

State of Florida
Department of Transportation

FDOTConnect *for* OpenBridge Modeler

A stylized background graphic featuring a suspension bridge with two towers and cables, and a road with a yellow center line and dashed lane markings. The bridge and road are rendered in a light blue and yellow color scheme, with the bridge towers and cables in a darker blue. The road is a bright yellow. The entire graphic is set against a white background.

Bridge Design & Modeling

Course Guide

PRODUCTION SUPPORT CADD OFFICE

TALLAHASSEE, FLORIDA

[HTTP://WWW.FDOT.GOV/CADD/](http://www.fdot.gov/cadd/)

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FDOTConnectXX.XX OpenBridge Modeler Training: Introduction to Model-Centric Workflows

Bridge Design & Modeling

Description

The training course details 3D bridge modeling workflow using Bentley product OpenBridge Modeler (OBM). To be in compliance with Florida Department of Transportation CADD standard (FDOT CADD), this effort must also be accomplished within FDOTConnectXX.XX workspace. Starting with laying out a 3D bridge model, following up with plan development and concluding with quantity reports, the participant is walked through a typical workflow using the tools and features available. Interspersed throughout are real-world detailing and design examples using the concepts in the course. Examples of data migration among different engineering disciplines are represented in the form of hands-on exercises.

Objectives

This course includes but is not limited to:

- OBM and OpenRoad Designer (ORD), Hierarchy and common tools
- FDOTConnectXX.XX Workspace and OBM Menu
- Software Installation and Data Migration
- Worksets for Project Management and Discipline Connectivity
- Design Files and Models
- 3D Bridge Modeling Tools and Workflow
- Plans Development
- Quantity and Reporting Tools

Prerequisites

No prior CADD experience required. However, basic knowledge of drawing tools, levels, details skills in MicroStation is recommended. Also, completing Bentley OpenBridge Modeler basic training courses for familiarity with tools and interface is recommended.

Duration: 16 Hours

Professional Credit Hours: 16 hours

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1 INTRODUCTION

Florida Department of Transportation (FDOT) 3D modeling initiative was developed in early 2016 and is currently in the active implementation phase. Progress includes release of ORD FDOTConnect CADD software for Roadway, Right of Way, Survey and Geotech in July 2019. The first production version of FDOTConnect OBM was released in July 2020. Data connectivity among different disciplines has always been an integral part of the effort.

Accordingly, this course was developed to introduce Bridge Designers to the OpenBridge Modeler Connect Edition tools for modeling FDOT projects. The curriculum was developed within the FDOTConnectXX.XX Workspace to introduce applicable content and provide sample exercises for this new platform and workflow. This training is based on a sample project data set provided.

COURSE OBJECTIVES

Participants of this course will be introduced to the latest bridge modeling workflows in OpenBridge Modeler for development of 3D BIM digital model, two dimensional (2D) graphic plans, quantity and report generation, and other value-added features in design. At successful completion, users will learn how to:

- Create new files in the FDOTConnectXX.XX Workspace
- Navigate the software interface
- Import Civil Geometry and Terrain files into bridge model files
- Set up a simple bridge model with FDOT bridge component templates
- Create design plans directly from the OBM model
- Create a quantities report and other design data reports from the model

EXPECTATIONS – WHAT THIS COURSE PROVIDES

This is an introductory course to get users familiar with the OBM software and creating a bridge model. Additionally, the user will see examples and techniques to use the model to create value-added content during the design process for typical deliverables. The course provides background and detailed information for the key tools and processes the user will likely use in the software, as well as exercises for practical applications. It is developed primarily as an instructor-led course but can be used for self-paced learning. The manual will use a typical FDOT prestressed girder superstructure bridge as the training model for exercises throughout each chapter. The course does NOT include advanced and extended topics including reinforcement, steel superstructure specific applications, and creating and modifying templates and parametric cells. Also, this course does not include workflows with OpenBridge Designer which includes links to other Bentley products such as the LEAP structural analysis products and offers additional potential for model-centric design applications. These topics and others will be covered in separate advanced courses.

DOCUMENT STYLE

Style conventions used throughout the course guide are shown in the following table.

Item	Convention	Example
Menu names and commands	Bold (Names separated with > symbol)	<ul style="list-style-type: none"> General form is Workflow (when applicable) > Tab > Group > Tool File > Open File > Settings > User > Preferences OpenBridge Modeler (Workflow) > FDOT > Actions > Create File
Dialog box actions	Bold	<ul style="list-style-type: none"> Click the Apply button. Click the Graphic Select button to the right of the <i>Horizontal Alignment Include</i> box. In the Segment Type list, click Lines.
Dialog box field names	Italic	<ul style="list-style-type: none"> Key in Hemfield Road in the <i>Alignment Name</i> field. Click the Graphic Select button to the right of the <i>Horizontal Alignment Include</i> field. In the <i>Segment Type</i> list, click Lines.
Key-ins	Bold	<ul style="list-style-type: none"> Key in Hemfield Road in the <i>Alignment Name</i> field.
File names	Italic	<ul style="list-style-type: none"> Open the file <i>Working Graphics.dgn</i> in the <u>C:\Bentley Training\GEOPAK 101\Project Setup\Practice\</u> folder.
File paths	Underline	<ul style="list-style-type: none"> Open the file <i>Working Graphics.dgn</i> in the <u>C:\Bentley Training\GEOPAK 101\Project Setup\Practice\</u> folder.
New terms or emphasis	Italic or Bold	<ul style="list-style-type: none"> The Template Library contains <i>templates</i>, which represent typical sections of the proposed roadway. The user is not to utilize this tool.
Bentley Products	Arial Font	<ul style="list-style-type: none"> Install OBM prior to FDOTConnectXX.XX state kit, similar to ORD installation.

DEFINITIONS AND KEY TERMS

3D Design: The process of creating 3D Models for a project

3D Model: A 3D model is a digital graphical representation of proposed facility/site data consisting of X, Y, and Z coordinates for producing objects in three dimensions to convey design intent useful for visualization, analysis, animation, simulation, plans, specifications, estimates production, and life-cycle asset management. An accurately designed 3D model is tied to a defined geographic coordinate system.

ByLevel: A setting that, when turned on, causes the element on a specific level to retrieve its definition from the Level Symbology of that layer, such as Color, Line Style, and Line Weight .

CADD: (Acronym for: Computer Aided Design and Drafting) Software and methods used to design and represent objects graphically on the computer. CADD facilitates the visual presentation of Engineering Data.

Connect Advisor: Bentley feature that links to online trainings and references.

Create File Application: FDOT application used to create new .dgn files per CADD Standards. Should be used in place of the Bentley “New File” option.

Design File: An electronic CADD file that conforms to MicroStation® (DGN) or AutoCAD® (DWG) graphics formats.

Digital Terrain Model (DTM): A DTM is a digital topographic model of the earth’s surface minus objects such as trees, vegetation, and structures that can be manipulated through computer-aided design programs. All elements of the DTM are spatially related to one another in three dimensions.

Explorer: An expandable menu with items including File, Items, Resources, Sheet Index, links, OpenBridge Model and OpenBridge Standards. It may be docked for consistent access or floatable based on user preference.

Feature Definition: The OBM Feature Definition Library refers to a component of a DGN Library that contains a level, element, feature symbology and feature definition structure.

Level: A category that data (linework, etc.) in the design file may be segregated into.

Line Style: Part of the symbology of an element: for example, whether a line is represented a solid, composed of dashes, dots and dashes, and so on. Each element has its own line style.

Master Units: The largest unit in common use in a design file, usually represented in US Survey Feet for most of the Department’s seed files.

New File: Standard Bentley file creation function that **should not be used** in the FDOT workspace

Project Root Folder: The file system folder that contains all projects’ files and folders. The project root folder should not contain files that do not pertain to the project, nor should files that are part of the project reside outside of the project root folder, or one of its sub-folders.

Properties Window: The window for a bridge component that allows the user to see the information about the component and make modifications. This window can be found by clicking the **Properties** tool in the **Primary** group of the **Home** tab. Or, it can be found by selecting an object in the view window and clicking the **Properties** tool.

Reference Files: A design file or other file type that is attached to and viewed simultaneously with the active design file.

Save Settings: Saves settings in the active design file. This option is enabled only if the Save Settings on Exit preference is set to off in the Preferences dialog Operation category. This allows the user to save settings (including level and reference visibility, viewport settings, etc.), as they are not automatically saved when you exit the file.

Search: The user can use this tool to find the location of a command or tool. It can be found in the upper right-hand corner of the OBM window or by hitting F4.

Seed File: A predefined settings file used to create a new design files or cell libraries.

SupportLine: Term used in OpenBridge Modeler (OBM) to describe the abutment and pier locations in plan view. The placement of these lines are usually at the centerline of piers and at the front face of backwall for abutments and are also used to determine extents of the deck and beams.

Symbology: The settings applied to an element for visualization/printing purposes, such as Color, Line Style, Line Weight, Transparency, etcetera.

Workflow: Drop-down list that controls which tabs are displayed on the ribbon.

Working Area: Size, in working units square, of design plane.

Working Units: The real-world units in MicroStation (or OBM) that the design plane is configured to, such as US Survey Feet.

Workset: Collection of files for a certain project.

Workspace: Container for organizational standards.

COURSE SUPPORTING FILES AND ADDITIONAL LEARNING RESOURCES

The exercises for each chapter are independent of one another and can be used without having to complete the exercises in previous modules. All files used in this course are located at this link:

<https://www.fdot.gov/cadd/downloads/documentation/fdotconnecttraining/fdotobm>

Download the Dataset before beginning this course. For a Workstation installation, copy the dataset (240835715201 folder, 240835715201.cfg, and 240835715201.dgnws) to: C:\Worksets\FDOT folder. For other installations or different drive names, adjust the file path as necessary.

There are additional training resources in the link below to provide supplemental learning opportunities:

<https://www.fdot.gov/cadd/main/fdotcaddtraining.shtm>

A link to the ORD CADD Essentials training mentioned above is found here:

<https://www.fdot.gov/cadd/downloads/documentation/fdotconnecttraining/fdotconnect-cadd-essentials>

OBM AND FDOTCONNECTXX.XX INSTALLATION

The FDOTConnectXX.XX CADD Software Installation Guide is available at this link:

<https://www.fdot.gov/cadd/downloads/software/fdotconnectcaddsoftware.shtm>

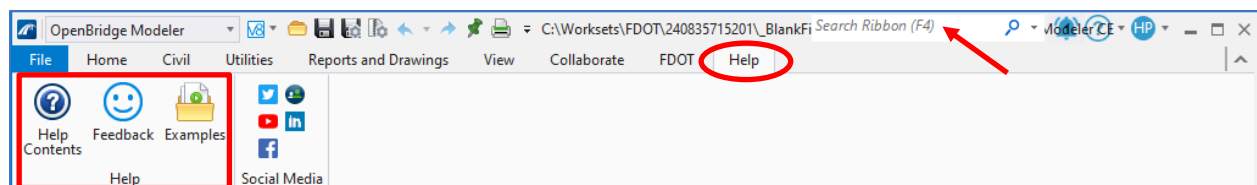
Following the installation instruction is key for a successful installation. The reason is that the process is atypical to common commercial software.

The following are a few items specific to FDOTConnectXX.XX OBM workspace, which will be included in the FDOTConnectXX.XX Installation Guide in the future.

- Save all existing templates XML files, library files and cell files created in earlier version of OBM and FDOTConnectXX.XX in the customized directory and be prepared with future inclusion via importing tools.
- Install OBM prior to FDOTConnectXX.XX state kit, similar to ORD installation. Configuration customization is required.
- FDOT OBM shortcut will be available in FDOTConnectXX.XX folder instead of FDOT ORD shortcut. In a rare case that both shortcuts may be available only for users who have both OBM and ORD installed on their computer.
- In the case that Bentley products are updated after FDOTConnectXX.XX installation, FDOTConnectXX.XX workspace will stay intact.
- For users with OpenBridge Designer installed on their computer, FDOT OBD shortcuts will also be provided.

OBM HELP AND SUPPORT

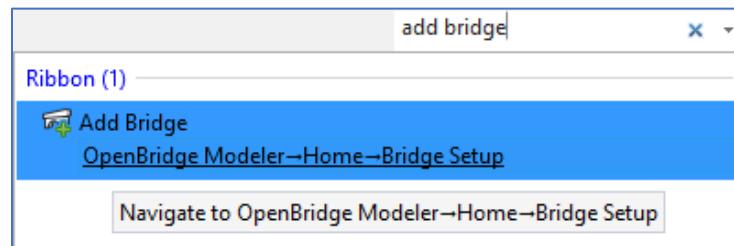
OBM provides **Help** and product support through online services, documentation and Tool Tips that can be accessed from the OBM menu bar once a session is opened.



SEARCH RIBBON

The user can use this tool to find the location of a tool or command or search for help on a specific topic. This is the most important tool in OBM. As MicroStation, ORD and OBM tools are developed, it may get cumbersome to remember the locations of each of the tools. Especially since many users have recently migrated to the CONNECT version with the new ribbon menu style and the same tools may be in three different locations in each of the three programs. Many tools are accessible via multiple paths. This search functionality will bring the

user directly to the tool as needed. When searching, the user can find the path to the desired tool by hovering over the search result in the ribbon. See the following figure.



HELP CONTENTS

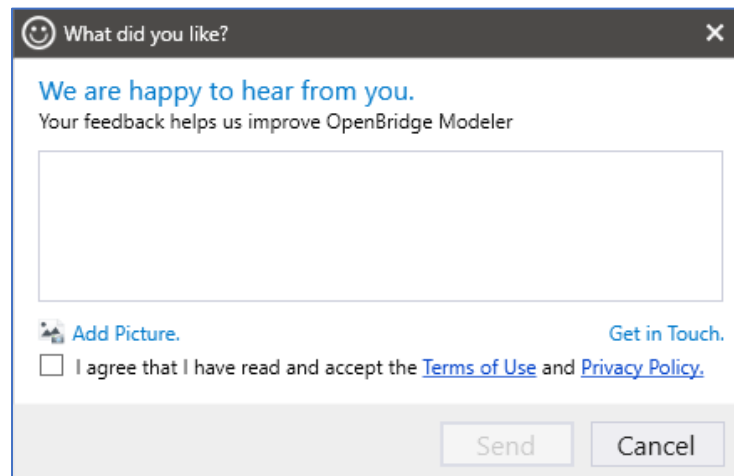
This is a specific link to online help documents and tutorials from Bentley.

CONNECT ADVISOR

This feature links to online trainings and references. This is a newly developed tool to provide internet support, online help, training and updates. It is gradually becoming a regular supporting tool for development and advancement.

FEEDBACK

This opens a dialog box shown below in which feedback can be shared with Bentley. Sharing issues, bugs and enhancement requests are encouraged to help improve the software.



BENTLEY COMMUNITIES AND PRODUCT SUPPORT

There is a continuously growing community of OpenBridge users around the world. The Bentley Communities site is helpful for troubleshooting issues and finding solutions. You may find help in categories including OpenBridge, OpenRoads, MicroStation, ProStructures, and more.

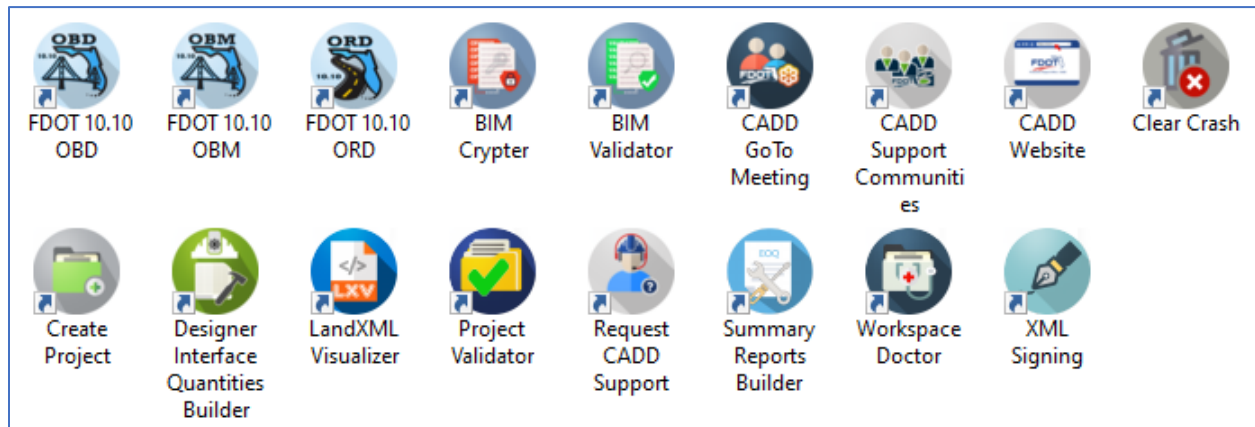
<https://communities.bentley.com/>

If an issue requires escalation to Bentley, they offer Product Support through their website.

FDOT HELP AND SUPPORT

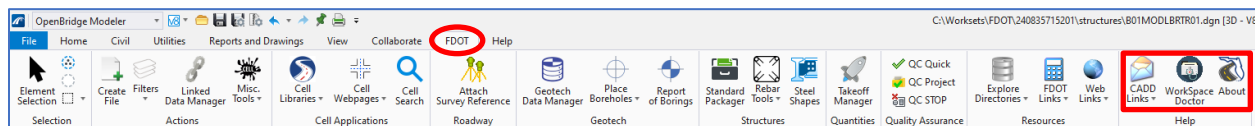
The FDOT Production Support Office | CADD provides many venues of help and support whether one-on-one; self-help; or group assistance. The FDOT Customer Support Guide is published on the CADD website under the Publications link to explain how to get help, who to contact and what to expect.

From the FDOT Desktop folder, the user will find links to join a GoToMeeting for one-on-one support, connect to FDOT's forum on the Bentley Communities website, connect to the FDOT PSO|CADD's website for on-line support, and an option to submit their own Support Request via FDOT PSO|CADD's online support portal.



For detailed instructions on CADD Support, CADD Website, Request CADD Support and FDOT Workspace Doctor applications, see FDOTConnectXX.XX related training menu. This training focus solely on FDOT OBM application.

From within an OBM session, the user will find many Help and Support links under the FDOT tab.



The FDOT CADD Office has many links to contact Support staff for assistance or find resource material within the CADD website.

- There is an FDOT CADD Support Forum for users to globally submit issues for any CADD user to respond. This forum is maintained and monitored by the PSO|CADD staff, but also opens the door to many other resources for assistance.

Through the CADD's website, the user will have access to much more Help and Support assistance through Publications, Downloads, Training Courses, FDOT Training Manuals, GoTo Webinars, Quick Clips, Frequently Asked Questions (FAQ), Quick Links and links to other offices and outside professional resources.

2 FDOTConnectXX.XX WORKSPACE ELEMENTS AND FEATURES

OVERVIEW

This chapter will discuss the different ways that the user can navigate the OBM workspace and organize their model by using the Model Explorer, Levels, Feature Definitions, etc.

OBJECTIVES

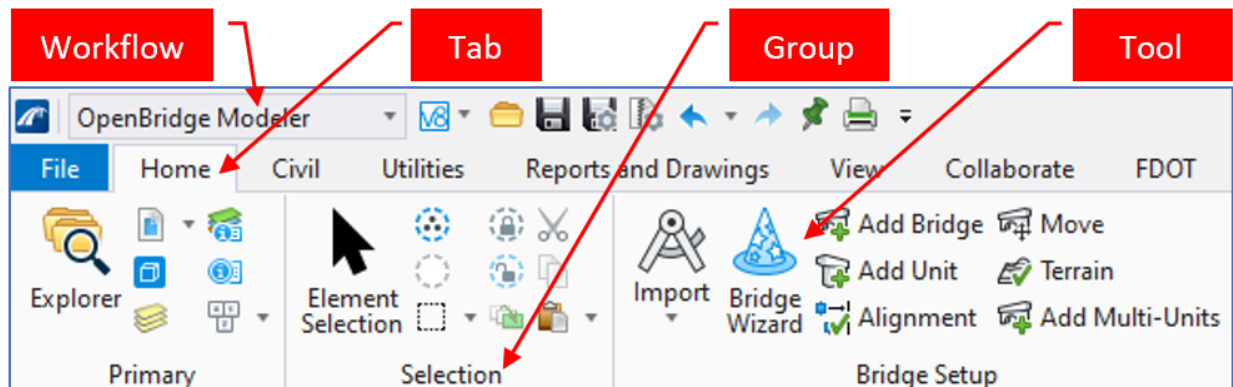
This chapter discusses the design environment within OBM. Highlights of this chapter include:

- FDOTConnectXX.XX Screen Layout
- Workspace Preferences
- OBM Explorer
- Feature Definitions

FDOTCONNECTXX.XX SCREEN LAYOUT

FDOTConnectXX.XX OBM screen layout may be customized to open with components in the same position for every editing session. It may also be reorganized or changed on the fly during an editing session. FDOT has established a default layout that is delivered with FDOTConnectXX.XX CADD software.

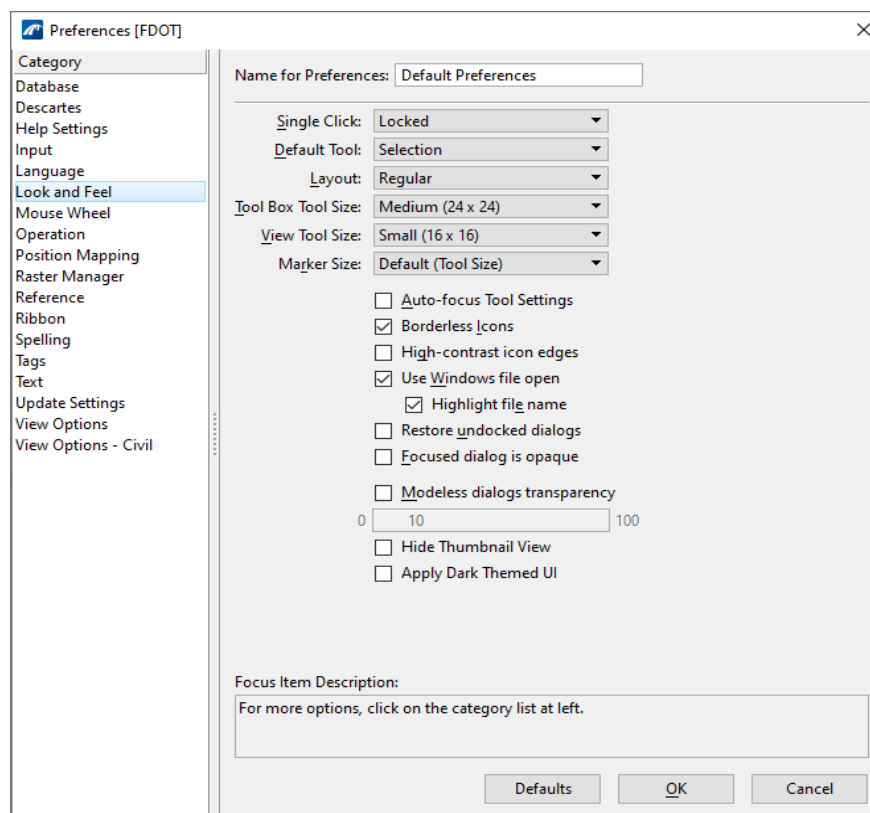
OBM tools are grouped into a family tree from the Workflow, ribbon tabs, groups and tools. If any tool has a triangle next to it, it contains multiple versions of the same tool. Most of the 3D bridge modeling is accessible from OpenBridge Modeler Workflow, while tools in Drawing and Modeling ribbons contain most MicroStation tool to fine tune CADD production.



For detailed MicroStation tools and instructions, see FDOTConnectXX.XX CADD Essentials training manual for further information. The topics include workspace preferences, views, models, drawing, drawing with precisions, level, changing elements, selecting and grouping, drawing annotation, cells and points, patterning and hatching, placing dimensions, information and measuring tool, reference files, raster images and point clouds. All these functions are still valid in OBM. This document is only covering what's unique to OBM.

WORKSPACE PREFERENCES

The preferences dialog contains settings that customize the way OBM operates and looks. To access the dialog, select the OBM menu option: **(Any Workflow) > File > Settings > User > Preferences.**



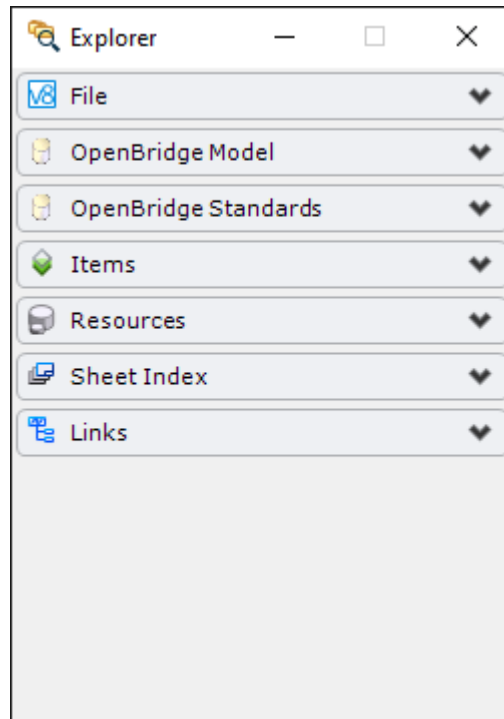
The settings in this dialog work at the system level, which means that they are not specific to any design file, but are active no matter which design file is being worked in. This dialog has many options which are referred to throughout this course manual. See Bentley's online Microstation help guide.

PROPERTIES

The *Properties* dialog box is located in the Home tab of any Workflow and may be floatable or docked as wished. It is used to review or modify the properties of any given selection. It can be used in conjunction with the various other OBM tools such as the Element Selection, Explorer, Models, and more.

EXPLORER

Explorer is one of the commonly used tools in Bentley products. OBM has its own version of the Explorer tool that is used to manage and control project content. It is located in the Home tab of any Workflow and may be floatable or docked as wished. It has expandable menu items including File, OpenBridge Model, OpenBridge Standards, Items, Resources, Sheet Index, and Links. Files created per FDOT workspace and Create File tool will have all delivered libraries listed under the OpenBridge Standards tab.



OPENBRIDGE MODEL

The *OpenBridge Model* menu is used to view the civil and bridge data in hierarchal order. It can be used to toggle on or off the display of various elements within the model. This functionality is helpful because unlike Level Display, it can control individual elements rather than all elements of a given category. For instance, a single pier could be toggled off while keeping the other piers on in the model. Individual elements can also be renamed from their default names by right clicking an element and selecting **Rename**. This can be helpful in organizing elements since they will be labeled as shown in the *OpenBridge Model* menu in various model-generated reports.

SHEET INDEX

The *Sheet Index* menu can be used to control the sheet numbering convention for the sheet models of each discipline, as well to generate an automated sheet index table. When working on a project with multiple disciplines, it is important to keep in mind that only one user can open the Sheet Index to edit at a given time. The Sheet Index can be used to create a batch plot of plan sheets with the Print Organizer.

LEVEL, ELEMENT TEMPLATE, FEATURE SYMBOLOGY, AND FEATURE DEFINITION

A MicroStation design is made with basic building blocks called elements that are placed in a design space within each model. Each element placed in a model is on a drawing *Level*. Each Level can have its own *color*, *line style*, and *weight* along with several other attributes. The next step up from Level is *Element Template*. Each Element Template can be assigned a Level, color, line style, weight, *class*, *transparency*, and *priority*. The color, line style, and weight can be set to *ByLevel* or can override the Level settings.

Similar to elements in MicroStation, *Features* were developed in OBM. When creating an OBM design, the user can use features to organize model information intelligently. *Feature symbology* is overlaid on top of Element Templates with “shape” information such as point, line, profile, surface and solid. *Feature definitions* provide an additional overlayer on top of Feature Symbology with “part” information, such as deck, beam, support etc. The list of shapes and parts are predetermined by OBM and may not be edited.

In addition to providing for the management and display options for levels through Level Manager, Level Filters, and Level Display applications, OBM also provides a list of applicable Feature Definitions through a flyout menu. FDOT Feature Definitions for bridge design projects are delivered with the FDOTConnectXX.XX workspace in a DGNLIB file. These FDOT Standard Libraries are locked and cannot be modified by the user.

