**Project Execution Plan for (Digital Delivery Project)**

**Contract No. XXXX**

2/13/2023

*Prepared for*



*Prepared by*

*Insert Company Name/Logo*

# This is how this document works

The intent and purpose of the Project Execution Plan (PxP) is to maintain a living document which contains guidance for all team members to understand project set up according to PTC guidelines. All sections of this document must be completed by the Design Consultant using the appropriate and correct information for both PTC and consultants. Everything written in **blue**, must be updated in reference to the project. The blue text specifies what should be filled out and provides examples of what may be included in that section. Once a section is updated/complete, change the blue text to black. Sections that do not apply can be noted as N/A.

**This document must be submitted for all project submissions** and in conjunction with the appropriate plan/model set. Every submission requires an update to the Revision History table on the following page. Additionally, the table of contents must be updated to reflect any changes in the document.

The Design Consultant is to complete this form with information pertaining to the project, which must be discussed and coordinated with the PTC Project Leads. If any assistance is needed to fill out the information for this document, the Design Consultant may reach out to the PTC Project Leads for further guidance.

# Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| Revision Date | Version | Revised By | Remark |
| 01/01/2023 | 01 |  | Initial Submission |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

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# Executive Statement

The Pennsylvania Turnpike Commission’s (PTC) Project Execution Plan’s (PxP) purpose is to document the efforts Consultant Project Teams must take to create and deliver discipline specific design models, including compliance with model development requirements and how this data will be exchanged throughout the project lifecycle for the intended model uses. This plan will be updated throughout the project lifecycle to reflect any changes in the required efforts.

## Goals and Guidelines

PTC’s high-level goals and objectives are documented in the PIM & CAD Standard. Any additional project goals will be listed below.

|  |
| --- |
| **GOALS** |
| Progress PTC’s Digital Delivery Program with implementation of the PIM & CAD Standards and providing recommendations to PTC. |
| Ex.) Improved accuracy and consistency of design information |
| Ex.) Visual communication and optimization of construction phasing sequencing |

# Project Information

## Project Description

Table 2.1 Project Description

|  |  |
| --- | --- |
| Project Title |  |
| Construction Contract Number |  |
| Project Address |  |
| Owner Name | Pennsylvania Turnpike Commission |
| Project Description |  |

## Project Submissions

The following table depicts the milestones and their expected schedule dates. *If applicable, rows may be added/removed per project submission requirements.*

Table 2.2 Project Submissions

|  |  |
| --- | --- |
| Project Submission | Estimated Completion Date |
| DFV | *Preliminary Completion Date* |
| OTS | *Completion Date* |
| 75% Design | *Completion Date* |
| Pre-Final PS&E | *Completion Date* |
| Final PS&E | *Completion Date* |
| Advertisement | *Completion Date* |
| As-Bid | *Completion Date* |

## Project Team and Directory

### PTC Project LEAD CONTACTS

Table 2.3 PTC Project Lead Contacts

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Company** | **Contact Name** | **Role** | **Email address** | **Phone Number** |
| PTC |  | PTC Project Manager |  |  |
| PTC |  | Design Services | Digitaldelivery@paturnpike.com |  |
|  |  | PTC Design Manager |  |  |

### Consultant Team Leads

Personnel responsible and accountable for all Digital Delivery Requirements and Deliverables. This will include all Consultants who will be signing and sealing any plan.

Table 2.4 Consultant Team Contacts

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Company | Contact Name | Role | Email address | Phone Number |
|  |  | Consultant Project Manager |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

# Deliverables

The design team’s deliverables and requirements with respect to Digital Delivery are listed below.

Table 3.1 Model as the Legal Document

|  |  |  |
| --- | --- | --- |
| **Model as the Legal Document Requirements** | | |
| **Does your project require model files as the legal document a part of the bid package?** | **Yes** | **No** |

***\*****If no, then skip table 3.2 below and note N/A.*

If yes was answered above, then the following table dictates what elements are required as model deliverables and will be stated as Models as the Legal Document (MALD) for the construction bid package. Please note the file format for each item listed and when it will be included as part of the deliverable package for each project submission. All remaining content for project submittals will be included within PDF files.

