit one hundred (100) percent of all transaction in accordance with the ICD to be developed for this interface during Design.
552	The interface shall be capable of transmitting the following data including but not limited to:
	• transaction records and
	• alarms.
553	The Contractor shall provide the capability to reconcile the successful transmission of the summary data to the existing PTC Toll Host system.

2.2.5.4 Cashless Toll Concentrator or Toll Host (if provided) System to Facility Server Interface

The provision of a facility server is optional but if the Contractor's solution includes a facility server, then the requirements in this section shall be met.

554	The Contractor shall design and develop an interface from the Cashless Toll Host System to the facility Servers (if applicable) to transmit, receive and acknowledge one hundred (100) percent of all data in accordance with the Approved ICD.

555	The interface shall be capable of sending TSL, VEL (if option is exercised), configuration files, Software updates and toll rates (if applicable) to the facility servers.
556	The interface shall be capable of receiving all transactions, alarms and event messages from the facility servers.
557	The Contractor shall provide the capability to reconcile the successful transmission and receipt of all data at the Cashless Toll Concentrator or Toll Host System.

2.2.5.5 Cashless Toll Concentrator or Toll Host (if provided) System to Zone Controller Interface

558	The Contractor shall design and develop an interface from the Cashless Toll Host System to the zone controllers to transmit and acknowledge one hundred (100) percent of all data in accordance with the Approved ICD.
559	The interface shall be capable of sending TSL, VEL (if option is exercised), configurations files, Software updates and toll rates (if applicable) to the zone controller.
560	The interface shall be capable of receiving all transactions, alarms and event messages from the zone controller.
561	The Contractor shall provide the capability to reconcile the successful transmission and receipt of all data at the Cashless Toll Concentrator or Toll Host System.

2.2.5.6 Image Server to Cashless Toll Concentrator or Toll Host System (if provided) Interface

Reconciliation of images to the video transactions and the status of the transfer of images and video transactions shall be maintained and reported at the Cashless Toll Concentrator or Toll Host System.

562	The Contractor shall design and develop an interface from the image server(s) to the Cashless Toll Concentrator or Toll Host System to transmit and track the status of the capture of images by the In-lane Systems for each video transaction and the subsequent transfer of images and video transactions to the existing CSC/VPC system.
563	The interface shall be capable of sending image reconciliation and transfer status data to the Cashless Toll Concentrator or Toll Host System.
564	The Contractor shall provide the capability to reconcile the successful transmission and receipt of all images and video transactions at the existing CSC/VPC system.

2.2.6 Maintenance Online Management System (MOMS)

There shall be a Maintenance Online Management System (MOMS) that supports the Cashless Tolling System Maintenance activities and Maintenance operations.

2.2.6.1 Maintenance Online Management System (MOMS) – General Requirements

565	Provide a MOMS that supports Maintenance operations for all Software and Hardware provided under this Contract.
566	Provide a MOMS that monitors, alerts and generates work orders in real-time for all processes, including but not limited to:
	• communications issues;
	• file transmission issues;
	• data exceptions;
	• Hardware issues;
	• Software issues or failures;
	• database issues;
	• issues with jobs, processes or data flows;
	• low storage space for each subsystem (configurable thresholds);
	• CPU utilization (configurable thresholds);
	• CPU load (configurable thresholds);
	• file system mounts (if applicable), and
	• disk IOs.
567	Provide a MOMS that monitors, alerts and tracks in real-time unusual activity triggered by users and systems, including but not limited to:
	• video transactions above threshold;
	• flushed transactions above threshold, and
	• other anomalies in daily toll operations.
568	Provide a MOMS that includes but is not limited to the following:
	• receiving and monitoring status messages of all system Hardware and Software;
	• receiving and transmitting alarm and status messages from the current Commission monitoring system;
	• is capable of local work order manual entry or email entry by Authorized Users;
	• storing data in a relational database to allow for data recovery and flexibility in reporting the raw data (including via Ad-hoc reporting);
	• tracking device failures and service requests;
	• assigning priorities and actions to events;
	• notifying (automatically) Maintenance personnel via reports, text and email;
	• assigning work orders to Maintenance personnel;
	• reassigning (manually) work orders to other Maintenance personnel;
	• escalating (automatically) work orders to other Maintenance personnel;
	• recording time of acknowledgement by Maintenance personnel;

	• recording time of acknowledgement by all subsequently assigned Maintenance personnel;
	• recording time of repair;
	• recording time of Equipment and process recovery;
	• recording completion of service calls;
	• providing automatic Alert for work orders not closed out in specified time;
	• maintaining and tracking Repair Maintenance Activity;
	• accepting and updating work orders via smart phones entries via secure communications;
	• tracking all system application Software components and Hardware via an asset management module;
	• role-based security;
	• containing an automatic system exception reporting for all processes that are not running;
	• containing an automatic system workflow exception reporting for all items that are not processing correctly or are hung in the system, and
	• providing hard copy reports on device failures and trouble resolution status.
569	Provide a MOMS that supports maintenance functions, including but not limited to:
	• automatic system job/workflow/queue exception reporting and alerting for all elements that are not processing correctly or are hung in the system;
	• issuing electronic notifications via email or text to Maintenance staff when problems are detected;
	• prioritization of failures and Alerts that is configurable and alert Authorized Users when configurations are changed;
	• for the calculation of response times, repair times, and down time from the data entered by the Maintenance staff and automatically generated by the system, and
	• scheduling of preventive Maintenance through the MOMS that generates automatic work orders at the scheduled times.
570	Provide a MOMS that supports asset management, including but not limited to:
	• tracking of all system Hardware and Software items to the subassembly level;
	• tracking of all system Hardware and Software locations;
	• tracking of all system Hardware and Software versions;
	• tracking of all Maintenance and service agreements;
	• maintains a list of vendors from where products were procured;
	• associates the original purchase order number to the individual item;
	• associates the original vendor number to the individual item;
	• associates all warranty information to the individual item;
	• provides an Alert prior to warranty expiration, and
	• provides automatic Alert for spare parts levels.

571	The MOMS will record all configuration data, and will be versioned after each system component change, including application of system patches.
572	Provide the capability for Authorized Users to access the MOMS screen through the single Cashless Toll Concentrator or Toll Host (if provided) System GUI.
573	Capability shall be provided to configure the priority level of each alarm and assign and change the escalation attributes.
574	Provide the capability to configure the initiation of a notification in the MOMS when an alarm is generated.
575	Authorized Users shall have the capability to indicate if an alarm should result in the generation of a work order and if an alarm should be considered in performance reporting.
576	Provide the capability to generate (on-demand and scheduled) daily, weekly and monthly performance reports as determined by the Commission during Design.
577	Provide the capability to generate operational, management and performance reports from the MOMS that include but are not limited to:
	• summarized and detailed alarm history;
	• Maintenance paging and response history;
	• work order status and tracking;
	• Equipment inventory and tracking to the subassembly level;
	• Equipment availability;
	• preventive Maintenance;
	• pervasive Maintenance;
	• corrective Maintenance;
	• response and repair times for each of the priorities and level of Maintenance;
	• Equipment use history;
	• Equipment repair history;
	• total system availability;
	• sub-system availability for the In-lane Systems and Cashless Toll Concentrator or Toll Host System (if provided);
	• Equipment versions, Software versions, firmware versions and serial numbers for all Equipment installed under this Scope of Work;
	• incident logs and lost revenue estimates;
	• Mean Time Between Failures (MTBF) for the preceding and current Maintenance periods and cumulative;
	• performance reports detailing compliance to the performance requirements;
	• detailed list of parts replaced as a result of Maintenance actions, with an identification of warranty versus non-warranty replacement;

	• status of removed parts and Equipment with an aging status for parts under repair or replacement (serial numbers, being repaired in Maintenance shop, purchase replacement part);
	• performance reports;
	• an exceptions report summarizing all unusual or significant occurrences during the period;
	• trend analysis for repetitive failure;
	• status of spare parts inventory, and
	• staffing report detailing positions, staff hours worked and performance.
578	When spare parts inventory is reduced to a configurable threshold quantity, automatic reorder Alerts shall be generated.
579	Provide a MOMS that has the ability to receive information (success or failure), including but not limited to:
	• backup;
	• time synchronization;
	• synchronization of primary and secondary systems;
	• Software updates and
	• file downloads.
580	In order to ensure that all tolling points are functional, all systems are operational, all the processes are working and file transfers are successful, Authorized Users shall have access to the MOMS screens. Capability shall be provided to verify the status of tolling point operations, the System and various file transfers, including the files transmitted and received from the existing PTC Toll Host system.
581	Tolling point and System status shall be shown in a pictorial view with the capability to drill down to the device causing the Alert and its associated error logs.
582	The MOMS screen shall show if required files were transmitted to all the lanes, the existing PTC Toll Host system and the existing CSC/VPC System.
583	In case of TSL and toll rate tables, the version in use shall be listed.
584	Authorized Users shall have the capability to re-initiate download in the event transmissions were not successful, for example toll rate tables.
585	Screens shall be available that show all the alarms generated by the various systems and subsystems, including the operating system and the database.
586	Failure of all devices, processes, programs, and scheduled tasks shall be forwarded to the MOMS screen that is accessible to authorized staff.
587	Various events and error logs shall be provided for each program that shall assist the system administrator to investigate problems.

2.2.6.2 System Health Monitoring Software

588	Provide System health monitoring Software that includes but is not limited to:

	• tight integration with the MOMS;
	• hardware and network health monitoring;
	• a Dashboard that graphically displays component's health;
	• comprehensive log reporting capabilities, and
	• integration with existing Commission monitoring software.

2.2.6.3 Time Synchronization

589	The Cashless Toll Concentrator or Toll Host (if provided) server shall be synchronized to a certified source Approved by the Commission using the standard network time protocol (NTP) at configurable intervals, but at a minimum of every five (5) minutes.
590	The zone controllers, AVI systems, AVC systems, LPICPS, image server(s), OCR/ALPR server (if the option to implement OCR/ALPR is exercised), DVAS, and other servers needed to support the requirements of this Scope of Work shall be synchronized to the Cashless Toll Concentrator or Toll Host server or the Approved certified source.
591	If needed, synchronization messages shall be sent to devices that do not support off-the-shelf time synchronization Software.
592	All servers and controllers shall have a primary and secondary source for synchronizing time.
593	The time synchronization technique shall ensure that duplicate or incorrect transaction times are not possible.
594	The Cashless Toll System shall have the capability to handle daylight saving time changes.

2.3 Test Site

595	The Contractor shall install and setup a dedicated test site at a Contractor Provided, Commission Approved location that shall be available for testing software and hardware changes or options exercised including those for AVI alternatives or upgrades for the term of the Contract. The test site shall have the full suite of Equipment and Systems as an operational tolling point, and test transactions and data shall be transmitted to the Cashless Toll Concentrator or Host Systems test environment. The test site shall be monitored through the MOMS and maintained identical to other tolling point as specified in this Scope of Work.
596	If the option for a replacement Toll Host is exercised by the PTC, the Contractor shall provide a Quality Assurance (QA) Toll Host System for development and testing changes prior to deployment into the production systems.

2.4 National Interoperability

597	The Cashless Tolling System shall be Designed to accommodate future National Interoperability such that it supports the inclusion of multiprotocol readers and/or the inclusion of multiprotocol transponders to support the current TDM (E-ZPass) and 6C protocols as part of the base Contract and optional SeGo protocols. The Contractor solution shall allow for modifying and adapting the

	Design to incorporate new readers, antennas types and locations, and support the transition to the new interoperable solution with limited interruptions to the revenue collection.
598	The Contractor shall support the conversion to National Interoperability if it becomes available during the term of the Contract.
599	If requested, the Contractor shall provide a Checklist (Section 4.8) and Systems Testing Concept (Section 6.1) for AVI alternatives.

2.5 Cashless Tolling Accuracy Requirements

The Contractor shall provide a Cashless Tolling System that is Designed to meet the accuracy, performance and throughput requirements set forth in this Scope of Work. The testing logistics required to prove adherence to these requirements shall be detailed in the Master Test Plan and the test procedures as set forth in Section VI of the Scope of Work.

600	The sample size for each requirement shall be the greater of N = log (1 - C) / log (A); or 100,000 transactions for the Cashless Tolling System Operational and Acceptance Test described in Section 6.5; where: * N = Number in the sample * C = Confidence level * A = Accuracy A value of ninety five (95) percent shall be used for the confidence level. Accuracy and confidence levels are expressed as decimals.

2.5.1 Accuracy Requirements

2.5.1.1 General Requirements

601	The Contractor shall provide a Cashless Tolling System that meets an overall accuracy of at least 99.9 percent for vehicle detection and classification, transponder read and association and vehicle image capture and association. The metrics to validate overall accuracy requirements will be a weighted averaging of the subsystems and shall be defined by the following formula: $Overall\ Accuracy\ Rate = (Vehicle\ Detection\ Rate\ x\ Vehicle\ Detection\ Weight\ Factor) + (Transponder\ Association\ Rate\ x\ Transponder\ Association\ Weight\ Factor) + (Vehicle\ Classification\ Rate\ x\ Vehicle\ Classification\ Weight\ Factor) + (Image\ Capture\ Rate\ x\ Image\ Capture\ Weight\ Factor)$ Where: Vehicle Detection Rate, Transponder Association Rate, Vehicle Classification Rate and Image Capture Rate are obtained from the transactions collected during the Cashless Tolling System Operational and Acceptance Test described in Section 6.5.
602	The Contractor shall provide a Cashless Tolling System that meets the accuracy requirements described below. The Contractor shall validate System compliance to the accuracy requirement by collecting data to the required sample size in live traffic operations as described below for each requirement.
603	Data collection shall include the use of live traffic and controlled vehicles (vehicles with a known transponder status) intermingled with live traffic to emulate normal operations such as congestion and traffic patterns as specified below for each requirement.
604	Prior to the start of testing the System shall be confirmed to be fully operational and ready for testing. Transactions that fail to meet the requirements shall be reviewed and audited and anomalies investigated. Exception criteria identified during the Design phase and the development of the test procedures that fall outside the System Design may be excluded from the accuracy calculations.

Weight table for requirement 601:

	Vehicle Detection	Transponder Association	Vehicle Classification	Image Capture & Association
Weight Factor	0.40	0.15	0.15	0.30

2.5.1.2 Transponder Capture Rate

605	A transponder mounted in accordance with the manufacturer mounting instructions shall be captured by the AVI system under all conditions within the Design specification described in this Scope of Work with an accuracy rate as defined by the greater of the E-ZPass Group or manufacturers specifications This requirement applies to all tolling point types based upon the transponder mix collected during the testing period for the Commission Approved sample size.

2.5.1.3 Transponder Reporting Accuracy

606	A transponder that is detected and read by the AVI reader shall be reported to the zone controller with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of transponder reads collected during live traffic operations.

2.5.1.4 Transponder Write Performance Accuracy Rate

607	The AVI system shall successfully and accurately complete a write operation to associate data with a passing vehicle with an accuracy rate as defined by the greater of the E-ZPass Group or manufacturers specifications under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of transponders captured during live traffic operations.

2.5.1.5 Vehicle Detection Accuracy

608	The zone controller shall detect and report vehicles traveling through the tolling point under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations. The resulting accuracy will be used in the calculation of the overall accuracy.

2.5.1.6 Transponder Association Accuracy

609	Every Transponder that is reported to the zone controller shall be assigned to the correct vehicle under all conditions within the Design specification described in this Scope of Work. This requirement applies to all tolling point types based upon the transponder penetration rate collected during the testing period for the Commission Approved sample size. The resulting accuracy will be used in the calculation of the overall accuracy.

2.5.1.7 Vehicle Classification Accuracy

610	The zone controller shall classify all vehicles in accordance with the Commission classification structure traveling through the tolling point with accuracies defined below under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations. The resulting accuracy will be used in the calculation of the overall accuracy.

2.5.1.8 Image Capture Reporting Accuracy

611	The System shall capture, report and correctly associate an image of the vehicle to the correct vehicle as defined in the Commission Business Rules under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations. The resulting accuracy will be used in the calculation of the overall accuracy.

2.5.1.9 License Plate Extraction (OCR/ALPR) Accuracy (if the option to implement OCR/ALPR or VEL is exercised)

612	For all video transactions without exception, the System shall perform OCR/ALPR on minimum seventy (70) percent of the images to obtain the license plate, jurisdictions and plate type with at least 99.95 percent accuracy of for the States of PA, NJ, OH, FL, NY, MD, TX, DE, VA and NC. For vehicles identified as requiring front plates the results shall be from the front image. Testing shall require the use of vehicle data collected during live traffic operations. Each tolling location can be independently tuned to optimize performance based on the mixture of plates for each given toll zone.

2.5.1.10 Overall Image Quality

613	For all video transactions, at least 99.95 percent of the images that are included in the calculation shall have a human readable license plate, jurisdiction and plate type. For vehicles identified as requiring front plates the front image shall be used. Testing shall require the use of vehicle data collected during live traffic operations. A plate shall be considered excluded from Overall Image Quality calculation only when:
	• the vehicle has no plate;
	• the plate numbers/letters are not human readable due to damage or obstruction.

2.5.1.11 Transaction Processing Requirements

614	All transactions generated by the zone controllers in accordance with the above accuracy requirements shall be reported and transmitted for processing to the Cashless Toll Concentrator or Toll Host Systems (if provided) with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations.

2.5.1.12 False Read Processing

615	The Cashless Tolling System false read processing (example cross lane reads and duplicate reads) shall be less than 0.001 percent of the transponder transactions under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations and test results will be verified by monitoring the CSC for accurate account posting and anomalies will be investigated.

2.5.1.13 Video Transaction and Image Transmission Requirements

616	All video transactions and images from the Cashless Tolling System shall be transmitted to the existing CSC/VPC system with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations.
617	All video transactions from the Cashless Tolling System shall be transmitted to the existing PTC Toll Host with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations.

2.5.1.14 AVI Transaction Transmission Requirements

618	All AVI transactions from the Cashless Tolling System shall be transmitted to the existing PTC Toll Host systems with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations.

2.5.1.15 Vehicle Throughput Requirements

619	The Cashless Tolling System shall process a minimum of 2,400 vehicles per hour per lane with a video transaction rate of one hundred (100) percent. Testing shall include the simulation of vehicle events that exercise all of the toll collection equipment and devices.

2.5.2 Mean Time Between Failure (MTBF)

620	The Cashless Tolling System shall be required to meet specific minimum duration requirements for components and subsystems in continuous operation. This time requirement is defined as the Mean Time Between Failure (MTBF). The Contractor shall provide all third-party MTBF on individual components to be used in the System.
621	MTBF requirements for all components of the Cashless Tolling System shall meet the MTBF as specified below in Table II-1:

Table II–1: MTBF Requirements

Component	MTBF (hours)
Redundant Zone Controller	30,000
Automatic Vehicle Identification (AVI) System Components	20,000
Automatic Vehicle Classification (AVC) System Components	30,000
License Plate Image Capture and Processing System (LPICPS) Components	30,000
Cashless Toll System Servers	50,000
Network Devices	50,000

622	The reliability of the System components shall be calculated based on the following MTBF calculation: MTBF = # units x test period (hours)/ # chargeable failures

2.5.3 Availability

623	The Contractor shall meet availability requirements for the following elements of the Cashless Tolling System:

Table II–2: Availability Requirements

System or Subsystem	Availability Requirements (Monthly) Percentage (%)
Toll Zone Lane Systems	99.95
Cashless Toll Concentrator or Toll Host System (if provided)	99.95

624	The availability requirements shall be separately calculated and applied to an available lane with all of its subsystems properly functioning and available to collect revenue and send required transactions to the Cashless Toll Concentrator or Toll Host System (if provided) and images to the image server(s)/CSC VPC systems.
625	The availability requirements shall be separately calculated for the Cashless Toll Concentrator or Toll Host System (if provided) with all of its devices, Software, applications and processes properly functioning and available to the Authorized Users, successfully transmitting transactions to the existing PTC Toll Host systems and the CSC/VPC systems and communicating with the in-lane systems.

626	Availability shall be calculated based on the following calculation: Availability = 100% - [Hours Downtime / (# Days in time period measured * 24)]
627	The Cashless Tolling System compliance to the availability requirements shall be validated during the Operational and Acceptance Test described in Section 6.5 Cashless Tolling System Operational and Acceptance Test.
628	During the Cashless Tolling System Maintenance and Software Support Services, the Contractor shall prove the Cashless Tolling System compliance to the availability requirements as described in Section 7.22 Performance Requirements for the Cashless Tolling System and Liquidated Damages.

2.5.4 Chargeable and Non-Chargeable Failures

For purposes of calculating MTBF and Availability performance requirements for testing, as detailed in Section VI, and for Maintenance performance, as detailed in Section VII, chargeable and non-chargeable failures are defined as follows:

2.5.4.1 Chargeable Failures

629	Chargeable failures include any failures that are not specifically identified as non-chargeable, including, but not limited to the following:
	• A malfunction which prevents the Cashless Tolling System component (Hardware or Software) from performing its designated function, when used and operated under its intended operational and environmental conditions as detailed in this Scope of Work.
	• A malfunction that poses a threat to the safety of the Cashless Tolling System components, PTC customers, employees or others.
	• An occurrence where data is not successfully transmitted between the lanes and the Cashless Toll Concentrator or Toll Host System (if provided) and images from the lanes to the image server(s) unless such failure is due to the WAN provided by the Commission.
	• A failure of Equipment or Software that allows data loss to occur on the Cashless Tolling System.
	• A failure of Equipment or Software that allows revenue loss to occur on the Cashless Tolling System that is not already accounted for as a separate performance failure.
	• Software anomalies and bugs that affect the performance and operation of the Cashless Tolling System.
	• Shutdown or unavailability of the Cashless Tolling System unless specifically directed by the Commission for reasons not under the control of the Contractor.
	• Failure to properly register or report a transaction.
	• Failure to properly reconcile the Cashless Tolling System.
	• Failure to electronically send or receive transaction information.
	• Failure to generate the reports required to reconcile and audit the System.

2.5.4.2 Non-Chargeable Failures

630	Non-chargeable failures shall include:
	• force majeure, as defined in the Contract Documents;
	• vandalism;
	• failure of a test facility or test instrumentation;
	• failure of a component the Commission has responsibility;
	• System component failures caused by externally applied stress conditions outside of the requirements of this Scope of Work;
	• System component failures caused by environmental or operating conditions outside of the requirements of this Scope of Work;
	• normal operating adjustments as allowed in the Test Procedure or Maintenance Plan, as applicable, and
	• failures that are customer or user induced.

III. CASHLESS TOLLING SYSTEM TRANSITION

All Commission facilities including barrier, ramp and the mainline will be transitioned to cashless tolling in accordance to *Attachment 9: Cashless Tolling Concept Plan* and the Approved project schedule. The Contractor's installation and transition plan shall support the conversion of the existing toll collection system to the Contractor's Cashless Tolling System.

3.1 Cashless Tolling System Transition – General Requirements

631	The Contractor shall accommodate the various installations of the Cashless Tolling System Implementation in accordance with the Approved schedule.
632	All changes to the System to accommodate technology upgrades and meet the Contract requirements shall be the responsibility of the Contractor.
633	The Contractor schedule shall be sufficiently flexible to accommodate modifications or changes such as early completions or delays in start or completion of phases that would normally be expected in a multi-phase, multi-contractor construction schedule.

3.2 Cashless Tolling System Implementation

634	The Contractor shall procure, Design, test, and install the Cashless Tolling In-lanes Systems, including the redundant Cashless Tolling In-lane System Hardware, Software, Equipment, Interfaces and communications provided in the toll equipment building at each tolling point.
635	The Cashless Toll Concentrator or Toll Host Systems (if provided) shall be tested and interface testing completed prior to commencing Onsite First Installation Test (OFIT) for the Cashless Tolling System at the initial Implementation.

636	The installation and Commissioning of all cashless tolling point implementations shall be in accordance with the Approved Transition Plan.

3.3 Transition to Cashless Tolling

3.3.1 Cashless Tolling Transition Plan

637	The Contractor shall provide a detailed Transition Plan for Commission Approval that addresses all critical transition elements and activities associated with the installation and Implementation of the Cashless Tolling System, including Cashless Tolling In-lane Systems; Cashless Toll Concentrator or Toll Host Systems (if provided), and interfaces to the existing PTC Toll Host system and the existing CSC/VPC system.
638	The Transition Plan shall, at a minimum, include the installation, Commissioning, Revenue Collection and Acceptance of Cashless Tolling In-lane Equipment, and Acceptance of each Implementation Phase of the Project.
639	Any temporary processes implemented to support the transition shall be documented in the Transition Plan including eventual replacement process if applicable.
640	All points of coordination or reliance on third-party deliverable, for example the WAN communications network shall be clearly identified in the Transition Plan.
641	The impacts to existing systems including those in the proximity of the tolling point shall be addressed in the Transition Plan.
642	The Cashless Tolling System Transition activities shall be coordinated with the civil contractor, civil designer and existing system integrators and Approved by the Commission in order to not interfere with on-going and continuing maintenance and operational requirements.
643	In order to ensure a seamless transition, the following activities shall take place prior to opening the first tolling point to cashless tolling in revenue collection.
	• Upon Approval to proceed with a Commissioning Test, the Contractor shall conduct such test at each tolling point prior to opening each location to traffic and revenue collection. Since each location may also include civil construction, the Contractor shall be responsible for interfacing and coordinating with the PTC and civil contractors for scheduling and maintenance and protection of traffic requirements during the conversion to cashless tolling.
	• The Cashless Toll Concentrator or Toll Host (if provided) servers and central image servers (if implemented) shall be installed and commissioned at the primary and secondary locations and its interface to the existing PTC Toll Host system and existing CSC/VPC shall be validated.
	• The MOMS shall be configured for go-live; inventory recorded; technicians scheduled, and notifications set up;
	• The DVAS shall be installed and validated and Authorized Commission personnel shall have access to the DVAS;
	• The OFIT shall be conducted and Cashless Tolling System functionality and performance validated at the initial tolling point installation;
	• An end to end test shall be conducted in the existing PTC Toll Host system and existing CSC/VPS system test environments, and

	• The Commission shall confirm the existing systems are ready for Conversion and give Approval for Go-Live. At such time, the Cashless Tolling System shall be switched over to the production existing PTC Toll Host system and existing CSC/VPC system.
644	The Contractor shall plan for possible variances in the sequencing of the transition due to construction and readiness of the CSC/VPC systems and operations in its Transition Plan.

Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional requirements:

645	The Transition Plan shall address the integration and interface of the Cashless Toll Host System to SAP when all existing facilities are converted to cashless tolling and the existing PTC host system is de-commissioned.
646	The Transition Plan shall address the migration of data from the current PTC host to the Cashless Toll Host System for new facilities as well as when existing facilities are converted to cashless tolling and the existing PTC host system is de-commissioned.
647	The operational requirements, interfaces, and/or Equipment installation for the Cashless Tolling System and its interface to the existing PTC Toll Host system, SAP and existing CSC/VPC System shall be included.

IV. CASHLESS TOLLING SYSTEM INSTALLATION REQUIREMENTS

This section details the requirements for the installation of the In-lane Cashless Tolling System and the Cashless Toll Concentrator or Toll Host (if provided) System. Unless Approved by the Commission, no System installation shall occur prior to the satisfactory Approval of Installation Design and the Factory Acceptance Test.

4.1 Installation Program

648	The Contractor shall have an Installation Program that addresses all aspects of the installation of the In-lane Cashless Tolling Systems and Cashless Toll Concentrator or Toll Host (if provided), including all installation Design, submissions and coordination.
649	The Contractor is responsible for the Design, procurement, installation, cabling, configuration, check-off, and testing of all Hardware, Equipment, communications, Software, lighting and fixtures provided by the Contractor as part of the In-lane Cashless Tolling Systems at each of the tolling points identified by the Commission.
650	In the event the Contractor decides to re-use existing hardware, conduits and junction boxes, the Contractor is responsible for ensuring that such elements are in their fully operational condition and will meet the requirements of the Contract for the term of the Contract.
651	The Contractor shall install the Cashless Tolling In-lane servers and Hardware in the toll equipment building provided by the Commission through the civil contractor.
652	The Contractor shall install the Cashless Toll Concentrator or Toll Host at locations specified in the Scope of Work and Approved by the Commission.
653	The Contractor shall work with the Commission to test the WAN and the connections to the existing PTC Toll Host system and the existing CSC/VPC systems. Testing shall include expected traffic loads and all types of production operation data
654	The Contractor shall coordinate all lane closure activities with the Commission and the civil contractor.
655	The Contractor shall validate and approve the Commission and the civil contractor infrastructure installation and confirm they are in compliance with the Approved civil drawings.
656	The removal and disposal of the existing equipment not re-used by the Contractor will be responsibility of the civil contractor and the Contractor shall support the coordination of this work.
657	The Contractor shall install and tune the certified AVI Equipment to the AVI vendor specifications in compliance with the E-ZPass Group requirements. In addition, the AVI vendor shall certify that the lanes are tuned to the Approved AVI specifications, including after AVI updates or replacements such as for interoperability or maintenance.

4.2 Installation Plan

658	The Contractor shall develop and submit an installation plan that identifies its approach to installation and drawing package submissions and documents all installation related activities for the Project. The installation plan shall be the master document from which the elements of the System shall be installed.
659	The installation plan shall include and define, at a minimum, the following items:
	• The installation schedule detailing all activities, shifts and resources for the installation of the In-lane Cashless Tolling Systems and Cashless Toll Concentrator or Toll Host (if provided), including third-party and civil contractor activities. Once the baseline schedule is Approved by the Commission, updates during the installation periods identifying all schedule changes and Work progress in the form of percentage completions shall be submitted to the Commission for Approval.
	• The minimum resource allocation requirement for any installation phase and segment.
	• How the Contractor manages delivery and staging of the Cashless Tolling In-Lane and Concentrator or Toll Host Equipment to be installed, including any staging, installation and testing performed at the Contractor or third-party facilities and their subsequent delivery and installation at the production sites.
	• The coordination between other contractors, including the civil designer, civil contractor(s), service providers, and the existing contractors.
	• Coordination of the lane closures with the civil contractor(s) for each phase of the Project.
	• Coordination with the civil contractor(s) for the installation of the toll equipment building, the generators and UPS.
	• Coordination activities as applicable with other third-party entities for the various interfaces including the existing PTC Toll Host, existing CSC/VPC and other existing PTC systems.
	• Testing of the Commission provided fiber communications network for connection of Cashless Tolling Systems to existing PTC Toll Host system and the existing CSC/VPC system.
	• Quality control, quality assurance, inspection, and testing processes including validation of Contractor installation to the requirements of the Contract installation drawings.
	• The order in which Equipment items are to be installed with estimated durations.
	• Special or unique installation requirements.
	• A detailed component list and a description of how each item version number and serial number shall be recorded for each installation and configuration into the MOMS.
	• Specific requirements to support the conversion to the new interoperable solution, including but not limited to infrastructure changes, AVI controller changes, antenna locations, lane configuration, servers, configuration files, firmware, host and plaza subsystems, and other modifications which may be required.
	• Organization Chart defining Key Team Members, roles and responsibilities and contact information.

	- Contingency Plan.

4.3 Installation and Construction Coordination and Meetings

During the Project Design, development and installation periods there shall be a series of meetings between the Contractor, the Commission, existing contractor, civil designer and the civil contractor(s) to clearly define and develop the installation requirements, methodology, timetables, test plans, roles, and contingency plans. The Contractor is responsible for coordinating and scheduling all meetings necessary to complete the Design and installation phase of the Project.

660	The Contractor shall schedule, manage and attend weekly installation meetings during the active Design and installation phases of the Project and report on progress of the installation. The Contractor shall identify and communicate any issues regarding Cashless Tolling System construction and installation immediately upon discovery to the civil contractor(s), existing system integrator and the Commission.
661	The Contractor shall ensure that the appropriate personnel are present at these meetings who can represent the Contractor's interest and provide the information necessary in a meaningful manner.
662	Prior to the meeting, the Contractor shall update the installation schedule based on the construction schedule and all changes shall be identified.
663	The Contractor shall prepare and distribute a meeting agenda at least forty-eight (48) hours prior to the scheduled meeting. The meeting agenda shall consist of those items pertaining to the installation and schedule for the previous and current week's installation efforts and for an agreed to "look ahead" period.
664	It is the Contractor's responsibility to make sure all issues that arose during the installation activity for the week are addressed and resolved or is scheduled for resolution.
665	At these meetings, the Contractor shall also be prepared to address any issues or questions raised by the civil designer, civil contractor, other contractors, and the Commission or its representative.
666	The Contractor shall document the meeting discussions and distribute the meeting minutes to the team. The Contractor shall also record and maintain an action items list that tracks all installation related issues.

4.3.1 Construction Coordination with Infrastructure Contractors

The Contractor shall coordinate all installation activities with the civil contractors on new cashless tolling facilities to ensure all Cashless Tolling System Equipment specifications are addressed in the Design and installation of the cashless tolling infrastructure. *Attachment 2: Cashless Tolling Installation Responsibility Matrix* defines the areas of responsibility for the parties involved in the Project Design and construction for new cashless tolling facilities.

667	The Commission (or its civil contractor) is responsible for the construction of the overhead structures/toll gantries, installation of the toll equipment building and provision of the generators for the new tolling point, and the Contractor shall coordinate closely with the Commission, and the Commission contractors.
668	The Contractor shall participate in the Design and installation of the cashless tolling infrastructure at the tolling points, including but not limited to:
	• provide all required Design and installation drawings, operating requirements and installation specifications to the Commission and the civil contractors for all toll system Equipment provided;
	• support and supply all information requested by the civil contractor and civil designer in the form of request for information (RFI);
	• review all civil contractor provided drawings with respect to the toll system;
	• approve all aspects of such drawings related to the toll system, and
	• ensure the Cashless Tolling System infrastructure needs necessary to meet the requirements set forth in this Scope of Work are met with regard to such Design.
669	The Contractor shall be responsible for ensuring that the locations, positions, installation, connections and other elements of the Contractor inputs identified on the Design and installation drawings provided by the Contractor, for all Contractor and Commission provided Equipment, whether in-roadway, structure/toll gantry mounted, in the toll equipment building or otherwise located are accurate and correct.
670	Contractor shall also ensure that the installed roadway; infrastructure; structures/toll gantries; toll equipment building; UPS, and generators meet the Design requirements provided by the Contractor and shall approve such installed work with regard to the Design provided.
671	Contractor shall cooperate with the Commission and infrastructure contactors to minimize required number of lane closures and to maximize the use of other scheduled lane closures. The Contractor shall transmit all lane closure requests to the Commission for approval.
672	Contractor shall work with the Commission and agree to a reasonable plan for scheduling and approving lane closures, including a procedure for advance notice of cancellations of lane closures and allowable conditions for such cancellations as described in this Scope of Work. The civil contractor is responsible for administering all lane closures and traffic controls during the installation phase and for all testing through Acceptance.

4.3.2 Construction Coordination with Civil Contractor

673	The Contractor shall coordinate all installation activities with the civil designers and civil contractors. *Attachment 2: Cashless Tolling Installation Responsibility Matrix* defines the areas of responsibility for the parties involved in the Project Design and installation on the cashless tolling facilities.

4.4 Installation Requirements

674	The Contractor shall be responsible for procurement, installation, cabling, termination configuration, testing, and check-off of all Equipment and Software required to meet the requirements of the Contract.
675	The Contractor shall install all appropriate In-lane System servers and Equipment required by the Cashless Tolling System in the toll equipment building provided by the Commission through a third party.
676	Procurement, installation, configuration, and testing of all local area communications Equipment and connection to the Commission installed network equipment in the toll equipment building shall be the responsibility of the Contractor as further set forth in this Scope of Work.
677	Procurement, installation, configuration, and testing of all appropriate Cashless Toll Concentrator or Toll Host System servers (if provided), Equipment and Software required by the Cashless Toll Concentrator or Toll Host System at the primary and secondary locations and validating communications to its interfacing systems shall be the responsibility of the Contractor as further set forth in this Scope of Work.

4.5 Compliance to Standards

The Contractor shall adhere to all installation standards, applicable laws, ordinances and codes as required.

678	The Contractor shall meet all electrical codes, traffic control, seismic considerations, calibration, configuration, and environmental requirements of and including, but not limited to:
	• Equipment manufacturer's;
	• NEC;
	• UL standards;
	• PTC;
	• PennDOT;
	• FHWA;
	• IEEE (Institute of Electrical and Electronics Engineers);
	• OSHA requirements, and
	• any local authorities having jurisdiction.
679	The Contractor shall adhere to all specifications of the latest Commission Standard Specifications at time of construction unless the Contractor receives written notification by the Commission which overrides the Standard Specifications. Commission Standard Specifications are located at: https://ebs.paturnpike.com/generalinformation/documents
680	The Contractor shall be responsible for all costs associated with any permits, plan reviews, and inspections related to toll system work.

681	It shall also be the Contractor's responsibility to procure all documentation required to install and adhere to the proper installation standards, law, ordinance, or codes.
682	The Contractor shall procure Services of Subcontractors qualified to work in this industry. If a vendor's component requires a vendor approved installer, the Contractor shall use an approved component installer, including qualified vendor staff.

4.6 In-lane System Installation Requirements

683	The Contractor shall supply all personnel, tools, vehicles, materials and Equipment required to perform the complete installation of the Cashless Tolling System, including but not limited to all Equipment and vehicles required for overhead installation Work on the overhead structures/toll gantries; specialty Equipment for preparation and saw-cutting of loops as required, and provide necessary test vehicles to adequately test the installed System in accordance with the Approved test plan.
684	Where the Contractor is providing subsystem components manufactured by a third-party vendor, the Contractor shall ensure that all such components are installed in accordance with manufacturer's installation guidelines. Third-party onsite services shall be obtained as applicable to install, configure and tune the first on-site installation.
685	The Contractor shall provide onsite and remote support for such subsystem manufacturer components as necessary to ensure the proper installation and operation of its Equipment at no additional cost to the Commission. All third-party Equipment and subsystems shall be certified by the manufacturer as being compliant with their installation guidelines and meeting Contract requirements.
686	The installation responsibilities for the Cashless Tolling System shall include but not be limited to:
	• Furnish and install uninterruptable power to all Cashless Tolling System Equipment on the overhead structures/toll gantries and in the toll equipment building. UPS and generator will be provided by the Commission.
	• Furnish and install all connecting conduit from wire ways and conduits provided and installed by others and/or stub conduits to the Equipment. The civil contractor(s) will install the conduits from the toll equipment building to the demarcation point on the overhead structures/toll gantries as shown in *Attachment 6: Installation Demarcation Diagram*.
	• Furnish and install separate ground wires for the Cashless Tolling System, surge protection devices (SPD), junction boxes, pull boxes, conduits, and other such items as required by the installation standards and requirements. All exposed junction boxes, pull boxes and other hardware shall be either zinc coated and epoxy painted or stainless steel;
	• Furnish and install all wiring for all in-lane Equipment and connections to the equipment racks in the toll equipment building. This includes the proper termination of all power, communication, and RF cables and/or wiring (copper or fiber optic) required to connect the individual components into a fully operational System as specified by the manufacturer.

	• Furnish and install all Equipment racks required for the in-lane electronics in the toll equipment building.
	• Furnish and install all AVI readers in the toll equipment building (if applicable) or at Approved Commission location.
	• Furnish and install all zone controller computers (Hardware and Software) into the equipment racks and test it connection to the zone controller and the facility servers (if provided)/ Cashless Toll Host Systems.
	• Furnish and install all electronics and other devices in their respective equipment racks as required to provide a fully operational System.
	• Furnish and install all Equipment mounting brackets to support structures for the installation of all toll system Equipment on the mounting arms on the overhead structures/toll gantries.
	• Furnish and install the AVC system Equipment, including in-pavement sensors and overhead mounted Equipment and controllers as specified by the manufacturer. Includes all the Commission Approved materials, Equipment and supplies required for saw-cutting, wiring and sealing of wires in the roadway.
	• Install the AVI system Equipment, including antennas, readers, related Equipment, cables, and any support brackets required. All AVI mounting Hardware, junction boxes, and cables shall be procured and supplied by the Contractor.
	• Synchronize the new Cashless Tolling System with existing AVI system, including the provision of required cables as needed.
	• Furnish and install the LPICPS Equipment, including cameras, LPICPS illumination, and any video controller Equipment, sensors, Software, controllers/servers, or specialty Equipment associated with the LPICPS.
	• Furnish and install facility servers (if required) in the equipment racks, including Software and test its connection to the zone controller and the Cashless Toll Host Systems.
	• Validate all cable and wire terminations via a test process to ensure that the cable is connected to the correct location on each end and that the cable/wire is properly terminated.
	• Power up and provide a field check out/installation acceptance test of all systems, to be witnessed and Approved by the Commission or its Designated Representative. Provide the completed installation checklist as described in Section III of this Scope of Work.
	• Tuning and testing of the AVI system, as described in, and in full accordance with, manufacturer's guidelines.
	• Calibration and testing of LPICPS in full accordance with manufacturer's guidelines and to meet the OCR/ALPR requirements specified in the Scope of Work (if the option to implement OCR/ALPR is exercised).
	• Calibration and testing of AVC system in full accordance with manufacturer's guidelines.
	• Installation, calibration and testing of the DVAS cameras and Equipment.
	• Furnish and install all necessary toll system specific lighting fixtures and wiring on the gantries to the TEB as required to meet the requirements of the Contract.

	• All other items, materials, and Equipment to complete installation in accordance with the Contract.

4.7 Cashless Toll Concentrator or Toll Host System Installation Requirements (if provided)

687	The Contractor shall coordinate all Cashless Toll Concentrator or Toll Host System installations and testing of the WAN and interfaces to the existing systems with the Commission and existing system integrator.
688	The Contractor shall install all Cashless Toll Concentrator or Toll Host Systems, including primary and secondary concentrator or host servers and central image servers (if provided) at the primary and secondary locations specified in the Scope of Work and Approved by the Commission.
689	All servers, storage devices, communications Equipment, and other Cashless Toll Concentrator or Toll Host System Hardware shall be installed in the designated locations as prescribed in the drawings submitted by the Contractor and Approved by the Commission.
690	The Contractor is responsible for the following activities, including but not limited to:
	• furnish, install, configure and test the necessary servers in accordance with the Approved Design documents;
	• furnish, install and test the storage units and backup devices;
	• furnish, install and test the network Equipment at the primary and secondary Cashless Toll Concentrator or Toll Host locations;
	• validate communications to the Commission installed network equipment at the toll equipment building;
	• establish and validate communications from the Cashless Toll Concentrator or Toll Host System (central servers and image servers) to each of the tolling points at the toll equipment building;
	• establish and validate communications from the Cashless Toll Concentrator or Toll Host System (central servers and image servers) to the existing CSC/VPC system;
	• establish and validate communications from the Cashless Toll Concentrator or Toll Host System to the existing PTC Toll Host system;
	• furnish, install and validate third-party Software and Contractor Software on all servers and Equipment required to support the Cashless Toll Concentrator or Toll Host System;
	• furnish, install, configure and test all servers and Equipment for correct point-to-point installation, proper connectivity, acceptable termination of all cables and successful communications linkage;
	• Configure the Cashless Toll Concentrator or Toll Host System to support interfaces as defined in the Approved ICDs and

	• All other items, materials, Equipment and Software required to complete installation of a fully functional Cashless Toll Concentrator or Toll Host System in accordance with the Contract.

4.8 Installation Checklist

691	The Contractor shall develop an installation checklist that tracks the progress and completion of all installation activities for the Cashless Tolling In-lane System installation and the primary and secondary Cashless Toll Concentrator or Toll Host System facilities installation.
692	The checklist shall be the document detailing those items required for the installation crew and technical team to complete the installation process for all Equipment and components, including terminations, connections and configurations.
693	A copy of the checklist signed and approved by the Contractor, attesting to the completeness of the installation, shall be provided to the Commission after the completion of the installation activities for each lane at each tolling point.
694	The Contractor shall conduct a final inspection of all installations and certify the installation Work.
695	The Commission reserves the right to obtain the services of the Facilities Department to witness the Contractor inspection and conduct an independent inspection. The Contractor shall coordinate and support such inspections at each facility.
696	The checklist shall identify all discrepancies and exceptions and Contractor shall be responsible for all corrections.
697	The checklist shall document all changes identified during the installation process and all such changes shall be Approved by the Commission or its Designated Representative.

4.9 Electrical Work

698	Electrical Work to be performed under this Contract shall include, but not be limited to the following general items of Work:
	• Provide and install surge protection devices as required to protect the Cashless Tolling System Equipment and electronics.
	• Install junction boxes and terminate new cable and conduit attachment devices, where applicable.
	• Bond all conduits, manhole frames, metallic junction boxes, and other conductive items to the grounding system in conformance with the Commission and PennDOT Standard Specifications, the NEC and other authorities that have jurisdiction.
699	All electrical Work shall be performed in accordance with the applicable regulations and Approved by the Commission and other authorities having jurisdiction. Appropriate NEC compliance shall be adhered to with all electrical articles for installation pertaining to wiring, enclosures, and other electrical Equipment in hazardous locations. UL labels shall be provided for all electrical panel boards, enclosures, and accessories.

700	All electrical Equipment must be inspected prior to installation for defects that could damage the Equipment or harm personnel. Any Equipment found to have defects shall not be installed but shall instead be replaced with a fully functioning replacement.
701	All electrical Equipment shall be properly grounded for safety. Equipment shall be furnished with grounding pads or grounding lugs. All ground connections shall be cleaned immediately prior to connection.
702	The Contractor shall provide all grounding material required for installation and all installations shall be in compliance with the applicable standards.

4.10 Lane Closure and Traffic Control Requirements and Conditions

703	The Commission will provide all MPT activities associated with completing Contractor Work during the Implementation Phase. All lane closures shall be coordinated with the PTC and civil contractor and lane closure schedules shall be submitted to the Commission is advance for Approval. Lane closure schedules and lane closure requirements can be found on the Commission website at https://www.paturnpike.com/business/engineering_standards.aspx.
704	In-lane Cashless Tolling Equipment installation shall be scheduled to minimize traffic delay during the installation process. The Contractor shall make every effort to schedule Work around peak traffic movement times. All lane closures shall be coordinated with the Traffic Operations Center.
705	In the event that extended lane closures (lane closure exceeding 2 hours) are required, the lane closures shall be completed between the hours of 11:00 P.M. EST and 6:00 A.M. EST, excluding Holiday periods as set forth in the lane closure requirements.
706	Lane closures scheduled for less than 2 hours shall be Approved by the Commission in accordance with the documentations provided on the website, and shall not occur during peak traffic times, and shall be solely at the Commission's discretion for Approval and continuance in cases where the lane closure is underway.
707	The Contractor shall follow the requirements as stipulated in the latest applicable Commission's Maintenance and Protection of Traffic Standards: https://www.paturnpike.com/business/engineering_standards.aspx.
708	Any Work involving removal/relocation of Equipment (loosening or removal of nuts/screws, cables, connectors etc.) shall be done with appropriate lane closures in coordination with the latest PTC traffic requirements.
709	Activities that require no removal/relocation of Equipment (for example, testing/monitoring functions) shall require no lane closures (Work shall be completed from the structure/walkway above live traffic). Activities shall be limited only to adjusting or shifting tethered toll Equipment in place without removal of Equipment, mounting devices, etc.
710	All Equipment and tools shall be tethered at all times when working above open/live traffic.

4.11 Contingency Plan

711	A detailed contingency plan shall be prepared for reopening closures to public traffic. A general contingency plan shall be included in the Installation Plan; however, a site specific contingency plan shall be submitted to the Commission before Work at the job site begins.

4.12 Work Standards and Requirements

712	The Cashless Tolling System Equipment installation shall be performed to an Approved set of Plans, which has previously been submitted and Approved by the Commission or their Designated Representative.
713	The Contractor shall provide Project management and oversight of all Work performed. At all times when installation Work is taking place, the Contractor shall have an individual designated in the Organization Chart as Site Manager onsite to supervise the installation.
714	The Contractor shall install the Cashless Tolling System Equipment to the highest standards, using experienced and knowledgeable personnel. For example, journeyman electricians shall terminate all cables, wiring, or fiber optic cables.
715	All tools such as crimpers, fiber optic termination tools, and test Equipment shall have been properly calibrated prior to being used.
716	The Contractor shall provide a safe environment for the installation process in accordance with all applicable local, State and federal requirements, as well as any Commission policies. Examples include but are not limited to the following:
	• safety harnesses shall be included and employed on all lifts, and the personnel trained on their use;
	• hard hats and safety vest shall be worn in all construction areas;
	• safety toe shoes shall be worn in construction areas and around active roadways while performing installation processes;
	• Contractor issued identification badges shall be worn at all times, and
	• regular safety meetings shall be scheduled to review safety procedures.

4.13 Design and Documentation during Construction and Installation

4.13.1 Engineering Design

717	The Contractor shall secure the services of a fully-qualified engineering design firm(s) for the purpose of performing all infrastructure related engineering Design (civil, structural, electrical, mechanical, and architectural) and the preparation of related Plans and documentation under the Contract.

718	All Design Work shall be performed under the direct supervision of a Licensed Engineer of the appropriate discipline in the State of Pennsylvania. All design professionals shall be licensed and authorized to practice in the State of Pennsylvania.
719	If the Engineering Design effort is performed by the Contractor, the Contractor shall submit documentation showing that the Contractor has met the required qualifications described in this section.

4.13.2 Document Control

720	The Contractor shall maintain a Configuration Management System to control all Project-related documents and drawings. Each document shall be properly titled, date updated, numbered by revision and version and shall incorporate signature blocks for authorship and approvals. Only the latest Approved drawing version may be used for installation.
721	All documentation regarding the lane Equipment and Cashless Toll Host System Equipment installation shall be maintained by the Contractor. All drawings and other such documentation shall be made accessible to the Commission for review.
722	The Contractor shall maintain all non-conformance reports (NCR) submitted by the inspectors and document the correction and resolution of all issues identified.

4.13.3 Installation Design and Drawings

723	The Cashless Tolling System Equipment shall be installed on existing infrastructure or overhead structures/toll gantries that will be designed and constructed by others separately procured by the Commission.
724	The Contractor shall provide the installation requirements including acceptable tolerances for the Cashless Tolling System Equipment, including all related Plans and documents. The civil designer and civil contractors shall rely on the installation requirements provided by the Contractor to design and construct the overhead structures/toll gantries for the Cashless Tolling System Equipment to function as intended, and Contactor shall be fully responsible for the accuracy of its installation requirements.
725	The installation requirements provided by Contractor shall be consistent with those provided in Contractor's Proposal and shall accommodate the selected design from the samples provided in *Attachment 5: Concept Plan for Overhead Structures/Toll Gantries*.
726	The Contractor shall certify the installation requirements provided as accurate and appropriate for its intended purpose to the satisfaction and Approval of the Commission.
727	Contractor shall indemnify all related parties as more fully described in the Terms and Conditions for any damages that result from reliance on the installation requirements provided by Contractor.

728	The Contractor shall submit shop drawings detailing the installation Design that shall be used onsite for installation Work. Detailed drawings shall be provided for each site where Equipment procured and supplied under the Contact shall be installed.
729	The Contractor shall submit the following Design drawings as part of the drawing package in accordance with the Commission submission requirements, including but not limited to:
	• detailed installation drawing for each piece of Equipment;
	• detailed drawing showing the equipment mounting brackets and details of their installation to the mounting arm;
	• details related to the range of Equipment adjustments;
	• detailed electrical schematics;
	• all junction boxes and panels;
	• detailed equipment rack layout and interconnections drawings;
	• detailed communications layout;
	• power and communications cabling schedules, and
	• pavement installation details for in-pavement sensor installations.
730	During installation the Contactor shall maintain a red line version of the drawing package that is submitted to the Commission upon the completion of the installation.
731	Documentation shall include memos denoting changes or modification to requirements.
732	The Contractor shall submit detailed component level network drawings showing all WAN, LAN and VLAN connections, including connection to the existing PTC Toll Host system and the existing CSC/VPC system.
733	Contractor shall utilize a predefined range of IP addresses provided by the Commission. An IP schematic shall be submitted and Approved by Commission IT Security that shows all the IP addresses for all Contractor supplied Equipment on the network.
734	The Contractor shall submit detailed component level primary and secondary server configuration instructions, including storage device mirroring, backup devices and configuration, and network configuration and testing.
735	The Contractor shall submit detailed instructions on the installation of the operating system, database, third-party Software, and application Software on the servers.
736	All testing required to verify successful installation and operation shall also be documented.

4.13.4 As-Built Drawings/Documents

737	The Contractor shall update the latest drawings with red-lines as changes are incorporated during the installation process. At the completion of the installation of the Cashless Tolling System, the Contractor shall gather all red line drawings.
738	The red line drawings shall be verified and then incorporated into a final As-Built drawing package. This final As-Built package shall include installation drawings, shop drawings and sketches, and other drawing types that may have been used to install the Cashless Tolling System. The As-Built drawings shall include at a minimum power and data connections, installed equipment locations and electronic cabinet/panel layouts.
739	All other documentation used regarding the installation shall be also be finalized and submitted as part of the As-Built submittal.
740	The Contractor shall update and resubmit the latest as-built drawings should any changes be made to the design during the Contract period.

V. CASHLESS TOLLING SYSTEM PROJECT REQUIREMENTS

5.1 Cashless Tolling System Project Management

The Contractor shall employ a Project Management System that is sufficiently detailed to enable the Commission to review and confirm that the Contractor has the necessary management, staff, and controls in place to meet the requirements of the Contract.

5.1.1 Program Management Plan

The Program Management Plan describes how the Contractor plans to implement and manage the Project, including staffing, scheduling and communication procedures for controlling all correspondence, submittals, and other communications between the Contractor and the Commission, and communications with the civil designer, civil contractors, third-party entities and existing contractors.

741	The Program Management Plan shall at a minimum include the following elements:
	• Project scope and key Deliverables;
	• a description of the management and organization of the program, including an organization chart, identification of Key Team Members, their responsibilities and percentage commitment to the Project, tasks leads for each functional area and location and identification of the resources to be used in fulfilling the requirements of the Contract;
	• Project team (Contractor, the Commission, Commission's Representatives and existing contractors) contact information;
	• a description of the Project planning, documentation and reporting methods to be utilized, both for use within the Contractor's staff and externally to the Commission and other entities;
	• a description of the process for communication, escalation and resolution of Project issues with the Commission;

	• meeting schedules for meetings with the Commission and other entities including the form of the meeting as part of the Communication Plan;
	• the Approved Project schedule;
	• a description of the process for reporting, updating and tracking the Project schedule and Project performance;
	• coordination process with the civil designers, civil contractors and management of the RFI process during the infrastructure design phase;
	• coordination process with the civil designers, civil contractors and management of the installation drawing review process;
	• approach to change management, consistent with Contract requirements, including a description of the process for documenting and submitting change requests, the Approval process and how the change management approach will be integrated into day-to-day Project management;
	• approach to document control, including Software (the Commission shall have the capability to download documents using this Software) and tools the Commission will use and have read-only access to via the Web;
	• approach to risk management;
	• approach to Quality Assurance and Quality Control;
	• documenting the invoice submission, invoice backup information, verification, and Approval process;
	• a section with all Approved Project forms including but not limited to, meeting agenda; meeting notes; action items tracking log; monthly progress report, and invoices.
	• an emergency contact list as described further in the requirements below.
742	The Contractor shall identify the tools and products used to manage the Project and the internal controls instituted by the Contractor to guarantee successful delivery of the Project.
743	The Contractor shall develop and submit the Project Management Plan (PMP) to the Commission for review and Approval.
744	The Contractor shall develop and submit a separate Communications Plan to the Commission for review and Approval that addresses the following, including but not limited to:
	• all correspondence shall identify the originator and designated receiver.
	• Tracking of document versions and changes.
	• All invoices shall be submitted with accompanying backup information as required by the Contract and consistent with the Commission processes and invoicing and auditing policies. The Contractor shall work with the Commission to develop the appropriate invoice and back-up materials as a part of the PMP development.
	• All submittals shall be delivered as an enclosure to the Contractor's submittal letter. Each submittal letter shall be limited to a single subject or item. The Contractor's letter shall identify the Contract number, Contract name and subject of the submittal.

	• All items of correspondence, invoices, submittals and documentation shall contain the Contract number and the designated Contract name.
	• Process for validating that all comments provided by the Commission on Contractor deliverables are successfully addressed.

5.1.2 Contractor's Project Management Office

745	The Contractor shall establish a Project management office in the Harrisburg metropolitan area. All Project management activities shall be conducted from this office.
746	The Project manager shall be assigned to the Project management office and shall be one hundred percent (100) percent dedicated to the Cashless Tolling Project for the Implementation Phase of the Contract.

5.1.3 Staffing and Key Team Members

747	The Contractor is responsible for maintaining and assigning a sufficient number of competent and qualified professionals who speak fluent English to meet the requirements of the Contract.
748	The Contractor shall ensure Key Team Members are readily accessible to the Commission or their authorized representatives during the Contractor's performance of this Contract.
749	Contractor is required to provide staff at all times sufficient to meet the Project Requirements and Contract. The following are designated as Key Team Members for this Project and are subject to the Approval, replacement and removal requirements of the Commission for Key Team Members as set forth in the Contract:
	• Project Principal – responsible for the overall conduct and performance of the Project, oversight of the Project, the performance of the Project manager and the Commission's single point of contact for any escalated Project issues that cannot be resolved by the Project manager;
	• Project Manager – responsible for all day-to-day Work, the overall execution and delivery of the Project and the day-to-day Contractor contact person on the Project;
	• Deputy Project Manager – assists the Project manager in the execution and delivery of the Project and the day-to-day operations;
	• Technical Manager, Lane Systems – responsible for management of all In-lane Systems technology resources including selection of the lane solutions, subsystems, Software development and Systems maintenance.
	• Technology Manager, Toll Concentrator/Host System – responsible for management of all technology resources related to the Toll Concentrator/Host System, including Software development, on-going Hardware/Software maintenance, Equipment and Systems and information security as required to satisfy the Requirements of the Contract;
	• Installation Manager – responsible for the installation and Commissioning of the Cashless Tolling System;

	• Quality Assurance Manager – responsible for consistent quality throughout the Design, Development, Testing and Implementation of the Cashless Tolling System through good Quality Assurance and Quality Control practices, and
	• Test Manager – responsible for the overall planning and implementation of the Cashless Tolling System testing program.

5.1.4 Cooperation with Other Contractors and Providers

750	The Contractor shall cooperate to the fullest extent with the civil designers, civil contractors, the Commission and existing contractors to ensure the Cashless Tolling System Implementation and Maintenance Phase do not conflict with or cause any interruption in capability, service or safety issues to the traveling public or customers, or impede the Commission's ability to collect tolls.
751	The Contractor shall cooperate with the civil designers, civil contractors, existing contractors and external parties, as directed by the Commission, to support any activity related to the implementation of cashless tolling, including but not limited to:
	• the Commission employees;
	• the Commission Designated Representatives;
	• other third parties, as directed by the Commission;
	• law enforcement;
	• inspectors;
	• Auditors, and
	• all contractors.
752	The Contractor shall cooperate with and immediately notify the Commission of any customer complaints and system issues identified in the Commission lanes that come to Contractor's attention during the course of Implementation, Testing or Maintenance Phases.
753	The Contractor shall provide and maintain a current emergency contact list for the Commission's use at all times for handling emergencies and escalations. The emergency contact list shall name primary and secondary (multiple secondary contacts as applicable) points of contact for each anticipated emergency type. The emergency contact list shall name the Contractor's preferred points of contact, in order of precedence and shall include, at a minimum, the Contractor's primary Project manager, deputy Project manager, installation manager, technology manager, and other support staff. The purpose of the emergency contact list is to ensure the Contractor can be reached outside normal working hours to address urgent matters.

5.1.5 Monthly Report and Progress Meeting During the Implementation Phase

Monthly Project reports and progress meetings will enable the Commission and the Contractor to monitor the status, progress, and quality of the Work performed on the Project and to take proactive steps to ensure successful delivery of the Project.

754	The Contractor shall provide and maintain a schedule for monthly progress meetings (in addition to the weekly Design/installation meetings during the active Design/installation periods) at a location designated by the Commission. The meeting shall be scheduled no later than the 20th day of the following month.
755	No less than five (5) Business Days prior to the meeting, the Contractor shall submit a draft monthly progress report to the Commission for the period covering the previous reporting period. The Commission shall review and comment on the progress report prior to the meeting.
756	The Contractor shall obtain updated installation status prior to the monthly meeting and include such updates in the Project Implementation schedule which shall be submitted with the monthly progress report.
757	The format of the monthly progress report shall be agreed upon as one of the initial Project tasks upon Notice to Proceed (NTP) and shall be incorporated by the Contractor into the Program Management Plan.
758	The monthly progress report that includes but is not limited to:
	• a summary outlining progress and status, and percentage of Work performed for each task as compared to planned activities in the Project Implementation schedule. Comments shall be included where appropriate. The summary shall also identify key milestones met and missed in the period;
	• an analysis of all critical path tasks, potential risks associated with the tasks and proposed contingency/work around plans to circumvent or mitigate delays to the Project;
	• identification of any Approved changes to Approved milestone dates and Approved Project Implementation schedule, clearly noting the details and identifying the Contract amendment;
	• a discussion of schedule compliance and an updated Project Implementation schedule showing current status against the baseline Approved Project Implementation schedule. Past due tasks shall be updated and actual dates shall be recorded for completed tasks;
	• an updated action items list that tracks the status of all outstanding action items, activities and issues that need decision/resolution;
	• an updated deliverables list showing submission dates, current version, current review status, responsible party and due date;
	• a payment request, if applicable. Payment requests must identify the payment milestone, number and dollar amount. Payments requests shall be made for completed and Approved milestone payments only;
	• a list of change requests (Contractor and Commission initiated) and their status;
	• the previous monthly final meeting minutes, and
	• a six (6) week look-ahead schedule.
759	No more than five (5) Business Days after the meeting, the Contractor shall submit the final monthly progress report and draft meeting minutes for the Commission's review and Approval.

5.1.6 Project Meetings

760	In addition to the monthly progress meeting, weekly or bi-weekly Project status meetings, as applicable and Approved by the Commission, and other regularly scheduled installation and ad-hoc Project meetings shall be required during the course of the Project to address specific deliverables, Work items, Maintenance procedures and issues as they arise.
761	The Contractor shall perform the following tasks related to all meetings, including but not limited to:
	• develop and coordinate the Project meeting schedule;
	• distribute notices of Project meetings in accordance with document control Requirements;
	• prepare the agenda in coordination with the Commission;
	• attend the meeting with all required staff in attendance;
	• prepare minutes of the meeting and forward them to the Commission within five (5) Business Days after the day of the meeting and
	• maintain an action item list for each type of meeting, identifying issues that need to be resolved at the Project level.

5.1.7 Project Schedule

The Project schedule is a comprehensive list of Project milestones, activities and Deliverables, with intended start and finish dates, including a detailed Work Breakdown Structure (WBS) that identifies Project tasks down to the Work package level and the activities required to complete the Work package Deliverables.

762	The Contractor shall provide and maintain a detailed Project Implementation schedule for the Project in Microsoft Project format (Project 2016 or above) that lists all Project activities and tasks for all Phases of the Project, including but not limited to:
	• Requirements;
	• Design;
	• development;
	• testing;
	• installation;
	• Transition, and
	• deployment of the Cashless Tolling System at the various facilities.
763	The Project Implementation schedule shall include coordination with civil contractor, existing contractors and the Commission and shall clearly document all interfacing tasks.
764	The Project Implementation schedule shall identify all milestones and tasks, starting with the NTP through the date of Acceptance and end of Warranty for each implementation location of the Project.

765	The Project Implementation schedule shall be resource loaded, and shall include all draft submissions and review cycles, and all tasks required of the Commission and other contractors with critical tasks.
766	The Project Implementation schedule shall identify all critical path tasks and shall be used to manage the Project.
767	The Project Implementation schedule shall include all tasks for the submission and approval of the final civil drawings identifying the locations of all toll equipment to be install in a toll zone within 60 days of NTP.
768	The Project Implementation schedule shall identify the anticipated Go-Live date of March 31, 2020 for the conversion of Clarks Summit.
769	The baseline for the Project Implementation schedule shall be submitted to the Commission for Approval within fifteen (15) Business Days after NTP.
770	The Contractor shall update the Project Implementation schedule on a monthly basis, as identified in the Requirements for the Monthly progress report.
771	The Contractor shall use the Project Implementation schedule as the basis for all subsequent schedules and updates throughout the duration of the Project.
772	The Contractor shall obtain Approval from the Commission for any and all changes to the baseline Project Implementation schedule and associated milestones in accordance with the Contract process for changes and amendments and are not considered Approved unless an amendment is executed through the Contract.

5.2 End of Contract Transition

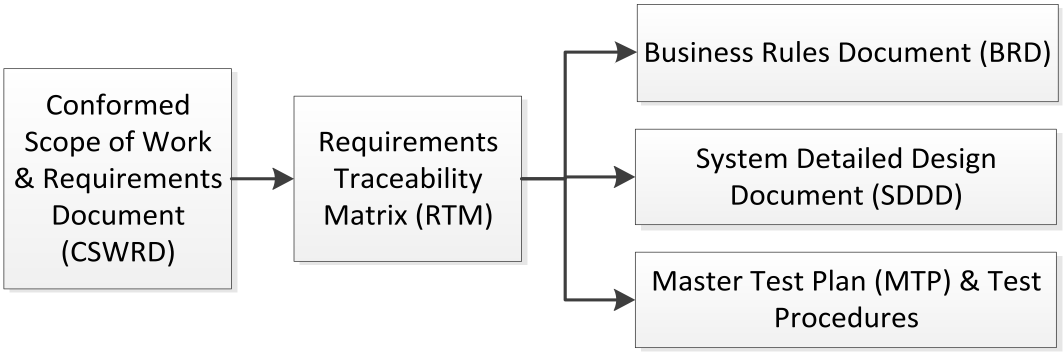
The Contractor acknowledges that the Services it provides under the terms of the Contract are vital to the successful operation of the System and that said Services shall be continued without interruption. Upon termination of the Contract, a successor (the Commission or a new service provider) may be responsible for providing these Services. The Contractor agrees to exercise its best efforts and cooperation to affect an orderly and efficient transition to a successor.

773	Upon the Commission's written notice, the Contractor shall furnish transition Services during the last ninety (90) days of the term of the Contract. The Contractor shall develop with the successor contractor or the Commission staff, a Contract Transition Plan describing the nature and extent of transition Services required.
774	The Contract Transition Plan and dates for transferring responsibilities for each division of Work shall be submitted within thirty (30) days of such notice. Upon completion of the Commission review, both parties will meet and resolve any additional requirements/differences.
775	The Contractor shall provide sufficient experienced lane and Software support personnel in each division of Work during the entire transition period to ensure that the quality of Services are maintained at the levels required by this Contract.
776	The Contractor shall provide sufficient staff to help the successor maintain the continuity and consistency of the Services required by the Contract. The Contractor shall allow the successor to conduct onsite interviews with the employees.

777	The Contractor shall provide the necessary Software and Systems support Services to assist the successor operator in setting up the systems, transfer of appropriate licenses and third-party Software, and transition of all host data required to sustain uninterrupted service.

5.3 Software Design and Development Requirements

The Commission expects the Contractor to propose a baseline product for the lane solution and the Cashless Toll Concentrator or Toll Host System, and that some custom development will be required. To ensure the Design Requirements for the Cashless Tolling System are fully understood by the Commission and the Contractor, a series of Requirements and Design review steps are specified following a sequential Design process or waterfall model. The Contractor shall work with the Commission and its representatives to produce a Conformed Scope of Work and Requirements Document (CSWRD). The CSWRD shall be the basis for the Contractor to produce a Requirements Traceability Matrix (RTM). The RTM allows for verification that the Requirements are addressed in the Design and documented in the System Detailed Design Document (SDDD) and traced to test procedures that validate the developed Cashless Tolling System meets the Contract Requirements. The RTM shall be the basis for all Design, development and testing efforts and documentation to be developed by the Contractor.


Conformed Scope of Work & Requirements Document (CSWRD)
Requirements Traceability Matrix (RTM)
Business Rules Document (BRD)
System Detailed Design Document (SDDD)
Master Test Plan (MTP) & Test Procedures

778	The Contractor shall establish and maintain an effective Software Design and development program along with a documented Software Development Life Cycle (SDLC) to ensure compliance with the Requirements of the Contract.
779	The Contractor shall employ effective techniques and methodologies to develop the System Requirements and Business Rules for the Project.
780	Prior to conducting any workshops, requirements reviews, focus group meetings and Design reviews, the Contractor shall develop the necessary documentation for the Commission review and submit such documentation ten (10) working days prior to such meetings.
781	The Contractor shall provide a Table of Contents for the Design document that identifies the required document Deliverables and any document templates that will be used to develop the documentation. Such documentation shall be tailored for the Project, and the CSWRD shall be used for developing such documentation.

5.3.1 System Requirements Review (SRR)

The Contractor shall conduct a series of System Requirements Review meetings with the Commission to outline how the Contract requirements will be met. The outcome of these meetings shall be a Requirements Traceability Matrix (RTM) that will be used to validate each Requirement against a Design item(s), Design Documentation and testing procedure(s).

782	The Contractor shall conduct a series of System requirements reviews with user groups to identify user needs.
783	The Contractor shall present lane logic and transaction framing rules of the baseline solution. Transaction framing logic shall be further demonstrated according to the workshops described in section 5.3.4.
784	Contractor's existing screens and presentation formats shall be used to solicit user requirements and feedback.
785	During the System requirements review phase the Contractor can also present the Contractor's standard product to the Commission, and use the feedback obtained in the presentation in the development of the Conformed Scope of Work and Requirements Document (CSWRD).

5.3.2 Business Rules Development

786	The Contractor shall conduct Business Rules development workshops with the Commission to develop and document the Business Rules and operational policies for the In-lane Cashless Tolling Systems and the Cashless Toll Concentrator or Toll Host (if provided) System.
787	The Business Rules workshops can occur concurrent to the System requirements reviews.
788	The Contractor shall provide Business Rules utilized at other cashless tolling facilities; however, they shall be tailored to meet the Commission's requirements and shall comply with the Scope of Work.
789	The Contractor shall track the design, development and testing of the Business Rules through the RTM.

5.3.3 Interface Development Workshops

The Contractor shall conduct a series of workshops with the Commission to facilitate the development of the Interface Control Documents (ICD) between the Contractors Cashless Tolling Systems and the existing PTC Toll Host and CSC/VPC.

790	The Contractor shall conduct interface control document (ICD) development workshops with the Commission to develop and document the Cashless Tolling Systems interface requirements between the Cashless Toll Systems and the existing PTC systems.

791	The ICD workshops shall be scheduled within 60 days of NTP and are anticipated to require a minimum of 2 weeks of design.
792	The ICD workshops can occur concurrent to the System requirements reviews.
793	Subject matter experts must provide a means for explaining each interface, its intended purpose, data fields and components and data integrity validation.
794	The interface requirements shall include the following data feeds that include but are not limited to:
	• transaction data file(s) naming conventions and data format requirements for transaction files transmitted from the Cashless Tolling Systems to the existing PTC Toll Host.
	• Image file naming requirements
	• Detailed image file TAG (.tag) file naming conventions and data formats to the CSC/VPC
	• Transponder status list data file naming conventions and data file formats from the existing PTC Toll Host to the Cashless Tolling Systems.
	• interface with SAP for the transmission of monthly toll transaction GL files and GL files received from the CSC (if full Host option exercised);

5.3.4 Transaction Framing and Building Logic Workshops

The Contractor shall conduct a series of workshops with the Commission to present the transaction building and framing process logic. The purpose of the workshops is to provide the PTC with a transparent understanding of the Contractors logic for building and framing transactions.

795	The Contractor shall conduct transaction building workshops with the Commission to walk-thru the logic of building a transaction in the lane.
796	The transaction building workshops shall be scheduled within 60 days of NTP and are anticipated to require 2 weeks of review.
797	The transaction building workshops can occur concurrent to the System requirements reviews.
798	Subject matter experts must provide a means for explaining how data from each lane device or subsystem is used in the framing logic and transaction building process for each vehicle.
799	The transaction building walk-thru shall provide at a minimum but not limited to the following:
	• Flow charts and timing diagrams to show how sensor information is associated with a vehicle.
	• Transponder association and rules for assigning transponders to a vehicle including possible early reads, late reads and cross lane reads. Transponder association shall also include vehicles that have multiple transponders.

	- Logic for determining vehicle classification as defined in *Attachment 4A - PTC Proposed AVC Class Structure and Silhouette*.
	- Logic for LPICS image triggering and corresponding image association to vehicles.
	- Straddle logic for processing vehicles that may straddle between lanes including shoulders.
	- Degraded mode logic to describe the behavior, impacts and limitations on the transaction framing logic.

5.3.5 System Detailed Design Review

Based on the RTM and Business Rules documents, the Contractor will Design the Cashless Tolling System and submit a preliminary Design document for the Commission to review and provide comments. The Contractor will then conduct a series of Design meetings with the Commission to address the comments and to create the System Detailed Design Document (SDDD), defining how the System Design will meet the Contract Requirements. Upon the submittal of an updated SDDD another review cycle will take place.

800	The Business Rules document (BRD) and the RTM shall be used to develop the System Design and the SDDD.
801	The Contractor shall schedule Design meetings with the Commission to fully understand the Design Requirements.
802	The Contractor shall support a phased Design process to support the multi-year implementation of the Cashless Tolling System on the Commission facilities. The Design process shall accommodate for the changes in technology that is inevitable given the duration of the Project.
803	The Contractor shall demonstrate pre-production working products (such as, beta versions) during the Design review process, and stakeholders shall be walked through the workflow, utilizing screens and data flow diagrams.
804	The Contractor shall explain how the System Design meets the RTM, the Business Rules and the Contract requirements.
805	The Contractor shall conduct as many meetings and submission review cycles as deemed necessary by the Commission to address all Design issues to the Commission's satisfaction.

5.3.6 Reports Design Workshops

The Contractor will conduct a series of workshops with the Commission to facilitate the Design of the Cashless Tolling System reports.

806	The Contractor shall employ an effective and productive methodology for Designing and finalizing the reports for the Project.

807	The reports Design process shall be iterative and the Contractor shall conduct multiple workshops with the Commission's stakeholders, and Contractor shall bring subject matter experts to the meeting.
808	Subject matter experts must provide a means for explaining each report, its intended purpose, columns, fields and components and its connection with other reconciling and validating reports.
809	Report templates from existing operational systems shall be submitted and changes to meet the PTC Cashless Tolling System requirements shall be noted. Sample reports shall have correct and accurate data and shall reconcile across other reports.
810	Upon receiving feedback from the stakeholder, the Contractor shall develop/modify the reports and resubmit the updated reports for review.
811	The modified and new reports shall be demonstrated to the Commission using accurate and reconciled data. Reports that are expected to reconcile to one another shall be demonstrated together.
812	The iterative series of workshops and demonstrations shall continue until baseline reports are Approved by the Commission.
813	The Approved baseline reports shall be used as the basis for the Design document.

5.3.7 Software Walkthrough

The intent of the Software walkthrough is to provide an overall status on the Contractor's Software development progress to ensure the Contractor is on track to deliver the Project on schedule and to obtain the Commission's feedback on the direction of the development prior to the full rollout of the Software.

814	The Contractor shall conduct a series of Software walkthroughs including product demonstrations to solicit input from the Commission during the development of the Cashless Tolling System.
815	Prior to the Software walkthrough, the Contractor shall develop and submit the use cases that will be demonstrated to the Commission for review and Approval. The walkthrough shall follow the process flow and emulate normal operations.
816	The product shall be demonstrated in a test environment that allows data to flow as it will in the final integrated System.
817	The Software walkthrough shall demonstrate to the Commission that the developed Software product meets the technical and functional Requirements of the Contract.
818	Comments and feedback provided during the Software walkthrough shall be documented and resolved by the Contractor and the resolution shall be Approved by the Commission.

819	The Contractor shall be responsible for identifying and correcting any Software issues or defects in its Design or product that impact the Contractor's ability to deliver the Cashless Tolling System that meets the Contract requirements. This shall apply to issues or defects found during or after Software walkthrough or in the subsequent testing and Implementation. Any such changes shall be Approved by the Commission in writing.

5.4 Documentation

The Contractor is required to provide various Hardware; Software; Requirements; Business Rules; Design; testing; installation, and Maintenance documentation that include Contractor-developed documentation and third-party documentation. All documentation provided under this Contract shall be specific and relevant to the system proposed to the PTC and void of extraneous information outside what is required and shall meet the requirements described below. All documentation provided shall minimize system generalities and not include system functionality that is not relevant to the PTC Cashless Tolling System(s).

820	The Contractor shall provide and maintain an online, electronic document management system in a central location that is accessible to the Commission by username and password, to control all Project-related documents, submissions and drawings in accordance with the Commission ECO process as defined in *Attachment 12: ETC System Change Control Procedures V1.6 (or the latest Approved version per PTC)* for the term of the Contract.
821	The electronic document management system shall be indexed and searchable.
822	All Project documents submitted under this Contract shall be available to the Commission using the online, electronic document management system provided by the Contractor at all times.
823	The Contractor shall maintain a deliverable tracking list that accurately tracks all Contractor submissions; the Commission's comments review documents; resubmissions and final Approval.
824	Each document shall be properly titled, date updated, numbered by revision and version, and shall incorporate signature blocks for authorship and Approvals. The Contractor shall provide a logical indexing system for ease of access for the Commission to locate documents in the electronic document management system.
825	Updated submissions of the document shall also include the red-lined version showing all revisions to the document since the last submission.
826	The Contractor shall utilize acceptable standards agreed upon by the Contractor and the Commission when updating documents and submitting revisions.
827	All documentation submitted by the Contractor under this Contract shall be accurate and comply with Contract requirements. All Deliverables shall be submitted in accordance with the Approved Project schedule.
828	A Table of Contents, for all documentation that requires one, shall be submitted by the Contractor to the Commission for review and comment prior to the submission of the preliminary draft.

829	The Contractor shall submit a minimum of: a preliminary draft, a final draft and a one hundred (100) percent final to the Commission for review and comment. All final documents shall incorporate all the Commission's review comments to the Commission's satisfaction. Each subsequent submission of a Deliverable shall also include the Commission's comments review log with the resolution of each comment updated by the Contractor.
830	The Commission shall have the right to require additional interim drafts from the Contractor at no additional cost should the draft documentation submitted not be of adequate quality, have missing or incorrect information or if it does not satisfactorily address the Commission's review comments.
831	The Commission shall review and Approve all documents submitted under the Contract. For documents containing less than one hundred (100) pages, the Commission will review and provide comment on preliminary draft documents within ten (10) Business Days. For documents containing more than one hundred (100) pages, the Commission will review and provide comment on preliminary draft documents within fifteen (15) Business Days. The Commission will review and provide comment on all final draft and final documents within ten (10) Business Days. When multiple documents are submitted to the Commission simultaneously, or within one week of each other, the number of Business Days required for review shall be adjusted to reflect the overlapping submissions.
832	The Commission will provide the Contractor with written comments on all submitted documents, and the Contractor shall respond in writing to all comments. A meeting may be conducted to clarify and resolve any remaining questions and issues concerning the comments and responses provided. The Contractor shall prepare a revised version of the document for Approval by the Commission.
833	The Contractor shall submit the electronic version of all Contractor developed documentation for the Commission review and Approval. Acceptable electronic formats are Microsoft Office 2016 Suite (or higher), unsecured Portable Document Format (PDF) and professional CAD applications for Contractor-prepared documentation.
834	The Contractor shall update documentation as changes occur through the Implementation Phase (and the Maintenance Phase) and shall maintain a document submittals list on the electronic document management site identifying all versions of documents, the date submitted, the nature of changes and provide relevant updates to the Commission as they are published.
835	The documentation package for all submittals as applicable shall include all required electronic media to install, operate and maintain the System/Deliverable/document being supplied.

5.4.1 Requirements Traceability Matrix (RTM)

836	Upon completion of the Requirements and Business Rules review process the Contractor shall deliver a Requirements Traceability Matrix (RTM) that details all the technical and functional Requirements for the Cashless Tolling System.
837	The RTM shall build on the specifications documented in the CSWRD and shall capture all user needs identified during the Requirements Business Rules review process.

838	Upon Approval of the RTM, this document shall be the basis for functional verification Design, development and testing.
839	During the Design and development of the Software, the Contractor shall update the RTM to reflect any changes to the Requirements that have been Approved by the Commission.
840	During Design and testing, the RTM shall be used to verify the System compliance to the Contract requirements and test procedures.
841	All changes to the System requirements during the course of the Project shall be tracked through the RTM.
842	The RTM shall include:
	• listing and categorization of all functional requirements;
	• listing and categorization of all Software related technical requirements;
	• identification of the source of all requirements;
	• identification of the Design section of the SDDD that addresses the Requirement and
	• identification of the test procedure that addresses the Requirement.

5.4.2 Business Rules Document (BRD)

As an outcome of the Business Rules workshops and review meetings, the Contractor will provide a Business Rules Document.

843	The Contractor shall submit a Business Rules Document that includes but is not limited to:
	• detailed Business Rules for all aspects of the System, including policies and processes developed by the Contractor and Approved by the Commission;
	• detailed description of all System Configurable options, ranges and thresholds (Configurable within the System or Configurable by Authorized User) for each business rule (if applicable);
	• categorization of all Business Rules, providing indication for the source of the business rule;
	• cross-referencing of all Business Rules to the underlying Requirements and
	• System and operational impacts of each business rule.

5.4.3 System Detailed Design Document

844	The Contractor shall develop and submit a System Detailed Design Document (SDDD) that describes the Design specifications of all Hardware and Software provided as part of the Cashless Tolling System to meet the Approved Contract requirements. The SDDD shall demonstrate that the Contractor understands the functional, technical and performance requirements of the Cashless Tolling System and has the processes, Hardware and Software Design in place to provide a high-quality and reliable product that meets the requirements of the Contract.
845	The SDDD shall be clear, well-written and organized into volumes to manage the submission and review process.
846	The SDDD shall be specific and relevant to the system proposed and designed for the PTC requirements.

847	The SDDD shall include the use of diagrams, figures and tables, and it shall apply to all environments, including primary and secondary production and testing environment.
848	The SDDD shall include but not be limited to:
	• System architecture, including overall System Design concept;
	• in-lane Equipment layout for each zone type,
	• lane layout electrical and logic diagrams;
	• toll equipment building equipment rack layout and interconnections;
	• data backup Systems Design, including sizing and processing calculations;
	• the Requirements for all peripheral device Interfaces and control;
	• server Design, including sizing and processing calculations;
	• storage system Design, including sizing and processing calculations;
	• network sizing and Design details including IP scheme and
	• space Requirements;
	• power Requirements;
	• degraded mode of operations and impacts of failures on System operations;
	• UPS sizing information detailing all Equipment on the UPS(s) and their total power Requirements including all Commission communications equipment regardless of purpose;
	• detailed database Design, schema and entity relationship modeling, including sizing and processing calculations;
	• high System availability Design, including Servers, storage, network, database and application;
	• Disaster Recovery Design, including Servers, storage, network, database, data resiliency and application;
	• Hardware dependencies and inter-dependencies;
	• detailed infrastructure Software Design,
	• detailed operating systems Design;
	• detailed primary and secondary locations rack and server placement Design;
	• detailed desktop computer Hardware configurations;
	• detailed desktop computer Software configurations;
	• detailed desktop peripherals configurations, including Requirements for all peripheral device Interfaces and control;
	• all internal System Interfaces;
	• all custom developed Software;
	• all Software provided by the Contractor or a third party;
	• Software dependencies and inter-dependencies;
	• data flow diagrams, state diagrams and data queues;
	• Module level descriptions and interaction among various Modules;

	• detailed description to the Module and/or process level for all of the functions according to the functional Requirements of the System;
	• lane logic and vehicle framing design and rules with illustrations;
	• degraded mode of operations and impacts of failures on System operations;
	• transaction audit and pre-processing;
	• transaction processing Design, including sizing and processing calculations;
	• detailed Interface specifications between all Software components;
	• Design of all System Interfaces (both sides of the Interface), including electronic Interface to the existing PTC Toll Host system and the existing CSC/VPC system.
	• formal and standard Interface Control Documents for documenting both sides of the Interface for all interfaces;
	• detailed data management Design and processes, including summarization, archiving and purging;
	• all user Interfaces (including reports and screen formats);
	• System data dictionaries;
	• application performance monitoring Design;
	• access/identity security methodology;
	• security access system layout and interconnections;
	• cabinet interconnection diagrams;
	• environmental specifications;
	• specification sheets for all Equipment;
	• complete Bill of Materials, including Hardware, Software and support/Maintenance agreements;
	• A logical division and an index of all contents within the SDDD.
849	Upon the completion of the Software development, and prior to transitioning the Cashless Tolling System, the Contractor shall submit the Final Updated SDDD that includes all changes/clarifications made during the Software development and testing phases.

5.4.4 Cashless Tolling System Installation Design Requirements Package

850	The Contractor shall prepare and submit the Cashless Tolling System Installation Design Requirements and Documentation package to the Commission for review in accordance with the Approved Project Schedule.
851	The Contractor shall secure the services of a fully qualified engineering design firm(s) for the purpose of providing electrical, mechanical, structural oversight, and documentation Approval for all installation drawings where applicable.
852	All drawings shall be sealed, stamped, and certified by a Licensed Engineer of the appropriate discipline valid in the State of Pennsylvania where applicable.

853	The Contractor shall develop a full size (24” by 36”) set of drawings providing sufficient and accurate detail to install the System components.
854	Sealed, stamped, and certified drawings shall be provided for each site where Equipment shall be installed.
855	In addition, the drawing shall contain notes and other detail defining specific processes that cannot be graphically depicted. The notes shall also be used to delineate specifications, tolerances, special conditions, or any other factor required to install and integrate a fully functional System.
856	The drawings shall include but not be limited to the following:
	• lane geometry and dimensions of actual size and placement of all Cashless Tolling In-lane Equipment;
	• Equipment bracket mounting detail to the mounting point, including how the mounts will be brought on the platform for Maintenance, if applicable;
	• specifications and tolerances;
	• conduit and cable schedule showing all conduits, cables and wires used for the Cashless Toll Zones;
	• placement of in-road components;
	• size and depth of loop cuts;
	• loop tolerances (such as induction, resistance, impedance, Q factor, if applicable);
	• any specific infrastructure limitations (for example, proximity of rebar);
	• any specific requirement of how the loop cable is placed into the cuts;
	• all homeruns from loops;
	• any cable twist requirements for loop homeruns;
	• placement of overhead sensors;
	• details describing termination process for each termination;
	• lightning and surge suppression system;
	• a graphical diagram of the network connectivity and data flow;
	• detailed interconnection diagrams for all Systems;
	• detailed electrical schematics, and
	• detailed communications layout.

5.4.5 Cashless Toll Concentrator or Toll Host System Installation Design and Documentation (if provided)

857	The Contractor shall prepare and submit the Cashless Toll Concentrator or Toll Host System Installation Design and Documentation package to the Commission for review in accordance with the Approved Project Schedule.

858	The Contractor shall develop a full size set of drawings (24" by 36") providing sufficient and accurate detail to install the System components.
859	The drawings shall include but not be limited to the following:
	• detailed interconnection diagrams for all Systems;
	• detailed electrical schematics;
	• detailed communications layout;
	• UPS sizing specifications;
	• Equipment rack layout, including power panels and connection to the UPS;
	• a detailed diagram of the network connectivity, including IP scheme;
	• server set-up and configuration;
	• other Toll Concentrator or Toll Host System Hardware installation and connections and
	• floor loading calculations.
860	The Contractor shall provide the installation Requirements for the Equipment, including all related Plans and documents. The Contractor shall certify the installation Requirements provided as accurate and appropriate for its intended purpose, to the satisfaction and Approval of the Commission.
861	The Contractor shall submit Server room drawings that show the location of the Equipment racks for all Cashless Toll Concentrator or Toll Host System Equipment at the primary facility. The layout of the Server components, storage devices and communication Equipment inside the cabinets shall be clearly presented with actual measurements shown.
862	The Contractor shall submit Server room drawings that show the location of the Equipment racks for all Cashless Toll Concentrator or Toll Host System Equipment at the Disaster Recovery facility. The layout of the Server components, storage devices and communication Equipment inside the cabinets shall be clearly presented with actual measurements shown.
863	The Contractor shall develop and submit to the Commission a full size (24" by 36") set of drawings, providing sufficient and accurate detail to install the System components.
864	The Contractor shall submit UPS sizing information for the primary and Disaster Recovery facilities, detailing all Equipment on the UPS and their power specifications.
865	The Contractor shall submit detailed network drawings showing all WAN, LAN and VLAN connections, including all interface connections and IP addresses for all Equipment on the network.
866	The Contractor shall submit detailed Server configuration instructions, including the configuration of storage devices, backup devices and network connectivity.

5.4.6 Quality Assurance Plan

867	The Quality Assurance (QA) Plan that details the Contractor's QA Program shall be submitted to the Commission for review and Approval in accordance with the Approved Project Schedule.

868	The QA Plan shall include the Contractor's QA Program through planning, documentation; Design; Development; production; purchasing; testing; and installation of all Hardware and Software provided under this Contract.
869	The Quality Assurance Plan shall describe the quality assurance procedures and methodology for the Project, including but not limited to:
	• quality management and organizational structure;
	• System Design;
	• Software development and defect management;
	• installation including civil installation sign-off;
	• Equipment purchase, delivery and validation;
	• inspection and verification for in-process, final assembly, unit tests and System testing;
	• configuration management;
	• change management and change control process;
	• training and safety;
	• quality management documentation;
	• transition;
	• compliance to Contract Requirements;
	• quality review and verification and
	• reporting and metrics.

5.4.7 Software Development Plan (SDP)

870	The Contractor shall develop and submit a Software Development Plan (SDP) that includes but is not limited to:
	• documentation of the Software development approach to the application architecture, behavior, architecture, business processes, security and data structures;
	• approach System Design and Development given the Cashless Tolling System Project phasing;
	• development resources and responsibilities, such as Software developers, system engineers, security engineers, test engineers, Quality Assurance and control personnel, configuration management administrator, documentation specialists and Project management staff;
	• describe natural segregation of development areas or teams, such as development of user Interfaces, development of reports, development of the functionality and development of Interfaces;
	• Software development standards;
	• security standards;
	• Software development methodology, such as use cases, modeling and other development tools;

	• Software development language strategy, platforms and technologies related to both development and Software Maintenance;
	• description of the Software Development Life-Cycle and Maintenance;
	• approach to segregation of environments (development, testing and deployment) and the number of environments;
	• Maintenance of standard and baseline codes and management of major releases;
	• gap analysis of baseline code to Contractor Requirements;
	• development problem reporting, defect tracking and remediation;
	• code reviews and code development standards;
	• source control;
	• informal and internal testing methodology;
	• regression testing and security and vulnerability testing;
	• development and integration approach for the major functional modules;
	• Software Quality Control processes;
	• Software end-user documentation review and usability;
	• development documentation;
	• technical Software code documentation and standards for all code;
	• Software configuration and change management approach and standards;
	• samples of detailed Software documentation for both external and in-line documentation;
	• Software deployment approach, release management and validation and
	• detailed documentation of the development environment, including enough information that the environment could be completely replicated.

5.4.8 Master Test Plan (MTP)

871	The Contractor shall provide to the Commission, for review, comment and final Approval a Master Test Plan (MTP) that outlines the scope and testing concepts to be used to administrator each test identified in the Contract. The MTP shall document the methodology used to validate the Cashless Tolling System compliance to the requirements and demonstrate the Cashless Tolling System satisfies Technical, Functional and Performance Requirements.
872	The Approved Master Test Plan shall be used as the basis for the detailed test procedures that shall be submitted to Commission for review and Approval.
873	The Master Test Plan shall cover all aspects of the In-lane Cashless Tolling System and the Cashless Toll Concentrator or Toll Host (if provided) System testing from initial development through deployment, tolling point Acceptance and Project Acceptance, including but not limited to:
	• overall approach to testing;
	• approach to each informal and formal testing;

	• approach to creation of data set for each test;
	• Regardless of AVI requirements or options, approach to transitioning to the new interoperable solution including subsystem (lane, plaza and host) testing, AVI subsystem testing (individual protocol performance up to and including all active protocols) and end-to-end integration testing;
	• Software test automation tools utilized for each test;
	• approach to validating all System requirements through the testing methodology;
	• describe the entry and exit criteria for each test;
	• document the severity and priority descriptions and levels for each test;
	• include a detailed schedule for each test identifying each test activity and resource;
	• describe the methodology for testing the performance requirements and sample size for each phase of testing;
	• describe the methodology for load testing;
	• describe the purpose; scope; duration; System resources, and human resources for all tests;
	• approach to validating all reporting Requirements;
	• approach to end-to-end testing, validation and Reconciliation;
	• approach to interface testing and compliance to standards,
	• document how defects will be triaged; tracked; reported; resolved, and retested, including tools used to document defects, and
	• a set of regression test procedures that will be exercised each time Software changes are made after the Approval of the FAT.
874	The Contractor shall provide detailed test procedures for the Commission's Approval for each test outlined in the Requirements and Approved MTP, including but not limited:
	• test logistics including test vehicles; drivers and test equipment;
	• test scenarios;
	• detailed test steps with expected outcomes;
	• test entry and exit criteria;
	• test preparation;
	• test data creation;
	• periodic status meetings;
	• all necessary human resources and
	• all necessary Hardware and Software.
875	The Commission's Approval of any aspect of testing shall not relieve the Contractor of its responsibility to meet the full requirements of the Contract.
876	The Contractor shall update the RTM linking every Requirement to a set of test cases to demonstrate the Requirement has been satisfied and which test satisfied the Requirement.

5.4.9 Maintenance Plan

The Contractor shall submit Maintenance Plans listed below that describes how the Contractor plans to facilitate the Commission in performing the Maintenance of the Cashless Tolling In-lane Systems, Cashless Toll Host System, and all Hardware at the toll equipment building in accordance with the requirements of the Contract. The Contractor shall have appropriate documentation available to all Maintenance and Software Support personnel, as required to perform their respective duties.

5.4.9.1 System Maintenance Plan

877	The System Maintenance Plan defines the approach to Services, staffing and resources to fulfill the System Maintenance requirements. The Plan shall include:
	• organizational structure, organizational chart and job descriptions and responsibilities; • detailed matrix of responsibilities (Commission and Contractor);
	• staffing plan;
	• approach to staffing and training;
	• detailed System monitoring requirements;
	• coverage and personnel locations;
	• third party System support agreements overview;
	• schedule of all System Maintenance activities;
	• all System Maintenance related communication methods;
	• Maintenance procedures, communication protocols and approval processes for System upgrades, scheduled Maintenance activities, change management and scheduled downtime;
	• Maintenance procedures and communications protocols for unscheduled downtime;
	• communication protocol for coordination with interoperable agencies and third-party entities;
	• communication protocol for coordination with the Commission's existing contractors;
	• trouble reporting processes;
	• escalation processes;
	• spare levels and reorder thresholds, Equipment and Software warranty tracking and return material processes;
	• monitoring the MOMS Dashboard;
	• monitoring Maintenance performance for compliance to performance requirements;
	• sample Maintenance reports;
	• Equipment replacement/refresh schedule;
	• upgrades to third-party Software and tools, and
	• process in place to meet Maintenance performance requirements.

5.4.9.2 Software Maintenance and Warranty Plan

878	Software Maintenance and Warranty Plan shall define the approach to Services, staffing and resources to fulfill the Software Maintenance and warranty requirements including but not limited to:
	• organizational structure, organizational chart and job descriptions and responsibilities; • detailed matrix of responsibilities (Commission and Contractor);
	• staffing plan;
	• approach to staffing and training;
	• approach to receiving and prioritizing Software defects (bugs);
	• reporting, categorization, prioritization, remediation and disposition of Software defects;
	• coverage and personnel locations;
	• all Software Maintenance related communication methods;
	• Maintenance procedures, communication protocols and approval processes for Software upgrades, Software releases, testing, scheduled Maintenance activities, change management and scheduled downtime;
	• Maintenance procedures and communications protocols for unscheduled downtime;
	• trouble reporting processes;
	• escalation processes;
	• sample Maintenance reports;
	• Software updates and testing to comply with E-ZPass Group specification changes, and third-party interface changes;
	• Software and security updates, remediation and testing to be compliant to Commission Audit requirements, and
	• process in place to meet Maintenance performance requirements.

5.4.10 Disaster Recovery Plan

The Disaster Recovery Plan (DRP) shall be a comprehensive, documented statement of actions to be taken before, during and after a disaster to protect and recover the information technology data, assets and facilities of the Cashless Tolling System.

879	The Contractor shall develop and submit a Disaster Recovery Plan (DRP) and subsequent Disaster Recovery Procedures that describe the approach, as well as activities and procedures that take place in the event of a disaster for each element of the Cashless Tolling System.
880	The DRP shall document the Contractor's approach to recovering from a disaster, including but not limited to:
	• events that constitute a disaster and party responsible for declaration of a disaster;
	• assessment of disaster risks;
	• mitigation of disaster risks;

	• preparations in the event of a disaster;
	• disaster declaration and Disaster Recovery process to invoke;
	• organization chart illustrating Disaster Recovery team members, roles and responsibilities;
	• notification contact list, including contact information;
	• notification protocol;
	• sites and Equipment for Disaster Recovery, presented in a diagram format;
	• Disaster Recovery process initiation and completion checklist;
	• Software and data replication processes;
	• detailed logistical processes for activation of Disaster Recovery site and systems;
	• detailed technical processes for activation of Disaster Recovery site and systems;
	• detailed operational functions for activation of Disaster Recovery site and
	• detailed technical processes for reactivation of primary site (or moving to a new primary site if the original primary site is destroyed), Operations and Systems.
881	The DRP shall be tested no less than annually.
882	The DRP shall include a Business Continuity Plan (BCP) that details the Contractor's approach to accommodating the personnel, Equipment, Systems, network, applications and data components required to ensure the resumption and continuity of critical Cashless Tolling System processes.
883	The BCP, based on a Business Impact Analysis to assess the needs of the Commission business areas, shall include but not be limited to:
	• Recovery Point Objective (RPO) maximum acceptable amount of data loss for all critical Cashless Tolling System services after an unplanned data-loss incident, expressed as an amount of time;
	• Recovery Time Objective (RTO) maximum acceptable amount of time for restoring a critical Cashless Tolling System services and regaining access to data after an unplanned disruption;
	• Level of Service (LOS) the combination of throughput and functionality required to sustain Cashless Tolling System business Operations and
	• detailed description of how site and System security will be maintained to ensure continued compliance with security requirements.

5.4.11 Training Program and Plan

884	The Contractor shall develop and maintain a training plan, subject to Approval by the Commission.
885	The training plan shall describe the plan for training new personnel and shall outline the required operational/maintenance and system knowledge for each position to be gained from the training. For each position/user type, the plan shall include a training instructor guide, training manual and other materials to be used in training. The plan also shall include a schedule for follow-up training and continuing education for staff.

886	The training plan shall provide a plan for cross-training staff from other areas of operations or management for peak period, emergency or temporary assignments to provide for staff redundancy. The training plan also shall include the training schedule for regular staff training and continuing education/training.
887	The Contractor shall submit a training plan, in accordance with the Approved Project schedule, that describes the approach to training administrators, end users at different levels, Maintenance and support personnel, including but not limited to:
	• overall description of the training program;
	• training techniques;
	• training delivery schedule;
	• names and descriptions of each training class;
	• purpose of each training class;
	• who should attend the class;
	• qualification Requirements for trainer;
	• minimum qualifications for personnel attending the class;
	• duration of the class;
	• training materials, including syllabus, schedule, training goals, manuals, guides, other support materials and techniques to be used;
	• data preparation, such as test Accounts and test transactions;
	• required Equipment and
	• facility Requirements.
888	Courses shall be limited to a maximum of eight (8) hours per day.
889	The Contractor shall be responsible for maintaining a training database baseline and supporting data files that can be restored at the beginning of each training session.

5.4.12 Third Party Documentation

Third-Party documentation includes standard commercial documentation for third-party provided Hardware, Software, Services and materials.

890	The Contractor shall catalogue all third-party documentation and include the catalogue with the third-party document submissions.
891	The Contractor shall provide and maintain standard, commercially available, updated documentation for third-party provided Hardware, Software, Services and materials provided under this Contract. This set of third-party documentation shall be retained at the Commission offices for the duration of this Contract and upon termination of the Contract.
892	All updated documents shall show the revisions and also include a version of the clean document.

893	An electronic copy of all third-party COTS Hardware and Software installation and user manuals, with updates, shall be provided to the Commission. Acceptable electronic formats are Microsoft Office 2010 Suite or higher, unsecured Portable Document Format (PDF) and professional CAD applications.
894	Documentation shall include sufficient detail to describe the configuration of the Software as it was installed by the Contractor for the Cashless Tolling System. These should include any customization or modifications made to the Software or configurations specific to the Commission environments.
895	The Contractor shall provide all Hardware and Software installation and user manuals for custom-developed (non-COTS) third-party products and services in a printable electronic format.

5.4.12.1 Third-Party Software Documentation

896	The Contractor shall provide third-party Software documentation, including but not limited to:
	• all user manuals;
	• programmer's reference manuals;
	• warranty documentation;
	• installation manuals;
	• Interface documents;
	• Maintenance manuals and
	• any other information required to utilize the Software, such as the operating system, utilities, programming languages, application Software and communications Software.
897	The third-party Software documentation shall be provided by the Contractor electronically in a standard and organized format, with appropriate labels, tabs and cross references to allow the Commission to easily access and reference information on each Software component on the System.

5.4.12.2 Third-Party Hardware Documentation

898	The Contractor shall provide third-party Hardware documentation, including but not limited to:
	• all technical manuals;
	• operator's guides;
	• installation guides;
	• warranty documentation;
	• Hardware reference manuals;
	• available options and versions;
	• catalogs, components and
	• illustrated parts lists.
899	The Contractor shall provide all third-party Hardware documentation in a standard and organized format, with appropriate labels, tabs and cross references to allow the Commission to easily access and reference Hardware information on each Equipment component.

900	Third-party Hardware documentation shall include sufficient detail to describe the configuration of the Hardware as it was installed by the Contractor for the Cashless Tolling System.

5.5 Manual Requirements

Various manuals shall be provided as described below to allow the Commission to understand the operations of the Cashless Tolling In-lane System and Cashless Toll Concentrator or Toll Host System (if provided). New manuals developed under this Contract that are not standard commercial catalogs or manuals, shall meet the Requirements set forth in this section.

901	The Contractor shall submit the Project manuals to the Commission for review and Approval in accordance with the Approved Project Schedule.
902	Whenever possible, all data shall be printed on 8-1/2" x 11" sheets; foldouts shall be 11" x 17".
903	Each manual shall include, but not be limited to:
	• a title sheet;
	• revision history;
	• Table of Contents;
	• list of illustrations (if applicable);
	• list of reference drawings and Exhibits (if applicable) and
	• a parts list (if applicable).
904	All manuals shall have a consistent look and feel and shall be professionally written and presented in clear and organized fashion.
905	All manuals prepared for the Commission under this Contract shall be produced, or editable, using Microsoft Office 2016 Suite (or higher). In addition, electronic copies of manuals shall be provided in unsecured Portable Document Format (PDF), if requested by the Commission.
906	Any special Software required to produce scalable typefaces or other graphs shall be provided by the Contractor as part of the documentation for the manuals.

5.5.1 Manual Submissions and Quantities

907	The Contractor shall submit electronic copies of all manuals listed below.
908	All manuals shall be maintained in electronic format in the Contractor's document management system for the term of the Contract.
909	The Contractor shall be responsible for producing a quantity of the manuals for the Contractor's use, sufficient to fulfill the Contractor's Requirements under the Contract.

5.5.2 Manuals to be Submitted

5.5.2.1 Cashless Tolling Lane Maintenance Manual

910	The Contractor shall submit Cashless Tolling Lane Maintenance Manual prepared for properly trained technical personnel assigned to the Maintenance of the Hardware and Software installed under this Contract on the Commission cashless tolling lanes. All manuals should be used for the training sessions. It shall document information required to support cashless tolling lane Maintenance and repair activities, including but not limited to:
	• lane Equipment layout for each Cashless Tolling Zone Type;
	• schematics and layouts of the Hardware in the lane cabinets, equipment racks and the interconnection diagrams;
	• parts lists required to service each piece of Hardware installed under this Contract;
	• general and detailed description and concepts of lane operations and functions;
	• detailed lane monitoring activities, specialty tools and schedule;
	• detailed Software monitoring activities and troubleshooting procedures;
	• Maintenance instructions to repair and replace parts and modules;
	• mechanical functions and installation of all Hardware;
	• listing of all event and error logs;
	• testing and basic troubleshooting procedures, and
	• preventive and corrective Maintenance procedures.
911	Standard service manuals for commercial products used for the Equipment shall be acceptable if they contain sufficient information to properly service the Equipment.
912	Large-size logic diagrams and mechanical assembly diagrams do not have to be reduced or incorporated into the manuals if these drawings are provided with the manuals and presented in a useable and durable form.
913	Photographic documentation of Equipment with appropriate labels and call-outs are satisfactory if they contain sufficient information to properly identify components, parts and features.

5.5.2.2 Cashless Tolling System Monitoring Manual

914	The Contractor shall submit the Cashless Tolling System Monitoring manual prepared for properly trained personnel assigned to monitoring the operations of the Cashless Tolling System including transmission of data and files to existing systems. All manuals should be used for the training sessions. It shall document information required to support Cashless Tolling System monitoring, including but not limited to:
	• all Dashboards, monitoring screens, notifications and data that needs to be checked;
	• listing of all jobs/process, their dependencies and their schedule;
	• listing of all folders and directories that need to be checked;

	• details related to the activity that needs to be checked;
	• frequency of the validations;
	• actions to take when results are not as expected;
	• notification and escalation process;
	• basic troubleshooting procedures, and
	• creation of work orders in MOMS.
915	Provide description about the tools and software for personnel to record the monitoring activity and instructions to use the tools/software.

5.5.2.3 Cashless Toll Systems Administrators Manual

916	The Contractor shall provide an Cashless Toll Systems Administration Manual that serves as a guide to the overall management and administration of the Cashless Toll Systems and shall include:
	• description of the programs and processes that need to be monitored to ensure that the System is operational;
	• procedures for validating tasks, processes and jobs have successfully completed, and errors and exceptions encountered;
	• procedures for validating the successful transfer and receipt of files for all interfaces, including existing PTC Toll Host system and the existing CSC/VPC system;
	• a listing of all the error codes, their meaning and potential associated problems shall be included in the manual, with a step by step guide to troubleshooting and correcting the problem;
	• all database Design, and database Maintenance activities required to keep the System operational shall also be clearly documented, including the scheduling of such activities;
	• detailed procedures for backup, archiving and purging data;
	• detailed schedule for all preventative Maintenance activities;
	• technical contact lists for Hardware and Software providers;
	• details and copies of all third-party system support agreements and
	• ad-hoc reporting tools and use of the tools to generate ad-hoc reports shall be documented, and
	• details of monitoring tools supplied by the Contractor to include but not limited to MOMS Dashboards and MOMS.

5.5.2.4 Cashless Toll Systems User Manual

The Contractor shall develop and provide a comprehensive set of system documentation and user manuals for the Cashless Toll System users. At a minimum, the documentation shall include all user and training manuals, a reports definitions and data flow diagrams.

917	The Contractor shall develop and submit Cashless Toll Systems User Manuals to be used by Commission staff to operate the Cashless Toll System and for training purposes.

918	The Contractor shall develop a separate manual for each job category that details all the processes, procedures and policies developed by the Contractor and Approved by the Commission required to fulfill the Requirements of each specific job description.
919	Each Cashless Toll Systems User Manual shall include but not be limited to:
	• screen images detailing the step-by-step activities needed to fulfill a specific functionality;
	• flowcharts to provide Commission staff a clear understanding of the workflow;
	• all screens, reports and data fields, clearly explained using sample formats applicable to the Cashless Toll Systems and
	• samples of all reports, included in the manual or as an attachment to the manual, with any specific instructions that may apply to a given report.

5.5.3 As-Built Documentation

Prior to the Commission Acceptance of each tolling location of the Project, As-Built documentation shall be provided that documents the final Cashless Tolling System Design and Implementation.

5.5.3.1 System Detailed Design Document

920	After the Approval of the Operational and Acceptance Test and prior to the Commission Acceptance of the Cashless Tolling System, for each tolling location of the Project, the Contractor shall submit the As-Built System Detailed Design Document (SDDD) that includes all Software and Hardware changes made during the System development, Implementation, and testing Phases.
921	The Contractor shall submit an electronic version of the As-built SDDD in a printable format Approved by the Commission.
922	The Contractor shall update the latest as-built SDDD should any changes be made to the system design after System Acceptance as a result of functional upgrades or Approved change orders during the Contract period.

5.5.3.2 As-Built Drawings

923	The Contractor shall provide to the Commission a complete set of As-Built drawings which shall be delivered in a readily printable in full and half size formats from the electronic format Approved by the Commission for all Equipment installed and furnished under this Contract.
924	As material changes are made to the System the Contractor will be required to update the As-built drawings to reflect the current status.
925	The sets shall include, but not be limited to:
	• all schematics;
	• logic diagrams;
	• layouts;
	• wiring diagrams;

	- interconnection diagrams;
	- all attachment hardware details;
	- installation diagrams;
	- cable schedule;
	- Interface details;
	- facility build-out details and
	- network diagrams, so as to provide a complete record of the as-built status of the Equipment.
926	All drawings for revisions to standard commercial assemblies or components for the Equipment shall be included in the As-Built drawing set.
927	All As-Built drawings shall contain a table of contents that shall include a listing of all drawings with headings for drawing number, drawing title, revisions number and date, and the type of material list, wiring diagram, wire list, specification control drawing, or similar categories.
928	The Contractor shall update the latest drawings with red lines as changes are incorporated during the installation process. At the completion of the installation, the Contractor shall gather all red line drawings.
929	The red line drawings shall be verified and incorporated into a final as-built drawing package. This final as-built package shall include all updated installation drawings, shop drawings and sketches, Plans and other drawing types that were used to install the Cashless Tolling System.
930	All other documentation used regarding the installation also shall be finalized and submitted as part of the as-built submittal.
931	The Contractor shall update and resubmit the latest as-built drawings should any changes be made to the system design or configuration after System Acceptance during the Contract period including interoperability and multiprotocol updates.

5.6 Quality Assurance Program

The Contractor shall establish and maintain an effective Quality Assurance (QA) program on all aspects of the Cashless Tolling Project to ensure compliance with the Contract. This Quality Assurance Plan will detail the process and procedures instituted by the Contractor to ensure the QA program is in place.

932	The Contractor shall establish and maintain an effective Quality Assurance (QA) program that ensures adequate quality throughout all areas of Cashless Tolling Project Contract performance.
933	All supplies and Services under this Contract, whether manufactured or performed within the Contractor's facilities or at any other source, shall be controlled by the Contractor at all points necessary to ensure conformance to the requirements of the Contract.
934	Purchase, delivery, verification, testing and assembly of Equipment, Hardware and Software conducted within the Contractor’s facilities and on-site shall be controlled completely by the Contractor.

935	Delivery, verification, testing and assembly of Servers and network Equipment conducted within the Contractor's facilities shall be controlled completely by the Contractor.
936	The QA program shall provide for the prevention and ready detection of discrepancies and for timely and positive corrective action.
937	The QA program shall include effective Quality Control of purchased materials and Subcontracted Work.
938	The Contractor shall make objective evidence of quality conformance readily available to the Commission, and the Commission shall have the right to review and verify the Contractor's compliance to the process.

5.6.1 Records

939	The Contractor shall maintain records or data essential to providing objective evidence of quality until the expiration of the Contract and these records shall be made available to the Commission upon request.
940	Quality-related records and data shall include but not be limited to:
	• inspection and test results;
	• records of Subcontractor QA programs;
	• cost records pertinent to Acceptance of nonconforming material;
	• inspection check-off of civil contractors work;
	• change request documentation;
	• Design reviews and walkthroughs and
	• results of internal and Contractor audits.
941	Records shall be maintained in a manner that shall allow for access and analysis of the status of the overall QA Program and in a format as defined in Section 5.4 Documentation.

5.6.2 Control of Purchase

942	The Contractor shall be responsible for ensuring that all supplies, components, developmental tools, assemblies, subassemblies, and Services procured from Subcontractors and vendors conform to the technical requirements and Contract.
943	The Contractor shall have a quality control process in place for tracking and handling non-conforming Equipment and products.
944	The Contractor's responsibility includes the establishment of procedures for the selection of qualified Suppliers. In selecting qualified Suppliers, the Contractor shall ensure that the Subcontractors and vendors control the quality of the supplies and Services provided.

5.6.3 Handling, Storage and Delivery

945	The Contractor shall document the approach to assembly of the Equipment, including the location where Equipment and Systems are assembled.
946	The Contractor's QA Program shall provide for adequate and documented handling, storage, preservation, packaging, and shipping instructions to protect the quality of products.
947	Commission assets, as defined by the Commission during the design process, shall be tracked and entered into the MOMS inventory and the cost and location of each asset shall be recorded.
948	All assets designated by the Commission shall have an inventory tag or labeling mechanism for the electronic data entry and tracking of Commission equipment by location and cost within the MOMS, subject to Approval by PTC during the design process. The tagging or labeling mechanism shall be readily and efficiently available to Authorized staff and automatically updated in MOMS.
949	Any unique or special requirements applicable to procured items shall be delineated in the procurement documents. All procurement documents shall be made available to the Commission upon request.

5.6.4 Inspection at Subcontractor-Vendor Facilities

950	The Commission reserves the right to inspect, at the source, supplies or services not fabricated or performed within the Contractor's facility.
951	The Commission's inspection shall not constitute Acceptance, nor shall it in any way replace the Contractor's inspection activity or relieve the Contractor of the responsibility to furnish an acceptable end product.

5.6.5 Access to/Inspection of Contractor's Facilities

952	Upon request, the Commission or its Designated Representative shall have access to the Contractor's facilities and personnel.
953	This access may be restricted to those portions of the facilities and personnel involved with or who are otherwise performing Work under this Contract.
954	Such access shall be for the purpose of inspecting the facilities; verifying progress; inspection of materials; Work-in-progress; or finished goods, or verifying test performance or results.
955	The Commission's inspection shall not constitute Acceptance or Approval, nor shall it in any way replace the Contractor's inspection activity or relieve the Contractor of the responsibility to furnish an acceptable end product.

5.7 Cashless Toll Systems Training

The Contractor shall provide comprehensive training for all aspects of the Cashless Tolling System, including but not limited to the operations, system monitoring, problem detection and resolution, audit, and Maintenance of the Cashless Tolling System.

5.7.1 Overview of Training Program

956	The Contractor shall be solely responsible for supplying all items necessary, including but not limited to training documentation, Software, Hardware and any other Equipment required to complete the delivery of the training program.
957	The Contractor's program shall include but not be limited to instruction, models, manuals, diagrams and component manuals and catalogs as required.
958	Where practical and useful, the Contractor's training shall be hands on and use actual Cashless Toll Systems Software in the training environment.
959	The Contractor shall produce all training materials and manuals of the latest documentation in electronic form to be used and printed for future training sessions.
960	The Contractor shall record training sessions to allow the Commission employees to remotely attend training sessions using WebEx or other online tool.
961	The Contractor shall ensure the Commission or their representatives have the right to attend any training sessions and to make video and audio recordings of training sessions and copies of all training program materials for their use in training new employees.
962	The Contractor shall obtain releases from all employees/Subcontractors to allow unlimited, royalty free use and copies of personal identity information (PII) compliant recordings and provide the same to the Commission upon request.

5.7.2 Training Requirements

963	The Contractor shall provide the following training courses for the Commission's personnel, including but not limited to the provision of all training manuals (including Contractor- provided manuals or relevant portions thereof), guides, training aids, as well as student and instructor work books accompanying the courses listed in the sections below.
964	The Commission may require additional courses be offered or additional personnel be provided training. The Contractor shall accommodate these requests to the extent possible with on-site personnel and documentation that is readily available.
965	Lane level training shall include an overview of generation of subsystem events and creation of transaction data and their flow through the System.

966	All Cashless Toll Systems training shall include a review and description of each of the appropriate Cashless Tolling System processes and procedures with actual Cashless Toll Systems Software. All students shall have their own workstation and interact directly with the training environment.

5.7.2.1 System Operation Overview

967	The Contractor shall provide a System operation overview training course for the Commission's management personnel who require a general understanding of all aspects of the operation, including but not limited to personnel from senior management, procurement, information technology, marketing and public information.
968	The system operations training shall include an overview of all aspects of the Cashless Tolling In-lane System and Cashless Toll Systems including DVAS, MOMS, cashless tolling operations, interface to the existing PTC Toll Host system, existing CSC/VPC system, System Maintenance, network, and any other operational area of the Cashless Tolling System.
969	System Operation Overview training will be conducted in one session with a minimum class size of ten (10) people, for a minimum of eight (8) hours.

5.7.2.2 Audit and Reconciliation and Cashless Toll Host System Operations

970	The Contractor shall provide an audit and reconciliation training course for the Commission's auditing staff to understand all aspects of the operation, particularly those related to reconciliation, audit and management.
971	Course shall include training all personnel who require a detailed understanding of the operations of the Cashless Toll System and how to access and view information and reports from the System on items such as status, alarms, performance, transactions and revenue.
972	Audit and reconciliation training will be conducted in one (1) session with a minimum class size of five (5) people, for a minimum of four (4) hours.

5.7.2.3 System Monitoring Staff Training Program

973	The Contractor shall ensure the System monitoring staff (PTC Operations Group) are properly trained in the requirements of monitoring the Cashless Tolling System and its uninterrupted operations.
974	Training on the Cashless Toll Concentrator or optional Toll Host shall include the maintenance activities provided by the Contractor to provide PTC personnel an understanding of the routine maintenance activities such as monitoring of system logs and Cashless Toll Host System Concentrator maintenance alarms; confirmation of file transmissions; confirmation of system backups.
975	The Contractor shall provide a minimum of one (1) weeks of classroom and on-the-job training (OJT) to all personnel in their respective area of responsibility before such personnel are assigned monitoring duties.

976	The Contractor shall provide documentation this initial training has been successfully completed.
977	The Contractor shall provide various training programs that include but are not limited to:
	• an in depth explanation of the Cashless Tolling Operations, including all Interfaces, file/data transfers and interconnections;
	• functions of the monitoring and tools used to manage monitoring tasks;
	• functions of the MOMS;
	• Cashless Toll Systems logs, error logs and processing of exceptions;
	• system dataflow and workflow queues;
	• explanation of the Dashboard data and analysis;
	• special use and monitoring tools and
	• queries and reports.
978	All System monitoring personnel shall attend the training sessions. The Commission's technical staff also shall attend all training sessions.
979	The Contractor shall keep accurate training records on all Maintenance and Software Support Services personnel. The Commission shall be permitted to review and verify Maintenance and Software Support Services personnel qualifications and training records at any time. Evidence of completion of training by Contractor personnel shall be provided to the Commission upon request.

5.7.2.4 Cashless Toll Systems Administration

980	The Contractor shall provide a System Users training course for all personnel who require a detailed understanding of the management, troubleshooting and administration of the interfaces, Software, database, applications, configurations and architecture of the Cashless Toll Systems.
981	Cashless Toll Systems Administration training will be conducted in one (1) session with a minimum class size of five (5) people, for a minimum of eight (8) hours and on-the-job training (OJT) to all personnel in their respective area of responsibility before such personnel are assigned administration duties.

5.7.3 Training Facilities

982	The Contractor shall conduct training at the classroom facilities at the Commission administrative building for all training and at designated locations identified by the Commission. Following review of Contractor's Training Plan, the Commission will confirm that it has the requisite space to accommodate the level of effort and physical requirements for each training session.

5.7.4 Scheduling and Preparation for Training

983	It shall be the Contractor's responsibility to provide sufficient notice to the Commission on the types of training it will provide and the timing for each training session. The Commission will identify a list of participants that Contractor shall notify to schedule their participation in the training.
984	The Contractor shall perform all scheduling activities and shall make every attempt necessary to accommodate the maximum number of persons for each training session given scheduling conflicts. Contractor shall provide sufficient notice to allow participants a reasonable lead time.
985	The Contractor shall notify the Commission of the dates or range of dates it would like to hold a training session at the Commission offices and shall coordinate with the Commission Information Technology (IT) office and Administrative Services staff to arrange the proper classroom setting and computer Hardware and Software are installed and the space configured for each training session.

5.7.5 Training Materials

986	Draft copies of all training materials shall be submitted to the Commission for review, comment and Approval, prior to final printing of quantities required for training.
987	The Commission shall have the right to require additional interim drafts at no additional cost should draft training materials submitted not be of adequate quality or have missing or incorrect information.
988	For each course described in the section above, Contractor shall provide the materials listed below.

5.7.5.1 Instructor Guides

989	The Contractor shall provide an instructor guide for each training course. The guide shall include the following elements:
	• course agenda;
	• course objective;
	• procedures for managing training session;
	• resource and facilities required, including work stations, power and communications requirements;
	• detailed lesson plans;
	• a description of training aids and items to aid in on the job performance (e.g., where applicable, pocket guides or reference sheets);
	• test to be administered to assure satisfactory completion;
	• instructions for using any audio-visual support Equipment or materials and
	• student survey to obtain feedback on the training sessions and the training materials.

5.7.5.2 Training Aids

990	The Contractor shall provide training aids such as mock-ups, scale models, overhead displays, video demonstrations, and simulations as are necessary to successfully complete the course agenda and meet the course objective.
991	The Contractor shall provide users a way to access training documents, aids and tips in an online, electronic format.

5.7.5.3 Student Workbook

992	For each course, the Contractor shall provide a student workbook, including but not limited to:
	• course agenda;
	• course objectives;
	• schedule of sessions;
	• copies of all overheads and visuals and
	• lesson outlines and summaries.
993	Materials such as operations and user manuals may be used to supplement the material provided in the student workbook.
994	To the extent that the user manuals (and training aids) are appropriately detailed and fit for training purposes they shall be used for training. If the Commission deems they are not sufficiently detail then supplementary training material shall be provided.
995	If such material is used appropriate cross-references shall be included in the Student Workbook so as to identify the complete set of training materials provided to the student.

5.7.6 Training Room Set-up and Software Installation

996	Contractor shall be responsible for loading any special Software required on the classroom computers (provided by the Contractor).
997	It is the Contractor's responsibility to ensure that the Software is operating as expected on each of the classroom computers.
998	It is also the Contractor‘s responsibility to ensure that appropriate communications are in place.

VI. CASHLESS TOLLING SYSTEM TESTING REQUIREMENTS

6.1 Cashless Tolling System Testing Concept

The Commission has employed a phased approach to deploying cashless tolling on the Commission toll facilities. Given the extended duration of the Project, and the potential differences in the various In-lane System solutions, the Contractor shall conduct the following tests.

999	Various tests (outlined for reference immediately below and with detailed Requirements in subsequent sections) shall be prepared and conducted by the Contractor, including but not limited to:
	• factory acceptance test (FAT)
	• onsite first installation test (OFIT) at baseline tolling points;
	• installation and Commissioning test at baseline tolling points;
	• Operational and Acceptance test at baseline tolling points to be identified by the PTC, and

6.1.1 General

The Requirements described in this section detail the labor, materials, facility, and support Services necessary to test the In-lane Cashless Tolling System and the Cashless Toll Concentrator or Toll Host System (if provided) and its interface to the existing PTC Toll Host system and the existing CSC/VPC system.

The Contractor shall prepare and conduct tests that validate adherence to the Requirements that guided its Design and development, compliance to Approved Design and Business Rules and demonstrate the Cashless Tolling System functionality.

1000	The Contractor shall be responsible for all aspects of testing performed as part of the Contract and to provide all necessary resources and facilities to conduct all tests including but not limited to:
	• test support personnel;
	• varying vehicle types and drivers;
	• test facilities;
	• test equipment, tools and safety devices;
	• test schedule and test sequence;
	• coordination with existing contractors;
	• coordination of lane closures and
	• conducting the test.
1001	The Contractor shall to the extent possible, develop and use specialized automated testing Software to, including but not limited to:

	• create test scripts;
	• control the automated testing;
	• exercise all conditions, configurations and scenarios;
	• conduct performance testing;
	• conduct security testing;
	• conduct regression testing;
	• compare actual test outcomes to expected outcomes;
	• test reporting;
	• conduct load testing;
	• conduct user Interface testing;
	• conduct stress testing;
	• WAN traffic testing;
	• conduct sustained operational testing and
	• conduct sustained burn-in testing.
1002	The Contractor shall provide a defect tracking system, accessible by the Commission, to document and track all defects identified as part of Cashless Tolling System testing and any subsequent actions taken to correct and retest those defects.
1003	The defect tracking system shall be capable of the following, including but not limited to:
	• rating (severity) defects;
	• categorizing defects;
	• prioritizing defects;
	• logging the date/time the defect was reported;
	• subsystems and test cases impacted by the defect;
	• the user who reported the defect;
	• the erroneous behavior;
	• the details on how to reproduce the defect;
	• the developers who worked on the defect and corrective action taken;
	• date the defect was corrected and formally re-tested;
	• life-cycle tracking and
	• reporting.

6.1.2 Testing Sequence and Logistics

1004	The Contractor shall obtain Approval from the Commission and shall have met the entry conditions prior to start of each test, including but not limited to:

	• Approval of all predecessor tests;
	• Approved test procedures for each individual test;
	• Approved test schedule;
	• successful closeout of all outstanding pre-test issues;
	• successful dry run testing with results provided to the Commission;
	• submittal of the latest Approved version of the RTM showing test validation against the requirements and
	• confirmation that both site and System are ready for testing.
1005	After the completion of each test, the Contractor shall submit for the Commission's review and Approval a test report that documents the results of the test.
1006	The test report shall address the following, including but not limited to:
	• the test summary;
	• the results of the test;
	• any anomalies and issues identified;
	• the corrective action/resolution of each item;
	• the test data;
	• calculations and backup data supporting compliance to requirements;
	• comments provided by the Commission and
	• the results of any re-tests necessary to successfully complete each testing phase
1007	The Commission shall participate in the testing and witness each test. The Commission shall have full access to the test data and results of the test. Test data and results shall be stored on Commission QA/Test Servers.
1008	Testing will not be considered complete by Commission until all anomalies and "punch-list" items are closed-out, and the final test report is Approved by the Commission.
1009	Testing shall occur per the above requirements subject to Commission's Approval of the final Master Test Plan.

6.2 Factory Acceptance Test (FAT)

1010	The factory acceptance test (FAT) shall be conducted by the Contractor at the Contractor's facility in actual lanes with the complete test Cashless Tolling System in accordance with the Approved MTP described in Section 5.4.8 Master Test Plan (MTP), detailed testing procedures and Project schedule. The FAT test site shall remain available through throughout the term of the Contract for testing and validating changes, fixes and enhancements to the Cashless Tolling Hardware and Software.
1011	The test configuration shall be representative of the Contractor's cashless tolling solutions.

1012	The FAT shall be conducted by the Contractor to verify that all functional elements of the Cashless Tolling System are in conformance with the Contract Requirements.
1013	Upon the successful completion of the FAT exit criteria and Approval of the FAT by the Commission, the Contractor shall be given the authorization to move forward to the On-site First Installation Test.
1014	The FAT shall validate that the Cashless Tolling System Hardware meets the Requirements of the Contract including but not limited to:
	• 72 hour burn-in testing for customized and assembled hardware and
	• certification of hardware compliance to environmental requirements.
1015	The FAT shall validate that the Cashless Tolling In-lane System meets the Requirements of the Contract including but not limited to:
	• accurate assignment and proper framing of each vehicle through various traffic conditions and test scenarios;
	• accurate capture of images and association of transponders and images to the correct vehicles;
	• compliance to accuracy requirements;
	• all exception processing requirements;
	• correct application of Business Rules;
	• degraded mode scenarios;
	• all device failure conditions;
	• rush-hour traffic scenarios;
	• redundancy;
	• mobile enforcement requirements (if option is exercised);
	• DVAS capabilities;
	• throughput and load testing using simulated data;
	• interface to the facility server (if provided) and/or Cashless Toll Concentrator or Toll Host System (if provided), and
	• transaction and image reconciliation.
1016	The FAT shall validate that the Cashless Toll Concentrator or Toll Host System (if provided) meets the Requirements of the Contract including but not limited to:
	• user interface;
	• Dashboards;
	• Cashless Toll Concentrator or Toll Host functions;
	• MOMS;
	• transaction audit;
	• correct application of Business Rules;

	• system performance;
	• reporting;
	• redundancy;
	• system loading;
	• compliance of Cashless Toll Concentrator or Toll Host System interface to Approved ICDs, and
	• OCR/ALPR (if the option to implement OCR/ALPR is exercised).

6.3 Onsite First Installation Test (OFIT)

1017	The OFIT shall be conducted by the Contractor at the on-site locations identified by the Commission that are representative of the two gantry concepts; the overhead structures and the toll gantries in accordance with the Approved MTP, detailed testing procedures and Project schedule.
1018	The OFIT shall verify the full functionality of the Contractor's Approved solution and its compliance with the Contract requirements and the Approved Design in a controlled, onsite environment using transactions created during live traffic operations and when lanes are closed to traffic. During OFIT testing the system shall be open to live traffic in a test environment and not collecting tolls.
1019	For OFIT the interface to the Cashless Toll Concentrator or Toll Host System (if provided) and the image server(s) shall be in the test environment.
1020	The testing shall not interfere with the existing system or impact lane operations.
1021	Before the commencement of the OFIT, all Equipment and Software that are required under the Contract shall be in place, in a production environment and configured for revenue operations. The interfaces to the existing PTC Toll Host system and the existing CSC/VPC system shall be connected to the respective test environments as Approved by the Commission.
1022	In order to test the full functionality of the MOMS and System Monitoring during OFIT, all Equipment shall be entered into the System prior to the start of OFIT and the MOMS shall be configured for cashless tolling operations.
1023	The Contractor shall test the vehicle throughput and speed requirements and generate the required number of transactions to prove the System can process transactions accurately and meet the performance requirements.
1024	Performance requirements shall be verified using Approved sample size.
1025	The OFIT shall validate that the Cashless Tolling In-lane System meets the Requirements of the Contract including but not limited to:
	• operations of in-lane Equipment and their ability to report failures to the MOMS including the UPS;

	• multi-lane multi-vehicle traffic conditions such as rush-hour traffic (bumper to bumper), vehicle straddling/changing lanes/merging;
	• accurate assignment and proper framing of each vehicle;
	• accurate capture and correct association of transponders and images to the correct vehicle;
	• transaction processing during equipment failures, and degraded modes of operation;
	• performance requirements using live traffic and controlled vehicles;
	• Redundancy as defined in this Scope Of Work;
	• receive and process TSL, VEL (if exercised) and toll rate schedules (if applicable);
	• DVAS functionality;
	• E-ZPass Group interoperability using interoperable test accounts;
	• lane Business Rules and
	• interface to the Cashless Toll Concentrator, Toll Host System (if provided) or facility servers and the existing CSC/VPC system.
1026	An Audit of the lanes shall be conducted using live (not simulated) in-lane traffic to verify that the Cashless Tolling System is processing vehicles accurately and transactions can be reconciled in the System using the audit tools Approved by the Commission.
1027	The OFIT shall validate that the Cashless Toll Concentrator or Toll Host System (if provided) meets the Requirements of the Contract including but not limited to:
	• functionality of the Cashless Tolling and MOMS Dashboards shall be verified as it applies to transactions, alarm and failure monitoring;
	• all failure conditions;
	• user interfaces and toll collection management functions;
	• Cashless Toll Business Rules;
	• reconciliation of transactions and revenue;
	• Cashless Toll reports;
	• Ad-hoc reporting capability;
	• accuracy of performance reports;
	• interface to the facility server (if applicable);
	• interface to the existing PTC Toll Host system and the existing CSC/VPC system including reconciliation;
	• conformance with performance, load and stress test requirements;
	• security requirements;
	• archival and purging requirements;
	• MOMS asset management; failure notification; work order tracking and performance reporting;

	• Cashless Toll System redundancy requirements including the demonstration of a failover and recovery from the primary to secondary Toll Concentrator or Toll Host (if provided), and
	• Cashless Toll System data resiliency requirements.
1028	As part of the OFIT, an end to end testing shall be conducted that validates the following functionality, including but not limited to:
	• System's ability to process and post transactions to the Cashless Toll Concentrator or Toll Host System (if provided) and on to the existing PTC Toll Host Systems and existing CSC/VPC system, and
	• The successful transfer of images from the In-lane Systems to the image server(s) and on to the existing CSC/VPC system;

6.4 Installation and Commissioning Test

1029	The Installation and Commissioning test shall be conducted by the Contractor on each lane as a part of the Contractor's Cashless Tolling System installation in accordance with the Approved MTP, detailed testing procedures and Project schedule.
1030	The Installation and Commissioning test shall validate the functionality and operational status of the lanes including installation and configuration of all Equipment and Software. The lane operations shall be verified end to end upon the completion of the installation checkout prior to opening the cashless tolling lanes for revenue collection.
1031	During the Installation and Commissioning test every piece of in-lane Equipment and its interface to the zone controller shall be verified to be fully operational. The zone controller, its interface to the Cashless Toll Concentrator or Toll Host System (if provided) and the transmission of images to the existing CSC/VPC system via the image server(s) shall be validated to ensure that the interfaces are in place and the Cashless Tolling System is ready for revenue collection.
1032	A Commissioning test shall be conducted on the Cashless Toll Concentrator or Toll Host System (if provided) and shall include the image server(s) and the interfaces to the existing CSC/VPC system and the existing PTC Toll Host system.

6.5 Cashless Tolling System Operational and Acceptance Test

1033	The Cashless Tolling System Operational and Acceptance test shall be conducted by the Contractor at each Cashless Tolling plaza location of the Cashless Tolling Project in accordance with the Approved MTP, detailed testing procedures and Project schedule.
1034	The Cashless Tolling System Operational and Acceptance Test shall be conducted for each Cashless Tolling implementation upon authorization by the Commission to commence such testing. The Cashless Tolling System shall be observed in live revenue operations by the Contractor and the Commission for a minimum of four (4) calendar months.

1035	The objective of the Cashless Tolling System Operational and Acceptance Test is to ensure that the Cashless Tolling System Software and Hardware functions over the test period with limited manual intervention in live operations. It is intended to confirm that the Cashless Tolling System and the network are sized and configured correctly and data is processed without interruption.
1036	The Cashless Tolling System Operational and Acceptance Test shall validate the interface of the Cashless Tolling System to the existing PTC Toll Host system and the existing CSC/VPC system and reconcile the transactions and images end to end.
1037	The Cashless Tolling System Operational and Acceptance Test shall validate the operation and accuracy of the Cashless Tolling System common to the Commonwealth of Pennsylvania.
1038	During the test period, System accuracy, performance of the system and operations shall be validated including:
	• all System accuracy requirements specified in the Contract using representative sample size for each facility under test;
	• all maintenance performance requirements;
	• all system performance requirements;
	• a two hour vehicle audit during AM and PM peak hours for a total of four (4) hours on each lane at each tolling point that is part of the Cashless Tolling location in test;
	• transaction processing in accordance with Commission Business Rules;
	• correct classification of vehicles and assignment of toll and
	• monitoring of all interfaces for the accurate transfer and processing of all records.
1039	System reliability and auditability shall be verified manually and through tools and reports provided in the System.
1040	Dashboards and reports shall be verified daily for accuracy and reconciled to operations and interface files. Queries and detailed reports shall be generated to validate the daily, weekly, monthly, yearly and comparative reports and compared to reports.
1041	The alarms displayed on the MOMS and all interface status notification shall be verified to be accurate.
1042	Failure of the Cashless Tolling System to meet a performance requirement shall result in the restart of that particular test until such time the accuracy requirements are met.
1043	The Cashless Tolling System Operational and Acceptance Test shall be repeated until the Commission is satisfied that the Cashless Tolling System meets the Contract requirements as set forth in the Contract at each tolling point.
1044	The Cashless Tolling System Operational and Acceptance Test shall be conducted on the baseline tolling points after toll zone commissioning and upon authorization by the Commission to commence such testing. The Cashless Tolling System shall be observed in live revenue operations by the Contractor and the Commission for a minimum of two (2) monthly audit cycles.

6.5.1 Cashless Tolling System Acceptance

1045	Upon the successful completion of Operational and Acceptance Test for the Cashless Tolling System for each implementation of the Cashless Tolling Project, the closure of all punch-list items and completion and submission of all Contract required documents as set forth in the Contract, the Contractor shall be given the Acceptance for the Cashless Tolling System for each Cashless Tolling implementation.

VII. MAINTENANCE AND SOFTWARE SERVICES

The Contractor shall provide all Maintenance and Software Support Services associated with the Cashless Tolling System throughout the term of the Contract as further set forth in this Scope of Work and detailed in *Attachment 10: Maintenance Responsibility Matrix*. The requirements described in this section detail the Hardware Maintenance and Software and Administrative Support Services for the Cashless Tolling System including any existing Equipment integrated into the Contractor's solution. The Commission will provide Maintenance and Support Services for the Wide Area Network (WAN).

Maintenance for the Cashless Tolling In-Lane Systems and Cashless Toll Concentrator (if provided) shall be the responsibility of the Contractor staff. Monitoring of the Cashless Toll Concentrator will be performed by Contractor personnel 24x7. This includes onsite monitoring of system logs and Cashless Toll Concentrator maintenance alarms; confirmation of system backups, and deploying third-party security software updates.

7.1 Cashless Tolling System Warranty Program

1046	The Contractor shall be responsible for the implementation and administration of a Warranty Program for all Hardware, Contractor Software and third-party Software provided under this Contract.
1047	The Contractor shall maintain warranty records and service agreements for all Hardware and third-party Software in MOMs, and shall review Software upgrades and available patch reports to keep the Cashless Tolling System current.

7.1.1 Hardware/System Warranty Program

1048	The Hardware Warranty period for all Equipment furnished under this Contract except server Hardware shall be for a period of one (1) year, commencing on the date of Commissioning Approval of each tolling location.
1049	In the one (1) year Hardware Warranty period, Warranty Maintenance shall include all Services required to maintain the System Hardware at required performance levels.
1050	In the Warranty period the Commission shall not be charged for any Services related to Maintenance beyond those associated with force majeure events such as vandalism, relocation of Equipment at the request of the Commission, or damage clearly caused by events outside the control of the Contractor, as set forth in the Contract.
1051	All Equipment mounting Hardware and brackets provided as a part of this Scope of Work shall be warrantied for the Contract Term.
1052	The one (1) year Warranty on any additional Approved installed and replaced Hardware and Equipment shall commence when the Hardware and Equipment are installed.

1053	The Contractor shall take all reasonable and prudent steps to ensure that all Hardware and third-party Software used by the System is supported by the third-party vendor and all warranties remain in effect.

7.1.1.1 Server Hardware Warranty and Support Services

1054	All server Hardware shall have a full manufacturer's Warranty and support services for a period of minimum five (5) years beginning with the Acceptance of the Cashless Tolling System for the Cashless Toll Concentrator or Toll Host (if provided) and for the server Hardware at each tolling point beginning with Acceptance at that tolling point.

7.1.1.2 Third Party Software Warranty

1055	All third-party Software shall have a full manufacturer's Warranty and Upgrade Services, which shall be no less than a period of five (5) years beginning with the Acceptance of the Cashless Tolling System.

7.1.1.3 Software Warranty

1056	The Cashless Tolling System Software shall have a full Warranty against defects and failures beginning at System Acceptance through the end of the Contract Term subject to the applicable provisions within the Agreement.

7.2 General Description of Cashless Tolling System Maintenance and Software Support Services

1057	The Contractor shall provide one hundred (100) percent of the Cashless Tolling In-Lane Systems and LAN Maintenance Services.
1058	The Contractor shall provide one hundred (100) percent of the Cashless Toll Concentrator or Toll Host System (if provided) Hardware, Software, Database and System Administration Maintenance Services including operating system and Software security updates through a coordinated effort with the Commission.
1059	Hardware Maintenance Services under this Contract shall be for a period as set forth in the Contract from Acceptance of each Cashless Tolling plaza location of the Project. The first year of Hardware Maintenance for each Cashless Tolling plaza location shall be covered under the System Warranty Program as set forth in Section 7.1.1.
1060	The Contractor shall provide Software Maintenance Services as described in this Scope of Work.
1061	Software Maintenance and Support Services under this Contract shall be for a period as set forth in the Contract from Acceptance of the Project. A Software Warranty shall be provided for the term of the Contract as set forth in Section 7.1.1.3.

1062	The Contractor shall be responsible for supporting and maintaining the Cashless Tolling System for any time period in which the System is installed, Commissioned and placed into revenue service but has not passed required testing until such time as the Warranty Period commences. The Maintenance of the Cashless Tolling System provided under this Contract prior to start of Warranty is not included in the term of the Maintenance and Software Support Services.
1063	The Contractor shall be responsible for supporting and maintaining the Cashless Tolling System at the test plazas until the test plazas are Accepted and Warranty has commenced.
1064	The one (1) year Cashless Tolling System Warranty for each implementation shall commence after the Acceptance of each implementation of the Cashless Tolling Project. The one (1) year Cashless Tolling System Warranty on all other new tolling points deployed by the Contractor shall commence after the Acceptance of the Cashless Tolling System for each subsequent implementations of the Cashless Tolling Project. The one (1) year Cashless Toll Concentrator or Toll Host System (if provided) Warranty shall commence after the Acceptance of the base Contract implementation of the Project.
1065	All changes and modifications to the Cashless Tolling System shall be Approved by the Commission and shall follow the Commission *Attachment 12 - ETC System Change Control Procedures V1.6.*
1066	The Services and Work performed under the Contract are considered highly confidential and the Contractor personnel shall at all times comply with the Commission security and privacy requirements. Contractor employees shall not discuss their Work with unauthorized personnel or any individuals not directly associated with the Commission.

7.3 Cashless Tolling System Maintenance and Software Support Services - Contractor

The Maintenance and Software Support Services shall include monitoring; preventive; pervasive; corrective; security related and emergency Maintenance Services and certain upgrades and enhancements to be performed on all elements of the Cashless Tolling System. Payment for Maintenance and Software Support Services on the Cashless Tolling System for each Cashless Tolling point implemented of the Project shall commence after the expiration of the one-year Cashless Tolling System Warranty Period. The Contractor shall provide the following Cashless Tolling System Maintenance and Software Support Services at the levels defined in Section VII.

7.3.1 Cashless Tolling In-lane Systems Hardware Maintenance and Software Support Services

Upon the completion of the Warranty Program at each Approved tolling point, the monitoring and Maintenance functions described below shall be performed by the Contractor.

1067	During and after the Warranty period the Contractor shall maintain the spare parts inventory in the MOMS and update accurate Equipment inventory status in the MOMS.

1068	The PTC Operations Group shall monitor the System for failures and alarms, and confirm a MOMS work order has been created for each failure as defined regardless of Maintenance Level.
1069	The Contractor shall automate the MOMS work order process to the maximum extent possible to anticipate and automate work orders. If a MOMS work order has not been created, the Contractor or the PTC Operations Group shall create a work order in MOMS and assign it to a technician for Maintenance action or troubleshooting.
1070	The Contractor shall perform the necessary Maintenance and close the MOMS work order upon confirmation that the failure has been successfully corrected. The Contractor shall notify the PTC Operations Group that the repair action is complete and work order has been closed.
1071	The Contractor shall perform all daily, weekly and scheduled preventive Maintenance on all Cashless Tolling In-lane System Hardware.
1072	Equipment racks and panels shall be inspected and maintained by the Contractor in full operational, orderly condition, and free of debris and dirt.
1073	The Contractor shall inspect and maintain all Contractor provided equipment mounting hardware and brackets provided as a part of its Scope of Work and shall also inform the Commission of any potential problems.
1074	The Contractor shall inspect and test cables, wiring and terminations to detect problems and degradation. Any item not in compliance with Contract requirements shall be replaced by the Contractor at no cost to the Commission unless such failure is considered non-chargeable as described in Section 2.5.4.2 Non-Chargeable Failures.
1075	The Contractor shall maintain the Cashless Tolling In-lane System Local Area Network that includes all Contractor network connections in the toll equipment building and interconnections between the toll equipment buildings as defined in *Attachment 3b: PTC Communications Network Responsibilities*.
1076	The Contractor shall provide monitoring and troubleshooting as part of Maintenance Services for the Cashless Tolling In-lane System including, but not be limited to:
	• zone controllers;
	• AVI system;
	• AVC system;
	• LPICPS components and controllers;
	• OCR/ALPR Software (if the option to implement OCR/ALPR is exercised);
	• facility servers and Software (if provided);
	• DVAS cameras;
	• all cables, wiring, junction boxes, and terminations;
	• all conduits and cable trays;
	• all In-lane System electronics and controllers;

	• Contractor supplied LAN equipment and
	• all In-lane Contractor and third-party Software.
1077	All System administrative functions, if not automated, shall be performed by the Contractor at regular intervals as part of the System preventive Maintenance Services according to the Approved Maintenance Plan to ensure System performance is optimized. All such System administrative functions shall be scheduled as preventive maintenance work orders through MOMS and tracked.
1078	Continuous monitoring of System operations shall be performed by the Contractor in conjunction with the Commission to verify System is functional; security posture is adequate; processes are being executed as scheduled; files are transmitted as specified, and System is operating to Contract performance requirements.
1079	Continuous monitoring by the Contractor shall include but not be limited to:
	• confirming and verifying receipt of all the MOMS messages and Alerts;
	• verifying the MOMS is receiving and processing System events and reporting the correct status;
	• evaluating sample transactions data for exception;
	• confirming data transmission to the Cashless Toll Concentrator or Toll Host System (if provided);
	• confirming image and transaction transmission to the existing CSC/VPC systems;
	• performing routine diagnostics on all in-lane subsystems;
	• verifying processes, programs and scheduled jobs are successful;
	• reviewing comparative reports to identify System degradation;
	• confirming successful transfer of Transponder Status List to the lanes;
	• reviewing OCR/ALPR results (if the option to implement OCR/ALPR is exercised) and poor quality images;
	• monitoring the DVAS video and event data;
	• reviewing sample images;
	• correcting identified performance issues;
	• evaluating storage requirements;
	• verify time synchronization is occurring as configured and System clocks are not drifting beyond acceptable threshold, and
	• reviewing error logs and Alerts.
1080	The Contractor shall perform vulnerability scans using a tool such as Tenable/Nessus, Qualys or other commercial vulnerability scanning tool of the Cashless Toll System and produce ensuing reports at the request of the Commission.
1081	The Contractor shall monitor for intrusion attempts and prevent all unauthorized access and intrusions at all levels and report such events to the MOMS. Any intrusion, compromise or breach must be reported to Commission IT Security within 12 hours of detection.

1082	The Contractor shall monitor notifications and initiate corrective actions upon Commission approval on the Cashless Tolling System to meet requirements.
1083	The Contractor shall perform any Maintenance, daily, weekly, or periodic, required to maintain the System at required performance levels (for example: archival and purging in accordance with the Commission's retention policy).
1084	The Contractor shall update all Software drivers to meet any new standard Operating Systems as they become available and such updates shall be deployed in accordance with Commission standards.
1085	The Contractor shall retrieve data manually from the zone controllers and download Transponder Status List and toll rate and schedule files in the event there is an extended communications failure.
1086	The Contractor shall re-establish or re-install System files, programs and parameters, as required, following a failure or damage to the System and return lanes to fully operational condition.
1087	In the event of a declared disaster the Contractor shall perform procedures as needed and return lanes to fully operational condition.
1088	The Contractor shall perform OCR/ALPR updates as required in accordance with the Commission ECO procedures within an Approved Commission time frame to support license plate changes if the option to implement OCR/ALPR is exercised.
1089	As part of the Software Support Services the Contractor shall develop and test Software as required to accommodate corrective action, changes to Business Rules or lane configurations in accordance with the Commission ECO procedures. Scope shall include provision of evidence packages and release notes detailing changes for Commission review and Approval, installation of new Software and confirmation of successful installation.
1090	The Contractor shall analyze daily and weekly trends to identify problems, including but not limited to:
	• high number of transactions without transponder;
	• high number of Class Mismatch transactions;
	• abnormal changes in traffic counts and class;
	• high number of exceptions or unusual occurrences;
	• high number of invalid transponder transactions;
	• abnormal changes in transponder counts and status changes and
	• high number of rejected images.

7.3.2 Cashless Toll Concentrator or Toll Host System (if provided) Server and Database Administration, Maintenance and Software Support Services

The requirements in this section describe the Services to be provided by the Contractor under the Maintenance and Software Support Service for the Cashless Tolling System.

1091	The Contractor shall provide Maintenance and Software Support Service for all elements of the Cashless Toll Concentrator or Toll Host System including but not limited to:
	• Cashless Toll Concentrator or Toll Host System Hardware;
	• operating systems;
	• databases;
	• application Software;
	• third-party Software patches;
	• security updates;
	• Software configuration and
	• Software version control.
1092	The Contractor shall provide continuous 24x7 system administration services coverage on the Cashless Toll Concentrator or Toll Host System to ensure that it is performing and will continue to perform at a satisfactory level.
1093	The Contractor support staff shall be available on-call 24x7 to investigate and perform maintenance for those failures escalated to the Contractor.
1094	System administration services shall include monitoring and corrective action to ensure System performance is in accordance with requirements of this Scope of Work. This shall include but is not limited to:
	• monitoring Cashless Toll Concentrator or Toll Host System Hardware (if provided) at the primary and secondary locations including servers; storage devices and backup systems;
	• verifying processes, programs, and scheduled jobs are successful;
	• confirming all transactions and images are successfully transmitted to the receiving Systems;
	• confirming all messages described in the ICD are being successfully exchanged between the Cashless Tolling Systems, existing CSC/VPC systems and existing PTC Toll Host system;
	• confirming applications are functional and available to Authorized Users;
	• confirming all scheduled reports are successfully generated and available to Authorized Users;
	• verifying all processes are functioning and data and images are moving successfully though the queues;
	• verifying all third-party interface are functioning and successfully exchanging files;
	• scheduling of preventive, corrective and predictive Maintenance activities;
	• performing any daily, weekly, or periodic Maintenance required to maintain the System at required performance levels (for example: indexing and tuning databases; and purging in accordance with the Commission's retention policy);
	• maintaining and updating records of all Maintenance events and activities in the MOMS;
	• performing third-party software or firmware upgrades in conjunction with the Commission, as required and to be compliant to security requirements including but not limited to performing security software upgrades, database upgrades and operating system upgrades at offsite or Cloud locations;

	• support upgrades performed by the Commission for third-party software or firmware as required to be compliant to security requirements including but not limited to performing security software upgrades and operating system upgrades at PTC Data Centers;
	• contact with the Commission, operations and contractors regarding System issues, performance, security posture, Software Release and Maintenance scheduling;
	• performing Approved manual actions, adjustments and updates to the System data based on predefined criteria to correct issues and as authorized by the Commission;
	• re-establishment or re-installation of System files, programs and parameters, as required, following a failure or damage to the System;
	• monitoring of error logs and System logs;
	• restoration testing of backups (Software and data) to be performed yearly in coordination with the Commission with the results reported back to the Commission.
	• Maintenance of up-to-date Software backups (all System Software and data);
	• installation of new Software and confirmation of successful installation;
	• verifying time synchronization is occurring as configured and System clocks are not drifting beyond acceptable threshold;
	• assisting Commission administrative staff as requested by the Commission;
	• troubleshooting Cashless Tolling System issues;
	• creation of Ad-hoc reports requested by the Commission;
	• generation of queries as requested by the Commission, and
	• analysis of data as requested by the Commission.
1095	Software support services shall include monitoring and corrective action to ensure System performance is in accordance with requirements of this Scope of Work, to include database management and operation. This shall include, but is not limited to:
	• investigation and analysis of errors and exceptions and taking corrective action including correcting the problem and reprocessing the data;
	• monitoring of notifications, and initiating corrective actions on application programs to meet requirements;
	• updates to the Cashless Tolling System and application to support upgrades to hardware or third-party software;
	• updates to the Cashless Tolling System and application to support all changes to Business Rules and Cashless Tolling System configurable parameters, and deploy changes in production according to Commission Approved deployment schedule;
	• updates to the Cashless Tolling System and application to support changes to E-ZPass Group ICD including the addition of new E-ZPass Group Agencies;
	• updates to the Cashless Tolling System and application to support the addition of new Interoperable Agencies;
	• updates to the Cashless Tolling System and application to support changes to continue its compliance to updated security requirements, and

	• updates to the Cashless Tolling System and application to support legislative and statutory changes.
1096	As part of the Software Support Services the Contractor shall develop and test Software as required to accommodate corrective action, changes to Business Rules or lane configurations in accordance with the Commission ECO procedures. Scope shall include provision of evidence packages and release notes detailing changes for Commission review and Approval, installation of new Software and confirmation of successful installation.

7.4 Cashless Tolling Network Maintenance Support Services – Commission Responsibility

Commission technical staff will provide Maintenance Support Services for the Commission Toll System WAN Network as specified in this section.

NA	Commission technical staff will maintain and monitor the WAN system that includes:
	• connection of the PTC Primary Data Center to the network equipment at the toll equipment building at each tolling point location;
	• connection of the PTC Primary Data Center to the CSC/VPC primary and disaster recovery locations;
	• connection to the existing PTC Toll Host locations and
	• operating system and Software patching levels for the Commission provided network equipment security postures.
NA	The Commission will upgrade and update the network security to ensure the Commission network is always in compliance with updated security standards.

7.5 Updates to Maintenance Plan and Other Maintenance Related Documentation

1097	The Contractor shall update the Maintenance Plan and other Maintenance documentation to reflect any changes to the policies or procedures developed by the Contractor and Approved by the Commission, for the Cashless Tolling System Maintenance services. The Maintenance Plan shall be updated and uploaded to the online System documentation library every year for review and Approval. However, sections of the Maintenance Plan or its Appendices shall be submitted for review and Approval as the changes are identified. A version update sheet shall be included with the Maintenance Plan, and the Maintenance Plan on file shall have the most recent version from the configuration management database.

7.6 Maintenance Requirements

7.6.1 Preventive Maintenance

1098	The Contractor shall provide and perform onsite Preventive Maintenance on the Cashless Tolling In-lane System Hardware, Cashless Toll Concentrator or Toll Host System Hardware (if provided), Contractor LAN communications equipment and Software in accordance with the Approved Preventive Maintenance plan.
1099	The Contractor shall inspect all Contractor installed Equipment, both major components and support components (fans, equipment racks, storage units) that constitute the Cashless Tolling System and shall make such repairs; cleaning; adjustments, and replacements of components as necessary to maintain the Equipment in normal operating condition in accordance with the Approved Preventive Maintenance plan.
1100	In addition to required ongoing Contractor monitoring the servers and data processing units shall be actively monitored by the Contractor to verify that storage space is not reaching limits, disks are not fragmented or damaged, Software being used is of latest version per the configuration management and data is being processed and transferred in an appropriate manner.
1101	Transaction and image processing volumes and times shall be monitored at the lane by the Contractor and Systems optimized for performance with Commission Approval.
1102	Report generation times, System access times, and System response time shall be monitored by the Contractor to ensure performance meets the Contractual requirements.
1103	The Contractor shall include all Equipment and Systems as part of the Preventive Maintenance in accordance with the original Equipment manufacturer's guidelines. Any variations or exceptions shall be noted by the Contractor and Approved in advance by the Commission.
1104	Preventive Maintenance shall be performed by the Contractor during the normal working hours when Maintenance technicians are scheduled to be onsite. Diagnostic aids, tools and Equipment Approved by the Commission to perform Preventive Maintenance equipment analysis shall be provided by the Contractor, as necessary.
1105	Preventive Maintenance requiring lane closure shall be scheduled by the Contractor for off-peak travel periods; evenings; Saturdays, and Sundays and coordinated with the Commission, so that the Work shall not interfere with normal traffic flow, unless otherwise Approved by the Commission.
1106	The Contractor shall provide a Preventive Maintenance schedule, to be Approved by the Commission, as part of the Maintenance Plan. The schedule shall detail the preventive Maintenance to be performed on each Equipment item and system. The schedule shall provide a description of the Work to be performed, expected duration and the frequency.

1107	The preventive Maintenance schedule shall be entered by the Contractor into the MOMS and work orders shall be automatically created to alert Contractor staff of required preventive Maintenance. Failure of the Contractor to perform required preventive Maintenance in accordance with the Approved schedule shall result in liquidated damages, as specified below in the Maintenance Performance Requirements Section 7.22.

7.6.2 Predictive Maintenance

1108	The Contractor shall establish a Predictive Maintenance program by which failure analysis can be determined by identifying potential failures through the MOMS records. The failure analysis shall take into account either or both specific components and sub-systems. This information shall then be used to investigate and correct problems and failures that could disrupt toll collection operations.
1109	The Contractor shall maintain all failure analysis documentation on site and provide the information, including charts or other analysis tools and shall submit the analysis as part of its monthly report.

7.6.3 Pervasive Maintenance

1110	The Contractor shall establish a Pervasive Maintenance program by which failure analysis can be determined by identifying continuing or repetitive failures through the MOMS records. The failure analysis shall take into account either or both specific components and sub-systems. This information shall then be used to investigate and correct problems and failures that continue to occur on a particular item of equipment, sub-system, or component.
1111	The Contractor shall maintain all failure analysis documentation on site and provide the information, including charts or other analysis tools and shall submit the analysis as part of its monthly report.

7.6.4 Corrective Maintenance

1112	All Work performed by the Contractor to correct problems to meet the requirements of the Contract or Software defects shall be considered as Corrective Maintenance and shall be corrected based on priority level within the time specified within this scope of work under Maintenance Coverage and Response Times. Such problems include but are not limited to:
	• failure of System functions;
	• failure of processes and programs;
	• report issues;
	• application failures;
	• toll system network issues;
	• inadequate security posture;
	• degraded System or component performance, and
	• non-conforming availability or MTBF.

1113	Corrective action that require modification to the Software shall be reviewed by the Commission and corrections deployed in accordance with Approved release notes and Commission schedule.
1114	The Commission shall be notified before any corrective Maintenance is performed.
1115	Notwithstanding the foregoing, for repeated failure of Equipment, components, or Systems, the Contractor shall undertake an investigation as outlined in Section 7.6.3. If the problem is determined by the Commission to be a pervasive defect, the Contractor shall be responsible for the replacement and repair of the problem Equipment, component, or System at no additional charge to the Commission.

7.6.5 Onsite Corrective Maintenance for Cashless Toll Concentrator or Toll Host System (if provided)

1116	Upon the confirmation that a failure/work order requires Onsite Corrective Maintenance, the Contractor shall submit a request to the Commission for Approval to perform the Onsite Corrective Maintenance in accordance with the of the Commission ECO process.
1117	The Contractor shall submit a schedule for performing the Onsite Corrective Maintenance and coordinate all travel with the Commission.
1118	Upon Authorization to perform the Onsite Corrective Maintenance, the Contractor shall initiate the Work. An authorized Commission representative shall be notified when the Contractor personnel is onsite at the Cashless Toll Concentrator or Toll Host facility performing the corrective action.
1119	The details of the Work shall be recorded in MOMS by the Contractor and upon verification of the corrective action by the Commission, the Contractor Work on this corrective action item shall be considered complete.

7.6.6 Upgrades and Enhancements

1120	Upgrades and enhancements required for reasons such as to meet changes to standards, statutes or interoperability changes (Equipment, software changes to accommodate TSL, ICD or regional interoperability hub changes) or the addition of new functionality; or, that provide the Commission with a demonstrable benefit in performance, costs or productivity, shall be proposed with costs and schedule by the Contractor in accordance with the requirements of the Commission ECO process, as set forth in the Contract.
1121	Software modifications that are required to maintain and support the System as a part of the normal course of business such as version changes, configuration or parameter changes or minor changes to Software or code such as changes to the existing ICDs; or Software modifications required to ensure System is compliant to specified standard (for example security) or, changes that improve the Contractor's ability to maintain and support the System, shall ***not*** be considered upgrades or enhancements and shall be provided by the Contractor at no cost to the Commission. All such Software modifications shall be in accordance with the of the Commission ECO process.

7.7 Maintenance Coverage and Response Times

1122	The Contractor shall post a weekly schedule identifying personnel and times for onsite and on-call Maintenance. Commission Approval is required for any change in Contractor staff. The Contractor shall provide to the Commission the updated active personnel list and contact information when there is a change in personnel.
1123	Response to calls and repair times shall be determined by priority as described below. Contractor failure to meet the response and repair time criteria described below shall result in liquidated damages as specified in Section 7.22.
1124	Regardless of onsite or on-call, acknowledgement of receipt of notification of a Maintenance issue or human acknowledgment of a failure shall not exceed thirty (30) minutes after the failure notification was recorded or problem was reported.
1125	Priority of failures shall be defined during the Design phase. Time to respond and complete repair are determined by priority and is defined as follows:
	• Priority 1: Defined as any malfunction or fault or software defect that results in the immediate loss of revenue; security breach; closure of lanes outside of the Commission lane closure requirements; hazard to personnel or driving public; loss of audit data; loss of redundancy in any redundant System components; loss of functionality that impacts E-ZPass Group Agencies or failure that negatively impacts Lane or Cashless Toll Concentrator or Toll Host System (if provided) operations. o For In-lane Systems Maintenance this priority shall have a two (2) hour time to respond and complete repair. o For Cashless Toll Concentrator or Toll Host Maintenance this priority shall have a two (2) hour time to respond and complete repair. In the event Onsite Corrective Maintenance is required, this priority shall have two (2) hour time to complete repair once Approval to commence Work is provided by the Commission and Maintenance personnel is onsite and ready to perform the repair. The Contractor shall make every effort to be onsite within twenty-four (24) hours of Approval to commence Work.
	• Priority 2: Defined as any malfunction or fault that degrades the System performance but not the operational ability of the System. It includes, but is not limited to inaccurate reporting, inability to reconcile revenue or loss of System functionality that impacts access to data. o For In-lane Systems Maintenance this priority shall have a four (4) hour time to respond and complete repair. o For Cashless Toll Concentrator or Toll Host Maintenance this priority shall have a four (4) hour time to respond and complete repair. In the event Onsite Corrective Maintenance is required, this priority shall have two (2) hour time to complete repair once Approval to commence Work is provided by the Commission and Maintenance personnel is onsite and ready to perform the repair. The Contractor shall make every effort to be onsite within forty-eight (48) hours of Approval to commence Work.

	• Priority 3: Defined as any action or event that has the potential to result in a malfunction or degrading of the System performance but has not impacted performance and is not anticipated to immediately impact performance. o For In-lane Systems Maintenance this priority shall have a twenty four (24) hour time to respond and complete repair. o For Cashless Toll Concentrator Maintenance this priority shall have a twenty-four (24) hour time to respond and complete repair. In the event Onsite Corrective Maintenance is required, the Contractor and the Commission shall agree on the time period for onsite correction but time to respond and complete repair shall be no longer than three (3) Calendar Days of Approval to commence Work.
1126	For Priority 1 and Priority 2 failures the Contractor shall provide dedicated resources until the issue has been resolved to the Commission's satisfaction.
1127	Outages and tasks performed under the Preventive Maintenance period shall be defined as Priority 4. The System shall be available and fully operational within the Approved time schedule for such activities and upon completion of the Preventive Maintenance period. Any failures generated or resulting from Preventive Maintenance activities shall be accounted for as Priorities 1, 2 or 3 and be addressed in accordance with these requirements.
1128	Response and Repair time is defined as the combined time from when failure occurred or problem was reported to when the repair or correction of the failure occurred; the period of time beginning when the failure occurred (failure time) and ending when the fault condition is corrected and returned to normal operations.
1129	Response and repair times for every Maintenance event shall be recorded in the MOMS and reported and such reports shall be provided to the Commission in accordance with the reporting requirements of this Scope of Work.

7.8 Notifications

1130	The entry of a problem (either by the System or an Authorized User) into the MOMS shall constitute the start of the acknowledgment time for purposes of measuring the Contractor's acknowledgment time and response/repair time.
1131	For purposes of measurement of performance and for the development of Maintenance policy and procedures, notification of System malfunctions, problems and discrepancies may be provided to the Contractor in three (3) different methods, summarized below.
	• Verbal Notification: Defined as an in-person notification or telephone call. In all cases, the first conversation with, or notification of the Contractor shall signify the start of the response time for purposes of measuring the Contractor's response time. All verbal notifications shall be recorded in MOMS by the Contractor.

	• Written Notification: Defined as a written description of a problem or condition, typically provided by the Commission or its representative. Written notification could be faxed, texted, or emailed to the Contractor by a customer or user. The time of receipt of fax, message or email shall signify the start of the response time for purposes of measuring the Contractor's response time. All written notifications shall be recorded in MOMS by the Contractor.
	• MOMS Notification: Defined as an automatic notification through the MOMS identifying a problem within the Cashless Tolling System that is the Maintenance responsibility of the Contractor and sending out an automatic alert message by email or text to a Contractor's Maintenance staff to respond to the failure. In addition to the Contractor notification, the Alert shall be posted on the MOMS and available via reports. The presence of a MOMS notification in the System shall constitute the start of the response time for purposes of measuring the Contractor's response time.

7.9 Recording of Maintenance Activities

1132	The Contractor and the Commission shall utilize the MOMS for initiating the work orders. MOMS shall be utilized for recording and tracking all Maintenance and Software Support Services performed on the Cashless Tolling System. All Equipment provided under this Contract shall be tracked through MOMS from the purchase to their disposal.
1133	In all cases, it shall be the Contractor's responsibility to log all reported Maintenance activities into the MOMS. The Contractor shall also be responsible for documenting all information and issues related to a failure condition, including all actions taken to complete the correction into the MOMS.
1134	The work order shall contain as much information as possible in order for persons other than the technician or his supervisor to reasonably determine the fault, when it was worked on, the corrective action and any other information pertaining to the individual Maintenance event, including replacement of parts.
1135	All performance metrics shall be recorded and tracked through the MOMS and compliance to performance requirements shall be validated using MOMS reports.
1136	It is the Contractor's responsibility to ensure that its Maintenance staff has real time access to the MOMS and that all the required connections are established and ongoing to ensure that the Maintenance staff has remote access. Maintenance staff shall be trained in the use of the MOMS.

7.10 Spare Parts

1137	Contractor shall be responsible for the inventory of all spare parts at an Approved storage facility(ies) and shall be insured in this regard as set forth in the Contract. The Contractor shall account for all spare parts and shall provide safeguards against theft, damage, or loss of the spare parts.

1138	The Contractor shall ensure that only spare parts and equipment required to service the Cashless Tolling System and LAN communications spare equipment are stored at this facility and shall only be used for the PTC Cashless Tolling System.

7.10.1 Spare Parts Inventory Management

1139	The Contractor shall be responsible for the Maintenance of an adequate spare parts inventory. The Contractor is responsible for monitoring and identifying the existing spare parts inventory, ordering spare parts as required, and proposing the quantity needed to maintain the required performance.
1140	The Contractor shall update and recommend a spare part quantity to be maintained in order to support the Cashless Tolling System functionality and operational readiness.
1141	The Contractor shall hold the Commission harmless in the event spare parts or consumables are not available as a consequence of the Contractor’s failure to purchase or replenish the spare parts or consumables Approved by the Commission.
1142	During the term of this Agreement (including after the expiration of any applicable warranty periods) the Contractor shall be responsible for purchasing all miscellaneous repair items and consumable materials necessary to maintain the Cashless Tolling System at the performance levels specified in the Contract.

7.10.2 Spare Part Inventory and Tracking

1143	The Contractor shall be responsible for recording the inventory into the MOMS, monitoring the inventory quantity and ensuring that the inventory is maintained to the levels required.
1144	The Contractor shall keep accurate records of all parts entering and leaving inventory including but not limited to: time and date part was dispensed, and the location within the Cashless Tolling System where the part was dispatched and used.
1145	The Contractor shall also be responsible for tracking of all warranty replacement for Contractor provided Equipment through returned materials authorization (RMA) process. If the replaced part is under warranty, the part shall be immediately replaced with a new part. If the replaced part is out of warranty, the Contractor shall make every effort to repair the replaced item to a usable status and place the part back into spares inventory.
1146	If the Contractor is unable to repair the part, a new part shall be purchased and placed into spares inventory. The details of the repair efforts, including problem; status; inventory, and repair disposition shall be included in the MOMS inventory and repair database.

7.10.3 Procurement and Control of Spare Parts

1147	Thirty (30) days prior to placing the Cashless Tolling System in revenue collection the Contractor shall have purchased and have on hand at Commission facilities the agreed upon inventory of spare parts.
1148	The spare parts shall be purchased on behalf of the Commission and shall be invoiced at the time of installation and owned by the Commission in a manner to ensure that the Commission receives the maximum benefit from any warranties associated with the spare parts. After the warranty period, the Commission shall reserve the right to purchase all spare parts directly from the source and all purchases will be coordinated through the Commission Procurement Office. After the Warranty period, Contractor provided spare parts not purchased directly by the Commission shall be provided at cost, shall not include any mark up and shall be in accordance with the agreed to Contract price. The Commission shall be under no obligation to buy back excess spare parts purchased by the Contractor.
1149	The Contractor shall cooperate with and assist the Commission to ensure that all spare parts, equipment, and other Commission owned property is stored or otherwise located on the Contractor's property or in Contractor controlled space shall not be subject to any risk of being confiscated, claimed, attached, withheld by a landlord, creditor, or similar risk.
1150	This cooperation includes, but is not be limited to, affixing appropriate labeling to track within MOMS and identify as the property of the Commission, with a Commission specific part or control number. All spare parts and consumables shall be maintained by the Contractor free and clear of any liens and encumbrances of any kind. The Commission shall have the right to inspect the spares and consumables inventory upon request.
1151	The facility and storage area shall be secured and connected to an up-to-date security network system with alarm notification provided to the Contractor's Maintenance staff. Further, it is required that the Commission shall have full and unrestricted access to the Maintenance and or storage facility.
1152	Any spare parts that are lost or damaged due to the negligence, intentional act, or omission of the Contractor or its employees, Subcontractors, agents, or invitees shall be replaced by the Contractor at its sole cost. The Commission may elect to assume responsibility at any time for storage of spare parts, and the Contractor shall deliver all spare parts to the Commission for storage after receipt of reasonable notice from the Commission.

7.11 Repair Depot

1153	The Contractor shall be responsible for providing and staffing a repair depot for the return and repair of Cashless Tolling System components.
1154	The Contractor shall be responsible for repairing failed Cashless Tolling System components and returning them to the spare parts inventory.

1155	Failed components shall be tracked by the Contractor utilizing MOMS, including final resolution. Component tracking shall include but not limited to the following: receipt, repair date/information, replace reason, date of return.
1156	The Contractor shall indicate the details of the repairs performed on any components. This shall include but not be limited to boards and connectors replaced.
1157	If the replaced part is under Warranty, the part shall be immediately replaced with a new part by the Contractor. If the replaced part is out of Warranty, the Contractor shall make every effort to repair the replaced item to a usable status and place the part back into spares inventory. Except for pervasive defects, for out of Warranty components, the Contractor shall document why the component could not be repaired and advise the Commission that a new spare must be ordered.

7.12 Audits

1158	The Contractor shall completely support the Commission in any audit activity relating to the PTC's Cashless Tolling System or operations. In addition, the Contractor shall conduct audits in accordance with the Contractor's Quality Assurance Program. All deficiencies identified through the Audit process shall be successfully corrected by the Contractor. These audits may include, but are not limited to the following:
	• internal control procedures;
	• revenue/transaction reporting;
	• financial audit and
	• System processing and performance.
	• Third party security evaluations

7.13 Security Certification

1159	The Contractor in coordination with the Commission shall perform monthly security tests that are scheduled in the MOMS, as well as every time a new Software release is deployed or new network equipment is added or replaced to evaluate the security risk to the Cashless Tolling System and identifying potential vulnerabilities. Commission IT Security shall be a party to these security tests and shall be notified in advance of any scheduled tests.
1160	The Contractor is responsible for correcting all Cashless Tolling System security deficiencies at the Contractor's cost and ensuring there are no security risks.

7.14 Cooperation with Other Vendors and Providers

1161	The Contractor shall cooperate to the fullest extent with other contractors and third-party vendors in order to ensure that the lane and Cashless Tolling System operation and Maintenance do not conflict with or cause any deterrent in capability or service to the traveling public, customers, or the Commission.

7.15 Emergency Response Management

The Commission has an emergency response management plan and the Contractor shall follow the procedures set forth in this plan when an emergency situation is invoked.

1162	The Contractor shall immediately respond to any emergency situation, as notified by the Commission or otherwise, that may arise that has already or could potentially damage the Cashless Tolling System. The Contractor shall be prepared to put forth all necessary resources to divert or correct an emergency condition.
1163	Such emergency conditions shall be handled in accordance with the policies and procedures established by the Commission. The following are a few examples of emergency conditions:
	• weather related;
	• vehicle accident;
	• conditions that invoke the Disaster Recovery Plan;
	• third party (power outage or communication failure);
	• vandalism that causes parts of the Cashless Tolling System to be inoperable and
	• detection of security breaches, discovered vulnerabilities and activities that pose a security threat to the Commission's toll collection system;

7.16 Cashless Toll Host (if provided) Disaster Recovery

1164	The Contractor shall perform Disaster Recovery procedures in accordance with the Approved Disaster Recovery Plan (DRP) in the event of a disaster and return the Cashless Toll Host System to a fully operational condition.
1165	The Contractor shall test the Disaster Recovery procedures on a yearly basis to validate that they are functioning per the Design. The Commission shall witness the test and the Contractor shall provide a report outlining the test, test results and any anomalies encountered for the Commission's review and Approval.
1166	The Contractor shall address any issues encountered from the yearly Disaster Recovery testing.
1167	The Contractor shall conduct an after-action review in conjunction with the PTC with the goal of continuous improvement and evaluating the Disaster Recovery Plan effectiveness.

7.17 Incident and Revenue Loss Reporting

1168	The Contractor shall immediately notify the Commission of any incident or event whereby the potential or actual loss of revenue occurred or could potentially occur. The Contractor shall take immediate action to rectify the condition and return the Cashless Tolling System to normal functioning.

1169	A Monthly Incident Report shall be provided by the Contractor that includes a breakdown of lost electronic data and revenue by the Commission for each incident. If the condition is determined to be due to the fault of the Contractor, damages shall be assessed in accordance with the terms of the Contract.

7.18 Maintenance Staffing, Materials and Training

7.18.1 Maintenance Staffing Requirements

1170	The Contractor shall be responsible for maintaining an adequate level of technical staff to perform Maintenance and Software Support Services on the Cashless Tolling System. The Contractor shall ensure that sufficient staffing is available to cover all Maintenance activities identified in this Scope of Work at all times but particularly during the following periods:
	• Weekends;
	• Holidays;
	• personnel on vacation/sick time;
	• after regular scheduled Work hours (on call), and
	• unexpected emergency or crisis.
1171	The Contractor shall provide personnel to perform the following functions. It shall be the Contractor's responsibility to staff at appropriate levels to meet the requirements, using the Maintenance Plan as the guideline for staffing levels and full job descriptions:
	• **Management:** Contractor's Maintenance Management responsibilities include all Maintenance Management business dealings with the Contractor's Project Manager. Responsibilities include single point of contact for all Work related issues, including System problems, material issues, or Contractor personnel issues. Maintenance Management responsibilities also include ensuring that Systems are properly functioning and that the Maintenance and repair Work are properly performed and documented.
	• **Field Supervision:** The Field Supervisory functions include being responsible for the day to day operations of the technicians, ensuring that all required Work is accomplished properly and efficiently.
	• **Maintenance Technical Staff:** Responsibilities include responding to Maintenance activities and Alerts and for field level preventive Maintenance. Maintenance technicians shall be qualified and maintain the proper certifications to troubleshoot Maintenance problems and identify the source of the problem.
	• **Network Engineering:** Network Administration shall include the configuration and Maintenance of the network systems and communications network.

	• **Database Administration:** Database administration shall include management of the servers and databases in accordance with *Attachment 11 - Database Standards for the Pennsylvania Turnpike Commission*. The database administration shall cover all aspects of the System database and ensuring the database is optimized for peak performance. The responsibilities include the configuration and operation of the System database and generation of database queries as requested by the Commission and other support personnel.
	• **Systems Engineering:** Responsibilities include the configuration and monitoring of all System processing and verify that all operations and processes are occurring as scheduled. All MOMS alarms relating to process failures shall be investigated and resolved by the System engineering staff. Systems engineering responsibilities also include ensuring the proper configuration of all servers and coordinating all server Maintenance. System engineering responsibilities also include identifying issues, communicating with the System Software personnel and coordinating resolution of the problem. All user-related problems (application Software) shall also be handled by the System engineering personnel.
	• **Software Technical Staff:** Responsibilities include responding to Maintenance activities and Alerts and resolution of Software problems. Software technical staff shall be qualified to troubleshoot Maintenance problems, identify the source of the problem and correct the problem.
	• **Administrative Staff:** Responsibilities include support of the Contractor's Maintenance organization for the performance of Maintenance functions and to provide adequate phone and administrative support at the Maintenance management facility.
	• **ECO Management:** Responsibilities include managing the ECO process between the Contractor and the Commission. ECO management staff will ensure all the proper forms are filled out and proper authorizations are obtained to perform the change order work.
	• **Documentation Staff:** Responsibilities include updating and maintaining the documentation library to ensure all Cashless Tolling project documentation required in this Scope of Work is current and up to date.

7.18.2 Tools and Materials

1172	The Contractor shall provide all test Equipment and tools and support; including but not limited monitoring tools; smart phones; laptops, and any other items required for the Maintenance and Software Support staff to perform their Maintenance activities. All such devices shall have adequate and up-to-date security software and be Approved by Commission IT before they are used on the Cashless Tolling System network. All required test Equipment, tools and Software tools shall be on site (as required) and in adequate supply, with all required personnel trained on their use. All test Equipment shall be standard units that are capable of achieving the measurement they are intended to make.

7.18.3 Training Program

1173	The Contractor shall ensure that Maintenance and Software services staff is properly trained for requirements of maintaining the System. The Contractor shall provide a minimum of two (2) weeks of classroom and On the Job Training (OJT) to all personnel in their respective area of responsibility before such personnel are assigned Maintenance duties.
1174	The Contractor shall provide trained qualified technical staff to support the Maintenance and Software Support Services described in the Scope of Work. It is the Contractor's sole responsibility to develop training necessary to successfully perform all of the Maintenance actions required to keep the System operational.
1175	The Contractor shall complete all required training and certifications prior to performing actual Maintenance and Software Support Services within a revenue collection environment. In the event changes or modifications are made to the System Equipment or configuration, supplemental training shall be accomplished prior to the actual service date for the changes or modifications.
1176	Training shall include the Contractor's safety standards and guidelines and applicable Commission policies and procedures.
1177	The Contractor shall provide documentation that this initial training has been successfully completed.
1178	Various training programs the Contractor shall institute shall include, but not be limited to, the following:
	• a thorough understanding and operating knowledge of the MOMS is required of all Maintenance personnel;
	• an in depth understanding of the Cashless Tolling System and operations, including all Equipment, Software, interfaces, file transfers and interconnections;
	• use of Maintenance documentation such as Maintenance manuals; drawings; vendor manuals, and parts list;
	• functions of the System monitoring tools used to manage the System monitoring tasks;
	• preventive Maintenance of all Systems and sub-systems;
	• troubleshooting; diagnostics; repair, testing, and Maintenance follow up;
	• System logs, errors logs and processing of exceptions;
	• System dataflow and workflow queues;
	• review of the Dashboard data and analysis;
	• discussion on the areas of responsibility;
	• special use Maintenance and monitoring tools;
	• queries and reports, and
	• System access and security.

1179	All System Maintenance and software support personnel shall attend the appropriate training sessions. The Commission staff shall be notified of and invited to attend any or all training sessions two (2) weeks in advance of the training.
1180	All System Maintenance and software support personnel shall be trained on scheduling, work assignments, escalation process, transportation requirements and communications;
1181	The Contractor shall provide training offered by vendors and original equipment manufacturer (OEM) for System components where available and required to properly operate, maintain, test and repair such Equipment and Software. Such training shall include but not be limited to:
	• LPICPS Equipment;
	• AVI Equipment;
	• AVC System;
	• DVAS;
	• MOMS;
	• network components and Software provided by the Contractor;
	• security software and security tests;
	• databases and
	• servers.

7.18.4 Training Materials and Ongoing Education

1182	Training material shall consist of Maintenance manuals, vendor manuals and any other documentation that provides for the efficient and effective Maintenance of the System and its components.
1183	The Contractor shall hold regular meetings with Commission technical personnel to update Maintenance procedures, bring proposed System changes to the attention of the technical staff and discuss Maintenance issues identified in the field. The Contractor shall provide the Commission with the meeting schedule so that the appropriate Commission staff can attend these meetings.
1184	The Commission shall have the right to make recordings and copies of all training program materials. The Contractor shall provide releases from all employees/contractors to allow unlimited, royalty free use and copies of recordings.

7.18.5 System Documentation

1185	The Contractor shall have appropriate System documentation available to all Maintenance and Software Support personnel as required to perform their respective duties.

1186	The Contractor shall make immediate updates to the online System documentation library to reflect any changes to the System Approved by the Commission. A version update sheet shall be included with the System documentation, and the documentation on file shall have the most recent version from the configuration management database. A complete submission of the System documentation shall be made every five (5) years that reflects all Approved changes to-date.

7.18.6 Training Records

1187	The Contractor shall keep accurate training records on all Contractor and Commission personnel. The Commission shall be permitted to audit personnel qualifications and training records at any time. Evidence of completion of training by Contractor and Commission personnel involved with system maintenance shall be provided to the Commission upon request.

7.19 Safety

1188	The Contractor shall adhere to all applicable safety standards and guidelines for working on or around energized Equipment and in a Maintenance environment, including but not limited to the following:
	• the Commission safety procedures and guidelines are on the Commission website: https://www.paturnpike.com/business/engineering_standards.aspx;
	• State of Pennsylvania safety procedures and guidelines;
	• OSHA (Occupational Safety and Health Administration);
	• NEMA (National Electrical Manufacturers Association);
	• NEC (National Electrical Code);
	• FHWA (Federal Highway Administration), and
	• any other local, state, or Federal ordinance, procedure, or guideline that provides for a safe operation and working environment.

7.20 Maintenance and Protection of Traffic (MPT)

1189	The Contractor shall perform maintenance and protection of traffic associated with the Cashless Tolling Maintenance Phase. The Contractor in conjunction with the Commission shall develop as a part of the Maintenance Plan an MPT procedure in accordance with standards on the Commission website: https://www.paturnpike.com/business/engineering_standards.aspx for Approval by the Commission.
1190	The Contractor shall adhere to the Approved MPT Plan when setting up, working under MPT and restoring lanes to traffic. The Contractor shall also work with the Commission to coordinate MPT Work and to adhere to the Commission advance notice requirements for Work in the lanes, both on a scheduled and emergency basis. All lane closures shall also be coordinated with the Commission Traffic Operations Center and public relations.

7.21 Maintenance and Software Support Records

1191	The Commission shall have access to all Maintenance and service records at any time for review and audit, upon reasonable notice. The Contractor shall provide monthly reports generated in the System that permits the Commission to evaluate Contractor's Maintenance performance.
1192	The Contractor's Maintenance manager shall maintain current, complete and accurate records for all Maintenance and Software Support Services activities. The Contractor's Maintenance manager shall institute procedures that make sure Maintenance staff enters complete information into the MOMS before closing a work order or trouble ticket.
1193	All preventive and predictive Maintenance activities shall be reported in the same manner as corrective or emergency Maintenance activities by the Contractor. The information shall be contained on the MOMS and shall be made available through various MOMS reports.

7.21.1 Maintenance Summary Reports

1194	The Contractor shall provide the Maintenance summary reports to the Commission on a monthly basis in advance of the Monthly Meeting. The format of the Monthly reports shall be Approved by the Commission and included in the Maintenance Plan.
1195	The Contractor shall provide an annual Executive Summary report to the Commission that summarizes the Contractor's performance for the Maintenance Year. The format of the Executive Summary reports shall be Approved by the Commission and included in the Maintenance Plan.
1196	Maintenance summary reports shall also be readily available in detail or summary format to the Commission applicable personnel via the network on a daily, weekly, or other time period basis determined by the Commission. The Maintenance summary report shall include but not be limited to:
	• a summary of the Contractor's performance for the month under review noting all accomplishments and deficiencies;
	• all Maintenance and System performance reports that show Contractor's compliance to Maintenance performance requirements;
	• detailed listing of failures and the impacted subsystems where Contractor's and System performance for the month were not in compliance with the performance requirements;
	• any exceptions the Contractor believes are non-chargeable failures that Contractor is not responsible for;
	• detailed list of parts replaced as a result of Maintenance actions, with an identification of warranty versus non-warranty replacement;
	• status of removed parts and Equipment with an aging status for parts under repair or replacement (serial numbers, being repaired in Maintenance shop, purchase replacement part);
	• trend analysis for repetitive failure;
	• status of spare parts inventory;

	• staffing report detailing positions and staff hours worked;
	• staff performance trends;
	• Software and firmware releases implemented;
	• major Maintenance activities that occurred and are scheduled to occur;
	• incidents that invoked emergency response or resulted in loss of toll revenue and
	• summary of work order, Software defects and trouble tickets by priority and category.

7.22 Performance Requirements for the Cashless Tolling System and Liquidated Damages

The Cashless Tolling System shall be designed, developed, tested, implemented and Maintained to meet the performance requirements specified herein without the need for manual intervention. The Contractor shall facilitate performance monitoring by reporting performance in clearly measurable terms. The Commission will conduct a review of the Contractor's performance on a monthly basis, as defined in the Maintenance Plan utilizing all required System reports provided by the Contractor and reports generated by the MOMS

1197	The Contractor shall submit backup data that confirms Contractor compliance to Maintenance performance requirements.
1198	A detailed listing of the Cashless Tolling System alarms for each subsystem shall be created with their priority levels in support of the performance data and Contractor's responsibility shall be clearly identified. The Contractor shall be responsible for all alarms and work orders that are escalated to the Contractor.
1199	Monthly performance reviews shall begin at the commencement of the Maintenance and Software Support Services Contract at each tolling point and shall continue monthly through the period of the Maintenance and Software Support Services Contract. The first month's performance shall be reviewed in month two of the Maintenance and Software Support Services Contract.
1200	Liquidated damages associated with monthly performance reviews, if applicable, shall be assessed beginning in month two for month one performance and shall continue through the period of the Maintenance and Software Support Services Contract.

7.22.1 Acknowledgement of All Priority Events

1201	The Contractor shall acknowledge receipt of all Priority events within thirty (30) minutes of failure/event notification.
1202	For the purposes of assessing Liquidated Damages, ninety five (95) percent of failure or priority event shall be acknowledged within thirty (30) minutes of receipt.
1203	The Contractor may be assessed Liquidated Damages of $250 if the acknowledgment percent is below the ninety five (95) percent threshold every month for every Priority event not acknowledged within the time frame specified in these Requirements.

7.22.2 Time to Respond and Repair (TTRR)

1204	The Contractor shall respond to and complete repair of **Priority 1** failures/events as follows:
	• For In-Lane System failures and Cashless Toll Concentrator or Toll Host (if provided) failures that can be handled remotely: respond and complete repair within two (2) hours of failure/event notification.
	• For Cashless Toll Concentrator or Toll Host (if provided) failures that require Onsite Corrective Maintenance: be onsite within twenty-four (24) hours of Approval to commence Work and once the Contractor is onsite, two (2) hour time to complete repair.
	The Contractor may be assessed Liquidated Damages of $100 per occurrence for every additional delay of one (1) hour to respond and complete repair of Priority 1 failures/events.
	The Contractor may be assessed Liquidated Damages of $500 per occurrence for every additional twenty-four (24) hour delay over the twenty-four (24) hours for being onsite and ready to commence Work.
1205	The Contractor shall respond to and complete repair of **Priority 2** failure/events as follows:
	• For In-Lane System failures and Cashless Toll Concentrator or Toll Host (if provided) failures that can be handled remotely: respond and complete repair within four (4) hours of failure/event notification.
	• For Cashless Toll Concentrator or Toll Host (if provided) failures that require Onsite Corrective Maintenance: be onsite within forty-eight (48) hours of Approval to commence Work and once the Contractor is onsite, two (2) hour time to complete repair.
	The Contractor may be assessed Liquidated Damages of $100 per occurrence for every additional delay of one (1) hour to respond and complete repair of Priority 2 failures/events.
	The Contractor may be assessed Liquidated Damages of $300 per occurrence for every additional twenty-four (24) hour delay over the forty-eight (48) hours for being onsite and ready to commence Work.
1206	The Contractor shall respond to and complete repair of **Priority 3** failures/events as follows:
	• For In-Lane System failures and Cashless Toll Concentrator or Toll Host (if provided) failures that can be handled remotely: respond and complete repair within twenty-four (24) hours of failure/event notification.
	• For Cashless Toll Concentrator or Toll Host (if provided) failures that require Onsite Corrective Maintenance: No longer than three (3) Calendar Days to respond and complete repair upon Approval to commence Work.
	The Contractor is not subject to any Liquidated Damages for Priority 3 failures/events.

7.22.3 Mean Time Between Failures (MTBF)

1207	The Contractor shall meet MTBF requirements for the following elements of the Cashless Tolling System Components:
	• Redundant Zone Controller: 30,000 hours
	• Automatic Vehicle Identification (AVI) System: 20,000 hours

	• Automatic Vehicle Classification (AVC) System: 30,000 hours
	• License Plate Image Capture and Processing System (LPICPS): 30,000 hours
	• Cashless Tolling Servers: 50,000 hours
	• Network Devices: 50,000 hours
1208	The reliability of the System components shall be calculated based on the following MTBF calculation: MTBF = # units x measuring period (hours)/ # chargeable failures
1209	The Contractor may be assessed Liquidated Damages of $500 for each Sub-system not meeting requirement due to Contractor and Contractor System failure.

7.22.4 Availability

1210	The Contractor shall meet availability requirements for the following elements of the Cashless Tolling System:
	• Lane Availability - Maintenance from Above or Below Toll Zones: 99.95%;
	• Cashless Toll Concentrator or Host System (if provided) – 99.95%;
1211	Availability for each of the above systems shall be calculated as follows: Availability = 100% - [Total number of hours of downtime in time period X / Total hours in time period X].
1212	For every month in which the Toll Zone lane is available less than the minimum requirement, Contractor may be subject to Liquidated Damages of:
	• a 0.5% adjustment to the monthly Maintenance fee for availability of 99.90% and up to 99.94%;
	• a 2% adjustment to the monthly Maintenance fee for availability of 99.50% and up to 99.89%;
	• a 5% adjustment to the monthly Maintenance fee for availability of 99% and 99.49%.
	• a 10% adjustment to the monthly Maintenance fee for availability below 99%.
1213	For every month in which the Cashless Toll Concentrator or Toll Host System (if provided) is available less than the minimum requirement, Contractor may be subject to Liquidated Damages of:
	• a 1% adjustment to the monthly Maintenance fee for availability of 99.90% and up to 99.94%;
	• a 2% adjustment to the monthly Maintenance fee for availability of 99.50% and up to 99.89%;
	• a 5% adjustment to the monthly Maintenance fee for availability of 99% and 99.49%.
	• a 10% adjustment to the monthly Maintenance fee for availability below 99%.

7.22.5 Transmission of TSL and VEL to the In-Lane Cashless Tolling System

1214	Successfully and accurately transmit the Comprehensive Home and Away/Interoperable TSL to each of the zone controllers within thirty (30) minutes of the Cashless Tolling Concentrator, Toll Host (if provided) or Facility Server(s) receipt of the TSL.

	The Contractor may be subject to Liquidated Damages of $500 per occurrence per one (1) hour delay for failure to successfully and accurately transmit the TSL to each of the zone controller.
1215	Successfully and accurately transmit the VEL (if exercised) to the In-lane Cashless Tolling System within thirty (30) minutes of the Cashless Toll Host System receipt of the VEL (if exercised).
1216	The Contractor is not subject to any Liquidated Damages.

7.22.6 Transaction Processing and Transmission Requirements

1217	One hundred (100) percent of transactions (AVI and video transactions) from the roadway systems shall be sent to the existing PTC Toll Host and reconciled with an accuracy of one hundred (100) percent.
1218	One hundred (100) percent of transactions (AVI and video transactions) identified to be pursuable and non-pursuable shall be successfully and accurately transmitted to the existing CSC/VPC system with an accuracy of one hundred (100) percent within twenty-four (24) hours of vehicle transit.
1219	For failure to accurately process and reconcile one hundred (100) percent of all transactions and successfully and accurately transmit pursuable and non-pursuable transactions to the existing CSC/VPC system within twenty-four (24) hours of vehicle transit, the Contractor shall be subject to Liquidated Damages of $50 per twenty-four (24) hour delay per 1,000 transactions.

7.22.7 Image Processing Requirements

1220	One hundred (100) percent of images (video) from the roadway systems shall be successfully and accurately transmitted to the existing CSC/VPC system and reconciled to the transactions with an accuracy of one hundred (100) percent.
1221	One hundred (100) percent of images identified to be pursuable shall be successfully and accurately transmitted to the existing CSC/VPC system with an accuracy of one hundred (100) percent within twenty-four (24) hours of vehicle transit.
1222	For failure to accurately process and reconcile one hundred (100) percent of all images and successfully and accurately transmit pursuable images to the existing CSC/VPC system within twenty-four (24) hours of vehicle transit, the Contractor shall be subject to Liquidated Damages $50 per twenty-four (24) hour delay per 1,000 images set.

7.22.8 License Plate Extraction Accuracy - if the option to implement OCR/ALPR is exercised

1223	The Contractor shall provide an accurate OCR/ALPR process which shall result in the Cashless Tolling System extracting the license plate, plate type, and jurisdiction with an accuracy of at least 99.95 percent on minimum seventy (70) percent of video transactions generated in the lanes.

1224	For error rates above the 0.05 percent rate, the Contractor may be subject to Liquidated Damages of $10 for each license plate in error.

7.22.9 Spare Parts Availability

1225	The Contractor shall maintain the required physical inventory of agreed to spare parts in accordance with the Contract.
1226	For failure to maintain spare parts inventory at adequate levels for the month, the Contractor may be subject to Liquidated Damages of $500 per month for each failure to maintain spare parts inventory per the counts required.

7.22.10 Preventive Maintenance

1227	The Contractor shall perform preventive Maintenance on the Cashless Tolling System according to Approved Preventive Maintenance schedule.
1228	The Contractor is not subject to any Liquidated Damages for this Maintenance Work.

7.23 Security

1229	All Contractor personnel shall be subject to appropriate security and background checks to the satisfaction of the Commission. The Contractor shall obtain written Approval from the Commission for all service personnel and each Contractor personnel shall be required to sign an acceptable use agreement.
1230	Contractor's personnel shall be issued Commission identification badges and shall wear such identification badges at all times when on the Commission property. Use of such identification badges for purposes other than work associated with the Contract will result in termination of the employee from the Contract and possible other legal or disciplinary action.
1231	The Services and Work performed under the Contract are considered highly confidential and the Contractor personnel shall at all times comply with applicable current computer and data industry standards with regard to data and information security. All employees of the Contractor shall not discuss their work with unauthorized personnel or any individuals not directly associated with the Commission.
1232	Contractor's personnel can only use Commission -assigned workstations, servers, and laptops to communicate with the Cashless Tolling System while on Commission premises.
1233	The Commission will identify and designate a primary point of contact for the Contractor. Under most circumstances, the Contractor will limit communication with Commission authorized staff and to the Commission's designated point of contact unless otherwise directed by the Commission.
1234	Discussion by the Contractor of any Services or Work performed under the Contract with the media, in oral presentations, in written publications, or in any other form, not related to this Contract shall be Approved in advance by the Commission.

7.24 Confidentiality

1235	The Contractor shall keep all information regarding its activities pursuant to this Contract confidential and will communicate such information only with authorized Commission personnel or Designated Representatives.

Attachments

Attachment 1

Cashless Toll Zone Locations

Toll Zone Types

For the purpose of developing cost estimates for roadside equipment, it is important to understand physical layout of the future Cashless Tolling System. Specifically, the number of lanes and shoulders, as well as the type of toll zone being implemented will be important to the cost estimates.

Shoulders of 8 feet or greater were considered full shoulders and will, thereby, be fully equipped. Table 1 describes the toll zone types found across the system.

Table 2 describes the location, anticipated conversion date and type for the toll zones which will be constructed on the baseline scope facilities on the Northeast Extension. The proposed mileposts for the gantry locations are estimates and will be finalized during the design phase by the Civil Designer(s).

Table 3 describes the location, anticipated conversion date and type for the optional toll zones which may be constructed on the Mainline and Northeast Extension. The proposed mileposts for the gantry locations are estimates and will be finalized during the design phase by the Civil Designer(s).

Table 4 describes the location, anticipated conversion date and type for the optional toll zones which may be constructed on the western extensions. Toll zone layouts have not been developed for the optional facilities (Beaver Valley Expressway, Amos. K. Hutchinson Bypass and Mon-Fayette Expressway). Therefore, cost estimates are requested for each toll zone type so that costs may be fully developed in coordination with the design of these facilities.

Table 1: Summary of Toll Zone Types

Toll Zone Type	Description	Existing Lane Configuration (lanes+full shoulder+partial shoulder)
Zone Type 1 (Z1)	Mainline Gantry (2) with Maintenance from Above	(3+1+1)
Zone Type 2 (Z2)	Mainline Gantry (2) with Maintenance from Above	(3+2+0)
Zone Type 3 (Z3)	Mainline Gantry (2) with Maintenance from Above	(2+1+1)
Zone Type 4 (Z4)	Mainline Gantry (2) with Maintenance from Below	(2+1+1)
Zone Type 5 (Z5)	Existing Mainline with Maintenance from Below	(2+1+1)
Zone Type 6 (Z6)	Existing Ramp with Maintenance from Below	(2+0+0)

Table 2: Toll Zone Details for Base Locations

Northeast Extension Tolling Segment	Proposed NEE Mile Post[1]	Toll Zone Type	Conversion year	Region	# Toll Zones
Northeast Extension	A130.6	Z4	2022	East	2

Table 3: Toll Zone Details for Future PTC Optional Locations on Mainline and Northeast Extension (Pricing Only)

Mainline Tolling Segment	Proposed Mainline Mile Post[1]	Toll Zone Type	Conversion year[2]	Region	# Toll Zones
Mainline	T1.43 [2]	Z5	2024	West	1
Mainline	T36.1	Z2	2024	West	2
Mainline	T44	Z2	2024	West	2
Mainline	T51.9	Z2	2024	West	2
Mainline	T63.35	Z2	2024	West	2
Mainline	T70.8	Z2	2024	West	2
Mainline	T76.6	Z2	2024	West	2
Mainline	T108.95	Z2	2024	West	2
Mainline	T131.6	Z2	2024	West	2
Mainline	T160.6	Z2	2024	West	2
Mainline	T173.2	Z2	2024	West	2
Mainline	T188.1	Z3	2024	West	2
Mainline	T189.7	Z2	2024	West	2
Mainline	T203.2	Z2	2024	West	2
Mainline	T226.9	Z2	2024	Central	2
Mainline	T240.6	Z2	2024	Central	2
Mainline	T243.6	Z2	2024	Central	2
Mainline	T248.3	Z2	2024	Central	2
Mainline	T285.7	Z2	2024	Central	2
Mainline	T295.0	Z2	2022	East	2
Mainline	T311.4	Z2	2022	East	2
Mainline	T312.9	Z2	2022	East	2
Mainline	T322.3	Z2	2022	East	2
Mainline	T329.1[6]	Z1	2022	East	2
Mainline	T332.1	Z1	2022	East	2
Mainline	T334.8	Z1	2022	East	2
Mainline Ramp	T339.80 [3,4]	Z6	2022	East	1
Mainline	T341.4	Z1	2022	East	2
Mainline	T348.8	Z1	2022	East	2
Mainline Ramp	T351.9 [3,5]	Z6	2022	East	1
Mainline	T353.3	Z3	2022	East	2
Mainline	T359 [3]	Z5	2022	East	1

Northeast Extension Tolling Segment	Proposed NEE Mile Post[1]	Toll Zone Type	Conversion year	Region	# Toll Zones
Northeast Extension	A27.4	Z2	2022	East	2
Northeast Extension	A30.8	Z2	2022	East	2
Northeast Extension	A56.9	Z2	2022	East	2
Northeast Extension	A61.9	Z4	2022	East	2
Northeast Extension	A76.9	Z4	2022	East	2
Northeast Extension	A90.3	Z4	2022	East	2
Northeast Extension	A97.5	Z4	2022	East	2
Northeast Extension	A112.5	Z4	2022	East	2
Northeast Extension	A121.3	Z4	2022	East	2

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[1] The proposed mileposts for the mainline gantry locations are for planning purposes only and final locations will be determined during the design phase.

[2] Conversion schedule of the Central/Western regions subject to change. Earliest conversion of 2024 for pricing evaluation.

[3] Existing AET or Express toll zones. Existing Toll System to remain initially, new implementation TBD. Included for pricing evaluation.

[4] Virginia Dr. slip ramps may toll in a single direction (most likely entry)

[5] Street Rd. slip ramps may toll in a single direction (most likely exit)

[6] Lafayette St. is a proposed future interchange that will require a new ORT gantry to support.

Table 4: Toll Zone Details for Future PTC Optional Locations on Beaver Valley Expressway, Amos K. Bypass and Mon Fayette Expressway (Pricing Only)

Tolling Segment	Proposed Mile Post [1]	Toll Zone Type	Conversion year [2]	Roadway	# Toll Zones
Ramp	B17	Z6	TBD	BVE	2
Mainline	B18.1	Z5	TBD	BVE	2
Ramp	B20	Z6	TBD	BVE	2
Ramp	B29	Z6	TBD	BVE	2
Mainline	B30.45	Z5	TBD	BVE	2
Ramp	G4	Z6	TBD	AKH	2
Mainline	G4.6	Z5	TBD	AKH	2
Ramp	G6	Z6	TBD	AKH	2
Ramp	G8	Z6	TBD	AKH	2
Ramp	G9	Z6	TBD	AKH	2
Ramp	M4	Z6	TBD	MFE	2
Mainline	M4.6	Z6	TBD	MFE	2
Ramp	M15	Z6	TBD	MFE	2
Ramp	M18	Z6	TBD	MFE	2
Mainline	M19.5	Z5	TBD	MFE	2
Ramp	M22	Z6	TBD	MFE	2
Ramp	M26	Z6	TBD	MFE	2
Mainline	M34.8	Z5	TBD	MFE	2
Ramp	M39	Z6	TBD	MFE	2
Ramp	M44	Z6	TBD	MFE	2
Ramp	M48	Z6	TBD	MFE	2
Mainline	M51.9	Z4	TBD	MFE	2

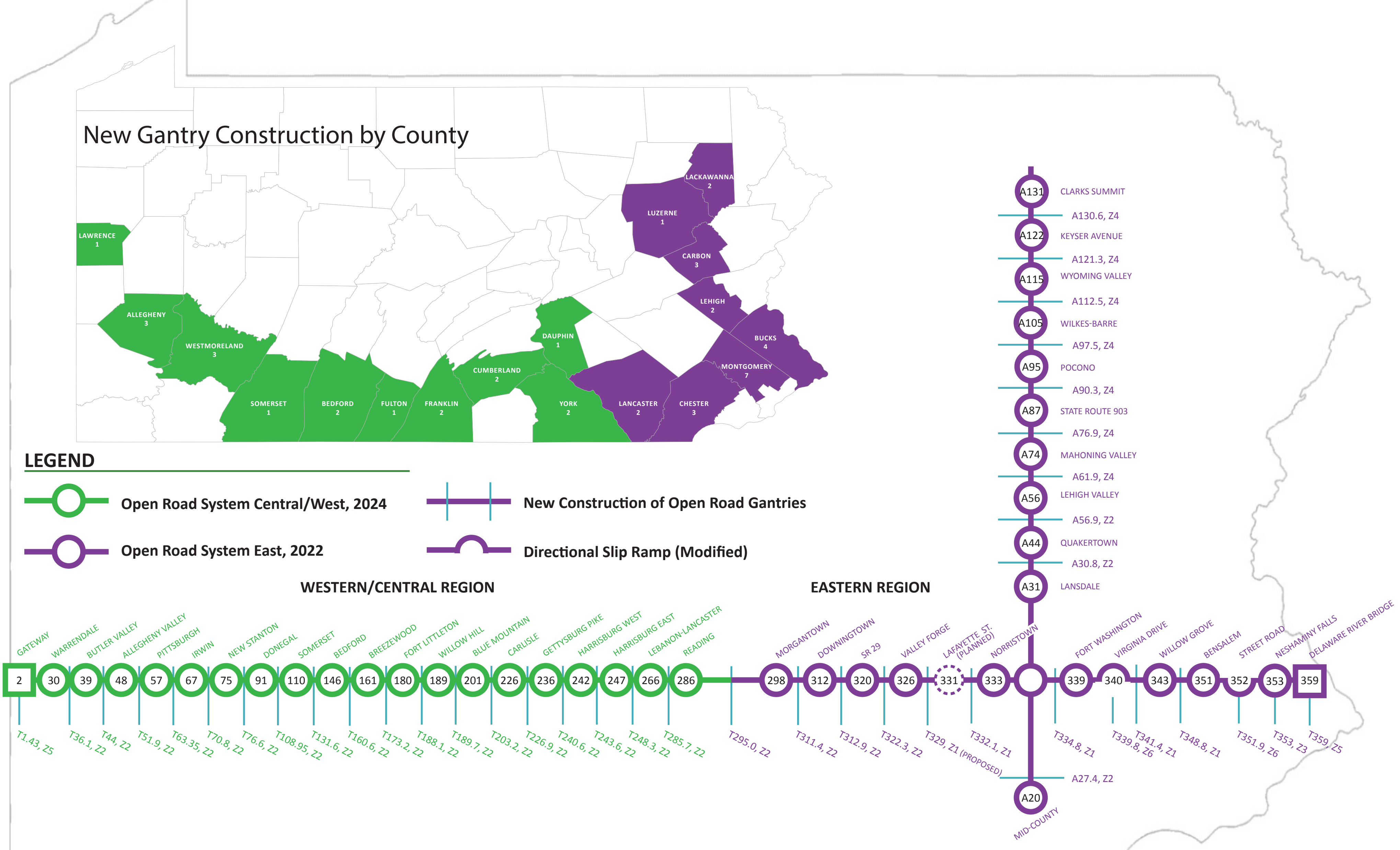
[1] The proposed mileposts for the tolling locations are for planning purposes only and final locations will be determined during the design phase.

[2] The conversion of the optional locations has yet to be determined. For informational and pricing comparison purposes only.

Attachment 1A

Cashless Toll Zone Locations Map

Mainline & Northeast Extension
Proposed Cashless Tolling Conversion Locations[1]



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[1] *The proposed mileposts for the mainline gantry locations are for planning purposes only and final locations will be determined during the design phase.*

Attachment 2

Cashless Tolling Installation Responsibility Matrix

Legend:

A = Primary Responsibility - The identified party has the primary responsibility for completion of the item.	1 =	Design
B = Support / Coordination - The identified party provides either support or coordination to assist the primary responsible party with successful completion of the item.	2 =	Purchase Materials/ Equipment
C = Limited/Minimum Responsibility - The identified party provides limited action for the item.	3 =	Installation and/or Construction

#	Element / Task / Component / Sub-System Description	Toll System "Contractor"			PTC			Civil Contractor			Civil Designer			Comments and Other Responsibilities / Information
		1	2	3	1	2	3	1	2	3	1	2	3	
1.	Overhead Structures/Toll Gantries	B	C	B	B	B	B	C	A	A	A	B	B	Civil Designer will design overhead structures/toll gantries based on known toll system requirements and in conformance with the standard gantry concept provided in Attachment 5 - Concept Plans for Overhead Structures and Toll Gantries, toll system proposals and future needs. Upon Contract award the Contractor shall review and approve Civil Designer and Civil Contractor shop drawings related to toll equipment. Civil Contractor will furnish and install the overhead structures/toll gantries including the drop down and retractable mounting arms and support plates mounted to the gantry. Contractor shall design, furnish and install mounting brackets and hardware as described in item 4 from mounting demarcation point to attach the Toll System equipment to the arms and support plates, and shall provide shop drawings for Civil Designer and PTC approval prior to installation. (See Attachment 6 – Installation Demarcation Diagram).
2.	Toll Lanes Pavement/Roadway Infrastructure	B	C	B	B	C	B	C	A	A	A	C	C	Civil Designer will design roadway infrastructure based on known toll system requirements, toll system proposals and future needs. Upon Contract award, Contractor shall review and approve Civil Designer and Civil Contractor shop drawings related to roadway. Civil Contractor to furnish and install roadway infrastructure up to and including demarcation points of the pavement, conduits and related roadway junction boxes (see Attachment 6 – Installation Demarcation Diagram). The Contractor approves the pavement design to ensure that the design will support the toll system, inspects and signs off on riser prior to asphalt overlay. The Contractor will be responsible for the installation of all in-lane sensors that will be imbedded into the pavement, including but not limited to loops and treadles. The Contractor will be responsible for sealing and patching any work they perform in the pavement. (i.e. saw cuts).
3.	Toll Zone Locations	B	n/a	n/a	B	n/a	n/a	C	n/a	n/a	A	n/a	n/a	Civil Designer to determine final toll zone footprint based on proposed locations in Attachment 1 - Cashless Toll Zone Locations based on PTC and AVI vendor requirements; known toll system requirements; toll system proposals, and future needs. Contractor shall provide support, as applicable, after Contract award has occurred.
4.	Mounting Hardware and Materials for Toll System Installation	A	A	A	B	B	B	C	C	B	B	C	B	Contractor shall design, furnish and install all mounting brackets, hardware and provide materials (e.g., loop wire, sealant), and all Toll System equipment from the point of mounting demarcation on the cashless tolling structures, from the designated demarcation point/junction box within the roadway, and within the TEB from the TEB demarcation point (see Attachment 6 – Installation Demarcation Diagram). The Civil Designer and Civil Contractor will incorporate equipment specific brackets into the design package.
5.	Roadside Toll System Equipment, excluding AVI	A	A	A	B	B	B	C	C	B	B	C	B	Contractor shall design, furnish and install all Toll System equipment to meet the requirements of the Contract, excluding AVI, which is covered under item 7.

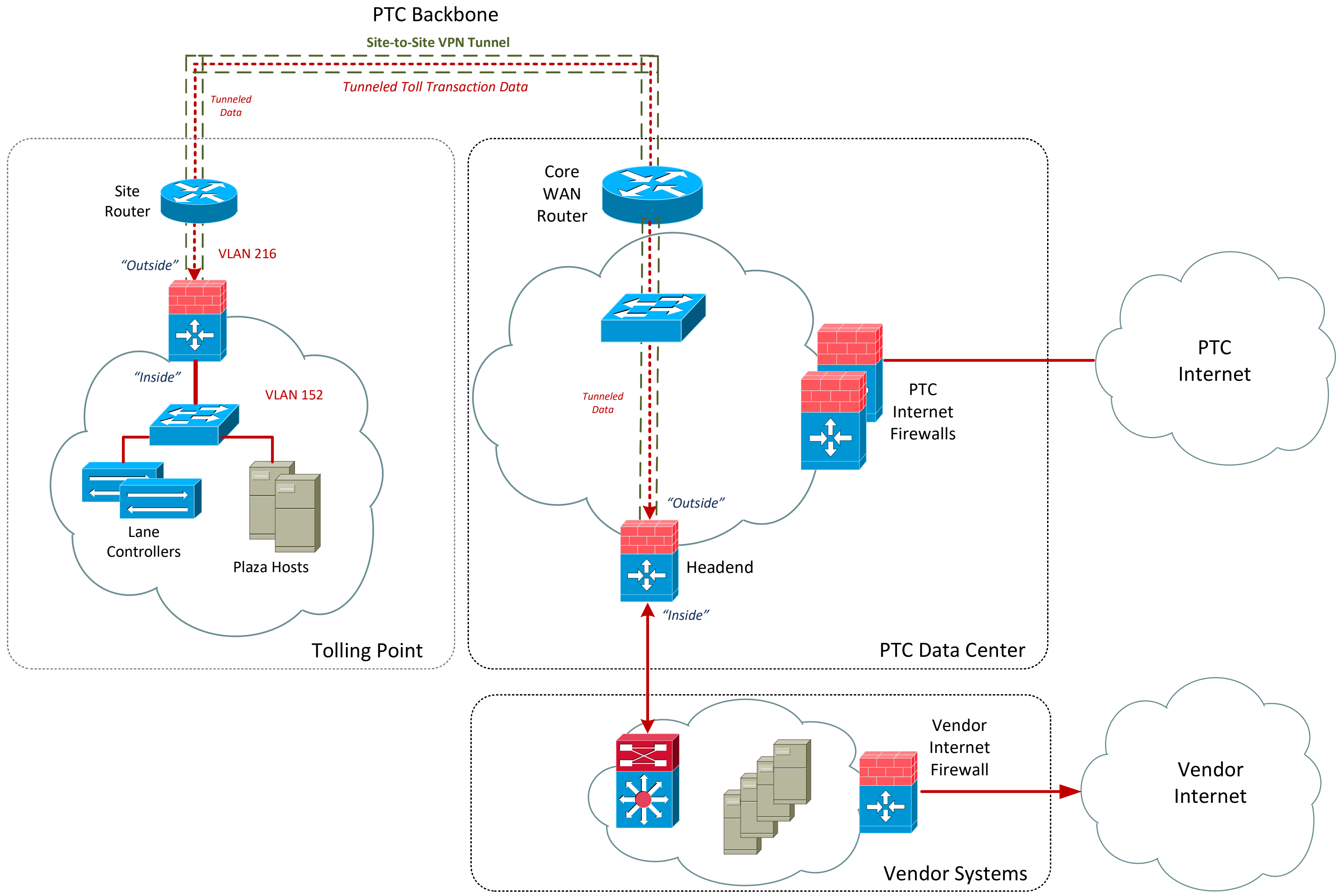
#	Element / Task / Component / Sub-System Description	Toll System "Contractor"			PTC			Civil Contractor			Civil Designer			Comments and Other Responsibilities / Information
		1	2	3	1	2	3	1	2	3	1	2	3	
6.	Toll System Equipment within the Toll Equipment Building (TEB)	A	A	A	B	B	B	C	C	B	B	C	B	Contractor shall design, furnish and install all Toll System equipment located within the TEB(s) to meet the requirements of the Contract. This includes but not limited to zone controllers, facility servers (if necessary), and image servers (if necessary).
7.	AVI Antennas and Readers, Mounting Hardware	A	B	A	B	A	B	C	C	B	B	C	B	PTC shall procure and Contractor shall take delivery and install the approved E-ZPass AVI equipment per the quantity identified by the Contractor's design to satisfy the Toll System requirements specified.
8.	Signage, Sign Supports, and Mounting	C	C	C	B	B	B	C	A	A	A	B	B	Civil Designer will design signs. Civil Contractor will be responsible for all signage procurement and installation related activities.
9.	Roadside Toll Equipment Building	B	C	B	B	B	B	C	A	A	A	B	B	Civil Designer will design toll equipment buildings and Civil Contractor will furnish and install toll equipment buildings. Contractor will provide space and power requirements as well as environmental considerations for all Contractor provided equipment housed inside the toll equipment building. The Contractor will review and approve designs and shall install equipment racks within the TEB to house the toll system servers and components.
10.	Back-up Generator	B	C	C	B	B	B	C	A	A	A	B	B	Civil Designer will specify roadside generator. Civil Contractor will furnish and install generators. Contractor and PTC to provide power requirements at each generator location for the toll system and ITS equipment.
11.	Toll System Equipment Racks within Toll Equipment Building	A	A	A	B	B	B	C	C	B	B	B	B	Contractor shall design, furnish and install equipment racks for LAN and toll equipment within the toll equipment building, including equipment layout design; power supplies, mounting materials, raceways, and wiring and conduit from toll equipment building demarcation points for power and communications and shall provide shop drawings for Civil Designer and PTC approval prior to installation. (see Attachment 6– Installation Demarcation Diagram)
12.	PTC WAN and ITS Equipment Racks within Toll Equipment Building	B	C	C	A	A	A	C	C	B	B	B	B	PTC shall design, furnish and install equipment racks for WAN and ITS equipment within the toll equipment building, including equipment layout design; power supplies, mounting materials, raceways, and wiring and conduit from toll equipment building demarcation points for power and communications and shall provide shop drawings for Civil Designer prior to installation.
13.	Power from Point of Service to Toll Equipment Building	B	C	B	B	B	B	C	A	A	A	B	B	Civil Designer will design power infrastructure based on known toll system requirements, toll system proposals and future needs. Upon Contract award Contractor shall review and approve Civil Designer and Civil Contractor shop drawings related to power requirements. Civil Contractor shall be responsible for providing the prime power and the electrical connectivity (including conduit and panels) between the point of service and the toll equipment buildings. Civil Contractor will also be responsible for stub out of conduits to demarcation points in the toll equipment building. (see Attachment 6 – Installation Demarcation Diagram) The Contractor will provide specific power requirements for the toll system and provide specifications for any utility clearances in the vicinity of the toll system equipment.
14.	Toll System equipment conduits or ducts and junction/pull boxes from TEB to demarcation point on the overhead structures/toll gantries	B	C	B	B	B	B	C	A	A	A	B	B	Civil Designer will design and Civil Contractor will furnish and install conduits, ducts and junction boxes and other related power infrastructure based on known toll system requirements, Cashless Tolling System proposals and future needs from the TEB to a pre-defined demarcation point (see Attachment 6 – Installation Demarcation Diagram). Upon contract award Contractor shall review and approve Civil design and Civil Contractor shop drawings related to this infrastructure. The Contractor will be responsible to pull Toll System cables and wires as described in #16 to the equipment racks. (see Attachment 6 – Installation Demarcation Diagram)

#	Element / Task / Component / Sub-System Description	Toll System "Contractor"			PTC			Civil Contractor			Civil Designer			Comments and Other Responsibilities / Information
		1	2	3	1	2	3	1	2	3	1	2	3	
15.	Conduit from Demarcation point(s) to Toll Equipment	A	A	A	B	B	B	B	B	B	B	B	B	The Contractor will furnish and install above grade conduits, ducts and junction boxes and other related power infrastructure based on the Toll System requirements beyond the pre-defined demarcation points to complete the connections to their toll equipment. (see Attachment 6 – Installation Demarcation Diagram)
16.	Toll System Equipment Cable and Wiring	A	A	A	B	B	B	C	C	B	B	C	B	The Contractor shall design, furnish and install all cables and wiring required (including but not limited to power and data/network) to fully connect and operate the Toll System from the point of power supplied by the Civil Contractor and the WAN equipment provided by PTC. The Contractor will be responsible for all cables and wiring to connect the Toll System equipment to the toll equipment racks in the TEB (see Attachment 6– Installation Demarcation Diagram).
17.	Toll Zone Lighting	A	A	A	B	C	C	C	B	B	B	B	B	The Contractor shall design, furnish and install any supplemental lighting and sensors required for the Cashless Tolling System including any supplemental lighting for the DVAS. Contractor to provide mounting requirements and any limitations on the positioning of light fixtures with respect to the tolling equipment to the Civil Designer(s).
18.	Toll System Design/Installation Drawings	A	n/a	n/a	B	n/a	n/a	B	n/a	n/a	B	n/a	n/a	The Contractor shall provide all design drawings and documentation required for the installation of the Toll System to the Civil Designer and shall review and approve Civil Designer's design and Civil Contractor shop drawings with regard to the Toll System.
19.	Toll System Network Equipment (LAN)	A	A	A	B	B	B	C	C	B	B	C	B	The Contractor shall design, and furnish all Toll System network equipment per specification and install all LAN network devices to interconnect with the appropriate PTC installed network equipment in the toll equipment buildings (see Attachment 3b – Network Responsibility Diagram). The Contractor will be responsible to manage and monitor all Cashless Tolling LAN equipment after the PTC provided firewall. It will be the responsibility of the Contractor and PTC to coordinate and develop the connection(s). The Contractor is responsible for verifying the connectivity between all Cashless Tolling System(s).
20.	WAN Network Equipment (remote sites, i.e. Disaster Recovery or Cloud locations)	A	A	A	B	B	B	C	C	B	B	C	B	The Contractor shall design, furnish and install all network equipment and WAN devices to provide network connectivity including but not limited to Contractor remote monitoring locations and colocations of servers outside of the PTC facilities.
21.	WAN Network Equipment (PTC facilities)	B	C	B	A	A	A	C	C	B	B	C	B	The PTC shall design, furnish and install ALL network equipment and WAN devices to provide network connectivity to the TEB(s) (see Attachment 3b – Network Responsibility Diagram), and to other PTC facilities including. It will be the shared responsibility of the Contractor and PTC to coordinate and develop the connection(s).
22.	Facility Servers	A	A	A	B	B	B	C	C	C	C	C	C	The Contractor shall furnish and install all facility servers, storage devices, and other required processing components as required in the TEB.
23.	Toll System UPS – Equipment	B	C	B	B	C	B	C	A	A	A	C	C	The Civil Designer shall design and the Civil Contractor shall furnish and install UPS in the toll equipment buildings. The Contractor shall furnish and install an electronic interface to the UPS to monitor the UPS performance. The Contractor and PTC will provide power requirements at each UPS location for the Toll System and supporting ITS and WAN equipment.
24.	Maintenance and Protection of Traffic (MPT) for Toll System Installation (prior to the Civil Contractor having completed their work within the toll zone)	B	B	B	B	B	B	B	A	A	A	B	B	The Civil Designer shall design typical MPT plans for the work and the Civil Contractor shall furnish all MPT and lane closures per the Contractor schedule for Toll System equipment related installation and testing during the civil construction period, and prior to the Civil Contractor completing their work. The Contractor shall coordinate with the Civil Contractor to take advantage of lane closures that could provide opportunities to perform their work Final detailed MPT packages shall be submitted by the Civil Designer to PTC for approval.
25.	Maintenance and Protection of Traffic (MPT) for Toll System Installation and Testing (after the Civil Contractor has completed their work within the toll zone)	B	A	A	B	B	B	C	C	C	A	B	B	The Civil Designer shall design typical MPT plans for the work and the Contractor shall furnish all MPT and lane closure requirements per the Contractor schedule for Toll System equipment related installation and testing activities after the civil construction of the toll zone is complete and the site is handed off to the Contractor. Final detailed MPT packages shall be submitted by the Civil Designer to PTC for approval.
26.	Maintenance and Protection of Traffic for Gantry Installation and related Civil Work	C	C	C	B	B	B	C	A	A	A	B	B	The Civil Designer shall design typical MPT plans for the work and Civil Contractor shall furnish all MPT for roadway, gantry, and other civil work. Final detailed MPT packages shall be submitted by the Civil Contractor to PTC and Civil Designer for approval.

#	Element / Task / Component / Sub-System Description	Toll System "Contractor"			PTC			Civil Contractor			Civil Designer			Comments and Other Responsibilities / Information
		1	2	3	1	2	3	1	2	3	1	2	3	
27.	Toll location design and construction permits (not related directly to Toll System equipment design or installation)	C	C	n/a	B	B	n/a	B/A	B/A	n/a	A/B	A/B	n/a	The Civil Designer and Civil Contractor will coordinate and shall be responsible for obtaining the required permits for the design, construction and installation of the civil infrastructure. This will include but not limited to all environmental and construction permits required by federal, state, and local municipalities.
28.	FCC licenses and permitting for Cashless Toll System	A	B	n/a	B	A	n/a	C	C	n/a	C	C	n/a	Contractor is responsible for preparing the required application and the Commission will obtain the required FCC licenses for all AVI equipment provided under this Scope of Work. The Commission has the FCC licenses for the existing AVI Systems.
29.	Toll System Infrastructure Installation Checkout	A	n/a	A	B	n/a	B	B	n/a	B	C	n/a	B	The Contractor shall develop an installation check-out document and procedure and shall inspect and approve all work-performed by the Civil Contractor related to the Toll System to ensure proper installation per the Contractor's requirements and design specifications once the Civil Contractor has installed the required infrastructure to support the Contractor's installation requirements. All System checkout plans shall be approved by PTC.
30.	Demolition of Existing Infrastructure	B	C	B	B	B	B	C	A	A	A	C	C	The Civil Contractor will be responsible for the demolition, removal, and proper disposal of any existing infrastructure that will no longer be needed or used in the Cashless Toll System. This will include the plazas and associated equipment no longer commissioned for use.
31.	Maintenance and Protection of Traffic for demolition and existing site reconfiguration related Civil Work	C	C	C	B	B	B	C	A	A	A	B	B	The Civil Designer shall design typical MPT plans for the work and Civil Contractor shall furnish all MPT and lane closures demolition work. Final detailed MPT packages shall be submitted by the Civil Contractor to PTC and Civil Designer for approval.
32.	Fire Suppression.	C	C	C	B	B	B	B	A	A	A	B	B	The Civil Designer will be responsible for the design of the fire suppression system and the Civil Contractor shall furnish and install the necessary fire suppression equipment per the specifications.
33.	Security Access System	C	C	C	A	A	A	C	B	B	B	C	B	PTC shall have the responsibility to design, procure, install and maintain all security and card access system equipment.
34.	DVAS Mounting Pole (if required)	B	C	B	B	B	B	C	A	A	A	B	B	Civil Designer will design the DVAS pole structure required for the mounting of the DVAS camera equipment. Upon Contract award the Contractor shall review and approve Civil Designer and Civil Contractor shop drawings related to toll equipment. Civil Contractor will furnish and install the DVAS pole structures. The Civil Contractor will be responsible for providing conduit(s) from the TEB to the pole. Contractor shall design, furnish and install mountings from mounting demarcation point as described in item 4, and shall provide shop drawings for Civil Designer and PTC approval prior to installation. The Contractor shall be responsible to mount the cameras to the pole and pull all cables and wires from the pole to the TEB.
35.	Cashless Tolling System Servers	A	A	A	B	B	B	C	C	C	C	C	C	The Contractor shall specify, design, purchase, and install all servers, storage devices, and other required processing components as required in the primary and secondary Cashless Toll Concentrator locations. The contractor will be responsible for installing and configuring all software databases, security software, and the Cashless Toll Concentrator Application Software and Databases according to PTC provided requirements. The Contractor will be responsible for all LAN networking equipment up to the PTC provided firewall (see Attachment 3b – Network Responsibility Diagram),
36.	Toll System Equipment Racks within PTC facilities (i.e. TIP, WRO, etc..)	A	A	A	B	B	B	C	C	C	C	C	C	Contractor shall design, furnish and install equipment racks for LAN and toll equipment within the PTC facilities, including equipment layout design; power supplies, mounting materials. The Contractor shall coordinate with the PTC to provide space, power and environmental requirements.

Attachment 3A

Existing PTC Communications System Architecture



Date Last Edited: 04-17-18

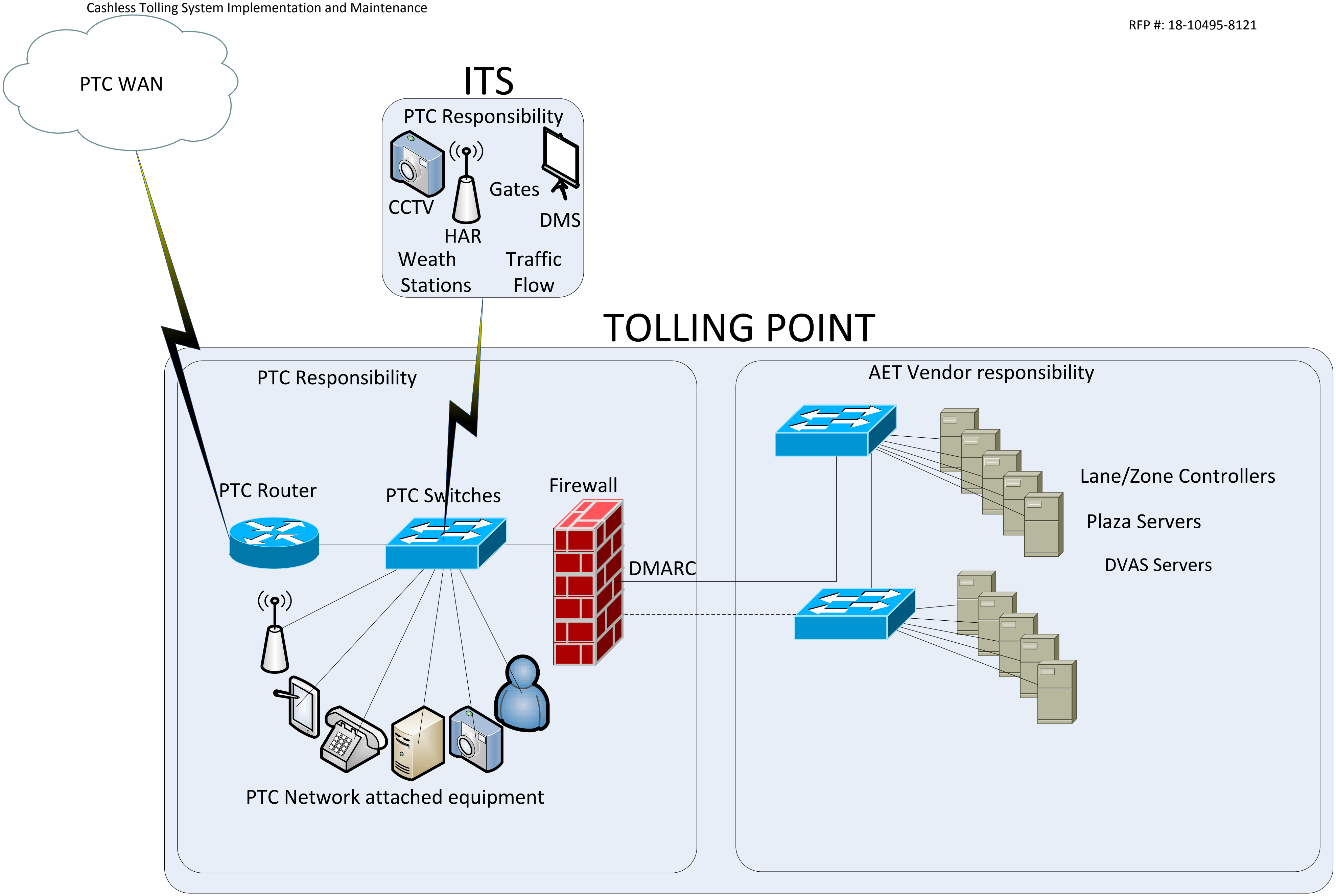
Roadside Tolling Infrastructure Site Example
Pennsylvania Turnpike Commission
Steve Durborow Network Security Engineering
SHEET 1 OF 1

Notes and Comments

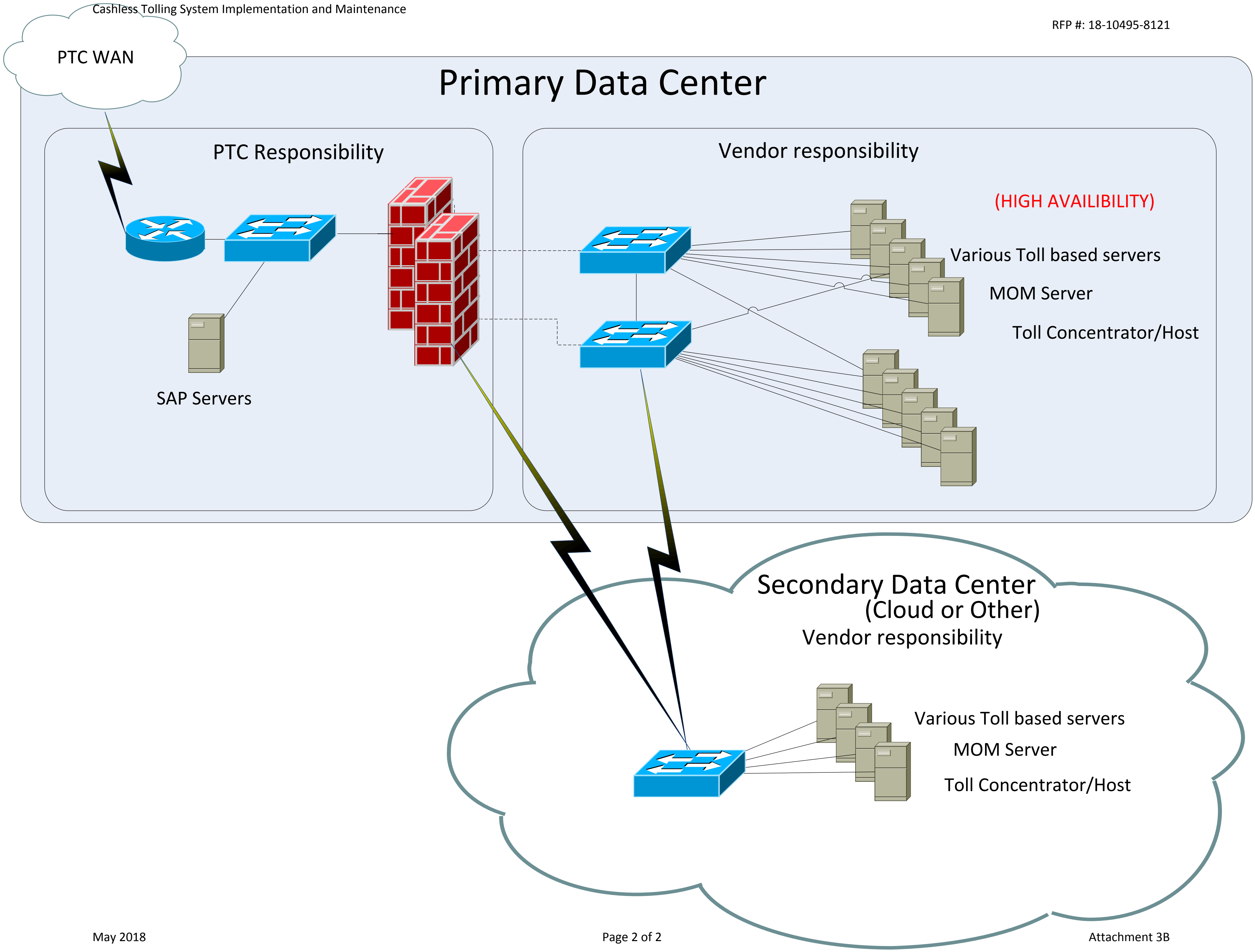
This is private and confidential information. Unless specifically directed, this document is not to be released to or shared with parties outside the PA Turnpike Commission's Information Technology.

Attachment 3B

PTC Communications Network Responsibilities

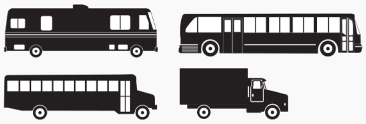
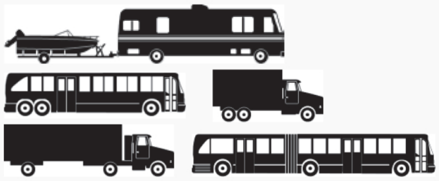
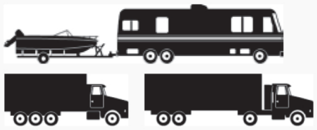
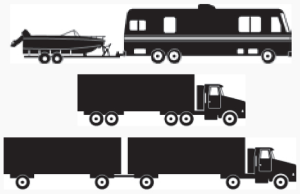
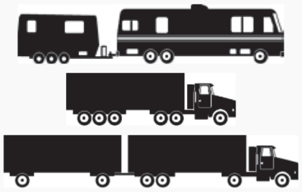


LEGEND:
Represents various methods of communications: Fiber, MW Radio, Leased circuits, Other wireless, Cellular


PTC WAN
Primary Data Center
PTC Responsibility
SAP Servers
Vendor responsibility
(HIGH AVAILIBILITY)
Various Toll based servers
MOM Server
Toll Concentrator/Host
Secondary Data Center
(Cloud or Other)
Vendor responsibility
Various Toll based servers
MOM Server
Toll Concentrator/Host

Attachment 4A

PTC Proposed AVC Class Structure and Silhouette

Number	Name	Description	
2L	2 axle, low profile	Car (2-axle: motorcycle, sport utility, minivan, van, pick-up)	
3L	3 axle, low profile	Class 1 with 1-axle trailer	
4L	4 axle, low profile	Class 1 with 2-axle trailer	
5L	5 axle, low profile	Class 1 with 3-axle trailer	
6L	6+ axle, low profile	Class 1 with 4+ axle trailer	
2H	2 axle, high profile 2 axle, high profile 2 axle, high profile 2 axle, high profile	2-axle motor home 2-axle transit bus 2-axle conventional school bus 2-axle single unit truck	
3H	3 axle, high profile 3 axle, high profile 3 axle, high profile 3 axle, high profile 3 axle, high profile	3-axle motor home/trailer combination 3-axle coach bus (i.e. intercity bus) 3-axle single unit truck 3-axle single trailer truck 3-axle articulated bus	
4H	4 axle, high profile 4 axle, high profile 4 axle, high profile	4-axle motor home/trailer combination 4-axle single unit truck 4-axle single trailer truck	
5H	5 axle, high profile 5 axle, high profile 5 axle, high profile	5-axle motor home/trailer combination 5-axle single trailer truck 5-axle multi-trailer truck	
6H	6 axle, high profile 6 axle, high profile 6 axle, high profile	6-axle motor home/trailer combination 6+ axle single unit truck 6-axle multi-trailer truck	
7H	7+ axle, high profile 7+ axle, high profile	7+ axle motor home/trailer combination 7+ axle multi-trailer truck	

PTC Proposed AVC Class Structure

Attachment 4B

E-ZPass Group Mapped Classes

	Vehicle Type	Axles	Num. Tires	Dual Tires	Over 7,000 lbs.	IAG Class	PTC (006) [1]	PTC (proposed) Axle + Dimension
Automobile/ Sport Utility (with possible trailer)	1	2	4	N	N	72	1	2L
	1	3	6	N	N	76	2	3L
	1	4	8	N	N	**80**	2	4L
	1	5	10	N	N	**84**	2	5L
Motorcycle (with possible sidecar or trailer)	2	2	2	N	N	136	1	2L
	2	3	3	N	N	**140**	1	3L
	2	4	>3	N	N	**144**	1	4L
Pick-Up Truck (with possible trailer)	3	2	4	N	N	200	1	2L
	3	2	4	N	Y	202	1	2L
	3	2	6	Y	N	201	1	2L
	3	2	6	Y	Y	203	1	2L
	3	3	6	N	N	204	2	3L
	3	3	6	N	Y	206	2	3L
	3	3	>= 8	Y	N	205	2	3L
	3	3	>= 8	Y	Y	207	2	3L
	3	4	8	N	N	**208**	2	4L
	3	4	8	N	Y	**210**	2	4L
	3	4	>= 10	Y	N	**209**	2	4L
	3	4	>= 10	Y	Y	**211**	2	4L
	3	5	10	N	N	**212**	2	5L
	3	5	10	N	Y	**214**	2	5L
	3	5	>= 12	Y	N	**213**	2	5L
	3	5	>= 12	Y	Y	**215**	2	5L
Passenger/ Cargo Van (seating 1-9 passengers)	4	2	4	N	N	264	1	2L
	4	2	4	N	Y	266	1	2L
	4	2	6	Y	N	265	1	2L
	4	2	6	Y	Y	267	1	2L
	4	3	6	N	N	268	2	3H
	4	3	6	N	Y	270	2	3H
	4	3	8-10	Y	N	269	2	3H
	4	3	8-10	Y	Y	271	2	3H
Minibus/ Team Van/ Stretch Limo (seating 10-15 passengers)	5	2	4	N	N	328	2	2L
	5	2	4	N	Y	330	2	2L
	5	2	6	Y	N	329	2	2L
	5	2	6	Y	Y	331	2	2L
	5	3	6	N	N	332	2	3L
	5	3	6	N	Y	334	2	3L
	5	3	8-10	Y	N	333	2	3L
	5	3	8-10	Y	Y	335	2	3L
Buses (seating 16 or more passengers)	6	2	4	N	N	392	3	2H
	6	2	4	N	Y	394	3	2H
	6	2	6	Y	N	393	3	2H
	6	2	6	Y	Y	395	3	2H
	6	3	6	N	N	396	5	3H
	6	3	6	N	Y	398	5	3H
	6	3	8-10	Y	N	397	5	3H
	6	3	8-10	Y	Y	399	5	3H
	6	4	8	N	N	400	5	4H
	6	4	8	N	Y	402	5	4H
	6	4	>= 10	Y	N	401	5	4H
	6	4	>= 10	Y	Y	403	5	4H

	Vehicle Type	Axles	Num. Tires	Dual Tires	Over 7,000 lbs.	IAG Class	PTC (006) [1]	PTC (proposed) Axle + Dimension
Recreational Vehicle/ Motor Home	7	2	4	N	N	456	2	2H
	7	2	4	N	Y	458	2	2H
	7	2	6	Y	N	457	2	2H
	7	2	6	Y	Y	459	2	2H
	7	3	6	N	N	460	3	3H
	7	3	6	N	Y	462	3	3H
	7	3	8-10	Y	N	461	3	3H
	7	3	8-10	Y	Y	463	3	3H
	7	4	8	N	N	464	3	4H
	7	4	8	N	Y	466	3	4H
	7	4	>= 10	Y	N	465	3	4H
	7	4	>= 10	Y	Y	467	3	4H
Truck	8	2	4	N	N	520	2	2H
	8	2	4	N	Y	522	2	2H
	8	2	6	Y	N	521	2	2H
	8	2	6	Y	Y	523	2	2H
	8	3	6	N	N	524	3	3H
	8	3	6	N	Y	526	3	3H
	8	3	8-10	Y	N	525	3	3H
	8	3	8-10	Y	Y	527	3	3H
	8	4	8	N	N	528	4	4H
	8	4	8	N	Y	530	4	4H
	8	4	>= 10	Y	N	529	4	4H
	8	4	>= 10	Y	Y	531	4	4H
	8	5	10	N	N	532	5	5H
	8	5	10	N	Y	534	5	5H
	8	5	>= 12	Y	N	533	5	5H
	8	5	>= 12	Y	Y	535	5	5H
	8	6	12	N	N	536	6	6H
	8	6	12	N	Y	538	6	6H
	8	6	>= 14	Y	N	537	6	6H
	8	6	>= 14	Y	Y	539	6	6H
	8	7	14	N	N	540	6	7H
	8	7	14	N	Y	542	6	7H
	8	7	>= 16	Y	N	541	6	7H
	8	7	>= 16	Y	Y	543	6	7H
Auto Transporter (up to 65')	9	3	n/a	Y	Y	591	4	3H
	9	4	n/a	Y	Y	595	4	4H
	9	5	n/a	Y	Y	599	5	5H
	9	6	n/a	Y	Y	603	5	6H
	9	7	n/a	Y	Y	607	5	7H
Auto Transporter (over 65')	10	4	n/a	Y	Y	659	4	4H
	10	5	n/a	Y	Y	663	5	5H
	10	6	n/a	Y	Y	667	5	6H
	10	7	n/a	Y	Y	671	5	7H
Tractor Trailer Combination (trailer <= 48')	11	3	n/a	Y	Y	719	5	3H
	11	4	n/a	Y	Y	723	5	4H
	11	5	n/a	Y	Y	727	5	5H
	11	6	n/a	Y	Y	731	5	6H
	11	7	n/a	Y	Y	735	5	7H
Tractor Trailer Combination (trailer > 48')	12	3	n/a	Y	Y	783	5	3H
	12	4	n/a	Y	Y	787	5	4H
	12	5	n/a	Y	Y	791	5	5H
	12	6	n/a	Y	Y	795	5	6H
	12	7	n/a	Y	Y	799	5	7H
Tandem Trailer Combination (each trailer <= 28.5')	13	5	n/a	Y	Y	855	6	5H
	13	6	n/a	Y	Y	859	6	6H
	13	7	n/a	Y	Y	863	6	7H
	13	8	n/a	Y	Y	867	6	7H
	13	9	n/a	Y	Y	871	6	7H
	13	10	n/a	Y	Y	875	6	7H

	Vehicle Type	Axles	Num. Tires	Dual Tires	Over 7,000 lbs.	IAG Class	PTC (006) [1]	PTC (proposed) Axle + Dimension
Tandem Trailer Combination (each trailer > 28.5')	14	5	n/a	Y	Y	919	6	5H
	14	6	n/a	Y	Y	923	6	6H
	14	7	n/a	Y	Y	927	6	7H
	14	8	n/a	Y	Y	931	6	7H
	14	9	n/a	Y	Y	935	6	7H
	14	10	n/a	Y	Y	939	6	7H
Tandem Trailer Combination (one trailer <= 28.5' other > 28.5')	15	5	n/a	Y	Y	983	6	5H
	15	6	n/a	Y	Y	987	6	6H
	15	7	n/a	Y	Y	991	6	7H
	15	8	n/a	Y	Y	995	6	7H
	15	9	n/a	Y	Y	999	6	7H
	15	10	n/a	Y	Y	1003	6	7H
Tractor/ Mobile Home Combination	17	3	n/a	Y	Y	1103	4	3H
	17	4	n/a	Y	Y	1107	4	4H
	17	5	n/a	Y	Y	1111	5	5H
	17	6	n/a	Y	Y	1115	5	6H
	17	7	n/a	Y	Y	1119	5	7H
	17	8	n/a	Y	Y	1123	5	7H
	17	9	n/a	Y	Y	1127	5	7H
	17	10	n/a	Y	Y	1131	5	7H

Footnotes

[1] PTC tolls are weight based. The classes shown are those as used manually when scales are not present in the lane. Therefore, the actual class reported for a transaction may vary (values of 1 - 9) if the in-lane system determines that the actual weight of the vehicle varies from the programmed vehicle class.

[2] MassPike classes represent the ticket, barrier and tunnel portions of the system respectively.

[3] MassPort classes represent private vehicle accounts, Resident (Commuter) accounts, and Commercial accounts respectively (where more than one class is shown). The class shown is superceded for the following cases – all Massachusetts Bay Transportation Authority vehicles are class 12; all non-revenue vehicles are class 13.

[4] NJHA toll charged is a combination of the basic class charge plus the actual number of extra axles.

[5] DRPA toll charged is a combination of Class (13) plus the actual number of axles in excess of 3.

[6] DRPA toll charged is a combination of Class (1) plus the actual number of axles in excess of 2.

[7] NYSBA toll charged is a combination of the Class (8) plus the actual number of axles in excess of 3.

[8] NJTA Class 1 or Class 2 without Omni-bus plates / B2 or B3 with Omni-bus plates.

[9] NJTA collector classifies as B4, toll charged is for a B3.

[10] DRPA toll charged is a combination of Class (9) plus the actual number of axles in excess of 3.

[11] PANYNJ toll charged is a combination of the Class (7) plus the actual number of axles in excess of 3.

[12] Deleted

[13] NYSBA toll charged is a combination of the Class (6) plus the actual number of axles in excess of 6.

[14] DRPA toll charged is a combination of Class (7) plus the actual number of axles in excess of 6.

[15] PANYNJ toll charged is a combination of the Class (6) plus the actual number of axles in excess of 6.

[16] NJHA toll charged is a combination of the basic class charge plus the actual number of extra axles. In addition, any vehicle over 55' in length requires a special permit to use the roadway.

[17] WVPA adds a surcharge for oversize vehicles (longer than 65 feet).

[18] Removed - Applied to old NYSTA classifications

[19] Deleted

[20] VDOT roads classify by actual axles. Facilities that offer motorcycle discounts require motorcycles to use manual lanes to receive discount.

[21] NYSTA changed class codes effective 05/15/2005.

[22] VDOT-CBBT class 65 is used for discounted return trips within 24 hours.

[23] VDOT-CBBT class 99 is used for certain vehicles required to use attended lanes.

[24] OTC adds a per trip fee for double and triple trailer combinations in excess of 90 feet.

[25] NJHA/NJTA classes merged into NJTA

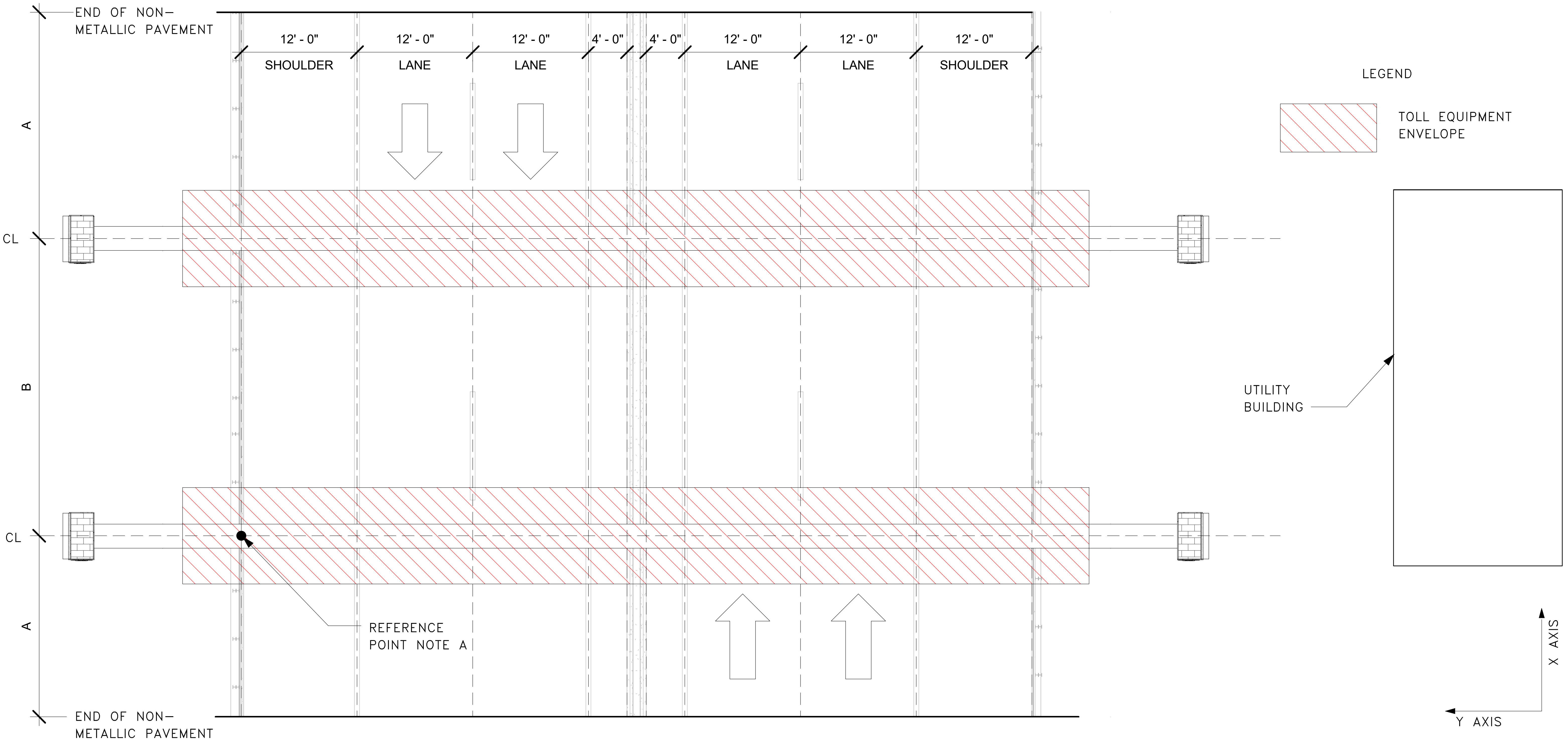
[26] NFBC classes are a combination of vehicle type and axle count. Types are: 1 = Car/MC; 3 = Bus; 4 = Truck; 6 = RV/Limo

[27] MassDOT (021) class structure is changing on 10/28/2016 as part of their AET conversion. All classes are strictly by axle count: 2-15. Legacy classes will be deleted in a future version.

[28] MassDOT (021) classes range from 2-15.

Attachment 5

Concept Plans for Overhead Structures/ Toll Gantries

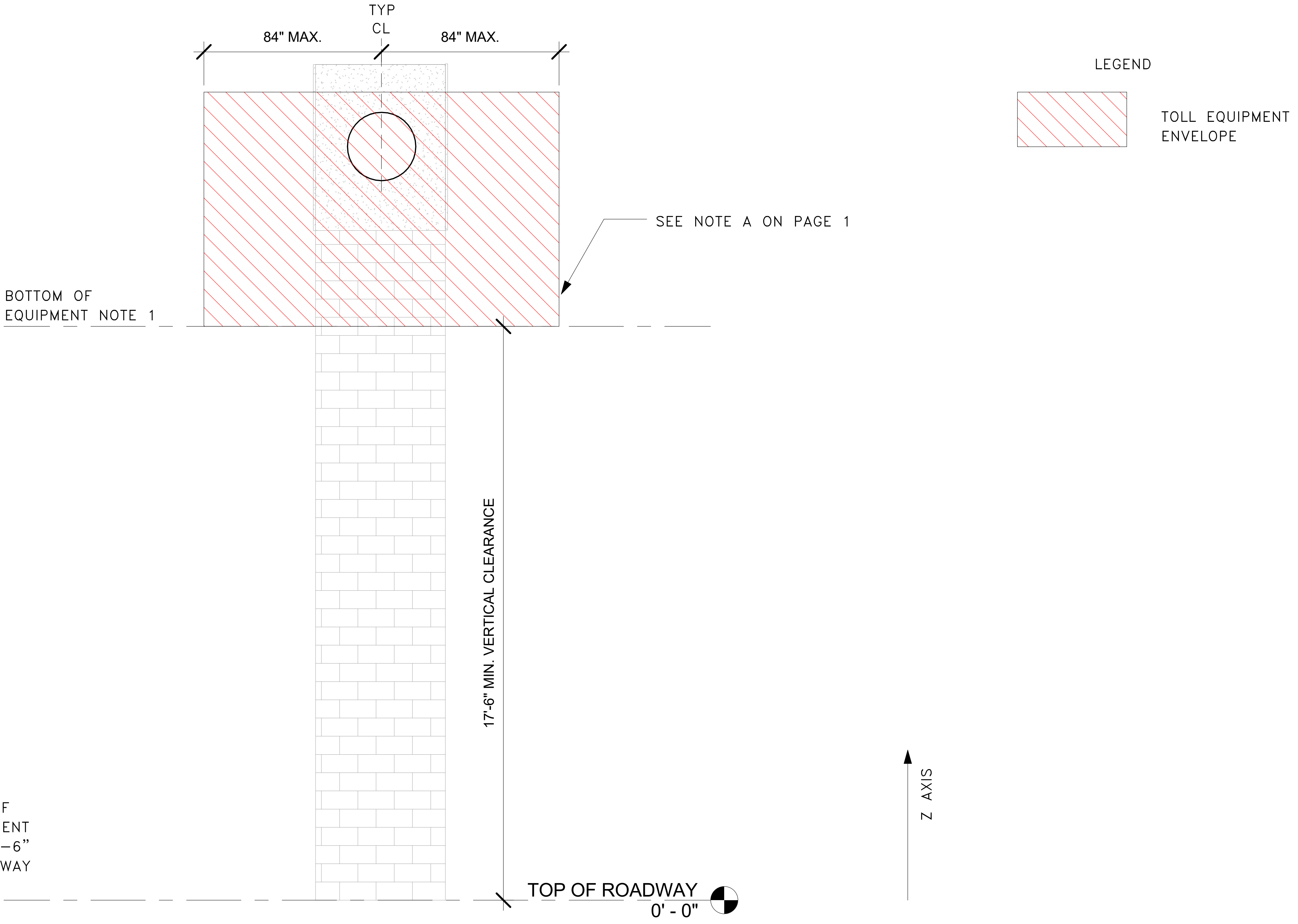


NOTE A: ALL X,Y AND Z MEASUREMENTS SHOULD BE FROM REFERENCE POINT

PTC MAINTENANCE

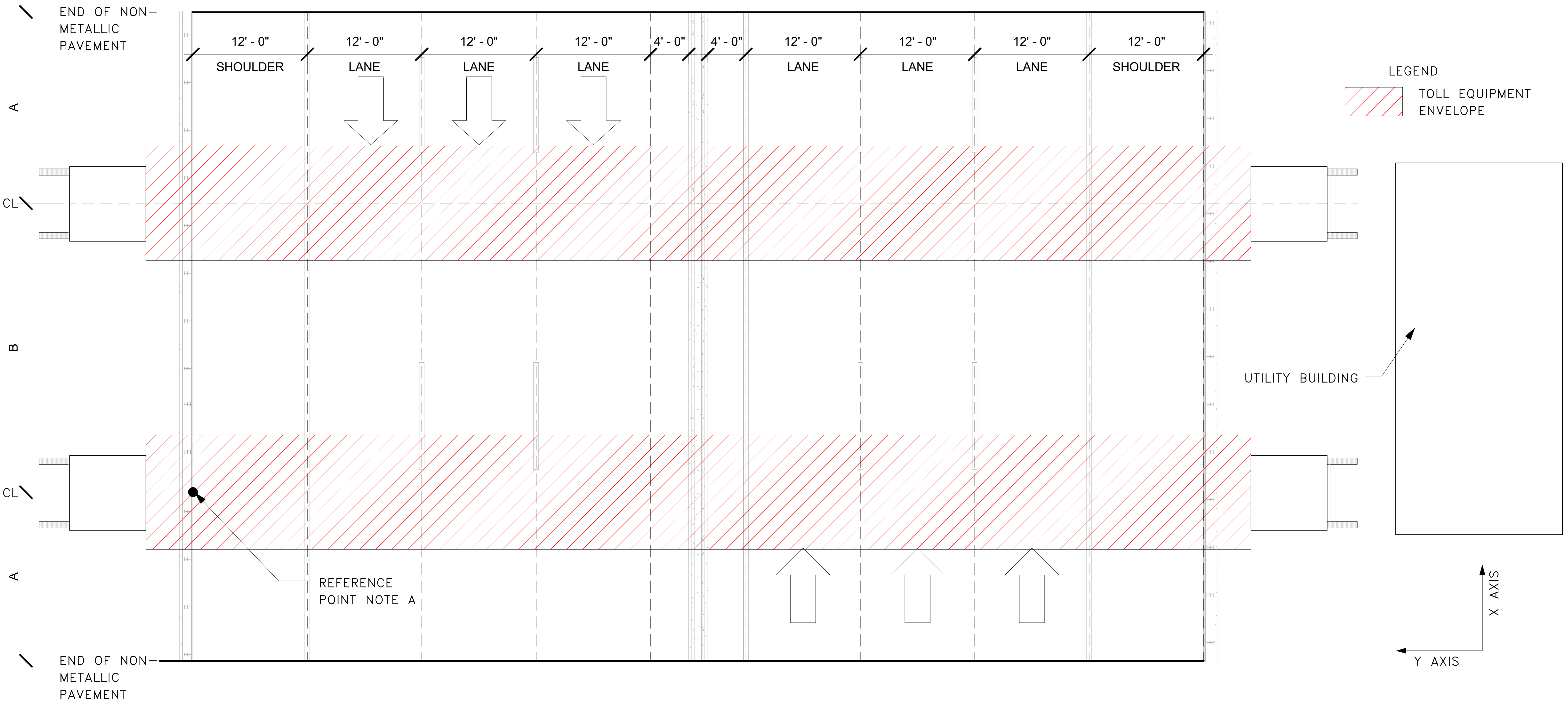
① BELOW CONCEPT - PLAN VIEW

1" = 10'-0"



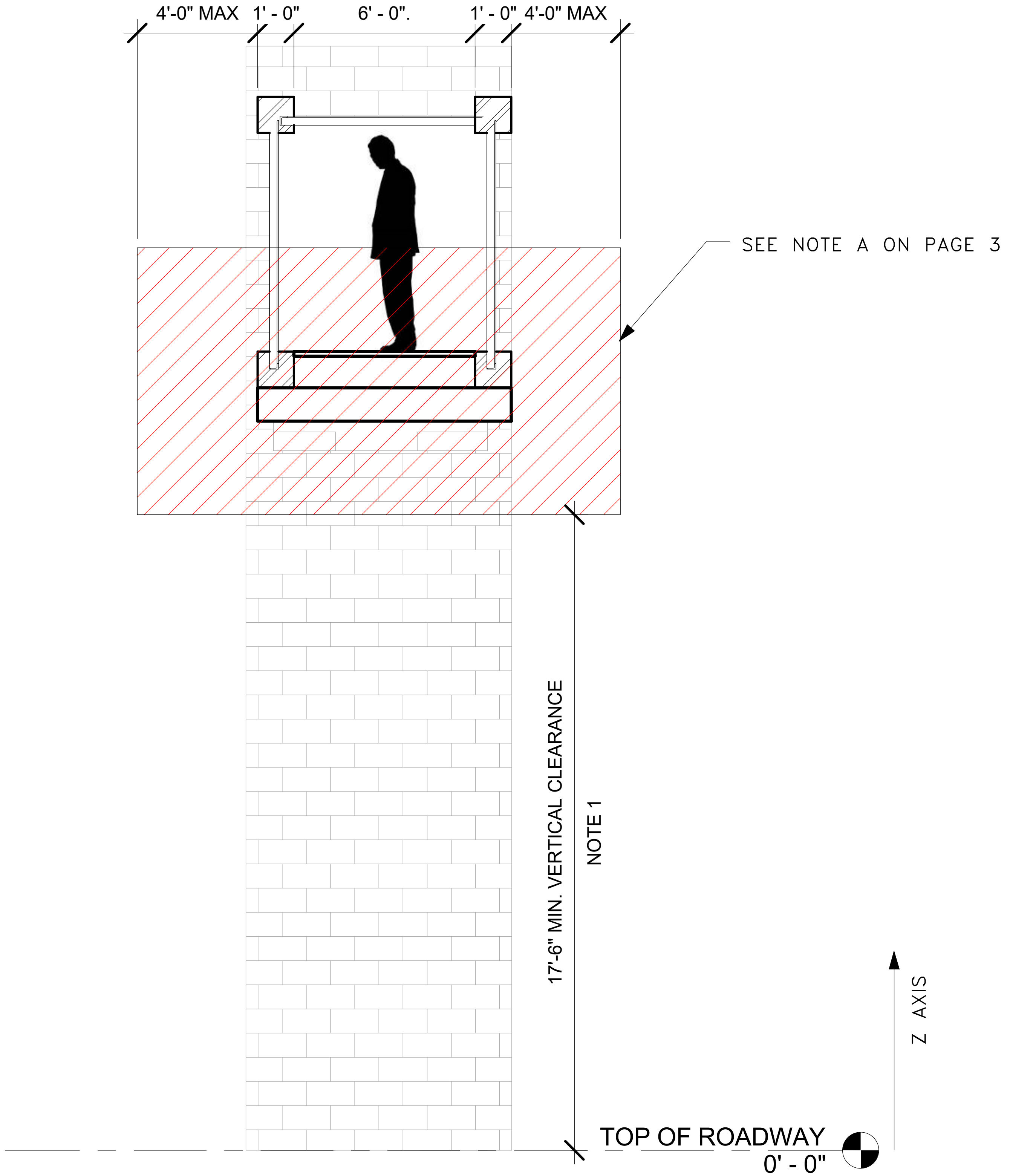
NOTE 1: LOWEST POINT OF THE GANTRY TOLL EQUIPMENT SHALL BE A MINIMUM 17'–6" ABOVE THE TOP OF ROADWAY

① PTC MAINTENANCE FROM BELOW CONCEPT - SECTION VIEW
1/4" = 1'-0"



NOTE A: ALL X,Y AND Z MEASUREMENTS SHOULD BE FROM REFERENCE POINT

① PTC MAINTENANCE FROM ABOVE CONCEPT - PLAN VIEW
1" = 10'-0"



LEGEND

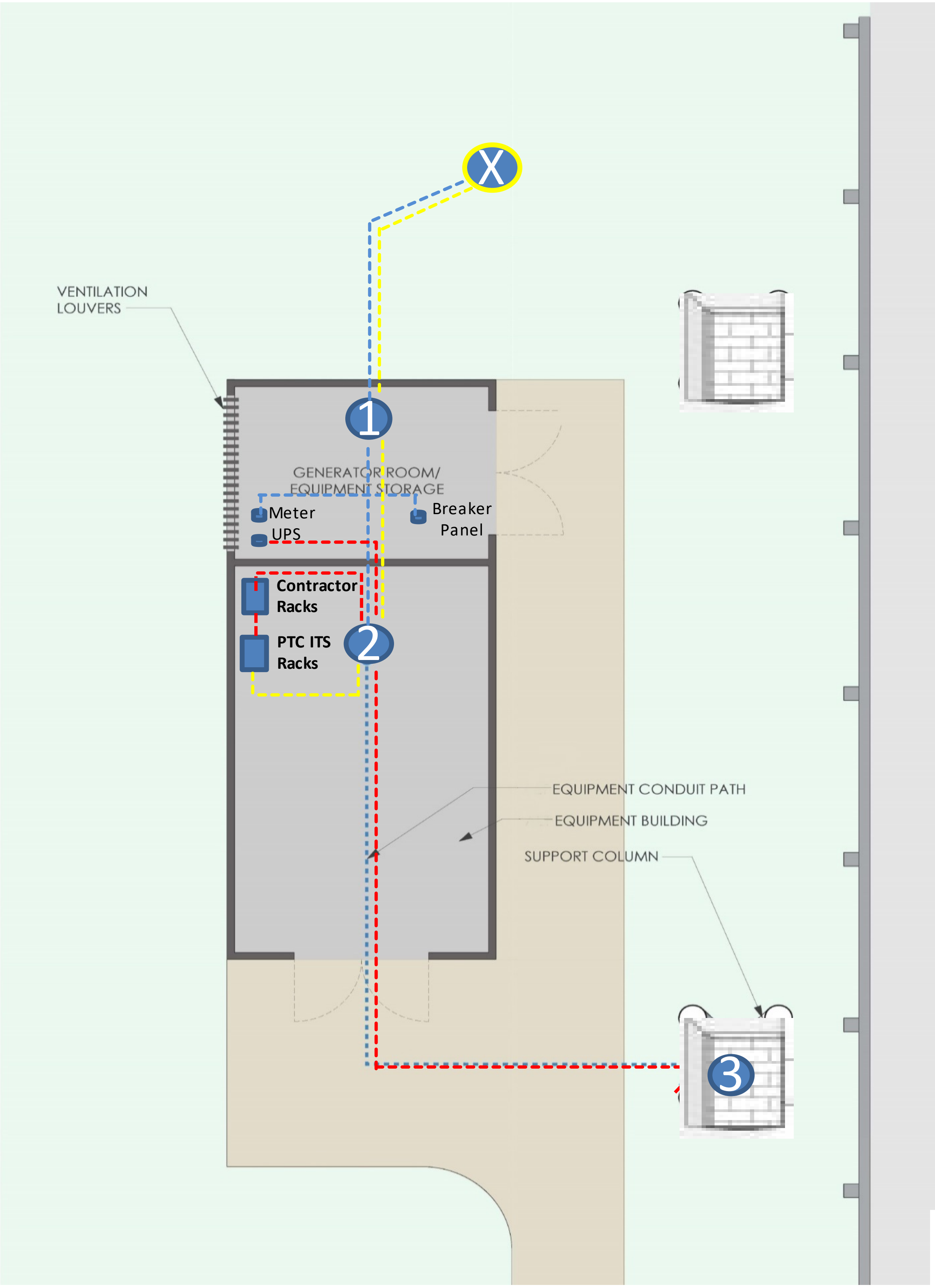
▨	TOLL EQUIPMENT ENVELOPE

NOTE 1: LOWEST POINT OF THE GANTRY TOLL EQUIPMENT SHALL BE A MINIMUM 17'–6" ABOVE THE TOP OF ROADWAY

① PTC MAINTENANCE FROM ABOVE CONCEPT - SECTION VIEW
1/4" = 1'-0"

Attachment 6

Installation Demarcation Diagram



Toll Equipment Building (TEB) Demarcation Points

Utilities:

- Power from point of service to TEB point X by Civil Contractor.
- Network connectivity from point of service to TEB point X by Civil Contractor/PTC.

Conduit / Cable Tray Installation:

- Cable Tray Installation within TEB by Civil Contractor
- Conduit from point of service to TEB point X by Civil Contractor.
- Conduit from point X to generator room point #1 by Civil Contractor.
- Conduit from generator room point #1 to equipment room point #2 by Civil Contractor.
- Conduit from equipment room point #2 to toll gantry point #3 by Civil Contractor.
- Conduit from point #2 to toll equipment racks in toll equipment room by Contractor.

Power Cabling:

- Grounding and surge protection by Civil Contractor.
- Power from point X to generator room point #1 by Civil Contractor.
- Power from generator room point #1 to equipment in generator room, including but not limited to meter, breaker panel, UPS and generator by Civil Contractor.
- Power from generator room point #1 to toll equipment room point #2 and toll gantry demarcation point #3 by Civil Contractor.
- Power from demarcation point #2 to LAN and toll equipment rack in toll equipment room by Contractor.
- Power from demarcation point #2 to WAN and ITS Equipment rack in toll equipment room by PTC.

Data Cabling:

- Network connectivity from point X to toll equipment room point #2 by Civil Contractor/PTC.
- ITS and WAN cabling from toll equipment room point #2 to PTC ITS equipment racks by PTC.
- LAN to WAN connections from PTC ITS racks to toll equipment racks in toll equipment room by Contractor.
- Toll System cabling from toll equipment room point #2 to toll equipment racks by Contractor.
- Toll System cabling from toll equipment rack in toll equipment room to gantry point #3 by Contractor.
- Toll system cabling from toll equipment rack in toll equipment room to UPS in generator room by Contractor.

*****FOR PLANNING PURPOSES ONLY. GANTRY TYPES AND EXACT LOCATIONS OF DEMARCATION POINTS TO BE DETERMINED DURING FINAL DESIGN.*****

Gantry Demarcation Points

Conduit Installation:

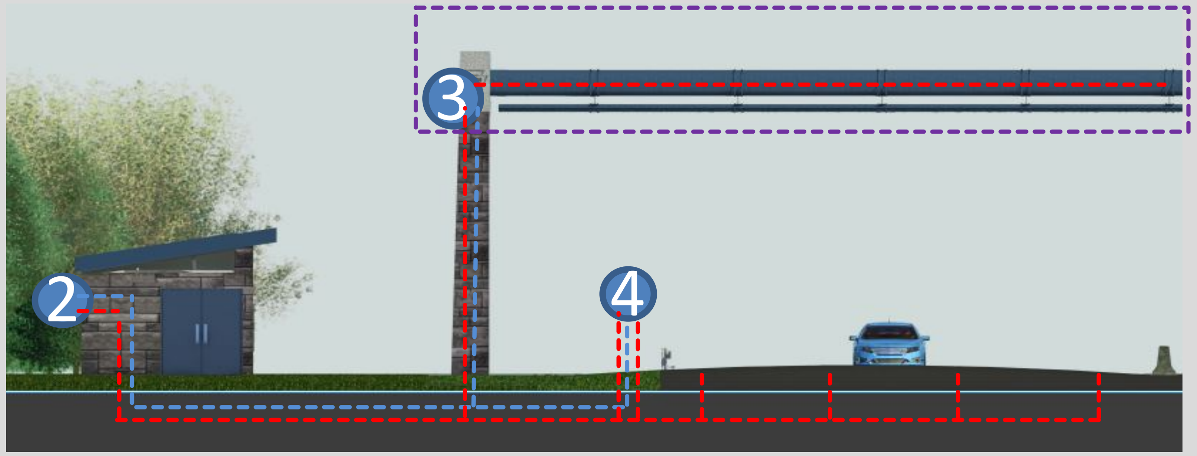
- Cable Tray Installation within Monotubes and Gantries by **Civil Contractor**
- Conduit from TEB point #2 to gantry point #3 by **Civil Contractor**.
- Conduit from TEB point #2 to roadside point #4 (if necessary) by **Civil Contractor**.
- Conduits, junction boxes and connectors from gantry point #3 to toll equipment on the gantry by **Contractor**.
- Conduits, junction boxes, cabinets and connectors from roadside point #4 to in-lane sensors (if necessary) by **Civil Contractor**.
- Conduits from TEB point #2 to DVAS pole (not shown) by **Civil Contractor**.

Power Cabling:

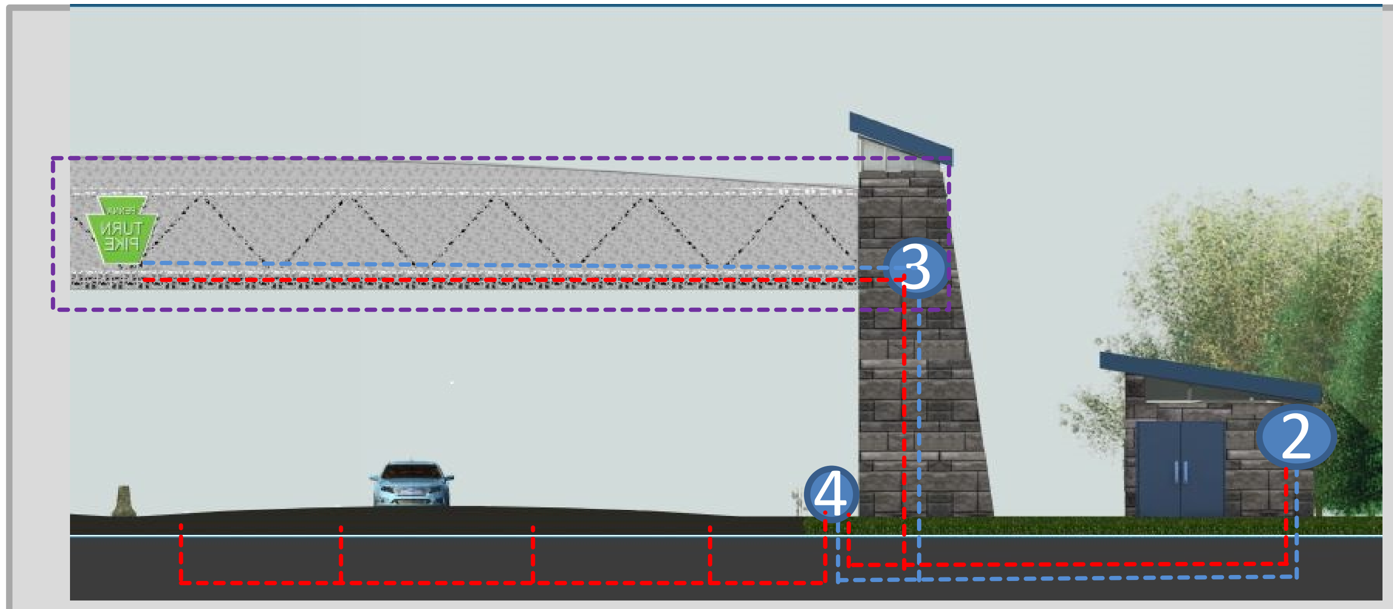
- Grounding and surge protection by **Civil Contractor**.
- Power from TEB point #2 to gantry point #3 by **Contractor**.
- Power from TEB point #2 to roadside point #4 (if necessary) by **Contractor**.
- Power from gantry point #3 to toll equipment on gantry by **Contractor**.
- Power from roadside point #4 to in-lane sensors (if necessary) by **Contractor**.
- Power from TEB to DVAS mounting location (not shown) by **Contractor**.
- Power from TEB to supplemental DVAS lighting by **Contractor.**

Data Cabling:

- Toll System cabling from toll equipment racks in toll equipment room to gantry point #3 to gantry toll equipment by **Contractor**.
- Toll System cabling from toll equipment racks in toll equipment room to roadside point #4 to in-lane sensors (if necessary) by **Contractor**.
- Toll System cabling from DVAS servers in TEB to DVAS camera by **Contractor**.



Maintenance from Below



Maintenance from Above

General Notes (not illustrated in diagram)

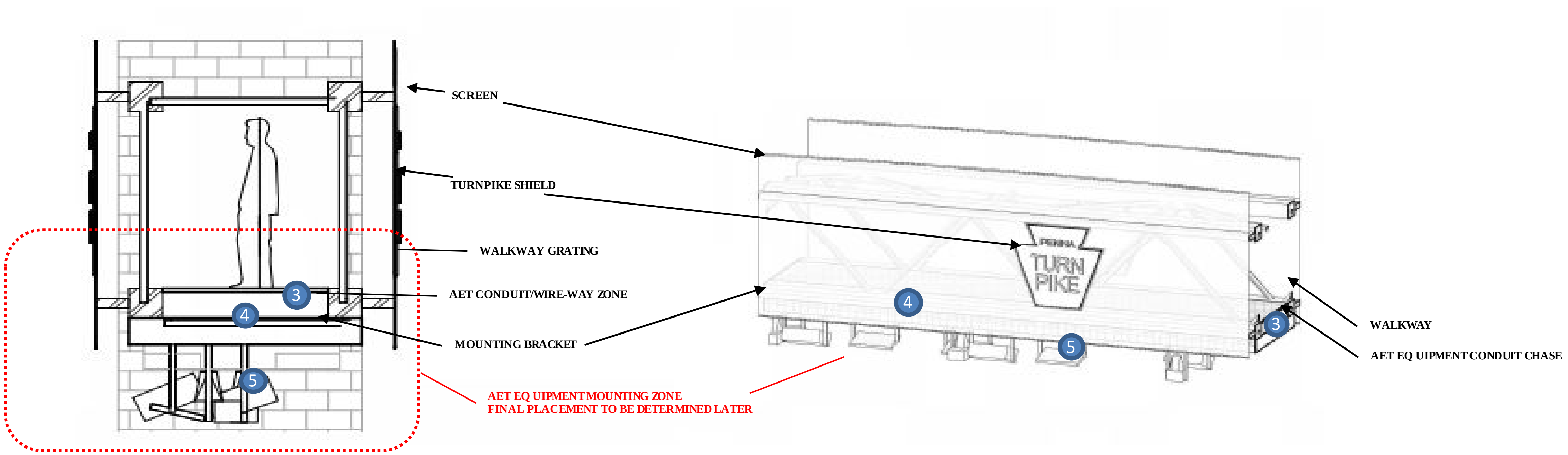
- **Contractor** to coordinate with Civil Designer and **Civil Contractor(s)** to specify the location, number and diameters of conduits required for the toll equipment installation, specify conduits for power, data and RF cables.
- **Contractor** to coordinate with Civil Designer and **Civil Contractor** specify mounting locations, required clearances and distance limitations of overhead equipment to be installed on the gantries.

*****FOR PLANNING PURPOSES ONLY. GANTRY TYPES AND EXACT LOCATIONS OF DEMARCATION POINTS TO BE DETERMINED DURING FINAL DESIGN.*****

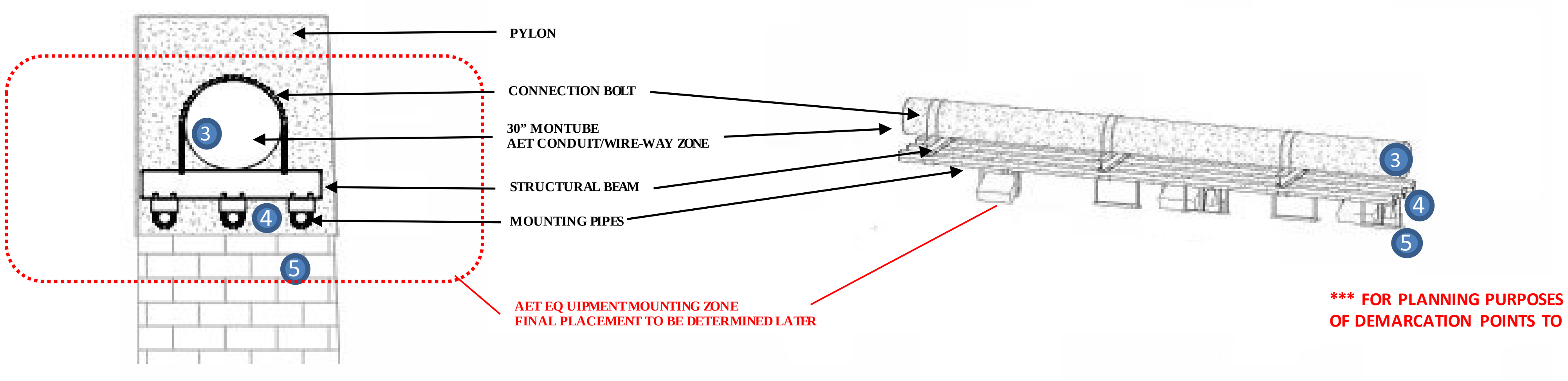
Gantry Mounting Equipment Demarcation Points

Mounting Equipment Installation:

- Gantry equipment mounting pipes and support plates from gantry point #4 to point #5 provided by Civil Contractor and installed by Contractor based on location (point #5) provided by the Contractor.
- Mounting brackets and Toll Equipment to the mounting pipes and support plates point #5 provided and installed by Contractor.
- Installation of conduits and cables to point #3 described on previous pages.


SCREEN
TURNPIKE SHIELD
WALKWAY GRATING
AET CONDUIT/WIRE-WAY ZONE
MOUNTING BRACKET
AET EQ UIPMENT MOUNTING ZONE
FINAL PLACEMENT TO BE DETERMINED LATER
WALKWAY
AET EQ UIPMENT CONDUIT CHASE
PENNA
TURN PIKE
3
4
5
4
5
3

Maintenance from Above


PYLON
CONNECTION BOLT
30" MONTUBE
AET CONDUIT/WIRE-WAY ZONE
STRUCTURAL BEAM
MOUNTING PIPES
AET EQ UIPMENT MOUNTING ZONE
FINAL PLACEMENT TO BE DETERMINED LATER
3
4
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3
4
5

*** FOR PLANNING PURPOSES ONLY. GANTRY TYPES AND EXACT LOCATIONS OF DEMARCATION POINTS TO BE DETERMINED DURING FINAL DESIGN. ***

Maintenance from Below

Attachment 7

PTC Cashless Tolling Security Standards

Cashless Tolling Operational Security

1	All Cashless Tolling applications, along with supporting components (operational technology) and subsystems (operating systems), must maintain current manufacturer's recommended security updates.
2	An escalation procedure must exist for the PTC to address and mitigate system and software security vulnerabilities discovered during normal operational monitoring as well as any security breaches.
3	All user accounts used to access any Cashless Tolling component or subsystem (hardware, operating system, application software) must be controlled through integration with the Commission's Active Directory implementation.
4	If local accounts are required for remote access or recovery processes, their number, per system, will be kept to an absolute minimum and the account passwords must meet the requirements and standards of the Commission.
5	Access logging must be enabled on all Cashless Tolling systems and subsystems, for local account usage, and forwarded to the PTC's SIEM for event correlation.
6	A system level account is required on all Cashless Tolling supporting systems for use in performing continuous credentialed PTC security assessment scans.
7	All Cashless Tolling related systems and subsystems will be hardened to accepted security standards. This includes, but is not limited to: stopping of unnecessary services, removal of protocols not needed for operation, disabling/removal of all unnecessary account, etc.
8	PTC IT Security reserves the right to remove any system or subsystem of Cashless Tolling if it has been determined to be a security threat to the larger PTC enterprise.
9	There will be no "backdoor" connections to any part of the Cashless Tolling system without prior authorization from PTC IT Security. All outside access must be made through the PTC's Internet gateway.
10	Connectivity to any new Cashless Tolling system or subsystem is prohibited without PTC IT Security's acknowledgment and authorization.
11	All new Cashless Tolling systems, subsystems or related components must be qualified by PTC IT Security personnel through vulnerability & risk acceptance testing before the system is placed into production.

Cashless Tolling Project Implementation Security

1	All Contractor personnel shall be subject to appropriate security and background checks to the satisfaction of the Commission. The Contractor shall obtain written Approval from the Commission for all service personnel.
2	All Contractor personnel must sign a PTC acceptable use agreement.
3	Contractor's personnel shall be issued PTC identification badges and shall wear such identification badges at all times when on the PTC property. Use of such identification badges for purposes other than work associated with the contract will result in termination of the employee from the contract and possible other legal or disciplinary action.
4	The services and work performed under the Contract are considered highly confidential and the Contractor personnel shall at all times comply with applicable current computer and data industry standards with regard to data and information security. All employees of the Contractor shall not discuss their work with unauthorized personnel or any individuals not directly associated with the Commission.
5	All Contractor personnel shall use only PTC-assigned workstations, servers, and laptops to communicate with Cashless Tolling Systems while on PTC property.
6	Discussion by the Contractor of any services or work performed under the contract with the media, in oral presentations, in written publications, or in any other form, not related to this Contract shall be Approved in advance by the Commission.
7	The Contractor will provide an infrastructure/architectural security overview and hardening task lists for PTC project-related personnel. This includes, but is not limited to: Cashless Tolling servers, lane controllers, plaza hosts, etc.

Attachment 8A

PTC Records Management Manual

Table of Contents

1. Introduction

The PTC Records Management Program is designed to control the creation, distribution, use, retention, storage, retrieval, protection, preservation, and final disposition of recorded information required in the operation of PTC business.

The management of PTC records cannot be taken lightly. If not done properly, records may be lost and unavailable for PTC or other use, or may not be properly preserved for business or historical purposes. The improper assignment of overly lengthy retention periods or the reluctance to transfer or destroy records according to records schedules creates costly and false needs for more equipment, floor space, supplies, and personnel.

The objectives of the PTC Records Management Program are to:

- Ensure that the PTC complies with prevailing state and federal guidelines as well as legal requirements related to litigation, government investigations and audits.
- Define the procedures by which PTC employees manage PTC records.
- Ensure that employees maintain only those records that are needed for legal compliance and to support current operations of the PTC.
- Ensure that employees maintain only Official Records and minimize retention of non-critically important documents, e.g. Convenience Copies, immediately upon expiration of their active, useful value.

1.1. General Guidelines for Records Management

Keep only what is legally or functionally needed. Do not retain convenience copies.
Records should be periodically purged; e.g. (monthly).
File by class code if possible.
-This will help to simplify the purge process.

Determine if information, in any form, falls under the PTC Records Retention Schedule and if applicable it must be stored as indicated in the PTC Records Retention Schedule.

Records in any form; paper, maps, or other physical or media form; MS Word, Excel, Power point, Project, or other electronic format or media form, will fall under the PTC Records Retention Program.

When determining if information falls under the PTC Records Retention Schedule please consider the following related to the following electronic communications methods:

Voice Mail - Voice Mails are normally retained for 30 days. After determining that a voice mail includes records that must be preserved, the employee must copy the message to a separate store, e.g. PTC Network drive, external media, where it must be retained as indicated in the PTC Records Retention Schedule.

Instant Messaging (IM) - Instant messages are not retained and should not be used to transmit records. IMs should be considered to be transitory in nature that is having little or no documentary or evidential value.

E-Mail – Regardless of how e-mail is accessed, e.g. smart phone, laptop, desktop, etc., e-mail is stored on PTC e-mail servers. E-Mail and e-mail attachments can be records and as such will fall under the PTC Records Management Program. Any e-mail that is considered to be a record must be moved out of e-mail to a separate store, e.g. PTC Network drive, external media, where it must be retained as indicated in the PTC Records Retention Schedule.

Phone System – The PTC phone system retains various call information, e.g. calling party, called party, length of call, original number dialed, time of call, talk duration, etc. This information is retained for 10 days.

1.2. Records Retention Schedule Overview

What is the Records Retention Schedule?

The Schedule is a tool that is used to ensure that records are being kept as long as legally and operationally required. The PTC retention schedule is used by employees to ensure that the PTC adheres to existing record keeping regulations and requirements and does so consistently.

Record Classes

Record Classes are categories of records that relate to the same (or similar) business process. Grouping like records together allows the PTC to apply consistent retention practices to similar records.

Each Record Class has a name and description. It also has some sample **Record Types**- Specific example of forms, reports, documents, etc. that all belong to the Record Class.

Each Record Class has three main retention periods:

- The **Legal Retention** period (the period of Time stipulated by the legal research),
- The **User Retention** period (the period of time specified by PTC for their business need), and
- The **Official Retention** period (the greater of the Legal and User Retention periods). All records will be kept for the Official Retention period for the applicable Record Class.

See the **Records Retention Schedule** for approved retention periods.

Record Class Criteria

Record Classes do not necessarily reflect how records are filed or stored. The criteria used to create a record class include:

- **Similar Business Function**. The records within a record class should support a similar business function, such as “accounts payable processing.”
- **Similar Retention Requirements**. The records within a record class should have similar Retention periods (as they will all be stored that same amount of time).

Factors Used to Determine Retention Requirements

The Records Retention Schedule takes two types of factors into account when determining retention periods for records:

- **Legal Research Requirements**. The Legal Research Requirements constitute the legal obligations and considerations that PTC took into account when determining the legal retention periods for records. Legal Research Requirements includes both Legal requirements and Legal Considerations.

- **User Retention Requirements**. The period of time that PTC employees need records "to do their job."

