

REQUEST FOR PROPOSALS FOR
SYSTEMWIDE DYNAMIC MESSAGE SIGN SYSTEMS

ISSUING OFFICE

Pennsylvania Turnpike Commission
Contracts Administration Department

On behalf of the
Traffic Engineering & Operations Department

RFP NUMBER

18-10480-8234

DATE OF ISSUANCE

June 22, 2019

**REQUEST FOR PROPOSALS FOR
SYSTEMWIDE DYNAMIC MESSAGE SIGN SYSTEMS**

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CALENDAR OF EVENTS

RFP #18-10480-8234

The Commission reserves the right to make changes or alterations to this schedule as the Commission determines is in its best interest.

Activity	Date	Time
Request for Proposals Issued	June 22, 2018	N/A
Deadline for Proposers to Submit Questions via email to RFP-Q@paturndpike.com	July 12, 2018	2:00 PM
Answers to Proposers questions posted to the Commission website at https://www.paturndpike.com/Procurement/Bidlist.aspx?RTYPE=O <i>(Estimate Only)</i>	July 26, 2018	N/A
Due Date for Proposals	August 9, 2018	2:00 PM
Anticipated Notice to Proceed <i>(Estimate Only)</i>	January 31, 2019	N/A

PART I

GENERAL INFORMATION FOR PROPOSERS

I-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 (Commission) to satisfy a need for furnishing, coordinating with Construction Contractors for installation support, integration, testing and acceptance, and training for completely functional Dynamic Message Sign (DMS) systems for upcoming construction projects throughout the Mainline and other approach highways.

I-2. Issuing Office. This RFP is issued for the Commission by the Contracts Administration Department on behalf of the Traffic Engineering & Operations Department.

I-3. Scope. This RFP contains instructions governing the proposals to be submitted and the material to be included therein; a description of the service 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.

I-4. Problem Statement. Throughout the transportation operations industry, the use of DMS to provide motorists with real-time traveler and emergency information has provided to be a valuable asset. In that regard, the Commission has an aggressive deployment plan for DMS throughout the system. The anticipated quantity of DMS, along with the commitment to maximize the functional uptime of these systems, has resulted in the need to streamline procurement and minimize maintenance efforts moving forward. The intent of this RFP is to acquire the services of a Proposer to furnish, coordinate with Construction Contractors to support the installation, integration, facilitate the testing and acceptance, and train Commission staff on the completely functional DMS systems for upcoming construction projects throughout the Mainline and other approach highways.

The Commission reserves the right to procure DMS through other Contracts if it is in its best interests during this Contract duration.

I-5. Type of Contract. The Commission intends to award one (1) contract as a result of this RFP. It is proposed that if a contract is entered into as a result of this RFP, it will be a deliverable-based, unit price contract. 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. A sample Contractual Agreement is provided in **Appendix A**.

I-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.paturndpike.com (Doing Business, General Information, Integrity Provisions).

Include full disclosure of any potential conflict with the State Adverse Interest Act, 71 P.S. § 776.3, for a State Advisor or State Consultant 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 Act 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.

I-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.

I-8. Subcontracting. Any use of subcontractors by a Proposer must be identified in the proposal. 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.

If a Joint Venture responds to this RFP, the Commission will not accept separate proposals from joint venture constituents. A firm will not be permitted to submit a proposal on more than one (1) joint venture for the same RFP. Also, a firm that responds to this RFP as a prime may not be included as a designated subconsultant to another firm that responds to the same RFP. Multiple responses under any of the forgoing situations will 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 subconsultant to more than one prime consultant responding to the RFP.

I-9. 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.

I-10. 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 the Calendar of Events, page 1 of this RFP. 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 <https://www.paturnpike.com/procurement/Bidlist.aspx?rtype=o>.

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.

I.11. Questions and Answers. There will be no pre-proposal conference for this RFP. 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 **RFP 18-10480-8234** in the Subject Line to be received no later than the date and time provided on the Calendar of Events. 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>), approximately on or before the date provided on the Calendar of Events and only if necessary. Proposers shall use the form provided in **Appendix B** to submit the questions.

I-12. 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 under the original RFP document (<http://www.paturnpike.com/procurement/Bidlist.aspx?rtype=o>). 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. If the Commission revises a published advertisement less than ten 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.

I-13. Response. To be considered, proposals must be delivered to the Pennsylvania Turnpike Commission's Contracts Administration Department, Attention: Stephanie Newbury, on or before the date and time provided on the Calendar of Events. The Commission will **not** accept proposals via email or facsimile transmission.

Overnight Delivery Address:

Contracts Administration Department
Attn: Stephanie Newbury
PA Turnpike Commission
700 South Eisenhower Blvd.
Middletown, PA 17057
Phone: (717) 831-7423

US Mail Delivery Address:

Contracts Administration Department
Attn: Stephanie Newbury
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.

I-14. Proposals. To be considered, Proposers should submit a complete response to this RFP, using the format provided in **Part II**. Each proposal should be submitted in five (5) hard copies of the Technical Submittal, five (5) hard copies of the Diverse Business (DB) participation submittal, and five (5) hard copies of the Cost Submittal. In addition to the hard copies of the proposal, two (2) **complete and exact copies** of the Technical, Cost and DB submittals, along with all requested documents on CD-ROM 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 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 or Flash drive before it was submitted. The Proposer shall present the proposal to the Contracts Administration Department only. No other distribution of proposals will be made by the Proposer. Each proposal page should be numbered for ease of reference.

An official authorized to bind the Proposer to its Proposal must sign the proposal. If the official signs the Proposal Cover Sheet (**Appendix C** to this RFP) and the Proposal Cover Sheet is attached to the proposal, the requirement will be met. For this RFP, the proposal must remain valid for at least 120 calendar days. Moreover, the contents of the proposal of the selected Proposer will become contractual obligations if a contract is entered into.

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 prior to the exact hour and date specified for proposal receipt.

However, if the Proposer chooses to attempt to provide such written notice by fax transmission, the Commission shall not be 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 receipt. 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.

I-15. Economy of Preparation. Proposals should be prepared simply and economically, providing a straightforward, concise description of the Proposer's ability to meet the requirements of the RFP. Proposals will be limited to 30 pages (not including appendices), no smaller than 12 pt. Times New Roman font, 8 ½" x 11" page size (larger pages are allowed for figures, cut sheets or tables, but they must be folded into the overall proposal and used sparingly).

I-16. Discussions for Clarification. Proposers who submit proposals may be required to make an oral or written clarification 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.

I-17. Best and Final Offers. The Issuing Office reserves the right to conduct discussions with Proposers for the purpose of obtaining "best and final offers." 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 c) request revised proposals. The Issuing Office will limit any discussions to responsible Proposers whose proposals the Issuing Office has determined to be reasonably susceptible of being selected for award.

I-18. Prime Proposer Responsibilities. The selected Proposer will be required to assume responsibility for all services offered in its proposal 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.

I-19. 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.

I-20. 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.

I-21. 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.

I-22. Commission Participation. Unless specifically noted in this section, Proposers must provide all services to complete the identified work. The Issuing Office will provide coordination with upcoming construction contracts for scheduling, delivery, and training efforts. The Issuing Office will also provide accommodations for training at Commission facilities.

I-23. Cost Submittal. The cost submittal (**Appendix I**) shall be placed in a separately sealed envelope within the sealed proposal and kept separate from the technical submittal.

I-24. Term of Contract. The term of the contract will commence on the Effective Date (as defined below) and will end three (3) years from the Effective Date. However, the Commission reserves the right to negotiate unit pricing after year three (3) and request up to three (3) two (2)-year extensions. The Commission shall fix the Effective Date after the contract has been fully executed by the Proposer and by the Commission and all approvals required by Commission contracting procedures have been obtained.

I-25. 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 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.

I-26. 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 Workers' Compensation Acts, Disability Benefits Acts, or other Employee Benefit Act.

I-27. Insurance. Proposer will comply with the Insurance requirements as described in **Appendix D** – Insurance Specification.

I-28. Diverse Business (DB) Requirements. Proposer will comply with the DB Requirements as described in **Appendix E** – Diverse Business (DB) Requirements.

PART II

INFORMATION REQUIRED FROM PROPOSERS

Proposals must be submitted in the format, including heading descriptions, outlined below. To be considered, the proposal must respond to all requirements in this part of the RFP. Any other information thought to be relevant, but not applicable to the enumerated categories, should be provided as an appendix to the proposal. 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 separately sealed submittals:

1. Technical Submittal, which shall be a response to RFP **Part II, Sections II-1 through II-11**;
2. Diverse Business Participation Submittal, in response to RFP **Part II, Section II-12**; and
3. Cost Submittal, in response to RFP **Part II, Section II-13**.

Proposers are required to provide a bid for all items included within the contract. It is not the Commission's intent to procure DMS equipment from multiple vendors.

The Commission reserves the right to request additional information which, in the Commission's opinion, is necessary to assure that the Proposer's competence, number of qualified employees, business organization, and financial resources 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 agreement and to complete the work specified.

II-1. Proposal Cover Sheet (See Appendix C). Show the name of your firm, Federal I.D. number, address, name of contact person, contact person's email and telephone number date and the subject: **Systemwide Dynamic Message Sign System, RFP 18-10480-8234. Appendix C** must be signed by an individual who is authorized to negotiate terms, render binding decisions and commit your firm's resources. In addition, it is required that all information requested in **Appendix C** 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.

II-2. Table of Contents. Include a clear identification of the material by section and by page number.

II-3. Executive Summary. State in succinct terms your understanding of the problem presented, or the service required by this RFP. Summarize your understanding of the work to be done and make a positive commitment to perform the work necessary. This section should summarize the key points of your submittal. (Limit to two pages.) 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.

II-4. Management Summary. Include a narrative description of the proposed effort and a list of the items to be delivered or services to be provided.

II-5. Work Plan. Describe in narrative form your technical plan for accomplishing the work. Use the task descriptions in Part IV of this RFP as your reference point.

II-6. Prior Experience. In accordance with Section IV-3, letter a, include experience design, manufacture, delivery, integration, testing, commissioning and training for DMS. The Proposer must submit information on contracts/subcontracts performed over the past five (5) years for organizations (commercial, state, local, federal, etc.) involving similar or related services. The Proposer shall submit no more than ten (10) contract/subcontract descriptions for the entire proposed team (Proposer plus any subcontractors/engineers) with a minimum of five (5) contracts within North America of which at least two (2) supplied full color DMS. The Proposer must submit this information on the most recently completed contracts/subcontracts or on-going contracts/subcontracts that have been installed, are at least three (3) months into the performance period and have been accepted by the End User. The following information must be provided:

- Customer name, address, and telephone number.
- Technical office point(s) of contact (name, telephone number, and email address).
- Contracting/Business office point(s) of contact (name and telephone number).
- Contract name and number, if applicable.
- Date of contract award and period performance.
- Type of procurement (Low-bid Construction, Design-Build RFP, Sole Source, etc.).
- The total number of DMS supplied, access type, size and LED color.
- Start/end dates of contract. Identify if the contract was completed early, late, or on-time.

Experience shown should be work done by individuals who will be assigned to this project as well as that of your company. Studies or projects referred to should be identified and the name of the customer shown, including the name, address, and telephone number of the responsible official of the customer, company, or agency who may be contacted.

II-7. Personnel. In accordance with Section IV-3, letter a, include the number, and names where practicable, of executive and professional personnel, analysts, auditors, researchers, programmers, consultants, etc., who will be engaged in the work. For this project, the Proposer must include the following individuals:

- Project Manager – This person will serve as the Proposer’s primary point of contact for each DMS through testing and acceptance. This person will also be responsible for the coordination of all training for Commission staff. Document the experience of this individual to demonstrate a minimum of three (3) projects and five (5) years successfully managing ITS projects/procurements of similar size and content.
- Lead Field Technician – This person will serve as the field technician who will work with the Construction Contractor to ensure the proper installation and configuration of the DMS on-site. This person will also be responsible for conducting on-site testing as well as supporting the Construction Contractor during systems acceptance testing. Provide assurances that this person will be located in a sufficient proximity to Commission facilities or will be able to travel to meet all scheduling requirements as specified. Document the experience of this individual to

demonstrate a minimum of three (3) projects and five (5) years successfully supporting the installation of DMS.

- Customer Service Representative – This person will serve as the point of contact for the Commission following acceptance of each DMS. This person will handle maintenance, service, and technical inquiries throughout the warranty period and life of the contract. Document the experience of this individual to demonstrate a minimum of two (2) years' experience in the DMS industry.

Show where these personnel will be physically located during the time they are engaged in the work. Include, through a resume or similar document, education and experience in which each team member will be providing his or her expertise. Indicate the responsibilities each will have in this project and how long each has been with your company. Resumes may be included in the appendix materials to the Proposer's submission.

Identify any major subcontractors you intend to use and the services they will perform. Where subcontractors are named, include information regarding their role, personnel to be provided, and, through resumes or similar documents, educational background and experience. Indicate the responsibilities each will have in this project and how long each has been with the named subcontractor.

II-8. DMS Technical Information. Technical information on each of the three (3) types of DMS being procured through this RFP should be provided by the Proposer within the proposal to demonstrate the ability to meet the functional objectives and specifications required by the special provisions. No cost data is to be included with the DMS Technical Information. DMS Technical Information should highlight those areas in which the Proposer's system exceeds the minimum technical requirements provided in **Appendix G**, and how that will be of additional value to the Commission. The Proposer shall complete **Appendix J**, Minimum Technical Requirements Traceability Matrix, to indicate the ability to meet each of the technical requirements.

II-9. Supplemental Device Technical Information. During the life of this agreement, the Commission may elect to amend the agreement for the provision of DMS of sizes other than those indicated for Types 1, 2, and 3 (see **Section IV-1**). These supplemental DMS shall meet or exceed the minimum technical requirements provided in **Appendix G**. Provide information requested for the potential, but not guaranteed, DMS sizes indicated in the Supplemental Devices Questionnaire in **Appendix H**, for the Commission's understanding in the event that a project need arises for these DMS sizes.

The Commission has no planned projects including the installation of Variable Speed Limit (VSL) or Lane Use Control Signal (LUCS) devices along the mainline Turnpike or approaching facilities, but during the life of the Agreement, the Commission may also elect to amend the Agreement for the provision of these devices. It is currently unknown how many devices and of what type, may be required. Provide technical information on the VSL and LUCS devices that are currently available and an overview of projects, locations, and customers that have installed VSL and LUCS equipment. Additional information is requested in the Supplemental Devices Questionnaire in **Appendix H**.

II-10. Training. The Proposer will provide up to two (2) training sessions per DMS type during the contract period. The training will consist of separate trainings for operators, supervisor/management/system administrators, and maintenance supervisors. The first of the two (2) sessions per DMS type will occur before final acceptance of the corresponding DMS type. The training will be digitally recorded and provided to the Commission within two (2) weeks of this training.

II-11. Appendices. The following appendices are required to be included with the proposal:

- a. DMS Technical Submittal – This should include all detailed information, including cut sheets and equipment manuals that demonstrate in detail that the supplied equipment meets or exceeds all Minimum Technical Requirements. Provide VSL and LUCS cut sheets and equipment manuals as well, if available.
- b. DMS Standard Shop Drawings – In accordance with Section IV-3, letter c, provide standard shop drawings for each sign type that include typical wiring, installation, and attachment details. Provide VSL and LUCS shop drawings as well, if available.
- c. DMS Testing Plans – Provide complete testing plans for Factory and Stand Alone Tests in accordance with Special Provisions in **Appendix F**.
- d. Training Plan – Provide complete training plan in accordance with Special Provisions in **Appendix F**.
- e. Recommended Spare Parts List – Provide complete list in accordance with Special Provisions in **Appendix F**, as well as additional items as indicated to ensure 95% uptime of DMS devices.
- f. Supplemental Devices Questionnaire – Complete questionnaire in **Appendix H**.
- g. Minimum Technical Requirements Traceability Matrix – Complete table in **Appendix J**.
- h. Additional Appendices may be provided if the Proposer feels that the additional information will provided added value to the bid. These additional Appendices should be referenced and described within the proposal document.

There is no page limit associated with the Appendices; however, the Proposer is encouraged to be economical in their preparation.

II-12. Diverse Business (DB) Requirements (Appendix E). The Commission’s Diverse Business (DB) Requirements for this procurement and a resulting contract are identified in **Appendix E**. There is no minimum participation level (MPL) for DBs established for this contract. However, the utilization of DBs are encouraged and will be considered as a criterion in the evaluation of proposals and may be considered as a factor in the Commission’s selection of a firm for this contract.

The proposer must include in its DB participation submittal that it meets the requirements set forth in the Commission’s DB Requirements – **Appendix E**. In particular, the proposer shall address the section of the DB Requirements labeled, “Actions Required by Proposer during the procurement/consultant selection phase”. In addition, the DB participation submittal shall indicate the amount of DB participation incurred in the proposal in terms of dollars committed or percentage of total contract amount.

II-13. Cost Submittal. The information requested in this section shall constitute your cost submittal. **The Cost Submittal shall be placed in a separate sealed envelope within the sealed proposal, and on a CD-ROM, separate from the technical submittal.**

Proposers should **not** include any assumptions in their cost submittals. If the proposer includes assumptions in its cost submittal, the Issuing Office may reject the proposal. Proposers should direct in writing to the Issuing Office pursuant to **Section I-11** of this RFP any questions about whether a cost or

other component is included or applies. All Proposers will then have the benefit of the Issuing Office's written answer so that all proposals are submitted on the same basis.

The total cost you are proposing must be broken down but not limited to the following components and include the completed Cost Submittal (**Appendix I**).

- a. Completed component prices to provide Types 1, 2, and 3 DMS.
 - i. Each DMS unit price should include all items for a complete and operational system, including but not limited to the following costs: DMS display, DMS controller, power supply, delivery, acceptance testing, and associated cabling. Reference Section **IV-2** for approximate DMS quantities.
 - ii. The unit price to provide one (1) pole and one (1) ground-mounted control cabinet.
 - iii. The unit price to provide one (1) session (eight (8) hours) of training to Commission staff. As previously noted, the Proposer should anticipate up to two (2) training sessions for each of the three (3) required sign types.
 - iv. Supplemental DMS Size cost information is included in **Appendix I** for additional DMS sizes other than the three (3) required sign types, as indicated.
 - i. No cost information is required in **Appendix I** for VSL and LUCS devices.
- b. Completed component prices for Miscellaneous Items. This information will be utilized by the Commission to procure additional spare parts and services from the Proposer in the future. This information will include the following:
 - i. The unit price to provide one (1) additional year of warranty for each of the three (3) required sign types, above and beyond the required first year of warranty. This additional warranty may be requested by the Commission at a later time.
- c. Completed component prices for Spare Parts
 - i. The unit price for common spare parts for each of the three (3) required sign types as identified in **Appendix I**.
 - ii. The additional Recommended Spare Parts to maintain a system uptime of 95% for each sign type.
- d. Commitment to Diversity and Inclusion (in response to **Section II-12** and **Section III-4.f**) – In the space provided in **Appendix I**, provide the utilization of DB firms expressed in terms of percentage of contract amount and/or total dollars committed.

Any costs not provided in the cost proposal will be assumed as no charge to the Commission.

The selected Proposer shall only perform work on this 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 selected Proposer 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 selected Proposer 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 this Contract.

PART III

CRITERIA FOR SELECTION

III-1. Mandatory Responsiveness Requirements. To be eligible for selection, a proposal shall be (a) timely received from a Proposer; and (b) properly signed by the Proposer.

III-2. Technical Nonconforming Proposals. The two (2) Mandatory Responsiveness Requirements set forth in **Section III-1** above (a and b) 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.

III-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 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 Proposer(s) determined to be highly recommended for this assignment.

The Commission will select the most highly qualified Proposer for the assignment or the Proposer 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 Proposer'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 Proposer, Proposer'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.

III-4. Evaluation Criteria. The following criteria will be used, in order of relative importance from the highest to the lowest, in evaluating each proposal:

- a. DMS Technical Information.** Emphasis here is on the ability of submitted equipment to meet or exceed the minimal technical requirements listed in **Appendix G** and addressed in **Appendix J**. In addition, testing plans and submitted spare parts will be evaluated in relation to the requirements identified in the Special Provisions in **Appendix F**. This is also the area where any additional added value identified by the Proposer will be evaluated.
- b. Proposer Qualifications.** This refers to the ability of the Proposer to meet the terms of the RFP, especially the time constraint and the quality, relevancy, and recency of projects completed by the Proposer. This also includes the Proposer's financial ability to undertake a project of this size.
- c. Personnel Qualifications.** This refers to the competence of professional personnel who would be assigned to the job by the Proposer. Qualifications of professional personnel will be measured by experience and education, with particular reference to experience on studies/services similar to that described in the RFP. Particular emphasis is placed on the qualifications of the project manager.

- d. Soundness of Approach.** Emphasis here is on the techniques for sequence and relationships of major steps, and methods for managing the supply and delivery of DMS for multiple projects. The Proposer shall provide a brief description of how it will conform to ensure that the required delivery timeline will be met, as well as a brief explanation of how multiple orders will be managed. Of equal importance is whether the technical approach is completely responsive to all written specifications and requirements contained in the RFP and if it appears to meet Commission objectives.
- e. Cost.** 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.
- f. Commitment to Diversity and Inclusion.** This refers to the inclusion of DB firms, as described in Section **II-12**. Participation may be measured in terms of total dollars committed or percentage of total contract amount to certified DB firms.

PART IV

WORK STATEMENT

IV-1. Objectives.

- a. **General.** The objective of this contract is to acquire the services of the Proposer to furnish, coordinate with Construction Contractors for installation support, integration, facilitate testing and acceptance, and perform training for completely functional DMS for upcoming construction projects throughout the Mainline and on other approach highways.
- b. **Specific.** The Proposer will provide new, fully functioning and completely debugged DMS, as well as the required support services. The three (3) DMS types will be as follows:
 - Type 1 – Full Matrix, Full Color, Freeway Size, Walk-in Access, LED Display, Three (3) Lines, 15 Characters per Line, 18” Characters;
 - Type 2 – Full Matrix, Full Color, Arterial Size, Front-Access, LED Display, Three (3) Lines, 12 Characters per Line, 12” Characters; and
 - Type 3 – Full Matrix, Full Color, Arterial Size, Front-Access, LED Display, Three (3) Lines, 11 Characters per Line, 12” Characters.

IV-2. Nature and Scope of the Project. The Pennsylvania Turnpike is a key transportation route within the Commonwealth of Pennsylvania and a vital link in the roadway network of the eastern United States. The Turnpike is 536 miles in length with 55 fare collection facilities, 22 service plazas and two (2) traveler information centers, 20 maintenance facilities, eight (8) State Police Barracks, and five (5) tunnels. The use of DMS to provide motorists with real-time traveler and emergency information has proved to be a valuable asset. In that regard, the Commission has an aggressive deployment plan for DMS throughout the system over the next years. The proposed Systemwide DMS Procurement will enable the Commission to streamline procurement of this valuable system over numerous construction projects and minimize maintenance efforts moving forward.

Through individual purchase orders, the Proposer will supply the DMS to the Commission’s Highspire Facility, or other pre-identified construction project location, for installation on separate construction contracts administered by the Commission. The Proposer will also provide the specified support services for each DMS. The Commission reserves the right to purchase said DMS under separate contract, as determined by the Commission, in its best interests.

The Commission is in the process of design or planning for a number of ITS Standalone DMS projects and other roadway construction projects to purchase approximately 40 Freeway DMS (Type 1) and 70 Arterial DMS (made up of an unknown combination of Types 2 and 3). The following is a list of the anticipated projects with approximate quantities of DMS:

- a. Mainline (I-576; I-376; Toll 66; PA 43; I-79; US 22)
 - Western Extensions; approximately 26 Freeway DMS and 42 Arterial DMS
 - Mon-Fayette Expressway; approximately 4 Freeway DMS and 4 Arterial DMS
- b. Off-System (All roads/highways leading up to an interchange)
 - DMS Northeast Pre-Entry MP A26 to A130; approximately 3 Freeway DMS and 13 Arterial DMS
 - DMS Northeast Pre-Entry MP A56 to A95; approximately 5 Freeway DMS and 8 Arterial DMS

The Commission does not guarantee the purchase of the quantities of DMS listed above. These quantities are approximations and are subject to change based on final design, field requirements, and design schedule.

IV-3. Requirements.

- a. Minimum Proposer Requirements.** The Proposer shall have a minimum of three (3) years' experience in designing, constructing, installing, testing, and training staff in the manufacture and delivery of full-color LED DMS technology. The Proposer shall submit references, including applicable projects and contracts in the past five (5) years. The DMS shall be manufactured in an ISO 9001 certified facility.
- b. Technical Requirements.** The Proposer shall meet all of the minimum technical requirements provided in **Appendix G** to be considered responsive in their proposal. The Proposer shall complete **Appendix J**, Minimum Technical Requirements Traceability Matrix, to indicate the ability to meet each of the listed requirements. In addition, the Proposer may supply equipment which exceeds these minimum requirements, and shall note such in the proposal documents.
- c. Submission Requirements.** The Proposer shall provide shop drawings for each proposed DMS type, along with technical data sheets, providing evidence of sufficient experience in the manufacture of Dynamic Message Signs.

IV-4. Tasks.

- a. Issuance of Purchase Order and Delivery Process, Notifications and Scheduling.** Upon entering a contract with the Proposer, the Commission will issue individual purchase orders for specific types and quantity of signs indicated herein. Upon receipt of the first purchase order for each type of sign, the Proposer agrees to supply the required signs, controllers, cabinets, and necessary ancillary equipment within 120 days of receipt. For subsequent orders of each sign type, the Proposer shall supply the required materials within 90 days of receipt. If the proposer wishes to offer delivery of equipment with a lead time less than 90 days, it should be indicated in the proposal. This will be viewed by the Commission as providing additional value to the contract. The Proposer shall be responsible for delivery of the signs, and agrees to support installation under various construction contracts as per of their bid cost. The delivery location of the DMS may vary throughout the Pennsylvania Turnpike System. The Commission shall reserve the right to defer delivery indicated in the purchase order for up to 60 days at no additional cost, provided that the request is made within four (4) weeks of shipment.
- b. Installation Support, Integration & Testing.** The Proposer shall include costs for travel to the Commission facilities for on-site assistance with sign installation, integration, final site testing, and system acceptance testing. The Proposer shall be responsible for up to two (2) trips for conducting site acceptance and supporting final system acceptance testing for each individual purchase order. The Commission or ITS project contractor will provide a two (2) week notification prior to being required on-site.
- c. Spare Parts, Maintenance, and Life Cycle.** The Proposal will identify the recommended spare parts for each type of DMS supplied, as well as the estimated life cycle prior to complete replacement, and recommended maintenance tasks. The ability to provide a documented maintenance history and life cycle cost for DMS deployments will be viewed by the Commission as providing additional value to the contract. Sign maintenance will be performed under separate

contract(s) with the Commission. The itemized costs for spare parts shall be identified in the cost proposal. No specific costs shall be included in the technical submittal. A minimum list of spare parts is included in the technical Special Provisions (**Appendix F**). In addition to the minimum list of spare parts, the Proposer is required to include a list and cost for all spare parts required to keep each type of sign operational with a minimum 95% uptime.

IV-5. Reports and Project Control.

- a. Task Plan.** After placement of each purchase order, the Proposer will develop and submit a work plan for each task that identifies the work elements of each task outlined above, and the time allotted to each activity.
- b. Status Report.** After submission of the task plan, the Proposer shall submit a monthly progress report covering activities, problems, and recommendations; the report should be keyed to the task plan developed by the Proposer in its proposal, as amended or approved by the Commission.
- c. Problem Identification Report.** “As required” reports identifying problem areas shall be submitted to describe the problems and their impacts on the delivery of goods or services, and on each affected task. They should list possible corrective courses of action with advantages and disadvantages of each, and include Proposer recommendations with supporting rationale.
- d. Invoice Tracking Sheet.** As part of every invoice submission, the Proposer shall include a tracking sheet of all invoicing to date.

AGREEMENT

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

(name of contractor) (“**CONTRACTOR**”), a **(state)** corporation, with its principal office at **(address)**.

WITNESSETH:

WHEREAS, the **COMMISSION** desires to satisfy a need for the **(name of solicitation)**;

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:

Contractor’s Scope of Work

The **CONTRACTOR** will perform the work described in **(solicitation identification, i.e. RFP number)** dated **(date of solicitation)**, titled **(Title of solicitation)** and the **CONTRACTOR’S** proposal dated **(date of contractor’s proposal)**. These documents are made a part of this Agreement by reference.

Commission’s Responsibilities

(As defined in Section I of the RFP, “Commission Participation”)

The **COMMISSION** shall furnish the **CONTRACTOR** access to key personnel, relevant documents, and adequate workspace for completing the work.

Compensation

For the work, services, and material as defined in this Agreement, the **CONTRACTOR** shall be paid a not-to-exceed amount of **(agreement dollar value)**.

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**.

Duration of Agreement

The term of this Agreement shall be for a period of **(agreement term)** 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.

This Agreement will not terminate until the **COMMISSION** accepts all work as complete and tenders final payment to the **CONTRACTOR**.

Termination

Either party may terminate this Agreement at any time upon thirty- (30) calendar days written notice. If this notice is given, the **CONTRACTOR** shall be paid only for the services already rendered upon the date of the notice and for the services rendered to the date of termination, subject to all provisions of this Agreement. The notice will be effective on the date of receipt. The right to cancel may be exercised as to the entire project, or as to any particular phase or phases, part or parts, and upon one or upon several occasions, but any termination may not be revoked except upon written consent of the parties through a supplemental Agreement to this Agreement.

Insurance

The **CONTRACTOR**, prior to execution of this Agreement, shall furnish to the **COMMISSION** the certificates of insurances as required in attached **Exhibit “X”** and made a part of this Agreement.

Diverse Business (DB) Requirements

The **CONTRACTOR** agrees to comply with the requirements set forth in the **COMMISSION’S** DB Requirements - **Exhibit X**, attached and made part of this Agreement. In particular, the **CONTRACTOR** agrees to comply with section (d) Consultant Requirements During Performance of Services.

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**.

The **CONTRACTOR** shall not engage the services of any person or persons currently employed by the **COMMISSION**, except with the **COMMISSION’s** approval.

The **CONTRACTOR** shall neither assign this contract, in part or in whole, nor the right to any monies due him under it. Any part of the work to be done or material furnished under the contract shall not be sublet except to those firms indicated as part of the team in the initial Proposal, without the **COMMISSION**'s prior consent in the form of a letter signed by the *Department Head (update accordingly)*.

Governing Law

This Agreement will be interpreted according to the laws of the Commonwealth of Pennsylvania.

Observance of Laws

The **CONTRACTOR** agrees to observe all relevant federal, state, and local laws and to obtain in its name all necessary permits and licenses.

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 Turnpike content or previously unprotected work product designated by the **COMMISSION** with a notice as follows: "Pennsylvania Turnpike Commission, (Year)".

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 for a minimum of three (3) years after the completion of the Agreement, final payment, or completion of any contract, audit or litigation, whichever is later. 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.

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.* 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.

Indemnification

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 Workmen's Compensation Acts, Disability Benefits Acts, or other Employee Benefit Act.

Data/Information Security Breach Notification

"Breach" shall mean any 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.

Virus, Malicious, Mischievous or Destructive Programming

Licensors 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.

Contractor Integrity Provisions

The Contractor Integrity Provisions are attached as **Exhibit X** and made a part of this Agreement.

Confidentiality Provisions

1. 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.

2. With respect to its employees, **CONTRACTOR** agrees to:

- a) require all of its employees to maintain such confidentiality;
- b) take appropriate action against its employees, officers, and subcontractors for any and all violations of this Agreement.

3. 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.

4. **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.

5. 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**.

6. **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.

7. **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.

8. **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**.

9. **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.

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.

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 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 Name)**

Signature_____	_____	Signature_____	_____
	Date		Date
Name_____		Name_____	
Title_____		Title_____	

Federal Tax ID No. _____

CONTRACTOR INTEGRITY PROVISIONS

It is essential that those who seek to contract with the Pennsylvania Turnpike Commission (“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 it 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.

Appendix B – Proposer Questions Form
 Systemwide DMS Systems RFP #18-10480-8234

Proposer Questions			Pennsylvania Turnpike Commission (PTC)		
Proposer Name:					
#	Page	Section	Section Description	Proposer Question	Commission Response
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					

**APPENDIX C
PROPOSAL COVER SHEET
PENNSYLVANIA TURNPIKE COMMISSION
SYSTEMWIDE DYNAMIC MESSAGE SIGN SYSTEMS**

RFP #18-10480-8234

Enclosed in three separately sealed submittals is the proposal for the Proposer identified below for the above referenced RFP:

Proposer Information:	
Proposer Company 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:

<input type="checkbox"/> Technical Submittal <input type="checkbox"/> Diverse Business Participation Submittal <input type="checkbox"/> Cost Submittal
Signature
Signature of an official authorized to bind the Proposer to the provisions contained in the Proposer's proposal: _____
Print Name
Title

An official authorized to bind the Proposer to its provisions must sign the proposal. If the official signs this Proposal Cover Sheet and the Proposal Cover Sheet is attached to the proposal, the requirement will be met.

Appendix D
MINIMUM INSURANCE REQUIREMENTS
The Pennsylvania Turnpike Commission
RFP #18-10480-8234-Systemwide DMS Systems

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, the Contractor is responsible for payment within the SIR of their policy(ies) and the Additional Insured requirements specified herein shall be offered within the SIR amount(s).
- c) All insurance required herein 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.

Appendix D
MINIMUM INSURANCE REQUIREMENTS
The Pennsylvania Turnpike Commission
RFP #18-10480-8234-Systemwide DMS Systems

- f) The Commission, and its Commissioners, officers, employees and agents shall be added as ADDITIONAL INSURED(S) on all required liability policies (except Workers' Compensation) for ongoing operations and completed operations on a primary noncontributory basis.
- 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.
- 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.

- 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 limits:

(1) General Aggregate:	\$2,000,000
(2) Products/Completed Operations Aggregate:	\$2,000,000

Appendix D
MINIMUM INSURANCE REQUIREMENTS
The Pennsylvania Turnpike Commission
RFP #18-10480-8234-Systemwide DMS Systems

- (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) 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: \$4,000,000
 - Aggregate Limit (where applicable): \$4,000,000

APPENDIX E

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 subconsultants 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 include, 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.

APPENDIX F SPECIAL PROVISIONS

GENERAL

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 (Commission) to satisfy a need for furnishing, coordinating with construction contractors for installation support, integration, testing and acceptance, and training for completely functional Dynamic Message Sign (DMS) systems for upcoming construction projects throughout the Mainline and other approach highways.