This manual focuses on Features Definitions in OBM, which is comprised of the following:

- Database intelligence developed from Level to Features
- Level Manager, Level Display, Element Templates, Features Symbology & Features
- FDOT delivered Feature Definition Standard

FDOT FEATURE DEFINITIONS

The OBM Feature Definition Library refers to a component of a DGN Library that contains a level, element template, feature symbology and feature definition structure. New libraries can be created; new and existing level libraries can be attached, detached, imported, and exported using the Level Manager dialog. They may also be delivered in the appropriate directory. A level or definition does not technically attach from the Standard Library to a design file until it is used.

The FDOT Levels and attributes are grouped and translated into specific Rule Files which are associated to each valid Standard Filename of each Discipline for the purpose of performing the Quality Control check for FDOT Standard compliancy of design files. Complete specifications can be found in the CADD Menu (CADD). FDOT QC check will not use Feature Definitions in the near future releases.

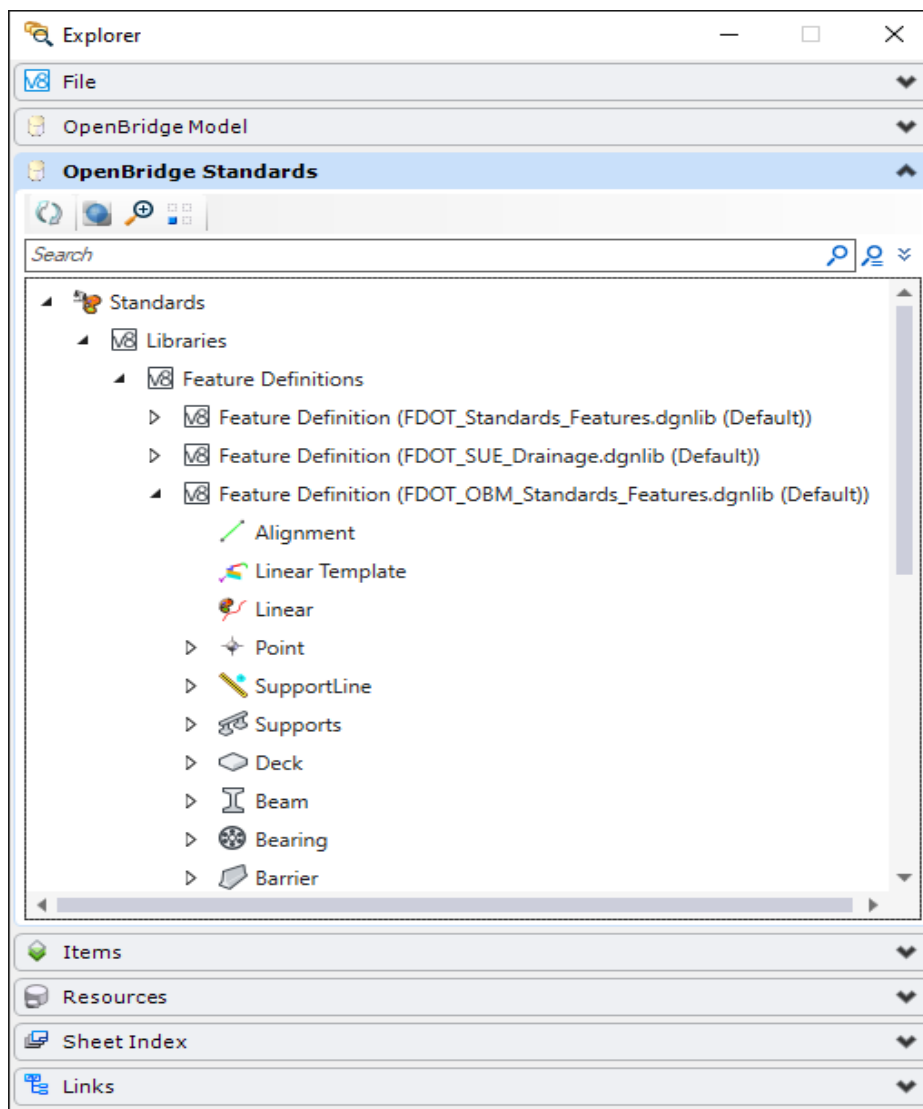
When using OBM to create an FDOT drawing, the color, line style and line weight attributes should be set to “ByLevel”. This setting allows the level to control these active attributes. This ensures that the levels comply with FDOT standards. FDOT levels are predefined and delivered in specific DGNLIB files. FDOT does not recommend overriding the ByLevel settings. To do so

would result in non-standard design files that would not be acceptable in FDOT Project submittals.

Note that users should be using the Feature Definitions provided in the FDOTConnectXX.XX workspace wherever possible. If new Feature Definitions are desired, this should be requested through the **FDOT > Help > CADD Support > Email CADD Support**.

Note New or modified Feature Definitions may be introduced into an existing DGN for an updated DGNLIB by right clicking on the filename within the OpenBridge Standards menu and selecting "Update Standards from dgnlib." This can be useful when updating an existing file to a new version of the program.

Note FDOTConnectXX.XX OBM will be using the Features Definitions for alignments defined by FDOTConnectXX.XX for ORD. There will not be a different set of Features Definitions for alignments for bridge modeling in OBM



3 DESIGN FILES

OVERVIEW

This chapter will cover file creation in OBM, file connectivity among disciplines and file management in FDOTConnectXX.XX workspace. FDOTConnectXX.XX is a CADD software developed by FDOT to provide a workspace for Bentley Connect Edition software. It includes all necessary resources, tools and customization that are required for FDOT projects. It must be used for compliance with the FDOT Computer Aided Design and Drafting (CADD) Standards. See FDOT CADD Manual for CADD Standard details.

OBJECTIVES

This chapter reviews the OBM design environment within the Florida Department of Transportation (FDOT) FDOTConnectXX.XX Workspace. Special consideration is given to:

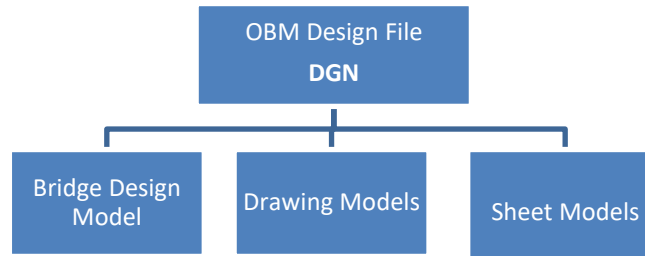
- OBM Structures Design Files
- FDOT ORD and OBM Seed Files
- Launching OBM in FDOTConnectXX.XX Workspace
- Opening Files in FDOTConnectXX.XX Workspace
- FDOTConnectXX.XX Discipline Configurations
- Creating Files in FDOTConnectXX.XX Workspace
- Design File Settings
- FDOTConnectXX.XX Preferences

OBM STRUCTURES DESIGN FILES

The OBM CONNECT format is a subset of .DGN and accepts .DWG file formats. This gives OBM native support for both Bentley and Autodesk platform. For other applicable formats, see OBM user guide.

A design file (.DGN) is a container for the data of the project. Note that this term is generic in the Bentley environments; a design file could be "Design File" or "Sheet File" as defined in the FDOT Create File tool in the FDOT tab. The design file contains elements called models, with the first one named "Default." Each model is a unique component within the "Design File" or "Sheet File," which allows multiple drawings to reside in the same design file. For example, design models, drawing models, and sheet models can exist as separate models in a single design file. Note that design file, "Design File" and design model are different concepts, so are "Sheet File" vs sheet model. "Design File" and "Sheet File" are FDOT introduced concepts while design file, design models and sheet models are Bentley concepts.

- Note**
1. Only one design file is opened at a time in OBM, but other design files may be viewed by attaching them as References, along with their models, to the active model in the open design file.
 2. All Dimensioning and annotation are to be done in drawing model.



In OBM, generally a *design model* is used to generate and modify the elements of the bridge, either in 2D or 3D. A *drawing model* can either have a reference to the design model or live linework, depending on the purpose of the plan sheet. A *sheet model* has a reference to one or more drawing models and is where the plan sheet border will be placed. When generating drawing and sheet models within the FDOT workspace and selecting the proper seed files, the FDOT border will be automatically placed.

When progressing to model-centric workflow, the goal is to generate a 3D design model. The option to create a 2D design model is either as a starting point to aid in the creation of a 3D design or for those who are not using a 3D workflow yet. Regardless of 2D or 3D design file, there should be one governing design file used for the purpose of digital delivery.

FDOTCONNECTXX.XX SEED FILES

Each OBM design file is created from a seed file. A seed file is a previously stored design file, with user specified settings, used as a template to create a new DGN. FDOT has created seed files for use in production that have standard settings stored within them. Available OBM seed files with FDOTConnectXX.XX are:

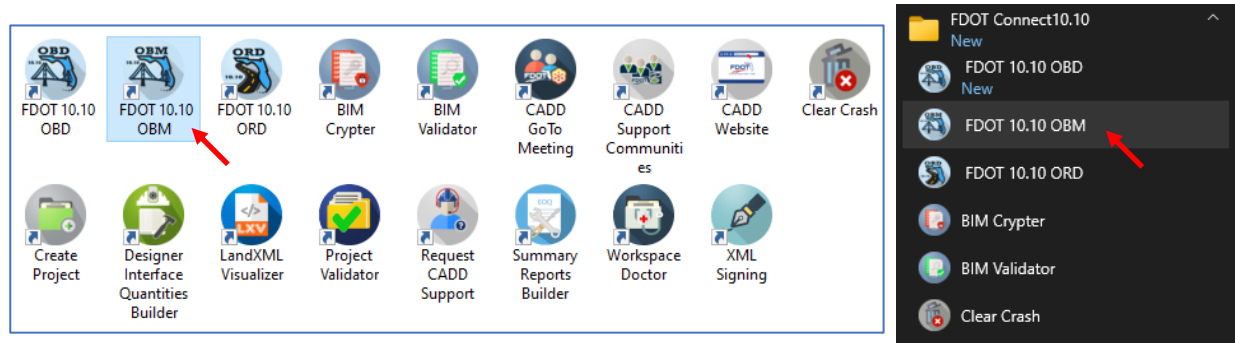
FDOT-OBM-KeySheetSeed.dgn	Contains settings to create a Key Sheet design file in OBM.
FDOT-OBM-StructuresSeed2d.DGN	Contains settings to create a 2D Bridge design file in OBM.
FDOT-OBM-StructuresSeed3d.DGN	Contains settings to create a 3D Bridge design file in OBM.
FDOT-OBM-StructuresSheetSeed3d.dgn	Contains settings to create a 3D “Sheet File” in OBM.

A default seed file will be selected for each design file when using the FDOT Create File tool, but the user can override the seed file if another is needed.

LAUNCHING OBM IN FDOTCONNECTXX.XX WORKSPACE

FDOT has created and provided a custom workspace FDOTConnectXX.XX to standardize the OBM environment for agency use. This workspace determines how OBM displays on the screen and sets up certain default files and search paths. FDOT's customized OBM workspace can be launched by the following common avenues:

- Double-click the FDOT-OBM icon from the FDOTConnectXX.XX desktop folder.
- From the Windows Start menu, select **Start > FDOT-ConnectXX.XX > FDOT-10.10-OBM**.



Note Opening an OBM session from the Bentley program group or by double clicking on a DGN file will not guarantee opening of OBM in the FDOTConnectXX.XX workspace.

Once the program is located, it can be pinned to Start or the Taskbar for easy access.

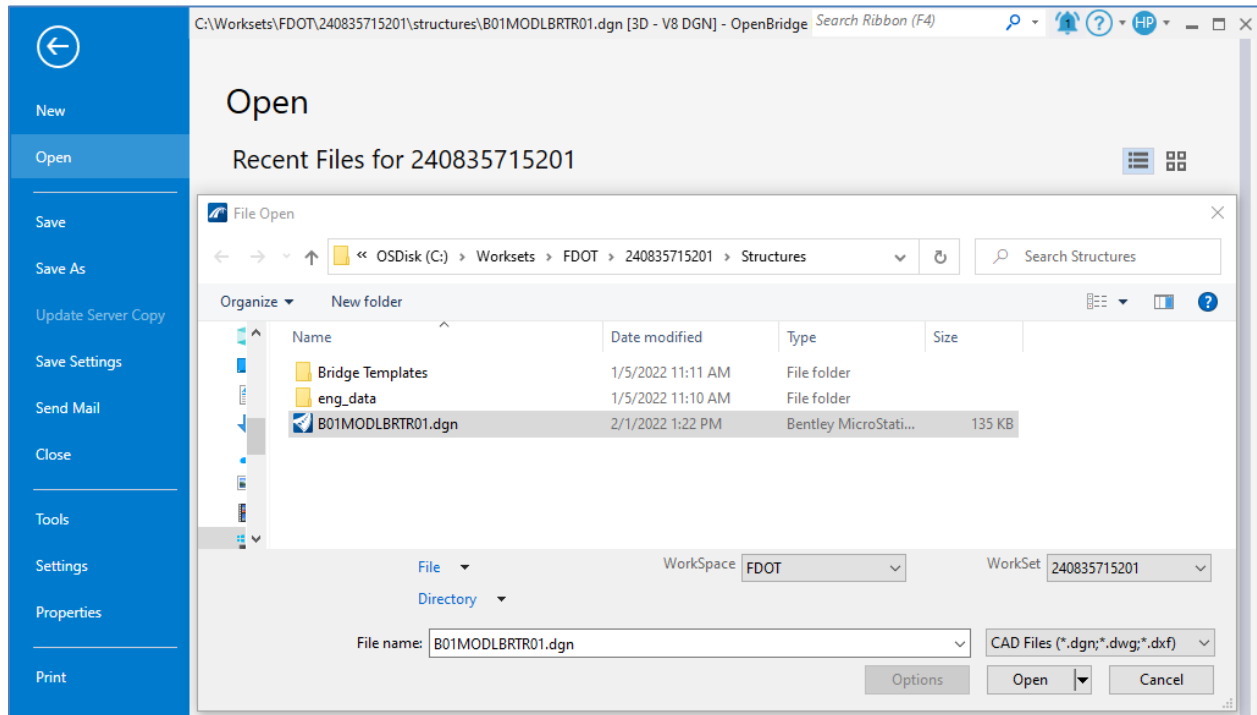
All the utilities presented in the above shown folder are created by FDOT. Workspace Doctor and Clear Crash are two very useful tools. Workspace doctor is provided to fix configuration problems, i.e. remove user preferences and return to program default. User may also manually remove user preferences by removing the file **personal.ysh** in the following directory `[drive]\user\[username]\appData\local\Bentley\OpenBridgeModeler\10.0.0\prefs\`. FDOT user preference and interface configuration are not part of the OBM settings like how it was in the older versions of Bentley programs.

BENTLEY PRODUCT HIERARCHY

Bentley's CONNECT Edition software include MicroStation, ORD and OBM. OBM is built on top of ORD and ORD on MicroStation. In general, functions and tools that are available in MicroStation are available in ORD and those for ORD are also available in OBM, but not the other way around. That means functions and tools available in OBM may not be used or available in ORD or MicroStation. With all that said, this does not mean that ORD files can be opened in OBM. Neither MicroStation files in ORD nor OBM. Even files created in a different version may not be recognized in the same program. This is true for new version to old version or old version to new version. The next section will discuss further on file management regarding this information.

OPENING FILES IN FDOT CONNECT WORKSPACE

- FDOT OBM File Open tool launches the File Open dialog. **File > Open** is used to manage design files and open existing drawings. Recent Files will appear when this is first opened. The user can also click on **Browse** at the end of the Recent Files list to open the “File Open” dialog box shown in the image below.



The File Open dialog contains standard navigation tools such as a drive list and files list. Right clicking on a file opens a dropdown menu with file options for use on the selected file.

The File name identifies a specific file selection and List Files of Type filters which type of files display in the Files list box. For example, to view DGN files only, change the option to MicroStation DGN Files [*.dgn].

The Options button only displays when selecting DWG file formats. FDOT Software delivery provides preset settings found within this option and does not recommend users to make any changes.

To navigate to a different directory, select the directory from the *Directories* list in the middle of the dialog. To open a design file, select it from the *Files* list and click OK, <OR> double-click on the file name to open it.

All roadway features are expected to be created in FDOT ORD workspace. They are to be referenced into OBM files. No ORD files should be opened in OBM, nor OBM files in ORD. LandXML or Alignment XML or ConceptStation XML may be imported into OBM and saved as a DGN file. Bridge modeling is expected to be completed within another file that references the above mentioned DGN file.

If any data created from ConceptStation is to be used in OBM, use only XML format exchange. Data transfer from OBM to ConceptStation shall be DGN referenced in ConceptStation. Opening ConceptStation file in OBM is not recommended.

It is clear now that no two DGN files are the same. Double clicking the DGN file in the file explorer is not recommended, as DGN files are affiliated with ORD, OBM, and MicroStation programs. The only recommended way to open a DGN file properly is to open it from the **File > Open** directory in the program and version it was created, otherwise utilizing the reference tool is encouraged.

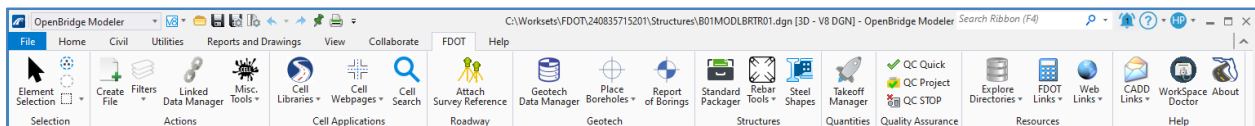
SWITCHING DESIGN FILES

Once a DGN file is open, users may switch to other DGN files by selecting the OBM menu option **File > Open** <OR> hold the Control key down and select the letter 'O' (Ctrl+O). The Open dialog displays with abbreviated options as in the File Open dialog.

FDOT DISCIPLINE CONFIGURATIONS

FDOT discipline menus are no longer necessary. Instead, tools will be available under the FDOT tab as shown. FDOT tools are strategically organized under multiple groups, such as the Resources group which will include Website Links and Explore Directories tools, and the Create File tool (discussed in detail in the next section) is under the Actions group. Other FDOT tools such as CADD Support and Workspace Doctor tools are also included and discussed in previous chapters in this guide.

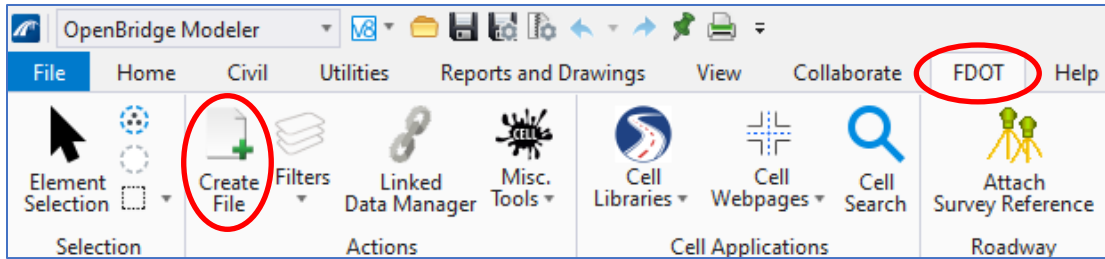
Structures specific groups/tools are available, such as a Structures Standards Packager, Rebar Tools (to generate reinforcing bar lists), and the Steel Shapes section generator. Also included are QC checks, Linked Data Manager (LDM), and a Place Professional of Record tool to fill in sheet border information.



CREATING FILES IN FDOTCONNECTXX.XX WORKSPACE

To create a new file in the FDOT OBM Worksets, the user should use the FDOT Create File tool in order to be in compliance with the file name Quality Control requirements per FDOT CADD manual. **The user should not use the New File that comes with OBM by default.** Instead, the user is encouraged to open the file **BlankFile.dgn** in \0_WORKSET_TEMPLATE\ that comes with FDOTConnectXX.XX software. As mentioned, FDOT provides an application named Create File to create new files with the correct seed file, file names and folder structure already in place. This FDOT utility may not be accessible outside of an FDOT OBM session. The *BlankFile.dgn* is only needed the first time a file needs to be created, afterward the user can access the tool from existing project DGNs.

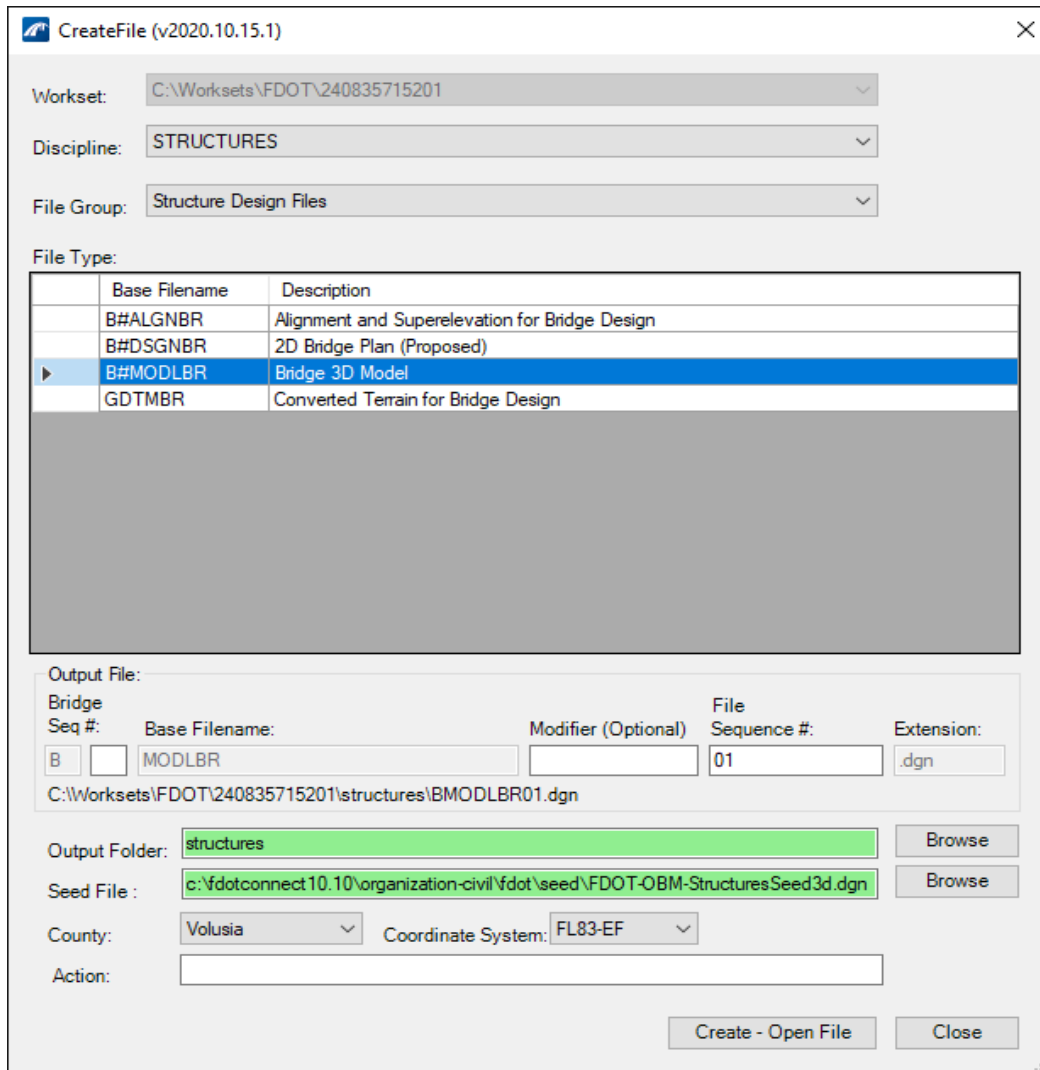
To access this FDOT utility within an OBM session, select the **FDOT > Actions > Create File**.



CREATE FILE TOOL

The Create File tool is used to create FDOT OBM design files in accordance with the FDOT standard file naming conventions. Create File uses an ASCII text file, called a Control File (*.ctl) to perform these task(s).

Note FDOT's Create File is a separate utility now delivered with FDOTConnectXX.XX Software. This application may no longer be accessible outside of OBM.



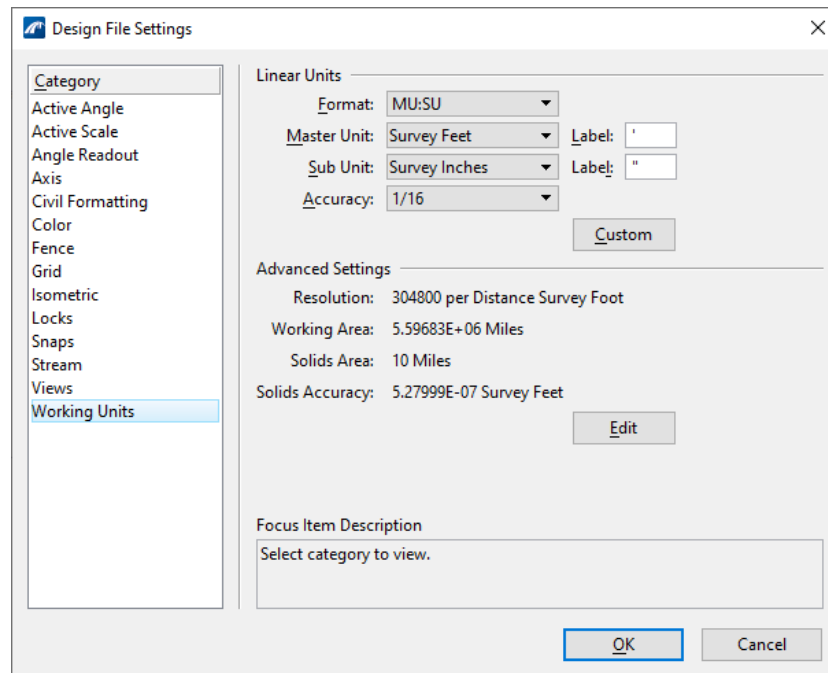
A description of the Create File dialog is listed below:

Discipline	<p>Defines the control file, which sets all other information in Create File dialog. Use the <i>Discipline</i> dropdown arrow to select the appropriate control file. There are various available disciplines: STRUCTURES, STRUCTURES – NON-BRIDGE SPECIFIC, ROADWAY, UTILITIES, etc.</p> <p>Upon selection of a <i>Control File</i>, all other fields automatically populate with FDOT standard information.</p>
File Group	<p>Each control file has several <i>File Groups</i> to choose from. Each group is a specific area of design and plans production, with either “Design Files” or “Sheet Files.” Selecting a file group automatically loads the file types related to that group into the <i>File Type</i> list box.</p>
File Type	<p>Selecting a <i>File Type</i> automatically sets all the settings for the <i>Output File (Name)</i>, <i>Output folder</i>, and <i>Seed File</i> fields, of the file to be created. If a file with the same name already exists, the numbering is automatically incremented.</p>
Output File Output Folder Seed File	<p>These settings are automatically set when the <i>Discipline</i>, <i>File Group</i> and <i>File Type</i> are specified. Only the <i>Output File</i> or <i>Seed File</i> may be modified directly. Browse buttons are provided to change the <i>Output Folder</i> or the <i>Seed Path</i>, if needed.</p>
Action	<p>When an OBM design file is created and opened, this text field can be used to enter MicroStation/OBM commands, such as set active scale to 10 (AS=10). Action functions similarly to the MicroStation Key-in utility.</p>
Create – Open File	<p>Selecting the Create – Open File button executes the creation of a new DGN file as specified by the selections made and saves the file to the <i>Output File</i> and <i>Output Folder</i> specified. Click the button more than once to create multiple new DGN files where needed. The application will automatically increment the numbering of subsequent files with the same file name. This is useful when more than one blank copy of a particular type of DGN file is needed, such as Plan and Profile Sheets.</p>

Note If any files created in OBM are roadway related features, such as turbidity walls, saving to the \Roadway directory is required. This means there will be ORD and OBM files mixed in the same directory. It may be helpful to organize these files into sub-folders.

DESIGN (DGN) FILE SETTINGS

When a new design file is created, it is recommended to review the set-up of the design file parameters that control how the drawing functions. The most common file settings are found in the Design File Settings dialog which provides control over such settings as highlight colors, coordinate readout, working units, and grid settings. To access Design File Settings, select the OBM menu option: **File > Settings > File > Design File Settings**.