The Official Retention Period for each Record Class is the greater value of the legal and user retention requirements. All records within a Record Class will be kept for the Official Retention Period.

1.3. Life Cycle of Records

To be most effective, a records management program must address the entire ‘life cycle’ of records. According to the life cycle concept, records go through four distinct phases:

A. **Creation.** Records are created in various ways, such as when a supervisor sends out an office memorandum, when a permit application is received from a contractor, or when a monthly report is created. By understanding how and why a record is created, the administrator is able to determine its value, and retention requirements.

B. **Active Use.** Once a record has been created or received, it moves into the active use phase of its life cycle. At this level, the information is seen as both an individual record and as part of an overall record class. During this state, the record is referenced from time to time by PTC personnel in connection with official activities and functions. As the record is used frequently during the active period, quick access to these records are needed.

   Note: Active Records are maintained on-site.

C. **Inactive Use.** As time goes by, the need for a record diminishes and it enters the inactive phase of its life cycle. It is during this phase that the record no longer needs to be kept in the office or on-line to carry out PTC business, but must still be maintained for administrative, legal, or fiscal reasons. Inactive PTC records that must be retained to satisfy some continuing administrative, legal, or fiscal purpose should be transferred to the off-site storage facility.

   As with active records, the time period that each record is considered inactive varies.

   Note: Inactive Records are maintained off-site at the PTC warehouse. Records are no longer shipped to the PA State Records Center; however PTC inactive records that are currently in storage at the PA State Records Center will remain there until final disposition.

D. **Final Disposition.** The last phase of the record’s life cycle occurs when it is no longer needed for PTC business or to satisfy legal requirements. Disposition is the final treatment of the record, and involves either destruction or transfer of permanently valuable records to the PTC Warehouse or State Archives for historical purposes.

1.4. Definitions

Convenience Copies –
Copies created for the convenience of business users; Convenience Copies must not be kept longer than the Official PTC Record.

Litigation Hold (also known as Mandatory Preservation Notices) –
Suspension of all document destruction procedures where there is pending or imminent litigation, government investigation, subpoena, tax hold, audit, or other consideration.

Non-records –
Information that does not meet the definition of a record as defined in this document. These materials relate to non-PTC business or activities and may include items such as announcements of community events and personal e-mails. Non-records may also include publications such as trade journals, pamphlets, and reference materials received from outside organizations, conferences, and workshops.

Official PTC Record –
Information, regardless of physical form or a characteristic, that documents a transaction or activity of the PTC and that is created, received, or retained pursuant to law or in connection with a transaction, business, or activity of the PTC. The term Official PTC Record includes a document, paper, letter, map, book, tape, photograph, film or sound recording, information stored or maintained electronically, and a data-processed or image-processed document. The term Official PTC Record excludes transitory records (which are records that have little or no documentary or evidential value and that need not be set aside for future use; have short term administrative, legal, or fiscal value and should be disposed of once that use has expired; or are only useful for a short period of time).

Record –
Information, regardless of physical form or characteristics, that document a transaction or activity and that is created, received or retained pursuant to law or in connection with a transaction, business or activity. The term includes media in any form including but not limited to a document, paper, letter, map, book, tape, photograph, film or sound recording, information stored or maintained electronically, and a data-processed or image-processed document.

Transitory Records –
Records that have little or no documentary or evidential value and that need not to be set aside for future use; have short term administrative, legal or fiscal value and should be disposed of once that administrative, legal or fiscal use has expired; or are only useful for a short period of time, perhaps to ensure that a task is completed or to help prepare a final product.

2. Records Management Team

2.1. Records Manager

Essentially, the Records Manager acts as the representative of the PTC regarding all issues of records management policy obligations. The following are the Records Manager’s responsibilities and duties:

- ***Serve as the primary liaison and point of contact with PTC executive staff, PTC Legal Department, PTC Policy Administrator, PTC Records Coordinators, PTC Records Clerk, and IT Department.***
  As the Records Manager is charged with overseeing the records management program within the PTC, it is important to maintain a relationship with these individuals. This relationship will allow the Records Manager, PTC Executive Staff, PTC Legal Department, PTC Policy Administrator, PTC Records Coordinators, PTC Records Clerk, and IT Department to work together to provide professional and technical direction, as well as to develop improved procedures, policies, and training. Without communication from the Records Clerk and Records Coordinators, the Records Manager will be unaware of common difficulties and consequently will be unable to help resolve them.

- ***Assist departmental staff by facilitating the inventory, analysis, and scheduling of records. Oversee and facilitate PTC efforts, along with Legal Counsel, to inventory, evaluate, and schedule records and develop methods to control the creation, maintenance, and disposition of records.***

- ***Ensure that the program is running effectively.***
- ***Ensure that the destruction review process takes place.***
- ***Maintains master Certificate of Destruction forms.***
- ***Coordinate Annual Purge Process.***

2.2. Records Coordinator

Department Heads shall appoint representatives to serve as their department's records coordinators.

The following are the responsibilities of the Records Coordinator:

- ***Coordinate, monitor and reinforce the records management process for their respective department/functional group, with a focus on:***
    - Filing Active Records
    - Filing Inactive Records
    - Disposition of Records
    - Retrieval of Records
    - Annual Clean-up & Purge
    - Transfer and retrieval of records off-site

- ***Serve as primary liaison and point of contact between the department/functional group and the PTC Records Manager and Records Clerk.***
  As the Records Coordinator is charged with overseeing the records management program within the their respective department/functional group, it is important to maintain a relationship with the Records Manager, Records Clerk and fellow Records Coordinators. This relationship will allow the Records Coordinator, Records Clerk and Records Manager to work together to provide professional and technical direction, as well as to develop improved procedures, policies, and training. Without communication from the Records Coordinators, the Records Manager and Records Clerk will be unaware of common difficulties and consequently will be unable to help resolve them. **The Records Coordinator is the point of contact for questions concerning the records management program within their department/functional group.**

- ***Assist departmental staff with reviewing and maintaining the PTC's Records Retention Schedule.***
  The Records Coordinator should participate in the records inventory and then use that information to help prepare additions and changes to the PTC's Records Retention Schedule. To assist in this stage, the Records Coordinators should work with PTC personnel, the PTC Records Manager and PTC legal counsel to determine the length of time records need to be maintained and to identify records that are protected by attorney-client privilege and/or work product doctrine.

- ***Disseminate information to department/functional group, and <u>ensure that new record types for department are added to the retention schedule.</u>***

- ***Coordinate with Records Clerk requests for boxes and forms.***

2.3. Records Clerk

The Records Clerk is responsible the day to day activities of the Records Management Program. This individual serves as liaison to the Records Coordinators and Records Manager, and supports their efforts as part of the Records Management Program.

As Records Coordinators are charged with overseeing the records management program within their respective department/functional group, it is important to maintain a relationship with the Records Manager to assist and support their efforts.

As the Records Manager is charged with overseeing the entire PTC records management program, it is important to maintain a relationship with the Records Manager and support their efforts. The Records Clerk will:

- ***Serve as liaison to the Administrative Services department.***
- ***Issue supplies, including boxes, forms, labels, etc.***
- ***Coordinate the transportation of records to the off-site storage facility and staging facility.***
- ***Coordinate the pick-up of records from the off-site storage facility.***
- ***Maintain the Records Management Procedures Guide.***
- ***Receive and maintain PTC Inactive Records Storage forms.***
- ***Enter information from various forms into designated computer systems/files.***
- ***Assign and maintain box numbers for inactive storage boxes.***
- ***Apply numbers to boxes.***
- ***Ensure occurrence of annual records purges***
- ***Coordinate semi-annual destruction reviews***

2.4. Legal Department

The Legal Department representative will:

- ***Provide a legal perspective to the destruction review process.***
- ***Provide legal guidance for overall Records Management Program.***
- ***Schedule meetings with PTC coordinators, records clerk, and program manager, as needed, to discuss timely issues such as compliance or needed program modifications.***
- ***Perform and review legal research associated with the Records Retention Schedule.***
- ***Review Policy.***

2.5. Facilities and Energy Management Operations Department

Duties & Responsibilities:

- ***Maintain carton/box inventory.***
- ***Delivery and pick-up of records to/from the off-site storage facility.***
- ***Move boxes from department locations to staging area prior to transportation to the off-site storage facility.***
- ***Place boxes into storage at off-site facility using a methodology that will allow for easy access and availability as needed.***
- ***Assist Records Clerk with the implementation of the semi-annual destruction process, listing of records ready for destruction, retrieval of containers, etc.***

2.6. Information Technology Department

Duties & Responsibilities:

Support the Records Management Program by:

- ***Providing the systems that are necessary to administer and maintain the program.***
- ***Providing required resources for electronic records retention.***

2.7. Off Site Storage - PTC Warehouse/PA State Records Center

Duties & Responsibilities:

- ***PTC Warehouse is the current PTC off-site storage facility.***
- ***PA State Records Center is the former PTC off-site storage facility.***
  - ***Boxes are no longer transported to the PA State Records Center; however boxes that are currently at the PA State Records Center will remain there until final disposition.***
- ***PA State Records Center STD Form distributor.***

2.8. PTC Employees

Duties & Responsibilities:

- ***Prepare records for inactive storage.***
- ***Use discretion creating records.***
- ***Treat records as PTC property.***
- ***File records carefully.***
- ***Adhere to processes associated with convenience copies, transitory, and non-records.***
- ***Adhere to the PTC Records Management Policy.***

3. Records Management Procedures

3.1. Records Inventory

3.1.1. Overview

A records inventory was performed in 1999 by the Iron Mountain Consulting Group. This records inventory was a survey of all PTC records and was used primarily to develop and maintain a retention schedule. The inventory identified all records and their locations. This information enabled the PTC to compile and maintain a retention schedule.

A comprehensive inventory of records should be done when the PTC undergoes major reorganization or is reevaluating its records management program. Individual inventories need to be completed when new record series are added to the PTC's records schedule. All media types, such as paper, magnetic tapes, disks, CDs/DVDs, maps, drawings, photographs, and microfilm, must be included in an inventory.

3.2. Annual Clean-up & Purge

Responsible Parties:	Records Manager Legal Records Clerk Records Coordinator All Employees

Scheduled: Annually or On Demand

3.2.1. Overview

The annual purge process occurs once a year and is a PTC enterprise initiative, and the following procedure should be used to evaluate associated records.

3.2.2. Procedures

3.2.2.1.1. Preparation –

- Retrieve Pre-Numbered boxes from Records Clerk. **Note: Use these official boxes for the Records Management Process, ONLY!**

- Obtain PTC Inactive Records Storage Forms from Records Clerk.
- Proceed to the Record Evaluation Procedure, which follows:

- **Step 1 – Record Evaluation**

  Determine if the information/record is Transitory, a Non-Record, or a Convenience copy –

  - Does the information have little or no documentary or evidential value, or,
  - Is the information a copy of an original record?

If YES –
You may dispose of the record OR Proceed to Step 2.

If NO –
Proceed to Step 2.

- **Step 2 – Can You Dispose of Record?**

  - **Step 2a: Find the 'Record Class Code' and 'Official' Retention Period.**
    - Reference the Records Retention Schedule.
    - What department/business group owns the record? Locate that 'Business Function.'
    - Find the 'Record Class Name'/'Record Class Description'/'Record Type' in the schedule.
    - Note the 'Record Class Code' and 'Official' retention period.

  - **Step 2b: Determine End of Retention Period.**
    - If 'Official' column DOES NOT list 'ACT+':
    - Add number of years in the 'Official' column to 'Date of Record'.
    - Proceed to Step 2c.
    - If 'Official' column lists ACT:
    - If activity concluded, add number of years in 'Official' column to date activity concluded.
    - If activity on-going, re-file onsite.

- **Step 2c: Is Current Date Greater than End of Retention Period?**

-If YES –
YOU MUST Dispose of Properly.
-If NO –
Proceed to Step 3.

- **Step 3 – Determine Where & How to File.**
  - **Step 3a: Is the Record a 'Convenience' Copy?**
    - If YES

      Do I frequently use it or reference it?
    - If YES –

      Re-file onsite; however convenience copies must be disposed of before the end of the referenced records retention period.
    - If NO –

      Dispose of Properly
    - If NO ('Official' Record):

      Proceed to Step 3b.
  - **Step 3b: Is the Record 'Active' or 'Inactive'?**
    - If 'ACTIVE' Record (frequently used or referenced) OR Activity Ongoing

      Re-File Onsite
    - If 'INACTIVE' Record

      Proceed to Step 3c.

- **Step 3c: Filing 'INACTIVE' Records.**
    - File records in box by 'Record Class Code'.
      One RECORD CLASS CODE per box.
      DO NOT WRITE ON or ALTER BOX.

- **Step 3d: Start Filling Out PTC Inactive Records Form.**
    - See Forms Tab for Instructions and Form.
    - One Form per Box.

- **Step 3e: Filing 'INACTIVE' Records.**
    - When finished or box is full, place lid on box.
    - Lid must fit on completely.
    - Complete PTC Inactive Records Storage Form.

- **Step 4 – Coordinate with Records Clerk**
    - **When Purge is Complete:**
        - Contact Records Clerk.
        - Return Completed PTC Inactive Records Storage Form(s) to Records Clerk.
    - **Communicate the following to Records Clerk:**
        - *EXACT location of boxes
        - *# of boxes
        - *Box numbers

- **Step 5 – Pick-up and Delivery**
    - Records Clerk coordinates pick-up and delivery.
    - The Records Clerk contacts Administrative Services.
    - Administrative Services picks up boxes and delivers to the warehouse area.
    - Administrative Services communicates back to Records Clerk verifying the pick-up and delivery.

3.3. Formal Disposal Process

3.3.1. Overview

Semi-annually, the Information Technology Department receives a Destruction Candidate Report, from FEMO and/or PA State Records Center, listing stored cartons that are eligible for destruction.

3.3.1.1. Procedure

Department managers will have two weeks to review the Destruction Candidate Report and note records that are still required to be maintained due to PTC ongoing business operations.

Information Technology will forward the Destruction Candidate Report to the Legal Department for final review and verification that no records controlled by Litigation Holds or Mandatory Preservation Notices have been authorized for destruction.

Upon receipt of the final approved Destruction Candidate Report, Information Technology will initiate the destruction of records. Information Technology will maintain all documentation verifying the destruction of records.

3.4. Forms

The PTC Inactive Records Storage Form can be found at:

http://ptcintranet/document_library/documents/Inactive_Records_Form.pdf

Instructions for filling out the Inactive Records Storage Form

Record Class Code: This is the record class code from the Records Retention Schedule for the group of records you are filing. Remember, only one (1) Record Class Code per sheet, per box. (This is a required field)

Date of Most Current Record in Box: This is the latest record date within the box. If, for example, there are records in the same box dated 08/96 and records dated 05/97, the date of the most current record would be 05/97. (This is a required field)

Prepared By: This is the name of the person filling out this form and placing the records into the box. (This is a required field)

Date: This is the current date. (This is a required field)

Box Number: This is the number that is on the Box. Each Box will have a unique number assigned by the Records Clerk. The number on the Box goes into this field. **This number MUST match the one on the box.** (This is a required field)

Record Class Descriptions and Records Types (contents): This field contains a description of the contents of the box. It is this field that you will use to perform searches on when trying to find records that you have stored off-site. Be sure to enter enough information so that you will be able to retrieve these records in the future. (This is a required field)

General Information: This is not a required field however you may use it to add additional information regarding the contents of the box.

The information on this form will be entered into a database system for reporting and retrieval purposes, so please be sure that all information on the form is legible.

Appendix A - Records Management Policy

See the Policy Letters Manual at:

http://ptcintranet/document_library/documents/Policy_Letters.pdf for current

Policy Letter 8.6 - Records Management Policy

Attachment 8B

PTC Records Retention Schedule

Pennsylvania Turnpike Commission

3/17/2009

Accounting

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+ OffSite	= Total
AC100	**Accounts Payable** **Invoices and Vouchers** Records related to the payment of financial obligations. These documents verify the purchase of goods and services. Includes vendor invoices and supporting documents needed to verify the accuracy of the invoice and to authorize payment. **Examples Include:** Accounts Payable Invoices; Accounts Payable Vouchers; Cancelled Checks; Check Copies; Check Registers **ACT (Activity) Event:** For federally funded projects, keep record in agency one year from the date the project is completed. For all other records, keep one year from the end of the fiscal year in which the record was created.	ACT+1	3	ACT+4
AC110	**Accounts Payable** **Employee Expenses** Records used to manage and administer the employee expense reimbursement function. Includes forms issued to employees for reimbursement, audit reports, authorizations, etc. **Examples Include:** Cash Advances; Employee Expense Reports; Request for Travel Advance; Travel Expense Vouchers **ACT (Activity) Event:** For federally funded projects, keep record in agency one year from the date the project is completed. For all other records, keep one year from the end of the fiscal year in which the record was created.	ACT+1	3	ACT+4

Revision Date: 3/17/2009

Pennsylvania Turnpike Commission

Accounting

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description		Retention Periods OnSite	+	OffSite	=	Total
AC120	**Accounts Payable** **Petty Cash** Records related to the administration of the petty cash function. Includes petty cash disbursements. **Examples Include:** Petty Cash Disbursements	**ACT (Activity) Event:** For federally funded projects, keep record in agency four years from the date the project is completed. For all other records, keep four years from the end of the fiscal year in which the record was created.	ACT+4		0		ACT+4
AC130	**Accounts Payable** **Management Reports** Records that are related to the review and management of the accounts payable function. Includes reports that are used to reconcile accounts. Does not include the actual vendor invoices and supporting documentation. See schedule record series number 001 for Accounts Payable / Invoices and Vouchers. **Examples Include:** Batch Edit Reports General Journal Reports	**ACT (Activity) Event:** Retain until updated or superseded.	0		0		0

Pennsylvania Turnpike Commission

Accounting

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods		
		OnSite +	OffSite =	Total
AC140	**Accounts Receivable** **Customer Invoicing** Records documenting the invoices sent to customers and the payments received. Includes invoices, check copies, and check requests. **Examples Include:** Check Copies Check Requests Invoices **ACT (Activity) Event:** For federally funded projects, keep record in agency one year from the date the project is completed. For all other records, keep one year from the end of the fiscal year in which the record was created.	ACT+1	3	ACT+4
AC150	**Accounts Receivable** **Cash Receipts** Records documenting cash payments received from toll collections. Includes cash receipts and deposit slips. **Examples Include:** Cash Receipts Ledgers Lockbox Receipts **ACT (Activity) Event:** For federally funded projects, keep record in agency one year from the date the project is completed. For all other records, keep one year from the end of the fiscal year in which the record was created.	ACT+1	3	ACT+4

Revision Date: 3/17/2009

Pennsylvania Turnpike Commission

Accounting

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+ OffSite	= Total
AC160	**Accounts Receivable Management Reports** Records that are related to the review and management of the invoicing and accounts receivable function. Includes review reports and control logs. See schedule record series number 005 for Customer Invoicing and schedule record series number 006 for Cash Receipts. **<u>Examples Include:</u>** Accounts Status Reports Surety Reports **<u>ACT (Activity) Event:</u>** Retain until updated or superseded.	0	0	0
AC170	**Capital Assets** Records used to document the purchasing activity of items that are capitalized, the purchase and sales of property and equipment and their depreciation, improvements, etc. Includes records related to the acquisition, transfer, retirement, disposal or loss of fixed assets that have been capitalized. Also included are reports that summarize this information. See schedule record series number 009 for Capital Assets - Federally Funded. **<u>Examples Include:</u>** Auction Records Capital Asset Reports Contract Estimates for Payments Depreciation Reports Fixed Asset Schedules Request for Disposal (Signed) Sale of Surplus Property Records **<u>ACT (Activity) Event:</u>** For federally funded projects, keep record in agency one year from the date the project is completed. For all other records, keep from the end of the fiscal year in which the record was created.	ACT+1	3	ACT+4

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Pennsylvania Turnpike Commission

Accounting

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+	 OffSite	=	 Total
AC180	**Capital Assets - Federally Funded** Records used to document the purchase and sale of property and equipment which is federally funded. Includes records related to the acquisition, transfer, retirement, disposal or loss of fixed assets that have been capitalized. Also included are reports that summarize this information. See schedule record series number 008 for Capital Assets. **<u>Examples Include:</u>** Capital Asset Reports Contract Estimates for Payments Depreciation Reports Fixed Asset Schedules **<u>ACT (Activity) Event:</u>** For federally funded projects, keep record in agency one year from the date the project is completed. For all other records, keep one year from the end of the fiscal year in which the record was created.	ACT+1		3		ACT+4
AC190	**General Ledger** **Journal Entries** Records used to transfer charges between accounts and for summarizing account information. Includes entries made to the general ledger to correct coding errors, correct ledger accounts, accrue for expenses not yet paid, or other similar activities. **<u>Examples Include:</u>** Edit Cycle Records Journal Entries **<u>ACT (Activity) Event:</u>** Retain two years from the end of the fiscal year in which the record was created.	ACT+2		2		ACT+4

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Accounting

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+ OffSite	= Total
AC200	**General Ledger** **Subsidiary Ledgers** Records consisting of subsidiary ledgers. See schedule record series number 012 Year End Ledger and Trial Balances. **Examples Include:** Ledgers - Additional Improvements; Ledgers - Construction; Ledgers - RMF; Ledgers - Tunnel Improvements; Registers **ACT (Activity) Event:** Retain four years from the end of the fiscal year in which the record was created.	ACT+4	0	ACT+4
AC210	**General Ledger** **Year-End Ledger and Trial Balances** Records related to the general ledger. Includes the actual general ledger that summarizes all corporate accounts. See AC200 for Subsidiary Ledgers. **Examples Include:** General Ledger - Year End; Trial Balances **ACT (Activity) Event:** The end of the fiscal year in which the record was created.	ACT+10	0	ACT+10

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Accounting

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	OnSite	+	OffSite	=	Total
AC220	**Financial Statements** Financial statements, operating statements, GAAP reports, and background information submitted to government agencies, etc. Includes financial and operating statements submitted to the State of Pennsylvania and outside auditors. **Examples Include:** Annual Reports GAAP Reports Official Statements Operating Reports - Year End Operating Statements **ACT (Activity) Event:** The end of the fiscal year in which the record was created.	ACT+10		0		ACT+10
AC230	**Interim Financial Records** Records related to interim financial records including interim inventory records, interim general ledgers, and interim financial reporting. **Examples Include:** GL Account Status Report Monthly Budget Statements Monthly Capital Projects Reports Monthly Cost Distribution Monthly Operating Reports **ACT (Activity) Event:** Retain four years from the end of the fiscal year in which the record was created.	ACT+4		0		ACT+4

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Administration

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+ OffSite	= Total
AD100	**Administrative Inventory Control** Records documenting the type, model, location, and quantities of commission-owned property (such as supplies, equipment, etc). These records are used for operational purposes only. Includes corporate items maintenance forms, inventory activity forms and inventory listings. **Examples Include:** Corporate Items Maintenance Forms; Inventory Activity Forms; Inventory Lists **ACT (Activity) Event:** The date that the assets are sold or disposed of.	ACT+1	0	ACT+1
AD110	**Internal Services** Records related to providing internal support for Commission personnel including services and products. Includes material and supply orders. **Examples Include:** Internal Service Orders; Reproduction/Copy Service Orders **ACT (Activity) Event:** The date that the record was created.	3	0	3
AD120	**Office Maintenance and Repair** Records related to repairs and maintenance of office and building equipment. Includes repair/maintenance of roofing, plumbing, mechanical systems, etc. **Examples Include:** Repair Records; Work Orders **ACT (Activity) Event:** The date that the assets are sold or disposed of.	ACT+1	0	ACT+1

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Administration

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	OnSite	+	OffSite	=	Total
AD130	**Receiving and Inspection** Records related to the receipt and inspection of goods purchased. Includes records that document the conditions and quantities of actual goods received. Also includes delivery receipts, packing lists, shipping records, count sheets and finalized updates. **Examples Include:** Delivery Receipt Inspection Reports Manifests Packing Lists Shipping Documentation (Product Returns) **ACT (Activity) Event:** The date that the record was created.	1		5		6

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Departmental and Project Management

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name Record Class Description		Retention Periods OnSite	+	OffSite	=	Total
DEP100	**Departmental Correspondence** Records related to correspondence records, primarily internal casual correspondence. This record class is only to be used for correspondence not covered elsewhere. **Examples Include:** Correspondence (General)	**ACT (Activity) Event:** The date that the record was created.	MAX3		0		MAX3
DEP110	**Project Management (Internal Projects)** Records related to management of internal projects. Includes project plans, meeting minutes, status reporting, presentations, etc. **Examples Include:** Project Meeting Agenda Project Meeting Minutes Project Plans Project Presentations	**ACT (Activity) Event:** The date the project is closed.	ACT+1		0		ACT+1
DEP120	**Departmental Policies and Procedures** Records related to guidelines and policies set forth by specific PTC department for their employees. **Examples Include:** Toll Collector Manuals	**ACT (Activity) Event:** The date that the policy, program or procedure is either superceded or discontinued.	ACT+0		10		ACT+10

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Engineering Design and Construction

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+	OffSite	=	Total
ENG100	**Engineering Construction - General** Records related to the construction of roadways, bridges, corporate facilities and other structures. Includes estimates, sketch books, correspondence, and other supporting documents. See ENG110 for Engineering Construction - Federally Funded and ENG120 for Engineering Construction - Final. **Examples Include:** Concrete Books Contract Change Orders Correspondence Estimates Field Inspector Diaries Property Releases QA Reports Quantity Books Structure Pike Records Structure Stake Out **ACT (Activity) Event:** The date that the project is completed.	ACT+0		14		ACT+14
ENG110	**Engineering Construction - Federally Funded** Record related to the construction of roadways, bridges and other structures that are funded by the federal government. Includes final estimates, sketch books, correspondence and other supporting documents. See ENG100 for Engineering Construction - General and ENG120 for Engineering Construction - Final. **Examples Include:** Concrete Books Contract Change Orders Correspondence Estimates Field Inspector Diaries Property Releases QA Reports Quantity Books Structure Pike Records Structure Stake Out **ACT (Activity) Event:** The date that the project is completed.	ACT+0		14		ACT+14

Pennsylvania Turnpike Commission

Engineering Design and Construction

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name / Record Class Description	Retention Periods OnSite	+	OffSite	=	Total
ENG120	**Engineering Construction - Final** Records related to the final construction of roadways, bridges, corporate facilities and other structures. Includes final shop drawings and catalog cuts, contract specifications book and contract cost and summary analysis. These final documents and are maintained indefinitely. **Examples Include:** Contract Specifications Book Final Contract Cost and Summary Analysis Shop Drawings and Catalog Cuts **ACT (Activity) Event:** The date that the project is completed.	ACT+0		IND		IND
ENG130	**Specifications Book** Records detailing the finalized construction specifications including contract, insurance, and payment information. Includes final contracts and addendums as well as contractor insurance, payment and surety bond records. **Examples Include:** Addendums Contractor Insurance Information Contractor Payment Information Contractor Surety Bonds Contracts **ACT (Activity) Event:** The date that the project is completed.	ACT+0		IND		IND
ENG140	**Consultant Proposals - Rejected** Records related to rejected proposals submitted by engineering consultants. **Examples Include:** Letters of Interest (Consultants Not Selected) Technical Proposals (Consultants Not Selected) **ACT (Activity) Event:** The date of final submission.	ACT+1		0		ACT+1

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Engineering Design and Construction

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods				
		OnSite	+	OffSite	=	Total
ENG150	**Contracts and Agreements** **Construction Consultants** Records related to agreements with external engineering consultants. Includes consultant agreements and consultant final invoices. **Examples Include:** Consultant Agreements Consultant Final Invoice Technical Proposals - Accepted **ACT (Activity) Event:** The date that the project is completed.	ACT+0		6		ACT+6
ENG160	**Master Diaries** Records of daily logs kept by engineering consultants detailing work schedules, equipment, weather, operations and other information. **Examples Include:** Master Diaries **ACT (Activity) Event:** The date that the project is completed.	ACT+0		IND		IND
ENG170	**Construction Research** Records related to general technical reference materials used for construction projects. Includes technical reports, books, manuals and periodicals. **Examples Include:** Books Manuals Periodicals Reports **ACT (Activity) Event:** The date that the material is no longer required onsite or superceded.	ACT+0		IND		IND

Pennsylvania Turnpike Commission

Engineering Design and Construction

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+	OffSite	=	Total
ENG180	**Materials Certification, Testing and Inspection**	ACT+0		14		ACT+14

Records related to the testing, inspection and certification of materials used for concrete pavement. Includes records reporting on the composition, mixture, compaction and treatments of materials.

Examples Include:

Aggregates Gradiations
Bituminous Records
Concrete Records
Delivery Tickets
Earthwork Computations
Embankment Compaction Test
Materials Certification
Mix Designs
Test Reports

ACT (Activity) Event:

The date that the project is completed.

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Engineering Design and Construction

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+	OffSite	=	Total
ENG200	**Engineering Design - General** Records related to drawings and designs and related project information used to support the construction of roadways, bridges, corporate facilities and other structures. Includes correspondence, plans, calculations, reports, as-builts and shop drawings. See ENG100 for Engineering Construction - General. **Examples Include:** ACT287 Notification Consultant Approvals Correspondence - Liaison or Designer Files Correspondence - Master Files Cross Sections (As-Builts) Design Calculations Design Location Reports Drawings (Mylars) Feasibility Reports Inspection Sheets and Reports Meeting Minutes Plans (As-Builts) Quantity Calculations Shop Drawings Survey Books **ACT (Activity) Event:** The date that the project is completed.	ACT+0		IND		IND
ENG210	**Engineering Design - Geotechnical** Records related to the geotechnical assessments of various construction of roadways, bridges and other structures. Includes geotechnical and foundation reports, structure boring sheets, typed boring logs and roadway reports. **Examples Include:** Miscellaneous Reports Roadway G.E.R. **ACT (Activity) Event:** The date that the project is completed.	ACT+0		IND		IND

Pennsylvania Turnpike Commission

Engineering Design and Construction

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+ OffSite	= Total
ENG220	**Engineering Design - Bridges/Structures** Records related to the design of bridges and structures. Includes bridge inspection sheets and reports and design calculations/computations. **<u>Examples Include:</u>** Bridge Inspection Reports Bridge Inspection Sheets Design Calculations/Computations Geotechnical and Foundation Reports Structure Boring Sheets Typed Boring Logs **<u>ACT (Activity) Event:</u>** Completion of the bi-annual bridge inspection program.	ACT+0	IND	IND
ENG230	**Engineering Design - Roadway** Records related to the planning and design of roadways to be constructed by the PTC. Includes standard and CADD drawings, mosaics and contours. **<u>Examples Include:</u>** 1968 Contours CADD Drawings Mosaics Old Standard Drawings Standard Drawings **<u>ACT (Activity) Event:</u>** The date that the record was created.	IND	0	IND

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Engineering Design and Construction

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+ OffSite	= Total
ENG240	**Traffic Studies and Plans** Records related to approved traffic studies and plans relating to traffic signal and other traffic control device installations. **Examples Include:** Dates of Installation Records Engineering and Traffic Studies Final Surveys Plan Sheets for Signal or Signing Projects Study Data Traffic and Revenue Studies Traffic Control Device Requests **ACT (Activity) Event:** The date of final submission.	ACT+3	IND	IND
ENG250	**Traffic Route Numbers** Records related to studies associated with the adding or changing of traffic route numbers reported to PADOT (Pennsylvania Department of Transportation) and FHWA (Federal Highway Association). **Examples Include:** Studies Traffic Route Number Requests **ACT (Activity) Event:** The date of final submission.	ACT+3	IND	IND
ENG260	**Engineering Design - Traffic** **Procession, Assemblages, and Special Events** Records related to requests and approval for processions, assemblages, and other special events on highways, bridges, etc., operated by the PTC. **Examples Include:** Approvals Requests Study Data **ACT (Activity) Event:** The date that the project is completed.	ACT+3	0	ACT+3

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Engineering Design and Construction

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name Record Class Description		Retention Periods OnSite	+ OffSite	= Total
ENG270	**Engineering Design - Traffic** **Removal of Traffic Hazards** Records related to the request and approval to remove various traffic hazards. **Examples Include:** Traffic Hazard Analysis	**ACT (Activity) Event:** The date that the record was created.	2	0	2
ENG280	**Engineering Design - Traffic** **Traffic Reporting** Records detailing the tracking of traffic volumes and flow, accidents, capacity and related analysis. **Examples Include:** Origin Destinations Reports Traffic Control Projects Traffic Flow Reports	**ACT (Activity) Event:** The date that the record was created.	3	IND	IND

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Engineering Design and Construction

Records Retention Schedule With Retention Periods

RecordClass	Record Class Name	Retention Periods				
Code	Record Class Description	OnSite	+	OffSite	=	Total
ENG290	**Engineering Design - Utilities** Records related to the relocating and/or adjusting of utility facilities such as gas, petroleum, water, telephone, sanitary sewage and electric which is affected by highway construction or reconstruction. **Examples Include:** Affidavits Certification of Utility Completion Estimate Permit Transmittal Lump Sum Estimate with Supportive Information Preliminary Estimate with Supportive Information Project Utility Relocation - Estimates Proof of Private Right of Way Summary of Billing and Supportive Documentation Utility Clearance Forms Utility Inspection Reports Utility Relocation Questionnaires Utility Relocation Unit - Clearance Forms **ACT (Activity) Event:** The date that the project is completed.	ACT+3		11		ACT+14
ENG300	**Engineering Design - Utilities** **Utility Approval and Agreements** Records documenting final approval and agreements between the PTC and the utility organization. Includes regulatory orders from the PUC, approvals from both parties, agreements of reimbursement and resolutions. Also includes utility plans indicating relocation/adjustments and occupancies and documentation for the establishment of utility corridors. **Examples Include:** Agreement of Reimbursements Bridge Occupancy Agreements Commission Approval Consultant/Utility Agreements Cost Sharing - Approvals/Rejections PUC Orders **ACT (Activity) Event:** The date that the record was created.	IND		0		IND

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Engineering Design and Construction

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name Record Class Description	OnSite	+	OffSite	=	Total
ENG310	**Engineering Permits**	ACT+0		3		ACT+3
ENG320	**Property Acquisitions/Right of Way**	IND		0		IND

ENG310 Engineering Permits

Records related to the permits required in the design and construction of highways. Includes highway occupancy, letter of authorization permits and other related permits.

Examples Include:

Letter of Authorization Permits
Permits - Highway Occupancy

ACT (Activity) Event:

The date that the permit expires.

ENG320 Property Acquisitions/Right of Way

Records relating to the purchase of property and the granting of right of way (from individual property owners) necessary when the PTC is building new highways or adding to existing ones. Includes negotiations reports, purchase/sales agreements, settlement documents, deeds, calculations, relocation records, title work, appraisals and other supporting records.

Examples Include:

Calculations
Condemnation Plans
Deeds
Final R/W Plans
Horizontal and Vertical Control Reports
Mapping
Purchase/Sales Agreements
Relocation Records
Settlement Documents
Survey Books
Title Work
Viewer's Plans

ACT (Activity) Event:

The date that the record was created.

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Engineering Design and Construction

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name / Record Class Description	Retention Periods OnSite	+ OffSite	= Total
ENG330	**Milepost Folders**	IND	0	IND
ENG340	**Environmental Reporting**	ACT+0	IND	IND

ENG330 Milepost Folders

Records documenting issues occurring at mileposts such as drainage problems, customer stormwater reviews and miscellaneous issues.

Examples Include:

Correspondence Files
Drainage Complaints
Stormwater Plans and Review Files

ACT (Activity) Event:

The date that the record was created.

ENG340 Environmental Reporting

Records that support the environmental issues needed on a particular site to be created, managed, and/or submitted by the Commission to governmental agencies (FHWA, PENDOT, PADEP) in order to comply with state/federal environmental requirements.

Examples Include:

Air Quality Analysis Report
Criteria of Effects Report
Detailed Site Investigation Report
Determination of Eligibility Report
Farmlands Assessment Report
Habitat Evaluation Report
Memorandum of Agreement
Needs Analysis
Noise Analysis Report
Noise Complaint Letters
Phase I, II, II Archeological Survey Report
Preliminary Alternatives Analysis Reports
Preliminary Area Reconnaissance Reports
Technical Files and Memos
Water Quality and Aquatic Biota Report
Wetlands Delineation Report
Wetlands Functional Assessment Reports
Wetlands Mitigation Site Selection Reports

ACT (Activity) Event:

The date that the project is completed.

Pennsylvania Turnpike Commission

Engineering Design and Construction

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+ OffSite	= Total
ENG350	**Environmental Impact and Assessment** Documents required by federal and state agencies for major construction projects that significantly affect the environment. Includes environmental overview report, categorical exclusion evaluation, environmental assessments, and environmental impact statements. **Examples Include:** Categorical Exclusion Evaluation Environmental Assessments Environmental Impact Statements Environmental Overview/Report **ACT (Activity) Event:** The date that the project is completed.	ACT+0	IND	IND
ENG360	**Environmental Permits** Records related to environmental permits and licenses required by federal and state environmental agencies. Includes supporting documentation used to obtain the permit or license. **Examples Include:** Dam Safety Permits NPDES Permit PADEP Permits (Chapter 105) Permit Applications Stream Mitigation Design U.S. Army Corp of Engineers Section 404 Permits Wetlands Mitigation Design **ACT (Activity) Event:** The date that the project is completed.	ACT+0	IND	IND

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Fare Collections

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name / Record Class Description		Retention Periods OnSite	+ OffSite	= Total
FAR100	**Fare Collection Tickets** Records of actual fare collection tickets collected at toll booths. **Examples Include:** Tickets	**ACT (Activity) Event:** The date that the record was created.	3	1	4
FAR110	**Fare Schedules** Historical records indicating toll collection fares. **Examples Include:** Fare Schedules	**ACT (Activity) Event:** The date that the record was created.	IND	0	IND
FAR120	**Toll Collector Schedules** Records related to the staffing and work schedules of toll collectors. **Examples Include:** Toll Collector Schedules	**ACT (Activity) Event:** The date that the record was created.	3	0	3

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RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+	OffSite	=	Total
LR100	**Labor Relations** **Labor Grievances - Departmental (Step 1)** Records related to complaints filed by labor union employees against the PTC. These grievances are resolved within the employee's department and are not escalated to the human resources or legal departments. Includes grievances, correspondence and supporting documents. See HE230 for labor grievances handled by the HR department and LE110 for labor grievances handled by the legal department. **Examples Include:** Correspondence Labor Grievances Supporting Documents **ACT (Activity) Event:** The date that the record was created.	3		2		5

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Pennsylvania Turnpike Commission

Finance

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods		
		OnSite +	OffSite =	Total
FN100	**Bad Debts and Collections** Records related to the monitoring, collecting, and writing off of bad debts. Includes authorizations and supporting details of uncollectible accounts. **Examples Include:** Collection Notices **ACT (Activity) Event:** The date that the record was closed.	ACT+2	2	ACT+4
FN110	**Banking** **Account Reconciliation** Records related to analysis and audit of the PTC's bank accounts. These records support the monthly account reconciliation process and are used to document reconciliations that develop from that analysis. Includes account statements and reconciliations. **Examples Include:** Bank Account Reconciliations Bank Account Statements **ACT (Activity) Event:** Retain two years from the date that the record was created.	ACT+2	2	ACT+4
FN120	**Banking** **Cancelled Checks and Registers** Records related to cancelled checks and check registers for corporate accounts. These records are used to verify the receipt of funds by a third party and the debit of cash from the corporate account. Includes cancelled checks and check registers. **Examples Include:** Cancelled Checks Check Copies Check Registers **ACT (Activity) Event:** Retain two years from the date that the record was created.	ACT+2	2	ACT+4

Pennsylvania Turnpike Commission

Finance

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+ OffSite	= Total
FN130	**Banking** **Bank Account Set-up and Management** Records related to the setup and management of the Commission's accounts. Includes bank account files. **<u>Examples Include:</u>** Bank Account Files **<u>ACT (Activity) Event:</u>** The date that the record was created.	2	2	4
FN140	**Banking** **Deposits and Wire Transfers** Records related to deposits and wire transfers made to and from corporate accounts. These records are used to verify the transfer and deposit of funds. Includes deposit slips, wire transfer records and automatic clearing house paments. **<u>Examples Include:</u>** ACH Payment Requests ACH Payments Deposit Letters Deposit Slips Wire Transfer Notifications Wire Transfers **<u>ACT (Activity) Event:</u>** Retain two years from the date that the record was created.	ACT+2	2	ACT+4

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Finance

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	OnSite	+ OffSite	= Total
FN150	**Budgets and Financial Forecasts** Records related to budgeting activities. Includes final budgets, budget workpapers, and actual versus budget comparisons. **Examples Include:** Actual to Budget Reports; Budget Workpapers; Budgets; Capital Budgets; G&A Reports; Operating Budgets **ACT (Activity) Event:** The date that the record was created.	5	0	5
FN160	**Cash Management** Records related to the analysis, forecasting, and disposition of the Commission's cash balances. Includes records used to determine actual and future cash balances, as well as records related to analysis of the PTC's borrowing strategies and investment strategies. **Examples Include:** Cash Forecasting Records; Cash Investment Analysis; Cash Management Reviews **ACT (Activity) Event:** The date that the record was created.	2	2	4
FN170	**Customer Credit Files** Records related to customer credit applications, agreements and financing arrangements for commercial and other customer accounts. Includes credit applications, credit reports and surety bonds. **Examples Include:** Credit Agreement; Credit Applications -- Accepted; Credit Reports; Surety Bonds **ACT (Activity) Event:** The date the loan is paid off.	ACT+3	1	ACT+4

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Finance

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name / Record Class Description	Retention Periods OnSite	+ OffSite	= Total
FN180	**External Financing** **Federal Grants** Records related to the applications, issuance, management and administration of loans to the Commission from federal funding. Includes correspondence, reports and workpapers. **Examples Include:** Correspondence; Reports; Workpapers **ACT (Activity) Event:** The date the financing efforts are concluded.	ACT+3	1	ACT+4
FN190	**Investment Management** Records documenting investments in stocks, bonds, mutual funds, etc. Includes proof of ownership, purchase information, annual statements and investment results. **Examples Include:** Correspondence; Investment Policy Committee; Investment Portfolio Records; Investment Schedules; Investments, Supporting Documents **ACT (Activity) Event:** The date the investment account is closed.	ACT+3	1	ACT+4
FN200	**Management Reporting** Reports and documents providing useful sales, accounting, financial, and inventory information to management. These records are not part of accounting transaction processing or financial statement functions. **Examples Include:** Monthly Reports; Statistics Report by Quarter; Status Reports **ACT (Activity) Event:** The date that the record was created.	MAX3	0	MAX3

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Pennsylvania Turnpike Commission

Finance

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+	OffSite	=	Total
FN210	**Financial External Audits** Records related to accounting audits performed by external auditors. Includes audit reports, workpapers and responses. **Examples Include:** Audit Reports Audit Responses Audit Workpapers **ACT (Activity) Event:** Retain two years from the date that the record was created.	ACT+2		2		ACT+4

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Pennsylvania Turnpike Commission

Health & Safety

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+ OffSite	= Total
SF100	**Highway Safety Incidents** Records tracking fire, EMS and authorized service incidents. Includes daily and monthly reports summarizing when and how vehicles were dispatched. **Examples Include:** Fire, EMS and Authorized Service Usage Reports **ACT (Activity) Event:** Retain one year from the date the record was created.	ACT+1	3	ACT+4
SF110	**Safety Policies and Procedures** Records documenting the guiding principles (policy) and procedures required by the safety department. Includes safety manuals and related documentation. See TR120 for Commission Policies and Procedures. **Examples Include:** Safety Handbooks **ACT (Activity) Event:** The date the policy, programs or procedure is either superceded or discontinued.	ACT+0	10	ACT+10

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Pennsylvania Turnpike Commission

Human Resources -- Benefits

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name / Record Class Description	Retention Periods OnSite	+ OffSite	= Total
HB100	**Benefit Administration** Records related to the general management and administration of corporate benefit plans. Includes plan-related and vendor correspondence and general employee communications. See HB110 for Retirement Plan Administration. **Examples Include:** Benefit Analysis Benefit Claims Administration Correspondence **ACT (Activity) Event:** The date that the record was created.	2	4	6
HB110	**Benefit Administration** **Retirement Plan Administration** Records related to the management and administration of corporate employee retirement programs. Contains trust reconciliations, 5500's, annual audit papers, annual valuation reports and correspondence. **Examples Include:** 5500 Forms Annual Audit Workpapers Annual Valuation Report Correspondence Trust Reconciliation **ACT (Activity) Event:** The date that the record was created.	2	4	6

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Pennsylvania Turnpike Commission

Human Resources -- Benefits

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name / Record Class Description	OnSite	+	OffSite	=	Total
HB130	**Benefit Enrollment and Participation** **Disability Benefits** Records related to the application of continuing benefits distributed under commission-sponsored disability benefit plans. **Examples Include:** Applications; Correspondence with Physician; Disability Review Information; Doctor's Statement; Long-term Benefit Calculation **ACT (Activity) Event:** The date that the record was created.	2		4		6
HB140	**Benefit Enrollment and Participation** **Loan Applications** Records related to money borrowed by an employee against their retirement plan. **Examples Include:** Correspondence; Loan Application **ACT (Activity) Event:** The date the loan is paid off.	ACT+2		4		ACT+6
HB150	**Benefit Plan Texts and Amendments** Records related to Commission-sponsored benefit plans. Includes insurance, pension, disability, vacation entitlements, educational assistance, savings plans, and any seniority or merit systems. **Examples Include:** Amendments; Plan Documentation **ACT (Activity) Event:** The date that the record was created.	IND		0		IND

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Human Resources -- Benefits

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+	Retention Periods OffSite	=	Retention Periods Total
HB160	**Benefit Plan Analysis and Reporting** Records related to the analysis and reporting of benefit plan medical and drug utilization. Includes prescription reports, COBRA reports, and related analysis. **Examples Include:** COBRA Reports Prescription Utilization Reports **ACT (Activity) Event:** The date that the record was created.	2		4		6

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Pennsylvania Turnpike Commission

Human Resources -- Employment

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name Record Class Description	ACT (Activity) Event	Retention Periods OnSite	+ OffSite	= Total
HE100	**Compensation Planning** Records documenting the determination and monitoring of salary structures, incentive programs, job classification and placement, allowances, etc. Includes payscales, salary surveys and other salary administration evaluations. **Examples Include:** College Recruiting Starting Salary Guidelines Job Evaluation Documents Wage and Benefit Surveys	The date that the record was created.	5	0	5
HE120	**Employee Recruitment and Selection** **Drug and Alcohol Testing** Records related to drug and alcohol screenings required by all individuals applying for a position at the PTC. **Examples Include:** Chain of Custody Form Test Results	The end of the calendar year in which the record was created.	ACT+1	0	ACT+1
HE130	**Employee Recruitment and Selection** **Rejected** Records related to personnel requests, job applications testing, advertising, position descriptions, interviews, etc. Applicants include employees who apply for open positions. **Examples Include:** Applications Candidate Evaluations Help Wanted Ads Job Posting Personnel Requisitions Resumes	The date the record was created.	2	0	2

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Human Resources -- Employment

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name Record Class Description		Retention Periods OnSite	+	OffSite	=	Total
HE140	**Employee Recruitment and Selection Skills Assessment** Records related to the testing of an applicant's skillset. **Examples Include:** Test Results	**ACT (Activity) Event:** The date that the record was created.	3		0		3
HE150	**Employee Situations Non-Union** Records related to employees concerns, complaints, employee assistance programs, referrals and disciplinary records. See EO140 for Employee Investigations and HE230 for Labor Grievances. **Examples Include:** Disciplinary Records Manager Notes	**ACT (Activity) Event:** The date that the record was created.	3		2		5
HE160	**Immigration and Naturalization** Records and correspondence related to immigration and naturalization of employees transferring to and from Company facilities. Includes federal Form I-9 which certifies employee identity and eligibility as a US citizen. **Examples Include:** Form I-9	**ACT (Activity) Event:** The end of the calendar year in which the employee leaves employment.	ACT+3		0		ACT+3

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Pennsylvania Turnpike Commission

Human Resources -- Employment

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description		Retention Periods OnSite	+ OffSite	= Total
HE170	**Job Descriptions** Records related to job descriptions. **Examples Include:** Job Descriptions	**ACT (Activity) Event:** The date that the job description is superceded.	ACT+1	9	ACT+10
HE180	**Personnel Files** Records regarding employees beginning with their initial hire. Includes hiring promotion, performance appraisals transfers, etc. These records provide a history of employment. **Examples Include:** Address Changes Applications College Transcripts Continuing Education Records Employee Agreements Letter of Acceptance Performance Appraisals References Resumes	**ACT (Activity) Event:** The end of the calendar year in which the employee leaves employment.	IND	0	IND
HE200	**Organization Charts** Records showing the structure of the organization including the positions, titles and employee names. **Examples Include:** Organization Charts (Commission-wide) Organization Charts (Departmental)	**ACT (Activity) Event:** The date that the record was created.	SUP	0	SUP

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Pennsylvania Turnpike Commission

Human Resources -- Employment

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name Record Class Description	OnSite	+ OffSite	= Total
HE210	**Labor Relations** **Labor Unit Bargaining Relationship** Records applicable to the Bargaining Unit relationship. Includes seniority listings, bulletins, notes of meetings with locals, etc. **Examples Include:** Bulletins; Meeting Minutes; Seniority Listings **ACT (Activity) Event:** The date that the record was created.	IND	0	IND
HE220	**Labor Relations** **Labor Contracts and Agreements** Records related to agreements between the Commission and labor unions. Includes labor union contracts, contract negotiations and collective bargaining agreements. **Examples Include:** Collective Bargaining Agreements; Contract Negotiations; Labor Union Contracts **ACT (Activity) Event:** The date that the record was created.	IND	0	IND
HE230	**Labor Relations** **Labor Grievances - Human Resources (Step 2)** Records related to grievances filed by labor union employees against the PTC. These are grievances that can not be resolved within the originating department and as a result are escalated to Human Resources. Includes grievances, correspondence and supporting documents. See LR100 for labor grievances handled at the departmental level and LE110 for labor grievances handled by the legal department. **Examples Include:** Correspondence; Labor Grievances; Supporting Documents **ACT (Activity) Event:** The end of the calendar year in which the record was created.	3	7	10

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Pennsylvania Turnpike Commission

Human Resources -- Training

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name Record Class Description	OnSite	+	OffSite	=	Total
HT100	**Training and Development Programs** Records related to the development and operation of Commission-sponsored training programs and seminars. Includes seminars, education assistance, management and supervision development, job progression, drug and alcohol awareness. See EO130 for Sexual Harassment Training. **Examples Include:** Course Evaluation Summaries Course Manuals Course Schedules **ACT (Activity) Event:** The date the program is superceded or is no longer available to employees	ACT+3		0		ACT+3
HT110	**Training Attendance and Certification** Records which document the attendance at Commission and vendor-sponsored training programs and seminars. Includes attendance and completion records. Includes records related to certification for individuals to perform certain tasks. **Examples Include:** Course Sign-In Sheets Employee Training Requirements/Record **ACT (Activity) Event:** The date the program is superceded or is no longer offered to employees.	ACT+3		0		ACT+3

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Pennsylvania Turnpike Commission

Information Technology

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	OnSite	+ OffSite	= Total
IT100	**Application Documentation** Records used to document the development of new functionality and architecture for Commission computer systems and applications. Includes business analysis, functional/technical specifications, and quality assurance testing documents. See IT120 for Source Code. **Examples Include:** Data Models Object Models Process Models Programming Design Specifications Programming Standards Requirement Documents Scope Documents Technical Design Documents User Acceptance Results User Acceptance Test Plans User Requirements **ACT (Activity) Event:** The date the hardware or software is superceded or is no longer in use.	ACT+1	0	ACT+1
IT110	**Contracts and Agreements** **Software Licenses and Escrow Agreements** Records that document the licensing of software applications and systems hardware for use by the Commission. Includes software escrow agreements, licenses and correspondence. **Examples Include:** Escrow Agreements External Correspondence Internal Correspondence Licenses **ACT (Activity) Event:** The date the hardware or software is superceded or is no longer in use.	ACT+6	0	ACT+6

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Pennsylvania Turnpike Commission

Information Technology

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name / Record Class Description	OnSite	+	OffSite	=	Total
IT120	**Source Code** Source code for Commission-owned software that is either internally or externally developed, and which is used internally by employees. See IT100 for Application Documentation. **Examples Include:** Source Code **ACT (Activity) Event:** The date the hardware or software is superceded or is no longer in use.	ACT+1		0		ACT+1
IT130	**System Technical Administration** Information used to provide details and a history of the technical environment including hardware and operating software specifications and configuration details, vendor documentation, space layouts of the data center and other equipment locations. Also included are documents reflecting cabling connections, wiring diagrams, and data center environmental equipment such as electrical and air conditioning settings and configurations. **Examples Include:** and configuration Asset Tracking/Inventory cartridges, and print bands. Change Documentation components such as ribbons, toner Mainframe and LAN server hardware manuals manuals and configuration. number listings for replaceable Printer manuals and configurations, including part Vendor operating system and associated software **ACT (Activity) Event:** Retain two years from the date the hardware or software is superseded or no longer in use.	ACT+2		0		ACT+2

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Pennsylvania Turnpike Commission

Information Technology

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description		Retention Periods OnSite	+ OffSite	= Total
IT140	**Technical Support Requests** Documents that chronicle employee requests for technical support. These records identify the caller's concern or request for information and identify the Commission's response and resolution. **Examples Include:** Problem Tracking Documentation	**ACT (Activity) Event:** The date that the record was created.	3	0	3
IT150	**Year 2000 Compliance** Documentation illustrating the necessary and reasonable steps taken to make the Commission's business and systems processes Year 2000 compliant. Also includes records documenting and certifying compliance of vendor/partner systems. **Examples Include:** Change Documentation Compliance Certification Supplier Lists Systems Inventory Test Documentation Test Plans Test Results Y2K Disclosure Statements	**ACT (Activity) Event:** January 1, 2000	ACT+0	6	ACT+6

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Information Technology

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+ OffSite	= Total
IT160	**System Production Operations** Information describing the production processing performed including activity logs, problems, operational status, and jobs requested. Include all production mainframe and LAN server processing. **Examples Include:** Capacity and Availability Documents Data Center Access Logs Job Transmittals Performance Reports Problem Logs **ACT (Activity) Event:** The date the record was created.	ACT+2	0	ACT+2

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Pennsylvania Turnpike Commission

Internal Audit

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+ OffSite	= Total
IA100	**Operations Audits** Records related to various audits of systems and/or business processes within the PTC. See FN210 for Financial External Audits. **Examples Include:** Audit Workpapers; Audits **ACT (Activity) Event:** The date that the audit is finalized.	ACT+3	0	ACT+3
IA110	**Operations Audits** **Bank Reconciliation** Records related to the audit and reconciliation of the following Commission bank accounts: Payroll, Special Account #14, Maintenance Revolving Fund and Change Fund. See FN110 for other Banking Account Reconciliation. **Examples Include:** Bank Account Reconcilations **ACT (Activity) Event:** The date that the audit is finalized.	ACT+3	0	ACT+3
IA120	**Operations Audits** **Payroll and Cash Disbursement Audits** Records related to audit testing of payroll and cash disbursement function in preparation for external auditors. **Examples Include:** Cash Disbursement Tests; Payroll Tests **ACT (Activity) Event:** The date that the audit is finalized.	ACT+3	0	ACT+3

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Pennsylvania Turnpike Commission

Internal Audit

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description		Retention Periods OnSite	+	OffSite	=	Total
IA130	**Operations Audits** **Commission Agenda Review** Records related to the review of materials/items put on Commission meeting agendas. **Examples Include:** Minutes/Agenda Backup	**ACT (Activity) Event:** The date that the record was approved by the Commission.	ACT+1		0		ACT+1
IA140	**Operations Audits** **Concessionaire & Compliance Audits** Records related to annual audits of concessionaires to ensure compliance with contracts and leases. **Examples Include:** Closeout Letters Concessionaire Compliance Audits Summary Memos	**ACT (Activity) Event:** The date that the audit is finalized.	ACT+3		0		ACT+3
IA150	**Operations Audits** **External Consultants Audits** Records documenting internal audits performed on external contractors/consultants hired by the PTC to ensure compliance with provisions of contracts. **Examples Include:** Audit Results	**ACT (Activity) Event:** The date that the audit is finalized.	ACT+3		0		ACT+3

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Pennsylvania Turnpike Commission

Internal Audit

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	OnSite	+ OffSite	= Total
IA160	**Systems Audits** **Monthly Charge Card Billings** Records related to the reconciliation and audit of customer accounts. Includes audits ensuring compliance with contracts and account reconciliations. **Examples Include:** Audit Findings/Results **ACT (Activity) Event:** The date that the record was created.	3	0	3
IA170	**Systems Audits** **Toll Collections** Records related to daily audits of toll collections. Includes reconciliation of tickets, cash, and other transactions generated during a toll collector's shift. **Examples Include:** Daily Audits **ACT (Activity) Event:** The date that the record was created.	0Y6M	2Y6M	3
IA180	**Business Continuity** Documentation of plans which would be implemented in the event of a disaster or systems failure. Includes contact persons, backup sites and instructions for personnel. **Examples Include:** Disaster Recovery Plan; Y2K Contingency Plan **ACT (Activity) Event:** The date the business continuity plan is superceded or is no longer in effect.	ACT+0	10	ACT+10

Pennsylvania Turnpike Commission

Legal

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+ OffSite	= Total
ENG320	**Property Acquisitions/Right of Way** Records relating to the purchase of property and the granting of right of way (from individual property owners) necessary when the PTC is building new highways or adding to existing ones. Includes negotiations reports, purchase/sales agreements, settlement documents, deeds, calculations, relocation records, title work, appraisals and other supporting records. **Examples Include:** Calculations Condemnation Plans Deeds Final R/W Plans Horizontal and Vertical Control Reports Mapping Purchase/Sales Agreements Relocation Records Settlement Documents Survey Books Title Work Viewer's Plans **ACT (Activity) Event:** The date that the record was created.	IND	0	IND
HE220	**Labor Relations** **Labor Contracts and Agreements** Records related to agreements between the Commission and labor unions. Includes labor union contracts, contract negotiations and collective bargaining agreements. **Examples Include:** Collective Bargaining Agreements Contract Negotiations Labor Union Contracts **ACT (Activity) Event:** The date that the record was created.	IND	0	IND

Pennsylvania Turnpike Commission

Legal

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods				
		OnSite	+	OffSite	=	Total
LE100	**Litigation and Claims** Records related to threatened or asserted litigation or government investigation. Includes pleadings, discovery, attorney work products, legal opinions, transcripts and exhibits. Includes final judgments, settlements, court orders and other documents specifying final terms, conditions and decisions related to claims and litigation. **Examples Include:** Correspondence Court Orders Depositions Discovery Documents Judgments Pleadings Settlement Agreements **ACT (Activity) Event:** The date the litigation or claim closes and that litigation no longer seems imminent.	ACT+1		5		ACT+6
LE110	**Labor Relations** **Labor Grievances - Legal (Step 3)** Records related to grievances filed by labor union employees against the PTC. These are grievances that are handled by the legal department. Includes grievances, correspondence and supporting documents. See LR100 for labor grievances handled at the departmental level and HE230 for labor grievances handled by the HR department. **Examples Include:** Correspondence Labor Grievances Supporting Documents **ACT (Activity) Event:** The date that the record was created.	IND		0		IND

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Pennsylvania Turnpike Commission

Legal

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+ OffSite	= Total
LE115	**Labor Relations** **Labor Arbitration (Step 4)** Records containing details regarding unsettled labor controversies which are presented to an arbitrator. See LE110 for Labor Grievances. **Examples Include:** Correspondence **ACT (Activity) Event:** The date that the record was created.	IND	0	IND
LE120	**Copyrights, Patents and Trademarks** Records related to the preparation, filing, maintenance and rights of copyrights, trademarks and patents. **Examples Include:** Copyrights Patents Trademark Registration and Related Correspondence Trademark Search Reports Trademarks **ACT (Activity) Event:** The date the copyright, patent or trademark is superceded or no longer in effect.	ACT+1	5	ACT+6
LE130	**Legal Projects** Legal opinions and related workpapers. Includes employee matters, insurance consultation for contracts and agreements, etc. Excludes legal opinions documenting specific litigation. **Examples Include:** Employee Matter Files Insurance Consultation Files Legal Opinions Legal Work Papers **ACT (Activity) Event:** The date the project concludes.	ACT+10	0	ACT+10

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Maintenance

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	OnSite	+	OffSite	=	Total
LR100	**Labor Relations** **Labor Grievances - Departmental (Step 1)** Records related to complaints filed by labor union employees against the PTC. These grievances are resolved within the employee's department and are not escalated to the human resources or legal departments. Includes grievances, correspondence and supporting documents. See HE230 for labor grievances handled by the HR department and LE110 for labor grievances handled by the legal department. **Examples Include:** Correspondence Labor Grievances Supporting Documents **ACT (Activity) Event:** The date that the record was created.	3		2		5
MA100	**Equipment - Capital Purchasing** Records which track equipment purchased. These records are used to project future capital purchases of equipment and are not actual purchase orders. See PU100 for Purchasing Orders and Agreements. **Examples Include:** Capital Purchases Projection of Purchasing Equipment Purchase Specifications **ACT (Activity) Event:** The date that the record was created.	4		0		4
MA110	**Equipment/Vehicle Specifications** Records detailing the specification of vehicular and other equipment utilized by the Maintenance Department. **Examples Include:** Equipment Specifications **ACT (Activity) Event:** The date the equipment or vehicle is no longer in use.	ACT+0		6		ACT+6

Pennsylvania Turnpike Commission

Maintenance

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+	OffSite	=	Total
MA120	**Equipment/Vehicle Ownership** Ownership records of equipment and vehicles owned and operated by the Maintenance Department. Includes license information, titles and inspection records. **Examples Include:** Equipment License Information Inspection Records Titles **ACT (Activity) Event:** The date the equipment or vehicle is no longer in use.	ACT+0		6		ACT+6
MA130	**Equipment/Vehicle Inventory** Records which document vehicle inventory owned and operated by the PTC. Includes location information and inventory listings. **Examples Include:** Inventory Lists Location Information **ACT (Activity) Event:** The date that the record was created.	ACT+1		0		ACT+1
MA140	**Equipment/Vehicle Inspection** Records related to the inspection of new equipment and components. Includes Inspection Reports. **Examples Include:** New Equipment and Component Inspection Reports **ACT (Activity) Event:** The date the equipment or vehicle is no longer in use.	ACT+2		4		ACT+6

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Pennsylvania Turnpike Commission

Maintenance

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+ OffSite	= Total
MA150	**Equipment/Vehicle History** Record related to the maintenance history of vehicles owned and operated by the PTC. Includes historical information regarding repairs, transfers and other mileage information. **Examples Include:** Equipment Fuel Costs (PTC Form 63-15) Inspection Records Monthly Mileage and Operations Reports Operator Daily Logs/Equipment Checklists Preventative Maintenance Rentals Repairs (PTC 63-52, Equipment Repair and Labor Costs) Transfers **ACT (Activity) Event:** The date the equipment or vehicle is no longer in use.	ACT+1	5	ACT+6
MA160	**Automated Fuel Dispensing** Records that document how much diesel and gas was dispensed to vehicles at fuel locations. **Examples Include:** System Reporting **ACT (Activity) Event:** The date that the record was created.	2	0	2
MA165	**Corporate Item Maintenance Form** Records used when requesting a corporate item identification number for a new inventoried item or change to an existing corporate number. **Examples Include:** Corporate Item Maintenance Form **ACT (Activity) Event:**	IND	0	IND

Pennsylvania Turnpike Commission

Maintenance

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description		Retention Periods: OnSite	+ OffSite	= Total
MA170	**Fuel Credit Cards** Records related to the administration and use of fuel credit cards. Includes records that track who has credit cards. **Examples Include:** Credit Card Maintenance Credit Cards	**ACT (Activity) Event:** The date that the record was created.	2	0	2
MA180	**Maintenance Manuals and Policy Letters** Manuals and policy letters providing guidance and procedures pertaining to the use and maintenance of vehicles by employees. **Examples Include:** Fleet Operations Manual PTC Vehicle Policy Letter Written Driver's Manual	**ACT (Activity) Event:** The date that the manual is superceded or no longer in use.	ACT+0	10	ACT+10
MA185	**Request for Disposal** Records used when any material or equipment inventoried or non-inventoried is identified for disposal. **Examples Include:** Request for Disposal Form	**ACT (Activity) Event:** The date of disposal.	ACT+7	0	ACT+7

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Pennsylvania Turnpike Commission

Maintenance

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name / Record Class Description		Retention Periods OnSite	+	OffSite	=	Total
MA190	**Equipment Incident Reports** Records related to the reporting and documentation of equipment vandalism, accidents or other incidents. **Examples Include:** Accident Reports Vandalism Reports	**ACT (Activity) Event:** The date that the record was created.	3		0		3
MA200	**Inventory and Disposition Reporting - Tools** Records related to the tracking of tool inventory. Includes records of when the tools were disposed. **Examples Include:** Inventory and Disposition Reports	**ACT (Activity) Event:** The date that the tools are disposed of.	ACT+1		0		ACT+1
MA210	**Equipment Certification and Licensing** Records related to the certification and licensing of maintenance personnel to operate equipment. **Examples Include:** Testing Records Training Records	**ACT (Activity) Event:** The date the employee leaves employment.	ACT+0		3		ACT+3
MA220	**Driver's License Checks** Records related to license checks on maintenance employees who will be operating PTC vehicles. **Examples Include:** Driver's License Checks	**ACT (Activity) Event:** The date that employment terminates.	ACT+1		2		ACT+3

Pennsylvania Turnpike Commission

Maintenance

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name / Record Class Description		Retention Periods OnSite	+ OffSite	= Total
MA230	**Annual Maintenance Work Plan** Records documenting annual maintenance work plans for ongoing maintenance to highways and facilities. **Examples Include:** Yearly Maintenance Plan	**ACT (Activity) Event:** The end of the fiscal year in which the work was created.	ACT+6	0	ACT+6
MA240	**Work Schedules** Records tracking the work schedules of maintenance personnel for work performed on emergency response, winter patrol and tunnel operations. **Examples Include:** Emergency Response Personnel Work Schedules Tunnel Operation Work Schedule Winter Patrol Work Schedule	**ACT (Activity) Event:** The date that the record was created.	3	0	3
MA250	**Work Order Requests** Records that document what type of maintenance work was performed on roadways, bridges, service plazas, interchanges, etc. Identifies who performed the work and when it was completed. **Examples Include:** Supporting Documentation Work Orders	**ACT (Activity) Event:** The date that the work is completed.	ACT+0	6	ACT+6

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Pennsylvania Turnpike Commission

Maintenance

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite +	OffSite =	Total
MA260	**Roadway Maintenance** Records summarizing maintenance of Turnpike roadways including landscaping, line painting, snow removal, vegetation control and cracked ceiling. **Examples Include:** Delaware River Bridge Maintenance Reports Landscaping Reports Lime Painting Reports Night Lighting Overtime Reports Spill Reports Winter Storm Reports Work Project Reports **ACT (Activity) Event:** The date that the work is completed.	ACT+0	6	ACT+6
MA270	**Tunnel Operating Reporting** Records related to the operations of tunnels on PTC roadways. Includes checking in/out logs. **Examples Include:** Checking In/Out Logs **ACT (Activity) Event:** The date that the record was created.	3	0	3
MA280	**Access and Security** Records granting access to personnel and other individuals to PTC facilities and roadways. Includes access and control reports, requests for keys, visitor logs, and ID badge lists. **Examples Include:** Access and Control Reports ID Badge Lists Request for Keys Visitor Logs **ACT (Activity) Event:** The date that the record was created.	3	0	3

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Pennsylvania Turnpike Commission

Maintenance

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+	 OffSite	=	 Total
RM130	**Insurance Claims** **Property Damage Claims** Records related to claims filed for physical damage, loss of property, or loss of the property's income producing abilities. See RM120 for General Liability Claims and RM140 for Worker's Compensation Claims. **Examples Include:** Accident Review Board Documentation Disciplinary Board Documentation Police Reports Property Damage Claims Safety Advisor Reports **ACT (Activity) Event:** The date that the record was created.	3		3		6

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Pennsylvania Turnpike Commission

Marketing and Customer Service

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name / Record Class Description	Retention Periods OnSite	+	Retention Periods OffSite	=	Retention Periods Total
MK100	**Advertising** Original artwork created by the Commission or external agencies in the development of an advertising or marketing campaigns. Includes photographs, layouts, displays and drawings. **Examples Include:** Artwork, Correspondence, Drawings, Layouts, Photographs, Vendor Information **ACT (Activity) Event:** The date that the record was created.	3		3		6
MK110	**Customer Relations** Records related to customer issues, business dealings and the actions taken by the PTC. Includes customer correspondence. **Examples Include:** Complaint Letters, Compliment Letters, Customer Correspondence, Requests for Information, Responses **ACT (Activity) Event:** The date that the customer relationship terminates.	ACT+6		0		ACT+6
MK120	**Business Development** Records related to marketing development activities used to obtain new business for Service Plazas. Includes marketing plans and promotional materials. **Examples Include:** Product Marketing Plans, Promotional Materials **ACT (Activity) Event:** The date that the material is no longer useful.	ACT+3		0		ACT+3

Pennsylvania Turnpike Commission

Marketing and Customer Service

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+ OffSite	= Total
MK130	**Marketing Research and Analysis** Records related to the development, administration and analysis of market research. Includes research reports, and competitive information. **Examples Include:** Competitive Information; Research Reports **ACT (Activity) Event:** The date that these records are no longer useful.	ACT+3	0	ACT+3
MK140	**Internal Employee Communications** Copies of employee announcements and other communications, policies, in-house magazines, special events and civic activities. Includes records related to informative communications to employees such as newsletters and intranet site information. **Examples Include:** Company Newsletter; Corporate Intranet **ACT (Activity) Event:** The date that the record was created.	3	0	3
MK150	**Legislative Issues** Records related to the PTC's involvement in legislative issues or the passing of bills. Includes responses from the PTC on how certain issues were handled. **Examples Include:** Legislative Bills; Responses **ACT (Activity) Event:** The date that the record was created.	5	0	5

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Pennsylvania Turnpike Commission

Marketing and Customer Service

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name Record Class Description	OnSite	+	OffSite	=	Total
MK160	**Public Information** **Public Relations**	3		0		3
MK170	**Public Information** **Industry Relations**	ACT+0		0		ACT+0

MK160 Public Information – Public Relations

Records related to service and product information that is released to the public. Includes records related to marketing and promoting the Commission's image, and activities such as press releases, web site information and photographs.

Examples Include:

Interviews
New Clips
Newspapers
Press Releases
Web Site Information

ACT (Activity) Event:

The date that the record was created.

MK170 Public Information – Industry Relations

Records documenting the Commission's relations and interactions with other companies or industries. Includes communication and correspondence with other companies/industries. Includes records documenting PTC participation in industry and professional organizations. Includes cooperative development of industry-wide standards.

Examples Include:

Correspondence (Industry)
Industry Relations

ACT (Activity) Event:

The date that these records are no longer useful.

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Pennsylvania Turnpike Commission

Marketing and Customer Service

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name / Record Class Description	Retention Periods OnSite	+	OffSite	=	Total
MK180	**Public Information** **Community Relations** Records documenting the Commission's relationship with the communities in which it operates. Includes communication and correspondence with communities. Includes records about charitable contributions, civic organizations and community events. **Examples Include:** Community Relations Records Correspondence (Communities) **ACT (Activity) Event:** The date that the record was created.	3		0		3

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Pennsylvania Turnpike Commission

Office of Equal Opportunity Development

Records Retention Schedule
With Retention Periods

RecordClass	Record Class Name	Retention Periods				
Code	Record Class Description	OnSite	+	OffSite	=	Total
EO100	**ADA Requests** Records of employees with disabilities who request special accommodations to better perform their job. Includes letters from physicians and other supporting documentation. See HE110 for Employee Medical Records. **Examples Include:** ADA Requests Physician Letters Supporting Documents **ACT (Activity) Event:** The date that employment is terminated.	ACT+0		5		ACT+5
EO110	**Certified Payrolls** Records ensuring labor compliance as governed by the Bureau of Labor Law. Bureau reviews payrolls to ensure fair pay/wages and benefits are in accordance with union contracts. **Examples Include:** Certified Payrolls Prevailing Wage Reports **ACT (Activity) Event:** For federally funded projects, the date that the project is completed.	ACT+7		0		ACT+7
EO120	**Equal Opportunity Reporting** Records documenting the PTC's compliance with its equal employment policies. Includes reports which the company is required to file with the Equal Employment Opportunity Commission identifying the composition of the workforce. **Examples Include:** EEO-4 Reports Supporting Documents **ACT (Activity) Event:** The date that the record was created.	2		1		3

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Pennsylvania Turnpike Commission

Office of Equal Opportunity Development

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name Record Class Description		Retention Periods OnSite	+ OffSite	= Total
EO130	**Sexual Harassment Training** Records related to employee sexual harassment training. Includes training and presentation materials. See HT100 for Training and Development Programs. **Examples Include:** Training Materials Training Presentations	**ACT (Activity) Event:** The date the program is superceded or is no longer available to employees	ACT+0	3	ACT+3
EO140	**Employee Investigations** Records that document the investigations resulting from employee discrimination, sexual harassment and other employment matters. See HE150 for Employee Situations - Non-union. **Examples Include:** Claims Investigation Files Suspension Records	**ACT (Activity) Event:** The date that the record was created.	3	2	5

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Pennsylvania Turnpike Commission

Operations Center

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description		Retention Periods OnSite	+	OffSite	=	Total
OPS100	**Daily Incident Records** Records related to highway accidents. Includes daily incident reports, call box reports, and weather information. **Examples Include:** Call Box Reports Daily Incident Reports Trip Records Weather Information	**ACT (Activity) Event:** The date that the record was created.	7		0		7
OPS110	**Audio Recordings** Tapes of telephone conversations between the dispatcher and state police detailing all daily occurrences. **Examples Include:** Tapes	**ACT (Activity) Event:** Retain three years from the date that the record was created.	ACT+3		0		ACT+3
OPS120	**Operating Procedures** Records documenting various operating plans and procedures. Includes radio and computer operating procedures. See TR120 for Commission Policies and Procedures. **Examples Include:** Emergency Management Process Plan X Radio Operations Strike Plan	**ACT (Activity) Event:** The date that the record was created.	IND		0		IND

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Pennsylvania Turnpike Commission

Operations Center

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name / Record Class Description	OnSite	+	OffSite	=	Total
OPS130	**NCIC CAD Certifications** Records related to individual licenses to operate the National Crime Index Computer (NCIC) CAD system. **Examples Include:** Certifications **ACT (Activity) Event:** The date that the record was created.	IND		0		IND
OPS140	**Transportation Agency Meetings** Records of the meetings and correspondence with external agencies, including I-95 Corridor Coalition and NTSB (National Transportation Safety Board). **Examples Include:** Correspondence Meeting Minutes **ACT (Activity) Event:** The date that the records are no longer useful.	ACT+1		2		ACT+3
OPS150	**Radio Operator Call Out Forms** Checksheets used for internal, operational purposes to track overtime completed by union radio operators. Maintained for operational and safety purposes. See PY140 for Time and Attendance. **Examples Include:** Call Out Forms **ACT (Activity) Event:** The date that the record was created.	3		0		3

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Pennsylvania Turnpike Commission

Operations Center

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name / Record Class Description	OnSite	OffSite	Total
OPS160	**PSP White Sheets** Records that furnish information to Pennsylvania State Police and Pennsylvania Turnpike Commission personnel regarding incidents of special interest. **Examples Include:** White Sheets **ACT (Activity) Event:** The date that the record was created.	3	0	3
OPS170	**Operations Reporting** Records that summarize daily activities performed by the operations center. Includes daily reports and PEMA (Pennsylvania Emergency Management Agency) reports. **Examples Include:** Daily Reports; PEMA Reports **ACT (Activity) Event:** The date that the record was created.	1	0	1

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Pennsylvania Turnpike Commission

Payroll

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name / Record Class Description	Retention Periods OnSite	+ OffSite	= Total
PY100	**Payroll Accounting** Administrative and accounting records related to the payment of salaries and wages, including deductions for benefits, taxes, etc. Includes salary, taxes, adjustments, benefits, contributions, and other adjustments to payroll checks. **Examples Include:** Payroll Deductions; Payroll Registers; Payroll Reports; Wage Tax **ACT (Activity) Event:** Retain two years from the end of the calendar year in which the record was created.	ACT+2	2	ACT+4
PY110	**Federal and State Tax Withholding** Records supporting the wages and taxes paid, withheld and reported. Includes employee W-2 forms. **Examples Include:** W-2 Forms **ACT (Activity) Event:** Retain four years from the end of the calendar year in which the record was created.	ACT+4	0	ACT+4
PY120	**Labor Cost and Distribution** Records that are used to analyze and report the cost of labor for projects and non-projects. Includes reports that summarize labor costs. **Examples Include:** Labor Distribution Analysis; Labor Distribution Reports **ACT (Activity) Event:** Retain four years from the end of the calendar year in which the record was created.	ACT+4	0	ACT+4

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Pennsylvania Turnpike Commission

Payroll

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods				
		OnSite	+	OffSite	=	Total
PY130	**Payroll Management Reports** Records that are related to the review and management of the payroll function. Includes reports that summarize payroll deductions and distributions. **Examples Include:** Account Distribution Death Benefits Reports Retirement Reports Savings Bond Reports SECA Reports Union Dues Reports **ACT (Activity) Event:** The end of the calendar year in which the record was created.	ACT+3		0		ACT+3
PY140	**Time and Attendance** Records related to the identification and reporting of hours worked. Includes all time cards and time sheets submitted to payroll in order to record hours worked for a particular period. **Examples Include:** Weekly Time Sheets **ACT (Activity) Event:** For federally funded projects, the date that the project is completed. For all other records, the end of the calendar year in which the record was created.	ACT+5		0		ACT+5
PY150	**Garnishment Accounting** Records that document garnishments and levies from employee wages as required by court order. Includes legal orders and payroll accounting. **Examples Include:** Garnishment Check Copies Legal Orders **ACT (Activity) Event:** Retain four years from the date that the record was created.	ACT+4		0		ACT+4

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Property Management

Records Retention Schedule
With Retention Periods

RecordClass	Record Class Name	Retention Periods		
Code	Record Class Description	OnSite +	OffSite =	Total
PM100	**Property Management** **Owned Property** Records related to the legal proof of property owned and operated by the PTC. Includes ownership records, tenant leases, property mortgage information, title insurance policy information, and correspondence. **Examples Include:** Correspondence Property Mortgage Information Purchase and Sales Agreement Tenant Leases Title Insurance Policy Information **ACT (Activity) Event:** The date that the record was created.	IND	0	IND
PM110	**Property Inspections** Records related to the inspection of Commission-owned buildings. Includes inspection reports and supporting records. **Examples Include:** Inspection Reports Supporting Records **ACT (Activity) Event:** The date that the record was created.	3	0	3
TR190	**Contracts and Agreements** **Leased Property** Records documenting the terms and conditions of property leased by the PTC. Includes leases and lease-related correspondence. **Examples Include:** Landlord Correspondence Lease Agreements Lease Amendments **ACT (Activity) Event:** The date the lease terminates.	ACT+1	5	ACT+6

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Pennsylvania Turnpike Commission

Purchasing

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+ OffSite	= Total
AC170	**Capital Assets** Records used to document the purchasing activity of items that are capitalized, the purchase and sales of property and equipment and their depreciation, improvements, etc. Includes records related to the acquisition, transfer, retirement, disposal or loss of fixed assets that have been capitalized. Also included are reports that summarize this information. See schedule record series number 009 for Capital Assets - Federally Funded. **Examples Include:** Auction Records Capital Asset Reports Contract Estimates for Payments Depreciation Reports Fixed Asset Schedules Request for Disposal (Signed) Sale of Surplus Property Records **ACT (Activity) Event:** For federally funded projects, keep record in agency one year from the date the project is completed. For all other records, keep from the end of the fiscal year in which the record was created.	ACT+1	3	ACT+4
PU100	**Purchasing and Requisition** **Purchase Orders and Purchase Agreements** Records of actual purchasing contracts with vendors. Includes purchase orders, requisitions and bids/proposals for low dollar volume materials ($.01 - 2,999). **Examples Include:** Bids/Proposals ($.01 - 2,999) Change Orders General Services/Dept of Transportation Contracts Material Requests Purchase Orders Vendor Documentation **ACT (Activity) Event:** The date that the purchasing contract concludes.	ACT+4	3	ACT+7

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Pennsylvania Turnpike Commission

Purchasing

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+ OffSite	= Total
PU110	**Purchasing and Requisition Sealed Bids** **Sealed Bids** Records related to actual purchases or commitments to purchase and authorizations for expenses. Includes request for bids, bid review, and receiving of materials, etc. for high dollar volume purchases (over $3,000). **Examples Include:** Correspondence Sealed Bids (Over $3,000) **ACT (Activity) Event:** The date that the purchasing contract concludes.	ACT+4	3	ACT+7
PU120	**Cancelled Material Requests** Records related to the canceling of material ordered or purchased. **Examples Include:** Cancelled Material Requests **ACT (Activity) Event:** The date that the record was created.	1	0	1
PU130	**Bidder Mailing List Application** Records related to the application to bid on a particular service or product offering. **Examples Include:** Bidder Mailing List Applications **ACT (Activity) Event:** The date that the record was created.	0Y1M	0	0Y1M

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Pennsylvania Turnpike Commission

Purchasing

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+ OffSite	= Total
PU140	**Vendor Performance Evaluations** Records related to the assessment of vendors/suppliers which determine future contracting. **Examples Include:** Vendor Performance Evaluations **ACT (Activity) Event:** The date that the record was created.	3	0	3

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Pennsylvania Turnpike Commission

Risk Management

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name / Record Class Description		Retention Periods OnSite	+	OffSite	=	Total
RM100	**Insurance Analysis and Reporting** Records used to analyze and summarize corporate insurance programs. **Examples Include:** Insurance Reports	**ACT (Activity) Event:** The date that the record was created.	5		0		5
RM110	**Insurance Certificates** Records related to legal proof of insurance coverage. Includes certificates provided to the PTC by vendors and insurance certificates for the PTC. **Examples Include:** Insurance Certificates	**ACT (Activity) Event:** The date that the insurance coverage terminates.	ACT+1		5		ACT+6
RM120	**Insurance Claims** **General Liability Claims** Records related to general liability claims filed against the PTC. See RM130 for Property Damage Claims and RM140 for Worker's Compensation Claims. **Examples Include:** General Liability Claims Incident Reports Statistical Reports	**ACT (Activity) Event:** The date that the record was created.	3		3		6

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Pennsylvania Turnpike Commission

Risk Management

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+ OffSite	= Total
RM130	**Insurance Claims** **Property Damage Claims** Records related to claims filed for physical damage, loss of property, or loss of the property's income producing abilities. See RM120 for General Liability Claims and RM140 for Worker's Compensation Claims. **Examples Include:** Accident Review Board Documentation Disciplinary Board Documentation Police Reports Property Damage Claims Safety Advisor Reports **ACT (Activity) Event:** The date that the record was created.	3	3	6
RM140	**Insurance Claims** **Workers' Compensation Claims** Records related to worker's compensation claims filed for on-the-job accidents. See schedule record series number 166 for General Liability Claims and schedule record series number 167 for Property Damage Claims. **Examples Include:** Worker's Compensation Claims **ACT (Activity) Event:** Retain three years from the date the claim is closed.	ACT+3	7	ACT+10

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Pennsylvania Turnpike Commission

Risk Management

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	OnSite	+ OffSite	= Total
RM150	**Insurance Policies** Records describing and administering corporate insurance programs that provide coverage affecting Commission liability. Includes policies, amendments, riders, proofs of payment, etc. Includes policies for crime, D&O, DIC, EEOC, general liability, property insurance, worker's compensation, automobile, business travel, umbrella and excess, environmental, errors & omission, pollution liability, fiduciary, non-owned air travel, safe deposit legal liability and wrap-up insurance. Excludes employee medical and life insurance. **Examples Include:** Corporate Insurance Policies Wrap-Up Insurance Program Records **ACT (Activity) Event:** The date that the policy is superceded or is no longer in effect.	ACT+1	5	ACT+6
RM160	**Insurance Policies** **Surety Bonds** Records of bonds posted to indemnify against the failure to perform specified terms and conditions. **Examples Include:** **ACT (Activity) Event:** The date that the bond is superceded or is no longer in effect.	ACT+1	5	ACT+6
RM170	**Accident Review and Discipline Advisory Board Meetings** Records documenting issues and decision making of the Accident Review Board and Discipline Advisory Board meetings. Includes meeting minutes, agendas and other related information. **Examples Include:** Agendas Meeting Minutes **ACT (Activity) Event:** The date that the record was created.	3	0	3

Pennsylvania Turnpike Commission

Risk Management

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+	Retention Periods OffSite	=	Retention Periods Total
RM180	**PSP Accident/Assignment Reports** Records summarizing Pennsylvania State Police reportable and non-reportable accidents and injuries. These reports are utilized for property damage and general liability claims, employee accidents, customer injuries and statistical reporting. **Examples Include:** PSP Accident/Assignment Reports Statistical Reports **ACT (Activity) Event:** The date that the record was created.	3		0		3

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Pennsylvania Turnpike Commission

Secretary Treasurer's Office

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name	Retention Periods		
	Record Class Description	OnSite +	OffSite =	Total
TR100	**Business Organization** Records documenting the creation, structure, and governance of the Commission. Includes by-laws, charters and related records. **Examples Include:** By-Laws Commission Charters **ACT (Activity) Event:** The date that the record was created.	IND	0	IND
TR110	**Commission Meetings** Records documenting proceedings of board, committee of board, shareholder, and other legally required meetings. Includes meeting minutes, meeting notices, voting records, proxies, etc. See DEP110 for departmental meeting minutes. **Examples Include:** Agendas and Meeting Notices Commission Approvals Commissioner Meeting Minutes and Decisions Meeting Notes **ACT (Activity) Event:** The date that the record was created.	6	IND	IND
TR120	**Commission Policies and Procedures** Records documenting Commission-wide directives and mandated polices and procedures. **Examples Include:** Ethics Books Policy Letters/Booklets **ACT (Activity) Event:** The date the policy or procedure is superceded.	ACT+0	10	ACT+10

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Pennsylvania Turnpike Commission

Secretary Treasurer's Office

Records Retention Schedule
With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods		
		OnSite +	OffSite =	Total
TR130	**Company Archives** Records documenting the Commission's past, its development, significant events, and key players. **Examples Include:** Appointments of Council Commissioner Files Historical Financial Records Original Plans and Drawings Trust Indentures **ACT (Activity) Event:** The date that the record was created.	IND	0	IND
TR140	**Debt Issuance** Records related to the issuance of revenue bonds that back construction by the Commission. **Examples Include:** Arbitrage Reports Bond Documents State and Local Government Investments Swap Payment Documentation **ACT (Activity) Event:** Retain three years or as long as bonds are outstanding, whichever is longer.	ACT+3	0	ACT+3
TR150	**Contracts and Agreements** Records related to obligations under contracts, leases, and other agreements between the Commission and outside parties. Includes contracts for services, purchases and sales, transportation, leases, property and construction, and exchange of property. **Examples Include:** Amendments Contracts Negotiations **ACT (Activity) Event:** The date that the final payment letter is received.	ACT+0	6	ACT+6

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Pennsylvania Turnpike Commission

Secretary Treasurer's Office

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name Record Class Description	Retention Periods OnSite	+	OffSite	=	Total
TR160	**Contracts and Agreements** **Warranties** Records related to warranties on various equipment at PTC facilities. **Examples Include:** Insurance Bonds Warranties **ACT (Activity) Event:** The date the warranty terminates.	ACT+1		5		ACT+6
TR170	**Contracts and Agreements** **Service Plaza Agreements (Concession Management)** Records related to agreements between the PTC and various concessions who lease space from service areas on the Turnpike. Includes lease agreements, amendments and related correspondence. **Examples Include:** Correspondence Lease Agreements Lease Amendments **ACT (Activity) Event:** The date the contract terminates.	ACT+1		5		ACT+6
TR180	**Contracts and Agreements** **Equipment and Application Support Agreements** Records supporting internal and external agreements to support the hardware and software used by the Commission. **Examples Include:** Hardware Lease Agreements Hardware Maintenance Agreements Software Agreements **ACT (Activity) Event:** The date the contract terminates.	ACT+1		5		ACT+6

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Pennsylvania Turnpike Commission

Secretary Treasurer's Office

Records Retention Schedule With Retention Periods

RecordClass Code	Record Class Name Record Class Description	OnSite	+	OffSite	=	Total
TR190	**Contracts and Agreements** **Leased Property** Records documenting the terms and conditions of property leased by the PTC. Includes leases and lease-related correspondence. **Examples Include:** Landlord Correspondence Lease Agreements Lease Amendments **ACT (Activity) Event:** The date the lease terminates.	ACT+1		5		ACT+6
TR200	**Strategic and Business Planning** Records that document the strategic and business plans of the PTC. **Examples Include:** Strategic Plans **ACT (Activity) Event:** The date that the record was created.	MAX3		0		MAX3

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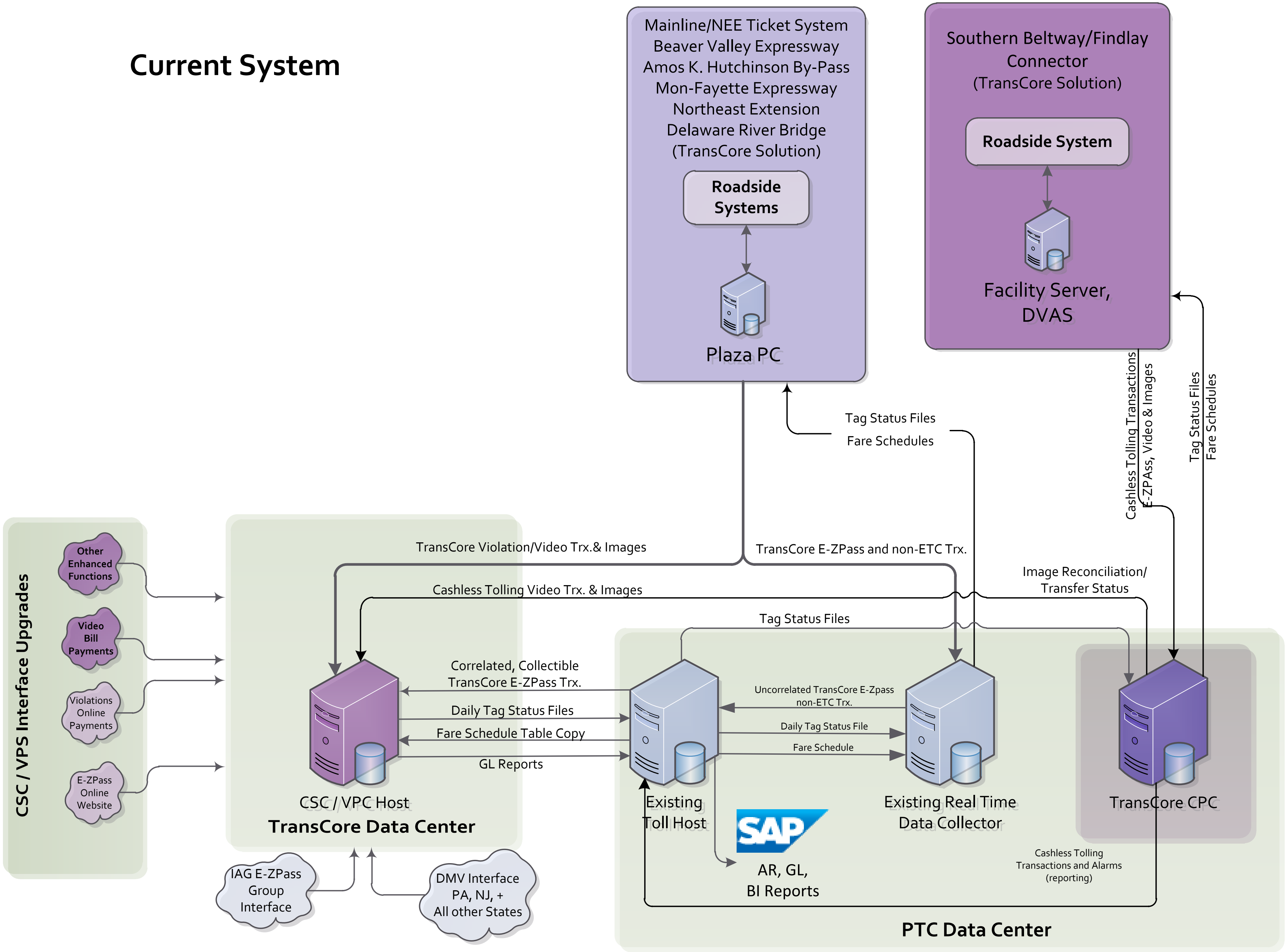
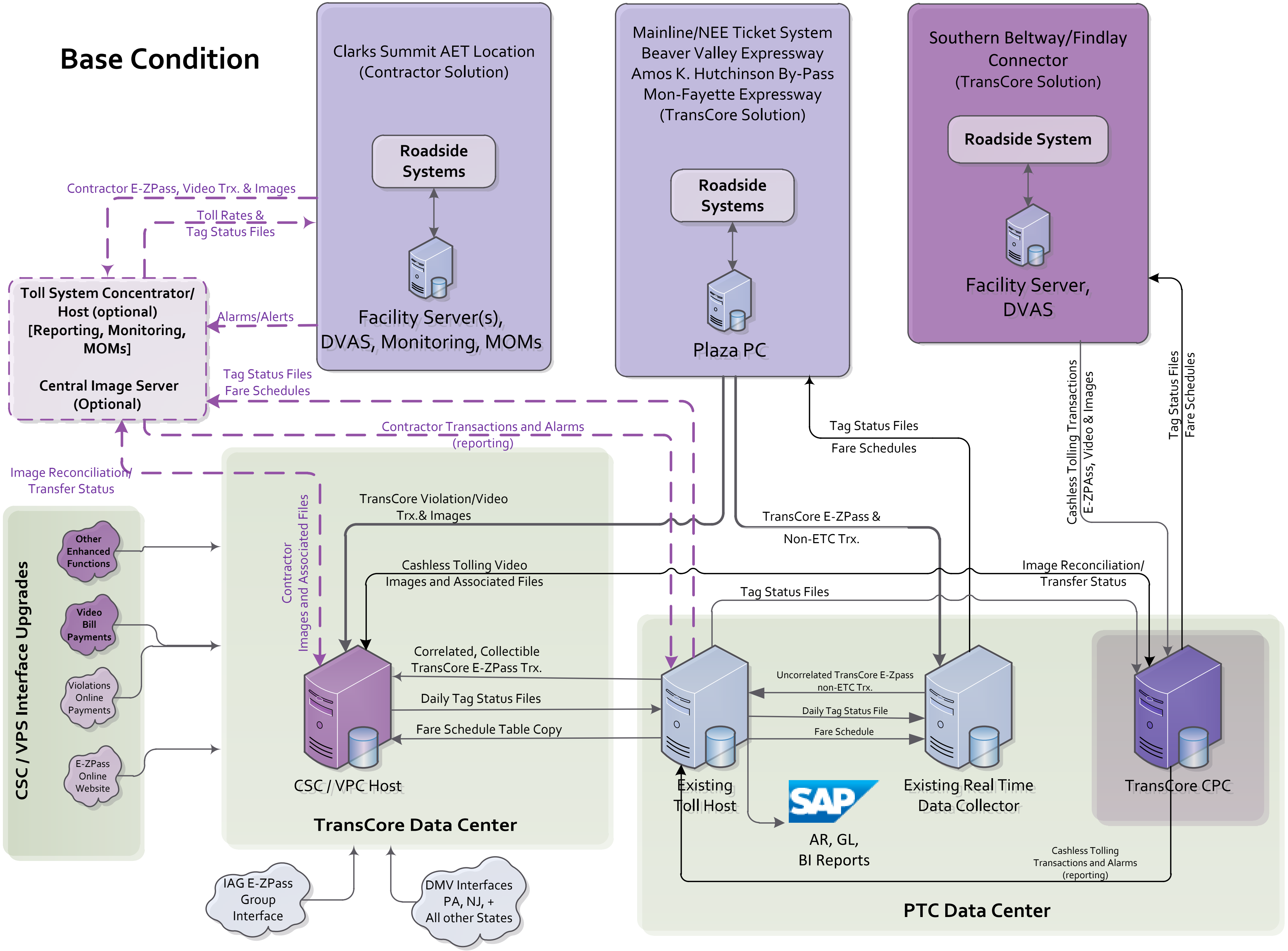
Attachment 9

Cashless Tolling Concept Plan

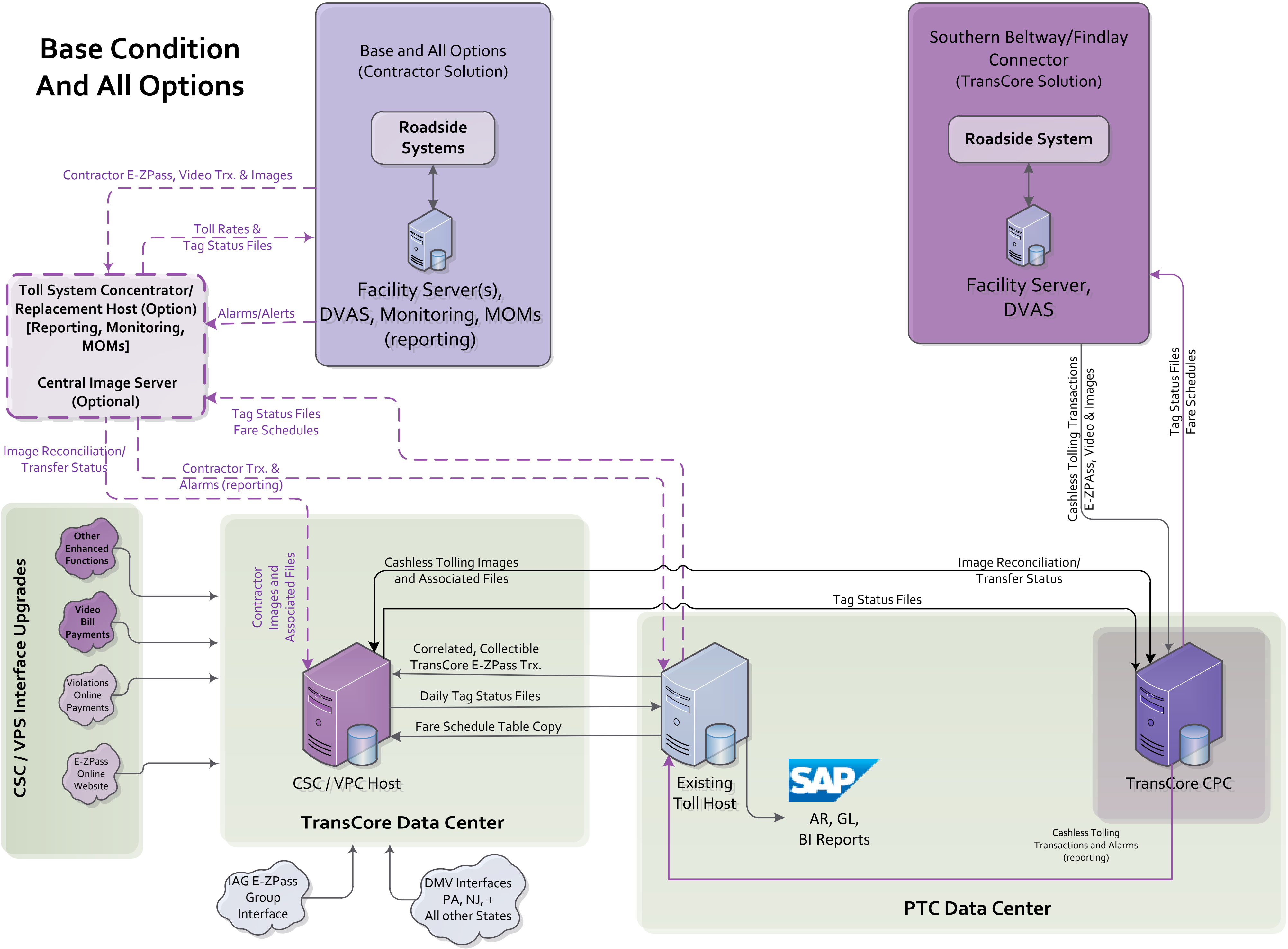
Current System



Base Condition


Clarks Summit AET Location
(Contractor Solution)
Roadside Systems
Facility Server(s), DVAS, Monitoring, MOMs
Mainline/NEE Ticket System
Beaver Valley Expressway
Amos K. Hutchinson By-Pass
Mon-Fayette Expressway
(TransCore Solution)
Roadside Systems
Plaza PC
Southern Beltway/Findlay Connector
(TransCore Solution)
Roadside System
Facility Server, DVAS
Contractor E-ZPass, Video Trx. & Images
Toll Rates & Tag Status Files
Toll System Concentrator/ Host (optional)
[Reporting, Monitoring, MOMs]
Central Image Server (Optional)
Alarms/Alerts
Tag Status Files
Fare Schedules
Contractor Transactions and Alarms (reporting)
Image Reconciliation/ Transfer Status
Contractor Images and Associated Files
TransCore Violation/Video Trx.& Images
TransCore E-ZPass & Non-ETC Trx.
Tag Status Files
Fare Schedules
Cashless Tolling Transactions E-ZPAss, Video & Images
Tag Status Files Fare Schedules
Cashless Tolling Video Images and Associated Files
Image Reconciliation/ Transfer Status
Tag Status Files
CSC / VPS Interface Upgrades
Other Enhanced Functions
Video Bill Payments
Violations Online Payments
E-ZPass Online Website
Correlated, Collectible TransCore E-ZPass Trx.
Daily Tag Status Files
Fare Schedule Table Copy
Uncorrelated TransCore E-Zpass non-ETC Trx.
Daily Tag Status File
Fare Schedule
CSC / VPC Host
Existing Toll Host
Existing Real Time Data Collector
TransCore CPC
SAP
AR, GL, BI Reports
Cashless Tolling Transactions and Alarms (reporting)
TransCore Data Center
PTC Data Center
IAG E-ZPass Group Interface
DMV Interfaces PA, NJ, + All other States

Base Condition And All Options


Base and All Options
(Contractor Solution)
Roadside Systems
Facility Server(s), DVAS, Monitoring, MOMs (reporting)
Southern Beltway/Findlay Connector
(TransCore Solution)
Roadside System
Facility Server, DVAS
Contractor E-ZPass, Video Trx. & Images
Toll Rates & Tag Status Files
Toll System Concentrator/ Replacement Host (Option) [Reporting, Monitoring, MOMs]
Central Image Server (Optional)
Alarms/Alerts
Tag Status Files
Fare Schedules
Image Reconciliation/ Transfer Status
Contractor Trx. & Alarms (reporting)
Cashless Tolling Transactions
E-ZPAss, Video & Images
Tag Status Files
Fare Schedules
CSC / VPS Interface Upgrades
Other Enhanced Functions
Video Bill Payments
Violations Online Payments
E-ZPass Online Website
Contractor Images and Associated Files
Cashless Tolling Images and Associated Files
Image Reconciliation/ Transfer Status
Tag Status Files
Correlated, Collectible TransCore E-ZPass Trx.
Daily Tag Status Files
Fare Schedule Table Copy
CSC / VPC Host
TransCore Data Center
Existing Toll Host
SAP
AR, GL, BI Reports
TransCore CPC
Cashless Tolling Transactions and Alarms (reporting)
PTC Data Center
IAG E-ZPass Group Interface
DMV Interfaces PA, NJ, + All other States

Attachment 10

Maintenance Responsibility Matrix

Maintenance Responsibilities Matrix

A =	Primary Responsibility - The identified party has the primary responsibility for completion of the item.[1]
B =	Support / Coordination -The identified party provides either support or coordination to assist the primary responsible party with successful completion of the item.[1]
C =	No Responsibility - The identified party has no action for the item.

1= Monitoring
2 = Preventive Maintenance
3 = Corrective Maintenance
4 = Emergency Maintenance
5 = Upgrades and Enhancements

Element / Task / Component Description		**Toll System "Contractor"**					**PTC**					**Comments and Other Responsibilities / Information**
		1	2	3	4	5	1	2	3	4	5	
Cashless Toll Concentrator/Host (if provided)												**Includes the Toll Concentrator Servers, MOMs, SFTP/FTP File Servers, Domain Servers, Terminal Servers and SAN.**
	Operating System Maintenance	A	A	A	A	A	B	C	C	C	B	Work includes updating and patching the Concentrator Operating System including new and security releases and ensure the most up to date software is installed and properly configured.
	Database Software Maintenance	A	A	A	A	A	B	C	C	C	B	Work includes installing and updating the most recent releases for the Concentrator Database(s).
	Data Administration and Management	A	A	A	A	A	B	B	B	B	B	Work includes the ongoing administration and management of Concentrator data including backup, archiving, deletion, & restoration of data. Also responsible for the administration of data storage for databases, file systems, and images.
	Cashless Toll Concentrator Hardware Maintenance	A	A	A	A	A	B	C	B	B	B	Work includes the replacement and upgrading of Concentrator server hardware and components to ensure proper operating conditions of the primary and secondary Concentrators.
	Cashless Toll Concentrator Network - WAN	B	C	C	C	B	A	A	A	A	A	Work includes the maintenance of the WAN and related devices such as switches and routers to ensure proper operating conditions. This will include any hardware, software, and configuration associated with such devices installed prior to the PTC firewall.
	Cashless Toll Concentrator Network - LAN	A	A	A	A	A	B	C	C	C	B	Work includes the maintenance of the Cashless Toll Concentrator network and related devices such as switches and routers to ensure proper operating conditions. This will include any hardware, software, and configuration associated with such devices installed after the PTC firewall.
	3rd Party Security Software Maintenance	A	A	A	A	A	B	B	B	B	B	Work includes updating and patching 3rd party software on all Cashless Concentrator Servers, including new and security releases and ensure the most up to date versions of virus, firewall, spam protection and other security software is installed and properly configured.
	3rd Party Network Monitoring Software Maintenance	A	A	A	A	A	B	B	B	B	B	Work Includes updating and patching 3rd party software on all Cashless Toll Concentrator Servers, including new and security releases and ensure the most up to date network monitoring and management software is installed and properly configured.

Maintenance Responsibilities Matrix

A =	Primary Responsibility - The identified party has the primary responsibility for completion of the item.[1]
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5 = Upgrades and Enhancements

Element / Task / Component Description		**Toll System "Contractor"**					**PTC**					**Comments and Other Responsibilities / Information**
		1	2	3	4	5	1	2	3	4	5	
	Cashless Toll Concentrator Application Software Maintenance	A	A	A	A	A	B	B	C	C	B	Work includes the monitoring and maintenance of the Concentrator toll system applications ensuring the most current version(s) are installed, configured, and operating properly according to change control policy.
	Database Maintenance/Administration/Tuning	A	A	A	A	A	B	C	C	C	B	Work includes the administration, maintenance, and tuning of the Concentrator Database(s) to ensure optimal performance. This includes the responsibility of creating new database partitions, table spaces, etc. as needed by the system.
	Inventory on Equipment in MOMS	A	A	n/a	n/a	n/a	B	B	n/a	n/a	n/a	The Contractor will maintain the inventory of hardware and Contractor will coordinate with PTC if inventory changes are needed.
	MOMs Alarm Entry and Maintenance	A	A	A	A	A	~~A~~ B	B	C	C	B	Work includes Alarm entry, configuration and maintenance and Contractor will coordinate with PTC to define alarms and secerity levels.
	Software Updates	A	A	A	A	A	B	B	B	B	B	Work includes performing software updates to support upgrades to hardware or third-party software; changes to Business Rules; changes to E-ZPass Group ICD; addition of new E-ZPass Group and Interoprable Agencies; compliance to security requirements and legislative and statutory changes.
Facility Server(s) (if required)												
	Operating System Maintenance	A	A	A	A	A	B	C	C	C	B	Work includes updating and patching the Facility Server Operating System including new and security releases and ensure the most up to date virus, firewall, spam protection and other security software is installed and properly configured.
	Database Software Maintenance.	A	A	A	A	A	B	C	C	C	B	Work includes installing and updating the most recent releases for the Facility Server Systems Database(s).
	Data Administration and Management	A	A	A	A	A	C	C	C	C	C	Work includes the ongoing administration and management of Facility Server data including backup, archiving, deletion, & restoration of data. Also responsible for the administration of data storage for databases, file systems, and images.
	Facility Server Hardware Maintenance	A	A	A	A	A	B	C	C	C	B	Work includes the replacement and upgrading of Facility Server hardware components to ensure proper operating conditions.

Maintenance Responsibilities Matrix

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5 = Upgrades and Enhancements

Element / Task / Component Description		**Toll System "Contractor"**					**PTC**					**Comments and Other Responsibilities / Information**
		1	2	3	4	5	1	2	3	4	5	
	Facility Server Network	A	A	A	A	A	B	C	C	C	B	Work includes the maintenance of Facility Server network and related devices such as switches and routers to ensure proper operating conditions.
	3rd Party Security and Network Monitoring Software Maintenance	A	A	A	A	A	B	C	C	C	B	Work includes updating and patching 3rd party software on the Cashless Tolling Facility Server(s), including new and security releases and ensure the most up to date version is installed and properly configured. This includes 3rd party security and network management software.
	Facility Server Toll Application Software Maintenance	A	A	A	A	A	B	C	C	C	B	Work includes the monitoring and maintenance of the Facility Server applications ensuring the most current version(s) are installed, configured, and operating properly according to change control policy.
	Database Maintenance/Administration/Tuning	A	A	A	A	A	B	C	C	C	B	Work includes updating and installing the most recent releases for the Facility Server Database. Responsibility will include the administration, maintaining and tuning of the Facility Server Database to ensure optimal performance. This includes the responsibility of creating new database partitions, table spaces, etc. as needed by the system.
	Software Updates	A	A	A	A	A	B	B	B	B	B	Work includes software updates to support upgrades to hardware or third-party software; changes to Business Rules; changes to E-ZPass Group ICD; addition of new E-ZPass Group and Interoprable Agencies; compliance to security requirements and legislative and statutory changes.
Image Server(s) (if required)												
	Operating System Maintenance	A	A	A	A	A	B	C	C	C	B	Work includes updating and patching the Image Server Operating System including new and security releases and ensure the most up to date virus, firewall, spam protection and other security software is installed and properly configured.
	Database Software Maintenance.	A	A	A	A	A	B	C	C	C	B	Work includes installing and updating the most recent releases for the Image Server Database(s).
	Data Administration and Management	A	A	A	A	A	C	C	C	C	C	Work includes the ongoing administration and management of Image Server data including backup, archiving, deletion, & restoration of data. Also responsible for the administration of data storage for databases, file systems, and images.
	Image Server Hardware Maintenance	A	A	A	A	A	B	C	C	C	B	Work includes the replacement and upgrading of Image server hardware components to ensure proper operating conditions.

Maintenance Responsibilities Matrix

A =	Primary Responsibility - The identified party has the primary responsibility for completion of the item.[1]
B =	Support / Coordination -The identified party provides either support or coordination to assist the primary responsible party with successful completion of the item.[1]
C =	No Responsibility - The identified party has no action for the item.

1= Monitoring
2 = Preventive Maintenance
3 = Corrective Maintenance
4 = Emergency Maintenance
5 = Upgrades and Enhancements

Element / Task / Component Description		**Toll System "Contractor"**					**PTC**					**Comments and Other Responsibilities / Information**
		1	2	3	4	5	1	2	3	4	5	
	Image Server Network	A	A	A	A	A	B	C	C	C	B	Work includes the maintenance of Image Server network and related devices such as switches and routers to ensure proper operating conditions.
	3rd Party Security and Network Monitoring Software Maintenance	A	A	A	A	A	B	C	C	C	B	Work includes updating and patching 3rd party software on the Image Servers, including new and security releases and ensure the most up to date version is installed and properly configured. This includes 3rd party security and network management software.
	Image Server Toll Application Software Maintenance	A	A	A	A	A	B	C	C	C	B	Work includes the monitoring and maintenance of the Image Server applications ensuring the most current version(s) are installed, configured, and operating properly according to change control policy.
	Database Maintenance/Administration/Tuning	A	A	A	A	A	B	C	C	C	B	Work includes updating and installing the most recent releases for the Image Server Database. Responsibility will include the administration, maintaining and tuning of the Image Server Database to ensure optimal performance. This includes the responsibility of creating new database partitions, table spaces, etc. as needed by the system.
	Software Updates	A	A	A	A	A	B	B	B	B	B	Work includes performing software updates to support upgrades to hardware or third-party software; changes to Business Rules; changes to E-ZPass Group ICD; addition of new E-ZPass Group and Interoprable Agencies; compliance to security requirements and legislative and statutory changes.
Zone Controller(s) & In-lane Equipment												
	Operating System Maintenance	A	A	A	A	A	B	C	C	C	B	Work includes updating and patching the Zone Controller Operating System including new and security releases and ensure the most up to date virus, firewall, spam protection and other security software is installed and properly configured.
	Data Administration and Management	A	A	A	A	A	C	C	C	C	C	Work includes the ongoing management of Zone Controller data including backup, archiving, deletion, & restoration of data.
	Zone Controller & in-lane equipment Hardware Maintenance	A	A	A	A	A	B	C	C	C	B	Work includes the replacement and upgrading of Zone Controller hardware components to ensure proper operating conditions. Includes servers, storage units, lane electronics, power supplies and misc. components.
	Zone Controller Network	A	A	A	A	A	B	C	C	C	B	Work includes the maintenance of Image Server network and related devices such as switches and routers to ensure proper operating conditions.

Maintenance Responsibilities Matrix

A =	Primary Responsibility - The identified party has the primary responsibility for completion of the item.[1]
B =	Support / Coordination -The identified party provides either support or coordination to assist the primary responsible party with successful completion of the item.[1]
C =	No Responsibility - The identified party has no action for the item.

1= Monitoring
2 = Preventive Maintenance
3 = Corrective Maintenance
4 = Emergency Maintenance
5 = Upgrades and Enhancements

Element / Task / Component Description		**Toll System "Contractor"**					**PTC**					**Comments and Other Responsibilities / Information**
		1	2	3	4	5	1	2	3	4	5	
	Zone Controller Toll Application Software Maintenance	A	A	A	A	A	B	C	C	C	B	Work includes the monitoring and maintenance of the Zone Controller toll applications ensuring the most current version(s) are installed, configured, and operating properly according to change control policy.
	Software Updates	A	A	A	A	A	B	B	B	B	B	Work includes performing software updates to support upgrades to hardware or third-party software; changes to Business Rules; changes to E-ZPass Group ICD; addition of new E-ZPass Group and Interoprable Agencies; compliance to security requirements and legislative and statutory changes.
	Firmware Updates to Lane Equipment	A	A	A	A	A	B	B	B	B	B	Work includes updating the lane equipment with the latest software/firmware releases from lane equipment vendor(s).
	AVI Equipment	A	A	A	A	A	B	C	C	C	B	Work includes the maintenance of all AVI related equipment and components including readers, reader cabinets, antennas, RF modules, and associated communication and power components to ensure proper configuration and normal operating condition.
	AVDC (Automatic Vehicle Detection & Classification) Equipment	A	A	A	A	A	B	C	C	C	B	Work includes the maintenance of all AVDC equipment and components including loops, light curtains, treadles, and scanners as well as all associated controllers housing units and communication and power components to ensure proper configuration normal operating condition.
	LPICPS (License Plate Image Capture & Processing System) Equipment	A	A	A	A	A	B	C	C	C	B	Work includes the maintenance of all image capture equipment and components including cameras, lenses, lighting, housing units, light sensors, controller and all associated communication and power components to ensure proper configuration, optimal alignment and illumination, and normal operating condition.
	DVAS Equipment	A	A	A	A	A	B	C	C	C	B	Work includes the maintenance of all the DVAS equipment including cameras, DVAS servers, image/video storage, housing units and all associated communication and power components to ensure proper configuration and normal operating condition.
	Wiring & Connections	A	A	A	A	A	B	C	C	C	C	Work includes the inspection, testing, and troubleshooting cables, wiring, junction boxes and terminations to detect problems and degradation and will be responsible to replace any item not in compliance with the Scope of Work, performance specifications and/or Local building code.
	Mounting Equipment & Brackets	A	A	A	A	A	C	C	C	C	C	Work includes the inspection and maintainence of all equipment mounting hardware and brackets provided as a part of the Scope of Work.
	Conduits & Cable Trays	A	A	A	A	A	C	C	C	C	C	Work includes the inspection of conduits and cable trays to detect problems and degradation and will be responsible to replace or repair any item not in compliance with the Scope of Work, performance specifications and/or Local building code.

Maintenance Responsibilities Matrix

A =	Primary Responsibility - The identified party has the primary responsibility for completion of the item.[1]
B =	Support / Coordination -The identified party provides either support or coordination to assist the primary responsible party with successful completion of the item.[1]
C =	No Responsibility - The identified party has no action for the item.

1= Monitoring

2 = Preventive Maintenance

3 = Corrective Maintenance

4 = Emergency Maintenance

5 = Upgrades and Enhancements

Element / Task / Component Description	**Toll System "Contractor"**					**PTC**					**Comments and Other Responsibilities / Information**
	1	2	3	4	5	1	2	3	4	5	
Toll Zone Specific Lighting	A	A	A	A	A	C	C	C	C	C	Work includes the inspection of toll zone lighting specifically installed to support the Toll Systems to detect problems and degradation and will be responsible to replace or repair any item not in compliance with the Scope of Work, performance specifications and/or local building code.
Zone Controller(s) & In-lane Equipment											
Maintenance & Protection of Traffic	A	A	A	A	A	B	B	B	B	B	Work includes the maintenance and protection of traffic. The Contractor will coordinate with PTC to schedule any lane closures required to perform maintenance in the lanes.
Lane Spare Parts and Inventory	A	A	A	A	A	B	B	B	B	B	Work includes maintaining an adequate level of replacement and spare parts as necessary for term of the contract. The Contractor will coordinate with PTC to ensure all inventory items are accurately entered into the MOM's system and that adequate replacement levels are maintained.
Communications and Network Equipment											
Communication System Equipment (WAN)	B	C	C	C	B	A	A	A	A	A	Work includes the inspection and to make repairs, adjustments, and replacements of WAN components as necessary to maintain the equipment up to the defined demarcation point in normal operating condition.
Communication System Equipment (LAN)	A	A	A	A	A	B	C	C	C	B	Work includes the inspection and to make repairs, adjustments, and replacements of LAN components as necessary to maintain the equipment from the defined demarcation point in normal operating condition.
Toll Equipment Building											
Toll System Equipment Racks/Cabinets	A	A	A	A	A	B	C	C	C	C	Work includes inspecting and maintaining the Contractor supplied Toll System equipment racks to ensure full operation, orderly condition, and are free of dust and debris.
Toll Equipment Building Access & Security	C	C	C	C	C	A	A	A	A	A	Work includes the inspection of all equipment, both major components and support components (cameras, access card readers, locks) that constitute the security system and make repairs, cleaning, adjustments, and replacements of components as necessary to maintain the equipment in normal operating condition. This will also include any card control servers and software.
Toll Equipment Building Janitorial Services	B	B	C	C	C	A	A	A	A	A	Work includes the inspection and maintainence of the toll equipment building to ensure full operational and orderly conditions and are free of dust and debris.
Plaza Facility Gantry Structures	C	C	C	C	B	A	A	A	A	A	Work includes periodically inspecting all gantries and supporting structures to ensure structural integrity. PTC will be responsible for the gantries up to a specified demarcation point. The Contractor will be responsible for their equipment and mounting structures betond the defined demarcation point.
Plaza TEB Facility Components	B	B	C	C	B	A	A	A	A	A	Work includes the inspection of all equipment, both major components and support components (fans, cabinets, UPS, generator, environmental control units, filters, and other equipment not provided by the Contractor) that constitute the Cashless Toll System and shall make such repairs, cleaning, adjustments, and replacements of components as necessary to maintain the equipment in normal operating condition.

[1] Note: This document does not supercede the need for notifications, scheduling and approvals that are required by the PTC. The Contractor shall inform and coordinate with PTC of any work to be done that impacts operations.

Attachment 11

Database Standards for the Pennsylvania Turnpike Commission

Pennsylvania Turnpike Commission

Database Standards

November 3, 2017

Summary

The purpose of this document is to outline specific standards for creation, use and management of databases used by various applications at the PTC including standards for supported database platforms, configuration standards for database servers, database permissions and use of service accounts and backup and recovery.

Scope

These standards apply to PTC IT staff responsible for creating and managing databases and database servers.

Version: 1.1
Document Type: IT Standard
Review Date: 11/3/2017
Review Cycle: Annual

[**Tags: database, SQL server, service account, administrator, standard**]

General Standard

The Server and Storage Management Group, within the IT Department, is responsible for creating and managing databases and database servers used by the various applications at the PTC. Microsoft SQL databases are to be created and maintained in accordance with the following set of standards.

Supported Database Platforms

The only supported database platform for applications, currently, is Microsoft SQL Server. The current landscape includes SQL Server 2008 R2, 2012, 2014 and 2016 versions.

When installing a new application or upgrading an existing one, the target should be the most recent database version that is available and is supported by the application vendor. The exception to this would be if an application supports a database in a newer version (such as SQL 2016) but the database will need to be accessed from a second application that does not support that version. In this case, the database should be established on the highest version that is supported by all applications that will need to use it. In addition, since SQL 2005 is nearing end of life in Microsoft's Product Lifecycle, it is highly desirable to create a new database in a newer version. The goal is to create any new database on a SQL Server 2016 database instance. If the application does not support SQL 2016, use the most recent version that the application supports.

Configuration Standards for a Database Server

Following SQL Server best practices, a SQL Server instance should be configured as follows:

- Use of Built-In Administrator Group
- Drive configuration
- Memory Configuration

Use of Built-In Administrator Group

Under NO circumstances should the Built-In Administrator group be added to a SQL Server instance.

Drive Configuration

For a new SQL Server, four drives will be needed to get started (not including the C: drive or a drive designated as a Page File location).

When creating a new Instance on a SQL Server, all executables should be placed onto the server's F: drive.

System databases (Master, Model, MSDB and TempDB) should be created on a second drive that is reserved for system databases only. In a SQL instance where TempDB usage is exceptionally high, TempDB can be moved to its own drive for performance purposes.

When creating databases within a SQL Server instance, the database name should be descriptive of the purpose or use of the database. This can be done by referencing the primary application that will be using the new database. For example, a database being created for an application named Spotlight on SQL Server should use the word Spotlight in its name.

Data files for all SQL databases created within an instance should be placed onto a drive reserved for this purpose. The log files for the same SQL databases should be placed on a drive that is different from the data files.

As an example, the following drive configuration might be used for a new SQL Server installation with a default instance.

Drive Letter	Purpose
C:	Reserved for Windows system installation as well as SQL Server files that are required to reside within one or more of the Windows directories.
F:	Reserved for SQL Server executables. All SQL Instances on a server will use the F: drive for this purpose.
G:	Used for the default instance’s system databases
H:	Used for the default instance’s data files
I:	Used for the default instance’s log files
X:	Used for Windows paging file

A second database instance created on the same SQL Server would only need three additional drives. Since the executables are installed on the F: drive for all SQL instances, drives will only be needed for the system databases, data files and log files. As an example, a named instance added to a SQL Server using the above configuration for the default instance could use the following additional drives:

J:	Used for the named instance’s system databases

K:	Used for the named instance's data files
L:	Used for the named instance's log files

Memory Configuration

By default, SQL Server is configured to utilize almost all available memory on a server and not let it go. Allowing this default configuration causes periodic performance issues when certain events occur.

An example of when this might cause a problem is when backup processing is launched. A part of the backup job runs outside of SQL Server as a Windows process. If SQL Server has used up almost all the available memory, the backup job running as a Windows process will need to acquire memory before it can run. Windows does this by requesting that SQL Server release memory for another purpose. SQL Server will release ALL pages in memory, tell Windows that it is OK to allocate memory to the backup job and then starts to reload pages into SQL memory using what memory remains.

A better solution to this is to set limits on how much memory SQL Server uses. There is not a perfect formula for doing this, so the initial settings may need to be adjusted after reviewing server performance. As a starting point, subtract 2 Gigabytes from the amount of available system memory. Then divide the remaining memory between all SQL Server instances that will be running on that server. If you have an instance that you know will not require a lot of memory for execution, you can lower the max memory setting for that instance and allocate the extra memory to another instance(s).

Database Permissions and use of Service Accounts

When creating a new SQL database, there are a few factors that need to be considered:

- User Accounts
    - Service Accounts
    - End user accounts
    - SysAdmin accounts
- Considerations for creation of SQL Logins

User Accounts

The general rules for accessing databases are as follows:

1) Whenever possible, use the application that the database belongs to for accessing the contents of a database. This is especially true when you need to make updates to the data.
2) If the application cannot provide the access needed to the contents of the database, then the user should use their OWN Windows login to gain access to the data.

   NO USER SHOULD USE A SERVICE ACCOUNT TO LOG INTERACTIVELY INTO A DATABASE.

   As a rule, a user's Windows login will only be granted READ permissions to a database. If the user needs to make manual updates to the database, contact a PTC Database Administrator (DBA) for assistance.
3) Use Service Accounts only with applications.

   NO USER SHOULD USE A SERVICE ACCOUNT TO LOG DIRECTLY INTO A DATABASE.

Types of SQL Server Logins

The following sections define three types of common SQL Server Logins and provide an explanation of when use of each type is acceptable.

Service Accounts

A SQL Server Service Account is a SQL Login which is used with an application to provide connections to one or more databases required by the application to perform its designed functions. If the application will need to access network resources during execution of any processes, a Windows domain account should be added as a SQL login for this purpose. If the application does not need to access network resources, a SQL Server login should be created for the application.

When creating a service account for use with one or more Applications, use a name that can be clearly associated with the application(s) that it will be used in. This will assist the DBA and auditors during future maintenance and reviews.

A SQL service account is for use with an application ONLY. If a user needs to access a database using tools such as the SQL Server Management Console (SSMC) or Crystal Reports, he or she should connect to the SQL Server using his or her own Windows credentials for authentication. Under no circumstances should the user log into the database using an application's Service Account. This is an auditing Requirement and if a user is found to be using a service account for access outside of the application, corrective measures will be taken as appropriate.

End user accounts

A user who needs to directly (outside of the scope of the application itself) access the database by using a tool such as SQL Service Management Studio (SSMS) or a reporting tool such as Crystal Reports, will be added to one or more SQL Server Instances using his or her Windows Login. If database access is required to perform updates to the database, a SQL Server DBA should be involved in the process unless prior arrangements have been made. At the DBA's discretion, the user requesting access may be temporarily granted elevated permissions for the time window when maintenance is being performed. It is PTC policy that any changes made to a database outside of the application that owns the database (e.g., manual updates to table(s) using the SQL Server Management Console or SSMC) must be documented and approved by a member of the PTC's Compliance Department.

Accounts with SysAdmin rights

Under normal circumstances, logins with Sysadmin rights are restricted to PTC DBAs since their use can be dangerous in the hands of a resource who does not fully understand database management procedures. Exceptions to this rule will be considered on a case-by-case basis. A temporary exception may be granted during the application installation process if the process requires this right during the database setup step of the installation process. If a more permanent exception is requested and granted, the application's database(s) should be created in a SQL Instance that is reserved for that application. This will protect other application's databases from inadvertent modification using this privileged account.

Since a SQL login with SysAdmin rights can make updates directly to database tables and other objects, it is important to keep PTC Policy in mind. It is PTC policy that any changes made to a database outside of the application that owns the database (e.g., manual updates to table(s) using the SQL Server Management Console or SSMC) must be documented with a Change Request or Help Desk ticket and approved by a member of the PTC's Compliance Department.

Backup and Recovery

When a new database server is created, or a new SQL Server instance is created on an existing SQL Server or new databases are added to an existing SQL Server instance, the backup product in use at the PTC will auto-discover the new objects and start performing appropriate backups.

Performance Monitoring

The PTC uses a product named Spotlight on SQL Server Enterprise to monitor production database servers. When creating new SQL Servers or SQL Server instances, the Spotlight database should be updated to include the new server or instance. On request, we can also use Spotlight on SQL Server Enterprise to monitor non-production database servers or instances.

Definitions

SQL

Structured Query Language (SQL) is a special-purpose programming language designed for managing data held in a relational database management system (RDBMS).

Exceptions

Any exception to this procedure must be approved by the Manager of Server and Storage Management and the Director of Technology Infrastructure.

Document Change History

Version	Reason for Change	Author	Date
1.1	Updates to the list of supported SQL Server versions. Updates to the use of built-in administrators group section to remove references to SQL versions that are no longer supported. Updates to the Backup and Recovery section to reflect the new backup product that is used at the PTC. Addition of Performance Monitoring section	Rick Snell	11/03/2017

Attachment 12

ETC System Change Control Procedures

ELECTRONIC TOLL COLLECTION SYSTEM – CHANGE CONTROL PROCEDURES

Version 1.6
October 21, 2015

Table of Contents

OVERVIEW

The purpose of this document is to provide the critical steps performed by ETC staff in working with our Toll Systems integrator(s) to ensure the proper procedures are followed for any changes made to the Commission Toll Collection System, either hardware or software. The Toll Collection System includes the following subsystems:

1. Lane/Plaza
2. ITMS/Toll Host

There are 3 possible cases that follow different procedures for hardware or software changes:

1. Change Requests (ECOs):
   a. Change triggered by PTC initiated requirement;
   b. Internal operations request that change system's design;
   c. Internal operations requests based on business needs;
2. Normal System Maintenance *
3. Urgent / Emergency Changes ("Hot Fixes") *

* Because of the system's dynamic nature and complexity, there are times when the ECO process will not be followed. Currently we have identified the following two (2) types:

- Normal System Maintenance is performed on a set schedule and upon request. This maintenance activity includes archiving data, rebuilding indices and refreshing the data in the QA environment.

- Urgent/Emergency Changes ("Hot Fixes") are requested by ETC or System Integrator and require software changes to be done ASAP to prevent greater impact on system, customers, commission's revenue flow, etc. All "Hot Fixes" should be documented through Release Notes.

Following are detailed descriptions of the procedures that will be followed for each case.

Change Requests (ECO):

What is an ECO?

An *Engineering Change Order (ECO)* describes an authorized and documented change to the

PTC Toll system specifications that were approved in the project's Detailed Design Document.

According to established policy, all changes to a system must be (1) *documented* by an Engineering Change Order, (2) *evaluated*, and then (3) *authorized* by both System Integrator and the PTC before work can commence and the change made. The ECO process was put in place for the purposes of having a tracking history for all Toll System changes, not following the ECO process could result in unauthorized or unnecessary/undocumented changes.

The current preferred method of ECO submission is to complete them in Word and submit them via e-mail (electronically) as attached files.

Where Are ECOs Kept?

ECOs are kept electronically and in hard copy by both System Integrator and the PTC.

Hard copy:

The final original signed copies (hard copy) of all engineering change orders are filed in a binder at System Integrator. The PTC also prints a hard copy of all completed ECOs and keeps them in a numerical binder in the ETC department.

Electronic copy:

The PTC Project Manager creates PDF copies of all ECOs (Forms 1, 2 and 3) and stores them on the PTC Network (under the ETC Department share). In addition an excel spreadsheet is maintained by the PTC Project Manager of all open and closed ECOs. The spreadsheet is updated regularly (usually bi-weekly) and reviewed once a month by PTC staff (ETC, Fare Collection, Compliance) and System Integrator Design Team Leaders to update the status of all open ECOs.

System Integrator maintains an internal database of all open/closed ECOs and electronic copies on their internal network.

How Are ECOs Named?

Each ECO is assigned a number by the *Control Person*, sequenced by order of submission. (For example, the fifth ECO submitted received the number 0005.)

All ECOs received for the current PTC project are assigned numbers within the same sequence, regardless of department. If a form is modified after it has been filed, the original file is archived as version 1 and the updated form is recorded as version 2. All modifications that are originally submitted will be archived with a new version number. If a form that has been signed is being updated, the updated version of the form will also need to be signed. All iterations of the forms will be archived.

Online, the filenames for a particular ECO are of the format:

ECO *0000-#* .DOCX

where *0000*	The assigned ECO number
#	The form number (1, 2, or 3)

Examples:

Description of ECO	*Corresponding Filename*
ECO 0003, Form 2	ECO 0003-2.DOCX
ECO 0022, Form 3	ECO 0022-3.DOCX
ECO 0022, Form 3,updated	ECO 0022-3_v2.DOCX

What Forms Comprise an ECO?

Each ECO is comprised of three forms, representing the three stages of the ECO process:

- **Form 1: Declaration of the change(s) to be made:** - This is the "Here is what we want to change" form.
- **Form 2: Evaluation & Authorization to Proceed:** - This is the "Here is what the change will entail" form. The proposed change is evaluated by System Integrator; a general solution is offered by System Integrator and reviewed by the PTC. The PTC has the option to authorize the change(s) or reject the change(s). Justification for the change must be offered at this stage, along with cost/time analysis.
- **Form 3: Commencement and approval of actual work:** - This is the "Here is what we changed" form. After testing (see ECO Testing Process section), is the finished product acceptable? This form is submitted after the changes are implemented into production

The ECO Process and Resources

All ECOs should be generated by the PTC Project Manager (or other members of the ETC group) or by System Integrator using the sample forms included at the end of this document. It is preferred that all ECO forms are completed electronically;

Process:

The four figures included on pages 18-21 show the flow of each form described below:

Initiating Change Request: ECO Form 1

Form 1 should be completed by the PTC Project Manager or by System Integrator that describes the change order. Once completed the form should be emailed to the Control Person. The Control Person is responsible for the ECO number assignment and will then return the ECO via email to the PTC Project Manager. The PTC Project Manager should store a PDF version of form 1 on the ETC Department share. (\\cofs2\department\Communications_&_Public_Relations\ETC\ECOs) (Note: There is a folder for each numerical series (i.e.; 500 series) that the forms should be kept in)

Change Order Evaluation and Approval: ECO Form 2

The System Integrator Design Team Leader performs a technical evaluation of the change requested and creates a technical design and plan of action for either the hardware or software changes. At this point ECO form 2 is generated explaining the recommended change, including the evaluation details, proposed action, change order category (Major/Minor – See pg 17 Letter E), time estimate and cost (if applicable). Evaluations which will exceed one page should be continued in a separate document. Alternatively, the evaluation may be summarized in the form and a complete evaluation provided in a separate document. These supplemental documents will be distributed and stored with the main form. Form 2 and any supporting documentation are sent by the Control Person via email to the PTC Project Manager.

After review by the PTC Project Manager and other PTC staff as required, form 2 is signed by the PTC Project Manager and returned to the Control Person via email. If the change has been rejected this is the end of the forms process. If the change indicated is considered a Major Change, the ETC Manager or ETC Director (if involved) will also be required to sign form 2 of the ECO.

The PTC Project Manager should store a PDF version of forms 1 and 2 on the ETC Department share, (Note: There is a folder for each numerical series (i.e.; 500 series) that the forms should be kept in).

Change Order Software Development and Testing

If form 2 has been approved for development, the System Integrator Implementer develops any new modules and/or makes software modifications, or replaces hardware according to its technical design and plan of action. Once the changes are completed the process moves to testing. The following testing procedure will be utilized to test ECO changes, whether for hardware or software:

PTC Q/A Testing:

The PTC expects that any changes made to the Toll System will be tested thoroughly by the System Integrator before sending an email to the PTC Project Manager to establish that the changes are now ready for PTC testing. The PTC Project Manager will respond to the email approving the move to the testing phase. The following testing procedure will be followed:

Test Strategizing: The PTC Project Manager, System Integrator Design Team Leader and Implementer will meet to discuss the change(s) being made as detailed in form 2 and develop a test script that will be used for QA testing.

Test Script Creation: Based upon the test strategy, the PTC Project Manager will create a test script that will be used to test the changes being made. A history of all test scripts is kept by the ETC department which can be used as the basis for creating test scripts. Possible types of tests that could be included in the test script are:

1. Positive Tests – tests that confirm the changes made as part of the ECO.
2. Negative Tests – tests that could break the system or the changes made as part of the ECO.
3. Regression Tests – tests which ensure there are no negative system wide impacts based upon the changes made for the ECO.
4. Expected Outcomes – each test case should include, where applicable, all expected outcomes, i.e.: screen shots of data related changes

If ITMS/Host changes are being made and the software is being put into the QA environment, The System Integrator will send an email to the PTC Project Manager notifying the PTC that the changes are ready to move to QA. The PTC Project Manager will send an approval email back to the System Integrator and update the QA Change History Log to identify the objects that are being moved into the QA environment and which ECOs they are related to. If made available to the PTC, the System Integrator's Unit Test document will also be included.

Test Plan Execution: The PTC Project Manager will perform the following steps:

1. Schedule the use of test facility – if being done in live lanes, will need to work with Fare Collection, Maintenance, and/or Engineering to work on a schedule for any lane closures.
2. Secure and schedule necessary personnel – Work with departments affected by the ECO change to secure test resources. In most cases this includes the Fare Collection and Compliance departments.
3. Secure necessary equipment – includes vehicles, scripts, test logs, laptops, E-Zpass tags,etc….
4. Direct the testing

Some possible outputs from test execution include but are not limited to:

1. Completed Test lane logs – a record of all occurrences in the lane as each test is run.
2. Transaction Data – a file containing the transactions for all tests should be

Saved and loaded into the QA Host database for review.

3. In some cases a before and after picture of screen changes, for example changes for ITMS are often shown in this way.
4. Defect Report – A list of all defects found during testing
5. A finalized script – Any corrections/changes to scripts should be made with a Final electronic copy saved and stored with the ETC ECO Documentation.

Defect Management: A defect is a flaw found in a system, or in a component of the system that causes the component or system to fail to perform its required function. The PTC Project Manager may complete a defect report, if there are defects found during the test plan execution. The Defect Report could include the following information:

1. Defect description – a one or two sentence description of the Defect found.
2. Module/Code Impact – an explanation of where/what the Defect has impacted.
3. Severity/Frequency – working with the System Integrator implementer and other PTC staff determine the severity and frequency of the Defect.
4. Priority/Retest Plan – determine how the defect will be fixed and retested.
5. Steps to reproduce – write the steps that created the defect so that they can be Properly re-tested if required.
6. Evaluation/Resolution – Explanation of defect found and recommended Resolution. A signature by the System Integrator and PTC Project Manager should be provided and the document stored by the PTC.

Defect Re-testing: if re-testing is required an additional report could be created and included in the Test results reporting:

1. Defect description
2. Steps followed to re-test
3. Verified by – person(s) involved in re-test
4. Status – success or failure of re-test
5. Resolution

Test Results Reporting: Test results to determine the quality of the changes made will vary depending on the types of changes to be made. For example changes to lane processes may require simple screen shots or the printing of receipts, whereas data changes may require the printing and analysis of Host reports. The expectations for Test Results reporting will be determined in the Test Strategizing part of this process.

The level of analysis of the transaction data and reports will be done to a level that makes the PTC Project Manager comfortable with the results of the changes. For example some changes may require a 100% analysis of the results whereas other changes may require only much smaller analysis or sample size to approve the effectiveness of the changes.

Change Order Deployment Approval: Form 3

Once the changes have been completed, tested by System Integrator and PTC staff, Form 3 is completed by the System Integrator Team Leader. The Control Person should email Form 3 to the PTC Project Manager and obtain a signature on line 1 and where applicable establish a post deployment acceptance period. The post deployment period represents a period of time that the new implementation will be evaluated to ensure no issues arise as a result of the change. The signature on line 1 authorizes the implementation of the change on a date that fits properly into the Commission and System Integrator's calendars. It is standard practice to avoid, Mondays, Fridays and any holiday for performing system releases. The PTC Project Manager should email the signed copy of form 3 back to the Control person. The System Integrator Team Leader should prepare release notes for the changes being implemented. The Release notes should contain any pertinent information necessary to explain the changes being made. In particular, any ECOs that are being moved into production as part of the change should be detailed in the Release Notes document. The System Integrator Team Leader should email the Release Notes Document to the PTC Project Manager.

The PTC Project Manager should send an email to a specified corporate email group (Department Heads and others that could be affected by the changes) several days prior to the production release informing the group of the changes being implemented, providing the group enough time to consider the changes and provide feedback if necessary. In addition, the PTC Project Manager should also include information regarding the production release on the IT Change Management weekly report.

Note: If the new release involves a new executable of ITMS there will be specific requirements for pushing the changes out to the ITMS users group.

After implementation is complete, if applicable the clock begins on the Post Deployment period.

Once the Post Deployment period has passed (if applicable) without issue, and all system documentation is complete, the PTC project Manager should secure a signature on line 4 of form 3, scan a copy of the document and email it back to the Control Person. The PDF version of forms 1, 2 and 3 should be put on the ETC Department share (Note: There is a folder for each numerical series (i.e.; 500 series) that the forms should be kept in.)

Normal System Maintenance:

As noted previously, normal system maintenance processes do not follow the ECO process. Examples of normal system maintenance include the following types of processes:

- **Archive data**
- **Rebuild Database indices and shrink logs**
- **Refresh the QA Database from Production**
- **Operating System(Server) Patches**
- **Reboot Servers**

Urgent/Emergency Changes ("Hot Fixes"):

Urgent/Emergency changes, "Hot Fixes" are those items that are found in production that require an immediate fix to prevent loss of revenue or incorrect processing which may impact customers in a negative way. Because of the high profile nature of "Hot Fixes", they are required to have multiple levels of approval before the fix can be put into production. Approval can be done by phone, but an email should always be delivered as well. The email should be generated by the System Integrator to the PTC Project Manager/ETC Manager/ETC Director describing the issue, the recommended resolution and requesting approval to move the changes into production as soon as possible. The PTC Project Manager/ETC Manager/ETC Director will respond to the email with approval/denial. If ETC Management and System Integrator agree, all the documentation can be provided after the "Hot Fix" has been implemented.

Due to the nature of these types of situations, time may play a critical part in having the solution deployed in production. Therefore quite often testing "Hot Fixes" is not possible. In the rare case where the issue can be tested, the PTC Compliance Department should be notified of the situation and at their discretion may participate in testing and reviewing results.

In the rare case where the issue can't be reproduced in the QA system or test environment, the following items may be provided:

- A detailed document which fully explains the issue, including the level of severity or impact.
- Explain why the issue cannot be reproduced in the QA system.
- The proposed solution, including any potential risks.
- Any other relevant documents that will support having to make the "Hot Fix"

If testing is possible before deployment, once the "Hot Fix" has been successfully tested and verified in the QA or test environment (or the necessary documents are provided) the System Integrator Team Leader, PTC Project Manager and the ETC Director or ETC Manager must all agree to move/make the "Hot Fix" changes in Production via email.

ECO Form 3-H should be completed for each "Hot Fix" (even if it is done after installation), that should have all sections completed.

Where possible Release Notes should be generated (even if it's after installation), that explain the issue, its impacts and an explanation of the fix (resolution) put into production.

Parameter changes:

Parameter changes are those items that are found in production that require an immediate fix but may not be an actual software change that affects the entire system or may not require a full release of the lane or plaza software. Parameter changes function the same as "Hot Fixes", in that they are required to have multiple levels of approval before the fix can be put into production. Approval can be done by phone, but an email should always be delivered as well. The email should be generated by the System Integrator to the PTC Project Manager/ETC Manager/ETC Director describing the issue, the recommended resolution and requesting approval to move the changes into production as soon as possible. The PTC Project Manager/ETC Manager/ETC Director will respond to the email with approval/denial. If ETC Management and System Integrator agree, all the documentation can be provided after the Parameter change has been implemented.

Due to the nature of these types of situations, time may play a critical part in having the solution deployed in production. Therefore quite often testing of Parameter changes is not possible. In the rare case where the issue can be tested, the PTC Compliance Department should be notified of the situation and at their discretion may participate in testing and reviewing results.

In the rare case where the issue can't be reproduced in the QA system or test environment, the following items may be provided:

- A detailed document which fully explains the issue, including the level of severity or impact.
- Explain why the issue cannot be reproduced in the QA system.
- The proposed solution, including any potential risks.
- Any other relevant documents that will support having to make the "Parameter change"

If testing is possible before deployment, once the Parameter change has been successfully tested and verified in the QA or test environment (or the necessary documents are provided) the System Integrator Team Leader, PTC Project Manager and the ETC Director or ETC Manager must all agree to move/make the Parameter Change changes in Production via email.

ECO Form 3-P should be completed for each Parameter change (even if it is done after installation), that should have all sections completed. Where possible Release Notes should be generated (even if it's after installation), that explain the issue, its impacts and an explanation of the fix (resolution) put into production.

Resources:

Below are the various people involved in the change control process and their responsibilities

- **Requestor:** The person(s) that request a change to made to the system which requires the generation of ECO form 1.
- **Control Person:** The System Integrator representative who is responsible for processing, distributing, filing, and inputting all ECO forms/data. *All ECOs (all forms and supplemental documentation) pass through and are routed by the Control Person.*
- **Evaluator:** A person assigned by the PTC Project Manager and/or System Integrator Design Team Leader to evaluate the proposed change, to determine its feasibility. *Fills out Form 2 after evaluation.*
- **Implementer:** A person (System Integrator employee) assigned by System Integrator to make the proposed changes for ECOs or Hot Fixes. *Fills out Form 3 when initial work is completed.*
- **PTC Project Manager:** The PTC representative who is responsible for the project and in a position to request changes and approve changes after implemented. *Reviews all Form 1's and is required to sign off on Forms 2 & 3.*
- **Submitter:** The person (System Integrator or PTC employee) who submits a possible change to the PTC Manager. *Fills out Form 1.*
- **System Integrator Design Team Leader:** The System Integrator representative who is in charge of company efforts on the project, and in a position, evaluates changes (ECO), as well as handles any maintenance or Hot Fix issues. *Reviews all Form 1's coming from the PTC, and is required to sign off on Form 3, prepares any required documents for system Hot fixes.*

It is not uncommon for the same individual to both evaluate a change and implement it.

Note: There are some very rare instances where an ECO is generated that has impacts to the PTC tolling system where the entire ECO process is done by PTC staff only and there is no interaction with System Integrator other than processing the forms for history.

The Paper Forms

Blank paper forms are included with this document and are stored on the PTC network. (\\cofs2\department\Communications_&_Public_Relations\ETC\ECOs)

FORM #1: Reporting a Change

When filling out Form 1, include the following information:

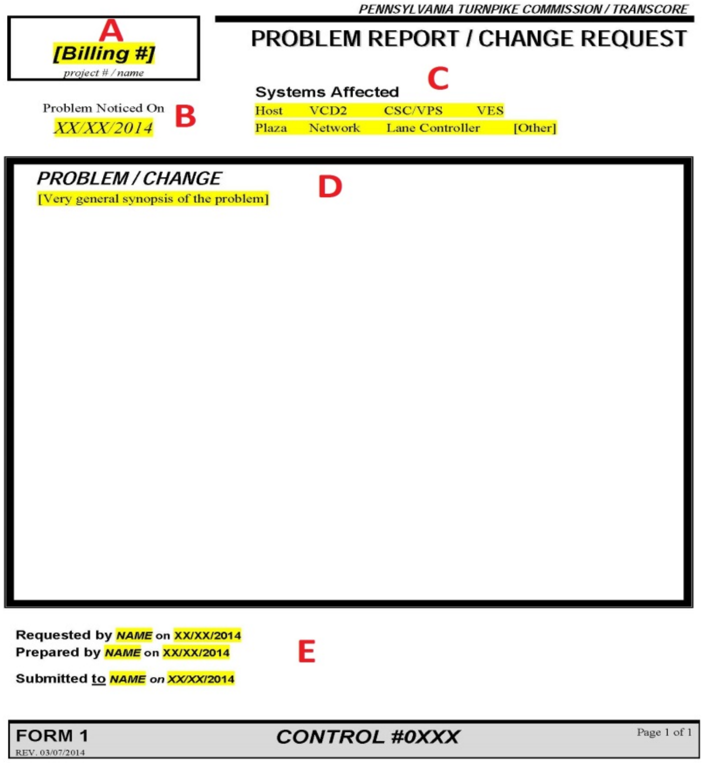
A. Project #. This is the BILLING number and can be added at System Integrator if the submitter doesn't know it. *(OPTIONAL)*

B. Date on which the problem was noticed/noted. *(REQUIRED)*

C. System(s) affected by the problem. Only include the system(s) that are affected by this change. *(REQUIRED)*

D. Description of the problem. *(REQUIRED)*

E. The requestors Name and date, preparer's name and date, and the PTC Project Manager (submitted to section), and the date submitted. *(REQUIRED)*



PENNSYLVANIA TURNPIKE COMMISSION / TRANSCORE

PROBLEM REPORT / CHANGE REQUEST

[Billing #]
project # / name

Problem Noticed On
XX/XX/2014

Systems Affected
Host VCD2 CSC/VPS VES
Plaza Network Lane Controller [Other]

PROBLEM / CHANGE
[Very general synopsis of the problem]

Requested by *NAME* on XX/XX/2014
Prepared by *NAME* on XX/XX/2014

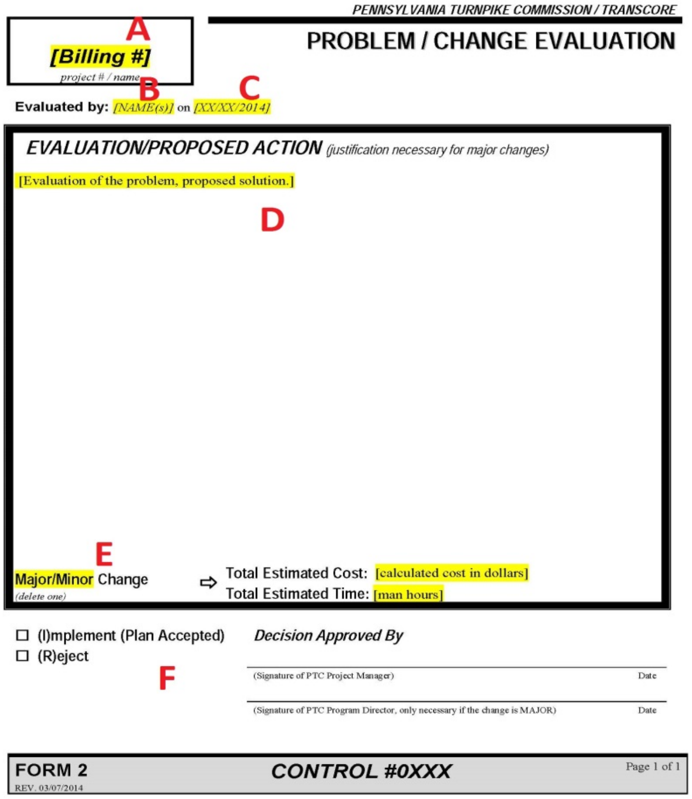
Submitted to *NAME on XX/XX/2014*

FORM 1 ***CONTROL #0XXX*** Page 1 of 1
REV. 03/07/2014

FORM #2: Evaluating a Change

The evaluator (assigned by the System Integrator Design Team Leader, in conjunction with the PTC Project Manager) will fill out Form 2. Required information includes:

A. Project #. This is the billing number, as appeared on Form 1. *(OPTIONAL)*
B. Evaluator's name *(REQUIRED)*
C. Date of the evaluation *(REQUIRED)*
D. Evaluation/Proposed Action: Is the change described in Form 1 necessary, what should be done to fix the change requested in Form 1. *(REQUIRED)*
E. Major/Minor Change. A minor change does not impact the budget and/or schedule, while a major change does. If the change is major, the evaluator must also determine total estimated cost and time to effect the change. *(REQUIRED)*
F. Implement or Reject changes Signed by PTC Project Manager and ETC Director if the change is a Major Change. *(REQUIRED)*



PENNSYLVANIA TURNPIKE COMMISSION / TRANSCORE

PROBLEM / CHANGE EVALUATION

[Billing #]
project # / name

Evaluated by: *[NAME(s)]* on *[XX/XX/2014]*

EVALUATION/PROPOSED ACTION *(justification necessary for major changes)*

[Evaluation of the problem, proposed solution.]

Major/Minor Change
(delete one)

⇨ Total Estimated Cost: [calculated cost in dollars]
Total Estimated Time: [man hours]

☐ (I)mplement (Plan Accepted)
☐ (R)eject

Decision Approved By

(Signature of PTC Project Manager) Date

(Signature of PTC Program Director, only necessary if the change is MAJOR) Date

FORM 2 ***CONTROL #0XXX*** Page 1 of 1
REV. 03/07/2014

FORM #3: Implementing a Change

The System Integrator Design Team Leader (the person who will make the actual change) must submit Form 3 before deploying the changes to production, providing the following information:

A. Project #. (Billing number.) *(OPTIONAL)*
B. System Integrator Design Team Leader name and the date *(REQUIRED)*

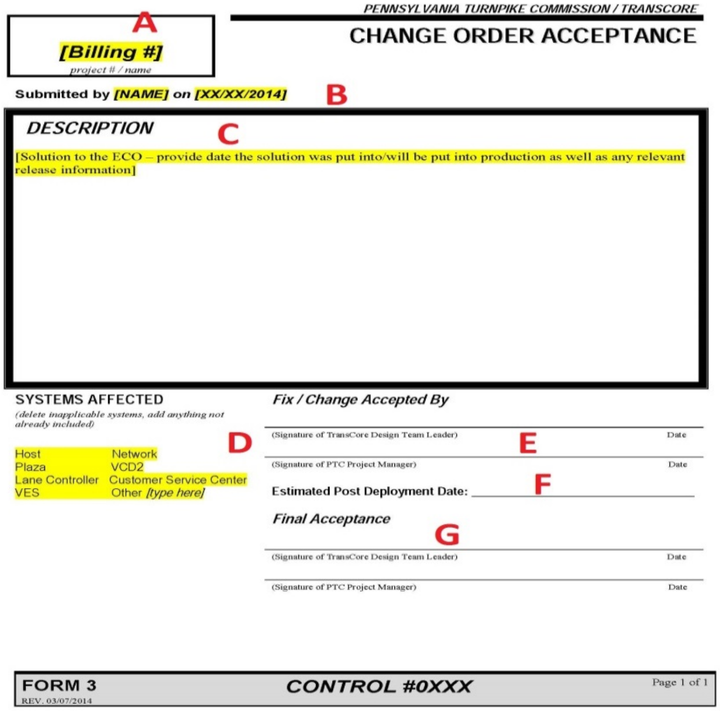
C. Description of the work completed (based on the Form 2 evaluation). *(REQUIRED)*

D. Systems affected. Only include the system(s) that are affected by this change. *(REQUIRED)*

E. Fix/Change Approved by- Once the changes have been tested, the PTC Project Manager and System Integrator Design Team Leader sign and date that the work is now ready for deployment. *(REQUIRED)*

F. Estimated Post Deployment Period – Where applicable the PTC Project Manager will establish a time period by which the implemented changes will be monitored for any new issues that may arise. *(REQUIRED)*

Post Deployment Work section – This section will be signed when the Post Deployment Period (where applicable) has passed without issue and when all Toll System documentation affected by the ECO changes has been updated. *(REQUIRED)*



PENNSYLVANIA TURNPIKE COMMISSION / TRANSCORE

CHANGE ORDER ACCEPTANCE

[Billing #]
project # / name

Submitted by *[NAME]* on *[XX/XX/2014]*

DESCRIPTION

[Solution to the ECO – provide date the solution was put into/will be put into production as well as any relevant release information]

SYSTEMS AFFECTED
(delete inapplicable systems, add anything not already included)

Host	Network
Plaza	VCD2
Lane Controller	Customer Service Center
VES	Other *[type here]*

Fix / Change Accepted By

(Signature of TransCore Design Team Leader) Date

(Signature of PTC Project Manager) Date

Estimated Post Deployment Date: ______

Final Acceptance

(Signature of TransCore Design Team Leader) Date

(Signature of PTC Project Manager) Date

FORM 3 ***CONTROL #0XXX*** Page 1 of 1
REV. 03/07/2014

FORM #3H: Hot Fix Approval

The System Integrator Design Team Leader (the person who will make the actual change) must submit Form 3H before or after deploying the changes to production depending on the urgency/timing of the change, providing the following information:

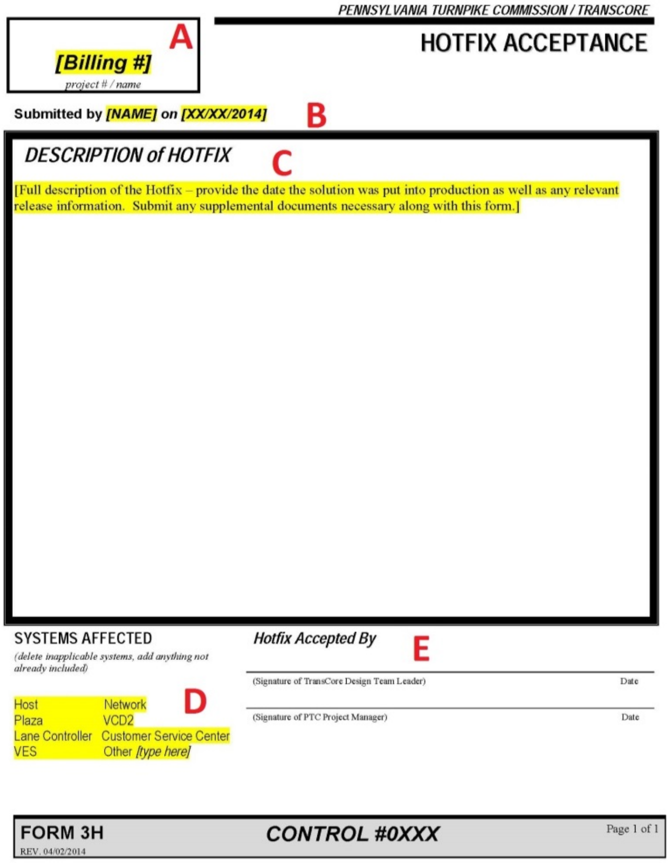
A. Project #. (Billing number.) *(OPTIONAL)*

B. System Integrator Design Team Leader name and the date. *(REQUIRED)*

C. Description of the Hot Fix required and the work done to complete the fix. *(REQUIRED)*

D. Systems affected. Only include the system(s) that are affected by this change. *(REQUIRED)*

E. Hot Fix Approved by- The PTC Project Manager and System Integrator Design Team Leader sign and date that the work is now ready for deployment to production. *(REQUIRED)*



PENNSYLVANIA TURNPIKE COMMISSION / TRANSCORE

HOTFIX ACCEPTANCE

[Billing #]
project # / name

Submitted by *[NAME]* on *[XX/XX/2014]*

DESCRIPTION of HOTFIX

[Full description of the Hotfix – provide the date the solution was put into production as well as any relevant release information. Submit any supplemental documents necessary along with this form.]

SYSTEMS AFFECTED
(delete inapplicable systems, add anything not already included)

Host
Plaza
Lane Controller
VES
Network
VCD2
Customer Service Center
Other *[type here]*

Hotfix Accepted By

(Signature of TransCore Design Team Leader) Date

(Signature of PTC Project Manager) Date

FORM 3H ***CONTROL #0XXX*** Page 1 of 1
REV. 04/02/2014

FORM #3P: Parameter change Approval

The System Integrator Design Team Leader (the person who will make the actual change) must submit Form 3P before or after deploying the changes to production depending on the urgency/timing of the change, providing the following information:

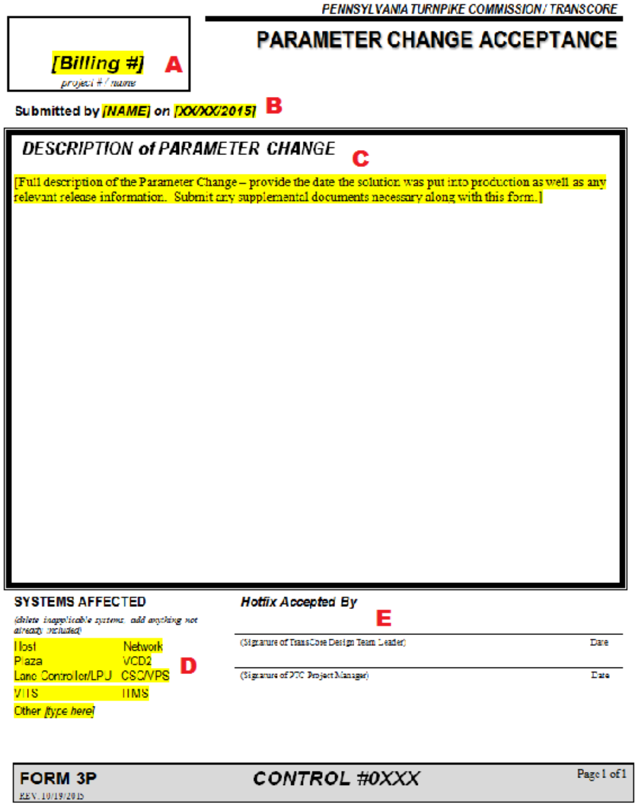
A. Project #. (Billing number.) *(OPTIONAL)*

B. System Integrator Design Team Leader name and the date. *(REQUIRED)*

C. Description of the Parameter Change required and the work done to complete the fix. *(REQUIRED)*

D. Systems affected. Only include the system(s) that are affected by this change. *(REQUIRED)*

E. Parameter Change Approved by- The PTC Project Manager and System Integrator Design Team Leader sign and date that the work is now ready for deployment to production. *(REQUIRED)*



PENNSYLVANIA TURNPIKE COMMISSION / TRANSCORE

PARAMETER CHANGE ACCEPTANCE

[Billing #]
project # / name

Submitted by *[NAME]* on *[XX/XX/2015]*

DESCRIPTION of PARAMETER CHANGE

[Full description of the Parameter Change – provide the date the solution was put into production as well as any relevant release information. Submit any supplemental documents necessary along with this form.]

SYSTEMS AFFECTED
(delete inapplicable systems, add anything not already included)
Host
Plaza
Lane Controller/LPU
VITS
Other *[type here]*
Network
VCD2
CSC/VPS
ITMS

Hotfix Accepted By

(Signature of TransCore Design Team Leader) Date

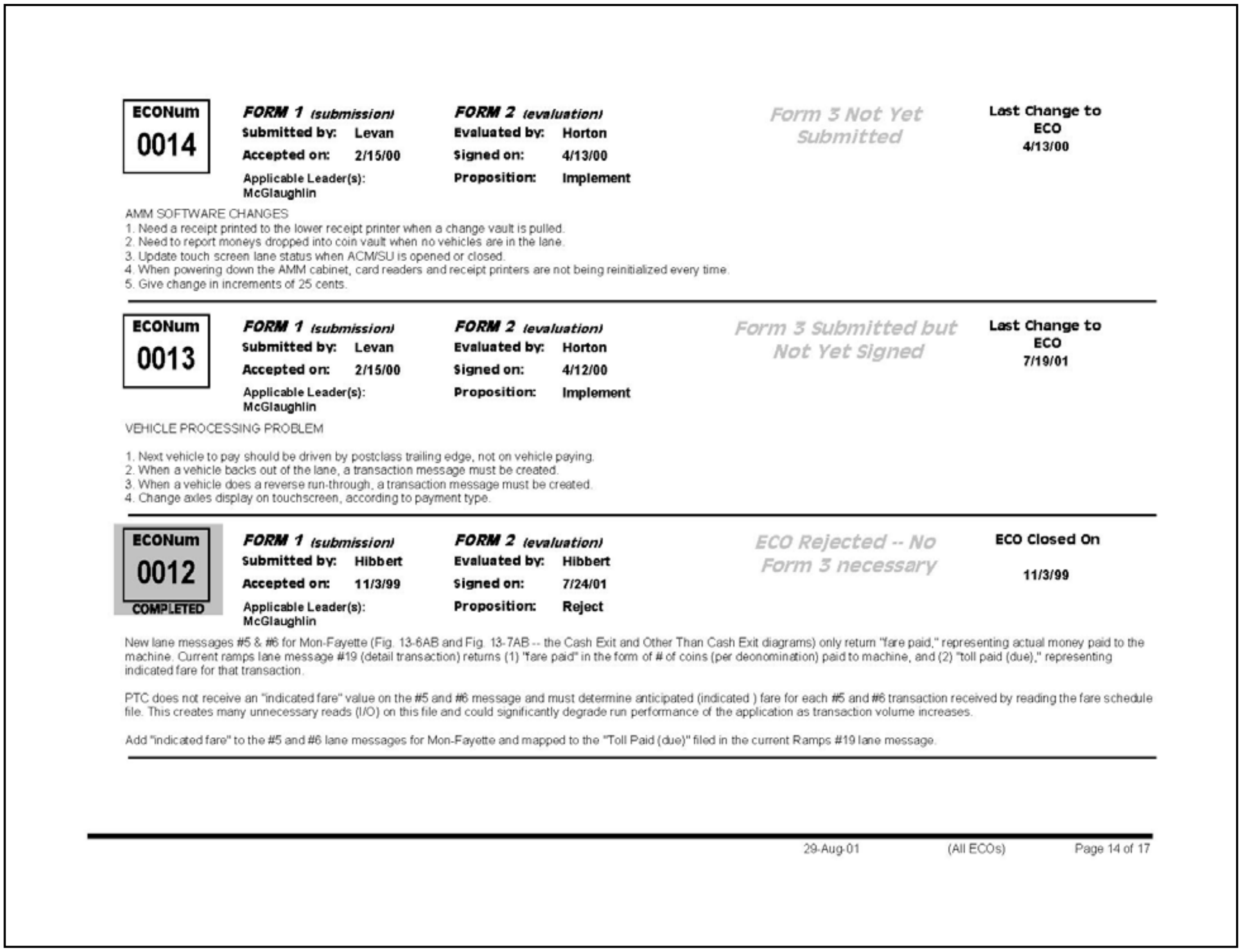
(Signature of PTC Project Manager) Date

FORM 3P ***CONTROL #0XXX*** Page 1 of 1
REV. 10/19/2015

ECO Reports

- Control Person currently sends the PTC one report each month: (distributed in PDF Format)
    - Open ECO list - This contains any open ECO lists, a sample is shown below.

The PTC can also request an Open/Closed ECO list from the Control Person on an as needed basis.



ECONum
0014

FORM 1 *(submission)*
Submitted by: Levan
Accepted on: 2/15/00
Applicable Leader(s): McGlaughlin

FORM 2 *(evaluation)*
Evaluated by: Horton
Signed on: 4/13/00
Proposition: Implement

Form 3 Not Yet Submitted

Last Change to ECO
4/13/00

AMM SOFTWARE CHANGES
1. Need a receipt printed to the lower receipt printer when a change vault is pulled.
2. Need to report moneys dropped into coin vault when no vehicles are in the lane.
3. Update touch screen lane status when ACM/SU is opened or closed.
4. When powering down the AMM cabinet, card readers and receipt printers are not being reinitialized every time.
5. Give change in increments of 25 cents.

ECONum
0013

FORM 1 *(submission)*
Submitted by: Levan
Accepted on: 2/15/00
Applicable Leader(s): McGlaughlin

FORM 2 *(evaluation)*
Evaluated by: Horton
Signed on: 4/12/00
Proposition: Implement

Form 3 Submitted but Not Yet Signed

Last Change to ECO
7/19/01

VEHICLE PROCESSING PROBLEM

1. Next vehicle to pay should be driven by postclass trailing edge, not on vehicle paying.
2. When a vehicle backs out of the lane, a transaction message must be created.
3. When a vehicle does a reverse run-through, a transaction message must be created.
4. Change axles display on touchscreen, according to payment type.

ECONum
0012
COMPLETED

FORM 1 *(submission)*
Submitted by: Hibbert
Accepted on: 11/3/99
Applicable Leader(s): McGlaughlin

FORM 2 *(evaluation)*
Evaluated by: Hibbert
Signed on: 7/24/01
Proposition: Reject

ECO Rejected -- No Form 3 necessary

ECO Closed On
11/3/99

New lane messages #5 & #6 for Mon-Fayette (Fig. 13-6AB and Fig. 13-7AB -- the Cash Exit and Other Than Cash Exit diagrams) only return "fare paid," representing actual money paid to the machine. Current ramps lane message #19 (detail transaction) returns (1) "fare paid" in the form of # of coins (per deonomination) paid to machine, and (2) "toll paid (due)," representing indicated fare for that transaction.

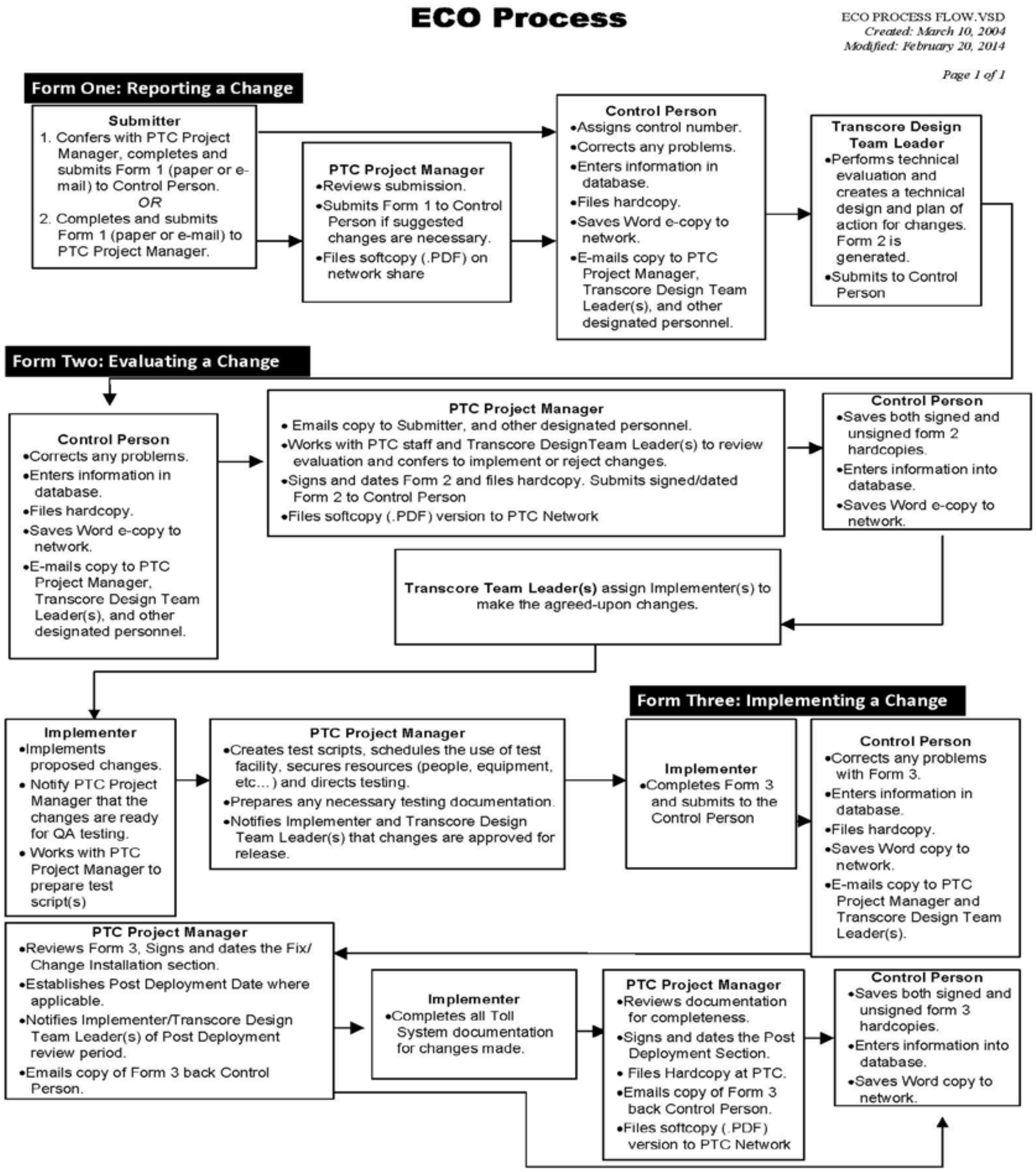
PTC does not receive an "indicated fare" value on the #5 and #6 message and must determine anticipated (indicated) fare for each #5 and #6 transaction received by reading the fare schedule file. This creates many unnecessary reads (I/O) on this file and could significantly degrade run performance of the application as transaction volume increases.

Add "indicated fare" to the #5 and #6 lane messages for Mon-Fayette and mapped to the "Toll Paid (due)" filed in the current Ramps #19 lane message.

29-Aug-01 (All ECOs) Page 14 of 17

A sample report page is included here. Note that completed ECOs are identified by a shaded number box, and that a description is provided as to what stage each ECO has reached.

ECO Process Flow Chart for Forms 1-3:



ECO Process

ECO PROCESS FLOW.VSD
Created: March 10, 2004
Modified: February 20, 2014

Page 1 of 1

Form One: Reporting a Change

Submitter
1. Confers with PTC Project Manager, completes and submits Form 1 (paper or e-mail) to Control Person.
OR
2. Completes and submits Form 1 (paper or e-mail) to PTC Project Manager.

PTC Project Manager
- Reviews submission.
- Submits Form 1 to Control Person if suggested changes are necessary.
- Files softcopy (.PDF) on network share

Control Person
- Assigns control number.
- Corrects any problems.
- Enters information in database.
- Files hardcopy.
- Saves Word e-copy to network.
- E-mails copy to PTC Project Manager, Transcore Design Team Leader(s), and other designated personnel.

Transcore Design Team Leader
- Performs technical evaluation and creates a technical design and plan of action for changes. Form 2 is generated.
- Submits to Control Person

Form Two: Evaluating a Change

Control Person
- Corrects any problems.
- Enters information in database.
- Files hardcopy.
- Saves Word e-copy to network.
- E-mails copy to PTC Project Manager, Transcore Design Team Leader(s), and other designated personnel.

PTC Project Manager
- Emails copy to Submitter, and other designated personnel.
- Works with PTC staff and Transcore DesignTeam Leader(s) to review evaluation and confers to implement or reject changes.
- Signs and dates Form 2 and files hardcopy. Submits signed/dated Form 2 to Control Person
- Files softcopy (.PDF) version to PTC Network

Control Person
- Saves both signed and unsigned form 2 hardcopies.
- Enters information into database.
- Saves Word e-copy to network.

Transcore Team Leader(s) assign Implementer(s) to make the agreed-upon changes.

Implementer
- Implements proposed changes.
- Notify PTC Project Manager that the changes are ready for QA testing.
- Works with PTC Project Manager to prepare test script(s)

PTC Project Manager
- Creates test scripts, schedules the use of test facility, secures resources (people, equipment, etc…) and directs testing.
- Prepares any necessary testing documentation.
- Notifies Implementer and Transcore Design Team Leader(s) that changes are approved for release.

Form Three: Implementing a Change

Implementer
- Completes Form 3 and submits to the Control Person

Control Person
- Corrects any problems with Form 3.
- Enters information in database.
- Files hardcopy.
- Saves Word copy to network.
- E-mails copy to PTC Project Manager and Transcore Design Team Leader(s).

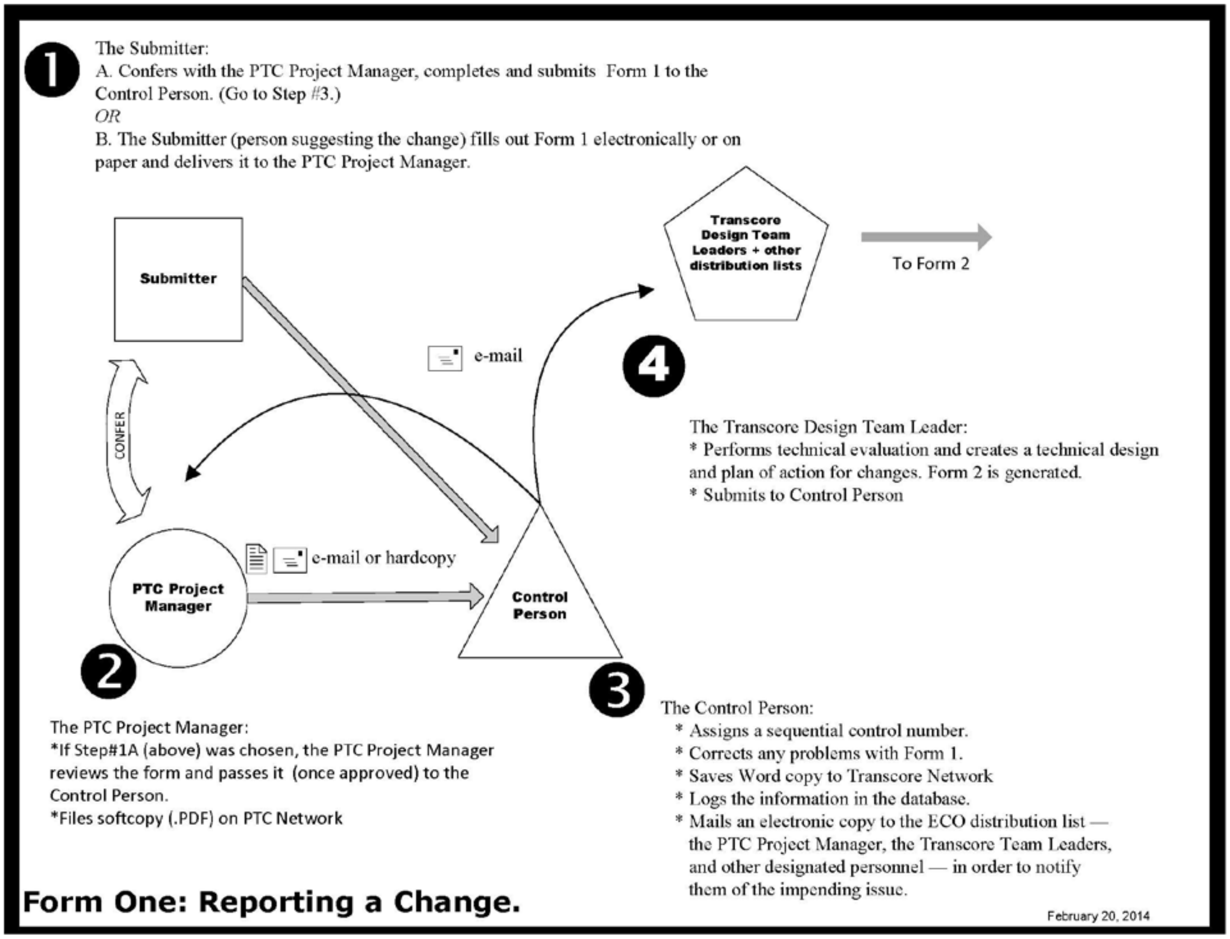
PTC Project Manager
- Reviews Form 3, Signs and dates the Fix/ Change Installation section.
- Establishes Post Deployment Date where applicable.
- Notifies Implementer/Transcore Design Team Leader(s) of Post Deployment review period.
- Emails copy of Form 3 back Control Person.

Implementer
- Completes all Toll System documentation for changes made.

PTC Project Manager
- Reviews documentation for completeness.
- Signs and dates the Post Deployment Section.
- Files Hardcopy at PTC.
- Emails copy of Form 3 back Control Person.
- Files softcopy (.PDF) version to PTC Network

Control Person
- Saves both signed and unsigned form 3 hardcopies.
- Enters information into database.
- Saves Word copy to network.

ECO Process Forms 1-3 Stage 1:



❶ The Submitter:
A. Confers with the PTC Project Manager, completes and submits Form 1 to the Control Person. (Go to Step #3.)
OR
B. The Submitter (person suggesting the change) fills out Form 1 electronically or on paper and delivers it to the PTC Project Manager.

❷ The PTC Project Manager:
*If Step#1A (above) was chosen, the PTC Project Manager reviews the form and passes it (once approved) to the Control Person.
*Files softcopy (.PDF) on PTC Network

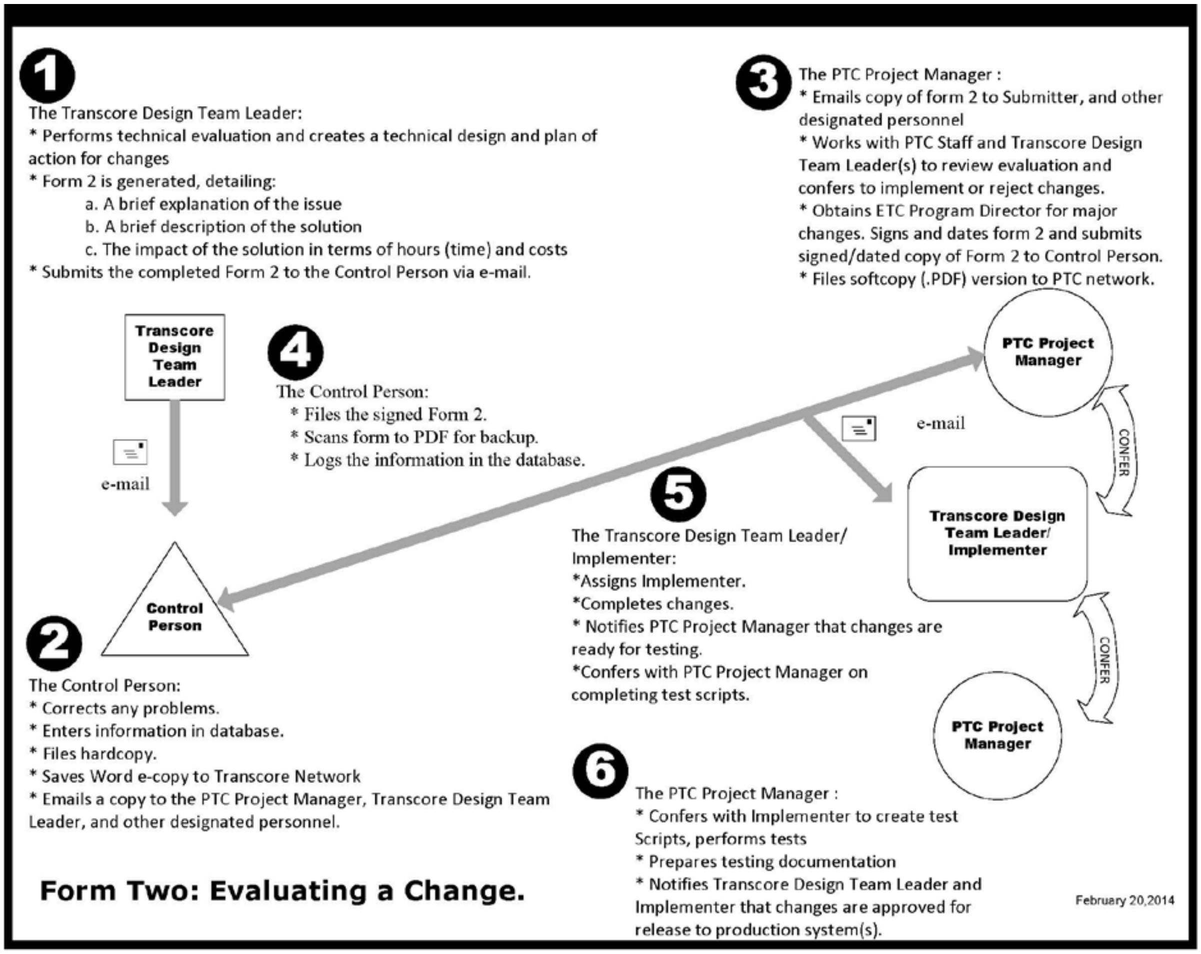
❸ The Control Person:
* Assigns a sequential control number.
* Corrects any problems with Form 1.
* Saves Word copy to Transcore Network
* Logs the information in the database.
* Mails an electronic copy to the ECO distribution list — the PTC Project Manager, the Transcore Team Leaders, and other designated personnel — in order to notify them of the impending issue.

❹ The Transcore Design Team Leader:
* Performs technical evaluation and creates a technical design and plan of action for changes. Form 2 is generated.
* Submits to Control Person

Form One: Reporting a Change.

February 20, 2014

ECO Process Forms 1-3 Stage 2:



1 The Transcore Design Team Leader:
* Performs technical evaluation and creates a technical design and plan of action for changes
* Form 2 is generated, detailing:
a. A brief explanation of the issue
b. A brief description of the solution
c. The impact of the solution in terms of hours (time) and costs
* Submits the completed Form 2 to the Control Person via e-mail.

2 The Control Person:
* Corrects any problems.
* Enters information in database.
* Files hardcopy.
* Saves Word e-copy to Transcore Network
* Emails a copy to the PTC Project Manager, Transcore Design Team Leader, and other designated personnel.

3 The PTC Project Manager :
* Emails copy of form 2 to Submitter, and other designated personnel
* Works with PTC Staff and Transcore Design Team Leader(s) to review evaluation and confers to implement or reject changes.
* Obtains ETC Program Director for major changes. Signs and dates form 2 and submits signed/dated copy of Form 2 to Control Person.
* Files softcopy (.PDF) version to PTC network.

4 The Control Person:
* Files the signed Form 2.
* Scans form to PDF for backup.
* Logs the information in the database.

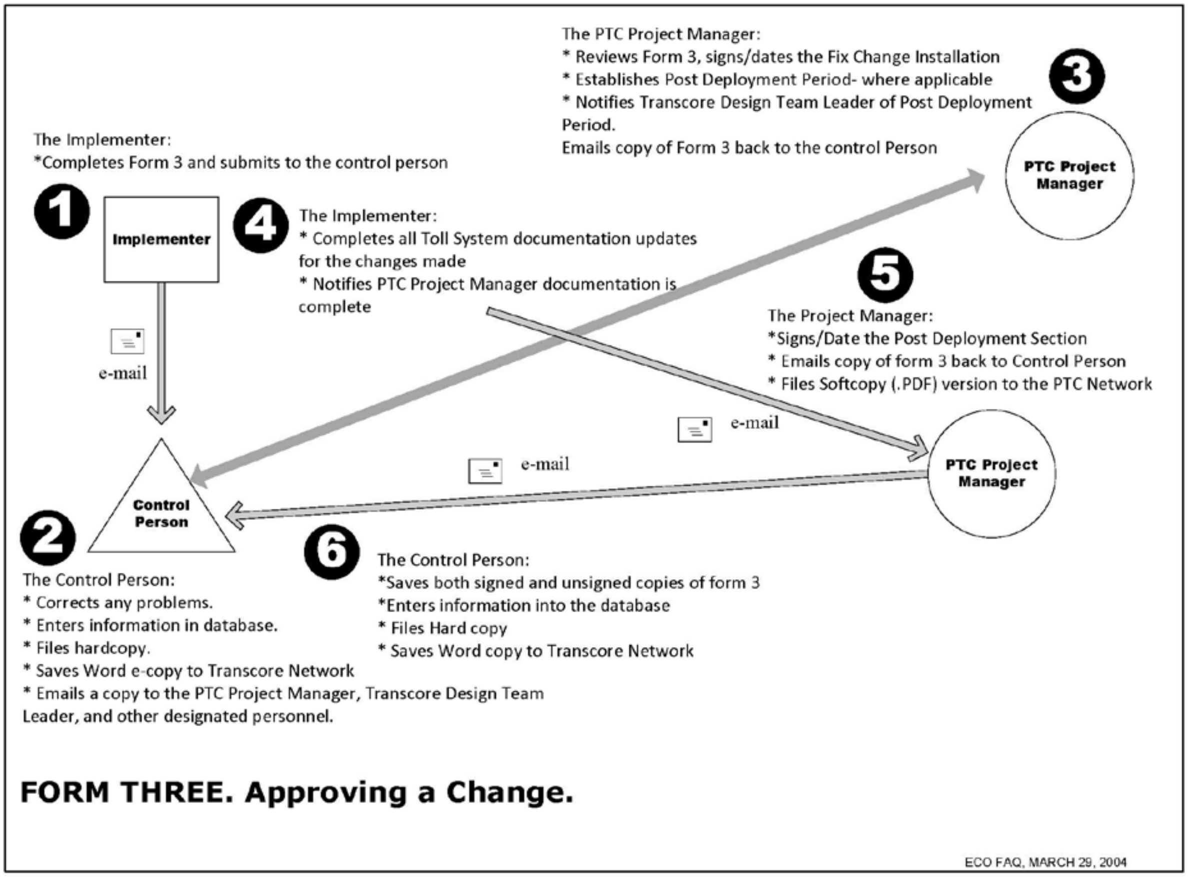
5 The Transcore Design Team Leader/ Implementer:
*Assigns Implementer.
*Completes changes.
* Notifies PTC Project Manager that changes are ready for testing.
*Confers with PTC Project Manager on completing test scripts.

6 The PTC Project Manager :
* Confers with Implementer to create test Scripts, performs tests
* Prepares testing documentation
* Notifies Transcore Design Team Leader and Implementer that changes are approved for release to production system(s).

Form Two: Evaluating a Change.

February 20,2014

ECO Process Forms 1-3 Stage 3:



The Implementer:
*Completes Form 3 and submits to the control person

The Control Person:
* Corrects any problems.
* Enters information in database.
* Files hardcopy.
* Saves Word e-copy to Transcore Network
* Emails a copy to the PTC Project Manager, Transcore Design Team Leader, and other designated personnel.

The PTC Project Manager:
* Reviews Form 3, signs/dates the Fix Change Installation
* Establishes Post Deployment Period- where applicable
* Notifies Transcore Design Team Leader of Post Deployment Period.
Emails copy of Form 3 back to the control Person

The Implementer:
* Completes all Toll System documentation updates for the changes made
* Notifies PTC Project Manager documentation is complete

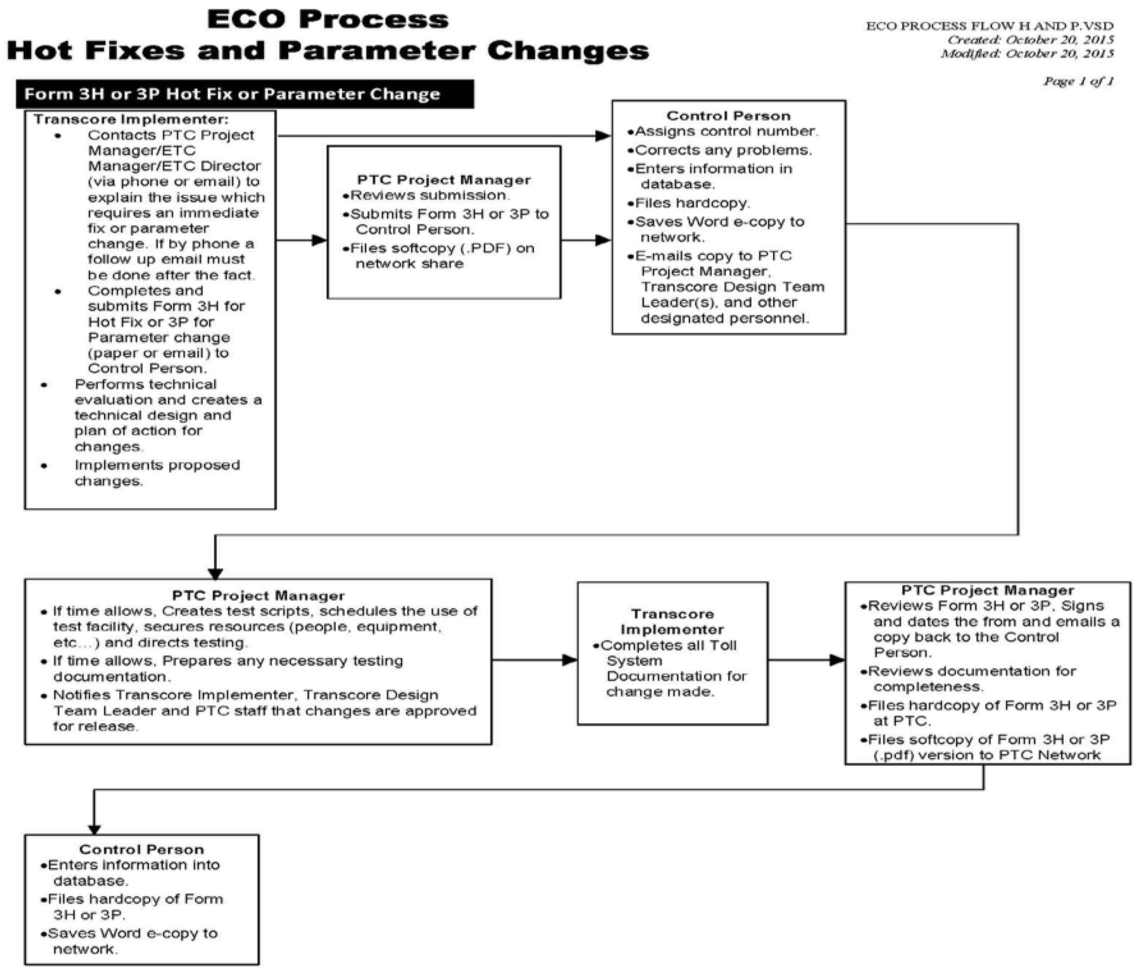
The Project Manager:
*Signs/Date the Post Deployment Section
* Emails copy of form 3 back to Control Person
* Files Softcopy (.PDF) version to the PTC Network

The Control Person:
*Saves both signed and unsigned copies of form 3
*Enters information into the database
* Files Hard copy
* Saves Word copy to Transcore Network

FORM THREE. Approving a Change.

ECO FAQ, MARCH 29, 2004

ECO Process Flow Chart for Form 3H or 3P:



ECO Process
Hot Fixes and Parameter Changes

ECO PROCESS FLOW H AND P.VSD
Created: October 20, 2015
Modified: October 20, 2015

Page 1 of 1

Form 3H or 3P Hot Fix or Parameter Change

Transcore Implementer:
- Contacts PTC Project Manager/ETC Manager/ETC Director (via phone or email) to explain the issue which requires an immediate fix or parameter change. If by phone a follow up email must be done after the fact.
- Completes and submits Form 3H for Hot Fix or 3P for Parameter change (paper or email) to Control Person.
- Performs technical evaluation and creates a technical design and plan of action for changes.
- Implements proposed changes.

PTC Project Manager
- Reviews submission.
- Submits Form 3H or 3P to Control Person.
- Files softcopy (.PDF) on network share

Control Person
- Assigns control number.
- Corrects any problems.
- Enters information in database.
- Files hardcopy.
- Saves Word e-copy to network.
- E-mails copy to PTC Project Manager, Transcore Design Team Leader(s), and other designated personnel.

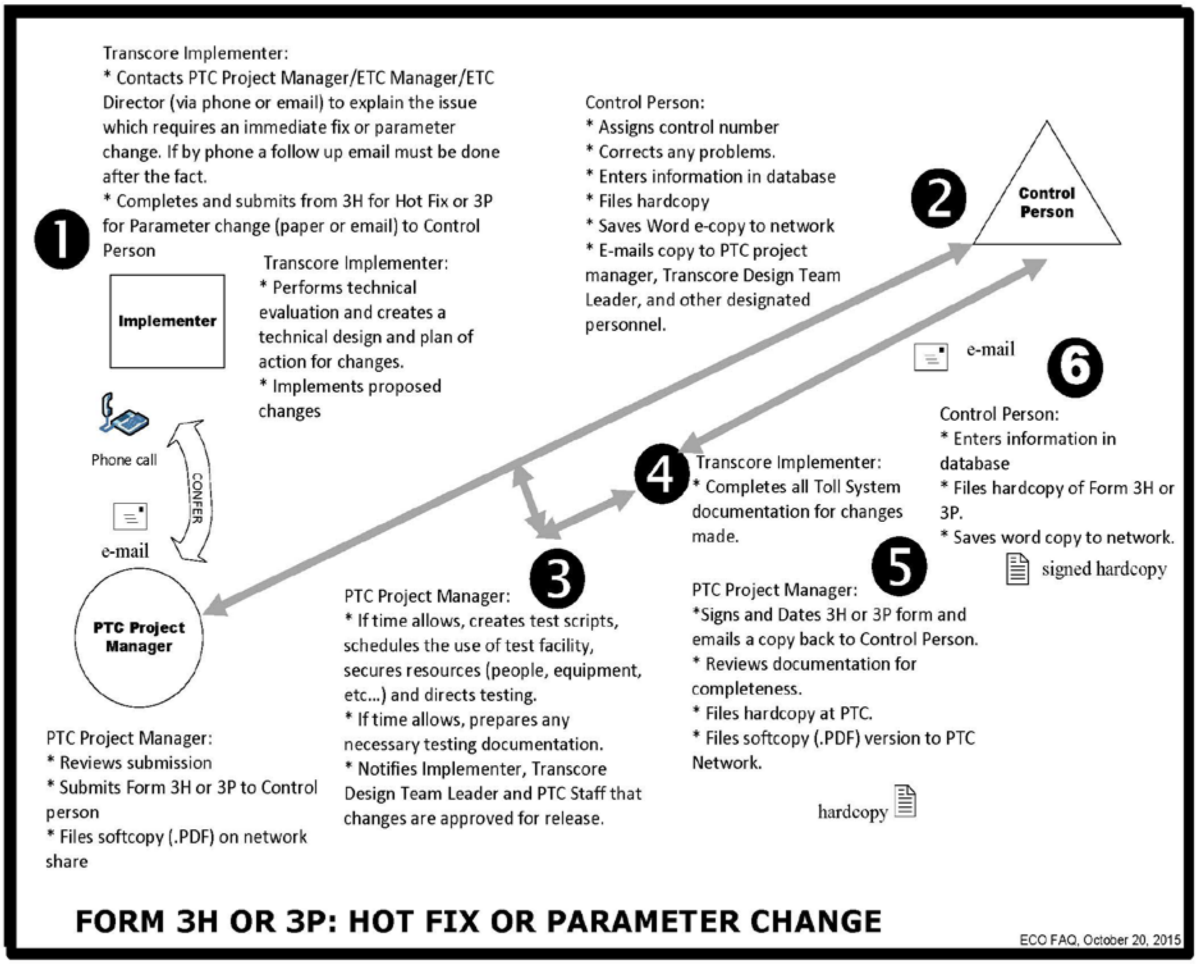
PTC Project Manager
- If time allows, Creates test scripts, schedules the use of test facility, secures resources (people, equipment, etc…) and directs testing.
- If time allows, Prepares any necessary testing documentation.
- Notifies Transcore Implementer, Transcore Design Team Leader and PTC staff that changes are approved for release.

Transcore Implementer
- Completes all Toll System Documentation for change made.

PTC Project Manager
- Reviews Form 3H or 3P, Signs and dates the from and emails a copy back to the Control Person.
- Reviews documentation for completeness.
- Files hardcopy of Form 3H or 3P at PTC.
- Files softcopy of Form 3H or 3P (.pdf) version to PTC Network

Control Person
- Enters information into database.
- Files hardcopy of Form 3H or 3P.
- Saves Word e-copy to network.

ECO Process Forms 3H or 3P:



Transcore Implementer:
* Contacts PTC Project Manager/ETC Manager/ETC Director (via phone or email) to explain the issue which requires an immediate fix or parameter change. If by phone a follow up email must be done after the fact.
* Completes and submits from 3H for Hot Fix or 3P for Parameter change (paper or email) to Control Person

Transcore Implementer:
* Performs technical evaluation and creates a technical design and plan of action for changes.
* Implements proposed changes

Control Person:
* Assigns control number
* Corrects any problems.
* Enters information in database
* Files hardcopy
* Saves Word e-copy to network
* E-mails copy to PTC project manager, Transcore Design Team Leader, and other designated personnel.

Transcore Implementer:
* Completes all Toll System documentation for changes made.

Control Person:
* Enters information in database
* Files hardcopy of Form 3H or 3P.
* Saves word copy to network.

PTC Project Manager:
* Reviews submission
* Submits Form 3H or 3P to Control person
* Files softcopy (.PDF) on network share

PTC Project Manager:
* If time allows, creates test scripts, schedules the use of test facility, secures resources (people, equipment, etc...) and directs testing.
* If time allows, prepares any necessary testing documentation.
* Notifies Implementer, Transcore Design Team Leader and PTC Staff that changes are approved for release.

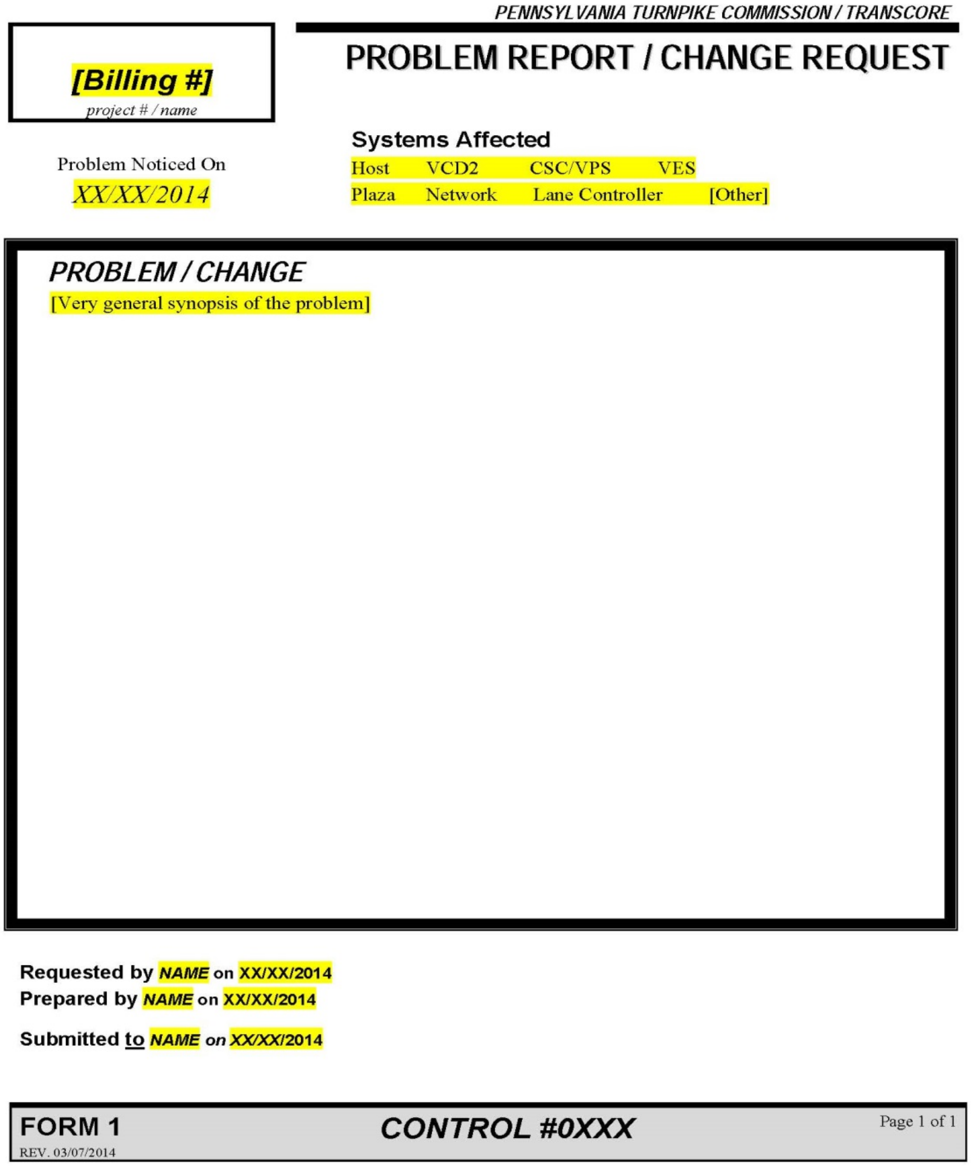
PTC Project Manager:
*Signs and Dates 3H or 3P form and emails a copy back to Control Person.
* Reviews documentation for completeness.
* Files hardcopy at PTC.
* Files softcopy (.PDF) version to PTC Network.

FORM 3H OR 3P: HOT FIX OR PARAMETER CHANGE

ECO FAQ, October 20, 2015

ECO Form Samples:

ECO Form 1 Sample:



PENNSYLVANIA TURNPIKE COMMISSION / TRANSCORE

PROBLEM REPORT / CHANGE REQUEST

[Billing #]
project # / name

Problem Noticed On
XX/XX/2014

Systems Affected
Host VCD2 CSC/VPS VES
Plaza Network Lane Controller [Other]

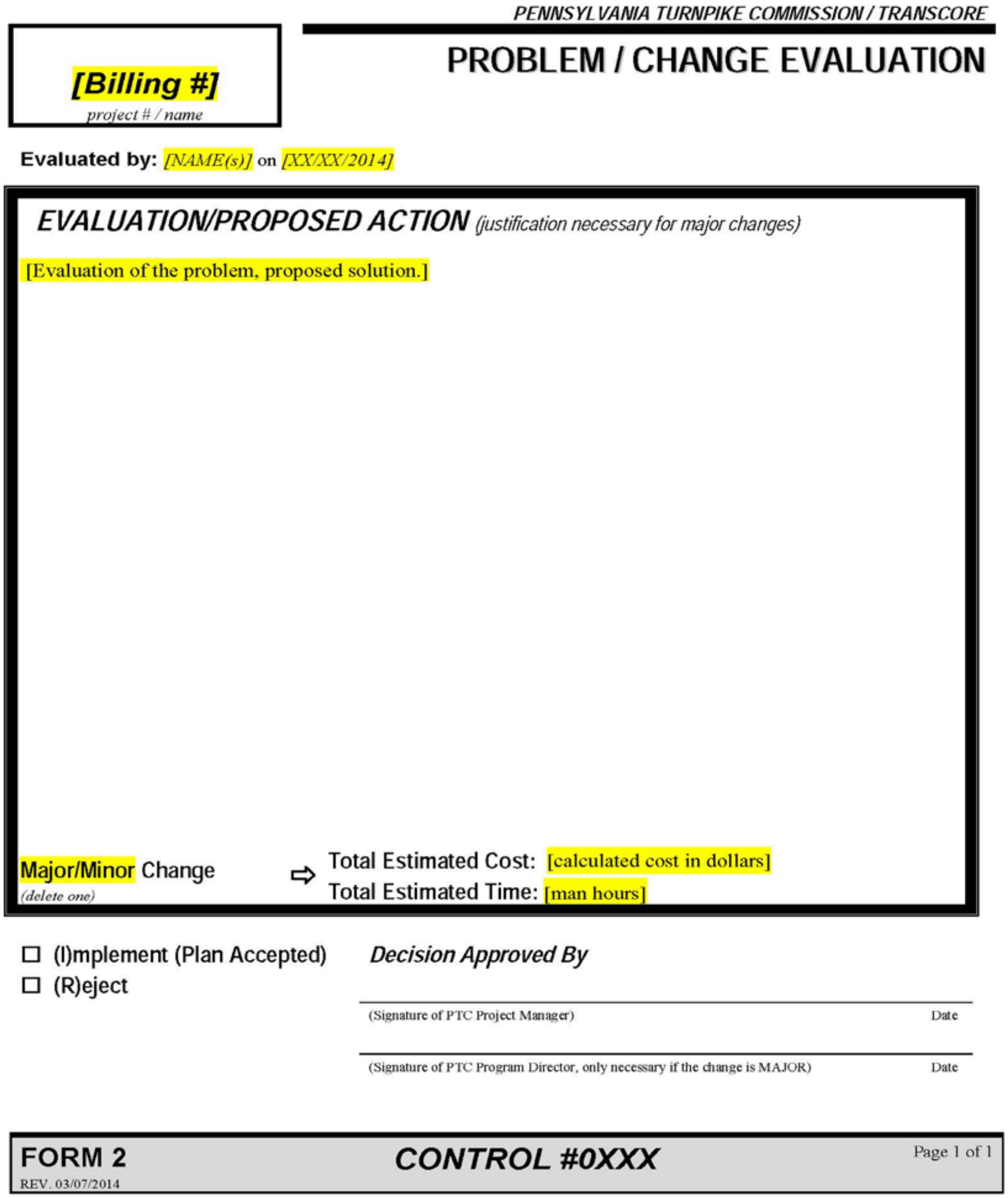
PROBLEM / CHANGE
[Very general synopsis of the problem]

Requested by *NAME* on XX/XX/2014
Prepared by *NAME* on XX/XX/2014

Submitted to *NAME* on *XX/XX/*2014

FORM 1 ***CONTROL #0XXX*** Page 1 of 1
REV. 03/07/2014

ECO Form 2 Sample:



PENNSYLVANIA TURNPIKE COMMISSION / TRANSCORE

PROBLEM / CHANGE EVALUATION

[Billing #]
project # / name

Evaluated by: *[NAME(s)]* on *[XX/XX/2014]*

EVALUATION/PROPOSED ACTION *(justification necessary for major changes)*

[Evaluation of the problem, proposed solution.]

Major/Minor Change
(delete one)

⇨ Total Estimated Cost: [calculated cost in dollars]
Total Estimated Time: [man hours]

☐ (I)mplement (Plan Accepted)
☐ (R)eject

Decision Approved By

(Signature of PTC Project Manager) Date

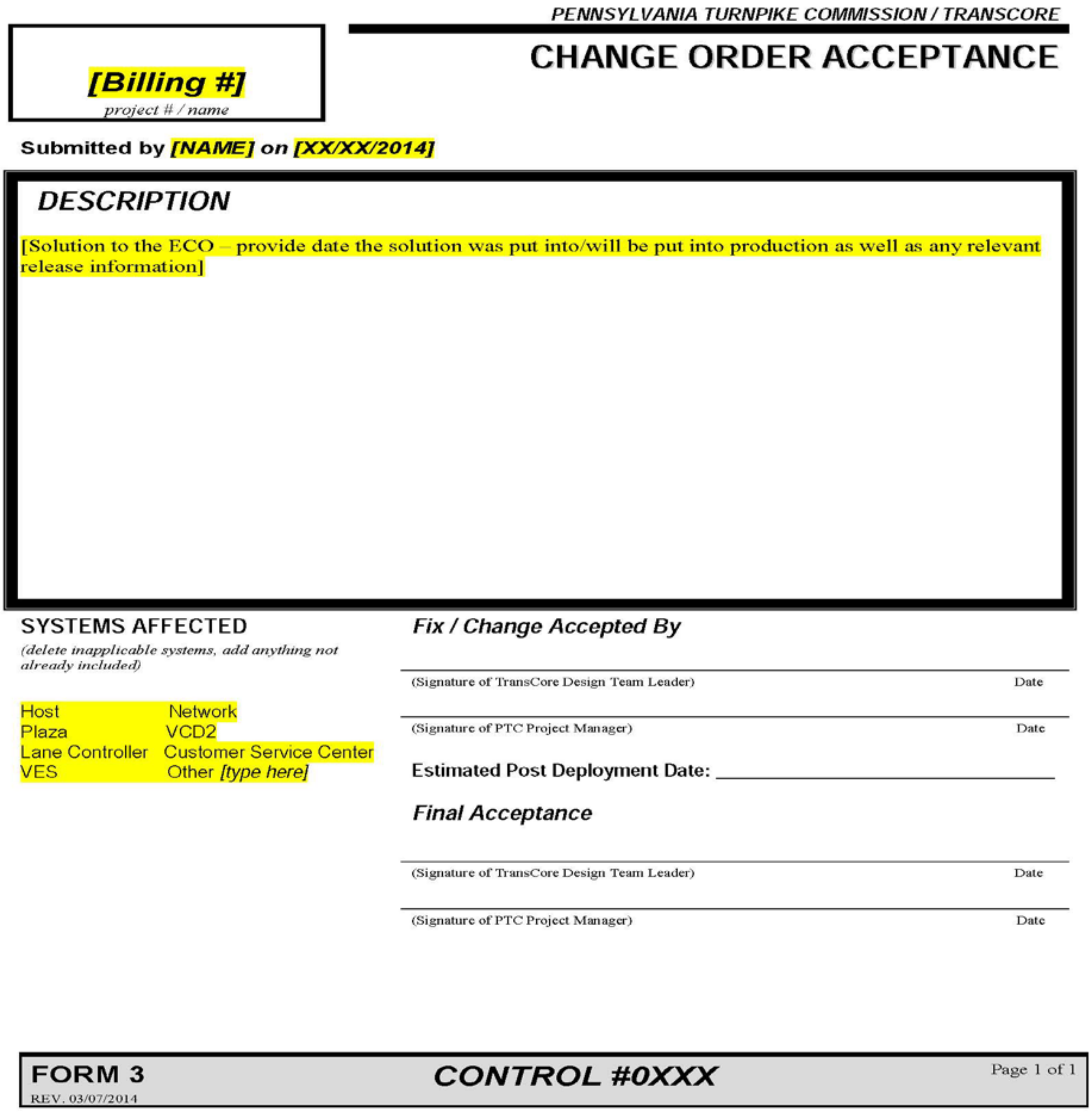
(Signature of PTC Program Director, only necessary if the change is MAJOR) Date

FORM 2
REV. 03/07/2014

CONTROL #0XXX

Page 1 of 1

ECO Form 3 Sample:



PENNSYLVANIA TURNPIKE COMMISSION / TRANSCORE

CHANGE ORDER ACCEPTANCE

[Billing #]
project # / name

Submitted by *[NAME]* on *[XX/XX/2014]*

DESCRIPTION

[Solution to the ECO – provide date the solution was put into/will be put into production as well as any relevant release information]

SYSTEMS AFFECTED

(delete inapplicable systems, add anything not already included)

Host
Plaza
Lane Controller
VES

Network
VCD2
Customer Service Center
Other *[type here]*

Fix / Change Accepted By

(Signature of TransCore Design Team Leader) Date

(Signature of PTC Project Manager) Date

Estimated Post Deployment Date: ______________________________

Final Acceptance

(Signature of TransCore Design Team Leader) Date

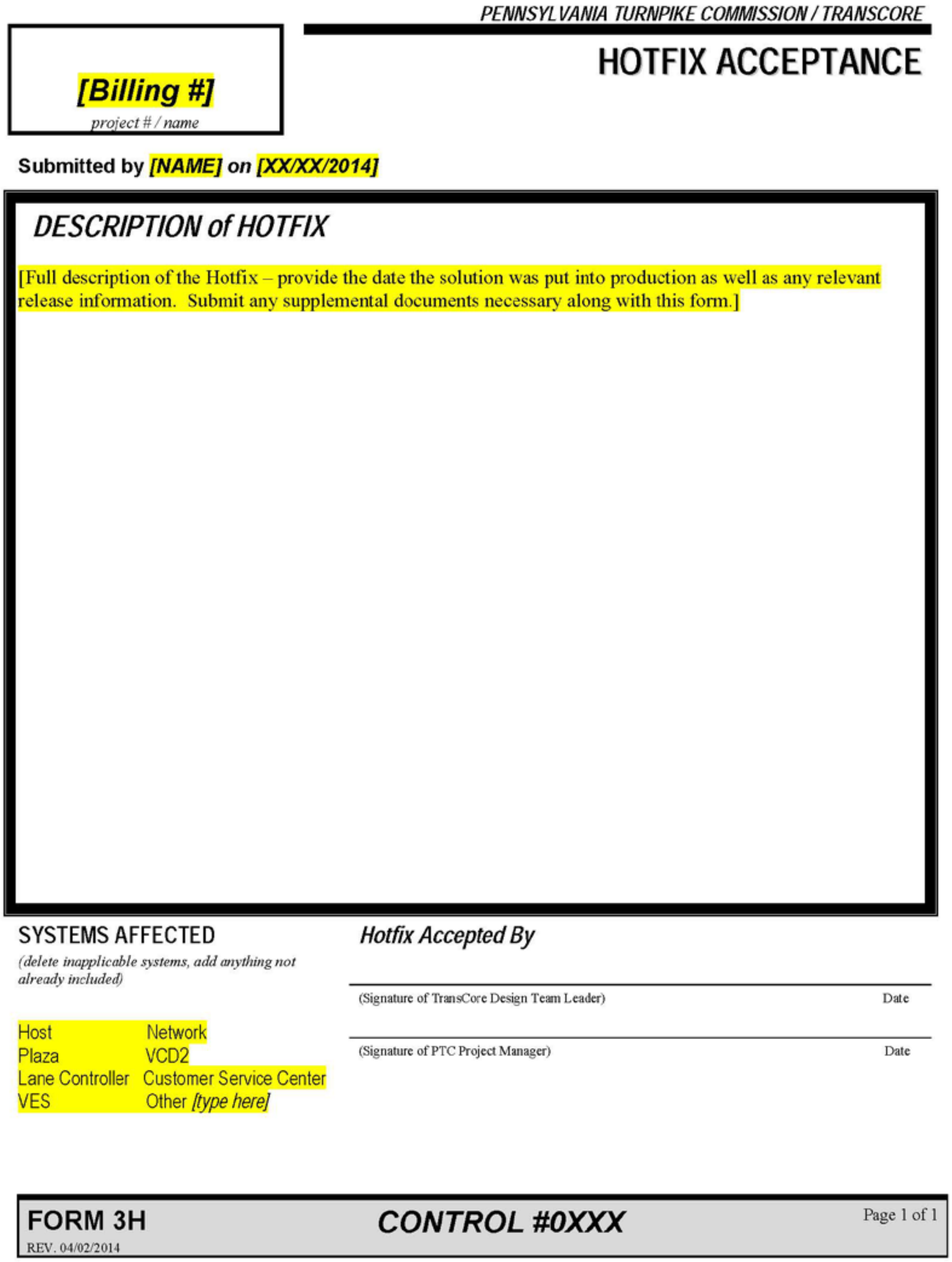
(Signature of PTC Project Manager) Date

FORM 3
REV. 03/07/2014

CONTROL #0XXX

Page 1 of 1

ECO Form 3H Sample:



PENNSYLVANIA TURNPIKE COMMISSION / TRANSCORE

HOTFIX ACCEPTANCE

[Billing #]
project # / name

Submitted by *[NAME]* on *[XX/XX/2014]*

DESCRIPTION of HOTFIX

[Full description of the Hotfix – provide the date the solution was put into production as well as any relevant release information. Submit any supplemental documents necessary along with this form.]

SYSTEMS AFFECTED
(delete inapplicable systems, add anything not already included)

Host
Plaza
Lane Controller
VES
Network
VCD2
Customer Service Center
Other *[type here]*

Hotfix Accepted By

(Signature of TransCore Design Team Leader) Date

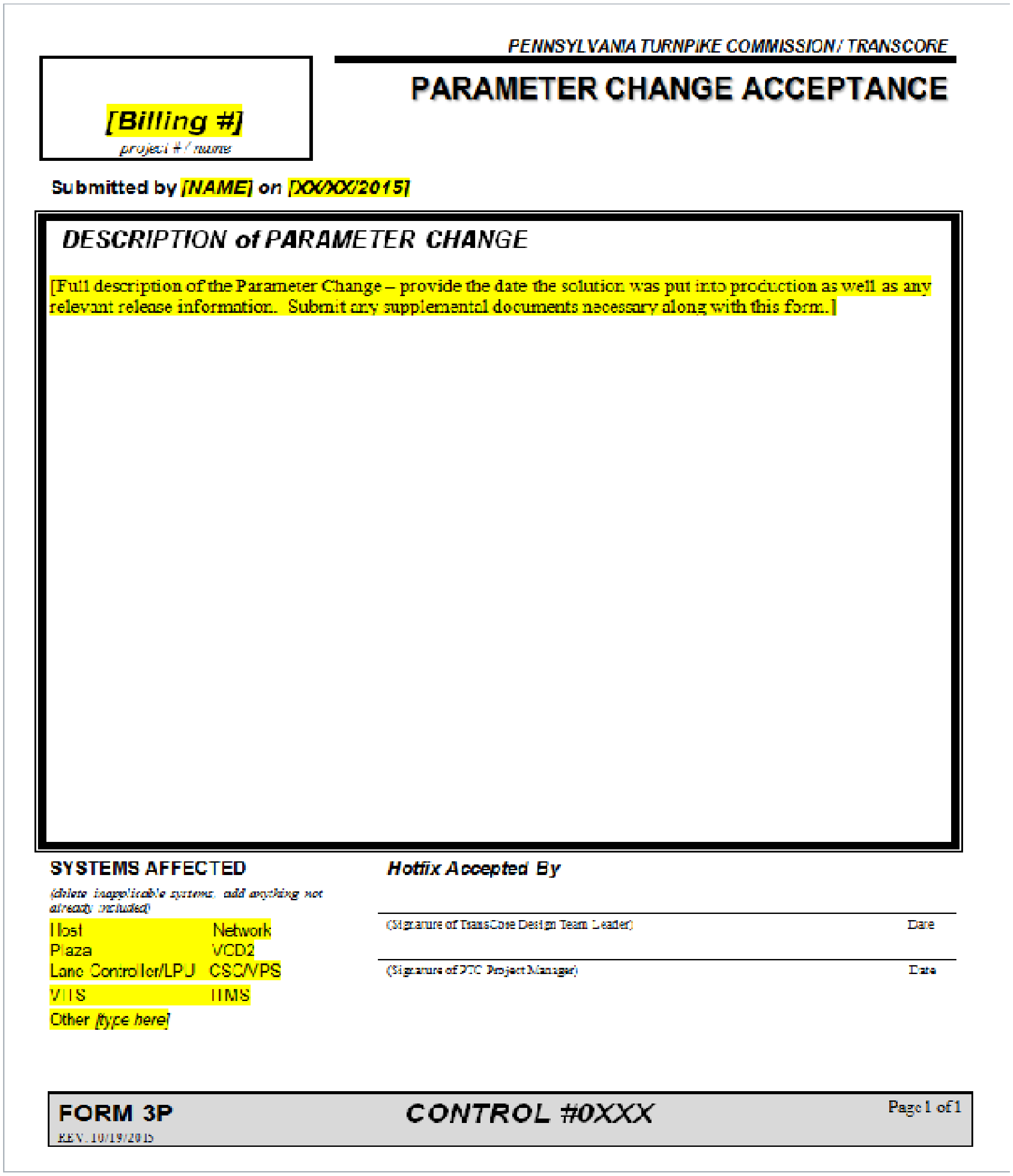
(Signature of PTC Project Manager) Date

FORM 3H
REV. 04/02/2014

CONTROL #0XXX

Page 1 of 1

ECO Form 3P Sample:



PENNSYLVANIA TURNPIKE COMMISSION / TRANSCORE

PARAMETER CHANGE ACCEPTANCE

[Billing #]
project # / name

Submitted by *[NAME]* on *[XX/XX/2015]*

DESCRIPTION of PARAMETER CHANGE

[Full description of the Parameter Change – provide the date the solution was put into production as well as any relevant release information. Submit any supplemental documents necessary along with this form.]

SYSTEMS AFFECTED

(delete inapplicable systems, add anything not already included)

Host	Network
Plaza	VCD2
Lane Controller/LPU	CSC/VPS
VIIS	IIMS
Other *[type here]*	

Hotfix Accepted By

(Signature of TransCore Design Team Leader) Date

(Signature of PTC Project Manager) Date

FORM 3P ***CONTROL #0XXX*** Page 1 of 1
REV. 10/19/2015

Attachment 13

Annual Traffic Volumes

Traffic Counts (Calendar Year)

Road Information

Highway: NE Barrier
District: (All)
Interchange: (All)

Data availability

ETC: Correlated/Unadjusted
Audit Status: Audited

Reporting Period

Calendar Year - 2017
01/01/2017
12/31/2017

EXIT TRAFFIC COUNTS

District 5		Combined			Non-ETC					ETC		
MP Interchange	**Class**	**Revenue**	**Non-Rev**	**Total**	**Cash**	**Charge**	**Non-Rev**	**Credit Card**	**Total**	**Revenue**	**Non-Rev**	**Total**
122 Keyser Avenue	Class 1	2,340,955	58,957	2,399,912	596,113	2	4,804	0	600,919	1,744,840	54,153	1,798,993
	Class 2-9	617,638	21,392	639,030	38,632	87	6,310	0	45,029	578,919	15,082	594,001
	All classes	**2,958,593**	**80,349**	**3,038,942**	**634,745**	**89**	**11,114**	**0**	**645,948**	**2,323,759**	**69,235**	**2,392,994**
131 Clarks Summit	Class 1	2,181,347	46,702	2,228,049	550,307	3	2,140	0	552,450	1,631,037	44,562	1,675,599
	Class 2-9	507,520	14,154	521,674	31,969	67	2,026	0	34,062	475,484	12,128	487,612
	All classes	**2,688,867**	**60,856**	**2,749,723**	**582,276**	**70**	**4,166**	**0**	**586,512**	**2,106,521**	**56,690**	**2,163,211**
District 5 Subtotal:	Class 1	4,522,302	105,659	4,627,961	1,146,420	5	6,944	0	1,153,369	3,375,877	98,715	3,474,592
	Class 2-9	1,125,158	35,546	1,160,704	70,601	154	8,336	0	79,091	1,054,403	27,210	1,081,613
	All classes	**5,647,460**	**141,205**	**5,788,665**	**1,217,021**	**159**	**15,280**	**0**	**1,232,460**	**4,430,280**	**125,925**	**4,556,205**

Traffic Flow (Calendar Year)

Road Information

Highway: Toll 76-276, Toll 476
From Interchange: (All)
To Interchange: (All)

Data Availability

ETC: Correlated/Unadjusted
Audit Status: 21 Day(s) Unaudited

Reporting Period

Calendar Year - 2017
01/01/2017
12/20/2017

Eastbound / Northbound - ETC Traffic

From MP	From Interchange	To MP	To Interchange	All Classes	Classes 2-9	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9
030	Warrendale	039	Butler Valley	5,025,367	1,156,237	3,869,130	169,473	44,661	173,442	269,503	233,116	263,674	2,232	136
039	Butler Valley	048	Allegheny Valley	5,538,258	1,177,124	4,361,134	191,252	46,654	175,713	270,264	230,457	260,369	2,246	169
048	Allegheny Valley	057	Pittsburgh	6,055,564	1,229,771	4,825,793	220,756	49,987	172,077	279,319	235,173	269,163	3,124	172
057	Pittsburgh	067	Irwin	6,688,617	1,291,167	5,397,450	238,921	54,968	183,234	305,338	239,857	265,537	3,152	160
067	Irwin	075	New Stanton	5,315,193	1,243,386	4,071,807	214,659	49,988	175,191	297,016	240,450	262,735	3,186	161
075	New Stanton	091	Donegal	5,169,796	1,757,263	3,412,533	165,451	40,532	138,565	397,792	443,078	567,258	4,386	201
091	Donegal	110	Somerset	4,825,640	1,735,544	3,090,096	146,602	40,071	132,038	400,121	443,868	568,197	4,452	195
110	Somerset	146	Bedford	4,573,512	1,660,049	2,913,463	128,970	36,371	119,919	382,834	434,118	554,320	3,330	187
146	Bedford	161	Breezewood	4,976,732	1,765,025	3,211,707	146,793	41,808	133,243	420,066	442,139	577,151	3,631	194
161	Breezewood	180	Fort Littleton	3,489,964	1,234,879	2,255,085	114,502	31,565	91,138	274,759	307,535	408,917	6,277	186
180	Fort Littleton	189	Willow Hill	3,557,984	1,225,763	2,332,221	122,979	31,989	92,866	267,978	302,707	400,611	6,447	186
189	Willow Hill	201	Blue Mountain	3,583,288	1,229,801	2,353,487	127,956	32,363	93,636	268,122	301,630	399,113	6,791	190
201	Blue Mountain	226	Carlisle	3,529,246	1,206,922	2,322,324	124,950	31,608	99,881	264,225	297,220	383,474	5,386	178
226	Carlisle	236	Gettysburg Pike	3,513,592	1,025,579	2,488,013	143,117	35,500	97,011	243,281	229,923	273,591	2,993	163
236	Gettysburg Pike	242	Harrisburg West	4,247,974	1,079,181	3,168,793	181,255	44,029	109,406	255,948	221,152	262,598	4,611	182
242	Harrisburg West	247	Harrisburg East	5,164,462	1,167,821	3,996,641	218,591	54,521	141,246	267,796	224,127	256,813	4,555	172
247	Harrisburg East	266	Lebanon-Lancaster	4,254,273	1,017,038	3,237,235	157,979	46,181	109,836	240,820	218,955	239,708	3,422	137
266	Lebanon-Lancaster	286	Reading	4,340,953	1,001,926	3,339,027	149,779	46,350	110,886	237,274	218,017	236,979	2,502	139
286	Reading	298	Morgantown	5,808,153	1,280,964	4,527,189	226,731	60,666	146,965	301,741	255,659	285,222	3,779	201
298	Morgantown	312	Downingtown	7,476,524	1,546,767	5,929,757	300,683	78,722	203,117	365,885	272,296	320,471	5,346	247
312	Downingtown	320	S.R. 29	7,558,665	1,398,066	6,160,599	283,358	76,244	189,659	327,527	242,016	273,705	5,274	283
320	S.R. 29	326	Valley Forge	8,089,164	1,431,966	6,657,198	291,628	79,923	199,557	331,722	246,837	276,305	5,700	294
326	Valley Forge	333	Norristown	11,124,237	1,441,428	9,682,809	389,495	93,592	204,900	315,956	203,410	222,352	11,237	486
333	Norristown	020	Mid-County	12,447,434	1,500,241	10,947,193	429,145	103,072	214,369	321,704	202,259	217,925	11,238	529
020	Mid-County	339	Fort Washington	18,491,077	2,220,463	16,270,614	636,992	160,654	351,138	458,475	281,706	318,278	12,537	683
339	Fort Washington	343	Willow Grove	16,274,395	2,116,311	14,158,084	585,027	152,606	342,056	441,657	272,902	309,268	12,096	699
343	Willow Grove	351	Bensalem	14,403,436	1,930,523	12,472,913	514,794	143,919	318,177	405,260	252,362	283,303	12,012	696

Traffic Flow (Calendar Year)

Road Information

Highway: Toll 76-276, Toll 476
From Interchange: (All)
To Interchange: (All)

Data Availability

ETC: Correlated/Unadjusted
Audit Status: 21 Day(s) Unaudited

Reporting Period

Calendar Year - 2017
01/01/2017
12/20/2017

Eastbound / Northbound - ETC Traffic

From		To												
MP	**Interchange**	**MP**	**Interchange**	**All Classes**	**Classes 2-9**	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**	**Class 6**	**Class 7**	**Class 8**	**Class 9**
351	Bensalem	352	Street Road	7,608,154	1,158,603	6,449,551	293,074	79,000	183,714	254,308	155,513	184,459	8,212	323
352	Street Road	353	Neshaminy Falls	6,587,331	1,107,481	5,479,850	250,518	75,084	180,359	253,784	154,987	184,245	8,184	320
020	Mid-County	031	Lansdale	9,755,580	1,635,173	8,120,407	370,395	108,645	371,913	403,800	160,050	214,390	5,575	405
031	Lansdale	044	Quakertown	7,242,502	1,396,811	5,845,691	281,851	88,795	322,071	363,487	145,398	191,241	3,727	241
044	Quakertown	056	Lehigh Valley	6,388,767	1,356,042	5,032,725	267,082	84,305	309,551	357,753	145,141	188,341	3,652	217
056	Lehigh Valley	074	Mahoning Valley	4,149,438	878,236	3,271,202	188,822	49,819	143,809	219,250	120,824	153,786	1,827	99
074	Mahoning Valley	087	S.R. 903	3,504,974	849,223	2,655,751	162,720	46,861	141,766	215,571	122,159	157,258	2,818	70
087	S.R. 903	095	Pocono	3,155,315	822,102	2,333,213	149,445	45,812	138,643	210,301	120,230	154,855	2,749	67
095	Pocono	105	Wilkes-Barre	2,270,308	499,617	1,770,691	113,903	36,865	87,103	133,274	63,671	63,407	1,368	26
105	Wilkes-Barre	115	Wyoming Valley	1,454,003	446,439	1,007,564	72,835	30,804	84,685	129,825	63,322	63,478	1,460	30

Traffic Flow (Calendar Year)

Road Information

Highway: Toll 76-276, Toll 476
From Interchange: (All)
To Interchange: (All)

Data Availability

ETC: Correlated/Unadjusted
Audit Status: 21 Day(s) Unaudited

Reporting Period

Calendar Year - 2017
01/01/2017
12/20/2017

Eastbound / Northbound - Non-ETC Traffic

From		To												
MP	**Interchange**	**MP**	**Interchange**	**All Classes**	**Classes 2-9**	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**	**Class 6**	**Class 7**	**Class 8**	**Class 9**
030	Warrendale	039	Butler Valley	1,343,490	123,344	1,220,146	59,613	9,430	12,095	15,220	10,861	15,850	208	67
039	Butler Valley	048	Allegheny Valley	1,499,213	133,243	1,365,970	64,301	10,041	14,624	15,901	11,040	16,752	408	176
048	Allegheny Valley	057	Pittsburgh	1,708,094	138,519	1,569,575	68,129	10,271	15,283	16,743	11,232	16,397	344	120
057	Pittsburgh	067	Irwin	2,073,787	144,061	1,929,726	70,523	11,056	14,909	17,387	11,856	17,895	297	138
067	Irwin	075	New Stanton	1,683,400	136,549	1,546,851	63,728	10,572	14,008	17,580	12,040	18,189	297	135
075	New Stanton	091	Donegal	1,762,196	240,390	1,521,806	78,199	13,889	17,873	38,903	34,676	56,061	498	291
091	Donegal	110	Somerset	1,620,438	233,546	1,386,892	72,977	13,436	17,009	38,726	34,703	55,930	488	277
110	Somerset	146	Bedford	1,520,397	224,139	1,296,258	69,060	12,684	15,908	37,176	34,195	54,297	585	234
146	Bedford	161	Breezewood	1,724,410	238,856	1,485,554	78,245	13,769	17,347	41,231	34,669	52,845	535	215
161	Breezewood	180	Fort Littleton	941,887	159,314	782,573	50,704	8,954	12,241	28,491	23,647	34,622	487	168
180	Fort Littleton	189	Willow Hill	974,711	157,457	817,254	53,646	8,967	11,169	26,586	22,504	33,891	516	178
189	Willow Hill	201	Blue Mountain	980,097	160,141	819,956	54,478	8,960	12,141	26,654	23,136	33,797	795	180
201	Blue Mountain	226	Carlisle	939,339	152,855	786,484	51,999	8,439	12,126	24,891	21,836	32,899	506	159
226	Carlisle	236	Gettysburg Pike	885,322	116,541	768,781	45,975	7,107	8,625	18,413	14,309	21,695	332	85
236	Gettysburg Pike	242	Harrisburg West	999,969	119,154	880,815	48,971	7,712	9,410	18,272	13,740	20,439	515	95
242	Harrisburg West	247	Harrisburg East	1,247,049	136,976	1,110,073	56,622	9,230	12,555	20,593	14,923	22,290	638	125
247	Harrisburg East	266	Lebanon-Lancaster	1,102,313	113,032	989,281	43,500	7,417	9,448	18,342	13,458	20,358	424	85
266	Lebanon-Lancaster	286	Reading	1,096,017	107,683	988,334	39,896	7,256	10,331	18,097	13,210	18,608	222	63
286	Reading	298	Morgantown	1,386,077	125,156	1,260,921	47,482	9,257	13,174	23,315	13,817	17,785	262	64
298	Morgantown	312	Downingtown	1,705,867	140,365	1,565,502	55,159	11,448	16,291	25,686	13,849	17,538	328	66
312	Downingtown	320	S.R. 29	1,497,960	124,073	1,373,887	49,316	10,447	14,561	21,471	12,127	15,725	352	74
320	S.R. 29	326	Valley Forge	1,497,963	124,073	1,373,890	49,316	10,447	14,561	21,471	12,127	15,725	352	74
326	Valley Forge	333	Norristown	1,568,176	122,828	1,445,348	53,145	11,384	14,915	18,359	10,269	13,931	727	98
333	Norristown	020	Mid-County	1,882,985	134,597	1,748,388	60,394	13,338	16,343	18,849	10,667	14,132	746	128
020	Mid-County	339	Fort Washington	3,001,855	205,360	2,796,495	95,778	20,487	24,675	29,314	15,412	19,079	467	148
339	Fort Washington	343	Willow Grove	2,763,298	192,504	2,570,794	88,023	19,173	23,683	27,731	14,993	18,322	430	149
343	Willow Grove	351	Bensalem	2,460,953	173,811	2,287,142	76,438	18,189	22,561	25,395	13,612	16,942	535	139

Traffic Flow (Calendar Year)

Road Information

Highway: Toll 76-276, Toll 476
From Interchange: (All)
To Interchange: (All)

Data Availability

ETC: Correlated/Unadjusted
Audit Status: 21 Day(s) Unaudited

Reporting Period

Calendar Year - 2017
01/01/2017
12/20/2017

Eastbound / Northbound - Non-ETC Traffic

From		To												
MP	**Interchange**	**MP**	**Interchange**	**All Classes**	**Classes 2-9**	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**	**Class 6**	**Class 7**	**Class 8**	**Class 9**
351	Bensalem	352	Street Road	969,255	88,185	881,070	35,810	10,823	10,579	14,540	8,139	8,067	206	21
352	Street Road	353	Neshaminy Falls	969,255	88,185	881,070	35,810	10,823	10,579	14,540	8,139	8,067	206	21
020	Mid-County	031	Lansdale	2,106,939	157,733	1,949,206	54,904	12,638	25,817	26,194	13,598	23,568	854	160
031	Lansdale	044	Quakertown	1,798,174	143,425	1,654,749	46,671	10,879	26,249	25,368	12,721	21,141	268	128
044	Quakertown	056	Lehigh Valley	1,651,555	139,909	1,511,646	47,138	10,254	25,308	25,007	12,086	19,799	218	99
056	Lehigh Valley	074	Mahoning Valley	1,163,500	98,086	1,065,414	36,291	7,201	13,998	16,958	9,376	13,901	328	33
074	Mahoning Valley	087	S.R. 903	981,019	94,704	886,315	31,695	6,522	14,971	16,831	9,537	14,737	378	33
087	S.R. 903	095	Pocono	981,025	94,704	886,321	31,695	6,522	14,971	16,831	9,537	14,737	378	33
095	Pocono	105	Wilkes-Barre	680,314	48,278	632,036	20,100	4,444	7,239	8,108	3,284	4,976	117	10
105	Wilkes-Barre	115	Wyoming Valley	389,864	40,849	349,015	14,074	2,975	6,963	8,159	3,294	5,237	136	11

Traffic Flow (Calendar Year)

Road Information

Highway: Toll 76-276, Toll 476
From Interchange: (All)
To Interchange: (All)

Data Availability

ETC: Correlated/Unadjusted
Audit Status: 21 Day(s) Unaudited

Reporting Period

Calendar Year - 2017
01/01/2017
12/20/2017

Eastbound / Northbound - Combined Traffic

From		To												
MP	**Interchange**	**MP**	**Interchange**	**All Classes**	**Classes 2-9**	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**	**Class 6**	**Class 7**	**Class 8**	**Class 9**
030	Warrendale	039	Butler Valley	6,368,857	1,279,581	5,089,276	229,086	54,091	185,537	284,723	243,977	279,524	2,440	203
039	Butler Valley	048	Allegheny Valley	7,037,471	1,310,367	5,727,104	255,553	56,695	190,337	286,165	241,497	277,121	2,654	345
048	Allegheny Valley	057	Pittsburgh	7,763,658	1,368,290	6,395,368	288,885	60,258	187,360	296,062	246,405	285,560	3,468	292
057	Pittsburgh	067	Irwin	8,762,404	1,435,228	7,327,176	309,444	66,024	198,143	322,725	251,713	283,432	3,449	298
067	Irwin	075	New Stanton	6,998,593	1,379,935	5,618,658	278,387	60,560	189,199	314,596	252,490	280,924	3,483	296
075	New Stanton	091	Donegal	6,931,992	1,997,653	4,934,339	243,650	54,421	156,438	436,695	477,754	623,319	4,884	492
091	Donegal	110	Somerset	6,446,078	1,969,090	4,476,988	219,579	53,507	149,047	438,847	478,571	624,127	4,940	472
110	Somerset	146	Bedford	6,093,909	1,884,188	4,209,721	198,030	49,055	135,827	420,010	468,313	608,617	3,915	421
146	Bedford	161	Breezewood	6,701,142	2,003,881	4,697,261	225,038	55,577	150,590	461,297	476,808	629,996	4,166	409
161	Breezewood	180	Fort Littleton	4,431,851	1,394,193	3,037,658	165,206	40,519	103,379	303,250	331,182	443,539	6,764	354
180	Fort Littleton	189	Willow Hill	4,532,695	1,383,220	3,149,475	176,625	40,956	104,035	294,564	325,211	434,502	6,963	364
189	Willow Hill	201	Blue Mountain	4,563,385	1,389,942	3,173,443	182,434	41,323	105,777	294,776	324,766	432,910	7,586	370
201	Blue Mountain	226	Carlisle	4,468,585	1,359,777	3,108,808	176,949	40,047	112,007	289,116	319,056	416,373	5,892	337
226	Carlisle	236	Gettysburg Pike	4,398,914	1,142,120	3,256,794	189,092	42,607	105,636	261,694	244,232	295,286	3,325	248
236	Gettysburg Pike	242	Harrisburg West	5,247,943	1,198,335	4,049,608	230,226	51,741	118,816	274,220	234,892	283,037	5,126	277
242	Harrisburg West	247	Harrisburg East	6,411,511	1,304,797	5,106,714	275,213	63,751	153,801	288,389	239,050	279,103	5,193	297
247	Harrisburg East	266	Lebanon-Lancaster	5,356,586	1,130,070	4,226,516	201,479	53,598	119,284	259,162	232,413	260,066	3,846	222
266	Lebanon-Lancaster	286	Reading	5,436,970	1,109,609	4,327,361	189,675	53,606	121,217	255,371	231,227	255,587	2,724	202
286	Reading	298	Morgantown	7,194,230	1,406,120	5,788,110	274,213	69,923	160,139	325,056	269,476	303,007	4,041	265
298	Morgantown	312	Downingtown	9,182,391	1,687,132	7,495,259	355,842	90,170	219,408	391,571	286,145	338,009	5,674	313
312	Downingtown	320	S.R. 29	9,056,625	1,522,139	7,534,486	332,674	86,691	204,220	348,998	254,143	289,430	5,626	357
320	S.R. 29	326	Valley Forge	9,587,127	1,556,039	8,031,088	340,944	90,370	214,118	353,193	258,964	292,030	6,052	368
326	Valley Forge	333	Norristown	12,692,413	1,564,256	11,128,157	442,640	104,976	219,815	334,315	213,679	236,283	11,964	584
333	Norristown	020	Mid-County	14,330,419	1,634,838	12,695,581	489,539	116,410	230,712	340,553	212,926	232,057	11,984	657
020	Mid-County	339	Fort Washington	21,492,932	2,425,823	19,067,109	732,770	181,141	375,813	487,789	297,118	337,357	13,004	831
339	Fort Washington	343	Willow Grove	19,037,693	2,308,815	16,728,878	673,050	171,779	365,739	469,388	287,895	327,590	12,526	848
343	Willow Grove	351	Bensalem	16,864,389	2,104,334	14,760,055	591,232	162,108	340,738	430,655	265,974	300,245	12,547	835

Pennsylvania Turnpike Commission (PTC)
Cashless Tolling System Implementation and Maintenance

Traffic Flow (Calendar Year)

RFP #: 18-10495-8121

Road Information

Highway: Toll 76-276, Toll 476
From Interchange: (All)
To Interchange: (All)

Data Availability

ETC: Correlated/Unadjusted
Audit Status: 21 Day(s) Unaudited

Reporting Period

Calendar Year - 2017
01/01/2017
12/20/2017

Eastbound / Northbound - Combined Traffic

From		To												
MP	**Interchange**	**MP**	**Interchange**	**All Classes**	**Classes 2-9**	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**	**Class 6**	**Class 7**	**Class 8**	**Class 9**
351	Bensalem	352	Street Road	8,577,409	1,246,788	7,330,621	328,884	89,823	194,293	268,848	163,652	192,526	8,418	344
352	Street Road	353	Neshaminy Falls	7,556,586	1,195,666	6,360,920	286,328	85,907	190,938	268,324	163,126	192,312	8,390	341
020	Mid-County	031	Lansdale	11,862,519	1,792,906	10,069,613	425,299	121,283	397,730	429,994	173,648	237,958	6,429	565
031	Lansdale	044	Quakertown	9,040,676	1,540,236	7,500,440	328,522	99,674	348,320	388,855	158,119	212,382	3,995	369
044	Quakertown	056	Lehigh Valley	8,040,322	1,495,951	6,544,371	314,220	94,559	334,859	382,760	157,227	208,140	3,870	316
056	Lehigh Valley	074	Mahoning Valley	5,312,938	976,322	4,336,616	225,113	57,020	157,807	236,208	130,200	167,687	2,155	132
074	Mahoning Valley	087	S.R. 903	4,485,993	943,927	3,542,066	194,415	53,383	156,737	232,402	131,696	171,995	3,196	103
087	S.R. 903	095	Pocono	4,136,340	916,806	3,219,534	181,140	52,334	153,614	227,132	129,767	169,592	3,127	100
095	Pocono	105	Wilkes-Barre	2,950,622	547,895	2,402,727	134,003	41,309	94,342	141,382	66,955	68,383	1,485	36
105	Wilkes-Barre	115	Wyoming Valley	1,843,867	487,288	1,356,579	86,909	33,779	91,648	137,984	66,616	68,715	1,596	41

Traffic Flow (Calendar Year)

Road Information

Highway: Toll 76-276, Toll 476
From Interchange: (All)
To Interchange: (All)

Data Availability

ETC: Correlated/Unadjusted
Audit Status: 21 Day(s) Unaudited

Reporting Period

Calendar Year - 2017
01/01/2017
12/20/2017

Westbound / Southbound - ETC Traffic

From		To												
MP	**Interchange**	**MP**	**Interchange**	**All Classes**	**Classes 2-9**	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**	**Class 6**	**Class 7**	**Class 8**	**Class 9**
115	Wyoming Valley	105	Wilkes-Barre	1,619,469	454,327	1,165,142	75,118	22,631	71,103	124,763	67,904	90,590	2,136	82
105	Wilkes-Barre	095	Pocono	2,503,055	546,850	1,956,205	111,015	32,418	85,182	148,523	73,011	94,325	2,291	85
095	Pocono	087	S.R. 903	3,385,142	860,748	2,524,394	152,268	44,021	121,935	222,351	130,944	183,802	5,315	112
087	S.R. 903	074	Mahoning Valley	3,716,563	883,441	2,833,122	163,918	44,776	124,192	226,864	132,443	185,761	5,377	110
074	Mahoning Valley	056	Lehigh Valley	4,318,471	891,432	3,427,039	179,212	48,167	126,668	226,725	129,893	177,107	3,556	104
056	Lehigh Valley	044	Quakertown	6,531,078	1,388,361	5,142,717	301,290	94,900	250,306	323,528	194,401	217,671	5,637	628
044	Quakertown	031	Lansdale	7,345,397	1,433,807	5,911,590	329,270	98,669	254,352	335,184	199,032	210,551	6,081	668
031	Lansdale	020	Mid-County	9,902,597	1,685,164	8,217,433	418,878	120,405	304,811	375,762	221,135	239,477	4,493	203
353	Neshaminy Falls	351	Bensalem	6,247,759	1,074,215	5,173,544	210,517	75,212	227,080	285,066	127,355	145,212	3,473	300
351	Bensalem	343	Willow Grove	14,238,747	1,966,102	12,272,645	511,390	137,590	346,645	506,133	214,661	240,074	8,578	1,031
343	Willow Grove	340	Virginia Drive	15,442,021	2,140,294	13,301,727	579,947	152,854	381,079	539,912	236,959	239,474	8,764	1,305
340	Virginia Drive	339	Fort Washington	16,718,317	2,172,823	14,545,494	608,510	154,473	382,917	540,301	237,055	239,471	8,769	1,327
339	Fort Washington	020	Mid-County	18,692,524	2,291,137	16,401,387	660,889	166,850	409,762	556,141	245,187	242,223	8,853	1,232
020	Mid-County	333	Norristown	12,434,276	1,516,300	10,917,976	423,387	101,421	252,607	358,234	183,817	189,019	6,918	897
333	Norristown	326	Valley Forge	11,275,635	1,480,773	9,794,862	395,368	94,479	249,110	359,524	182,860	191,400	7,168	864
326	Valley Forge	320	S.R. 29	7,905,144	1,470,970	6,434,174	296,390	85,008	235,337	389,274	209,051	249,874	5,707	329
320	S.R. 29	312	Downingtown	7,285,174	1,403,064	5,882,110	268,964	79,773	220,082	377,383	206,277	245,082	5,250	253
312	Downingtown	298	Morgantown	7,095,971	1,525,870	5,570,101	271,254	83,506	242,335	421,458	226,386	275,370	5,339	222
298	Morgantown	286	Reading	5,456,123	1,258,309	4,197,814	201,667	62,654	190,516	364,555	203,871	231,661	3,210	175
286	Reading	266	Lebanon-Lancaster	3,994,721	1,005,340	2,989,381	147,439	45,083	132,467	283,249	189,253	205,326	2,379	144
266	Lebanon-Lancaster	247	Harrisburg East	3,875,163	1,011,895	2,863,268	153,830	44,584	130,862	282,750	191,910	205,408	2,409	142
247	Harrisburg East	242	Harrisburg West	4,787,846	1,175,768	3,612,078	209,239	51,139	163,065	292,211	213,591	241,993	4,324	206
242	Harrisburg West	236	Gettysburg Pike	4,083,586	1,155,559	2,928,027	183,130	45,391	151,531	286,013	224,844	260,084	4,358	208
236	Gettysburg Pike	226	Carlisle	3,156,215	1,081,031	2,075,184	135,818	34,230	127,994	277,851	234,931	266,612	3,426	169
226	Carlisle	201	Blue Mountain	3,080,355	1,221,591	1,858,764	116,794	27,048	92,539	300,387	298,515	381,929	4,229	150
201	Blue Mountain	189	Willow Hill	3,116,815	1,231,705	1,885,110	119,635	27,730	99,669	307,164	300,986	371,265	5,102	154
189	Willow Hill	180	Fort Littleton	3,082,511	1,224,757	1,857,754	115,164	27,325	98,562	307,109	301,223	370,751	4,470	153

Traffic Flow (Calendar Year)

Road Information

Highway: Toll 76-276, Toll 476
From Interchange: (All)
To Interchange: (All)

Data Availability

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Reporting Period

Calendar Year - 2017
01/01/2017
12/20/2017

Westbound / Southbound - ETC Traffic

From MP	From Interchange	To MP	To Interchange	All Classes	Classes 2-9	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9
180	Fort Littleton	161	Breezewood	2,995,394	1,222,105	1,773,289	104,741	26,834	102,176	309,413	304,249	371,472	3,070	150
161	Breezewood	146	Bedford	4,520,903	1,763,973	2,756,930	136,626	36,714	125,998	453,891	420,279	586,353	3,925	187
146	Bedford	110	Somerset	4,065,949	1,642,980	2,422,969	119,179	32,777	109,931	425,139	396,838	555,032	3,905	179
110	Somerset	091	Donegal	4,321,878	1,727,545	2,594,333	137,343	36,856	126,130	443,271	405,543	573,434	4,776	192
091	Donegal	075	New Stanton	4,660,180	1,748,273	2,911,907	153,581	37,982	128,045	440,299	403,537	576,929	7,665	235
075	New Stanton	067	Irwin	4,805,363	1,273,761	3,531,602	197,858	49,704	127,218	318,039	235,677	338,526	6,604	135
067	Irwin	057	Pittsburgh	6,058,103	1,316,407	4,741,696	229,338	55,119	139,307	331,010	232,299	323,095	6,099	140
057	Pittsburgh	048	Allegheny Valley	5,409,985	1,238,775	4,171,210	213,634	52,001	147,753	312,514	209,760	298,531	4,475	107
048	Allegheny Valley	039	Butler Valley	4,850,893	1,200,492	3,650,401	194,231	48,080	148,737	300,992	205,301	298,579	4,474	98
039	Butler Valley	030	Warrendale	4,355,795	1,181,157	3,174,638	179,548	46,108	155,102	300,012	205,448	290,993	3,864	82

Traffic Flow (Calendar Year)

Road Information

Highway: Toll 76-276, Toll 476
From Interchange: (All)
To Interchange: (All)

Data Availability

ETC: Correlated/Unadjusted
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Reporting Period

Calendar Year - 2017
01/01/2017
12/20/2017

Westbound / Southbound - Non-ETC Traffic

From MP	From Interchange	To MP	To Interchange	All Classes	Classes 2-9	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9
115	Wyoming Valley	105	Wilkes-Barre	380,803	37,046	343,757	15,490	2,520	5,443	6,919	2,413	4,153	91	17
105	Wilkes-Barre	095	Pocono	682,124	49,502	632,622	23,152	3,910	7,057	7,922	2,754	4,587	99	21
095	Pocono	087	S.R. 903	982,614	98,215	884,399	35,217	5,656	11,304	16,234	10,189	19,081	478	56
087	S.R. 903	074	Mahoning Valley	982,616	98,215	884,401	35,217	5,656	11,304	16,234	10,189	19,081	478	56
074	Mahoning Valley	056	Lehigh Valley	1,161,875	98,524	1,063,351	37,989	6,375	10,972	16,235	9,335	17,208	348	62
056	Lehigh Valley	044	Quakertown	1,678,032	146,708	1,531,324	52,707	10,903	16,436	32,374	11,435	22,339	395	119
044	Quakertown	031	Lansdale	1,823,862	150,666	1,673,196	52,667	11,780	17,881	34,294	11,548	21,923	433	140
031	Lansdale	020	Mid-County	2,138,163	166,171	1,971,992	60,452	13,684	23,822	36,461	12,600	18,678	344	130
353	Neshaminy Falls	351	Bensalem	963,781	85,690	878,091	32,013	10,799	16,863	13,881	6,448	5,590	79	17
351	Bensalem	343	Willow Grove	2,492,004	178,106	2,313,898	75,044	19,430	30,100	27,719	12,166	13,223	267	157
343	Willow Grove	340	Virginia Drive	2,701,602	194,927	2,506,675	84,143	20,420	32,688	29,660	13,473	14,048	320	175
340	Virginia Drive	339	Fort Washington	2,701,605	194,927	2,506,678	84,143	20,420	32,688	29,660	13,473	14,048	320	175
339	Fort Washington	020	Mid-County	3,112,536	207,501	2,905,035	92,263	20,892	33,836	30,400	15,122	14,471	333	184
020	Mid-County	333	Norristown	1,930,643	142,467	1,788,176	58,745	13,877	25,616	21,743	11,493	10,568	303	122
333	Norristown	326	Valley Forge	1,645,996	130,093	1,515,903	52,685	12,019	24,230	20,625	10,111	10,006	300	117
326	Valley Forge	320	S.R. 29	1,524,131	128,173	1,395,958	47,026	10,769	20,856	23,076	11,659	14,348	348	91
320	S.R. 29	312	Downingtown	1,524,135	128,173	1,395,962	47,026	10,769	20,856	23,076	11,659	14,348	348	91
312	Downingtown	298	Morgantown	1,693,798	139,413	1,554,385	50,830	11,490	22,108	25,641	12,768	16,194	320	62
298	Morgantown	286	Reading	1,385,555	125,516	1,260,039	45,531	9,674	19,541	23,945	12,514	13,985	262	64
286	Reading	266	Lebanon-Lancaster	1,097,489	109,059	988,430	40,518	7,637	15,129	21,006	11,582	12,972	145	70
266	Lebanon-Lancaster	247	Harrisburg East	1,093,872	112,725	981,147	43,013	7,816	16,276	20,639	11,737	13,054	98	92
247	Harrisburg East	242	Harrisburg West	1,256,348	140,532	1,115,816	55,874	9,367	19,955	22,706	14,955	17,298	275	102
242	Harrisburg West	236	Gettysburg Pike	1,108,016	137,950	970,066	54,330	8,641	18,301	23,585	15,198	17,636	156	103
236	Gettysburg Pike	226	Carlisle	926,843	127,145	799,698	46,313	7,686	16,340	23,042	15,559	17,987	120	98
226	Carlisle	201	Blue Mountain	934,186	154,544	779,642	49,262	9,029	18,120	30,490	20,183	27,048	189	223
201	Blue Mountain	189	Willow Hill	969,022	160,952	808,070	52,282	9,574	19,167	32,386	21,211	25,652	441	239
189	Willow Hill	180	Fort Littleton	963,263	158,431	804,832	51,305	9,598	19,133	32,481	20,445	25,031	200	238

Traffic Flow (Calendar Year)

Road Information

Highway: Toll 76-276, Toll 476
From Interchange: (All)
To Interchange: (All)

Data Availability

ETC: Correlated/Unadjusted
Audit Status: 21 Day(s) Unaudited

Reporting Period

Calendar Year - 2017
01/01/2017
12/20/2017

Westbound / Southbound - Non-ETC Traffic

From		To												
MP	**Interchange**	**MP**	**Interchange**	**All Classes**	**Classes 2-9**	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**	**Class 6**	**Class 7**	**Class 8**	**Class 9**
180	Fort Littleton	161	Breezewood	922,961	158,378	764,583	47,849	9,412	19,941	33,970	21,029	25,552	390	235
161	Breezewood	146	Bedford	1,760,060	244,992	1,515,068	76,581	13,745	25,418	47,483	32,368	48,759	373	265
146	Bedford	110	Somerset	1,529,683	228,917	1,300,766	67,368	12,665	23,850	46,329	31,183	46,910	352	260
110	Somerset	091	Donegal	1,629,907	238,384	1,391,523	71,259	13,216	25,122	47,758	31,894	48,270	530	335
091	Donegal	075	New Stanton	1,768,474	244,084	1,524,390	75,918	13,625	25,661	47,511	31,902	48,571	563	333
075	New Stanton	067	Irwin	1,711,721	148,223	1,563,498	60,946	10,336	17,244	25,118	12,455	21,479	501	144
067	Irwin	057	Pittsburgh	2,088,927	156,768	1,932,159	69,614	10,889	18,066	24,413	12,536	20,638	465	147
057	Pittsburgh	048	Allegheny Valley	1,716,825	148,537	1,568,288	66,484	10,247	16,524	23,875	11,551	19,318	355	183
048	Allegheny Valley	039	Butler Valley	1,507,783	142,690	1,365,093	62,249	9,474	15,858	22,386	11,817	20,093	611	202
039	Butler Valley	030	Warrendale	1,353,906	132,493	1,221,413	58,138	8,966	14,721	21,787	10,876	17,629	318	58

Traffic Flow (Calendar Year)

Road Information

Highway: Toll 76-276, Toll 476
From Interchange: (All)
To Interchange: (All)

Data Availability

ETC: Correlated/Unadjusted
Audit Status: 21 Day(s) Unaudited

Reporting Period

Calendar Year - 2017
01/01/2017
12/20/2017

Westbound / Southbound - Combined Traffic

From		To												
MP	**Interchange**	**MP**	**Interchange**	**All Classes**	**Classes 2-9**	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**	**Class 6**	**Class 7**	**Class 8**	**Class 9**
115	Wyoming Valley	105	Wilkes-Barre	2,000,272	491,373	1,508,899	90,608	25,151	76,546	131,682	70,317	94,743	2,227	99
105	Wilkes-Barre	095	Pocono	3,185,179	596,352	2,588,827	134,167	36,328	92,239	156,445	75,765	98,912	2,390	106
095	Pocono	087	S.R. 903	4,367,756	958,963	3,408,793	187,485	49,677	133,239	238,585	141,133	202,883	5,793	168
087	S.R. 903	074	Mahoning Valley	4,699,179	981,656	3,717,523	199,135	50,432	135,496	243,098	142,632	204,842	5,855	166
074	Mahoning Valley	056	Lehigh Valley	5,480,346	989,956	4,490,390	217,201	54,542	137,640	242,960	139,228	194,315	3,904	166
056	Lehigh Valley	044	Quakertown	8,209,110	1,535,069	6,674,041	353,997	105,803	266,742	355,902	205,836	240,010	6,032	747
044	Quakertown	031	Lansdale	9,169,259	1,584,473	7,584,786	381,937	110,449	272,233	369,478	210,580	232,474	6,514	808
031	Lansdale	020	Mid-County	12,040,760	1,851,335	10,189,425	479,330	134,089	328,633	412,223	233,735	258,155	4,837	333
353	Neshaminy Falls	351	Bensalem	7,211,540	1,159,905	6,051,635	242,530	86,011	243,943	298,947	133,803	150,802	3,552	317
351	Bensalem	343	Willow Grove	16,730,751	2,144,208	14,586,543	586,434	157,020	376,745	533,852	226,827	253,297	8,845	1,188
343	Willow Grove	340	Virginia Drive	18,143,623	2,335,221	15,808,402	664,090	173,274	413,767	569,572	250,432	253,522	9,084	1,480
340	Virginia Drive	339	Fort Washington	19,419,922	2,367,750	17,052,172	692,653	174,893	415,605	569,961	250,528	253,519	9,089	1,502
339	Fort Washington	020	Mid-County	21,805,060	2,498,638	19,306,422	753,152	187,742	443,598	586,541	260,309	256,694	9,186	1,416
020	Mid-County	333	Norristown	14,364,919	1,658,767	12,706,152	482,132	115,298	278,223	379,977	195,310	199,587	7,221	1,019
333	Norristown	326	Valley Forge	12,921,631	1,610,866	11,310,765	448,053	106,498	273,340	380,149	192,971	201,406	7,468	981
326	Valley Forge	320	S.R. 29	9,429,275	1,599,143	7,830,132	343,416	95,777	256,193	412,350	220,710	264,222	6,055	420
320	S.R. 29	312	Downingtown	8,809,309	1,531,237	7,278,072	315,990	90,542	240,938	400,459	217,936	259,430	5,598	344
312	Downingtown	298	Morgantown	8,789,769	1,665,283	7,124,486	322,084	94,996	264,443	447,099	239,154	291,564	5,659	284
298	Morgantown	286	Reading	6,841,678	1,383,825	5,457,853	247,198	72,328	210,057	388,500	216,385	245,646	3,472	239
286	Reading	266	Lebanon-Lancaster	5,092,210	1,114,399	3,977,811	187,957	52,720	147,596	304,255	200,835	218,298	2,524	214
266	Lebanon-Lancaster	247	Harrisburg East	4,969,035	1,124,620	3,844,415	196,843	52,400	147,138	303,389	203,647	218,462	2,507	234
247	Harrisburg East	242	Harrisburg West	6,044,194	1,316,300	4,727,894	265,113	60,506	183,020	314,917	228,546	259,291	4,599	308
242	Harrisburg West	236	Gettysburg Pike	5,191,602	1,293,509	3,898,093	237,460	54,032	169,832	309,598	240,042	277,720	4,514	311
236	Gettysburg Pike	226	Carlisle	4,083,058	1,208,176	2,874,882	182,131	41,916	144,334	300,893	250,490	284,599	3,546	267
226	Carlisle	201	Blue Mountain	4,014,541	1,376,135	2,638,406	166,056	36,077	110,659	330,877	318,698	408,977	4,418	373
201	Blue Mountain	189	Willow Hill	4,085,837	1,392,657	2,693,180	171,917	37,304	118,836	339,550	322,197	396,917	5,543	393
189	Willow Hill	180	Fort Littleton	4,045,774	1,383,188	2,662,586	166,469	36,923	117,695	339,590	321,668	395,782	4,670	391

Traffic Flow (Calendar Year)

Road Information

Highway: Toll 76-276, Toll 476
From Interchange: (All)
To Interchange: (All)

Data Availability

ETC: Correlated/Unadjusted
Audit Status: 21 Day(s) Unaudited

Reporting Period

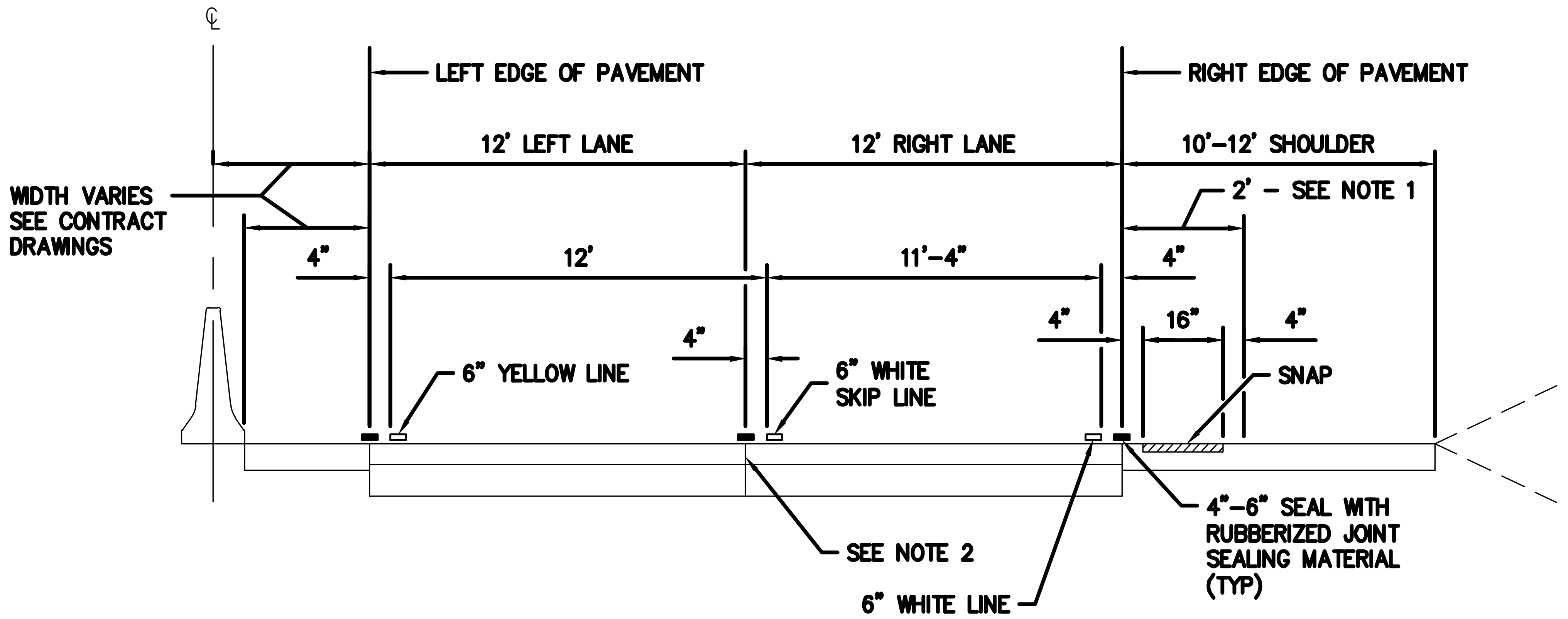
Calendar Year - 2017
01/01/2017
12/20/2017

Westbound / Southbound - Combined Traffic

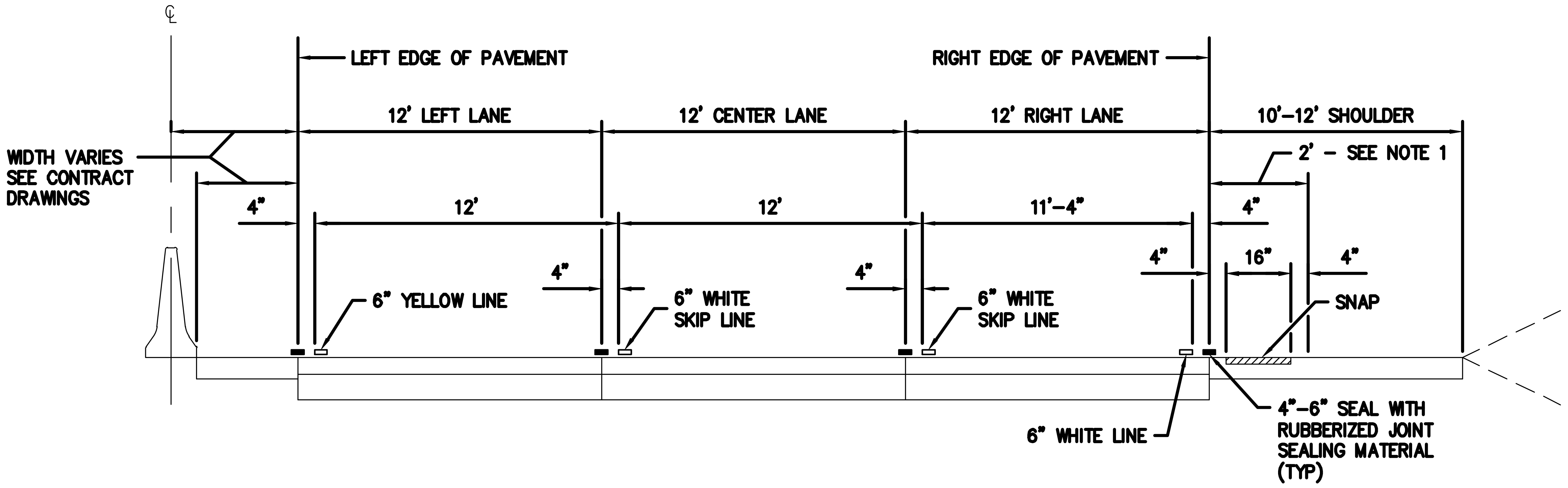
From MP	From Interchange	To MP	To Interchange	All Classes	Classes 2-9	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9
180	Fort Littleton	161	Breezewood	3,918,355	1,380,483	2,537,872	152,590	36,246	122,117	343,383	325,278	397,024	3,460	385
161	Breezewood	146	Bedford	6,280,963	2,008,965	4,271,998	213,207	50,459	151,416	501,374	452,647	635,112	4,298	452
146	Bedford	110	Somerset	5,595,632	1,871,897	3,723,735	186,547	45,442	133,781	471,468	428,021	601,942	4,257	439
110	Somerset	091	Donegal	5,951,785	1,965,929	3,985,856	208,602	50,072	151,252	491,029	437,437	621,704	5,306	527
091	Donegal	075	New Stanton	6,428,654	1,992,357	4,436,297	229,499	51,607	153,706	487,810	435,439	625,500	8,228	568
075	New Stanton	067	Irwin	6,517,084	1,421,984	5,095,100	258,804	60,040	144,462	343,157	248,132	360,005	7,105	279
067	Irwin	057	Pittsburgh	8,147,030	1,473,175	6,673,855	298,952	66,008	157,373	355,423	244,835	343,733	6,564	287
057	Pittsburgh	048	Allegheny Valley	7,126,810	1,387,312	5,739,498	280,118	62,248	164,277	336,389	221,311	317,849	4,830	290
048	Allegheny Valley	039	Butler Valley	6,358,676	1,343,182	5,015,494	256,480	57,554	164,595	323,378	217,118	318,672	5,085	300
039	Butler Valley	030	Warrendale	5,709,701	1,313,650	4,396,051	237,686	55,074	169,823	321,799	216,324	308,622	4,182	140

Attachment 14

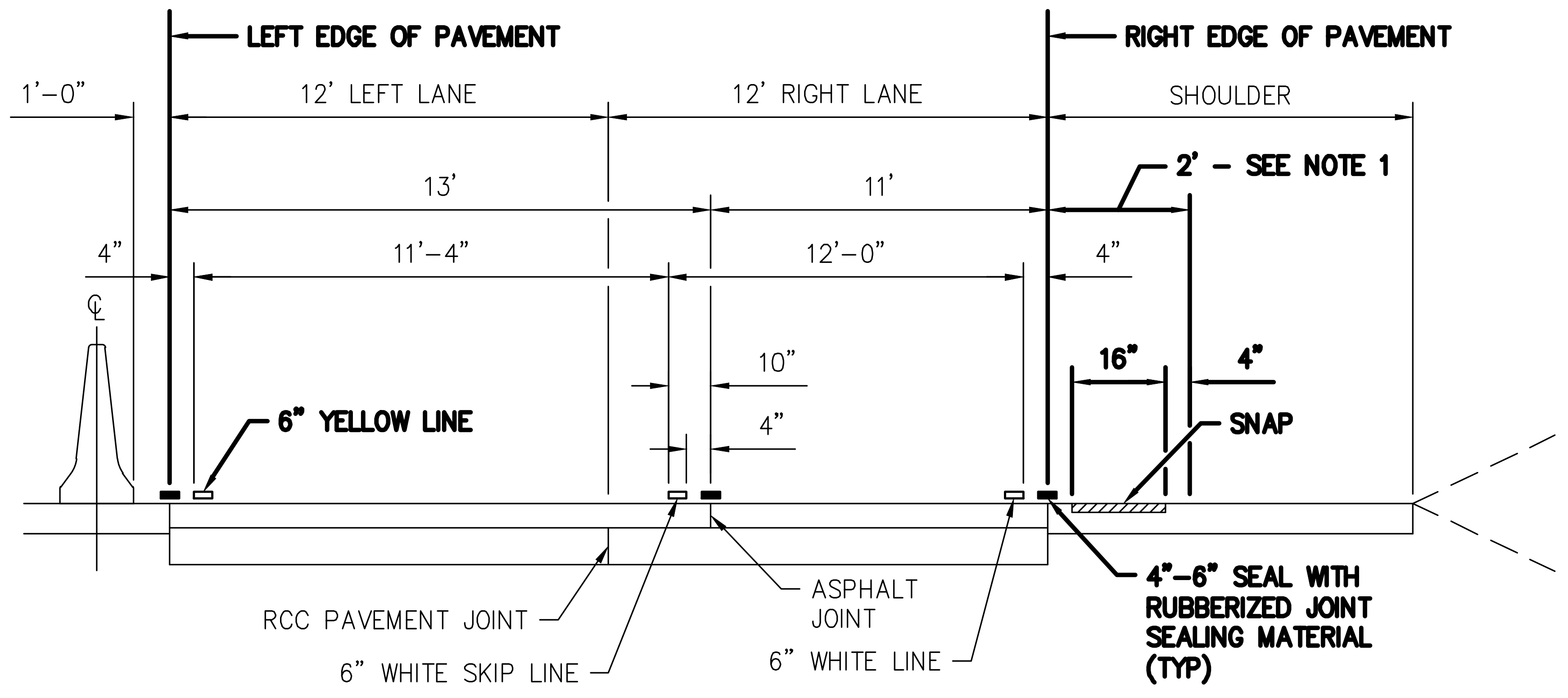
PTC Standard Pavement Markings



TWO LANE ONE DIRECTION – MAINLINE SECTION



THREE LANE ONE DIRECTION



TWO LANE ONE DIRECTION – NORTHEAST EXTENSION

NOTES:

1. SEE CONTRACT DOCUMENTS FOR LIMITS OF SHOULDER RESURFACING. 2' MINIMUM.
2. FOR MAINLINE RESURFACING CONTRACTS PLACE CONSTRUCTION JOINT IN ASPHALT OVERLAY DIRECTLY ABOVE THE JOINT IN THE RCC PAVEMENT.
3. FOR TWO LANE – ONE DIRECTION NORTHEAST RESURFACING CONTRACTS PLACE CONSTRUCTION JOINT IN ASPHALT OVERLAY 1'-0" OFFSET INTO THE RIGHT LANE FROM THE JOINT IN THE RCC PAVEMENT.
4. SEE PTS-192 FOR SNAP.

PENNA
TURN
PIKE

RECOMMENDED: DECEMBER 31, 2014
ASSISTANT CHIEF ENGINEER - DESIGN
APPROVED: JANUARY 5, 2015
CHIEF ENGINEER

**LOCATION OF JOINT SEALING,
PAVEMENT MARKINGS
AND SNAP**

**PENNSYLVANIA TURNPIKE COMMISSION
STANDARD DRAWING**

FILE NAME: PTS-112.dwg
DRAWING TYPE: 5A
SHEET 1 OF 1

DATE: JANUARY 2015

PTS-112

Exhibit B

Defined Terms and Acronyms

Exhibit B: Defined Terms and Acronyms

Defined Terms

Term	Definition
Acceptance	Approval of a Phase or Work based on meeting certain conditions, including functional; operational; performance, and test requirements set forth in the Scope of Work and Contract.
Active Directory	Microsoft's trademarked directory service. A centralized and standardized system that automates network management of user data, security, and distributed resources, and enables interoperation with other directories.
Alert(s)	Electronic notifications sent by the System to notify authorized users of System issues or conditions that may require attention.
Approve	The term "Approve" and its variations (e.g., "Approval") when capitalized in this Agreement refer to the Commission's Acceptance of a Document, condition, action or Deliverable in writing for its own internal purposes. The Commission's Approval shall not be construed to mean the Commission's endorsement or assumption of liability nor shall it relieve the Contractor of its responsibilities under the Agreement.
Approved Project Implementation Schedule	The schedule to be submitted by Contractor within 15 days of NTP and Approved by the Commission in accordance with Section 11.2 of the Contract.
As-Built Drawings	Documents and other items set forth in this Scope of Work that constitute a complete and accurate record of the System as Designed, delivered, installed and Approved.
Authorized User	Using a role-based login, Authorized Users are users authorized by the Commission to have specific privileges allowing access to information and functionality on the System not afforded to other users.
Automatic License Plate Recognition (ALPR)	The process whereby license plate characters and issuing jurisdiction are extracted from an image of a vehicle via automated (non-human) means. This may also include automatically determining and reporting license plate type if this capability is provided by the System. Also referred to as "Optical Character Recognition".
Automatic Vehicle Classification (AVC)	Lane system that uses specialized devices, sensors, and Software to recognize that a vehicle has entered the tolling zone and to classify the vehicle according to PTC classification rules.
Automatic Vehicle Identification (AVI)	Lane system comprised of radio frequency antennas and readers that communicate with transponders that are affixed to vehicles in order to read and report the transponder identification information.
Away Agency	An agency or interoperable organization with roadways traveled on by a Pennsylvania E-ZPass customer whose account is not with that agency or interoperable organization.

Term	Definition
Buffered Transponder Read	Transponder reads that are retained in the AVI reader when communications between the reader and the zone controller are down and not transmitted to the zone controller at the time of the Transponder read. Upon reestablishment of the communications such Transponder reads are transmitted to the zone controller and are called Buffered Transponder Read(s).
Business Day	Each day, exclusive of Saturdays, Sundays and Holidays, beginning at 12:00 a.m. (midnight) Eastern Time (standard or daylight as applicable).
Business Rules	A set of rules that defines how the Cashless Tolling System shall respond to various situations and conditions that occur during the toll collection process based on business case and policy decisions Approved by the Commission.
Calendar Day	Every day shown on the calendar, beginning at 12:00 a.m. (midnight) Eastern Time (standard or daylight as applicable).
Cashless Toll Concentrator / Host	Central system that receives and consolidates data from the roadside equipment to be transmitted to the existing PTC Systems. May also host functionality to support the operation and reporting of the Cashless Tolling System.
Cashless Tolling	A tolling process that enables an agency to bill or debit the toll accounts of registered vehicles for fares they incur while moving along a toll facility. Patrons are identified by the use of an on-board transponder or by capturing the vehicle's license plate.
Cashless Tolling Plaza	A toll collection facility located on a corridor or roadway that provides Cashless Toll Collection. Also referred to as "toll location or "toll Plaza".
Cashless Tolling System	Refers to the entirety of the infrastructure, Hardware, Software and Services provided by the Contractor for this Contract. This includes the lane systems and all lane Equipment, plaza/host system, MOMS and the DVAS. Also referred to as "the System" and "the Cashless Tolling System".
Class Mismatch	A condition in the transaction where the vehicle class as determined by the AVC does not match the vehicle class encoded in the transponder.
Commission	The Pennsylvania Turnpike Commission (the "Commission") operates the Pennsylvania Turnpike. To avoid unnecessary repetition of expressions, whenever in the Contract Documents the term "Commission" is used, it is understood that "or the PTC designated representative" is a part of the term unless specifically indicated otherwise. Such designated representative will be identified by the Commission.
Commissioning	The test that occurs upon completion and Approval of installation that indicates readiness for operations. Upon the Approval of the Commissioning Test at each Cashless Tolling Plaza, the Cashless Tolling Plaza shall be considered Commissioned.

Term	Definition
Conformed Scope of Work	The updated Scope of Work as agreed to between the Commission and the Contractor, executed as part of the Contract, including any Approved amendments generated during the ITN and negotiation process. When the term "Scope of Work" is referred to in the executed Contract Documents it is referring to the Conformed Scope of Work, unless otherwise indicated.
Contract	The entire and integrated contract between the parties there under which supersedes all prior negotiations, representations, or contracts, either written or oral. The Contract Documents, as amended from time to time, form the contract between the Commission and the Contractor, setting forth the obligations of the parties including, but not limited to, the performance of the Work and the basis of payment. May also be referred to as "Agreement".
Contract Documents	The documents forming the Contract including all addenda or appendices thereto, any supplemental agreements, amendments, Contract modifications, and all provisions required by law to be inserted in the Contract, whether actually inserted or not.
Contract Price	The maximum amount of money payable by the Commission to the Contractor for completion of the Work in accordance with the Contract Documents.
Contract Term	The term of the Contract, including any authorized renewals and extensions.
Contractor	In the context of the Contract Documents, Contractor means any company, firm, partnership, corporation, association, joint venture, or other legal entity permitted by law to perform the Work in the State of Pennsylvania. Such legal entity shall be the entity that enters into a written Contract with the Commission to perform the Work described in the RFP Documents and Contract Documents.
Contractor Project Manager	Contractor Key Team responsible for the management of this Project for the Contractor. May also be referred to as "Project Manager".
Dashboard	A visual display of collected information that is consolidated, arranged, and displayed on a screen(s) in an intuitive manner so that the information can be monitored and interpreted at a glance.
Day	Calendar day unless otherwise designated.
Deliverable	Any written document or item of Work provided by the Contractor to the Commission as part of meeting the Scope of Work.
Design	All aspects of Design relating to the Cashless Tolling System and Services as set forth in additional detail in the Contract Documents, including but not limited to the Scope of Work.
Digital Video Audit System (DVAS)	System with cameras and servers located at each Cashless Tolling Plaza that allows remote viewing of vehicular events and video/images in real time or stored for review. DVAS provides transaction/vehicle event data overlaid on video for correlation of vehicle and transaction data.

Term	Definition
Diverse Businesses (DB)	A disadvantaged business, minority-owned or women-owned business or service-disabled veteran-owned or veteran-owned small business that has been certified by a third-party certifying organization.
Document	See "Deliverable"
Electronic Toll Collection (ETC)	A system of integrated devices and components that perform the automatic recording and reporting of vehicle transactions through electronic media in a toll revenue collection system.
Equipment	See Hardware.
Engineering Change Order	Process for making changes to Work subject to the provisions of **Exhibit G Contract** set forth in Section 13.
E-ZPass	E-ZPass refers to the devices and programs for electronic toll collection at the E-ZPass Group interoperable agencies.
E-ZPass Group	The official name of the Interagency Group (IAG) consortium which consists of 28-member agencies in 16 states as of the date of publication of the RFP that coordinates the operation of E-ZPass, setting the necessary business and technology requirements to make the E-ZPass system interoperable.
File Transfer Protocol/Secure File Transfer Protocol	A fast, application-level protocol widely used for copying/transferring files to and from remote computer systems over a network. This protocol allows users to use FTP (or Secure FTP) commands to work with files, such as listing files and directories on the remote system.
Final Acceptance	Final Acceptance will be deemed to have occurred when the conditions for Final Acceptance set forth in Section 10 of **Exhibit G Contract** have been met.
Force Majeure	An event for which a party is excused from performance as set forth in Section 20 of **Exhibit G Contract.**
Go-Live	The date on which revenue operations commence in accordance with **Exhibit A Scope of Work**.
Hardened	A system that has undergone rigorous mechanical, thermal, and component compatibility testing to ensure overall system reliability and consistent performance in the field, however hazardous the environment may be.
Hardware	"Hardware" or "Equipment" is an all-inclusive term to mean the Equipment, Hardware, associated peripherals, associated firmware, electrical and other materials and supplies necessary or furnished by the Contractor to provide Services pursuant to the Contract Documents.

Term	Definition
Holidays	The following days are observed as PTC Holidays: A) New Year's Day (January 1); B) Martin Luther King Day (3rd Monday in January); C) Lincoln's Birthday (February 12) D) President's Day (third Monday of February) E) Good Friday (Friday preceding Easter) F) Primary Election Day G) Memorial Day (last Monday in May); H) Flag Day (June 14) I) Independence Day (July 4); J) Labor Day (1st Monday in September); K) Columbus Day (second Monday of October) L) General Election Day M) Veterans' Day (November 11); N) Thanksgiving Day (4th Thursday in November); and O) Christmas Day (December 25). If any Holiday listed in (A) through (O) above falls on a Saturday or Sunday, the previous Friday or following Monday, respectively, shall be considered a Holiday.
Home Agency	The Home agency is the agency that establishes and/or maintains the customer's account and issues the customer's transponder(s), if applicable.
IAG Class	The numeric vehicle class code that is programmed in the transponder and obtained from the transponder data as detailed in Attachment 4B - E-ZPass Group Mapped Classes.
IAG Mapped Class	The toll Authority vehicle class that the IAG class is mapped to as detailed in Attachment 4B - E-ZPass Group Mapped Classes.
Implementation Phase	The phase of the Project, which begins at Notice to Proceed and ends upon Acceptance of the Cashless Tolling System Implementation.
Interagency Group (IAG)	See E-ZPass Group.
Interface	Software program or file exchange that facilitates data exchange from one component of a system to another or between separate systems.
Interoperable (Interoperability)	A general term used to describe a relationship between tolling agencies or entities where their systems are capable of capturing and transmitting transactions generated on an agency's roads by customers of the other agency or entity. Requires that reciprocity agreements between agencies and entities are in place to govern payments and reconciliation.
Key Team/ Key Team Member	Key Team for this Project shall be Project Principal, Project Manager, Technical/Software Development Manager, Lane Technical Lead, Systems Technical Lead, Installation Manager, Maintenance Manager and Quality Assurance/Test Manager. This designation requires that certain standards, processes and procedures be followed by the Contractor with regard to Key Team personnel, as further set forth in the Scope of Work and the Contract Documents.

Term	Definition
Local Area Network (LAN)	A group of computers and other devices dispersed over a relatively limited area and connected by a communications link that enables any device to interact with any other on the network.
License Plate Image Capture and Processing System (LPICPS)	System that uses a camera(s) to capture and identify vehicle and license plate information, including the use of optical character recognition (OCR) Software.
Maintenance	See "Maintenance and Software Support Services".
Maintenance and Software Support Services	The Contractor's responsibility for providing Maintenance and Software Support Services as described in this Scope of Work.
Maintenance Online Management System (MOMS)	An automated, fully integrated system that monitors the status of operational Equipment in real time, records Equipment and process failures, electronically notifies Maintenance and PTC personnel, generates and tracks work orders, maintains preventative Maintenance schedules, generates repair history, and maintains parts inventory and asset management, as set forth in the Scope of Work.
Maintenance Phase	The phase of the Project, which begins at Acceptance, during which the Contractor performs all required Maintenance activities, provides all required Maintenance deliverables and maintains the System.
Non-Revenue Vehicle	Vehicles identified by Pennsylvania Turnpike Commission that are exempt from tolls on Pennsylvania Turnpike toll facilities.
Notice to Proceed (NTP)	A written notice given by the Commission to the Contractor establishing the date on which the Contract Term will commence to run, and on which the Contractor shall start to perform the Contractor's obligations under the Contract Documents. Also referred to as 'NTP.'
Onsite First Integration Test (OFIT)	The test to verify the full functionality of the Cashless Tolling System (in-lane and Plaza/Host) and its compliance with the Contract requirements and the Approved Design in a controlled, onsite environment. Also referred to as "OFIT".
Optical Character Recognition (OCR)	The process whereby license plate characters and issuing jurisdiction are extracted from an image of a vehicle via automated (non-human) means. This may also include automatically determining and reporting license plate type if this capability is provided by the System. Also referred to as "ALPR".
Pervasive Defect	A persistent or reoccurring issue or problem as further set forth in Section 17 of **Exhibit G Contract**.
Plans	Documents delivered by the Contractor providing detailed information regarding the Design, development, implementation, and Maintenance of the System.
Plaza	See Toll Plaza.
Pennsylvania Turnpike Commission (PTC)	Refers to the agency created in 1937 to construct, finance, operate and maintain the Pennsylvania Turnpike. In addition to the Pennsylvania Turnpike, the commission also operates the James E. Ross Highway, Amos K. Hutchinson Bypass, Mon/Fayette Expressway and Pittsburgh's Southern Beltway.