COORDINATION OF WORK

It is inherent in the nature of this contract that the Proposer will be required to work with various construction contractors performing work for the Commission for the delivery, installation, and testing of DMS. The Proposer, as well as the contractors, working on either the same or adjacent projects shall cooperate with each other as part of their own scope of work and as directed. The general purchase and delivery process and responsibilities are as follows:

- Purchase Orders for DMS, controllers, cabinets, and other materials will be made by the Commission, no less than 120 days from requested delivery for the first Purchase Order, and no less than 90 days for each subsequent Purchase Order.
- Contractors will coordinate directly with the Proposer for delivery of the DMS and will provide the Proposer at least three (3) weeks prior written notice to the requested delivery date.
- If a contractor delays shipment of DMS beyond sixty (60) days after the initially requested delivery date indicated at the time of Commission Purchase Order, it will be the responsibility of the contractor to store the DMS and all delivered materials, in a manner suitable to the Commission, until installation of the DMS.
- The Proposer will deliver the DMS to no more than two (2) locations identified by the contractor and approved by the Commission.
- The Proposer will ensure that appropriate personnel are on-site when the DMS are delivered and will inspect the DMS along with the Commission and its contractor. Any damage will be documented, and the contractor will agree to accept delivery. The contractor will be responsible for any damage to the DMS that is not documented at delivery acceptance and all damage to the DMS until installation.

The Proposer is not responsible for the physical installation of DMS signs, controller cabinet and power and communication hook-ups, unless the Proposer states otherwise. The Proposer is required to provide the testing and controller configuration of all DMS upon notice from the construction contractor that power and communication connections are made. Contractors will provide a minimum of two (2) weeks' notice prior to the Systems Acceptance Testing (SAT). The Proposer shall be responsible for at least two (2) trips per Purchase Order to assist with the commissioning and testing of DMS, with the understanding that multiple DMS are to be commissioned and tested in as few trips as possible. The Proposer is required to notify the Commission if additional visits will be required to commission and test the DMS due to the scope/size of the project or delays incurred by the contractor. Any additional visits related to commissioning/testing that result from a prior failed test will be the responsibility of the Proposer.

The Proposer may be required to provide painted sign enclosures and controller cabinets in accordance with local site requirements. The Proposer will be notified of any such requirements at the time of the Purchase Order; however, payment for paint will not be completed under this Contract but through a separate as-needed Purchase Order specific to each construction project.

Include all considerations, financial and otherwise, resulting from the requirements herein to interface, coordinate, and cooperate with other contractors working the same or other areas, as well as with the Commission and its authorized representative.

If any part of the work depends on proper execution or results upon the work of any other contractor, within two (2) working days of the start of the work, inspect the work of the other contractor and report in writing to the Commission any apparent discrepancies, interferences, defects, or delays in such work that render it unsuitable for such proper execution and results. Failure to so inspect and report will constitute an acceptance of the other contractor's work as fit and proper to receive this work, except as to defects which may develop in the other contractor's work after the execution of the work hereunder. If any other contractor does not complete the various portions of the work in general harmony, and another contractor is caused damage or injury by the failure to so act in harmony, the contractor damaged or injured is to settle with the contractor causing the damage or injury by agreement or arbitrate such claim or disputes. The Commission, however, is not liable to any contractor for any increased costs or damages resulting from the defective work, interference, final construction decisions, failure to coordinate and cooperate, or delays of other contractors.

PROJECT SCHEDULE AND LIQUIDATED DAMAGES

By submitting a proposal, the Proposer agrees to make a commitment to meet the timeframes and notifications as indicated in the Work Statement.

The Proposer may be subject to liquidated damages as per the PennDOT Publication 408, Section 108.07, under "Construction Engineering Liquidated Damages", applied to the individual Purchase Order amount, for each calendar day that any work under the Contract remains after the required completion dates indicated in the Proposer's original (PTC approved) Purchase Order and Delivery Schedule. This provision shall continue in full force and effect for a maximum of 180 days following termination of the Contract.

Liquidated damages shall be assessed only after the Commission notifies the Proposer in writing of the failure to meet the milestones, as detailed in the approved Final Purchase Order and Delivery Schedule.

GENERAL PROJECT REQUIREMENTS

This section describes the general requirements that the Proposer has to meet in furnishing of completely functional DMS systems.

Standard Drawings

Items not specifically covered in these Special Provisions will be governed by the applicable sections of the Commission's Standard Drawings as well as the Commonwealth of Pennsylvania – Department of Transportation Specifications (Publication 408/2016-3).

Standard drawings include:

Pennsylvania Turnpike Commission Standard Drawings

PTS-750 MONOPIPE SIGN STRUCTURES FOR DYNAMIC MESSAGE SIGNS,
OCTOBER 2015 (12 SHEETS)

Pennsylvania Department of Transportation and Pennsylvania Turnpike Commission Standard Drawings

PUB 647 CIVIL AND STRUCTURAL STANDARD DRAWINGS FOR
INTELLIGENT TRANSPORTATION SYSTEMS, Latest Edition

- ITS 1201 – GENERAL ITS STANDARDS (23 SHEETS)
- ITS 1230 – DYNAMIC MESSAGE SIGN STANDARDS (8 SHEETS)

Equipment Requirements

1. General –
 - a. Procure all material and equipment, which meet the latest applicable standards of National Electrical Manufacturers Association (NEMA), Electronics Industries Association (EIA), National Electric Code (NEC) Underwriters Laboratory (UL), PennDOT Publication 408 (2016-3), and these Special Provisions.
 - b. Procure the equipment from a manufacturer or manufacturers who have been successfully engaged in the manufacture of such equipment for a period of at least five (5) years.
 - c. Submit certification(s) from the various manufacturer(s) of equipment supplied under this contract that they will carry in factory stock, for at least 10 years, all necessary parts and stock items to keep the equipment operational.
2. Parts and Material – In the selection of parts and materials, fulfillment of the requirements of these Special Provisions is of prime consideration. Design equipment to utilize the latest available techniques and utilize the minimum number of different parts, subassemblies, circuits, cards and/or modules, to maximize standardization and commonality.
3. Electrical Components – Use electrical components that are generally industry standard items available from several manufacturers. Comply with the latest industry standard practices, specifications and tests, or approved alternatives for all the components, being furnished under this contract to assure reliable operation of all the equipment.
4. Mechanical Components –
 - a. Hardware – Provide stainless steel external screws, nuts and lock washers. Do not use self-tapping screws. For internal screws, nuts and lock washers, use corrosion resistant material or material suitably plated to resist corrosion. Use material in accordance with the highest industry practices.
 - b. Material – Provide parts made of corrosion resistant material, such as plastic,

stainless steel, aluminum, or brass; or parts treated to resist corrosion, such as cadmium plating or galvanizing.

- c. Component Mounting and Identification – Identify operating circuit components mounted on circuit boards by either identifying characters, which are legible and permanently printed on the circuit boards, and by the use of complete assembly drawings showing all components with values or by JEDEC numbers. Reference the identifying characters to their respective components in the schematic diagram and in the parts list.

Control Software

All ITS devices are controlled through the Commission’s Advanced Traffic Management System (ATMS) software, located at the Commission’s Highspire Traffic Operations Center (TOC). The Proposer will coordinate with the Commission or the Commission’s ATMS vendor to aid in the connection and integration of the DMS into the Commission’s ATMS.

The Proposer will provide its control software to the Commission for use in the event of issues with the ATMS in order to avoid disruption in device control.

Design and Construction

Design and construct equipment such that performance will not be impaired after it has been subjected to shock and vibration caused by installation, transportation, maintenance handling, and normal use.

Install surge and lightning protection for all electrical and communication cables that are leaving or entering a cabinet. Provide resettable surge and lightning protection devices that can be subjected to multiple surges.

1. Electrical –
 - a. Design Life – Design all components in their normal circuit applications to operate continuously for at least ten (10) years.
 - b. Power Requirements – Provide equipment that meets the performance requirements at the specified power input level plus or minus 5%.
 - c. Primary Input Power Interruption – Provide equipment such that in the event of a power failure, proper operation will commence immediately after restoration of power without creating false information or malfunction.
 - d. High Frequency Interference and Line Voltage Transients – Protect the equipment power supply circuitry against high frequency electrical interference and line voltage transients.
 - e. Wire Size – Procure all wiring of such size to meet the requirements of the National Electric Code.

- f. Wire Identification – Identify all wiring connected to terminal strips by the use of insulated preprinted sleeving slipped over the wire before final attachment.
- g. Wire Dressing – Procure wires cut to proper length before assembly. Do not double back wires to take slack. Lace wires neatly into cables in nylon lacing or plastic straps. Secure cables with suitable clamps. Provide identification tags for all cables.
- h. Cable Termination – Terminate all cables, as required, using appropriate termination panels, with built-in surge protection and test access ports.
- i. Protection – Provide equipment containing readily accessible, manually replaceable circuit protection devices such as fuses, for equipment and power source protection.
- j. Fail Safe – Provide and install equipment such that failure of individual equipment does not cause failure of the system or subsystem.
- k. Static, Lightning and Surge Protection – Fully protect each piece of equipment from damage due to static electricity accumulation or discharge during unpacking, normal handling, and installation. Provide static electricity protection by case construction and by the use of protective devices on wires connected to the equipment. Use material and type of finish, which will not permit the accumulation of static electric charge. Internal electrical components shall be coated for protection from static discharge. Protect all electrical and communication cables entering or leaving the equipment cabinets and which might be subject to damage, with bleeder resistors, current limiting resistors, zener diodes, MOVs, or other suitable means of limiting momentary current surges. Provide in-line, re-settable surge protection to avoid damage from lightning induced surges or other power line transients for all cables entering and leaving all cabinets. Provide transient suppression devices meeting the requirements of NEMA TS-2 specifications. Surge protection is incidental to the cost of equipment. Include surge protection details in the shop drawings for approval by the Representative.

Coordinate with the equipment and surge protection device manufacturers to determine in-line voltage requirements.

2. Mechanical –

- a. Modular Design – Design equipment in a modular fashion such that major portions may be readily replaced in the field.
- b. Keying – Mechanically key modules of unlike functions to prevent insertion into the wrong socket or connector.
- c. Identification – Clearly identify all modules and assemblies with name, model number, serial number and any other pertinent information required to facilitate equipment maintenance.

Maintenance Provisions

Procure equipment designed for ease of maintenance. Make all component parts readily accessible for inspection and maintenance. Provide test points utilizing test jacks or equivalent to enable testing and troubleshooting with the equipment operating.

Environmental Design Requirements

Provide equipment meeting all of its specified requirements during and after exposure to any combination of the specified environmental and power line conditions.

Temperature Range: -22 degrees F to +165 degrees F, unless otherwise specified for each piece of equipment or subsystem.

Relative Humidity: Not to exceed 99%, non-condensing.

Personnel Safety

Procure equipment with provisions for personnel safety designed in. Design equipment/components to prevent reversed assembly or installation of connectors, fasteners, etc., where possible malfunction or personnel hazards might occur. Properly ground, in accordance with the requirements of the National Electric Code, all external conductive material on the equipment. Provide electrical equipment having provisions to limit ground fault current and leakage current to levels below that prescribed by Underwriters Laboratories, Inc.

Quality Assurance Provisions

In cases where design tests are specified herein, documentation may be provided indicating that such tests have previously been satisfactorily completed and consideration will be given to determine if additional tests will not be required. Subject equipment to all tests as specified to determine conformance with all the applicable requirements. The Commission reserves the right to have a representative witness all tests. The results of each test will be compared with the requirements specified herein. Failure to conform to requirements for any test will result in rejection by the Commission. Rejected equipment may be offered again for retest provided all non-compliances have been corrected and retested by the Proposer. Final inspection and acceptance of equipment will be made after delivery and successful completion of final system acceptance tests.

1. Preparation for Delivery – Package equipment to prevent shipping damage. All equipment must be in an undamaged and operational condition after delivery and unpacking in order to be accepted. Make all repairs or replacements to the satisfaction of the Commission at no additional cost.
2. Field Cabinet Locks and Keys – Provide all cabinets with a hasp locking mechanism which provides a means to secure the door and handle in the closed / locked position. The Commission will provide padlocks.

Documentation

Following award, all official project correspondence, including submissions, will be transmitted via email or hardcopy documentation.

Technical Documentation Requirements

As an appendix to the proposal, provide descriptive material, (manuals, cut-sheets, drawings, brochures, etc.), for each type of equipment and apparatus proposed for this project to demonstrate that the intended equipment or integration of intended equipment will meet the functional objectives and specifications of the system.

The Proposer shall not submit incomplete or portions of documentation. Include in these documents sufficient technical data for complete evaluation of the proposed system by the Commission. Provide original manuals or brochures or copies equal to originals.

Provide all user manuals and maintenance manuals for all provided equipment. Provide the following documentation:

1. Equipment Manuals – Provide operating, maintenance and installation manuals for each type of equipment item to be furnished. Include in the manuals sufficient information to operate and maintain the equipment including schematic wiring and interconnection diagrams; complete instructions for proper installation including equipment outlines, mounting, weight, power and cooling requirements; a complete parts list and a list of recommended spares.

Include text, which completely describes all functional capabilities of the equipment. Explain all adjustments, how they are performed and their effect on equipment operation. Include flow charts, which describe troubleshooting procedures in a logical manner. Define expected signal levels and waveforms at key test points. Describe required test equipment and incorporate descriptions of its use in manual sections dealing with maintenance and repair of equipment items.

Include information necessary for the proper installation, start-up, initialization, operation, and fine-tuning of the equipment item. Include environmental and operational specifications such as operating temperature range, power requirements, equipment weight, special handling considerations, and equipment power dissipation rates and cooling requirements.

Third Party Testing Documentation – Provide documentation, along with the Technical Submittal providing evidence of the appropriate industry standards including, but not limited to:

- Underwriter’s Laboratory (UL) listings: 48 & 50
- NEMA Standards TS-4

Control Cabinet and Service Panel Drawings – Provide drawings, which show all terminals, terminations and connections within each equipment cabinet. At each terminal illustrate the terminal designation for the other end of the wire or cable. Cross-reference connections that go to equipment harnesses or connectors to the nomenclature used in that equipment's manual.

System Operations and Maintenance Manuals – Develop and deliver comprehensive systems operation and maintenance manuals for all the DMS sub-systems furnished under this contract. The objective of each manual is to present a systems oriented view of the

operation and maintenance requirements of the system. Include a detailed functional description of the system. Include a description and streamlined step-by-step procedure for all routine operating events. Include equipment preventative maintenance procedures and equipment fine-tuning and adjustment procedures.

2. Shop Drawings – Include at a minimum in the provided shop drawings:
 - a. Typical Wiring Diagrams
 - b. Typical Installation Diagrams
 - c. Typical Detail Drawings
 - d. Typical Catalog Information
3. Testing Procedures – Submit test procedures and checklists required for the various stages of equipment tests as required.
4. Training Plans – Submit a complete training plan including all intended course handouts and presentation materials.
5. List of Recommended Spare Parts – This list is to include minimum spare parts as well as additional items required to keep signs functional with a minimum 95% uptime. 95% uptime is defined as follows: Individual DMS system(s) as furnished by the Proposer will be functioning as specified herein and will be operating at a minimum 95% through the life of the DMS system(s). These spare parts, as well as their unit costs should also be included in **Appendix I Cost Proposal**.

WARRANTIES AND GUARANTEES

Guarantee the equipment services, software and hardware provided under each purchase order for a period of one (1) year following project acceptance (completion of 60-day Operational Acceptance Test and written acceptance by the Commission) of the provided equipment. Submit all equipment and material guarantees or warranties to the Commission in writing.

Software License, Warranty, Support, and Upgrades

1. The Commission's Rights – The Proposer and its subcontractors shall grant the Commission intellectual property rights to unlimited copies of any software/firmware, if any, acquired or created for use at any site or facility operated by the Commission. The Commission shall have the right to duplicate any documentation associated with the software/firmware for use of its employees or agents. If the DMS systems make use of software packages purchased from a Third Party, the Proposer will provide the Commission enough licensed copies of that software package to properly implement the systems for this project. The Proposer will coordinate with the Commission on the final number of software licenses required.

2. Warranty – Fully guarantee all Software/Firmware, and items, or materials created by, or manufactured by the Proposer, and provided under this Contract, to be FREE FROM DEFECTS (insofar as known) at the time of acceptance. For third-party suppliers, furnish the Commission those warranties offered as normal trade practice by those suppliers.

For one (1) year after acceptance, the Proposer will provide promptly, within one (1) month after it is made available by the manufacturer, any amendments or alterations to the software/firmware that may be required to correct errors present at the time of acceptance, which affect performance, in accordance with these Specifications. Any alterations will be performed with a system configuration management process, which will first be approved by the Commission.

3. Upgrades – For one (1) year after acceptance, the Proposer will notify the Commission of upgrades, enhancements, or special features developed for these systems. The Proposer will provide upgrades and enhancements to the software that will improve the operating performance of the systems, but do not change the basic functions of the systems. These upgrades and enhancements shall be provided to the Commission at no charge. After this term it will be the sole responsibility of the Commission for requesting available upgrades, enhancements, or special features developed for these systems.
4. Level of Service (LOS) – The LOS of the Warranty is equivalent to FHWA/McTrans LOS 1, “Full Technical and Maintenance Support.” Provide the following:
 - a. Immediate (same-day notification via email and telephone of any serious “defect/bug” discovered in a supported, maintained program.
 - b. Free replacement of programs, program modules, firmware, and documentation, which are updated to correct “defects/bugs”. This is the implementation of the Warranty.
 - c. Full telephone, email, and FAX, question and answer user support during normal business hours.

Send two (2) copies of each replacement /enhancement /upgrade /version /documentation via overnight/express carrier delivery. The Proposer has the right to market or sell the software/firmware developed for the Commission to other vendors, agencies, or highway departments. In return, during the period of Warranty, the Proposer shall provide the Commission free of cost, those new versions of the software/firmware that may be developed as enhancements or modifications to meet the requirements of other highway departments.

MODIFICATIONS TO TECHNICAL SPECIFICATIONS

If, during the life of this agreement, the Proposer wishes to make modifications to the technical specification of any equipment provided, they must notify the Commission prior to supplying any equipment incorporating said modifications. The Commission reserves the right to review new technical documentation and approve or reject any modifications. The Commission will review any updated technical specifications or cut sheets and provide a response to the Proposer within thirty (30) days of receipt.

If entire makes or models of equipment are to be discontinued by the vendor during the life of this agreement, replacement equipment meeting or exceeding that provided in response to this RFP must be submitted for approval by the Commission. Failure to provide equipment meeting the technical and performance specifications indicated in response to this RFP, and at the price indicated may result in a cancellation of the overall contract.

At any time during the life of this agreement, the Proposer is free to propose enhancements to equipment provided in response to this RFP as they become available. Additional technical specifications, cut sheets, and pricing information will be required for review by the Commission prior to approving the provision of any enhanced equipment. The Commission reserves the right to request technical and pricing information for enhanced equipment from the Proposer as well.

PROPOSER RESPONSIBILITY

It is the sole responsibility of the Proposer to provide the Commission with the design, procurement, testing and integration of fully functional DMS, to the approval of the Commission. The Proposer's final bid price for this contract will not be altered unless additional work is mutually agreed upon between both the Commission and the Proposer.

For equipment malfunctions, respond to and repair within the applicable time frame as specified. If the equipment is damaged or rendered inoperable due to external reasons including, but not limited to, vehicular accidents on the roadway, rainstorm, snowstorm, or other natural disasters, restore to proper operating conditions within the applicable time frame as specified. If such damage occurs after the start of the system acceptance test and before the guaranty period, the Proposer will be reimbursed for the repair in accordance with PennDOT Publication 408, Section 110.03.

If additional visits to the site are required by the Proposer due to the fault of the construction contractor, the additional visits will be negotiated with the Commission.

TESTING

This work entails providing testing services and documentation for all ITS equipment.

Provide testing services to verify that the system functions and performs as per the Minimum Technical Requirements (**Appendix G**). Submit the testing procedures for each sign as an attachment to proposal documents. These procedures are to be used for all testing during the duration of this contract. Prior to the beginning of any test, the Proposer must submit additional copies of the testing procedures completed for every installed device, verifying that the referenced equipment is in proper working order as per the test requirements.

Provide testing services to ensure that the system elements fulfill the Contract requirements and are properly integrated to achieve a fully functioning and operating DMS system. Conduct the following tests in the order indicated and on each piece of equipment (or device), sub-system and system:

1. Factory Acceptance Tests (FAT)
2. System Acceptance Tests (SAT) – Provide support to construction contractor as required to complete this testing.

3. 60-Day Operational Acceptance Test (OAT) – Provide support to construction contractor to respond to all maintenance tickets regarding DMS equipment.

The acceptance of each stage of testing does not imply that problems found at a later date or stage of testing will not require the Proposer to return to an earlier stage of testing for a component or sub-system. Retest to the level necessary to isolate any problem and establish a course of action to remedy the situation. If a unit has been modified as a result of the equipment replacement, prepare a report and deliver it to the Commission for approval. Describe in the report the nature of the failure and the corrective action taken. If a failure pattern, as defined by the Commission, develops, the Commission has the discretion to direct that design and construction modifications be made to all similar units without additional cost to the Commission. In the case of problems common to many units, modify or replace all units without additional cost to the Commission.

Factory Acceptance Tests (FAT)

It is expected that most of the equipment specified for this project can be provided with standard off-the-shelf equipment having certification of compliance with industry-accepted standards that also meet the requirements of this Contract. Prepare FAT documentation as required. Conduct FATs at the manufacturer's facility for all devices of each type provided for this project, and provide testing documentation and results for the approval of the Commission prior to material delivery. Make sure to include housing leakage tests in the FAT.

It is required that the Proposer conducts the first FAT for each device type in the presence of Commission Personnel. Up to four (4) Commission Representatives will witness the FAT(s) at the Proposer's facility.

System Acceptance Tests (SAT)

System Acceptance Tests shall verify that all equipment has been installed properly in the field and is fully operational in a local mode (at the field site) as well as in the Highspire Traffic Operations Center (TOC) facility. Following installation and commissioning of equipment, the project construction contractor will conduct tests to verify final system acceptance of all systems. The Proposer will be required to coordinate with the contractor to assist them in the preparation of testing documentation as well as the conducting of the test, if required. For reference, a typical SAT will include the following:

1. System Interface Test
 - a. Conduct system interface tests after all equipment is installed and interconnected, and ready to operate as a system.
 - b. System interface tests are intended to strategically isolate interconnected sub-systems and demonstrate in a piece-wise manner that the transfer of information occurs properly and is capable of achieving functional objectives described in these Special Provisions.
 - c. System interface tests for the TOC computer system will demonstrate that bits which are properly set in the computer's output buffers pass through the proper interface to the intended location to achieve the desired function.
 - d. Develop or provide the necessary test software to perform the system interface test described above for all the systems.

2. System Performance Test

- a. Conduct the system performance test from the TOC and if required, from the field location after the system interface tests have been successfully performed and accepted for all the system.
- b. Utilize the DMS control software and TOC central software to fully test all functions for all DMS signs.
- c. Fully exercise all functions of the DMS for each field location.
- d. Demonstrate that the communications system is fully functional, including network management, malfunction isolation/diagnosis of failed equipment, and performance monitoring.

60-Day Operational Acceptance Test (OAT)

The 60-Day OAT will commence following the construction contractor's successful completion of the SAT. The intent of the OAT is to ensure that there are no system defects that will inhibit the operations of supplied equipment on an ongoing basis. During this time, the DMS system will be fully operated by Commission staff. During this test, the construction contractor will be responsible for the timely correction of any and all errors documented by Commission operations staff. The Proposer will be required to provide support to the construction contractor to correct any errors or malfunctions to the DMS.

In the case where ten percent (10%) of DMS equipment malfunctions during this testing period, the Commission may declare the DMS system defective and require the replacement of affected equipment. When a system defect is declared, the OAT will be restarted as a 30-day test for the DMS system, following the re-completion of Systems Acceptance Testing for all replaced equipment. A total of 60 calendar days will be provided for the retesting of the system under this case.

Testing Services Documentation

Provide test documentation as an attachment to the proposal. At a minimum, provide test procedures, checklist, and test forms and data summary sheets for each item tested. Tailor test documentation for each item being tested.

Reports and records (together referred to as "results") of each test and each inspection, must be submitted for approval. The original results are to contain the original forms filled out by the persons performing the inspection/ tests, and original signatures. Forms are to be filled out in ink. Errors are to be crossed out with a single line and initialed by the person making the correction. Include a cover letter signed by the Project Manager or his/her designee with each set of inspection/test results.

Include the following information in each set of results:

1. The completed, signed, set of procedures used.
2. The completed, signed, set of forms used.
3. A summary of the inspection/test. For inspection/test of components, equipment and assemblies, include quantity inspected/tested, quantity that failed the inspection/test, quantities that failed one or more individual procedures.

4. A summary table showing the serial number or lot number of each unit inspected/tested and the outcome for that unit to be included.

All required data and reference drawing explanations to permit evaluation of test report without the necessity of securing this information from other sources.

Provide test documentation, including at a minimum, performance requirements, test procedures, checklist and test forms for each item tested. Tailor test documentation for each test and for each item. Reference performance requirements, test procedures, test forms and checklists to the requirements contained herein and the requirements contained in the approved design documents, listing each requirement to be tested, for each item. Provide clearly worded Testing Procedures and Test Forms.

Include, as a minimum, the following information in the test procedure:

1. Unique test title number.
2. The purpose of the tests, including reference to the corresponding test plan test areas; requirements and functions covered by the procedures, specified design and performance requirements, and cases and conditions tested by the procedures.
3. The test/measurement equipment and tools to be used, identified by manufacturer and model number. Include space to record test equipment serial numbers and calibration status and date.
4. Include space in each procedure to record the serial numbers of the equipment tested and the version numbers of the software tested.
5. Description of the required test configuration setup, including target equipment and software, test equipment and software, measurement/monitoring tools, and diagrams illustrating configuration and test equipment connections. Enumerated step- by- step instructions for performing the procedure, identifying the points where data is to be recorded, the expected test results, and the limits for acceptable data. Provisions for recording pertinent test conditions and environment at time of test.

Test Forms are to be provided as integral components of the Testing Procedures, except in the case of individual components or units of equipment that do not warrant the need for a comprehensive Testing Procedure. For all test forms, include the following:

1. Test title, requirements to be tested, and procedure description.
2. Test date, and the signature of the tester.
3. The manufacturer, model number and calibration date of each piece of test equipment calibrated to industry standards or the Bureau of Standards.
4. Calibration must be certified by a recognized testing facility.

A table, for each unit tested, as applicable, which includes the following:

1. The serial number of the unit tested. For wire and cable, include lot number.
2. Individual functions to be tested, with corresponding pass or fail record.
3. Individual readings to be taken and actual values measured or determined.
4. Corresponding pass/fail record must be included for each reading.
5. Space to record the unique identifier of the defect problem reports generated as a result of faults/problems/variances detected during the test.

The results of each test will be compared with the requirements specified herein. Failure to conform to the requirements of any test will be considered defective and equipment will be subject to rejection by the Commission. In the event a defect is determined, analyze and categorize all defects as to whether they are limited to the specific unit being tested or could be potential problems in all such units. Equipment rejected because of problems limited to the specific unit being tested may be offered again for retest provided all noncompliance items have been corrected and retested by the Proposer and evidence thereof submitted to the Commission.

Test the equipment in accordance with submitted test procedures only. Record test results on data summary sheets for each piece of equipment tested. Provide certification of test results by a qualified representative. Submit all test records to the Commission immediately following the test. Complete testing for each equipment unit in as few consecutive days as possible, in a reasonable time frame as determined by the Commission. Schedule testing with ample additional time allotted for the Commission to request that certain portions of a test be repeated.

The Commission has the right to witness and/or assign a representative to witness any test. The witness of such tests does not relieve the Proposer of his responsibility to provide a completely acceptable and operating system that meets the requirements of this RFP.

TRAINING

This work is providing Commission personnel and/or their representatives with an installation, operations, and maintenance training program for all the equipment and systems furnished under this Contract. Conduct classroom training at the Commission provided facility and "hands-on" training at field locations as required.

Training is a separate pay item and at the discretion of the Commission. If the Commission requests training, the Proposer will provide up to two (2) training sessions per DMS type during the contract period. The training will consist of separate training for operators, supervisor/management/system administrators, and maintenance supervisors, and the first of the two (2) sessions per DMS type will occur before final acceptance of the corresponding DMS type. Provide training for up to 10 (ten) Commission personnel and/or representatives, at times mutually agreed upon by the Commission and the Proposer. The training will be digitally recorded and provided to the Commission within two (2) weeks of this training.

Provide training on the components of each sub-system, configuration of the equipment. Design the course to train Commission personnel to operate the system, manage device communications,

analyze the system performance, revise critical operating parameters based on the analysis, and perform routine system diagnostics and maintenance activities. The training material will also include operation and maintenance procedures for all furnished hardware, firmware and software.

Submit training program courseware, material, schedule, and instructors' qualifications to the Commission as an attachment to the proposal.

SPARE PARTS

The Commission's goal in the ongoing operation of DMS is to maximize the uptime and utility of all deployed signs. As part of the proposal, the Proposer will be required to identify the amount of spare parts that will be required to achieve a system uptime of 95% for each type of sign.

The minimum list of required spare parts includes the following for each type of sign:

1. Sign Controller Unit – One (1)
2. Sign Pixel Boards – Six (6)
3. Sign Luminosity Sensors – Two (2)
4. Sign Power Supply – One (1)

Any equipment proposed in addition to the above required will be at the discretion of the Proposer. The cost for additional spare parts to maintain the required minimum 95% uptime must be included with the cost submittal on the designated form.

Spare parts for each sign will be required to be delivered to the Commission's Highspire facility within 30 days of the first equipment delivery. Coordinate with Commission staff at Highspire TOC for delivery of spare parts.

APPENDIX G

MINIMUM TECHNICAL REQUIREMENTS

GENERAL

The Proposer shall design and furnish a typical highway usage Light Emitting Diode (LED) Dynamic Message Signs (DMS) as described herein. The DMS shall utilize the existing Commission Advanced Traffic Management System (ATMS) software that is capable of controlling all of the Commission's existing and proposed DMS from this contract. This document describes the functional sign requirements for several locations. The DMS, depending on the location, shall electronically vary the visual textual word, number, symbolic or graphic display as traffic conditions warrant.

Design, furnish, integrate, and test all DMS as described herein. These signs shall be Full Matrix, Full Color, LED-based DMS. Provide all information necessary to support the Commission in integration of the DMS into the Commission's ATMS.

It is the sole responsibility of the Proposer to design, furnish, and integrate a fully functional DMS system, to the approval of the Commission. No additional payments will be made to the Proposer for the DMS system, unless additional work items are mutually agreed upon by both the Proposer and the Commission.

Material – Provide a fully debugged DMS system complete with all individual units, components, software modules, cabling, connectors, etc. that are completely compatible with each other and is capable of being controlled by the current ATMS workstations operated by the Commission.

General Requirements – The Dynamic Message Sign shall be designed in accordance with the latest versions of the following: PennDOT Publication 647, AASHTO Standards Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, MUTCD, NEMA, and NEC Codes. The DMS shall be manufactured from an ISO-9001 certified facility.

The power, communications, foundation, structure and attachment details for each DMS and control cabinet will be designed and furnished by others.

Each new DMS shall be compatible with the Commission ATMS software. The Proposer will support the Commission as required in the configuration of each DMS into the ATMS system with pre-established IP addresses provided by the Commission.

The Freeway Size DMS (Type 1) shall be comprised of multiple pixel-based modules, containing full color LED technology, arranged to form a full matrix display. The matrix shall be capable of displaying, at a minimum, three (3) rows of fifteen (15) characters, with a nominal character size of 18-inches and a pixel pitch of between 0.79 to 0.81-inches. It shall have walk-in sign access and a maximum weight of 4,000 pounds.

The Arterial Size DMS (Types 2 and 3) shall be comprised of multiple pixel-based modules, containing full color LED technology, arranged to form a full matrix display. The following characteristics are required of each sign Type:

- Type 2 – Provide a matrix capable of displaying, at a minimum, three (3) rows of twelve (12) characters each, with a nominal character size of 12-inches and pixel pitch of between 0.79 to 0.81-inches.
- Type 3 – Provide a matrix capable of displaying, at a minimum, three (3) rows of eleven (11) characters each, with a nominal character size of 12-inches and a pixel pitch of between 0.79 to 0.81-inches.

The Arterial Size DMS shall have front sign access and a maximum weight of 1,200 pounds.

The DMS shall utilize full-color technology, in which the LED module is comprised of Red, Green and Blue LEDs. Each new DMS shall be mounted on a structure conforming to the Commission's ITS Standards.

Light Emitting Diodes (LEDs)

- A. The LEDs that make up the display modules shall be high luminous intensity T-1 3/4" type manufactured by a reputable manufacturer, such as Avago Technologies (formerly Agilent Technologies), Nichia Corporation, OSRAM, CREE or EOI. The LEDs shall have an ultraviolet light inhibitor in the epoxy dome package and be of a production type already tested for use in high vibration commercial traffic environments and climate of the northeastern United States.
- B. Each Full-color DMS LED module shall be comprised of Red Green and Blue LEDs that meet the following specifications:
 1. Red LEDs shall utilize AlInGaP semiconductor technology and shall emit red light that has a peak wavelength of 615-635nm.
 2. Green LEDs shall utilize InGaN semiconductor technology and shall emit green light that has a peak wavelength of 520-535nm.
 3. Blue LEDs shall utilize InGaN semiconductor technology and shall emit blue light that has a peak wavelength of 464-475nm.
- C. All LEDs shall have a nominal viewing cone of 30 degrees with a half-power angle of 15 degrees measured from the longitudinal axis of the LED.
- D. The LEDs shall be rated by the LED manufacturer to have a minimum lifetime of 100,000 hours of continuous operation while maintaining a minimum of 70% of the original brightness.
- E. The LEDs used in the display shall be obtained from batches sorted for luminous output, where the highest luminosity LED in the batch shall not be more than fifty percent more luminous than the lowest luminosity LED in the batch when operated at the manufacturer's recommended drive current. To ensure uniformity of display and operational life, all LEDs used to make up a display module shall be obtained from the same manufacturing batch.