Note It is important to note that, if the proper Seed File is used when the OBM file is created, then there should be only limited reasons to change any of the design file settings. One example may be updating Working Units based on Plans Development needs (see section below).

WORKING UNITS

Working Units consists of controls that are used to set “real world” units of measurement for design models. OBM recognizes Metric and English units, either of which may be selected. Additionally, users can create their own custom units, by relating them to the standard units (Metric or English). Changing between the units used in a model makes no difference to the size of geometry in the model; alternatively, changing the Resolution setting in the Advanced Settings does change the size of existing geometry in the model. In practice, the Resolution setting will rarely, if ever, have to be changed from the default.

The default Working Units in the FDOTConnectXX.XX OBM seeds are Survey Feet and Inches with rounding to the nearest 1/16th of an inch. In order to take advantage of some OBM plans development and reporting tools, the user may want to change the Working Units. For example, changing the Working Units to decimal survey feet for creating deck elevation reports so that the values are reported as typically provided in drawings and calculations. Another instance is when the Structures Detailing Manual (SDM) precision requirements vary from the default.

GLOBAL ORIGIN

The global origin for FDOT's standard seed files are set to an XY coordinate of 0, 0. The global origin can be relocated to specific coordinate values to create a custom coordinate system.

When using Create File to create OBM files, a predefined seed file is used to create each design file automatically and thus the global origin is set to FDOT standards.

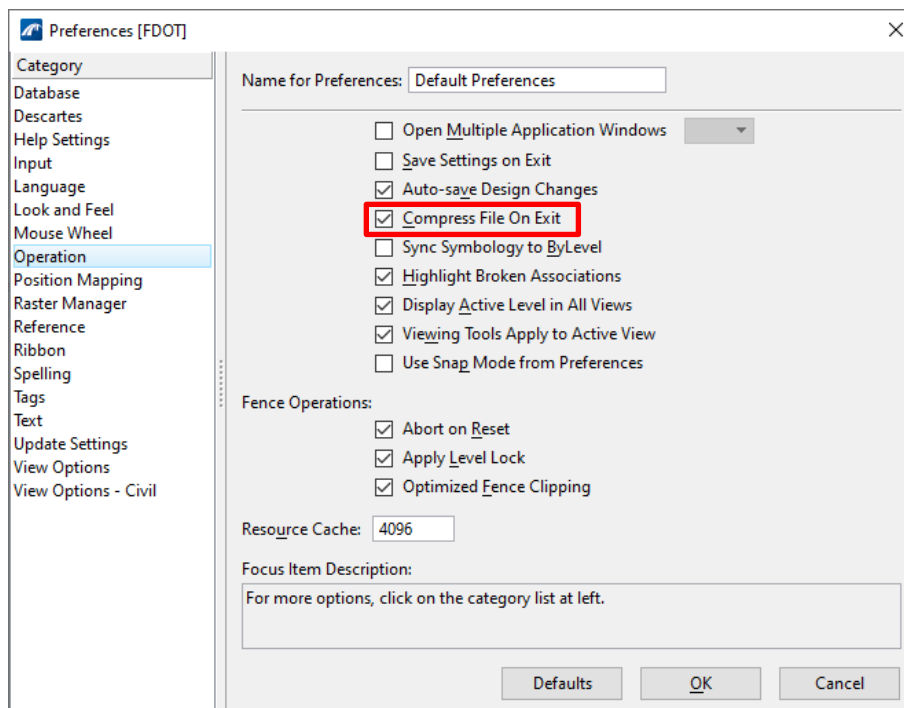
FDOT PREFERENCES

COMPRESSING DESIGN FILE

When elements are deleted from a OBM design file, the elements no longer display in the design, but a record of the deleted elements remains in the design file. The *Compress Design File* command removes the records, which reduces the file's size.

The undo buffer is cleared when a design file is compressed, so after compressing, the user will no longer be able to undo any previous operations.

It is best to use the *Compress Design File* command at the end of an editing session. This can also be set to happen automatically upon exiting the design file. To enable this setting, select **File > Settings > User > Preferences** from the OBM menu, select the *Operation* category and click the checkbox for *Compress File on Exit*.



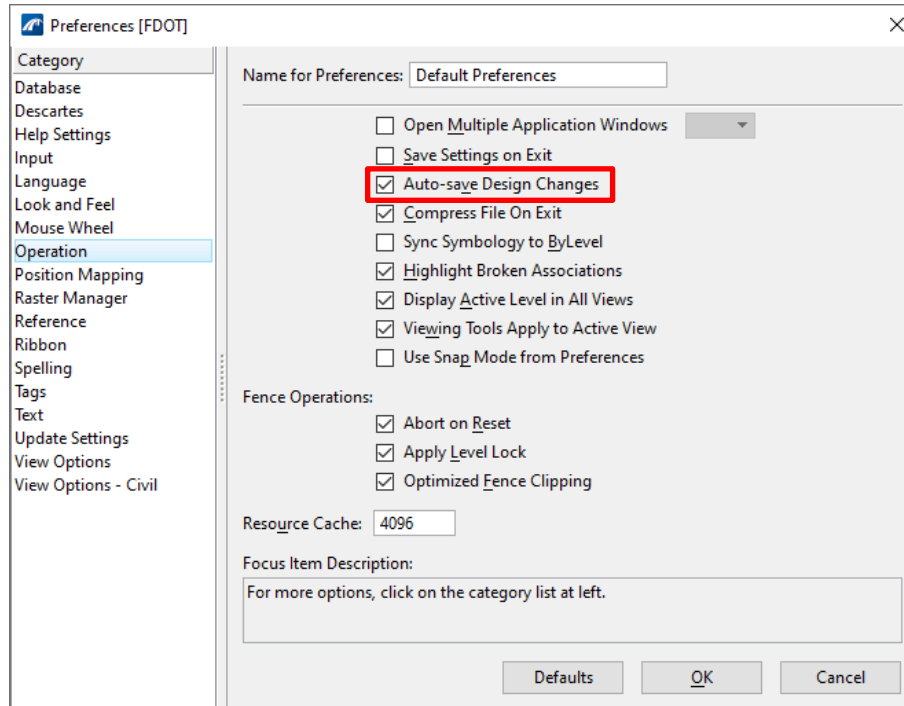
SAVING FILES

By default, OBM saves drawing changes automatically. OBM design files are saved in DGN format.

The fact that the file is saved automatically is a very powerful feature of the software. This gives the user security of knowing that in the event of a computer crash or power failure, the design changes for the last completed command are saved.

Only changes to design elements are saved automatically. File settings (active color, view setup) must be saved using the OBM menu option: **File > Save Settings** <OR> **[Ctrl] + [F]** on the keyboard. This preserves all file settings to ensure reflection of current settings in future openings of the file.

To disable this feature, select the OBM menu option: **File > Settings > User > Preferences** and then select the **Operation** category in the Preferences dialog. Uncheck the Auto-save Design Changes checkbox.



If Automatically Save Design Changes is disabled, the user must manually save the file by clicking the OBM menu option: **File > Save**. Selecting **File > Save As** allows the user to save the file as a V8, V7, DWG, or DXF file format. The **Save As** command can also be used to create a backup of the design file.

Note Save Settings can be set to execute automatically from this Operation category of the Preferences dialog, by checking the Save Settings on Exit checkbox.

To return to the File Open dialog during an editing session, select the OBM menu option: **File > Close**.

EXERCISE OVERVIEW

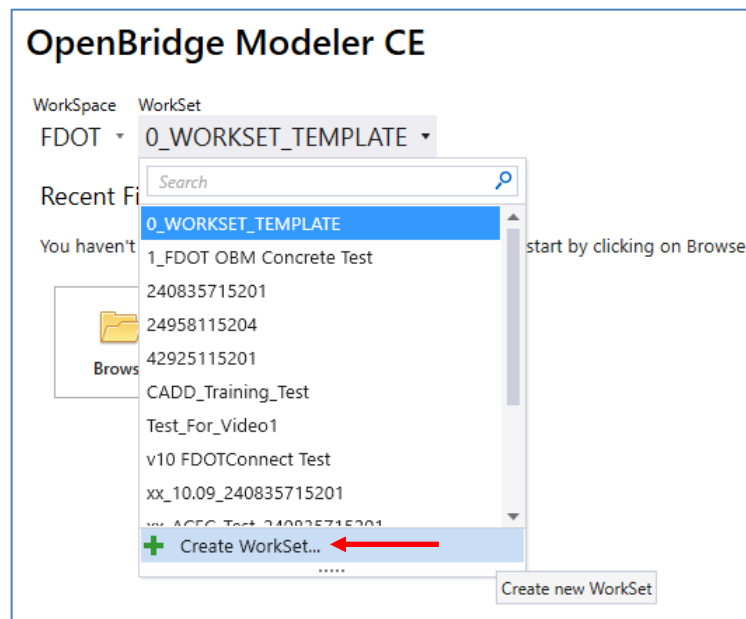
EXERCISE 3.1 REVIEWING THE DESIGN ENVIRONMENT AND CREATING A NEW FILE 3-11

Exercise 3.1 Reviewing the Design Environment and Creating a New File

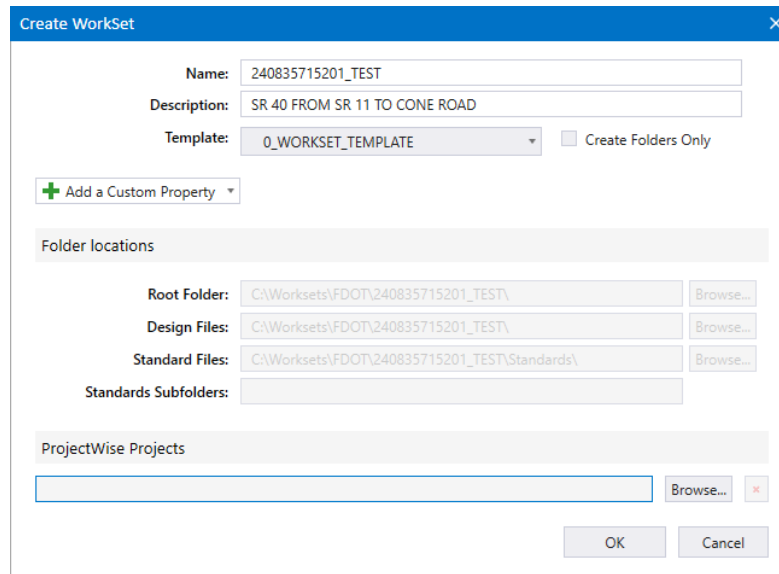
This exercise covers opening the program, creating a Workset, and creating a new file. The Workset created in the first part of this exercise is used only as an example for the purpose of demonstrating the process. The Workset for the remaining exercises should be downloaded and copied into the Worksets folder prior to beginning the course, see link and instructions in Chapter 1 of this training guide.

➤ ***Reviewing FDOTConnectXX.XX Workspace and Creating a Workset:***

1. Before we launch the program, locate the FDOTConnectXX.XX and FDOT Workset Directories. The FDOTConnectXX.XX file directory should be in C:\FDOTConnectXX.XX and a separate directory used for Worksets, such as C:\Worksets\FDOT. The Worksets directory is where the "240835715201" folder downloaded from Chapter 1 should be located, along with the corresponding .CFG a .DGNWS files.
2. Next, launch OBM by Double-clicking the FDOT-OBM shortcut from the FDOTConnectXX.XX desktop folder or from the Windows Start menu by select **Start > FDOT-ConnectXX.XX > FDOT-10.10-OBM**.

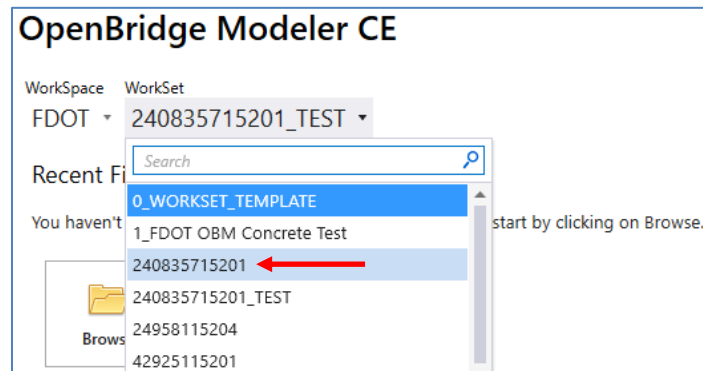


3. Under the Workset pulldown menu, select "Create Workset..."
4. Add the Workset name **240835715201_TEST** (also shown below), the *Description* **SR 40 FROM SR 11 TO CONE ROAD**, select the "0_WORKSET_TEMPLATE" as the template and select **OK** to create the new Workset.

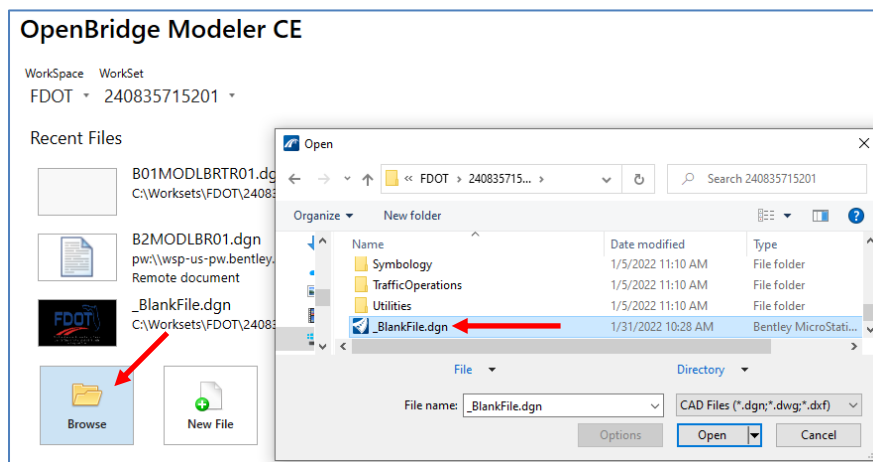


Note The *Description* field is what is placed into the “Project Name” portion of the plan sheet border. The information is stored in the project DGNWS file within the Worksets folder.

5. Change the active Workset from the “_TEST” that was just created to the Workset downloaded with the dataset.

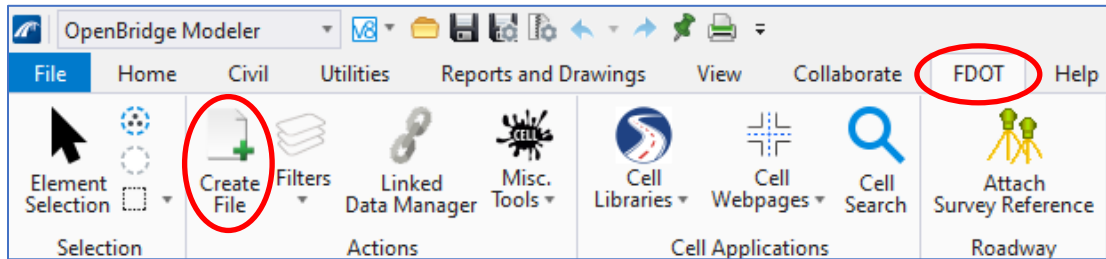


6. Click the Browse button and navigate to the “_BlankFile.dgn” in the previously downloaded Workset and select open.

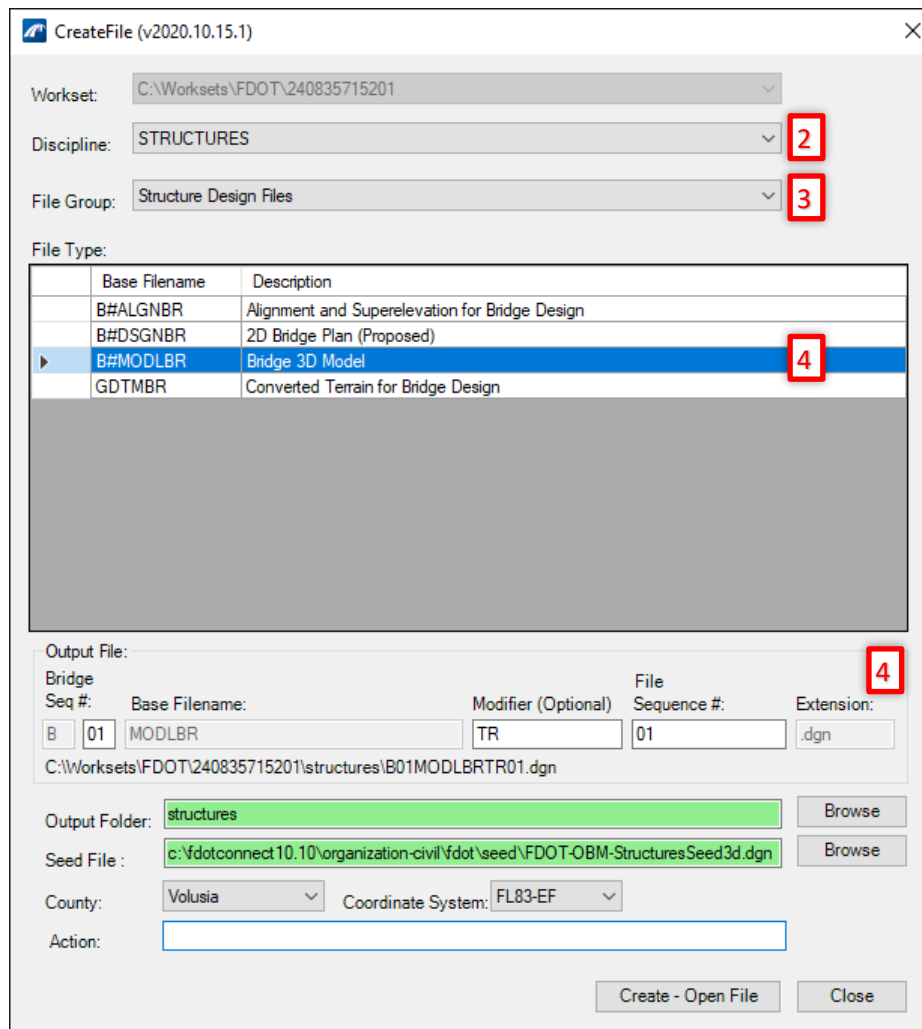


➤ **To Create a new Design File:**

1. Open the Create File dialog by selecting FDOT tab option: **FDOT > Actions > Create File**. The Create File dialog displays.



2. From the Create File dialog, click on the *Discipline* dropdown arrow to select STRUCTURES.
3. Click on the *File Group* dropdown arrow to select the applicable **Structure Design Files**. This will populate the *File Type* window with the associated files for selection.
4. Select the **File Type** of “B#MODLBR: Bridge 3D Model” and add the following information into the Output File sections. Note that we are adding a “TR” as a modifier to the file name to designate this as the training model.



5. Select the **Create-Open File** button to open the newly created design file in OBM. The new design file is automatically created and opened as specified and saved under the corresponding discipline folder. The Create File dialog remains open to continue creating as many new design files as needed.

4 INCORPORATING CIVIL & OTHER DISCIPLINE DATA

OVERVIEW

Data connectivity among different disciplines has always been the integral part of the FDOT 3D initiative. Specifically in bridge design and modeling workflows, it is important to be able to reference the applicable information from various sources including Roadway, Survey, Geotech, and more. This chapter will introduce the data commonly communicated through different disciplines and how to reference that data into our bridge model file for use. The exercise will provide participants with practice using reference files and managing changes during the course of the project.

Roadway data is especially important in OBM. Alignment and profile data must be created, imported, or referenced first before starting any bridge modeling in OBM. A terrain file is also recommended for modeling to allow for visual confirmation of elements, as well as the usage of additional OBM tools for substructure unit placement.

OBJECTIVES

This chapter reviews how to acquire data from other disciplines inside FDOTConnectXX.XX environment or outside. Topics include:

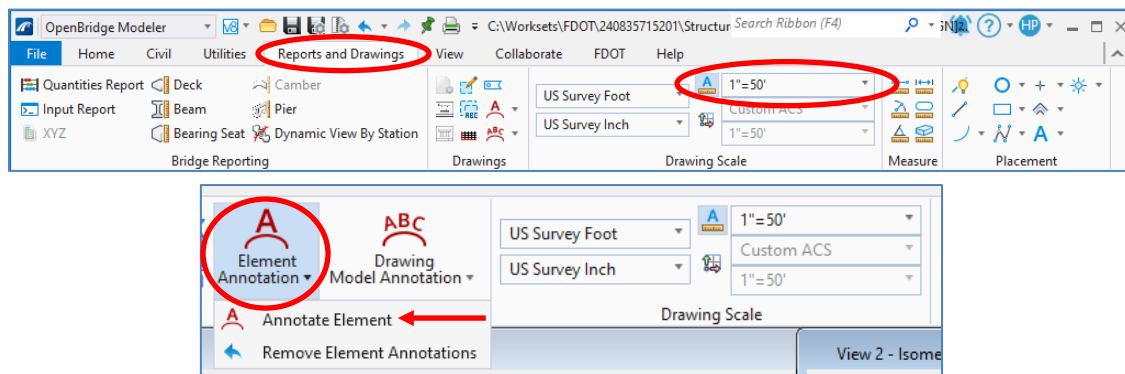
- Roadway alignment from GPK file from earlier versions of Bentley products
- Alignment in LandXML file
- Superelevation in DGN file
- Survey data in TIN file
- Survey data in LandXML
- Alignment and superelevation for Dual Bridges
- GINT file for Geotech

DATA COMMUNICATED FROM OTHER DISCIPLINES

ROADWAY

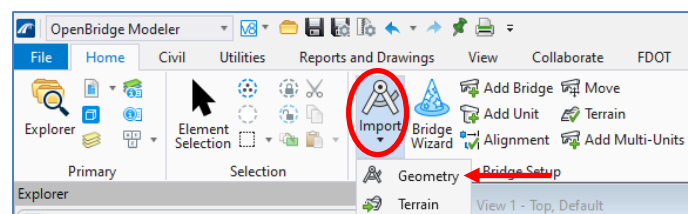
In general, the necessary roadway data is provided in the \Roadway directory for bridge modeling. This file typically follows the **ALGNRDX.dgn** naming convention, is generated with the ORD FDOTConnectXX.XX workspace, and contains all necessary alignment, profile, and superelevation features that are necessary to complete the project. Once the **ALGNRDX.dgn** is referenced, the user should set the annotation scale as desired and annotate the alignment:

Reports and Drawings > Drawing Scale > Annotation Scale and Reports and Drawings > Drawings > Element Annotation.



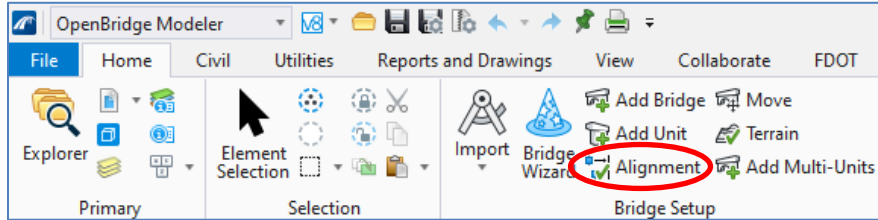
If the alignment and profile are provided via GPK or LandXML file in the \Roadway directory, a file named **ALGNBRXX.dgn** must be created in the \Structures directory. Create this file by using the Create File tool. Once **ALGNBRXX.dgn** is created, use the Import Geometry tool to import data. The **Home > Import > Geometry** tool in the Bridge Setup group is used to import GPK or LandXML geometry. Before annotating the alignment as referenced above, define the Feature Definition as an alignment (right click on the alignment: **Properties > Feature Definition > Alignment > Baseline <OR> Centerline**). If alignment data is to be provided for dual bridges for the same centerline of construction, alignment and profile for each bridge need to be communicated.

Clarification of profile and alignment affiliations must be communicated if importing via GPK file. GPK files generally store information for many alignment and profile chains. The user must ensure the profile(s) and alignment(s) that correspond to one another are selected since the program will not indicate if non-matching chains are selected. To avoid any issues, select the profile first and the corresponding alignment will be automatically selected. If alignment and profile are provided in LandXML in the \Roadway directory, affiliation does not need to be clarified and the files can be used as-is.

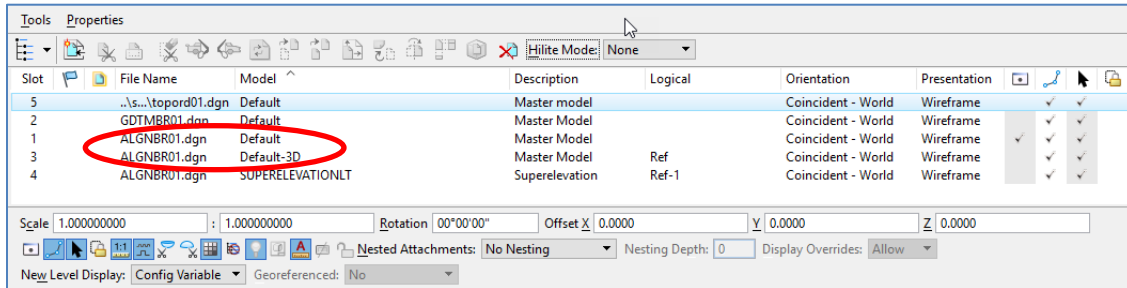


Note If Alignment is imported from GPK or LandXML files, proper Feature Definition must be assigned and the alignment must be annotated inside the DGN file.

The alignment associated with the active bridge unit can be updated or changed. Use the **Home > Bridge Setup > Alignment** tool and click on the new alignment after it has been re-imported. See the following image.

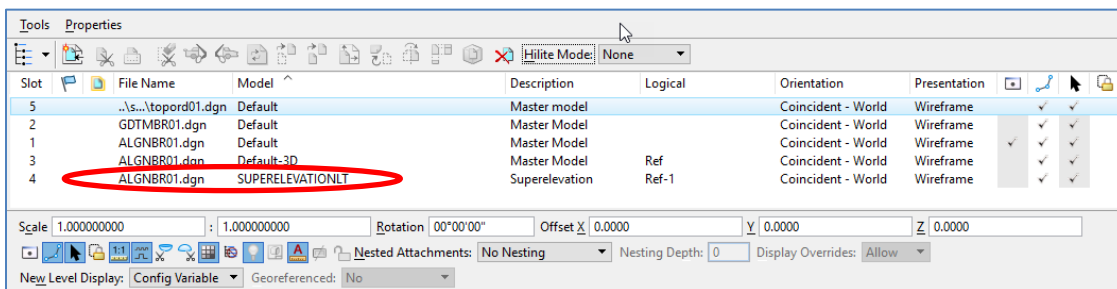


The remaining steps to utilize roadway information are similar for each of the approaches. First, reference the alignment file DGN into the bridge model file. The referenced DGN will have be one model with the alignment and one with the profile, "Default" and "Default-3D" in the image below.



Note If an alignment or other reference file has been updated during a session, the user will see an indication in the “Status” flag and can right click and select “Reload” to update the reference. Depending on the nature and extent of the changes, any bridge elements directly using elements from these reference files (alignment, surfaces for substructure foundation placement, etc.) may update automatically or may need additional manual updates.

If there is superelevation on the bridge portion of the project, superelevation is to be included in the superelevation model that comes with **ALGNBRXX.dgn**.