Table 3.2 Required Model Deliverables

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Required Model Deliverables** | | | | | | |
| **Element** | **File Type** | **Deliverable Frequency** | | | | |
| **DFV** | **OTS** | **75% Design** | **Pre-Final PS&E** | **Final PS&E** |
| Roadway including pavement, median, guiderail, and barrier. | * *OpenRoads (.DGN)* * *Civil 3D (.DWG)* |  | **X** | **X** | **X** | **X** |
| Surfaces for final roadway conditions | * *LandXML* |  |  |  | **X** | **X** |
| Drainage | * *OpenRoads (.DGN)* * *Civil 3D (.DWG)* |  |  | **X** | **X** | **X** |

Table 3.3 Digital Delivery Initiation Deliverables

|  |  |  |
| --- | --- | --- |
| **Digital Delivery Initiation Deliverables** | | |
| **Deliverable** | **File Type** | **Frequency** |
| PxP | * Word Doc * PDF | *First draft due 30 days after notice to proceed, and at a minimum every project submission (frequency may increase dependent on PTC and Design Consultant team’s deliverable requirements.)* |
| Engineering Technology Kickoff Meeting | * Meeting Minutes | *At completion of initial PxP (30 Days after notice to proceed)* |

Table 3.4 Model Authoring/Design Intent Models

|  |  |  |
| --- | --- | --- |
| **Model Authoring/ Design Intent Models / Drawings** | | |
| **Deliverable** | **File Type** | **Frequency** |
| Design Intent Models | * *OpenRoads (.DGN)* * *Civil 3D (.DWG)* * *Revit (.RVT)* | *Each Project Submission* |
| Federated Model | * *Navisworks (.NWD)* * *iModel (.I.DGN)* * *IFC (.IFC)* | *Each Project Submission* |
| Record Models | * *OpenRoads (.DGN)* * *Civil 3D (.DWG)* * *Revit (.RVT)* | *Project Closeout* |

Table 3.5 2D Documentation / Contract Documents

|  |  |  |
| --- | --- | --- |
| **2D Documentation (Drawing sets) / Contract Documents** | | |
| **Deliverable** | **File Type** | **Frequency** |
| Contract Documents | * PDF | *Each Project Submission* |
| Specifications | * PDF | *TBD* |

Table 3.6 3D Coordination

|  |  |  |
| --- | --- | --- |
| **3D Coordination** | | |
| **Deliverable** | **File Type** | **Frequency** |
| Discipline Specific 3D Coordination Model | * *NWC* | *TBD* |
| Discipline specific 2D coordination models | * *Civil 3D (.DWG)* * *OpenRoads (.DGN)* | *TBD* |
| Federated 3D Coordination Model | * *NWD – Published Coordination Model* * *iModel* * *IFC* | *TBD* |
| Coordination/Clash Reports | * PDF | *TBD* |

Table 3.7 QAQC

|  |  |  |
| --- | --- | --- |
| **QAQC** | | |
| **Deliverable** | **File Type** | **Frequency** |
| Technology Standards Review Report  *(PTC Design Services will complete this Report)* | * PDF | OTS & PS&E |

## Additional Engineering Technology Deliverables

PTC’s high-level deliverables and requirements are documented in the PIM & CAD Standard. Any additional project deliverables will be listed below.

Table 3.8 Additional Deliverables

|  |
| --- |
| **Deliverables** |
| Ex.) IFC models |
| Ex.) Models and information which can support operation and maintenance |

# Collaboration

## Proposed Technology Versions

Below marks the software that will be utilized for project execution. *Note in the table below if using a different software version than listed in the Standards.*

Table 4.1 Proposed Technology Versions

| **Software** | **Description of Use** | **Version** | **Phase/Scope** |
| --- | --- | --- | --- |
| Autodesk AutoCAD | Design Intent Models | 2021 |  |
| Autodesk Civil 3D | Design Intent Models | 2021 |  |
| Bentley OpenRoads Designer | Design Intent Models | 10.10.01.03 |  |
| Bentley OpenBridge Modeler\* | Design Intent Models | 10.10.01.03 |  |
| Autodesk Revit \* | Design Intent Models | 2021 |  |
| Autodesk Infraworks | Design Intent Models | 2021 |  |
| Autodesk Inventor | Design Intent Models | 2021 |  |

\*If utilizing this software, you must fill out Appendix A

### Data migration and software version updates

It is the Consultant Project Manager’s responsibility, at the completion of a project phase, to review the ETS for latest updates on supported versions by PTC. Data migration and software version updates will be determined on a case-by-case basis depending on the schedule and advances of the software. If a version of software has been updated, then the Consultant Project Manager will discuss with PTC’s Design Services Unit whether to implement a change for that project. If an update is required for your project, please fill out the following table:

Table 4.2 Data Migration and Software Version Updates

|  |  |  |  |
| --- | --- | --- | --- |
| Process Type | Current Software &  Version | Succeeding Software &  Version | Process |
| Data Migration |  |  |  |
| Software Upgrade |  |  |  |

## Common Data Environment

The Pennsylvania Turnpike Commission will create a project on their Common Data Environment (CDE) in order to host project submissions. PTC will invite the appropriate parties to their CDE for the purpose of project submissions and to share feedback/comments on model files. Common Data Environment is utilized for all submissions. The PTC admin will create the project and fill out the information below, after the initial submission of the PxP:

Table 4.3 Common Data Environment

|  |  |
| --- | --- |
| **Common Data Environment** | |
| **CDE System** | Platform |
| **CDE Admin** | Name |
| **Hyperlink** | Link |

*\*Note: the table above is completed by PTC after the initial submission of the PxP by the Design Consultant.*

### Folder Structure

Design Consultant must update this section to reflect their folder structure for their model files. Insert general description of the folder structure and graphic/diagram for ease of understanding. Folder structure must adhere to section 10.2 of the PTC PIM & CAD Standards.

### File Management

File Management should comply with the Collaboration standards laid out in section 10 of the PTC PIM & CAD Standards. Since PTC is the admin for the Common Data Environment, they will set appropriate permissions and security to various folders within the project. If for some reason, additional permissions are required please list below along with a request to the PTC Design Services Unit

#### Project Number for File Naming

The project number for file naming is a shortened project number associating the route and milepost to the project (also known as the abbreviated contract number). This will be the predecessor for all model file names. Project naming should follow standard naming conventions laid out in section 8 of the PTC PIM & CAD Standards document.

Table 4.4 Project Number for File Naming

|  |  |
| --- | --- |
| **Project Number for File Naming** | |
| **Project Number** | Abbreviated Project # for naming (i.e., A083.88S) |

#### Originator Designator for File Naming

Below lists the acronyms that will be used to represent each Consultant’s Organization on the project. This nomenclature will be utilized for file naming. NOTE: This designation will be utilized on all future projects. The format for designation must be 2-4 characters.

Table 4.5 Originator Designator for File Naming

|  |  |
| --- | --- |
| Organization | Designation |
| Pennsylvania Turnpike Commission | PTC |
| Consultant 1 | CS1 |
| Consultant 2 | CS2 |

## Existing Conditions

The following sections list survey data received from PTC, additional data acquired by GIS, in addition to other survey means in order to develop the existing condition model files.

### Survey Data from PTC

Table 4.6 Survey Data from PTC

|  |  |  |
| --- | --- | --- |
| Survey Data from PTC | | |
| File Name | Source | Date |
| *List original name of file* | (LiDAR, point file, etc) | Date |
|  | (LiDAR, point file, etc), Date | Date |

### Additional Survey Data

If additional survey data is necessary for this project, then list the data collected, date and source of survey type. All additional survey data must be sent to PTC in its native format for their records.

Table 4.7 Additional Survey Data

|  |  |  |  |
| --- | --- | --- | --- |
| Additional Survey Data | | | |
| File Name | Source | Data Captured | Date |
| *List name of file* | (LiDAR, total station point file, etc) | Pavement elevations | Date |

### GIS Data

Table 4.8 GIS Data

|  |  |  |
| --- | --- | --- |
| GIS Data | | |
| File Name | Data Sourced | Provider |
| *List original name of file* | Terrain, drainage network, etc. | Provider name |
|  | Terrain, drainage network, etc. | Provider name |

### Model Files for Existing COnditions

List all existing conditions model files that will be utilized. All model files must follow the naming convention described in section 8 of the PTC PIM & CAD Standards. The existing conditions models are located in the ‘Base Data’ folder within the folder structure.

Table 4.9 Model Files for Existing Conditions

|  |  |  |
| --- | --- | --- |
| Model Files for Existing Conditions | | |
| Model Name | Scope | Source |
| *####- V-XX-XXX-XXXX.dwg* | Master existing conditions 2D model | PTC Survey XX/XX/XX |
| *####- V-XX-XXX-XXXX.dwg* | Terrain/surface model for existing Topo | Survey XX/XX/XX |
| *####- V-XX-XXX-XXXX.dwg* | Existing Utilities Model | Survey XX/XX/XX |

# Model Setup

## Model Breakdown Strategy

Insert the full list of Project Information Models below following naming convention described in section 8 of the PTC PIM & CAD Standards.