- F. The LED manufacturer shall perform intensity sorting of the bins. LEDs shall be obtained from no more than two (2) consecutive luminous intensity “bins” as defined by the LED manufacturer.
- G. The LED manufacturer shall perform color sorting of the bins. LEDs shall be obtained from no more than two (2) consecutive color “bins” as defined by the LED manufacturer.
- H. The LED mean time before failure (MTBF) shall be a minimum of 100,000 hours of elapsed time calendar hours use in an ambient temperature of 131 degrees Fahrenheit, based on an average daily on-time usage factor of 50%, when driven at the specific forward current recommended by the LED manufacturer for normal daylight DMS display operation. As part of the LED manufacturer's technical specification sheet submittal, the specific forward current shall be noted.
- I. The statistical average long-term light output degradation of the LEDs used in the display, operated at the LED manufacturer’s recommended drive current to achieve a minimum of 100,000 hours of operation without catastrophic failure in an ambient temperature of 131 degrees Fahrenheit, shall not exceed the following:
 - 1. A maximum of 10% reduction in light output after 10,000 hours of continuous on time.
 - 2. A maximum of 25% reduction in light output after 50,000 hours of continuous on time.
 - 3. A maximum of 30% reduction in light output after 100,000 hours of continuous on-time.
 - 4. Manufacturer’s documentation for high temperature operating life (HTOL) shall indicate if HTOL values are based upon actual or extrapolated data.

LED Display Modules

- A. The LED display modules shall have a minimum refresh rate of 60 times per second to prevent visible flicker.
- B. The LEDs shall be grouped in pixels consisting of discrete LEDs arranged in a continuous matrix display with individual pixel addressability. The centers of all pixels shall be arranged so as to maintain the same horizontal and vertical spacing between adjacent pixels. All pixels shall be replaceable. The LED grouping and mounting angle shall be optimized for maximum readability.
- C. The electronics for the DMS shall be fully configured to drive the total required number of LEDs. The failure of any one pixel shall not affect the operation of any other pixel. The power driver circuitry shall be designed to minimize power consumption. Each LED display module shall have a diagnostic capability to detect a failure on the LED display module, down to the pixel level and report the failure to the DMS controller.
- D. Removal of any display module shall not affect the operation of the remaining modules.
- E. The LED modules shall be protected from degradation due to sunlight. The method used shall not obstruct the view of the display or reduce the viewing angle below that provided

by an unprotected LED module. The method and design of the DMS sunlight protection shall be approved by the Commission or its Representative.

- F. Each pixel shall contain an adequate number of discrete LEDs, based on a nominal pixel spacing of 0.79 to 0.81 inches, center to center, to meet the luminosity requirements herein.
- G. Each discrete LED on the display module is driven at the LED manufacturer's recommended drive current to achieve a minimum of 100,000 hours of operation without catastrophic failure.
- H. All DMS must be capable of meeting or exceeding the Manual of Uniform Traffic Control Devices (MUTCD) guidelines for inter-character and inter-line spacing of 25% and 50% of character height, respectively.
- I. The 18" character of the Freeway DMS shall be clearly visible and legible from in-vehicle distance of 1,000 feet from the DMS face under clear daylight and nighttime conditions with the DMS face positioned in the roadway line of sight. The 12" character of the Arterial DMS shall be clearly visible and legible from in-vehicle viewing distance of 600 feet from the DMS face under clear daylight and nighttime conditions with the DMS face positioned in the roadway line of sight.

Dimming Circuitry

- A. The DMS shall have a photocell controlled dimming circuit which shall automatically adjust the luminance of the LED display pixels in accordance with ambient light conditions. As part of the Proposer's submittal, a complete schematic of the LED display power, driver and dimming circuits shall be provided for approval by the Commission.
- B. Continuous current drive shall be used at the maximum brightness level. The current used for maximum brightness shall not exceed the current used to achieve the rated mean time before failure (MTBF). The current used for maximum brightness shall be indicated as part of the submittal.
- C. For luminance levels less than maximum brightness, either continuous current drive or current pulse width modulation shall be used to dim the LEDs. If pulse width modulation is used, the dimming circuit shall be designed so that the maximum, instantaneous and average currents shall not exceed the rated peak and transient forward current ratings of the LEDs.
- D. The DMS shall be equipped with a minimum of two external light sensors oriented in opposite directions and shall be scaled for up to 100,000 lux.
- E. The LED dimming circuit shall also incorporate temperature-controlled dimming, which shall reduce the current through the LEDs based on the temperature inside the DMS enclosure, so that the LED current does not exceed the rated LED current at that temperature. If the temperature of the DMS exceeds the rated operating temperature of the LEDs the DMS shall blank-out, until the temperature has returned to safe operating levels.

- F. The LED dimming circuit shall not cause the LED display to flicker as the temperature oscillates above and below the rated operating temperature of the LEDs.

Power Supply

- A. The DMS shall be operated at a low internal DC voltage not exceeding 24 Volts.
- B. The quantity of power supplies and current rating of each power supply shall be at least 25% spare capacity over that required to light every pixel of the DMS at full brightness.
- C. The DMS and controller shall have redundant power supplies wired so that in the event of a failure of any one power supply, the second power supply shall automatically power that portion of the sign. Power supply failure shall be automatically reported by the DMS controller when polled by the DMS Central Processor.
- D. The power supplies shall be short circuit protected and shall reset automatically after 5 seconds of AC power off. The power supplies shall be protected by a suitable overcurrent protection device.
- E. The power supply shall have an efficiency rating of 85%, minimum.
- F. The operating temperature range of the power supply inside the DMS enclosure shall be negative 20 degrees Fahrenheit to 140 degrees Fahrenheit.
- G. The power supply shall be UL listed.

Sign Enclosures

The DMS enclosures shall be of such design and shape as to house all necessary LED display modules, LED display driver electronics, transformers, and power supplies unless otherwise indicated on the Contract Drawings.

- A. The DMS enclosures shall have a weatherproof housing and all internal components shall be non-condensing and withstand a humidity range of 0 to 99%, non-condensing.
- B. The DMS enclosures shall be constructed of corrosion resistant aluminum material conforming to the following:
 - 1. Sheet aluminum shall be fabricated from aluminum alloy sheet meeting the requirements of ASTM B 209, Alloy 5052, Temper H3, or equivalent, minimum 0.125 inch thick. Cast aluminum shall be fabricated from aluminum alloy meeting the requirements of ASTM B 686, Alloy A 356 (A 13560) or equivalent. Flat cast surfaces exceeding 12 inches in both directions shall have a minimum thickness of 0.25 inches. Flat cast surfaces not exceeding 12 inches in both directions shall have a minimum thickness of 0.187 inches.
 - 2. All DMS enclosures shall meet the requirements for TYPE 3R enclosures according to NEMA Standard Publication 250, as well as those of PennDOT Publication 408/2016-

- 3, Section 1230 and Publication 647. All seams and openings shall be designed to prevent entry of water resulting from high pressure washing of the DMS enclosure.
3. Unpainted aluminum DMS enclosures shall be fabricated from mill-finish material and shall be cleaned using appropriate methods that will remove oil, film, weld black, and mill ink marks and render the surface clean, bright, smooth, and non-sticky to touch.
 4. Isolate all adjacent dissimilar materials, as approved by the Commission.
 5. All nuts and bolts used in the DMS assembly shall be stainless steel. All connecting surfaces shall be weatherproof and watertight when secured. All internal components shall be mounted so that there are no external protrusions.
 6. The DMS shall be in accordance with the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals, except as modified herein: The DMS enclosures shall be designed and constructed to present a clean, neat appearance and the equipment located inside shall be adequately protected from moisture, dust, dirt, corrosion, and excessive heat.
 7. All surfaces shall be suitably protected from the weather. All corners and seams shall be heli-arc welded to provide a weatherproof seal around the entire case.
 8. The DMS enclosure shall not be adversely affected by salt from the roadways or marine environments or chemicals or fumes discharged from nearby automobiles, industries and other sources. The interior of the DMS face window and the LEDs shall be easily accessible for cleaning and other maintenance.
 9. Appropriate precautions, such as heating elements or ventilation fans or openings, shall be taken to ensure that condensation does not occur between the matrix elements and the DMS window face, and that the environment inside all enclosures remains within the temperature and humidity limits required for proper operation of the sign's electronic components.
 10. Provide temperature sensor(s) in the DMS enclosure that is/are controlled and monitored by the DMS controller. Provide the capability for user defined critical thresholds to be established and changed remotely from the Commission's Highspire Traffic Operations Center (TOC) or other location using the sign controller.
 11. Provide humidity sensor(s) within the DMS enclosure that can detect relative humidity from 0%-100% in 1% or smaller increments. Provide an interface between the humidity sensor and the DMS controller which allows humidity levels to be monitored remotely from the TOC. Provide a sensor with an accuracy that exceeds 5% relative humidity.
 12. All hinges used shall be continuous stainless steel, equipped with stainless steel hinge pins. Each hinge shall be secured with stainless steel bolts and lock nuts. The hinge pins and bolts shall be tamper proof.

13. The dead load shall consist of the total weight as installed of the DMS enclosure and appurtenances. The point of application of weights of the individual items shall be their representative centers of gravity.
 14. Ice load shall be as per AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals, except that ice load shall be applied to all sides and top surfaces of the DMS enclosure simultaneously.
 15. Wind load shall be as per AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals, except as modified herein: the enclosure and their mountings shall withstand a sustained wind speed of 90 miles per hour (mph), with a gust factor of 1.3.
 16. Full 100 percent impact shall be used for handling and erection stress.
- C. The signs shall be capable of being mounted without gaining access to the inside of the enclosure. All mounting eyes shall be attached to the DMS enclosure structural framing. The DMS enclosure shall be adaptable for mounting as shown in PennDOT Publication 647.
 - D. Removal of any of the display modules or any other electronic or electrical component, shall not alter the structural integrity of the DMS display assembly or the DMS enclosure.
 - E. For Type 1 DMS, access to the interior of the DMS enclosure shall be walk-in access. Access to the interior of the Types 2 and 3 DMS enclosure shall be front access. Opening door(s) shall allow maintenance personnel immediate access to circuit boards and internal sign parts, without having to remove any item in the sign, or the need to use any tools or to remove any device that could be dropped or lost, such as a locking pin or bolt. Each door shall be sealed to prevent the elements from entering, and shall have at least two locking points to keep unauthorized persons from accessing the interior of the DMS. In addition, each door shall be provided with rigid, telescopic, retention device, to keep the door in the open position. All doors, when in the open position, shall not obstruct any portion of the opening. The door system shall pull the door tight and compress a gasket located around the perimeter. The gasket shall prevent water from entering the interior of the cabinet.
 - F. All serviceable components shall be modular, interchangeable and removable from within the DMS enclosure. The sign design shall allow unobstructed and convenient access to all serviceable components within the DMS enclosure and between the DMS display and the DMS display cover.
 - G. Drain holes shall be provided and designed to remove any condensation that may form inside the DMS enclosure and allow any water that may have collected in the housing to escape. All holes shall be screened to prevent small objects, insects and creatures from entering into the enclosure.

Ventilation Requirements for Type 1 DMS

- A. Heating, cooling and/or dehumidifying equipment shall be sized to maintain the internal DMS enclosure temperature within the operating ranges of the electric, electronic and

mechanical equipment components. The environmental equipment shall have controls which shall shut down the DMS just prior to the temperature that the interior of the enclosure reaches the rated maximum operating temperature of the LEDs, and shall restore operation when the temperature has returned to safe operating levels. The shutdown shall be automatically reported by the DMS controller when polled by the DMS Central Processor.

- B. Electric ventilation fans shall be provided to generate positive pressure ventilation and shall be sized to provide 25 percent excess ventilation capacity, with one fan inoperative, over that required to maintain the DMS enclosure interior temperature within the range over which the DMS components can operate without failure or degradation, during full daylight heat gain conditions. All fans shall have ball or roller bearings. Fan operation and failure shall be reported to the DMS Central Processor via the communications protocol.
- C. Louvered air inlets with removable, non-proprietary 500 micron, 2-stage filters and air deflector, sized to provide a maximum air intake velocity of 600 feet per minute with all fans operating. The direction of airflow and the filter characteristics (i.e., filter model number, type, dimensions, and particle size) shall be permanently engraved on each air vent. Exhaust air vents, if without filters, shall be screened to prevent small objects and creatures from entering into the enclosure.

Ventilation Requirements for Types 2 and 3 DMS

Ventilation Requirements for Types 2 and 3 DMS shall be identical to those for the Type 1 DMS. A vent-free DMS housing for Types 2 and 3 DMS may be considered by the Commission if satisfactory evidence of proper operation is supplied with the technical submittal, including factory or third-party certification. Vent-free design shall ensure that the DMS enclosure interior temperature does not exceed the maximum range of the DMS components to ensure continued operation without failure or degradation, particularly during full daylight heat gain.

DMS Controller

- A. The DMS controller shall be a microprocessor-based unit with sufficient on-board memory and input and output interfaces to provide all the functions required by this Section.
- B. Proposer shall supply a (minimum) 30-minute battery backup for all DMS controllers.
- C. The DMS controller shall accommodate both local and remote control from multiple host devices as described herein. Local control shall be supported from a locally connected sign programmer. Remote control shall be supported from a remotely located DMS Central Processor (control computer system).
- D. The DMS controller shall receive and interpret commands sent by the host device to either configure the DMS or cause a requested message to be displayed on the DMS. Based on the command, the DMS Controller shall provide return data to the host device to provide information about the status of the sign.

- E. The DMS controller shall be capable of simultaneously receiving commands from and transmitting status data to multiple host devices; i.e., the sign programmer, local control panel and the DMS Central Processor.
- F. The method of control of the DMS shall be dependent upon the setting of the Control Mode Selector switch in each local control panel. This switch shall allow for two modes of operation:
 - 1. "Remote" mode: This is the normal mode of operation of the DMS, where all control is from a remote DMS Central Processor, via NTCIP data exchanged directly between the remote DMS Central Processor and the DMS controller.
 - 2. "Local" mode: When the Control Mode Selector switch is in this position, control from the remote DMS Central Processor shall be disabled and the DMS shall be controlled in accordance with commands entered via the message selector switch on the Local Control Panel or a NTCIP data exchanged directly with a locally connected Sign Programmer. When in "local" mode, the remote DMS Central Processor shall still be able to monitor the status of the DMS.
- G. When switching from one mode to another, the DMS shall continue to display its current message, until it receives a command to display another message, from either the remote DMS Central Processor or the local controls, as applicable.
- H. A change of position of the mode selector switch shall be immediately reported to the DMS Central Processor in the form of an alarm, and shall be logged internally at the site CPU for retrieval on the next polling cycle, and in accordance with the communications protocol.
- I. Each DMS controller shall have error detection and reporting features which shall be utilized to guard against incomplete or incorrect information transmission, message generation and display on the DMS, as well as provide capability to detect a failure down to a replaceable component and report the failure and failed component. All errors and hardware failures shall be logged and reported to the DMS Central Processor or Sign Programmer (if connected) via the communications protocol. The DMS controller shall have the capability to automatically recover from failure conditions when the failure conditions are corrected, or the failures are no longer present, and report the restored operation of the DMS to the DMS Central Processor or Sign Programmer (if connected).
- J. The DMS controller shall have diagnostic capabilities features to:
 - 1. Perform redundant checking of all data received and transmitted and incorporate cyclic redundancy check (CRC) error detection logic, as specified by the NTCIP standards.
 - 2. Validate the content of all received transmissions.
 - 3. Check and report logic or data errors.
 - 4. Monitor status for communication line malfunction or break.
 - 5. Respond to system polling from the DMS Central Processor.

6. Check and report errors in display driver operation.
 7. Check and report the failure and location of bad pixels.
 8. Check and report the failure of bad fans.
 9. Check and report whether the controller cabinet or DMS enclosure door is open or closed.
 10. Check the operation and report the failure and location of bad power supplies.
 11. Check the duration of power failures.
 12. Check and report the number of occurrences the watchdog timer resets the controller.
- K. Whenever any of the following error or failure conditions is detected, the DMS controller shall blank the DMS and shall include the error or failure in the return message:
1. The number of pixels that are not working for the particular sign type exceed a specified maximum value. The Proposer shall determine this number for each sign type and have these numbers approved by the Commission.
 2. The ratio of the number of pixels that achieve a commanded state divided by the number of pixels commanded to that state exceeds a legibility threshold value. The test shall include only those pixels that are contained in the character positions of the message text.
 3. Communication loss greater than a configurable time value measured in minutes. The default value shall be 10 minutes. If a system poll is not received within a configurable threshold period, the controller shall blank all signs connected to it. The configuration of system polling shall also have an option for disabling this feature.
 4. Upon detection of a power failure to the DMS controller or the DMS display(s) connected to the controller, the current message displayed on the DMS just prior to the power failure shall be retained in memory.
 5. Upon power restoration, the DMS shall remain blank if the duration of the power failure exceeded the configurable long-term power failure duration threshold, else the previous message shall be restored to its respective DMS. The default value of the long-term power failure duration threshold shall be 10 minutes.
 6. Overheating condition in DMS enclosure: The LED dimming circuit shall also incorporate temperature-controlled dimming, which shall reduce the current through the LEDs based on the temperature inside the DMS enclosure, so that it does not exceed the rated LED current at that temperature. If the temperature of the DMS exceeds the rated operating temperature of the LEDs, the DMS shall blank-out until the temperature has returned to safe operating levels.

7. Information on each of the specific failures shall be sent to the DMS Central Processor.
- L. Each DMS controller shall have the capability of displaying messages transmitted directly from a DMS Central Processor or Sign Programmer in addition to displaying locally commanded messages from a pre-programmed local message library. Each sign's local message library shall have the capacity to store a minimum of 256 display messages with related display attributes for each message, such as flashing rate and percent "on" time. The local message library shall consist of:
 1. A "changeable, non-volatile" local message library stored in battery-backed RAM. The changeable local message library shall be programmable through both the DMS Central Processor and the Sign Programmer.
 2. A "permanent, non-volatile" local message library, stored on EPROM shall be provided. Battery-backed RAM memory shall not be acceptable. If a microprocessor-based controller is used, then EEPROM, flash RAM or similar technology memory devices, programmed as described herein, may be used to store the message library.
 - M. Each DMS controller shall write messages on the DMS at a minimum rate of 300 characters per second.
 - N. Each DMS controller shall have an easily accessible and clearly labeled ON/OFF switch. When in the "OFF" position all power shall be disconnected from the DMS control electronics and matrix units and the DMS shall blank-out.
 - O. The Proposer shall provide a means of establishing a monetary reset switch on the DMS controller. The contact switch shall reset the DMS controller when depressed. Operation of the momentary contact switch shall not require the user to hold the switch in the depressed position for more than 0.25 seconds.
 - P. The DMS controller shall interface and communicate with one or more Operator Interfaces, as indicated on the Contract Drawings. Operator Interfaces and associated functions shall be as described elsewhere herein.
 - Q. The DMS controller shall be provided with all software and hardware required to perform the following functions:
 1. Password protection to restrict access to control and configuration functions.
 2. Fully programmable parameters for all functions described in this section.
 3. Real-time clock and calendar for timing and scheduling of automatic functions. The calendar shall automatically adjust itself for leap years, and for changeover from Standard to Daylight savings time and back.
 4. Variable message flash rate and percent "on" time.
 - a. Flash rate shall be adjustable in one-tenth second increments.

- b. Percent "on" time shall be adjustable from 0 to 9.9 seconds, in one-tenth second increments.
5. Multi-page messages with variable page display times that are adjustable in one-tenth second increments from 0 to 15.0 seconds.
6. Negative text inversion (or inverse/reverse video) - switch between illuminated text on a dark background or dark text on an illuminated background. Inverse/reverse video shall be implemented with the use of standard NTCIP foreground and background objects.
7. Configurable line justification (center, left or right) with center justification as the default setting.
8. Configurable page justification (top, center, bottom) with center justification as the default setting.
9. Configurable message duration parameter, to specify how long the current message should remain displayed regardless of the status of the communications with the DMS Central Processor.
10. Communications Loss message threshold, to specify how long the current message should remain displayed in the absence of communications with the DMS Central Processor.
11. Control of pixel luminance levels, both directly and based on ambient light levels obtained from the photocells. Luminance levels shall be stored in the DMS controller and shall be adjustable, in a range of 0 to 255, on either a continuous logarithmic basis, to match the normal human eye luminous response characteristic, or a 1/2 incremental dimming basis, where each lower dimming level is 1/2 the previous level.
12. Monitoring of each pixel of the DMS.
13. Monitoring of power failures: When a power failure is detected, the displayed message shall be retained in memory. If power to the DMS controller is restored within a configurable period of time, the last displayed message shall be restored. If the duration of the power failure exceeds the configured period of time, the DMS shall remain blank, until a command to display a message is received. Upon restoration of power, the DMS controller shall report the occurrence, time and duration of the power failure, to the DMS Central Processor or Sign Programmer, if connected.
14. Hardware watchdog timer: The DMS controller shall have a hardware watchdog timer that shall check for a stall condition in the controller hardware, software or firmware. While the DMS controller is powered on, the software shall poll the watchdog timer. Upon reset, the watchdog timer shall initialize its timing circuit. If the watchdog timing circuit times out without being reset by the software, the watchdog counter shall be incremented, and the watchdog shall reset the controller to clear a potential stall condition from the hardware, software or firmware and send an error message to the DMS Central Processor or Sign Programmer (if connected) to advise of the condition.

The number of occurrences that the watchdog timer resets the controller shall be transmitted to the DMS Central Processor or Sign Programmer (if connected) upon request and then cleared.

15. Programmable Font Sets: The DMS controller shall support multiple programmable font sets. The Commission currently utilizes fonts for 6", 9", 12", and 18" character heights, variable and fixed width fonts, and single, double, and triple stroke fonts. Each font set shall be capable of being programmed from the DMS Central Processor or the Sign Programmer if connected. Three of the font sets shall look like the E-modified font set defined by the MUTCD, replicating the appearance of the font used on some static signage on the DMS. A single, double and triple stroke E-modified font shall be provided. A fourth font set shall be provided and shall replicate the Helvetica Medium font used on most static signage at the facility where the DMS is to be installed. Additional font sets may be provided at no additional cost and will be considered as additional value added to the proposal.
16. Each font set shall include, but not be limited to, all upper-case letters, numerals, punctuation marks and arrows that are displayed in each of the eight cardinal directions.
17. Customizable and Standard Graphics Library: Provide a suite of pre-generated MUTCD style symbols, along with the ability to modify or create independent symbols, saving of new graphics and color editing. The library should hold a minimum of 50 graphics.
18. The DMS controller shall keep a log of all system errors, malfunctions, automatic operations and locally controlled commands and activities. All logs shall be time and date stamped. The DMS controller shall have sufficient memory to store a minimum of 500 log entries. If 100% of the log storage memory has been reached without a successful download to the DMS Central Processor or a Sign Programmer, the oldest log entry shall be overwritten. The DMS controller shall download all log entries to a DMS Central Processor or Sign Programmer, upon user request from one of these devices and clear the log.
19. The DMS and Controller shall be capable of displaying a minimum of 256 different colors and colors in accordance with the standard messages indicated in the PTC DMS Messaging Library (**Appendix K**). DMS Controller shall be capable of displaying colors that conform to MUTCD requirements.

Controller Cabinet

Furnish a controller cabinet capable of being pole or ground mounted for each of the DMS provided under this Contract. The controller cabinet shall protect all internal components from rain, ice, dust and corrosion in accordance with NEMA 3R standards, as described in NEMA Standards Publication 250 and be made of aluminum (0.125-inch thick). The controller cabinet must conform to the latest versions of PennDOT Publications 647 and 408, Section 1230. The controller cabinet shall include the following:

- A. A full-height standard EIA 19-inch rack.

- B. The main power supply and energy distribution system (main disconnect).
- C. One work lamp to illuminate the work area, when the cabinet door is open (lamp shall automatically turn off when cabinet door is closed).
- D. At least one 15 A, 120 VAC GFCI protected duplex service outlet.
- E. Lightning protection and terminations for the communication and control cables.
- F. Termination blocks for the control cables to and from the DMS housing.
- G. Permanently mounted, weather-resistant document holder.
- H. Electrical drawings printed on water/tear-resistant material.
- I. A pullout shelf.
- J. An open-door alarm that reports to the DMS controller.
- K. Surge protection on all incoming power lines meeting the following minimum specifications:
 - 1. Maximum Clamp Voltage: 340V
 - 2. Peak Current: 20,000 Amps
 - 3. Response Time: 5 nanoseconds
 - 4. Occurrences: 20 times at peak current
 - 5. Minimum Series Inductance: 200 microhenries
- L. In order to facilitate the potential future installation of communication system components, the controller cabinet must provide a minimum of 6 RUs for communication equipment installation.
- M. The controller cabinet shall provide a minimum of one 120VAC outlet capable of providing 105W of power to the DC power supply.

Communications

- A. The Proposer shall provide layout space for a cellular modem and antenna, Ethernet network switches, and/or 4.9GHz communications network equipment.
- B. The DMS controller shall have a minimum of two (2) serial data and one (1) Ethernet communications ports to facilitate simultaneous communications for local and remote control, programming, and diagnostics.
- C. When connected to a serial port, the DMS shall automatically use the NTCIP communications stack associated with serial communications, i.e., NTCIP 2101, NTCIP 2201, and NTCIP 2301.

- D. When connected to the Ethernet port, the DMS shall automatically use the NTCIP communications stack associated with Ethernet communications, i.e., NTCIP 2104, NTCIP 2202, and NTCIP 2301. All ports shall be configurable such that:
1. Communications with the serial ports shall support all typical serial baud rates ranging from 1200 to 115,200 baud.
 2. Communications with the Ethernet port shall be capable of communicating via TCP/IP or UDP/IP at 10 or 100 MB.
- E. The serial ports in the DMS sign controller shall be protected with surge protection to protect the modem communication port from over-voltage and overcurrent conditions between each signal line and ground.

DMS Software

- A. Furnish NTCIP compatible control/diagnostic software for the purpose of troubleshooting and testing. The software shall send requests and receive responses over any TCP/IP-based network for the functions of controlling DMS messaging, monitoring system status and performing DMS diagnostics (detecting failed pixels, display drivers, power supplies, alarm conditions, etc.).
- B. For the details and definitions for the actual NTCIP communications protocols used to accomplish this, see below.

NTCIP

- A. All DMS and associated control equipment shall comply with the latest versions of the National Transportation Communication for ITS Protocol (NTCIP) Standards, as follows:
1. NTCIP 1101:1996 (v01.12, December 2001) – Simple Transportation Management Framework.
 2. NTCIP 1103 v03 (December 2016) – Transportation Management Protocols (TMP).
 3. NTCIP 1201 (v03, March 2011) – Global Objects (GO) Definitions.
 4. NTCIP 1203 (v03, September 2014) –Object Definitions for Dynamic Message Signs (DMS).
 5. NTCIP 2101:2001 (v01.19, November 26, 2001) – Point to Multi-Point Protocol Using RS-232 Subnetwork Profile.
 6. NTCIP 2103 (v02, December 2008) – Point-to-Point Protocol over RS-232 Subnetwork Profile.
 7. NTCIP 2104:2003 (v01.11, September 2005) – Ethernet Subnetwork Profile.
 8. NTCIP 2201:2003 (v01.15, September 2005) – Transportation Transport Profile.

9. NTCIP 2202:2001 (v01.05, December 2001) – Internet (TCP/IP and UDP/IP) Transport Profile.
 10. NTCIP 2301 (v02.19s, October 2010) – Simple Transportation Management Framework (STMF) Application Profile (AP) (AP-STMF).
- B. Furnish all mandatory objects specified by the NTCIP specifications and all other objects, both NTCIP optional and the manufacturer specific, that are required to provide the functionality to meet the requirements of these specifications.
 - C. Each DMS Component shall support the Full, Standardized Object Range (FSOR) of all objects required by these procurement specifications, unless otherwise indicated or approved by the Commission or its Representative.
 - D. The DMS system shall not require the support of any agency-specific or manufacturer-specific objects. However, the Proposer shall propose any object definitions necessary to fulfill the above functional requirements that are not addressable by standardized NTCIP-defined object definitions. All functional requirements and the corresponding NTCIP objects have been carefully reviewed and only functions that have corresponding NTCIP objects have been selected. Manufacturer-specific objects may be implemented in the sign controller but they shall in no way required to be used in order to communicate with the sign.
 - E. The DMS shall support all mandatory objects of all mandatory Conformance Groups as defined in NTCIP 1201 and NTCIP 1203 and their amendments.
 - F. The NTCIP Component shall also implement all mandatory objects of the following optional conformance groups:
 1. Time Management, as defined in NTCIP 1201.
 2. Time base Event Schedule, as defined in NTCIP 1201.
 3. In the event of a conflict between the Specifications and Standards, the Commission or its Representative shall be solely responsible for the identification of the acceptable solution.

**APPENDIX H
SUPPLEMENTAL DEVICES QUESTIONNAIRE**

GENERAL

The Commission may consider the installation of DMS of sizes other than those indicated for Types 1, 2, and 3, as well as variable speed limit (VSL) and lane use control signals (LUCS) devices, along the mainline Turnpike and approaching highways, but has no current plans for installation. The Commission is soliciting information from prospective Proposers to assess their ability to provide such devices through this contract in the future. Please complete the form by providing a brief answer to each item as it relates to your ability to provide these potential, but not guaranteed, devices in the future.

DMS				
Question	Sizes			Additional Comment(s)
	Front Access, Three (3) Lines, 15 Characters per Line, 12” Characters	Front Access, Three (3) Lines, 22 Characters per Line, 18” Characters	Walk-in Access, Three (3) Lines, 22 Characters per Line, 18” Characters	
1. Do you currently provide a Full Matrix, Full Color, LED DMS with the following specifications?				
a. Does this type of sign meet or exceed the following minimum technical requirements provided in Appendix G ? If not, provide a brief explanation.				
• General				
• LED				
• LED Display Module				
• Dimming Circuitry				
• Power Supply				
• Sign Enclosure				
• Ventilation				
• DMS Controller				
• Controller Cabinet				
• Communications				
• DMS Software				
• NTCIP				

**APPENDIX H
SUPPLEMENTAL DEVICES QUESTIONNAIRE**

DMS				
Question	Front Access	Walk-in Access	Rear Access	Additional Comment(s)
2. Do you currently provide a DMS that meets the below parameters in any of these access options: Front Access, Walk-in Access, and/or Rear Access?				
a. At least 42 feet wide?				
b. 4 lines of 18" characters; 20 mm pixel spacing?				
c. 5 lines of 18" characters; 20 mm pixel spacing?				
d. Does this type of sign meet or exceed the following minimum technical requirements provided in Appendix G ? If not, provide a brief explanation.				
• General				
• LED				
• LED Display Module				
• Dimming Circuitry				
• Power Supply				
• Sign Enclosure				
• Ventilation				
• DMS Controller				
• Controller Cabinet				
• Communications				
• DMS Software				
• NTCIP				

**APPENDIX H
SUPPLEMENTAL DEVICES QUESTIONNAIRE**

VSL Technical Summary		
Question	Answer	Additional Comment(s)
1. Do you currently provide a VSL device?		
2. Does the VSL device meet MUTCD and Pennsylvania Vehicle Code requirements?		
3. Do you provide a combination static/dynamic, or a fully dynamic VSL? Or both?		
4. Provide an overview of VSL display capabilities.		
5. Do you provide VSL specific software? What are its capabilities?		
6. Provide an overview of central ATMS software integration capabilities.		
7. How can the VSL signs be mounted? Are there any special requirements or structural limitation?		
8. Provide an overview of VSL cabinet requirements, and required supporting equipment.		
9. Do VSL devices have any specific power or Communications requirements?		
10. Describe locations and projects where your VSL devices are deployed, and in what context.		

**APPENDIX H
SUPPLEMENTAL DEVICES QUESTIONNAIRE**

LUCS Technical Summary		
Question	Answer	Additional Comment(s)
1. Do you currently provide a LUCS device?		
2. Do you provide full-matrix LUCS devices?		
3. Do you provide full-color LUCS devices?		
4. Are your LUCS devices capable of displaying MUTCD graphics or images?		
5. In what size(s) do you provide LUCS devices?		
6. Provide an overview of LUCS display capabilities.		
7. Do you provide LUCS specific software? What are its capabilities?		
8. Provide an overview of central ATMS software integration capabilities.		
9. How can the LUCS signs be mounted? Are there any special requirements or structural limitations?		
10. Provide an overview of LUCS cabinet requirements and required supporting equipment.		
11. Do LUCS devices have any specific power or Communications requirements?		
12. Describe locations and projects where your LUCS devices are deployed, and in what context.		
13. Describe the context in which your LUCS devices have been deployed.		

**APPENDIX I
COST SUBMITTAL**

**PROCUREMENT OF SYSTEMWIDE DYNAMIC MESSAGE SIGN SYSTEMS
PROPOSER COST SHEET
RFP NO. 18-10480-8234**

ITEM NO.	Quantity	Unit	ITEM DESCRIPTION	UNIT PRICE	TOTAL ITEM COST
4000-0001	40*	EA	TYPE 1 - FULL MATRIX, FULL COLOR, FREEWAY SIZE, WALK-IN ACCESS, LED DISPLAY, THREE (3) LINES, 15 CHAR/LINE, 18" CHAR	\$	\$
4000-0002	35*	EA	TYPE 2 - FULL MATRIX, FULL COLOR, ARTERIAL SIZE, FRONT ACCESS, LED DISPLAY, THREE (3) LINES, 12 CHAR/LINE, 12" CHAR	\$	\$
4000-0003	35*	EA	TYPE 3 - FULL MATRIX, FULL COLOR, ARTERIAL SIZE, FRONT ACCESS, LED DISPLAY, THREE (3) LINES, 11 CHAR/LINE, 12" CHAR	\$	\$
4000-0101	65**	EA	GROUND MOUNTED CONTROL CABINET	\$	\$
4000-0102	45**	EA	POLE MOUNTED CONTROL CABINET	\$	\$
4000-0200	6	EA	TRAINING - ONE SESSION @ 8 HOURS	\$	\$
Total					

* The Commission is in the planning stages of a number of projects to include approximately 40 Freeway DMS (Type 1) and 70 Arterial DMS (made up of an undetermined combination of Types 2 and 3). For the purpose of this proposal, assume quantities of 35 Type 2 and 35 Type 3 DMS.

** Each DMS will require a control cabinet, consisting of an undetermined number of Ground Mounted and Pole Mounted Control Cabinets. For the purpose of this proposal, assume quantities of 65 Ground Mounted Control Cabinets and 45 Pole Mounted Control Cabinets.