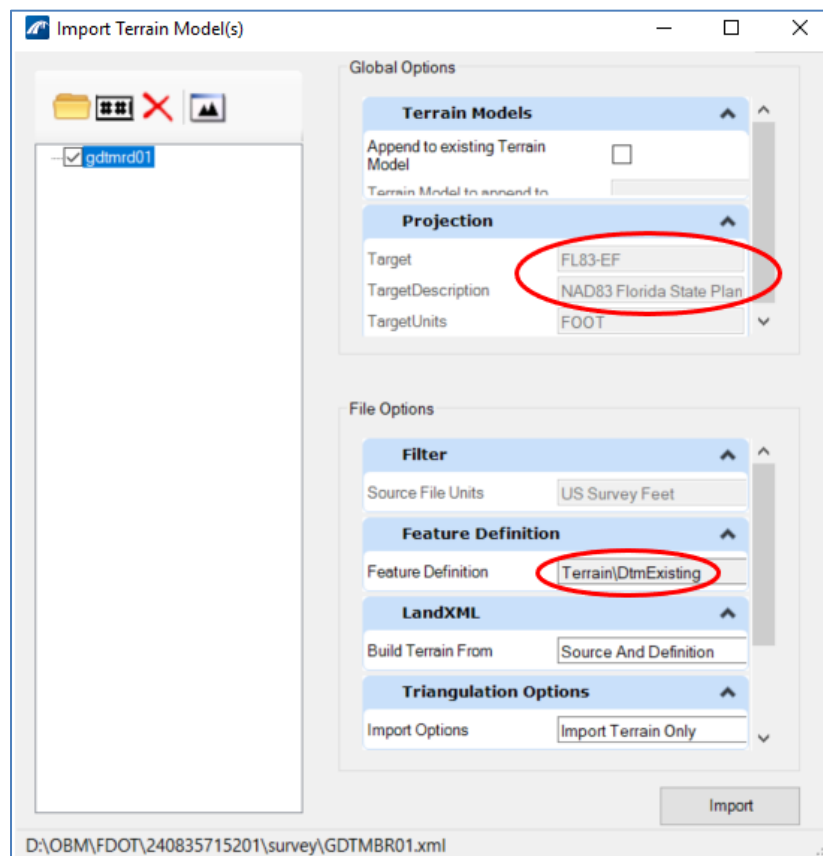


If a superelevation DGN file is provided in the \Roadway directory, a direct reference is sufficient to use the OBM superelevation tools.

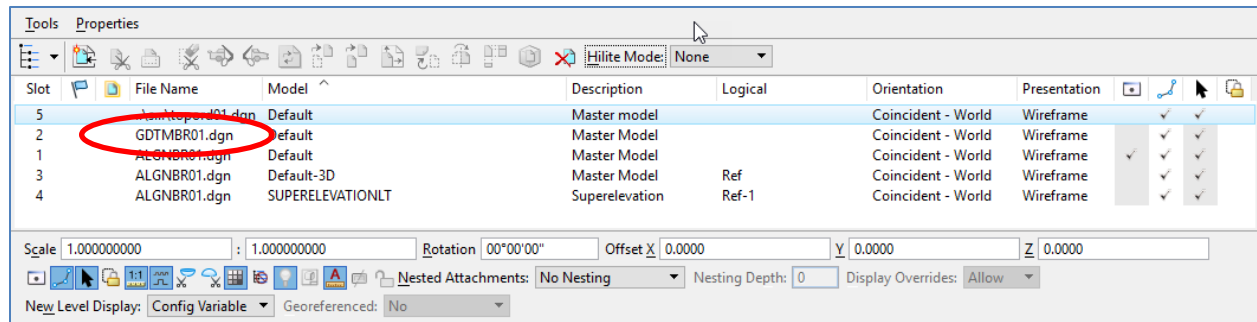
Traditionally in design, all profile grade lines (PGL) are given in reference to the Centerline of Construction and multiple profiles are given at a point left or right to the Centerline of Construction. Currently, OBM cannot accommodate this versatility. A bridge must be created with a unique alignment and a unique profile. The limitation is caused by the fact that alignment may not be paired with multiple profiles. If dual bridges are intended, a separate alignment/profile must be referenced and the second structure created as a separate bridge (see the Add Bridge section in Chapter 5). Alternatively, dual bridges can be modeled in two separate files if referencing a single alignment.

SURVEY

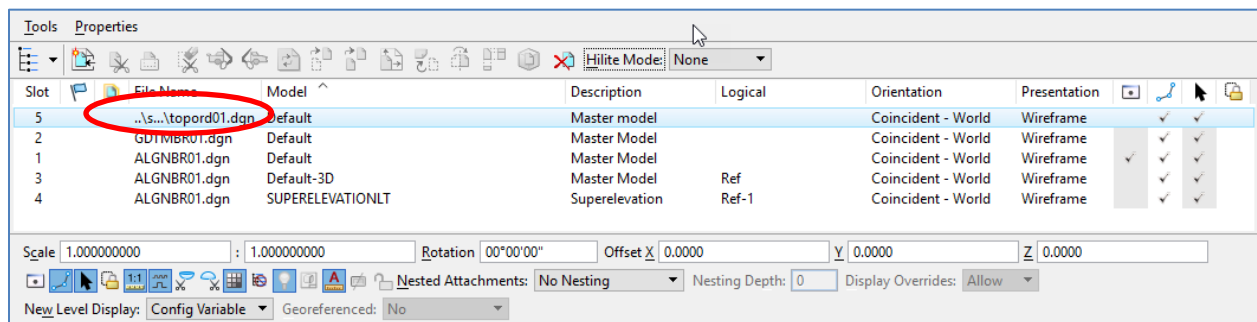
Similarly, survey data from a TIN or LandXML in the \Survey directory may be imported in a newly created file using the naming convention **GDTMBRXX.dgn** within the \Structures directory. Be aware of the Georeferenced Coordinated System for the project and the ability to add the Feature Definition as part of the import process shown below.



If available, a DGN file can also be referenced (without importing) by the user.

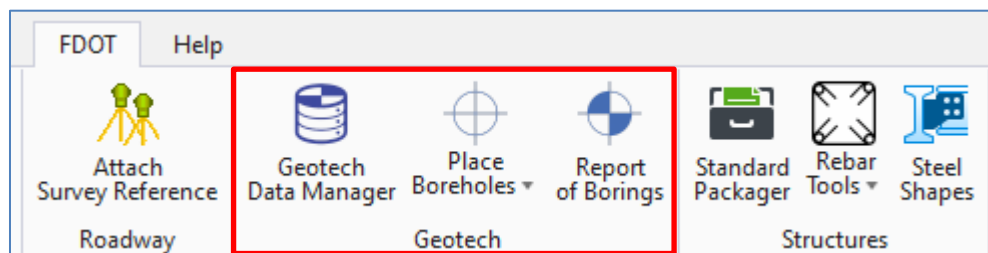


Additionally, topographic data may also be available in the \Survey directory using the naming convention **TORPORDXX.dgn**. Direct reference of this file is sufficient to include existing conditions and utility features, for example.



GEOTECH

FDOT has developed a group of Geotech tools within the FDOT tab that is included in both OBM and ORD. These tools can be used to manage the boring data, plot them in 2D/3D, and generate the Report of Core Borings. The workflow and spreadsheets are currently under development and additional exercises will be provided in the future.



Prior to their inclusion in the training guides, users can view the "New Geotech Tools for FDOTConnect" webinar found on FDOT's Posted Webinar Sessions site:

<https://www.fdot.gov/cadd/downloads/webinars/posted.shtm>

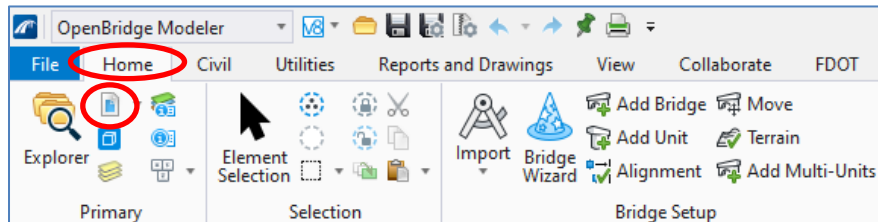
EXERCISE OVERVIEW

Exercise 4.1 Data Communicated from other Disciplines [4-6](#)

Exercise 4.1 Data Communicated from other Disciplines

➤ **Referencing Roadway and Survey Data:**

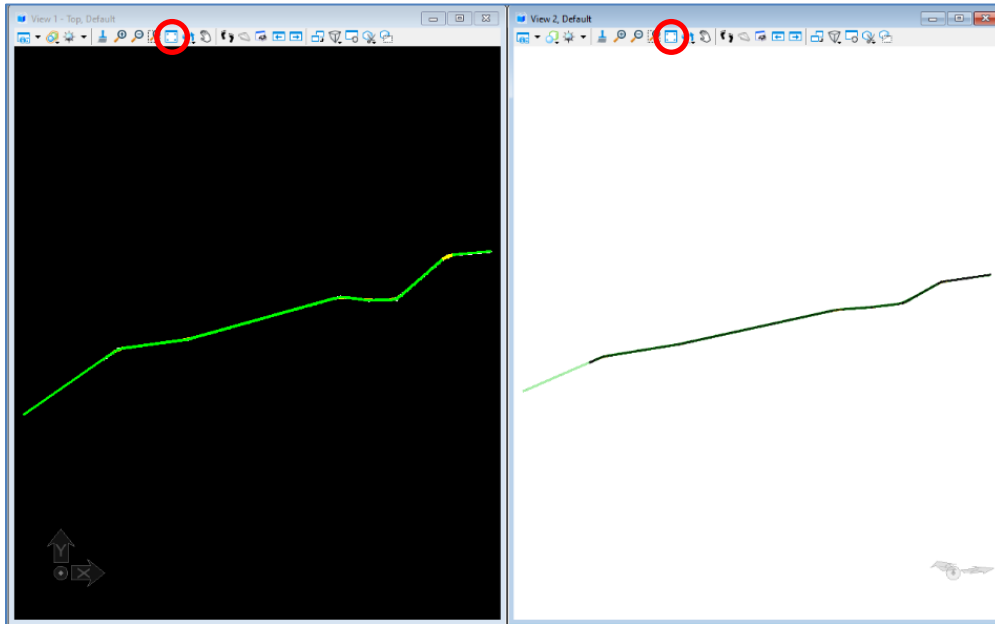
1. Open the data set file: **B01MODLBRTR01_4.1_Begin**
2. Choose the Reference tool from **Home > Primary > References**



3. Attach the files shown below as references. They can be found in [C:\Worksets\FDOT\240835715201\Roadway](#) and [C:\Worksets\FDOT\240835715201\Survey](#). Note that the ALGNRD01.dgn file is referenced 4 times, once for each of the models (Default, Default-3D, SUPERELEVATIONLT, and SUPERELEVATIONLT-3D). Note that the "SUPERELEVATIONLT-3D" model is generated automatically in ORD but does not have any content.

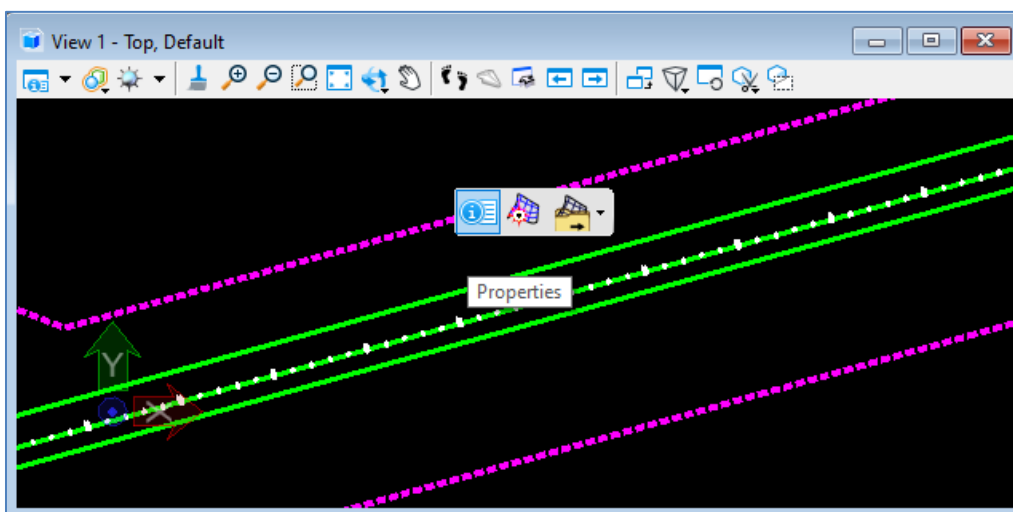
Slot	File Name	Model	Description	Logical	Orientation
1	..\Roadway\ALGNRD01.dgn	Default	Master Model		Coincident - World
2	..\Roadway\ALGNRD01.dgn	Default-3D	Master Model	Ref	Coincident - World
3	..\Roadway\ALGNRD01.dgn	SUPERELEVATIONLT	PGL-LT	Ref-1	Coincident - World
4	..\Roadway\ALGNRD01.dgn	SUPERELEVATIONLT-3D	PGL-LT	Ref-2	Coincident - World
5	..\Survey\GDTMRD01.dgn	Default	Master Model		Coincident - World

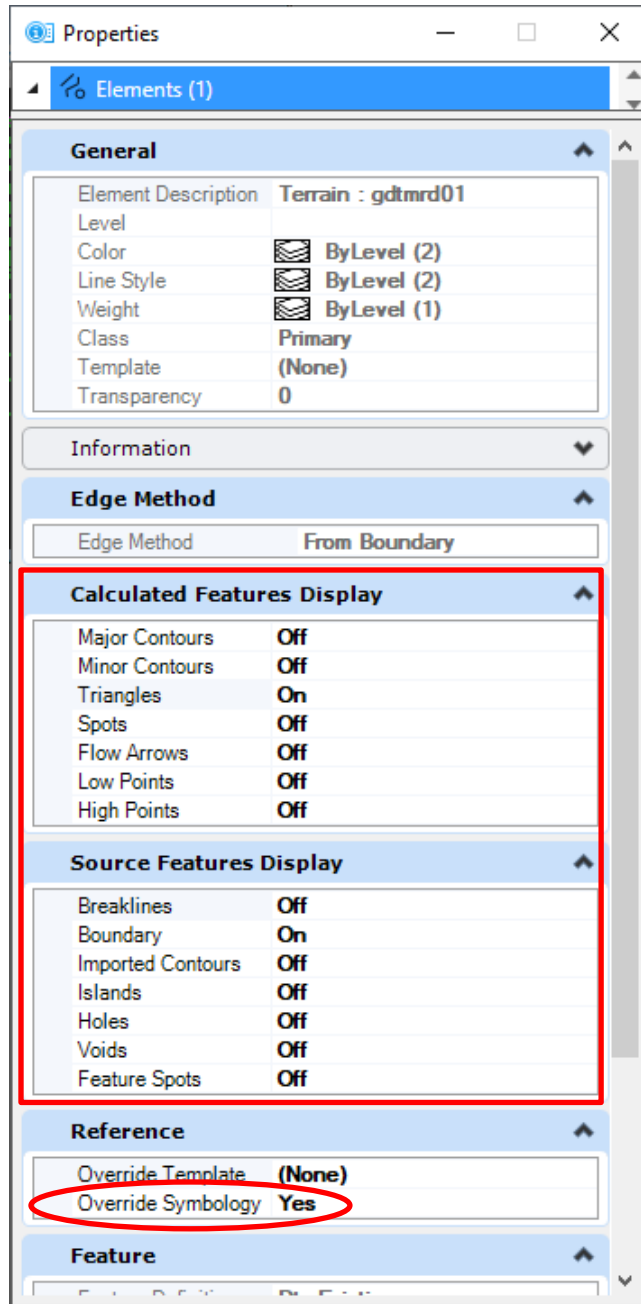
- Use the **Fit View** tool for all open views to show the extents of these reference files. Change the Annotation Scale to 1"=20' by going to **Reports and Drawings > Drawing Scale > Annotation Scale**. Annotation Scales can be adjusted as required for plans production.



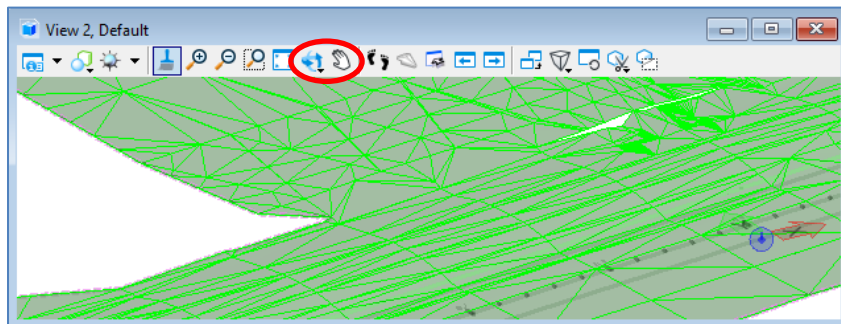
Note *If desired, references can be clipped to remove data outside of bridge limits. This can help with processing speed while navigating around the file.*

- Test out different terrain file view options by clicking on the outline of the terrain feature, hovering over it, and selecting the Terrain Model Properties. Once there, change the *Override Symbology* field to **Yes** (circled below). This allows you to override the symbology without changing the source file. Change the *Calculated Features Display* and *Source Features Display* fields to see what switching between **Yes** and **No** will do to the terrain model (boxed below).

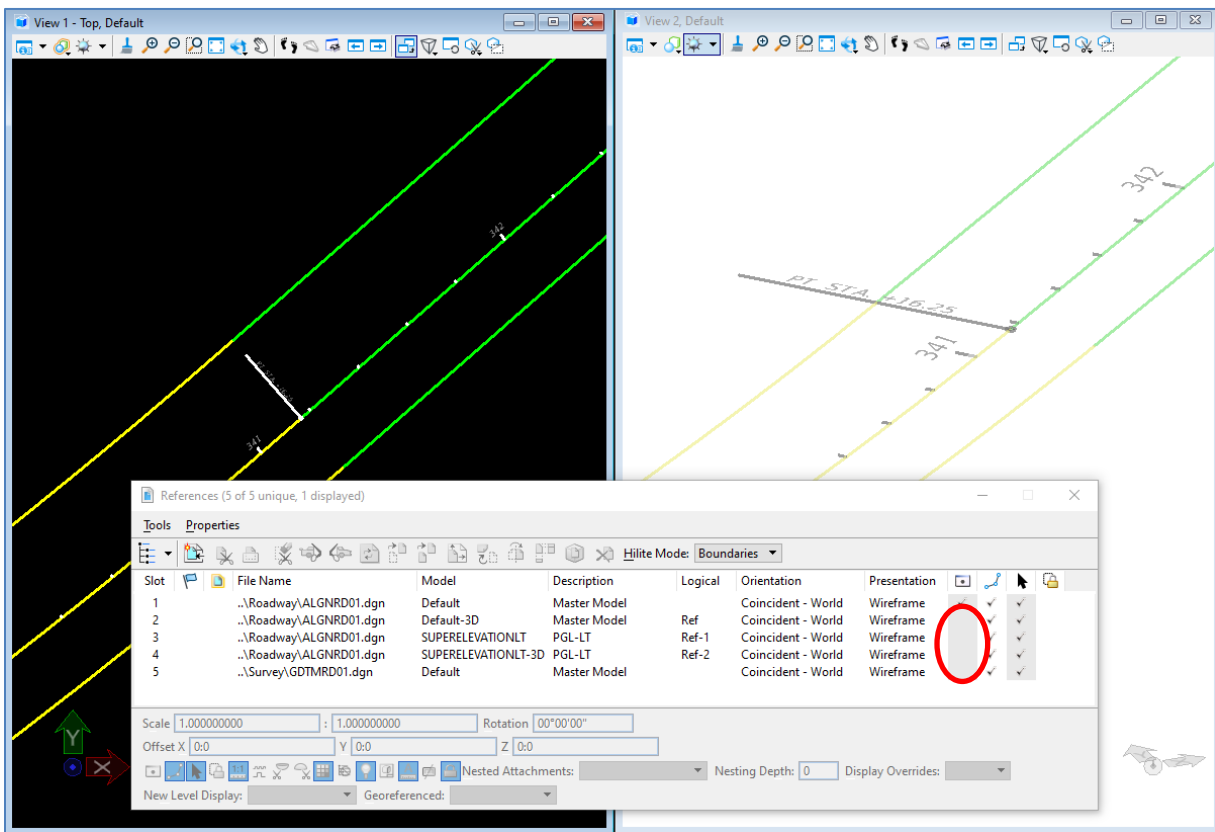




6. Become familiar with these reference files and their content. Rotate and pan through the 3D Survey and Roadway data provided. The reference files can be displayed (turned off or on) individually based on preference.



- Turn off all reference displays except the Default model of ALGNRD01.dgn by unchecking the boxes circled in the figure below for the open views and save your view settings by selecting **File > Save Settings**.



Note Typically there will be one alignment per bridge. This example uses a centerline of construction and one PGL each for dual bridges. This example will only show the left bridge.

5 BRIDGE MODELING

OVERVIEW

All of the prior chapters prepare and build our knowledge for the essential effort of this course: 3D bridge modeling. At the end of this chapter, the user will be able to create a 3D model of a typical FDOT bridge structure. The modeling will be accomplished using the FDOTConnectXX.XX OBM Workspace.

At the time of this training guide release, the following types of structures can be modeled in OBM: Beam-Slab (P/S or Reinforced Concrete Girders), Beam-Slab (Steel Girders), Reinforced Concrete Slab, CIP Concrete Box, and Segmental. This chapter covers how to model the common elements of an FDOT Prestressed Beam-Slab bridge with Approach Slabs (modeled as Reinforced Concrete Slab bridges). The basics of model creation, as applicable to the FDOTConnectXX.XX Workspace, are detailed through the exercises. This chapter, and others throughout the manual, also provides commentary and tool tips for additional situations that the user may encounter beyond the scope of this training bridge model development including steel girder superstructures, skewed supports, and more.

There is also a **Bridge Wizard** tool in OBM added to quickly generate simple bridge components; however, there are currently limitations with this approach including loss of control over templates when placing, additional settings not available, and others which require the user to go back to each element for updates. This chapter follows the traditional OBM modeling workflow as this is more suitable for most situations users are likely to encounter. The user should carefully consider the limitations before proceeding with this approach.

OBJECTIVES

This chapter covers the steps to build a bridge 3D model built around key tools within OBM including:

- Add Bridge
- Place SupportLine
- Place Deck
- Place Barrier
- Assign Superelevation
- Place Beam Layout and Beam
- Place Abutment
- Place Pier
- Place Bearing

WORKFLOW INFORMATION

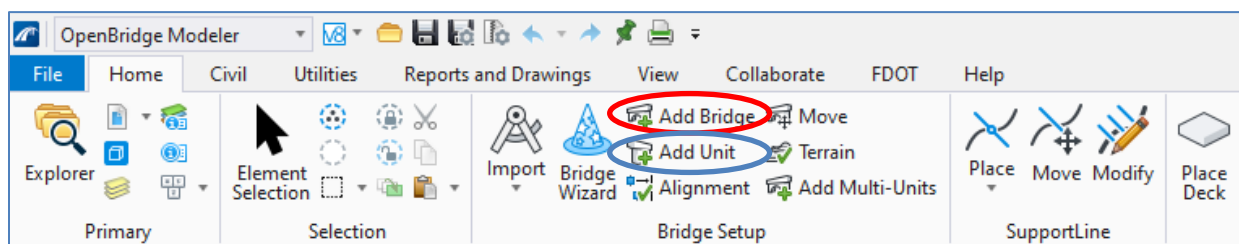
The model-centric approach in this training manual is a shift from traditional CADD and Plans Development workflows. Instead of creating separate views in 2D space, a model is created, element by element, to serve as the central repository of geometric and other data that is linked and referenced for activities and deliverables. The steps to create the model build upon each other using the shared data to streamline the process; therefore, the model progression becomes a critical aspect of the workflow. OBM is built on this model progression and step-wise approach. This chapter outlines not only the tools, but also the order in which to complete these steps for successful model development.

ADD BRIDGE

A bridge model must have a file container. The recommended procedure for creating the active bridge model file is with the **FDOT > Create File** tool as described in Chapter 2. Once created, an alignment file needs to be referenced into the active bridge model dgn file prior to any bridge element modeling. These reference files may be established by acquiring alignment files from Roadway or may be imported and saved in OBM files. See Chapter 4 for more details. The alignment can be annotated with station numbers for orientation with the overall project.

The first step in creating the actual 3D bridge model is to use the Add Bridge tool. The tool is accessed from the **Home > Bridge Setup > Add Bridge**. This tool allows the user to add a description for a new bridge as well as define the bridge type (Beam-Slab, Reinforced Concrete Slab, etc.). Multiple bridges can be added in the same file which may be used for certain situations. However, consideration should be given when determining the number of bridges to add to one file, especially for large projects. The bridge model files can be referenced and opened as read-only by other users, but only one user can be actively working in a file at a time. This has implications for work-sharing and also to the extent of lost data if the file becomes unstable during development.

A method for adding approach slabs and splitting up longer structures is to use the **Add Unit** tool. This will place another bridge “unit” in the active bridge resulting in a similar workflow and procedure outlined in this section; however, all units in a bridge must use the same alignment/profile. This guide uses the method of adding the approach slabs as units. If an asphalt overlay is required, a vertical offset from the profile can be used to accommodate the lower top of concrete deck elevation.



The Bridge Type is also an important category in the Add Bridge dialog box. The user can select from a drop-down list of currently available bridge types in OBM. **Note that the “Bridge Decorations” Feature Definition is the default and should be utilized when adding any bridge model.** This Feature Definition

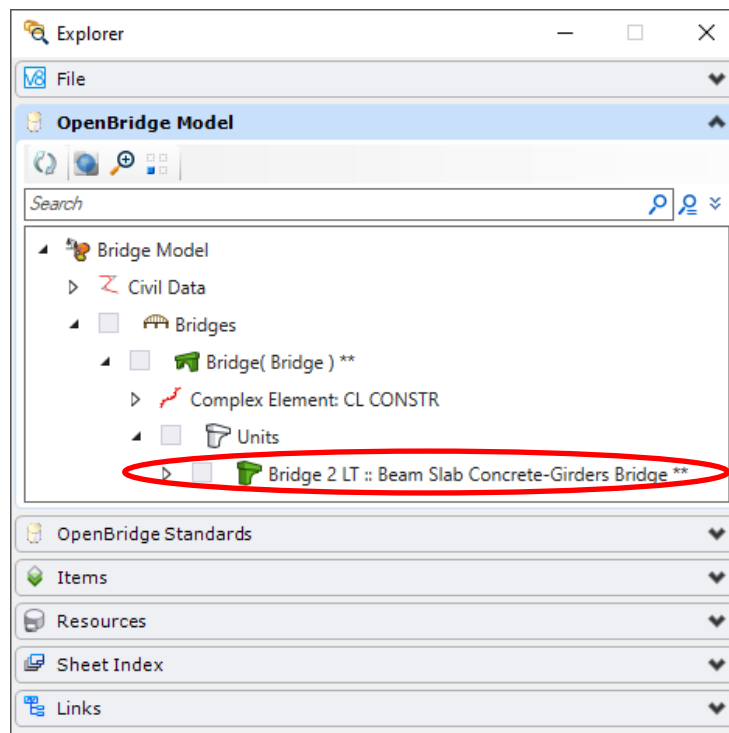
is specifically created to take advantage of developments for enhancements in annotation scaling for plans production.

Main	
Description	SR 40 from SR 11 to Cone Road
Requires Road Alignment	<input type="checkbox"/>
Use Road Alignment For Stationing	<input type="checkbox"/>

Unit	
Name	Bridge 2 LT
Description	
Bridge Type	Beam Slab (P/S or RC Concrete Girders)

Feature	
Feature Definition	Bridge Decorations
Name Prefix	Bridge

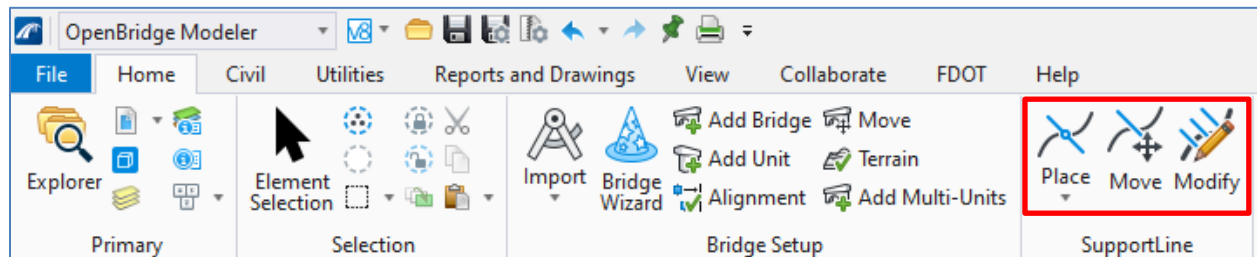
Once the Add Bridge prompts are completed, the new bridge will appear in the **Explorer > OpenBridge Model** window.



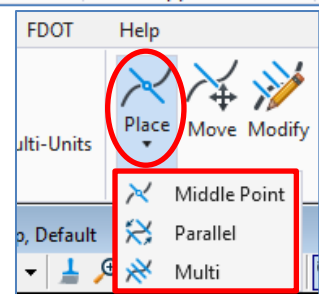
Note The Explorer window can be turned on and off through the **Home > Primary > Explorer** tool.