Term	Definition
Project	The total Work defined in the Scope of Work and as further set forth and detailed in the Contract Documents.
Project Manager	See "Contractor Project Manager".
Project Principal	Key Team Member and Contractor officer who is authorized to sign the Agreement and amendments thereto and who may make commitments on behalf of the Contractor.
Proposal	An offer made in accordance with the requirements of this RFP.
Proposer	An entity that has submitted a Proposal for this RFP.
Protocol (telecommunications)	A standardized set of digital rules that specify format, timing, sequencing, and/or error checking for data transmissions.
Provisional Acceptance	The conditional Acceptance of a phase as further set forth in Section 10 of **Exhibit G Contract**
PTC Designated Representatives	Person or persons authorized by the Commission to represent the Commission ("the PTC") in all dealings with the Contractor. Also referred to as "Authorized Representative".
PTC Class	The vehicle class that is assigned to the transaction after the application of the PTC Business Rules. The PTC class is used to calculate the fare amount for each transaction. Also called the revenue vehicle class.
PTC Operations Group	Department at the PTC responsible for monitoring the System for anomalies and failures and notifying personnel of System issues.
PTC Project Manager	PTC Designated representative who directs Contractor and Approves Contractor submitted Deliverables, with further authority as is set forth in the Contract.
PTC Toll Host	The existing central toll system that performs pre-processing of toll transactions, traffic and revenue reporting, and reconciliation functions.
Radio Frequency Identification (RFID)	For Electronic Toll Collection a subsystem consisting of E-ZPass transponders, antenna(s), and reader equipment installed for a toll lane.
Reciprocity	The mutual acceptance and payment of toll transactions between the Commission and other interoperable agencies and entities.
Revenue Collection	The Cashless Tolling System is installed and operating in the PTC production environment and is collecting, transmitting and reporting tolling data to the Cashless Tolling host system in accordance with the requirements of Article I Scope of Work and the Contract Documents, such that in the sole determination of the Commission tolls can be collected.
Revenue Day	The twenty-four (24) hour period of toll collection day expressed from 00:00:00 to 23:59:59 in military time.
Revenue Vehicle Class	See PTC class.
Scope of Work	Services to be provided by Contractor. Also referred to as "Services" or "Work".
Services	Refer to Scope of Work".

Term	Definition
Software	All System Software including the media and documentation that regulate and control the operation of a data processing system by specifying computer programs, procedures and rules required to be provided hereunder as more fully described in the Scope of Work. It includes compilers, library routines, and circuit diagrams.
Subcontractor	Any person, firm or corporation, other than the Contractor's employees, who contracts to furnish labor, materials, or Services at the Site(s) or in connection with the System and Services, whether directly or indirectly, on the Contractor's behalf and whether or not in privity with the Contractor.
Submittal	See "Deliverable".
Supplemental Agreement	Process for making changes to the Agreement as set forth in Section 13 of **Exhibit G Contract.**
Supplier	Any person, firm, or corporation who contracts to furnish materials, Software, Equipment, or supplies for incorporation in or in connection with the System, whether directly or indirectly, on the Contractor's behalf and whether or not in privity with the Contractor.
Surety files	Financial data related to the Post Paid Accounts.
System	See "Cashless Tolling System".
System Acceptance	A completion milestone defined in **Exhibit A Scope of Work** and the Agreement.
System Detail Design Document (SDDD)	Document Deliverable that includes but is not limited to the defined architecture, components, interfaces, Design and functionality for the Cashless Toll System to satisfy applicable Requirements in Section III, System Scope of Work and Requirements, which is submitted by the Contractor for Approval by the NCTA.
Tag	See "Transponder".
Transponder	An RFID device with a unique identity installed in a vehicle for the purpose of Electronic Toll Collection. E-ZPass is a brand of transponder used by the E-ZPass Inter-Agency Group.
Transponder Status List (TSL)	A file transmitted to the zone controllers through the Cashless Tolling Host systems containing the status of transponders issued by the Pennsylvania CSC and the other interoperable agencies and entities.
Uninterruptible Power Supply (UPS)	A device, connected between a computer (or other electronic Equipment) and a power source (usually an outlet receptacle), that ensures that electrical flow to the computer is not interrupted because of a blackout and, in most cases, protects the computer against potentially damaging events, such as power surges and brownouts.
Valid Transponder	A transponder that is on the transponder status list (TSL) and has a status of valid, low balance and non-revenue. A valid transponder will post to a Pennsylvania E-ZPass customer account or an Interoperable Agency customer account.

Term	Definition
Video Image Toll (VToll)	Usually an image toll transaction that is processed and posted to an account prior to image review verification based on the transponder ID information associated with the image transaction message. These usually occur if the balance temporarily dips to a negative level causing the transponder to be invalid for a short duration.
Video Transaction	A license plate transaction created and transmitted to the CSC/VPC for processing that results from the capture of an image(s) in the lane. Video transactions are generated for vehicles when a valid transponder is not associated with the vehicle or when a vehicle has an invalid transponder. Video transactions not associated to a customer E-ZPass account are used to generate video invoices.
Violation Enforcement List (VEL)	A list of repeat violators license plate numbers that are not pursuable through the CSC/VPC for various reasons that the Commission would like to pursue through manual enforcement action on-site.
Wide Area Network	A geographically widespread communications network that relies on communication capabilities to link the various network segments. A Wide Area Network (WAN) can be one large network, or it can consist of a number of linked LANs (local area networks). See 'Local Area Network.'
Work	All Services which, in the judgment of the Commission, are necessary for Contractor completion of the Project under the Contract Documents and includes, without limitation, all plant, labor, materials, Equipment, systems, Services and Software and other facilities, installation, testing, operations and Maintenance and other things necessary or proper for or incidental to the carrying out and completion of the terms of the Contract Documents. Also referred to as Services.

Acronyms

Acronym	Definition
ADT	Average Daily Traffic
ALPR	Automatic License Plate Recognition
AVC	Automatic Vehicle Classification
AVI	Automatic Vehicle Identification
BOM	Bill of Materials
BRD	Business Rules Document
COTS	Commercial off the Shelf
CPU	Central Processing Unit
CRO	Central Regional Office
CSC	Customer Service Center
DBA	Doing Business As
DMV	Department of Motor Vehicles
DPU	Data Processing Unit
DR	Disaster Recovery
DVAS	Digital Video Audit System
EMI	Electromagnetic Interference
ECO	Engineering Change Order
ERO	Eastern Regional Office
ETC	Electronic Toll Collection
FAT	Factory Acceptance Test
FHWA	Federal Highway Administration
FMS	Financial Management System
FTP/SFTP	File Transfer Protocol/Secure File Transfer Protocol
GUI	Graphical User Interface
HVAC	Heating, Ventilation and Air Conditioning
IAG	Interagency Group
ICD	Interface Control Document
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organization for Standardization

Acronym	Definition
IT	Information Technology
ITS	Intelligent Transportation Systems
ITSM	Intelligent Transportation Systems Maintenance
LAN	Local Area Network
LPICPS	Image Capture and Processing System
MOMS	Maintenance On-line Monitoring System
MPT	Maintenance and Protection of Traffic
MTBF	Mean Time Between Failures
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NTP	Network Time Protocol
NTP	Notice to Proceed
OCR	Optical Character Recognition
ODC	Other Direct Costs
OEM	Original Equipment Manufacturer
OFIT	Onsite First Installation Test
OS	Operating System
OSHA	Occupational Safety and Health Administration
PIN	Personal Identification Number
PMP	Project Management Plan
PMR	Project Management Review
PO	Purchase Order
PTC	Pennsylvania Turnpike Commission
QA	Quality Assurance
QAP	Quality Assurance Plan
QC	Quality Control
RDBMS	Relational Database Management System
RFI	Radio Frequency Interference
RFI	Request for Information
RFID	Radio Frequency Identification

Acronym	Definition
RFP	Request for Proposal
RMA	Return Materials Authorization
SDDD	System Detail Design Document
SDLC	Software Development Lifecycle
SDP	Software Development Plan
SOW	Scope of Work
SRD	System Requirements Document
SRR	System Requirements Review
TDM	Time Division Multiplexing
TIP	Turnpike Industrial Park
TOC	Toll Operations Center
TSL	Transponder Status List
TTRR	Time to Respond and Repair
UIL	User Identification List
UPS	Uninterruptible Power Supply
VLAN	Virtual Local Area Network
VPC	Violation Processing Center
VPN	Virtual Private Network
WAN	Wide Area Network
WRO	Western Regional Office

Exhibit C
Price Proposal Instructions

Table of Contents

1. GENERAL INSTRUCTIONS

Proposers shall complete their Price Proposals in accordance with the following instructions:

1. The Price Proposal Forms are provided in Excel format worksheets for ease of completion and checking. The Excel version of the Price Proposal shall be downloaded from the Commission's Website at: www.paturnpike.com/procurement.
2. Proposers shall submit their Price Proposals on the Price Proposal Forms included in RFP, Exhibit F - Forms. Price Proposals shall be sealed and submitted separate from the Technical Proposal as further instructed in the RFP. Price Proposals shall be submitted in the quantities and manner identified in the RFP.
3. The Price Proposal Forms shall constitute the full and complete Price Proposal for compensation for performance of the Contractor's obligations and Work under the Cashless Tolling System Implementation and Maintenance Project.
4. Proposers must complete the Price Proposal Forms in their entirety. The Price Proposal Forms for the Project are as follows:
    - **Base and Optional Cashless Tolling System Implementation and Maintenance Cost** – Sheet 1
    - **Base and Optional In-lane System Cost** – Sheets 2, 2-a, 2-1, 2-2, 2-3, 2-4, 2-5, 2-6, and 2-7
    - **Base and Optional System Cost** – Sheets 3, 3-1, 3-2, and 3-3
    - **Base and Optional Toll Concentrator/Host Cost (if provided)** – Sheets 4, 4-1, 4-2, and 4-3
    - **Base and Optional In-lane System Hardware Maintenance and Software Support Services Cost** – Sheets 5, 5-1, 5-2, 5-3, 5-4, and 5-5
    - **Base and Optional Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost (if provided)** – Sheets 6, 6-1, 6-2, 6-3, and 6-4
    - **Optional Toll Host System Replacement Implementation Cost** – Sheets 7, 7-1, 7-2, and 7-3
    - **Additional Services Rates and Markup for Out of Scope Work** – Sheet 8-1
    - **Payment Schedule** – Exhibit D
5. Proposers should not fill in any grayed-out cells on the Price Proposal Forms, nor shall Proposers make any other entry on or alteration to the Price Proposal Forms other than in accordance with these Price Proposal Instructions.
6. The Commission may waive or correct any error appearing in a Proposer's completed Price Proposal Forms if the correct amount can be clearly ascertained from the information provided; however, the Commission is under no obligation to do so. In the event of an inconsistency between the amount stated in numbers and the amount stated in written words, the amount stated in written words will control. In the event of a mathematical miscalculation, the correct sum will control.

7. An officer of the Proposer or an individual otherwise authorized in writing by an officer of the Proposer must sign and date Sheet 1 in the appropriate place as identified.
8. All elements of the Price Proposal must be completed. On line items where zero (0) quantities are shown in red font for hours or units, if the Proposer is proposing zero (0) quantities for that item no change should be entered into the corresponding cell and a zero (0) quantity for that item will be assumed. In addition, all items identified by the Commission in the Price Proposal Forms will be assumed to be included in the Price Proposal.
9. The Commission reserves the right to reject Price Proposals that are not completed in accordance with the instructions set forth herein.
10. Instructions for completion of each of the Price Proposal Forms are provided in Sections 2 through 13 below.
11. The Price Proposal shall be inclusive of all costs, fees and applicable taxes needed to meet the requirements of the RFP, including the **Exhibit A, Scope of Work**. **All costs should be entered in 2018 dollar values.** No price escalation will be allowed above the costs provided on the Price Proposal Forms to complete the Work, with the exception of the CPI as specifically identified herein.

2.INSTRUCTIONS ON COMPLETING THE PRICE PROPOSAL FORMS

1. There are thirty-four (34) Price Proposal Forms, as detailed above, including seven pricing summary sheets (Sheets 1, 2, 3, 4, 5, 6 and 7) and associated back-up information on back-up sheets for each pricing sheet. Back-up sheets for each summary sheet are labeled to identify the corresponding summary pricing sheet; for example, Sheet 2-1 is a back-up sheet to pricing Sheet 2. Back-up sheets are located following summary sheets 1 through 7. The Additional Services Rates and Markup for Out of Scope Work Sheet 8-1 is a standalone sheet and does not require a summary sheet.
2. Table 1 summarizes the 34 Price Proposal forms that shall be completed by all Proposers. Each form is located on a unique sheet in an Excel workbook. The table provides the following information for each form:
    a. The sheet number (e.g. 2, 2-1, etc.)
    b. The sheet identifier listed on the tab in Excel
    c. The sheet title listed at the top of each sheet

Table 1 – Price Proposal Form Summary

Sheet Number	Sheet Identifier	Sheet Title
1	Project Summary	Project Summary – Base and Optional PTC Cashless Tolling System Implementation and Maintenance Cost
2	In-lane Summary	Base and Optional In-lane System Cost by Roadway
2-a	Backup Opt In-lane Cost	Back-up Optional Mainline and Western Extensions In-lane Implementation Cost by Zone
2-1	Backup In-lane Z1	Back-up Optional In-lane System Cost Schedule – Zone 1
2-2	Backup In-lane Z2	Back-up Optional In-lane System Cost Schedule – Zone 2
2-3	Backup In-lane Z3	Back-up Optional In-lane System Cost Schedule – Zone 3
2-4	Backup In-lane Z4	Back-up Base and Optional In-lane System Cost Schedule – Zone 4
2-5	Backup In-lane Z5	Back-up Optional In-lane System Cost Schedule – Zone 5
2-6	Backup In-lane Z6	Back-up Optional In-lane System Cost Schedule – Zone 6
2-7	Backup In-lane Staff	Back-up Base and Optional In-lane System Pricing by Zone Type – Staff and Position Classifications with Rates
3	System Summary	Base and Optional System Cost
3-1	Backup System Sch	Back-up Base and Optional System Cost Schedule
3-2	Backup System Spares	Back-up Base and Optional In-lane System Spare Parts and Equipment Cost Year 1
3-3	Backup System Staff	Back-up Base and Optional System Cost – Staff and Position Classifications with Rates
4	Toll Con-Host Summary	Base and Optional Toll Concentrator/Host Cost (if provided)
4-1	Backup Toll Con-Host Sch	Back-up Base and Optional Toll Concentrator/Host Cost Schedule (if provided)
4-2	Backup Toll Con-Host Spares	Back-up Base and Optional Toll Concentrator/Host Spare Parts and Equipment Cost Year 1 (if provided)
4-3	Backup Toll Con-Host Staff	Back-up Base and Optional Toll Concentrator/Host Cost – Staff and Position Classifications with Rates (if provided)
5	In-lane Maint Summary	Base and Optional In-lane System Hardware Maintenance and Software Support Services Cost
5-1	Backup In-lane Maint Sch	Back-up Base and Optional In-lane System Hardware Maintenance and Software Support Services Cost Schedule
5-2	Backup In-lane Maint Detail	Back-up Base and Optional In-lane System Hardware Maintenance and Software Support Services – Labor and Other Direct Cost Items by Month
5-3	Backup Inlane Mnt Staff CS	Back-up Base and Optional <u>Clarks Summit</u> In-lane System Hardware Maintenance and Software Support Services – Staff and Position Classifications with Rates
5-4	Backup Inlane Mnt Staff ML	Back-up Optional <u>Mainline</u> In-lane System Hardware Maintenance and Software Support Services – Staff and Position Classifications with Rates
5-5	Backup Inlane Mnt Staff WE	Back-up Optional <u>Western Extensions</u> In-lane System Hardware Maintenance and Software Support Services – Staff and Position Classifications with Rates
6	Toll Con-Host Maint Summary	Base and Optional Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost (if provided)
6-1	Backup Host Maint Sch	Back-up Base and Optional Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost Schedule– Labor and Other Direct Cost Items by

Sheet Number	Sheet Identifier	Sheet Title
		Month (if provided)
6-2	Backup Host Maint Staff CS	Back-up Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services – Staff and Position Classifications with Rates
6-3	Backup Host Maint Staff ML	Back-up Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services – Staff and Position Classifications with Rates
6-4	Backup Host Maint Staff WE	Back-up Optional Western Extensions Incremental Toll Concentrator/Host Maintenance and Software Support Services – Staff and Position Classifications with Rates
7	Opt Host System Repl Summary	Optional Toll Host System Replacement Implementation Cost
7-1	Backup Opt Host Repl Sch	Back-up Optional Toll Host System Replacement Implementation Cost Schedule
7-2	Backup Opt Host Repl Spares	Back-up Optional Toll Host System Replacement Implementation Spare Parts and Equipment Cost Year 1
7-3	Backup Opt Host Repl Staff	Back-up Optional Toll Host System Replacement Implementation Cost – Staff and Position Classifications with Rates
8-1	Additional Services Rates	Additional Services Rates and Markup for Out of Scope Work
Exhibit D		Payment Schedule – Clarks Summit

3. The Price Proposal Forms are password protected and shall not be unlocked by Proposers. Only the unlocked cells may the Proposers enter data.

4. Blue colored tabs represent summary sheets that do *not* require Proposer input. Green tabs represent worksheets that require Proposer input.

5. On most sheets there are formulas that are automatically calculated based on data entered from elsewhere in the sheet or work book. Font and background colors are used to indicate different types of cells as follows:

   - Black font – Indicates the cell cannot be altered by Proposer.
   - Red font – Indicates the Proposer should enter data.
   - Light red background – Indicates input required. All such cells should be completed accordingly.
   - Light yellow background – Indicates optional input, if Proposers need to provide additional detail.
   - Light green background – Indicates that data has been entered into the cell. Light red and light yellow background will change to light green when any non-zero data is entered. The background for any cells where the Proposer enters zero (0) will not change colors in this manner.

6. While the Commission has made every effort to ensure the Price Proposal Forms contain accurate formulas and calculation, Proposers are required to independently verify that formulas and calculations are being performed correctly.

3. TOTAL PROJECT COSTS

The Proposer's proposed total price shall be the aggregate of all costs included in Sheet 1. Sheet 1 will automatically roll-up and present the totals from Sheets 2 through 7. These costs will be totaled and presented in the Grand Total Cost column in the line entitled Total Implementation and Maintenance Phase with Optional Functionality and Optional Extension Phases.

4. COMPLETION OF IN-LANE SYSTEM COST (BASE AND OPTIONAL) - SHEETS 2, 2-a, 2-1, 2-2, 2-3, 2-4, 2-5, 2-6 AND 2-7

The Proposer's total price for the Base and Optional In-lane System (roadway) portion of the Implementation Phase shall be the aggregate of all costs included in Sheet 2 which covers all costs associated with the Base and Optional In-lane System portion of the Work.

The costs for Sheet 2 shall include (without limitation) all Equipment, supplies, Software, parts and materials, overhead, burden, profit, taxes, duties, fees, Contractor-acquired permits, licenses, warranties, and other items necessary to meet the Contractor contractual requirements associated with the Base and Optional In-Lane portion of the System. No price escalation will be allowed above the costs provided on the Price Proposal Sheets to complete the Work except as set forth in Section 13.

The prices on Sheet 2 and related back-up sheets shall not include charges and costs associated with the System, Toll Concentrator/Host or the Maintenance Phase. These costs shall be provided on separate Price Proposal Sheets as described in Section 2 above.

To complete Sheets 2, 2-a, 2-1, 2-2, 2-3, 2-4, 2-5, 2-6 and 2-7 Proposers should do the following:

1. **Sheet 2-1, 2-2, 2-3, 2-4, 2-5, and 2-6**. These sheets allow the Proposer to provide costs by zone (1-6) type for the Base and Optional In-lane System portion of the Work. For each zone type, in the columns provided under each cost component (Items 1-8) and the Facility Server, enter a description for each price element for each component in as much detail as space allows. Moving to the right in the 2nd column (B) enter the quantity for each item and in the 3rd column (C) enter the unit costs. If the item is provided as a lump sum, the quantity should be shown as 1. Total item costs will be calculated automatically. Moving to the right, in the 5th column (E), enter the labor costs associated with each of the price elements. The costs for each price element will then automatically be calculated and the summary will be shown in the appropriate line items on Sheets 2 and 2-a.

   Complete the cost data for the Optional OCR/ALPR and Enforcement Notification and for the Optional Tri-Protocol Implementation for each zone type by entering a description for each price element for this option in as much detail as space allows. Moving to the right in the 2nd column (B) enter the quantity for each item and in the 3rd column (C) enter the unit costs. If the item is provided as a lump sum, the quantity should be shown as 1. Total item costs will be calculated automatically. Moving to the right, in the 5th column (E), enter the labor costs associated with each of the price elements. The costs for each price element will then automatically be calculated and the summary will be shown in the appropriate line items on Sheets 2 and 2-a.

2. **Sheets 2 and 2-a**. These sheets will be automatically populated from Sheet 2-1, 2-2, 2-3, 2-4, 2-5, and 2-6. No Proposer input is required.
3. **Sheet 2-7**. Enter specific names for the Key Team positions (Items 1-9) for In-lane System labor costs related to the Implementation Phase for Clarks Summit (Zone Type 4). Next enter the specific loaded labor rate in the rate column and the number of hours required for the implementation of each zone type. Moving down the sheet, enter additional labor categories for all labor to be used to complete this Work, including rates and hours. The staff names are not required for these additional positions (i.e. the positions that are not highlighted in red). The total labor dollars will be calculated for each staff person and labor category and a grand total will be calculated. The labor dollar grand total must match the zone Total with Facility Server on Sheets 2-1, 2-2, 2-3, 2-4, 2-5, and 2-6. A labor check cell is provided to assist Proposers with verifying that the two (2) labor totals are equal.

5. COMPLETION OF SYSTEM COST (BASE AND OPTIONAL) - SHEETS 3, 3-1, 3-2 AND 3-3

The Proposer's proposed total price for the Base and Optional System portion of the Implementation Phase shall be the aggregate of all costs included in Sheet 3. This sheet covers all costs associated with the Base and Optional System and non-roadway specific costs, to complete the implementation, such as project management, engineering and design, software, and testing. Additionally, Sheet 3 includes the Warranty Year 1 of Maintenance - In-lane System Hardware Maintenance and Software Support Services which is carried forward from Sheet 5. The cost for this item is included in the Total System Costs in Sheet 3 and although it is shown as a line item in Sheet 5, it is not included in the total in Sheet 5.

The System cost shall include all costs for items identified in line items 1 through 15 of Sheet 3 associated with the System cost components. The total price shall include (without limitation) all overhead, burden, profit, taxes, duties, fees, warranties, and other items necessary for the Contractor to complete the Work. The costs shall also include (without limitation) all Equipment, supplies, Software, parts and materials, Contractor-acquired permits, licenses, warranties, and other items necessary to meet the Contractor contractual requirements associated with the Toll Host/System Cost. No price escalation will be allowed above the costs provided on the Price Proposal Sheets to complete this Work except as set forth in Section 13.

With the exception of including the Year 1 Warranty Maintenance costs, the prices on Sheet 3 and related back-up shall not include charges and costs associated with the In-lane System or Maintenance Phase. These costs shall be set forth on separate Price Proposal Forms as described in Section 2 above.

Proposers shall complete Sheets 3, 3-1, 3-2, and 3-3 as follows:

1. **Sheet 3-2.** This sheet includes Base and Optional In-lane System Spare Parts and Equipment costs for Year 1. In the columns provided for Clarks Summit under each cost component (Items 1-7), enter the total quantity in column (B) for each listed element required during the Warranty Year. If the item is provided as a lump sum, the quantity should be shown as 1. Moving to the right in column (C), enter the unit cost for each item. If additional items are required to be included under each component provided by the Proposer, enter each element name using the additional spaces provided under the appropriate component section. For all additional items entered, the Proposer must also enter the total quantity and unit cost as described above.

Next, in the columns provided for Optional Mainline and Optional Western Extensions under each cost component (Items 1-7), enter the total quantity in columns (E and H) for each listed element required during the Warranty Year. If the item is provided as a lump sum, the quantity should be shown as 1. Moving to the right in columns (F and I), enter the unit cost for each item. If additional items are required to be included under each component provided by the Proposer, enter each element name using the additional spaces provided under the appropriate component section. For all additional items entered, the Proposer must also enter the total quantity and unit cost as described above.

Total item costs will be calculated automatically for each item and cost component. The Total In-lane System Spare Parts and Equipment Cost (Warranty) Year 1 for Clarks Summit, Optional Mainline and Optional Western Extensions will then automatically be calculated and shown in the appropriate line item within item 11 on Sheet 3-1.

2. **Sheet 3-1**. This sheet provides back up for Sheet 3 Base and Optional System cost components 1-9 and 12-15. Beginning with Clarks Summit, enter a description for each cost component in as much detail as space allows. If there are costs other than labor costs that are not included or are not already listed, enter such unit quantities and unit costs. If the item is provided as a lump sum, the quantity should be shown as 1. Total item costs will be calculated automatically. Moving to the right, in the column (F), enter the labor costs associated with each of the price elements.

   Next enter a description for each cost component in as much detail as space allows for Optional Mainline and Optional Western Extensions. If there are costs other than labor costs that are not included or are not already listed, enter such unit quantities and unit costs. If the item is provided as a lump sum, the quantity should be shown as 1. Total item costs will be calculated automatically. Moving to the right, in the columns (K and P), enter the labor costs associated with each of the price elements.

   Please note the following regarding Sheet 3-1:

   - Line item 10 Warranty (Year 1 of Maintenance) – In-lane System Hardware Maintenance and Software Support Services is automatically populated from Sheet 5 for Clarks Summit (cell C4), Optional Mainline (cell D7) and Optional Western Extensions (cell E12).
   - Line item 11 Warranty - In-lane System Spare Parts and Equipment Year 1 is automatically populated from Sheet 3-2 for Clarks Summit (cell D88), Optional Mainline (cell G88) and Optional Western Extensions (cell J88).

   The costs for each price element will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 3.

3. **Sheet 3.** This sheet is automatically populated from Sheet 3-1. No Proposer input is required.

4. **Sheet 3-3.** Enter specific names for the Key Team positions (Items 1-9) for the System labor costs related to the Implementation Phase for Clarks Summit. Next enter the specific loaded labor rate for each staff member in the rate columns and their number of hours for Clark Summit, Optional Mainline, and Optional Western Extensions for the System. Moving down the sheet, enter additional labor categories for all labor to be used to complete this Work, including rates and hours. For positions listed beyond item 9, staff names are not required. The total labor dollars will be calculated for each staff person and labor category and a grand total will be calculated for each region. <u>The labor dollar grand total must match the total labor dollars total on Sheet 3-1 for each</u>

region. A labor check cell is provided on the bottom of Sheet 3-1 to assist Proposers with the verification that the labor totals are equal.

6. COMPLETION OF TOLL CONCENTRATOR/HOST COST (BASE AND OPTIONAL) - SHEETS 4, 4-1, 4-2 AND 4-3

The Proposer's proposed total price for the Base and Optional Toll Concentrator/Host (if provided) portion of the Implementation Phase shall be the aggregate of all costs included in Sheet 4. This sheet covers all costs associated with the Base and Optional Toll Concentrator/Host costs, to complete the implementation, such as system hardware, third party software, installation and commissioning, communication equipment, design documentation, training, and third party warranty and licenses. Additionally, Sheet 4 includes the Warranty (Year 1 of Maintenance) Incremental Toll Concentrator/Host Maintenance and Software Support Services which is carried forward from Sheet 6. The cost for this item is included in the Total Toll Concentrator/Host Costs in Sheet 4 and although it is shown as a line item in Sheet 6, it is not included in the total in Sheet 6.

The Toll Concentrator/Host cost shall include all costs for items identified in line items 1 through 9 of Sheet 4 associated with the Toll Concentrator/Host cost components. The total price shall include (without limitation) all overhead, burden, profit, taxes, duties, fees, warranties, and other items necessary for the Contractor to complete the Work. The costs shall also include (without limitation) all Equipment, supplies, Software, parts and materials, Contractor-acquired permits, licenses, warranties, and other items necessary to meet the Contractor contractual requirements associated with the Toll Concentrator/Host cost. No price escalation will be allowed above the costs provided on the Price Proposal Sheets to complete this Work except as set forth in Section 13.

With the exception of including the Year 1 (Warranty) Maintenance costs, the prices on Sheet 4 and related back-up shall not include charges and costs associated with the In-lane System or Maintenance Phase. These costs shall be set forth on separate Price Proposal Forms as described in Section 2 above.

Proposers shall complete Sheets 4, 4-1, 4-2, and 4-3 as follows:

1. **Sheet 4-2.** This sheet includes Base and Optional Toll Concentrator/Host Spare Parts and Equipment costs for Year 1. In the columns provided for Clarks Summit under each cost component (Items 1-2), enter the total quantity in column (B) for each listed element required during the Warranty Year. If the item is provided as a lump sum, the quantity should be shown as 1. Moving to the right in column (C), enter the unit cost for each item. If additional items are required to be included under each component provided by the Proposer, enter each element name using the additional spaces provided under the appropriate component section. For all additional items entered, the Proposer must also enter the total quantity and unit cost as described above.

   Next, in the columns provided for Optional Mainline and Optional Western Extensions under each cost component (Items 1-2), enter the total quantity in columns (E and H) for each listed element required during the Warranty Year. If the item is provided as a lump sum, the quantity should be shown as 1. Moving to the right in columns (F and I), enter the unit cost for each item. If additional items are required to be included under each component provided by the Proposer, enter each element name using the additional spaces provided under the appropriate component section. For all additional items entered, the Proposer must also enter the total quantity and unit cost as described above.

Total item costs will be calculated automatically for each item and cost component. The Total Toll Concentrator/Host Spare Parts and Equipment Cost (Warranty) Year 1 for Clarks Summit, Optional Mainline and Optional Western Extensions will then automatically be calculated and shown in the appropriate line item within item 9 on Sheet 4-1.

2. **Sheet 4-1**. This sheet provides back up for Sheet 4 Base and Optional Toll Concentrator/Host cost components 1-7. Beginning with Clarks Summit, enter a description for each cost component in as much detail as space allows. If there are costs other than labor costs that are not included or are not already listed, enter such unit quantities and unit costs. If the item is provided as a lump sum, the quantity should be shown as 1. Total item costs will be calculated automatically. Moving to the right, in the column (F), enter the labor costs associated with each of the price elements.

   Next enter a description for each cost component in as much detail as space allows for Optional Mainline and Optional Western Extensions. If there are costs other than labor costs that are not included or are not already listed, enter such unit quantities and unit costs. If the item is provided as a lump sum, the quantity should be shown as 1. Total item costs will be calculated automatically. Moving to the right, in the columns (K and P), enter the labor costs associated with each of the price elements.

   Please note the following regarding Sheet 4-1:

   - Line item 8 Warranty (Year 1 of Maintenance) – Incremental Toll Concentrator/Host Maintenance and Software Support Services is automatically populated from Sheet 6 for Clarks Summit (cell D4).
   - Line item 9 Warranty - Toll Concentrator/Host Spare Parts and Equipment Year 1 is automatically populated from Sheet 4-2 for Clarks Summit (cell D28), Optional Mainline (cell G28) and Optional Western Extensions (cell J28).

   The costs for each price element will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 4.

3. **Sheet 4.** This sheet is automatically populated from Sheet 4-1. No Proposer input is required.

4. **Sheet 4-3.** Enter specific names for the Key Team positions (Items 1-9) for the Toll Concentrator/Host labor costs related to the Implementation Phase for Clarks Summit. Next enter the specific loaded labor rate for each staff member in the rate columns and their number of hours for Clark Summit, Optional Mainline, and Optional Western Extensions for the System. Moving down the sheet, enter additional labor categories for all labor to be used to complete this Work, including rates and hours. For positions listed beyond item 9, staff names are not required. The total labor dollars will be calculated for each staff person and labor category and a grand total will be calculated for each region. The labor dollar grand total must match the total labor dollars total on Sheet 4-1 for each region. A labor check cell is provided on the bottom of Sheet 4-1 to assist Proposers with the verification that the labor totals are equal.

7. COMPLETION OF IN-LANE SYSTEM HARDWARE MAINTENANCE AND SOFTWARE SUPPORT SERVICES COST (BASE AND OPTIONAL) - SHEETS 5, 5-1, 5-2, 5-3, 5-4, AND 5-5

The Proposer's proposed total price for the Base and Optional In-lane System Hardware Maintenance and Software Support Services shall be the aggregate of all costs included in Sheet 5. This sheet covers all costs associated with the Maintenance Phase of the In-lane System.

The costs shall include (without limitation) all Contractor management, administrative and support labor costs, as well as all direct costs associated with maintaining the In-lane system. The total price shall include (without limitation) all overhead, burden, profit, taxes, duties, fees, warranties, Equipment, supplies, Software, parts and materials, Contractor-acquired permits, licenses, warranties, and all other items necessary to meet the Contractor contractual requirements associated with the In-lane System Maintenance. All labor rates provided are to include overhead, burden and profit ("Loaded Labor Rate"). No price escalation will be allowed above the costs provided on the Price Proposal Sheets to complete the Work, except as provided in Section 13.

Proposers shall complete Sheets 5, 5-1, 5-2, 5-3, 5-4 and 5-5 as follows:

1. **Sheet 5-2**. For the Base Contract for Clarks Summit Maintenance (Years 1–9), as well as for Optional Extension 1 (Years 1-5) and Optional Extension 2 (Years 1-5), each year is identified with a corresponding set of Work elements. Starting in column (B), enter the monthly per-zone cost associated with each price element. (Please note that the monthly labor cost per zone is automatically populated from Sheet 5-3 for Clarks Summit and therefore requires no input from the Proposer.) Include all other direct, non-labor costs required for each price element. The Total Monthly costs by zone for each year will then automatically be populated in the appropriate line item on Sheet 5-1.

   For Optional Mainline Maintenance (Years 4–9), as well as for Optional Extension 1 (Years 1-5) and Optional Extension 2 (Years 1-5), each year is identified with a corresponding set of Work elements. In column (C), enter the monthly per-zone cost associated with each price element. (Please note that the monthly labor cost per zone is automatically populated from Sheet 5-4 for Optional Mainline and therefore requires no input from the Proposer.) Include all other direct, non-labor costs required for each price element. The Total Monthly costs by zone for each year will then automatically be populated in the appropriate line item on Sheet 5-1.

   For Optional Western Extensions Maintenance (Years 9), as well as for Optional Extension 1 (Years 1-5) and Optional Extension 2 (Years 1-5), each year is identified with a corresponding set of Work elements. In column (D), enter the monthly per-zone cost associated with each price element. (Please note that the monthly labor cost per zone is automatically populated from Sheet 5-5 for Optional Western Extensions and therefore requires no input from the Proposer.) Include all other direct, non-labor costs required for each price element. The Total Monthly costs by zone for each year will then automatically be populated in the appropriate line item on Sheet 5-1.

2. **Sheet 5-1.** This sheet is automatically populated from Sheet 5-2 and calculates the Annual Cost for all Toll Zones; it requires no input from the Proposer.

3. **Sheet 5**. This sheet is automatically populated from Sheet 5-1; it requires no input from the Proposer.

4. **Sheets 5-3 (Clarks Summit), 5-4 (Optional Mainline), and 5-5 (Optional Western Extensions)** the Proposer shall do the following:
   - Enter specific names for the Key Team positions (Items 1-9) required for the Maintenance Phase.
   - Moving down the sheet, enter the names of additional labor categories for all labor to be used. Staff names are not required for these additional positions.
   - Enter the 2018 specific loaded labor rate for each Key Team staff member and labor category in the 2018 Loaded Labor Rate column.
   - For evaluation purposes the Maintenance Year 1 Rate will automatically be populated based on the 2018 Loaded Labor Rate and applying an assumed annual escalation rate. For purposes of the evaluation an estimated Consumer Price Increase (CPI) increase of 3% per year has been used, assuming Maintenance Phase Work for Clarks Summit will begin in Year 2 of the Base Contract. The Maintenance Phase for optional Work is assumed to begin following the Warranty Year after the Implementation Phases.
   - Next, for Clarks Summit (Sheet 5-3) enter the annual number of hours for each position/classification required for all zones for Year 1, Year 2 and Year 3. This worksheet assumes that Year 3 labor hours will remain consistent for the duration of the base and optional extension(s) Maintenance years. For evaluation purposes, labor rates for Maintenance Year 1 is assumed to begin in Year 2 of the Base Contract and have been automatically populated using an assumed annual escalation of 3% per year from the 2018 Loaded Labor Rate. Labor rates for Maintenance Years 2 through 9 and Optional Extension 1 and 2 will then automatically populated using an assumed annual escalation of 3% from the previous year for evaluation purposes. Note that the actual labor price adjustments will be determined as described in Section 13.
   - Next, for Optional Mainline (Sheet 5-4) enter the annual number of hours for each position/classification required for all zones for Years 4-8, this allows for the separate Go-live date of the East and Northeast Extension and the Central and West. This worksheet assumes that Year 8 labor hours will remain consistent for the duration of the base and optional extension(s) Maintenance years. For evaluation purposes, labor rates for Maintenance Year 4 is assumed to begin in Year 5 of the Contract and have been automatically populated using an assumed annual escalation of 3% per year from the 2018 Loaded Labor Rate. Labor rates for Maintenance Years 5 through 9 and Optional Extension 1 and 2 will then automatically populated using an assumed annual escalation of 3% from the previous year for evaluation purposes. Note that the actual labor price adjustments will be determined as described in Section 13.
   - Next, for Optional Western Extensions (Sheet 5-5) enter the annual number of hours for each position/classification required for all zones for Year 9 and Optional Extension 1 Years 1-2. This worksheet assumes that Optional Extension 1 Year 2 labor hours will remain consistent for the duration of the optional extension(s) Maintenance years. For evaluation purposes, labor rates for Maintenance Year 9 is assumed to begin in Year 10 of the Contract and have been automatically populated using an assumed annual escalation of 3% per year from the 2018 Loaded Labor Rate. Labor rates for Optional Extension 1 and 2 will then automatically

populated using an assumed annual escalation of 3% from the previous year for evaluation purposes. Note that the actual labor price adjustments will be determined as described in Section 13.

- The total labor dollars will be calculated for each staff person and labor category for Years 1 through 9 and each year of the Optional Extensions periods. A grand total will be calculated for each year. The Total Monthly Per Zone Cost for each year will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 5-2.

8. COMPLETION OF TOLL CONCENTRATOR/HOST MAINTENANCE AND SOFTWARE SUPPORT SERVICES COST (BASE AND OPTIONAL) - SHEETS 6, 6-1, 6-2, 6-3, AND 6-4

The Proposer's proposed total price for the Base and Optional Toll Concentrator/Host Maintenance and Software Support Services shall be the aggregate of all costs included in Sheet 6. This sheet covers all costs associated with the Maintenance Phase for the Toll Concentrator/Host.

The costs shall include (without limitation) all Contractor management, administrative and support labor costs, as well as all direct costs associated with maintaining the Toll Concentrator/Host. The total price shall include (without limitation) all overhead, burden, profit, taxes, duties, fees, warranties, Equipment, supplies, Software, parts and materials, Contractor-acquired permits, licenses, warranties, and all other items necessary to meet the Contractor contractual requirements associated with the Toll Concentrator/Host Maintenance. All labor rates provided are to include overhead, burden and profit ("Loaded Labor Rate"). No price escalation will be allowed above the costs provided on the Price Proposal Sheets to complete the Work, except as provided in Section 13.

Proposers shall complete Sheets 6, 6-1,6-2, 6-3, and 6-4 as follows:

1. **Sheet 6-1 (Clarks Summit)**. For the Base Contract for Clarks Summit Maintenance (Years 1–9), as well as for Optional Extension 1 (Years 1-5) and Optional Extension 2 (Years 1-5), each year is identified with a corresponding set of Work elements. In column (B), enter the monthly cost associated with each price element. (Please note that the monthly labor cost is automatically populated from Sheet 6-2 for Clarks Summit and therefore requires no input from the Proposer.) If additional items are required by the Proposer, enter each element name using the additional spaces provided. For all additional items entered, the Proposer must also enter the total monthly cost as described above. Include all monthly labor costs and other direct, non-labor costs required for each month. The Total Monthly costs for each year will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 6.

   Sheet 6-1 (Optional Mainline). For the Optional Mainline Maintenance (Years 4-9), as well as for Optional Extension 1 (Years 1-5) and Optional Extension 2 (Years 1-5), each year is identified with a corresponding set of Work elements. In column (C), enter the monthly cost associated with each price element. (Please note that the monthly labor cost is automatically populated from Sheet 6-3 for Optional Mainline and therefore requires no input from the Proposer.) If additional items are required by the Proposer, enter each element name using the additional spaces provided. For all additional items entered, the Proposer must also enter the total monthly cost as described above. Include all monthly labor costs and other direct, non-labor costs required for each month. The Total Monthly costs for each year will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 6.

Sheet 6-1 (Optional Western Extensions). For the Optional Western Extensions Maintenance (Year 9), as well as for Optional Extension 1 (Years 1-5) and Optional Extension 2 (Years 1-5), each year is identified with a corresponding set of Work elements. Starting in column (D), enter the monthly cost associated with each price element. (Please note that the monthly labor cost is automatically populated from Sheet 6-4 for Optional Western Extensions and therefore requires no input from the Proposer.) If additional items are required by the Proposer, enter each element name using the additional spaces provided. For all additional items entered, the Proposer must also enter the total monthly cost as described above. Include all monthly labor costs and other direct, non-labor costs required for each month. The Total Monthly costs for each year will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 6.

2. **Sheet 6.** This sheet is automatically populated from Sheet 6-1 and calculates the annual cost per region; it requires no input from the Proposer.
3. **Sheets 6-2 (Clarks Summit), 6-3 (Optional Mainline), and 6-4 (Optional Western Extensions)** the Proposers shall do the following:
    - Enter specific names for the Key Team positions (Items 1-9) to be used for these Toll Concentrator/Host Maintenance and Software Support Services.
    - Moving down the sheet, enter the names of additional labor categories for all labor to be used for these Toll Concentrator/Host Maintenance and Software Support Services. Staff names are not required for these additional positions.
    - Enter the 2018 specific loaded labor rate for each Key Team staff member and labor category in the 2018 Loaded Labor Rate column for the Toll Concentrator/Host Maintenance and Software Support Services.
    - Next, for Clarks Summit (Sheet 6-2) enter the annual number of hours for each position/classification required for Year 1, Year 2 and Year 3. This worksheet assumes that Year 3 labor hours will remain consistent for the duration of the base and optional extension(s) Maintenance years. For evaluation purposes, labor rates for Maintenance Year 1 is assumed to begin in Year 2 of the Contract and have been automatically populated using an assumed annual escalation of 3% per year from the 2018 Loaded Labor Rate. Labor rates for Maintenance Years 2 through 9 and Optional Extension 1 and 2 will then automatically populated using an assumed annual escalation of 3% from the previous year for evaluation purposes. Note that the actual labor price adjustments will be determined as described in Section 13.
    - Next, for Optional Mainline (Sheet 6-3) enter the annual number of hours for each position/classification required for Years 4-8, this allows for the separate Go-live date of the East and Northeast Extension and the Central and West. This worksheet assumes that Year 8 labor hours will remain consistent for the duration of the base and optional extension(s) Maintenance years. For evaluation purposes, labor rates for Maintenance Year 4 is assumed to begin in Year 5 of the Contract and have been automatically populated using an assumed annual escalation of 3% per year from the 2018 Loaded Labor Rate. Labor rates for

Maintenance Years 5 through 9 and Optional Extension 1 and 2 will then automatically populated using an assumed annual escalation of 3% from the previous year for evaluation purposes. Note that the actual labor price adjustments will be determined as described in Section 13.

- Next, for Optional Western Extensions (Sheet 6-4) enter the annual number of hours for each position/classification required for Year 9 and Optional Extension 1 Years 1-2. This worksheet assumes that Optional Extension 1 Year 2 labor hours will remain consistent for the duration of the optional extension(s) Maintenance years. For evaluation purposes, labor rates for Maintenance Year 9 is assumed to begin in Year 10 of the Contract and have been automatically populated using an assumed annual escalation of 3% per year from the 2018 Loaded Labor Rate. Labor rates for Optional Extension 1 and 2 will then automatically populated using an assumed annual escalation of 3% from the previous year for evaluation purposes. Note that the actual labor price adjustments will be determined as described in Section 13.
- The total labor dollars will be calculated for each staff person and labor category for Years 1 through 9 and each year of the Optional Extensions periods. A grand total will be calculated for each year. The Total Monthly Cost for each year will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 6-1.

9. COMPLETION OF OPTIONAL TOLL HOST SYSTEM REPLACEMENT IMPLEMENTATION - SHEETS 7, 7-1, 7-2, AND 7-3

The Proposer’s proposed total price for the Optional Toll Host System Replacement Implementation shall be the aggregate of all costs included in Sheet 7. This sheet covers all costs associated with the Implementation of the Optional Toll Host System Replacement.

The Optional Toll Host System Replacement Implementation cost shall include all costs for items identified in line items 1 through 15 of Sheet 7 associated with the Toll Host System Replacement cost components. The total price shall include (without limitation) all overhead, burden, profit, taxes, duties, fees, warranties, and other items necessary for the Contractor to complete the Work. The costs shall also include (without limitation) all Equipment, supplies, Software, parts and materials, Contractor-acquired permits, licenses, warranties, and other items necessary to meet the Contractor contractual requirements associated with the Optional Toll Host System Replacement Implementation cost. No price escalation will be allowed above the costs provided on the Price Proposal Sheets to complete this Work except as set forth in Section 13.

With the exception of including the Year 1 Warranty Maintenance costs, the prices on Sheet 7 and related back-up shall not include charges and costs associated with the In-lane System or Maintenance Phase, these costs shall be set forth on separate Price Proposal Forms as described in Section 2 above.

Proposers shall complete Sheets 7, 7-1, 7-2, and 7-3 as follows:

1. **Sheet 7-2.** This sheet includes the Optional Toll Host System Replacement Spare Parts and Equipment costs for Year 1. In the columns provided under each cost component (Items 1-2), enter the total quantity in column (B) for each listed element required during the Warranty Year.

If the item is provided as a lump sum, the quantity should be shown as 1. Moving to the right in column (C), enter the unit cost for each item. If additional items are required to be included under each component provided by the Proposer, enter each element name using the additional spaces provided under the appropriate component section. For all additional items entered, the Proposer must also enter the total quantity and unit cost as described above.

Total item costs will be calculated automatically for each item and cost component. The Total Toll Host System Replacement Spare Parts and Equipment Cost (Warranty) Year 1 will then automatically be calculated and shown in the appropriate line item within item 12 on Sheet 7-1.

2. **Sheet 7-1**. This sheet provides back up for Sheet 7 Optional Total Toll Host System Replacement Implementation cost components 1-11 and 13-15. In the Description of Items column (A/B) enter a description for each price component in as much detail as space allows. Note that some component sections include a list of required sub-components and should not be altered; however, the Proposer may add sub-component items below the existing sub-components listed, as needed. Starting in column (C), enter the number of units for each sub-component (e.g., use “4” to represent 4 units or “1” to represent a lump sum). In column (D) enter the unit cost. Total unit costs will be calculated automatically in column (E). Moving to the right columns, in column (F), enter the labor costs associated with each of the sub-components. The costs for each sub-component (the sum of columns (E) and (F)) will then automatically be calculated in column (G), with the sum of all line items for each component automatically sub-totaled and shown in the appropriate line item on Sheet 7. A total for the sheet is provided at the bottom of the sheet.
    - Please note the following regarding Sheet 7-1: Line item 12 is automatically populated from Sheet 7-2 Optional Toll Host System Replacement Implementation Spare Parts and Equipment Cost Year 1.
3. **Sheet 7.** This sheet is automatically populated from Sheet 7-1. No Proposer input is required.
4. **Sheet 7-3.** Enter specific names for the Key Team positions (Items 1-9) for the Optional Toll Host System Replacement labor costs. Next enter the specific loaded labor rate for each staff member in the rate columns and their number of hours. Moving down the sheet, enter additional labor categories for all labor to be used to complete this Work, including rates and hours. For positions listed beyond item 9, staff names are not required. The total labor dollars will be calculated for each staff person and labor category and a grand total will be calculated. The labor dollar grand total must match the total labor dollars total on Sheet 7-1. A labor check cell is provided on the bottom of Sheet 7-1 to assist Proposers with the verification that the labor totals are equal.

10. COMPLETION OF ADDITIONAL SERVICES RATES AND MARKUP FOR OUT OF SCOPE WORK - SHEET 8-1

On Sheet 8-1, the Proposer shall provide a listing of staff positions and loaded hourly labor rates for the purpose of providing pricing for future Work not currently included in **Exhibit A, Scope of Work**. All changes to the Contract involving labor shall use the hourly labor rates in this table. All hourly labor rates shall be stated for the year 2018 and shall be inclusive of burden/overhead and profit. Hourly labor rates shall be adjusted based on changes to the CPI for the previous year beginning with Maintenance Year 1 as described below.

The Proposer shall also provide the current associated Subcontractor Markup, Equipment and Materials Markup, Overhead including burden, and Profit percentages in the cells identified.

11. COMPLETION OF PAYMENT SCHEDULE – EXHIBIT D

The Payment Schedule – Clarks Summit sheet applies the Implementation Costs to payment milestones and associated percentages shown in RFP Exhibit D Payment Schedule. The sheet takes the total Proposer's Implementation price shown on Sheets 2, 3, and 4 for Clarks Summit and multiplies it by the percentage associated with each payment milestone. The result is a dollar amount to be paid for each milestone.

12. COMPLETION OF PROJECT SUMMARY - SHEET 1

Sheet 1 will automatically summarize the costs and pricing detailed in Sheets 2 through 7. These costs will be totaled and presented in the line entitled Total Implementation and Maintenance Phase with Optional Functionality and Optional Extension Phases.

To complete Sheet 1, Proposers must do the following:

1. An officer of the Proposer or an individual otherwise authorized in writing by an officer of the Proposer is required to enter the price written out in words for the Grand Total Cost.
2. The sheet will need to include a signature and date, along with the authorized officer's name, title, address and phone number.

13. COST ESCALATION

Pricing that is noted above as subject to adjustment shall be adjusted up or down from the Proposal pricing using the following Bureau of Labor Statistics' (BLS) Employment Cost (CPI) indices as applicable:

CPI: CUUR0400SA0 Consumer Price Index - All Urban Consumers; West Urban All Items

NOTE: The above index names and numbers were obtained from the Bureau of Labor Statistics (BLS) and were current as of the date this RFP was written. In the event that the BLS updates an index name or number, the Commission shall consult the BLS web site to determine the new name and number of the index. More information about the index can be found on the U.S. Bureau of Labor's website (see http://www.bls.gov/cpi/).

For the purposes of the price proposal calculations, an assumed rate has been included. Adjustments shall be made to future prices based on actual CPI (Labor) for each applicable year. The basis for calculating the actual CPI to be applied shall be as follows:

1. Annual adjustment to prices shall be made using the anniversary date of start of the Maintenance Phase at which each new Maintenance year begins.

2. In the first applicable year for adjustments (Year 1 of the Maintenance Phase) the reference for the adjustment calculation shall be the 2018 Loaded Labor Rate provided by Proposers.

The assumed CPI index for evaluation purposes has been applied to the following Cost Worksheets ONLY:

1. Sheet 2 (Optional Toll Zones Only) (including back-up sheets 2-a, 2-1, 2-2, 2-3, 2-4, 2-5, 2-6, and 2-7),
2. Sheet 5 (including back-up sheets 5-1, 5-2, 5-3, 5-4, and 5-5), and
3. Sheet 6 (including back-up sheets 6-1, 6-2, 6-3, and 6-4).

Adjustments shall be made to future prices in the above sheets based on actual CPI (Labor) for each applicable year. The basis for calculating the actual CPI to be applied shall be as follows:

1. Annual adjustment to prices shall be made using the anniversary date of start of the Maintenance Phase at which each new Maintenance year begins.
2. In the first applicable year for adjustments (Year 1 of Maintenance) the reference period for the adjustment calculation shall be the 2018 Loaded Labor Rate.
3. For the subsequent applicable years of Maintenance and Software Support Services, as well as for Optional Extension 1 (Extension Years 1-5) and for Optional Extension 2 (Extension Years 1-5), the CPI adjustments shall be applied against the previous reference year. For example, Maintenance and Software Support Services pricing shall be adjusted using the index change from Maintenance Year 1 as a reference point for adjusting each of the pricing elements identified in the above table).
4. The annual adjustment shall be equal to the cumulative change in the applicable index for the latest previous 12 month period available at the time of the anniversary date.
5. The applicable index shall be applied as follows:
    a. CPI shall be applied when the entire component of the cost is direct Contractor labor.

Exhibit D
Payment Schedule

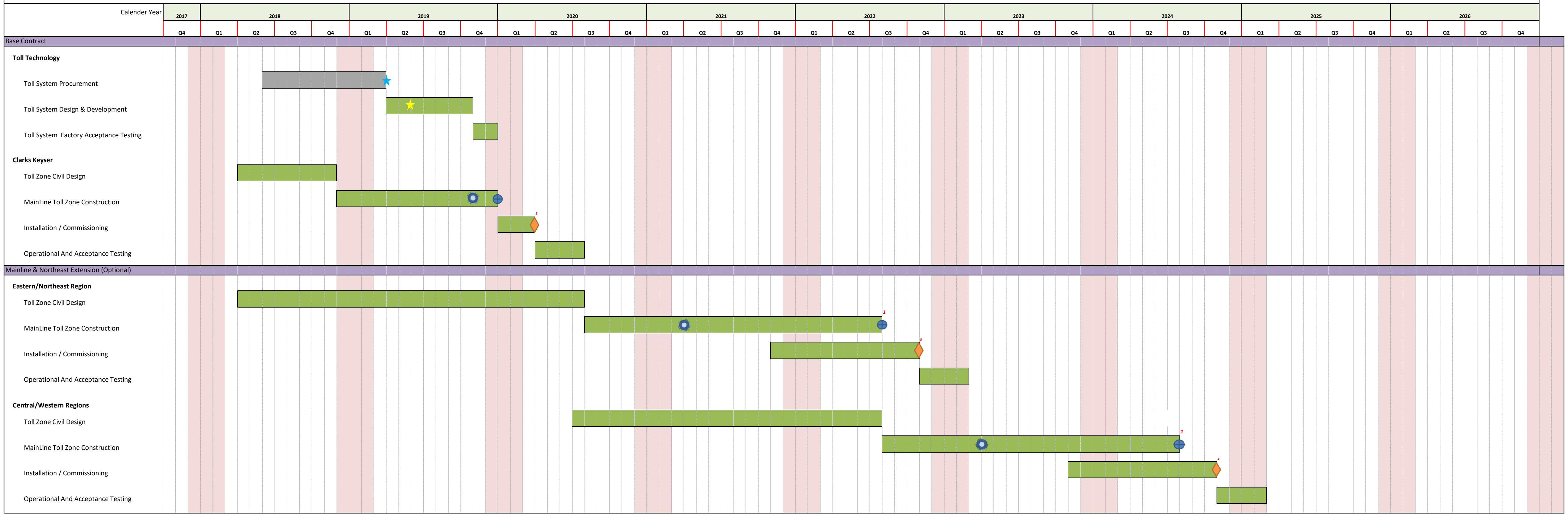
Exhibit D - Payment Schedule - Clarks Summit

A. Payments for Implementation Cashless Tolling System Design and Development					**$ -**
Payment Number	**Payment Milestone**	**Pay Items**	**% Paid**	**Cum.% Paid**	
A-1	Notice to Proceed	Notice to Proceed.	5.00%	5.00%	$ -
A-2	Cashless Toll System Development and Administration	Project Management Documents Approved (PMP, Project Schedule, QA Plan and SDP, SRD).	10.00%	15.00%	$ -
A-3	Cashless Toll System Design	Business Rules and Design Documents Approved (BRD and SDDD) .	15.00%	30.00%	$ -
A-4	Cashless Toll System Factory Acceptance Testing (FAT)	Test Documentation and Factory Acceptance Testing Approved.	15.00%	45.00%	$ -
A-5	Cashless Toll System Onsite First Installation Testing (OFIT)	Installation Plan Approved, Test Documentation and Onsite Integration Testing Approved - First Site.	15.00%	60.00%	$ -
A-6	Cashless Toll System Manuals and Training	Manuals Approved and Training Approved.	5.00%	65.00%	$ -
A-7	Cashless Toll System Commissioning - Clarks Summit	Installation and Commissioning Approved Ready for Go Live.	10.00%	75.00%	$ -
A-9	Cashless Toll System Acceptance	Operational and Acceptance Test Approved, As-builts Approved and Implementation Phase Closed Out.	25.00%	100.00%	$ -

B. Payments Related to Hardware, Equipment and Off-the-Shelf Software				**$ -**
Payment Number	**Payment Milestone**	**% Paid**	**Cum.% Paid**	
B-1	Ordering Verified	20.00%	20.00%	$ -
B-2	Purchased, Received and Verified	60.00%	80.00%	$ -
B-3	Installation Approved	20.00%	**100.00%**	$ -

Exhibit E
Project Implementation Schedule

Cashless Tolling Implementation Schedule (DRAFT*)



★ Anticipated NTP May 2019

★ Approved Civil Design and System Workshops 60 days from NTP

1 Toll Zones Construction Complete and available to Contractor

2 Clarks Summit Go-Live March 2020

3 Eastern Region Go-Live October 2022

4 Central/Western Region Go-Live October 2024

⊕ All Sites Available to Vendor for installation and testing

◆ Projected Go-Live Date

▨ Winter Months that may impact Construction

◉ Begin Toll Equipment installation as toll zones become available (Coordination with Civil contractors to take advantage of lane closures)

* For planning purposes only. The final Implementation schedule to be developed by the Contractor in accordance with the requirements with Approval from the Commission.

Exhibit F
Forms

Exhibit F-1

Proposal Cover Sheet

(Word file "paperclipped" to RFP for ease of completion)

EXHIBIT F-1 – PROPOSAL COVER SHEET
Pennsylvania Turnpike Commission
Cashless Tolling System Implementation and Maintenance

RFP# 18-10495-8121

Enclosed in three separately sealed submittals is the proposal for the Proposer identified below for the above referenced RFP:

Proposer Information:	
Proposer Name	
Proposer Mailing Address	
Proposer Website	
Proposer Contact Person/Title	
Contact Person's Phone Number	
Contact Person's Fax Number	
Contact Person's Email Address	
Proposer Federal ID Number	
Location of Headquarters	
Location of Office(s) Performing the Work	
Listing of all Pennsylvania Offices and Total Number of Pennsylvania Employees	

Submittals Enclosed and Separately Sealed:

☐ Technical Submittal ☐ Diverse Business Participation Submittal ☐ Cost Submittal

Signature	
Signature of an official authorized to bind the Proposer to the provisions contained in the Proposer's proposal:	____
Print Name	
Title	

FAILURE TO COMPLETE, SIGN AND RETURN THIS FORM WITH THE PROPOSAL MAY RESULT IN THE REJECTION OF THE PROPOSAL.

Exhibit F-2
List of Subcontractors

(Word file "paperclipped" to RFP for ease of completion)

Please duplicate this page as necessary to provide the requested information.

	SUBCONTRACTOR	**SUBCONTRACTOR**	**SUBCONTRACTOR**
Legal Name of Company			
Company's FEID Number			
Company Contact Name			
Company Address			
City, State, Zip Code			
Company Telephone No.			
Company Fax Number			
Company E-mail address			
Legal Name of Principal(s)			
Address of Principal(s)			
City, State, Zip Code			
Telephone No. of Principal(s)			
Fax Number of Principal(s)			
E-mail address of Principal(s)			
Corporate Number (if applicable)			
License Number (if applicable)			
Status of License (if applicable)			
Work to be Performed			
Expected Percentage of Total Work			

Exhibit F-3

Recent Client List

(Word file "paperclipped" to RFP for ease of completion)

#	Name of Client including address and telephone #	Project Name	Project Description	Start Date	End Date	Contract Amount
001						
002						

Exhibit F-4

Reference Forms Part 1

(Word file “paperclipped” to RFP for ease of completion)

Proposer shall use this attachment to clearly demonstrate how Proposer meets the minimum qualification requirements for Proposals with regard to Proposer project experience. Each reference provided may be contacted by the Commission. Copy this form as needed to comply with the requirements outlined in the RFP for the Implementation and Maintenance Phase minimum requirements.

Proposer's Name: ____

Please check off which qualifications requirement this reference is intended to address (you may check more than one box to cover both Implementation and Maintenance requirements as long as the explanation below is sufficiently detailed to cover both).

☐ Implementation ☐ Maintenance

Reference Company/Agency Name:	
Address:	
City:	State: Zip Code:
Phone Number:	Fax Number:
Project Manager Reference:	
E-mail:	
Alternate Reference*:	
Phone Number:	Fax Number:
E-mail:	
Alternate Reference Role on Reference Project:	
***Must be completed in addition to the Project Manager reference**	
Proposer's role on project and years of participation (mm/dd/yy to mm/dd/yy):	

Project location, scope, cost, start / end dates:
Operational functionality, number of lanes / plazas, revenue collected, etc.:
Relevant equipment and systems used (such as Host, Cashless Tolling, and OCR etc.):
Comparison to Commission requirements:
Installed System and Maintenance documented performance, as applicable:
Key Personnel involved and role who are also proposed on PTC project:

Exhibit F-5
Reference Forms Part 2

(Word file "paperclipped" to RFP for ease of completion)

Proposer shall use this form for Key Team member references. Each reference provided may be contacted to determine the Proposer's ability to meet the Proposal requirements. Copy this form as needed to comply with the requirements of the RFP and the number of references cited.

Key Project Team Member ______________________________

Proposed Position ______________________________

Reference Company Name:	
Address:	
City:	State: Zip Code:
Phone Number:	Fax Number:
Project Manager:	
E-mail:	
Number of total years' experience of Key Personnel team member in similar role to one proposed for the Commission:	
Reference Project:	
Key Personnel team member role on reference project, including dates of participation and job description:	
Description of reference project location, scope, cost, start / end dates, etc.:	
Operational functionality, number of lanes, plazas, revenue collected, etc.:	
Relevant systems used (Host, Cashless Tolling, and OCR etc.):	
Key Personnel team member's major contributions and highlights:	

Exhibit F-6

Requirements Conformance Matrix

(Excel file "paperclipped" to RFP for ease of completion)

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	**Comments**
No.	**Requirements**	**Existing (E) - Met by current system, no modifications required** **Modification (M) - Modifications needed to meet requirement** **Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs** **To Be Developed (D) - Not in current system, but will be developed** **Not Provided (N**) - Will not be provided - requires explanation**	**If "Status of Functionality = N" then Proposer must provide an Explanation in this Column**
II	**Cashless Tolling System Installation Requirements**		
2.1	**In-lane Systems Functional Requirements**		
	This section defines the In-lane requirements of the Contractor Scope of Work. Each Segment of the Highway has a tolling point which could have one or two toll zones and tolls are collected in each direction of travel at the toll zones. At the toll zones identified, the Cashless Tolling Equipment and electronics shall be installed on toll gantries and in the toll equipment building provided by the civil contractor. The toll gantry conceptual details at each of the toll zones are provided in *Attachment 5: Concept Plan for Overhead Structures/Toll Gantries.* The Contractor shall work with the Commission, the civil designer and civil contractor on requirements for all civil design and construction work to be performed by others on the Project, including the design and location of equipment mounting locations and retractable mounting arm(s).		
2.1.1	**Cashless Tolling System Hardware**		
2.1.1.1	**General Requirements**		
1	All Hardware and Equipment supplied under this Contract, including consumable material (material that requires periodic replacement/replenishment), shall be new and certified to have a ten (10) year minimum service life. Materials and products that have been previously used for development work or the Contractor's internal testing, or items that have been salvaged or rebuilt shall not be permitted to be used in connection with this Contract.		
2	All components, supplies and materials furnished under this Contract for the Cashless Tolling System shall be new, Commercial Off-the-Shelf (COTS) and to the extent possible, field proven, and in revenue operations to the extent possible.		
3	All components procured, furnished, and installed by the Contractor shall be available through multiple sources identified by the Contractor to the extent possible and the names of such sources shall be readily available to the Commission. The Commission shall have the right to purchase third-party Equipment directly from the Equipment vendor.		
4	All Hardware and Software provided under this Contract shall be supported by their manufacturer, upgradeable, maintained, updated, patched and secured throughout the term of the Contract.		
5	Proof of purchase in the form of purchase orders, dated invoices and shipping bills shall be retained by the Contractor and furnished to the Commission in accordance with the requirements of this Scope of Work and Contract.		
6	All Commission standards in accordance with the requirements of this Scope of Work shall be maintained throughout the term of the Contract. Standards include but are not limited to, IT security, data retention, Software and Database design and development, installation, change management, testing, maintenance and protection of traffic (MPT) and safety.		
2.1.1.2	**FCC License**		
7	The AVI system shall comply with all applicable Federal Communications Commission (FCC) regulations.		
8	It is the Contractor's responsibility to prepare the required application and the Commission will obtain the required FCC licenses for all AVI equipment provided under this Scope of Work and Agreement. The Commission has the FCC licenses for the existing AVI systems.		
9	The Contractor shall, as part of this effort, identify and accommodate any site conditions that may potentially degrade the performance of the AVI system.		
10	Under all circumstances it is the Contractor's responsibility to comply with the AVI performance requirements of this Scope of Work and Agreement and no relief in such performance shall be provided.		
2.1.1.3	**Maintainability**		
11	The Cashless Tolling System Hardware shall be designed with the following specifications:		
	· modular, replaceable and repairable components to allow for efficient Maintenance;		
	· all replacements shall be plug compatible with no changes required;		
	· all components that perform the same function shall be interchangeable;		
	· all zone controllers shall be designed such that they are identical and can be configured to operate the specific number of lanes at each toll zone as shown in *Attachment 1: Cashless Toll Zone Locations* through the addition of Hardware pluggable modules and setting of appropriate Software parameters;		
	· where possible, there shall be a second source for all parts and components and it shall be identified in the Bill of Materials (BOM) unless otherwise Approved by the Commission;		
	· all electronic components shall be installed in equipment racks and installed inside the toll equipment building at each toll zone/toll point as applicable;		
	· zone controllers shall be expandable at a minimum to add two (2)additional in-lane devices;		
	· Contractor's electronic Design and installation shall prevent electrical disturbances and noise in the electronics;		
	· ISO standard I/O interface modules shall be used in the Design and all serial, discrete and network interface boards shall have at minimum two (2) spare slots to support the addition of components;		

Functional Requirements			
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	· all exposed junction boxes, pull boxes and other hardware shall be either zinc coated and epoxy painted or stainless steel;		
	· all field wiring shall be terminated on screw lugs or connectors and all connectors shall be keyed or polarized to prevent incorrect connections;		
	· all wiring and connectors shall be labeled and strain relief shall be provided to protect the conductors;		
	· surge suppression shall be provided for all field wiring susceptible to lightning or similar surges;		
	· all lane Equipment shall be fused and protected against over current, over voltage, under voltage and lightning;		
	· redundant power supplies shall be provided for all required internal DC voltages, and		
	· all Equipment shall be properly grounded to ensure the safety of Maintenance personnel.		
2.1.1.4	**Diagnostics**		
12	Equipment mounting and installation design shall support the maintenance of Equipment from above and from below on toll gantries as applicable to each cashless toll zone.		
13	Maintenance personnel shall have easy access to major subsystem components, and removal, testing, and replacement shall not require tools. Components mounted on overhead structures shall also be capable of tethering to secure points during removal or placement during replacement activities such that items cannot be dropped. All test points necessary to diagnose the Equipment while in operation shall be easily accessible and light emitting diode (LED) indicators shall be provided to assist technicians to identify and diagnose problems.		
14	Technicians shall have the ability to connect a laptop authorized by the Commission in accordance with Commission policies to troubleshoot the components. Technicians shall have secured remote access to the device to monitor its status and to perform diagnostics when the lane is in operation.		
15	For easy diagnostic and trouble shooting, all error and event logs shall be consolidated such that all events and errors associated to a transaction are in a single log sequential order based on receipt of the event or error. The consolidated error and event logs shall be retained online for a configurable period of time and shall be easily accessible to the technicians and Authorized PTC staff.		
16	The consolidated error and event logs shall contain but not be limited to all sensor events, triggers and logic decisions associated with a transaction in time order from which they were received from the lane sensors, subsystems or generated by the lane systems.		
17	The consolidated error and event logs shall also be transmitted to the MOMS and available to Authorized Users in viewable form. Search and filter capability shall be provided to display and review data in the consolidated log.		
18	All diagnostics performed shall be recorded and automatically reported to the MOMS, including the technician ID, the time the Maintenance was performed, and all status and recovery messages.		
19	All diagnostic Software and specialty tools required for support of Maintenance activities shall be supplied by the Contractor and the Commission shall have full rights and access as further defined in the Contract. All Software and operating systems shall meet the Commission's most current technology standards; all such Software and equipment shall meet Commission IT security standards.		
2.1.1.5	**Customized Hardware**		
20	If customized components or controllers are used, the Contractor shall provide detailed documentation on the Design, production and testing of these units and shall provide usage rights to the Commission. Documentation shall include electronic diagrams, component layouts and the detailed Bill of Material listing manufacturers/vendors. The Contractor shall identify all customized components and controllers and indicate their plan to make them available for the term of the Contract, including the option for placing in escrow.		
2.1.1.6	**Equipment Racks**		
21	All in-lane Equipment controllers and Cashless Tolling System electronics, devices, servers and associated communications Equipment shall be installed inside dedicated toll equipment racks that are housed within the toll equipment building according to a layout Approved by the Commission IT Department. The Contractor shall purchase and install the equipment racks in accordance with the requirements of this section.		
22	It is the Contractor's responsibility to provide the equipment racks of the correct size that meets the requirements of this Scope of Work. Equipment racks shall have adequate space (twenty five {25} percent extra) for added boards, servers and components for future expansion.		
23	The equipment racks shall support the Cashless Tolling System components for a minimum of ten (10) years. The equipment racks shall not be used to support peripheral non-toll related equipment.		
2.1.1.7	**Environmental**		

Functional Requirements			
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24	The Cashless Tolling System Equipment to be supplied will be installed in areas exposed to the range of climatic conditions found in Pennsylvania. In addition to the climatic conditions, the Equipment will also be subjected to harsh environmental factors normally found in the operation of a toll lane, such as, but not limited to: car, truck, and bus emissions; deicing materials, industrial exhausts; industrial cleaners; gasoline and car lubricants; Electromagnetic Interference (EMI) and Radio Frequency Interference (RFI), and vibrations. These conditions shall be taken into account in the Design and selection of Equipment used on this Project and the Contractor shall ensure that the System works accurately and reliably in such environment.		
25	Lane electronics, zone controllers, LPICPS controllers/servers and other components shall be able to operate in the sealed and enclosed environment of the equipment racks installed within the toll equipment building.		
26	All Hardware provided under this Contract shall be corrosion resistant and remain corrosion resistant for the term of the Contract.		
27	The in-lane Equipment not in environmentally controlled conditions shall operate with no degradation of performance in ambient air temperature of negative thirty (-30) to seventy (70) degrees Celsius, with and without direct sunlight, and relative humidity of five (5) to one hundred (100) percent for Equipment installed in an outside environment and five (5) to ninety-five (95) percent non-condensing for Equipment installed inside equipment racks.		
28	During the Design phase, the Contractor shall provide specification sheets that prove the zone controller and other lane electronics meet the environmental specifications given above. Results of all environmental tests conducted and certification of compliance shall be provided to the Commission for Approval.		
29	All exposed or in-lane Equipment, when in its fully assembled configuration, shall not be damaged, nor shall operational performance or expected lifetime be degraded. During Design phase, the Contractor shall provide specifications for the in-lane Equipment for Commission Approval.		
2.1.1.8	**Assembly**		
30	All customized Hardware shall be assembled and tested in the Contractor's fabrication/assembly facilities before being installed in the lane in accordance with the Commission's Approved test plan for customized Hardware. All chassis, attachments, and Hardware shall be fabricated stainless steel, hot dipped galvanized or other materials resistant to salt exposure and corrosion.		
31	All customized Hardware shall be identified and shall undergo a seventy-two (72) hour burn-in test before they are installed in the lanes, in accordance with the Commission's Approved test plan.		
32	Customized Hardware assembly shall facilitate replacement of failed components in accordance with requirements of this Scope of Work.		
2.1.1.9	**Bill of Materials**		
33	The Contractor shall include the BOM for all Equipment and Hardware supplied for the Cashless Tolling System. Each component shall also include the second manufacturer source and any exceptions shall be noted and explained. During the Design phase the BOM shall be finalized and all changes shall be subject to the approval of the Commission.		
34	Prior to purchase of any Equipment and as part of its Design the Contractor shall submit the final BOM to the Commission for Approval. No equipment shall be purchased by the Contractor prior to Approval of the BOM and the Design, unless otherwise authorized in writing by the Commission.		
35	All Hardware and Software procured under this Scope of Work shall be confirmed to be the latest model/version at the time of purchase with the required warranty, security, Maintenance and support Services.		
36	Updates to the BOM shall be provided by the Contractor whenever changes occur and at a minimum on a semi-annual basis over the term of this Contract.		
2.1.1.10	**Spare Parts and Support**		
37	The Cashless Tolling System procured, furnished, and installed under this Contract shall allow the Contractor to Maintain and replace parts for the term of the Contract. The Contractor shall provide a spare parts list the cost to the Commission (inclusive of shipping) and recommended quantities for all Hardware supplied for the Cashless Tolling System for each year of the Contract.		
38	This Contract shall include the initial purchase quantities of spare parts required for the operation of the tolling points during the Warranty period as recommended by the Contractor. Costs for the replacement of spare parts during the Warranty period shall be the responsibility of the Contractor.		
39	At the end of the Maintenance term, all spare parts inventory shall be turned over to the Commission at one hundred (100) percent of the required inventory level. The Contractor shall identify (via the MOMS) the warranty status for each piece of Hardware and warranty period remaining, if applicable.		
2.1.2	**Cashless Tolling System Software**		
40	The operating system, database, other third-party Software, and Cashless Tolling System Software procured, furnished, and installed by the Contractor shall support real time operations of the lane and shall be field proven.		
41	The operating systems shall have a future upgrade path and shall be supported for a minimum of ten (10) years. The Contractor shall ensure that the risk of obsolescence to the Hardware is minimized through the selection of the operating system Software and the peripheral Hardware.		

Functional Requirements

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42	All Cashless Tolling System Software developed, furnished, and installed under this Contract shall be warrantied against Software defects, security vulnerabilities and deficiencies for the term of the Contract and as described within the Contract and associated attachments.		
43	The vendor shall have an annual information security risk assessment and a vulnerability scan performed by a third party, in consultation with Commission IT Security, and provide the results to the Commission.		
2.1.3	**Cashless Tolling System Lane Configurations**		
44	The Cashless Tolling System shall support the toll zone types, lane configurations and dimensions detailed in *Attachment 1: Cashless Toll Zone Locations*.		
45	Travel lane widths shall be assumed to be either eleven (11) feet four (4) inches or twelve (12) feet in all lanes from stripe to stripe per standard PTC lane markings shown in *Attachment 14 – PTC Standard Pavement Markings*. Shoulders widths for each toll zone are detailed in *Attachment 1: Cashless Toll Zone Locations*. Shoulder lanes that are eight (8) feet or greater shall be fully equipped as a travel lane. Shoulder lanes that are less than eight (8) feet shall have vehicle detection and image capture Equipment to detect and capture vehicles straddling the shoulder.		
46	During the detailed Design, the Contractor shall make the required adjustments to the System Design to accommodate for variations in the actual lane widths and PTC standard lane markings.		
2.1.4	**Toll System Requirements**		
2.1.4.1	**Toll System Software Security**		
47	Access to information on the Cashless Tolling System and network shall be password controlled. The access shall be role based and limited to the authorized Contractor staff and designated Commission personnel.		
48	Accounts for user access to the System shall require a strong password and be compliant with Commission IT security standards and requirements.		
49	The Cashless Tolling System shall use ADFS (SAML 2.0) for user access authentication if the Cashless Toll Concentrator or optional Cashless Toll Host (if implemented) solution is located offsite or Cloud based.		
50	User access security, including sign-on facilities, permission control and access privileges for different levels shall be provided for the files, directories and application Software and shall be fully configurable by a system administrator. Access to all systems needs to be controlled through a central repository with each user having an unique log-in.		
51	User sign-on, access and access failures, both local and remote, to any element of the Cashless Tolling System shall be recorded and tracked for security audit proposes and reported to the MOMS. The System shall continuously and automatically monitor for unauthorized access; violations shall be reported to the MOMS as priority 1 Alert. These reports should be provided to Commission IT Security within twelve (12) hours of discovery.		
52	The Contractor shall develop the access levels, user roles and privileges matrix during System Design with the Commission input, including review by Commission IT Security, and Approval. The System shall allow for additions, deletions and changes to the access levels, user roles and the addition of personnel in a secure manner. Users who have separated from the Commission or the vendor shall have their access removed within 24 hours after the date of separation.		
53	A system level account shall be provided for Commission security systems to perform vulnerability scans using a tool such as Tenable/Nessus, Qualys or other commercial vulnerability scanning tool. Additionally, Commission IT Security can request the Contractor to perform any scans and ensuing reports through the term of the Contract. A user access review is to be done annually with final approval by Commission business owners.		
54	The Contractor shall not circumvent the Commission Approved System security. All access to the System and Approved changes made shall be recorded, monitored, reviewed and audited by the Commission. Specific requirements shall be developed by the Contractor during System Design.		
55	Authorized Users shall have access to the zone controller user access logs to audit the system access.		
56	The Contractor shall provide at a minimum read-only access for Authorized PTC staff to all databases and system log files including but not limited to transaction tables, MOMS tables, stored procedures, auditing, archiving, database views, database logs and scheduled jobs.		
2.1.5	**Cashless Tolling In-Lane System**		
2.1.5.1	**Automatic Vehicle Identification (AVI) System Base Requirements**		
57	The Contractor shall provide an AVI system that is compliant with the E-ZPass Group interoperability requirements and at a minimum support a dual protocol to include the E-ZPass (PS111 TDM/IAG E-ZPass Group) and 6C (ISOC (ISO 18000-63/6C)) protocols at the tolling points specified in this Scope of Work.		
58	The Commission will procure the antennas and the readers as specified by the Contractor through a certified E-ZPass Group vendor. The Contractor shall take delivery of the equipment and the Contractor shall be responsible for the AVI equipment installation and maintenance upon delivery.		
59	The Contractor shall furnish and install all other Hardware, cabling and associated mounting fixtures to form a fully functioning AVI system that meets the requirements of this Scope of Work.		

Functional Requirements

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60	The Contractor shall be responsible for the physical tuning of the certified AVI Equipment, and integrating the AVI system into the Contractor in-lane Design. In addition, the AVI vendor shall certify in writing that the lanes are tuned to the Approved AVI specifications. All AVI installation, configuration and tuning shall be in compliance with the certified E-ZPass Group vendor requirements.		
61	The Contractor is responsible for synchronizing all AVI readers that are in close proximity to the tolling points as required by the certified AVI manufacturer.		
62	The AVI system shall provide full coverage in all areas of the toll zone to read and report transponders. Transponders on vehicles straddling the shoulders that are less than eight (8) feet shall be read and reported to the zone controller. The Contractor shall support adjustments to the antenna quantity and placement based on the final shoulder configuration.		
63	The Contractor shall maximize any inherent redundancy built into the AVI readers whereby the failure of the master or primary reader will result in the reporting of the transponder reads via the slave or secondary reader.		
64	The AVI system shall be able to read the transponder, write to the transponder and report all E-ZPass Group interoperable transponders on vehicles traveling through any area of the toll zone, including but not limited to shoulder, center of lane, traversing lanes and straddling lanes with no interference or degradation of performance. Non-E-ZPass Group interoperable transponder reads shall also be reported and flagged if the AVI system is capable of reading such transponders.		
65	The AVI system shall have the ability to process transponders mounted on vehicles traveling in stop and go and bumper-to-bumper traffic and vehicles traveling at speeds of up to one hundred (100) miles per hour.		
66	The read zones in the lanes at a toll zone shall be tuned such that transponders in vehicles traveling through the lanes in the opposite direction of travel are not reported by the AVI system.		
67	The AVI system shall buffer transponder reads when it is unable to communicate to the zone controller. When communications are restored, the Buffered Transponder Reads shall be reported to the zone controller.		
68	If more than one transponder is present in a vehicle, the AVI system shall have the ability to accurately read, write to and report all transponders that are compliant with the E-ZPass Group and current National Interoperability (NIOP) candidate protocols. The zone controller shall properly associate the first read Commission transponder that has a valid status at the time of the transaction to the vehicle and report the additional transponders in the transaction. If both transponders have a valid status the zone controller shall associate the first read to the vehicle and report any additional transponders in the transaction. Additional transponder reads shall be reported to the existing PTC systems according to the Business Rules.		
69	The Contractor shall use the full capability of the selected AVI system to obtain AVI system status in accordance with the manufacturer specifications and report such status to the MOMS. Loss of communication to any element of the AVI system shall be immediately detected by the zone controller and reported to the MOMS. The Contractor-provided monitoring logic shall specifically detect any failures and generate alarms when failures are detected.		
70	The Contractor shall provide maintenance tools to support remote lane tuning, diagnostics and other configuration changes. Setup and configuration of the AVI system shall be achieved remotely and shall not require lane closure except for major lane tuning, when initially installed or when a reader or antenna is replaced.		
2.1.5.2	**Automatic Vehicle Identification (AVI) System Tri-Protocol Implementation (Optional)**		
71	The Contractor shall provide an AVI system that is compliant with the E-ZPass Group interoperability requirements at the tolling points specified in this Scope of Work.		
72	The Contractor shall provide an AVI System comprised of tri-protocol readers, antennas and ancillary Equipment that is compliant with the base AVI system requirements plus the SeGo protocol (ISOB_80K).		
73	Tri-protocol readers shall be Configurable with the option to select active protocols to support the transition to the new interoperable solution.		
74	If requested, the Contractor shall support the transition of the current E-ZPass Group protocols to include the protocols required within this section when and if applicable and such support shall include but not be limited to installation adjustments, configuration, tuning, testing and verifying compliance to applicable interoperable requirements including accuracy requirements.		
75	The Commission will procure the antennas and the readers as specified by the Contractor through a certified E-ZPass Group vendor. The Contractor shall take delivery of the equipment and the Contractor shall be responsible for the AVI equipment installation and maintenance upon delivery.		
76	The Contractor shall furnish and install all other Hardware, cabling and associated mounting fixtures to form a fully functioning AVI system that meets the requirements of this Scope of Work.		
77	The Contractor shall be responsible for the physical tuning of the certified AVI Equipment, and integrating the AVI system into the Contractor in-lane Design. In addition, the AVI vendor shall certify in writing that the lanes are tuned to the Approved AVI specifications. All AVI installation, configuration and tuning shall be in compliance with the certified E-ZPass Group vendor requirements.		
78	The Contractor is responsible for synchronizing all AVI readers that are in close proximity to the tolling points as required by the certified AVI manufacturer.		

Functional Requirements			
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79	The AVI system shall provide full coverage in all areas of the toll zone to read and report transponders. Transponders on vehicles straddling the shoulders that are less than eight (8) feet shall be read and reported to the zone controller. The Contractor shall support adjustments to the antenna quantity and placement based on the final shoulder configuration.		
80	The Contractor shall maximize any inherent redundancy built into the AVI readers whereby the failure of the master or primary reader will result in the reporting of the transponder reads via the slave or secondary reader.		
81	The AVI system shall be able to read the transponder, write to the transponder and report all E-ZPass Group interoperable transponders on vehicles traveling through any area of the toll zone, including but not limited to shoulder, center of lane, traversing lanes and straddling lanes with no interference or degradation of performance. Non-E-ZPass Group interoperable transponder reads shall also be reported and flagged if the AVI system is capable of reading such transponders.		
82	The AVI system shall have the ability to process transponders mounted on vehicles traveling in stop and go and bumper-to-bumper traffic and vehicles traveling at speeds of up to one hundred (100) miles per hour.		
83	The read zones in the lanes at a toll zone shall be tuned such that transponders in vehicles traveling through the lanes in the opposite direction of travel are not reported by the AVI system.		
84	The AVI system shall buffer transponder reads when it is unable to communicate to the zone controller. When communications are restored, the Buffered Transponder Reads shall be reported to the zone controller.		
85	If more than one transponder is present in a vehicle, the AVI system shall have the ability to accurately read, write to and report all transponders that are compliant with the E-ZPass Group and future National Interoperability (NIOP) requirements. Additional transponder reads shall be reported to the existing PTC systems according to the Business Rules.		
86	The Contractor shall use the full capability of the selected AVI system to obtain AVI system status in accordance with the manufacturer specifications and report such status to the MOMS. Loss of communication to any element of the AVI system shall be immediately detected by the zone controller and reported to the MOMS. The Contractor-provided monitoring logic shall specifically detect any failures and generate alarms when failures are detected.		
87	The Contractor shall provide maintenance tools to support remote lane tuning, diagnostics and other configuration changes. Setup and configuration of the AVI system shall be achieved remotely and shall not require lane closure except for major lane tuning, when initially installed or when a reader or antenna is replaced.		
2.1.5.3	**Automatic Vehicle Classification (AVC) System**		
88	The Contractor shall analyze the site conditions and Design, procure, furnish and install the required sensors and Hardware on all lanes at the specified Cashless Toll Zones as part of the AVC system that performs in accordance with performance requirements set forth in this Scope of Work under all weather conditions. The AVC system shall accurately detect, classify and separate vehicles spaced as close as three (3) feet apart traveling in stop and go and bumper-to-bumper traffic and vehicles traveling at speeds up to one hundred 100 miles per hour.		
89	The AVC system shall determine vehicle axle count or axle count and vehicle dimensions, and classify vehicles in accordance with the Commission vehicle classification structure described in *Attachment 4a: PTC Proposed AVC Class Structure and Silhouette* based on the type of toll location. Classification of vehicles traveling on the shoulders of less than eight (8) feet width is not required; however, the System shall detect vehicles that travel on the shoulder and trigger the LPICPS.		
90	The AVC system shall have the ability to detect trailer hitches and ensure that vehicles with a trailer in tow are reported as one unit to the zone controller as part of the vehicle transaction data.		
91	The AVC system shall determine the speed of the vehicle and report the speed to the zone controller as part of the vehicle transaction data.		
92	The Contractor shall ensure that there is sensor coverage at all areas of the toll zone to accurately detect and report vehicles traveling the shoulder and vehicles straddling lanes.		
93	The AVC system shall provide vehicle event messages and signals, and vehicle classification data to the zone controller. Exception conditions processed by the AVC system shall be included in the transaction data, for example vehicle straddling the lane.		
94	The Contractor's proposed AVC system shall have redundancy whereby AVC continues to function in the event any element of the AVC system fails or is degraded. The failure of a single sensor shall not prevent the lanes from processing vehicles or impact the System's capability to accurately associate transponders and to capture and process images.		
95	The AVC system shall report its health to the zone controller and shall provide status when polled. Loss of communication to any element of the AVC system shall be immediately detected and reported. All health and failure status messages shall be transmitted and reported to the MOMS. In the event the primary AVC sensor fails, then the secondary sensors shall be used to capture and process images in accordance with the Commission Business Rules.		
96	In the event there is a Class Mismatch between the AVC system and the transponder class, as defined by the Commission Business Rules during the Design phase, an image of the vehicle shall be captured and processed. The ability to enable or disable image capture for a Class Mismatch shall be configurable.		
2.1.5.4	**License Plate Image Capture and Processing System (LCICPS)**		

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97	The Contractor shall Design, procure, furnish, and install all necessary front and rear LPICPS Hardware and Software required to support the video tolling and video processing requirements as set forth in this Scope of Work.		
98	High resolution front and rear cameras shall be utilized for performing the OCR/ALPR.		
99	Contractor shall install high resolution front and rear color ALPR cameras to meet the requirements of the Scope of Work. The Contractor shall install high resolution front and rear color cameras to provide one hundred (100) percent image capture during individual camera failures and excessive glare conditions.		
100	The LPICPS shall capture and process vehicles traveling in stop and go and "bumper-to-bumper" traffic, vehicles traveling at speeds up to one hundred (100) miles per hour, and vehicles with separation as close as three (3) feet apart.		
101	The Contractor shall ensure that there is shoulder coverage and vehicles traveling through any area of the toll zone, including but not limited to shoulder, center of lane, traversing lanes and straddling lanes, shall be accurately detected and their images captured and processed in accordance with the Commission Business Rules.		
102	The LPICPS shall buffer images (retaining an image until its disposition is known) such that no image is lost in order to support multiple vehicles in the lane and in accordance with the Commission Business Rules.		
103	The Contractor shall procure, furnish, and install cameras, lighting, necessary image triggers, backup triggers and the necessary camera control Software to automatically adjust the cameras to accommodate varying light and weather conditions to maintain adequate brightness and contrast settings, with or without traffic, to ensure optimum license plate information capture under all conditions and time of day.		
104	The system shall associate all images captured for a single vehicle to the vehicle transaction including multiple images captured by a camera.		
105	Lights installed in support of the cameras shall not distract motorists traveling in either direction in the lanes. Contractor shall make no assumption of ambient light and the system shall function without any degradation regardless of the ambient light.		
106	The Contractor shall procure, furnish, and install the necessary redundant controllers/servers to support the in-lane LPICPS Equipment and such servers shall be separate of the zone controller servers.		
107	The Contractor shall provide robust industrialized computers and operating systems (PC's or workstation-type operating systems are not permitted) sufficient processor speed and memory to process vehicles in real time to meet the speed and traffic volumes as specified in this Scope of Work.		
108	The following traffic volumes are provided as projections for planning purposes only and subject to change. The projected Average Annual Daily Traffic (AADT) various tolling locations identified in this Scope of Work can be found in *Attachment 13 -Annual Traffic Volumes* .		
109	The LPICPS controllers/servers shall support standalone operations and be sized to store a minimum of thirty (30) days of images and data per lane at each of the toll zones under normal operating conditions.		
110	The LPICPS shall perform with no degradation under conditions where every vehicle is considered a video transaction (100 percent video transaction). Under these conditions the System shall store images at the lane level for minimum of seven (7) consecutive days per lane. The System shall provide a configurable setting for the processing of one hundred percent (100) percent of video transactions.		
111	When the storage utilization on the LPICPS controllers/servers reaches a configurable percentage (for example 80 percent), a message shall be transmitted to the MOMS. Images shall be deleted only after it is confirmed/acknowledged that the images have been successfully transmitted to the image server(s). Any deletion of images shall be automatic, without user intervention, and shall generate a message to be transmitted to the MOMS (configurable).		
112	The LPICPS controllers/servers architecture shall have full redundancy such that failure of a processor, board, power supply, disk, communications or other critical component does not result in loss of images and data.		
113	In the event communications to the LPICPS are lost or any LPICPS Hardware becomes non-operational, the Contractor's Design shall ensure that no images and/or data are lost and that all images and associated data are saved to a backup controller/server and transmitted to the image server(s) upon restoration of communications.		
114	The Contractor's Design shall guarantee transmission of the video transactions, images and license plate results (optional) from the lanes to the image server(s) and from the image server(s) to the existing CSC/VPC system.		
115	The System shall provide the capability to reconcile images to the transaction data and verify one hundred (100) percent transmission of video transactions and images to the existing CSC/VPC system.		
116	If the Contractor solution includes toll rate determination within the In-lane Systems, then the video transactions may have the toll rates assigned to each transaction as specified in the Approved interface control document (ICD).		
117	The Contractor's architecture shall support the image throughput requirements specified in the Scope of Work.		
118	The LPICPS shall be capable of continuously performing diagnostics and reporting its health to the zone controller and the MOMS. Loss of communication to any element of the LPICPS shall be immediately detected. All health, failure and recovery status messages shall be transmitted and reported to the MOMS.		
119	The LPICPS shall be capable of transferring video transaction data, images and license plate data to the image server(s) or the existing CSC/VPC systems in real-time or in batch mode as determined by the Commission to efficiently utilize the limited network bandwidth.		

Functional Requirements			
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2.1.5.5	**Optical Character Recognition (OCR)/Automatic License Plate Recognition (ALPR) – Optional**		
	If the option to provide OCR/ALPR Software is exercised, then the Contractor shall provide OCR/ALPR Software for determining the license plate data (number, jurisdiction and plate type) that results in the System meeting the requirements specified in the Scope of Work.		
120	The OCR/ALPR Software may reside at the toll zone level, plaza level or the Highway level, as long as it meets the performance and functional requirements specified in this Scope of Work.		
121	The System shall correctly identify the jurisdiction, plate type, special characters and stacked characters, and accurately determine the license plate number.		
122	There shall be no backlog or failure in the processing of images for obtaining the license plate data (number, jurisdiction and plate type) and there shall be server redundancy whereby standby servers are available immediately and fully operational in the event of a failure.		
123	The OCR/ALPR Software procured, furnished, and installed under this Contract can include Software that enhances and improves the accuracy and efficiency of the OCR/ALPR process. The System shall meet the OCR/ALPR performance requirements specified in this Scope of Work for license plates from States of PA, NJ, OH, FL, NY, MD, TX, DE, VA and NC. Each tolling location can be independently tuned to optimize performance based on the mixture of plates for each given toll zone.		
124	The LPICPS shall provide the capability of detecting image quality degradation in near real-time and generate alarms that are reported to MOMS when image quality impacts OCR/ALPR performance.		
125	If a vehicle has two license plates or cameras capture multiple front and rear images for a vehicle, the region of interest (ROI) for all license plates shall be obtained and the license plate number from all plates shall be extracted and associated to the vehicle transaction.		
126	Vehicles with two rear license plates shall be identified to allow the back-office to apply separate Business Rules for such transactions.		
127	The images transferred to the existing CSC/VPC system shall include, at a minimum, the front and rear full uncompressed image(s) and the ROI.		
128	Based on the OCR/ALPR results, the System shall identify the best license plate image that was used by the OCR/ALPR to obtain the license plate data including identification of front and rear images.		
129	The data transmitted along with the image shall meet the Approved ICD and shall include, but not be limited to:		
	· transaction data;		
	· license plate data, including license plate number, jurisdiction and plate type;		
	· confidence level of the OCR/ALPR results for individual characters and overall license plate number;		
	· confidence level of the jurisdiction, and		
	· enforcement notification status and action (if exercised).		
130	For audit and Maintenance purposes, Authorized Users shall have the capability to view all the images in real time on any device connected to the Cashless Tolling System network and verify the OCR/ALPR performance.		
131	For audit and testing purposes Authorized Users shall have the ability to perform image review, utilize image enhancement tools, and enter license plate data independent of the normal image processing workflow. A flexible user interface shall be provided that allows Authorized Users to select the image review criteria. Data entered through this process shall be transmitted to the Cashless Toll Concentrator or optional Cashless Toll Host System for reporting.		
132	All data entered through the independent image review process for testing and audit described above shall be saved separate from the normal production environment and shall be available to Authorized Users through reports. Such an audit process shall not impact normal operations and in most cases will occur after the images are transmitted to the existing CSC/VPC system.		
2.1.6	**Enforcement Notification** - *Optional*		
	If the option to provide Enforcement Notification functionality is exercised, then the Contractor shall provide Enforcement Notification that results in the System meeting the requirements specified in the Scope of Work.		
133	The Cashless Tolling System shall support the Maintenance and update of VEL that contains transponder numbers and license plate numbers that the Commission requires notification on. This could include repeat violators.		
134	The VEL will be transmitted from the existing CSC/VPC system or existing PTC Toll Host to the Cashless Toll Concentrator, Cashless Toll Host (optional) or facility server(s) and from the Cashless Toll Concentrator, Cashless Toll Host (optional) or facility server(s) to the lanes at frequent configurable increments and when changes take place.		
135	The Cashless Tolling System shall provide the capability to alert applicable personnel if the System detects a transponder or license plate passing through the cashless toll zone that is identified for enforcement notification. The criteria for notification shall include the status of the transponder and presence of the license plate on the VEL.		
136	Notification methods shall include but not be limited to text message, email or system to system interface.		

Functional Requirements			
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137	The System shall alert applicable personnel within twenty (20) seconds of the vehicle passing through the toll zone if a vehicle on the VEL is identified. The transponder ID, transponder status, license plate number and jurisdiction shall be included in the Alert.		
138	If an enforcement notification was successfully transmitted to applicable personnel, the transaction shall have a flag denoting the transmission of the enforcement notification. This enforcement transmission status shall be transmitted to the existing CSC/VPC system.		
139	The System shall support the transmission of images (configurable) to the applicable personnel and shall include the image of the vehicle or just the ROI.		
2.1.7	**Zone Controller**		
2.1.7.1	**Zone Controller Hardware**		
140	A fully redundant zone controller shall be Designed, procured, furnished, and installed at each of the toll zones. The redundant zone controllers shall have the identical configuration.		
141	The zone controllers shall be installed in equipment racks and housed in the toll equipment building whether there is a single or dual toll equipment building at each tolling point.		
142	When any Hardware and/or process on the primary zone controller fails preventing it from processing vehicles and creating transactions, the secondary zone controller shall automatically and immediately assume the functions of the primary zone controller. The failover from the primary zone controller to the secondary zone controller shall be transparent to the rest of the System and shall not require human intervention or the restart of any subsystems. Only one zone controller at a time shall generate revenue transactions.		
143	Alarm messages shall be generated and reported to the MOMS when such a failover event occurs. The Contractor's failover Design shall ensure that there is no loss of revenue or transactions when one of the zone controllers fails.		
144	The System shall provide Authorized Users the capability to manually and remotely failover the active zone controller to and from the primary zone controller to the secondary zone controller. All such events shall be recorded and transmitted to the MOMS.		
145	The zone controllers shall be Hardened, industrial grade servers and the processor speed and memory shall be sufficient to process vehicles in real time to meet the traffic speed and volumes as specified in this Scope of Work. The following traffic volumes are provided as projections for planning purposes only and subject to change. The projected Average Annual Daily Traffic (AADT) for the various tolling locations identified in this Scope of Work can be found in *Attachment 13: Annual Traffic Volumes* .		
146	Storage shall be sized to store a minimum of thirty (30) days of transaction and event data for each lane at the toll zone supported by the zone controller.		
147	Proprietary zone controller Hardware will be considered for use, subject to the Commission's Approval. All drawings and instructions that enable construction and assembly, installation, repair, and modification of the Hardware, as well as sufficient property and use rights shall be provided to the Commission.		
2.1.7.2	**Zone Controller Software**		
148	The zone controller Software shall interface to the various devices and subsystems for each of the toll zone types specified in *Attachment 1: Cashless Toll Zone Locations* and perform all the functions as described in this Scope of Work for all Commission toll facilities.		
149	The zone controller located at each toll zone shall process all of the data obtained from the other subsystems as described in this Scope of Work to generate a transaction record for each vehicle passage through the toll zone. The zone controller shall:		
	· manage the TSL for all E-ZPass Group interoperable agencies used to validate the status of a transponder received from the AVI system;		
	· use the data obtained from the AVI and AVC systems to assign the transponder read to the correct vehicle and frame the vehicle transaction accurately;		
	· notify the LPICPS to capture and process vehicle images if no Valid Transponder read is obtained from a vehicle or if the Commission Business Rules require the capture of an image;		
	· transmit the transaction record to the facility server (if provided) or to the Cashless Toll Concentrator or optional Cashless Toll Host, including but not limited to the following data: vehicle detection and classification data, transponder data (including raw transponder data as reported by the reader), Equipment status data, and all other pertinent information regarding the transaction as specified during the Design phase;		
	· transmit to the MOMS all alarm messages relating to the health of each subsystem, including the health of the primary and secondary (redundant) zone controller. Recovery messages shall also be transmitted and reported;		
	· ensure that vehicle event data and transaction data shall be accessible to the DVAS, and		
	· transmit to the facility server (if provided) or Cashless Toll Concentrator or optional Cashless Toll Host for further processing all other messages/events in accordance with Approved ICDs.		

Functional Requirements

No.	**Requirements**	**Required Proposer Inputs**	
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150	The zone controller Software shall be configurable and shall be able to support the Commission Cashless Tolling operational needs without requiring changes to Software. The configurable parameters shall be defined and documented during the Design process. All parameters shall have default values that shall be established during the Design process.		
151	The Contractor shall propose appropriate Protocols and data structures to accomplish the communications required between various peripherals. These Protocols and data structures shall be fully detailed and documented, in Consultation with the Commission, by the Contractor during the Design process and Approved by the Commission.		
152	Guaranteed transmission Protocols shall be used for all messages exchanged between systems, including but not limited to:		
	· zone controller;		
	· LPICPS;		
	· AVI system;		
	· AVC system;		
	· facility servers (if provided);		
	· Cashless Toll Concentrator;		
	· Cashless Toll Host (optional);		
	· image server(s);		
	· existing CSC/VPC;		
	· DVAS;		
	· MOMS, and		
	· the existing PTC Toll Host		
153	The Cashless Tolling System shall support the various lane configurations shown in *Attachment 1: Cashless Toll Zone Locations*. The zone controller application Software shall support all lane functions required to meet the Commission Cashless Tolling operational requirements.		
2.1.7.3	**Zone Controller Start-Up**		
154	Upon start-up or initialization the zone controller shall perform a self-diagnostics test to ensure full System operations. Alarm messages shall be reported for all failure conditions and a notification of the diagnostic check completion shall be displayed on the MOMS Dashboard. The failure of a critical system shall result in the toll zone operating under degraded operations in accordance with the Commission Business Rules.		
155	Upon start-up, the zone controller shall verify with the facility server (if provided), the Cashless Toll Concentrator or optional Cashless Toll Host that it has the latest configuration files; VEL (if exercised); TSL; and any other files required to support the lane operations. If the latest files are not present on the zone controller, it shall request the latest data from the facility server (if provided), Cashless Toll Concentrator or optional Cashless Toll Host. If a zone controller is unable to get the latest files, an Alert shall be generated and sent to MOMS.		
156	The zone controller shall also synchronize its time with the Commission time source and an Approved secondary source upon start-up and at established configurable intervals. The zone controller shall also support a secondary source for time synchronization.		
2.1.7.4	**Lane Operations**		
157	The Cashless Tolling System shall support various modes of operation that are managed and initiated by Authorized Users through the Cashless Toll Concentrator, the facility server (if provided), optional Cashless Toll Host or other means as approved by the PTC.		
158	Transactions shall be processed according to different Business Rules either at the lane level or the host level based on the mode of operation. The Contractor shall be responsible for ensuring that the AVI and video transactions are processed according to Commission Business Rules and transmitted correctly to the existing PTC Toll Host and/or CSC/VPC system.		
159	The Cashless Tolling System shall support the following modes of operations:		
	· Open Mode: All transactions shall be processed normally in an open mode;		
	· Maintenance Mode: Transactions created in Maintenance mode are processed and transmitted as normal transaction but are identified as Maintenance mode transactions and transmitted to the Cashless Toll Host. Transactions that occur during Maintenance mode are not reported as traffic or revenue transactions.		
	· Emergency Mode: Transactions created during emergency mode shall be identified as emergency mode transactions and processed in accordance with Commission Business Rules to be determined during the Design phase.		
	· Save Image Mode: Capability shall be provided whereby Authorized Users can enable and disable a zone controller to save one hundred (100) percent of vehicle images processed through the LPICPS based on various selection criteria. Transactions under such condition shall be processed normally; however, these transactions and images shall be flagged with the save image mode and processed according to the Commission Business Rules (for example audit purposes).		
160	When a lane is operating in a mode other than normal open mode, an Alert shall be generated and sent to MOMS at regular (configurable) intervals.		

Functional Requirements			
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161	Authorized Users shall have the ability (local and remote) to configure the next operating mode and to gracefully shutdown the zone controller. Each time a mode change is requested an Alert message shall be sent to the MOMS.		
2.1.7.5	**Transaction Processing**		
162	The zone controller shall detect, classify, and frame vehicles; assign the transponder accurately to the correct vehicle and capture and process the image of the correct vehicle in accordance with the Commission Business Rules and with the performance requirements specified in this Scope of Work.		
163	The detailed transaction processing rules shall be defined and finalized during the Design phase; however, the following basic rules shall apply:		
	· the System shall have the ability to process and record multiple transponders in a vehicle and associate each transponder to the vehicle transaction;		
	· any non-E-ZPass Group interoperable transponder reads shall be reported to the Cashless Toll Host System;		
	· a minimum of one revenue bearing transaction shall be created for each vehicle that travels through the toll zone and the zone controller shall ensure that the transaction is complete prior to transmitting it;		
	· the zone controller shall be able to accurately identify, process, and track multiple vehicles in the toll zone;		
	· the zone controller shall ensure that duplicate transponder transactions (same transponder ID) are not reported from the same lane or toll zone within a configurable period of time or consecutively;		
	· Buffered Transponder Reads that are transmitted to the zone controller shall be processed but not be assigned to a vehicle by the zone controller and shall be flagged and reported to the facility server, Cashless Toll Concentrator or optional Cashless Toll Host for further processing and vehicle assignment;		
	· the zone controller shall automatically synchronize with the various subsystems to ensure the events in the lane correspond to the transaction generated, and		
	· the System shall incorporate self-correcting logic to adjust for lane anomalies and event synchronization issues.		
164	The transaction message details shall be defined and finalized during the Design phase; however, the following basic rules shall apply:		
	· The In-lane System shall transmit the video transaction to the existing CSC/VPC system for processing and billing.		
	· the In-lane System shall transmit AVI and video transactions to the Cashless Toll Concentrator or optional Cashless Toll Host for processing, reporting, and reconciliation with the existing PTC Toll Host and CSC/VPC;		
	· the transaction message shall contain all data required by the existing PTC Toll Host and CSC/VPC systems to process the AVI and video transaction;		
	· each transaction shall contain various event times to help with transaction pre-processing and synchronizing events to a transaction including but not limited to: "vehicle entry" time; "LPICPS trigger" time; "transponder read" time; "transponder write" time, and "vehicle exit" time. Such event times shall allow transponder reads, images and transaction to be associated correctly with the vehicle, and		
	· the System shall assign a lane number as approved by the PTC sequential by lane to each transaction and report the lane in which the vehicle was detected within the toll zone.		
	· the System shall assign a sequential sequence number by lane to each transaction detected within the toll zone.		
2.1.7.6	**E-ZPass Group Mapped Class**		
165	The System shall utilize the raw E-ZPass Group class obtained from the transponder data and map that raw class to the Commission E-ZPass Group proposed axle+dimension mapped class in accordance with *Attachment 4b: E-ZPass Group Mapped Classes* to be finalized during the Design Phase.		
166	The System shall retain the raw E-ZPass Group class and include that in the transaction data along with the E-ZPass Group mapped axle+dimension class for Commission.		
167	If a transponder has a raw E-ZPass Group class that is not mapped to the Commission E-ZPass Group axle+dimension class then the transaction shall be assigned a default class (configurable).		
2.1.7.7	**Revenue Vehicle Class (PTC Class)**		
168	The assignment of the Revenue Vehicle Class in normal operations and in degraded mode of operations shall be in accordance with the Commission Business Rules. If no classification data is obtained, a configurable default revenue class shall be assigned to the transaction and the transaction shall be flagged.		
169	The Revenue Vehicle Class shall be used to determine the fare amount for a transaction as defined by the Commission Business Rules. Flags in the transaction shall identify which class was used as the Revenue Vehicle Class.		
170	The System shall have the capability to cap the maximum and minimum (configurable) axles and class and to charge a set toll rate per additional axle count.		
171	Transactions shall include the raw E-ZPass Group class, AVC class, mapped E-ZPass Group class and Revenue Vehicle Class. The Revenue Vehicle Class assigned in accordance with the Commission Business Rules shall be used to determine the toll amount.		
2.1.7.8	**Fare Determination**		

Functional Requirements			
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	Fare determination is not required at the In-lane Systems, and can be performed at the Cashless Tolling Host Concentrator, facility server(s), Cashless Toll Host (optional) or existing PTC Toll Host. The Contractor solution shall include fare determination at the Cashless Toll Host Concentrator, facility server(s), Cashless Toll Host (optional) or the In-lane Systems for AVI transactions and shall meet the following requirements. Currently the existing CSC/VPC system assesses the toll for violation transactions and will continue to do so for video transactions; however, the Contractor can assign the toll to video transactions if the Contractor solution provides this capability.		
172	Fare determination shall be performed at the In-lane Systems, the Cashless Toll Concentrator or optional Cashless Toll Host systems or the existing PTC Toll Host for all AVI transactions.		
173	The Contractor solution shall include fare determination at the Cashless Toll Concentrator, optional Cashless Toll Host System or the In-lane Systems for AVI transactions.		
174	Fare determination may be performed at the In-lane Systems for all video transactions and may later be adjusted at the PTC CSC/VPC based on the transaction categorization, for example Video Image Toll (VToll).		
175	The assignment of tolls shall be assigned based on the final Design and shall be assessed using the toll rates and schedules established for each tolling point for barrier type locations such as DRB and Gateway or may be assessed based on a completed trip that would be built based on the number of gantries the customer passed under while traveling on the Mainline and/or Northeastern Extension (if Toll Host option exercised). The toll rate and class structure for the various toll facilities are not developed yet but the System shall support the toll rates and class structure for the classifications in *Attachment 4a: PTC Proposed AVC Class Structure and Silhouette* based on the toll location.		
176	The System shall support the assessment of toll by payment type for example video, E-ZPass, and Non-Revenue; vehicle class and location.		
177	Home Agency(Commission issued) non-revenue transponders shall be charged $0.00 (configurable) fare but Away Agency non-revenue transponders shall be charged the normal fare.		
178	Class 1 motorcycles with valid E-ZPass transactions that use a Home Agency(Commission issued) transponder shall be charged a configurable discounted fare.		
179	Motorcycles and other vehicles that qualify for discounted fare shall be identified by using the E-ZPass Group vehicle Type 2 which is comprised of E-ZPass Group class 136, 140 and 144. The category of E-ZPass Group class that qualifies for discounted fare shall be configurable.		
180	Motorcycle discount fares shall be rounded to the nearest penny (configurable) but shall be no less than the minimum fare (configurable). Currently the minimum fare is fifty (50) cents.		
181	The toll charged for E-ZPass transactions shall be based on Commission Business Rules developed during the Design phase and shall consider the operational status of the AVC.		
182	Tolls charged for video transactions shall be based on AVC (if it is operational) or the default class and shall be defined during the Design phase.		
183	Transactions shall be flagged if the vehicle class is estimated by the AVC system (for example, when the class is based on the vehicle profile or AVC data is incomplete or degraded).		
2.1.7.9	**Saving of Images**		
184	Images shall be captured and saved for the following conditions and as further defined during the Design process, including but not limited to:		
	· in all cases where there is no transponder read (including when the AVI system is down or degraded), the transponder is not "valid", or a non- interoperable read is detected;		
	· in all cases where there is a vehicle classification condition as determined by the Commission Business Rules, for example in conditions where the AVC class is estimated by the System;		
	· if the LPICPS loses communications with the zone controller in accordance with the Commission Business Rules;		
	· in all cases where there is a Class Mismatch between the transponder class and the AVC, as determined by the Commission Business Rules, and		
	· in conditions where the "save image mode" is enabled.		
185	Images saved during a LPICPS loss of communication event shall be flagged and subsequently matched with the correct transaction data when communication with the zone controller resumes. This matching can occur at the Cashless Toll Host Concentrator or optional Cashless Toll Host but shall take place in a manner that does not interfere with or degrade real time zone controller operations.		
186	If the AVC system is not operational but the LPICPS trigger is functioning, images shall be saved such that all non-Valid Transponder transactions that occur during the AVC malfunction can be subsequently pursued for collection. Sufficient data shall be provided in the transactions to allow the PTC CSC/VPC to process such transactions so that customers are not charged in error when lane operation is degraded.		
2.1.7.10	**Configuration Files**		

Functional Requirements

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187	All parameters and settings required to run the zone controller application and the lane equipment shall be maintained in configuration files. Access to configuration files required to support the zone controller operations shall be limited to Authorized Users.		
188	The configuration files shall be maintained at the toll zone and the Cashless Toll Concentrator or optional Cashless Toll Host for configuration and version control. All zone controllers shall have default configuration files that allow the lane to start-up automatically.		
189	Authorized Users shall be able to make changes to parameters and settings that are defined as configurable in this Scope of Work and in the Approved Design documents. Authorized Users shall be able to make changes to the configuration files in the field. Changes to configuration shall result in an alert message to the MOMS. All changes made to the configuration files in the field shall be synchronized to the master configuration file that is maintained at the Cashless Toll Concentrator or optional Cashless Toll Host.		
190	Each zone controller shall automatically back up its critical configuration files to a backup server once a day to be used to rebuild the master drive in the event of hard disk failures.		
2.1.7.11	**Zone Controller Interfaces**		
191	The zone controller shall interface to various devices and subsystems to transmit and obtain data and synchronize the time.		
192	The zone controller shall provide checks on all data it receives from each of the devices and subsystems it interfaces to and generate alarm messages that are reported to the MOMS.		
Interface to AVI System			
193	The zone controller shall interface with the designated AVI system in accordance with the Approved ICD and transmit all relevant transponder data received from the AVI system as programmed on the transponder, as defined and Approved by the Commission during the Design phase, and reported as part of the vehicle transaction data to the Cashless Toll Concentrator or optional Cashless Toll Host.		
Interface to AVC System			
194	The zone controller shall interface with the AVC system to obtain vehicle events that shall permit accurate detection, classification, tracking and processing of vehicles. Vehicle class and speed information shall also be obtained from the AVC system and reported as part of the vehicle transaction data reported to the Cashless Toll Concentrator or optional Cashless Toll Host.		
Interface to LPICPS			
195	The zone controller shall interface with the LPICPS to capture and process images of vehicles in accordance with the Commission Business Rules to be developed during the Design phase. The vehicle data, OCR/ALPR results (if the option to implement OCR/ALPR is exercised) and images obtained from the LPICPS shall be transmitted to the image server(s) to support the Commission's video tolling and processing requirements and PTC E-ZPass CSC operations requirements.		
Interface to DVAS			
196	The zone controller shall interface with the DVAS to transmit event data for display on the DVAS. The event data shall include transponder reads and AVC event messages that are received as the vehicle travels through the lane.		
Interface to Facility Server/ Cashless Toll Concentrator or Cashless Toll Host (if provided) Systems			
197	The zone controller shall interface with the facility server (if one is deemed necessary) or directly to the Cashless Toll Concentrator or Toll Host Systems to transmit lane data and to receive files, commands, messages and other data required for lane operations. Error detection checks shall be instituted on both systems to ensure incorrect or corrupt data is not inserted into the System. The Contractor shall work with Commission IT Security to develop a secure method of allowing this flow of data through a Commission firewall into the network.		
198	The Cashless Tolling System shall include automated methods to determine when there is a loss of communications between the zone controller and the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems; any failures detected shall be reported to the MOMS.		
199	The Cashless Tolling System shall include automated methods to determine when there is a loss of communications between the zone controller and the image server(s); any failure detected shall be reported to the MOMS.		
200	Receipt of all files and data shall be acknowledged; any transmission failures shall be reported to the MOMS.		
201	The Contractor shall provide an automated means of synchronizing the zone controller and facility server (if provided) or Cashless Toll Concentrator or Toll Host System messages in the event that the zone controllers are replaced, communications are down, or if data on the zone controller is not retrievable due to a catastrophic failure.		
2.1.7.12	**Transmitting Data**		
202	All messages generated at the zone controllers shall be transmitted to the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems in real-time using a transport mechanism that performs error detection and correction to guarantee data transmission. All messages shall be uniquely identified and validated at the Cashless Toll Concentrator or Toll Host Systems to ensure there are no missing or duplicate messages.		
203	The System shall support exception handling in accordance with the Commission Business Rules Approved during the Design phase. An alarm shall be generated and reported to the MOMS for all failed transactions, exceptions and errors.		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	Comments
No.	**Requirements**	**Existing (E) - Met by current system, no modifications required Modification (M) - Modifications needed to meet requirement Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs To Be Developed (D) - Not in current system, but will be developed Not Provided (N**) - Will not be provided - requires explanation**	**If "Status of Functionality = N" then Proposer must provide an Explanation in this Column**
204	Failure of transmission of data to the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems shall result in the generation and transmission of alarm message to the MOMS.		
205	All messages shall be confirmed as received by the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems before they are flagged for purging or overwritten. In the event of a communication failure the messages shall be retained on the zone controller until successful transmission is complete and verified.		
206	The zone controller shall transmit all data to the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems, including but not limited to the following:		
	· all transaction messages generated in the lanes;		
	· all alarm and status messages generated in the lanes;		
	· all lane operational communication status messages and system health messages;		
	· all events generated in the lanes that are displayed on the Dashboard or are required at the Cashless Toll Concentrator or Toll Host System, and		
	· all events required by the DVAS for real-time review or playback.		
2.1.7.13	**Receiving Data**		
207	The zone controller shall support the E-ZPass Group TSL and other interoperable agency lists and shall have the capability to support every Agency and its assigned transponder number range as described in the E-ZPass Group specifications.		
208	The zone controller shall accept comprehensive (complete list once a day) and incremental (changes updated on a configurable interval, but not more frequently than every sixty (60) minutes) TSLs in accordance with the established Business Rules and shall activate the lists upon validation of the files.		
209	The Contractor shall utilize data compression, encoding or other means to efficiently store and transmit the E-ZPass Group TSL and other interoperable agency lists, such that the new lists are available at the zone controllers within thirty (30) minutes of the Cashless Toll Concentrator, Toll Host Systems or facility server(s) receiving the new lists.		
210	If tolls are determined by the In-lane Systems, then the toll rates, toll schedules and the effective date/time shall be downloaded to the zone controller and new toll rates initiated when the toll rate structure changes.		
211	All configuration files and tables needed to support the lane operations shall be downloaded to the zone controllers from the Cashless Toll l Concentrator or Toll Host Systems or facility server(s) upon confirmed change or at scheduled intervals and activated as required. Versions of the configurable files on each zone controller shall be maintained, tracked, and recorded.		
212	All zone controller Software shall be downloaded to the zone controllers from the Cashless Toll l Concentrator or Toll Host Systems or facility server(s). Software versions on each zone controller shall be maintained, tracked, and recorded.		
213	The Cashless Tolling System shall provide checks to detect issues with the data it receives from the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems, including but not limited to:		
	· incorrect versions of the data received;		
	· corrupted data received, and		
	· missing files when a file was expected.		
214	An alarm shall be generated and reported to the MOMS for all exceptions/errors.		
2.1.7.14	**Monitor All Lane Equipment for Device Status**		
215	Each zone controller shall monitor the status and system health of its internal components and all associated in-lane Equipment. All Cashless Tolling Systems, including the AVI system, AVC system and the LPICPS shall be continuously polled for status. The health of digital devices that do not provide status shall be inferred from events (for example simple loops).		
216	The System shall generate a recovery message and restore the operational status of a device that recovers after reporting a failure. Recovery messages shall be recorded against the original work ordered through the MOMS and shall be available to Authorized Users. Recovery messages shall not cause the associated work order to close, but shall serve as supporting evidence of an Equipment recovery.		
217	If communications from the zone controller to the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems are unavailable, an alarm message shall be generated and reported to the MOMS.		
218	If communications to the image server(s) are unavailable, an alarm message shall be generated and reported to the MOMS.		
219	If a lane is operating in any mode other than normal open mode an Alert message shall be generated at configurable intervals and reported to the MOMS.		
2.1.7.15	**Diagnostics and Equipment Malfunction**		
220	The zone controller Software shall execute periodic diagnostic checks on internal processes, the in-lane Equipment and interfaces. Peripheral devices shall be interrogated for device status on a regular basis (configurable per device).		
221	A device's failure to respond to a status inquiry after a configurable number of retries shall be regarded by the zone controller Software as an Equipment failure.		
222	An alarm shall be generated and reported to the MOMS for all failures that are detected.		

Functional Requirements

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223	Diagnostic checks shall be performed in all modes of lane operation. Results shall be stored in the appropriate zone controller's event log and easily accessible to technicians. The System shall include "sanity checks" for fault conditions and shall report any detection of such conditions to the MOMS.		
224	Degraded modes of operation shall be supported based on the Commission Business Rules developed during the Design process and Approved by the Commission. The Contractor shall ensure the Cashless Tolling System continues to operate with minimal loss of revenue or visible impact to the patron in the event that some components of the Cashless Tolling System fail and degraded mode operations occur.		
2.1.7.16	**Stand-alone Mode of Operation**		
225	The zone controller shall operate in a stand-alone mode for a minimum of thirty (30) days if communications to the Cashless Toll Concentrator or Toll Host Systems (if provided) and existing PTC systems are down. When operating in stand-alone mode, the last files downloaded to the zone controller from the Cashless Toll Host Systems shall be used for processing vehicles.		
226	The zone controller shall have an available data port to permit onsite manual uploading of Software, TSL or other data required for continued operation until communications with the Cashless Toll Concentrator or Toll Host Systems (if provided) and existing PTC systems is re-established. Devices utilized to download the TSL and rate tables to the lanes shall have the capability of synchronizing current file versions such that a new TSL is updated on the device within an hour of receipt.		
227	The System shall provide the capability for Authorized Users to download transactions from the zone controller and to transfer such transactions to the Cashless Toll Concentrator or Toll Host Systems (if provided)or to the existing PTC Toll Host and CSC/VPC system.		
228	The System shall provide the capability for Authorized Users to download event/transaction data for manual and stand-alone playback of the DVAS.		
229	Upon re-establishing communications with the Cashless Toll Concentrator or Toll Host Systems (if provided) and existing PTC systems all back-logged messages, including manually transferred messages, shall be flagged and transmitted to the appropriate system without affecting the real time operations or degrading lane operations.		
230	Upon re-establishment of communications and successful transmission of all messages, a recovery message shall be generated and reported to the MOMS.		
2.1.8	**Digital Video Audit System (DVAS)**		
231	The Contractor shall provide a Digital Video Audit System (DVAS) that provides the Commission the capability to investigate lane performance issues and support the Commission in customer dispute resolution.		
232	The Contractor shall develop, procure, furnish and install two or more IP addressable, color video cameras as part of the DVAS at each toll zone sufficient to meet the requirements of this section. The cameras installed shall be the same at all Toll Zones.		
233	Authorized Users shall have the ability to individually setup, configure and control the cameras remotely through the application. Configurable settings shall be available on a per-camera basis to allow for tuning for site conditions.		
234	As part of the Design phase, the Contractor and the Commission shall determine the optimum location for the installation of the DVAS Equipment to allow for the complete monitoring of each toll lane.		
235	The location and number of cameras shall permit the capture of video that allows Authorized Users to identify the vehicle class and number of axles based on the ambient lighting conditions.		
236	The Contractor is responsible for the installation of the DVAS Equipment, including mounting Hardware to the designated structure (either toll gantry or separate mounting pole) as well as power and signal cabling between the DVAS Equipment and the storage media as described in *Attachment 2: Cashless Tolling Installation Responsibility Matrix* .		
237	The DVAS cameras shall have pan-tilt-zoom (PTZ) functionality that allows Authorized Users to remotely control each camera. When no PTZ commands are received within a configurable time the DVAS cameras shall revert to their default settings. Alarm messages shall be generated and reported to the MOMS when remote controls are activated or settings other than the defaults are detected.		
238	The Contractor shall provide the lighting requirements to the civil contractor during the Design phase, as needed to ensure that the quality of the video of each toll lane, based on ambient lighting and/or weather conditions, is sufficient to meet the requirements. The lighting requirements shall include but not limited to the minimum light levels required within the toll zone and the preferred placement or restrictions of light fixtures as to not interfere with the tolling equipment, either known based on design requirements or as coordinated with the civil designer and contractor in advance of installation. The Contractor shall be responsible to furnish and install toll zone specific lighting including sensors to control the lighting based on time of day or lighting conditions.		
239	The DVAS shall include all Equipment and Software necessary to provide the audit capability described herein, including but not limited to:		
	· digital cameras and any associated lenses, lighting and sensors;		
	· interfaces to the zone controllers to capture event data;		
	· storage media, and		

Functional Requirements

No.	Requirements	Required Proposer Inputs	
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	· an application to view real-time video and events and playback the information.		
240	The continuous DVAS video stream and audit data shall be provided to the Cashless Tolling System independently of the transaction data stream; however, the DVAS shall be integrated into the System application and the video stream shall be linked to the transaction to meet the requirements specified in this section.		
241	The Contractor shall provide Authorized Users the ability to access to the DVAS through the Cashless Tolling System application using any device authorized by the Commission with access to the Commission System network.		
242	The DVAS video and event data shall be available from the Dashboard to Maintenance staff when investigating anomalies.		
243	The DVAS solution for each tolling point shall provide continuous video coverage with the capability to monitor the overall configuration of the toll lanes with the ability to see each lane and the vehicle traveling that lane, and shall display detailed events for each lane as they occur in real-time.		
244	At a minimum the DVAS shall display the highway, plaza ID, lane number, transaction number, transaction date and time, transponder ID, transponder class and the AVC class. The DVAS video and data shall be accessible in read-only mode; no changes or alterations to the video or data shall be allowed.		
245	All detailed data obtained from various subsystems shall be available and shall be displayed to assist auditors and Maintenance staff with the investigation of discrepancies and problems. The DVAS shall perform and display video and data in real-time and shall have the ability to playback event data.		
246	The DVAS shall also have the capacity to record and store up to a minimum of twelve (12) months (configurable) of continuous video and data to an electronic media for each toll zone.		
247	DVAS video and the corresponding event and transaction data shall be saved together such that when the data is moved to a different environment outside the production environment, the video can be replayed with the corresponding event and transaction data as long as the DVAS replay Software is available.		
248	The health of the DVAS shall be displayed and monitored. Any problems or failures detected shall be reported to the MOMS.		
249	The DVAS shall be time synchronized to the same source as the zone controllers and shall interface to the zone controllers to obtain event data in accordance with the Approved ICD.		
250	The DVAS screens shall allow the Authorized User to obtain and sort the video/data events through various query criteria or configurable report templates finalized during the Design phase, including but not limited to:		
	· Plaza/Zone ID;		
	· lane ID;		
	· vehicle class;		
	· transaction time;		
	· payment type;		
	· transaction time range;		
	· alarm condition;		
	· class mismatch condition;		
	· unusual event conditions;		
	· transponder ID;		
	· transponder status;		
	· transponder class;		
	· vehicle height;		
	· vehicle speed;		
	· axle counts, and		
	· transaction number.		
251	Identification displayed on the screen shall allow the reviewers to clearly differentiate the lane under review and its associated event data. The data on the DVAS display for each vehicle shall include but not limited to:		
	· Plaza/Zone ID;		
	· lane ID;		
	· vehicle class;		
	· transaction date and time;		
	· alarm condition (if applicable);		
	· class mismatch condition (if applicable);;		
	· unusual event conditions (if applicable);;		
	· transponder ID;		
	· transponder status;		
	· transponder class;		
	· vehicle height;		
	· vehicle speed;		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	**Comments**
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	· axle counts, and		
	· transaction number.		
252	The DVAS shall provide the capability to save the displayed contents of a screen (images and data) and electronically distribute such information as needed.		
253	Controls shall be provided to allow reviewers to step forward and backward through video data, by frame and to display the associated event data. All digitized video and corresponding event data shall be tightly synchronized and stored in accordance with these requirements.		
2.1.9	**Cashless Tolling Facility Server (Optional)**		
	The provision of a facility server is optional but if the Contractor’s solution includes a facility server, then the requirements in this section shall be met. The Contractor has the option to use the facility server as an image server as long as the Design complies with the requirements of the Scope of Work.		
254	The Contractor shall provide one or more facility servers located at a tolling point if it is deemed necessary to meet the requirements specified in this Scope of Work. A facility server or set of servers can support multiple toll zones.		
255	The Contractor shall furnish and install a complete Hardware configuration for each facility server to support the redundancy and performance requirements of this Contract, including but not limited to:		
	· multiple processors;		
	· dual, redundant, hot-swappable power supplies;		
	· redundant storage devices; and		
	· backup library (using a media such as Cloud or Network Attached Storage (NAS) based backup that does not require storage devices such as backup tapes or CDs).		
256	The Hardware solution shall provide high-speed intra system network fabric between all storage, databases, servers, and backup systems.		
257	The facility server shall interface to the zone controller and shall serve as a store and forward server for transactions and messages.		
258	Each facility server shall communicate with the primary and secondary Cashless Toll Concentrator or existing PTC Toll Host.		
259	Each facility server shall be capable of storing transactions and images (if used as a local image server) from the in-lane subsystems for a period of minimum sixty (60) days, in the event of a communications failure.		
260	The facility server shall be capable of operating in a stand-alone mode for a minimum of sixty (60) days if communications to the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host are down. When operating in stand-alone mode, the last files downloaded from the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host shall be used for processing vehicles.		
261	The facility server shall have an available data port to permit onsite manual uploading of Software, TSL, or other pertinent data required for continued lane operation until communications with the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host are re-established. Devices utilized to download the TSL and rate tables (if applicable) to the facility server shall have the capability of synchronizing the current versions whereby a new TSL is updated on the device within an hour of receipt.		
262	The System shall provide the capability for Authorized Users to download transactions from the facility server and transfer such transactions to the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host.		
263	Upon re-establishing communications with the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host all back-logged messages, including manually transferred messages, shall be flagged and transmitted to the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host without affecting the real time operations or degrading the lane operations.		
264	Upon re-establishment of communications and successful transmission of all messages, a recovery message shall be transmitted to the MOMS.		
265	Failure of any component of the facility server shall be detected and reported to the MOMS.		
2.1.10	**Roadway Pavement, Overhead Structures/Toll Gantries, and Toll Equipment Building Design Support**		
2.1.10.1	**General Design Requirements**		
266	At the tolling points the Contractor shall install the toll collection equipment on the infrastructure provided by the civil Contractor as identified further in *Attachment 2: Cashless Tolling Installation Responsibility Matrix* .		
267	The Contractor shall work with the Commission, the civil designer and civil contractor on requirements for all civil construction work to be performed by others on the Project, including overhead platforms/toll gantries, toll equipment buildings, roadway/pavement, lighting requirements, power requirements and conduit relative to the aspects that integrate with the Design and installation of the Cashless Tolling System.		

Functional Requirements			
		Required Proposer Inputs	
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268	During civil design, Contractor shall provide review, comment and approval of civil design drawings or similar within the context of the toll system functional and performance requirements. For documents containing less than fifty (50) pages, the Contractor shall review and provide comment on preliminary draft documents within ten (10) Business Days. For documents containing more than fifty (50) pages, the Contractor shall review and provide comment on preliminary draft documents within fifteen (15) Business Days. The Contractor shall review and provide comment on all final draft and final documents within ten (10) Business Days.		
269	The Contractor shall cooperate and provide support as needed to the civil Design and construction efforts. During civil design, Contractor support is anticipated to include responses to information requests for clarification on proposed designs.		
270	During construction, Contractor shall provide review and approval of civil Contractor shop drawings or similar within the context of the toll system functional and performance requirements.		
271	During installation, the Contractor shall provide verification and approval of toll system related elements that the civil Contractor is responsible for installing.		
272	Upon approval of shop drawings or similar design elements by the Contractor within the context of System function and performance, Contractor shall assume responsibility for those elements to the extent that if the civil work is installed as designed and does not meet the performance requirements of this Scope of Work, the Contractor shall be responsible for the costs of redesign, civil rework and additional Equipment costs as further set forth in the Contract.		
273	Contractor shall also coordinate, attend meetings and be available onsite as needed during the installation of the civil elements related to the Cashless Tolling System to ensure that the civil work is performed in accordance with the Contractor's requirements.		
2.1.10.2	**Overhead Structures/Toll Gantries**		
274	The Contractor's Equipment mounting and installation Design for any AVC overhead Equipment, AVI Equipment and LPICPS Equipment shall take into consideration its accessibility from the walkways on the overhead structure at the tolling points. The Design of the mounting structures and mounting arm shall allow technicians to replace Equipment and restore it to normal operations without additional tuning and without impacting performance.		
275	The Contractor's cable routing Design shall include sufficient service loops to facilitate the retrieval of Equipment from the walkway providing sufficient retractable capability.		
276	The Contractor shall provide in-lane Equipment Design, installation specifications, structural requirements and drawings for mounting the Equipment to the overhead structures/toll gantries at each toll zone as it relates to the Contractor's Equipment requirements to the civil contractor(s), including but not limited to Equipment mounting locations and installation instructions, mounting structure and mounting arms, conduit, cable separation and tie offs, required clearances, junction boxes, and electrical requirements, wind load, Equipment load and power calculations, as well as Contractor requirements related to special electrical grounding and isolated circuit integrity by Equipment.		
277	The Contractor shall also review and Approve all aspects of toll overhead structures/toll gantries design drawings submitted by the civil Contractors that are related to the toll system Equipment, including but not limited to, the items identified in the requirements above in this section.		
278	The Contractor shall be responsible for all necessary mounting Hardware required to install the toll Equipment on each overhead structure/toll gantry as specified in this Scope of Work and shall ensure installation is in compliance with Commission specifications.		
279	The Contractor's Equipment installation Design shall have all overhead Equipment tethered to the platform structure at all times during installation and removal. The Equipment mounting devices shall also be tethered such that no loose bolts, nuts or pins shall fall into live traffic during Maintenance activities.		
280	The Contractor shall be responsible for all Equipment installations, terminations, and connections of Equipment located on the overhead structures/toll gantries and for connecting such Equipment to the electronics in the equipment racks within the toll equipment building.		
2.1.10.3	**Uninterruptible Power Supply (UPS)**		
281	All Cashless Tolling System Hardware and equipment shall be on UPS. The UPS will be supplied by the civil Contractor.		
282	The civil Contractor will furnish and install automatic transfer switch (ATS) and smart Power Distribution Units (PDUs) to manage the roadside power distribution.		
283	The Contractor shall furnish and install an electronic interface to the UPS to monitor the UPS performance. The MOMS shall detect the status of the UPS and Alert technicians when the System is on UPS.		
284	Software drivers shall be developed, furnished, and installed to acquire, display, store and report all parameters provided as outputs from the UPS.		
285	When the System is on the UPS and when it is off the UPS a notification shall be reported to the MOMS.		
2.1.10.4	**Toll Equipment Building**		

Functional Requirements			
		Required Proposer Inputs	
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	A toll equipment building with UPS, backup generator and Heating, Ventilation and Air Conditioning (HVAC) will be provided by the civil Contractor at each tolling point indicated in *Attachment 1: Cashless Toll Zone Locations*. The emergency backup generators are contained in a separate room with outside access as shown in *Attachment 5: Concept Plan for Overhead Structure/Toll Gantries.*		
286	The toll equipment building shall house the Cashless Tolling System equipment racks provided by the Contractor.		
287	The Contractor shall provide the equipment rack space requirements to the civil Contractor for each toll equipment building at each tolling point.		
288	The Contractor shall install equipment racks within the toll equipment building in accordance with applicable Pennsylvania State building codes and Pennsylvania State DOT design standards, if and where applicable.		
289	The Contractor shall adhere to all specifications of the latest PennDOT Standard Specifications at time of construction unless the Contractor receives written notification by the Commission which overrides the Standard Specifications. The PennDOT Standard Specifications can be found at: http://www.dot.state.pa.us/Internet/Bureaus/pdDesign.nsf/ConstructionSpecs408and7?OpenForm		
290	At locations where tolling points are in close proximity to one another, a single toll equipment building with backup power generator will be used to support the toll Equipment requirements for multiple toll zones. At locations where a single toll equipment building is used for the Equipment at multiple toll zones, the Contractor shall procure, furnish, and install the interconnecting signal and power cables, and the necessary equipment racks and Equipment required for the multiple toll zones. The civil Contractor is responsible for the provision of power and the raceway. The Contractor shall ensure that the lane performance is not degraded at locations where a single toll equipment building is utilized for multiple toll zones and that cable lengths are within manufacturer specifications.		
291	The Contractor shall also review and Approve all aspects of the toll equipment building design drawings, power specifications, electrical and cabling design, circuit breaker and switches, and grounding design submitted by the civil designer and civil Contractors that are related to the Cashless Tolling System Equipment.		
292	The civil Contractors will install the conduits between the toll equipment building and the demarcation point on the overhead structures/toll gantries as shown in *Attachment 6: Installation Demarcation Diagram*. The Contractor shall procure, furnish and install any conduit required from the demarcation point to the Equipment and between the various components on the overhead structures/toll gantries.		
293	The Contractor shall procure, furnish, and install the cables necessary for terminating and connecting the Cashless Tolling System Equipment on the overhead structures/toll gantries to the electronics in the toll equipment building. Cable lengths shall include sufficient service loops to facilitate maintenance.		
294	The Commission is responsible for the WAN communications and the Commission will furnish and install networking equipment at the toll equipment building and test the communications to the network at the PTC Data Centers. The Commission shall make available a number of ports, as specified during the Design phase, to the Contractor to allow access to the Commission network through the Commission administered firewall. The Contractor shall be responsible for all LAN communications related to the Cashless Tolling In-lane System and the Cashless Toll System outside the Commission firewall as shown in *Attachment 3b: PTC Communications Network Responsibilities*.		
295	Each location will be allotted an IP v4 Class C range of addresses and all networking addressing will be coordinated with the Commission. LAN equipment shall be capable of supporting IPv6 addresses.		
2.1.10.5	**Roadway Pavement**		
296	During the Design phase the Contractor shall provide the in-pavement sensor requirements to the civil designers and civil Contractors, if such sensors are to be used. Additionally, the Contractor shall review and approve the pavement Design, including roadway material to be utilized and construction methods to be used in the construction of the pavement.		
297	The Contractor is responsible for the Design and installation of all elements of the Cashless Tolling System that embedded into the pavement.		
298	The Contractor shall coordinate with the civil designer and civil Contractors for the installation of the sensors in the lanes and identify the pull boxes and conduits. The location and Design of the pull boxes shall minimize the impact of Maintenance activities on the affected lane.		
2.2	**Cashless Toll Concentrator or Toll Host System (Optional) Functional Requirements**		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	**Comments**
No.	**Requirements**	**Existing (E) - Met by current system, no modifications required** **Modification (M) - Modifications needed to meet requirement** **Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs** **To Be Developed (D) - Not in current system, but will be developed** **Not Provided (N**) - Will not be provided - requires explanation**	**If "Status of Functionality = N" then Proposer must provide an Explanation in this Column**
	For this base Contract the existing PTC Toll Host will be the Host of record for traffic and financial reporting and a new Cashless Toll Host is not required but may provided to meet the requirements of this scope of work. The provision of a Cashless Toll Concentrator or Toll Host System (if provided) shall meet the requirements set forth in this section. The Contractor has the option to use the Concentrator or Toll Host System to meet any specified functionality as long as the Design complies with the requirements of the Scope of Work. The option of a fully functional Cashless Toll Host to replace the existing PTC Toll Host for reporting may be exercised by the PTC in the future as the open road cashless tolling systems is deployed throughout the entire system. Should the PTC exercise the option to implement a new full function Cashless Toll Host the additional requirements identified (if exercised) in section shall be met as applicable.		
2.2.1	**Cashless Toll Concentrator or Toll Host System (if provided) – General Requirements**		
299	The Contractor's central processing system architecture shall include a fully redundant highly available primary and secondary Cashless Toll Concentrator or Toll Host System that meets the functional and performance requirements of the Scope of Work and is accessible to Authorized Users of the Commission System network.		
300	The functions of the Central Image Servers (if provided) and the MOMS shall be part of the Cashless Toll Concentrator or Toll Host System.		
301	The cashless toll collection process shall be administered and controlled by the Cashless Toll Concentrator or Toll Host System provided by the Contractor.		
302	The Contractor shall work with the Commission to procure, furnish, and install all servers, storage and communications Hardware needed to support the Software that meets the Commission Cashless Tolling System requirements. While choosing the Cashless Toll Concentrator or Toll Host System Hardware and third-party Software, the Contractor shall consider the staged implementation of the Cashless Tolling System in order to ensure the products are supported for the entire duration of the PTC Cashless Tolling Project.		
303	The primary Cashless Toll Concentrator or Toll Host System shall be installed in the PTC Data Center , a different physical location in the vicinity of the PTC Data Center, or a privately hosted Cloud location Approved by the Commission. The secondary solution can be hosted anywhere within the contiguous United States or an Approved, privately hosted, Cloud location. All infrastructure required to support the servers, including but not limited to UPS, air conditioning, security and backup generators shall be the responsibility of the Contractor. The primary and secondary Cashless Toll Concentrator or Toll Host System configuration shall meet the Commission resiliency and Business Continuity plans.		
304	The secondary Cashless Toll Concentrator or Toll Host System shall be configured as a "hot stand-by" in an active-active state to allow continuous operations in the event of a failure of the primary Cashless Toll Concentrator or Toll Host System.		
305	The secondary Cashless Toll Concentrator or Toll Host System environment shall mirror the primary system in all Hardware and Software configurations, be kept up to date and be capable of performing all functions of the primary Cashless Toll Concentrator or Toll Host System as described in this Scope of Work.		
306	All Hardware and third-party Software procured under this Scope of Work shall be confirmed to be the latest model or version at the time of purchase and shall be Approved by the Commission.		
307	All servers and Hardware procured, furnished, and installed under this Contract shall have current anti-virus, firewall, spam protection and other security Software that protects from virus attacks and unauthorized access. All such third-party products shall meet the Commission IT security requirements described in *Attachment 7: PTC Cashless Tolling Security Standards.*		
308	The System shall detect intrusion attempts and prevent all unauthorized access and intrusions at all levels and report such events to the MOMS. Any intrusion, compromise or breach must be reported to Commission IT Security with 12 hours of detection.		
309	The Commission shall be notified in writing within 24 hours of the earliest indication or report of a breach or unintended disclosure of confidential information or a system that supports it. If requested by the Commission, or if required by law, the vendor shall notify in writing all persons affected by the incident, at its own cost and expense. The Commission shall have the right to view all incident response evidence, reports, communications, and related materials upon request.		
310	Virus protection and other Software shall automatically obtain updates according to a recommended (configurable) Maintenance schedule and report such events to the MOMS.		
311	Redundancy shall be built into the System to support high availability requirements defined in table II-2.		
	The Cashless Toll Concentrator or Toll Host System shall support the following general functions:		
	· communicate with all the zone controllers in receiving transaction, alarm and other messages and transmitting TSLs, UIL and VEL (if exercised);		

Functional Requirements			
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312	· communicate with facility servers (if provided) in receiving transaction, alarm and other messages and transmitting TSLs, UIL and VEL (if exercised);		
	· communicate with the applicable image server(s) for tracking and reconciliation image transmission and transfer status;		
	· provide Dashboards to assist Maintenance and supervisory staff observation of transaction and event data in real-time, including reviewing DVAS image/video, images and data through these screens;		
	· provide the capability to remotely operate the cashless tolling lanes through real time screens;		
	· interface with the existing PTC Toll Host system to transmit transaction details and alarms;		
	· interface with the existing CSC/VPC system to transmit transactions and toll rates and receive TSL and VEL (if exercised);		
	· perform Maintenance management functions of the System, including alarm notification and tracking, Equipment inventory, Maintenance history and other Maintenance related functions, incorporated into the MOMS;		
	· provide an independent audit of successful receipt of all transactions from the zone controllers to the Cashless Toll Host Concentrator;		
	· provide the capability to manage toll rate/toll schedule and transmit the toll rates/toll schedules to the zone controllers and the existing CSC/VPC system;		
	· provide the capability to obtain employee information defined in the Design phase such as employee ID, role and access privileges from Active Directory and, if required, to transmit the (UIL to the zone controllers;		
	· provide various management reports that assess the operational performance of the System, and		
	· provide transaction reconciliation reports as determined by the Commission during Design.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional system functions:		
313	Provide the capability to import detailed and summarized data from the existing PTC Toll Host for historical reporting purposes.		
314	Interface with SAP for the transmission of monthly toll transaction GL files and GL files received from the CSC.		
315	Provide the capability to manage toll rate/toll schedule and transmit the toll rates/toll schedules to the zone controllers and the existing CSC/VPC system.		
316	Interface with the existing CSC/VPC system to transmit transactions and toll rates and receive TSL and VEL (if exercised).		
2.2.2	**Cashless Toll Concentrator or Toll Host System (if provided) Hardware and Third-party Products**		
317	The Work under this section shall include all labor, materials, and support Services to complete the Design; fabrication; assembly; integration; packaging; delivery; testing, and Acceptance of the primary Cashless Toll Concentrator or Host System Hardware and third-party Software in accordance with the requirements of this Scope of Work.		
318	The Commission shall have ownership of all Hardware, third-party Software and firmware procured, developed, furnished, and installed as part of the Cashless Toll Concentrator.		
319	The Contractor is responsible for obtaining all required licenses in the name of the Commission. All licenses and media shall be provided to the Commission for all Hardware, third-party Software and firmware. The Contractor shall retain authorized copies (backups) for all Software media to use for periodic system Maintenance, upgrades, or restore, as required.		
320	The Contractor shall furnish and install a complete, fully redundant, Cashless Toll Concentrator or Toll Host System Hardware configuration needed to support the redundancy and performance requirements of this Contract, including but not limited to:		
	· multi-processors		
	· dual, redundant, hot-swappable power supplies;		
	· storage devices, and		
	· storage devices, backup library.		
321	The Cashless Toll Concentrator or Toll Host Hardware solution shall provide high-speed intra system network fabric between all storage, databases, servers, and backup systems.		
322	The System Design and Implementation shall ensure the Cashless Tolling System continues to operate without data loss even if any unit of the server configuration fails.		
323	All components, supplies, Software and materials furnished under this Contract shall be new, commercial off-the-shelf (COTS) and field proven, and in revenue operations for two (2) years.		
324	The Cashless Toll Concentrator or Toll Host System server configuration, including all major Hardware elements, shall be of the latest design and incorporate standard commercial products currently in production.		
325	All components procured, furnished, and installed by the Contractor should have the capability of sourcing from multiple Suppliers. The intent is to increase compatibility and reduce maintainability problems.		
326	Proof of purchase in the form of dated invoice and shipping bills shall be retained and furnished to the Commission in accordance with the requirements of this Scope of Work and Contract for all hardware purchased by the Contractor.		

Functional Requirements			
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327	The Cashless Toll Concentrator or Toll Host System Hardware shall have a minimum manufacturer warranty for five (5) years.		
328	The Cashless Toll Concentrator or Toll Host System Hardware shall be supported for the duration of the Contract after the date of Operational and Acceptance Test Acceptance. During the life of the Contract the Contractor is responsible for ensuring the system is operational in accordance with the performance requirements.		
329	The Contractor shall use proven server configurations that support future upgrades to processors, memory, storage, operating system, database, and other system components. All third-party Hardware and Software and Contractor Software shall be hardware neutral and shall perform without intervention on any hardware platform.		
330	The System architecture shall have expansion capability to support a ten (10) year growth in traffic volumes in its installed Hardware which includes support of video tolling at the tolling points. For the purposes of calculation, an average E-ZPass penetration of seventy (70) percent and video transaction rate of thirty (30) percent, with ranges from 60-85% E-ZPass depending on locations throughout the system shall be assumed for the tolling point. The following traffic volumes are provided as projections for planning purposes only and subject to change. The projected Average Annual Daily Traffic (AADT) for the various tolling locations identified in this Scope of Work can be found in *Attachment 13 -Annual Traffic Volumes*.		
331	The operating system for the Cashless Toll Concentrator or Toll Host System servers shall be a proven system used widely throughout the United States for intensive database operations and shall be compatible with the Relational Database Management System (RDBMS) and other tools employed.		
332	The operating system for the Cashless Toll Concentrator or Host System servers shall be a multi-user, multi-tasking operating system.		
333	The operating system shall support the redundant Cashless Toll Concentrator or Toll Host System server architecture and all peripherals defined in these specifications.		
334	The operating system shall also support the proposed communications topology, redundant Cashless Toll Concentrator or Toll Host System configuration and Contractor's application Software.		
335	The Contractor shall warranty the operating system for a minimum of five (5) years from the date of Operational and Acceptance Test Acceptance.		
336	The operating system shall have a future upgrade path and shall be supported for the term of the Contract.		
337	The Contractor shall provide and maintain supported versions of the operating system for the term of the Contract and all upgrades of the Cashless Tolling System operating system shall be the Contractor responsibility.		
338	The Contractor shall keep all Software instances throughout all environments at the same configuration and patch level.		
339	The Contractor shall provide a highly reliable and secure RDBMS for the storage of images, video, transaction data, violation data, audit data, and all other data, as applicable, for the retention period specified in the Scope of Work.		
340	Contractor shall provide the latest version of the RDBMS that is field-proven to operate in a transaction intensive environment and shall meet the standards as defined in *Attachment 11: Database Standards for the Pennsylvania Turnpike Commission,* where applicable.		
341	The RDBMS shall be compatible with the operating system and application Software, and shall support the redundant Cashless Toll Concentrator or Toll Host System server architecture and shall meet the standards as defined in *Attachment 11: Database Standards for the Pennsylvania Turnpike Commission,* where applicable.		
342	The RDBMS shall have an upgrade path and shall support upgrades to operating system, application, memory, processors, and other components.		
343	The RDBMS shall have Maintenance and Upgrade Services for the term of the Contract.		
344	The Contractor shall provide and maintain supported versions of the RDBMS for the term of the Contract and shall be responsible for upgrading the Cashless Tolling System RDBMS to the latest supported version.		
2.2.2.1	**Central Image Server (Optional)**		
	The provision for a central image server is optional; however, Contractor's image processing solution shall meet the functional and performance requirements of the Scope of Work. The Design shall support latency in the transfer of images to the existing CSC/VPC system and prevent loss of images and video transactions if there are communications or server issues. If the Contractor's solution includes the provision for a central image server, then the central image server shall be located at a Commission Approved location.		
345	The image processing solution shall support, but not be limited to the following general functions:		
	· communicate with all the in-lane LPICPS for the transmission, tracking, reconciliation and processing of all vehicle images and video transactions;		
	· communicate with facility servers (if provided) for the transmission, tracking, reconciliation and processing of all vehicle images and video transactions;		
	· interface with Cashless Toll Concentrator or Toll Host System for the processing and reconciliation of all vehicles images and video transactions;		
	· interface with existing CSC/VPC system for the processing and reconciliation of all vehicles images and video transactions;		

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	· support the transfer of images and video transaction to the existing CSC/VPC system without loss of any image or video transaction, and		
	· provide reconciliation reports as determined by the Commission during Design.		
2.2.2.2	**System and Data Backup**		
346	During the installation of the Cashless Toll Concentrator or Toll Host servers, the Contractor shall create an image of the completed server configurations, as well as maintain regular local and remote backups. If there is a catastrophic failure that results in the loss of data, means shall be provided to reconfigure the servers without disruption to Cashless Toll Concentrator or Toll Host System operations.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional system backup functions:		
347	The Cashless Toll Host System shall include data backup software and hardware that allows remote incremental and full back up of data without manual intervention. Events from the backup software and status notifications from the backup process shall be reported to the MOMS.		
348	The backup software shall be capable of displaying the backup data in a user-friendly and readable form as defined during the Design phase.		
349	The Contractor shall provide a solution for data backup storage locally and off-site.		
2.2.2.3	**Archive and Purge Control Mechanisms**		
350	Provide the capability for fully automated and configurable data purging in accordance with the Commission's data retention requirements as defined in *Attachment 8A: PTC Records Management Manual, Attachment 8B: PTC Records Retention Schedule* and during the Design phase.		
351	Purge routines shall be configurable for each impacted data elements, including but not limited to:		
	· transaction data;		
	· System logs;		
	· MOMS data, and		
	· interface files.		
352	Servers shall retain transaction and summarized data, images, MOMS data and system logs, in accordance with the retention procedures, including but not limited to:		
	· Cashless toll transactions shall be retained online for a minimum of twenty four (24) months and then purged;		
	· compressed images associated with class mismatch transactions shall be retained online for a minimum of ninety (90) days;		
	· video transactions and images (compressed video transaction image and region of interest{if implemented}) online for a minimum of one (1) year;		
	· DVAS video shall be retained online in accordance with the requirements of this Scope of Work;		
	· system logs shall be retained online on the System for at least one (1) year and then purged;		
	· All security logs shall be retained online for at least one (1) year and then purged;		
	· MOMS detailed data shall be retained online for a minimum duration to ensure MTBF requirements are being met or at least twenty-four (24) months, whichever is greater;		
	· MOMS summary data shall be retained online for the term of the Contract, and		
	· all other data shall be retained on the System for ninety (90) days and then purged.		
353	Status and other events from the archival process shall be reported to the MOMS. No transactions shall be deleted unless confirmed to be successfully transmitted to the existing PTC systems (PTC Toll Host and CSC/VPC).		
354	Authorized Users shall be able to report on restored data.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional archive and purge functions:		
355	Archive toll collection related data shall be retained for the life of the Contract with archived data transferred to the PTC at completion of the Contract. Details of archiving methods and handover process to be detailed in Design phase.		
356	Summarized data shall be retained online for the term of the Contract.		
357	Compressed images associated with class mismatch transactions shall be retained online for a minimum of ninety (90) days and then archived and purged.		
358	Video transactions and images (compressed video transaction image and region of interest{if implemented}) online for a minimum of six (6) months and then archived and purged.		
359	Storage shall be sized to accommodate all data to be retained online as specified in this Scope of Work and for the restoration of selected archived data (two months minimum).		
2.2.2.4	**Maintenance Access and Application Access**		
360	The Cashless Toll Concentrator or Toll Host Systems applications shall run on existing workstations and laptops and Commission Authorized Users shall use their workstations/laptops to access the System. The Contractor is not required to procure, furnish, and install Commission workstations/laptops as part of the Cashless Toll Concentrator or Toll Host System.		

Functional Requirements			
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2.2.2.5	**Maintenance Access**		
361	The Contractor shall procure, furnish, and install the required laptops, keyboards, video monitors, mouse(s), and KVM switches at the In-lane and Cashless Toll Concentrator or Toll Host Systems locations to allow the Contractor technical staff to access all servers, controllers, computers, and devices in order to perform diagnostics and other Maintenance activities.		
362	All maintenance hardware and software installed on the In-lane and Concentrator or Toll Host Systems shall comply with Commission security requirements defined in *Attachment 7: PTC Cashless Tolling Security Standards.*		
2.2.2.6	**Commission Access**		
363	Any Commission authorized workstation/laptop connected to the Commission System network shall be able to access to the System application.		
2.2.2.7	**Printers**		
364	The Commission shall have the ability to print to any printer connected to the Commission System network. The Contractor is not required to procure, furnish, and install any printers for the Commission as part of the Cashless Toll System.		
2.2.2.8	**Communications Equipment**		
365	The LAN within a toll equipment building shall be connected by CAT6 (or higher) cabling and the LAN between Site toll equipment buildings shall be fiber. The WAN connectivity between the toll equipment buildings at each Cashless Toll Site and PTC Data Centers shall be provided by others. The Contractor shall be responsible for providing and obtaining the connectivity from any primary or secondary Cashless Toll Concentrator or Toll Host (if provided) locations to the PTC Data Center.		
366	The Cashless System at the toll zones shall be connected and communicate to the primary and secondary Cashless Toll Concentrator or Toll Host (if provided) System and the existing CSC/VPC system.		
367	The Contractor shall procure, furnish and install all required Tier 1 communication Equipment at the toll equipment building to support the Cashless System LAN. All LAN communications Equipment procured, furnished, and installed under this Contract shall be able to communicate with the Commission firewall and router.		
368	The Commission is responsible for providing a WAN demarcation point (Ethernet hand off) at each Cashless Toll Site. The Contractor shall work with Commission IT staff to make the necessary connections and validate the connectivity between the Cashless Toll Site Systems and the Cashless Toll Concentrator or Toll Host (if provided) Systems. The LAN equipment at a Cashless Toll Site, its configuration, and the connection of the LAN equipment to the WAN demarcation point as shown in *Attachment 3b: PTC Communications Network Responsibilities* shall be the responsibility of the Contractor. Network addressing and connectivity will be coordinated with Commission IT staff.		
369	The Commission is responsible for providing a demarcation point (Ethernet hand off) in the Commission's Data Center to the primary Cashless Toll Concentrator or Toll Host (if provided) System site. The Contractor shall work with Commission IT staff to make the necessary connections and validate the connectivity between the PTC Data Center and the Cashless Toll Concentrator or Toll Host System site. The LAN equipment at the primary Cashless Toll Concentrator or Toll Host System site, its configuration, and connection to the demarcation point as shown in *Attachment 3b: PTC Communications Network Responsibilities* shall be the responsibility of the Contractor. Network addressing and connectivity will be coordinated with Commission IT staff.		
370	The Contractor may install the secondary Cashless Toll Concentrator or Toll Host Systems at a Contractor location within the contiguous states of the United States as Approved by the Commission. The secondary Cashless Toll Concentrator or Toll Host System can be housed in a Commission Approved privately hosted Cloud site. The Contractor is responsible for securing the connectivity from such secondary location to the PTC Data Center. If a cloud environment is desired, the Contractor must work with the Commission to determine appropriate architecture and security measures.		
371	The Contractor shall work with the Commission in designing the interfaces between the Cashless Toll Concentrator or Toll Host (if provided) System, the existing CSC/VPC system, the existing PTC Toll Host system.		
372	The Contractor shall work with PTC in designing the interfaces between the In-Lane Systems, the existing PTC Toll Host and the existing CSC/VPC system.		
373	The Contractor shall be responsible to procure and establish any public Internet domains and/or services to provide connectivity between the Toll lanes, Toll Zone Plaza servers and the Cashless Toll Host outside the PTC firewall and the user workstations inside the PTC firewall. Public domain names procured for the Cashless Tolling project shall be approved by the PTC.		
374	Network monitoring Software shall be procured, furnished, and installed on the MOMS server to monitor the System LAN status and communications, including the connections to the existing PTC Toll Host system, the In-lane Systems, and the CSC/VPC system. All network alarms shall be reported to the MOMS.		
375	If communications to any element of the Cashless Tolling System is degraded or down an alarm shall be generated and reported to the MOMS.		
2.2.3	**Cashless Toll Concentrator or Toll Host System Software (if provided)**		

Functional Requirements			
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	The Cashless Toll Concentrator or Toll Host System Software (if provided) shall support the functionality detailed in this section and shall meet the Commission operational requirements set forth in this Scope of Work and Contract for the Term of the Contract.		
2.2.3.1	**Data Communications and Interface Requirements**		
376	All transactions, images and messages transferred between all subsystems shall be guaranteed and have the required data validation Protocols to confirm the accuracy and validity of data transfer.		
377	The Cashless Toll Concentrator or Toll Host System shall support the interfaces specified in this Scope of Work including, but not limited to:		
	· Interface to the zone controllers: If the Contractor’s solution does not include a facility server, the Cashless Toll Concentrator or Toll Host System shall receive and store all the messages from the zone controllers in real-time. It shall transmit all data required by the zone controllers to support its operation, including the UIL and TSL. All data sent to and received from each zone controller and the Cashless Toll Concentrator or Toll Host System shall be acknowledged and confirmed.		
	· the VEL shall be transmitted from the Cashless Toll Concentrator or Toll Host System to the In-lane System to support on-site enforcement (if exercised).		
	· Interface to the facility servers (if provided): If the Contractor’s solution includes a facility server, the Cashless Toll Concentrator or Toll Host System shall have the capability to transmit all data to and receive data from the facility servers as required in this Scope of Work to support lane operations. All data sent to and received from each facility server at the Cashless Toll Concentrator or Toll Host System shall be acknowledged and confirmed.		
	· Interface to the existing PTC Toll Host system: The Cashless Toll Concentrator or Toll Host System shall have the capability to transmit detailed transactions and alarms to the existing PTC Toll Host system in batch mode (at configurable intervals/transactions) in accordance with the Approved ICD developed during the Design phase interface workshops described in Section 5.3.3.		
	· Interface to the existing CSC/VPC system: The Cashless Toll Concentrator or Toll Host System shall have the capability to transmit AVI Video transactions and images to the existing CSC/VPC system in real time and in batch mode (at configurable intervals/transactions) in accordance with the Approved ICD developed during the Design phase interface workshops described in Section 5.3.3.		
	· Interface to the image server(s): The Cashless Toll Concentrator or Toll Host System shall track and reconcile image transmission and transfer status.		
	· Interface to the MOMS: The Cashless Toll Concentrator or Toll Host System shall interface with the MOMS to transmit alarms and Cashless Toll Concentrator or Toll Host System operational status including recovery messages.		
	· Interface between the MOMS and the current Commission diagnostic monitoring system, based on the Approved ICD developed during the Design phase interface workshops described in Section 5.5.3.		
378	The Cashless Toll Concentrator or Toll Host System shall receive a comprehensive TSL from the existing CSC/VPC system once a day and incremental TSL/updates not more frequently than every sixty (60) minutes (configurable).		
379	Toll rate tables shall be transmitted to the CSC/VPC when rate changes are initiated on the Cashless Toll Concentrator or Toll Host System. shall have the ability to receive toll rate files from the existing PTC Toll Host.		
380	Interface to SAP: The Cashless Toll Host System (if exercised) shall transmit monthly toll transaction, account, and other GL files received from the CSC/VPC system. Interface to SAP shall be further defined during the Design phase.		
2.2.3.2	**Version Tracking Requirements**		
381	The Cashless Toll Concentrator or Toll Host System shall maintain records of the last 20 versions of the TSL, toll rates tables, VEL (if exercised), UIL, and lane configuration files that it received and/or created and that were successfully downloaded to the lanes. Receipt of files from the existing CSC/VPC system, their version, time of receipt and processing status shall also be tracked.		
382	Reports and screens shall be made available to verify the versions and the file download status. Failure in the transmission of any data to a lane shall result in a failure message being logged and reported to the MOMS.		
383	The system shall provide the capability to track the versions of lane executable programs installed at each toll zone location.		
2.2.3.3	**Transaction Audit and Verification**		
384	The Cashless Tolling System shall have the capability to perform an independent audit that confirms all vehicles traveling through a toll zone are detected, as well as an automatic audit and verification process that confirms all vehicles traveling through the toll lane are reported as transactions; all transaction transmissions between the zone controller and Cashless Toll Concentrator or Toll Host System are successful. The System shall have screens and reports to validate the audit trail.		
385	If the validation process fails for any reason, failure messages shall be created and reported to the MOMS. If the audit process determines that vehicles or transactions are missing, the missing information shall be identified and reported to the MOMS.		

Functional Requirements

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386	If the audit process is successful then the audit for the location for the Revenue Day shall be deemed "complete" and System shall track this status of the audit on reports.		
387	Once the Revenue Day is "complete" the data reported for that day should not change. Any condition for example toll waiving that result in changes to the data shall be identified and Authorized Users alerted.		
2.2.3.4	**Data Summarization**		
388	During the Design process and based on Commission Business Rules and reporting requirements, the system shall perform data summarization.		
2.2.3.5	**Diagnostics**		
389	The Cashless Toll Concentrator or Toll Host System shall provide self-diagnosis functions to detect and report on the status and functioning of the Cashless Toll Concentrator or Toll Host System Hardware devices; third party Software; communications; processes; tasks, and Software applications, as defined in the Commission Approved Design Document.		
390	All Hardware and Software failures detected shall be reported to the MOMS.		
2.2.3.6	**Data Security**		
391	The Contractor shall ensure that any transactional data records, once entered into the System, cannot be deleted or changed.		
392	Data records and files shall only be appended to and not edited or deleted as determined by the Commission during the Design phase.		
393	All System access/entry, logins, and modifications (for example, flagging actions) shall be recorded and unauthorized access shall be prevented, logged and reported to Commission IT Security within 12 hours of detection.		
2.2.3.7	**Transaction Pre-processing**		
394	The Cashless Toll Concentrator or Toll Host System shall ensure all transactions transmitted to the existing PTC Toll Host and existing CSC/VPC system comply with the ICD specifications and Commission Business Rules.		
395	The Cashless Toll Concentrator shall identify exceptions, anomalies and other conditions determined during the Design phase in the event they have not been filtered at the zone controller, for example, same transponder read within configurable conditions.		
396	In scenarios where multiple transponders with valid status are reported, all transponders can be transmitted to the existing CSC/VPC system via the existing PTC Toll Host and the existing CSC/VPC will post the transaction in accordance with Commission Business Rules.		
397	Alarm messages shall be created and reported to the MOMS in the event such exceptions identified in this section exceed a configurable threshold.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional transaction pre-processing functions:		
398	The Cashless Toll Host System shall pre-process all transactions in accordance with the Approved Business Rules in order to filter incorrect transactions that may result from Equipment failures and lane logic issues.		
399	Transactions that should not be processed further at the PTC Host and existing CSC/VPC system shall be identified and flagged prior to transmission and then transmitted to the PTC Host and existing CSC/VPC system as defined during the Design phase.		
400	In cases where there is a Transponder read data and a video transaction created for a vehicle (in case of Buffered Transponder Reads or lane logic issues) the Cashless Toll Host System shall identify the transaction that needs to be terminated based upon configurable parameters Approved during the Design phase. In case of Buffered Transponder Read transactions, the Transponder read time shall be used as the transaction time.		
401	Based on the results of the pre-processing, an Exception List shall be generated and transmitted to the PTC Host and existing CSC/VPC system in accordance with the Approved ICD that identifies video transactions that needs to be terminated at the existing CSC/VPC system and further processing on these transactions stopped.		
2.2.4	**Cashless Toll Concentrator or Toll Host (if provided) System Application Software**		
402	The Contractor shall develop, furnish, and install a single, role-based, GUI application Software for the Cashless System that supports all user functions for the Cashless Toll Concentrator or Toll Host System, including the MOMS and DVAS.		
403	Based on the user's access privileges obtained from Active Directory the appropriate menus, screens, tabs, reports and other system functionality shall be made available.		
404	Changes to the System data and parameters shall be through screens and only Authorized Users shall have access to these screens.		
405	All access to the application and changes to the data shall be recorded and tracked, and the System shall provide an audit trail for all data modifications and parameter changes.		
406	Authorized Users shall have access to the data modifications and parameter changes initiated by users.		
2.2.4.1	**Graphical User Interface (GUI) Requirements**		
	The GUI design must include accepted industry design standards for ease of readability, understanding and appropriate use of menu-driven operations, user customization and intuitive operation.		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	**Comments**
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407	The Contractor shall meet all Commission IT Security standards and practices in the design of the GUI for the Cashless Toll Concentrator or Toll Host application.		
408	All components of the client GUI, including but not limited to browsers, Java, Adobe Flash Player, etc., shall be able to be patched/updated to the latest security level recommended by the component's manufacturer.		
409	The GUI design and development shall incorporate human factors and usability engineering and be optimized for speed, as well as provide the following controls, including but not limited to:		
	· menus (such as pull down, popup, cascading, leveling, etc.);		
	· windows (allowing for multiple windows within the application, such as to navigate back without having to re-enter information)		
	· informational messages;		
	· positive feedback;		
	· exception handling and error dialogs, including logging the error;		
	· control icons, links and action buttons;		
	· data entry fields, combo boxes, check boxes;		
	· display (read-only) fields, and		
	· general and context-specific help menus.		
410	Data entry screens shall have configurable mandatory fields that require data entry prior to continuing through the process.		
411	Provide field-level validation (server-side enforced) and format verification upon exiting data fields applicable to pre-defined formats or standards, including but not limited to:		
	· alpha-numeric;		
	· date;		
	· time;		
	· special characters;		
	· length;		
	· lane and plaza ID, and		
	· Transponder numbers.		
412	Provide other formatting masks (server-side enforced) as configured by the System administrator (visible to certain users but masked for other users), which can be applied to any other field in the GUI.		
413	Provide field-level "tooltips" or other interactive help, Configurable by the System administrator, that provide specific guidance on any field presented, including but not limited to:		
	· alpha-numeric fields;		
	· date fields;		
	· time fields;		
	· special characters;		
	· username and password;		
	· length restrictions;		
	· lane and plaza ID, and		
	· Transponder fields.		
414	Online help shall be provided for each screen, each editable field and each selectable option within each screen.		
2.2.4.2	**Screens and Report Access**		
415	Provide the capability to assign users access privileges to System reports based on user level/role, as determined by the Commission during the Design phase, to the Cashless Tolling System application.		
416	Provide the capability to assign read-only rights to roles so that users belonging to that role will not be allowed to enter any data.		
417	Provide the capability for Authorized Users to maintain roles and permission access to the System.		
2.2.4.3	**Cashless Tolling System Screens and Reports**		
418	All data entered or generated in the System shall be retrievable (on-demand and scheduled) through reports and screens.		
419	Reports menu shall be organized by category of reports and shall be intuitive to users and easily accessible based on user access.		
420	Data shall be summarized to improve report generation performance and to track changes in data for as-of-date reporting.		
421	Reports and screens available through the System shall have various selection, group by, and sort criteria, and shall be easily configurable.		
422	The location selection criteria shall include but not be limited to District, Highway, tolling point, lane, and direction of travel to be defined during the Design phase.		

Functional Requirements

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423	Provide the capability to generate the same report by hour, day, date range, weekly, monthly, quarterly, yearly (fiscal and calendar), year-to-date and comparative.		
424	Provide the capability to present report data as an accumulation or individually for the selected criteria. This capability shall be configurable and applicable to District, Highway, Cashless Toll Plaza, and different transaction types whereby the user can choose the data to be presented as an accumulation of, for example grouped by all Cashless Toll Plazas and/or payment types or as individual Cashless Toll Plazas and/or payment types.		
425	Reports developed shall allow the Commission to audit and reconcile data transmitted between various subsystems within the Cashless Tolling System, and with the PTC Toll Host system and existing CSC/VPC system in accordance with this Scope of Work.		
426	All reports shall show the status of the validation/audit process, as defined by the Commission and other relevant statuses that indicate items, including but not limited to whether:		
	· all data has been obtained from the lanes;		
	· the data has been re-summarized;		
	· the transactions have been transmitted to the existing PTC Toll Host and existing CSC/VPC system, and		
	· the report is complete.		
427	The time of the last transaction processed shall be included in all applicable reports to assist with the reconciliation and audit.		
428	All reports shall include individual totals, sub-totals, and grand-totals as appropriate.		
429	Reports shall have the capability to select the date type, including but not limited to:		
	· revenue date;		
	· transmission date;		
	· as-of date;		
	· process date;		
	· transaction date, or		
	· a combination thereof, as designated by the Commission.		
430	Reports shall use conditional formatting to identify exceptions and data that are outside the normal trend.		
431	Provide reporting output in various formats (both compressed and uncompressed), including but not limited to:		
	· Portable Document Format (PDF);		
	· plain text format (TXT);		
	· rich text format (RTF);		
	· Microsoft Excel (2010 version and later);		
	· delimiter-separated values;		
	· hypertext markup language (HTML), and		
	· extensible markup language (XML).		
432	A report generation feature shall be available for configuration and shall permit Authorized Users to request selected reports for auto delivery by email or to a designated server according to a routine or custom interval, such as the start of the Business Day or at other appropriate times as designated or requested by the user as determined in the Design phase.		
433	Data from summary reports scheduled to run daily shall be automatically exported daily to a specified file format and made available on the Commission designated server as defined during the Design phase.		
434	Capability shall be provided to drill down all high-level reports to the next level of detail and to event level details as required as defined in the Design phase.		
435	Authorized Users shall have the capability to display and review the LPICPS images and DVAS video and event details associated with the selected transaction from the drilled down details.		
436	Authorized Users shall have the capability to view the contents of files that are received by the Cashless Toll Concentrator or Toll Host System (if provided) and transmitted by the Cashless Toll Concentrator or Toll Host System in a readable format. If files are compressed or encrypted, the necessary Software tools shall be provided to view their contents. If the user selects a specific file, the contents of the file shall be displayed and the user shall have the ability to save the contents at minimum as a .csv file, xml, txt and in a useable Excel format as Approved.		
437	Capability shall be provided to present data in graph forms and chart types and the user shall be able to select presentation form from a variety of graphic styles.		
438	Data shall be organized and summarized in a manner to allow for report generation within no more than two (2) seconds for daily reports, and no more than twenty (20) seconds for monthly and annual reports, of a report generation request.		
439	The Contractor shall support the creation of additional reports and/or the modification of implemented reports, as needed after the initial deployment and implementation of the System. . It is anticipated that no more than one hundred (100) additional reports will be required for the term of the Contract.		

Functional Requirements			
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	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional screen and report functions:		
440	Provide ad-hoc reporting tool capabilities to Authorized Users to allow the creation and execution of custom reports, including but not limited to:		
	· drag-and-drop field functionality;		
	· drill down functionality;		
	· filtering;		
	· parameter prompting;		
	· formula support;		
	· grouping;		
	· sorting, and		
	· stored procedure and function support.		
441	The ad-hoc reporting tool shall be COTS software and be the latest version at the time of Acceptance testing and field-		
442	The ad-hoc software shall be compatible with operating system standards and shall be patched and upgradeable to new		
443	Ad-hoc report templates created by Authorized Users shall be saved and made available to all Authorized Users.		
444	Once the audit process is completed and Revenue Day is closed, the data on reports for the day shall not change unless data is re-summarized.		
2.2.4.4	**Cashless Tolling Reports**		
445	The Cashless Tolling System shall provide reports to audit and reconcile the System, provide traffic and revenue trends, and validate System performance and perform historical reporting on detailed and summarized data imported from the existing PTC Toll Host.		
446	Report Designs and templates shall be presented by the Contractor and reviewed by the Commission during the Design phase and Approved.		
Transaction Reports			
447	Transaction Summary Reports: These reports show daily, weekly, monthly, quarterly, yearly, and comparative transaction and revenue, by vehicle class and payment type. Transaction and revenue reports shall be summarized and detailed. The summary data shall drill down to the Transaction Detail Report.		
448	Transaction Detail Report: The transaction details shall be provided in this report including lane status, equipment status, transaction status and various lane flags. Users shall be able to access the bit descriptions in all cases where information is coded. The report shall be used to investigate discrepancies and issues.		
449	Class Report: This report shows information related to traffic and revenue by vehicle class by transaction types, for example E-ZPass, Video and Non-Revenue This report is used by management and operations to report on traffic and revenue by vehicle class.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional functions and transaction and revenue reports:		
450	Accounting Revenue and Associate Traffic Report: This report shows accounting revenue and traffic counts by Revenue Dates for the vehicle class categories.		
451	Executive Summary Traffic and Revenue Report: This report shows daily traffic counts and revenue amounts by revenue category, for example E-ZPass and Video by vehicle class category, grouped by shift, selected day totals, previous day totals, percentage of increase/decrease and month to selected day totals. This report is used to show the increase and/or decrease in traffic counts and revenue compared to the previous days' totals using the breakdown by revenue types. Data in this report shall also be represented graphically to include selected day traffic and revenue statistics; daily revenue and traffic comparisons by vehicle class and revenue type including selected day; previous day; month to selected day average and prior week day. Backup of the summary data by District and tolling point shall be included.		
452	Finance Traffic and Revenue Details Report: This report shows traffic and revenue counts by tolling point and is grouped by vehicle class categories for the specified highway(s) selected. This report provides operations and management with traffic and revenue totals for each tolling point by vehicle class categories for a specified date range.		
453	Traffic and Revenue Report: This report shows transaction by transaction type, for example E-ZPass, Video and Non-Revenue for tolling points in each District for the selected highway(s). The data is grouped by vehicle class categories and tolling point. A summary is provided at the end of the report by vehicle class category and transaction type.		
454	Traffic and Revenue Comparison Report: This report shall provide a comparison of current year monthly traffic and revenue data with the previous year with percentage increase/decrease and includes selected highway(s) by district and tolling point. Similar to the traffic and revenue report above, the report includes a breakdown by vehicle class category. The report is further divided into sub-groups by revenue category, for example E-ZPass and Video.		
Traffic Reports			
455	Average Lane Throughput Report: This report shall display hourly traffic volumes for each lane grouped for each tolling point within the selected District. Hourly traffic volumes shall be totaled by lane for the day for each tolling point to calculate the average lane throughput at each tolling point.		

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456	Counts and Percentages Report: This report shall display vehicle counts and percentages of each count grouped by vehicle class category and vehicle class for each revenue category for example E-ZPass and Video for each tolling point. This is a daily report and is grouped by tolling point for the selected highway(s) and district. This report shall drill down to the Counts and Percentages by Direction Report.		
457	Counts and Percentages by Direction Report: This report shall display vehicle counts and percentages of each count grouped by vehicle class category and vehicle class for each revenue category for example E-ZPass and Video for each tolling point. This is a daily report and is grouped by tolling point and direction for the selected highway(s) and district.		
458	Lane Traffic Counts and Statistics Reports: This report shall provide AM and PM traffic counts and statistics by hour for each Highway and tolling point by revenue category for example E-ZPass and Video. The report shall also include AM and PM peak hour statistics and provide a grand total by revenue category for all peak hour. The total percentage of E-ZPass transactions with the AM/PM breakdown and identification on the E-ZPass high hour and lane shall be included.		
459	Plaza By Lane Report: This report shows traffic counts by lane for each tolling point by vehicle class categories and vehicle classes. This report includes the summary by tolling point for the selected District. This report is used by operations staff in analyzing traffic volumes by lane and vehicle class.		
460	Speed Reports: This report shows the traffic count information per lane by speed segments. This report is used by operations staff to monitor traffic flows and speeds.		
461	Traffic Counts Report: This report shows traffic count information grouped by revenue category for example E-ZPass and Video with breakdown by transaction types and sub-totaled by tolling point and vehicle class categories. The combined counts include a breakdown by revenue and nonrevenue transactions. This report shall drill down to the Traffic Counts by Direction Report.		
462	Traffic Counts by Direction Report: This report shows traffic count information grouped by c revenue category for example E-ZPass and Video with breakdown by transaction types and sub-totaled by tolling point, direction and vehicle class categories. The combined counts include a breakdown by revenue and nonrevenue transactions.		
463	Vehicle Count Through Closed Lanes Report: This report shall display tolling point, lane and detailed transaction information for vehicles that travel through a closed lane based on the date range, tolling point and lane.		
464	Vehicles and Mileage Report: This report shows traffic counts for all vehicle classes in addition to vehicle class category for each revenue category between tolling points and total distance traveled for the selected criteria. The report includes a summary page with traffic between tolling points and total miles traveled. Each summary shall be grouped by vehicle class category and revenue category, for example E-ZPass and Video.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional functions and traffic reports:		
465	Finance Traffic Details Report: This report shall display traffic counts grouped by tolling point and vehicle class category and include grand totals for each vehicle class category		
466	Market Penetration Report: This report shows traffic counts by revenue category, for example E-ZPass and Video for AM/PM peak hours and includes the E-ZPass penetration percentage.		
System Audit Reports			
467	Transaction Audit Report: This report shows the status of the transaction transmission from the zone controllers to the cashless tolling concentrator, the audit status, the failed transactions, duplicate transactions, all exceptions, and missing transaction sequence numbers at each of the tolling points. The communication status between the zone controllers to all of the subsystems shall be displayed. The report shall also include the date the transactions were received at the Cashless Toll Concentrator and the days lagging. It also shows the transmission status of the transactions to the existing PTC Toll Host system with the date/time of the transmission was completed.		
468	System Audit Trail Reports: Weekly and monthly reports shall be made available that show the modifications made by the users to system parameters and ability shall be provided to obtain the details of the modifications.		
469	System Exceptions Report: The System Exceptions report shall display transactions that are considered exceptions, including but not limited to duplicate transactions; dual transponders; Cashless Toll Concentrator filtered transactions and non-interoperable transponder reads. Exception handling errors and the disposition of these exceptions shall also be displayed along with the transaction.		
470	Image Reconciliation Report: The Image Reconciliation report shall provide the ability to match transactions by type to images and to help identify missing images. These reports shall not only reconcile the actual images saved to what was expected but also verify that the images were successfully transmitted from the lanes to the image server(s) and on to the CSC/VPC system. Data on this report shall match other transactions summary reports. This report shall drill down to the Image Reconciliation Detail Report.		
471	Image Reconciliation Detail Report: This operational report list the information on the video transaction for a user defined transaction date/time range. Capability shall be provided to show only records where an image is expected and if the image is expected if the image has arrived yet. The report also shows the transmission status of the images to the CSC/VPC system.		

Functional Requirements			
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472	Transactions Reconciliation Reports: Yearly, quarterly, monthly, weekly, and daily reports that show AVI and video transaction transmission reconciliation for all of the tolling points. These reports shall validate that all of the AVI and video transactions received from the lanes were posted to the Cashless Toll Concentrator System and transmitted to the existing PTC Toll Host system. Reports shall be available by transaction day and transmit day, and transmit day reports shall show the files transmitted and acknowledged by the receiving system.		
473	Hardware Status Report: This report shows the Hardware status codes and descriptions based on the selected date range, Highway, District, Plaza, Lane and type of Hardware failure. This report allows maintenance staff to audit the state of all Hardware components in the lanes.		
474	Transaction Number Gap Report: This report shall provide information on gaps in transaction numbers based on tolling point and lane for the specified date range.		
475	Unusual Occurrence Report: This report shall be used to provide operations and maintenance staff with information regarding unusual occurrences with lane data to identify potential Hardware issues, Software issues or other system anomalies. The report shall include the Highway(s), and tolling point and may be filtered by unusual occurrence (UO) code. This report includes lane number, transactions date and time, lane status transaction number and a description of the UO.		
476	Lane Operations Report: This operational report lists and summarizes vehicle transactions and equipment messages that are generated in the lanes. This report is an audit tool that presents all lane activity for a specified location and desired transaction date and time period. Numerous selection and filter criteria shall be provided to help identify problems. Detailed information regarding the transaction and event shall be included.		
477	Transponder Audit Report: This report verifies that transponders are properly read at each cashless tolling location		
Performance Reports			
478	Transponder Status List Transmission Report: The TSL Transmission report shows the status of the TSL transmissions to the Cashless Toll Concentrator or Toll Host System and to all of the zone controllers. Summary information related to the number of transponders, time acknowledged by the zone controller and other data shall be provided to verify results and performance requirements. Time of receipt from the existing CSC/VPC system, time of transmission to the zone controllers and the status of the transmission shall be displayed. Lanes not compliant to the requirements shall be identified.		
479	Image Transmission Summary Report: This operational report counts the number of images created in the lanes for a user defined image created date range and other criteria. Data displayed include the number of triggered, non-triggered and total images from the lanes and the date the images were received at the image server(s). For each received date, the total images, number of lag days, the percentage of transactions received each day and a cumulative percentage shall be included.		
480	Image Transmission Detail Report: This operational report lists information on images from the lanes for a user defined lane created date. Capability shall be included to show image records where it took longer than a user defined number of hours for the image to arrive at the image server(s).		
481	File Transfer Performance: This operational report lists files that have been created and sent from the Cashless Toll Concentrator or Toll Host System by component for either the created date range or sent date range selected by the user. Information displayed include, file information, created date and time, sent date and time and process time. This report verifies System compliance to performance requirements. File/data transmissions to the lanes shall include confirmation of successful delivery at each lane.		
482	OCR/ALPR Performance Report (if the option to implement OCR/ALPR is exercised): The OCR/ALPR Performance Report shall display OCR/ALPR performance statistics by jurisdiction. Problematic cashless tolling lanes, Plazas and jurisdictions shall be identified. The report shall include a breakdown of the OCR/ALPR performance by confidence levels.		
2.2.4.5	**Cashless Tolling Dashboards**		
483	The Contractor shall provide Dashboards developed during the Design phase to monitor the cashless tolling system. The Dashboards shall include but not be limited to real-time monitoring of tolling point traffic, maintenance data and system performance monitoring.		
484	The Contractor shall provide the capability for Authorized Users to monitor the real-time activity at all tolling points in a pictorial and Dashboard view. There shall be an overview representation of all the highways from which individual highways can be accessed.		
485	The Contractor shall provide Authorized Users the capability to view real time DVAS video and also playback recorded video via the Dashboard. The event data pertaining to the vehicle in the video shall be displayed on the video.		
486	Authorized Users shall have access to the detailed data directly from the pictorial and Dashboard view.		
487	Authorized Users shall have the capability to drill down to each lane to review and monitor detailed events as they occur for each transaction.		
488	Authorized Users shall be able to easily maneuver through screens and view data, and different colors and pictures shall be used to bring critical events to the user's attention.		

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489	Summary data by payment type for all Commission toll facilities and by tolling point shall be displayed and users shall have the ability to drill down to the details. If a specific tolling point is selected, transaction and event level data by lane shall be made available and users shall have the ability to view the DVAS real-time video and video transaction images through this screen.		
490	All priority 1 alarms shall be displayed in color and shall be audible to direct attention to the failure.		
491	Authorized Users shall be able to easily identify problems (traffic or Equipment) on the cashless tolling lanes and initiate MOMS work order from this interface.		
492	In addition, the Dashboard shall provide detailed real-time information about the AVI system performance (including handshakes by protocol), the AVC system performance, and the LPICPS performance to assist in diagnosing and investigating problems. Data pertinent to traffic monitoring and Maintenance shall be displayed in real-time.		
2.2.4.6	**Remote Operations**		
493	The System shall provide the ability to allow Authorized Users to remotely operate the cashless tolling lanes to support the Commission operations, including but not limited to:		
	· remote update of security patches and Software updates;		
	· download TSL, VEL (if exercised), and any files required to selected zone controllers when there are issues, and		
	· restart a specific zone controller node.		
2.2.4.7	**User Setup and Maintenance Screen**		
	User setup and maintenance is a critical task since the employee access levels/roles created through the System determines what privileges and access rights each employee is granted.		
494	Access to the zone controllers and Cashless Toll Concentrator or Toll Host System including the MOMS and DVAS functions shall be controlled through the user setup interface.		
495	The user list shall be obtained from the Commission Active Directory maintained by Commission IT or from an Approved source at regular intervals as defined during the Design phase.		
496	An operations alert shall be generated each time a new user is detected so that their user roles can added and access to the System defined.		
497	Authorized Users shall have the capability to also create new users through the System.		
498	Through a user setup and maintenance screen, the users shall be designated various access levels/roles based on their responsibilities (job description).		
499	In the Design phase access levels/roles shall be created and the System shall allow the input and editing of generic job access levels/roles.		
500	The access rights of each role and the ability to add roles and users shall be defined by the Commission during the Design phase.		
501	The user setup and maintenance screen shall be also used to activate and inactivate employees and also terminate them from the System.		
502	The same screen shall also be used to assign and update User ID and PIN/password for access to applications.		
503	Passwords assigned to employees and the password management process shall meet current Commission policy standards.		
504	As soon as the information is saved, the UIL shall be transmitted in near real-time to the various Systems for immediate user access.		
2.2.4.8	**Toll Rates and Schedule (if Toll Host exercised)**		
505	The System shall provide Authorized Users the capability to create and manage toll rates and schedules.		
506	At a minimum, capability shall be provided to establish toll rates based on Highway, tolling point, vehicle class, and payment type and shall support time of day and holiday toll rates as defined during the Design phase.		
507	The assignment of tolls shall be assigned based on the final Design and shall be assessed using the toll rates and schedules established for each tolling point for barrier type locations such as DRB and Gateway.		
508	The assignment of tolls shall be assigned based on the final Design and shall be assessed based on a completed trip that would be built based on the number of gantries the customer passed under while traveling on the Mainline and/or Northeastern Extension (if exercised).		
509	Authorized Users shall have the capability to pre-establish the effective date/time the toll rates will be enabled. The System shall permit the Commission to schedule toll rates and changes in toll schedules in advance of the new rates becoming effective.		
510	Authorized Users shall have the capability to establish a default toll rate to be used in the event of data unavailability or other conditions as determined by the Commission that would warrant the use of the default toll rate.		
511	The System shall record and track the toll rate ID and toll schedule ID and their transmission status for audit purposes.		
2.2.4.9	**Configurable Parameters**		
	All parameters changes shall be Approved by the Commission in accordance with the Commission Engineering Change Order (ECO) Process.		
512	The System shall provide the capability for Authorized Users to modify the configurable System parameters.		

Functional Requirements

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		Existing (E) - Met by current system, no modifications required Modification (M) - Modifications needed to meet requirement Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs To Be Developed (D) - Not in current system, but will be developed Not Provided (N**) - Will not be provided - requires explanation	If "Status of Functionality = N" then Proposer must provide an Explanation in this Column
513	Any change shall result in the creation of a new configurable parameter set and each change shall be identified by a unique identifier.		
514	Changes to configurable parameters can be scheduled to take effect immediately or at a scheduled time as determined by the user.		
515	The System shall record and track all changes to configurable parameters for audit purposes.		
516	When a new parameter takes effect, a notification shall be generated and reported to the MOMS.		
2.2.4.10	**Zone Controller Executable Download**		
	All Software changes shall be Approved by the Commission in accordance with the Commission Engineering Change Order Process.		
517	The System shall have the capability to download zone controller executable files and all other files required by the lane for its operations. All Software updates shall be coordinated with the Commission.		
518	Successful download of the files shall be verified and alarm messages generated if any file was not received by any zone controllers.		
519	Where possible, once the Commission has Approved a Software release, all System application updates shall be automated requiring no action by Maintenance personnel.		
2.2.5	**General Requirements for Interfaces**		
	The Contractor is responsible for working with the Commission and the existing Contractors in Designing, developing, documenting, testing and implementing all required interfaces. Electronic interfaces are required to provide connectivity between the existing PTC Systems (PTC Toll Host and CSC/VPC), the Cashless Toll Concentrator or Toll Host System (if provided) and In-lane Systems. The Contractor shall be responsible for developing the ICDs, and where changes to existing ICDs are required, these documents shall be modified by the Contractor as part of this Scope of Work based on the Contractor solution during the Design phase. The ICDs shall include requirements for data format and transmission, criteria for acknowledgement and validation of transmitted data and procedures for recording and reconciliation, as appropriate for each interface. It is expected that the latest version of the ICDs will be implemented at go-live and that the Contractor shall continue to update the ICDs as appropriate for the life of the Contract.		
520	Provide electronic automated interfaces to the existing systems in accordance with these requirements.		
521	Provide for guaranteed transmission of data for all interfaces.		
522	Provide for one hundred (100) percent reconciliation of the transmitted data and files.		
523	Provide the capability for Authorized Users to access and view the contents of files, including compressed or encrypted files, which are received and transmitted by the Cashless Toll Concentrator or Toll Host System (if provided) in a readable format. Authorized Users shall have the capability to save the contents of such files.		
524	Provide the capability for real-time alerting to the MOMS of interface and data transmission failures, including but not limited to:		
	· MOMS Dashboard for managing and monitoring interfaces;		
	· workflow user interface for managing and monitoring steps within each interface;		
	· status and history of executions;		
	· comprehensive scheduling of file transmissions;		
	· comprehensive reporting for inbound and outbound transmissions;		
	· tight integration with the MOMS and notification of failed transmissions;		
	· notification of file transmission and receipt status, and		
	· capability to manually execute a failed transmission.		
525	The Contractor shall utilize secure Protocols Approved by the Commission for the transfer of data and/or files via interfaces defined during the Design phase.		
526	Provide the capability to transmit and receive multiple files during each scheduled batch.		
527	Provide the capability to transmit and receive multiple files in a day.		
528	Utilize file naming conventions that prevent the overwrite of data and/or files. For example, include the date and time of transmission and provide for unique identifiers.		
529	Utilize file handling and processing methods that provide a complete log of the data and/or file transfer process. For example, files that are successfully processed are moved to a processed folder.		
530	Validate records and identify errors in the received data and/or files, including but not limited to:		
	· mandatory fields;		
	· data formats;		
	· data validity (such as tolling points and lane numbers);		
	· duplicate records;		
	· unexpected response;		
	· checksum/record count verification and		
	· incorrect status.		
531	Provide the capability to correct and re-transmit data and/or files.		

Functional Requirements			
		Required Proposer Inputs	
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532	Provide the capability to process re-transmitted data and/or files automatically or manually by Authorized Users as determined during the Design phase.		
533	Provide the capability to transmit the error details to the transmitting entity, as well as record it in the MOMS.		
534	Provide the ability to identify missing records/transactions/images and request the transmission of such missing records/transactions/images.		
535	Reconcile the transmitted records to the records received and accepted by the receiving entity.		
536	Provide the means to identify interface issues by validating the file transmission process, including but not limited to:		
	· creation and transmission of data and/or a file at the scheduled time, even if there are no records to transmit;		
	· determination if the data and/or a file was transmitted or received at the scheduled time;		
	· creation of alerts to the MOMS if data and/or a file was not created or received at the scheduled time;		
	· creation of alerts to the MOMS if received data and/or a file was not acknowledged;		
	· creation of alerts to the MOMS if records in the received data and/or file had errors when processed;		
	· provide details in real-time to the MOMS of each failed record and		
	· creation of alerts to the MOMS when a response has not been received for individual records within the expected duration.		
537	Provide data and/or file transmission and reconciliation reports as described in these requirements.		
538	Provide a Dashboard that tracks the progress of data and/or file transmissions through each stage and their acknowledgements by the receiving entity, including but not limited to:		
	· transactions eligible for transmission;		
	· file and/or data created with file name;		
	· file and/or data transmitted;		
	· file and/or data received;		
	· file and/or data accepted;		
	· file and /or data rejected;		
	· file and/or data re-transmitted;		
	· number of records in the file and/or data set and		
	· number of failed records.		
539	Provide the capability for Authorized Users to configure the relevant parameters related to file and/or data transmission for each interface.		
540	Monitor the disk capacity where files and/or data are deposited and send an alert to the MOMS and interfaces entities (if applicable) if folders are near capacity (configurable) or full.		
541	Provide the capability to automatically archive successfully processed data and/or files after a configurable number of days.		
542	Provide the data to reconcile file transmissions.		
543	Conform to any existing ICDs, including any updates required at the time of Design and develop all new ICDs that have been identified as “to be developed”. It is the Contractor’s responsibility to ensure all ICDs (including existing) are accurate, updated and meet the requirements of the Scope of Work before developing the interfaces.		
2.2.5.1	**Cashless Toll Host System to SAP Interface (if exercised)**		
544	The Contractor shall design and develop an interface from the Cashless Toll Host System (if exercised) to SAP to transfer financial files received from the existing CSC/VPC system.		
545	The Contractor shall provide the capability to validate that the received files were successfully transmitted to SAP.		
2.2.5.2	**Cashless Toll Concentrator or Toll Host (if provided) System Interface to the Existing PTC CSC/VPC System**		
546	The Contractor shall design and develop an interface from the Cashless Toll Host System to the existing CSC/VPC system to transmit receive and acknowledge one hundred (100) percent of all transactional and financial data in accordance with the Approved ICD developed during the Design phase.		
547	The interface shall be capable of transmitting AVI transactions, Exception List, and Non-Revenue License Plate List and toll rates to the existing CSC/VPC system.		
548	The interface shall be capable of receiving TSL and VEL (if option is exercised) files from the existing CSC/VPC system.		
549	The Contractor shall provide the capability to positively acknowledge (ACK) message receipt, negatively acknowledge or reject a message (NACK) and reconcile data transmissions to/from the Cashless Toll Concentrator or Toll Host System.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional functions and data feeds:		
550	The Cashless Toll Host (if exercised) shall interface shall be capable of receiving the following financial data from the existing CSC/VPC system for transfer including but not limited to:		
	· monthly GL data feeds sent from the CSC/VPC;		
	· monthly CSC surety files, and		
	· monthly CSC tag and account files.		
2.2.5.3	**Cashless Toll Systems Interfaces to the Existing PTC Toll Host Systems**		

Functional Requirements			
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551	The Contractor shall design and develop an interface from the Cashless Tolling Host System to the existing PTC Toll Host system to transmit one hundred (100) percent of all transaction in accordance with the ICD to be developed for this interface during Design.		
552	The interface shall be capable of transmitting the following data including but not limited to:		
	· transaction records and		
	· alarms.		
553	The Contractor shall provide the capability to reconcile the successful transmission of the summary data to the existing PTC Toll Host system.		
2.2.5.4	**Cashless Toll Concentrator or Toll Host (if provided) System to Facility Server Interface**		
	The provision of a facility server is optional but if the Contractor's solution includes a facility server, then the requirements in this section shall be met.		
554	The Contractor shall design and develop an interface from the Cashless Toll Host System to the facility Servers (if applicable) to transmit, receive and acknowledge one hundred (100) percent of all data in accordance with the Approved ICD.		
555	The interface shall be capable of sending TSL, VEL (if option is exercised), configuration files, Software updates and toll rates (if applicable) to the facility servers.		
556	The interface shall be capable of receiving all transactions, alarms and event messages from the facility servers.		
557	The Contractor shall provide the capability to reconcile the successful transmission and receipt of all data at the Cashless Toll Concentrator or Toll Host System.		
2.2.5.5	**Cashless Toll Concentrator or Toll Host (if provided) System to Zone Controller Interface**		
558	The Contractor shall design and develop an interface from the Cashless Toll Host System to the zone controllers to transmit and acknowledge one hundred (100) percent of all data in accordance with the Approved ICD.		
559	The interface shall be capable of sending TSL, VEL (if option is exercised), configurations files, Software updates and toll rates (if applicable) to the zone controller.		
560	The interface shall be capable of receiving all transactions, alarms and event messages from the zone controller.		
561	The Contractor shall provide the capability to reconcile the successful transmission and receipt of all data at the Cashless Toll Concentrator or Toll Host System.		
2.2.5.6	**Image Server to Cashless Toll Concentrator or Toll Host System (if provided) Interface**		
	Reconciliation of images to the video transactions and the status of the transfer of images and video transactions shall be maintained and reported at the Cashless Toll Concentrator or Toll Host System.		
562	The Contractor shall design and develop an interface from the image server(s) to the Cashless Toll Concentrator or Toll Host System to transmit and track the status of the capture of images by the In-lane Systems for each video transaction and the subsequent transfer of images and video transactions to the existing CSC/VPC system.		
563	The interface shall be capable of sending image reconciliation and transfer status data to the Cashless Toll Concentrator or Toll Host System.		
564	The Contractor shall provide the capability to reconcile the successful transmission and receipt of all images and video transactions at the existing CSC/VPC system.		
2.2.6	**Maintenance Online Management System (MOMS)**		
	There shall be a Maintenance Online Management System (MOMS) that supports the Cashless Tolling System Maintenance activities and Maintenance operations.		
2.2.6.1	**Maintenance Online Management System (MOMS) – General Requirements**		
565	Provide a MOMS that supports Maintenance operations for all Software and Hardware provided under this Contract.		
566	Provide a MOMS that monitors, alerts and generates work orders in real-time for all processes, including but not limited to:		
	· communications issues;		
	· file transmission issues;		
	· data exceptions;		
	· Hardware issues;		
	· Software issues or failures;		
	· database issues;		
	· issues with jobs, processes or data flows;		
	· low storage space for each subsystem (configurable thresholds);		
	· CPU utilization (configurable thresholds);		
	· CPU load (configurable thresholds);		
	· file system mounts (if applicable), and		
	· disk IOs.		
	Provide a MOMS that monitors, alerts and tracks in real-time unusual activity triggered by users and systems, including but not limited to:		

Functional Requirements			
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567	· video transactions above threshold;		
	· flushed transactions above threshold, and		
	· other anomalies in daily toll operations.		
568	Provide a MOMS that includes but is not limited to the following:		
	· receiving and monitoring status messages of all system Hardware and Software;		
	· receiving and transmitting alarm and status messages from the current Commission monitoring system;		
	· is capable of local work order manual entry or email entry by Authorized Users;		
	· storing data in a relational database to allow for data recovery and flexibility in reporting the raw data (including via Ad-hoc reporting);		
	· tracking device failures and service requests;		
	· assigning priorities and actions to events;		
	· notifying (automatically) Maintenance personnel via reports, text and email;		
	· assigning work orders to Maintenance personnel;		
	· reassigning (manually) work orders to other Maintenance personnel;		
	· escalating (automatically) work orders to other Maintenance personnel;		
	· recording time of acknowledgement by Maintenance personnel;		
	· recording time of acknowledgement by all subsequently assigned Maintenance personnel;		
	· recording time of repair;		
	· recording time of Equipment and process recovery;		
	· recording completion of service calls;		
	· providing automatic alert for work orders not closed out in specified time;		
	· maintaining and tracking Repair Maintenance Activity;		
	· accepting and updating work orders via smart phones entries via secure communications;		
	· tracking all system application Software components and Hardware via an asset management module;		
	· role-based security;		
	· containing an automatic system exception reporting for all processes that are not running;		
	· containing an automatic system workflow exception reporting for all items that are not processing correctly or are hung in the system, and		
	· providing hard copy reports on device failures and trouble resolution status.		
569	Provide a MOMS that supports maintenance functions, including but not limited to:		
	· automatic system job/workflow/queue exception reporting and alerting for all elements that are not processing correctly or are hung in the system;		
	· issuing electronic notifications via email or text to Maintenance staff when problems are detected;		
	· prioritization of failures and alerts that is configurable and alert Authorized Users when configurations are changed;		
	· for the calculation of response times, repair times, and down time from the data entered by the Maintenance staff and automatically generated by the system, and		
	· scheduling of preventive Maintenance through the MOMS that generates automatic work orders at the scheduled times.		
570	Provide a MOMS that supports asset management, including but not limited to:		
	· tracking of all system Hardware and Software items to the subassembly level;		
	· tracking of all system Hardware and Software locations;		
	· tracking of all system Hardware and Software versions;		
	· tracking of all Maintenance and service agreements;		
	· maintains a list of vendors from where products were procured;		
	· associates the original purchase order number to the individual item;		
	· associates the original vendor number to the individual item;		
	· associates all warranty information to the individual item;		
	· provides an alert prior to warranty expiration, and		
	· provides automatic alert for spare parts levels.		
571	The MOMS will record all configuration data, and will be versioned after each system component change, including application of system patches.		
572	Provide the capability for Authorized Users to access the MOMS screen through the single Cashless Toll Concentrator or Toll Host (if provided) System GUI.		
573	Capability shall be provided to configure the priority level of each alarm and assign and change the escalation attributes.		
574	Provide the capability to configure the initiation of a notification in the MOMS when an alarm is generated.		

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575	Authorized Users shall have the capability to indicate if an alarm should result in the generation of a work order and if an alarm should be considered in performance reporting.		
576	Provide the capability to generate (on-demand and scheduled) daily, weekly and monthly performance reports as determined by the Commission during Design.		
577	Provide the capability to generate operational, management and performance reports from the MOMS that include but are not limited to:		
	· summarized and detailed alarm history;		
	· Maintenance paging and response history;		
	· work order status and tracking;		
	· Equipment inventory and tracking to the subassembly level;		
	· Equipment availability;		
	· preventive Maintenance;		
	· pervasive Maintenance;		
	· corrective Maintenance;		
	· response and repair times for each of the priorities and level of Maintenance;		
	· Equipment use history;		
	· Equipment repair history;		
	· total system availability;		
	· sub-system availability for the In-lane Systems and Cashless Toll Concentrator or Toll Host System (if provided);		
	· Equipment versions, Software versions, firmware versions and serial numbers for all Equipment installed under this Scope of Work;		
	· incident logs and lost revenue estimates;		
	· Mean Time Between Failures (MTBF) for the preceding and current Maintenance periods and cumulative;		
	· performance reports detailing compliance to the performance requirements;		
	· detailed list of parts replaced as a result of Maintenance actions, with an identification of warranty versus non-warranty replacement;		
	· status of removed parts and Equipment with an aging status for parts under repair or replacement (serial numbers, being repaired in Maintenance shop, purchase replacement part);		
	· performance reports;		
	· an exceptions report summarizing all unusual or significant occurrences during the period;		
	· trend analysis for repetitive failure;		
	· status of spare parts inventory, and		
	· staffing report detailing positions, staff hours worked and performance.		
578	When spare parts inventory is reduced to a configurable threshold quantity, automatic reorder alerts shall be generated.		
579	Provide a MOMS that has the ability to receive information (success or failure), including but not limited to:		
	· backup;		
	· time synchronization;		
	· synchronization of primary and secondary systems;		
	· Software updates and		
	· file downloads.		
580	In order to ensure that all tolling points are functional, all systems are operational, all the processes are working and file transfers are successful, Authorized Users shall have access to the MOMS screens. Capability shall be provided to verify the status of tolling point operations, the System and various file transfers, including the files transmitted and received from the existing PTC Toll Host system.		
581	Tolling point and System status shall be shown in a pictorial view with the capability to drill down to the device causing the alert and its associated error logs.		
582	The MOMS screen shall show if required files were transmitted to all the lanes, the existing PTC Toll Host system and the existing CSC/VPC System.		
583	In case of TSL and toll rate tables, the version in use shall be listed.		
584	Authorized Users shall have the capability to re-initiate download in the event transmissions were not successful, for example toll rate tables.		
585	Screens shall be available that show all the alarms generated by the various systems and subsystems, including the operating system and the database.		
586	Failure of all devices, processes, programs, and scheduled tasks shall be forwarded to the MOMS screen that is accessible to authorized staff.		
587	Various events and error logs shall be provided for each program that shall assist the system administrator to investigate problems.		
2.2.6.2	**System Health Monitoring Software**		

Functional Requirements

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588	Provide System health monitoring Software that includes but is not limited to:		
	· tight integration with the MOMS;		
	· Hardware and network health monitoring;		
	· a dashboard that graphically displays component's health;		
	· comprehensive log reporting capabilities, and		
	· integration with existing Commission monitoring Software.		
2.2.6.3	**Time Synchronization**		
589	The Cashless Toll Concentrator or Toll Host (if provided) server shall be synchronized to a certified source Approved by the Commission using the standard network time protocol (NTP) at configurable intervals, but at a minimum of every five (5) minutes.		
590	The zone controllers, AVI systems, AVC systems, LPICPS, image server(s), OCR/ALPR server (if the option to implement OCR/ALPR is exercised), DVAS, and other servers needed to support the requirements of this Scope of Work shall be synchronized to the Cashless Toll Concentrator or Toll Host server or the Approved certified source.		
591	If needed, synchronization messages shall be sent to devices that do not support off-the-shelf time synchronization Software.		
592	All servers and controllers shall have a primary and secondary source for synchronizing time.		
593	The time synchronization technique shall ensure that duplicate or incorrect transaction times are not possible.		
594	The Cashless Toll System shall have the capability to handle daylight saving time changes.		
2.3	**Test Site**		
595	The Contractor shall install and setup a dedicated test site at a Contractor Provided, Commission Approved location. that shall be available for testing software and hardware changes or options exercised including those for AVI alternatives or upgrades for the term of the Contract. The test site shall have the full suite of Equipment and Systems as an operational tolling point, and test transactions and data shall be transmitted to the Cashless Toll Concentrator or Host Systems test environment. The test site shall be monitored through the MOMS and maintained identical to other tolling point as specified in this Scope of Work.		
596	If the option for a replacement Toll Host is exercised by the PTC, the Contractor shall provide a Quality Assurance (QA) Toll Host System for development and testing changes prior to deployment into the production systems.		
2.4	**National Interoperability**		
597	The Cashless Tolling System shall be Designed to accommodate future National Interoperability such that it supports the inclusion of multiprotocol readers and/or the inclusion of multiprotocol transponders to support the current TDM (E-ZPass) and 6C protocols as part of the base Contract and optional SeGo protocols. The Contractor solution shall allow for modifying and adapting the Design to incorporate new readers, antennas types and locations, and support the transition to the new interoperable solution with limited interruptions to the revenue collection.		
598	The Contractor shall support the conversion to National Interoperability if it becomes available during the term of the Contract.		
599	If requested, the Contractor shall provide a Checklist (Section 4.8) and Systems Testing Concept (Section 6.1) for AVI alternatives.		
2.5	**Cashless Tolling Accuracy Requirements**		
	The Contractor shall provide a Cashless Tolling System that is Designed to meet the accuracy, performance and throughput requirements set forth in this Scope of Work. The testing logistics required to prove adherence to these requirements shall be detailed in the Master Test Plan and the test procedures as set forth in Section VI of the Scope of Work.		
600	The sample size for each requirement shall be the greater of N = log (1 - C) / log (A); or 100,000 transactions for the Cashless Tolling System Operational and Acceptance Test described in Section 6.6; where: * N = Number in the sample * C = Confidence level * A = Accuracy A value of ninety five (95) percent shall be used for the confidence level. Accuracy and confidence levels are expressed as decimals.		
2.5.1	**Accuracy Requirements**		
2.5.1.1	**General Requirements**		

<table>
<tr><th colspan="4">Functional Requirements</th></tr>
<tr><th rowspan="3">No.</th><th rowspan="3">Requirements</th><th colspan="2">Required Proposer Inputs</th></tr>
<tr><th>Status of Functionality</th><th>Comments</th></tr>
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<tr><td>601</td><td>The Contractor shall provide a Cashless Tolling System that meets an overall accuracy of at least 99.9 percent for vehicle detection and classification, transponder read and association and vehicle image capture and association. The metrics to validate overall accuracy requirements will be a weighted averaging of the subsystems and shall be defined by the following formula:
$$\begin{aligned}&\mathit{Overall\ Accuracy\ Rate}\\&\quad= (\mathit{Vehicle\ Detection\ Rate\ x\ Vehicle\ Detection\ Weight\ Factor})\\&\quad+ (\mathit{Transponder\ Association\ Rate\ x\ Transponder\ Association\ Weight\ Factor})\\&\quad+ (\mathit{Vehicle\ Classification\ Rate\ x\ Vehicle\ Classification\ Weight\ Factor})\\&\quad+ (\mathit{Image\ Capture\ Rate\ x\ Image\ Capture\ Weight\ Factor})\end{aligned}$$
Where: Vehicle Detection Rate, Transponder Association Rate, Vehicle Classification Rate and Image Capture Rate are obtained from the transactions collected during the Cashless Tolling System Operational and Acceptance Test described in Section 6.5.
<table>
<tr><th></th><th>Vehicle Detection</th><th>Transponder Association</th><th>Vehicle Classification</th><th>Image Capture & Association</th></tr>
<tr><td>Weight Factor</td><td>0.40</td><td>0.15</td><td>0.15</td><td>0.30</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>602</td><td>The Contractor shall provide a Cashless Tolling System that meets the accuracy requirements described below. The Contractor shall validate System compliance to the accuracy requirement by collecting data to the required sample size in live traffic operations as described below for each requirement.</td><td></td><td></td></tr>
<tr><td>603</td><td>Data collection shall include the use of live traffic and controlled vehicles (vehicles with a known transponder status) intermingled with live traffic to emulate normal operations such as congestion and traffic patterns as specified below for each requirement.</td><td></td><td></td></tr>
<tr><td>604</td><td>Prior to the start of testing the System shall be confirmed to be fully operational and ready for testing. Transactions that fail to meet the requirements shall be reviewed and audited and anomalies investigated. Exception criteria identified during the Design phase and the development of the test procedures that fall outside the System Design may be excluded from the accuracy calculations.</td><td></td><td></td></tr>
<tr><td>**2.5.1.2**</td><td>**Transponder Capture Rate**</td><td></td><td></td></tr>
<tr><td>605</td><td>A transponder mounted in accordance with the manufacturer mounting instructions shall be captured by the AVI system under all conditions within the Design specification described in this Scope of Work with an accuracy rate as defined by the greater of the E-ZPass Group or manufacturers specifications This requirement applies to all tolling point types based upon the transponder mix collected during the testing period for the Commission Approved sample size.</td><td></td><td></td></tr>
<tr><td>**2.5.1.3**</td><td>**Transponder Reporting Accuracy**</td><td></td><td></td></tr>
<tr><td>606</td><td>A transponder that is detected and read by the AVI reader shall be reported to the zone controller with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of transponder reads collected during live traffic operations.</td><td></td><td></td></tr>
<tr><td>**2.5.1.4**</td><td>**1.1.1.3 Transponder Write Performance Accuracy Rate**</td><td></td><td></td></tr>
<tr><td>607</td><td>The AVI system shall successfully and accurately complete a write operation to associate data with a passing vehicle with an accuracy rate as defined by the greater of the E-ZPass Group or manufacturers specifications under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of transponders captured during live traffic operations.</td><td></td><td></td></tr>
<tr><td>**2.5.1.5**</td><td>**Vehicle Detection Accuracy**</td><td></td><td></td></tr>
<tr><td>608</td><td>The zone controller shall detect and report vehicles traveling through the tolling point under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations. The resulting accuracy will be used in the calculation of the overall accuracy.</td><td></td><td></td></tr>
<tr><td>**2.5.1.6**</td><td>**Transponder Association Accuracy**</td><td></td><td></td></tr>
<tr><td>609</td><td>Every Transponder that is reported to the zone controller shall be assigned to the correct vehicle under all conditions within the Design specification described in this Scope of Work. This requirement applies to all tolling point types based upon the transponder penetration rate collected during the testing period for the Commission Approved sample size. The resulting accuracy will be used in the calculation of the overall accuracy.</td><td></td><td></td></tr>
<tr><td>**2.5.1.7**</td><td>**Vehicle Classification Accuracy**</td><td></td><td></td></tr>
</table>

Functional Requirements			
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610	The zone controller shall classify all vehicles in accordance with the Commission classification structure traveling through the tolling point with accuracies defined below under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations. The resulting accuracy will be used in the calculation of the overall accuracy.		
2.5.1.8	**Image Capture Reporting Accuracy**		
611	The System shall capture, report and correctly associate an image of the vehicle to the correct vehicle as defined in the Commission Business Rules under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations. The resulting accuracy will be used in the calculation of the overall accuracy.		
2.5.1.9	**License Plate Extraction (OCR/ALPR) Accuracy (if the option to implement OCR/ALPR or VEL is exercised)**		
612	For all video transactions without exception, the System shall perform OCR/ALPR on minimum seventy (70) percent of the images to obtain the license plate, jurisdictions and plate type with at least 99.95 percent accuracy of for the States of PA, NJ, OH, FL, NY, MD, TX, DE, VA and NCPA, NY, NJ, IN, OH, MD, IL, DE, FL and VA. For vehicles identified as requiring front plates the results shall be from the front image. Testing shall require the use of vehicle data collected during live traffic operations. Each tolling location can be independently tuned to optimize performance based on the mixture of plates for each given toll zone.		
2.5.1.10	**Overall Image Quality**		
613	For all video transactions, at least 99.95 percent of the images that are included in the calculation shall have a human readable license plate, jurisdiction and plate type. For vehicles identified as requiring front plates the front image shall be used. Testing shall require the use of vehicle data collected during live traffic operations.		
	A plate shall be considered excluded from Overall Image Quality calculation only when:		
	· the vehicle has no plate;		
	· the plate numbers/letters are not human readable due to damage or obstruction.		
2.5.1.11	**Transaction Processing Requirements**		
614	All transactions generated by the zone controllers in accordance with the above accuracy requirements shall be reported and transmitted for processing to the Cashless Toll Concentrator or Toll Host Systems (if provided) with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations.		
2.5.1.12	**False Read Processing**		
615	The Cashless Tolling System false read processing (example cross lane reads and duplicate reads) shall be less than 0.001 percent of the transponder transactions under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations and test results will be verified by monitoring the CSC for accurate account posting and anomalies will be investigated.		
2.5.1.13	**Video Transaction and Image Transmission Requirements**		
616	All video transactions and images from the Cashless Tolling System shall be transmitted to the existing CSC/VPC system with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations.		
617	All video transactions from the Cashless Tolling System shall be transmitted to the existing PTC Toll Host with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations.		
2.5.1.14	**AVI Transaction Transmission Requirements**		
618	All AVI transactions from the Cashless Tolling System shall be transmitted to the existing PTC Toll Host CSC/VPC systems with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations.		
2.5.1.15	**Vehicle Throughput Requirements**		
619	The Cashless Tolling System shall process a minimum of 2,400 vehicles per hour per lane with a video transaction rate of one hundred (100) percent. Testing shall include the simulation of vehicle events that exercise all of the toll collection equipment and devices.		
2.5.2	**Mean Time Between Failure (MTBF)**		
620	The Cashless Tolling System shall be required to meet specific minimum duration requirements for components and subsystems in continuous operation. This time requirement is defined as the Mean Time Between Failure (MTBF). The Contractor shall provide all third-party MTBF on individual components to be used in the System.		

<table>
<tr><th colspan="4">Functional Requirements</th></tr>
<tr><th rowspan="3">No.</th><th rowspan="3">Requirements</th><th colspan="2">Required Proposer Inputs</th></tr>
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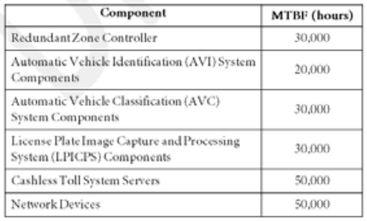
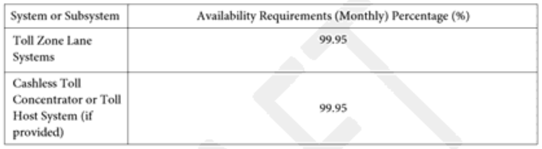
<tr><td>621</td><td>MTBF requirements for all components of the Cashless Tolling System shall meet the MTBF as specified below in Table II-1:
<b>Table II-1: MTBF Requirements</b>
<table><tr><th>Component</th><th>MTBF (hours)</th></tr><tr><td>Redundant Zone Controller</td><td>30,000</td></tr><tr><td>Automatic Vehicle Identification (AVI) System Components</td><td>20,000</td></tr><tr><td>Automatic Vehicle Classification (AVC) System Components</td><td>30,000</td></tr><tr><td>License Plate Image Capture and Processing System (LPICPS) Components</td><td>30,000</td></tr><tr><td>Cashless Toll System Servers</td><td>50,000</td></tr><tr><td>Network Devices</td><td>50,000</td></tr></table></td><td></td><td></td></tr>
<tr><td>622</td><td>The reliability of the System components shall be calculated based on the following MTBF calculation: MTBF = # units x test period (hours)/ # chargeable failures.</td><td></td><td></td></tr>
<tr><td><b>2.5.3</b></td><td><b>Availability</b></td><td></td><td></td></tr>
<tr><td>623</td><td>The Contractor shall meet availability requirements for the following elements of the Cashless Tolling System:
<b>Table II-2: Availability Requirements</b>
<table><tr><th>System or Subsystem</th><th>Availability Requirements (Monthly) Percentage (%)</th></tr><tr><td>Toll Zone Lane Systems</td><td>99.95</td></tr><tr><td>Cashless Toll Concentrator or Toll Host System (if provided)</td><td>99.95</td></tr></table></td><td></td><td></td></tr>
<tr><td>624</td><td>The availability requirements shall be separately calculated and applied to an available lane with all of its subsystems properly functioning and available to collect revenue and send required transactions to the Cashless Toll Concentrator or Toll Host System (if provided) and images to the image server(s)/CSC VPC systems.</td><td></td><td></td></tr>
<tr><td>625</td><td>The availability requirements shall be separately calculated for the Cashless Toll Concentrator or Toll Host System (if provided) with all of its devices, Software, applications and processes properly functioning and available to the Authorized Users, successfully transmitting transactions to the existing PTC Toll Host systems and the CSC/VPC systems, successfully transmitting files to the SAP system and communicating with the in-lane systems.</td><td></td><td></td></tr>
<tr><td>626</td><td>Availability shall be calculated based on the following calculation:
Availability = 100% - [Hours Downtime / (# Days in time period measured * 24)]</td><td></td><td></td></tr>
<tr><td>627</td><td>The Cashless Tolling System compliance to the availability requirements shall be validated during the Operational and Acceptance Test described in Section 6.6 Cashless Tolling System Operational and Acceptance Test.</td><td></td><td></td></tr>
<tr><td>628</td><td>During the Cashless Tolling System Maintenance and Software Support Services, the Contractor shall prove the Cashless Tolling System compliance to the availability requirements as described in Section 7.22 Performance Requirements for the Cashless Tolling System and Liquidated Damages.</td><td></td><td></td></tr>
<tr><td><b>2.5.4</b></td><td><b>Chargeable and Non-Chargeable Failures</b></td><td></td><td></td></tr>
<tr><td></td><td>For purposes of calculating MTBF and Availability performance requirements for testing, as detailed in Section VI, and for Maintenance performance, as detailed in Section VII, chargeable and non-chargeable failures are defined as follows:</td><td></td><td></td></tr>
<tr><td><b>2.5.4.1</b></td><td><b>Chargeable Failures</b></td><td></td><td></td></tr>
<tr><td rowspan="6">629</td><td>Chargeable failures include any failures that are not specifically identified as non-chargeable, including, but not limited to the following:</td><td></td><td></td></tr>
<tr><td>· A malfunction which prevents the Cashless Tolling System component (Hardware or Software) from performing its designated function, when used and operated under its intended operational and environmental conditions as detailed in this Scope of Work.</td><td></td><td></td></tr>
<tr><td>· A malfunction that poses a threat to the safety of the Cashless Tolling System components, PTC customers, employees or others.</td><td></td><td></td></tr>
<tr><td>· An occurrence where data is not successfully transmitted between the lanes and the Cashless Toll Concentrator or Toll Host System (if provided) and images from the lanes to the image server(s) unless such failure is due to the WAN provided by the Commission.</td><td></td><td></td></tr>
<tr><td>· A failure of Equipment or Software that allows data loss to occur on the Cashless Tolling System.</td><td></td><td></td></tr>
<tr><td>· A failure of Equipment or Software that allows revenue loss to occur on the Cashless Tolling System that is not already accounted for as a separate performance failure.</td><td></td><td></td></tr>
</table>

Functional Requirements			
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	· Software anomalies and bugs that affect the performance and operation of the Cashless Tolling System.		
	· Shutdown or unavailability of the Cashless Tolling System unless specifically directed by the Commission for reasons not under the control of the Contractor.		
	· Failure to properly register or report a transaction.		
	· Failure to properly reconcile the Cashless Tolling System.		
	· Failure to electronically send or receive transaction information.		
	· Failure to generate the reports required to reconcile and audit the System.		
2.5.4.2	**Non-Chargeable Failures**		
630	Non-chargeable failures shall include:		
	· force majeure, as defined in the Contract Documents;		
	· vandalism;		
	· failure of a test facility or test instrumentation;		
	· failure of a component the Commission has responsibility;		
	· System component failures caused by externally applied stress conditions outside of the requirements of this Scope of Work;		
	· System component failures caused by environmental or operating conditions outside of the requirements of this Scope of Work;		
	· normal operating adjustments as allowed in the Test Procedure or Maintenance Plan, as applicable, and		
	· failures that are customer or user induced.		
III.	**Cashless Tolling System Transition**		
	All Commission facilities including barrier, ramp and the mainline will be transitioned to cashless tolling in accordance to *Attachment 9: Cashless Tolling Concept Plan* and the Approved project schedule. The Contractor's installation and transition plan shall support the conversion of the existing toll collection system to the Contractor's Cashless Tolling System.		
3.1	**Cashless Tolling System Transition – General Requirements**		
631	The Contractor shall accommodate the various installations of the Cashless Tolling System implementation in accordance with the Approved schedule.		
632	All changes to the System to accommodate technology upgrades and meet the Contract requirements shall be the responsibility of the Contractor.		
633	The Contractor schedule shall be sufficiently flexible to accommodate modifications or changes such as early completions or delays in start or completion of phases that would normally be expected in a multi-phase, multi-Contractor construction schedule.		
3.2	**Cashless Tolling System Implementation**		
634	The Contractor shall procure, Design, test, and install the Cashless Tolling In-lanes Systems, including the redundant Cashless Tolling In-lane System Hardware, Software, Equipment, Interfaces and communications provided in the toll equipment building at each tolling point.		
635	The Cashless Toll Concentrator or Toll Host Systems (if provided) shall be tested and interface testing completed prior to commencing Onsite First Installation Test (OFIT) for the Cashless Tolling System at the initial Implementation.		
636	The installation and Commissioning of all cashless tolling point implementations shall be in accordance with the Approved Transition Plan.		
3.3	**Transition to Cashless Tolling**		
3.3.1	**Cashless Tolling Transition Plan**		
637	The Contractor shall provide a detailed Transition Plan for Commission Approval that addresses all critical transition elements and activities associated with the installation and Implementation of the Cashless Tolling System, including Cashless Tolling In-lane Systems; Cashless Toll Concentrator or Toll Host Systems (if provided), and interfaces to the existing PTC Toll Host system and the existing CSC/VPC system.		
638	The Transition Plan shall, at a minimum, include the installation, Commissioning, Revenue Collection and Acceptance of Cashless Tolling In-lane Equipment, and Acceptance of each Implementation Phase of the Project.		
639	Any temporary processes implemented to support the transition shall be documented in the Transition Plan including eventual replacement process if applicable.		
640	All points of coordination or reliance on third-party deliverable, for example the WAN communications network shall be clearly identified in the Transition Plan.		
641	The impacts to existing systems including those in the proximity of the tolling point shall be addressed in the Transition Plan.		
642	The Cashless Tolling System Transition activities shall be coordinated with the civil Contractor, civil designer and existing system integrators and Approved by the Commission in order to not interfere with on-going and continuing maintenance and operational requirements.		

Functional Requirements

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643	In order to ensure a seamless transition, the following activities shall take place prior to opening the first tolling point to cashless tolling in revenue collection.		
	· Upon Approval to proceed with a Commissioning Test, the Contractor shall conduct such test at each tolling point prior to opening each location to traffic and revenue collection. Since each location may also include civil construction, the Contractor shall be responsible for interfacing and coordinating with the PTC and civil contractors for scheduling and maintenance and protection of traffic requirements during the conversion to cashless tolling.		
	· The Cashless Toll Concentrator or Toll Host (if provided) servers and central image servers (if implemented) shall be installed and commissioned at the primary and secondary locations and its interface to the existing PTC Toll Host system and existing CSC/VPC shall be validated.		
	· The MOMS shall be configured for go-live; inventory recorded; technicians scheduled, and notifications set up;		
	· The DVAS shall be installed and validated and Authorized Commission personnel shall have access to the DVAS;		
	· The OFIT shall be conducted and Cashless Tolling System functionality and performance validated at the initial tolling point installation;		
	· An end to end test shall be conducted in the existing PTC Toll Host system and existing CSC/VPS system test environments, and		
	· The Commission shall confirm the existing systems are ready for Conversion and give Approval for Go-Live. At such time, the Cashless Tolling System shall be switched over to the production existing PTC Toll Host system and existing CSC/VPC system.		
644	The Contractor shall plan for possible variances in the sequencing of the transition due to construction and readiness of the CSC/VPC systems and operations in its Transition Plan.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional requirements:		
645	The Transition Plan shall address the integration and interface of the Cashless Toll Host System to SAP when all existing facilities are converted to cashless tolling and the existing PTC host system is de-commissioned.		
646	The Transition Plan shall address the migration of data from the current PTC host to the Cashless Toll Host System for new facilities as well as when existing facilities are converted to cashless tolling and the existing PTC host system is de-commissioned.		
647	The operational requirements, interfaces, and/or Equipment installation for the Cashless Tolling System and its interface to the existing PTC Toll Host system, SAP and existing CSC/VPC System shall be included.		
IV	**Cashless Tolling System Installation Requirements**		
	This section details the requirements for the installation of the In-lane Cashless Tolling System and the Cashless Toll Concentrator or Toll Host (if provided) System. Unless Approved by the Commission, no System installation shall occur prior to the satisfactory Approval of Installation Design and the Factory Acceptance Test.		
4.1	**Installation Program**		
648	The Contractor shall have an Installation Program that addresses all aspects of the installation of the In-lane Cashless Tolling Systems and Cashless Toll Concentrator or Toll Host (if provided), including all installation Design, submissions and coordination.		
649	The Contractor is responsible for the Design, procurement, installation, cabling, configuration, check-off, and testing of all Hardware, Equipment, communications, Software, lighting and fixtures provided by the Contractor as part of the In-lane Cashless Tolling Systems at each of the tolling points identified by the Commission.		
650	In the event the Contractor decides to re-use existing hardware, conduits and junction boxes, the Contractor is responsible for ensuring that such elements are in their fully operational condition and will meet the requirements of the Contract for the term of the Contract.		
651	The Contractor shall install the Cashless Tolling In-lane servers and Hardware in the toll equipment building provided by the Commission through the civil contractor.		
652	The Contractor shall install the Cashless Toll Concentrator or Toll Host at locations specified in the Scope of Work and Approved by the Commission.		
653	The Contractor shall work with the Commission to test the WAN and the connections to the existing PTC Toll Host system and the existing CSC/VPC systems. Testing shall include expected traffic loads and all types of production operation data		
654	The Contractor shall coordinate all lane closure activities with the Commission and the civil contractor.		
655	The Contractor shall validate and approve the Commission and the civil contractor infrastructure installation and confirm they are in compliance with the Approved civil drawings.		
656	The removal and disposal of the existing equipment not re-used by the Contractor will be responsibility of the civil contractor and the Contractor shall support the coordination of this work.		
657	The Contractor shall install and tune the certified AVI Equipment to the AVI vendor specifications in compliance with the E-ZPass Group requirements. In addition, the AVI vendor shall certify that the lanes are tuned to the Approved AVI specifications, including after AVI updates or replacements such as for interoperability or maintenance.		

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4.2	**Installation Plan**		
658	The Contractor shall develop and submit an installation plan that identifies its approach to installation and drawing package submissions and documents all installation related activities for the Project. The installation plan shall be the master document from which the elements of the System shall be installed.		
659	The installation plan shall include and define, at a minimum, the following items:		
	· The installation schedule detailing all activities, shifts and resources for the installation of the In-lane Cashless Tolling Systems and Cashless Toll Concentrator or Toll Host (if provided) and the Cashless Toll Host Systems, including third-party and civil contractor activities. Once the baseline schedule is Approved by the Commission, updates during the installation periods identifying all schedule changes and Work progress in the form of percentage completions shall be submitted to the Commission for Approval.		
	· The minimum resource allocation requirement for any installation phase and segment.		
	· How the Contractor manages delivery and staging of the Cashless Tolling In-Lane and Concentrator or Toll Host Equipment to be installed, including any staging, installation and testing performed at the Contractor or third-party facilities and their subsequent delivery and installation at the production sites.		
	· The coordination between other Contractors, including the civil designer, civil Contractor(s), service providers, and the existing Contractors.		
	· Coordination of the lane closures with the civil Contractor(s) for each phase of the project.		
	· Coordination with the civil Contractor(s) for the installation of the toll equipment building, the generators and UPS.		
	· Coordination activities as applicable with other third-party entities for the various interfaces including the existing PTC Toll Host, existing CSC/VPC and other existing PTC systems.		
	· Testing of the Commission provided fiber communications network for connection of Cashless Tolling Systems to existing PTC Toll Host system and the existing CSC/VPC system.		
	· Quality control, quality assurance, inspection, and testing processes including validation of Contractor installation to the requirements of the Contract installation drawings.		
	· The order in which Equipment items are to be installed with estimated durations.		
	· Special or unique installation requirements.		
	· A detailed component list and a description of how each item version number and serial number shall be recorded for each installation and configuration into the MOMS.		
	· Specific requirements to support the conversion to the new interoperable solution, including but not limited to infrastructure changes, AVI controller changes, antenna locations, lane configuration, servers, configuration files, firmware, host and plaza subsystems, and other modifications which may be required.		
	· Organization Chart defining Key Team Members, roles and responsibilities and contact information.		
	· Contingency Plan.		
4.3	**Installation and Construction Coordination and Meetings**		
	During the Project Design, development and installation periods there shall be a series of meetings between the Contractor, the Commission, existing Contractor, civil designer and the civil Contractor(s) to clearly define and develop the installation requirements, methodology, timetables, test plans, roles, and contingency plans. The Contractor is responsible for coordinating and scheduling all meetings necessary to complete the Design and installation phase of the Project.		
660	The Contractor shall schedule, manage and attend weekly installation meetings during the active Design and installation phases of the Project and report on progress of the installation. The Contractor shall identify and communicate any issues regarding Cashless Tolling System construction and installation immediately upon discovery to the civil Contractor(s), existing system integrator and the Commission.		
661	The Contractor shall ensure that the appropriate personnel are present at these meetings who can represent the Contractor's interest and provide the information necessary in a meaningful manner.		
662	Prior to the meeting, the Contractor shall update the installation schedule based on the construction schedule and all changes shall be identified.		
663	The Contractor shall prepare and distribute a meeting agenda at least forty-eight (48) hours prior to the scheduled meeting. The meeting agenda shall consist of those items pertaining to the installation and schedule for the previous and current week's installation efforts and for an agreed to "look ahead" period.		
664	It is the Contractor's responsibility to make sure all issues that arose during the installation activity for the week are addressed and resolved or is scheduled for resolution.		
665	At these meetings, the Contractor shall also be prepared to address any issues or questions raised by the civil designer, civil Contractor, other Contractors, and the Commission or its representative.		
666	The Contractor shall document the meeting discussions and distribute the meeting minutes to the team. The Contractor shall also record and maintain an action items list that tracks all installation related issues.		
4.3.1	**Construction Coordination with Infrastructure Contractors**		

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	The Contractor shall coordinate all installation activities with the civil Contractors on new cashless tolling facilities to ensure all Cashless Tolling System Equipment specifications are addressed in the Design and installation of the cashless tolling infrastructure. *Attachment 2: Cashless Tolling Installation Responsibility Matrix* defines the areas of responsibility for the parties involved in the Project Design and construction for new cashless tolling facilities.		
667	The Commission (or its civil Contractor) is responsible for the construction of the overhead structures/toll gantries, installation of the toll equipment building and provision of the generators for the new tolling point, and the Contractor shall coordinate closely with the Commission, and the Commission Contractors.		
668	The Contractor shall participate in the Design and installation of the cashless tolling infrastructure at the tolling points, including but not limited to:		
	· provide all required Design and installation drawings, operating requirements and installation specifications to the Commission and the civil Contractors for all toll system Equipment provided;		
	· support and supply all information requested by the civil Contractor and civil designer in the form of request for information (RFI);		
	· review all civil Contractor provided drawings with respect to the toll system;		
	· approve all aspects of such drawings related to the toll system, and		
	· ensure the Cashless Tolling System infrastructure needs necessary to meet the requirements set forth in this Scope of Work are met with regard to such Design.		
669	The Contractor shall be responsible for ensuring that the locations, positions, installation, connections and other elements of the Contractor inputs identified on the Design and installation drawings provided by the Contractor, for all Contractor and Commission provided Equipment, whether in-roadway, structure/toll gantry mounted, in the toll equipment building or otherwise located are accurate and correct.		
670	Contractor shall also ensure that the installed roadway; infrastructure; structures/toll gantries; toll equipment building; UPS, and generators meet the Design requirements provided by the Contractor and shall approve such installed work with regard to the Design provided.		
671	Contractor shall cooperate with the Commission and infrastructure contactors to minimize required number of lane closures and to maximize the use of other scheduled lane closures. The Contractor shall transmit all lane closure requests to the Commission for approval.		
672	Contractor shall work with the Commission and agree to a reasonable plan for scheduling and approving lane closures, including a procedure for advance notice of cancellations of lane closures and allowable conditions for such cancellations as described in this Scope of Work. The civil Contractor is responsible for administering all lane closures and traffic controls during the installation phase and for all testing through Acceptance.		
4.3.2	**Construction Coordination with Civil Contractor**		
673	The Contractor shall coordinate all installation activities with the civil designers and civil contractors. *Attachment 2: Cashless Tolling Installation Responsibility Matrix* defines the areas of responsibility for the parties involved in the Project Design and installation on the cashless tolling facilities.		
4.4	**Installation Requirements**		
674	The Contractor shall be responsible for procurement, installation, cabling, termination configuration, testing, and check-off of all Equipment and Software required to meet the requirements of the Contract.		
675	The Contractor shall install all appropriate In-lane System servers and Equipment required by the Cashless Tolling System in the toll equipment building provided by the Commission through a third party.		
676	Procurement, installation, configuration, and testing of all local area communications Equipment and connection to the Commission installed network equipment in the toll equipment building shall be the responsibility of the Contractor as further set forth in this Scope of Work.		
677	Procurement, installation, configuration, and testing of all appropriate Cashless Toll Concentrator or Toll Host System servers (if provided) , Equipment and Software required by the Cashless Toll Concentrator or Toll Host System at the primary and secondary locations and validating communications to its interfacing systems shall be the responsibility of the Contractor as further set forth in this Scope of Work.		
4.5	**Compliance to Standards**		
	The Contractor shall adhere to all installation standards, applicable laws, ordinances and codes as required.		
678	The Contractor shall meet all electrical codes, traffic control, seismic considerations, calibration, configuration, and environmental requirements of and including, but not limited to:		
	· Equipment manufacturer's;		
	· NEC;		
	· UL standards;		
	· PTC;		
	· PennDOT;		
	· FHWA;		
	· IEEE (Institute of Electrical and Electronics Engineers);		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	Comments
No.	**Requirements**	**Existing (E) - Met by current system, no modifications required** **Modification (M) - Modifications needed to meet requirement** **Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs** **To Be Developed (D) - Not in current system, but will be developed** **Not Provided (N**) - Will not be provided - requires explanation**	**If "Status of Functionality = N" then Proposer must provide an Explanation in this Column**
	· OSHA requirements, and		
	· any local authorities having jurisdiction.		
679	The Contractor shall adhere to all specifications of the latest Commission Standard Specifications at time of construction unless the Contractor receives written notification by the Commission which overrides the Standard Specifications. Commission Standard Specifications are located at: https://ebs.paturnpike.com/generalinformation/documents		
680	The Contractor shall be responsible for all costs associated with any permits, plan reviews, and inspections related to toll system work.		
681	It shall also be the Contractor's responsibility to procure all documentation required to install and adhere to the proper installation standards, law, ordinance, or codes.		
682	The Contractor shall procure Services of Subcontractors qualified to work in this industry. If a vendor's component requires a vendor Approved installer, the Contractor shall use an Approved component installer, including qualified vendor staff.		
4.6	**In-lane System Installation Requirements**		
683	The Contractor shall supply all personnel, tools, vehicles, materials and Equipment required to perform the complete installation of the Cashless Tolling System, including but not limited to all Equipment and vehicles required for overhead installation Work on the overhead structures/toll gantries; specialty Equipment for preparation and saw-cutting of loops as required, and provide necessary test vehicles to adequately test the installed System in accordance with the Approved test plan.		
684	Where the Contractor is providing subsystem components manufactured by a third party vendor, the Contractor shall ensure that all such components are installed in accordance with manufacturer's installation guidelines. Third-party onsite services shall be obtained as applicable to install, configure and tune the first on-site installation.		
685	The Contractor shall provide onsite and remote support for such subsystem manufacturer components as necessary to ensure the proper installation and operation of its Equipment at no additional cost to the Commission. All third party Equipment and subsystems shall be certified by the manufacturer as being compliant with their installation guidelines and meeting Contract requirements.		
686	The installation responsibilities for the Cashless Tolling System shall include but not be limited to:		
	· Furnish and install uninterruptable power to all Cashless Tolling System Equipment on the overhead structures/toll gantries and in the toll equipment building. UPS and generator will be provided by the Commission.		
	· Furnish and install all connecting conduit from wire ways and conduits provided and installed by others and/or stub conduits to the Equipment. The civil Contractor(s) will install the conduits from the toll equipment building to the demarcation point on the overhead structures/toll gantries as shown in *Attachment 6: Installation Demarcation Diagram* .		
	· Furnish and install separate ground wires for the Cashless Tolling System, surge protection devices (SPD), junction boxes, pull boxes, conduits, and other such items as required by the installation standards and requirements. All exposed junction boxes, pull boxes and other Hardware shall be either zinc coated and epoxy painted or stainless steel;		
	· Furnish and install all wiring for all in-lane Equipment and connections to the equipment racks in the toll equipment building. This includes the proper termination of all power, communication, and RF cables and/or wiring (copper or fiber optic) required to connect the individual components into a fully operational System as specified by the manufacturer.		
	· Furnish and install all Equipment racks required for the in-lane electronics in the toll equipment building.		
	· Furnish and install all AVI readers in the toll equipment building (if applicable) or at Approved Commission location.		
	· Furnish and install all zone controller computers (Hardware and Software) into the equipment racks and test it connection to the zone controller and the facility servers (if provided)/ Cashless Toll Host Systems.		
	· Furnish and install all electronics and other devices in their respective equipment racks as required to provide a fully operational System.		
	· Furnish and install all Equipment mounting brackets to support structures for the installation of all toll system Equipment on the mounting arms on the overhead structures/toll gantries.		
	· Furnish and install the AVC system Equipment, including in-pavement sensors and overhead mounted Equipment and controllers as specified by the manufacturer. Includes all the Commission Approved materials, Equipment and supplies required for saw-cutting, wiring and sealing of wires in the roadway.		
	· Install the AVI system Equipment, including antennas, readers, related Equipment, cables, and any support brackets required. All AVI mounting Hardware, junction boxes, and cables shall be procured and supplied by the Contractor.		
	· Synchronize the new Cashless Tolling System with existing AVI system, including the provision of required cables as needed.		
	· Furnish and install the LPICPS Equipment, including cameras, LPICPS illumination, and any video controller Equipment, sensors, Software, controllers/servers, or specialty Equipment associated with the LPICPS.		

Functional Requirements			
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	· Furnish and install facility servers (if required) in the equipment racks, including Software and test it connection to the zone controller and the Cashless Toll Host Systems.		
	· Validate all cable and wire terminations via a test process to ensure that the cable is connected to the correct location on each end and that the cable/wire is properly terminated.		
	· Power up and provide a field check out/installation acceptance test of all systems, to be witnessed and Approved by the Commission or its designated representative. Provide the completed installation checklist as described in Section III of this Scope of Work.		
	· Tuning and testing of the AVI system, as described in, and in full accordance with, manufacturer's guidelines.		
	· Calibration and testing of LPICPS in full accordance with manufacturer's guidelines and to meet the OCR/ALPR requirements specified in the Scope of Work (if the option to implement OCR/ALPR is exercised).		
	· Calibration and testing of AVC system in full accordance with manufacturer's guidelines.		
	· Installation, calibration and testing of the DVAS cameras and Equipment.		
	· Furnish and install all necessary toll system specific lighting fixtures and wiring on the gantries to the TEB as required to meet the requirements of the Contract.		
	· All other items, materials, and Equipment to complete installation in accordance with the Contract.		
4.7	**Cashless Toll Concentrator or Toll Host System Installation Requirements (if provided)**		
687	The Contractor shall coordinate all Cashless Toll Concentrator or Toll Host System installations and testing of the WAN and interfaces to the existing systems with the Commission and existing system integrator.		
688	The Contractor shall install all Cashless Toll Concentrator or Toll Host Systems, including primary and secondary concentrator or host servers and central image servers (if provided) at the primary and secondary locations specified in the Scope of Work and Approved by the Commission.		
689	All servers, storage devices, communications Equipment, and other Cashless Toll Concentrator or Toll Host System Hardware shall be installed in the designated locations as prescribed in the drawings submitted by the Contractor and Approved by the Commission.		
690	The Contractor is responsible for the following activities, including but not limited to:		
	· furnish, install, configure and test the necessary servers in accordance with the Approved Design documents;		
	· furnish, install and test the storage units and backup devices;		
	· furnish, install and test the network Equipment at the primary and secondary Cashless Toll Concentrator or Toll Host locations;		
	· validate communications to the Commission installed network equipment at the toll equipment building;		
	· establish and validate communications from the Cashless Toll Concentrator or Toll Host System (central servers and image servers) to each of the tolling points at the toll equipment building;		
	· establish and validate communications from the Cashless Toll Concentrator or Toll Host System (central servers and image servers) to the existing CSC/VPC system;		
	· establish and validate communications from the Cashless Toll Concentrator or Toll Host System to the existing PTC Toll Host system;		
	· furnish, install and validate third-party Software and Contractor Software on all servers and Equipment required to support the Cashless Toll Concentrator or Toll Host System;		
	· furnish, install, configure and test all servers and Equipment for correct point-to-point installation, proper connectivity, acceptable termination of all cables and successful communications linkage;		
	· Configure the Cashless Toll Concentrator or Toll Host System to support interfaces as defined in the Approved ICDs and		
	· All other items, materials, Equipment and Software required to complete installation of a fully functional Cashless Toll Concentrator or Toll Host System in accordance with the Contract.		
4.8	**Installation Checklist**		
691	The Contractor shall develop an installation checklist that tracks the progress and completion of all installation activities for the Cashless Tolling In-lane System installation and the primary and secondary Cashless Toll Concentrator or Toll Host System facilities installation.		
692	The checklist shall be the document detailing those items required for the installation crew and technical team to complete the installation process for all Equipment and components, including terminations, connections and configurations.		
693	A copy of the checklist signed and Approved by the Contractor, attesting to the completeness of the installation, shall be provided to the Commission after the completion of the installation activities for each lane at each tolling point.		
694	The Contractor shall conduct a final inspection of all installations and certify the installation Work.		
695	The Commission reserves the right to obtain the services of the Facilities Department to witness the Contractor inspection and conduct an independent inspection. The Contractor shall coordinate and support such inspections at each facility.		
696	The checklist shall identify all discrepancies and exceptions and Contractor shall be responsible for all corrections.		

Functional Requirements

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697	The checklist shall document all changes identified during the installation process and all such changes shall be Approved by the Commission or its designated representative.		
4.9	**Electrical Work**		
698	Electrical Work to be performed under this Contract shall include, but not be limited to the following general items of Work:		
	· Provide and install surge protection devices as required to protect the Cashless Tolling System Equipment and electronics.		
	· Install junction boxes and terminate new cable and conduit attachment devices, where applicable.		
	· Bond all conduits, manhole frames, metallic junction boxes, and other conductive items to the grounding system in conformance with the Commission and PennDOT Standard Specifications, the NEC and other authorities that have jurisdiction.		
699	All electrical Work shall be performed in accordance with the applicable regulations and Approved by the Commission and other authorities having jurisdiction. Appropriate NEC compliance shall be adhered to with all electrical articles for installation pertaining to wiring, enclosures, and other electrical Equipment in hazardous locations. UL labels shall be provided for all electrical panel boards, enclosures, and accessories.		
700	All electrical Equipment must be inspected prior to installation for defects that could damage the Equipment or harm personnel. Any Equipment found to have defects shall not be installed but shall instead be replaced with a fully functioning replacement.		
701	All electrical Equipment shall be properly grounded for safety. Equipment shall be furnished with grounding pads or grounding lugs. All ground connections shall be cleaned immediately prior to connection.		
702	The Contractor shall provide all grounding material required for installation and all installations shall be in compliance with the applicable standards.		
4.10	**Lane Closure and Traffic Control Requirements and Conditions**		
703	The Commission will provide all MPT activities associated with completing Contractor Work during the Implementation Phase. All lane closures shall be coordinated with the civil Contractor and lane closure schedules shall be submitted to the Commission is advance for Approval. Lane closure schedules and lane closure requirements can be found on the Commission website at https://www.paturnpike.com/business/engineering_standards.aspx		
704	In-lane Cashless Tolling Equipment installation shall be scheduled to minimize traffic delay during the installation process. The Contractor shall make every effort to schedule Work around peak traffic movement times. All lane closures shall be coordinated with the Traffic Operations Center.		
705	In the event that extended lane closures (lane closure exceeding 2 hours) are required, the lane closures shall be completed between the hours of 11:00 P.M. EST and 6:00 A.M. EST, excluding Holiday periods as set forth in the lane closure requirements.		
706	Lane closures scheduled for less than 2 hours shall be Approved by the Commission in accordance with the documentations provided on the website, and shall not occur during peak traffic times, and shall be solely at the Commission's discretion for Approval and continuance in cases where the lane closure is underway.		
707	The Contractor shall follow the requirements as stipulated in the latest applicable Commission's Maintenance and Protection of Traffic Standards: www.paturnpike.com/business/engineering_standards.aspx.		
708	Any Work involving removal/relocation of Equipment (loosening or removal of nuts/screws, cables, connectors etc.) shall be done with appropriate lane closures during nighttime period or off peak hours as listed within this section.		
709	Activities that require no removal/relocation of Equipment (for example, testing/monitoring functions) shall require no lane closures (Work shall be completed from the structure/walkway above live traffic). Activities shall be limited only to adjusting or shifting tethered toll Equipment in place without removal of Equipment, mounting devices, etc.		
710	All Equipment and tools shall be tethered at all times when working above open/live traffic.		
4.11	**Contingency Plan**		
711	A detailed contingency plan shall be prepared for reopening closures to public traffic. A general contingency plan shall be included in the Installation Plan; however, a site specific contingency plan shall be submitted to the Commission before Work at the job site begins.		
4.12	**Work Standards and Requirements**		
712	The Cashless Tolling System Equipment installation shall be performed to an Approved set of plans, which has previously been submitted and Approved by the Commission or their designated representative.		
713	The Contractor shall provide Project management and oversight of all Work performed. At all times when installation Work is taking place, the Contractor shall have an individual designated in the Organization Chart as Site Manager onsite to supervise the installation.		
714	The Contractor shall install the Cashless Tolling System Equipment to the highest standards, using experienced and knowledgeable personnel. For example, journeyman electricians shall terminate all cables, wiring, or fiber optic cables.		
715	All tools such as crimpers, fiber optic termination tools, and test Equipment shall have been properly calibrated prior to being used.		

Functional Requirements

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716	The Contractor shall provide a safe environment for the installation process in accordance with all applicable local, State and federal requirements, as well as any Commission policies. Examples include but are not limited to the following:		
	· safety harnesses shall be included and employed on all lifts, and the personnel trained on their use;		
	· hard hats and safety vest shall be worn in all construction areas;		
	· safety toe shoes shall be worn in construction areas and around active roadways while performing installation processes;		
	· Contractor issued identification badges shall be worn at all times, and		
	· regular safety meetings shall be scheduled to review safety procedures.		
4.13	**Design and Documentation during Construction and Installation**		
4.13.1	**Engineering Design**		
717	The Contractor shall secure the services of a fully-qualified engineering design firm(s) for the purpose of performing all infrastructure related engineering Design (civil, structural, electrical, mechanical, and architectural) and the preparation of related plans and documentation under the Contract.		
718	All Design Work shall be performed under the direct supervision of a Licensed Engineer of the appropriate discipline in the State of Pennsylvania. All design professionals shall be licensed and authorized to practice in the State of Pennsylvania.		
719	If the Engineering Design effort is performed by the Contractor, the Contractor shall submit documentation showing that the Contractor has met the required qualifications described in this section.		
4.13.2	**Document Control**		
720	The Contractor shall maintain a Configuration Management System to control all Project-related documents and drawings. Each document shall be properly titled, date updated, numbered by revision and version and shall incorporate signature blocks for authorship and approvals. Only the latest Approved drawing version may be used for installation.		
721	All documentation regarding the lane Equipment and Cashless Toll Host System Equipment installation shall be maintained by the Contractor. All drawings and other such documentation shall be made accessible to the Commission for review.		
722	The Contractor shall maintain all non-conformance reports (NCR) submitted by the inspectors and document the correction and resolution of all issues identified.		
4.13.3	**Installation Design and Drawings**		
723	The Cashless Tolling System Equipment shall be installed on existing infrastructure or overhead structures/toll gantries that will be designed and constructed by others separately procured by the Commission.		
724	The Contractor shall provide the installation requirements including acceptable tolerances for the Cashless Tolling System Equipment, including all related plans and documents. The civil designer and civil Contractors shall rely on the installation requirements provided by the Contractor to design and construct the overhead structures/toll gantries for the Cashless Tolling System Equipment to function as intended, and Contactor shall be fully responsible for the accuracy of its installation requirements.		
725	The installation requirements provided by Contractor shall be consistent with those provided in Contractor’s Proposal and shall accommodate the selected design from the samples provided in *Attachment 5: Concept Plan for Overhead Structures/Toll Gantries* .		
726	The Contractor shall certify the installation requirements provided as accurate and appropriate for its intended purpose to the satisfaction and Approval of the Commission.		
727	Contractor shall indemnify all related parties as more fully described in the Terms and Conditions for any damages that result from reliance on the installation requirements provided by Contractor.		
728	The Contractor shall submit shop drawings detailing the installation Design that shall be used onsite for installation Work. Detailed drawings shall be provided for each site where Equipment procured and supplied under the Contact shall be installed.		
729	The Contractor shall submit the following Design drawings as part of the drawing package in accordance with the Commission submission requirements, including but not limited to:.		
	· detailed installation drawing for each piece of Equipment;		
	· detailed drawing showing the equipment mounting brackets and details of their installation to the mounting arm;		
	· details related to the range of Equipment adjustments;		
	· detailed electrical schematics;		
	· all junction boxes and panels;		
	· detailed equipment rack layout and interconnections drawings;		
	· detailed communications layout;		
	· power and communications cabling schedules, and		
	· pavement installation details for in-pavement sensor installations.		
730	During installation the Contactor shall maintain a red line version of the drawing package that is submitted to the Commission upon the completion of the installation.		

Functional Requirements			
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731	Documentation shall include memos denoting changes or modification to requirements.		
732	The Contractor shall submit detailed component level network drawings showing all WAN, LAN and VLAN connections, including connection to the existing PTC Toll Host system and the existing CSC/VPC system.		
733	Contractor shall utilize a predefined range of IP addresses provided by the Commission. An IP schematic shall be submitted and Approved by Commission IT Security that shows all the IP addresses for all Contractor supplied Equipment on the network.		
734	The Contractor shall submit detailed component level primary and secondary server configuration instructions, including storage device mirroring, backup devices and configuration, and network configuration and testing.		
735	The Contractor shall submit detailed instructions on the installation of the operating system, database, third-party Software, and application Software on the servers.		
736	All testing required to verify successful installation and operation shall also be documented.		
4.13.4	**As-Built Drawings/Documents**		
737	The Contractor shall update the latest drawings with red-lines as changes are incorporated during the installation process. At the completion of the installation of the Cashless Tolling System, the Contractor shall gather all red line drawings.		
738	The red line drawings shall be verified and then incorporated into a final As-Built drawing package. This final As-Built package shall include installation drawings, shop drawings and sketches, and other drawing types that may have been used to install the Cashless Tolling System. The As-Built drawings shall include at a minimum power and data connections, installed equipment locations and electronic cabinet/panel layouts.		
739	All other documentation used regarding the installation shall be also be finalized and submitted as part of the As-Built submittal.		
740	The Contractor shall update and resubmit the latest as-built drawings should any substantial changes be made to the design during the Contract period.		
V	**Cashless Tolling SYSTEM PROJECT REQUIREMENTS**		
5.1	**Cashless Tolling System Project Management**		
	The Contractor shall employ a Project Management System that is sufficiently detailed to enable the Commission to review and confirm that the Contractor has the necessary management, staff, and controls in place to meet the requirements of the Contract.		
5.1.1	**Program Management Plan**		
	The Program Management Plan describes how the Contractor plans to implement and manage the Project, including staffing, scheduling and communication procedures for controlling all correspondence, submittals, and other communications between the Contractor and the Commission, and communications with the civil designer, civil Contractors, third-party entities and existing Contractors.		
741	The Program Management Plan shall at a minimum include the following elements:		
	· Project scope and key Deliverables;		
	· a description of the management and organization of the program, including an organization chart, identification of Key Team Members, their responsibilities and percentage commitment to the Project, tasks leads for each functional area and location and identification of the resources to be used in fulfilling the requirements of the Contract;		
	· Project team (Contractor, the Commission, Commission's Representatives and existing Contractors) contact information;		
	· a description of the Project planning, documentation and reporting methods to be utilized, both for use within the Contractor's staff and externally to the Commission and other entities;		
	· a description of the process for communication, escalation and resolution of Project issues with the Commission;		
	· meeting schedules for meetings with the Commission and other entities including the form of the meeting as part of the Communication Plan;		
	· the Approved Project schedule;		
	· a description of the process for reporting, updating and tracking the Project schedule and Project performance;		
	· coordination process with the civil designers, civil Contractors and management of the RFI process during the infrastructure design phase;		
	· coordination process with the civil designers, civil Contractors and management of the installation drawing review process;		
	· approach to change management, consistent with Contract requirements, including a description of the process for documenting and submitting change requests, the Approval process and how the change management approach will be integrated into day-to-day Project management;		
	· approach to document control, including Software (the Commission shall have the capability to download documents using this Software) and tools the Commission will use and have read-only access to via the Web;		
	· approach to risk management;		
	· approach to Quality Assurance and Quality Control;		

Functional Requirements			
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	· documenting the invoice submission, invoice backup information, verification, and Approval process;		
	· a section with all Approved Project forms including but not limited to, meeting agenda; meeting notes; action items tracking log; monthly progress report, and invoices.		
	· an emergency contact list as described further in the requirements below.		
742	The Contractor shall identify the tools and products used to manage the Project and the internal controls instituted by the Contractor to guarantee successful delivery of the Project.		
743	The Contractor shall develop and submit the Project Management Plan to the Commission for review and Approval.		
744	The Contractor shall develop and submit a separate Communications Plan to the Commission for review and Approval that addresses the following, including but not limited to:		
	· all correspondence shall identify the originator and designated receiver.		
	· Tracking of document versions and changes.		
	· All invoices shall be submitted with accompanying backup information as required by the Contract and consistent with the Commission processes and invoicing and auditing policies. The Contractor shall work with the Commission to develop the appropriate invoice and back-up materials as a part of the PMP development.		
	· All submittals shall be delivered as an enclosure to the Contractor's submittal letter. Each submittal letter shall be limited to a single subject or item. The Contractor's letter shall identify the Contract number, Contract name and subject of the submittal.		
	· All items of correspondence, invoices, submittals and documentation shall contain the Contract number and the designated Contract name.		
	· Process for validating that all comments provided by the Commission on Contractor deliverables are successfully addressed.		
5.1.2	**Contractor's Project Management Office**		
745	The Contractor shall establish a Project management office in the Harrisburg metropolitan area. All Project management activities shall be conducted from this office.		
746	The Project manager shall be assigned to the Project management office and shall be one hundred percent (100) percent dedicated to the Cashless Tolling Project for the Implementation Phase of the Contract.		
5.1.3	**Staffing and Key Team Members**		
747	The Contractor is responsible for maintaining and assigning a sufficient number of competent and qualified professionals who speak fluent English to meet the requirements of the Contract.		
748	The Contractor shall ensure Key Team Members are readily accessible to the Commission or their authorized representatives during the Contractor's performance of this Contract.		
749	Contractor is required to provide staff at all times sufficient to meet the Project Requirements and Contract. The following are designated as Key Team Members for this Project and are subject to the Approval, replacement and removal requirements of the Commission for Key Team Members as set forth in the Contract:		
	· Project Principal – responsible for the overall conduct and performance of the Project, oversight of the Project, the performance of the Project manager and the Commission's single point of contact for any escalated Project issues that cannot be resolved by the Project manager;		
	· Project Manager – responsible for all day-to-day Work, the overall execution and delivery of the Project and the day-to-day Contractor contact person on the Project;		
	· Deputy Project Manager – assists the Project manager in the execution and delivery of the Project and the day-to-day operations;		
	· Technical Manager, Lane Systems – responsible for management of all In-lane Systems technology resources including selection of the lane solutions, subsystems, Software development and Systems maintenance.		
	· Technology Manager, Toll Concentrator/Host System – responsible for management of all technology resources related to the Toll Concentrator/Host System, including Software development, on-going Hardware/Software maintenance, Equipment and Systems and information security as required to satisfy the Requirements of the Contract;		
	· Installation Manager – responsible for the installation and Commissioning of the Cashless Tolling System;		
	· Quality Assurance Manager – responsible for consistent quality throughout the Design, Development, Testing and Implementation of the Cashless Tolling System through good Quality Assurance and Quality Control practices, and		
	· Test Manager – responsible for the overall planning and implementation of the Cashless Tolling System testing program.		
5.1.4	**Cooperation with Other Contractors and Providers**		
750	The Contractor shall cooperate to the fullest extent with the civil designers, civil Contractors, the Commission and existing Contractors to ensure the Cashless Tolling System Implementation and Maintenance Phase do not conflict with or cause any interruption in capability, service or safety issues to the traveling public or customers, or impede the Commission's ability to collect tolls.		

Functional Requirements			
No.		**Required Proposer Inputs**	
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751	The Contractor shall cooperate with the civil designers, civil Contractors, existing Contractors and external parties, as directed by the Commission, to support any activity related to the implementation of cashless tolling, including but not limited to:		
	· the Commission employees;		
	· the Commission designated representatives;		
	· other third parties, as directed by the Commission;		
	· law enforcement;		
	· inspectors;		
	· Auditors, and		
	· all Contractors.		
752	The Contractor shall cooperate with and immediately notify the Commission of any customer complaints and system issues identified in the Commission lanes that come to Contractor's attention during the course of Implementation, Testing or Maintenance Phases.		
753	The Contractor shall provide and maintain a current emergency contact list for the Commission's use at all times for handling emergencies and escalations. The emergency contact list shall name primary and secondary (multiple secondary contacts as applicable) points of contact for each anticipated emergency type. The emergency contact list shall name the Contractor's preferred points of contact, in order of precedence and shall include, at a minimum, the Contractor's primary Project manager, deputy Project manager, installation manager, technology manager, and other support staff. The purpose of the emergency contact list is to ensure the Contractor can be reached outside normal working hours to address urgent matters.		
5.1.5	**Monthly Report and Progress Meeting During the Implementation Phase**		
	Monthly Project reports and progress meetings will enable the Commission and the Contractor to monitor the status, progress, and quality of the Work performed on the Project and to take proactive steps to ensure successful delivery of the Project.		
754	The Contractor shall provide and maintain a schedule for monthly progress meetings (in addition to the weekly Design/installation meetings during the active Design/installation periods) at a location designated by the Commission. The meeting shall be scheduled no later than the 20th day of the following month.		
755	No less than five (5) Business Days prior to the meeting, the Contractor shall submit a draft monthly progress report to the Commission for the period covering the previous reporting period. The Commission shall review and comment on the progress report prior to the meeting.		
756	The Contractor shall obtain updated installation status prior to the monthly meeting and include such updates in the Project Implementation schedule which shall be submitted with the monthly progress report.		
757	The format of the monthly progress report shall be agreed upon as one of the initial Project tasks upon notice to proceed (NTP) and shall be incorporated by the Contractor into the Program Management Plan.		
758	The monthly progress report that includes but is not limited to:		
	· a summary outlining progress and status, and percentage of Work performed for each task as compared to planned activities in the Project Implementation schedule. Comments shall be included where appropriate. The summary shall also identify key milestones met and missed in the period;		
	· an analysis of all critical path tasks, potential risks associated with the tasks and proposed contingency/work around plans to circumvent or mitigate delays to the Project;		
	· identification of any Approved changes to Approved milestone dates and Approved Project Implementation schedule, clearly noting the details and identifying the Contract amendment;		
	· a discussion of schedule compliance and an updated Project Implementation schedule showing current status against the baseline Approved Project Implementation schedule. Past due tasks shall be updated and actual dates shall be recorded for completed tasks;		
	· an updated action items list that tracks the status of all outstanding action items, activities and issues that need decision/resolution;		
	· an updated deliverables list showing submission dates, current version, current review status, responsible party and due date;		
	· a payment request, if applicable. Payment requests must identify the payment milestone, number and dollar amount. Payments requests shall be made for completed and Approved milestone payments only;		
	· a list of change requests (Contractor and Commission initiated) and their status;		
	· the previous monthly final meeting minutes, and		
	· a six (6) week look-ahead schedule.		
759	No more than five (5) Business Days after the meeting, the Contractor shall submit the final monthly progress report and draft meeting minutes for the Commission's review and Approval.		
5.1.6	**Project Meetings**		

Functional Requirements			
		Required Proposer Inputs	
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760	In addition to the monthly progress meeting, weekly or bi-weekly Project status meetings, as applicable and Approved by the Commission, and other regularly scheduled installation and ad-hoc Project meetings shall be required during the course of the Project to address specific deliverables, Work items, Maintenance procedures and issues as they arise.		
761	The Contractor shall perform the following tasks related to all meetings, including but not limited to:		
	· develop and coordinate the Project meeting schedule;		
	· distribute notices of Project meetings in accordance with document control Requirements;		
	· prepare the agenda in coordination with the Commission;		
	· attend the meeting with all required staff in attendance;		
	· prepare minutes of the meeting and forward them to the Commission within five (5) Business Days after the day of the meeting and		
	· maintain an action item list for each type of meeting, identifying issues that need to be resolved at the Project level.		
5.1.7	**Project Schedule**		
	The Project schedule is a comprehensive list of Project milestones, activities and Deliverables, with intended start and finish dates, including a detailed Work Breakdown Structure (WBS) that identifies Project tasks down to the Work package level and the activities required to complete the Work package Deliverables.		
762	The Contractor shall provide and maintain a detailed Project Implementation schedule for the Project in Microsoft Project format (Project 2016 or above) that lists all Project activities and tasks for all Phases of the Project, including but not limited to:		
	· Requirements;		
	· Design;		
	· development;		
	· testing;		
	· installation;		
	· Transition, and		
	· deployment of the Cashless Tolling System at the various facilities.		
763	The Project Implementation schedule shall include coordination with civil Contractor, existing Contractors and the Commission and shall clearly document all interfacing tasks.		
764	The Project Implementation schedule shall identify all milestones and tasks, starting with the NTP through the date of Acceptance and end of Warranty for each implementation location of the Project.		
765	The Project Implementation schedule shall be resource loaded, and shall include all draft submissions and review cycles, and all tasks required of the Commission and other Contractors with critical tasks.		
766	The Project Implementation schedule shall identify all critical path tasks and shall be used to manage the Project.		
767	The Project Implementation schedule shall include all tasks for the submission and approval of the final civil drawings identifying the locations of all toll equipment to be install in a toll zone within 60 days of NTP.		
768	The Project Implementation schedule shall identify the anticipated Go-Live date of March 31, 2020 for the conversion of Clarks Summit.		
769	The baseline for the Project Implementation schedule shall be submitted to the Commission for Approval within fifteen (15) Business Days after NTP.		
770	The Contractor shall update the Project Implementation schedule on a monthly basis, as identified in the Requirements for the Monthly progress report.		
771	The Contractor shall use the Project Implementation schedule as the basis for all subsequent schedules and updates throughout the duration of the Project.		
772	The Contractor shall obtain Approval from the Commission for any and all changes to the baseline Project Implementation schedule and associated milestones in accordance with the Contract process for changes and amendments and are not considered Approved unless an amendment is executed through the Contract.		
5.2	**End of Contract Transition**		
	The Contractor acknowledges that the Services it provides under the terms of the Contract are vital to the successful operation of the System and that said Services shall be continued without interruption. Upon termination of the Contract, a successor (the Commission or a new service provider) may be responsible for providing these Services. The Contractor agrees to exercise its best efforts and cooperation to affect an orderly and efficient transition to a successor.		
773	Upon the Commission's written notice, the Contractor shall furnish transition Services during the last ninety (90) days of the term of the Contract. The Contractor shall develop with the successor Contractor or the Commission staff, a Contract Transition Plan describing the nature and extent of transition Services required.		
774	The Contract Transition Plan and dates for transferring responsibilities for each division of Work shall be submitted within thirty (30) days of such notice. Upon completion of the Commission review, both parties will meet and resolve any additional requirements/differences.		

Functional Requirements

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775	The Contractor shall provide sufficient experienced lane and Software support personnel in each division of Work during the entire transition period to ensure that the quality of Services are maintained at the levels required by this Contract.		
776	The Contractor shall provide sufficient staff to help the successor maintain the continuity and consistency of the Services required by the Contract. The Contractor shall allow the successor to conduct onsite interviews with the employees.		
777	The Contractor shall provide the necessary Software and Systems support Services to assist the successor operator in setting up the systems, transfer of appropriate licenses and third-party Software, and transition of all host data required to sustain uninterrupted service.		
5.3	**Software Design and Development Requirements**		
	The Commission expects the Contractor to propose a baseline product for the lane solution and the Cashless Toll Concentrator or Toll Host System, and that some custom development will be required. To ensure the Design Requirements for the Cashless Tolling System are fully understood by the Commission and the Contractor, a series of Requirements and Design review steps are specified following a sequential Design process or waterfall model. The Contractor shall work with the Commission and its representatives to produce a Conformed Scope of Work and Requirements Document (CSWRD). The CSWRD shall be the basis for the Contractor to produce a Requirements Traceability Matrix (RTM). The RTM allows for verification that the Requirements are addressed in the Design and documented in the System Detailed Design Document (SDDD) and traced to test procedures that validate the developed Cashless Tolling System meets the Contract Requirements. The RTM shall be the basis for all Design, development and testing efforts and documentation to be developed by the Contractor.		
778	The Contractor shall establish and maintain an effective Software Design and development program along with a documented Software Development Life Cycle (SDLC) to ensure compliance with the Requirements of the Contract.		
779	The Contractor shall employ effective techniques and methodologies to develop the System Requirements and Business Rules for the Project.		
780	Prior to conducting any workshops, requirements reviews, focus group meetings and Design reviews, the Contractor shall develop the necessary documentation for the Commission review and submit such documentation ten (10) working days prior to such meetings.		
781	The Contractor shall provide a Table of Contents for the Design document that identifies the required document Deliverables and any document templates that will be used to develop the documentation. Such documentation shall be tailored for the Project, and the CSWRD shall be used for developing such documentation.		
5.3.1	**System Requirements Review (SRR)**		
	The Contractor shall conduct a series of System Requirements Review meetings with the Commission to outline how the Contract requirements will be met. The outcome of these meetings shall be a Requirements Traceability Matrix (RTM) that will be used to validate each Requirement against a Design item(s), Design Documentation and testing procedure(s).		
782	The Contractor shall conduct a series of System requirements reviews with user groups to identify user needs.		
783	The Contractor shall present lane logic and transaction framing rules of the baseline solution. Transaction framing logic shall be further demonstrated according to the workshops described in section 5.3.4.		
784	Contractor's existing screens and presentation formats shall be used to solicit user requirements and feedback.		
785	During the System requirements review phase the Contractor can also present the Contractor's standard product to the Commission, and use the feedback obtained in the presentation in the development of the System Requirements Document.		
5.3.2	**Business Rules Development**		
786	The Contractor shall conduct Business Rules development workshops with the Commission to develop and document the Business Rules and operational policies for the In-lane Cashless Tolling Systems and the Cashless Toll Concentrator or Toll Host (if provided) System.		
787	The Business Rules workshops can occur concurrent to the System requirements reviews.		
788	The Contractor shall provide Business Rules utilized at other cashless tolling facilities; however, they shall be tailored to meet the Commission's requirements and shall comply with the Scope of Work.		
789	The Contractor shall track the design, development and testing of the Business Rules through the RTM.		
5.3.3	**Interface Development Workshops**		
	The Contractor shall conduct a series of workshops with the Commission to facilitate the development of the Interface Control Documents (ICD) between the Contractors Cashless Tolling Systems and the existing PTC Toll Host and CSC/VPC.		
790	The Contractor shall conduct interface control document (ICD) development workshops with the Commission to develop and document the Cashless Tolling Systems interface requirements between the Cashless Toll Systems and the existing PTC systems.		

Functional Requirements			
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791	The ICD workshops shall be scheduled within 60 days of NTP and are anticipated to require a minimum of 2 weeks of design.		
792	The ICD workshops can occur concurrent to the System requirements reviews.		
793	Subject matter experts must provide a means for explaining each interface, its intended purpose, data fields and components and data integrity validation.		
794	The interface requirements shall include the following data feeds that include but are not limited to:		
	· transaction data file(s) naming conventions and data format requirements for transaction files transmitted from the Cashless Tolling Systems to the existing PTC Toll Host.		
	· Image file naming requirements		
	· Detailed image file TAG (.tag) file naming conventions and data formats to the CSC/VPC		
	· Transponder status list data file naming conventions and data file formats from the existing PTC Toll Host to the Cashless Tolling Systems.		
	· interface with SAP for the transmission of monthly toll transaction GL files and GL files received from the CSC (if full Host option exercised).		
5.3.4	**Transaction Framing and Building Logic Workshops**		
	The Contractor shall conduct a series of workshops with the Commission to present the transaction building and framing process logic. The purpose of the workshops is to provide the PTC with a transparent understanding of the Contractors logic for building and framing transactions.		
795	The Contractor shall conduct transaction building workshops with the Commission to walk-thru the logic of building a transaction in the lane.		
796	The transaction building workshops shall be scheduled within 60 days of NTP and are anticipated to require 2 weeks of review.		
797	The transaction building workshops can occur concurrent to the System requirements reviews.		
798	Subject matter experts must provide a means for explaining how data from each lane device or subsystem is used in the framing logic and transaction building process for each vehicle.		
799	The transaction building walk-thru shall provide at a minimum but not limited to the following:		
	· Flow charts and timing diagrams to show how sensor information is associated with a vehicle.		
	· Transponder association and rules for assigning transponders to a vehicle including possible early reads, late reads and cross lane reads. Transponder association shall also include vehicles that have multiple transponders.		
	· Logic for determining vehicle classification as defined in *Attachment 4A - PTC Proposed AVC Class Structure and Silhouette*.		
	· Logic for LPICS image triggering and corresponding image association to vehicles.		
	· Straddle logic for processing vehicles that may straddle between lanes including shoulders.		
	· Degraded mode logic to describe the behavior, impacts and limitations on the transaction framing logic.		
5.3.5	**System Detailed Design Review**		
	Based on the RTM and Business Rules documents, the Contractor will Design the Cashless Tolling System and submit a preliminary Design document for the Commission to review and provide comments. The Contractor will then conduct a series of Design meetings with the Commission to address the comments and to create the System Detailed Design Document (SDDD), defining how the System Design will meet the Contract Requirements. Upon the submittal of an updated SDDD another review cycle will take place.		
800	The Business Rules document and the RTM shall be used to develop the System Design and the SDDD.		
801	The Contractor shall schedule Design meetings with the Commission to fully understand the Design Requirements.		
802	The Contractor shall support a phased Design process to support the multi-year implementation of the Cashless Tolling System on the Commission facilities. The Design process shall accommodate for the changes in technology that is inevitable given the duration of the Project.		
803	The Contractor shall demonstrate pre-production working products (such as, beta versions) during the Design review process, and stakeholders shall be walked through the workflow, utilizing screens and data flow diagrams.		
804	The Contractor shall explain how the System Design meets the RTM, the Business Rules and the Contract requirements.		
805	The Contractor shall conduct as many meetings and submission review cycles as deemed necessary by the Commission to address all Design issues to the Commission's satisfaction.		
5.3.6	**Reports Design Workshops**		
	The Contractor will conduct a series of workshops with the Commission to facilitate the Design of the Cashless Tolling System reports.		
806	The Contractor shall employ an effective and productive methodology for Designing and finalizing the reports for the Project.		
807	The reports Design process shall be iterative and the Contractor shall conduct multiple workshops with the Commission's stakeholders, and Contractor shall bring subject matter experts to the meeting.		

Functional Requirements

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808	Subject matter experts must provide a means for explaining each report, its intended purpose, columns, fields and components and its connection with other reconciling and validating reports.		
809	Report templates from existing operational systems shall be submitted and changes to meet the PTC Cashless Tolling System requirements shall be noted. Sample reports shall have correct and accurate data and shall reconcile across other reports.		
810	Upon receiving feedback from the stakeholder, the Contractor shall develop/modify the reports and resubmit the updated reports for review.		
811	The modified and new reports shall be demonstrated to the Commission using accurate and reconciled data. Reports that are expected to reconcile to one another shall be demonstrated together.		
812	The iterative series of workshops and demonstrations shall continue until baseline reports are Approved by the Commission.		
813	The Approved baseline reports shall be used as the basis for the Design document.		
5.3.7	**Software Walkthrough**		
	The intent of the Software walkthrough is to provide an overall status on the Contractor's Software development progress to ensure the Contractor is on track to deliver the Project on schedule and to obtain the Commission's feedback on the direction of the development prior to the full rollout of the Software.		
814	The Contractor shall conduct a series of Software walkthroughs including product demonstrations to solicit input from the Commission during the development of the Cashless Tolling System.		
815	Prior to the Software walkthrough, the Contractor shall develop and submit the use cases that will be demonstrated to the Commission for review and Approval. The walkthrough shall follow the process flow and emulate normal operations.		
816	The product shall be demonstrated in a test environment that allows data to flow as it will in the final integrated System.		
817	The Software walkthrough shall demonstrate to the Commission that the developed Software product meets the technical and functional Requirements of the Contract.		
818	Comments and feedback provided during the Software walkthrough shall be documented and resolved by the Contractor and the resolution shall be Approved by the Commission.		
819	The Contractor shall be responsible for identifying and correcting any Software issues or defects in its Design or product that impact the Contractor's ability to deliver the Cashless Tolling System that meets the Contract requirements. This shall apply to issues or defects found during or after Software walkthrough or in the subsequent testing and Implementation. Any such changes shall be Approved by the Commission in writing.		
5.4	**Documentation**		
	The Contractor is required to provide various Hardware; Software; Requirements; Business Rules; Design; testing; installation, and Maintenance documentation that include Contractor-developed documentation and third-party documentation. All documentation provided under this Contract shall be specific and relevant to the system proposed to the PTC and void of extraneous information outside what is required and shall meet the requirements described below. All documentation provided shall minimize system generalities and not include system functionality that is not relevant to the PTC Cashless Tolling System(s).		
820	The Contractor shall provide and maintain an online, electronic document management system in a central location that is accessible to the Commission by username and password, to control all Project-related documents, submissions and drawings in accordance with the Commission ECO process as defined in *Attachment 12: ETC System Change Control Procedures V1.6* (or the latest Approved version per PTC) for the term of the Contract.		
821	The electronic document management system shall be indexed and searchable.		
822	All Project documents submitted under this Contract shall be available to the Commission using the online, electronic document management system provided by the Contractor at all times.		
823	The Contractor shall maintain a deliverable tracking list that accurately tracks all Contractor submissions; the Commission's comments review documents; resubmissions and final Approval.		
824	Each document shall be properly titled, date updated, numbered by revision and version, and shall incorporate signature blocks for authorship and Approvals. The Contractor shall provide a logical indexing system for ease of access for the Commission to locate documents in the electronic document management system.		
825	Updated submissions of the document shall also include the red-lined version showing all revisions to the document since the last submission.		
826	The Contractor shall utilize acceptable standards agreed upon by the Contractor and the Commission when updating documents and submitting revisions.		
827	All documentation submitted by the Contractor under this Contract shall be accurate and comply with Contract requirements. All deliverables shall be submitted in accordance with the Approved Project schedule.		
828	A Table of Contents, for all documentation that requires one, shall be submitted by the Contractor to the Commission for review and comment prior to the submission of the preliminary draft.		