ITEM NO.	Quantity	Unit	Optional Item (Per Section II-12)	Unit Price	Total Item Cost
4000-0401	1	LS	ONE (1) ADDITIONAL YEAR WARRANTY - TYPE 1 DMS - WALK-IN ACCESS	\$	\$
4000-0402	1	LS	ONE (1) ADDITIONAL YEAR WARRANTY - TYPE 2 DMS - FRONT ACCESS	\$	\$
4000-0403	1	LS	ONE (1) ADDITIONAL YEAR WARRANTY - TYPE 3 DMS - FRONT ACCESS	\$	\$

ITEM NO.	Quantity	Unit	Supplemental DMS Sizes	Unit Price ⁺	Total Item Cost
4000-0500	1	EA	DMS FULL MATRIX, FULL COLOR, WALK-IN ACCESS, LED DISPLAY, THREE (3) LINES, 22 CHAR/LINE, 18" CHAR	\$	\$
4000-0500	10	EA	DMS FULL MATRIX, FULL COLOR, WALK-IN ACCESS, LED DISPLAY, THREE (3) LINES, 22 CHAR/LINE, 18" CHAR	\$	\$
4000-0500	20	EA	DMS FULL MATRIX, FULL COLOR, WALK-IN ACCESS, LED DISPLAY, THREE (3) LINES, 22 CHAR/LINE, 18" CHAR	\$	\$
4000-0600	1	EA	DMS FULL MATRIX, FULL COLOR, FRONT ACCESS, LED DISPLAY, THREE (3) LINES, 22 CHAR/LINE, 18" CHAR	\$	\$
4000-0600	10	EA	DMS FULL MATRIX, FULL COLOR, FRONT ACCESS, LED DISPLAY, THREE (3) LINES, 22 CHAR/LINE, 18" CHAR	\$	\$
4000-0600	20	EA	DMS FULL MATRIX, FULL COLOR, FRONT ACCESS, LED DISPLAY, THREE (3) LINES, 22 CHAR/LINE, 18" CHAR	\$	\$
4000-0700	1	EA	DMS FULL MATRIX, FULL COLOR, FRONT ACCESS, LED DISPLAY, THREE (3) LINES, 15 CHAR/LINE, 12" CHAR	\$	\$
4000-0700	10	EA	DMS FULL MATRIX, FULL COLOR, FRONT ACCESS, LED DISPLAY, THREE (3) LINES, 15 CHAR/LINE, 12" CHAR	\$	\$
4000-0700	20	EA	DMS FULL MATRIX, FULL COLOR, FRONT ACCESS, LED DISPLAY, THREE (3) LINES, 15 CHAR/LINE, 12" CHAR	\$	\$

⁺ Enter "N/A" if DMS model is not available.

**PROCUREMENT OF SYSTEMWIDE DYNAMIC MESSAGE SIGN SYSTEMS
COMMITMENT TO DIVERSITY AND INCLUSION
RFP NO. 18-10480-8234**

Item Description: Commitment to Diversity and Inclusion

Per Section II-11. In the space below, provide the utilization of DB firms expressed in terms of percentage of contract amount and/or dollars committed.

APPENDIX J - MINIMUM TECHNICAL REQUIREMENTS TRACEABILITY MATRIX
Systemwide DMS Systems RFP #18-10480-8234

INSTRUCTIONS

TECHNICAL REQUIREMENTS TAB:

Indicate the ability to meet each of the listed technical requirements detailed in **Appendix G** - Minimum Technical Requirements.

The Commission has established the following response codes for use.

FM - Requirement is fully met "out of the box", requiring no configuration or change to the device.

PM - Requirement is partially met.

DNM - Requirement cannot be met by the proposer.

The Proposer shall select only one response code per requirement. Any response in another manner shall be considered a response of "DNM". Any response that is considered to be contradictory to information provided in other areas of the Proposal shall also be considered a response of "DNM".

For any response of "PM", the Proposer shall provide clarification comments in the provided cells with a clear description of any customization required to meet the referenced requirement, any alternative that is provided out of the box that the Proposer believes will provide the same functionality, while not fully meeting the requirement to the letter, or a description of how the requirement is partially met.

Proposers are encouraged to provide clarification comments to any response of "DNM", indicating why the requirement cannot be met and/or proposing an alternative, which can be provided, that may provide similar or superior functionality or benefit.

PASSWORD to unlock column D and E on Technical Requirements Tab

PTCDMSRFP2018

**APPENDIX J
MINIMUM TECHNICAL REQUIREMENTS TRACEABILITY MATRIX**

ID	Requirement Definition	Existing Capability / Conformance	Clarification Comments
GENERAL (G) REQUIREMENTS			
G- 1	The DMS shall be compatible with and utilize the existing Commission Advanced Traffic Management System (ATMS) software.		
G- 2	The DMS shall be Full Matrix, Full Color, LED-based DMS.		
G- 3	The DMS system shall be fully debugged, complete with all individual units, components, software modules, cabling, connectors, etc. that are completely compatible with each other.		
G- 4	The DMS shall be designed in accordance with the latest versions of the following: PennDOT Publication 647, AASHTO Standards Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, MUTCD, NEMA, and NEC Codes.		
G- 5	The DMS shall be manufactured from an ISO-9001 certified facility.		
G- 6	The DMS shall be comprised of multiple pixel based modules, containing full color LED technology, arranged to form a full matrix display.		
G- 7	The Freeway Size DMS (Type 1) matrix shall be capable of displaying, at a minimum, three (3) rows of fifteen (15) characters, with a nominal character size of 18-inches and a pixel pitch of between 0.79 to 0.81-inches.		
G- 8	The Freeway Size DMS (Type 1) shall have walk-in sign access and a maximum weight of 4,000 pounds.		
G- 9	The Arterial Size, Type 2 DMS matrix shall be capable of displaying, at a minimum, three (3) rows of twelve (12) characters each, with a nominal character size of 12-inches and pixel pitch of between 0.79 to 0.81-inches.		
G- 10	The Arterial Size, Type 3 DMS matrix shall be capable of displaying, at a minimum, three (3) rows of eleven (11) characters each, with a nominal character size of 12-inches and a pixel pitch of between 0.79 to 0.81-inches.		
G- 11	The Arterial Size DMS (Types 2 and 3) shall have front sign access and a maximum weight of 1,200 pounds.		
G- 12	The DMS shall utilize full-color technology, in which the LED module is comprised of Red, Green and Blue LEDs		
LIGHT EMITTING DIODES (LED) REQUIREMENTS			
LED- 1	The LEDs that make up the display modules shall be high luminous intensity T-1 3/4" type manufactured by a reputable manufacturer such as Avago Technologies (formerly Agilent Technologies), Nichia Corporation, OSRAM, CREE or EOI.		
LED- 2	The LEDs shall have an ultraviolet light inhibitor in the epoxy dome package and be of a production type already tested for use in high vibration commercial traffic environments and climate of the northeastern United States.		
LED- 3	Each Full-color DMS LED module shall be comprised of Red Green and Blue LEDs.		
LED- 4	Red LEDs shall utilize AlInGaP semiconductor technology and shall emit red light that has a peak wavelength of 615-635nm.		
LED- 5	Green LEDs shall utilize InGaN semiconductor technology and shall emit green light that has a peak wavelength of 520-535nm.		
LED- 6	Blue LEDs shall utilize InGaN semiconductor technology and shall emit blue light that has a peak wavelength of 464-475nm.		
LED- 7	All LEDs shall have a nominal viewing cone of 30 degrees with a half-power angle of 15 degrees measured from the longitudinal axis of the LED.		
LED- 8	The LEDs shall be rated by the LED manufacturer to have a minimum lifetime of 100,000 hours of continuous operation while maintaining a minimum of 70% of the original brightness.		
LED- 9	The LEDs used in the display shall be obtained from batches sorted for luminous output, where the highest luminosity LED in the batch shall not be more than fifty percent more luminous than the lowest luminosity LED in the batch when operated at the manufacturer's recommended drive current. To ensure uniformity of display and operational life, all LEDs used to make up a display module shall be obtained from the same manufacturing batch.		
LED- 10	The LED manufacturer shall perform intensity sorting of the bins. LEDs shall be obtained from no more than two (2) consecutive luminous intensity "bins" as defined by the LED manufacturer.		
LED- 11	The LED manufacturer shall perform color sorting of the bins. LEDs shall be obtained from no more than two (2) consecutive color "bins" as defined by the LED manufacturer.		

ID	Requirement Definition	Existing Capability / Conformance	Clarification Comments
LED- 12	The LED mean time before failure (MTBF) shall be a minimum of 100,000 hours of elapsed time calendar hours use in an ambient temperature of 131 degrees Fahrenheit, based on an average daily on-time usage factor of 50%, when driven at the specific forward current recommended by the LED manufacturer for normal daylight LED DMS display operation.		
LED- 13	The statistical average long term light output degradation of the LEDs used in the display, operated at the LED manufacturer's recommended drive current to achieve a minimum of 100,000 hours of operation without catastrophic failure in an ambient temperature of 131 degrees Fahrenheit, shall not exceed a maximum of 10% reduction in light output after 10,000 hours of continuous on time.		
LED- 14	The statistical average long term light output degradation of the LEDs used in the display, operated at the LED manufacturer's recommended drive current to achieve a minimum of 100,000 hours of operation without catastrophic failure in an ambient temperature of 131 degrees Fahrenheit, shall not exceed a maximum of 25% reduction in light output after 50,000 hours of continuous on time.		
LED- 15	The statistical average long term light output degradation of the LEDs used in the display, operated at the LED manufacturer's recommended drive current to achieve a minimum of 100,000 hours of operation without catastrophic failure in an ambient temperature of 131 degrees Fahrenheit, shall not exceed a maximum of 30% reduction in light output after 100,000 hours of continuous on-time.		
LED- 16	Manufacturer's documentation for high temperature operating life (HTOL) shall indicate if HTOL values are based upon actual or extrapolated data.		
LED DISPLAY MODULE (LDM) REQUIREMENTS			
LDM- 1	The LED display modules shall have a minimum refresh rate of 60 times per second to prevent visible flicker.		
LDM- 2	The LEDs shall be grouped in pixels consisting of discrete LEDs arranged in a continuous matrix display with individual pixel addressability.		
LDM- 3	The centers of all pixels shall be arranged so as to maintain the same horizontal and vertical spacing between adjacent pixels.		
LDM- 4	All pixels shall be replaceable.		
LDM- 5	The LED grouping and mounting angle shall be optimized for maximum readability.		
LDM- 6	The electronics for the LED DMS shall be fully configured to drive the total required number of LEDs.		
LDM- 7	The failure of any one pixel shall not affect the operation of any other pixel.		
LDM- 8	The power driver circuitry shall be designed to minimize power consumption.		
LDM- 9	Each LED display module shall have a diagnostic capability to detect a failure on the LED display module, down to the pixel level and report the failure to the DMS controller.		
LDM- 10	Removal of any display module shall not affect the operation of the remaining modules.		
LDM- 11	The LED modules shall be protected from degradation due to sunlight.		
LDM- 12	The method used shall not obstruct the view of the display or reduce the viewing angle below that provided by an unprotected LED module.		
LDM- 13	Each pixel shall contain an adequate number of discrete LEDs, based on a nominal pixel spacing of 0.79 to 0.81 inches, center to center, to meet the luminosity requirements herein.		
LDM- 14	Each discrete LED on the display module is driven at the LED manufacturer's recommended drive current to achieve a minimum of 100,000 hours of operation without catastrophic failure.		
LDM- 15	All DMS must be capable of meeting or exceeding the Manual of Uniform Traffic Control Devices (MUTCD) guidelines for inter-character and inter-line spacing of 25% and 50% of character height, respectively.		
LDM- 16	The 18" character of the Freeway LED DMS shall be clearly visible and legible from in-vehicle distance of 1,000 feet from the DMS face under clear daylight and nighttime conditions with the DMS face positioned in the roadway line of sight.		
LDM- 17	The 12" character of the Arterial DMS shall be clearly visible and legible from in-vehicle viewing distance of 600 feet from the DMS face under clear daylight and nighttime conditions with the DMS face positioned in the roadway line of sight.		
DIMMING CIRCUITRY (DC) REQUIREMENTS			
DC- 1	The DMS shall have a photocell controlled dimming circuit which shall automatically adjust the luminance of the LED display pixels in accordance with ambient light conditions.		
DC- 2	Continuous current drive shall be used at the maximum brightness level.		
DC- 3	The current used for maximum brightness shall not exceed the current used to achieve the rated mean time before failure (MTBF).		
DC- 4	For luminance levels less than maximum brightness, either continuous current drive or current pulse width modulation shall be used to dim the LEDs.		
DC- 5	If pulse width modulation is used, the dimming circuit shall be designed so that the maximum, instantaneous and average currents shall not exceed the rated peak and transient forward current ratings of the LEDs.		

ID	Requirement Definition	Existing Capability / Conformance	Clarification Comments
DC- 6	The DMS shall be equipped with a minimum of two external light sensors oriented in opposite directions and shall be scaled for up to 100,000 lux.		
DC- 7	The LED dimming circuit shall also incorporate temperature controlled dimming, which shall reduce the current through the LEDs based on the temperature inside the DMS enclosure, so that the LED current does not exceed the rated LED current at that temperature.		
DC- 8	If the temperature of the DMS exceeds the rated operating temperature of the LEDs the DMS shall blank-out, until the temperature has returned to safe operating levels.		
DC- 9	The LED dimming circuit shall not cause the LED display to flicker as the temperature oscillates above and below the rated operating temperature of the LEDs.		
POWER SUPPLY (PS) REQUIREMENTS			
PS- 1	The DMS shall be operated at a low internal DC voltage not exceeding 24 Volts.		
PS- 2	The quantity of power supplies and current rating of each power supply shall be at least 25% spare capacity over that required to light every pixel of the DMS at full brightness.		
PS- 3	The DMS and controller shall have redundant power supplies wired so that in the event of a failure of any one power supply, the second power supply shall automatically power that portion of the sign.		
PS- 4	Power supply failure shall be automatically reported by the DMS controller when polled by the DMS Central Processor.		
PS- 5	The power supplies shall be short circuit protected and shall reset automatically after 5 seconds of AC power off.		
PS- 6	The power supplies shall be protected by a suitable overcurrent protection device.		
PS- 7	The power supply shall have an efficiency rating of 85%, minimum.		
PS- 8	The operating temperature range of the power supply inside the DMS enclosure shall be negative 20 degrees Fahrenheit to 140 degrees Fahrenheit.		
PS- 9	The power supply shall be UL listed.		
SIGN ENCLOSURE (SE) REQUIREMENTS			
SE- 1	The DMS enclosures shall have a weatherproof housing and all internal components shall be non-condensing and withstand a humidity range of 0 to 99%, non-condensing.		
SE- 2	The DMS enclosures shall be constructed of corrosion resistant aluminum material.		
SE- 3	Sheet aluminum shall be fabricated from aluminum alloy sheet meeting the requirements of ASTM B 209, Alloy 5052, Temper H3, or equivalent, minimum 0.125 inch thick.		
SE- 4	Cast aluminum shall be fabricated from aluminum alloy meeting the requirements of ASTM B 686, Alloy A 356 (A 13560) or equivalent.		
SE- 5	Flat cast surfaces exceeding 12 inches in both directions shall have a minimum thickness of 0.25 inches.		
SE- 6	Flat cast surfaces not exceeding 12 inches in both directions shall have a minimum thickness of 0.187 inches.		
SE- 7	All DMS enclosures shall meet the requirements for TYPE 3R enclosures according to NEMA Standard Publication 250, as well as those of PennDOT Publication 408/2016-3, Section 1230 and Publication 647.		
SE- 8	All seams and openings shall be designed to prevent entry of water resulting from high pressure washing of the DMS enclosure.		
SE- 9	Unpainted aluminum DMS enclosures shall be fabricated from mill-finish material and shall be cleaned using appropriate methods that will remove oil, film, weld black, and mill ink marks and render the surface clean, bright, smooth, and non-sticky to touch.		
SE- 10	All adjacent dissimilar materials shall be isolated, as approved by the Commission.		
SE- 11	All nuts and bolts used in the DMS assembly shall be stainless steel.		
SE- 12	All connecting surfaces shall be weatherproof and watertight when secured.		
SE- 13	All internal components shall be mounted so that there are no external protrusions.		
SE- 14	The DMS shall be in accordance with the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals, except as modified herein: The DMS enclosures shall be designed and constructed to present a clean, neat appearance and the equipment located inside shall be adequately protected from moisture, dust, dirt, corrosion, and excessive heat.		
SE- 15	All surfaces shall be suitably protected from the weather.		
SE- 16	All corners and seams shall be heli-arc welded to provide a weatherproof seal around the entire case.		
SE- 17	The DMS enclosure shall not be adversely affected by salt from the roadways or marine environments or chemicals or fumes discharged from nearby automobiles, industries and other sources.		
SE- 18	The interior of the DMS face window and the LEDs shall be easily accessible for cleaning and other maintenance.		

ID	Requirement Definition	Existing Capability / Conformance	Clarification Comments
SE- 19	Appropriate precautions, such as heating elements or ventilation fans or openings, shall be taken to ensure that condensation does not occur between the matrix elements and the DMS window face, and that the environment inside all enclosures remains within the temperature and humidity limits required for proper operation of the sign's electronic components.		
SE- 20	Temperature sensor(s) shall be provided in the DMS enclosure that is/are controlled and monitored by the DMS controller.		
SE- 21	Capability shall be provided for user defined critical thresholds to be established and changed remotely from the TOC or other location using the sign controller.		
SE- 22	Humidity sensor(s) shall be provided within the DMS enclosure that can detect relative humidity from 0%-100% in 1% or smaller increments.		
SE- 23	A interface shall be provided between the humidity sensor and the DMS controller which allows humidity levels to be monitored remotely from the TOC.		
SE- 24	A sensor shall be provided with an accuracy that exceeds 5% relative humidity.		
SE- 25	All hinges used shall be continuous stainless steel, equipped with stainless steel hinge pins.		
SE- 26	Each hinge shall be secured with stainless steel bolts and lock nuts.		
SE- 27	The hinge pins and bolts shall be tamper proof.		
SE- 28	The dead load shall consist of the total weight as installed of the DMS enclosure and appurtenances. The point of application of weights of the individual items shall be their representative centers of gravity.		
SE- 29	Ice load shall be as per AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals, except that ice load shall be applied to all sides and top surfaces of the DMS enclosure simultaneously.		
SE- 30	Wind load shall be as per AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals except as modified herein. The enclosure and their mountings shall withstand a sustained wind speed of 90 miles per hour (mph), with a gust factor of 1.3.		
SE- 31	Full 100 percent impact shall be used for handling and erection stress.		
SE- 32	The signs shall be capable of being mounted without gaining access to the inside of the enclosure.		
SE- 33	All mounting eyes shall be attached to the DMS enclosure structural framing.		
SE- 34	The DMS enclosure shall be adaptable for mounting as shown in PennDOT Publication 647.		
SE- 35	Removal of any of the display modules or any other electronic or electrical component, shall not alter the structural integrity of the DMS display assembly or the DMS enclosure.		
SE- 36	For Type 1 DMS, access to the interior of the DMS enclosure shall be walk-in access.		
SE- 37	For Types 2 and 3 DMS, access to the interior of the enclosure shall be front access.		
SE- 38	Opening door(s) shall allow maintenance personnel immediate access to circuit boards and internal sign parts, without having to remove any item in the sign, or the need to use any tools or to remove any device that could be dropped or lost, such as a locking pin or bolt.		
SE- 39	Each door shall be sealed to prevent the elements from entering, and shall have at least two locking points to keep unauthorized persons from accessing the interior of the DMS.		
SE- 40	Each door shall be provided with rigid, telescopic, retention device, to keep the door in the open position.		
SE- 41	All doors, when in the open position, shall not obstruct any portion of the opening.		
SE- 42	The doors system shall pull the door tight and compress a gasket located around the perimeter. The gasket shall prevent water from entering the interior of the cabinet.		
SE- 43	All serviceable components shall be modular, interchangeable and removable from within the DMS enclosure.		
SE- 44	The sign design shall allow unobstructed and convenient access to all serviceable components within the DMS enclosure and between the DMS display and the DMS display cover.		
SE- 45	Drain holes shall be provided and designed to remove any condensation that may form inside the DMS enclosure and allow any water that may have collected in the housing to escape.		
SE- 46	All holes shall be screened to prevent small objects, insects and creatures from entering into the enclosure.		
VENTILATION (V) REQUIREMENTS			
V- 1	Heating, cooling and/or dehumidifying equipment shall be sized to maintain the internal DMS enclosure temperature within the operating ranges of the electric, electronic and mechanical equipment components.		
V- 2	The environmental equipment shall have controls which shall shut down the DMS just prior to the temperature that the interior of the enclosure reaches the rated maximum operating temperature of the LEDs, and shall restore operation when the temperature has returned to safe operating levels.		
V- 3	The shutdown shall be automatically reported by the DMS controller when polled by the DMS Central Processor.		
V- 4	Electric ventilation fans shall be provided to generate positive pressure ventilation and shall be sized to provide 25 percent excess ventilation capacity, with one fan inoperative, over that required to maintain the DMS enclosure interior temperature within the range over which the DMS components can operate without failure or degradation, during full daylight heat gain conditions.		

ID	Requirement Definition	Existing Capability / Conformance	Clarification Comments
V- 5	All fans shall have ball or roller bearings.		
V- 6	Fan operation and failure shall be reported to the DMS Central Processor via the communications protocol.		
V- 7	Louvered air inlets with removable, non-proprietary 500 micron, 2-stage filters and air deflector, sized to provide a maximum air intake velocity of 600 feet per minute with all fans operating.		
V- 8	The direction of airflow and the filter characteristics (i.e., filter model number, type, dimensions, and particle size) shall be permanently engraved on each air vent.		
V- 9	Exhaust air vents, if without filters, shall be screened to prevent small objects and creatures from entering into the enclosure.		
V- 10	For Types 2 and 3 DMS, vent-free design (if approved by the Commission) shall ensure that the DMS enclosure interior temperature does not exceed the maximum range of the DMS components to ensure continued operation without failure or degradation, particularly during full daylight heat gain.		
DMS CONTROLLER (DMS) REQUIREMENTS			
DMS- 1	The DMS controller shall be a microprocessor-based unit with sufficient on-board memory and input and output interfaces to provide all the functions required by the Minimum Technical Requirements.		
DMS- 2	The DMS controller shall have a minimum 30-minute battery backup.		
DMS- 3	The DMS controller shall accommodate both local and remote control from multiple host devices as described in the Minimum Technical Requirements.		
DMS- 4	Local control shall be supported from a locally connected sign programmer.		
DMS- 5	Remote control shall be supported from a remotely located DMS Central Processor (control computer system).		
DMS- 6	The DMS controller shall receive and interpret commands sent by the host device to either configure the DMS or cause a requested message to be displayed on the DMS.		
DMS- 7	The DMS Controller shall provide return data to the host device, based on the command, to provide information about the status of the sign.		
DMS- 8	The DMS controller shall be capable of simultaneously receiving commands from and transmitting status data to multiple host devices; i.e., the sign programmer, local control panel and the DMS Central Processor.		
DMS- 9	The method of control of the DMS shall be dependent upon the setting of the Control Mode Selector switch in each local control panel.		
DMS- 10	The Control Mode Selector switch shall allow for both remote and local modes of operation.		
DMS- 11	The "remote" mode shall be the normal mode of operation of the DMS, where all control is from a remote DMS Central Processor, via NTCIP data exchanged directly between the remote DMS Central Processor and the DMS controller.		
DMS- 12	The "local" mode shall be when control from the remote DMS Central Processor is disabled and the DMS is controlled in accordance with commands entered via the message selector switch on the Local Control Panel or a NTCIP data exchanged directly with a locally connected Sign Programmer.		
DMS- 13	The remote DMS Central Processor shall still be able to monitor the status of the DMS when in "local" mode.		
DMS- 14	When switching from one mode to another, the DMS shall continue to display its current message, until it receives a command to display another message, from either the remote DMS Central Processor or the local controls, as applicable.		
DMS- 15	A change of position of the mode selector switch shall be immediately reported to the DMS Central Processor in the form of an alarm, and shall be logged internally at the site CPU for retrieval on the next polling cycle, and in accordance with the communications protocol.		
DMS- 16	Each DMS controller shall have error detection and reporting features which shall be utilized to guard against incomplete or incorrect information transmission, message generation and display on the DMS, as well as provide capability to detect a failure down to a replaceable component and report the failure and failed component.		
DMS- 17	All errors and hardware failures shall be logged and reported to the DMS Central Processor or Sign Programmer (if connected) via the communications protocol.		
DMS- 18	The DMS controller shall have the capability to automatically recover from failure conditions when the failure conditions are corrected or the failures are no longer present, and report the restored operation of the DMS to the DMS Central Processor or Sign Programmer (if connected).		
DMS- 19	The DMS controller shall have diagnostic capabilities features to perform redundant checking of all data received and transmitted, and incorporate cyclic redundancy check (CRC) error detection logic, as specified by the NTCIP standards.		
DMS- 20	The DMS controller shall have diagnostic capabilities features to validate the content of all received transmissions.		
DMS- 21	The DMS controller shall have diagnostic capabilities features to check and report logic or data errors.		
DMS- 22	The DMS controller shall have diagnostic capabilities features to monitor status for communication line malfunction or break.		
DMS- 23	The DMS controller shall have diagnostic capabilities features to respond to system polling from the DMS Central Processor.		

ID	Requirement Definition	Existing Capability / Conformance	Clarification Comments
DMS- 24	The DMS controller shall have diagnostic capabilities features to check and report errors in display driver operation.		
DMS- 25	The DMS controller shall have diagnostic capabilities features to check and report the failure and location of bad pixels.		
DMS- 26	The DMS controller shall have diagnostic capabilities features to check and report the failure of bad fans.		
DMS- 27	The DMS controller shall have diagnostic capabilities features to check and report whether the controller cabinet or DMS enclosure door is open or closed.		
DMS- 28	The DMS controller shall have diagnostic capabilities features to check the operation and report the failure and location of bad power supplies.		
DMS- 29	The DMS controller shall have diagnostic capabilities features to check the duration of power failures.		
DMS- 30	The DMS controller shall have diagnostic capabilities features to check and report the number of occurrences the watchdog timer resets the controller.		
DMS- 31	The DMS controller shall blank the DMS and include the error or failure in the return message if it is detected that the number of pixels that are not working for the particular sign type exceed a specified maximum value (the Proposer shall determine this number for each sign type and have these numbers approved by the Commission).		
DMS- 32	The DMS controller shall blank the DMS and include the error or failure in the return message if it is detected that the ratio of the number of pixels that achieve a commanded state divided by the number of pixels commanded to that state exceeds a legibility threshold value (the test shall include only those pixels that are contained in the character positions of the message text).		
DMS- 33	The DMS controller shall blank the DMS and include the error or failure in the return message if it is detected that the communication loss is greater than a configurable time value measured in minutes (default value shall be 10 minutes).		
DMS- 34	The configuration of system polling shall have an option for disabling the feature of blanking the DMS and including the error or failure in the return message if it is detected that the communication loss is greater than a configurable time value.		
DMS- 35	The current message displayed on the DMS just prior to the power failure shall be retained in memory upon detection of a power failure to the DMS controller or the DMS display(s) connected to the controller.		
DMS- 36	The DMS shall remain blank upon power restoration if the duration of the power failure exceeded the configurable long term power failure duration threshold (default value shall be 10 minutes), else the previous message shall be restored to its respective DMS.		
DMS- 37	Based on the temperature inside of the DMS enclosure, the LED dimming circuit shall incorporate temperature-controlled dimming in order to reduce the current through the LEDs so that it does not exceed the rated LED current at that temperature.		
DMS- 38	The DMS shall blank-out if the temperature of the DMS exceeds the rated operating temperature of the LEDs, until the temperature has returned to safe operating levels.		
DMS- 39	Information on each of the specific failures shall be sent to the DMS Central Processor.		
DMS- 40	The DMS controller shall have the capability to display messages transmitted directly from a DMS Central Processor or Sign Programmer in addition to displaying locally commanded messages from a pre-programmed local message library.		
DMS- 41	The local message library shall have the capacity to store a minimum of 256 display messages with related display attributes for each message, such as flashing rate and percent "on" time.		
DMS- 42	The local message library shall include a "changeable, non-volatile" local message library stored in battery-backed RAM.		
DMS- 43	The changeable local message library shall be programmable through both the DMS Central Processor and the Sign Programmer.		
DMS- 44	The local message library shall include a "permanent, non-volatile" local message library, stored on EPROM. Battery-backed RAM memory shall not be acceptable. If a microprocessor-based controller is used, then EEPROM, flash RAM or similar technology memory devices, programmed as described in the Minimum Technical Requirements, may be used to store the message library.		
DMS- 45	The DMS controller shall write messages on the DMS at a minimum rate of 300 characters per second.		
DMS- 46	The DMS controller shall have an easily accessible and clearly labeled ON/OFF switch.		
DMS- 47	All power shall be disconnected from the DMS control electronics and matrix units when the switch is in the "OFF" position and the DMS shall blank-out.		
DMS- 48	A means of establishing a monetary reset switch on the DMS controller shall be provided. The contact switch shall reset the DMS controller when depressed. Operation of the momentary contact switch shall not require the user to hold the switch in the depressed position for more than 0.25 seconds.		
DMS- 49	The DMS controller shall be provided with all software and hardware required for password protection to restrict access to control and configuration functions.		
DMS- 50	The DMS controller shall be provided with all software and hardware required for fully programmable parameters for all functions described in the Minimum Technical Requirements.		

ID	Requirement Definition	Existing Capability / Conformance	Clarification Comments
DMS- 51	The DMS controller shall be provided with all software and hardware required for real-time clock and calendar for timing and scheduling of automatic functions. The calendar shall automatically adjust itself for leap years, and for changeover from Standard to Daylight savings time and back.		
DMS- 52	The DMS controller shall be provided with all software and hardware required for variable message flash rate and percent "on" time.		
DMS- 53	The flash rate shall be adjustable in one-tenth second increments.		
DMS- 54	The percent "on" time shall be adjustable from 0 to 9.9 seconds, in one-tenth second increments.		
DMS- 55	The DMS controller shall be provided with all software and hardware required for multi-page messages with variable page display times that are adjustable in one-tenth second increments from 0 to 15.0 seconds.		
DMS- 56	The DMS controller shall be provided with all software and hardware required for negative text inversion (or inverse/reverse video) - switch between illuminated text on a dark background or dark text on an illuminated background.		
DMS- 57	Inverse/reverse video shall be implemented with the use of standard NTCIP foreground and background objects.		
DMS- 58	The DMS controller shall be provided with all software and hardware required for configurable line justification (center, left or right) with center justification as the default setting.		
DMS- 59	The DMS controller shall be provided with all software and hardware required for configurable page justification (top, center, bottom) with center justification as the default setting.		
DMS- 60	The DMS controller shall be provided with all software and hardware required for configurable message duration parameter, to specify how long the current message should remain displayed regardless of the status of the communications with the DMS Central Processor.		
DMS- 61	The DMS controller shall be provided with all software and hardware required for the communications loss message threshold, to specify how long the current message should remain displayed in the absence of communications with the DMS Central Processor.		
DMS- 62	The DMS controller shall be provided with all software and hardware required for control of pixel luminance levels, both directly and based on ambient light levels obtained from the photocells.		
DMS- 63	Luminance levels shall be stored in the DMS controller and shall be adjustable, in a range of 0 to 255, on either a continuous logarithmic basis, to match the normal human eye luminous response characteristic, or a 1/2 incremental dimming basis, where each lower dimming level is 1/2 the previous level.		
DMS- 64	The DMS controller shall be provided with all software and hardware required for monitoring of each pixel of the DMS.		
DMS- 65	The DMS controller shall be provided with all software and hardware required for monitoring of power failures.		
DMS- 66	The DMS controller shall report the occurrence, time, and duration of the power failure, upon restoration of power, to the DMS Central Processor or Sign Programmer (if connected).		
DMS- 67	The DMS controller shall be provided with all software and hardware required for the hardware watchdog timer.		
DMS- 68	The DMS controller shall have a hardware watchdog timer that shall check for a stall condition in the controller hardware, software or firmware.		
DMS- 69	The software shall poll the watchdog timer while the DMS controller is powered on.		
DMS- 70	The watchdog timer shall initialize its timing circuit upon reset.		
DMS- 71	The watchdog counter shall be incremented and the watchdog shall reset the controller to clear a potential stall condition from the hardware, software or firmware and send an error message to the DMS Central Processor or Sign Programmer (if connected) to advise of the condition, if the watchdog timing circuit times out without being reset by the software.		
DMS- 72	The number of occurrences the watchdog timer resets the controller shall be transmitted to the DMS Central Processor or Sign Programmer (if connected) upon request and then cleared.		
DMS- 73	The DMS controller shall be provided with all software and hardware required for programmable font sets.		
DMS- 74	The DMS controller shall support multiple programmable font sets, including those for 6", 9", 12", and 18" character heights, variable and fixed width fonts, and single, double, and triple stroke fonts.		
DMS- 75	Each font set shall be capable of being programmed from the DMS Central Processor or the Sign Programmer (if connected).		
DMS- 76	Three of the font sets shall look like the E-modified font set defined by the MUTCD, replicating the appearance of the font used on some static signage on the DMS.		
DMS- 77	A single, double and triple stroke E-modified font shall be provided.		
DMS- 78	A fourth font set shall be provided and shall replicate the Helvetica Medium font used on most static signage at the facility where the DMS is to be installed.		
DMS- 79	The DMS controller shall be provided with all software and hardware required so that each font set shall include, but not be limited to, all upper case letters, numerals, punctuation marks and arrows that are displayed in each of the eight cardinal directions.		