Table 5.1 Model Breakdown Strategy

|  |  |  |
| --- | --- | --- |
| Model Discipline | Model Name | Description |
| Civil Model(s)\* | *####- C-XX-XXX-XXXX.dwg ####- C-XX-XXX-XXXX.dwg* |  |
| Structural | *####- S-XX-XXX-XXXX.rvt* |  |
| Traffic | *####- T-XX-XXX-XXXX.dwg* |  |
| Architectural Model(s) | *####- A-XX-XXX-XXXX.rvt* |  |
| Electrical | *####- E-XX-XXX-XXXX.dwg* |  |
| Fire Protection | *####- F-XX-XXX-XXXX.dwg* |  |
| Mechanical | *####- M-XX-XXX-XXXX.dwg* |  |
| Plumbing | *####- P-XX-XXX-XXXX.dwg* |  |
| Landscape | *####- L-XX-XXX-XXXX.dwg* |  |

\*Civil includes Roadway, Drainage, etc.

### Federated Model

Design Intent Federated Model: Insert flow chart, diagram, or strategy for model federation. The primary civil/architecture/structural model can suffice if all PIMs and references are linked in.

### LOD Exceptions

The design team will model all elements according to the LOD matrix, with the exception of the following items at the following stages:

Table 5.2 LOD Exceptions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Design Object/Element | LOD | | | | | Justification |
| DFV | OTS | 75% Design | Pre-Final PS&E | Final PS&E | Below describes the justification for deviating from the LOD Standards | |
| *Ex.) Site Communications Conduit Fittings* | *100* | *100* | *100* | *200* | *200* |  | |
| *Ex.) Footing Reinforcement* | *100* | *100* | *100* | *100* | *100* |  | |
| *Ex.) Storm Drainage Trench Embedment* | *100* | *100* | *100* | *200* | *200* |  | |

## Project Coordinates

The horizontal and vertical controls for the project are:

Table 5.3 Horizontal Coordinates

|  |  |
| --- | --- |
| **Horizontal Coordinates** | |
| **Project Location** | **Coordinate System** |
|  | NAD 83 State Plane Pennsylvania North FIPS 3701 (US Feet) |
|  | NAD 83 State Plane Pennsylvania South FIPS 3702 (US Feet) |

*Refer to the Project Information Modeling & CAD Standards for datum references (see* ***PIM & CAD Standards****:* ***Section 13.2 Coordinate System and Datums****).*

Table 5.4 Vertical Coordinates

|  |  |
| --- | --- |
| **Vertical Coordinates** | |
| **Project Location** | **Coordinate System** |
|  | NAVD 1988 |

## Titleblocks and Sheets

The standard sheet size for the project is ***ANSI D (22” x 34”).*** However, various full project length PDF sheet sizes are available from PTC’s Civil 3D template file, PTC Plan Sheet-C3D.dwt, and ORD template file, PTC Full Project Length PDF.dgn. It is up to the design lead to determine if various full project length PDF’s will be needed for the project and make the necessary recommendations to the project lead for PTC’s approval. Sheet sizes must follow the sizes listed within the PIM & CAD standards, see section 7.7.

Table 5.5 PDF Sheet Sizes

|  |  |  |
| --- | --- | --- |
| **Start Here** | **Plan Sheet Size to Use** | |
| *Is your project required to deliver a full project length PDF?* | ***NO / Not Applicable*** | ***YES*** |
| *Full Project Length PDF size* | *Use standard ANSI D (34”x22”)* | Click to Select Size |

# Coordination

## Design Intent Coordination Strategy

PTC’s strategy must align to the master schedule and to the project scope of work and phases. This includes both 3D and 2D coordination and must answer the following questions:

● Who – identify who needs to attend design coordination

● What – What models and elements are being coordinated first. Does the LOD Matrix need to be revised? Is there a clash matrix?

● Where – are these taking place virtually? If so, include link to meeting.

● When – What is the proposed design coordination schedule

● Why – Identify the objective of the proposed coordination sessions

● How – This is your strategy on how to coordinate the design. Can be a combination of items and tools. BIM 360 model coordination and Navisworks with unified issues is one proposed approach.