PLACE SUPPORTLINE

Supportlines are the terminology used by OBM to describe the lines used to layout the spans of the bridge. At a minimum, a supportline will be needed at every substructure location. For a typical bridge, a supportline will be added at the front face of backwall for abutments (begin/end of bridge station) and the centerline of piers. Supportlines will also be needed for the approach slabs. There are also other situations in which adding more supportlines will be beneficial in creating a bridge model. These situations include locations in which there is a change in deck width or thickness, change in beam/girder framing (number in cross section), or other variation in cross sectional properties. **Supportlines are only linked to the bridge that is active at the time of placement.** If a new bridge is created in the model the user must create new supportlines for that bridge.



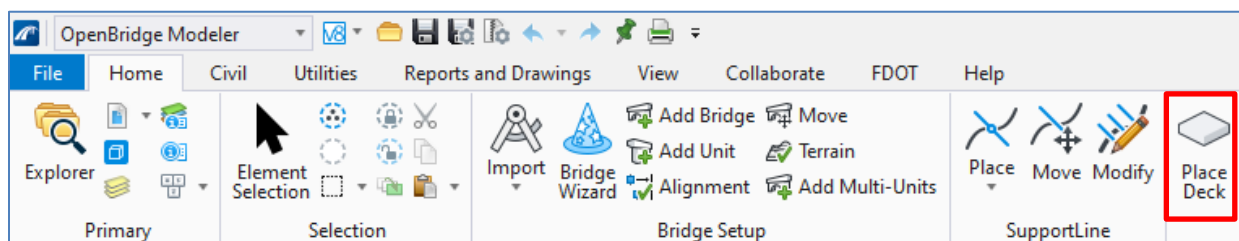
Supportlines can be added by several methods: Place by Middle Point, Parallel, and Multi. These tools are located in the **Home > Supportline** group. The **Middle Point** tool creates a single supportline centered on the selected alignment of the activated Bridge Unit. The **Parallel** tool creates multiple supportlines along the alignment that are all parallel to each other. The **Multi** tool allows for the most control when adding multiple supportlines and modifying them all at once.



Once supportlines are created they can be moved by selecting **Supportline > Move** tool. Only supportlines created with the Multi supportline tool can be revised with the selecting **Supportline > Modify** tool.

PLACE DECK

After Supportlines are defined, the deck can now be modeled. The deck must be added for beams or other elements to be modeled. To add a deck, select the **Home > Place Deck** tool under the superstructure group.



This brings up the Place Deck dialog box which allows for the selection of the deck template, offset values, material, Feature Definition, and other parameters. The *Max Distance Between Sections* field can be reduced for more refined models with tighter curve radii. Below is a description of several fields and the OBM Help Contents material can be consulted for additional information.

The screenshot shows the 'Place Deck' dialog box with the following fields and values:

Deck	
Template Name	Slab w/ constrain ...
Start Station Offset	0:0
End Station Offset	0:0
Horizontal Offset	-32:0
Vertical Offset	0:0
Add Constraints	<input type="checkbox"/>
Chord Tolerance	0.1000000000000000
Max Dist Between Sections	1:0
Analytical Deck	<input type="checkbox"/>
Material	
Deck Material	Deck Concrete, C ...
Build Order	
Build Order	1
Feature	
Feature Definition	Concrete Deck ▾
Name Prefix	Deck

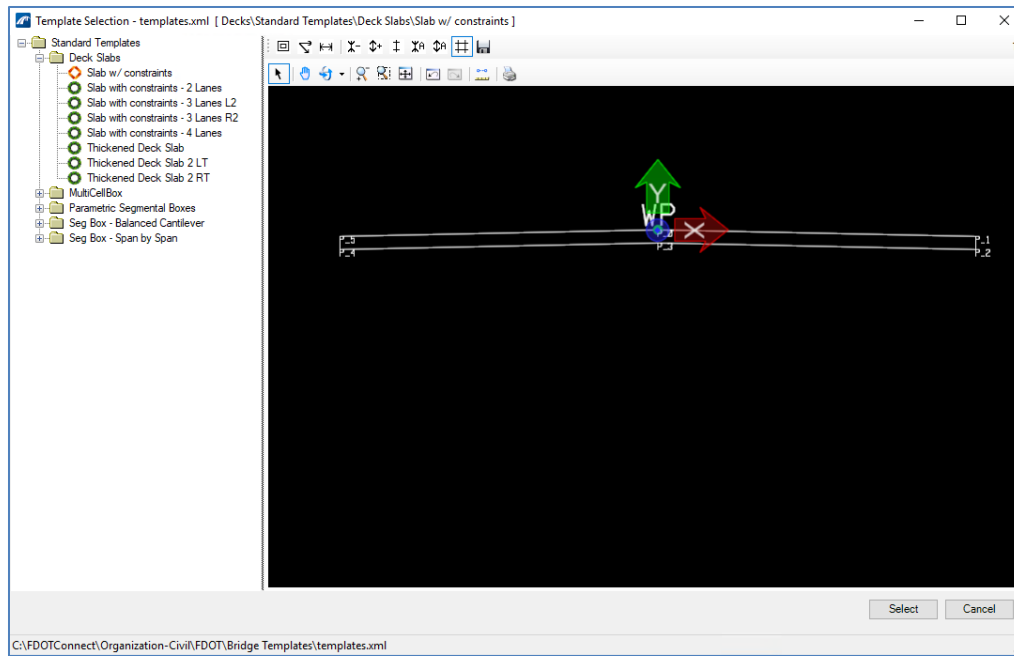
Note The Feature Definition defines what an element is and controls the attributes of the model linework for the bridge elements for plans production. The Material category will be directly used and reported in the Quantities Report and the associated unit costs, etc. will be used for the bridge elements (see Chapter 7 for more details).

The Start and End Station Offset values allow the user to place deck segments that span from points that are offset from the supportlines, rather than aligned with them. This will be demonstrated in the approach slab exercise to accommodate the flexible pavement approach slab.

The vertical offset value allows the user to have the top of the deck higher or lower than the vertical profile control point. This will also be demonstrated in the approach slab exercise for the deck underneath the asphalt overlay.

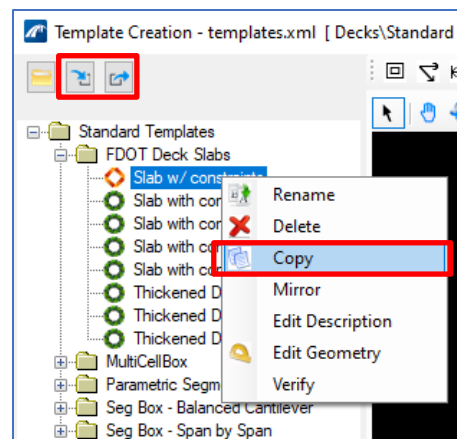
DECK TEMPLATES

Templates are used throughout the OBM elements to quickly generate bridge elements, especially commonly used details. Deck templates are one of the most flexible modeling elements in OBM and many variations can be accommodated. Below is the Template Selection window showing the provided deck templates. The Bentley provided templates are available as well as several FDOT developed templates.

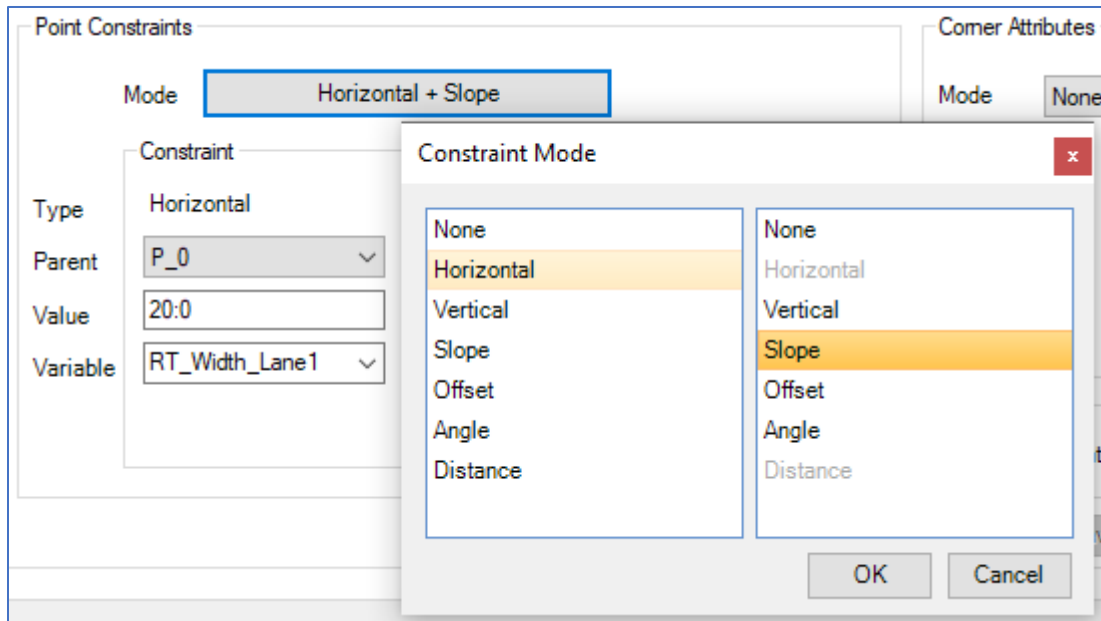


A template provides a single working point used to associate it with the bridge alignment/profile. This may be directly aligned or offset from the specified bridge alignment/profile. Additionally, the cross slope, thickness, and geometric properties are controlled by variables and constraints in the template. The values of these parameters for anything different than the library template and variations along the length of the bridge are input with the Variable Constraints dialog box, discussed in the next section.

To access the deck template library, navigate to **Utilities > Libraries > Decks**. The Template Creation window that opens allows the user to view, copy, and edit any of the existing templates. Templates are stored in an xml file of the workset project folder in ... > **Structures > Bridge Templates > templates.xml**. If a template from one project needs to be used on another project, there are options to import and export template libraries via the xml files, see image below. The easiest way to create a deck new template is to make a copy of an existing template that is closest to the desired deck template. This can be done by right clicking on an existing template and selecting **Copy**. The copied template can be renamed as needed, also by right clicking. Alternatively, a new deck template can be created from scratch using Microstation drawing tools. See the Place Barrier section for a discussion of using the Edit Geometry and temporary view feature of the Template Creation window.

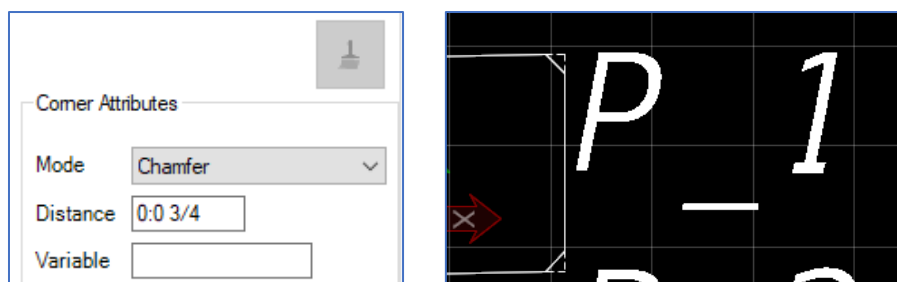


Templates are made up of **Points**, with the relative location of each Point controlled by one or two **Variables**. The **Working Point** (WP in the graphic) that follows along the profile and can either be a unique point or coincide with another point on the template. The other points should be assigned working out from the WP, by assigning the *Mode* of relative location assignment with the *Points Constraints* section. The Mode Options are: Horizontal, Vertical, Slope, Offset, Angle, and Distance.

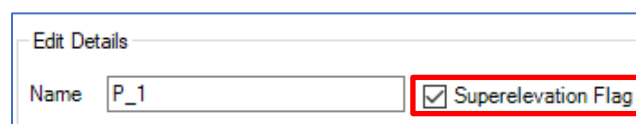


Once the *Mode* is selected, the *Parent* point is chosen. This will be the point that will have the constraint modes applied to determine the next point. Next the *Value* of the constraint is set. For example, if the Working Point is chosen as the Parent for P_1 with a Horizontal constraint Value of 10:0 and a Slope constraint Value of 0.02, P_1 will be placed 10ft to the right of the WP with a slope of 2% upward from the WP. The *Variable* section is optional, but can be used to name certain constraint/value relationships that can then be edited using the Variable Constraints before or after placement of the deck.

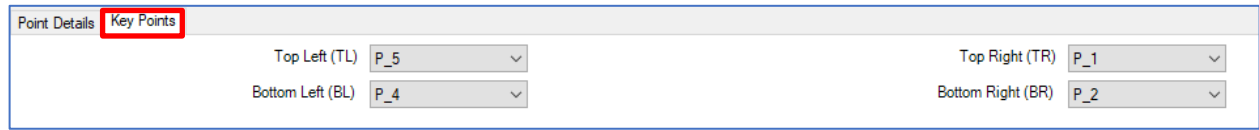
Corner Attributes can be used to set a **Fillet**, **Chamfer**, or **Asymmetrical Chamfer**. Depending on the Level of Detail required for the model, this can be used to modify the corners from being squared off.



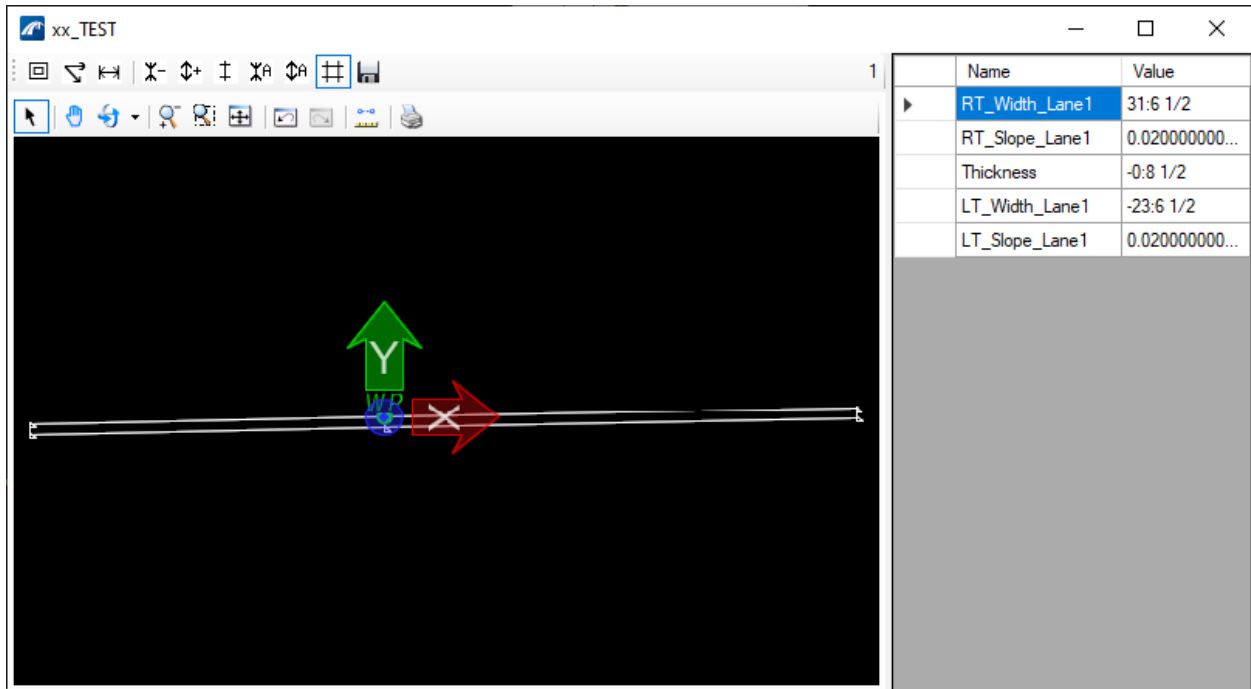
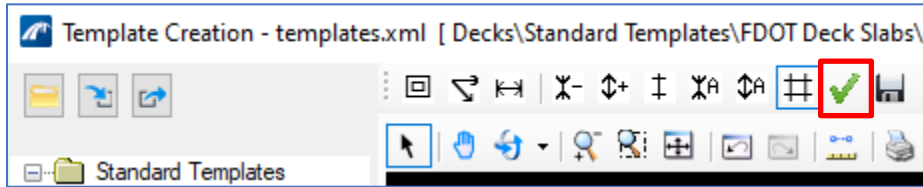
The Superelevation Flag box should be checked for all top deck points, as those are what will be controlled when a Roadway superelevation shape is applied to an OBM deck element.



The Key Points tab will display the corner points of the current deck template and are editable if needed.



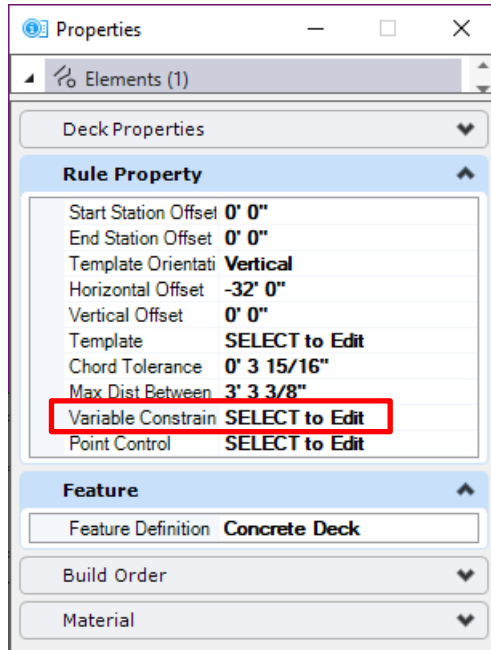
The green Verify checkbox at the top of the Template Creation window can be used to test the defined Variables within the selected Deck Template. Various values can be entered and the graphical representation of the deck template will adjust based on the input.



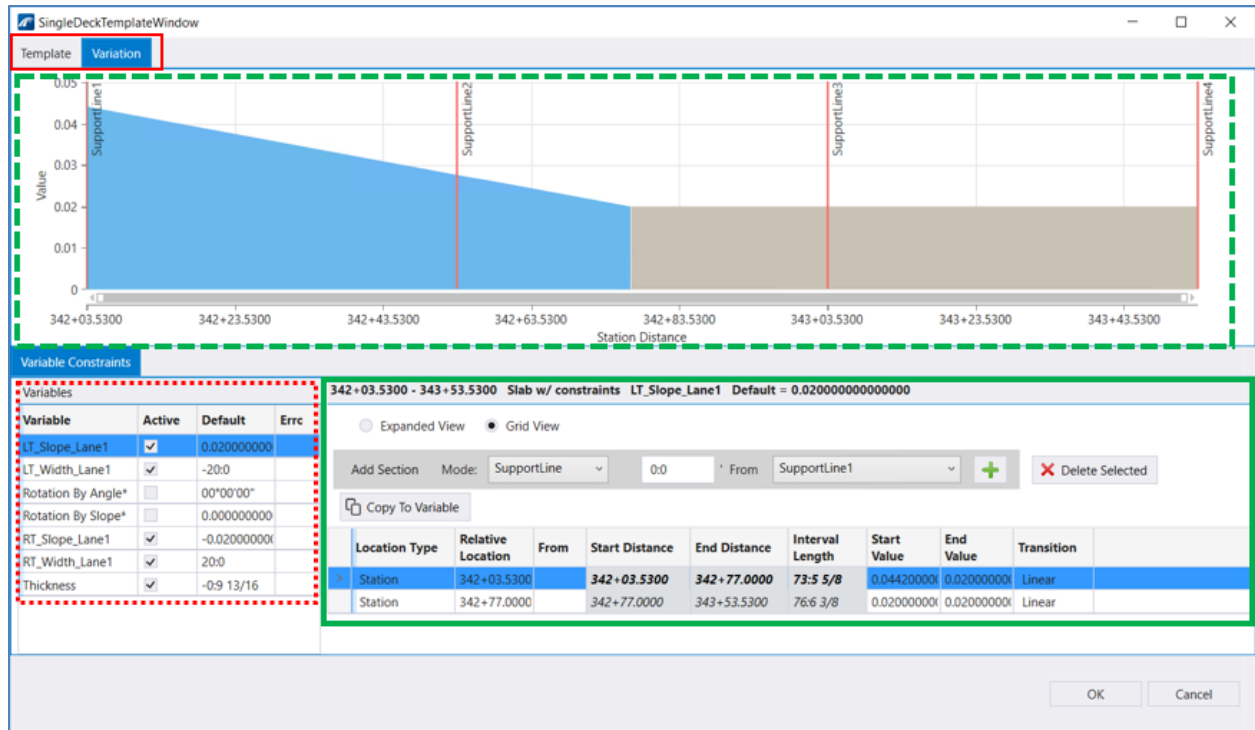
Once the template is completed, it can be used with the **Place Deck** tool.

VARIABLE CONSTRAINTS

The variable constraints dialog can be accessed while creating a new deck or by selecting a current deck, opening the properties window, and clicking the “...” beside the *Variable Constraints* field. See the following figure.



The image below shows the variable constraints window with boxes calling out the different sections of the window. Descriptions follow the image.



Solid Red Box – Selection between viewing windows. The “Variation” Window is shown in the screenshot displaying the details of the selected variable. The “Template” Window shows the cross section of the selected template.

Dashed Red Box – This **Variable** table has 4 columns. The **Variable** column lists the variable names as defined by the selected template. The **Active** column contains check boxes for each variable, that can be checked if the desired inputs for that variable are different than the values brought in by the template. The **Default** column shows the values given by the template and will be used if the check box is not checked.

Solid Green Box – This window shows the change in the selected variable over the length of the active bridge. Changes can be made only if the checkbox for the selected variable is checked. The screenshot above shows the details for the **RT_Slope_Lane1** variable, which has a changing slope (Superelevation) from station 342+03.53 to 342+77.00. The slope is then unchanged until 343+53.53. The **Mode** controls what method is used to determine the location of the transitions. The options are **Supportline**, **Ratio by Span**, and **Station**. There is an accompanying input for either the offset values, ratio, or station. **Linear**, **Parabolic**, and **Circular** transitions are accommodated.

Dashed Green Box – This window shows a graphical representation of the information put in the Solid Green Box. The y-axis represents the values for that variable, and the x-axis follows the stationing of the selected deck.

The exercise at the end of this chapter shows the user how to use these features in practice.

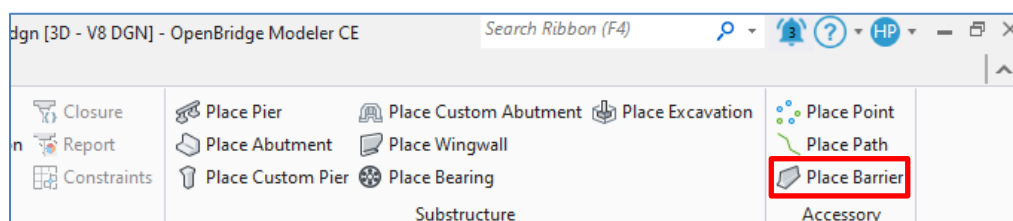
Offsets are used to control the deck location, horizontally and vertically, from the bridge alignment and the Work Point in the deck template. For example, a horizontal offset is required if using a Centerline Alignment for a dual highway structure as the bridge alignment in order to keep the Work Point for the deck template in the correct location for the left and right structures.

There are Feature Definitions provided for both Deck Slabs and Approach Slabs. Selecting the proper Feature Definition will place the elements on the correct FDOT levels in the model space and also any linework in views or sections for plans production purposes.

PLACE BARRIER

Barriers are placed directly onto the deck of the active bridge and are referenced either to an alignment or to a point on the cross-section of the deck. The user should be able to add a barrier by selecting one of those alignments or deck points, a barrier template (cross-section) and adding it to the bridge model.

To place a barrier on a deck, go to **Home > Accessory > Place Barrier** (see below)



Once **Place Barrier** is selected, the “Place Barrier” dialog box will open, shown below. This box is where the user will choose their inputs for the placement of the barrier. Clicking the “...” beside the *Template Name* field will open a window that will allow the user to choose which template they want. Note that the templates cannot be modified without going back to the Utilities ribbon and changing the template.

The screenshot shows the 'Place Barrier' dialog box with the following fields and values:

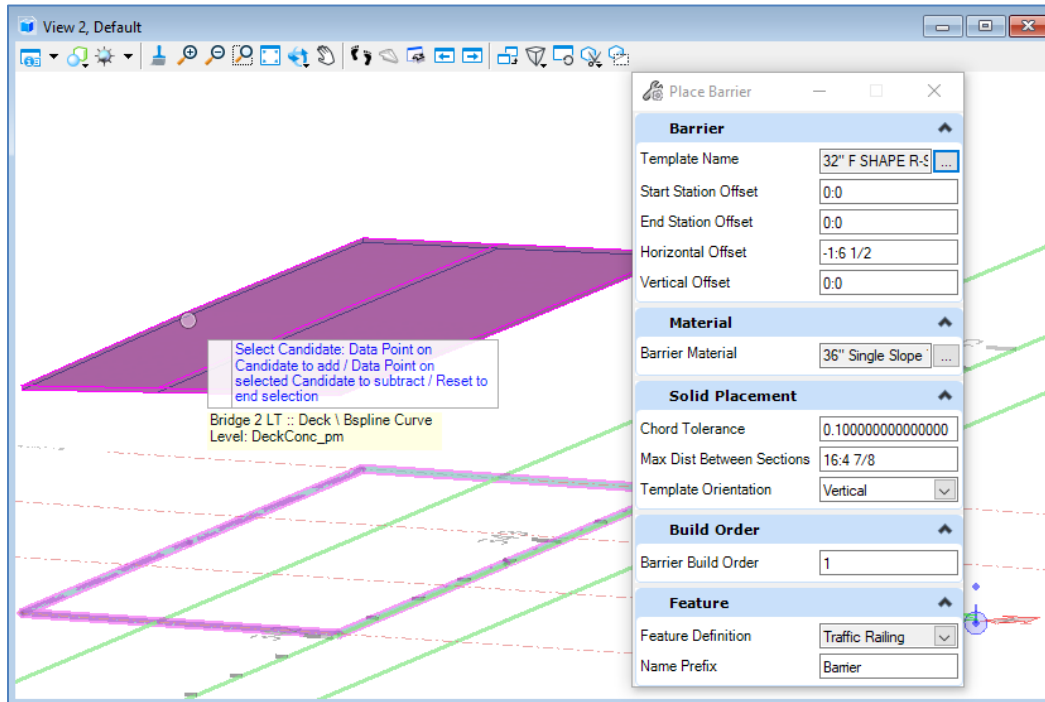
Barrier	
Template Name	32" F SHAPE R-S
Start Station Offset	0:0
End Station Offset	0:0
Horizontal Offset	-1:6 1/2
Vertical Offset	0:0
Material	
Barrier Material	36" Single Slope
Solid Placement	
Chord Tolerance	0.1000000000000000
Max Dist Between Sections	16:4 7/8
Template Orientation	Vertical
Build Order	
Barrier Build Order	1
Feature	
Feature Definition	Traffic Railing
Name Prefix	Barrier

Three red callout boxes provide additional information:

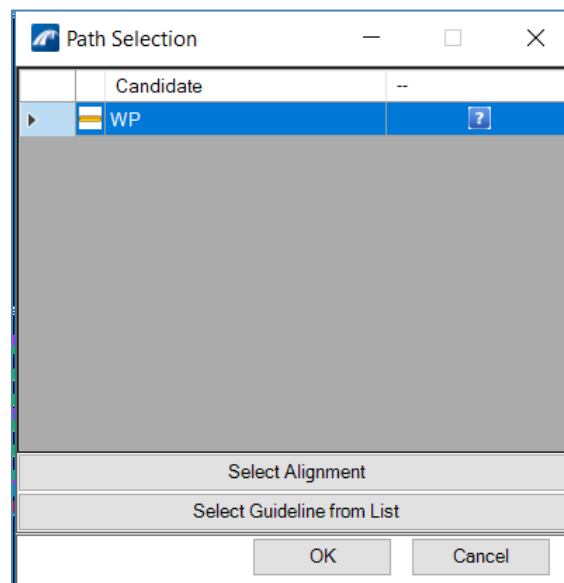
- Barrier Templates are either for the Left or Right side of the Deck. Be sure to remember which template is being used for the Horizontal Offset.** (Points to the Template Name field)
- These inputs move the start or end of the barrier relative to the start and end stations of the selected deck.** (Points to the Start Station Offset and End Station Offset fields)
- These inputs move the position of the barrier cross-section relative to the selected alignment point.** (Points to the Horizontal Offset and Vertical Offset fields)

Note the *Horizontal Offset* field, this is where the horizontal adjustment should be made to accommodate for a template that has a WP that is not on the coping. A negative offset will move the barrier to the left of the alignment chosen, and a positive offset will move it right.