ID	Requirement Definition	Existing Capability / Conformance	Clarification Comments
DMS- 80	The DMS controller shall be provided with all software and hardware required for a customizable and standard graphics library. A suite of pre-generated MUTCD style symbols shall be provided, along with the ability to modify or create independent symbols, saving of new graphics and color editing. The library should hold a minimum of 50 graphics.		
DMS- 81	The DMS controller shall keep a log of all system errors, malfunctions, automatic operations and locally controlled commands and activities. All logs shall be time and date stamped.		
DMS- 82	The DMS controller shall have sufficient memory to store a minimum of 500 log entries. If 100% of the log storage memory has been reached without a successful download to the DMS Central Processor or a Sign Programmer, the oldest log entry shall be overwritten.		
DMS- 83	The DMS controller shall download all log entries to a DMS Central Processor or Sign Programmer, upon user request from one of these devices and clear the log.		
DMS- 84	The DMS and Controller shall be capable of displaying a minimum of 256 different colors, and colors in accordance with the standard messages indicated in the PTC DMS Messaging Library (Appendix K).		
DMS- 85	The DMS Controller shall be capable of displaying colors that conform to MUTCD requirements.		
CONTROLLER CABINET (CC) REQUIREMENTS			
CC- 1	The controller cabinet shall be capable of being pole or ground mounted.		
CC- 2	The controller cabinet shall protect all internal components from rain, ice, dust and corrosion in accordance with NEMA 3R standards, as described in NEMA Standards Publication 250 and be made of aluminum (0.125-inch thick).		
CC- 3	The controller cabinet must conform to the latest versions of PennDOT Publications 647 and 408, 2016-3, Section 1230.		
CC- 4	The controller cabinet shall include a full-height standard EIA 19-inch rack.		
CC- 5	The controller cabinet shall include the main power supply and energy distribution system (main disconnect).		
CC- 6	The controller cabinet shall include one work lamp to illuminate the work area, when the cabinet door is open (lamp shall automatically turn off when cabinet door is closed).		
CC- 7	The controller cabinet shall include at least one 15 A, 120 VAC GFCI protected duplex service outlet.		
CC- 8	The controller cabinet shall include lightning protection and terminations for the communication and control cables.		
CC- 9	The controller cabinet shall include termination blocks for the control cables to and from the DMS sign housing.		
CC- 10	The controller cabinet shall include permanently mounted, weather-resistant document holder.		
CC- 11	The controller cabinet shall include electrical drawings printed on water/tear-resistant material.		
CC- 12	The controller cabinet shall include a pullout shelf.		
CC- 13	The controller cabinet shall include an open door alarm that reports to the DMS controller.		
CC- 14	The controller cabinet shall include surge protection on all incoming power lines meeting the following minimum specifications: <ul style="list-style-type: none"> • Maximum Clamp Voltage - 340V • Peak Current - 20,000 Amps • Response Time - 5 nanoseconds • Occurrences - 20 times at peak current • Minimum Series Inductance - 200 microhenries 		
CC- 15	The controller cabinet must provide a minimum of 6 RUs for communication equipment installation in order to facilitate the potential future installation of communication system components.		
CC- 16	The controller cabinet shall provide a minimum of one 120VAC outlet capable of providing 105W of power to the DC power supply.		
COMMUNICATIONS (C) REQUIREMENTS			
C- 1	The controller cabinet shall provide layout space for a cellular modem and antenna, Ethernet network switches, and/or 4.9GHz communications network equipment .		
C- 2	The DMS controller shall have a minimum of two (2) serial data and one (1) Ethernet communications ports to facilitate simultaneous communications for local and remote control, programming, and diagnostics.		
C- 3	The DMS shall automatically use the NTCIP communications stack associated with serial communications (i.e., NTCIP 2101, NTCIP 2201, and NTCIP 2301) when connected to the serial port.		
C- 4	The DMS shall automatically use the NTCIP communications stack associated with Ethernet communications (i.e., NTCIP 2104, NTCIP 2202, and NTCIP 2301) when connected to the Ethernet port.		
C- 5	All ports shall be configurable such that communications with the serial ports shall support all typical serial baud rates ranging from 1200 to 115,200 baud.		
C- 6	All ports shall be configurable such that communications with the Ethernet port shall be capable of communicating via TCP/IP or UDP/IP at 10 or 100 MB.		

ID	Requirement Definition	Existing Capability / Conformance	Clarification Comments
C- 7	The serial ports in the DMS sign controller shall be protected with surge protection to protect the modem communication port from over-voltage and overcurrent conditions between each signal line and ground.		
DMS SOFTWARE (DS) REQUIREMENTS			
DS- 1	NTCIP compatible control/diagnostic software shall be furnished for the purpose of troubleshooting and testing.		
DS- 2	The software shall send requests and receive responses over any TCP/IP-based network for the functions of controlling DMS messaging, monitoring system status and performing DMS diagnostics (detecting failed pixels, display drivers, power supplies, alarm conditions etc.).		
NTCIP (N) REQUIREMENTS			
N- 1	The DMS and associated control equipment shall comply with the latest versions of the National Transportation Communication for ITS Protocol (NTCIP) Standards.		
N- 2	The DMS and associated control equipment shall comply with NTCIP 1101:1996 (v01.12, December 2001) – Simple Transportation Management Framework.		
N- 3	The DMS and associated control equipment shall comply with NTCIP 1103 v03 (December 2016) – Transportation Management Protocols (TMP).		
N- 4	The DMS and associated control equipment shall comply with NTCIP 1201 (v03, March 2011) – Global Objects (GO) Definitions.		
N- 5	The DMS and associated control equipment shall comply with NTCIP 1203 (v03, September 2014) –Object Definitions for Dynamic Message Signs (DMS).		
N- 6	The DMS and associated control equipment shall comply with NTCIP 2101:2001 (v01.19, November 26, 2001) – Point to Multi-Point Protocol Using RS-232 Subnetwork Profile.		
N- 7	The DMS and associated control equipment shall comply with NTCIP 2103 (v02, December 2008) – Point-to-Point Protocol over RS-232 Subnetwork Profile.		
N- 8	The DMS and associated control equipment shall comply with NTCIP 2104:2003 (v01.11, September 2005) – Ethernet Subnetwork Profile.		
N- 9	The DMS and associated control equipment shall comply with NTCIP 2201:2003 (v01.15, September 2005) – Transportation Transport Profile.		
N- 10	The DMS and associated control equipment shall comply with NTCIP 2202:2001 (v01.05, December 2001) – Internet (TCP/IP and UDP/IP) Transport Profile.		
N- 11	The DMS and associated control equipment shall comply with NTCIP 2301 (v02.19s, October 2010) – Simple Transportation Management Framework (STMF) Application Profile (AP) (AP-STMF).		
N- 12	All mandatory objects specified by the NTCIP specifications and all other objects, both NTCIP optional and the manufacturer specific, shall be furnished that are required to provide the functionality to meet the requirements of the specifications.		
N- 13	The DMS Component shall support the Full, Standardized Object Range (FSOR) of all objects required by these procurement specifications, unless otherwise indicated or approved by the Representative.		
N- 14	The DMS system shall not require the support of any agency-specific or manufacturer-specific objects. However, the Proposer shall propose any object definitions necessary to fulfill the above functional requirements that are not addressable by standardized NTCIP-defined object definitions.		
N- 15	Manufacturer-specific objects may be implemented in the sign controller but they shall in no way required to be used in order to communicate with the sign.		
N- 16	The DMS shall support all mandatory objects of all mandatory Conformance Groups as defined in NTCIP 1201 and NTCIP 1203 and their amendments.		
N- 17	The NTCIP Component shall implement all mandatory objects of Time Management, as defined in NTCIP 1201.		
N- 18	The NTCIP Component shall implement all mandatory objects of the Timebase Event Schedule, as defined in NTCIP 1201.		

APPENDIX K

PTC DMS Messaging Library

Systemwide DMS Systems RFP# 18-10480-8234



October 2017



Change Log		
Date	Author	Changes/ Affected Sheets
11/18/2016	AECOM	Original
10/26/2017	A. Reimnitz - PTC	4_Amber Alert; Removed logo from graphic image

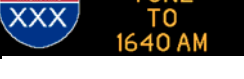
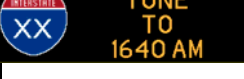
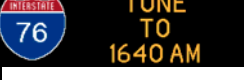
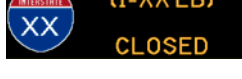
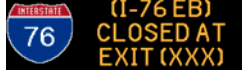
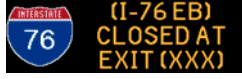
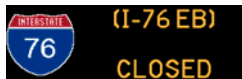


DMS MESSAGE CATEGORY MAPPING		
PA Turnpike "Standard VMS Messages"	AECOM Proposed Scenario Groupings	Recommended DMS Messages PennDOT DMS Operating Standards Appendix B (Page)
Amber Alert	4_Amber Alert	Amber Alert / MEPA (22)
	2_Rdwy Restriction	Lane Restriction (20) Speed/Vehicle Restrictions (21)
Weather	6_Weather	Winter Weather (24) Other Weather (25)
Plan X	1_Road Closure	No Entry Access (19)
Safety Messages	11_Scheduled Safety Messages	Safety Press Office Approved DMS Messages (29, 30)
Plaza Services, E-Zpass Express Closures	8_Toll and Service Plaza	Travel Plaza (28)
Toll Related	8_Toll and Service Plaza	
Miscellaneous	9_Special Events 12_Sign Testing	Special Events (26)
Accident and Congestion (Current) Road Work	5_Congestion & Road Work	Congestion (23)
	3_Emergency Management	
(Planned) Road Work	10_Future/Planned Events	Future Road Work (26) Impending Severe Weather (27)
FWS DMS Messages	13_Fog Warning DMS	
	7_Travel Times	Travel Times (25)

DMS Classes								
Class	Display Size	Pitch	Max Chars	Lines	Char Ht	Color	Matrix	Location
Class 1	54 x 180	34 mm	15	3	18"	RGB	Full	Mainline / Pre-entry
	96 x 288	20 mm	15	3	18"	RGB	Full	Mainline / Pre-entry
Class 2	27 x 90	66 mm	15	3	18"	Amber	Full	Mainline / Pre-entry
	27 x 110	66 mm	15	3	18"	Amber	Full	Mainline
Class 3	3 Line 7 x 90	66 mm	15	3	18"	Amber	Line	Mainline
	16 x 90 - MIST ONLY		15	3	18"	Amber	Line	Mainline
Class 4	64 x 160	20 mm	12	3	12"	RGB	Full	Pre-Entry
Class 5	64 x 144	20 mm	11	3	12"	RGB	Full	Pre-Entry
Class 6	27 x 60	46 mm	10	3	12"	Amber	Full	Fog/Pre-Entry
Class 7			8	3	12"	Amber	Full	PCMS
Class 8			12	3	12"	RGB	Full	PCMS

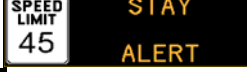
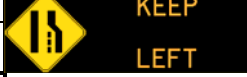
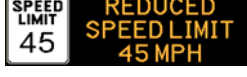
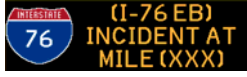
(Note: a maximum of 15 chars/line will be used even on 18 chars/line signs)

1. ROADWAY CLOSURE		LEGEND:			
		Messages for Pre-Entry Signs Only			
Message ID		Messages Generated by ATMS			
Sign Classes		VARIABLE TEXT - Change as Required for Situation			
Max Characters	Message Title	Page 1		Page 2	
1-1 ALL SIGNS 8	1.1_Quick_Incident Ahead Stay Alert.	INCIDENT	8	STAY	4
			0		0
		AHEAD	5	ALERT	5
1-2 1, 2, 3 13	1.2_Quick_Incident ahead All lanes blocked	INCIDENT	8	ALL LANES	9
		AHEAD	5	BLOCKED	7
		MILE XXX	8	EXPECT DELAYS	13
1-3 ALL SIGNS 7	Pre_Turnpike closed HAR PA Turnpike Logo	I-76 EB	7	TUNE	4
			0	TO	2
		CLOSED	6	1640 AM	7
1-4 1, 2, 3, 4, 5, 6 9	Pre_Turnpike closed At exit Use alternate route. PA Turnpike Logo	I-76 EB	7	USE	3
		CLOSED AT	9	ALTERNATE	9
		EXIT XXX	9	ROUTE	5
1-5 1, 2, 3, 4, 5, 6 10	Pre_Turnpike closed Due to weather PA Turnpike Logo	I-76 EB	7	TUNE	4
		CLOSED DUE	10	TO	2
		TO WEATHER	10	1640 AM	7
1-6 1, 2, 3, 4, 5 11	Turnpike closed At exit All traffic must exit. PA Turnpike Logo	I-76 EB	7	ALL TRAFFIC	11
		CLOSED AT	9	MUST EXIT	9
		EXIT XXX	9	AT EXIT XXX	11
1-7 1, 2, 3, 4, 5, 6 9	Turnpike closed At exit HAR. PA Turnpike Logo	I-76 EB	7	TUNE	4
		CLOSED AT	9	TO	2
		EXIT XXX	9	1640 AM	7
1-8 1, 2, 3 14	Turnpike closed Between exits All traffic must exit. PA Turnpike Logo	I-76 EB CLOSED	14	ALL TRAFFIC	11
		EXIT XXX TO	11	MUST EXIT	9
		EXIT XXX	9	AT EXIT XXX	11
1-9 1, 2, 3 14	Turnpike closed Between exits HAR. PA Turnpike Logo	I-76 EB CLOSED	14	TUNE	4
		EXIT XXX TO	11	TO	2
		EXIT XXX	9	1640 AM	7
PennDOT Messages					
1-10 1, 2, 3, 4, 5, 6 9	HWY_2digit PennDOTClosed AtExit. Interstate Logo	I-XX EB	7	USE	3
		CLOSED AT	9	ALTERNATE	9
		EXIT XXX	8	ROUTE	5
1-11 ALL SIGNS 7	HWY_2digit PennDOTClosedHAR Interstate Logo	I-XX EB	7	TUNE	4
			0	TO	2
		CLOSED	6	1640 AM	7
1-12 1, 2, 3, 4, 5, 6 9	HWY_3digit PennDOTClosed AtExit. Interstate Logo	I-XXX EB	8	USE	3
		CLOSED AT	9	ALTERNATE	9
		EXIT XXX	8	ROUTE	5
1-13 ALL SIGNS 8	HWY_3digit PennDOTClosedHAR Interstate Shield	I-XXX EB	8	TUNE	4
			0	TO	2
		CLOSED	6	1640 AM	7



1. ROADWAY CLOSURE		LEGEND:					
Message ID	Messages for Pre-Entry Signs Only						
Sign Classes	Messages Generated by ATMS						
Max Characters	VARIABLE TEXT - Change as Required for Situation						
Message Title	Page 1	Page 2					
(PA-XX EB) CLOSED AT EXIT (XXX)	1-14	State_2digit	<i>PA-XX EB</i>	8	USE	3	USE ALTERNATE ROUTE
	1, 2, 3, 4, 5, 6	PennDOTClosed	CLOSED AT	9	ALTERNATE	9	
	9	AtExit. <i>Keystone Logo</i>	EXIT <i>XXX</i>	8	ROUTE	5	
(PA-XX EB) CLOSED	1-15	State_2digit	<i>PA-XX EB</i>	8	TUNE	4	TUNE TO 1640 AM
	ALL SIGNS	PennDOTClosedHAR		0	TO	2	
	8	<i>Keystone Logo</i>	CLOSED	6	1640 AM	7	
(PA-XXX EB) CLOSED AT EXIT (XXX)	1-16	State_3digit	<i>PA-XXX EB</i>	9	USE	3	USE ALTERNATE ROUTE
	1, 2, 3, 4, 5, 6	PennDOTClosed	CLOSED AT	9	ALTERNATE	9	
	9	AtExit. <i>Keystone Logo</i>	EXIT <i>XXX</i>	8	ROUTE	5	
(PA-XXX EB) CLOSED	1-17	State_3digit	<i>PA-XXX EB</i>	9	TUNE	4	TUNE TO 1640 AM
	1, 2, 3, 4, 5, 6	PennDOTClosedHAR		0	TO	2	
	9	<i>Keystone Logo</i>	CLOSED	6	1640 AM	7	
(US-X EB) CLOSED AT EXIT (XXX)	1-18	US_1digit	<i>US-X EB</i>	7	USE	3	USE ALTERNATE ROUTE
	1, 2, 3, 4, 5, 6	PennDOTClosed	CLOSED AT	9	ALTERNATE	9	
	9	AtExit. <i>US Logo</i>	EXIT <i>XXX</i>	8	ROUTE	5	
(US-X EB) CLOSED	1-19	US_1digit	<i>US-X EB</i>	7	TUNE	4	TUNE TO 1640 AM
	ALL SIGNS	PennDOTClosedHAR		0	TO	2	
	7	<i>US Logo</i>	CLOSED	6	1640 AM	7	
(US-XX EB) CLOSED AT EXIT (XXX)	1-20	US_2digit	<i>US-XX EB</i>	8	USE	3	USE ALTERNATE ROUTE
	1, 2, 3, 4, 5, 6	PennDOTClosed	CLOSED AT	9	ALTERNATE	9	
	9	AtExit. <i>US Logo</i>	EXIT <i>XXX</i>	8	ROUTE	5	
(US-XX EB) CLOSED	1-21	US_2digit	<i>US-XX EB</i>	8	TUNE	4	TUNE TO 1640 AM
	ALL SIGNS	PennDOTClosedHAR		0	TO	2	
	8	<i>US Logo</i>	CLOSED	6	1640 AM	7	
(US-XXX EB) CLOSED AT EXIT (XXX)	1-22	US_3digit	<i>US-XXX EB</i>	9	USE	3	USE ALTERNATE ROUTE
	1, 2, 3, 4, 5, 6	PennDOTClosed	CLOSED AT	9	ALTERNATE	9	
	9	AtExit. <i>US Logo</i>	EXIT <i>XXX</i>	8	ROUTE	5	
(US-XXX EB) CLOSED	1-23	US_3digit	<i>US-XXX EB</i>	9	TUNE	4	TUNE TO 1640 AM
	1, 2, 3, 4, 5, 6	PennDOTClosedHAR		0	TO	2	
	9	<i>US Logo</i>	CLOSED	6	1640 AM	7	



2. ROADWAY RESTRICTIONS		LEGEND:				
		Messages for Pre-Entry Signs Only				
		Messages Generated by ATMS				
		VARIABLE TEXT - Change as Required for Situation				
Message ID	Sign Classes	Message Title	Page 1		Page 2	
Max Characters						
2-1	ALL SIGNS 6	2.1_Quick_Lane closed ahead	LANE	4	STAY	4
		Stay alert	CLOSED	6		0
			AHEAD	5	ALERT	5
2-2	1, 2, 3 14	Comm Vehicle	COMMERCIAL VEH	14	TUNE	4
		Restriction	RESTRICTION	11	TO	2
		HAR	IN EFFECT	10	1640 AM	7
2-3	1, 2, 3, 4, 5 11	Incident	I-76 EB	7	STAY ALERT	10
		xx miles ahead.	INCIDENT	8	EXPECT	6
		Stay Alert. ATMS. PA Turnpike Logo.	XX MI AHEAD	11	DELAYS	7
2-4	1, 2, 3, 4, 5 11	Left lane closed ahead	LEFT LANE	9	KEEP	4
		Keep right	CLOSED	6		0
		ATMS. LT Lane Closed Logo	XX MI AHEAD	11	RIGHT	5
2-5	1, 2, 3, 4, 5 11	Left Lane closed ahead	LEFT LANE	9	STAY ALERT	10
		Stay alert	CLOSED	6	EXPECT	6
		ATMS. LT Lane Closed Logo	XX MI AHEAD	11	DELAYS	6
2-6	1, 2, 3, 4, 5 11	Left lane closed at location	LEFT LANE	9	KEEP	4
		Keep right	CLOSED	6		0
		LT Lane Closed Logo	AT MILE XXX	11	RIGHT	5
2-7	1, 2, 3, 4, 5 11	Left lane closed at location	LEFT LANE	9	STAY ALERT	10
		Stay alert	CLOSED	6	EXPECT	6
		LT Lane Closed Logo	AT MILE XXX	11	DELAYS	6
2-8	1, 2, 3 13	No Shoulder	NO SHOULDER	11	STAY	4
			FOR	3		0
			NEXT XX MILES	13	ALERT	5
2-9	1, 2, 3, 4, 5 11	Pre_Incident	I-76 EB	7	STAY ALERT	10
		At location	INCIDENT AT	11	EXPECT	6
		Stay Alert. PA Turnpike Logo.	MILE XXX	8	DELAYS	7
2-10	1, 2, 3, 4, 5 11	Right lane closed ahead	RIGHT LANE	10	KEEP	4
		Keep left	CLOSED	6		0
		ATMS. RT Lane Closed Logo	XX MI AHEAD	11	LEFT	4
2-11	1, 2, 3, 4, 5 11	Right Lane closed ahead	RIGHT LANE	10	STAY ALERT	10
		Stay alert	CLOSED	6	EXPECT	6
		ATMS. RT Lane Closed Logo	XX MI AHEAD	11	DELAYS	6
2-12	1, 2, 3, 4, 5 11	Right lane closed at location	RIGHT LANE	10	KEEP	4
		Keep left	CLOSED	6		0
		RT Lane Closed Logo	AT MILE XXX	11	LEFT	4
2-13	1, 2, 3, 4, 5 11	Right Lane closed at location	RIGHT LANE	10	STAY ALERT	10
		Stay alert	CLOSED	6	EXPECT	6
		RT Lane Closed Logo	AT MILE XXX	11	DELAYS	6
2-14	1, 2, 3, 4, 5 11	Speed	REDUCED	7	STAY	4
		Reduction	SPEED LIMIT	11		0
		Stay Alert_25. 25 MPH logo	25 MPH	6	ALERT	5
2-15	1, 2, 3, 4, 5 11	Speed	REDUCED	7	STAY	4
		Reduction	SPEED LIMIT	11		0
		Stay Alert_45. 45 MPH logo	45 MPH	6	ALERT	5



2. ROADWAY RESTRICTIONS			LEGEND:				
Message ID <i>Sign Classes</i> Max Characters			Messages for Pre-Entry Signs Only				
			Messages Generated by ATMS				
			VARIABLE TEXT - Change as Required for Situation				
			Page 1	Page 2			
PennDOT Messages							
	(I-XX EB) INCIDENT AHEAD	2-16 1, 2, 4, 5, 6 10	HWY_2digit_PennDOT IncidentAhead Interstate Logo	I-XX EB	7	STAY ALERT	10
				INCIDENT	8	EXPECT	6
				AHEAD	5	DELAYS	6
PennDOT Messages							
	(I-XX EB) INCIDENT AT MILE (XXX)	2-17 1, 2, 3, 4, 5 11	HWY_2digit_PennDOT IncidentAtLocation Interstate Logo	I-XX EB	7	STAY ALERT	10
				INCIDENT AT	11	EXPECT	6
				MILE XXX	8	DELAYS	6
	(I-XXX EB) INCIDENT AHEAD	2-18 1, 2, 4, 5, 6 10	HWY_3digit_PennDOT IncidentAhead Interstate Logo	I-XXX EB	8	STAY ALERT	10
				INCIDENT	8	EXPECT	6
				AHEAD	5	DELAYS	6
	(I-XXX EB) INCIDENT AT MILE (XXX)	2-19 1, 2, 3, 4, 5 11	HWY_3digit_PennDOT IncidentAtLocation Interstate Logo	I-XXX EB	8	STAY ALERT	10
				INCIDENT AT	11	EXPECT	6
				MILE XXX	8	DELAYS	6
	(PA-XX EB) INCIDENT AHEAD	2-20 1, 2, 4, 5, 6 10	State_2digit_PennDOT IncidentAhead Keystone Logo	PA-XX EB	8	STAY ALERT	10
				INCIDENT	8	EXPECT	6
				AHEAD	5	DELAYS	6
	(PA-XX EB) INCIDENT AT MILE (XXX)	2-21 1, 2, 3, 4, 5 11	State_2digit_PennDOT IncidentAtLocation Keystone Logo	PA-XX EB	8	STAY ALERT	10
				INCIDENT AT	11	EXPECT	6
				MILE XXX	8	DELAYS	6
	(PA-XXX EB) INCIDENT AHEAD	2-22 1, 2, 4, 5, 6 10	State_3digit_PennDOT IncidentAhead Keystone Logo	PA-XXX EB	9	STAY ALERT	10
				INCIDENT	8	EXPECT	6
				AHEAD	5	DELAYS	6
	(PA-XXX EB) INCIDENT AT MILE (XXX)	2-23 1, 2, 3, 4, 5 11	State_3digit_PennDOT IncidentAtLocation Keystone Logo	PA-XXX EB	9	STAY ALERT	10
				INCIDENT AT	11	EXPECT	6
				MILE XXX	8	DELAYS	6
	(US-X EB) INCIDENT AHEAD	2-24 1, 2, 4, 5, 6 10	US_1digit_PennDOT IncidentAhead US Logo	US-X EB	7	STAY ALERT	10
				INCIDENT	8	EXPECT	6
				AHEAD	5	DELAYS	6
	(US-X EB) INCIDENT AT MILE (XXX)	2-25 1, 2, 3, 4, 5 11	US_1digit_PennDOT IncidentAtLocation US Logo	US-X EB	7	STAY ALERT	10
				INCIDENT AT	11	EXPECT	6
				MILE XXX	8	DELAYS	6
	(US-XX EB) INCIDENT AHEAD	2-26 1, 2, 4, 5, 6 10	US_2digit_PennDOT IncidentAhead US Logo	US-XX EB	8	STAY ALERT	10
				INCIDENT	8	EXPECT	6
				AHEAD	5	DELAYS	6
	(US-XX EB) INCIDENT AT MILE (XXX)	2-27 1, 2, 3, 4, 5 11	US_2digit_PennDOT IncidentAtLocation US Logo	US-XX EB	8	STAY ALERT	10
				INCIDENT AT	11	EXPECT	6
				MILE XXX	8	DELAYS	6
	(US-XXX EB) INCIDENT AHEAD	2-28 1, 2, 4, 5, 6 10	US_3digit_PennDOT IncidentAhead US Logo	US-XXX EB	9	STAY ALERT	10
				INCIDENT	8	EXPECT	6
				AHEAD	5	DELAYS	6
	(US-XXX EB) INCIDENT AT MILE (XXX)	2-29 1, 2, 3, 4, 5 11	US_3digit_PennDOT IncidentAtLocation US Logo	US-XXX EB	9	STAY ALERT	10
				INCIDENT AT	11	EXPECT	6
				MILE XXX	8	DELAYS	6



3. EMERGENCY MANAGEMENT		LEGEND:			
		Messages for Pre-Entry Signs Only			
		Messages Generated by ATMS			
		VARIABLE TEXT - Change as Required for Situation			
Message ID Sign Classes	Message Title	Page 1		Page 2	
Max Characters					
3-1	Warning	WARNING	7		0
1, 2, 3	Wrong Way Driver	WRONG WAY DRIVER	16		0
16		REPORTED	8		0
3-2	Warning	WARNING	7	REPORTED	8
6	Wrong Way Driver	WRONG WAY	9		0
9		DRIVER	6	AHEAD	5

4. AMBER ALERT			LEGEND:			
Message ID			Messages for Pre-Entry Signs Only			
Sign Classes			Messages Generated by ATMS			
Max Characters			VARIABLE TEXT - Change as Required for Situation			
		Message Title	Page 1		Page 2	
	4-1	Amber Alert	AMBER ALERT	11	<i>Veh Color</i>	9
	1, 2, 3, 4, 5	No HAR	SIGHTING	8	<i>Make/Model</i>	10
	11	(logo)	CALL *11	8	<i>Tag</i>	3
	4-2	MEP	MISSING PERSON	14	<i>Veh Color</i>	9
	1, 2, 3	No HAR	SIGHTING	8	<i>Make/Model</i>	10
	14	(logo)	CALL *11	8	<i>Tag</i>	3
	4-3	Amber Alert	AMBER	5	TUNE	4
	6	HAR		0	TO	2
	7		ALERT	5	1640 AM	7

5. CONGESTION (due to accident, road work, non-recurring)		LEGEND:				
		Messages for Pre-Entry Signs Only				
Message ID Sign Classes		Messages Generated by ATMS				
Max Characters		VARIABLE TEXT - Change as Required for Situation				
Message Title		Page 1		Page 2		
5-1 1, 2, 3 13	5.1_Quick_Congestion Ahead	CONGESTION	10	STAY ALERT	10	
			0		0	
		AHEAD	5	EXPECT DELAYS	13	
(I-76 EB) HEAVY CONGESTION	5-2 1, 2, 4, 5, 6 10	5.2_Quick_Pre_Heavy Congestion	I-76 EB	7	STAY ALERT	10
			HEAVY	5	EXPECT DELAYS	7
			CONGESTION	10	STAY ALERT	6
	5-3 1, 2, 3 13	5.3_Quick_Stopped or slow Traffic	STOPPED OR	10	STAY ALERT	10
			SLOW TRAFFIC	12		0
			AHEAD	5	EXPECT DELAYS	13
	5-4 ALL SIGNS 7	New Pattern Message	NEW	3	STAY	4
			TRAFFIC	7		0
			PATTERN	7	ALERT	5
	5-5 1 17	Pre_Slow Traffic Paces at MP Stay Alert (Logo)	I-XX EB	7	STAY ALERT	10
			TRAFFIC PACES	13	WATCH FOR STOPPED	17
			MP XXX	6	OR SLOW TRAFFIC	15
	5-6 6 10	Pre_Slow Traffic Paces Stay Alert	I-XX EB	7	MP XXX-XXX	10
			TRAFFIC	7		0
			PACES	5	STAY ALERT	10
	5-7 6 10	Pre_Slow Traffic Paces Stay Alert Expect Delays	I-XX EB	7	STAY ALERT	10
			TRAFFIC	7	EXPECT	6
			PACES	5	DELAYS	6
	5-8 1, 2, 3, 4, 5 11	Road Work Ahead (logo) at MP Left Lane Closed	ROAD WORK	9	LEFT LANE	9
			AHEAD	5	CLOSED	6
			AT MILE XXX	11	STAY ALERT	10
	5-9 1, 2, 3, 4, 5 11	Road Work Ahead (logo) at MP Right Lane Closed	ROAD WORK	9	RIGHT LANE	10
			AHEAD	5	CLOSED	6
			AT MILE XXX	11	STAY ALERT	10
	5-10 1, 2, 3, 4, 5 11	Road Work Ahead (logo) at MP Stay Alert	ROAD WORK	9	STAY	4
			AHEAD	5		0
			AT MILE XXX	11	ALERT	5
	5-11 1, 2, 3, 4, 5 11	Road Work (logo) XX miles Lt Lane Closed. ATMS	ROAD WORK	9	LEFT LANE	9
				0	CLOSED	6
			XX MI AHEAD	11	STAY ALERT	10
	5-12 1, 2, 3, 4, 5 11	Road Work (logo) XX miles Rt Lane Closed. ATMS	ROAD WORK	9	RIGHT LANE	10
				0	CLOSED	6
			XX MI AHEAD	11	STAY ALERT	10
	5-13 1, 2, 3, 4, 5, 6 9	Road Work (logo) XX miles Stay Alert ATMS	ROAD WORK	9	STAY	4
			XX MI	5		0
			AHEAD	5	ALERT	5
	5-14 1 17	Slow Traffic Paces at MP Stay Alert	SLOW MOVING	11	STAY ALERT	10
			TRAFFIC PACES	13	WATCH FOR STOPPED	17
			MP XXX	6	OR SLOW TRAFFIC	15
	5-15 1, 2, 3, 4, 5, 6 9	Trucks use Left Lane	TRUCKS	6	THROUGH	7
			USE	3	WORK	4
			LEFT LANE	9	ZONE	4
	5-16 1, 2, 3, 4, 5, 6 10	Trucks use Right Lane	TRUCKS	6	THROUGH	7
			USE	3	WORK	4
			RIGHT LANE	10	ZONE	4

5. CONGESTION (due to accident, road work, non-recurring)		LEGEND:				
Message ID		Messages for Pre-Entry Signs Only				
Sign Classes		Messages Generated by ATMS				
Max Characters		VARIABLE TEXT - Change as Required for Situation				
		Message Title	Page 1	Page 2		
5-17 1, 3 15	Tunnel Message 1	TUNNEL WORK	11	STAY ALERT	10	
			0	FOR	3	
		AHEAD	5	STOPPED TRAFFIC	15	
5-18 1, 3 15	Tunnel Message 2	SINGLE LANE	11	STAY	4	
		TRAFFIC THROUGH	15		0	
		TUNNEL	6	ALERT	5	
5-19 1, 3 15	Tunnel Message 3	STOPPED TRAFFIC	15		0	
		AT TUNNEL	9		0	
		STAY ALERT	10		0	
5-20 1, 3 14	Tunnel Message 4	TWO-WAY	7	STAY	4	
		TRAFFIC	7		0	
		THROUGH TUNNEL	14	ALERT	5	
5-21 1, 3 15	Tunnel Message 5	STOPPED TRAFFIC	15	STAY ALERT	10	
			0		0	
		AHEAD	5	EXPECT DELAYS	13	
5-22 1, 3 15	Tunnel Message 6	TRAFFIC STOPPED	15	STAY ALERT	10	
		AT	2		0	
		TUNNEL	6	EXPECT DELAYS	13	
5-23 1, 3 12	Tunnel Message 7	SINGLE LANE	12	SLOW DOWN	9	
		TRAFFIC IN	10		0	
		TUNNEL AHEAD	12	STAY ALERT	10	
5-24 1, 3 11	Tunnel Message 8	SINGLE LANE	11	STAY	4	
		THROUGH	7	IN	2	
		TUNNEL	6	LANE	4	
Long Term Construction						
SPEED LIMIT 55 CONSTRUCTION ZONE REDUCE SPEED	5-25 1, 2, 3, 4 12	LT Lane Shift Long Term Construction Msg 55 MPH/Left Lane shift logo	CONSTRUCTION	12	LANE SHIFTS	11
			ZONE	4	STAY	4
			REDUCE SPEED	12	ALERT	5
SPEED LIMIT 55 CONSTRUCTION ZONE REDUCE SPEED	5-26 1, 2, 3, 4 12	No Restrictions Long Term Construction Msg 55 MPH Logo	CONSTRUCTION	12		0
			ZONE	4		0
			REDUCE SPEED	12		0
SPEED LIMIT 55 CONSTRUCTION ZONE REDUCE SPEED	5-27 1, 2, 3 13	No Shoulder Long Term Construction Msg 55 MPH Logo	CONSTRUCTION	12	NO SHOULDER	11
			ZONE	4	FOR	3
			REDUCE SPEED	12	NEXT XX MILES	13
SPEED LIMIT 55 CONSTRUCTION ZONE REDUCE SPEED	5-28 1, 2, 3, 4 12	RT Lane Shift Long Term Construction Msg 55 MPH/Right Lane shift logo	CONSTRUCTION	12	LANE SHIFTS	11
			ZONE	4	STAY	4
			REDUCE SPEED	12	ALERT	5
SPEED LIMIT 55 CONSTRUCTION ZONE REDUCE SPEED	5-29 1, 2, 3, 4 12	Uneven Lanes Long Term Construction Msg 55 MPH Logo	CONSTRUCTION	12	UNEVEN LANES	12
			ZONE	4	STAY	4
			REDUCE SPEED	12	ALERT	5
SPEED LIMIT 55 CONSTRUCTION ZONE REDUCE SPEED	5-30 1, 2, 3, 4 12	Uneven Lanes_LT Lane Shift Long Term Construction Msg 55 MPH/Left Lane shift logo	CONSTRUCTION	12	UNEVEN LANES	12
			ZONE	4	LANE SHIFTS	11
			REDUCE SPEED	12	STAY ALERT	10
SPEED LIMIT 55 CONSTRUCTION ZONE REDUCE SPEED	5-31 1, 2, 3, 4 12	Uneven Lanes_RT Lane Shift Long Term Construction Msg 55 MPH/Right Lane shift logo	CONSTRUCTION	12	UNEVEN LANES	12
			ZONE	4	LANE SHIFTS	11
			REDUCE SPEED	12	STAY ALERT	10