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829	The Contractor shall submit a minimum of: a preliminary draft, a final draft and a one hundred (100) percent final to the Commission for review and comment. All final documents shall incorporate all the Commission’s review comments to the Commission’s satisfaction. Each subsequent submission of a deliverable shall also include the Commission’s comments review log with the resolution of each comment updated by the Contractor.		
830	The Commission shall have the right to require additional interim drafts from the Contractor at no additional cost should the draft documentation submitted not be of adequate quality, have missing or incorrect information or if it does not satisfactorily address the Commission’s review comments.		
831	The Commission shall review and Approve all documents submitted under the Contract. For documents containing less than one hundred (100) pages, the Commission will review and provide comment on preliminary draft documents within ten (10) Business Days. For documents containing more than one hundred (100) pages, the Commission will review and provide comment on preliminary draft documents within fifteen (15) Business Days. The Commission will review and provide comment on all final draft and final documents within ten (10) Business Days. When multiple documents are submitted to the Commission simultaneously, or within one week of each other, the number of Business Days required for review shall be adjusted to reflect the overlapping submissions.		
832	The Commission will provide the Contractor with written comments on all submitted documents, and the Contractor shall respond in writing to all comments. A meeting may be conducted to clarify and resolve any remaining questions and issues concerning the comments and responses provided. The Contractor shall prepare a revised version of the document for Approval by the Commission.		
833	The Contractor shall submit the electronic version of all Contractor developed documentation for the Commission review and Approval. Acceptable electronic formats are Microsoft Office 2016 Suite (or higher), unsecured Portable Document Format (PDF) and professional CAD applications for Contractor-prepared documentation.		
834	The Contractor shall update documentation as changes occur through the Implementation Phase (and the Maintenance Phase) and shall maintain a document submittals list on the electronic document management site identifying all versions of documents, the date submitted, the nature of changes and provide relevant updates to the Commission as they are published.		
835	The documentation package for all submittals as applicable shall include all required electronic media to install, operate and maintain the System/Deliverable/document being supplied.		
5.4.1	**Requirements Traceability Matrix (RTM)**		
836	Upon completion of the Requirements and Business Rules review process the Contractor shall deliver a Requirements Traceability Matrix (RTM) that details all the technical and functional Requirements for the Cashless Tolling System.		
837	The RTM shall build on the specifications documented in the CSWRD and shall capture all user needs identified during the Requirements Business Rules review process.		
838	Upon Approval of the RTM, this document shall be the basis for functional verification Design, development and testing.		
839	During the Design and development of the Software, the Contractor shall update the RTM to reflect any changes to the Requirements that have been Approved by the Commission.		
840	During Design and testing, the RTM shall be used to verify the System compliance to the Contract requirements and test procedures.		
841	All changes to the System requirements during the course of the Project shall be tracked through the RTM.		
842	The RTM shall include:		
	· listing and categorization of all functional requirements;		
	· listing and categorization of all Software related technical requirements;		
	· identification of the source of all requirements;		
	· identification of the Design section of the SDDD that addresses the Requirement and		
	· identification of the test procedure that addresses the Requirement.		
5.4.2	**Business Rules Document**		
	As an outcome of the Business Rules workshops and review meetings, the Contractor will provide a Business Rules Document.		
843	The Contractor shall submit a Business Rules Document that includes but is not limited to:		
	· detailed Business Rules for all aspects of the System, including policies and processes developed by the Contractor and Approved by the Commission;		
	· detailed description of all System Configurable options, ranges and thresholds (Configurable within the System or Configurable by Authorized User) for each business rule (if applicable);		
	· categorization of all Business Rules, providing indication for the source of the business rule;		
	· cross-referencing of all Business Rules to the underlying Requirements and		
	· System and operational impacts of each business rule.		
5.4.3	**System Detailed Design Document**		

Functional Requirements

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844	The Contractor shall develop and submit a System Detailed Design Document (SDDD) that describes the Design specifications of all Hardware and Software provided as part of the Cashless Tolling System to meet the Approved Contract requirements. The SDDD shall demonstrate that the Contractor understands the functional, technical and performance requirements of the Cashless Tolling System and has the processes, Hardware and Software Design in place to provide a high-quality and reliable product that meets the requirements of the Contract.		
845	The SDDD shall be clear, well-written and organized into volumes to manage the submission and review process.		
846	The SDDD shall be specific and relevant to the system proposed and designed for the PTC requirements.		
847	The SDDD shall include the use of diagrams, figures and tables, and it shall apply to all environments, including primary and secondary production and testing environment.		
848	The SDDD shall include but not be limited to:		
	· System architecture, including overall System Design concept;		
	· in-lane Equipment layout for each zone type,		
	· lane layout electrical and logic diagrams;		
	· toll equipment building equipment rack layout and interconnections;		
	· data backup Systems Design, including sizing and processing calculations;		
	· the Requirements for all peripheral device Interfaces and control;		
	· server Design, including sizing and processing calculations;		
	· storage system Design, including sizing and processing calculations;		
	· network sizing and Design details including IP scheme and		
	· space Requirements;		
	· power Requirements;		
	· degraded mode of operations and impacts of failures on System operations;		
	· UPS sizing information detailing all Equipment on the UPS(s) and their total power Requirements including all Commission communications equipment regardless of purpose;		
	· detailed database Design, schema and entity relationship modeling, including sizing and processing calculations;		
	· high System availability Design, including Servers, storage, network, database and application;		
	· Disaster Recovery Design, including Servers, storage, network, database, data resiliency and application;		
	· Hardware dependencies and inter-dependencies;		
	· detailed infrastructure Software Design,		
	· detailed operating systems Design;		
	· detailed primary and secondary locations rack and server placement Design;		
	· detailed desktop computer Hardware configurations;		
	· detailed desktop computer Software configurations;		
	· detailed desktop peripherals configurations, including Requirements for all peripheral device Interfaces and control;		
	· all internal System Interfaces;		
	· all custom developed Software;		
	· all Software provided by the Contractor or a third party;		
	· Software dependencies and inter-dependencies;		
	· data flow diagrams, state diagrams and data queues;		
	· Module level descriptions and interaction among various Modules;		
	· detailed description to the Module and/or process level for all of the functions according to the functional Requirements of the System;		
	· lane logic and vehicle framing design and rules with illustrations;		
	· degraded mode of operations and impacts of failures on System operations;		
	· transaction audit and pre-processing;		
	· transaction processing Design, including sizing and processing calculations;		
	· detailed Interface specifications between all Software components;		
	· Design of all System Interfaces (both sides of the Interface), including electronic Interface to the existing PTC Toll Host system and the existing CSC/VPC system.		
	· formal and standard Interface Control Documents for documenting both sides of the Interface for all interfaces;		
	· detailed data management Design and processes, including summarization, archiving and purging;		
	· all user Interfaces (including reports and screen formats);		
	· System data dictionaries;		
	· application performance monitoring Design;		
	· access/identity security methodology;		
	· security access system layout and interconnections;		

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	· cabinet interconnection diagrams;		
	· environmental specifications;		
	· specification sheets for all Equipment;		
	· complete Bill of Materials, including Hardware, Software and support/Maintenance agreements;		
	· A logical division and an index of all contents within the SDDD.		
849	Upon the completion of the Software development, and prior to transitioning the Cashless Tolling System, the Contractor shall submit the Final Updated SDDD that includes all changes/clarifications made during the Software development and testing phases.		
5.4.4	**Cashless Tolling System Installation Design Requirements Package**		
850	The Contractor shall prepare and submit the Cashless Tolling System Installation Design Requirements and Documentation package to the Commission for review in accordance with the Approved Project Schedule.		
851	The Contractor shall secure the services of a fully qualified engineering design firm(s) for the purpose of providing electrical, mechanical, structural oversight, and documentation Approval for all installation drawings where applicable.		
852	All drawings shall be sealed, stamped, and certified by a Licensed Engineer of the appropriate discipline valid in the State of Pennsylvania where applicable.		
853	The Contractor shall develop a full size (24'' by 36") set of drawings providing sufficient and accurate detail to install the System components.		
854	Sealed, stamped, and certified drawings shall be provided for each site where Equipment shall be installed.		
855	In addition, the drawing shall contain notes and other detail defining specific processes that cannot be graphically depicted. The notes shall also be used to delineate specifications, tolerances, special conditions, or any other factor required to install and integrate a fully functional System.		
856	The drawings shall include but not be limited to the following:		
	· lane geometry and dimensions of actual size and placement of all Cashless Tolling In-lane Equipment;		
	· Equipment bracket mounting detail to the mounting point, including how the mounts will be brought on the platform for Maintenance, if applicable;		
	· specifications and tolerances;		
	· conduit and cable schedule showing all conduits, cables and wires used for the Cashless Toll Zones;		
	· placement of in-road components;		
	· size and depth of loop cuts;		
	· loop tolerances (such as induction, resistance, impedance, Q factor, if applicable);		
	· any specific infrastructure limitations (for example, proximity of rebar);		
	· any specific requirement of how the loop cable is placed into the cuts;		
	· all homeruns from loops;		
	· any cable twist requirements for loop homeruns;		
	· placement of overhead sensors;		
	· details describing termination process for each termination;		
	· lightning and surge suppression system;		
	· a graphical diagram of the network connectivity and data flow;		
	· detailed interconnection diagrams for all Systems;		
	· detailed electrical schematics, and		
	· detailed communications layout.		
5.4.5	**Cashless Toll Concentrator or Toll Host System Installation Design and Documentation (if provided)**		
857	The Contractor shall prepare and submit the Cashless Toll Concentrator or Toll Host System Installation Design and Documentation package to the Commission for review in accordance with the Approved Project Schedule.		
858	The Contractor shall develop a full size set of drawings (24'' by 36") providing sufficient and accurate detail to install the System components.		
859	The drawings shall include but not be limited to the following:		
	· detailed interconnection diagrams for all Systems;		
	· detailed electrical schematics;		
	· detailed communications layout;		
	· UPS sizing specifications;		
	· Equipment rack layout, including power panels and connection to the UPS;		
	· a detailed diagram of the network connectivity, including IP scheme;		
	· server set-up and configuration;		
	· other Toll Concentrator or Toll Host System Hardware installation and connections and		
	· floor loading calculations.		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	Comments
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860	The Contractor shall provide the installation Requirements for the Equipment, including all related Plans and documents. The Contractor shall certify the installation Requirements provided as accurate and appropriate for its intended purpose, to the satisfaction and Approval of the Commission.		
861	The Contractor shall submit Server room drawings that show the location of the Equipment racks for all Cashless Toll Concentrator or Toll Host System Equipment at the primary facility. The layout of the Server components, storage devices and communication Equipment inside the cabinets shall be clearly presented with actual measurements shown.		
862	The Contractor shall submit Server room drawings that show the location of the Equipment racks for all Cashless Toll Concentrator or Toll Host System Equipment at the Disaster Recovery facility. The layout of the Server components, storage devices and communication Equipment inside the cabinets shall be clearly presented with actual measurements shown.		
863	The Contractor shall develop and submit to the Commission a full size (24” by 36”) set of drawings, providing sufficient and accurate detail to install the System components.		
864	The Contractor shall submit UPS sizing information for the primary and Disaster Recovery facilities, detailing all Equipment on the UPS and their power specifications.		
865	The Contractor shall submit detailed network drawings showing all WAN, LAN and VLAN connections, including all interface connections and IP addresses for all Equipment on the network.		
866	The Contractor shall submit detailed Server configuration instructions, including the configuration of storage devices, backup devices and network connectivity.		
5.4.6	**Quality Assurance Plan**		
867	The Quality Assurance (QA) Plan that details the Contractor’s QA Program shall be submitted to the Commission for review and Approval in accordance with the Approved Project Schedule.		
868	The QA Plan shall include the Contractor’s QA Program through planning, documentation; Design; Development; production; purchasing; testing; and installation of all Hardware and Software provided under this Contract.		
869	The Quality Assurance Plan shall describe the quality assurance procedures and methodology for the Project, including but not limited to:		
	· quality management and organizational structure;		
	· System Design;		
	· Software development and defect management;		
	· installation including civil installation sign-off;		
	· Equipment purchase, delivery and validation;		
	· inspection and verification for in-process, final assembly, unit tests and System testing;		
	· configuration management;		
	· change management and change control process;		
	· training and safety;		
	· quality management documentation;		
	· transition;		
	· compliance to Contract Requirements;		
	· quality review and verification and		
	· reporting and metrics.		
5.4.7	**Software Development Plan (SDP)**		
870	The Contractor shall develop and submit a Software Development Plan (SDP) that includes but is not limited to:		
	· documentation of the Software development approach to the application architecture, behavior, architecture, business processes, security and data structures;		
	· approach System Design and Development given the Cashless Tolling System Project phasing;		
	· development resources and responsibilities, such as Software developers, system engineers, security engineers, test engineers, Quality Assurance and control personnel, configuration management administrator, documentation specialists and Project management staff;		
	· describe natural segregation of development areas or teams, such as development of user Interfaces, development of reports, development of the functionality and development of Interfaces;		
	· Software development standards;		
	· security standards;		
	· Software development methodology, such as use cases, modeling and other development tools;		
	· Software development language strategy, platforms and technologies related to both development and Software Maintenance;		
	· description of the Software Development Life-Cycle and Maintenance;		
	· approach to segregation of environments (development, testing and deployment) and the number of environments;		
	· Maintenance of standard and baseline codes and management of major releases;		

Functional Requirements			
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	· gap analysis of baseline code to Contractor Requirements;		
	· development problem reporting, defect tracking and remediation;		
	· code reviews and code development standards;		
	· source control;		
	· informal and internal testing methodology;		
	· regression testing and security and vulnerability testing;		
	· development and integration approach for the major functional modules;		
	· Software Quality Control processes;		
	· Software end-user documentation review and usability;		
	· development documentation;		
	· technical Software code documentation and standards for all code;		
	· Software configuration and change management approach and standards;		
	· samples of detailed Software documentation for both external and in-line documentation;		
	· Software deployment approach, release management and validation and		
	· detailed documentation of the development environment, including enough information that the environment could be completely replicated.		
5.4.8	**Master Test Plan (MTP)**		
871	The Contractor shall provide to the Commission, for review, comment and final Approval a Master Test Plan (MTP) that outlines the scope and testing concepts to be used to administrator each test identified in the Contract. The MTP shall document the methodology used to validate the Cashless Tolling System compliance to the requirements and demonstrate the Cashless Tolling System satisfies Technical, Functional and Performance Requirements.		
872	The Approved Master Test Plan shall be used as the basis for the detailed test procedures that shall be submitted to Commission for review and Approval.		
873	The Master Test Plan shall cover all aspects of the In-lane Cashless Tolling System and the Cashless Toll Concentrator or Toll Host (if provided) System testing from initial development through deployment, tolling point Acceptance and Project Acceptance, including but not limited to:		
	· overall approach to testing;		
	· approach to each informal and formal testing;		
	· approach to creation of data set for each test;		
	· Regardless of AVI requirements or options, approach to transitioning to the new interoperable solution including subsystem (lane, plaza and host) testing, AVI subsystem testing (individual protocol performance up to and including all active protocols) and end-to-end integration testing;		
	· Software test automation tools utilized for each test;		
	· approach to validating all System requirements through the testing methodology;		
	· describe the entry and exit criteria for each test;		
	· document the severity and priority descriptions and levels for each test;		
	· include a detailed schedule for each test identifying each test activity and resource;		
	· describe the methodology for testing the performance requirements and sample size for each phase of testing;		
	· describe the methodology for load testing;		
	· describe the purpose; scope; duration; System resources, and human resources for all tests;		
	· approach to validating all reporting Requirements;		
	· approach to end-to-end testing, validation and Reconciliation;		
	· approach to interface testing and compliance to standards,		
	· document how defects will be triaged; tracked; reported; resolved, and retested, including tools used to document defects, and		
	· a set of regression test procedures that will be exercised each time Software changes are made after the Approval of the FAT.		
874	The Contractor shall provide detailed test procedures for the Commission's Approval for each test outlined in the Requirements and Approved MTP, including but not limited:		
	· test logistics including test vehicles; drivers and test equipment;		
	· test scenarios;		
	· detailed test steps with expected outcomes;		
	· test entry and exit criteria;		
	· test preparation;		
	· test data creation;		
	· periodic status meetings;		
	· all necessary human resources and		

Functional Requirements			
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		Status of Functionality	**Comments**
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	· all necessary Hardware and Software.		
875	The Commission's Approval of any aspect of testing shall not relieve the Contractor of its responsibility to meet the full requirements of the Contract.		
876	The Contractor shall update the RTM linking every Requirement to a set of test cases to demonstrate the Requirement has been satisfied and which test satisfied the Requirement.		
5.4.9	**Maintenance Plan**		
	The Contractor shall submit Maintenance Plans listed below that describes how the Contractor plans to facilitate the Commission in performing the Maintenance of the Cashless Tolling In-lane Systems, Cashless Toll Host System, and all Hardware at the toll equipment building in accordance with the requirements of the Contract. The Contractor shall have appropriate documentation available to all Maintenance and Software Support personnel, as required to perform their respective duties.		
5.4.9.1	**System Maintenance Plan**		
877	The System Maintenance Plan defines the approach to Services, staffing and resources to fulfill the System Maintenance requirements. The Plan shall include:		
	· organizational structure, organizational chart and job descriptions and responsibilities;		
	· detailed matrix of responsibilities (Commission and Contractor);		
	· staffing plan;		
	· approach to staffing and training;		
	· detailed System monitoring requirements;		
	· coverage and personnel locations;		
	· third party System support agreements overview;		
	· schedule of all System Maintenance activities;		
	· all System Maintenance related communication methods;		
	· Maintenance procedures, communication Protocols and approval processes for System upgrades, scheduled Maintenance activities, change management and scheduled downtime;		
	· Maintenance procedures and communications Protocols for unscheduled downtime;		
	· communication protocol for coordination with interoperable agencies and third-party entities;		
	· communication protocol for coordination with the Commission's existing Contractors;		
	· trouble reporting processes;		
	· escalation processes;		
	· spare levels and reorder thresholds, Equipment and Software warranty tracking and return material processes;		
	· monitoring the MOMS Dashboard;		
	· monitoring Maintenance performance for compliance to performance requirements;		
	· sample Maintenance reports;		
	· Equipment replacement/refresh schedule;		
	· upgrades to third-party Software and tools, and		
	· process in place to meet Maintenance performance requirements.		
5.4.9.2	**Software Maintenance and Warranty Plan**		
878	Software Maintenance and Warranty Plan shall define the approach to Services, staffing and resources to fulfill the Software Maintenance and warranty requirements including but not limited to:		
	· organizational structure, organizational chart and job descriptions and responsibilities;		
	· detailed matrix of responsibilities (Commission and Contractor);		
	· staffing plan;		
	· approach to staffing and training;		
	· approach to receiving and prioritizing Software defects (bugs);		
	· reporting, categorization, prioritization, remediation and disposition of Software defects;		
	· coverage and personnel locations;		
	· all Software Maintenance related communication methods;		
	· Maintenance procedures, communication Protocols and approval processes for Software upgrades, Software releases, testing, scheduled Maintenance activities, change management and scheduled downtime;		
	· Maintenance procedures and communications Protocols for unscheduled downtime;		
	· trouble reporting processes;		
	· escalation processes;		
	· sample Maintenance reports;		
	· Software updates and testing to comply with E-ZPass Group specification changes, and third party interface changes;		
	· Software and security updates, remediation and testing to be compliant to Commission Audit requirements, and		

Functional Requirements			
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	· process in place to meet Maintenance performance requirements.		
5.4.10	**Disaster Recovery Plan**		
	The Disaster Recovery Plan (DRP) shall be a comprehensive, documented statement of actions to be taken before, during and after a disaster to protect and recover the information technology data, assets and facilities of the Cashless Tolling System.		
879	The Contractor shall develop and submit a Disaster Recovery Plan (DRP) and subsequent Disaster Recovery Procedures that describe the approach, as well as activities and procedures that take place in the event of a disaster for each element of the Cashless Tolling System.		
880	The DRP shall document the Contractor's approach to recovering from a disaster, including but not limited to:		
	· events that constitute a disaster and party responsible for declaration of a disaster;		
	· assessment of disaster risks;		
	· mitigation of disaster risks;		
	· preparations in the event of a disaster;		
	· disaster declaration and Disaster Recovery process to invoke;		
	· organization chart illustrating Disaster Recovery team members, roles and responsibilities;		
	· notification contact list, including contact information;		
	· notification protocol;		
	· sites and Equipment for Disaster Recovery, presented in a diagram format;		
	· Disaster Recovery process initiation and completion checklist;		
	· Software and data replication processes;		
	· detailed logistical processes for activation of Disaster Recovery site and systems;		
	· detailed technical processes for activation of Disaster Recovery site and systems;		
	· detailed operational functions for activation of Disaster Recovery site and		
	· detailed technical processes for reactivation of primary site (or moving to a new primary site if the original primary site is destroyed), Operations and Systems.		
881	The DRP shall be tested no less than annually.		
882	The DRP shall include a Business Continuity Plan (BCP) that details the Contractor's approach to accommodating the personnel, Equipment, Systems, network, applications and data components required to ensure the resumption and continuity of critical Cashless Tolling System processes.		
883	The BCP, based on a Business Impact Analysis to assess the needs of the Commission business areas, shall include but not be limited to:		
	· Recovery Point Objective (RPO) maximum acceptable amount of data loss for all critical Cashless Tolling System services after an unplanned data-loss incident, expressed as an amount of time;		
	· Recovery Time Objective (RTO) maximum acceptable amount of time for restoring a critical Cashless Tolling System services and regaining access to data after an unplanned disruption;		
	· Level of Service (LOS) the combination of throughput and functionality required to sustain Cashless Tolling System business Operations and		
	· detailed description of how site and System security will be maintained to ensure continued compliance with security requirements.		
5.4.11	**Training Program and Plan**		
884	The Contractor shall develop and maintain a training plan, subject to Approval by the Commission.		
885	The training plan shall describe the plan for training new personnel and shall outline the required operational/maintenance and system knowledge for each position to be gained from the training. For each position/user type, the plan shall include a training instructor guide, training manual and other materials to be used in training. The plan also shall include a schedule for follow-up training and continuing education for staff.		
886	The training plan shall provide a plan for cross-training staff from other areas of operations or management for peak period, emergency or temporary assignments to provide for staff redundancy. The training plan also shall include the training schedule for regular staff training and continuing education/training.		
887	The Contractor shall submit a training plan, in accordance with the Approved Project schedule, that describes the approach to training administrators, end users at different levels, Maintenance and support personnel, including but not limited to:		
	· overall description of the training program;		
	· training techniques;		
	· training delivery schedule;		
	· names and descriptions of each training class;		
	· purpose of each training class;		
	· who should attend the class;		
	· qualification Requirements for trainer;		

Functional Requirements

No.	Requirements	Required Proposer Inputs	
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	· minimum qualifications for personnel attending the class;		
	· duration of the class;		
	· training materials, including syllabus, schedule, training goals, manuals, guides, other support materials and techniques to be used;		
	· data preparation, such as test Accounts and test transactions;		
	· required Equipment and		
	· facility Requirements.		
888	Courses shall be limited to a maximum of eight (8) hours per day.		
889	The Contractor shall be responsible for maintaining a training database baseline and supporting data files that can be restored at the beginning of each training session.		
5.4.12	**Third-Party Documentation**		
	Third-Party documentation includes standard commercial documentation for third-party provided Hardware, Software, services and materials.		
890	The Contractor shall catalogue all third-party documentation and include the catalogue with the third-party document submissions.		
891	The Contractor shall provide and maintain standard, commercially available, updated documentation for third-party provided Hardware, Software, services and materials provided under this Contract. This set of third-party documentation shall be retained at the Commission offices for the duration of this Contract and upon termination of the Contract.		
892	All updated documents shall show the revisions and also include a version of the clean document.		
893	An electronic copy of all third-party COTS Hardware and Software installation and user manuals, with updates, shall be provided to the Commission. Acceptable electronic formats are Microsoft Office 2016 Suite or higher, unsecured Portable Document Format (PDF) and professional CAD applications.		
894	Documentation shall include sufficient detail to describe the configuration of the Software as it was installed by the Contractor for the Cashless Tolling System. These should include any customization or modifications made to the Software or configurations specific to the Commission environments.		
895	The Contractor shall provide all Hardware and Software installation and user manuals for custom-developed (non-COTS) third-party products and services in a printable electronic format.		
5.4.12.1	**Third-Party Software Documentation**		
896	The Contractor shall provide third-party Software documentation, including but not limited to:		
	· all user manuals;		
	· programmer's reference manuals;		
	· warranty documentation;		
	· installation manuals;		
	· Interface documents;		
	· Maintenance manuals and		
	· any other information required to utilize the Software, such as the operating system, utilities, programming languages, application Software and communications Software.		
897	The third-party Software documentation shall be provided by the Contractor electronically in a standard and organized format, with appropriate labels, tabs and cross references to allow the Commission to easily access and reference information on each Software component on the System.		
5.4.12.2	**Third-Party Hardware Documentation**		
898	The Contractor shall provide third-party Hardware documentation, including but not limited to:		
	· all technical manuals;		
	· operator's guides;		
	· installation guides;		
	· warranty documentation;		
	· Hardware reference manuals;		
	· available options and versions;		
	· catalogs, components and		
	· illustrated parts lists.		
899	The Contractor shall provide all third-party Hardware documentation in a standard and organized format, with appropriate labels, tabs and cross references to allow the Commission to easily access and reference Hardware information on each Equipment component.		
900	Third-party Hardware documentation shall include sufficient detail to describe the configuration of the Hardware as it was installed by the Contractor for the Cashless Tolling System.		
5.5	**Manual Requirements**		

Functional Requirements			
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	Various manuals shall be provided as described below to allow the Commission to understand the operations of the Cashless Tolling In-lane System and Cashless Toll Concentrator or Toll Host System (if provided). New manuals developed under this Contract that are not standard commercial catalogs or manuals, shall meet the Requirements set forth in this section.		
901	The Contractor shall submit the Project manuals to the Commission for review and Approval in accordance with the Approved Project Schedule.		
902	Whenever possible, all data shall be printed on 8-1/2" x 11" sheets; foldouts shall be 11" x 17".		
903	Each manual shall include, but not be limited to:		
	· a title sheet;		
	· revision history;		
	· Table of Contents;		
	· list of illustrations (if applicable);		
	· list of reference drawings and Exhibits (if applicable) and		
	· a parts list (if applicable).		
904	All manuals shall have a consistent look and feel and shall be professionally written and presented in clear and organized fashion.		
905	All manuals prepared for the Commission under this Contract shall be produced, or editable, using Microsoft Office 2016 Suite (or higher). In addition, electronic copies of manuals shall be provided in unsecured Portable Document Format (PDF), if requested by the Commission.		
906	Any special Software required to produce scalable typefaces or other graphs shall be provided by the Contractor as part of the documentation for the manuals.		
5.5.1	**Manual Submissions and Quantities**		
907	The Contractor shall submit electronic copies of all manuals listed below.		
908	All manuals shall be maintained in electronic format in the Contractor's document management system for the term of the Contract.		
909	The Contractor shall be responsible for producing a quantity of the manuals for the Contractor's use, sufficient to fulfill the Contractor's Requirements under the Contract.		
5.5.2	**Manuals to be Submitted**		
5.5.2.1	**Cashless Tolling Lane Maintenance Manual**		
910	The Contractor shall submit Cashless Tolling Lane Maintenance Manual prepared for properly trained technical personnel assigned to the Maintenance of the Hardware and Software installed under this Contract on the Commission cashless tolling lanes. All manuals should be used for the training sessions. It shall document information required to support cashless tolling lane Maintenance and repair activities, including but not limited to:		
	· lane Equipment layout for each Cashless Tolling Zone Type;		
	· schematics and layouts of the Hardware in the lane cabinets, equipment racks and the interconnection diagrams;		
	· parts lists required to service each piece of Hardware installed under this Contract;		
	· general and detailed description and concepts of lane operations and functions;		
	· detailed lane monitoring activities, specialty tools and schedule;		
	· detailed Software monitoring activities and troubleshooting procedures;		
	· Maintenance instructions to repair and replace parts and modules;		
	· mechanical functions and installation of all Hardware;		
	· listing of all event and error logs;		
	· testing and basic troubleshooting procedures, and		
	· preventive and corrective Maintenance procedures.		
911	Standard service manuals for commercial products used for the Equipment shall be acceptable if they contain sufficient information to properly service the Equipment.		
912	Large-size logic diagrams and mechanical assembly diagrams do not have to be reduced or incorporated into the manuals if these drawings are provided with the manuals and presented in a useable and durable form.		
913	Photographic documentation of Equipment with appropriate labels and call-outs are satisfactory if they contain sufficient information to properly identify components, parts and features.		
5.5.2.2	**Cashless Tolling System Monitoring Manual**		
914	The Contractor shall submit the Cashless Tolling System Monitoring manual prepared for properly trained personnel assigned to monitoring the operations of the Cashless Tolling System including transmission of data and files to existing systems. All manuals should be used for the training sessions. It shall document information required to support Cashless Tolling System monitoring, including but not limited to:		
	· all Dashboards, monitoring screens, notifications and data that needs to be checked;		
	· listing of all jobs/process, their dependencies and their schedule;		
	· listing of all folders and directories that need to be checked;		

Functional Requirements			
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	· details related to the activity that needs to be checked;		
	· frequency of the validations;		
	· actions to take when results are not as expected;		
	· notification and escalation process;		
	· basic troubleshooting procedures, and		
	· creation of work orders in MOMS.		
915	Provide description about the tools and Software for personnel to record the monitoring activity and instructions to use the tools/Software.		
5.5.2.3	**Cashless Toll Systems Administrators Manual**		
916	The Contractor shall provide an Cashless Toll Systems Administration Manual that serves as a guide to the overall management and administration of the Cashless Toll Systems and shall include:		
	· description of the programs and processes that need to be monitored to ensure that the System is operational;		
	· procedures for validating tasks, processes and jobs have successfully completed, and errors and exceptions encountered;		
	· procedures for validating the successful transfer and receipt of files for all interfaces, including existing PTC Toll Host system and the existing CSC/VPC system;		
	· a listing of all the error codes, their meaning and potential associated problems shall be included in the manual, with a step by step guide to troubleshooting and correcting the problem;		
	· all database Design, and database Maintenance activities required to keep the System operational shall also be clearly documented, including the scheduling of such activities;		
	· detailed procedures for backup, archiving and purging data;		
	· detailed schedule for all preventative Maintenance activities;		
	· technical contact lists for Hardware and Software providers;		
	· details and copies of all third-party system support agreements and		
	· ad-hoc reporting tools and use of the tools to generate ad-hoc reports shall be documented, and		
	· details of monitoring tools supplied by the Contractor to include but not limited to MOMS Dashboards and MOMS.		
5.5.2.4	**Cashless Toll Systems User Manual**		
	The Contractor shall develop and provide a comprehensive set of system documentation and user manuals for the Cashless Toll System users. At a minimum, the documentation shall include all user and training manuals, a reports definitions and data flow diagrams.		
917	The Contractor shall develop and submit Cashless Toll Systems User Manuals to be used by Commission staff to operate the Cashless Toll System and for training purposes.		
918	The Contractor shall develop a separate manual for each job category that details all the processes, procedures and policies developed by the Contractor and Approved by the Commission required to fulfill the Requirements of each specific job description.		
919	Each Cashless Toll Systems User Manual shall include but not be limited to:		
	· screen images detailing the step-by-step activities needed to fulfill a specific functionality;		
	· flowcharts to provide Commission staff a clear understanding of the workflow;		
	· all screens, reports and data fields, clearly explained using sample formats applicable to the Cashless Toll Systems and		
	· samples of all reports, included in the manual or as an attachment to the manual, with any specific instructions that may apply to a given report.		
5.5.3	**As-Built Documentation**		
	Prior to the Commission Acceptance of each tolling location of the Project, As-Built documentation shall be provided that documents the final Cashless Tolling System Design and implementation.		
5.5.3.1	**System Detailed Design Document**		
920	After the Approval of the Operational Test and prior to the Commission Acceptance of the Cashless Tolling System, for each tolling location of the Project, the Contractor shall submit the As-Built System Detailed Design Document (SDDD) that includes all Software and Hardware changes made during the System development, implementation, and testing phases.		
921	The Contractor shall submit an electronic version of the As-built SDDD in a printable format Approved by the Commission.		
922	The Contractor shall update the latest as-built SDDD should any changes be made to the system design after System Acceptance as a result of functional upgrades or Approved change orders during the Contract period.		
5.5.3.2	**As-Built Drawings**		
923	The Contractor shall provide to the Commission a complete set of As-Built drawings which shall be delivered in a readily printable in full and half size formats from the electronic format Approved by the Commission for all Equipment installed and furnished under this Contract.		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	**Comments**
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924	As material changes are made to the System the Contractor will be required to update the as-built drawings to reflect the current status.		
925	The sets shall include, but not be limited to:		
	· all schematics;		
	· logic diagrams;		
	· layouts;		
	· wiring diagrams;		
	· interconnection diagrams;		
	· all attachment Hardware details;		
	· installation diagrams;		
	· cable schedule;		
	· Interface details;		
	· facility build-out details and		
	· network diagrams, so as to provide a complete record of the as-built status of the Equipment.		
926	All drawings for revisions to standard commercial assemblies or components for the Equipment shall be included in the As-Built drawing set.		
927	All As-Built drawings shall contain a table of contents that shall include a listing of all drawings with headings for drawing number, drawing title, revisions number and date, and the type of material list, wiring diagram, wire list, specification control drawing, or similar categories.		
928	The Contractor shall update the latest drawings with red lines as changes are incorporated during the installation process. At the completion of the installation, the Contractor shall gather all red line drawings.		
929	The red line drawings shall be verified and incorporated into a final as-built drawing package. This final as-built package shall include all updated installation drawings, shop drawings and sketches, Plans and other drawing types that were used to install the Cashless Tolling System.		
930	All other documentation used regarding the installation also shall be finalized and submitted as part of the as-built submittal.		
931	The Contractor shall update and resubmit the latest as-built drawings should any changes be made to the system design or configuration after System Acceptance during the Contract period including interoperability and multiprotocol updates.		
5.6	**Quality Assurance Program**		
	The Contractor shall establish and maintain an effective Quality Assurance (QA) program on all aspects of the Cashless Tolling Project to ensure compliance with the Contract. This Quality Assurance Plan will detail the process and procedures instituted by the Contractor to ensure the QA program is in place.		
932	The Contractor shall establish and maintain an effective Quality Assurance (QA) program that ensures adequate quality throughout all areas of Cashless Tolling Project Contract performance.		
933	All supplies and services under this Contract, whether manufactured or performed within the Contractor's facilities or at any other source, shall be controlled by the Contractor at all points necessary to ensure conformance to the requirements of the Contract.		
934	Purchase, delivery, verification, testing and assembly of Equipment, Hardware and Software conducted within the Contractor's facilities and on-site shall be controlled completely by the Contractor.		
935	Delivery, verification, testing and assembly of Servers and network Equipment conducted within the Contractor's facilities shall be controlled completely by the Contractor.		
936	The QA program shall provide for the prevention and ready detection of discrepancies and for timely and positive corrective action.		
937	The QA program shall include effective Quality Control of purchased materials and Subcontracted Work.		
938	The Contractor shall make objective evidence of quality conformance readily available to the Commission, and the Commission shall have the right to review and verify the Contractor's compliance to the process.		
5.6.1	**Records**		
939	The Contractor shall maintain records or data essential to providing objective evidence of quality until the expiration of the Contract and these records shall be made available to the Commission upon request.		
940	Quality-related records and data shall include but not be limited to:		
	· inspection and test results;		
	· records of Subcontractor QA programs;		
	· cost records pertinent to Acceptance of nonconforming material;		
	· inspection check-off of civil Contractors work;		
	· change request documentation;		
	· Design reviews and walkthroughs and		
	· results of internal and Contractor audits.		

Functional Requirements			
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941	Records shall be maintained in a manner that shall allow for access and analysis of the status of the overall QA Program and in a format as defined in Section 5.4 Documentation.		
5.6.2	**Control of Purchase**		
942	The Contractor shall be responsible for ensuring that all supplies, components, developmental tools, assemblies, subassemblies, and Services procured from Subcontractors and vendors conform to the technical requirements and Contract.		
943	The Contractor shall have a quality control process in place for tracking and handling non-conforming Equipment and products.		
944	The Contractor’s responsibility includes the establishment of procedures for the selection of qualified Suppliers. In selecting qualified Suppliers, the Contractor shall ensure that the Subcontractors and vendors control the quality of the supplies and Services provided.		
5.6.3	**Handling, Storage and Delivery**		
945	The Contractor shall document the approach to assembly of the Equipment, including the location where Equipment and Systems are assembled.		
946	The Contractor’s QA Program shall provide for adequate and documented handling, storage, preservation, packaging, and shipping instructions to protect the quality of products.		
947	Commission assets, as defined by the Commission during the design process, shall be tracked and entered into the MOMS inventory and the cost and location of each asset shall be recorded.		
948	All assets designated by the Commission shall have an inventory tag or labeling mechanism for the electronic data entry and tracking of Commission equipment by location and cost within the MOMS, subject to Approval by PTC during the design process. The tagging or labeling mechanism shall be readily and efficiently available to Authorized staff and automatically updated in MOMS.		
949	Any unique or special requirements applicable to procured items shall be delineated in the procurement documents. All procurement documents shall be made available to the Commission upon request.		
5.6.4	**Inspection at Subcontractor-Vendor Facilities**		
950	The Commission reserves the right to inspect, at the source, supplies or services not fabricated or performed within the Contractor’s facility.		
951	The Commission’s inspection shall not constitute acceptance, nor shall it in any way replace the Contractor’s inspection activity or relieve the Contractor of the responsibility to furnish an acceptable end product.		
5.6.5	**Access to/Inspection of Contractor's Facilities**		
952	Upon request, the Commission or its designated representative shall have access to the Contractor’s facilities and personnel.		
953	This access may be restricted to those portions of the facilities and personnel involved with or who are otherwise performing Work under this Contract.		
954	Such access shall be for the purpose of inspecting the facilities; verifying progress; inspection of materials; Work-in-progress; or finished goods, or verifying test performance or results.		
955	The Commission’s inspection shall not constitute Acceptance or Approval, nor shall it in any way replace the Contractor’s inspection activity or relieve the Contractor of the responsibility to furnish an acceptable end product.		
5.7	**Cashless Toll Systems Training**		
	The Contractor shall provide comprehensive training for all aspects of the Cashless Tolling System, including but not limited to the operations, system monitoring, problem detection and resolution, audit, and Maintenance of the Cashless Tolling System.		
5.7.1	**Overview of Training Program**		
956	The Contractor shall be solely responsible for supplying all items necessary, including but not limited to training documentation, Software, Hardware and any other Equipment required to complete the delivery of the training program.		
957	The Contractor’s program shall include but not be limited to instruction, models, manuals, diagrams and component manuals and catalogs as required.		
958	Where practical and useful, the Contractor’s training shall be hands on and use actual Cashless Toll Systems Software in the training environment.		
959	The Contractor shall produce all training materials and manuals of the latest documentation in electronic form to be used and printed for future training sessions.		
960	The Contractor shall record training sessions to allow the Commission employees to remotely attend training sessions using WebEx or other online tool.		
961	The Contractor shall ensure the Commission or their representatives have the right to attend any training sessions and to make video and audio recordings of training sessions and copies of all training program materials for their use in training new employees.		

Functional Requirements			
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962	The Contractor shall obtain releases from all employees/Subcontractors to allow unlimited, royalty free use and copies of personal identity information (PII) compliant recordings and provide the same to the Commission upon request.		
5.7.2	**Training Requirements**		
963	The Contractor shall provide the following training courses for the Commission's personnel, including but not limited to the provision of all training manuals (including Contractor- provided manuals or relevant portions thereof), guides, training aids, as well as student and instructor work books accompanying the courses listed in the sections below.		
964	The Commission may require additional courses be offered or additional personnel be provided training. The Contractor shall accommodate these requests to the extent possible with on-site personnel and documentation that is readily available.		
965	Lane level training shall include an overview of generation of subsystem events and creation of transaction data and their flow through the System.		
966	All Cashless Toll Systems training shall include a review and description of each of the appropriate Cashless Tolling System processes and procedures with actual Cashless Toll Host System Software. All students shall have their own workstation and interact directly with the training environment.		
5.7.2.1	**System Operation Overview**		
967	The Contractor shall provide a System operation overview training course for the Commission's management personnel who require a general understanding of all aspects of the operation, including but not limited to personnel from senior management, procurement, information technology, marketing and public information.		
968	The system operations training shall include an overview of all aspects of the Cashless Tolling In-lane System and Cashless Toll Systems including DVAS, MOMS, cashless tolling operations, interface to the existing PTC Toll Host system, existing CSC/VPC system, System Maintenance, network, and any other operational area of the Cashless Tolling System.		
969	System Operation Overview training will be conducted in one session with a minimum class size of ten (10) people, for a minimum of eight (8) hours.		
5.7.2.2	**Audit and Reconciliation and Cashless Toll Host System Operations**		
970	The Contractor shall provide an audit and reconciliation training course for the Commission's auditing staff to understand all aspects of the operation, particularly those related to reconciliation, audit and management.		
971	Course shall include training all personnel who require a detailed understanding of the operations of the Cashless Toll System and how to access and view information and reports from the System on items such as status, alarms, performance, transactions and revenue.		
972	Audit and reconciliation training will be conducted in one (1) session with a minimum class size of five (5) people, for a minimum of four (4) hours.		
5.7.2.3	**System Monitoring Staff Training Program**		
973	The Contractor shall ensure the System monitoring staff (PTC Operations Group) are properly trained in the requirements of monitoring the Cashless Tolling System and its uninterrupted operations.		
974	Training on the Cashless Toll Concentrator or optional Toll Host shall include the maintenance activities provided by the Contractor to provide PTC personnel an understanding of the routine maintenance activities such as monitoring of system logs and Cashless Toll Host System Concentrator maintenance alarms; confirmation of file transmissions; confirmation of system backups.		
975	The Contractor shall provide a minimum of one (1) weeks of classroom and on-the-job training (OJT) to all personnel in their respective area of responsibility before such personnel are assigned monitoring duties.		
976	The Contractor shall provide documentation this initial training has been successfully completed.		
977	The Contractor shall provide various training programs that include but are not limited to:		
	· an in depth explanation of the Cashless Tolling Operations, including all Interfaces, file/data transfers and interconnections;		
	· functions of the monitoring and tools used to manage monitoring tasks;		
	· functions of the MOMS;		
	· Cashless Toll Systems logs, error logs and processing of exceptions;		
	· system dataflow and workflow queues;		
	· explanation of the Dashboard data and analysis;		
	· special use and monitoring tools and		
	· queries and reports.		
978	All System monitoring personnel shall attend the training sessions. The Commission's technical staff also shall attend all training sessions.		
979	The Contractor shall keep accurate training records on all Maintenance and Software support services personnel. The Commission shall be permitted to review and verify Maintenance and Software support services personnel qualifications and training records at any time. Evidence of completion of training by Contractor personnel shall be provided to the Commission upon request.		
5.7.2.4	**Cashless Toll Systems Administration**		

Functional Requirements			
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980	The Contractor shall provide a System Users training course for all personnel who require a detailed understanding of the management, troubleshooting and administration of the interfaces, Software, database, applications, configurations and architecture of the Cashless Toll Systems.		
981	Cashless Toll Systems Administration training will be conducted in one (1) session with a minimum class size of five (5) people, for a minimum of eight (8) hours and on-the-job training (OJT) to all personnel in their respective area of responsibility before such personnel are assigned administration duties.		
5.7.3	**Training Facilities**		
982	The Contractor shall conduct training at the classroom facilities at the Commission administrative building for all training and at designated locations identified by the Commission. Following review of Contractor's Training Plan, the Commission will confirm that it has the requisite space to accommodate the level of effort and physical requirements for each training session.		
5.7.4	**Scheduling and Preparation for Training**		
983	It shall be the Contractor's responsibility to provide sufficient notice to the Commission on the types of training it will provide and the timing for each training session. The Commission will identify a list of participants that Contractor shall notify to schedule their participation in the training.		
984	The Contractor shall perform all scheduling activities and shall make every attempt necessary to accommodate the maximum number of persons for each training session given scheduling conflicts. Contractor shall provide sufficient notice to allow participants a reasonable lead time.		
985	The Contractor shall notify the Commission of the dates or range of dates it would like to hold a training session at the Commission offices and shall coordinate with the Commission Information Technology (IT) office and Administrative Services staff to arrange the proper classroom setting and computer Hardware and Software are installed and the space configured for each training session.		
5.7.5	**Training Materials**		
986	Draft copies of all training materials shall be submitted to the Commission for review, comment and Approval, prior to final printing of quantities required for training.		
987	The Commission shall have the right to require additional interim drafts at no additional cost should draft training materials submitted not be of adequate quality or have missing or incorrect information.		
988	For each course described in the section above, Contractor shall provide the materials listed below.		
5.7.5.1	**Instructor Guides**		
989	The Contractor shall provide an instructor guide for each training course. The guide shall include the following elements:		
	· course agenda;		
	· course objective;		
	· procedures for managing training session;		
	· resource and facilities required, including work stations, power and communications requirements;		
	· detailed lesson plans;		
	· a description of training aids and items to aid in on the job performance (e.g., where applicable, pocket guides or reference sheets);		
	· test to be administered to assure satisfactory completion;		
	· instructions for using any audio-visual support Equipment or materials and		
	· student survey to obtain feedback on the training sessions and the training materials.		
5.7.5.2	**Training Aids**		
990	The Contractor shall provide training aids such as mock-ups, scale models, overhead displays, video demonstrations, and simulations as are necessary to successfully complete the course agenda and meet the course objective.		
991	The Contractor shall provide users a way to access training documents, aids and tips in an online, electronic format.		
5.7.5.3	**Student Workbook**		
992	For each course, the Contractor shall provide a student workbook, including but not limited to:		
	· course agenda;		
	· course objectives;		
	· schedule of sessions;		
	· copies of all overheads and visuals and		
	· lesson outlines and summaries.		
993	Materials such as operations and user manuals may be used to supplement the material provided in the student workbook.		
994	To the extent that the user manuals (and training aids) are appropriately detailed and fit for training purposes they shall be used for training. If the Commission deems they are not sufficiently detail then supplementary training material shall be provided.		
995	If such material is used appropriate cross-references shall be included in the Student Workbook so as to identify the complete set of training materials provided to the student.		

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5.7.6	**Training Room Set-up and Software Installation**		
996	Contractor shall be responsible for loading any special Software required on the classroom computers (provided by the Contractor).		
997	It is the Contractor's responsibility to ensure that the Software is operating as expected on each of the classroom computers.		
998	It is also the Contractor's responsibility to ensure that appropriate communications are in place.		
VI	**Cashless Tolling System Testing Requirements**		
6.1	**Cashless Tolling System Testing Concept**		
	The Commission has employed a phased approach to deploying cashless tolling on the Commission toll facilities. Given the extended duration of the Project, and the potential differences in the various In-lane System solutions, the Contractor shall conduct the following tests.		
999	Various tests (outlined for reference immediately below and with detailed Requirements in subsequent sections) shall be prepared and conducted by the Contractor, including but not limited to:		
	· factory acceptance test (FAT)		
	· onsite first installation test (OFIT) at baseline tolling points;		
	· installation and Commissioning test at baseline tolling points, and		
	· Operational and Acceptance test at baseline tolling points to be identified by the PTC.		
6.1.1	**General**		
	The Requirements described in this section detail the labor, materials, facility, and support Services necessary to test the In-lane Cashless Tolling System and the Cashless Toll Concentrator or Toll Host System (if provided) and its interface to the existing PTC Toll Host system and the existing CSC/VPC system.		
	The Contractor shall prepare and conduct tests that validate adherence to the Requirements that guided its Design and development, compliance to Approved Design and Business Rules and demonstrate the Cashless Tolling System functionality.		
1000	The Contractor shall be responsible for all aspects of testing performed as part of the Contract and to provide all necessary resources and facilities to conduct all tests including but not limited to:		
	· test support personnel;		
	· varying vehicle types and drivers;		
	· test facilities;		
	· test equipment, tools and safety devices;		
	· test schedule and test sequence;		
	· coordination with existing Contractors;		
	· coordination of lane closures and		
	· conducting the test.		
1001	The Contractor shall to the extent possible, develop and use specialized automated testing Software to, including but not limited to:		
	· create test scripts;		
	· control the automated testing;		
	· exercise all conditions, configurations and scenarios;		
	· conduct performance testing;		
	· conduct security testing;		
	· conduct regression testing;		
	· compare actual test outcomes to expected outcomes;		
	· test reporting;		
	· conduct load testing;		
	· conduct user Interface testing;		
	· conduct stress testing;		
	· WAN traffic testing;		
	· conduct sustained operational testing and		
	· conduct sustained burn-in testing.		
1002	The Contractor shall provide a defect tracking system, accessible by the Commission, to document and track all defects identified as part of Cashless Tolling System testing and any subsequent actions taken to correct and retest those defects.		
	The defect tracking system shall be capable of the following, including but not limited to:		
	· rating (severity) defects;		
	· categorizing defects;		
	· prioritizing defects;		

Functional Requirements			
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1003	· logging the date/time the defect was reported;		
	· subsystems and test cases impacted by the defect;		
	· the user who reported the defect;		
	· the erroneous behavior;		
	· the details on how to reproduce the defect;		
	· the developers who worked on the defect and corrective action taken;		
	· date the defect was corrected and formally re-tested;		
	· life-cycle tracking and		
	· reporting.		
6.1.2	**Testing Sequence and Logistics**		
1004	The Contractor shall obtain Approval from the Commission and shall have met the entry conditions prior to start of each test, including but not limited to:		
	· Approval of all predecessor tests;		
	· Approved test procedures for each individual test;		
	· Approved test schedule;		
	· successful closeout of all outstanding pre-test issues;		
	· successful dry run testing with results provided to the Commission;		
	· submittal of the latest Approved version of the RTM showing test validation against the requirements and		
	· confirmation that both site and System are ready for testing.		
1005	After the completion of each test, the Contractor shall submit for the Commission’s review and Approval a test report that documents the results of the test.		
1006	The test report shall address the following, including but not limited to:		
	· the test summary;		
	· the results of the test;		
	· any anomalies and issues identified;		
	· the corrective action/resolution of each item;		
	· the test data;		
	· calculations and backup data supporting compliance to requirements;		
	· comments provided by the Commission and		
	· the results of any re-tests necessary to successfully complete each testing phase		
1007	The Commission shall participate in the testing and witness each test. The Commission shall have full access to the test data and results of the test. Test data and results shall be stored on Commission QA/Test Servers.		
1008	Testing will not be considered complete by Commission until all anomalies and “punch-list” items are closed-out, and the final test report is Approved by the Commission.		
1009	Testing shall occur per the above requirements, subject to Commission’s Approval of the final Master Test Plan.		
6.2	**Factory Acceptance Test (FAT)**		
1010	The factory acceptance test (FAT) shall be conducted by the Contractor at the Contractor’s facility in actual lanes with the complete test Cashless Tolling System in accordance with the Approved MTP described in Section 5.4.8 Master Test Plan (MTP), detailed testing procedures and Project schedule. The FAT test site shall remain available through throughout the term of the Contract for testing and validating changes, fixes and enhancements to the Cashless Tolling Hardware and Software.		
1011	The test configuration shall be representative of the Contractor’s cashless tolling solutions.		
1012	The FAT shall be conducted by the Contractor to verify that all functional elements of the Cashless Tolling System are in conformance with the Contract Requirements.		
1013	Upon the successful completion of the FAT exit criteria and Approval of the FAT by the Commission, the Contractor shall be given the authorization to move forward to the On-site First Installation Test.		
1014	The FAT shall validate that the Cashless Tolling System Hardware meets the Requirements of the Contract including but not limited to:		
	· 72 hour burn-in testing for customized and assembled Hardware and		
	· certification of Hardware compliance to environmental requirements.		
	The FAT shall validate that the Cashless Tolling In-lane System meets the Requirements of the Contract including but not limited to:		
	· accurate assignment and proper framing of each vehicle through various traffic conditions and test scenarios;		
	· accurate capture of images and association of transponders and images to the correct vehicles;		
	· compliance to accuracy requirements;		
	· all exception processing requirements;		
	· correct application of Business Rules;		

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1015	· degraded mode scenarios;		
	· all device failure conditions;		
	· rush-hour traffic scenarios;		
	· redundancy;		
	· mobile enforcement requirements (if option is exercised);		
	· DVAS capabilities;		
	· throughput and load testing using simulated data;		
	· interface to the facility server (if provided) and/or Cashless Toll Concentrator or Toll Host System (if provided), and		
	· transaction and image reconciliation.		
1016	The FAT shall validate that the Cashless Toll Concentrator or Toll Host System (if provided) meets the Requirements of the Contract including but not limited to:		
	· user interface;		
	· Dashboards;		
	· Cashless Toll Concentrator or Toll Host functions;		
	· MOMS;		
	· transaction audit;		
	· correct application of Business Rules;		
	· system performance;		
	· reporting;		
	· redundancy;		
	· system loading;		
	· compliance of Cashless Toll Concentrator or Toll Host System interface to Approved ICDs, and		
	· OCR/ALPR (if the option to implement OCR/ALPR is exercised).		
6.3	**Onsite First Installation Test (OFIT)**		
1017	The OFIT shall be conducted by the Contractor at the on-site locations identified by the Commission that are representative of the two gantry concepts; the overhead structures and the toll gantries in accordance with the Approved MTP, detailed testing procedures and Project schedule.		
1018	The OFIT shall verify the full functionality of the Contractor's Approved solution and its compliance with the Contract requirements and the Approved Design in a controlled, onsite environment using transactions created during live traffic operations and when lanes are closed to traffic. During OFIT testing the system shall be open to live traffic in a test environment and not collecting tolls.		
1019	For OFIT the interface to the Cashless Toll Concentrator or Toll Host System (if provided) and the image server(s) shall be in the test environment.		
1020	The testing shall not interfere with the existing system or impact lane operations.		
1021	Before the commencement of the OFIT, all Equipment and Software that are required under the Contract shall be in place, in a production environment and configured for revenue operations. The interfaces to the existing PTC Toll Host system and the existing CSC/VPC system shall be connected to the respective test environments as Approved by the Commission.		
1022	In order to test the full functionality of the MOMS and System Monitoring during OFIT, all Equipment shall be entered into the System prior to the start of OFIT and the MOMS shall be configured for cashless tolling operations.		
1023	The Contractor shall test the vehicle throughput and speed requirements and generate the required number of transactions to prove the System can process transactions accurately and meet the performance requirements.		
1024	Performance requirements shall be verified using Approved sample size.		
1025	The OFIT shall validate that the Cashless Tolling In-lane System meets the Requirements of the Contract including but not limited to:		
	· operations of in-lane Equipment and their ability to report failures to the MOMS including the UPS;		
	· multi-lane multi-vehicle traffic conditions such as rush-hour traffic (bumper to bumper), vehicle straddling/changing lanes/merging;		
	· accurate assignment and proper framing of each vehicle;		
	· accurate capture and correct association of transponders and images to the correct vehicle;		
	· transaction processing during equipment failures, and degraded modes of operation;		
	· performance requirements using live traffic and controlled vehicles;		
	· Redundancy as defined in this Scope Of Work;		
	· receive and process TSL, VEL (if exercised) and toll rate schedules (if applicable);		
	· DVAS functionality;		

Functional Requirements

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	· E-ZPass Group interoperability using interoperable test accounts;		
	· lane Business Rules and		
	· interface to the Cashless Toll Concentrator or Toll Host System (if provided) or facility servers and the existing CSC/VPC system.		
1026	An Audit of the lanes shall be conducted using live (not simulated) in-lane traffic to verify that the Cashless Tolling System is processing vehicles accurately and transactions can be reconciled in the System using the audit tools Approved by the Commission.		
1027	The OFIT shall validate that the Cashless Toll Concentrator or Toll Host System (if provided) meets the Requirements of the Contract including but not limited to:		
	· functionality of the Cashless Tolling and MOMS Dashboards shall be verified as it applies to transactions, alarm and failure monitoring;		
	· all failure conditions;		
	· user interfaces and toll collection management functions;		
	· Cashless Toll Business Rules;		
	· reconciliation of transactions and revenue;		
	· Cashless Toll reports;		
	· Ad-hoc reporting capability;		
	· accuracy of performance reports;		
	· interface to the facility server (if applicable);		
	· interface to the existing PTC Toll Host system and the existing CSC/VPC system including reconciliation;		
	· conformance with performance, load and stress test requirements;		
	· security requirements;		
	· archival and purging requirements;		
	· MOMS asset management; failure notification; work order tracking and performance reporting;		
	· Cashless Toll Host System redundancy requirements including the demonstration of a failover and recovery from the primary to secondary Toll Concentrator or Toll Host (if provided), and		
	· Cashless Toll System data resiliency requirements.		
1028	As part of the OFIT, an end to end testing shall be conducted that validates the following functionality, including but not limited to:		
	· System's ability to process and post transactions to the Cashless Toll Concentrator or Toll Host System (if provided) and on to the existing PTC Toll Host Systems and existing CSC/VPC system, and		
	· The successful transfer of images from the In-lane Systems to the image server(s) and on to the existing CSC/VPC system;		
6.4	**Installation and Commissioning Test**		
1029	The Installation and Commissioning test shall be conducted by the Contractor on each lane as a part of the Contractor's Cashless Tolling System installation in accordance with the Approved MTP, detailed testing procedures and Project schedule.		
1030	The Installation and Commissioning test shall validate the functionality and operational status of the lanes including installation and configuration of all Equipment and Software. The lane operations shall be verified end to end upon the completion of the installation checkout prior to opening the cashless tolling lanes for revenue collection.		
1031	During the Installation and Commissioning test every piece of in-lane Equipment and its interface to the zone controller shall be verified to be fully operational. The zone controller, its interface to the Cashless Toll Concentrator or Toll Host System (if provided) and the transmission of images to the existing CSC/VPC system via the image server(s) shall be validated to ensure that the interfaces are in place and the Cashless Tolling System is ready for revenue collection.		
1032	A Commissioning test shall be conducted on the Cashless Toll Concentrator or Toll Host System (if provided) and shall include the image server(s) and the interfaces to the existing CSC/VPC system and the existing PTC Toll Host system.		
6.5	**Cashless Tolling System Operational and Acceptance Test**		
1033	The Cashless Tolling System Operational and Acceptance test shall be conducted by the Contractor at each Cashless Tolling plaza location of the Cashless Tolling Project in accordance with the Approved MTP, detailed testing procedures and Project schedule.		
1034	The Cashless Tolling System Operational and Acceptance Test shall be conducted for each Cashless Tolling implementation upon authorization by the Commission to commence such testing. The Cashless Tolling System shall be observed in live revenue operations by the Contractor and the Commission for a minimum of four (4) calendar months.		
1035	The objective of the Cashless Tolling System Operational and Acceptance Test is to ensure that the Cashless Tolling System Software and Hardware functions over the test period with limited manual intervention in live operations. It is intended to confirm that the Cashless Tolling System and the network are sized and configured correctly and data is processed without interruption.		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	**Comments**
No.	**Requirements**	**Existing (E) - Met by current system, no modifications required** **Modification (M) - Modifications needed to meet requirement** **Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs** **To Be Developed (D) - Not in current system, but will be developed** **Not Provided (N**) - Will not be provided - requires explanation**	**If "Status of Functionality = N" then Proposer must provide an Explanation in this Column**
1036	The Cashless Tolling System Operational and Acceptance Test shall validate the interface of the Cashless Tolling System to the existing PTC Toll Host system and the existing CSC/VPC system and reconcile the transactions and images end to end.		
1037	The Cashless Tolling System Operational and Acceptance Test shall validate the operation and accuracy of the Cashless Tolling System common to the Commonwealth of Pennsylvania.		
1038	During the test period, System accuracy, performance of the system and operations shall be validated including:		
	· all System accuracy requirements specified in the Contract using representative sample size for each facility under test;		
	· all maintenance performance requirements;		
	· all system performance requirements;		
	· a two hour vehicle audit during AM and PM peak hours for a total of four (4) hours on each lane at each tolling point that is part of the Cashless Tolling location in test;		
	· transaction processing in accordance with Commission Business Rules;		
	· correct classification of vehicles and assignment of toll and		
	· monitoring of all interfaces for the accurate transfer and processing of all records.		
1039	System reliability and auditability shall be verified manually and through tools and reports provided in the System.		
1040	Dashboards and reports shall be verified daily for accuracy and reconciled to operations and interface files. Queries and detailed reports shall be generated to validate the daily, weekly, monthly, yearly and comparative reports and compared to reports.		
1041	The alarms displayed on the MOMS and all interface status notification shall be verified to be accurate.		
1042	Failure of the Cashless Tolling System to meet a performance requirement shall result in the restart of that particular test until such time the accuracy requirements are met.		
1043	The Cashless Tolling System Operational and Acceptance Test shall be repeated until the Commission is satisfied that the Cashless Tolling System meets the Contract requirements as set forth in the Contract at each tolling point.		
1044	The Cashless Tolling System Operational and Acceptance Test shall be conducted on the baseline tolling points after toll zone commissioning and upon authorization by the Commission to commence such testing. The Cashless Tolling System shall be observed in live revenue operations by the Contractor and the Commission for a minimum of two (2) monthly audit cycles.		
6.5.1	**Cashless Tolling System Acceptance**		
1045	Upon the successful completion of Operational and Acceptance Test for the Cashless Tolling System for each implementation of the Cashless Tolling Project, the closure of all punch-list items and completion and submission of all Contract required documents as set forth in the Contract, the Contractor shall be given the Acceptance for the Cashless Tolling System for each Cashless Tolling implementation.		
VII.	**Maintenance and Software Services**		
	The Contractor shall provide all Maintenance and Software Support Services associated with the Cashless Tolling System throughout the term of the Contract as further set forth in this Scope of Work and detailed in *Attachment 10: Maintenance Responsibility Matrix*. The requirements described in this section detail the Hardware Maintenance and Software and Administrative Support Services for the Cashless Tolling System including any existing Equipment integrated into the Contractor's solution. The Commission will provide Maintenance and Support Services for the Wide Area Network (WAN). Maintenance for the Cashless Tolling In-Lane Systems and Cashless Toll Concentrator (if provided) shall be the responsibility of the Contractor staff. Monitoring of the Cashless Toll Concentrator will be performed by Contractor personnel 24x7. This includes onsite monitoring of system logs and Cashless Toll Concentrator maintenance alarms; confirmation of system backups, and deploying third-party security software updates.		
7.1	**Cashless Tolling System Warranty Program**		
1046	The Contractor shall be responsible for the implementation and administration of a Warranty Program for all Hardware, Contractor Software and third-party Software provided under this Contract.		
1047	The Contractor shall maintain warranty records and service agreements for all Hardware and third party Software in MOMs, and shall review Software upgrades and available patch reports to keep the Cashless Tolling System current.		
7.1.1	**Hardware/System Warranty Program**		
1048	The Hardware Warranty period for all Equipment furnished under this Contract except server Hardware shall be for a period of one (1) year, commencing on the date of Approved installations of each tolling location.		
1049	In the one (1) year Hardware Warranty period, Warranty Maintenance shall include all Services required to maintain the System Hardware at required performance levels.		

Functional Requirements			
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1050	In the Warranty period the Commission shall not be charged for any Services related to Maintenance beyond those associated with force majeure events such as vandalism, relocation of Equipment at the request of the Commission, or damage clearly caused by events outside the control of the Contractor, as set forth in the Contract.		
1051	All Equipment mounting Hardware and brackets provided as a part of this Scope of Work shall be warrantied for the Contract Term.		
1052	The one (1) year Warranty on any additional Approved installed and replaced Hardware and Equipment shall commence when the Hardware and Equipment are installed.		
1053	The Contractor shall take all reasonable and prudent steps to ensure that all Hardware and third party Software used by the System is supported by the third party vendor and all warranties remain in effect.		
7.1.1.1	**Server Hardware Warranty and Support Services**		
1054	All server Hardware shall have a full manufacturer's Warranty and support services for a period of minimum five (5) years beginning with the Acceptance of the Cashless Tolling System for the Cashless Toll Concentrator or Toll Host (if provided) and for the server Hardware at each tolling point beginning with Acceptance at that tolling point.		
7.1.1.2	**Third Party Software Warranty**		
1055	All third party Software shall have a full manufacturer's Warranty and Upgrade Services, which shall be no less than a period of five (5) years beginning with the Acceptance of the Cashless Tolling System.		
7.1.1.3	**Software Warranty**		
1056	The Cashless Tolling System Software shall have a full Warranty against defects and failures beginning at System Acceptance through the end of the Contract Term subject to the applicable provisions within the Agreement.		
7.2	**General Description of Cashless Tolling System Maintenance and Software Support Services**		
1057	The Contractor shall provide one hundred (100) percent of the Cashless Tolling In-Lane Systems and LAN Maintenance Services.		
1058	The Contractor shall provide one hundred (100) percent of the Cashless Toll Concentrator or Toll Host System (if provided) Hardware, Software, Database and System Administration Maintenance Services including operating system and Software security updates through a coordinated effort with the Commission.		
1059	Hardware Maintenance Services under this Contract shall be for a period as set forth in the Contract from Acceptance of each Cashless Tolling plaza location of the Project. The first year of Hardware Maintenance for each Cashless Tolling plaza location shall be covered under the System Warranty Program as set forth in Section 7.1.1.		
1060	The Contractor shall provide Software Maintenance Services as described in this Scope of Work.		
1061	Software Maintenance and Support Services under this Contract shall be for a period as set forth in the Contract from Acceptance of the Project. A Software Warranty shall be provided for the term of the Contract as set forth in Section 7.1.1.3.		
1062	The Contractor shall be responsible for supporting and maintaining the Cashless Tolling System for any time period in which the System is installed, Commissioned and placed into revenue service but has not passed required testing until such time as the Warranty Period commences. The Maintenance of the Cashless Tolling System provided under this Contract prior to start of Warranty is not included in the term of the Maintenance and Software Support Services.		
1063	The Contractor shall be responsible for supporting and maintaining the Cashless Tolling System at the test plazas until the test plazas are Accepted and Warranty has commenced.		
1064	The one (1) year Cashless Tolling System Warranty for each implementation shall commence after the Acceptance of each implementation of the Cashless Tolling Project. The one (1) year Cashless Tolling System Warranty on all other new tolling points deployed by the Contractor shall commence after the Acceptance of the Cashless Tolling System for each subsequent implementations of the Cashless Tolling Project. The one (1) year Cashless Toll Concentrator or Toll Host System (if provided) Warranty shall commence after the Acceptance of the base Contract implementation of the Project.		
1065	All changes and modifications to the Cashless Tolling System shall be Approved by the Commission and shall follow the Commission *Attachment 12 - ETC System Change Control Procedures V1.6* .		
1066	The Services and Work performed under the Contract are considered highly confidential and the Contractor personnel shall at all times comply with the Commission security and privacy requirements. Contractor employees shall not discuss their Work with unauthorized personnel or any individuals not directly associated with the Commission.		
7.3	**Cashless Tolling System Maintenance and Software Support Services - Contractor**		
	The Maintenance and Software Support Services shall include monitoring; preventive; pervasive; corrective; security related and emergency Maintenance Services and certain upgrades and enhancements to be performed on all elements of the Cashless Tolling System. Payment for Maintenance and Software Support Services on the Cashless Tolling System for each Cashless Tolling point implemented of the Project shall commence after the expiration of the one-year Cashless Tolling System Warranty Period. The Contractor shall provide the following Cashless Tolling System Maintenance and Software Support Services at the levels defined in Section VII.		
7.3.1	**Cashless Tolling In-lane Systems Hardware Maintenance and Software Support Services**		
	Upon the completion of the Warranty Program at each Approved tolling point, the monitoring and Maintenance functions described below shall be performed by the Contractor.		

Functional Requirements			
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1067	During and after the Warranty period the Contractor shall maintain the spare parts inventory in the MOMS and update accurate Equipment inventory status in the MOMS.		
1068	The PTC Operations Group shall monitor the System for failures and alarms, and confirm a MOMS work order has been created for each failure as defined regardless of Maintenance Level.		
1069	The Contractor shall automate the MOMS work order process to the maximum extent possible to anticipate and automate work orders. If a MOMS work order has not been created, the Contractor or the PTC Operations Group shall create a work order in MOMS and assign it to a technician for Maintenance action or troubleshooting.		
1070	The Contractor shall perform the necessary Maintenance and close the MOMS work order upon confirmation that the failure has been successfully corrected. The Contractor shall notify the PTC Operations Group that the repair action is complete and work order has been closed.		
1071	The Contractor shall perform all daily, weekly and scheduled preventive Maintenance on all Cashless Tolling In-lane System Hardware.		
1072	Equipment racks and panels shall be inspected and maintained by the Contractor in full operational, orderly condition, and free of debris and dirt.		
1073	The Contractor shall inspect and maintain all Contractor provided equipment mounting Hardware and brackets provided as a part of its Scope of Work and shall also inform the Commission of any potential problems.		
1074	The Contractor shall inspect and test cables, wiring and terminations to detect problems and degradation. Any item not in compliance with Contract requirements shall be replaced by the Contractor at no cost to the Commission unless such failure is considered non-chargeable as described in Section 2.5.4.2 Non-Chargeable Failures.		
1075	The Contractor shall maintain the Cashless Tolling In-lane System local area network that includes all Contractor network connections in the toll equipment building and interconnections between the toll equipment buildings as defined in *Attachment 3b: PTC Communications Network Responsibilities* .		
1076	The Contractor shall provide monitoring and troubleshooting as part of Maintenance Services for the Cashless Tolling In-lane System including, but not limited to:		
	· zone controllers;		
	· AVI system;		
	· AVC system;		
	· LPICPS components and controllers;		
	· OCR/ALPR Software(if the option to implement OCR/ALPR is exercised);		
	· facility servers and Software (if provided);		
	· DVAS cameras;		
	· all cables, wiring, junction boxes, and terminations;		
	· all conduits and cable trays;		
	· all In-lane System electronics and controllers;		
	· Contractor supplied LAN equipment and		
	· all In-lane Contractor and third-party Software.		
1077	All System administrative functions, if not automated, shall be performed by the Contractor at regular intervals as part of the System preventive Maintenance Services according to the Approved Maintenance Plan to ensure System performance is optimized. All such System administrative functions shall be scheduled as preventive maintenance work orders through MOMS and tracked.		
1078	Continuous monitoring of System operations shall be performed by the Contractor in conjunction with the Commission to verify System is functional; security posture is adequate; processes are being executed as scheduled; files are transmitted as specified, and System is operating to Contract performance requirements.		
1079	Continuous monitoring by the Contractor shall include but not be limited to:		
	· confirming and verifying receipt of all the MOMS messages and Alerts;		
	· verifying the MOMS is receiving and processing System events and reporting the correct status;		
	· evaluating sample transactions data for exception;		
	· confirming data transmission to the Cashless Toll Concentrator or Toll Host System (if provided);		
	· confirming image and transaction transmission to the existing CSC/VPC systems;		
	· performing routine diagnostics on all in-lane subsystems;		
	· verifying processes, programs and scheduled jobs are successful;		
	· reviewing comparative reports to identify System degradation;		
	· confirming successful transfer of transponder status list to the lanes;		
	· reviewing OCR/ALPR results (if the option to implement OCR/ALPR is exercised) and poor quality images;		
	· monitoring the DVAS video and event data;		
	· reviewing sample images;		
	· correcting identified performance issues;		
	· evaluating storage requirements;		

Functional Requirements			
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	· verify time synchronization is occurring as configured and System clocks are not drifting beyond acceptable threshold, and		
	· reviewing error logs and Alerts.		
1080	The Contractor shall perform vulnerability scans using a tool such as Tenable/Nessus, Qualys or other commercial vulnerability scanning tool of the Cashless Toll System and produce ensuing reports at the request of the Commission.		
1081	The Contractor shall monitor for intrusion attempts and prevent all unauthorized access and intrusions at all levels and report such events to the MOMS. Any intrusion, compromise or breach must be reported to Commission IT Security within 12 hours of detection.		
1082	The Contractor shall monitor notifications and initiate corrective actions upon Commission approval on the Cashless Tolling System to meet requirements.		
1083	The Contractor shall perform any Maintenance, daily, weekly, or periodic, required to maintain the System at required performance levels (for example: archival and purging in accordance with the Commission's retention policy).		
1084	The Contractor shall update all Software drivers to meet any new standard Operating Systems as they become available and such updates shall be deployed in accordance with Commission standards.		
1085	The Contractor shall retrieve data manually from the zone controllers and download transponder status list and toll rate and schedule files in the event there is an extended communications failure.		
1086	The Contractor shall re-establish or re-install System files, programs and parameters, as required, following a failure or damage to the System and return lanes to fully operational condition.		
1087	In the event of a declared disaster the Contractor shall perform procedures as needed and return lanes to fully operational condition.		
1088	The Contractor shall perform OCR/ALPR updates as required in accordance with the Commission ECO procedures within an Approved Commission time frame to support license plate changes if the option to implement OCR/ALPR is exercised.		
1089	As part of the Software Support Services the Contractor shall develop and test Software as required to accommodate corrective action, changes to Business Rules or lane configurations in accordance with the Commission ECO procedures. Scope shall include provision of evidence packages and release notes detailing changes for Commission review and Approval, installation of new Software and confirmation of successful installation.		
1090	The Contractor shall analyze daily and weekly trends to identify problems, including but not limited to:		
	· high number of transactions without transponder;		
	· high number of Class Mismatch transactions;		
	· abnormal changes in traffic counts and class;		
	· high number of exceptions or unusual occurrences;		
	· high number of invalid Transponder transactions;		
	· abnormal changes in transponder counts and status changes and		
	· high number of rejected images.		
7.3.2	**Cashless Toll Concentrator or Toll Host System (if provided) Server and Database Administration, Maintenance and Software Support Services**		
	The requirements in this section describe the services to be provided by the Contractor under the Maintenance and Software Support Service for the Cashless Tolling System.		
1091	The Contractor shall provide Maintenance and Software Support Service for all elements of the Cashless Toll Concentrator or Toll Host System including but not limited to:		
	· Cashless Toll Concentrator or Toll Host System Hardware;		
	· operating systems;		
	· databases;		
	· application Software;		
	· third-party Software patches;		
	· security updates;		
	· Software configuration and		
	· Software version control.		
1092	The Contractor shall provide continuous 24x7 system administration services coverage on the Cashless Toll Concentrator or Toll Host System, if off-site or Cloud location, to ensure that it is performing and will continue to perform at a satisfactory level.		
1093	The Contractor support staff shall be available on-call 24x7 to investigate and perform maintenance for those failures escalated to the Contractor.		
	System administration services shall include monitoring and corrective action to ensure System performance is in accordance with requirements of this Scope of Work. This shall include but is not limited to:		
	· monitoring Cashless Toll Concentrator or Toll Host System Hardware (if provided) at the primary and secondary locations including servers; storage devices and backup systems;		
	· verifying processes, programs, and scheduled jobs are successful;		

Functional Requirements			
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1094	· confirming all transactions and images are successfully transmitted to the receiving Systems;		
	· confirming all messages described in the ICD are being successfully exchanged between the Cashless Tolling Systems, existing CSC/VPC systems, and existing PTC Toll Host system;		
	· confirming applications are functional and available to Authorized Users;		
	· confirming all scheduled reports are successfully generated and available to Authorized Users;		
	· verifying all processes are functioning and data and images are moving successfully though the queues;		
	· verifying all third-party interface are functioning and successfully exchanging files;		
	· scheduling of preventive, corrective and predictive Maintenance activities;		
	· performing any daily, weekly, or periodic Maintenance required to maintain the System at required performance levels (for example: indexing and tuning databases; and purging in accordance with the Commission's retention policy);		
	· maintaining and updating records of all Maintenance events and activities in the MOMS;		
	· performing third-party Software or firmware upgrades in conjunction with the Commission, as required and to be compliant to security requirements including but not limited to performing security Software upgrades, database upgrades and operating system upgrades at offsite or Cloud locations;		
	· support upgrades performed by the Commission for third-party Software or firmware as required to be compliant to security requirements including but not limited to performing security Software upgrades and operating system upgrades at PTC Data Centers;		
	· contact with the Commission, operations and Contractors regarding System issues, performance, security posture, Software Release and Maintenance scheduling;		
	· performing Approved manual actions, adjustments and updates to the System data based on predefined criteria to correct issues and as Authorized by the Commission;		
	· re-establishment or re-installation of System files, programs and parameters, as required, following a failure or damage to the System;		
	· monitoring of error logs and System logs;		
	· restoration testing of backups (Software and data) to be performed yearly in coordination with the Commission with the results reported back to the Commission.		
	· Maintenance of up-to-date Software backups (all System Software and data);		
	· installation of new Software and confirmation of successful installation;		
	· verifying time synchronization is occurring as configured and System clocks are not drifting beyond acceptable threshold;		
	· assisting Commission administrative staff as requested by the Commission;		
	· troubleshooting Cashless Tolling System issues;		
	· creation of Ad-hoc reports requested by the Commission;		
	· generation of queries as requested by the Commission, and		
	· analysis of data as requested by the Commission.		
1095	Software support services shall include monitoring and corrective action to ensure System performance is in accordance with requirements of this Scope of Work, to include database management and operation. This shall include, but is not limited to:		
	· investigation and analysis of errors and exceptions and taking corrective action including correcting the problem and reprocessing the data;		
	· monitoring of notifications, and initiating corrective actions on application programs to meet requirements;		
	· updates to the Cashless Tolling System and application to support upgrades to Hardware or third-party Software;		
	· updates to the Cashless Tolling System and application to support all changes to Business Rules and Cashless Tolling System configurable parameters, and deploy changes in production according to Commission Approved deployment schedule;		
	· updates to the Cashless Tolling System and application to support changes to E-ZPass Group ICD including the addition of new E-ZPass Group Agencies;		
	· updates to the Cashless Tolling System and application to support the addition of new Interoperable Agencies;		
	· updates to the Cashless Tolling System and application to support changes to continue its compliance to updated security requirements, and		
	· updates to the Cashless Tolling System and application to support legislative and statutory changes.		
1096	As part of the Software Support Services the Contractor shall develop and test Software as required to accommodate corrective action, changes to Business Rules or lane configurations in accordance with the Commission ECO procedures. Scope shall include provision of evidence packages and release notes detailing changes for Commission review and Approval, installation of new Software and confirmation of successful installation.		
7.4	**Cashless Tolling Network Maintenance Support Services – Commission Responsibility**		
	Commission technical staff will provide Maintenance Support Services for the Commission Toll System WAN Network as specified in this section.		

Functional Requirements			
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	Commission technical staff will maintain and monitor the WAN system that includes:		
	· connection of the PTC Primary Data Center to the network equipment at the toll equipment building at each tolling point location;		
	· connection of the PTC Primary Data Center to the CSC/VPC primary and disaster recovery locations;		
	· connection to the existing PTC Toll Host locations and		
	· operating system and Software patching levels for the Commission provided network equipment security postures.		
	The Commission will upgrade and update the network security to ensure the Commission network is always in compliance with updated security standards.		
7.5	**Updates to Maintenance Plan and Other Maintenance Related Documentation**		
1097	The Contractor shall update the Maintenance Plan and other Maintenance documentation to reflect any changes to the policies or procedures developed by the Contractor and Approved by the Commission, for the Cashless Tolling System Maintenance services. The Maintenance Plan shall be updated and uploaded to the online System documentation library every year for review and Approval. However, sections of the Maintenance Plan or its Appendices shall be submitted for review and Approval as the changes are identified. A version update sheet shall be included with the Maintenance Plan, and the Maintenance Plan on file shall have the most recent version from the configuration management database.		
7.6	**Maintenance Requirements**		
7.6.1	**Preventive Maintenance**		
1098	The Contractor shall provide and perform onsite Preventive Maintenance on the Cashless Tolling In-lane System Hardware, Cashless Toll Concentrator or Toll Host System Hardware (if provided), Contractor LAN communications equipment and Software in accordance with the Approved Preventive Maintenance plan.		
1099	The Contractor shall inspect all Contractor installed Equipment, both major components and support components (fans, equipment racks, storage units) that constitute the Cashless Tolling System and shall make such repairs; cleaning; adjustments, and replacements of components as necessary to maintain the Equipment in normal operating condition in accordance with the Approved Preventive Maintenance plan.		
1100	In addition to required ongoing Contractor monitoring the servers and data processing units shall be actively monitored by the Contractor to verify that storage space is not reaching limits, disks are not fragmented or damaged, Software being used is of latest version per the configuration management and data is being processed and transferred in an appropriate manner.		
1101	Transaction and image processing volumes and times shall be monitored at the lane by the Contractor and Systems optimized for performance with Commission Approval.		
1102	Report generation times, System access times, and System response time shall be monitored by the Contractor to ensure performance meets the Contractual requirements.		
1103	The Contractor shall include all Equipment and Systems as part of the Preventive Maintenance in accordance with the original Equipment manufacturer's guidelines. Any variations or exceptions shall be noted by the Contractor and Approved in advance by the Commission.		
1104	Preventive Maintenance shall be performed by the Contractor during the normal working hours when Maintenance technicians are scheduled to be onsite. Diagnostic aids, tools and Equipment Approved by the Commission to perform Preventive Maintenance equipment analysis shall be provided by the Contractor, as necessary.		
1105	Preventive Maintenance requiring lane closure shall be scheduled by the Contractor for off-peak travel periods; evenings; Saturdays, and Sundays and coordinated with the Commission, so that the Work shall not interfere with normal traffic flow, unless otherwise Approved by the Commission.		
1106	The Contractor shall provide a Preventive Maintenance schedule, to be Approved by the Commission, as part of the Maintenance Plan. The schedule shall detail the preventive Maintenance to be performed on each Equipment item and system. The schedule shall provide a description of the Work to be performed, expected duration and the frequency.		
1107	The preventive Maintenance schedule shall be entered by the Contractor into the MOMS and work orders shall be automatically created to alert Contractor staff of required preventive Maintenance. Failure of the Contractor to perform required preventive Maintenance in accordance with the Approved schedule shall result in liquidated damages, as specified below in the Maintenance Performance Requirements Section 7.22.		
7.6.2	**Predictive Maintenance**		
1108	The Contractor shall establish a Predictive Maintenance program by which failure analysis can be determined by identifying potential failures through the MOMS records. The failure analysis shall take into account either or both specific components and sub-systems. This information shall then be used to investigate and correct problems and failures that could disrupt toll collection operations.		
1109	The Contractor shall maintain all failure analysis documentation on site and provide the information, including charts or other analysis tools and shall submit the analysis as part of its monthly report.		
7.6.3	**Pervasive Maintenance**		

Functional Requirements			
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1110	The Contractor shall establish a Pervasive Maintenance program by which failure analysis can be determined by identifying continuing or repetitive failures through the MOMS records. The failure analysis shall take into account either or both specific components and sub-systems. This information shall then be used to investigate and correct problems and failures that continue to occur on a particular item of equipment, sub-system, or component.		
1111	The Contractor shall maintain all failure analysis documentation on site and provide the information, including charts or other analysis tools and shall submit the analysis as part of its monthly report.		
7.6.4	**Corrective Maintenance**		
1112	All Work performed by the Contractor to correct problems to meet the requirements of the Contract or Software defects shall be considered as Corrective Maintenance and shall be corrected based on priority level within the time specified within this scope of work under Maintenance Coverage and Response Times. Such problems include but are not limited to:		
	· failure of System functions;		
	· failure of processes and programs;		
	· report issues;		
	· application failures;		
	· toll system network issues;		
	· inadequate security posture;		
	· degraded System or component performance, and		
	· non-conforming availability or MTBF.		
1113	Corrective action that require modification to the Software shall be reviewed by the Commission and corrections deployed in accordance with Approved release notes and Commission schedule.		
1114	The Commission shall be notified before any corrective Maintenance is performed.		
1115	Notwithstanding the foregoing, for repeated failure of Equipment, components, or Systems, the Contractor shall undertake an investigation as outlined in Section 7.6.3. If the problem is determined by the Commission to be a pervasive defect, the Contractor shall be responsible for the replacement and repair of the problem Equipment, component, or System at no additional charge to the Commission.		
7.6.5	**Onsite Corrective Maintenance for Cashless Toll Concentrator or Toll Host System (if provided)**		
1116	Upon the confirmation that a failure/work order requires Onsite Corrective Maintenance, the Contractor shall submit a request to the Commission for Approval to perform the Onsite Corrective Maintenance in accordance with the of the Commission ECO process.		
1117	The Contractor shall submit a schedule for performing the Onsite Corrective Maintenance and coordinate all travel with the Commission.		
1118	Upon Authorization to perform the Onsite Corrective Maintenance, the Contractor shall initiate the Work. An authorized Commission representative shall be notified when the Contractor personnel is onsite at the Cashless Toll Concentrator or Toll Host facility performing the corrective action.		
1119	The details of the Work shall be recorded in MOMS by the Contractor and upon verification of the corrective action by the Commission, the Contractor Work on this corrective action item shall be considered complete.		
7.6.6	**Upgrades and Enhancements**		
1120	Upgrades and enhancements required for reasons such as to meet changes to standards, statutes or interoperability changes (Equipment, software changes to accommodate TSL, ICD or regional interoperability hub changes) or the addition of new functionality; or, that provide the Commission with a demonstrable benefit in performance, costs or productivity, shall be proposed with costs and schedule by the Contractor in accordance with the requirements of the Commission ECO process, as set forth in the Contract.		
1121	Software modifications that are required to maintain and support the System as a part of the normal course of business such as version changes, configuration or parameter changes or minor changes to Software or code such as changes to the existing ICDs; or Software modifications required to ensure System is compliant to specified standard (for example security) or, changes that improve the Contractor's ability to maintain and support the System, shall not be considered upgrades or enhancements and shall be provided by the Contractor at no cost to the Commission. All such Software modifications shall be in accordance with the of the Commission ECO process.		
7.7	**Maintenance Coverage and Response Times**		
1122	The Contractor shall post a weekly schedule identifying personnel and times for onsite and on-call Maintenance. Commission Approval is required for any change in Contractor staff. The Contractor shall provide to the Commission the updated active personnel list and contact information when there is a change in personnel.		
1123	Response to calls and repair times shall be determined by priority as described below. Contractor failure to meet the response and repair time criteria described below shall result in liquidated damages as specified in Section 7.22.		
1124	Regardless of onsite or on-call, acknowledgement of receipt of notification of a Maintenance issue or human acknowledgment of a failure shall not exceed thirty (30) minutes after the failure notification was recorded or problem was reported.		

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1125	Priority of failures shall be defined during the Design phase. Time to respond and complete repair are determined by priority and is defined as follows:		
	· Priority 1: Defined as any malfunction or fault or Software defect that results in the immediate loss of revenue; security breach; closure of lanes outside of the Commission lane closure requirements; hazard to personnel or driving public; loss of audit data; loss of redundancy in any redundant System components; loss of functionality that impacts E-ZPass Group Agencies or failure that negatively impacts Lane or Cashless Toll Concentrator or Toll Host System (if provided) operations.		
	o For In-lane Systems Maintenance this priority shall have a two (2) hour time to respond and complete repair.		
	o For Cashless Toll Concentrator or Toll Host Maintenance this priority shall have a two (2) hour time to respond and complete repair. In the event Onsite Corrective Maintenance is required, this priority shall have two (2) hour time to complete repair once Approval to commence Work is provided by the Commission and Maintenance personnel is onsite and ready to perform the repair. The Contractor shall make every effort to be onsite within twenty-four (24) hours of Approval to commence Work.		
	· Priority 2: Defined as any malfunction or fault that degrades the System performance but not the operational ability of the System. It includes, but is not limited to inaccurate reporting, inability to reconcile revenue or loss of System functionality that impacts access to data.		
	o For In-lane Systems Maintenance this priority shall have a four (4) hour time to respond and complete repair.		
	o For Cashless Toll Concentrator or Toll Host Maintenance this priority shall have a four (4) hour time to respond and complete repair. In the event Onsite Corrective Maintenance is required, this priority shall have two (2) hour time to complete repair once Approval to commence Work is provided by the Commission and Maintenance personnel is onsite and ready to perform the repair. The Contractor shall make every effort to be onsite within forty-eight (48) hours of Approval to commence Work.		
	· Priority 3: Defined as any action or event that has the potential to result in a malfunction or degrading of the System performance but has not impacted performance and is not anticipated to immediately impact performance.		
	o For In-lane Systems Maintenance this priority shall have a twenty four (24) hour time to respond and complete repair.		
	o For Cashless Toll Concentrator Maintenance this priority shall have a twenty-four (24) hour time to respond and complete repair. In the event Onsite Corrective Maintenance is required, the Contractor and the Commission shall agree on the time period for onsite correction but time to respond and complete repair shall be no longer than three (3) Calendar Days of Approval to commence Work.		
1126	For Priority 1 and Priority 2 failures the Contractor shall provide dedicated resources until the issue has been resolved to the Commission's satisfaction.		
1127	Outages and tasks performed under the Preventive Maintenance period shall be defined as Priority 4. The System shall be available and fully operational within the Approved time schedule for such activities and upon completion of the Preventive Maintenance period. Any failures generated or resulting from Preventive Maintenance activities shall be accounted for as Priorities 1, 2 or 3 and be addressed in accordance with these requirements.		
1128	Response and Repair time is defined as the combined time from when failure occurred or problem was reported to when the repair or correction of the failure occurred; the period of time beginning when the failure occurred (failure time) and ending when the fault condition is corrected and returned to normal operations.		
1129	Response and repair times for every Maintenance event shall be recorded in the MOMS and reported and such reports shall be provided to the Commission in accordance with the reporting requirements of this Scope of Work.		
7.8	**Notifications**		
1130	The entry of a problem (either by the System or an Authorized User) into the MOMS shall constitute the start of the acknowledgment time for purposes of measuring the Contractor's acknowledgment time and response/repair time.		
1131	For purposes of measurement of performance and for the development of Maintenance policy and procedures, notification of System malfunctions, problems and discrepancies may be provided to the Contractor in three (3) different methods, summarized below.		
	· Verbal Notification: Defined as an in-person notification or telephone call. In all cases, the first conversation with, or notification of the Contractor shall signify the start of the response time for purposes of measuring the Contractor's response time. All verbal notifications shall be recorded in MOMS by the Contractor.		
	· Written Notification: Defined as a written description of a problem or condition, typically provided by the Commission or its representative. Written notification could be faxed, texted, or emailed to the Contractor by a customer or user. The time of receipt of fax, message or email shall signify the start of the response time for purposes of measuring the Contractor's response time. All written notifications shall be recorded in MOMS by the Contractor.		

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	· MOMS Notification: Defined as an automatic notification through the MOMS identifying a problem within the Cashless Tolling System that is the Maintenance responsibility of the Contractor and sending out an automatic Alert message by email or text to a Contractor's Maintenance staff to respond to the failure. In addition to the Contractor notification, the Alert shall be posted on the MOMS and available via reports. The presence of a MOMS notification in the System shall constitute the start of the response time for purposes of measuring the Contractor's response time.		
7.9	**Recording of Maintenance Activities**		
1132	The Contractor and the Commission shall utilize the MOMS for initiating the work orders. MOMS shall be utilized for recording and tracking all Maintenance and Software Support Services performed on the Cashless Tolling System. All Equipment provided under this Contract shall be tracked through MOMS from the purchase to their disposal.		
1133	In all cases, it shall be the Contractor's responsibility to log all reported Maintenance activities into the MOMS. The Contractor shall also be responsible for documenting all information and issues related to a failure condition, including all actions taken to complete the correction into the MOMS.		
1134	The work order shall contain as much information as possible in order for persons other than the technician or his supervisor to reasonably determine the fault, when it was worked on, the corrective action and any other information pertaining to the individual Maintenance event, including replacement of parts.		
1135	All performance metrics shall be recorded and tracked through the MOMS and compliance to performance requirements shall be validated using MOMS reports.		
1136	It is the Contractor's responsibility to ensure that its Maintenance staff has real time access to the MOMS and that all the required connections are established and ongoing to ensure that the Maintenance staff has remote access. Maintenance staff shall be trained in the use of the MOMS.		
7.10	**Spare Parts**		
1137	Contractor shall be responsible for the inventory of all spare parts at an Approved storage facility(ies) and shall be insured in this regard as set forth in the Contract. The Contractor shall account for all spare parts and shall provide safeguards against theft, damage, or loss of the spare parts.		
1138	The Contractor shall ensure that only spare parts and equipment required to service the Cashless Tolling System and LAN communications spare equipment are stored at this facility and shall only be used for the PTC Cashless Tolling System.		
7.10.1	**Spare Parts Inventory Management**		
1139	The Contractor shall be responsible for the Maintenance of an adequate spare parts inventory. The Contractor is responsible for monitoring and identifying the existing spare parts inventory, ordering spare parts as required, and proposing the quantity needed to maintain the required performance.		
1140	The Contractor shall update and recommend a spare part quantity to be maintained in order to support the Cashless Tolling System functionality and operational readiness.		
1141	The Contractor shall hold the Commission harmless in the event spare parts or consumables are not available as a consequence of the Contractor's failure to purchase or replenish the spare parts or consumables Approved by the Commission.		
1142	During the term of this Agreement (including after the expiration of any applicable warranty periods) the Contractor shall be responsible for purchasing all miscellaneous repair items and consumable materials necessary to maintain the Cashless Tolling System at the performance levels specified in the Contract.		
7.10.2	**Spare Part Inventory and Tracking**		
1143	The Contractor shall be responsible for recording the inventory into the MOMS, monitoring the inventory quantity and ensuring that the inventory is maintained to the levels required.		
1144	The Contractor shall keep accurate records of all parts entering and leaving inventory including but not limited to: time and date part was dispensed, and the location within the Cashless Tolling System where the part was dispatched and used.		
1145	The Contractor shall also be responsible for tracking of all warranty replacement for Contractor provided Equipment through returned materials authorization (RMA) process. If the replaced part is under warranty, the part shall be immediately replaced with a new part. If the replaced part is out of warranty, the Contractor shall make every effort to repair the replaced item to a usable status and place the part back into spares inventory.		
1146	If the Contractor is unable to repair the part, a new part shall be purchased and placed into spares inventory. The details of the repair efforts, including problem; status; inventory, and repair disposition shall be included in the MOMS inventory and repair database.		
7.10.3	**Procurement and Control of Spare Parts**		
1147	Thirty (30) days prior to placing the Cashless Tolling System in revenue collection the Contractor shall have purchased and have on hand at Commission facilities the agreed upon inventory of spare parts.		

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1148	The spare parts shall be purchased on behalf of the Commission and shall be invoiced at the time of installation and owned by the Commission in a manner to ensure that the Commission receives the maximum benefit from any warranties associated with the spare parts. After the warranty period, the Commission shall reserve the right to purchase all spare parts directly from the source and all purchases will be coordinated through the Commission Procurement Office. After the Warranty period, Contractor provided spare parts not purchased directly by the Commission shall be provided at cost, shall not include any mark up and shall be in accordance with the agreed to Contract price. The Commission shall be under no obligation to buy back excess spare parts purchased by the Contractor.		
1149	The Contractor shall cooperate with and assist the Commission to ensure that all spare parts, equipment, and other Commission owned property is stored or otherwise located on the Contractor's property or in Contractor controlled space shall not be subject to any risk of being confiscated, claimed, attached, withheld by a landlord, creditor, or similar risk.		
1150	This cooperation includes, but is not be limited to, affixing appropriate labeling to track within MOMS and identify as the property of the Commission, with a Commission specific part or control number. All spare parts and consumables shall be maintained by the Contractor free and clear of any liens and encumbrances of any kind. The Commission shall have the right to inspect the spares and consumables inventory upon request.		
1151	The facility and storage area shall be secured and connected to an up-to-date security network system with alarm notification provided to the Contractor's Maintenance staff. Further, it is required that the Commission shall have full and unrestricted access to the Maintenance and or storage facility.		
1152	Any spare parts that are lost or damaged due to the negligence, intentional act, or omission of the Contractor or its employees, Subcontractors, agents, or invitees shall be replaced by the Contractor at its sole cost. The Commission may elect to assume responsibility at any time for storage of spare parts, and the Contractor shall deliver all spare parts to the Commission for storage after receipt of reasonable notice from the Commission.		
7.11	**Repair Depot**		
1153	The Contractor shall be responsible for providing and staffing a repair depot for the return and repair of Cashless Tolling System components.		
1154	The Contractor shall be responsible for repairing failed Cashless Tolling System components and returning them to the spare parts inventory.		
1155	Failed components shall be tracked by the Contractor utilizing MOMS, including final resolution. Component tracking shall include but not limited to the following: receipt, repair date/information, replace reason, date of return.		
1156	The Contractor shall indicate the details of the repairs performed on any components. This shall include but not be limited to boards and connectors replaced.		
1157	If the replaced part is under Warranty, the part shall be immediately replaced with a new part by the Contractor. If the replaced part is out of Warranty, the Contractor shall make every effort to repair the replaced item to a usable status and place the part back into spares inventory. Except for pervasive defects, for out of Warranty components, the Contractor shall document why the component could not be repaired and advise the Commission that a new spare must be ordered.		
7.12	**Audits**		
1158	The Contractor shall completely support the Commission in any audit activity relating to the PTC's Cashless Tolling System or operations. In addition, the Contractor shall conduct audits in accordance with the Contractor's Quality Assurance Program. All deficiencies identified through the Audit process shall be successfully corrected by the Contractor. These audits may include, but are not limited to the following:		
	· internal control procedures;		
	· revenue/transaction reporting;		
	· financial audit and		
	· System processing and performance.		
	· Third party security evaluations		
7.13	**Security Certification**		
1159	The Contractor in coordination with the Commission shall perform monthly security tests that are scheduled in the MOMS, as well as every time a new Software release is deployed or new network equipment is added or replaced to evaluate the security risk to the Cashless Tolling System and identifying potential vulnerabilities. Commission IT Security shall be a party to these security tests and shall be notified in advance of any scheduled tests.		
1160	The Contractor is responsible for correcting all Cashless Tolling System security deficiencies at the Contractor's cost and ensuring there are no security risks.		
7.14	**Cooperation with Other Vendors and Providers**		
1161	The Contractor shall cooperate to the fullest extent with other Contractors and third-party vendors in order to ensure that the lane and Cashless Tolling System operation and Maintenance do not conflict with or cause any deterrent in capability or service to the traveling public, customers, or the Commission.		
7.15	**Emergency Response Management**		

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	The Commission has an emergency response management plan and the Contractor shall follow the procedures set forth in this plan when an emergency situation is invoked.		
1162	The Contractor shall immediately respond to any emergency situation, as notified by the Commission or otherwise, that may arise that has already or could potentially damage the Cashless Tolling System. The Contractor shall be prepared to put forth all necessary resources to divert or correct an emergency condition.		
1163	Such emergency conditions shall be handled in accordance with the policies and procedures established by the Commission. The following are a few examples of emergency conditions:		
	· weather related;		
	· vehicle accident;		
	· conditions that invoke the Disaster Recovery Plan;		
	· third party (power outage or communication failure);		
	· vandalism that causes parts of the Cashless Tolling System to be inoperable and		
	· detection of security breaches, discovered vulnerabilities and activities that pose a security threat to the Commission's toll collection system;		
7.16	**Cashless Toll Host (if provided) Disaster Recovery**		
1164	The Contractor shall perform Disaster Recovery procedures in accordance with the Approved Disaster Recovery Plan (DRP) in the event of a disaster and return the Cashless Toll Host System to a fully operational condition.		
1165	The Contractor shall test the Disaster Recovery procedures on a yearly basis to validate that they are functioning per the Design. The Commission shall witness the test and the Contractor shall provide a report outlining the test, test results and any anomalies encountered for the Commission's review and Approval.		
1166	The Contractor shall address any issues encountered from the yearly Disaster Recovery testing.		
1167	The Contractor shall conduct an after-action review in conjunction with the PTC with the goal of continuous improvement and evaluating the Disaster Recovery Plan effectiveness.		
7.17	**Incident and Revenue Loss Reporting**		
1168	The Contractor shall immediately notify the Commission of any incident or event whereby the potential or actual loss of revenue occurred or could potentially occur. The Contractor shall take immediate action to rectify the condition and return the Cashless Tolling System to normal functioning.		
1169	A Monthly Incident Report shall be provided by the Contractor that includes a breakdown of lost electronic data and revenue by the Commission for each incident. If the condition is determined to be due to the fault of the Contractor, damages shall be assessed in accordance with the terms of the Contract.		
7.18	**Maintenance Staffing, Materials and Training**		
7.18.1	**Maintenance Staffing Requirements**		
1170	The Contractor shall be responsible for maintaining an adequate level of technical staff to perform Maintenance and Software Support Services on the Cashless Tolling System. The Contractor shall ensure that sufficient staffing is available to cover all Maintenance activities identified in this Scope of Work at all times but particularly during the following periods:		
	· Weekends;		
	· Holidays;		
	· personnel on vacation/sick time;		
	· after regular scheduled Work hours (on call), and		
	· unexpected emergency or crisis.		
	The Contractor shall provide personnel to perform the following functions. It shall be the Contractor's responsibility to staff at appropriate levels to meet the requirements, using the Maintenance Plan as the guideline for staffing levels and full job descriptions:		
	· Management: Contractor's Maintenance Management responsibilities include all Maintenance Management business dealings with the Contractor's Project Manager. Responsibilities include single point of contact for all Work related issues, including System problems, material issues, or Contractor personnel issues. Maintenance Management responsibilities also include ensuring that Systems are properly functioning and that the Maintenance and repair Work are properly performed and documented.		
	· Field Supervision: The Field Supervisory functions include being responsible for the day to day operations of the technicians, ensuring that all required Work is accomplished properly and efficiently.		
	· Maintenance Technical Staff: Responsibilities include responding to Maintenance activities and Alerts and for field level preventive Maintenance. Maintenance technicians shall be qualified and maintain the proper certifications to troubleshoot Maintenance problems and identify the source of the problem.		
	· Network Engineering: Network Administration shall include the configuration and Maintenance of the network systems and communications network.		

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1171	· Database Administration: Database administration shall include management of the servers and databases in accordance with *Attachment 11 - Database Standards for the Pennsylvania Turnpike Commission* . The database administration shall cover all aspects of the System database and ensuring the database is optimized for peak performance. The responsibilities include the configuration and operation of the System database and generation of database queries as requested by the Commission and other support personnel.		
	· Systems Engineering: Responsibilities include the configuration and monitoring of all System processing and verify that all operations and processes are occurring as scheduled. All MOMS alarms relating to process failures shall be investigated and resolved by the System engineering staff. Systems engineering responsibilities also include ensuring the proper configuration of all servers and coordinating all server Maintenance. System engineering responsibilities also include identifying issues, communicating with the System Software personnel and coordinating resolution of the problem. All user-related problems (application Software) shall also be handled by the System engineering personnel.		
	· Software Technical Staff: Responsibilities include responding to Maintenance activities and Alerts and resolution of Software problems. Software technical staff shall be qualified to troubleshoot Maintenance problems, identify the source of the problem and correct the problem.		
	· Administrative Staff: Responsibilities include support of the Contractor's Maintenance organization for the performance of Maintenance functions and to provide adequate phone and administrative support at the Maintenance management facility.		
	· ECO Management: Responsibilities include managing the ECO process between the Contractor and the Commission. ECO management staff will ensure all the proper forms are filled out and proper authorizations are obtained to perform the change order work.		
	· Documentation Staff: Responsibilities include updating and maintaining the documentation library to ensure all Cashless Tolling project documentation required in this Scope of Work is current and up to date.		
7.18.2	**Tools and Materials**		
1172	The Contractor shall provide all test Equipment and tools and support; including but not limited monitoring tools; smart phones; laptops, and any other items required for the Maintenance and Software Support staff to perform their Maintenance activities. All such devices shall have adequate and up-to-date security software and be Approved by Commission IT before they are used on the Cashless Tolling System network. All required test Equipment, tools and Software tools shall be on site (as required) and in adequate supply, with all required personnel trained on their use. All test Equipment shall be standard units that are capable of achieving the measurement they are intended to make.		
7.18.3	**Training Program**		
1173	The Contractor shall ensure that Maintenance and Software services staff is properly trained for requirements of maintaining the System. The Contractor shall provide a minimum of two (2) weeks of classroom and On the Job Training (OJT) to all personnel in their respective area of responsibility before such personnel are assigned Maintenance duties.		
1174	The Contractor shall provide trained qualified technical staff to support the Maintenance and Software Support Services described in the Scope of Work. It is the Contractor's sole responsibility to develop training necessary to successfully perform all of the Maintenance actions required to keep the System operational.		
1175	The Contractor shall complete all required training and certifications prior to performing actual Maintenance and Software Support Services within a revenue collection environment. In the event changes or modifications are made to the System Equipment or configuration, supplemental training shall be accomplished prior to the actual service date for the changes or modifications.		
1176	Training shall include the Contractor's safety standards and guidelines and applicable Commission policies and procedures.		
1177	The Contractor shall provide documentation that this initial training has been successfully completed.		
1178	Various training programs the Contractor shall institute shall include, but not be limited to, the following:		
	· a thorough understanding and operating knowledge of the MOMS is required of all Maintenance personnel;		
	· an in depth understanding of the Cashless Tolling System and operations, including all Equipment, Software, interfaces, file transfers and interconnections;		
	· use of Maintenance documentation such as Maintenance manuals; drawings; vendor manuals, and parts list;		
	· functions of the System monitoring tools used to manage the System monitoring tasks;		
	· preventive Maintenance of all Systems and sub-systems;		
	· troubleshooting; diagnostics; repair, testing, and Maintenance follow up;		
	· System logs, errors logs and processing of exceptions;		
	· System dataflow and workflow queues;		
	· review of the Dashboard data and analysis;		
	· discussion on the areas of responsibility;		
	· special use Maintenance and monitoring tools;		
	· queries and reports, and		
	· System access and security.		

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1179	All System Maintenance and Software support personnel shall attend the appropriate training sessions. The Commission staff shall be notified of and invited to attend any or all training sessions two (2) weeks in advance of the training.		
1180	All System Maintenance and Software support personnel shall be trained on scheduling, work assignments, escalation process, transportation requirements and communications;		
1181	The Contractor shall provide training offered by vendors and original equipment manufacturer (OEM) for System components where available and required to properly operate, maintain, test and repair such Equipment and Software. Such training shall include but not be limited to:		
	· LPICPS Equipment;		
	· AVI Equipment;		
	· AVC System;		
	· DVAS;		
	· MOMS;		
	· network components and Software provided by the Contractor;		
	· security Software and security tests;		
	· databases and		
	· servers.		
7.18.4	**Training Materials and Ongoing Education**		
1182	Training material shall consist of Maintenance manuals, vendor manuals and any other documentation that provides for the efficient and effective Maintenance of the System and its components.		
1183	The Contractor shall hold regular meetings with Commission technical personnel to update Maintenance procedures, bring proposed System changes to the attention of the technical staff and discuss Maintenance issues identified in the field. The Contractor shall provide the Commission with the meeting schedule so that the appropriate Commission staff can attend these meetings.		
1184	The Commission shall have the right to make recordings and copies of all training program materials. The Contractor shall provide releases from all employees/Contractors to allow unlimited, royalty free use and copies of recordings.		
7.18.5	**System Documentation**		
1185	The Contractor shall have appropriate System documentation available to all Maintenance and Software Support personnel as required to perform their respective duties.		
1186	The Contractor shall make immediate updates to the online System documentation library to reflect any changes to the System Approved by the Commission. A version update sheet shall be included with the System documentation, and the documentation on file shall have the most recent version from the configuration management database. A complete submission of the System documentation shall be made every five (5) years that reflects all Approved changes to-date.		
7.18.6	**Training Records**		
1187	The Contractor shall keep accurate training records on all Contractor and Commission personnel. The Commission shall be permitted to audit personnel qualifications and training records at any time. Evidence of completion of training by Contractor and Commission personnel involved with system maintenance shall be provided to the Commission upon request.		
7.19	**Safety**		
1188	The Contractor shall adhere to all applicable safety standards and guidelines for working on or around energized Equipment and in a Maintenance environment, including but not limited to the following:		
	· the Commission safety procedures and guidelines are on the Commission website: https://www.paturnpike.com/business/engineering_standards.aspx;		
	· State of Pennsylvania safety procedures and guidelines;		
	· OSHA (Occupational Safety and Health Administration);		
	· NEMA (National Electrical Manufacturers Association);		
	· NEC (National Electrical Code);		
	· FHWA (Federal Highway Administration), and		
	· any other local, state, or Federal ordinance, procedure, or guideline that provides for a safe operation and working environment.		
7.20	**Maintenance and Protection of Traffic (MPT)**		
1189	The Contractor shall perform maintenance and protection of traffic associated with the Cashless Tolling Maintenance Phase. The Contractor in conjunction with the Commission shall develop as a part of the Maintenance Plan an MPT procedure in accordance with standards on the Commission website: https://www.paturnpike.com/business/engineering_standards.aspx for Approval by the Commission.		

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1190	The Contractor shall adhere to the Approved MPT Plan when setting up, working under MPT and restoring lanes to traffic. The Contractor shall also work with the Commission to coordinate MPT Work and to adhere to the Commission advance notice requirements for Work in the lanes, both on a scheduled and emergency basis. All lane closures shall also be coordinated with the Commission Traffic Operations Center and public relations.		
7.21	**Maintenance and Software Support Records**		
1191	The Commission shall have access to all Maintenance and service records at any time for review and audit, upon reasonable notice. The Contractor shall provide monthly reports generated in the System that permits the Commission to evaluate Contractor's Maintenance performance.		
1192	The Contractor's Maintenance manager shall maintain current, complete and accurate records for all Maintenance and Software Support Services activities. The Contractor's Maintenance manager shall institute procedures that make sure Maintenance staff enters complete information into the MOMS before closing a work order or trouble ticket.		
1193	All preventive and predictive Maintenance activities shall be reported in the same manner as corrective or emergency Maintenance activities by the Contractor. The information shall be contained on the MOMS and shall be made available through various MOMS reports.		
7.21.1	**Maintenance Summary Reports**		
1194	The Contractor shall provide the Maintenance summary reports to the Commission on a monthly basis in advance of the Monthly Meeting. The format of the Monthly reports shall be Approved by the Commission and included in the Maintenance Plan.		
1195	The Contractor shall provide an annual Executive Summary report to the Commission that summarizes the Contractor's performance for the Maintenance Year. The format of the Executive Summary reports shall be Approved by the Commission and included in the Maintenance Plan.		
1196	Maintenance summary reports shall also be readily available in detail or summary format to the Commission applicable personnel via the network on a daily, weekly, or other time period basis determined by the Commission. The Maintenance summary report shall include but not be limited to:		
	· a summary of the Contractor's performance for the month under review noting all accomplishments and deficiencies;		
	· all Maintenance and System performance reports that show Contractor's compliance to Maintenance performance requirements;		
	· detailed listing of failures and the impacted subsystems where Contractor's and System performance for the month were not in compliance with the performance requirements;		
	· any exceptions the Contractor believes are non-chargeable failures that Contractor is not responsible for;		
	· detailed list of parts replaced as a result of Maintenance actions, with an identification of warranty versus non-warranty replacement;		
	· status of removed parts and Equipment with an aging status for parts under repair or replacement (serial numbers, being repaired in Maintenance shop, purchase replacement part);		
	· trend analysis for repetitive failure;		
	· status of spare parts inventory;		
	· staffing report detailing positions and staff hours worked;		
	· staff performance trends;		
	· Software and firmware releases implemented;		
	· major Maintenance activities that occurred and are scheduled to occur;		
	· incidents that invoked emergency response or resulted in loss of toll revenue and		
	· summary of work order, Software defects and trouble tickets by priority and category.		
7.22	**Performance Requirements for the Cashless Tolling System and Liquidated Damages**		
	The Cashless Tolling System shall be designed, developed, tested, implemented and Maintained to meet the performance requirements specified herein without the need for manual intervention. The Contractor shall facilitate performance monitoring by reporting performance in clearly measurable terms. The Commission will conduct a review of the Contractor's performance on a monthly basis, as defined in the Maintenance Plan utilizing all required System reports provided by the Contractor and reports generated by the MOMS.		
1197	The Contractor shall submit backup data that confirms Contractor compliance to Maintenance performance requirements.		
1198	A detailed listing of the Cashless Tolling System alarms for each subsystem shall be created with their priority levels in support of the performance data and Contractor's responsibility shall be clearly identified. The Contractor shall be responsible for all alarms and work orders that are escalated to the Contractor.		
1199	Monthly performance reviews shall begin at the commencement of the Maintenance and Software Support Services Contract at each tolling point and shall continue monthly through the period of the Maintenance and Software Support Services Contract. The first month's performance shall be reviewed in month two of the Maintenance and Software Support Services Contract.		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	**Comments**
No.	**Requirements**	**Existing (E) - Met by current system, no modifications required** **Modification (M) - Modifications needed to meet requirement** **Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs** **To Be Developed (D) - Not in current system, but will be developed** **Not Provided (N**) - Will not be provided - requires explanation**	**If "Status of Functionality = N" then Proposer must provide an Explanation in this Column**
1200	Liquidated damages associated with monthly performance reviews, if applicable, shall be assessed beginning in month two		
7.22.1	**Acknowledgement of All Priority Events**		
1201	The Contractor shall acknowledge receipt of all Priority events within thirty (30) minutes of failure/event notification.		
1202	For the purposes of assessing Liquidated Damages, ninety five (95) percent of failure or priority event shall be acknowledged within thirty (30) minutes of receipt.		
1203	The Contractor may be assessed Liquidated Damages of $250 if the acknowledgment percent is below the ninety five (95) percent threshold every month for every Priority event not acknowledged within the time frame specified in these Requirements.		
7.22.2	**Time to Respond and Repair (TTRR)**		
1204	The Contractor shall respond to and complete repair of Priority 1 failures/events as follows:		
	· For In-Lane System failures and Cashless Toll Concentrator or Toll Host (if provided) failures that can be handled remotely: respond and complete repair within two (2) hours of failure/event notification.		
	· For Cashless Toll Concentrator or Toll Host (if provided) failures that require Onsite Corrective Maintenance: be onsite within twenty-four (24) hours of Approval to commence Work and once the Contractor is onsite, two (2) hour time to complete repair.		
	The Contractor may be assessed Liquidated Damages of $100 per occurrence for every additional delay of one (1) hour to respond and complete repair of Priority 1 failures/events.		
	The Contractor may be assessed Liquidated Damages of $500 per occurrence for every additional twenty-four (24) hour delay over the twenty-four (24) hours for being onsite and ready to commence Work.		
1205	The Contractor shall respond to and complete repair of Priority 2 failure/events as follows:		
	· For In-Lane System failures and Cashless Toll Concentrator or Toll Host (if provided) failures that can be handled remotely: respond and complete repair within four (4) hours of failure/event notification.		
	· For Cashless Toll Concentrator or Toll Host (if provided) failures that require Onsite Corrective Maintenance:: be onsite within forty-eight (48) hours of Approval to commence Work and once the Contractor is onsite, two (2) hour time to complete repair.		
	The Contractor may be assessed Liquidated Damages of $100 per occurrence for every additional delay of one (1) hour to respond and complete repair of Priority 2 failures/events.		
	The Contractor may be assessed Liquidated Damages of $300 per occurrence for every additional twenty-four (24) hour delay over the forty-eight (48) hours for being onsite and ready to commence Work.		
1206	The Contractor shall respond to and complete repair of Priority 3 failures/events as follows:		
	· For In-Lane System failures and Cashless Toll Concentrator or Toll Host (if provided) failures that can be handled remotely: respond and complete repair within twenty-four (24) hours of failure/event notification.		
	· For Cashless Toll Concentrator or Toll Host (if provided) failures that require Onsite Corrective Maintenance:: No longer than three (3) Calendar Days to respond and complete repair upon Approval to commence Work.		
	The Contractor is not subject to any Liquidated Damages for Priority 3 failures/events.		
7.22.3	**Mean Time Between Failures (MTBF)**		
1207	The Contractor shall meet MTBF requirements for the following elements of the Cashless Tolling System Components:		
	· Redundant Zone Controller: 30,000 hours		
	· Automatic Vehicle Identification (AVI) System: 20,000 hours		
	· Automatic Vehicle Classification (AVC) System: 30,000 hours		
	· License Plate Image Capture and Processing System (LPICPS): 30,000 hours		
	· Cashless Tolling Servers: 50,000 hours		
	· Network Devices: 50,000 hours		
1208	The reliability of the System components shall be calculated based on the following MTBF calculation: MTBF = # units x measuring period (hours)/ # chargeable failures		
1209	The Contractor may be assessed Liquidated Damages of $500 for each Sub-system not meeting requirement due to Contractor and Contractor System failure.		
7.22.4	**Availability**		
1210	The Contractor shall meet availability requirements for the following elements of the Cashless Tolling System:		
	· Lane Availability - Maintenance from Above or Below Toll Zones: 99.95%;		
	· Cashless Toll Concentrator or Toll Host System (if provided) – 99.95%;		
1211	Availability for each of the above systems shall be calculated as follows: Availability = 100% - [Total number of hours of downtime in time period X / Total hours in time period X].		
1212	For every month in which the Toll Zone lane is available less than the minimum requirement, Contractor may be subject to Liquidated Damages of:		
	· a 0.5% adjustment to the monthly Maintenance fee for availability of 99.90% and up to 99.94%;		
	· a 2% adjustment to the monthly Maintenance fee for availability of 99.50% and up to 99.89%;		
	· a 5% adjustment to the monthly Maintenance fee for availability of 99% and 99.49%.		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	Comments
No.	Requirements	Existing (E) - Met by current system, no modifications required Modification (M) - Modifications needed to meet requirement Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs To Be Developed (D) - Not in current system, but will be developed Not Provided (N**) - Will not be provided - requires explanation	If "Status of Functionality = N" then Proposer must provide an Explanation in this Column
	· a 10% adjustment to the monthly Maintenance fee for availability below 99%.		
1213	For every month in which the Cashless Toll Concentrator or Toll Host System (if provided) is available less than the minimum requirement, Contractor may be subject to Liquidated Damages of:		
	· a 1% adjustment to the monthly Maintenance fee for availability of 99.90% and up to 99.94%;		
	· a 2% adjustment to the monthly Maintenance fee for availability of 99.50% and up to 99.89%;		
	· a 5% adjustment to the monthly Maintenance fee for availability of 99% and 99.49%.		
	· a 10% adjustment to the monthly Maintenance fee for availability below 99%.		
7.22.5	**Transmission of TSL and VEL to the In-Lane Cashless Tolling System**		
1214	Successfully and accurately transmit the Comprehensive Home and Away/Interoperable TSL to each of the zone controllers within thirty (30) minutes of the Cashless Tolling Concentrator, Toll Host (if provided) or Facility Server(s) receipt of the TSL.		
	The Contractor may be subject to Liquidated Damages of $500 per occurrence per one (1) hour delay for failure to successfully and accurately transmit the TSL to each of the zone controller.		
1215	Successfully and accurately transmit the VEL (if exercised) to the In-lane Cashless Tolling System within thirty (30) minutes of the Cashless Toll Host System receipt of the VEL (if exercised).		
1216	The Contractor is not subject to any Liquidated Damages.		
7.22.6	**Transaction Processing and Transmission Requirements**		
1217	One hundred (100) percent of transactions (AVI and video transactions) from the roadway systems shall be sent to the existing PTC Toll Host and reconciled with an accuracy of one hundred (100) percent.		
1218	One hundred (100) percent of transactions (AVI and video transactions) identified to be pursuable and non-pursuable shall be successfully and accurately transmitted to the existing CSC/VPC system with an accuracy of one hundred (100) percent within twenty-four (24) hours of vehicle transit.		
1219	For failure to accurately process and reconcile one hundred (100) percent of all transactions and successfully and accurately transmit pursuable and non-pursuable transactions to the existing CSC/VPC system within twenty-four (24) hours of vehicle transit, the Contractor shall be subject to Liquidated Damages of $50 per twenty-four (24) hour delay per 1,000 transactions.		
7.22.7	**Image Processing Requirements**		
1220	One hundred (100) percent of images (video) from the roadway systems shall be successfully and accurately transmitted to the existing CSC/VPC system and reconciled to the transactions with an accuracy of one hundred (100) percent.		
1221	One hundred (100) percent of images identified to be pursuable shall be successfully and accurately transmitted to the existing CSC/VPC system with an accuracy of one hundred (100) percent within twenty-four (24) hours of vehicle transit.		
1222	For failure to accurately process and reconcile one hundred (100) percent of all images and successfully and accurately transmit pursuable images to the existing CSC/VPC system within twenty-four (24) hours of vehicle transit, the Contractor shall be subject to Liquidated Damages $50 per twenty-four (24) hour delay per 1,000 images set.		
7.22.8	**License Plate Extraction Accuracy - if the option to implement OCR/ALPR is exercised**		
1223	The Contractor shall provide an accurate OCR/ALPR process which shall result in the Cashless Tolling System extracting the license plate, plate type, and jurisdiction with an accuracy of at least 99.95 percent on minimum seventy (70) percent of video transactions generated in the lanes.		
1224	For error rates above the 0.05 percent rate, the Contractor may be subject to Liquidated Damages of $10 for each license		
7.22.9	**Spare Parts Availability**		
1225	The Contractor shall maintain the required physical inventory of agreed to spare parts in accordance with the Contract.		
1226	For failure to maintain spare parts inventory at adequate levels for the month, the Contractor may be subject to Liquidated Damages of $500 per month for each failure to maintain spare parts inventory per the counts required.		
7.22.10	**Preventive Maintenance**		
1227	The Contractor shall perform preventive Maintenance on the Cashless Tolling System according to Approved Preventive Maintenance schedule.		
1228	The Contractor is not subject to any Liquidated Damages for this Maintenance Work.		
7.23	**Security**		
1229	All Contractor personnel shall be subject to appropriate security and background checks to the satisfaction of the Commission. The Contractor shall obtain written Approval from the Commission for all service personnel and each Contractor personnel shall be required to sign an acceptable use agreement.		
1230	Contractor's personnel shall be issued Commission identification badges and shall wear such identification badges at all times when on the Commission property. Use of such identification badges for purposes other than work associated with the Contract will result in termination of the employee from the Contract and possible other legal or disciplinary action.		

Functional Requirements			
No.		**Required Proposer Inputs**	
		Status of Functionality	**Comments**
	Requirements	**Existing (E) - Met by current system, no modifications required** **Modification (M) - Modifications needed to meet requirement** **Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs** **To Be Developed (D) - Not in current system, but will be developed** **Not Provided (N**) - Will not be provided - requires explanation**	**If "Status of Functionality = N" then Proposer must provide an Explanation in this Column**
1231	The services and Work performed under the Contract are considered highly confidential and the Contractor personnel shall at all times comply with applicable current computer and data industry standards with regard to data and information security. All employees of the Contractor shall not discuss their work with unauthorized personnel or any individuals not directly associated with the Commission.		
1232	Contractor's personnel can only use Commission -assigned workstations, servers, and laptops to communicate with the Cashless Tolling System while on Commission premises.		
1233	The Commission will identify and designate a primary point of contact for the Contractor. Under most circumstances, the Contractor will limit communication with Commission authorized staff and to the Commission's designated point of contact unless otherwise directed by the Commission.		
1234	Discussion by the Contractor of any Services or Work performed under the Contract with the media, in oral presentations, in written publications, or in any other form, not related to this Contract shall be Approved in advance by the Commission.		
7.24	**Confidentiality**		
1235	The Contractor shall keep all information regarding its activities pursuant to this Contract confidential and will communicate such information only with authorized Commission personnel or Designated Representatives.		

Exhibit F-7

Price Proposal

(Excel file "paperclipped" to RFP for ease of completion)

Sheet 1
Project Summary - Base and Optional
PTC Cashless Tolling System Implementation and Maintenance Cost
(Summary Only - No Proposer Input Required)

	Base Contract Cost ($)	Optional Future Facilities Cost ($)	Optional Future Facilities Cost ($)	Optional Toll Host Replacement Cost ($)	Grand Total Cost ($)
Implementation Phase	**Clarks Summit**	**Optional Mainline**	**Optional Western Extensions**		
In-lane System Cost (Sheet 2)	$ -	$ -	$ -		$ -
System Cost (Sheet 3)	$ -	$ -	$ -		$ -
Toll Concentrator/Host Cost (if provided) (Sheet 4)	$ -	$ -	$ -		$ -
Total Implementation Phase	**$ -**	**$ -**	**$ -**		**$ -**
Maintenance Phase					
In-lane System Hardware Maintenance and Software Support Services Cost (Sheet 5)	$ -	$ -	$ -		$ -
Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost (if provided) (Sheet 6)	$ -	$ -	$ -		$ -
Total Maintenance Phase	**$ -**	**$ -**	**$ -**		**$ -**
TOTAL IMPLEMENTATION AND MAINTENANCE PHASE	**$ -**	**$ -**	**$ -**		**$ -**
Optional Functionality					
In-lane OCR/ALPR and Enforcement Notification Pricing (Sheet 2)	$ -	$ -	$ -		$ -
Tri-Protocol Implementation (Sheet 2)	$ -	$ -	$ -		$ -
Toll Host System Replacement Implementation Cost (Sheet 7)				$ -	$ -
Toll Host System Replacement Maintenance and Software Support Services Cost - Year 1 only (Sheet 7)				$ -	$ -
Total Optional Functionality	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
TOTAL IMPLEMENTATION AND MAINTENANCE PHASE WITH OPTIONAL FUNCTIONALITY	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Sheet 1
Project Summary - Base and Optional
PTC Cashless Tolling System Implementation and Maintenance Cost
(Summary Only - No Proposer Input Required)

	Base Contract Cost ($)	Optional Future Facilities Cost ($)	Optional Future Facilities Cost ($)	Optional Toll Host Replacement Cost ($)	Grand Total Cost ($)
Optional Extension Phase					
Extension #1 In-lane System Hardware Maintenance and Software Support Services Cost (Sheet 5)	$ -	$ -	$ -		$ -
Extension #1 Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost (if provided) (Sheet 6)	$ -	$ -	$ -		$ -
Extension #2 In-lane System Hardware Maintenance and Software Support Services Cost (Sheet 5)	$ -	$ -	$ -		$ -
Extension #2 Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost (if provided) (Sheet 6)	$ -	$ -	$ -		$ -
Total Optional Extension Phases	**$ -**	**$ -**	**$ -**		**$ -**
TOTAL IMPLEMENTATION AND MAINTENANCE PHASE WITH OPTIONAL EXTENSION PHASES	**$ -**	**$ -**	**$ -**		**$ -**
TOTAL IMPLEMENTATION AND MAINTENANCE PHASE WITH OPTIONAL FUNCTIONALITY AND OPTIONAL EXTENSION PHASES	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Grand Total Dollars

Officer Signature

Date

Typed Name, Title, Address and Phone Number

Sheet 2
Base and Optional In-lane System Cost by Roadway
(Summary Only - No Proposer Input Required)

Highway	Region	Shadow Go-Live Date	Toll Zone Type	Total # of Toll Zones or Locations	Cost Per Toll Zone ($)	Total Cost Toll Zones ($)
Base Contract						
Clarks Summit	Northeast Extension	March 31, 2020	Zone Type 4 (2+1+1) Maint from Below	2	$ -	$ -
			Facility Server	1	$ -	$ -
			Total Base Contract - Clarks Summit	2/1		**$ -**
Optional Total Zones, OCR/ALPR and Enforcement Notification, and Tri-Protocol Readers (Sheet 2-a)						
Optional Total Zones						
Optional Mainline	East and Northeast Extension	2022	Zone Type 1 (3+1+1) Maint From Above	10		$ -
			Facility Server	5		$ -
			Zone Type 2 (3+2+0) Maint From Above	14		$ -
			Facility Server	7		$ -
			Zone Type 3 (2+1+1) Maint From Above	2		$ -
			Facility Server	1		$ -
			Zone Type 4 (2+1+1) Maint from Below	12		$ -
			Facility Server	6		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	1		$ -
			Facility Server	1		$ -
			Zone Type 6 (2+0+0) Existing Ramp Maint From Below	2		$ -
			Facility Server	2		$ -
	Volume Discount					$ -
	Central and West	2024	Zone Type 2 (3+2+0) Maint From Above	34		$ -
			Facility Server	17		$ -
			Zone Type 3 (2+1+1) Maint From Above	2		$ -
			Facility Server	1		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	1		$ -
			Facility Server	1		$ -
	Volume Discount					$ -
			Total Optional - Mainline	78/41		**$ -**
Optional Western Extensions	Beaver Valley Expressway, Mon-Fayette Expressway, and Amos K Bypass	2027	Zone Type 4 (2+1+1) Maint from Below	2		$ -
			Facility Server	1		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	10		$ -
			Facility Server	5		$ -
			Zone Type 6 (2+0+0) Existing Ramp Maint From Below	32		$ -
			Facility Server	16		$ -
	Volume Discount					$ -
			Total Optional - Western Extensions	44/22		**$ -**

Sheet 2
Base and Optional In-lane System Cost by Roadway
(Summary Only - No Proposer Input Required)

Highway	Region	Shadow Go-Live Date	Toll Zone Type	Total # of Toll Zones or Locations	Cost Per Toll Zone ($)	Total Cost Toll Zones ($)
Optional OCR/ALPR and Enforcement Notification						
Clarks Summit	Northeast Extension	March 31, 2020	Zone Type 4 (2+1+1) Maint from Below	2	$ -	$ -
Total Optional OCR/ALPR and Enforcement Notification - Clarks Summit				2		**$ -**
Mainline - Optional	East and Northeast Extension	2022	Zone Type 1 (3+1+1) Maint From Above	10		$ -
			Zone Type 2 (3+2+0) Maint From Above	14		$ -
			Zone Type 3 (2+1+1) Maint From Above	2		$ -
			Zone Type 4 (2+1+1) Maint from Below	12		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	1		$ -
			Zone Type 6 (2+0+0) Existing Ramp Maint From Below	2		$ -
	Central and West	2024	Zone Type 2 (3+2+0) Maint From Above	34		$ -
			Zone Type 3 (2+1+1) Maint From Above	2		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	1		$ -
Total Optional OCR/ALPR and Enforcement Notification - Mainline				78		**$ -**
Western Extensions - Optional	Beaver Valley Expressway, Amos K Bypass, and Mon-Fayette Expressway	2027	Zone Type 4 (2+1+1) Maint from Below	2		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	10		$ -
			Zone Type 6 (2+0+0) Existing Ramp Maint From Below	32		$ -
Total Optional OCR/ALPR and Enforcement Notification - Western Extensions				44		**$ -**
Optional Tri-Protocol Implementation						
Clarks Summit	Northeast Extension	March 31, 2020	Zone Type 4 (2+1+1) Maint from Below	2	$ -	$ -
Total Optional Tri-Protocol Implementation - Clarks Summit				2		**$ -**
Mainline - Optional	East and Northeast Extension	2022	Zone Type 1 (3+1+1) Maint From Above	10		$ -
			Zone Type 2 (3+2+0) Maint From Above	14		$ -
			Zone Type 3 (2+1+1) Maint From Above	2		$ -
			Zone Type 4 (2+1+1) Maint from Below	12		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	1		$ -
			Zone Type 6 (2+0+0) Existing Ramp Maint From Below	2		$ -
	Central and West	2024	Zone Type 2 (3+2+0) Maint From Above	34		$ -
			Zone Type 3 (2+1+1) Maint From Above	2		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	1		$ -
Total Optional Tri-Protocol Implementation - Mainline				78		**$ -**
Western Extensions - Optional	Beaver Valley Expressway, Amos K Bypass, and Mon-Fayette Expressway	2027	Zone Type 4 (2+1+1) Maint from Below	2		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	10		$ -
			Zone Type 6 (2+0+0) Existing Ramp Maint From Below	32		$ -
Total Optional Tri-Protocol Implementation - Western Extensions				44		**$ -**

Sheet 3
Base and Optional System Cost
(Summary Only - No Proposer Input Required)

Item #	Description	Unit	Total Cost ($)	Total Cost ($)	Total Cost ($)
			Clarks Summit	**Optional Mainline**	**Optional Western Extensions**
1	Zone Controller Software Costs (not otherwise covered)	LS	$ -	$ -	$ -
2	Design Documentation	LS	$ -		
3	User, Maintenance, and Project Documentation	LS	$ -		
4	Training (manuals, materials and delivery)	LS	$ -		
5	Factory Acceptance Test	LS	$ -		
6	On-Site First Installation Test	LS	$ -		
7	Installation and Commissioning Test	LS	$ -	$ -	$ -
8	System Operational and Acceptance Test	LS	$ -	$ -	$ -
9	Third Party Warranty and Licenses	LS	$ -	$ -	$ -
10	Warranty (Year 1 of Maintenance) - In-lane System Hardware Maintenance and Software Support Services	LS	$ -	$ -	$ -
11	Warranty - In-Lane System Spare Parts and Equipment - Year 1	LS	$ -	$ -	$ -
12	Insurance and Bonding	LS	$ -	$ -	$ -
13	Project Management	LS	$ -	$ -	$ -
14	Engineering and Design	LS	$ -	$ -	$ -
15	Transition Costs	LS	$ -	$ -	$ -
Total System Costs			$ -	$ -	$ -

Sheet 4
Base and Optional Toll Concentrator/Host Cost (if provided)
(Summary Only - No Proposer Input Required)

Item #	Description	Unit	Total Cost ($)	Total Cost ($)	Total Cost ($)
			Clarks Summit	**Optional Mainline**	**Optional Western Extensions**
1	System Hardware, Third Party Software, Installation and Commissioning not Otherwise Covered	LS	$ -	$ -	$ -
2	Communications Equipment	LS	$ -	$ -	$ -
3	Software (GUI, Back-end), Host System, MOMS, DVAS and License	LS	$ -	$ -	$ -
4	Design Documentation	LS	$ -		
5	User, Maintenance, and Project Documentation	LS	$ -		
6	Training (manuals, materials and delivery)	LS	$ -		
7	Third Party Warranty and Licenses	LS	$ -		
8	Warranty (Year 1 of Maintenance) - Incremental Toll Concentrator/Host Maintenance and Software Support Services	LS	$ -		
9	Warranty - Toll Concentrator/Host Spare Parts and Equipment - Year 1	LS	$ -	$ -	$ -
Total Toll Concentrator/Host Costs			$ -	$ -	$ -

Sheet 5
Base and Optional
In-lane System Hardware Maintenance and Software Support Services Cost
(Summary Only - No Proposer Input Required)

Item #	Description of Items	Total Annual Cost ($)	Total Annual Cost ($)	Total Annual Cost ($)	
	Base Contract Maintenance Costs	**Clarks Summit**	**Optional Mainline**	**Optional Western Extensions**	
1	Year 1 of Maintenance (Warranty)	$ -			See Note #1
2	Year 2 of Maintenance	$ -			
3	Year 3 of Maintenance	$ -			
4	Year 4 of Maintenance	$ -	$ -		See Note #2
5	Year 5 of Maintenance	$ -	$ -		
6	Year 6 of Maintenance	$ -	$ -		
7	Year 7 of Maintenance	$ -	$ -		
8	Year 8 of Maintenance	$ -	$ -		
9	Year 9 of Maintenance	$ -	$ -	$ -	See Note #3
	Total In-Lane System Hardware Maintenance and Software Support Services (excluding Warranty Years)	$ -	$ -	$ -	
	Optional Extension 1 Costs				
10	Extension 1 - Year 1 of Maintenance	$ -	$ -	$ -	
11	Extension 1 - Year 2 of Maintenance	$ -	$ -	$ -	
12	Extension 1 - Year 3 of Maintenance	$ -	$ -	$ -	
13	Extension 1 - Year 4 of Maintenance	$ -	$ -	$ -	
14	Extension 1 - Year 5 of Maintenance	$ -	$ -	$ -	
	Total Extension 1 Cost	$ -	$ -	$ -	
	Optional Extension 2 Costs				
15	Extension 2 - Year 1 of Maintenance	$ -	$ -	$ -	
16	Extension 2 - Year 2 of Maintenance	$ -	$ -	$ -	
17	Extension 2 - Year 3 of Maintenance	$ -	$ -	$ -	
18	Extension 2 - Year 4 of Maintenance	$ -	$ -	$ -	
19	Extension 2 - Year 5 of Maintenance	$ -	$ -	$ -	
	Total Extension 2 Cost	$ -	$ -	$ -	
Total Base and Optional In-Lane System Hardware Maintenance and Software Support Services (excluding Warranty Years)		$ -	$ -	$ -	

Note 1: Clarks Summit First Year Maintenance (Year 1 of Maintenance) Total carried forward to Sheet 3 - System Cost. Not included in the total of Sheet 5.

Note 2: Optional Mainline First Year Maintenance (Year 4 of Maintenance) Total carried forward to Sheet 3 - System Cost. Not included in the total of Sheet 5.

Note 3: Optional Western Extensions First Year Maintenance (Year 9 of Maintenance) Total carried forward to Sheet 3 - System Cost. Not included in the total of Sheet 5.

Sheet 6
Base and Optional
Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost (if provided)
(Summary Only - No Proposer Input Required)

Item #	Description of Items	Total Monthly Cost ($)	Total Annual Cost ($)	Total Monthly Cost ($)	Total Annual Cost ($)	Total Monthly Cost ($)	Total Annual Cost ($)	
	Base Contract Maintenance Costs	**Clarks Summit**		**Optional Mainline**		**Optional Western Extensions**		
1	Year 1 of Maintenance (Warranty)	$ -	$ -					See Note #1
2	Year 2 of Maintenance	$ -	$ -					
3	Year 3 of Maintenance	$ -	$ -					
4	Year 4 of Maintenance	$ -	$ -	$ -	$ -			
5	Year 5 of Maintenance	$ -	$ -	$ -	$ -			
6	Year 6 of Maintenance	$ -	$ -	$ -	$ -			
7	Year 7 of Maintenance	$ -	$ -	$ -	$ -			
8	Year 8 of Maintenance	$ -	$ -	$ -	$ -			
9	Year 9 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
	Total Toll Concentrator/Host Maintenance and Software Support Services Base Contract Cost (Maintenance Years 2-9)		$ -		$ -		$ -	
	Optional Extension 1 Costs							
10	Extension 1 - Year 1 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
11	Extension 1 - Year 2 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
12	Extension 1 - Year 3 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
13	Extension 1 - Year 4 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
14	Extension 1 - Year 5 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
	Total Extension 1 Cost		$ -		$ -		$ -	
	Optional Extension 2 Costs							
15	Extension 2 - Year 1 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
16	Extension 2 - Year 2 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
17	Extension 2 - Year 3 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
18	Extension 2 - Year 4 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
19	Extension 2 - Year 5 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
	Total Extension 2 Cost		$ -		$ -		$ -	
Total Base and Optional Toll Concentrator/Host Maintenance and Software Support Services (excluding Warranty)			$ -		$ -		$ -	

Note 1: Year 1 of Maintenance Total carried forward to Sheet 4 - Toll Concentrator/Host Cost. Not included in the total of Sheet 6.

Sheet 7
Optional Toll Host System Replacement Implementation Cost
(Summary Only - No Proposer Input Required)

Item #	Description	Unit	Total Cost ($)
1	System Hardware, Third Party Software, Installation and Commissioning not Otherwise Covered	LS	$ -
2	Communications Equipment	LS	$ -
3	Software (GUI, Back-end), Host System, MOMS, DVAS and License	LS	$ -
4	Design Documentation	LS	$ -
5	User, Maintenance, and Project Documentation	LS	$ -
6	Training (manuals, materials and delivery)	LS	$ -
7	Factory Acceptance Test	LS	$ -
8	Installation and Commissioning Test	LS	$ -
9	System Operational and Acceptance Test	LS	$ -
10	Third Party Warranty and Licenses	LS	$ -
11	Warranty First Year of Maintenance - Toll Host System Replacement Maintenance and Software Support Services	LS	$ -
12	Spare Parts and Equipment Year 1 - Warranty Year	LS	$ -
13	Project Management	LS	$ -
14	Engineering and Design	LS	$ -
15	Transition Costs	LS	$ -
Total Toll Host/System Costs			$ -

Sheet 2-a Back-up
Optional Mainline and Western Extensions
In-lane Implementation Cost by Zone
(Summary Only) (2018 Values)

Optional In-Lane System Implementation Cost (by Zone)		Escalation % for Labor (Over Previous Year)			
		3.0%	Year 4	Year 4	Year 4
	2018 Values for Other Direct Cost	2018 Labor	Quantity	Unit Evaluation Cost including Labor	Total Evaluation Cost
Zone Type 1 (3+1+1)	$ -	$ -	10	$ -	$ -
Facility Server (if applicable)	$ -	$ -	5	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	10	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	10	$ -	$ -
Zone Type 2 (3+2+0)	$ -	$ -	14	$ -	$ -
Facility Server (if applicable)	$ -	$ -	7	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	14	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	14	$ -	$ -
Zone Type 3 (2+1+1)	$ -	$ -	2	$ -	$ -
Facility Server (if applicable)	$ -	$ -	1	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	2	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	2	$ -	$ -
Zone Type 4 (2+2+0)	$ -	$ -	12	$ -	$ -
Facility Server (if applicable)	$ -	$ -	6	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	12	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	12	$ -	$ -
Zone Type 5 (2+1+1) Space Frame with Maint Below	$ -	$ -	1	$ -	$ -
Facility Server (if applicable)	$ -	$ -	1	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	1	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	1	$ -	$ -
Zone Type 6 (3+1+1) Space Frame with Maint Below	$ -	$ -	2	$ -	$ -
Facility Server (if applicable)	$ -	$ -	2	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	2	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	2	$ -	$ -
Estimated Zones Ordered/Costs			41		$ -
Estimated Zones Ordered/Costs Volume Discount					$ -
Estimated Zones Ordered/Costs (less volume discount)					$ -
Estimated Facility Server Cost					$ -
Estimated Zones Ordered/Costs (including volume discount) and Facility Server Costs					$ -
Optional OCR/ALPR and Enforcement Notification Incremental Cost					$ -
Optional Tri-Protocol Implementation Incremental Cost					$ -
Volume Discount by Zone Quantity:					
Volume Discount for 10- 19 Zones	0.00%				
Volume Discount for 20- 29 Zones	0.00%				
Volume Discount for 30- 39 Zones	0.00%				
Volume Discount for over 40 Zones	0.00%				

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Implementation Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Sheet 2-a Back-up
Optional Mainline and Western Extensions
In-lane Implementation Cost by Zone
(Summary Only) (2018 Values)

Optional In-Lane System Implementation Cost (by Zone)		Escalation % for Labor (Over Previous Year)			
		3.0%	Year 6	Year 6	Year 6
	2018 Values for Other Direct Cost	2018 Labor	Quantity	Unit Evaluation Cost including Labor	Total Evaluation Cost
Zone Type 1 (3+1+1)	$ -	$ -			
Facility Server (if applicable)	$ -	$ -			
Optional OCR/ALPR and Enforcement Notification	$ -	$ -			
Optional Tri-Protocol Implementation	$ -	$ -			
Zone Type 2 (3+2+0)	$ -	$ -	34	$ -	$ -
Facility Server (if applicable)	$ -	$ -	17	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	34	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	34	$ -	$ -
Zone Type 3 (2+1+1)	$ -	$ -	2	$ -	$ -
Facility Server (if applicable)	$ -	$ -	1	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	2	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	2	$ -	$ -
Zone Type 4 (2+2+0)	$ -	$ -			
Facility Server (if applicable)	$ -	$ -			
Optional OCR/ALPR and Enforcement Notification	$ -	$ -			
Optional Tri-Protocol Implementation	$ -	$ -			
Zone Type 5 (2+1+1) Space Frame with Maint Below	$ -	$ -	1	$ -	$ -
Facility Server (if applicable)	$ -	$ -	1	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	1	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	1	$ -	$ -
Zone Type 6 (3+1+1) Space Frame with Maint Below	$ -	$ -			
Facility Server (if applicable)	$ -	$ -			
Optional OCR/ALPR and Enforcement Notification	$ -	$ -			
Optional Tri-Protocol Implementation	$ -	$ -			
Estimated Zones Ordered/Costs			37		$ -
Estimated Zones Ordered/Costs Volume Discount					$ -
Estimated Zones Ordered/Costs (less volume discount)					$ -
Estimated Facility Server Cost					$ -
Estimated Zones Ordered/Costs (including volume discount) and Facility Server Costs					$ -
Optional OCR/ALPR and Enforcement Notification Incremental Cost					$ -
Optional Tri-Protocol Implementation Incremental Cost					$ -
Volume Discount by Zone Quantity:					
Volume Discount for 10- 19 Zones	0.00%				
Volume Discount for 20- 29 Zones	0.00%				
Volume Discount for 30- 39 Zones	0.00%				
Volume Discount for over 40 Zones	0.00%				

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Implementation Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Sheet 2-a Back-up
Optional Mainline and Western Extensions
In-lane Implementation Cost by Zone
(Summary Only) (2018 Values)

		Escalation % for Labor (Over Previous Year)			
Optional In-Lane System Implementation Cost (by Zone)		3.0%	Year 9	Year 9	Year 9
	2018 Values for Other Direct Cost	2018 Labor	Quantity	Unit Evaluation Cost including Labor	Total Evaluation Cost
Zone Type 1 (3+1+1)	$ -	$ -			
Facility Server (if applicable)	$ -	$ -			
Optional OCR/ALPR and Enforcement Notification	$ -	$ -			
Optional Tri-Protocol Implementation	$ -	$ -			
Zone Type 2 (3+2+0)	$ -	$ -			
Facility Server (if applicable)	$ -	$ -			
Optional OCR/ALPR and Enforcement Notification	$ -	$ -			
Optional Tri-Protocol Implementation	$ -	$ -			
Zone Type 3 (2+1+1)	$ -	$ -			
Facility Server (if applicable)	$ -	$ -			
Optional OCR/ALPR and Enforcement Notification	$ -	$ -			
Optional Tri-Protocol Implementation	$ -	$ -			
Zone Type 4 (2+2+0)	$ -	$ -	2	$ -	$ -
Facility Server (if applicable)	$ -	$ -	1	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	2	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	2	$ -	$ -
Zone Type 5 (2+1+1) Space Frame with Maint Below	$ -	$ -	10	$ -	$ -
Facility Server (if applicable)	$ -	$ -	5	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	10	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	10	$ -	$ -
Zone Type 6 (3+1+1) Space Frame with Maint Below	$ -	$ -	32	$ -	$ -
Facility Server (if applicable)	$ -	$ -	16	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	32	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	32	$ -	$ -
Estimated Zones Ordered/Costs			44		$ -
Estimated Zones Ordered/Costs Volume Discount					$ -
Estimated Zones Ordered/Costs (less volume discount)					$ -
Estimated Facility Server Cost					$ -
Estimated Zones Ordered/Costs (including volume discount) and Facility Server Costs					$ -
Optional OCR/ALPR and Enforcement Notification Incremental Cost					$ -
Optional Tri-Protocol Implementation Incremental Cost					$ -
Volume Discount by Zone Quantity:					
Volume Discount for 10- 19 Zones	0.00%				
Volume Discount for 20- 29 Zones	0.00%				
Volume Discount for 30- 39 Zones	0.00%				
Volume Discount for over 40 Zones	0.00%				

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Implementation Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Sheet 2-1 Back-up
Optional In-lane System Cost Schedule - Zone 1

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
Zone Type 1 (3+1+1) Maintenance from Above					
1. Redundant Toll Zone Controller and In-lane Electronics¹					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Redundant Toll Zone Controller and In-lane Electronics¹			$ -	$ -	$ -
2. AVI System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVI System			$ -	$ -	$ -
3. AVC System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVC System			$ -	$ -	$ -
4. LPICPS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total LPICPS			$ -	$ -	$ -
5. Communications Equipment					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
6. Equipment Racks					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Equipment Racks			$ -	$ -	$ -
7. DVAS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total DVAS			$ -	$ -	$ -

Sheet 2-1 Back-up
Optional In-lane System Cost Schedule - Zone 1

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
8. Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Commissioning Test			$ -	$ -	$ -
Total			$ -	$ -	$ -
Facility Server					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server			$ -	$ -	$ -
Total with Facility Server			$ -	$ -	$ -
Labor Check (from Sheet 2-7, cell F50) should equal cell E77				$ -	
Optional OCR/ALPR and Enforcement Notification					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional OCR/ALPR and Enforcement Notification			$ -	$ -	$ -
Optional Tri-Protocol Implementation					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional Tri-Protocol Implementation			$ -	$ -	$ -

Note 1: All hardware/software provided under this Contract should be included in these costs.
Note 2: Use the additional rows as needed to itemize each components
Note 3: All roadways are current Year Cost.
Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.
Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in Section 4 of the Scope of Work
Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in Section 6 of the Scope of Work.

Sheet 2-2 Back-up
Optional In-lane System Cost Schedule - Zone 2

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
Zone Type 2 (3+2+0) Maintenance from Above					
1. Redundant Toll Zone Controller and In-lane Electronics[1]					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Redundant Toll Zone Controller and In-lane Electronics[1]			$ -	$ -	$ -
2. AVI System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVI System			$ -	$ -	$ -
3. AVC System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVC System			$ -	$ -	$ -
4. LPICPS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total LPICPS			$ -	$ -	$ -
5. Communications Equipment					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
6. Equipment Racks					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Equipment Racks			$ -	$ -	$ -
7. DVAS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total DVAS			$ -	$ -	$ -

Sheet 2-2 Back-up
Optional In-lane System Cost Schedule - Zone 2

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
8. Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Commissioning Test			$ -	$ -	$ -
Total			$ -	$ -	$ -
Facility Server					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server			$ -	$ -	$ -
Total with Facility Server			$ -	$ -	$ -
Labor Check (from Sheet 2-7, cell H50) should equal cell E77				$ -	
Optional OCR/ALPR and Enforcement Notification					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional OCR/ALPR and Enforcement Notification			$ -	$ -	$ -
Optional Tri-Protocol Implementation					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional Tri-Protocol Implementation			$ -	$ -	$ -

Note 1: All hardware/software provided under this Contract should be included in these costs.
Note 2: Use the additional rows as needed to itemize each components
Note 3: All roadways are current Year Cost.
Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.
Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in Section 4 of the Scope of Work
Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in Section 6 of the Scope of Work.

Sheet 2-3 Back-up
Optional In-lane System Cost Schedule - Zone 3

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
Zone Type 3 (2+1+1) Maintenance from Above					
1. Redundant Toll Zone Controller and In-lane Electronics[1]					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Redundant Toll Zone Controller and In-lane Electronics[1]			$ -	$ -	$ -
2. AVI System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVI System			$ -	$ -	$ -
3. AVC System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVC System			$ -	$ -	$ -
4. LPICPS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total LPICPS			$ -	$ -	$ -
5. Communications Equipment					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
6. Equipment Racks					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Equipment Racks			$ -	$ -	$ -
7. DVAS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total DVAS			$ -	$ -	$ -

Sheet 2-3 Back-up
Optional In-lane System Cost Schedule - Zone 3

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
8. Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Commissioning Test			$ -	$ -	$ -
Total			$ -	$ -	$ -
Facility Server					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server			$ -	$ -	$ -
Total with Facility Server			$ -	$ -	$ -
Labor Check (from Sheet 2-7, cell J50) should equal cell E77				$ -	
Optional OCR/ALPR and Enforcement Notification					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional OCR/ALPR and Enforcement Notification			$ -	$ -	$ -
Optional Tri-Protocol Implementation					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional Tri-Protocol Implementation			$ -	$ -	$ -

Note 1: All hardware/software provided under this Contract should be included in these costs.
Note 2: Use the additional rows as needed to itemize each components
Note 3: All roadways are current Year Cost.
Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.
Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in Section 4 of the Scope of Work
Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in Section 6 of the Scope of Work.

Sheet 2-4 Back-up
Base and Optional In-lane System Cost Schedule - Zone 4

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
Zone Type 4 (2+1+1) Maintenance from Below					
1. Redundant Toll Zone Controller and In-lane Electronics[1]					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Redundant Toll Zone Controller and In-lane Electronics[1]			$ -	$ -	$ -
2. AVI System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVI System			$ -	$ -	$ -
3. AVC System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVC System			$ -	$ -	$ -
4. LPICPS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total LPICPS			$ -	$ -	$ -
5. Communications Equipment					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
6. Equipment Racks					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Equipment Racks			$ -	$ -	$ -
7. DVAS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total DVAS			$ -	$ -	$ -

Sheet 2-4 Back-up
Base and Optional In-lane System Cost Schedule - Zone 4

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
8. Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Commissioning Test			$ -	$ -	$ -
Total			$ -	$ -	$ -
Facility Server					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server			$ -	$ -	$ -
Total with Facility Server			$ -	$ -	$ -
Labor Check (from Sheet 2-7, cell L50) should equal cell E77				$ -	
Optional OCR/ALPR and Enforcement Notification					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional OCR/ALPR and Enforcement Notification			$ -	$ -	$ -
Optional Tri-Protocol Implementation					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional Tri-Protocol Implementation			$ -	$ -	$ -

Note 1: All hardware/software provided under this Contract should be included in these costs.
Note 2: Use the additional rows as needed to itemize each components
Note 3: All roadways are current Year Cost.
Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.
Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in Section 4 of the Scope of Work
Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in Section 6 of the Scope of Work.

Sheet 2-5 Back-up
Optional In-lane System Cost Schedule - Zone 5

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
Zone Type 5 (2+1+1) Existing Mainline Maintenance from Below					
1. Redundant Toll Zone Controller and In-lane Electronics¹					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Redundant Toll Zone Controller and In-lane Electronics¹			$ -	$ -	$ -
2. AVI System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVI System			$ -	$ -	$ -
3. AVC System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVC System			$ -	$ -	$ -
4. LPICPS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total LPICPS			$ -	$ -	$ -
5. Communications Equipment					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
6. Equipment Racks					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Equipment Racks			$ -	$ -	$ -
7. DVAS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total DVAS			$ -	$ -	$ -

Sheet 2-5 Back-up
Optional In-lane System Cost Schedule - Zone 5

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
8. Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Commissioning Test			$ -	$ -	$ -
Total			$ -	$ -	$ -
Facility Server					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server			$ -	$ -	$ -
Total with Facility Server			$ -	$ -	$ -
Labor Check (from Sheet 2-7, cell N50) should equal cell E77				$ -	
Optional OCR/ALPR and Enforcement Notification					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional OCR/ALPR and Enforcement Notification			$ -	$ -	$ -
Optional Tri-Protocol Implementation					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional Tri-Protocol Implementation			$ -	$ -	$ -

Note 1: All hardware/software provided under this Contract should be included in these costs.
Note 2: Use the additional rows as needed to itemize each components
Note 3: All roadways are current Year Cost.
Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.
Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in Section 4 of the Scope of Work
Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in Section 6 of the Scope of Work.

Sheet 2-6 Back-up
Optional In-lane System Cost Schedule - Zone 6

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
Zone Type 6 (2+0+0) Existing Ramp Maintenance from Below					
1. Redundant Toll Zone Controller and In-lane Electronics[1]					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Redundant Toll Zone Controller and In-lane Electronics[1]			$ -	$ -	$ -
2. AVI System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVI System			$ -	$ -	$ -
3. AVC System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVC System			$ -	$ -	$ -
4. LPICPS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total LPICPS			$ -	$ -	$ -
5. Communications Equipment					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
6. Equipment Racks					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Equipment Racks			$ -	$ -	$ -
7. DVAS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total DVAS			$ -	$ -	$ -

Sheet 2-6 Back-up
Optional In-lane System Cost Schedule - Zone 6

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
8. Commissioning Test					
	0	$ -	$ -		$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Commissioning Test			$ -	$ -	$ -
Total			$ -	$ -	$ -
Facility Server					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server			$ -	$ -	$ -
Total with Facility Server			$ -	$ -	$ -
Labor Check (from Sheet 2-7, cell P50) should equal cell E77				$ -	
Optional OCR/ALPR and Enforcement Notification					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional OCR/ALPR and Enforcement Notification			$ -	$ -	$ -
Optional Tri-Protocol Implementation					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional Tri-Protocol Implementation			$ -	$ -	$ -

Note 1: All hardware/software provided under this Contract should be included in these costs.
Note 2: Use the additional rows as needed to itemize each components
Note 3: All roadways are current Year Cost.
Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.
Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in Section 4 of the Scope of Work
Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in Section 6 of the Scope of Work.

Sheet 2-7 Back-up
Base and Optional In-lane System Pricing by Zone Type
Staff and Position Classifications with Rates

Item #	STAFF NAMES FOR CLARKS SUMMIT	POSITION/CLASSIFICATION	LOADED HOURLY BILLING RATES BY TASK			LOADED HOURLY BILLING RATES BY TASK		
			Zone Type 1 (3+1+1) Maint From Above			Zone Type 2 (3+2+0) Maint From Above		
			2018 Values			2018 Values		
			Loaded Labor Rate	Hours	Total Labor Cost	Loaded Labor Rate	Hours	Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
	Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page

Sheet 2-7 Back-up
Base and Optional In-lane System Pricing by Zone Type
Staff and Position Classifications with Rates

Item #	STAFF NAMES FOR CLARKS SUMMIT	POSITION/CLASSIFICATION	LOADED HOURLY BILLING RATES BY TASK			LOADED HOURLY BILLING RATES BY TASK		
			Zone Type 3 (2+1+1) Maint From Above			Zone Type 4 (2+1+1) Maint From Below		
			2018 Values			2018 Values		
			Loaded Labor Rate	Hours	Total Labor Cost	Loaded Labor Rate	Hours	Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
	Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page

Sheet 2-7 Back-up
Base and Optional In-lane System Pricing by Zone Type
Staff and Position Classifications with Rates

Item #	STAFF NAMES FOR CLARKS SUMMIT	POSITION/CLASSIFICATION	LOADED HOURLY BILLING RATES BY TASK			LOADED HOURLY BILLING RATES BY TASK		
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below			Zone Type 6 (2+0+0) Existing Ramp Maint From Below		
			2018 Values			2018 Values		
			Loaded Labor Rate	Hours	Total Labor Cost	Loaded Labor Rate	Hours	Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
	Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Clarks Summit				
1 Zone Controller Software Costs (not otherwise covered)					
Host Servers - equipment, purchase, install, configure and test	0	$ -	$ -	$ -	$ -
Storage Works	0	$ -	$ -	$ -	$ -
Back-up Library	0	$ -	$ -	$ -	$ -
Other Third-party Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Zone Controller Software Costs			$ -	$ -	$ -
2 Design Documentation					
Switches	0	$ -	$ -	$ -	$ -
LAN HW	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Design Documentation			$ -	$ -	$ -
3 User, Maintenance, and Project Documentation					
Zone Controller Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total User, Maintenance, and Project Documentation			$ -	$ -	$ -
4 Training (manuals, materials and delivery)					
Host Software	0	$ -	$ -	$ -	$ -
MOMS	0	$ -	$ -	$ -	$ -
DVAS	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Training			$ -	$ -	$ -
5 Factory Acceptance Test					
Lane Drawings	0	$ -	$ -	$ -	$ -
SDDD	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Factory Acceptance Test			$ -	$ -	$ -
6 On-Site First Installation Test					
Documents/Manuals	0	$ -	$ -	$ -	$ -
Maintenance Manual	0	$ -	$ -	$ -	$ -
Installation Manual	0	$ -	$ -	$ -	$ -
Project Plans	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total On-Site First Installation Test			$ -	$ -	$ -

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Clarks Summit				
7 Installation and Commissioning Test					
Maintenance Training	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Installation and Commissioning Test			$ -	$ -	$ -
8 System Operational and Acceptance Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Operational and Acceptance Test			$ -	$ -	$ -
9 Third Party Warranty and Licenses					
DB Licenses	0	$ -	$ -	$ -	$ -
OS Licenses	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Third Party Warranty and Licenses			$ -	$ -	$ -
10 Warranty (Year 1 of Maintenance) - In-lane System Hardware Maintenance and Software Support Services					
Year 1 Maintenance (Warranty) (from Sheet 5)			$ -		$ -
Total Warranty (Year 1 of Maintenance) - In-Lane System Hardware Maintenance and Software Support Services			$ -		$ -
11 Warranty - In-Lane System Spare Parts and Equipment - Year 1					
Year 1 In-Lane Spare Parts and Equipment Cost (Warranty) (from Sheet 3-2)			$ -		$ -
Total Warranty - In-lane Spare Parts and Equipment - Year 1			$ -		$ -
12 Insurance and Bonding					
Insurance and Bonding	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Insurance and Bonding			$ -	$ -	$ -

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Clarks Summit				
13 Project Management					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Project Management			$ -	$ -	$ -
14 Engineering and Design					
Lane Installation Design Drawings	0	$ -	$ -	$ -	$ -
As-Built Drawings	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Engineering and Design			$ -	$ -	$ -
15 Transition Costs					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Transition Costs			$ -	$ -	$ -
Total System Costs			$ -	$ -	$ -
Labor Check (from Sheet 3-3, row 50) should equal row 140				$ -	

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Mainline				
1 Zone Controller Software Costs (not otherwise covered)					
Host Servers - equipment, purchase, install, configure and test	0	$ -	$ -	$ -	$ -
Storage Works	0	$ -	$ -	$ -	$ -
Back-up Library	0	$ -	$ -	$ -	$ -
Other Third-party Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Zone Controller Software Costs			$ -	$ -	$ -
2 Design Documentation					
Switches					
LAN HW					
Total Design Documentation					
3 User, Maintenance, and Project Documentation					
Zone Controller Software					
Total User, Maintenance, and Project Documentation					
4 Training (manuals, materials and delivery)					
Host Software					
MOMS					
DVAS					
Total Training					
5 Factory Acceptance Test					
Lane Drawings					
SDDD					
Total Factory Acceptance Test					
6 On-Site First Installation Test					
Documents/Manuals					
Maintenance Manual					
Installation Manual					
Project Plans					
Total On-Site First Installation Test					

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Mainline				
7 Installation and Commissioning Test					
Maintenance Training	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Installation and Commissioning Test			$ -	$ -	$ -
8 System Operational and Acceptance Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Operational and Acceptance Test			$ -	$ -	$ -
9 Third Party Warranty and Licenses					
DB Licenses	0	$ -	$ -	$ -	$ -
OS Licenses	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Third Party Warranty and Licenses			$ -	$ -	$ -
10 Warranty (Year 1 of Maintenance) - In-lane System Hardware Maintenance and Software Support Services					
Year 1 Maintenance (Warranty) (from Sheet 5)			$ -		$ -
Total Warranty (Year 1 of Maintenance) - In-Lane System Hardware Maintenance and Software Support Services			$ -		$ -
11 Warranty - In-Lane System Spare Parts and Equipment - Year 1					
Year 1 In-Lane Spare Parts and Equipment Cost (Warranty) (from Sheet 3-2)			$ -		$ -
Total Warranty - In-lane Spare Parts and Equipment - Year 1			$ -		$ -
12 Insurance and Bonding					
Insurance and Bonding	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Insurance and Bonding			$ -	$ -	$ -

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Mainline				
13 Project Management					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Project Management			$ -	$ -	$ -
14 Engineering and Design					
Lane Installation Design Drawings	0	$ -	$ -	$ -	$ -
As-Built Drawings	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Engineering and Design			$ -	$ -	$ -
15 Transition Costs					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Transition Costs			$ -	$ -	$ -
Total System Costs			$ -	$ -	$ -
Labor Check (from Sheet 3-3, row 50) should equal row 140				$ -	

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Western Extensions				
1 Zone Controller Software Costs (not otherwise covered)					
Host Servers - equipment, purchase, install, configure and test	0	$ -	$ -	$ -	$ -
Storage Works	0	$ -	$ -	$ -	$ -
Back-up Library	0	$ -	$ -	$ -	$ -
Other Third-party Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Zone Controller Software Costs			$ -	$ -	$ -
2 Design Documentation					
Switches					
LAN HW					
Total Design Documentation					
3 User, Maintenance, and Project Documentation					
Zone Controller Software					
Total User, Maintenance, and Project Documentation					
4 Training (manuals, materials and delivery)					
Host Software					
MOMS					
DVAS					
Total Training					
5 Factory Acceptance Test					
Lane Drawings					
SDDD					
Total Factory Acceptance Test					
6 On-Site First Installation Test					
Documents/Manuals					
Maintenance Manual					
Installation Manual					
Project Plans					
Total On-Site First Installation Test					

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Western Extensions				
7 Installation and Commissioning Test					
Maintenance Training	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Installation and Commissioning Test			$ -	$ -	$ -
8 System Operational and Acceptance Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Operational and Acceptance Test			$ -	$ -	$ -
9 Third Party Warranty and Licenses					
DB Licenses	0	$ -	$ -	$ -	$ -
OS Licenses	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Third Party Warranty and Licenses			$ -	$ -	$ -
10 Warranty (Year 1 of Maintenance) - In-lane System Hardware Maintenance and Software Support Services					
Year 1 Maintenance (Warranty) (from Sheet 5)			$ -		$ -
Total Warranty (Year 1 of Maintenance) - In-Lane System Hardware Maintenance and Software Support Services			$ -		$ -
11 Warranty - In-Lane System Spare Parts and Equipment - Year 1					
Year 1 In-Lane Spare Parts and Equipment Cost (Warranty) (from Sheet 3-2)			$ -		$ -
Total Warranty - In-lane Spare Parts and Equipment - Year 1			$ -		$ -
12 Insurance and Bonding					
Insurance and Bonding	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Insurance and Bonding			$ -	$ -	$ -

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Western Extensions				
13 Project Management					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Project Management			$ -	$ -	$ -
14 Engineering and Design					
Lane Installation Design Drawings	0	$ -	$ -	$ -	$ -
As-Built Drawings	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Engineering and Design			$ -	$ -	$ -
15 Transition Costs					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Transition Costs			$ -	$ -	$ -
Total System Costs			$ -	$ -	$ -
Labor Check (from Sheet 3-3, row 50) should equal row 140				$ -	

Sheet 3-2 Back-up
Base and Optional In-lane System Spare Parts and Equipment Cost Year 1

SPARE PARTS DESCRIPTION	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)
	Clarks Summit Year 1 - Warranty Year			**Optional Mainline Year 1 - Warranty Year**			**Optional Western Extensions Year 1 - Warranty Year**		
1. Redundant Toll Zone Controller and In-lane Electronics[1]									
Servers	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Hard Drive	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Serial Controllers	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Power Supply	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Cables and Connectors	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total Redundant Toll Zone Controller and In-lane Electronics[1]			$ -			$ -			$ -
2. AVI System									
AVI Reader Modules	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
AVI Antennas	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Cables and Connectors	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total AVI System			$ -			$ -			$ -
3. AVC System									
Primary AVDC Sensor	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
AVDC Detector Cards	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Cables and Connectors	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total AVC System			$ -			$ -			$ -
4. LPICPS									
Front Cameras	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Rear Cameras	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Illuminators	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Servers	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Hard Drive	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Cables and Connectors	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total LPICPS			$ -			$ -			$ -

Sheet 3-2 Back-up
Base and Optional In-lane System Spare Parts and Equipment Cost Year 1

SPARE PARTS DESCRIPTION	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)
	Clarks Summit Year 1 - Warranty Year			**Optional Mainline Year 1 - Warranty Year**			**Optional Western Extensions Year 1 - Warranty Year**		
5. Communications Equipment									
Switches	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Power Supply	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Router	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total Communications Equipment			$ -			$ -			$ -
6. Equipment Racks									
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total Equipment Racks			$ -			$ -			$ -
7. DVAS									
Cameras	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Servers	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Hard Drive	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total DVAS			$ -			$ -			$ -
Warranty Year - System Spare Parts and Equipment Costs Year 1			$ -			$ -			$ -

Sheet 3-3 Back-up
Base and Optional System Cost - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	LOADED HOURLY BILLING RATES BY TASK			LOADED HOURLY BILLING RATES BY TASK			LOADED HOURLY BILLING RATES BY TASK		
			Clarks Summit			**Optional Mainline**			**Optional Western Extensions**		
			Rate	Hours	Total System Labor Cost	Rate	Hours	Total System Labor Cost	Rate	Hours	Total System Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
	Total Labor Cost				$ -			$ -			$ -

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 4-1 Back-up
Base and Optional Toll Concentrator/Host Cost Schedule (if provided)

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Clarks Summit				
1 System Hardware, Third Party Software, Installation and Commissioning not Otherwise Covered					
Host Servers - equipment, purchase, install, configure and test	0	$ -	$ -	$ -	$ -
Storage Works	0	$ -	$ -	$ -	$ -
Back-up Library	0	$ -	$ -	$ -	$ -
Other Third-party Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Hardware, Third Party SW and Installation not Otherwise Covered			$ -	$ -	$ -
2 Communications Equipment					
Switches	0	$ -	$ -	$ -	$ -
LAN HW	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
3 Software (GUI, Back-end), Host System, MOMS, DVAS and License					
Host Software	0	$ -	$ -	$ -	$ -
MOMS	0	$ -	$ -	$ -	$ -
DVAS	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Software (GUI, Back-end), Host System, MOMS, DVAS and License			$ -	$ -	$ -
4 Design Documentation					
Lane Drawings	0	$ -	$ -	$ -	$ -
SDDD	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Design Documentation			$ -	$ -	$ -
5 User, Maintenance, and Project Documentation					
Documents/Manuals	0	$ -	$ -	$ -	$ -
Maintenance Manual	0	$ -	$ -	$ -	$ -
Installation Manual	0	$ -	$ -	$ -	$ -
Project Plans	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total User, Maintenance and Project Documentation			$ -	$ -	$ -
6 Training (manuals, materials and delivery)					
Maintenance Training	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Training			$ -	$ -	$ -

Sheet 4-1 Back-up
Base and Optional Toll Concentrator/Host Cost Schedule (if provided)

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Clarks Summit				
7 Third Party Warranty and Licenses					
DB Licenses	0	$ -	$ -	$ -	$ -
OS Licenses	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Third Party Warranty and Licenses			$ -	$ -	$ -
8 Warranty (Year 1 of Maintenance) - Incremental Toll Concentrator/Host Maintenance and Software Support Services					
Year 1 Warranty (from Sheet 6)			$ -		$ -
Total Warranty First Year of Operation - Incremental Toll Concentrator/Host Maintenance and Software Support Services - Clarks Summit			$ -		$ -
9 Warranty - Toll Concentrator/Host Spare Parts and Equipment - Year 1					
Year 1 Warranty (From Sheet 4-2) Toll Concentrator/Host Spare Parts and Equipment			$ -		$ -
Total Warranty Year - Toll Concentrator/Host Spare Parts and Equipment Year 1			$ -		$ -
Total Toll Concentrator/Host Costs			$ -	$ -	$ -
Labor Check (from Sheet 4-3, row 50) should equal row 80				$ -	

Sheet 4-1 Back-up
Base and Optional Toll Concentrator/Host Cost Schedule (if provided)

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Mainline				
1 System Hardware, Third Party Software, Installation and Commissioning not Otherwise Covered					
Host Servers - equipment, purchase, install, configure and test	0	$ -	$ -	$ -	$ -
Storage Works	0	$ -	$ -	$ -	$ -
Back-up Library	0	$ -	$ -	$ -	$ -
Other Third-party Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Hardware, Third Party SW and Installation not Otherwise Covered			$ -	$ -	$ -
2 Communications Equipment					
Switches	0	$ -	$ -	$ -	$ -
LAN HW	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
3 Software (GUI, Back-end), Host System, MOMS, DVAS and License					
Host Software	0	$ -	$ -	$ -	$ -
MOMS	0	$ -	$ -	$ -	$ -
DVAS	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Software (GUI, Back-end), Host System, MOMS, DVAS and License			$ -	$ -	$ -
4 Design Documentation					
Lane Drawings					
SDDD					
Total Design Documentation					
5 User, Maintenance, and Project Documentation					
Documents/Manuals					
Maintenance Manual					
Installation Manual					
Project Plans					
Total User, Maintenance and Project Documentation					
6 Training (manuals, materials and delivery)					
Maintenance Training					
Total Training					

Sheet 4-1 Back-up
Base and Optional Toll Concentrator/Host Cost Schedule (if provided)

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Mainline				
7 Third Party Warranty and Licenses					
DB Licenses					
OS Licenses					
Total Third Party Warranty and Licenses					
8 Warranty (Year 1 of Maintenance) - Incremental Toll Concentrator/Host Maintenance and Software Support Services					
Year 1 Warranty (from Sheet 6)					
Total Warranty First Year of Operation - Incremental Toll Concentrator/Host Maintenance and Software Support Services - Clarks Summit					
9 Warranty - Toll Concentrator/Host Spare Parts and Equipment - Year 1					
Year 1 Warranty (From Sheet 4-2) Toll Concentrator/Host Spare Parts and Equipment			$ -		$ -
Total Warranty Year - Toll Concentrator/Host Spare Parts and Equipment Year 1			$ -		$ -
Total Toll Concentrator/Host Costs			$ -	$ -	$ -
Labor Check (from Sheet 4-3, row 50) should equal row 80				$ -	

Sheet 4-1 Back-up
Base and Optional Toll Concentrator/Host Cost Schedule (if provided)

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Western Extensions				
1 System Hardware, Third Party Software, Installation and Commissioning not Otherwise Covered					
Host Servers - equipment, purchase, install, configure and test	0	$ -	$ -	$ -	$ -
Storage Works	0	$ -	$ -	$ -	$ -
Back-up Library	0	$ -	$ -	$ -	$ -
Other Third-party Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Hardware, Third Party SW and Installation not Otherwise Covered			$ -	$ -	$ -
2 Communications Equipment					
Switches	0	$ -	$ -	$ -	$ -
LAN HW	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
3 Software (GUI, Back-end), Host System, MOMS, DVAS and License					
Host Software	0	$ -	$ -	$ -	$ -
MOMS	0	$ -	$ -	$ -	$ -
DVAS	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Software (GUI, Back-end), Host System, MOMS, DVAS and License			$ -	$ -	$ -
4 Design Documentation					
Lane Drawings					
SDDD					
Total Design Documentation					
5 User, Maintenance, and Project Documentation					
Documents/Manuals					
Maintenance Manual					
Installation Manual					
Project Plans					
Total User, Maintenance and Project Documentation					
6 Training (manuals, materials and delivery)					
Maintenance Training					
Total Training					

Sheet 4-1 Back-up
Base and Optional Toll Concentrator/Host Cost Schedule (if provided)

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Western Extensions				
7 Third Party Warranty and Licenses					
DB Licenses					
OS Licenses					
Total Third Party Warranty and Licenses					
8 Warranty (Year 1 of Maintenance) - Incremental Toll Concentrator/Host Maintenance and Software Support Services					
Year 1 Warranty (from Sheet 6)					
Total Warranty First Year of Operation - Incremental Toll Concentrator/Host Maintenance and Software Support Services - Clarks Summit					
9 Warranty - Toll Concentrator/Host Spare Parts and Equipment - Year 1					
Year 1 Warranty (From Sheet 4-2) Toll Concentrator/Host Spare Parts and Equipment			$ -		$ -
Total Warranty Year - Toll Concentrator/Host Spare Parts and Equipment Year 1			$ -		$ -
Total Toll Concentrator/Host Costs			$ -	$ -	$ -
Labor Check (from Sheet 4-3, row 50) should equal row 80				$ -	

Sheet 4-2 Back-up
Base and Optional Toll Concentrator/Host Spare Parts and Equipment Cost Year 1 (if provided)

SPARE PARTS DESCRIPTION	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)
	Clarks Summit Year 1 - Warranty Year			**Optional Mainline Year 1 - Warranty Year**			**Optional Western Extensions Year 1 - Warranty Year**		
1. System Hardware									
Servers	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Hard Drive	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Miscellaneous	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total System Hardware			$ -			$ -			$ -
2. Communications Equipment									
LAN Equipment	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Power Supply	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total Communications Equipment			$ -			$ -			$ -
Total Warranty Year - Toll Concentrator/Host Spare Parts and Equipment Costs Year 1			$ -			$ -			$ -

Sheet 4-3 Back-up
Base and Optional Toll Concentrator/Host Cost
Staff and Position Classifications with Rates (if provided)

Item #	STAFF NAMES	POSITION/CLASSIFICATION	LOADED HOURLY BILLING RATES BY TASK			LOADED HOURLY BILLING RATES BY TASK			LOADED HOURLY BILLING RATES BY TASK		
			Clarks Summit			**Optional Mainline**			**Optional Western Extensions**		
			Rate	Hours	Total System Labor Cost	Rate	Hours	Total System Labor Cost	Rate	Hours	Total System Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
	Total Labor Cost				$ -			$ -			$ -

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-1 Back-up
Base and Optional In-lane System Hardware Maintenance and Software Support Services Cost Schedule
(Summary Only - No Proposer Input Required)

DESCRIPTION OF ITEMS	Total Monthly Cost ($) Per Toll Zone	# of Toll Zones	Number of Months	Annual Cost ($)
	Clarks Summit			
Total Year 1 In-Lane System Hardware Maintenance and Software Support Services (Warranty)	$ -	2	12	$ -
Total Year 2 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Year 3 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Year 6 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Year 7 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Year 8 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Year 9 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Optional Extension 1 Costs				
Total Extension 1 Year 1 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 1 Year 2 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 1 Year 3 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 1 Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 1 Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Optional Extension 2 Costs				
Total Extension 2 Year 1 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 2 Year 2 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 2 Year 3 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 2 Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 2 Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -

Sheet 5-1 Back-up
Base and Optional In-lane System Hardware Maintenance and Software Support Services Cost Schedule
(Summary Only - No Proposer Input Required)

DESCRIPTION OF ITEMS	Total Monthly Cost ($) Per Toll Zone	# of Toll Zones	Number of Months	Annual Cost ($)
	Optional Mainline			
Total Year 1 In-Lane System Hardware Maintenance and Software Support Services (Warranty)				
Total Year 2 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 3 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	41	12	$ -
Total Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	41	12	$ -
Total Year 6 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Year 7 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Year 8 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Year 9 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Optional Extension 1 Costs				
Total Extension 1 Year 1 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 1 Year 2 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 1 Year 3 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 1 Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 1 Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Optional Extension 2 Costs				
Total Extension 2 Year 1 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 2 Year 2 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 2 Year 3 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 2 Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 2 Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -

Sheet 5-1 Back-up
Base and Optional In-lane System Hardware Maintenance and Software Support Services Cost Schedule
(Summary Only - No Proposer Input Required)

DESCRIPTION OF ITEMS	Total Monthly Cost ($) Per Toll Zone	# of Toll Zones	Number of Months	Annual Cost ($)
	Optional Western Extensions			
Total Year 1 In-Lane System Hardware Maintenance and Software Support Services (Warranty)				
Total Year 2 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 3 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 4 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 5 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 6 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 7 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 8 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 9 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Optional Extension 1 Costs				
Total Extension 1 Year 1 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 1 Year 2 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 1 Year 3 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 1 Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 1 Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Optional Extension 2 Costs				
Total Extension 2 Year 1 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 2 Year 2 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 2 Year 3 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 2 Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 2 Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -

Sheet 5-2 Back-up
Base and Optional In-lane System Hardware Maintenance and Software Support Services
Labor and Other Direct Cost Items by Month

DESCRIPTION OF ITEMS	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE
	Clarks Summit	**Optional Mainline**	**Optional Western Extensions**
Year 1 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -		
MPT	$ -		
Material, Tools and Occupancy	$ -		
Other	$ -		
Maintenance Payment of Performance Bond (X%)	$ -		
Total Monthly Year 1	$ -		
Year 2 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -		
MPT	$ -		
Material, Tools and Occupancy	$ -		
Other	$ -		
Maintenance Payment of Performance Bond (X%)	$ -		
Total Monthly Year 2	$ -		
Year 3 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -		
MPT	$ -		
Material, Tools and Occupancy	$ -		
Other	$ -		
Maintenance Payment of Performance Bond (X%)	$ -		
Total Monthly Year 3	$ -		
Year 4 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	
MPT	$ -	$ -	
Material, Tools and Occupancy	$ -	$ -	
Other	$ -	$ -	
Maintenance Payment of Performance Bond (X%)	$ -	$ -	
Total Monthly Year 4	$ -	$ -	
Year 5 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	
MPT	$ -	$ -	
Material, Tools and Occupancy	$ -	$ -	
Other	$ -	$ -	
Maintenance Payment of Performance Bond (X%)	$ -	$ -	
Total Monthly Year 5	$ -	$ -	

Sheet 5-2 Back-up
Base and Optional In-lane System Hardware Maintenance and Software Support Services
Labor and Other Direct Cost Items by Month

DESCRIPTION OF ITEMS	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE
	Clarks Summit	**Optional Mainline**	**Optional Western Extensions**
Year 6 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	
MPT	$ -	$ -	
Material, Tools and Occupancy	$ -	$ -	
Other	$ -	$ -	
Maintenance Payment of Performance Bond (X%)	$ -	$ -	
Total Monthly Year 6	$ -	$ -	
Year 7 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	
MPT	$ -	$ -	
Material, Tools and Occupancy	$ -	$ -	
Other	$ -	$ -	
Maintenance Payment of Performance Bond (X%)	$ -	$ -	
Total Monthly Year 7	$ -	$ -	
Year 8 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	
MPT	$ -	$ -	
Material, Tools and Occupancy	$ -	$ -	
Other	$ -	$ -	
Maintenance Payment of Performance Bond (X%)	$ -	$ -	
Total Monthly Year 8	$ -	$ -	
Year 9 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Year 9	$ -	$ -	$ -

Sheet 5-2 Back-up
Base and Optional In-lane System Hardware Maintenance and Software Support Services
Labor and Other Direct Cost Items by Month

DESCRIPTION OF ITEMS	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE
	Clarks Summit	**Optional Mainline**	**Optional Western Extensions**
Optional Extension 1 Costs			
Extension 1 Year 1 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 1 Year 1	$ -	$ -	$ -
Extension 1 Year 2 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 1 Year 2	$ -	$ -	$ -
Extension 1 Year 3 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 1 Year 3	$ -	$ -	$ -
Extension 1 Year 4 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 1 Year 4	$ -	$ -	$ -
Extension 1 Year 5 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 1 Year 5	$ -	$ -	$ -

Sheet 5-2 Back-up
Base and Optional In-lane System Hardware Maintenance and Software Support Services
Labor and Other Direct Cost Items by Month

DESCRIPTION OF ITEMS	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE
	Clarks Summit	**Optional Mainline**	**Optional Western Extensions**
Optional Extension 2 Costs			
Extension 2 Year 1 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 2 Year 1	$ -	$ -	$ -
Extension 2 Year 2 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 2 Year 2	$ -	$ -	$ -
Extension 2 Year 3 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 2 Year 3	$ -	$ -	$ -
Extension 2 Year 4 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 2 Year 4	$ -	$ -	$ -
Extension 2 Year 5 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 2 Year 5	$ -	$ -	$ -

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION		Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
				LOADED HOURLY BILLING RATES Year 1 of Maintenance			LOADED HOURLY BILLING RATES Year 2 of Maintenance		
Clarks Summit			2018 Loaded Labor Rate	Year 1 Rate	Year 1 Hours	Year 1 Total Labor Cost	Year 2 Rate	Year 2 Hours	Year 2 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost					$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 3 of Maintenance			LOADED HOURLY BILLING RATES Year 4 of Maintenance		
Clarks Summit			Year 3 Rate	Year 3 Hours	Year 3 Total Labor Cost	Year 4 Rate	Year 4 Hours	Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -
	% increase/decrease from previous year							

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 5 of Maintenance			LOADED HOURLY BILLING RATES Year 6 of Maintenance		
Clarks Summit			Year 5 Rate	Year 5 Hours	Year 5 Total Labor Cost	Year 6 Rate	Year 6 Hours	Year 6 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 7 of Maintenance			LOADED HOURLY BILLING RATES Year 8 of Maintenance		
Clarks Summit			Year 7 Rate	Year 7 Hours	Year 7 Total Labor Cost	Year 8 Rate	Year 8 Hours	Year 8 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 1

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 9 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance		
Clarks Summit			Year 9 Rate	Year 9 Hours	Year 9 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 1			Optional Extension 1		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance		
Clarks Summit			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 1			Optional Extension 1		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Clarks Summit			Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost	Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 2			Optional Extension 2		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance		
Clarks Summit			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost	Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year	

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 2			Optional Extension 2		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance		
Clarks Summit			Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost	Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Clarks Summit			Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -
7		Installation Manager	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -
10		CADD Technician	$ -	0	$ -
11		Database Analyst	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -
15		Installation Technician	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -
20		Network Administrator	$ -	0	$ -
21		Network Engineer	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -
23		Software Architect	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -
26		Software Lead	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -
30		System Administrator	$ -	0	$ -
31		System Analyst	$ -	0	$ -
32		Technical Writer	$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION		Escalation % (Over Previous Year)		3.0%
				LOADED HOURLY BILLING RATES Year 4 of Maintenance		
Optional Mainline			2018 Loaded Labor Rate	Year 4 Rate	Year 4 Hours	Year 4 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	$ -	0	$ -
7		Installation Manager	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	$ -	0	$ -
10		CADD Technician	$ -	$ -	0	$ -
11		Database Analyst	$ -	$ -	0	$ -
12		Electrician Helper	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	$ -	0	$ -
15		Installation Technician	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	$ -	0	$ -
20		Network Administrator	$ -	$ -	0	$ -
21		Network Engineer	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	$ -	0	$ -
23		Software Architect	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	$ -	0	$ -
25		Software Development Manager	$ -	$ -	0	$ -
26		Software Lead	$ -	$ -	0	$ -
27		Software Programmer I	$ -	$ -	0	$ -
28		Software Programmer II	$ -	$ -	0	$ -
29		Software Programmer III	$ -	$ -	0	$ -
30		System Administrator	$ -	$ -	0	$ -
31		System Analyst	$ -	$ -	0	$ -
32		Technical Writer	$ -	$ -	0	$ -
33			$ -	$ -	0	$ -
34			$ -	$ -	0	$ -
35			$ -	$ -	0	$ -
36			$ -	$ -	0	$ -
37			$ -	$ -	0	$ -
38			$ -	$ -	0	$ -
39			$ -	$ -	0	$ -
40			$ -	$ -	0	$ -
41			$ -	$ -	0	$ -
42			$ -	$ -	0	$ -
43			$ -	$ -	0	$ -
44			$ -	$ -	0	$ -
45			$ -	$ -	0	$ -
	Grand Total Labor Cost					$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 5 of Maintenance			LOADED HOURLY BILLING RATES Year 6 of Maintenance		
Optional Mainline			Year 5 Rate	Year 5 Hours	Year 5 Total Labor Cost	Year 6 Rate	Year 6 Hours	Year 6 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 7 of Maintenance			LOADED HOURLY BILLING RATES Year 8 of Maintenance		
Optional Mainline			Year 7 Rate	Year 7 Hours	Year 7 Total Labor Cost	Year 8 Rate	Year 8 Hours	Year 8 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -
	% increase/decrease from previous year							

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 1

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 9 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance		
Optional Mainline			Year 9 Rate	Year 9 Hours	Year 9 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -
	% increase/decrease from previous year							

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional <u>Mainline</u> In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance		
Optional Mainline			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 1			Optional Extension 1		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Mainline			Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost	Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 2			Optional Extension 2		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance		
Optional Mainline			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost	Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 2			Optional Extension 2		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance		
Optional Mainline			Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost	Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -
	% increase/decrease from previous year							

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Mainline			Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -
7		Installation Manager	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -
10		CADD Technician	$ -	0	$ -
11		Database Analyst	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -
15		Installation Technician	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -
20		Network Administrator	$ -	0	$ -
21		Network Engineer	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -
23		Software Architect	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -
26		Software Lead	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -
30		System Administrator	$ -	0	$ -
31		System Analyst	$ -	0	$ -
32		Technical Writer	$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-5 Back-up
Optional Western Extensions In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 1

Item #	STAFF NAMES	POSITION/CLASSIFICATION		Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
				LOADED HOURLY BILLING RATES Year 9 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance		
Optional Western Extensions			2018 Loaded Labor Rate	Year 9 Rate	Year 9 Hours	Year 9 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost					$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-5 Back-up
Optional Western Extensions In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance		
Optional Western Extensions			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-5 Back-up
Optional <u>Western Extensions</u> In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 1 | Optional Extension 1

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Western Extensions			Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost	Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-5 Back-up
Optional Western Extensions In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)	3.0%	
			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance		
Optional Western Extensions			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -
7		Installation Manager	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -
10		CADD Technician	$ -	0	$ -
11		Database Analyst	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -
15		Installation Technician	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -
20		Network Administrator	$ -	0	$ -
21		Network Engineer	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -
23		Software Architect	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -
26		Software Lead	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -
30		System Administrator	$ -	0	$ -
31		System Analyst	$ -	0	$ -
32		Technical Writer	$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-5 Back-up
Optional <u>Western Extensions</u> In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 2			Optional Extension 2		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance		
Optional Western Extensions			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -
	% increase/decrease from previous year							

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-5 Back-up

Optional Western Extensions In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 2			Optional Extension 2		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Western Extensions			Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost	Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-1 Back-up
Base and Optional Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost Schedule
Labor and Other Direct Cost Items by Month (if provided)

DESCRIPTION OF ITEMS	TOTAL MONTHLY COST	TOTAL MONTHLY COST	TOTAL MONTHLY COST
	Clarks Summit	**Optional Mainline**	**Optional Western Extensions**
Year 1 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -		
Upgrades	$ -		
Materials	$ -		
Equipment	$ -		
	$ -		
	$ -		
Total Year 1 Monthly Toll Host/System Maintenance and Software Support Services	$ -		
Year 2 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -		
Upgrades	$ -		
Materials	$ -		
Equipment	$ -		
	$ -		
	$ -		
Total Year 2 Monthly Toll Host/System Maintenance and Software Support Services	$ -		
Year 3 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -		
Upgrades	$ -		
Materials	$ -		
Equipment	$ -		
	$ -		
	$ -		
Total Year 3 Monthly Toll Host/System Maintenance and Software Support Services	$ -		
Year 4 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	
Upgrades	$ -	$ -	
Materials	$ -	$ -	
Equipment	$ -	$ -	
	$ -	$ -	
	$ -	$ -	
Total Year 4 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	
Year 5 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	
Upgrades	$ -	$ -	
Materials	$ -	$ -	
Equipment	$ -	$ -	
	$ -	$ -	
	$ -	$ -	
Total Year 5 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	

Sheet 6-1 Back-up
Base and Optional Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost Schedule
Labor and Other Direct Cost Items by Month (if provided)

DESCRIPTION OF ITEMS	TOTAL MONTHLY COST	TOTAL MONTHLY COST	TOTAL MONTHLY COST
	Clarks Summit	**Optional Mainline**	**Optional Western Extensions**
Year 6 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	
Upgrades	$ -	$ -	
Materials	$ -	$ -	
Equipment	$ -	$ -	
	$ -	$ -	
	$ -	$ -	
Total Year 6 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	
Year 7 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	
Upgrades	$ -	$ -	
Materials	$ -	$ -	
Equipment	$ -	$ -	
	$ -	$ -	
	$ -	$ -	
Total Year 7 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	
Year 8 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	
Upgrades	$ -	$ -	
Materials	$ -	$ -	
Equipment	$ -	$ -	
	$ -	$ -	
	$ -	$ -	
Total Year 8 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	
Year 9 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Year 9 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -

Sheet 6-1 Back-up
Base and Optional Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost Schedule
Labor and Other Direct Cost Items by Month (if provided)

DESCRIPTION OF ITEMS	TOTAL MONTHLY COST	TOTAL MONTHLY COST	TOTAL MONTHLY COST
	Clarks Summit	**Optional Mainline**	**Optional Western Extensions**
Optional Extension Costs			
Extension 1 Costs			
Extension 1 Year 1 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 1 Year 1 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 1 Year 2 Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 1 Year 2 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 1 Year 3 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 1 Year 3 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 1 Year 4 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 1 Year 4 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 1 Year 5 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 1 Year 5 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -

Sheet 6-1 Back-up
Base and Optional Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost Schedule
Labor and Other Direct Cost Items by Month (if provided)

DESCRIPTION OF ITEMS	TOTAL MONTHLY COST	TOTAL MONTHLY COST	TOTAL MONTHLY COST
	Clarks Summit	**Optional Mainline**	**Optional Western Extensions**
Extension 2 Costs			
Extension 2 Year 1 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 2 Year 1 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 2 Year 2 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 2 Year 2 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 2 Year 3 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 2 Year 3 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 2 Year 4 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 2 Year 4 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 2 Year 5 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 2 Year 5 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -

Sheet 6-2 Back-up
Base and Optional <u>Clarks Summit</u> Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION		Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
				LOADED HOURLY BILLING RATES Year 1 of Maintenance			LOADED HOURLY BILLING RATES Year 2 of Maintenance		
Clarks Summit			2018 Loaded Labor Rate	Year 1 Rate	Year 1 Hours	Year 1 Total Labor Cost	Year 2 Rate	Year 2 Hours	Year 2 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	$ -	0	$ -	$ -	0	$ -
31			$ -	$ -	0	$ -	$ -	0	$ -
32			$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost					$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 3 of Maintenance			LOADED HOURLY BILLING RATES Year 4 of Maintenance		
Clarks Summit			Year 3 Rate	Year 3 Hours	Year 3 Total Labor Cost	Year 4 Rate	Year 4 Hours	Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 5 of Maintenance			LOADED HOURLY BILLING RATES Year 6 of Maintenance		
Clarks Summit			Year 5 Rate	Year 5 Hours	Year 5 Total Labor Cost	Year 6 Rate	Year 6 Hours	Year 6 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 7 of Maintenance			LOADED HOURLY BILLING RATES Year 8 of Maintenance		
Clarks Summit			Year 7 Rate	Year 7 Hours	Year 7 Total Labor Cost	Year 8 Rate	Year 8 Hours	Year 8 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 1

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 9 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance		
Clarks Summit			Year 9 Rate	Year 9 Hours	Year 9 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 1			Optional Extension 1		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance		
Clarks Summit			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Clarks Summit			Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost	Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -
	% increase/decrease from previous year							

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 2			Optional Extension 2		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance		
Clarks Summit			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost	Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 2			Optional Extension 2		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance		
Clarks Summit			Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost	Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Clarks Summit			Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -
7		Installation Manager	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -
10		Database Administrator	$ -	0	$ -
11		Database Analyst	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -
16		Network Administrator	$ -	0	$ -
17		Operations Manager	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -
21		Software Lead	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -
25		System Administrator	$ -	0	$ -
26		System Analyst	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -
28		Technical Writer	$ -	0	$ -
29		Training Manager	$ -	0	$ -
30		Transition Manager	$ -	0	$ -
31			$ -	0	$ -
32			$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION		Escalation % (Over Previous Year)		3.0%
				LOADED HOURLY BILLING RATES Year 4 of Maintenance		
Optional Mainline			2018 Loaded Labor Rate	Year 4 Rate	Year 4 Hours	Year 4 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	$ -	0	$ -
7		Installation Manager	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	$ -	0	$ -
10		Database Administrator	$ -	$ -	0	$ -
11		Database Analyst	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	$ -	0	$ -
16		Network Administrator	$ -	$ -	0	$ -
17		Operations Manager	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	$ -	0	$ -
20		Software Development Manager	$ -	$ -	0	$ -
21		Software Lead	$ -	$ -	0	$ -
22		Software Programmer I	$ -	$ -	0	$ -
23		Software Programmer II	$ -	$ -	0	$ -
24		Software Programmer III	$ -	$ -	0	$ -
25		System Administrator	$ -	$ -	0	$ -
26		System Analyst	$ -	$ -	0	$ -
27		Systems Engineer	$ -	$ -	0	$ -
28		Technical Writer	$ -	$ -	0	$ -
29		Training Manager	$ -	$ -	0	$ -
30		Transition Manager	$ -	$ -	0	$ -
31			$ -	$ -	0	$ -
32			$ -	$ -	0	$ -
33			$ -	$ -	0	$ -
34			$ -	$ -	0	$ -
35			$ -	$ -	0	$ -
36			$ -	$ -	0	$ -
37			$ -	$ -	0	$ -
38			$ -	$ -	0	$ -
39			$ -	$ -	0	$ -
40			$ -	$ -	0	$ -
41			$ -	$ -	0	$ -
42			$ -	$ -	0	$ -
43			$ -	$ -	0	$ -
44			$ -	$ -	0	$ -
45			$ -	$ -	0	$ -
	Grand Total Labor Cost					$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 5 of Maintenance			LOADED HOURLY BILLING RATES Year 6 of Maintenance		
Optional Mainline			Year 5 Rate	Year 5 Hours	Year 5 Total Labor Cost	Year 6 Rate	Year 6 Hours	Year 6 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 7 of Maintenance			LOADED HOURLY BILLING RATES Year 8 of Maintenance		
Optional Mainline			Year 7 Rate	Year 7 Hours	Year 7 Total Labor Cost	Year 8 Rate	Year 8 Hours	Year 8 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 1

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 9 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance		
Optional Mainline			Year 9 Rate	Year 9 Hours	Year 9 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance		
Optional Mainline			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -
	% increase/decrease from previous year							

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Mainline			Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost	Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 2			Optional Extension 2		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance		
Optional Mainline			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost	Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 2			Optional Extension 2		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance		
Optional Mainline			Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost	Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -
	% increase/decrease from previous year							

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional <u>Mainline</u> Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Mainline			Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -
7		Installation Manager	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -
10		Database Administrator	$ -	0	$ -
11		Database Analyst	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -
16		Network Administrator	$ -	0	$ -
17		Operations Manager	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -
21		Software Lead	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -
25		System Administrator	$ -	0	$ -
26		System Analyst	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -
28		Technical Writer	$ -	0	$ -
29		Training Manager	$ -	0	$ -
30		Transition Manager	$ -	0	$ -
31			$ -	0	$ -
32			$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-4 Back-up
Optional Western Extensions Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 1

Item #	STAFF NAMES	POSITION/CLASSIFICATION		Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
				LOADED HOURLY BILLING RATES Year 9 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance		
Optional Western Extension			2018 Loaded Labor Rate	Year 9 Rate	Year 9 Hours	Year 9 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	$ -	0	$ -	$ -	0	$ -
31			$ -	$ -	0	$ -	$ -	0	$ -
32			$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost					$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-4 Back-up
Optional Western Extensions Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 1			Optional Extension 1		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance		
Optional Western Extension			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-4 Back-up
Optional Western Extensions Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Western Extension			Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost	Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -
	% increase/decrease from previous year							

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-4 Back-up

Optional Western Extensions Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 2			Optional Extension 2		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance		
Optional Western Extension			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost	Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-4 Back-up
Optional Western Extensions Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 2			Optional Extension 2		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance		
Optional Western Extension			Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost	Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -
	% increase/decrease from previous year							

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-4 Back-up
Optional Western Extensions Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Western Extension			Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -
7		Installation Manager	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -
10		Database Administrator	$ -	0	$ -
11		Database Analyst	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -
16		Network Administrator	$ -	0	$ -
17		Operations Manager	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -
21		Software Lead	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -
25		System Administrator	$ -	0	$ -
26		System Analyst	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -
28		Technical Writer	$ -	0	$ -
29		Training Manager	$ -	0	$ -
30		Transition Manager	$ -	0	$ -
31			$ -	0	$ -
32			$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 7-1 Back-up
Optional Toll Host System Replacement Implementation Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
1 System Hardware, Third Party Software, Installation and Commissioning not Otherwise Covered					
Host Servers - equipment, purchase, install, configure and test	0	$ -	$ -	$ -	$ -
Storage Works	0	$ -	$ -	$ -	$ -
Back-up Library	0	$ -	$ -	$ -	$ -
Other Third-party Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Hardware, Third Party SW and Installation not Otherwise Covered			$ -	$ -	$ -
2 Communications Equipment					
Switches	0	$ -	$ -	$ -	$ -
LAN HW	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
3 Software (GUI, Back-end), Host System, MOMS, DVAS and License					
Host Software	0	$ -	$ -	$ -	$ -
MOMS	0	$ -	$ -	$ -	$ -
DVAS	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Software (GUI, Back-end), Host System, MOMS, DVAS and License			$ -	$ -	$ -
4 Design Documentation					
Lane Drawings	0	$ -	$ -	$ -	$ -
SDDD	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Design Documentation			$ -	$ -	$ -
5 User, Maintenance, and Project Documentation					
Documents/Manuals	0	$ -	$ -	$ -	$ -
Maintenance Manual	0	$ -	$ -	$ -	$ -
Installation Manual	0	$ -	$ -	$ -	$ -
Project Plans	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total User, Maintenance and Project Documentation			$ -	$ -	$ -
6 Training (manuals, materials and delivery)					
Maintenance Training	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Training			$ -	$ -	$ -

Sheet 7-1 Back-up
Optional Toll Host System Replacement Implementation Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
7 Factory Acceptance Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Factory Acceptance Test			$ -	$ -	$ -
8 Installation and Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Installation and Commissioning Test			$ -	$ -	$ -
9 System Operational and Acceptance Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Operational and Acceptance Test			$ -	$ -	$ -
10 Third Party Warranty and Licenses					
DB Licenses	0	$ -	$ -	$ -	$ -
OS Licenses	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Third Party Warranty and Licenses			$ -	$ -	$ -
11 Warranty First Year of Maintenance - Toll Host System Replacement Maintenance and Software Support Services					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Warranty First Year of maintenance - Toll Host System Replacement Maintenance and Software Support Services			$ -	$ -	$ -
12 Spare Parts and Equipment Year 1 - Warranty Year					
Toll Host System Replacement Spare Parts and Equipment (Year 1) (Sheet 7-2)			$ -		$ -
Total Spare Parts and Equipment Year 1 - Warranty Year			$ -	$ -	$ -

Sheet 7-1 Back-up
Optional Toll Host System Replacement Implementation Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
13 Project Management					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Project Management			$ -	$ -	$ -
14 Engineering and Design					
Lane Installation Design Drawings	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Engineering and Design			$ -	$ -	$ -
15 Transition Costs					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Transition Costs			$ -	$ -	$ -
Total Optional Toll Host System Replacement Implementation Costs			$ -	$ -	$ -
Labor Check (from Sheet 7-3, cell F50) should equal cell F146				$ -	

Sheet 7-2 Back-up
Optional Toll Host System Replacement Implementation
Spare Parts and Equipment Cost Year 1

SPARE PARTS DESCRIPTION	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)
	Year 1 - Warranty Year		
1. System Hardware			
Servers	0	$ -	$ -
Hard Drive	0	$ -	$ -
Miscellaneous	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
Total System Hardware			$ -
2. Communications Equipment			
LAN Equipment	0	$ -	$ -
Power Supply	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
Total Communications Equipment			$ -
Toll Host System Replacement Implementation Spare Parts and Equipment Cost Year 1			$ -

Sheet 7-3 Back-up
Optional Toll Host System Replacement Implementation Cost
Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	LOADED HOURLY BILLING RATES BY TASK		
			Rate	Hours	Total System Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -
7		Installation Manager	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -
10		Database Administrator	$ -	0	$ -
11		Database Analyst	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -
16		Network Administrator	$ -	0	$ -
17		Operations Manager	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -
21		Software Lead	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -
25		System Administrator	$ -	0	$ -
26		System Analyst	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -
28		Technical Writer	$ -	0	$ -
29		Training Manager	$ -	0	$ -
30		Transition Manager	$ -	0	$ -
31			$ -	0	$ -
32			$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Total Labor Cost				$ -

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 8-1
Additional Services Rates and Markup for Out of Scope Work

DESCRIPTION	PERCENTAGE
Subcontractor Markup	0.0000%
Equipment & Materials Markup	0.0000%
Overhead including Burden	0.0000%
Profit	0.0000%
STAFF POSITION/CLASSIFICATION	LOADED HOURLY RATE (2018 Value)
CADD Technician	$ -
Database Administrator	$ -
Database Analyst	$ -
Deputy Project Manager	$ -
Electrician Helper	$ -
Finance Manager (Design/Implementation)	$ -
Finance Manager (Operations)	$ -
Hardware Engineer/Lead	$ -
Installation Manager	$ -
Installation Supervisor	$ -
Installation Technician	$ -
Lane Technical Lead	$ -
Licensed Electrical Engineer	$ -
Licensed Electrician	$ -
Maintenance Manager	$ -
Maintenance Supervisor	$ -
Maintenance Technician	$ -
Network Administrator	$ -
Network Engineer	$ -
Operations Manager	$ -
Project Manager	$ -
Project Principal	$ -
Quality Assurance/Test Manager	$ -
Senior Maintenance Technician	$ -
Software Architect	$ -
Software Development Engineer	$ -
Software Development Manager	$ -
Software Lead	$ -
Software Programmer I	$ -
Software Programmer II	$ -
Software Programmer III	$ -

Sheet 8-1
Additional Services Rates and Markup for Out of Scope Work

DESCRIPTION	PERCENTAGE
Subcontractor Markup	0.0000%
Equipment & Materials Markup	0.0000%
Overhead including Burden	0.0000%
Profit	0.0000%
STAFF POSITION/CLASSIFICATION	LOADED HOURLY RATE (2018 Value)
System Administrator	$ -
System Analyst	$ -
System Technical Lead (if applicable)	$ -
Systems Engineer	$ -
Technical /Software Development Manager	$ -
Technical Writer	$ -
Training Manager	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -

Note 1: CPI adjustments will be made to the Cost based on actual CPI change for the previous year beginning with Maintenance Year 2 as further described in the Price Proposal Instructions.

Exhibit F-8

Proposer Questions Form

(Word file "paperclipped" to RFP for ease of completion)

Proposer Questions

Pennsylvania Turnpike Commission (PTC) **RFP #: 18-10495-8121**

#	Page	Section	Section Description	Proposer Question	Commission Response
1					
2					
3					
4					

Exhibit G
Draft Contract

EXHIBIT G: DRAFT CONTRACT

This **AGREEMENT** is made this ______ day of ___________________, 2018, between the **Pennsylvania Turnpike Commission ("COMMISSION")**, an instrumentality of the Commonwealth of Pennsylvania, with principal offices at 700 South Eisenhower, Blvd., Middletown, Pennsylvania 17057 (mailing address: P. O. Box 67676, Harrisburg, PA 17106-7676);

AND

____________ **("CONTRACTOR")**, **[insert the legal status of CONTRACTOR such as a Pennsylvania (or Foreign) corporation (or partnership, LLC, LLP, etc)]**, with its principal office at **[insert address].**

WITNESSETH:

WHEREAS, the COMMISSION desires the Services for furnishing, installation, testing, Implementation and Maintenance of a cashless tolling roadway toll collection system at designated tolling locations with an associated central computer system;

WHEREAS, by Act No. 211 of the General Assembly of the Commonwealth of Pennsylvania, approved May 21, 1937, and its amendments, the COMMISSION is authorized and empowered to enter into an Agreement with the CONTRACTOR;

WHEREAS, the COMMISSION desires to retain the Services of CONTRACTOR upon the following terms; and

NOW, **THEREFORE** in consideration of these mutual covenants, and intending to be legally bound, the parties agree as follows:

1 CONTRACTOR's Scope of Work

The CONTRACTOR will perform the Scope of Work described in RFP #18-10495-8121 dated May 31, 2018, titled "*Cashless Tolling System Implementation and Maintenance*" as amended and Conformed, including all associated attachments and exhibits. These documents are made part of this Agreement by reference.

In the event that any provision of this Agreement is inconsistent or in conflict with another provision, the order of precedence shall be as follows:

a) Supplemental Agreements

b) Executed Agreement (including items i, ii, and iii immediately below and excluding items c-i below)

  i. Exhibit H Insurance Requirements

  ii. Exhibit I DB Requirements

  iii. Exhibit J Software License and Escrow

c) Exhibit A Conformed Scope of Work

d) Exhibit B- Defined Terms and Acronyms

e) Exhibit C Price Proposal Instructions

f) Exhibit D Payment Schedule

g) Exhibit E Approved Project Implementation Schedule

h) Exhibit F: Price Proposal

i) Exhibit C Request for Proposals, including any addenda thereto (in case of conflict the most recent addenda will apply)

j) Exhibit J: Prevailing Wage Rate Requirements

k) COMMISSION General Provisions for Facility Projects (GPFP) Dated October 2015

l) Exhibit D CONTRACTOR's Proposal

2 Provisions of Services, Resources and Staffing

The CONTRACTOR shall provide all resources, personnel, Equipment, Software and supplies necessary to perform the Services. The CONTRACTOR shall provide the Services described herein in a competent and professional manner, in conformance with the highest industry standards, to the satisfaction of the COMMISSION. The COMMISSION shall be entitled to full and prompt cooperation by the CONTRACTOR in all aspects of the Services. The COMMISSION shall have the right to inspect the performance of such Services at any time, and the CONTRACTOR shall fully and promptly cooperate with the COMMISSION in the execution of such inspections. At the request of the COMMISSION, the CONTRACTOR shall promptly remove from assignment to the performance of Services pursuant to this Agreement any employee, Subcontractor, or any other person performing Services hereunder. Notwithstanding the foregoing Key Team Member shall be subject to the provisions of Section 3 CONTRACTOR's Key Team Member. The COMMISSION recognizes that such removal of an employee from the performance of Services pursuant to this Agreement will not necessarily result in the termination or demotion of such employee.

The CONTRACTOR recognizes the paramount importance of the successful operation of the System for which these Services are sought. Inasmuch as these Services are provided for the convenience and benefit of the public, the CONTRACTOR acknowledges that the quality and timeliness of such Services are the essence of this Agreement.

a) The CONTRACTOR agrees that it will at all times employ, maintain and assign to the performance of the Services a sufficient number of competent and qualified professionals and other personnel to perform the Services in a timely manner.

b) The CONTRACTOR warrants and represents that its staff personnel have the proper skill, training, background, knowledge, experience, rights, authorizations, integrity, character and licenses necessary to perform the Services described herein, in a competent and professional manner.

c) The CONTRACTOR agrees to comply with all provisions of all federal, state, and local laws, ordinances, rules, and regulations that are applicable to the performance of Services pursuant to this Agreement, and to obtain in its name all necessary licenses and permits.

If in order to provide such Services the CONTRACTOR must make an external connection to the COMMISSION's data communications infrastructure and/or access COMMISSION information systems, the CONTRACTOR shall in all respects comply with all COMMISSION policies and procedures regarding such connections and information systems access and undertake whatever actions are necessary in the discretion of the COMMISSION to ensure such compliance. The CONTRACTOR shall be responsible for all costs associated with ensuring that its own network security measures comply with all COMMISSION policies and procedures regarding external connections

3 CONTRACTOR's Key Team Members

The CONTRACTOR has designated an individual Project Principal identified in the Proposal, who is an officer authorized to sign the Agreement and any amendments to the Agreement and to speak for and make commitments on behalf of the CONTRACTOR.

The CONTRACTOR shall designate a project manager ("CONTRACTOR Project Manager"), identified in the Proposal, who shall act as the primary point of contact in all matters on behalf of CONTRACTOR. The CONTRACTOR Project Manager shall assign other individuals as contacts with regard to specific functional areas of the Work, subject to the Approval of the COMMISSION. The COMMISSION shall have input into determining who shall be assigned as Project Manager for CONTRACTOR and the CONTRACTOR may not change the CONTRACTOR Project Manager without consulting with the COMMISSION and obtaining Approval from the COMMISSION as set forth in the following paragraph.

The CONTRACTOR's Proposal identifies certain job categories as "Key Team Member" for the Agreement. Key Team Member for this Project are identified in the CONTRACTOR's Proposal and shall be approved as part of the Project Management Plan as set forth in **Exhibit A Scope of Work**. Key Team Member shall be required to work in the position indicated in the Proposal and approved Project Management Plan, unless approval is obtained from the COMMISSION. The CONTRACTOR shall obtain the COMMISSION's prior approval to any desired changes in Key Team Member or any significant reduction in the level of effort for such Key Team Member, which consent shall not be unreasonably withheld. Should the COMMISSION determine during the term of the Agreement that the list of Key Team Member does not include personnel essential to the successful performance of the work, the COMMISSION may require the CONTRACTOR to add any existing job category to such list.

If the COMMISSION becomes dissatisfied with the performance of any person designated as Key Team Member performing under this Agreement, the COMMISSION shall notify CONTRACTOR in writing. Within ten (10) business days of receipt of such Notice, the CONTRACTOR shall either propose a replacement person for evaluation and approval by the COMMISSION or present to the COMMISSION a plan for correcting the incumbent's performance deficiencies within a period of thirty (30) calendar days thereafter. If either the COMMISSION rejects the plan presented by CONTRACTOR or the incumbent's performance deficiencies are not corrected to the COMMISSION's satisfaction within the thirty (30) calendar day plan period Approved by the COMMISSION, then the CONTRACTOR shall, within ten

(10) business days after rejection of the plan or expiration of the thirty (30) business day plan period, propose to the COMMISSION a replacement person for evaluation and Approval by the COMMISSION.

4 COMMISSION Responsibilities

4.1 COMMISSION Responsibilities

The COMMISSION will provide the CONTRACTOR the necessary workspace, infrastructure and support as further set forth in the **Exhibit A Scope of Work**, including RFP Attachment 10 Maintenance Responsibility Matrix.

4.2 Authority of the COMMISSION Project Manager

The CONTRACTOR hereby acknowledges the COMMISSION Project Manager ("the Project Manager") has the authority to determine in the first instance all questions of any nature whatsoever arising out of, under, or in connection with, or in any way related to or on account of, this Agreement including, without limitation: questions as to the value, acceptability of the Services; questions as to either party's fulfillment of its obligations under this Agreement; negligence, fraud or misrepresentation before or subsequent to execution of this Agreement; questions as to the interpretation of **Exhibit A Scope of Work**; and claims for damages, compensation and losses.

The Project Manager shall act as the designated representative of the COMMISSION in all matters relating to the Project.

The Project Manager may give orders to the CONTRACTOR to do Work that he determines to be necessary for the CONTRACTOR to fulfill the CONTRACTOR's obligations under this Agreement.

If requested by the CONTRACTOR, the Project Manager will promptly provide appropriate explanations and reasons for his determinations and orders hereunder.

The CONTRACTOR shall be bound by all determinations or orders and shall promptly obey and follow every order of the Project Manager, including the withdrawal or modification of any previous order and regardless of whether the CONTRACTOR agrees with the Project Manager's determination or order. Orders shall be in writing, unless not practicable, in which event any oral order must be confirmed in writing by the Project Manager as soon thereafter as practicable.

4.3 Responsibility for Operational Policy

The CONTRACTOR acknowledges that the COMMISSION shall be responsible for making all policy decisions regarding the operation of the System. The CONTRACTOR agrees to provide advice and recommendations with respect to policy issues as directed by the COMMISSION. The CONTRACTOR agrees to implement any and all changes in providing Services pursuant to this Agreement as a result of policy changes implemented by the COMMISSION. The CONTRACTOR agrees to act in an expeditious and fiscally sound manner in providing the COMMISSION with input regarding the time and cost (if any) to implement said changes and in executing the activities required to implement said changes.

5 General Cooperation Requirements

During the course of this Agreement, the COMMISSION may undertake or award other agreements for additional work or professional services, including but not limited to separate agreements with different contractors, including the civil construction work related to **Exhibit A Scope of Work**, including but not limited to the roadway, gantries and shelters and associated work. It is critical that close coordination with interfacing contractors occurs throughout the term of this Agreement. CONTRACTOR shall fully cooperate with the COMMISSION and the parties to all other COMMISSION contracts and carefully integrate and schedule its own work with said parties.

5.1 Interface Control Document Development and Ongoing Cooperation Requirements

a) The CONTRACTOR shall fully cooperate with the COMMISSION and its designated contractor(s) as necessary to develop interface control documents (ICDs) as set forth in **Exhibit A Scope of Work**. The ICDs shall specify all specifications, parameters, system requirements, programming interfaces and all other elements to effectively and completely interface the Toll Collection System components being provided by the various interfacing contractors. In this event, the CONTRACTOR shall be responsible for its respective roles and responsibilities as set forth in the Scope of Work.

b) In the event that the elements comprising the Toll Collection System do not properly interface with each other, and the CONTRACTOR's and the interfacing contractors' collective efforts to correct same are untimely or unsuccessful, or the interfacing contractors fail to cooperate with other COMMISSION designated and/or interfacing contractor(s) to the satisfaction of the COMMISSION and as determined at the COMMISSION's sole discretion, then in addition to the COMMISSION's other available remedies, the COMMISSION shall have the right to, in whole or in part, withhold and/or require a refund of payments to the CONTRACTOR and/or the interfacing contractors involved in developing the ICD.

5.2 Additional Coordination and Cooperation Requirements

a) It is anticipated that work by one or more contractors of the COMMISSION, may be in progress adjacent to or within the limits of this project during progress of the Work on this contract. The CONTRACTOR shall work closely with the COMMISSION and any other contractors who will be working for the COMMISSION for the purpose of coordinating any activity which may affect both contractors. Examples of this work include but are not limited to installation of toll equipment, equipment testing, power and conduit installation and maintenance and protection of traffic.

b) Should problems in coordination with other contractors occur, the CONTRACTOR shall make the COMMISSION aware of these problems immediately and shall take steps to address the problems and mitigate any delays or additional costs. CONTRACTOR shall not commit or permit any act that will interfere with the performance of work by any other contractor or by the COMMISSION.

c) CONTRACTOR shall cooperate with all other contractors or forces performing construction or work of any other nature within or adjacent to the limits of the Work specified in order to avoid any delay or hindrance to the other contractors or forces. The COMMISSION reserves the right to perform other or additional work at or near the site (including material sources) at any time, by the use of other forces.

d) When two or more contractors of the COMMISSION are employed on related or adjacent work, each shall conduct their operations in such a manner as not to cause any unnecessary delay or hindrance to the other.

e) Each contractor shall be responsible to the other for all damage to work, to persons or property caused to the other by their operations, and for losses caused by the other due to unnecessary delays or failure to finish the work within the time specified for completion.

f) Upon Approval of the Design by the CONTRACTOR, CONTRACTOR shall assume responsibility for the Design to the extent that if the civil work is installed as designed and does not meet the performance requirements of this Scope of Work, the CONTRACTOR shall be responsible for the costs of redesign, civil rework and additional equipment costs.

6 Duration of the Agreement

The term of this Agreement shall be for a period of ten (10) years inclusive of the Implementation and Maintenance Phases and shall commence on the Effective Date as defined below.

The Effective Date shall be fixed by the COMMISSION after the Agreement has been fully executed by the CONTRACTOR and by the COMMISSION, and after all approvals required by the COMMISSION contracting procedures have been obtained.

Two five (5) year optional extensions may be exercised at the sole discretion of the COMMISSION. This Agreement will not terminate until the COMMISSION accepts all Work as complete and tenders final payment to the CONTRACTOR and the conditions identified in for Project Acceptance identified in Section 10.1 Acceptance are met.

7 Termination

The COMMISSION shall have the right, in its sole discretion, to postpone, suspend, abandon or terminate this Agreement at any time and for any reason, and such action shall in no event be deemed a breach of contract. In the event the COMMISSION exercises its right to postpone, suspend, abandon or terminate this Agreement, the COMMISSION will provide the CONTRACTOR with forty-five (45) Calendar Days prior written notice, unless otherwise provided in Section 22 Notice of Default/Chance to Cure and Termination.

a) The CONTRACTOR shall, upon receipt of such notice, unless otherwise directed by the COMMISSION:

    i) stop work on the date specified in the notice (the “Effective Date”);

ii) take such action as may be necessary for the protection and preservation of the COMMISSION's materials and property, including data and other aspects of the CONTRACTOR's performance which are not completed;

iii) cancel orders;

iv) assign to the COMMISSION and deliver to the site or any other location designated by the COMMISSION any non-cancelable orders for material and Equipment that is not capable of use except in the performance of Services pursuant to this Agreement and has been specifically fabricated for the sole purpose of this Agreement and not incorporated in the Services;

v) take no action which will increase the amounts payable by the COMMISSION under this Agreement; and

vi) take all steps necessary to assure a smooth transition of Services to a new contractor or the COMMISSION.

b) In the event that the COMMISSION exercises its right to postpone, suspend, abandon or terminate this Agreement, the COMMISSION will pay the CONTRACTOR's actual cost or the fair and reasonable value, whichever is less, of:

i) the Services completed in accordance with this Agreement up to the Effective Date;

ii) non-cancelable materials and Equipment that are not capable of use except in the performance of Services pursuant to this Agreement and have been specifically fabricated for the sole purpose of this Agreement but not incorporated in the Services; and

iii) reasonably incurred non-cancelable labor and lease obligations not included in the transition service included in Exhibit A Scope of Work.

c) In no event shall any payments under this Section exceed the compensation for such items identified in (b).

d) The amount due hereunder shall be offset by all payments already made to the CONTRACTOR.

e) All payments made pursuant to this Section shall be accepted by the CONTRACTOR in full satisfaction of all claims against the COMMISSION arising out of the postponement, suspension, abandonment, or termination, including consequential damages.

f) All payments pursuant to this Section are subject to audit.

g) Upon such a postponement, suspension, abandonment or termination, the CONTRACTOR must within ten (10) Business Days deliver to the COMMISSION all records, documents and data pertaining to Services rendered under this Agreement.

8 Succession

In the event that this Agreement is terminated for convenience or default or upon the Agreement completion date or expiration of the Agreement term or any extensions thereof, the CONTRACTOR shall cooperate with the COMMISSION to facilitate a smooth succession to the COMMISSION's selected successor for the Services. In addition to the requirements contained in **Exhibit A Scope of Work** Section 5.2 End of Contract Transition of the Scope of Work, the CONTRACTOR agrees to:

a) make all operational records, documents, data, systems, and facilities required to maintain day-to-day operations of the Services being rendered under this Agreement available on or before the date of such termination, suspension, or expiration;

b) make all other records, documents, data and Software which is licensed to the COMMISSION and pertaining to the Services rendered for this Agreement available within thirty (30) Calendar Days upon written notice or as otherwise provided in the executed License Agreement;

c) make all necessary provisions for transferring any leases held by the CONTRACTOR to the COMMISSION; and

d) make all necessary provisions for securing, providing, and/or granting Software licenses to continue operations.

9 Compensation

9.1 General

For the performance of Work and Services as described in this Agreement, the CONTRACTOR shall be paid in accordance with Exhibit D Payment Schedule and Exhibit F CONTRACTOR's Price Proposal and CONTRACTOR agrees to accept such amount as full compensation for such Services. In no event shall payment pursuant to this Agreement exceed $[], unless this Agreement is amended. The COMMISSION's obligation to pay for such Services is contingent upon the COMMISSION's finding that the CONTRACTOR has performed in a competent and professional manner satisfactory to the COMMISSION and has satisfactorily performed and met the requirements of the Agreement, including of Exhibit A Scope of Work and Exhibit D Payment Schedule.

9.2 Set-Offs and Adjustments

The CONTRACTOR agrees that the COMMISSION may set off the amount of any state tax liability or other obligation of the CONTRACTOR or its subsidiaries to the Commonwealth against any payments due the CONTRACTOR under any contract with the COMMISSION.

9.3 Pricing Adjustment for Non-Compliance with Performance Standards

If in the performance of Services the CONTRACTOR does not meet or exceed the Performance Standards identified in **Exhibit A Scope of Work**, the COMMISSION shall reduce the amount it would otherwise pay CONTRACTOR for such Services pursuant to the adjustment amounts set forth in Section 7.22.4, Availability of the Scope of Work and in Section 24.3, Performance Adjustments During Maintenance Phase of this Agreement.

9.4 Method and Times of Payment

To receive payment, the CONTRACTOR must submit a monthly invoice to the COMMISSION documenting the Services rendered and any adjustments applicable for the invoice period under consideration. Such invoice shall be in a form and contain such detail Approved by the COMMISSION that meets the monthly reporting and invoicing requirements identified in **Exhibit A Scope of Work** including the Approved Project Management Plan.

The CONTRACTOR agrees to provide the COMMISSION with such detailed documentation substantiating fees and disbursements as the COMMISSION may request.

10 Phases of the Project

CONTRACTOR shall perform all planning, Design and Software development, testing and installation Services and complete and have Approval for all corresponding Submittals, Deliverables and milestones required in **Exhibit A Scope of Work** for the Implementation Phase. The Implementation Phase shall begin at Notice to Proceed and shall be complete upon System Acceptance and close-out, as further defined in this Agreement and in **Exhibit A Scope of Work**.

The CONTRACTOR's Operations and Maintenance Phase responsibilities shall begin upon Approval of Go-Live, subject to the warranty provisions pursuant to Section 16.1 System Warranties and the payment provisions pursuant to Section 9.4 Method and Times of Payment, and shall continue for up to six years or until the expiration of the Initial Contract Term, whichever occurs first and also shall include any Contract renewals or extensions thereof. Commencement of this phase shall not relieve the CONTRACTOR of any of its responsibilities to complete all Requirements and the Scope of Work of the Implementation Phase and does not waive any of the rights of the agencies in this regard. The Operations and Maintenance Phase may be extended in accordance with Section 6 Duration of Agreement, at the sole discretion of the COMMISSION.

10.1 Acceptance

10.1.1 General

Provisional Acceptance for the Implementation Phase of the Project will be achieved when the COMMISSION, in its sole discretion, determines that the CONTRACTOR has complied with the completion Requirements set forth for that phase under the Agreement, including in Exhibit A Scope of Work, pursuant to Section 28.1.2.

Final Acceptance of the Implementation Phase will be considered by the COMMISSION to have occurred, when the COMMISSION has received and Approved all Project documents, drawings, Software, Interface data, test data, manuals and other Deliverables for the Implementation Phase, and CONTRACTOR shall have successfully completed the Acceptance Testing and when, in the COMMISSION's sole discretion, CONTRACTOR has met all other obligations under the Agreement, including in Exhibit A Scope of Work, pursuant to Section 28.1.3

Project Acceptance will be considered to have occurred when the COMMISSION, in its sole discretion, determines that CONTRACTOR has complied with all of the completion Requirements set forth for the Project for both the Implementation and Operations and Maintenance Phases, set forth in **Exhibit A Scope of Work** pursuant to Section 28.1.4

The COMMISSION's beneficial use of the Project Deliverables during any phase prior to Project Acceptance shall not constitute Acceptance of any Deliverable, nor shall such use give rise to equitable claim for adjustment.

10.1.2 Provisional Acceptance

The COMMISSION, in its sole discretion, may grant a Provisional Acceptance of the Implementation Phase if it deems that the Work on the phase is substantially complete, and the following conditions have been met:

a) CONTRACTOR has passed the COMMISSION's Commissioning test and Go-Live has been Approved, as set forth in **Exhibit A Scope of Work**;

b) CONTRACTOR, in the COMMISSION's sole determination, has substantially passed and has been given Provisional Approval of the Acceptance test; and

c) A punch list of items not yet in compliance with **Exhibit A Scope of Work** has been delivered by the CONTRACTOR and has been verified by the COMMISSION and Approved as being complete.

The COMMISSION shall issue a written Notice of Provisional Acceptance upon satisfaction of the conditions listed above in items 1 through 3. The occurrence of Provisional Acceptance shall not relieve the CONTRACTOR of any of its continuing obligations hereunder.

10.1.3 Final Acceptance of Implementation Phase

Final Acceptance of the Implementation Phase shall be deemed to have occurred when all of the following conditions have been met:

a) The CONTRACTOR shall provide a Final Acceptance letter certification to close out the Phase. The certification shall include but not be limited to: total costs associated with the Phase, date of Work completion and any additional information contained in items b) through h) below, if applicable:

b) Successful completion and Approval of the Operational and Acceptance Test(s), as applicable, by the COMMISSION, as defined in **Exhibit A Scope of Work**;

c) Delivery by the CONTRACTOR and Approval by the COMMISSION of all Deliverables, including As-Built Documentation/Drawings, as defined in **Exhibit A Scope of Work**;

d) Any and all punch list items have been satisfactorily completed and Approved by the COMMISSION;

e) An affidavit has been delivered to the COMMISSION signed by the CONTRACTOR, stating all debts and claims of Suppliers and Subcontractors have been paid and/or settled;

f) All CONTRACTOR claims for the Phase are deemed to be resolved by the COMMISSION, and the CONTRACTOR has submitted a statement that no such requests or protests will be applied for; any and all claims under this Agreement are resolved, and that no such claims will be made;

g) All of CONTRACTOR's other obligations under the Agreement shall have been satisfied in full or waived in writing by the COMMISSION; and

h) The COMMISSION shall have delivered to the CONTRACTOR a Notice of Final Acceptance for the Phase.

10.1.4 Project Acceptance of All Phases

Project Acceptance shall mean the Final Acceptance for all Phases, including both Implementation and Operations and Maintenance, and shall be deemed to have occurred when all of the following conditions have been met:

a) The CONTRACTOR shall provide a Project Acceptance letter certification to close out the Agreement. The certification shall include but not be limited to: total costs associated with the Agreement, date of Work completion and any additional required information contained in item 2 through 9 below, if applicable;

b) The Implementation Phase has been Accepted and closed out in accordance with Section 10.1.3;

c) The CONTRACTOR has met all transition and succession requirements pursuant to **Exhibit A Scope of Work** and this Agreement;

d) The CONTRACTOR has deposited all current escrow materials required under this Agreement, including all necessary documentation and support materials;

e) The CONTRACTOR has provided the COMMISSION with all required materials, fixtures, furnishings, Equipment and Software; documentation and manuals, either owned by or licensed to the COMMISSION, pursuant to this Agreement. All such materials have been verified by the COMMISSION to be in good, working order;

f) An affidavit has been delivered to the COMMISSION, signed by the CONTRACTOR, stating all debts and claims of Suppliers and Subcontractors have been paid and/or settled;

g) All CONTRACTOR claims for the Phase are deemed to be resolved by the COMMISSION, and the CONTRACTOR has submitted a statement that no such requests or protests will be applied for; any and all claims under this Agreement are resolved, and that no such claims will be made;

h) All Requirements identified in the System Requirements (Volume I), as described in **Exhibit A Scope of Work** shall be verified and certified by the CONTRACTOR to be successfully delivered, and shall be Approved by the COMMISSION;

i) All the CONTRACTOR's other obligations under the Agreement shall have been satisfied in full or waived by the COMMISSION; and

j) The COMMISSION shall have delivered to the CONTRACTOR a Notice of Project Acceptance for all implementation Phases to the effect of the foregoing.

10.1.5 Project Completion

Project Completion shall be deemed to have occurred when all obligations under this Agreement have been successfully performed by the CONTRACTOR, including but not limited to all retentions owed to the CONTRACTOR have been released by the COMMISSION and, when the COMMISSION has delivered a Notice of Project completion to the effect of the foregoing.

11 Submittals, Approvals and Schedule

11.1 Submittals

The CONTRACTOR's submittal requirements and submittal schedule shall be as set out in the CONTRACTOR's Approved Program Management Plan and the CONTRACTOR's Approved Implementation Phase Schedule, in accordance with **Exhibit A Scope of Work**. The baseline schedule Approved after Notice to Proceed shall establish accepted dates by which the CONTRACTOR shall submit required permits, documents, and applications, and Design; develop; deliver; install; test, and implement the required System, including all necessary documents in support thereof.

The COMMISSION's written Approval will be required for submittals. The COMMISSION will Approve or reject such submittals, providing an explanation of any reasons for rejection in a manner agreed to in the Approved Project Management Plan. Such Approval or rejection will be provided within a specified number of days of submittal according to the Approved baseline submittal schedule, unless prior to the expiration of the specified period, the COMMISSION provides the CONTRACTOR with written notification that the review period for a particular submittal will be extended and stating the time in which it will be completed. In the event that the review period expires on a non-Business Day, the review period shall be extended through the next Business Day. The COMMISSION's right to extend the review period is intended to allow flexibility in special circumstances where the nature of the submittal requires more involved review, and not as a diminution of the COMMISSION's obligation to promptly review submittals.

The CONTRACTOR shall not be held responsible for delays in Schedule due to delays in Approvals completely beyond the control of the CONTRACTOR as specified elsewhere in this Contract. However, nothing in this section relieves the CONTRACTOR of its responsibility to provide complete and accurate submittals and Deliverables that meet the Scope of Work. If submittals are rejected by the COMMISSION due to the CONTRACTOR's failure to meet the Requirements of the submittal or Deliverable or to address the previous comments provided by the COMMISSION, the CONTRACTOR shall be held responsible for all associated delays.

11.2 Project Implementation Schedule

Within fifteen (15) days of the Implementation Phase Notice to Proceed the CONTRACTOR shall submit a baseline Project Implementation Schedule in accordance with the requirements set forth in Section 5.1.7 of **Exhibit A Scope of Work** for baseline Approval. The Approved Project Implementation Schedule at the time of the execution of the Agreement is included as Exhibit E, Project Implementation Schedule.

The CONTRACTOR shall clearly label each revision to the Approved Project Implementation Schedule, pursuant to the Requirements of the Approved Project Management Plan. Submission of the monthly progress updates against the Approved Schedule shall not release or relieve the CONTRACTOR from full responsibility for completing the Work within the time set forth in the current Approved Schedule for the associated Work. If the CONTRACTOR causes delays and fails or refuses to implement measures sufficient to bring its Work back into conformity with the current Approved Schedule, its right to proceed with any or all portions of the associated Work may be terminated under the provisions of the Contract. However, in the event the COMMISSION, in its sole determination, should permit the CONTRACTOR to proceed, the COMMISSION's permission shall in no way operate as a waiver of its rights nor shall it deprive the COMMISSION of its rights under any other provisions of the Contract.

Any changes to a baseline Approved schedule require Approval and a change to the Contract.

12 General Guaranty

Neither Acceptance of the System and Services or payment therefor, nor any provision in this Agreement, nor partial or entire use of the System and Services by the COMMISSION shall constitute an Acceptance of System and Services not performed in accordance with this Agreement or relieve the CONTRACTOR of liability for any express or implied warranties or responsibility for faulty materials or workmanship

13 Extra Work and Engineering Change Orders (ECO)

13.1 General

The COMMISSION reserves the right to make alterations and to permit deviations from this Agreement and execute options and to require such changes to the extent or in the manner of performance of the Work and/or Services as are determined by the COMMISSION to be reasonably necessary. All changes to this Agreement beyond the limited capacity Engineering Change Order (ECO) process described in the following section shall be implemented by means of a Supplemental Agreement signed by both parties. Reference herein to this Agreement shall be deemed to include any supplement hereto. Unless otherwise agreed to by the COMMISSION in writing, the CONTRACTOR's Payment Schedule and Price Proposal, including labor rates identified in the Price Proposal, shall apply to all Supplemental Agreements. If cost for additional Work and/or Services cannot be established on the basis of the Price Proposal, the Payment Schedule, a catalog or market price of a commercial product sold in substantial quantities, or on the basis of prices set by law or regulation, the CONTRACTOR is required to submit to the COMMISSION detailed cost breakdowns, including information on labor and materials costs, overhead and other indirect costs.

All supplemental Work and/or Services shall be Approved by the COMMISSION and fully set forth in a Supplemental Agreement executed by the COMMISSION and the CONTRACTOR. CONTRACTOR shall not commence such additional Work and/or Services prior to the issuance of a Notice to Proceed for such additional Work and/or Services.

13.2 Limited Engineering Change Order (ECO) Process

As a part of its scope the CONTRACTOR may be required to perform Work that cannot be quantified at this time and is therefore considered to be part of a limited engineering change order (ECO) process. As part of finalization of this Agreement, the COMMISSION shall Approve a capped amount of additional costs available via the ECO process above the total final Approved value of the Price Proposal. As examples, these ECOs could be related to the support, engineering, maintenance (including emergency maintenance), modifications, growth and enhancement of all toll technologies owned and operated by the COMMISSION not otherwise identified in this Agreement. The Work may include, but is not limited to disciplines such as Design; Software development; infrastructure engineering; engineering analysis; recommendations; testing; fabrication; prototype programs; data collection activities; installation; civil work; minor roadway work; reporting, and Documentation.

The need for an ECO may be identified by the COMMISSION or through recommendations from the CONTRACTOR. The COMMISSION will verify budgetary allocations for ECOs prior to Approval. Once an ECO has been identified and requested by the COMMISSION, the CONTRACTOR shall provide an estimate for the Work in accordance with latest COMMISSION ECO process. Unless otherwise agreed to by the COMMISSION in writing, the Payment Schedule and Price Proposal, including labor rates identified in the Price Proposal, shall apply. If cost for the ECO cannot be established on the basis of the Price Proposal, the Payment Schedule, a catalog or market price of a commercial product sold in substantial quantities, or on the basis of prices set by law or regulation, the CONTRACTOR is required to submit to the COMMISSION detailed cost breakdowns, including information on labor and materials costs, overhead and other indirect costs.

All ECOs shall be Approved in accordance with the COMMISSION ECO process and fully set forth in a Task Work Order executed by the COMMISSION and the CONTRACTOR. The CONTRACTOR shall not commence any Work prior to the issuance of a Task Work Order for an ECO. Reference herein to this Agreement, shall be deemed to include any ECO that has an executed Task Work Order.

14 License and Software

A Software License and Escrow Agreement shall be attached to the final Contract as Exhibit J. The License and Escrow Agreement shall include the terms and conditions set forth as follows**:**

14.1 Description of License

The CONTRACTOR hereby grants to the COMMISSION, for purposes of operating the System, an unlimited, fully-paid-up, royalty-free, perpetual, universal, irrevocable, non-exclusive license: (i) to use, maintain, disclose, modify, adapt, and improve any and all Software and other Equipment; notwithstanding the foregoing, any modifications not made by the CONTRACTOR, its Subcontractors or agents shall be subject to CONTRACTOR validation in order to continue to maintain applicable warranties; (ii) to use all resulting versions, modifications, adaptations and improvements of any and all

Software and other Equipment; (iii) to make, have made, use, distribute and display copies, reproductions, and derivative works of any and all Software and documentation; and (iv) to permit any other person or entity providing Services to the COMMISSION to do any and all of the foregoing (i) through (iii). The foregoing license includes the right to use any systems, processes, methods, applications, technical data specifications and other documentation (including those provided by the CONTRACTOR, any third party or currently used by the COMMISSION) comprised or practiced by the Equipment or that are necessary or useful to operate the System.

14.2 Scope of License and Escrow

All rights and licenses granted to the COMMISSION under this Agreement shall be exercisable at any time by the COMMISSION and each of the persons and entities provided Services by the CONTRACTOR. The license shall permit the COMMISSION to add at any time, entities or persons to receive CONTRACTOR Services with no additional license fees charged to COMMISSION. The foregoing shall apply to the COMMISSION, and such persons and entities and their respective successors and assigns. CONTRACTOR shall include, without requirement of any payment or provision of any consideration other than or in addition to that which is expressly specified by this Agreement, the right of the COMMISSION and each other person or entity referred to in this subparagraph:

a) to utilize the System (including all Equipment or related documentation), in whole or in part, in connection with Services provided by or to the COMMISSION or such other persons or entities, without regard to present or future location, including for purposes of technical support, Maintenance or repair;

b) to make multiple copies of the Software and related documentation for purposes of the exercise of the COMMISSION’s rights and licenses hereunder;

c) to use the Software and related documentation on or in connection with multiple processors, components obtained by or on behalf of the COMMISSION from the CONTRACTOR or from third parties, and systems (including the System) utilized by the COMMISSION or any person or entity providing Services to or on behalf of the COMMISSION;

d) to maintain and modify the Software subject to the CONTRACTOR validation set forth in Section14.1. Description of License subparagraph(i) and to use the resulting versions and modifications thereof;

e) to sell or distribute user technology, device or method permitting public access to and use of the user Interface of the System, to any person or entity; and

f) to exercise any and all such rights and licenses under this Agreement through the services of its employees, agents, independent contractors or subcontractors, or such other persons or entities as it may employ or engage in its own discretion, and to disclose the Software and related documentation, in whole or in part, to such persons or entities for such purposes.

For the avoidance of doubt, nothing in this Agreement shall restrict or preclude the COMMISSION from providing to any other person or entity, or any such other person or entity from using, any of the Equipment, Software or other materials provided to the COMMISSION hereunder by the

CONTRACTOR, in connection with the provision of any products or Services to or on behalf of the COMMISSION, or to any person or entity providing services to or on behalf of the COMMISSION.

Pre-existing CONTRACTOR software shall remain the property of the CONTRACTOR and nothing in this Agreement shall be construed to provide title to such software to the COMMISSION, subject to the license provided as set forth in Section 14.1 Description of License.

14.3 Establishing the Escrow

Upon execution of the Contract the parties shall enter into a Software Escrow Agreement, hereto attached, to the final Contract as Exhibit J. Prior to depositing the Software and related documentation into escrow, the CONTRACTOR shall submit the name of the Escrow Agent to the COMMISSION for its Approval. In the event that the Escrow Agent requires its own form of Escrow Agreement, the form of Escrow Agreement used by the Escrow Agent shall be subject to the prior written Approval of the COMMISSION and if not Approved by the COMMISSION then another Escrow Agent shall be selected. If the Escrow Agent's form of Escrow Agreement is Approved by the COMMISSION, said Escrow Agreement shall be used.

14.4 Deposits

Pursuant to the terms of the Escrow Agreement, the CONTRACTOR shall deposit with the Escrow Agent, without charge to the COMMISSION, all Deposit Materials (as hereinafter defined) necessary or useful to: (i) use, reproduce, modify, repair and maintain the Software; (ii) operate, modify, repair and Maintain the Equipment, and (iii) operate, use, modify, repair and maintain the System in accordance with this Agreement. Access to and rights in the materials in the escrow shall be governed by the terms and conditions hereof and as further defined in the Escrow Agreement.

Materials so deposited ("Deposit Materials") shall include but not be limited to: all Software programs (including all source and object code with respect thereto); configuration files; Interface Control Documents; operator's and user's manuals, and other associated documentation; reports; control files, utilities, and packages; operating systems; data base systems; network packages; Maintenance items (including test programs and program specifications); functional documentation, compilers, instructions for generating the Software, and any proprietary Software tools that are necessary in order to maintain the Software and other Equipment. A list of all deposit materials shall accompany the Deposit Materials.

CONTRACTOR shall deposit a complete set of Deposit Materials upon the Acceptance of the Implementation Phase and shall make updates no less frequently than quarterly or when major updates are made to Software pursuant to the following paragraph, whichever occurs first.

In the event the CONTRACTOR revises or supplements any of the Deposit Materials or creates additional materials related to the System, the CONTRACTOR shall deposit a complete set of such revised, supplemented, or additional Deposit Materials with the above named Escrow Agent within thirty (30) Calendar Days of such revision, supplement or addition and shall indicate with each deposit which documents and which pages have been revised, supplemented or added since the last deposit. Any deposits made pursuant to the two preceding sentences shall become part of the Deposit Materials.

The CONTRACTOR shall provide Notice to the COMMISSION confirming and describing the content of any deposits made within thirty (30) Calendar Days of such deposits, certifying that all such deposits are complete and include accurate copies of the required materials.

To the extent the Software includes components developed by third parties, the CONTRACTOR shall ensure that the Deposit Materials include copies of license agreements, computer programs, disks and documentation for all Software obtained by the CONTRACTOR from third parties. At the CONTRACTOR's expense, the CONTRACTOR shall ensure that all third-party licenses are transferable to the COMMISSION at the time of any release of the escrow provided for hereunder.

14.5 Payment for Costs of Escrow

The CONTRACTOR shall be responsible for payment of all costs arising in connection with the establishment and maintenance of the escrow, referred to in this Section 14.5, throughout the Contract Term, including any fees of the Escrow Agent, and the COMMISSION shall not be charged by the CONTRACTOR for its time in compiling and depositing Deposit Materials. The CONTRACTOR's obligation to maintain the escrow in place shall continue after the expiration or termination of the Contract Term until the CONTRACTOR receives Notice from the COMMISSION that the escrow is no longer required, pursuant to Section 14.7 Release of Escrow Deposits.

14.6 Verification of Escrow Deposits

From time to time while the escrow is in place, the COMMISSION may, at its sole discretion, verify directly or hire a firm qualified and mutually and reasonably acceptable to both parties, to provide verification of the applicable escrow deposits at the COMMISSION's expense, and to prepare a report on items including the content, status and proper functioning of the Software on deposit. The agreement between the COMMISSION and such firm will include non-disclosure provisions deemed appropriate by the COMMISSION. Should any deficiencies or differences be noted between the System implemented under this Agreement and the applicable deposits delivered to the Escrow Agent, the COMMISSION shall provide Notice to the CONTRACTOR and shall provide the CONTRACTOR with a copy of the audit report. Within thirty (30) Calendar Days after its receipt of such notification and accompanying audit report, the CONTRACTOR shall deliver to the Escrow Agent for deposit the applicable Deposit Materials necessary to make the escrow deposits consistent with the System.

14.7 Release of Escrow Deposits

Except as may be otherwise provided in the Escrow Agreement, the Deposit Materials are to remain in Escrow unless or until withdrawal of such Deposit Materials is permitted in accordance with an Event of Default, pursuant to Section 21 of this Agreement, or upon end of the Contract, whether due to termination or expiration, at which time such Deposit Materials shall be provided to the COMMISSION subject to the limitations contained in the confidentiality provisions, and the terms of the Escrow Agreement, and shall be incorporated into the licenses granted to the COMMISSION hereunder.

In addition, effective upon any release of the Deposit Materials to the COMMISSION, the CONTRACTOR hereby grants to the COMMISSION and its designees a perpetual, irrevocable, universal, non-exclusive, fully-paid-up, royalty-free license to use, reproduce, adapt, modify, enhance and reverse engineer the source code form of the Software and all Deposit Materials for the purpose of supporting and maintaining the System, and for using, making, and having made derivatives of the Software and Deposit Materials in connection therewith. The license granted hereunder shall cover the full definition of Software, including components directly owned, developed or licensed by the CONTRACTOR, as well as components owned, developed or licensed by any CONTRACTOR affiliates, licensors, CONTRACTOR Parties, including third-party Software Suppliers.

15 Work for Hire

Except for Hardware, third-party licensed Software, and Software previously developed by CONTRACTOR, all Deliverables, including but not limited to source code, software, specifications, plans, designs and engineering, drawings, data, information or other written, recorded, photographic, or visual materials, trademarks, service marks, copyrights or other Deliverables produced by CONTRACTOR or any supplier in the performance of this Agreement shall be deemed "Work Product". All Work Product shall be considered Services for hire. Accordingly, except as set forth earlier in this paragraph, all Work Product shall be the exclusive property of the COMMISSION.

The CONTRACTOR agrees to notify the COMMISSION in writing before using any of CONTRACTOR's previously developed Software for services provided under this Agreement.

The CONTRACTOR and the COMMISSION will honor all applicable preexisting licenses, copyrights, trademarks, service marks, and patents. If as part of an expense item under this Agreement, the CONTRACTOR purchases the right to any license, the agreements for the use or ownership of such license will be placed in the name of the COMMISSION along with all other rights and obligations. In addition, the CONTRACTOR will mark all COMMISSION content or previously unprotected Work Product designated by the COMMISSION with a notice as follows: "Pennsylvania Turnpike Commission, (Year)".

The COMMISSION also shall have all rights, title and interest in and to inventions, Software (such software not a part of the License Agreement), ideas, designs and methods developed by the CONTRACTOR and any Subcontractors specifically for the COMMISSION ("COMMISSION Owned Inventions"). Such COMMISSION Owned Inventions shall include all specifications and other documentation related thereto.

Upon the request of the COMMISSION, the CONTRACTOR shall promptly execute or shall cause its employees, agents, Subcontractors, or Suppliers to execute, in a form specified by the COMMISSION, a transfer of rights to all COMMISSION Owned Inventions and data and documentation in which the COMMISSION has ownership rights. The COMMISSION may, at its option, regard this as an assignment by the CONTRACTOR of any proprietary rights it may otherwise have in and to all such materials.

In addition, the CONTRACTOR agrees to give the COMMISSION and any person designated by the COMMISSION any and all assistance required to perfect the rights defined in subparagraph a. of this Section, including, but not limited to, execution and delivery of all documents required by the

COMMISSION to document and protect the COMMISSION's proprietary rights in the COMMISSION Owned Inventions and data and documentation. Such assistance may also include filing applications for patent and copyright registration in the name of the COMMISSION and making all other necessary or appropriate filings with governmental entities so as to secure and maintain maximum protection for such COMMISSION Owned Inventions.

For such custom/developed software under this provision specifically for, or at the request or direction of, and paid for by the COMMISSION, the CONTRACTOR shall have worldwide, non-exclusive, royalty-free, perpetual license to use, modify, or sell for any legal business purposes, provided that the CONTRACTOR has credited the COMMISSION for the value of the retained license as reflected in the CONTRACTOR's invoice for the software.

16 Warranties

16.1 System Warranties

A full System warranty is required on all System Equipment, Hardware and Software for one (1) year beginning from the date of Acceptance by the COMMISSION. Notwithstanding the foregoing, all Servers provided under this Contract that are installed at the time of Acceptance shall have a warranty of not less than five (5) years from the date of Acceptance. During the System warranty period the COMMISSION shall not be charged for any Maintenance or support Work performed on the System other than Work identified as excluded in **Exhibit A Scope of Work.** Such excluded Work shall include Work related to Force Majeure events or agreed-to out of scope work requested by the COMMISSION, pursuant to Section 13 Extra Work and Engineering Change Orders. Notwithstanding the foregoing, in the period after installation and prior to Acceptance, all Maintenance Work shall also be at CONTRACTOR's sole expense. Such replacement, whether pre-or post-Acceptance, shall include any unit of Equipment, Hardware or Software, or part or component thereof, which the COMMISSION deems defective or insufficient, or which the COMMISSION deems to have failed to comply with the Scope of Work. All fees associated with restocking cancelled or returned orders shall be the responsibility of the CONTRACTOR. All defective Equipment replaced by the CONTRACTOR shall become the property of the CONTRACTOR.

16.2 Equipment and Installation Warranties

All Equipment and Hardware installed on the System after the initial System warranty period shall have a warranty for a period of not less than one (1) year from the date of Approved installation against defective materials, workmanship, and failure to perform in accordance with required Contract performance criteria. Notwithstanding the foregoing, all Servers provided under this Contract shall have a warranty of not less than five (5) years. Replacement or repair of all materials found defective within the applicable warranty period shall be made without cost to the COMMISSION, including transportation if applicable. Such replacement shall include any unit of Equipment or Hardware or part or component thereof, which the COMMISSION deems defective or insufficient, or which the COMMISSION deems to have failed to comply with the Scope of Work. All fees associated with restocking cancelled or returned orders shall be the responsibility of the CONTRACTOR. All defective Equipment replaced by the CONTRACTOR will become the property of the CONTRACTOR.

The provisions of this Section shall survive the expiration, cancellation, or termination of this Agreement.

16.2.1 Software Warranties

a) The Software needed to operate the System shall be as set forth in **Exhibit A Scope of Work**. The COMMISSION's Acceptance of the Software shall occur in accordance with the provisions of **Exhibit A Scope of Work**. The CONTRACTOR warrants that the Software and each module or component and function thereof shall:

   i) be free from defects in materials and workmanship under normal use;

   ii) remain in good working order, be free from viruses; trap doors; disabling devices; Trojan horses; disabling codes; back doors; time bombs; drop-dead devices; worms, and any other type of malicious or damaging code or other technology or means which has the ability to interfere with the use of the System by the COMMISSION or its designees, or permit access to the COMMISSION's computing systems without its knowledge or contrary to its system connectivity policies or procedures;

   iii) not interfere with Electronic Toll Collection;

   iv) operate and function fully, properly and in conformity with the warranties in this Agreement, and

   v) meet the Requirements set forth in sub-paragraphs in Section 16.2.1.b. (i-iii) and the subparagraphs in Section 16.2.1.c. (i through x).2 through 13 of this Section.

b) The CONTRACTOR represents and warrants that upon the COMMISSION's Acceptance of and for the Agreement term the Software will:

   i) operate fully and correctly in the operating environment identified in **Exhibit A Scope of Work**, including by means of the full and correct performance of the Software, and all updates, enhancements, or new releases of the Software, on or in connection with the Equipment, any updates, enhancements, or new releases to such Equipment, and any other Software used by or in connection with any such Equipment;

   ii) be fully compatible and Interface completely and effectively with the Equipment, including other Software programs provided to the COMMISSION hereunder, such that the Software and other Equipment combined will perform and continuously attain the standards identified in the Scope of Work, and

   iii) accurately direct the operation of the System, as required by the Scope of Work, and the descriptions, specifications and documentation set forth therein and herein.

c) During the term of the Contract the CONTRACTOR shall provide Services to Maintain the Software provided hereunder in good working order, keeping it free from defects such that the System shall perform in accordance with this Agreement, the Scope of Work, and the warranties set forth herein.

   i) The CONTRACTOR shall provide technical support and shall remedy any failure, malfunction, defect or non-conformity in Software, in accordance with the Scope of

Work, but in any event not later than the deadline(s) in **Exhibit A Scope of Work** Section 7 Maintenance Maintenance and Software Services.

ii) The CONTRACTOR shall provide the COMMISSION the most current release of all Software available on the date of delivery to maintain optimum performance pursuant to this Agreement.

iii) The CONTRACTOR shall promptly provide Notice to the COMMISSION in writing of any defects or malfunctions in the Software provided hereunder, regardless of the source of information. The CONTRACTOR shall promptly correct all defects or malfunctions in the Software or documentation discovered and shall promptly provide the COMMISSION with corrected copies of same, without additional charge. If Software can only be corrected in conjunction with additional or revised Hardware, the CONTRACTOR shall provide such Hardware to the COMMISSION, and the cost of such Hardware shall be borne solely by the CONTRACTOR.

iv) No updates or enhancements shall adversely affect the performance of the System, in whole or in part, or result in any failure to meet any Requirements of the Scope of Work.

v) The CONTRACTOR shall ensure continued satisfactory performance by the current operating system of the Software in accordance with all provisions of this Section 16.2.1.

vi) The CONTRACTOR shall obtain Maintenance agreements for third-party Software. The CONTRACTOR shall secure such Maintenance agreements for the same duration and upon the same terms and conditions as the Maintenance provisions between the CONTRACTOR and the COMMISSION. All third party contracts and licenses shall be assignable to the COMMISSION.

vii) In the event that the Software does not satisfy the conditions of performance set forth in **Exhibit A Scope of Work**, the CONTRACTOR is obligated to promptly repair or replace such Software at the CONTRACTOR's sole cost and expense or, if expressly agreed to in writing by the COMMISSION, provide different Equipment or Software, and perform Services required to attain the performance Requirements set forth in the Scope of Work.

viii) In the event of any defect in the media upon which any tangible portions of the Software is provided, the CONTRACTOR shall provide the COMMISSION with a new copy of the Software.

ix) Without releasing the CONTRACTOR from its obligations for warranty (during an applicable warranty period), support or Maintenance of the Software, the COMMISSION shall have the right to use and maintain versions of the Software provided by the CONTRACTOR which are one or more levels behind the most current version of such Software and to refuse to install any updates or enhancements if, in the COMMISSION's discretion, installation of such updates or enhancements would interfere with its Operations. The CONTRACTOR shall not, however, be responsible or liable for the effect of any error or defect in the version of the Software then in use by the COMMISSION that occurs after the CONTRACTOR has both (i) offered, by written notice to the COMMISSION, a suitable correction (by way of update, enhancement or otherwise) of such error or defect and (ii) provided the COMMISSION a reasonable opportunity to implement such existing correction, provided that the CONTRACTOR establishes that neither the implementation nor the use of such correction would limit, interfere with, adversely affect, or materially alter the interoperability, functionality or quality of the System.

x) All provisions of this Section 16.2.1, referring or relating to obligations to be performed pursuant to an applicable warranty period that extends beyond the term hereof, shall survive the expiration, cancellation, or termination of this Agreement.

16.2.2 Third-Party Warranties

In addition to the foregoing warranties, the CONTRACTOR shall assign to the COMMISSION, and the COMMISSION shall have the benefit of, any and all Subcontractors' and Suppliers' warranties and representations with respect to the System and Services provided hereunder. The CONTRACTOR's agreements with Subcontractors, Suppliers and any other third parties shall require that such parties (a) consent to the assignment of such warranties and representations to the COMMISSION, (b) agree to the enforcement of such warranties and representations by the COMMISSION in its own name, and (c) furnish to the COMMISSION, the warranties set forth herein. At the COMMISSION's request, the CONTRACTOR shall provide supporting documentation which confirms that these warranties are enforceable in the COMMISSION's name.

16.2.3 Services Warranties

The CONTRACTOR warrants that all Services shall be performed in a high-quality, professional manner by qualified and skilled personnel in compliance with the COMMISSION's Requirements as set forth in **Exhibit A Scope of Work**. In the event the COMMISSION determines that any Services do not conform to the foregoing warranty, the COMMISSION shall be entitled to elect one of the following remedies: (i) reperformance of the Services by the CONTRACTOR until the COMMISSION deems them to be in conformity with the warranty in this Section 16.2.3, at no charge to the COMMISSION; (ii) refund from the CONTRACTOR for all fees paid in connection with the Services, which the COMMISSION deems were not as warranted, subject to the provisions of Section 24 Liquidated Damages such that the CONTRACTOR is not required to refund fees for non-provision of Services for which Liquidated Damages have been assessed, (iii) reimbursement by the CONTRACTOR for the COMMISSION's costs and expenses incurred in having the Services re-performed by the COMMISSION or someone other than the CONTRACTOR. Notwithstanding the foregoing, nothing in this Section 16.2.3 shall be construed to limit the COMMISSION's rights pursuant to Section 23 Remedies in the Event of Default.

16.2.4 Data Accuracy

The CONTRACTOR acknowledges and understands that the data and/or information it collects, processes and/or provides to the COMMISSION will be relied upon by to the COMMISSION and other persons or entities that are now or will in the future be under Agreement with the COMMISSION. Should information derived and provided by CONTRACTOR be inaccurate and cause the COMMISSION to incur damages or additional expenses, the COMMISSION shall notify CONTRACTOR and the CONTRACTOR shall immediately place any applicable insurance carrier on Notice of a potential claim. This provision shall survive termination of this Agreement, and the CONTRACTOR agrees to waive any applicable limitation periods consistent with enforcement of this provision.

16.2.5 Additional Warranties

The CONTRACTOR warrants the following:

a) All guarantees and warranties made herein are fully enforceable by the COMMISSION acting in its own name.

b) The Equipment and Systems the CONTRACTOR installs and places into operation will not result in any damage to existing facilities, walls or other parts of adjacent, abutting or overhead buildings, structures, surfaces, or any physical/mental damage to any individual utilizing any units(s) of Equipment.

c) All provided equipment is new and unused.

17 Pervasive Defects

The CONTRACTOR agrees to promptly remedy, at no cost to the COMMISSION, any defects determined by the COMMISSION to be pervasive, such that if the COMMISSION determines that any Equipment, component, sub-component or Software is experiencing continued or repetitive failure that requires constant replacement or repair, the CONTRACTOR agrees that a “Pervasive Defect” shall be deemed to be present in such affected types of Equipment or Software. The CONTRACTOR shall then be required to investigate, develop and deploy, at no additional expense to the COMMISSION, all required component or System performance improvements to remediate this condition.

A resolution plan shall be produced by the CONTRACTOR and submitted to the COMMISSION within seven (7) days of notification of the Pervasive Defect. The plan shall include the investigation results, remediation steps performed to-date, and a plan and schedule to complete the Pervasive Defect resolution. The status shall be updated and briefed in weekly meetings until complete resolution.

The obligations set forth in this Section shall be in addition to any warranty obligations set forth in this Agreement. The provisions of this Section shall survive the expiration or earlier termination of this Agreement.

18 Unforeseen Circumstances

Except as otherwise provided in this Agreement, all loss or damage arising from any unforeseen obstruction or difficulties, whether natural or artificial, which may be encountered in the prosecution of the Work, or the furnishing of the supplies, materials or equipment, or from any action of the elements in the Implementation or Maintenance Phases, or of the supplies, materials or Equipment, or from any act or omission not authorized by the Agreement on the part of the CONTRACTOR or any agent or person employed by it, and which does not constitute a Force Majeure event shall be the responsibility of and be borne solely by CONTRACTOR.

19 Risk of Damage and Loss to Cashless Tolling System

CONTRACTOR shall bear all risk of damage or loss to the Cashless Tolling System , including all materials, Equipment and property required for the implementation of the Project, any System equipment located off-site for repair or any other reason (with the exception of materials, Equipment or property located at the COMMISSION’s office or any other site the usage of which is exclusively controlled by the COMMISSION) except for damage and loss caused by the sole negligence or wrong-doing of the COMMISSION.

In the case of damage or loss that the COMMISSION agrees was caused by the sole negligence of the COMMISSION, CONTRACTOR shall promptly replace the damaged or lost portions of the System at CONTRACTOR's cost after such cost is pre-Approved by the COMMISSION, and submit the amount(s) thus expended to the COMMISSION for reimbursement as a clearly identified, separate item on its next invoice to the COMMISSION.

20 Force Majeure

Either party is excused from performance hereunder if such non-performance results from acts of God, war, riots, acts of governmental authorities, or any other cause that could not have been reasonably anticipated and which could not be overcome by the exercise of due diligence or planning by the non-performing party. In the event of the occurrence of a Force Majeure event, the party unable to perform shall promptly notify the other party. It shall further pursue its best efforts to resume performance as quickly as possible and shall suspend performance only for such period of time as is necessary as a result of the Force Majeure event.

21 Event of Default

a) An Event of Default shall mean a material breach of this Agreement by the CONTRACTOR. Without limiting the generality of the foregoing and in addition to those instances referred to elsewhere in this Agreement as a breach, an Event of Default shall include the following:

    i) the CONTRACTOR failed to transmit and process transactions and data in accordance with this Agreement;

    ii) the CONTRACTOR materially inhibited the COMMISSION’s collection of toll revenue;

    iii) the CONTRACTOR has not submitted acceptable Deliverables to the COMMISSION on a timely basis;

iv) the Software/Equipment proves incapable of meeting the functional and/or performance Requirements set forth in **Exhibit A Scope of Work**;

v) the CONTRACTOR refused or failed, except in cases for which an extension of time is provided, to supply enough properly skilled workers or proper materials to properly perform the Services required under this Agreement;

vi) the CONTRACTOR failed to make prompt payment to Subcontractors or Suppliers for materials or labor;

vii) the CONTRACTOR has become insolvent (other than as interdicted by the bankruptcy laws), or has assigned the proceeds received from this Agreement for the benefit of its creditors, or it has taken advantage of any insolvency statute or debtor/creditor law or if the CONTRACTOR's property or affairs have been put in the hands of a receiver;

viii) any case, proceeding or other action against the CONTRACTOR is commenced in bankruptcy, or seeking reorganization, liquidation or any relief under any bankruptcy, insolvency, reorganization, liquidation, dissolution or other similar act or law of any jurisdiction, which case, proceeding or other action remains undismissed, undischarged or unbonded for a period of thirty (30) Calendar Days;

ix) the CONTRACTOR fails to maintain insurance policies and coverages or fails to provide proof of insurance or copies of insurance policies as required by this Agreement;

x) any warranty, representation, certification, financial statement or other information made or furnished to induce the COMMISSION to enter into this Agreement, or made or furnished, at any time, in or pursuant to the terms of this Agreement or otherwise by the CONTRACTOR, or by any person who guarantees or who is liable for any obligation of the CONTRACTOR under this Agreement, shall prove to have been false or misleading in any material respect when made;

xi) any intentional violation by the CONTRACTOR of the ethics provisions, or applicable laws, rules or regulations;

xii) the CONTRACTOR has failed to obtain the Approval of the COMMISSION where required by this Agreement;

xiii) the CONTRACTOR has failed to provide "adequate assurances" as required under subsection (b) below;

xiv) the CONTRACTOR's Audited Financial Statements or those of its parent company submitted to the COMMISSION do not fairly represent the CONTRACTOR or its parent's true financial position;

xv) the CONTRACTOR has failed in the representation of any warranties stated herein;

xvi) the CONTRACTOR makes a statement to any representative of the COMMISSION indicating that the CONTRACTOR cannot or will not perform any one or more of its obligations under this Agreement;

xvii) the CONTRACTOR fails to remedy Pervasive Defects;

xviii) any act or omission of the CONTRACTOR or any other occurrence which makes it improbable at the time that the CONTRACTOR will be able to perform any one or more of its obligations under this Agreement;

xix) any suspension of or failure to proceed with any part of the Services by the CONTRACTOR which makes it improbable that the CONTRACTOR will be able to perform any one or more of its obligations under this Agreement;

xx) a pattern of repeated failures to meet the performance metric or metrics as defined in **Exhibit A Scope of Work**;

xxi) the suspension or revocation of any license, permit, or registration necessary for the performance of the CONTRACTOR's obligations under this Agreement; or

xxii) the default in the performance or observance of any of the CONTRACTOR's other obligations under this Agreement and the continuance thereof for a period of thirty (30) Calendar Days after Notice given to the CONTRACTOR by the COMMISSION.

b) Actions in Event of Default

When, in the opinion of the COMMISSION, reasonable grounds for uncertainty exist with respect to the CONTRACTOR's ability to perform the Services or any portion thereof, the COMMISSION may request that the CONTRACTOR, within the time frame set forth in the COMMISSION's request, provide adequate assurances to the COMMISSION, in writing, of the CONTRACTOR's ability to perform in accordance with terms of this Agreement. Until the COMMISSION receives such written assurances, the COMMISSION may suspend all payments to the CONTRACTOR. In the event that the CONTRACTOR fails to provide to the COMMISSION the requested assurances within the prescribed time frame, the COMMISSION may:

i) treat such failure as a repudiation of this Agreement;

ii) resort to any remedy for breach provided herein or at law or equity, including, but not limited to, taking over the performance of the Services or any part thereof either by itself or through others;

iii) remove all technical documentation deposited with the escrow agent (as defined in Section 14 License and Software) as set forth in the Escrow Agreement, with the purpose of competitively procuring any Equipment or Software or providing any Services based on such documentation;

iv) suspend the CONTRACTOR's performance hereunder, and

v) notify the surety and take other steps in accordance with the terms of the performance bond.

The enumeration in this Section or elsewhere in this Agreement of specific rights or remedies of the COMMISSION shall not be deemed to limit any rights or remedies which the COMMISSION would have in the absence of such enumeration and no exercise by the COMMISSION of any right or remedy shall operate as a waiver of any other of the COMMISSION's rights or remedies not inconsistent therewith or to stop the COMMISSION from exercising such other rights or remedies.

22 Notice of Default/Chance to Cure and Termination

Without limiting the COMMISSION's rights under subparagraph (b) of the preceding Section, the COMMISSION may terminate this Agreement if, within a period of thirty (30) Calendar Days after the CONTRACTOR has received Notice from the COMMISSION that an Event of Default has occurred under subparagraph (a) of Section 21 Event of Default, the CONTRACTOR has not remedied such Event of Default or, if such event is one not reasonably curable within thirty (30) Calendar Days, the CONTRACTOR has not commenced and continued to pursue with due diligence a remedy for any such Event of Default and has not cured such Event of Default within ninety (90) Calendar Days of the Notice of Event of Default.

The COMMISSION may terminate this Agreement immediately without notice upon an Event of Default of the character described in subparagraphs 7 through 11, inclusive, of subparagraph (a) of Section 21, Event of Default.

23 Remedies in Event of Default

Upon the occurrence of an Event of Default, and at any time thereafter during the continuation of such Event of Default, the COMMISSION may exercise any right or remedy available to it in law or equity to enforce all rights under this Agreement, including any one or more of the following remedial steps:

a) Take any action at law or in equity to enforce performance and observance of any obligation, agreement or covenant of the CONTRACTOR under this Agreement.

b) Perform or cause to be performed for the account of the CONTRACTOR any covenant in the performance of which the CONTRACTOR is in default or make any payment for which the CONTRACTOR is in default. The CONTRACTOR shall pay to the COMMISSION upon demand any amount paid or incurred by the COMMISSION in the performance of such covenant. For any amounts which have been paid or incurred by reason of failure of the CONTRACTOR to comply with any covenant or provision of this Agreement, including reasonable counsel fees incurred in connection with prosecution or defense of any proceedings instituted by reason of default of the CONTRACTOR, such amounts shall bear interest at the Default Rate, which shall be defined as the Prime Rate, from the date of payment by the COMMISSION until paid by the CONTRACTOR and shall be secured by the financial assurance instruments described in Section 29 Surety Bonds. The Prime Rate shall be determined to be the Prime Rate of Interest published by the Wall Street Journal, or if the published rate is a range, shall be the highest of such range.

c) The COMMISSION, or its designated representatives, shall have the right to immediately take possession of all applicable Equipment and data, and the applicable facilities that house such items. The COMMISSION, as part of its right to complete or cause to be completed the Scope of Work, may: take possession of and use any or all of the materials, plants, tools, technical specifications, drawings, Equipment, supplies and property of every kind, provided, purchased, maintained, leased, owned, or rented by the CONTRACTOR, including but not limited to all Deposit Materials, as defined in the Escrow Agreement, placed into escrow in accordance with the Agreement; make available any or all of the foregoing items; and/or procure other materials, plant, tools, Equipment, and supplies and may charge the CONTRACTOR, and the CONTRACTOR shall be liable to the COMMISSION for the expense of said labor, materials, plant, tools, Equipment, supplies and property. Such procurement shall in no event be deemed a breach by the COMMISSION of what might otherwise be its obligations under this Agreement. All leases and sub-leases of property, buildings and Equipment shall contain provisions that permit the COMMISSION to assume the CONTRACTOR's obligation and take control of the property, buildings or Equipment pursuant to the terms of this Agreement. The CONTRACTOR shall provide the COMMISSION with copies of such leases and sub-leases for Approval for the purposes of this sub-paragraph.

In addition to the foregoing, if an Event of Default occurs, or the CONTRACTOR threatens to commit an Event of Default, the COMMISSION shall have the right and remedy, without posting bond or other security, to have the provisions of this Agreement specifically enforced by any court having equity jurisdiction, it being acknowledged and agreed that any such Event of Default will cause irreparable injury to the COMMISSION and that money damages will not always provide an adequate remedy therefor.

This Section 23 shall survive termination, cancellation, or expiration of this Agreement.

24 Liquidated Damages and Performance Adjustments

24.1 Liquidated Damages for Delays in Completion of the Commissioning

Liquidated damages in the amount of up to $30,000 per Calendar Day shall be assessed for the CONTRACTOR's failure to complete Commissioning at locations on the Mainline including the Northeast Extension, in accordance with the Approved Project Schedule, but in no event, shall liquidated damages exceed $2,000,000.00 under this subparagraph. Liquidated damages associated with future optional locations shall be determined at the time of development of associated Supplemental Agreements.

24.2 Lane Rental Fees in Maintenance and Implementation Phases

Lane Rental Fees shall be charged to the CONTRACTOR in the event that the CONTRACTOR fails to reopen a toll lane or lanes of traffic within the allowable lane closure time limits and the lanes remain closed during a time period in which a lane closure is not allowed. Allowable lane closure time limits will be defined as part of Approved lane closure plans with regard to daily, weekend and Holiday period closures for the CONTRACTOR's use and occupancy in order to perform Contract Work. During the allowable lane closure time limits, the COMMISSION will not assess Lane Rental Fees.

a) The chargeable Lane Rental Fee rate per hour per lane or any portion thereof is $1,600.00 for work within the Mainline including the Northeast Extension project area. Lane Rental Fees for work within the Mainline including the Northeast Extension project area during Implementation Phase shall not exceed $1,000,000.00 and during the Operation and Maintenance Phase shall not exceed $1,000,000.00. Lane Rental Fees associated with future optional locations shall be determined at the time of development of associated Supplemental Agreements.

b) Lane Rental Fees will be deducted from CONTRACTOR’s next monthly invoice.

24.3 Performance Adjustments during Maintenance Phase

Payment reductions will be assessed not as a penalty, but as liquidated damages for not meeting the Maintenance Performance Standard Requirements set forth in Section 7.22 Performance Requirements for the Cashless Tolling System and Liquidated Damages of **Exhibit A Scope of Work.** In no event will liquidated damages under this subparagraph exceed $1,000,000.00. If in the performance of the Services the CONTRACTOR does not meet or exceed the performance standards identified in Section 7.22 of Exhibit A Scope of Work, the COMMISSION shall reduce the amount it would otherwise pay to the CONTRACTOR for such Services subject to the reduction amounts and limits set forth in therein.

25 Actual Damages

The CONTRACTOR acknowledges that its performance is critical to the operation of the COMMISSION in so much as the Services to be provided pursuant to this Agreement directly involve the COMMISSION’s revenue and customer service. The CONTRACTOR agrees that the actual damages set forth below are fair and reasonable and shall be incurred by the CONTRACTOR in the event of unsatisfactory performance:

The CONTRACTOR shall reimburse the COMMISSION for any revenue, which the COMMISSION identifies as having been lost due to the fault of the CONTRACTOR. Lost revenue includes, but is not limited to such events as lost transactions; lost images; lost data; revenue lost due to data security breach; transactions that are not able to be collected upon due to delays in processing; CONTRACTOR-caused delays in escalation or customer notifications that exceed statutory requirements, and transactions which are otherwise unable to be posted to customer accounts due to the fault of the CONTRACTOR.

The CONTRACTOR shall be responsible for any other costs incurred, which are the results of its improper handling of these Services, including such things as special mailings to customers to notify them of a mistake in their monthly statements due to transaction gathering and processing failures and inaccuracies.

The COMMISSION may choose, in its sole discretion, to recover such lost revenue from the CONTRACTOR by deducting such amounts from payments otherwise due and owing from the COMMISSION to the CONTRACTOR.

26 Limits on Liability

26.1 Limitation of Damages

26.a. In no event will the COMMISSION be liable to the CONTRACTOR for any loss of profits or anticipated revenues, loss of use of equipment or facilities, loss of labor, downtime costs, claims of customers, or other consequential or incidental damages resulting from any non-performance of obligations under this Agreement. Damages recoverable by CONTRACTOR hereunder will be limited to out-of-pocket costs actually paid by CONTRACTOR which are a direct and proximate result of a breach of legal duty by the COMMISSION. This limitation applies to any claim, whenever asserted by CONTRACTOR, and whether disputed in arbitration or judicial proceedings.

26.b. In no event will the CONTRACTOR be liable to the COMMISSION for any amounts in excess of five million dollars ($5,000,000.00), except amounts excluded from such limit by Section 26.c.1. hereof; provided, however, that this limitation of liability will not limit, in any manner, the rights of the COMMISSION, its Commissioners, officers, servants, agents and employees, as Additional Insureds under any policy of insurance issued to CONTRACTOR. Otherwise, this limitation applies to any claim, whenever asserted by the COMMISSION, and whether disputed in arbitration or judicial proceedings.

26.c. Except as limited by Section 26.b, CONTRACTOR shall be liable for any and all direct damages suffered or incurred by the COMMISSION as a result of any default by the CONTRACTOR in its obligations under this Agreement. However, in no event will the CONTRACTOR be liable for any other damages, including indirect, incidental, consequential, special or punitive damage of any kind in connection with or arising out of this Agreement, whether alleged as a breach of contract or tortious conduct, including negligence. Without limiting the generality of the foregoing, the CONTRACTOR shall not be liable for the loss of toll collection revenues or lost profits, unless directly resulting from the gross negligence or willful misconduct of the CONTRACTOR. The COMMISSION shall take commercially reasonable action to mitigate any direct damages, lost profits or lost toll collection revenues.

26.c.1 Except for the CONTRACTOR’s liability for Special Obligations (as defined below) under no circumstances will the CONTRACTOR’s liability for claims under this Agreement and the Software License, howsoever arising, exceed $5,000,000 minus any claims previously paid (excluding claims arising out of Special Obligations). $5,000,000 is the total cumulative liability of the CONTRACTOR for all claims under this Part 26.c.1 and the Software License, excluding claims arising out of Special Obligations. The parties acknowledge that the foregoing limitations were a material inducement to the CONTRACTOR to enter into this Agreement and represent an acceptable allocation of risk. This limitation on liability shall not apply to or limit the obligation or liability of the CONTRACTOR with respect to any of the following obligations (“Special Obligations”):

26.c.1.1 the obligation of the CONTRACTOR (at its sole cost and expense) to correct any problem in the operation and performance of the Host System (as defined below), where such problems has resulted in a Total Failure of the Host System (as defined below),

26.c.1.2 the obligation of the CONTRACTOR to pay any liquidated damages specifically provided for under the terms of this Agreement.

26.c.1.3 any obligation of the CONTRACTOR under this Agreement or the Software License to indemnify the COMMISSION with respect to any infringement claims, and

26.c.1.4 any obligation of the CONTRACTOR to pay any damages directly resulting from the gross negligence or willful misconduct of the CONTRACTOR. In the event of a Total

Failure of the Host System, the sole and exclusive remedies of the COMMISSION shall be to enforce the foregoing Special Obligations of the CONTRACTOR. Any amounts paid or incurred by the CONTRACTOR in connection with Special Obligations shall be excluded from the $5,000,000.00 limitation on liability set forth in this Section.

27 COMMISSION'S Purchase Rights

The COMMISSION reserves the right to purchase Equipment, Hardware and licenses directly from a third-party supplier or original manufacturer.

28 Insurance

The CONTRACTOR, prior to execution of this Agreement, shall furnish to the COMMISSION the certificates of insurances as required in attached Exhibit H and made a part of this Agreement.

29 Surety Bonds

When awarded the Contract, Contractor shall furnish a Performance Bond with sufficient surety or sureties, in an amount equal to 100% of the Contract Implementation Phase price. Have the bond specify that the contracted work will be completed in a manner satisfactory to the COMMISSION. Have the bond state that the COMMISSION is not liable for any expenses incurred through the failure to complete the work as specified, nor liable for any damages growing out of the carelessness of the Contractor, the Contractor's employees, or subcontractors. Also furnish a Payment Bond in the amount of 100% of the Contract Implementation Phase price. Have a corporate surety, legally authorized to transact business in the State and that have an A.M. Best's rating of no less than A-, with a financial size category of IX, or better, execute both bonds. If the COMMISSION decides the bond surety is unsatisfactory, promptly furnish any additional required security to protect the COMMISSION's interests and the interests of all persons, firms, or corporations who/which have furnished material, provided equipment on rental, or supplied/performed labor or services on, or in connection with, the performance of the work for this contract. For a joint venture bid, an authorized general partner or corporate officer of the lead joint venture will be responsible for proper execution of the bonds.

Upon commencement of the Contract Maintenance Phase, Contractor shall furnish a Performance Bond and a Payment Bond, with sufficient surety or sureties, in an amount calculated as the sum of Year 1 maintenance as identified in the Contractor's Price Proposal. For each year thereafter the Maintenance Bond shall be equal to the sum of the gross invoice amounts (prior to any deductions for Non-Compliance Payments) for the previous twelve (12) months.

Performance bond coverage shall be continuous and shall be required on all open base or option project as a part of the Contract that have not yet been Approved or closed-out. Once a project has been Approved as complete and is closed out the bond value may be reduced by the dollar amount of the bond associated with the close-out.

30 Indemnification and Duty to Defend

The CONTRACTOR shall be responsible for, and shall indemnify, defend, and hold harmless the COMMISSION and its Commissioners, officers, employees, and agents from any claim, liability, damages, losses, causes of action, and expenses, including reasonable attorneys' fees, arising from damage to life or bodily injury or real or tangible personal property caused by the negligence or other tortious acts, errors, and omissions of CONTRACTOR, its employees, or its subcontractors while engaged in performing the work of this Agreement or while present on the COMMISSION's premises, and for breach of this Agreement regarding the use or disclosure of proprietary and confidential information where it is determined that CONTRACTOR is responsible for any use of such information not permitted by this Agreement. The indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for CONTRACTOR or its subcontractors under Worker's Compensation Acts, Disability Benefits Acts, or other Employee Benefit Act.

Further, for all intellectual property rights in effect at the time of contract signature, CONTRACTOR shall defend all suits and claims for infringement of any patent or other intellectual property rights and shall save and hold the COMMISSION, its agents, and assigns harmless from loss on account thereof resulting from the use by the COMMISSION or any of its employees or agents of equipment or intellectual property supplied under this Agreement. This patent infringement provision shall not apply to any infringement which has been established to be the result of or to have arisen solely out of the COMMISSION, its employees or agents modifying or altering any part or component, alone or in combination with any other part or component, except as consented to by CONTRACTOR.

31 Data/Information Security Breach Notification

"Breach" shall mean any attempted or successful unauthorized acquisition, access, use, or disclosure of COMMISSION data that compromises the security or privacy of such data.

"Commission Data" means COMMISSION provided information and COMMISSION related information acquired as a result of the services provided to COMMISSION under this Agreement.

CONTRACTOR shall report to the COMMISSION any Breach affecting COMMISSION Data. The notice to be provided to the COMMISSION by CONTRACTOR shall be provided without unreasonable delay and no later than within 48 hours of CONTRACTOR's discovery of any Breach. A Breach shall be deemed to be discovered on the first day on which the CONTRACTOR knows or reasonably should have known of the Breach. The notice to be provided to the COMMISSION by CONTRACTOR shall be made in writing to the COMMISSION's Information Security Officer and shall include the following content: (i) the nature of the Breach; (2) the specific Commission Data affected by the Breach; (3) the steps the CONTRACTOR is taking to remediate the Breach; and (4) steps the CONTRACTOR is taking to mitigate future Breaches. Following notification of the Breach, CONTRACTOR shall cooperate with the COMMISSION's investigation of the Breach and provide any other information regarding the Breach or the Commission Data affected which the COMMISSION may reasonably request. Should notice to individuals whose information was part of Commission Data be required under any applicable data privacy law, including, but not limited to, individual state data breach notice laws or federal laws such as HIPAA and Graham Leach Bliley Act, CONTRACTOR shall provide the COMMISSION with copies of any template notification letters and draft regulatory correspondence for COMMISSION's prior approval. CONTRACTOR shall provide any notifications required under the applicable data privacy laws on behalf of the COMMISSION at the request of COMMISSION. The COMMISSION reserves the right to handle any notifications required and shall notify CONTRACTOR if the COMMISSION will be handling the required notifications. Upon request, CONTRACTOR shall provide the COMMISSION with its cyber-security policies and procedures. CONTRACTOR agrees to reimburse the COMMISSION for any and all reasonable costs associated with the COMMISSION's response to CONTRACTOR's Breach, including any fees associated with the COMMISSION's investigation of CONTRACTOR's Breach, notification costs, and any reasonable offer of credit or identity monitoring product.

32 Virus, Malicious, Mischievous or Destructive Programming

Licensor warrants that the licensed product as delivered by Licensor does not contain any viruses, worms, Trojan Horses, or other malicious or destructive code to allow unauthorized intrusion upon, disabling of, or erasure of the licensed products (each a "Virus").

The Commission's exclusive remedy, and Licensor's sole obligation, for any breach of the foregoing warranty shall be for Licensor to (a) replace the licensed products with a copy that does not contain Virus, and (b) if the Commission, has suffered an interruption in the availability of its computer system caused by Virus contained in the licensed product, reimburse the Commission for the actual reasonable cost to remove the Virus and restore the Commission's most recent back up copy of data provided that:

- the licensed products have been installed and used by the Commission in accordance with the Documentation;
- the licensed products have not been modified by any party other than Licensor;
- the Commission has installed and tested, in a test environment which is a mirror image of the production environment, all new releases of the licensed products and has used a generally accepted antivirus software to screen the licensed products prior to installation in its production environment.

Under no circumstances shall Licensor be liable for damages to the Commission for loss of the Commission's data arising from the failure of the licensed products to conform to the warranty stated above.

33 Diverse Business (DB) Requirements

The CONTRACTOR agrees to comply with the requirements set forth in the COMMISSION'S DB Requirements - Exhibit I, attached and made part of this Agreement. In particular, the CONTRACTOR agrees to comply with section (d) Consultant Requirements During Performance of Services.

34 Assignment and Delegation

The CONTRACTOR may not transfer, assign, or delegate any terms of this Agreement, in whole or in part, without prior written permission from the COMMISSION.

35 Benefit

Subject to the provisions hereof with respect to assignment, this Agreement shall be binding upon and shall inure to the benefit of the parties hereto and their respective successors and permitted assigns.

36 Governing Law

This Agreement will be interpreted according to the laws of the Commonwealth of Pennsylvania.

37 Independent CONTRACTOR

The CONTRACTOR is and shall be, in all respects, an independent CONTRACTOR in performing Services pursuant to the Agreement. In accordance with its status as an independent CONTRACTOR, the CONTRACTOR shall covenant and agree that neither it nor its agents and/or employees will hold itself or themselves out as or claim to be an officer or employee of the COMMISSION, and that neither the CONTRACTOR nor its agents and employees shall make any claim, demand or application to or for any right or privilege applicable to an officer or employee of the COMMISSION, including, but not limited to Workers' Compensation coverage, Unemployment Insurance benefits, Social Security coverage or Retirement System membership or credit.

38 No Third Party Beneficiary

Nothing in this Agreement shall act to confer third party beneficiary rights. Nothing in this Agreement shall create any obligation on the part of the COMMISSION to any third party.

39 Language

If any words and descriptions used in this Agreement are defined pursuant to RFP Exhibit B Defined Terms and Acronyms, they shall have the meaning prescribed therein, except when it is clear from the context that another meaning is intended.

As used in this Agreement, unless the express terms or context herein clearly otherwise require:

a) Terms referred to in the singular shall include the plural (and vice versa);

b) References to Articles, Sections and Chapters are to articles, sections and chapters of this Agreement;

c) References to Appendices, Attachments, Exhibits and Schedules or appendices, attachments, exhibits and schedules hereto, all of which will be incorporated and made a part of this Agreement;

d) Captions and headings are used for convenience of reference only and shall not be construed to modify the meaning of the terms and conditions of this Agreement;

e) References to any law or regulation shall be construed as including all statutory and regulatory provisions amending, replacing, supplementing or interpreting such law or regulation, and any corresponding provisions of successor laws or regulations;

f) References to agreements and contracts shall include any amendments and supplements thereto duly executed from time to time;

g) “Including” is used in the inclusive sense of “including, without limitation”;

h) “Or” is used in the inclusive sense of “and/or”;

i) “Any” is used in the inclusive sense of “any and/or all”;

j) “Herein,” “hereof”, “hereunder” and words of similar effect shall refer to the entirety of this Agreement; and

k) In computing any period of time fixed by the terms of this Agreement, the day of the act or event from which the designated period begins to run is not to be included, but the last day of the period so computed is to be included.

The language of all provisions of this Agreement shall be construed according to its fair meaning and not strictly against any party.

40 Survival of Terms

In addition to those Sections noted in this Agreement as surviving the termination, cancellation, or expiration of this Agreement, the terms of this Agreement, the CONTRACTOR’s obligations and the obligations of the COMMISSION under this Agreement, which by their nature would reasonably be understood to continue beyond the termination, cancellation, or expiration hereof, shall survive termination, cancellation, or expiration hereof.

41 Notices

All notices, requests, demands and other communications required or permitted hereunder, other than with respect to daily operations and Maintenance, shall be in writing and shall be deemed to have been duly given (a) if delivered by hand or nationally recognized overnight delivery service, when delivered; (b) if by facsimile, on the first Business Day when received, or (c) if by mail, five (5) Business Days after being mailed, certified or registered mail, with postage prepaid as follows:

a) If to the COMMISSION, to the address and to the attention indicated on the execution page of this Agreement.

b) If to the CONTRACTOR, to the address and to the attention set forth on the execution page of this Agreement.

Any party may change such addresses by providing a Notice in accordance with this Section

42 Audit/Retention of Records

CONTRACTOR and its subcontractors shall maintain books and records related to performance of this Agreement or subcontract and necessary to support amounts charged to the COMMISSION in accordance with applicable law, terms and conditions of this Agreement, and generally accepted accounting practice. CONTRACTOR shall maintain these books and records in accordance with the latest applicable version of the PTC Records Management Manual and Records Retention Schedule. All books and records shall be available for review or audit by the COMMISSION, its representatives, and other governmental entities with monitoring authority upon reasonable notice and during normal business hours. CONTRACTOR agrees to cooperate fully with any such review or audit. If any audit indicates overpayment to CONTRACTOR, or subcontractor, the COMMISSION shall adjust future or final payments otherwise due. If no payments are due and owing to CONTRACTOR, or if the overpayment exceeds the amount otherwise due, CONTRACTOR shall immediately refund all amounts which may be due to the COMMISSION. Failure to maintain the books and records required by this Section shall establish a presumption in favor of the COMMISSION for the recovery of any funds paid by the COMMISSION under this Agreement for which adequate books and records are not available to support the purported disbursement.

43 Dispute_Resolution

All questions or disputes regarding any matter involving this Agreement or its breach shall be referred to the Board of Claims of the Commonwealth of Pennsylvania pursuant to 62 Pa.C.S.A. § 1701 et seq.

To resolve disputes early in the process, before filing a claim under § 1701 et seq., the CONTRACTOR's Project Manager shall submit notice of intent to claim to the COMMISSION's Project Manager, in writing, within 10 days of the act or omission. This notice of intent will give the COMMISSION the opportunity to investigate the claim and to maintain and document information for future resolution or litigation of the claim. The CONTRACTOR's Project Manager and the COMMISSION's Project Manager shall attempt to resolve all disputes. If a dispute cannot be resolved between these project managers, the dispute will be referred to the CONTRACTOR's Project Principal and the COMMISSION's Project Principal for resolution.

Ultimately under 62 Pa.C.S.A. § 1701 et seq. and specifically § 1712.1, CONTRACTOR must file the claim in writing with the COMMISSION's Contracting Officer within 6 months of the date it accrues and not thereafter. If the CONTRACTOR fails to file the claim or does not timely file the claim, the CONTRACTOR is deemed to have waived its right to assert the claim in any forum. Claims not filed within the specified time period will be disregarded by the Contracting Officer. The claim, when filed, must state all grounds upon which the claim is based and must include a copy of the previously submitted notice of intent to claim.

The Contracting Officer will attempt to settle and resolve the claim with the CONTRACTOR. The Contracting Officer, at his or her discretion, may conduct a claim review meeting to attempt to settle and resolve the claim with the CONTRACTOR. If a claim review meeting is held, it will be attended by representatives of the CONTRACTOR and such COMMISSION representatives as the Contracting Officer considers appropriate.

If the claim is not resolved by agreement between the Contracting Officer and the CONTRACTOR, the Contracting Officer will issue a determination in writing, regarding the claim and will mail it to the CONTRACTOR by first class mail. The determination will be mailed within 120 days of the date on which the Contracting Officer received the claim, unless the 120 day period is extended by consent of the Contracting Officer and the CONTRACTOR. If the Contracting Officer fails to issue a final determination within the 120 days, unless extended by consent of the Contracting Officer and the CONTRACTOR, the claim will be deemed denied. The determination of the Contracting Officer will be the final order of the COMMISSION regarding the claim. The determination of the Contracting Officer will be conclusive and binding upon the CONTRACTOR unless the CONTRACTOR appeals the determination by filing a statement of claim with the Board of Claims within 15 days of the mailing date of the determination, or, if no extension is agreed to by the Contracting Officer and the CONTRACTOR, within 135 days of the receipt by the Contracting Officer of the claim, whichever occurs first.

If the Board of Claims either refuses or lacks jurisdiction, these questions or disputes shall proceed as provided in 42 Pa.C.S.A. § 7301 et seq. (Statutory Arbitration). The panel of arbitrators will consist of a representative of each of the parties and a third party chosen by the representatives, or if the representatives are unable to choose, by the American Arbitration Association.

44 CONTRACTOR Integrity Provisions

It is essential that those who seek to contract with the COMMISSION observe high standards of honesty and integrity. They must conduct themselves in a manner that fosters public confidence in the integrity of the COMMISSION contracting and procurement process.

I. DEFINITIONS. For purposes of these CONTRACTOR Integrity Provisions, the following terms shall have the meanings found in this Section:

a. **"Affiliate"** means two or more entities where (a) a parent entity owns more than fifty percent of the voting stock of each of the entities; or (b) a common shareholder or group of shareholders owns more than fifty percent of the voting stock of each of the entities; or (c) the entities have a common proprietor or general partner.

b. **"Consent"** means written permission signed by a duly authorized officer or employee of the COMMISSION, provided that where the material facts have been disclosed, in writing, by prequalification, bid, proposal, or contractual terms, the COMMISSION shall be deemed to have consented by virtue of the execution of this contract.

c. **"Contractor"** means the individual or entity, that has entered into this contract with the COMMISSION, and "Contractor Related Parties" means any affiliates of the Contractor and the Contractor's executive officers, Pennsylvania officers and directors, or owners of 5% or more interest in the Contractor

d. **"Financial Interest"** means either:

i. Ownership of more than a five percent interest in any business; or

ii. Holding a position as an officer, director, trustee, partner, employee, or holding any position of management.

e. **"Gratuity"** means tendering, giving, or providing anything of monetary value including, but not limited to, cash, travel, entertainment, gifts, meals, lodging, loans, subscriptions, advances, deposits of money, services, employment, or contracts of any kind. See Commission Policy 3.10, Code of Conduct.

f. **"Non-bid Basis"** means a contract awarded or executed by the COMMISSION with Contractor without seeking bids or proposals from any other potential bidder or offeror.

II. In furtherance of this policy, Contractor agrees to the following:

1. Contractor shall maintain the highest standards of honesty and integrity during the performance of this contract and shall take no action in violation of state or federal laws or regulations or any other applicable laws or regulations, or other requirements applicable to Contractor or that govern contracting or procurement with the COMMISSION.

2. Contractor shall establish and implement a written business integrity policy, which includes, at a minimum, the requirements of these provisions as they relate to Contractor activity with the COMMISSION and COMMISSION employees and which is made known to all Contractor employees. Posting these Contractor Integrity Provisions conspicuously in easily-accessible and well-lighted places customarily frequented by employees and at or near where the contract services are performed shall satisfy this requirement.

3. Contractor, its affiliates, agents, employees and anyone in privity with Contractor shall not accept, agree to give, offer, confer, or agree to confer or promise to confer, directly or indirectly, any gratuity or pecuniary benefit to any person, or to influence or attempt to influence any person in violation of the Public Official and Employees Ethics Act, 65 Pa.C.S. §§1101 et seq.; the State Adverse Interest Act, 71 P.S. §776.1 et seq.; Commission Policy 3.10, Code of Conduct or in violation of any other federal or state law in connection with performance of work under this contract, except as provided in this contract.

4. Contractor shall not have a financial interest in any other contractor, subcontractor, or supplier providing services, labor, or material under this contract, unless the financial interest is disclosed to the COMMISSION in writing and the COMMISSION consents to Contractor's financial interest prior to COMMISSION execution of the contract. Contractor shall disclose the financial interest to the COMMISSION at the time of bid or proposal submission, or if no bids or proposals are solicited, no later than Contractor's submission of the contract signed by Contractor.

5. Contractor certifies to the best of its knowledge and belief that within the last five (5) years Contractor or Contractor Related Entities have not:

a. been indicted or convicted of a crime involving moral turpitude or business honesty or integrity in any jurisdiction;

b. been suspended, debarred or otherwise disqualified from entering into any contract with any governmental agency;

c. had any business license or professional license suspended or revoked;

d. had any sanction or finding of fact imposed as a result of a judicial or administrative proceeding related to fraud, extortion, bribery, bid rigging, embezzlement, misrepresentation or anti-trust; and

e. been, and is not currently, the subject of a criminal investigation by any federal, state or local prosecuting or investigative agency and/or civil anti-trust investigation by any federal, state or local prosecuting or investigative agency.

If Contractor cannot so certify to the above, then it must submit along with its bid, proposal or contract a written explanation of why such certification cannot be made and the COMMISSION will determine whether a contract may be entered into with the Contractor. The Contractor's obligation pursuant to this certification is ongoing from and after the effective date of the contract through the termination date thereof. Accordingly, the Contractor shall have an obligation to immediately notify the COMMISSION in writing if at any time during the term of the contract if becomes aware of any event which would cause the Contractor's certification or explanation to change. Contractor acknowledges that the COMMISSION may, in its sole discretion, terminate the contract for cause if it learns that any of the certifications made herein are currently false due to intervening factual circumstances or were false or should have been known to be false when entering into the contract.

6. Contractor shall comply with the requirements of the Lobbying Disclosure Act (65 Pa.C.S. §13A01 et seq.) regardless of the method of award. If this contract was awarded on a Non-bid Basis, Contractor must also comply with the requirements of the Section 1641 of the Pennsylvania Election Code (25 P.S. §3260a).

7. When Contractor has reason to believe that any breach of ethical standards as set forth in law, Commission Policy 3.10, Code of Conduct, or these Contractor Integrity Provisions has occurred or may occur, including but not limited to contact by a COMMISSION officer or employee which, if acted upon, would violate such ethical standards, Contractor shall immediately notify the COMMISSION contracting officer or the Chief Compliance Officer in writing.

8. Contractor, by submission of its bid or proposal and/or execution of this contract and by the submission of any bills, invoices or requests for payment pursuant to the contract, certifies and represents that it has not violated any of these Contractor Integrity Provisions in connection with the submission of the bid or proposal, during any contract negotiations or during the term of the contract, to include any extensions thereof. Contractor shall immediately notify the COMMISSION in writing of any actions for occurrences that would result in a violation of these Contractor Integrity Provisions. Contractor agrees to reimburse the COMMISSION for the reasonable costs of investigation incurred by the Chief Compliance Officer for investigations of the Contractor's compliance with the terms of this or any other agreement between the Contractor and the COMMISSION that results in the suspension or debarment of the Contractor. Contractor shall not be responsible for investigative costs for investigations that do not result in the Contractor's suspension or debarment.

9. Contractor shall cooperate with the Chief Compliance Officer in investigating any alleged

COMMISSION agency or employee breach of ethical standards and any alleged Contractor non-compliance with these Contractor Integrity Provisions. Contractor agrees to make identified Contractor employees available for interviews at reasonable times and places. Contractor, upon the inquiry or request of the Chief Compliance Officer, shall provide, or if appropriate, make promptly available for inspection or copying, any information of any type or form deemed relevant by the Chief Compliance Officer to Contractor's integrity and compliance with these provisions. Such information may include, but shall not be limited to, Contractor's business or financial records, documents or files of any type or form that refer to or concern this contract. Contractor shall incorporate this paragraph in any agreement, contract or subcontract it enters into in the course of the performance of this contract/agreement solely for the purpose of obtaining subcontractor compliance with this provision. The incorporation of this provision in a subcontract shall not create privity of contract between the COMMISSION and any such subcontractor, and no third party beneficiaries shall be created thereby.

10. For violation of any of these Contractor Integrity Provisions, the COMMISSION may terminate this and any other contract with Contractor, claim liquidated damages in an amount equal to the value of anything received in breach of these Provisions, claim damages for all additional costs and expenses incurred in obtaining another contractor to complete performance under this contract, and debar and suspend Contractor from doing business with the Commonwealth. These rights and remedies are cumulative, and the use or non-use of any one shall not preclude the use of all or any other. These rights and remedies are in addition to those the COMMISSION may have under law, statute, regulation, or otherwise.

45 Confidentiality Provisions

As a consequence of the performance of its duties with the COMMISSION, CONTRACTOR may learn, be given, or become aware of certain information, including, but not limited to, matters pertaining to internal communications, information, proprietary information, individually identifiable health information, trade practices, business operations, or other sensitive information collectively known as Confidential Information. Regardless of how transmitted or received by CONTRACTOR, whether by receipt, sending, or merely becoming available to CONTRACTOR through its relationship to the COMMISSION, CONTRACTOR agrees to maintain and treat as proprietary and confidential to the COMMISSION all such Commission Confidential Information, and shall not discuss, reveal, or use for any purpose outside the performance of its contract with the COMMISSION such Commission Confidential Information. Confidential Information shall not include any information that (i) is or becomes available to the public other than as a consequence of a breach by any individual, a partnership, a corporation, an association, a limited liability company, a joint stock company, a trust, a joint venture, an unincorporated organization (each a “Person”) of any fiduciary duty or obligation of confidentiality, including, without limitation, catalogues, publications, product descriptions and sales literature that the COMMISSION has distributed to the public generally; or (ii) information which at the time of disclosure to the CONTRACTOR is in the public domain; or (iii) is disclosed as required by a final, unappealable court order and no suitable protective order, or equivalent remedy, is available, or (iv) the CONTRACTOR was aware of prior to its disclosure to the CONTRACTOR by the COMMISSION from a source not bound by a confidential obligation and the CONTRACTOR provides the COMMISSION written notice of such fact prior to the execution of this Agreement or promptly upon the CONTRACTOR's learning that the information was Confidential Information; or (v) information which the CONTRACTOR can demonstrate with competent written evidence was independently developed by or for the CONTRACTOR without use of or reliance on the Confidential Information.