Once the inputs are correct the user is prompted to select the deck(s) for which they would like to add barriers. Multiple decks can be selected to place the barrier on at the same time.

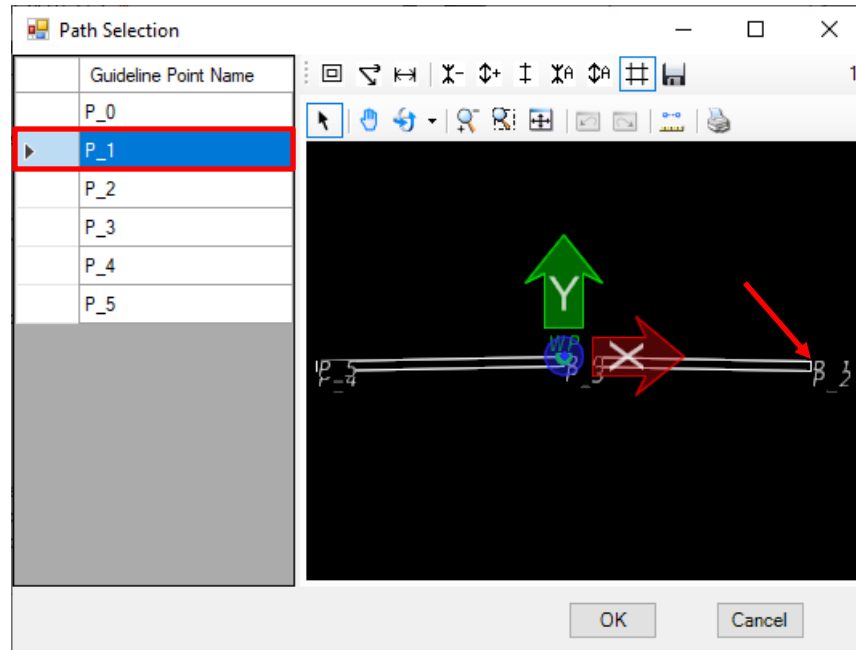


End the selection by right clicking in open space, and then left click again in open space to open the **Path Selection** Window.

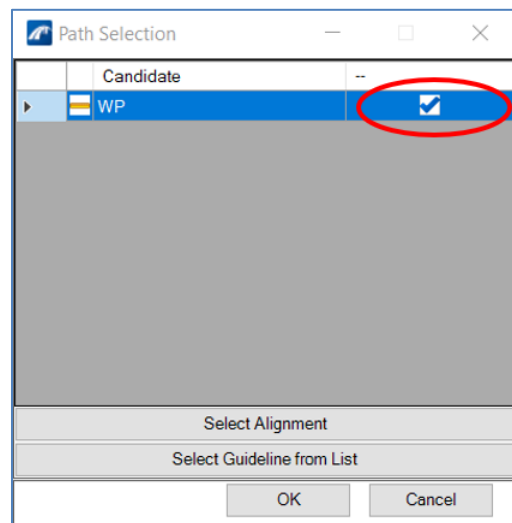


To pick an alignment from the roadway geometry, click **Select Alignment**. The user can create auxiliary alignments if needed for geometrically complex situations such as gore areas. To pick an alignment using one of the control points from the deck template, click **Select Guideline from List**. Either method is valid and will depend on individual situations; however, the **Select Guideline from List** method is more helpful in most applications as it does not depend on individual alignment locations but rather on key points of the deck template such as the top edges or the break points.

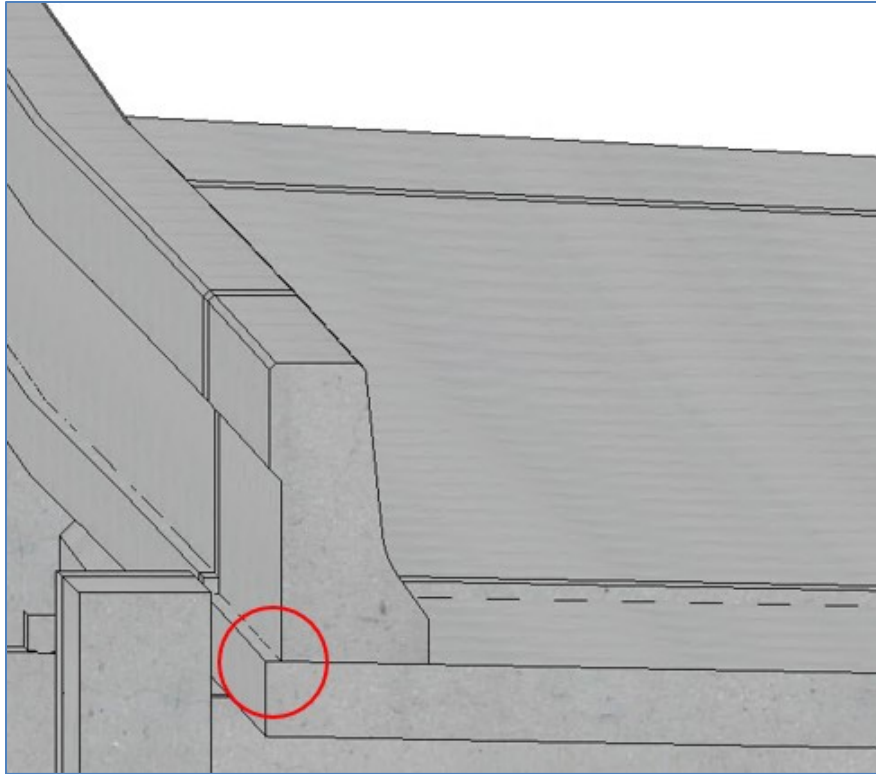
If using the **Select Guideline from List** option another **Path Selection** window will appear with an image of the deck template cross section and a list of the Guideline Point Names. In the previous step the user chose the right barrier template in the barrier template selection with a corresponding deck point at the top left corner. In the figure below, this is **P_1**.



Select "OK" in the second **Path Selection** window and make sure that there is a blue check mark where the question mark used to be (see below)

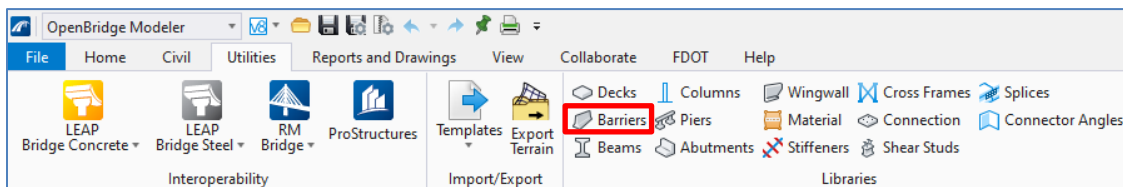


Click "OK" again to place the barrier. In the image below take note of the circled offset.

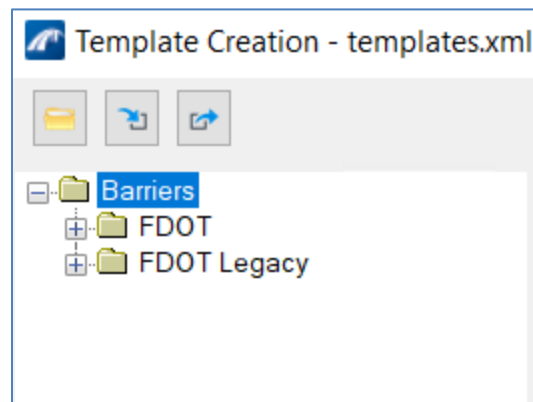


BARRIER TEMPLATES

Barrier templates have already been created and should be available to all FDOTConnectXX.XX users. These templates can be found in **Utilities > Libraries > Barriers**.

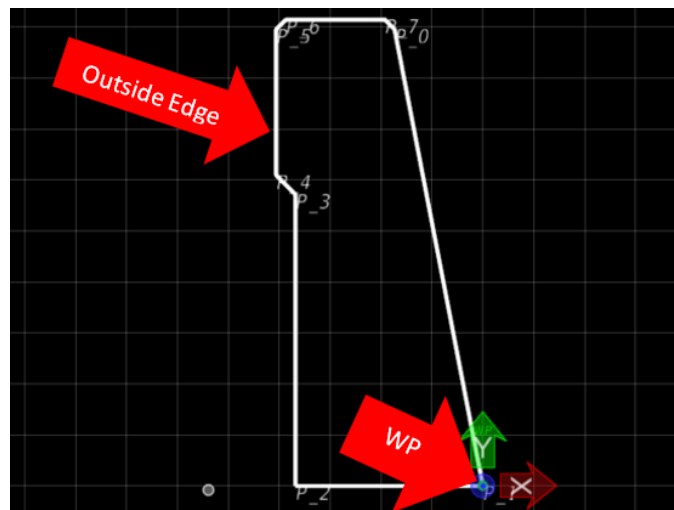
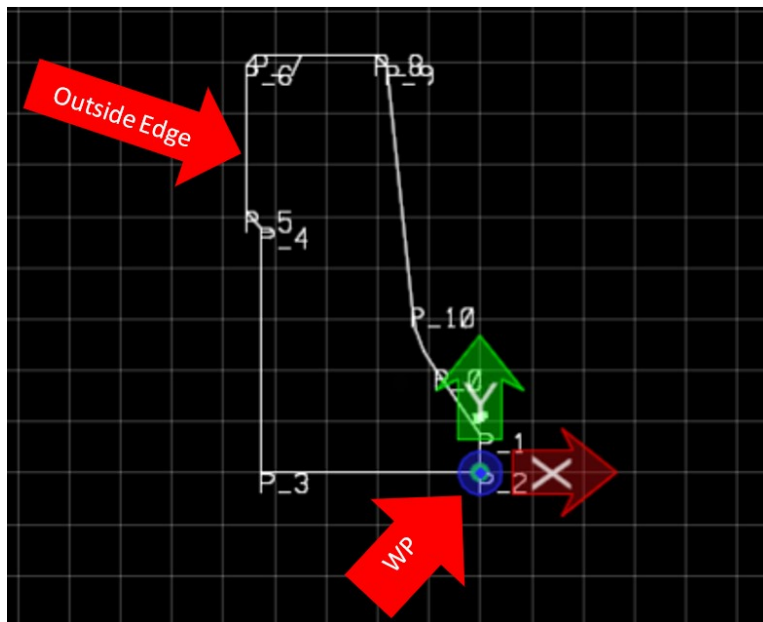


Clicking on this tool will open the barrier templates window, showing the folders with the different templates currently in the user's library. The user should have access to current Standards Plans FDOT barrier templates and Legacy FDOT templates. See below.



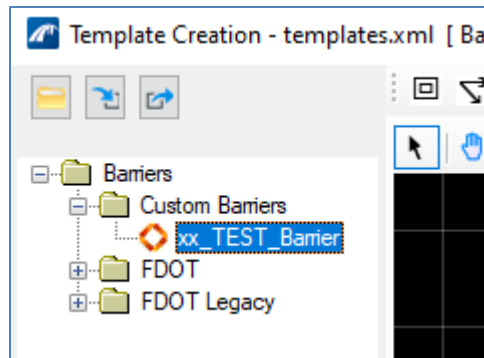
Before adding a barrier to the model, it is important to know where the working point (WP) is located for the template used in the model. The WP, as discussed in the deck creation section above, is the base point used to orient the object on a certain alignment or control point. Adding a barrier to the model will have the user select a point on the deck to align with the WP on the barrier. To place the barrier appropriately the **Horizontal Offset** is used to offset the working point from the selected deck point (generally the coping).

The below image shows an example of a template that needs an offset to fit properly on the deck for both an FDOT Legacy and a typical current FDOT Standard Plans barrier. Because the working point is placed on the curb side of these barriers (gutterline), the **Horizontal Offset** should be the total width of the barrier plus any additional width to match with FDOT standards, or the distance from the gutterline to the coping.



The Template Creation window can be used to view and modify different templates in the user's library. There are very few occasions where the user will need a custom barrier since the FDOT barrier library encompasses all the standard barriers. If there is a situation where a user needs a barrier outside of the FDOT and OBM barrier library, a new template can be created from scratch. If the geometry of the barrier exists in a dgn at the proper scale, the linework can be used.

Custom barriers should be added to their own folder in the workset template library. This can be done by right clicking the Barriers folder and selecting **Add Category**. With the new subfolder created, right clicking on the subfolder and selecting **Add Template** will create a blank barrier template.

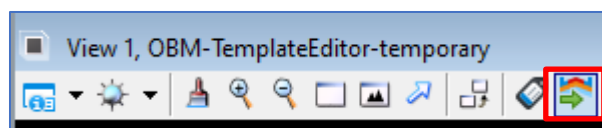


Once the name and description are entered for the new template, the dialog box will go into the background for a view selection. At this point, any view can be selected to be used for the temporary view; selecting one will not affect the current content.

A temporary view opens with nothing but a Working Point (WP). Often the temporary view windows will need the Drawing Scale adjusted from the default. This can be adjusted as needed in the **Reports and Drawings > Drawing Scale Annotation Scale**.

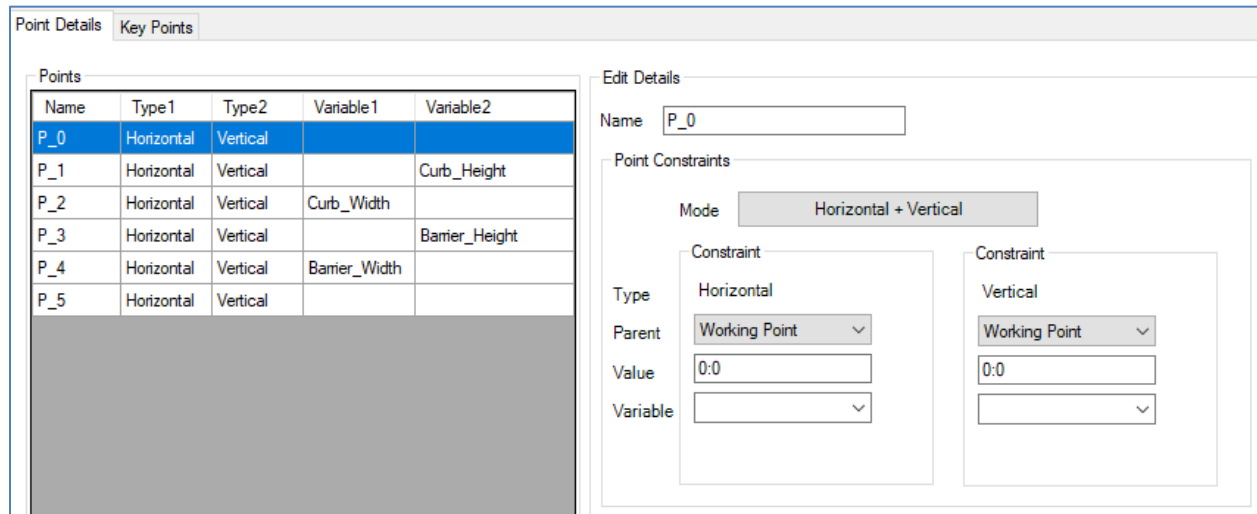
The temporary view is where the custom barrier shape will either be drawn using the Microstation tools within the **Drawing** workflow or referenced from an existing dgn. Generally, the WP would be the barrier point that defines the gutterline. The order that the segments of the barrier are drawn will determine the automatic sequence of numbering for the Points. If existing linework is referenced and merged from another dgn, the Point numbering can be adjusted afterward if needed.

Once the linework for the barrier is completed in the temporary view, click the **Import template from model** button on the right side of the view toolbar.

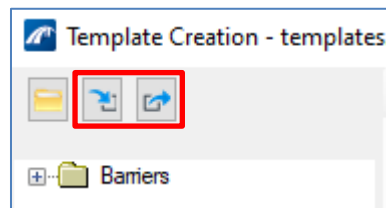


With the barrier geometry defined, the *Point Constraints* can be used to set each point relative to each other. The available constraints are the same as those for the deck templates, with an additional option of **Elevation Provider**.

Whenever a *Mode* is selected for the *Point Constraint*, the point relationship based on the current geometry will be filled in. Since barrier points are generally rigid, the points can often be constrained based on their default *Parent/Value* relationship once the *Mode* is selected. If desired, the *Variable* input can be filled in to assign a given dimension to an editable variable.



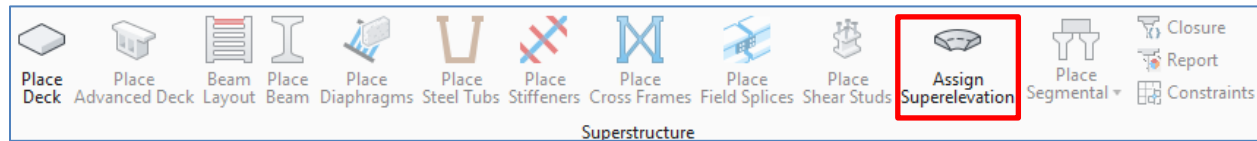
Similarly to deck templates, barrier templates are stored in an xml file of the workset project folder in ... > **Structures > Bridge Templates > templates.xml**. If a template from one project needs to be used on another project, there are options to import and export template libraries via the xml files.



After the *Point Constraints* are set, the custom barrier can be used with the **Place Barrier** tool.

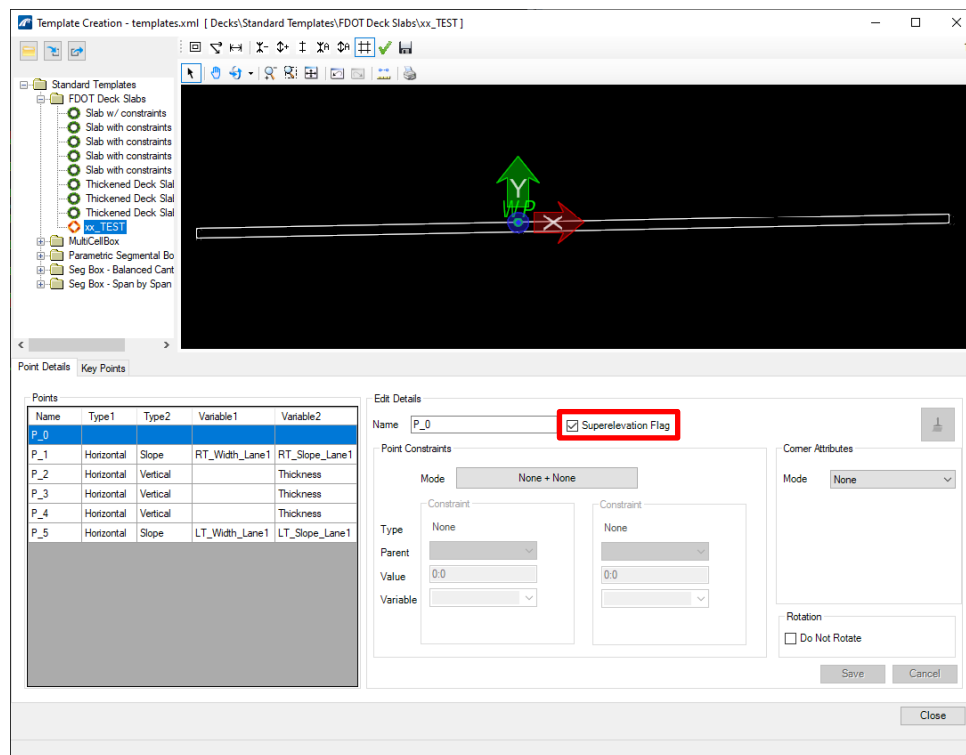
ASSIGN SUPERELEVATION

Superelevation can be assigned in several ways within OBM. The most direct method is to use the **Assign Superelevation** tool found at **Home > Superstructure > Assign Superelevation**.



This tool utilizes a referenced roadway dgn file with the Superelevation information already included. In order to use this approach, the correct roadway file must be attached and the reference turned on.

The **Assign Superelevation** tool uses the points in the deck template to assign the cross slope along the length of the deck. The points that should be tied to the Superelevation file need to have the *Superelevation Flag* checked in the Template Creation Window (See below). These points are usually the points along the top of the deck.



After the prompts are followed and the Superelevation section and deck element are selected, the Superelevation Assignment dialog box is available.

Superelevation Assignment										
	Lanes	Lane Detail	Offset	Pivot Point	Start Station	End Station	Start Slope	End Slope	Station & Slope Detail	Template Point
▶	LeftOuter	Station ...	-55:6 1/2	P_0	342+03.53...	343+53.53...	0.04424510...	0.02000...	Station ...	P_5
	LeftInner	Station ...	-32:0	P_0	342+03.53...	343+53.53...	0.04424510...	0.02000...	Station ...	P_1

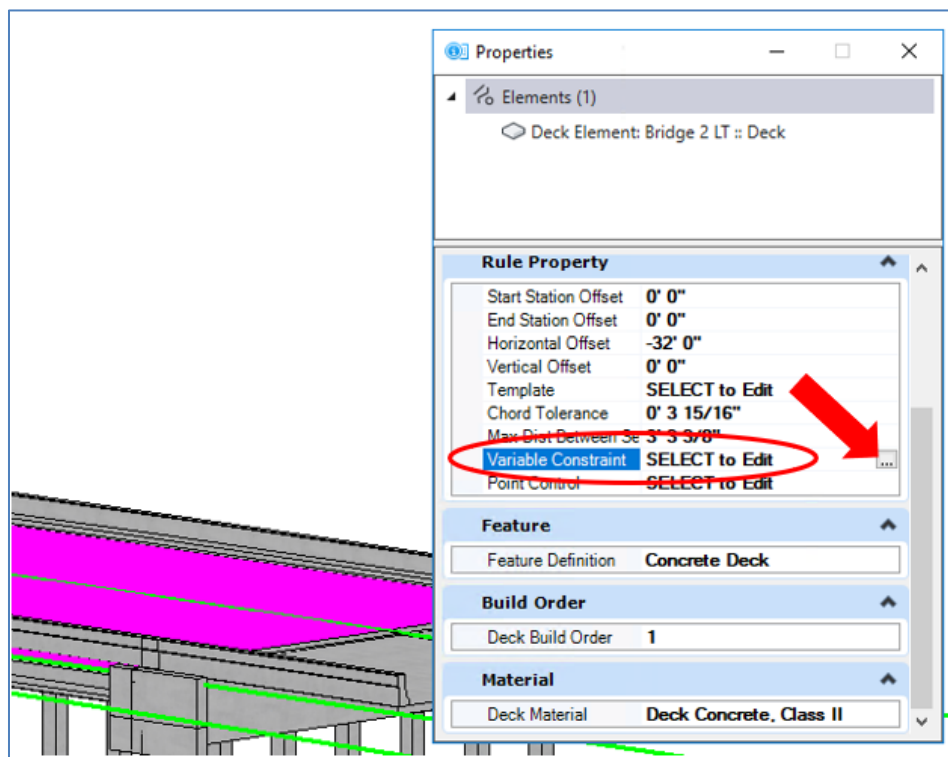
The current version of OBM makes the Superelevation Point selection process slightly cumbersome. The *Pivot Point* and the *Template Point* cannot be the same value in the same row. For example, say that the *Pivot Point* for the **LeftInner** row is desired to be **P_0**. If the **Superelevation Assignment** dialog box automatically brings in **P_0** for the *Template Point* field, the user should:


1. Change the *Template Point* to a value different than the desired *Pivot Point*, chosen from the dropdown arrow.
2. The dropdown window for the *Pivot Point* should now display **P_0** as an option.
3. Go back to the *Template Point* dropdown window and select the desired value.

Note that a positive slope in a Superelevation file from ORD: going from alignment outwards. Slanting upward while looking down station is considered positive slope and slanting downward is negative slope. OBM on the other hand, has positive and negative slope consistent with the slope of a line in a cartesian coordinate. Additionally, in OBM, Superelevation grade and signs are in reference to the Superelevation pivot point, not as assigned in the Superelevation definitions in ORD. Superelevation in OBM will not allow pivoting points outside the deck template.

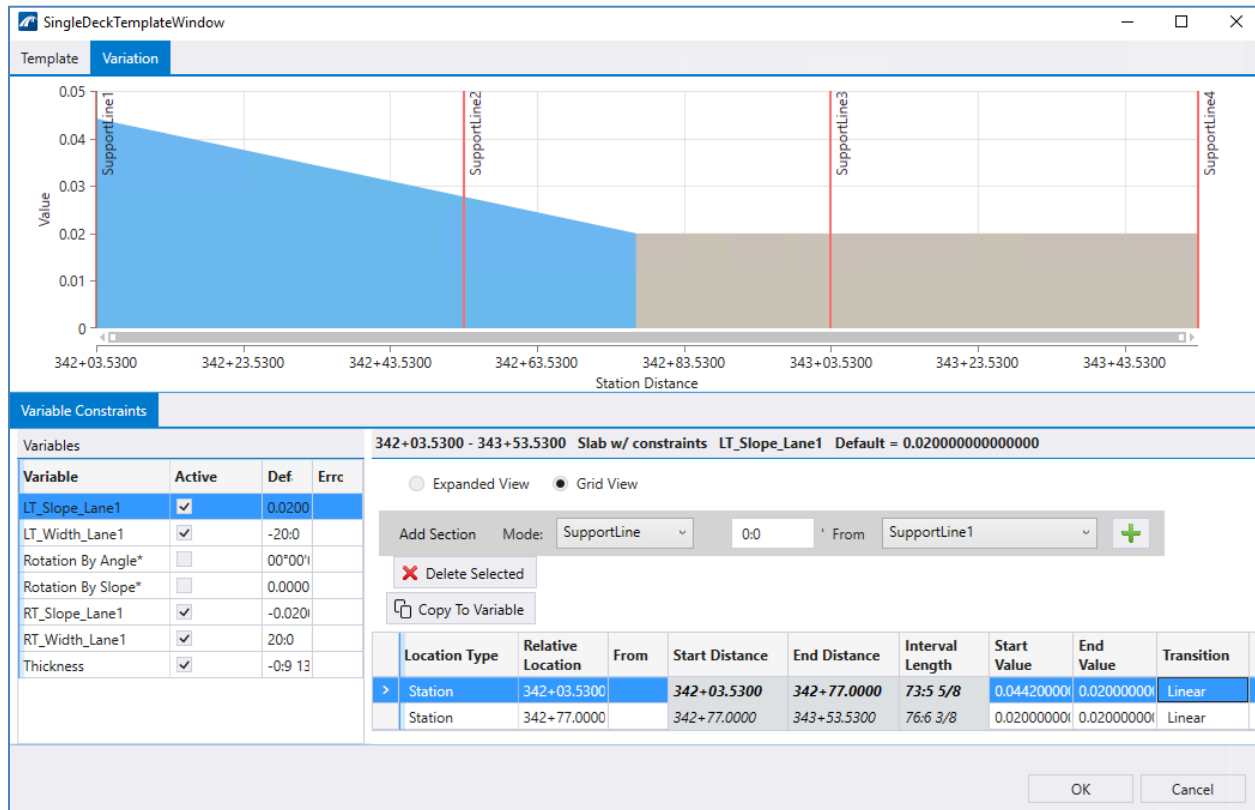
If the user wishes to modify the variable constraints of the deck (other than the cross slope), they must do so after the **Assign Superelevation** tool is used. Using the Superelevation tool will effectively eliminate any modifications to other variable constraints of the selected deck.

Users can also assign Superelevation using the Variable Constraints dialog box by accessing the properties of a modeled deck component.