5. CONGESTION (due to accident, road work, non-recurring)			LEGEND:			
Message ID			Messages for Pre-Entry Signs Only			
Sign Classes			Messages Generated by ATMS			
Max Characters	Message Title		Page 1		Page 2	
VARIABLE TEXT - Change as Required for Situation						
PennDOT Messages						
(I-XX EB) HEAVY CONGESTION	5-32	HWY_2digit_PennDOT	<i>I-XX EB</i>	7	STAY ALERT	10
	1, 2, 3, 4, 5, 6	HeavyCongestion	HEAVY	5	EXPECT	6
	10	Interstate Logo	CONGESTION	10	DELAYS	6
(I-XXX EB) HEAVY CONGESTION	5-33	HWY_3digit_PennDOT	<i>I-XXX EB</i>	8	STAY ALERT	10
	1, 2, 3, 4, 5, 6	HeavyCongestion	HEAVY	5	EXPECT	6
	10	Interstate Logo	CONGESTION	10	DELAYS	6
(PA-XX EB) HEAVY CONGESTION	5-34	State_2digit_PennDOT	<i>PA-XX EB</i>	8	STAY ALERT	10
	1, 2, 3, 4, 5, 6	HeavyCongestion	HEAVY	5	EXPECT	6
	10	Keystone Logo	CONGESTION	10	DELAYS	6
(PA-XXX EB) HEAVY CONGESTION	5-35	State_3digit_PennDOT	<i>PA-XXX EB</i>	9	STAY ALERT	10
	1, 2, 3, 4, 5, 6	HeavyCongestion	HEAVY	5	EXPECT	6
	10	Keystone Logo	CONGESTION	10	DELAYS	6
(US-X EB) HEAVY CONGESTION	5-36	US_1digit_PennDOT	<i>US-X EB</i>	7	STAY ALERT	10
	1, 2, 3, 4, 5, 6	HeavyCongestion	HEAVY	5	EXPECT	6
	10	US Logo	CONGESTION	10	DELAYS	6
(US-XX EB) HEAVY CONGESTION	5-37	US_2digit_PennDOT	<i>US-XX EB</i>	8	STAY ALERT	10
	1, 2, 3, 4, 5, 6	HeavyCongestion	HEAVY	5	EXPECT	6
	10	US Logo	CONGESTION	10	DELAYS	6
(US-XXX EB) HEAVY CONGESTION	5-38	US_3digit_PennDOT	<i>US-XXX EB</i>	9	STAY ALERT	10
	1, 2, 3, 4, 5, 6	HeavyCongestion	HEAVY	5	EXPECT	6
	10	US Logo	CONGESTION	10	DELAYS	6
Trucks Left Lane						
TRUCK/BUS ALERT LEFT LANE ONLY MP 227-220	5-39	Truck/Bus Alert (logo)	TRUCK/BUS ALERT	15		0
	1	Left Lane Only	LEFT LANE ONLY	14		0
	15	bet MP	MP XXX-XXX	10		0
TRUCK/BUS ALERT LEFT LANE ONLY	5-40	Truck/Bus Alert (logo)	TRUCK/BUS ALERT	15		0
	1	Left Lane Only	LEFT LANE	9		0
	15		ONLY	4		0

6. CURRENT WEATHER		LEGEND:			
		Messages for Pre-Entry Signs Only			
		Messages Generated by ATMS			
		VARIABLE TEXT - Change as Required for Situation			
Message ID	Message Title	Page 1		Page 2	
Sign Classes					
Max Characters					
6-1 1, 2, 3, 4 12	6.1_Quick_Weather Plan Level I, II	WEATHER	7	KEEP ALERT	10
			0	FOR CHANGING	12
		ALERT	5	CONDITIONS	10
6-2 ALL SIGNS 5	Cross Winds	HIGH	4	STAY	4
		CROSS	5		0
		WINDS	5	ALERT	5
6-3 ALL SIGNS 8	Flooding Generic location	ROADWAY	7	STAY	4
		FLOODING	8		0
		POSSIBLE	8	ALERT	5
6-4 1, 2, 3, 4, 5, 6 10	Fog	DENSE FOG	9	SLOW DOWN	9
			0		0
		AHEAD	5	STAY ALERT	10
6-5 1, 2, 3, 4, 5, 6 10	Rain and ponding water ATMS Slippery logo	HEAVY	5	SLOW DOWN	9
		RAIN	4		0
		AHEAD	5	STAY ALERT	10
6-6 1, 2, 3, 4, 5, 6 10	Severe Heat Warning	EXCESSIVE	9	DIAL *11	8
		HEAT	4	FOR	3
		ALERT	5	ASSISTANCE	10
6-7 1, 2, 3, 4 12	Severe Thunderstorm Alert	SEVERE	6	KEEP ALERT	10
		WEATHER	7	FOR CHANGING	12
		ALERT	5	CONDITIONS	10
6-8 1, 2, 3 13	Speed limit Restriction 25 HAR. 25 MPH Logo	WEATHER ALERT	13	TUNE	4
		SPEED LIMIT	11	TO	2
		25 MPH	6	1640 AM	7
6-9 1, 2, 3 13	Speed limit Restriction 25 TruckTrailerRestr. 25 MPH Logo	WEATHER ALERT	13	TRUCK AND	9
		SPEED LIMIT	11	TRAILER	7
		25 MPH	6	RESTRICTIONS	12
6-10 1, 2, 3 13	Speed limit Restriction 45 HAR. 45 MPH Logo	WEATHER ALERT	13	TUNE	4
		SPEED LIMIT	11	TO	2
		45 MPH	6	1640 AM	7
6-11 1, 2, 3 13	Speed limit Restriction 45 TruckTrailerRestr. 45 MPH Logo	WEATHER ALERT	13	TRUCK AND	9
		SPEED LIMIT	11	TRAILER	7
		45 MPH	6	RESTRICTIONS	12
6-12 1, 2, 3 13	Speed limit Restriction HAR	WEATHER ALERT	13	TUNE	4
		REDUCE	6	TO	2
		SPEED	5	1640 AM	7
6-13 1, 2, 3 13	Speed limit Restriction TruckTrailerRestr	WEATHER ALERT	13	TRUCK AND	9
		REDUCE	6	TRAILER	7
		SPEED	5	RESTRICTIONS	12
6-14 1, 2, 3, 4, 5 11	Speed Reduction 25 25 MPH Logo	WINTER	6	REDUCED	7
		WEATHER	7	SPEED LIMIT	11
		ALERT	5	25 MPH	6
6-15 1, 2, 3, 4, 5 11	Speed Reduction 45 45 MPH Logo	WINTER	6	REDUCED	7
		WEATHER	7	SPEED LIMIT	11
		ALERT	5	45 MPH	6





6. CURRENT WEATHER		LEGEND:			
		Messages for Pre-Entry Signs Only			
		Messages Generated by ATMS			
		<i>VARIABLE TEXT</i> - Change as Required for Situation			
Message ID <i>Sign Classes</i>	Message Title	Page 1		Page 2	
Max Characters					
6-16 1, 2, 3 13	Weather Plan III	WEATHER ALERT	13	<i>Type</i>	4
		<i>Condition</i>	8	<i>of</i>	2
			0	<i>Restriction</i>	11
6-17 1, 2, 3 13	Weather Plan Level IV	WEATHER ALERT	13	ROADWAY	7
		TUNE TO	7	CLOSED	6
		1640 AM	7	<i>Location</i>	8
6-18 1, 2, 3, 4, 5, 6 9	Weather Plan Level IV-2	WEATHER	7	<i>Selected</i>	8
			0	<i>Safety</i>	6
		EMERGENCY	9	<i>Message</i>	7
6-19 1, 2, 3 13	White Out Conditions Reduce speed	WEATHER ALERT	13	STAY ALERT	10
		WHITE OUT	9		0
		CONDITIONS	10	REDUCE SPEED	12
6-20 ALL SIGNS 7	Winter Weather Alert	WINTER	6	TUNE	4
		WEATHER	7	TO	2
		ALERT	5	1640 AM	7



7. TRAVEL TIME		LEGEND:			
		Messages for Pre-Entry Signs Only			
		Messages Generated by ATMS			
		<i>VARIABLE TEXT</i> - Change as Required for Situation			
Message ID Sign Classes	Message Title	Page 1		Page 2	
Max Characters					
7-1 1, 2, 3 14	Travel Time 1 ATMS	TRAVEL TIME TO	14		0
		EXIT <i>XXX</i>	8		0
		<i>XX</i> MI <i>XX</i> MIN	14		0
7-2 1, 2, 3 14	Travel Time 2 ATMS	TRAVEL TIME TO	14	TRAVEL TIME TO	14
		EXIT <i>XXX</i>	8	EXIT <i>YYY</i>	8
		<i>XX</i> MI <i>XX</i> MIN	14	<i>YY</i> MI <i>YY</i> MIN	14

8. TOLL AND SERVICE PLAZA		LEGEND:			
		Messages for Pre-Entry Signs Only			
		Messages Generated by ATMS			
		VARIABLE TEXT - Change as Required for Situation			
Message ID	Message Title	Page 1		Page 2	
Sign Classes					
Max Characters					
8-1 ALL SIGNS 8	8.1_Quick_Plaza Limited Services	LIMITED	7	TUNE	4
		SERVICE	7	TO	2
		MILE <i>XXX</i>	8	1640 AM	7
8-2 1, 2, 3, 4, 5, 6 9	Cashless Toll In Effect HAR	CASHLESS	8	TUNE	4
		TOLL	4	TO	2
		IN EFFECT	9	1640 AM	7
8-3 1, 2, 3 14	Cashless Toll In Effect Keep Moving	CASHLESS	8	KEEP MOVING	11
		TOLL	4	AT <i>Interchange</i>	14
		IN EFFECT	9	INTERCHANGE	11
8-4 1, 2, 3 13	Cashless Toll Starting HAR	CASHLESS TOLL	13	TUNE	4
		STARTING	8	TO	2
		<i>Month / Day</i>	11	1640 AM	7
8-5 1, 2, 3 13	EZ Pass Express Lane Closed <small>All Traffic Keep Right. EZPass Logo.</small>	EZ PASS	7	ALL TRAFFIC	11
		EXPRESS LANES	13	KEEP	4
		CLOSED	6	RIGHT	5
8-6 1, 2, 3 13	EZ Pass Express Lanes Closed <small>At Interchange. EZPass Logo.</small>	EZ PASS	7	AT	2
		EXPRESS LANES	13	<i>Interchange</i>	11
		CLOSED	6	EXIT <i>XXX</i>	8
8-7 1, 2, 3 13	EZ Pass Express Lane Closed HAR. <small>EZPass Logo.</small>	EZ PASS	7	TUNE	4
		EXPRESS LANES	13	TO	2
		CLOSED	6	1640 AM	7
8-8 1, 2, 3 13	Heavy traffic Approaching Toll ahead	HEAVY TRAFFIC	13	STAY ALERT	10
		EXITING	7		0
		AT MILE <i>XXX</i>	11	EXPECT DELAYS	13
8-9 1, 2, 3 15	New cash Toll Rates	TOLL	4	<i>Time</i>	4
		INCREASE	8	<i>Date</i>	4
		IN EFFECT	9	TUNE TO 1640 AM	15
8-10 ALL SIGNS 8	New cash Toll Rates Now In effect	NEW CASH	8	NOW	3
		TOLL	4	IN	2
		RATES	5	EFFECT	6
8-11 1, 2, 3, 4, 5, 6 10	No Plaza Services	<i>NO Type</i>	7	NEXT PLAZA	10
		<i>Plaza</i>	5		0
		MILE <i>XXX</i>	8	MILE <i>XXX</i>	8
8-12 1, 2, 3, 4, 5, 6 10	Plaza Closed	<i>Plaza</i>	5	NEXT PLAZA	10
			0	LOCATED AT	10
		CLOSED	6	MILE <i>XXX</i>	8

EZPass
EXPRESS LANES
CLOSED

ALL TRAFFIC
KEEP
RIGHT

EZPass
EXPRESS LANES
CLOSED

AT
(INTERCHANGE)
EXIT (XXX)

EZPass
EXPRESS LANES
CLOSED

TUNE
TO
1640 AM



9. SPECIAL EVENTS		LEGEND:			
Message ID <i>Sign Classes</i> Max Characters		Messages for Pre-Entry Signs Only			
		Messages Generated by ATMS			
		<i>VARIABLE TEXT</i> - Change as Required for Situation			
Message Title		Page 1		Page 2	
9-1 ALL SIGNS 7	Generic name	<i>GENERIC</i>	7	TUNE	4
	Traffic	<i>NAME</i>	4	TO	2
	HAR	TRAFFIC	7	1640 AM	7
9-2 ALL SIGNS 7	Special event	<i>SPECIAL</i>	7	EXPECT	6
	Expect delays	<i>EVENT</i>	5		0
		<i>NAME</i>	4	DELAYS	6
9-3 ALL SIGNS 8	Special event	<i>SPECIAL</i>	7	USE	3
	Use exit	<i>EVENT</i>	5		0
		<i>NAME</i>	4	EXIT <i>XXX</i>	8



10. FUTURE EVENTS		LEGEND:			
		Messages for Pre-Entry Signs Only			
		Messages Generated by ATMS			
		<i>VARIABLE TEXT</i> - Change as Required for Situation			
Message ID	Message Title	Page 1		Page 2	
Sign Classes					
Max Characters					
10-1	Planned	ROAD CLOSED	11	I-76 EB	7
1, 2, 3, 4	Road Closure	<i>DofW / Date</i>	11	EXIT <i>XXX</i> TO	11
12		<i>Time TO Time</i>	12	EXIT <i>XXX</i>	8
10-2	Planned	SEVERE WEATHER	14		
1, 2, 3	Severe Weather	EXPECTED	8		
14	Expected	<i>Day of Week</i>	11		

11. SCHEDULED SAFETY MESSAGES		LEGEND:			
Message ID Sign Classes Max Characters		Messages for Pre-Entry Signs Only			
		Messages Generated by ATMS			
		VARIABLE TEXT - Change as Required for Situation			
Message Title	Page 1	Page 2			
11-1 1, 2, 3 14	Emergency Vehicle	MOVE OVER	9	IT'S	4
	Law	FOR	3	THE	3
	Message	EMERG VEHICLES	14	LAW	3
11-2 1, 2, 3, 4, 5, 6 10	Texting	DON'T TEXT	10	IT'S	4
	Law		0	THE	3
		AND DRIVE	9	LAW	3
11-3 1, 2, 3, 4, 5 11	Impaired Driving	DON'T DRIVE	11	DRIVE SOBER	11
	Message 1		0	OR GET	6
	Large	IMPAIRED	8	PULLED OVER	11
11-4 1, 2, 3, 4, 5 11	Impaired Driving	DRIVE SOBER	11		0
	Message 2	OR GET	6		0
	Small	PULLED OVER	11		0
11-5 ALL SIGNS 7	Impaired Driving	BUZZED	6	DRUNK	5
	Message 3	DRIVING	7		0
		IS	2	DRIVING	7
11-6 1, 2, 3 13	Impaired Driving	DRIVE SOBER	11	LAST YEAR	9
	Message 4	OR GET	6	XX DUI	6
		PULLED OVER	11	CRASHES IN PA	13
11-7 1, 2, 3, 4, 5, 6 10	Occupant Protection	BUCKLE UP	9	CLICK IT	8
	Message 1. Seat belt logo.	SEAT BELTS	10	OR	2
		SAVE LIVES	10	TICKET	6
11-8 ALL SIGNS 8	Occupant Protection	CLICK IT	8	DRIVE	5
	Message 2. Seat belt logo.	OR	2		0
		TICKET	6	SAFELY	6
11-9 1, 2, 3, 4, 5 11	Aggressive Driving	SLOW DOWN	9	AVOID	5
	Message 1		0	AGGRESSIVE	10
		SAVE A LIFE	11	DRIVING	7
11-10 ALL SIGNS 4	Aggressive Driving	SLOW	4	SAVE	4
	Message 2		0	A	1
		DOWN	4	LIFE	4
11-11 1, 2, 3 14	Motorcycle Safety	SHARE THE ROAD	14		0
	Message 1	WATCH FOR	9		0
		MOTORCYCLES	11		0
11-12 1, 2, 3, 4, 5, 6 10	Motorcycle Safety	SHARE	5	MOTORCYCLE	10
	Message 2	THE	3	SAFETY	6
		ROAD	4	MONTH	5
11-13 ALL SIGNS 7	Motorcycle Safety	WATCH 4	7	DRIVE	5
	Message 3	MOTOR	5		0
		CYCLES	6	SAFELY	6
11-14 1, 2, 3 14	Distracted Driving	DISTRACTED	10	KEEP ALERT	10
	Message 1	DRIVING	7	ON THE ROAD &	13
		CAUSES CRASHES	14	AT TOLL PLAZAS	14
11-15 1, 2, 3, 4, 5, 6 10	Stay Right, Pass Left	STAY RIGHT	10	IT'S	4
	Law		0	THE	3
	Message	PASS LEFT	9	LAW	3



11. SCHEDULED SAFETY MESSAGES		LEGEND:			
		Messages for Pre-Entry Signs Only			
Message ID		Messages Generated by ATMS			
Sign Classes		VARIABLE TEXT - Change as Required for Situation			
Max Characters	Message Title	Page 1		Page 2	
11-16 1, 2, 3 13	Headlights and wipers on Message 1	WIPERS ON	9	IT'S	4
			0	THE	3
		HEADLIGHTS ON	13	LAW	3
11-17 1, 2, 3 14	Buzzed Driving Drunk Driving logo	BUZZED DRIVING IS DRUNK DRIVING	14	DON'T DRIVE IMPAIRED	5
			2		5
			13		8
11-18 ALL SIGNS 8	Impaired Driving Drunk Driving logo	DON'T DRIVE IMPAIRED	5		0
			5		0
			8		0
11-19 1, 2, 3, 4, 5 11	Deer Awareness Deer logo	OCT - NOV DEER ACTIVE DUSK- DAWN	9	BE ALERT FOR DEER ON ROADWAY	8
			11		8
			10		10
11-20 1, 2, 3 14	Distracted Driving color	DISTRACTED DRIVING CAUSES CRASHES	10	KEEP ALERT ON THE ROAD & AT TOLL PLAZAS	10
			7		13
			14		14
11-21 1, 2, 3 14	Motorcycle Safety color	SHARE THE ROAD WATCH FOR MOTORCYCLES	14		0
			9		0
			11		0
11-22 TOO BIG 18	Move Over color	STATE LAW MOVE OVER AND SLOW DOWN FOR	9	EMERGENCY VEHICLES MAINTENANCE AND TOW TRUCKS	18
			13		15
			13		10
11-23 1, 2, 3, 4, 5, 6 10	Operation Orange Squeeze Orange Squeeze logo	SLOW DOWN IN WORK ZONES	9		0
			2		0
			10		0
11-24 1, 2, 3, 4, 5 11	Trip Talk Trip Talk logo	PLAN AHEAD W/ TRIPTALK APP	10		0
			11		0
			3		0
11-25 TOO BIG 16	Veterans Day color	THANK YOU VETERANS FOR YOUR SERVICE	9	SEATBELTS SAVE LIVES	9
			8		4
			16		5

BUZZED DRIVING IS DRUNK DRIVING



DON'T DRIVE IMPAIRED



DON'T DRIVE IMPAIRED



DISTRACTED DRIVING CAUSES CRASHES

KEEP ALERT ON THE ROAD & AT TOLL PLAZAS

SHARE THE ROAD WATCH FOR MOTORCYCLES

STATE LAW MOVE OVER AND SLOW DOWN FOR

EMERGENCY VEHICLES MAINTENANCE AND TOW TRUCKS

SLOW DOWN IN WORK ZONES



THANK YOU VETERANS FOR YOUR SERVICE

SEATBELTS SAVE LIVES



12. SIGN TESTING		LEGEND:				
		Messages for Pre-Entry Signs Only				
		Messages Generated by ATMS				
		VARIABLE TEXT - Change as Required for Situation				
Message ID	Sign Classes	Message Title	Page 1		Page 2	
Max Characters						
12-1	SAT		STAY ALERT IN	13	SIGN	4
1, 2, 3	Message		CONSTRUCTION	9	UNDER	9
13	PA Turnpike Logo		ZONES	9	TEST	5

**STAY ALERT IN
CONSTRUCTION
ZONES**

**PENNA
TURN
PIKE
SIGN
UNDER
TEST**

13. FOG WARNING SYSTEM				LEGEND:								
Message ID Sign Classes Max Characters		Message Title	Page 1	Page 2	Page 3							
13-1 1, 6 7		13-1_Quick_Reduced Vision Ahead	REDUCED VISION AHEAD	7 6 5	0 0 0							
13-2 1, 6 8		Reduced vision XX miles ahead	REDUCED VISION	7 6 0	XX MILES AHEAD	8 5 0	0 0 0					
13-3 1, 6 8		Reduced vision ahead Prepare to Stop	REDUCED VISION AHEAD	7 6 5	PREAPARE TO STOP	8 2 4	0 0 0					
SPEED LIMIT 30	REDUCED VISION AHEAD	13-4 1, 6 8	Reduced vision ahead SP30 30 mph logo.	REDUCED VISION AHEAD	7 6 5	SPEED LIMIT 30 MPH	5 5 6	TRUCKS KEEP RIGHT	SPEED LIMIT 30	SPEED LIMIT 30 MPH	SPEED LIMIT 30	TRUCKS KEEP RIGHT
SPEED LIMIT 40	REDUCED VISION AHEAD	13-5 1, 6 8	Reduced vision ahead SP40 40 mph logo.	REDUCED VISION AHEAD	7 6 5	SPEED LIMIT 40 MPH	5 5 6	TRUCKS KEEP RIGHT	SPEED LIMIT 40	SPEED LIMIT 40 MPH	SPEED LIMIT 40	TRUCKS KEEP RIGHT
SPEED LIMIT 50	REDUCED VISION AHEAD	13-6 1, 6 8	Reduced vision ahead SP50 50 mph logo.	REDUCED VISION AHEAD	7 6 5	SPEED LIMIT 50 MPH	5 5 6	TRUCKS KEEP RIGHT	SPEED LIMIT 50	SPEED LIMIT 50 MPH	SPEED LIMIT 50	TRUCKS KEEP RIGHT
SPEED LIMIT 30	SPEED LIMIT 30 MPH	13-7 1, 6 6	SP 30 Slow Down 30 mph logo.	SPEED LIMIT 30 MPH	5 5 6	SLOW DOWN	4 0 4		SPEED LIMIT 30	SLOW DOWN		
SPEED LIMIT 40	SPEED LIMIT 40 MPH	13-8 1, 6 6	SP 40 Slow Down 40 mph logo.	SPEED LIMIT 40 MPH	5 5 6	SLOW DOWN	4 0 4		SPEED LIMIT 40	SLOW DOWN		
SPEED LIMIT 50	SPEED LIMIT 50 MPH	13-9 1, 6 6	SP 50 Slow Down 50 mph logo.	SPEED LIMIT 50 MPH	5 5 6	SLOW DOWN	4 0 4		SPEED LIMIT 50	SLOW DOWN		

Addendum No. 1

RFP #18-10480-8234

Systemwide Dynamic Message Sign Systems

Prospective Respondents: You are hereby notified of the following information in regard to the referenced RFP:

REVISIONS

1. Replace Appendix G – Minimum Technical Requirements in its entirety with Appendix G – Minimum Technical Requirements – Addendum No 1 as provided to this Addendum.

Note. Additional requirements were added to the Communications and DMS software sections.

2. Replace Appendix J – Minimum Technical Requirements Traceability Matrix in its entirety with Appendix J – Minimum Technical Requirements Traceability Matrix – Addendum No 1 as provided to this Addendum.

Note. Additional requirements were added to the Communications and DMS software sections.

ADDITIONS

1. Appendix L – Security Requirements

QUESTIONS AND ANSWERS

Following are the answers to questions submitted in response to the above referenced RFP as of July 12, 2018. All of the questions have been listed verbatim, as received by the Pennsylvania Turnpike Commission.

Proposer Questions		Pennsylvania Turnpike Commission (PTC)			
		Systemwide Dynamic Message Sign Systems RFP #18-10480-8234			
#	Page	Section	Section Description	Proposer Question	Commission Response
1.				With the potential for a nine (9)-year contract and changes in inflation and other factors, will both parties, the Commission and the DMS provider, have the opportunity to negotiate unit pricing after year three and each additional extension?	Refer to the RFP, Section I-24. Term of Contract.
2.				If the Diverse Business Program is to be addressed within the RFP response, does PTC have any recommendations for organizations we can post public solicitations for interested Diverse Business (DB) Firms? Is there a location we can go to that provides a listing of these organizations?	Refer to Appendix E DIVERSE BUSINESS (DB) REQUIREMENTS, definition section #8 which lists 5 organizations that could be contacted.
3.				If the Diverse Business Program is to be addressed within the RFP response, does PTC have any specific format they would like to see a good faith effort to solicit Diverse Business (DB) subcontractors? Would a public solicitation meet this requirement?	A letter or email exchange showing the good faith effort is acceptable. Also refer to the Appendix E DIVERSE BUSINESS (DB) REQUIREMENTS, section 1c, Actions required during the procurement/consultant selection phase item b. Section 2 identifies what must be included in a good faith effort.

Proposer Questions		Pennsylvania Turnpike Commission (PTC)			
		Systemwide Dynamic Message Sign Systems RFP #18-10480-8234			
#	Page	Section	Section Description	Proposer Question	Commission Response
4.				Do you require the sign faces to be aluminum masked with polycarbonate faces?	DMS enclosures, including sign faces, shall be in accordance with PennDOT Publication 408/2016-3, Section 1230, as referenced in the RFP.

All other terms, conditions and requirements of the original RFP dated June 22, 2018 remain unchanged unless modified by this Addendum.

APPENDIX G

MINIMUM TECHNICAL REQUIREMENTS

GENERAL

The Proposer shall design and furnish a typical highway usage Light Emitting Diode (LED) Dynamic Message Signs (DMS) as described herein. The DMS shall utilize the existing Commission Advanced Traffic Management System (ATMS) software that is capable of controlling all of the Commission's existing and proposed DMS from this contract. This document describes the functional sign requirements for several locations. The DMS, depending on the location, shall electronically vary the visual textual word, number, symbolic or graphic display as traffic conditions warrant.

Design, furnish, integrate, and test all DMS as described herein. These signs shall be Full Matrix, Full Color, LED-based DMS. Provide all information necessary to support the Commission in integration of the DMS into the Commission's ATMS.

It is the sole responsibility of the Proposer to design, furnish, and integrate a fully functional DMS system, to the approval of the Commission. No additional payments will be made to the Proposer for the DMS system, unless additional work items are mutually agreed upon by both the Proposer and the Commission.

Material – Provide a fully debugged DMS system complete with all individual units, components, software modules, cabling, connectors, etc. that are completely compatible with each other and is capable of being controlled by the current ATMS workstations operated by the Commission.

General Requirements – The Dynamic Message Sign shall be designed in accordance with the latest versions of the following: PennDOT Publication 647, AASHTO Standards Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, MUTCD, NEMA, and NEC Codes. The DMS shall be manufactured from an ISO-9001 certified facility.

The power, communications, foundation, structure and attachment details for each DMS and control cabinet will be designed and furnished by others.

Each new DMS shall be compatible with the Commission ATMS software. The Proposer will support the Commission as required in the configuration of each DMS into the ATMS system with pre-established IP addresses provided by the Commission.

The Freeway Size DMS (Type 1) shall be comprised of multiple pixel based modules, containing full color LED technology, arranged to form a full matrix display. The matrix shall be capable of displaying, at a minimum, three (3) rows of fifteen (15) characters, with a nominal character size of 18-inches and a pixel pitch of between 0.79 to 0.81-inches. It shall have walk-in sign access and a maximum weight of 4,000 pounds.

The Arterial Size DMS (Types 2 and 3) shall be comprised of multiple pixel based modules, containing full color LED technology, arranged to form a full matrix display. The following characteristics are required of each sign Type:

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- Type 2 – Provide a matrix capable of displaying, at a minimum, three (3) rows of twelve (12) characters each, with a nominal character size of 12-inches and pixel pitch of between 0.79 to 0.81-inches.
- Type 3 – Provide a matrix capable of displaying, at a minimum, three (3) rows of eleven (11) characters each, with a nominal character size of 12-inches and a pixel pitch of between 0.79 to 0.81-inches.

The Arterial Size DMS shall have front sign access and a maximum weight of 1,200 pounds.

The DMS shall utilize full-color technology, in which the LED module is comprised of Red, Green and Blue LEDs. Each new DMS shall be mounted on a structure conforming to the Commission's ITS Standards.

Light Emitting Diodes (LEDs)

- A. The LEDs that make up the display modules shall be high luminous intensity T-1 3/4" type manufactured by a reputable manufacturer, such as Avago Technologies (formerly Agilent Technologies), Nichia Corporation, OSRAM, CREE or EOI. The LEDs shall have an ultraviolet light inhibitor in the epoxy dome package and be of a production type already tested for use in high vibration commercial traffic environments and climate of the northeastern United States.
- B. Each Full-color DMS LED module shall be comprised of Red Green and Blue LEDs that meet the following specifications:
 - 1. Red LEDs shall utilize AlInGaP semiconductor technology and shall emit red light that has a peak wavelength of 615-635nm.
 - 2. Green LEDs shall utilize InGaN semiconductor technology and shall emit green light that has a peak wavelength of 520-535nm.
 - 3. Blue LEDs shall utilize InGaN semiconductor technology and shall emit blue light that has a peak wavelength of 464-475nm.
- C. All LEDs shall have a nominal viewing cone of 30 degrees with a half-power angle of 15 degrees measured from the longitudinal axis of the LED.
- D. The LEDs shall be rated by the LED manufacturer to have a minimum lifetime of 100,000 hours of continuous operation while maintaining a minimum of 70% of the original brightness.
- E. The LEDs used in the display shall be obtained from batches sorted for luminous output, where the highest luminosity LED in the batch shall not be more than fifty percent more luminous than the lowest luminosity LED in the batch when operated at the manufacturer's recommended drive current. To ensure uniformity of display and operational life, all LEDs used to make up a display module shall be obtained from the same manufacturing batch.

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- F. The LED manufacturer shall perform intensity sorting of the bins. LEDs shall be obtained from no more than two (2) consecutive luminous intensity “bins” as defined by the LED manufacturer.
- G. The LED manufacturer shall perform color sorting of the bins. LEDs shall be obtained from no more than two (2) consecutive color “bins” as defined by the LED manufacturer.
- H. The LED mean time before failure (MTBF) shall be a minimum of 100,000 hours of elapsed time calendar hours use in an ambient temperature of 131 degrees Fahrenheit, based on an average daily on-time usage factor of 50%, when driven at the specific forward current recommended by the LED manufacturer for normal daylight DMS display operation. As part of the LED manufacturer's technical specification sheet submittal, the specific forward current shall be noted.
- I. The statistical average long term light output degradation of the LEDs used in the display, operated at the LED manufacturer's recommended drive current to achieve a minimum of 100,000 hours of operation without catastrophic failure in an ambient temperature of 131 degrees Fahrenheit, shall not exceed the following:
 - 1. A maximum of 10% reduction in light output after 10,000 hours of continuous on time.
 - 2. A maximum of 25% reduction in light output after 50,000 hours of continuous on time.
 - 3. A maximum of 30% reduction in light output after 100,000 hours of continuous on-time.
 - 4. Manufacturer's documentation for high temperature operating life (HTOL) shall indicate if HTOL values are based upon actual or extrapolated data.

LED Display Modules

- A. The LED display modules shall have a minimum refresh rate of 60 times per second to prevent visible flicker.
- B. The LEDs shall be grouped in pixels consisting of discrete LEDs arranged in a continuous matrix display with individual pixel addressability. The centers of all pixels shall be arranged so as to maintain the same horizontal and vertical spacing between adjacent pixels. All pixels shall be replaceable. The LED grouping and mounting angle shall be optimized for maximum readability.
- C. The electronics for the DMS shall be fully configured to drive the total required number of LEDs. The failure of any one pixel shall not affect the operation of any other pixel. The power driver circuitry shall be designed to minimize power consumption. Each LED display module shall have a diagnostic capability to detect a failure on the LED display module, down to the pixel level and report the failure to the DMS controller.
- D. Removal of any display module shall not affect the operation of the remaining modules.

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- E. The LED modules shall be protected from degradation due to sunlight. The method used shall not obstruct the view of the display or reduce the viewing angle below that provided by an unprotected LED module. The method and design of the DMS sunlight protection shall be approved by the Commission or its Representative.
- F. Each pixel shall contain an adequate number of discrete LEDs, based on a nominal pixel spacing of 0.79 to 0.81 inches, center to center, to meet the luminosity requirements herein.
- G. Each discrete LED on the display module is driven at the LED manufacturer's recommended drive current to achieve a minimum of 100,000 hours of operation without catastrophic failure.
- H. All DMS must be capable of meeting or exceeding the Manual of Uniform Traffic Control Devices (MUTCD) guidelines for inter-character and inter-line spacing of 25% and 50% of character height, respectively.
- I. The 18" character of the Freeway DMS shall be clearly visible and legible from in-vehicle distance of 1,000 feet from the DMS face under clear daylight and nighttime conditions with the DMS face positioned in the roadway line of sight. The 12" character of the Arterial DMS shall be clearly visible and legible from in-vehicle viewing distance of 600 feet from the DMS face under clear daylight and nighttime conditions with the DMS face positioned in the roadway line of sight.