With respect to its employees, CONTRACTOR agrees

a) to require all of its employees to maintain confidentiality;
b) take appropriate action against its employees, officers, and subcontractors for any and all violations of this Agreement.

With respect to any subcontractors that CONTRACTOR wishes to employ to perform any of its obligations under any agreement with the COMMISSION, CONTRACTOR agrees to require any such approved subcontractor to execute written confidentiality agreements that require each such CONTRACTOR and its employees to comply with all the requirements set forth above.

CONTRACTOR agrees that any breach of these Confidentiality Provisions may result in civil and/or criminal penalties, for CONTRACTOR, its officers and employees, and subcontractors.

Notwithstanding any other provision to the contrary, CONTRACTOR agrees that these provisions shall survive the termination of this and any and all agreements between the CONTRACTOR and the COMMISSION.

CONTRACTOR agrees to treat the information in the same way CONTRACTOR treats its own most confidential information and to inform each such person of these provisions.

CONTRACTOR agrees to immediately notify the COMMISSION of any information which comes to its attention which does or might indicate that there has been any loss of confidentiality or information.

CONTRACTOR shall return to the COMMISSION upon demand any and all Confidential Information entrusted to it by the COMMISSION pursuant to this Agreement (including any and all copies, abstracts, compilations or analyses thereof and memoranda related thereto or incorporating the Confidential Information) or the CONTRACTOR may request permission from the COMMISSION, which permission may be granted or denied in the COMMISSION's sole discretion, to destroy all such Confidential Information and provide a certificate of destruction to the COMMISSION signed by the CONTRACTOR. The CONTRACTOR further agrees that neither itself nor its employees or representatives will copy, in whole or in part, any such Confidential Information without the prior written consent of the COMMISSION.

CONTRACTOR agrees that if they have had or will have an SSAE16 audit that they will comply with and abide by the findings of such audit to protect COMMISSION information.

46 Entire Agreement

This Agreement, together with any writings either attached as exhibits or incorporated by reference, constitutes the entire understanding between the parties and there are no other oral or extrinsic understandings of any kind between the parties.

47 Modification

This Agreement may be modified only by a writing signed by both parties.

(SIGNATURES ARE SET FORTH ON THE NEXT PAGE)

IN WITNESS WHEREOF, the **Pennsylvania Turnpike Commission** and **[Contractor's Name]** have executed this Agreement by their duly authorized officers on the date written above.

ATTEST:	PENNSYLVANIA TURNPIKE COMMISSION
______________________________ ________	______________________________ ________
Ann Louise Edmunds Date	Leslie S. Richards Date
Assistant Secretary-Treasurer	Chair

APPROVED AS TO FORM AND LEGALITY:

______________________________ ________	______________________________ ________
Albert C. Peters II Date	Pennsylvania Attorney General Date
General Litigation & Contracts Counsel	

ATTEST:	**[CONTRACTOR'S NAME]**
Signature____________________ ________	Signature______________________ ______
Date	Date
Name________________________	Name_________________________
Title_________________________	Title__________________________

Federal Tax ID No.______________________

Exhibit H
Insurance Requirements

INSURANCE SPECIFICATION "D"
MINIMUM INSURANCE REQUIREMENTS

The Pennsylvania Turnpike Commission

Before starting any work and until completion and final payment is made for the work, or final acceptance of the work, the Contractor will provide and maintain the following minimum levels of insurance at Contractor's own expense. The cost of the required insurance shall be included in the Contractor's cost proposal and no adjustment shall be made to the contract price on account of such costs. Contractor shall furnish Certificates of Insurance showing the effective date of coverage as outlined below. No work may be performed until the required evidence of Insurance is provided in accordance with the terms of the contract. Contractor shall be responsible for ensuring that all Subcontractors hired by the Contractor are properly insured. Contractor shall not permit any such Subcontractors to start work until such evidence has been provided to the Contractor.

a) All insurance shall be procured from insurers permitted to do business in the State in which the project is taking place and having an A.M. Best Rating of at least "A-, Class VIII".

b) Contractor shall not have a Self-Insured Retention (SIR) on any policy greater than $50,000, which is the responsibility of the Contractor. If Contractor's policy(ies) has a Self-Insured Retention exceeding this amount, approval must be received from the Commission prior to starting work. In the event any policy includes an SIR or Deductible, the Contractor is responsible for payment within the SIR or Deductible of their policy(ies) and the Additional Insured requirements specified herein shall be offered within the SIR or Deductible amount(s).

c) All insurance required herein, except for Professional Liability Insurance, shall be written on an "occurrence" basis.

d) The Contractor's insurance carrier(s) shall agree to provide at least thirty (30) days prior written notice to the Commission in the event coverage is canceled or non-renewed, unless cancellation is for non-payment of premium. In the event of cancellation or non-renewal of coverage(s) for any reason, it is the Contractor's responsibility to replace coverage to comply with the Contract requirements so there is no lapse of coverage for any time period.

   If the insurance carriers will not issue or endorse their policy(s) to comply with the above it is the responsibility of the Contractor to report any notice of cancellation or non-renewal at least thirty (30) days prior to the effective date of this notice.

e) Contractor shall provide the Commission with Certificates of Insurance, showing the insurance coverages listed below, ten days prior to the start of work of this Project and thereafter upon renewal or replacement of each coverage. The Contractor shall not begin any work until the Commission has reviewed and approved the Certificate of Insurance.

   Failure of the Commission to demand such certificate or other evidence of full compliance with these insurance requirements or failure of the Commission to identify a deficiency from evidence that is provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

Upon completion of the contract, an additional certificate(s) of insurance evidencing coverage shall be provided to the Commission with final application for payment.

f) The Commission, and its Commissioners, officers, employees and agents shall be added as ADDITIONAL INSUREDS on all required liability policies (except Workers' Compensation and Professional Liability policies) for ongoing operations and completed operations on a primary noncontributory basis.

There shall be no "Insured versus Insured Exclusion" on any policies; all policies will provide for "cross liability coverage".

g) Waiver of Rights of Subrogation: Contractor shall waive all rights of recovery against the Commission and all the additional insureds for loss or damage covered by any of the required insurance (except Professional Liability).

h) The amount of insurance in the required coverages shall not be construed to be a limitation of the liability on the part of the Contractor.

i) The carrying of insurance described below shall in no way be interpreted as relieving the Contractor of any responsibility or liability under the contract.

j) Any type of insurance or any increase in limits of liability which the Contractor requires for its own protection or on account of statute shall be its own responsibility and at its own expense.

k) Contractor shall promptly notify the Commission and the appropriate insurance company(ies) in writing of any accident(s) as well as any claim, suit or process received by the insured Contractor arising in the course of operations under the contract. The Contractor shall forward such documents received to its insurance company(ies), as soon as practicable, or as required by its insurance policy(ies).

REQUIRED COVERAGES - the following may be provided through a combination of primary and excess policies in order to meet the minimum limits set forth below:

1. **Workers' Compensation and Employer's Liability:**
Provided in the State in which the work is to be performed and elsewhere as may be required and shall include:

a) Workers' Compensation Coverage: Statutory Requirements

b) Employers Liability Limits not less than:

Bodily Injury by Accident:	$500,000 Each Accident
Bodily Injury by Disease:	$500,000 Each Employee

Bodily Injury by Disease:	$500,000 Policy Limit

c) Includes sole proprietorships and officers of corporation who will be performing the work.

d) The Commission shall be named as an alternate employer by endorsement to the policy.

2. **Commercial General Liability:**

Provided on standard ISO forms or an equivalent form including Premises - Operations, Independent Contractors, Products/Completed Operations, Broad Form Property Damage, Contractual Liability, and Personal Injury and Advertising Injury.

a) Occurrence Form with the following minimum limits:

(1)	General Aggregate:	$2,000,000
(2)	Products/Completed Operations Aggregate:	$2,000,000
(3)	Each Occurrence:	$1,000,000
(4)	Personal and Advertising Injury:	$1,000,000

3. **Automobile Liability:**

a) Coverage to include All Owned, Hired and Non-Owned Vehicles (or "Any Auto"). If Contractor does not have any Owned Vehicles, Contractor is still required to maintain coverage for Hired and Non-Owned Vehicles as either a stand-alone policy or endorsed onto the Commercial General Liability policy above

b) Minimum Per Accident Combined Single Limit $1,000,000

4. **Commercial Umbrella Liability:**

a) Policy(ies) to apply on a Following Form Basis of the following:
   (1) Commercial General Liability,
   (2) Automobile Liability, and
   (3) Employers Liability Coverage.

b) Minimum Limits of Liability

Occurrence Limit:	$5,000,000
Aggregate Limit (where applicable):	$5,000,000

5. **Professional Liability:**

a) The definition of "Covered Services" shall include the services required in the scope of this contract.

b) Minimum Limits of Liability:

Per Claim:	$10,000,000
Aggregate:	$10,000,000

c) If the policy is issued on a claims-made form, the following requirements will apply:

1. The retroactive date must be on or before the start of work under this contract;
2. In the event of policy termination, cancellation or non-renewal, the Contractor must purchase "tail coverage/an extended reporting period" or maintain coverage for a period of three (3) years after the completion of their work/final payment.

6. **Network Security and Privacy Liability:**
   a) Contractor shall maintain the following coverage including but not limited to:
      (1) Network Security Liability for third party liability arising out of hacking, network system intrusions, unauthorized access/use to data or systems, distribution of malicious code, denial of service and cyber extortion.
      (2) Privacy Liability for third party liability arising out of breach of privacy, inclusive of confidential and proprietary business information, HIPAA violations and other breaches of personally identifiable information and /or protected health information that may arise from their work with this contract.

   b) Minimum Limits of Liability:

Per Claim:	$10,000,000
Aggregate:	$10,000,000

   c) Minimum Limits of Liability:
   Privacy Breach Notification and Credit Monitoring: $5,000,000 Per Occurrence

7. **Crime Insurance:**
   a) Include the Employee Theft and Theft, Disappearance and Destruction coverage parts. The Employee Theft Coverage part shall include the Clients' Property Endorsement (ISO Form CR 04 01, or its equivalent).

   b) Minimum Limits of Liability: Per Occurrence: $1,000,000

8. **Property Coverage:**

   a) Contractor shall provide coverage for damage to their work, materials to be part of the project (on-site and off-site), and in transit.

   b) Contractor shall maintain Property Coverage for their owned, leased, rented or borrowed equipment, tools, trailers, etc. for the full replacement cost of the equipment

   c) Coverage to be provided on an All Risk, Agreed Amount Basis with no Coinsurance

   d) Valuable Papers coverage is to be included with a minimum $500,000 Limit.

   e) Coverage shall also be provided for any ensuing loss of Business Income.

9. **Installation Floater:**

a) Contractor shall provide coverage for damage to property in the course of installation or transit to the installation site.

b) Coverage shall be equal to the full replacement cost of the equipment or materials being installed.

Exhibit I
Diverse Business (DB) Requirements

Pennsylvania Turnpike Commission
DIVERSE BUSINESS (DB) REQUIREMENTS

Diverse Business Participation. The Commission is committed to Diverse Business (DB) participation on competitive contracting opportunities. Firms or entities that have not previously performed work or provided services to the Commission are encouraged to respond to the solicitations. RFPs may include DB participation as part of the criteria for the evaluation of proposals, and the Commission may consider DB participation as a selection factor.

Minimum Participation Level (MPL). The minimum participation level (MPL) for the inclusion of DBs will be established in the RFP/advertisement as a percentage.

(a) General Requirements. Section 303 of Title 74 of the Pennsylvania Consolidated Statutes, 74 Pa.C.S. § 303, requires proposer on contracts funded pursuant to the provisions of Title 74 (Transportation) and 75 (Vehicle Code) administered and issued by the Commission to make Good Faith Efforts to solicit subonsultants that are Diverse Businesses (DBs) as defined in Section 303. The DB requirements of Section 303 apply to this contract.

Section 303 requires proposers to make Good Faith Efforts, as described below, to solicit subconsultants that are DBs during the proposal process to maximize participation of DBs in competitive contracting opportunities.

The Commission is committed to participation by DBs and will enforce the requirements of Section 303 and this section. Failure to make Good Faith Efforts and demonstrate such Good Faith Efforts in the solicitation of subconsultants may result in the proposer being declared ineligible for the contract.

Proposers shall document and submit to the Commission all Good Faith Efforts, as described in this section, to solicit subconsultants that are DBs during the solicitation process.

Proposers are encouraged to utilize and give consideration to consultants offering to utilize DBs in the selection and award of contracts.

Proposers shall not discriminate on the basis of gender, race, creed or color in the award and performance of contracts in accordance with 62 Pa.C.S. §3701.

Failure to comply with the requirements of Section 303 or this specification may result in the imposition of sanctions as appropriate under section 531 of the Procurement Code, 62 Pa.C.S.§ 531 relating to debarment and suspension.

The Commission's Director of the Office of Diversity and Inclusion, or designee, is designated the Responsible Official who shall supervise the DB program and ensure that the Commission complies with the DB program.

(b) Definitions. The following definitions apply to terms used in this specification:

1. **Disadvantaged Business** – A business that is owned or controlled by a majority of persons, not limited to members of minority groups, who are subject to racial, social, ethnic prejudice or cultural bias.

2. **Diverse Business** – A disadvantaged business, minority-owned or women-owned business or service-disabled veteran-owned or veteran-owned small business that has been certified by a third-party certifying organization.

3. **Minority-owned Business** – A business owned and controlled by a majority of individuals who are African Americans, Hispanic Americans, Native Americans, Asian Americans, Alaskans or Pacific Islanders.
4. **Professional Services** – An industry of infrequent, technical or unique functions performed by independent contractors or consultants whose occupation is the rendering of the

services, including: (1) design professional services as defined in 62 Pa.C.S.§ 901 (relating to definitions); (2) legal services; (3) advertising or public relations services; (4) accounting, auditing or actuarial services; (5) security consultant services; (6) computer and information technology services; and (7) insurance underwriting services.

5. **Pro Forma Effort-**The act of completing a form or document identifying efforts to solicit DBs for a project in order to satisfy criteria with little or no expectation that the DBs contacted or identified will perform any of the work.

6. **Service-Disabled Veteran-Owned Small Business** – A business in the United States which is independently owned and controlled by a service-disabled veteran(s), not dominant in its field of operation, and employs 100 or fewer employees.

7. **Subconsultant-** Any individual, partnership, firm, or corporation entering into a contract with the prime consultant for work under the contract, including those providing professional and other services.

8. **Third-party Certifying Organization** – An organization that certifies a small business, minority-owned business, women-owned business or veteran-owned small business as a diverse business. The term includes: (1) the National Minority Supplier Development Council; (2) the Women's Business Development Enterprise National Council; (3) the Small Business Administration; (4) The Department of Veteran Affairs; (5) the Pennsylvania Unified Certification Program.

9. **Veteran-owned Small Business** –A small business owned and controlled by a veteran or veterans.

10. **Women-Owned Business** – A business owned and controlled by a majority of individuals who are women.

(c) Actions Required by Proposer during the procurement/consultant selection phase

1. Submission Requirements – Consultant Responsiveness.

a. **Minimum Participation Level (MPL) Documentation -** If the documentation submitted with the proposal demonstrates that the proposer has identified DBs sufficient to meet the MPL established for this contract, the proposer will be deemed to have satisfied the DB requirement during this phase. The proposer is required to provide the business name and business address of each DB and supporting documentation that includes proof of certification.

If the consultant's proposal demonstrates the consultant's inability to meet the MPL established for this contract, the proposer shall demonstrate Good Faith Efforts with its proposal. Failure to submit the required documentation demonstrating Good Faith Efforts as further described below with the proposal may result in a rejection of the proposal.

b. If no MPL has been established for this contract, the proposer is required to either provide a statement of intent that it will self-perform 100% of the work for the agreement, or demonstrate Good Faith Efforts to solicit subconsultants that are DBs. In either case documentation shall be provided with the proposal.

Failure to submit the required information identified above with the proposal may result in a rejection of the proposal.

2. **Good Faith Effort Requirements**: The documentation of Good Faith Efforts must include the business name and business address of each DB considered. Supporting documentation must also include proof of certification and any explanation of Good Faith Efforts the proposer would like the Commission to consider. Any services to be performed by a DB are required to be readily identifiable to the agreement. Good Faith efforts are demonstrated by seeking out DB participation in the project given all relevant circumstances. The Commission requires the proposer to demonstrate more than Pro Forma Efforts. Evidence of Good Faith Efforts includes, but is not limited to:

a. Consultant solicits through all reasonable and available means the interest of all certified DBs with the capacity to perform the scope of work set forth in the agreement.
b. The proposer must provide written notification at least 5 business days before proposals are due to allow the DBs to respond to the solicitation.
c. The proposer must determine with certainty if DBs are interested by taking appropriate steps to follow up initial solicitations.
d. The proposer must make efforts to select portions of the work to be performed by DBs to includes, where appropriate, breaking out contract work into economically feasible units to facilitate DB participation;
e. It is the proposer's responsibility to make a portion of the work available to DBs and, to select those portions of the work, so as to facilitate DB participation.
f. The proposer shall provide evidence of such negotiations that include the names, addresses, and telephone numbers of DBs considered; A description of the information provided regarding the required work and services for the work selected for subconsultants; and evidence as to why additional agreements could not be reached for DBs to perform the work.
g. Proposers cannot reject or withhold solicitation of DBs as being unqualified without sound reasons based on a thorough investigation of their capabilities.
h. The DB's standing within its industry, membership in specific groups, organizations or associations and political or social affiliations (for example union v. non-union employee status) are not legitimate causes for the rejection or non-solicitation of proposals in the proposer's efforts to meet the Good Faith Efforts requirement.
i. Efforts to assist interested DBs in obtaining bonding, lines of credit or insurance.

3. **Actions Taken by the Commission.** As part of the proposal review process, the Commission will review the submissions to determine whether the proposer has complied with Section 303 and this requirement in the selection of DB subconsultants. The Commission will determine whether the proposer has either met the MPL or provided acceptable documentation as noted above. The Commission reserves the right to contact proposers for clarification during the review and negotiation process.

If the Commission determines that the proposer has failed to either meet the MPL or provide acceptable documentation as noted above, the proposal may be rejected.

(d) Consultant Requirements During Performance of Services.

1. **Replacement of a DB Subconsultant.** Consultant must continue good faith efforts through completion of the contract. The obligation to make Good Faith

Efforts to solicit subconsultants for any type of service extends to additional work required for any service which is identified to be performed by a DB. If at any time during the performance of the work, it becomes necessary to replace or add a subconsultant that is a DB, the consultant, as appropriate, shall immediately notify the Commission and seek approval in writing in accordance with the Agreement of the need to replace the DB, which notice shall include the reasons for the replacement. If a prime consultant who originally indicated that it would self-perform all work subsequently decides to use a subconsultant for any work under the contract, the consultant must submit documentation of all Good Faith Efforts as to the work for which a subconsultant is obtained.

2. **Records.** Maintain project records as are necessary to evaluate DB compliance and as necessary to perform the reporting function addressed below. Maintain all records for a period of 3 years following acceptance of final payment. Make these records available for inspection by the Commission, its designees or agents. These records should indicate:

2.a. The number of DB and non-DB subconsultants and the type of services performed on or incorporated in this project.

2.b. The progress and efforts made in seeking out DB subconsultant organizations and individual DB consultants for work on this project to increase the amount of DB participation and/or to maintain the commitments made at the time of the proposal to DBs.

2.c. Documentation of all correspondence, contacts, telephone calls, and other contacts made to obtain the service of DBs on this project.

3. **Reports.** Maintain monthly reports and submit reports as required by the Commission concerning those contracts and other business executed with DBs with respect to the records referred to in subsection (e)2. above in such form and manner as prescribed by the Commission. At a minimum, the Reports shall contain the following:

3.a The number of Contracts with DBs noting the type of services provided, including the execution date of each contract.

3.b The amounts paid to each DB during the month, the dates of payment, and the overall amounts paid to date. If no payments are made to a DB during the month, enter a zero ($0) payment.

3.c Upon request and upon completion of individual DB firm's work, submit paid invoices or a certification attesting to the actual amount paid. In the event the actual amount paid is less than the award amount, a complete explanation of difference is required.

4. Subconsultant Contracts

4.a. Subcontracts with DB firms will not contain provisions waiving legal rights or remedies provided by laws or regulations of the Federal Government or the Commonwealth of Pennsylvania or the Commission through contract provisions or regulations.

4.b. Prime consultant will not impose provisions on DB subconsultants that are more onerous or restrictive than the terms of the prime's contract with non-DBs.

4.c. Executed copies of subcontracts/purchase orders are to be received by the Commission before the commencement of work by the DB.

5. Payments to DB Subconsultants. Payments to DBs are to be made in accordance with the prompt payment requirements of Chapter 39, Subchapter D of the Procurement Code, 62 Pa.C.S. §3931 et seq. Performance of services by a DB subconsultant in accordance with the terms of the contract entitles the subconsultant to payment.

(e) Actions to be Taken by Commission After Performance of Services. Following completion of the Consultant's services, the Director of the Commission's Office of Diversity and Inclusion or his/her designee will review the overall DB participation to assess the Consultant's compliance with Section 303 and this contract. Appropriate sanctions may be imposed under 62 Pa.C.S. § 531 (relating to debarment or suspension) for a Consultant's failure to comply with Section 303 and the requirements of the contract.

Exhibit J

Prevailing Wage Rate Requirements

Bureau of Labor Law Compliance Prevailing Wages Project Rates
LACKAWANNA COUNTY

Project Name:	Cashless Tolling Implementation and Maintenance
Awarding Agency:	Pa Turnpike Commission
Contract Award Date:	4/30/2019
Serial Number:	18-03843
Project Classification:	Building/Heavy/Highway
Determination Date:	5/15/2018
Assigned Field Office:	Scranton
Field Office Phone Number:	(570)963-4577
Toll Free Phone Number:	(877)214-3962
Project County:	Lackawanna County

Project: 18-03843 • Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Asbestos & Insulation Workers	7/1/2019		$32.48	$20.52	$53.00
Asbestos & Insulation Workers	7/1/2018		$32.48	$19.52	$52.00
Asbestos & Insulation Workers	7/1/2016		$32.48	$18.52	$51.00
Boilermaker {Commercial, Institutional, and Minor Repair Work)	3/1/2018		$29.52	$18.22	$47.74
Boilermaker {Commercial, Institutional, and Minor Repair Work)	3/1/2017		$28.52	$18.22	$46.74
Boilermakers	3/1/2018		$45.89	$33.73	$79.62
Boilermakers	1/1/2018		$46.26	$33.36	$79.62
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2020		$35.94	$17.14	$53.08
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2021		$36.82	$17.36	$54.18
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2019		$35.15	$16.93	$52.08
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2017		$33.82	$16.56	$50.38
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2018		$34.44	$16.74	$51.18
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	5/1/2016		$28.53	$16.08	$44.61
Cement Finishers	6/1/2016		$32.43	$11.35	$43.78
Drywall Finisher	5/1/2017		$27.81	$18.17	$45.98
Electricians	6/1/2017		$35.94	$21.70	$57.64
Elevator Constructor	1/1/2016		$45.04	$30.28	$75.32
Elevator Constructor	1/1/2018		$47.48	$33.00	$80.48
Glazier	5/1/2016		$29.02	$15.51	$44.53
Iron Workers {Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2017		$32.32	$28.42	$60.74
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2018		$33.07	$28.42	$61.49
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2019		$33.76	$28.42	$62.18
Laborers (Class 01 - See notes)	5/1/2018		$21.40	$17.63	$39.03
Laborers (Class 01 - See notes)	5/1/2017		$21.15	$16.88	$38.03
Laborers (Class 01 - See notes)	5/1/2019	4/30/2020	$21.70	$18.33	$40.03
Laborers (Class 01 - See notes)	5/1/2019		$21.70	$18.62	$40.32
Laborers (Class 01 - See notes)	5/1/2020		$22.05	$19.32	$41.37
Laborers (Class 02 - See notes)	5/1/2018		$23.40	$17.63	$41.03
Laborers (Class 02 - See notes)	5/1/2017		$23.15	$16.88	$40.03
Laborers (Class 02 - See notes)	5/1/2019		$23.70	$18.33	$42.03
Laborers (Class 02 - See notes)	5/1/2019	4/30/2020	$23.70	$18.33	$42.03
Laborers (Class 02 - See notes)	5/1/2020		$24.05	$19.03	$43.08
Laborers (Class 03 - See notes)	5/1/2017		$23.67	$17.17	$40.84
Laborers {Class 03 - See notes)	5/1/2019		$24.47	$18.62	$43.09
Laborers {Class 03 - See notes)	5/1/2019	4/30/2020	$24.47	$18.62	$43.09
Laborers {Class 03 - See notes)	5/1/2020		$24.05	$19.32	$43.37
Laborers {Class 03 - See notes)	5/1/2018		$24.02	$17.92	$41.94

Project: 18-03843 • Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Laborers (Class 04 - See notes)	5/1/2017		$25.17	$17.17	$42.34
Laborers (Class 04 - See notes)	5/1/2019		$25.97	$18.51	$44.48
Laborers (Class 04 - See notes)	5/1/2018		$25.52	$17.81	$43.33
Laborers (Class 04 - See notes)	5/1/2019	4/30/2020	$25.97	$18.62	$44.59
Laborers (Class 04 - See notes)	5/1/2020		$26.12	$19.21	$45.33
Laborers (Class 04 - See notes)	5/1/2019	4/30/2020	$26.47	$18.62	$45.09
Laborers (Class 05 - See notes)	5/1/2020		$26.12	$19.32	$45.44
Laborers (Class 05 - See notes)	5/1/2019		$26.47	$18.62	$45.09
Laborers (Class 05 - See notes)	5/1/2017		$25.67	$17.17	$42.84
Laborers (Class 05 - See notes)	5/1/2018		$26.02	$17.92	$43.94
Laborers (Class 05 - See notes)	5/1/2019	4/30/2020	$26.47	$18.62	$45.09
Laborers (Class 06 - See notes)	5/1/2019	4/30/2020	$24.47	$18.33	$42.80
Laborers (Class 06 - See notes)	5/1/2020		$24.82	$19.03	$43.85
Laborers (Class 06 - See notes)	5/1/2019		$24.47	$18.33	$42.80
Laborers (Class 06 - See notes)	5/1/2017		$23.92	$16.88	$40.80
Laborers (Class 06 - See notes)	5/1/2018		$24.17	$17.63	$41.80
Laborers (Group 1)	5/1/2018	4/30/2019	$21.40	$17.63	$39.03
Laborers (Group 2)	5/1/2018	4/30/2019	$23.40	$17.63	$41.03
Laborers (Group 4)	5/1/2018	4/30/2019	$25.52	$17.92	$43.44
Marble Mason	5/1/2020		$33.45	$15.68	$49.13
Marble Mason	5/1/2019		$32.66	$15.47	$48.13
Marble Mason	5/1/2018		$31.85	$15.28	$47.13
Marble Mason	5/1/2021		$34.23	$15.90	$50.13
Marble Mason	5/1/2017		$31.03	$15.10	$46.13
Millwright	5/1/2017		$33.79	$18.16	$51.95
Operators (Building, Class 01 - See Notes)	5/1/2020		$39.87	$25.94	$65.81
Operators (Building, Class 01 - See Notes)	5/1/2021		$41.41	$26.40	$67.81
Operators (Building, Class 01 - See Notes)	5/1/2018		$36.78	$25.03	$61.81
Operators (Building, Class 01 - See Notes)	5/1/2019		$38.32	$25.49	$63.81
Operators (Building, Class 01 - See Notes)	5/1/2017		$35.24	$24.58	$59.82
Operators (Building, Class 01A - See Notes)	5/1/2021		$43.66	$27.06	$70.72
Operators (Building, Class 01A - See Notes)	5/1/2020		$42.12	$26.60	$68.72
Operators (Building, Class 01A - See Notes)	5/1/2019		$40.57	$26.15	$66.72
Operators (Building, Class 01A - See Notes)	5/1/2018		$39.03	$25.69	$64.72
Operators (Building, Class 01A - See Notes)	5/1/2017		$37.49	$25.23	$62.72
Operators (Building, Class 02 - See Notes)	5/1/2020		$39.59	$25.84	$65.43
Operators (Building, Class 02 - See Notes)	5/1/2018		$36.50	$24.95	$61.45
Operators (Building, Class 02 - See Notes)	5/1/2019		$38.05	$25.39	$63.44
Operators (Building, Class 02 - See Notes)	5/1/2021		$41.13	$26.30	$67.43
Operators (Building, Class 02 - See Notes)	5/1/2017		$34.96	$24.49	$59.45
Operators (Building, Class 02A - See Notes)	5/1/2021		$43.38	$26.98	$70.36
Operators (Building, Class 02A - See Notes)	5/1/2019		$40.30	$26.06	$66.36
Operators (Building, Class 02A - See Notes)	5/1/2018		$38.75	$25.61	$64.36
Operators (Building, Class 02A - See Notes)	5/1/2016		$36.43	$23.93	$60.36

Project: 18-03843 • Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Building, Class 02A - See Notes)	5/1/2017		$37.21	$25.16	$62.37
Operators (Building, Class 03 - See Notes)	5/1/2020		$36.86	$25.05	$61.91
Operators (Building, Class 03 - See Notes)	5/1/2021		$38.41	$25.50	$63.91
Operators (Building, Class 03 - See Notes)	5/1/2019		$35.32	$24.59	$59.91
Operators (Building, Class 03 - See Notes)	5/1/2018		$33.78	$24.12	$57.90
Operators (Building, Class 03 - See Notes)	5/1/2017		$32.23	$23.68	$55.91
Operators (Building, Class 04 - See Notes)	5/1/2021		$37.26	$25.18	$62.44
Operators (Building, Class 04 - See Notes)	5/1/2018		$32.63	$23.80	$56.43
Operators (Building, Class 04 - See Notes)	5/1/2019		$34.17	$24.27	$58.44
Operators (Building, Class 04 - See Notes)	5/1/2020		$35.73	$24.71	$60.44
Operators (Building, Class 04 - See Notes)	5/1/2017		$30.33	$22.12	$52.45
Operators (Building, Class 05 - See Notes)	5/1/2020		$35.28	$24.59	$59.87
Operators (Building, Class 05 - See Notes)	5/1/2021		$36.82	$25.04	$61.86
Operators (Building, Class 05 - See Notes)	5/1/2018		$32.18	$23.69	$55.87
Operators (Building, Class 05 - See Notes)	5/1/2017		$29.87	$21.99	$51.86
Operators (Building, Class 05 - See Notes)	5/1/2019		$33.73	$24.14	$57.87
Operators (Building, Class 06 - See Notes)	5/1/2021		$35.95	$24.77	$60.72
Operators (Building, Class 06 - See Notes)	5/1/2018		$31.31	$23.41	$54.72
Operators (Building, Class 06 - See Notes)	5/1/2020		$34.40	$24.32	$58.72
Operators (Building, Class 06 - See Notes)	5/1/2017		$29.00	$21.72	$50.72
Operators (Building, Class 06 - See Notes)	5/1/2019		$32.86	$23.86	$56.72
Operators (Building, Class 07A - See Notes)	5/1/2021		$49.86	$30.31	$80.17
Operators (Building, Class 07A - See Notes)	5/1/2019		$46.15	$29.22	$75.37
Operators (Building, Class 07A - See Notes)	5/1/2020		$48.00	$29.77	$77.77
Operators (Building, Class 07A - See Notes)	5/1/2018		$44.29	$28.68	$72.97
Operators (Building, Class 07A - See Notes)	5/1/2017		$42.44	$28.13	$70.57
Operators (Building, Class 078 - See Notes)	5/1/2021		$49.51	$30.20	$79.71
Operators (Building, Class 078 - See Notes)	5/1/2017		$42.09	$28.03	$70.12
Operators (Building, Class 078 - See Notes)	5/1/2020		$47.65	$29.67	$77.32
Operators (Building, Class 078 - See Notes)	5/1/2018		$43.95	$28.58	$72.53
Operators (Building, Class 078 - See Notes)	5/1/2019		$45.80	$29.12	$74.92
Painters Class 1 (see notes)	5/1/2017		$27.25	$18.17	$45.42
Painters Class 2 (see notes)	5/1/2017		$30.15	$18.17	$48.32
Painters Class 3 (see notes)	5/1/2017		$36.25	$18.17	$54.42
Pile Driver Divers (Building, Heavy, Highway)	1/1/2017		$49.13	$17.95	$67.08
Piledrivers	1/1/2019		$34.30	$19.30	$53.60
Piledrivers	1/1/2018		$33.55	$18.55	$52.10
Plasterers	6/1/2016		$32.94	$10.92	$43.86
Plumbers and Steamfitters	6/1/2018		$42.64	$20.77	$63.41
Plumbers and Steamfitters	6/1/2019		$44.04	$20.77	$64.81
Plumbers and Steamfitters	6/1/2017		$41.24	$20.77	$62.01
Roofers	6/1/2017		$27.50	$19.08	$46.58
Sheet Metal Workers	5/1/2018	4/30/2019	$30.63	$23.73	$54.36
Sheet Metal Workers	5/1/2017		$30.61	$22.95	$53.56

Project: 18-03843 • Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Sprinklerfitters	4/1/2018		$38.80	$22.74	$61.54
Sprinklerfitters	4/1/2017		$37.40	$21.74	$59.14
Terrazzo Finisher	5/1/2019		$33.04	$16.22	$49.26
Terrazzo Finisher	5/1/2018		$32.35	$15.91	$48.26
Terrazzo Finisher	5/1/2017		$31.64	$15.62	$47.26
Terrazzo Setter	5/1/2019		$31.81	$19.67	$51.48
Terrazzo Setter	5/1/2018		$31.23	$19.25	$50.48
Terrazzo Setter	5/1/2017		$30.63	$18.85	$49.48
Tile & Marble Finisher	5/1/2019		$29.30	$15.42	$44.72
Tile & Marble Finisher	5/1/2021		$31.32	$15.40	$46.72
Tile & Marble Finisher	5/1/2020		$30.54	$15.18	$45.72
Tile & Marble Finisher	5/1/2017		$28.12	$14.60	$42.72
Tile& Marble Finisher	5/1/2018		$28.94	$14.78	$43.72
Tile Setter	5/1/2020		$33.45	$15.68	$49.13
Tile Setter	5/1/2021		$34.23	$15.90	$50.13
Tile Setter	5/1/2019		$32.66	$15.47	$48.13
Tile Setter	5/1/2017		$31.03	$15.10	$46.13
Tile Setter	5/1/201B		$31.85	$15.28	$47.13
Truckdriver class 1(see notes)	5/1/2019		$36.12	$0.00	$36.12
Truckdriver class 1(see notes)	5/1/201B		$35.32	$0.00	$35.32
Truckdriver class 1(see notes)	5/1/2017		$34.47	$0.00	$34.47
Truckdriver class 2 (see notes)	5/1/2019		$36.19	$0.00	$36.19
Truckdriver class 2 (see notes)	5/1/2018		$35.39	$0.00	$35.39
Truckdriver class 2 (see notes)	5/1/2017		$34.54	$0.00	$34.54
Truckdriver class 3 (see notes)	5/1/2019		$36.68	$0.00	$36.68
Truckdriver class 3 (see notes)	5/1/2018		$35.88	$0.00	$35.88
Truckdriver class 3 (see notes)	5/1/2017		$35.03	$0.00	$35.03

Project: 18-03843 • Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Carpenter	5/1/2020		$32.22	$17.19	$49.41
Carpenter	5/1/2018		$30.75	$15.96	$46.71
Carpenter	5/1/2019		$31.51	$16.55	$48.06
Carpenter	5/1/2021		$33.12	$17.74	$50.86
Carpenters	5/1/2017		$30.12	$15.34	$45.46
Carpenters	5/1/2016		$29.67	$14.54	$44.21
Cement Finishers	6/1/2016		$32.43	$11.35	$43.78
Electric Lineman	1/1/2018		$55.43	$22.48	$77.91
Iron Workers	7/1/2016		$29.42	$28.78	$58.20
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2019		$33.76	$28.42	$62.18
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2018		$33.07	$28.42	$61.49
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2017		$32.32	$28.42	$60.74
Laborers (Class 01 - See notes)	5/1/2019		$21.61	$17.29	$38.90
Laborers (Class 01 - See notes)	5/1/2018		$20.96	$16.79	$37.75
Laborers (Class 01 - See notes)	5/1/2016		$19.81	$15.79	$35.60
Laborers (Class 01 - See notes)	5/1/2017		$20.36	$16.29	$36.65
Laborers (Class 02 - See notes)	5/1/2017		$26.98	$16.29	$43.27
Laborers (Class 02 - See notes)	5/1/2019		$28.23	$17.29	$45.52
Laborers (Class 02 - See notes)	5/1/2018		$27.58	$16.79	$44.37
Laborers (Class 02 - See notes)	5/1/2016		$26.43	$15.79	$42.22
Laborers (Class 03 - See notes)	5/1/2019		$25.22	$17.29	$42.51
Laborers (Class 03 - See notes)	5/1/2016		$23.42	$15.79	$39.21
Laborers (Class 03 - See notes)	5/1/2018		$24.57	$16.79	$41.36
Laborers (Class 03 - See notes)	5/1/2017		$23.97	$16.29	$40.26
Laborers (Class 04 - See notes)	5/1/2017		$24.32	$16.29	$40.61
Laborers (Class 04 - See notes)	5/1/2019		$25.57	$17.29	$42.86
Laborers (Class 04 - See notes)	5/1/2018		$24.92	$16.79	$41.71
Laborers (Class 04 - See notes)	5/1/2016		$23.77	$15.79	$39.56
Laborers (Class 05 - See notes)	5/1/2017		$24.99	$16.29	$41.28
Laborers (Class 05 - See notes)	5/1/2019		$26.24	$17.29	$43.53
Laborers (Class 05 - See notes)	5/1/2016		$24.44	$15.79	$40.23
Laborers (Class 05 - See notes)	5/1/2018		$25.59	$16.79	$42.38
Laborers (Class 06 - See notes)	5/1/2017		$24.41	$16.29	$40.70
Laborers (Class 06 - See notes)	5/1/2016		$23.86	$15.79	$39.65
Laborers (Class 06 - See notes)	5/1/201B		$25.01	$16.79	$41.80
Laborers (Class 06 - See notes)	5/1/2019		$25.66	$17.29	$42.95
Laborers (Class 07 - See notes)	5/1/201B		$25.30	$16.79	$42.09
Laborers (Class 07 - See notes)	5/1/2019		$25.95	$17.29	$43.24
Laborers (Class 07 - See notes)	5/1/2016		$24.15	$15.79	$39.94
Laborers (Class 07 - See notes)	5/1/2017		$24.70	$16.29	$40.99
Laborers (Class 08 - See notes)	5/1/2017		$25.18	$16.29	$41.47
Laborers (Class 08 - See notes)	5/1/2016		$24.63	$15.79	$40.42

Project: 18-03843 • Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Laborers (Class OB - See notes)	5/1/2019		$26.43	$17.29	$43.72
Laborers (Class OB - See notes)	5/1/2018		$25.78	$16.79	$42.57
Operators (Building/Heavy, Class 01 - See Notes)	5/1/2016		$32.16	$22.64	$54.80
Operators (Building/Heavy, Class 01 - See Notes)	5/1/2017		$33.80	$24.16	$57.96
Operators (Building/Heavy, Class 01 - See Notes)	5/1/2020		$38.44	$25.52	$63.96
Operators (Building/Heavy, Class 01 - See Notes)	5/1/2021		$39.98	$25.97	$65.95
Operators (Building/Heavy, Class 01 - See Notes)	5/1/201B		$35.35	$24.61	$59.96
Operators (Building/Heavy, Class 01 - See Notes)	5/1/2019		$36.90	$25.06	$61.96
Operators (Building/Heavy, Class 01a - See Notes)	5/1/201B		$37.60	$25.27	$62.87
Operators (Building/Heavy, Class 01a - See Notes)	5/1/2020		$40.69	$26.19	$66.88
Operators (Building/Heavy, Class 01a - See Notes)	5/1/2017		$36.05	$24.82	$60.87
Operators (Building/Heavy, Class 01a - See Notes)	5/1/2021		$42.24	$26.64	$68.88
Operators (Building/Heavy, Class 01a - See Notes)	5/1/2019		$39.14	$25.73	$64.87
Operators (Building/Heavy, Class 02 - See Notes)	5/1/2020		$38.16	$25.44	$63.60
Operators (Building/Heavy, Class 02 - See Notes)	5/1/2021		$39.70	$25.89	$65.59
Operators (Building/Heavy, Class 02 - See Notes)	5/1/2017		$33.52	$24.07	$57.59
Operators (Building/Heavy, Class 02 - See Notes)	5/1/2019		$36.61	$24.98	$61.59
Operators (Building/Heavy, Class 02 - See Notes)	5/1/2018		$35.07	$24.52	$59.59
Operators (Building/Heavy, Class 02a - See Notes)	5/1/2020		$40.41	$26.10	$66.51
Operators (Building/Heavy, Class 02a - See Notes)	5/1/2021		$41.95	$26.56	$68.51
Operators (Building/Heavy, Class 02a - See Notes)	5/1/2019		$38.87	$25.64	$64.51
Operators (Building/Heavy, Class 02a - See Notes)	5/1/2017		$35.78	$24.72	$60.50
Operators (Building/Heavy, Class 02a - See Notes)	5/1/2018		$37.32	$25.19	$62.51
Operators (Building/Heavy, Class 03 - See Notes)	5/1/2020		$35.23	$24.57	$59.80
Operators (Building/Heavy, Class 03 - See Notes)	5/1/2021		$36.78	$25.03	$61.81
Operators (Building/Heavy, Class 03 - See Notes)	5/1/2019		$33.69	$24.11	$57.80
Operators (Building/Heavy, Class 03 - See Notes)	5/1/2017		$30.60	$23.21	$53.81
Operators (Building/Heavy, Class 03 - See Notes)	5/1/2018		$32.15	$23.66	$55.81
Operators (Building/Heavy, Class 04 - See Notes)	5/1/2017		$29.47	$22.88	$52.35
Operators (Building/Heavy, Class 04 - See Notes)	5/1/2020		$33.65	$24.11	$57.76
Operators (Building/Heavy, Class 04 - See Notes)	5/1/2021		$35.64	$24.69	$60.33
Operators (Building/Heavy, Class 04 - See Notes)	5/1/2018		$31.01	$23.32	$54.33
Operators (Building/Heavy, Class 04 - See Notes)	5/1/2019		$32.55	$23.78	$56.33
Operators (Building/Heavy, Class 05 - See Notes)	5/1/2020		$33.65	$24.11	$57.76
Operators (Building/Heavy, Class 05 - See Notes)	5/1/2021		$35.20	$24.56	$59.76
Operators (Building/Heavy, Class 05 - See Notes)	5/1/2019		$32.11	$23.65	$55.76
Operators (Building/Heavy, Class 05 - See Notes)	5/1/2017		$29.02	$22.74	$51.76
Operators (Building/Heavy, Class 05 - See Notes)	5/1/2018		$30.56	$23.20	$53.76
Operators (Building/Heavy, Class 06 - See Notes)	5/1/2018		$29.68	$22.93	$52.61
Operators (Building/Heavy, Class 06 - See Notes)	5/1/2017		$28.14	$22.49	$50.63
Operators (Building/Heavy, Class 06 - See Notes)	5/1/2020		$32.78	$23.84	$56.62
Operators (Building/Heavy, Class 06 - See Notes)	5/1/2019		$31.22	$23.40	$54.62
Operators (Building/Heavy, Class 06 - See Notes)	5/1/2021		$34.31	$24.31	$58.62
Operators (Heavy, Class 07A - See Notes)	5/1/2017		$40.73	$27.63	$68.36

Project: 18-03843 • Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Heavy, Class 07A - See Notes)	5/1/2021		$48.14	$29.83	$77.97
Operators (Heavy, Class 07A - See Notes)	5/1/2018		$42.58	$28.18	$70.76
Operators (Heavy, Class 07A - See Notes)	5/1/2019		$44.43	$28.73	$73.16
Operators (Heavy, Class 07A - See Notes)	5/1/2020		$46.28	$29.27	$75.55
Operators (Heavy, Class 07B - See Notes)	5/1/2018		$42.23	$28.09	$70.32
Operators (Heavy, Class 07B - See Notes)	5/1/2019		$44.09	$28.63	$72.72
Operators (Heavy, Class 07B - See Notes)	5/1/2021		$47.79	$29.71	$77.50
Operators (Heavy, Class 07B - See Notes)	5/1/2020		$45.94	$29.17	$75.11
Operators (Heavy, Class 07B - See Notes)	5/1/2017		$40.38	$27.53	$67.91
Operators (Highway, Class 01 - See Notes)	5/1/2019		$36.02	$24.79	$60.81
Operators (Highway, Class 01 - See Notes)	5/1/2020		$37.56	$25.24	$62.80
Operators (Highway, Class 01 - See Notes)	5/1/2021		$39.10	$25.70	$64.80
Operators (Highway, Class 01 - See Notes)	5/1/2016		$32.16	$22.64	$54.80
Operators (Highway, Class 01 - See Notes)	5/1/2017		$32.93	$23.87	$56.80
Operators (Highway, Class 01 - See Notes)	5/1/2018		$34.47	$24.33	$58.80
Operators (Highway, Class 01a - See Notes)	5/1/2020		$39.81	$25.92	$65.73
Operators (Highway, Class 01a - See Notes)	5/1/2021		$41.35	$26.38	$67.73
Operators (Highway, Class 01a - See Notes)	5/1/2019		$38.27	$25.46	$63.73
Operators (Highway, Class 01a - See Notes)	5/1/2017		$35.18	$24.56	$59.74
Operators (Highway, Class 01a - See Notes)	5/1/2018		$36.72	$25.01	$61.73
Operators (Highway, Class 02 - See Notes)	5/1/2018		$33.30	$23.98	$57.28
Operators (Highway, Class 02 - See Notes)	5/1/2016		$30.98	$22.31	$53.29
Operators (Highway, Class 02 - See Notes)	5/1/2020		$36.38	$24.90	$61.28
Operators (Highway, Class 02 - See Notes)	5/1/2021		$37.93	$25.35	$63.28
Operators (Highway, Class 02 - See Notes)	5/1/2017		$31.75	$23.53	$55.28
Operators (Highway, Class 02 - See Notes)	5/1/2019		$34.84	$24.44	$59.28
Operators (Highway, Class 03 - See Notes)	5/1/2020		$35.69	$24.69	$60.38
Operators (Highway, Class 03 - See Notes)	5/1/2021		$37.23	$25.16	$62.39
Operators (Highway, Class 03 - See Notes)	5/1/2018		$32.59	$23.80	$56.39
Operators (Highway, Class 03 - See Notes)	5/1/2019		$34.14	$24.25	$58.39
Operators (Highway, Class 03 - See Notes)	5/1/2017		$31.06	$23.32	$54.38
Operators (Highway, Class 03 - See Notes)	5/1/2016		$30.28	$22.10	$52.38
Operators (Highway, Class 04 - See Notes)	5/1/2021		$36.77	$25.03	$61.80
Operators (Highway, Class 04 - See Notes)	5/1/2019		$33.68	$24.12	$57.80
Operators (Highway, Class 04 - See Notes)	5/1/2018		$32.14	$23.66	$55.80
Operators (Highway, Class 04 - See Notes)	5/1/2020		$35.23	$24.57	$59.80
Operators (Highway, Class 04 - See Notes)	5/1/2016		$29.82	$21.98	$51.80
Operators (Highway, Class 04 - See Notes)	5/1/2017		$30.60	$23.20	$53.80
Operators (Highway, Class 05 - See Notes)	5/1/2019		$33.18	$23.97	$57.15
Operators (Highway, Class 05 - See Notes)	5/1/2020		$34.72	$24.42	$59.14
Operators (Highway, Class 05 - See Notes)	5/1/2021		$36.26	$24.87	$61.13
Operators (Highway, Class 05 - See Notes)	5/1/2018		$31.63	$23.51	$55.14
Operators (Highway, Class 05 - See Notes)	5/1/2016		$29.31	$21.83	$51.14
Operators (Highway, Class 05 - See Notes)	5/1/2017		$30.08	$23.06	$53.14

Project: 18-03843 • Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Highway, Class 06 - See Notes)	5/1/2020		$37.79	$25.30	$63.09
Operators (Highway, Class 06 - See Notes)	5/1/2019		$36.25	$24.85	$61.10
Operators (Highway, Class 06 - See Notes)	5/1/2018		$34.71	$24.39	$59.10
Operators (Highway, Class 06 - See Notes)	5/1/2021		$39.33	$25.78	$65.11
Operators (Highway, Class 06 - See Notes)	5/1/2016		$32.40	$22.70	$55.10
Operators (Highway, Class 06 - See Notes)	5/1/2017		$33.17	$23.94	$57.11
Operators (Highway, Class 06/A - See Notes)	5/1/2020		$40.04	$25.97	$66.01
Operators (Highway, Class 06/A - See Notes)	5/1/2021		$41.58	$26.43	$68.01
Operators (Highway, Class 06/A - See Notes)	5/1/2018		$36.96	$25.05	$62.01
Operators (Highway, Class 06/A - See Notes)	5/1/2019		$38.50	$25.52	$64.02
Operators (Highway, Class 06/A - See Notes)	5/1/2016		$34.65	$23.36	$58.01
Operators (Highway, Class 06/A - See Notes)	5/1/2017		$35.42	$24.59	$60.01
Operators (Highway, Class 07/A - See Notes)	5/1/2021		$47.08	$29.49	$76.57
Operators (Highway, Class 07/A - See Notes)	5/1/2020		$45.23	$28.94	$74.17
Operators (Highway, Class 07/A - See Notes)	5/1/2016		$38.56	$25.99	$64.55
Operators (Highway, Class 07/A - See Notes)	5/1/2018		$41.52	$27.84	$69.36
Operators (Highway, Class 07/A - See Notes)	5/1/2019		$43.37	$28.41	$71.78
Operators (Highway, Class 07/A - See Notes)	5/1/2017		$39.66	$27.31	$66.97
Operators (Highway, Class 07/8 - See Notes)	5/1/2020		$43.81	$28.53	$72.34
Operators (Highway, Class 07/8 - See Notes)	5/1/2018		$40.10	$27.44	$67.54
Operators (Highway, Class 07/8 - See Notes)	5/1/2019		$43.37	$28.41	$71.78
Operators (Highway, Class 07/8 - See Notes)	5/1/2021		$45.66	$29.08	$74.74
Operators (Highway, Class 07/8 - See Notes)	5/1/2016		$37.17	$25.57	$62.74
Operators (Highway, Class 07/8 - See Notes)	5/1/2017		$38.25	$26.89	$65.14
Pile Driver Divers (Building, Heavy, Highway)	1/1/2017		$49.13	$17.95	$67.08
Piledrivers	1/1/2018		$33.55	$18.55	$52.10
Piledrivers	1/1/2019		$34.30	$19.30	$53.60
Piledrivers	5/1/2018		$30.75	$15.96	$46.71
Piledrivers	5/1/2019		$31.51	$16.55	$48.06
Piledrivers	5/1/2020		$32.22	$17.19	$49.41
Piledrivers	5/1/2021		$33.12	$17.74	$50.86
Piledrivers	1/1/2017		$32.75	$17.95	$50.70
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2017		$40.98	$32.53	$73.51
Truckdriver class 1(see notes)	5/1/2017		$34.47	$0.00	$34.47
Truckdriver class 1(see notes)	5/1/2016		$33.57	$0.00	$33.57
Truckdriver class 1(see notes)	5/1/2018		$35.32	$0.00	$35.32
Truckdriver class 1(see notes)	5/1/2019		$36.12	$0.00	$36.12
Truckdriver class 2 (see notes)	5/1/2016		$33.64	$0.00	$33.64
Truckdriver class 2 (see notes)	5/1/2017		$34.54	$0.00	$34.54
Truckdriver class 2 (see notes)	5/1/2019		$36.19	$0.00	$36.19
Truckdriver class 2 (see notes)	5/1/2018		$35.39	$0.00	$35.39
Truckdriver class 3 (see notes)	5/1/2019		$36.68	$0.00	$36.68
Truckdriver class 3 (see notes)	5/1/2017		$35.03	$0.00	$35.03
Truckdriver class 3 (see notes)	5/1/2016		$34.13	$0.00	$34.13

Project: 18-03843 • Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Truckdriver class 3 (see notes)	5/1/2018		$35.88	$0.00	$35.88

Bureau of Labor Law Compliance Prevailing Wages Project Rates
BERKS COUNTY

Project Name:	Cashless Tolling Implementation and Maintenance
Awarding Agency:	Pa Turnpike Commission
Contract Award Date:	4/30/2019
Serial Number:	18-04053
Project Classification:	Building/Highw ay
Determination Date:	5/22/2018
Assigned Field Office:	Scranton
Field Office Phone Number:	(570)963-4577
Toll Free Phone Number:	(877)214-3962
Project County:	Berks County

Project: 18-04053 • Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Asbestos & Insulation Workers	6/26/2017		$32.00	$26.51	$58.51
Boilermaker {Commercial, Institutional,and Minor Repair Work)	3/1/2018		$29.52	$18.22	$47.74
Boilermaker {Commercial, Institutional, and Minor Repair Work)	3/1/2017		$28.52	$18.22	$46.74
Boilermakers	3/1/2018		$45.89	$33.73	$79.62
Boilermakers	1/1/2018		$46.26	$33.36	$79.62
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2020		$35.64	$16.36	$52.00
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2021		$36.33	$16.77	$53.10
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2019		$35.04	$15.96	$51.00
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2017		$34.11	$15.19	$49.30
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2018		$34.53	$15.57	$50.10
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2017		$30.05	$16.05	$46.10
Cement Finishers	5/1/2017		$35.87	$12.93	$48.80
DockBuilder/Pile Drivers (Building, Heavy & Highway)	5/1/2018		$53.64	$33.22	$86.86
DockBuilder/Pile Drivers (Building, Heavy & Highway)	11/1/2017		$52.14	$33.22	$85.36
DockBuilder/Piledriver (Building, Heavy, Highway)	5/1/2018		$44.70	$33.22	$77.92
DockBuilder/Piledriver (Building, Heavy, Highway)	11/1/2017		$43.45	$33.22	$76.67
Drywall Finisher	5/1/2017		$27.81	$18.17	$45.98
Electricians	9/1/2017		$34.77	$21.77	$56.54
Electricians	6/1/2018		$30.60	$23.63	$54.23
Elevator Constructor	1/1/2018		$47.48	$33.00	$80.48
Floor Layer	5/1/2017		$30.80	$16.71	$47.51
Glazier	5/1/2017		$34.69	$18.05	$52.74
Glazier	5/1/2018		$35.69	$18.35	$54.04
Iron Workers (Bridge, Structural Steel, Ornamental , Precast, Reinforcing)	7/1/2018		$32.53	$28.42	$60.95
Iron Workers (Bridge, Structural Steel, Ornamental , Precast, Reinforcing)	7/1/2017		$31.33	$28.42	$59.75
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2019		$33.76	$28.42	$62.18
Laborers {Class 01 - See notes)	5/1/2018	4/30/2019	$22.07	$15.59	$37.66
Laborers {Class 01 - See notes)	5/1/2018		$21.57	$16.09	$37.66
Laborers {Class 01 - See notes)	5/1/2017		$21.57	$15.04	$36.61
Laborers {Class 01 - See notes)	5/1/2019	4/30/2020	$22.07	$15.59	$37.66
Laborers {Class 01 - See notes)	5/1/2019		$21.57	$17.14	$38.71
Laborers {Class 01 - See notes)	5/1/2020		$21.57	$18.19	$39.76
Laborers (Class 02 - See notes)	5/1/2018		$23.57	$16.09	$39.66
Laborers (Class 02 - See notes)	5/1/2017		$23.57	$15.04	$38.61
Laborers (Class 02 - See notes)	5/1/2020		$23.57	$18.19	$41.76
Laborers (Class 02 - See notes)	5/1/2019	4/30/2020	$24.07	$15.59	$39.66

Project: 18-04053 • Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Laborers (Class 02 - See notes)	5/1/2019		$23.57	$17.14	$40.71
Laborers (Class 02 - see notes)	5/1/2018	4/30/2019	$24.07	$15.59	$39.66
Laborers (Class 03 - See notes)	5/1/2018	4/30/2019	$25.82	$16.13	$41.95
Laborers (Class 03 - See notes)	5/1/2020		$25.27	$18.48	$43.75
Laborers (Class 03 - See notes)	5/1/2019	4/30/2020	$25.82	$16.13	$41.95
Laborers (Class 03 - See notes)	5/1/2017		$25.57	$15.58	$41.15
Laborers (Class 03 - See notes)	5/1/2019		$25.27	$17.83	$43.10
Laborers (Class 03 - See notes)	5/1/2018		$25.27	$16.68	$41.95
Laborers (Class 04 - See notes)	5/1/2019		$26.77	$17.83	$44.60
Laborers (Class 04 - See notes)	5/1/2017		$26.77	$15.58	$42.35
Laborers (Class 04 - See notes)	5/1/2018		$26.77	$16.68	$43.45
Laborers (Class 04 - See notes)	5/1/2018	4/30/2019	$27.32	$16.13	$43.45
Laborers (Class 04 - See notes)	5/1/2019	4/30/2020	$27.32	$16.13	$43.45
Laborers (Class 04 - See notes)	5/1/2020		$27.27	$18.48	$45.75
Laborers (Class 05 - See notes)	5/1/2019		$27.27	$17.83	$45.10
Laborers (Class 05 - See notes)	5/1/2019	4/30/2020	$27.82	$16.13	$43.95
Laborers (Class 05 - See notes)	5/1/2018		$27.27	$16.68	$43.95
Laborers (Class 05 - See notes)	5/1/2017		$27.27	$15.58	$42.85
Laborers (Class 05 - See notes)	5/1/2018	4/30/2019	$27.82	$16.13	$43.95
Laborers (Class 05 - See notes)	5/1/2020		$27.27	$18.48	$45.75
Laborers (Class 06 - See notes)	5/1/2019		$22.92	$17.14	$40.06
Laborers (Class 06 - See notes)	5/1/2019	4/30/2020	$23.42	$15.59	$39.01
Laborers (Class 06 - See notes)	5/1/2020		$22.92	$18.19	$41.11
Laborers (Class 06 - See notes)	5/1/2018	4/30/2019	$23.42	$15.59	$39.01
Laborers (Class 06 - See notes)	5/1/2017		$22.92	$15.04	$37.96
Laborers (Class 06 - See notes)	5/1/2018		$22.92	$16.09	$39.01
Laborers (Class 06 - See notes)	5/1/2018	4/30/2019	$27.82	$16.13	$43.95
Marble Mason	5/1/2020		$31.97	$15.92	$47.89
Marble Mason	5/1/2017		$30.14	$14.75	$44.89
Marble Mason	5/1/2018		$30.76	$15.13	$45.89
Marble Mason	5/1/2019		$31.37	$15.52	$46.89
Marble Mason	5/1/2021		$32.56	$16.33	$48.89
Millwright	7/1/2017		$36.49	$18.93	$55.42
Operators (Building, Class 01 - See Notes)	5/1/2017		$35.24	$24.58	$59.82
Operators (Building, Class 01 - See Notes)	5/1/2020		$39.87	$25.94	$65.81
Operators (Building, Class 01 - See Notes)	5/1/2021		$41.41	$26.40	$67.81
Operators (Building, Class 01 - See Notes)	5/1/2018		$36.78	$25.03	$61.81
Operators (Building, Class 01 - See Notes)	5/1/2019		$38.32	$25.49	$63.81
Operators (Building, Class 01A - See Notes)	5/1/2017		$37.49	$25.23	$62.72
Operators (Building, Class 01A - See Notes)	5/1/2021		$43.66	$27.06	$70.72
Operators (Building, Class 01A - See Notes)	5/1/2020		$42.12	$26.60	$68.72
Operators (Building, Class 01A - See Notes)	5/1/2018		$39.03	$25.69	$64.72
Operators (Building, Class 01A - See Notes)	5/1/2019		$40.57	$26.15	$66.72
Operators (Building, Class 02 - See Notes)	5/1/2021		$41.13	$26.30	$67.43

Project: 18-04053 • Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Building, Class 02 - See Notes)	5/1/2020		$39.59	$25.84	$65.43
Operators (Building, Class 02 - See Notes)	5/1/2019		$38.05	$25.39	$63.44
Operators (Building, Class 02 - See Notes)	5/1/2017		$34.96	$24.49	$59.45
Operators (Building, Class 02 - See Notes)	5/1/2018		$36.50	$24.95	$61.45
Operators (Building, Class 02A - See Notes)	5/1/2019		$40.30	$26.06	$66.36
Operators (Building, Class 02A - See Notes)	5/1/2018		$38.75	$25.61	$64.36
Operators (Building, Class 02A - See Notes)	5/1/2021		$43.38	$26.98	$70.36
Operators (Building, Class 02A - See Notes)	5/1/2017		$37.21	$25.16	$62.37
Operators (Building, Class 03 - See Notes)	5/1/2017		$32.23	$23.68	$55.91
Operators (Building, Class 03 - See Notes)	5/1/2018		$33.78	$24.12	$57.90
Operators (Building, Class 03 - See Notes)	5/1/2021		$38.41	$25.50	$63.91
Operators (Building, Class 03 - See Notes)	5/1/2020		$36.86	$25.05	$61.91
Operators (Building, Class 03 - See Notes)	5/1/2019		$35.32	$24.59	$59.91
Operators (Building, Class 04 - See Notes)	5/1/2021		$37.26	$25.18	$62.44
Operators (Building, Class 04 - See Notes)	5/1/2020		$35.73	$24.71	$60.44
Operators (Building, Class 04 - See Notes)	5/1/2017		$30.33	$22.12	$52.45
Operators (Building, Class 04 - See Notes)	5/1/2018		$32.63	$23.80	$56.43
Operators (Building, Class 04 - See Notes)	5/1/2019		$34.17	$24.27	$58.44
Operators (Building, Class 05 - See Notes)	5/1/2019		$33.73	$24.14	$57.87
Operators (Building, Class 05 - See Notes)	5/1/2020		$35.28	$24.59	$59.87
Operators (Building, Class 05 - See Notes)	5/1/2018		$32.18	$23.69	$55.87
Operators (Building, Class 05 - See Notes)	5/1/2017		$29.87	$21.99	$51.86
Operators (Building, Class 05 - See Notes)	5/1/2021		$36.82	$25.04	$61.86
Operators (Building, Class 06 - See Notes)	5/1/2019		$32.86	$23.86	$56.72
Operators (Building, Class 06 - See Notes)	5/1/2017		$29.00	$21.72	$50.72
Operators (Building, Class 06 - See Notes)	5/1/2018		$31.31	$23.41	$54.72
Operators (Building, Class 06 - See Notes)	5/1/2020		$34.40	$24.32	$58.72
Operators (Building, Class 06 - See Notes)	5/1/2021		$35.95	$24.77	$60.72
Operators (Building, Class 07A- See Notes)	5/1/2019		$46.15	$29.22	$75.37
Operators (Building, Class 07A- See Notes)	5/1/2021		$49.86	$30.31	$80.17
Operators (Building, Class 07A- See Notes)	5/1/2018		$44.29	$28.68	$72.97
Operators (Building, Class 07A- See Notes)	5/1/2017		$42.44	$28.13	$70.57
Operators (Building, Class 07A- See Notes)	5/1/2020		$48.00	$29.77	$77.77
Operators (Building, Class 078- See Notes)	5/1/2017		$42.09	$28.03	$70.12
Operators (Building, Class 07B- See Notes)	5/1/2021		$49.51	$30.20	$79.71
Operators (Building,Class 078- See Notes)	5/1/2018		$43.95	$28.58	$72.53
Operators (Building, Class 07B- See Notes)	5/1/2019		$45.80	$29.12	$74.92
Operators (Building,Class 078- See Notes)	5/1/2020		$47.65	$29.67	$77.32
Painters Class 1 (see notes)	5/1/2017		$27.25	$18.17	$45.42
Painters Class 2 (see notes)	5/1/2017		$30.15	$18.17	$48.32
Painters Class 3 (see notes)	5/1/2017		$36.25	$18.17	$54.42
Plasterers	5/1/2017		$24.23	$21.38	$45.61
Plumbers	5/1/2017		$44.39	$30.60	$74.99
Roofers (Composition)	5/1/2018		$37.15	$31.27	$68.42

Project: 18-04053 • Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Roofers (Composition)	5/1/2017		$36.15	$30.22	$66.37
Roofers (Shingle)	5/1/2016		$25.70	$19.17	$44.87
Roofers (Shingle, Slate, Tile)	5/1/2018		$27.50	$20.37	$47.87
Roofers (Slate & Tile)	5/1/2018		$30.50	$20.37	$50.87
Roofers (Slate & Tile)	5/1/2016		$28.70	$19.17	$47.87
Sheet Metal Workers	6/1/2017		$33.98	$35.40	$69.38
Sheet Metal Workers	6/1/2016		$33.60	$33.43	$67.03
Sprinklerfitters	4/1/2018		$38.80	$22.74	$61.54
Sprinklerfitters	4/1/2017		$37.40	$21.74	$59.14
Steamfitters	5/1/2017		$46.99	$32.67	$79.66
Terrazzo Finisher	5/1/2019		$33.04	$16.22	$49.26
Terrazzo Finisher	5/1/2018		$32.35	$15.91	$48.26
Terrazzo Finisher	5/1/2017		$31.64	$15.62	$47.26
Terrazzo Setter	5/1/2019		$31.81	$19.67	$51.48
Terrazzo Setter	5/1/2018		$31.23	$19.25	$50.48
Terrazzo Setter	5/1/2017		$30.63	$18.85	$49.48
Tile & Marble Finisher	5/1/2019		$28.29	$14.46	$42.75
Tile& Marble Finisher	5/1/2021		$29.61	$15.14	$44.75
Tile & Marble Finisher	5/1/2020		$28.96	$14.79	$43.75
Tile& Marble Finisher	5/1/2017		$26.89	$13.86	$40.75
Tile & Marble Finisher	5/1/2018		$27.60	$14.15	$41.75
Tile Setter	5/1/2020		$31.97	$15.92	$47.89
Tile Setter	5/1/2021		$32.56	$16.33	$48.89
Tile Setter	5/1/2019		$31.37	$15.52	$46.89
Tile Setter	5/1/2017		$30.14	$14.75	$44.89
Tile Setter	5/1/2018		$30.76	$15.13	$45.89
Truckdriver class 1(see notes)	5/1/2019		$36.12	$0.00	$36.12
Truckdriver class 1(see notes)	5/1/2018		$35.32	$0.00	$35.32
Truckdriver class 1(see notes)	5/1/2017		$34.47	$0.00	$34.47
Truckdriver class 2 (see notes)	5/1/2019		$36.19	$0.00	$36.19
Truckdriver class 2 (see notes)	5/1/2018		$35.39	$0.00	$35.39
Truckdriver class 2 (see notes)	5/1/2017		$34.54	$0.00	$34.54
Truckdriver class 3 (see notes)	5/1/2019		$36.68	$0.00	$36.68
Truckdriver class 3 (see notes)	5/1/2018		$35.88	$0.00	$35.88
Truckdriver class 3 (see notes)	5/1/2017		$35.03	$0.00	$35.03

Project: 18-04053 • Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Carpenter - Instrument Person (Surveying & Layout)	5/1/2016		$27.12	$13.83	$40.95
Carpenter - Rodman I (Survey & Layout)	5/1/2016		$21.09	$13.83	$34.92
Carpenter - Rodman II (Survey & Layout)	5/1/2016		$18.69	$13.83	$32.52
Carpenters	6/1/2017		$30.92	$14.14	$45.06
Cement Finishers	1/1/2017		$27.70	$20.20	$47.90
Electric Lineman	5/28/2018		$45.25	$24.94	$70.19
Electric Lineman	5/27/2019		$46.32	$25.97	$72.29
Electric Lineman	5/29/2017		$44.22	$23.94	$68.16
Iron Workers	7/1/2106		$31.95	$27.65	$59.60
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2017		$31.33	$28.42	$59.75
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2018		$32.53	$28.42	$60.95
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2019		$33.76	$28.42	$62.18
Laborers (Class 01 - See notes)	5/1/2016		$19.81	$15.79	$35.60
Laborers (Class 01 - See notes)	5/1/2017		$20.36	$16.29	$36.65
Laborers (Class 01 - See notes)	5/1/2018		$20.96	$16.79	$37.75
Laborers (Class 01 - See notes)	5/1/2019		$21.61	$17.29	$38.90
Laborers (Class 02 - See notes)	5/1/2019		$28.23	$17.29	$45.52
Laborers (Class 02 - See notes)	5/1/2017		$26.98	$16.29	$43.27
Laborers (Class 02 - See notes)	5/1/2016		$26.43	$15.79	$42.22
Laborers (Class 02 - See notes)	5/1/2018		$27.58	$16.79	$44.37
Laborers (Class 03 - See notes)	5/1/2018		$24.57	$16.79	$41.36
Laborers (Class 03 - See notes)	5/1/2016		$23.42	$15.79	$39.21
Laborers (Class 03 - See notes)	5/1/2017		$23.97	$16.29	$40.26
Laborers (Class 03 - See notes)	5/1/2019		$25.22	$17.29	$42.51
Laborers (Class 04 - See notes)	5/1/2016		$23.77	$15.79	$39.56
Laborers (Class 04 - See notes)	5/1/2018		$24.92	$16.79	$41.71
Laborers (Class 04 - See notes)	5/1/2019		$25.57	$17.29	$42.86
Laborers (Class 04 - See notes)	5/1/2017		$24.32	$16.29	$40.61
Laborers (Class 05 - See notes)	5/1/2016		$24.44	$15.79	$40.23
Laborers (Class 05 - See notes)	5/1/2017		$24.99	$16.29	$41.28
Laborers (Class 05 - See notes)	5/1/2018		$25.59	$16.79	$42.38
Laborers (Class 05 - See notes)	5/1/2019		$26.24	$17.29	$43.53
Laborers (Class 06 - See notes)	5/1/2016		$23.86	$15.79	$39.65
Laborers (Class 06 - See notes)	5/1/2017		$24.41	$16.29	$40.70
Laborers (Class 06 - See notes)	5/1/2018		$25.01	$16.79	$41.80
Laborers (Class 06 - See notes)	5/1/2019		$25.66	$17.29	$42.95
Laborers (Class 07 - See notes)	5/1/2018		$25.30	$16.79	$42.09
Laborers (Class 07 - See notes)	5/1/2017		$24.70	$16.29	$40.99
Laborers (Class 07 - See notes)	5/1/2019		$25.95	$17.29	$43.24
Laborers (Class 07 - See notes)	5/1/2016		$24.15	$15.79	$39.94
Laborers (Class 08 - See notes)	5/1/2017		$25.18	$16.29	$41.47
Laborers (Class 08 - See notes)	5/1/2018		$25.78	$16.79	$42.57

Project: 18-04053 • Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Laborers (Class OB - See notes)	5/1/2019		$26.43	$17.29	$43.72
Laborers (Class OB - See notes)	5/1/2016		$24.63	$15.79	$40.42
Operators (Building/Heavy, Class 01 - See Notes)	5/1/2016		$32.16	$22.64	$54.80
Operators (Building/Heavy, Class 01 - See Notes)	5/1/2020		$38.44	$25.52	$63.96
Operators (Building/Heavy, Class 01 - See Notes)	5/1/2021		$39.98	$25.97	$65.95
Operators (Building/Heavy, Class 01 - See Notes)	5/1/2019		$36.90	$25.06	$61.96
Operators (Building/Heavy, Class 01 - See Notes)	5/1/2017		$33.80	$24.16	$57.96
Operators (Building/Heavy, Class 01 - See Notes)	5/1/2018		$35.35	$24.61	$59.96
Operators (Building/Heavy, Class 01a - See Notes)	5/1/2020		$40.69	$26.19	$66.88
Operators (Building/Heavy, Class 01a - See Notes)	5/1/2021		$42.24	$26.64	$68.88
Operators (Building/Heavy, Class 01a - See Notes)	5/1/2019		$39.14	$25.73	$64.87
Operators (Building/Heavy, Class 01a - See Notes)	5/1/2017		$36.05	$24.82	$60.87
Operators (Building/Heavy, Class 01a - See Notes)	5/1/2018		$37.60	$25.27	$62.87
Operators (Building/Heavy, Class 02 - See Notes)	5/1/2020		$38.16	$25.44	$63.60
Operators (Building/Heavy, Class 02 - See Notes)	5/1/2021		$39.70	$25.89	$65.59
Operators (Building/Heavy, Class 02 - See Notes)	5/1/2019		$36.61	$24.98	$61.59
Operators (Building/Heavy, Class 02 - See Notes)	5/1/2017		$33.52	$24.07	$57.59
Operators (Building/Heavy, Class 02 - See Notes)	5/1/2018		$35.07	$24.52	$59.59
Operators (Building/Heavy, Class 02a - See Notes)	5/1/2020		$40.41	$26.10	$66.51
Operators (Building/Heavy, Class 02a - See Notes)	5/1/2021		$41.95	$26.56	$68.51
Operators (Building/Heavy, Class 02a - See Notes)	5/1/2019		$38.87	$25.64	$64.51
Operators (Building/Heavy, Class 02a - See Notes)	5/1/2017		$35.78	$24.72	$60.50
Operators (Building/Heavy, Class 02a - See Notes)	5/1/2018		$37.32	$25.19	$62.51
Operators (Building/Heavy, Class 03 - See Notes)	5/1/2020		$35.23	$24.57	$59.80
Operators (Building/Heavy, Class 03 - See Notes)	5/1/2021		$36.78	$25.03	$61.81
Operators (Building/Heavy, Class 03 - See Notes)	5/1/2019		$33.69	$24.11	$57.80
Operators (Building/Heavy, Class 03 - See Notes)	5/1/2017		$30.60	$23.21	$53.81
Operators (Building/Heavy, Class 03 - See Notes)	5/1/2018		$32.15	$23.66	$55.81
Operators (Building/Heavy, Class 04 - See Notes)	5/1/2020		$33.65	$24.11	$57.76
Operators (Building/Heavy, Class 04 - See Notes)	5/1/2021		$35.64	$24.69	$60.33
Operators (Building/Heavy, Class 04 - See Notes)	5/1/2019		$32.55	$23.78	$56.33
Operators (Building/Heavy, Class 04 - See Notes)	5/1/2017		$29.47	$22.88	$52.35
Operators (Building/Heavy, Class 04 - See Notes)	5/1/2018		$31.01	$23.32	$54.33
Operators (Building/Heavy, Class 05 - See Notes)	5/1/2019		$32.11	$23.65	$55.76
Operators (Building/Heavy, Class 05 - See Notes)	5/1/2020		$33.65	$24.11	$57.76
Operators (Building/Heavy, Class 05 - See Notes)	5/1/2018		$30.56	$23.20	$53.76
Operators (Building/Heavy, Class 05 - See Notes)	5/1/2021		$35.20	$24.56	$59.76
Operators (Building/Heavy, Class 05 - See Notes)	5/1/2017		$29.02	$22.74	$51.76
Operators (Building/Heavy, Class 06 - See Notes)	5/1/2019		$31.22	$23.40	$54.62
Operators (Building/Heavy, Class 06 - See Notes)	5/1/2020		$32.78	$23.84	$56.62
Operators (Building/Heavy, Class 06 - See Notes)	5/1/2018		$29.68	$22.93	$52.61
Operators (Building/Heavy, Class 06 - See Notes)	5/1/2021		$34.31	$24.31	$58.62
Operators (Building/Heavy, Class 06 - See Notes)	5/1/2017		$28.14	$22.49	$50.63
Operators (Heavy, Class 07A - See Notes)	5/1/2021		$48.14	$29.83	$77.97

Project: 18-04053 • Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Heavy, Class 07A - See Notes)	5/1/2020		$46.28	$29.27	$75.55
Operators (Heavy, Class 07A - See Notes)	5/1/2019		$44.43	$28.73	$73.16
Operators (Heavy, Class 07A - See Notes)	5/1/2018		$42.58	$28.18	$70.76
Operators (Heavy, Class 07A - See Notes)	5/1/2017		$40.73	$27.63	$68.36
Operators (Heavy, Class 07B - See Notes)	5/1/2020		$45.94	$29.17	$75.11
Operators (Heavy, Class 07B - See Notes)	5/1/2021		$47.79	$29.71	$77.50
Operators (Heavy, Class 07B - See Notes)	5/1/2019		$44.09	$28.63	$72.72
Operators (Heavy, Class 07B - See Notes)	5/1/2017		$40.38	$27.53	$67.91
Operators (Heavy, Class 07B - See Notes)	5/1/2018		$42.23	$28.09	$70.32
Operators (Highway, Class 01 - See Notes)	5/1/2019		$36.02	$24.79	$60.81
Operators (Highway, Class 01 - See Notes)	5/1/2020		$37.56	$25.24	$62.80
Operators (Highway, Class 01 - See Notes)	5/1/2018		$34.47	$24.33	$58.80
Operators (Highway, Class 01 - See Notes)	5/1/2016		$32.16	$22.64	$54.80
Operators (Highway, Class 01 - See Notes)	5/1/2017		$32.93	$23.87	$56.80
Operators (Highway, Class 01 - See Notes)	5/1/2021		$39.10	$25.70	$64.80
Operators (Highway, Class 01a - See Notes)	5/1/2020		$39.81	$25.92	$65.73
Operators (Highway, Class 01a - See Notes)	5/1/2021		$41.35	$26.38	$67.73
Operators (Highway, Class 01a - See Notes)	5/1/2019		$38.27	$25.46	$63.73
Operators (Highway, Class 01a - See Notes)	5/1/2017		$35.18	$24.56	$59.74
Operators (Highway, Class 01a - See Notes)	5/1/2018		$36.72	$25.01	$61.73
Operators (Highway, Class 02 - See Notes)	5/1/2019		$34.84	$24.44	$59.28
Operators (Highway, Class 02 - See Notes)	5/1/2020		$36.38	$24.90	$61.28
Operators (Highway, Class 02 - See Notes)	5/1/2021		$37.93	$25.35	$63.28
Operators (Highway, Class 02 - See Notes)	5/1/2016		$30.98	$22.31	$53.29
Operators (Highway, Class 02 - See Notes)	5/1/2017		$31.75	$23.53	$55.28
Operators (Highway, Class 02 - See Notes)	5/1/2018		$33.30	$23.98	$57.28
Operators (Highway, Class 03 - See Notes)	5/1/2019		$34.14	$24.25	$58.39
Operators (Highway, Class 03 - See Notes)	5/1/2020		$35.69	$24.69	$60.38
Operators (Highway, Class 03 - See Notes)	5/1/2021		$37.23	$25.16	$62.39
Operators (Highway, Class 03 - See Notes)	5/1/2016		$30.28	$22.10	$52.38
Operators (Highway, Class 03 - See Notes)	5/1/2017		$31.06	$23.32	$54.38
Operators (Highway, Class 03 - See Notes)	5/1/2018		$32.59	$23.80	$56.39
Operators (Highway, Class 04 - See Notes)	5/1/2016		$29.82	$21.98	$51.80
Operators (Highway, Class 04 - See Notes)	5/1/2021		$36.77	$25.03	$61.80
Operators (Highway, Class 04 - See Notes)	5/1/2017		$30.60	$23.20	$53.80
Operators (Highway, Class 04 - See Notes)	5/1/2020		$35.23	$24.57	$59.80
Operators (Highway, Class 04 - See Notes)	5/1/2019		$33.68	$24.12	$57.80
Operators (Highway, Class 04 - See Notes)	5/1/2018		$32.14	$23.66	$55.80
Operators (Highway, Class 05 - See Notes)	5/1/2019		$33.18	$23.97	$57.15
Operators (Highway, Class 05 - See Notes)	5/1/2016		$29.31	$21.83	$51.14
Operators (Highway, Class 05 - See Notes)	5/1/2021		$36.26	$24.87	$61.13
Operators (Highway, Class 05 - See Notes)	5/1/2020		$34.72	$24.42	$59.14
Operators (Highway, Class 05 - See Notes)	5/1/2017		$30.08	$23.06	$53.14
Operators (Highway, Class 05 - See Notes)	5/1/2018		$31.63	$23.51	$55.14

Project: 18-04053 • Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Highway, Class 06 - See Notes)	5/1/2021		$39.33	$25.78	$65.11
Operators (Highway, Class 06 - See Notes)	5/1/2018		$34.71	$24.39	$59.10
Operators (Highway, Class 06 - See Notes)	5/1/2020		$37.79	$25.30	$63.09
Operators (Highway, Class 06 - See Notes)	5/1/2016		$32.40	$22.70	$55.10
Operators (Highway, Class 06 - See Notes)	5/1/2019		$36.25	$24.85	$61.10
Operators (Highway, Class 06 - See Notes)	5/1/2017		$33.17	$23.94	$57.11
Operators (Highway, Class 06/A - See Notes)	5/1/2018		$36.96	$25.05	$62.01
Operators (Highway, Class 06/A - See Notes)	5/1/2017		$35.42	$24.59	$60.01
Operators (Highway, Class 06/A - See Notes)	5/1/2016		$34.65	$23.36	$58.01
Operators (Highway, Class 06/A - See Notes)	5/1/2019		$38.50	$25.52	$64.02
Operators (Highway, Class 06/A - See Notes)	5/1/2021		$41.58	$26.43	$68.01
Operators (Highway, Class 06/A - See Notes)	5/1/2020		$40.04	$25.97	$66.01
Operators (Highway, Class 07/A - See Notes)	5/1/2020		$45.23	$28.94	$74.17
Operators (Highway, Class 07/A - See Notes)	5/1/2019		$43.37	$28.41	$71.78
Operators (Highway, Class 07/A - See Notes)	5/1/2021		$47.08	$29.49	$76.57
Operators (Highway, Class 07/A - See Notes)	5/1/2018		$41.52	$27.84	$69.36
Operators (Highway, Class 07/A - See Notes)	5/1/2016		$38.56	$25.99	$64.55
Operators (Highway, Class 07/A - See Notes)	5/1/2017		$39.66	$27.31	$66.97
Operators (Highway, Class 07/8 - See Notes)	5/1/2021		$45.66	$29.08	$74.74
Operators (Highway, Class 07/8 - See Notes)	5/1/2017		$38.25	$26.89	$65.14
Operators (Highway, Class 07/8 - See Notes)	5/1/2020		$43.81	$28.53	$72.34
Operators (Highway, Class 07/8 - See Notes)	5/1/2019		$43.37	$28.41	$71.78
Operators (Highway, Class 07/8 - See Notes)	5/1/2018		$40.10	$27.44	$67.54
Operators (Highway, Class 07/8 - See Notes)	5/1/2016		$37.17	$25.57	$62.74
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2017		$40.98	$32.53	$73.51
Truckdriver class 1(see notes)	5/1/2016		$33.57	$0.00	$33.57
Truckdriver class 1(see notes)	5/1/2017		$34.47	$0.00	$34.47
Truckdriver class 1(see notes)	5/1/2019		$36.12	$0.00	$36.12
Truckdriver class 1(see notes)	5/1/2018		$35.32	$0.00	$35.32
Truckdriver class 2 (see notes)	5/1/2017		$34.54	$0.00	$34.54
Truckdriver class 2 (see notes)	5/1/2016		$33.64	$0.00	$33.64
Truckdriver class 2 (see notes)	5/1/2018		$35.39	$0.00	$35.39
Truckdriver class 2 (see notes)	5/1/2019		$36.19	$0.00	$36.19
Truckdriver class 3 (see notes)	5/1/2019		$36.68	$0.00	$36.68
Truckdriver class 3 (see notes)	5/1/2016		$34.13	$0.00	$34.13
Truckdriver class 3 (see notes)	5/1/2017		$35.03	$0.00	$35.03
Truckdriver class 3 (see notes)	5/1/2018		$35.88	$0.00	$35.88

Addendum No. 1

RFP # 18-10495-8121

Cashless Tolling System Implementation and Maintenance

Prospective Respondents: You are hereby notified of the following information in regard to the referenced RFP:

REVISIONS

1. Delete requirement #58 within section 2.1.5.1 Automatic Vehicle Identification (AVI) System Base Requirements on page 14 of 178 of Exhibit A – Scope of Work (page 61 of 770 in original RFP PDF file).

2. Delete requirement #75 within section 2.1.5.2 Automatic Vehicle Identification (AVI) System Tri-Protocol Implementation *(Optional)* on page 15 of 178 of Exhibit A – Scope of Work (page 62 of 770 in original RFP PDF file).

3. Replace Attachment 2 – Installation Responsibility Matrix in its entirety with the revised Attachment 2 – Installation Responsibility Matrix – Addendum #1 06-12-2018 provided as attached to this addendum.

4. Replace Section 4.10 Lane Closure and Traffic Control Requirements and Conditions on page 96 of 178 of Exhibit A – Scope of Work (page 144 of 770 in original RFP PDF file) in its entirety with the following:

4.10 Lane Closure and Traffic Control Requirements and Conditions

703	The Contractor shall provide all MPT activities associated with completing Contractor Work during the Implementation Phase. All lane closures shall be coordinated with the PTC and civil contractor and lane closure schedules shall be submitted to the Commission in advance for Approval.
704	In-lane Cashless Tolling Equipment installation and MPT activities shall be scheduled to occur within the allowable working hours outside of any holiday or event periods. The 2018 allowable working hours and holiday restrictions can be found in *Attachment 15: Lane Closure and MPT* Provisions. Allowable working hours and holiday restrictions are subject to change and Contractor shall be responsible for monitoring new releases of all standards/policies to assure their work schedule aligns with the most recent PTC requirements.

705	The Contractor shall maintain a minimum number of open lanes during all MPT activities as defined in the latest PTC lane charts within the allowable working hours. The Contractor shall request the latest lane charts from the PTC.
706	Contractor shall provide the PTC representative the information required in the "Construction Daily Lane Closure Report" shown in *Attachment 15: Lane Closure and MPT Provisions*. The information required for completion of this form should be submitted to the PTC representative a minimum of three (3) days prior to the planned lane closure.
707	The Contractor shall follow the requirements as stipulated in the latest applicable Commission's Maintenance and Protection of Traffic Standard Drawings, as provided at https://www.paturnpike.com/business/engineering_standards.aspx. Contractor shall follow the requirements as stipulated in CS 901 and the MPT Standard Special Provision, provided in their current form in *Attachment 15: Lane Closure and MPT Provisions*. Contractor shall be responsible for monitoring new releases of all standards/policies and assure their work complies with the most recent versions available.
708	Any Work involving removal/relocation of Equipment (loosening or removal of nuts/screws, cables, connectors etc.) shall be done with appropriate lane closures in coordination with the latest PTC traffic requirements.
709	This requirement intentionally left blank.
710	This requirement intentionally left blank.

5. Replace Section 7.20 Maintenance and Protection of Traffic (MPT) on page 171 of 178 of Exhibit A – Scope of Work (page 218 of 770 in original RFP PDF file) in its entirety with the following:

7.20 Maintenance and Protection of Traffic (MPT)

1189	The Contractor shall provide all MPT associated with the Cashless Tolling Maintenance Phase. The Contractor shall develop as a part of the Maintenance Plan an MPT procedure for Approval by the Commission. The Contractor shall follow the requirements as stipulated in the the most recent applicable Commission's Maintenance and Protection of Traffic Standard Drawings, as provided at https://www.paturnpike.com/business/engineering_standards.aspx. Contractor shall also follow the requirements as stipulated in CS 901 and the MPT Special Provision, which are provided in their current form in *Attachment 15: Lane Closure and MPT Provisions*. The Contractor shall be responsible for monitoring new releases of all standards/policies and assure their work complies with the most recent versions available.

1190	The Contractor shall adhere to the Approved MPT Plan when setting up, working under MPT and restoring lanes to traffic. The Contractor shall provide the PTC representative the information required in the “Construction Daily Lane Closure Report” shown in *Attachment 15: Lane Closure and MPT Provisions*. Contractor shall work with the Commission to coordinate MPT Work and to adhere to the Commission advance notice requirements for Work in the lanes, both on a scheduled and emergency basis.

6. Replace Exhibit F-6 - Requirements Conformance Matrix in its entirety with the revised Exhibit F-6 - Requirements Conformance Matrix – Addendum #1 06-13-2018 provided as attached to this addendum. Electronic file is also provided.

ADDITIONS

1. Attachment 15 - Lane Closure and MPT Provisions - Addendum #1 06-13-2018 is provided as additional information and attached as part of this addendum.

QUESTIONS AND ANSWERS

Following are the answers to questions submitted in response to the above referenced RFP as of June 8, 2018. All of the questions have been listed, as received by the Pennsylvania Turnpike Commission.

#	Page	Section	Section Description	Proposer Question	Commission Response
1				Whether companies from Outside USA can apply for this? (like, from India or Canada)	The RFP does not prohibit non-US firms from submitting proposals.
2				Whether we need to come over there for meetings?	We reserve the right to request in-person demonstrations during the proposal process. Other proposal related work may be performed offsite. A successful proposer will be expected to meet and perform work on-site during implementation as requested by the PTC and defined in the RFP.
3				Can we perform the tasks (related to RFP) outside USA? (like, from India or Canada)?	See answer to question 3.
4				Can we submit the proposals via email?	No, refer to the RFP Part I-16 – Response.
5	Exhibit A - Scope of Work: 18 of 178	2.1.5.4	License Plate Image Capture and Processing Systems (LPICPS)	For item #98, does this mean PTC requires that the OCR/ALPR processing be performed in the camera or just that the imagery from such cameras are required for OCR/ALPR processing?	OCR/ALPR processing is not required to be performed in the camera. The imagery needs to meet the requirements for OCR/ALPR processing.

6	Exhibit A - Scope of Work: 20 of 178	2.1.5.5	Optical Character Recognition (OCR)/Automatic License Plate Recognition (ALPR) – Optional	Will PTC consider making a cost saving element like OCR/ALPR part of the full scope instead of being optional?	Submission of the option is required as part of the Contractor proposal. The Commission may exercise the option in the future.

All other terms, conditions and requirements of the original RFP dated May 30, 2018 remain unchanged unless modified by this Addendum.

Legend:

A = Primary Responsibility - The identified party has the primary responsibility for completion of the item.	1 =	Design
B = Support / Coordination -The identified party provides either support or coordination to assist the primary responsible party with successful completion of the item.	2 =	Purchase Materials/ Equipment
C = Limited/Minimum Responsibility - The identified party provides limited action for the item.	3 =	Installation and/or Construction

#	Element / Task / Component / Sub-System Description	Toll System "Contractor"			PTC			Civil Contractor			Civil Designer			Comments and Other Responsibilities / Information
		1	2	3	1	2	3	1	2	3	1	2	3	
1.	Overhead Structures/Toll Gantries	B	C	B	B	B	B	C	A	A	A	B	B	Civil Designer will design overhead structures/toll gantries based on known toll system requirements and in conformance with the standard gantry concept provided in Attachment 5 - Concept Plans for Overhead Structures and Toll Gantries, toll system proposals and future needs. Upon Contract award the Contractor shall review and approve Civil Designer and Civil Contractor shop drawings related to toll equipment. Civil Contractor will furnish and install the overhead structures/toll gantries including the drop down and retractable mounting arms and support plates mounted to the gantry. Contractor shall design, furnish and install mounting brackets and hardware as described in item 4 from mounting demarcation point to attach the Toll System equipment to the arms and support plates, and shall provide shop drawings for Civil Designer and PTC approval prior to installation. (See Attachment 6 – Installation Demarcation Diagram).
2.	Toll Lanes Pavement/Roadway Infrastructure	B	C	B	B	C	B	C	A	A	A	C	C	Civil Designer will design roadway infrastructure based on known toll system requirements, toll system proposals and future needs. Upon Contract award, Contractor shall review and approve Civil Designer and Civil Contractor shop drawings related to roadway. Civil Contractor to furnish and install roadway infrastructure up to and including demarcation points of the pavement, conduits and related roadway junction boxes (see Attachment 6 – Installation Demarcation Diagram). The Contractor approves the pavement design to ensure that the design will support the toll system, inspects and signs off on riser prior to asphalt overlay. The Contractor will be responsible for the installation of all in-lane sensors that will be imbedded into the pavement, including but not limited to loops and treadles. The Contractor will be responsible for sealing and patching any work they perform in the pavement. (i.e. saw cuts).
3.	Toll Zone Locations	B	n/a	n/a	B	n/a	n/a	C	n/a	n/a	A	n/a	n/a	Civil Designer to determine final toll zone footprint based on proposed locations in Attachment 1 - Cashless Toll Zone Locations based on PTC and AVI vendor requirements; known toll system requirements; toll system proposals, and future needs. Contractor shall provide support, as applicable, after Contract award has occurred.
4.	Mounting Hardware and Materials for Toll System Installation	A	A	A	B	B	B	C	C	B	B	C	B	Contractor shall design, furnish and install all mounting brackets, hardware and provide materials (e.g., loop wire, sealant), and all Toll System equipment from the point of mounting demarcation on the cashless tolling structures, from the designated demarcation point/junction box within the roadway, and within the TEB from the TEB demarcation point (see Attachment 6 – Installation Demarcation Diagram). The Civil Designer and Civil Contractor will incorporate equipment specific brackets into the design package.
#	Element / Task / Component / Sub-System Description	Toll System "Contractor"			PTC			Civil Contractor			Civil Designer			Comments and Other Responsibilities / Information
		1	2	3	1	2	3	1	2	3	1	2	3	

#	Element / Task / Component / Sub-System Description	Toll System "Contractor"			PTC			Civil Contractor			Civil Designer			Comments and Other Responsibilities / Information
		1	2	3	1	2	3	1	2	3	1	2	3	
5.	Roadside Toll System Equipment	A	A	A	B	B	B	C	C	B	B	C	B	Contractor shall design, procure, furnish and install all Toll System equipment to meet the requirements of the Contract.
6.	Toll System Equipment within the Toll Equipment Building (TEB)	A	A	A	B	B	B	C	C	B	B	C	B	Contractor shall design, furnish and install all Toll System equipment located within the TEB(s) to meet the requirements of the Contract. This includes but not limited to zone controllers, facility servers (if necessary), and image servers (if necessary).
7.	Signage, Sign Supports, and Mounting	C	C	C	B	B	B	C	A	A	A	B	B	Civil Designer will design signs. Civil Contractor will be responsible for all signage procurement and installation related activities.
8.	Roadside Toll Equipment Building	B	C	B	B	B	B	C	A	A	A	B	B	Civil Designer will design toll equipment buildings and Civil Contractor will furnish and install toll equipment buildings. Contractor will provide space and power requirements as well as environmental considerations for all Contractor provided equipment housed inside the toll equipment building. The Contractor will review and approve designs and shall install equipment racks within the TEB to house the toll system servers and components.
9.	Back-up Generator	B	C	C	B	B	B	C	A	A	A	B	B	Civil Designer will specify roadside generator. Civil Contractor will furnish and install generators. Contractor and PTC to provide power requirements at each generator location for the toll system and ITS equipment.
10.	Toll System Equipment Racks within Toll Equipment Building	A	A	A	B	B	B	C	C	B	B	B	B	Contractor shall design, furnish and install equipment racks for LAN and toll equipment within the toll equipment building, including equipment layout design; power supplies, mounting materials, raceways, and wiring and conduit from toll equipment building demarcation points for power and communications and shall provide shop drawings for Civil Designer and PTC approval prior to installation. (see Attachment 6– Installation Demarcation Diagram)
11.	PTC WAN and ITS Equipment Racks within Toll Equipment Building	B	C	C	A	A	A	C	C	B	B	B	B	PTC shall design, furnish and install equipment racks for WAN and ITS equipment within the toll equipment building, including equipment layout design; power supplies, mounting materials, raceways, and wiring and conduit from toll equipment building demarcation points for power and communications and shall provide shop drawings for Civil Designer prior to installation.
12.	Power from Point of Service to Toll Equipment Building	B	C	B	B	B	B	C	A	A	A	B	B	Civil Designer will design power infrastructure based on known toll system requirements, toll system proposals and future needs. Upon Contract award Contractor shall review and approve Civil Designer and Civil Contractor shop drawings related to power requirements. Civil Contractor shall be responsible for providing the prime power and the electrical connectivity (including conduit and panels) between the point of service and the toll equipment buildings. Civil Contractor will also be responsible for stub out of conduits to demarcation points in the toll equipment building. (see Attachment 6 – Installation Demarcation Diagram) The Contractor will provide specific power requirements for the toll system and provide specifications for any utility clearances in the vicinity of the toll system equipment.
13.	Toll System equipment conduits or ducts and junction/pull boxes from TEB to demarcation point on the overhead structures/toll gantries	B	C	B	B	B	B	C	A	A	A	B	B	Civil Designer will design and Civil Contractor will furnish and install conduits, ducts and junction boxes and other related power infrastructure based on known toll system requirements, Cashless Tolling System proposals and future needs from the TEB to a pre-defined demarcation point (see Attachment 6 – Installation Demarcation Diagram). Upon contract award Contractor shall review and approve Civil design and Civil Contractor shop drawings related to this infrastructure. The Contractor will be responsible to pull Toll System cables and wires as described in #16 to the equipment racks. (see Attachment 6 – Installation Demarcation Diagram)
14.	Conduit from Demarcation point(s) to Toll Equipment	A	A	A	B	B	B	B	B	B	B	B	B	The Contractor will furnish and install above grade conduits, ducts and junction boxes and other related power infrastructure based on the Toll System requirements beyond the pre-defined demarcation points to complete the connections to their toll equipment. (see Attachment 6 – Installation Demarcation Diagram)

15.	Toll System Equipment Cable and Wiring	A	A	A	B	B	B	C	C	B	B	C	B	The Contractor shall design, furnish and install all cables and wiring required (including but not limited to power and data/network) to fully connect and operate the Toll System from the point of power supplied by the Civil Contractor and the WAN equipment provided by PTC. The Contractor will be responsible for all cables and wiring to connect the Toll System equipment to the toll equipment racks in the TEB (see Attachment 6– Installation Demarcation Diagram).
16.	Toll Zone Lighting	A	A	A	B	C	C	C	B	B	B	B	B	The Contractor shall design, furnish and install any supplemental lighting and sensors required for the Cashless Tolling System including any supplemental lighting for the DVAS. Contractor to provide mounting requirements and any limitations on the positioning of light fixtures with respect to the tolling equipment to the Civil Designer(s).
17.	Toll System Design/Installation Drawings	A	n/a	n/a	B	n/a	n/a	B	n/a	n/a	B	n/a	n/a	The Contractor shall provide all design drawings and documentation required for the installation of the Toll System to the Civil Designer and shall review and approve Civil Designer's design and Civil Contractor shop drawings with regard to the Toll System.
18.	Toll System Network Equipment (LAN)	A	A	A	B	B	B	C	C	B	B	C	B	The Contractor shall design, and furnish all Toll System network equipment per specification and install all LAN network devices to interconnect with the appropriate PTC installed network equipment in the toll equipment buildings (see Attachment 3b – Network Responsibility Diagram). The Contractor will be responsible to manage and monitor all Cashless Tolling LAN equipment after the PTC provided firewall. It will be the responsibility of the Contractor and PTC to coordinate and develop the connection(s). The Contractor is responsible for verifying the connectivity between all Cashless Tolling System(s).
19.	WAN Network Equipment (remote sites, i.e. Disaster Recovery or Cloud locations)	A	A	A	B	B	B	C	C	B	B	C	B	The Contractor shall design, furnish and install all network equipment and WAN devices to provide network connectivity including but not limited to Contractor remote monitoring locations and colocations of servers outside of the PTC facilities.
20.	WAN Network Equipment (PTC facilities)	B	C	B	A	A	A	C	C	B	B	C	B	The PTC shall design, furnish and install ALL network equipment and WAN devices to provide network connectivity to the TEB(s) (see Attachment 3b – Network Responsibility Diagram), and to other PTC facilities including. It will be the shared responsibility of the Contractor and PTC to coordinate and develop the connection(s).
21.	Facility Servers	A	A	A	B	B	B	C	C	C	C	C	C	The Contractor shall furnish and install all facility servers, storage devices, and other required processing components as required in the TEB.
22.	Toll System UPS – Equipment	B	C	B	B	C	B	C	A	A	A	C	C	The Civil Designer shall design and the Civil Contractor shall furnish and install UPS in the toll equipment buildings. The Contractor shall furnish and install an electronic interface to the UPS to monitor the UPS performance. The Contractor and PTC will provide power requirements at each UPS location for the Toll System and supporting ITS and WAN equipment.
23.	Maintenance and Protection of Traffic (MPT) for Toll System Installation (prior to the Civil Contractor having completed their work within the toll zone)	B	B	B	B	B	B	B	A	A	A	B	B	The Civil Designer shall design typical MPT plans for the work and the Civil Contractor shall furnish all MPT and lane closures per the Contractor schedule for Toll System equipment related installation and testing during the civil construction period, and prior to the Civil Contractor completing their work. The Contractor shall coordinate with the Civil Contractor to take advantage of lane closures that could provide opportunities to perform their work Final detailed MPT packages shall be submitted by the Civil Designer to PTC for approval.
24.	Maintenance and Protection of Traffic (MPT) for Toll System Installation and Testing (after the Civil Contractor has completed their work within the toll zone)	B	A	A	B	B	B	C	C	C	A	B	B	The Civil Designer shall design typical MPT plans for the work and the Contractor shall furnish all MPT and lane closure requirements per the Contractor schedule for Toll System equipment related installation and testing activities after the civil construction of the toll zone is complete and the site is handed off to the Contractor. Final detailed MPT packages shall be submitted by the Civil Designer to PTC for approval.
#	**Element / Task / Component / Sub-System Description**	**Toll System "Contractor"**			**PTC**			**Civil Contractor**			**Civil Designer**			**Comments and Other Responsibilities / Information**
		1	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	
25.	Maintenance and Protection of Traffic for Gantry Installation and related Civil Work	C	C	C	B	B	B	C	A	A	A	B	B	The Civil Designer shall design typical MPT plans for the work and Civil Contractor shall furnish all MPT for roadway, gantry, and other civil work. Final detailed MPT packages shall be submitted by the Civil Contractor to PTC and Civil Designer for approval.

26.	Toll location design and construction permits (not related directly to Toll System equipment design or installation)	C	C	n/a	B	B	n/a	B/A	B/A	n/a	A/B	A/B	n/a	The Civil Designer and Civil Contractor will coordinate and shall be responsible for obtaining the required permits for the design, construction and installation of the civil infrastructure. This will include but not limited to all environmental and construction permits required by federal, state, and local municipalities.
27.	FCC licenses and permitting for Cashless Toll System	A	B	n/a	B	A	n/a	C	C	n/a	C	C	n/a	Contractor is responsible for preparing the required application and the Commission will obtain the required FCC licenses for all AVI equipment provided under this Scope of Work. The Commission has the FCC licenses for the existing AVI Systems.
28.	Toll System Infrastructure Installation Checkout	A	n/a	A	B	n/a	B	B	n/a	B	C	n/a	B	The Contractor shall develop an installation check-out document and procedure and shall inspect and approve all work-performed by the Civil Contractor related to the Toll System to ensure proper installation per the Contractor's requirements and design specifications once the Civil Contractor has installed the required infrastructure to support the Contractor's installation requirements. All System checkout plans shall be approved by PTC.
29.	Demolition of Existing Infrastructure	B	C	B	B	B	B	C	A	A	A	C	C	The Civil Contractor will be responsible for the demolition, removal, and proper disposal of any existing infrastructure that will no longer be needed or used in the Cashless Toll System. This will include the plazas and associated equipment no longer commissioned for use.
30.	Maintenance and Protection of Traffic for demolition and existing site reconfiguration related Civil Work	C	C	C	B	B	B	C	A	A	A	B	B	The Civil Designer shall design typical MPT plans for the work and Civil Contractor shall furnish all MPT and lane closures demolition work. Final detailed MPT packages shall be submitted by the Civil Contractor to PTC and Civil Designer for approval.
31.	Fire Suppression.	C	C	C	B	B	B	B	A	A	A	B	B	The Civil Designer will be responsible for the design of the fire suppression system and the Civil Contractor shall furnish and install the necessary fire suppression equipment per the specifications.
32.	Security Access System	C	C	C	A	A	A	C	B	B	B	C	B	PTC shall have the responsibility to design, procure, install and maintain all security and card access system equipment.
33.	DVAS Mounting Pole (if required)	B	C	B	B	B	B	C	A	A	A	B	B	Civil Designer will design the DVAS pole structure required for the mounting of the DVAS camera equipment. Upon Contract award the Contractor shall review and approve Civil Designer and Civil Contractor shop drawings related to toll equipment. Civil Contractor will furnish and install the DVAS pole structures. The Civil Contractor will be responsible for providing conduit(s) from the TEB to the pole. Contractor shall design, furnish and install mountings from mounting demarcation point as described in item 4, and shall provide shop drawings for Civil Designer and PTC approval prior to installation. The Contractor shall be responsible to mount the cameras to the pole and pull all cables and wires from the pole to the TEB.
34.	Cashless Tolling System Servers	A	A	A	B	B	B	C	C	C	C	C	C	The Contractor shall specify, design, purchase, and install all servers, storage devices, and other required processing components as required in the primary and secondary Cashless Toll Concentrator locations. The contractor will be responsible for installing and configuring all software databases, security software, and the Cashless Toll Concentrator Application Software and Databases according to PTC provided requirements. The Contractor will be responsible for all LAN networking equipment up to the PTC provided firewall (see Attachment 3b – Network Responsibility Diagram),
35.	Toll System Equipment Racks within PTC facilities (i.e. TIP, WRO, etc..)	A	A	A	B	B	B	C	C	C	C	C	C	Contractor shall design, furnish and install equipment racks for LAN and toll equipment within the PTC facilities, including equipment layout design; power supplies, mounting materials. The Contractor shall coordinate with the PTC to provide space, power and environmental requirements.

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	**Comments**
No.	**Requirements**	**Existing (E) - Met by current system, no modifications required** **Modification (M) - Modifications needed to meet requirement** **Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs** **To Be Developed (D) - Not in current system, but will be developed** **Not Provided (N**) - Will not be provided - requires explanation**	**If "Status of Functionality = N" then Proposer must provide an Explanation in this Column**
II	**Cashless Tolling System Installation Requirements**		
2.1	**In-lane Systems Functional Requirements**		
	This section defines the In-lane requirements of the Contractor Scope of Work. Each Segment of the Highway has a tolling point which could have one or two toll zones and tolls are collected in each direction of travel at the toll zones. At the toll zones identified, the Cashless Tolling Equipment and electronics shall be installed on toll gantries and in the toll equipment building provided by the civil contractor. The toll gantry conceptual details at each of the toll zones are provided in *Attachment 5: Concept Plan for Overhead Structures/Toll Gantries.* The Contractor shall work with the Commission, the civil designer and civil contractor on requirements for all civil design and construction work to be performed by others on the Project, including the design and location of equipment mounting locations and retractable mounting arm(s).		
2.1.1	**Cashless Tolling System Hardware**		
2.1.1.1	**General Requirements**		
1	All Hardware and Equipment supplied under this Contract, including consumable material (material that requires periodic replacement/replenishment), shall be new and certified to have a ten (10) year minimum service life. Materials and products that have been previously used for development work or the Contractor's internal testing, or items that have been salvaged or rebuilt shall not be permitted to be used in connection with this Contract.		
2	All components, supplies and materials furnished under this Contract for the Cashless Tolling System shall be new, Commercial Off-the-Shelf (COTS) and to the extent possible, field proven, and in revenue operations to the extent possible.		
3	All components procured, furnished, and installed by the Contractor shall be available through multiple sources identified by the Contractor to the extent possible and the names of such sources shall be readily available to the Commission. The Commission shall have the right to purchase third-party Equipment directly from the Equipment vendor.		
4	All Hardware and Software provided under this Contract shall be supported by their manufacturer, upgradeable, maintained, updated, patched and secured throughout the term of the Contract.		
5	Proof of purchase in the form of purchase orders, dated invoices and shipping bills shall be retained by the Contractor and furnished to the Commission in accordance with the requirements of this Scope of Work and Contract.		
6	All Commission standards in accordance with the requirements of this Scope of Work shall be maintained throughout the term of the Contract. Standards include but are not limited to, IT security, data retention, Software and Database design and development, installation, change management, testing, maintenance and protection of traffic (MPT) and safety.		
2.1.1.2	**FCC License**		
7	The AVI system shall comply with all applicable Federal Communications Commission (FCC) regulations.		
8	It is the Contractor's responsibility to prepare the required application and the Commission will obtain the required FCC licenses for all AVI equipment provided under this Scope of Work and Agreement. The Commission has the FCC licenses for the existing AVI systems.		
9	The Contractor shall, as part of this effort, identify and accommodate any site conditions that may potentially degrade the performance of the AVI system.		
10	Under all circumstances it is the Contractor's responsibility to comply with the AVI performance requirements of this Scope of Work and Agreement and no relief in such performance shall be provided.		
2.1.1.3	**Maintainability**		
	The Cashless Tolling System Hardware shall be designed with the following specifications:		
	· modular, replaceable and repairable components to allow for efficient Maintenance;		
	· all replacements shall be plug compatible with no changes required;		
	· all components that perform the same function shall be interchangeable;		
	· all zone controllers shall be designed such that they are identical and can be configured to operate the specific number of lanes at each toll zone as shown in *Attachment 1: Cashless Toll Zone Locations* through the addition of Hardware pluggable modules and setting of appropriate Software parameters;		
	· where possible, there shall be a second source for all parts and components and it shall be identified in the Bill of Materials (BOM) unless otherwise Approved by the Commission;		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	**Comments**
No.	**Requirements**	**Existing (E) - Met by current system, no modifications required** **Modification (M) - Modifications needed to meet requirement** **Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs** **To Be Developed (D) - Not in current system, but will be developed** **Not Provided (N**) - Will not be provided - requires explanation**	**If "Status of Functionality = N" then Proposer must provide an Explanation in this Column**
11	· all electronic components shall be installed in equipment racks and installed inside the toll equipment building at each toll zone/toll point as applicable;		
	· zone controllers shall be expandable at a minimum to add two (2)additional in-lane devices;		
	· Contractor’s electronic Design and installation shall prevent electrical disturbances and noise in the electronics;		
	· ISO standard I/O interface modules shall be used in the Design and all serial, discrete and network interface boards shall have at minimum two (2) spare slots to support the addition of components;		
	· all exposed junction boxes, pull boxes and other hardware shall be either zinc coated and epoxy painted or stainless steel;		
	· all field wiring shall be terminated on screw lugs or connectors and all connectors shall be keyed or polarized to prevent incorrect connections;		
	· all wiring and connectors shall be labeled and strain relief shall be provided to protect the conductors;		
	· surge suppression shall be provided for all field wiring susceptible to lightning or similar surges;		
	· all lane Equipment shall be fused and protected against over current, over voltage, under voltage and lightning;		
	· redundant power supplies shall be provided for all required internal DC voltages, and		
	· all Equipment shall be properly grounded to ensure the safety of Maintenance personnel.		
2.1.1.4	**Diagnostics**		
12	Equipment mounting and installation design shall support the maintenance of Equipment from above and from below on toll gantries as applicable to each cashless toll zone.		
13	Maintenance personnel shall have easy access to major subsystem components, and removal, testing, and replacement shall not require tools. Components mounted on overhead structures shall also be capable of tethering to secure points during removal or placement during replacement activities such that items cannot be dropped. All test points necessary to diagnose the Equipment while in operation shall be easily accessible and light emitting diode (LED) indicators shall be provided to assist technicians to identify and diagnose problems.		
14	Technicians shall have the ability to connect a laptop authorized by the Commission in accordance with Commission policies to troubleshoot the components. Technicians shall have secured remote access to the device to monitor its status and to perform diagnostics when the lane is in operation.		
15	For easy diagnostic and trouble shooting, all error and event logs shall be consolidated such that all events and errors associated to a transaction are in a single log sequential order based on receipt of the event or error. The consolidated error and event logs shall be retained online for a configurable period of time and shall be easily accessible to the technicians and Authorized PTC staff.		
16	The consolidated error and event logs shall contain but not be limited to all sensor events, triggers and logic decisions associated with a transaction in time order from which they were received from the lane sensors, subsystems or generated by the lane systems.		
17	The consolidated error and event logs shall also be transmitted to the MOMS and available to Authorized Users in viewable form. Search and filter capability shall be provided to display and review data in the consolidated log.		
18	All diagnostics performed shall be recorded and automatically reported to the MOMS, including the technician ID, the time the Maintenance was performed, and all status and recovery messages.		
19	All diagnostic Software and specialty tools required for support of Maintenance activities shall be supplied by the Contractor and the Commission shall have full rights and access as further defined in the Contract. All Software and operating systems shall meet the Commission’s most current technology standards; all such Software and equipment shall meet Commission IT security standards.		
2.1.1.5	**Customized Hardware**		
20	If customized components or controllers are used, the Contractor shall provide detailed documentation on the Design, production and testing of these units and shall provide usage rights to the Commission. Documentation shall include electronic diagrams, component layouts and the detailed Bill of Material listing manufacturers/vendors. The Contractor shall identify all customized components and controllers and indicate their plan to make them available for the term of the Contract, including the option for placing in escrow.		
2.1.1.6	**Equipment Racks**		
21	All in-lane Equipment controllers and Cashless Tolling System electronics, devices, servers and associated communications Equipment shall be installed inside dedicated toll equipment racks that are housed within the toll equipment building according to a layout Approved by the Commission IT Department. The Contractor shall purchase and install the equipment racks in accordance with the requirements of this section.		

Functional Requirements			
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22	It is the Contractor's responsibility to provide the equipment racks of the correct size that meets the requirements of this Scope of Work. Equipment racks shall have adequate space (twenty five {25} percent extra) for added boards, servers and components for future expansion.		
23	The equipment racks shall support the Cashless Tolling System components for a minimum of ten (10) years. The equipment racks shall not be used to support peripheral non-toll related equipment.		
2.1.1.7	**Environmental**		
24	The Cashless Tolling System Equipment to be supplied will be installed in areas exposed to the range of climatic conditions found in Pennsylvania. In addition to the climatic conditions, the Equipment will also be subjected to harsh environmental factors normally found in the operation of a toll lane, such as, but not limited to: car, truck, and bus emissions; deicing materials, industrial exhausts; industrial cleaners; gasoline and car lubricants; Electromagnetic Interference (EMI) and Radio Frequency Interference (RFI), and vibrations. These conditions shall be taken into account in the Design and selection of Equipment used on this Project and the Contractor shall ensure that the System works accurately and reliably in such environment.		
25	Lane electronics, zone controllers, LPICPS controllers/servers and other components shall be able to operate in the sealed and enclosed environment of the equipment racks installed within the toll equipment building.		
26	All Hardware provided under this Contract shall be corrosion resistant and remain corrosion resistant for the term of the Contract.		
27	The in-lane Equipment not in environmentally controlled conditions shall operate with no degradation of performance in ambient air temperature of negative thirty (-30) to seventy (70) degrees Celsius, with and without direct sunlight, and relative humidity of five (5) to one hundred (100) percent for Equipment installed in an outside environment and five (5) to ninety-five (95) percent non-condensing for Equipment installed inside equipment racks.		
28	During the Design phase, the Contractor shall provide specification sheets that prove the zone controller and other lane electronics meet the environmental specifications given above. Results of all environmental tests conducted and certification of compliance shall be provided to the Commission for Approval.		
29	All exposed or in-lane Equipment, when in its fully assembled configuration, shall not be damaged, nor shall operational performance or expected lifetime be degraded. During Design phase, the Contractor shall provide specifications for the in-lane Equipment for Commission Approval.		
2.1.1.8	**Assembly**		
30	All customized Hardware shall be assembled and tested in the Contractor's fabrication/assembly facilities before being installed in the lane in accordance with the Commission's Approved test plan for customized Hardware. All chassis, attachments, and Hardware shall be fabricated stainless steel, hot dipped galvanized or other materials resistant to salt exposure and corrosion.		
31	All customized Hardware shall be identified and shall undergo a seventy-two (72) hour burn-in test before they are installed in the lanes, in accordance with the Commission's Approved test plan.		
32	Customized Hardware assembly shall facilitate replacement of failed components in accordance with requirements of this Scope of Work.		
2.1.1.9	**Bill of Materials**		
33	The Contractor shall include the BOM for all Equipment and Hardware supplied for the Cashless Tolling System. Each component shall also include the second manufacturer source and any exceptions shall be noted and explained. During the Design phase the BOM shall be finalized and all changes shall be subject to the approval of the Commission.		
34	Prior to purchase of any Equipment and as part of its Design the Contractor shall submit the final BOM to the Commission for Approval. No equipment shall be purchased by the Contractor prior to Approval of the BOM and the Design, unless otherwise authorized in writing by the Commission.		
35	All Hardware and Software procured under this Scope of Work shall be confirmed to be the latest model/version at the time of purchase with the required warranty, security, Maintenance and support Services.		
36	Updates to the BOM shall be provided by the Contractor whenever changes occur and at a minimum on a semi-annual basis over the term of this Contract.		
2.1.1.10	**Spare Parts and Support**		

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37	The Cashless Tolling System procured, furnished, and installed under this Contract shall allow the Contractor to Maintain and replace parts for the term of the Contract. The Contractor shall provide a spare parts list the cost to the Commission (inclusive of shipping) and recommended quantities for all Hardware supplied for the Cashless Tolling System for each year of the Contract.		
38	This Contract shall include the initial purchase quantities of spare parts required for the operation of the tolling points during the Warranty period as recommended by the Contractor. Costs for the replacement of spare parts during the Warranty period shall be the responsibility of the Contractor.		
39	At the end of the Maintenance term, all spare parts inventory shall be turned over to the Commission at one hundred (100) percent of the required inventory level. The Contractor shall identify (via the MOMS) the warranty status for each piece of Hardware and warranty period remaining, if applicable.		
2.1.2	**Cashless Tolling System Software**		
40	The operating system, database, other third-party Software, and Cashless Tolling System Software procured, furnished, and installed by the Contractor shall support real time operations of the lane and shall be field proven.		
41	The operating systems shall have a future upgrade path and shall be supported for a minimum of ten (10) years. The Contractor shall ensure that the risk of obsolescence to the Hardware is minimized through the selection of the operating system Software and the peripheral Hardware.		
42	All Cashless Tolling System Software developed, furnished, and installed under this Contract shall be warrantied against Software defects, security vulnerabilities and deficiencies for the term of the Contract and as described within the Contract and associated attachments.		
43	The vendor shall have an annual information security risk assessment and a vulnerability scan performed by a third party, in consultation with Commission IT Security, and provide the results to the Commission.		
2.1.3	**Cashless Tolling System Lane Configurations**		
44	The Cashless Tolling System shall support the toll zone types, lane configurations and dimensions detailed in *Attachment 1: Cashless Toll Zone Locations* .		
45	Travel lane widths shall be assumed to be either eleven (11) feet four (4) inches or twelve (12) feet in all lanes from stripe to stripe per standard PTC lane markings shown in *Attachment 14 – PTC Standard Pavement Markings* . Shoulders widths for each toll zone are detailed in *Attachment 1: Cashless Toll Zone Locations*. Shoulder lanes that are eight (8) feet or greater shall be fully equipped as a travel lane. Shoulder lanes that are less than eight (8) feet shall have vehicle detection and image capture Equipment to detect and capture vehicles straddling the shoulder.		
46	During the detailed Design, the Contractor shall make the required adjustments to the System Design to accommodate for variations in the actual lane widths and PTC standard lane markings.		
2.1.4	**Toll System Requirements**		
2.1.4.1	**Toll System Software Security**		
47	Access to information on the Cashless Tolling System and network shall be password controlled. The access shall be role based and limited to the authorized Contractor staff and designated Commission personnel.		
48	Accounts for user access to the System shall require a strong password and be compliant with Commission IT security standards and requirements.		
49	The Cashless Tolling System shall use ADFS (SAML 2.0) for user access authentication if the Cashless Toll Concentrator or optional Cashless Toll Host (if implemented) solution is located offsite or Cloud based.		
50	User access security, including sign-on facilities, permission control and access privileges for different levels shall be provided for the files, directories and application Software and shall be fully configurable by a system administrator. Access to all systems needs to be controlled through a central repository with each user having an unique log-in.		
51	User sign-on, access and access failures, both local and remote, to any element of the Cashless Tolling System shall be recorded and tracked for security audit proposes and reported to the MOMS. The System shall continuously and automatically monitor for unauthorized access; violations shall be reported to the MOMS as priority 1 Alert. These reports should be provided to Commission IT Security within twelve (12) hours of discovery.		
52	The Contractor shall develop the access levels, user roles and privileges matrix during System Design with the Commission input, including review by Commission IT Security, and Approval. The System shall allow for additions, deletions and changes to the access levels, user roles and the addition of personnel in a secure manner. Users who have separated from the Commission or the vendor shall have their access removed within 24 hours after the date of separation.		

Functional Requirements			
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53	A system level account shall be provided for Commission security systems to perform vulnerability scans using a tool such as Tenable/Nessus, Qualys or other commercial vulnerability scanning tool. Additionally, Commission IT Security can request the Contractor to perform any scans and ensuing reports through the term of the Contract. A user access review is to be done annually with final approval by Commission business owners.		
54	The Contractor shall not circumvent the Commission Approved System security. All access to the System and Approved changes made shall be recorded, monitored, reviewed and audited by the Commission. Specific requirements shall be developed by the Contractor during System Design.		
55	Authorized Users shall have access to the zone controller user access logs to audit the system access.		
56	The Contractor shall provide at a minimum read-only access for Authorized PTC staff to all databases and system log files including but not limited to transaction tables, MOMS tables, stored procedures, auditing, archiving, database views, database logs and scheduled jobs.		
2.1.5	**Cashless Tolling In-Lane System**		
2.1.5.1	**Automatic Vehicle Identification (AVI) System Base Requirements**		
57	The Contractor shall provide an AVI system that is compliant with the E-ZPass Group interoperability requirements and at a minimum support a dual protocol to include the E-ZPass (PS111 TDM/IAG E-ZPass Group) and 6C (ISOC (ISO 18000-63/6C)) protocols at the tolling points specified in this Scope of Work.		
58	Intentionally Left Blank		
59	The Contractor shall furnish and install all other Hardware, cabling and associated mounting fixtures to form a fully functioning AVI system that meets the requirements of this Scope of Work.		
60	The Contractor shall be responsible for the physical tuning of the certified AVI Equipment, and integrating the AVI system into the Contractor in-lane Design. In addition, the AVI vendor shall certify in writing that the lanes are tuned to the Approved AVI specifications. All AVI installation, configuration and tuning shall be in compliance with the certified E-ZPass Group vendor requirements.		
61	The Contractor is responsible for synchronizing all AVI readers that are in close proximity to the tolling points as required by the certified AVI manufacturer.		
62	The AVI system shall provide full coverage in all areas of the toll zone to read and report transponders. Transponders on vehicles straddling the shoulders that are less than eight (8) feet shall be read and reported to the zone controller. The Contractor shall support adjustments to the antenna quantity and placement based on the final shoulder configuration.		
63	The Contractor shall maximize any inherent redundancy built into the AVI readers whereby the failure of the master or primary reader will result in the reporting of the transponder reads via the slave or secondary reader.		
64	The AVI system shall be able to read the transponder, write to the transponder and report all E-ZPass Group interoperable transponders on vehicles traveling through any area of the toll zone, including but not limited to shoulder, center of lane, traversing lanes and straddling lanes with no interference or degradation of performance. Non-E-ZPass Group interoperable transponder reads shall also be reported and flagged if the AVI system is capable of reading such transponders.		
65	The AVI system shall have the ability to process transponders mounted on vehicles traveling in stop and go and bumper-to-bumper traffic and vehicles traveling at speeds of up to one hundred (100) miles per hour.		
66	The read zones in the lanes at a toll zone shall be tuned such that transponders in vehicles traveling through the lanes in the opposite direction of travel are not reported by the AVI system.		
67	The AVI system shall buffer transponder reads when it is unable to communicate to the zone controller. When communications are restored, the Buffered Transponder Reads shall be reported to the zone controller.		
68	If more than one transponder is present in a vehicle, the AVI system shall have the ability to accurately read, write to and report all transponders that are compliant with the E-ZPass Group and current National Interoperability (NIOP) candidate protocols. The zone controller shall properly associate the first read Commission transponder that has a valid status at the time of the transaction to the vehicle and report the additional transponders in the transaction. If both transponders have a valid status the zone controller shall associate the first read to the vehicle and report any additional transponders in the transaction. Additional transponder reads shall be reported to the existing PTC systems according to the Business Rules.		
69	The Contractor shall use the full capability of the selected AVI system to obtain AVI system status in accordance with the manufacturer specifications and report such status to the MOMS. Loss of communication to any element of the AVI system shall be immediately detected by the zone controller and reported to the MOMS. The Contractor-provided monitoring logic shall specifically detect any failures and generate alarms when failures are detected.		

Functional Requirements

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70	The Contractor shall provide maintenance tools to support remote lane tuning, diagnostics and other configuration changes. Setup and configuration of the AVI system shall be achieved remotely and shall not require lane closure except for major lane tuning, when initially installed or when a reader or antenna is replaced.		
2.1.5.2	**Automatic Vehicle Identification (AVI) System Tri-Protocol Implementation (Optional)**		
71	The Contractor shall provide an AVI system that is compliant with the E-ZPass Group interoperability requirements at the tolling points specified in this Scope of Work.		
72	The Contractor shall provide an AVI System comprised of tri-protocol readers, antennas and ancillary Equipment that is compliant with the base AVI system requirements plus the SeGo protocol (ISOB_80K).		
73	Tri-protocol readers shall be Configurable with the option to select active protocols to support the transition to the new interoperable solution.		
74	If requested, the Contractor shall support the transition of the current E-ZPass Group protocols to include the protocols required within this section when and if applicable and such support shall include but not be limited to installation adjustments, configuration, tuning, testing and verifying compliance to applicable interoperable requirements including accuracy requirements.		
75	Intentionally left blank		
76	The Contractor shall furnish and install all other Hardware, cabling and associated mounting fixtures to form a fully functioning AVI system that meets the requirements of this Scope of Work.		
77	The Contractor shall be responsible for the physical tuning of the certified AVI Equipment, and integrating the AVI system into the Contractor in-lane Design. In addition, the AVI vendor shall certify in writing that the lanes are tuned to the Approved AVI specifications. All AVI installation, configuration and tuning shall be in compliance with the certified E-ZPass Group vendor requirements.		
78	The Contractor is responsible for synchronizing all AVI readers that are in close proximity to the tolling points as required by the certified AVI manufacturer.		
79	The AVI system shall provide full coverage in all areas of the toll zone to read and report transponders. Transponders on vehicles straddling the shoulders that are less than eight (8) feet shall be read and reported to the zone controller. The Contractor shall support adjustments to the antenna quantity and placement based on the final shoulder configuration.		
80	The Contractor shall maximize any inherent redundancy built into the AVI readers whereby the failure of the master or primary reader will result in the reporting of the transponder reads via the slave or secondary reader.		
81	The AVI system shall be able to read the transponder, write to the transponder and report all E-ZPass Group interoperable transponders on vehicles traveling through any area of the toll zone, including but not limited to shoulder, center of lane, traversing lanes and straddling lanes with no interference or degradation of performance. Non-E-ZPass Group interoperable transponder reads shall also be reported and flagged if the AVI system is capable of reading such transponders.		
82	The AVI system shall have the ability to process transponders mounted on vehicles traveling in stop and go and bumper-to-bumper traffic and vehicles traveling at speeds of up to one hundred (100) miles per hour.		
83	The read zones in the lanes at a toll zone shall be tuned such that transponders in vehicles traveling through the lanes in the opposite direction of travel are not reported by the AVI system.		
84	The AVI system shall buffer transponder reads when it is unable to communicate to the zone controller. When communications are restored, the Buffered Transponder Reads shall be reported to the zone controller.		
85	If more than one transponder is present in a vehicle, the AVI system shall have the ability to accurately read, write to and report all transponders that are compliant with the E-ZPass Group and future National Interoperability (NIOP) requirements. Additional transponder reads shall be reported to the existing PTC systems according to the Business Rules.		
86	The Contractor shall use the full capability of the selected AVI system to obtain AVI system status in accordance with the manufacturer specifications and report such status to the MOMS. Loss of communication to any element of the AVI system shall be immediately detected by the zone controller and reported to the MOMS. The Contractor-provided monitoring logic shall specifically detect any failures and generate alarms when failures are detected.		
87	The Contractor shall provide maintenance tools to support remote lane tuning, diagnostics and other configuration changes. Setup and configuration of the AVI system shall be achieved remotely and shall not require lane closure except for major lane tuning, when initially installed or when a reader or antenna is replaced.		
2.1.5.3	**Automatic Vehicle Classification (AVC) System**		

Functional Requirements			
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88	The Contractor shall analyze the site conditions and Design, procure, furnish and install the required sensors and Hardware on all lanes at the specified Cashless Toll Zones as part of the AVC system that performs in accordance with performance requirements set forth in this Scope of Work under all weather conditions. The AVC system shall accurately detect, classify and separate vehicles spaced as close as three (3) feet apart traveling in stop and go and bumper-to-bumper traffic and vehicles traveling at speeds up to one hundred 100 miles per hour.		
89	The AVC system shall determine vehicle axle count or axle count and vehicle dimensions, and classify vehicles in accordance with the Commission vehicle classification structure described in *Attachment 4a: PTC Proposed AVC Class Structure and Silhouette* based on the type of toll location. Classification of vehicles traveling on the shoulders of less than eight (8) feet width is not required; however, the System shall detect vehicles that travel on the shoulder and trigger the LPICPS.		
90	The AVC system shall have the ability to detect trailer hitches and ensure that vehicles with a trailer in tow are reported as one unit to the zone controller as part of the vehicle transaction data.		
91	The AVC system shall determine the speed of the vehicle and report the speed to the zone controller as part of the vehicle transaction data.		
92	The Contractor shall ensure that there is sensor coverage at all areas of the toll zone to accurately detect and report vehicles traveling the shoulder and vehicles straddling lanes.		
93	The AVC system shall provide vehicle event messages and signals, and vehicle classification data to the zone controller. Exception conditions processed by the AVC system shall be included in the transaction data, for example vehicle straddling the lane.		
94	The Contractor's proposed AVC system shall have redundancy whereby AVC continues to function in the event any element of the AVC system fails or is degraded. The failure of a single sensor shall not prevent the lanes from processing vehicles or impact the System's capability to accurately associate transponders and to capture and process images.		
95	The AVC system shall report its health to the zone controller and shall provide status when polled. Loss of communication to any element of the AVC system shall be immediately detected and reported. All health and failure status messages shall be transmitted and reported to the MOMS. In the event the primary AVC sensor fails, then the secondary sensors shall be used to capture and process images in accordance with the Commission Business Rules.		
96	In the event there is a Class Mismatch between the AVC system and the transponder class, as defined by the Commission Business Rules during the Design phase, an image of the vehicle shall be captured and processed. The ability to enable or disable image capture for a Class Mismatch shall be configurable.		
2.1.5.4	**License Plate Image Capture and Processing System (LCICPS)**		
97	The Contractor shall Design, procure, furnish, and install all necessary front and rear LPICPS Hardware and Software required to support the video tolling and video processing requirements as set forth in this Scope of Work.		
98	High resolution front and rear cameras shall be utilized for performing the OCR/ALPR.		
99	Contractor shall install high resolution front and rear color ALPR cameras to meet the requirements of the Scope of Work. The Contractor shall install high resolution front and rear color cameras to provide one hundred (100) percent image capture during individual camera failures and excessive glare conditions.		
100	The LPICPS shall capture and process vehicles traveling in stop and go and "bumper-to-bumper" traffic, vehicles traveling at speeds up to one hundred (100) miles per hour, and vehicles with separation as close as three (3) feet apart.		
101	The Contractor shall ensure that there is shoulder coverage and vehicles traveling through any area of the toll zone, including but not limited to shoulder, center of lane, traversing lanes and straddling lanes, shall be accurately detected and their images captured and processed in accordance with the Commission Business Rules.		
102	The LPICPS shall buffer images (retaining an image until its disposition is known) such that no image is lost in order to support multiple vehicles in the lane and in accordance with the Commission Business Rules.		
103	The Contractor shall procure, furnish, and install cameras, lighting, necessary image triggers, backup triggers and the necessary camera control Software to automatically adjust the cameras to accommodate varying light and weather conditions to maintain adequate brightness and contrast settings, with or without traffic, to ensure optimum license plate information capture under all conditions and time of day.		
104	The system shall associate all images captured for a single vehicle to the vehicle transaction including multiple images captured by a camera.		

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105	Lights installed in support of the cameras shall not distract motorists traveling in either direction in the lanes. Contractor shall make no assumption of ambient light and the system shall function without any degradation regardless of the ambient light.		
106	The Contractor shall procure, furnish, and install the necessary redundant controllers/servers to support the in-lane LPICPS Equipment and such servers shall be separate of the zone controller servers.		
107	The Contractor shall provide robust industrialized computers and operating systems (PC's or workstation-type operating systems are not permitted) sufficient processor speed and memory to process vehicles in real time to meet the speed and traffic volumes as specified in this Scope of Work.		
108	The following traffic volumes are provided as projections for planning purposes only and subject to change. The projected Average Annual Daily Traffic (AADT) various tolling locations identified in this Scope of Work can be found in *Attachment 13 -Annual Traffic Volumes* .		
109	The LPICPS controllers/servers shall support standalone operations and be sized to store a minimum of thirty (30) days of images and data per lane at each of the toll zones under normal operating conditions.		
110	The LPICPS shall perform with no degradation under conditions where every vehicle is considered a video transaction (100 percent video transaction). Under these conditions the System shall store images at the lane level for minimum of seven (7) consecutive days per lane. The System shall provide a configurable setting for the processing of one hundred percent (100) percent of video transactions.		
111	When the storage utilization on the LPICPS controllers/servers reaches a configurable percentage (for example 80 percent), a message shall be transmitted to the MOMS. Images shall be deleted only after it is confirmed/acknowledged that the images have been successfully transmitted to the image server(s). Any deletion of images shall be automatic, without user intervention, and shall generate a message to be transmitted to the MOMS (configurable).		
112	The LPICPS controllers/servers architecture shall have full redundancy such that failure of a processor, board, power supply, disk, communications or other critical component does not result in loss of images and data.		
113	In the event communications to the LPICPS are lost or any LPICPS Hardware becomes non-operational, the Contractor's Design shall ensure that no images and/or data are lost and that all images and associated data are saved to a backup controller/server and transmitted to the image server(s) upon restoration of communications.		
114	The Contractor's Design shall guarantee transmission of the video transactions, images and license plate results (optional) from the lanes to the image server(s) and from the image server(s) to the existing CSC/VPC system.		
115	The System shall provide the capability to reconcile images to the transaction data and verify one hundred (100) percent transmission of video transactions and images to the existing CSC/VPC system.		
116	If the Contractor solution includes toll rate determination within the In-lane Systems, then the video transactions may have the toll rates assigned to each transaction as specified in the Approved interface control document (ICD).		
117	The Contractor's architecture shall support the image throughput requirements specified in the Scope of Work.		
118	The LPICPS shall be capable of continuously performing diagnostics and reporting its health to the zone controller and the MOMS. Loss of communication to any element of the LPICPS shall be immediately detected. All health, failure and recovery status messages shall be transmitted and reported to the MOMS.		
119	The LPICPS shall be capable of transferring video transaction data, images and license plate data to the image server(s) or the existing CSC/VPC systems in real-time or in batch mode as determined by the Commission to efficiently utilize the limited network bandwidth.		
2.1.5.5	**Optical Character Recognition (OCR)/Automatic License Plate Recognition (ALPR) – Optional**		
	If the option to provide OCR/ALPR Software is exercised, then the Contractor shall provide OCR/ALPR Software for determining the license plate data (number, jurisdiction and plate type) that results in the System meeting the requirements specified in the Scope of Work.		
120	The OCR/ALPR Software may reside at the toll zone level, plaza level or the Highway level, as long as it meets the performance and functional requirements specified in this Scope of Work.		
121	The System shall correctly identify the jurisdiction, plate type, special characters and stacked characters, and accurately determine the license plate number.		
122	There shall be no backlog or failure in the processing of images for obtaining the license plate data (number, jurisdiction and plate type) and there shall be server redundancy whereby standby servers are available immediately and fully operational in the event of a failure.		

Functional Requirements			
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123	The OCR/ALPR Software procured, furnished, and installed under this Contract can include Software that enhances and improves the accuracy and efficiency of the OCR/ALPR process. The System shall meet the OCR/ALPR performance requirements specified in this Scope of Work for license plates from States of PA, NJ, OH, FL, NY, MD, TX, DE, VA and NC. Each tolling location can be independently tuned to optimize performance based on the mixture of plates for each given toll zone.		
124	The LPICPS shall provide the capability of detecting image quality degradation in near real-time and generate alarms that are reported to MOMS when image quality impacts OCR/ALPR performance.		
125	If a vehicle has two license plates or cameras capture multiple front and rear images for a vehicle, the region of interest (ROI) for all license plates shall be obtained and the license plate number from all plates shall be extracted and associated to the vehicle transaction.		
126	Vehicles with two rear license plates shall be identified to allow the back-office to apply separate Business Rules for such transactions.		
127	The images transferred to the existing CSC/VPC system shall include, at a minimum, the front and rear full uncompressed image(s) and the ROI.		
128	Based on the OCR/ALPR results, the System shall identify the best license plate image that was used by the OCR/ALPR to obtain the license plate data including identification of front and rear images.		
129	The data transmitted along with the image shall meet the Approved ICD and shall include, but not be limited to:		
	· transaction data;		
	· license plate data, including license plate number, jurisdiction and plate type;		
	· confidence level of the OCR/ALPR results for individual characters and overall license plate number;		
	· confidence level of the jurisdiction, and		
	· enforcement notification status and action (if exercised).		
130	For audit and Maintenance purposes, Authorized Users shall have the capability to view all the images in real time on any device connected to the Cashless Tolling System network and verify the OCR/ALPR performance.		
131	For audit and testing purposes Authorized Users shall have the ability to perform image review, utilize image enhancement tools, and enter license plate data independent of the normal image processing workflow. A flexible user interface shall be provided that allows Authorized Users to select the image review criteria. Data entered through this process shall be transmitted to the Cashless Toll Concentrator or optional Cashless Toll Host System for reporting.		
132	All data entered through the independent image review process for testing and audit described above shall be saved separate from the normal production environment and shall be available to Authorized Users through reports. Such an audit process shall not impact normal operations and in most cases will occur after the images are transmitted to the existing CSC/VPC system.		
2.1.6	**Enforcement Notification** - *Optional*		
	If the option to provide Enforcement Notification functionality is exercised, then the Contractor shall provide Enforcement Notification that results in the System meeting the requirements specified in the Scope of Work.		
133	The Cashless Tolling System shall support the Maintenance and update of VEL that contains transponder numbers and license plate numbers that the Commission requires notification on. This could include repeat violators.		
134	The VEL will be transmitted from the existing CSC/VPC system or existing PTC Toll Host to the Cashless Toll Concentrator, Cashless Toll Host (optional) or facility server(s) and from the Cashless Toll Concentrator, Cashless Toll Host (optional) or facility server(s) to the lanes at frequent configurable increments and when changes take place.		
135	The Cashless Tolling System shall provide the capability to alert applicable personnel if the System detects a transponder or license plate passing through the cashless toll zone that is identified for enforcement notification. The criteria for notification shall include the status of the transponder and presence of the license plate on the VEL.		
136	Notification methods shall include but not be limited to text message, email or system to system interface.		
137	The System shall alert applicable personnel within twenty (20) seconds of the vehicle passing through the toll zone if a vehicle on the VEL is identified. The transponder ID, transponder status, license plate number and jurisdiction shall be included in the Alert.		
138	If an enforcement notification was successfully transmitted to applicable personnel, the transaction shall have a flag denoting the transmission of the enforcement notification. This enforcement transmission status shall be transmitted to the existing CSC/VPC system.		

Functional Requirements

		Required Proposer Inputs	
		Status of Functionality	**Comments**
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139	The System shall support the transmission of images (configurable) to the applicable personnel and shall include the image of the vehicle or just the ROI.		
2.1.7	**Zone Controller**		
2.1.7.1	**Zone Controller Hardware**		
140	A fully redundant zone controller shall be Designed, procured, furnished, and installed at each of the toll zones. The redundant zone controllers shall have the identical configuration.		
141	The zone controllers shall be installed in equipment racks and housed in the toll equipment building whether there is a single or dual toll equipment building at each tolling point.		
142	When any Hardware and/or process on the primary zone controller fails preventing it from processing vehicles and creating transactions, the secondary zone controller shall automatically and immediately assume the functions of the primary zone controller. The failover from the primary zone controller to the secondary zone controller shall be transparent to the rest of the System and shall not require human intervention or the restart of any subsystems. Only one zone controller at a time shall generate revenue transactions.		
143	Alarm messages shall be generated and reported to the MOMS when such a failover event occurs. The Contractor's failover Design shall ensure that there is no loss of revenue or transactions when one of the zone controllers fails.		
144	The System shall provide Authorized Users the capability to manually and remotely failover the active zone controller to and from the primary zone controller to the secondary zone controller. All such events shall be recorded and transmitted to the MOMS.		
145	The zone controllers shall be Hardened, industrial grade servers and the processor speed and memory shall be sufficient to process vehicles in real time to meet the traffic speed and volumes as specified in this Scope of Work. The following traffic volumes are provided as projections for planning purposes only and subject to change. The projected Average Annual Daily Traffic (AADT) for the various tolling locations identified in this Scope of Work can be found in *Attachment 13: Annual Traffic Volumes* .		
146	Storage shall be sized to store a minimum of thirty (30) days of transaction and event data for each lane at the toll zone supported by the zone controller.		
147	Proprietary zone controller Hardware will be considered for use, subject to the Commission's Approval. All drawings and instructions that enable construction and assembly, installation, repair, and modification of the Hardware, as well as sufficient property and use rights shall be provided to the Commission.		
2.1.7.2	**Zone Controller Software**		
148	The zone controller Software shall interface to the various devices and subsystems for each of the toll zone types specified in *Attachment 1: Cashless Toll Zone Locations* and perform all the functions as described in this Scope of Work for all Commission toll facilities.		
149	The zone controller located at each toll zone shall process all of the data obtained from the other subsystems as described in this Scope of Work to generate a transaction record for each vehicle passage through the toll zone. The zone controller shall:		
	· manage the TSL for all E-ZPass Group interoperable agencies used to validate the status of a transponder received from the AVI system;		
	· use the data obtained from the AVI and AVC systems to assign the transponder read to the correct vehicle and frame the vehicle transaction accurately;		
	· notify the LPICPS to capture and process vehicle images if no Valid Transponder read is obtained from a vehicle or if the Commission Business Rules require the capture of an image;		
	· transmit the transaction record to the facility server (if provided) or to the Cashless Toll Concentrator or optional Cashless Toll Host, including but not limited to the following data: vehicle detection and classification data, transponder data (including raw transponder data as reported by the reader), Equipment status data, and all other pertinent information regarding the transaction as specified during the Design phase;		
	· transmit to the MOMS all alarm messages relating to the health of each subsystem, including the health of the primary and secondary (redundant) zone controller. Recovery messages shall also be transmitted and reported;		
	· ensure that vehicle event data and transaction data shall be accessible to the DVAS, and		
	· transmit to the facility server (if provided) or Cashless Toll Concentrator or optional Cashless Toll Host for further processing all other messages/events in accordance with Approved ICDs.		

Functional Requirements			
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150	The zone controller Software shall be configurable and shall be able to support the Commission Cashless Tolling operational needs without requiring changes to Software. The configurable parameters shall be defined and documented during the Design process. All parameters shall have default values that shall be established during the Design process.		
151	The Contractor shall propose appropriate Protocols and data structures to accomplish the communications required between various peripherals. These Protocols and data structures shall be fully detailed and documented, in Consultation with the Commission, by the Contractor during the Design process and Approved by the Commission.		
152	Guaranteed transmission Protocols shall be used for all messages exchanged between systems, including but not limited to:		
	· zone controller;		
	· LPICPS;		
	· AVI system;		
	· AVC system;		
	· facility servers (if provided);		
	· Cashless Toll Concentrator;		
	· Cashless Toll Host (optional);		
	· image server(s);		
	· existing CSC/VPC;		
	· DVAS;		
	· MOMS, and		
	· the existing PTC Toll Host		
153	The Cashless Tolling System shall support the various lane configurations shown in *Attachment 1: Cashless Toll Zone Locations*. The zone controller application Software shall support all lane functions required to meet the Commission Cashless Tolling operational requirements.		
2.1.7.3	**Zone Controller Start-Up**		
154	Upon start-up or initialization the zone controller shall perform a self-diagnostics test to ensure full System operations. Alarm messages shall be reported for all failure conditions and a notification of the diagnostic check completion shall be displayed on the MOMS Dashboard. The failure of a critical system shall result in the toll zone operating under degraded operations in accordance with the Commission Business Rules.		
155	Upon start-up, the zone controller shall verify with the facility server (if provided), the Cashless Toll Concentrator or optional Cashless Toll Host that it has the latest configuration files; VEL (if exercised); TSL; and any other files required to support the lane operations. If the latest files are not present on the zone controller, it shall request the latest data from the facility server (if provided), Cashless Toll Concentrator or optional Cashless Toll Host. If a zone controller is unable to get the latest files, an Alert shall be generated and sent to MOMS.		
156	The zone controller shall also synchronize its time with the Commission time source and an Approved secondary source upon start-up and at established configurable intervals. The zone controller shall also support a secondary source for time synchronization.		
2.1.7.4	**Lane Operations**		
157	The Cashless Tolling System shall support various modes of operation that are managed and initiated by Authorized Users through the Cashless Toll Concentrator, the facility server (if provided), optional Cashless Toll Host or other means as approved by the PTC.		
158	Transactions shall be processed according to different Business Rules either at the lane level or the host level based on the mode of operation. The Contractor shall be responsible for ensuring that the AVI and video transactions are processed according to Commission Business Rules and transmitted correctly to the existing PTC Toll Host and/or CSC/VPC system.		
	The Cashless Tolling System shall support the following modes of operations:		
	· Open Mode: All transactions shall be processed normally in an open mode;		
	· Maintenance Mode: Transactions created in Maintenance mode are processed and transmitted as normal transaction but are identified as Maintenance mode transactions and transmitted to the Cashless Toll Host. Transactions that occur during Maintenance mode are not reported as traffic or revenue transactions.		

Functional Requirements

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159	· Emergency Mode: Transactions created during emergency mode shall be identified as emergency mode transactions and processed in accordance with Commission Business Rules to be determined during the Design phase.		
	· Save Image Mode: Capability shall be provided whereby Authorized Users can enable and disable a zone controller to save one hundred (100) percent of vehicle images processed through the LPICPS based on various selection criteria. Transactions under such condition shall be processed normally; however, these transactions and images shall be flagged with the save image mode and processed according to the Commission Business Rules (for example audit purposes).		
160	When a lane is operating in a mode other than normal open mode, an Alert shall be generated and sent to MOMS at regular (configurable) intervals.		
161	Authorized Users shall have the ability (local and remote) to configure the next operating mode and to gracefully shutdown the zone controller. Each time a mode change is requested an Alert message shall be sent to the MOMS.		
2.1.7.5	**Transaction Processing**		
162	The zone controller shall detect, classify, and frame vehicles; assign the transponder accurately to the correct vehicle and capture and process the image of the correct vehicle in accordance with the Commission Business Rules and with the performance requirements specified in this Scope of Work.		
163	The detailed transaction processing rules shall be defined and finalized during the Design phase; however, the following basic rules shall apply:		
	· the System shall have the ability to process and record multiple transponders in a vehicle and associate each transponder to the vehicle transaction;		
	· any non-E-ZPass Group interoperable transponder reads shall be reported to the Cashless Toll Host System;		
	· a minimum of one revenue bearing transaction shall be created for each vehicle that travels through the toll zone and the zone controller shall ensure that the transaction is complete prior to transmitting it;		
	· the zone controller shall be able to accurately identify, process, and track multiple vehicles in the toll zone;		
	· the zone controller shall ensure that duplicate transponder transactions (same transponder ID) are not reported from the same lane or toll zone within a configurable period of time or consecutively;		
	· Buffered Transponder Reads that are transmitted to the zone controller shall be processed but not be assigned to a vehicle by the zone controller and shall be flagged and reported to the facility server, Cashless Toll Concentrator or optional Cashless Toll Host for further processing and vehicle assignment;		
	· the zone controller shall automatically synchronize with the various subsystems to ensure the events in the lane correspond to the transaction generated, and		
	· the System shall incorporate self-correcting logic to adjust for lane anomalies and event synchronization issues.		
164	The transaction message details shall be defined and finalized during the Design phase; however, the following basic rules shall apply:		
	· The In-lane System shall transmit the video transaction to the existing CSC/VPC system for processing and billing.		
	· the In-lane System shall transmit AVI and video transactions to the Cashless Toll Concentrator or optional Cashless Toll Host for processing, reporting, and reconciliation with the existing PTC Toll Host and CSC/VPC;		
	· the transaction message shall contain all data required by the existing PTC Toll Host and CSC/VPC systems to process the AVI and video transaction;		
	· each transaction shall contain various event times to help with transaction pre-processing and synchronizing events to a transaction including but not limited to: “vehicle entry” time; “LPICPS trigger” time; “transponder read” time; “transponder write” time, and “vehicle exit” time. Such event times shall allow transponder reads, images and transaction to be associated correctly with the vehicle, and		
	· the System shall assign a lane number as approved by the PTC sequential by lane to each transaction and report the lane in which the vehicle was detected within the toll zone.		
	· the System shall assign a sequential sequence number by lane to each transaction detected within the toll zone.		
2.1.7.6	**E-ZPass Group Mapped Class**		
165	The System shall utilize the raw E-ZPass Group class obtained from the transponder data and map that raw class to the Commission E-ZPass Group proposed axle+dimension mapped class in accordance with *Attachment 4b: E-ZPass Group Mapped Classes* to be finalized during the Design Phase.		

Functional Requirements			
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166	The System shall retain the raw E-ZPass Group class and include that in the transaction data along with the E-ZPass Group mapped axle+dimension class for Commission.		
167	If a transponder has a raw E-ZPass Group class that is not mapped to the Commission E-ZPass Group axle+dimension class then the transaction shall be assigned a default class (configurable).		
2.1.7.7	**Revenue Vehicle Class (PTC Class)**		
168	The assignment of the Revenue Vehicle Class in normal operations and in degraded mode of operations shall be in accordance with the Commission Business Rules. If no classification data is obtained, a configurable default revenue class shall be assigned to the transaction and the transaction shall be flagged.		
169	The Revenue Vehicle Class shall be used to determine the fare amount for a transaction as defined by the Commission Business Rules. Flags in the transaction shall identify which class was used as the Revenue Vehicle Class.		
170	The System shall have the capability to cap the maximum and minimum (configurable) axles and class and to charge a set toll rate per additional axle count.		
171	Transactions shall include the raw E-ZPass Group class, AVC class, mapped E-ZPass Group class and Revenue Vehicle Class. The Revenue Vehicle Class assigned in accordance with the Commission Business Rules shall be used to determine the toll amount.		
2.1.7.8	**Fare Determination**		
	Fare determination is not required at the In-lane Systems, and can be performed at the Cashless Tolling Host Concentrator, facility server(s), Cashless Toll Host (optional) or existing PTC Toll Host. The Contractor solution shall include fare determination at the Cashless Toll Host Concentrator, facility server(s), Cashless Toll Host (optional) or the In-lane Systems for AVI transactions and shall meet the following requirements. Currently the existing CSC/VPC system assesses the toll for violation transactions and will continue to do so for video transactions; however, the Contractor can assign the toll to video transactions if the Contractor solution provides this capability.		
172	Fare determination shall be performed at the In-lane Systems, the Cashless Toll Concentrator or optional Cashless Toll Host systems or the existing PTC Toll Host for all AVI transactions.		
173	The Contractor solution shall include fare determination at the Cashless Toll Concentrator, optional Cashless Toll Host System or the In-lane Systems for AVI transactions.		
174	Fare determination may be performed at the In-lane Systems for all video transactions and may later be adjusted at the PTC CSC/VPC based on the transaction categorization, for example Video Image Toll (VToll).		
175	The assignment of tolls shall be assigned based on the final Design and shall be assessed using the toll rates and schedules established for each tolling point for barrier type locations such as DRB and Gateway or may be assessed based on a completed trip that would be built based on the number of gantries the customer passed under while traveling on the Mainline and/or Northeastern Extension (if Toll Host option exercised). The toll rate and class structure for the various toll facilities are not developed yet but the System shall support the toll rates and class structure for the classifications in *Attachment 4a: PTC Proposed AVC Class Structure and Silhouette* based on the toll location.		
176	The System shall support the assessment of toll by payment type for example video, E-ZPass, and Non-Revenue; vehicle class and location.		
177	Home Agency(Commission issued) non-revenue transponders shall be charged $0.00 (configurable) fare but Away Agency non-revenue transponders shall be charged the normal fare.		
178	Class 1 motorcycles with valid E-ZPass transactions that use a Home Agency(Commission issued) transponder shall be charged a configurable discounted fare.		
179	Motorcycles and other vehicles that qualify for discounted fare shall be identified by using the E-ZPass Group vehicle Type 2 which is comprised of E-ZPass Group class 136, 140 and 144. The category of E-ZPass Group class that qualifies for discounted fare shall be configurable.		
180	Motorcycle discount fares shall be rounded to the nearest penny (configurable) but shall be no less than the minimum fare (configurable). Currently the minimum fare is fifty (50) cents.		
181	The toll charged for E-ZPass transactions shall be based on Commission Business Rules developed during the Design phase and shall consider the operational status of the AVC.		
182	Tolls charged for video transactions shall be based on AVC (if it is operational) or the default class and shall be defined during the Design phase.		

Functional Requirements			
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183	Transactions shall be flagged if the vehicle class is estimated by the AVC system (for example, when the class is based on the vehicle profile or AVC data is incomplete or degraded).		
2.1.7.9	**Saving of Images**		
184	Images shall be captured and saved for the following conditions and as further defined during the Design process, including but not limited to:		
	· in all cases where there is no transponder read (including when the AVI system is down or degraded), the transponder is not "valid", or a non- interoperable read is detected;		
	· in all cases where there is a vehicle classification condition as determined by the Commission Business Rules, for example in conditions where the AVC class is estimated by the System;		
	· if the LPICPS loses communications with the zone controller in accordance with the Commission Business Rules;		
	· in all cases where there is a Class Mismatch between the transponder class and the AVC, as determined by the Commission Business Rules, and		
	· in conditions where the "save image mode" is enabled.		
185	Images saved during a LPICPS loss of communication event shall be flagged and subsequently matched with the correct transaction data when communication with the zone controller resumes. This matching can occur at the Cashless Toll Host Concentrator or optional Cashless Toll Host but shall take place in a manner that does not interfere with or degrade real time zone controller operations.		
186	If the AVC system is not operational but the LPICPS trigger is functioning, images shall be saved such that all non-Valid Transponder transactions that occur during the AVC malfunction can be subsequently pursued for collection. Sufficient data shall be provided in the transactions to allow the PTC CSC/VPC to process such transactions so that customers are not charged in error when lane operation is degraded.		
2.1.7.10	**Configuration Files**		
187	All parameters and settings required to run the zone controller application and the lane equipment shall be maintained in configuration files. Access to configuration files required to support the zone controller operations shall be limited to Authorized Users.		
188	The configuration files shall be maintained at the toll zone and the Cashless Toll Concentrator or optional Cashless Toll Host for configuration and version control. All zone controllers shall have default configuration files that allow the lane to start-up automatically.		
189	Authorized Users shall be able to make changes to parameters and settings that are defined as configurable in this Scope of Work and in the Approved Design documents. Authorized Users shall be able to make changes to the configuration files in the field. Changes to configuration shall result in an alert message to the MOMS. All changes made to the configuration files in the field shall be synchronized to the master configuration file that is maintained at the Cashless Toll Concentrator or optional Cashless Toll Host.		
190	Each zone controller shall automatically back up its critical configuration files to a backup server once a day to be used to rebuild the master drive in the event of hard disk failures.		
2.1.7.11	**Zone Controller Interfaces**		
191	The zone controller shall interface to various devices and subsystems to transmit and obtain data and synchronize the time.		
192	The zone controller shall provide checks on all data it receives from each of the devices and subsystems it interfaces to and generate alarm messages that are reported to the MOMS.		
Interface to AVI System			
193	The zone controller shall interface with the designated AVI system in accordance with the Approved ICD and transmit all relevant transponder data received from the AVI system as programmed on the transponder, as defined and Approved by the Commission during the Design phase, and reported as part of the vehicle transaction data to the Cashless Toll Concentrator or optional Cashless Toll Host.		
Interface to AVC System			
194	The zone controller shall interface with the AVC system to obtain vehicle events that shall permit accurate detection, classification, tracking and processing of vehicles. Vehicle class and speed information shall also be obtained from the AVC system and reported as part of the vehicle transaction data reported to the Cashless Toll Concentrator or optional Cashless Toll Host.		
Interface to LPICPS			

Functional Requirements

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195	The zone controller shall interface with the LPICPS to capture and process images of vehicles in accordance with the Commission Business Rules to be developed during the Design phase. The vehicle data, OCR/ALPR results (if the option to implement OCR/ALPR is exercised) and images obtained from the LPICPS shall be transmitted to the image server(s) to support the Commission's video tolling and processing requirements and PTC E-ZPass CSC operations requirements.		
Interface to DVAS			
196	The zone controller shall interface with the DVAS to transmit event data for display on the DVAS. The event data shall include transponder reads and AVC event messages that are received as the vehicle travels through the lane.		
Interface to Facility Server/ Cashless Toll Concentrator or Cashless Toll Host (if provided) Systems			
197	The zone controller shall interface with the facility server (if one is deemed necessary) or directly to the Cashless Toll Concentrator or Toll Host Systems to transmit lane data and to receive files, commands, messages and other data required for lane operations. Error detection checks shall be instituted on both systems to ensure incorrect or corrupt data is not inserted into the System. The Contractor shall work with Commission IT Security to develop a secure method of allowing this flow of data through a Commission firewall into the network.		
198	The Cashless Tolling System shall include automated methods to determine when there is a loss of communications between the zone controller and the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems; any failures detected shall be reported to the MOMS.		
199	The Cashless Tolling System shall include automated methods to determine when there is a loss of communications between the zone controller and the image server(s); any failure detected shall be reported to the MOMS.		
200	Receipt of all files and data shall be acknowledged; any transmission failures shall be reported to the MOMS.		
201	The Contractor shall provide an automated means of synchronizing the zone controller and facility server (if provided) or Cashless Toll Concentrator or Toll Host System messages in the event that the zone controllers are replaced, communications are down, or if data on the zone controller is not retrievable due to a catastrophic failure.		
2.1.7.12	**Transmitting Data**		
202	All messages generated at the zone controllers shall be transmitted to the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems in real-time using a transport mechanism that performs error detection and correction to guarantee data transmission. All messages shall be uniquely identified and validated at the Cashless Toll Concentrator or Toll Host Systems to ensure there are no missing or duplicate messages.		
203	The System shall support exception handling in accordance with the Commission Business Rules Approved during the Design phase. An alarm shall be generated and reported to the MOMS for all failed transactions, exceptions and errors.		
204	Failure of transmission of data to the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems shall result in the generation and transmission of alarm message to the MOMS.		
205	All messages shall be confirmed as received by the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems before they are flagged for purging or overwritten. In the event of a communication failure the messages shall be retained on the zone controller until successful transmission is complete and verified.		
206	The zone controller shall transmit all data to the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems, including but not limited to the following:		
	· all transaction messages generated in the lanes;		
	· all alarm and status messages generated in the lanes;		
	· all lane operational communication status messages and system health messages;		
	· all events generated in the lanes that are displayed on the Dashboard or are required at the Cashless Toll Concentrator or Toll Host System, and		
	· all events required by the DVAS for real-time review or playback.		
2.1.7.13	**Receiving Data**		
207	The zone controller shall support the E-ZPass Group TSL and other interoperable agency lists and shall have the capability to support every Agency and its assigned transponder number range as described in the E-ZPass Group specifications.		
208	The zone controller shall accept comprehensive (complete list once a day) and incremental (changes updated on a configurable interval, but not more frequently than every sixty (60) minutes) TSLs in accordance with the established Business Rules and shall activate the lists upon validation of the files.		

Functional Requirements			
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209	The Contractor shall utilize data compression, encoding or other means to efficiently store and transmit the E-ZPass Group TSL and other interoperable agency lists, such that the new lists are available at the zone controllers within thirty (30) minutes of the Cashless Toll Concentrator, Toll Host Systems or facility server(s) receiving the new lists.		
210	If tolls are determined by the In-lane Systems, then the toll rates, toll schedules and the effective date/time shall be downloaded to the zone controller and new toll rates initiated when the toll rate structure changes.		
211	All configuration files and tables needed to support the lane operations shall be downloaded to the zone controllers from the Cashless Toll l Concentrator or Toll Host Systems or facility server(s) upon confirmed change or at scheduled intervals and activated as required. Versions of the configurable files on each zone controller shall be maintained, tracked, and recorded.		
212	All zone controller Software shall be downloaded to the zone controllers from the Cashless Toll l Concentrator or Toll Host Systems or facility server(s). Software versions on each zone controller shall be maintained, tracked, and recorded.		
213	The Cashless Tolling System shall provide checks to detect issues with the data it receives from the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems, including but not limited to:		
	· incorrect versions of the data received;		
	· corrupted data received, and		
	· missing files when a file was expected.		
214	An alarm shall be generated and reported to the MOMS for all exceptions/errors.		
2.1.7.14	**Monitor All Lane Equipment for Device Status**		
215	Each zone controller shall monitor the status and system health of its internal components and all associated in-lane Equipment. All Cashless Tolling Systems, including the AVI system, AVC system and the LPICPS shall be continuously polled for status. The health of digital devices that do not provide status shall be inferred from events (for example simple loops).		
216	The System shall generate a recovery message and restore the operational status of a device that recovers after reporting a failure. Recovery messages shall be recorded against the original work ordered through the MOMS and shall be available to Authorized Users. Recovery messages shall not cause the associated work order to close, but shall serve as supporting evidence of an Equipment recovery.		
217	If communications from the zone controller to the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems are unavailable, an alarm message shall be generated and reported to the MOMS.		
218	If communications to the image server(s) are unavailable, an alarm message shall be generated and reported to the MOMS.		
219	If a lane is operating in any mode other than normal open mode an Alert message shall be generated at configurable intervals and reported to the MOMS.		
2.1.7.15	**Diagnostics and Equipment Malfunction**		
220	The zone controller Software shall execute periodic diagnostic checks on internal processes, the in-lane Equipment and interfaces. Peripheral devices shall be interrogated for device status on a regular basis (configurable per device).		
221	A device's failure to respond to a status inquiry after a configurable number of retries shall be regarded by the zone controller Software as an Equipment failure.		
222	An alarm shall be generated and reported to the MOMS for all failures that are detected.		
223	Diagnostic checks shall be performed in all modes of lane operation. Results shall be stored in the appropriate zone controller's event log and easily accessible to technicians. The System shall include “sanity checks” for fault conditions and shall report any detection of such conditions to the MOMS.		
224	Degraded modes of operation shall be supported based on the Commission Business Rules developed during the Design process and Approved by the Commission. The Contractor shall ensure the Cashless Tolling System continues to operate with minimal loss of revenue or visible impact to the patron in the event that some components of the Cashless Tolling System fail and degraded mode operations occur.		
2.1.7.16	**Stand-alone Mode of Operation**		
225	The zone controller shall operate in a stand-alone mode for a minimum of thirty (30) days if communications to the Cashless Toll Concentrator or Toll Host Systems (if provided) and existing PTC systems are down. When operating in stand-alone mode, the last files downloaded to the zone controller from the Cashless Toll Host Systems shall be used for processing vehicles.		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	Comments
No.	**Requirements**	**Existing (E) - Met by current system, no modifications required** **Modification (M) - Modifications needed to meet requirement** **Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs** **To Be Developed (D) - Not in current system, but will be developed** **Not Provided (N**) - Will not be provided - requires explanation**	**If "Status of Functionality = N" then Proposer must provide an Explanation in this Column**
226	The zone controller shall have an available data port to permit onsite manual uploading of Software, TSL or other data required for continued operation until communications with the Cashless Toll Concentrator or Toll Host Systems (if provided) and existing PTC systems is re-established. Devices utilized to download the TSL and rate tables to the lanes shall have the capability of synchronizing current file versions such that a new TSL is updated on the device within an hour of receipt.		
227	The System shall provide the capability for Authorized Users to download transactions from the zone controller and to transfer such transactions to the Cashless Toll Concentrator or Toll Host Systems (if provided)or to the existing PTC Toll Host and CSC/VPC system.		
228	The System shall provide the capability for Authorized Users to download event/transaction data for manual and stand-alone playback of the DVAS.		
229	Upon re-establishing communications with the Cashless Toll Concentrator or Toll Host Systems (if provided) and existing PTC systems all back-logged messages, including manually transferred messages, shall be flagged and transmitted to the appropriate system without affecting the real time operations or degrading lane operations.		
230	Upon re-establishment of communications and successful transmission of all messages, a recovery message shall be generated and reported to the MOMS.		
2.1.8	**Digital Video Audit System (DVAS)**		
231	The Contractor shall provide a Digital Video Audit System (DVAS) that provides the Commission the capability to investigate lane performance issues and support the Commission in customer dispute resolution.		
232	The Contractor shall develop, procure, furnish and install two or more IP addressable, color video cameras as part of the DVAS at each toll zone sufficient to meet the requirements of this section. The cameras installed shall be the same at all Toll Zones.		
233	Authorized Users shall have the ability to individually setup, configure and control the cameras remotely through the application. Configurable settings shall be available on a per-camera basis to allow for tuning for site conditions.		
234	As part of the Design phase, the Contractor and the Commission shall determine the optimum location for the installation of the DVAS Equipment to allow for the complete monitoring of each toll lane.		
235	The location and number of cameras shall permit the capture of video that allows Authorized Users to identify the vehicle class and number of axles based on the ambient lighting conditions.		
236	The Contractor is responsible for the installation of the DVAS Equipment, including mounting Hardware to the designated structure (either toll gantry or separate mounting pole) as well as power and signal cabling between the DVAS Equipment and the storage media as described in *Attachment 2: Cashless Tolling Installation Responsibility Matrix* .		
237	The DVAS cameras shall have pan-tilt-zoom (PTZ) functionality that allows Authorized Users to remotely control each camera. When no PTZ commands are received within a configurable time the DVAS cameras shall revert to their default settings. Alarm messages shall be generated and reported to the MOMS when remote controls are activated or settings other than the defaults are detected.		
238	The Contractor shall provide the lighting requirements to the civil contractor during the Design phase, as needed to ensure that the quality of the video of each toll lane, based on ambient lighting and/or weather conditions, is sufficient to meet the requirements. The lighting requirements shall include but not limited to the minimum light levels required within the toll zone and the preferred placement or restrictions of light fixtures as to not interfere with the tolling equipment, either known based on design requirements or as coordinated with the civil designer and contractor in advance of installation. The Contractor shall be responsible to furnish and install toll zone specific lighting including sensors to control the lighting based on time of day or lighting conditions.		
239	The DVAS shall include all Equipment and Software necessary to provide the audit capability described herein, including but not limited to:		
	· digital cameras and any associated lenses, lighting and sensors;		
	· interfaces to the zone controllers to capture event data;		
	· storage media, and		
	· an application to view real-time video and events and playback the information.		
240	The continuous DVAS video stream and audit data shall be provided to the Cashless Tolling System independently of the transaction data stream; however, the DVAS shall be integrated into the System application and the video stream shall be linked to the transaction to meet the requirements specified in this section.		
241	The Contractor shall provide Authorized Users the ability to access to the DVAS through the Cashless Tolling System application using any device authorized by the Commission with access to the Commission System network.		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	**Comments**
No.	**Requirements**	**Existing (E) - Met by current system, no modifications required** **Modification (M) - Modifications needed to meet requirement** **Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs** **To Be Developed (D) - Not in current system, but will be developed** **Not Provided (N**) - Will not be provided - requires explanation**	**If "Status of Functionality = N" then Proposer must provide an Explanation in this Column**
242	The DVAS video and event data shall be available from the Dashboard to Maintenance staff when investigating anomalies.		
243	The DVAS solution for each tolling point shall provide continuous video coverage with the capability to monitor the overall configuration of the toll lanes with the ability to see each lane and the vehicle traveling that lane, and shall display detailed events for each lane as they occur in real-time.		
244	At a minimum the DVAS shall display the highway, plaza ID, lane number, transaction number, transaction date and time, transponder ID, transponder class and the AVC class. The DVAS video and data shall be accessible in read-only mode; no changes or alterations to the video or data shall be allowed.		
245	All detailed data obtained from various subsystems shall be available and shall be displayed to assist auditors and Maintenance staff with the investigation of discrepancies and problems. The DVAS shall perform and display video and data in real-time and shall have the ability to playback event data.		
246	The DVAS shall also have the capacity to record and store up to a minimum of twelve (12) months (configurable) of continuous video and data to an electronic media for each toll zone.		
247	DVAS video and the corresponding event and transaction data shall be saved together such that when the data is moved to a different environment outside the production environment, the video can be replayed with the corresponding event and transaction data as long as the DVAS replay Software is available.		
248	The health of the DVAS shall be displayed and monitored. Any problems or failures detected shall be reported to the MOMS.		
249	The DVAS shall be time synchronized to the same source as the zone controllers and shall interface to the zone controllers to obtain event data in accordance with the Approved ICD.		
250	The DVAS screens shall allow the Authorized User to obtain and sort the video/data events through various query criteria or configurable report templates finalized during the Design phase, including but not limited to:		
	· Plaza/Zone ID;		
	· lane ID;		
	· vehicle class;		
	· transaction time;		
	· payment type;		
	· transaction time range;		
	· alarm condition;		
	· class mismatch condition;		
	· unusual event conditions;		
	· transponder ID;		
	· transponder status;		
	· transponder class;		
	· vehicle height;		
	· vehicle speed;		
	· axle counts, and		
	· transaction number.		
251	Identification displayed on the screen shall allow the reviewers to clearly differentiate the lane under review and its associated event data. The data on the DVAS display for each vehicle shall include but not limited to:		
	· Plaza/Zone ID;		
	· lane ID;		
	· vehicle class;		
	· transaction date and time;		
	· alarm condition (if applicable);		
	· class mismatch condition (if applicable);;		
	· unusual event conditions (if applicable);;		
	· transponder ID;		
	· transponder status;		
	· transponder class;		
	· vehicle height;		
	· vehicle speed;		
	· axle counts, and		

	Functional Requirements		
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		Status of Functionality	**Comments**
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	· transaction number.		
252	The DVAS shall provide the capability to save the displayed contents of a screen (images and data) and electronically distribute such information as needed.		
253	Controls shall be provided to allow reviewers to step forward and backward through video data, by frame and to display the associated event data. All digitized video and corresponding event data shall be tightly synchronized and stored in accordance with these requirements.		
2.1.9	**Cashless Tolling Facility Server (Optional)**		
	The provision of a facility server is optional but if the Contractor's solution includes a facility server, then the requirements in this section shall be met. The Contractor has the option to use the facility server as an image server as long as the Design complies with the requirements of the Scope of Work.		
254	The Contractor shall provide one or more facility servers located at a tolling point if it is deemed necessary to meet the requirements specified in this Scope of Work. A facility server or set of servers can support multiple toll zones.		
255	The Contractor shall furnish and install a complete Hardware configuration for each facility server to support the redundancy and performance requirements of this Contract, including but not limited to:		
	· multiple processors;		
	· dual, redundant, hot-swappable power supplies;		
	· redundant storage devices; and		
	· backup library (using a media such as Cloud or Network Attached Storage (NAS) based backup that does not require storage devices such as backup tapes or CDs).		
256	The Hardware solution shall provide high-speed intra system network fabric between all storage, databases, servers, and backup systems.		
257	The facility server shall interface to the zone controller and shall serve as a store and forward server for transactions and messages.		
258	Each facility server shall communicate with the primary and secondary Cashless Toll Concentrator or existing PTC Toll Host.		
259	Each facility server shall be capable of storing transactions and images (if used as a local image server) from the in-lane subsystems for a period of minimum sixty (60) days, in the event of a communications failure.		
260	The facility server shall be capable of operating in a stand-alone mode for a minimum of sixty (60) days if communications to the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host are down. When operating in stand-alone mode, the last files downloaded from the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host shall be used for processing vehicles.		
261	The facility server shall have an available data port to permit onsite manual uploading of Software, TSL, or other pertinent data required for continued lane operation until communications with the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host are re-established. Devices utilized to download the TSL and rate tables (if applicable) to the facility server shall have the capability of synchronizing the current versions whereby a new TSL is updated on the device within an hour of receipt.		
262	The System shall provide the capability for Authorized Users to download transactions from the facility server and transfer such transactions to the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host.		
263	Upon re-establishing communications with the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host all back-logged messages, including manually transferred messages, shall be flagged and transmitted to the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host without affecting the real time operations or degrading the lane operations.		
264	Upon re-establishment of communications and successful transmission of all messages, a recovery message shall be transmitted to the MOMS.		
265	Failure of any component of the facility server shall be detected and reported to the MOMS.		
2.1.10	**Roadway Pavement, Overhead Structures/Toll Gantries, and Toll Equipment Building Design Support**		
2.1.10.1	**General Design Requirements**		
266	At the tolling points the Contractor shall install the toll collection equipment on the infrastructure provided by the civil Contractor as identified further in *Attachment 2: Cashless Tolling Installation Responsibility Matrix* .		

Functional Requirements			
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267	The Contractor shall work with the Commission, the civil designer and civil contractor on requirements for all civil construction work to be performed by others on the Project, including overhead platforms/toll gantries, toll equipment buildings, roadway/pavement, lighting requirements, power requirements and conduit relative to the aspects that integrate with the Design and installation of the Cashless Tolling System.		
268	During civil design, Contractor shall provide review, comment and approval of civil design drawings or similar within the context of the toll system functional and performance requirements. For documents containing less than fifty (50) pages, the Contractor shall review and provide comment on preliminary draft documents within ten (10) Business Days. For documents containing more than fifty (50) pages, the Contractor shall review and provide comment on preliminary draft documents within fifteen (15) Business Days. The Contractor shall review and provide comment on all final draft and final documents within ten (10) Business Days.		
269	The Contractor shall cooperate and provide support as needed to the civil Design and construction efforts. During civil design, Contractor support is anticipated to include responses to information requests for clarification on proposed designs.		
270	During construction, Contractor shall provide review and approval of civil Contractor shop drawings or similar within the context of the toll system functional and performance requirements.		
271	During installation, the Contractor shall provide verification and approval of toll system related elements that the civil Contractor is responsible for installing.		
272	Upon approval of shop drawings or similar design elements by the Contractor within the context of System function and performance, Contractor shall assume responsibility for those elements to the extent that if the civil work is installed as designed and does not meet the performance requirements of this Scope of Work, the Contractor shall be responsible for the costs of redesign, civil rework and additional Equipment costs as further set forth in the Contract.		
273	Contractor shall also coordinate, attend meetings and be available onsite as needed during the installation of the civil elements related to the Cashless Tolling System to ensure that the civil work is performed in accordance with the Contractor's requirements.		
2.1.10.2	**Overhead Structures/Toll Gantries**		
274	The Contractor's Equipment mounting and installation Design for any AVC overhead Equipment, AVI Equipment and LPICPS Equipment shall take into consideration its accessibility from the walkways on the overhead structure at the tolling points. The Design of the mounting structures and mounting arm shall allow technicians to replace Equipment and restore it to normal operations without additional tuning and without impacting performance.		
275	The Contractor's cable routing Design shall include sufficient service loops to facilitate the retrieval of Equipment from the walkway providing sufficient retractable capability.		
276	The Contractor shall provide in-lane Equipment Design, installation specifications, structural requirements and drawings for mounting the Equipment to the overhead structures/toll gantries at each toll zone as it relates to the Contractor's Equipment requirements to the civil contractor(s), including but not limited to Equipment mounting locations and installation instructions, mounting structure and mounting arms, conduit, cable separation and tie offs, required clearances, junction boxes, and electrical requirements, wind load, Equipment load and power calculations, as well as Contractor requirements related to special electrical grounding and isolated circuit integrity by Equipment.		
277	The Contractor shall also review and Approve all aspects of toll overhead structures/toll gantries design drawings submitted by the civil Contractors that are related to the toll system Equipment, including but not limited to, the items identified in the requirements above in this section.		
278	The Contractor shall be responsible for all necessary mounting Hardware required to install the toll Equipment on each overhead structure/toll gantry as specified in this Scope of Work and shall ensure installation is in compliance with Commission specifications.		
279	The Contractor's Equipment installation Design shall have all overhead Equipment tethered to the platform structure at all times during installation and removal. The Equipment mounting devices shall also be tethered such that no loose bolts, nuts or pins shall fall into live traffic during Maintenance activities.		
280	The Contractor shall be responsible for all Equipment installations, terminations, and connections of Equipment located on the overhead structures/toll gantries and for connecting such Equipment to the electronics in the equipment racks within the toll equipment building.		
2.1.10.3	**Uninterruptible Power Supply (UPS)**		

Functional Requirements			
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281	All Cashless Tolling System Hardware and equipment shall be on UPS. The UPS will be supplied by the civil Contractor.		
282	The civil Contractor will furnish and install automatic transfer switch (ATS) and smart Power Distribution Units (PDUs) to manage the roadside power distribution.		
283	The Contractor shall furnish and install an electronic interface to the UPS to monitor the UPS performance. The MOMS shall detect the status of the UPS and Alert technicians when the System is on UPS.		
284	Software drivers shall be developed, furnished, and installed to acquire, display, store and report all parameters provided as outputs from the UPS.		
285	When the System is on the UPS and when it is off the UPS a notification shall be reported to the MOMS.		
2.1.10.4	**Toll Equipment Building**		
	A toll equipment building with UPS, backup generator and Heating, Ventilation and Air Conditioning (HVAC) will be provided by the civil Contractor at each tolling point indicated in *Attachment 1: Cashless Toll Zone Locations* . The emergency backup generators are contained in a separate room with outside access as shown in *Attachment 5: Concept Plan for Overhead Structure/Toll Gantries.*		
286	The toll equipment building shall house the Cashless Tolling System equipment racks provided by the Contractor.		
287	The Contractor shall provide the equipment rack space requirements to the civil Contractor for each toll equipment building at each tolling point.		
288	The Contractor shall install equipment racks within the toll equipment building in accordance with applicable Pennsylvania State building codes and Pennsylvania State DOT design standards, if and where applicable.		
289	The Contractor shall adhere to all specifications of the latest PennDOT Standard Specifications at time of construction unless the Contractor receives written notification by the Commission which overrides the Standard Specifications. The PennDOT Standard Specifications can be found at: http://www.dot.state.pa.us/Internet/Bureaus/pdDesign.nsf/ConstructionSpecs408and7?OpenForm		
290	At locations where tolling points are in close proximity to one another, a single toll equipment building with backup power generator will be used to support the toll Equipment requirements for multiple toll zones. At locations where a single toll equipment building is used for the Equipment at multiple toll zones, the Contractor shall procure, furnish, and install the interconnecting signal and power cables, and the necessary equipment racks and Equipment required for the multiple toll zones. The civil Contractor is responsible for the provision of power and the raceway. The Contractor shall ensure that the lane performance is not degraded at locations where a single toll equipment building is utilized for multiple toll zones and that cable lengths are within manufacturer specifications.		
291	The Contractor shall also review and Approve all aspects of the toll equipment building design drawings, power specifications, electrical and cabling design, circuit breaker and switches, and grounding design submitted by the civil designer and civil Contractors that are related to the Cashless Tolling System Equipment.		
292	The civil Contractors will install the conduits between the toll equipment building and the demarcation point on the overhead structures/toll gantries as shown in *Attachment 6: Installation Demarcation Diagram* . The Contractor shall procure, furnish and install any conduit required from the demarcation point to the Equipment and between the various components on the overhead structures/toll gantries.		
293	The Contractor shall procure, furnish, and install the cables necessary for terminating and connecting the Cashless Tolling System Equipment on the overhead structures/toll gantries to the electronics in the toll equipment building. Cable lengths shall include sufficient service loops to facilitate maintenance.		
294	The Commission is responsible for the WAN communications and the Commission will furnish and install networking equipment at the toll equipment building and test the communications to the network at the PTC Data Centers. The Commission shall make available a number of ports, as specified during the Design phase, to the Contractor to allow access to the Commission network through the Commission administered firewall. The Contractor shall be responsible for all LAN communications related to the Cashless Tolling In-lane System and the Cashless Toll System outside the Commission firewall as shown in *Attachment 3b: PTC Communications Network Responsibilities* .		
295	Each location will be allotted an IP v4 Class C range of addresses and all networking addressing will be coordinated with the Commission. LAN equipment shall be capable of supporting IPv6 addresses.		
2.1.10.5	**Roadway Pavement**		

Functional Requirements			
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296	During the Design phase the Contractor shall provide the in-pavement sensor requirements to the civil designers and civil Contractors, if such sensors are to be used. Additionally, the Contractor shall review and approve the pavement Design, including roadway material to be utilized and construction methods to be used in the construction of the pavement.		
297	The Contractor is responsible for the Design and installation of all elements of the Cashless Tolling System that embedded into the pavement.		
298	The Contractor shall coordinate with the civil designer and civil Contractors for the installation of the sensors in the lanes and identify the pull boxes and conduits. The location and Design of the pull boxes shall minimize the impact of Maintenance activities on the affected lane.		
2.2	**Cashless Toll Concentrator or Toll Host System (Optional) Functional Requirements**		
	For this base Contract the existing PTC Toll Host will be the Host of record for traffic and financial reporting and a new Cashless Toll Host is not required but may provided to meet the requirements of this scope of work. The provision of a Cashless Toll Concentrator or Toll Host System (if provided) shall meet the requirements set forth in this section. The Contractor has the option to use the Concentrator or Toll Host System to meet any specified functionality as long as the Design complies with the requirements of the Scope of Work. The option of a fully functional Cashless Toll Host to replace the existing PTC Toll Host for reporting may be exercised by the PTC in the future as the open road cashless tolling systems is deployed throughout the entire system. Should the PTC exercise the option to implement a new full function Cashless Toll Host the additional requirements identified (if exercised) in section shall be met as applicable.		
2.2.1	**Cashless Toll Concentrator or Toll Host System (if provided) – General Requirements**		
299	The Contractor's central processing system architecture shall include a fully redundant highly available primary and secondary Cashless Toll Concentrator or Toll Host System that meets the functional and performance requirements of the Scope of Work and is accessible to Authorized Users of the Commission System network.		
300	The functions of the Central Image Servers (if provided) and the MOMS shall be part of the Cashless Toll Concentrator or Toll Host System.		
301	The cashless toll collection process shall be administered and controlled by the Cashless Toll Concentrator or Toll Host System provided by the Contractor.		
302	The Contractor shall work with the Commission to procure, furnish, and install all servers, storage and communications Hardware needed to support the Software that meets the Commission Cashless Tolling System requirements. While choosing the Cashless Toll Concentrator or Toll Host System Hardware and third-party Software, the Contractor shall consider the staged implementation of the Cashless Tolling System in order to ensure the products are supported for the entire duration of the PTC Cashless Tolling Project.		
303	The primary Cashless Toll Concentrator or Toll Host System shall be installed in the PTC Data Center , a different physical location in the vicinity of the PTC Data Center, or a privately hosted Cloud location Approved by the Commission. The secondary solution can be hosted anywhere within the contiguous United States or an Approved, privately hosted, Cloud location. All infrastructure required to support the servers, including but not limited to UPS, air conditioning, security and backup generators shall be the responsibility of the Contractor. The primary and secondary Cashless Toll Concentrator or Toll Host System configuration shall meet the Commission resiliency and Business Continuity plans.		
304	The secondary Cashless Toll Concentrator or Toll Host System shall be configured as a "hot stand-by" in an active-active state to allow continuous operations in the event of a failure of the primary Cashless Toll Concentrator or Toll Host System.		
305	The secondary Cashless Toll Concentrator or Toll Host System environment shall mirror the primary system in all Hardware and Software configurations, be kept up to date and be capable of performing all functions of the primary Cashless Toll Concentrator or Toll Host System as described in this Scope of Work.		
306	All Hardware and third-party Software procured under this Scope of Work shall be confirmed to be the latest model or version at the time of purchase and shall be Approved by the Commission.		
307	All servers and Hardware procured, furnished, and installed under this Contract shall have current anti-virus, firewall, spam protection and other security Software that protects from virus attacks and unauthorized access. All such third-party products shall meet the Commission IT security requirements described in *Attachment 7: PTC Cashless Tolling Security Standards.*		

Functional Requirements

No.	Requirements	Required Proposer Inputs	
		Status of Functionality	**Comments**
		Existing (E) - Met by current system, no modifications required **Modification (M) - Modifications needed to meet requirement** **Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs** **To Be Developed (D) - Not in current system, but will be developed** **Not Provided (N**) - Will not be provided - requires explanation**	**If "Status of Functionality = N" then Proposer must provide an Explanation in this Column**
308	The System shall detect intrusion attempts and prevent all unauthorized access and intrusions at all levels and report such events to the MOMS. Any intrusion, compromise or breach must be reported to Commission IT Security with 12 hours of detection.		
309	The Commission shall be notified in writing within 24 hours of the earliest indication or report of a breach or unintended disclosure of confidential information or a system that supports it. If requested by the Commission, or if required by law, the vendor shall notify in writing all persons affected by the incident, at its own cost and expense. The Commission shall have the right to view all incident response evidence, reports, communications, and related materials upon request.		
310	Virus protection and other Software shall automatically obtain updates according to a recommended (configurable) Maintenance schedule and report such events to the MOMS.		
311	Redundancy shall be built into the System to support high availability requirements defined in table II-2.		
312	The Cashless Toll Concentrator or Toll Host System shall support the following general functions:		
	· communicate with all the zone controllers in receiving transaction, alarm and other messages and transmitting TSLs, UIL and VEL (if exercised);		
	· communicate with facility servers (if provided) in receiving transaction, alarm and other messages and transmitting TSLs, UIL and VEL (if exercised);		
	· communicate with the applicable image server(s) for tracking and reconciliation image transmission and transfer status;		
	· provide Dashboards to assist Maintenance and supervisory staff observation of transaction and event data in real-time, including reviewing DVAS image/video, images and data through these screens;		
	· provide the capability to remotely operate the cashless tolling lanes through real time screens;		
	· interface with the existing PTC Toll Host system to transmit transaction details and alarms;		
	· interface with the existing CSC/VPC system to transmit transactions and toll rates and receive TSL and VEL (if exercised);		
	· perform Maintenance management functions of the System, including alarm notification and tracking, Equipment inventory, Maintenance history and other Maintenance related functions, incorporated into the MOMS;		
	· provide an independent audit of successful receipt of all transactions from the zone controllers to the Cashless Toll Host Concentrator;		
	· provide the capability to manage toll rate/toll schedule and transmit the toll rates/toll schedules to the zone controllers and the existing CSC/VPC system;		
	· provide the capability to obtain employee information defined in the Design phase such as employee ID, role and access privileges from Active Directory and, if required, to transmit the (UIL to the zone controllers;		
	· provide various management reports that assess the operational performance of the System, and		
	· provide transaction reconciliation reports as determined by the Commission during Design.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional system functions:		
313	Provide the capability to import detailed and summarized data from the existing PTC Toll Host for historical reporting purposes.		
314	Interface with SAP for the transmission of monthly toll transaction GL files and GL files received from the CSC.		
315	Provide the capability to manage toll rate/toll schedule and transmit the toll rates/toll schedules to the zone controllers and the existing CSC/VPC system.		
316	Interface with the existing CSC/VPC system to transmit transactions and toll rates and receive TSL and VEL (if exercised).		
2.2.2	**Cashless Toll Concentrator or Toll Host System (if provided) Hardware and Third-party Products**		
317	The Work under this section shall include all labor, materials, and support Services to complete the Design; fabrication; assembly; integration; packaging; delivery; testing, and Acceptance of the primary Cashless Toll Concentrator or Host System Hardware and third-party Software in accordance with the requirements of this Scope of Work.		
318	The Commission shall have ownership of all Hardware, third-party Software and firmware procured, developed, furnished, and installed as part of the Cashless Toll Concentrator.		

Functional Requirements			
		Required Proposer Inputs	
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319	The Contractor is responsible for obtaining all required licenses in the name of the Commission. All licenses and media shall be provided to the Commission for all Hardware, third-party Software and firmware. The Contractor shall retain authorized copies (backups) for all Software media to use for periodic system Maintenance, upgrades, or restore, as required.		
320	The Contractor shall furnish and install a complete, fully redundant, Cashless Toll Concentrator or Toll Host System Hardware configuration needed to support the redundancy and performance requirements of this Contract, including but not limited to:		
	· multi-processors		
	· dual, redundant, hot-swappable power supplies;		
	· storage devices, and		
	· storage devices, backup library.		
321	The Cashless Toll Concentrator or Toll Host Hardware solution shall provide high-speed intra system network fabric between all storage, databases, servers, and backup systems.		
322	The System Design and Implementation shall ensure the Cashless Tolling System continues to operate without data loss even if any unit of the server configuration fails.		
323	All components, supplies, Software and materials furnished under this Contract shall be new, commercial off-the-shelf (COTS) and field proven, and in revenue operations for two (2) years.		
324	The Cashless Toll Concentrator or Toll Host System server configuration, including all major Hardware elements, shall be of the latest design and incorporate standard commercial products currently in production.		
325	All components procured, furnished, and installed by the Contractor should have the capability of sourcing from multiple Suppliers. The intent is to increase compatibility and reduce maintainability problems.		
326	Proof of purchase in the form of dated invoice and shipping bills shall be retained and furnished to the Commission in accordance with the requirements of this Scope of Work and Contract for all hardware purchased by the Contractor.		
327	The Cashless Toll Concentrator or Toll Host System Hardware shall have a minimum manufacturer warranty for five (5) years.		
328	The Cashless Toll Concentrator or Toll Host System Hardware shall be supported for the duration of the Contract after the date of Operational and Acceptance Test Acceptance. During the life of the Contract the Contractor is responsible for ensuring the system is operational in accordance with the performance requirements.		
329	The Contractor shall use proven server configurations that support future upgrades to processors, memory, storage, operating system, database, and other system components. All third-party Hardware and Software and Contractor Software shall be hardware neutral and shall perform without intervention on any hardware platform.		
330	The System architecture shall have expansion capability to support a ten (10) year growth in traffic volumes in its installed Hardware which includes support of video tolling at the tolling points. For the purposes of calculation, an average E-ZPass penetration of seventy (70) percent and video transaction rate of thirty (30) percent, with ranges from 60-85% E-ZPass depending on locations throughout the system shall be assumed for the tolling point. The following traffic volumes are provided as projections for planning purposes only and subject to change. The projected Average Annual Daily Traffic (AADT) for the various tolling locations identified in this Scope of Work can be found in *Attachment 13 -Annual Traffic Volumes* .		
331	The operating system for the Cashless Toll Concentrator or Toll Host System servers shall be a proven system used widely throughout the United States for intensive database operations and shall be compatible with the Relational Database Management System (RDBMS) and other tools employed.		
332	The operating system for the Cashless Toll Concentrator or Host System servers shall be a multi-user, multi-tasking operating system.		
333	The operating system shall support the redundant Cashless Toll Concentrator or Toll Host System server architecture and all peripherals defined in these specifications.		
334	The operating system shall also support the proposed communications topology, redundant Cashless Toll Concentrator or Toll Host System configuration and Contractor's application Software.		
335	The Contractor shall warranty the operating system for a minimum of five (5) years from the date of Operational and Acceptance Test Acceptance.		
336	The operating system shall have a future upgrade path and shall be supported for the term of the Contract.		
337	The Contractor shall provide and maintain supported versions of the operating system for the term of the Contract and all upgrades of the Cashless Tolling System operating system shall be the Contractor responsibility.		

Functional Requirements

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338	The Contractor shall keep all Software instances throughout all environments at the same configuration and patch level.		
339	The Contractor shall provide a highly reliable and secure RDBMS for the storage of images, video, transaction data, violation data, audit data, and all other data, as applicable, for the retention period specified in the Scope of Work.		
340	Contractor shall provide the latest version of the RDBMS that is field-proven to operate in a transaction intensive environment and shall meet the standards as defined in *Attachment 11: Database Standards for the Pennsylvania Turnpike Commission,* where applicable.		
341	The RDBMS shall be compatible with the operating system and application Software, and shall support the redundant Cashless Toll Concentrator or Toll Host System server architecture and shall meet the standards as defined in *Attachment 11: Database Standards for the Pennsylvania Turnpike Commission,* where applicable.		
342	The RDBMS shall have an upgrade path and shall support upgrades to operating system, application, memory, processors, and other components.		
343	The RDBMS shall have Maintenance and Upgrade Services for the term of the Contract.		
344	The Contractor shall provide and maintain supported versions of the RDBMS for the term of the Contract and shall be responsible for upgrading the Cashless Tolling System RDBMS to the latest supported version.		
2.2.2.1	**Central Image Server (Optional)**		
	The provision for a central image server is optional; however, Contractor's image processing solution shall meet the functional and performance requirements of the Scope of Work. The Design shall support latency in the transfer of images to the existing CSC/VPC system and prevent loss of images and video transactions if there are communications or server issues. If the Contractor's solution includes the provision for a central image server, then the central image server shall be located at a Commission Approved location.		
345	The image processing solution shall support, but not be limited to the following general functions:		
	· communicate with all the in-lane LPICPS for the transmission, tracking, reconciliation and processing of all vehicle images and video transactions;		
	· communicate with facility servers (if provided) for the transmission, tracking, reconciliation and processing of all vehicle images and video transactions;		
	· interface with Cashless Toll Concentrator or Toll Host System for the processing and reconciliation of all vehicles images and video transactions;		
	· interface with existing CSC/VPC system for the processing and reconciliation of all vehicles images and video transactions;		
	· support the transfer of images and video transaction to the existing CSC/VPC system without loss of any image or video transaction, and		
	· provide reconciliation reports as determined by the Commission during Design.		
2.2.2.2	**System and Data Backup**		
346	During the installation of the Cashless Toll Concentrator or Toll Host servers, the Contractor shall create an image of the completed server configurations, as well as maintain regular local and remote backups. If there is a catastrophic failure that results in the loss of data, means shall be provided to reconfigure the servers without disruption to Cashless Toll Concentrator or Toll Host System operations.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional system backup functions:		
347	The Cashless Toll Host System shall include data backup software and hardware that allows remote incremental and full back up of data without manual intervention. Events from the backup software and status notifications from the backup process shall be reported to the MOMS.		
348	The backup software shall be capable of displaying the backup data in a user-friendly and readable form as defined during the Design phase.		
349	The Contractor shall provide a solution for data backup storage locally and off-site.		
2.2.2.3	**Archive and Purge Control Mechanisms**		
350	Provide the capability for fully automated and configurable data purging in accordance with the Commission's data retention requirements as defined in *Attachment 8A: PTC Records Management Manual, Attachment 8B: PTC Records Retention Schedule* and during the Design phase.		
351	Purge routines shall be configurable for each impacted data elements, including but not limited to:		
	· transaction data;		
	· System logs;		

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	· MOMS data, and		
	· interface files.		
352	Servers shall retain transaction and summarized data, images, MOMS data and system logs, in accordance with the retention procedures, including but not limited to:		
	· Cashless toll transactions shall be retained online for a minimum of twenty four (24) months and then purged;		
	· compressed images associated with class mismatch transactions shall be retained online for a minimum of ninety (90) days;		
	· video transactions and images (compressed video transaction image and region of interest{if implemented}) online for a minimum of one (1) year;		
	· DVAS video shall be retained online in accordance with the requirements of this Scope of Work;		
	· system logs shall be retained online on the System for at least one (1) year and then purged;		
	· All security logs shall be retained online for at least one (1) year and then purged;		
	· MOMS detailed data shall be retained online for a minimum duration to ensure MTBF requirements are being met or at least twenty-four (24) months, whichever is greater;		
	· MOMS summary data shall be retained online for the term of the Contract, and		
	· all other data shall be retained on the System for ninety (90) days and then purged.		
353	Status and other events from the archival process shall be reported to the MOMS. No transactions shall be deleted unless confirmed to be successfully transmitted to the existing PTC systems (PTC Toll Host and CSC/VPC).		
354	Authorized Users shall be able to report on restored data.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional archive and purge functions:		
355	Archive toll collection related data shall be retained for the life of the Contract with archived data transferred to the PTC at completion of the Contract. Details of archiving methods and handover process to be detailed in Design phase.		
356	Summarized data shall be retained online for the term of the Contract.		
357	Compressed images associated with class mismatch transactions shall be retained online for a minimum of ninety (90) days and then archived and purged.		
358	Video transactions and images (compressed video transaction image and region of interest{if implemented}) online for a minimum of six (6) months and then archived and purged.		
359	Storage shall be sized to accommodate all data to be retained online as specified in this Scope of Work and for the restoration of selected archived data (two months minimum).		
2.2.2.4	**Maintenance Access and Application Access**		
360	The Cashless Toll Concentrator or Toll Host Systems applications shall run on existing workstations and laptops and Commission Authorized Users shall use their workstations/laptops to access the System. The Contractor is not required to procure, furnish, and install Commission workstations/laptops as part of the Cashless Toll Concentrator or Toll Host System.		
2.2.2.5	**Maintenance Access**		
361	The Contractor shall procure, furnish, and install the required laptops, keyboards, video monitors, mouse(s), and KVM switches at the In-lane and Cashless Toll Concentrator or Toll Host Systems locations to allow the Contractor technical staff to access all servers, controllers, computers, and devices in order to perform diagnostics and other Maintenance activities.		
362	All maintenance hardware and software installed on the In-lane and Concentrator or Toll Host Systems shall comply with Commission security requirements defined in *Attachment 7: PTC Cashless Tolling Security Standards.*		
2.2.2.6	**Commission Access**		
363	Any Commission authorized workstation/laptop connected to the Commission System network shall be able to access to the System application.		
2.2.2.7	**Printers**		
364	The Commission shall have the ability to print to any printer connected to the Commission System network. The Contractor is not required to procure, furnish, and install any printers for the Commission as part of the Cashless Toll System.		
2.2.2.8	**Communications Equipment**		

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365	The LAN within a toll equipment building shall be connected by CAT6 (or higher) cabling and the LAN between Site toll equipment buildings shall be fiber. The WAN connectivity between the toll equipment buildings at each Cashless Toll Site and PTC Data Centers shall be provided by others. The Contractor shall be responsible for providing and obtaining the connectivity from any primary or secondary Cashless Toll Concentrator or Toll Host (if provided) locations to the PTC Data Center.		
366	The Cashless System at the toll zones shall be connected and communicate to the primary and secondary Cashless Toll Concentrator or Toll Host (if provided) System and the existing CSC/VPC system.		
367	The Contractor shall procure, furnish and install all required Tier 1 communication Equipment at the toll equipment building to support the Cashless System LAN. All LAN communications Equipment procured, furnished, and installed under this Contract shall be able to communicate with the Commission firewall and router.		
368	The Commission is responsible for providing a WAN demarcation point (Ethernet hand off) at each Cashless Toll Site. The Contractor shall work with Commission IT staff to make the necessary connections and validate the connectivity between the Cashless Toll Site Systems and the Cashless Toll Concentrator or Toll Host (if provided) Systems. The LAN equipment at a Cashless Toll Site, its configuration, and the connection of the LAN equipment to the WAN demarcation point as shown in *Attachment 3b: PTC Communications Network Responsibilities* shall be the responsibility of the Contractor. Network addressing and connectivity will be coordinated with Commission IT staff.		
369	The Commission is responsible for providing a demarcation point (Ethernet hand off) in the Commission's Data Center to the primary Cashless Toll Concentrator or Toll Host (if provided) System site. The Contractor shall work with Commission IT staff to make the necessary connections and validate the connectivity between the PTC Data Center and the Cashless Toll Concentrator or Toll Host System site. The LAN equipment at the primary Cashless Toll Concentrator or Toll Host System site, its configuration, and connection to the demarcation point as shown in *Attachment 3b: PTC Communications Network Responsibilities* shall be the responsibility of the Contractor. Network addressing and connectivity will be coordinated with Commission IT staff.		
370	The Contractor may install the secondary Cashless Toll Concentrator or Toll Host Systems at a Contractor location within the contiguous states of the United States as Approved by the Commission. The secondary Cashless Toll Concentrator or Toll Host System can be housed in a Commission Approved privately hosted Cloud site. The Contractor is responsible for securing the connectivity from such secondary location to the PTC Data Center. If a cloud environment is desired, the Contractor must work with the Commission to determine appropriate architecture and security measures.		
371	The Contractor shall work with the Commission in designing the interfaces between the Cashless Toll Concentrator or Toll Host (if provided) System, the existing CSC/VPC system, the existing PTC Toll Host system.		
372	The Contractor shall work with PTC in designing the interfaces between the In-Lane Systems, the existing PTC Toll Host and the existing CSC/VPC system.		
373	The Contractor shall be responsible to procure and establish any public Internet domains and/or services to provide connectivity between the Toll lanes, Toll Zone Plaza servers and the Cashless Toll Host outside the PTC firewall and the user workstations inside the PTC firewall. Public domain names procured for the Cashless Tolling project shall be approved by the PTC.		
374	Network monitoring Software shall be procured, furnished, and installed on the MOMS server to monitor the System LAN status and communications, including the connections to the existing PTC Toll Host system, the In-lane Systems, and the CSC/VPC system. All network alarms shall be reported to the MOMS.		
375	If communications to any element of the Cashless Tolling System is degraded or down an alarm shall be generated and reported to the MOMS.		
2.2.3	**Cashless Toll Concentrator or Toll Host System Software (if provided)**		
	The Cashless Toll Concentrator or Toll Host System Software (if provided) shall support the functionality detailed in this section and shall meet the Commission operational requirements set forth in this Scope of Work and Contract for the Term of the Contract.		
2.2.3.1	**Data Communications and Interface Requirements**		
376	All transactions, images and messages transferred between all subsystems shall be guaranteed and have the required data validation Protocols to confirm the accuracy and validity of data transfer.		
	The Cashless Toll Concentrator or Toll Host System shall support the interfaces specified in this Scope of Work including, but not limited to:		

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377	· Interface to the zone controllers: If the Contractor's solution does not include a facility server, the Cashless Toll Concentrator or Toll Host System shall receive and store all the messages from the zone controllers in real-time. It shall transmit all data required by the zone controllers to support its operation, including the UIL and TSL. All data sent to and received from each zone controller and the Cashless Toll Concentrator or Toll Host System shall be acknowledged and confirmed.		
	· the VEL shall be transmitted from the Cashless Toll Concentrator or Toll Host System to the In-lane System to support on-site enforcement (if exercised).		
	· Interface to the facility servers (if provided): If the Contractor's solution includes a facility server, the Cashless Toll Concentrator or Toll Host System shall have the capability to transmit all data to and receive data from the facility servers as required in this Scope of Work to support lane operations. All data sent to and received from each facility server at the Cashless Toll Concentrator or Toll Host System shall be acknowledged and confirmed.		
	· Interface to the existing PTC Toll Host system: The Cashless Toll Concentrator or Toll Host System shall have the capability to transmit detailed transactions and alarms to the existing PTC Toll Host system in batch mode (at configurable intervals/transactions) in accordance with the Approved ICD developed during the Design phase interface workshops described in Section 5.3.3.		
	· Interface to the existing CSC/VPC system: The Cashless Toll Concentrator or Toll Host System shall have the capability to transmit AVI Video transactions and images to the existing CSC/VPC system in real time and in batch mode (at configurable intervals/transactions) in accordance with the Approved ICD developed during the Design phase interface workshops described in Section 5.3.3.		
	· Interface to the image server(s): The Cashless Toll Concentrator or Toll Host System shall track and reconcile image transmission and transfer status.		
	· Interface to the MOMS: The Cashless Toll Concentrator or Toll Host System shall interface with the MOMS to transmit alarms and Cashless Toll Concentrator or Toll Host System operational status including recovery messages.		
	· Interface between the MOMS and the current Commission diagnostic monitoring system, based on the Approved ICD developed during the Design phase interface workshops described in Section 5.5.3.		
378	The Cashless Toll Concentrator or Toll Host System shall receive a comprehensive TSL from the existing CSC/VPC system once a day and incremental TSL/updates not more frequently than every sixty (60) minutes (configurable).		
379	Toll rate tables shall be transmitted to the CSC/VPC when rate changes are initiated on the Cashless Toll Concentrator or Toll Host System. shall have the ability to receive toll rate files from the existing PTC Toll Host.		
380	Interface to SAP: The Cashless Toll Host System (if exercised) shall transmit monthly toll transaction, account, and other GL files received from the CSC/VPC system. Interface to SAP shall be further defined during the Design phase.		
2.2.3.2	**Version Tracking Requirements**		
381	The Cashless Toll Concentrator or Toll Host System shall maintain records of the last 20 versions of the TSL, toll rates tables, VEL (if exercised), UIL, and lane configuration files that it received and/or created and that were successfully downloaded to the lanes. Receipt of files from the existing CSC/VPC system, their version, time of receipt and processing status shall also be tracked.		
382	Reports and screens shall be made available to verify the versions and the file download status. Failure in the transmission of any data to a lane shall result in a failure message being logged and reported to the MOMS.		
383	The system shall provide the capability to track the versions of lane executable programs installed at each toll zone location.		
2.2.3.3	**Transaction Audit and Verification**		
384	The Cashless Tolling System shall have the capability to perform an independent audit that confirms all vehicles traveling through a toll zone are detected, as well as an automatic audit and verification process that confirms all vehicles traveling through the toll lane are reported as transactions; all transaction transmissions between the zone controller and Cashless Toll Concentrator or Toll Host System are successful. The System shall have screens and reports to validate the audit trail.		
385	If the validation process fails for any reason, failure messages shall be created and reported to the MOMS. If the audit process determines that vehicles or transactions are missing, the missing information shall be identified and reported to the MOMS.		
386	If the audit process is successful then the audit for the location for the Revenue Day shall be deemed "complete" and System shall track this status of the audit on reports.		

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387	Once the Revenue Day is “complete” the data reported for that day should not change. Any condition for example toll waiving that result in changes to the data shall be identified and Authorized Users alerted.		
2.2.3.4	**Data Summarization**		
388	During the Design process and based on Commission Business Rules and reporting requirements, the system shall perform data summarization.		
2.2.3.5	**Diagnostics**		
389	The Cashless Toll Concentrator or Toll Host System shall provide self-diagnosis functions to detect and report on the status and functioning of the Cashless Toll Concentrator or Toll Host System Hardware devices; third party Software; communications; processes; tasks, and Software applications, as defined in the Commission Approved Design Document.		
390	All Hardware and Software failures detected shall be reported to the MOMS.		
2.2.3.6	**Data Security**		
391	The Contractor shall ensure that any transactional data records, once entered into the System, cannot be deleted or changed.		
392	Data records and files shall only be appended to and not edited or deleted as determined by the Commission during the Design phase.		
393	All System access/entry, logins, and modifications (for example, flagging actions) shall be recorded and unauthorized access shall be prevented, logged and reported to Commission IT Security within 12 hours of detection.		
2.2.3.7	**Transaction Pre-processing**		
394	The Cashless Toll Concentrator or Toll Host System shall ensure all transactions transmitted to the existing PTC Toll Host and existing CSC/VPC system comply with the ICD specifications and Commission Business Rules.		
395	The Cashless Toll Concentrator shall identify exceptions, anomalies and other conditions determined during the Design phase in the event they have not been filtered at the zone controller, for example, same transponder read within configurable conditions.		
396	In scenarios where multiple transponders with valid status are reported, all transponders can be transmitted to the existing CSC/VPC system via the existing PTC Toll Host and the existing CSC/VPC will post the transaction in accordance with Commission Business Rules.		
397	Alarm messages shall be created and reported to the MOMS in the event such exceptions identified in this section exceed a configurable threshold.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional transaction pre-processing functions:		
398	The Cashless Toll Host System shall pre-process all transactions in accordance with the Approved Business Rules in order to filter incorrect transactions that may result from Equipment failures and lane logic issues.		
399	Transactions that should not be processed further at the PTC Host and existing CSC/VPC system shall be identified and flagged prior to transmission and then transmitted to the PTC Host and existing CSC/VPC system as defined during the Design phase.		
400	In cases where there is a Transponder read data and a video transaction created for a vehicle (in case of Buffered Transponder Reads or lane logic issues) the Cashless Toll Host System shall identify the transaction that needs to be terminated based upon configurable parameters Approved during the Design phase. In case of Buffered Transponder Read transactions, the Transponder read time shall be used as the transaction time.		
401	Based on the results of the pre-processing, an Exception List shall be generated and transmitted to the PTC Host and existing CSC/VPC system in accordance with the Approved ICD that identifies video transactions that needs to be terminated at the existing CSC/VPC system and further processing on these transactions stopped.		
2.2.4	**Cashless Toll Concentrator or Toll Host (if provided) System Application Software**		
402	The Contractor shall develop, furnish, and install a single, role-based, GUI application Software for the Cashless System that supports all user functions for the Cashless Toll Concentrator or Toll Host System, including the MOMS and DVAS.		
403	Based on the user’s access privileges obtained from Active Directory the appropriate menus, screens, tabs, reports and other system functionality shall be made available.		
404	Changes to the System data and parameters shall be through screens and only Authorized Users shall have access to these screens.		

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405	All access to the application and changes to the data shall be recorded and tracked, and the System shall provide an audit trail for all data modifications and parameter changes.		
406	Authorized Users shall have access to the data modifications and parameter changes initiated by users.		
2.2.4.1	**Graphical User Interface (GUI) Requirements**		
	The GUI design must include accepted industry design standards for ease of readability, understanding and appropriate use of menu-driven operations, user customization and intuitive operation.		
407	The Contractor shall meet all Commission IT Security standards and practices in the design of the GUI for the Cashless Toll Concentrator or Toll Host application.		
408	All components of the client GUI, including but not limited to browsers, Java, Adobe Flash Player, etc., shall be able to be patched/updated to the latest security level recommended by the component's manufacturer.		
409	The GUI design and development shall incorporate human factors and usability engineering and be optimized for speed, as well as provide the following controls, including but not limited to:		
	· menus (such as pull down, popup, cascading, leveling, etc.);		
	· windows (allowing for multiple windows within the application, such as to navigate back without having to re-enter information)		
	· informational messages;		
	· positive feedback;		
	· exception handling and error dialogs, including logging the error;		
	· control icons, links and action buttons;		
	· data entry fields, combo boxes, check boxes;		
	· display (read-only) fields, and		
	· general and context-specific help menus.		
410	Data entry screens shall have configurable mandatory fields that require data entry prior to continuing through the process.		
411	Provide field-level validation (server-side enforced) and format verification upon exiting data fields applicable to pre-defined formats or standards, including but not limited to:		
	· alpha-numeric;		
	· date;		
	· time;		
	· special characters;		
	· length;		
	· lane and plaza ID, and		
	· Transponder numbers.		
412	Provide other formatting masks (server-side enforced) as configured by the System administrator (visible to certain users but masked for other users), which can be applied to any other field in the GUI.		
413	Provide field-level "tooltips" or other interactive help, Configurable by the System administrator, that provide specific guidance on any field presented, including but not limited to:		
	· alpha-numeric fields;		
	· date fields;		
	· time fields;		
	· special characters;		
	· username and password;		
	· length restrictions;		
	· lane and plaza ID, and		
	· Transponder fields.		
414	Online help shall be provided for each screen, each editable field and each selectable option within each screen.		
2.2.4.2	**Screens and Report Access**		
415	Provide the capability to assign users access privileges to System reports based on user level/role, as determined by the Commission during the Design phase, to the Cashless Tolling System application.		
416	Provide the capability to assign read-only rights to roles so that users belonging to that role will not be allowed to enter any data.		
417	Provide the capability for Authorized Users to maintain roles and permission access to the System.		
2.2.4.3	**Cashless Tolling System Screens and Reports**		

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418	All data entered or generated in the System shall be retrievable (on-demand and scheduled) through reports and screens.		
419	Reports menu shall be organized by category of reports and shall be intuitive to users and easily accessible based on user access.		
420	Data shall be summarized to improve report generation performance and to track changes in data for as-of-date reporting.		
421	Reports and screens available through the System shall have various selection, group by, and sort criteria, and shall be easily configurable.		
422	The location selection criteria shall include but not be limited to District, Highway, tolling point, lane, and direction of travel to be defined during the Design phase.		
423	Provide the capability to generate the same report by hour, day, date range, weekly, monthly, quarterly, yearly (fiscal and calendar), year-to-date and comparative.		
424	Provide the capability to present report data as an accumulation or individually for the selected criteria. This capability shall be configurable and applicable to District, Highway, Cashless Toll Plaza, and different transaction types whereby the user can choose the data to be presented as an accumulation of, for example grouped by all Cashless Toll Plazas and/or payment types or as individual Cashless Toll Plazas and/or payment types.		
425	Reports developed shall allow the Commission to audit and reconcile data transmitted between various subsystems within the Cashless Tolling System, and with the PTC Toll Host system and existing CSC/VPC system in accordance with this Scope of Work.		
426	All reports shall show the status of the validation/audit process, as defined by the Commission and other relevant statuses that indicate items, including but not limited to whether:		
	· all data has been obtained from the lanes;		
	· the data has been re-summarized;		
	· the transactions have been transmitted to the existing PTC Toll Host and existing CSC/VPC system, and		
	· the report is complete.		
427	The time of the last transaction processed shall be included in all applicable reports to assist with the reconciliation and audit.		
428	All reports shall include individual totals, sub-totals, and grand-totals as appropriate.		
429	Reports shall have the capability to select the date type, including but not limited to:		
	· revenue date;		
	· transmission date;		
	· as-of date;		
	· process date;		
	· transaction date, or		
	· a combination thereof, as designated by the Commission.		
430	Reports shall use conditional formatting to identify exceptions and data that are outside the normal trend.		
431	Provide reporting output in various formats (both compressed and uncompressed), including but not limited to:		
	· Portable Document Format (PDF);		
	· plain text format (TXT);		
	· rich text format (RTF);		
	· Microsoft Excel (2010 version and later);		
	· delimiter-separated values;		
	· hypertext markup language (HTML), and		
	· extensible markup language (XML).		
432	A report generation feature shall be available for configuration and shall permit Authorized Users to request selected reports for auto delivery by email or to a designated server according to a routine or custom interval, such as the start of the Business Day or at other appropriate times as designated or requested by the user as determined in the Design phase.		
433	Data from summary reports scheduled to run daily shall be automatically exported daily to a specified file format and made available on the Commission designated server as defined during the Design phase.		
434	Capability shall be provided to drill down all high-level reports to the next level of detail and to event level details as required as defined in the Design phase.		

Functional Requirements

		Required Proposer Inputs	
		Status of Functionality	**Comments**
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435	Authorized Users shall have the capability to display and review the LPICPS images and DVAS video and event details associated with the selected transaction from the drilled down details.		
436	Authorized Users shall have the capability to view the contents of files that are received by the Cashless Toll Concentrator or Toll Host System (if provided) and transmitted by the Cashless Toll Concentrator or Toll Host System in a readable format. If files are compressed or encrypted, the necessary Software tools shall be provided to view their contents. If the user selects a specific file, the contents of the file shall be displayed and the user shall have the ability to save the contents at minimum as a .csv file, xml, txt and in a useable Excel format as Approved.		
437	Capability shall be provided to present data in graph forms and chart types and the user shall be able to select presentation form from a variety of graphic styles.		
438	Data shall be organized and summarized in a manner to allow for report generation within no more than two (2) seconds for daily reports, and no more than twenty (20) seconds for monthly and annual reports, of a report generation request.		
439	The Contractor shall support the creation of additional reports and/or the modification of implemented reports, as needed after the initial deployment and implementation of the System. . It is anticipated that no more than one hundred (100) additional reports will be required for the term of the Contract.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional screen and report functions:		
440	Provide ad-hoc reporting tool capabilities to Authorized Users to allow the creation and execution of custom reports, including but not limited to:		
	· drag-and-drop field functionality;		
	· drill down functionality;		
	· filtering;		
	· parameter prompting;		
	· formula support;		
	· grouping;		
	· sorting, and		
	· stored procedure and function support.		
441	The ad-hoc reporting tool shall be COTS software and be the latest version at the time of Acceptance testing and field-		
442	The ad-hoc software shall be compatible with operating system standards and shall be patched and upgradeable to new		
443	Ad-hoc report templates created by Authorized Users shall be saved and made available to all Authorized Users.		
444	Once the audit process is completed and Revenue Day is closed, the data on reports for the day shall not change unless data is re-summarized.		
2.2.4.4	**Cashless Tolling Reports**		
445	The Cashless Tolling System shall provide reports to audit and reconcile the System, provide traffic and revenue trends, and validate System performance and perform historical reporting on detailed and summarized data imported from the existing PTC Toll Host.		
446	Report Designs and templates shall be presented by the Contractor and reviewed by the Commission during the Design phase and Approved.		
Transaction Reports			
447	Transaction Summary Reports: These reports show daily, weekly, monthly, quarterly, yearly, and comparative transaction and revenue, by vehicle class and payment type. Transaction and revenue reports shall be summarized and detailed. The summary data shall drill down to the Transaction Detail Report.		
448	Transaction Detail Report: The transaction details shall be provided in this report including lane status, equipment status, transaction status and various lane flags. Users shall be able to access the bit descriptions in all cases where information is coded. The report shall be used to investigate discrepancies and issues.		
449	Class Report: This report shows information related to traffic and revenue by vehicle class by transaction types, for example E-ZPass, Video and Non-Revenue This report is used by management and operations to report on traffic and revenue by vehicle class.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional functions and transaction and revenue reports:		
450	Accounting Revenue and Associate Traffic Report: This report shows accounting revenue and traffic counts by Revenue Dates for the vehicle class categories.		

Functional Requirements			
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451	Executive Summary Traffic and Revenue Report: This report shows daily traffic counts and revenue amounts by revenue category, for example E-ZPass and Video by vehicle class category, grouped by shift, selected day totals, previous day totals, percentage of increase/decrease and month to selected day totals. This report is used to show the increase and/or decrease in traffic counts and revenue compared to the previous days' totals using the breakdown by revenue types. Data in this report shall also be represented graphically to include selected day traffic and revenue statistics; daily revenue and traffic comparisons by vehicle class and revenue type including selected day; previous day; month to selected day average and prior week day. Backup of the summary data by District and tolling point shall be included.		
452	Finance Traffic and Revenue Details Report: This report shows traffic and revenue counts by tolling point and is grouped by vehicle class categories for the specified highway(s) selected. This report provides operations and management with traffic and revenue totals for each tolling point by vehicle class categories for a specified date range.		
453	Traffic and Revenue Report: This report shows transaction by transaction type, for example E-ZPass, Video and Non-Revenue for tolling points in each District for the selected highway(s). The data is grouped by vehicle class categories and tolling point. A summary is provided at the end of the report by vehicle class category and transaction type.		
454	Traffic and Revenue Comparison Report: This report shall provide a comparison of current year monthly traffic and revenue data with the previous year with percentage increase/decrease and includes selected highway(s) by district and tolling point. Similar to the traffic and revenue report above, the report includes a breakdown by vehicle class category. The report is further divided into sub-groups by revenue category, for example E-ZPass and Video.		
Traffic Reports			
455	Average Lane Throughput Report: This report shall display hourly traffic volumes for each lane grouped for each tolling point within the selected District. Hourly traffic volumes shall be totaled by lane for the day for each tolling point to calculate the average lane throughput at each tolling point.		
456	Counts and Percentages Report: This report shall display vehicle counts and percentages of each count grouped by vehicle class category and vehicle class for each revenue category for example E-ZPass and Video for each tolling point. This is a daily report and is grouped by tolling point for the selected highway(s) and district. This report shall drill down to the Counts and Percentages by Direction Report.		
457	Counts and Percentages by Direction Report: This report shall display vehicle counts and percentages of each count grouped by vehicle class category and vehicle class for each revenue category for example E-ZPass and Video for each tolling point. This is a daily report and is grouped by tolling point and direction for the selected highway(s) and district.		
458	Lane Traffic Counts and Statistics Reports: This report shall provide AM and PM traffic counts and statistics by hour for each Highway and tolling point by revenue category for example E-ZPass and Video. The report shall also include AM and PM peak hour statistics and provide a grand total by revenue category for all peak hour. The total percentage of E-ZPass transactions with the AM/PM breakdown and identification on the E-ZPass high hour and lane shall be included.		
459	Plaza By Lane Report: This report shows traffic counts by lane for each tolling point by vehicle class categories and vehicle classes. This report includes the summary by tolling point for the selected District. This report is used by operations staff in analyzing traffic volumes by lane and vehicle class.		
460	Speed Reports: This report shows the traffic count information per lane by speed segments. This report is used by operations staff to monitor traffic flows and speeds.		
461	Traffic Counts Report: This report shows traffic count information grouped by revenue category for example E-ZPass and Video with breakdown by transaction types and sub-totaled by tolling point and vehicle class categories. The combined counts include a breakdown by revenue and nonrevenue transactions. This report shall drill down to the Traffic Counts by Direction Report.		
462	Traffic Counts by Direction Report: This report shows traffic count information grouped by c revenue category for example E-ZPass and Video with breakdown by transaction types and sub-totaled by tolling point, direction and vehicle class categories. The combined counts include a breakdown by revenue and nonrevenue transactions.		
463	Vehicle Count Through Closed Lanes Report: This report shall display tolling point, lane and detailed transaction information for vehicles that travel through a closed lane based on the date range, tolling point and lane.		

Functional Requirements			
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464	Vehicles and Mileage Report: This report shows traffic counts for all vehicle classes in addition to vehicle class category for each revenue category between tolling points and total distance traveled for the selected criteria. The report includes a summary page with traffic between tolling points and total miles traveled. Each summary shall be grouped by vehicle class category and revenue category, for example E-ZPass and Video.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional functions and traffic reports:		
465	Finance Traffic Details Report: This report shall display traffic counts grouped by tolling point and vehicle class category and include grand totals for each vehicle class category		
466	Market Penetration Report: This report shows traffic counts by revenue category, for example E-ZPass and Video for AM/PM peak hours and includes the E-ZPass penetration percentage.		
System Audit Reports			
467	Transaction Audit Report: This report shows the status of the transaction transmission from the zone controllers to the cashless tolling concentrator, the audit status, the failed transactions, duplicate transactions, all exceptions, and missing transaction sequence numbers at each of the tolling points. The communication status between the zone controllers to all of the subsystems shall be displayed. The report shall also include the date the transactions were received at the Cashless Toll Concentrator and the days lagging. It also shows the transmission status of the transactions to the existing PTC Toll Host system with the date/time of the transmission was completed.		
468	System Audit Trail Reports: Weekly and monthly reports shall be made available that show the modifications made by the users to system parameters and ability shall be provided to obtain the details of the modifications.		
469	System Exceptions Report: The System Exceptions report shall display transactions that are considered exceptions, including but not limited to duplicate transactions; dual transponders; Cashless Toll Concentrator filtered transactions and non-interoperable transponder reads. Exception handling errors and the disposition of these exceptions shall also be displayed along with the transaction.		
470	Image Reconciliation Report: The Image Reconciliation report shall provide the ability to match transactions by type to images and to help identify missing images. These reports shall not only reconcile the actual images saved to what was expected but also verify that the images were successfully transmitted from the lanes to the image server(s) and on to the CSC/VPC system. Data on this report shall match other transactions summary reports. This report shall drill down to the Image Reconciliation Detail Report.		
471	Image Reconciliation Detail Report: This operational report list the information on the video transaction for a user defined transaction date/time range. Capability shall be provided to show only records where an image is expected and if the image is expected if the image has arrived yet. The report also shows the transmission status of the images to the CSC/VPC system.		
472	Transactions Reconciliation Reports: Yearly, quarterly, monthly, weekly, and daily reports that show AVI and video transaction transmission reconciliation for all of the tolling points. These reports shall validate that all of the AVI and video transactions received from the lanes were posted to the Cashless Toll Concentrator System and transmitted to the existing PTC Toll Host system. Reports shall be available by transaction day and transmit day, and transmit day reports shall show the files transmitted and acknowledged by the receiving system.		
473	Hardware Status Report: This report shows the Hardware status codes and descriptions based on the selected date range, Highway, District, Plaza, Lane and type of Hardware failure. This report allows maintenance staff to audit the state of all Hardware components in the lanes.		
474	Transaction Number Gap Report: This report shall provide information on gaps in transaction numbers based on tolling point and lane for the specified date range.		
475	Unusual Occurrence Report: This report shall be used to provide operations and maintenance staff with information regarding unusual occurrences with lane data to identify potential Hardware issues, Software issues or other system anomalies. The report shall include the Highway(s), and tolling point and may be filtered by unusual occurrence (UO) code. This report includes lane number, transactions date and time, lane status transaction number and a description of the UO.		
476	Lane Operations Report: This operational report lists and summarizes vehicle transactions and equipment messages that are generated in the lanes. This report is an audit tool that presents all lane activity for a specified location and desired transaction date and time period. Numerous selection and filter criteria shall be provided to help identify problems. Detailed information regarding the transaction and event shall be included.		
477	Transponder Audit Report: This report verifies that transponders are properly read at each cashless tolling location		
Performance Reports			

Functional Requirements			
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478	Transponder Status List Transmission Report: The TSL Transmission report shows the status of the TSL transmissions to the Cashless Toll Concentrator or Toll Host System and to all of the zone controllers. Summary information related to the number of transponders, time acknowledged by the zone controller and other data shall be provided to verify results and performance requirements. Time of receipt from the existing CSC/VPC system, time of transmission to the zone controllers and the status of the transmission shall be displayed. Lanes not compliant to the requirements shall be identified.		
479	Image Transmission Summary Report: This operational report counts the number of images created in the lanes for a user defined image created date range and other criteria. Data displayed include the number of triggered, non-triggered and total images from the lanes and the date the images were received at the image server(s). For each received date, the total images, number of lag days, the percentage of transactions received each day and a cumulative percentage shall be included.		
480	Image Transmission Detail Report: This operational report lists information on images from the lanes for a user defined lane created date. Capability shall be included to show image records where it took longer than a user defined number of hours for the image to arrive at the image server(s).		
481	File Transfer Performance: This operational report lists files that have been created and sent from the Cashless Toll Concentrator or Toll Host System by component for either the created date range or sent date range selected by the user. Information displayed include, file information, created date and time, sent date and time and process time. This report verifies System compliance to performance requirements. File/data transmissions to the lanes shall include confirmation of successful delivery at each lane.		
482	OCR/ALPR Performance Report (if the option to implement OCR/ALPR is exercised): The OCR/ALPR Performance Report shall display OCR/ALPR performance statistics by jurisdiction. Problematic cashless tolling lanes, Plazas and jurisdictions shall be identified. The report shall include a breakdown of the OCR/ALPR performance by confidence levels.		
2.2.4.5	**Cashless Tolling Dashboards**		
483	The Contractor shall provide Dashboards developed during the Design phase to monitor the cashless tolling system. The Dashboards shall include but not be limited to real-time monitoring of tolling point traffic, maintenance data and system performance monitoring.		
484	The Contractor shall provide the capability for Authorized Users to monitor the real-time activity at all tolling points in a pictorial and Dashboard view. There shall be an overview representation of all the highways from which individual highways can be accessed.		
485	The Contractor shall provide Authorized Users the capability to view real time DVAS video and also playback recorded video via the Dashboard. The event data pertaining to the vehicle in the video shall be displayed on the video.		
486	Authorized Users shall have access to the detailed data directly from the pictorial and Dashboard view.		
487	Authorized Users shall have the capability to drill down to each lane to review and monitor detailed events as they occur for each transaction.		
488	Authorized Users shall be able to easily maneuver through screens and view data, and different colors and pictures shall be used to bring critical events to the user’s attention.		
489	Summary data by payment type for all Commission toll facilities and by tolling point shall be displayed and users shall have the ability to drill down to the details. If a specific tolling point is selected, transaction and event level data by lane shall be made available and users shall have the ability to view the DVAS real-time video and video transaction images through this screen.		
490	All priority 1 alarms shall be displayed in color and shall be audible to direct attention to the failure.		
491	Authorized Users shall be able to easily identify problems (traffic or Equipment) on the cashless tolling lanes and initiate MOMS work order from this interface.		
492	In addition, the Dashboard shall provide detailed real-time information about the AVI system performance (including handshakes by protocol), the AVC system performance, and the LPICPS performance to assist in diagnosing and investigating problems. Data pertinent to traffic monitoring and Maintenance shall be displayed in real-time.		
2.2.4.6	**Remote Operations**		
493	The System shall provide the ability to allow Authorized Users to remotely operate the cashless tolling lanes to support the Commission operations, including but not limited to:		
	· remote update of security patches and Software updates;		

	Functional Requirements		
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	· download TSL, VEL (if exercised), and any files required to selected zone controllers when there are issues, and		
	· restart a specific zone controller node.		
2.2.4.7	**User Setup and Maintenance Screen**		
	User setup and maintenance is a critical task since the employee access levels/roles created through the System determines what privileges and access rights each employee is granted.		
494	Access to the zone controllers and Cashless Toll Concentrator or Toll Host System including the MOMS and DVAS functions shall be controlled through the user setup interface.		
495	The user list shall be obtained from the Commission Active Directory maintained by Commission IT or from an Approved source at regular intervals as defined during the Design phase.		
496	An operations alert shall be generated each time a new user is detected so that their user roles can added and access to the System defined.		
497	Authorized Users shall have the capability to also create new users through the System.		
498	Through a user setup and maintenance screen, the users shall be designated various access levels/roles based on their responsibilities (job description).		
499	In the Design phase access levels/roles shall be created and the System shall allow the input and editing of generic job access levels/roles.		
500	The access rights of each role and the ability to add roles and users shall be defined by the Commission during the Design phase.		
501	The user setup and maintenance screen shall be also used to activate and inactivate employees and also terminate them from the System.		
502	The same screen shall also be used to assign and update User ID and PIN/password for access to applications.		
503	Passwords assigned to employees and the password management process shall meet current Commission policy standards.		
504	As soon as the information is saved, the UIL shall be transmitted in near real-time to the various Systems for immediate user access.		
2.2.4.8	**Toll Rates and Schedule (if Toll Host exercised)**		
505	The System shall provide Authorized Users the capability to create and manage toll rates and schedules.		
506	At a minimum, capability shall be provided to establish toll rates based on Highway, tolling point, vehicle class, and payment type and shall support time of day and holiday toll rates as defined during the Design phase.		
507	The assignment of tolls shall be assigned based on the final Design and shall be assessed using the toll rates and schedules established for each tolling point for barrier type locations such as DRB and Gateway.		
508	The assignment of tolls shall be assigned based on the final Design and shall be assessed based on a completed trip that would be built based on the number of gantries the customer passed under while traveling on the Mainline and/or Northeastern Extension (if exercised).		
509	Authorized Users shall have the capability to pre-establish the effective date/time the toll rates will be enabled. The System shall permit the Commission to schedule toll rates and changes in toll schedules in advance of the new rates becoming effective.		
510	Authorized Users shall have the capability to establish a default toll rate to be used in the event of data unavailability or other conditions as determined by the Commission that would warrant the use of the default toll rate.		
511	The System shall record and track the toll rate ID and toll schedule ID and their transmission status for audit purposes.		
2.2.4.9	**Configurable Parameters**		
	All parameters changes shall be Approved by the Commission in accordance with the Commission Engineering Change Order (ECO) Process.		
512	The System shall provide the capability for Authorized Users to modify the configurable System parameters.		
513	Any change shall result in the creation of a new configurable parameter set and each change shall be identified by a unique identifier.		
514	Changes to configurable parameters can be scheduled to take effect immediately or at a scheduled time as determined by the user.		
515	The System shall record and track all changes to configurable parameters for audit purposes.		
516	When a new parameter takes effect, a notification shall be generated and reported to the MOMS.		
2.2.4.10	**Zone Controller Executable Download**		

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	All Software changes shall be Approved by the Commission in accordance with the Commission Engineering Change Order Process.		
517	The System shall have the capability to download zone controller executable files and all other files required by the lane for its operations. All Software updates shall be coordinated with the Commission.		
518	Successful download of the files shall be verified and alarm messages generated if any file was not received by any zone controllers.		
519	Where possible, once the Commission has Approved a Software release, all System application updates shall be automated requiring no action by Maintenance personnel.		
2.2.5	**General Requirements for Interfaces**		
	The Contractor is responsible for working with the Commission and the existing Contractors in Designing, developing, documenting, testing and implementing all required interfaces. Electronic interfaces are required to provide connectivity between the existing PTC Systems (PTC Toll Host and CSC/VPC), the Cashless Toll Concentrator or Toll Host System (if provided) and In-lane Systems. The Contractor shall be responsible for developing the ICDs, and where changes to existing ICDs are required, these documents shall be modified by the Contractor as part of this Scope of Work based on the Contractor solution during the Design phase. The ICDs shall include requirements for data format and transmission, criteria for acknowledgement and validation of transmitted data and procedures for recording and reconciliation, as appropriate for each interface. It is expected that the latest version of the ICDs will be implemented at go-live and that the Contractor shall continue to update the ICDs as appropriate for the life of the Contract.		
520	Provide electronic automated interfaces to the existing systems in accordance with these requirements.		
521	Provide for guaranteed transmission of data for all interfaces.		
522	Provide for one hundred (100) percent reconciliation of the transmitted data and files.		
523	Provide the capability for Authorized Users to access and view the contents of files, including compressed or encrypted files, which are received and transmitted by the Cashless Toll Concentrator or Toll Host System (if provided) in a readable format. Authorized Users shall have the capability to save the contents of such files.		
524	Provide the capability for real-time alerting to the MOMS of interface and data transmission failures, including but not limited to:		
	· MOMS Dashboard for managing and monitoring interfaces;		
	· workflow user interface for managing and monitoring steps within each interface;		
	· status and history of executions;		
	· comprehensive scheduling of file transmissions;		
	· comprehensive reporting for inbound and outbound transmissions;		
	· tight integration with the MOMS and notification of failed transmissions;		
	· notification of file transmission and receipt status, and		
	· capability to manually execute a failed transmission.		
525	The Contractor shall utilize secure Protocols Approved by the Commission for the transfer of data and/or files via interfaces defined during the Design phase.		
526	Provide the capability to transmit and receive multiple files during each scheduled batch.		
527	Provide the capability to transmit and receive multiple files in a day.		
528	Utilize file naming conventions that prevent the overwrite of data and/or files. For example, include the date and time of transmission and provide for unique identifiers.		
529	Utilize file handling and processing methods that provide a complete log of the data and/or file transfer process. For example, files that are successfully processed are moved to a processed folder.		
530	Validate records and identify errors in the received data and/or files, including but not limited to:		
	· mandatory fields;		
	· data formats;		
	· data validity (such as tolling points and lane numbers);		
	· duplicate records;		
	· unexpected response;		
	· checksum/record count verification and		
	· incorrect status.		
531	Provide the capability to correct and re-transmit data and/or files.		

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532	Provide the capability to process re-transmitted data and/or files automatically or manually by Authorized Users as determined during the Design phase.		
533	Provide the capability to transmit the error details to the transmitting entity, as well as record it in the MOMS.		
534	Provide the ability to identify missing records/transactions/images and request the transmission of such missing records/transactions/images.		
535	Reconcile the transmitted records to the records received and accepted by the receiving entity.		
536	Provide the means to identify interface issues by validating the file transmission process, including but not limited to:		
	· creation and transmission of data and/or a file at the scheduled time, even if there are no records to transmit;		
	· determination if the data and/or a file was transmitted or received at the scheduled time;		
	· creation of alerts to the MOMS if data and/or a file was not created or received at the scheduled time;		
	· creation of alerts to the MOMS if received data and/or a file was not acknowledged;		
	· creation of alerts to the MOMS if records in the received data and/or file had errors when processed;		
	· provide details in real-time to the MOMS of each failed record and		
	· creation of alerts to the MOMS when a response has not been received for individual records within the expected duration.		
537	Provide data and/or file transmission and reconciliation reports as described in these requirements.		
538	Provide a Dashboard that tracks the progress of data and/or file transmissions through each stage and their acknowledgements by the receiving entity, including but not limited to:		
	· transactions eligible for transmission;		
	· file and/or data created with file name;		
	· file and/or data transmitted;		
	· file and/or data received;		
	· file and/or data accepted;		
	· file and /or data rejected;		
	· file and/or data re-transmitted;		
	· number of records in the file and/or data set and		
	· number of failed records.		
539	Provide the capability for Authorized Users to configure the relevant parameters related to file and/or data transmission for each interface.		
540	Monitor the disk capacity where files and/or data are deposited and send an alert to the MOMS and interfaces entities (if applicable) if folders are near capacity (configurable) or full.		
541	Provide the capability to automatically archive successfully processed data and/or files after a configurable number of days.		
542	Provide the data to reconcile file transmissions.		
543	Conform to any existing ICDs, including any updates required at the time of Design and develop all new ICDs that have been identified as "to be developed". It is the Contractor's responsibility to ensure all ICDs (including existing) are accurate, updated and meet the requirements of the Scope of Work before developing the interfaces.		
2.2.5.1	**Cashless Toll Host System to SAP Interface (if exercised)**		
544	The Contractor shall design and develop an interface from the Cashless Toll Host System (if exercised) to SAP to transfer financial files received from the existing CSC/VPC system.		
545	The Contractor shall provide the capability to validate that the received files were successfully transmitted to SAP.		
2.2.5.2	**Cashless Toll Concentrator or Toll Host (if provided) System Interface to the Existing PTC CSC/VPC System**		
546	The Contractor shall design and develop an interface from the Cashless Toll Host System to the existing CSC/VPC system to transmit receive and acknowledge one hundred (100) percent of all transactional and financial data in accordance with the Approved ICD developed during the Design phase.		
547	The interface shall be capable of transmitting AVI transactions, Exception List, and Non-Revenue License Plate List and toll rates to the existing CSC/VPC system.		
548	The interface shall be capable of receiving TSL and VEL (if option is exercised) files from the existing CSC/VPC system.		
549	The Contractor shall provide the capability to positively acknowledge (ACK) message receipt, negatively acknowledge or reject a message (NACK) and reconcile data transmissions to/from the Cashless Toll Concentrator or Toll Host System.		

	Functional Requirements		
		Required Proposer Inputs	
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	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional functions and data feeds:		
550	The Cashless Toll Host (if exercised) shall interface shall be capable of receiving the following financial data from the existing CSC/VPC system for transfer including but not limited to:		
	· monthly GL data feeds sent from the CSC/VPC;		
	· monthly CSC surety files, and		
	· monthly CSC tag and account files.		
2.2.5.3	**Cashless Toll Systems Interfaces to the Existing PTC Toll Host Systems**		
551	The Contractor shall design and develop an interface from the Cashless Tolling Host System to the existing PTC Toll Host system to transmit one hundred (100) percent of all transaction in accordance with the ICD to be developed for this interface during Design.		
552	The interface shall be capable of transmitting the following data including but not limited to:		
	· transaction records and		
	· alarms.		
553	The Contractor shall provide the capability to reconcile the successful transmission of the summary data to the existing PTC Toll Host system.		
2.2.5.4	**Cashless Toll Concentrator or Toll Host (if provided) System to Facility Server Interface**		
	The provision of a facility server is optional but if the Contractor's solution includes a facility server, then the requirements in this section shall be met.		
554	The Contractor shall design and develop an interface from the Cashless Toll Host System to the facility Servers (if applicable) to transmit, receive and acknowledge one hundred (100) percent of all data in accordance with the Approved ICD.		
555	The interface shall be capable of sending TSL, VEL (if option is exercised), configuration files, Software updates and toll rates (if applicable) to the facility servers.		
556	The interface shall be capable of receiving all transactions, alarms and event messages from the facility servers.		
557	The Contractor shall provide the capability to reconcile the successful transmission and receipt of all data at the Cashless Toll Concentrator or Toll Host System.		
2.2.5.5	**Cashless Toll Concentrator or Toll Host (if provided) System to Zone Controller Interface**		
558	The Contractor shall design and develop an interface from the Cashless Toll Host System to the zone controllers to transmit and acknowledge one hundred (100) percent of all data in accordance with the Approved ICD.		
559	The interface shall be capable of sending TSL, VEL (if option is exercised), configurations files, Software updates and toll rates (if applicable) to the zone controller.		
560	The interface shall be capable of receiving all transactions, alarms and event messages from the zone controller.		
561	The Contractor shall provide the capability to reconcile the successful transmission and receipt of all data at the Cashless Toll Concentrator or Toll Host System.		
2.2.5.6	**Image Server to Cashless Toll Concentrator or Toll Host System (if provided) Interface**		
	Reconciliation of images to the video transactions and the status of the transfer of images and video transactions shall be maintained and reported at the Cashless Toll Concentrator or Toll Host System.		
562	The Contractor shall design and develop an interface from the image server(s) to the Cashless Toll Concentrator or Toll Host System to transmit and track the status of the capture of images by the In-lane Systems for each video transaction and the subsequent transfer of images and video transactions to the existing CSC/VPC system.		
563	The interface shall be capable of sending image reconciliation and transfer status data to the Cashless Toll Concentrator or Toll Host System.		
564	The Contractor shall provide the capability to reconcile the successful transmission and receipt of all images and video transactions at the existing CSC/VPC system.		
2.2.6	**Maintenance Online Management System (MOMS)**		
	There shall be a Maintenance Online Management System (MOMS) that supports the Cashless Tolling System Maintenance activities and Maintenance operations.		
2.2.6.1	**Maintenance Online Management System (MOMS) – General Requirements**		
565	Provide a MOMS that supports Maintenance operations for all Software and Hardware provided under this Contract.		
	Provide a MOMS that monitors, alerts and generates work orders in real-time for all processes, including but not limited to:		
	· communications issues;		

Functional Requirements			
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566	· file transmission issues;		
	· data exceptions;		
	· Hardware issues;		
	· Software issues or failures;		
	· database issues;		
	· issues with jobs, processes or data flows;		
	· low storage space for each subsystem (configurable thresholds);		
	· CPU utilization (configurable thresholds);		
	· CPU load (configurable thresholds);		
	· file system mounts (if applicable), and		
	· disk IOs.		
567	Provide a MOMS that monitors, alerts and tracks in real-time unusual activity triggered by users and systems, including but not limited to:		
	· video transactions above threshold;		
	· flushed transactions above threshold, and		
	· other anomalies in daily toll operations.		
568	Provide a MOMS that includes but is not limited to the following:		
	· receiving and monitoring status messages of all system Hardware and Software;		
	· receiving and transmitting alarm and status messages from the current Commission monitoring system;		
	· is capable of local work order manual entry or email entry by Authorized Users;		
	· storing data in a relational database to allow for data recovery and flexibility in reporting the raw data (including via Ad-hoc reporting);		
	· tracking device failures and service requests;		
	· assigning priorities and actions to events;		
	· notifying (automatically) Maintenance personnel via reports, text and email;		
	· assigning work orders to Maintenance personnel;		
	· reassigning (manually) work orders to other Maintenance personnel;		
	· escalating (automatically) work orders to other Maintenance personnel;		
	· recording time of acknowledgement by Maintenance personnel;		
	· recording time of acknowledgement by all subsequently assigned Maintenance personnel;		
	· recording time of repair;		
	· recording time of Equipment and process recovery;		
	· recording completion of service calls;		
	· providing automatic alert for work orders not closed out in specified time;		
	· maintaining and tracking Repair Maintenance Activity;		
	· accepting and updating work orders via smart phones entries via secure communications;		
	· tracking all system application Software components and Hardware via an asset management module;		
	· role-based security;		
	· containing an automatic system exception reporting for all processes that are not running;		
	· containing an automatic system workflow exception reporting for all items that are not processing correctly or are hung in the system, and		
	· providing hard copy reports on device failures and trouble resolution status.		
569	Provide a MOMS that supports maintenance functions, including but not limited to:		
	· automatic system job/workflow/queue exception reporting and alerting for all elements that are not processing correctly or are hung in the system;		
	· issuing electronic notifications via email or text to Maintenance staff when problems are detected;		
	· prioritization of failures and alerts that is configurable and alert Authorized Users when configurations are changed;		
	· for the calculation of response times, repair times, and down time from the data entered by the Maintenance staff and automatically generated by the system, and		
	· scheduling of preventive Maintenance through the MOMS that generates automatic work orders at the scheduled times.		
	Provide a MOMS that supports asset management, including but not limited to:		

Functional Requirements			
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570	· tracking of all system Hardware and Software items to the subassembly level;		
	· tracking of all system Hardware and Software locations;		
	· tracking of all system Hardware and Software versions;		
	· tracking of all Maintenance and service agreements;		
	· maintains a list of vendors from where products were procured;		
	· associates the original purchase order number to the individual item;		
	· associates the original vendor number to the individual item;		
	· associates all warranty information to the individual item;		
	· provides an alert prior to warranty expiration, and		
	· provides automatic alert for spare parts levels.		
571	The MOMS will record all configuration data, and will be versioned after each system component change, including application of system patches.		
572	Provide the capability for Authorized Users to access the MOMS screen through the single Cashless Toll Concentrator or Toll Host (if provided) System GUI.		
573	Capability shall be provided to configure the priority level of each alarm and assign and change the escalation attributes.		
574	Provide the capability to configure the initiation of a notification in the MOMS when an alarm is generated.		
575	Authorized Users shall have the capability to indicate if an alarm should result in the generation of a work order and if an alarm should be considered in performance reporting.		
576	Provide the capability to generate (on-demand and scheduled) daily, weekly and monthly performance reports as determined by the Commission during Design.		
577	Provide the capability to generate operational, management and performance reports from the MOMS that include but are not limited to:		
	· summarized and detailed alarm history;		
	· Maintenance paging and response history;		
	· work order status and tracking;		
	· Equipment inventory and tracking to the subassembly level;		
	· Equipment availability;		
	· preventive Maintenance;		
	· pervasive Maintenance;		
	· corrective Maintenance;		
	· response and repair times for each of the priorities and level of Maintenance;		
	· Equipment use history;		
	· Equipment repair history;		
	· total system availability;		
	· sub-system availability for the In-lane Systems and Cashless Toll Concentrator or Toll Host System (if provided);		
	· Equipment versions, Software versions, firmware versions and serial numbers for all Equipment installed under this Scope of Work;		
	· incident logs and lost revenue estimates;		
	· Mean Time Between Failures (MTBF) for the preceding and current Maintenance periods and cumulative;		
	· performance reports detailing compliance to the performance requirements;		
	· detailed list of parts replaced as a result of Maintenance actions, with an identification of warranty versus non-warranty replacement;		
	· status of removed parts and Equipment with an aging status for parts under repair or replacement (serial numbers, being repaired in Maintenance shop, purchase replacement part);		
	· performance reports;		
	· an exceptions report summarizing all unusual or significant occurrences during the period;		
	· trend analysis for repetitive failure;		
	· status of spare parts inventory, and		
	· staffing report detailing positions, staff hours worked and performance.		
578	When spare parts inventory is reduced to a configurable threshold quantity, automatic reorder alerts shall be generated.		

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579	Provide a MOMS that has the ability to receive information (success or failure), including but not limited to:		
	· backup;		
	· time synchronization;		
	· synchronization of primary and secondary systems;		
	· Software updates and		
	· file downloads.		
580	In order to ensure that all tolling points are functional, all systems are operational, all the processes are working and file transfers are successful, Authorized Users shall have access to the MOMS screens. Capability shall be provided to verify the status of tolling point operations, the System and various file transfers, including the files transmitted and received from the existing PTC Toll Host system.		
581	Tolling point and System status shall be shown in a pictorial view with the capability to drill down to the device causing the alert and its associated error logs.		
582	The MOMS screen shall show if required files were transmitted to all the lanes, the existing PTC Toll Host system and the existing CSC/VPC System.		
583	In case of TSL and toll rate tables, the version in use shall be listed.		
584	Authorized Users shall have the capability to re-initiate download in the event transmissions were not successful, for example toll rate tables.		
585	Screens shall be available that show all the alarms generated by the various systems and subsystems, including the operating system and the database.		
586	Failure of all devices, processes, programs, and scheduled tasks shall be forwarded to the MOMS screen that is accessible to authorized staff.		
587	Various events and error logs shall be provided for each program that shall assist the system administrator to investigate problems.		
2.2.6.2	**System Health Monitoring Software**		
588	Provide System health monitoring Software that includes but is not limited to:		
	· tight integration with the MOMS;		
	· Hardware and network health monitoring;		
	· a dashboard that graphically displays component's health;		
	· comprehensive log reporting capabilities, and		
	· integration with existing Commission monitoring Software.		
2.2.6.3	**Time Synchronization**		
589	The Cashless Toll Concentrator or Toll Host (if provided) server shall be synchronized to a certified source Approved by the Commission using the standard network time protocol (NTP) at configurable intervals, but at a minimum of every five (5) minutes.		
590	The zone controllers, AVI systems, AVC systems, LPICPS, image server(s), OCR/ALPR server (if the option to implement OCR/ALPR is exercised), DVAS, and other servers needed to support the requirements of this Scope of Work shall be synchronized to the Cashless Toll Concentrator or Toll Host server or the Approved certified source.		
591	If needed, synchronization messages shall be sent to devices that do not support off-the-shelf time synchronization Software.		
592	All servers and controllers shall have a primary and secondary source for synchronizing time.		
593	The time synchronization technique shall ensure that duplicate or incorrect transaction times are not possible.		
594	The Cashless Toll System shall have the capability to handle daylight saving time changes.		
2.3	**Test Site**		
595	The Contractor shall install and setup a dedicated test site at a Contractor Provided, Commission Approved location. that shall be available for testing software and hardware changes or options exercised including those for AVI alternatives or upgrades for the term of the Contract. The test site shall have the full suite of Equipment and Systems as an operational tolling point, and test transactions and data shall be transmitted to the Cashless Toll Concentrator or Host Systems test environment. The test site shall be monitored through the MOMS and maintained identical to other tolling point as specified in this Scope of Work.		
596	If the option for a replacement Toll Host is exercised by the PTC, the Contractor shall provide a Quality Assurance (QA) Toll Host System for development and testing changes prior to deployment into the production systems.		
2.4	**National Interoperability**		

<table>
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<tr><td>597</td><td>The Cashless Tolling System shall be Designed to accommodate future National Interoperability such that it supports the inclusion of multiprotocol readers and/or the inclusion of multiprotocol transponders to support the current TDM (E-ZPass) and 6C protocols as part of the base Contract and optional SeGo protocols. The Contractor solution shall allow for modifying and adapting the Design to incorporate new readers, antennas types and locations, and support the transition to the new interoperable solution with limited interruptions to the revenue collection.</td><td></td><td></td></tr>
<tr><td>598</td><td>The Contractor shall support the conversion to National Interoperability if it becomes available during the term of the Contract.</td><td></td><td></td></tr>
<tr><td>599</td><td>If requested, the Contractor shall provide a Checklist (Section 4.8) and Systems Testing Concept (Section 6.1) for AVI alternatives.</td><td></td><td></td></tr>
<tr><td><b>2.5</b></td><td><b>Cashless Tolling Accuracy Requirements</b></td><td></td><td></td></tr>
<tr><td></td><td>The Contractor shall provide a Cashless Tolling System that is Designed to meet the accuracy, performance and throughput requirements set forth in this Scope of Work. The testing logistics required to prove adherence to these requirements shall be detailed in the Master Test Plan and the test procedures as set forth in Section VI of the Scope of Work.</td><td></td><td></td></tr>
<tr><td>600</td><td>The sample size for each requirement shall be the greater of N = log (1 - C) / log (A); or 100,000 transactions for the Cashless Tolling System Operational and Acceptance Test described in Section 6.6; where:
* N = Number in the sample
* C = Confidence level
* A = Accuracy
A value of ninety five (95) percent shall be used for the confidence level. Accuracy and confidence levels are expressed as decimals.</td><td></td><td></td></tr>
<tr><td><b>2.5.1</b></td><td><b>Accuracy Requirements</b></td><td></td><td></td></tr>
<tr><td><b>2.5.1.1</b></td><td><b>General Requirements</b></td><td></td><td></td></tr>
<tr><td>601</td><td>The Contractor shall provide a Cashless Tolling System that meets an overall accuracy of at least 99.9 percent for vehicle detection and classification, transponder read and association and vehicle image capture and association. The metrics to validate overall accuracy requirements will be a weighted averaging of the subsystems and shall be defined by the following formula:
$$\begin{aligned}&\mathit{Overall\ Accuracy\ Rate}\\&= (\mathit{Vehicle\ Detection\ Rate\ x\ Vehicle\ Detection\ Weight\ Factor})\\&+ (\mathit{Transponder\ Association\ Rate\ x\ Transponder\ Association\ Weight\ Factor})\\&+ (\mathit{Vehicle\ Classification\ Rate\ x\ Vehicle\ Classification\ Weight\ Factor})\\&+ (\mathit{Image\ Capture\ Rate\ x\ Image\ Capture\ Weight\ Factor})\end{aligned}$$
Where: Vehicle Detection Rate, Transponder Association Rate, Vehicle Classification Rate and Image Capture Rate are obtained from the transactions collected during the Cashless Tolling System Operational and Acceptance Test described in Section 6.5.
<table>
<tr><th></th><th>Vehicle Detection</th><th>Transponder Association</th><th>Vehicle Classification</th><th>Image Capture & Association</th></tr>
<tr><td>Weight Factor</td><td>0.40</td><td>0.15</td><td>0.15</td><td>0.30</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>602</td><td>The Contractor shall provide a Cashless Tolling System that meets the accuracy requirements described below. The Contractor shall validate System compliance to the accuracy requirement by collecting data to the required sample size in live traffic operations as described below for each requirement.</td><td></td><td></td></tr>
<tr><td>603</td><td>Data collection shall include the use of live traffic and controlled vehicles (vehicles with a known transponder status) intermingled with live traffic to emulate normal operations such as congestion and traffic patterns as specified below for each requirement.</td><td></td><td></td></tr>
</table>

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604	Prior to the start of testing the System shall be confirmed to be fully operational and ready for testing. Transactions that fail to meet the requirements shall be reviewed and audited and anomalies investigated. Exception criteria identified during the Design phase and the development of the test procedures that fall outside the System Design may be excluded from the accuracy calculations.		
2.5.1.2	**Transponder Capture Rate**		
605	A transponder mounted in accordance with the manufacturer mounting instructions shall be captured by the AVI system under all conditions within the Design specification described in this Scope of Work with an accuracy rate as defined by the greater of the E-ZPass Group or manufacturers specifications This requirement applies to all tolling point types based upon the transponder mix collected during the testing period for the Commission Approved sample size.		
2.5.1.3	**Transponder Reporting Accuracy**		
606	A transponder that is detected and read by the AVI reader shall be reported to the zone controller with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of transponder reads collected during live traffic operations.		
2.5.1.4	**1.1.1.3 Transponder Write Performance Accuracy Rate**		
607	The AVI system shall successfully and accurately complete a write operation to associate data with a passing vehicle with an accuracy rate as defined by the greater of the E-ZPass Group or manufacturers specifications under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of transponders captured during live traffic operations.		
2.5.1.5	**Vehicle Detection Accuracy**		
608	The zone controller shall detect and report vehicles traveling through the tolling point under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations. The resulting accuracy will be used in the calculation of the overall accuracy.		
2.5.1.6	**Transponder Association Accuracy**		
609	Every Transponder that is reported to the zone controller shall be assigned to the correct vehicle under all conditions within the Design specification described in this Scope of Work. This requirement applies to all tolling point types based upon the transponder penetration rate collected during the testing period for the Commission Approved sample size. The resulting accuracy will be used in the calculation of the overall accuracy.		
2.5.1.7	**Vehicle Classification Accuracy**		
610	The zone controller shall classify all vehicles in accordance with the Commission classification structure traveling through the tolling point with accuracies defined below under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations. The resulting accuracy will be used in the calculation of the overall accuracy.		
2.5.1.8	**Image Capture Reporting Accuracy**		
611	The System shall capture, report and correctly associate an image of the vehicle to the correct vehicle as defined in the Commission Business Rules under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations. The resulting accuracy will be used in the calculation of the overall accuracy.		
2.5.1.9	**License Plate Extraction (OCR/ALPR) Accuracy (if the option to implement OCR/ALPR or VEL is exercised)**		
612	For all video transactions without exception, the System shall perform OCR/ALPR on minimum seventy (70) percent of the images to obtain the license plate, jurisdictions and plate type with at least 99.95 percent accuracy of for the States of PA, NJ, OH, FL, NY, MD, TX, DE, VA and NCPA, NY, NJ, IN, OH, MD, IL, DE, FL and VA. For vehicles identified as requiring front plates the results shall be from the front image. Testing shall require the use of vehicle data collected during live traffic operations. Each tolling location can be independently tuned to optimize performance based on the mixture of plates for each given toll zone.		
2.5.1.10	**Overall Image Quality**		
613	For all video transactions, at least 99.95 percent of the images that are included in the calculation shall have a human readable license plate, jurisdiction and plate type. For vehicles identified as requiring front plates the front image shall be used. Testing shall require the use of vehicle data collected during live traffic operations.		
	A plate shall be considered excluded from Overall Image Quality calculation only when:		
	· the vehicle has no plate;		
	· the plate numbers/letters are not human readable due to damage or obstruction.		
2.5.1.11	**Transaction Processing Requirements**		

<table>
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<tr><td>614</td><td>All transactions generated by the zone controllers in accordance with the above accuracy requirements shall be reported and transmitted for processing to the Cashless Toll Concentrator or Toll Host Systems (if provided) with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations.</td><td></td><td></td></tr>
<tr><td><b>2.5.1.12</b></td><td><b>False Read Processing</b></td><td></td><td></td></tr>
<tr><td>615</td><td>The Cashless Tolling System false read processing (example cross lane reads and duplicate reads) shall be less than 0.001 percent of the transponder transactions under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations and test results will be verified by monitoring the CSC for accurate account posting and anomalies will be investigated.</td><td></td><td></td></tr>
<tr><td><b>2.5.1.13</b></td><td><b>Video Transaction and Image Transmission Requirements</b></td><td></td><td></td></tr>
<tr><td>616</td><td>All video transactions and images from the Cashless Tolling System shall be transmitted to the existing CSC/VPC system with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations.</td><td></td><td></td></tr>
<tr><td>617</td><td>All video transactions from the Cashless Tolling System shall be transmitted to the existing PTC Toll Host with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations.</td><td></td><td></td></tr>
<tr><td><b>2.5.1.14</b></td><td><b>AVI Transaction Transmission Requirements</b></td><td></td><td></td></tr>
<tr><td>618</td><td>All AVI transactions from the Cashless Tolling System shall be transmitted to the existing PTC Toll Host CSC/VPC systems with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations.</td><td></td><td></td></tr>
<tr><td><b>2.5.1.15</b></td><td><b>Vehicle Throughput Requirements</b></td><td></td><td></td></tr>
<tr><td>619</td><td>The Cashless Tolling System shall process a minimum of 2,400 vehicles per hour per lane with a video transaction rate of one hundred (100) percent. Testing shall include the simulation of vehicle events that exercise all of the toll collection equipment and devices.</td><td></td><td></td></tr>
<tr><td><b>2.5.2</b></td><td><b>Mean Time Between Failure (MTBF)</b></td><td></td><td></td></tr>
<tr><td>620</td><td>The Cashless Tolling System shall be required to meet specific minimum duration requirements for components and subsystems in continuous operation. This time requirement is defined as the Mean Time Between Failure (MTBF). The Contractor shall provide all third-party MTBF on individual components to be used in the System.</td><td></td><td></td></tr>
<tr><td>621</td><td>MTBF requirements for all components of the Cashless Tolling System shall meet the MTBF as specified below in Table II-1:
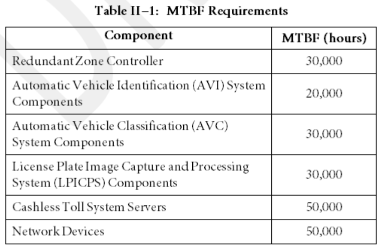
Table II–1: MTBF Requirements
<table>
<tr><th>Component</th><th>MTBF (hours)</th></tr>
<tr><td>Redundant Zone Controller</td><td>30,000</td></tr>
<tr><td>Automatic Vehicle Identification (AVI) System Components</td><td>20,000</td></tr>
<tr><td>Automatic Vehicle Classification (AVC) System Components</td><td>30,000</td></tr>
<tr><td>License Plate Image Capture and Processing System (LPICPS) Components</td><td>30,000</td></tr>
<tr><td>Cashless Toll System Servers</td><td>50,000</td></tr>
<tr><td>Network Devices</td><td>50,000</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>622</td><td>The reliability of the System components shall be calculated based on the following MTBF calculation: MTBF = # units x test period (hours)/ # chargeable failures.</td><td></td><td></td></tr>
<tr><td><b>2.5.3</b></td><td><b>Availability</b></td><td></td><td></td></tr>
</table>

<table>
<tr><th colspan="4">Functional Requirements</th></tr>
<tr><th rowspan="3">No.</th><th></th><th colspan="2">Required Proposer Inputs</th></tr>
<tr><th></th><th>Status of Functionality</th><th>Comments</th></tr>
<tr><th>Requirements</th><th>Existing (E) - Met by current system, no modifications required
Modification (M) - Modifications needed to meet requirement
Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs
To Be Developed (D) - Not in current system, but will be developed
Not Provided (N**) - Will not be provided - requires explanation</th><th>If "Status of Functionality = N" then Proposer must provide an Explanation in this Column</th></tr>
<tr><td>623</td><td>The Contractor shall meet availability requirements for the following elements of the Cashless Tolling System:
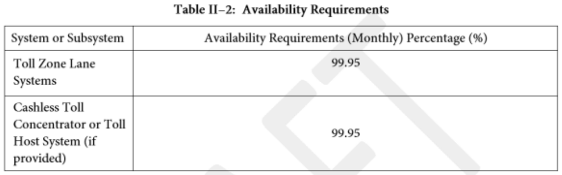
Table II–2: Availability Requirements
<table>
<tr><th>System or Subsystem</th><th>Availability Requirements (Monthly) Percentage (%)</th></tr>
<tr><td>Toll Zone Lane Systems</td><td>99.95</td></tr>
<tr><td>Cashless Toll Concentrator or Toll Host System (if provided)</td><td>99.95</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>624</td><td>The availability requirements shall be separately calculated and applied to an available lane with all of its subsystems properly functioning and available to collect revenue and send required transactions to the Cashless Toll Concentrator or Toll Host System (if provided) and images to the image server(s)/CSC VPC systems.</td><td></td><td></td></tr>
<tr><td>625</td><td>The availability requirements shall be separately calculated for the Cashless Toll Concentrator or Toll Host System (if provided) with all of its devices, Software, applications and processes properly functioning and available to the Authorized Users, successfully transmitting transactions to the existing PTC Toll Host systems and the CSC/VPC systems, successfully transmitting files to the SAP system and communicating with the in-lane systems.</td><td></td><td></td></tr>
<tr><td>626</td><td>Availability shall be calculated based on the following calculation:
Availability = 100% - [Hours Downtime / (# Days in time period measured * 24)]</td><td></td><td></td></tr>
<tr><td>627</td><td>The Cashless Tolling System compliance to the availability requirements shall be validated during the Operational and Acceptance Test described in Section 6.6 Cashless Tolling System Operational and Acceptance Test.</td><td></td><td></td></tr>
<tr><td>628</td><td>During the Cashless Tolling System Maintenance and Software Support Services, the Contractor shall prove the Cashless Tolling System compliance to the availability requirements as described in Section 7.22 Performance Requirements for the Cashless Tolling System and Liquidated Damages.</td><td></td><td></td></tr>
<tr><td><b>2.5.4</b></td><td><b>Chargeable and Non-Chargeable Failures</b></td><td></td><td></td></tr>
<tr><td></td><td>For purposes of calculating MTBF and Availability performance requirements for testing, as detailed in Section VI, and for Maintenance performance, as detailed in Section VII, chargeable and non-chargeable failures are defined as follows:</td><td></td><td></td></tr>
<tr><td><b>2.5.4.1</b></td><td><b>Chargeable Failures</b></td><td></td><td></td></tr>
<tr><td rowspan="12">629</td><td>Chargeable failures include any failures that are not specifically identified as non-chargeable, including, but not limited to the following:</td><td></td><td></td></tr>
<tr><td>· A malfunction which prevents the Cashless Tolling System component (Hardware or Software) from performing its designated function, when used and operated under its intended operational and environmental conditions as detailed in this Scope of Work.</td><td></td><td></td></tr>
<tr><td>· A malfunction that poses a threat to the safety of the Cashless Tolling System components, PTC customers, employees or others.</td><td></td><td></td></tr>
<tr><td>· An occurrence where data is not successfully transmitted between the lanes and the Cashless Toll Concentrator or Toll Host System (if provided) and images from the lanes to the image server(s) unless such failure is due to the WAN provided by the Commission.</td><td></td><td></td></tr>
<tr><td>· A failure of Equipment or Software that allows data loss to occur on the Cashless Tolling System.</td><td></td><td></td></tr>
<tr><td>· A failure of Equipment or Software that allows revenue loss to occur on the Cashless Tolling System that is not already accounted for as a separate performance failure.</td><td></td><td></td></tr>
<tr><td>· Software anomalies and bugs that affect the performance and operation of the Cashless Tolling System.</td><td></td><td></td></tr>
<tr><td>· Shutdown or unavailability of the Cashless Tolling System unless specifically directed by the Commission for reasons not under the control of the Contractor.</td><td></td><td></td></tr>
<tr><td>· Failure to properly register or report a transaction.</td><td></td><td></td></tr>
<tr><td>· Failure to properly reconcile the Cashless Tolling System.</td><td></td><td></td></tr>
<tr><td>· Failure to electronically send or receive transaction information.</td><td></td><td></td></tr>
<tr><td>· Failure to generate the reports required to reconcile and audit the System.</td><td></td><td></td></tr>
<tr><td><b>2.5.4.2</b></td><td><b>Non-Chargeable Failures</b></td><td></td><td></td></tr>
<tr><td rowspan="3"></td><td>Non-chargeable failures shall include:</td><td></td><td></td></tr>
<tr><td>· force majeure, as defined in the Contract Documents;</td><td></td><td></td></tr>
<tr><td>· vandalism;</td><td></td><td></td></tr>
</table>

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	Comments
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630	· failure of a test facility or test instrumentation;		
	· failure of a component the Commission has responsibility;		
	· System component failures caused by externally applied stress conditions outside of the requirements of this Scope of Work;		
	· System component failures caused by environmental or operating conditions outside of the requirements of this Scope of Work;		
	· normal operating adjustments as allowed in the Test Procedure or Maintenance Plan, as applicable, and		
	· failures that are customer or user induced.		
III.	**Cashless Tolling System Transition**		
	All Commission facilities including barrier, ramp and the mainline will be transitioned to cashless tolling in accordance to *Attachment 9: Cashless Tolling Concept Plan* and the Approved project schedule. The Contractor's installation and transition plan shall support the conversion of the existing toll collection system to the Contractor's Cashless Tolling System.		
3.1	**Cashless Tolling System Transition – General Requirements**		
631	The Contractor shall accommodate the various installations of the Cashless Tolling System implementation in accordance with the Approved schedule.		
632	All changes to the System to accommodate technology upgrades and meet the Contract requirements shall be the responsibility of the Contractor.		
633	The Contractor schedule shall be sufficiently flexible to accommodate modifications or changes such as early completions or delays in start or completion of phases that would normally be expected in a multi-phase, multi-Contractor construction schedule.		
3.2	**Cashless Tolling System Implementation**		
634	The Contractor shall procure, Design, test, and install the Cashless Tolling In-lanes Systems, including the redundant Cashless Tolling In-lane System Hardware, Software, Equipment, Interfaces and communications provided in the toll equipment building at each tolling point.		
635	The Cashless Toll Concentrator or Toll Host Systems (if provided) shall be tested and interface testing completed prior to commencing Onsite First Installation Test (OFIT) for the Cashless Tolling System at the initial Implementation.		
636	The installation and Commissioning of all cashless tolling point implementations shall be in accordance with the Approved Transition Plan.		
3.3	**Transition to Cashless Tolling**		
3.3.1	**Cashless Tolling Transition Plan**		
637	The Contractor shall provide a detailed Transition Plan for Commission Approval that addresses all critical transition elements and activities associated with the installation and Implementation of the Cashless Tolling System, including Cashless Tolling In-lane Systems; Cashless Toll Concentrator or Toll Host Systems (if provided), and interfaces to the existing PTC Toll Host system and the existing CSC/VPC system.		
638	The Transition Plan shall, at a minimum, include the installation, Commissioning, Revenue Collection and Acceptance of Cashless Tolling In-lane Equipment, and Acceptance of each Implementation Phase of the Project.		
639	Any temporary processes implemented to support the transition shall be documented in the Transition Plan including eventual replacement process if applicable.		
640	All points of coordination or reliance on third-party deliverable, for example the WAN communications network shall be clearly identified in the Transition Plan.		
641	The impacts to existing systems including those in the proximity of the tolling point shall be addressed in the Transition Plan.		
642	The Cashless Tolling System Transition activities shall be coordinated with the civil Contractor, civil designer and existing system integrators and Approved by the Commission in order to not interfere with on-going and continuing maintenance and operational requirements.		
	In order to ensure a seamless transition, the following activities shall take place prior to opening the first tolling point to cashless tolling in revenue collection.		
	· Upon Approval to proceed with a Commissioning Test, the Contractor shall conduct such test at each tolling point prior to opening each location to traffic and revenue collection. Since each location may also include civil construction, the Contractor shall be responsible for interfacing and coordinating with the PTC and civil contractors for scheduling and maintenance and protection of traffic requirements during the conversion to cashless tolling.		

Functional Requirements			
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643	· The Cashless Toll Concentrator or Toll Host (if provided) servers and central image servers (if implemented) shall be installed and commissioned at the primary and secondary locations and its interface to the existing PTC Toll Host system and existing CSC/VPC shall be validated.		
	· The MOMS shall be configured for go-live; inventory recorded; technicians scheduled, and notifications set up;		
	· The DVAS shall be installed and validated and Authorized Commission personnel shall have access to the DVAS;		
	· The OFIT shall be conducted and Cashless Tolling System functionality and performance validated at the initial tolling point installation;		
	· An end to end test shall be conducted in the existing PTC Toll Host system and existing CSC/VPS system test environments, and		
	· The Commission shall confirm the existing systems are ready for Conversion and give Approval for Go-Live. At such time, the Cashless Tolling System shall be switched over to the production existing PTC Toll Host system and existing CSC/VPC system.		
644	The Contractor shall plan for possible variances in the sequencing of the transition due to construction and readiness of the CSC/VPC systems and operations in its Transition Plan.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional requirements:		
645	The Transition Plan shall address the integration and interface of the Cashless Toll Host System to SAP when all existing facilities are converted to cashless tolling and the existing PTC host system is de-commissioned.		
646	The Transition Plan shall address the migration of data from the current PTC host to the Cashless Toll Host System for new facilities as well as when existing facilities are converted to cashless tolling and the existing PTC host system is de-commissioned.		
647	The operational requirements, interfaces, and/or Equipment installation for the Cashless Tolling System and its interface to the existing PTC Toll Host system, SAP and existing CSC/VPC System shall be included.		
IV	**Cashless Tolling System Installation Requirements**		
	This section details the requirements for the installation of the In-lane Cashless Tolling System and the Cashless Toll Concentrator or Toll Host (if provided) System. Unless Approved by the Commission, no System installation shall occur prior to the satisfactory Approval of Installation Design and the Factory Acceptance Test.		
4.1	**Installation Program**		
648	The Contractor shall have an Installation Program that addresses all aspects of the installation of the In-lane Cashless Tolling Systems and Cashless Toll Concentrator or Toll Host (if provided), including all installation Design, submissions and coordination.		
649	The Contractor is responsible for the Design, procurement, installation, cabling, configuration, check-off, and testing of all Hardware, Equipment, communications, Software, lighting and fixtures provided by the Contractor as part of the In-lane Cashless Tolling Systems at each of the tolling points identified by the Commission.		
650	In the event the Contractor decides to re-use existing hardware, conduits and junction boxes, the Contractor is responsible for ensuring that such elements are in their fully operational condition and will meet the requirements of the Contract for the term of the Contract.		
651	The Contractor shall install the Cashless Tolling In-lane servers and Hardware in the toll equipment building provided by the Commission through the civil contractor.		
652	The Contractor shall install the Cashless Toll Concentrator or Toll Host at locations specified in the Scope of Work and Approved by the Commission.		
653	The Contractor shall work with the Commission to test the WAN and the connections to the existing PTC Toll Host system and the existing CSC/VPC systems. Testing shall include expected traffic loads and all types of production operation data		
654	The Contractor shall coordinate all lane closure activities with the Commission and the civil contractor.		
655	The Contractor shall validate and approve the Commission and the civil contractor infrastructure installation and confirm they are in compliance with the Approved civil drawings.		
656	The removal and disposal of the existing equipment not re-used by the Contractor will be responsibility of the civil contractor and the Contractor shall support the coordination of this work.		

Functional Requirements

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657	The Contractor shall install and tune the certified AVI Equipment to the AVI vendor specifications in compliance with the E-ZPass Group requirements. In addition, the AVI vendor shall certify that the lanes are tuned to the Approved AVI specifications, including after AVI updates or replacements such as for interoperability or maintenance.		
4.2	**Installation Plan**		
658	The Contractor shall develop and submit an installation plan that identifies its approach to installation and drawing package submissions and documents all installation related activities for the Project. The installation plan shall be the master document from which the elements of the System shall be installed.		
659	The installation plan shall include and define, at a minimum, the following items:		
	· The installation schedule detailing all activities, shifts and resources for the installation of the In-lane Cashless Tolling Systems and Cashless Toll Concentrator or Toll Host (if provided) and the Cashless Toll Host Systems, including third-party and civil contractor activities. Once the baseline schedule is Approved by the Commission, updates during the installation periods identifying all schedule changes and Work progress in the form of percentage completions shall be submitted to the Commission for Approval.		
	· The minimum resource allocation requirement for any installation phase and segment.		
	· How the Contractor manages delivery and staging of the Cashless Tolling In-Lane and Concentrator or Toll Host Equipment to be installed, including any staging, installation and testing performed at the Contractor or third-party facilities and their subsequent delivery and installation at the production sites.		
	· The coordination between other Contractors, including the civil designer, civil Contractor(s), service providers, and the existing Contractors.		
	· Coordination of the lane closures with the civil Contractor(s) for each phase of the project.		
	· Coordination with the civil Contractor(s) for the installation of the toll equipment building, the generators and UPS.		
	· Coordination activities as applicable with other third-party entities for the various interfaces including the existing PTC Toll Host, existing CSC/VPC and other existing PTC systems.		
	· Testing of the Commission provided fiber communications network for connection of Cashless Tolling Systems to existing PTC Toll Host system and the existing CSC/VPC system.		
	· Quality control, quality assurance, inspection, and testing processes including validation of Contractor installation to the requirements of the Contract installation drawings.		
	· The order in which Equipment items are to be installed with estimated durations.		
	· Special or unique installation requirements.		
	· A detailed component list and a description of how each item version number and serial number shall be recorded for each installation and configuration into the MOMS.		
	· Specific requirements to support the conversion to the new interoperable solution, including but not limited to infrastructure changes, AVI controller changes, antenna locations, lane configuration, servers, configuration files, firmware, host and plaza subsystems, and other modifications which may be required.		
	· Organization Chart defining Key Team Members, roles and responsibilities and contact information.		
	· Contingency Plan.		
4.3	**Installation and Construction Coordination and Meetings**		
	During the Project Design, development and installation periods there shall be a series of meetings between the Contractor, the Commission, existing Contractor, civil designer and the civil Contractor(s) to clearly define and develop the installation requirements, methodology, timetables, test plans, roles, and contingency plans. The Contractor is responsible for coordinating and scheduling all meetings necessary to complete the Design and installation phase of the Project.		
660	The Contractor shall schedule, manage and attend weekly installation meetings during the active Design and installation phases of the Project and report on progress of the installation. The Contractor shall identify and communicate any issues regarding Cashless Tolling System construction and installation immediately upon discovery to the civil Contractor(s), existing system integrator and the Commission.		
661	The Contractor shall ensure that the appropriate personnel are present at these meetings who can represent the Contractor’s interest and provide the information necessary in a meaningful manner.		
662	Prior to the meeting, the Contractor shall update the installation schedule based on the construction schedule and all changes shall be identified.		

Functional Requirements			
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663	The Contractor shall prepare and distribute a meeting agenda at least forty-eight (48) hours prior to the scheduled meeting. The meeting agenda shall consist of those items pertaining to the installation and schedule for the previous and current week's installation efforts and for an agreed to "look ahead" period.		
664	It is the Contractor's responsibility to make sure all issues that arose during the installation activity for the week are addressed and resolved or is scheduled for resolution.		
665	At these meetings, the Contractor shall also be prepared to address any issues or questions raised by the civil designer, civil Contractor, other Contractors, and the Commission or its representative.		
666	The Contractor shall document the meeting discussions and distribute the meeting minutes to the team. The Contractor shall also record and maintain an action items list that tracks all installation related issues.		
4.3.1	**Construction Coordination with Infrastructure Contractors**		
	The Contractor shall coordinate all installation activities with the civil Contractors on new cashless tolling facilities to ensure all Cashless Tolling System Equipment specifications are addressed in the Design and installation of the cashless tolling infrastructure. *Attachment 2: Cashless Tolling Installation Responsibility Matrix* defines the areas of responsibility for the parties involved in the Project Design and construction for new cashless tolling facilities.		
667	The Commission (or its civil Contractor) is responsible for the construction of the overhead structures/toll gantries, installation of the toll equipment building and provision of the generators for the new tolling point, and the Contractor shall coordinate closely with the Commission, and the Commission Contractors.		
668	The Contractor shall participate in the Design and installation of the cashless tolling infrastructure at the tolling points, including but not limited to:		
	· provide all required Design and installation drawings, operating requirements and installation specifications to the Commission and the civil Contractors for all toll system Equipment provided;		
	· support and supply all information requested by the civil Contractor and civil designer in the form of request for information (RFI);		
	· review all civil Contractor provided drawings with respect to the toll system;		
	· approve all aspects of such drawings related to the toll system, and		
	· ensure the Cashless Tolling System infrastructure needs necessary to meet the requirements set forth in this Scope of Work are met with regard to such Design.		
669	The Contractor shall be responsible for ensuring that the locations, positions, installation, connections and other elements of the Contractor inputs identified on the Design and installation drawings provided by the Contractor, for all Contractor and Commission provided Equipment, whether in-roadway, structure/toll gantry mounted, in the toll equipment building or otherwise located are accurate and correct.		
670	Contractor shall also ensure that the installed roadway; infrastructure; structures/toll gantries; toll equipment building; UPS, and generators meet the Design requirements provided by the Contractor and shall approve such installed work with regard to the Design provided.		
671	Contractor shall cooperate with the Commission and infrastructure contactors to minimize required number of lane closures and to maximize the use of other scheduled lane closures. The Contractor shall transmit all lane closure requests to the Commission for approval.		
672	Contractor shall work with the Commission and agree to a reasonable plan for scheduling and approving lane closures, including a procedure for advance notice of cancellations of lane closures and allowable conditions for such cancellations as described in this Scope of Work. The civil Contractor is responsible for administering all lane closures and traffic controls during the installation phase and for all testing through Acceptance.		
4.3.2	**Construction Coordination with Civil Contractor**		
673	The Contractor shall coordinate all installation activities with the civil designers and civil contractors. *Attachment 2: Cashless Tolling Installation Responsibility Matrix* defines the areas of responsibility for the parties involved in the Project Design and installation on the cashless tolling facilities.		
4.4	**Installation Requirements**		
674	The Contractor shall be responsible for procurement, installation, cabling, termination configuration, testing, and check-off of all Equipment and Software required to meet the requirements of the Contract.		
675	The Contractor shall install all appropriate In-lane System servers and Equipment required by the Cashless Tolling System in the toll equipment building provided by the Commission through a third party.		
676	Procurement, installation, configuration, and testing of all local area communications Equipment and connection to the Commission installed network equipment in the toll equipment building shall be the responsibility of the Contractor as further set forth in this Scope of Work.		