## Quality Assurance and Quality Control Strategies

The Consultant Project Manager may appoint leaders of each organization/discipline to maintain the standards of the PxP and to preserve the model health throughout the process. The following checks must be performed in order to maintain the quality of the models between disciplines:

Table 6.1 QAQC Strategies

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Check | Description | Responsibility | Software Used | Frequency |
| Visual | *Ensure all model elements are intentionally modeled following the design, with no missing elements and removing all extra components.* | *All users* | *Civil 3D* | *Daily* |
| Clash | *Ensure all modeled elements in a single model are free of collisions between linked models, regardless of severity.* | *Consultant Project Manager or appointee by Consultant PM* | *Civil 3D, OpenRoads, Designer, Revit, Navisworks, Glue* | *Agreed Upon* |
| Maintenance | *Ensuring models are set up appropriately, periodic audit & compacting the model, vetting links and references, and maintaining file size.* | *All users* | *Civil 3D* | *Weekly* |
| Standards | *Ensure that the Project Information Modeling & CAD Standards are followed in all models.* | *Consultant Project Team* | *Civil 3D, OpenRoads, Designer, Revit* | *Before Project Submissions* |
| Integrity | *Ensure that all Objects and Object Data has no undefined, incorrectly defined, or duplicated elements* | *Consultant Team* | *Civil 3D* | *Before Project Submissions* |

### Model Maintenance

The Consultant Team will be responsible to perform a series of quality control measures to check for compliance against the Protocol, PxP, and Project Information Modeling & CAD Standards. There are many causes for degradation of file performance, slowness in overall navigation and corruption. To best overcome this and other potential performance related issues, a good model maintenance plan is suggested below.

Table 6.2 Model Maintenance

|  |  |
| --- | --- |
| **Function** | **Recommended Frequency** |
| **Audit** | * *Once a week at the beginning of the week* |
| **Compact** | * *Once a week at the end of the week* |
| **Purge elements** | * *At major milestones & when transmitting file to consultants* |
| **Purge Views** | * *At major milestones & when transmitting file to consultants* |
| **Review Links** | * *When links are received, periodically there after* |
| **Warnings Management** | * *Weekly – bi-weekly* |

# Design Review Process

There are 5 scheduled reviews of full drawing packages. These more formal reviews will occur after each main phase of design; DFV, OTS, 75% Design, Pre-Final PS&E, and Final PS&E.

Table 7.1 Model Deliverable Requirements per Submission

|  |  |  |
| --- | --- | --- |
| Model Deliverable Requirements per Submission | | |
| Submission | Digital Deliverable Item | Format |
| DFV | * Alignment Files | * OpenRoads (.DGN) * Civil 3D (.DWG) |
| OTS | * Alignment Files * Roadway Corridor (no guiderail included in this submission) | * OpenRoads (.DGN) * Civil 3D (.DWG) |
| 75% Design | * Alignment Files * Roadway Corridor (including guiderail, pavement attribute, and barriers) * Drainage | * OpenRoads (.DGN) * Civil 3D (.DWG) |
| Pre-Final PS&E | * Alignment Files * Roadway Corridor (including guiderail, pavement attribute, and barriers) * Drainage * Surfaces   + Existing Roadway conditions   + Intermittent for Roadway pavement courses   + Final Roadway conditions | * OpenRoads (.DGN) * Civil 3D (.DWG) * LandXML |
| Final PS&E | * Alignment Files * Roadway Corridor (including guiderail, pavement attribute, and barriers) * Drainage * Surfaces   + Existing Roadway conditions   + Intermittent for Roadway pavement courses   + Final Roadway conditions | * OpenRoads (.DGN) * Civil 3D (.DWG) * LandXML |

# Document Review

The following table will be completed after reviewing the PxP at the Initial Kickoff meeting with PTC Design Services Unit. By signing and acknowledging acceptance below, the Company agrees that it has read, will abide by the standards set forth and referenced within this document and consents to the delivery program established herein.

**Table 27. Document Review**

|  |  |  |
| --- | --- | --- |
| Company Name | Date Reviewed | Signee |
| PTC Project Manager | *XX/XX/XXXX* |  |
| PTC Design Services | *XX/XX/XXXX* |  |
| Consultant (insert Company name) Project Manager | *XX/XX/XXXX* |  |

# Appendix A – Vertical Projects

## Shared Model Element Ownership

The design team will eliminate redundant model elements across disciplines where possible, thereby increasing accuracy and reducing modeling time and model size. To the largest extent possible, elements in a model that host elements in another model (e.g. shear wall in Structural model hosting openings in Arch model) should be modified rather than deleted and replaced with new elements to avoid orphaning hosted elements. Should this occur, model authors will collaborate to minimize disruption of hosted element models.

