BIM Execution Plan (BIMxp)

**INFO ONLY—DELETE THIS TEXT BOX
CTRL+\*** to show/hide instructions

[Project Title]

*This document is a starting point. Revise it to meet your project’s needs and requirements. Fill out this document and submit to* SPU\_CADsupport@Seattle.gov *for review.*

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# Introduction

BIM stands for “Building Information Modeling” – typically used for architectural projects but has expanded into civil engineering and other disciplines recently. It’s not only software, but a method of collaboration and a way of building and updating plans, models and associated data. The goal is to build 3D models in a collaborative environment and 2D construction drawings are created, based on those models.

# Submittal Requirements

Refer to Section 10 of the [CAD Manual](http://seattle.gov/util/CAD) for detailed CAD submittal requirements.

# Project Information

|  |  |
| --- | --- |
| Project Location(s) |  |
| SpeedType (charge code*—contact Project Manager to acquire*) |  |
| Project Tracking Number (PTN *—contact* SPU\_CADsupport@Seattle.gov *to acquire*)  |  |

# Datums, Coordinate System & Units

|  |  |
| --- | --- |
| Vertical Datum | NAVD88 |
| Horizontal Datum | NAD83 (####) |
| Zone Description | HPGN (HARN) Washington State Planes, North Zone, US Foot |
| Origin Coordinate | 0,0,0 |
| Combined Scale Factor | 1 |
| AutoCAD Insertion Scale Units*—the UNITS command* | Unitless |
| Civil 3D Drawing Units*—the EDITDRAWINGSETTINGS command* | Feet |

# Software & Hardware

|  |  |
| --- | --- |
| Point Cloud Processing Software | Leica Cyclone & Autodesk ReCap 360 |
| Civil Mapping/Design Working Software | Autodesk AutoCAD Civil 3D 2017+ |
| Vertical Design Working Software | Autodesk Revit 2017+ and/or AutoCAD Plant 3D 2017+ |
| Clash Detection Software | Navisworks Manage 2017+ |
| Survey/CAD Workstations | HP Z240 or approved equal w/32 GB RAM & 64-bit OS |
| BIM Platform | [Autodesk BIM 360](http://www.seattle.gov/util/cs/groups/public/%40spu/%40engineering/documents/webcontent/1_074382.pdf) with [Desktop Connector](https://info.bim360.autodesk.com/desktop-connector): rename “Project Files” to the PTN. |
| [Digital Signature](http://www.dol.wa.gov/business/engineerslandsurveyors/docs/eDocsInterpretiveGuideline.pdf) Solution(s) | **City of Seattle Staff:** DocuSign Digital Signature Appliance |