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677	Procurement, installation, configuration, and testing of all appropriate Cashless Toll Concentrator or Toll Host System servers (if provided) , Equipment and Software required by the Cashless Toll Concentrator or Toll Host System at the primary and secondary locations and validating communications to its interfacing systems shall be the responsibility of the Contractor as further set forth in this Scope of Work.		
4.5	**Compliance to Standards**		
	The Contractor shall adhere to all installation standards, applicable laws, ordinances and codes as required.		
678	The Contractor shall meet all electrical codes, traffic control, seismic considerations, calibration, configuration, and environmental requirements of and including, but not limited to:		
	· Equipment manufacturer's;		
	· NEC;		
	· UL standards;		
	· PTC;		
	· PennDOT;		
	· FHWA;		
	· IEEE (Institute of Electrical and Electronics Engineers);		
	· OSHA requirements, and		
	· any local authorities having jurisdiction.		
679	The Contractor shall adhere to all specifications of the latest Commission Standard Specifications at time of construction unless the Contractor receives written notification by the Commission which overrides the Standard Specifications. Commission Standard Specifications are located at: https://ebs.paturnpike.com/generalinformation/documents		
680	The Contractor shall be responsible for all costs associated with any permits, plan reviews, and inspections related to toll system work.		
681	It shall also be the Contractor's responsibility to procure all documentation required to install and adhere to the proper installation standards, law, ordinance, or codes.		
682	The Contractor shall procure Services of Subcontractors qualified to work in this industry. If a vendor's component requires a vendor Approved installer, the Contractor shall use an Approved component installer, including qualified vendor staff.		
4.6	**In-lane System Installation Requirements**		
683	The Contractor shall supply all personnel, tools, vehicles, materials and Equipment required to perform the complete installation of the Cashless Tolling System, including but not limited to all Equipment and vehicles required for overhead installation Work on the overhead structures/toll gantries; specialty Equipment for preparation and saw-cutting of loops as required, and provide necessary test vehicles to adequately test the installed System in accordance with the Approved test plan.		
684	Where the Contractor is providing subsystem components manufactured by a third party vendor, the Contractor shall ensure that all such components are installed in accordance with manufacturer's installation guidelines. Third-party onsite services shall be obtained as applicable to install, configure and tune the first on-site installation.		
685	The Contractor shall provide onsite and remote support for such subsystem manufacturer components as necessary to ensure the proper installation and operation of its Equipment at no additional cost to the Commission. All third party Equipment and subsystems shall be certified by the manufacturer as being compliant with their installation guidelines and meeting Contract requirements.		
	The installation responsibilities for the Cashless Tolling System shall include but not be limited to:		
	· Furnish and install uninterruptable power to all Cashless Tolling System Equipment on the overhead structures/toll gantries and in the toll equipment building. UPS and generator will be provided by the Commission.		
	· Furnish and install all connecting conduit from wire ways and conduits provided and installed by others and/or stub conduits to the Equipment. The civil Contractor(s) will install the conduits from the toll equipment building to the demarcation point on the overhead structures/toll gantries as shown in *Attachment 6: Installation Demarcation Diagram* .		
	· Furnish and install separate ground wires for the Cashless Tolling System, surge protection devices (SPD), junction boxes, pull boxes, conduits, and other such items as required by the installation standards and requirements. All exposed junction boxes, pull boxes and other Hardware shall be either zinc coated and epoxy painted or stainless steel;		

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686	· Furnish and install all wiring for all in-lane Equipment and connections to the equipment racks in the toll equipment building. This includes the proper termination of all power, communication, and RF cables and/or wiring (copper or fiber optic) required to connect the individual components into a fully operational System as specified by the manufacturer.		
	· Furnish and install all Equipment racks required for the in-lane electronics in the toll equipment building.		
	· Furnish and install all AVI readers in the toll equipment building (if applicable) or at Approved Commission location.		
	· Furnish and install all zone controller computers (Hardware and Software) into the equipment racks and test it connection to the zone controller and the facility servers (if provided)/ Cashless Toll Host Systems.		
	· Furnish and install all electronics and other devices in their respective equipment racks as required to provide a fully operational System.		
	· Furnish and install all Equipment mounting brackets to support structures for the installation of all toll system Equipment on the mounting arms on the overhead structures/toll gantries.		
	· Furnish and install the AVC system Equipment, including in-pavement sensors and overhead mounted Equipment and controllers as specified by the manufacturer. Includes all the Commission Approved materials, Equipment and supplies required for saw-cutting, wiring and sealing of wires in the roadway.		
	· Install the AVI system Equipment, including antennas, readers, related Equipment, cables, and any support brackets required. All AVI mounting Hardware, junction boxes, and cables shall be procured and supplied by the Contractor.		
	· Synchronize the new Cashless Tolling System with existing AVI system, including the provision of required cables as needed.		
	· Furnish and install the LPICPS Equipment, including cameras, LPICPS illumination, and any video controller Equipment, sensors, Software, controllers/servers, or specialty Equipment associated with the LPICPS.		
	· Furnish and install facility servers (if required) in the equipment racks, including Software and test it connection to the zone controller and the Cashless Toll Host Systems.		
	· Validate all cable and wire terminations via a test process to ensure that the cable is connected to the correct location on each end and that the cable/wire is properly terminated.		
	· Power up and provide a field check out/installation acceptance test of all systems, to be witnessed and Approved by the Commission or its designated representative. Provide the completed installation checklist as described in Section III of this Scope of Work.		
	· Tuning and testing of the AVI system, as described in, and in full accordance with, manufacturer's guidelines.		
	· Calibration and testing of LPICPS in full accordance with manufacturer's guidelines and to meet the OCR/ALPR requirements specified in the Scope of Work (if the option to implement OCR/ALPR is exercised).		
	· Calibration and testing of AVC system in full accordance with manufacturer's guidelines.		
	· Installation, calibration and testing of the DVAS cameras and Equipment.		
	· Furnish and install all necessary toll system specific lighting fixtures and wiring on the gantries to the TEB as required to meet the requirements of the Contract.		
	· All other items, materials, and Equipment to complete installation in accordance with the Contract.		
4.7	**Cashless Toll Concentrator or Toll Host System Installation Requirements (if provided)**		
687	The Contractor shall coordinate all Cashless Toll Concentrator or Toll Host System installations and testing of the WAN and interfaces to the existing systems with the Commission and existing system integrator.		
688	The Contractor shall install all Cashless Toll Concentrator or Toll Host Systems, including primary and secondary concentrator or host servers and central image servers (if provided) at the primary and secondary locations specified in the Scope of Work and Approved by the Commission.		
689	All servers, storage devices, communications Equipment, and other Cashless Toll Concentrator or Toll Host System Hardware shall be installed in the designated locations as prescribed in the drawings submitted by the Contractor and Approved by the Commission.		
	The Contractor is responsible for the following activities, including but not limited to:		
	· furnish, install, configure and test the necessary servers in accordance with the Approved Design documents;		
	· furnish, install and test the storage units and backup devices;		
	· furnish, install and test the network Equipment at the primary and secondary Cashless Toll Concentrator or Toll Host locations;		
	· validate communications to the Commission installed network equipment at the toll equipment building;		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	**Comments**
No.	**Requirements**	**Existing (E) - Met by current system, no modifications required** **Modification (M) - Modifications needed to meet requirement** **Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs** **To Be Developed (D) - Not in current system, but will be developed** **Not Provided (N**) - Will not be provided - requires explanation**	**If "Status of Functionality = N" then Proposer must provide an Explanation in this Column**
690	· establish and validate communications from the Cashless Toll Concentrator or Toll Host System (central servers and image servers) to each of the tolling points at the toll equipment building;		
	· establish and validate communications from the Cashless Toll Concentrator or Toll Host System (central servers and image servers) to the existing CSC/VPC system;		
	· establish and validate communications from the Cashless Toll Concentrator or Toll Host System to the existing PTC Toll Host system;		
	· furnish, install and validate third-party Software and Contractor Software on all servers and Equipment required to support the Cashless Toll Concentrator or Toll Host System;		
	· furnish, install, configure and test all servers and Equipment for correct point-to-point installation, proper connectivity, acceptable termination of all cables and successful communications linkage;		
	· Configure the Cashless Toll Concentrator or Toll Host System to support interfaces as defined in the Approved ICDs and		
	· All other items, materials, Equipment and Software required to complete installation of a fully functional Cashless Toll Concentrator or Toll Host System in accordance with the Contract.		
4.8	**Installation Checklist**		
691	The Contractor shall develop an installation checklist that tracks the progress and completion of all installation activities for the Cashless Tolling In-lane System installation and the primary and secondary Cashless Toll Concentrator or Toll Host System facilities installation.		
692	The checklist shall be the document detailing those items required for the installation crew and technical team to complete the installation process for all Equipment and components, including terminations, connections and configurations.		
693	A copy of the checklist signed and Approved by the Contractor, attesting to the completeness of the installation, shall be provided to the Commission after the completion of the installation activities for each lane at each tolling point.		
694	The Contractor shall conduct a final inspection of all installations and certify the installation Work.		
695	The Commission reserves the right to obtain the services of the Facilities Department to witness the Contractor inspection and conduct an independent inspection. The Contractor shall coordinate and support such inspections at each facility.		
696	The checklist shall identify all discrepancies and exceptions and Contractor shall be responsible for all corrections.		
697	The checklist shall document all changes identified during the installation process and all such changes shall be Approved by the Commission or its designated representative.		
4.9	**Electrical Work**		
698	Electrical Work to be performed under this Contract shall include, but not be limited to the following general items of Work:		
	· Provide and install surge protection devices as required to protect the Cashless Tolling System Equipment and electronics.		
	· Install junction boxes and terminate new cable and conduit attachment devices, where applicable.		
	· Bond all conduits, manhole frames, metallic junction boxes, and other conductive items to the grounding system in conformance with the Commission and PennDOT Standard Specifications, the NEC and other authorities that have jurisdiction.		
699	All electrical Work shall be performed in accordance with the applicable regulations and Approved by the Commission and other authorities having jurisdiction. Appropriate NEC compliance shall be adhered to with all electrical articles for installation pertaining to wiring, enclosures, and other electrical Equipment in hazardous locations. UL labels shall be provided for all electrical panel boards, enclosures, and accessories.		
700	All electrical Equipment must be inspected prior to installation for defects that could damage the Equipment or harm personnel. Any Equipment found to have defects shall not be installed but shall instead be replaced with a fully functioning replacement.		
701	All electrical Equipment shall be properly grounded for safety. Equipment shall be furnished with grounding pads or grounding lugs. All ground connections shall be cleaned immediately prior to connection.		
702	The Contractor shall provide all grounding material required for installation and all installations shall be in compliance with the applicable standards.		
4.10	**Lane Closure and Traffic Control Requirements and Conditions**		

Functional Requirements			
		Required Proposer Inputs	
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703	The Contractor shall provide all MPT activities associated with completing Contractor Work during the Implementation Phase. All lane closures shall be coordinated with the PTC and civil contractor and lane closure schedules shall be submitted to the Commission in advance for Approval.		
704	In-lane Cashless Tolling Equipment installation and MPT activities shall be scheduled to occur within the allowable working hours outside of any holiday or event periods. The 2018 allowable working hours and holiday restrictions can be found in Attachment 15: Lane Closure and MPT Provisions. Allowable working hours and holiday restrictions are subject to change and Contractor shall be responsible for monitoring new releases of all standards/policies to assure their work schedule aligns with the most recent PTC requirements.		
705	The Contractor shall maintain a minimum number of open lanes during all MPT activities as defined in the latest PTC lane charts within the allowable working hours. The Contractor shall request the latest lane charts from the PTC.		
706	Contractor shall provide the PTC representative the information required in the “Construction Daily Lane Closure Report” shown in Attachment 15: Lane Closure and MPT Provisions. The information required for completion of this form should be submitted to the PTC representative a minimum of three (3) days prior to the planned lane closure.		
707	The Contractor shall follow the requirements as stipulated in the latest applicable Commission’s Maintenance and Protection of Traffic Standard Drawings, as provided at https://www.paturnpike.com/business/engineering_standards.aspx. Contractor shall follow the requirements as stipulated in CS 901 and the MPT Standard Special Provision, provided in their current form in Attachment 15: Lane Closure and MPT Provisions. Contractor shall be responsible for monitoring new releases of all standards/policies and assure their work complies with the most recent versions available.		
708	Any Work involving removal/relocation of Equipment (loosening or removal of nuts/screws, cables, connectors etc.) shall be done with appropriate lane closures in coordination with the latest PTC traffic requirements.		
709	This requirement intentionally left blank.		
710	This requirement intentionally left blank.		
4.11	**Contingency Plan**		
711	A detailed contingency plan shall be prepared for reopening closures to public traffic. A general contingency plan shall be included in the Installation Plan; however, a site specific contingency plan shall be submitted to the Commission before Work at the job site begins.		
4.12	**Work Standards and Requirements**		
712	The Cashless Tolling System Equipment installation shall be performed to an Approved set of plans, which has previously been submitted and Approved by the Commission or their designated representative.		
713	The Contractor shall provide Project management and oversight of all Work performed. At all times when installation Work is taking place, the Contractor shall have an individual designated in the Organization Chart as Site Manager onsite to supervise the installation.		
714	The Contractor shall install the Cashless Tolling System Equipment to the highest standards, using experienced and knowledgeable personnel. For example, journeyman electricians shall terminate all cables, wiring, or fiber optic cables.		
715	All tools such as crimpers, fiber optic termination tools, and test Equipment shall have been properly calibrated prior to being used.		
716	The Contractor shall provide a safe environment for the installation process in accordance with all applicable local, State and federal requirements, as well as any Commission policies. Examples include but are not limited to the following:		
	· safety harnesses shall be included and employed on all lifts, and the personnel trained on their use;		
	· hard hats and safety vest shall be worn in all construction areas;		
	· safety toe shoes shall be worn in construction areas and around active roadways while performing installation processes;		
	· Contractor issued identification badges shall be worn at all times, and		
	· regular safety meetings shall be scheduled to review safety procedures.		
4.13	**Design and Documentation during Construction and Installation**		
4.13.1	**Engineering Design**		

Functional Requirements			
		Required Proposer Inputs	
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717	The Contractor shall secure the services of a fully-qualified engineering design firm(s) for the purpose of performing all infrastructure related engineering Design (civil, structural, electrical, mechanical, and architectural) and the preparation of related plans and documentation under the Contract.		
718	All Design Work shall be performed under the direct supervision of a Licensed Engineer of the appropriate discipline in the State of Pennsylvania. All design professionals shall be licensed and authorized to practice in the State of Pennsylvania.		
719	If the Engineering Design effort is performed by the Contractor, the Contractor shall submit documentation showing that the Contractor has met the required qualifications described in this section.		
4.13.2	**Document Control**		
720	The Contractor shall maintain a Configuration Management System to control all Project-related documents and drawings. Each document shall be properly titled, date updated, numbered by revision and version and shall incorporate signature blocks for authorship and approvals. Only the latest Approved drawing version may be used for installation.		
721	All documentation regarding the lane Equipment and Cashless Toll Host System Equipment installation shall be maintained by the Contractor. All drawings and other such documentation shall be made accessible to the Commission for review.		
722	The Contractor shall maintain all non-conformance reports (NCR) submitted by the inspectors and document the correction and resolution of all issues identified.		
4.13.3	**Installation Design and Drawings**		
723	The Cashless Tolling System Equipment shall be installed on existing infrastructure or overhead structures/toll gantries that will be designed and constructed by others separately procured by the Commission.		
724	The Contractor shall provide the installation requirements including acceptable tolerances for the Cashless Tolling System Equipment, including all related plans and documents. The civil designer and civil Contractors shall rely on the installation requirements provided by the Contractor to design and construct the overhead structures/toll gantries for the Cashless Tolling System Equipment to function as intended, and Contactor shall be fully responsible for the accuracy of its installation requirements.		
725	The installation requirements provided by Contractor shall be consistent with those provided in Contractor's Proposal and shall accommodate the selected design from the samples provided in *Attachment 5: Concept Plan for Overhead Structures/Toll Gantries* .		
726	The Contractor shall certify the installation requirements provided as accurate and appropriate for its intended purpose to the satisfaction and Approval of the Commission.		
727	Contractor shall indemnify all related parties as more fully described in the Terms and Conditions for any damages that result from reliance on the installation requirements provided by Contractor.		
728	The Contractor shall submit shop drawings detailing the installation Design that shall be used onsite for installation Work. Detailed drawings shall be provided for each site where Equipment procured and supplied under the Contact shall be installed.		
729	The Contractor shall submit the following Design drawings as part of the drawing package in accordance with the Commission submission requirements, including but not limited to:.		
	· detailed installation drawing for each piece of Equipment;		
	· detailed drawing showing the equipment mounting brackets and details of their installation to the mounting arm;		
	· details related to the range of Equipment adjustments;		
	· detailed electrical schematics;		
	· all junction boxes and panels;		
	· detailed equipment rack layout and interconnections drawings;		
	· detailed communications layout;		
	· power and communications cabling schedules, and		
	· pavement installation details for in-pavement sensor installations.		
730	During installation the Contactor shall maintain a red line version of the drawing package that is submitted to the Commission upon the completion of the installation.		
731	Documentation shall include memos denoting changes or modification to requirements.		
732	The Contractor shall submit detailed component level network drawings showing all WAN, LAN and VLAN connections, including connection to the existing PTC Toll Host system and the existing CSC/VPC system.		

Functional Requirements			
		Required Proposer Inputs	
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733	Contractor shall utilize a predefined range of IP addresses provided by the Commission. An IP schematic shall be submitted and Approved by Commission IT Security that shows all the IP addresses for all Contractor supplied Equipment on the network.		
734	The Contractor shall submit detailed component level primary and secondary server configuration instructions, including storage device mirroring, backup devices and configuration, and network configuration and testing.		
735	The Contractor shall submit detailed instructions on the installation of the operating system, database, third-party Software, and application Software on the servers.		
736	All testing required to verify successful installation and operation shall also be documented.		
4.13.4	**As-Built Drawings/Documents**		
737	The Contractor shall update the latest drawings with red-lines as changes are incorporated during the installation process. At the completion of the installation of the Cashless Tolling System, the Contractor shall gather all red line drawings.		
738	The red line drawings shall be verified and then incorporated into a final As-Built drawing package. This final As-Built package shall include installation drawings, shop drawings and sketches, and other drawing types that may have been used to install the Cashless Tolling System. The As-Built drawings shall include at a minimum power and data connections, installed equipment locations and electronic cabinet/panel layouts.		
739	All other documentation used regarding the installation shall be also be finalized and submitted as part of the As-Built submittal.		
740	The Contractor shall update and resubmit the latest as-built drawings should any substantial changes be made to the design during the Contract period.		
V	**Cashless Tolling SYSTEM PROJECT REQUIREMENTS**		
5.1	**Cashless Tolling System Project Management**		
	The Contractor shall employ a Project Management System that is sufficiently detailed to enable the Commission to review and confirm that the Contractor has the necessary management, staff, and controls in place to meet the requirements of the Contract.		
5.1.1	**Program Management Plan**		
	The Program Management Plan describes how the Contractor plans to implement and manage the Project, including staffing, scheduling and communication procedures for controlling all correspondence, submittals, and other communications between the Contractor and the Commission, and communications with the civil designer, civil Contractors, third-party entities and existing Contractors.		
741	The Program Management Plan shall at a minimum include the following elements:		
	· Project scope and key Deliverables;		
	· a description of the management and organization of the program, including an organization chart, identification of Key Team Members, their responsibilities and percentage commitment to the Project, tasks leads for each functional area and location and identification of the resources to be used in fulfilling the requirements of the Contract;		
	· Project team (Contractor, the Commission, Commission’s Representatives and existing Contractors) contact information;		
	· a description of the Project planning, documentation and reporting methods to be utilized, both for use within the Contractor’s staff and externally to the Commission and other entities;		
	· a description of the process for communication, escalation and resolution of Project issues with the Commission;		
	· meeting schedules for meetings with the Commission and other entities including the form of the meeting as part of the Communication Plan;		
	· the Approved Project schedule;		
	· a description of the process for reporting, updating and tracking the Project schedule and Project performance;		
	· coordination process with the civil designers, civil Contractors and management of the RFI process during the infrastructure design phase;		
	· coordination process with the civil designers, civil Contractors and management of the installation drawing review process;		

Functional Requirements

		Required Proposer Inputs	
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	· approach to change management, consistent with Contract requirements, including a description of the process for documenting and submitting change requests, the Approval process and how the change management approach will be integrated into day-to-day Project management;		
	· approach to document control, including Software (the Commission shall have the capability to download documents using this Software) and tools the Commission will use and have read-only access to via the Web;		
	· approach to risk management;		
	· approach to Quality Assurance and Quality Control;		
	· documenting the invoice submission, invoice backup information, verification, and Approval process;		
	· a section with all Approved Project forms including but not limited to, meeting agenda; meeting notes; action items tracking log; monthly progress report, and invoices.		
	· an emergency contact list as described further in the requirements below.		
742	The Contractor shall identify the tools and products used to manage the Project and the internal controls instituted by the Contractor to guarantee successful delivery of the Project.		
743	The Contractor shall develop and submit the Project Management Plan to the Commission for review and Approval.		
744	The Contractor shall develop and submit a separate Communications Plan to the Commission for review and Approval that addresses the following, including but not limited to:		
	· all correspondence shall identify the originator and designated receiver.		
	· Tracking of document versions and changes.		
	· All invoices shall be submitted with accompanying backup information as required by the Contract and consistent with the Commission processes and invoicing and auditing policies. The Contractor shall work with the Commission to develop the appropriate invoice and back-up materials as a part of the PMP development.		
	· All submittals shall be delivered as an enclosure to the Contractor's submittal letter. Each submittal letter shall be limited to a single subject or item. The Contractor's letter shall identify the Contract number, Contract name and subject of the submittal.		
	· All items of correspondence, invoices, submittals and documentation shall contain the Contract number and the designated Contract name.		
	· Process for validating that all comments provided by the Commission on Contractor deliverables are successfully addressed.		
5.1.2	**Contractor's Project Management Office**		
745	The Contractor shall establish a Project management office in the Harrisburg metropolitan area. All Project management activities shall be conducted from this office.		
746	The Project manager shall be assigned to the Project management office and shall be one hundred percent (100) percent dedicated to the Cashless Tolling Project for the Implementation Phase of the Contract.		
5.1.3	**Staffing and Key Team Members**		
747	The Contractor is responsible for maintaining and assigning a sufficient number of competent and qualified professionals who speak fluent English to meet the requirements of the Contract.		
748	The Contractor shall ensure Key Team Members are readily accessible to the Commission or their authorized representatives during the Contractor's performance of this Contract.		
749	Contractor is required to provide staff at all times sufficient to meet the Project Requirements and Contract. The following are designated as Key Team Members for this Project and are subject to the Approval, replacement and removal requirements of the Commission for Key Team Members as set forth in the Contract:		
	· Project Principal – responsible for the overall conduct and performance of the Project, oversight of the Project, the performance of the Project manager and the Commission's single point of contact for any escalated Project issues that cannot be resolved by the Project manager;		
	· Project Manager – responsible for all day-to-day Work, the overall execution and delivery of the Project and the day-to-day Contractor contact person on the Project;		
	· Deputy Project Manager – assists the Project manager in the execution and delivery of the Project and the day-to-day operations;		
	· Technical Manager, Lane Systems – responsible for management of all In-lane Systems technology resources including selection of the lane solutions, subsystems, Software development and Systems maintenance.		

Functional Requirements

No.	Requirements	Required Proposer Inputs	
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	· Technology Manager, Toll Concentrator/Host System – responsible for management of all technology resources related to the Toll Concentrator/Host System, including Software development, on-going Hardware/Software maintenance, Equipment and Systems and information security as required to satisfy the Requirements of the Contract;		
	· Installation Manager – responsible for the installation and Commissioning of the Cashless Tolling System;		
	· Quality Assurance Manager – responsible for consistent quality throughout the Design, Development, Testing and Implementation of the Cashless Tolling System through good Quality Assurance and Quality Control practices, and		
	· Test Manager – responsible for the overall planning and implementation of the Cashless Tolling System testing program.		
5.1.4	**Cooperation with Other Contractors and Providers**		
750	The Contractor shall cooperate to the fullest extent with the civil designers, civil Contractors, the Commission and existing Contractors to ensure the Cashless Tolling System Implementation and Maintenance Phase do not conflict with or cause any interruption in capability, service or safety issues to the traveling public or customers, or impede the Commission's ability to collect tolls.		
751	The Contractor shall cooperate with the civil designers, civil Contractors, existing Contractors and external parties, as directed by the Commission, to support any activity related to the implementation of cashless tolling, including but not limited to:		
	· the Commission employees;		
	· the Commission designated representatives;		
	· other third parties, as directed by the Commission;		
	· law enforcement;		
	· inspectors;		
	· Auditors, and		
	· all Contractors.		
752	The Contractor shall cooperate with and immediately notify the Commission of any customer complaints and system issues identified in the Commission lanes that come to Contractor's attention during the course of Implementation, Testing or Maintenance Phases.		
753	The Contractor shall provide and maintain a current emergency contact list for the Commission's use at all times for handling emergencies and escalations. The emergency contact list shall name primary and secondary (multiple secondary contacts as applicable) points of contact for each anticipated emergency type. The emergency contact list shall name the Contractor's preferred points of contact, in order of precedence and shall include, at a minimum, the Contractor's primary Project manager, deputy Project manager, installation manager, technology manager, and other support staff. The purpose of the emergency contact list is to ensure the Contractor can be reached outside normal working hours to address urgent matters.		
5.1.5	**Monthly Report and Progress Meeting During the Implementation Phase**		
	Monthly Project reports and progress meetings will enable the Commission and the Contractor to monitor the status, progress, and quality of the Work performed on the Project and to take proactive steps to ensure successful delivery of the Project.		
754	The Contractor shall provide and maintain a schedule for monthly progress meetings (in addition to the weekly Design/installation meetings during the active Design/installation periods) at a location designated by the Commission. The meeting shall be scheduled no later than the 20th day of the following month.		
755	No less than five (5) Business Days prior to the meeting, the Contractor shall submit a draft monthly progress report to the Commission for the period covering the previous reporting period. The Commission shall review and comment on the progress report prior to the meeting.		
756	The Contractor shall obtain updated installation status prior to the monthly meeting and include such updates in the Project Implementation schedule which shall be submitted with the monthly progress report.		
757	The format of the monthly progress report shall be agreed upon as one of the initial Project tasks upon notice to proceed (NTP) and shall be incorporated by the Contractor into the Program Management Plan.		
	The monthly progress report that includes but is not limited to:		
	· a summary outlining progress and status, and percentage of Work performed for each task as compared to planned activities in the Project Implementation schedule. Comments shall be included where appropriate. The summary shall also identify key milestones met and missed in the period;		

Functional Requirements			
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758	· an analysis of all critical path tasks, potential risks associated with the tasks and proposed contingency/work around plans to circumvent or mitigate delays to the Project;		
	· identification of any Approved changes to Approved milestone dates and Approved Project Implementation schedule, clearly noting the details and identifying the Contract amendment;		
	· a discussion of schedule compliance and an updated Project Implementation schedule showing current status against the baseline Approved Project Implementation schedule. Past due tasks shall be updated and actual dates shall be recorded for completed tasks;		
	· an updated action items list that tracks the status of all outstanding action items, activities and issues that need decision/resolution;		
	· an updated deliverables list showing submission dates, current version, current review status, responsible party and due date;		
	· a payment request, if applicable. Payment requests must identify the payment milestone, number and dollar amount. Payments requests shall be made for completed and Approved milestone payments only;		
	· a list of change requests (Contractor and Commission initiated) and their status;		
	· the previous monthly final meeting minutes, and		
	· a six (6) week look-ahead schedule.		
759	No more than five (5) Business Days after the meeting, the Contractor shall submit the final monthly progress report and draft meeting minutes for the Commission's review and Approval.		
5.1.6	**Project Meetings**		
760	In addition to the monthly progress meeting, weekly or bi-weekly Project status meetings, as applicable and Approved by the Commission, and other regularly scheduled installation and ad-hoc Project meetings shall be required during the course of the Project to address specific deliverables, Work items, Maintenance procedures and issues as they arise.		
761	The Contractor shall perform the following tasks related to all meetings, including but not limited to:		
	· develop and coordinate the Project meeting schedule;		
	· distribute notices of Project meetings in accordance with document control Requirements;		
	· prepare the agenda in coordination with the Commission;		
	· attend the meeting with all required staff in attendance;		
	· prepare minutes of the meeting and forward them to the Commission within five (5) Business Days after the day of the meeting and		
	· maintain an action item list for each type of meeting, identifying issues that need to be resolved at the Project level.		
5.1.7	**Project Schedule**		
	The Project schedule is a comprehensive list of Project milestones, activities and Deliverables, with intended start and finish dates, including a detailed Work Breakdown Structure (WBS) that identifies Project tasks down to the Work package level and the activities required to complete the Work package Deliverables.		
762	The Contractor shall provide and maintain a detailed Project Implementation schedule for the Project in Microsoft Project format (Project 2016 or above) that lists all Project activities and tasks for all Phases of the Project, including but not limited to:		
	· Requirements;		
	· Design;		
	· development;		
	· testing;		
	· installation;		
	· Transition, and		
	· deployment of the Cashless Tolling System at the various facilities.		
763	The Project Implementation schedule shall include coordination with civil Contractor, existing Contractors and the Commission and shall clearly document all interfacing tasks.		
764	The Project Implementation schedule shall identify all milestones and tasks, starting with the NTP through the date of Acceptance and end of Warranty for each implementation location of the Project.		
765	The Project Implementation schedule shall be resource loaded, and shall include all draft submissions and review cycles, and all tasks required of the Commission and other Contractors with critical tasks.		
766	The Project Implementation schedule shall identify all critical path tasks and shall be used to manage the Project.		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	Comments
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767	The Project Implementation schedule shall include all tasks for the submission and approval of the final civil drawings identifying the locations of all toll equipment to be install in a toll zone within 60 days of NTP.		
768	The Project Implementation schedule shall identify the anticipated Go-Live date of March 31, 2020 for the conversion of Clarks Summit.		
769	The baseline for the Project Implementation schedule shall be submitted to the Commission for Approval within fifteen (15) Business Days after NTP.		
770	The Contractor shall update the Project Implementation schedule on a monthly basis, as identified in the Requirements for the Monthly progress report.		
771	The Contractor shall use the Project Implementation schedule as the basis for all subsequent schedules and updates throughout the duration of the Project.		
772	The Contractor shall obtain Approval from the Commission for any and all changes to the baseline Project Implementation schedule and associated milestones in accordance with the Contract process for changes and amendments and are not considered Approved unless an amendment is executed through the Contract.		
5.2	**End of Contract Transition**		
	The Contractor acknowledges that the Services it provides under the terms of the Contract are vital to the successful operation of the System and that said Services shall be continued without interruption. Upon termination of the Contract, a successor (the Commission or a new service provider) may be responsible for providing these Services. The Contractor agrees to exercise its best efforts and cooperation to affect an orderly and efficient transition to a successor.		
773	Upon the Commission's written notice, the Contractor shall furnish transition Services during the last ninety (90) days of the term of the Contract. The Contractor shall develop with the successor Contractor or the Commission staff, a Contract Transition Plan describing the nature and extent of transition Services required.		
774	The Contract Transition Plan and dates for transferring responsibilities for each division of Work shall be submitted within thirty (30) days of such notice. Upon completion of the Commission review, both parties will meet and resolve any additional requirements/differences.		
775	The Contractor shall provide sufficient experienced lane and Software support personnel in each division of Work during the entire transition period to ensure that the quality of Services are maintained at the levels required by this Contract.		
776	The Contractor shall provide sufficient staff to help the successor maintain the continuity and consistency of the Services required by the Contract. The Contractor shall allow the successor to conduct onsite interviews with the employees.		
777	The Contractor shall provide the necessary Software and Systems support Services to assist the successor operator in setting up the systems, transfer of appropriate licenses and third-party Software, and transition of all host data required to sustain uninterrupted service.		
5.3	**Software Design and Development Requirements**		
	The Commission expects the Contractor to propose a baseline product for the lane solution and the Cashless Toll Concentrator or Toll Host System, and that some custom development will be required. To ensure the Design Requirements for the Cashless Tolling System are fully understood by the Commission and the Contractor, a series of Requirements and Design review steps are specified following a sequential Design process or waterfall model. The Contractor shall work with the Commission and its representatives to produce a Conformed Scope of Work and Requirements Document (CSWRD). The CSWRD shall be the basis for the Contractor to produce a Requirements Traceability Matrix (RTM). The RTM allows for verification that the Requirements are addressed in the Design and documented in the System Detailed Design Document (SDDD) and traced to test procedures that validate the developed Cashless Tolling System meets the Contract Requirements. The RTM shall be the basis for all Design, development and testing efforts and documentation to be developed by the Contractor.		
778	The Contractor shall establish and maintain an effective Software Design and development program along with a documented Software Development Life Cycle (SDLC) to ensure compliance with the Requirements of the Contract.		
779	The Contractor shall employ effective techniques and methodologies to develop the System Requirements and Business Rules for the Project.		
780	Prior to conducting any workshops, requirements reviews, focus group meetings and Design reviews, the Contractor shall develop the necessary documentation for the Commission review and submit such documentation ten (10) working days prior to such meetings.		

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781	The Contractor shall provide a Table of Contents for the Design document that identifies the required document Deliverables and any document templates that will be used to develop the documentation. Such documentation shall be tailored for the Project, and the CSWRD shall be used for developing such documentation.		
5.3.1	**System Requirements Review (SRR)**		
	The Contractor shall conduct a series of System Requirements Review meetings with the Commission to outline how the Contract requirements will be met. The outcome of these meetings shall be a Requirements Traceability Matrix (RTM) that will be used to validate each Requirement against a Design item(s), Design Documentation and testing procedure(s).		
782	The Contractor shall conduct a series of System requirements reviews with user groups to identify user needs.		
783	The Contractor shall present lane logic and transaction framing rules of the baseline solution. Transaction framing logic shall be further demonstrated according to the workshops described in section 5.3.4.		
784	Contractor's existing screens and presentation formats shall be used to solicit user requirements and feedback.		
785	During the System requirements review phase the Contractor can also present the Contractor's standard product to the Commission, and use the feedback obtained in the presentation in the development of the System Requirements Document.		
5.3.2	**Business Rules Development**		
786	The Contractor shall conduct Business Rules development workshops with the Commission to develop and document the Business Rules and operational policies for the In-lane Cashless Tolling Systems and the Cashless Toll Concentrator or Toll Host (if provided) System.		
787	The Business Rules workshops can occur concurrent to the System requirements reviews.		
788	The Contractor shall provide Business Rules utilized at other cashless tolling facilities; however, they shall be tailored to meet the Commission's requirements and shall comply with the Scope of Work.		
789	The Contractor shall track the design, development and testing of the Business Rules through the RTM.		
5.3.3	**Interface Development Workshops**		
	The Contractor shall conduct a series of workshops with the Commission to facilitate the development of the Interface Control Documents (ICD) between the Contractors Cashless Tolling Systems and the existing PTC Toll Host ands CSC/VPC.		
790	The Contractor shall conduct interface control document (ICD) development workshops with the Commission to develop and document the Cashless Tolling Systems interface requirements between the Cashless Toll Systems and the existing PTC systems.		
791	The ICD workshops shall be scheduled within 60 days of NTP and are anticipated to require a minimum of 2 weeks of design.		
792	The ICD workshops can occur concurrent to the System requirements reviews.		
793	Subject matter experts must provide a means for explaining each interface, its intended purpose, data fields and components and data integrity validation.		
794	The interface requirements shall include the following data feeds that include but are not limited to:		
	· transaction data file(s) naming conventions and data format requirements for transaction files transmitted from the Cashless Tolling Systems to the existing PTC Toll Host.		
	· Image file naming requirements		
	· Detailed image file TAG (.tag) file naming conventions and data formats to the CSC/VPC		
	· Transponder status list data file naming conventions and data file formats from the existing PTC Toll Host to the Cashless Tolling Systems.		
	· interface with SAP for the transmission of monthly toll transaction GL files and GL files received from the CSC (if full Host option exercised).		
5.3.4	**Transaction Framing and Building Logic Workshops**		
	The Contractor shall conduct a series of workshops with the Commission to present the transaction building and framing process logic. The purpose of the workshops is to provide the PTC with a transparent understanding of the Contractors logic for building and framing transactions.		
795	The Contractor shall conduct transaction building workshops with the Commission to walk-thru the logic of building a transaction in the lane.		
796	The transaction building workshops shall be scheduled within 60 days of NTP and are anticipated to require 2 weeks of review.		
797	The transaction building workshops can occur concurrent to the System requirements reviews.		

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798	Subject matter experts must provide a means for explaining how data from each lane device or subsystem is used in the framing logic and transaction building process for each vehicle.		
799	The transaction building walk-thru shall provide at a minimum but not limited to the following:		
	· Flow charts and timing diagrams to show how sensor information is associated with a vehicle.		
	· Transponder association and rules for assigning transponders to a vehicle including possible early reads, late reads and cross lane reads. Transponder association shall also include vehicles that have multiple transponders.		
	· Logic for determining vehicle classification as defined in *Attachment 4A - PTC Proposed AVC Class Structure and Silhouette* .		
	· Logic for LPICS image triggering and corresponding image association to vehicles.		
	· Straddle logic for processing vehicles that may straddle between lanes including shoulders.		
	· Degraded mode logic to describe the behavior, impacts and limitations on the transaction framing logic.		
5.3.5	**System Detailed Design Review**		
	Based on the RTM and Business Rules documents, the Contractor will Design the Cashless Tolling System and submit a preliminary Design document for the Commission to review and provide comments. The Contractor will then conduct a series of Design meetings with the Commission to address the comments and to create the System Detailed Design Document (SDDD), defining how the System Design will meet the Contract Requirements. Upon the submittal of an updated SDDD another review cycle will take place.		
800	The Business Rules document and the RTM shall be used to develop the System Design and the SDDD.		
801	The Contractor shall schedule Design meetings with the Commission to fully understand the Design Requirements.		
802	The Contractor shall support a phased Design process to support the multi-year implementation of the Cashless Tolling System on the Commission facilities. The Design process shall accommodate for the changes in technology that is inevitable given the duration of the Project.		
803	The Contractor shall demonstrate pre-production working products (such as, beta versions) during the Design review process, and stakeholders shall be walked through the workflow, utilizing screens and data flow diagrams.		
804	The Contractor shall explain how the System Design meets the RTM, the Business Rules and the Contract requirements.		
805	The Contractor shall conduct as many meetings and submission review cycles as deemed necessary by the Commission to address all Design issues to the Commission's satisfaction.		
5.3.6	**Reports Design Workshops**		
	The Contractor will conduct a series of workshops with the Commission to facilitate the Design of the Cashless Tolling System reports.		
806	The Contractor shall employ an effective and productive methodology for Designing and finalizing the reports for the Project.		
807	The reports Design process shall be iterative and the Contractor shall conduct multiple workshops with the Commission's stakeholders, and Contractor shall bring subject matter experts to the meeting.		
808	Subject matter experts must provide a means for explaining each report, its intended purpose, columns, fields and components and its connection with other reconciling and validating reports.		
809	Report templates from existing operational systems shall be submitted and changes to meet the PTC Cashless Tolling System requirements shall be noted. Sample reports shall have correct and accurate data and shall reconcile across other reports.		
810	Upon receiving feedback from the stakeholder, the Contractor shall develop/modify the reports and resubmit the updated reports for review.		
811	The modified and new reports shall be demonstrated to the Commission using accurate and reconciled data. Reports that are expected to reconcile to one another shall be demonstrated together.		
812	The iterative series of workshops and demonstrations shall continue until baseline reports are Approved by the Commission.		
813	The Approved baseline reports shall be used as the basis for the Design document.		
5.3.7	**Software Walkthrough**		
	The intent of the Software walkthrough is to provide an overall status on the Contractor's Software development progress to ensure the Contractor is on track to deliver the Project on schedule and to obtain the Commission's feedback on the direction of the development prior to the full rollout of the Software.		
814	The Contractor shall conduct a series of Software walkthroughs including product demonstrations to solicit input from the Commission during the development of the Cashless Tolling System.		

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815	Prior to the Software walkthrough, the Contractor shall develop and submit the use cases that will be demonstrated to the Commission for review and Approval. The walkthrough shall follow the process flow and emulate normal operations.		
816	The product shall be demonstrated in a test environment that allows data to flow as it will in the final integrated System.		
817	The Software walkthrough shall demonstrate to the Commission that the developed Software product meets the technical and functional Requirements of the Contract.		
818	Comments and feedback provided during the Software walkthrough shall be documented and resolved by the Contractor and the resolution shall be Approved by the Commission.		
819	The Contractor shall be responsible for identifying and correcting any Software issues or defects in its Design or product that impact the Contractor's ability to deliver the Cashless Tolling System that meets the Contract requirements. This shall apply to issues or defects found during or after Software walkthrough or in the subsequent testing and Implementation. Any such changes shall be Approved by the Commission in writing.		
5.4	**Documentation**		
	The Contractor is required to provide various Hardware; Software; Requirements; Business Rules; Design; testing; installation, and Maintenance documentation that include Contractor-developed documentation and third-party documentation. All documentation provided under this Contract shall be specific and relevant to the system proposed to the PTC and void of extraneous information outside what is required and shall meet the requirements described below. All documentation provided shall minimize system generalities and not include system functionality that is not relevant to the PTC Cashless Tolling System(s).		
820	The Contractor shall provide and maintain an online, electronic document management system in a central location that is accessible to the Commission by username and password, to control all Project-related documents, submissions and drawings in accordance with the Commission ECO process as defined in *Attachment 12: ETC System Change Control Procedures V1.6* (or the latest Approved version per PTC) for the term of the Contract.		
821	The electronic document management system shall be indexed and searchable.		
822	All Project documents submitted under this Contract shall be available to the Commission using the online, electronic document management system provided by the Contractor at all times.		
823	The Contractor shall maintain a deliverable tracking list that accurately tracks all Contractor submissions; the Commission's comments review documents; resubmissions and final Approval.		
824	Each document shall be properly titled, date updated, numbered by revision and version, and shall incorporate signature blocks for authorship and Approvals. The Contractor shall provide a logical indexing system for ease of access for the Commission to locate documents in the electronic document management system.		
825	Updated submissions of the document shall also include the red-lined version showing all revisions to the document since the last submission.		
826	The Contractor shall utilize acceptable standards agreed upon by the Contractor and the Commission when updating documents and submitting revisions.		
827	All documentation submitted by the Contractor under this Contract shall be accurate and comply with Contract requirements. All deliverables shall be submitted in accordance with the Approved Project schedule.		
828	A Table of Contents, for all documentation that requires one, shall be submitted by the Contractor to the Commission for review and comment prior to the submission of the preliminary draft.		
829	The Contractor shall submit a minimum of: a preliminary draft, a final draft and a one hundred (100) percent final to the Commission for review and comment. All final documents shall incorporate all the Commission's review comments to the Commission's satisfaction. Each subsequent submission of a deliverable shall also include the Commission's comments review log with the resolution of each comment updated by the Contractor.		
830	The Commission shall have the right to require additional interim drafts from the Contractor at no additional cost should the draft documentation submitted not be of adequate quality, have missing or incorrect information or if it does not satisfactorily address the Commission's review comments.		

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831	The Commission shall review and Approve all documents submitted under the Contract. For documents containing less than one hundred (100) pages, the Commission will review and provide comment on preliminary draft documents within ten (10) Business Days. For documents containing more than one hundred (100) pages, the Commission will review and provide comment on preliminary draft documents within fifteen (15) Business Days. The Commission will review and provide comment on all final draft and final documents within ten (10) Business Days. When multiple documents are submitted to the Commission simultaneously, or within one week of each other, the number of Business Days required for review shall be adjusted to reflect the overlapping submissions.		
832	The Commission will provide the Contractor with written comments on all submitted documents, and the Contractor shall respond in writing to all comments. A meeting may be conducted to clarify and resolve any remaining questions and issues concerning the comments and responses provided. The Contractor shall prepare a revised version of the document for Approval by the Commission.		
833	The Contractor shall submit the electronic version of all Contractor developed documentation for the Commission review and Approval. Acceptable electronic formats are Microsoft Office 2016 Suite (or higher), unsecured Portable Document Format (PDF) and professional CAD applications for Contractor-prepared documentation.		
834	The Contractor shall update documentation as changes occur through the Implementation Phase (and the Maintenance Phase) and shall maintain a document submittals list on the electronic document management site identifying all versions of documents, the date submitted, the nature of changes and provide relevant updates to the Commission as they are published.		
835	The documentation package for all submittals as applicable shall include all required electronic media to install, operate and maintain the System/Deliverable/document being supplied.		
5.4.1	**Requirements Traceability Matrix (RTM)**		
836	Upon completion of the Requirements and Business Rules review process the Contractor shall deliver a Requirements Traceability Matrix (RTM) that details all the technical and functional Requirements for the Cashless Tolling System.		
837	The RTM shall build on the specifications documented in the CSWRD and shall capture all user needs identified during the Requirements Business Rules review process.		
838	Upon Approval of the RTM, this document shall be the basis for functional verification Design, development and testing.		
839	During the Design and development of the Software, the Contractor shall update the RTM to reflect any changes to the Requirements that have been Approved by the Commission.		
840	During Design and testing, the RTM shall be used to verify the System compliance to the Contract requirements and test procedures.		
841	All changes to the System requirements during the course of the Project shall be tracked through the RTM.		
842	The RTM shall include:		
	· listing and categorization of all functional requirements;		
	· listing and categorization of all Software related technical requirements;		
	· identification of the source of all requirements;		
	· identification of the Design section of the SDDD that addresses the Requirement and		
	· identification of the test procedure that addresses the Requirement.		
5.4.2	**Business Rules Document**		
	As an outcome of the Business Rules workshops and review meetings, the Contractor will provide a Business Rules Document.		
843	The Contractor shall submit a Business Rules Document that includes but is not limited to:		
	· detailed Business Rules for all aspects of the System, including policies and processes developed by the Contractor and Approved by the Commission;		
	· detailed description of all System Configurable options, ranges and thresholds (Configurable within the System or Configurable by Authorized User) for each business rule (if applicable);		
	· categorization of all Business Rules, providing indication for the source of the business rule;		
	· cross-referencing of all Business Rules to the underlying Requirements and		
	· System and operational impacts of each business rule.		
5.4.3	**System Detailed Design Document**		

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844	The Contractor shall develop and submit a System Detailed Design Document (SDDD) that describes the Design specifications of all Hardware and Software provided as part of the Cashless Tolling System to meet the Approved Contract requirements. The SDDD shall demonstrate that the Contractor understands the functional, technical and performance requirements of the Cashless Tolling System and has the processes, Hardware and Software Design in place to provide a high-quality and reliable product that meets the requirements of the Contract.		
845	The SDDD shall be clear, well-written and organized into volumes to manage the submission and review process.		
846	The SDDD shall be specific and relevant to the system proposed and designed for the PTC requirements.		
847	The SDDD shall include the use of diagrams, figures and tables, and it shall apply to all environments, including primary and secondary production and testing environment.		
848	The SDDD shall include but not be limited to:		
	· System architecture, including overall System Design concept;		
	· in-lane Equipment layout for each zone type,		
	· lane layout electrical and logic diagrams;		
	· toll equipment building equipment rack layout and interconnections;		
	· data backup Systems Design, including sizing and processing calculations;		
	· the Requirements for all peripheral device Interfaces and control;		
	· server Design, including sizing and processing calculations;		
	· storage system Design, including sizing and processing calculations;		
	· network sizing and Design details including IP scheme and		
	· space Requirements;		
	· power Requirements;		
	· degraded mode of operations and impacts of failures on System operations;		
	· UPS sizing information detailing all Equipment on the UPS(s) and their total power Requirements including all Commission communications equipment regardless of purpose;		
	· detailed database Design, schema and entity relationship modeling, including sizing and processing calculations;		
	· high System availability Design, including Servers, storage, network, database and application;		
	· Disaster Recovery Design, including Servers, storage, network, database, data resiliency and application;		
	· Hardware dependencies and inter-dependencies;		
	· detailed infrastructure Software Design,		
	· detailed operating systems Design;		
	· detailed primary and secondary locations rack and server placement Design;		
	· detailed desktop computer Hardware configurations;		
	· detailed desktop computer Software configurations;		
	· detailed desktop peripherals configurations, including Requirements for all peripheral device Interfaces and control;		
	· all internal System Interfaces;		
	· all custom developed Software;		
	· all Software provided by the Contractor or a third party;		
	· Software dependencies and inter-dependencies;		
	· data flow diagrams, state diagrams and data queues;		
	· Module level descriptions and interaction among various Modules;		
	· detailed description to the Module and/or process level for all of the functions according to the functional Requirements of the System;		
	· lane logic and vehicle framing design and rules with illustrations;		
	· degraded mode of operations and impacts of failures on System operations;		
	· transaction audit and pre-processing;		
	· transaction processing Design, including sizing and processing calculations;		
	· detailed Interface specifications between all Software components;		
	· Design of all System Interfaces (both sides of the Interface), including electronic Interface to the existing PTC Toll Host system and the existing CSC/VPC system.		
	· formal and standard Interface Control Documents for documenting both sides of the Interface for all interfaces;		

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	· detailed data management Design and processes, including summarization, archiving and purging;		
	· all user Interfaces (including reports and screen formats);		
	· System data dictionaries;		
	· application performance monitoring Design;		
	· access/identity security methodology;		
	· security access system layout and interconnections;		
	· cabinet interconnection diagrams;		
	· environmental specifications;		
	· specification sheets for all Equipment;		
	· complete Bill of Materials, including Hardware, Software and support/Maintenance agreements;		
	· A logical division and an index of all contents within the SDDD.		
849	Upon the completion of the Software development, and prior to transitioning the Cashless Tolling System, the Contractor shall submit the Final Updated SDDD that includes all changes/clarifications made during the Software development and testing phases.		
5.4.4	**Cashless Tolling System Installation Design Requirements Package**		
850	The Contractor shall prepare and submit the Cashless Tolling System Installation Design Requirements and Documentation package to the Commission for review in accordance with the Approved Project Schedule.		
851	The Contractor shall secure the services of a fully qualified engineering design firm(s) for the purpose of providing electrical, mechanical, structural oversight, and documentation Approval for all installation drawings where applicable.		
852	All drawings shall be sealed, stamped, and certified by a Licensed Engineer of the appropriate discipline valid in the State of Pennsylvania where applicable.		
853	The Contractor shall develop a full size (24'' by 36") set of drawings providing sufficient and accurate detail to install the System components.		
854	Sealed, stamped, and certified drawings shall be provided for each site where Equipment shall be installed.		
855	In addition, the drawing shall contain notes and other detail defining specific processes that cannot be graphically depicted. The notes shall also be used to delineate specifications, tolerances, special conditions, or any other factor required to install and integrate a fully functional System.		
856	The drawings shall include but not be limited to the following:		
	· lane geometry and dimensions of actual size and placement of all Cashless Tolling In-lane Equipment;		
	· Equipment bracket mounting detail to the mounting point, including how the mounts will be brought on the platform for Maintenance, if applicable;		
	· specifications and tolerances;		
	· conduit and cable schedule showing all conduits, cables and wires used for the Cashless Toll Zones;		
	· placement of in-road components;		
	· size and depth of loop cuts;		
	· loop tolerances (such as induction, resistance, impedance, Q factor, if applicable);		
	· any specific infrastructure limitations (for example, proximity of rebar);		
	· any specific requirement of how the loop cable is placed into the cuts;		
	· all homeruns from loops;		
	· any cable twist requirements for loop homeruns;		
	· placement of overhead sensors;		
	· details describing termination process for each termination;		
	· lightning and surge suppression system;		
	· a graphical diagram of the network connectivity and data flow;		
	· detailed interconnection diagrams for all Systems;		
	· detailed electrical schematics, and		
	· detailed communications layout.		
5.4.5	**Cashless Toll Concentrator or Toll Host System Installation Design and Documentation (if provided)**		
857	The Contractor shall prepare and submit the Cashless Toll Concentrator or Toll Host System Installation Design and Documentation package to the Commission for review in accordance with the Approved Project Schedule.		
858	The Contractor shall develop a full size set of drawings (24'' by 36") providing sufficient and accurate detail to install the System components.		

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859	The drawings shall include but not be limited to the following:		
	· detailed interconnection diagrams for all Systems;		
	· detailed electrical schematics;		
	· detailed communications layout;		
	· UPS sizing specifications;		
	· Equipment rack layout, including power panels and connection to the UPS;		
	· a detailed diagram of the network connectivity, including IP scheme;		
	· server set-up and configuration;		
	· other Toll Concentrator or Toll Host System Hardware installation and connections and		
	· floor loading calculations.		
860	The Contractor shall provide the installation Requirements for the Equipment, including all related Plans and documents. The Contractor shall certify the installation Requirements provided as accurate and appropriate for its intended purpose, to the satisfaction and Approval of the Commission.		
861	The Contractor shall submit Server room drawings that show the location of the Equipment racks for all Cashless Toll Concentrator or Toll Host System Equipment at the primary facility. The layout of the Server components, storage devices and communication Equipment inside the cabinets shall be clearly presented with actual measurements shown.		
862	The Contractor shall submit Server room drawings that show the location of the Equipment racks for all Cashless Toll Concentrator or Toll Host System Equipment at the Disaster Recovery facility. The layout of the Server components, storage devices and communication Equipment inside the cabinets shall be clearly presented with actual measurements shown.		
863	The Contractor shall develop and submit to the Commission a full size (24" by 36") set of drawings, providing sufficient and accurate detail to install the System components.		
864	The Contractor shall submit UPS sizing information for the primary and Disaster Recovery facilities, detailing all Equipment on the UPS and their power specifications.		
865	The Contractor shall submit detailed network drawings showing all WAN, LAN and VLAN connections, including all interface connections and IP addresses for all Equipment on the network.		
866	The Contractor shall submit detailed Server configuration instructions, including the configuration of storage devices, backup devices and network connectivity.		
5.4.6	**Quality Assurance Plan**		
867	The Quality Assurance (QA) Plan that details the Contractor's QA Program shall be submitted to the Commission for review and Approval in accordance with the Approved Project Schedule.		
868	The QA Plan shall include the Contractor's QA Program through planning, documentation; Design; Development; production; purchasing; testing; and installation of all Hardware and Software provided under this Contract.		
869	The Quality Assurance Plan shall describe the quality assurance procedures and methodology for the Project, including but not limited to:		
	· quality management and organizational structure;		
	· System Design;		
	· Software development and defect management;		
	· installation including civil installation sign-off;		
	· Equipment purchase, delivery and validation;		
	· inspection and verification for in-process, final assembly, unit tests and System testing;		
	· configuration management;		
	· change management and change control process;		
	· training and safety;		
	· quality management documentation;		
	· transition;		
	· compliance to Contract Requirements;		
	· quality review and verification and		
	· reporting and metrics.		
5.4.7	**Software Development Plan (SDP)**		
	The Contractor shall develop and submit a Software Development Plan (SDP) that includes but is not limited to:		

Functional Requirements			
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		Status of Functionality	**Comments**
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870	· documentation of the Software development approach to the application architecture, behavior, architecture, business processes, security and data structures;		
	· approach System Design and Development given the Cashless Tolling System Project phasing;		
	· development resources and responsibilities, such as Software developers, system engineers, security engineers, test engineers, Quality Assurance and control personnel, configuration management administrator, documentation specialists and Project management staff;		
	· describe natural segregation of development areas or teams, such as development of user Interfaces, development of reports, development of the functionality and development of Interfaces;		
	· Software development standards;		
	· security standards;		
	· Software development methodology, such as use cases, modeling and other development tools;		
	· Software development language strategy, platforms and technologies related to both development and Software Maintenance;		
	· description of the Software Development Life-Cycle and Maintenance;		
	· approach to segregation of environments (development, testing and deployment) and the number of environments;		
	· Maintenance of standard and baseline codes and management of major releases;		
	· gap analysis of baseline code to Contractor Requirements;		
	· development problem reporting, defect tracking and remediation;		
	· code reviews and code development standards;		
	· source control;		
	· informal and internal testing methodology;		
	· regression testing and security and vulnerability testing;		
	· development and integration approach for the major functional modules;		
	· Software Quality Control processes;		
	· Software end-user documentation review and usability;		
	· development documentation;		
	· technical Software code documentation and standards for all code;		
	· Software configuration and change management approach and standards;		
	· samples of detailed Software documentation for both external and in-line documentation;		
	· Software deployment approach, release management and validation and		
	· detailed documentation of the development environment, including enough information that the environment could be completely replicated.		
5.4.8	**Master Test Plan (MTP)**		
871	The Contractor shall provide to the Commission, for review, comment and final Approval a Master Test Plan (MTP) that outlines the scope and testing concepts to be used to administrator each test identified in the Contract. The MTP shall document the methodology used to validate the Cashless Tolling System compliance to the requirements and demonstrate the Cashless Tolling System satisfies Technical, Functional and Performance Requirements.		
872	The Approved Master Test Plan shall be used as the basis for the detailed test procedures that shall be submitted to Commission for review and Approval.		
873	The Master Test Plan shall cover all aspects of the In-lane Cashless Tolling System and the Cashless Toll Concentrator or Toll Host (if provided) System testing from initial development through deployment, tolling point Acceptance and Project Acceptance, including but not limited to:		
	· overall approach to testing;		
	· approach to each informal and formal testing;		
	· approach to creation of data set for each test;		
	· Regardless of AVI requirements or options, approach to transitioning to the new interoperable solution including subsystem (lane, plaza and host) testing, AVI subsystem testing (individual protocol performance up to and including all active protocols) and end-to-end integration testing;		
	· Software test automation tools utilized for each test;		
	· approach to validating all System requirements through the testing methodology;		
	· describe the entry and exit criteria for each test;		
	· document the severity and priority descriptions and levels for each test;		

Functional Requirements			
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	· include a detailed schedule for each test identifying each test activity and resource;		
	· describe the methodology for testing the performance requirements and sample size for each phase of testing;		
	· describe the methodology for load testing;		
	· describe the purpose; scope; duration; System resources, and human resources for all tests;		
	· approach to validating all reporting Requirements;		
	· approach to end-to-end testing, validation and Reconciliation;		
	· approach to interface testing and compliance to standards,		
	· document how defects will be triaged; tracked; reported; resolved, and retested, including tools used to document defects, and		
	· a set of regression test procedures that will be exercised each time Software changes are made after the Approval of the FAT.		
874	The Contractor shall provide detailed test procedures for the Commission’s Approval for each test outlined in the Requirements and Approved MTP, including but not limited:		
	· test logistics including test vehicles; drivers and test equipment;		
	· test scenarios;		
	· detailed test steps with expected outcomes;		
	· test entry and exit criteria;		
	· test preparation;		
	· test data creation;		
	· periodic status meetings;		
	· all necessary human resources and		
	· all necessary Hardware and Software.		
875	The Commission’s Approval of any aspect of testing shall not relieve the Contractor of its responsibility to meet the full requirements of the Contract.		
876	The Contractor shall update the RTM linking every Requirement to a set of test cases to demonstrate the Requirement has been satisfied and which test satisfied the Requirement.		
5.4.9	**Maintenance Plan**		
	The Contractor shall submit Maintenance Plans listed below that describes how the Contractor plans to facilitate the Commission in performing the Maintenance of the Cashless Tolling In-lane Systems, Cashless Toll Host System, and all Hardware at the toll equipment building in accordance with the requirements of the Contract. The Contractor shall have appropriate documentation available to all Maintenance and Software Support personnel, as required to perform their respective duties.		
5.4.9.1	**System Maintenance Plan**		
877	The System Maintenance Plan defines the approach to Services, staffing and resources to fulfill the System Maintenance requirements. The Plan shall include:		
	· organizational structure, organizational chart and job descriptions and responsibilities;		
	· detailed matrix of responsibilities (Commission and Contractor);		
	· staffing plan;		
	· approach to staffing and training;		
	· detailed System monitoring requirements;		
	· coverage and personnel locations;		
	· third party System support agreements overview;		
	· schedule of all System Maintenance activities;		
	· all System Maintenance related communication methods;		
	· Maintenance procedures, communication Protocols and approval processes for System upgrades, scheduled Maintenance activities, change management and scheduled downtime;		
	· Maintenance procedures and communications Protocols for unscheduled downtime;		
	· communication protocol for coordination with interoperable agencies and third-party entities;		
	· communication protocol for coordination with the Commission’s existing Contractors;		
	· trouble reporting processes;		
	· escalation processes;		
	· spare levels and reorder thresholds, Equipment and Software warranty tracking and return material processes;		

Functional Requirements

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	· monitoring the MOMS Dashboard;		
	· monitoring Maintenance performance for compliance to performance requirements;		
	· sample Maintenance reports;		
	· Equipment replacement/refresh schedule;		
	· upgrades to third-party Software and tools, and		
	· process in place to meet Maintenance performance requirements.		
5.4.9.2	**Software Maintenance and Warranty Plan**		
878	Software Maintenance and Warranty Plan shall define the approach to Services, staffing and resources to fulfill the Software Maintenance and warranty requirements including but not limited to:		
	· organizational structure, organizational chart and job descriptions and responsibilities;		
	· detailed matrix of responsibilities (Commission and Contractor);		
	· staffing plan;		
	· approach to staffing and training;		
	· approach to receiving and prioritizing Software defects (bugs);		
	· reporting, categorization, prioritization, remediation and disposition of Software defects;		
	· coverage and personnel locations;		
	· all Software Maintenance related communication methods;		
	· Maintenance procedures, communication Protocols and approval processes for Software upgrades, Software releases, testing, scheduled Maintenance activities, change management and scheduled downtime;		
	· Maintenance procedures and communications Protocols for unscheduled downtime;		
	· trouble reporting processes;		
	· escalation processes;		
	· sample Maintenance reports;		
	· Software updates and testing to comply with E-ZPass Group specification changes, and third party interface changes;		
	· Software and security updates, remediation and testing to be compliant to Commission Audit requirements, and		
	· process in place to meet Maintenance performance requirements.		
5.4.10	**Disaster Recovery Plan**		
	The Disaster Recovery Plan (DRP) shall be a comprehensive, documented statement of actions to be taken before, during and after a disaster to protect and recover the information technology data, assets and facilities of the Cashless Tolling System.		
879	The Contractor shall develop and submit a Disaster Recovery Plan (DRP) and subsequent Disaster Recovery Procedures that describe the approach, as well as activities and procedures that take place in the event of a disaster for each element of the Cashless Tolling System.		
880	The DRP shall document the Contractor's approach to recovering from a disaster, including but not limited to:		
	· events that constitute a disaster and party responsible for declaration of a disaster;		
	· assessment of disaster risks;		
	· mitigation of disaster risks;		
	· preparations in the event of a disaster;		
	· disaster declaration and Disaster Recovery process to invoke;		
	· organization chart illustrating Disaster Recovery team members, roles and responsibilities;		
	· notification contact list, including contact information;		
	· notification protocol;		
	· sites and Equipment for Disaster Recovery, presented in a diagram format;		
	· Disaster Recovery process initiation and completion checklist;		
	· Software and data replication processes;		
	· detailed logistical processes for activation of Disaster Recovery site and systems;		
	· detailed technical processes for activation of Disaster Recovery site and systems;		
	· detailed operational functions for activation of Disaster Recovery site and		
	· detailed technical processes for reactivation of primary site (or moving to a new primary site if the original primary site is destroyed), Operations and Systems.		
881	The DRP shall be tested no less than annually.		

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882	The DRP shall include a Business Continuity Plan (BCP) that details the Contractor's approach to accommodating the personnel, Equipment, Systems, network, applications and data components required to ensure the resumption and continuity of critical Cashless Tolling System processes.		
883	The BCP, based on a Business Impact Analysis to assess the needs of the Commission business areas, shall include but not be limited to:		
	· Recovery Point Objective (RPO) maximum acceptable amount of data loss for all critical Cashless Tolling System services after an unplanned data-loss incident, expressed as an amount of time;		
	· Recovery Time Objective (RTO) maximum acceptable amount of time for restoring a critical Cashless Tolling System services and regaining access to data after an unplanned disruption;		
	· Level of Service (LOS) the combination of throughput and functionality required to sustain Cashless Tolling System business Operations and		
	· detailed description of how site and System security will be maintained to ensure continued compliance with security requirements.		
5.4.11	**Training Program and Plan**		
884	The Contractor shall develop and maintain a training plan, subject to Approval by the Commission.		
885	The training plan shall describe the plan for training new personnel and shall outline the required operational/maintenance and system knowledge for each position to be gained from the training. For each position/user type, the plan shall include a training instructor guide, training manual and other materials to be used in training. The plan also shall include a schedule for follow-up training and continuing education for staff.		
886	The training plan shall provide a plan for cross-training staff from other areas of operations or management for peak period, emergency or temporary assignments to provide for staff redundancy. The training plan also shall include the training schedule for regular staff training and continuing education/training.		
887	The Contractor shall submit a training plan, in accordance with the Approved Project schedule, that describes the approach to training administrators, end users at different levels, Maintenance and support personnel, including but not limited to:		
	· overall description of the training program;		
	· training techniques;		
	· training delivery schedule;		
	· names and descriptions of each training class;		
	· purpose of each training class;		
	· who should attend the class;		
	· qualification Requirements for trainer;		
	· minimum qualifications for personnel attending the class;		
	· duration of the class;		
	· training materials, including syllabus, schedule, training goals, manuals, guides, other support materials and techniques to be used;		
	· data preparation, such as test Accounts and test transactions;		
	· required Equipment and		
	· facility Requirements.		
888	Courses shall be limited to a maximum of eight (8) hours per day.		
889	The Contractor shall be responsible for maintaining a training database baseline and supporting data files that can be restored at the beginning of each training session.		
5.4.12	**Third-Party Documentation**		
	Third-Party documentation includes standard commercial documentation for third-party provided Hardware, Software, services and materials.		
890	The Contractor shall catalogue all third-party documentation and include the catalogue with the third-party document submissions.		
891	The Contractor shall provide and maintain standard, commercially available, updated documentation for third-party provided Hardware, Software, services and materials provided under this Contract. This set of third-party documentation shall be retained at the Commission offices for the duration of this Contract and upon termination of the Contract.		
892	All updated documents shall show the revisions and also include a version of the clean document.		

Functional Requirements			
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893	An electronic copy of all third-party COTS Hardware and Software installation and user manuals, with updates, shall be provided to the Commission. Acceptable electronic formats are Microsoft Office 2016 Suite or higher, unsecured Portable Document Format (PDF) and professional CAD applications.		
894	Documentation shall include sufficient detail to describe the configuration of the Software as it was installed by the Contractor for the Cashless Tolling System. These should include any customization or modifications made to the Software or configurations specific to the Commission environments.		
895	The Contractor shall provide all Hardware and Software installation and user manuals for custom-developed (non-COTS) third-party products and services in a printable electronic format.		
5.4.12.1	**Third-Party Software Documentation**		
896	The Contractor shall provide third-party Software documentation, including but not limited to:		
	· all user manuals;		
	· programmer's reference manuals;		
	· warranty documentation;		
	· installation manuals;		
	· Interface documents;		
	· Maintenance manuals and		
	· any other information required to utilize the Software, such as the operating system, utilities, programming languages, application Software and communications Software.		
897	The third-party Software documentation shall be provided by the Contractor electronically in a standard and organized format, with appropriate labels, tabs and cross references to allow the Commission to easily access and reference information on each Software component on the System.		
5.4.12.2	**Third-Party Hardware Documentation**		
898	The Contractor shall provide third-party Hardware documentation, including but not limited to:		
	· all technical manuals;		
	· operator's guides;		
	· installation guides;		
	· warranty documentation;		
	· Hardware reference manuals;		
	· available options and versions;		
	· catalogs, components and		
	· illustrated parts lists.		
899	The Contractor shall provide all third-party Hardware documentation in a standard and organized format, with appropriate labels, tabs and cross references to allow the Commission to easily access and reference Hardware information on each Equipment component.		
900	Third-party Hardware documentation shall include sufficient detail to describe the configuration of the Hardware as it was installed by the Contractor for the Cashless Tolling System.		
5.5	**Manual Requirements**		
	Various manuals shall be provided as described below to allow the Commission to understand the operations of the Cashless Tolling In-lane System and Cashless Toll Concentrator or Toll Host System (if provided). New manuals developed under this Contract that are not standard commercial catalogs or manuals, shall meet the Requirements set forth in this section.		
901	The Contractor shall submit the Project manuals to the Commission for review and Approval in accordance with the Approved Project Schedule.		
902	Whenever possible, all data shall be printed on 8-1/2" x 11" sheets; foldouts shall be 11" x 17".		
903	Each manual shall include, but not be limited to:		
	· a title sheet;		
	· revision history;		
	· Table of Contents;		
	· list of illustrations (if applicable);		
	· list of reference drawings and Exhibits (if applicable) and		
	· a parts list (if applicable).		
904	All manuals shall have a consistent look and feel and shall be professionally written and presented in clear and organized fashion.		

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905	All manuals prepared for the Commission under this Contract shall be produced, or editable, using Microsoft Office 2016 Suite (or higher). In addition, electronic copies of manuals shall be provided in unsecured Portable Document Format (PDF), if requested by the Commission.		
906	Any special Software required to produce scalable typefaces or other graphs shall be provided by the Contractor as part of the documentation for the manuals.		
5.5.1	**Manual Submissions and Quantities**		
907	The Contractor shall submit electronic copies of all manuals listed below.		
908	All manuals shall be maintained in electronic format in the Contractor's document management system for the term of the Contract.		
909	The Contractor shall be responsible for producing a quantity of the manuals for the Contractor's use, sufficient to fulfill the Contractor's Requirements under the Contract.		
5.5.2	**Manuals to be Submitted**		
5.5.2.1	**Cashless Tolling Lane Maintenance Manual**		
910	The Contractor shall submit Cashless Tolling Lane Maintenance Manual prepared for properly trained technical personnel assigned to the Maintenance of the Hardware and Software installed under this Contract on the Commission cashless tolling lanes. All manuals should be used for the training sessions. It shall document information required to support cashless tolling lane Maintenance and repair activities, including but not limited to:		
	· lane Equipment layout for each Cashless Tolling Zone Type;		
	· schematics and layouts of the Hardware in the lane cabinets, equipment racks and the interconnection diagrams;		
	· parts lists required to service each piece of Hardware installed under this Contract;		
	· general and detailed description and concepts of lane operations and functions;		
	· detailed lane monitoring activities, specialty tools and schedule;		
	· detailed Software monitoring activities and troubleshooting procedures;		
	· Maintenance instructions to repair and replace parts and modules;		
	· mechanical functions and installation of all Hardware;		
	· listing of all event and error logs;		
	· testing and basic troubleshooting procedures, and		
	· preventive and corrective Maintenance procedures.		
911	Standard service manuals for commercial products used for the Equipment shall be acceptable if they contain sufficient information to properly service the Equipment.		
912	Large-size logic diagrams and mechanical assembly diagrams do not have to be reduced or incorporated into the manuals if these drawings are provided with the manuals and presented in a useable and durable form.		
913	Photographic documentation of Equipment with appropriate labels and call-outs are satisfactory if they contain sufficient information to properly identify components, parts and features.		
5.5.2.2	**Cashless Tolling System Monitoring Manual**		
914	The Contractor shall submit the Cashless Tolling System Monitoring manual prepared for properly trained personnel assigned to monitoring the operations of the Cashless Tolling System including transmission of data and files to existing systems. All manuals should be used for the training sessions. It shall document information required to support Cashless Tolling System monitoring, including but not limited to:		
	· all Dashboards, monitoring screens, notifications and data that needs to be checked;		
	· listing of all jobs/process, their dependencies and their schedule;		
	· listing of all folders and directories that need to be checked;		
	· details related to the activity that needs to be checked;		
	· frequency of the validations;		
	· actions to take when results are not as expected;		
	· notification and escalation process;		
	· basic troubleshooting procedures, and		
	· creation of work orders in MOMS.		
915	Provide description about the tools and Software for personnel to record the monitoring activity and instructions to use the tools/Software.		
5.5.2.3	**Cashless Toll Systems Administrators Manual**		

Functional Requirements

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916	The Contractor shall provide an Cashless Toll Systems Administration Manual that serves as a guide to the overall management and administration of the Cashless Toll Systems and shall include:		
	· description of the programs and processes that need to be monitored to ensure that the System is operational;		
	· procedures for validating tasks, processes and jobs have successfully completed, and errors and exceptions encountered;		
	· procedures for validating the successful transfer and receipt of files for all interfaces, including existing PTC Toll Host system and the existing CSC/VPC system;		
	· a listing of all the error codes, their meaning and potential associated problems shall be included in the manual, with a step by step guide to troubleshooting and correcting the problem;		
	· all database Design, and database Maintenance activities required to keep the System operational shall also be clearly documented, including the scheduling of such activities;		
	· detailed procedures for backup, archiving and purging data;		
	· detailed schedule for all preventative Maintenance activities;		
	· technical contact lists for Hardware and Software providers;		
	· details and copies of all third-party system support agreements and		
	· ad-hoc reporting tools and use of the tools to generate ad-hoc reports shall be documented, and		
	· details of monitoring tools supplied by the Contractor to include but not limited to MOMS Dashboards and MOMS.		
5.5.2.4	**Cashless Toll Systems User Manual**		
	The Contractor shall develop and provide a comprehensive set of system documentation and user manuals for the Cashless Toll System users. At a minimum, the documentation shall include all user and training manuals, a reports definitions and data flow diagrams.		
917	The Contractor shall develop and submit Cashless Toll Systems User Manuals to be used by Commission staff to operate the Cashless Toll System and for training purposes.		
918	The Contractor shall develop a separate manual for each job category that details all the processes, procedures and policies developed by the Contractor and Approved by the Commission required to fulfill the Requirements of each specific job description.		
919	Each Cashless Toll Systems User Manual shall include but not be limited to:		
	· screen images detailing the step-by-step activities needed to fulfill a specific functionality;		
	· flowcharts to provide Commission staff a clear understanding of the workflow;		
	· all screens, reports and data fields, clearly explained using sample formats applicable to the Cashless Toll Systems and		
	· samples of all reports, included in the manual or as an attachment to the manual, with any specific instructions that may apply to a given report.		
5.5.3	**As-Built Documentation**		
	Prior to the Commission Acceptance of each tolling location of the Project, As-Built documentation shall be provided that documents the final Cashless Tolling System Design and implementation.		
5.5.3.1	**System Detailed Design Document**		
920	After the Approval of the Operational Test and prior to the Commission Acceptance of the Cashless Tolling System, for each tolling location of the Project, the Contractor shall submit the As-Built System Detailed Design Document (SDDD) that includes all Software and Hardware changes made during the System development, implementation, and testing phases.		
921	The Contractor shall submit an electronic version of the As-built SDDD in a printable format Approved by the Commission.		
922	The Contractor shall update the latest as-built SDDD should any changes be made to the system design after System Acceptance as a result of functional upgrades or Approved change orders during the Contract period.		
5.5.3.2	**As-Built Drawings**		
923	The Contractor shall provide to the Commission a complete set of As-Built drawings which shall be delivered in a readily printable in full and half size formats from the electronic format Approved by the Commission for all Equipment installed and furnished under this Contract.		
924	As material changes are made to the System the Contractor will be required to update the as-built drawings to reflect the current status.		
	The sets shall include, but not be limited to:		

Functional Requirements

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925	· all schematics;		
	· logic diagrams;		
	· layouts;		
	· wiring diagrams;		
	· interconnection diagrams;		
	· all attachment Hardware details;		
	· installation diagrams;		
	· cable schedule;		
	· Interface details;		
	· facility build-out details and		
	· network diagrams, so as to provide a complete record of the as-built status of the Equipment.		
926	All drawings for revisions to standard commercial assemblies or components for the Equipment shall be included in the As-Built drawing set.		
927	All As-Built drawings shall contain a table of contents that shall include a listing of all drawings with headings for drawing number, drawing title, revisions number and date, and the type of material list, wiring diagram, wire list, specification control drawing, or similar categories.		
928	The Contractor shall update the latest drawings with red lines as changes are incorporated during the installation process. At the completion of the installation, the Contractor shall gather all red line drawings.		
929	The red line drawings shall be verified and incorporated into a final as-built drawing package. This final as-built package shall include all updated installation drawings, shop drawings and sketches, Plans and other drawing types that were used to install the Cashless Tolling System.		
930	All other documentation used regarding the installation also shall be finalized and submitted as part of the as-built submittal.		
931	The Contractor shall update and resubmit the latest as-built drawings should any changes be made to the system design or configuration after System Acceptance during the Contract period including interoperability and multiprotocol updates.		
5.6	**Quality Assurance Program**		
	The Contractor shall establish and maintain an effective Quality Assurance (QA) program on all aspects of the Cashless Tolling Project to ensure compliance with the Contract. This Quality Assurance Plan will detail the process and procedures instituted by the Contractor to ensure the QA program is in place.		
932	The Contractor shall establish and maintain an effective Quality Assurance (QA) program that ensures adequate quality throughout all areas of Cashless Tolling Project Contract performance.		
933	All supplies and services under this Contract, whether manufactured or performed within the Contractor's facilities or at any other source, shall be controlled by the Contractor at all points necessary to ensure conformance to the requirements of the Contract.		
934	Purchase, delivery, verification, testing and assembly of Equipment, Hardware and Software conducted within the Contractor’s facilities and on-site shall be controlled completely by the Contractor.		
935	Delivery, verification, testing and assembly of Servers and network Equipment conducted within the Contractor’s facilities shall be controlled completely by the Contractor.		
936	The QA program shall provide for the prevention and ready detection of discrepancies and for timely and positive corrective action.		
937	The QA program shall include effective Quality Control of purchased materials and Subcontracted Work.		
938	The Contractor shall make objective evidence of quality conformance readily available to the Commission, and the Commission shall have the right to review and verify the Contractor’s compliance to the process.		
5.6.1	**Records**		
939	The Contractor shall maintain records or data essential to providing objective evidence of quality until the expiration of the Contract and these records shall be made available to the Commission upon request.		
940	Quality-related records and data shall include but not be limited to:		
	· inspection and test results;		
	· records of Subcontractor QA programs;		
	· cost records pertinent to Acceptance of nonconforming material;		
	· inspection check-off of civil Contractors work;		
	· change request documentation;		

Functional Requirements			
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	· Design reviews and walkthroughs and		
	· results of internal and Contractor audits.		
941	Records shall be maintained in a manner that shall allow for access and analysis of the status of the overall QA Program and in a format as defined in Section 5.4 Documentation.		
5.6.2	**Control of Purchase**		
942	The Contractor shall be responsible for ensuring that all supplies, components, developmental tools, assemblies, subassemblies, and Services procured from Subcontractors and vendors conform to the technical requirements and Contract.		
943	The Contractor shall have a quality control process in place for tracking and handling non-conforming Equipment and products.		
944	The Contractor's responsibility includes the establishment of procedures for the selection of qualified Suppliers. In selecting qualified Suppliers, the Contractor shall ensure that the Subcontractors and vendors control the quality of the supplies and Services provided.		
5.6.3	**Handling, Storage and Delivery**		
945	The Contractor shall document the approach to assembly of the Equipment, including the location where Equipment and Systems are assembled.		
946	The Contractor's QA Program shall provide for adequate and documented handling, storage, preservation, packaging, and shipping instructions to protect the quality of products.		
947	Commission assets, as defined by the Commission during the design process, shall be tracked and entered into the MOMS inventory and the cost and location of each asset shall be recorded.		
948	All assets designated by the Commission shall have an inventory tag or labeling mechanism for the electronic data entry and tracking of Commission equipment by location and cost within the MOMS, subject to Approval by PTC during the design process. The tagging or labeling mechanism shall be readily and efficiently available to Authorized staff and automatically updated in MOMS.		
949	Any unique or special requirements applicable to procured items shall be delineated in the procurement documents. All procurement documents shall be made available to the Commission upon request.		
5.6.4	**Inspection at Subcontractor-Vendor Facilities**		
950	The Commission reserves the right to inspect, at the source, supplies or services not fabricated or performed within the Contractor's facility.		
951	The Commission's inspection shall not constitute acceptance, nor shall it in any way replace the Contractor's inspection activity or relieve the Contractor of the responsibility to furnish an acceptable end product.		
5.6.5	**Access to/Inspection of Contractor's Facilities**		
952	Upon request, the Commission or its designated representative shall have access to the Contractor's facilities and personnel.		
953	This access may be restricted to those portions of the facilities and personnel involved with or who are otherwise performing Work under this Contract.		
954	Such access shall be for the purpose of inspecting the facilities; verifying progress; inspection of materials; Work-in-progress; or finished goods, or verifying test performance or results.		
955	The Commission's inspection shall not constitute Acceptance or Approval, nor shall it in any way replace the Contractor's inspection activity or relieve the Contractor of the responsibility to furnish an acceptable end product.		
5.7	**Cashless Toll Systems Training**		
	The Contractor shall provide comprehensive training for all aspects of the Cashless Tolling System, including but not limited to the operations, system monitoring, problem detection and resolution, audit, and Maintenance of the Cashless Tolling System.		
5.7.1	**Overview of Training Program**		
956	The Contractor shall be solely responsible for supplying all items necessary, including but not limited to training documentation, Software, Hardware and any other Equipment required to complete the delivery of the training program.		
957	The Contractor's program shall include but not be limited to instruction, models, manuals, diagrams and component manuals and catalogs as required.		
958	Where practical and useful, the Contractor's training shall be hands on and use actual Cashless Toll Systems Software in the training environment.		

Functional Requirements			
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		Status of Functionality	Comments
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959	The Contractor shall produce all training materials and manuals of the latest documentation in electronic form to be used and printed for future training sessions.		
960	The Contractor shall record training sessions to allow the Commission employees to remotely attend training sessions using WebEx or other online tool.		
961	The Contractor shall ensure the Commission or their representatives have the right to attend any training sessions and to make video and audio recordings of training sessions and copies of all training program materials for their use in training new employees.		
962	The Contractor shall obtain releases from all employees/Subcontractors to allow unlimited, royalty free use and copies of personal identity information (PII) compliant recordings and provide the same to the Commission upon request.		
5.7.2	**Training Requirements**		
963	The Contractor shall provide the following training courses for the Commission's personnel, including but not limited to the provision of all training manuals (including Contractor- provided manuals or relevant portions thereof), guides, training aids, as well as student and instructor work books accompanying the courses listed in the sections below.		
964	The Commission may require additional courses be offered or additional personnel be provided training. The Contractor shall accommodate these requests to the extent possible with on-site personnel and documentation that is readily available.		
965	Lane level training shall include an overview of generation of subsystem events and creation of transaction data and their flow through the System.		
966	All Cashless Toll Systems training shall include a review and description of each of the appropriate Cashless Tolling System processes and procedures with actual Cashless Toll Host System Software. All students shall have their own workstation and interact directly with the training environment.		
5.7.2.1	**System Operation Overview**		
967	The Contractor shall provide a System operation overview training course for the Commission's management personnel who require a general understanding of all aspects of the operation, including but not limited to personnel from senior management, procurement, information technology, marketing and public information.		
968	The system operations training shall include an overview of all aspects of the Cashless Tolling In-lane System and Cashless Toll Systems including DVAS, MOMS, cashless tolling operations, interface to the existing PTC Toll Host system, existing CSC/VPC system, System Maintenance, network, and any other operational area of the Cashless Tolling System.		
969	System Operation Overview training will be conducted in one session with a minimum class size of ten (10) people, for a minimum of eight (8) hours.		
5.7.2.2	**Audit and Reconciliation and Cashless Toll Host System Operations**		
970	The Contractor shall provide an audit and reconciliation training course for the Commission's auditing staff to understand all aspects of the operation, particularly those related to reconciliation, audit and management.		
971	Course shall include training all personnel who require a detailed understanding of the operations of the Cashless Toll System and how to access and view information and reports from the System on items such as status, alarms, performance, transactions and revenue.		
972	Audit and reconciliation training will be conducted in one (1) session with a minimum class size of five (5) people, for a minimum of four (4) hours.		
5.7.2.3	**System Monitoring Staff Training Program**		
973	The Contractor shall ensure the System monitoring staff (PTC Operations Group) are properly trained in the requirements of monitoring the Cashless Tolling System and its uninterrupted operations.		
974	Training on the Cashless Toll Concentrator or optional Toll Host shall include the maintenance activities provided by the Contractor to provide PTC personnel an understanding of the routine maintenance activities such as monitoring of system logs and Cashless Toll Host System Concentrator maintenance alarms; confirmation of file transmissions; confirmation of system backups.		
975	The Contractor shall provide a minimum of one (1) weeks of classroom and on-the-job training (OJT) to all personnel in their respective area of responsibility before such personnel are assigned monitoring duties.		
976	The Contractor shall provide documentation this initial training has been successfully completed.		
	The Contractor shall provide various training programs that include but are not limited to:		

Functional Requirements			
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977	· an in depth explanation of the Cashless Tolling Operations, including all Interfaces, file/data transfers and interconnections;		
	· functions of the monitoring and tools used to manage monitoring tasks;		
	· functions of the MOMS;		
	· Cashless Toll Systems logs, error logs and processing of exceptions;		
	· system dataflow and workflow queues;		
	· explanation of the Dashboard data and analysis;		
	· special use and monitoring tools and		
	· queries and reports.		
978	All System monitoring personnel shall attend the training sessions. The Commission's technical staff also shall attend all training sessions.		
979	The Contractor shall keep accurate training records on all Maintenance and Software support services personnel. The Commission shall be permitted to review and verify Maintenance and Software support services personnel qualifications and training records at any time. Evidence of completion of training by Contractor personnel shall be provided to the Commission upon request.		
5.7.2.4	**Cashless Toll Systems Administration**		
980	The Contractor shall provide a System Users training course for all personnel who require a detailed understanding of the management, troubleshooting and administration of the interfaces, Software, database, applications, configurations and architecture of the Cashless Toll Systems.		
981	Cashless Toll Systems Administration training will be conducted in one (1) session with a minimum class size of five (5) people, for a minimum of eight (8) hours and on-the-job training (OJT) to all personnel in their respective area of responsibility before such personnel are assigned administration duties.		
5.7.3	**Training Facilities**		
982	The Contractor shall conduct training at the classroom facilities at the Commission administrative building for all training and at designated locations identified by the Commission. Following review of Contractor's Training Plan, the Commission will confirm that it has the requisite space to accommodate the level of effort and physical requirements for each training session.		
5.7.4	**Scheduling and Preparation for Training**		
983	It shall be the Contractor's responsibility to provide sufficient notice to the Commission on the types of training it will provide and the timing for each training session. The Commission will identify a list of participants that Contractor shall notify to schedule their participation in the training.		
984	The Contractor shall perform all scheduling activities and shall make every attempt necessary to accommodate the maximum number of persons for each training session given scheduling conflicts. Contractor shall provide sufficient notice to allow participants a reasonable lead time.		
985	The Contractor shall notify the Commission of the dates or range of dates it would like to hold a training session at the Commission offices and shall coordinate with the Commission Information Technology (IT) office and Administrative Services staff to arrange the proper classroom setting and computer Hardware and Software are installed and the space configured for each training session.		
5.7.5	**Training Materials**		
986	Draft copies of all training materials shall be submitted to the Commission for review, comment and Approval, prior to final printing of quantities required for training.		
987	The Commission shall have the right to require additional interim drafts at no additional cost should draft training materials submitted not be of adequate quality or have missing or incorrect information.		
988	For each course described in the section above, Contractor shall provide the materials listed below.		
5.7.5.1	**Instructor Guides**		
989	The Contractor shall provide an instructor guide for each training course. The guide shall include the following elements:		
	· course agenda;		
	· course objective;		
	· procedures for managing training session;		
	· resource and facilities required, including work stations, power and communications requirements;		
	· detailed lesson plans;		

Functional Requirements

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	· a description of training aids and items to aid in on the job performance (e.g., where applicable, pocket guides or reference sheets);		
	· test to be administered to assure satisfactory completion;		
	· instructions for using any audio-visual support Equipment or materials and		
	· student survey to obtain feedback on the training sessions and the training materials.		
5.7.5.2	**Training Aids**		
990	The Contractor shall provide training aids such as mock-ups, scale models, overhead displays, video demonstrations, and simulations as are necessary to successfully complete the course agenda and meet the course objective.		
991	The Contractor shall provide users a way to access training documents, aids and tips in an online, electronic format.		
5.7.5.3	**Student Workbook**		
992	For each course, the Contractor shall provide a student workbook, including but not limited to:		
	· course agenda;		
	· course objectives;		
	· schedule of sessions;		
	· copies of all overheads and visuals and		
	· lesson outlines and summaries.		
993	Materials such as operations and user manuals may be used to supplement the material provided in the student workbook.		
994	To the extent that the user manuals (and training aids) are appropriately detailed and fit for training purposes they shall be used for training. If the Commission deems they are not sufficiently detail then supplementary training material shall be provided.		
995	If such material is used appropriate cross-references shall be included in the Student Workbook so as to identify the complete set of training materials provided to the student.		
5.7.6	**Training Room Set-up and Software Installation**		
996	Contractor shall be responsible for loading any special Software required on the classroom computers (provided by the Contractor).		
997	It is the Contractor's responsibility to ensure that the Software is operating as expected on each of the classroom computers.		
998	It is also the Contractor's responsibility to ensure that appropriate communications are in place.		
VI	**Cashless Tolling System Testing Requirements**		
6.1	**Cashless Tolling System Testing Concept**		
	The Commission has employed a phased approach to deploying cashless tolling on the Commission toll facilities. Given the extended duration of the Project, and the potential differences in the various In-lane System solutions, the Contractor shall conduct the following tests.		
999	Various tests (outlined for reference immediately below and with detailed Requirements in subsequent sections) shall be prepared and conducted by the Contractor, including but not limited to:		
	· factory acceptance test (FAT)		
	· onsite first installation test (OFIT) at baseline tolling points;		
	· installation and Commissioning test at baseline tolling points, and		
	· Operational and Acceptance test at baseline tolling points to be identified by the PTC.		
6.1.1	**General**		
	The Requirements described in this section detail the labor, materials, facility, and support Services necessary to test the In-lane Cashless Tolling System and the Cashless Toll Concentrator or Toll Host System (if provided) and its interface to the existing PTC Toll Host system and the existing CSC/VPC system.		
	The Contractor shall prepare and conduct tests that validate adherence to the Requirements that guided its Design and development, compliance to Approved Design and Business Rules and demonstrate the Cashless Tolling System functionality.		
1000	The Contractor shall be responsible for all aspects of testing performed as part of the Contract and to provide all necessary resources and facilities to conduct all tests including but not limited to:		
	· test support personnel;		
	· varying vehicle types and drivers;		
	· test facilities;		
	· test equipment, tools and safety devices;		

Functional Requirements			
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	· test schedule and test sequence;		
	· coordination with existing Contractors;		
	· coordination of lane closures and		
	· conducting the test.		
1001	The Contractor shall to the extent possible, develop and use specialized automated testing Software to, including but not limited to:		
	· create test scripts;		
	· control the automated testing;		
	· exercise all conditions, configurations and scenarios;		
	· conduct performance testing;		
	· conduct security testing;		
	· conduct regression testing;		
	· compare actual test outcomes to expected outcomes;		
	· test reporting;		
	· conduct load testing;		
	· conduct user Interface testing;		
	· conduct stress testing;		
	· WAN traffic testing;		
	· conduct sustained operational testing and		
	· conduct sustained burn-in testing.		
1002	The Contractor shall provide a defect tracking system, accessible by the Commission, to document and track all defects identified as part of Cashless Tolling System testing and any subsequent actions taken to correct and retest those defects.		
1003	The defect tracking system shall be capable of the following, including but not limited to:		
	· rating (severity) defects;		
	· categorizing defects;		
	· prioritizing defects;		
	· logging the date/time the defect was reported;		
	· subsystems and test cases impacted by the defect;		
	· the user who reported the defect;		
	· the erroneous behavior;		
	· the details on how to reproduce the defect;		
	· the developers who worked on the defect and corrective action taken;		
	· date the defect was corrected and formally re-tested;		
	· life-cycle tracking and		
	· reporting.		
6.1.2	**Testing Sequence and Logistics**		
1004	The Contractor shall obtain Approval from the Commission and shall have met the entry conditions prior to start of each test, including but not limited to:		
	· Approval of all predecessor tests;		
	· Approved test procedures for each individual test;		
	· Approved test schedule;		
	· successful closeout of all outstanding pre-test issues;		
	· successful dry run testing with results provided to the Commission;		
	· submittal of the latest Approved version of the RTM showing test validation against the requirements and		
	· confirmation that both site and System are ready for testing.		
1005	After the completion of each test, the Contractor shall submit for the Commission's review and Approval a test report that documents the results of the test.		
1006	The test report shall address the following, including but not limited to:		
	· the test summary;		
	· the results of the test;		
	· any anomalies and issues identified;		
	· the corrective action/resolution of each item;		

Functional Requirements			
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	· the test data;		
	· calculations and backup data supporting compliance to requirements;		
	· comments provided by the Commission and		
	· the results of any re-tests necessary to successfully complete each testing phase		
1007	The Commission shall participate in the testing and witness each test. The Commission shall have full access to the test data and results of the test. Test data and results shall be stored on Commission QA/Test Servers.		
1008	Testing will not be considered complete by Commission until all anomalies and "punch-list" items are closed-out, and the final test report is Approved by the Commission.		
1009	Testing shall occur per the above requirements, subject to Commission's Approval of the final Master Test Plan.		
6.2	**Factory Acceptance Test (FAT)**		
1010	The factory acceptance test (FAT) shall be conducted by the Contractor at the Contractor's facility in actual lanes with the complete test Cashless Tolling System in accordance with the Approved MTP described in Section 5.4.8 Master Test Plan (MTP), detailed testing procedures and Project schedule. The FAT test site shall remain available through throughout the term of the Contract for testing and validating changes, fixes and enhancements to the Cashless Tolling Hardware and Software.		
1011	The test configuration shall be representative of the Contractor's cashless tolling solutions.		
1012	The FAT shall be conducted by the Contractor to verify that all functional elements of the Cashless Tolling System are in conformance with the Contract Requirements.		
1013	Upon the successful completion of the FAT exit criteria and Approval of the FAT by the Commission, the Contractor shall be given the authorization to move forward to the On-site First Installation Test.		
1014	The FAT shall validate that the Cashless Tolling System Hardware meets the Requirements of the Contract including but not limited to:		
	· 72 hour burn-in testing for customized and assembled Hardware and		
	· certification of Hardware compliance to environmental requirements.		
1015	The FAT shall validate that the Cashless Tolling In-lane System meets the Requirements of the Contract including but not limited to:		
	· accurate assignment and proper framing of each vehicle through various traffic conditions and test scenarios;		
	· accurate capture of images and association of transponders and images to the correct vehicles;		
	· compliance to accuracy requirements;		
	· all exception processing requirements;		
	· correct application of Business Rules;		
	· degraded mode scenarios;		
	· all device failure conditions;		
	· rush-hour traffic scenarios;		
	· redundancy;		
	· mobile enforcement requirements (if option is exercised);		
	· DVAS capabilities;		
	· throughput and load testing using simulated data;		
	· interface to the facility server (if provided) and/or Cashless Toll Concentrator or Toll Host System (if provided), and		
	· transaction and image reconciliation.		
1016	The FAT shall validate that the Cashless Toll Concentrator or Toll Host System (if provided) meets the Requirements of the Contract including but not limited to:		
	· user interface;		
	· Dashboards;		
	· Cashless Toll Concentrator or Toll Host functions;		
	· MOMS;		
	· transaction audit;		
	· correct application of Business Rules;		
	· system performance;		
	· reporting;		
	· redundancy;		
	· system loading;		

Functional Requirements

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	· compliance of Cashless Toll Concentrator or Toll Host System interface to Approved ICDs, and		
	· OCR/ALPR (if the option to implement OCR/ALPR is exercised).		
6.3	**Onsite First Installation Test (OFIT)**		
1017	The OFIT shall be conducted by the Contractor at the on-site locations identified by the Commission that are representative of the two gantry concepts; the overhead structures and the toll gantries in accordance with the Approved MTP, detailed testing procedures and Project schedule.		
1018	The OFIT shall verify the full functionality of the Contractor's Approved solution and its compliance with the Contract requirements and the Approved Design in a controlled, onsite environment using transactions created during live traffic operations and when lanes are closed to traffic. During OFIT testing the system shall be open to live traffic in a test environment and not collecting tolls.		
1019	For OFIT the interface to the Cashless Toll Concentrator or Toll Host System (if provided) and the image server(s) shall be in the test environment.		
1020	The testing shall not interfere with the existing system or impact lane operations.		
1021	Before the commencement of the OFIT, all Equipment and Software that are required under the Contract shall be in place, in a production environment and configured for revenue operations. The interfaces to the existing PTC Toll Host system and the existing CSC/VPC system shall be connected to the respective test environments as Approved by the Commission.		
1022	In order to test the full functionality of the MOMS and System Monitoring during OFIT, all Equipment shall be entered into the System prior to the start of OFIT and the MOMS shall be configured for cashless tolling operations.		
1023	The Contractor shall test the vehicle throughput and speed requirements and generate the required number of transactions to prove the System can process transactions accurately and meet the performance requirements.		
1024	Performance requirements shall be verified using Approved sample size.		
1025	The OFIT shall validate that the Cashless Tolling In-lane System meets the Requirements of the Contract including but not limited to:		
	· operations of in-lane Equipment and their ability to report failures to the MOMS including the UPS;		
	· multi-lane multi-vehicle traffic conditions such as rush-hour traffic (bumper to bumper), vehicle straddling/changing lanes/merging;		
	· accurate assignment and proper framing of each vehicle;		
	· accurate capture and correct association of transponders and images to the correct vehicle;		
	· transaction processing during equipment failures, and degraded modes of operation;		
	· performance requirements using live traffic and controlled vehicles;		
	· Redundancy as defined in this Scope Of Work;		
	· receive and process TSL, VEL (if exercised) and toll rate schedules (if applicable);		
	· DVAS functionality;		
	· E-ZPass Group interoperability using interoperable test accounts;		
	· lane Business Rules and		
	· interface to the Cashless Toll Concentrator or Toll Host System (if provided) or facility servers and the existing CSC/VPC system.		
1026	An Audit of the lanes shall be conducted using live (not simulated) in-lane traffic to verify that the Cashless Tolling System is processing vehicles accurately and transactions can be reconciled in the System using the audit tools Approved by the Commission.		
1027	The OFIT shall validate that the Cashless Toll Concentrator or Toll Host System (if provided) meets the Requirements of the Contract including but not limited to:		
	· functionality of the Cashless Tolling and MOMS Dashboards shall be verified as it applies to transactions, alarm and failure monitoring;		
	· all failure conditions;		
	· user interfaces and toll collection management functions;		
	· Cashless Toll Business Rules;		
	· reconciliation of transactions and revenue;		
	· Cashless Toll reports;		
	· Ad-hoc reporting capability;		
	· accuracy of performance reports;		

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	· interface to the facility server (if applicable);		
	· interface to the existing PTC Toll Host system and the existing CSC/VPC system including reconciliation;		
	· conformance with performance, load and stress test requirements;		
	· security requirements;		
	· archival and purging requirements;		
	· MOMS asset management; failure notification; work order tracking and performance reporting;		
	· Cashless Toll Host System redundancy requirements including the demonstration of a failover and recovery from the primary to secondary Toll Concentrator or Toll Host (if provided), and		
	· Cashless Toll System data resiliency requirements.		
1028	As part of the OFIT, an end to end testing shall be conducted that validates the following functionality, including but not limited to:		
	· System's ability to process and post transactions to the Cashless Toll Concentrator or Toll Host System (if provided) and on to the existing PTC Toll Host Systems and existing CSC/VPC system, and		
	· The successful transfer of images from the In-lane Systems to the image server(s) and on to the existing CSC/VPC system;		
6.4	**Installation and Commissioning Test**		
1029	The Installation and Commissioning test shall be conducted by the Contractor on each lane as a part of the Contractor's Cashless Tolling System installation in accordance with the Approved MTP, detailed testing procedures and Project schedule.		
1030	The Installation and Commissioning test shall validate the functionality and operational status of the lanes including installation and configuration of all Equipment and Software. The lane operations shall be verified end to end upon the completion of the installation checkout prior to opening the cashless tolling lanes for revenue collection.		
1031	During the Installation and Commissioning test every piece of in-lane Equipment and its interface to the zone controller shall be verified to be fully operational. The zone controller, its interface to the Cashless Toll Concentrator or Toll Host System (if provided) and the transmission of images to the existing CSC/VPC system via the image server(s) shall be validated to ensure that the interfaces are in place and the Cashless Tolling System is ready for revenue collection.		
1032	A Commissioning test shall be conducted on the Cashless Toll Concentrator or Toll Host System (if provided) and shall include the image server(s) and the interfaces to the existing CSC/VPC system and the existing PTC Toll Host system.		
6.5	**Cashless Tolling System Operational and Acceptance Test**		
1033	The Cashless Tolling System Operational and Acceptance test shall be conducted by the Contractor at each Cashless Tolling plaza location of the Cashless Tolling Project in accordance with the Approved MTP, detailed testing procedures and Project schedule.		
1034	The Cashless Tolling System Operational and Acceptance Test shall be conducted for each Cashless Tolling implementation upon authorization by the Commission to commence such testing. The Cashless Tolling System shall be observed in live revenue operations by the Contractor and the Commission for a minimum of four (4) calendar months.		
1035	The objective of the Cashless Tolling System Operational and Acceptance Test is to ensure that the Cashless Tolling System Software and Hardware functions over the test period with limited manual intervention in live operations. It is intended to confirm that the Cashless Tolling System and the network are sized and configured correctly and data is processed without interruption.		
1036	The Cashless Tolling System Operational and Acceptance Test shall validate the interface of the Cashless Tolling System to the existing PTC Toll Host system and the existing CSC/VPC system and reconcile the transactions and images end to end.		
1037	The Cashless Tolling System Operational and Acceptance Test shall validate the operation and accuracy of the Cashless Tolling System common to the Commonwealth of Pennsylvania.		
1038	During the test period, System accuracy, performance of the system and operations shall be validated including:		
	· all System accuracy requirements specified in the Contract using representative sample size for each facility under test;		
	· all maintenance performance requirements;		
	· all system performance requirements;		

Functional Requirements			
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	· a two hour vehicle audit during AM and PM peak hours for a total of four (4) hours on each lane at each tolling point that is part of the Cashless Tolling location in test;		
	· transaction processing in accordance with Commission Business Rules;		
	· correct classification of vehicles and assignment of toll and		
	· monitoring of all interfaces for the accurate transfer and processing of all records.		
1039	System reliability and auditability shall be verified manually and through tools and reports provided in the System.		
1040	Dashboards and reports shall be verified daily for accuracy and reconciled to operations and interface files. Queries and detailed reports shall be generated to validate the daily, weekly, monthly, yearly and comparative reports and compared to reports.		
1041	The alarms displayed on the MOMS and all interface status notification shall be verified to be accurate.		
1042	Failure of the Cashless Tolling System to meet a performance requirement shall result in the restart of that particular test until such time the accuracy requirements are met.		
1043	The Cashless Tolling System Operational and Acceptance Test shall be repeated until the Commission is satisfied that the Cashless Tolling System meets the Contract requirements as set forth in the Contract at each tolling point.		
1044	The Cashless Tolling System Operational and Acceptance Test shall be conducted on the baseline tolling points after toll zone commissioning and upon authorization by the Commission to commence such testing. The Cashless Tolling System shall be observed in live revenue operations by the Contractor and the Commission for a minimum of two (2) monthly audit cycles.		
6.5.1	**Cashless Tolling System Acceptance**		
1045	Upon the successful completion of Operational and Acceptance Test for the Cashless Tolling System for each implementation of the Cashless Tolling Project, the closure of all punch-list items and completion and submission of all Contract required documents as set forth in the Contract, the Contractor shall be given the Acceptance for the Cashless Tolling System for each Cashless Tolling implementation.		
VII.	**Maintenance and Software Services**		
	The Contractor shall provide all Maintenance and Software Support Services associated with the Cashless Tolling System throughout the term of the Contract as further set forth in this Scope of Work and detailed in *Attachment 10: Maintenance Responsibility Matrix* . The requirements described in this section detail the Hardware Maintenance and Software and Administrative Support Services for the Cashless Tolling System including any existing Equipment integrated into the Contractor's solution. The Commission will provide Maintenance and Support Services for the Wide Area Network (WAN). Maintenance for the Cashless Tolling In-Lane Systems and Cashless Toll Concentrator (if provided) shall be the responsibility of the Contractor staff. Monitoring of the Cashless Toll Concentrator will be performed by Contractor personnel 24x7. This includes onsite monitoring of system logs and Cashless Toll Concentrator maintenance alarms; confirmation of system backups, and deploying third-party security software updates.		
7.1	**Cashless Tolling System Warranty Program**		
1046	The Contractor shall be responsible for the implementation and administration of a Warranty Program for all Hardware, Contractor Software and third-party Software provided under this Contract.		
1047	The Contractor shall maintain warranty records and service agreements for all Hardware and third party Software in MOMs, and shall review Software upgrades and available patch reports to keep the Cashless Tolling System current.		
7.1.1	**Hardware/System Warranty Program**		
1048	The Hardware Warranty period for all Equipment furnished under this Contract except server Hardware shall be for a period of one (1) year, commencing on the date of Approved installations of each tolling location.		
1049	In the one (1) year Hardware Warranty period, Warranty Maintenance shall include all Services required to maintain the System Hardware at required performance levels.		
1050	In the Warranty period the Commission shall not be charged for any Services related to Maintenance beyond those associated with force majeure events such as vandalism, relocation of Equipment at the request of the Commission, or damage clearly caused by events outside the control of the Contractor, as set forth in the Contract.		
1051	All Equipment mounting Hardware and brackets provided as a part of this Scope of Work shall be warrantied for the Contract Term.		

Functional Requirements

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1052	The one (1) year Warranty on any additional Approved installed and replaced Hardware and Equipment shall commence when the Hardware and Equipment are installed.		
1053	The Contractor shall take all reasonable and prudent steps to ensure that all Hardware and third party Software used by the System is supported by the third party vendor and all warranties remain in effect.		
7.1.1.1	**Server Hardware Warranty and Support Services**		
1054	All server Hardware shall have a full manufacturer's Warranty and support services for a period of minimum five (5) years beginning with the Acceptance of the Cashless Tolling System for the Cashless Toll Concentrator or Toll Host (if provided) and for the server Hardware at each tolling point beginning with Acceptance at that tolling point.		
7.1.1.2	**Third Party Software Warranty**		
1055	All third party Software shall have a full manufacturer's Warranty and Upgrade Services, which shall be no less than a period of five (5) years beginning with the Acceptance of the Cashless Tolling System.		
7.1.1.3	**Software Warranty**		
1056	The Cashless Tolling System Software shall have a full Warranty against defects and failures beginning at System Acceptance through the end of the Contract Term subject to the applicable provisions within the Agreement.		
7.2	**General Description of Cashless Tolling System Maintenance and Software Support Services**		
1057	The Contractor shall provide one hundred (100) percent of the Cashless Tolling In-Lane Systems and LAN Maintenance Services.		
1058	The Contractor shall provide one hundred (100) percent of the Cashless Toll Concentrator or Toll Host System (if provided) Hardware, Software, Database and System Administration Maintenance Services including operating system and Software security updates through a coordinated effort with the Commission.		
1059	Hardware Maintenance Services under this Contract shall be for a period as set forth in the Contract from Acceptance of each Cashless Tolling plaza location of the Project. The first year of Hardware Maintenance for each Cashless Tolling plaza location shall be covered under the System Warranty Program as set forth in Section 7.1.1.		
1060	The Contractor shall provide Software Maintenance Services as described in this Scope of Work.		
1061	Software Maintenance and Support Services under this Contract shall be for a period as set forth in the Contract from Acceptance of the Project. A Software Warranty shall be provided for the term of the Contract as set forth in Section 7.1.1.3.		
1062	The Contractor shall be responsible for supporting and maintaining the Cashless Tolling System for any time period in which the System is installed, Commissioned and placed into revenue service but has not passed required testing until such time as the Warranty Period commences. The Maintenance of the Cashless Tolling System provided under this Contract prior to start of Warranty is not included in the term of the Maintenance and Software Support Services.		
1063	The Contractor shall be responsible for supporting and maintaining the Cashless Tolling System at the test plazas until the test plazas are Accepted and Warranty has commenced.		
1064	The one (1) year Cashless Tolling System Warranty for each implementation shall commence after the Acceptance of each implementation of the Cashless Tolling Project. The one (1) year Cashless Tolling System Warranty on all other new tolling points deployed by the Contractor shall commence after the Acceptance of the Cashless Tolling System for each subsequent implementations of the Cashless Tolling Project. The one (1) year Cashless Toll Concentrator or Toll Host System (if provided) Warranty shall commence after the Acceptance of the base Contract implementation of the Project.		
1065	All changes and modifications to the Cashless Tolling System shall be Approved by the Commission and shall follow the Commission *Attachment 12 - ETC System Change Control Procedures V1.6* .		
1066	The Services and Work performed under the Contract are considered highly confidential and the Contractor personnel shall at all times comply with the Commission security and privacy requirements. Contractor employees shall not discuss their Work with unauthorized personnel or any individuals not directly associated with the Commission.		
7.3	**Cashless Tolling System Maintenance and Software Support Services - Contractor**		
	The Maintenance and Software Support Services shall include monitoring; preventive; pervasive; corrective; security related and emergency Maintenance Services and certain upgrades and enhancements to be performed on all elements of the Cashless Tolling System. Payment for Maintenance and Software Support Services on the Cashless Tolling System for each Cashless Tolling point implemented of the Project shall commence after the expiration of the one-year Cashless Tolling System Warranty Period. The Contractor shall provide the following Cashless Tolling System Maintenance and Software Support Services at the levels defined in Section VII.		

Functional Requirements

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7.3.1	**Cashless Tolling In-lane Systems Hardware Maintenance and Software Support Services**		
	Upon the completion of the Warranty Program at each Approved tolling point, the monitoring and Maintenance functions described below shall be performed by the Contractor.		
1067	During and after the Warranty period the Contractor shall maintain the spare parts inventory in the MOMS and update accurate Equipment inventory status in the MOMS.		
1068	The PTC Operations Group shall monitor the System for failures and alarms, and confirm a MOMS work order has been created for each failure as defined regardless of Maintenance Level.		
1069	The Contractor shall automate the MOMS work order process to the maximum extent possible to anticipate and automate work orders. If a MOMS work order has not been created, the Contractor or the PTC Operations Group shall create a work order in MOMS and assign it to a technician for Maintenance action or troubleshooting.		
1070	The Contractor shall perform the necessary Maintenance and close the MOMS work order upon confirmation that the failure has been successfully corrected. The Contractor shall notify the PTC Operations Group that the repair action is complete and work order has been closed.		
1071	The Contractor shall perform all daily, weekly and scheduled preventive Maintenance on all Cashless Tolling In-lane System Hardware.		
1072	Equipment racks and panels shall be inspected and maintained by the Contractor in full operational, orderly condition, and free of debris and dirt.		
1073	The Contractor shall inspect and maintain all Contractor provided equipment mounting Hardware and brackets provided as a part of its Scope of Work and shall also inform the Commission of any potential problems.		
1074	The Contractor shall inspect and test cables, wiring and terminations to detect problems and degradation. Any item not in compliance with Contract requirements shall be replaced by the Contractor at no cost to the Commission unless such failure is considered non-chargeable as described in Section 2.5.4.2 Non-Chargeable Failures.		
1075	The Contractor shall maintain the Cashless Tolling In-lane System local area network that includes all Contractor network connections in the toll equipment building and interconnections between the toll equipment buildings as defined in *Attachment 3b: PTC Communications Network Responsibilities* .		
1076	The Contractor shall provide monitoring and troubleshooting as part of Maintenance Services for the Cashless Tolling In-lane System including, but not be limited to:		
	· zone controllers;		
	· AVI system;		
	· AVC system;		
	· LPICPS components and controllers;		
	· OCR/ALPR Software(if the option to implement OCR/ALPR is exercised);		
	· facility servers and Software (if provided);		
	· DVAS cameras;		
	· all cables, wiring, junction boxes, and terminations;		
	· all conduits and cable trays;		
	· all In-lane System electronics and controllers;		
	· Contractor supplied LAN equipment and		
	· all In-lane Contractor and third-party Software.		
1077	All System administrative functions, if not automated, shall be performed by the Contractor at regular intervals as part of the System preventive Maintenance Services according to the Approved Maintenance Plan to ensure System performance is optimized. All such System administrative functions shall be scheduled as preventive maintenance work orders through MOMS and tracked.		
1078	Continuous monitoring of System operations shall be performed by the Contractor in conjunction with the Commission to verify System is functional; security posture is adequate; processes are being executed as scheduled; files are transmitted as specified, and System is operating to Contract performance requirements.		
	Continuous monitoring by the Contractor shall include but not be limited to:		
	· confirming and verifying receipt of all the MOMS messages and Alerts;		
	· verifying the MOMS is receiving and processing System events and reporting the correct status;		
	· evaluating sample transactions data for exception;		
	· confirming data transmission to the Cashless Toll Concentrator or Toll Host System (if provided);		
	· confirming image and transaction transmission to the existing CSC/VPC systems;		
	· performing routine diagnostics on all in-lane subsystems;		

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1079	· verifying processes, programs and scheduled jobs are successful;		
	· reviewing comparative reports to identify System degradation;		
	· confirming successful transfer of transponder status list to the lanes;		
	· reviewing OCR/ALPR results (if the option to implement OCR/ALPR is exercised) and poor quality images;		
	· monitoring the DVAS video and event data;		
	· reviewing sample images;		
	· correcting identified performance issues;		
	· evaluating storage requirements;		
	· verify time synchronization is occurring as configured and System clocks are not drifting beyond acceptable threshold, and		
	· reviewing error logs and Alerts.		
1080	The Contractor shall perform vulnerability scans using a tool such as Tenable/Nessus, Qualys or other commercial vulnerability scanning tool of the Cashless Toll System and produce ensuing reports at the request of the Commission.		
1081	The Contractor shall monitor for intrusion attempts and prevent all unauthorized access and intrusions at all levels and report such events to the MOMS. Any intrusion, compromise or breach must be reported to Commission IT Security within 12 hours of detection.		
1082	The Contractor shall monitor notifications and initiate corrective actions upon Commission approval on the Cashless Tolling System to meet requirements.		
1083	The Contractor shall perform any Maintenance, daily, weekly, or periodic, required to maintain the System at required performance levels (for example: archival and purging in accordance with the Commission’s retention policy).		
1084	The Contractor shall update all Software drivers to meet any new standard Operating Systems as they become available and such updates shall be deployed in accordance with Commission standards.		
1085	The Contractor shall retrieve data manually from the zone controllers and download transponder status list and toll rate and schedule files in the event there is an extended communications failure.		
1086	The Contractor shall re-establish or re-install System files, programs and parameters, as required, following a failure or damage to the System and return lanes to fully operational condition.		
1087	In the event of a declared disaster the Contractor shall perform procedures as needed and return lanes to fully operational condition.		
1088	The Contractor shall perform OCR/ALPR updates as required in accordance with the Commission ECO procedures within an Approved Commission time frame to support license plate changes if the option to implement OCR/ALPR is exercised.		
1089	As part of the Software Support Services the Contractor shall develop and test Software as required to accommodate corrective action, changes to Business Rules or lane configurations in accordance with the Commission ECO procedures. Scope shall include provision of evidence packages and release notes detailing changes for Commission review and Approval, installation of new Software and confirmation of successful installation.		
1090	The Contractor shall analyze daily and weekly trends to identify problems, including but not limited to:		
	· high number of transactions without transponder;		
	· high number of Class Mismatch transactions;		
	· abnormal changes in traffic counts and class;		
	· high number of exceptions or unusual occurrences;		
	· high number of invalid Transponder transactions;		
	· abnormal changes in transponder counts and status changes and		
	· high number of rejected images.		
7.3.2	**Cashless Toll Concentrator or Toll Host System (if provided) Server and Database Administration, Maintenance and Software Support Services**		
	The requirements in this section describe the services to be provided by the Contractor under the Maintenance and Software Support Service for the Cashless Tolling System.		
	The Contractor shall provide Maintenance and Software Support Service for all elements of the Cashless Toll Concentrator or Toll Host System including but not limited to:		
	· Cashless Toll Concentrator or Toll Host System Hardware;		
	· operating systems;		

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1091	· databases;		
	· application Software;		
	· third-party Software patches;		
	· security updates;		
	· Software configuration and		
	· Software version control.		
1092	The Contractor shall provide continuous 24x7 system administration services coverage on the Cashless Toll Concentrator or Toll Host System, if off-site or Cloud location, to ensure that it is performing and will continue to perform at a satisfactory level.		
1093	The Contractor support staff shall be available on-call 24x7 to investigate and perform maintenance for those failures escalated to the Contractor.		
1094	System administration services shall include monitoring and corrective action to ensure System performance is in accordance with requirements of this Scope of Work. This shall include but is not limited to:		
	· monitoring Cashless Toll Concentrator or Toll Host System Hardware (if provided) at the primary and secondary locations including servers; storage devices and backup systems;		
	· verifying processes, programs, and scheduled jobs are successful;		
	· confirming all transactions and images are successfully transmitted to the receiving Systems;		
	· confirming all messages described in the ICD are being successfully exchanged between the Cashless Tolling Systems, existing CSC/VPC systems, and existing PTC Toll Host system;		
	· confirming applications are functional and available to Authorized Users;		
	· confirming all scheduled reports are successfully generated and available to Authorized Users;		
	· verifying all processes are functioning and data and images are moving successfully though the queues;		
	· verifying all third-party interface are functioning and successfully exchanging files;		
	· scheduling of preventive, corrective and predictive Maintenance activities;		
	· performing any daily, weekly, or periodic Maintenance required to maintain the System at required performance levels (for example: indexing and tuning databases; and purging in accordance with the Commission's retention policy);		
	· maintaining and updating records of all Maintenance events and activities in the MOMS;		
	· performing third-party Software or firmware upgrades in conjunction with the Commission, as required and to be compliant to security requirements including but not limited to performing security Software upgrades, database upgrades and operating system upgrades at offsite or Cloud locations;		
	· support upgrades performed by the Commission for third-party Software or firmware as required to be compliant to security requirements including but not limited to performing security Software upgrades and operating system upgrades at PTC Data Centers;		
	· contact with the Commission, operations and Contractors regarding System issues, performance, security posture, Software Release and Maintenance scheduling;		
	· performing Approved manual actions, adjustments and updates to the System data based on predefined criteria to correct issues and as Authorized by the Commission;		
	· re-establishment or re-installation of System files, programs and parameters, as required, following a failure or damage to the System;		
	· monitoring of error logs and System logs;		
	· restoration testing of backups (Software and data) to be performed yearly in coordination with the Commission with the results reported back to the Commission.		
	· Maintenance of up-to-date Software backups (all System Software and data);		
	· installation of new Software and confirmation of successful installation;		
	· verifying time synchronization is occurring as configured and System clocks are not drifting beyond acceptable threshold;		
	· assisting Commission administrative staff as requested by the Commission;		
	· troubleshooting Cashless Tolling System issues;		
	· creation of Ad-hoc reports requested by the Commission;		
	· generation of queries as requested by the Commission, and		
	· analysis of data as requested by the Commission.		

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1095	Software support services shall include monitoring and corrective action to ensure System performance is in accordance with requirements of this Scope of Work, to include database management and operation. This shall include, but is not limited to:		
	· investigation and analysis of errors and exceptions and taking corrective action including correcting the problem and reprocessing the data;		
	· monitoring of notifications, and initiating corrective actions on application programs to meet requirements;		
	· updates to the Cashless Tolling System and application to support upgrades to Hardware or third-party Software;		
	· updates to the Cashless Tolling System and application to support all changes to Business Rules and Cashless Tolling System configurable parameters, and deploy changes in production according to Commission Approved deployment schedule;		
	· updates to the Cashless Tolling System and application to support changes to E-ZPass Group ICD including the addition of new E-ZPass Group Agencies;		
	· updates to the Cashless Tolling System and application to support the addition of new Interoperable Agencies;		
	· updates to the Cashless Tolling System and application to support changes to continue its compliance to updated security requirements, and		
	· updates to the Cashless Tolling System and application to support legislative and statutory changes.		
1096	As part of the Software Support Services the Contractor shall develop and test Software as required to accommodate corrective action, changes to Business Rules or lane configurations in accordance with the Commission ECO procedures. Scope shall include provision of evidence packages and release notes detailing changes for Commission review and Approval, installation of new Software and confirmation of successful installation.		
7.4	**Cashless Tolling Network Maintenance Support Services – Commission Responsibility**		
	Commission technical staff will provide Maintenance Support Services for the Commission Toll System WAN Network as specified in this section.		
	Commission technical staff will maintain and monitor the WAN system that includes:		
	· connection of the PTC Primary Data Center to the network equipment at the toll equipment building at each tolling point location;		
	· connection of the PTC Primary Data Center to the CSC/VPC primary and disaster recovery locations;		
	· connection to the existing PTC Toll Host locations and		
	· operating system and Software patching levels for the Commission provided network equipment security postures.		
	The Commission will upgrade and update the network security to ensure the Commission network is always in compliance with updated security standards.		
7.5	**Updates to Maintenance Plan and Other Maintenance Related Documentation**		
1097	The Contractor shall update the Maintenance Plan and other Maintenance documentation to reflect any changes to the policies or procedures developed by the Contractor and Approved by the Commission, for the Cashless Tolling System Maintenance services. The Maintenance Plan shall be updated and uploaded to the online System documentation library every year for review and Approval. However, sections of the Maintenance Plan or its Appendices shall be submitted for review and Approval as the changes are identified. A version update sheet shall be included with the Maintenance Plan, and the Maintenance Plan on file shall have the most recent version from the configuration management database.		
7.6	**Maintenance Requirements**		
7.6.1	**Preventive Maintenance**		
1098	The Contractor shall provide and perform onsite Preventive Maintenance on the Cashless Tolling In-lane System Hardware, Cashless Toll Concentrator or Toll Host System Hardware (if provided), Contractor LAN communications equipment and Software in accordance with the Approved Preventive Maintenance plan.		
1099	The Contractor shall inspect all Contractor installed Equipment, both major components and support components (fans, equipment racks, storage units) that constitute the Cashless Tolling System and shall make such repairs; cleaning; adjustments, and replacements of components as necessary to maintain the Equipment in normal operating condition in accordance with the Approved Preventive Maintenance plan.		

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1100	In addition to required ongoing Contractor monitoring the servers and data processing units shall be actively monitored by the Contractor to verify that storage space is not reaching limits, disks are not fragmented or damaged, Software being used is of latest version per the configuration management and data is being processed and transferred in an appropriate manner.		
1101	Transaction and image processing volumes and times shall be monitored at the lane by the Contractor and Systems optimized for performance with Commission Approval.		
1102	Report generation times, System access times, and System response time shall be monitored by the Contractor to ensure performance meets the Contractual requirements.		
1103	The Contractor shall include all Equipment and Systems as part of the Preventive Maintenance in accordance with the original Equipment manufacturer's guidelines. Any variations or exceptions shall be noted by the Contractor and Approved in advance by the Commission.		
1104	Preventive Maintenance shall be performed by the Contractor during the normal working hours when Maintenance technicians are scheduled to be onsite. Diagnostic aids, tools and Equipment Approved by the Commission to perform Preventive Maintenance equipment analysis shall be provided by the Contractor, as necessary.		
1105	Preventive Maintenance requiring lane closure shall be scheduled by the Contractor for off-peak travel periods; evenings; Saturdays, and Sundays and coordinated with the Commission, so that the Work shall not interfere with normal traffic flow, unless otherwise Approved by the Commission.		
1106	The Contractor shall provide a Preventive Maintenance schedule, to be Approved by the Commission, as part of the Maintenance Plan. The schedule shall detail the preventive Maintenance to be performed on each Equipment item and system. The schedule shall provide a description of the Work to be performed, expected duration and the frequency.		
1107	The preventive Maintenance schedule shall be entered by the Contractor into the MOMS and work orders shall be automatically created to alert Contractor staff of required preventive Maintenance. Failure of the Contractor to perform required preventive Maintenance in accordance with the Approved schedule shall result in liquidated damages, as specified below in the Maintenance Performance Requirements Section 7.22.		
7.6.2	**Predictive Maintenance**		
1108	The Contractor shall establish a Predictive Maintenance program by which failure analysis can be determined by identifying potential failures through the MOMS records. The failure analysis shall take into account either or both specific components and sub-systems. This information shall then be used to investigate and correct problems and failures that could disrupt toll collection operations.		
1109	The Contractor shall maintain all failure analysis documentation on site and provide the information, including charts or other analysis tools and shall submit the analysis as part of its monthly report.		
7.6.3	**Pervasive Maintenance**		
1110	The Contractor shall establish a Pervasive Maintenance program by which failure analysis can be determined by identifying continuing or repetitive failures through the MOMS records. The failure analysis shall take into account either or both specific components and sub-systems. This information shall then be used to investigate and correct problems and failures that continue to occur on a particular item of equipment, sub-system, or component.		
1111	The Contractor shall maintain all failure analysis documentation on site and provide the information, including charts or other analysis tools and shall submit the analysis as part of its monthly report.		
7.6.4	**Corrective Maintenance**		
1112	All Work performed by the Contractor to correct problems to meet the requirements of the Contract or Software defects shall be considered as Corrective Maintenance and shall be corrected based on priority level within the time specified within this scope of work under Maintenance Coverage and Response Times. Such problems include but are not limited to:		
	· failure of System functions;		
	· failure of processes and programs;		
	· report issues;		
	· application failures;		
	· toll system network issues;		
	· inadequate security posture;		
	· degraded System or component performance, and		
	· non-conforming availability or MTBF.		

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1113	Corrective action that require modification to the Software shall be reviewed by the Commission and corrections deployed in accordance with Approved release notes and Commission schedule.		
1114	The Commission shall be notified before any corrective Maintenance is performed.		
1115	Notwithstanding the foregoing, for repeated failure of Equipment, components, or Systems, the Contractor shall undertake an investigation as outlined in Section 7.6.3. If the problem is determined by the Commission to be a pervasive defect, the Contractor shall be responsible for the replacement and repair of the problem Equipment, component, or System at no additional charge to the Commission.		
7.6.5	**Onsite Corrective Maintenance for Cashless Toll Concentrator or Toll Host System (if provided)**		
1116	Upon the confirmation that a failure/work order requires Onsite Corrective Maintenance, the Contractor shall submit a request to the Commission for Approval to perform the Onsite Corrective Maintenance in accordance with the of the Commission ECO process.		
1117	The Contractor shall submit a schedule for performing the Onsite Corrective Maintenance and coordinate all travel with the Commission.		
1118	Upon Authorization to perform the Onsite Corrective Maintenance, the Contractor shall initiate the Work. An authorized Commission representative shall be notified when the Contractor personnel is onsite at the Cashless Toll Concentrator or Toll Host facility performing the corrective action.		
1119	The details of the Work shall be recorded in MOMS by the Contractor and upon verification of the corrective action by the Commission, the Contractor Work on this corrective action item shall be considered complete.		
7.6.6	**Upgrades and Enhancements**		
1120	Upgrades and enhancements required for reasons such as to meet changes to standards, statutes or interoperability changes (Equipment, software changes to accommodate TSL, ICD or regional interoperability hub changes) or the addition of new functionality; or, that provide the Commission with a demonstrable benefit in performance, costs or productivity, shall be proposed with costs and schedule by the Contractor in accordance with the requirements of the Commission ECO process, as set forth in the Contract.		
1121	Software modifications that are required to maintain and support the System as a part of the normal course of business such as version changes, configuration or parameter changes or minor changes to Software or code such as changes to the existing ICDs; or Software modifications required to ensure System is compliant to specified standard (for example security) or, changes that improve the Contractor’s ability to maintain and support the System, shall not be considered upgrades or enhancements and shall be provided by the Contractor at no cost to the Commission. All such Software modifications shall be in accordance with the of the Commission ECO process.		
7.7	**Maintenance Coverage and Response Times**		
1122	The Contractor shall post a weekly schedule identifying personnel and times for onsite and on-call Maintenance. Commission Approval is required for any change in Contractor staff. The Contractor shall provide to the Commission the updated active personnel list and contact information when there is a change in personnel.		
1123	Response to calls and repair times shall be determined by priority as described below. Contractor failure to meet the response and repair time criteria described below shall result in liquidated damages as specified in Section 7.22.		
1124	Regardless of onsite or on-call, acknowledgement of receipt of notification of a Maintenance issue or human acknowledgment of a failure shall not exceed thirty (30) minutes after the failure notification was recorded or problem was reported.		
	Priority of failures shall be defined during the Design phase. Time to respond and complete repair are determined by priority and is defined as follows:		
	· Priority 1: Defined as any malfunction or fault or Software defect that results in the immediate loss of revenue; security breach; closure of lanes outside of the Commission lane closure requirements; hazard to personnel or driving public; loss of audit data; loss of redundancy in any redundant System components; loss of functionality that impacts E-ZPass Group Agencies or failure that negatively impacts Lane or Cashless Toll Concentrator or Toll Host System (if provided) operations.		
	o For In-lane Systems Maintenance this priority shall have a two (2) hour time to respond and complete repair.		
	o For Cashless Toll Concentrator or Toll Host Maintenance this priority shall have a two (2) hour time to respond and complete repair. In the event Onsite Corrective Maintenance is required, this priority shall have two (2) hour time to complete repair once Approval to commence Work is provided by the Commission and Maintenance personnel is onsite and ready to perform the repair. The Contractor shall make every effort to be onsite within twenty-four (24) hours of Approval to commence Work.		

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1125	· Priority 2: Defined as any malfunction or fault that degrades the System performance but not the operational ability of the System. It includes, but is not limited to inaccurate reporting, inability to reconcile revenue or loss of System functionality that impacts access to data.		
	o For In-lane Systems Maintenance this priority shall have a four (4) hour time to respond and complete repair.		
	o For Cashless Toll Concentrator or Toll Host Maintenance this priority shall have a four (4) hour time to respond and complete repair. In the event Onsite Corrective Maintenance is required, this priority shall have two (2) hour time to complete repair once Approval to commence Work is provided by the Commission and Maintenance personnel is onsite and ready to perform the repair. The Contractor shall make every effort to be onsite within forty-eight (48) hours of Approval to commence Work.		
	· Priority 3: Defined as any action or event that has the potential to result in a malfunction or degrading of the System performance but has not impacted performance and is not anticipated to immediately impact performance.		
	o For In-lane Systems Maintenance this priority shall have a twenty four (24) hour time to respond and complete repair.		
	o For Cashless Toll Concentrator Maintenance this priority shall have a twenty-four (24) hour time to respond and complete repair. In the event Onsite Corrective Maintenance is required, the Contractor and the Commission shall agree on the time period for onsite correction but time to respond and complete repair shall be no longer than three (3) Calendar Days of Approval to commence Work.		
1126	For Priority 1 and Priority 2 failures the Contractor shall provide dedicated resources until the issue has been resolved to the Commission's satisfaction.		
1127	Outages and tasks performed under the Preventive Maintenance period shall be defined as Priority 4. The System shall be available and fully operational within the Approved time schedule for such activities and upon completion of the Preventive Maintenance period. Any failures generated or resulting from Preventive Maintenance activities shall be accounted for as Priorities 1, 2 or 3 and be addressed in accordance with these requirements.		
1128	Response and Repair time is defined as the combined time from when failure occurred or problem was reported to when the repair or correction of the failure occurred; the period of time beginning when the failure occurred (failure time) and ending when the fault condition is corrected and returned to normal operations.		
1129	Response and repair times for every Maintenance event shall be recorded in the MOMS and reported and such reports shall be provided to the Commission in accordance with the reporting requirements of this Scope of Work.		
7.8	**Notifications**		
1130	The entry of a problem (either by the System or an Authorized User) into the MOMS shall constitute the start of the acknowledgment time for purposes of measuring the Contractor's acknowledgment time and response/repair time.		
1131	For purposes of measurement of performance and for the development of Maintenance policy and procedures, notification of System malfunctions, problems and discrepancies may be provided to the Contractor in three (3) different methods, summarized below.		
	· Verbal Notification: Defined as an in-person notification or telephone call. In all cases, the first conversation with, or notification of the Contractor shall signify the start of the response time for purposes of measuring the Contractor's response time. All verbal notifications shall be recorded in MOMS by the Contractor.		
	· Written Notification: Defined as a written description of a problem or condition, typically provided by the Commission or its representative. Written notification could be faxed, texted, or emailed to the Contractor by a customer or user. The time of receipt of fax, message or email shall signify the start of the response time for purposes of measuring the Contractor's response time. All written notifications shall be recorded in MOMS by the Contractor.		
	· MOMS Notification: Defined as an automatic notification through the MOMS identifying a problem within the Cashless Tolling System that is the Maintenance responsibility of the Contractor and sending out an automatic Alert message by email or text to a Contractor's Maintenance staff to respond to the failure. In addition to the Contractor notification, the Alert shall be posted on the MOMS and available via reports. The presence of a MOMS notification in the System shall constitute the start of the response time for purposes of measuring the Contractor's response time.		
7.9	**Recording of Maintenance Activities**		

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1132	The Contractor and the Commission shall utilize the MOMS for initiating the work orders. MOMS shall be utilized for recording and tracking all Maintenance and Software Support Services performed on the Cashless Tolling System. All Equipment provided under this Contract shall be tracked through MOMS from the purchase to their disposal.		
1133	In all cases, it shall be the Contractor's responsibility to log all reported Maintenance activities into the MOMS. The Contractor shall also be responsible for documenting all information and issues related to a failure condition, including all actions taken to complete the correction into the MOMS.		
1134	The work order shall contain as much information as possible in order for persons other than the technician or his supervisor to reasonably determine the fault, when it was worked on, the corrective action and any other information pertaining to the individual Maintenance event, including replacement of parts.		
1135	All performance metrics shall be recorded and tracked through the MOMS and compliance to performance requirements shall be validated using MOMS reports.		
1136	It is the Contractor's responsibility to ensure that its Maintenance staff has real time access to the MOMS and that all the required connections are established and ongoing to ensure that the Maintenance staff has remote access. Maintenance staff shall be trained in the use of the MOMS.		
7.10	**Spare Parts**		
1137	Contractor shall be responsible for the inventory of all spare parts at an Approved storage facility(ies) and shall be insured in this regard as set forth in the Contract. The Contractor shall account for all spare parts and shall provide safeguards against theft, damage, or loss of the spare parts.		
1138	The Contractor shall ensure that only spare parts and equipment required to service the Cashless Tolling System and LAN communications spare equipment are stored at this facility and shall only be used for the PTC Cashless Tolling System.		
7.10.1	**Spare Parts Inventory Management**		
1139	The Contractor shall be responsible for the Maintenance of an adequate spare parts inventory. The Contractor is responsible for monitoring and identifying the existing spare parts inventory, ordering spare parts as required, and proposing the quantity needed to maintain the required performance.		
1140	The Contractor shall update and recommend a spare part quantity to be maintained in order to support the Cashless Tolling System functionality and operational readiness.		
1141	The Contractor shall hold the Commission harmless in the event spare parts or consumables are not available as a consequence of the Contractor's failure to purchase or replenish the spare parts or consumables Approved by the Commission.		
1142	During the term of this Agreement (including after the expiration of any applicable warranty periods) the Contractor shall be responsible for purchasing all miscellaneous repair items and consumable materials necessary to maintain the Cashless Tolling System at the performance levels specified in the Contract.		
7.10.2	**Spare Part Inventory and Tracking**		
1143	The Contractor shall be responsible for recording the inventory into the MOMS, monitoring the inventory quantity and ensuring that the inventory is maintained to the levels required.		
1144	The Contractor shall keep accurate records of all parts entering and leaving inventory including but not limited to: time and date part was dispensed, and the location within the Cashless Tolling System where the part was dispatched and used.		
1145	The Contractor shall also be responsible for tracking of all warranty replacement for Contractor provided Equipment through returned materials authorization (RMA) process. If the replaced part is under warranty, the part shall be immediately replaced with a new part. If the replaced part is out of warranty, the Contractor shall make every effort to repair the replaced item to a usable status and place the part back into spares inventory.		
1146	If the Contractor is unable to repair the part, a new part shall be purchased and placed into spares inventory. The details of the repair efforts, including problem; status; inventory, and repair disposition shall be included in the MOMS inventory and repair database.		
7.10.3	**Procurement and Control of Spare Parts**		
1147	Thirty (30) days prior to placing the Cashless Tolling System in revenue collection the Contractor shall have purchased and have on hand at Commission facilities the agreed upon inventory of spare parts.		

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1148	The spare parts shall be purchased on behalf of the Commission and shall be invoiced at the time of installation and owned by the Commission in a manner to ensure that the Commission receives the maximum benefit from any warranties associated with the spare parts. After the warranty period, the Commission shall reserve the right to purchase all spare parts directly from the source and all purchases will be coordinated through the Commission Procurement Office. After the Warranty period, Contractor provided spare parts not purchased directly by the Commission shall be provided at cost, shall not include any mark up and shall be in accordance with the agreed to Contract price. The Commission shall be under no obligation to buy back excess spare parts purchased by the Contractor.		
1149	The Contractor shall cooperate with and assist the Commission to ensure that all spare parts, equipment, and other Commission owned property is stored or otherwise located on the Contractor's property or in Contractor controlled space shall not be subject to any risk of being confiscated, claimed, attached, withheld by a landlord, creditor, or similar risk.		
1150	This cooperation includes, but is not be limited to, affixing appropriate labeling to track within MOMS and identify as the property of the Commission, with a Commission specific part or control number. All spare parts and consumables shall be maintained by the Contractor free and clear of any liens and encumbrances of any kind. The Commission shall have the right to inspect the spares and consumables inventory upon request.		
1151	The facility and storage area shall be secured and connected to an up-to-date security network system with alarm notification provided to the Contractor's Maintenance staff. Further, it is required that the Commission shall have full and unrestricted access to the Maintenance and or storage facility.		
1152	Any spare parts that are lost or damaged due to the negligence, intentional act, or omission of the Contractor or its employees, Subcontractors, agents, or invitees shall be replaced by the Contractor at its sole cost. The Commission may elect to assume responsibility at any time for storage of spare parts, and the Contractor shall deliver all spare parts to the Commission for storage after receipt of reasonable notice from the Commission.		
7.11	**Repair Depot**		
1153	The Contractor shall be responsible for providing and staffing a repair depot for the return and repair of Cashless Tolling System components.		
1154	The Contractor shall be responsible for repairing failed Cashless Tolling System components and returning them to the spare parts inventory.		
1155	Failed components shall be tracked by the Contractor utilizing MOMS, including final resolution. Component tracking shall include but not limited to the following: receipt, repair date/information, replace reason, date of return.		
1156	The Contractor shall indicate the details of the repairs performed on any components. This shall include but not be limited to boards and connectors replaced.		
1157	If the replaced part is under Warranty, the part shall be immediately replaced with a new part by the Contractor. If the replaced part is out of Warranty, the Contractor shall make every effort to repair the replaced item to a usable status and place the part back into spares inventory. Except for pervasive defects, for out of Warranty components, the Contractor shall document why the component could not be repaired and advise the Commission that a new spare must be ordered.		
7.12	**Audits**		
1158	The Contractor shall completely support the Commission in any audit activity relating to the PTC's Cashless Tolling System or operations. In addition, the Contractor shall conduct audits in accordance with the Contractor's Quality Assurance Program. All deficiencies identified through the Audit process shall be successfully corrected by the Contractor. These audits may include, but are not limited to the following:		
	· internal control procedures;		
	· revenue/transaction reporting;		
	· financial audit and		
	· System processing and performance.		
	· Third party security evaluations		
7.13	**Security Certification**		
1159	The Contractor in coordination with the Commission shall perform monthly security tests that are scheduled in the MOMS, as well as every time a new Software release is deployed or new network equipment is added or replaced to evaluate the security risk to the Cashless Tolling System and identifying potential vulnerabilities. Commission IT Security shall be a party to these security tests and shall be notified in advance of any scheduled tests.		

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1160	The Contractor is responsible for correcting all Cashless Tolling System security deficiencies at the Contractor's cost and ensuring there are no security risks.		
7.14	Cooperation with Other Vendors and Providers		
1161	The Contractor shall cooperate to the fullest extent with other Contractors and third-party vendors in order to ensure that the lane and Cashless Tolling System operation and Maintenance do not conflict with or cause any deterrent in capability or service to the traveling public, customers, or the Commission.		
7.15	Emergency Response Management		
	The Commission has an emergency response management plan and the Contractor shall follow the procedures set forth in this plan when an emergency situation is invoked.		
1162	The Contractor shall immediately respond to any emergency situation, as notified by the Commission or otherwise, that may arise that has already or could potentially damage the Cashless Tolling System. The Contractor shall be prepared to put forth all necessary resources to divert or correct an emergency condition.		
1163	Such emergency conditions shall be handled in accordance with the policies and procedures established by the Commission. The following are a few examples of emergency conditions:		
	· weather related;		
	· vehicle accident;		
	· conditions that invoke the Disaster Recovery Plan;		
	· third party (power outage or communication failure);		
	· vandalism that causes parts of the Cashless Tolling System to be inoperable and		
	· detection of security breaches, discovered vulnerabilities and activities that pose a security threat to the Commission's toll collection system;		
7.16	Cashless Toll Host (if provided) Disaster Recovery		
1164	The Contractor shall perform Disaster Recovery procedures in accordance with the Approved Disaster Recovery Plan (DRP) in the event of a disaster and return the Cashless Toll Host System to a fully operational condition.		
1165	The Contractor shall test the Disaster Recovery procedures on a yearly basis to validate that they are functioning per the Design. The Commission shall witness the test and the Contractor shall provide a report outlining the test, test results and any anomalies encountered for the Commission's review and Approval.		
1166	The Contractor shall address any issues encountered from the yearly Disaster Recovery testing.		
1167	The Contractor shall conduct an after-action review in conjunction with the PTC with the goal of continuous improvement and evaluating the Disaster Recovery Plan effectiveness.		
7.17	Incident and Revenue Loss Reporting		
1168	The Contractor shall immediately notify the Commission of any incident or event whereby the potential or actual loss of revenue occurred or could potentially occur. The Contractor shall take immediate action to rectify the condition and return the Cashless Tolling System to normal functioning.		
1169	A Monthly Incident Report shall be provided by the Contractor that includes a breakdown of lost electronic data and revenue by the Commission for each incident. If the condition is determined to be due to the fault of the Contractor, damages shall be assessed in accordance with the terms of the Contract.		
7.18	Maintenance Staffing, Materials and Training		
7.18.1	Maintenance Staffing Requirements		
1170	The Contractor shall be responsible for maintaining an adequate level of technical staff to perform Maintenance and Software Support Services on the Cashless Tolling System. The Contractor shall ensure that sufficient staffing is available to cover all Maintenance activities identified in this Scope of Work at all times but particularly during the following periods:		
	· Weekends;		
	· Holidays;		
	· personnel on vacation/sick time;		
	· after regular scheduled Work hours (on call), and		
	· unexpected emergency or crisis.		
	The Contractor shall provide personnel to perform the following functions. It shall be the Contractor's responsibility to staff at appropriate levels to meet the requirements, using the Maintenance Plan as the guideline for staffing levels and full job descriptions:		

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1171	· Management: Contractor's Maintenance Management responsibilities include all Maintenance Management business dealings with the Contractor's Project Manager. Responsibilities include single point of contact for all Work related issues, including System problems, material issues, or Contractor personnel issues. Maintenance Management responsibilities also include ensuring that Systems are properly functioning and that the Maintenance and repair Work are properly performed and documented.		
	· Field Supervision: The Field Supervisory functions include being responsible for the day to day operations of the technicians, ensuring that all required Work is accomplished properly and efficiently.		
	· Maintenance Technical Staff: Responsibilities include responding to Maintenance activities and Alerts and for field level preventive Maintenance. Maintenance technicians shall be qualified and maintain the proper certifications to troubleshoot Maintenance problems and identify the source of the problem.		
	· Network Engineering: Network Administration shall include the configuration and Maintenance of the network systems and communications network.		
	· Database Administration: Database administration shall include management of the servers and databases in accordance with *Attachment 11 - Database Standards for the Pennsylvania Turnpike Commission* . The database administration shall cover all aspects of the System database and ensuring the database is optimized for peak performance. The responsibilities include the configuration and operation of the System database and generation of database queries as requested by the Commission and other support personnel.		
	· Systems Engineering: Responsibilities include the configuration and monitoring of all System processing and verify that all operations and processes are occurring as scheduled. All MOMS alarms relating to process failures shall be investigated and resolved by the System engineering staff. Systems engineering responsibilities also include ensuring the proper configuration of all servers and coordinating all server Maintenance. System engineering responsibilities also include identifying issues, communicating with the System Software personnel and coordinating resolution of the problem. All user-related problems (application Software) shall also be handled by the System engineering personnel.		
	· Software Technical Staff: Responsibilities include responding to Maintenance activities and Alerts and resolution of Software problems. Software technical staff shall be qualified to troubleshoot Maintenance problems, identify the source of the problem and correct the problem.		
	· Administrative Staff: Responsibilities include support of the Contractor's Maintenance organization for the performance of Maintenance functions and to provide adequate phone and administrative support at the Maintenance management facility.		
	· ECO Management: Responsibilities include managing the ECO process between the Contractor and the Commission. ECO management staff will ensure all the proper forms are filled out and proper authorizations are obtained to perform the change order work.		
	· Documentation Staff: Responsibilities include updating and maintaining the documentation library to ensure all Cashless Tolling project documentation required in this Scope of Work is current and up to date.		
7.18.2	**Tools and Materials**		
1172	The Contractor shall provide all test Equipment and tools and support; including but not limited monitoring tools; smart phones; laptops, and any other items required for the Maintenance and Software Support staff to perform their Maintenance activities. All such devices shall have adequate and up-to-date security software and be Approved by Commission IT before they are used on the Cashless Tolling System network. All required test Equipment, tools and Software tools shall be on site (as required) and in adequate supply, with all required personnel trained on their use. All test Equipment shall be standard units that are capable of achieving the measurement they are intended to make.		
7.18.3	**Training Program**		
1173	The Contractor shall ensure that Maintenance and Software services staff is properly trained for requirements of maintaining the System. The Contractor shall provide a minimum of two (2) weeks of classroom and On the Job Training (OJT) to all personnel in their respective area of responsibility before such personnel are assigned Maintenance duties.		
1174	The Contractor shall provide trained qualified technical staff to support the Maintenance and Software Support Services described in the Scope of Work. It is the Contractor's sole responsibility to develop training necessary to successfully perform all of the Maintenance actions required to keep the System operational.		

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1175	The Contractor shall complete all required training and certifications prior to performing actual Maintenance and Software Support Services within a revenue collection environment. In the event changes or modifications are made to the System Equipment or configuration, supplemental training shall be accomplished prior to the actual service date for the changes or modifications.		
1176	Training shall include the Contractor’s safety standards and guidelines and applicable Commission policies and procedures.		
1177	The Contractor shall provide documentation that this initial training has been successfully completed.		
1178	Various training programs the Contractor shall institute shall include, but not be limited to, the following:		
	· a thorough understanding and operating knowledge of the MOMS is required of all Maintenance personnel;		
	· an in depth understanding of the Cashless Tolling System and operations, including all Equipment, Software, interfaces, file transfers and interconnections;		
	· use of Maintenance documentation such as Maintenance manuals; drawings; vendor manuals, and parts list;		
	· functions of the System monitoring tools used to manage the System monitoring tasks;		
	· preventive Maintenance of all Systems and sub-systems;		
	· troubleshooting; diagnostics; repair, testing, and Maintenance follow up;		
	· System logs, errors logs and processing of exceptions;		
	· System dataflow and workflow queues;		
	· review of the Dashboard data and analysis;		
	· discussion on the areas of responsibility;		
	· special use Maintenance and monitoring tools;		
	· queries and reports, and		
	· System access and security.		
1179	All System Maintenance and Software support personnel shall attend the appropriate training sessions. The Commission staff shall be notified of and invited to attend any or all training sessions two (2) weeks in advance of the training.		
1180	All System Maintenance and Software support personnel shall be trained on scheduling, work assignments, escalation process, transportation requirements and communications;		
1181	The Contractor shall provide training offered by vendors and original equipment manufacturer (OEM) for System components where available and required to properly operate, maintain, test and repair such Equipment and Software. Such training shall include but not be limited to:		
	· LPICPS Equipment;		
	· AVI Equipment;		
	· AVC System;		
	· DVAS;		
	· MOMS;		
	· network components and Software provided by the Contractor;		
	· security Software and security tests;		
	· databases and		
	· servers.		
7.18.4	**Training Materials and Ongoing Education**		
1182	Training material shall consist of Maintenance manuals, vendor manuals and any other documentation that provides for the efficient and effective Maintenance of the System and its components.		
1183	The Contractor shall hold regular meetings with Commission technical personnel to update Maintenance procedures, bring proposed System changes to the attention of the technical staff and discuss Maintenance issues identified in the field. The Contractor shall provide the Commission with the meeting schedule so that the appropriate Commission staff can attend these meetings.		
1184	The Commission shall have the right to make recordings and copies of all training program materials. The Contractor shall provide releases from all employees/Contractors to allow unlimited, royalty free use and copies of recordings.		
7.18.5	**System Documentation**		
1185	The Contractor shall have appropriate System documentation available to all Maintenance and Software Support personnel as required to perform their respective duties.		

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1186	The Contractor shall make immediate updates to the online System documentation library to reflect any changes to the System Approved by the Commission. A version update sheet shall be included with the System documentation, and the documentation on file shall have the most recent version from the configuration management database. A complete submission of the System documentation shall be made every five (5) years that reflects all Approved changes to-date.		
7.18.6	**Training Records**		
1187	The Contractor shall keep accurate training records on all Contractor and Commission personnel. The Commission shall be permitted to audit personnel qualifications and training records at any time. Evidence of completion of training by Contractor and Commission personnel involved with system maintenance shall be provided to the Commission upon request.		
7.19	**Safety**		
1188	The Contractor shall adhere to all applicable safety standards and guidelines for working on or around energized Equipment and in a Maintenance environment, including but not limited to the following:		
	· the Commission safety procedures and guidelines are on the Commission website: https://www.paturnpike.com/business/engineering_standards.aspx;		
	· State of Pennsylvania safety procedures and guidelines;		
	· OSHA (Occupational Safety and Health Administration);		
	· NEMA (National Electrical Manufacturers Association);		
	· NEC (National Electrical Code);		
	· FHWA (Federal Highway Administration), and		
	· any other local, state, or Federal ordinance, procedure, or guideline that provides for a safe operation and working environment.		
7.20	**Maintenance and Protection of Traffic (MPT)**		
1189	The Contractor shall provide all MPT associated with the Cashless Tolling Maintenance Phase. The Contractor shall develop as a part of the Maintenance Plan an MPT procedure for Approval by the Commission. The Contractor shall follow the requirements as stipulated in the the most recent applicable Commission's Maintenance and Protection of Traffic Standard Drawings, as provided at https://www.paturnpike.com/business/engineering_standards.aspx. Contractor shall also follow the requirements as stipulated in CS 901 and the MPT Special Provision, which are provided in their current form in Attachment 15: Lane Closure and MPT Provisions. The Contractor shall be responsible for monitoring new releases of all standards/policies and assure their work complies with the most recent versions available.		
1190	The Contractor shall adhere to the Approved MPT Plan when setting up, working under MPT and restoring lanes to traffic. The Contractor shall provide the PTC representative the information required in the "Construction Daily Lane Closure Report" shown in Attachment 15: Lane Closure and MPT Provisions. Contractor shall work with the Commission to coordinate MPT Work and to adhere to the Commission advance notice requirements for Work in the lanes, both on a scheduled and emergency basis.		
7.21	**Maintenance and Software Support Records**		
1191	The Commission shall have access to all Maintenance and service records at any time for review and audit, upon reasonable notice. The Contractor shall provide monthly reports generated in the System that permits the Commission to evaluate Contractor's Maintenance performance.		
1192	The Contractor's Maintenance manager shall maintain current, complete and accurate records for all Maintenance and Software Support Services activities. The Contractor's Maintenance manager shall institute procedures that make sure Maintenance staff enters complete information into the MOMS before closing a work order or trouble ticket.		
1193	All preventive and predictive Maintenance activities shall be reported in the same manner as corrective or emergency Maintenance activities by the Contractor. The information shall be contained on the MOMS and shall be made available through various MOMS reports.		
7.21.1	**Maintenance Summary Reports**		
1194	The Contractor shall provide the Maintenance summary reports to the Commission on a monthly basis in advance of the Monthly Meeting. The format of the Monthly reports shall be Approved by the Commission and included in the Maintenance Plan.		

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1195	The Contractor shall provide an annual Executive Summary report to the Commission that summarizes the Contractor's performance for the Maintenance Year. The format of the Executive Summary reports shall be Approved by the Commission and included in the Maintenance Plan.		
1196	Maintenance summary reports shall also be readily available in detail or summary format to the Commission applicable personnel via the network on a daily, weekly, or other time period basis determined by the Commission. The Maintenance summary report shall include but not be limited to:		
	· a summary of the Contractor's performance for the month under review noting all accomplishments and deficiencies;		
	· all Maintenance and System performance reports that show Contractor's compliance to Maintenance performance requirements;		
	· detailed listing of failures and the impacted subsystems where Contractor's and System performance for the month were not in compliance with the performance requirements;		
	· any exceptions the Contractor believes are non-chargeable failures that Contractor is not responsible for;		
	· detailed list of parts replaced as a result of Maintenance actions, with an identification of warranty versus non-warranty replacement;		
	· status of removed parts and Equipment with an aging status for parts under repair or replacement (serial numbers, being repaired in Maintenance shop, purchase replacement part);		
	· trend analysis for repetitive failure;		
	· status of spare parts inventory;		
	· staffing report detailing positions and staff hours worked;		
	· staff performance trends;		
	· Software and firmware releases implemented;		
	· major Maintenance activities that occurred and are scheduled to occur;		
	· incidents that invoked emergency response or resulted in loss of toll revenue and		
	· summary of work order, Software defects and trouble tickets by priority and category.		
7.22	**Performance Requirements for the Cashless Tolling System and Liquidated Damages**		
	The Cashless Tolling System shall be designed, developed, tested, implemented and Maintained to meet the performance requirements specified herein without the need for manual intervention. The Contractor shall facilitate performance monitoring by reporting performance in clearly measurable terms. The Commission will conduct a review of the Contractor's performance on a monthly basis, as defined in the Maintenance Plan utilizing all required System reports provided by the Contractor and reports generated by the MOMS.		
1197	The Contractor shall submit backup data that confirms Contractor compliance to Maintenance performance requirements.		
1198	A detailed listing of the Cashless Tolling System alarms for each subsystem shall be created with their priority levels in support of the performance data and Contractor's responsibility shall be clearly identified. The Contractor shall be responsible for all alarms and work orders that are escalated to the Contractor.		
1199	Monthly performance reviews shall begin at the commencement of the Maintenance and Software Support Services Contract at each tolling point and shall continue monthly through the period of the Maintenance and Software Support Services Contract. The first month's performance shall be reviewed in month two of the Maintenance and Software Support Services Contract.		
1200	Liquidated damages associated with monthly performance reviews, if applicable, shall be assessed beginning in month		
7.22.1	**Acknowledgement of All Priority Events**		
1201	The Contractor shall acknowledge receipt of all Priority events within thirty (30) minutes of failure/event notification.		
1202	For the purposes of assessing Liquidated Damages, ninety five (95) percent of failure or priority event shall be acknowledged within thirty (30) minutes of receipt.		
1203	The Contractor may be assessed Liquidated Damages of $250 if the acknowledgment percent is below the ninety five (95) percent threshold every month for every Priority event not acknowledged within the time frame specified in these Requirements.		
7.22.2	**Time to Respond and Repair (TTRR)**		
	The Contractor shall respond to and complete repair of Priority 1 failures/events as follows:		
	· For In-Lane System failures and Cashless Toll Concentrator or Toll Host (if provided) failures that can be handled remotely: respond and complete repair within two (2) hours of failure/event notification.		

Functional Requirements

		Required Proposer Inputs	
		Status of Functionality	**Comments**
No.	**Requirements**	**Existing (E) - Met by current system, no modifications required** **Modification (M) - Modifications needed to meet requirement** **Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs** **To Be Developed (D) - Not in current system, but will be developed** **Not Provided (N**) - Will not be provided - requires explanation**	**If "Status of Functionality = N" then Proposer must provide an Explanation in this Column**
1204	· For Cashless Toll Concentrator or Toll Host (if provided) failures that require Onsite Corrective Maintenance: be onsite within twenty-four (24) hours of Approval to commence Work and once the Contractor is onsite, two (2) hour time to complete repair.		
	The Contractor may be assessed Liquidated Damages of $100 per occurrence for every additional delay of one (1) hour to respond and complete repair of Priority 1 failures/events.		
	The Contractor may be assessed Liquidated Damages of $500 per occurrence for every additional twenty-four (24) hour delay over the twenty-four (24) hours for being onsite and ready to commence Work.		
1205	The Contractor shall respond to and complete repair of Priority 2 failure/events as follows:		
	· For In-Lane System failures and Cashless Toll Concentrator or Toll Host (if provided) failures that can be handled remotely: respond and complete repair within four (4) hours of failure/event notification.		
	· For Cashless Toll Concentrator or Toll Host (if provided) failures that require Onsite Corrective Maintenance:: be onsite within forty-eight (48) hours of Approval to commence Work and once the Contractor is onsite, two (2) hour time to complete repair.		
	The Contractor may be assessed Liquidated Damages of $100 per occurrence for every additional delay of one (1) hour to respond and complete repair of Priority 2 failures/events.		
	The Contractor may be assessed Liquidated Damages of $300 per occurrence for every additional twenty-four (24) hour delay over the forty-eight (48) hours for being onsite and ready to commence Work.		
1206	The Contractor shall respond to and complete repair of Priority 3 failures/events as follows:		
	· For In-Lane System failures and Cashless Toll Concentrator or Toll Host (if provided) failures that can be handled remotely: respond and complete repair within twenty-four (24) hours of failure/event notification.		
	· For Cashless Toll Concentrator or Toll Host (if provided) failures that require Onsite Corrective Maintenance:: No longer than three (3) Calendar Days to respond and complete repair upon Approval to commence Work.		
	The Contractor is not subject to any Liquidated Damages for Priority 3 failures/events.		
7.22.3	**Mean Time Between Failures (MTBF)**		
1207	The Contractor shall meet MTBF requirements for the following elements of the Cashless Tolling System Components:		
	· Redundant Zone Controller: 30,000 hours		
	· Automatic Vehicle Identification (AVI) System: 20,000 hours		
	· Automatic Vehicle Classification (AVC) System: 30,000 hours		
	· License Plate Image Capture and Processing System (LPICPS): 30,000 hours		
	· Cashless Tolling Servers: 50,000 hours		
	· Network Devices: 50,000 hours		
1208	The reliability of the System components shall be calculated based on the following MTBF calculation: MTBF = # units x measuring period (hours)/ # chargeable failures		
1209	The Contractor may be assessed Liquidated Damages of $500 for each Sub-system not meeting requirement due to Contractor and Contractor System failure.		
7.22.4	**Availability**		
1210	The Contractor shall meet availability requirements for the following elements of the Cashless Tolling System:		
	· Lane Availability - Maintenance from Above or Below Toll Zones: 99.95%;		
	· Cashless Toll Concentrator or Toll Host System (if provided) – 99.95%;		
1211	Availability for each of the above systems shall be calculated as follows: Availability = 100% - [Total number of hours of downtime in time period X / Total hours in time period X].		
1212	For every month in which the Toll Zone lane is available less than the minimum requirement, Contractor may be subject to Liquidated Damages of:		
	· a 0.5% adjustment to the monthly Maintenance fee for availability of 99.90% and up to 99.94%;		
	· a 2% adjustment to the monthly Maintenance fee for availability of 99.50% and up to 99.89%;		
	· a 5% adjustment to the monthly Maintenance fee for availability of 99% and 99.49%.		
	· a 10% adjustment to the monthly Maintenance fee for availability below 99%.		
1213	For every month in which the Cashless Toll Concentrator or Toll Host System (if provided) is available less than the minimum requirement, Contractor may be subject to Liquidated Damages of:		
	· a 1% adjustment to the monthly Maintenance fee for availability of 99.90% and up to 99.94%;		
	· a 2% adjustment to the monthly Maintenance fee for availability of 99.50% and up to 99.89%;		
	· a 5% adjustment to the monthly Maintenance fee for availability of 99% and 99.49%.		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	Comments
No.	Requirements	Existing (E) - Met by current system, no modifications required Modification (M) - Modifications needed to meet requirement Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs To Be Developed (D) - Not in current system, but will be developed Not Provided (N**) - Will not be provided - requires explanation	If "Status of Functionality = N" then Proposer must provide an Explanation in this Column
	· a 10% adjustment to the monthly Maintenance fee for availability below 99%.		
7.22.5	**Transmission of TSL and VEL to the In-Lane Cashless Tolling System**		
1214	Successfully and accurately transmit the Comprehensive Home and Away/Interoperable TSL to each of the zone controllers within thirty (30) minutes of the Cashless Tolling Concentrator, Toll Host (if provided) or Facility Server(s) receipt of the TSL.		
	The Contractor may be subject to Liquidated Damages of $500 per occurrence per one (1) hour delay for failure to successfully and accurately transmit the TSL to each of the zone controller.		
1215	Successfully and accurately transmit the VEL (if exercised) to the In-lane Cashless Tolling System within thirty (30) minutes of the Cashless Toll Host System receipt of the VEL (if exercised).		
1216	The Contractor is not subject to any Liquidated Damages.		
7.22.6	**Transaction Processing and Transmission Requirements**		
1217	One hundred (100) percent of transactions (AVI and video transactions) from the roadway systems shall be sent to the existing PTC Toll Host and reconciled with an accuracy of one hundred (100) percent.		
1218	One hundred (100) percent of transactions (AVI and video transactions) identified to be pursuable and non-pursuable shall be successfully and accurately transmitted to the existing CSC/VPC system with an accuracy of one hundred (100) percent within twenty-four (24) hours of vehicle transit.		
1219	For failure to accurately process and reconcile one hundred (100) percent of all transactions and successfully and accurately transmit pursuable and non-pursuable transactions to the existing CSC/VPC system within twenty-four (24) hours of vehicle transit, the Contractor shall be subject to Liquidated Damages of $50 per twenty-four (24) hour delay per 1,000 transactions.		
7.22.7	**Image Processing Requirements**		
1220	One hundred (100) percent of images (video) from the roadway systems shall be successfully and accurately transmitted to the existing CSC/VPC system and reconciled to the transactions with an accuracy of one hundred (100) percent.		
1221	One hundred (100) percent of images identified to be pursuable shall be successfully and accurately transmitted to the existing CSC/VPC system with an accuracy of one hundred (100) percent within twenty-four (24) hours of vehicle transit.		
1222	For failure to accurately process and reconcile one hundred (100) percent of all images and successfully and accurately transmit pursuable images to the existing CSC/VPC system within twenty-four (24) hours of vehicle transit, the Contractor shall be subject to Liquidated Damages $50 per twenty-four (24) hour delay per 1,000 images set.		
7.22.8	**License Plate Extraction Accuracy - if the option to implement OCR/ALPR is exercised**		
1223	The Contractor shall provide an accurate OCR/ALPR process which shall result in the Cashless Tolling System extracting the license plate, plate type, and jurisdiction with an accuracy of at least 99.95 percent on minimum seventy (70) percent of video transactions generated in the lanes.		
1224	For error rates above the 0.05 percent rate, the Contractor may be subject to Liquidated Damages of $10 for each license		
7.22.9	**Spare Parts Availability**		
1225	The Contractor shall maintain the required physical inventory of agreed to spare parts in accordance with the Contract.		
1226	For failure to maintain spare parts inventory at adequate levels for the month, the Contractor may be subject to Liquidated Damages of $500 per month for each failure to maintain spare parts inventory per the counts required.		
7.22.10	**Preventive Maintenance**		
1227	The Contractor shall perform preventive Maintenance on the Cashless Tolling System according to Approved Preventive Maintenance schedule.		
1228	The Contractor is not subject to any Liquidated Damages for this Maintenance Work.		
7.23	**Security**		
1229	All Contractor personnel shall be subject to appropriate security and background checks to the satisfaction of the Commission. The Contractor shall obtain written Approval from the Commission for all service personnel and each Contractor personnel shall be required to sign an acceptable use agreement.		
1230	Contractor's personnel shall be issued Commission identification badges and shall wear such identification badges at all times when on the Commission property. Use of such identification badges for purposes other than work associated with the Contract will result in termination of the employee from the Contract and possible other legal or disciplinary action.		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	Comments
No.	Requirements	Existing (E) - Met by current system, no modifications required Modification (M) - Modifications needed to meet requirement Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs To Be Developed (D) - Not in current system, but will be developed Not Provided (N**) - Will not be provided - requires explanation	If "Status of Functionality = N" then Proposer must provide an Explanation in this Column
1231	The services and Work performed under the Contract are considered highly confidential and the Contractor personnel shall at all times comply with applicable current computer and data industry standards with regard to data and information security. All employees of the Contractor shall not discuss their work with unauthorized personnel or any individuals not directly associated with the Commission.		
1232	Contractor’s personnel can only use Commission -assigned workstations, servers, and laptops to communicate with the Cashless Tolling System while on Commission premises.		
1233	The Commission will identify and designate a primary point of contact for the Contractor. Under most circumstances, the Contractor will limit communication with Commission authorized staff and to the Commission’s designated point of contact unless otherwise directed by the Commission.		
1234	Discussion by the Contractor of any Services or Work performed under the Contract with the media, in oral presentations, in written publications, or in any other form, not related to this Contract shall be Approved in advance by the Commission.		
7.24	**Confidentiality**		
1235	The Contractor shall keep all information regarding its activities pursuant to this Contract confidential and will communicate such information only with authorized Commission personnel or Designated Representatives.		

Attachment 15
Lane Closure and MPT Provisions

ALLOWABLE WORKING HOURS[1]

1. MP 000.00 to MP 075.39 – 9 PM to 6 AM nightly, Sunday night through Friday morning
2. MP 075.39 to MP 179.44 – 11 PM to 6 AM nightly, Sunday night through Friday morning
3. MP 179.44 to MP 226.54 – 9 PM to 7 AM nightly, Sunday night through Friday morning
4. MP 226.54 to MP 241.87 – 8 PM to 7 AM nightly, Sunday night through Friday morning
5. MP 241.87 to MP 245.75 – 10 PM to 6 AM nightly, Sunday night through Friday morning
6. MP 245.75 to MP 359.00 – 10 PM to 5 AM nightly, Sunday night through Friday morning
7. MP A-020.00 to MP A-094.59 – 10 PM to 5 AM nightly, Sunday night through Friday Morning
8. MP A-094.59 to MP A-131.00 – 6 AM to 7 PM daily, Monday through Thursday
9. Toll I-376, Turnpike 66, Turnpike 43, Turnpike 576 – 9 AM to 2 PM daily, Monday through Thursday; 9 PM to 6 AM nightly, Sunday night through Friday morning

[1] For Planning purposes only. Allowable working hours subject to change at PTC discretion.

2018 HOLIDAYS[1]

EASTER	From 5:00 A.M., local time, Friday, March 30 to 11:00 P.M., local time, Monday, April 2, 2018.
MEMORIAL DAY	From 3:00 P.M., local time, Thursday, May 24 to 11:00 P.M., local time, Monday, May 28, 2018.
INDEPENDENCE DAY	From 5:00 A.M., local time, Friday, June 29 to 11:00 P.M., local time, Sunday, July 8, 2018.
LABOR DAY	From 3:00 P.M., local time, Thursday, August 30 to 11:00 P.M., local time, Monday, September 3, 2018.
THANKSGIVING DAY	From 5:00 A.M., local time, Tuesday, November 20 to 11:00 P.M., local time, Sunday, November 25, 2018.
CHRISTMAS AND NEW YEARS	From 5:00 A.M., local time, Friday, December 21, 2018, to 11:00 P.M., local time, Tuesday, January 1, 2019.

2018 EVENTS (only for projects in event areas)

SPRING CARLISLE AUTO SHOW	From 5:00 A.M., local time, Thursday, April 19 to 6:00 P.M., local time, Sunday, April 22, 2018.
POCONO 400 RACE	From 5:00 A.M., local time, Saturday, June 2 to 11:00 P.M., local time, Sunday, June 3, 2018.
CELTIC FLING & HIGHLAND GAMES	From 5:00 A.M., local time, Saturday, June 23 to 11:00 P.M., local time, Sunday, June 24, 2018.
OVERTON’S 400 RACE	From 5:00 A.M., local time, Saturday, July 28 to 11:00 P.M., local time, Sunday, July 29, 2018.
CORVETTES AT CARLISLE AUTO SHOW	From 5:00 A.M., local time, Friday, August 24 to 6:00 P.M., local time, Sunday, August 26, 2018.
FALL CARLISLE AUTO SHOW	From 5:00 A.M., local time, Friday, October 5 to 6:00 P.M., local time, Sunday, October 7, 2018.
MAPLE GROVE RACEWAY NATIONALS	From 5:00 A.M., local time, Thursday, September 13 to 11:00 P.M., local time, Sunday, September 16, 2018.
HERSHEY REGION FALL MEET	From 5:00 A.M., local time, Friday, October 5 to 11:00 P.M., local time, Saturday, October 6, 2018.
FORT LIGONIER DAYS	From 5:00 A.M., local time, Friday, October 12 to 8:00 P.M., local time, Sunday, October 14, 2018.

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[1] For Planning purposes only. Holiday and Special Events Calendars updated yearly and subject to change.

CONSTRUCTION DAILY LANE CLOSURE REPORT
Contract No.

DATE:

FROM MILEPOST:

WEST ☐ **EAST** ☐ **NORTH** ☐ **SOUTH** ☐

LEFT ☐ **CENTER** ☐ **RIGHT** ☐ **SHOULDER** ☐

ESTIMATED TIME LANE CLOSED:

ESTIMATED TIME LANE OPENED:

REASON FOR LANE CLOSURE:

PennDOT CONTACT PERSON NAME & PHONE #:

CONTRACTOR CONTACT NAME & PHONE #:

CONTACT CELLULAR NUMBER:

FORM COMPLETED BY:

Duty Officer Telephone #866-332-5889 or #800-932-0586
Field Contact dial *11 on cell phone

CS 901

SECTION 901 - MAINTENANCE AND PROTECTION OF TURNPIKE TRAFFIC DURING CONSTRUCTION

901.1 DESCRIPTION - This work is the furnishing, installing, maintaining, and relocating of traffic control devices of Turnpike traffic adjacent to and within the construction area. Perform all work as specified in these Specifications, the Publication 212, the Special Provisions, Standard Drawings, the Maintenance and Protection of Traffic/Traffic Control Plans (TCP), and as directed.

901.2 MATERIAL - Furnish material and traffic control devices necessary for maintenance and protection of traffic, and conforming to the TCP, Publication 212, and as follows:

- Temporary Concrete Barrier - Section 627.2
- Temporary Impact Attenuating Devices - Section 696.2
- Reset Temporary Concrete Barrier - Section 628.2
- Reset Temporary Impact Attenuating Devices - Section 697.2
- Painting Traffic Lines and Markings - Section 962.2
- Temporary Pavement Markers - As manufactured by Ennis Paint, Inc.
    - Non-Plowable Raised Pavement Markers - Model No. 911 or approved equal
    - Recessed Reflective Pavement Markers - Model No. 948 or approved equal
- Bituminous Tack Coat - Section 460.2
- Superpave Bituminous Wearing Course - Section 409.2
- Bituminous Wearing Course FJ-1 - Section 422.2
- Flat Sheet Signs (for Post Mounted Signs, Type B, C and F and Distance Marker(s)) – Section 1103.04

When traffic line paint and glass beads are provided according to the requirements of Section 901.3(k), furnish certification, as specified in Section 106.03(b)3, that these materials meet specifications.

All temporary traffic control devices must be listed in Bulletin 15 as NCHRP-350 compliant. Temporary Type III barricades must comply with Standard Drawing TC-8716 or be listed in Bulletin 15 as NCHRP-350 compliant.

901.3 CONSTRUCTION -

(a) General. Comply with Publication 212.

At least 2 weeks before any maintenance and protection of traffic signs are set up, submit a QC Plan describing the installation, maintenance, and relocation operations for traffic control devices, protection of Turnpike traffic adjacent to and within the construction area, and methods necessary to achieve the requirements of this section, Publication 212, special provisions, Standard Drawings and the Maintenance and Protection of Traffic/Traffic Control Plans (TCP) and hold a pre-operations meeting to review the quality control plan for field control and evaluation of the maintenance and protection of traffic operations. Approval of the QC plan does not change or alter any specification requirements.

Furnish, install, maintain, and remove traffic control devices as indicated on the TCP and the Standard Drawings. To accommodate active operations, furnish and maintain all necessary signs and devices. If construction operations, equipment and resultant conditions, including winter shutdown periods and unforeseen conditions, necessitate the use of additional signs, devices and flaggers, furnish and maintain such as are required and to the satisfaction of the Representative. The Representative may revise the TCP in writing during construction. If revisions are made to the TCP by the Representative, install and maintain any additional warning lights and traffic control signs and devices on necessary mounting devices according to Publication 212, and at locations designated in writing by the Representative. Use PennDOT approved channelizing devices only. Reflectorize channelizing devices with PennDOT approved Type XI reflectorized material. Provide safety for the general public and the work crew. Ensure that all equipment approaches, enters, and departs from working zones in the direction of and with the normal adjacent traffic flow. Schedule construction operations to allow movement of traffic through various phases of construction with minimum interference. If traffic interruptions become too frequent, cease operations in the area concerned, as directed. Take remedial action to correct the situation before continuing operations. Remove or cover existing traffic control devices that conflict with the TCP. When the conflict no longer exists, erect or uncover them. The Chief Executive Officer may impose restrictions on the Contractor's operations, including complete suspension, as is necessary to eliminate adverse traffic conditions on the Turnpike without liability for delay.

The Contractor is cautioned that other Commission Contractor(s) and/or Commission Maintenance Personnel may be working adjacent to the work zone(s) during portions of this contract period. The Representative will specify the working sequence of the contracts in order to facilitate coordinated traffic control operations.

If it is necessary to stop traffic, the Turnpike detail of the Pennsylvania State Police (Troop T) will conduct all traffic stoppages. These stoppages will not exceed fifteen minutes in length, or as otherwise indicated. To halt traffic, schedule the stoppage during non-peak hours during the time period indicated in the Special Provisions. For consecutive stoppages, Troop T may stop traffic following the preceding stoppage and after traffic has returned to its normal flow. According to current traffic conditions, Troop T will determine the time duration between stoppages. Troop T may stop traffic only when the weather conditions are satisfactory.

A minimum of 14 days in advance of the scheduled work that will require a traffic stoppage, notify the Representative. The Representative will notify the Troop T. In addition, provide sufficient flaggers to assist Troop T. These flaggers are subject to the direction and control of Troop T.

Maintain full access to all interchanges, maintenance areas, service plazas, rest areas and access gates. When operations prevent full access to these areas, schedule, arrange, and conduct work in such manner as will provide the least interference to traffic, utilizing the provided access, and to the satisfaction of the Representative. Maintain open traffic lanes in a satisfactory manner. Immediately remove all dirt, spillage or other foreign material deposited on the roadway. Be responsible for any damage caused to passing vehicles or persons. Provide suitable shields or other means to prevent such damage. The Representative’s approval of such measures does not relieve the Contractor of the responsibility for damage caused.

Cover all speed limit signs as well as all other existing warning and informational signs and retain the covers when such messages are inappropriate for the traffic control pattern used. When work is not being performed and all normal lanes and shoulders are available and at the same elevation for the effected direction(s), cover all work area signs and turn off all Type A, Type B, and Type C lights associated with these signs. When all normal lanes and shoulders are not available or are not at the same elevation for the effected direction(s), cover all appropriate work area signs and turn off all Type A, Type B and Type C lights associated with these signs. Uncover signs and turn on all Type A, Type B and Type C lights associated with these signs prior to the resumption of work.

Install and maintain reduced regulatory speed limit signs in work areas, as indicated on the TCP, the Standard Drawings, or as directed. Establish work zone speed limit of 55 MPH in all construction zones except when using tunnel cross-over traffic pattern establish work zone speed limit of 40 MPH. Establish work zone speed limit by installing 55 MPH speed limit signs in advance of construction area access openings and truck crossings as shown in the Standard Drawings. Establish work zone speed limit of 55 MPH when a pavement differential exists between any of the temporary or permanent travel lanes.

Temporarily remove or cover reduced regulatory speed limit signs when workers are not present, except as otherwise indicated on the TCP, the Standard Drawings, or as directed. Cover or remove work zone speed limit signs when all normal lanes and all normal median and shoulders are available and all travel lanes are at the same elevation for the affected direction(s). Cover or remove work zone speed limit signs when temporary concrete barrier closes the median or shoulder.

Open any substantially completed section of roadway for the use and convenience of traffic, as directed, and as specified in Section 107.15. When work is completed, immediately remove temporary traffic control devices.

Construct and erect all devices in an efficient manner. Maintain, clean, and properly operate the devices during the entire time they are in use. Traffic control devices must meet the acceptable or marginal standards of the Pennsylvania Quality Guidelines for Temporary Traffic Control Devices. Remove all devices when no longer required or not used for a period of two weeks. Where operations are performed in stages, maintain and operate only the necessary devices that apply to the present stage of construction. If operations include a winter shutdown period, remove all signs, devices, material and equipment and store off the Turnpike right-of-way until beginning construction in the spring. Store devices off the Turnpike right-of-way until required on the project.

Do not allow weeds, brush, trees, construction equipment, materials, and the like to obscure any traffic control device.

Secure all approved access gates to prevent the unauthorized entry of persons, vehicles and animals. When required, station watchmen at the access gates to provide security. Secure approved access gates with locks when watchmen are not used. Provide locks that will not interfere with the Commission's locking system.

At the completion of the project, remove all signs and devices from the Turnpike right-of-way.

(b) Maintenance of Roadway and/or Structures. Treat existing earth roads or improved roads that have been graded, with calcium chloride or by other approved dust control palliatives, as specified in the proposal or as directed.

For the duration of the project, be responsible for repairs, on a 24 hour a day basis, necessary to maintain smooth traffic flow in all available traffic lanes within the limits of the traffic control patterns. These limits start where any traffic control devices begin encroaching on the roadway and end where traffic is returned to its normal lanes. If operations cease during the holiday period or if the Commission suspends construction, the Commission's Maintenance Department will be responsible for maintaining open traffic lanes. Payment for repairs directed by the Representative will be according to Section 110.03.

The Commission reserves the right to enter upon a project and, at its own expense, maintain the existing roadway and/or structures. This maintenance will be during the life of the project, but will not include those items that are the Contractor's responsibility as specified in Section 105.13 for the contract items of work and Section 901.3(e) for the accommodation of local traffic. The Commission does not assume responsibility in any way for maintenance of traffic as a consequence of performing this roadway and/or structure maintenance. If the Commission does not exercise its right to enter upon a project, then the Contractor is to perform routine maintenance of the existing roadway and/or structures that are open to traffic at not additional cost to the Commission.

(c) Snow Removal and Anti-Skid Material. The Commission reserves the right to enter upon a project and, at its own expense, remove snow and/or place anti-skid material, considered necessary for continued traffic flow. The Commission does not assume responsibility in any way for maintenance of traffic as a consequence of removing snow or placing anti-skid material.

Remove the anti-skid material, when necessary.

(d) Employee Parking and Safety. Turnpike traffic regulations prohibit parking of vehicles on or adjacent to the travel lanes. Employees will not be permitted to park their cars within the Turnpike right-of-way, including interchange areas. Provide off-site parking areas for employee's cars and transport employees between the parking areas and the project in buses or other approved vehicles. In no case will employees be permitted to ride on the outside of any vehicle. Do not discharge passengers from any vehicle within ten feet of any travel lane. Workers are not permitted to cross live traffic lanes except in the interchanges and service plazas.

Turnpike regulations also prohibit U-turns and crossing of travel lanes with vehicles and equipment. Exceptions to these regulations may be granted by the Safety Manager upon receipt of proper written request. The Commission will not permit U-turns at interchanges.

Require all persons to wear high-visibility safety apparel meeting the Performance Class 2 or 3 requirements of the current ANSI/ISEA 107 publication when working within the Commission's right-of-way or while in work zones adjacent to traffic.

(e) Local Traffic Maintenance and Safety. Proceed with the work to ensure safety and the least inconvenience to local traffic. Maintain local traffic ingress and egress by use of existing or new roadways.

Provide and maintain local access to and from the nearest intersecting public road or street, unless otherwise directed. As directed, provide temporary approaches for local vehicular and pedestrian access to and from commuter service, residential, business, industrial, and other public and private facilities.

Also, provide and maintain adequate bridging over base and surface courses, trenches, or other construction, when directed.

(f) Equipment and Material Storage. At the end of the workday and whenever practical during the workday, store equipment, vehicles and material a minimum of 40 feet from the edge of the nearest open travel lane or store behind existing guide rail and/or concrete barrier using the clearances in RC 54M.

(g) Tubular Markers. When indicated, furnish and install tubular markers according to the MUTCD.

When directed or as required, replace the complete tubular marker or the tubular marker post only, as the case may be.

When directed or as required, replace the reflective band on the tubular marker.

Remove all tubular markers when no longer necessary for traffic control or as directed.

(h) Existing Commission Signs. Remove and temporarily relocate to appropriate locations existing warning, regulatory, guide, and directional signs as required to accommodate construction operations. Do not remove Stop or Yield signs unless an alternate type of traffic control is provided, such as flaggers, temporary traffic signals, etc. Continue the alternate traffic control until the Stop or Yield signs are replaced. Stake or mark sign locations or locate signs on construction drawings before removing any signs. Mark signs with the milepost or station of its existing location along with the offset in feet from the existing centerline. With the exception of Stop or Yield signs as herein noted, permanently reinstall existing warning, regulatory, guide and directional signs at appropriate locations as soon as operations that interfere with the signs are complete. The Contractor is responsible for signs or supports damaged or lost.

(i) Barricades. When indicated, furnish and install barricades according to Publication 212.

(j) Entrances and Exits to Turnpike. In addition to the existing entrances and exits to the Turnpike, establish all temporary entrances and exits that are deemed necessary and approved in writing by the Representative. In order to meet the rules and regulations of the Commission, the Representative will establish controls for construction, safety, and traffic. Deviations from such rules will not be tolerated and will be sufficient grounds for the withdrawal of the Representative's approval. Upon completion of the Contract, restore the affected areas and appurtenances to their original condition.

(k) Work Zone Pavement Markings. The type and location of temporary pavement markings will be indicated on the TCP. Do not open any section of roadway to traffic without proper temporary or permanent pavement markings. Remove conflicting pavement markings prior to changing traffic patterns. Correct any irregular or inaccurate pavement markings as directed by the Representative.

The Contractor is responsible for all temporary pavement markings.

Place standard pavement markings in the same location as covered or destroyed pavement markings, unless otherwise indicated on the TCP or directed.

Be responsible for the maintenance of all work zone pavement markings. Reapply work zone pavement markings prior to winter shutdown, prior to beginning construction in the spring, and every 3 months for each stage of construction.

Be responsible for the removal of all work zone pavement markings as specified in Section 963.3. Remove the temporary painted markings by water blasting or sandblasting. Use only high-pressure water blasting to remove lines on permanent, Superpave surfaces. Temporary painted markings must be entirely removed.

Remove any pavement markings improperly placed and install in the correct location at no additional cost to the Commission.

Do NOT, under any circumstances, apply painted markings to permanent barrier used on the project or on mainline bridge decks with latex concrete surfacing.

1. Painted Pavement Markings. Section 962 and as follows:

Paint any temporary markings at the normal millage used when painting permanent markings. Paint the temporary skip line 4 inches wide by 10 feet long with a 30-foot space between each temporary skip line. Apply glass beads at the normal rate. Use traffic line paint and glass beads for pavement markings meeting requirements in Publication 212.

2. Temporary Pavement Markers. Install markers according to the manufacturer's specifications. Unless otherwise specified below, space markers at 20 foot centers in transition areas and at 40 foot centers elsewhere. Install markers adjacent to solid lines and in between skip lines. Markers are to be the same color as adjacent pavement markings. Remove pavement markers that are no longer required or that conflict with traffic patterns being used. Temporary pavement markers are not required for each stage of construction that utilize temporary highly reflectorized polyurea pavement markings or temporary removable pavement marking tape.

Install markers as shown on the plans and according to the following requirements:

- Mainline bridges. Use temporary non-plowable raised pavement markers for all temporary pavement markings required on the bridge decks.

- Roadway Pavement. Install temporary non-plowable raised pavement markers in addition to pavement markings along the centerline of narrowed or shifted travel lanes and along the right edgeline of shifted travel lanes. Temporary non-plowable raised pavement markers along the right edgeline of shifted travel lanes are not required when the right edgeline is directly adjacent to temporary barrier.

- Median Reconstruction. On final roadway pavement surface, install temporary yellow non-plowable raised pavement markers on the pavement adjacent to the permanent concrete median barrier in temporary position at the midpoint of each permanent concrete median barrier section.

- Markings required between March 1 and November 30 - Install non-plowable raised pavement markers.

- Markings required between December 1 and February 29 – Install non-plowable raised pavement markers on final surfaces only. Install recessed reflective pavement markers on non-final surfaces only. Install as shown on the Standard Drawings, as recommended by the manufacturer, as directed by the Representative and as follows:

Perform a test section prior to performing any work and at any time as directed by the Representative. Select a location for the test in an area agreed to by the Representative. Perform the test section to ensure that the machine is capable of cutting RRPM slots as shown on the Standard Drawings.

Install the recessed pavement markers by cutting a slot in the pavement as shown on the Standard Drawings. Ensure that the slot is wide enough for the marker to fit freely into the slot and deep enough to allow for epoxy adhesive. Ensure that the top of the installed marker is flush with the pavement surface or no more than 1/16 inch below the pavement surface.

Bond the marker in the slot with an acceptable epoxy adhesive in such a manner as specified and recommended by the manufacturer and as approved by the Representative.

Prior to opening the lane to traffic, remove and dispose of all milled debris as required.

- Remove temporary non-plowable raised pavement markers prior to November 30 and replace, if required, with temporary recessed reflective pavement markers. If a stage change occurs between October 1 and March 1, temporary recessed reflective pavement markers may be installed on non-final surfaces only in lieu of the temporary non-plowable raised pavement markers for the duration of the stage at no additional cost to the Commission, as approved by the Representative.

3. Temporary Concrete Barrier Delineation. Install delineators of an approved type listed in Bulletin 15. Delineators are to be the same color as adjacent pavement markings and are to be in accordance with Section 937.2(a).

(l) Portable Road Light and Power Unit. Use portable road light and power units to illuminate all crossovers at night and to illuminate work zones during nighttime work hours. Do not locate lighting fixtures to produce distracting or blinding glare for the driver. Provide units meeting the following minimum requirements:

1. Illumination.

- Lamp - 250 watt, high-pressure sodium.
- Distribution - IES Type V.
- Mounting Height - 25 feet.
- Design and construct refractor from unbreakable material and to reduce specified light distribution without causing glare to motorists.

2. Power Unit. Self-contained power generation unit satisfactory to the Representative.

3. Assembly. Mount lamps on telescoping pole or tower with T-bar support for three lamps capable of being operated separately or together by individual control. Mount lamps on T-bar assembly to enable positioning lamps at any location within 180 degrees of horizontal. Mount entire power-pole unit on trailer capable of being towed. Secure unit to trailer by mechanical attachment affixed to trailer so that unit cannot be raised inadvertently while being towed. Equip trailer unit with rubber tires and automotive wheels. Equip trailer with standard attachment tow-bar assembly with safety chain and Pennsylvania approved taillights and directional signals. Stabilize for wind conditions in excess of 65

MPH. Provide electric wiring, cable, connection, etc., according to type approved for automotive use and meeting the requirements of the latest National Electric Code and the Commonwealth of Pennsylvania.

4. Alternate Power Supply. Make provisions for quiet zone operation from alternate power supply or commercial service.

5. Acceptance. Obtain the Representative's approval of each unit prior to use on the project.

Alternate construction lighting may be used to illuminate work zones during nighttime work hours. The Commission has pre-approved an alternate that meets the following requirements:

- Multi-Directional Lighting Device (MDLD) units which can self-inflate and are capable of illuminating approximately 15,000 ft^2.
- MDLD units 3.5 ft. horizontal diameter and capable of withstanding 60 mph winds.
- MDLD units with halogen bulbs recommended by the manufacturer.

Furnish, maintain, and operate sufficient number of units to properly illuminate work zones and/or provide proper lighting of all crossovers. Repair or replace damaged lighting units and bulbs within 24 hours.

(m) Construction Vehicles and Equipment. Identify all vehicles, cars and trucks used on the project and which travel the open lanes of traffic with a magnetically attached sign, or approved equal sign, prominently positioned on the rear of the vehicle. Attach signs to vehicles whenever traveling open traffic lanes. Provide signs per the Standard Drawings, or as approved by the Representative. Provide black legend on orange Type XI reflectorized material.

Obtain the Representative's approval prior to using the signs on the project. Keep signs clean and in good repair at all times to the satisfaction of the Representative. Ensure that all equipment approaches, enters, and departs from working zones in the direction of the adjacent traffic flow. Furnish all equipment and vehicles with a yellow flashing light attached to the equipment adjacent to and facing the traffic and which is visible 360 degrees. Provide lights meeting the following requirements:

1. Description. Operate light from a nominal 12 volt DC power source. Provide amber lens and lamps that are visible 360 degrees. Furnish housing to provide rigid support to the lamp, motor and drive train.

2. Minimum Dimensions. Height 7.25 in; Diameter 8.5 in.

3. Lamps. Consisting of two Par 36 Sealed Beam Incandescent Lamps to provide 3500 beam candlepower. Provide sealed beam lamps that produce approximately 80 flashes per minute when rotating.

4. Construction. Provide reinforced thermoplastic lamp holder. Use spring clips to hold lamp in holder and make electrical connection to the lamp when properly placed in holder. Screw terminals or spade connections to the lamp are unacceptable.

5. Motor. Provide a permanently lubricated, high torque, permanent magnet type operating from nominal 12 volt DC, filtered to reduce radio frequency interference.

6. Drive Train. Utilize a gear assembly with the worm-gear being part of the motor armature. Incorporate in the drive chain a slip clutch arrangement to prevent motor damage. RUBBER BANDS OR FRICTION DRIVE UNITS ARE UNACCEPTABLE.

7. Lens Retainer. Fabricated from stainless steel with a nut and bolt fastener. Luggage clamp type fasteners are acceptable.

8. Mounting. Provide unit capable of being surface mounted or on a self-leveling mount. Provide all mounting hardware including 14-gauge wire, 24 feet in length with an in-line fuse, switch-rocker type (lighted), and roof mounting bolts. Provide a rubber or neoprene gasket or mounting pad to form a weatherproof seal between housing and vehicle roof.

9. Reference. Arrow Model 530, Modified (99005); Federal Model 14, Modified; Dietz Model 7-40004; or approved equal. Strobe type and LED lights that meet the dimension, candlepower, flash, lens and retainer and mounting requirements will be acceptable.

(n) Sign Identification and Covers. Provide contract number, Contractor name, owner of traffic control sign and Contractor's telephone number for 24-hour contact on the back of each traffic control sign, PCMS, and Speed Display Sign. This information is to be available to Turnpike personnel for emergency purposes. Furnish a sticker indicating the manufacturer of each PCMS and Speed Display Sign.

Cover existing signs and traffic control signs that conflict with the TCP or that do not apply to existing conditions. Cover with black vinyl coated polyester material having a minimum weight of 18 oz. per square yard and minimum thickness of 20 mils. All other materials, including but not limited to burlap or similar open mesh materials, other signs, and trash bags are unacceptable. Cover the entire sign, including any supplemental plaques. Stabilize and fasten this material to the sign with either plastic or wood to prevent any movement. Do not apply tape to the face of the sign. Do not deface or damage the sign face using this procedure. Maintain sign cover retainers in good condition. Remove signs not required or not used for a period of two weeks. Store signs off the Turnpike right-of-way until required on the project.

(o) Tenth and Whole Mile Markers. Mark sign locations or locate signs on construction drawings before removing whole mile marker signs in the median. At all times, ensure that the customers can see the whole and tenth mile markers. Permanently reinstall the whole mile marker signs in the median and the tenth mile marker signs on the shoulder as soon as operations that interfere with the signs are complete. The Contractor is responsible for signs or supports damaged or lost.

(p) Inspections and Patrols. Perform routine inspection of traffic control elements during each work shift. Additional inspections of traffic control elements may be required as directed by the Representative. Assign responsibility for safety and traffic control to a representative(s) trained and certified by PennDOT and/or ATSSA during each work shift. This individual(s) will ensure that all traffic control measures implemented on the project are necessary, conform to the TCP, and are effective in providing safe conditions for motorists and workers. If modifications to traffic control or working conditions are required to satisfy these requirements, this representative(s) will have the authority to modify conditions or stop the work until a safe condition is provided. Submit the name and qualifications of this individual(s) for acceptance by the Commission.

Assign personnel with vehicles to patrol the project, its approaches and other affected roadways. Provide patrol personnel with vehicles equipped with a 360-degree emergency warning light as specified in Section 901.3(m). Equip vehicles with four-way flashing warning lights, visible from front and rear to be used when the vehicle is stopped. Assign sufficient patrol personnel to provide for all necessary maintenance, repair or replacement of signs and devices. The patrol personnel are responsible to insure all access gates are locked or secured and to report accidents involving damaged traffic control devices to the Commission's Operations Center.

Report any adverse traffic conditions to the Operations Center who will notify Troop T. Remain at the scene until Troop T arrives. Take all reasonable steps to abate the adverse traffic conditions and take necessary precautions to warn other customers of the condition. Upon arrival of Troop T, cooperate with

Troop T to control traffic. At no time is the Contractor relieved of the responsibility for the maintenance and protection of traffic.

Patrol personnel are to report to the Operations Center traffic accidents involving customers and construction employees, equipment or vehicles. The Operations Center will notify Troop T. Report to the designated safety officer industrial-type accidents involving construction personnel. Notify the Representative of all accidents occurring within the project, its approaches or on other affected roadways.

Provide 24 hour patrols during continuous single lanes or when less than two 11 foot lanes, three 11 foot lanes in 3-lane sections, in either direction are available during non-working hours. Provide 24 hour patrols when normal ramp lanes and ramp widths are unavailable during non-working hours.

(q) Temporary Concrete Barrier. Except for temporary pavement markings, temporary concrete barrier is not to be painted.

Provide, install and maintain top-mounted and side-mounted delineators on temporary concrete barriers, glare screen and bridge barrier as indicated on the TCP.

Clean or replace all delineators as directed. Clean in an approved method.

(r) Flaggers. Provide flaggers at all sites where construction equipment and vehicles cross or have access to the travel lanes or as indicated on the traffic control plans. The flaggers are responsible to regulate the entry and departure of the construction equipment and vehicles.

Provide flaggers that successfully completed a flagger-training course within the last 3 years that complies with PennDOT's minimum flagger training guidelines described below. Assure that flaggers carry a valid wallet-sized training card containing the name of the flagger, training source, date of successful completion of training, and signature; or provide a roster of trained flaggers to the Representative before the start of flagging operations that contains the names of flaggers, training source, and date of successful completion of training. Minimum flagger training guidelines include the following:

1. Minimum Course Contents.

- Why flagging is important
- Fundamental principles of work zone traffic control
    - Component parts of the work zone
    - Channelization devices, spacing
    - Tapers
    - Buffer Space
    - Visibility to approaching drivers
- Human factors – driver attitude, expectation, reaction
- Qualifications of a flagger
- Clothing
- Flagger Operations
    - Setting up the flagger station
    - Signaling devices and when used
    - Hand signaling procedure
    - Communications
    - Two-flagger operations
    - Single flagger operations
    - Flagging in intersections
    - Nighttime flagging
    - Emergency situations

- Flagging in adverse weather conditions
- Sign requirements
- Practical exercise

2. Objectives. At the end of the course the student should be able to:

- Describe why flagging is important
- Describe flagger qualifications
- Ensure the flagger station complies with Turnpike, PennDOT, and FHWA requirements
- Gather all necessary equipment
- Select the proper flagging station/position/location
- Control traffic using the stop/slow paddle
- Control traffic using the red flag
- Control two-way traffic in one lane of a highway
- Control traffic at an intersection
- Recognize and be able to control traffic in unique or special flagging situations
- Control traffic at night and recognize a safe nighttime flagging operation
- Communicate with co-workers and the public

3. Test. All students must take and pass a written, closed book, knowledge test consisting of a minimum of 20 questions. Passing is 70%.

4. Re-training. Re-training is required every 3 years.

(s) Lifting of Construction Materials. Stop traffic during the placement or removal of any construction materials that are above open lanes to traffic, such as, but not limited to, lifting equipment, bridge components, signs, and overhead sign structure components as directed.

(t) Non-Compliance of Maintenance and Protection of Traffic. Liquidated damages will be assessed in the event of non-compliance with Maintenance and Protection of Traffic requirements. Liquidated damages will be assessed following notification by the Inspector-in-Charge.

When deficiencies are found, written notification will be provided to the Contractor to correct the deficiencies within a specified time frame. If the Contractor remains in violation of the Maintenance and Protection of Traffic provisions, a written action plan for correction will be required and work zone liquidated damages in the amount of $1,000 per day will be assessed until the deficiency is corrected to the satisfaction of the Representative. The Assistant Chief Engineer – Construction may also direct Commission Maintenance Personnel to correct the deficiencies. If Commission Maintenance Personnel are directed to correct the deficiencies, the Contractor will be charged for labor, equipment, and material costs incurred by the Commission in addition to the work zone liquidated damages. If the Contractor remains in violation of the Maintenance and Protection of Traffic requirements after second notification, the Assistant Chief Engineer – Construction may suspend work in accordance with Section 105.01(b) until the deficiencies are corrected.

(u) Arrow Panels. Provide units from an approved source with panels a minimum of 48-inch high and 96-inch wide with non-reflective, flat black finish on front and back surfaces. Arrow panels shall be legible for a minimum distance of 1 mile. Use a 12-volt battery pack to supply electrical power to the sign panel for a minimum of 72 continuous hours. Solar powered arrow panels listed in Bulletin 15 are acceptable. Operation from alternate electric power supply or commercial electric service may be used with the approval of the Representative.

The number of units required will be indicated in the bid proposal for the project. The Contractor may furnish additional units at no additional cost to the Commission.

(v) Shadow Vehicle with Truck Mounted Attenuator (TMA). Provide a shadow vehicle with TMA that meets the requirements of Publication 212. Provide documentation to the Representative that the requirements for the shadow vehicle with TMA are met. To the rear of the shadow vehicle, attach a Truck Mounted Attenuator (TMA) provided from a PennDOT approved source and tested and approved for NCHRP 350 Test Level 3 Criteria. In the bed of the shadow vehicle, insert a Skid-Mounted Arrow Panel (from a PennDOT approved source) that measures a minimum of 48 inches high by 96 inches wide. In conjunction with the use of the Shadow Vehicle with TMA, provide and use a PennDOT approved Traffic Alert Radio that is capable of being carried by the Shadow Vehicle with TMA.

To provide advance information to approaching drivers and to separate the workers and work vehicles from approaching drivers, position the shadow vehicle with TMA in advance of work locations which are not separated from approaching drivers by concrete barrier. Assign operator(s) to each Shadow Vehicle with TMA. Provide a means for the operator(s) to verbally communicate with the operation for which the Shadow Vehicle with TMA is being used. The operator(s) must be available at all times to position and/or relocate the shadow vehicle with TMA. During periods of multiple work locations, prioritize the use of the shadow vehicle with TMA based on the priority chart provided.

1. Stationary Operation. When separating a stationary operation (i.e.: stopped for more than fifteen minutes) from approaching drivers, the shadow vehicle with TMA is to be unoccupied.

2. Slow-Moving or Moving Operation. When separating approaching drivers from an operation that will be moving continuously or intermittently where the vehicle will not be stopped at any single location for more than fifteen minutes, the operator is to be the only occupant of the vehicle.

3. Position. Position all shadow vehicles with TMA so they are visible to approaching vehicles from a distance calculated as follows:

Speed Limit (mph) x 10 = Sight Distance (feet)

If this sight distance cannot be obtained, use the maximum sight distance which the local geometry of the road allows. Orient all shadow vehicles with TMA so that the rear of the vehicle (and the TMA) is perpendicular to and facing oncoming traffic.

4. Priorities for the Application of Shadow Vehicles with TMA.

Closure / Exposure Condition	**Priority**
No Formal Lane Closure	
a) Shadow Vehicle with TMA for Operation Involving Exposed Personnel	1a
b) Shadow Vehicle with TMA for Operation Not Involving Exposed Personnel	1b
No Formal Shoulder Closure	
a) Shadow Vehicle with TMA for Operation Involving Exposed Personnel	2a
b) Shadow Vehicle with TMA for Operation Not Involving Exposed Personnel	2b

Formal Lane Closure	
a) Shadow Vehicle with TMA for Operation Involving Exposed Personnel	3a
b) Shadow Vehicle with TMA for Operation Not Involving Exposed Personnel	3b
Formal Shoulder Closure	
a) Shadow Vehicle with TMA for Operation Involving Exposed Personnel	4a
b) Shadow Vehicle with TMA for Operation Not Involving Exposed Personnel	4b

The number of units required for the payment type indicated will be shown in the bid proposal for the project. The Contractor may furnish additional units for the payment type indicated at no additional cost to the Commission. In addition, the Contractor may furnish additional shadow vehicles with TMA regardless of the payment type indicated at no additional cost to the Commission.

(w) Portable Changeable Message Signs (PCMS). From a PennDOT approved source, provide units as indicated in the bid proposal for the project, that can display a three-line message with either 8 or 12 characters per line that meet MUTCD character height requirements, of 18" minimum character heights. Messages in excess of 8-characters per line shall use a condensed width font consisting of a character make-up of a three-wide pixel by seven-high pixel matrix at a minimum. Each message shall consist of no more than two phases. A phase shall consist of no more than three lines of text. Each phase shall be understood by itself regardless of the sequence in which it is read. Messages shall be centered within each line of legend. Messages shall not include advertising, animation, rapid flashing, dissolving, exploding, scrolling, or other dynamic elements. PCMS shall automatically adjust their brightness under varying light conditions to maintain legibility. Run pixel test on PCMS a minimum of once per week to check for errors or failing pixels. Install PCMS a minimum of ten (10) calendar days prior to lane closures, stoppages, or traffic paces to inform customers of upcoming construction work. The PCMS shall be secured to prevent unauthorized access, both physically and electronically.

Place PCMS a minimum of 800 feet from major guide signs and .5 mile from Dynamic Message Signs (DMS). Multiple PCMS shall be spaced at least 1,000 feet apart. PCMS shall be visible from 0.5 mile under both day and night conditions. PCMS shall be turned three degrees toward the travel lanes from the perpendicular edge of the travel lanes to reduce glare. PCMS shall be raised a minimum of seven feet above the roadway. Place PCMS off the paved shoulder and behind guiderail or concrete barrier, if practical. Where guiderail or concrete barrier is not available, place off the paved shoulder and outside the clear zone. If a PCMS has to be placed on the paved shoulder or within the clear zone, delineate it with a minimum of 3 PennDOT approved channelizing devices with PennDOT approved Type XI reflectorized material, tapered at a 45-degree angle away from traffic and spaced five feet apart. The Representative will determine the sign locations and approve messages. Based on traffic conditions and as directed by the Representative, relocate the signs at no additional cost.

Within 24 hours of being notified that a sign is damaged or inoperative, repair or replace the sign to the satisfaction of the Representative. If the sign remains unrepaired beyond the 24-hour limit, the Contractor will be assessed $500.00 per day in liquidated damages.

The number of units required will be indicated in the bid proposal for the project. The Contractor may furnish additional units at no additional cost to the Commission.

(x) Portable Pan/Tilt/Zoom Closed Circuit Television (PPCCTV) Cameras. Place PPCCTV cameras on the Turnpike at each merge point, crossover area and within the work zone, to provide full continuous coverage, on construction projects 9 months in duration or longer. The exact location and placement of PPCCTV cameras will be determined in the field by the Representative and Contractor with the approval of the Commission's Traffic Operation Center (TOC). Relocate the PPCCTV cameras at no additional cost to the Commission as required by the traffic control staging and by the Representative based on traffic conditions during construction.

Provide PPCCTV camera subsystem meeting the requirements of Section 1210. All references to TMC/RTMC shall be replaced with the Commission's TOC.

(y) Emergency Contact. Designate a responsible individual(s) to be in charge of all safety including the maintenance and protection of traffic. Designate an individual(s) that can be contacted at all times (day or night) and who is authorized to make necessary decisions. Furnish the name(s), address and telephone number of the designated individual(s) for 24-hour availability.

901.4 MEASUREMENT AND PAYMENT -

(a) Maintenance and Protection of Turnpike Traffic During Construction. Lump Sum

The Commission will measure and pay for this item in a proportionate manner, one designated by the Commission, on the basis of current estimates.

With the exception of the separate pay items specified in Section 901.4(b), if an item or device is required for maintenance and protection of traffic, the cost of the item or device is incidental to Item 2901-0001.

(b) Separate Pay Items. The Commission will separately measure and pay for the following items or devices, when indicated or required or as directed by the Representative for maintenance and protection of traffic during construction:

- Arrow Panel - Each
- Calcium Chloride - Ton
- Other Dust Control Palliatives - Gallon or Ton
- Tubular Markers - Each
- Replace Tubular Markers - Each
- Replace Tubular Markers, Post Only - Each
- Replace Reflective Band on Tubular Marker - Each
- Remove Tubular Markers - Each
- Portable Changeable Message Sign (PCMS) - Each
- Temporary Concrete Barrier - Section 627.4
- Reset Temporary Concrete Barrier - Section 628.4
- Pavement Marking Removal - Section 963.4

- Painting Traffic Lines and Markings - Section 962.4
- Temporary Non-Plowable Raised Pavement Markers, Yellow - Each
- Temporary Non-Plowable Raised Pavement Markers, White - Each
- Temporary Recessed Reflective Pavement Markers, Yellow - Each
- Temporary Recessed Reflective Pavement Markers, White - Each
- Temporary Bituminous Rumble Strips - Square Yard
- Temporary Impact Attenuating Devices - Section 696.4
- Reset Temporary Impact Attenuating Devices - Section 697.4
- Standard Pavement Markings, Paint & Beads, for the type indicated - Linear Foot. Payment will be made for the initial application of temporary markings for each stage of construction. Maintenance of temporary markings, including the required reapplications prior to winter shutdown, prior to beginning construction in the spring, and every 3 months for each stage of construction are incidental to the initial application.
- Shadow Vehicle with Truck Mounted Attenuator (TMA) - One of the following:

  a) Each.

  b) Day. A day is defined as approved usage of any duration within a 24-hour calendar day period.

  c) Hour. Measured beginning when the Shadow Vehicle with TMA is properly positioned in advance of the work location to the time when the Shadow Vehicle with TMA is removed from in advance of the work location rounded to the nearest whole hour.

- Portable Pan/Tilt/Zoom Closed Circuit Television Camera Subsystem – Each. Includes camera, lens, encoder, decoder, wires, connectors, grounding rod and conductor, trailer, mounting and installation, training, integration work, and documentation for a complete subsystem.

  a) 50% of payment will be made upon complete installation of PPCCTV

  b) 30% of payment will be made upon completion of the standalone acceptance tests as specified in Section 1201.3(b).

  c) 20% of payment will be made upon completion of the 60-day test as specified in Section 1201.3(b).

  Completion of tests includes completion of training, submission of all manuals and documentation as required, and completion of all final inspections as required by the Representative.

MPT Standard Special Provisions

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BRIAN M. RANCK

STANDARD SPECIAL PROVISION

Detail

Index or Category: Non-Pay Item Related
Status: Active
Sequence ID: 12201
District: CO
Version: A
Provision Name: a12201 PENNSYLVANIA TURNPIKE COMMISSION

Usage Information

Measurement: Dual
Edit Body: No
Include on all projects: No
Edit Header: No
Include on all federally funded projects: No
Edit Project Specific Details: No
Include on all 100% State funded projects: No
Instructions for Usage: Use on projects involving Pennsylvania Turnpike Commission right of way.

This Standard Special Provision was identified as S00(ND00511A) in CMS.

408 Section:
Effective From: 07/18/2002
To: 01/01/2999

Associated Items

Item Number	Description
No records found.	

Header

PENNSYLVANIA TURNPIKE COMMISSION

Provision Body

I. GENERAL - It is the expressed intent of this Special Provision to keep to a minimum any interference with traffic on the Pennsylvania Turnpike.

Make arrangements with the Pennsylvania Turnpike Commission, regarding operations on, over, or under right of way owned by the Turnpike Commission, to provide flagmen, watchmen, safeguards, and any other required services.

In addition to the requirements specified above, note the following:

(a) Before starting any work within Turnpike right of way, submit to the Chief Engineer of the Pennsylvania Turnpike Commission, for approval, a detailed plan of the proposed sequence of operations to maintain traffic as specified together with a plan of suggested traffic movement during construction operations. Adhere rigidly to the approved plan.

(b) Advise the Chief Engineer of the Pennsylvania Turnpike Commission, in writing, before any work is started within the Turnpike right of way. Do not obstruct any portion of the shoulders, pavement, or medial strip without prior written approval of the Chief Engineer of the Pennsylvania Turnpike Commission.

(c)Maintain normal travel lanes in each direction to the fullest extent possible. If lane restrictions are necessary, specific work hours will be provided.

(d)Place protection shields, or other protective devices acceptable to the Pennsylvania Turnpike Commission, under the bridge structure in a position which will maintain a clearance of 4.45 m (14-1/2 feet) and prevent objects from falling onto the Turnpike roadway, its median, and shoulder area, at all times.

(e) Operate equipment and trucks, provide temporary access, and implement parking restrictions, etc., in accordance with applicable portions of the Specifications for Maintenance and Protection of Traffic.

(f) Place bridge beams, or other major construction units, across the Turnpike only during the specified time period. Do not stop traffic for more than 15 minutes during any one stoppage. Have the Pennsylvania Turnpike Commission's authorized representative, the Pennsylvania State Police, control successive stoppages of traffic.

(g) In the event falsework, cranes, or other equipment occupy the shoulders or medial strip in a manner that does not require lane restrictions, prior to such occupancy, submit to the Chief Engineer of the Pennsylvania Turnpike Commission, for approval, a sketch showing the protective signing and devices which will be used.

(h) Erect warning signs as indicated on the Pennsylvania Turnpike Commission's Standard Drawing(s) for Maintenance and Protection of Traffic.

(i) In the event any operations on or over Turnpike right of way are considered unsafe by the Turnpike Police or Turnpike Engineer, immediately stop work until the unsafe condition is corrected. The Chief Engineer of the Pennsylvania Turnpike Commission, Captain of Police, or their designated representatives will be the sole judge of the adequacy of any corrective measures.

(j) Upon completion of construction operations, restore all Turnpike facilities and property to a satisfactory condition acceptable to the Chief Engineer of the Pennsylvania Turnpike Commission.

II. SAFETY -

The safety of patrons on the Turnpike is deemed paramount by both the Pennsylvania Turnpike Commission and the Department. To maintain the patrons' safety to the maximum extent possible, accept responsibility for the following:

(a) Turnpike Commission Engineer. The Pennsylvania Turnpike Commission may require one of its engineers to be on site, for inspection purposes, during project operations within Turnpike right of way.

(b) State Police. When, in the opinion of the Pennsylvania Turnpike Commission, the construction work creates a hazard to the safe flow of Turnpike traffic, the Turnpike Commission may place qualified personnel at the work site, including members of the Turnpike Detail of the Pennsylvania State Police, in addition to that required by the contract. Providing such personnel and other precautionary measures does not relieve the Contractor from liability for payment of damages resulting from acts of the Contractor, employees, or others undertaking work on the Contractor's behalf.

(c) Flagmen. Whenever the Pennsylvania Turnpike Commission deems it necessary to halt the flow of traffic, provide competent, able-bodied watchmen or flagmen to assist the State Police. Instruct watchmen or flagmen to perform their duties in the manner directed by the State Police and provide them with appropriate Stop and Slow paddles and/or flags and clothing as directed by the Turnpike Commission's Director of Safety. Failure to provide said personnel will give the Turnpike Commission sufficient authority to do so at the Contractor's expense.

(d) Blasting. Carry out all blasting operations in accordance with the Regulations of the Department of Labor and Industry for the Storage, Handling, and Use of Explosives as promulgated October 23, 1957, and as thereafter amended and supplemented. Comply fully with all provisions of any statutes, ordinances, and regulations, of the United States Government, the Commonwealth of Pennsylvania, and the Political Subdivisions in which the work is to be performed, that may be applicable to the subject of blasting. In addition to the blast warnings required by the regulations and applicable law, place signs, prior to the arming of blasting charges, warning of the imminence of blasting operations and prohibiting the use of all radio and telephone communications within the immediate area. Place these warning signs at all roads within a radius of one-half mile of the work site, including the Turnpike.

NOTE: Do not carry out blasting operations within 150 m (500 feet) of Turnpike right of way fences except during the specified time period. Give 24 hours prior notice to the Chief Engineer of the Pennsylvania Turnpike Commission of the intention to set off blast and state the time of blast. Do not detonate any blast until the State Police are at the site to control traffic.

(e) Parking. Turnpike traffic regulations prohibit parking of nonessential construction vehicles on or adjacent to the travel lanes of the Turnpike. Do not allow employees to park their cars within Turnpike right of way, including Interchange areas. Do not allow employees to ride on the outside of any vehicle. Do not allow passengers to be discharged from vehicles within 10 feet of any paved travel lane.

Turnpike regulations also prohibit U-turns and the crossing of travel lanes with vehicles and equipment.

(f) Fencing. After the right of way fence is opened and until such time as it is satisfactorily re-erected after completion of the work, prevent entry of all unauthorized persons, especially children, and animals onto Turnpike right of way. In addition to watchmen, guards, and flagmen, erect temporary fencing as approved by the Pennsylvania Turnpike Commission. Anchor fencing at the construction site as directed by the Chief Engineer of the Pennsylvania Turnpike Commission. Satisfactorily reset any right of way fence removed during contract operations at no expense to the Turnpike Commission or the Department.

III. RESPONSIBILITY -

The Pennsylvania Turnpike Commission has no financial obligation or responsibility whatsoever in connection with the construction work undertaken by the Department and the Contractor.

Project Specific Details

Audit Information

Created By	Created On	Modified By	Modified On
William Kosco/PennDOT	06/25/2002 01:12:01 PM	Scott G Vottero/PennDOT	06/01/2009 09:13:31 AM

MAINTENANCE AND PROTECTION OF TRAFFIC

(ITEM: 2901-0001)

FXX.00 MAINTENANCE AND PROTECTION OF TRAFFIC (ITEM: 2901-0001)

04/06/18

FXX.01 Description - This work is the furnishing, installing, maintaining, resetting, relocating, storing, and removal of all traffic control devices necessary for maintenance and protection of traffic during construction.

FXX.03 Construction -

Perform maintenance and protection of traffic according to the current version of Section 901, PTS 900, PTS 905, , the contract drawings and the special provisions.

Furnish, install and maintain all required lights, guides, sandbags and appurtenances as deemed necessary by the Representative for the proper maintenance and protection of traffic and to warn of any obstruction or hazard to traffic. Use Type A and Type B flasher units and Sequential Warning Lights on this project. Furnish, install and maintain all shadow vehicles. Shadow vehicles without a truck mounted attenuator must be a 33,000 lb GVW (Gross Vehicle Weight) or larger vehicle and loaded to weigh a minimum of 22,000 lbs., or as indicated on the Standard Drawings, in addition to meeting the requirements of Publication 212.

Provide signs with PennDOT approved Type XI reflectorized material.

Utilize the following general procedures for maintenance and protection of traffic:

A. For Pre-Construction Signing: Erect these signs prior to the performance of any work that may affect or alter the normal traffic pattern on the Turnpike.

   1. Erect MPT-33, CAUTION - NEW TRAFFIC PATTERNS - NEXT X MILES at the approaches to the work zone. In addition, erect R22-1 signs, WORK ZONE STATE LAW TURN ON HEADLIGHTS, as the first sign approaching the work zone.

      Furnish, install and maintain an adequate post-mounted sign support system that will retain the signs in-place during the course of the project. PennDOT approved Type III barricades may be used as conditions warrant and as directed by the Representative.

   2. Erect W20-1 and other signs at the approaches (from 2 miles) to the work limits for each physical work zone with appropriate legends as indicated on PTS-900,905), to warn traffic of construction to be encountered. For physical work zones that are being worked on concurrently that are less than 2 miles apart, provide a portable changeable message sign (PCMS) approximately 1 mile in advance of the physical work zone; message as approved by the Representative. R2-1 sign at the end of the first work zone is to be 55 MPH when followed by additional work zones, only when the physical work zones are less than 2 miles apart. Erect W21-20 signs, END ACTIVE WORK ZONE, immediately at the end of the first active work zone. Post G20-2 sign at the end of the final work zone. Post mount signs at locations designated by the Representative in such a manner as not to obstruct shoulders and be clear of work areas. Relocate approach signing as work progresses.

B. Do not exceed a maximum work zone of 4 miles in length for operations not behind barrier. In the event a 4 mile work zone for operations not behind barrier is not required or the work zone is not used in an efficient manner, the Representative will direct the length of the work zone be shortened to that length sufficient for the Contractor's operation and efficiency. Maintain a minimum of 1 mile of unrestricted roadway between patterns on the same side of the road.

   1. Furnish, operate, and maintain in the following manner, additional safety devices and controls for operation adjacent to traffic patterns:

      a. Furnish all equipment and vehicles with a yellow flashing light attached to the equipment to indicate its outer limit, visible 360 degrees. Lights are to be according to Section 901.

      b. Mount vertical panels with Type A lights at the approach end, facing traffic, of all shoulder inlets, guide rail ends, and bridge parapet ends whenever traffic is using the shoulder or part of the shoulder as a travel lane.

      c. Place vertical panels at 25 foot intervals for 150 feet in advance of each Vehicle Attenuating Terminal End Treatment (VATET) during traffic control stages in which traffic will operate on shoulders adjacent to guide rail and VATETs.

   2. Use PennDOT approved vertical panels with self-ballasting bases for channelizing devices. The entire face of the vertical panel visible to traffic is to be reflectorized with PennDOT approved Type XI reflectorized material. Completely remove channelizing devices from the roadway so they are not visible to motorists during non-working hours. Channelizing devices may be temporarily relocated to the minimum offset to allow for work to be performed, as directed by the Representative. The channelizing devices must remain between traffic and the work zone. Relocate channelizing devices to original position as work progresses.

   3. Lane restrictions will not be permitted during non-working hours, required by PTC minimum lane requirement charts in coordination with PTC. or the specified holiday restrictions, for any operation requiring a mobile lane restriction, stationary lane restriction, mobile shoulder restriction, or stationary shoulder restriction.

   4. Lane or shoulder restrictions not behind temporary concrete barrier are not permitted when work is not being performed at any location within the work zone for a period of more than 60 minutes.

   7. Maintain the entrances and exits to Interchanges, Service Plazas, Maintenance Sheds and Access Ramps at all times.

11. All stoppages and pacing of traffic as well as their associated coordination with the Turnpike detail of the Pennsylvania State Police must be approved and coordinated through the Representative a minimum of fourteen (14) days prior and confirmed with the Representative within the last 48 hours. Pacing will only be allowed during allowable single lane hours.

12. For a minimum of ten (10) calendar days prior to utilizing Turnpike traffic stoppage(s) or pace(s), program the PCMS to provide the proposed date of traffic stoppage(s) or pace(s) and to provide for advance notification of anticipated traffic stoppage(s) or pace(s). From a PennDOT approved source, provide PCMS units that can display a three-line message with 12 characters per line. PCMS is incidental to the Maintenance and Protection of Traffic.

FXX.04 Measurement and Payment - Lump sum.

Addendum No. 2

RFP # 16-10495-8121

Cashless Tolling System Implementation and Maintenance

Prospective Respondents: You are hereby notified of the following information in regard to the referenced RFP:

ADDITION

1. The Pre-Proposal Meeting sign in sheets are provided as additional information only and attached to this addendum.

All other terms, conditions and requirements of the original RFP dated May 30, 2018 and Addendum 1 remain unchanged unless modified by this Addendum.

SIGN-IN SHEET
PREPROPOSAL CONFERENCE RFP #18-10495-8121
Cashless Tolling System Implementation and Maintenance

DATE: June 14, 2018

TIME: 1:00 PM

	COMPANY NAME	REP NAME	ADDRESS	PHONE	EMAIL
1	A2Z Diversity ~~TREMAYNE~~ Solutions | MBE DBE	TREMAYNE TERRY	HBG, PA	717-379-3802	tremayne,terry@A2ZDivesity.com
2	NEOLOGY	RUBEN MANRIQUEZ	San Diego, CA	949.689.6817	rmanriquez@neology.net
3	NEOLOGY	VANCE WILLIAMS	AUSTIN, TX	941-321-8366	vwilliams@neology.net
4	HNTB	Walter Fagerlund	Westbrook, ME	207-272-4013	wfagerlund@hntb.com
5	PTC	Chris Maugans	CAB	x7486	
6	HNTB	Michael Kapp	Harisburg, PA		mkapp@hntb.com
7	Kapsch	Terry Hannis	Charlotte NC.	704-225-6271	Terry.Hannis@Kapsch.net
8	ETC	Randy Moore	Richardson, TX	214.601.1334	rmoore@etcc.com
9	PERCEPTICS	JENNIFER SHERBLOM	KNOXVILLE, TN	508-723-3353	JENNIFER.SHERBLOM@PERCEPTICS.COM
10	TransCore	Milan Mitrovich	Harrisburg, PA	717-578-3688	milan.Mitrovich@transcore.com

SIGN-IN SHEET
PREPROPOSAL CONFERENCE RFP #18-10495-8121
Cashless Tolling System Implementation and Maintenance

DATE: June 14, 2018

TIME: 1:00 PM

	COMPANY NAME	REP NAME	ADDRESS	PHONE	EMAIL
11	KAPSCH	STEVE LITTLE	3810 CONCORDE PKWY, STE 1000 CHANTILLY, VA 20151	757 270-5533	steve.little@kapsch.net
12	Tattile	Jim Kennedy	521 Altamira Drive Knoxville, TN 37934	865 712 6758	J.kennedy@tattile.com
13	HARRY DRUCK	TRECOM	99 NOVEMBER DR. CAMP HILL PA 17011	717 283 5971	hdruck@trecomsystems.com
14	CONDUENT	Gretchen Vreeland	3016 Jonestown Road Harrisburg 17110	717.839.4272	gretchen.Vreeland@conduent.com
15	Jill Shannon	PTC	CO.	717.831.7443	JShannon@paturnpike.com
16	LAURA Marriott	PTC	Co	717 831 ~~783~~ 7837	lmarriott@paturnpike.com
17	Joe Suess	PTC	Co	831-7186	JSuess@ "
18	TOM OWEN	ETC	Richardson TX	630 303 8545	TOwen@ETEC.com
19	JOHN MIKE	PERCEPTICS	Knoxville TN	717 307 1092	JOHN.MIKE@PERCEPTICS.COM
20	TRANSCORE	BOB MARTINO	7917 OBERRY STREET	717 525-9606	BOB.MARTINO @TRANSCORE.COM

SIGN-IN SHEET

PREPROPOSAL CONFERENCE RFP #18-10495-8121

Cashless Tolling System Implementation and Maintenance

DATE: June 14, 2018

TIME: 1:00 PM

	COMPANY NAME	REP NAME	ADDRESS	PHONE	EMAIL
21	Gannett Fleming	Jason McCartney	1801 Market St, Phila, 19147	215-557-0106	JMCCARTNEY@GFNET.COM
22	WSP	Kwan Caglar	1600 JFK, 4 Penn Ctr Phila 19103	215 209 1216	kwan.caglar@wsp.com
23	PTC	DON KLINGENSMITH		717-831-7585	dklingen@paturnpike.com
24	PTC	DON STEELE		717-831-7387	dsteele@paturnpike.com
25	PTC	Matt McConnell		717-831-7144	mmccanne@paturnpike.com
26	PTC	Wanda Metzger	700 S Eisenhower Blvd Middletown	717-831-7429	wmetzger@paturnpike.com
27					
28					
29					
30					

Addendum No. 3

RFP # 18-10495-8121

Cashless Tolling System Implementation and Maintenance

Prospective Respondents: You are hereby notified of the following information in regard to the referenced RFP:

REVISIONS

1. Add the following key team member to section 2.2.2 Technical Proposal Format and Contents, Proposal Section 2: Key Team Member Qualifications on page 17 of 35 of the RFP (page 21 of 770 in original RFP PDF file) the following:

   h) Maintenance Manager: At least five (5) years of experience in maintaining toll systems with at least two (2) years of experience in the management of maintenance of systems similar to the Work on this Project. The Maintenance Manager and the Installation Manager responsibilities may be covered by the same person.

2. Replace requirement #12 within section 2.1.1.4 Diagnostics on page 9 of 178 of Exhibit A – Scope of Work (page 56 of 770 in original RFP PDF file) in its entirety with the following:

12	Equipment mounting and installation design shall support the maintenance of Equipment from below on toll gantries as applicable to each cashless toll zone.

3. Replace requirement #27 within section 2.1.1.7 Environmental on page 10 of 178 of Exhibit A – Scope of Work (page 57 of 770 in original RFP PDF file) in its entirety with the following:

27	The in-lane Equipment not in environmentally controlled conditions shall operate with no degradation of performance in ambient air temperature of negative thirty (-30) to fifty-five (55) degrees Celsius, with and without direct sunlight, and relative humidity of five (5) to one hundred (100) percent for Equipment installed in an outside environment and five (5) to ninety-five (95) percent non-condensing for Equipment installed inside equipment racks.

4. Replace requirement #156 within section 2.1.7.3 Zone Controller Start-Up on page 25 of 178 of Exhibit A – Scope of Work (page 72 of 770 in original RFP PDF file) in its entirety with the following:

156	The zone controller shall also synchronize its time with the Commission Approved time source and an Approved secondary source upon start-up and at established configurable intervals. The zone controller shall also support a secondary source for time synchronization.

5. Replace requirement #743 within section 5.1.1 Program Management Plan on page 101 of 178 of Exhibit A – Scope of Work (page 148 of 770 in original RFP PDF file) in its entirety with the following:

743	The Contractor shall develop and submit the Program Management Plan (PMP) to the Commission for review and Approval.

6. Replace the last 2 bullet items of requirement #749 within section 5.1.3 Staffing and Key Team Members on page 103 of 178 of Exhibit A – Scope of Work (page 150 of 770 in original RFP PDF file) in their entirety with the following:

749	• Quality Assurance/Test Manager – responsible for consistent quality throughout the Design, Development, Testing and Implementation of the Cashless Tolling System through good Quality Assurance and Quality Control practices, and
	• Maintenance Manager – responsible for the overall planning and implementation of the Cashless Tolling System maintenance program.

7. Replace requirement #767 within section 5.1.7 Project Schedule on page 106 of 178 of Exhibit A – Scope of Work (page 153 of 770 in original RFP PDF file) in its entirety with the following:

767	The Project Implementation schedule shall include all tasks for the submission and approval of the final toll equipment layout and positioning to be provided to the Civil Designer(s) identifying the locations of all toll equipment, including conduit counts and sizing to be installed in a toll zone within 60 days of NTP.

8. Delete requirement #828 within section 5.4 Documentation on page 112 of 178 of Exhibit A – Scope of Work (page 159 of 770 in original RFP PDF file).

9. Delete requirement #1063 within section 7.2 General Description of Cashless Tolling System Maintenance and Software Support Services on page 150 of 178 of Exhibit A – Scope of Work (page 197 of 770 in original RFP PDF file).

10. Replace the first bullet of requirement #1210 within section 7.22.4 Availability on page 175 of 178 of Exhibit A – Scope of Work (page 222 of 770 in original RFP PDF file) in its entirety with the following:

1210	The Contractor shall meet availability requirements for the following elements of the Cashless Tolling System:
	• Lane Availability - 99.95%;

11. Replace the Definition of Key Team/Key Team Member on page 5 of 12 of Exhibit B – Defined Terms and Acronyms (page 442 of 770 in original RFP PDF file) in its entirety with the following:

Key Team/ Key Team Member	Key Team for this Project shall be Project Principal, Project Manager, Deputy Project Manager, Technical Manager, Toll Concentrator/Host System, Technical Manager Lane Systems, Installation Manager, Maintenance Manager and Quality Assurance/Test Manager. This designation requires that certain standards, processes and procedures be followed by the Contractor with regard to Key Team personnel, as further set forth in the Scope of Work and the Contract Documents.

12. Replace Attachment 1 - Cashless Toll Zone Locations in its entirety with the revised Attachment 1 - Cashless Toll Zone Locations - Addendum #3 - 07-18-2018 provided as attached to this addendum. **(Note: This change reflects all Mainline Toll Gantry types to be maintenance from below).**

13. Replace Attachment 5 - Concept Plans for Overhead Structures Toll Gantries in its entirety with the revised Attachment 5 - Concept Plans for Overhead Structures Toll Gantries - Addendum #3 - 07-18-2018 provided as attached to this addendum. **(Note: This change reflects all Mainline Toll Gantry types to be maintenance from below).**

14. Replace Attachment 6 - Attachment 6 - Installation Demarcation Diagram in its entirety with the revised Attachment 6 - Installation Demarcation Diagram - Addendum #3 - 07-18-2018 provided as attached to this addendum. **(Note: This change reflects all Mainline Toll Gantry types to be maintenance from below).**

15. Replace Exhibit E - Project Implementation Schedule in its entirety with the revised Exhibit E - Project Implementation Schedule - Addendum #3 - 07-18-2018 provided as attached to this addendum.

16. Replace Exhibit C - Price Proposal Instructions in its entirety with the revised Exhibit C - Price Proposal Instructions - Addendum #3 - 07-18-2018 provided as attached to this addendum.

17. Replace Exhibit F-6 - Requirements Conformance Matrix in its entirety with the revised Exhibit F-6 - Requirements Conformance Matrix – Addendum #3 - 07-18-2018 provided as attached to this addendum. Electronic file is also provided.

18. Replace Exhibit F-7 – Price Proposal in its entirety with the revised Exhibit F-7 – Price Proposal – Addendum #3 - 07-18-2018 provided as attached to this addendum. Electronic file is also provided.

QUESTIONS AND ANSWERS

Following are the answers to questions submitted in response to the above referenced RFP as of July 18, 2018. All the questions have been listed, as received by the Pennsylvania Turnpike Commission.

#	Page	Section	Section Description	Proposer Question	Commission Response
1	14	2.1.5.1	Req. 57	For clarity purposes, please define what "IAG Compliant" means. Does that mean certified by the IAG? Can the Commission provide a list of IAG Compliant systems?	Yes, IAG compliant means certified by the IAG. It is the proposer's responsibility to be aware of IAG requirements and certified systems.
2	14	2.1.5.1 2.1.5.2	Req. 58 and 75	Is the Commission aware with Addendum 1, removing req 58 and 75 will allow the vendor/manufacturer of AVI systems to have an unfair cost and competitive advantage against those integrators that are not also a vendor/manufacturer?	It is the proposer's responsibility to propose a system to meet the requirements of the RFP. The procurement of any 3rd party hardware and software necessary to meet the requirements of the RFP is the responsibility of the proposer.
3	5	Table1-1	Key Procurement Dates	Anticipated Notice to Proceed (Estimate Only) is listed as April 2019. The Project Implementation Schedule states May 2019. Please provide clarification.	Anticipated NTP is April 2019. The legend on the project schedule was improperly labeled. See update to Exhibit E included with this addendum.
4	43/178	2.2.1	Cashless Toll Concentrator or Toll Host (if Provided) system	"The secondary Cashless Toll Concentrator or Toll Host System shall be configured as a 'hot stand-by' in an active-active state to allow continuous operations in the	Yes, provided the solution is compliant with the requirements of the RFP.

			– General Requirements	event of a failure of the primary Cashless Toll Concentrator or Toll Host System.” We understand that the Commission desires a highly available system. The terms in the requirement for hot stand-by and active-active appear to be contradictory. Is it correct to assume that the commission is open to any architecture that meets the availability in the RFP and has the ability to automatically transition to the secondary system if a failure condition is detected?	
5	5 16 102	Exhibit B 2.2.2. 5.1.3. (Req. 749)	Exhibit B: Defined Terms and Acronyms Proposal Section 2: Key Team Member Qualifications Exhibit A: Staffing and Key Team Members	The Key Team/Key Team Member definitions on pg. 5 of Exhibit B do not match the requirements listed in 2.2.2. (Proposal Section 2: Key Team Member Qualifications pg. 16) or 5.1.3. Exhibit A (Staffing and Key Team Members pg. 102). Please clarify the Key Personnel requirements for the project.	The key team members listed in section 5.1.3 of Exhibit A-Scope of Work, section 2.2.2 of the RFP and Exhibit B – Defined Terms and Acronyms have been updated in this addendum as noted above.

6	31	2.5	Submission of Diverse Business (DB) Participation Documentation	Do the DBE requirements apply only to the Implementation Phase, or also to Maintenance?	The DB Requirements apply to all phases of the contract. The proposer shall address the section of Exhibit I (DB Requirements) labeled, “Actions Required by Proposer during the procurement/consultant selection phase”.
7	35	Exhibit F-7: Price Proposal	Bonding	Please clarify if the Commission is requiring two separate bonds: one payment and one performance, each of equal value.	Correct.
8	N/A	N/A	Installation	During installation, will the roadway at the installation sites be closed/blocked off from traffic, or will MOTs be required to perform the install work?	MPT will be required to perform installation at each tolling location.
9	100, 101	Exhibit A “Scope of Work”	5.1.1 Program Management Plan	Section 5.1.1 begins by describing the Program Management Plan. However, with Requirement 743, the term Project Management Plan (PMP) is introduced. Does PTC consider the Program Management Plan and Project Management Plan the same document, or are they two separate document deliverables?	They are the same document. See revision to requirement #743 included with this addendum.
10	24	2.2.2 Technical Proposal Format and Contents	Proposal Section 4 / Approach to Project Plan and Implementation	The Preliminary Project Implementation Schedule in MS Project format is a required element of Section 4: Approach to	The proposer may provide the schedule as an appendix and exclude the project schedule from the proposal page limits.

			1) Project Schedule	Project Plan and Implementation, which applies to the 150-page limit. Given the significant amount of other responses required within the 150-page limit, can we provide this schedule as an appendix?	
11	18, 19, 20	2.2.2 Technical Proposal Format and Contents	Proposal Section 3 / Approach to Scope of Work and Technical Requirements 7) Reference to Appendix 4: Civil Infrastructure Package	The level of detail required to answer all of the questions under item 7 is typically not required until the Design Phase. Are you looking for general information in response to these questions, or are we expected to complete this significant amount of our design work at this time?	The proposer is to provide sufficient details in Appendix 4 as described in the section to support of the design of the Cashless Tolling System civil infrastructure.
12	10	Exhibit A “Scope of Work”	Requirement 27	Requirement 27 states, “The in-lane Equipment not in environmentally controlled conditions shall operate with no degradation of performance in ambient air temperature of negative thirty (-30) to seventy (70) degrees Celsius, with and without direct sunlight, and relative humidity of five (5) to one hundred (100) percent for Equipment installed in an outside environment and five (5) to ninety-five (95) percent non-	Upper temperature limit revised to 55° C. See revision to requirement #27 included with this addendum.

				condensing for Equipment installed inside equipment racks.” This limit exceeds that of hardware typically used in tolling systems, for example, DVAS cameras with PTZ. We request that PTC adjust the upper temperature limit for all equipment to 60° C.	
13	35	Exhibit A “Scope of Work”	Requirement 241	Requirement 241 states, “The Contractor shall provide Authorized Users the ability to access to the DVAS through the Cashless Tolling System application using any device authorized by the Commission with access to the Commission System network.”. Will PTC kindly specify which devices might be authorized to access the DVAS (for example, only a simple remote desktop, or also a Smartphone?).	At a minimum the DVAS application needs to be accessed using any PTC authorized desktop/laptop/tablet computer with access to Cashless Tolling Application(s). It is not anticipated to use smart phones to access the Cashless Tolling application.
14	100, 118	Exhibit A “Scope of Work”	Exhibit A “Scope of Work” 5.1.1 Program Management Plan,	We would like to provide the Quality Assurance Plan as an appendix to the Program Management Plan.	This is acceptable to the PTC as long as the documentation components are delivered in accordance with component schedule requirements.

			5.4.6 Quality Assurance Plan	Is this acceptable to PTC?	
15	88, 95, 97, 98, 133, 145	Exhibit A "Scope of Work"	4.2 Installation Plan, 4.8 Installation Checklist, 4.11 Contingency Plan, 4.13.3 Installation Design and Drawings, 5.6.3 Handling, Storage, and Delivery, 6.4 Installation and Commissioning Test	We would like to provide the Installation Checklist, Installation Design and Drawings, any assembly Documentation, Contingency Plan, and Installation and Commission Test as part of the Installation Plan submittal. Is this acceptable to PTC?	This is acceptable to the PTC as long as the documentation components are delivered in accordance with component schedule requirements.
16	11, 66, 114, 141, 143	Exhibit A "Scope of Work"	2.1.1.9 Bill of Materials, 2.2.5 General Requirements for Interfaces, 5.4.3 System Detailed Design Document,	We would like to include the BOM, Interface Control Documents, Factory Acceptance Test (FAT) Procedures, and the Onsite First Installation Test (OFIT) Procedures as part of the System Detailed Design Document (SDDD).	The PTC requires separate submissions for these documents. Upon Approval, the proposer may combine these documents into a single final deliverable.

			6.2 Factory Acceptance Test (FAT), 6.3 Onsite First Installation Test (OFIT)	Is this acceptable to PTC?	
17	135	Exhibit A "Scope of Work"	5.7.2.3 System Monitoring Staff Training Program	Requirement 975 states: "The Contractor shall provide a minimum of one (1) week of classroom and on-the-job training (OJT) to all personnel in their respective area of responsibility before such personnel are assigned monitoring duties." What is the estimated number of personnel that would need this kind of training?	The proposers can assume a maximum of 15 persons for each training session.
18	N/A	N/A	Price Proposal	Is PTC tax exempt, or are we expected to include sales tax in our price?	PTC is tax exempt.
19	N/A	N/A	N/A	Please confirm that PTC will provide a time source to synchronize to - separate from the internet.	Refer to section 2.2.6.3 of Exhibit A - Scope of Work. PTC will not provide the time source but will approve. See revision to requirement #156 included with this addendum.
20	561	7.1.1.1	Server Hardware Warranty and Support Services	Reqt 1054: Would PTC accept 5 years from the date of purchase, as that is the standard offering	No.

				from major server hardware suppliers.	
21	561	7.1.1.2	Third Party Software Warranty	Reqt 1055: Would PTC accept 5 years from the date of purchase, as that is the standard offering from major third party software suppliers	No.
22	561	7.2	General Description of Cashless Tolling System Maintenance and Software Support Services	Reqt 1063: Can OTC confirm that this test plaza requirement is not required and only the 2 toll zones at Clarks Summit are to be priced?	Confirmed, the proposer is responsible for the maintenance of the cashless tolling equipment at Clarks Summit for the base contract and should price accordingly. Requirement #1063 deleted as part of this addendum as noted above. See Section 2.3 Requirement #595 for test site requirements.
23	569	7.13	Security Certification	Reqt 1159: Are these security certifications in conjunction with vulnerability scanning or are further methods required?	Vulnerability scanning should be adequate with PTC approving the tool and method.
24	147, 159	5.1.1 5.4	Project Management Plan Documentation	In order to provide a more accurate preliminary project schedule, would PTC please provide a single list of all deliverables, plans and manuals to be provided to PTC after Notice to Proceed, and for the duration of the project?	Deliverable requirements are described within Exhibit A - Scope of work.
25	28 472	2.2.2 Exhibit E	Technical Proposal Format and Contents	In Section 2.2.2 Proposal Section 4, Paragraph 2, reference is made to critical milestone dates in	Critical Milestone Dates as shown in Exhibit E: ~ Anticipated NTP April 30, 2019

			Cashless Tolling Implementation Schedule (DRAFT)	Exhibit E in "bold italics". However, there are no such milestones shown in bold italics within Exhibit E. Please clarify.	~ Approved Civil Design and System Workshops 60 days from NTP ~ Projected Clarks Summit Go-Live March 30, 2020 ~ Projected Eastern Region Go-Live October 30, 2022 ~ Projected Central/Western Region Go-Live October 30, 2024
26	N/A	Exhibit F-7 – Price Proposal	N/A	Do proposers need to include the costs of Tolls in their monthly maintenance pricing or will the successful bidder be provided "non-revenue" transponders for their maintenance vehicles?	PTC will not provide non-revenue transponders. Proposer is responsible for paying any tolls and may include cost in pricing.
27	N/A	Exhibit F-7 – Price Proposal	N/A	Is PTC Tax Exempt? And if Yes, should bidders exclude All Taxes (State, Federal, Local, etc.) in their pricing?	See response to question #18 above.
28	N/A	Exhibit F-7 – Price Proposal	N/A	Should bidders include the cost of Spares Replacement/Replenishment in their monthly maintenance pricing or will Spares Replenishment be handled as a Pass-Through plus a 10% Mark-up (handling Fee) to PTC as parts are procured and therefore should be excluded from the monthly system maintenance pricing?	The cost of initial spare parts is to be included in the costs of the system implementation and warranty. The costs of any spare parts replacement/replenishment estimated required beyond the year 1 warranty in the maintenance phase should be included in the monthly maintenance pricing as indicated in tab **5-2 Backup In-lane Maint Detail** and **6-1 Backup Host Maint Sch** of the updated Exhibit F-7 Price Proposal included with this addendum.

29		Exhibit F-7 – Price Proposal	N/A	Can PTC please confirm that the Prevailing Wage requirements are applicable to all phases of the contract including the Base and Optional Maintenance periods?	Confirmed.
30	N/A	Exhibit F-7 – Price Proposal	N/A	Can PTC please point-out in Exhibit-J (Prevailing Wage Rate Requirements) the Job Classification/Description that should be used for the following Resources: • Installation Technician • Senior Installation Technician • Maintenance Technician • Senior Maintenance Technician	For purposes of estimating costs, the proposers are to use the prevailing rate for an Electrician. It is the proposer's/Contractor's responsibility to periodically verify rates with the state of PA.
31	N/A	Exhibit F-7 – Price Proposal Sheet/Tab: 3-1 Backup System Sch.	Sheet 3-1 Back-up Base and Optional System Cost Schedule l	For items 1-7, the Section Title Summary Descriptions do not line-up with the detailed pricing items. Example, under item-2 (Design Documentation) it lists “Switches” and “LAN HW”. Can PTC please check this section of 3-1 and correct the line mismatches?	Corrected Sheet **3-1 Backup System Sch**. of the updated Exhibit F-7 Price Proposal included with this addendum.
32	N/A	N/A	N/A	For the Clark Summit locations and the Eastern portion of the Turnpike deployed in 2022 locations, do the projected gantry locations have ferrous materials in the pavement or any other elements that would cause	See Proposer Section 3, question 7b of the RFP. Proposer to provide requirements for pavement.

				degradation of performance of loop sensors?	
33	228, 249-253	Attachments 1 and 5	Cashless Toll Zone Locations Concept Plans for Overhead Structures/ Toll Gantries	It is described through the attachments that PTC wants to have 2 types of Toll gantries. Gantries with maintenance from below and from above. As gantries with maintenance from above are authorized by PTC, is it acceptable to design all gantries to utilize maintenance from above concepts to allow this feature to be utilized moving forward at all cashless toll gantry locations installed throughout the state?	No. The PTC has decided to eliminate the maintenance from above gantry option and will implement exclusively the maintenance from below option. See Additional information included with this addendum.
34	5 of 35	1.12	Procurement Schedule of Events	Table 1-1: Key Procurement Dates – states, “Due Date for Proposals is August 8, 2018.” Will PTC consider extending the due date to September 5?	No.
35	10 of 178	2.1.1.7	Environmental	The requirement states, “The in-lane Equipment not in environmentally controlled conditions shall operate with no degradation of performance in ambient air temperature of negative thirty (-30) to seventy (70) degrees Celsius…”	See response to question #12 above.

				This limit exceeds that of several pieces of hardware typically used in Express Lanes systems, including those already installed at PTC. Request ACTC adjust the upper temp of all equipment limit to 131° F. Will PTC please consider changing the temperature range to negative thirty (-30) to fifty (50) degrees Celsius?	
36	5 of 5	1.12	Procurement Schedule of Events	Table 1-1: Key Procurement Dates – states "Deadline for Proposers to Submit Final Questions via email… June 29, 2018". "Answers to Proposers questions posted to the Commission website…July 18, 2018" Will PTC consider extending this deadline one week beyond the date answers will be posted?	No.
37	E – 32	Tables, 2-1 and 2-2	Proposal Page Limitations Forms and Submittal Checklist	The table and proposal instructions require the Preliminary Project Schedule to be included in Section 4. Table 2-1, Proposal Page Limitations indicates that Section	See response to question #10 above.

				4 is included in the 150 page count. Will PTC consider removing the Preliminary Project Schedule from the page count and, instead, include it as an appendix?	
38			Diverse Business Requirements	Can PTC please assist in identifying MPL DB Certification organizations? Does MBA subscribe to the DBP certifying bodies listed at Pennsylvania Department of Transportation? http://www.penndot.gov/about-us/EqualEmployment/Pages/Diverse-Business-Program.aspx	See RFP Exhibit I, Definitions, Item #8 for the list of acceptable Third-party Certifying Organizations.
39	8	Part I 1.20	Prime proposer responsibilities	Will traditional Prime - Subcontractor bids be considered?	See RFP Section 1.8.
40	8	Part I 1.20	Prime proposer responsibilities	Would PTC consider consortia/joint ventures?	See RFP Section 1.8.
41	8	Part I 1.20	Prime proposer responsibilities	Is there a minimum % of the scope of works to be performed by prime contractor?	No
42	4	Part I 1.10	Minimum qualifications	Will Prime-Sub bid teams be able to meet the qualifications as a collective team?	Yes. It will be up to the proposer to demonstrate how they would meet the qualifications and requirements of the RFP.
43	1	Ex A 1.1	Background	Who is the incumbent system integrator(s) for RSE, CSC, BOS?	TransCore

44	3	Part I 1.8	Subcontracting	Can PTC provide a list of local DBE electrical contractors?	No.
45	32	Part III 3.4	Evaluation criteria	Can PTC anticipate scoring points/weight associated with each of the areas considered for evaluation?	Selection criteria is described PART 3 CRITERIA FOR SELECTION of the RFP. The Proposal Evaluation criteria is described in order of importance in section 3
46			Pennsylvania foreign qualification	For companies registered outside of PA, when should PA foreign qualification be obtained? Prior to submitting response to RFP or can it be done at a later stage?	A foreign filing association [foreign filing associations are corporations for profit, corporations not-for-profit, limited partnerships, limited liability companies, professional associations and business or statutory trusts that were not created or formed under the laws of Pennsylvania] or foreign limited liability partnership may not do business in this Commonwealth until it registers with the Department. See 15 Pa.C.S. § 403 for activities that do not constitute doing business in this Commonwealth. It is up to the association to determine whether its activities require it to register with the Department of State. If required, the association must do so prior to entering into agreement with the Commission (not prior to submitting a proposal).
47			FAT	Is there any restriction on the location to perform FAT? Could FAT be arranged at any current PTC facility?	See requirement #1010 of Attachment A - Scope of Work.

48	5	Part I 1.12	Procurement schedule of events	Given today June 29st is the deadline to submit questions and some of the previously submitted ones have not been responded yet, would PTC consider granting a one-week extension on the deadline for submitting questions and the final proposal due date?	No.
49	Addendum 1 - Page 117 of 138	901.2	Maintenance and Protection of Turnpike Traffic During Construction – Material	This section makes references to Section 600 (e.g., Section 627.2, Section 696.2, etc.). Please provide a copy of the document that contains these specific sections.	The most recent version of the Commission Standard Specifications can be found at the following website: https://ebs.paturnpike.com/generalinformation/standards/download_specs.aspx. If a referenced Section is not found in the Commission Specification list, contractor should utilize the most recent version of the PennDOT Standard Specifications, which can be found at the following website: http://www.penndot.gov/ProjectAndPrograms/Construction/Pages/ConstructionSpecifications.aspx
50	Addendum 1 - Page 117 of 138	901.1	Maintenance and Protection of Turnpike Traffic During Construction - Description	Please provide a copy of all publications, standards, drawings etc. identified in this section relating to Maintenance and Protection of Traffic.	See answer to question 55. Turnpike Standard drawings for Maintenance and Protection of Traffic can be found at the following website: https://ebs.paturnpike.com/generalinformation/standards/download_drawings.aspx.

51	Addendum 1 - Page 113 of 138	Allowable Working Hours		Please clarify per the addendum that 6:00AM – 7:00PM (Monday – Thursday) are the correct days and times when we can close the lanes to install equipment during the Installation phase of the project.	This is the correct information for this section of the roadway.
52	Page 533 of 770	4.9	Electrical Work - Electrical Enclosures	What material is to be used for electrical enclosures that are outside of the Toll Equipment Building.?	The Proposer to provide response in Proposal Section 3, question 7. Proposer to provide requirements for roadside cabinets if required.
53	Page 747 of 770	Exhibit I	Diverse Business (DB) – Requirements - (b) Definitions, 8. Third-Party Certifying Organization	Are the 5 organizations that are listed the only allowable certifying organizations for DB participation under this RFP?	Yes.
54	Page 192 & 193 of 770	6.5 Cashless Tolling System Operational and Acceptance Test	Requirement 1034 – “The Cashless Tolling System shall be observed in live revenue operations by the Contractor and the Commission for a minimum of four (4) calendar	Please clarify if the Operational and Acceptance Test period ("minimum of 2 monthly audit cycles") is in parallel or sequential to the 4-month revenue operations observation period.	The Operational and Acceptance Test is four (4) calendar months for each implementation location. The two (2) monthly audit cycles are in parallel to the OAT at the baseline Clarks Summit toll location that coincide with PTC audit cycles.

			months.” Requirement 1044 – “The Cashless Tolling System shall be observed in live revenue operations by the Contractor and the Commission for a minimum of two (2) monthly audit cycles.”		
55	Page 152 of 770	5.1.7 Project Schedule	Requirement 762 “The Contractor shall provide and maintain a detailed Project Implementation schedule for the Project in Microsoft Project format (Project 2016 or above)”	Is the use of Oracle/Primavera P6 acceptable?	No.
56	Page 33 of 770	2.3 Submission of Technical Proposal	The Technical Proposal shall be organized as instructed above in Section 2.2.2	We request the Preliminary Project Implementation Schedule be excluded from the 10-11 point font requirement due to the nature of generating a PDF to a	The project schedule can be excluded from the 150-page limit per the response to question #10 above. The font size may be excluded from the font size

			Technical Proposal Format and Contents. Type size shall be no less than 11-point font-type; however, charts and tables may be in a font no less than 10 point.	specific page size from the scheduling software.	requirement but needs to be of adequate size for readability.
57	Page 86 of 770 and Page 153 of 770	2.1.10 Roadway Pavement, Overhead Structures/ Toll Gantries, and Toll Equipment Building Design Support and 5.1.7 Project Schedule	Requirement 268 – During civil design, Contractor shall provide review, comment and approval of civil design drawings or similar within the context of the toll system functional and performance requirements. Requirement 767 – "The Project Implementation schedule shall include all tasks for the submission	Considering Civil Design may not be finalized at the time Notice to Proceed is given, and Contractor may still be reviewing and commenting on the Civil Design per Requirement 268, the NTP+60 day Requirement 767 may not be achievable. Will PTC consider changing Requirement 767 to indicate all toll equipment locations will be identified within 60 days of receipt of final Civil Design Plans?	The final toll equipment layout and positioning including conduit counts and sizing need to be provided by the proposer within 60 days of NTP to be incorporated into the final Civil Design plans. including conduit counts and sizing, See update to requirement #767 as part of this addendum. See section 2.1.10 of Attachment A - Scope of Work for design support requirements.

			and approval of the final civil drawings identifying the locations of all toll equipment to be install in a toll zone within 60 days of NTP.”		
58	Page 28 of 770	Proposal Section 4: Approach to Project Plan and Implementation	This section states“….it is critical that the milestone dates in bold italics are achieved on the dates shown in the schedule”	Please clarify which “dates in bold italics” are being referred to here.	See response to question #25 above.
59	Page 159 of 770	5.4 Documentation	Requirement 828 – “A Table of Contents, for all documentation that requires one, shall be submitted by the Contractor to the Commission for review and comment prior to the submission of	Requirement 828 states a Table of Contents are required for all documentation that require one. Requirement 829 provides review times for all documentation review cycles, except Table of Contents. We request the PTC review period for Table of Contents be established as 5 business days.	Requirement #828 has been deleted in this addendum as noted above. The Table of Contents to be included as part of the initial submission where applicable.

			the preliminary draft.”		
60	Page 28 of 770	Pt2, Sec 2.2.2, bullet 1	Preliminary Project Implementation Schedule	This section states: “Provide a Preliminary Project Implementation Schedule in MS Project format that meets the schedule guidelines set forth above and is based on the Exhibit E Project Implementation Schedule.” Table 2-1, Proposal Page Limitations on page RFP page 14 states there is a page limit of 150 pages for Sections 1-5, which would include the Preliminary Project Implementation Schedule. Since the Preliminary Project Implementation Schedule can be quite lengthy page wise, please verify that proposers can provide the Preliminary Project Implementation Schedule in Section 7.	See response to question #10 above.
61	10 of 115	Exhibit F-7 Price Proposal	Tab 2-a Backup Opt In-lane Cost	Cells B37 through B40 contain discount percentages based on volume of toll zones. The instructions in Exhibit C – Price Proposal Instructions on Page 5 of	The proposer may provide a volume discount as a percentage to be entered in sheet **2-a Backup Opt In-lane Cost** that will automatically be applied to the pricing based on the number of zones and the

				17, item 4.2 indicate “Sheets 2 and 2-a. These sheets will be automatically populated from Sheet 2-1, 2-2, 2-3, 2-4, 2-5, and 2-6. No Proposer input is required”. Is the Commission looking for these values to be populated? If so, with cost values already computed and entered in the SS or to be computed from the cost values entered?	discount provided. See updated Exhibit C - Price Proposal Instruction, Section 4 provided in this addendum for additional information.

All other terms, conditions and requirements of the original RFP dated May 30, 2018, Addendum 1 and Addendum 2 remain unchanged unless modified by this Addendum.

Attachment 1

Cashless Toll Zone Locations

Toll Zone Types

For the purpose of developing cost estimates for roadside equipment, it is important to understand physical layout of the future Cashless Tolling System. Specifically, the number of lanes and shoulders, as well as the type of toll zone being implemented will be important to the cost estimates.

Shoulders of 8 feet or greater were considered full shoulders and will, thereby, be fully equipped. Table 1 describes the toll zone types found across the system.

Table 2 describes the location, anticipated conversion date and type for the toll zones which will be constructed on the baseline scope facilities on the Northeast Extension. The proposed mileposts for the gantry locations are estimates and will be finalized during the design phase by the Civil Designer(s).

Table 3 describes the location, anticipated conversion date and type for the optional toll zones which may be constructed on the Mainline and Northeast Extension. The proposed mileposts for the gantry locations are estimates and will be finalized during the design phase by the Civil Designer(s).

Table 4 describes the location, anticipated conversion date and type for the optional toll zones which may be constructed on the western extensions. Toll zone layouts have not been developed for the optional facilities (Beaver Valley Expressway, Amos. K. Hutchinson Bypass and Mon-Fayette Expressway). Therefore, cost estimates are requested for each toll zone type so that costs may be fully developed in coordination with the design of these facilities.

Table 1: Summary of Toll Zone Types

Toll Zone Type	Description	Existing Lane Configuration (lanes+full shoulder+partial shoulder)
Zone Type 1 (Z1)	Mainline Gantry (2) with Maintenance from Below	(3+1+1)
Zone Type 2 (Z2)	Mainline Gantry (2) with Maintenance from Below	(3+2+0)
Zone Type 3 (Z3)	Mainline Gantry (2) with Maintenance from Below	(2+1+1)
Zone Type 4 (Z4)	Mainline Gantry (2) with Maintenance from Below	(2+1+1)
Zone Type 5 (Z5)	Existing Mainline with Maintenance from Below	(2+1+1)
Zone Type 6 (Z6)	Existing Ramp with Maintenance from Below	(2+0+0)

Table 2: Toll Zone Details for Base Locations

Northeast Extension Tolling Segment	Proposed NEE Mile Post [1]	Toll Zone Type	Conversion year	Region	# Toll Zones
Northeast Extension	A123.4	Z4	2022	East	2

Table 3: Toll Zone Details for Future PTC Optional Locations on Mainline and Northeast Extension (Pricing Only)

Mainline Tolling Segment	Proposed Mainline Mile Post [1]	Toll Zone Type	Conversion year [2]	Region	# Toll Zones
Mainline	T1.43 [2]	Z5	2024	West	1
Mainline	T36.1	Z2	2024	West	2
Mainline	T44	Z2	2024	West	2
Mainline	T51.9	Z2	2024	West	2
Mainline	T63.35	Z2	2024	West	2
Mainline	T70.8	Z2	2024	West	2
Mainline	T76.6	Z2	2024	West	2
Mainline	T108.95	Z2	2024	West	2
Mainline	T131.6	Z2	2024	West	2
Mainline	T160.6	Z2	2024	West	2
Mainline	T173.2	Z2	2024	West	2
Mainline	T188.1	Z3	2024	West	2
Mainline	T189.7	Z2	2024	West	2
Mainline	T203.2	Z2	2024	West	2
Mainline	T226.9	Z2	2024	Central	2
Mainline	T240.6	Z2	2024	Central	2
Mainline	T243.6	Z2	2024	Central	2
Mainline	T248.3	Z2	2024	Central	2
Mainline	T285.7	Z2	2024	Central	2
Mainline	T295.0	Z2	2022	East	2
Mainline	T311.4	Z2	2022	East	2
Mainline	T312.9	Z2	2022	East	2
Mainline	T322.3	Z2	2022	East	2
Mainline	T329.1[6]	Z1	2022	East	2
Mainline	T332.1	Z1	2022	East	2
Mainline	T334.8	Z1	2022	East	2
Mainline Ramp	T339.80 [3,4]	Z6	2022	East	1
Mainline	T341.4	Z1	2022	East	2
Mainline	T348.8	Z1	2022	East	2
Mainline Ramp	T351.9 [3,5]	Z6	2022	East	1
Mainline	T353.3	Z3	2022	East	2
Mainline	T359 [3]	Z5	2022	East	1

Northeast Extension Tolling Segment	Proposed NEE Mile Post [1]	Toll Zone Type	Conversion year	Region	# Toll Zones
Northeast Extension	A27.4	Z2	2022	East	2
Northeast Extension	A30.8	Z2	2022	East	2
Northeast Extension	A56.9	Z2	2022	East	2
Northeast Extension	A61.9	Z4	2022	East	2
Northeast Extension	A76.9	Z4	2022	East	2
Northeast Extension	A90.3	Z4	2022	East	2
Northeast Extension	A97.5	Z4	2022	East	2
Northeast Extension	A112.5	Z4	2022	East	2
Northeast Extension	A121.3	Z4	2022	East	2

[1] The proposed mileposts for the mainline gantry locations are for planning purposes only and final locations will be determined during the design phase.

[2] Conversion schedule of the Central/Western regions subject to change. Earliest conversion of 2024 for pricing evaluation.

[3] Existing AET or Express toll zones. Existing Toll System to remain initially, new implementation TBD. Included for pricing evaluation.

[4] Virginia Dr. slip ramps may toll in a single direction (most likely entry)

[5] Street Rd. slip ramps may toll in a single direction (most likely exit)

[6] Lafayette St. is a proposed future interchange that will require a new ORT gantry to support.

Table 4: Toll Zone Details for Future PTC Optional Locations on Beaver Valley Expressway, Amos K. Bypass and Mon Fayette Expressway (Pricing Only)

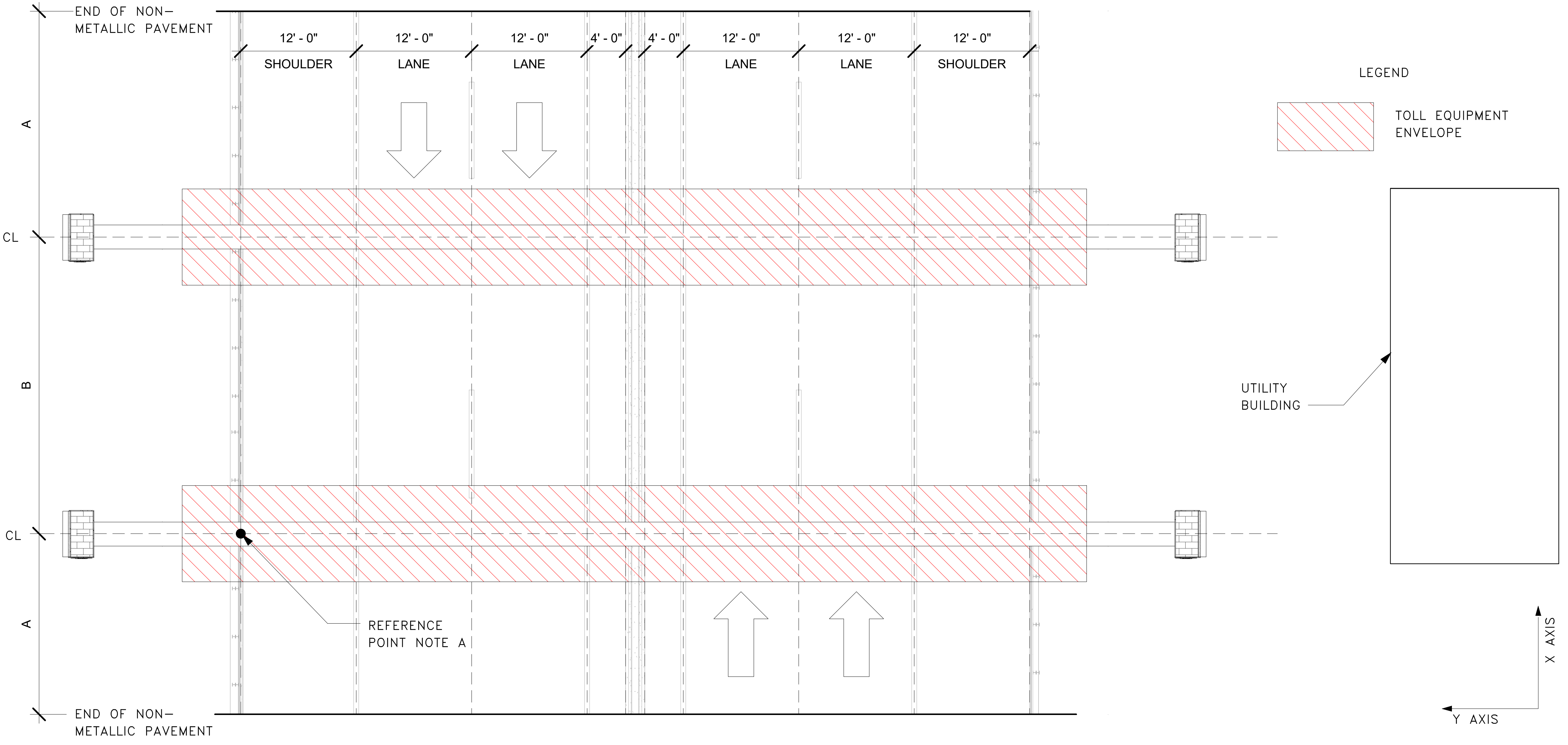
Tolling Segment	Proposed Mile Post [1]	Toll Zone Type	Conversion year [2]	Roadway	# Toll Zones
Ramp	B17	Z6	TBD	BVE	2
Mainline	B18.1	Z5	TBD	BVE	2
Ramp	B20	Z6	TBD	BVE	2
Ramp	B29	Z6	TBD	BVE	2
Mainline	B30.45	Z5	TBD	BVE	2
Ramp	G4	Z6	TBD	AKH	2
Mainline	G4.6	Z5	TBD	AKH	2
Ramp	G6	Z6	TBD	AKH	2
Ramp	G8	Z6	TBD	AKH	2
Ramp	G9	Z6	TBD	AKH	2
Ramp	M4	Z6	TBD	MFE	2
Mainline	M4.6	Z6	TBD	MFE	2
Ramp	M15	Z6	TBD	MFE	2
Ramp	M18	Z6	TBD	MFE	2
Mainline	M19.5	Z5	TBD	MFE	2
Ramp	M22	Z6	TBD	MFE	2
Ramp	M26	Z6	TBD	MFE	2
Mainline	M34.8	Z5	TBD	MFE	2
Ramp	M39	Z6	TBD	MFE	2
Ramp	M44	Z6	TBD	MFE	2
Ramp	M48	Z6	TBD	MFE	2
Mainline	M51.9	Z4	TBD	MFE	2

[1] The proposed mileposts for the tolling locations are for planning purposes only and final locations will be determined during the design phase.

[2] The conversion of the optional locations has yet to be determined. For informational and pricing comparison purposes only.

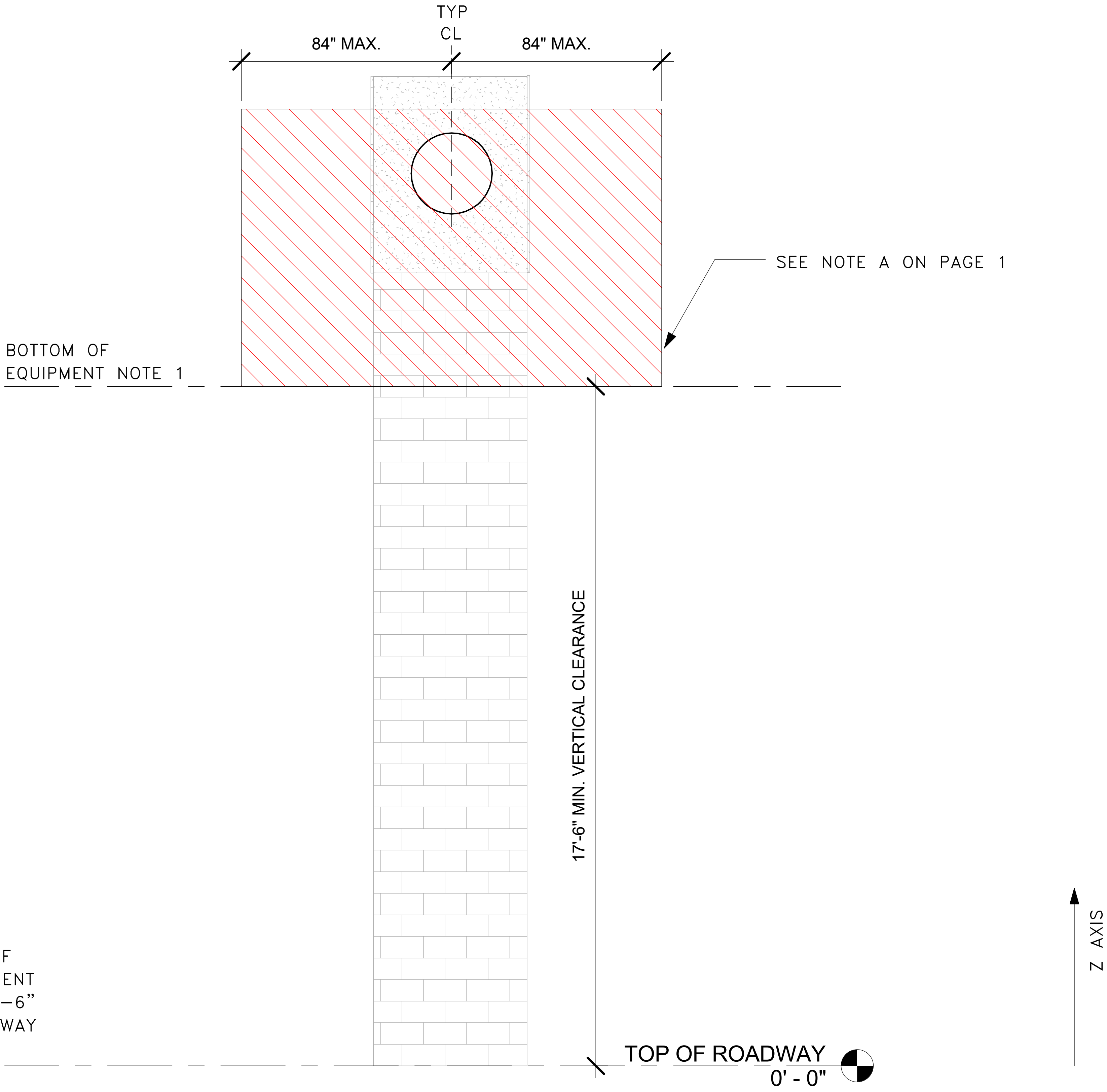
Attachment 5

Concept Plans for Overhead Structures/ Toll Gantries



NOTE A: ALL X,Y AND Z
MEASUREMENTS SHOULD
BE FROM REFERENCE
POINT

PTC MAINTENANCE
BELOW CONCEPT - PLAN VIEW
1 1" = 10'-0"



LEGEND

▨ TOLL EQUIPMENT ENVELOPE

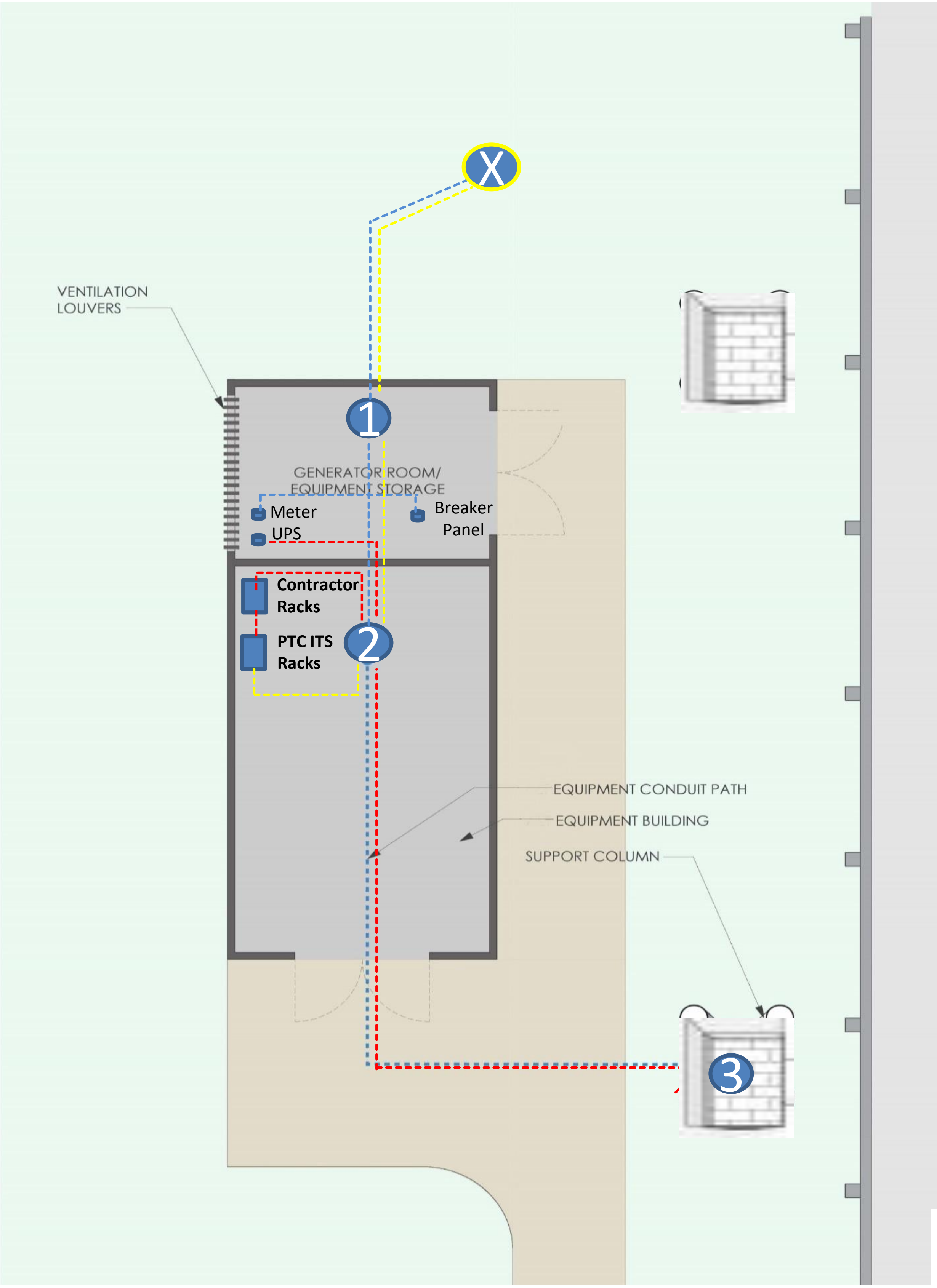
NOTE 1: LOWEST POINT OF THE GANTRY TOLL EQUIPMENT SHALL BE A MINIMUM 17'–6" ABOVE THE TOP OF ROADWAY

① PTC MAINTENANCE FROM BELOW CONCEPT - SECTION VIEW
1/4" = 1'-0"

Attachment 6

Installation Demarcation Diagram

Toll Equipment Building (TEB) Demarcation Points



Utilities:

- Power from point of service to TEB point X by Civil Contractor.
- Network connectivity from point of service to TEB point X by Civil Contractor/PTC.

Conduit / Cable Tray Installation:

- Cable Tray Installation within TEB by Civil Contractor
- Conduit from point of service to TEB point X by Civil Contractor.
- Conduit from point X to generator room point #1 by Civil Contractor.
- Conduit from generator room point #1 to equipment room point #2 by Civil Contractor.
- Conduit from equipment room point #2 to toll gantry point #3 by Civil Contractor.
- Conduit from point #2 to toll equipment racks in toll equipment room by Contractor.

Power Cabling:

- Grounding and surge protection by Civil Contractor.
- Power from point X to generator room point #1 by Civil Contractor.
- Power from generator room point #1 to equipment in generator room, including but not limited to meter, breaker panel, UPS and generator by Civil Contractor.
- Power from generator room point #1 to toll equipment room point #2 and toll gantry demarcation point #3 by Civil Contractor.
- Power from demarcation point #2 to LAN and toll equipment rack in toll equipment room by Contractor.
- Power from demarcation point #2 to WAN and ITS Equipment rack in toll equipment room by PTC.

Data Cabling:

- Network connectivity from point X to toll equipment room point #2 by Civil Contractor/PTC.
- ITS and WAN cabling from toll equipment room point #2 to PTC ITS equipment racks by PTC.
- LAN to WAN connections from PTC ITS racks to toll equipment racks in toll equipment room by Contractor.
- Toll System cabling from toll equipment room point #2 to toll equipment racks by Contractor.
- Toll System cabling from toll equipment rack in toll equipment room to gantry point #3 by Contractor.
- Toll system cabling from toll equipment rack in toll equipment room to UPS in generator room by Contractor.

*****FOR PLANNING PURPOSES ONLY. GANTRY TYPES AND EXACT LOCATIONS OF DEMARCATION POINTS TO BE DETERMINED DURING FINAL DESIGN.*****

Gantry Demarcation Points

Conduit Installation:

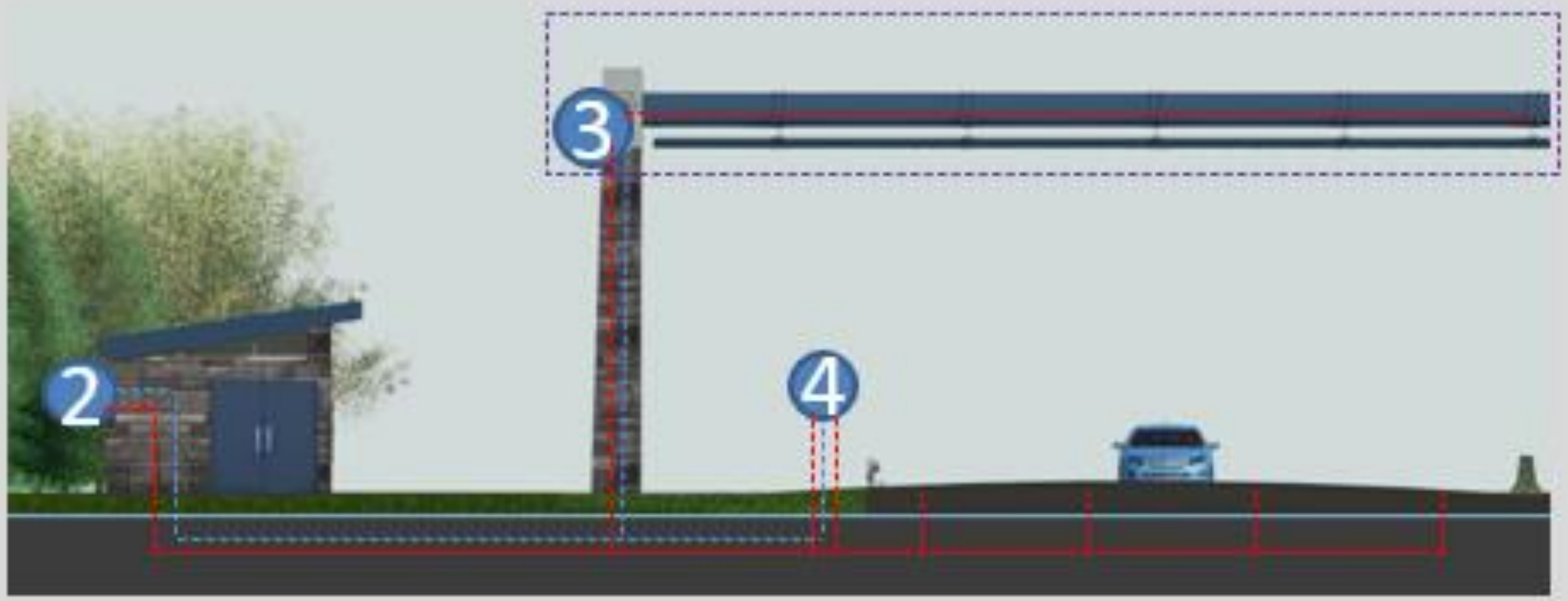
- Cable Tray Installation within Monotubes and Gantries by **Civil Contractor**
- Conduit from TEB point #2 to gantry point #3 by **Civil Contractor**.
- Conduit from TEB point #2 to roadside point #4 (if necessary) by **Civil Contractor**.
- Conduits, junction boxes and connectors from gantry point #3 to toll equipment on the gantry by **Contractor**.
- Conduits, junction boxes, cabinets and connectors from roadside point #4 to in-lane sensors (if necessary) by **Civil Contractor**.
- Conduits from TEB point #2 to DVAS pole (not shown) by **Civil Contractor**.

Power Cabling:

- Grounding and surge protection by **Civil Contractor**.
- Power from TEB point #2 to gantry point #3 by **Contractor**.
- Power from TEB point #2 to roadside point #4 (if necessary) by **Contractor**.
- Power from gantry point #3 to toll equipment on gantry by **Contractor**.
- Power from roadside point #4 to in-lane sensors (if necessary) by **Contractor**.
- Power from TEB to DVAS mounting location (not shown) by **Contractor**.
- Power from TEB to supplemental DVAS lighting by **Contractor.**

Data Cabling:

- Toll System cabling from toll equipment racks in toll equipment room to gantry point #3 to gantry toll equipment by **Contractor**.
- Toll System cabling from toll equipment racks in toll equipment room to roadside point #4 to in-lane sensors (if necessary) by **Contractor**.
- Toll System cabling from DVAS servers in TEB to DVAS camera by **Contractor**.



Maintenance from Below

General Notes (not illustrated in diagram)

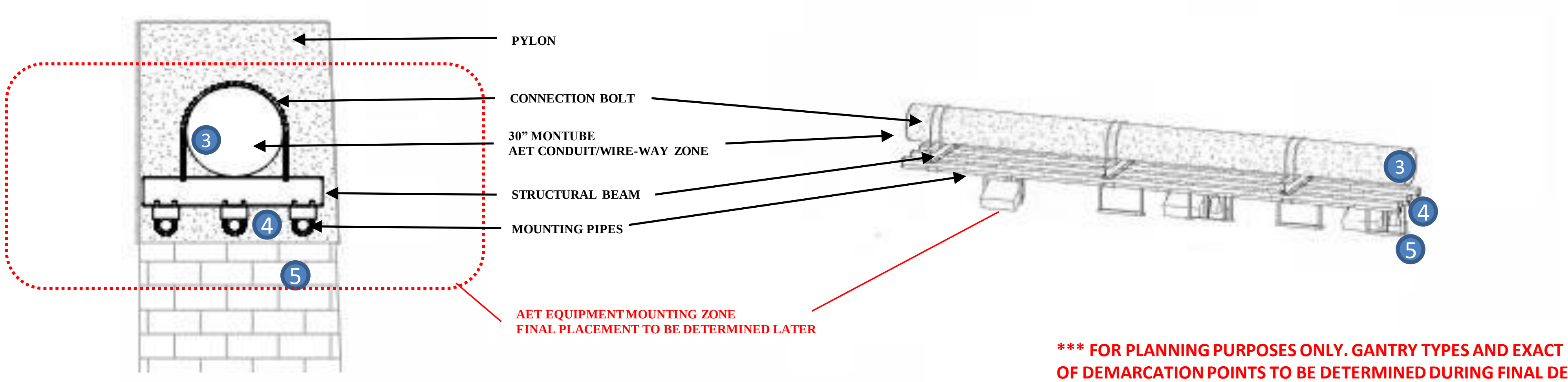
- **Contractor** to coordinate with Civil Designer and **Civil Contractor(s)** to specify the location, number and diameters of conduits required for the toll equipment installation, specify conduits for power, data and RF cables.
- **Contractor** to coordinate with Civil Designer and **Civil Contractor** specify mounting locations, required clearances and distance limitations of overhead equipment to be installed on the gantries.

*****FOR PLANNING PURPOSES ONLY. GANTRY TYPES AND EXACT LOCATIONS OF DEMARCATION POINTS TO BE DETERMINED DURING FINAL DESIGN.*****

Gantry Mounting Equipment Demarcation Points

Mounting Equipment Installation:

- Gantry equipment mounting pipes and support plates from gantry point #4 to point #5 provided by Civil Contractor and installed by Contractor based on location (point #5) provided by the Contractor.
- Mounting brackets and Toll Equipment to the mounting pipes and support plates point #5 provided and installed by Contractor.
- Installation of conduits and cables to point #3 described on previous pages.


PYLON
CONNECTION BOLT
30" MONTUBE
AET CONDUIT/WIRE-WAY ZONE
STRUCTURAL BEAM
MOUNTING PIPES
AET EQUIPMENT MOUNTING ZONE
FINAL PLACEMENT TO BE DETERMINED LATER
3
4
5
3
4
5

*** FOR PLANNING PURPOSES ONLY. GANTRY TYPES AND EXACT LOCATIONS OF DEMARCATION POINTS TO BE DETERMINED DURING FINAL DESIGN. ***

Maintenance from Below

Exhibit B
Defined Terms and Acronyms

Exhibit B: Defined Terms and Acronyms

Defined Terms

Term	Definition
Acceptance	Approval of a Phase or Work based on meeting certain conditions, including functional; operational; performance, and test requirements set forth in the Scope of Work and Contract.
Active Directory	Microsoft's trademarked directory service. A centralized and standardized system that automates network management of user data, security, and distributed resources, and enables interoperation with other directories.
Alert(s)	Electronic notifications sent by the System to notify authorized users of System issues or conditions that may require attention.
Approve	The term "Approve" and its variations (e.g., "Approval") when capitalized in this Agreement refer to the Commission's Acceptance of a Document, condition, action or Deliverable in writing for its own internal purposes. The Commission's Approval shall not be construed to mean the Commission's endorsement or assumption of liability nor shall it relieve the Contractor of its responsibilities under the Agreement.
Approved Project Implementation Schedule	The schedule to be submitted by Contractor within 15 days of NTP and Approved by the Commission in accordance with Section 11.2 of the Contract.
As-Built Drawings	Documents and other items set forth in this Scope of Work that constitute a complete and accurate record of the System as Designed, delivered, installed and Approved.
Authorized User	Using a role-based login, Authorized Users are users authorized by the Commission to have specific privileges allowing access to information and functionality on the System not afforded to other users.
Automatic License Plate Recognition (ALPR)	The process whereby license plate characters and issuing jurisdiction are extracted from an image of a vehicle via automated (non-human) means. This may also include automatically determining and reporting license plate type if this capability is provided by the System. Also referred to as "Optical Character Recognition".
Automatic Vehicle Classification (AVC)	Lane system that uses specialized devices, sensors, and Software to recognize that a vehicle has entered the tolling zone and to classify the vehicle according to PTC classification rules.
Automatic Vehicle Identification (AVI)	Lane system comprised of radio frequency antennas and readers that communicate with transponders that are affixed to vehicles in order to read and report the transponder identification information.
Away Agency	An agency or interoperable organization with roadways traveled on by a Pennsylvania E-ZPass customer whose account is not with that agency or interoperable organization.

Term	Definition
Buffered Transponder Read	Transponder reads that are retained in the AVI reader when communications between the reader and the zone controller are down and not transmitted to the zone controller at the time of the Transponder read. Upon reestablishment of the communications such Transponder reads are transmitted to the zone controller and are called Buffered Transponder Read(s).
Business Day	Each day, exclusive of Saturdays, Sundays and Holidays, beginning at 12:00 a.m. (midnight) Eastern Time (standard or daylight as applicable).
Business Rules	A set of rules that defines how the Cashless Tolling System shall respond to various situations and conditions that occur during the toll collection process based on business case and policy decisions Approved by the Commission.
Calendar Day	Every day shown on the calendar, beginning at 12:00 a.m. (midnight) Eastern Time (standard or daylight as applicable).
Cashless Toll Concentrator / Host	Central system that receives and consolidates data from the roadside equipment to be transmitted to the existing PTC Systems. May also host functionality to support the operation and reporting of the Cashless Tolling System.
Cashless Tolling	A tolling process that enables an agency to bill or debit the toll accounts of registered vehicles for fares they incur while moving along a toll facility. Patrons are identified by the use of an on-board transponder or by capturing the vehicle's license plate.
Cashless Tolling Plaza	A toll collection facility located on a corridor or roadway that provides Cashless Toll Collection. Also referred to as "toll location or "toll Plaza".
Cashless Tolling System	Refers to the entirety of the infrastructure, Hardware, Software and Services provided by the Contractor for this Contract. This includes the lane systems and all lane Equipment, plaza/host system, MOMS and the DVAS. Also referred to as "the System" and "the Cashless Tolling System".
Class Mismatch	A condition in the transaction where the vehicle class as determined by the AVC does not match the vehicle class encoded in the transponder.
Commission	The Pennsylvania Turnpike Commission (the "Commission") operates the Pennsylvania Turnpike. To avoid unnecessary repetition of expressions, whenever in the Contract Documents the term "Commission" is used, it is understood that "or the PTC designated representative" is a part of the term unless specifically indicated otherwise. Such designated representative will be identified by the Commission.
Commissioning	The test that occurs upon completion and Approval of installation that indicates readiness for operations. Upon the Approval of the Commissioning Test at each Cashless Tolling Plaza, the Cashless Tolling Plaza shall be considered Commissioned.

Term	Definition
Conformed Scope of Work	The updated Scope of Work as agreed to between the Commission and the Contractor, executed as part of the Contract, including any Approved amendments generated during the ITN and negotiation process. When the term "Scope of Work" is referred to in the executed Contract Documents it is referring to the Conformed Scope of Work, unless otherwise indicated.
Contract	The entire and integrated contract between the parties there under which supersedes all prior negotiations, representations, or contracts, either written or oral. The Contract Documents, as amended from time to time, form the contract between the Commission and the Contractor, setting forth the obligations of the parties including, but not limited to, the performance of the Work and the basis of payment. May also be referred to as "Agreement".
Contract Documents	The documents forming the Contract including all addenda or appendices thereto, any supplemental agreements, amendments, Contract modifications, and all provisions required by law to be inserted in the Contract, whether actually inserted or not.
Contract Price	The maximum amount of money payable by the Commission to the Contractor for completion of the Work in accordance with the Contract Documents.
Contract Term	The term of the Contract, including any authorized renewals and extensions.
Contractor	In the context of the Contract Documents, Contractor means any company, firm, partnership, corporation, association, joint venture, or other legal entity permitted by law to perform the Work in the State of Pennsylvania. Such legal entity shall be the entity that enters into a written Contract with the Commission to perform the Work described in the RFP Documents and Contract Documents.
Contractor Project Manager	Contractor Key Team responsible for the management of this Project for the Contractor. May also be referred to as "Project Manager".
Dashboard	A visual display of collected information that is consolidated, arranged, and displayed on a screen(s) in an intuitive manner so that the information can be monitored and interpreted at a glance.
Day	Calendar day unless otherwise designated.
Deliverable	Any written document or item of Work provided by the Contractor to the Commission as part of meeting the Scope of Work.
Design	All aspects of Design relating to the Cashless Tolling System and Services as set forth in additional detail in the Contract Documents, including but not limited to the Scope of Work.
Digital Video Audit System (DVAS)	System with cameras and servers located at each Cashless Tolling Plaza that allows remote viewing of vehicular events and video/images in real time or stored for review. DVAS provides transaction/vehicle event data overlaid on video for correlation of vehicle and transaction data.

Term	Definition
Diverse Businesses (DB)	A disadvantaged business, minority-owned or women-owned business or service-disabled veteran-owned or veteran-owned small business that has been certified by a third-party certifying organization.
Document	See "Deliverable"
Electronic Toll Collection (ETC)	A system of integrated devices and components that perform the automatic recording and reporting of vehicle transactions through electronic media in a toll revenue collection system.
Equipment	See Hardware.
Engineering Change Order	Process for making changes to Work subject to the provisions of **Exhibit G Contract** set forth in Section 13.
E-ZPass	E-ZPass refers to the devices and programs for electronic toll collection at the E-ZPass Group interoperable agencies.
E-ZPass Group	The official name of the Interagency Group (IAG) consortium which consists of 28-member agencies in 16 states as of the date of publication of the RFP that coordinates the operation of E-ZPass, setting the necessary business and technology requirements to make the E-ZPass system interoperable.
File Transfer Protocol/Secure File Transfer Protocol	A fast, application-level protocol widely used for copying/transferring files to and from remote computer systems over a network. This protocol allows users to use FTP (or Secure FTP) commands to work with files, such as listing files and directories on the remote system.
Final Acceptance	Final Acceptance will be deemed to have occurred when the conditions for Final Acceptance set forth in Section 10 of **Exhibit G Contract** have been met.
Force Majeure	An event for which a party is excused from performance as set forth in Section 20 of **Exhibit G Contract.**
Go-Live	The date on which revenue operations commence in accordance with **Exhibit A Scope of Work**.
Hardened	A system that has undergone rigorous mechanical, thermal, and component compatibility testing to ensure overall system reliability and consistent performance in the field, however hazardous the environment may be.
Hardware	"Hardware" or "Equipment" is an all-inclusive term to mean the Equipment, Hardware, associated peripherals, associated firmware, electrical and other materials and supplies necessary or furnished by the Contractor to provide Services pursuant to the Contract Documents.

Term	Definition
Holidays	The following days are observed as PTC Holidays: A) New Year's Day (January 1); B) Martin Luther King Day (3rd Monday in January); C) Lincoln's Birthday (February 12) D) President's Day (third Monday of February) E) Good Friday (Friday preceding Easter) F) Primary Election Day G) Memorial Day (last Monday in May); H) Flag Day (June 14) I) Independence Day (July 4); J) Labor Day (1st Monday in September); K) Columbus Day (second Monday of October) L) General Election Day M) Veterans' Day (November 11); N) Thanksgiving Day (4th Thursday in November); and O) Christmas Day (December 25). If any Holiday listed in (A) through (O) above falls on a Saturday or Sunday, the previous Friday or following Monday, respectively, shall be considered a Holiday.
Home Agency	The Home agency is the agency that establishes and/or maintains the customer's account and issues the customer's transponder(s), if applicable.
IAG Class	The numeric vehicle class code that is programmed in the transponder and obtained from the transponder data as detailed in Attachment 4B - E-ZPass Group Mapped Classes.
IAG Mapped Class	The toll Authority vehicle class that the IAG class is mapped to as detailed in Attachment 4B - E-ZPass Group Mapped Classes.
Implementation Phase	The phase of the Project, which begins at Notice to Proceed and ends upon Acceptance of the Cashless Tolling System Implementation.
Interagency Group (IAG)	See E-ZPass Group.
Interface	Software program or file exchange that facilitates data exchange from one component of a system to another or between separate systems.
Interoperable (Interoperability)	A general term used to describe a relationship between tolling agencies or entities where their systems are capable of capturing and transmitting transactions generated on an agency's roads by customers of the other agency or entity. Requires that reciprocity agreements between agencies and entities are in place to govern payments and reconciliation.
Key Team/ Key Team Member	Key Team for this Project shall be Project Principal, Project Manager, Deputy Project Manager, Technical Manager, Toll Concentrator/Host System, Technical Manager Lane Systems, Installation Manager, Maintenance Manager and Quality Assurance/Test Manager. This designation requires that certain standards, processes and procedures be followed by the Contractor with regard to Key Team personnel, as further set forth in the Scope of Work and the Contract Documents.

Term	Definition
Local Area Network (LAN)	A group of computers and other devices dispersed over a relatively limited area and connected by a communications link that enables any device to interact with any other on the network.
License Plate Image Capture and Processing System (LPICPS)	System that uses a camera(s) to capture and identify vehicle and license plate information, including the use of optical character recognition (OCR) Software.
Maintenance	See "Maintenance and Software Support Services".
Maintenance and Software Support Services	The Contractor's responsibility for providing Maintenance and Software Support Services as described in this Scope of Work.
Maintenance Online Management System (MOMS)	An automated, fully integrated system that monitors the status of operational Equipment in real time, records Equipment and process failures, electronically notifies Maintenance and PTC personnel, generates and tracks work orders, maintains preventative Maintenance schedules, generates repair history, and maintains parts inventory and asset management, as set forth in the Scope of Work.
Maintenance Phase	The phase of the Project, which begins at Acceptance, during which the Contractor performs all required Maintenance activities, provides all required Maintenance deliverables and maintains the System.
Non-Revenue Vehicle	Vehicles identified by Pennsylvania Turnpike Commission that are exempt from tolls on Pennsylvania Turnpike toll facilities.
Notice to Proceed (NTP)	A written notice given by the Commission to the Contractor establishing the date on which the Contract Term will commence to run, and on which the Contractor shall start to perform the Contractor's obligations under the Contract Documents. Also referred to as 'NTP.'
Onsite First Integration Test (OFIT)	The test to verify the full functionality of the Cashless Tolling System (in-lane and Plaza/Host) and its compliance with the Contract requirements and the Approved Design in a controlled, onsite environment. Also referred to as "OFIT".
Optical Character Recognition (OCR)	The process whereby license plate characters and issuing jurisdiction are extracted from an image of a vehicle via automated (non-human) means. This may also include automatically determining and reporting license plate type if this capability is provided by the System. Also referred to as "ALPR".
Pervasive Defect	A persistent or reoccurring issue or problem as further set forth in Section 17 of **Exhibit G Contract**.
Plans	Documents delivered by the Contractor providing detailed information regarding the Design, development, implementation, and Maintenance of the System.
Plaza	See Toll Plaza.
Pennsylvania Turnpike Commission (PTC)	Refers to the agency created in 1937 to construct, finance, operate and maintain the Pennsylvania Turnpike. In addition to the Pennsylvania Turnpike, the commission also operates the James E. Ross Highway, Amos K. Hutchinson Bypass, Mon/Fayette Expressway and Pittsburgh's Southern Beltway.