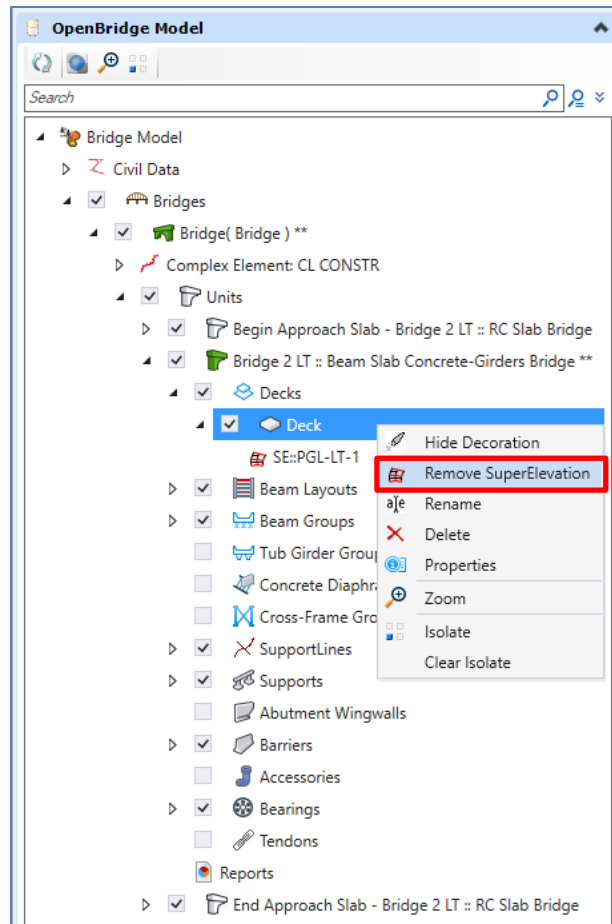
Note The properties of any model element can be accessed by hovering over the element and selecting the  tool or by bringing up the **Home > Properties** under the Primary group. The user may even want to dock the Properties tool for easy access while creating models.

From this dialog box you can select the Variables for deck slope and define the start/end stations and slope values for the Superelevation transition. Additional transition points can be added by clicking the green + in the *Add Section* area.



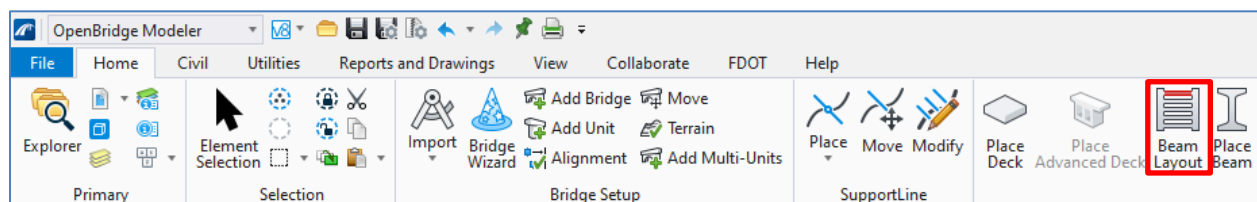
Note After the Assign Superelevation tool is used, the Variable Constraints dialog box shows the values used in the model.

If the Assign Superelevation tool is used, the parameters used for the cross-slope transitions can be viewed in the Variable Constraints dialog box as well. However, these parameters cannot be deleted or modified in this case. The only way to remove the superelevation values or modify the parameters after assigning is to right click on the specific deck element in the **Explorer** window and select "Remove SuperElevation" as shown below.



PLACE BEAM LAYOUT

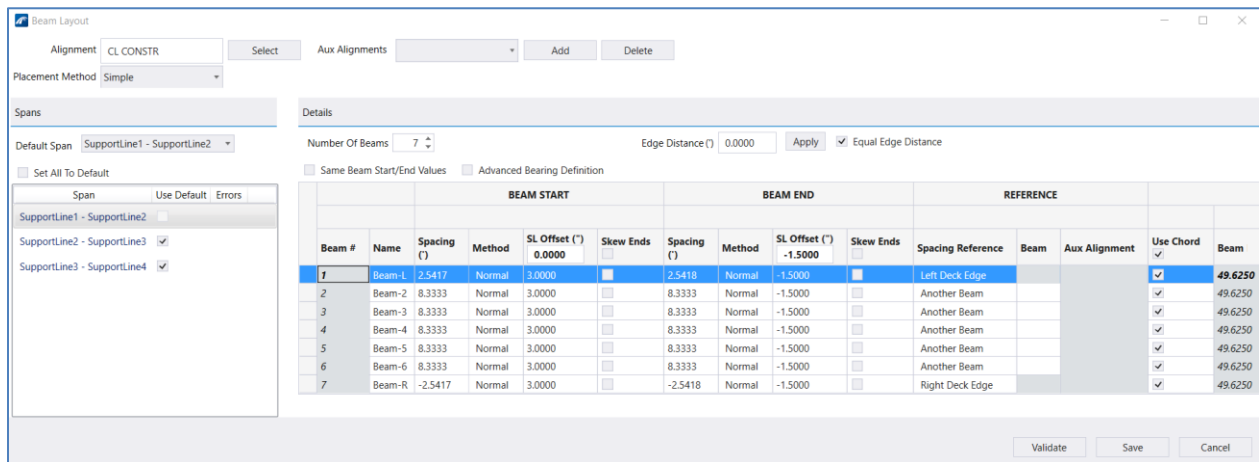
The Beam Layout essentially creates the framing plan for the bridge. To add a beam layout, select the **Home > Superstructure > Place Beam Layout** tool.



The resulting 2D linework in plan view generated by this tool is placed at elevation zero ($Z=0$) and are placed on a “decoration” level. Note that the beam elements are not modeled in this step (that occurs with the **Place Beam** tool described in the next section). Instead, the number of beams per span, beam spacing, supportline offsets, and whether the beam has skewed ends are controlled in this tool. Below is an example of the Beam Layout dialog box.

The initial beam spacing can be set by selecting the *Number Of Beams* and the *Edge Distance* (overhang width). Within the table, varying beam spacings or overhangs can be accommodated. The beam spacing can be measured **Normal** to the deck or **Along Skew**. The SL Offset is the parallel offset distance from

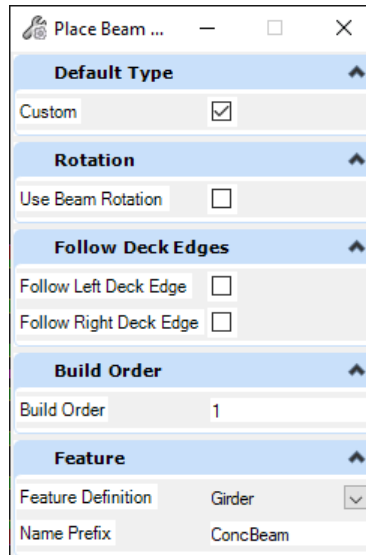
the controlling supportline. With the given options for beam layout, almost every framing plan can be modeled. Clicking **Validate** will allow the user to temporarily view the placement within the model of the current beam layout. Clicking **Save** will finalize the adjustments and close the dialog box.



Note Using the “Set All To Default” checkbox or the copy/paste (Ctrl+C & Ctrl+V) functionality can be an efficient way to add the beam layout in multiple spans.

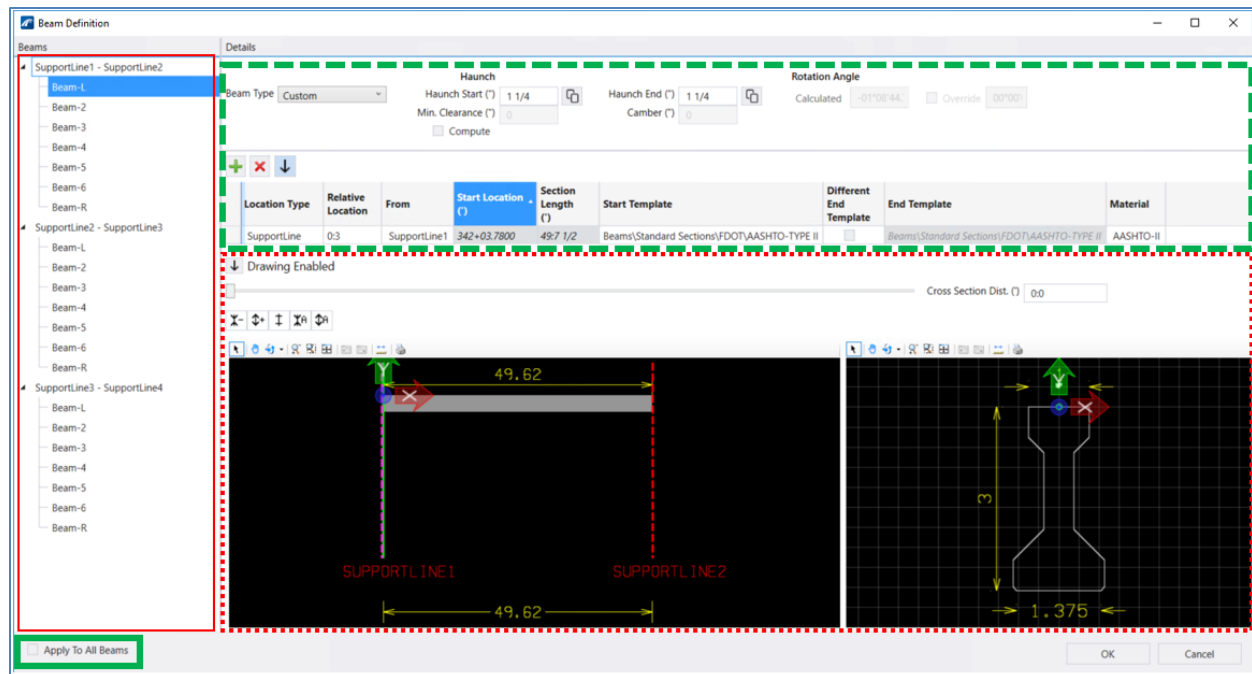
PLACE BEAM

Now the user is ready to add 3D beam elements. To model the beams, navigate to and select **Home > Superstructure > Place Beam**. A dialog box will open with different beam placement options.

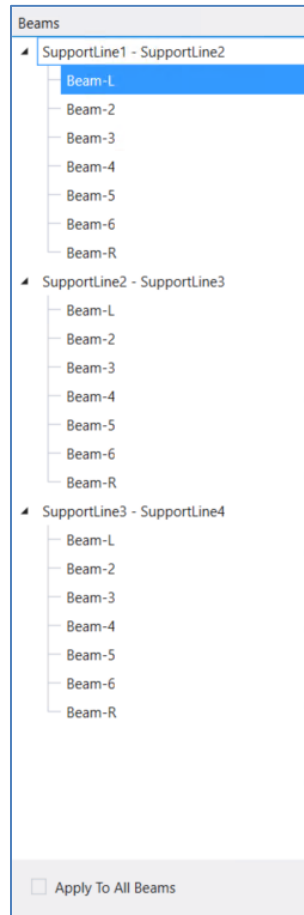


Name Prefix can be used to describe the beam type based on the material, for example "ConcBeam" or "SteelGirder." This can be helpful if there are both concrete beams and steel girders on a bridge. In this case, the user would need to use the **Add Unit** tool since different *Bridge Types* would need to be selected.

A Beam Layout must be selected to open the Beam Definition dialog box. This allows for defining minimum haunch thicknesses, beam sections, and beam material. See the Beam Definition dialog box and corresponding information.



Solid Red Box – This Beam List is determined by the Beam Layout created in the previous section. This particular Beam List contains 3 spans of beams with 7 beams across the width of each span. Using the **Apply To All Beams** check box called out by the **Solid Green Box** in the bottom left of the window allows the user to make changes to one beam and apply it to all the beams in the Beam List. See the image below.



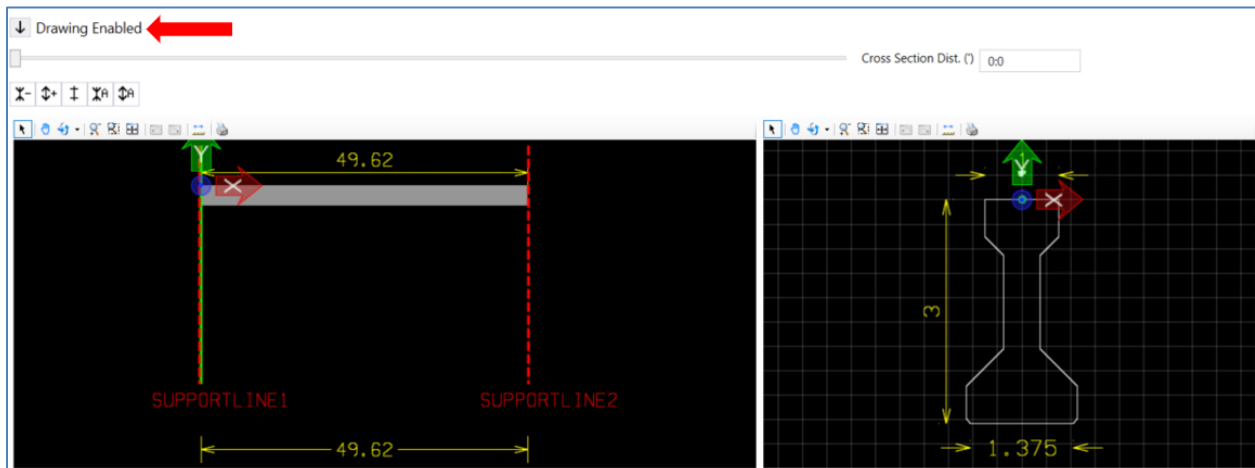
Note Using the "Apply To All Beams" checkbox functionality can be an efficient way to add the beam sections and other parameters in multiple spans. The check can always be cleared to make individual beam modification as needed.

Dashed Green Box – This Details section is where the user can modify the beam type, haunch, beam dimensions, and the chosen template. The Beam Template Library can be found in **Utilities > Libraries > Beams**. This is where the templates can be viewed and modified prior to selection.

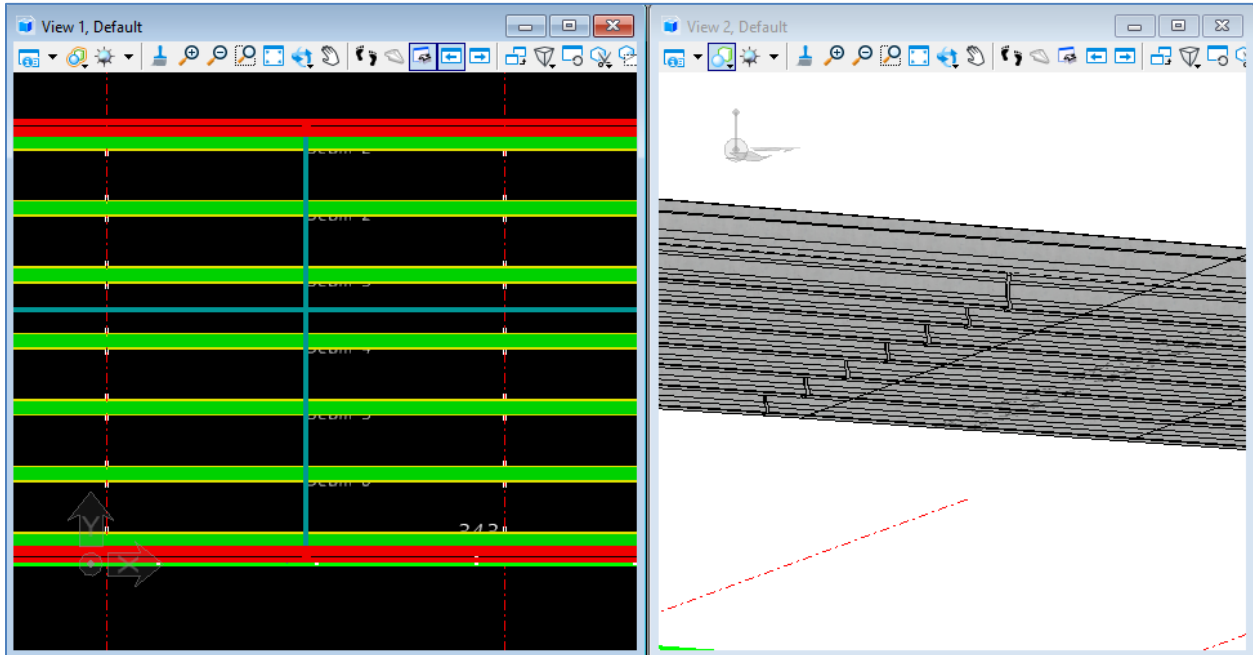
Location Type	Relative Location	From	Start Location (')	Section Length (')	Start Template	Different End Template	End Template	Material
SupportLine	0:3	SupportLine1	342+03.7800	49:7 1/2	Beams\Standard Sections\FDOT\AASHTO-TYPE II	<input type="checkbox"/>	Beams\Standard Sections\FDOT\AASHTO-TYPE II	AASHTO-II

Note The haunch thickness can be manually entered for both the start and end of the beams. Also, the user can check the “Compute” box and provide the minimum haunch at the edge of girder and the total net camber at midspan to allow the software to provide the haunch thickness. Note that the camber is not modeled, only used to determine the required haunch thickness.

Dotted Red Line – This window contains drawing views of the selected beam. The left view window shows the span of the beam, and the right view window shows the cross-section of the selected beam template. Clicking the arrow next to **Drawing Enabled** will enable or disable these drawing views. See the red arrow in the following figure.



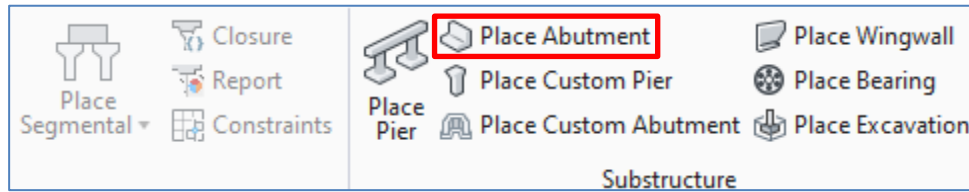
After the information for the first beam is changed according to the desired inputs and the **Apply To All Beams** is checked the user can select **OK** to create the beams in the model.



To return to the *Beam Definition* window for the beams just created, the user must select the **Beam Group** for the active bridge in the model space and open the properties window. In the *Beam Definition* field select the “...” to open the *Beam Definition*.

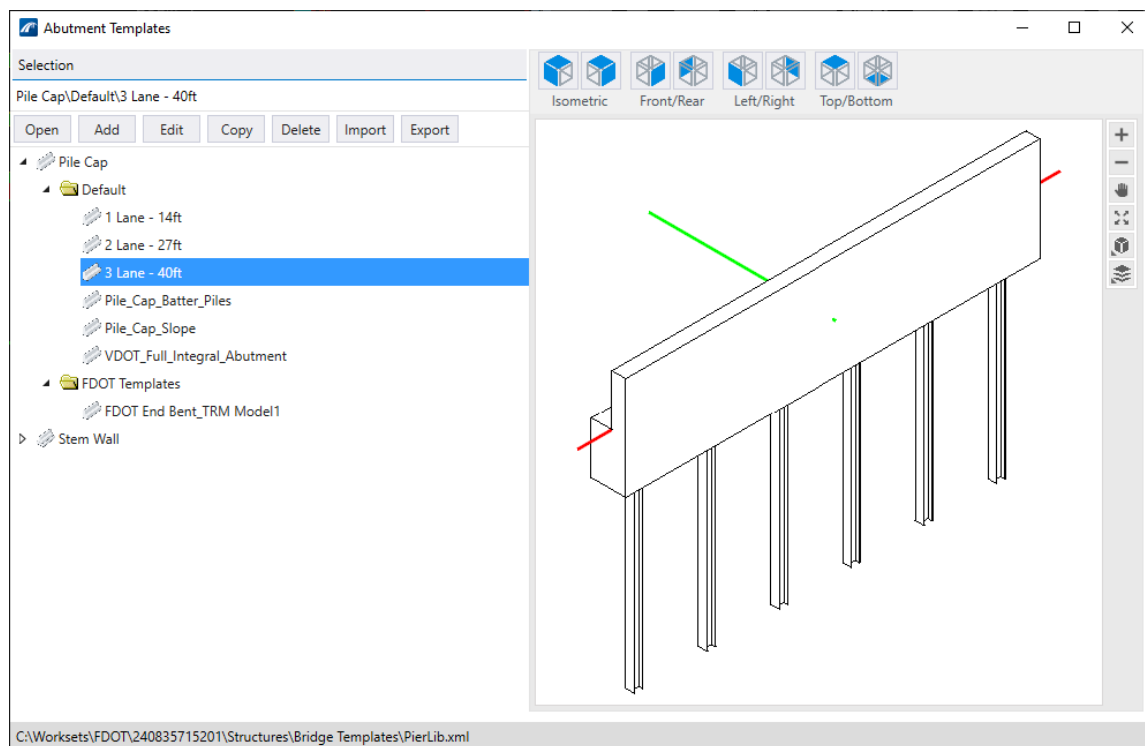
PLACE ABUTMENT

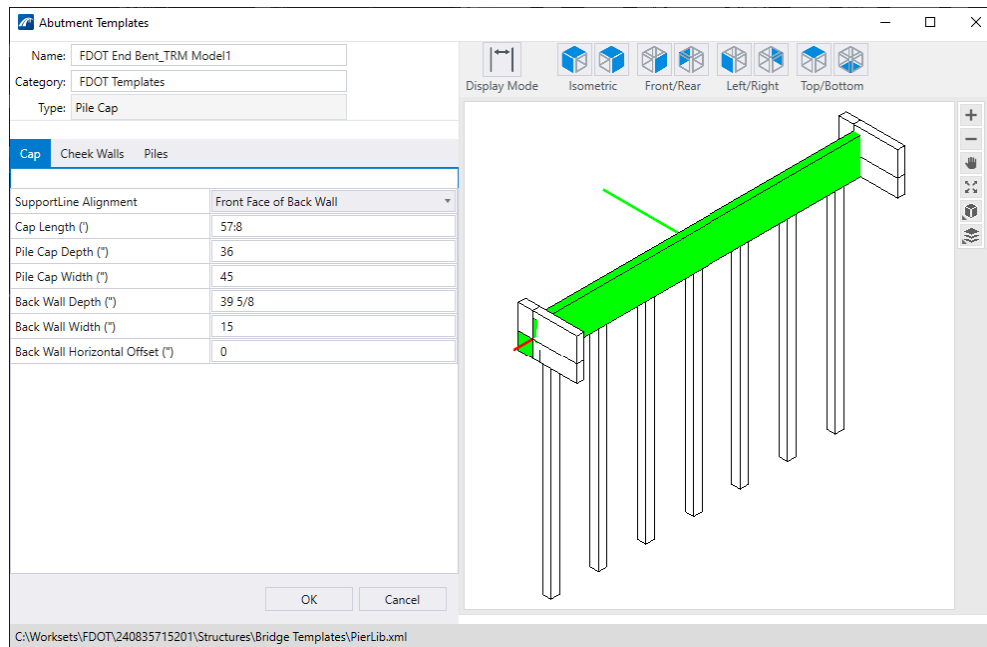
After the beams are created, substructure units can be added to the model. To add an abutment, select the **Home > Substructure > Place Abutment** tool.



Similar to deck elements, templates are used to generate abutment elements. However, the substructure templates, especially for the abutments and wingwall, are less flexible than the deck templates and the user may not be able to model these elements to a high level of development with the provided tools in OBM. A higher level of development can be accomplished with a Custom Abutment using a parametric cell, and/or using solids modification tools. A separate training course on advanced topics will provide more details on this approach. FDOT is developing a parametric cell library for standard FDOT end bents, which will be delivered with future versions of FDOTConnectXX.XX.

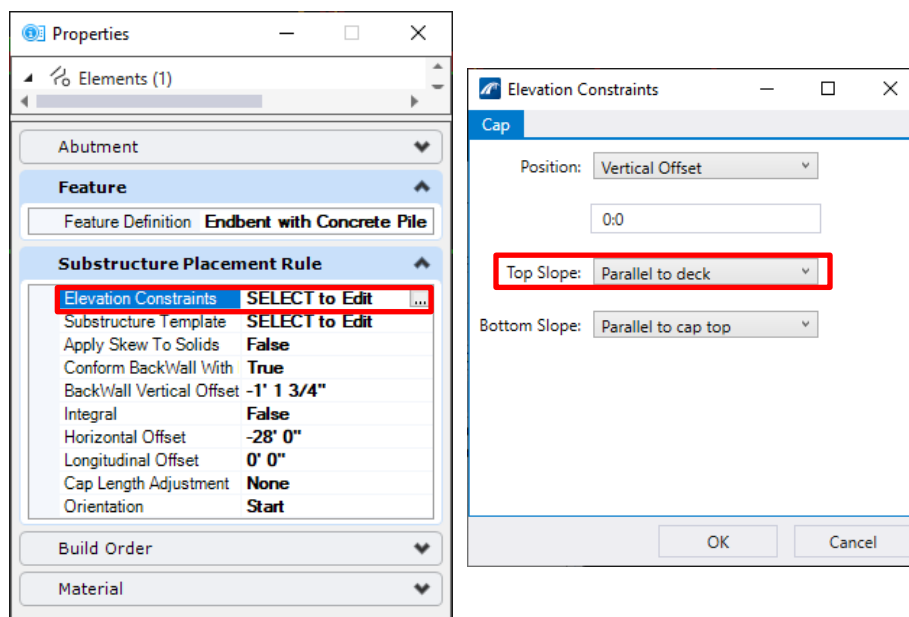
OBM provides templates for two categories of abutments: Pile Caps and Stem Walls. Users can utilize these templates and add piles of different types including square prestressed and steel H-piles. These templates can be edited and copied as needed. New templates can be created from scratch with the **Add** button. The templates can be found in **Utilities > Libraries > Abutments**. Templates are stored in an xml file of the project folder in ... > **Structures > Bridge Templates > PierLib.xml**. If a template from one project needs to be used on another project, there are options to import and export template libraries via the xml files.



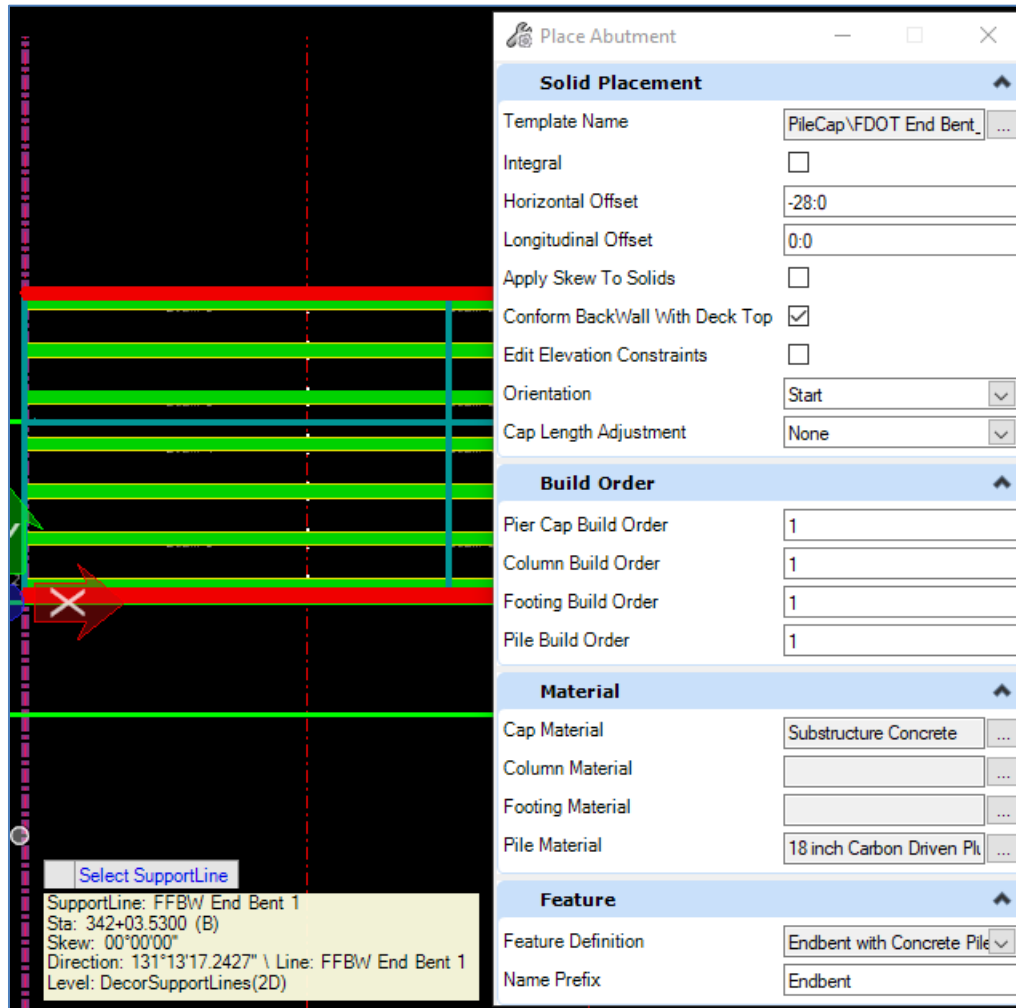


Note The *Back Wall Depth* entered can be an estimate. When the abutment is placed, there will be options to conform the backwall with the top of deck and offset the backwall vertically from the top of deck. These options override the value entered for *Back Wall Depth* from the template.