# Files & Data

|  |  |
| --- | --- |
| Existing Conditions Mapping | **Point Cloud Format:** Reality Capture Project (.RCP) file.**Topo/Base Map Drawing:** symbology, linework, and annotation of existing conditions in AutoCAD Civil 3D (.DWG) format.**3D Surfaces & 3D Pipes/Structures:** AutoCAD Drawing (.DWG) with 3D (ACIS) solids and LandXML formats uploaded to [BIM Platform](#BIMplatform) for clash detection, collaboration and submittals. |
| Civil Data Protocol(see CAD Manual) | **Set Working Folder on BIM Platform:** C:\Users\[username]\BIM 360\Seattle Public Utilities\[project name]**Set Data Shortcuts Project Folder on BIM Platform:** Set the project folder to the PTN (formerly the “Project Files” folder)**Georeferenced Utility Objects:** AutoCAD Civil 3D (.DWG) format; classified objects w/object data tables attached (see [Asset Data Standards](#_Asset_Data_Standards)). Plan/profile/section/detail views displayed on sheets.**3D Surfaces & 3D Pipes/Structures:** AutoCAD Drawing (.DWG) with 3D (ACIS) solids and LandXML formats uploaded to [BIM Platform](#BIMplatform) for clash detection, collaboration and submittals. |
| Vertical Data Protocol | **Pre-Final Submittals:** uploaded to [BIM Platform](#BIMplatform) for clash detection, collaboration and coordination. Views shall be exported into .DWG format for display on sheets.**Final Submittals:** AutoCAD Drawing (.DWG) with 3D (ACIS) solids and Navisworks (.NWD) formats uploaded to [BIM Platform](#BIMplatform). Views shall be exported into .DWG format for display on sheets. |
| Sheet Production | **Working Format:** Sheets will be created in AutoCAD (.DWG) format and managed with Sheet Set Manager (.DST) by the [SSM Lead](#SSM). **Review Format:** PDFs will be created from the sheets and uploaded to [BIM Platform](#BIMplatform) for review. |
| File-Naming Conventions (add or remove file naming conventions as needed)[PTN]=Project Tracking #[DWG]=See “Drawing Numbering” below[XXXX]=major layer field per Section 5 of the CAD Manual[VPI]=Vault Plan Index # | **Sheet Set:** [PTN]\_[project\_name].dst**Sheets:** # [DWG].dwg**XREF drawings:** [PTN]\_X-[XXXX]-[optional\_description].dwg**Revit:** [PTN]\_[project\_name].rvt**Navisworks:** [PTN]\_[project\_name].nwd**Industry Foundation Classes:** [PTN]\_[project\_name].ifc**PDF review sets:** [PTN]\_[milestone]-[project\_name].pdf**Final PDFs:** [VPI]-[Sheet #].pdf |
| Drawing Numbering (see Section 3 of the CAD Manual; add disciplines required for this project, based on the discipline designators shown in Section 5 of the CAD Manual)EXAMPLE 1:Seventh Civil Plan/Profile:**C-107**BREAKDOWN:Discipline: **C-**107Sheet Type: C-**1**07Sequence #: C-1**07**EXAMPLE 2:Second Civil Paving Plan/Profile:**CP102**BREAKDOWN:Discipline: **CP**102Sheet Type: CP**1**02Sequence #: CP1**02** | **Discipline:** | **Name:** |
| G- | General (cover sheet, notes, etc.) |
| V- | Survey/Mapping |
| C- | Civil (site prep, CSEC, demo, etc.) |
| CU | Civil Utilities |
| CP | Civil Paving |
| L- | Landscaping |
| S- | Structural |
| A- | Architectural |
| I- | Interiors |
| Q- | Equipment |
| F- | Fire |
| P- | Plumbing |
| M- | Mechanical |
| E- | Electrical |
| T- | Telecommunications |
| D- | Process and Instrumentation Diagrams (P&IDs) |
| X- | Instrumentation and Controls (I&C) |
|  |  |
|  |  |
|  |  |
| **Sheet Type:** | **Name:** |
| 0 | General (symbol legend, abbreviations, notes, etc.) |
| 1 | Plans and/or Profiles |
| 2 | Details and/or Sections |
| 3 | Diagrams and/or Schedules |
| 4 | Intersections and Plan Blow-ups |
| Sheet Submittals(see CAD Manual) | **Pre-Final Submittals:** PDFs created with “DWG to PDF.pc3” from AutoCAD Civil 3D and uploaded to [BIM Platform](#BIMplatform) for review.**Final Submittals:** Individual PDF files created for each sheet with “DWG-to-PDF-COS-DS.pc3” from AutoCAD Civil 3D and digitally signed. |

# Roles & Responsibilities

| **Role:** | **Name (Email Address):** |
| --- | --- |
| Project Manager |  |
| Project Engineer |  |
| Project Surveyor |  |
| Project Estimator |  |
| Construction Manager |  |
| [BIM Project Controller (BPC)](#BPC) |  |
| [Model Managers (MM)](#MM) |  |
| [Model Element Authors (MEA)](#MEA) and [Codes](#MEAcodes) (2 or 3 characters) | **Responsible Persons:** |  **MEA Codes:** |
| Will Choate (William.Choate@Seattle.gov)  | SV |
| [Model Users (MU)](#MU) | Jonathan Batara (Jonathan.Batara@seattle.gov)Ray Brown (Ray.Brown@seattle.gov)Charles Oppelt (Charles.Oppelt@seattle.gov) Ryane Mar (Ryane.Mar@seattle.gov)  |
| [Sheet Set Manager (SSM) Lead](#SSM) |  |
| CAD Support Staff |  |