Term	Definition
Project	The total Work defined in the Scope of Work and as further set forth and detailed in the Contract Documents.
Project Manager	See "Contractor Project Manager".
Project Principal	Key Team Member and Contractor officer who is authorized to sign the Agreement and amendments thereto and who may make commitments on behalf of the Contractor.
Proposal	An offer made in accordance with the requirements of this RFP.
Proposer	An entity that has submitted a Proposal for this RFP.
Protocol (telecommunications)	A standardized set of digital rules that specify format, timing, sequencing, and/or error checking for data transmissions.
Provisional Acceptance	The conditional Acceptance of a phase as further set forth in Section 10 of **Exhibit G Contract**
PTC Designated Representatives	Person or persons authorized by the Commission to represent the Commission ("the PTC") in all dealings with the Contractor. Also referred to as "Authorized Representative".
PTC Class	The vehicle class that is assigned to the transaction after the application of the PTC Business Rules. The PTC class is used to calculate the fare amount for each transaction. Also called the revenue vehicle class.
PTC Operations Group	Department at the PTC responsible for monitoring the System for anomalies and failures and notifying personnel of System issues.
PTC Project Manager	PTC Designated representative who directs Contractor and Approves Contractor submitted Deliverables, with further authority as is set forth in the Contract.
PTC Toll Host	The existing central toll system that performs pre-processing of toll transactions, traffic and revenue reporting, and reconciliation functions.
Radio Frequency Identification (RFID)	For Electronic Toll Collection a subsystem consisting of E-ZPass transponders, antenna(s), and reader equipment installed for a toll lane.
Reciprocity	The mutual acceptance and payment of toll transactions between the Commission and other interoperable agencies and entities.
Revenue Collection	The Cashless Tolling System is installed and operating in the PTC production environment and is collecting, transmitting and reporting tolling data to the Cashless Tolling host system in accordance with the requirements of Article I Scope of Work and the Contract Documents, such that in the sole determination of the Commission tolls can be collected.
Revenue Day	The twenty-four (24) hour period of toll collection day expressed from 00:00:00 to 23:59:59 in military time.
Revenue Vehicle Class	See PTC class.
Scope of Work	Services to be provided by Contractor. Also referred to as "Services" or "Work".
Services	Refer to Scope of Work".

Term	Definition
Software	All System Software including the media and documentation that regulate and control the operation of a data processing system by specifying computer programs, procedures and rules required to be provided hereunder as more fully described in the Scope of Work. It includes compilers, library routines, and circuit diagrams.
Subcontractor	Any person, firm or corporation, other than the Contractor's employees, who contracts to furnish labor, materials, or Services at the Site(s) or in connection with the System and Services, whether directly or indirectly, on the Contractor's behalf and whether or not in privity with the Contractor.
Submittal	See "Deliverable".
Supplemental Agreement	Process for making changes to the Agreement as set forth in Section 13 of **Exhibit G Contract.**
Supplier	Any person, firm, or corporation who contracts to furnish materials, Software, Equipment, or supplies for incorporation in or in connection with the System, whether directly or indirectly, on the Contractor's behalf and whether or not in privity with the Contractor.
Surety files	Financial data related to the Post Paid Accounts.
System	See "Cashless Tolling System".
System Acceptance	A completion milestone defined in **Exhibit A Scope of Work** and the Agreement.
System Detail Design Document (SDDD)	Document Deliverable that includes but is not limited to the defined architecture, components, interfaces, Design and functionality for the Cashless Toll System to satisfy applicable Requirements in Section III, System Scope of Work and Requirements, which is submitted by the Contractor for Approval by the NCTA.
Tag	See "Transponder".
Transponder	An RFID device with a unique identity installed in a vehicle for the purpose of Electronic Toll Collection. E-ZPass is a brand of transponder used by the E-ZPass Inter-Agency Group.
Transponder Status List (TSL)	A file transmitted to the zone controllers through the Cashless Tolling Host systems containing the status of transponders issued by the Pennsylvania CSC and the other interoperable agencies and entities.
Uninterruptible Power Supply (UPS)	A device, connected between a computer (or other electronic Equipment) and a power source (usually an outlet receptacle), that ensures that electrical flow to the computer is not interrupted because of a blackout and, in most cases, protects the computer against potentially damaging events, such as power surges and brownouts.
Valid Transponder	A transponder that is on the transponder status list (TSL) and has a status of valid, low balance and non-revenue. A valid transponder will post to a Pennsylvania E-ZPass customer account or an Interoperable Agency customer account.

Term	Definition
Video Image Toll (VToll)	Usually an image toll transaction that is processed and posted to an account prior to image review verification based on the transponder ID information associated with the image transaction message. These usually occur if the balance temporarily dips to a negative level causing the transponder to be invalid for a short duration.
Video Transaction	A license plate transaction created and transmitted to the CSC/VPC for processing that results from the capture of an image(s) in the lane. Video transactions are generated for vehicles when a valid transponder is not associated with the vehicle or when a vehicle has an invalid transponder. Video transactions not associated to a customer E-ZPass account are used to generate video invoices.
Violation Enforcement List (VEL)	A list of repeat violators license plate numbers that are not pursuable through the CSC/VPC for various reasons that the Commission would like to pursue through manual enforcement action on-site.
Wide Area Network	A geographically widespread communications network that relies on communication capabilities to link the various network segments. A Wide Area Network (WAN) can be one large network, or it can consist of a number of linked LANs (local area networks). See 'Local Area Network.'
Work	All Services which, in the judgment of the Commission, are necessary for Contractor completion of the Project under the Contract Documents and includes, without limitation, all plant, labor, materials, Equipment, systems, Services and Software and other facilities, installation, testing, operations and Maintenance and other things necessary or proper for or incidental to the carrying out and completion of the terms of the Contract Documents. Also referred to as Services.

Acronyms

Acronym	Definition
ADT	Average Daily Traffic
ALPR	Automatic License Plate Recognition
AVC	Automatic Vehicle Classification
AVI	Automatic Vehicle Identification
BOM	Bill of Materials
BRD	Business Rules Document
COTS	Commercial off the Shelf
CPU	Central Processing Unit
CRO	Central Regional Office
CSC	Customer Service Center
DBA	Doing Business As
DMV	Department of Motor Vehicles
DPU	Data Processing Unit
DR	Disaster Recovery
DVAS	Digital Video Audit System
EMI	Electromagnetic Interference
ECO	Engineering Change Order
ERO	Eastern Regional Office
ETC	Electronic Toll Collection
FAT	Factory Acceptance Test
FHWA	Federal Highway Administration
FMS	Financial Management System
FTP/SFTP	File Transfer Protocol/Secure File Transfer Protocol
GUI	Graphical User Interface
HVAC	Heating, Ventilation and Air Conditioning
IAG	Interagency Group
ICD	Interface Control Document
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organization for Standardization

Acronym	Definition
IT	Information Technology
ITS	Intelligent Transportation Systems
ITSM	Intelligent Transportation Systems Maintenance
LAN	Local Area Network
LPICPS	Image Capture and Processing System
MOMS	Maintenance On-line Monitoring System
MPT	Maintenance and Protection of Traffic
MTBF	Mean Time Between Failures
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NTP	Network Time Protocol
NTP	Notice to Proceed
OCR	Optical Character Recognition
ODC	Other Direct Costs
OEM	Original Equipment Manufacturer
OFIT	Onsite First Installation Test
OS	Operating System
OSHA	Occupational Safety and Health Administration
PIN	Personal Identification Number
PMP	Project Management Plan
PMR	Project Management Review
PO	Purchase Order
PTC	Pennsylvania Turnpike Commission
QA	Quality Assurance
QAP	Quality Assurance Plan
QC	Quality Control
RDBMS	Relational Database Management System
RFI	Radio Frequency Interference
RFI	Request for Information
RFID	Radio Frequency Identification

Acronym	Definition
RFP	Request for Proposal
RMA	Return Materials Authorization
SDDD	System Detail Design Document
SDLC	Software Development Lifecycle
SDP	Software Development Plan
SOW	Scope of Work
SRD	System Requirements Document
SRR	System Requirements Review
TDM	Time Division Multiplexing
TIP	Turnpike Industrial Park
TOC	Toll Operations Center
TSL	Transponder Status List
TTRR	Time to Respond and Repair
UIL	User Identification List
UPS	Uninterruptible Power Supply
VLAN	Virtual Local Area Network
VPC	Violation Processing Center
VPN	Virtual Private Network
WAN	Wide Area Network
WRO	Western Regional Office

Exhibit C
Price Proposal Instructions

Table of Contents

1. GENERAL INSTRUCTIONS

Proposers shall complete their Price Proposals in accordance with the following instructions:

1. The Price Proposal Forms are provided in Excel format worksheets for ease of completion and checking. The Excel version of the Price Proposal shall be downloaded from the Commission's Website at: www.paturnpike.com/procurement.
2. Proposers shall submit their Price Proposals on the Price Proposal Forms included in RFP, Exhibit F - Forms. Price Proposals shall be sealed and submitted separate from the Technical Proposal as further instructed in the RFP. Price Proposals shall be submitted in the quantities and manner identified in the RFP.
3. The Price Proposal Forms shall constitute the full and complete Price Proposal for compensation for performance of the Contractor's obligations and Work under the Cashless Tolling System Implementation and Maintenance Project.
4. Proposers must complete the Price Proposal Forms in their entirety. The Price Proposal Forms for the Project are as follows:
    - **Base and Optional Cashless Tolling System Implementation and Maintenance Cost** – Sheet 1
    - **Base and Optional In-lane System Cost** – Sheets 2, 2-a, 2-1, 2-2, 2-3, 2-4, 2-5, 2-6, and 2-7
    - **Base and Optional System Cost** – Sheets 3, 3-1, 3-2, and 3-3
    - **Base and Optional Toll Concentrator/Host Cost (if provided)** – Sheets 4, 4-1, 4-2, and 4-3
    - **Base and Optional In-lane System Hardware Maintenance and Software Support Services Cost** – Sheets 5, 5-1, 5-2, 5-3, 5-4, and 5-5
    - **Base and Optional Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost (if provided)** – Sheets 6, 6-1, 6-2, 6-3, and 6-4
    - **Optional Toll Host System Replacement Implementation Cost** – Sheets 7, 7-1, 7-2, and 7-3
    - **Additional Services Rates and Markup for Out of Scope Work** – Sheet 8-1
    - **Payment Schedule** – Exhibit D
5. Proposers should not fill in any grayed-out cells on the Price Proposal Forms, nor shall Proposers make any other entry on or alteration to the Price Proposal Forms other than in accordance with these Price Proposal Instructions.
6. The Commission may waive or correct any error appearing in a Proposer's completed Price Proposal Forms if the correct amount can be clearly ascertained from the information provided; however, the Commission is under no obligation to do so. In the event of an inconsistency between the amount stated in numbers and the amount stated in written words, the amount stated in written words will control. In the event of a mathematical miscalculation, the correct sum will control.

7. An officer of the Proposer or an individual otherwise authorized in writing by an officer of the Proposer must sign and date Sheet 1 in the appropriate place as identified.
8. All elements of the Price Proposal must be completed. On line items where zero (0) quantities are shown in red font for hours or units, if the Proposer is proposing zero (0) quantities for that item no change should be entered into the corresponding cell and a zero (0) quantity for that item will be assumed. In addition, all items identified by the Commission in the Price Proposal Forms will be assumed to be included in the Price Proposal.
9. The Commission reserves the right to reject Price Proposals that are not completed in accordance with the instructions set forth herein.
10. Instructions for completion of each of the Price Proposal Forms are provided in Sections 2 through 13 below.
11. The Price Proposal shall be inclusive of all costs, fees and applicable taxes needed to meet the requirements of the RFP, including the **Exhibit A, Scope of Work**. **All costs should be entered in 2018 dollar values.** No price escalation will be allowed above the costs provided on the Price Proposal Forms to complete the Work, with the exception of the CPI as specifically identified herein.

2.INSTRUCTIONS ON COMPLETING THE PRICE PROPOSAL FORMS

1. There are thirty-four (34) Price Proposal Forms, as detailed above, including seven pricing summary sheets (Sheets 1, 2, 3, 4, 5, 6 and 7) and associated back-up information on back-up sheets for each pricing sheet. Back-up sheets for each summary sheet are labeled to identify the corresponding summary pricing sheet; for example, Sheet 2-1 is a back-up sheet to pricing Sheet 2. Back-up sheets are located following summary sheets 1 through 7. The Additional Services Rates and Markup for Out of Scope Work Sheet 8-1 is a standalone sheet and does not require a summary sheet.
2. Table 1 summarizes the 34 Price Proposal forms that shall be completed by all Proposers. Each form is located on a unique sheet in an Excel workbook. The table provides the following information for each form:
   a. The sheet number (e.g. 2, 2-1, etc.)
   b. The sheet identifier listed on the tab in Excel
   c. The sheet title listed at the top of each sheet

Table 1 – Price Proposal Form Summary

Sheet Number	Sheet Identifier	Sheet Title
1	Project Summary	Project Summary – Base and Optional PTC Cashless Tolling System Implementation and Maintenance Cost
2	In-lane Summary	Base and Optional In-lane System Cost by Roadway
2-a	Backup Opt In-lane Cost	Back-up Optional Mainline and Western Extensions In-lane Implementation Cost by Zone
2-1	Backup In-lane Z1	Back-up Optional In-lane System Cost Schedule – Zone 1
2-2	Backup In-lane Z2	Back-up Optional In-lane System Cost Schedule – Zone 2
2-3	Backup In-lane Z3	Back-up Optional In-lane System Cost Schedule – Zone 3
2-4	Backup In-lane Z4	Back-up Base and Optional In-lane System Cost Schedule – Zone 4
2-5	Backup In-lane Z5	Back-up Optional In-lane System Cost Schedule – Zone 5
2-6	Backup In-lane Z6	Back-up Optional In-lane System Cost Schedule – Zone 6
2-7	Backup In-lane Staff	Back-up Base and Optional In-lane System Pricing by Zone Type – Staff and Position Classifications with Rates
3	System Summary	Base and Optional System Cost
3-1	Backup System Sch	Back-up Base and Optional System Cost Schedule
3-2	Backup System Spares	Back-up Base and Optional In-lane System Spare Parts and Equipment Cost Year 1
3-3	Backup System Staff	Back-up Base and Optional System Cost – Staff and Position Classifications with Rates
4	Toll Con-Host Summary	Base and Optional Toll Concentrator/Host Cost (if provided)
4-1	Backup Toll Con-Host Sch	Back-up Base and Optional Toll Concentrator/Host Cost Schedule (if provided)
4-2	Backup Toll Con-Host Spares	Back-up Base and Optional Toll Concentrator/Host Spare Parts and Equipment Cost Year 1 (if provided)
4-3	Backup Toll Con-Host Staff	Back-up Base and Optional Toll Concentrator/Host Cost – Staff and Position Classifications with Rates (if provided)
5	In-lane Maint Summary	Base and Optional In-lane System Hardware Maintenance and Software Support Services Cost
5-1	Backup In-lane Maint Sch	Back-up Base and Optional In-lane System Hardware Maintenance and Software Support Services Cost Schedule
5-2	Backup In-lane Maint Detail	Back-up Base and Optional In-lane System Hardware Maintenance and Software Support Services – Labor and Other Direct Cost Items by Month
5-3	Backup Inlane Mnt Staff CS	Back-up Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services – Staff and Position Classifications with Rates
5-4	Backup Inlane Mnt Staff ML	Back-up Optional Mainline In-lane System Hardware Maintenance and Software Support Services – Staff and Position Classifications with Rates
5-5	Backup Inlane Mnt Staff WE	Back-up Optional Western Extensions In-lane System Hardware Maintenance and Software Support Services – Staff and Position Classifications with Rates
6	Toll Con-Host Maint Summary	Base and Optional Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost (if provided)
6-1	Backup Host Maint Sch	Back-up Base and Optional Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost Schedule– Labor and Other Direct Cost Items by

Sheet Number	Sheet Identifier	Sheet Title
		Month (if provided)
6-2	Backup Host Maint Staff CS	Back-up Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services – Staff and Position Classifications with Rates
6-3	Backup Host Maint Staff ML	Back-up Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services – Staff and Position Classifications with Rates
6-4	Backup Host Maint Staff WE	Back-up Optional Western Extensions Incremental Toll Concentrator/Host Maintenance and Software Support Services – Staff and Position Classifications with Rates
7	Opt Host System Repl Summary	Optional Toll Host System Replacement Implementation Cost
7-1	Backup Opt Host Repl Sch	Back-up Optional Toll Host System Replacement Implementation Cost Schedule
7-2	Backup Opt Host Repl Spares	Back-up Optional Toll Host System Replacement Implementation Spare Parts and Equipment Cost Year 1
7-3	Backup Opt Host Repl Staff	Back-up Optional Toll Host System Replacement Implementation Cost – Staff and Position Classifications with Rates
8-1	Additional Services Rates	Additional Services Rates and Markup for Out of Scope Work
Exhibit D		Payment Schedule – Clarks Summit

3. The Price Proposal Forms are password protected and shall not be unlocked by Proposers. Only the unlocked cells may the Proposers enter data.
4. Blue colored tabs represent summary sheets that do *not* require Proposer input. Green tabs represent worksheets that require Proposer input.
5. On most sheets there are formulas that are automatically calculated based on data entered from elsewhere in the sheet or work book. Font and background colors are used to indicate different types of cells as follows:
    - Black font – Indicates the cell cannot be altered by Proposer.
    - Red font – Indicates the Proposer should enter data.
    - Light red background – Indicates input required. All such cells should be completed accordingly.
    - Light yellow background – Indicates optional input, if Proposers need to provide additional detail.
    - Light green background – Indicates that data has been entered into the cell. Light red and light yellow background will change to light green when any non-zero data is entered. The background for any cells where the Proposer enters zero (0) will not change colors in this manner.
6. While the Commission has made every effort to ensure the Price Proposal Forms contain accurate formulas and calculation, Proposers are required to independently verify that formulas and calculations are being performed correctly.

3. TOTAL PROJECT COSTS

The Proposer's proposed total price shall be the aggregate of all costs included in Sheet 1. Sheet 1 will automatically roll-up and present the totals from Sheets 2 through 7. These costs will be totaled and presented in the Grand Total Cost column in the line entitled Total Implementation and Maintenance Phase with Optional Functionality and Optional Extension Phases.

4. COMPLETION OF IN-LANE SYSTEM COST (BASE AND OPTIONAL) - SHEETS 2, 2-a, 2-1, 2-2, 2-3, 2-4, 2-5, 2-6 AND 2-7

The Proposer's total price for the Base and Optional In-lane System (roadway) portion of the Implementation Phase shall be the aggregate of all costs included in Sheet 2 which covers all costs associated with the Base and Optional In-lane System portion of the Work.

The costs for Sheet 2 shall include (without limitation) all Equipment, supplies, Software, parts and materials, overhead, burden, profit, taxes, duties, fees, Contractor-acquired permits, licenses, warranties, and other items necessary to meet the Contractor contractual requirements associated with the Base and Optional In-Lane portion of the System. No price escalation will be allowed above the costs provided on the Price Proposal Sheets to complete the Work except as set forth in Section 13.

The prices on Sheet 2 and related back-up sheets shall not include charges and costs associated with the System, Toll Concentrator/Host or the Maintenance Phase. These costs shall be provided on separate Price Proposal Sheets as described in Section 2 above.

To complete Sheets 2, 2-a, 2-1, 2-2, 2-3, 2-4, 2-5, 2-6 and 2-7 Proposers should do the following:

1. **Sheet 2-1, 2-2, 2-3, 2-4, 2-5, and 2-6**. These sheets allow the Proposer to provide costs by zone (1-6) type for the Base and Optional In-lane System portion of the Work. For each zone type, in the columns provided under each cost component (Items 1-8) and the Facility Server, enter a description for each price element for each component in as much detail as space allows. Moving to the right in the 2nd column (B) enter the quantity for each item and in the 3rd column (C) enter the unit costs. If the item is provided as a lump sum, the quantity should be shown as 1. Total item costs will be calculated automatically. Moving to the right, in the 5th column (E), enter the labor costs associated with each of the price elements. The costs for each price element will then automatically be calculated and the summary will be shown in the appropriate line items on Sheets 2 and 2-a.

   Complete the cost data for the Optional OCR/ALPR and Enforcement Notification and for the Optional Tri-Protocol Implementation for each zone type by entering a description for each price element for this option in as much detail as space allows. Moving to the right in the 2nd column (B) enter the quantity for each item and in the 3rd column (C) enter the unit costs. If the item is provided as a lump sum, the quantity should be shown as 1. Total item costs will be calculated automatically. Moving to the right, in the 5th column (E), enter the labor costs associated with each of the price elements. The costs for each price element will then automatically be calculated and the summary will be shown in the appropriate line items on Sheets 2 and 2-a.

2. **Sheets 2**. This sheet is automatically populated from Sheets 2-a and 2-4. No Proposer input is required.
3. **Sheet 2-a**. This sheet is automatically populated from Sheets 2-1, 2-2, 2-3, 2-4, 2-5, and 2-6. The proposer may provide a volume discount based on zone quantities ordered in a year in cells B37 – B40. A volume discount percentage may be entered for 10–19 zones, 20–29 zones, 30-39 zones, and over 40 zones. The volume discount will automatically be calculated in row 30 of this sheet.
4. **Sheet 2-7**. Enter specific names for the Key Team positions (Items 1-9) for In-lane System labor costs related to the Implementation Phase for Clarks Summit (Zone Type 4). Next enter the specific loaded labor rate in the rate column and the number of hours required for the implementation of each zone type. Moving down the sheet, enter additional labor categories for all labor to be used to complete this Work, including rates and hours. The staff names are not required for these additional positions (i.e. the positions that are not highlighted in red). The total labor dollars will be calculated for each staff person and labor category and a grand total will be calculated. The labor dollar grand total must match the zone Total with Facility Server on Sheets 2-1, 2-2, 2-3, 2-4, 2-5, and 2-6. A labor check cell is provided to assist Proposers with verifying that the two (2) labor totals are equal.

5. COMPLETION OF SYSTEM COST (BASE AND OPTIONAL) - SHEETS 3, 3-1, 3-2 AND 3-3

The Proposer's proposed total price for the Base and Optional System portion of the Implementation Phase shall be the aggregate of all costs included in Sheet 3. This sheet covers all costs associated with the Base and Optional System and non-roadway specific costs, to complete the implementation, such as project management, engineering and design, software, and testing. Additionally, Sheet 3 includes the Warranty Year 1 of Maintenance - In-lane System Hardware Maintenance and Software Support Services which is carried forward from Sheet 5. The cost for this item is included in the Total System Costs in Sheet 3 and although it is shown as a line item in Sheet 5, it is not included in the total in Sheet 5.

The System cost shall include all costs for items identified in line items 1 through 15 of Sheet 3 associated with the System cost components. The total price shall include (without limitation) all overhead, burden, profit, taxes, duties, fees, warranties, and other items necessary for the Contractor to complete the Work. The costs shall also include (without limitation) all Equipment, supplies, Software, parts and materials, Contractor-acquired permits, licenses, warranties, and other items necessary to meet the Contractor contractual requirements associated with the Toll Host/System Cost. No price escalation will be allowed above the costs provided on the Price Proposal Sheets to complete this Work except as set forth in Section 13.

With the exception of including the Year 1 Warranty Maintenance costs, the prices on Sheet 3 and related back-up shall not include charges and costs associated with the In-lane System or Maintenance Phase. These costs shall be set forth on separate Price Proposal Forms as described in Section 2 above.

Proposers shall complete Sheets 3, 3-1, 3-2, and 3-3 as follows:

1. **Sheet 3-2.** This sheet includes Base and Optional In-lane System Spare Parts and Equipment costs for Year 1. In the columns provided for Clarks Summit under each cost component (Items 1-7), enter the total quantity in column (B) for each listed element required during the Warranty Year. If the item is provided as a lump sum, the quantity should be shown as 1. Moving to the right in

column (C), enter the unit cost for each item. If additional items are required to be included under each component provided by the Proposer, enter each element name using the additional spaces provided under the appropriate component section. For all additional items entered, the Proposer must also enter the total quantity and unit cost as described above.

Next, in the columns provided for Optional Mainline and Optional Western Extensions under each cost component (Items 1-7), enter the total quantity in columns (E and H) for each listed element required during the Warranty Year. If the item is provided as a lump sum, the quantity should be shown as 1. Moving to the right in columns (F and I), enter the unit cost for each item. If additional items are required to be included under each component provided by the Proposer, enter each element name using the additional spaces provided under the appropriate component section. For all additional items entered, the Proposer must also enter the total quantity and unit cost as described above.

Total item costs will be calculated automatically for each item and cost component. The Total In-lane System Spare Parts and Equipment Cost (Warranty) Year 1 for Clarks Summit, Optional Mainline and Optional Western Extensions will then automatically be calculated and shown in the appropriate line item within item 11 on Sheet 3-1.

2. **Sheet 3-1**. This sheet provides back up for Sheet 3 Base and Optional System cost components 1-9 and 12-15. Beginning with Clarks Summit, enter a description for each cost component in as much detail as space allows. If there are costs other than labor costs that are not included or are not already listed, enter such unit quantities and unit costs. If the item is provided as a lump sum, the quantity should be shown as 1. Total item costs will be calculated automatically. Moving to the right, in the column (F), enter the labor costs associated with each of the price elements.

   Next enter a description for each cost component in as much detail as space allows for Optional Mainline and Optional Western Extensions. If there are costs other than labor costs that are not included or are not already listed, enter such unit quantities and unit costs. If the item is provided as a lump sum, the quantity should be shown as 1. Total item costs will be calculated automatically. Moving to the right, in the columns (K and P), enter the labor costs associated with each of the price elements.

   Please note the following regarding Sheet 3-1:

   - Line item 10 Warranty (Year 1 of Maintenance) – In-lane System Hardware Maintenance and Software Support Services is automatically populated from Sheet 5 for Clarks Summit (cell C4), Optional Mainline (cell D7) and Optional Western Extensions (cell E12).
   - Line item 11 Warranty - In-lane System Spare Parts and Equipment Year 1 is automatically populated from Sheet 3-2 for Clarks Summit (cell D88), Optional Mainline (cell G88) and Optional Western Extensions (cell J88).

   The costs for each price element will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 3.

3. **Sheet 3.** This sheet is automatically populated from Sheet 3-1. No Proposer input is required.
4. **Sheet 3-3.** Enter specific names for the Key Team positions (Items 1-9) for the System labor costs related to the Implementation Phase for Clarks Summit. Next enter the specific loaded labor rate for each staff member in the rate columns and their number of hours for Clark Summit, Optional Mainline, and Optional Western Extensions for the System. Moving down the sheet, enter

additional labor categories for all labor to be used to complete this Work, including rates and hours. For positions listed beyond item 9, staff names are not required. The total labor dollars will be calculated for each staff person and labor category and a grand total will be calculated for each region. The labor dollar grand total must match the total labor dollars total on Sheet 3-1 for each region. A labor check cell is provided on the bottom of Sheet 3-1 to assist Proposers with the verification that the labor totals are equal.

6. COMPLETION OF TOLL CONCENTRATOR/HOST COST (BASE AND OPTIONAL) - SHEETS 4, 4-1, 4-2 AND 4-3

The Proposer's proposed total price for the Base and Optional Toll Concentrator/Host (if provided) portion of the Implementation Phase shall be the aggregate of all costs included in Sheet 4. This sheet covers all costs associated with the Base and Optional Toll Concentrator/Host costs, to complete the implementation, such as system hardware, third party software, installation and commissioning, communication equipment, design documentation, training, and third party warranty and licenses. Additionally, Sheet 4 includes the Warranty (Year 1 of Maintenance) Incremental Toll Concentrator/Host Maintenance and Software Support Services which is carried forward from Sheet 6. The cost for this item is included in the Total Toll Concentrator/Host Costs in Sheet 4 and although it is shown as a line item in Sheet 6, it is not included in the total in Sheet 6.

The Toll Concentrator/Host cost shall include all costs for items identified in line items 1 through 9 of Sheet 4 associated with the Toll Concentrator/Host cost components. The total price shall include (without limitation) all overhead, burden, profit, taxes, duties, fees, warranties, and other items necessary for the Contractor to complete the Work. The costs shall also include (without limitation) all Equipment, supplies, Software, parts and materials, Contractor-acquired permits, licenses, warranties, and other items necessary to meet the Contractor contractual requirements associated with the Toll Concentrator/Host cost. No price escalation will be allowed above the costs provided on the Price Proposal Sheets to complete this Work except as set forth in Section 13.

With the exception of including the Year 1 (Warranty) Maintenance costs, the prices on Sheet 4 and related back-up shall not include charges and costs associated with the In-lane System or Maintenance Phase. These costs shall be set forth on separate Price Proposal Forms as described in Section 2 above.

Proposers shall complete Sheets 4, 4-1, 4-2, and 4-3 as follows:

1. **Sheet 4-2.** This sheet includes Base and Optional Toll Concentrator/Host Spare Parts and Equipment costs for Year 1. In the columns provided for Clarks Summit under each cost component (Items 1-2), enter the total quantity in column (B) for each listed element required during the Warranty Year. If the item is provided as a lump sum, the quantity should be shown as 1. Moving to the right in column (C), enter the unit cost for each item. If additional items are required to be included under each component provided by the Proposer, enter each element name using the additional spaces provided under the appropriate component section. For all additional items entered, the Proposer must also enter the total quantity and unit cost as described above.

   Next, in the columns provided for Optional Mainline and Optional Western Extensions under each cost component (Items 1-2), enter the total quantity in columns (E and H) for each listed element required during the Warranty Year. If the item is provided as a lump sum, the quantity should be shown as 1. Moving to the right in columns (F and I), enter the unit cost for each item. If additional items are required to be included under each component provided by the Proposer, enter each element name using the additional spaces provided under the appropriate component section. For all additional items entered, the Proposer must also enter the total quantity and unit cost as described above.

Total item costs will be calculated automatically for each item and cost component. The Total Toll Concentrator/Host Spare Parts and Equipment Cost (Warranty) Year 1 for Clarks Summit, Optional Mainline and Optional Western Extensions will then automatically be calculated and shown in the appropriate line item within item 9 on Sheet 4-1.

2. **Sheet 4-1**. This sheet provides back up for Sheet 4 Base and Optional Toll Concentrator/Host cost components 1-7. Beginning with Clarks Summit, enter a description for each cost component in as much detail as space allows. If there are costs other than labor costs that are not included or are not already listed, enter such unit quantities and unit costs. If the item is provided as a lump sum, the quantity should be shown as 1. Total item costs will be calculated automatically. Moving to the right, in the column (F), enter the labor costs associated with each of the price elements.

   Next enter a description for each cost component in as much detail as space allows for Optional Mainline and Optional Western Extensions. If there are costs other than labor costs that are not included or are not already listed, enter such unit quantities and unit costs. If the item is provided as a lump sum, the quantity should be shown as 1. Total item costs will be calculated automatically. Moving to the right, in the columns (K and P), enter the labor costs associated with each of the price elements.

   Please note the following regarding Sheet 4-1:

   - Line item 8 Warranty (Year 1 of Maintenance) – Incremental Toll Concentrator/Host Maintenance and Software Support Services is automatically populated from Sheet 6 for Clarks Summit (cell D4).
   - Line item 9 Warranty - Toll Concentrator/Host Spare Parts and Equipment Year 1 is automatically populated from Sheet 4-2 for Clarks Summit (cell D28), Optional Mainline (cell G28) and Optional Western Extensions (cell J28).

   The costs for each price element will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 4.

3. **Sheet 4.** This sheet is automatically populated from Sheet 4-1. No Proposer input is required.
4. **Sheet 4-3.** Enter specific names for the Key Team positions (Items 1-9) for the Toll Concentrator/Host labor costs related to the Implementation Phase for Clarks Summit. Next enter the specific loaded labor rate for each staff member in the rate columns and their number of hours for Clark Summit, Optional Mainline, and Optional Western Extensions for the System. Moving down the sheet, enter additional labor categories for all labor to be used to complete this Work, including rates and hours. For positions listed beyond item 9, staff names are not required. The total labor dollars will be calculated for each staff person and labor category and a grand total will be calculated for each region. <u>The labor dollar grand total must match the total labor dollars total on Sheet 4-1 for each region</u>. A labor check cell is provided on the bottom of Sheet 4-1 to assist Proposers with the verification that the labor totals are equal.

7. COMPLETION OF IN-LANE SYSTEM HARDWARE MAINTENANCE AND SOFTWARE SUPPORT SERVICES COST (BASE AND OPTIONAL) - SHEETS 5, 5-1, 5-2, 5-3, 5-4, AND 5-5

The Proposer's proposed total price for the Base and Optional In-lane System Hardware Maintenance and Software Support Services shall be the aggregate of all costs included in Sheet 5. This sheet covers all costs associated with the Maintenance Phase of the In-lane System.

The costs shall include (without limitation) all Contractor management, administrative and support labor costs, as well as all direct costs associated with maintaining the In-lane system. The total price shall include (without limitation) all overhead, burden, profit, taxes, duties, fees, warranties, Equipment, supplies, Software, parts and materials, Contractor-acquired permits, licenses, warranties, and all other items necessary to meet the Contractor contractual requirements associated with the In-lane System Maintenance. All labor rates provided are to include overhead, burden and profit ("Loaded Labor Rate"). No price escalation will be allowed above the costs provided on the Price Proposal Sheets to complete the Work, except as provided in Section 13.

Proposers shall complete Sheets 5, 5-1, 5-2, 5-3, 5-4 and 5-5 as follows:

1. **Sheet 5-2**. For the Base Contract for Clarks Summit Maintenance (Years 1–9), as well as for Optional Extension 1 (Years 1-5) and Optional Extension 2 (Years 1-5), each year is identified with a corresponding set of Work elements. Starting in column (B), enter the monthly per-zone cost associated with each price element. (Please note that the monthly labor cost per zone is automatically populated from Sheet 5-3 for Clarks Summit and therefore requires no input from the Proposer.) Include all other direct, non-labor costs required for each price element. The Total Monthly costs by zone for each year will then automatically be populated in the appropriate line item on Sheet 5-1.

   For Optional Mainline Maintenance (Years 4–9), as well as for Optional Extension 1 (Years 1-5) and Optional Extension 2 (Years 1-5), each year is identified with a corresponding set of Work elements. In column (C), enter the monthly per-zone cost associated with each price element. (Please note that the monthly labor cost per zone is automatically populated from Sheet 5-4 for Optional Mainline and therefore requires no input from the Proposer.) Include all other direct, non-labor costs required for each price element. The Total Monthly costs by zone for each year will then automatically be populated in the appropriate line item on Sheet 5-1.

   For Optional Western Extensions Maintenance (Years 9), as well as for Optional Extension 1 (Years 1-5) and Optional Extension 2 (Years 1-5), each year is identified with a corresponding set of Work elements. In column (D), enter the monthly per-zone cost associated with each price element. (Please note that the monthly labor cost per zone is automatically populated from Sheet 5-5 for Optional Western Extensions and therefore requires no input from the Proposer.) Include all other direct, non-labor costs required for each price element. The Total Monthly costs by zone for each year will then automatically be populated in the appropriate line item on Sheet 5-1.

2. **Sheet 5-1.** This sheet is automatically populated from Sheet 5-2 and calculates the Annual Cost for all Toll Zones; it requires no input from the Proposer.

3. **Sheet 5**. This sheet is automatically populated from Sheet 5-1; it requires no input from the Proposer.

4. **Sheets 5-3 (Clarks Summit), 5-4 (Optional Mainline), and 5-5 (Optional Western Extensions)** the Proposer shall do the following:

- Enter specific names for the Key Team positions (Items 1-9) required for the Maintenance Phase.
- Moving down the sheet, enter the names of additional labor categories for all labor to be used. Staff names are not required for these additional positions.
- Enter the 2018 specific loaded labor rate for each Key Team staff member and labor category in the 2018 Loaded Labor Rate column.
- For evaluation purposes the Maintenance Year 1 Rate will automatically be populated based on the 2018 Loaded Labor Rate and applying an assumed annual escalation rate. For purposes of the evaluation an estimated Consumer Price Increase (CPI) increase of 3% per year has been used, assuming Maintenance Phase Work for Clarks Summit will begin in Year 2 of the Base Contract. The Maintenance Phase for optional Work is assumed to begin following the Warranty Year after the Implementation Phases.
- Next, for Clarks Summit (Sheet 5-3) enter the annual number of hours for each position/classification required for all zones for Year 1, Year 2 and Year 3. This worksheet assumes that Year 3 labor hours will remain consistent for the duration of the base and optional extension(s) Maintenance years. For evaluation purposes, labor rates for Maintenance Year 1 is assumed to begin in Year 2 of the Base Contract and have been automatically populated using an assumed annual escalation of 3% per year from the 2018 Loaded Labor Rate. Labor rates for Maintenance Years 2 through 9 and Optional Extension 1 and 2 will then automatically populated using an assumed annual escalation of 3% from the previous year for evaluation purposes. Note that the actual labor price adjustments will be determined as described in Section 13.
- Next, for Optional Mainline (Sheet 5-4) enter the annual number of hours for each position/classification required for all zones for Years 4-8, this allows for the separate Go-live date of the East and Northeast Extension and the Central and West. This worksheet assumes that Year 8 labor hours will remain consistent for the duration of the base and optional extension(s) Maintenance years. For evaluation purposes, labor rates for Maintenance Year 4 is assumed to begin in Year 5 of the Contract and have been automatically populated using an assumed annual escalation of 3% per year from the 2018 Loaded Labor Rate. Labor rates for Maintenance Years 5 through 9 and Optional Extension 1 and 2 will then automatically populated using an assumed annual escalation of 3% from the previous year for evaluation purposes. Note that the actual labor price adjustments will be determined as described in Section 13.
- Next, for Optional Western Extensions (Sheet 5-5) enter the annual number of hours for each position/classification required for all zones for Year 9 and Optional Extension 1 Years 1-2. This worksheet assumes that Optional Extension 1 Year 2 labor hours will remain consistent for the duration of the optional extension(s) Maintenance years. For evaluation purposes, labor rates for Maintenance Year 9 is assumed to begin in Year 10 of the Contract and have been automatically populated using an assumed annual escalation of 3% per year from the 2018 Loaded Labor Rate. Labor rates for Optional Extension 1 and 2 will then automatically

populated using an assumed annual escalation of 3% from the previous year for evaluation purposes. Note that the actual labor price adjustments will be determined as described in Section 13.

- The total labor dollars will be calculated for each staff person and labor category for Years 1 through 9 and each year of the Optional Extensions periods. A grand total will be calculated for each year. The Total Monthly Per Zone Cost for each year will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 5-2.

8. COMPLETION OF TOLL CONCENTRATOR/HOST MAINTENANCE AND SOFTWARE SUPPORT SERVICES COST (BASE AND OPTIONAL) - SHEETS 6, 6-1, 6-2, 6-3, AND 6-4

The Proposer's proposed total price for the Base and Optional Toll Concentrator/Host Maintenance and Software Support Services shall be the aggregate of all costs included in Sheet 6. This sheet covers all costs associated with the Maintenance Phase for the Toll Concentrator/Host.

The costs shall include (without limitation) all Contractor management, administrative and support labor costs, as well as all direct costs associated with maintaining the Toll Concentrator/Host. The total price shall include (without limitation) all overhead, burden, profit, taxes, duties, fees, warranties, Equipment, supplies, Software, parts and materials, Contractor-acquired permits, licenses, warranties, and all other items necessary to meet the Contractor contractual requirements associated with the Toll Concentrator/Host Maintenance. All labor rates provided are to include overhead, burden and profit ("Loaded Labor Rate"). No price escalation will be allowed above the costs provided on the Price Proposal Sheets to complete the Work, except as provided in Section 13.

Proposers shall complete Sheets 6, 6-1,6-2, 6-3, and 6-4 as follows:

1. **Sheet 6-1 (Clarks Summit)**. For the Base Contract for Clarks Summit Maintenance (Years 1–9), as well as for Optional Extension 1 (Years 1-5) and Optional Extension 2 (Years 1-5), each year is identified with a corresponding set of Work elements. In column (B), enter the monthly cost associated with each price element. (Please note that the monthly labor cost is automatically populated from Sheet 6-2 for Clarks Summit and therefore requires no input from the Proposer.) If additional items are required by the Proposer, enter each element name using the additional spaces provided. For all additional items entered, the Proposer must also enter the total monthly cost as described above. Include all monthly labor costs and other direct, non-labor costs required for each month. The Total Monthly costs for each year will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 6.

   Sheet 6-1 (Optional Mainline). For the Optional Mainline Maintenance (Years 4-9), as well as for Optional Extension 1 (Years 1-5) and Optional Extension 2 (Years 1-5), each year is identified with a corresponding set of Work elements. In column (C), enter the monthly cost associated with each price element. (Please note that the monthly labor cost is automatically populated from Sheet 6-3 for Optional Mainline and therefore requires no input from the Proposer.) If additional items are required by the Proposer, enter each element name using the additional spaces provided. For all additional items entered, the Proposer must also enter the total monthly cost as described above. Include all monthly labor costs and other direct, non-labor costs required for each month. The Total Monthly costs for each year will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 6.

Sheet 6-1 (Optional Western Extensions). For the Optional Western Extensions Maintenance (Year 9), as well as for Optional Extension 1 (Years 1-5) and Optional Extension 2 (Years 1-5), each year is identified with a corresponding set of Work elements. Starting in column (D), enter the monthly cost associated with each price element. (Please note that the monthly labor cost is automatically populated from Sheet 6-4 for Optional Western Extensions and therefore requires no input from the Proposer.) If additional items are required by the Proposer, enter each element name using the additional spaces provided. For all additional items entered, the Proposer must also enter the total monthly cost as described above. Include all monthly labor costs and other direct, non-labor costs required for each month. The Total Monthly costs for each year will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 6.

2. **Sheet 6.** This sheet is automatically populated from Sheet 6-1 and calculates the annual cost per region; it requires no input from the Proposer.
3. **Sheets 6-2 (Clarks Summit), 6-3 (Optional Mainline), and 6-4 (Optional Western Extensions)** the Proposers shall do the following:
    - Enter specific names for the Key Team positions (Items 1-9) to be used for these Toll Concentrator/Host Maintenance and Software Support Services.
    - Moving down the sheet, enter the names of additional labor categories for all labor to be used for these Toll Concentrator/Host Maintenance and Software Support Services. Staff names are not required for these additional positions.
    - Enter the 2018 specific loaded labor rate for each Key Team staff member and labor category in the 2018 Loaded Labor Rate column for the Toll Concentrator/Host Maintenance and Software Support Services.
    - Next, for Clarks Summit (Sheet 6-2) enter the annual number of hours for each position/classification required for Year 1, Year 2 and Year 3. This worksheet assumes that Year 3 labor hours will remain consistent for the duration of the base and optional extension(s) Maintenance years. For evaluation purposes, labor rates for Maintenance Year 1 is assumed to begin in Year 2 of the Contract and have been automatically populated using an assumed annual escalation of 3% per year from the 2018 Loaded Labor Rate. Labor rates for Maintenance Years 2 through 9 and Optional Extension 1 and 2 will then automatically populated using an assumed annual escalation of 3% from the previous year for evaluation purposes. Note that the actual labor price adjustments will be determined as described in Section 13.
    - Next, for Optional Mainline (Sheet 6-3) enter the annual number of hours for each position/classification required for Years 4-8, this allows for the separate Go-live date of the East and Northeast Extension and the Central and West. This worksheet assumes that Year 8 labor hours will remain consistent for the duration of the base and optional extension(s) Maintenance years. For evaluation purposes, labor rates for Maintenance Year 4 is assumed to begin in Year 5 of the Contract and have been automatically populated using an assumed annual escalation of 3% per year from the 2018 Loaded Labor Rate. Labor rates for

Maintenance Years 5 through 9 and Optional Extension 1 and 2 will then automatically populated using an assumed annual escalation of 3% from the previous year for evaluation purposes. Note that the actual labor price adjustments will be determined as described in Section 13.

- Next, for Optional Western Extensions (Sheet 6-4) enter the annual number of hours for each position/classification required for Year 9 and Optional Extension 1 Years 1-2. This worksheet assumes that Optional Extension 1 Year 2 labor hours will remain consistent for the duration of the optional extension(s) Maintenance years. For evaluation purposes, labor rates for Maintenance Year 9 is assumed to begin in Year 10 of the Contract and have been automatically populated using an assumed annual escalation of 3% per year from the 2018 Loaded Labor Rate. Labor rates for Optional Extension 1 and 2 will then automatically populated using an assumed annual escalation of 3% from the previous year for evaluation purposes. Note that the actual labor price adjustments will be determined as described in Section 13.
- The total labor dollars will be calculated for each staff person and labor category for Years 1 through 9 and each year of the Optional Extensions periods. A grand total will be calculated for each year. The Total Monthly Cost for each year will then automatically be calculated and the summary will be shown in the appropriate line item on Sheet 6-1.

9. COMPLETION OF OPTIONAL TOLL HOST SYSTEM REPLACEMENT IMPLEMENTATION - SHEETS 7, 7-1, 7-2, AND 7-3

The Proposer's proposed total price for the Optional Toll Host System Replacement Implementation shall be the aggregate of all costs included in Sheet 7. This sheet covers all costs associated with the Implementation of the Optional Toll Host System Replacement.

The Optional Toll Host System Replacement Implementation cost shall include all costs for items identified in line items 1 through 15 of Sheet 7 associated with the Toll Host System Replacement cost components. The total price shall include (without limitation) all overhead, burden, profit, taxes, duties, fees, warranties, and other items necessary for the Contractor to complete the Work. The costs shall also include (without limitation) all Equipment, supplies, Software, parts and materials, Contractor-acquired permits, licenses, warranties, and other items necessary to meet the Contractor contractual requirements associated with the Optional Toll Host System Replacement Implementation cost. No price escalation will be allowed above the costs provided on the Price Proposal Sheets to complete this Work except as set forth in Section 13.

With the exception of including the Year 1 Warranty Maintenance costs, the prices on Sheet 7 and related back-up shall not include charges and costs associated with the In-lane System or Maintenance Phase, these costs shall be set forth on separate Price Proposal Forms as described in Section 2 above.

Proposers shall complete Sheets 7, 7-1, 7-2, and 7-3 as follows:

1. **Sheet 7-2.** This sheet includes the Optional Toll Host System Replacement Spare Parts and Equipment costs for Year 1. In the columns provided under each cost component (Items 1-2), enter the total quantity in column (B) for each listed element required during the Warranty Year.

If the item is provided as a lump sum, the quantity should be shown as 1. Moving to the right in column (C), enter the unit cost for each item. If additional items are required to be included under each component provided by the Proposer, enter each element name using the additional spaces provided under the appropriate component section. For all additional items entered, the Proposer must also enter the total quantity and unit cost as described above.

Total item costs will be calculated automatically for each item and cost component. The Total Toll Host System Replacement Spare Parts and Equipment Cost (Warranty) Year 1 will then automatically be calculated and shown in the appropriate line item within item 12 on Sheet 7-1.

2. **Sheet 7-1**. This sheet provides back up for Sheet 7 Optional Total Toll Host System Replacement Implementation cost components 1-11 and 13-15. In the Description of Items column (A/B) enter a description for each price component in as much detail as space allows. Note that some component sections include a list of required sub-components and should not be altered; however, the Proposer may add sub-component items below the existing sub-components listed, as needed. Starting in column (C), enter the number of units for each sub-component (e.g., use "4" to represent 4 units or "1" to represent a lump sum). In column (D) enter the unit cost. Total unit costs will be calculated automatically in column (E). Moving to the right columns, in column (F), enter the labor costs associated with each of the sub-components. The costs for each sub-component (the sum of columns (E) and (F)) will then automatically be calculated in column (G), with the sum of all line items for each component automatically sub-totaled and shown in the appropriate line item on Sheet 7. A total for the sheet is provided at the bottom of the sheet.
    - Please note the following regarding Sheet 7-1: Line item 12 is automatically populated from Sheet 7-2 Optional Toll Host System Replacement Implementation Spare Parts and Equipment Cost Year 1.
3. **Sheet 7.** This sheet is automatically populated from Sheet 7-1. No Proposer input is required.
4. **Sheet 7-3.** Enter specific names for the Key Team positions (Items 1-9) for the Optional Toll Host System Replacement labor costs. Next enter the specific loaded labor rate for each staff member in the rate columns and their number of hours. Moving down the sheet, enter additional labor categories for all labor to be used to complete this Work, including rates and hours. For positions listed beyond item 9, staff names are not required. The total labor dollars will be calculated for each staff person and labor category and a grand total will be calculated. The labor dollar grand total must match the total labor dollars total on Sheet 7-1. A labor check cell is provided on the bottom of Sheet 7-1 to assist Proposers with the verification that the labor totals are equal.

10. COMPLETION OF ADDITIONAL SERVICES RATES AND MARKUP FOR OUT OF SCOPE WORK - SHEET 8-1

On Sheet 8-1, the Proposer shall provide a listing of staff positions and loaded hourly labor rates for the purpose of providing pricing for future Work not currently included in **Exhibit A, Scope of Work**. All changes to the Contract involving labor shall use the hourly labor rates in this table. All hourly labor rates shall be stated for the year 2018 and shall be inclusive of burden/overhead and profit. Hourly labor rates shall be adjusted based on changes to the CPI for the previous year beginning with Maintenance Year 1 as described below.

The Proposer shall also provide the current associated Subcontractor Markup, Equipment and Materials Markup, Overhead including burden, and Profit percentages in the cells identified.

11. COMPLETION OF PAYMENT SCHEDULE – EXHIBIT D

The Payment Schedule – Clarks Summit sheet applies the Implementation Costs to payment milestones and associated percentages shown in RFP Exhibit D Payment Schedule. The sheet takes the total Proposer's Implementation price shown on Sheets 2, 3, and 4 for Clarks Summit and multiplies it by the percentage associated with each payment milestone. The result is a dollar amount to be paid for each milestone.

12. COMPLETION OF PROJECT SUMMARY - SHEET 1

Sheet 1 will automatically summarize the costs and pricing detailed in Sheets 2 through 7. These costs will be totaled and presented in the line entitled Total Implementation and Maintenance Phase with Optional Functionality and Optional Extension Phases.

To complete Sheet 1, Proposers must do the following:

1. An officer of the Proposer or an individual otherwise authorized in writing by an officer of the Proposer is required to enter the price written out in words for the Grand Total Cost.
2. The sheet will need to include a signature and date, along with the authorized officer's name, title, address and phone number.

13. COST ESCALATION

Pricing that is noted above as subject to adjustment shall be adjusted up or down from the Proposal pricing using the following Bureau of Labor Statistics' (BLS) Employment Cost (CPI) indices as applicable:

CPI: CUUR0400SA0 Consumer Price Index - All Urban Consumers; West Urban All Items

NOTE: The above index names and numbers were obtained from the Bureau of Labor Statistics (BLS) and were current as of the date this RFP was written. In the event that the BLS updates an index name or number, the Commission shall consult the BLS web site to determine the new name and number of the index. More information about the index can be found on the U.S. Bureau of Labor's website (see http://www.bls.gov/cpi/).

For the purposes of the price proposal calculations, an assumed rate has been included. Adjustments shall be made to future prices based on actual CPI (Labor) for each applicable year. The basis for calculating the actual CPI to be applied shall be as follows:

1. Annual adjustment to prices shall be made using the anniversary date of start of the Maintenance Phase at which each new Maintenance year begins.

2. In the first applicable year for adjustments (Year 1 of the Maintenance Phase) the reference for the adjustment calculation shall be the 2018 Loaded Labor Rate provided by Proposers.

The assumed CPI index for evaluation purposes has been applied to the following Cost Worksheets ONLY:

1. Sheet 2 (Optional Toll Zones Only) (including back-up sheets 2-a, 2-1, 2-2, 2-3, 2-4, 2-5, 2-6, and 2-7),
2. Sheet 5 (including back-up sheets 5-1, 5-2, 5-3, 5-4, and 5-5), and
3. Sheet 6 (including back-up sheets 6-1, 6-2, 6-3, and 6-4).

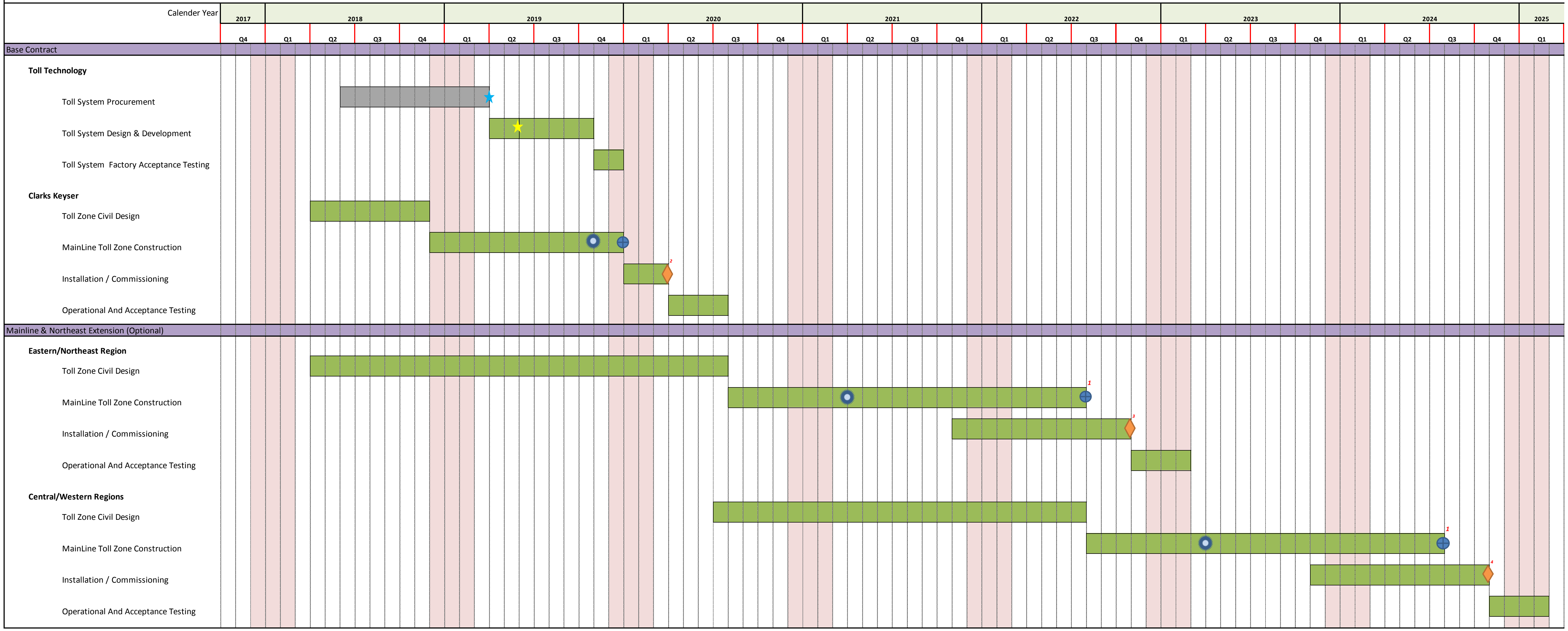
Adjustments shall be made to future prices in the above sheets based on actual CPI (Labor) for each applicable year. The basis for calculating the actual CPI to be applied shall be as follows:

1. Annual adjustment to prices shall be made using the anniversary date of start of the Maintenance Phase at which each new Maintenance year begins.
2. In the first applicable year for adjustments (Year 1 of Maintenance) the reference period for the adjustment calculation shall be the 2018 Loaded Labor Rate.
3. For the subsequent applicable years of Maintenance and Software Support Services, as well as for Optional Extension 1 (Extension Years 1-5) and for Optional Extension 2 (Extension Years 1-5), the CPI adjustments shall be applied against the previous reference year. For example, Maintenance and Software Support Services pricing shall be adjusted using the index change from Maintenance Year 1 as a reference point for adjusting each of the pricing elements identified in the above table).
4. The annual adjustment shall be equal to the cumulative change in the applicable index for the latest previous 12 month period available at the time of the anniversary date.
5. The applicable index shall be applied as follows:
    a. CPI shall be applied when the entire component of the cost is direct Contractor labor.

Exhibit E

Project Implementation Schedule

Cashless Tolling Implementation Schedule (DRAFT*)



* For planning purposes only. The final Implementation schedule to be developed by the Contractor in accordance with the requirements with Approval from the Commission.

★ *Anticipated NTP April 2019*

★ *Approved Civil Design and System Workshops 60 days from NTP*

1 Toll Zones Construction Complete and available to Contractor

2 *Projected Clarks Summit Go-Live March 2020*

3 *Projected Eastern Region Go-Live October 2022*

4 *Projected Central/Western Region Go-Live October 2024*

⊕ All Sites Available to Vendor for installation and testing

◆ *Projected Go-Live Dates*

▨ Winter Months that may impact Construction

◉ Begin Toll Equipment installation as toll zones become available (Coordination with Civil contractors to take advantage of lane closures)

Exhibit F-6

Requirements Conformance Matrix

(Excel file "paperclipped" to Addendum for ease of completion)

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	**Comments**
No.	**Requirements**	**Existing (E) - Met by current system, no modifications required** **Modification (M) - Modifications needed to meet requirement** **Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs** **To Be Developed (D) - Not in current system, but will be developed** **Not Provided (N**) - Will not be provided - requires explanation**	**If "Status of Functionality = N" then Proposer must provide an Explanation in this Column**
II	**Cashless Tolling System Installation Requirements**		
2.1	**In-lane Systems Functional Requirements**		
	This section defines the In-lane requirements of the Contractor Scope of Work. Each Segment of the Highway has a tolling point which could have one or two toll zones and tolls are collected in each direction of travel at the toll zones. At the toll zones identified, the Cashless Tolling Equipment and electronics shall be installed on toll gantries and in the toll equipment building provided by the civil contractor. The toll gantry conceptual details at each of the toll zones are provided in *Attachment 5: Concept Plan for Overhead Structures/Toll Gantries.* The Contractor shall work with the Commission, the civil designer and civil contractor on requirements for all civil design and construction work to be performed by others on the Project, including the design and location of equipment mounting locations and retractable mounting arm(s).		
2.1.1	**Cashless Tolling System Hardware**		
2.1.1.1	**General Requirements**		
1	All Hardware and Equipment supplied under this Contract, including consumable material (material that requires periodic replacement/replenishment), shall be new and certified to have a ten (10) year minimum service life. Materials and products that have been previously used for development work or the Contractor's internal testing, or items that have been salvaged or rebuilt shall not be permitted to be used in connection with this Contract.		
2	All components, supplies and materials furnished under this Contract for the Cashless Tolling System shall be new, Commercial Off-the-Shelf (COTS) and to the extent possible, field proven, and in revenue operations to the extent possible.		
3	All components procured, furnished, and installed by the Contractor shall be available through multiple sources identified by the Contractor to the extent possible and the names of such sources shall be readily available to the Commission. The Commission shall have the right to purchase third-party Equipment directly from the Equipment vendor.		
4	All Hardware and Software provided under this Contract shall be supported by their manufacturer, upgradeable, maintained, updated, patched and secured throughout the term of the Contract.		
5	Proof of purchase in the form of purchase orders, dated invoices and shipping bills shall be retained by the Contractor and furnished to the Commission in accordance with the requirements of this Scope of Work and Contract.		
6	All Commission standards in accordance with the requirements of this Scope of Work shall be maintained throughout the term of the Contract. Standards include but are not limited to, IT security, data retention, Software and Database design and development, installation, change management, testing, maintenance and protection of traffic (MPT) and safety.		
2.1.1.2	**FCC License**		
7	The AVI system shall comply with all applicable Federal Communications Commission (FCC) regulations.		
8	It is the Contractor's responsibility to prepare the required application and the Commission will obtain the required FCC licenses for all AVI equipment provided under this Scope of Work and Agreement. The Commission has the FCC licenses for the existing AVI systems.		
9	The Contractor shall, as part of this effort, identify and accommodate any site conditions that may potentially degrade the performance of the AVI system.		
10	Under all circumstances it is the Contractor's responsibility to comply with the AVI performance requirements of this Scope of Work and Agreement and no relief in such performance shall be provided.		
2.1.1.3	**Maintainability**		
	The Cashless Tolling System Hardware shall be designed with the following specifications:		
	· modular, replaceable and repairable components to allow for efficient Maintenance;		
	· all replacements shall be plug compatible with no changes required;		
	· all components that perform the same function shall be interchangeable;		
	· all zone controllers shall be designed such that they are identical and can be configured to operate the specific number of lanes at each toll zone as shown in *Attachment 1: Cashless Toll Zone Locations* through the addition of Hardware pluggable modules and setting of appropriate Software parameters;		
	· where possible, there shall be a second source for all parts and components and it shall be identified in the Bill of Materials (BOM) unless otherwise Approved by the Commission;		

Functional Requirements			
No.	**Requirements**	**Required Proposer Inputs**	
		Status of Functionality	**Comments**
		Existing (E) - Met by current system, no modifications required **Modification (M) - Modifications needed to meet requirement** **Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs** **To Be Developed (D) - Not in current system, but will be developed** **Not Provided (N**) - Will not be provided - requires explanation**	**If "Status of Functionality = N" then Proposer must provide an Explanation in this Column**
11	· all electronic components shall be installed in equipment racks and installed inside the toll equipment building at each toll zone/toll point as applicable;		
	· zone controllers shall be expandable at a minimum to add two (2)additional in-lane devices;		
	· Contractor's electronic Design and installation shall prevent electrical disturbances and noise in the electronics;		
	· ISO standard I/O interface modules shall be used in the Design and all serial, discrete and network interface boards shall have at minimum two (2) spare slots to support the addition of components;		
	· all exposed junction boxes, pull boxes and other hardware shall be either zinc coated and epoxy painted or stainless steel;		
	· all field wiring shall be terminated on screw lugs or connectors and all connectors shall be keyed or polarized to prevent incorrect connections;		
	· all wiring and connectors shall be labeled and strain relief shall be provided to protect the conductors;		
	· surge suppression shall be provided for all field wiring susceptible to lightning or similar surges;		
	· all lane Equipment shall be fused and protected against over current, over voltage, under voltage and lightning;		
	· redundant power supplies shall be provided for all required internal DC voltages, and		
	· all Equipment shall be properly grounded to ensure the safety of Maintenance personnel.		
2.1.1.4	**Diagnostics**		
12	Equipment mounting and installation design shall support the maintenance of Equipment from below on toll gantries as applicable to each cashless toll zone.		
13	Maintenance personnel shall have easy access to major subsystem components, and removal, testing, and replacement shall not require tools. Components mounted on overhead structures shall also be capable of tethering to secure points during removal or placement during replacement activities such that items cannot be dropped. All test points necessary to diagnose the Equipment while in operation shall be easily accessible and light emitting diode (LED) indicators shall be provided to assist technicians to identify and diagnose problems.		
14	Technicians shall have the ability to connect a laptop authorized by the Commission in accordance with Commission policies to troubleshoot the components. Technicians shall have secured remote access to the device to monitor its status and to perform diagnostics when the lane is in operation.		
15	For easy diagnostic and trouble shooting, all error and event logs shall be consolidated such that all events and errors associated to a transaction are in a single log sequential order based on receipt of the event or error. The consolidated error and event logs shall be retained online for a configurable period of time and shall be easily accessible to the technicians and Authorized PTC staff.		
16	The consolidated error and event logs shall contain but not be limited to all sensor events, triggers and logic decisions associated with a transaction in time order from which they were received from the lane sensors, subsystems or generated by the lane systems.		
17	The consolidated error and event logs shall also be transmitted to the MOMS and available to Authorized Users in viewable form. Search and filter capability shall be provided to display and review data in the consolidated log.		
18	All diagnostics performed shall be recorded and automatically reported to the MOMS, including the technician ID, the time the Maintenance was performed, and all status and recovery messages.		
19	All diagnostic Software and specialty tools required for support of Maintenance activities shall be supplied by the Contractor and the Commission shall have full rights and access as further defined in the Contract. All Software and operating systems shall meet the Commission's most current technology standards; all such Software and equipment shall meet Commission IT security standards.		
2.1.1.5	**Customized Hardware**		
20	If customized components or controllers are used, the Contractor shall provide detailed documentation on the Design, production and testing of these units and shall provide usage rights to the Commission. Documentation shall include electronic diagrams, component layouts and the detailed Bill of Material listing manufacturers/vendors. The Contractor shall identify all customized components and controllers and indicate their plan to make them available for the term of the Contract, including the option for placing in escrow.		
2.1.1.6	**Equipment Racks**		
21	All in-lane Equipment controllers and Cashless Tolling System electronics, devices, servers and associated communications Equipment shall be installed inside dedicated toll equipment racks that are housed within the toll equipment building according to a layout Approved by the Commission IT Department. The Contractor shall purchase and install the equipment racks in accordance with the requirements of this section.		

Functional Requirements

No.	Requirements	Required Proposer Inputs	
		Status of Functionality	**Comments**
		Existing (E) - Met by current system, no modifications required **Modification (M) - Modifications needed to meet requirement** **Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs** **To Be Developed (D) - Not in current system, but will be developed** **Not Provided (N**) - Will not be provided - requires explanation**	**If "Status of Functionality = N" then Proposer must provide an Explanation in this Column**
22	It is the Contractor's responsibility to provide the equipment racks of the correct size that meets the requirements of this Scope of Work. Equipment racks shall have adequate space (twenty five {25} percent extra) for added boards, servers and components for future expansion.		
23	The equipment racks shall support the Cashless Tolling System components for a minimum of ten (10) years. The equipment racks shall not be used to support peripheral non-toll related equipment.		
2.1.1.7	**Environmental**		
24	The Cashless Tolling System Equipment to be supplied will be installed in areas exposed to the range of climatic conditions found in Pennsylvania. In addition to the climatic conditions, the Equipment will also be subjected to harsh environmental factors normally found in the operation of a toll lane, such as, but not limited to: car, truck, and bus emissions; deicing materials, industrial exhausts; industrial cleaners; gasoline and car lubricants; Electromagnetic Interference (EMI) and Radio Frequency Interference (RFI), and vibrations. These conditions shall be taken into account in the Design and selection of Equipment used on this Project and the Contractor shall ensure that the System works accurately and reliably in such environment.		
25	Lane electronics, zone controllers, LPICPS controllers/servers and other components shall be able to operate in the sealed and enclosed environment of the equipment racks installed within the toll equipment building.		
26	All Hardware provided under this Contract shall be corrosion resistant and remain corrosion resistant for the term of the Contract.		
27	The in-lane Equipment not in environmentally controlled conditions shall operate with no degradation of performance in ambient air temperature of negative thirty (-30) to fifty-five (55) degrees Celsius, with and without direct sunlight, and relative humidity of five (5) to one hundred (100) percent for Equipment installed in an outside environment and five (5) to ninety-five (95) percent non-condensing for Equipment installed inside equipment racks.		
28	During the Design phase, the Contractor shall provide specification sheets that prove the zone controller and other lane electronics meet the environmental specifications given above. Results of all environmental tests conducted and certification of compliance shall be provided to the Commission for Approval.		
29	All exposed or in-lane Equipment, when in its fully assembled configuration, shall not be damaged, nor shall operational performance or expected lifetime be degraded. During Design phase, the Contractor shall provide specifications for the in-lane Equipment for Commission Approval.		
2.1.1.8	**Assembly**		
30	All customized Hardware shall be assembled and tested in the Contractor's fabrication/assembly facilities before being installed in the lane in accordance with the Commission's Approved test plan for customized Hardware. All chassis, attachments, and Hardware shall be fabricated stainless steel, hot dipped galvanized or other materials resistant to salt exposure and corrosion.		
31	All customized Hardware shall be identified and shall undergo a seventy-two (72) hour burn-in test before they are installed in the lanes, in accordance with the Commission's Approved test plan.		
32	Customized Hardware assembly shall facilitate replacement of failed components in accordance with requirements of this Scope of Work.		
2.1.1.9	**Bill of Materials**		
33	The Contractor shall include the BOM for all Equipment and Hardware supplied for the Cashless Tolling System. Each component shall also include the second manufacturer source and any exceptions shall be noted and explained. During the Design phase the BOM shall be finalized and all changes shall be subject to the approval of the Commission.		
34	Prior to purchase of any Equipment and as part of its Design the Contractor shall submit the final BOM to the Commission for Approval. No equipment shall be purchased by the Contractor prior to Approval of the BOM and the Design, unless otherwise authorized in writing by the Commission.		
35	All Hardware and Software procured under this Scope of Work shall be confirmed to be the latest model/version at the time of purchase with the required warranty, security, Maintenance and support Services.		
36	Updates to the BOM shall be provided by the Contractor whenever changes occur and at a minimum on a semi-annual basis over the term of this Contract.		
2.1.1.10	**Spare Parts and Support**		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	**Comments**
No.	**Requirements**	**Existing (E) - Met by current system, no modifications required** **Modification (M) - Modifications needed to meet requirement** **Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs** **To Be Developed (D) - Not in current system, but will be developed** **Not Provided (N**) - Will not be provided - requires explanation**	**If "Status of Functionality = N" then Proposer must provide an Explanation in this Column**
37	The Cashless Tolling System procured, furnished, and installed under this Contract shall allow the Contractor to Maintain and replace parts for the term of the Contract. The Contractor shall provide a spare parts list the cost to the Commission (inclusive of shipping) and recommended quantities for all Hardware supplied for the Cashless Tolling System for each year of the Contract.		
38	This Contract shall include the initial purchase quantities of spare parts required for the operation of the tolling points during the Warranty period as recommended by the Contractor. Costs for the replacement of spare parts during the Warranty period shall be the responsibility of the Contractor.		
39	At the end of the Maintenance term, all spare parts inventory shall be turned over to the Commission at one hundred (100) percent of the required inventory level. The Contractor shall identify (via the MOMS) the warranty status for each piece of Hardware and warranty period remaining, if applicable.		
2.1.2	**Cashless Tolling System Software**		
40	The operating system, database, other third-party Software, and Cashless Tolling System Software procured, furnished, and installed by the Contractor shall support real time operations of the lane and shall be field proven.		
41	The operating systems shall have a future upgrade path and shall be supported for a minimum of ten (10) years. The Contractor shall ensure that the risk of obsolescence to the Hardware is minimized through the selection of the operating system Software and the peripheral Hardware.		
42	All Cashless Tolling System Software developed, furnished, and installed under this Contract shall be warrantied against Software defects, security vulnerabilities and deficiencies for the term of the Contract and as described within the Contract and associated attachments.		
43	The vendor shall have an annual information security risk assessment and a vulnerability scan performed by a third party, in consultation with Commission IT Security, and provide the results to the Commission.		
2.1.3	**Cashless Tolling System Lane Configurations**		
44	The Cashless Tolling System shall support the toll zone types, lane configurations and dimensions detailed in *Attachment 1: Cashless Toll Zone Locations* .		
45	Travel lane widths shall be assumed to be either eleven (11) feet four (4) inches or twelve (12) feet in all lanes from stripe to stripe per standard PTC lane markings shown in *Attachment 14 – PTC Standard Pavement Markings* . Shoulders widths for each toll zone are detailed in *Attachment 1: Cashless Toll Zone Locations*. Shoulder lanes that are eight (8) feet or greater shall be fully equipped as a travel lane. Shoulder lanes that are less than eight (8) feet shall have vehicle detection and image capture Equipment to detect and capture vehicles straddling the shoulder.		
46	During the detailed Design, the Contractor shall make the required adjustments to the System Design to accommodate for variations in the actual lane widths and PTC standard lane markings.		
2.1.4	**Toll System Requirements**		
2.1.4.1	**Toll System Software Security**		
47	Access to information on the Cashless Tolling System and network shall be password controlled. The access shall be role based and limited to the authorized Contractor staff and designated Commission personnel.		
48	Accounts for user access to the System shall require a strong password and be compliant with Commission IT security standards and requirements.		
49	The Cashless Tolling System shall use ADFS (SAML 2.0) for user access authentication if the Cashless Toll Concentrator or optional Cashless Toll Host (if implemented) solution is located offsite or Cloud based.		
50	User access security, including sign-on facilities, permission control and access privileges for different levels shall be provided for the files, directories and application Software and shall be fully configurable by a system administrator. Access to all systems needs to be controlled through a central repository with each user having an unique log-in.		
51	User sign-on, access and access failures, both local and remote, to any element of the Cashless Tolling System shall be recorded and tracked for security audit proposes and reported to the MOMS. The System shall continuously and automatically monitor for unauthorized access; violations shall be reported to the MOMS as priority 1 Alert. These reports should be provided to Commission IT Security within twelve (12) hours of discovery.		
52	The Contractor shall develop the access levels, user roles and privileges matrix during System Design with the Commission input, including review by Commission IT Security, and Approval. The System shall allow for additions, deletions and changes to the access levels, user roles and the addition of personnel in a secure manner. Users who have separated from the Commission or the vendor shall have their access removed within 24 hours after the date of separation.		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	Comments
No.	Requirements	Existing (E) - Met by current system, no modifications required Modification (M) - Modifications needed to meet requirement Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs To Be Developed (D) - Not in current system, but will be developed Not Provided (N**) - Will not be provided - requires explanation	If "Status of Functionality = N" then Proposer must provide an Explanation in this Column
53	A system level account shall be provided for Commission security systems to perform vulnerability scans using a tool such as Tenable/Nessus, Qualys or other commercial vulnerability scanning tool. Additionally, Commission IT Security can request the Contractor to perform any scans and ensuing reports through the term of the Contract. A user access review is to be done annually with final approval by Commission business owners.		
54	The Contractor shall not circumvent the Commission Approved System security. All access to the System and Approved changes made shall be recorded, monitored, reviewed and audited by the Commission. Specific requirements shall be developed by the Contractor during System Design.		
55	Authorized Users shall have access to the zone controller user access logs to audit the system access.		
56	The Contractor shall provide at a minimum read-only access for Authorized PTC staff to all databases and system log files including but not limited to transaction tables, MOMS tables, stored procedures, auditing, archiving, database views, database logs and scheduled jobs.		
2.1.5	**Cashless Tolling In-Lane System**		
2.1.5.1	**Automatic Vehicle Identification (AVI) System Base Requirements**		
57	The Contractor shall provide an AVI system that is compliant with the E-ZPass Group interoperability requirements and at a minimum support a dual protocol to include the E-ZPass (PS111 TDM/IAG E-ZPass Group) and 6C (ISOC (ISO 18000-63/6C)) protocols at the tolling points specified in this Scope of Work.		
58	This requirement intentionally left blank.		
59	The Contractor shall furnish and install all other Hardware, cabling and associated mounting fixtures to form a fully functioning AVI system that meets the requirements of this Scope of Work.		
60	The Contractor shall be responsible for the physical tuning of the certified AVI Equipment, and integrating the AVI system into the Contractor in-lane Design. In addition, the AVI vendor shall certify in writing that the lanes are tuned to the Approved AVI specifications. All AVI installation, configuration and tuning shall be in compliance with the certified E-ZPass Group vendor requirements.		
61	The Contractor is responsible for synchronizing all AVI readers that are in close proximity to the tolling points as required by the certified AVI manufacturer.		
62	The AVI system shall provide full coverage in all areas of the toll zone to read and report transponders. Transponders on vehicles straddling the shoulders that are less than eight (8) feet shall be read and reported to the zone controller. The Contractor shall support adjustments to the antenna quantity and placement based on the final shoulder configuration.		
63	The Contractor shall maximize any inherent redundancy built into the AVI readers whereby the failure of the master or primary reader will result in the reporting of the transponder reads via the slave or secondary reader.		
64	The AVI system shall be able to read the transponder, write to the transponder and report all E-ZPass Group interoperable transponders on vehicles traveling through any area of the toll zone, including but not limited to shoulder, center of lane, traversing lanes and straddling lanes with no interference or degradation of performance. Non-E-ZPass Group interoperable transponder reads shall also be reported and flagged if the AVI system is capable of reading such transponders.		
65	The AVI system shall have the ability to process transponders mounted on vehicles traveling in stop and go and bumper-to-bumper traffic and vehicles traveling at speeds of up to one hundred (100) miles per hour.		
66	The read zones in the lanes at a toll zone shall be tuned such that transponders in vehicles traveling through the lanes in the opposite direction of travel are not reported by the AVI system.		
67	The AVI system shall buffer transponder reads when it is unable to communicate to the zone controller. When communications are restored, the Buffered Transponder Reads shall be reported to the zone controller.		
68	If more than one transponder is present in a vehicle, the AVI system shall have the ability to accurately read, write to and report all transponders that are compliant with the E-ZPass Group and current National Interoperability (NIOP) candidate protocols. The zone controller shall properly associate the first read Commission transponder that has a valid status at the time of the transaction to the vehicle and report the additional transponders in the transaction. If both transponders have a valid status the zone controller shall associate the first read to the vehicle and report any additional transponders in the transaction. Additional transponder reads shall be reported to the existing PTC systems according to the Business Rules.		
69	The Contractor shall use the full capability of the selected AVI system to obtain AVI system status in accordance with the manufacturer specifications and report such status to the MOMS. Loss of communication to any element of the AVI system shall be immediately detected by the zone controller and reported to the MOMS. The Contractor-provided monitoring logic shall specifically detect any failures and generate alarms when failures are detected.		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	Comments
No.	Requirements	Existing (E) - Met by current system, no modifications required Modification (M) - Modifications needed to meet requirement Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs To Be Developed (D) - Not in current system, but will be developed Not Provided (N**) - Will not be provided - requires explanation	If "Status of Functionality = N" then Proposer must provide an Explanation in this Column
70	The Contractor shall provide maintenance tools to support remote lane tuning, diagnostics and other configuration changes. Setup and configuration of the AVI system shall be achieved remotely and shall not require lane closure except for major lane tuning, when initially installed or when a reader or antenna is replaced.		
2.1.5.2	**Automatic Vehicle Identification (AVI) System Tri-Protocol Implementation (Optional)**		
71	The Contractor shall provide an AVI system that is compliant with the E-ZPass Group interoperability requirements at the tolling points specified in this Scope of Work.		
72	The Contractor shall provide an AVI System comprised of tri-protocol readers, antennas and ancillary Equipment that is compliant with the base AVI system requirements plus the SeGo protocol (ISOB_80K).		
73	Tri-protocol readers shall be Configurable with the option to select active protocols to support the transition to the new interoperable solution.		
74	If requested, the Contractor shall support the transition of the current E-ZPass Group protocols to include the protocols required within this section when and if applicable and such support shall include but not be limited to installation adjustments, configuration, tuning, testing and verifying compliance to applicable interoperable requirements including accuracy requirements.		
75	This requirement intentionally left blank.		
76	The Contractor shall furnish and install all other Hardware, cabling and associated mounting fixtures to form a fully functioning AVI system that meets the requirements of this Scope of Work.		
77	The Contractor shall be responsible for the physical tuning of the certified AVI Equipment, and integrating the AVI system into the Contractor in-lane Design. In addition, the AVI vendor shall certify in writing that the lanes are tuned to the Approved AVI specifications. All AVI installation, configuration and tuning shall be in compliance with the certified E-ZPass Group vendor requirements.		
78	The Contractor is responsible for synchronizing all AVI readers that are in close proximity to the tolling points as required by the certified AVI manufacturer.		
79	The AVI system shall provide full coverage in all areas of the toll zone to read and report transponders. Transponders on vehicles straddling the shoulders that are less than eight (8) feet shall be read and reported to the zone controller. The Contractor shall support adjustments to the antenna quantity and placement based on the final shoulder configuration.		
80	The Contractor shall maximize any inherent redundancy built into the AVI readers whereby the failure of the master or primary reader will result in the reporting of the transponder reads via the slave or secondary reader.		
81	The AVI system shall be able to read the transponder, write to the transponder and report all E-ZPass Group interoperable transponders on vehicles traveling through any area of the toll zone, including but not limited to shoulder, center of lane, traversing lanes and straddling lanes with no interference or degradation of performance. Non-E-ZPass Group interoperable transponder reads shall also be reported and flagged if the AVI system is capable of reading such transponders.		
82	The AVI system shall have the ability to process transponders mounted on vehicles traveling in stop and go and bumper-to-bumper traffic and vehicles traveling at speeds of up to one hundred (100) miles per hour.		
83	The read zones in the lanes at a toll zone shall be tuned such that transponders in vehicles traveling through the lanes in the opposite direction of travel are not reported by the AVI system.		
84	The AVI system shall buffer transponder reads when it is unable to communicate to the zone controller. When communications are restored, the Buffered Transponder Reads shall be reported to the zone controller.		
85	If more than one transponder is present in a vehicle, the AVI system shall have the ability to accurately read, write to and report all transponders that are compliant with the E-ZPass Group and future National Interoperability (NIOP) requirements. Additional transponder reads shall be reported to the existing PTC systems according to the Business Rules.		
86	The Contractor shall use the full capability of the selected AVI system to obtain AVI system status in accordance with the manufacturer specifications and report such status to the MOMS. Loss of communication to any element of the AVI system shall be immediately detected by the zone controller and reported to the MOMS. The Contractor-provided monitoring logic shall specifically detect any failures and generate alarms when failures are detected.		
87	The Contractor shall provide maintenance tools to support remote lane tuning, diagnostics and other configuration changes. Setup and configuration of the AVI system shall be achieved remotely and shall not require lane closure except for major lane tuning, when initially installed or when a reader or antenna is replaced.		
2.1.5.3	**Automatic Vehicle Classification (AVC) System**		

Functional Requirements

		Required Proposer Inputs	
		Status of Functionality	**Comments**
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88	The Contractor shall analyze the site conditions and Design, procure, furnish and install the required sensors and Hardware on all lanes at the specified Cashless Toll Zones as part of the AVC system that performs in accordance with performance requirements set forth in this Scope of Work under all weather conditions. The AVC system shall accurately detect, classify and separate vehicles spaced as close as three (3) feet apart traveling in stop and go and bumper-to-bumper traffic and vehicles traveling at speeds up to one hundred 100 miles per hour.		
89	The AVC system shall determine vehicle axle count or axle count and vehicle dimensions, and classify vehicles in accordance with the Commission vehicle classification structure described in *Attachment 4a: PTC Proposed AVC Class Structure and Silhouette* based on the type of toll location. Classification of vehicles traveling on the shoulders of less than eight (8) feet width is not required; however, the System shall detect vehicles that travel on the shoulder and trigger the LPICPS.		
90	The AVC system shall have the ability to detect trailer hitches and ensure that vehicles with a trailer in tow are reported as one unit to the zone controller as part of the vehicle transaction data.		
91	The AVC system shall determine the speed of the vehicle and report the speed to the zone controller as part of the vehicle transaction data.		
92	The Contractor shall ensure that there is sensor coverage at all areas of the toll zone to accurately detect and report vehicles traveling the shoulder and vehicles straddling lanes.		
93	The AVC system shall provide vehicle event messages and signals, and vehicle classification data to the zone controller. Exception conditions processed by the AVC system shall be included in the transaction data, for example vehicle straddling the lane.		
94	The Contractor's proposed AVC system shall have redundancy whereby AVC continues to function in the event any element of the AVC system fails or is degraded. The failure of a single sensor shall not prevent the lanes from processing vehicles or impact the System's capability to accurately associate transponders and to capture and process images.		
95	The AVC system shall report its health to the zone controller and shall provide status when polled. Loss of communication to any element of the AVC system shall be immediately detected and reported. All health and failure status messages shall be transmitted and reported to the MOMS. In the event the primary AVC sensor fails, then the secondary sensors shall be used to capture and process images in accordance with the Commission Business Rules.		
96	In the event there is a Class Mismatch between the AVC system and the transponder class, as defined by the Commission Business Rules during the Design phase, an image of the vehicle shall be captured and processed. The ability to enable or disable image capture for a Class Mismatch shall be configurable.		
2.1.5.4	**License Plate Image Capture and Processing System (LCICPS)**		
97	The Contractor shall Design, procure, furnish, and install all necessary front and rear LPICPS Hardware and Software required to support the video tolling and video processing requirements as set forth in this Scope of Work.		
98	High resolution front and rear cameras shall be utilized for performing the OCR/ALPR.		
99	Contractor shall install high resolution front and rear color ALPR cameras to meet the requirements of the Scope of Work. The Contractor shall install high resolution front and rear color cameras to provide one hundred (100) percent image capture during individual camera failures and excessive glare conditions.		
100	The LPICPS shall capture and process vehicles traveling in stop and go and "bumper-to-bumper" traffic, vehicles traveling at speeds up to one hundred (100) miles per hour, and vehicles with separation as close as three (3) feet apart.		
101	The Contractor shall ensure that there is shoulder coverage and vehicles traveling through any area of the toll zone, including but not limited to shoulder, center of lane, traversing lanes and straddling lanes, shall be accurately detected and their images captured and processed in accordance with the Commission Business Rules.		
102	The LPICPS shall buffer images (retaining an image until its disposition is known) such that no image is lost in order to support multiple vehicles in the lane and in accordance with the Commission Business Rules.		
103	The Contractor shall procure, furnish, and install cameras, lighting, necessary image triggers, backup triggers and the necessary camera control Software to automatically adjust the cameras to accommodate varying light and weather conditions to maintain adequate brightness and contrast settings, with or without traffic, to ensure optimum license plate information capture under all conditions and time of day.		
104	The system shall associate all images captured for a single vehicle to the vehicle transaction including multiple images captured by a camera.		

Functional Requirements			
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105	Lights installed in support of the cameras shall not distract motorists traveling in either direction in the lanes. Contractor shall make no assumption of ambient light and the system shall function without any degradation regardless of the ambient light.		
106	The Contractor shall procure, furnish, and install the necessary redundant controllers/servers to support the in-lane LPICPS Equipment and such servers shall be separate of the zone controller servers.		
107	The Contractor shall provide robust industrialized computers and operating systems (PC's or workstation-type operating systems are not permitted) sufficient processor speed and memory to process vehicles in real time to meet the speed and traffic volumes as specified in this Scope of Work.		
108	The following traffic volumes are provided as projections for planning purposes only and subject to change. The projected Average Annual Daily Traffic (AADT) various tolling locations identified in this Scope of Work can be found in *Attachment 13 -Annual Traffic Volumes* .		
109	The LPICPS controllers/servers shall support standalone operations and be sized to store a minimum of thirty (30) days of images and data per lane at each of the toll zones under normal operating conditions.		
110	The LPICPS shall perform with no degradation under conditions where every vehicle is considered a video transaction (100 percent video transaction). Under these conditions the System shall store images at the lane level for minimum of seven (7) consecutive days per lane. The System shall provide a configurable setting for the processing of one hundred percent (100) percent of video transactions.		
111	When the storage utilization on the LPICPS controllers/servers reaches a configurable percentage (for example 80 percent), a message shall be transmitted to the MOMS. Images shall be deleted only after it is confirmed/acknowledged that the images have been successfully transmitted to the image server(s). Any deletion of images shall be automatic, without user intervention, and shall generate a message to be transmitted to the MOMS (configurable).		
112	The LPICPS controllers/servers architecture shall have full redundancy such that failure of a processor, board, power supply, disk, communications or other critical component does not result in loss of images and data.		
113	In the event communications to the LPICPS are lost or any LPICPS Hardware becomes non-operational, the Contractor's Design shall ensure that no images and/or data are lost and that all images and associated data are saved to a backup controller/server and transmitted to the image server(s) upon restoration of communications.		
114	The Contractor's Design shall guarantee transmission of the video transactions, images and license plate results (optional) from the lanes to the image server(s) and from the image server(s) to the existing CSC/VPC system.		
115	The System shall provide the capability to reconcile images to the transaction data and verify one hundred (100) percent transmission of video transactions and images to the existing CSC/VPC system.		
116	If the Contractor solution includes toll rate determination within the In-lane Systems, then the video transactions may have the toll rates assigned to each transaction as specified in the Approved interface control document (ICD).		
117	The Contractor's architecture shall support the image throughput requirements specified in the Scope of Work.		
118	The LPICPS shall be capable of continuously performing diagnostics and reporting its health to the zone controller and the MOMS. Loss of communication to any element of the LPICPS shall be immediately detected. All health, failure and recovery status messages shall be transmitted and reported to the MOMS.		
119	The LPICPS shall be capable of transferring video transaction data, images and license plate data to the image server(s) or the existing CSC/VPC systems in real-time or in batch mode as determined by the Commission to efficiently utilize the limited network bandwidth.		
2.1.5.5	**Optical Character Recognition (OCR)/Automatic License Plate Recognition (ALPR) – Optional**		
	If the option to provide OCR/ALPR Software is exercised, then the Contractor shall provide OCR/ALPR Software for determining the license plate data (number, jurisdiction and plate type) that results in the System meeting the requirements specified in the Scope of Work.		
120	The OCR/ALPR Software may reside at the toll zone level, plaza level or the Highway level, as long as it meets the performance and functional requirements specified in this Scope of Work.		
121	The System shall correctly identify the jurisdiction, plate type, special characters and stacked characters, and accurately determine the license plate number.		
122	There shall be no backlog or failure in the processing of images for obtaining the license plate data (number, jurisdiction and plate type) and there shall be server redundancy whereby standby servers are available immediately and fully operational in the event of a failure.		

Functional Requirements			
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123	The OCR/ALPR Software procured, furnished, and installed under this Contract can include Software that enhances and improves the accuracy and efficiency of the OCR/ALPR process. The System shall meet the OCR/ALPR performance requirements specified in this Scope of Work for license plates from States of PA, NJ, OH, FL, NY, MD, TX, DE, VA and NC. Each tolling location can be independently tuned to optimize performance based on the mixture of plates for each given toll zone.		
124	The LPICPS shall provide the capability of detecting image quality degradation in near real-time and generate alarms that are reported to MOMS when image quality impacts OCR/ALPR performance.		
125	If a vehicle has two license plates or cameras capture multiple front and rear images for a vehicle, the region of interest (ROI) for all license plates shall be obtained and the license plate number from all plates shall be extracted and associated to the vehicle transaction.		
126	Vehicles with two rear license plates shall be identified to allow the back-office to apply separate Business Rules for such transactions.		
127	The images transferred to the existing CSC/VPC system shall include, at a minimum, the front and rear full uncompressed image(s) and the ROI.		
128	Based on the OCR/ALPR results, the System shall identify the best license plate image that was used by the OCR/ALPR to obtain the license plate data including identification of front and rear images.		
129	The data transmitted along with the image shall meet the Approved ICD and shall include, but not be limited to:		
	· transaction data;		
	· license plate data, including license plate number, jurisdiction and plate type;		
	· confidence level of the OCR/ALPR results for individual characters and overall license plate number;		
	· confidence level of the jurisdiction, and		
	· enforcement notification status and action (if exercised).		
130	For audit and Maintenance purposes, Authorized Users shall have the capability to view all the images in real time on any device connected to the Cashless Tolling System network and verify the OCR/ALPR performance.		
131	For audit and testing purposes Authorized Users shall have the ability to perform image review, utilize image enhancement tools, and enter license plate data independent of the normal image processing workflow. A flexible user interface shall be provided that allows Authorized Users to select the image review criteria. Data entered through this process shall be transmitted to the Cashless Toll Concentrator or optional Cashless Toll Host System for reporting.		
132	All data entered through the independent image review process for testing and audit described above shall be saved separate from the normal production environment and shall be available to Authorized Users through reports. Such an audit process shall not impact normal operations and in most cases will occur after the images are transmitted to the existing CSC/VPC system.		
2.1.6	**Enforcement Notification -** *Optional*		
	If the option to provide Enforcement Notification functionality is exercised, then the Contractor shall provide Enforcement Notification that results in the System meeting the requirements specified in the Scope of Work.		
133	The Cashless Tolling System shall support the Maintenance and update of VEL that contains transponder numbers and license plate numbers that the Commission requires notification on. This could include repeat violators.		
134	The VEL will be transmitted from the existing CSC/VPC system or existing PTC Toll Host to the Cashless Toll Concentrator, Cashless Toll Host (optional) or facility server(s) and from the Cashless Toll Concentrator, Cashless Toll Host (optional) or facility server(s) to the lanes at frequent configurable increments and when changes take place.		
135	The Cashless Tolling System shall provide the capability to alert applicable personnel if the System detects a transponder or license plate passing through the cashless toll zone that is identified for enforcement notification. The criteria for notification shall include the status of the transponder and presence of the license plate on the VEL.		
136	Notification methods shall include but not be limited to text message, email or system to system interface.		
137	The System shall alert applicable personnel within twenty (20) seconds of the vehicle passing through the toll zone if a vehicle on the VEL is identified. The transponder ID, transponder status, license plate number and jurisdiction shall be included in the Alert.		
138	If an enforcement notification was successfully transmitted to applicable personnel, the transaction shall have a flag denoting the transmission of the enforcement notification. This enforcement transmission status shall be transmitted to the existing CSC/VPC system.		

Functional Requirements			
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139	The System shall support the transmission of images (configurable) to the applicable personnel and shall include the image of the vehicle or just the ROI.		
2.1.7	**Zone Controller**		
2.1.7.1	**Zone Controller Hardware**		
140	A fully redundant zone controller shall be Designed, procured, furnished, and installed at each of the toll zones. The redundant zone controllers shall have the identical configuration.		
141	The zone controllers shall be installed in equipment racks and housed in the toll equipment building whether there is a single or dual toll equipment building at each tolling point.		
142	When any Hardware and/or process on the primary zone controller fails preventing it from processing vehicles and creating transactions, the secondary zone controller shall automatically and immediately assume the functions of the primary zone controller. The failover from the primary zone controller to the secondary zone controller shall be transparent to the rest of the System and shall not require human intervention or the restart of any subsystems. Only one zone controller at a time shall generate revenue transactions.		
143	Alarm messages shall be generated and reported to the MOMS when such a failover event occurs. The Contractor’s failover Design shall ensure that there is no loss of revenue or transactions when one of the zone controllers fails.		
144	The System shall provide Authorized Users the capability to manually and remotely failover the active zone controller to and from the primary zone controller to the secondary zone controller. All such events shall be recorded and transmitted to the MOMS.		
145	The zone controllers shall be Hardened, industrial grade servers and the processor speed and memory shall be sufficient to process vehicles in real time to meet the traffic speed and volumes as specified in this Scope of Work. The following traffic volumes are provided as projections for planning purposes only and subject to change. The projected Average Annual Daily Traffic (AADT) for the various tolling locations identified in this Scope of Work can be found in *Attachment 13: Annual Traffic Volumes* .		
146	Storage shall be sized to store a minimum of thirty (30) days of transaction and event data for each lane at the toll zone supported by the zone controller.		
147	Proprietary zone controller Hardware will be considered for use, subject to the Commission’s Approval. All drawings and instructions that enable construction and assembly, installation, repair, and modification of the Hardware, as well as sufficient property and use rights shall be provided to the Commission.		
2.1.7.2	**Zone Controller Software**		
148	The zone controller Software shall interface to the various devices and subsystems for each of the toll zone types specified in *Attachment 1: Cashless Toll Zone Locations* and perform all the functions as described in this Scope of Work for all Commission toll facilities.		
149	The zone controller located at each toll zone shall process all of the data obtained from the other subsystems as described in this Scope of Work to generate a transaction record for each vehicle passage through the toll zone. The zone controller shall:		
	· manage the TSL for all E-ZPass Group interoperable agencies used to validate the status of a transponder received from the AVI system;		
	· use the data obtained from the AVI and AVC systems to assign the transponder read to the correct vehicle and frame the vehicle transaction accurately;		
	· notify the LPICPS to capture and process vehicle images if no Valid Transponder read is obtained from a vehicle or if the Commission Business Rules require the capture of an image;		
	· transmit the transaction record to the facility server (if provided) or to the Cashless Toll Concentrator or optional Cashless Toll Host, including but not limited to the following data: vehicle detection and classification data, transponder data (including raw transponder data as reported by the reader), Equipment status data, and all other pertinent information regarding the transaction as specified during the Design phase;		
	· transmit to the MOMS all alarm messages relating to the health of each subsystem, including the health of the primary and secondary (redundant) zone controller. Recovery messages shall also be transmitted and reported;		
	· ensure that vehicle event data and transaction data shall be accessible to the DVAS, and		
	· transmit to the facility server (if provided) or Cashless Toll Concentrator or optional Cashless Toll Host for further processing all other messages/events in accordance with Approved ICDs.		

Functional Requirements			
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150	The zone controller Software shall be configurable and shall be able to support the Commission Cashless Tolling operational needs without requiring changes to Software. The configurable parameters shall be defined and documented during the Design process. All parameters shall have default values that shall be established during the Design process.		
151	The Contractor shall propose appropriate Protocols and data structures to accomplish the communications required between various peripherals. These Protocols and data structures shall be fully detailed and documented, in Consultation with the Commission, by the Contractor during the Design process and Approved by the Commission.		
152	Guaranteed transmission Protocols shall be used for all messages exchanged between systems, including but not limited to:		
	· zone controller;		
	· LPICPS;		
	· AVI system;		
	· AVC system;		
	· facility servers (if provided);		
	· Cashless Toll Concentrator;		
	· Cashless Toll Host (optional);		
	· image server(s);		
	· existing CSC/VPC;		
	· DVAS;		
	· MOMS, and		
	· the existing PTC Toll Host		
153	The Cashless Tolling System shall support the various lane configurations shown in *Attachment 1: Cashless Toll Zone Locations*. The zone controller application Software shall support all lane functions required to meet the Commission Cashless Tolling operational requirements.		
2.1.7.3	**Zone Controller Start-Up**		
154	Upon start-up or initialization the zone controller shall perform a self-diagnostics test to ensure full System operations. Alarm messages shall be reported for all failure conditions and a notification of the diagnostic check completion shall be displayed on the MOMS Dashboard. The failure of a critical system shall result in the toll zone operating under degraded operations in accordance with the Commission Business Rules.		
155	Upon start-up, the zone controller shall verify with the facility server (if provided), the Cashless Toll Concentrator or optional Cashless Toll Host that it has the latest configuration files; VEL (if exercised); TSL; and any other files required to support the lane operations. If the latest files are not present on the zone controller, it shall request the latest data from the facility server (if provided), Cashless Toll Concentrator or optional Cashless Toll Host. If a zone controller is unable to get the latest files, an Alert shall be generated and sent to MOMS.		
156	The zone controller shall also synchronize its time with the Commission Approved time source and an Approved secondary source upon start-up and at established configurable intervals. The zone controller shall also support a secondary source for time synchronization.		
2.1.7.4	**Lane Operations**		
157	The Cashless Tolling System shall support various modes of operation that are managed and initiated by Authorized Users through the Cashless Toll Concentrator, the facility server (if provided), optional Cashless Toll Host or other means as approved by the PTC.		
158	Transactions shall be processed according to different Business Rules either at the lane level or the host level based on the mode of operation. The Contractor shall be responsible for ensuring that the AVI and video transactions are processed according to Commission Business Rules and transmitted correctly to the existing PTC Toll Host and/or CSC/VPC system.		
	The Cashless Tolling System shall support the following modes of operations:		
	· Open Mode: All transactions shall be processed normally in an open mode;		
	· Maintenance Mode: Transactions created in Maintenance mode are processed and transmitted as normal transaction but are identified as Maintenance mode transactions and transmitted to the Cashless Toll Host. Transactions that occur during Maintenance mode are not reported as traffic or revenue transactions.		

Functional Requirements			
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159	· Emergency Mode: Transactions created during emergency mode shall be identified as emergency mode transactions and processed in accordance with Commission Business Rules to be determined during the Design phase.		
	· Save Image Mode: Capability shall be provided whereby Authorized Users can enable and disable a zone controller to save one hundred (100) percent of vehicle images processed through the LPICPS based on various selection criteria. Transactions under such condition shall be processed normally; however, these transactions and images shall be flagged with the save image mode and processed according to the Commission Business Rules (for example audit purposes).		
160	When a lane is operating in a mode other than normal open mode, an Alert shall be generated and sent to MOMS at regular (configurable) intervals.		
161	Authorized Users shall have the ability (local and remote) to configure the next operating mode and to gracefully shutdown the zone controller. Each time a mode change is requested an Alert message shall be sent to the MOMS.		
2.1.7.5	**Transaction Processing**		
162	The zone controller shall detect, classify, and frame vehicles; assign the transponder accurately to the correct vehicle and capture and process the image of the correct vehicle in accordance with the Commission Business Rules and with the performance requirements specified in this Scope of Work.		
163	The detailed transaction processing rules shall be defined and finalized during the Design phase; however, the following basic rules shall apply:		
	· the System shall have the ability to process and record multiple transponders in a vehicle and associate each transponder to the vehicle transaction;		
	· any non-E-ZPass Group interoperable transponder reads shall be reported to the Cashless Toll Host System;		
	· a minimum of one revenue bearing transaction shall be created for each vehicle that travels through the toll zone and the zone controller shall ensure that the transaction is complete prior to transmitting it;		
	· the zone controller shall be able to accurately identify, process, and track multiple vehicles in the toll zone;		
	· the zone controller shall ensure that duplicate transponder transactions (same transponder ID) are not reported from the same lane or toll zone within a configurable period of time or consecutively;		
	· Buffered Transponder Reads that are transmitted to the zone controller shall be processed but not be assigned to a vehicle by the zone controller and shall be flagged and reported to the facility server, Cashless Toll Concentrator or optional Cashless Toll Host for further processing and vehicle assignment;		
	· the zone controller shall automatically synchronize with the various subsystems to ensure the events in the lane correspond to the transaction generated, and		
	· the System shall incorporate self-correcting logic to adjust for lane anomalies and event synchronization issues.		
164	The transaction message details shall be defined and finalized during the Design phase; however, the following basic rules shall apply:		
	· The In-lane System shall transmit the video transaction to the existing CSC/VPC system for processing and billing.		
	· the In-lane System shall transmit AVI and video transactions to the Cashless Toll Concentrator or optional Cashless Toll Host for processing, reporting, and reconciliation with the existing PTC Toll Host and CSC/VPC;		
	· the transaction message shall contain all data required by the existing PTC Toll Host and CSC/VPC systems to process the AVI and video transaction;		
	· each transaction shall contain various event times to help with transaction pre-processing and synchronizing events to a transaction including but not limited to: "vehicle entry" time; "LPICPS trigger" time; "transponder read" time; "transponder write" time, and "vehicle exit" time. Such event times shall allow transponder reads, images and transaction to be associated correctly with the vehicle, and		
	· the System shall assign a lane number as approved by the PTC sequential by lane to each transaction and report the lane in which the vehicle was detected within the toll zone.		
	· the System shall assign a sequential sequence number by lane to each transaction detected within the toll zone.		
2.1.7.6	**E-ZPass Group Mapped Class**		
165	The System shall utilize the raw E-ZPass Group class obtained from the transponder data and map that raw class to the Commission E-ZPass Group proposed axle+dimension mapped class in accordance with *Attachment 4b: E-ZPass Group Mapped Classes* to be finalized during the Design Phase.		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	**Comments**
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166	The System shall retain the raw E-ZPass Group class and include that in the transaction data along with the E-ZPass Group mapped axle+dimension class for Commission.		
167	If a transponder has a raw E-ZPass Group class that is not mapped to the Commission E-ZPass Group axle+dimension class then the transaction shall be assigned a default class (configurable).		
2.1.7.7	**Revenue Vehicle Class (PTC Class)**		
168	The assignment of the Revenue Vehicle Class in normal operations and in degraded mode of operations shall be in accordance with the Commission Business Rules. If no classification data is obtained, a configurable default revenue class shall be assigned to the transaction and the transaction shall be flagged.		
169	The Revenue Vehicle Class shall be used to determine the fare amount for a transaction as defined by the Commission Business Rules. Flags in the transaction shall identify which class was used as the Revenue Vehicle Class.		
170	The System shall have the capability to cap the maximum and minimum (configurable) axles and class and to charge a set toll rate per additional axle count.		
171	Transactions shall include the raw E-ZPass Group class, AVC class, mapped E-ZPass Group class and Revenue Vehicle Class. The Revenue Vehicle Class assigned in accordance with the Commission Business Rules shall be used to determine the toll amount.		
2.1.7.8	**Fare Determination**		
	Fare determination is not required at the In-lane Systems, and can be performed at the Cashless Tolling Host Concentrator, facility server(s), Cashless Toll Host (optional) or existing PTC Toll Host. The Contractor solution shall include fare determination at the Cashless Toll Host Concentrator, facility server(s), Cashless Toll Host (optional) or the In-lane Systems for AVI transactions and shall meet the following requirements. Currently the existing CSC/VPC system assesses the toll for violation transactions and will continue to do so for video transactions; however, the Contractor can assign the toll to video transactions if the Contractor solution provides this capability.		
172	Fare determination shall be performed at the In-lane Systems, the Cashless Toll Concentrator or optional Cashless Toll Host systems or the existing PTC Toll Host for all AVI transactions.		
173	The Contractor solution shall include fare determination at the Cashless Toll Concentrator, optional Cashless Toll Host System or the In-lane Systems for AVI transactions.		
174	Fare determination may be performed at the In-lane Systems for all video transactions and may later be adjusted at the PTC CSC/VPC based on the transaction categorization, for example Video Image Toll (VToll).		
175	The assignment of tolls shall be assigned based on the final Design and shall be assessed using the toll rates and schedules established for each tolling point for barrier type locations such as DRB and Gateway or may be assessed based on a completed trip that would be built based on the number of gantries the customer passed under while traveling on the Mainline and/or Northeastern Extension (if Toll Host option exercised). The toll rate and class structure for the various toll facilities are not developed yet but the System shall support the toll rates and class structure for the classifications in *Attachment 4a: PTC Proposed AVC Class Structure and Silhouette* based on the toll location.		
176	The System shall support the assessment of toll by payment type for example video, E-ZPass, and Non-Revenue; vehicle class and location.		
177	Home Agency(Commission issued) non-revenue transponders shall be charged $0.00 (configurable) fare but Away Agency non-revenue transponders shall be charged the normal fare.		
178	Class 1 motorcycles with valid E-ZPass transactions that use a Home Agency(Commission issued) transponder shall be charged a configurable discounted fare.		
179	Motorcycles and other vehicles that qualify for discounted fare shall be identified by using the E-ZPass Group vehicle Type 2 which is comprised of E-ZPass Group class 136, 140 and 144. The category of E-ZPass Group class that qualifies for discounted fare shall be configurable.		
180	Motorcycle discount fares shall be rounded to the nearest penny (configurable) but shall be no less than the minimum fare (configurable). Currently the minimum fare is fifty (50) cents.		
181	The toll charged for E-ZPass transactions shall be based on Commission Business Rules developed during the Design phase and shall consider the operational status of the AVC.		
182	Tolls charged for video transactions shall be based on AVC (if it is operational) or the default class and shall be defined during the Design phase.		

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183	Transactions shall be flagged if the vehicle class is estimated by the AVC system (for example, when the class is based on the vehicle profile or AVC data is incomplete or degraded).		
2.1.7.9	**Saving of Images**		
184	Images shall be captured and saved for the following conditions and as further defined during the Design process, including but not limited to:		
	· in all cases where there is no transponder read (including when the AVI system is down or degraded), the transponder is not "valid", or a non- interoperable read is detected;		
	· in all cases where there is a vehicle classification condition as determined by the Commission Business Rules, for example in conditions where the AVC class is estimated by the System;		
	· if the LPICPS loses communications with the zone controller in accordance with the Commission Business Rules;		
	· in all cases where there is a Class Mismatch between the transponder class and the AVC, as determined by the Commission Business Rules, and		
	· in conditions where the "save image mode" is enabled.		
185	Images saved during a LPICPS loss of communication event shall be flagged and subsequently matched with the correct transaction data when communication with the zone controller resumes. This matching can occur at the Cashless Toll Host Concentrator or optional Cashless Toll Host but shall take place in a manner that does not interfere with or degrade real time zone controller operations.		
186	If the AVC system is not operational but the LPICPS trigger is functioning, images shall be saved such that all non-Valid Transponder transactions that occur during the AVC malfunction can be subsequently pursued for collection. Sufficient data shall be provided in the transactions to allow the PTC CSC/VPC to process such transactions so that customers are not charged in error when lane operation is degraded.		
2.1.7.10	**Configuration Files**		
187	All parameters and settings required to run the zone controller application and the lane equipment shall be maintained in configuration files. Access to configuration files required to support the zone controller operations shall be limited to Authorized Users.		
188	The configuration files shall be maintained at the toll zone and the Cashless Toll Concentrator or optional Cashless Toll Host for configuration and version control. All zone controllers shall have default configuration files that allow the lane to start-up automatically.		
189	Authorized Users shall be able to make changes to parameters and settings that are defined as configurable in this Scope of Work and in the Approved Design documents. Authorized Users shall be able to make changes to the configuration files in the field. Changes to configuration shall result in an alert message to the MOMS. All changes made to the configuration files in the field shall be synchronized to the master configuration file that is maintained at the Cashless Toll Concentrator or optional Cashless Toll Host.		
190	Each zone controller shall automatically back up its critical configuration files to a backup server once a day to be used to rebuild the master drive in the event of hard disk failures.		
2.1.7.11	**Zone Controller Interfaces**		
191	The zone controller shall interface to various devices and subsystems to transmit and obtain data and synchronize the time.		
192	The zone controller shall provide checks on all data it receives from each of the devices and subsystems it interfaces to and generate alarm messages that are reported to the MOMS.		
Interface to AVI System			
193	The zone controller shall interface with the designated AVI system in accordance with the Approved ICD and transmit all relevant transponder data received from the AVI system as programmed on the transponder, as defined and Approved by the Commission during the Design phase, and reported as part of the vehicle transaction data to the Cashless Toll Concentrator or optional Cashless Toll Host.		
Interface to AVC System			
194	The zone controller shall interface with the AVC system to obtain vehicle events that shall permit accurate detection, classification, tracking and processing of vehicles. Vehicle class and speed information shall also be obtained from the AVC system and reported as part of the vehicle transaction data reported to the Cashless Toll Concentrator or optional Cashless Toll Host.		
Interface to LPICPS			

Functional Requirements

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195	The zone controller shall interface with the LPICPS to capture and process images of vehicles in accordance with the Commission Business Rules to be developed during the Design phase. The vehicle data, OCR/ALPR results (if the option to implement OCR/ALPR is exercised) and images obtained from the LPICPS shall be transmitted to the image server(s) to support the Commission's video tolling and processing requirements and PTC E-ZPass CSC operations requirements.		
Interface to DVAS			
196	The zone controller shall interface with the DVAS to transmit event data for display on the DVAS. The event data shall include transponder reads and AVC event messages that are received as the vehicle travels through the lane.		
Interface to Facility Server/ Cashless Toll Concentrator or Cashless Toll Host (if provided) Systems			
197	The zone controller shall interface with the facility server (if one is deemed necessary) or directly to the Cashless Toll Concentrator or Toll Host Systems to transmit lane data and to receive files, commands, messages and other data required for lane operations. Error detection checks shall be instituted on both systems to ensure incorrect or corrupt data is not inserted into the System. The Contractor shall work with Commission IT Security to develop a secure method of allowing this flow of data through a Commission firewall into the network.		
198	The Cashless Tolling System shall include automated methods to determine when there is a loss of communications between the zone controller and the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems; any failures detected shall be reported to the MOMS.		
199	The Cashless Tolling System shall include automated methods to determine when there is a loss of communications between the zone controller and the image server(s); any failure detected shall be reported to the MOMS.		
200	Receipt of all files and data shall be acknowledged; any transmission failures shall be reported to the MOMS.		
201	The Contractor shall provide an automated means of synchronizing the zone controller and facility server (if provided) or Cashless Toll Concentrator or Toll Host System messages in the event that the zone controllers are replaced, communications are down, or if data on the zone controller is not retrievable due to a catastrophic failure.		
2.1.7.12	**Transmitting Data**		
202	All messages generated at the zone controllers shall be transmitted to the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems in real-time using a transport mechanism that performs error detection and correction to guarantee data transmission. All messages shall be uniquely identified and validated at the Cashless Toll Concentrator or Toll Host Systems to ensure there are no missing or duplicate messages.		
203	The System shall support exception handling in accordance with the Commission Business Rules Approved during the Design phase. An alarm shall be generated and reported to the MOMS for all failed transactions, exceptions and errors.		
204	Failure of transmission of data to the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems shall result in the generation and transmission of alarm message to the MOMS.		
205	All messages shall be confirmed as received by the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems before they are flagged for purging or overwritten. In the event of a communication failure the messages shall be retained on the zone controller until successful transmission is complete and verified.		
206	The zone controller shall transmit all data to the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems, including but not limited to the following:		
	· all transaction messages generated in the lanes;		
	· all alarm and status messages generated in the lanes;		
	· all lane operational communication status messages and system health messages;		
	· all events generated in the lanes that are displayed on the Dashboard or are required at the Cashless Toll Concentrator or Toll Host System, and		
	· all events required by the DVAS for real-time review or playback.		
2.1.7.13	**Receiving Data**		
207	The zone controller shall support the E-ZPass Group TSL and other interoperable agency lists and shall have the capability to support every Agency and its assigned transponder number range as described in the E-ZPass Group specifications.		
208	The zone controller shall accept comprehensive (complete list once a day) and incremental (changes updated on a configurable interval, but not more frequently than every sixty (60) minutes) TSLs in accordance with the established Business Rules and shall activate the lists upon validation of the files.		

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209	The Contractor shall utilize data compression, encoding or other means to efficiently store and transmit the E-ZPass Group TSL and other interoperable agency lists, such that the new lists are available at the zone controllers within thirty (30) minutes of the Cashless Toll Concentrator, Toll Host Systems or facility server(s) receiving the new lists.		
210	If tolls are determined by the In-lane Systems, then the toll rates, toll schedules and the effective date/time shall be downloaded to the zone controller and new toll rates initiated when the toll rate structure changes.		
211	All configuration files and tables needed to support the lane operations shall be downloaded to the zone controllers from the Cashless Toll l Concentrator or Toll Host Systems or facility server(s) upon confirmed change or at scheduled intervals and activated as required. Versions of the configurable files on each zone controller shall be maintained, tracked, and recorded.		
212	All zone controller Software shall be downloaded to the zone controllers from the Cashless Toll l Concentrator or Toll Host Systems or facility server(s). Software versions on each zone controller shall be maintained, tracked, and recorded.		
213	The Cashless Tolling System shall provide checks to detect issues with the data it receives from the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems, including but not limited to:		
	· incorrect versions of the data received;		
	· corrupted data received, and		
	· missing files when a file was expected.		
214	An alarm shall be generated and reported to the MOMS for all exceptions/errors.		
2.1.7.14	**Monitor All Lane Equipment for Device Status**		
215	Each zone controller shall monitor the status and system health of its internal components and all associated in-lane Equipment. All Cashless Tolling Systems, including the AVI system, AVC system and the LPICPS shall be continuously polled for status. The health of digital devices that do not provide status shall be inferred from events (for example simple loops).		
216	The System shall generate a recovery message and restore the operational status of a device that recovers after reporting a failure. Recovery messages shall be recorded against the original work ordered through the MOMS and shall be available to Authorized Users. Recovery messages shall not cause the associated work order to close, but shall serve as supporting evidence of an Equipment recovery.		
217	If communications from the zone controller to the facility server (if provided) or Cashless Toll Concentrator or Toll Host Systems are unavailable, an alarm message shall be generated and reported to the MOMS.		
218	If communications to the image server(s) are unavailable, an alarm message shall be generated and reported to the MOMS.		
219	If a lane is operating in any mode other than normal open mode an Alert message shall be generated at configurable intervals and reported to the MOMS.		
2.1.7.15	**Diagnostics and Equipment Malfunction**		
220	The zone controller Software shall execute periodic diagnostic checks on internal processes, the in-lane Equipment and interfaces. Peripheral devices shall be interrogated for device status on a regular basis (configurable per device).		
221	A device's failure to respond to a status inquiry after a configurable number of retries shall be regarded by the zone controller Software as an Equipment failure.		
222	An alarm shall be generated and reported to the MOMS for all failures that are detected.		
223	Diagnostic checks shall be performed in all modes of lane operation. Results shall be stored in the appropriate zone controller's event log and easily accessible to technicians. The System shall include “sanity checks” for fault conditions and shall report any detection of such conditions to the MOMS.		
224	Degraded modes of operation shall be supported based on the Commission Business Rules developed during the Design process and Approved by the Commission. The Contractor shall ensure the Cashless Tolling System continues to operate with minimal loss of revenue or visible impact to the patron in the event that some components of the Cashless Tolling System fail and degraded mode operations occur.		
2.1.7.16	**Stand-alone Mode of Operation**		
225	The zone controller shall operate in a stand-alone mode for a minimum of thirty (30) days if communications to the Cashless Toll Concentrator or Toll Host Systems (if provided) and existing PTC systems are down. When operating in stand-alone mode, the last files downloaded to the zone controller from the Cashless Toll Host Systems shall be used for processing vehicles.		

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226	The zone controller shall have an available data port to permit onsite manual uploading of Software, TSL or other data required for continued operation until communications with the Cashless Toll Concentrator or Toll Host Systems (if provided) and existing PTC systems is re-established. Devices utilized to download the TSL and rate tables to the lanes shall have the capability of synchronizing current file versions such that a new TSL is updated on the device within an hour of receipt.		
227	The System shall provide the capability for Authorized Users to download transactions from the zone controller and to transfer such transactions to the Cashless Toll Concentrator or Toll Host Systems (if provided)or to the existing PTC Toll Host and CSC/VPC system.		
228	The System shall provide the capability for Authorized Users to download event/transaction data for manual and stand-alone playback of the DVAS.		
229	Upon re-establishing communications with the Cashless Toll Concentrator or Toll Host Systems (if provided) and existing PTC systems all back-logged messages, including manually transferred messages, shall be flagged and transmitted to the appropriate system without affecting the real time operations or degrading lane operations.		
230	Upon re-establishment of communications and successful transmission of all messages, a recovery message shall be generated and reported to the MOMS.		
2.1.8	**Digital Video Audit System (DVAS)**		
231	The Contractor shall provide a Digital Video Audit System (DVAS) that provides the Commission the capability to investigate lane performance issues and support the Commission in customer dispute resolution.		
232	The Contractor shall develop, procure, furnish and install two or more IP addressable, color video cameras as part of the DVAS at each toll zone sufficient to meet the requirements of this section. The cameras installed shall be the same at all Toll Zones.		
233	Authorized Users shall have the ability to individually setup, configure and control the cameras remotely through the application. Configurable settings shall be available on a per-camera basis to allow for tuning for site conditions.		
234	As part of the Design phase, the Contractor and the Commission shall determine the optimum location for the installation of the DVAS Equipment to allow for the complete monitoring of each toll lane.		
235	The location and number of cameras shall permit the capture of video that allows Authorized Users to identify the vehicle class and number of axles based on the ambient lighting conditions.		
236	The Contractor is responsible for the installation of the DVAS Equipment, including mounting Hardware to the designated structure (either toll gantry or separate mounting pole) as well as power and signal cabling between the DVAS Equipment and the storage media as described in *Attachment 2: Cashless Tolling Installation Responsibility Matrix* .		
237	The DVAS cameras shall have pan-tilt-zoom (PTZ) functionality that allows Authorized Users to remotely control each camera. When no PTZ commands are received within a configurable time the DVAS cameras shall revert to their default settings. Alarm messages shall be generated and reported to the MOMS when remote controls are activated or settings other than the defaults are detected.		
238	The Contractor shall provide the lighting requirements to the civil contractor during the Design phase, as needed to ensure that the quality of the video of each toll lane, based on ambient lighting and/or weather conditions, is sufficient to meet the requirements. The lighting requirements shall include but not limited to the minimum light levels required within the toll zone and the preferred placement or restrictions of light fixtures as to not interfere with the tolling equipment, either known based on design requirements or as coordinated with the civil designer and contractor in advance of installation. The Contractor shall be responsible to furnish and install toll zone specific lighting including sensors to control the lighting based on time of day or lighting conditions.		
239	The DVAS shall include all Equipment and Software necessary to provide the audit capability described herein, including but not limited to:		
	· digital cameras and any associated lenses, lighting and sensors;		
	· interfaces to the zone controllers to capture event data;		
	· storage media, and		
	· an application to view real-time video and events and playback the information.		
240	The continuous DVAS video stream and audit data shall be provided to the Cashless Tolling System independently of the transaction data stream; however, the DVAS shall be integrated into the System application and the video stream shall be linked to the transaction to meet the requirements specified in this section.		
241	The Contractor shall provide Authorized Users the ability to access to the DVAS through the Cashless Tolling System application using any device authorized by the Commission with access to the Commission System network.		

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242	The DVAS video and event data shall be available from the Dashboard to Maintenance staff when investigating anomalies.		
243	The DVAS solution for each tolling point shall provide continuous video coverage with the capability to monitor the overall configuration of the toll lanes with the ability to see each lane and the vehicle traveling that lane, and shall display detailed events for each lane as they occur in real-time.		
244	At a minimum the DVAS shall display the highway, plaza ID, lane number, transaction number, transaction date and time, transponder ID, transponder class and the AVC class. The DVAS video and data shall be accessible in read-only mode; no changes or alterations to the video or data shall be allowed.		
245	All detailed data obtained from various subsystems shall be available and shall be displayed to assist auditors and Maintenance staff with the investigation of discrepancies and problems. The DVAS shall perform and display video and data in real-time and shall have the ability to playback event data.		
246	The DVAS shall also have the capacity to record and store up to a minimum of twelve (12) months (configurable) of continuous video and data to an electronic media for each toll zone.		
247	DVAS video and the corresponding event and transaction data shall be saved together such that when the data is moved to a different environment outside the production environment, the video can be replayed with the corresponding event and transaction data as long as the DVAS replay Software is available.		
248	The health of the DVAS shall be displayed and monitored. Any problems or failures detected shall be reported to the MOMS.		
249	The DVAS shall be time synchronized to the same source as the zone controllers and shall interface to the zone controllers to obtain event data in accordance with the Approved ICD.		
250	The DVAS screens shall allow the Authorized User to obtain and sort the video/data events through various query criteria or configurable report templates finalized during the Design phase, including but not limited to:		
	· Plaza/Zone ID;		
	· lane ID;		
	· vehicle class;		
	· transaction time;		
	· payment type;		
	· transaction time range;		
	· alarm condition;		
	· class mismatch condition;		
	· unusual event conditions;		
	· transponder ID;		
	· transponder status;		
	· transponder class;		
	· vehicle height;		
	· vehicle speed;		
	· axle counts, and		
	· transaction number.		
251	Identification displayed on the screen shall allow the reviewers to clearly differentiate the lane under review and its associated event data. The data on the DVAS display for each vehicle shall include but not limited to:		
	· Plaza/Zone ID;		
	· lane ID;		
	· vehicle class;		
	· transaction date and time;		
	· alarm condition (if applicable);		
	· class mismatch condition (if applicable);;		
	· unusual event conditions (if applicable);;		
	· transponder ID;		
	· transponder status;		
	· transponder class;		
	· vehicle height;		
	· vehicle speed;		
	· axle counts, and		

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	· transaction number.		
252	The DVAS shall provide the capability to save the displayed contents of a screen (images and data) and electronically distribute such information as needed.		
253	Controls shall be provided to allow reviewers to step forward and backward through video data, by frame and to display the associated event data. All digitized video and corresponding event data shall be tightly synchronized and stored in accordance with these requirements.		
2.1.9	**Cashless Tolling Facility Server (Optional)**		
	The provision of a facility server is optional but if the Contractor's solution includes a facility server, then the requirements in this section shall be met. The Contractor has the option to use the facility server as an image server as long as the Design complies with the requirements of the Scope of Work.		
254	The Contractor shall provide one or more facility servers located at a tolling point if it is deemed necessary to meet the requirements specified in this Scope of Work. A facility server or set of servers can support multiple toll zones.		
255	The Contractor shall furnish and install a complete Hardware configuration for each facility server to support the redundancy and performance requirements of this Contract, including but not limited to:		
	· multiple processors;		
	· dual, redundant, hot-swappable power supplies;		
	· redundant storage devices; and		
	· backup library (using a media such as Cloud or Network Attached Storage (NAS) based backup that does not require storage devices such as backup tapes or CDs).		
256	The Hardware solution shall provide high-speed intra system network fabric between all storage, databases, servers, and backup systems.		
257	The facility server shall interface to the zone controller and shall serve as a store and forward server for transactions and messages.		
258	Each facility server shall communicate with the primary and secondary Cashless Toll Concentrator or existing PTC Toll Host.		
259	Each facility server shall be capable of storing transactions and images (if used as a local image server) from the in-lane subsystems for a period of minimum sixty (60) days, in the event of a communications failure.		
260	The facility server shall be capable of operating in a stand-alone mode for a minimum of sixty (60) days if communications to the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host are down. When operating in stand-alone mode, the last files downloaded from the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host shall be used for processing vehicles.		
261	The facility server shall have an available data port to permit onsite manual uploading of Software, TSL, or other pertinent data required for continued lane operation until communications with the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host are re-established. Devices utilized to download the TSL and rate tables (if applicable) to the facility server shall have the capability of synchronizing the current versions whereby a new TSL is updated on the device within an hour of receipt.		
262	The System shall provide the capability for Authorized Users to download transactions from the facility server and transfer such transactions to the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host.		
263	Upon re-establishing communications with the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host all back-logged messages, including manually transferred messages, shall be flagged and transmitted to the Cashless Toll Concentrator or Toll Host Systems (if provided) or existing PTC Toll Host without affecting the real time operations or degrading the lane operations.		
264	Upon re-establishment of communications and successful transmission of all messages, a recovery message shall be transmitted to the MOMS.		
265	Failure of any component of the facility server shall be detected and reported to the MOMS.		
2.1.10	**Roadway Pavement, Overhead Structures/Toll Gantries, and Toll Equipment Building Design Support**		
2.1.10.1	**General Design Requirements**		
266	At the tolling points the Contractor shall install the toll collection equipment on the infrastructure provided by the civil Contractor as identified further in *Attachment 2: Cashless Tolling Installation Responsibility Matrix* .		

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267	The Contractor shall work with the Commission, the civil designer and civil contractor on requirements for all civil construction work to be performed by others on the Project, including overhead platforms/toll gantries, toll equipment buildings, roadway/pavement, lighting requirements, power requirements and conduit relative to the aspects that integrate with the Design and installation of the Cashless Tolling System.		
268	During civil design, Contractor shall provide review, comment and approval of civil design drawings or similar within the context of the toll system functional and performance requirements. For documents containing less than fifty (50) pages, the Contractor shall review and provide comment on preliminary draft documents within ten (10) Business Days. For documents containing more than fifty (50) pages, the Contractor shall review and provide comment on preliminary draft documents within fifteen (15) Business Days. The Contractor shall review and provide comment on all final draft and final documents within ten (10) Business Days.		
269	The Contractor shall cooperate and provide support as needed to the civil Design and construction efforts. During civil design, Contractor support is anticipated to include responses to information requests for clarification on proposed designs.		
270	During construction, Contractor shall provide review and approval of civil Contractor shop drawings or similar within the context of the toll system functional and performance requirements.		
271	During installation, the Contractor shall provide verification and approval of toll system related elements that the civil Contractor is responsible for installing.		
272	Upon approval of shop drawings or similar design elements by the Contractor within the context of System function and performance, Contractor shall assume responsibility for those elements to the extent that if the civil work is installed as designed and does not meet the performance requirements of this Scope of Work, the Contractor shall be responsible for the costs of redesign, civil rework and additional Equipment costs as further set forth in the Contract.		
273	Contractor shall also coordinate, attend meetings and be available onsite as needed during the installation of the civil elements related to the Cashless Tolling System to ensure that the civil work is performed in accordance with the Contractor’s requirements.		
2.1.10.2	**Overhead Structures/Toll Gantries**		
274	The Contractor’s Equipment mounting and installation Design for any AVC overhead Equipment, AVI Equipment and LPICPS Equipment shall take into consideration its accessibility from the walkways on the overhead structure at the tolling points. The Design of the mounting structures and mounting arm shall allow technicians to replace Equipment and restore it to normal operations without additional tuning and without impacting performance.		
275	The Contractor’s cable routing Design shall include sufficient service loops to facilitate the retrieval of Equipment from the walkway providing sufficient retractable capability.		
276	The Contractor shall provide in-lane Equipment Design, installation specifications, structural requirements and drawings for mounting the Equipment to the overhead structures/toll gantries at each toll zone as it relates to the Contractor’s Equipment requirements to the civil contractor(s), including but not limited to Equipment mounting locations and installation instructions, mounting structure and mounting arms, conduit, cable separation and tie offs, required clearances, junction boxes, and electrical requirements, wind load, Equipment load and power calculations, as well as Contractor requirements related to special electrical grounding and isolated circuit integrity by Equipment.		
277	The Contractor shall also review and Approve all aspects of toll overhead structures/toll gantries design drawings submitted by the civil Contractors that are related to the toll system Equipment, including but not limited to, the items identified in the requirements above in this section.		
278	The Contractor shall be responsible for all necessary mounting Hardware required to install the toll Equipment on each overhead structure/toll gantry as specified in this Scope of Work and shall ensure installation is in compliance with Commission specifications.		
279	The Contractor’s Equipment installation Design shall have all overhead Equipment tethered to the platform structure at all times during installation and removal. The Equipment mounting devices shall also be tethered such that no loose bolts, nuts or pins shall fall into live traffic during Maintenance activities.		
280	The Contractor shall be responsible for all Equipment installations, terminations, and connections of Equipment located on the overhead structures/toll gantries and for connecting such Equipment to the electronics in the equipment racks within the toll equipment building.		
2.1.10.3	**Uninterruptible Power Supply (UPS)**		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	**Comments**
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281	All Cashless Tolling System Hardware and equipment shall be on UPS. The UPS will be supplied by the civil Contractor.		
282	The civil Contractor will furnish and install automatic transfer switch (ATS) and smart Power Distribution Units (PDUs) to manage the roadside power distribution.		
283	The Contractor shall furnish and install an electronic interface to the UPS to monitor the UPS performance. The MOMS shall detect the status of the UPS and Alert technicians when the System is on UPS.		
284	Software drivers shall be developed, furnished, and installed to acquire, display, store and report all parameters provided as outputs from the UPS.		
285	When the System is on the UPS and when it is off the UPS a notification shall be reported to the MOMS.		
2.1.10.4	**Toll Equipment Building**		
	A toll equipment building with UPS, backup generator and Heating, Ventilation and Air Conditioning (HVAC) will be provided by the civil Contractor at each tolling point indicated in *Attachment 1: Cashless Toll Zone Locations* . The emergency backup generators are contained in a separate room with outside access as shown in *Attachment 5: Concept Plan for Overhead Structure/Toll Gantries.*		
286	The toll equipment building shall house the Cashless Tolling System equipment racks provided by the Contractor.		
287	The Contractor shall provide the equipment rack space requirements to the civil Contractor for each toll equipment building at each tolling point.		
288	The Contractor shall install equipment racks within the toll equipment building in accordance with applicable Pennsylvania State building codes and Pennsylvania State DOT design standards, if and where applicable.		
289	The Contractor shall adhere to all specifications of the latest PennDOT Standard Specifications at time of construction unless the Contractor receives written notification by the Commission which overrides the Standard Specifications. The PennDOT Standard Specifications can be found at: http://www.dot.state.pa.us/Internet/Bureaus/pdDesign.nsf/ConstructionSpecs408and7?OpenForm		
290	At locations where tolling points are in close proximity to one another, a single toll equipment building with backup power generator will be used to support the toll Equipment requirements for multiple toll zones. At locations where a single toll equipment building is used for the Equipment at multiple toll zones, the Contractor shall procure, furnish, and install the interconnecting signal and power cables, and the necessary equipment racks and Equipment required for the multiple toll zones. The civil Contractor is responsible for the provision of power and the raceway. The Contractor shall ensure that the lane performance is not degraded at locations where a single toll equipment building is utilized for multiple toll zones and that cable lengths are within manufacturer specifications.		
291	The Contractor shall also review and Approve all aspects of the toll equipment building design drawings, power specifications, electrical and cabling design, circuit breaker and switches, and grounding design submitted by the civil designer and civil Contractors that are related to the Cashless Tolling System Equipment.		
292	The civil Contractors will install the conduits between the toll equipment building and the demarcation point on the overhead structures/toll gantries as shown in *Attachment 6: Installation Demarcation Diagram* . The Contractor shall procure, furnish and install any conduit required from the demarcation point to the Equipment and between the various components on the overhead structures/toll gantries.		
293	The Contractor shall procure, furnish, and install the cables necessary for terminating and connecting the Cashless Tolling System Equipment on the overhead structures/toll gantries to the electronics in the toll equipment building. Cable lengths shall include sufficient service loops to facilitate maintenance.		
294	The Commission is responsible for the WAN communications and the Commission will furnish and install networking equipment at the toll equipment building and test the communications to the network at the PTC Data Centers. The Commission shall make available a number of ports, as specified during the Design phase, to the Contractor to allow access to the Commission network through the Commission administered firewall. The Contractor shall be responsible for all LAN communications related to the Cashless Tolling In-lane System and the Cashless Toll System outside the Commission firewall as shown in *Attachment 3b: PTC Communications Network Responsibilities* .		
295	Each location will be allotted an IP v4 Class C range of addresses and all networking addressing will be coordinated with the Commission. LAN equipment shall be capable of supporting IPv6 addresses.		
2.1.10.5	**Roadway Pavement**		

Functional Requirements			
		Required Proposer Inputs	
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296	During the Design phase the Contractor shall provide the in-pavement sensor requirements to the civil designers and civil Contractors, if such sensors are to be used. Additionally, the Contractor shall review and approve the pavement Design, including roadway material to be utilized and construction methods to be used in the construction of the pavement.		
297	The Contractor is responsible for the Design and installation of all elements of the Cashless Tolling System that embedded into the pavement.		
298	The Contractor shall coordinate with the civil designer and civil Contractors for the installation of the sensors in the lanes and identify the pull boxes and conduits. The location and Design of the pull boxes shall minimize the impact of Maintenance activities on the affected lane.		
2.2	**Cashless Toll Concentrator or Toll Host System (Optional) Functional Requirements**		
	For this base Contract the existing PTC Toll Host will be the Host of record for traffic and financial reporting and a new Cashless Toll Host is not required but may provided to meet the requirements of this scope of work. The provision of a Cashless Toll Concentrator or Toll Host System (if provided) shall meet the requirements set forth in this section. The Contractor has the option to use the Concentrator or Toll Host System to meet any specified functionality as long as the Design complies with the requirements of the Scope of Work. The option of a fully functional Cashless Toll Host to replace the existing PTC Toll Host for reporting may be exercised by the PTC in the future as the open road cashless tolling systems is deployed throughout the entire system. Should the PTC exercise the option to implement a new full function Cashless Toll Host the additional requirements identified (if exercised) in section shall be met as applicable.		
2.2.1	**Cashless Toll Concentrator or Toll Host System (if provided) – General Requirements**		
299	The Contractor's central processing system architecture shall include a fully redundant highly available primary and secondary Cashless Toll Concentrator or Toll Host System that meets the functional and performance requirements of the Scope of Work and is accessible to Authorized Users of the Commission System network.		
300	The functions of the Central Image Servers (if provided) and the MOMS shall be part of the Cashless Toll Concentrator or Toll Host System.		
301	The cashless toll collection process shall be administered and controlled by the Cashless Toll Concentrator or Toll Host System provided by the Contractor.		
302	The Contractor shall work with the Commission to procure, furnish, and install all servers, storage and communications Hardware needed to support the Software that meets the Commission Cashless Tolling System requirements. While choosing the Cashless Toll Concentrator or Toll Host System Hardware and third-party Software, the Contractor shall consider the staged implementation of the Cashless Tolling System in order to ensure the products are supported for the entire duration of the PTC Cashless Tolling Project.		
303	The primary Cashless Toll Concentrator or Toll Host System shall be installed in the PTC Data Center , a different physical location in the vicinity of the PTC Data Center, or a privately hosted Cloud location Approved by the Commission. The secondary solution can be hosted anywhere within the contiguous United States or an Approved, privately hosted, Cloud location. All infrastructure required to support the servers, including but not limited to UPS, air conditioning, security and backup generators shall be the responsibility of the Contractor. The primary and secondary Cashless Toll Concentrator or Toll Host System configuration shall meet the Commission resiliency and Business Continuity plans.		
304	The secondary Cashless Toll Concentrator or Toll Host System shall be configured as a "hot stand-by" in an active-active state to allow continuous operations in the event of a failure of the primary Cashless Toll Concentrator or Toll Host System.		
305	The secondary Cashless Toll Concentrator or Toll Host System environment shall mirror the primary system in all Hardware and Software configurations, be kept up to date and be capable of performing all functions of the primary Cashless Toll Concentrator or Toll Host System as described in this Scope of Work.		
306	All Hardware and third-party Software procured under this Scope of Work shall be confirmed to be the latest model or version at the time of purchase and shall be Approved by the Commission.		
307	All servers and Hardware procured, furnished, and installed under this Contract shall have current anti-virus, firewall, spam protection and other security Software that protects from virus attacks and unauthorized access. All such third-party products shall meet the Commission IT security requirements described in *Attachment 7: PTC Cashless Tolling Security Standards.*		

Functional Requirements			
		Required Proposer Inputs	
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308	The System shall detect intrusion attempts and prevent all unauthorized access and intrusions at all levels and report such events to the MOMS. Any intrusion, compromise or breach must be reported to Commission IT Security with 12 hours of detection.		
309	The Commission shall be notified in writing within 24 hours of the earliest indication or report of a breach or unintended disclosure of confidential information or a system that supports it. If requested by the Commission, or if required by law, the vendor shall notify in writing all persons affected by the incident, at its own cost and expense. The Commission shall have the right to view all incident response evidence, reports, communications, and related materials upon request.		
310	Virus protection and other Software shall automatically obtain updates according to a recommended (configurable) Maintenance schedule and report such events to the MOMS.		
311	Redundancy shall be built into the System to support high availability requirements defined in table II-2.		
312	The Cashless Toll Concentrator or Toll Host System shall support the following general functions:		
	· communicate with all the zone controllers in receiving transaction, alarm and other messages and transmitting TSLs, UIL and VEL (if exercised);		
	· communicate with facility servers (if provided) in receiving transaction, alarm and other messages and transmitting TSLs, UIL and VEL (if exercised);		
	· communicate with the applicable image server(s) for tracking and reconciliation image transmission and transfer status;		
	· provide Dashboards to assist Maintenance and supervisory staff observation of transaction and event data in real-time, including reviewing DVAS image/video, images and data through these screens;		
	· provide the capability to remotely operate the cashless tolling lanes through real time screens;		
	· interface with the existing PTC Toll Host system to transmit transaction details and alarms;		
	· interface with the existing CSC/VPC system to transmit transactions and toll rates and receive TSL and VEL (if exercised);		
	· perform Maintenance management functions of the System, including alarm notification and tracking, Equipment inventory, Maintenance history and other Maintenance related functions, incorporated into the MOMS;		
	· provide an independent audit of successful receipt of all transactions from the zone controllers to the Cashless Toll Host Concentrator;		
	· provide the capability to manage toll rate/toll schedule and transmit the toll rates/toll schedules to the zone controllers and the existing CSC/VPC system;		
	· provide the capability to obtain employee information defined in the Design phase such as employee ID, role and access privileges from Active Directory and, if required, to transmit the (UIL to the zone controllers;		
	· provide various management reports that assess the operational performance of the System, and		
	· provide transaction reconciliation reports as determined by the Commission during Design.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional system functions:		
313	Provide the capability to import detailed and summarized data from the existing PTC Toll Host for historical reporting purposes.		
314	Interface with SAP for the transmission of monthly toll transaction GL files and GL files received from the CSC.		
315	Provide the capability to manage toll rate/toll schedule and transmit the toll rates/toll schedules to the zone controllers and the existing CSC/VPC system.		
316	Interface with the existing CSC/VPC system to transmit transactions and toll rates and receive TSL and VEL (if exercised).		
2.2.2	**Cashless Toll Concentrator or Toll Host System (if provided) Hardware and Third-party Products**		
317	The Work under this section shall include all labor, materials, and support Services to complete the Design; fabrication; assembly; integration; packaging; delivery; testing, and Acceptance of the primary Cashless Toll Concentrator or Host System Hardware and third-party Software in accordance with the requirements of this Scope of Work.		
318	The Commission shall have ownership of all Hardware, third-party Software and firmware procured, developed, furnished, and installed as part of the Cashless Toll Concentrator.		

Functional Requirements

No.	Requirements	Required Proposer Inputs	
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319	The Contractor is responsible for obtaining all required licenses in the name of the Commission. All licenses and media shall be provided to the Commission for all Hardware, third-party Software and firmware. The Contractor shall retain authorized copies (backups) for all Software media to use for periodic system Maintenance, upgrades, or restore, as required.		
320	The Contractor shall furnish and install a complete, fully redundant, Cashless Toll Concentrator or Toll Host System Hardware configuration needed to support the redundancy and performance requirements of this Contract, including but not limited to:		
	· multi-processors		
	· dual, redundant, hot-swappable power supplies;		
	· storage devices, and		
	· storage devices, backup library.		
321	The Cashless Toll Concentrator or Toll Host Hardware solution shall provide high-speed intra system network fabric between all storage, databases, servers, and backup systems.		
322	The System Design and Implementation shall ensure the Cashless Tolling System continues to operate without data loss even if any unit of the server configuration fails.		
323	All components, supplies, Software and materials furnished under this Contract shall be new, commercial off-the-shelf (COTS) and field proven, and in revenue operations for two (2) years.		
324	The Cashless Toll Concentrator or Toll Host System server configuration, including all major Hardware elements, shall be of the latest design and incorporate standard commercial products currently in production.		
325	All components procured, furnished, and installed by the Contractor should have the capability of sourcing from multiple Suppliers. The intent is to increase compatibility and reduce maintainability problems.		
326	Proof of purchase in the form of dated invoice and shipping bills shall be retained and furnished to the Commission in accordance with the requirements of this Scope of Work and Contract for all hardware purchased by the Contractor.		
327	The Cashless Toll Concentrator or Toll Host System Hardware shall have a minimum manufacturer warranty for five (5) years.		
328	The Cashless Toll Concentrator or Toll Host System Hardware shall be supported for the duration of the Contract after the date of Operational and Acceptance Test Acceptance. During the life of the Contract the Contractor is responsible for ensuring the system is operational in accordance with the performance requirements.		
329	The Contractor shall use proven server configurations that support future upgrades to processors, memory, storage, operating system, database, and other system components. All third-party Hardware and Software and Contractor Software shall be hardware neutral and shall perform without intervention on any hardware platform.		
330	The System architecture shall have expansion capability to support a ten (10) year growth in traffic volumes in its installed Hardware which includes support of video tolling at the tolling points. For the purposes of calculation, an average E-ZPass penetration of seventy (70) percent and video transaction rate of thirty (30) percent, with ranges from 60-85% E-ZPass depending on locations throughout the system shall be assumed for the tolling point. The following traffic volumes are provided as projections for planning purposes only and subject to change. The projected Average Annual Daily Traffic (AADT) for the various tolling locations identified in this Scope of Work can be found in *Attachment 13 -Annual Traffic Volumes* .		
331	The operating system for the Cashless Toll Concentrator or Toll Host System servers shall be a proven system used widely throughout the United States for intensive database operations and shall be compatible with the Relational Database Management System (RDBMS) and other tools employed.		
332	The operating system for the Cashless Toll Concentrator or Host System servers shall be a multi-user, multi-tasking operating system.		
333	The operating system shall support the redundant Cashless Toll Concentrator or Toll Host System server architecture and all peripherals defined in these specifications.		
334	The operating system shall also support the proposed communications topology, redundant Cashless Toll Concentrator or Toll Host System configuration and Contractor's application Software.		
335	The Contractor shall warranty the operating system for a minimum of five (5) years from the date of Operational and Acceptance Test Acceptance.		
336	The operating system shall have a future upgrade path and shall be supported for the term of the Contract.		
337	The Contractor shall provide and maintain supported versions of the operating system for the term of the Contract and all upgrades of the Cashless Tolling System operating system shall be the Contractor responsibility.		

Functional Requirements

No.	Requirements	Required Proposer Inputs	
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338	The Contractor shall keep all Software instances throughout all environments at the same configuration and patch level.		
339	The Contractor shall provide a highly reliable and secure RDBMS for the storage of images, video, transaction data, violation data, audit data, and all other data, as applicable, for the retention period specified in the Scope of Work.		
340	Contractor shall provide the latest version of the RDBMS that is field-proven to operate in a transaction intensive environment and shall meet the standards as defined in *Attachment 11: Database Standards for the Pennsylvania Turnpike Commission,* where applicable.		
341	The RDBMS shall be compatible with the operating system and application Software, and shall support the redundant Cashless Toll Concentrator or Toll Host System server architecture and shall meet the standards as defined in *Attachment 11: Database Standards for the Pennsylvania Turnpike Commission,* where applicable.		
342	The RDBMS shall have an upgrade path and shall support upgrades to operating system, application, memory, processors, and other components.		
343	The RDBMS shall have Maintenance and Upgrade Services for the term of the Contract.		
344	The Contractor shall provide and maintain supported versions of the RDBMS for the term of the Contract and shall be responsible for upgrading the Cashless Tolling System RDBMS to the latest supported version.		
2.2.2.1	**Central Image Server (Optional)**		
	The provision for a central image server is optional; however, Contractor's image processing solution shall meet the functional and performance requirements of the Scope of Work. The Design shall support latency in the transfer of images to the existing CSC/VPC system and prevent loss of images and video transactions if there are communications or server issues. If the Contractor's solution includes the provision for a central image server, then the central image server shall be located at a Commission Approved location.		
345	The image processing solution shall support, but not be limited to the following general functions:		
	· communicate with all the in-lane LPICPS for the transmission, tracking, reconciliation and processing of all vehicle images and video transactions;		
	· communicate with facility servers (if provided) for the transmission, tracking, reconciliation and processing of all vehicle images and video transactions;		
	· interface with Cashless Toll Concentrator or Toll Host System for the processing and reconciliation of all vehicles images and video transactions;		
	· interface with existing CSC/VPC system for the processing and reconciliation of all vehicles images and video transactions;		
	· support the transfer of images and video transaction to the existing CSC/VPC system without loss of any image or video transaction, and		
	· provide reconciliation reports as determined by the Commission during Design.		
2.2.2.2	**System and Data Backup**		
346	During the installation of the Cashless Toll Concentrator or Toll Host servers, the Contractor shall create an image of the completed server configurations, as well as maintain regular local and remote backups. If there is a catastrophic failure that results in the loss of data, means shall be provided to reconfigure the servers without disruption to Cashless Toll Concentrator or Toll Host System operations.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional system backup functions:		
347	The Cashless Toll Host System shall include data backup software and hardware that allows remote incremental and full back up of data without manual intervention. Events from the backup software and status notifications from the backup process shall be reported to the MOMS.		
348	The backup software shall be capable of displaying the backup data in a user-friendly and readable form as defined during the Design phase.		
349	The Contractor shall provide a solution for data backup storage locally and off-site.		
2.2.2.3	**Archive and Purge Control Mechanisms**		
350	Provide the capability for fully automated and configurable data purging in accordance with the Commission's data retention requirements as defined in *Attachment 8A: PTC Records Management Manual, Attachment 8B: PTC Records Retention Schedule* and during the Design phase.		
351	Purge routines shall be configurable for each impacted data elements, including but not limited to:		
	· transaction data;		
	· System logs;		

Functional Requirements			
		Required Proposer Inputs	
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	· MOMS data, and		
	· interface files.		
352	Servers shall retain transaction and summarized data, images, MOMS data and system logs, in accordance with the retention procedures, including but not limited to:		
	· Cashless toll transactions shall be retained online for a minimum of twenty four (24) months and then purged;		
	· compressed images associated with class mismatch transactions shall be retained online for a minimum of ninety (90) days;		
	· video transactions and images (compressed video transaction image and region of interest{if implemented}) online for a minimum of one (1) year;		
	· DVAS video shall be retained online in accordance with the requirements of this Scope of Work;		
	· system logs shall be retained online on the System for at least one (1) year and then purged;		
	· All security logs shall be retained online for at least one (1) year and then purged;		
	· MOMS detailed data shall be retained online for a minimum duration to ensure MTBF requirements are being met or at least twenty-four (24) months, whichever is greater;		
	· MOMS summary data shall be retained online for the term of the Contract, and		
	· all other data shall be retained on the System for ninety (90) days and then purged.		
353	Status and other events from the archival process shall be reported to the MOMS. No transactions shall be deleted unless confirmed to be successfully transmitted to the existing PTC systems (PTC Toll Host and CSC/VPC).		
354	Authorized Users shall be able to report on restored data.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional archive and purge functions:		
355	Archive toll collection related data shall be retained for the life of the Contract with archived data transferred to the PTC at completion of the Contract. Details of archiving methods and handover process to be detailed in Design phase.		
356	Summarized data shall be retained online for the term of the Contract.		
357	Compressed images associated with class mismatch transactions shall be retained online for a minimum of ninety (90) days and then archived and purged.		
358	Video transactions and images (compressed video transaction image and region of interest{if implemented}) online for a minimum of six (6) months and then archived and purged.		
359	Storage shall be sized to accommodate all data to be retained online as specified in this Scope of Work and for the restoration of selected archived data (two months minimum).		
2.2.2.4	**Maintenance Access and Application Access**		
360	The Cashless Toll Concentrator or Toll Host Systems applications shall run on existing workstations and laptops and Commission Authorized Users shall use their workstations/laptops to access the System. The Contractor is not required to procure, furnish, and install Commission workstations/laptops as part of the Cashless Toll Concentrator or Toll Host System.		
2.2.2.5	**Maintenance Access**		
361	The Contractor shall procure, furnish, and install the required laptops, keyboards, video monitors, mouse(s), and KVM switches at the In-lane and Cashless Toll Concentrator or Toll Host Systems locations to allow the Contractor technical staff to access all servers, controllers, computers, and devices in order to perform diagnostics and other Maintenance activities.		
362	All maintenance hardware and software installed on the In-lane and Concentrator or Toll Host Systems shall comply with Commission security requirements defined in *Attachment 7: PTC Cashless Tolling Security Standards.*		
2.2.2.6	**Commission Access**		
363	Any Commission authorized workstation/laptop connected to the Commission System network shall be able to access to the System application.		
2.2.2.7	**Printers**		
364	The Commission shall have the ability to print to any printer connected to the Commission System network. The Contractor is not required to procure, furnish, and install any printers for the Commission as part of the Cashless Toll System.		
2.2.2.8	**Communications Equipment**		

Functional Requirements

		Required Proposer Inputs	
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365	The LAN within a toll equipment building shall be connected by CAT6 (or higher) cabling and the LAN between Site toll equipment buildings shall be fiber. The WAN connectivity between the toll equipment buildings at each Cashless Toll Site and PTC Data Centers shall be provided by others. The Contractor shall be responsible for providing and obtaining the connectivity from any primary or secondary Cashless Toll Concentrator or Toll Host (if provided) locations to the PTC Data Center.		
366	The Cashless System at the toll zones shall be connected and communicate to the primary and secondary Cashless Toll Concentrator or Toll Host (if provided) System and the existing CSC/VPC system.		
367	The Contractor shall procure, furnish and install all required Tier 1 communication Equipment at the toll equipment building to support the Cashless System LAN. All LAN communications Equipment procured, furnished, and installed under this Contract shall be able to communicate with the Commission firewall and router.		
368	The Commission is responsible for providing a WAN demarcation point (Ethernet hand off) at each Cashless Toll Site. The Contractor shall work with Commission IT staff to make the necessary connections and validate the connectivity between the Cashless Toll Site Systems and the Cashless Toll Concentrator or Toll Host (if provided) Systems. The LAN equipment at a Cashless Toll Site, its configuration, and the connection of the LAN equipment to the WAN demarcation point as shown in *Attachment 3b: PTC Communications Network Responsibilities* shall be the responsibility of the Contractor. Network addressing and connectivity will be coordinated with Commission IT staff.		
369	The Commission is responsible for providing a demarcation point (Ethernet hand off) in the Commission's Data Center to the primary Cashless Toll Concentrator or Toll Host (if provided) System site. The Contractor shall work with Commission IT staff to make the necessary connections and validate the connectivity between the PTC Data Center and the Cashless Toll Concentrator or Toll Host System site. The LAN equipment at the primary Cashless Toll Concentrator or Toll Host System site, its configuration, and connection to the demarcation point as shown in *Attachment 3b: PTC Communications Network Responsibilities* shall be the responsibility of the Contractor. Network addressing and connectivity will be coordinated with Commission IT staff.		
370	The Contractor may install the secondary Cashless Toll Concentrator or Toll Host Systems at a Contractor location within the contiguous states of the United States as Approved by the Commission. The secondary Cashless Toll Concentrator or Toll Host System can be housed in a Commission Approved privately hosted Cloud site. The Contractor is responsible for securing the connectivity from such secondary location to the PTC Data Center. If a cloud environment is desired, the Contractor must work with the Commission to determine appropriate architecture and security measures.		
371	The Contractor shall work with the Commission in designing the interfaces between the Cashless Toll Concentrator or Toll Host (if provided) System, the existing CSC/VPC system, the existing PTC Toll Host system.		
372	The Contractor shall work with PTC in designing the interfaces between the In-Lane Systems, the existing PTC Toll Host and the existing CSC/VPC system.		
373	The Contractor shall be responsible to procure and establish any public Internet domains and/or services to provide connectivity between the Toll lanes, Toll Zone Plaza servers and the Cashless Toll Host outside the PTC firewall and the user workstations inside the PTC firewall. Public domain names procured for the Cashless Tolling project shall be approved by the PTC.		
374	Network monitoring Software shall be procured, furnished, and installed on the MOMS server to monitor the System LAN status and communications, including the connections to the existing PTC Toll Host system, the In-lane Systems, and the CSC/VPC system. All network alarms shall be reported to the MOMS.		
375	If communications to any element of the Cashless Tolling System is degraded or down an alarm shall be generated and reported to the MOMS.		
2.2.3	**Cashless Toll Concentrator or Toll Host System Software (if provided)**		
	The Cashless Toll Concentrator or Toll Host System Software (if provided) shall support the functionality detailed in this section and shall meet the Commission operational requirements set forth in this Scope of Work and Contract for the Term of the Contract.		
2.2.3.1	**Data Communications and Interface Requirements**		
376	All transactions, images and messages transferred between all subsystems shall be guaranteed and have the required data validation Protocols to confirm the accuracy and validity of data transfer.		
	The Cashless Toll Concentrator or Toll Host System shall support the interfaces specified in this Scope of Work including, but not limited to:		

Functional Requirements			
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377	· Interface to the zone controllers: If the Contractor's solution does not include a facility server, the Cashless Toll Concentrator or Toll Host System shall receive and store all the messages from the zone controllers in real-time. It shall transmit all data required by the zone controllers to support its operation, including the UIL and TSL. All data sent to and received from each zone controller and the Cashless Toll Concentrator or Toll Host System shall be acknowledged and confirmed.		
	· the VEL shall be transmitted from the Cashless Toll Concentrator or Toll Host System to the In-lane System to support on-site enforcement (if exercised).		
	· Interface to the facility servers (if provided): If the Contractor's solution includes a facility server, the Cashless Toll Concentrator or Toll Host System shall have the capability to transmit all data to and receive data from the facility servers as required in this Scope of Work to support lane operations. All data sent to and received from each facility server at the Cashless Toll Concentrator or Toll Host System shall be acknowledged and confirmed.		
	· Interface to the existing PTC Toll Host system: The Cashless Toll Concentrator or Toll Host System shall have the capability to transmit detailed transactions and alarms to the existing PTC Toll Host system in batch mode (at configurable intervals/transactions) in accordance with the Approved ICD developed during the Design phase interface workshops described in Section 5.3.3.		
	· Interface to the existing CSC/VPC system: The Cashless Toll Concentrator or Toll Host System shall have the capability to transmit AVI Video transactions and images to the existing CSC/VPC system in real time and in batch mode (at configurable intervals/transactions) in accordance with the Approved ICD developed during the Design phase interface workshops described in Section 5.3.3.		
	· Interface to the image server(s): The Cashless Toll Concentrator or Toll Host System shall track and reconcile image transmission and transfer status.		
	· Interface to the MOMS: The Cashless Toll Concentrator or Toll Host System shall interface with the MOMS to transmit alarms and Cashless Toll Concentrator or Toll Host System operational status including recovery messages.		
	· Interface between the MOMS and the current Commission diagnostic monitoring system, based on the Approved ICD developed during the Design phase interface workshops described in Section 5.5.3.		
378	The Cashless Toll Concentrator or Toll Host System shall receive a comprehensive TSL from the existing CSC/VPC system once a day and incremental TSL/updates not more frequently than every sixty (60) minutes (configurable).		
379	Toll rate tables shall be transmitted to the CSC/VPC when rate changes are initiated on the Cashless Toll Concentrator or Toll Host System. shall have the ability to receive toll rate files from the existing PTC Toll Host.		
380	Interface to SAP: The Cashless Toll Host System (if exercised) shall transmit monthly toll transaction, account, and other GL files received from the CSC/VPC system. Interface to SAP shall be further defined during the Design phase.		
2.2.3.2	**Version Tracking Requirements**		
381	The Cashless Toll Concentrator or Toll Host System shall maintain records of the last 20 versions of the TSL, toll rates tables, VEL (if exercised), UIL, and lane configuration files that it received and/or created and that were successfully downloaded to the lanes. Receipt of files from the existing CSC/VPC system, their version, time of receipt and processing status shall also be tracked.		
382	Reports and screens shall be made available to verify the versions and the file download status. Failure in the transmission of any data to a lane shall result in a failure message being logged and reported to the MOMS.		
383	The system shall provide the capability to track the versions of lane executable programs installed at each toll zone location.		
2.2.3.3	**Transaction Audit and Verification**		
384	The Cashless Tolling System shall have the capability to perform an independent audit that confirms all vehicles traveling through a toll zone are detected, as well as an automatic audit and verification process that confirms all vehicles traveling through the toll lane are reported as transactions; all transaction transmissions between the zone controller and Cashless Toll Concentrator or Toll Host System are successful. The System shall have screens and reports to validate the audit trail.		
385	If the validation process fails for any reason, failure messages shall be created and reported to the MOMS. If the audit process determines that vehicles or transactions are missing, the missing information shall be identified and reported to the MOMS.		
386	If the audit process is successful then the audit for the location for the Revenue Day shall be deemed "complete" and System shall track this status of the audit on reports.		

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387	Once the Revenue Day is “complete” the data reported for that day should not change. Any condition for example toll waiving that result in changes to the data shall be identified and Authorized Users alerted.		
2.2.3.4	**Data Summarization**		
388	During the Design process and based on Commission Business Rules and reporting requirements, the system shall perform data summarization.		
2.2.3.5	**Diagnostics**		
389	The Cashless Toll Concentrator or Toll Host System shall provide self-diagnosis functions to detect and report on the status and functioning of the Cashless Toll Concentrator or Toll Host System Hardware devices; third party Software; communications; processes; tasks, and Software applications, as defined in the Commission Approved Design Document.		
390	All Hardware and Software failures detected shall be reported to the MOMS.		
2.2.3.6	**Data Security**		
391	The Contractor shall ensure that any transactional data records, once entered into the System, cannot be deleted or changed.		
392	Data records and files shall only be appended to and not edited or deleted as determined by the Commission during the Design phase.		
393	All System access/entry, logins, and modifications (for example, flagging actions) shall be recorded and unauthorized access shall be prevented, logged and reported to Commission IT Security within 12 hours of detection.		
2.2.3.7	**Transaction Pre-processing**		
394	The Cashless Toll Concentrator or Toll Host System shall ensure all transactions transmitted to the existing PTC Toll Host and existing CSC/VPC system comply with the ICD specifications and Commission Business Rules.		
395	The Cashless Toll Concentrator shall identify exceptions, anomalies and other conditions determined during the Design phase in the event they have not been filtered at the zone controller, for example, same transponder read within configurable conditions.		
396	In scenarios where multiple transponders with valid status are reported, all transponders can be transmitted to the existing CSC/VPC system via the existing PTC Toll Host and the existing CSC/VPC will post the transaction in accordance with Commission Business Rules.		
397	Alarm messages shall be created and reported to the MOMS in the event such exceptions identified in this section exceed a configurable threshold.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional transaction pre-processing functions:		
398	The Cashless Toll Host System shall pre-process all transactions in accordance with the Approved Business Rules in order to filter incorrect transactions that may result from Equipment failures and lane logic issues.		
399	Transactions that should not be processed further at the PTC Host and existing CSC/VPC system shall be identified and flagged prior to transmission and then transmitted to the PTC Host and existing CSC/VPC system as defined during the Design phase.		
400	In cases where there is a Transponder read data and a video transaction created for a vehicle (in case of Buffered Transponder Reads or lane logic issues) the Cashless Toll Host System shall identify the transaction that needs to be terminated based upon configurable parameters Approved during the Design phase. In case of Buffered Transponder Read transactions, the Transponder read time shall be used as the transaction time.		
401	Based on the results of the pre-processing, an Exception List shall be generated and transmitted to the PTC Host and existing CSC/VPC system in accordance with the Approved ICD that identifies video transactions that needs to be terminated at the existing CSC/VPC system and further processing on these transactions stopped.		
2.2.4	**Cashless Toll Concentrator or Toll Host (if provided) System Application Software**		
402	The Contractor shall develop, furnish, and install a single, role-based, GUI application Software for the Cashless System that supports all user functions for the Cashless Toll Concentrator or Toll Host System, including the MOMS and DVAS.		
403	Based on the user’s access privileges obtained from Active Directory the appropriate menus, screens, tabs, reports and other system functionality shall be made available.		
404	Changes to the System data and parameters shall be through screens and only Authorized Users shall have access to these screens.		

Functional Requirements			
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405	All access to the application and changes to the data shall be recorded and tracked, and the System shall provide an audit trail for all data modifications and parameter changes.		
406	Authorized Users shall have access to the data modifications and parameter changes initiated by users.		
2.2.4.1	**Graphical User Interface (GUI) Requirements**		
	The GUI design must include accepted industry design standards for ease of readability, understanding and appropriate use of menu-driven operations, user customization and intuitive operation.		
407	The Contractor shall meet all Commission IT Security standards and practices in the design of the GUI for the Cashless Toll Concentrator or Toll Host application.		
408	All components of the client GUI, including but not limited to browsers, Java, Adobe Flash Player, etc., shall be able to be patched/updated to the latest security level recommended by the component's manufacturer.		
409	The GUI design and development shall incorporate human factors and usability engineering and be optimized for speed, as well as provide the following controls, including but not limited to:		
	· menus (such as pull down, popup, cascading, leveling, etc.);		
	· windows (allowing for multiple windows within the application, such as to navigate back without having to re-enter information)		
	· informational messages;		
	· positive feedback;		
	· exception handling and error dialogs, including logging the error;		
	· control icons, links and action buttons;		
	· data entry fields, combo boxes, check boxes;		
	· display (read-only) fields, and		
	· general and context-specific help menus.		
410	Data entry screens shall have configurable mandatory fields that require data entry prior to continuing through the process.		
411	Provide field-level validation (server-side enforced) and format verification upon exiting data fields applicable to pre-defined formats or standards, including but not limited to:		
	· alpha-numeric;		
	· date;		
	· time;		
	· special characters;		
	· length;		
	· lane and plaza ID, and		
	· Transponder numbers.		
412	Provide other formatting masks (server-side enforced) as configured by the System administrator (visible to certain users but masked for other users), which can be applied to any other field in the GUI.		
413	Provide field-level "tooltips" or other interactive help, Configurable by the System administrator, that provide specific guidance on any field presented, including but not limited to:		
	· alpha-numeric fields;		
	· date fields;		
	· time fields;		
	· special characters;		
	· username and password;		
	· length restrictions;		
	· lane and plaza ID, and		
	· Transponder fields.		
414	Online help shall be provided for each screen, each editable field and each selectable option within each screen.		
2.2.4.2	**Screens and Report Access**		
415	Provide the capability to assign users access privileges to System reports based on user level/role, as determined by the Commission during the Design phase, to the Cashless Tolling System application.		
416	Provide the capability to assign read-only rights to roles so that users belonging to that role will not be allowed to enter any data.		
417	Provide the capability for Authorized Users to maintain roles and permission access to the System.		
2.2.4.3	**Cashless Tolling System Screens and Reports**		

Functional Requirements			
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418	All data entered or generated in the System shall be retrievable (on-demand and scheduled) through reports and screens.		
419	Reports menu shall be organized by category of reports and shall be intuitive to users and easily accessible based on user access.		
420	Data shall be summarized to improve report generation performance and to track changes in data for as-of-date reporting.		
421	Reports and screens available through the System shall have various selection, group by, and sort criteria, and shall be easily configurable.		
422	The location selection criteria shall include but not be limited to District, Highway, tolling point, lane, and direction of travel to be defined during the Design phase.		
423	Provide the capability to generate the same report by hour, day, date range, weekly, monthly, quarterly, yearly (fiscal and calendar), year-to-date and comparative.		
424	Provide the capability to present report data as an accumulation or individually for the selected criteria. This capability shall be configurable and applicable to District, Highway, Cashless Toll Plaza, and different transaction types whereby the user can choose the data to be presented as an accumulation of, for example grouped by all Cashless Toll Plazas and/or payment types or as individual Cashless Toll Plazas and/or payment types.		
425	Reports developed shall allow the Commission to audit and reconcile data transmitted between various subsystems within the Cashless Tolling System, and with the PTC Toll Host system and existing CSC/VPC system in accordance with this Scope of Work.		
426	All reports shall show the status of the validation/audit process, as defined by the Commission and other relevant statuses that indicate items, including but not limited to whether:		
	· all data has been obtained from the lanes;		
	· the data has been re-summarized;		
	· the transactions have been transmitted to the existing PTC Toll Host and existing CSC/VPC system, and		
	· the report is complete.		
427	The time of the last transaction processed shall be included in all applicable reports to assist with the reconciliation and audit.		
428	All reports shall include individual totals, sub-totals, and grand-totals as appropriate.		
429	Reports shall have the capability to select the date type, including but not limited to:		
	· revenue date;		
	· transmission date;		
	· as-of date;		
	· process date;		
	· transaction date, or		
	· a combination thereof, as designated by the Commission.		
430	Reports shall use conditional formatting to identify exceptions and data that are outside the normal trend.		
431	Provide reporting output in various formats (both compressed and uncompressed), including but not limited to:		
	· Portable Document Format (PDF);		
	· plain text format (TXT);		
	· rich text format (RTF);		
	· Microsoft Excel (2010 version and later);		
	· delimiter-separated values;		
	· hypertext markup language (HTML), and		
	· extensible markup language (XML).		
432	A report generation feature shall be available for configuration and shall permit Authorized Users to request selected reports for auto delivery by email or to a designated server according to a routine or custom interval, such as the start of the Business Day or at other appropriate times as designated or requested by the user as determined in the Design phase.		
433	Data from summary reports scheduled to run daily shall be automatically exported daily to a specified file format and made available on the Commission designated server as defined during the Design phase.		
434	Capability shall be provided to drill down all high-level reports to the next level of detail and to event level details as required as defined in the Design phase.		

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435	Authorized Users shall have the capability to display and review the LPICPS images and DVAS video and event details associated with the selected transaction from the drilled down details.		
436	Authorized Users shall have the capability to view the contents of files that are received by the Cashless Toll Concentrator or Toll Host System (if provided) and transmitted by the Cashless Toll Concentrator or Toll Host System in a readable format. If files are compressed or encrypted, the necessary Software tools shall be provided to view their contents. If the user selects a specific file, the contents of the file shall be displayed and the user shall have the ability to save the contents at minimum as a .csv file, xml, txt and in a useable Excel format as Approved.		
437	Capability shall be provided to present data in graph forms and chart types and the user shall be able to select presentation form from a variety of graphic styles.		
438	Data shall be organized and summarized in a manner to allow for report generation within no more than two (2) seconds for daily reports, and no more than twenty (20) seconds for monthly and annual reports, of a report generation request.		
439	The Contractor shall support the creation of additional reports and/or the modification of implemented reports, as needed after the initial deployment and implementation of the System. . It is anticipated that no more than one hundred (100) additional reports will be required for the term of the Contract.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional screen and report functions:		
440	Provide ad-hoc reporting tool capabilities to Authorized Users to allow the creation and execution of custom reports, including but not limited to:		
	· drag-and-drop field functionality;		
	· drill down functionality;		
	· filtering;		
	· parameter prompting;		
	· formula support;		
	· grouping;		
	· sorting, and		
	· stored procedure and function support.		
441	The ad-hoc reporting tool shall be COTS software and be the latest version at the time of Acceptance testing and field-		
442	The ad-hoc software shall be compatible with operating system standards and shall be patched and upgradeable to new		
443	Ad-hoc report templates created by Authorized Users shall be saved and made available to all Authorized Users.		
444	Once the audit process is completed and Revenue Day is closed, the data on reports for the day shall not change unless data is re-summarized.		
2.2.4.4	**Cashless Tolling Reports**		
445	The Cashless Tolling System shall provide reports to audit and reconcile the System, provide traffic and revenue trends, and validate System performance and perform historical reporting on detailed and summarized data imported from the existing PTC Toll Host.		
446	Report Designs and templates shall be presented by the Contractor and reviewed by the Commission during the Design phase and Approved.		
Transaction Reports			
447	Transaction Summary Reports: These reports show daily, weekly, monthly, quarterly, yearly, and comparative transaction and revenue, by vehicle class and payment type. Transaction and revenue reports shall be summarized and detailed. The summary data shall drill down to the Transaction Detail Report.		
448	Transaction Detail Report: The transaction details shall be provided in this report including lane status, equipment status, transaction status and various lane flags. Users shall be able to access the bit descriptions in all cases where information is coded. The report shall be used to investigate discrepancies and issues.		
449	Class Report: This report shows information related to traffic and revenue by vehicle class by transaction types, for example E-ZPass, Video and Non-Revenue This report is used by management and operations to report on traffic and revenue by vehicle class.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional functions and transaction and revenue reports:		
450	Accounting Revenue and Associate Traffic Report: This report shows accounting revenue and traffic counts by Revenue Dates for the vehicle class categories.		

Functional Requirements			
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451	Executive Summary Traffic and Revenue Report: This report shows daily traffic counts and revenue amounts by revenue category, for example E-ZPass and Video by vehicle class category, grouped by shift, selected day totals, previous day totals, percentage of increase/decrease and month to selected day totals. This report is used to show the increase and/or decrease in traffic counts and revenue compared to the previous days' totals using the breakdown by revenue types. Data in this report shall also be represented graphically to include selected day traffic and revenue statistics; daily revenue and traffic comparisons by vehicle class and revenue type including selected day; previous day; month to selected day average and prior week day. Backup of the summary data by District and tolling point shall be included.		
452	Finance Traffic and Revenue Details Report: This report shows traffic and revenue counts by tolling point and is grouped by vehicle class categories for the specified highway(s) selected. This report provides operations and management with traffic and revenue totals for each tolling point by vehicle class categories for a specified date range.		
453	Traffic and Revenue Report: This report shows transaction by transaction type, for example E-ZPass, Video and Non-Revenue for tolling points in each District for the selected highway(s). The data is grouped by vehicle class categories and tolling point. A summary is provided at the end of the report by vehicle class category and transaction type.		
454	Traffic and Revenue Comparison Report: This report shall provide a comparison of current year monthly traffic and revenue data with the previous year with percentage increase/decrease and includes selected highway(s) by district and tolling point. Similar to the traffic and revenue report above, the report includes a breakdown by vehicle class category. The report is further divided into sub-groups by revenue category, for example E-ZPass and Video.		
Traffic Reports			
455	Average Lane Throughput Report: This report shall display hourly traffic volumes for each lane grouped for each tolling point within the selected District. Hourly traffic volumes shall be totaled by lane for the day for each tolling point to calculate the average lane throughput at each tolling point.		
456	Counts and Percentages Report: This report shall display vehicle counts and percentages of each count grouped by vehicle class category and vehicle class for each revenue category for example E-ZPass and Video for each tolling point. This is a daily report and is grouped by tolling point for the selected highway(s) and district. This report shall drill down to the Counts and Percentages by Direction Report.		
457	Counts and Percentages by Direction Report: This report shall display vehicle counts and percentages of each count grouped by vehicle class category and vehicle class for each revenue category for example E-ZPass and Video for each tolling point. This is a daily report and is grouped by tolling point and direction for the selected highway(s) and district.		
458	Lane Traffic Counts and Statistics Reports: This report shall provide AM and PM traffic counts and statistics by hour for each Highway and tolling point by revenue category for example E-ZPass and Video. The report shall also include AM and PM peak hour statistics and provide a grand total by revenue category for all peak hour. The total percentage of E-ZPass transactions with the AM/PM breakdown and identification on the E-ZPass high hour and lane shall be included.		
459	Plaza By Lane Report: This report shows traffic counts by lane for each tolling point by vehicle class categories and vehicle classes. This report includes the summary by tolling point for the selected District. This report is used by operations staff in analyzing traffic volumes by lane and vehicle class.		
460	Speed Reports: This report shows the traffic count information per lane by speed segments. This report is used by operations staff to monitor traffic flows and speeds.		
461	Traffic Counts Report: This report shows traffic count information grouped by revenue category for example E-ZPass and Video with breakdown by transaction types and sub-totaled by tolling point and vehicle class categories. The combined counts include a breakdown by revenue and nonrevenue transactions. This report shall drill down to the Traffic Counts by Direction Report.		
462	Traffic Counts by Direction Report: This report shows traffic count information grouped by c revenue category for example E-ZPass and Video with breakdown by transaction types and sub-totaled by tolling point, direction and vehicle class categories. The combined counts include a breakdown by revenue and nonrevenue transactions.		
463	Vehicle Count Through Closed Lanes Report: This report shall display tolling point, lane and detailed transaction information for vehicles that travel through a closed lane based on the date range, tolling point and lane.		

Functional Requirements			
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464	Vehicles and Mileage Report: This report shows traffic counts for all vehicle classes in addition to vehicle class category for each revenue category between tolling points and total distance traveled for the selected criteria. The report includes a summary page with traffic between tolling points and total miles traveled. Each summary shall be grouped by vehicle class category and revenue category, for example E-ZPass and Video.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional functions and traffic reports:		
465	Finance Traffic Details Report: This report shall display traffic counts grouped by tolling point and vehicle class category and include grand totals for each vehicle class category		
466	Market Penetration Report: This report shows traffic counts by revenue category, for example E-ZPass and Video for AM/PM peak hours and includes the E-ZPass penetration percentage.		
System Audit Reports			
467	Transaction Audit Report: This report shows the status of the transaction transmission from the zone controllers to the cashless tolling concentrator, the audit status, the failed transactions, duplicate transactions, all exceptions, and missing transaction sequence numbers at each of the tolling points. The communication status between the zone controllers to all of the subsystems shall be displayed. The report shall also include the date the transactions were received at the Cashless Toll Concentrator and the days lagging. It also shows the transmission status of the transactions to the existing PTC Toll Host system with the date/time of the transmission was completed.		
468	System Audit Trail Reports: Weekly and monthly reports shall be made available that show the modifications made by the users to system parameters and ability shall be provided to obtain the details of the modifications.		
469	System Exceptions Report: The System Exceptions report shall display transactions that are considered exceptions, including but not limited to duplicate transactions; dual transponders; Cashless Toll Concentrator filtered transactions and non-interoperable transponder reads. Exception handling errors and the disposition of these exceptions shall also be displayed along with the transaction.		
470	Image Reconciliation Report: The Image Reconciliation report shall provide the ability to match transactions by type to images and to help identify missing images. These reports shall not only reconcile the actual images saved to what was expected but also verify that the images were successfully transmitted from the lanes to the image server(s) and on to the CSC/VPC system. Data on this report shall match other transactions summary reports. This report shall drill down to the Image Reconciliation Detail Report.		
471	Image Reconciliation Detail Report: This operational report list the information on the video transaction for a user defined transaction date/time range. Capability shall be provided to show only records where an image is expected and if the image is expected if the image has arrived yet. The report also shows the transmission status of the images to the CSC/VPC system.		
472	Transactions Reconciliation Reports: Yearly, quarterly, monthly, weekly, and daily reports that show AVI and video transaction transmission reconciliation for all of the tolling points. These reports shall validate that all of the AVI and video transactions received from the lanes were posted to the Cashless Toll Concentrator System and transmitted to the existing PTC Toll Host system. Reports shall be available by transaction day and transmit day, and transmit day reports shall show the files transmitted and acknowledged by the receiving system.		
473	Hardware Status Report: This report shows the Hardware status codes and descriptions based on the selected date range, Highway, District, Plaza, Lane and type of Hardware failure. This report allows maintenance staff to audit the state of all Hardware components in the lanes.		
474	Transaction Number Gap Report: This report shall provide information on gaps in transaction numbers based on tolling point and lane for the specified date range.		
475	Unusual Occurrence Report: This report shall be used to provide operations and maintenance staff with information regarding unusual occurrences with lane data to identify potential Hardware issues, Software issues or other system anomalies. The report shall include the Highway(s), and tolling point and may be filtered by unusual occurrence (UO) code. This report includes lane number, transactions date and time, lane status transaction number and a description of the UO.		
476	Lane Operations Report: This operational report lists and summarizes vehicle transactions and equipment messages that are generated in the lanes. This report is an audit tool that presents all lane activity for a specified location and desired transaction date and time period. Numerous selection and filter criteria shall be provided to help identify problems. Detailed information regarding the transaction and event shall be included.		
477	Transponder Audit Report: This report verifies that transponders are properly read at each cashless tolling location		
Performance Reports			

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	Comments
No.	Requirements	Existing (E) - Met by current system, no modifications required Modification (M) - Modifications needed to meet requirement Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs To Be Developed (D) - Not in current system, but will be developed Not Provided (N**) - Will not be provided - requires explanation	If "Status of Functionality = N" then Proposer must provide an Explanation in this Column
478	Transponder Status List Transmission Report: The TSL Transmission report shows the status of the TSL transmissions to the Cashless Toll Concentrator or Toll Host System and to all of the zone controllers. Summary information related to the number of transponders, time acknowledged by the zone controller and other data shall be provided to verify results and performance requirements. Time of receipt from the existing CSC/VPC system, time of transmission to the zone controllers and the status of the transmission shall be displayed. Lanes not compliant to the requirements shall be identified.		
479	Image Transmission Summary Report: This operational report counts the number of images created in the lanes for a user defined image created date range and other criteria. Data displayed include the number of triggered, non-triggered and total images from the lanes and the date the images were received at the image server(s). For each received date, the total images, number of lag days, the percentage of transactions received each day and a cumulative percentage shall be included.		
480	Image Transmission Detail Report: This operational report lists information on images from the lanes for a user defined lane created date. Capability shall be included to show image records where it took longer than a user defined number of hours for the image to arrive at the image server(s).		
481	File Transfer Performance: This operational report lists files that have been created and sent from the Cashless Toll Concentrator or Toll Host System by component for either the created date range or sent date range selected by the user. Information displayed include, file information, created date and time, sent date and time and process time. This report verifies System compliance to performance requirements. File/data transmissions to the lanes shall include confirmation of successful delivery at each lane.		
482	OCR/ALPR Performance Report (if the option to implement OCR/ALPR is exercised): The OCR/ALPR Performance Report shall display OCR/ALPR performance statistics by jurisdiction. Problematic cashless tolling lanes, Plazas and jurisdictions shall be identified. The report shall include a breakdown of the OCR/ALPR performance by confidence levels.		
2.2.4.5	**Cashless Tolling Dashboards**		
483	The Contractor shall provide Dashboards developed during the Design phase to monitor the cashless tolling system. The Dashboards shall include but not be limited to real-time monitoring of tolling point traffic, maintenance data and system performance monitoring.		
484	The Contractor shall provide the capability for Authorized Users to monitor the real-time activity at all tolling points in a pictorial and Dashboard view. There shall be an overview representation of all the highways from which individual highways can be accessed.		
485	The Contractor shall provide Authorized Users the capability to view real time DVAS video and also playback recorded video via the Dashboard. The event data pertaining to the vehicle in the video shall be displayed on the video.		
486	Authorized Users shall have access to the detailed data directly from the pictorial and Dashboard view.		
487	Authorized Users shall have the capability to drill down to each lane to review and monitor detailed events as they occur for each transaction.		
488	Authorized Users shall be able to easily maneuver through screens and view data, and different colors and pictures shall be used to bring critical events to the user's attention.		
489	Summary data by payment type for all Commission toll facilities and by tolling point shall be displayed and users shall have the ability to drill down to the details. If a specific tolling point is selected, transaction and event level data by lane shall be made available and users shall have the ability to view the DVAS real-time video and video transaction images through this screen.		
490	All priority 1 alarms shall be displayed in color and shall be audible to direct attention to the failure.		
491	Authorized Users shall be able to easily identify problems (traffic or Equipment) on the cashless tolling lanes and initiate MOMS work order from this interface.		
492	In addition, the Dashboard shall provide detailed real-time information about the AVI system performance (including handshakes by protocol), the AVC system performance, and the LPICPS performance to assist in diagnosing and investigating problems. Data pertinent to traffic monitoring and Maintenance shall be displayed in real-time.		
2.2.4.6	**Remote Operations**		
493	The System shall provide the ability to allow Authorized Users to remotely operate the cashless tolling lanes to support the Commission operations, including but not limited to:		
	· remote update of security patches and Software updates;		

Functional Requirements			
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	· download TSL, VEL (if exercised), and any files required to selected zone controllers when there are issues, and		
	· restart a specific zone controller node.		
2.2.4.7	**User Setup and Maintenance Screen**		
	User setup and maintenance is a critical task since the employee access levels/roles created through the System determines what privileges and access rights each employee is granted.		
494	Access to the zone controllers and Cashless Toll Concentrator or Toll Host System including the MOMS and DVAS functions shall be controlled through the user setup interface.		
495	The user list shall be obtained from the Commission Active Directory maintained by Commission IT or from an Approved source at regular intervals as defined during the Design phase.		
496	An operations alert shall be generated each time a new user is detected so that their user roles can added and access to the System defined.		
497	Authorized Users shall have the capability to also create new users through the System.		
498	Through a user setup and maintenance screen, the users shall be designated various access levels/roles based on their responsibilities (job description).		
499	In the Design phase access levels/roles shall be created and the System shall allow the input and editing of generic job access levels/roles.		
500	The access rights of each role and the ability to add roles and users shall be defined by the Commission during the Design phase.		
501	The user setup and maintenance screen shall be also used to activate and inactivate employees and also terminate them from the System.		
502	The same screen shall also be used to assign and update User ID and PIN/password for access to applications.		
503	Passwords assigned to employees and the password management process shall meet current Commission policy standards.		
504	As soon as the information is saved, the UIL shall be transmitted in near real-time to the various Systems for immediate user access.		
2.2.4.8	**Toll Rates and Schedule (if Toll Host exercised)**		
505	The System shall provide Authorized Users the capability to create and manage toll rates and schedules.		
506	At a minimum, capability shall be provided to establish toll rates based on Highway, tolling point, vehicle class, and payment type and shall support time of day and holiday toll rates as defined during the Design phase.		
507	The assignment of tolls shall be assigned based on the final Design and shall be assessed using the toll rates and schedules established for each tolling point for barrier type locations such as DRB and Gateway.		
508	The assignment of tolls shall be assigned based on the final Design and shall be assessed based on a completed trip that would be built based on the number of gantries the customer passed under while traveling on the Mainline and/or Northeastern Extension (if exercised).		
509	Authorized Users shall have the capability to pre-establish the effective date/time the toll rates will be enabled. The System shall permit the Commission to schedule toll rates and changes in toll schedules in advance of the new rates becoming effective.		
510	Authorized Users shall have the capability to establish a default toll rate to be used in the event of data unavailability or other conditions as determined by the Commission that would warrant the use of the default toll rate.		
511	The System shall record and track the toll rate ID and toll schedule ID and their transmission status for audit purposes.		
2.2.4.9	**Configurable Parameters**		
	All parameters changes shall be Approved by the Commission in accordance with the Commission Engineering Change Order (ECO) Process.		
512	The System shall provide the capability for Authorized Users to modify the configurable System parameters.		
513	Any change shall result in the creation of a new configurable parameter set and each change shall be identified by a unique identifier.		
514	Changes to configurable parameters can be scheduled to take effect immediately or at a scheduled time as determined by the user.		
515	The System shall record and track all changes to configurable parameters for audit purposes.		
516	When a new parameter takes effect, a notification shall be generated and reported to the MOMS.		
2.2.4.10	**Zone Controller Executable Download**		

Functional Requirements			
		Required Proposer Inputs	
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	All Software changes shall be Approved by the Commission in accordance with the Commission Engineering Change Order Process.		
517	The System shall have the capability to download zone controller executable files and all other files required by the lane for its operations. All Software updates shall be coordinated with the Commission.		
518	Successful download of the files shall be verified and alarm messages generated if any file was not received by any zone controllers.		
519	Where possible, once the Commission has Approved a Software release, all System application updates shall be automated requiring no action by Maintenance personnel.		
2.2.5	**General Requirements for Interfaces**		
	The Contractor is responsible for working with the Commission and the existing Contractors in Designing, developing, documenting, testing and implementing all required interfaces. Electronic interfaces are required to provide connectivity between the existing PTC Systems (PTC Toll Host and CSC/VPC), the Cashless Toll Concentrator or Toll Host System (if provided) and In-lane Systems. The Contractor shall be responsible for developing the ICDs, and where changes to existing ICDs are required, these documents shall be modified by the Contractor as part of this Scope of Work based on the Contractor solution during the Design phase. The ICDs shall include requirements for data format and transmission, criteria for acknowledgement and validation of transmitted data and procedures for recording and reconciliation, as appropriate for each interface. It is expected that the latest version of the ICDs will be implemented at go-live and that the Contractor shall continue to update the ICDs as appropriate for the life of the Contract.		
520	Provide electronic automated interfaces to the existing systems in accordance with these requirements.		
521	Provide for guaranteed transmission of data for all interfaces.		
522	Provide for one hundred (100) percent reconciliation of the transmitted data and files.		
523	Provide the capability for Authorized Users to access and view the contents of files, including compressed or encrypted files, which are received and transmitted by the Cashless Toll Concentrator or Toll Host System (if provided) in a readable format. Authorized Users shall have the capability to save the contents of such files.		
524	Provide the capability for real-time alerting to the MOMS of interface and data transmission failures, including but not limited to:		
	· MOMS Dashboard for managing and monitoring interfaces;		
	· workflow user interface for managing and monitoring steps within each interface;		
	· status and history of executions;		
	· comprehensive scheduling of file transmissions;		
	· comprehensive reporting for inbound and outbound transmissions;		
	· tight integration with the MOMS and notification of failed transmissions;		
	· notification of file transmission and receipt status, and		
	· capability to manually execute a failed transmission.		
525	The Contractor shall utilize secure Protocols Approved by the Commission for the transfer of data and/or files via interfaces defined during the Design phase.		
526	Provide the capability to transmit and receive multiple files during each scheduled batch.		
527	Provide the capability to transmit and receive multiple files in a day.		
528	Utilize file naming conventions that prevent the overwrite of data and/or files. For example, include the date and time of transmission and provide for unique identifiers.		
529	Utilize file handling and processing methods that provide a complete log of the data and/or file transfer process. For example, files that are successfully processed are moved to a processed folder.		
530	Validate records and identify errors in the received data and/or files, including but not limited to:		
	· mandatory fields;		
	· data formats;		
	· data validity (such as tolling points and lane numbers);		
	· duplicate records;		
	· unexpected response;		
	· checksum/record count verification and		
	· incorrect status.		
531	Provide the capability to correct and re-transmit data and/or files.		

Functional Requirements			
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532	Provide the capability to process re-transmitted data and/or files automatically or manually by Authorized Users as determined during the Design phase.		
533	Provide the capability to transmit the error details to the transmitting entity, as well as record it in the MOMS.		
534	Provide the ability to identify missing records/transactions/images and request the transmission of such missing records/transactions/images.		
535	Reconcile the transmitted records to the records received and accepted by the receiving entity.		
536	Provide the means to identify interface issues by validating the file transmission process, including but not limited to:		
	· creation and transmission of data and/or a file at the scheduled time, even if there are no records to transmit;		
	· determination if the data and/or a file was transmitted or received at the scheduled time;		
	· creation of alerts to the MOMS if data and/or a file was not created or received at the scheduled time;		
	· creation of alerts to the MOMS if received data and/or a file was not acknowledged;		
	· creation of alerts to the MOMS if records in the received data and/or file had errors when processed;		
	· provide details in real-time to the MOMS of each failed record and		
	· creation of alerts to the MOMS when a response has not been received for individual records within the expected duration.		
537	Provide data and/or file transmission and reconciliation reports as described in these requirements.		
538	Provide a Dashboard that tracks the progress of data and/or file transmissions through each stage and their acknowledgements by the receiving entity, including but not limited to:		
	· transactions eligible for transmission;		
	· file and/or data created with file name;		
	· file and/or data transmitted;		
	· file and/or data received;		
	· file and/or data accepted;		
	· file and /or data rejected;		
	· file and/or data re-transmitted;		
	· number of records in the file and/or data set and		
	· number of failed records.		
539	Provide the capability for Authorized Users to configure the relevant parameters related to file and/or data transmission for each interface.		
540	Monitor the disk capacity where files and/or data are deposited and send an alert to the MOMS and interfaces entities (if applicable) if folders are near capacity (configurable) or full.		
541	Provide the capability to automatically archive successfully processed data and/or files after a configurable number of days.		
542	Provide the data to reconcile file transmissions.		
543	Conform to any existing ICDs, including any updates required at the time of Design and develop all new ICDs that have been identified as "to be developed". It is the Contractor's responsibility to ensure all ICDs (including existing) are accurate, updated and meet the requirements of the Scope of Work before developing the interfaces.		
2.2.5.1	**Cashless Toll Host System to SAP Interface (if exercised)**		
544	The Contractor shall design and develop an interface from the Cashless Toll Host System (if exercised) to SAP to transfer financial files received from the existing CSC/VPC system.		
545	The Contractor shall provide the capability to validate that the received files were successfully transmitted to SAP.		
2.2.5.2	**Cashless Toll Concentrator or Toll Host (if provided) System Interface to the Existing PTC CSC/VPC System**		
546	The Contractor shall design and develop an interface from the Cashless Toll Host System to the existing CSC/VPC system to transmit receive and acknowledge one hundred (100) percent of all transactional and financial data in accordance with the Approved ICD developed during the Design phase.		
547	The interface shall be capable of transmitting AVI transactions, Exception List, and Non-Revenue License Plate List and toll rates to the existing CSC/VPC system.		
548	The interface shall be capable of receiving TSL and VEL (if option is exercised) files from the existing CSC/VPC system.		
549	The Contractor shall provide the capability to positively acknowledge (ACK) message receipt, negatively acknowledge or reject a message (NACK) and reconcile data transmissions to/from the Cashless Toll Concentrator or Toll Host System.		

Functional Requirements			
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	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional functions and data feeds:		
550	The Cashless Toll Host (if exercised) shall interface shall be capable of receiving the following financial data from the existing CSC/VPC system for transfer including but not limited to:		
	· monthly GL data feeds sent from the CSC/VPC;		
	· monthly CSC surety files, and		
	· monthly CSC tag and account files.		
2.2.5.3	**Cashless Toll Systems Interfaces to the Existing PTC Toll Host Systems**		
551	The Contractor shall design and develop an interface from the Cashless Tolling Host System to the existing PTC Toll Host system to transmit one hundred (100) percent of all transaction in accordance with the ICD to be developed for this interface during Design.		
552	The interface shall be capable of transmitting the following data including but not limited to:		
	· transaction records and		
	· alarms.		
553	The Contractor shall provide the capability to reconcile the successful transmission of the summary data to the existing PTC Toll Host system.		
2.2.5.4	**Cashless Toll Concentrator or Toll Host (if provided) System to Facility Server Interface**		
	The provision of a facility server is optional but if the Contractor's solution includes a facility server, then the requirements in this section shall be met.		
554	The Contractor shall design and develop an interface from the Cashless Toll Host System to the facility Servers (if applicable) to transmit, receive and acknowledge one hundred (100) percent of all data in accordance with the Approved ICD.		
555	The interface shall be capable of sending TSL, VEL (if option is exercised), configuration files, Software updates and toll rates (if applicable) to the facility servers.		
556	The interface shall be capable of receiving all transactions, alarms and event messages from the facility servers.		
557	The Contractor shall provide the capability to reconcile the successful transmission and receipt of all data at the Cashless Toll Concentrator or Toll Host System.		
2.2.5.5	**Cashless Toll Concentrator or Toll Host (if provided) System to Zone Controller Interface**		
558	The Contractor shall design and develop an interface from the Cashless Toll Host System to the zone controllers to transmit and acknowledge one hundred (100) percent of all data in accordance with the Approved ICD.		
559	The interface shall be capable of sending TSL, VEL (if option is exercised), configurations files, Software updates and toll rates (if applicable) to the zone controller.		
560	The interface shall be capable of receiving all transactions, alarms and event messages from the zone controller.		
561	The Contractor shall provide the capability to reconcile the successful transmission and receipt of all data at the Cashless Toll Concentrator or Toll Host System.		
2.2.5.6	**Image Server to Cashless Toll Concentrator or Toll Host System (if provided) Interface**		
	Reconciliation of images to the video transactions and the status of the transfer of images and video transactions shall be maintained and reported at the Cashless Toll Concentrator or Toll Host System.		
562	The Contractor shall design and develop an interface from the image server(s) to the Cashless Toll Concentrator or Toll Host System to transmit and track the status of the capture of images by the In-lane Systems for each video transaction and the subsequent transfer of images and video transactions to the existing CSC/VPC system.		
563	The interface shall be capable of sending image reconciliation and transfer status data to the Cashless Toll Concentrator or Toll Host System.		
564	The Contractor shall provide the capability to reconcile the successful transmission and receipt of all images and video transactions at the existing CSC/VPC system.		
2.2.6	**Maintenance Online Management System (MOMS)**		
	There shall be a Maintenance Online Management System (MOMS) that supports the Cashless Tolling System Maintenance activities and Maintenance operations.		
2.2.6.1	**Maintenance Online Management System (MOMS) – General Requirements**		
565	Provide a MOMS that supports Maintenance operations for all Software and Hardware provided under this Contract.		
	Provide a MOMS that monitors, alerts and generates work orders in real-time for all processes, including but not limited to:		
	· communications issues;		

Functional Requirements			
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566	· file transmission issues;		
	· data exceptions;		
	· Hardware issues;		
	· Software issues or failures;		
	· database issues;		
	· issues with jobs, processes or data flows;		
	· low storage space for each subsystem (configurable thresholds);		
	· CPU utilization (configurable thresholds);		
	· CPU load (configurable thresholds);		
	· file system mounts (if applicable), and		
	· disk IOs.		
567	Provide a MOMS that monitors, alerts and tracks in real-time unusual activity triggered by users and systems, including but not limited to:		
	· video transactions above threshold;		
	· flushed transactions above threshold, and		
	· other anomalies in daily toll operations.		
568	Provide a MOMS that includes but is not limited to the following:		
	· receiving and monitoring status messages of all system Hardware and Software;		
	· receiving and transmitting alarm and status messages from the current Commission monitoring system;		
	· is capable of local work order manual entry or email entry by Authorized Users;		
	· storing data in a relational database to allow for data recovery and flexibility in reporting the raw data (including via Ad-hoc reporting);		
	· tracking device failures and service requests;		
	· assigning priorities and actions to events;		
	· notifying (automatically) Maintenance personnel via reports, text and email;		
	· assigning work orders to Maintenance personnel;		
	· reassigning (manually) work orders to other Maintenance personnel;		
	· escalating (automatically) work orders to other Maintenance personnel;		
	· recording time of acknowledgement by Maintenance personnel;		
	· recording time of acknowledgement by all subsequently assigned Maintenance personnel;		
	· recording time of repair;		
	· recording time of Equipment and process recovery;		
	· recording completion of service calls;		
	· providing automatic alert for work orders not closed out in specified time;		
	· maintaining and tracking Repair Maintenance Activity;		
	· accepting and updating work orders via smart phones entries via secure communications;		
	· tracking all system application Software components and Hardware via an asset management module;		
	· role-based security;		
	· containing an automatic system exception reporting for all processes that are not running;		
	· containing an automatic system workflow exception reporting for all items that are not processing correctly or are hung in the system, and		
	· providing hard copy reports on device failures and trouble resolution status.		
569	Provide a MOMS that supports maintenance functions, including but not limited to:		
	· automatic system job/workflow/queue exception reporting and alerting for all elements that are not processing correctly or are hung in the system;		
	· issuing electronic notifications via email or text to Maintenance staff when problems are detected;		
	· prioritization of failures and alerts that is configurable and alert Authorized Users when configurations are changed;		
	· for the calculation of response times, repair times, and down time from the data entered by the Maintenance staff and automatically generated by the system, and		
	· scheduling of preventive Maintenance through the MOMS that generates automatic work orders at the scheduled times.		
	Provide a MOMS that supports asset management, including but not limited to:		

Functional Requirements			
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570	· tracking of all system Hardware and Software items to the subassembly level;		
	· tracking of all system Hardware and Software locations;		
	· tracking of all system Hardware and Software versions;		
	· tracking of all Maintenance and service agreements;		
	· maintains a list of vendors from where products were procured;		
	· associates the original purchase order number to the individual item;		
	· associates the original vendor number to the individual item;		
	· associates all warranty information to the individual item;		
	· provides an alert prior to warranty expiration, and		
	· provides automatic alert for spare parts levels.		
571	The MOMS will record all configuration data, and will be versioned after each system component change, including application of system patches.		
572	Provide the capability for Authorized Users to access the MOMS screen through the single Cashless Toll Concentrator or Toll Host (if provided) System GUI.		
573	Capability shall be provided to configure the priority level of each alarm and assign and change the escalation attributes.		
574	Provide the capability to configure the initiation of a notification in the MOMS when an alarm is generated.		
575	Authorized Users shall have the capability to indicate if an alarm should result in the generation of a work order and if an alarm should be considered in performance reporting.		
576	Provide the capability to generate (on-demand and scheduled) daily, weekly and monthly performance reports as determined by the Commission during Design.		
577	Provide the capability to generate operational, management and performance reports from the MOMS that include but are not limited to:		
	· summarized and detailed alarm history;		
	· Maintenance paging and response history;		
	· work order status and tracking;		
	· Equipment inventory and tracking to the subassembly level;		
	· Equipment availability;		
	· preventive Maintenance;		
	· pervasive Maintenance;		
	· corrective Maintenance;		
	· response and repair times for each of the priorities and level of Maintenance;		
	· Equipment use history;		
	· Equipment repair history;		
	· total system availability;		
	· sub-system availability for the In-lane Systems and Cashless Toll Concentrator or Toll Host System (if provided);		
	· Equipment versions, Software versions, firmware versions and serial numbers for all Equipment installed under this Scope of Work;		
	· incident logs and lost revenue estimates;		
	· Mean Time Between Failures (MTBF) for the preceding and current Maintenance periods and cumulative;		
	· performance reports detailing compliance to the performance requirements;		
	· detailed list of parts replaced as a result of Maintenance actions, with an identification of warranty versus non-warranty replacement;		
	· status of removed parts and Equipment with an aging status for parts under repair or replacement (serial numbers, being repaired in Maintenance shop, purchase replacement part);		
	· performance reports;		
	· an exceptions report summarizing all unusual or significant occurrences during the period;		
	· trend analysis for repetitive failure;		
	· status of spare parts inventory, and		
	· staffing report detailing positions, staff hours worked and performance.		
578	When spare parts inventory is reduced to a configurable threshold quantity, automatic reorder alerts shall be generated.		

Functional Requirements			
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579	Provide a MOMS that has the ability to receive information (success or failure), including but not limited to:		
	· backup;		
	· time synchronization;		
	· synchronization of primary and secondary systems;		
	· Software updates and		
	· file downloads.		
580	In order to ensure that all tolling points are functional, all systems are operational, all the processes are working and file transfers are successful, Authorized Users shall have access to the MOMS screens. Capability shall be provided to verify the status of tolling point operations, the System and various file transfers, including the files transmitted and received from the existing PTC Toll Host system.		
581	Tolling point and System status shall be shown in a pictorial view with the capability to drill down to the device causing the alert and its associated error logs.		
582	The MOMS screen shall show if required files were transmitted to all the lanes, the existing PTC Toll Host system and the existing CSC/VPC System.		
583	In case of TSL and toll rate tables, the version in use shall be listed.		
584	Authorized Users shall have the capability to re-initiate download in the event transmissions were not successful, for example toll rate tables.		
585	Screens shall be available that show all the alarms generated by the various systems and subsystems, including the operating system and the database.		
586	Failure of all devices, processes, programs, and scheduled tasks shall be forwarded to the MOMS screen that is accessible to authorized staff.		
587	Various events and error logs shall be provided for each program that shall assist the system administrator to investigate problems.		
2.2.6.2	**System Health Monitoring Software**		
588	Provide System health monitoring Software that includes but is not limited to:		
	· tight integration with the MOMS;		
	· Hardware and network health monitoring;		
	· a dashboard that graphically displays component's health;		
	· comprehensive log reporting capabilities, and		
	· integration with existing Commission monitoring Software.		
2.2.6.3	**Time Synchronization**		
589	The Cashless Toll Concentrator or Toll Host (if provided) server shall be synchronized to a certified source Approved by the Commission using the standard network time protocol (NTP) at configurable intervals, but at a minimum of every five (5) minutes.		
590	The zone controllers, AVI systems, AVC systems, LPICPS, image server(s), OCR/ALPR server (if the option to implement OCR/ALPR is exercised), DVAS, and other servers needed to support the requirements of this Scope of Work shall be synchronized to the Cashless Toll Concentrator or Toll Host server or the Approved certified source.		
591	If needed, synchronization messages shall be sent to devices that do not support off-the-shelf time synchronization Software.		
592	All servers and controllers shall have a primary and secondary source for synchronizing time.		
593	The time synchronization technique shall ensure that duplicate or incorrect transaction times are not possible.		
594	The Cashless Toll System shall have the capability to handle daylight saving time changes.		
2.3	**Test Site**		
595	The Contractor shall install and setup a dedicated test site at a Contractor Provided, Commission Approved location. that shall be available for testing software and hardware changes or options exercised including those for AVI alternatives or upgrades for the term of the Contract. The test site shall have the full suite of Equipment and Systems as an operational tolling point, and test transactions and data shall be transmitted to the Cashless Toll Concentrator or Host Systems test environment. The test site shall be monitored through the MOMS and maintained identical to other tolling point as specified in this Scope of Work.		
596	If the option for a replacement Toll Host is exercised by the PTC, the Contractor shall provide a Quality Assurance (QA) Toll Host System for development and testing changes prior to deployment into the production systems.		
2.4	**National Interoperability**		

<table>
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Not Provided (N**) - Will not be provided - requires explanation</th><th>If "Status of Functionality = N" then Proposer must provide an Explanation in this Column</th></tr>
<tr><td>597</td><td>The Cashless Tolling System shall be Designed to accommodate future National Interoperability such that it supports the inclusion of multiprotocol readers and/or the inclusion of multiprotocol transponders to support the current TDM (E-ZPass) and 6C protocols as part of the base Contract and optional SeGo protocols. The Contractor solution shall allow for modifying and adapting the Design to incorporate new readers, antennas types and locations, and support the transition to the new interoperable solution with limited interruptions to the revenue collection.</td><td></td><td></td></tr>
<tr><td>598</td><td>The Contractor shall support the conversion to National Interoperability if it becomes available during the term of the Contract.</td><td></td><td></td></tr>
<tr><td>599</td><td>If requested, the Contractor shall provide a Checklist (Section 4.8) and Systems Testing Concept (Section 6.1) for AVI alternatives.</td><td></td><td></td></tr>
<tr><td><strong>2.5</strong></td><td><strong>Cashless Tolling Accuracy Requirements</strong></td><td></td><td></td></tr>
<tr><td></td><td>The Contractor shall provide a Cashless Tolling System that is Designed to meet the accuracy, performance and throughput requirements set forth in this Scope of Work. The testing logistics required to prove adherence to these requirements shall be detailed in the Master Test Plan and the test procedures as set forth in Section VI of the Scope of Work.</td><td></td><td></td></tr>
<tr><td>600</td><td>The sample size for each requirement shall be the greater of N = log (1 - C) / log (A); or 100,000 transactions for the Cashless Tolling System Operational and Acceptance Test described in Section 6.6; where:
* N = Number in the sample
* C = Confidence level
* A = Accuracy
A value of ninety five (95) percent shall be used for the confidence level. Accuracy and confidence levels are expressed as decimals.</td><td></td><td></td></tr>
<tr><td><strong>2.5.1</strong></td><td><strong>Accuracy Requirements</strong></td><td></td><td></td></tr>
<tr><td><strong>2.5.1.1</strong></td><td><strong>General Requirements</strong></td><td></td><td></td></tr>
<tr><td>601</td><td>The Contractor shall provide a Cashless Tolling System that meets an overall accuracy of at least 99.9 percent for vehicle detection and classification, transponder read and association and vehicle image capture and association. The metrics to validate overall accuracy requirements will be a weighted averaging of the subsystems and shall be defined by the following formula:
$$\begin{aligned}&\mathit{Overall\ Accuracy\ Rate}\\&\quad = (\mathit{Vehicle\ Detection\ Rate\ x\ Vehicle\ Detection\ Weight\ Factor})\\&\quad + (\mathit{Transponder\ Association\ Rate\ x\ Transponder\ Association\ Weight\ Factor})\\&\quad + (\mathit{Vehicle\ Classification\ Rate\ x\ Vehicle\ Classification\ Weight\ Factor})\\&\quad + (\mathit{Image\ Capture\ Rate\ x\ Image\ Capture\ Weight\ Factor})\end{aligned}$$
Where: Vehicle Detection Rate, Transponder Association Rate, Vehicle Classification Rate and Image Capture Rate are obtained from the transactions collected during the Cashless Tolling System Operational and Acceptance Test described in Section 6.5.
<table>
<tr><th></th><th>Vehicle Detection</th><th>Transponder Association</th><th>Vehicle Classification</th><th>Image Capture & Association</th></tr>
<tr><td>Weight Factor</td><td>0.40</td><td>0.15</td><td>0.15</td><td>0.30</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>602</td><td>The Contractor shall provide a Cashless Tolling System that meets the accuracy requirements described below. The Contractor shall validate System compliance to the accuracy requirement by collecting data to the required sample size in live traffic operations as described below for each requirement.</td><td></td><td></td></tr>
<tr><td>603</td><td>Data collection shall include the use of live traffic and controlled vehicles (vehicles with a known transponder status) intermingled with live traffic to emulate normal operations such as congestion and traffic patterns as specified below for each requirement.</td><td></td><td></td></tr>
</table>

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604	Prior to the start of testing the System shall be confirmed to be fully operational and ready for testing. Transactions that fail to meet the requirements shall be reviewed and audited and anomalies investigated. Exception criteria identified during the Design phase and the development of the test procedures that fall outside the System Design may be excluded from the accuracy calculations.		
2.5.1.2	**Transponder Capture Rate**		
605	A transponder mounted in accordance with the manufacturer mounting instructions shall be captured by the AVI system under all conditions within the Design specification described in this Scope of Work with an accuracy rate as defined by the greater of the E-ZPass Group or manufacturers specifications This requirement applies to all tolling point types based upon the transponder mix collected during the testing period for the Commission Approved sample size.		
2.5.1.3	**Transponder Reporting Accuracy**		
606	A transponder that is detected and read by the AVI reader shall be reported to the zone controller with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of transponder reads collected during live traffic operations.		
2.5.1.4	**1.1.1.3 Transponder Write Performance Accuracy Rate**		
607	The AVI system shall successfully and accurately complete a write operation to associate data with a passing vehicle with an accuracy rate as defined by the greater of the E-ZPass Group or manufacturers specifications under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of transponders captured during live traffic operations.		
2.5.1.5	**Vehicle Detection Accuracy**		
608	The zone controller shall detect and report vehicles traveling through the tolling point under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations. The resulting accuracy will be used in the calculation of the overall accuracy.		
2.5.1.6	**Transponder Association Accuracy**		
609	Every Transponder that is reported to the zone controller shall be assigned to the correct vehicle under all conditions within the Design specification described in this Scope of Work. This requirement applies to all tolling point types based upon the transponder penetration rate collected during the testing period for the Commission Approved sample size. The resulting accuracy will be used in the calculation of the overall accuracy.		
2.5.1.7	**Vehicle Classification Accuracy**		
610	The zone controller shall classify all vehicles in accordance with the Commission classification structure traveling through the tolling point with accuracies defined below under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations. The resulting accuracy will be used in the calculation of the overall accuracy.		
2.5.1.8	**Image Capture Reporting Accuracy**		
611	The System shall capture, report and correctly associate an image of the vehicle to the correct vehicle as defined in the Commission Business Rules under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations. The resulting accuracy will be used in the calculation of the overall accuracy.		
2.5.1.9	**License Plate Extraction (OCR/ALPR) Accuracy (if the option to implement OCR/ALPR or VEL is exercised)**		
612	For all video transactions without exception, the System shall perform OCR/ALPR on minimum seventy (70) percent of the images to obtain the license plate, jurisdictions and plate type with at least 99.95 percent accuracy of for the States of PA, NJ, OH, FL, NY, MD, TX, DE, VA and NCPA, NY, NJ, IN, OH, MD, IL, DE, FL and VA. For vehicles identified as requiring front plates the results shall be from the front image. Testing shall require the use of vehicle data collected during live traffic operations. Each tolling location can be independently tuned to optimize performance based on the mixture of plates for each given toll zone.		
2.5.1.10	**Overall Image Quality**		
613	For all video transactions, at least 99.95 percent of the images that are included in the calculation shall have a human readable license plate, jurisdiction and plate type. For vehicles identified as requiring front plates the front image shall be used. Testing shall require the use of vehicle data collected during live traffic operations.		
	A plate shall be considered excluded from Overall Image Quality calculation only when:		
	· the vehicle has no plate;		
	· the plate numbers/letters are not human readable due to damage or obstruction.		
2.5.1.11	**Transaction Processing Requirements**		

<table>
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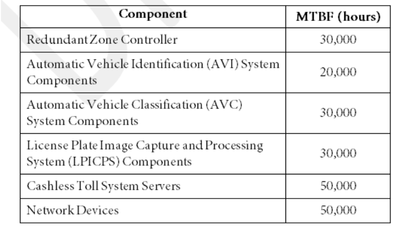
<tr><td>614</td><td>All transactions generated by the zone controllers in accordance with the above accuracy requirements shall be reported and transmitted for processing to the Cashless Toll Concentrator or Toll Host Systems (if provided) with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations.</td><td></td><td></td></tr>
<tr><td><b>2.5.1.12</b></td><td><b>False Read Processing</b></td><td></td><td></td></tr>
<tr><td>615</td><td>The Cashless Tolling System false read processing (example cross lane reads and duplicate reads) shall be less than 0.001 percent of the transponder transactions under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations and test results will be verified by monitoring the CSC for accurate account posting and anomalies will be investigated.</td><td></td><td></td></tr>
<tr><td><b>2.5.1.13</b></td><td><b>Video Transaction and Image Transmission Requirements</b></td><td></td><td></td></tr>
<tr><td>616</td><td>All video transactions and images from the Cashless Tolling System shall be transmitted to the existing CSC/VPC system with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations.</td><td></td><td></td></tr>
<tr><td>617</td><td>All video transactions from the Cashless Tolling System shall be transmitted to the existing PTC Toll Host with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations.</td><td></td><td></td></tr>
<tr><td><b>2.5.1.14</b></td><td><b>AVI Transaction Transmission Requirements</b></td><td></td><td></td></tr>
<tr><td>618</td><td>All AVI transactions from the Cashless Tolling System shall be transmitted to the existing PTC Toll Host CSC/VPC systems with an accuracy of one hundred (100) percent under all conditions within the Design specification described in this Scope of Work. Testing shall require the use of vehicle data collected during live traffic operations.</td><td></td><td></td></tr>
<tr><td><b>2.5.1.15</b></td><td><b>Vehicle Throughput Requirements</b></td><td></td><td></td></tr>
<tr><td>619</td><td>The Cashless Tolling System shall process a minimum of 2,400 vehicles per hour per lane with a video transaction rate of one hundred (100) percent. Testing shall include the simulation of vehicle events that exercise all of the toll collection equipment and devices.</td><td></td><td></td></tr>
<tr><td><b>2.5.2</b></td><td><b>Mean Time Between Failure (MTBF)</b></td><td></td><td></td></tr>
<tr><td>620</td><td>The Cashless Tolling System shall be required to meet specific minimum duration requirements for components and subsystems in continuous operation. This time requirement is defined as the Mean Time Between Failure (MTBF). The Contractor shall provide all third-party MTBF on individual components to be used in the System.</td><td></td><td></td></tr>
<tr><td>621</td><td>MTBF requirements for all components of the Cashless Tolling System shall meet the MTBF as specified below in Table II-1:
<b>Table II–1: MTBF Requirements</b>

<table>
<tr><th>Component</th><th>MTBF (hours)</th></tr>
<tr><td>Redundant Zone Controller</td><td>30,000</td></tr>
<tr><td>Automatic Vehicle Identification (AVI) System Components</td><td>20,000</td></tr>
<tr><td>Automatic Vehicle Classification (AVC) System Components</td><td>30,000</td></tr>
<tr><td>License Plate Image Capture and Processing System (LPICPS) Components</td><td>30,000</td></tr>
<tr><td>Cashless Toll System Servers</td><td>50,000</td></tr>
<tr><td>Network Devices</td><td>50,000</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>622</td><td>The reliability of the System components shall be calculated based on the following MTBF calculation: MTBF = # units x test period (hours)/ # chargeable failures.</td><td></td><td></td></tr>
<tr><td><b>2.5.3</b></td><td><b>Availability</b></td><td></td><td></td></tr>
</table>

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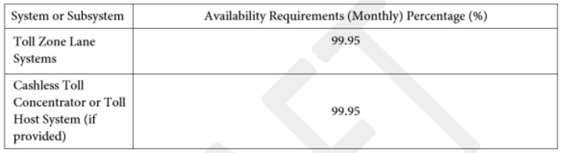
<tr><td>623</td><td>The Contractor shall meet availability requirements for the following elements of the Cashless Tolling System:
Table II–2: Availability Requirements
<table><tr><th>System or Subsystem</th><th>Availability Requirements (Monthly) Percentage (%)</th></tr><tr><td>Toll Zone Lane Systems</td><td>99.95</td></tr><tr><td>Cashless Toll Concentrator or Toll Host System (if provided)</td><td>99.95</td></tr></table></td><td></td><td></td></tr>
<tr><td>624</td><td>The availability requirements shall be separately calculated and applied to an available lane with all of its subsystems properly functioning and available to collect revenue and send required transactions to the Cashless Toll Concentrator or Toll Host System (if provided) and images to the image server(s)/CSC VPC systems.</td><td></td><td></td></tr>
<tr><td>625</td><td>The availability requirements shall be separately calculated for the Cashless Toll Concentrator or Toll Host System (if provided) with all of its devices, Software, applications and processes properly functioning and available to the Authorized Users, successfully transmitting transactions to the existing PTC Toll Host systems and the CSC/VPC systems, successfully transmitting files to the SAP system and communicating with the in-lane systems.</td><td></td><td></td></tr>
<tr><td>626</td><td>Availability shall be calculated based on the following calculation:
Availability = 100% - [Hours Downtime / (# Days in time period measured * 24)]</td><td></td><td></td></tr>
<tr><td>627</td><td>The Cashless Tolling System compliance to the availability requirements shall be validated during the Operational and Acceptance Test described in Section 6.6 Cashless Tolling System Operational and Acceptance Test.</td><td></td><td></td></tr>
<tr><td>628</td><td>During the Cashless Tolling System Maintenance and Software Support Services, the Contractor shall prove the Cashless Tolling System compliance to the availability requirements as described in Section 7.22 Performance Requirements for the Cashless Tolling System and Liquidated Damages.</td><td></td><td></td></tr>
<tr><td><b>2.5.4</b></td><td><b>Chargeable and Non-Chargeable Failures</b></td><td></td><td></td></tr>
<tr><td></td><td>For purposes of calculating MTBF and Availability performance requirements for testing, as detailed in Section VI, and for Maintenance performance, as detailed in Section VII, chargeable and non-chargeable failures are defined as follows:</td><td></td><td></td></tr>
<tr><td><b>2.5.4.1</b></td><td><b>Chargeable Failures</b></td><td></td><td></td></tr>
<tr><td rowspan="12">629</td><td>Chargeable failures include any failures that are not specifically identified as non-chargeable, including, but not limited to the following:</td><td></td><td></td></tr>
<tr><td>· A malfunction which prevents the Cashless Tolling System component (Hardware or Software) from performing its designated function, when used and operated under its intended operational and environmental conditions as detailed in this Scope of Work.</td><td></td><td></td></tr>
<tr><td>· A malfunction that poses a threat to the safety of the Cashless Tolling System components, PTC customers, employees or others.</td><td></td><td></td></tr>
<tr><td>· An occurrence where data is not successfully transmitted between the lanes and the Cashless Toll Concentrator or Toll Host System (if provided) and images from the lanes to the image server(s) unless such failure is due to the WAN provided by the Commission.</td><td></td><td></td></tr>
<tr><td>· A failure of Equipment or Software that allows data loss to occur on the Cashless Tolling System.</td><td></td><td></td></tr>
<tr><td>· A failure of Equipment or Software that allows revenue loss to occur on the Cashless Tolling System that is not already accounted for as a separate performance failure.</td><td></td><td></td></tr>
<tr><td>· Software anomalies and bugs that affect the performance and operation of the Cashless Tolling System.</td><td></td><td></td></tr>
<tr><td>· Shutdown or unavailability of the Cashless Tolling System unless specifically directed by the Commission for reasons not under the control of the Contractor.</td><td></td><td></td></tr>
<tr><td>· Failure to properly register or report a transaction.</td><td></td><td></td></tr>
<tr><td>· Failure to properly reconcile the Cashless Tolling System.</td><td></td><td></td></tr>
<tr><td>· Failure to electronically send or receive transaction information.</td><td></td><td></td></tr>
<tr><td>· Failure to generate the reports required to reconcile and audit the System.</td><td></td><td></td></tr>
<tr><td><b>2.5.4.2</b></td><td><b>Non-Chargeable Failures</b></td><td></td><td></td></tr>
<tr><td rowspan="3"></td><td>Non-chargeable failures shall include:</td><td></td><td></td></tr>
<tr><td>· force majeure, as defined in the Contract Documents;</td><td></td><td></td></tr>
<tr><td>· vandalism;</td><td></td><td></td></tr>
</table>

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630	· failure of a test facility or test instrumentation;		
	· failure of a component the Commission has responsibility;		
	· System component failures caused by externally applied stress conditions outside of the requirements of this Scope of Work;		
	· System component failures caused by environmental or operating conditions outside of the requirements of this Scope of Work;		
	· normal operating adjustments as allowed in the Test Procedure or Maintenance Plan, as applicable, and		
	· failures that are customer or user induced.		
III.	**Cashless Tolling System Transition**		
	All Commission facilities including barrier, ramp and the mainline will be transitioned to cashless tolling in accordance to *Attachment 9: Cashless Tolling Concept Plan* and the Approved project schedule. The Contractor's installation and transition plan shall support the conversion of the existing toll collection system to the Contractor's Cashless Tolling System.		
3.1	**Cashless Tolling System Transition – General Requirements**		
631	The Contractor shall accommodate the various installations of the Cashless Tolling System implementation in accordance with the Approved schedule.		
632	All changes to the System to accommodate technology upgrades and meet the Contract requirements shall be the responsibility of the Contractor.		
633	The Contractor schedule shall be sufficiently flexible to accommodate modifications or changes such as early completions or delays in start or completion of phases that would normally be expected in a multi-phase, multi-Contractor construction schedule.		
3.2	**Cashless Tolling System Implementation**		
634	The Contractor shall procure, Design, test, and install the Cashless Tolling In-lanes Systems, including the redundant Cashless Tolling In-lane System Hardware, Software, Equipment, Interfaces and communications provided in the toll equipment building at each tolling point.		
635	The Cashless Toll Concentrator or Toll Host Systems (if provided) shall be tested and interface testing completed prior to commencing Onsite First Installation Test (OFIT) for the Cashless Tolling System at the initial Implementation.		
636	The installation and Commissioning of all cashless tolling point implementations shall be in accordance with the Approved Transition Plan.		
3.3	**Transition to Cashless Tolling**		
3.3.1	**Cashless Tolling Transition Plan**		
637	The Contractor shall provide a detailed Transition Plan for Commission Approval that addresses all critical transition elements and activities associated with the installation and Implementation of the Cashless Tolling System, including Cashless Tolling In-lane Systems; Cashless Toll Concentrator or Toll Host Systems (if provided), and interfaces to the existing PTC Toll Host system and the existing CSC/VPC system.		
638	The Transition Plan shall, at a minimum, include the installation, Commissioning, Revenue Collection and Acceptance of Cashless Tolling In-lane Equipment, and Acceptance of each Implementation Phase of the Project.		
639	Any temporary processes implemented to support the transition shall be documented in the Transition Plan including eventual replacement process if applicable.		
640	All points of coordination or reliance on third-party deliverable, for example the WAN communications network shall be clearly identified in the Transition Plan.		
641	The impacts to existing systems including those in the proximity of the tolling point shall be addressed in the Transition Plan.		
642	The Cashless Tolling System Transition activities shall be coordinated with the civil Contractor, civil designer and existing system integrators and Approved by the Commission in order to not interfere with on-going and continuing maintenance and operational requirements.		
	In order to ensure a seamless transition, the following activities shall take place prior to opening the first tolling point to cashless tolling in revenue collection.		
	· Upon Approval to proceed with a Commissioning Test, the Contractor shall conduct such test at each tolling point prior to opening each location to traffic and revenue collection. Since each location may also include civil construction, the Contractor shall be responsible for interfacing and coordinating with the PTC and civil contractors for scheduling and maintenance and protection of traffic requirements during the conversion to cashless tolling.		

Functional Requirements			
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No.	Requirements	Existing (E) - Met by current system, no modifications required Modification (M) - Modifications needed to meet requirement Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs To Be Developed (D) - Not in current system, but will be developed Not Provided (N**) - Will not be provided - requires explanation	If "Status of Functionality = N" then Proposer must provide an Explanation in this Column
643	· The Cashless Toll Concentrator or Toll Host (if provided) servers and central image servers (if implemented) shall be installed and commissioned at the primary and secondary locations and its interface to the existing PTC Toll Host system and existing CSC/VPC shall be validated.		
	· The MOMS shall be configured for go-live; inventory recorded; technicians scheduled, and notifications set up;		
	· The DVAS shall be installed and validated and Authorized Commission personnel shall have access to the DVAS;		
	· The OFIT shall be conducted and Cashless Tolling System functionality and performance validated at the initial tolling point installation;		
	· An end to end test shall be conducted in the existing PTC Toll Host system and existing CSC/VPS system test environments, and		
	· The Commission shall confirm the existing systems are ready for Conversion and give Approval for Go-Live. At such time, the Cashless Tolling System shall be switched over to the production existing PTC Toll Host system and existing CSC/VPC system.		
644	The Contractor shall plan for possible variances in the sequencing of the transition due to construction and readiness of the CSC/VPC systems and operations in its Transition Plan.		
	Additional requirements for a replacement Cashless Toll Host (if exercised) shall support the following additional requirements:		
645	The Transition Plan shall address the integration and interface of the Cashless Toll Host System to SAP when all existing facilities are converted to cashless tolling and the existing PTC host system is de-commissioned.		
646	The Transition Plan shall address the migration of data from the current PTC host to the Cashless Toll Host System for new facilities as well as when existing facilities are converted to cashless tolling and the existing PTC host system is de-commissioned.		
647	The operational requirements, interfaces, and/or Equipment installation for the Cashless Tolling System and its interface to the existing PTC Toll Host system, SAP and existing CSC/VPC System shall be included.		
IV	Cashless Tolling System Installation Requirements		
	This section details the requirements for the installation of the In-lane Cashless Tolling System and the Cashless Toll Concentrator or Toll Host (if provided) System. Unless Approved by the Commission, no System installation shall occur prior to the satisfactory Approval of Installation Design and the Factory Acceptance Test.		
4.1	Installation Program		
648	The Contractor shall have an Installation Program that addresses all aspects of the installation of the In-lane Cashless Tolling Systems and Cashless Toll Concentrator or Toll Host (if provided), including all installation Design, submissions and coordination.		
649	The Contractor is responsible for the Design, procurement, installation, cabling, configuration, check-off, and testing of all Hardware, Equipment, communications, Software, lighting and fixtures provided by the Contractor as part of the In-lane Cashless Tolling Systems at each of the tolling points identified by the Commission.		
650	In the event the Contractor decides to re-use existing hardware, conduits and junction boxes, the Contractor is responsible for ensuring that such elements are in their fully operational condition and will meet the requirements of the Contract for the term of the Contract.		
651	The Contractor shall install the Cashless Tolling In-lane servers and Hardware in the toll equipment building provided by the Commission through the civil contractor.		
652	The Contractor shall install the Cashless Toll Concentrator or Toll Host at locations specified in the Scope of Work and Approved by the Commission.		
653	The Contractor shall work with the Commission to test the WAN and the connections to the existing PTC Toll Host system and the existing CSC/VPC systems. Testing shall include expected traffic loads and all types of production operation data		
654	The Contractor shall coordinate all lane closure activities with the Commission and the civil contractor.		
655	The Contractor shall validate and approve the Commission and the civil contractor infrastructure installation and confirm they are in compliance with the Approved civil drawings.		
656	The removal and disposal of the existing equipment not re-used by the Contractor will be responsibility of the civil contractor and the Contractor shall support the coordination of this work.		

Functional Requirements			
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657	The Contractor shall install and tune the certified AVI Equipment to the AVI vendor specifications in compliance with the E-ZPass Group requirements. In addition, the AVI vendor shall certify that the lanes are tuned to the Approved AVI specifications, including after AVI updates or replacements such as for interoperability or maintenance.		
4.2	**Installation Plan**		
658	The Contractor shall develop and submit an installation plan that identifies its approach to installation and drawing package submissions and documents all installation related activities for the Project. The installation plan shall be the master document from which the elements of the System shall be installed.		
659	The installation plan shall include and define, at a minimum, the following items:		
	· The installation schedule detailing all activities, shifts and resources for the installation of the In-lane Cashless Tolling Systems and Cashless Toll Concentrator or Toll Host (if provided) and the Cashless Toll Host Systems, including third-party and civil contractor activities. Once the baseline schedule is Approved by the Commission, updates during the installation periods identifying all schedule changes and Work progress in the form of percentage completions shall be submitted to the Commission for Approval.		
	· The minimum resource allocation requirement for any installation phase and segment.		
	· How the Contractor manages delivery and staging of the Cashless Tolling In-Lane and Concentrator or Toll Host Equipment to be installed, including any staging, installation and testing performed at the Contractor or third-party facilities and their subsequent delivery and installation at the production sites.		
	· The coordination between other Contractors, including the civil designer, civil Contractor(s), service providers, and the existing Contractors.		
	· Coordination of the lane closures with the civil Contractor(s) for each phase of the project.		
	· Coordination with the civil Contractor(s) for the installation of the toll equipment building, the generators and UPS.		
	· Coordination activities as applicable with other third-party entities for the various interfaces including the existing PTC Toll Host, existing CSC/VPC and other existing PTC systems.		
	· Testing of the Commission provided fiber communications network for connection of Cashless Tolling Systems to existing PTC Toll Host system and the existing CSC/VPC system.		
	· Quality control, quality assurance, inspection, and testing processes including validation of Contractor installation to the requirements of the Contract installation drawings.		
	· The order in which Equipment items are to be installed with estimated durations.		
	· Special or unique installation requirements.		
	· A detailed component list and a description of how each item version number and serial number shall be recorded for each installation and configuration into the MOMS.		
	· Specific requirements to support the conversion to the new interoperable solution, including but not limited to infrastructure changes, AVI controller changes, antenna locations, lane configuration, servers, configuration files, firmware, host and plaza subsystems, and other modifications which may be required.		
	· Organization Chart defining Key Team Members, roles and responsibilities and contact information.		
	· Contingency Plan.		
4.3	**Installation and Construction Coordination and Meetings**		
	During the Project Design, development and installation periods there shall be a series of meetings between the Contractor, the Commission, existing Contractor, civil designer and the civil Contractor(s) to clearly define and develop the installation requirements, methodology, timetables, test plans, roles, and contingency plans. The Contractor is responsible for coordinating and scheduling all meetings necessary to complete the Design and installation phase of the Project.		
660	The Contractor shall schedule, manage and attend weekly installation meetings during the active Design and installation phases of the Project and report on progress of the installation. The Contractor shall identify and communicate any issues regarding Cashless Tolling System construction and installation immediately upon discovery to the civil Contractor(s), existing system integrator and the Commission.		
661	The Contractor shall ensure that the appropriate personnel are present at these meetings who can represent the Contractor's interest and provide the information necessary in a meaningful manner.		
662	Prior to the meeting, the Contractor shall update the installation schedule based on the construction schedule and all changes shall be identified.		

Functional Requirements

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663	The Contractor shall prepare and distribute a meeting agenda at least forty-eight (48) hours prior to the scheduled meeting. The meeting agenda shall consist of those items pertaining to the installation and schedule for the previous and current week's installation efforts and for an agreed to "look ahead" period.		
664	It is the Contractor's responsibility to make sure all issues that arose during the installation activity for the week are addressed and resolved or is scheduled for resolution.		
665	At these meetings, the Contractor shall also be prepared to address any issues or questions raised by the civil designer, civil Contractor, other Contractors, and the Commission or its representative.		
666	The Contractor shall document the meeting discussions and distribute the meeting minutes to the team. The Contractor shall also record and maintain an action items list that tracks all installation related issues.		
4.3.1	**Construction Coordination with Infrastructure Contractors**		
	The Contractor shall coordinate all installation activities with the civil Contractors on new cashless tolling facilities to ensure all Cashless Tolling System Equipment specifications are addressed in the Design and installation of the cashless tolling infrastructure. *Attachment 2: Cashless Tolling Installation Responsibility Matrix* defines the areas of responsibility for the parties involved in the Project Design and construction for new cashless tolling facilities.		
667	The Commission (or its civil Contractor) is responsible for the construction of the overhead structures/toll gantries, installation of the toll equipment building and provision of the generators for the new tolling point, and the Contractor shall coordinate closely with the Commission, and the Commission Contractors.		
668	The Contractor shall participate in the Design and installation of the cashless tolling infrastructure at the tolling points, including but not limited to:		
	· provide all required Design and installation drawings, operating requirements and installation specifications to the Commission and the civil Contractors for all toll system Equipment provided;		
	· support and supply all information requested by the civil Contractor and civil designer in the form of request for information (RFI);		
	· review all civil Contractor provided drawings with respect to the toll system;		
	· approve all aspects of such drawings related to the toll system, and		
	· ensure the Cashless Tolling System infrastructure needs necessary to meet the requirements set forth in this Scope of Work are met with regard to such Design.		
669	The Contractor shall be responsible for ensuring that the locations, positions, installation, connections and other elements of the Contractor inputs identified on the Design and installation drawings provided by the Contractor, for all Contractor and Commission provided Equipment, whether in-roadway, structure/toll gantry mounted, in the toll equipment building or otherwise located are accurate and correct.		
670	Contractor shall also ensure that the installed roadway; infrastructure; structures/toll gantries; toll equipment building; UPS, and generators meet the Design requirements provided by the Contractor and shall approve such installed work with regard to the Design provided.		
671	Contractor shall cooperate with the Commission and infrastructure contactors to minimize required number of lane closures and to maximize the use of other scheduled lane closures. The Contractor shall transmit all lane closure requests to the Commission for approval.		
672	Contractor shall work with the Commission and agree to a reasonable plan for scheduling and approving lane closures, including a procedure for advance notice of cancellations of lane closures and allowable conditions for such cancellations as described in this Scope of Work. The civil Contractor is responsible for administering all lane closures and traffic controls during the installation phase and for all testing through Acceptance.		
4.3.2	**Construction Coordination with Civil Contractor**		
673	The Contractor shall coordinate all installation activities with the civil designers and civil contractors. *Attachment 2: Cashless Tolling Installation Responsibility Matrix* defines the areas of responsibility for the parties involved in the Project Design and installation on the cashless tolling facilities.		
4.4	**Installation Requirements**		
674	The Contractor shall be responsible for procurement, installation, cabling, termination configuration, testing, and check-off of all Equipment and Software required to meet the requirements of the Contract.		
675	The Contractor shall install all appropriate In-lane System servers and Equipment required by the Cashless Tolling System in the toll equipment building provided by the Commission through a third party.		
676	Procurement, installation, configuration, and testing of all local area communications Equipment and connection to the Commission installed network equipment in the toll equipment building shall be the responsibility of the Contractor as further set forth in this Scope of Work.		

Functional Requirements			
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677	Procurement, installation, configuration, and testing of all appropriate Cashless Toll Concentrator or Toll Host System servers (if provided) , Equipment and Software required by the Cashless Toll Concentrator or Toll Host System at the primary and secondary locations and validating communications to its interfacing systems shall be the responsibility of the Contractor as further set forth in this Scope of Work.		
4.5	**Compliance to Standards**		
	The Contractor shall adhere to all installation standards, applicable laws, ordinances and codes as required.		
678	The Contractor shall meet all electrical codes, traffic control, seismic considerations, calibration, configuration, and environmental requirements of and including, but not limited to:		
	· Equipment manufacturer's;		
	· NEC;		
	· UL standards;		
	· PTC;		
	· PennDOT;		
	· FHWA;		
	· IEEE (Institute of Electrical and Electronics Engineers);		
	· OSHA requirements, and		
	· any local authorities having jurisdiction.		
679	The Contractor shall adhere to all specifications of the latest Commission Standard Specifications at time of construction unless the Contractor receives written notification by the Commission which overrides the Standard Specifications. Commission Standard Specifications are located at: https://ebs.paturnpike.com/generalinformation/documents		
680	The Contractor shall be responsible for all costs associated with any permits, plan reviews, and inspections related to toll system work.		
681	It shall also be the Contractor's responsibility to procure all documentation required to install and adhere to the proper installation standards, law, ordinance, or codes.		
682	The Contractor shall procure Services of Subcontractors qualified to work in this industry. If a vendor's component requires a vendor Approved installer, the Contractor shall use an Approved component installer, including qualified vendor staff.		
4.6	**In-lane System Installation Requirements**		
683	The Contractor shall supply all personnel, tools, vehicles, materials and Equipment required to perform the complete installation of the Cashless Tolling System, including but not limited to all Equipment and vehicles required for overhead installation Work on the overhead structures/toll gantries; specialty Equipment for preparation and saw-cutting of loops as required, and provide necessary test vehicles to adequately test the installed System in accordance with the Approved test plan.		
684	Where the Contractor is providing subsystem components manufactured by a third party vendor, the Contractor shall ensure that all such components are installed in accordance with manufacturer's installation guidelines. Third-party onsite services shall be obtained as applicable to install, configure and tune the first on-site installation.		
685	The Contractor shall provide onsite and remote support for such subsystem manufacturer components as necessary to ensure the proper installation and operation of its Equipment at no additional cost to the Commission. All third party Equipment and subsystems shall be certified by the manufacturer as being compliant with their installation guidelines and meeting Contract requirements.		
	The installation responsibilities for the Cashless Tolling System shall include but not be limited to:		
	· Furnish and install uninterruptable power to all Cashless Tolling System Equipment on the overhead structures/toll gantries and in the toll equipment building. UPS and generator will be provided by the Commission.		
	· Furnish and install all connecting conduit from wire ways and conduits provided and installed by others and/or stub conduits to the Equipment. The civil Contractor(s) will install the conduits from the toll equipment building to the demarcation point on the overhead structures/toll gantries as shown in *Attachment 6: Installation Demarcation Diagram* .		
	· Furnish and install separate ground wires for the Cashless Tolling System, surge protection devices (SPD), junction boxes, pull boxes, conduits, and other such items as required by the installation standards and requirements. All exposed junction boxes, pull boxes and other Hardware shall be either zinc coated and epoxy painted or stainless steel;		

Functional Requirements

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686	· Furnish and install all wiring for all in-lane Equipment and connections to the equipment racks in the toll equipment building. This includes the proper termination of all power, communication, and RF cables and/or wiring (copper or fiber optic) required to connect the individual components into a fully operational System as specified by the manufacturer.		
	· Furnish and install all Equipment racks required for the in-lane electronics in the toll equipment building.		
	· Furnish and install all AVI readers in the toll equipment building (if applicable) or at Approved Commission location.		
	· Furnish and install all zone controller computers (Hardware and Software) into the equipment racks and test it connection to the zone controller and the facility servers (if provided)/ Cashless Toll Host Systems.		
	· Furnish and install all electronics and other devices in their respective equipment racks as required to provide a fully operational System.		
	· Furnish and install all Equipment mounting brackets to support structures for the installation of all toll system Equipment on the mounting arms on the overhead structures/toll gantries.		
	· Furnish and install the AVC system Equipment, including in-pavement sensors and overhead mounted Equipment and controllers as specified by the manufacturer. Includes all the Commission Approved materials, Equipment and supplies required for saw-cutting, wiring and sealing of wires in the roadway.		
	· Install the AVI system Equipment, including antennas, readers, related Equipment, cables, and any support brackets required. All AVI mounting Hardware, junction boxes, and cables shall be procured and supplied by the Contractor.		
	· Synchronize the new Cashless Tolling System with existing AVI system, including the provision of required cables as needed.		
	· Furnish and install the LPICPS Equipment, including cameras, LPICPS illumination, and any video controller Equipment, sensors, Software, controllers/servers, or specialty Equipment associated with the LPICPS.		
	· Furnish and install facility servers (if required) in the equipment racks, including Software and test it connection to the zone controller and the Cashless Toll Host Systems.		
	· Validate all cable and wire terminations via a test process to ensure that the cable is connected to the correct location on each end and that the cable/wire is properly terminated.		
	· Power up and provide a field check out/installation acceptance test of all systems, to be witnessed and Approved by the Commission or its designated representative. Provide the completed installation checklist as described in Section III of this Scope of Work.		
	· Tuning and testing of the AVI system, as described in, and in full accordance with, manufacturer's guidelines.		
	· Calibration and testing of LPICPS in full accordance with manufacturer's guidelines and to meet the OCR/ALPR requirements specified in the Scope of Work (if the option to implement OCR/ALPR is exercised).		
	· Calibration and testing of AVC system in full accordance with manufacturer's guidelines.		
	· Installation, calibration and testing of the DVAS cameras and Equipment.		
	· Furnish and install all necessary toll system specific lighting fixtures and wiring on the gantries to the TEB as required to meet the requirements of the Contract.		
	· All other items, materials, and Equipment to complete installation in accordance with the Contract.		
4.7	**Cashless Toll Concentrator or Toll Host System Installation Requirements (if provided)**		
687	The Contractor shall coordinate all Cashless Toll Concentrator or Toll Host System installations and testing of the WAN and interfaces to the existing systems with the Commission and existing system integrator.		
688	The Contractor shall install all Cashless Toll Concentrator or Toll Host Systems, including primary and secondary concentrator or host servers and central image servers (if provided) at the primary and secondary locations specified in the Scope of Work and Approved by the Commission.		
689	All servers, storage devices, communications Equipment, and other Cashless Toll Concentrator or Toll Host System Hardware shall be installed in the designated locations as prescribed in the drawings submitted by the Contractor and Approved by the Commission.		
	The Contractor is responsible for the following activities, including but not limited to:		
	· furnish, install, configure and test the necessary servers in accordance with the Approved Design documents;		
	· furnish, install and test the storage units and backup devices;		
	· furnish, install and test the network Equipment at the primary and secondary Cashless Toll Concentrator or Toll Host locations;		
	· validate communications to the Commission installed network equipment at the toll equipment building;		

Functional Requirements			
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690	· establish and validate communications from the Cashless Toll Concentrator or Toll Host System (central servers and image servers) to each of the tolling points at the toll equipment building;		
	· establish and validate communications from the Cashless Toll Concentrator or Toll Host System (central servers and image servers) to the existing CSC/VPC system;		
	· establish and validate communications from the Cashless Toll Concentrator or Toll Host System to the existing PTC Toll Host system;		
	· furnish, install and validate third-party Software and Contractor Software on all servers and Equipment required to support the Cashless Toll Concentrator or Toll Host System;		
	· furnish, install, configure and test all servers and Equipment for correct point-to-point installation, proper connectivity, acceptable termination of all cables and successful communications linkage;		
	· Configure the Cashless Toll Concentrator or Toll Host System to support interfaces as defined in the Approved ICDs and		
	· All other items, materials, Equipment and Software required to complete installation of a fully functional Cashless Toll Concentrator or Toll Host System in accordance with the Contract.		
4.8	**Installation Checklist**		
691	The Contractor shall develop an installation checklist that tracks the progress and completion of all installation activities for the Cashless Tolling In-lane System installation and the primary and secondary Cashless Toll Concentrator or Toll Host System facilities installation.		
692	The checklist shall be the document detailing those items required for the installation crew and technical team to complete the installation process for all Equipment and components, including terminations, connections and configurations.		
693	A copy of the checklist signed and Approved by the Contractor, attesting to the completeness of the installation, shall be provided to the Commission after the completion of the installation activities for each lane at each tolling point.		
694	The Contractor shall conduct a final inspection of all installations and certify the installation Work.		
695	The Commission reserves the right to obtain the services of the Facilities Department to witness the Contractor inspection and conduct an independent inspection. The Contractor shall coordinate and support such inspections at each facility.		
696	The checklist shall identify all discrepancies and exceptions and Contractor shall be responsible for all corrections.		
697	The checklist shall document all changes identified during the installation process and all such changes shall be Approved by the Commission or its designated representative.		
4.9	**Electrical Work**		
698	Electrical Work to be performed under this Contract shall include, but not be limited to the following general items of Work:		
	· Provide and install surge protection devices as required to protect the Cashless Tolling System Equipment and electronics.		
	· Install junction boxes and terminate new cable and conduit attachment devices, where applicable.		
	· Bond all conduits, manhole frames, metallic junction boxes, and other conductive items to the grounding system in conformance with the Commission and PennDOT Standard Specifications, the NEC and other authorities that have jurisdiction.		
699	All electrical Work shall be performed in accordance with the applicable regulations and Approved by the Commission and other authorities having jurisdiction. Appropriate NEC compliance shall be adhered to with all electrical articles for installation pertaining to wiring, enclosures, and other electrical Equipment in hazardous locations. UL labels shall be provided for all electrical panel boards, enclosures, and accessories.		
700	All electrical Equipment must be inspected prior to installation for defects that could damage the Equipment or harm personnel. Any Equipment found to have defects shall not be installed but shall instead be replaced with a fully functioning replacement.		
701	All electrical Equipment shall be properly grounded for safety. Equipment shall be furnished with grounding pads or grounding lugs. All ground connections shall be cleaned immediately prior to connection.		
702	The Contractor shall provide all grounding material required for installation and all installations shall be in compliance with the applicable standards.		
4.10	**Lane Closure and Traffic Control Requirements and Conditions**		

	Functional Requirements		
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703	The Contractor shall provide all MPT activities associated with completing Contractor Work during the Implementation Phase. All lane closures shall be coordinated with the PTC and civil contractor and lane closure schedules shall be submitted to the Commission in advance for Approval.		
704	In-lane Cashless Tolling Equipment installation and MPT activities shall be scheduled to occur within the allowable working hours outside of any holiday or event periods. The 2018 allowable working hours and holiday restrictions can be found in Attachment 15: Lane Closure and MPT Provisions. Allowable working hours and holiday restrictions are subject to change and Contractor shall be responsible for monitoring new releases of all standards/policies to assure their work schedule aligns with the most recent PTC requirements.		
705	The Contractor shall maintain a minimum number of open lanes during all MPT activities as defined in the latest PTC lane charts within the allowable working hours. The Contractor shall request the latest lane charts from the PTC.		
706	Contractor shall provide the PTC representative the information required in the “Construction Daily Lane Closure Report” shown in Attachment 15: Lane Closure and MPT Provisions. The information required for completion of this form should be submitted to the PTC representative a minimum of three (3) days prior to the planned lane closure.		
707	The Contractor shall follow the requirements as stipulated in the latest applicable Commission’s Maintenance and Protection of Traffic Standard Drawings, as provided at https://www.paturnpike.com/business/engineering_standards.aspx. Contractor shall follow the requirements as stipulated in CS 901 and the MPT Standard Special Provision, provided in their current form in Attachment 15: Lane Closure and MPT Provisions. Contractor shall be responsible for monitoring new releases of all standards/policies and assure their work complies with the most recent versions available.		
708	Any Work involving removal/relocation of Equipment (loosening or removal of nuts/screws, cables, connectors etc.) shall be done with appropriate lane closures in coordination with the latest PTC traffic requirements.		
709	This requirement intentionally left blank.		
710	This requirement intentionally left blank.		
4.11	**Contingency Plan**		
711	A detailed contingency plan shall be prepared for reopening closures to public traffic. A general contingency plan shall be included in the Installation Plan; however, a site specific contingency plan shall be submitted to the Commission before Work at the job site begins.		
4.12	**Work Standards and Requirements**		
712	The Cashless Tolling System Equipment installation shall be performed to an Approved set of plans, which has previously been submitted and Approved by the Commission or their designated representative.		
713	The Contractor shall provide Project management and oversight of all Work performed. At all times when installation Work is taking place, the Contractor shall have an individual designated in the Organization Chart as Site Manager onsite to supervise the installation.		
714	The Contractor shall install the Cashless Tolling System Equipment to the highest standards, using experienced and knowledgeable personnel. For example, journeyman electricians shall terminate all cables, wiring, or fiber optic cables.		
715	All tools such as crimpers, fiber optic termination tools, and test Equipment shall have been properly calibrated prior to being used.		
716	The Contractor shall provide a safe environment for the installation process in accordance with all applicable local, State and federal requirements, as well as any Commission policies. Examples include but are not limited to the following:		
	· safety harnesses shall be included and employed on all lifts, and the personnel trained on their use;		
	· hard hats and safety vest shall be worn in all construction areas;		
	· safety toe shoes shall be worn in construction areas and around active roadways while performing installation processes;		
	· Contractor issued identification badges shall be worn at all times, and		
	· regular safety meetings shall be scheduled to review safety procedures.		
4.13	**Design and Documentation during Construction and Installation**		
4.13.1	**Engineering Design**		

Functional Requirements

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717	The Contractor shall secure the services of a fully-qualified engineering design firm(s) for the purpose of performing all infrastructure related engineering Design (civil, structural, electrical, mechanical, and architectural) and the preparation of related plans and documentation under the Contract.		
718	All Design Work shall be performed under the direct supervision of a Licensed Engineer of the appropriate discipline in the State of Pennsylvania. All design professionals shall be licensed and authorized to practice in the State of Pennsylvania.		
719	If the Engineering Design effort is performed by the Contractor, the Contractor shall submit documentation showing that the Contractor has met the required qualifications described in this section.		
4.13.2	**Document Control**		
720	The Contractor shall maintain a Configuration Management System to control all Project-related documents and drawings. Each document shall be properly titled, date updated, numbered by revision and version and shall incorporate signature blocks for authorship and approvals. Only the latest Approved drawing version may be used for installation.		
721	All documentation regarding the lane Equipment and Cashless Toll Host System Equipment installation shall be maintained by the Contractor. All drawings and other such documentation shall be made accessible to the Commission for review.		
722	The Contractor shall maintain all non-conformance reports (NCR) submitted by the inspectors and document the correction and resolution of all issues identified.		
4.13.3	**Installation Design and Drawings**		
723	The Cashless Tolling System Equipment shall be installed on existing infrastructure or overhead structures/toll gantries that will be designed and constructed by others separately procured by the Commission.		
724	The Contractor shall provide the installation requirements including acceptable tolerances for the Cashless Tolling System Equipment, including all related plans and documents. The civil designer and civil Contractors shall rely on the installation requirements provided by the Contractor to design and construct the overhead structures/toll gantries for the Cashless Tolling System Equipment to function as intended, and Contactor shall be fully responsible for the accuracy of its installation requirements.		
725	The installation requirements provided by Contractor shall be consistent with those provided in Contractor's Proposal and shall accommodate the selected design from the samples provided in *Attachment 5: Concept Plan for Overhead Structures/Toll Gantries* .		
726	The Contractor shall certify the installation requirements provided as accurate and appropriate for its intended purpose to the satisfaction and Approval of the Commission.		
727	Contractor shall indemnify all related parties as more fully described in the Terms and Conditions for any damages that result from reliance on the installation requirements provided by Contractor.		
728	The Contractor shall submit shop drawings detailing the installation Design that shall be used onsite for installation Work. Detailed drawings shall be provided for each site where Equipment procured and supplied under the Contact shall be installed.		
729	The Contractor shall submit the following Design drawings as part of the drawing package in accordance with the Commission submission requirements, including but not limited to:.		
	· detailed installation drawing for each piece of Equipment;		
	· detailed drawing showing the equipment mounting brackets and details of their installation to the mounting arm;		
	· details related to the range of Equipment adjustments;		
	· detailed electrical schematics;		
	· all junction boxes and panels;		
	· detailed equipment rack layout and interconnections drawings;		
	· detailed communications layout;		
	· power and communications cabling schedules, and		
	· pavement installation details for in-pavement sensor installations.		
730	During installation the Contactor shall maintain a red line version of the drawing package that is submitted to the Commission upon the completion of the installation.		
731	Documentation shall include memos denoting changes or modification to requirements.		
732	The Contractor shall submit detailed component level network drawings showing all WAN, LAN and VLAN connections, including connection to the existing PTC Toll Host system and the existing CSC/VPC system.		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	Comments
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733	Contractor shall utilize a predefined range of IP addresses provided by the Commission. An IP schematic shall be submitted and Approved by Commission IT Security that shows all the IP addresses for all Contractor supplied Equipment on the network.		
734	The Contractor shall submit detailed component level primary and secondary server configuration instructions, including storage device mirroring, backup devices and configuration, and network configuration and testing.		
735	The Contractor shall submit detailed instructions on the installation of the operating system, database, third-party Software, and application Software on the servers.		
736	All testing required to verify successful installation and operation shall also be documented.		
4.13.4	**As-Built Drawings/Documents**		
737	The Contractor shall update the latest drawings with red-lines as changes are incorporated during the installation process. At the completion of the installation of the Cashless Tolling System, the Contractor shall gather all red line drawings.		
738	The red line drawings shall be verified and then incorporated into a final As-Built drawing package. This final As-Built package shall include installation drawings, shop drawings and sketches, and other drawing types that may have been used to install the Cashless Tolling System. The As-Built drawings shall include at a minimum power and data connections, installed equipment locations and electronic cabinet/panel layouts.		
739	All other documentation used regarding the installation shall be also be finalized and submitted as part of the As-Built submittal.		
740	The Contractor shall update and resubmit the latest as-built drawings should any substantial changes be made to the design during the Contract period.		
V	**Cashless Tolling SYSTEM PROJECT REQUIREMENTS**		
5.1	**Cashless Tolling System Project Management**		
	The Contractor shall employ a Project Management System that is sufficiently detailed to enable the Commission to review and confirm that the Contractor has the necessary management, staff, and controls in place to meet the requirements of the Contract.		
5.1.1	**Program Management Plan**		
	The Program Management Plan describes how the Contractor plans to implement and manage the Project, including staffing, scheduling and communication procedures for controlling all correspondence, submittals, and other communications between the Contractor and the Commission, and communications with the civil designer, civil Contractors, third-party entities and existing Contractors.		
741	The Program Management Plan shall at a minimum include the following elements:		
	· Project scope and key Deliverables;		
	· a description of the management and organization of the program, including an organization chart, identification of Key Team Members, their responsibilities and percentage commitment to the Project, tasks leads for each functional area and location and identification of the resources to be used in fulfilling the requirements of the Contract;		
	· Project team (Contractor, the Commission, Commission's Representatives and existing Contractors) contact information;		
	· a description of the Project planning, documentation and reporting methods to be utilized, both for use within the Contractor's staff and externally to the Commission and other entities;		
	· a description of the process for communication, escalation and resolution of Project issues with the Commission;		
	· meeting schedules for meetings with the Commission and other entities including the form of the meeting as part of the Communication Plan;		
	· the Approved Project schedule;		
	· a description of the process for reporting, updating and tracking the Project schedule and Project performance;		
	· coordination process with the civil designers, civil Contractors and management of the RFI process during the infrastructure design phase;		
	· coordination process with the civil designers, civil Contractors and management of the installation drawing review process;		

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	· approach to change management, consistent with Contract requirements, including a description of the process for documenting and submitting change requests, the Approval process and how the change management approach will be integrated into day-to-day Project management;		
	· approach to document control, including Software (the Commission shall have the capability to download documents using this Software) and tools the Commission will use and have read-only access to via the Web;		
	· approach to risk management;		
	· approach to Quality Assurance and Quality Control;		
	· documenting the invoice submission, invoice backup information, verification, and Approval process;		
	· a section with all Approved Project forms including but not limited to, meeting agenda; meeting notes; action items tracking log; monthly progress report, and invoices.		
	· an emergency contact list as described further in the requirements below.		
742	The Contractor shall identify the tools and products used to manage the Project and the internal controls instituted by the Contractor to guarantee successful delivery of the Project.		
743	The Contractor shall develop and submit the Program Management Plan to the Commission for review and Approval.		
744	The Contractor shall develop and submit a separate Communications Plan to the Commission for review and Approval that addresses the following, including but not limited to:		
	· all correspondence shall identify the originator and designated receiver.		
	· Tracking of document versions and changes.		
	· All invoices shall be submitted with accompanying backup information as required by the Contract and consistent with the Commission processes and invoicing and auditing policies. The Contractor shall work with the Commission to develop the appropriate invoice and back-up materials as a part of the PMP development.		
	· All submittals shall be delivered as an enclosure to the Contractor's submittal letter. Each submittal letter shall be limited to a single subject or item. The Contractor's letter shall identify the Contract number, Contract name and subject of the submittal.		
	· All items of correspondence, invoices, submittals and documentation shall contain the Contract number and the designated Contract name.		
	· Process for validating that all comments provided by the Commission on Contractor deliverables are successfully addressed.		
5.1.2	**Contractor's Project Management Office**		
745	The Contractor shall establish a Project management office in the Harrisburg metropolitan area. All Project management activities shall be conducted from this office.		
746	The Project manager shall be assigned to the Project management office and shall be one hundred percent (100) percent dedicated to the Cashless Tolling Project for the Implementation Phase of the Contract.		
5.1.3	**Staffing and Key Team Members**		
747	The Contractor is responsible for maintaining and assigning a sufficient number of competent and qualified professionals who speak fluent English to meet the requirements of the Contract.		
748	The Contractor shall ensure Key Team Members are readily accessible to the Commission or their authorized representatives during the Contractor's performance of this Contract.		
749	Contractor is required to provide staff at all times sufficient to meet the Project Requirements and Contract. The following are designated as Key Team Members for this Project and are subject to the Approval, replacement and removal requirements of the Commission for Key Team Members as set forth in the Contract:		
	· Project Principal – responsible for the overall conduct and performance of the Project, oversight of the Project, the performance of the Project manager and the Commission's single point of contact for any escalated Project issues that cannot be resolved by the Project manager;		
	· Project Manager – responsible for all day-to-day Work, the overall execution and delivery of the Project and the day-to-day Contractor contact person on the Project;		
	· Deputy Project Manager – assists the Project manager in the execution and delivery of the Project and the day-to-day operations;		
	· Technical Manager, Lane Systems – responsible for management of all In-lane Systems technology resources including selection of the lane solutions, subsystems, Software development and Systems maintenance.		

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	· Technology Manager, Toll Concentrator/Host System – responsible for management of all technology resources related to the Toll Concentrator/Host System, including Software development, on-going Hardware/Software maintenance, Equipment and Systems and information security as required to satisfy the Requirements of the Contract;		
	· Installation Manager – responsible for the installation and Commissioning of the Cashless Tolling System;		
	· Quality Assurance/Test Manager – responsible for consistent quality throughout the Design, Development, Testing and Implementation of the Cashless Tolling System through good Quality Assurance and Quality Control practices, and		
	· Maintenance Manager – responsible for the overall planning and implementation of the Cashless Tolling System maintenance program.		
5.1.4	**Cooperation with Other Contractors and Providers**		
750	The Contractor shall cooperate to the fullest extent with the civil designers, civil Contractors, the Commission and existing Contractors to ensure the Cashless Tolling System Implementation and Maintenance Phase do not conflict with or cause any interruption in capability, service or safety issues to the traveling public or customers, or impede the Commission's ability to collect tolls.		
751	The Contractor shall cooperate with the civil designers, civil Contractors, existing Contractors and external parties, as directed by the Commission, to support any activity related to the implementation of cashless tolling, including but not limited to:		
	· the Commission employees;		
	· the Commission designated representatives;		
	· other third parties, as directed by the Commission;		
	· law enforcement;		
	· inspectors;		
	· Auditors, and		
	· all Contractors.		
752	The Contractor shall cooperate with and immediately notify the Commission of any customer complaints and system issues identified in the Commission lanes that come to Contractor's attention during the course of Implementation, Testing or Maintenance Phases.		
753	The Contractor shall provide and maintain a current emergency contact list for the Commission's use at all times for handling emergencies and escalations. The emergency contact list shall name primary and secondary (multiple secondary contacts as applicable) points of contact for each anticipated emergency type. The emergency contact list shall name the Contractor's preferred points of contact, in order of precedence and shall include, at a minimum, the Contractor's primary Project manager, deputy Project manager, installation manager, technology manager, and other support staff. The purpose of the emergency contact list is to ensure the Contractor can be reached outside normal working hours to address urgent matters.		
5.1.5	**Monthly Report and Progress Meeting During the Implementation Phase**		
	Monthly Project reports and progress meetings will enable the Commission and the Contractor to monitor the status, progress, and quality of the Work performed on the Project and to take proactive steps to ensure successful delivery of the Project.		
754	The Contractor shall provide and maintain a schedule for monthly progress meetings (in addition to the weekly Design/installation meetings during the active Design/installation periods) at a location designated by the Commission. The meeting shall be scheduled no later than the 20th day of the following month.		
755	No less than five (5) Business Days prior to the meeting, the Contractor shall submit a draft monthly progress report to the Commission for the period covering the previous reporting period. The Commission shall review and comment on the progress report prior to the meeting.		
756	The Contractor shall obtain updated installation status prior to the monthly meeting and include such updates in the Project Implementation schedule which shall be submitted with the monthly progress report.		
757	The format of the monthly progress report shall be agreed upon as one of the initial Project tasks upon notice to proceed (NTP) and shall be incorporated by the Contractor into the Program Management Plan.		
	The monthly progress report that includes but is not limited to:		
	· a summary outlining progress and status, and percentage of Work performed for each task as compared to planned activities in the Project Implementation schedule. Comments shall be included where appropriate. The summary shall also identify key milestones met and missed in the period;		

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758	· an analysis of all critical path tasks, potential risks associated with the tasks and proposed contingency/work around plans to circumvent or mitigate delays to the Project;		
	· identification of any Approved changes to Approved milestone dates and Approved Project Implementation schedule, clearly noting the details and identifying the Contract amendment;		
	· a discussion of schedule compliance and an updated Project Implementation schedule showing current status against the baseline Approved Project Implementation schedule. Past due tasks shall be updated and actual dates shall be recorded for completed tasks;		
	· an updated action items list that tracks the status of all outstanding action items, activities and issues that need decision/resolution;		
	· an updated deliverables list showing submission dates, current version, current review status, responsible party and due date;		
	· a payment request, if applicable. Payment requests must identify the payment milestone, number and dollar amount. Payments requests shall be made for completed and Approved milestone payments only;		
	· a list of change requests (Contractor and Commission initiated) and their status;		
	· the previous monthly final meeting minutes, and		
	· a six (6) week look-ahead schedule.		
759	No more than five (5) Business Days after the meeting, the Contractor shall submit the final monthly progress report and draft meeting minutes for the Commission's review and Approval.		
5.1.6	**Project Meetings**		
760	In addition to the monthly progress meeting, weekly or bi-weekly Project status meetings, as applicable and Approved by the Commission, and other regularly scheduled installation and ad-hoc Project meetings shall be required during the course of the Project to address specific deliverables, Work items, Maintenance procedures and issues as they arise.		
761	The Contractor shall perform the following tasks related to all meetings, including but not limited to:		
	· develop and coordinate the Project meeting schedule;		
	· distribute notices of Project meetings in accordance with document control Requirements;		
	· prepare the agenda in coordination with the Commission;		
	· attend the meeting with all required staff in attendance;		
	· prepare minutes of the meeting and forward them to the Commission within five (5) Business Days after the day of the meeting and		
	· maintain an action item list for each type of meeting, identifying issues that need to be resolved at the Project level.		
5.1.7	**Project Schedule**		
	The Project schedule is a comprehensive list of Project milestones, activities and Deliverables, with intended start and finish dates, including a detailed Work Breakdown Structure (WBS) that identifies Project tasks down to the Work package level and the activities required to complete the Work package Deliverables.		
762	The Contractor shall provide and maintain a detailed Project Implementation schedule for the Project in Microsoft Project format (Project 2016 or above) that lists all Project activities and tasks for all Phases of the Project, including but not limited to:		
	· Requirements;		
	· Design;		
	· development;		
	· testing;		
	· installation;		
	· Transition, and		
	· deployment of the Cashless Tolling System at the various facilities.		
763	The Project Implementation schedule shall include coordination with civil Contractor, existing Contractors and the Commission and shall clearly document all interfacing tasks.		
764	The Project Implementation schedule shall identify all milestones and tasks, starting with the NTP through the date of Acceptance and end of Warranty for each implementation location of the Project.		
765	The Project Implementation schedule shall be resource loaded, and shall include all draft submissions and review cycles, and all tasks required of the Commission and other Contractors with critical tasks.		
766	The Project Implementation schedule shall identify all critical path tasks and shall be used to manage the Project.		

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767	The Project Implementation schedule shall include all tasks for the submission and approval of the final toll equipment layout and positioning to be provided to the Civil Designer(s) identifying the locations of all toll equipment, including conduit counts and sizing to be install in a toll zone within 60 days of NTP.		
768	The Project Implementation schedule shall identify the anticipated Go-Live date of March 31, 2020 for the conversion of Clarks Summit.		
769	The baseline for the Project Implementation schedule shall be submitted to the Commission for Approval within fifteen (15) Business Days after NTP.		
770	The Contractor shall update the Project Implementation schedule on a monthly basis, as identified in the Requirements for the Monthly progress report.		
771	The Contractor shall use the Project Implementation schedule as the basis for all subsequent schedules and updates throughout the duration of the Project.		
772	The Contractor shall obtain Approval from the Commission for any and all changes to the baseline Project Implementation schedule and associated milestones in accordance with the Contract process for changes and amendments and are not considered Approved unless an amendment is executed through the Contract.		
5.2	**End of Contract Transition**		
	The Contractor acknowledges that the Services it provides under the terms of the Contract are vital to the successful operation of the System and that said Services shall be continued without interruption. Upon termination of the Contract, a successor (the Commission or a new service provider) may be responsible for providing these Services. The Contractor agrees to exercise its best efforts and cooperation to affect an orderly and efficient transition to a successor.		
773	Upon the Commission's written notice, the Contractor shall furnish transition Services during the last ninety (90) days of the term of the Contract. The Contractor shall develop with the successor Contractor or the Commission staff, a Contract Transition Plan describing the nature and extent of transition Services required.		
774	The Contract Transition Plan and dates for transferring responsibilities for each division of Work shall be submitted within thirty (30) days of such notice. Upon completion of the Commission review, both parties will meet and resolve any additional requirements/differences.		
775	The Contractor shall provide sufficient experienced lane and Software support personnel in each division of Work during the entire transition period to ensure that the quality of Services are maintained at the levels required by this Contract.		
776	The Contractor shall provide sufficient staff to help the successor maintain the continuity and consistency of the Services required by the Contract. The Contractor shall allow the successor to conduct onsite interviews with the employees.		
777	The Contractor shall provide the necessary Software and Systems support Services to assist the successor operator in setting up the systems, transfer of appropriate licenses and third-party Software, and transition of all host data required to sustain uninterrupted service.		
5.3	**Software Design and Development Requirements**		
	The Commission expects the Contractor to propose a baseline product for the lane solution and the Cashless Toll Concentrator or Toll Host System, and that some custom development will be required. To ensure the Design Requirements for the Cashless Tolling System are fully understood by the Commission and the Contractor, a series of Requirements and Design review steps are specified following a sequential Design process or waterfall model. The Contractor shall work with the Commission and its representatives to produce a Conformed Scope of Work and Requirements Document (CSWRD). The CSWRD shall be the basis for the Contractor to produce a Requirements Traceability Matrix (RTM). The RTM allows for verification that the Requirements are addressed in the Design and documented in the System Detailed Design Document (SDDD) and traced to test procedures that validate the developed Cashless Tolling System meets the Contract Requirements. The RTM shall be the basis for all Design, development and testing efforts and documentation to be developed by the Contractor.		
778	The Contractor shall establish and maintain an effective Software Design and development program along with a documented Software Development Life Cycle (SDLC) to ensure compliance with the Requirements of the Contract.		
779	The Contractor shall employ effective techniques and methodologies to develop the System Requirements and Business Rules for the Project.		
780	Prior to conducting any workshops, requirements reviews, focus group meetings and Design reviews, the Contractor shall develop the necessary documentation for the Commission review and submit such documentation ten (10) working days prior to such meetings.		

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781	The Contractor shall provide a Table of Contents for the Design document that identifies the required document Deliverables and any document templates that will be used to develop the documentation. Such documentation shall be tailored for the Project, and the CSWRD shall be used for developing such documentation.		
5.3.1	**System Requirements Review (SRR)**		
	The Contractor shall conduct a series of System Requirements Review meetings with the Commission to outline how the Contract requirements will be met. The outcome of these meetings shall be a Requirements Traceability Matrix (RTM) that will be used to validate each Requirement against a Design item(s), Design Documentation and testing procedure(s).		
782	The Contractor shall conduct a series of System requirements reviews with user groups to identify user needs.		
783	The Contractor shall present lane logic and transaction framing rules of the baseline solution. Transaction framing logic shall be further demonstrated according to the workshops described in section 5.3.4.		
784	Contractor's existing screens and presentation formats shall be used to solicit user requirements and feedback.		
785	During the System requirements review phase the Contractor can also present the Contractor's standard product to the Commission, and use the feedback obtained in the presentation in the development of the System Requirements Document.		
5.3.2	**Business Rules Development**		
786	The Contractor shall conduct Business Rules development workshops with the Commission to develop and document the Business Rules and operational policies for the In-lane Cashless Tolling Systems and the Cashless Toll Concentrator or Toll Host (if provided) System.		
787	The Business Rules workshops can occur concurrent to the System requirements reviews.		
788	The Contractor shall provide Business Rules utilized at other cashless tolling facilities; however, they shall be tailored to meet the Commission's requirements and shall comply with the Scope of Work.		
789	The Contractor shall track the design, development and testing of the Business Rules through the RTM.		
5.3.3	**Interface Development Workshops**		
	The Contractor shall conduct a series of workshops with the Commission to facilitate the development of the Interface Control Documents (ICD) between the Contractors Cashless Tolling Systems and the existing PTC Toll Host ands CSC/VPC.		
790	The Contractor shall conduct interface control document (ICD) development workshops with the Commission to develop and document the Cashless Tolling Systems interface requirements between the Cashless Toll Systems and the existing PTC systems.		
791	The ICD workshops shall be scheduled within 60 days of NTP and are anticipated to require a minimum of 2 weeks of design.		
792	The ICD workshops can occur concurrent to the System requirements reviews.		
793	Subject matter experts must provide a means for explaining each interface, its intended purpose, data fields and components and data integrity validation.		
794	The interface requirements shall include the following data feeds that include but are not limited to:		
	· transaction data file(s) naming conventions and data format requirements for transaction files transmitted from the Cashless Tolling Systems to the existing PTC Toll Host.		
	· Image file naming requirements		
	· Detailed image file TAG (.tag) file naming conventions and data formats to the CSC/VPC		
	· Transponder status list data file naming conventions and data file formats from the existing PTC Toll Host to the Cashless Tolling Systems.		
	· interface with SAP for the transmission of monthly toll transaction GL files and GL files received from the CSC (if full Host option exercised).		
5.3.4	**Transaction Framing and Building Logic Workshops**		
	The Contractor shall conduct a series of workshops with the Commission to present the transaction building and framing process logic. The purpose of the workshops is to provide the PTC with a transparent understanding of the Contractors logic for building and framing transactions.		
795	The Contractor shall conduct transaction building workshops with the Commission to walk-thru the logic of building a transaction in the lane.		
796	The transaction building workshops shall be scheduled within 60 days of NTP and are anticipated to require 2 weeks of review.		
797	The transaction building workshops can occur concurrent to the System requirements reviews.		

Functional Requirements			
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798	Subject matter experts must provide a means for explaining how data from each lane device or subsystem is used in the framing logic and transaction building process for each vehicle.		
799	The transaction building walk-thru shall provide at a minimum but not limited to the following:		
	· Flow charts and timing diagrams to show how sensor information is associated with a vehicle.		
	· Transponder association and rules for assigning transponders to a vehicle including possible early reads, late reads and cross lane reads. Transponder association shall also include vehicles that have multiple transponders.		
	· Logic for determining vehicle classification as defined in *Attachment 4A - PTC Proposed AVC Class Structure and Silhouette* .		
	· Logic for LPICS image triggering and corresponding image association to vehicles.		
	· Straddle logic for processing vehicles that may straddle between lanes including shoulders.		
	· Degraded mode logic to describe the behavior, impacts and limitations on the transaction framing logic.		
5.3.5	**System Detailed Design Review**		
	Based on the RTM and Business Rules documents, the Contractor will Design the Cashless Tolling System and submit a preliminary Design document for the Commission to review and provide comments. The Contractor will then conduct a series of Design meetings with the Commission to address the comments and to create the System Detailed Design Document (SDDD), defining how the System Design will meet the Contract Requirements. Upon the submittal of an updated SDDD another review cycle will take place.		
800	The Business Rules document and the RTM shall be used to develop the System Design and the SDDD.		
801	The Contractor shall schedule Design meetings with the Commission to fully understand the Design Requirements.		
802	The Contractor shall support a phased Design process to support the multi-year implementation of the Cashless Tolling System on the Commission facilities. The Design process shall accommodate for the changes in technology that is inevitable given the duration of the Project.		
803	The Contractor shall demonstrate pre-production working products (such as, beta versions) during the Design review process, and stakeholders shall be walked through the workflow, utilizing screens and data flow diagrams.		
804	The Contractor shall explain how the System Design meets the RTM, the Business Rules and the Contract requirements.		
805	The Contractor shall conduct as many meetings and submission review cycles as deemed necessary by the Commission to address all Design issues to the Commission’s satisfaction.		
5.3.6	**Reports Design Workshops**		
	The Contractor will conduct a series of workshops with the Commission to facilitate the Design of the Cashless Tolling System reports.		
806	The Contractor shall employ an effective and productive methodology for Designing and finalizing the reports for the Project.		
807	The reports Design process shall be iterative and the Contractor shall conduct multiple workshops with the Commission’s stakeholders, and Contractor shall bring subject matter experts to the meeting.		
808	Subject matter experts must provide a means for explaining each report, its intended purpose, columns, fields and components and its connection with other reconciling and validating reports.		
809	Report templates from existing operational systems shall be submitted and changes to meet the PTC Cashless Tolling System requirements shall be noted. Sample reports shall have correct and accurate data and shall reconcile across other reports.		
810	Upon receiving feedback from the stakeholder, the Contractor shall develop/modify the reports and resubmit the updated reports for review.		
811	The modified and new reports shall be demonstrated to the Commission using accurate and reconciled data. Reports that are expected to reconcile to one another shall be demonstrated together.		
812	The iterative series of workshops and demonstrations shall continue until baseline reports are Approved by the Commission.		
813	The Approved baseline reports shall be used as the basis for the Design document.		
5.3.7	**Software Walkthrough**		
	The intent of the Software walkthrough is to provide an overall status on the Contractor’s Software development progress to ensure the Contractor is on track to deliver the Project on schedule and to obtain the Commission’s feedback on the direction of the development prior to the full rollout of the Software.		
814	The Contractor shall conduct a series of Software walkthroughs including product demonstrations to solicit input from the Commission during the development of the Cashless Tolling System.		

Functional Requirements			
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815	Prior to the Software walkthrough, the Contractor shall develop and submit the use cases that will be demonstrated to the Commission for review and Approval. The walkthrough shall follow the process flow and emulate normal operations.		
816	The product shall be demonstrated in a test environment that allows data to flow as it will in the final integrated System.		
817	The Software walkthrough shall demonstrate to the Commission that the developed Software product meets the technical and functional Requirements of the Contract.		
818	Comments and feedback provided during the Software walkthrough shall be documented and resolved by the Contractor and the resolution shall be Approved by the Commission.		
819	The Contractor shall be responsible for identifying and correcting any Software issues or defects in its Design or product that impact the Contractor's ability to deliver the Cashless Tolling System that meets the Contract requirements. This shall apply to issues or defects found during or after Software walkthrough or in the subsequent testing and Implementation. Any such changes shall be Approved by the Commission in writing.		
5.4	**Documentation**		
	The Contractor is required to provide various Hardware; Software; Requirements; Business Rules; Design; testing; installation, and Maintenance documentation that include Contractor-developed documentation and third-party documentation. All documentation provided under this Contract shall be specific and relevant to the system proposed to the PTC and void of extraneous information outside what is required and shall meet the requirements described below. All documentation provided shall minimize system generalities and not include system functionality that is not relevant to the PTC Cashless Tolling System(s).		
820	The Contractor shall provide and maintain an online, electronic document management system in a central location that is accessible to the Commission by username and password, to control all Project-related documents, submissions and drawings in accordance with the Commission ECO process as defined in *Attachment 12: ETC System Change Control Procedures V1.6* (or the latest Approved version per PTC) for the term of the Contract.		
821	The electronic document management system shall be indexed and searchable.		
822	All Project documents submitted under this Contract shall be available to the Commission using the online, electronic document management system provided by the Contractor at all times.		
823	The Contractor shall maintain a deliverable tracking list that accurately tracks all Contractor submissions; the Commission's comments review documents; resubmissions and final Approval.		
824	Each document shall be properly titled, date updated, numbered by revision and version, and shall incorporate signature blocks for authorship and Approvals. The Contractor shall provide a logical indexing system for ease of access for the Commission to locate documents in the electronic document management system.		
825	Updated submissions of the document shall also include the red-lined version showing all revisions to the document since the last submission.		
826	The Contractor shall utilize acceptable standards agreed upon by the Contractor and the Commission when updating documents and submitting revisions.		
827	All documentation submitted by the Contractor under this Contract shall be accurate and comply with Contract requirements. All deliverables shall be submitted in accordance with the Approved Project schedule.		
828	This requirement left intentionally blank.		
829	The Contractor shall submit a minimum of: a preliminary draft, a final draft and a one hundred (100) percent final to the Commission for review and comment. All final documents shall incorporate all the Commission's review comments to the Commission's satisfaction. Each subsequent submission of a deliverable shall also include the Commission's comments review log with the resolution of each comment updated by the Contractor.		
830	The Commission shall have the right to require additional interim drafts from the Contractor at no additional cost should the draft documentation submitted not be of adequate quality, have missing or incorrect information or if it does not satisfactorily address the Commission's review comments.		
831	The Commission shall review and Approve all documents submitted under the Contract. For documents containing less than one hundred (100) pages, the Commission will review and provide comment on preliminary draft documents within ten (10) Business Days. For documents containing more than one hundred (100) pages, the Commission will review and provide comment on preliminary draft documents within fifteen (15) Business Days. The Commission will review and provide comment on all final draft and final documents within ten (10) Business Days. When multiple documents are submitted to the Commission simultaneously, or within one week of each other, the number of Business Days required for review shall be adjusted to reflect the overlapping submissions.		

Functional Requirements			
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832	The Commission will provide the Contractor with written comments on all submitted documents, and the Contractor shall respond in writing to all comments. A meeting may be conducted to clarify and resolve any remaining questions and issues concerning the comments and responses provided. The Contractor shall prepare a revised version of the document for Approval by the Commission.		
833	The Contractor shall submit the electronic version of all Contractor developed documentation for the Commission review and Approval. Acceptable electronic formats are Microsoft Office 2016 Suite (or higher), unsecured Portable Document Format (PDF) and professional CAD applications for Contractor-prepared documentation.		
834	The Contractor shall update documentation as changes occur through the Implementation Phase (and the Maintenance Phase) and shall maintain a document submittals list on the electronic document management site identifying all versions of documents, the date submitted, the nature of changes and provide relevant updates to the Commission as they are published.		
835	The documentation package for all submittals as applicable shall include all required electronic media to install, operate and maintain the System/Deliverable/document being supplied.		
5.4.1	**Requirements Traceability Matrix (RTM)**		
836	Upon completion of the Requirements and Business Rules review process the Contractor shall deliver a Requirements Traceability Matrix (RTM) that details all the technical and functional Requirements for the Cashless Tolling System.		
837	The RTM shall build on the specifications documented in the CSWRD and shall capture all user needs identified during the Requirements Business Rules review process.		
838	Upon Approval of the RTM, this document shall be the basis for functional verification Design, development and testing.		
839	During the Design and development of the Software, the Contractor shall update the RTM to reflect any changes to the Requirements that have been Approved by the Commission.		
840	During Design and testing, the RTM shall be used to verify the System compliance to the Contract requirements and test procedures.		
841	All changes to the System requirements during the course of the Project shall be tracked through the RTM.		
842	The RTM shall include:		
	· listing and categorization of all functional requirements;		
	· listing and categorization of all Software related technical requirements;		
	· identification of the source of all requirements;		
	· identification of the Design section of the SDDD that addresses the Requirement and		
	· identification of the test procedure that addresses the Requirement.		
5.4.2	**Business Rules Document**		
	As an outcome of the Business Rules workshops and review meetings, the Contractor will provide a Business Rules Document.		
843	The Contractor shall submit a Business Rules Document that includes but is not limited to:		
	· detailed Business Rules for all aspects of the System, including policies and processes developed by the Contractor and Approved by the Commission;		
	· detailed description of all System Configurable options, ranges and thresholds (Configurable within the System or Configurable by Authorized User) for each business rule (if applicable);		
	· categorization of all Business Rules, providing indication for the source of the business rule;		
	· cross-referencing of all Business Rules to the underlying Requirements and		
	· System and operational impacts of each business rule.		
5.4.3	**System Detailed Design Document**		
844	The Contractor shall develop and submit a System Detailed Design Document (SDDD) that describes the Design specifications of all Hardware and Software provided as part of the Cashless Tolling System to meet the Approved Contract requirements. The SDDD shall demonstrate that the Contractor understands the functional, technical and performance requirements of the Cashless Tolling System and has the processes, Hardware and Software Design in place to provide a high-quality and reliable product that meets the requirements of the Contract.		
845	The SDDD shall be clear, well-written and organized into volumes to manage the submission and review process.		
846	The SDDD shall be specific and relevant to the system proposed and designed for the PTC requirements.		
847	The SDDD shall include the use of diagrams, figures and tables, and it shall apply to all environments, including primary and secondary production and testing environment.		