Dimming Circuitry

- A. The DMS shall have a photocell controlled dimming circuit which shall automatically adjust the luminance of the LED display pixels in accordance with ambient light conditions. As part of the Proposer's submittal, a complete schematic of the LED display power, driver and dimming circuits shall be provided for approval by the Commission.
- B. Continuous current drive shall be used at the maximum brightness level. The current used for maximum brightness shall not exceed the current used to achieve the rated mean time before failure (MTBF). The current used for maximum brightness shall be indicated as part of the submittal.
- C. For luminance levels less than maximum brightness, either continuous current drive or current pulse width modulation shall be used to dim the LEDs. If pulse width modulation is used, the dimming circuit shall be designed so that the maximum, instantaneous and average currents shall not exceed the rated peak and transient forward current ratings of the LEDs.
- D. The DMS shall be equipped with a minimum of two external light sensors oriented in opposite directions and shall be scaled for up to 100,000 lux.
- E. The LED dimming circuit shall also incorporate temperature controlled dimming, which shall reduce the current through the LEDs based on the temperature inside the DMS enclosure, so that the LED current does not exceed the rated LED current at that

temperature. If the temperature of the DMS exceeds the rated operating temperature of the LEDs the DMS shall blank-out, until the temperature has returned to safe operating levels.

- F. The LED dimming circuit shall not cause the LED display to flicker as the temperature oscillates above and below the rated operating temperature of the LEDs.

Power Supply

- A. The DMS shall be operated at a low internal DC voltage not exceeding 24 Volts.
- B. The quantity of power supplies and current rating of each power supply shall be at least 25% spare capacity over that required to light every pixel of the DMS at full brightness.
- C. The DMS and controller shall have redundant power supplies wired so that in the event of a failure of any one power supply, the second power supply shall automatically power that portion of the sign. Power supply failure shall be automatically reported by the DMS controller when polled by the DMS Central Processor.
- D. The power supplies shall be short circuit protected and shall reset automatically after 5 seconds of AC power off. The power supplies shall be protected by a suitable overcurrent protection device.
- E. The power supply shall have an efficiency rating of 85%, minimum.
- F. The operating temperature range of the power supply inside the DMS enclosure shall be negative 20 degrees Fahrenheit to 140 degrees Fahrenheit.
- G. The power supply shall be UL listed.

Sign Enclosures

The DMS enclosures shall be of such design and shape as to house all necessary LED display modules, LED display driver electronics, transformers, and power supplies unless otherwise indicated on the Contract Drawings.

- A. The DMS enclosures shall have a weatherproof housing and all internal components shall be non-condensing and withstand a humidity range of 0 to 99%, non-condensing.
- B. The DMS enclosures shall be constructed of corrosion resistant aluminum material conforming to the following:
 - 1. Sheet aluminum shall be fabricated from aluminum alloy sheet meeting the requirements of ASTM B 209, Alloy 5052, Temper H3, or equivalent, minimum 0.125 inch thick. Cast aluminum shall be fabricated from aluminum alloy meeting the requirements of ASTM B 686, Alloy A 356 (A 13560) or equivalent. Flat cast surfaces exceeding 12 inches in both directions shall have a minimum thickness of 0.25 inches. Flat cast surfaces not exceeding 12 inches in both directions shall have a minimum thickness of 0.187 inches.

2. All DMS enclosures shall meet the requirements for TYPE 3R enclosures according to NEMA Standard Publication 250, as well as those of PennDOT Publication 408/2016-3, Section 1230 and Publication 647. All seams and openings shall be designed to prevent entry of water resulting from high pressure washing of the DMS enclosure.
3. Unpainted aluminum DMS enclosures shall be fabricated from mill-finish material and shall be cleaned using appropriate methods that will remove oil, film, weld black, and mill ink marks and render the surface clean, bright, smooth, and non-sticky to touch.
4. Isolate all adjacent dissimilar materials, as approved by the Commission.
5. All nuts and bolts used in the DMS assembly shall be stainless steel. All connecting surfaces shall be weatherproof and watertight when secured. All internal components shall be mounted so that there are no external protrusions.
6. The DMS shall be in accordance with the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals, except as modified herein: The DMS enclosures shall be designed and constructed to present a clean, neat appearance and the equipment located inside shall be adequately protected from moisture, dust, dirt, corrosion, and excessive heat.
7. All surfaces shall be suitably protected from the weather. All corners and seams shall be heli-arc welded to provide a weatherproof seal around the entire case.
8. The DMS enclosure shall not be adversely affected by salt from the roadways or marine environments or chemicals or fumes discharged from nearby automobiles, industries and other sources. The interior of the DMS face window and the LEDs shall be easily accessible for cleaning and other maintenance.
9. Appropriate precautions, such as heating elements or ventilation fans or openings, shall be taken to ensure that condensation does not occur between the matrix elements and the DMS window face, and that the environment inside all enclosures remains within the temperature and humidity limits required for proper operation of the sign's electronic components.
10. Provide temperature sensor(s) in the DMS enclosure that is/are controlled and monitored by the DMS controller. Provide the capability for user defined critical thresholds to be established and changed remotely from the Commission's Highspire Traffic Operations Center (TOC) or other location using the sign controller.
11. Provide humidity sensor(s) within the DMS enclosure that can detect relative humidity from 0%-100% in 1% or smaller increments. Provide an interface between the humidity sensor and the DMS controller which allows humidity levels to be monitored remotely from the TOC. Provide a sensor with an accuracy that exceeds 5% relative humidity.

12. All hinges used shall be continuous stainless steel, equipped with stainless steel hinge pins. Each hinge shall be secured with stainless steel bolts and lock nuts. The hinge pins and bolts shall be tamper proof.
 13. The dead load shall consist of the total weight as installed of the DMS enclosure and appurtenances. The point of application of weights of the individual items shall be their representative centers of gravity.
 14. Ice load shall be as per AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals, except that ice load shall be applied to all sides and top surfaces of the DMS enclosure simultaneously.
 15. Wind load shall be as per AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals, except as modified herein: the enclosure and their mountings shall withstand a sustained wind speed of 90 miles per hour (mph), with a gust factor of 1.3.
 16. Full 100 percent impact shall be used for handling and erection stress.
- C. The signs shall be capable of being mounted without gaining access to the inside of the enclosure. All mounting eyes shall be attached to the DMS enclosure structural framing. The DMS enclosure shall be adaptable for mounting as shown in PennDOT Publication 647.
 - D. Removal of any of the display modules or any other electronic or electrical component, shall not alter the structural integrity of the DMS display assembly or the DMS enclosure.
 - E. For Type 1 DMS, access to the interior of the DMS enclosure shall be walk-in access. Access to the interior of the Types 2 and 3 DMS enclosure shall be front access. Opening door(s) shall allow maintenance personnel immediate access to circuit boards and internal sign parts, without having to remove any item in the sign, or the need to use any tools or to remove any device that could be dropped or lost, such as a locking pin or bolt. Each door shall be sealed to prevent the elements from entering, and shall have at least two locking points to keep unauthorized persons from accessing the interior of the DMS. In addition, each door shall be provided with rigid, telescopic, retention device, to keep the door in the open position. All doors, when in the open position, shall not obstruct any portion of the opening. The door system shall pull the door tight and compress a gasket located around the perimeter. The gasket shall prevent water from entering the interior of the cabinet.
 - F. All serviceable components shall be modular, interchangeable and removable from within the DMS enclosure. The sign design shall allow unobstructed and convenient access to all serviceable components within the DMS enclosure and between the DMS display and the DMS display cover.
 - G. Drain holes shall be provided and designed to remove any condensation that may form inside the DMS enclosure and allow any water that may have collected in the housing to escape. All holes shall be screened to prevent small objects, insects and creatures from entering into the enclosure.

Ventilation Requirements for Type 1 DMS

- A. Heating, cooling and/or dehumidifying equipment shall be sized to maintain the internal DMS enclosure temperature within the operating ranges of the electric, electronic and mechanical equipment components. The environmental equipment shall have controls which shall shut down the DMS just prior to the temperature that the interior of the enclosure reaches the rated maximum operating temperature of the LEDs, and shall restore operation when the temperature has returned to safe operating levels. The shutdown shall be automatically reported by the DMS controller when polled by the DMS Central Processor.
- B. Electric ventilation fans shall be provided to generate positive pressure ventilation and shall be sized to provide 25 percent excess ventilation capacity, with one fan inoperative, over that required to maintain the DMS enclosure interior temperature within the range over which the DMS components can operate without failure or degradation, during full daylight heat gain conditions. All fans shall have ball or roller bearings. Fan operation and failure shall be reported to the DMS Central Processor via the communications protocol.
- C. Louvered air inlets with removable, non-proprietary 500 micron, 2-stage filters and air deflector, sized to provide a maximum air intake velocity of 600 feet per minute with all fans operating. The direction of airflow and the filter characteristics (i.e., filter model number, type, dimensions, and particle size) shall be permanently engraved on each air vent. Exhaust air vents, if without filters, shall be screened to prevent small objects and creatures from entering into the enclosure.

Ventilation Requirements for Types 2 and 3 DMS

Ventilation Requirements for Types 2 and 3 DMS shall be identical to those for the Type 1 DMS. A vent-free DMS housing for Types 2 and 3 DMS may be considered by the Commission if satisfactory evidence of proper operation is supplied with the technical submittal, including factory or third-party certification. Vent-free design shall ensure that the DMS enclosure interior temperature does not exceed the maximum range of the DMS components to ensure continued operation without failure or degradation, particularly during full daylight heat gain.

DMS Controller

- A. The DMS controller shall be a microprocessor-based unit with sufficient on-board memory and input and output interfaces to provide all the functions required by this Section.
- B. Proposer shall supply a (minimum) 30-minute battery backup for all DMS controllers.
- C. The DMS controller shall accommodate both local and remote control from multiple host devices as described herein. Local control shall be supported from a locally connected sign programmer. Remote control shall be supported from a remotely located DMS Central Processor (control computer system).

- D. The DMS controller shall receive and interpret commands sent by the host device to either configure the DMS or cause a requested message to be displayed on the DMS. Based on the command, the DMS Controller shall provide return data to the host device to provide information about the status of the sign.
- E. The DMS controller shall be capable of simultaneously receiving commands from and transmitting status data to multiple host devices; i.e., the sign programmer, local control panel and the DMS Central Processor.
- F. The method of control of the DMS shall be dependent upon the setting of the Control Mode Selector switch in each local control panel. This switch shall allow for two modes of operation:
 - 1. "Remote" mode: This is the normal mode of operation of the DMS, where all control is from a remote DMS Central Processor, via NTCIP data exchanged directly between the remote DMS Central Processor and the DMS controller.
 - 2. "Local" mode: When the Control Mode Selector switch is in this position, control from the remote DMS Central Processor shall be disabled and the DMS shall be controlled in accordance with commands entered via the message selector switch on the Local Control Panel or a NTCIP data exchanged directly with a locally connected Sign Programmer. When in "local" mode, the remote DMS Central Processor shall still be able to monitor the status of the DMS.
- G. When switching from one mode to another, the DMS shall continue to display its current message, until it receives a command to display another message, from either the remote DMS Central Processor or the local controls, as applicable.
- H. A change of position of the mode selector switch shall be immediately reported to the DMS Central Processor in the form of an alarm, and shall be logged internally at the site CPU for retrieval on the next polling cycle, and in accordance with the communications protocol.
- I. Each DMS controller shall have error detection and reporting features which shall be utilized to guard against incomplete or incorrect information transmission, message generation and display on the DMS, as well as provide capability to detect a failure down to a replaceable component and report the failure and failed component. All errors and hardware failures shall be logged and reported to the DMS Central Processor or Sign Programmer (if connected) via the communications protocol. The DMS controller shall have the capability to automatically recover from failure conditions when the failure conditions are corrected or the failures are no longer present, and report the restored operation of the DMS to the DMS Central Processor or Sign Programmer (if connected).
- J. The DMS controller shall have diagnostic capabilities features to:
 - 1. Perform redundant checking of all data received and transmitted, and incorporate cyclic redundancy check (CRC) error detection logic, as specified by the NTCIP standards.
 - 2. Validate the content of all received transmissions.

3. Check and report logic or data errors.
 4. Monitor status for communication line malfunction or break.
 5. Respond to system polling from the DMS Central Processor.
 6. Check and report errors in display driver operation.
 7. Check and report the failure and location of bad pixels.
 8. Check and report the failure of bad fans.
 9. Check and report whether the controller cabinet or DMS enclosure door is open or closed.
 10. Check the operation and report the failure and location of bad power supplies.
 11. Check the duration of power failures.
 12. Check and report the number of occurrences the watchdog timer resets the controller.
- K. Whenever any of the following error or failure conditions is detected, the DMS controller shall blank the DMS and shall include the error or failure in the return message:
1. The number of pixels that are not working for the particular sign type exceed a specified maximum value. The Proposer shall determine this number for each sign type and have these numbers approved by the Commission.
 2. The ratio of the number of pixels that achieve a commanded state divided by the number of pixels commanded to that state exceeds a legibility threshold value. The test shall include only those pixels that are contained in the character positions of the message text.
 3. Communication loss greater than a configurable time value measured in minutes. The default value shall be 10 minutes. If a system poll is not received within a configurable threshold period, the controller shall blank all signs connected to it. The configuration of system polling shall also have an option for disabling this feature.
 4. Upon detection of a power failure to the DMS controller or the DMS display(s) connected to the controller, the current message displayed on the DMS just prior to the power failure shall be retained in memory.
 5. Upon power restoration, the DMS shall remain blank if the duration of the power failure exceeded the configurable long term power failure duration threshold, else the previous message shall be restored to its respective DMS. The default value of the long term power failure duration threshold shall be 10 minutes.

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6. Overheating condition in DMS enclosure: The LED dimming circuit shall also incorporate temperature controlled dimming, which shall reduce the current through the LEDs based on the temperature inside the DMS enclosure, so that the it does not exceed the rated LED current at that temperature. If the temperature of the DMS exceeds the rated operating temperature of the LEDs, the DMS shall blank-out until the temperature has returned to safe operating levels.
 7. Information on each of the specific failures shall be sent to the DMS Central Processor.
- L. Each DMS controller shall have the capability of displaying messages transmitted directly from a DMS Central Processor or Sign Programmer in addition to displaying locally commanded messages from a pre-programmed local message library. Each sign's local message library shall have the capacity to store a minimum of 256 display messages with related display attributes for each message, such as flashing rate and percent "on" time. The local message library shall consist of:
1. A "changeable, non-volatile" local message library stored in battery-backed RAM. The changeable local message library shall be programmable through both the DMS Central Processor and the Sign Programmer.
 2. A "permanent, non-volatile" local message library, stored on EPROM shall be provided. Battery-backed RAM memory shall not be acceptable. If a microprocessor-based controller is used, then EEPROM, flash RAM or similar technology memory devices, programmed as described herein, may be used to store the message library.
- M. Each DMS controller shall write messages on the DMS at a minimum rate of 300 characters per second.
- N. Each DMS controller shall have an easily accessible and clearly labeled ON/OFF switch. When in the "OFF" position all power shall be disconnected from the DMS control electronics and matrix units and the DMS shall blank-out.
- O. The Proposer shall provide a means of establishing a monetary reset switch on the DMS controller. The contact switch shall reset the DMS controller when depressed. Operation of the momentary contact switch shall not require the user to hold the switch in the depressed position for more than 0.25 seconds.
- P. The DMS controller shall interface and communicate with one or more Operator Interfaces, as indicated on the Contract Drawings. Operator Interfaces and associated functions shall be as described elsewhere herein.
- Q. The DMS controller shall be provided with all software and hardware required to perform the following functions:
1. Password protection to restrict access to control and configuration functions.
 2. Fully programmable parameters for all functions described in this section.

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3. Real-time clock and calendar for timing and scheduling of automatic functions. The calendar shall automatically adjust itself for leap years, and for changeover from Standard to Daylight savings time and back.
4. Variable message flash rate and percent "on" time.
 - a. Flash rate shall be adjustable in one-tenth second increments.
 - b. Percent "on" time shall be adjustable from 0 to 9.9 seconds, in one-tenth second increments.
5. Multi-page messages with variable page display times that are adjustable in one-tenth second increments from 0 to 15.0 seconds.
6. Negative text inversion (or inverse/reverse video) - switch between illuminated text on a dark background or dark text on an illuminated background. Inverse/reverse video shall be implemented with the use of standard NTCIP foreground and background objects.
7. Configurable line justification (center, left or right) with center justification as the default setting.
8. Configurable page justification (top, center, bottom) with center justification as the default setting.
9. Configurable message duration parameter, to specify how long the current message should remain displayed regardless of the status of the communications with the DMS Central Processor.
10. Communications Loss message threshold, to specify how long the current message should remain displayed in the absence of communications with the DMS Central Processor.
11. Control of pixel luminance levels, both directly and based on ambient light levels obtained from the photocells. Luminance levels shall be stored in the DMS controller and shall be adjustable, in a range of 0 to 255, on either a continuous logarithmic basis, to match the normal human eye luminous response characteristic, or a 1/2 incremental dimming basis, where each lower dimming level is 1/2 the previous level.
12. Monitoring of each pixel of the DMS.
13. Monitoring of power failures: When a power failure is detected, the displayed message shall be retained in memory. If power to the DMS controller is restored within a configurable period of time, the last displayed message shall be restored. If the duration of the power failure exceeds the configured period of time, the DMS shall remain blank, until a command to display a message is received. Upon restoration of power, the DMS controller shall report the occurrence, time and duration of the power failure, to the DMS Central Processor or Sign Programmer, if connected.

14. Hardware watchdog timer: The DMS controller shall have a hardware watchdog timer that shall check for a stall condition in the controller hardware, software or firmware. While the DMS controller is powered on, the software shall poll the watchdog timer. Upon reset, the watchdog timer shall initialize its timing circuit. If the watchdog timing circuit times out without being reset by the software, the watchdog counter shall be incremented, and the watchdog shall reset the controller to clear a potential stall condition from the hardware, software or firmware and send an error message to the DMS Central Processor or Sign Programmer (if connected) to advise of the condition. The number of occurrences that the watchdog timer resets the controller shall be transmitted to the DMS Central Processor or Sign Programmer (if connected) upon request and then cleared.
15. Programmable Font Sets: The DMS controller shall support multiple programmable font sets. The Commission currently utilizes fonts for 6", 9", 12", and 18" character heights, variable and fixed width fonts, and single, double, and triple stroke fonts. Each font set shall be capable of being programmed from the DMS Central Processor or the Sign Programmer if connected. Three of the font sets shall look like the E-modified font set defined by the MUTCD, replicating the appearance of the font used on some static signage on the DMS. A single, double and triple stroke E-modified font shall be provided. A fourth font set shall be provided and shall replicate the Helvetica Medium font used on most static signage at the facility where the DMS is to be installed. Additional font sets may be provided at no additional cost and will be considered as additional value added to the proposal.
16. Each font set shall include, but not be limited to, all upper case letters, numerals, punctuation marks and arrows that are displayed in each of the eight cardinal directions.
17. Customizable and Standard Graphics Library: Provide a suite of pre-generated MUTCD style symbols, along with the ability to modify or create independent symbols, saving of new graphics and color editing. The library should hold a minimum of 50 graphics.
18. The DMS controller shall keep a log of all system errors, malfunctions, automatic operations and locally controlled commands and activities. All logs shall be time and date stamped. The DMS controller shall have sufficient memory to store a minimum of 500 log entries. If 100% of the log storage memory has been reached without a successful download to the DMS Central Processor or a Sign Programmer, the oldest log entry shall be overwritten. The DMS controller shall download all log entries to a DMS Central Processor or Sign Programmer, upon user request from one of these devices and clear the log.
19. The DMS and Controller shall be capable of displaying a minimum of 256 different colors and colors in accordance with the standard messages indicated in the PTC DMS Messaging Library (**Appendix K**). DMS Controller shall be capable of displaying colors that conform to MUTCD requirements.

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Controller Cabinet

Furnish a controller cabinet capable of being pole or ground mounted for each of the DMS provided under this Contract. The controller cabinet shall protect all internal components from rain, ice, dust and corrosion in accordance with NEMA 3R standards, as described in NEMA Standards Publication 250 and be made of aluminum (0.125-inch thick). The controller cabinet must conform to the latest versions of PennDOT Publications 647 and 408, Section 1230. The controller cabinet shall include the following:

- A. A full-height standard EIA 19-inch rack.
- B. The main power supply and energy distribution system (main disconnect).
- C. One work lamp to illuminate the work area, when the cabinet door is open (lamp shall automatically turn off when cabinet door is closed).
- D. At least one 15 A, 120 VAC GFCI protected duplex service outlet.
- E. Lightning protection and terminations for the communication and control cables.
- F. Termination blocks for the control cables to and from the DMS housing.
- G. Permanently mounted, weather-resistant document holder.
- H. Electrical drawings printed on water/tear-resistant material.
- I. A pullout shelf.
- J. An open door alarm that reports to the DMS controller.
- K. Surge protection on all incoming power lines meeting the following minimum specifications:
 - 1. Maximum Clamp Voltage: 340V
 - 2. Peak Current: 20,000 Amps
 - 3. Response Time: 5 nanoseconds
 - 4. Occurrences: 20 times at peak current
 - 5. Minimum Series Inductance: 200 microhenries
- L. In order to facilitate the potential future installation of communication system components, the controller cabinet must provide a minimum of 6 RUs for communication equipment installation.
- M. The controller cabinet shall provide a minimum of one 120VAC outlet capable of providing 105W of power to the DC power supply.

Communications

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- A. The Proposer shall provide layout space for a cellular modem and antenna, Ethernet network switches, and/or 4.9GHz communications network equipment.
- B. The DMS controller shall have a minimum of two (2) serial data and one (1) Ethernet communications ports to facilitate simultaneous communications for local and remote control, programming, and diagnostics.
- C. When connected to a serial port, the DMS shall automatically use the NTCIP communications stack associated with serial communications, i.e., NTCIP 2101, NTCIP 2201, and NTCIP 2301.
- D. When connected to the Ethernet port, the DMS shall automatically use the NTCIP communications stack associated with Ethernet communications, i.e., NTCIP 2104, NTCIP 2202, and NTCIP 2301. All ports shall be configurable such that:
 - 1. Communications with the serial ports shall support all typical serial baud rates ranging from 1200 to 115,200 baud.
 - 2. Communications with the Ethernet port shall be capable of communicating via TCP/IP or UDP/IP at 10 or 100 MB.
- E. The serial ports in the DMS sign controller shall be protected with surge protection to protect the modem communication port from over-voltage and overcurrent conditions between each signal line and ground.
- F. It is desirable that the DMS and DMS controller have the ability to send Syslog event messages to a Commission headend SIEM/Syslog server via Simple Network Management Protocol (SNMP).
- G. The Proposer shall harden all devices to run only the services required to support the application. All unnecessary services must be disabled.

DMS Software

- A. Furnish NTCIP compatible control/diagnostic software for the purpose of troubleshooting and testing. The software shall send requests and receive responses over any TCP/IP-based network for the functions of controlling DMS messaging, monitoring system status and performing DMS diagnostics (detecting failed pixels, display drivers, power supplies, alarm conditions, etc.).
- B. The operating system and application software must be patched/updated to vendor recommended levels at all times.
- C. Client software must not rely upon a specific version of Java or Adobe Flash to operate or maintain the DMS.
- D. It is desirable that the administrator authentication/authorization access to the DMS be performed using Lightweight Directory Access Protocol (LDAP).

- E. For the details and definitions for the actual NTCIP communications protocols used to accomplish this, see below.

NTCIP

- A. All DMS and associated control equipment shall comply with the latest versions of the National Transportation Communication for ITS Protocol (NTCIP) Standards, as follows:
1. NTCIP 1101:1996 (v01.12, December 2001) – Simple Transportation Management Framework.
 2. NTCIP 1103 v03 (December 2016) – Transportation Management Protocols (TMP).
 3. NTCIP 1201 (v03, March 2011) – Global Objects (GO) Definitions.
 4. NTCIP 1203 (v03, September 2014) –Object Definitions for Dynamic Message Signs (DMS).
 5. NTCIP 2101:2001 (v01.19, November 26, 2001) – Point to Multi-Point Protocol Using RS-232 Subnetwork Profile.
 6. NTCIP 2103 (v02, December 2008) – Point-to-Point Protocol over RS-232 Subnetwork Profile.
 7. NTCIP 2104:2003 (v01.11, September 2005) – Ethernet Subnetwork Profile.
 8. NTCIP 2201:2003 (v01.15, September 2005) – Transportation Transport Profile.
 9. NTCIP 2202:2001 (v01.05, December 2001) – Internet (TCP/IP and UDP/IP) Transport Profile.
 10. NTCIP 2301 (v02.19s, October 2010) – Simple Transportation Management Framework (STMF) Application Profile (AP) (AP-STMF).
- B. Furnish all mandatory objects specified by the NTCIP specifications and all other objects, both NTCIP optional and the manufacturer specific, that are required to provide the functionality to meet the requirements of these specifications.
- C. Each DMS Component shall support the Full, Standardized Object Range (FSOR) of all objects required by these procurement specifications, unless otherwise indicated or approved by the Commission or its Representative.
- D. The DMS system shall not require the support of any agency-specific or manufacturer-specific objects. However, the Proposer shall propose any object definitions necessary to fulfill the above functional requirements that are not addressable by standardized NTCIP-defined object definitions. All functional requirements and the corresponding NTCIP objects have been carefully reviewed and only functions that have corresponding NTCIP

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objects have been selected. Manufacturer-specific objects may be implemented in the sign controller but they shall in no way required to be used in order to communicate with the sign.

- E. The DMS shall support all mandatory objects of all mandatory Conformance Groups as defined in NTCIP 1201 and NTCIP 1203 and their amendments.
- F. The NTCIP Component shall also implement all mandatory objects of the following optional conformance groups:
 - 1. Time Management, as defined in NTCIP 1201.
 - 2. Timebase Event Schedule, as defined in NTCIP 1201.
 - 3. In the event of a conflict between the Specifications and Standards, the Commission or its Representative shall be solely responsible for the identification of the acceptable solution.

APPENDIX J - MINIMUM TECHNICAL REQUIREMENTS TRACEABILITY MATRIX - Addendum No 1
Systemwide DMS Systems RFP # 18-10480-8234

INSTRUCTIONS

TECHNICAL REQUIREMENTS TAB:

Indicate the ability to meet each of the listed technical requirements detailed in **Appendix G** - Minimum Technical Requirements.

The Commission has established the following response codes for use.

FM - Requirement is fully met "out of the box", requiring no configuration or change to the device.

PM - Requirement is partially met.

DNM - Requirement cannot be met by the proposer.

The Proposer shall select only one response code per requirement. Any response in another manner shall be considered a response of "DNM". Any response that is considered to be contradictory to information provided in other areas of the Proposal shall also be considered a response of "DNM".

For any response of "PM", the Proposer shall provide clarification comments in the provided cells with a clear description of any customization required to meet the referenced requirement, any alternative that is provided out of the box that the Proposer believes will provide the same functionality, while not fully meeting the requirement to the letter, or a description of how the requirement is partially met.

Proposers are encouraged to provide clarification comments to any response of "DNM", indicating why the requirement cannot be met and/or proposing an alternative, which can be provided, that may provide similar or superior functionality or benefit.

PASSWORD to unlock column D and E on Technical Requirements Tab

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**APPENDIX J
MINIMUM TECHNICAL REQUIREMENTS TRACEABILITY MATRIX - Addendum No. 1**

ID	Requirement Definition	Existing Capability / Conformance	Clarification Comments
GENERAL (G) REQUIREMENTS			
G- 1	The DMS shall be compatible with and utilize the existing Commission Advanced Traffic Management System (ATMS) software.		
G- 2	The DMS shall be Full Matrix, Full Color, LED-based DMS.		
G- 3	The DMS system shall be fully debugged, complete with all individual units, components, software modules, cabling, connectors, etc. that are completely compatible with each other.		
G- 4	The DMS shall be designed in accordance with the latest versions of the following: PennDOT Publication 647, AASHTO Standards Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, MUTCD, NEMA, and NEC Codes.		
G- 5	The DMS shall be manufactured from an ISO-9001 certified facility.		
G- 6	The DMS shall be comprised of multiple pixel based modules, containing full color LED technology, arranged to form a full matrix display.		
G- 7	The Freeway Size DMS (Type 1) matrix shall be capable of displaying, at a minimum, three (3) rows of fifteen (15) characters, with a nominal character size of 18-inches and a pixel pitch of between 0.79 to 0.81-inches.		
G- 8	The Freeway Size DMS (Type 1) shall have walk-in sign access and a maximum weight of 4,000 pounds.		
G- 9	The Arterial Size, Type 2 DMS matrix shall be capable of displaying, at a minimum, three (3) rows of twelve (12) characters each, with a nominal character size of 12-inches and pixel pitch of between 0.79 to 0.81-inches.		
G- 10	The Arterial Size, Type 3 DMS matrix shall be capable of displaying, at a minimum, three (3) rows of eleven (11) characters each, with a nominal character size of 12-inches and a pixel pitch of between 0.79 to 0.81-inches.		
G- 11	The Arterial Size DMS (Types 2 and 3) shall have front sign access and a maximum weight of 1,200 pounds.		
G- 12	The DMS shall utilize full-color technology, in which the LED module is comprised of Red, Green and Blue LEDs		
LIGHT EMITTING DIODES (LED) REQUIREMENTS			
LED- 1	The LEDs that make up the display modules shall be high luminous intensity T-1 3/4" type manufactured by a reputable manufacturer such as Avago Technologies (formerly Agilent Technologies), Nichia Corporation, OSRAM, CREE or EOI.		
LED- 2	The LEDs shall have an ultraviolet light inhibitor in the epoxy dome package and be of a production type already tested for use in high vibration commercial traffic environments and climate of the northeastern United States.		
LED- 3	Each Full-color DMS LED module shall be comprised of Red Green and Blue LEDs.		
LED- 4	Red LEDs shall utilize AlInGaP semiconductor technology and shall emit red light that has a peak wavelength of 615-635nm.		
LED- 5	Green LEDs shall utilize InGaN semiconductor technology and shall emit green light that has a peak wavelength of 520-535nm.		
LED- 6	Blue LEDs shall utilize InGaN semiconductor technology and shall emit blue light that has a peak wavelength of 464-475nm.		
LED- 7	All LEDs shall have a nominal viewing cone of 30 degrees with a half-power angle of 15 degrees measured from the longitudinal axis of the LED.		
LED- 8	The LEDs shall be rated by the LED manufacturer to have a minimum lifetime of 100,000 hours of continuous operation while maintaining a minimum of 70% of the original brightness.		
LED- 9	The LEDs used in the display shall be obtained from batches sorted for luminous output, where the highest luminosity LED in the batch shall not be more than fifty percent more luminous than the lowest luminosity LED in the batch when operated at the manufacturer's recommended drive current. To ensure uniformity of display and operational life, all LEDs used to make up a display module shall be obtained from the same manufacturing batch.		
LED- 10	The LED manufacturer shall perform intensity sorting of the bins. LEDs shall be obtained from no more than two (2) consecutive luminous intensity "bins" as defined by the LED manufacturer.		
LED- 11	The LED manufacturer shall perform color sorting of the bins. LEDs shall be obtained from no more than two (2) consecutive color "bins" as defined by the LED manufacturer.		

ID	Requirement Definition	Existing Capability / Conformance	Clarification Comments
LED- 12	The LED mean time before failure (MTBF) shall be a minimum of 100,000 hours of elapsed time calendar hours use in an ambient temperature of 131 degrees Fahrenheit, based on an average daily on-time usage factor of 50%, when driven at the specific forward current recommended by the LED manufacturer for normal daylight LED DMS display operation.		
LED- 13	The statistical average long term light output degradation of the LEDs used in the display, operated at the LED manufacturer's recommended drive current to achieve a minimum of 100,000 hours of operation without catastrophic failure in an ambient temperature of 131 degrees Fahrenheit, shall not exceed a maximum of 10% reduction in light output after 10,000 hours of continuous on time.		
LED- 14	The statistical average long term light output degradation of the LEDs used in the display, operated at the LED manufacturer's recommended drive current to achieve a minimum of 100,000 hours of operation without catastrophic failure in an ambient temperature of 131 degrees Fahrenheit, shall not exceed a maximum of 25% reduction in light output after 50,000 hours of continuous on time.		
LED- 15	The statistical average long term light output degradation of the LEDs used in the display, operated at the LED manufacturer's recommended drive current to achieve a minimum of 100,000 hours of operation without catastrophic failure in an ambient temperature of 131 degrees Fahrenheit, shall not exceed a maximum of 30% reduction in light output after 100,000 hours of continuous on-time.		
LED- 16	Manufacturer's documentation for high temperature operating life (HTOL) shall indicate if HTOL values are based upon actual or extrapolated data.		
LED DISPLAY MODULE (LDM) REQUIREMENTS			
LDM- 1	The LED display modules shall have a minimum refresh rate of 60 times per second to prevent visible flicker.		
LDM- 2	The LEDs shall be grouped in pixels consisting of discrete LEDs arranged in a continuous matrix display with individual pixel addressability.		
LDM- 3	The centers of all pixels shall be arranged so as to maintain the same horizontal and vertical spacing between adjacent pixels.		
LDM- 4	All pixels shall be replaceable.		
LDM- 5	The LED grouping and mounting angle shall be optimized for maximum readability.		
LDM- 6	The electronics for the LED DMS shall be fully configured to drive the total required number of LEDs.		
LDM- 7	The failure of any one pixel shall not affect the operation of any other pixel.		
LDM- 8	The power driver circuitry shall be designed to minimize power consumption.		
LDM- 9	Each LED display module shall have a diagnostic capability to detect a failure on the LED display module, down to the pixel level and report the failure to the DMS controller.		
LDM- 10	Removal of any display module shall not affect the operation of the remaining modules.		
LDM- 11	The LED modules shall be protected from degradation due to sunlight.		
LDM- 12	The method used shall not obstruct the view of the display or reduce the viewing angle below that provided by an unprotected LED module.		
LDM- 13	Each pixel shall contain an adequate number of discrete LEDs, based on a nominal pixel spacing of 0.79 to 0.81 inches, center to center, to meet the luminosity requirements herein.		
LDM- 14	Each discrete LED on the display module is driven at the LED manufacturer's recommended drive current to achieve a minimum of 100,000 hours of operation without catastrophic failure.		
LDM- 15	All DMS must be capable of meeting or exceeding the Manual of Uniform Traffic Control Devices (MUTCD) guidelines for inter-character and inter-line spacing of 25% and 50% of character height, respectively.		
LDM- 16	The 18" character of the Freeway LED DMS shall be clearly visible and legible from in-vehicle distance of 1,000 feet from the DMS face under clear daylight and nighttime conditions with the DMS face positioned in the roadway line of sight.		
LDM- 17	The 12" character of the Arterial DMS shall be clearly visible and legible from in-vehicle viewing distance of 600 feet from the DMS face under clear daylight and nighttime conditions with the DMS face positioned in the roadway line of sight.		
DIMMING CIRCUITRY (DC) REQUIREMENTS			
DC- 1	The DMS shall have a photocell controlled dimming circuit which shall automatically adjust the luminance of the LED display pixels in accordance with ambient light conditions.		
DC- 2	Continuous current drive shall be used at the maximum brightness level.		
DC- 3	The current used for maximum brightness shall not exceed the current used to achieve the rated mean time before failure (MTBF).		
DC- 4	For luminance levels less than maximum brightness, either continuous current drive or current pulse width modulation shall be used to dim the LEDs.		
DC- 5	If pulse width modulation is used, the dimming circuit shall be designed so that the maximum, instantaneous and average currents shall not exceed the rated peak and transient forward current ratings of the LEDs.		