**Table A1. Shared Model Element Ownership**

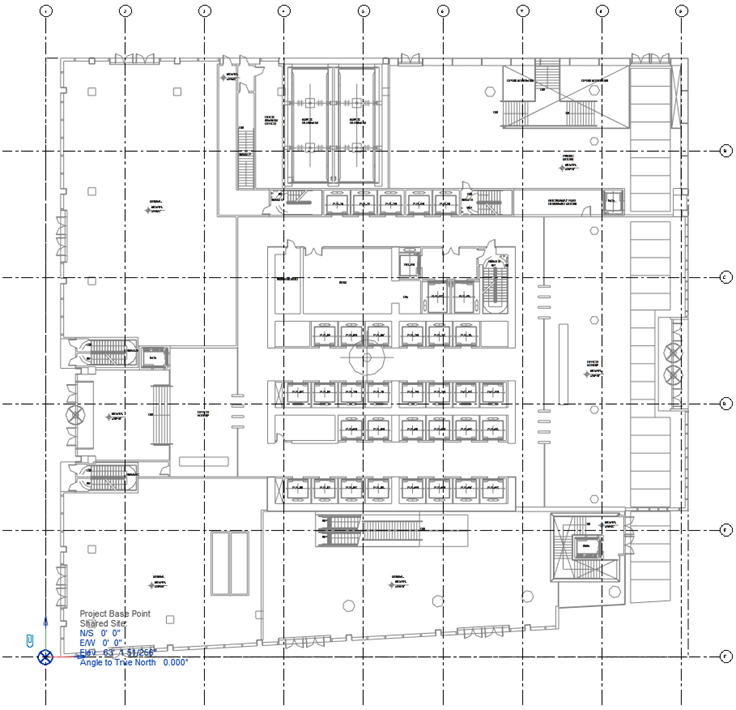
|  |  |  |  |
| --- | --- | --- | --- |
| Component | Placement in the Model for Coordination Only | Placement Responsibility and Ownership | Content Source |
| Existing Site Conditions | *Architect* | *Civil* | *Civil* |
| Bridge | *Civil* | *Structural Engineer* | *Structural Engineer* |
| Chilled Beams | *Architect* | *MEP* | *MEP* |

## Project Coordinates

For facilities, insert the local project coordinates below:

**Table A2. Project Coordinates**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Scope | N/S | E/W | Elevation | Angle to True North |
| Survey Point | *0’-0”* | *0’-0”* | *0’-0”* | *0˚* |
| Project Basepoint | *0’-0”* | *0’-0”* | *0’-0”* | *0˚* |



*[Sample diagram. Replace with Project Base and Survey Point locations once set. Erase if not applicable.]*

A project base point will be established and must be reflected in not only all the models, but it should also be reflected in the civil drawings. This will support the accuracy and precision of model placement and linking between models.

### Levels/Grids

*Only Applicable to Revit and Architecture/Structural software design.*

To maintain the accuracy and placement of levels and grids, only one model shall host either element for which other disciplines will copy/monitor in to reflect the project’s levels and grids. The design architect will create the levels in their model and structural will add the grids to their own designated model. These models must be shared with all disciplines for each organization and each organization is responsible for copy monitoring either grids and levels into their project and placed in their appropriate work set for their reference.

*See Section 4.2 Model Element Ownership for more information.*

The project Levels and Grids are listed below.

**Table A3. Project Levels and Grids**

|  |  |  |
| --- | --- | --- |
| Height | Name | Description |
|  |  |  |
|  |  |  |
|  |  |  |

## Phasing

*If applicable, projects undergoing or participating in the use of the Revit phase feature must coordinate with all organizations to adhere to the same phase naming conventions and graphic standards. Upholding these features will allow all sheet views to read consistently between models and creates ease for linked model graphic management.*

**Table A4. Phasing**

|  |  |
| --- | --- |
| **Phase** | **Description** |
| *Existing Conditions* | *Periods of construction occurring before contract.* |
| *Phase 1 – (ex. Site) - New Construction* | *All new construction and demolition to occur during construction Phase 1.* |
| *Phase 2 – (ex. Arch) - New Construction* | *All new construction and demolition to occur during construction Phase 2.* |