Functional Requirements			
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848	The SDDD shall include but not be limited to:		
	· System architecture, including overall System Design concept;		
	· in-lane Equipment layout for each zone type,		
	· lane layout electrical and logic diagrams;		
	· toll equipment building equipment rack layout and interconnections;		
	· data backup Systems Design, including sizing and processing calculations;		
	· the Requirements for all peripheral device Interfaces and control;		
	· server Design, including sizing and processing calculations;		
	· storage system Design, including sizing and processing calculations;		
	· network sizing and Design details including IP scheme and		
	· space Requirements;		
	· power Requirements;		
	· degraded mode of operations and impacts of failures on System operations;		
	· UPS sizing information detailing all Equipment on the UPS(s) and their total power Requirements including all Commission communications equipment regardless of purpose;		
	· detailed database Design, schema and entity relationship modeling, including sizing and processing calculations;		
	· high System availability Design, including Servers, storage, network, database and application;		
	· Disaster Recovery Design, including Servers, storage, network, database, data resiliency and application;		
	· Hardware dependencies and inter-dependencies;		
	· detailed infrastructure Software Design,		
	· detailed operating systems Design;		
	· detailed primary and secondary locations rack and server placement Design;		
	· detailed desktop computer Hardware configurations;		
	· detailed desktop computer Software configurations;		
	· detailed desktop peripherals configurations, including Requirements for all peripheral device Interfaces and control;		
	· all internal System Interfaces;		
	· all custom developed Software;		
	· all Software provided by the Contractor or a third party;		
	· Software dependencies and inter-dependencies;		
	· data flow diagrams, state diagrams and data queues;		
	· Module level descriptions and interaction among various Modules;		
	· detailed description to the Module and/or process level for all of the functions according to the functional Requirements of the System;		
	· lane logic and vehicle framing design and rules with illustrations;		
	· degraded mode of operations and impacts of failures on System operations;		
	· transaction audit and pre-processing;		
	· transaction processing Design, including sizing and processing calculations;		
	· detailed Interface specifications between all Software components;		
	· Design of all System Interfaces (both sides of the Interface), including electronic Interface to the existing PTC Toll Host system and the existing CSC/VPC system.		
	· formal and standard Interface Control Documents for documenting both sides of the Interface for all interfaces;		
	· detailed data management Design and processes, including summarization, archiving and purging;		
	· all user Interfaces (including reports and screen formats);		
	· System data dictionaries;		
	· application performance monitoring Design;		
	· access/identity security methodology;		
	· security access system layout and interconnections;		
	· cabinet interconnection diagrams;		
	· environmental specifications;		
	· specification sheets for all Equipment;		

Functional Requirements

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	· complete Bill of Materials, including Hardware, Software and support/Maintenance agreements;		
	· A logical division and an index of all contents within the SDDD.		
849	Upon the completion of the Software development, and prior to transitioning the Cashless Tolling System, the Contractor shall submit the Final Updated SDDD that includes all changes/clarifications made during the Software development and testing phases.		
5.4.4	**Cashless Tolling System Installation Design Requirements Package**		
850	The Contractor shall prepare and submit the Cashless Tolling System Installation Design Requirements and Documentation package to the Commission for review in accordance with the Approved Project Schedule.		
851	The Contractor shall secure the services of a fully qualified engineering design firm(s) for the purpose of providing electrical, mechanical, structural oversight, and documentation Approval for all installation drawings where applicable.		
852	All drawings shall be sealed, stamped, and certified by a Licensed Engineer of the appropriate discipline valid in the State of Pennsylvania where applicable.		
853	The Contractor shall develop a full size (24'' by 36") set of drawings providing sufficient and accurate detail to install the System components.		
854	Sealed, stamped, and certified drawings shall be provided for each site where Equipment shall be installed.		
855	In addition, the drawing shall contain notes and other detail defining specific processes that cannot be graphically depicted. The notes shall also be used to delineate specifications, tolerances, special conditions, or any other factor required to install and integrate a fully functional System.		
856	The drawings shall include but not be limited to the following:		
	· lane geometry and dimensions of actual size and placement of all Cashless Tolling In-lane Equipment;		
	· Equipment bracket mounting detail to the mounting point, including how the mounts will be brought on the platform for Maintenance, if applicable;		
	· specifications and tolerances;		
	· conduit and cable schedule showing all conduits, cables and wires used for the Cashless Toll Zones;		
	· placement of in-road components;		
	· size and depth of loop cuts;		
	· loop tolerances (such as induction, resistance, impedance, Q factor, if applicable);		
	· any specific infrastructure limitations (for example, proximity of rebar);		
	· any specific requirement of how the loop cable is placed into the cuts;		
	· all homeruns from loops;		
	· any cable twist requirements for loop homeruns;		
	· placement of overhead sensors;		
	· details describing termination process for each termination;		
	· lightning and surge suppression system;		
	· a graphical diagram of the network connectivity and data flow;		
	· detailed interconnection diagrams for all Systems;		
	· detailed electrical schematics, and		
	· detailed communications layout.		
5.4.5	**Cashless Toll Concentrator or Toll Host System Installation Design and Documentation (if provided)**		
857	The Contractor shall prepare and submit the Cashless Toll Concentrator or Toll Host System Installation Design and Documentation package to the Commission for review in accordance with the Approved Project Schedule.		
858	The Contractor shall develop a full size set of drawings (24'' by 36") providing sufficient and accurate detail to install the System components.		
859	The drawings shall include but not be limited to the following:		
	· detailed interconnection diagrams for all Systems;		
	· detailed electrical schematics;		
	· detailed communications layout;		
	· UPS sizing specifications;		
	· Equipment rack layout, including power panels and connection to the UPS;		
	· a detailed diagram of the network connectivity, including IP scheme;		
	· server set-up and configuration;		
	· other Toll Concentrator or Toll Host System Hardware installation and connections and		

	Functional Requirements		
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	· floor loading calculations.		
860	The Contractor shall provide the installation Requirements for the Equipment, including all related Plans and documents. The Contractor shall certify the installation Requirements provided as accurate and appropriate for its intended purpose, to the satisfaction and Approval of the Commission.		
861	The Contractor shall submit Server room drawings that show the location of the Equipment racks for all Cashless Toll Concentrator or Toll Host System Equipment at the primary facility. The layout of the Server components, storage devices and communication Equipment inside the cabinets shall be clearly presented with actual measurements shown.		
862	The Contractor shall submit Server room drawings that show the location of the Equipment racks for all Cashless Toll Concentrator or Toll Host System Equipment at the Disaster Recovery facility. The layout of the Server components, storage devices and communication Equipment inside the cabinets shall be clearly presented with actual measurements shown.		
863	The Contractor shall develop and submit to the Commission a full size (24” by 36”) set of drawings, providing sufficient and accurate detail to install the System components.		
864	The Contractor shall submit UPS sizing information for the primary and Disaster Recovery facilities, detailing all Equipment on the UPS and their power specifications.		
865	The Contractor shall submit detailed network drawings showing all WAN, LAN and VLAN connections, including all interface connections and IP addresses for all Equipment on the network.		
866	The Contractor shall submit detailed Server configuration instructions, including the configuration of storage devices, backup devices and network connectivity.		
5.4.6	**Quality Assurance Plan**		
867	The Quality Assurance (QA) Plan that details the Contractor’s QA Program shall be submitted to the Commission for review and Approval in accordance with the Approved Project Schedule.		
868	The QA Plan shall include the Contractor’s QA Program through planning, documentation; Design; Development; production; purchasing; testing; and installation of all Hardware and Software provided under this Contract.		
869	The Quality Assurance Plan shall describe the quality assurance procedures and methodology for the Project, including but not limited to:		
	· quality management and organizational structure;		
	· System Design;		
	· Software development and defect management;		
	· installation including civil installation sign-off;		
	· Equipment purchase, delivery and validation;		
	· inspection and verification for in-process, final assembly, unit tests and System testing;		
	· configuration management;		
	· change management and change control process;		
	· training and safety;		
	· quality management documentation;		
	· transition;		
	· compliance to Contract Requirements;		
	· quality review and verification and		
	· reporting and metrics.		
5.4.7	**Software Development Plan (SDP)**		
	The Contractor shall develop and submit a Software Development Plan (SDP) that includes but is not limited to:		
	· documentation of the Software development approach to the application architecture, behavior, architecture, business processes, security and data structures;		
	· approach System Design and Development given the Cashless Tolling System Project phasing;		
	· development resources and responsibilities, such as Software developers, system engineers, security engineers, test engineers, Quality Assurance and control personnel, configuration management administrator, documentation specialists and Project management staff;		
	· describe natural segregation of development areas or teams, such as development of user Interfaces, development of reports, development of the functionality and development of Interfaces;		
	· Software development standards;		
	· security standards;		

Functional Requirements

		Required Proposer Inputs	
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870	· Software development methodology, such as use cases, modeling and other development tools;		
	· Software development language strategy, platforms and technologies related to both development and Software Maintenance;		
	· description of the Software Development Life-Cycle and Maintenance;		
	· approach to segregation of environments (development, testing and deployment) and the number of environments;		
	· Maintenance of standard and baseline codes and management of major releases;		
	· gap analysis of baseline code to Contractor Requirements;		
	· development problem reporting, defect tracking and remediation;		
	· code reviews and code development standards;		
	· source control;		
	· informal and internal testing methodology;		
	· regression testing and security and vulnerability testing;		
	· development and integration approach for the major functional modules;		
	· Software Quality Control processes;		
	· Software end-user documentation review and usability;		
	· development documentation;		
	· technical Software code documentation and standards for all code;		
	· Software configuration and change management approach and standards;		
	· samples of detailed Software documentation for both external and in-line documentation;		
	· Software deployment approach, release management and validation and		
	· detailed documentation of the development environment, including enough information that the environment could be completely replicated.		
5.4.8	**Master Test Plan (MTP)**		
871	The Contractor shall provide to the Commission, for review, comment and final Approval a Master Test Plan (MTP) that outlines the scope and testing concepts to be used to administrator each test identified in the Contract. The MTP shall document the methodology used to validate the Cashless Tolling System compliance to the requirements and demonstrate the Cashless Tolling System satisfies Technical, Functional and Performance Requirements.		
872	The Approved Master Test Plan shall be used as the basis for the detailed test procedures that shall be submitted to Commission for review and Approval.		
873	The Master Test Plan shall cover all aspects of the In-lane Cashless Tolling System and the Cashless Toll Concentrator or Toll Host (if provided) System testing from initial development through deployment, tolling point Acceptance and Project Acceptance, including but not limited to:		
	· overall approach to testing;		
	· approach to each informal and formal testing;		
	· approach to creation of data set for each test;		
	· Regardless of AVI requirements or options, approach to transitioning to the new interoperable solution including subsystem (lane, plaza and host) testing, AVI subsystem testing (individual protocol performance up to and including all active protocols) and end-to-end integration testing;		
	· Software test automation tools utilized for each test;		
	· approach to validating all System requirements through the testing methodology;		
	· describe the entry and exit criteria for each test;		
	· document the severity and priority descriptions and levels for each test;		
	· include a detailed schedule for each test identifying each test activity and resource;		
	· describe the methodology for testing the performance requirements and sample size for each phase of testing;		
	· describe the methodology for load testing;		
	· describe the purpose; scope; duration; System resources, and human resources for all tests;		
	· approach to validating all reporting Requirements;		
	· approach to end-to-end testing, validation and Reconciliation;		
	· approach to interface testing and compliance to standards,		
	· document how defects will be triaged; tracked; reported; resolved, and retested, including tools used to document defects, and		

Functional Requirements			
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	· a set of regression test procedures that will be exercised each time Software changes are made after the Approval of the FAT.		
874	The Contractor shall provide detailed test procedures for the Commission's Approval for each test outlined in the Requirements and Approved MTP, including but not limited:		
	· test logistics including test vehicles; drivers and test equipment;		
	· test scenarios;		
	· detailed test steps with expected outcomes;		
	· test entry and exit criteria;		
	· test preparation;		
	· test data creation;		
	· periodic status meetings;		
	· all necessary human resources and		
	· all necessary Hardware and Software.		
875	The Commission's Approval of any aspect of testing shall not relieve the Contractor of its responsibility to meet the full requirements of the Contract.		
876	The Contractor shall update the RTM linking every Requirement to a set of test cases to demonstrate the Requirement has been satisfied and which test satisfied the Requirement.		
5.4.9	**Maintenance Plan**		
	The Contractor shall submit Maintenance Plans listed below that describes how the Contractor plans to facilitate the Commission in performing the Maintenance of the Cashless Tolling In-lane Systems, Cashless Toll Host System, and all Hardware at the toll equipment building in accordance with the requirements of the Contract. The Contractor shall have appropriate documentation available to all Maintenance and Software Support personnel, as required to perform their respective duties.		
5.4.9.1	**System Maintenance Plan**		
877	The System Maintenance Plan defines the approach to Services, staffing and resources to fulfill the System Maintenance requirements. The Plan shall include:		
	· organizational structure, organizational chart and job descriptions and responsibilities;		
	· detailed matrix of responsibilities (Commission and Contractor);		
	· staffing plan;		
	· approach to staffing and training;		
	· detailed System monitoring requirements;		
	· coverage and personnel locations;		
	· third party System support agreements overview;		
	· schedule of all System Maintenance activities;		
	· all System Maintenance related communication methods;		
	· Maintenance procedures, communication Protocols and approval processes for System upgrades, scheduled Maintenance activities, change management and scheduled downtime;		
	· Maintenance procedures and communications Protocols for unscheduled downtime;		
	· communication protocol for coordination with interoperable agencies and third-party entities;		
	· communication protocol for coordination with the Commission's existing Contractors;		
	· trouble reporting processes;		
	· escalation processes;		
	· spare levels and reorder thresholds, Equipment and Software warranty tracking and return material processes;		
	· monitoring the MOMS Dashboard;		
	· monitoring Maintenance performance for compliance to performance requirements;		
	· sample Maintenance reports;		
	· Equipment replacement/refresh schedule;		
	· upgrades to third-party Software and tools, and		
	· process in place to meet Maintenance performance requirements.		
5.4.9.2	**Software Maintenance and Warranty Plan**		
	Software Maintenance and Warranty Plan shall define the approach to Services, staffing and resources to fulfill the Software Maintenance and warranty requirements including but not limited to:		

Functional Requirements			
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878	· organizational structure, organizational chart and job descriptions and responsibilities;		
	· detailed matrix of responsibilities (Commission and Contractor);		
	· staffing plan;		
	· approach to staffing and training;		
	· approach to receiving and prioritizing Software defects (bugs);		
	· reporting, categorization, prioritization, remediation and disposition of Software defects;		
	· coverage and personnel locations;		
	· all Software Maintenance related communication methods;		
	· Maintenance procedures, communication Protocols and approval processes for Software upgrades, Software releases, testing, scheduled Maintenance activities, change management and scheduled downtime;		
	· Maintenance procedures and communications Protocols for unscheduled downtime;		
	· trouble reporting processes;		
	· escalation processes;		
	· sample Maintenance reports;		
	· Software updates and testing to comply with E-ZPass Group specification changes, and third party interface changes;		
	· Software and security updates, remediation and testing to be compliant to Commission Audit requirements, and		
	· process in place to meet Maintenance performance requirements.		
5.4.10	**Disaster Recovery Plan**		
	The Disaster Recovery Plan (DRP) shall be a comprehensive, documented statement of actions to be taken before, during and after a disaster to protect and recover the information technology data, assets and facilities of the Cashless Tolling System.		
879	The Contractor shall develop and submit a Disaster Recovery Plan (DRP) and subsequent Disaster Recovery Procedures that describe the approach, as well as activities and procedures that take place in the event of a disaster for each element of the Cashless Tolling System.		
880	The DRP shall document the Contractor's approach to recovering from a disaster, including but not limited to:		
	· events that constitute a disaster and party responsible for declaration of a disaster;		
	· assessment of disaster risks;		
	· mitigation of disaster risks;		
	· preparations in the event of a disaster;		
	· disaster declaration and Disaster Recovery process to invoke;		
	· organization chart illustrating Disaster Recovery team members, roles and responsibilities;		
	· notification contact list, including contact information;		
	· notification protocol;		
	· sites and Equipment for Disaster Recovery, presented in a diagram format;		
	· Disaster Recovery process initiation and completion checklist;		
	· Software and data replication processes;		
	· detailed logistical processes for activation of Disaster Recovery site and systems;		
	· detailed technical processes for activation of Disaster Recovery site and systems;		
	· detailed operational functions for activation of Disaster Recovery site and		
	· detailed technical processes for reactivation of primary site (or moving to a new primary site if the original primary site is destroyed), Operations and Systems.		
881	The DRP shall be tested no less than annually.		
882	The DRP shall include a Business Continuity Plan (BCP) that details the Contractor's approach to accommodating the personnel, Equipment, Systems, network, applications and data components required to ensure the resumption and continuity of critical Cashless Tolling System processes.		
883	The BCP, based on a Business Impact Analysis to assess the needs of the Commission business areas, shall include but not be limited to:		
	· Recovery Point Objective (RPO) maximum acceptable amount of data loss for all critical Cashless Tolling System services after an unplanned data-loss incident, expressed as an amount of time;		
	· Recovery Time Objective (RTO) maximum acceptable amount of time for restoring a critical Cashless Tolling System services and regaining access to data after an unplanned disruption;		

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	· Level of Service (LOS) the combination of throughput and functionality required to sustain Cashless Tolling System business Operations and		
	· detailed description of how site and System security will be maintained to ensure continued compliance with security requirements.		
5.4.11	**Training Program and Plan**		
884	The Contractor shall develop and maintain a training plan, subject to Approval by the Commission.		
885	The training plan shall describe the plan for training new personnel and shall outline the required operational/maintenance and system knowledge for each position to be gained from the training. For each position/user type, the plan shall include a training instructor guide, training manual and other materials to be used in training. The plan also shall include a schedule for follow-up training and continuing education for staff.		
886	The training plan shall provide a plan for cross-training staff from other areas of operations or management for peak period, emergency or temporary assignments to provide for staff redundancy. The training plan also shall include the training schedule for regular staff training and continuing education/training.		
887	The Contractor shall submit a training plan, in accordance with the Approved Project schedule, that describes the approach to training administrators, end users at different levels, Maintenance and support personnel, including but not limited to:		
	· overall description of the training program;		
	· training techniques;		
	· training delivery schedule;		
	· names and descriptions of each training class;		
	· purpose of each training class;		
	· who should attend the class;		
	· qualification Requirements for trainer;		
	· minimum qualifications for personnel attending the class;		
	· duration of the class;		
	· training materials, including syllabus, schedule, training goals, manuals, guides, other support materials and techniques to be used;		
	· data preparation, such as test Accounts and test transactions;		
	· required Equipment and		
	· facility Requirements.		
888	Courses shall be limited to a maximum of eight (8) hours per day.		
889	The Contractor shall be responsible for maintaining a training database baseline and supporting data files that can be restored at the beginning of each training session.		
5.4.12	**Third-Party Documentation**		
	Third-Party documentation includes standard commercial documentation for third-party provided Hardware, Software, services and materials.		
890	The Contractor shall catalogue all third-party documentation and include the catalogue with the third-party document submissions.		
891	The Contractor shall provide and maintain standard, commercially available, updated documentation for third-party provided Hardware, Software, services and materials provided under this Contract. This set of third-party documentation shall be retained at the Commission offices for the duration of this Contract and upon termination of the Contract.		
892	All updated documents shall show the revisions and also include a version of the clean document.		
893	An electronic copy of all third-party COTS Hardware and Software installation and user manuals, with updates, shall be provided to the Commission. Acceptable electronic formats are Microsoft Office 2016 Suite or higher, unsecured Portable Document Format (PDF) and professional CAD applications.		
894	Documentation shall include sufficient detail to describe the configuration of the Software as it was installed by the Contractor for the Cashless Tolling System. These should include any customization or modifications made to the Software or configurations specific to the Commission environments.		
895	The Contractor shall provide all Hardware and Software installation and user manuals for custom-developed (non-COTS) third-party products and services in a printable electronic format.		
5.4.12.1	**Third-Party Software Documentation**		
	The Contractor shall provide third-party Software documentation, including but not limited to:		

Functional Requirements			
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896	· all user manuals;		
	· programmer's reference manuals;		
	· warranty documentation;		
	· installation manuals;		
	· Interface documents;		
	· Maintenance manuals and		
	· any other information required to utilize the Software, such as the operating system, utilities, programming languages, application Software and communications Software.		
897	The third-party Software documentation shall be provided by the Contractor electronically in a standard and organized format, with appropriate labels, tabs and cross references to allow the Commission to easily access and reference information on each Software component on the System.		
5.4.12.2	**Third-Party Hardware Documentation**		
898	The Contractor shall provide third-party Hardware documentation, including but not limited to:		
	· all technical manuals;		
	· operator's guides;		
	· installation guides;		
	· warranty documentation;		
	· Hardware reference manuals;		
	· available options and versions;		
	· catalogs, components and		
	· illustrated parts lists.		
899	The Contractor shall provide all third-party Hardware documentation in a standard and organized format, with appropriate labels, tabs and cross references to allow the Commission to easily access and reference Hardware information on each Equipment component.		
900	Third-party Hardware documentation shall include sufficient detail to describe the configuration of the Hardware as it was installed by the Contractor for the Cashless Tolling System.		
5.5	**Manual Requirements**		
	Various manuals shall be provided as described below to allow the Commission to understand the operations of the Cashless Tolling In-lane System and Cashless Toll Concentrator or Toll Host System (if provided). New manuals developed under this Contract that are not standard commercial catalogs or manuals, shall meet the Requirements set forth in this section.		
901	The Contractor shall submit the Project manuals to the Commission for review and Approval in accordance with the Approved Project Schedule.		
902	Whenever possible, all data shall be printed on 8-1/2" x 11" sheets; foldouts shall be 11" x 17".		
903	Each manual shall include, but not be limited to:		
	· a title sheet;		
	· revision history;		
	· Table of Contents;		
	· list of illustrations (if applicable);		
	· list of reference drawings and Exhibits (if applicable) and		
	· a parts list (if applicable).		
904	All manuals shall have a consistent look and feel and shall be professionally written and presented in clear and organized fashion.		
905	All manuals prepared for the Commission under this Contract shall be produced, or editable, using Microsoft Office 2016 Suite (or higher). In addition, electronic copies of manuals shall be provided in unsecured Portable Document Format (PDF), if requested by the Commission.		
906	Any special Software required to produce scalable typefaces or other graphs shall be provided by the Contractor as part of the documentation for the manuals.		
5.5.1	**Manual Submissions and Quantities**		
907	The Contractor shall submit electronic copies of all manuals listed below.		
908	All manuals shall be maintained in electronic format in the Contractor's document management system for the term of the Contract.		

Functional Requirements			
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909	The Contractor shall be responsible for producing a quantity of the manuals for the Contractor's use, sufficient to fulfill the Contractor's Requirements under the Contract.		
5.5.2	**Manuals to be Submitted**		
5.5.2.1	**Cashless Tolling Lane Maintenance Manual**		
910	The Contractor shall submit Cashless Tolling Lane Maintenance Manual prepared for properly trained technical personnel assigned to the Maintenance of the Hardware and Software installed under this Contract on the Commission cashless tolling lanes. All manuals should be used for the training sessions. It shall document information required to support cashless tolling lane Maintenance and repair activities, including but not limited to:		
	· lane Equipment layout for each Cashless Tolling Zone Type;		
	· schematics and layouts of the Hardware in the lane cabinets, equipment racks and the interconnection diagrams;		
	· parts lists required to service each piece of Hardware installed under this Contract;		
	· general and detailed description and concepts of lane operations and functions;		
	· detailed lane monitoring activities, specialty tools and schedule;		
	· detailed Software monitoring activities and troubleshooting procedures;		
	· Maintenance instructions to repair and replace parts and modules;		
	· mechanical functions and installation of all Hardware;		
	· listing of all event and error logs;		
	· testing and basic troubleshooting procedures, and		
	· preventive and corrective Maintenance procedures.		
911	Standard service manuals for commercial products used for the Equipment shall be acceptable if they contain sufficient information to properly service the Equipment.		
912	Large-size logic diagrams and mechanical assembly diagrams do not have to be reduced or incorporated into the manuals if these drawings are provided with the manuals and presented in a useable and durable form.		
913	Photographic documentation of Equipment with appropriate labels and call-outs are satisfactory if they contain sufficient information to properly identify components, parts and features.		
5.5.2.2	**Cashless Tolling System Monitoring Manual**		
914	The Contractor shall submit the Cashless Tolling System Monitoring manual prepared for properly trained personnel assigned to monitoring the operations of the Cashless Tolling System including transmission of data and files to existing systems. All manuals should be used for the training sessions. It shall document information required to support Cashless Tolling System monitoring, including but not limited to:		
	· all Dashboards, monitoring screens, notifications and data that needs to be checked;		
	· listing of all jobs/process, their dependencies and their schedule;		
	· listing of all folders and directories that need to be checked;		
	· details related to the activity that needs to be checked;		
	· frequency of the validations;		
	· actions to take when results are not as expected;		
	· notification and escalation process;		
	· basic troubleshooting procedures, and		
	· creation of work orders in MOMS.		
915	Provide description about the tools and Software for personnel to record the monitoring activity and instructions to use the tools/Software.		
5.5.2.3	**Cashless Toll Systems Administrators Manual**		
916	The Contractor shall provide an Cashless Toll Systems Administration Manual that serves as a guide to the overall management and administration of the Cashless Toll Systems and shall include:		
	· description of the programs and processes that need to be monitored to ensure that the System is operational;		
	· procedures for validating tasks, processes and jobs have successfully completed, and errors and exceptions encountered;		
	· procedures for validating the successful transfer and receipt of files for all interfaces, including existing PTC Toll Host system and the existing CSC/VPC system;		
	· a listing of all the error codes, their meaning and potential associated problems shall be included in the manual, with a step by step guide to troubleshooting and correcting the problem;		

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	· all database Design, and database Maintenance activities required to keep the System operational shall also be clearly documented, including the scheduling of such activities;		
	· detailed procedures for backup, archiving and purging data;		
	· detailed schedule for all preventative Maintenance activities;		
	· technical contact lists for Hardware and Software providers;		
	· details and copies of all third-party system support agreements and		
	· ad-hoc reporting tools and use of the tools to generate ad-hoc reports shall be documented, and		
	· details of monitoring tools supplied by the Contractor to include but not limited to MOMS Dashboards and MOMS.		
5.5.2.4	**Cashless Toll Systems User Manual**		
	The Contractor shall develop and provide a comprehensive set of system documentation and user manuals for the Cashless Toll System users. At a minimum, the documentation shall include all user and training manuals, a reports definitions and data flow diagrams.		
917	The Contractor shall develop and submit Cashless Toll Systems User Manuals to be used by Commission staff to operate the Cashless Toll System and for training purposes.		
918	The Contractor shall develop a separate manual for each job category that details all the processes, procedures and policies developed by the Contractor and Approved by the Commission required to fulfill the Requirements of each specific job description.		
919	Each Cashless Toll Systems User Manual shall include but not be limited to:		
	· screen images detailing the step-by-step activities needed to fulfill a specific functionality;		
	· flowcharts to provide Commission staff a clear understanding of the workflow;		
	· all screens, reports and data fields, clearly explained using sample formats applicable to the Cashless Toll Systems and		
	· samples of all reports, included in the manual or as an attachment to the manual, with any specific instructions that may apply to a given report.		
5.5.3	**As-Built Documentation**		
	Prior to the Commission Acceptance of each tolling location of the Project, As-Built documentation shall be provided that documents the final Cashless Tolling System Design and implementation.		
5.5.3.1	**System Detailed Design Document**		
920	After the Approval of the Operational Test and prior to the Commission Acceptance of the Cashless Tolling System, for each tolling location of the Project, the Contractor shall submit the As-Built System Detailed Design Document (SDDD) that includes all Software and Hardware changes made during the System development, implementation, and testing phases.		
921	The Contractor shall submit an electronic version of the As-built SDDD in a printable format Approved by the Commission.		
922	The Contractor shall update the latest as-built SDDD should any changes be made to the system design after System Acceptance as a result of functional upgrades or Approved change orders during the Contract period.		
5.5.3.2	**As-Built Drawings**		
923	The Contractor shall provide to the Commission a complete set of As-Built drawings which shall be delivered in a readily printable in full and half size formats from the electronic format Approved by the Commission for all Equipment installed and furnished under this Contract.		
924	As material changes are made to the System the Contractor will be required to update the as-built drawings to reflect the current status.		
925	The sets shall include, but not be limited to:		
	· all schematics;		
	· logic diagrams;		
	· layouts;		
	· wiring diagrams;		
	· interconnection diagrams;		
	· all attachment Hardware details;		
	· installation diagrams;		
	· cable schedule;		
	· Interface details;		

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	· facility build-out details and		
	· network diagrams, so as to provide a complete record of the as-built status of the Equipment.		
926	All drawings for revisions to standard commercial assemblies or components for the Equipment shall be included in the As-Built drawing set.		
927	All As-Built drawings shall contain a table of contents that shall include a listing of all drawings with headings for drawing number, drawing title, revisions number and date, and the type of material list, wiring diagram, wire list, specification control drawing, or similar categories.		
928	The Contractor shall update the latest drawings with red lines as changes are incorporated during the installation process. At the completion of the installation, the Contractor shall gather all red line drawings.		
929	The red line drawings shall be verified and incorporated into a final as-built drawing package. This final as-built package shall include all updated installation drawings, shop drawings and sketches, Plans and other drawing types that were used to install the Cashless Tolling System.		
930	All other documentation used regarding the installation also shall be finalized and submitted as part of the as-built submittal.		
931	The Contractor shall update and resubmit the latest as-built drawings should any changes be made to the system design or configuration after System Acceptance during the Contract period including interoperability and multiprotocol updates.		
5.6	**Quality Assurance Program**		
	The Contractor shall establish and maintain an effective Quality Assurance (QA) program on all aspects of the Cashless Tolling Project to ensure compliance with the Contract. This Quality Assurance Plan will detail the process and procedures instituted by the Contractor to ensure the QA program is in place.		
932	The Contractor shall establish and maintain an effective Quality Assurance (QA) program that ensures adequate quality throughout all areas of Cashless Tolling Project Contract performance.		
933	All supplies and services under this Contract, whether manufactured or performed within the Contractor's facilities or at any other source, shall be controlled by the Contractor at all points necessary to ensure conformance to the requirements of the Contract.		
934	Purchase, delivery, verification, testing and assembly of Equipment, Hardware and Software conducted within the Contractor's facilities and on-site shall be controlled completely by the Contractor.		
935	Delivery, verification, testing and assembly of Servers and network Equipment conducted within the Contractor's facilities shall be controlled completely by the Contractor.		
936	The QA program shall provide for the prevention and ready detection of discrepancies and for timely and positive corrective action.		
937	The QA program shall include effective Quality Control of purchased materials and Subcontracted Work.		
938	The Contractor shall make objective evidence of quality conformance readily available to the Commission, and the Commission shall have the right to review and verify the Contractor's compliance to the process.		
5.6.1	**Records**		
939	The Contractor shall maintain records or data essential to providing objective evidence of quality until the expiration of the Contract and these records shall be made available to the Commission upon request.		
940	Quality-related records and data shall include but not be limited to:		
	· inspection and test results;		
	· records of Subcontractor QA programs;		
	· cost records pertinent to Acceptance of nonconforming material;		
	· inspection check-off of civil Contractors work;		
	· change request documentation;		
	· Design reviews and walkthroughs and		
	· results of internal and Contractor audits.		
941	Records shall be maintained in a manner that shall allow for access and analysis of the status of the overall QA Program and in a format as defined in Section 5.4 Documentation.		
5.6.2	**Control of Purchase**		
942	The Contractor shall be responsible for ensuring that all supplies, components, developmental tools, assemblies, subassemblies, and Services procured from Subcontractors and vendors conform to the technical requirements and Contract.		

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943	The Contractor shall have a quality control process in place for tracking and handling non-conforming Equipment and products.		
944	The Contractor's responsibility includes the establishment of procedures for the selection of qualified Suppliers. In selecting qualified Suppliers, the Contractor shall ensure that the Subcontractors and vendors control the quality of the supplies and Services provided.		
5.6.3	**Handling, Storage and Delivery**		
945	The Contractor shall document the approach to assembly of the Equipment, including the location where Equipment and Systems are assembled.		
946	The Contractor's QA Program shall provide for adequate and documented handling, storage, preservation, packaging, and shipping instructions to protect the quality of products.		
947	Commission assets, as defined by the Commission during the design process, shall be tracked and entered into the MOMS inventory and the cost and location of each asset shall be recorded.		
948	All assets designated by the Commission shall have an inventory tag or labeling mechanism for the electronic data entry and tracking of Commission equipment by location and cost within the MOMS, subject to Approval by PTC during the design process. The tagging or labeling mechanism shall be readily and efficiently available to Authorized staff and automatically updated in MOMS.		
949	Any unique or special requirements applicable to procured items shall be delineated in the procurement documents. All procurement documents shall be made available to the Commission upon request.		
5.6.4	**Inspection at Subcontractor-Vendor Facilities**		
950	The Commission reserves the right to inspect, at the source, supplies or services not fabricated or performed within the Contractor's facility.		
951	The Commission's inspection shall not constitute acceptance, nor shall it in any way replace the Contractor's inspection activity or relieve the Contractor of the responsibility to furnish an acceptable end product.		
5.6.5	**Access to/Inspection of Contractor's Facilities**		
952	Upon request, the Commission or its designated representative shall have access to the Contractor's facilities and personnel.		
953	This access may be restricted to those portions of the facilities and personnel involved with or who are otherwise performing Work under this Contract.		
954	Such access shall be for the purpose of inspecting the facilities; verifying progress; inspection of materials; Work-in-progress; or finished goods, or verifying test performance or results.		
955	The Commission's inspection shall not constitute Acceptance or Approval, nor shall it in any way replace the Contractor's inspection activity or relieve the Contractor of the responsibility to furnish an acceptable end product.		
5.7	**Cashless Toll Systems Training**		
	The Contractor shall provide comprehensive training for all aspects of the Cashless Tolling System, including but not limited to the operations, system monitoring, problem detection and resolution, audit, and Maintenance of the Cashless Tolling System.		
5.7.1	**Overview of Training Program**		
956	The Contractor shall be solely responsible for supplying all items necessary, including but not limited to training documentation, Software, Hardware and any other Equipment required to complete the delivery of the training program.		
957	The Contractor's program shall include but not be limited to instruction, models, manuals, diagrams and component manuals and catalogs as required.		
958	Where practical and useful, the Contractor's training shall be hands on and use actual Cashless Toll Systems Software in the training environment.		
959	The Contractor shall produce all training materials and manuals of the latest documentation in electronic form to be used and printed for future training sessions.		
960	The Contractor shall record training sessions to allow the Commission employees to remotely attend training sessions using WebEx or other online tool.		
961	The Contractor shall ensure the Commission or their representatives have the right to attend any training sessions and to make video and audio recordings of training sessions and copies of all training program materials for their use in training new employees.		

Functional Requirements			
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962	The Contractor shall obtain releases from all employees/Subcontractors to allow unlimited, royalty free use and copies of personal identity information (PII) compliant recordings and provide the same to the Commission upon request.		
5.7.2	**Training Requirements**		
963	The Contractor shall provide the following training courses for the Commission’s personnel, including but not limited to the provision of all training manuals (including Contractor- provided manuals or relevant portions thereof), guides, training aids, as well as student and instructor work books accompanying the courses listed in the sections below.		
964	The Commission may require additional courses be offered or additional personnel be provided training. The Contractor shall accommodate these requests to the extent possible with on-site personnel and documentation that is readily available.		
965	Lane level training shall include an overview of generation of subsystem events and creation of transaction data and their flow through the System.		
966	All Cashless Toll Systems training shall include a review and description of each of the appropriate Cashless Tolling System processes and procedures with actual Cashless Toll Host System Software. All students shall have their own workstation and interact directly with the training environment.		
5.7.2.1	**System Operation Overview**		
967	The Contractor shall provide a System operation overview training course for the Commission’s management personnel who require a general understanding of all aspects of the operation, including but not limited to personnel from senior management, procurement, information technology, marketing and public information.		
968	The system operations training shall include an overview of all aspects of the Cashless Tolling In-lane System and Cashless Toll Systems including DVAS, MOMS, cashless tolling operations, interface to the existing PTC Toll Host system, existing CSC/VPC system, System Maintenance, network, and any other operational area of the Cashless Tolling System.		
969	System Operation Overview training will be conducted in one session with a minimum class size of ten (10) people, for a minimum of eight (8) hours.		
5.7.2.2	**Audit and Reconciliation and Cashless Toll Host System Operations**		
970	The Contractor shall provide an audit and reconciliation training course for the Commission’s auditing staff to understand all aspects of the operation, particularly those related to reconciliation, audit and management.		
971	Course shall include training all personnel who require a detailed understanding of the operations of the Cashless Toll System and how to access and view information and reports from the System on items such as status, alarms, performance, transactions and revenue.		
972	Audit and reconciliation training will be conducted in one (1) session with a minimum class size of five (5) people, for a minimum of four (4) hours.		
5.7.2.3	**System Monitoring Staff Training Program**		
973	The Contractor shall ensure the System monitoring staff (PTC Operations Group) are properly trained in the requirements of monitoring the Cashless Tolling System and its uninterrupted operations.		
974	Training on the Cashless Toll Concentrator or optional Toll Host shall include the maintenance activities provided by the Contractor to provide PTC personnel an understanding of the routine maintenance activities such as monitoring of system logs and Cashless Toll Host System Concentrator maintenance alarms; confirmation of file transmissions; confirmation of system backups.		
975	The Contractor shall provide a minimum of one (1) weeks of classroom and on-the-job training (OJT) to all personnel in their respective area of responsibility before such personnel are assigned monitoring duties.		
976	The Contractor shall provide documentation this initial training has been successfully completed.		
977	The Contractor shall provide various training programs that include but are not limited to:		
	· an in depth explanation of the Cashless Tolling Operations, including all Interfaces, file/data transfers and interconnections;		
	· functions of the monitoring and tools used to manage monitoring tasks;		
	· functions of the MOMS;		
	· Cashless Toll Systems logs, error logs and processing of exceptions;		
	· system dataflow and workflow queues;		
	· explanation of the Dashboard data and analysis;		
	· special use and monitoring tools and		

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	· queries and reports.		
978	All System monitoring personnel shall attend the training sessions. The Commission's technical staff also shall attend all training sessions.		
979	The Contractor shall keep accurate training records on all Maintenance and Software support services personnel. The Commission shall be permitted to review and verify Maintenance and Software support services personnel qualifications and training records at any time. Evidence of completion of training by Contractor personnel shall be provided to the Commission upon request.		
5.7.2.4	**Cashless Toll Systems Administration**		
980	The Contractor shall provide a System Users training course for all personnel who require a detailed understanding of the management, troubleshooting and administration of the interfaces, Software, database, applications, configurations and architecture of the Cashless Toll Systems.		
981	Cashless Toll Systems Administration training will be conducted in one (1) session with a minimum class size of five (5) people, for a minimum of eight (8) hours and on-the-job training (OJT) to all personnel in their respective area of responsibility before such personnel are assigned administration duties.		
5.7.3	**Training Facilities**		
982	The Contractor shall conduct training at the classroom facilities at the Commission administrative building for all training and at designated locations identified by the Commission. Following review of Contractor's Training Plan, the Commission will confirm that it has the requisite space to accommodate the level of effort and physical requirements for each training session.		
5.7.4	**Scheduling and Preparation for Training**		
983	It shall be the Contractor's responsibility to provide sufficient notice to the Commission on the types of training it will provide and the timing for each training session. The Commission will identify a list of participants that Contractor shall notify to schedule their participation in the training.		
984	The Contractor shall perform all scheduling activities and shall make every attempt necessary to accommodate the maximum number of persons for each training session given scheduling conflicts. Contractor shall provide sufficient notice to allow participants a reasonable lead time.		
985	The Contractor shall notify the Commission of the dates or range of dates it would like to hold a training session at the Commission offices and shall coordinate with the Commission Information Technology (IT) office and Administrative Services staff to arrange the proper classroom setting and computer Hardware and Software are installed and the space configured for each training session.		
5.7.5	**Training Materials**		
986	Draft copies of all training materials shall be submitted to the Commission for review, comment and Approval, prior to final printing of quantities required for training.		
987	The Commission shall have the right to require additional interim drafts at no additional cost should draft training materials submitted not be of adequate quality or have missing or incorrect information.		
988	For each course described in the section above, Contractor shall provide the materials listed below.		
5.7.5.1	**Instructor Guides**		
989	The Contractor shall provide an instructor guide for each training course. The guide shall include the following elements:		
	· course agenda;		
	· course objective;		
	· procedures for managing training session;		
	· resource and facilities required, including work stations, power and communications requirements;		
	· detailed lesson plans;		
	· a description of training aids and items to aid in on the job performance (e.g., where applicable, pocket guides or reference sheets);		
	· test to be administered to assure satisfactory completion;		
	· instructions for using any audio-visual support Equipment or materials and		
	· student survey to obtain feedback on the training sessions and the training materials.		
5.7.5.2	**Training Aids**		
990	The Contractor shall provide training aids such as mock-ups, scale models, overhead displays, video demonstrations, and simulations as are necessary to successfully complete the course agenda and meet the course objective.		
991	The Contractor shall provide users a way to access training documents, aids and tips in an online, electronic format.		

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5.7.5.3	**Student Workbook**		
992	For each course, the Contractor shall provide a student workbook, including but not limited to:		
	· course agenda;		
	· course objectives;		
	· schedule of sessions;		
	· copies of all overheads and visuals and		
	· lesson outlines and summaries.		
993	Materials such as operations and user manuals may be used to supplement the material provided in the student workbook.		
994	To the extent that the user manuals (and training aids) are appropriately detailed and fit for training purposes they shall be used for training. If the Commission deems they are not sufficiently detail then supplementary training material shall be provided.		
995	If such material is used appropriate cross-references shall be included in the Student Workbook so as to identify the complete set of training materials provided to the student.		
5.7.6	**Training Room Set-up and Software Installation**		
996	Contractor shall be responsible for loading any special Software required on the classroom computers (provided by the Contractor).		
997	It is the Contractor's responsibility to ensure that the Software is operating as expected on each of the classroom computers.		
998	It is also the Contractor's responsibility to ensure that appropriate communications are in place.		
VI	**Cashless Tolling System Testing Requirements**		
6.1	**Cashless Tolling System Testing Concept**		
	The Commission has employed a phased approach to deploying cashless tolling on the Commission toll facilities. Given the extended duration of the Project, and the potential differences in the various In-lane System solutions, the Contractor shall conduct the following tests.		
999	Various tests (outlined for reference immediately below and with detailed Requirements in subsequent sections) shall be prepared and conducted by the Contractor, including but not limited to:		
	· factory acceptance test (FAT)		
	· onsite first installation test (OFIT) at baseline tolling points;		
	· installation and Commissioning test at baseline tolling points, and		
	· Operational and Acceptance test at baseline tolling points to be identified by the PTC.		
6.1.1	**General**		
	The Requirements described in this section detail the labor, materials, facility, and support Services necessary to test the In-lane Cashless Tolling System and the Cashless Toll Concentrator or Toll Host System (if provided) and its interface to the existing PTC Toll Host system and the existing CSC/VPC system.		
	The Contractor shall prepare and conduct tests that validate adherence to the Requirements that guided its Design and development, compliance to Approved Design and Business Rules and demonstrate the Cashless Tolling System functionality.		
1000	The Contractor shall be responsible for all aspects of testing performed as part of the Contract and to provide all necessary resources and facilities to conduct all tests including but not limited to:		
	· test support personnel;		
	· varying vehicle types and drivers;		
	· test facilities;		
	· test equipment, tools and safety devices;		
	· test schedule and test sequence;		
	· coordination with existing Contractors;		
	· coordination of lane closures and		
	· conducting the test.		
	The Contractor shall to the extent possible, develop and use specialized automated testing Software to, including but not limited to:		
	· create test scripts;		
	· control the automated testing;		
	· exercise all conditions, configurations and scenarios;		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	**Comments**
No.	**Requirements**	**Existing (E) - Met by current system, no modifications required** **Modification (M) - Modifications needed to meet requirement** **Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs** **To Be Developed (D) - Not in current system, but will be developed** **Not Provided (N**) - Will not be provided - requires explanation**	**If "Status of Functionality = N" then Proposer must provide an Explanation in this Column**
1001	· conduct performance testing;		
	· conduct security testing;		
	· conduct regression testing;		
	· compare actual test outcomes to expected outcomes;		
	· test reporting;		
	· conduct load testing;		
	· conduct user Interface testing;		
	· conduct stress testing;		
	· WAN traffic testing;		
	· conduct sustained operational testing and		
	· conduct sustained burn-in testing.		
1002	The Contractor shall provide a defect tracking system, accessible by the Commission, to document and track all defects identified as part of Cashless Tolling System testing and any subsequent actions taken to correct and retest those defects.		
1003	The defect tracking system shall be capable of the following, including but not limited to:		
	· rating (severity) defects;		
	· categorizing defects;		
	· prioritizing defects;		
	· logging the date/time the defect was reported;		
	· subsystems and test cases impacted by the defect;		
	· the user who reported the defect;		
	· the erroneous behavior;		
	· the details on how to reproduce the defect;		
	· the developers who worked on the defect and corrective action taken;		
	· date the defect was corrected and formally re-tested;		
	· life-cycle tracking and		
	· reporting.		
6.1.2	**Testing Sequence and Logistics**		
1004	The Contractor shall obtain Approval from the Commission and shall have met the entry conditions prior to start of each test, including but not limited to:		
	· Approval of all predecessor tests;		
	· Approved test procedures for each individual test;		
	· Approved test schedule;		
	· successful closeout of all outstanding pre-test issues;		
	· successful dry run testing with results provided to the Commission;		
	· submittal of the latest Approved version of the RTM showing test validation against the requirements and		
	· confirmation that both site and System are ready for testing.		
1005	After the completion of each test, the Contractor shall submit for the Commission’s review and Approval a test report that documents the results of the test.		
1006	The test report shall address the following, including but not limited to:		
	· the test summary;		
	· the results of the test;		
	· any anomalies and issues identified;		
	· the corrective action/resolution of each item;		
	· the test data;		
	· calculations and backup data supporting compliance to requirements;		
	· comments provided by the Commission and		
	· the results of any re-tests necessary to successfully complete each testing phase		
1007	The Commission shall participate in the testing and witness each test. The Commission shall have full access to the test data and results of the test. Test data and results shall be stored on Commission QA/Test Servers.		
1008	Testing will not be considered complete by Commission until all anomalies and “punch-list” items are closed-out, and the final test report is Approved by the Commission.		
1009	Testing shall occur per the above requirements, subject to Commission’s Approval of the final Master Test Plan.		

Functional Requirements			
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6.2	Factory Acceptance Test (FAT)		
1010	The factory acceptance test (FAT) shall be conducted by the Contractor at the Contractor's facility in actual lanes with the complete test Cashless Tolling System in accordance with the Approved MTP described in Section 5.4.8 Master Test Plan (MTP), detailed testing procedures and Project schedule. The FAT test site shall remain available through throughout the term of the Contract for testing and validating changes, fixes and enhancements to the Cashless Tolling Hardware and Software.		
1011	The test configuration shall be representative of the Contractor's cashless tolling solutions.		
1012	The FAT shall be conducted by the Contractor to verify that all functional elements of the Cashless Tolling System are in conformance with the Contract Requirements.		
1013	Upon the successful completion of the FAT exit criteria and Approval of the FAT by the Commission, the Contractor shall be given the authorization to move forward to the On-site First Installation Test.		
1014	The FAT shall validate that the Cashless Tolling System Hardware meets the Requirements of the Contract including but not limited to:		
	· 72 hour burn-in testing for customized and assembled Hardware and		
	· certification of Hardware compliance to environmental requirements.		
1015	The FAT shall validate that the Cashless Tolling In-lane System meets the Requirements of the Contract including but not limited to:		
	· accurate assignment and proper framing of each vehicle through various traffic conditions and test scenarios;		
	· accurate capture of images and association of transponders and images to the correct vehicles;		
	· compliance to accuracy requirements;		
	· all exception processing requirements;		
	· correct application of Business Rules;		
	· degraded mode scenarios;		
	· all device failure conditions;		
	· rush-hour traffic scenarios;		
	· redundancy;		
	· mobile enforcement requirements (if option is exercised);		
	· DVAS capabilities;		
	· throughput and load testing using simulated data;		
	· interface to the facility server (if provided) and/or Cashless Toll Concentrator or Toll Host System (if provided), and		
	· transaction and image reconciliation.		
1016	The FAT shall validate that the Cashless Toll Concentrator or Toll Host System (if provided) meets the Requirements of the Contract including but not limited to:		
	· user interface;		
	· Dashboards;		
	· Cashless Toll Concentrator or Toll Host functions;		
	· MOMS;		
	· transaction audit;		
	· correct application of Business Rules;		
	· system performance;		
	· reporting;		
	· redundancy;		
	· system loading;		
	· compliance of Cashless Toll Concentrator or Toll Host System interface to Approved ICDs, and		
	· OCR/ALPR (if the option to implement OCR/ALPR is exercised).		
6.3	Onsite First Installation Test (OFIT)		
1017	The OFIT shall be conducted by the Contractor at the on-site locations identified by the Commission that are representative of the two gantry concepts; the overhead structures and the toll gantries in accordance with the Approved MTP, detailed testing procedures and Project schedule.		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	Comments
No.	Requirements	Existing (E) - Met by current system, no modifications required Modification (M) - Modifications needed to meet requirement Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs To Be Developed (D) - Not in current system, but will be developed Not Provided (N**) - Will not be provided - requires explanation	If "Status of Functionality = N" then Proposer must provide an Explanation in this Column
1018	The OFIT shall verify the full functionality of the Contractor's Approved solution and its compliance with the Contract requirements and the Approved Design in a controlled, onsite environment using transactions created during live traffic operations and when lanes are closed to traffic. During OFIT testing the system shall be open to live traffic in a test environment and not collecting tolls.		
1019	For OFIT the interface to the Cashless Toll Concentrator or Toll Host System (if provided) and the image server(s) shall be in the test environment.		
1020	The testing shall not interfere with the existing system or impact lane operations.		
1021	Before the commencement of the OFIT, all Equipment and Software that are required under the Contract shall be in place, in a production environment and configured for revenue operations. The interfaces to the existing PTC Toll Host system and the existing CSC/VPC system shall be connected to the respective test environments as Approved by the Commission.		
1022	In order to test the full functionality of the MOMS and System Monitoring during OFIT, all Equipment shall be entered into the System prior to the start of OFIT and the MOMS shall be configured for cashless tolling operations.		
1023	The Contractor shall test the vehicle throughput and speed requirements and generate the required number of transactions to prove the System can process transactions accurately and meet the performance requirements.		
1024	Performance requirements shall be verified using Approved sample size.		
1025	The OFIT shall validate that the Cashless Tolling In-lane System meets the Requirements of the Contract including but not limited to:		
	· operations of in-lane Equipment and their ability to report failures to the MOMS including the UPS;		
	· multi-lane multi-vehicle traffic conditions such as rush-hour traffic (bumper to bumper), vehicle straddling/changing lanes/merging;		
	· accurate assignment and proper framing of each vehicle;		
	· accurate capture and correct association of transponders and images to the correct vehicle;		
	· transaction processing during equipment failures, and degraded modes of operation;		
	· performance requirements using live traffic and controlled vehicles;		
	· Redundancy as defined in this Scope Of Work;		
	· receive and process TSL, VEL (if exercised) and toll rate schedules (if applicable);		
	· DVAS functionality;		
	· E-ZPass Group interoperability using interoperable test accounts;		
	· lane Business Rules and		
	· interface to the Cashless Toll Concentrator or Toll Host System (if provided) or facility servers and the existing CSC/VPC system.		
1026	An Audit of the lanes shall be conducted using live (not simulated) in-lane traffic to verify that the Cashless Tolling System is processing vehicles accurately and transactions can be reconciled in the System using the audit tools Approved by the Commission.		
1027	The OFIT shall validate that the Cashless Toll Concentrator or Toll Host System (if provided) meets the Requirements of the Contract including but not limited to:		
	· functionality of the Cashless Tolling and MOMS Dashboards shall be verified as it applies to transactions, alarm and failure monitoring;		
	· all failure conditions;		
	· user interfaces and toll collection management functions;		
	· Cashless Toll Business Rules;		
	· reconciliation of transactions and revenue;		
	· Cashless Toll reports;		
	· Ad-hoc reporting capability;		
	· accuracy of performance reports;		
	· interface to the facility server (if applicable);		
	· interface to the existing PTC Toll Host system and the existing CSC/VPC system including reconciliation;		
	· conformance with performance, load and stress test requirements;		
	· security requirements;		
	· archival and purging requirements;		
	· MOMS asset management; failure notification; work order tracking and performance reporting;		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	Comments
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	· Cashless Toll Host System redundancy requirements including the demonstration of a failover and recovery from the primary to secondary Toll Concentrator or Toll Host (if provided), and		
	· Cashless Toll System data resiliency requirements.		
1028	As part of the OFIT, an end to end testing shall be conducted that validates the following functionality, including but not limited to:		
	· System's ability to process and post transactions to the Cashless Toll Concentrator or Toll Host System (if provided) and on to the existing PTC Toll Host Systems and existing CSC/VPC system, and		
	· The successful transfer of images from the In-lane Systems to the image server(s) and on to the existing CSC/VPC system;		
6.4	**Installation and Commissioning Test**		
1029	The Installation and Commissioning test shall be conducted by the Contractor on each lane as a part of the Contractor's Cashless Tolling System installation in accordance with the Approved MTP, detailed testing procedures and Project schedule.		
1030	The Installation and Commissioning test shall validate the functionality and operational status of the lanes including installation and configuration of all Equipment and Software. The lane operations shall be verified end to end upon the completion of the installation checkout prior to opening the cashless tolling lanes for revenue collection.		
1031	During the Installation and Commissioning test every piece of in-lane Equipment and its interface to the zone controller shall be verified to be fully operational. The zone controller, its interface to the Cashless Toll Concentrator or Toll Host System (if provided) and the transmission of images to the existing CSC/VPC system via the image server(s) shall be validated to ensure that the interfaces are in place and the Cashless Tolling System is ready for revenue collection.		
1032	A Commissioning test shall be conducted on the Cashless Toll Concentrator or Toll Host System (if provided) and shall include the image server(s) and the interfaces to the existing CSC/VPC system and the existing PTC Toll Host system.		
6.5	**Cashless Tolling System Operational and Acceptance Test**		
1033	The Cashless Tolling System Operational and Acceptance test shall be conducted by the Contractor at each Cashless Tolling plaza location of the Cashless Tolling Project in accordance with the Approved MTP, detailed testing procedures and Project schedule.		
1034	The Cashless Tolling System Operational and Acceptance Test shall be conducted for each Cashless Tolling implementation upon authorization by the Commission to commence such testing. The Cashless Tolling System shall be observed in live revenue operations by the Contractor and the Commission for a minimum of four (4) calendar months.		
1035	The objective of the Cashless Tolling System Operational and Acceptance Test is to ensure that the Cashless Tolling System Software and Hardware functions over the test period with limited manual intervention in live operations. It is intended to confirm that the Cashless Tolling System and the network are sized and configured correctly and data is processed without interruption.		
1036	The Cashless Tolling System Operational and Acceptance Test shall validate the interface of the Cashless Tolling System to the existing PTC Toll Host system and the existing CSC/VPC system and reconcile the transactions and images end to end.		
1037	The Cashless Tolling System Operational and Acceptance Test shall validate the operation and accuracy of the Cashless Tolling System common to the Commonwealth of Pennsylvania.		
1038	During the test period, System accuracy, performance of the system and operations shall be validated including:		
	· all System accuracy requirements specified in the Contract using representative sample size for each facility under test;		
	· all maintenance performance requirements;		
	· all system performance requirements;		
	· a two hour vehicle audit during AM and PM peak hours for a total of four (4) hours on each lane at each tolling point that is part of the Cashless Tolling location in test;		
	· transaction processing in accordance with Commission Business Rules;		
	· correct classification of vehicles and assignment of toll and		
	· monitoring of all interfaces for the accurate transfer and processing of all records.		
1039	System reliability and auditability shall be verified manually and through tools and reports provided in the System.		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	**Comments**
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1040	Dashboards and reports shall be verified daily for accuracy and reconciled to operations and interface files. Queries and detailed reports shall be generated to validate the daily, weekly, monthly, yearly and comparative reports and compared to reports.		
1041	The alarms displayed on the MOMS and all interface status notification shall be verified to be accurate.		
1042	Failure of the Cashless Tolling System to meet a performance requirement shall result in the restart of that particular test until such time the accuracy requirements are met.		
1043	The Cashless Tolling System Operational and Acceptance Test shall be repeated until the Commission is satisfied that the Cashless Tolling System meets the Contract requirements as set forth in the Contract at each tolling point.		
1044	The Cashless Tolling System Operational and Acceptance Test shall be conducted on the baseline tolling points after toll zone commissioning and upon authorization by the Commission to commence such testing. The Cashless Tolling System shall be observed in live revenue operations by the Contractor and the Commission for a minimum of two (2) monthly audit cycles.		
6.5.1	**Cashless Tolling System Acceptance**		
1045	Upon the successful completion of Operational and Acceptance Test for the Cashless Tolling System for each implementation of the Cashless Tolling Project, the closure of all punch-list items and completion and submission of all Contract required documents as set forth in the Contract, the Contractor shall be given the Acceptance for the Cashless Tolling System for each Cashless Tolling implementation.		
VII.	**Maintenance and Software Services**		
	The Contractor shall provide all Maintenance and Software Support Services associated with the Cashless Tolling System throughout the term of the Contract as further set forth in this Scope of Work and detailed in *Attachment 10: Maintenance Responsibility Matrix* . The requirements described in this section detail the Hardware Maintenance and Software and Administrative Support Services for the Cashless Tolling System including any existing Equipment integrated into the Contractor's solution. The Commission will provide Maintenance and Support Services for the Wide Area Network (WAN). Maintenance for the Cashless Tolling In-Lane Systems and Cashless Toll Concentrator (if provided) shall be the responsibility of the Contractor staff. Monitoring of the Cashless Toll Concentrator will be performed by Contractor personnel 24x7. This includes onsite monitoring of system logs and Cashless Toll Concentrator maintenance alarms; confirmation of system backups, and deploying third-party security software updates.		
7.1	**Cashless Tolling System Warranty Program**		
1046	The Contractor shall be responsible for the implementation and administration of a Warranty Program for all Hardware, Contractor Software and third-party Software provided under this Contract.		
1047	The Contractor shall maintain warranty records and service agreements for all Hardware and third party Software in MOMs, and shall review Software upgrades and available patch reports to keep the Cashless Tolling System current.		
7.1.1	**Hardware/System Warranty Program**		
1048	The Hardware Warranty period for all Equipment furnished under this Contract except server Hardware shall be for a period of one (1) year, commencing on the date of Approved installations of each tolling location.		
1049	In the one (1) year Hardware Warranty period, Warranty Maintenance shall include all Services required to maintain the System Hardware at required performance levels.		
1050	In the Warranty period the Commission shall not be charged for any Services related to Maintenance beyond those associated with force majeure events such as vandalism, relocation of Equipment at the request of the Commission, or damage clearly caused by events outside the control of the Contractor, as set forth in the Contract.		
1051	All Equipment mounting Hardware and brackets provided as a part of this Scope of Work shall be warrantied for the Contract Term.		
1052	The one (1) year Warranty on any additional Approved installed and replaced Hardware and Equipment shall commence when the Hardware and Equipment are installed.		
1053	The Contractor shall take all reasonable and prudent steps to ensure that all Hardware and third party Software used by the System is supported by the third party vendor and all warranties remain in effect.		
7.1.1.1	**Server Hardware Warranty and Support Services**		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	**Comments**
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1054	All server Hardware shall have a full manufacturer’s Warranty and support services for a period of minimum five (5) years beginning with the Acceptance of the Cashless Tolling System for the Cashless Toll Concentrator or Toll Host (if provided) and for the server Hardware at each tolling point beginning with Acceptance at that tolling point.		
7.1.1.2	**Third Party Software Warranty**		
1055	All third party Software shall have a full manufacturer’s Warranty and Upgrade Services, which shall be no less than a period of five (5) years beginning with the Acceptance of the Cashless Tolling System.		
7.1.1.3	**Software Warranty**		
1056	The Cashless Tolling System Software shall have a full Warranty against defects and failures beginning at System Acceptance through the end of the Contract Term subject to the applicable provisions within the Agreement.		
7.2	**General Description of Cashless Tolling System Maintenance and Software Support Services**		
1057	The Contractor shall provide one hundred (100) percent of the Cashless Tolling In-Lane Systems and LAN Maintenance Services.		
1058	The Contractor shall provide one hundred (100) percent of the Cashless Toll Concentrator or Toll Host System (if provided) Hardware, Software, Database and System Administration Maintenance Services including operating system and Software security updates through a coordinated effort with the Commission.		
1059	Hardware Maintenance Services under this Contract shall be for a period as set forth in the Contract from Acceptance of each Cashless Tolling plaza location of the Project. The first year of Hardware Maintenance for each Cashless Tolling plaza location shall be covered under the System Warranty Program as set forth in Section 7.1.1.		
1060	The Contractor shall provide Software Maintenance Services as described in this Scope of Work.		
1061	Software Maintenance and Support Services under this Contract shall be for a period as set forth in the Contract from Acceptance of the Project. A Software Warranty shall be provided for the term of the Contract as set forth in Section 7.1.1.3.		
1062	The Contractor shall be responsible for supporting and maintaining the Cashless Tolling System for any time period in which the System is installed, Commissioned and placed into revenue service but has not passed required testing until such time as the Warranty Period commences. The Maintenance of the Cashless Tolling System provided under this Contract prior to start of Warranty is not included in the term of the Maintenance and Software Support Services.		
1063	This requirement left intentionally blank.		
1064	The one (1) year Cashless Tolling System Warranty for each implementation shall commence after the Acceptance of each implementation of the Cashless Tolling Project. The one (1) year Cashless Tolling System Warranty on all other new tolling points deployed by the Contractor shall commence after the Acceptance of the Cashless Tolling System for each subsequent implementations of the Cashless Tolling Project. The one (1) year Cashless Toll Concentrator or Toll Host System (if provided) Warranty shall commence after the Acceptance of the base Contract implementation of the Project.		
1065	All changes and modifications to the Cashless Tolling System shall be Approved by the Commission and shall follow the Commission *Attachment 12 - ETC System Change Control Procedures V1.6* .		
1066	The Services and Work performed under the Contract are considered highly confidential and the Contractor personnel shall at all times comply with the Commission security and privacy requirements. Contractor employees shall not discuss their Work with unauthorized personnel or any individuals not directly associated with the Commission.		
7.3	**Cashless Tolling System Maintenance and Software Support Services - Contractor**		
	The Maintenance and Software Support Services shall include monitoring; preventive; pervasive; corrective; security related and emergency Maintenance Services and certain upgrades and enhancements to be performed on all elements of the Cashless Tolling System. Payment for Maintenance and Software Support Services on the Cashless Tolling System for each Cashless Tolling point implemented of the Project shall commence after the expiration of the one-year Cashless Tolling System Warranty Period. The Contractor shall provide the following Cashless Tolling System Maintenance and Software Support Services at the levels defined in Section VII.		
7.3.1	**Cashless Tolling In-lane Systems Hardware Maintenance and Software Support Services**		
	Upon the completion of the Warranty Program at each Approved tolling point, the monitoring and Maintenance functions described below shall be performed by the Contractor.		
1067	During and after the Warranty period the Contractor shall maintain the spare parts inventory in the MOMS and update accurate Equipment inventory status in the MOMS.		

Functional Requirements			
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1068	The PTC Operations Group shall monitor the System for failures and alarms, and confirm a MOMS work order has been created for each failure as defined regardless of Maintenance Level.		
1069	The Contractor shall automate the MOMS work order process to the maximum extent possible to anticipate and automate work orders. If a MOMS work order has not been created, the Contractor or the PTC Operations Group shall create a work order in MOMS and assign it to a technician for Maintenance action or troubleshooting.		
1070	The Contractor shall perform the necessary Maintenance and close the MOMS work order upon confirmation that the failure has been successfully corrected. The Contractor shall notify the PTC Operations Group that the repair action is complete and work order has been closed.		
1071	The Contractor shall perform all daily, weekly and scheduled preventive Maintenance on all Cashless Tolling In-lane System Hardware.		
1072	Equipment racks and panels shall be inspected and maintained by the Contractor in full operational, orderly condition, and free of debris and dirt.		
1073	The Contractor shall inspect and maintain all Contractor provided equipment mounting Hardware and brackets provided as a part of its Scope of Work and shall also inform the Commission of any potential problems.		
1074	The Contractor shall inspect and test cables, wiring and terminations to detect problems and degradation. Any item not in compliance with Contract requirements shall be replaced by the Contractor at no cost to the Commission unless such failure is considered non-chargeable as described in Section 2.5.4.2 Non-Chargeable Failures.		
1075	The Contractor shall maintain the Cashless Tolling In-lane System local area network that includes all Contractor network connections in the toll equipment building and interconnections between the toll equipment buildings as defined in *Attachment 3b: PTC Communications Network Responsibilities* .		
1076	The Contractor shall provide monitoring and troubleshooting as part of Maintenance Services for the Cashless Tolling In-lane System including, but not be limited to:		
	· zone controllers;		
	· AVI system;		
	· AVC system;		
	· LPICPS components and controllers;		
	· OCR/ALPR Software(if the option to implement OCR/ALPR is exercised);		
	· facility servers and Software (if provided);		
	· DVAS cameras;		
	· all cables, wiring, junction boxes, and terminations;		
	· all conduits and cable trays;		
	· all In-lane System electronics and controllers;		
	· Contractor supplied LAN equipment and		
	· all In-lane Contractor and third-party Software.		
1077	All System administrative functions, if not automated, shall be performed by the Contractor at regular intervals as part of the System preventive Maintenance Services according to the Approved Maintenance Plan to ensure System performance is optimized. All such System administrative functions shall be scheduled as preventive maintenance work orders through MOMS and tracked.		
1078	Continuous monitoring of System operations shall be performed by the Contractor in conjunction with the Commission to verify System is functional; security posture is adequate; processes are being executed as scheduled; files are transmitted as specified, and System is operating to Contract performance requirements.		
1079	Continuous monitoring by the Contractor shall include but not be limited to:		
	· confirming and verifying receipt of all the MOMS messages and Alerts;		
	· verifying the MOMS is receiving and processing System events and reporting the correct status;		
	· evaluating sample transactions data for exception;		
	· confirming data transmission to the Cashless Toll Concentrator or Toll Host System (if provided);		
	· confirming image and transaction transmission to the existing CSC/VPC systems;		
	· performing routine diagnostics on all in-lane subsystems;		
	· verifying processes, programs and scheduled jobs are successful;		
	· reviewing comparative reports to identify System degradation;		
	· confirming successful transfer of transponder status list to the lanes;		
	· reviewing OCR/ALPR results (if the option to implement OCR/ALPR is exercised) and poor quality images;		
	· monitoring the DVAS video and event data;		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	Comments
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	· reviewing sample images;		
	· correcting identified performance issues;		
	· evaluating storage requirements;		
	· verify time synchronization is occurring as configured and System clocks are not drifting beyond acceptable threshold, and		
	· reviewing error logs and Alerts.		
1080	The Contractor shall perform vulnerability scans using a tool such as Tenable/Nessus, Qualys or other commercial vulnerability scanning tool of the Cashless Toll System and produce ensuing reports at the request of the Commission.		
1081	The Contractor shall monitor for intrusion attempts and prevent all unauthorized access and intrusions at all levels and report such events to the MOMS. Any intrusion, compromise or breach must be reported to Commission IT Security within 12 hours of detection.		
1082	The Contractor shall monitor notifications and initiate corrective actions upon Commission approval on the Cashless Tolling System to meet requirements.		
1083	The Contractor shall perform any Maintenance, daily, weekly, or periodic, required to maintain the System at required performance levels (for example: archival and purging in accordance with the Commission's retention policy).		
1084	The Contractor shall update all Software drivers to meet any new standard Operating Systems as they become available and such updates shall be deployed in accordance with Commission standards.		
1085	The Contractor shall retrieve data manually from the zone controllers and download transponder status list and toll rate and schedule files in the event there is an extended communications failure.		
1086	The Contractor shall re-establish or re-install System files, programs and parameters, as required, following a failure or damage to the System and return lanes to fully operational condition.		
1087	In the event of a declared disaster the Contractor shall perform procedures as needed and return lanes to fully operational condition.		
1088	The Contractor shall perform OCR/ALPR updates as required in accordance with the Commission ECO procedures within an Approved Commission time frame to support license plate changes if the option to implement OCR/ALPR is exercised.		
1089	As part of the Software Support Services the Contractor shall develop and test Software as required to accommodate corrective action, changes to Business Rules or lane configurations in accordance with the Commission ECO procedures. Scope shall include provision of evidence packages and release notes detailing changes for Commission review and Approval, installation of new Software and confirmation of successful installation.		
1090	The Contractor shall analyze daily and weekly trends to identify problems, including but not limited to:		
	· high number of transactions without transponder;		
	· high number of Class Mismatch transactions;		
	· abnormal changes in traffic counts and class;		
	· high number of exceptions or unusual occurrences;		
	· high number of invalid Transponder transactions;		
	· abnormal changes in transponder counts and status changes and		
	· high number of rejected images.		
7.3.2	**Cashless Toll Concentrator or Toll Host System (if provided) Server and Database Administration, Maintenance and Software Support Services**		
	The requirements in this section describe the services to be provided by the Contractor under the Maintenance and Software Support Service for the Cashless Tolling System.		
1091	The Contractor shall provide Maintenance and Software Support Service for all elements of the Cashless Toll Concentrator or Toll Host System including but not limited to:		
	· Cashless Toll Concentrator or Toll Host System Hardware;		
	· operating systems;		
	· databases;		
	· application Software;		
	· third-party Software patches;		
	· security updates;		
	· Software configuration and		

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	· Software version control.		
1092	The Contractor shall provide continuous 24x7 system administration services coverage on the Cashless Toll Concentrator or Toll Host System, if off-site or Cloud location, to ensure that it is performing and will continue to perform at a satisfactory level.		
1093	The Contractor support staff shall be available on-call 24x7 to investigate and perform maintenance for those failures escalated to the Contractor.		
1094	System administration services shall include monitoring and corrective action to ensure System performance is in accordance with requirements of this Scope of Work. This shall include but is not limited to:		
	· monitoring Cashless Toll Concentrator or Toll Host System Hardware (if provided) at the primary and secondary locations including servers; storage devices and backup systems;		
	· verifying processes, programs, and scheduled jobs are successful;		
	· confirming all transactions and images are successfully transmitted to the receiving Systems;		
	· confirming all messages described in the ICD are being successfully exchanged between the Cashless Tolling Systems, existing CSC/VPC systems, and existing PTC Toll Host system;		
	· confirming applications are functional and available to Authorized Users;		
	· confirming all scheduled reports are successfully generated and available to Authorized Users;		
	· verifying all processes are functioning and data and images are moving successfully though the queues;		
	· verifying all third-party interface are functioning and successfully exchanging files;		
	· scheduling of preventive, corrective and predictive Maintenance activities;		
	· performing any daily, weekly, or periodic Maintenance required to maintain the System at required performance levels (for example: indexing and tuning databases; and purging in accordance with the Commission's retention policy);		
	· maintaining and updating records of all Maintenance events and activities in the MOMS;		
	· performing third-party Software or firmware upgrades in conjunction with the Commission, as required and to be compliant to security requirements including but not limited to performing security Software upgrades, database upgrades and operating system upgrades at offsite or Cloud locations;		
	· support upgrades performed by the Commission for third-party Software or firmware as required to be compliant to security requirements including but not limited to performing security Software upgrades and operating system upgrades at PTC Data Centers;		
	· contact with the Commission, operations and Contractors regarding System issues, performance, security posture, Software Release and Maintenance scheduling;		
	· performing Approved manual actions, adjustments and updates to the System data based on predefined criteria to correct issues and as Authorized by the Commission;		
	· re-establishment or re-installation of System files, programs and parameters, as required, following a failure or damage to the System;		
	· monitoring of error logs and System logs;		
	· restoration testing of backups (Software and data) to be performed yearly in coordination with the Commission with the results reported back to the Commission.		
	· Maintenance of up-to-date Software backups (all System Software and data);		
	· installation of new Software and confirmation of successful installation;		
	· verifying time synchronization is occurring as configured and System clocks are not drifting beyond acceptable threshold;		
	· assisting Commission administrative staff as requested by the Commission;		
	· troubleshooting Cashless Tolling System issues;		
	· creation of Ad-hoc reports requested by the Commission;		
	· generation of queries as requested by the Commission, and		
	· analysis of data as requested by the Commission.		
	Software support services shall include monitoring and corrective action to ensure System performance is in accordance with requirements of this Scope of Work, to include database management and operation. This shall include, but is not limited to:		
	· investigation and analysis of errors and exceptions and taking corrective action including correcting the problem and reprocessing the data;		
	· monitoring of notifications, and initiating corrective actions on application programs to meet requirements;		

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1095	· updates to the Cashless Tolling System and application to support upgrades to Hardware or third-party Software;		
	· updates to the Cashless Tolling System and application to support all changes to Business Rules and Cashless Tolling System configurable parameters, and deploy changes in production according to Commission Approved deployment schedule;		
	· updates to the Cashless Tolling System and application to support changes to E-ZPass Group ICD including the addition of new E-ZPass Group Agencies;		
	· updates to the Cashless Tolling System and application to support the addition of new Interoperable Agencies;		
	· updates to the Cashless Tolling System and application to support changes to continue its compliance to updated security requirements, and		
	· updates to the Cashless Tolling System and application to support legislative and statutory changes.		
1096	As part of the Software Support Services the Contractor shall develop and test Software as required to accommodate corrective action, changes to Business Rules or lane configurations in accordance with the Commission ECO procedures. Scope shall include provision of evidence packages and release notes detailing changes for Commission review and Approval, installation of new Software and confirmation of successful installation.		
7.4	**Cashless Tolling Network Maintenance Support Services – Commission Responsibility**		
	Commission technical staff will provide Maintenance Support Services for the Commission Toll System WAN Network as specified in this section.		
	Commission technical staff will maintain and monitor the WAN system that includes:		
	· connection of the PTC Primary Data Center to the network equipment at the toll equipment building at each tolling point location;		
	· connection of the PTC Primary Data Center to the CSC/VPC primary and disaster recovery locations;		
	· connection to the existing PTC Toll Host locations and		
	· operating system and Software patching levels for the Commission provided network equipment security postures.		
	The Commission will upgrade and update the network security to ensure the Commission network is always in compliance with updated security standards.		
7.5	**Updates to Maintenance Plan and Other Maintenance Related Documentation**		
1097	The Contractor shall update the Maintenance Plan and other Maintenance documentation to reflect any changes to the policies or procedures developed by the Contractor and Approved by the Commission, for the Cashless Tolling System Maintenance services. The Maintenance Plan shall be updated and uploaded to the online System documentation library every year for review and Approval. However, sections of the Maintenance Plan or its Appendices shall be submitted for review and Approval as the changes are identified. A version update sheet shall be included with the Maintenance Plan, and the Maintenance Plan on file shall have the most recent version from the configuration management database.		
7.6	**Maintenance Requirements**		
7.6.1	**Preventive Maintenance**		
1098	The Contractor shall provide and perform onsite Preventive Maintenance on the Cashless Tolling In-lane System Hardware, Cashless Toll Concentrator or Toll Host System Hardware (if provided), Contractor LAN communications equipment and Software in accordance with the Approved Preventive Maintenance plan.		
1099	The Contractor shall inspect all Contractor installed Equipment, both major components and support components (fans, equipment racks, storage units) that constitute the Cashless Tolling System and shall make such repairs; cleaning; adjustments, and replacements of components as necessary to maintain the Equipment in normal operating condition in accordance with the Approved Preventive Maintenance plan.		
1100	In addition to required ongoing Contractor monitoring the servers and data processing units shall be actively monitored by the Contractor to verify that storage space is not reaching limits, disks are not fragmented or damaged, Software being used is of latest version per the configuration management and data is being processed and transferred in an appropriate manner.		
1101	Transaction and image processing volumes and times shall be monitored at the lane by the Contractor and Systems optimized for performance with Commission Approval.		
1102	Report generation times, System access times, and System response time shall be monitored by the Contractor to ensure performance meets the Contractual requirements.		

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1103	The Contractor shall include all Equipment and Systems as part of the Preventive Maintenance in accordance with the original Equipment manufacturer's guidelines. Any variations or exceptions shall be noted by the Contractor and Approved in advance by the Commission.		
1104	Preventive Maintenance shall be performed by the Contractor during the normal working hours when Maintenance technicians are scheduled to be onsite. Diagnostic aids, tools and Equipment Approved by the Commission to perform Preventive Maintenance equipment analysis shall be provided by the Contractor, as necessary.		
1105	Preventive Maintenance requiring lane closure shall be scheduled by the Contractor for off-peak travel periods; evenings; Saturdays, and Sundays and coordinated with the Commission, so that the Work shall not interfere with normal traffic flow, unless otherwise Approved by the Commission.		
1106	The Contractor shall provide a Preventive Maintenance schedule, to be Approved by the Commission, as part of the Maintenance Plan. The schedule shall detail the preventive Maintenance to be performed on each Equipment item and system. The schedule shall provide a description of the Work to be performed, expected duration and the frequency.		
1107	The preventive Maintenance schedule shall be entered by the Contractor into the MOMS and work orders shall be automatically created to alert Contractor staff of required preventive Maintenance. Failure of the Contractor to perform required preventive Maintenance in accordance with the Approved schedule shall result in liquidated damages, as specified below in the Maintenance Performance Requirements Section 7.22.		
7.6.2	**Predictive Maintenance**		
1108	The Contractor shall establish a Predictive Maintenance program by which failure analysis can be determined by identifying potential failures through the MOMS records. The failure analysis shall take into account either or both specific components and sub-systems. This information shall then be used to investigate and correct problems and failures that could disrupt toll collection operations.		
1109	The Contractor shall maintain all failure analysis documentation on site and provide the information, including charts or other analysis tools and shall submit the analysis as part of its monthly report.		
7.6.3	**Pervasive Maintenance**		
1110	The Contractor shall establish a Pervasive Maintenance program by which failure analysis can be determined by identifying continuing or repetitive failures through the MOMS records. The failure analysis shall take into account either or both specific components and sub-systems. This information shall then be used to investigate and correct problems and failures that continue to occur on a particular item of equipment, sub-system, or component.		
1111	The Contractor shall maintain all failure analysis documentation on site and provide the information, including charts or other analysis tools and shall submit the analysis as part of its monthly report.		
7.6.4	**Corrective Maintenance**		
1112	All Work performed by the Contractor to correct problems to meet the requirements of the Contract or Software defects shall be considered as Corrective Maintenance and shall be corrected based on priority level within the time specified within this scope of work under Maintenance Coverage and Response Times. Such problems include but are not limited to:		
	· failure of System functions;		
	· failure of processes and programs;		
	· report issues;		
	· application failures;		
	· toll system network issues;		
	· inadequate security posture;		
	· degraded System or component performance, and		
	· non-conforming availability or MTBF.		
1113	Corrective action that require modification to the Software shall be reviewed by the Commission and corrections deployed in accordance with Approved release notes and Commission schedule.		
1114	The Commission shall be notified before any corrective Maintenance is performed.		
1115	Notwithstanding the foregoing, for repeated failure of Equipment, components, or Systems, the Contractor shall undertake an investigation as outlined in Section 7.6.3. If the problem is determined by the Commission to be a pervasive defect, the Contractor shall be responsible for the replacement and repair of the problem Equipment, component, or System at no additional charge to the Commission.		
7.6.5	**Onsite Corrective Maintenance for Cashless Toll Concentrator or Toll Host System (if provided)**		

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1116	Upon the confirmation that a failure/work order requires Onsite Corrective Maintenance, the Contractor shall submit a request to the Commission for Approval to perform the Onsite Corrective Maintenance in accordance with the of the Commission ECO process.		
1117	The Contractor shall submit a schedule for performing the Onsite Corrective Maintenance and coordinate all travel with the Commission.		
1118	Upon Authorization to perform the Onsite Corrective Maintenance, the Contractor shall initiate the Work. An authorized Commission representative shall be notified when the Contractor personnel is onsite at the Cashless Toll Concentrator or Toll Host facility performing the corrective action.		
1119	The details of the Work shall be recorded in MOMS by the Contractor and upon verification of the corrective action by the Commission, the Contractor Work on this corrective action item shall be considered complete.		
7.6.6	**Upgrades and Enhancements**		
1120	Upgrades and enhancements required for reasons such as to meet changes to standards, statutes or interoperability changes (Equipment, software changes to accommodate TSL, ICD or regional interoperability hub changes) or the addition of new functionality; or, that provide the Commission with a demonstrable benefit in performance, costs or productivity, shall be proposed with costs and schedule by the Contractor in accordance with the requirements of the Commission ECO process, as set forth in the Contract.		
1121	Software modifications that are required to maintain and support the System as a part of the normal course of business such as version changes, configuration or parameter changes or minor changes to Software or code such as changes to the existing ICDs; or Software modifications required to ensure System is compliant to specified standard (for example security) or, changes that improve the Contractor's ability to maintain and support the System, shall not be considered upgrades or enhancements and shall be provided by the Contractor at no cost to the Commission. All such Software modifications shall be in accordance with the of the Commission ECO process.		
7.7	**Maintenance Coverage and Response Times**		
1122	The Contractor shall post a weekly schedule identifying personnel and times for onsite and on-call Maintenance. Commission Approval is required for any change in Contractor staff. The Contractor shall provide to the Commission the updated active personnel list and contact information when there is a change in personnel.		
1123	Response to calls and repair times shall be determined by priority as described below. Contractor failure to meet the response and repair time criteria described below shall result in liquidated damages as specified in Section 7.22.		
1124	Regardless of onsite or on-call, acknowledgement of receipt of notification of a Maintenance issue or human acknowledgment of a failure shall not exceed thirty (30) minutes after the failure notification was recorded or problem was reported.		
1125	Priority of failures shall be defined during the Design phase. Time to respond and complete repair are determined by priority and is defined as follows:		
	· Priority 1: Defined as any malfunction or fault or Software defect that results in the immediate loss of revenue; security breach; closure of lanes outside of the Commission lane closure requirements; hazard to personnel or driving public; loss of audit data; loss of redundancy in any redundant System components; loss of functionality that impacts E-ZPass Group Agencies or failure that negatively impacts Lane or Cashless Toll Concentrator or Toll Host System (if provided) operations.		
	o For In-lane Systems Maintenance this priority shall have a two (2) hour time to respond and complete repair.		
	o For Cashless Toll Concentrator or Toll Host Maintenance this priority shall have a two (2) hour time to respond and complete repair. In the event Onsite Corrective Maintenance is required, this priority shall have two (2) hour time to complete repair once Approval to commence Work is provided by the Commission and Maintenance personnel is onsite and ready to perform the repair. The Contractor shall make every effort to be onsite within twenty-four (24) hours of Approval to commence Work.		
	· Priority 2: Defined as any malfunction or fault that degrades the System performance but not the operational ability of the System. It includes, but is not limited to inaccurate reporting, inability to reconcile revenue or loss of System functionality that impacts access to data.		
	o For In-lane Systems Maintenance this priority shall have a four (4) hour time to respond and complete repair.		

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	o For Cashless Toll Concentrator or Toll Host Maintenance this priority shall have a four (4) hour time to respond and complete repair. In the event Onsite Corrective Maintenance is required, this priority shall have two (2) hour time to complete repair once Approval to commence Work is provided by the Commission and Maintenance personnel is onsite and ready to perform the repair. The Contractor shall make every effort to be onsite within forty-eight (48) hours of Approval to commence Work.		
	· Priority 3: Defined as any action or event that has the potential to result in a malfunction or degrading of the System performance but has not impacted performance and is not anticipated to immediately impact performance.		
	o For In-lane Systems Maintenance this priority shall have a twenty four (24) hour time to respond and complete repair.		
	o For Cashless Toll Concentrator Maintenance this priority shall have a twenty-four (24) hour time to respond and complete repair. In the event Onsite Corrective Maintenance is required, the Contractor and the Commission shall agree on the time period for onsite correction but time to respond and complete repair shall be no longer than three (3) Calendar Days of Approval to commence Work.		
1126	For Priority 1 and Priority 2 failures the Contractor shall provide dedicated resources until the issue has been resolved to the Commission's satisfaction.		
1127	Outages and tasks performed under the Preventive Maintenance period shall be defined as Priority 4. The System shall be available and fully operational within the Approved time schedule for such activities and upon completion of the Preventive Maintenance period. Any failures generated or resulting from Preventive Maintenance activities shall be accounted for as Priorities 1, 2 or 3 and be addressed in accordance with these requirements.		
1128	Response and Repair time is defined as the combined time from when failure occurred or problem was reported to when the repair or correction of the failure occurred; the period of time beginning when the failure occurred (failure time) and ending when the fault condition is corrected and returned to normal operations.		
1129	Response and repair times for every Maintenance event shall be recorded in the MOMS and reported and such reports shall be provided to the Commission in accordance with the reporting requirements of this Scope of Work.		
7.8	**Notifications**		
1130	The entry of a problem (either by the System or an Authorized User) into the MOMS shall constitute the start of the acknowledgment time for purposes of measuring the Contractor's acknowledgment time and response/repair time.		
1131	For purposes of measurement of performance and for the development of Maintenance policy and procedures, notification of System malfunctions, problems and discrepancies may be provided to the Contractor in three (3) different methods, summarized below.	▨	▨
	· Verbal Notification: Defined as an in-person notification or telephone call. In all cases, the first conversation with, or notification of the Contractor shall signify the start of the response time for purposes of measuring the Contractor's response time. All verbal notifications shall be recorded in MOMS by the Contractor.		
	· Written Notification: Defined as a written description of a problem or condition, typically provided by the Commission or its representative. Written notification could be faxed, texted, or emailed to the Contractor by a customer or user. The time of receipt of fax, message or email shall signify the start of the response time for purposes of measuring the Contractor's response time. All written notifications shall be recorded in MOMS by the Contractor.		
	· MOMS Notification: Defined as an automatic notification through the MOMS identifying a problem within the Cashless Tolling System that is the Maintenance responsibility of the Contractor and sending out an automatic Alert message by email or text to a Contractor's Maintenance staff to respond to the failure. In addition to the Contractor notification, the Alert shall be posted on the MOMS and available via reports. The presence of a MOMS notification in the System shall constitute the start of the response time for purposes of measuring the Contractor's response time.		
7.9	**Recording of Maintenance Activities**		
1132	The Contractor and the Commission shall utilize the MOMS for initiating the work orders. MOMS shall be utilized for recording and tracking all Maintenance and Software Support Services performed on the Cashless Tolling System. All Equipment provided under this Contract shall be tracked through MOMS from the purchase to their disposal.		
1133	In all cases, it shall be the Contractor's responsibility to log all reported Maintenance activities into the MOMS. The Contractor shall also be responsible for documenting all information and issues related to a failure condition, including all actions taken to complete the correction into the MOMS.		

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1134	The work order shall contain as much information as possible in order for persons other than the technician or his supervisor to reasonably determine the fault, when it was worked on, the corrective action and any other information pertaining to the individual Maintenance event, including replacement of parts.		
1135	All performance metrics shall be recorded and tracked through the MOMS and compliance to performance requirements shall be validated using MOMS reports.		
1136	It is the Contractor's responsibility to ensure that its Maintenance staff has real time access to the MOMS and that all the required connections are established and ongoing to ensure that the Maintenance staff has remote access. Maintenance staff shall be trained in the use of the MOMS.		
7.10	**Spare Parts**		
1137	Contractor shall be responsible for the inventory of all spare parts at an Approved storage facility(ies) and shall be insured in this regard as set forth in the Contract. The Contractor shall account for all spare parts and shall provide safeguards against theft, damage, or loss of the spare parts.		
1138	The Contractor shall ensure that only spare parts and equipment required to service the Cashless Tolling System and LAN communications spare equipment are stored at this facility and shall only be used for the PTC Cashless Tolling System.		
7.10.1	**Spare Parts Inventory Management**		
1139	The Contractor shall be responsible for the Maintenance of an adequate spare parts inventory. The Contractor is responsible for monitoring and identifying the existing spare parts inventory, ordering spare parts as required, and proposing the quantity needed to maintain the required performance.		
1140	The Contractor shall update and recommend a spare part quantity to be maintained in order to support the Cashless Tolling System functionality and operational readiness.		
1141	The Contractor shall hold the Commission harmless in the event spare parts or consumables are not available as a consequence of the Contractor's failure to purchase or replenish the spare parts or consumables Approved by the Commission.		
1142	During the term of this Agreement (including after the expiration of any applicable warranty periods) the Contractor shall be responsible for purchasing all miscellaneous repair items and consumable materials necessary to maintain the Cashless Tolling System at the performance levels specified in the Contract.		
7.10.2	**Spare Part Inventory and Tracking**		
1143	The Contractor shall be responsible for recording the inventory into the MOMS, monitoring the inventory quantity and ensuring that the inventory is maintained to the levels required.		
1144	The Contractor shall keep accurate records of all parts entering and leaving inventory including but not limited to: time and date part was dispensed, and the location within the Cashless Tolling System where the part was dispatched and used.		
1145	The Contractor shall also be responsible for tracking of all warranty replacement for Contractor provided Equipment through returned materials authorization (RMA) process. If the replaced part is under warranty, the part shall be immediately replaced with a new part. If the replaced part is out of warranty, the Contractor shall make every effort to repair the replaced item to a usable status and place the part back into spares inventory.		
1146	If the Contractor is unable to repair the part, a new part shall be purchased and placed into spares inventory. The details of the repair efforts, including problem; status; inventory, and repair disposition shall be included in the MOMS inventory and repair database.		
7.10.3	**Procurement and Control of Spare Parts**		
1147	Thirty (30) days prior to placing the Cashless Tolling System in revenue collection the Contractor shall have purchased and have on hand at Commission facilities the agreed upon inventory of spare parts.		
1148	The spare parts shall be purchased on behalf of the Commission and shall be invoiced at the time of installation and owned by the Commission in a manner to ensure that the Commission receives the maximum benefit from any warranties associated with the spare parts. After the warranty period, the Commission shall reserve the right to purchase all spare parts directly from the source and all purchases will be coordinated through the Commission Procurement Office. After the Warranty period, Contractor provided spare parts not purchased directly by the Commission shall be provided at cost, shall not include any mark up and shall be in accordance with the agreed to Contract price. The Commission shall be under no obligation to buy back excess spare parts purchased by the Contractor.		

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1149	The Contractor shall cooperate with and assist the Commission to ensure that all spare parts, equipment, and other Commission owned property is stored or otherwise located on the Contractor’s property or in Contractor controlled space shall not be subject to any risk of being confiscated, claimed, attached, withheld by a landlord, creditor, or similar risk.		
1150	This cooperation includes, but is not be limited to, affixing appropriate labeling to track within MOMS and identify as the property of the Commission, with a Commission specific part or control number. All spare parts and consumables shall be maintained by the Contractor free and clear of any liens and encumbrances of any kind. The Commission shall have the right to inspect the spares and consumables inventory upon request.		
1151	The facility and storage area shall be secured and connected to an up-to-date security network system with alarm notification provided to the Contractor’s Maintenance staff. Further, it is required that the Commission shall have full and unrestricted access to the Maintenance and or storage facility.		
1152	Any spare parts that are lost or damaged due to the negligence, intentional act, or omission of the Contractor or its employees, Subcontractors, agents, or invitees shall be replaced by the Contractor at its sole cost. The Commission may elect to assume responsibility at any time for storage of spare parts, and the Contractor shall deliver all spare parts to the Commission for storage after receipt of reasonable notice from the Commission.		
7.11	**Repair Depot**		
1153	The Contractor shall be responsible for providing and staffing a repair depot for the return and repair of Cashless Tolling System components.		
1154	The Contractor shall be responsible for repairing failed Cashless Tolling System components and returning them to the spare parts inventory.		
1155	Failed components shall be tracked by the Contractor utilizing MOMS, including final resolution. Component tracking shall include but not limited to the following: receipt, repair date/information, replace reason, date of return.		
1156	The Contractor shall indicate the details of the repairs performed on any components. This shall include but not be limited to boards and connectors replaced.		
1157	If the replaced part is under Warranty, the part shall be immediately replaced with a new part by the Contractor. If the replaced part is out of Warranty, the Contractor shall make every effort to repair the replaced item to a usable status and place the part back into spares inventory. Except for pervasive defects, for out of Warranty components, the Contractor shall document why the component could not be repaired and advise the Commission that a new spare must be ordered.		
7.12	**Audits**		
1158	The Contractor shall completely support the Commission in any audit activity relating to the PTC’s Cashless Tolling System or operations. In addition, the Contractor shall conduct audits in accordance with the Contractor’s Quality Assurance Program. All deficiencies identified through the Audit process shall be successfully corrected by the Contractor. These audits may include, but are not limited to the following:		
	· internal control procedures;		
	· revenue/transaction reporting;		
	· financial audit and		
	· System processing and performance.		
	· Third party security evaluations		
7.13	**Security Certification**		
1159	The Contractor in coordination with the Commission shall perform monthly security tests that are scheduled in the MOMS, as well as every time a new Software release is deployed or new network equipment is added or replaced to evaluate the security risk to the Cashless Tolling System and identifying potential vulnerabilities. Commission IT Security shall be a party to these security tests and shall be notified in advance of any scheduled tests.		
1160	The Contractor is responsible for correcting all Cashless Tolling System security deficiencies at the Contractor’s cost and ensuring there are no security risks.		
7.14	**Cooperation with Other Vendors and Providers**		
1161	The Contractor shall cooperate to the fullest extent with other Contractors and third-party vendors in order to ensure that the lane and Cashless Tolling System operation and Maintenance do not conflict with or cause any deterrent in capability or service to the traveling public, customers, or the Commission.		
7.15	**Emergency Response Management**		

Functional Requirements			
		Required Proposer Inputs	
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	The Commission has an emergency response management plan and the Contractor shall follow the procedures set forth in this plan when an emergency situation is invoked.		
1162	The Contractor shall immediately respond to any emergency situation, as notified by the Commission or otherwise, that may arise that has already or could potentially damage the Cashless Tolling System. The Contractor shall be prepared to put forth all necessary resources to divert or correct an emergency condition.		
1163	Such emergency conditions shall be handled in accordance with the policies and procedures established by the Commission. The following are a few examples of emergency conditions:		
	· weather related;		
	· vehicle accident;		
	· conditions that invoke the Disaster Recovery Plan;		
	· third party (power outage or communication failure);		
	· vandalism that causes parts of the Cashless Tolling System to be inoperable and		
	· detection of security breaches, discovered vulnerabilities and activities that pose a security threat to the Commission’s toll collection system;		
7.16	**Cashless Toll Host (if provided) Disaster Recovery**		
1164	The Contractor shall perform Disaster Recovery procedures in accordance with the Approved Disaster Recovery Plan (DRP) in the event of a disaster and return the Cashless Toll Host System to a fully operational condition.		
1165	The Contractor shall test the Disaster Recovery procedures on a yearly basis to validate that they are functioning per the Design. The Commission shall witness the test and the Contractor shall provide a report outlining the test, test results and any anomalies encountered for the Commission’s review and Approval.		
1166	The Contractor shall address any issues encountered from the yearly Disaster Recovery testing.		
1167	The Contractor shall conduct an after-action review in conjunction with the PTC with the goal of continuous improvement and evaluating the Disaster Recovery Plan effectiveness.		
7.17	**Incident and Revenue Loss Reporting**		
1168	The Contractor shall immediately notify the Commission of any incident or event whereby the potential or actual loss of revenue occurred or could potentially occur. The Contractor shall take immediate action to rectify the condition and return the Cashless Tolling System to normal functioning.		
1169	A Monthly Incident Report shall be provided by the Contractor that includes a breakdown of lost electronic data and revenue by the Commission for each incident. If the condition is determined to be due to the fault of the Contractor, damages shall be assessed in accordance with the terms of the Contract.		
7.18	**Maintenance Staffing, Materials and Training**		
7.18.1	**Maintenance Staffing Requirements**		
1170	The Contractor shall be responsible for maintaining an adequate level of technical staff to perform Maintenance and Software Support Services on the Cashless Tolling System. The Contractor shall ensure that sufficient staffing is available to cover all Maintenance activities identified in this Scope of Work at all times but particularly during the following periods:		
	· Weekends;		
	· Holidays;		
	· personnel on vacation/sick time;		
	· after regular scheduled Work hours (on call), and		
	· unexpected emergency or crisis.		
	The Contractor shall provide personnel to perform the following functions. It shall be the Contractor’s responsibility to staff at appropriate levels to meet the requirements, using the Maintenance Plan as the guideline for staffing levels and full job descriptions:		
	· Management: Contractor’s Maintenance Management responsibilities include all Maintenance Management business dealings with the Contractor’s Project Manager. Responsibilities include single point of contact for all Work related issues, including System problems, material issues, or Contractor personnel issues. Maintenance Management responsibilities also include ensuring that Systems are properly functioning and that the Maintenance and repair Work are properly performed and documented.		
	· Field Supervision: The Field Supervisory functions include being responsible for the day to day operations of the technicians, ensuring that all required Work is accomplished properly and efficiently.		

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1171	· Maintenance Technical Staff: Responsibilities include responding to Maintenance activities and Alerts and for field level preventive Maintenance. Maintenance technicians shall be qualified and maintain the proper certifications to troubleshoot Maintenance problems and identify the source of the problem.		
	· Network Engineering: Network Administration shall include the configuration and Maintenance of the network systems and communications network.		
	· Database Administration: Database administration shall include management of the servers and databases in accordance with *Attachment 11 - Database Standards for the Pennsylvania Turnpike Commission* . The database administration shall cover all aspects of the System database and ensuring the database is optimized for peak performance. The responsibilities include the configuration and operation of the System database and generation of database queries as requested by the Commission and other support personnel.		
	· Systems Engineering: Responsibilities include the configuration and monitoring of all System processing and verify that all operations and processes are occurring as scheduled. All MOMS alarms relating to process failures shall be investigated and resolved by the System engineering staff. Systems engineering responsibilities also include ensuring the proper configuration of all servers and coordinating all server Maintenance. System engineering responsibilities also include identifying issues, communicating with the System Software personnel and coordinating resolution of the problem. All user-related problems (application Software) shall also be handled by the System engineering personnel.		
	· Software Technical Staff: Responsibilities include responding to Maintenance activities and Alerts and resolution of Software problems. Software technical staff shall be qualified to troubleshoot Maintenance problems, identify the source of the problem and correct the problem.		
	· Administrative Staff: Responsibilities include support of the Contractor's Maintenance organization for the performance of Maintenance functions and to provide adequate phone and administrative support at the Maintenance management facility.		
	· ECO Management: Responsibilities include managing the ECO process between the Contractor and the Commission. ECO management staff will ensure all the proper forms are filled out and proper authorizations are obtained to perform the change order work.		
	· Documentation Staff: Responsibilities include updating and maintaining the documentation library to ensure all Cashless Tolling project documentation required in this Scope of Work is current and up to date.		
7.18.2	**Tools and Materials**		
1172	The Contractor shall provide all test Equipment and tools and support; including but not limited monitoring tools; smart phones; laptops, and any other items required for the Maintenance and Software Support staff to perform their Maintenance activities. All such devices shall have adequate and up-to-date security software and be Approved by Commission IT before they are used on the Cashless Tolling System network. All required test Equipment, tools and Software tools shall be on site (as required) and in adequate supply, with all required personnel trained on their use. All test Equipment shall be standard units that are capable of achieving the measurement they are intended to make.		
7.18.3	**Training Program**		
1173	The Contractor shall ensure that Maintenance and Software services staff is properly trained for requirements of maintaining the System. The Contractor shall provide a minimum of two (2) weeks of classroom and On the Job Training (OJT) to all personnel in their respective area of responsibility before such personnel are assigned Maintenance duties.		
1174	The Contractor shall provide trained qualified technical staff to support the Maintenance and Software Support Services described in the Scope of Work. It is the Contractor's sole responsibility to develop training necessary to successfully perform all of the Maintenance actions required to keep the System operational.		
1175	The Contractor shall complete all required training and certifications prior to performing actual Maintenance and Software Support Services within a revenue collection environment. In the event changes or modifications are made to the System Equipment or configuration, supplemental training shall be accomplished prior to the actual service date for the changes or modifications.		
1176	Training shall include the Contractor's safety standards and guidelines and applicable Commission policies and procedures.		
1177	The Contractor shall provide documentation that this initial training has been successfully completed.		
	Various training programs the Contractor shall institute shall include, but not be limited to, the following:		
	· a thorough understanding and operating knowledge of the MOMS is required of all Maintenance personnel;		

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1178	· an in depth understanding of the Cashless Tolling System and operations, including all Equipment, Software, interfaces, file transfers and interconnections;		
	· use of Maintenance documentation such as Maintenance manuals; drawings; vendor manuals, and parts list;		
	· functions of the System monitoring tools used to manage the System monitoring tasks;		
	· preventive Maintenance of all Systems and sub-systems;		
	· troubleshooting; diagnostics; repair, testing, and Maintenance follow up;		
	· System logs, errors logs and processing of exceptions;		
	· System dataflow and workflow queues;		
	· review of the Dashboard data and analysis;		
	· discussion on the areas of responsibility;		
	· special use Maintenance and monitoring tools;		
	· queries and reports, and		
	· System access and security.		
1179	All System Maintenance and Software support personnel shall attend the appropriate training sessions. The Commission staff shall be notified of and invited to attend any or all training sessions two (2) weeks in advance of the training.		
1180	All System Maintenance and Software support personnel shall be trained on scheduling, work assignments, escalation process, transportation requirements and communications;		
1181	The Contractor shall provide training offered by vendors and original equipment manufacturer (OEM) for System components where available and required to properly operate, maintain, test and repair such Equipment and Software. Such training shall include but not be limited to:		
	· LPICPS Equipment;		
	· AVI Equipment;		
	· AVC System;		
	· DVAS;		
	· MOMS;		
	· network components and Software provided by the Contractor;		
	· security Software and security tests;		
	· databases and		
	· servers.		
7.18.4	**Training Materials and Ongoing Education**		
1182	Training material shall consist of Maintenance manuals, vendor manuals and any other documentation that provides for the efficient and effective Maintenance of the System and its components.		
1183	The Contractor shall hold regular meetings with Commission technical personnel to update Maintenance procedures, bring proposed System changes to the attention of the technical staff and discuss Maintenance issues identified in the field. The Contractor shall provide the Commission with the meeting schedule so that the appropriate Commission staff can attend these meetings.		
1184	The Commission shall have the right to make recordings and copies of all training program materials. The Contractor shall provide releases from all employees/Contractors to allow unlimited, royalty free use and copies of recordings.		
7.18.5	**System Documentation**		
1185	The Contractor shall have appropriate System documentation available to all Maintenance and Software Support personnel as required to perform their respective duties.		
1186	The Contractor shall make immediate updates to the online System documentation library to reflect any changes to the System Approved by the Commission. A version update sheet shall be included with the System documentation, and the documentation on file shall have the most recent version from the configuration management database. A complete submission of the System documentation shall be made every five (5) years that reflects all Approved changes to-date.		
7.18.6	**Training Records**		
1187	The Contractor shall keep accurate training records on all Contractor and Commission personnel. The Commission shall be permitted to audit personnel qualifications and training records at any time. Evidence of completion of training by Contractor and Commission personnel involved with system maintenance shall be provided to the Commission upon request.		

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7.19	Safety		
1188	The Contractor shall adhere to all applicable safety standards and guidelines for working on or around energized Equipment and in a Maintenance environment, including but not limited to the following:		
	· the Commission safety procedures and guidelines are on the Commission website: https://www.paturnpike.com/business/engineering_standards.aspx;		
	· State of Pennsylvania safety procedures and guidelines;		
	· OSHA (Occupational Safety and Health Administration);		
	· NEMA (National Electrical Manufacturers Association);		
	· NEC (National Electrical Code);		
	· FHWA (Federal Highway Administration), and		
	· any other local, state, or Federal ordinance, procedure, or guideline that provides for a safe operation and working environment.		
7.20	Maintenance and Protection of Traffic (MPT)		
1189	The Contractor shall provide all MPT associated with the Cashless Tolling Maintenance Phase. The Contractor shall develop as a part of the Maintenance Plan an MPT procedure for Approval by the Commission. The Contractor shall follow the requirements as stipulated in the the most recent applicable Commission's Maintenance and Protection of Traffic Standard Drawings, as provided at https://www.paturnpike.com/business/engineering_standards.aspx. Contractor shall also follow the requirements as stipulated in CS 901 and the MPT Special Provision, which are provided in their current form in Attachment 15: Lane Closure and MPT Provisions. The Contractor shall be responsible for monitoring new releases of all standards/policies and assure their work complies with the most recent versions available.		
1190	The Contractor shall adhere to the Approved MPT Plan when setting up, working under MPT and restoring lanes to traffic. The Contractor shall provide the PTC representative the information required in the "Construction Daily Lane Closure Report" shown in Attachment 15: Lane Closure and MPT Provisions. Contractor shall work with the Commission to coordinate MPT Work and to adhere to the Commission advance notice requirements for Work in the lanes, both on a scheduled and emergency basis.		
7.21	Maintenance and Software Support Records		
1191	The Commission shall have access to all Maintenance and service records at any time for review and audit, upon reasonable notice. The Contractor shall provide monthly reports generated in the System that permits the Commission to evaluate Contractor's Maintenance performance.		
1192	The Contractor's Maintenance manager shall maintain current, complete and accurate records for all Maintenance and Software Support Services activities. The Contractor's Maintenance manager shall institute procedures that make sure Maintenance staff enters complete information into the MOMS before closing a work order or trouble ticket.		
1193	All preventive and predictive Maintenance activities shall be reported in the same manner as corrective or emergency Maintenance activities by the Contractor. The information shall be contained on the MOMS and shall be made available through various MOMS reports.		
7.21.1	Maintenance Summary Reports		
1194	The Contractor shall provide the Maintenance summary reports to the Commission on a monthly basis in advance of the Monthly Meeting. The format of the Monthly reports shall be Approved by the Commission and included in the Maintenance Plan.		
1195	The Contractor shall provide an annual Executive Summary report to the Commission that summarizes the Contractor's performance for the Maintenance Year. The format of the Executive Summary reports shall be Approved by the Commission and included in the Maintenance Plan.		
	Maintenance summary reports shall also be readily available in detail or summary format to the Commission applicable personnel via the network on a daily, weekly, or other time period basis determined by the Commission. The Maintenance summary report shall include but not be limited to:		
	· a summary of the Contractor's performance for the month under review noting all accomplishments and deficiencies;		
	· all Maintenance and System performance reports that show Contractor's compliance to Maintenance performance requirements;		
	· detailed listing of failures and the impacted subsystems where Contractor's and System performance for the month were not in compliance with the performance requirements;		

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1196	· any exceptions the Contractor believes are non-chargeable failures that Contractor is not responsible for;		
	· detailed list of parts replaced as a result of Maintenance actions, with an identification of warranty versus non-warranty replacement;		
	· status of removed parts and Equipment with an aging status for parts under repair or replacement (serial numbers, being repaired in Maintenance shop, purchase replacement part);		
	· trend analysis for repetitive failure;		
	· status of spare parts inventory;		
	· staffing report detailing positions and staff hours worked;		
	· staff performance trends;		
	· Software and firmware releases implemented;		
	· major Maintenance activities that occurred and are scheduled to occur;		
	· incidents that invoked emergency response or resulted in loss of toll revenue and		
	· summary of work order, Software defects and trouble tickets by priority and category.		
7.22	**Performance Requirements for the Cashless Tolling System and Liquidated Damages**		
	The Cashless Tolling System shall be designed, developed, tested, implemented and Maintained to meet the performance requirements specified herein without the need for manual intervention. The Contractor shall facilitate performance monitoring by reporting performance in clearly measurable terms. The Commission will conduct a review of the Contractor's performance on a monthly basis, as defined in the Maintenance Plan utilizing all required System reports provided by the Contractor and reports generated by the MOMS.		
1197	The Contractor shall submit backup data that confirms Contractor compliance to Maintenance performance requirements.		
1198	A detailed listing of the Cashless Tolling System alarms for each subsystem shall be created with their priority levels in support of the performance data and Contractor's responsibility shall be clearly identified. The Contractor shall be responsible for all alarms and work orders that are escalated to the Contractor.		
1199	Monthly performance reviews shall begin at the commencement of the Maintenance and Software Support Services Contract at each tolling point and shall continue monthly through the period of the Maintenance and Software Support Services Contract. The first month's performance shall be reviewed in month two of the Maintenance and Software Support Services Contract.		
1200	Liquidated damages associated with monthly performance reviews, if applicable, shall be assessed beginning in month		
7.22.1	**Acknowledgement of All Priority Events**		
1201	The Contractor shall acknowledge receipt of all Priority events within thirty (30) minutes of failure/event notification.		
1202	For the purposes of assessing Liquidated Damages, ninety five (95) percent of failure or priority event shall be acknowledged within thirty (30) minutes of receipt.		
1203	The Contractor may be assessed Liquidated Damages of $250 if the acknowledgment percent is below the ninety five (95) percent threshold every month for every Priority event not acknowledged within the time frame specified in these Requirements.		
7.22.2	**Time to Respond and Repair (TTRR)**		
1204	The Contractor shall respond to and complete repair of Priority 1 failures/events as follows:		
	· For In-Lane System failures and Cashless Toll Concentrator or Toll Host (if provided) failures that can be handled remotely: respond and complete repair within two (2) hours of failure/event notification.		
	· For Cashless Toll Concentrator or Toll Host (if provided) failures that require Onsite Corrective Maintenance: be onsite within twenty-four (24) hours of Approval to commence Work and once the Contractor is onsite, two (2) hour time to complete repair.		
	The Contractor may be assessed Liquidated Damages of $100 per occurrence for every additional delay of one (1) hour to respond and complete repair of Priority 1 failures/events.		
	The Contractor may be assessed Liquidated Damages of $500 per occurrence for every additional twenty-four (24) hour delay over the twenty-four (24) hours for being onsite and ready to commence Work.		
	The Contractor shall respond to and complete repair of Priority 2 failure/events as follows:		
	· For In-Lane System failures and Cashless Toll Concentrator or Toll Host (if provided) failures that can be handled remotely: respond and complete repair within four (4) hours of failure/event notification.		

Functional Requirements

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1205	· For Cashless Toll Concentrator or Toll Host (if provided) failures that require Onsite Corrective Maintenance:: be onsite within forty-eight (48) hours of Approval to commence Work and once the Contractor is onsite, two (2) hour time to complete repair.		
	The Contractor may be assessed Liquidated Damages of $100 per occurrence for every additional delay of one (1) hour to respond and complete repair of Priority 2 failures/events.		
	The Contractor may be assessed Liquidated Damages of $300 per occurrence for every additional twenty-four (24) hour delay over the forty-eight (48) hours for being onsite and ready to commence Work.		
1206	The Contractor shall respond to and complete repair of Priority 3 failures/events as follows:		
	· For In-Lane System failures and Cashless Toll Concentrator or Toll Host (if provided) failures that can be handled remotely: respond and complete repair within twenty-four (24) hours of failure/event notification.		
	· For Cashless Toll Concentrator or Toll Host (if provided) failures that require Onsite Corrective Maintenance:: No longer than three (3) Calendar Days to respond and complete repair upon Approval to commence Work.		
	The Contractor is not subject to any Liquidated Damages for Priority 3 failures/events.		
7.22.3	**Mean Time Between Failures (MTBF)**		
1207	The Contractor shall meet MTBF requirements for the following elements of the Cashless Tolling System Components:		
	· Redundant Zone Controller: 30,000 hours		
	· Automatic Vehicle Identification (AVI) System: 20,000 hours		
	· Automatic Vehicle Classification (AVC) System: 30,000 hours		
	· License Plate Image Capture and Processing System (LPICPS): 30,000 hours		
	· Cashless Tolling Servers: 50,000 hours		
	· Network Devices: 50,000 hours		
1208	The reliability of the System components shall be calculated based on the following MTBF calculation: MTBF = # units x measuring period (hours)/ # chargeable failures		
1209	The Contractor may be assessed Liquidated Damages of $500 for each Sub-system not meeting requirement due to Contractor and Contractor System failure.		
7.22.4	**Availability**		
1210	The Contractor shall meet availability requirements for the following elements of the Cashless Tolling System:		
	· Lane Availability - 99.95%;		
	· Cashless Toll Concentrator or Toll Host System (if provided) – 99.95%;		
1211	Availability for each of the above systems shall be calculated as follows: Availability = 100% - [Total number of hours of downtime in time period X / Total hours in time period X].		
1212	For every month in which the Toll Zone lane is available less than the minimum requirement, Contractor may be subject to Liquidated Damages of:		
	· a 0.5% adjustment to the monthly Maintenance fee for availability of 99.90% and up to 99.94%;		
	· a 2% adjustment to the monthly Maintenance fee for availability of 99.50% and up to 99.89%;		
	· a 5% adjustment to the monthly Maintenance fee for availability of 99% and 99.49%.		
	· a 10% adjustment to the monthly Maintenance fee for availability below 99%.		
1213	For every month in which the Cashless Toll Concentrator or Toll Host System (if provided) is available less than the minimum requirement, Contractor may be subject to Liquidated Damages of:		
	· a 1% adjustment to the monthly Maintenance fee for availability of 99.90% and up to 99.94%;		
	· a 2% adjustment to the monthly Maintenance fee for availability of 99.50% and up to 99.89%;		
	· a 5% adjustment to the monthly Maintenance fee for availability of 99% and 99.49%.		
	· a 10% adjustment to the monthly Maintenance fee for availability below 99%.		
7.22.5	**Transmission of TSL and VEL to the In-Lane Cashless Tolling System**		
1214	Successfully and accurately transmit the Comprehensive Home and Away/Interoperable TSL to each of the zone controllers within thirty (30) minutes of the Cashless Tolling Concentrator, Toll Host (if provided) or Facility Server(s) receipt of the TSL.		
	The Contractor may be subject to Liquidated Damages of $500 per occurrence per one (1) hour delay for failure to successfully and accurately transmit the TSL to each of the zone controller.		
1215	Successfully and accurately transmit the VEL (if exercised) to the In-lane Cashless Tolling System within thirty (30) minutes of the Cashless Toll Host System receipt of the VEL (if exercised).		
1216	The Contractor is not subject to any Liquidated Damages.		

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7.22.6	**Transaction Processing and Transmission Requirements**		
1217	One hundred (100) percent of transactions (AVI and video transactions) from the roadway systems shall be sent to the existing PTC Toll Host and reconciled with an accuracy of one hundred (100) percent.		
1218	One hundred (100) percent of transactions (AVI and video transactions) identified to be pursuable and non-pursuable shall be successfully and accurately transmitted to the existing CSC/VPC system with an accuracy of one hundred (100) percent within twenty-four (24) hours of vehicle transit.		
1219	For failure to accurately process and reconcile one hundred (100) percent of all transactions and successfully and accurately transmit pursuable and non-pursuable transactions to the existing CSC/VPC system within twenty-four (24) hours of vehicle transit, the Contractor shall be subject to Liquidated Damages of $50 per twenty-four (24) hour delay per 1,000 transactions.		
7.22.7	**Image Processing Requirements**		
1220	One hundred (100) percent of images (video) from the roadway systems shall be successfully and accurately transmitted to the existing CSC/VPC system and reconciled to the transactions with an accuracy of one hundred (100) percent.		
1221	One hundred (100) percent of images identified to be pursuable shall be successfully and accurately transmitted to the existing CSC/VPC system with an accuracy of one hundred (100) percent within twenty-four (24) hours of vehicle transit.		
1222	For failure to accurately process and reconcile one hundred (100) percent of all images and successfully and accurately transmit pursuable images to the existing CSC/VPC system within twenty-four (24) hours of vehicle transit, the Contractor shall be subject to Liquidated Damages $50 per twenty-four (24) hour delay per 1,000 images set.		
7.22.8	**License Plate Extraction Accuracy - if the option to implement OCR/ALPR is exercised**		
1223	The Contractor shall provide an accurate OCR/ALPR process which shall result in the Cashless Tolling System extracting the license plate, plate type, and jurisdiction with an accuracy of at least 99.95 percent on minimum seventy (70) percent of video transactions generated in the lanes.		
1224	For error rates above the 0.05 percent rate, the Contractor may be subject to Liquidated Damages of $10 for each license		
7.22.9	**Spare Parts Availability**		
1225	The Contractor shall maintain the required physical inventory of agreed to spare parts in accordance with the Contract.		
1226	For failure to maintain spare parts inventory at adequate levels for the month, the Contractor may be subject to Liquidated Damages of $500 per month for each failure to maintain spare parts inventory per the counts required.		
7.22.10	**Preventive Maintenance**		
1227	The Contractor shall perform preventive Maintenance on the Cashless Tolling System according to Approved Preventive Maintenance schedule.		
1228	The Contractor is not subject to any Liquidated Damages for this Maintenance Work.		
7.23	**Security**		
1229	All Contractor personnel shall be subject to appropriate security and background checks to the satisfaction of the Commission. The Contractor shall obtain written Approval from the Commission for all service personnel and each Contractor personnel shall be required to sign an acceptable use agreement.		
1230	Contractor's personnel shall be issued Commission identification badges and shall wear such identification badges at all times when on the Commission property. Use of such identification badges for purposes other than work associated with the Contract will result in termination of the employee from the Contract and possible other legal or disciplinary action.		
1231	The services and Work performed under the Contract are considered highly confidential and the Contractor personnel shall at all times comply with applicable current computer and data industry standards with regard to data and information security. All employees of the Contractor shall not discuss their work with unauthorized personnel or any individuals not directly associated with the Commission.		
1232	Contractor's personnel can only use Commission -assigned workstations, servers, and laptops to communicate with the Cashless Tolling System while on Commission premises.		
1233	The Commission will identify and designate a primary point of contact for the Contractor. Under most circumstances, the Contractor will limit communication with Commission authorized staff and to the Commission's designated point of contact unless otherwise directed by the Commission.		

Functional Requirements			
		Required Proposer Inputs	
		Status of Functionality	**Comments**
No.	**Requirements**	**Existing (E) - Met by current system, no modifications required** **Modification (M) - Modifications needed to meet requirement** **Replaced (R) - Function is available within current system, but will be replaced to meet PTC needs** **To Be Developed (D) - Not in current system, but will be developed** **Not Provided (N**) - Will not be provided - requires explanation**	**If "Status of Functionality = N" then Proposer must provide an Explanation in this Column**
1234	Discussion by the Contractor of any Services or Work performed under the Contract with the media, in oral presentations, in written publications, or in any other form, not related to this Contract shall be Approved in advance by the Commission.		
7.24	**Confidentiality**		
1235	The Contractor shall keep all information regarding its activities pursuant to this Contract confidential and will communicate such information only with authorized Commission personnel or Designated Representatives.		

Exhibit F-7
Price Proposal

(Excel file "paperclipped" to Addendum for ease of completion)

Sheet 1
Project Summary - Base and Optional
PTC Cashless Tolling System Implementation and Maintenance Cost
(Summary Only - No Proposer Input Required)

	Base Contract Cost ($)	Optional Future Facilities Cost ($)	Optional Future Facilities Cost ($)	Optional Toll Host Replacement Cost ($)	Grand Total Cost ($)
Implementation Phase	Clarks Summit	Optional Mainline	Optional Western Extensions		
In-lane System Cost (Sheet 2)	$ -	$ -	$ -		$ -
System Cost (Sheet 3)	$ -	$ -	$ -		$ -
Toll Concentrator/Host Cost (if provided) (Sheet 4)	$ -	$ -	$ -		$ -
Total Implementation Phase	$ -	$ -	$ -		$ -
Maintenance Phase					
In-lane System Hardware Maintenance and Software Support Services Cost (Sheet 5)	$ -	$ -	$ -		$ -
Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost (if provided) (Sheet 6)	$ -	$ -	$ -		$ -
Total Maintenance Phase	$ -	$ -	$ -		$ -
TOTAL IMPLEMENTATION AND MAINTENANCE PHASE	$ -	$ -	$ -		$ -
Optional Functionality					
In-lane OCR/ALPR and Enforcement Notification Pricing (Sheet 2)	$ -	$ -	$ -		$ -
Tri-Protocol Implementation (Sheet 2)	$ -	$ -	$ -		$ -
Toll Host System Replacement Implementation Cost (Sheet 7)				$ -	$ -
Toll Host System Replacement Maintenance and Software Support Services Cost - Year 1 only (Sheet 7)				$ -	$ -
Total Optional Functionality	$ -	$ -	$ -	$ -	$ -
TOTAL IMPLEMENTATION AND MAINTENANCE PHASE WITH OPTIONAL FUNCTIONALITY	$ -	$ -	$ -	$ -	$ -

Sheet 2
Base and Optional In-lane System Cost by Roadway
(Summary Only - No Proposer Input Required)

Highway	Region	Shadow Go-Live Date	Toll Zone Type	Total # of Toll Zones or Locations	Cost Per Toll Zone ($)	Total Cost Toll Zones ($)
Base Contract						
Clarks Summit	Northeast Extension	March 31, 2020	Zone Type 4 (2+1+1) Maint from Below	2	$ -	$ -
			Facility Server	1	$ -	$ -
			Total Base Contract - Clarks Summit	2/1		$ -
Optional Total Zones, OCR/ALPR and Enforcement Notification, and Tri-Protocol Readers (Sheet 2-a)						
Optional Total Zones						
Optional Mainline	East and Northeast Extension	2022	Zone Type 1 (3+1+1) Maint From Below	10		$ -
			Facility Server	5		$ -
			Zone Type 2 (3+2+0) Maint From Below	14		$ -
			Facility Server	7		$ -
			Zone Type 3 (2+1+1) Maint From Below	2		$ -
			Facility Server	1		$ -
			Zone Type 4 (2+1+1) Maint from Below	12		$ -
			Facility Server	6		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	1		$ -
			Facility Server	1		$ -
			Zone Type 6 (2+0+0) Existing Ramp Maint From Below	2		$ -
			Facility Server	2		$ -
	Volume Discount					$ -
	Central and West	2024	Zone Type 2 (3+2+0) Maint From Below	34		$ -
			Facility Server	17		$ -
			Zone Type 3 (2+1+1) Maint From Below	2		$ -
			Facility Server	1		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	1		$ -
			Facility Server	1		$ -
	Volume Discount					$ -
			Total Optional - Mainline	78/41		$ -
Optional Western Extensions	Beaver Valley Expressway, Mon-Fayette Expressway, and Amos K Bypass	2027	Zone Type 4 (2+1+1) Maint from Below	2		$ -
			Facility Server	1		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	10		$ -
			Facility Server	5		$ -
			Zone Type 6 (2+0+0) Existing Ramp Maint From Below	32		$ -
			Facility Server	16		$ -
	Volume Discount					$ -
			Total Optional - Western Extensions	44/22		$ -

Sheet 2
Base and Optional In-lane System Cost by Roadway
(Summary Only - No Proposer Input Required)

Highway	Region	Shadow Go-Live Date	Toll Zone Type	Total # of Toll Zones or Locations	Cost Per Toll Zone ($)	Total Cost Toll Zones ($)
Optional OCR/ALPR and Enforcement Notification						
Clarks Summit	Northeast Extension	March 31, 2020	Zone Type 4 (2+1+1) Maint from Below	2	$ -	$ -
Total Optional OCR/ALPR and Enforcement Notification - Clarks Summit				2		$ -
Mainline - Optional	East and Northeast Extension	2022	Zone Type 1 (3+1+1) Maint From Below	10		$ -
			Zone Type 2 (3+2+0) Maint From Below	14		$ -
			Zone Type 3 (2+1+1) Maint From Below	2		$ -
			Zone Type 4 (2+1+1) Maint from Below	12		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	1		$ -
			Zone Type 6 (2+0+0) Existing Ramp Maint From Below	2		$ -
	Central and West	2024	Zone Type 2 (3+2+0) Maint From Below	34		$ -
			Zone Type 3 (2+1+1) Maint From Below	2		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	1		$ -
Total Optional OCR/ALPR and Enforcement Notification - Mainline				78		$ -
Western Extensions - Optional	Beaver Valley Expressway, Amos K Bypass, and Mon-Fayette Expressway	2027	Zone Type 4 (2+1+1) Maint from Below	2		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	10		$ -
			Zone Type 6 (2+0+0) Existing Ramp Maint From Below	32		$ -
Total Optional OCR/ALPR and Enforcement Notification - Western Extensions				44		$ -
Optional Tri-Protocol Implementation						
Clarks Summit	Northeast Extension	March 31, 2020	Zone Type 4 (2+1+1) Maint from Below	2	$ -	$ -
Total Optional Tri-Protocol Implementation - Clarks Summit				2		$ -
Mainline - Optional	East and Northeast Extension	2022	Zone Type 1 (3+1+1) Maint From Below	10		$ -
			Zone Type 2 (3+2+0) Maint From Below	14		$ -
			Zone Type 3 (2+1+1) Maint From Below	2		$ -
			Zone Type 4 (2+1+1) Maint from Below	12		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	1		$ -
			Zone Type 6 (2+0+0) Existing Ramp Maint From Below	2		$ -
	Central and West	2024	Zone Type 2 (3+2+0) Maint From Below	34		$ -
			Zone Type 3 (2+1+1) Maint From Below	2		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	1		$ -
Total Optional Tri-Protocol Implementation - Mainline				78		$ -
Western Extensions - Optional	Beaver Valley Expressway, Amos K Bypass, and Mon-Fayette Expressway	2027	Zone Type 4 (2+1+1) Maint from Below	2		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	10		$ -
			Zone Type 6 (2+0+0) Existing Ramp Maint From Below	32		$ -
Total Optional Tri-Protocol Implementation - Western Extensions				44		$ -

Sheet 3
Base and Optional System Cost
(Summary Only - No Proposer Input Required)

Item #	Description	Unit	Total Cost ($)	Total Cost ($)	Total Cost ($)
			Clarks Summit	Optional Mainline	Optional Western Extensions
1	Zone Controller Software Costs (not otherwise covered)	LS	$ -	$ -	$ -
2	Design Documentation	LS	$ -		
3	User, Maintenance, and Project Documentation	LS	$ -		
4	Training (manuals, materials and delivery)	LS	$ -		
5	Factory Acceptance Test	LS	$ -		
6	On-Site First Installation Test	LS	$ -		
7	Installation and Commissioning Test	LS	$ -	$ -	$ -
8	System Operational and Acceptance Test	LS	$ -	$ -	$ -
9	Third Party Warranty and Licenses	LS	$ -	$ -	$ -
10	Warranty (Year 1 of Maintenance) - In-lane System Hardware Maintenance and Software Support Services	LS	$ -	$ -	$ -
11	Warranty - In-Lane System Spare Parts and Equipment - Year 1	LS	$ -	$ -	$ -
12	Insurance and Bonding	LS	$ -	$ -	$ -
13	Project Management	LS	$ -	$ -	$ -
14	Engineering and Design	LS	$ -	$ -	$ -
15	Transition Costs	LS	$ -	$ -	$ -
Total System Costs			$ -	$ -	$ -

Sheet 4
Base and Optional Toll Concentrator/Host Cost (if provided)
(Summary Only - No Proposer Input Required)

Item #	Description	Unit	Total Cost ($)	Total Cost ($)	Total Cost ($)
			Clarks Summit	Optional Mainline	Optional Western Extensions
1	System Hardware, Third Party Software, Installation and Commissioning not Otherwise Covered	LS	$ -	$ -	$ -
2	Communications Equipment	LS	$ -	$ -	$ -
3	Software (GUI, Back-end), Host System, MOMS, DVAS and License	LS	$ -	$ -	$ -
4	Design Documentation	LS	$ -		
5	User, Maintenance, and Project Documentation	LS	$ -		
6	Training (manuals, materials and delivery)	LS	$ -		
7	Third Party Warranty and Licenses	LS	$ -		
8	Warranty (Year 1 of Maintenance) - Incremental Toll Concentrator/Host Maintenance and Software Support Services	LS	$ -		
9	Warranty - Toll Concentrator/Host Spare Parts and Equipment - Year 1	LS	$ -	$ -	$ -
Total Toll Concentrator/Host Costs			$ -	$ -	$ -

Sheet 5
Base and Optional
In-lane System Hardware Maintenance and Software Support Services Cost
(Summary Only - No Proposer Input Required)

Item #	Description of Items	Total Annual Cost ($)	Total Annual Cost ($)	Total Annual Cost ($)	
	Base Contract Maintenance Costs	Clarks Summit	Optional Mainline	Optional Western Extensions	
1	Year 1 of Maintenance (Warranty)	$ -			See Note #1
2	Year 2 of Maintenance	$ -			
3	Year 3 of Maintenance	$ -			
4	Year 4 of Maintenance	$ -	$ -		See Note #2
5	Year 5 of Maintenance	$ -	$ -		
6	Year 6 of Maintenance	$ -	$ -		
7	Year 7 of Maintenance	$ -	$ -		
8	Year 8 of Maintenance	$ -	$ -		
9	Year 9 of Maintenance	$ -	$ -	$ -	See Note #3
	Total In-Lane System Hardware Maintenance and Software Support Services (excluding Warranty Years)	$ -	$ -	$ -	
	Optional Extension 1 Costs				
10	Extension 1 - Year 1 of Maintenance	$ -	$ -	$ -	
11	Extension 1 - Year 2 of Maintenance	$ -	$ -	$ -	
12	Extension 1 - Year 3 of Maintenance	$ -	$ -	$ -	
13	Extension 1 - Year 4 of Maintenance	$ -	$ -	$ -	
14	Extension 1 - Year 5 of Maintenance	$ -	$ -	$ -	
	Total Extension 1 Cost	$ -	$ -	$ -	
	Optional Extension 2 Costs				
15	Extension 2 - Year 1 of Maintenance	$ -	$ -	$ -	
16	Extension 2 - Year 2 of Maintenance	$ -	$ -	$ -	
17	Extension 2 - Year 3 of Maintenance	$ -	$ -	$ -	
18	Extension 2 - Year 4 of Maintenance	$ -	$ -	$ -	
19	Extension 2 - Year 5 of Maintenance	$ -	$ -	$ -	
	Total Extension 2 Cost	$ -	$ -	$ -	
Total Base and Optional In-Lane System Hardware Maintenance and Software Support Services (excluding Warranty Years)		$ -	$ -	$ -	

Note 1: Clarks Summit First Year Maintenance (Year 1 of Maintenance) Total carried forward to Sheet 3 - System Cost. Not included in the total of Sheet 5.

Note 2: Optional Mainline First Year Maintenance (Year 4 of Maintenance) Total carried forward to Sheet 3 - System Cost. Not included in the total of Sheet 5.

Note 3: Optional Western Extensions First Year Maintenance (Year 9 of Maintenance) Total carried forward to Sheet 3 - System Cost. Not included in the total of Sheet 5.

Sheet 6
Base and Optional
Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost (if provided)
(Summary Only - No Proposer Input Required)

Item #	Description of Items	Total Monthly Cost ($)	Total Annual Cost ($)	Total Monthly Cost ($)	Total Annual Cost ($)	Total Monthly Cost ($)	Total Annual Cost ($)	
	Base Contract Maintenance Costs	Clarks Summit		Optional Mainline		Optional Western Extensions		
1	Year 1 of Maintenance (Warranty)	$ -	$ -					See Note #1
2	Year 2 of Maintenance	$ -	$ -					
3	Year 3 of Maintenance	$ -	$ -					
4	Year 4 of Maintenance	$ -	$ -	$ -	$ -			
5	Year 5 of Maintenance	$ -	$ -	$ -	$ -			
6	Year 6 of Maintenance	$ -	$ -	$ -	$ -			
7	Year 7 of Maintenance	$ -	$ -	$ -	$ -			
8	Year 8 of Maintenance	$ -	$ -	$ -	$ -			
9	Year 9 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
	Total Toll Concentrator/Host Maintenance and Software Support Services Base Contract Cost (Maintenance Years 2-9)		$ -		$ -		$ -	
	Optional Extension 1 Costs							
10	Extension 1 - Year 1 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
11	Extension 1 - Year 2 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
12	Extension 1 - Year 3 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
13	Extension 1 - Year 4 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
14	Extension 1 - Year 5 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
	Total Extension 1 Cost		$ -		$ -		$ -	
	Optional Extension 2 Costs							
15	Extension 2 - Year 1 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
16	Extension 2 - Year 2 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
17	Extension 2 - Year 3 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
18	Extension 2 - Year 4 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
19	Extension 2 - Year 5 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
	Total Extension 2 Cost		$ -		$ -		$ -	
Total Base and Optional Toll Concentrator/Host Maintenance and Software Support Services (excluding Warranty)			$ -		$ -		$ -	

Note 1: Year 1 of Maintenance Total carried forward to Sheet 4 - Toll Concentrator/Host Cost. Not included in the total of Sheet 6.

Sheet 7
Optional Toll Host System Replacement Implementation Cost
(Summary Only - No Proposer Input Required)

Item #	Description	Unit	Total Cost ($)
1	System Hardware, Third Party Software, Installation and Commissioning not Otherwise Covered	LS	$ -
2	Communications Equipment	LS	$ -
3	Software (GUI, Back-end), Host System, MOMS, DVAS and License	LS	$ -
4	Design Documentation	LS	$ -
5	User, Maintenance, and Project Documentation	LS	$ -
6	Training (manuals, materials and delivery)	LS	$ -
7	Factory Acceptance Test	LS	$ -
8	Installation and Commissioning Test	LS	$ -
9	System Operational and Acceptance Test	LS	$ -
10	Third Party Warranty and Licenses	LS	$ -
11	Warranty First Year of Maintenance - Toll Host System Replacement Maintenance and Software Support Services	LS	$ -
12	Spare Parts and Equipment Year 1 - Warranty Year	LS	$ -
13	Project Management	LS	$ -
14	Engineering and Design	LS	$ -
15	Transition Costs	LS	$ -
		Total Toll Host/System Costs	$ -

Sheet 2-a Back-up
Optional Mainline and Western Extensions
In-lane Implementation Cost by Zone
(Summary Only) (2018 Values)

Optional In-Lane System Implementation Cost (by Zone)		Escalation % for Labor (Over Previous Year)			
		3.0%	Year 4	Year 4	Year 4
	2018 Values for Other Direct Cost	2018 Labor	Quantity	Unit Evaluation Cost including Labor	Total Evaluation Cost
Zone Type 1 (3+1+1)	$ -	$ -	10	$ -	$ -
Facility Server (if applicable)	$ -	$ -	5	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	10	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	10	$ -	$ -
Zone Type 2 (3+2+0)	$ -	$ -	14	$ -	$ -
Facility Server (if applicable)	$ -	$ -	7	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	14	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	14	$ -	$ -
Zone Type 3 (2+1+1)	$ -	$ -	2	$ -	$ -
Facility Server (if applicable)	$ -	$ -	1	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	2	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	2	$ -	$ -
Zone Type 4 (2+1+1)	$ -	$ -	12	$ -	$ -
Facility Server (if applicable)	$ -	$ -	6	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	12	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	12	$ -	$ -
Zone Type 5 (2+1+1) Existing Mainline Maintenance From Below	$ -	$ -	1	$ -	$ -
Facility Server (if applicable)	$ -	$ -	1	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	1	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	1	$ -	$ -
Zone Type 6 (2+0+0) Existing Ramp Maintenance From Below	$ -	$ -	2	$ -	$ -
Facility Server (if applicable)	$ -	$ -	2	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	2	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	2	$ -	$ -
Estimated Zones Ordered/Costs			41		$ -
Estimated Zones Ordered/Costs Volume Discount					$ -
Estimated Zones Ordered/Costs (less volume discount)					$ -
Estimated Facility Server Cost					$ -
Estimated Zones Ordered/Costs (including volume discount) and Facility Server Costs					$ -
Optional OCR/ALPR and Enforcement Notification Incremental Cost					$ -
Optional Tri-Protocol Implementation Incremental Cost					$ -
Volume Discount by Zone Quantity:					
Volume Discount for 10- 19 Zones	0.00%				
Volume Discount for 20- 29 Zones	0.00%				
Volume Discount for 30- 39 Zones	0.00%				
Volume Discount for over 40 Zones	0.00%				

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Implementation Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Sheet 2-a Back-up
Optional Mainline and Western Extensions
In-lane Implementation Cost by Zone
(Summary Only) (2018 Values)

Optional In-Lane System Implementation Cost (by Zone)		Escalation % for Labor (Over Previous Year)			
		3.0%	Year 6	Year 6	Year 6
	2018 Values for Other Direct Cost	2018 Labor	Quantity	Unit Evaluation Cost including Labor	Total Evaluation Cost
Zone Type 1 (3+1+1)	$ -	$ -			
Facility Server (if applicable)	$ -	$ -			
Optional OCR/ALPR and Enforcement Notification	$ -	$ -			
Optional Tri-Protocol Implementation	$ -	$ -			
Zone Type 2 (3+2+0)	$ -	$ -	34	$ -	$ -
Facility Server (if applicable)	$ -	$ -	17	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	34	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	34	$ -	$ -
Zone Type 3 (2+1+1)	$ -	$ -	2	$ -	$ -
Facility Server (if applicable)	$ -	$ -	1	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	2	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	2	$ -	$ -
Zone Type 4 (2+1+1)	$ -	$ -			
Facility Server (if applicable)	$ -	$ -			
Optional OCR/ALPR and Enforcement Notification	$ -	$ -			
Optional Tri-Protocol Implementation	$ -	$ -			
Zone Type 5 (2+1+1) Existing Mainline Maintenance From Below	$ -	$ -	1	$ -	$ -
Facility Server (if applicable)	$ -	$ -	1	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	1	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	1	$ -	$ -
Zone Type 6 (2+0+0) Existing Ramp Maintenance From Below	$ -	$ -			
Facility Server (if applicable)	$ -	$ -			
Optional OCR/ALPR and Enforcement Notification	$ -	$ -			
Optional Tri-Protocol Implementation	$ -	$ -			
Estimated Zones Ordered/Costs			37		$ -
Estimated Zones Ordered/Costs Volume Discount					$ -
Estimated Zones Ordered/Costs (less volume discount)					$ -
Estimated Facility Server Cost					$ -
Estimated Zones Ordered/Costs (including volume discount) and Facility Server Costs					$ -
Optional OCR/ALPR and Enforcement Notification Incremental Cost					$ -
Optional Tri-Protocol Implementation Incremental Cost					$ -
Volume Discount by Zone Quantity:					
Volume Discount for 10- 19 Zones	0.00%				
Volume Discount for 20- 29 Zones	0.00%				
Volume Discount for 30- 39 Zones	0.00%				
Volume Discount for over 40 Zones	0.00%				

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Implementation Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Sheet 2-a Back-up
Optional Mainline and Western Extensions
In-lane Implementation Cost by Zone
(Summary Only) (2018 Values)

		Escalation % for Labor (Over Previous Year)			
		3.0%	Year 9	Year 9	Year 9
Optional In-Lane System Implementation Cost (by Zone)	2018 Values for Other Direct Cost	2018 Labor	Quantity	Unit Evaluation Cost including Labor	Total Evaluation Cost
Zone Type 1 (3+1+1)	$ -	$ -			
Facility Server (if applicable)	$ -	$ -			
Optional OCR/ALPR and Enforcement Notification	$ -	$ -			
Optional Tri-Protocol Implementation	$ -	$ -			
Zone Type 2 (3+2+0)	$ -	$ -			
Facility Server (if applicable)	$ -	$ -			
Optional OCR/ALPR and Enforcement Notification	$ -	$ -			
Optional Tri-Protocol Implementation	$ -	$ -			
Zone Type 3 (2+1+1)	$ -	$ -			
Facility Server (if applicable)	$ -	$ -			
Optional OCR/ALPR and Enforcement Notification	$ -	$ -			
Optional Tri-Protocol Implementation	$ -	$ -			
Zone Type 4 (2+1+1)	$ -	$ -	2	$ -	$ -
Facility Server (if applicable)	$ -	$ -	1	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	2	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	2	$ -	$ -
Zone Type 5 (2+1+1) Existing Mainline Maintenance From Below	$ -	$ -	10	$ -	$ -
Facility Server (if applicable)	$ -	$ -	5	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	10	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	10	$ -	$ -
Zone Type 6 (2+0+0) Existing Ramp Maintenance From Below	$ -	$ -	32	$ -	$ -
Facility Server (if applicable)	$ -	$ -	16	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	32	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	32	$ -	$ -
Estimated Zones Ordered/Costs			44		$ -
Estimated Zones Ordered/Costs Volume Discount					$ -
Estimated Zones Ordered/Costs (less volume discount)					$ -
Estimated Facility Server Cost					$ -
Estimated Zones Ordered/Costs (including volume discount) and Facility Server Costs					$ -
Optional OCR/ALPR and Enforcement Notification Incremental Cost					$ -
Optional Tri-Protocol Implementation Incremental Cost					$ -
Volume Discount by Zone Quantity:					
Volume Discount for 10- 19 Zones	0.00%				
Volume Discount for 20- 29 Zones	0.00%				
Volume Discount for 30- 39 Zones	0.00%				
Volume Discount for over 40 Zones	0.00%				

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Implementation Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Sheet 2-1 Back-up
Optional In-lane System Cost Schedule - Zone 1

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
Zone Type 1 (3+1+1) Maintenance from Below					
1. Redundant Toll Zone Controller and In-lane Electronics[1]					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Redundant Toll Zone Controller and In-lane Electronics[1]			$ -	$ -	$ -
2. AVI System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVI System			$ -	$ -	$ -
3. AVC System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVC System			$ -	$ -	$ -
4. LPICPS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total LPICPS			$ -	$ -	$ -
5. Communications Equipment					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
6. Equipment Racks					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Equipment Racks			$ -	$ -	$ -
7. DVAS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total DVAS			$ -	$ -	$ -

Sheet 2-1 Back-up
Optional In-lane System Cost Schedule - Zone 1

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
8. Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Commissioning Test			$ -	$ -	$ -
Total			$ -	$ -	$ -
Facility Server					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server			$ -	$ -	$ -
Total with Facility Server			$ -	$ -	$ -
Labor Check (from Sheet 2-7, cell F50) should equal cell E77				$ -	
Optional OCR/ALPR and Enforcement Notification					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional OCR/ALPR and Enforcement Notification			$ -	$ -	$ -
Optional Tri-Protocol Implementation					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional Tri-Protocol Implementation			$ -	$ -	$ -

Note 1: All hardware/software provided under this Contract should be included in these costs.
Note 2: Use the additional rows as needed to itemize each components
Note 3: All roadways are current Year Cost.
Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.
Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in Section 4 of the Scope of Work
Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in Section 6 of the Scope of Work.

Sheet 2-2 Back-up
Optional In-lane System Cost Schedule - Zone 2

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
Zone Type 2 (3+2+0) Maintenance from Below					
1. Redundant Toll Zone Controller and In-lane Electronics¹					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Redundant Toll Zone Controller and In-lane Electronics¹			$ -	$ -	$ -
2. AVI System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVI System			$ -	$ -	$ -
3. AVC System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVC System			$ -	$ -	$ -
4. LPICPS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total LPICPS			$ -	$ -	$ -
5. Communications Equipment					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
6. Equipment Racks					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Equipment Racks			$ -	$ -	$ -
7. DVAS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total DVAS			$ -	$ -	$ -

Sheet 2-2 Back-up
Optional In-lane System Cost Schedule - Zone 2

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
8. Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Commissioning Test			$ -	$ -	$ -
Total			$ -	$ -	$ -
Facility Server					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server			$ -	$ -	$ -
Total with Facility Server			$ -	$ -	$ -
Labor Check (from Sheet 2-7, cell H50) should equal cell E77				$ -	
Optional OCR/ALPR and Enforcement Notification					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional OCR/ALPR and Enforcement Notification			$ -	$ -	$ -
Optional Tri-Protocol Implementation					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional Tri-Protocol Implementation			$ -	$ -	$ -

Note 1: All hardware/software provided under this Contract should be included in these costs.
Note 2: Use the additional rows as needed to itemize each components
Note 3: All roadways are current Year Cost.
Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.
Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in Section 4 of the Scope of Work
Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in Section 6 of the Scope of Work.

Sheet 2-3 Back-up
Optional In-lane System Cost Schedule - Zone 3

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
Zone Type 3 (2+1+1) Maintenance from Below					
1. Redundant Toll Zone Controller and In-lane Electronics¹					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Redundant Toll Zone Controller and In-lane Electronics¹			$ -	$ -	$ -
2. AVI System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVI System			$ -	$ -	$ -
3. AVC System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVC System			$ -	$ -	$ -
4. LPICPS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total LPICPS			$ -	$ -	$ -
5. Communications Equipment					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
6. Equipment Racks					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Equipment Racks			$ -	$ -	$ -
7. DVAS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total DVAS			$ -	$ -	$ -

Sheet 2-3 Back-up
Optional In-lane System Cost Schedule - Zone 3

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
8. Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Commissioning Test			$ -	$ -	$ -
Total			$ -	$ -	$ -
Facility Server					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server			$ -	$ -	$ -
Total with Facility Server			$ -	$ -	$ -
Labor Check (from Sheet 2-7, cell J50) should equal cell E77				$ -	
Optional OCR/ALPR and Enforcement Notification					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional OCR/ALPR and Enforcement Notification			$ -	$ -	$ -
Optional Tri-Protocol Implementation					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional Tri-Protocol Implementation			$ -	$ -	$ -

Note 1: All hardware/software provided under this Contract should be included in these costs.
Note 2: Use the additional rows as needed to itemize each components
Note 3: All roadways are current Year Cost.
Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.
Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in Section 4 of the Scope of Work
Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in Section 6 of the Scope of Work.

Sheet 2-4 Back-up
Base and Optional In-lane System Cost Schedule - Zone 4

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
Zone Type 4 (2+1+1) Maintenance from Below					
1. Redundant Toll Zone Controller and In-lane Electronics[1]					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Redundant Toll Zone Controller and In-lane Electronics[1]			$ -	$ -	$ -
2. AVI System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVI System			$ -	$ -	$ -
3. AVC System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVC System			$ -	$ -	$ -
4. LPICPS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total LPICPS			$ -	$ -	$ -
5. Communications Equipment					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
6. Equipment Racks					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Equipment Racks			$ -	$ -	$ -
7. DVAS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total DVAS			$ -	$ -	$ -

Sheet 2-4 Back-up
Base and Optional In-lane System Cost Schedule - Zone 4

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
8. Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Commissioning Test			$ -	$ -	$ -
Total			$ -	$ -	$ -
Facility Server					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server			$ -	$ -	$ -
Total with Facility Server			$ -	$ -	$ -
Labor Check (from Sheet 2-7, cell L50) should equal cell E77				$ -	
Optional OCR/ALPR and Enforcement Notification					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional OCR/ALPR and Enforcement Notification			$ -	$ -	$ -
Optional Tri-Protocol Implementation					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional Tri-Protocol Implementation			$ -	$ -	$ -

Note 1: All hardware/software provided under this Contract should be included in these costs.
Note 2: Use the additional rows as needed to itemize each components
Note 3: All roadways are current Year Cost.
Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.
Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in Section 4 of the Scope of Work
Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in Section 6 of the Scope of Work.

Sheet 2-5 Back-up
Optional In-lane System Cost Schedule - Zone 5

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
Zone Type 5 (2+1+1) Existing Mainline Maintenance from Below					
1. Redundant Toll Zone Controller and In-lane Electronics[1]					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Redundant Toll Zone Controller and In-lane Electronics[1]			$ -	$ -	$ -
2. AVI System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVI System			$ -	$ -	$ -
3. AVC System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVC System			$ -	$ -	$ -
4. LPICPS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total LPICPS			$ -	$ -	$ -
5. Communications Equipment					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
6. Equipment Racks					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Equipment Racks			$ -	$ -	$ -
7. DVAS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total DVAS			$ -	$ -	$ -

Sheet 2-5 Back-up
Optional In-lane System Cost Schedule - Zone 5

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
8. Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Commissioning Test			$ -	$ -	$ -
Total			$ -	$ -	$ -
Facility Server					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server			$ -	$ -	$ -
Total with Facility Server			$ -	$ -	$ -
Labor Check (from Sheet 2-7, cell N50) should equal cell E77				$ -	
Optional OCR/ALPR and Enforcement Notification					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional OCR/ALPR and Enforcement Notification			$ -	$ -	$ -
Optional Tri-Protocol Implementation					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional Tri-Protocol Implementation			$ -	$ -	$ -

Note 1: All hardware/software provided under this Contract should be included in these costs.
Note 2: Use the additional rows as needed to itemize each components
Note 3: All roadways are current Year Cost.
Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.
Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in Section 4 of the Scope of Work
Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in Section 6 of the Scope of Work.

Sheet 2-6 Back-up
Optional In-lane System Cost Schedule - Zone 6

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
Zone Type 6 (2+0+0) Existing Ramp Maintenance from Below					
1. Redundant Toll Zone Controller and In-lane Electronics[1]					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Redundant Toll Zone Controller and In-lane Electronics[1]			$ -	$ -	$ -
2. AVI System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVI System			$ -	$ -	$ -
3. AVC System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVC System			$ -	$ -	$ -
4. LPICPS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total LPICPS			$ -	$ -	$ -
5. Communications Equipment					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
6. Equipment Racks					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Equipment Racks			$ -	$ -	$ -
7. DVAS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total DVAS			$ -	$ -	$ -

Sheet 2-6 Back-up
Optional In-lane System Cost Schedule - Zone 6

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
8. Commissioning Test					
	0	$ -	$ -		$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Commissioning Test			$ -	$ -	$ -
Total			$ -	$ -	$ -
Facility Server					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server			$ -	$ -	$ -
Total with Facility Server			$ -	$ -	$ -
Labor Check (from Sheet 2-7, cell P50) should equal cell E77				$ -	
Optional OCR/ALPR and Enforcement Notification					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional OCR/ALPR and Enforcement Notification			$ -	$ -	$ -
Optional Tri-Protocol Implementation					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional Tri-Protocol Implementation			$ -	$ -	$ -

Note 1: All hardware/software provided under this Contract should be included in these costs.
Note 2: Use the additional rows as needed to itemize each components
Note 3: All roadways are current Year Cost.
Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.
Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in Section 4 of the Scope of Work
Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in Section 6 of the Scope of Work.

Sheet 2-7 Back-up
Base and Optional In-lane System Pricing by Zone Type
Staff and Position Classifications with Rates

Item #	STAFF NAMES FOR CLARKS SUMMIT	POSITION/CLASSIFICATION	LOADED HOURLY BILLING RATES BY TASK			LOADED HOURLY BILLING RATES BY TASK		
			Zone Type 1 (3+1+1) Maint From Below			Zone Type 2 (3+2+0) Maint From Below		
			2018 Values			2018 Values		
			Loaded Labor Rate	Hours	Total Labor Cost	Loaded Labor Rate	Hours	Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
	Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

with number)

Sheet 2-7 Back-up
Base and Optional In-lane System Pricing by Zone Type
Staff and Position Classifications with Rates

Item #	STAFF NAMES FOR CLARKS SUMMIT	POSITION/CLASSIFICATION	LOADED HOURLY BILLING RATES BY TASK			LOADED HOURLY BILLING RATES BY TASK		
			Zone Type 3 (2+1+1) Maint From Below			Zone Type 4 (2+1+1) Maint From Below		
			2018 Values			2018 Values		
			Loaded Labor Rate	Hours	Total Labor Cost	Loaded Labor Rate	Hours	Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
	Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

with number)

Sheet 2-7 Back-up
Base and Optional In-lane System Pricing by Zone Type
Staff and Position Classifications with Rates

Item #	STAFF NAMES FOR CLARKS SUMMIT	POSITION/CLASSIFICATION	LOADED HOURLY BILLING RATES BY TASK			LOADED HOURLY BILLING RATES BY TASK		
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below			Zone Type 6 (2+0+0) Existing Ramp Maint From Below		
			2018 Values			2018 Values		
			Loaded Labor Rate	Hours	Total Labor Cost	Loaded Labor Rate	Hours	Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
	Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

with number)

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Clarks Summit				
1 Zone Controller Software Costs (not otherwise covered)					
Zone Controller Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Zone Controller Software Costs			$ -	$ -	$ -
2 Design Documentation					
Lane Drawings	0	$ -	$ -	$ -	$ -
SDDD	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Design Documentation			$ -	$ -	$ -
3 User, Maintenance, and Project Documentation					
Documents/Manuals	0	$ -	$ -	$ -	$ -
Maintenance Manual	0	$ -	$ -	$ -	$ -
Installation Manual	0	$ -	$ -	$ -	$ -
Project Plans	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total User, Maintenance, and Project Documentation			$ -	$ -	$ -
4 Training (manuals, materials and delivery)					
Maintenance Training	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Training			$ -	$ -	$ -
5 Factory Acceptance Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Factory Acceptance Test			$ -	$ -	$ -
6 On-Site First Installation Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total On-Site First Installation Test			$ -	$ -	$ -

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Clarks Summit				
7 Installation and Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Installation and Commissioning Test			$ -	$ -	$ -
8 System Operational and Acceptance Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Operational and Acceptance Test			$ -	$ -	$ -
9 Third Party Warranty and Licenses					
DB Licenses	0	$ -	$ -	$ -	$ -
OS Licenses	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Third Party Warranty and Licenses			$ -	$ -	$ -
10 Warranty (Year 1 of Maintenance) - In-lane System Hardware Maintenance and Software Support Services					
Year 1 Maintenance (Warranty) (from Sheet 5)			$ -		$ -
Total Warranty (Year 1 of Maintenance) - In-Lane System Hardware Maintenance and Software Support Services			$ -		$ -
11 Warranty - In-Lane System Spare Parts and Equipment - Year 1					
Year 1 In-Lane Spare Parts and Equipment Cost (Warranty) (from Sheet 3-2)			$ -		$ -
Total Warranty - In-lane Spare Parts and Equipment - Year 1			$ -		$ -
12 Insurance and Bonding					
Insurance and Bonding	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Insurance and Bonding			$ -	$ -	$ -

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Clarks Summit				
13 Project Management					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Project Management			$ -	$ -	$ -
14 Engineering and Design					
Lane Installation Design Drawings	0	$ -	$ -	$ -	$ -
As-Built Drawings	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Engineering and Design			$ -	$ -	$ -
15 Transition Costs					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Transition Costs			$ -	$ -	$ -
Total System Costs			$ -	$ -	$ -
Labor Check (from Sheet 3-3, row 50) should equal row 140				$ -	

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Mainline				
1 Zone Controller Software Costs (not otherwise covered)					
Zone Controller Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Zone Controller Software Costs			$ -	$ -	$ -
2 Design Documentation					
Lane Drawings					
SDDD					
Total Design Documentation					
3 User, Maintenance, and Project Documentation					
Documents/Manuals					
Maintenance Manual					
Installation Manual					
Project Plans					
Total User, Maintenance, and Project Documentation					
4 Training (manuals, materials and delivery)					
Maintenance Training					
Total Training					
5 Factory Acceptance Test					
Total Factory Acceptance Test					
6 On-Site First Installation Test					
Total On-Site First Installation Test					

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Mainline				
7 Installation and Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Installation and Commissioning Test			$ -	$ -	$ -
8 System Operational and Acceptance Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Operational and Acceptance Test			$ -	$ -	$ -
9 Third Party Warranty and Licenses					
DB Licenses	0	$ -	$ -	$ -	$ -
OS Licenses	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Third Party Warranty and Licenses			$ -	$ -	$ -
10 Warranty (Year 1 of Maintenance) - In-lane System Hardware Maintenance and Software Support Services					
Year 1 Maintenance (Warranty) (from Sheet 5)			$ -		$ -
Total Warranty (Year 1 of Maintenance) - In-Lane System Hardware Maintenance and Software Support Services			$ -		$ -
11 Warranty - In-Lane System Spare Parts and Equipment - Year 1					
Year 1 In-Lane Spare Parts and Equipment Cost (Warranty) (from Sheet 3-2)			$ -		$ -
Total Warranty - In-lane Spare Parts and Equipment - Year 1			$ -		$ -
12 Insurance and Bonding					
Insurance and Bonding	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Insurance and Bonding			$ -	$ -	$ -

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Mainline				
13 Project Management					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Project Management			$ -	$ -	$ -
14 Engineering and Design					
Lane Installation Design Drawings	0	$ -	$ -	$ -	$ -
As-Built Drawings	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Engineering and Design			$ -	$ -	$ -
15 Transition Costs					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Transition Costs			$ -	$ -	$ -
Total System Costs			$ -	$ -	$ -
Labor Check (from Sheet 3-3, row 50) should equal row 140				$ -	

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Western Extensions				
1 Zone Controller Software Costs (not otherwise covered)					
Zone Controller Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Zone Controller Software Costs			$ -	$ -	$ -
2 Design Documentation					
Lane Drawings					
SDDD					
Total Design Documentation					
3 User, Maintenance, and Project Documentation					
Documents/Manuals					
Maintenance Manual					
Installation Manual					
Project Plans					
Total User, Maintenance, and Project Documentation					
4 Training (manuals, materials and delivery)					
Maintenance Training					
Total Training					
5 Factory Acceptance Test					
Total Factory Acceptance Test					
6 On-Site First Installation Test					
Total On-Site First Installation Test					

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Western Extensions				
7 Installation and Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Installation and Commissioning Test			$ -	$ -	$ -
8 System Operational and Acceptance Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Operational and Acceptance Test			$ -	$ -	$ -
9 Third Party Warranty and Licenses					
DB Licenses	0	$ -	$ -	$ -	$ -
OS Licenses	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Third Party Warranty and Licenses			$ -	$ -	$ -
10 Warranty (Year 1 of Maintenance) - In-lane System Hardware Maintenance and Software Support Services					
Year 1 Maintenance (Warranty) (from Sheet 5)			$ -		$ -
Total Warranty (Year 1 of Maintenance) - In-Lane System Hardware Maintenance and Software Support Services			$ -		$ -
11 Warranty - In-Lane System Spare Parts and Equipment - Year 1					
Year 1 In-Lane Spare Parts and Equipment Cost (Warranty) (from Sheet 3-2)			$ -		$ -
Total Warranty - In-lane Spare Parts and Equipment - Year 1			$ -		$ -
12 Insurance and Bonding					
Insurance and Bonding	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Insurance and Bonding			$ -	$ -	$ -

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Western Extensions				
13 Project Management					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Project Management			$ -	$ -	$ -
14 Engineering and Design					
Lane Installation Design Drawings	0	$ -	$ -	$ -	$ -
As-Built Drawings	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Engineering and Design			$ -	$ -	$ -
15 Transition Costs					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Transition Costs			$ -	$ -	$ -
Total System Costs			$ -	$ -	$ -
Labor Check (from Sheet 3-3, row 50) should equal row 140				$ -	

Sheet 3-2 Back-up
Base and Optional In-lane System Spare Parts and Equipment Cost Year 1

SPARE PARTS DESCRIPTION	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)
	Clarks Summit Year 1 - Warranty Year			Optional Mainline Year 1 - Warranty Year			Optional Western Extensions Year 1 - Warranty Year		
1. Redundant Toll Zone Controller and In-lane Electronics[1]									
Servers	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Hard Drive	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Serial Controllers	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Power Supply	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Cables and Connectors	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total Redundant Toll Zone Controller and In-lane Electronics[1]			$ -			$ -			$ -
2. AVI System									
AVI Reader Modules	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
AVI Antennas	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Cables and Connectors	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total AVI System			$ -			$ -			$ -
3. AVC System									
Primary AVDC Sensor	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
AVDC Detector Cards	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Cables and Connectors	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total AVC System			$ -			$ -			$ -
4. LPICPS									
Front Cameras	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Rear Cameras	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Illuminators	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Servers	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Hard Drive	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Cables and Connectors	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total LPICPS			$ -			$ -			$ -

Sheet 3-2 Back-up
Base and Optional In-lane System Spare Parts and Equipment Cost Year 1

SPARE PARTS DESCRIPTION	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)
	Clarks Summit Year 1 - Warranty Year			Optional Mainline Year 1 - Warranty Year			Optional Western Extensions Year 1 - Warranty Year		
5. Communications Equipment									
Switches	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Power Supply	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Router	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total Communications Equipment			$ -			$ -			$ -
6. Equipment Racks									
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total Equipment Racks			$ -			$ -			$ -
7. DVAS									
Cameras	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Servers	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Hard Drive	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total DVAS			$ -			$ -			$ -
Warranty Year - System Spare Parts and Equipment Costs Year 1			$ -			$ -			$ -

Sheet 3-3 Back-up
Base and Optional System Cost - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	LOADED HOURLY BILLING RATES BY TASK			LOADED HOURLY BILLING RATES BY TASK			LOADED HOURLY BILLING RATES BY TASK		
			Clarks Summit			Optional Mainline			Optional Western Extensions		
			Rate	Hours	Total System Labor Cost	Rate	Hours	Total System Labor Cost	Rate	Hours	Total System Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
	Total Labor Cost				$ -			$ -			$ -

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 4-1 Back-up
Base and Optional Toll Concentrator/Host Cost Schedule (if provided)

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Clarks Summit				
1 System Hardware, Third Party Software, Installation and Commissioning not Otherwise Covered					
Host Servers - equipment, purchase, install, configure and test	0	$ -	$ -	$ -	$ -
Storage Works	0	$ -	$ -	$ -	$ -
Back-up Library	0	$ -	$ -	$ -	$ -
Other Third-party Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Hardware, Third Party SW and Installation not Otherwise Covered			$ -	$ -	$ -
2 Communications Equipment					
Switches	0	$ -	$ -	$ -	$ -
LAN HW	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
3 Software (GUI, Back-end), Host System, MOMS, DVAS and License					
Host Software	0	$ -	$ -	$ -	$ -
MOMS	0	$ -	$ -	$ -	$ -
DVAS	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Software (GUI, Back-end), Host System, MOMS, DVAS and License			$ -	$ -	$ -
4 Design Documentation					
Lane Drawings	0	$ -	$ -	$ -	$ -
SDDD	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Design Documentation			$ -	$ -	$ -
5 User, Maintenance, and Project Documentation					
Documents/Manuals	0	$ -	$ -	$ -	$ -
Maintenance Manual	0	$ -	$ -	$ -	$ -
Installation Manual	0	$ -	$ -	$ -	$ -
Project Plans	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total User, Maintenance and Project Documentation			$ -	$ -	$ -
6 Training (manuals, materials and delivery)					
Maintenance Training	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Training			$ -	$ -	$ -

Sheet 4-1 Back-up
Base and Optional Toll Concentrator/Host Cost Schedule (if provided)

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Clarks Summit				
7 Third Party Warranty and Licenses					
DB Licenses	0	$ -	$ -	$ -	$ -
OS Licenses	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Third Party Warranty and Licenses			$ -	$ -	$ -
8 Warranty (Year 1 of Maintenance) - Incremental Toll Concentrator/Host Maintenance and Software Support Services					
Year 1 Warranty (from Sheet 6)			$ -		$ -
Total Warranty First Year of Operation - Incremental Toll Concentrator/Host Maintenance and Software Support Services - Clarks Summit			$ -		$ -
9 Warranty - Toll Concentrator/Host Spare Parts and Equipment - Year 1					
Year 1 Warranty (From Sheet 4-2) Toll Concentrator/Host Spare Parts and Equipment			$ -		$ -
Total Warranty Year - Toll Concentrator/Host Spare Parts and Equipment Year 1			$ -		$ -
Total Toll Concentrator/Host Costs			$ -	$ -	$ -
Labor Check (from Sheet 4-3, row 50) should equal row 80				$ -	

Sheet 4-1 Back-up
Base and Optional Toll Concentrator/Host Cost Schedule (if provided)

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Mainline				
1 System Hardware, Third Party Software, Installation and Commissioning not Otherwise Covered					
Host Servers - equipment, purchase, install, configure and test	0	$ -	$ -	$ -	$ -
Storage Works	0	$ -	$ -	$ -	$ -
Back-up Library	0	$ -	$ -	$ -	$ -
Other Third-party Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Hardware, Third Party SW and Installation not Otherwise Covered			$ -	$ -	$ -
2 Communications Equipment					
Switches	0	$ -	$ -	$ -	$ -
LAN HW	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
3 Software (GUI, Back-end), Host System, MOMS, DVAS and License					
Host Software	0	$ -	$ -	$ -	$ -
MOMS	0	$ -	$ -	$ -	$ -
DVAS	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Software (GUI, Back-end), Host System, MOMS, DVAS and License			$ -	$ -	$ -
4 Design Documentation					
Lane Drawings					
SDDD					
Total Design Documentation					
5 User, Maintenance, and Project Documentation					
Documents/Manuals					
Maintenance Manual					
Installation Manual					
Project Plans					
Total User, Maintenance and Project Documentation					
6 Training (manuals, materials and delivery)					
Maintenance Training					
Total Training					

Sheet 4-1 Back-up
Base and Optional Toll Concentrator/Host Cost Schedule (if provided)

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Mainline				
7 Third Party Warranty and Licenses					
DB Licenses					
OS Licenses					
Total Third Party Warranty and Licenses					
8 Warranty (Year 1 of Maintenance) - Incremental Toll Concentrator/Host Maintenance and Software Support Services					
Year 1 Warranty (from Sheet 6)					
Total Warranty First Year of Operation - Incremental Toll Concentrator/Host Maintenance and Software Support Services - Clarks Summit					
9 Warranty - Toll Concentrator/Host Spare Parts and Equipment - Year 1					
Year 1 Warranty (From Sheet 4-2) Toll Concentrator/Host Spare Parts and Equipment			$ -		$ -
Total Warranty Year - Toll Concentrator/Host Spare Parts and Equipment Year 1			$ -		$ -
Total Toll Concentrator/Host Costs			$ -	$ -	$ -
Labor Check (from Sheet 4-3, row 50) should equal row 80				$ -	

Sheet 4-1 Back-up
Base and Optional Toll Concentrator/Host Cost Schedule (if provided)

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Western Extensions				
1 System Hardware, Third Party Software, Installation and Commissioning not Otherwise Covered					
Host Servers - equipment, purchase, install, configure and test	0	$ -	$ -	$ -	$ -
Storage Works	0	$ -	$ -	$ -	$ -
Back-up Library	0	$ -	$ -	$ -	$ -
Other Third-party Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Hardware, Third Party SW and Installation not Otherwise Covered			$ -	$ -	$ -
2 Communications Equipment					
Switches	0	$ -	$ -	$ -	$ -
LAN HW	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
3 Software (GUI, Back-end), Host System, MOMS, DVAS and License					
Host Software	0	$ -	$ -	$ -	$ -
MOMS	0	$ -	$ -	$ -	$ -
DVAS	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Software (GUI, Back-end), Host System, MOMS, DVAS and License			$ -	$ -	$ -
4 Design Documentation					
Lane Drawings					
SDDD					
Total Design Documentation					
5 User, Maintenance, and Project Documentation					
Documents/Manuals					
Maintenance Manual					
Installation Manual					
Project Plans					
Total User, Maintenance and Project Documentation					
6 Training (manuals, materials and delivery)					
Maintenance Training					
Total Training					

Sheet 4-1 Back-up
Base and Optional Toll Concentrator/Host Cost Schedule (if provided)

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Western Extensions				
7 Third Party Warranty and Licenses					
DB Licenses					
OS Licenses					
Total Third Party Warranty and Licenses					
8 Warranty (Year 1 of Maintenance) - Incremental Toll Concentrator/Host Maintenance and Software Support Services					
Year 1 Warranty (from Sheet 6)					
Total Warranty First Year of Operation - Incremental Toll Concentrator/Host Maintenance and Software Support Services - Clarks Summit					
9 Warranty - Toll Concentrator/Host Spare Parts and Equipment - Year 1					
Year 1 Warranty (From Sheet 4-2) Toll Concentrator/Host Spare Parts and Equipment			$ -		$ -
Total Warranty Year - Toll Concentrator/Host Spare Parts and Equipment Year 1			$ -		$ -
Total Toll Concentrator/Host Costs			$ -	$ -	$ -
Labor Check (from Sheet 4-3, row 50) should equal row 80				$ -	

Sheet 4-2 Back-up
Base and Optional Toll Concentrator/Host Spare Parts and Equipment Cost Year 1 (if provided)

SPARE PARTS DESCRIPTION	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)
	Clarks Summit Year 1 - Warranty Year			Optional Mainline Year 1 - Warranty Year			Optional Western Extensions Year 1 - Warranty Year		
1. System Hardware									
Servers	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Hard Drive	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Miscellaneous	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total System Hardware			$ -			$ -			$ -
2. Communications Equipment									
LAN Equipment	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Power Supply	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total Communications Equipment			$ -			$ -			$ -
Total Warranty Year - Toll Concentrator/Host Spare Parts and Equipment Costs Year 1			$ -			$ -			$ -

Sheet 4-3 Back-up
Base and Optional Toll Concentrator/Host Cost
Staff and Position Classifications with Rates (if provided)

Item #	STAFF NAMES	POSITION/CLASSIFICATION	LOADED HOURLY BILLING RATES BY TASK			LOADED HOURLY BILLING RATES BY TASK			LOADED HOURLY BILLING RATES BY TASK		
			Clarks Summit			Optional Mainline			Optional Western Extensions		
			Rate	Hours	Total System Labor Cost	Rate	Hours	Total System Labor Cost	Rate	Hours	Total System Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
	Total Labor Cost				$ -			$ -			$ -

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-1 Back-up
Base and Optional In-lane System Hardware Maintenance and Software Support Services Cost Schedule
(Summary Only - No Proposer Input Required)

DESCRIPTION OF ITEMS	Total Monthly Cost ($) Per Toll Zone	# of Toll Zones	Number of Months	Annual Cost ($)
	Clarks Summit			
Total Year 1 In-Lane System Hardware Maintenance and Software Support Services (Warranty)	$ -	2	12	$ -
Total Year 2 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Year 3 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Year 6 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Year 7 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Year 8 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Year 9 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Optional Extension 1 Costs				
Total Extension 1 Year 1 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 1 Year 2 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 1 Year 3 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 1 Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 1 Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Optional Extension 2 Costs				
Total Extension 2 Year 1 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 2 Year 2 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 2 Year 3 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 2 Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 2 Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -

Sheet 5-1 Back-up
Base and Optional In-lane System Hardware Maintenance and Software Support Services Cost Schedule
(Summary Only - No Proposer Input Required)

DESCRIPTION OF ITEMS	Total Monthly Cost ($) Per Toll Zone	# of Toll Zones	Number of Months	Annual Cost ($)
	Optional Mainline			
Total Year 1 In-Lane System Hardware Maintenance and Software Support Services (Warranty)				
Total Year 2 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 3 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	41	12	$ -
Total Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	41	12	$ -
Total Year 6 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Year 7 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Year 8 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Year 9 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Optional Extension 1 Costs				
Total Extension 1 Year 1 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 1 Year 2 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 1 Year 3 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 1 Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 1 Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Optional Extension 2 Costs				
Total Extension 2 Year 1 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 2 Year 2 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 2 Year 3 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 2 Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 2 Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -

Sheet 5-1 Back-up
Base and Optional In-lane System Hardware Maintenance and Software Support Services Cost Schedule
(Summary Only - No Proposer Input Required)

DESCRIPTION OF ITEMS	Total Monthly Cost ($) Per Toll Zone	# of Toll Zones	Number of Months	Annual Cost ($)
	Optional Western Extensions			
Total Year 1 In-Lane System Hardware Maintenance and Software Support Services (Warranty)				
Total Year 2 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 3 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 4 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 5 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 6 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 7 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 8 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 9 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Optional Extension 1 Costs				
Total Extension 1 Year 1 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 1 Year 2 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 1 Year 3 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 1 Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 1 Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Optional Extension 2 Costs				
Total Extension 2 Year 1 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 2 Year 2 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 2 Year 3 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 2 Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 2 Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -

Sheet 5-2 Back-up
Base and Optional In-lane System Hardware Maintenance and Software Support Services
Labor and Other Direct Cost Items by Month

DESCRIPTION OF ITEMS	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE	
	Clarks Summit	Optional Mainline	Optional Western Extensions	
Year 1 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services				
Labor	$ -			
MPT	$ -			
Material, Tools and Occupancy	$ -			
Spare Parts and Equipment				See Note #1
Other	$ -			
Maintenance Payment of Performance Bond (X%)	$ -			
Total Monthly Year 1	$ -			
Year 2 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services				
Labor	$ -			
MPT	$ -			
Material, Tools and Occupancy	$ -			
Spare Parts and Equipment	$ -			
Other	$ -			
Maintenance Payment of Performance Bond (X%)	$ -			
Total Monthly Year 2	$ -			
Year 3 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services				
Labor	$ -			
MPT	$ -			
Material, Tools and Occupancy	$ -			
Spare Parts and Equipment	$ -			
Other	$ -			
Maintenance Payment of Performance Bond (X%)	$ -			
Total Monthly Year 3	$ -			
Year 4 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services				
Labor	$ -	$ -		
MPT	$ -	$ -		
Material, Tools and Occupancy	$ -	$ -		
Spare Parts and Equipment	$ -			See Note #2
Other	$ -	$ -		
Maintenance Payment of Performance Bond (X%)	$ -	$ -		
Total Monthly Year 4	$ -	$ -		
Year 5 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services				
Labor	$ -	$ -		
MPT	$ -	$ -		
Material, Tools and Occupancy	$ -	$ -		
Spare Parts and Equipment	$ -	$ -		
Other	$ -	$ -		
Maintenance Payment of Performance Bond (X%)	$ -	$ -		
Total Monthly Year 5	$ -	$ -		

Sheet 5-2 Back-up
Base and Optional In-lane System Hardware Maintenance and Software Support Services
Labor and Other Direct Cost Items by Month

DESCRIPTION OF ITEMS	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE
	Clarks Summit	Optional Mainline	Optional Western Extensions
Year 6 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	
MPT	$ -	$ -	
Material, Tools and Occupancy	$ -	$ -	
Spare Parts and Equipment	$ -	$ -	
Other	$ -	$ -	
Maintenance Payment of Performance Bond (X%)	$ -	$ -	
Total Monthly Year 6	$ -	$ -	
Year 7 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	
MPT	$ -	$ -	
Material, Tools and Occupancy	$ -	$ -	
Spare Parts and Equipment	$ -	$ -	
Other	$ -	$ -	
Maintenance Payment of Performance Bond (X%)	$ -	$ -	
Total Monthly Year 7	$ -	$ -	
Year 8 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	
MPT	$ -	$ -	
Material, Tools and Occupancy	$ -	$ -	
Spare Parts and Equipment	$ -	$ -	
Other	$ -	$ -	
Maintenance Payment of Performance Bond (X%)	$ -	$ -	
Total Monthly Year 8	$ -	$ -	
Year 9 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Year 9	$ -	$ -	$ -

See Note #3

Sheet 5-2 Back-up
Base and Optional In-lane System Hardware Maintenance and Software Support Services
Labor and Other Direct Cost Items by Month

DESCRIPTION OF ITEMS	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE
	Clarks Summit	Optional Mainline	Optional Western Extensions
Optional Extension 1 Costs			
Extension 1 Year 1 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 1 Year 1	$ -	$ -	$ -
Extension 1 Year 2 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 1 Year 2	$ -	$ -	$ -
Extension 1 Year 3 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 1 Year 3	$ -	$ -	$ -
Extension 1 Year 4 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 1 Year 4	$ -	$ -	$ -
Extension 1 Year 5 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 1 Year 5	$ -	$ -	$ -

Sheet 5-2 Back-up
Base and Optional In-lane System Hardware Maintenance and Software Support Services
Labor and Other Direct Cost Items by Month

DESCRIPTION OF ITEMS	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE
	Clarks Summit	Optional Mainline	Optional Western Extensions
Optional Extension 2 Costs			
Extension 2 Year 1 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 2 Year 1	$ -	$ -	$ -
Extension 2 Year 2 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 2 Year 2	$ -	$ -	$ -
Extension 2 Year 3 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 2 Year 3	$ -	$ -	$ -
Extension 2 Year 4 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 2 Year 4	$ -	$ -	$ -
Extension 2 Year 5 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 2 Year 5	$ -	$ -	$ -

Note 1: Clarks Summit Spare Parts and Equipment Cost Year 1 (Warranty Year) are included on Sheet 3-2.

Note 2: Optional Mainline Spare Parts and Equipment Cost Year 1 (Warranty Year) are included on Sheet 3-2.

Note 3: Optional Western Extensions Spare Parts and Equipment Cost Year 1 (Warranty Year) are included on Sheet 3-2.

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION		Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
				LOADED HOURLY BILLING RATES Year 1 of Maintenance			LOADED HOURLY BILLING RATES Year 2 of Maintenance		
Clarks Summit			2018 Loaded Labor Rate	Year 1 Rate	Year 1 Hours	Year 1 Total Labor Cost	Year 2 Rate	Year 2 Hours	Year 2 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost					$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 3 of Maintenance			LOADED HOURLY BILLING RATES Year 4 of Maintenance		
Clarks Summit			Year 3 Rate	Year 3 Hours	Year 3 Total Labor Cost	Year 4 Rate	Year 4 Hours	Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 5 of Maintenance			LOADED HOURLY BILLING RATES Year 6 of Maintenance		
Clarks Summit			Year 5 Rate	Year 5 Hours	Year 5 Total Labor Cost	Year 6 Rate	Year 6 Hours	Year 6 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 7 of Maintenance			LOADED HOURLY BILLING RATES Year 8 of Maintenance		
Clarks Summit			Year 7 Rate	Year 7 Hours	Year 7 Total Labor Cost	Year 8 Rate	Year 8 Hours	Year 8 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 1

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 9 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance		
Clarks Summit			Year 9 Rate	Year 9 Hours	Year 9 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance		
Clarks Summit			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 1 | Optional Extension 1

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Clarks Summit			Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost	Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 2			Optional Extension 2		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance		
Clarks Summit			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost	Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 2			Optional Extension 2		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance		
Clarks Summit			Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost	Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Clarks Summit			Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -
7		Installation Manager	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -
10		CADD Technician	$ -	0	$ -
11		Database Analyst	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -
15		Installation Technician	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -
20		Network Administrator	$ -	0	$ -
21		Network Engineer	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -
23		Software Architect	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -
26		Software Lead	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -
30		System Administrator	$ -	0	$ -
31		System Analyst	$ -	0	$ -
32		Technical Writer	$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional <u>Mainline</u> In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION		Escalation % (Over Previous Year)		3.0%
				LOADED HOURLY BILLING RATES Year 4 of Maintenance		
Optional Mainline			2018 Loaded Labor Rate	Year 4 Rate	Year 4 Hours	Year 4 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	$ -	0	$ -
7		Installation Manager	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	$ -	0	$ -
10		CADD Technician	$ -	$ -	0	$ -
11		Database Analyst	$ -	$ -	0	$ -
12		Electrician Helper	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	$ -	0	$ -
15		Installation Technician	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	$ -	0	$ -
20		Network Administrator	$ -	$ -	0	$ -
21		Network Engineer	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	$ -	0	$ -
23		Software Architect	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	$ -	0	$ -
25		Software Development Manager	$ -	$ -	0	$ -
26		Software Lead	$ -	$ -	0	$ -
27		Software Programmer I	$ -	$ -	0	$ -
28		Software Programmer II	$ -	$ -	0	$ -
29		Software Programmer III	$ -	$ -	0	$ -
30		System Administrator	$ -	$ -	0	$ -
31		System Analyst	$ -	$ -	0	$ -
32		Technical Writer	$ -	$ -	0	$ -
33			$ -	$ -	0	$ -
34			$ -	$ -	0	$ -
35			$ -	$ -	0	$ -
36			$ -	$ -	0	$ -
37			$ -	$ -	0	$ -
38			$ -	$ -	0	$ -
39			$ -	$ -	0	$ -
40			$ -	$ -	0	$ -
41			$ -	$ -	0	$ -
42			$ -	$ -	0	$ -
43			$ -	$ -	0	$ -
44			$ -	$ -	0	$ -
45			$ -	$ -	0	$ -
	Grand Total Labor Cost					$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 5 of Maintenance			LOADED HOURLY BILLING RATES Year 6 of Maintenance		
Optional Mainline			Year 5 Rate	Year 5 Hours	Year 5 Total Labor Cost	Year 6 Rate	Year 6 Hours	Year 6 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional <u>Mainline</u> In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 7 of Maintenance			LOADED HOURLY BILLING RATES Year 8 of Maintenance		
Optional Mainline			Year 7 Rate	Year 7 Hours	Year 7 Total Labor Cost	Year 8 Rate	Year 8 Hours	Year 8 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 1

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 9 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance		
Optional Mainline			Year 9 Rate	Year 9 Hours	Year 9 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 1			Optional Extension 1		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance		
Optional Mainline			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Mainline			Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost	Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 2			Optional Extension 2		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance		
Optional Mainline			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost	Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year	

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 2			Optional Extension 2		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance		
Optional Mainline			Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost	Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Mainline			Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -
7		Installation Manager	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -
10		CADD Technician	$ -	0	$ -
11		Database Analyst	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -
15		Installation Technician	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -
20		Network Administrator	$ -	0	$ -
21		Network Engineer	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -
23		Software Architect	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -
26		Software Lead	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -
30		System Administrator	$ -	0	$ -
31		System Analyst	$ -	0	$ -
32		Technical Writer	$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -
	% increase/decrease from previous year				

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-5 Back-up
Optional Western Extensions In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 1

Item #	STAFF NAMES	POSITION/CLASSIFICATION		Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
				LOADED HOURLY BILLING RATES Year 9 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance		
Optional Western Extensions			2018 Loaded Labor Rate	Year 9 Rate	Year 9 Hours	Year 9 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost					$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-5 Back-up
Optional Western Extensions In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 1			Optional Extension 1		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance		
Optional Western Extensions			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-5 Back-up
Optional Western Extensions In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 1			Optional Extension 1		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Western Extensions			Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost	Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-5 Back-up
Optional Western Extensions In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance		
Optional Western Extensions			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -
7		Installation Manager	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -
10		CADD Technician	$ -	0	$ -
11		Database Analyst	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -
15		Installation Technician	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -
20		Network Administrator	$ -	0	$ -
21		Network Engineer	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -
23		Software Architect	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -
26		Software Lead	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -
30		System Administrator	$ -	0	$ -
31		System Analyst	$ -	0	$ -
32		Technical Writer	$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-5 Back-up
Optional Western Extensions In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 2			Optional Extension 2		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance		
Optional Western Extensions			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-5 Back-up
Optional Western Extensions In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 2			Optional Extension 2		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Western Extensions			Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost	Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-1 Back-up
Base and Optional Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost Schedule
Labor and Other Direct Cost Items by Month (if provided)

DESCRIPTION OF ITEMS	TOTAL MONTHLY COST	TOTAL MONTHLY COST	TOTAL MONTHLY COST	
	Clarks Summit	Optional Mainline	Optional Western Extensions	
Year 1 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services				
Labor	$ -			
Upgrades				
Materials	$ -			
Spare Parts and Equipment				See Note #1
	$ -			
	$ -			
Total Year 1 Monthly Toll Host/System Maintenance and Software Support Services	$ -			
Year 2 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services				
Labor	$ -			
Upgrades	$ -			
Materials	$ -			
Spare Parts and Equipment	$ -			
	$ -			
	$ -			
Total Year 2 Monthly Toll Host/System Maintenance and Software Support Services	$ -			
Year 3 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services				
Labor	$ -			
Upgrades	$ -			
Materials	$ -			
Spare Parts and Equipment	$ -			
	$ -			
	$ -			
Total Year 3 Monthly Toll Host/System Maintenance and Software Support Services	$ -			
Year 4 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services				
Labor	$ -	$ -		
Upgrades	$ -	$ -		
Materials	$ -	$ -		
Spare Parts and Equipment	$ -			See Note #2
	$ -	$ -		
	$ -	$ -		
Total Year 4 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -		
Year 5 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services				
Labor	$ -	$ -		
Upgrades	$ -	$ -		
Materials	$ -	$ -		
Spare Parts and Equipment	$ -	$ -		
	$ -	$ -		
	$ -	$ -		
Total Year 5 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -		

Sheet 6-1 Back-up
Base and Optional Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost Schedule
Labor and Other Direct Cost Items by Month (if provided)

DESCRIPTION OF ITEMS	TOTAL MONTHLY COST	TOTAL MONTHLY COST	TOTAL MONTHLY COST	
	Clarks Summit	Optional Mainline	Optional Western Extensions	
Year 6 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services				
Labor	$ -	$ -		
Upgrades	$ -	$ -		
Materials	$ -	$ -		
Spare Parts and Equipment	$ -	$ -		
	$ -	$ -		
	$ -	$ -		
Total Year 6 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -		
Year 7 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services				
Labor	$ -	$ -		
Upgrades	$ -	$ -		
Materials	$ -	$ -		
Spare Parts and Equipment	$ -	$ -		
	$ -	$ -		
	$ -	$ -		
Total Year 7 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -		
Year 8 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services				
Labor	$ -	$ -		
Upgrades	$ -	$ -		
Materials	$ -	$ -		
Spare Parts and Equipment	$ -	$ -		
	$ -	$ -		
	$ -	$ -		
Total Year 8 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -		
Year 9 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services				
Labor	$ -	$ -	$ -	
Upgrades	$ -	$ -	$ -	
Materials	$ -	$ -	$ -	
Spare Parts and Equipment	$ -	$ -		See Note #3
	$ -	$ -	$ -	
	$ -	$ -	$ -	
Total Year 9 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -	

Sheet 6-1 Back-up
Base and Optional Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost Schedule
Labor and Other Direct Cost Items by Month (if provided)

DESCRIPTION OF ITEMS	TOTAL MONTHLY COST	TOTAL MONTHLY COST	TOTAL MONTHLY COST
	Clarks Summit	Optional Mainline	Optional Western Extensions
Optional Extension Costs			
Extension 1 Costs			
Extension 1 Year 1 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 1 Year 1 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 1 Year 2 Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 1 Year 2 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 1 Year 3 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 1 Year 3 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 1 Year 4 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 1 Year 4 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 1 Year 5 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 1 Year 5 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -

Sheet 6-1 Back-up
Base and Optional Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost Schedule
Labor and Other Direct Cost Items by Month (if provided)

DESCRIPTION OF ITEMS	TOTAL MONTHLY COST	TOTAL MONTHLY COST	TOTAL MONTHLY COST
	Clarks Summit	Optional Mainline	Optional Western Extensions
Extension 2 Costs			
Extension 2 Year 1 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 2 Year 1 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 2 Year 2 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 2 Year 2 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 2 Year 3 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 2 Year 3 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 2 Year 4 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 2 Year 4 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 2 Year 5 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 2 Year 5 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -

Note 1: Clarks Summit Spare Parts and Equipment Cost Year 1 (Warranty Year) are included on Sheet 4-2.

Note 2: Optional Mainline Spare Parts and Equipment Cost Year 1 (Warranty Year) are included on Sheet 4-2.

Note 3: Optional Western Extensions Spare Parts and Equipment Cost Year 1 (Warranty Year) are included on Sheet 4-2.

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION		Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
				LOADED HOURLY BILLING RATES Year 1 of Maintenance			LOADED HOURLY BILLING RATES Year 2 of Maintenance		
Clarks Summit			2018 Loaded Labor Rate	Year 1 Rate	Year 1 Hours	Year 1 Total Labor Cost	Year 2 Rate	Year 2 Hours	Year 2 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	$ -	0	$ -	$ -	0	$ -
31			$ -	$ -	0	$ -	$ -	0	$ -
32			$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost					$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 3 of Maintenance			LOADED HOURLY BILLING RATES Year 4 of Maintenance		
Clarks Summit			Year 3 Rate	Year 3 Hours	Year 3 Total Labor Cost	Year 4 Rate	Year 4 Hours	Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 5 of Maintenance			LOADED HOURLY BILLING RATES Year 6 of Maintenance		
Clarks Summit			Year 5 Rate	Year 5 Hours	Year 5 Total Labor Cost	Year 6 Rate	Year 6 Hours	Year 6 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year	

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 7 of Maintenance			LOADED HOURLY BILLING RATES Year 8 of Maintenance		
Clarks Summit			Year 7 Rate	Year 7 Hours	Year 7 Total Labor Cost	Year 8 Rate	Year 8 Hours	Year 8 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 1

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 9 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance		
Clarks Summit			Year 9 Rate	Year 9 Hours	Year 9 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance		
Clarks Summit			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Clarks Summit			Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost	Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 2			Optional Extension 2		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance		
Clarks Summit			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost	Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 2			Optional Extension 2		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance		
Clarks Summit			Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost	Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Clarks Summit			Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -
7		Installation Manager	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -
10		Database Administrator	$ -	0	$ -
11		Database Analyst	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -
16		Network Administrator	$ -	0	$ -
17		Operations Manager	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -
21		Software Lead	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -
25		System Administrator	$ -	0	$ -
26		System Analyst	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -
28		Technical Writer	$ -	0	$ -
29		Training Manager	$ -	0	$ -
30		Transition Manager	$ -	0	$ -
31			$ -	0	$ -
32			$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

% increase/decrease from previous year	

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION		Escalation % (Over Previous Year)		3.0%
				LOADED HOURLY BILLING RATES Year 4 of Maintenance		
Optional Mainline			2018 Loaded Labor Rate	Year 4 Rate	Year 4 Hours	Year 4 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	$ -	0	$ -
7		Installation Manager	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	$ -	0	$ -
10		Database Administrator	$ -	$ -	0	$ -
11		Database Analyst	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	$ -	0	$ -
16		Network Administrator	$ -	$ -	0	$ -
17		Operations Manager	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	$ -	0	$ -
20		Software Development Manager	$ -	$ -	0	$ -
21		Software Lead	$ -	$ -	0	$ -
22		Software Programmer I	$ -	$ -	0	$ -
23		Software Programmer II	$ -	$ -	0	$ -
24		Software Programmer III	$ -	$ -	0	$ -
25		System Administrator	$ -	$ -	0	$ -
26		System Analyst	$ -	$ -	0	$ -
27		Systems Engineer	$ -	$ -	0	$ -
28		Technical Writer	$ -	$ -	0	$ -
29		Training Manager	$ -	$ -	0	$ -
30		Transition Manager	$ -	$ -	0	$ -
31			$ -	$ -	0	$ -
32			$ -	$ -	0	$ -
33			$ -	$ -	0	$ -
34			$ -	$ -	0	$ -
35			$ -	$ -	0	$ -
36			$ -	$ -	0	$ -
37			$ -	$ -	0	$ -
38			$ -	$ -	0	$ -
39			$ -	$ -	0	$ -
40			$ -	$ -	0	$ -
41			$ -	$ -	0	$ -
42			$ -	$ -	0	$ -
43			$ -	$ -	0	$ -
44			$ -	$ -	0	$ -
45			$ -	$ -	0	$ -
	Grand Total Labor Cost					$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 5 of Maintenance			LOADED HOURLY BILLING RATES Year 6 of Maintenance		
Optional Mainline			Year 5 Rate	Year 5 Hours	Year 5 Total Labor Cost	Year 6 Rate	Year 6 Hours	Year 6 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 7 of Maintenance			LOADED HOURLY BILLING RATES Year 8 of Maintenance		
Optional Mainline			Year 7 Rate	Year 7 Hours	Year 7 Total Labor Cost	Year 8 Rate	Year 8 Hours	Year 8 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 1

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 9 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance		
Optional Mainline			Year 9 Rate	Year 9 Hours	Year 9 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 1			Optional Extension 1		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance		
Optional Mainline			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year	

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Mainline			Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost	Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 2			Optional Extension 2		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance		
Optional Mainline			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost	Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2 | Optional Extension 2

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance		
Optional Mainline			Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost	Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Mainline			Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -
7		Installation Manager	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -
10		Database Administrator	$ -	0	$ -
11		Database Analyst	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -
16		Network Administrator	$ -	0	$ -
17		Operations Manager	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -
21		Software Lead	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -
25		System Administrator	$ -	0	$ -
26		System Analyst	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -
28		Technical Writer	$ -	0	$ -
29		Training Manager	$ -	0	$ -
30		Transition Manager	$ -	0	$ -
31			$ -	0	$ -
32			$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-4 Back-up
Optional Western Extensions Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 1

Item #	STAFF NAMES	POSITION/CLASSIFICATION		Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
				LOADED HOURLY BILLING RATES Year 9 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance		
Optional Western Extension			2018 Loaded Labor Rate	Year 9 Rate	Year 9 Hours	Year 9 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	$ -	0	$ -	$ -	0	$ -
31			$ -	$ -	0	$ -	$ -	0	$ -
32			$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost					$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-4 Back-up
Optional Western Extensions Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance		
Optional Western Extension			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-4 Back-up
Optional Western Extensions Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Western Extension			Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost	Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-4 Back-up
Optional Western Extensions Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 2			Optional Extension 2		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance		
Optional Western Extension			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost	Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year	

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-4 Back-up
Optional Western Extensions Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 2			Optional Extension 2		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance		
Optional Western Extension			Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost	Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-4 Back-up
Optional Western Extensions Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Western Extension			Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -
7		Installation Manager	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -
10		Database Administrator	$ -	0	$ -
11		Database Analyst	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -
16		Network Administrator	$ -	0	$ -
17		Operations Manager	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -
21		Software Lead	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -
25		System Administrator	$ -	0	$ -
26		System Analyst	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -
28		Technical Writer	$ -	0	$ -
29		Training Manager	$ -	0	$ -
30		Transition Manager	$ -	0	$ -
31			$ -	0	$ -
32			$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

% increase/decrease from previous year	

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 7-1 Back-up
Optional Toll Host System Replacement Implementation Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
1 System Hardware, Third Party Software, Installation and Commissioning not Otherwise Covered					
Host Servers - equipment, purchase, install, configure and test	0	$ -	$ -	$ -	$ -
Storage Works	0	$ -	$ -	$ -	$ -
Back-up Library	0	$ -	$ -	$ -	$ -
Other Third-party Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Hardware, Third Party SW and Installation not Otherwise Covered			$ -	$ -	$ -
2 Communications Equipment					
Switches	0	$ -	$ -	$ -	$ -
LAN HW	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
3 Software (GUI, Back-end), Host System, MOMS, DVAS and License					
Host Software	0	$ -	$ -	$ -	$ -
MOMS	0	$ -	$ -	$ -	$ -
DVAS	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Software (GUI, Back-end), Host System, MOMS, DVAS and License			$ -	$ -	$ -
4 Design Documentation					
Lane Drawings	0	$ -	$ -	$ -	$ -
SDDD	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Design Documentation			$ -	$ -	$ -
5 User, Maintenance, and Project Documentation					
Documents/Manuals	0	$ -	$ -	$ -	$ -
Maintenance Manual	0	$ -	$ -	$ -	$ -
Installation Manual	0	$ -	$ -	$ -	$ -
Project Plans	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total User, Maintenance and Project Documentation			$ -	$ -	$ -
6 Training (manuals, materials and delivery)					
Maintenance Training	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Training			$ -	$ -	$ -

Sheet 7-1 Back-up
Optional Toll Host System Replacement Implementation Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
7 Factory Acceptance Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Factory Acceptance Test			$ -	$ -	$ -
8 Installation and Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Installation and Commissioning Test			$ -	$ -	$ -
9 System Operational and Acceptance Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Operational and Acceptance Test			$ -	$ -	$ -
10 Third Party Warranty and Licenses					
DB Licenses	0	$ -	$ -	$ -	$ -
OS Licenses	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Third Party Warranty and Licenses			$ -	$ -	$ -
11 Warranty First Year of Maintenance - Toll Host System Replacement Maintenance and Software Support Services					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Warranty First Year of maintenance - Toll Host System Replacement Maintenance and Software Support Services			$ -	$ -	$ -
12 Spare Parts and Equipment Year 1 - Warranty Year					
Toll Host System Replacement Spare Parts and Equipment (Year 1) (Sheet 7-2)			$ -		$ -
Total Spare Parts and Equipment Year 1 - Warranty Year			$ -	$ -	$ -

Sheet 7-1 Back-up
Optional Toll Host System Replacement Implementation Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
13 Project Management					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Project Management			$ -	$ -	$ -
14 Engineering and Design					
Lane Installation Design Drawings	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Engineering and Design			$ -	$ -	$ -
15 Transition Costs					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Transition Costs			$ -	$ -	$ -
Total Optional Toll Host System Replacement Implementation Costs			$ -	$ -	$ -
Labor Check (from Sheet 7-3, cell F50) should equal cell F146				$ -	

Sheet 7-2 Back-up
Optional Toll Host System Replacement Implementation
Spare Parts and Equipment Cost Year 1

SPARE PARTS DESCRIPTION	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)
	Year 1 - Warranty Year		
1. System Hardware			
Servers	0	$ -	$ -
Hard Drive	0	$ -	$ -
Miscellaneous	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
Total System Hardware			$ -
2. Communications Equipment			
LAN Equipment	0	$ -	$ -
Power Supply	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
Total Communications Equipment			$ -
Toll Host System Replacement Implementation Spare Parts and Equipment Cost Year 1			$ -

Sheet 7-3 Back-up
Optional Toll Host System Replacement Implementation Cost
Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	LOADED HOURLY BILLING RATES BY TASK		
			Rate	Hours	Total System Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -
7		Installation Manager	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -
10		Database Administrator	$ -	0	$ -
11		Database Analyst	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -
16		Network Administrator	$ -	0	$ -
17		Operations Manager	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -
21		Software Lead	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -
25		System Administrator	$ -	0	$ -
26		System Analyst	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -
28		Technical Writer	$ -	0	$ -
29		Training Manager	$ -	0	$ -
30		Transition Manager	$ -	0	$ -
31			$ -	0	$ -
32			$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Total Labor Cost				$ -

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 8-1
Additional Services Rates and Markup for Out of Scope Work

DESCRIPTION	PERCENTAGE
Subcontractor Markup	0.0000%
Equipment & Materials Markup	0.0000%
Overhead including Burden	0.0000%
Profit	0.0000%
STAFF POSITION/CLASSIFICATION	LOADED HOURLY RATE (2018 Value)
CADD Technician	$ -
Database Administrator	$ -
Database Analyst	$ -
Deputy Project Manager	$ -
Electrician Helper	$ -
Finance Manager (Design/Implementation)	$ -
Finance Manager (Operations)	$ -
Hardware Engineer/Lead	$ -
Installation Manager	$ -
Installation Supervisor	$ -
Installation Technician	$ -
Lane Technical Lead	$ -
Licensed Electrical Engineer	$ -
Licensed Electrician	$ -
Maintenance Manager	$ -
Maintenance Supervisor	$ -
Maintenance Technician	$ -
Network Administrator	$ -
Network Engineer	$ -
Operations Manager	$ -
Project Manager	$ -
Project Principal	$ -
Quality Assurance/Test Manager	$ -
Senior Maintenance Technician	$ -
Software Architect	$ -
Software Development Engineer	$ -
Software Development Manager	$ -
Software Lead	$ -
Software Programmer I	$ -
Software Programmer II	$ -

Sheet 8-1
Additional Services Rates and Markup for Out of Scope Work

DESCRIPTION	PERCENTAGE
Subcontractor Markup	0.0000%
Equipment & Materials Markup	0.0000%
Overhead including Burden	0.0000%
Profit	0.0000%
STAFF POSITION/CLASSIFICATION	LOADED HOURLY RATE (2018 Value)
Software Programmer III	$ -
System Administrator	$ -
System Analyst	$ -
System Technical Lead (if applicable)	$ -
Systems Engineer	$ -
Technical /Software Development Manager	$ -
Technical Writer	$ -
Training Manager	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -

Note 1: CPI adjustments will be made to the Cost based on actual CPI change for the previous year beginning with Maintenance Year 2 as further described in the Price Proposal Instructions.

Exhibit D - Payment Schedule - Clarks Summit

A. Payments for Implementation Cashless Tolling System Design and Development					**$ -**
Payment Number	**Payment Milestone**	**Pay Items**	**% Paid**	**Cum.% Paid**	
A-1	Notice to Proceed	Notice to Proceed.	5.00%	5.00%	$ -
A-2	Cashless Toll System Development and Administration	Project Management Documents Approved (PMP, Project Schedule, QA Plan and SDP, SRD).	10.00%	15.00%	$ -
A-3	Cashless Toll System Design	Business Rules and Design Documents Approved (BRD and SDDD) .	15.00%	30.00%	$ -
A-4	Cashless Toll System Factory Acceptance Testing (FAT)	Test Documentation and Factory Acceptance Testing Approved.	15.00%	45.00%	$ -
A-5	Cashless Toll System Onsite First Installation Testing (OFIT)	Installation Plan Approved, Test Documentation and Onsite Integration Testing Approved - First Site.	15.00%	60.00%	$ -
A-6	Cashless Toll System Manuals and Training	Manuals Approved and Training Approved.	5.00%	65.00%	$ -
A-7	Cashless Toll System Commissioning - Clarks Summit	Installation and Commissioning Approved Ready for Go Live.	10.00%	75.00%	$ -
A-9	Cashless Toll System Acceptance	Operational and Acceptance Test Approved, As-builts Approved and Implementation Phase Closed Out.	25.00%	100.00%	$ -

B. Payments Related to Hardware, Equipment and Off-the-Shelf Software				**$ -**
Payment Number	**Payment Milestone**	**% Paid**	**Cum.% Paid**	
B-1	Ordering Verified	20.00%	20.00%	$ -
B-2	Purchased, Received and Verified	60.00%	80.00%	$ -
B-3	Installation Approved	20.00%	**100.00%**	$ -

Exhibit D - Payment Schedule - Clarks Summit

A. Payments for Implementation Cashless Tolling System Design and Development					**$ -**
Payment Number	**Payment Milestone**	**Pay Items**	**% Paid**	**Cum.% Paid**	
A-1	Notice to Proceed	Notice to Proceed.	5.00%	5.00%	$ -
A-2	Cashless Toll System Development and Administration	Project Management Documents Approved (PMP, Project Schedule, QA Plan and SDP, SRD).	10.00%	15.00%	$ -
A-3	Cashless Toll System Design	Business Rules and Design Documents Approved (BRD and SDDD) .	15.00%	30.00%	$ -
A-4	Cashless Toll System Factory Acceptance Testing (FAT)	Test Documentation and Factory Acceptance Testing Approved.	15.00%	45.00%	$ -
A-5	Cashless Toll System Onsite First Installation Testing (OFIT)	Installation Plan Approved, Test Documentation and Onsite Integration Testing Approved - First Site.	15.00%	60.00%	$ -
A-6	Cashless Toll System Manuals and Training	Manuals Approved and Training Approved.	5.00%	65.00%	$ -
A-7	Cashless Toll System Commissioning - Clarks Summit	Installation and Commissioning Approved Ready for Go Live.	10.00%	75.00%	$ -
A-9	Cashless Toll System Acceptance	Operational and Acceptance Test Approved, As-builts Approved and Implementation Phase Closed Out.	25.00%	100.00%	$ -

B. Payments Related to Hardware, Equipment and Off-the-Shelf Software				**$ -**
Payment Number	**Payment Milestone**	**% Paid**	**Cum.% Paid**	
B-1	Ordering Verified	20.00%	20.00%	$ -
B-2	Purchased, Received and Verified	60.00%	80.00%	$ -
B-3	Installation Approved	20.00%	**100.00%**	$ -

Addendum No. 4

RFP # 18-10495-8121

Cashless Tolling System Implementation and Maintenance

Prospective Respondents: You are hereby notified of the following information in regard to the referenced RFP:

PTC has corrected several spreadsheet formula inconsistencies in Exhibit F-7 Price Proposal that impact the overall pricing summarization. This update has no material impact on the input data required by Proposers, only revisions to how some data is summarized. The changes applied to the updated Exhibit F-7 – Price Proposal impacting locked data cells that require no input from Proposers and are either cosmetic in nature or contain summary calculations based on input by the Proposer. The following revisions to Exhibit F-7 Price Proposal have been addressed and corrected with this addendum:

REVISIONS

1. Sheet/Tab: 1 Project Summary - Column “G” of rows 21-24 were incorrectly summing up columns “C” and “D” but should sum up columns “C” thru “F”. This has been corrected in the updated Exhibit F-7 Pricing Proposal – Addendum #4 – 08-01-2018 attached to this addendum.

2. Sheet/Tab: 4-1 Backup Toll Con-Host Sch – Cell “B35” indicated Lane drawings as part of the Design Documentation for the Toll Concentrator/Host. Clarification: This cell has been updated to indicate additional Host Drawings required as part of the Toll Concentrator/Host design documentation and/or SDDD that may not have been captured in Sheet/Tab: 3-1 Backup System Sch.

3. Sheet/Tab: 6-2 Backup Host Maint Staff CS - Column “AU” of rows 5-49 were incorrectly using column “AO” but should be using Column “AR” to calculate year over year escalation costs from the previous year. This has been corrected in the updated Exhibit F-7 Pricing Proposal – Addendum #4 – 08-01-2018 attached to this addendum.

4. The following descriptive updates have been corrected with the proper cell reference in the updated Exhibit F-7 Pricing Proposal – Addendum #4 – 08-01-2018 attached to this addendum. No formulas or proposer input data were impacted.

    a. Sheet/Tab: 2-a Backup Opt In-lane Cost – Updated Cell A40 to state “Volume Discount for 40 Zones or more”.

b. Sheet/Tab: 2-2 Backup In-lane Z2 – Updated Cell A78 to state "Labor Check (from Sheet 2-7, cell I50) should equal cell E77".
c. Sheet/Tab: 2-3 Backup In-lane Z3 – Updated Cell A78 to state "Labor Check (from Sheet 2-7, cell L50) should equal cell E77".
d. Sheet/Tab: 2-4 Backup In-lane Z4 – Updated Cell A78 to state "Labor Check (from Sheet 2-7, cell O50) should equal cell E77".
e. Sheet/Tab: 2-5 Backup In-lane Z5 – Updated Cell A78 to state "Labor Check (from Sheet 2-7, cell R50) should equal cell E77".
f. Sheet/Tab: 2-6 Backup In-lane Z6 – Updated Cell A78 to state "Labor Check (from Sheet 2-7, cell U50) should equal cell E77".
g. Sheet/Tab: 7-1 Backup Opt Host Repl Sch– Updated Cell A147 to state "Labor Check (from Sheet 7-3, cell F49) should equal cell F146".

5. Replace Exhibit F-7 – Price Proposal in its entirety with the revised Exhibit F-7 – Price Proposal – Addendum #4 - 08-01-2018 provided as attached to this addendum. Electronic file is also provided.

All other terms, conditions and requirements of the original RFP dated May 30, 2018, Addendum 1, Addendum 2 and Addendum 3 remain unchanged unless modified by this Addendum.

Exhibit F-7

Price Proposal

(Excel file "paperclipped" to Addendum for ease of completion)

Sheet 1
Project Summary - Base and Optional
PTC Cashless Tolling System Implementation and Maintenance Cost
(Summary Only - No Proposer Input Required)

	Base Contract Cost ($)	Optional Future Facilities Cost ($)	Optional Future Facilities Cost ($)	Optional Toll Host Replacement Cost ($)	Grand Total Cost ($)
Implementation Phase	Clarks Summit	Optional Mainline	Optional Western Extensions		
In-lane System Cost (Sheet 2)	$ -	$ -	$ -		$ -
System Cost (Sheet 3)	$ -	$ -	$ -		$ -
Toll Concentrator/Host Cost (if provided) (Sheet 4)	$ -	$ -	$ -		$ -
Total Implementation Phase	$ -	$ -	$ -		$ -
Maintenance Phase					
In-lane System Hardware Maintenance and Software Support Services Cost (Sheet 5)	$ -	$ -	$ -		$ -
Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost (if provided) (Sheet 6)	$ -	$ -	$ -		$ -
Total Maintenance Phase	$ -	$ -	$ -		$ -
TOTAL IMPLEMENTATION AND MAINTENANCE PHASE	$ -	$ -	$ -		$ -
Optional Functionality					
In-lane OCR/ALPR and Enforcement Notification Pricing (Sheet 2)	$ -	$ -	$ -		$ -
Tri-Protocol Implementation (Sheet 2)	$ -	$ -	$ -		$ -
Toll Host System Replacement Implementation Cost (Sheet 7)				$ -	$ -
Toll Host System Replacement Maintenance and Software Support Services Cost - Year 1 only (Sheet 7)				$ -	$ -
Total Optional Functionality	$ -	$ -	$ -	$ -	$ -
TOTAL IMPLEMENTATION AND MAINTENANCE PHASE WITH OPTIONAL FUNCTIONALITY	$ -	$ -	$ -	$ -	$ -

Sheet 1
Project Summary - Base and Optional
PTC Cashless Tolling System Implementation and Maintenance Cost
(Summary Only - No Proposer Input Required)

	Base Contract Cost ($)	Optional Future Facilities Cost ($)	Optional Future Facilities Cost ($)	Optional Toll Host Replacement Cost ($)	Grand Total Cost ($)
Optional Extension Phase					
Extension #1 In-lane System Hardware Maintenance and Software Support Services Cost (Sheet 5)	$ -	$ -	$ -		$ -
Extension #1 Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost (if provided) (Sheet 6)	$ -	$ -	$ -		$ -
Extension #2 In-lane System Hardware Maintenance and Software Support Services Cost (Sheet 5)	$ -	$ -	$ -		$ -
Extension #2 Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost (if provided) (Sheet 6)	$ -	$ -	$ -		$ -
Total Optional Extension Phases	$ -	$ -	$ -		$ -
TOTAL IMPLEMENTATION AND MAINTENANCE PHASE WITH OPTIONAL EXTENSION PHASES	$ -	$ -	$ -		$ -
TOTAL IMPLEMENTATION AND MAINTENANCE PHASE WITH OPTIONAL FUNCTIONALITY AND OPTIONAL EXTENSION PHASES	$ -	$ -	$ -	$ -	$ -

Grand Total Dollars

Officer Signature
Date
Typed Name, Title, Address and Phone Number

Sheet 2
Base and Optional In-lane System Cost by Roadway
(Summary Only - No Proposer Input Required)

Highway	Region	Shadow Go-Live Date	Toll Zone Type	Total # of Toll Zones or Locations	Cost Per Toll Zone ($)	Total Cost Toll Zones ($)
Base Contract						
Clarks Summit	Northeast Extension	March 31, 2020	Zone Type 4 (2+1+1) Maint from Below	2	$ -	$ -
			Facility Server	1	$ -	$ -
			Total Base Contract - Clarks Summit	2/1		$ -
Optional Total Zones, OCR/ALPR and Enforcement Notification, and Tri-Protocol Readers (Sheet 2-a)						
Optional Total Zones						
Optional Mainline	East and Northeast Extension	2022	Zone Type 1 (3+1+1) Maint From Below	10		$ -
			Facility Server	5		$ -
			Zone Type 2 (3+2+0) Maint From Below	14		$ -
			Facility Server	7		$ -
			Zone Type 3 (2+1+1) Maint From Below	2		$ -
			Facility Server	1		$ -
			Zone Type 4 (2+1+1) Maint from Below	12		$ -
			Facility Server	6		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	1		$ -
			Facility Server	1		$ -
			Zone Type 6 (2+0+0) Existing Ramp Maint From Below	2		$ -
			Facility Server	2		$ -
	Volume Discount					$ -
	Central and West	2024	Zone Type 2 (3+2+0) Maint From Below	34		$ -
			Facility Server	17		$ -
			Zone Type 3 (2+1+1) Maint From Below	2		$ -
			Facility Server	1		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	1		$ -
			Facility Server	1		$ -
	Volume Discount					$ -
			Total Optional - Mainline	78/41		$ -
Optional Western Extensions	Beaver Valley Expressway, Mon-Fayette Expressway, and Amos K Bypass	2027	Zone Type 4 (2+1+1) Maint from Below	2		$ -
			Facility Server	1		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	10		$ -
			Facility Server	5		$ -
			Zone Type 6 (2+0+0) Existing Ramp Maint From Below	32		$ -
			Facility Server	16		$ -
	Volume Discount					$ -
			Total Optional - Western Extensions	44/22		$ -

Sheet 2
Base and Optional In-lane System Cost by Roadway
(Summary Only - No Proposer Input Required)

Highway	Region	Shadow Go-Live Date	Toll Zone Type	Total # of Toll Zones or Locations	Cost Per Toll Zone ($)	Total Cost Toll Zones ($)
Optional OCR/ALPR and Enforcement Notification						
Clarks Summit	Northeast Extension	March 31, 2020	Zone Type 4 (2+1+1) Maint from Below	2	$ -	$ -
Total Optional OCR/ALPR and Enforcement Notification - Clarks Summit				2		$ -
Mainline - Optional	East and Northeast Extension	2022	Zone Type 1 (3+1+1) Maint From Below	10		$ -
			Zone Type 2 (3+2+0) Maint From Below	14		$ -
			Zone Type 3 (2+1+1) Maint From Below	2		$ -
			Zone Type 4 (2+1+1) Maint from Below	12		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	1		$ -
			Zone Type 6 (2+0+0) Existing Ramp Maint From Below	2		$ -
	Central and West	2024	Zone Type 2 (3+2+0) Maint From Below	34		$ -
			Zone Type 3 (2+1+1) Maint From Below	2		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	1		$ -
Total Optional OCR/ALPR and Enforcement Notification - Mainline				78		$ -
Western Extensions - Optional	Beaver Valley Expressway, Amos K Bypass, and Mon-Fayette Expressway	2027	Zone Type 4 (2+1+1) Maint from Below	2		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	10		$ -
			Zone Type 6 (2+0+0) Existing Ramp Maint From Below	32		$ -
Total Optional OCR/ALPR and Enforcement Notification - Western Extensions				44		$ -
Optional Tri-Protocol Implementation						
Clarks Summit	Northeast Extension	March 31, 2020	Zone Type 4 (2+1+1) Maint from Below	2	$ -	$ -
Total Optional Tri-Protocol Implementation - Clarks Summit				2		$ -
Mainline - Optional	East and Northeast Extension	2022	Zone Type 1 (3+1+1) Maint From Below	10		$ -
			Zone Type 2 (3+2+0) Maint From Below	14		$ -
			Zone Type 3 (2+1+1) Maint From Below	2		$ -
			Zone Type 4 (2+1+1) Maint from Below	12		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	1		$ -
			Zone Type 6 (2+0+0) Existing Ramp Maint From Below	2		$ -
	Central and West	2024	Zone Type 2 (3+2+0) Maint From Below	34		$ -
			Zone Type 3 (2+1+1) Maint From Below	2		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	1		$ -
Total Optional Tri-Protocol Implementation - Mainline				78		$ -
Western Extensions - Optional	Beaver Valley Expressway, Amos K Bypass, and Mon-Fayette Expressway	2027	Zone Type 4 (2+1+1) Maint from Below	2		$ -
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below	10		$ -
			Zone Type 6 (2+0+0) Existing Ramp Maint From Below	32		$ -
Total Optional Tri-Protocol Implementation - Western Extensions				44		$ -

Sheet 3
Base and Optional System Cost
(Summary Only - No Proposer Input Required)

Item #	Description	Unit	Total Cost ($)	Total Cost ($)	Total Cost ($)
			Clarks Summit	Optional Mainline	Optional Western Extensions
1	Zone Controller Software Costs (not otherwise covered)	LS	$ -	$ -	$ -
2	Design Documentation	LS	$ -		
3	User, Maintenance, and Project Documentation	LS	$ -		
4	Training (manuals, materials and delivery)	LS	$ -		
5	Factory Acceptance Test	LS	$ -		
6	On-Site First Installation Test	LS	$ -		
7	Installation and Commissioning Test	LS	$ -	$ -	$ -
8	System Operational and Acceptance Test	LS	$ -	$ -	$ -
9	Third Party Warranty and Licenses	LS	$ -	$ -	$ -
10	Warranty (Year 1 of Maintenance) - In-lane System Hardware Maintenance and Software Support Services	LS	$ -	$ -	$ -
11	Warranty - In-Lane System Spare Parts and Equipment - Year 1	LS	$ -	$ -	$ -
12	Insurance and Bonding	LS	$ -	$ -	$ -
13	Project Management	LS	$ -	$ -	$ -
14	Engineering and Design	LS	$ -	$ -	$ -
15	Transition Costs	LS	$ -	$ -	$ -
		Total System Costs	$ -	$ -	$ -

Sheet 4
Base and Optional Toll Concentrator/Host Cost (if provided)
(Summary Only - No Proposer Input Required)

Item #	Description	Unit	Total Cost ($)	Total Cost ($)	Total Cost ($)
			Clarks Summit	Optional Mainline	Optional Western Extensions
1	System Hardware, Third Party Software, Installation and Commissioning not Otherwise Covered	LS	$ -	$ -	$ -
2	Communications Equipment	LS	$ -	$ -	$ -
3	Software (GUI, Back-end), Host System, MOMS, DVAS and License	LS	$ -	$ -	$ -
4	Design Documentation	LS	$ -		
5	User, Maintenance, and Project Documentation	LS	$ -		
6	Training (manuals, materials and delivery)	LS	$ -		
7	Third Party Warranty and Licenses	LS	$ -		
8	Warranty (Year 1 of Maintenance) - Incremental Toll Concentrator/Host Maintenance and Software Support Services	LS	$ -		
9	Warranty - Toll Concentrator/Host Spare Parts and Equipment - Year 1	LS	$ -	$ -	$ -
	Total Toll Concentrator/Host Costs		$ -	$ -	$ -

Sheet 5
Base and Optional
In-lane System Hardware Maintenance and Software Support Services Cost
(Summary Only - No Proposer Input Required)

Item #	Description of Items	Total Annual Cost ($)	Total Annual Cost ($)	Total Annual Cost ($)	
	Base Contract Maintenance Costs	Clarks Summit	Optional Mainline	Optional Western Extensions	
1	Year 1 of Maintenance (Warranty)	$ -			See Note #1
2	Year 2 of Maintenance	$ -			
3	Year 3 of Maintenance	$ -			
4	Year 4 of Maintenance	$ -	$ -		See Note #2
5	Year 5 of Maintenance	$ -	$ -		
6	Year 6 of Maintenance	$ -	$ -		
7	Year 7 of Maintenance	$ -	$ -		
8	Year 8 of Maintenance	$ -	$ -		
9	Year 9 of Maintenance	$ -	$ -	$ -	See Note #3
	Total In-Lane System Hardware Maintenance and Software Support Services (excluding Warranty Years)	$ -	$ -	$ -	
	Optional Extension 1 Costs				
10	Extension 1 - Year 1 of Maintenance	$ -	$ -	$ -	
11	Extension 1 - Year 2 of Maintenance	$ -	$ -	$ -	
12	Extension 1 - Year 3 of Maintenance	$ -	$ -	$ -	
13	Extension 1 - Year 4 of Maintenance	$ -	$ -	$ -	
14	Extension 1 - Year 5 of Maintenance	$ -	$ -	$ -	
	Total Extension 1 Cost	$ -	$ -	$ -	
	Optional Extension 2 Costs				
15	Extension 2 - Year 1 of Maintenance	$ -	$ -	$ -	
16	Extension 2 - Year 2 of Maintenance	$ -	$ -	$ -	
17	Extension 2 - Year 3 of Maintenance	$ -	$ -	$ -	
18	Extension 2 - Year 4 of Maintenance	$ -	$ -	$ -	
19	Extension 2 - Year 5 of Maintenance	$ -	$ -	$ -	
	Total Extension 2 Cost	$ -	$ -	$ -	
Total Base and Optional In-Lane System Hardware Maintenance and Software Support Services (excluding Warranty Years)		$ -	$ -	$ -	

Note 1: Clarks Summit First Year Maintenance (Year 1 of Maintenance) Total carried forward to Sheet 3 - System Cost. Not included in the total of Sheet 5.

Note 2: Optional Mainline First Year Maintenance (Year 4 of Maintenance) Total carried forward to Sheet 3 - System Cost. Not included in the total of Sheet 5.

Note 3: Optional Western Extensions First Year Maintenance (Year 9 of Maintenance) Total carried forward to Sheet 3 - System Cost. Not included in the total of Sheet 5.

Sheet 6
Base and Optional
Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost (if provided)
(Summary Only - No Proposer Input Required)

Item #	Description of Items	Total Monthly Cost ($)	Total Annual Cost ($)	Total Monthly Cost ($)	Total Annual Cost ($)	Total Monthly Cost ($)	Total Annual Cost ($)	
	Base Contract Maintenance Costs	Clarks Summit		Optional Mainline		Optional Western Extensions		
1	Year 1 of Maintenance (Warranty)	$ -	$ -					See Note #1
2	Year 2 of Maintenance	$ -	$ -					
3	Year 3 of Maintenance	$ -	$ -					
4	Year 4 of Maintenance	$ -	$ -	$ -	$ -			
5	Year 5 of Maintenance	$ -	$ -	$ -	$ -			
6	Year 6 of Maintenance	$ -	$ -	$ -	$ -			
7	Year 7 of Maintenance	$ -	$ -	$ -	$ -			
8	Year 8 of Maintenance	$ -	$ -	$ -	$ -			
9	Year 9 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
	Total Toll Concentrator/Host Maintenance and Software Support Services Base Contract Cost (Maintenance Years 2-9)		$ -		$ -		$ -	
	Optional Extension 1 Costs							
10	Extension 1 - Year 1 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
11	Extension 1 - Year 2 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
12	Extension 1 - Year 3 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
13	Extension 1 - Year 4 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
14	Extension 1 - Year 5 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
	Total Extension 1 Cost		$ -		$ -		$ -	
	Optional Extension 2 Costs							
15	Extension 2 - Year 1 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
16	Extension 2 - Year 2 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
17	Extension 2 - Year 3 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
18	Extension 2 - Year 4 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
19	Extension 2 - Year 5 of Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	
	Total Extension 2 Cost		$ -		$ -		$ -	
	Total Base and Optional Toll Concentrator/Host Maintenance and Software Support Services (excluding Warranty)		$ -		$ -		$ -	

Note 1: Year 1 of Maintenance Total carried forward to Sheet 4 - Toll Concentrator/Host Cost. Not included in the total of Sheet 6.

Sheet 7
Optional Toll Host System Replacement Implementation Cost
(Summary Only - No Proposer Input Required)

Item #	Description	Unit	Total Cost ($)
1	System Hardware, Third Party Software, Installation and Commissioning not Otherwise Covered	LS	$ -
2	Communications Equipment	LS	$ -
3	Software (GUI, Back-end), Host System, MOMS, DVAS and License	LS	$ -
4	Design Documentation	LS	$ -
5	User, Maintenance, and Project Documentation	LS	$ -
6	Training (manuals, materials and delivery)	LS	$ -
7	Factory Acceptance Test	LS	$ -
8	Installation and Commissioning Test	LS	$ -
9	System Operational and Acceptance Test	LS	$ -
10	Third Party Warranty and Licenses	LS	$ -
11	Warranty First Year of Maintenance - Toll Host System Replacement Maintenance and Software Support Services	LS	$ -
12	Spare Parts and Equipment Year 1 - Warranty Year	LS	$ -
13	Project Management	LS	$ -
14	Engineering and Design	LS	$ -
15	Transition Costs	LS	$ -
		Total Toll Host/System Costs	$ -

Sheet 2-a Back-up
Optional Mainline and Western Extensions
In-lane Implementation Cost by Zone
(Summary Only) (2018 Values)

Optional In-Lane System Implementation Cost (by Zone)		Escalation % for Labor (Over Previous Year)			
		3.0%	Year 4	Year 4	Year 4
	2018 Values for Other Direct Cost	2018 Labor	Quantity	Unit Evaluation Cost including Labor	Total Evaluation Cost
Zone Type 1 (3+1+1)	$ -	$ -	10	$ -	$ -
Facility Server (if applicable)	$ -	$ -	5	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	10	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	10	$ -	$ -
Zone Type 2 (3+2+0)	$ -	$ -	14	$ -	$ -
Facility Server (if applicable)	$ -	$ -	7	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	14	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	14	$ -	$ -
Zone Type 3 (2+1+1)	$ -	$ -	2	$ -	$ -
Facility Server (if applicable)	$ -	$ -	1	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	2	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	2	$ -	$ -
Zone Type 4 (2+1+1)	$ -	$ -	12	$ -	$ -
Facility Server (if applicable)	$ -	$ -	6	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	12	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	12	$ -	$ -
Zone Type 5 (2+1+1) Existing Mainline Maintenance From Below	$ -	$ -	1	$ -	$ -
Facility Server (if applicable)	$ -	$ -	1	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	1	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	1	$ -	$ -
Zone Type 6 (2+0+0) Existing Ramp Maintenance From Below	$ -	$ -	2	$ -	$ -
Facility Server (if applicable)	$ -	$ -	2	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	2	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	2	$ -	$ -
Estimated Zones Ordered/Costs			41		$ -
Estimated Zones Ordered/Costs Volume Discount					$ -
Estimated Zones Ordered/Costs (less volume discount)					$ -
Estimated Facility Server Cost					$ -
Estimated Zones Ordered/Costs (including volume discount) and Facility Server Costs					$ -
Optional OCR/ALPR and Enforcement Notification Incremental Cost					$ -
Optional Tri-Protocol Implementation Incremental Cost					$ -
Volume Discount by Zone Quantity:					
Volume Discount for 10- 19 Zones	0.00%				
Volume Discount for 20- 29 Zones	0.00%				
Volume Discount for 30- 39 Zones	0.00%				
Volume Discount for 40 Zones or more	0.00%				

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Implementation Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Sheet 2-a Back-up
Optional Mainline and Western Extensions
In-lane Implementation Cost by Zone
(Summary Only) (2018 Values)

Optional In-Lane System Implementation Cost (by Zone)		Escalation % for Labor (Over Previous Year)			
		3.0%	Year 6	Year 6	Year 6
	2018 Values for Other Direct Cost	2018 Labor	Quantity	Unit Evaluation Cost including Labor	Total Evaluation Cost
Zone Type 1 (3+1+1)	$ -	$ -			
Facility Server (if applicable)	$ -	$ -			
Optional OCR/ALPR and Enforcement Notification	$ -	$ -			
Optional Tri-Protocol Implementation	$ -	$ -			
Zone Type 2 (3+2+0)	$ -	$ -	34	$ -	$ -
Facility Server (if applicable)	$ -	$ -	17	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	34	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	34	$ -	$ -
Zone Type 3 (2+1+1)	$ -	$ -	2	$ -	$ -
Facility Server (if applicable)	$ -	$ -	1	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	2	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	2	$ -	$ -
Zone Type 4 (2+1+1)	$ -	$ -			
Facility Server (if applicable)	$ -	$ -			
Optional OCR/ALPR and Enforcement Notification	$ -	$ -			
Optional Tri-Protocol Implementation	$ -	$ -			
Zone Type 5 (2+1+1) Existing Mainline Maintenance From Below	$ -	$ -	1	$ -	$ -
Facility Server (if applicable)	$ -	$ -	1	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	1	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	1	$ -	$ -
Zone Type 6 (2+0+0) Existing Ramp Maintenance From Below	$ -	$ -			
Facility Server (if applicable)	$ -	$ -			
Optional OCR/ALPR and Enforcement Notification	$ -	$ -			
Optional Tri-Protocol Implementation	$ -	$ -			
Estimated Zones Ordered/Costs			37		$ -
Estimated Zones Ordered/Costs Volume Discount					$ -
Estimated Zones Ordered/Costs (less volume discount)					$ -
Estimated Facility Server Cost					$ -
Estimated Zones Ordered/Costs (including volume discount) and Facility Server Costs					$ -
Optional OCR/ALPR and Enforcement Notification Incremental Cost					$ -
Optional Tri-Protocol Implementation Incremental Cost					$ -
Volume Discount by Zone Quantity:					
Volume Discount for 10- 19 Zones	0.00%				
Volume Discount for 20- 29 Zones	0.00%				
Volume Discount for 30- 39 Zones	0.00%				
Volume Discount for 40 Zones or more	0.00%				

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Implementation Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Sheet 2-a Back-up
Optional Mainline and Western Extensions
In-lane Implementation Cost by Zone
(Summary Only) (2018 Values)

Optional In-Lane System Implementation Cost (by Zone)		Escalation % for Labor (Over Previous Year)			
		3.0%	Year 9	Year 9	Year 9
	2018 Values for Other Direct Cost	2018 Labor	Quantity	Unit Evaluation Cost including Labor	Total Evaluation Cost
Zone Type 1 (3+1+1)	$ -	$ -			
Facility Server (if applicable)	$ -	$ -			
Optional OCR/ALPR and Enforcement Notification	$ -	$ -			
Optional Tri-Protocol Implementation	$ -	$ -			
Zone Type 2 (3+2+0)	$ -	$ -			
Facility Server (if applicable)	$ -	$ -			
Optional OCR/ALPR and Enforcement Notification	$ -	$ -			
Optional Tri-Protocol Implementation	$ -	$ -			
Zone Type 3 (2+1+1)	$ -	$ -			
Facility Server (if applicable)	$ -	$ -			
Optional OCR/ALPR and Enforcement Notification	$ -	$ -			
Optional Tri-Protocol Implementation	$ -	$ -			
Zone Type 4 (2+1+1)	$ -	$ -	2	$ -	$ -
Facility Server (if applicable)	$ -	$ -	1	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	2	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	2	$ -	$ -
Zone Type 5 (2+1+1) Existing Mainline Maintenance From Below	$ -	$ -	10	$ -	$ -
Facility Server (if applicable)	$ -	$ -	5	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	10	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	10	$ -	$ -
Zone Type 6 (2+0+0) Existing Ramp Maintenance From Below	$ -	$ -	32	$ -	$ -
Facility Server (if applicable)	$ -	$ -	16	$ -	$ -
Optional OCR/ALPR and Enforcement Notification	$ -	$ -	32	$ -	$ -
Optional Tri-Protocol Implementation	$ -	$ -	32	$ -	$ -
Estimated Zones Ordered/Costs			44		$ -
Estimated Zones Ordered/Costs Volume Discount					$ -
Estimated Zones Ordered/Costs (less volume discount)					$ -
Estimated Facility Server Cost					$ -
Estimated Zones Ordered/Costs (including volume discount) and Facility Server Costs					$ -
Optional OCR/ALPR and Enforcement Notification Incremental Cost					$ -
Optional Tri-Protocol Implementation Incremental Cost					$ -
Volume Discount by Zone Quantity:					
Volume Discount for 10- 19 Zones	0.00%				
Volume Discount for 20- 29 Zones	0.00%				
Volume Discount for 30- 39 Zones	0.00%				
Volume Discount for 40 Zones or more	0.00%				

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Implementation Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Sheet 2-1 Back-up
Optional In-lane System Cost Schedule - Zone 1

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
Zone Type 1 (3+1+1) Maintenance from Below					
1. Redundant Toll Zone Controller and In-lane Electronics[1]					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Redundant Toll Zone Controller and In-lane Electronics[1]			$ -	$ -	$ -
2. AVI System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVI System			$ -	$ -	$ -
3. AVC System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVC System			$ -	$ -	$ -
4. LPICPS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total LPICPS			$ -	$ -	$ -
5. Communications Equipment					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
6. Equipment Racks					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Equipment Racks			$ -	$ -	$ -
7. DVAS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total DVAS			$ -	$ -	$ -

Sheet 2-1 Back-up
Optional In-lane System Cost Schedule - Zone 1

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
8. Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Commissioning Test			$ -	$ -	$ -
Total			$ -	$ -	$ -
Facility Server					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server			$ -	$ -	$ -
Total with Facility Server			$ -	$ -	$ -
Labor Check (from Sheet 2-7, cell F50) should equal cell E77				$ -	
Optional OCR/ALPR and Enforcement Notification					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional OCR/ALPR and Enforcement Notification			$ -	$ -	$ -
Optional Tri-Protocol Implementation					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional Tri-Protocol Implementation			$ -	$ -	$ -

Note 1: All hardware/software provided under this Contract should be included in these costs.
Note 2: Use the additional rows as needed to itemize each components
Note 3: All roadways are current Year Cost.
Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.
Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in Section 4 of the Scope of Work
Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in Section 6 of the Scope of Work.

Sheet 2-2 Back-up
Optional In-lane System Cost Schedule - Zone 2

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
Zone Type 2 (3+2+0) Maintenance from Below					
1. Redundant Toll Zone Controller and In-lane Electronics¹					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Redundant Toll Zone Controller and In-lane Electronics¹			$ -	$ -	$ -
2. AVI System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVI System			$ -	$ -	$ -
3. AVC System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVC System			$ -	$ -	$ -
4. LPICPS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total LPICPS			$ -	$ -	$ -
5. Communications Equipment					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
6. Equipment Racks					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Equipment Racks			$ -	$ -	$ -
7. DVAS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total DVAS			$ -	$ -	$ -

Sheet 2-2 Back-up
Optional In-lane System Cost Schedule - Zone 2

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
8. Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Commissioning Test			$ -	$ -	$ -
Total			$ -	$ -	$ -
Facility Server					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server			$ -	$ -	$ -
Total with Facility Server			$ -	$ -	$ -
Labor Check (from Sheet 2-7, cell I50) should equal cell E77				$ -	
Optional OCR/ALPR and Enforcement Notification					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional OCR/ALPR and Enforcement Notification			$ -	$ -	$ -
Optional Tri-Protocol Implementation					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional Tri-Protocol Implementation			$ -	$ -	$ -

Note 1: All hardware/software provided under this Contract should be included in these costs.
Note 2: Use the additional rows as needed to itemize each components
Note 3: All roadways are current Year Cost.
Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.
Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in Section 4 of the Scope of Work
Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in Section 6 of the Scope of Work.

Sheet 2-3 Back-up
Optional In-lane System Cost Schedule - Zone 3

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
Zone Type 3 (2+1+1) Maintenance from Below					
1. Redundant Toll Zone Controller and In-lane Electronics[1]					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Redundant Toll Zone Controller and In-lane Electronics[1]			$ -	$ -	$ -
2. AVI System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVI System			$ -	$ -	$ -
3. AVC System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVC System			$ -	$ -	$ -
4. LPICPS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total LPICPS			$ -	$ -	$ -
5. Communications Equipment					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
6. Equipment Racks					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Equipment Racks			$ -	$ -	$ -
7. DVAS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total DVAS			$ -	$ -	$ -

Sheet 2-3 Back-up
Optional In-lane System Cost Schedule - Zone 3

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
8. Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Commissioning Test			$ -	$ -	$ -
Total			$ -	$ -	$ -
Facility Server					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server			$ -	$ -	$ -
Total with Facility Server			$ -	$ -	$ -
Labor Check (from Sheet 2-7, cell L50) should equal cell E77				$ -	
Optional OCR/ALPR and Enforcement Notification					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional OCR/ALPR and Enforcement Notification			$ -	$ -	$ -
Optional Tri-Protocol Implementation					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional Tri-Protocol Implementation			$ -	$ -	$ -

Note 1: All hardware/software provided under this Contract should be included in these costs.
Note 2: Use the additional rows as needed to itemize each components
Note 3: All roadways are current Year Cost.
Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.
Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in Section 4 of the Scope of Work
Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in Section 6 of the Scope of Work.

Sheet 2-4 Back-up
Base and Optional In-lane System Cost Schedule - Zone 4

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
Zone Type 4 (2+1+1) Maintenance from Below					
1. Redundant Toll Zone Controller and In-lane Electronics[1]					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Redundant Toll Zone Controller and In-lane Electronics[1]			$ -	$ -	$ -
2. AVI System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVI System			$ -	$ -	$ -
3. AVC System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVC System			$ -	$ -	$ -
4. LPICPS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total LPICPS			$ -	$ -	$ -
5. Communications Equipment					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
6. Equipment Racks					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Equipment Racks			$ -	$ -	$ -
7. DVAS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total DVAS			$ -	$ -	$ -

Sheet 2-4 Back-up
Base and Optional In-lane System Cost Schedule - Zone 4

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
8. Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Commissioning Test			$ -	$ -	$ -
Total			$ -	$ -	$ -
Facility Server					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server			$ -	$ -	$ -
Total with Facility Server			$ -	$ -	$ -
Labor Check (from Sheet 2-7, cell O50) should equal cell E77				$ -	
Optional OCR/ALPR and Enforcement Notification					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional OCR/ALPR and Enforcement Notification			$ -	$ -	$ -
Optional Tri-Protocol Implementation					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional Tri-Protocol Implementation			$ -	$ -	$ -

Note 1: All hardware/software provided under this Contract should be included in these costs.

Note 2: Use the additional rows as needed to itemize each components

Note 3: All roadways are current Year Cost.

Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.

Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in Section 4 of the Scope of Work

Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in Section 6 of the Scope of Work.

Sheet 2-5 Back-up
Optional In-lane System Cost Schedule - Zone 5

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
Zone Type 5 (2+1+1) Existing Mainline Maintenance from Below					
1. Redundant Toll Zone Controller and In-lane Electronics¹					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Redundant Toll Zone Controller and In-lane Electronics¹			$ -	$ -	$ -
2. AVI System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVI System			$ -	$ -	$ -
3. AVC System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVC System			$ -	$ -	$ -
4. LPICPS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total LPICPS			$ -	$ -	$ -
5. Communications Equipment					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
6. Equipment Racks					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Equipment Racks			$ -	$ -	$ -
7. DVAS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total DVAS			$ -	$ -	$ -

Sheet 2-5 Back-up
Optional In-lane System Cost Schedule - Zone 5

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
8. Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Commissioning Test			$ -	$ -	$ -
Total			$ -	$ -	$ -
Facility Server					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server			$ -	$ -	$ -
Total with Facility Server			$ -	$ -	$ -
Labor Check (from Sheet 2-7, cell R50) should equal cell E77				$ -	
Optional OCR/ALPR and Enforcement Notification					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional OCR/ALPR and Enforcement Notification			$ -	$ -	$ -
Optional Tri-Protocol Implementation					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional Tri-Protocol Implementation			$ -	$ -	$ -

Note 1: All hardware/software provided under this Contract should be included in these costs.
Note 2: Use the additional rows as needed to itemize each components
Note 3: All roadways are current Year Cost.
Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.
Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in Section 4 of the Scope of Work
Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in Section 6 of the Scope of Work.

Sheet 2-6 Back-up
Optional In-lane System Cost Schedule - Zone 6

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
Zone Type 6 (2+0+0) Existing Ramp Maintenance from Below					
1. Redundant Toll Zone Controller and In-lane Electronics¹					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Redundant Toll Zone Controller and In-lane Electronics¹			$ -	$ -	$ -
2. AVI System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVI System			$ -	$ -	$ -
3. AVC System					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total AVC System			$ -	$ -	$ -
4. LPICPS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total LPICPS			$ -	$ -	$ -
5. Communications Equipment					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
6. Equipment Racks					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Equipment Racks			$ -	$ -	$ -
7. DVAS					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total DVAS			$ -	$ -	$ -

Sheet 2-6 Back-up
Optional In-lane System Cost Schedule - Zone 6

LANE TYPES & ITEM DESCRIPTION	Quantity per Toll Zone	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
8. Commissioning Test					
	0	$ -	$ -		$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Commissioning Test			$ -	$ -	$ -
Total			$ -	$ -	$ -
Facility Server					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Facility Server			$ -	$ -	$ -
Total with Facility Server			$ -	$ -	$ -
Labor Check (from Sheet 2-7, cell U50) should equal cell E77				$ -	
Optional OCR/ALPR and Enforcement Notification					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional OCR/ALPR and Enforcement Notification			$ -	$ -	$ -
Optional Tri-Protocol Implementation					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Optional Tri-Protocol Implementation			$ -	$ -	$ -

Note 1: All hardware/software provided under this Contract should be included in these costs.
Note 2: Use the additional rows as needed to itemize each components
Note 3: All roadways are current Year Cost.
Note 4: Single redundant zone controller is inclusive of two redundant units in all cases in the schedules.
Note 5: Costs must include all in-lane installation costs, including cost of installation check and inspection as detailed in Section 4 of the Scope of Work
Note 6: Commissioning Test shall also include all costs to provide the individual tolling plaza testing as detailed in Section 6 of the Scope of Work.

Sheet 2-7 Back-up
Base and Optional In-lane System Pricing by Zone Type
Staff and Position Classifications with Rates

Item #	STAFF NAMES FOR CLARKS SUMMIT	POSITION/CLASSIFICATION	LOADED HOURLY BILLING RATES BY TASK			LOADED HOURLY BILLING RATES BY TASK		
			Zone Type 1 (3+1+1) Maint From Below			Zone Type 2 (3+2+0) Maint From Below		
			2018 Values			2018 Values		
			Loaded Labor Rate	Hours	Total Labor Cost	Loaded Labor Rate	Hours	Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
	Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

with number)

Sheet 2-7 Back-up
Base and Optional In-lane System Pricing by Zone Type
Staff and Position Classifications with Rates

Item #	STAFF NAMES FOR CLARKS SUMMIT	POSITION/CLASSIFICATION	LOADED HOURLY BILLING RATES BY TASK			LOADED HOURLY BILLING RATES BY TASK		
			Zone Type 3 (2+1+1) Maint From Below			Zone Type 4 (2+1+1) Maint From Below		
			2018 Values			2018 Values		
			Loaded Labor Rate	Hours	Total Labor Cost	Loaded Labor Rate	Hours	Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
	Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

with number)

Sheet 2-7 Back-up
Base and Optional In-lane System Pricing by Zone Type
Staff and Position Classifications with Rates

Item #	STAFF NAMES FOR CLARKS SUMMIT	POSITION/CLASSIFICATION	LOADED HOURLY BILLING RATES BY TASK			LOADED HOURLY BILLING RATES BY TASK		
			Zone Type 5 (2+1+1) Existing Mainline Maint From Below			Zone Type 6 (2+0+0) Existing Ramp Maint From Below		
			2018 Values			2018 Values		
			Loaded Labor Rate	Hours	Total Labor Cost	Loaded Labor Rate	Hours	Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
	Total Labor Cost				$ -			$ -

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

with number)

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Clarks Summit				
1 Zone Controller Software Costs (not otherwise covered)					
Zone Controller Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Zone Controller Software Costs			$ -	$ -	$ -
2 Design Documentation					
Lane Drawings	0	$ -	$ -	$ -	$ -
SDDD	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Design Documentation			$ -	$ -	$ -
3 User, Maintenance, and Project Documentation					
Documents/Manuals	0	$ -	$ -	$ -	$ -
Maintenance Manual	0	$ -	$ -	$ -	$ -
Installation Manual	0	$ -	$ -	$ -	$ -
Project Plans	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total User, Maintenance, and Project Documentation			$ -	$ -	$ -
4 Training (manuals, materials and delivery)					
Maintenance Training	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Training			$ -	$ -	$ -
5 Factory Acceptance Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Factory Acceptance Test			$ -	$ -	$ -
6 On-Site First Installation Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total On-Site First Installation Test			$ -	$ -	$ -

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Clarks Summit				
7 Installation and Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Installation and Commissioning Test			$ -	$ -	$ -
8 System Operational and Acceptance Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Operational and Acceptance Test			$ -	$ -	$ -
9 Third Party Warranty and Licenses					
DB Licenses	0	$ -	$ -	$ -	$ -
OS Licenses	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Third Party Warranty and Licenses			$ -	$ -	$ -
10 Warranty (Year 1 of Maintenance) - In-lane System Hardware Maintenance and Software Support Services					
Year 1 Maintenance (Warranty) (from Sheet 5)			$ -		$ -
Total Warranty (Year 1 of Maintenance) - In-Lane System Hardware Maintenance and Software Support Services			$ -		$ -
11 Warranty - In-Lane System Spare Parts and Equipment - Year 1					
Year 1 In-Lane Spare Parts and Equipment Cost (Warranty) (from Sheet 3-2)			$ -		$ -
Total Warranty - In-lane Spare Parts and Equipment - Year 1			$ -		$ -
12 Insurance and Bonding					
Insurance and Bonding	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Insurance and Bonding			$ -	$ -	$ -

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Clarks Summit				
13 Project Management					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Project Management			$ -	$ -	$ -
14 Engineering and Design					
Lane Installation Design Drawings	0	$ -	$ -	$ -	$ -
As-Built Drawings	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Engineering and Design			$ -	$ -	$ -
15 Transition Costs					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Transition Costs			$ -	$ -	$ -
Total System Costs			$ -	$ -	$ -
Labor Check (from Sheet 3-3, row 50) should equal row 140				$ -	

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Mainline				
1 Zone Controller Software Costs (not otherwise covered)					
Zone Controller Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Zone Controller Software Costs			$ -	$ -	$ -
2 Design Documentation					
Lane Drawings					
SDDD					
Total Design Documentation					
3 User, Maintenance, and Project Documentation					
Documents/Manuals					
Maintenance Manual					
Installation Manual					
Project Plans					
Total User, Maintenance, and Project Documentation					
4 Training (manuals, materials and delivery)					
Maintenance Training					
Total Training					
5 Factory Acceptance Test					
Total Factory Acceptance Test					
6 On-Site First Installation Test					
Total On-Site First Installation Test					

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Mainline				
7 Installation and Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Installation and Commissioning Test			$ -	$ -	$ -
8 System Operational and Acceptance Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Operational and Acceptance Test			$ -	$ -	$ -
9 Third Party Warranty and Licenses					
DB Licenses	0	$ -	$ -	$ -	$ -
OS Licenses	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Third Party Warranty and Licenses			$ -	$ -	$ -
10 Warranty (Year 1 of Maintenance) - In-lane System Hardware Maintenance and Software Support Services					
Year 1 Maintenance (Warranty) (from Sheet 5)			$ -		$ -
Total Warranty (Year 1 of Maintenance) - In-Lane System Hardware Maintenance and Software Support Services			$ -		$ -
11 Warranty - In-Lane System Spare Parts and Equipment - Year 1					
Year 1 In-Lane Spare Parts and Equipment Cost (Warranty) (from Sheet 3-2)			$ -		$ -
Total Warranty - In-lane Spare Parts and Equipment - Year 1			$ -		$ -
12 Insurance and Bonding					
Insurance and Bonding	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Insurance and Bonding			$ -	$ -	$ -

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Mainline				
13 Project Management					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Project Management			$ -	$ -	$ -
14 Engineering and Design					
Lane Installation Design Drawings	0	$ -	$ -	$ -	$ -
As-Built Drawings	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Engineering and Design			$ -	$ -	$ -
15 Transition Costs					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Transition Costs			$ -	$ -	$ -
Total System Costs			$ -	$ -	$ -
Labor Check (from Sheet 3-3, row 50) should equal row 140				$ -	

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Western Extensions				
1 Zone Controller Software Costs (not otherwise covered)					
Zone Controller Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Zone Controller Software Costs			$ -	$ -	$ -
2 Design Documentation					
Lane Drawings					
SDDD					
Total Design Documentation					
3 User, Maintenance, and Project Documentation					
Documents/Manuals					
Maintenance Manual					
Installation Manual					
Project Plans					
Total User, Maintenance, and Project Documentation					
4 Training (manuals, materials and delivery)					
Maintenance Training					
Total Training					
5 Factory Acceptance Test					
Total Factory Acceptance Test					
6 On-Site First Installation Test					
Total On-Site First Installation Test					

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Western Extensions				
7 Installation and Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Installation and Commissioning Test			$ -	$ -	$ -
8 System Operational and Acceptance Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Operational and Acceptance Test			$ -	$ -	$ -
9 Third Party Warranty and Licenses					
DB Licenses	0	$ -	$ -	$ -	$ -
OS Licenses	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Third Party Warranty and Licenses			$ -	$ -	$ -
10 Warranty (Year 1 of Maintenance) - In-lane System Hardware Maintenance and Software Support Services					
Year 1 Maintenance (Warranty) (from Sheet 5)			$ -		$ -
Total Warranty (Year 1 of Maintenance) - In-Lane System Hardware Maintenance and Software Support Services			$ -		$ -
11 Warranty - In-Lane System Spare Parts and Equipment - Year 1					
Year 1 In-Lane Spare Parts and Equipment Cost (Warranty) (from Sheet 3-2)			$ -		$ -
Total Warranty - In-lane Spare Parts and Equipment - Year 1			$ -		$ -
12 Insurance and Bonding					
Insurance and Bonding	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Insurance and Bonding			$ -	$ -	$ -

Sheet 3-1 Back-up
Base and Optional System Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Western Extensions				
13 Project Management					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Project Management			$ -	$ -	$ -
14 Engineering and Design					
Lane Installation Design Drawings	0	$ -	$ -	$ -	$ -
As-Built Drawings	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Engineering and Design			$ -	$ -	$ -
15 Transition Costs					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Transition Costs			$ -	$ -	$ -
Total System Costs			$ -	$ -	$ -
Labor Check (from Sheet 3-3, row 50) should equal row 140				$ -	

Sheet 3-2 Back-up
Base and Optional In-lane System Spare Parts and Equipment Cost Year 1

SPARE PARTS DESCRIPTION	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)
	Clarks Summit Year 1 - Warranty Year			Optional Mainline Year 1 - Warranty Year			Optional Western Extensions Year 1 - Warranty Year		
1. Redundant Toll Zone Controller and In-lane Electronics[1]									
Servers	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Hard Drive	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Serial Controllers	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Power Supply	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Cables and Connectors	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total Redundant Toll Zone Controller and In-lane Electronics[1]			$ -			$ -			$ -
2. AVI System									
AVI Reader Modules	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
AVI Antennas	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Cables and Connectors	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total AVI System			$ -			$ -			$ -
3. AVC System									
Primary AVDC Sensor	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
AVDC Detector Cards	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Cables and Connectors	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total AVC System			$ -			$ -			$ -
4. LPICPS									
Front Cameras	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Rear Cameras	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Illuminators	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Servers	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Hard Drive	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Cables and Connectors	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total LPICPS			$ -			$ -			$ -

Sheet 3-2 Back-up
Base and Optional In-lane System Spare Parts and Equipment Cost Year 1

SPARE PARTS DESCRIPTION	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)
	Clarks Summit Year 1 - Warranty Year			Optional Mainline Year 1 - Warranty Year			Optional Western Extensions Year 1 - Warranty Year		
5. Communications Equipment									
Switches	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Power Supply	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Router	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total Communications Equipment			$ -			$ -			$ -
6. Equipment Racks									
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total Equipment Racks			$ -			$ -			$ -
7. DVAS									
Cameras	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Servers	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Hard Drive	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total DVAS			$ -			$ -			$ -
Warranty Year - System Spare Parts and Equipment Costs Year 1			$ -			$ -			$ -

Sheet 3-3 Back-up
Base and Optional System Cost - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	LOADED HOURLY BILLING RATES BY TASK			LOADED HOURLY BILLING RATES BY TASK			LOADED HOURLY BILLING RATES BY TASK		
			Clarks Summit			Optional Mainline			Optional Western Extensions		
			Rate	Hours	Total System Labor Cost	Rate	Hours	Total System Labor Cost	Rate	Hours	Total System Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
	Total Labor Cost				$ -			$ -			$ -

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 4-1 Back-up
Base and Optional Toll Concentrator/Host Cost Schedule (if provided)

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Clarks Summit				
1 System Hardware, Third Party Software, Installation and Commissioning not Otherwise Covered					
Host Servers - equipment, purchase, install, configure and test	0	$ -	$ -	$ -	$ -
Storage Works	0	$ -	$ -	$ -	$ -
Back-up Library	0	$ -	$ -	$ -	$ -
Other Third-party Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Hardware, Third Party SW and Installation not Otherwise Covered			$ -	$ -	$ -
2 Communications Equipment					
Switches	0	$ -	$ -	$ -	$ -
LAN HW	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
3 Software (GUI, Back-end), Host System, MOMS, DVAS and License					
Host Software	0	$ -	$ -	$ -	$ -
MOMS	0	$ -	$ -	$ -	$ -
DVAS	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Software (GUI, Back-end), Host System, MOMS, DVAS and License			$ -	$ -	$ -
4 Design Documentation					
Host Drawings	0	$ -	$ -	$ -	$ -
SDDD	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Design Documentation			$ -	$ -	$ -
5 User, Maintenance, and Project Documentation					
Documents/Manuals	0	$ -	$ -	$ -	$ -
Maintenance Manual	0	$ -	$ -	$ -	$ -
Installation Manual	0	$ -	$ -	$ -	$ -
Project Plans	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total User, Maintenance and Project Documentation			$ -	$ -	$ -
6 Training (manuals, materials and delivery)					
Maintenance Training	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Training			$ -	$ -	$ -

Sheet 4-1 Back-up
Base and Optional Toll Concentrator/Host Cost Schedule (if provided)

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Clarks Summit				
7 Third Party Warranty and Licenses					
DB Licenses	0	$ -	$ -	$ -	$ -
OS Licenses	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Third Party Warranty and Licenses			$ -	$ -	$ -
8 Warranty (Year 1 of Maintenance) - Incremental Toll Concentrator/Host Maintenance and Software Support Services					
Year 1 Warranty (from Sheet 6)			$ -		$ -
Total Warranty First Year of Operation - Incremental Toll Concentrator/Host Maintenance and Software Support Services - Clarks Summit			$ -		$ -
9 Warranty - Toll Concentrator/Host Spare Parts and Equipment - Year 1					
Year 1 Warranty (From Sheet 4-2) Toll Concentrator/Host Spare Parts and Equipment			$ -		$ -
Total Warranty Year - Toll Concentrator/Host Spare Parts and Equipment Year 1			$ -		$ -
Total Toll Concentrator/Host Costs			$ -	$ -	$ -
Labor Check (from Sheet 4-3, row 50) should equal row 80				$ -	

Sheet 4-1 Back-up
Base and Optional Toll Concentrator/Host Cost Schedule (if provided)

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Mainline				
1 System Hardware, Third Party Software, Installation and Commissioning not Otherwise Covered					
Host Servers - equipment, purchase, install, configure and test	0	$ -	$ -	$ -	$ -
Storage Works	0	$ -	$ -	$ -	$ -
Back-up Library	0	$ -	$ -	$ -	$ -
Other Third-party Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Hardware, Third Party SW and Installation not Otherwise Covered			$ -	$ -	$ -
2 Communications Equipment					
Switches	0	$ -	$ -	$ -	$ -
LAN HW	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
3 Software (GUI, Back-end), Host System, MOMS, DVAS and License					
Host Software	0	$ -	$ -	$ -	$ -
MOMS	0	$ -	$ -	$ -	$ -
DVAS	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Software (GUI, Back-end), Host System, MOMS, DVAS and License			$ -	$ -	$ -
4 Design Documentation					
Host Drawings					
SDDD					
Total Design Documentation					
5 User, Maintenance, and Project Documentation					
Documents/Manuals					
Maintenance Manual					
Installation Manual					
Project Plans					
Total User, Maintenance and Project Documentation					
6 Training (manuals, materials and delivery)					
Maintenance Training					
Total Training					

Sheet 4-1 Back-up
Base and Optional Toll Concentrator/Host Cost Schedule (if provided)

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Mainline				
7 Third Party Warranty and Licenses					
DB Licenses					
OS Licenses					
Total Third Party Warranty and Licenses					
8 Warranty (Year 1 of Maintenance) - Incremental Toll Concentrator/Host Maintenance and Software Support Services					
Year 1 Warranty (from Sheet 6)					
Total Warranty First Year of Operation - Incremental Toll Concentrator/Host Maintenance and Software Support Services - Clarks Summit					
9 Warranty - Toll Concentrator/Host Spare Parts and Equipment - Year 1					
Year 1 Warranty (From Sheet 4-2) Toll Concentrator/Host Spare Parts and Equipment			$ -		$ -
Total Warranty Year - Toll Concentrator/Host Spare Parts and Equipment Year 1			$ -		$ -
Total Toll Concentrator/Host Costs			$ -	$ -	$ -
Labor Check (from Sheet 4-3, row 50) should equal row 80				$ -	

Sheet 4-1 Back-up
Base and Optional Toll Concentrator/Host Cost Schedule (if provided)

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Western Extensions				
1 System Hardware, Third Party Software, Installation and Commissioning not Otherwise Covered					
Host Servers - equipment, purchase, install, configure and test	0	$ -	$ -	$ -	$ -
Storage Works	0	$ -	$ -	$ -	$ -
Back-up Library	0	$ -	$ -	$ -	$ -
Other Third-party Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Hardware, Third Party SW and Installation not Otherwise Covered			$ -	$ -	$ -
2 Communications Equipment					
Switches	0	$ -	$ -	$ -	$ -
LAN HW	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
3 Software (GUI, Back-end), Host System, MOMS, DVAS and License					
Host Software	0	$ -	$ -	$ -	$ -
MOMS	0	$ -	$ -	$ -	$ -
DVAS	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Software (GUI, Back-end), Host System, MOMS, DVAS and License			$ -	$ -	$ -
4 Design Documentation					
Host Drawings					
SDDD					
Total Design Documentation					
5 User, Maintenance, and Project Documentation					
Documents/Manuals					
Maintenance Manual					
Installation Manual					
Project Plans					
Total User, Maintenance and Project Documentation					
6 Training (manuals, materials and delivery)					
Maintenance Training					
Total Training					

Sheet 4-1 Back-up
Base and Optional Toll Concentrator/Host Cost Schedule (if provided)

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
	Optional Western Extensions				
7 Third Party Warranty and Licenses					
DB Licenses					
OS Licenses					
Total Third Party Warranty and Licenses					
8 Warranty (Year 1 of Maintenance) - Incremental Toll Concentrator/Host Maintenance and Software Support Services					
Year 1 Warranty (from Sheet 6)					
Total Warranty First Year of Operation - Incremental Toll Concentrator/Host Maintenance and Software Support Services - Clarks Summit					
9 Warranty - Toll Concentrator/Host Spare Parts and Equipment - Year 1					
Year 1 Warranty (From Sheet 4-2) Toll Concentrator/Host Spare Parts and Equipment			$ -		$ -
Total Warranty Year - Toll Concentrator/Host Spare Parts and Equipment Year 1			$ -		$ -
Total Toll Concentrator/Host Costs			$ -	$ -	$ -
Labor Check (from Sheet 4-3, row 50) should equal row 80				$ -	

Sheet 4-2 Back-up
Base and Optional Toll Concentrator/Host Spare Parts and Equipment Cost Year 1 (if provided)

SPARE PARTS DESCRIPTION	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)
	Clarks Summit Year 1 - Warranty Year			Optional Mainline Year 1 - Warranty Year			Optional Western Extensions Year 1 - Warranty Year		
1. System Hardware									
Servers	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Hard Drive	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Miscellaneous	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total System Hardware			$ -			$ -			$ -
2. Communications Equipment									
LAN Equipment	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Power Supply	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
	0	$ -	$ -	0	$ -	$ -	0	$ -	$ -
Total Communications Equipment			$ -			$ -			$ -
Total Warranty Year - Toll Concentrator/Host Spare Parts and Equipment Costs Year 1			$ -			$ -			$ -

Sheet 4-3 Back-up
Base and Optional Toll Concentrator/Host Cost
Staff and Position Classifications with Rates (if provided)

Item #	STAFF NAMES	POSITION/CLASSIFICATION	LOADED HOURLY BILLING RATES BY TASK			LOADED HOURLY BILLING RATES BY TASK			LOADED HOURLY BILLING RATES BY TASK		
			Clarks Summit			Optional Mainline			Optional Western Extensions		
			Rate	Hours	Total System Labor Cost	Rate	Hours	Total System Labor Cost	Rate	Hours	Total System Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -	$ -	0	$ -
	Total Labor Cost				$ -			$ -			$ -

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-1 Back-up
Base and Optional In-lane System Hardware Maintenance and Software Support Services Cost Schedule
(Summary Only - No Proposer Input Required)

DESCRIPTION OF ITEMS	Total Monthly Cost ($) Per Toll Zone	# of Toll Zones	Number of Months	Annual Cost ($)
	Clarks Summit			
Total Year 1 In-Lane System Hardware Maintenance and Software Support Services (Warranty)	$ -	2	12	$ -
Total Year 2 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Year 3 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Year 6 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Year 7 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Year 8 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Year 9 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Optional Extension 1 Costs				
Total Extension 1 Year 1 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 1 Year 2 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 1 Year 3 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 1 Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 1 Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Optional Extension 2 Costs				
Total Extension 2 Year 1 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 2 Year 2 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 2 Year 3 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 2 Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -
Total Extension 2 Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	2	12	$ -

Sheet 5-1 Back-up
Base and Optional In-lane System Hardware Maintenance and Software Support Services Cost Schedule
(Summary Only - No Proposer Input Required)

DESCRIPTION OF ITEMS	Total Monthly Cost ($) Per Toll Zone	# of Toll Zones	Number of Months	Annual Cost ($)
	Optional Mainline			
Total Year 1 In-Lane System Hardware Maintenance and Software Support Services (Warranty)				
Total Year 2 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 3 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	41	12	$ -
Total Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	41	12	$ -
Total Year 6 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Year 7 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Year 8 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Year 9 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Optional Extension 1 Costs				
Total Extension 1 Year 1 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 1 Year 2 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 1 Year 3 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 1 Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 1 Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Optional Extension 2 Costs				
Total Extension 2 Year 1 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 2 Year 2 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 2 Year 3 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 2 Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -
Total Extension 2 Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	78	12	$ -

Sheet 5-1 Back-up
Base and Optional In-lane System Hardware Maintenance and Software Support Services Cost Schedule
(Summary Only - No Proposer Input Required)

DESCRIPTION OF ITEMS	Total Monthly Cost ($) Per Toll Zone	# of Toll Zones	Number of Months	Annual Cost ($)
	Optional Western Extensions			
Total Year 1 In-Lane System Hardware Maintenance and Software Support Services (Warranty)				
Total Year 2 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 3 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 4 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 5 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 6 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 7 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 8 In-Lane System Hardware Maintenance and Software Support Services				
Total Year 9 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Optional Extension 1 Costs				
Total Extension 1 Year 1 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 1 Year 2 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 1 Year 3 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 1 Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 1 Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Optional Extension 2 Costs				
Total Extension 2 Year 1 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 2 Year 2 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 2 Year 3 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 2 Year 4 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -
Total Extension 2 Year 5 In-Lane System Hardware Maintenance and Software Support Services	$ -	44	12	$ -

Sheet 5-2 Back-up
Base and Optional In-lane System Hardware Maintenance and Software Support Services
Labor and Other Direct Cost Items by Month

DESCRIPTION OF ITEMS	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE	
	Clarks Summit	Optional Mainline	Optional Western Extensions	
Year 1 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services				
Labor	$ -			
MPT	$ -			
Material, Tools and Occupancy	$ -			
Spare Parts and Equipment				See Note #1
Other	$ -			
Maintenance Payment of Performance Bond (X%)	$ -			
Total Monthly Year 1	$ -			
Year 2 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services				
Labor	$ -			
MPT	$ -			
Material, Tools and Occupancy	$ -			
Spare Parts and Equipment	$ -			
Other	$ -			
Maintenance Payment of Performance Bond (X%)	$ -			
Total Monthly Year 2	$ -			
Year 3 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services				
Labor	$ -			
MPT	$ -			
Material, Tools and Occupancy	$ -			
Spare Parts and Equipment	$ -			
Other	$ -			
Maintenance Payment of Performance Bond (X%)	$ -			
Total Monthly Year 3	$ -			
Year 4 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services				
Labor	$ -	$ -		
MPT	$ -	$ -		
Material, Tools and Occupancy	$ -	$ -		
Spare Parts and Equipment	$ -			See Note #2
Other	$ -	$ -		
Maintenance Payment of Performance Bond (X%)	$ -	$ -		
Total Monthly Year 4	$ -	$ -		
Year 5 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services				
Labor	$ -	$ -		
MPT	$ -	$ -		
Material, Tools and Occupancy	$ -	$ -		
Spare Parts and Equipment	$ -	$ -		
Other	$ -	$ -		
Maintenance Payment of Performance Bond (X%)	$ -	$ -		
Total Monthly Year 5	$ -	$ -		

Sheet 5-2 Back-up
Base and Optional In-lane System Hardware Maintenance and Software Support Services
Labor and Other Direct Cost Items by Month

DESCRIPTION OF ITEMS	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE	
	Clarks Summit	Optional Mainline	Optional Western Extensions	
Year 6 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services				
Labor	$ -	$ -		
MPT	$ -	$ -		
Material, Tools and Occupancy	$ -	$ -		
Spare Parts and Equipment	$ -	$ -		
Other	$ -	$ -		
Maintenance Payment of Performance Bond (X%)	$ -	$ -		
Total Monthly Year 6	$ -	$ -		
Year 7 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services				
Labor	$ -	$ -		
MPT	$ -	$ -		
Material, Tools and Occupancy	$ -	$ -		
Spare Parts and Equipment	$ -	$ -		
Other	$ -	$ -		
Maintenance Payment of Performance Bond (X%)	$ -	$ -		
Total Monthly Year 7	$ -	$ -		
Year 8 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services				
Labor	$ -	$ -		
MPT	$ -	$ -		
Material, Tools and Occupancy	$ -	$ -		
Spare Parts and Equipment	$ -	$ -		
Other	$ -	$ -		
Maintenance Payment of Performance Bond (X%)	$ -	$ -		
Total Monthly Year 8	$ -	$ -		
Year 9 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services				
Labor	$ -	$ -	$ -	
MPT	$ -	$ -	$ -	
Material, Tools and Occupancy	$ -	$ -	$ -	
Spare Parts and Equipment	$ -	$ -		See Note #3
Other	$ -	$ -	$ -	
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -	
Total Monthly Year 9	$ -	$ -	$ -	

Sheet 5-2 Back-up
Base and Optional In-lane System Hardware Maintenance and Software Support Services
Labor and Other Direct Cost Items by Month

DESCRIPTION OF ITEMS	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE
	Clarks Summit	Optional Mainline	Optional Western Extensions
Optional Extension 1 Costs			
Extension 1 Year 1 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 1 Year 1	$ -	$ -	$ -
Extension 1 Year 2 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 1 Year 2	$ -	$ -	$ -
Extension 1 Year 3 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 1 Year 3	$ -	$ -	$ -
Extension 1 Year 4 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 1 Year 4	$ -	$ -	$ -
Extension 1 Year 5 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 1 Year 5	$ -	$ -	$ -

Sheet 5-2 Back-up
Base and Optional In-lane System Hardware Maintenance and Software Support Services
Labor and Other Direct Cost Items by Month

DESCRIPTION OF ITEMS	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE	MONTHLY TOTAL ($) BY ZONE
	Clarks Summit	Optional Mainline	Optional Western Extensions
Optional Extension 2 Costs			
Extension 2 Year 1 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 2 Year 1	$ -	$ -	$ -
Extension 2 Year 2 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 2 Year 2	$ -	$ -	$ -
Extension 2 Year 3 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 2 Year 3	$ -	$ -	$ -
Extension 2 Year 4 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 2 Year 4	$ -	$ -	$ -
Extension 2 Year 5 of Maintenance - Monthly In-Lane Hardware Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
MPT	$ -	$ -	$ -
Material, Tools and Occupancy	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
Other	$ -	$ -	$ -
Maintenance Payment of Performance Bond (X%)	$ -	$ -	$ -
Total Monthly Extension 2 Year 5	$ -	$ -	$ -

Note 1: Clarks Summit Spare Parts and Equipment Cost Year 1 (Warranty Year) are included on Sheet 3-2.

Note 2: Optional Mainline Spare Parts and Equipment Cost Year 1 (Warranty Year) are included on Sheet 3-2.

Note 3: Optional Western Extensions Spare Parts and Equipment Cost Year 1 (Warranty Year) are included on Sheet 3-2.

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION		Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
				LOADED HOURLY BILLING RATES Year 1 of Maintenance			LOADED HOURLY BILLING RATES Year 2 of Maintenance		
Clarks Summit			2018 Loaded Labor Rate	Year 1 Rate	Year 1 Hours	Year 1 Total Labor Cost	Year 2 Rate	Year 2 Hours	Year 2 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost					$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 3 of Maintenance			LOADED HOURLY BILLING RATES Year 4 of Maintenance		
Clarks Summit			Year 3 Rate	Year 3 Hours	Year 3 Total Labor Cost	Year 4 Rate	Year 4 Hours	Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 5 of Maintenance			LOADED HOURLY BILLING RATES Year 6 of Maintenance		
Clarks Summit			Year 5 Rate	Year 5 Hours	Year 5 Total Labor Cost	Year 6 Rate	Year 6 Hours	Year 6 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 7 of Maintenance			LOADED HOURLY BILLING RATES Year 8 of Maintenance		
Clarks Summit			Year 7 Rate	Year 7 Hours	Year 7 Total Labor Cost	Year 8 Rate	Year 8 Hours	Year 8 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 1

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 9 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance		
Clarks Summit			Year 9 Rate	Year 9 Hours	Year 9 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 1			Optional Extension 1		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance		
Clarks Summit			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 1			Optional Extension 1		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Clarks Summit			Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost	Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 2			Optional Extension 2		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance		
Clarks Summit			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost	Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 2			Optional Extension 2		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance		
Clarks Summit			Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost	Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -
	% increase/decrease from previous year							

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-3 Back-up
Base and Optional Clarks Summit In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Clarks Summit			Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -
7		Installation Manager	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -
10		CADD Technician	$ -	0	$ -
11		Database Analyst	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -
15		Installation Technician	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -
20		Network Administrator	$ -	0	$ -
21		Network Engineer	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -
23		Software Architect	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -
26		Software Lead	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -
30		System Administrator	$ -	0	$ -
31		System Analyst	$ -	0	$ -
32		Technical Writer	$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION		Escalation % (Over Previous Year)		3.0%
				LOADED HOURLY BILLING RATES Year 4 of Maintenance		
Optional Mainline			2018 Loaded Labor Rate	Year 4 Rate	Year 4 Hours	Year 4 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	$ -	0	$ -
7		Installation Manager	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	$ -	0	$ -
10		CADD Technician	$ -	$ -	0	$ -
11		Database Analyst	$ -	$ -	0	$ -
12		Electrician Helper	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	$ -	0	$ -
15		Installation Technician	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	$ -	0	$ -
20		Network Administrator	$ -	$ -	0	$ -
21		Network Engineer	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	$ -	0	$ -
23		Software Architect	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	$ -	0	$ -
25		Software Development Manager	$ -	$ -	0	$ -
26		Software Lead	$ -	$ -	0	$ -
27		Software Programmer I	$ -	$ -	0	$ -
28		Software Programmer II	$ -	$ -	0	$ -
29		Software Programmer III	$ -	$ -	0	$ -
30		System Administrator	$ -	$ -	0	$ -
31		System Analyst	$ -	$ -	0	$ -
32		Technical Writer	$ -	$ -	0	$ -
33			$ -	$ -	0	$ -
34			$ -	$ -	0	$ -
35			$ -	$ -	0	$ -
36			$ -	$ -	0	$ -
37			$ -	$ -	0	$ -
38			$ -	$ -	0	$ -
39			$ -	$ -	0	$ -
40			$ -	$ -	0	$ -
41			$ -	$ -	0	$ -
42			$ -	$ -	0	$ -
43			$ -	$ -	0	$ -
44			$ -	$ -	0	$ -
45			$ -	$ -	0	$ -
	Grand Total Labor Cost					$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 5 of Maintenance			LOADED HOURLY BILLING RATES Year 6 of Maintenance		
Optional Mainline			Year 5 Rate	Year 5 Hours	Year 5 Total Labor Cost	Year 6 Rate	Year 6 Hours	Year 6 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 7 of Maintenance			LOADED HOURLY BILLING RATES Year 8 of Maintenance		
Optional Mainline			Year 7 Rate	Year 7 Hours	Year 7 Total Labor Cost	Year 8 Rate	Year 8 Hours	Year 8 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional <u>Mainline</u> In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 1

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 9 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance		
Optional Mainline			Year 9 Rate	Year 9 Hours	Year 9 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance		
Optional Mainline			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Mainline			Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost	Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 2			Optional Extension 2		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance		
Optional Mainline			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost	Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional Mainline In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 2			Optional Extension 2		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance		
Optional Mainline			Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost	Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-4 Back-up
Optional <u>Mainline</u> In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Mainline			Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -
7		Installation Manager	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -
10		CADD Technician	$ -	0	$ -
11		Database Analyst	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -
15		Installation Technician	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -
20		Network Administrator	$ -	0	$ -
21		Network Engineer	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -
23		Software Architect	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -
26		Software Lead	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -
30		System Administrator	$ -	0	$ -
31		System Analyst	$ -	0	$ -
32		Technical Writer	$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-5 Back-up
Optional <u>Western Extensions</u> In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 1

Item #	STAFF NAMES	POSITION/CLASSIFICATION		Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
				LOADED HOURLY BILLING RATES Year 9 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance		
Optional Western Extensions			2018 Loaded Labor Rate	Year 9 Rate	Year 9 Hours	Year 9 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost					$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-5 Back-up
Optional Western Extensions In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 1			Optional Extension 1		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance		
Optional Western Extensions			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-5 Back-up
Optional Western Extensions In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 1			Optional Extension 1		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Western Extensions			Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost	Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-5 Back-up
Optional <u>Western Extensions</u> In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance		
Optional Western Extensions			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -
7		Installation Manager	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -
10		CADD Technician	$ -	0	$ -
11		Database Analyst	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -
15		Installation Technician	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -
20		Network Administrator	$ -	0	$ -
21		Network Engineer	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -
23		Software Architect	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -
26		Software Lead	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -
30		System Administrator	$ -	0	$ -
31		System Analyst	$ -	0	$ -
32		Technical Writer	$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-5 Back-up
Optional Western Extensions In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 2			Optional Extension 2		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance		
Optional Western Extensions			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -
	% increase/decrease from previous year							

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 5-5 Back-up
Optional Western Extensions In-lane System Hardware Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 2			Optional Extension 2		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Western Extensions			Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost	Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		CADD Technician	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Electrician Helper	$ -	0	$ -	$ -	0	$ -
13		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
14		Installation Supervisor	$ -	0	$ -	$ -	0	$ -
15		Installation Technician	$ -	0	$ -	$ -	0	$ -
16		Licensed Electrical Engineer	$ -	0	$ -	$ -	0	$ -
17		Licensed Electrician	$ -	0	$ -	$ -	0	$ -
18		Maintenance Supervisor	$ -	0	$ -	$ -	0	$ -
19		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
20		Network Administrator	$ -	0	$ -	$ -	0	$ -
21		Network Engineer	$ -	0	$ -	$ -	0	$ -
22		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
23		Software Architect	$ -	0	$ -	$ -	0	$ -
24		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
25		Software Development Manager	$ -	0	$ -	$ -	0	$ -
26		Software Lead	$ -	0	$ -	$ -	0	$ -
27		Software Programmer I	$ -	0	$ -	$ -	0	$ -
28		Software Programmer II	$ -	0	$ -	$ -	0	$ -
29		Software Programmer III	$ -	0	$ -	$ -	0	$ -
30		System Administrator	$ -	0	$ -	$ -	0	$ -
31		System Analyst	$ -	0	$ -	$ -	0	$ -
32		Technical Writer	$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-1 Back-up
Base and Optional Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost Schedule
Labor and Other Direct Cost Items by Month (if provided)

DESCRIPTION OF ITEMS	TOTAL MONTHLY COST	TOTAL MONTHLY COST	TOTAL MONTHLY COST	
	Clarks Summit	Optional Mainline	Optional Western Extensions	
Year 1 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services				
Labor	$ -			
Upgrades				
Materials	$ -			
Spare Parts and Equipment				See Note #1
	$ -			
	$ -			
Total Year 1 Monthly Toll Host/System Maintenance and Software Support Services	$ -			
Year 2 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services				
Labor	$ -			
Upgrades	$ -			
Materials	$ -			
Spare Parts and Equipment	$ -			
	$ -			
	$ -			
Total Year 2 Monthly Toll Host/System Maintenance and Software Support Services	$ -			
Year 3 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services				
Labor	$ -			
Upgrades	$ -			
Materials	$ -			
Spare Parts and Equipment	$ -			
	$ -			
	$ -			
Total Year 3 Monthly Toll Host/System Maintenance and Software Support Services	$ -			
Year 4 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services				
Labor	$ -	$ -		
Upgrades	$ -	$ -		
Materials	$ -	$ -		
Spare Parts and Equipment	$ -			See Note #2
	$ -	$ -		
	$ -	$ -		
Total Year 4 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -		
Year 5 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services				
Labor	$ -	$ -		
Upgrades	$ -	$ -		
Materials	$ -	$ -		
Spare Parts and Equipment	$ -	$ -		
	$ -	$ -		
	$ -	$ -		
Total Year 5 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -		

Sheet 6-1 Back-up
Base and Optional Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost Schedule
Labor and Other Direct Cost Items by Month (if provided)

DESCRIPTION OF ITEMS	TOTAL MONTHLY COST	TOTAL MONTHLY COST	TOTAL MONTHLY COST	
	Clarks Summit	Optional Mainline	Optional Western Extensions	
Year 6 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services				
Labor	$ -	$ -		
Upgrades	$ -	$ -		
Materials	$ -	$ -		
Spare Parts and Equipment	$ -	$ -		
	$ -	$ -		
	$ -	$ -		
Total Year 6 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -		
Year 7 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services				
Labor	$ -	$ -		
Upgrades	$ -	$ -		
Materials	$ -	$ -		
Spare Parts and Equipment	$ -	$ -		
	$ -	$ -		
	$ -	$ -		
Total Year 7 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -		
Year 8 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services				
Labor	$ -	$ -		
Upgrades	$ -	$ -		
Materials	$ -	$ -		
Spare Parts and Equipment	$ -	$ -		
	$ -	$ -		
	$ -	$ -		
Total Year 8 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -		
Year 9 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services				
Labor	$ -	$ -	$ -	
Upgrades	$ -	$ -	$ -	
Materials	$ -	$ -	$ -	
Spare Parts and Equipment	$ -	$ -		See Note #3
	$ -	$ -	$ -	
	$ -	$ -	$ -	
Total Year 9 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -	

Sheet 6-1 Back-up
Base and Optional Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost Schedule
Labor and Other Direct Cost Items by Month (if provided)

DESCRIPTION OF ITEMS	TOTAL MONTHLY COST	TOTAL MONTHLY COST	TOTAL MONTHLY COST
	Clarks Summit	Optional Mainline	Optional Western Extensions
Optional Extension Costs			
Extension 1 Costs			
Extension 1 Year 1 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 1 Year 1 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 1 Year 2 Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 1 Year 2 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 1 Year 3 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 1 Year 3 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 1 Year 4 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 1 Year 4 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 1 Year 5 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 1 Year 5 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -

Sheet 6-1 Back-up
Base and Optional Incremental Toll Concentrator/Host Maintenance and Software Support Services Cost Schedule
Labor and Other Direct Cost Items by Month (if provided)

DESCRIPTION OF ITEMS	TOTAL MONTHLY COST	TOTAL MONTHLY COST	TOTAL MONTHLY COST
	Clarks Summit	Optional Mainline	Optional Western Extensions
Extension 2 Costs			
Extension 2 Year 1 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 2 Year 1 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 2 Year 2 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 2 Year 2 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 2 Year 3 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 2 Year 3 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 2 Year 4 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 2 Year 4 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -
Extension 2 Year 5 of Maintenance: Monthly Toll Host/System Maintenance and Software Support Services			
Labor	$ -	$ -	$ -
Upgrades	$ -	$ -	$ -
Materials	$ -	$ -	$ -
Spare Parts and Equipment	$ -	$ -	$ -
	$ -	$ -	$ -
	$ -	$ -	$ -
Total Extension 2 Year 5 Monthly Toll Host/System Maintenance and Software Support Services	$ -	$ -	$ -

Note 1: Clarks Summit Spare Parts and Equipment Cost Year 1 (Warranty Year) are included on Sheet 4-2.

Note 2: Optional Mainline Spare Parts and Equipment Cost Year 1 (Warranty Year) are included on Sheet 4-2.

Note 3: Optional Western Extensions Spare Parts and Equipment Cost Year 1 (Warranty Year) are included on Sheet 4-2.

Sheet 6-2 Back-up
Base and Optional <u>Clarks Summit</u> Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION		Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
				LOADED HOURLY BILLING RATES Year 1 of Maintenance			LOADED HOURLY BILLING RATES Year 2 of Maintenance		
Clarks Summit			2018 Loaded Labor Rate	Year 1 Rate	Year 1 Hours	Year 1 Total Labor Cost	Year 2 Rate	Year 2 Hours	Year 2 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	$ -	0	$ -	$ -	0	$ -
31			$ -	$ -	0	$ -	$ -	0	$ -
32			$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost					$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 3 of Maintenance			LOADED HOURLY BILLING RATES Year 4 of Maintenance		
Clarks Summit			Year 3 Rate	Year 3 Hours	Year 3 Total Labor Cost	Year 4 Rate	Year 4 Hours	Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 5 of Maintenance			LOADED HOURLY BILLING RATES Year 6 of Maintenance		
Clarks Summit			Year 5 Rate	Year 5 Hours	Year 5 Total Labor Cost	Year 6 Rate	Year 6 Hours	Year 6 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 7 of Maintenance			LOADED HOURLY BILLING RATES Year 8 of Maintenance		
Clarks Summit			Year 7 Rate	Year 7 Hours	Year 7 Total Labor Cost	Year 8 Rate	Year 8 Hours	Year 8 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 1

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 9 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance		
Clarks Summit			Year 9 Rate	Year 9 Hours	Year 9 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance		
Clarks Summit			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Clarks Summit			Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost	Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 2			Optional Extension 2		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance		
Clarks Summit			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost	Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 2			Optional Extension 2		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance		
Clarks Summit			Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost	Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-2 Back-up
Base and Optional Clarks Summit Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Clarks Summit			Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -
7		Installation Manager	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -
10		Database Administrator	$ -	0	$ -
11		Database Analyst	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -
16		Network Administrator	$ -	0	$ -
17		Operations Manager	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -
21		Software Lead	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -
25		System Administrator	$ -	0	$ -
26		System Analyst	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -
28		Technical Writer	$ -	0	$ -
29		Training Manager	$ -	0	$ -
30		Transition Manager	$ -	0	$ -
31			$ -	0	$ -
32			$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION		Escalation % (Over Previous Year)		3.0%
				LOADED HOURLY BILLING RATES Year 4 of Maintenance		
Optional Mainline			2018 Loaded Labor Rate	Year 4 Rate	Year 4 Hours	Year 4 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	$ -	0	$ -
7		Installation Manager	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	$ -	0	$ -
10		Database Administrator	$ -	$ -	0	$ -
11		Database Analyst	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	$ -	0	$ -
16		Network Administrator	$ -	$ -	0	$ -
17		Operations Manager	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	$ -	0	$ -
20		Software Development Manager	$ -	$ -	0	$ -
21		Software Lead	$ -	$ -	0	$ -
22		Software Programmer I	$ -	$ -	0	$ -
23		Software Programmer II	$ -	$ -	0	$ -
24		Software Programmer III	$ -	$ -	0	$ -
25		System Administrator	$ -	$ -	0	$ -
26		System Analyst	$ -	$ -	0	$ -
27		Systems Engineer	$ -	$ -	0	$ -
28		Technical Writer	$ -	$ -	0	$ -
29		Training Manager	$ -	$ -	0	$ -
30		Transition Manager	$ -	$ -	0	$ -
31			$ -	$ -	0	$ -
32			$ -	$ -	0	$ -
33			$ -	$ -	0	$ -
34			$ -	$ -	0	$ -
35			$ -	$ -	0	$ -
36			$ -	$ -	0	$ -
37			$ -	$ -	0	$ -
38			$ -	$ -	0	$ -
39			$ -	$ -	0	$ -
40			$ -	$ -	0	$ -
41			$ -	$ -	0	$ -
42			$ -	$ -	0	$ -
43			$ -	$ -	0	$ -
44			$ -	$ -	0	$ -
45			$ -	$ -	0	$ -
	Grand Total Labor Cost					$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 5 of Maintenance			LOADED HOURLY BILLING RATES Year 6 of Maintenance		
Optional Mainline			Year 5 Rate	Year 5 Hours	Year 5 Total Labor Cost	Year 6 Rate	Year 6 Hours	Year 6 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 7 of Maintenance			LOADED HOURLY BILLING RATES Year 8 of Maintenance		
Optional Mainline			Year 7 Rate	Year 7 Hours	Year 7 Total Labor Cost	Year 8 Rate	Year 8 Hours	Year 8 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 1

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Year 9 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance		
Optional Mainline			Year 9 Rate	Year 9 Hours	Year 9 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance		
Optional Mainline			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Mainline			Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost	Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up

Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 2			Optional Extension 2		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance		
Optional Mainline			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost	Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 2			Optional Extension 2		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance		
Optional Mainline			Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost	Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-3 Back-up
Optional Mainline Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Mainline			Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -
7		Installation Manager	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -
10		Database Administrator	$ -	0	$ -
11		Database Analyst	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -
16		Network Administrator	$ -	0	$ -
17		Operations Manager	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -
21		Software Lead	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -
25		System Administrator	$ -	0	$ -
26		System Analyst	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -
28		Technical Writer	$ -	0	$ -
29		Training Manager	$ -	0	$ -
30		Transition Manager	$ -	0	$ -
31			$ -	0	$ -
32			$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

% increase/decrease from previous year	

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-4 Back-up
Optional Western Extensions Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 1

Item #	STAFF NAMES	POSITION/CLASSIFICATION		Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
				LOADED HOURLY BILLING RATES Year 9 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance		
Optional Western Extension			2018 Loaded Labor Rate	Year 9 Rate	Year 9 Hours	Year 9 Total Labor Cost	Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost
1		Project Principal	$ -	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	$ -	0	$ -	$ -	0	$ -
31			$ -	$ -	0	$ -	$ -	0	$ -
32			$ -	$ -	0	$ -	$ -	0	$ -
33			$ -	$ -	0	$ -	$ -	0	$ -
34			$ -	$ -	0	$ -	$ -	0	$ -
35			$ -	$ -	0	$ -	$ -	0	$ -
36			$ -	$ -	0	$ -	$ -	0	$ -
37			$ -	$ -	0	$ -	$ -	0	$ -
38			$ -	$ -	0	$ -	$ -	0	$ -
39			$ -	$ -	0	$ -	$ -	0	$ -
40			$ -	$ -	0	$ -	$ -	0	$ -
41			$ -	$ -	0	$ -	$ -	0	$ -
42			$ -	$ -	0	$ -	$ -	0	$ -
43			$ -	$ -	0	$ -	$ -	0	$ -
44			$ -	$ -	0	$ -	$ -	0	$ -
45			$ -	$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost					$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-4 Back-up
Optional Western Extensions Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 1			Optional Extension 1		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance		
Optional Western Extension			Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost	Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-4 Back-up
Optional Western Extensions Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 1			Optional Extension 1		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Western Extension			Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost	Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-4 Back-up
Optional Western Extensions Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Optional Extension 2			Optional Extension 2		
			Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 1 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 2 of Maintenance		
Optional Western Extension			Extension Year 1 Rate	Extension Year 1 Hours	Extension Year 1 Total Labor Cost	Extension Year 2 Rate	Extension Year 2 Hours	Extension Year 2 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-4 Back-up
Optional Western Extensions Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

			Optional Extension 2			Optional Extension 2		
Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 3 of Maintenance			LOADED HOURLY BILLING RATES Extension Year 4 of Maintenance		
Optional Western Extension			Extension Year 3 Rate	Extension Year 3 Hours	Extension Year 3 Total Labor Cost	Extension Year 4 Rate	Extension Year 4 Hours	Extension Year 4 Total Labor Cost
1		Project Principal	$ -	0	$ -	$ -	0	$ -
2		Project Manager	$ -	0	$ -	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -	$ -	0	$ -
7		Installation Manager	$ -	0	$ -	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -	$ -	0	$ -
10		Database Administrator	$ -	0	$ -	$ -	0	$ -
11		Database Analyst	$ -	0	$ -	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -	$ -	0	$ -
16		Network Administrator	$ -	0	$ -	$ -	0	$ -
17		Operations Manager	$ -	0	$ -	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -	$ -	0	$ -
21		Software Lead	$ -	0	$ -	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -	$ -	0	$ -
25		System Administrator	$ -	0	$ -	$ -	0	$ -
26		System Analyst	$ -	0	$ -	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -	$ -	0	$ -
28		Technical Writer	$ -	0	$ -	$ -	0	$ -
29		Training Manager	$ -	0	$ -	$ -	0	$ -
30		Transition Manager	$ -	0	$ -	$ -	0	$ -
31			$ -	0	$ -	$ -	0	$ -
32			$ -	0	$ -	$ -	0	$ -
33			$ -	0	$ -	$ -	0	$ -
34			$ -	0	$ -	$ -	0	$ -
35			$ -	0	$ -	$ -	0	$ -
36			$ -	0	$ -	$ -	0	$ -
37			$ -	0	$ -	$ -	0	$ -
38			$ -	0	$ -	$ -	0	$ -
39			$ -	0	$ -	$ -	0	$ -
40			$ -	0	$ -	$ -	0	$ -
41			$ -	0	$ -	$ -	0	$ -
42			$ -	0	$ -	$ -	0	$ -
43			$ -	0	$ -	$ -	0	$ -
44			$ -	0	$ -	$ -	0	$ -
45			$ -	0	$ -	$ -	0	$ -
	Grand Total Labor Cost				$ -			$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 6-4 Back-up
Optional Western Extensions Incremental Toll Concentrator/Host Maintenance and Software Support Services - Staff and Position Classifications with Rates

Optional Extension 2

Item #	STAFF NAMES	POSITION/CLASSIFICATION	Escalation % (Over Previous Year)		3.0%
			LOADED HOURLY BILLING RATES Extension Year 5 of Maintenance		
Optional Western Extension			Extension Year 5 Rate	Extension Year 5 Hours	Extension Year 5 Total Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -
7		Installation Manager	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -
10		Database Administrator	$ -	0	$ -
11		Database Analyst	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -
16		Network Administrator	$ -	0	$ -
17		Operations Manager	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -
21		Software Lead	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -
25		System Administrator	$ -	0	$ -
26		System Analyst	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -
28		Technical Writer	$ -	0	$ -
29		Training Manager	$ -	0	$ -
30		Transition Manager	$ -	0	$ -
31			$ -	0	$ -
32			$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Grand Total Labor Cost				$ -

% increase/decrease from previous year

Note 1: CPI Composite of 3% used for evaluation purposes. CPI adjustments will be made to the Monthly Maintenance Cost based on actual CPI change for the previous year as further described in the Price Proposal Instructions.

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 7-1 Back-up
Optional Toll Host System Replacement Implementation Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
1 System Hardware, Third Party Software, Installation and Commissioning not Otherwise Covered					
Host Servers - equipment, purchase, install, configure and test	0	$ -	$ -	$ -	$ -
Storage Works	0	$ -	$ -	$ -	$ -
Back-up Library	0	$ -	$ -	$ -	$ -
Other Third-party Software	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Hardware, Third Party SW and Installation not Otherwise Covered			$ -	$ -	$ -
2 Communications Equipment					
Switches	0	$ -	$ -	$ -	$ -
LAN HW	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Communications Equipment			$ -	$ -	$ -
3 Software (GUI, Back-end), Host System, MOMS, DVAS and License					
Host Software	0	$ -	$ -	$ -	$ -
MOMS	0	$ -	$ -	$ -	$ -
DVAS	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Software (GUI, Back-end), Host System, MOMS, DVAS and License			$ -	$ -	$ -
4 Design Documentation					
Lane Drawings	0	$ -	$ -	$ -	$ -
SDDD	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Design Documentation			$ -	$ -	$ -
5 User, Maintenance, and Project Documentation					
Documents/Manuals	0	$ -	$ -	$ -	$ -
Maintenance Manual	0	$ -	$ -	$ -	$ -
Installation Manual	0	$ -	$ -	$ -	$ -
Project Plans	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total User, Maintenance and Project Documentation			$ -	$ -	$ -
6 Training (manuals, materials and delivery)					
Maintenance Training	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Training			$ -	$ -	$ -

Sheet 7-1 Back-up
Optional Toll Host System Replacement Implementation Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
7 Factory Acceptance Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Factory Acceptance Test			$ -	$ -	$ -
8 Installation and Commissioning Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Installation and Commissioning Test			$ -	$ -	$ -
9 System Operational and Acceptance Test					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total System Operational and Acceptance Test			$ -	$ -	$ -
10 Third Party Warranty and Licenses					
DB Licenses	0	$ -	$ -	$ -	$ -
OS Licenses	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Third Party Warranty and Licenses			$ -	$ -	$ -
11 Warranty First Year of Maintenance - Toll Host System Replacement Maintenance and Software Support Services					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Warranty First Year of maintenance - Toll Host System Replacement Maintenance and Software Support Services			$ -	$ -	$ -
12 Spare Parts and Equipment Year 1 - Warranty Year					
Toll Host System Replacement Spare Parts and Equipment (Year 1) (Sheet 7-2)			$ -		$ -
Total Spare Parts and Equipment Year 1 - Warranty Year			$ -	$ -	$ -

Sheet 7-1 Back-up
Optional Toll Host System Replacement Implementation Cost Schedule

DESCRIPTION OF ITEMS	# UNIT	UNIT ($)	TOTAL ITEM COST ($)	LABOR ($)	TOTAL COST ($)
13 Project Management					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Project Management			$ -	$ -	$ -
14 Engineering and Design					
Lane Installation Design Drawings	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Engineering and Design			$ -	$ -	$ -
15 Transition Costs					
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
	0	$ -	$ -	$ -	$ -
Total Transition Costs			$ -	$ -	$ -
Total Optional Toll Host System Replacement Implementation Costs			$ -	$ -	$ -
Labor Check (from Sheet 7-3, cell F49) should equal cell F146				$ -	

Sheet 7-2 Back-up
Optional Toll Host System Replacement Implementation
Spare Parts and Equipment Cost Year 1

SPARE PARTS DESCRIPTION	TOTAL QUANTITY	UNIT ($)	TOTAL ITEM COST ($)
	Year 1 - Warranty Year		
1. System Hardware			
Servers	0	$ -	$ -
Hard Drive	0	$ -	$ -
Miscellaneous	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
Total System Hardware			$ -
2. Communications Equipment			
LAN Equipment	0	$ -	$ -
Power Supply	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
	0	$ -	$ -
Total Communications Equipment			$ -
Toll Host System Replacement Implementation Spare Parts and Equipment Cost Year 1			$ -

Sheet 7-3 Back-up
Optional Toll Host System Replacement Implementation Cost
Staff and Position Classifications with Rates

Item #	STAFF NAMES	POSITION/CLASSIFICATION	LOADED HOURLY BILLING RATES BY TASK		
			Rate	Hours	Total System Labor Cost
1		Project Principal	$ -	0	$ -
2		Project Manager	$ -	0	$ -
3		Deputy Project Manager	$ -	0	$ -
4		Technical /Software Development Manager	$ -	0	$ -
5		Lane Technical Lead	$ -	0	$ -
6		System Technical Lead (if applicable)	$ -	0	$ -
7		Installation Manager	$ -	0	$ -
8		Maintenance Manager	$ -	0	$ -
9		Quality Assurance/Test Manager	$ -	0	$ -
10		Database Administrator	$ -	0	$ -
11		Database Analyst	$ -	0	$ -
12		Finance Manager (Design/Implementation)	$ -	0	$ -
13		Finance Manager (Operations)	$ -	0	$ -
14		Hardware Engineer/Lead	$ -	0	$ -
15		Maintenance Technician	$ -	0	$ -
16		Network Administrator	$ -	0	$ -
17		Operations Manager	$ -	0	$ -
18		Senior Maintenance Technician	$ -	0	$ -
19		Software Development Engineer	$ -	0	$ -
20		Software Development Manager	$ -	0	$ -
21		Software Lead	$ -	0	$ -
22		Software Programmer I	$ -	0	$ -
23		Software Programmer II	$ -	0	$ -
24		Software Programmer III	$ -	0	$ -
25		System Administrator	$ -	0	$ -
26		System Analyst	$ -	0	$ -
27		Systems Engineer	$ -	0	$ -
28		Technical Writer	$ -	0	$ -
29		Training Manager	$ -	0	$ -
30		Transition Manager	$ -	0	$ -
31			$ -	0	$ -
32			$ -	0	$ -
33			$ -	0	$ -
34			$ -	0	$ -
35			$ -	0	$ -
36			$ -	0	$ -
37			$ -	0	$ -
38			$ -	0	$ -
39			$ -	0	$ -
40			$ -	0	$ -
41			$ -	0	$ -
42			$ -	0	$ -
43			$ -	0	$ -
44			$ -	0	$ -
45			$ -	0	$ -
	Total Labor Cost				$ -

Use as many pages as necessary to develop the Staff Listing (please label each page with number)

Sheet 8-1
Additional Services Rates and Markup for Out of Scope Work

DESCRIPTION	PERCENTAGE
Subcontractor Markup	0.0000%
Equipment & Materials Markup	0.0000%
Overhead including Burden	0.0000%
Profit	0.0000%
STAFF POSITION/CLASSIFICATION	LOADED HOURLY RATE (2018 Value)
CADD Technician	$ -
Database Administrator	$ -
Database Analyst	$ -
Deputy Project Manager	$ -
Electrician Helper	$ -
Finance Manager (Design/Implementation)	$ -
Finance Manager (Operations)	$ -
Hardware Engineer/Lead	$ -
Installation Manager	$ -
Installation Supervisor	$ -
Installation Technician	$ -
Lane Technical Lead	$ -
Licensed Electrical Engineer	$ -
Licensed Electrician	$ -
Maintenance Manager	$ -
Maintenance Supervisor	$ -
Maintenance Technician	$ -
Network Administrator	$ -
Network Engineer	$ -
Operations Manager	$ -
Project Manager	$ -
Project Principal	$ -
Quality Assurance/Test Manager	$ -
Senior Maintenance Technician	$ -
Software Architect	$ -
Software Development Engineer	$ -
Software Development Manager	$ -
Software Lead	$ -
Software Programmer I	$ -
Software Programmer II	$ -

Sheet 8-1
Additional Services Rates and Markup for Out of Scope Work

DESCRIPTION	PERCENTAGE
Subcontractor Markup	0.0000%
Equipment & Materials Markup	0.0000%
Overhead including Burden	0.0000%
Profit	0.0000%
STAFF POSITION/CLASSIFICATION	LOADED HOURLY RATE (2018 Value)
Software Programmer III	$ -
System Administrator	$ -
System Analyst	$ -
System Technical Lead (if applicable)	$ -
Systems Engineer	$ -
Technical /Software Development Manager	$ -
Technical Writer	$ -
Training Manager	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -
	$ -

Note 1: CPI adjustments will be made to the Cost based on actual CPI change for the previous year beginning with Maintenance Year 2 as further described in the Price Proposal Instructions.

Exhibit D - Payment Schedule - Clarks Summit

A. Payments for Implementation Cashless Tolling System Design and Development					$ -
Payment Number	**Payment Milestone**	**Pay Items**	**% Paid**	**Cum.% Paid**	
A-1	Notice to Proceed	Notice to Proceed.	5.00%	5.00%	$ -
A-2	Cashless Toll System Development and Administration	Project Management Documents Approved (PMP, Project Schedule, QA Plan and SDP, SRD).	10.00%	15.00%	$ -
A-3	Cashless Toll System Design	Business Rules and Design Documents Approved (BRD and SDDD) .	15.00%	30.00%	$ -
A-4	Cashless Toll System Factory Acceptance Testing (FAT)	Test Documentation and Factory Acceptance Testing Approved.	15.00%	45.00%	$ -
A-5	Cashless Toll System Onsite First Installation Testing (OFIT)	Installation Plan Approved, Test Documentation and Onsite Integration Testing Approved - First Site.	15.00%	60.00%	$ -
A-6	Cashless Toll System Manuals and Training	Manuals Approved and Training Approved.	5.00%	65.00%	$ -
A-7	Cashless Toll System Commissioning - Clarks Summit	Installation and Commissioning Approved Ready for Go Live.	10.00%	75.00%	$ -
A-9	Cashless Toll System Acceptance	Operational and Acceptance Test Approved, As-builts Approved and Implementation Phase Closed Out.	25.00%	100.00%	$ -

B. Payments Related to Hardware, Equipment and Off-the-Shelf Software				$ -
Payment Number	**Payment Milestone**	**% Paid**	**Cum.% Paid**	
B-1	Ordering Verified	20.00%	20.00%	$ -
B-2	Purchased, Received and Verified	60.00%	80.00%	$ -
B-3	Installation Approved	20.00%	**100.00%**	$ -