# Collaboration

|  |  |
| --- | --- |
| Upload Frequency | Upload/sync files at predetermined submittal dates to [BIM Platform](#BIMplatform). |
| X-VIEW Drawing | The [SSM Lead](#SSM) will use the design drafting (DD) Civil 3D template provided at [Seattle.gov/util/CAD](http://seattle.gov/util/CAD) to create a model view (X-VIEW) drawing containing views that represent plan viewport scales and orientations (see CAD Manual) and share it with the team. |
| Sheet Set Manager DST | The DST file is to be used to make sheet/detail references. The [SSM Lead](#SSM) will create/maintain/update the DST file and share it with the team on the [BIM Platform](#BIMplatform). All changes to the DST must be made by the Sheet Set Manager Lead and no changes shall be made to the DST file except by the SSM Lead. |
| Sheet Drawings | Sheet drawings may contain locked viewports, north arrows, bar scales, street names, profile grids, match lines, profile grid stationing, reference blocks, and detail/section titles.All XREFs must be set to OVERLAY and RELATIVE in sheet drawings and overlaid in the correct order so the base map is on the bottom and the primary XREF is on the top.To avoid duplicate contours and alignments, freeze base map and secondary XREF contours and alignments if those objects are shown in the primary XREF.Freeze base map street names shown in viewports.Ensure that drawing/sheet-numbering, detail/section referencing, and file-naming conventions are to standard |
| Reference DrawingsXREF = external reference used for presentation purposesDREF = data reference source file | Plan view XREFs and DREFs shall be created from the X-VIEW drawing.All XREFs shall be set to OVERLAY and RELATIVE in reference drawings.All linework, annotation, and legends shall be placed in XREFs only (not in sheet drawings).Linetype variables LTSCALE, PSLTSCALE, MSLTSCALE, and CELTSCALE must be set to 1.Horizontal/conveyance assets must be classified objects with data filled-in, and vertical assets must have property set data attached, in accordance with the Asset Data Standards.Feature Lines, Grading Objects, Corridors, Pipe Networks, and Pressure Pipe Networks shall be on non-plotting layers (typically residing in DREF drawings). Object labels may be on plotting layers. |
| Shared Folder Structure (Project Files)[PTN]=Project Tracking #For efficient file-management, local working folders must match the shared folder structure on the [Collaboration Platform](#Collaboration). All data shortcuts must be created from DREF files saved within the local 00-BIM folder which will generate XML files in the local **\_Shortcuts** folder. Data shortcut XML files in the **\_Shortcuts** sub-folders contain the DwgRelPath tag and can be used in a shared environment, and when a data shortcut is created locally, the associated XML file must be uploaded to the appropriate **\_Shortcuts** sub-folder on the [Collaboration Platform](#Collaboration).DREF, XREF and sheet drawings are maintained in the 00-BIM folder. The master Sheet Set Manager DST file must be maintained locally by the [SSM Lead](#SSM). All XREF’d files must be uploaded to the 00-BIM folder as “linked files” to maintain the parent-child relationships. | * **[PTN]**
	+ **\_Shortcuts** (required; if you create a data-shortcut, upload the associated XML file to the appropriate sub-folder below)
		- Alignments (auto-created by Civil 3D)
		- Corridors (auto-created by Civil 3D)
		- PipeNetworks (auto-created by Civil 3D)
		- PressurePipeNetworks (auto-created by Civil 3D)
		- Profiles (auto-created by Civil 3D)
		- Surfaces (auto-created by Civil 3D)
		- ViewframeGroups (not used; auto-created by Civil 3D)

**⤤** ShortcutsHistory.xml (add project name between the quotation marks in desc="" tag)* + **00-BIM**
		- PDFs
			* 30%-Submittal (transfer PDFs to Issue & Markup Tracking platform for reviews)
			* 60%-Submittal (transfer PDFs to Issue & Markup Tracking platform for reviews)
			* 90%-Submittal (transfer PDFs to Issue & Markup Tracking platform for reviews)
			* 100%-Submittal (transfer PDFs to Issue & Markup Tracking platform for reviews)
			* Final-PDFs (place final PDFs here, ready to be signed)
			* Signed-PDFs (place signed PDFs here along with certificate files, if needed)
 |

# Clash Detection

|  |  |
| --- | --- |
| Upload Frequency | [MEAs](#MEA) will upload model data to [BIM Platform](#BIMplatform) at predetermined submittal dates. |
| Clash Detection MatrixEach model element author (MEA) is required to provide 3D models for other MEAs to compare to.The left-hand column MEA leads the interference check directly againstwhat is marked from the top row.H = horizontal/conveyanceV = vertical | Model ([MEA Code](#MEAcodes)): | H: Power | H: Water | H: Sewer/Storm | H: Existing Utilities | Structural | V: Mechanical | V: Electrical | V: Process Piping |
| H: Intake & Exhaust Piping () | X | X | X | X | X |  |  |  |
| H: Power () |  | X | X | X | X |  |  |  |
| H: Water () |  |  | X | X | X |  |  |  |
| H: Sewer/Storm () |  |  |  | X | X |  |  |  |
| Structural () |  |  |  | X |  | X | X | X |
| V: Mechanical () |  |  |  |  |  |  | X | X |
| V: Electrical () |  |  |  |  |  |  |  | X |
| V: Process Piping () |  |  |  |  |  |  |  | X |