ID	Requirement Definition	Existing Capability / Conformance	Clarification Comments
DC- 6	The DMS shall be equipped with a minimum of two external light sensors oriented in opposite directions and shall be scaled for up to 100,000 lux.		
DC- 7	The LED dimming circuit shall also incorporate temperature controlled dimming, which shall reduce the current through the LEDs based on the temperature inside the DMS enclosure, so that the LED current does not exceed the rated LED current at that temperature.		
DC- 8	If the temperature of the DMS exceeds the rated operating temperature of the LEDs the DMS shall blank-out, until the temperature has returned to safe operating levels.		
DC- 9	The LED dimming circuit shall not cause the LED display to flicker as the temperature oscillates above and below the rated operating temperature of the LEDs.		
POWER SUPPLY (PS) REQUIREMENTS			
PS- 1	The DMS shall be operated at a low internal DC voltage not exceeding 24 Volts.		
PS- 2	The quantity of power supplies and current rating of each power supply shall be at least 25% spare capacity over that required to light every pixel of the DMS at full brightness.		
PS- 3	The DMS and controller shall have redundant power supplies wired so that in the event of a failure of any one power supply, the second power supply shall automatically power that portion of the sign.		
PS- 4	Power supply failure shall be automatically reported by the DMS controller when polled by the DMS Central Processor.		
PS- 5	The power supplies shall be short circuit protected and shall reset automatically after 5 seconds of AC power off.		
PS- 6	The power supplies shall be protected by a suitable overcurrent protection device.		
PS- 7	The power supply shall have an efficiency rating of 85%, minimum.		
PS- 8	The operating temperature range of the power supply inside the DMS enclosure shall be negative 20 degrees Fahrenheit to 140 degrees Fahrenheit.		
PS- 9	The power supply shall be UL listed.		
SIGN ENCLOSURE (SE) REQUIREMENTS			
SE- 1	The DMS enclosures shall have a weatherproof housing and all internal components shall be non-condensing and withstand a humidity range of 0 to 99%, non-condensing.		
SE- 2	The DMS enclosures shall be constructed of corrosion resistant aluminum material.		
SE- 3	Sheet aluminum shall be fabricated from aluminum alloy sheet meeting the requirements of ASTM B 209, Alloy 5052, Temper H3, or equivalent, minimum 0.125 inch thick.		
SE- 4	Cast aluminum shall be fabricated from aluminum alloy meeting the requirements of ASTM B 686, Alloy A 356 (A 13560) or equivalent.		
SE- 5	Flat cast surfaces exceeding 12 inches in both directions shall have a minimum thickness of 0.25 inches.		
SE- 6	Flat cast surfaces not exceeding 12 inches in both directions shall have a minimum thickness of 0.187 inches.		
SE- 7	All DMS enclosures shall meet the requirements for TYPE 3R enclosures according to NEMA Standard Publication 250, as well as those of PennDOT Publication 408/2016-3, Section 1230 and Publication 647.		
SE- 8	All seams and openings shall be designed to prevent entry of water resulting from high pressure washing of the DMS enclosure.		
SE- 9	Unpainted aluminum DMS enclosures shall be fabricated from mill-finish material and shall be cleaned using appropriate methods that will remove oil, film, weld black, and mill ink marks and render the surface clean, bright, smooth, and non-sticky to touch.		
SE- 10	All adjacent dissimilar materials shall be isolated, as approved by the Commission.		
SE- 11	All nuts and bolts used in the DMS assembly shall be stainless steel.		
SE- 12	All connecting surfaces shall be weatherproof and watertight when secured.		
SE- 13	All internal components shall be mounted so that there are no external protrusions.		
SE- 14	The DMS shall be in accordance with the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals, except as modified herein: The DMS enclosures shall be designed and constructed to present a clean, neat appearance and the equipment located inside shall be adequately protected from moisture, dust, dirt, corrosion, and excessive heat.		
SE- 15	All surfaces shall be suitably protected from the weather.		
SE- 16	All corners and seams shall be heli-arc welded to provide a weatherproof seal around the entire case.		
SE- 17	The DMS enclosure shall not be adversely affected by salt from the roadways or marine environments or chemicals or fumes discharged from nearby automobiles, industries and other sources.		
SE- 18	The interior of the DMS face window and the LEDs shall be easily accessible for cleaning and other maintenance.		

ID	Requirement Definition	Existing Capability / Conformance	Clarification Comments
SE- 19	Appropriate precautions, such as heating elements or ventilation fans or openings, shall be taken to ensure that condensation does not occur between the matrix elements and the DMS window face, and that the environment inside all enclosures remains within the temperature and humidity limits required for proper operation of the sign's electronic components.		
SE- 20	Temperature sensor(s) shall be provided in the DMS enclosure that is/are controlled and monitored by the DMS controller.		
SE- 21	Capability shall be provided for user defined critical thresholds to be established and changed remotely from the TOC or other location using the sign controller.		
SE- 22	Humidity sensor(s) shall be provided within the DMS enclosure that can detect relative humidity from 0%-100% in 1% or smaller increments.		
SE- 23	A interface shall be provided between the humidity sensor and the DMS controller which allows humidity levels to be monitored remotely from the TOC.		
SE- 24	A sensor shall be provided with an accuracy that exceeds 5% relative humidity.		
SE- 25	All hinges used shall be continuous stainless steel, equipped with stainless steel hinge pins.		
SE- 26	Each hinge shall be secured with stainless steel bolts and lock nuts.		
SE- 27	The hinge pins and bolts shall be tamper proof.		
SE- 28	The dead load shall consist of the total weight as installed of the DMS enclosure and appurtenances. The point of application of weights of the individual items shall be their representative centers of gravity.		
SE- 29	Ice load shall be as per AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals, except that ice load shall be applied to all sides and top surfaces of the DMS enclosure simultaneously.		
SE- 30	Wind load shall be as per AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals except as modified herein. The enclosure and their mountings shall withstand a sustained wind speed of 90 miles per hour (mph), with a gust factor of 1.3.		
SE- 31	Full 100 percent impact shall be used for handling and erection stress.		
SE- 32	The signs shall be capable of being mounted without gaining access to the inside of the enclosure.		
SE- 33	All mounting eyes shall be attached to the DMS enclosure structural framing.		
SE- 34	The DMS enclosure shall be adaptable for mounting as shown in PennDOT Publication 647.		
SE- 35	Removal of any of the display modules or any other electronic or electrical component, shall not alter the structural integrity of the DMS display assembly or the DMS enclosure.		
SE- 36	For Type 1 DMS, access to the interior of the DMS enclosure shall be walk-in access.		
SE- 37	For Types 2 and 3 DMS, access to the interior of the enclosure shall be front access.		
SE- 38	Opening door(s) shall allow maintenance personnel immediate access to circuit boards and internal sign parts, without having to remove any item in the sign, or the need to use any tools or to remove any device that could be dropped or lost, such as a locking pin or bolt.		
SE- 39	Each door shall be sealed to prevent the elements from entering, and shall have at least two locking points to keep unauthorized persons from accessing the interior of the DMS.		
SE- 40	Each door shall be provided with rigid, telescopic, retention device, to keep the door in the open position.		
SE- 41	All doors, when in the open position, shall not obstruct any portion of the opening.		
SE- 42	The doors system shall pull the door tight and compress a gasket located around the perimeter. The gasket shall prevent water from entering the interior of the cabinet.		
SE- 43	All serviceable components shall be modular, interchangeable and removable from within the DMS enclosure.		
SE- 44	The sign design shall allow unobstructed and convenient access to all serviceable components within the DMS enclosure and between the DMS display and the DMS display cover.		
SE- 45	Drain holes shall be provided and designed to remove any condensation that may form inside the DMS enclosure and allow any water that may have collected in the housing to escape.		
SE- 46	All holes shall be screened to prevent small objects, insects and creatures from entering into the enclosure.		
VENTILATION (V) REQUIREMENTS			
V- 1	Heating, cooling and/or dehumidifying equipment shall be sized to maintain the internal DMS enclosure temperature within the operating ranges of the electric, electronic and mechanical equipment components.		
V- 2	The environmental equipment shall have controls which shall shut down the DMS just prior to the temperature that the interior of the enclosure reaches the rated maximum operating temperature of the LEDs, and shall restore operation when the temperature has returned to safe operating levels.		
V- 3	The shutdown shall be automatically reported by the DMS controller when polled by the DMS Central Processor.		
V- 4	Electric ventilation fans shall be provided to generate positive pressure ventilation and shall be sized to provide 25 percent excess ventilation capacity, with one fan inoperative, over that required to maintain the DMS enclosure interior temperature within the range over which the DMS components can operate without failure or degradation, during full daylight heat gain conditions.		

ID	Requirement Definition	Existing Capability / Conformance	Clarification Comments
V- 5	All fans shall have ball or roller bearings.		
V- 6	Fan operation and failure shall be reported to the DMS Central Processor via the communications protocol.		
V- 7	Louvered air inlets with removable, non-proprietary 500 micron, 2-stage filters and air deflector, sized to provide a maximum air intake velocity of 600 feet per minute with all fans operating.		
V- 8	The direction of airflow and the filter characteristics (i.e., filter model number, type, dimensions, and particle size) shall be permanently engraved on each air vent.		
V- 9	Exhaust air vents, if without filters, shall be screened to prevent small objects and creatures from entering into the enclosure.		
V- 10	For Types 2 and 3 DMS, vent-free design (if approved by the Commission) shall ensure that the DMS enclosure interior temperature does not exceed the maximum range of the DMS components to ensure continued operation without failure or degradation, particularly during full daylight heat gain.		
DMS CONTROLLER (DMS) REQUIREMENTS			
DMS- 1	The DMS controller shall be a microprocessor-based unit with sufficient on-board memory and input and output interfaces to provide all the functions required by the Minimum Technical Requirements.		
DMS- 2	The DMS controller shall have a minimum 30-minute battery backup.		
DMS- 3	The DMS controller shall accommodate both local and remote control from multiple host devices as described in the Minimum Technical Requirements.		
DMS- 4	Local control shall be supported from a locally connected sign programmer.		
DMS- 5	Remote control shall be supported from a remotely located DMS Central Processor (control computer system).		
DMS- 6	The DMS controller shall receive and interpret commands sent by the host device to either configure the DMS or cause a requested message to be displayed on the DMS.		
DMS- 7	The DMS Controller shall provide return data to the host device, based on the command, to provide information about the status of the sign.		
DMS- 8	The DMS controller shall be capable of simultaneously receiving commands from and transmitting status data to multiple host devices; i.e., the sign programmer, local control panel and the DMS Central Processor.		
DMS- 9	The method of control of the DMS shall be dependent upon the setting of the Control Mode Selector switch in each local control panel.		
DMS- 10	The Control Mode Selector switch shall allow for both remote and local modes of operation.		
DMS- 11	The "remote" mode shall be the normal mode of operation of the DMS, where all control is from a remote DMS Central Processor, via NTCIP data exchanged directly between the remote DMS Central Processor and the DMS controller.		
DMS- 12	The "local" mode shall be when control from the remote DMS Central Processor is disabled and the DMS is controlled in accordance with commands entered via the message selector switch on the Local Control Panel or a NTCIP data exchanged directly with a locally connected Sign Programmer.		
DMS- 13	The remote DMS Central Processor shall still be able to monitor the status of the DMS when in "local" mode.		
DMS- 14	When switching from one mode to another, the DMS shall continue to display its current message, until it receives a command to display another message, from either the remote DMS Central Processor or the local controls, as applicable.		
DMS- 15	A change of position of the mode selector switch shall be immediately reported to the DMS Central Processor in the form of an alarm, and shall be logged internally at the site CPU for retrieval on the next polling cycle, and in accordance with the communications protocol.		
DMS- 16	Each DMS controller shall have error detection and reporting features which shall be utilized to guard against incomplete or incorrect information transmission, message generation and display on the DMS, as well as provide capability to detect a failure down to a replaceable component and report the failure and failed component.		
DMS- 17	All errors and hardware failures shall be logged and reported to the DMS Central Processor or Sign Programmer (if connected) via the communications protocol.		
DMS- 18	The DMS controller shall have the capability to automatically recover from failure conditions when the failure conditions are corrected or the failures are no longer present, and report the restored operation of the DMS to the DMS Central Processor or Sign Programmer (if connected).		
DMS- 19	The DMS controller shall have diagnostic capabilities features to perform redundant checking of all data received and transmitted, and incorporate cyclic redundancy check (CRC) error detection logic, as specified by the NTCIP standards.		
DMS- 20	The DMS controller shall have diagnostic capabilities features to validate the content of all received transmissions.		
DMS- 21	The DMS controller shall have diagnostic capabilities features to check and report logic or data errors.		
DMS- 22	The DMS controller shall have diagnostic capabilities features to monitor status for communication line malfunction or break.		
DMS- 23	The DMS controller shall have diagnostic capabilities features to respond to system polling from the DMS Central Processor.		

ID	Requirement Definition	Existing Capability / Conformance	Clarification Comments
DMS- 24	The DMS controller shall have diagnostic capabilities features to check and report errors in display driver operation.		
DMS- 25	The DMS controller shall have diagnostic capabilities features to check and report the failure and location of bad pixels.		
DMS- 26	The DMS controller shall have diagnostic capabilities features to check and report the failure of bad fans.		
DMS- 27	The DMS controller shall have diagnostic capabilities features to check and report whether the controller cabinet or DMS enclosure door is open or closed.		
DMS- 28	The DMS controller shall have diagnostic capabilities features to check the operation and report the failure and location of bad power supplies.		
DMS- 29	The DMS controller shall have diagnostic capabilities features to check the duration of power failures.		
DMS- 30	The DMS controller shall have diagnostic capabilities features to check and report the number of occurrences the watchdog timer resets the controller.		
DMS- 31	The DMS controller shall blank the DMS and include the error or failure in the return message if it is detected that the number of pixels that are not working for the particular sign type exceed a specified maximum value (the Proposer shall determine this number for each sign type and have these numbers approved by the Commission).		
DMS- 32	The DMS controller shall blank the DMS and include the error or failure in the return message if it is detected that the ratio of the number of pixels that achieve a commanded state divided by the number of pixels commanded to that state exceeds a legibility threshold value (the test shall include only those pixels that are contained in the character positions of the message text).		
DMS- 33	The DMS controller shall blank the DMS and include the error or failure in the return message if it is detected that the communication loss is greater than a configurable time value measured in minutes (default value shall be 10 minutes).		
DMS- 34	The configuration of system polling shall have an option for disabling the feature of blanking the DMS and including the error or failure in the return message if it is detected that the communication loss is greater than a configurable time value.		
DMS- 35	The current message displayed on the DMS just prior to the power failure shall be retained in memory upon detection of a power failure to the DMS controller or the DMS display(s) connected to the controller.		
DMS- 36	The DMS shall remain blank upon power restoration if the duration of the power failure exceeded the configurable long term power failure duration threshold (default value shall be 10 minutes), else the previous message shall be restored to its respective DMS.		
DMS- 37	Based on the temperature inside of the DMS enclosure, the LED dimming circuit shall incorporate temperature-controlled dimming in order to reduce the current through the LEDs so that it does not exceed the rated LED current at that temperature.		
DMS- 38	The DMS shall blank-out if the temperature of the DMS exceeds the rated operating temperature of the LEDs, until the temperature has returned to safe operating levels.		
DMS- 39	Information on each of the specific failures shall be sent to the DMS Central Processor.		
DMS- 40	The DMS controller shall have the capability to display messages transmitted directly from a DMS Central Processor or Sign Programmer in addition to displaying locally commanded messages from a pre-programmed local message library.		
DMS- 41	The local message library shall have the capacity to store a minimum of 256 display messages with related display attributes for each message, such as flashing rate and percent "on" time.		
DMS- 42	The local message library shall include a "changeable, non-volatile" local message library stored in battery-backed RAM.		
DMS- 43	The changeable local message library shall be programmable through both the DMS Central Processor and the Sign Programmer.		
DMS- 44	The local message library shall include a "permanent, non-volatile" local message library, stored on EPROM. Battery-backed RAM memory shall not be acceptable. If a microprocessor-based controller is used, then EEPROM, flash RAM or similar technology memory devices, programmed as described in the Minimum Technical Requirements, may be used to store the message library.		
DMS- 45	The DMS controller shall write messages on the DMS at a minimum rate of 300 characters per second.		
DMS- 46	The DMS controller shall have an easily accessible and clearly labeled ON/OFF switch.		
DMS- 47	All power shall be disconnected from the DMS control electronics and matrix units when the switch is in the "OFF" position and the DMS shall blank-out.		
DMS- 48	A means of establishing a monetary reset switch on the DMS controller shall be provided. The contact switch shall reset the DMS controller when depressed. Operation of the momentary contact switch shall not require the user to hold the switch in the depressed position for more than 0.25 seconds.		
DMS- 49	The DMS controller shall be provided with all software and hardware required for password protection to restrict access to control and configuration functions.		
DMS- 50	The DMS controller shall be provided with all software and hardware required for fully programmable parameters for all functions described in the Minimum Technical Requirements.		

ID	Requirement Definition	Existing Capability / Conformance	Clarification Comments
DMS- 51	The DMS controller shall be provided with all software and hardware required for real-time clock and calendar for timing and scheduling of automatic functions. The calendar shall automatically adjust itself for leap years, and for changeover from Standard to Daylight savings time and back.		
DMS- 52	The DMS controller shall be provided with all software and hardware required for variable message flash rate and percent "on" time.		
DMS- 53	The flash rate shall be adjustable in one-tenth second increments.		
DMS- 54	The percent "on" time shall be adjustable from 0 to 9.9 seconds, in one-tenth second increments.		
DMS- 55	The DMS controller shall be provided with all software and hardware required for multi-page messages with variable page display times that are adjustable in one-tenth second increments from 0 to 15.0 seconds.		
DMS- 56	The DMS controller shall be provided with all software and hardware required for negative text inversion (or inverse/reverse video) - switch between illuminated text on a dark background or dark text on an illuminated background.		
DMS- 57	Inverse/reverse video shall be implemented with the use of standard NTCIP foreground and background objects.		
DMS- 58	The DMS controller shall be provided with all software and hardware required for configurable line justification (center, left or right) with center justification as the default setting.		
DMS- 59	The DMS controller shall be provided with all software and hardware required for configurable page justification (top, center, bottom) with center justification as the default setting.		
DMS- 60	The DMS controller shall be provided with all software and hardware required for configurable message duration parameter, to specify how long the current message should remain displayed regardless of the status of the communications with the DMS Central Processor.		
DMS- 61	The DMS controller shall be provided with all software and hardware required for the communications loss message threshold, to specify how long the current message should remain displayed in the absence of communications with the DMS Central Processor.		
DMS- 62	The DMS controller shall be provided with all software and hardware required for control of pixel luminance levels, both directly and based on ambient light levels obtained from the photocells.		
DMS- 63	Luminance levels shall be stored in the DMS controller and shall be adjustable, in a range of 0 to 255, on either a continuous logarithmic basis, to match the normal human eye luminous response characteristic, or a 1/2 incremental dimming basis, where each lower dimming level is 1/2 the previous level.		
DMS- 64	The DMS controller shall be provided with all software and hardware required for monitoring of each pixel of the DMS.		
DMS- 65	The DMS controller shall be provided with all software and hardware required for monitoring of power failures.		
DMS- 66	The DMS controller shall report the occurrence, time, and duration of the power failure, upon restoration of power, to the DMS Central Processor or Sign Programmer (if connected).		
DMS- 67	The DMS controller shall be provided with all software and hardware required for the hardware watchdog timer.		
DMS- 68	The DMS controller shall have a hardware watchdog timer that shall check for a stall condition in the controller hardware, software or firmware.		
DMS- 69	The software shall poll the watchdog timer while the DMS controller is powered on.		
DMS- 70	The watchdog timer shall initialize its timing circuit upon reset.		
DMS- 71	The watchdog counter shall be incremented and the watchdog shall reset the controller to clear a potential stall condition from the hardware, software or firmware and send an error message to the DMS Central Processor or Sign Programmer (if connected) to advise of the condition, if the watchdog timing circuit times out without being reset by the software.		
DMS- 72	The number of occurrences the watchdog timer resets the controller shall be transmitted to the DMS Central Processor or Sign Programmer (if connected) upon request and then cleared.		
DMS- 73	The DMS controller shall be provided with all software and hardware required for programmable font sets.		
DMS- 74	The DMS controller shall support multiple programmable font sets, including those for 6", 9", 12", and 18" character heights, variable and fixed width fonts, and single, double, and triple stroke fonts.		
DMS- 75	Each font set shall be capable of being programmed from the DMS Central Processor or the Sign Programmer (if connected).		
DMS- 76	Three of the font sets shall look like the E-modified font set defined by the MUTCD, replicating the appearance of the font used on some static signage on the DMS.		
DMS- 77	A single, double and triple stroke E-modified font shall be provided.		
DMS- 78	A fourth font set shall be provided and shall replicate the Helvetica Medium font used on most static signage at the facility where the DMS is to be installed.		
DMS- 79	The DMS controller shall be provided with all software and hardware required so that each font set shall include, but not be limited to, all upper case letters, numerals, punctuation marks and arrows that are displayed in each of the eight cardinal directions.		

ID	Requirement Definition	Existing Capability / Conformance	Clarification Comments
DMS- 80	The DMS controller shall be provided with all software and hardware required for a customizable and standard graphics library. A suite of pre-generated MUTCD style symbols shall be provided, along with the ability to modify or create independent symbols, saving of new graphics and color editing. The library should hold a minimum of 50 graphics.		
DMS- 81	The DMS controller shall keep a log of all system errors, malfunctions, automatic operations and locally controlled commands and activities. All logs shall be time and date stamped.		
DMS- 82	The DMS controller shall have sufficient memory to store a minimum of 500 log entries. If 100% of the log storage memory has been reached without a successful download to the DMS Central Processor or a Sign Programmer, the oldest log entry shall be overwritten.		
DMS- 83	The DMS controller shall download all log entries to a DMS Central Processor or Sign Programmer, upon user request from one of these devices and clear the log.		
DMS- 84	The DMS and Controller shall be capable of displaying a minimum of 256 different colors, and colors in accordance with the standard messages indicated in the PTC DMS Messaging Library (Appendix K).		
DMS- 85	The DMS Controller shall be capable of displaying colors that conform to MUTCD requirements.		
CONTROLLER CABINET (CC) REQUIREMENTS			
CC- 1	The controller cabinet shall be capable of being pole or ground mounted.		
CC- 2	The controller cabinet shall protect all internal components from rain, ice, dust and corrosion in accordance with NEMA 3R standards, as described in NEMA Standards Publication 250 and be made of aluminum (0.125-inch thick).		
CC- 3	The controller cabinet must conform to the latest versions of PennDOT Publications 647 and 408, 2016-3, Section 1230.		
CC- 4	The controller cabinet shall include a full-height standard EIA 19-inch rack.		
CC- 5	The controller cabinet shall include the main power supply and energy distribution system (main disconnect).		
CC- 6	The controller cabinet shall include one work lamp to illuminate the work area, when the cabinet door is open (lamp shall automatically turn off when cabinet door is closed).		
CC- 7	The controller cabinet shall include at least one 15 A, 120 VAC GFCI protected duplex service outlet.		
CC- 8	The controller cabinet shall include lightning protection and terminations for the communication and control cables.		
CC- 9	The controller cabinet shall include termination blocks for the control cables to and from the DMS sign housing.		
CC- 10	The controller cabinet shall include permanently mounted, weather-resistant document holder.		
CC- 11	The controller cabinet shall include electrical drawings printed on water/tear-resistant material.		
CC- 12	The controller cabinet shall include a pullout shelf.		
CC- 13	The controller cabinet shall include an open door alarm that reports to the DMS controller.		
CC- 14	The controller cabinet shall include surge protection on all incoming power lines meeting the following minimum specifications: <ul style="list-style-type: none"> • Maximum Clamp Voltage - 340V • Peak Current - 20,000 Amps • Response Time - 5 nanoseconds • Occurrences - 20 times at peak current • Minimum Series Inductance - 200 microhenries 		
CC- 15	The controller cabinet must provide a minimum of 6 RUs for communication equipment installation in order to facilitate the potential future installation of communication system components.		
CC- 16	The controller cabinet shall provide a minimum of one 120VAC outlet capable of providing 105W of power to the DC power supply.		
COMMUNICATIONS (C) REQUIREMENTS			
C- 1	The controller cabinet shall provide layout space for a cellular modem and antenna, Ethernet network switches, and/or 4.9GHz communications network equipment .		
C- 2	The DMS controller shall have a minimum of two (2) serial data and one (1) Ethernet communications ports to facilitate simultaneous communications for local and remote control, programming, and diagnostics.		
C- 3	The DMS shall automatically use the NTCIP communications stack associated with serial communications (i.e., NTCIP 2101, NTCIP 2201, and NTCIP 2301) when connected to the serial port.		
C- 4	The DMS shall automatically use the NTCIP communications stack associated with Ethernet communications (i.e., NTCIP 2104, NTCIP 2202, and NTCIP 2301) when connected to the Ethernet port.		
C- 5	All ports shall be configurable such that communications with the serial ports shall support all typical serial baud rates ranging from 1200 to 115,200 baud.		
C- 6	All ports shall be configurable such that communications with the Ethernet port shall be capable of communicating via TCP/IP or UDP/IP at 10 or 100 MB.		

ID	Requirement Definition	Existing Capability / Conformance	Clarification Comments
C- 7	The serial ports in the DMS sign controller shall be protected with surge protection to protect the modem communication port from over-voltage and overcurrent conditions between each signal line and ground.		
C- 8	It is desirable that the DMS and DMS controller have the ability to send Syslog event messages to a Commission headend SIEM/Syslog server via Simple Network Management Protocol (SNMP).		
C- 9	The Proposer shall harden all devices to run only the services required to support the application. All unnecessary services must be disabled.		
DMS SOFTWARE (DS) REQUIREMENTS			
DS- 1	NTCIP compatible control/diagnostic software shall be furnished for the purpose of troubleshooting and testing.		
DS- 2	The software shall send requests and receive responses over any TCP/IP-based network for the functions of controlling DMS messaging, monitoring system status and performing DMS diagnostics (detecting failed pixels, display drivers, power supplies, alarm conditions etc.).		
DS- 3	Client software must not rely upon a specific version of Java or Adobe Flash to operate or maintain the DMS.		
DS- 4	It is desirable that the administrator authentication/authorization access to the DMS be performed using Lightweight Directory Access Protocol (LDAP).		
NTCIP (N) REQUIREMENTS			
N- 1	The DMS and associated control equipment shall comply with the latest versions of the National Transportation Communication for ITS Protocol (NTCIP) Standards.		
N- 2	The DMS and associated control equipment shall comply with NTCIP 1101:1996 (v01.12, December 2001) – Simple Transportation Management Framework.		
N- 3	The DMS and associated control equipment shall comply with NTCIP 1103 v03 (December 2016) – Transportation Management Protocols (TMP).		
N- 4	The DMS and associated control equipment shall comply with NTCIP 1201 (v03, March 2011) – Global Objects (GO) Definitions.		
N- 5	The DMS and associated control equipment shall comply with NTCIP 1203 (v03, September 2014) –Object Definitions for Dynamic Message Signs (DMS).		
N- 6	The DMS and associated control equipment shall comply with NTCIP 2101:2001 (v01.19, November 26, 2001) – Point to Multi-Point Protocol Using RS-232 Subnetwork Profile.		
N- 7	The DMS and associated control equipment shall comply with NTCIP 2103 (v02, December 2008) – Point-to-Point Protocol over RS-232 Subnetwork Profile.		
N- 8	The DMS and associated control equipment shall comply with NTCIP 2104:2003 (v01.11, September 2005) – Ethernet Subnetwork Profile.		
N- 9	The DMS and associated control equipment shall comply with NTCIP 2201:2003 (v01.15, September 2005) – Transportation Transport Profile.		
N- 10	The DMS and associated control equipment shall comply with NTCIP 2202:2001 (v01.05, December 2001) – Internet (TCP/IP and UDP/IP) Transport Profile.		
N- 11	The DMS and associated control equipment shall comply with NTCIP 2301 (v02.19s, October 2010) – Simple Transportation Management Framework (STMF) Application Profile (AP) (AP-STMF).		
N- 12	All mandatory objects specified by the NTCIP specifications and all other objects, both NTCIP optional and the manufacturer specific, shall be furnished that are required to provide the functionality to meet the requirements of the specifications.		
N- 13	The DMS Component shall support the Full, Standardized Object Range (FSOR) of all objects required by these procurement specifications, unless otherwise indicated or approved by the Representative.		
N- 14	The DMS system shall not require the support of any agency-specific or manufacturer-specific objects. However, the Proposer shall propose any object definitions necessary to fulfill the above functional requirements that are not addressable by standardized NTCIP-defined object definitions.		
N- 15	Manufacturer-specific objects may be implemented in the sign controller but they shall in no way required to be used in order to communicate with the sign.		
N- 16	The DMS shall support all mandatory objects of all mandatory Conformance Groups as defined in NTCIP 1201 and NTCIP 1203 and their amendments.		
N- 17	The NTCIP Component shall implement all mandatory objects of Time Management, as defined in NTCIP 1201.		
N- 18	The NTCIP Component shall implement all mandatory objects of the Timebase Event Schedule, as defined in NTCIP 1201.		

APPENDIX L

COMMISSION SECURITY REQUIREMENTS





Security Requirements

<p>Equipment Installations, Changes, and Access</p>	<ul style="list-style-type: none"> <input type="checkbox"/> The Commission’s IT Security Team must be allowed to scan, for security vulnerabilities, any new equipment and/or changes to existing equipment before implementation. <input type="checkbox"/> The vendor is responsible for hardening all devices to run only the services required to support the application. All unnecessary services must be disabled (for example, UPnP, SLP, etc.). <input type="checkbox"/> The Commission’s IT Security team must be given administrator-level access to all installed equipment for incident response and security assessment. <input type="checkbox"/> If Commission user service disruptions are expected, the change must be approved by the Change Review Board (CRB) before implementation.
<p>Vulnerability Management</p>	<ul style="list-style-type: none"> <input type="checkbox"/> All Windows-based systems, connected to the Commission’s network, will be joined to the Commission’s Active Directory domain and will be patched by the Commission’s IT staff on a monthly-basis at a minimum. <input type="checkbox"/> The vendor is responsible for updating all non-Windows systems, not operated or administered by the Commission, to the vendors’ latest recommended level.
<p>Off-Premises Systems</p>	<ul style="list-style-type: none"> <input type="checkbox"/> If systems are located off the Commission’s network and Commission employee access is required, then the latest version of ADFS (Active Directory Federated Services), using latest version of SAML, must be used for authentication and authorization. <input type="checkbox"/> All off-premises systems using HTTP, or any other protocol using SSL/TLS, must use TLS 1.1 or later with a key size no smaller than 2048 bits. <input type="checkbox"/> For public-facing systems, the vendor shall utilize a third- party certificate provider who is a recognized and trusted authority in the industry.



Vendor Remote Access and Accounts	<ul style="list-style-type: none"><input type="checkbox"/> All vendors shall use the Commission’s VMWare’s HorizonView infrastructure for remote access.<input type="checkbox"/> No generic user accounts for shared resources will be permitted (because every technician/engineer will have their own unique user account).
Incident Response	<ul style="list-style-type: none"><input type="checkbox"/> Vendors must have a plan for compliance with all applicable breach notification laws, including Pennsylvania’s Breach of Personal Information Notification.<input type="checkbox"/> The Commission must be notified in writing within 24 hours of the earliest indication or report of a potential breach or unintended disclosure of confidential information.<input type="checkbox"/> Incident response actions that may affect confidential information must be conducted quickly and with ample resources. Vendor must hire a professional third-party incident response team if its inhouse resources do not have sufficient skill or availability.<input type="checkbox"/> The Commission shall have the right to view all incident response evidence, reports, communications, and related materials upon request.<input type="checkbox"/> If requested by the Commission, or if required by law, the vendor, at its own cost and expense, shall notify in writing all persons affected by the incident.



<p>Information Security Policies</p>	<ul style="list-style-type: none"><input type="checkbox"/> Vendors must have, and upon request by the Commission, shall provide copies of its information security policies that cover the following elements:<ul style="list-style-type: none">- Data classification and privacy- Security training and awareness- Systems administration, patching, and configuration- Application development and code review- Incident Response- Workstation management, mobile devices, and antivirus- Backups, disaster recovery and business continuity- Regular audits and testing- Requirements for third-party business partners and contractors- Compliance with information security or privacy laws, rules, regulations or standards- Any other information security policies.
<p>Audit & Inspection</p>	<ul style="list-style-type: none"><input type="checkbox"/> The vendor shall allow the Commission, upon reasonable notice, to perform security assessments, vulnerability assessments, or audits of systems that handle or support confidential information.<input type="checkbox"/> In the event of adverse risk findings through an audit or assessment, the vendor shall cooperate with the Commission in remediating any risks to the system, including complying with requests to temporarily take the system offline or otherwise limit access to the system during remediation.<input type="checkbox"/> Audit logs must be implemented for all systems on the Commission’s network. All attempted violations of system security must generate an audit log. Audit logs must be secured against unauthorized access or modification.



<p>Malware</p>	<ul style="list-style-type: none"><input type="checkbox"/> Whether the service’s software/application is hosted on the Commission’s network or off-premises, the software/application must be delivered free of all malware.<input type="checkbox"/> If the service is hosted on the Commission’s network, the vendor’s software must coexist with all industry-accepted endpoint software.<ul style="list-style-type: none"><input type="checkbox"/> Note: It is not an option to avoid running endpoint protection on a Commission server.<input type="checkbox"/> If the service is hosted off the Commission’s network – Software As A Service (SaaS) -- then an industry-accepted endpoint protection solution must be operated on all hosting servers.<input type="checkbox"/> If the service is hosted on the Commission’s network, the vendor must provide the necessary directory and file exclusions to allow the software to operate as intended.
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