# Coordination

|  |  |
| --- | --- |
| Sheet Coordination (PDFs)Setup the sheet coordination space (create a “PDF” sub-folder in the “Plans” folder of the Document Management module of BIM 360) for PDF uploads. This will become the sheet coordination space for the project team. This folder may contain sub-folders, if required. Ensure that the document “number” is linked to the drawing number (not the sheet number) in the title blocks. | The [SSM Lead](#SSM) shall update the PDFs to [BIM Platform](#BIMplatform). Project team members must record ALL issues and markups in the Coordination Platform. |
| Model CoordinationSet up the model coordination space for Revit models (create a “Revit” sub-folder in the “Plans” folder of the Document Management module of BIM 360). This will become the model coordination space for the project team. This folder may contain sub-folders, if required. Place Civil 3D models and data shortcuts in the correct Project Files sub-folders of the Document Management module of BIM 360. | [Model Managers](#MM) shall update 3D models (including drawings and data shortcuts) on the [BIM Platform](#BIMplatform) for [Model Element Authors](#MEA) and [Model Users](#MU) to access. |
| Upload Frequency | Upload/sync files at predetermined submittal dates. |
| Issue Protocol | Add & resolve issues before creating markups. |
| Markup Protocol | red (new/revised linework or text)green (deletions)blue (clarifying comments) |

# Asset Data Standards

Horizontal/conveyance assets are classified objects with object data tables attached in AutoCAD Civil 3D. Vertical assets are 3D solids with the “Equipment” property set data attached.

Below are asset name/location/number labels required for drawings(modify as needed):

| **Object Type:** | **Name:** | **Location:** | **Number:** |
| --- | --- | --- | --- |
| Horizontal/Conveyance: Maint. Holes | \*\_ENDPT\_ID | Station/Offset/Elevation | ASSETNUM |
| Horizontal/Conveyance: Water Valves | Size & valve type | Station/Offset/Elevation | ASSETNUM |
| Horizontal/Conveyance: Fire Hydrant Pipe Lines | Hydrant type | Station/Offset of Hydrant | ASSETNUM(of pipe) |
| Vertical Equipment | Description | Dimensioned | Tag Label1 |
| SCADA | Description | Diagramed | Tag Label1 |

*1Define “Tag Label” format in a document.*

The \*\_ENDPT\_ID and ASSETNUM values are acquired by SPU staff as part of the asset onboarding process. See Section 6 of the CAD Manual for more information about horizontal/conveyance data requirements.

Vertical equipment and SCADA schedule requirements are defined by the engineering team, and at a minimum must contain the Tag Label and a description. Dimensions are shown in sheet views.

# LOD Specification

“LOD” stands for “Level of Development”. Per [BIM Forum](http://bimforum.org/lod/), the LOD Specification “enables practitioners in the AEC Industry to specify and articulate with a high degree of clarity the content and reliability of Building Information Models (BIMs) at various stages in the design and construction process.”.

| **LOD:** | **Description:** |
| --- | --- |
| 100 | Schematic Design |
| 200 | Design Development |
| 300 | Construction Documentation |
| 400 | Shop Drawings/Construction Admin |
| 500 | Survey/Base Maps/As-Built Conditions/Record Drawings |

# Support, Training & Documentation

* CAD Support Email: SPU\_CADsupport@Seattle.gov
* CAD Support Files & Info: <http://seattle.gov/util/CAD>
* Standard Plans & Specs: <http://www.seattle.gov/util/StandardSpecsandPlans>
* Street Improvement Permit (SIP) Info: <http://www.seattle.gov/transportation/stuse_sip.htm>
* Learn Navisworks: <https://www.youtube.com/playlist?list=PL87AF6290D6BDFABA>
* BIM 360 Health Status: <https://health.autodesk.com/>
* Learn BIM 360: <http://learnbim360.autodesk.com/>

# Model Elements

| *Develop MEA codes in the Roles & Responsibilities table.* | **30% Permit** | **30% Circulation** | **60% Permit** | **60% Circulation** | **90% Permit** | **90% Circulation** | **100% Submittal** | **Notes** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MODEL ELEMENTS | MEA | LOD | MEA | LOD | MEA | LOD | MEA | LOD | MEA | LOD | MEA | LOD | MEA | LOD |  |
| Existing Grade | SV | 500 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Existing Utilities | SV | 500 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| H: Intake & Exhaust Piping |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| H: Power |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| H: Water |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| H: Sewer/Storm |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Structural |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| V: Mechanical |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| V: Electrical |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| V: Process Piping |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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