The cap is to be stepped or sloped if pedestals are greater than 15" tall per SDG 3.11.4.A. A stepped cap can be created during the bearing placement step (see Place Bearings section below). To slope a pile cap, the user will need to utilize the "Elevation Constraints" option and indicate that the top and bottom of the cap are to be sloped. Note that the only slope option is for the cap to be parallel to the deck slope, and that the slope will be constant and only in one direction (i.e., cap cannot follow a normal crown deck). This functionality will be added in future OBM updates. For now, a custom slope can be achieved with a parametric cell. Parametric cells are an advanced topic and outside the current scope of this guide. Bentley has information and instructions on how to create and use parametric cells available online.



The abutments are placed on the Supportlines in the active bridge. After selecting **Place Abutment**, the *Place Abutment* dialog box will open and the user will have the opportunity to select the desired Supportline for the abutment location and modify the placement details of the abutment. These include offsets, template selection, abutment materials, and feature definition. See the following image and field descriptions for more details.

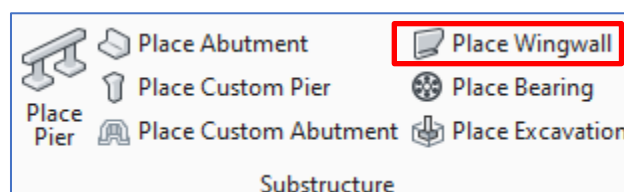


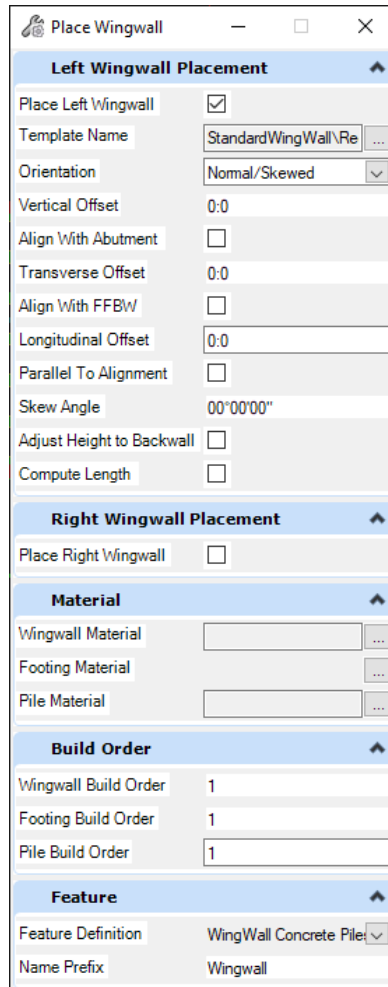
<i>Template Name:</i>	Selecting the “...” in this field will open up the template library where any previously created template will be opened.
<i>Horizontal Offset and Vertical Offset:</i>	These fields will move the abutment in plan view relative to the selected Supportline.
<i>Apply Skew to Solids:</i>	This field automatically adjusts the template solids based on the supportline skew angle.
<i>Conform BackWall with Deck Top:</i>	If this checkbox is selected, the backwall will follow the slope of the top of deck.

<i>Edit Elevation Constraints:</i>	This checkbox will open the Elevation Constraints dialog box after the substructure unit is placed to allow the user to edit these fields.
<i>Orientation:</i>	Selecting Start or End will tell the program which abutment this will be relative to the stationing of the alignment curve.
<i>Cap Length Adjustment:</i>	There are three options for this field: None , By Deck , and By Skew . These will automatically modify the cap horizontal length in the template to whatever is chosen.
<i>Material:</i>	The materials for each component of the abutment can be added by selecting the “...” next to the field. Note that this is then tied to the bridge element and is used in the Material Quantities Report (see Chapter 7).
<i>Build Order:</i>	This refers to the order of construction (if desired).
<i>Feature Definition:</i>	This field will determine the levels the model and any section view linework will use for the individual components, so the user should select the Feature Definition that applies to the desired abutment.

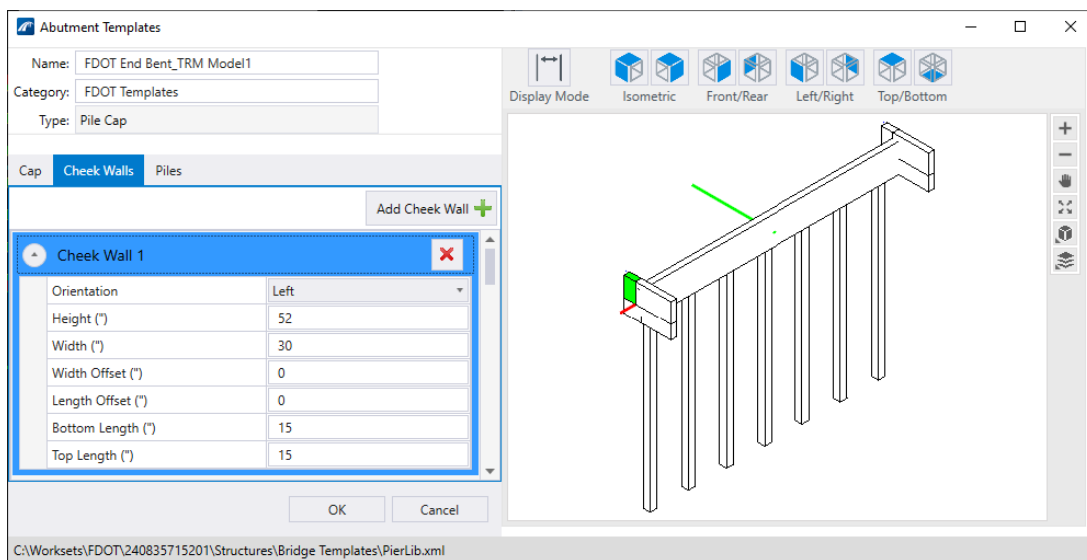
If any part of the abutment must be modified after placement, the user can access the details of the abutment by opening the abutment properties. The *Elevation Constraints* field allows the user to change the top or bottom slope of the abutment cap and to set cap elevations as a hard-entered rather than internally calculated value. The *Substructure Template* field allows the user to change the dimensions and layout of the piles, cheekwalls, cap, etc.

Users can place the wingwalls as individual elements by selecting **Home > Substructure > Place Wingwall**. The placement options for this tool can be tricky, but can generally be used along with solids modification tools to get the required geometry. Information on solids modification tools can be found in the Bentley Help Contents for Microstation. Solids generated by OBM can be modified with the standard Microstation solids modification tools found in the **Modeling** workflow. There are implications at this point in time which need to be considered when modifying OBM solids. First, any modifications to the solids will not be reflected in the OBM quantity report tool. Second, the 2D decoration levels will not be updated to reflect modifications to their parent solids. Modifying OBM solids is an advanced topic and outside the current scope of this guide.





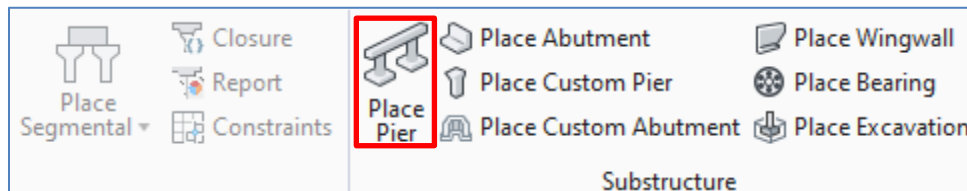
Note that Cheek Walls can be used as a “workaround” to model typical wingwalls directly with the end bent templates. This is shown in the example above and is included in several of the provided Abutment Templates. Note that there is an area of overlap between the backwall and the cheekwall when using



this workaround, and the volumes noted in the Quantities Reports will need to be adjusted as such (see Chapter 7 for more details).

PLACE PIER

Modeling piers in OBM is very similar to abutments. To add pier, navigate to **Home > Substructure > Place Pier**.

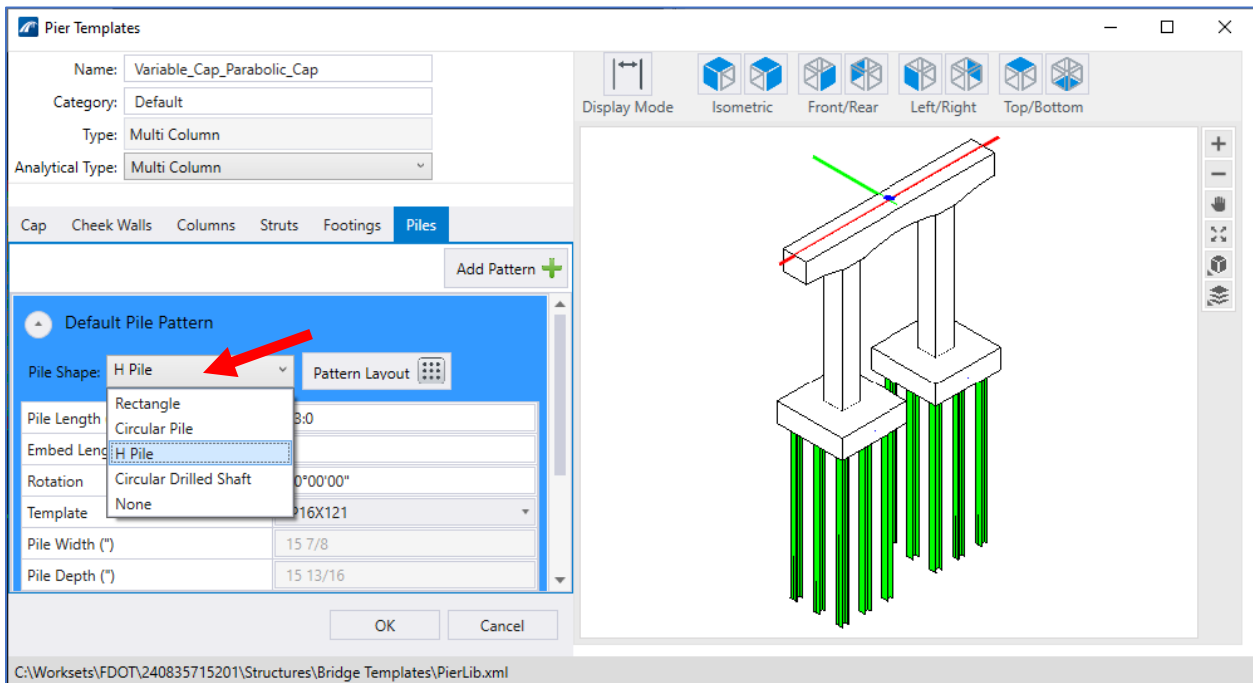
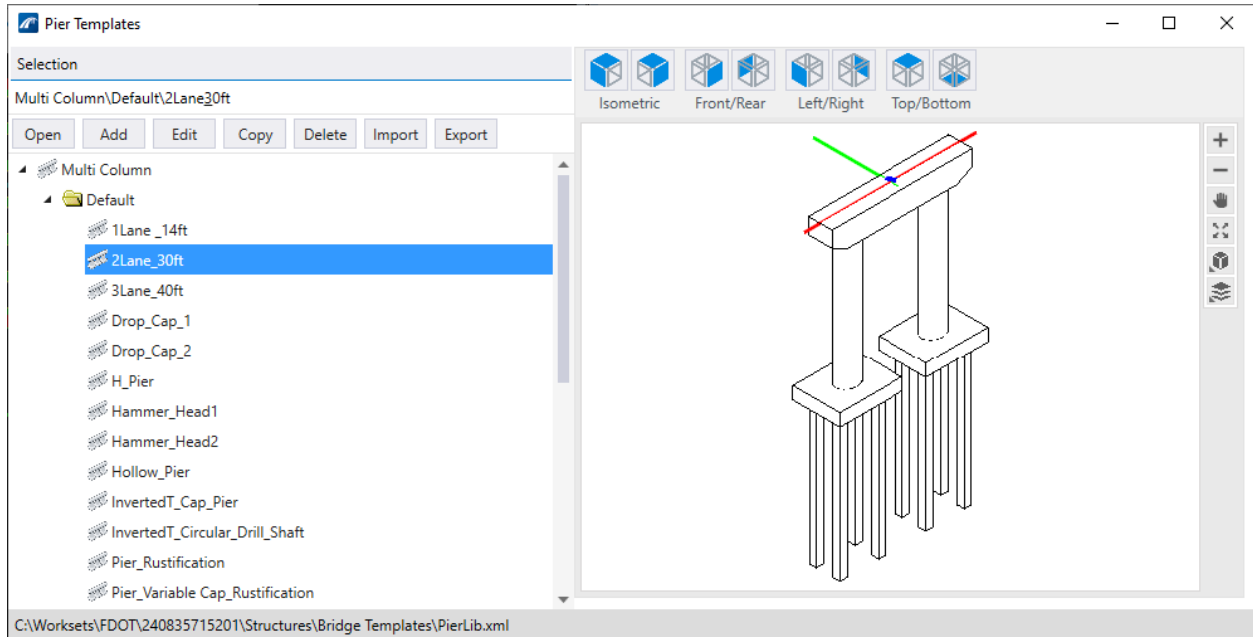


After filling in the input (see Place Abutment section for more information), simply select one or more supportlines to place the pier(s) as desired. The input is similar to the abutment input, but with less options. The Cap Length Adjustment generally will not be used for pier caps since they often do not run the full width of the deck.

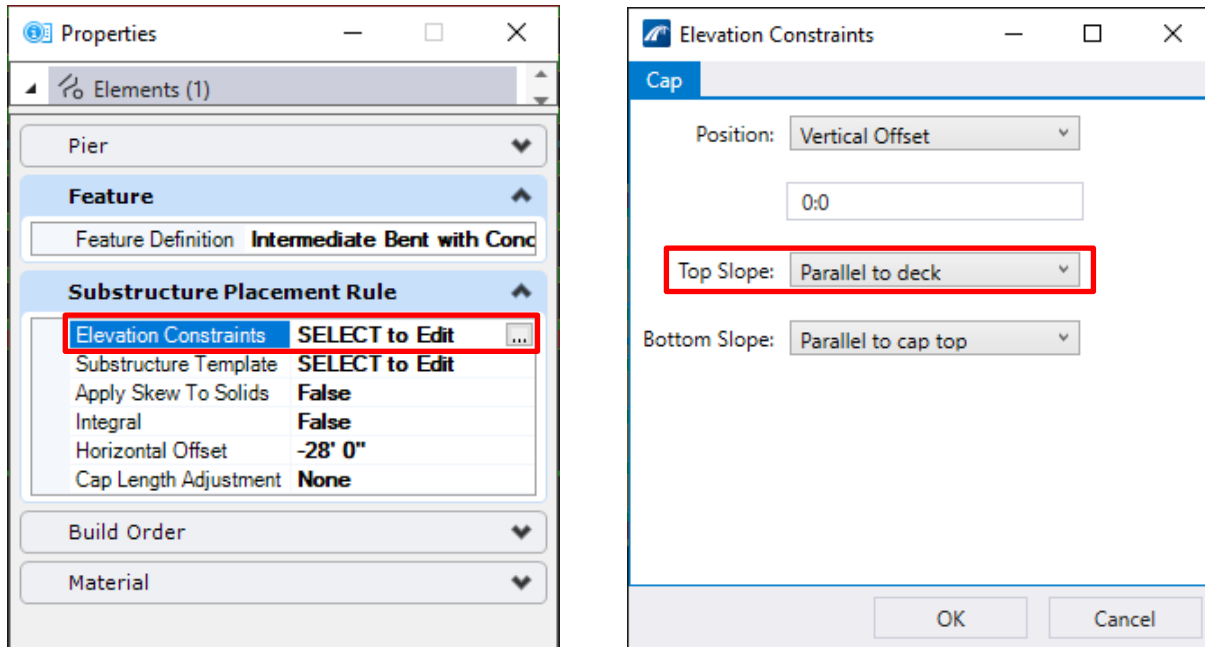
Solid Placement	
Template Name	PileBent\FDOT Pier - 3ft Deep x 3: ...
Integral	<input type="checkbox"/>
Horizontal Offset	-28:0
Cap Length Adjustment	None
Edit Elevation Constraints	<input type="checkbox"/>
Apply Skew To Solids	<input type="checkbox"/>
Material	
Cap Material	Substructure Concrete
Column Material	Substructure Concrete
Footing Material	Substructure Concrete
Pile Material	18 inch Carbon Driven Plumb
Build Order	
Pier Cap Build Order	1
Column Build Order	1
Footing Build Order	1
Pile Build Order	1
Feature	
Feature Definition	Intermediate Bent with Concrete Pile
Name Prefix	Intbent

Piers are also template-based and there are additional options for cap shape, variations and tapers, and column shape which allows for more pier types to be accommodated. A higher level of development can be accomplished with a Custom Pier or parametric cell. Parametric cells are an advanced topic and outside the current scope of this guide. Bentley has information and instructions on how to create and use parametric cells available online.

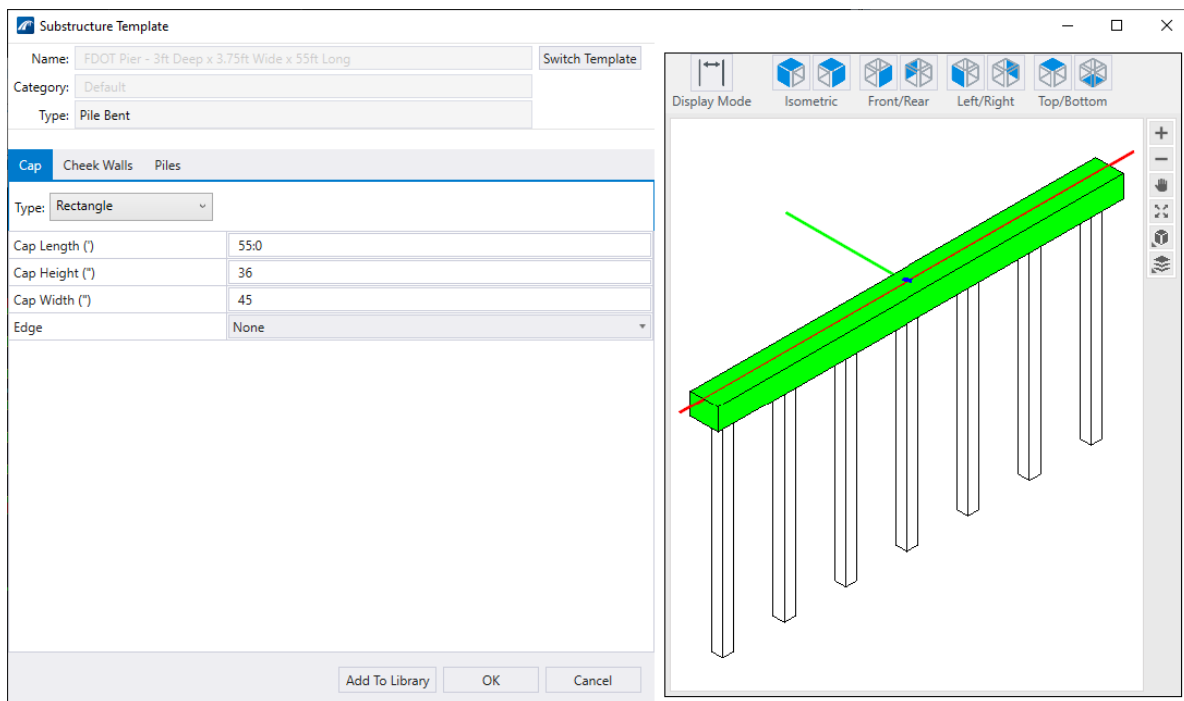
OBM provides templates for two categories of piers: Pile Bents and Multi Columns. Users can utilize these templates and add piles of different types including square prestressed and steel H-piles. These templates can be found in **Utilities > Library > Piers**. Templates are stored in an xml file of the project folder in ... > **Structures > Bridge Templates > PierLib.xml**. If a template from one project needs to be used on another project, there are options to import and export template libraries via the xml files. These template can be edited and copied as needed. New templates can be created from scratch with the **Add** button.

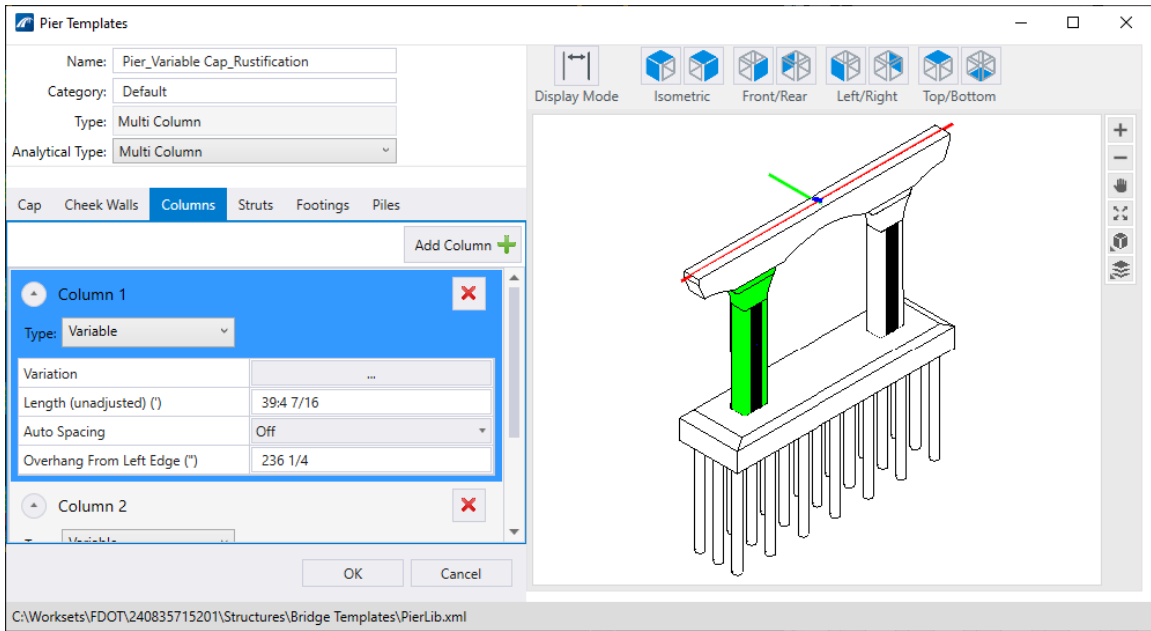
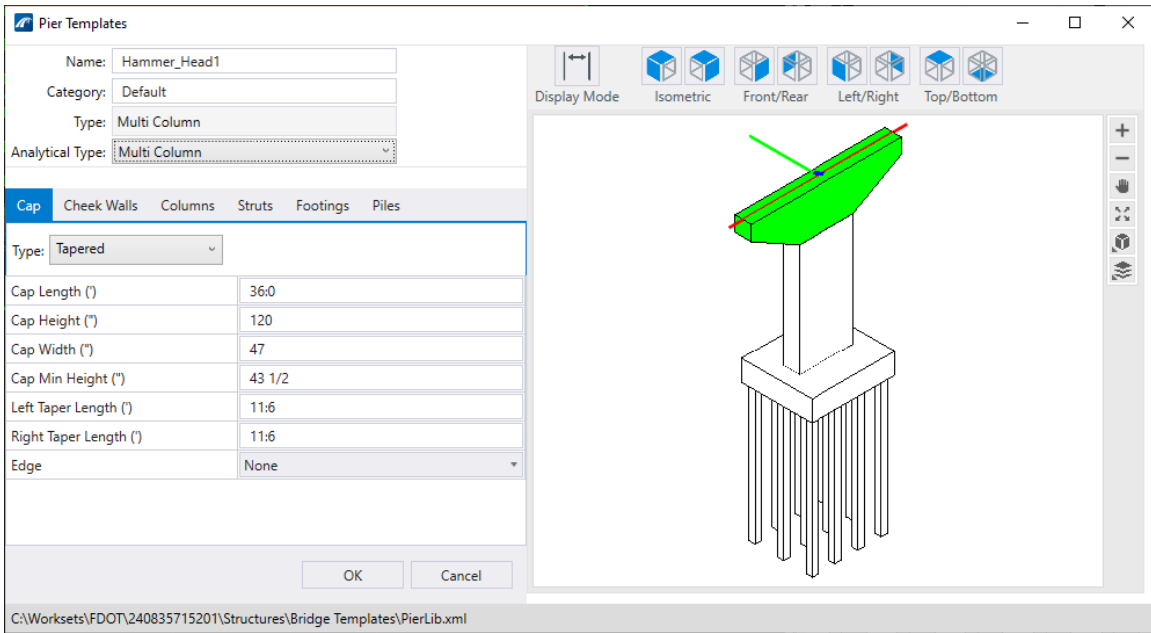


As with abutment pile caps, the pier caps are to be stepped or sloped if pedestals are greater than 15” tall per SDG 3.11.4.A. The cap can be stepped by selecting this option in the bearing dialog box (See Place Bearings section below). To slope a pier cap, the user will need to utilize the “Elevation Constraints” option and indicate that the top and bottom of the cap are to be sloped. Note that, similar to abutments, the only slope option is for the cap to be parallel to the deck slope, and that the slope will be constant and only in one direction (i.e., cap cannot follow a normal crown deck). This functionality will be added in future OBM updates. For now, a custom slope can be achieved with a parametric cell.



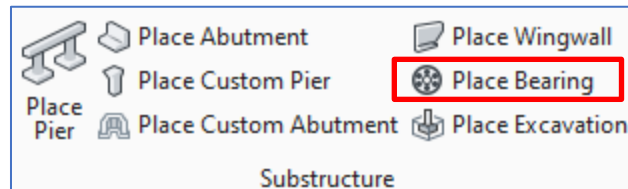
Note that different variables will be available to edit based on the *Type* of pier, cap, column, footing, and piles that are selected.





PLACE BEARING

Bearing elements and bearing assemblies are modeled after both beams and substructure units are added. The bearings are inserted underneath the beams and will offset the substructure downwards. The user will have options to create Bearing Seats, create Grout Pads/Bevel Plates, model stepped caps, change the bearing materials, etc. To add a bearing, navigate to and select **Home > Substructure > Place Bearing**.



The following dialog box will open, along with many placement options. Note that these dimensions are in reference to the centerline of bearing as defined by the selected Supportlines. If the substructure location has been offset from their respective Supportlines, the bearings must be offset to match.

Place Bearing ...	
Bearing	
Bearing Type	Cube
Cube Width, W	1:2
Cube Depth, D	0:10
Cube Height	0:2 9/16
Orientation	Girder
Grout Pad/Bevel Plate	
Has Pad or Plate	<input type="checkbox"/>
Bearing Seat	
Has Bearing Seats	<input type="checkbox"/>
Path	
Back Offset	-0:11 1/2
Ahead Offset	0:11 1/2
Material	
Pad or Plate Material	...
Bearing Material	Neoprene Bearing I
Bearing Seat Material	...
Build Order	
Pad or Plate Build Order	1
Bearing Build Order	1
Beam Seat Build Order	1
Feature	
Feature Definition	Neoprene Composite
Name Prefix	Bearing

Bearing modeling is from centerline of bearing. D is measured in the longitudinal direction and W in the transverse direction. Bearing type defines the shape of the bearing, including cells.

Checking these boxes can add additional components to the bearings. See the description in the following paragraph.

These *Path* options describe the offsets relative to the selected Supportline.

The materials are first defined by the Feature Definition field, but can be adjusted afterward by selecting the "..."

The *Build Order* can be used to model construction sequencing, which is used in other Bentley software such as RM Bridge and Synchro.

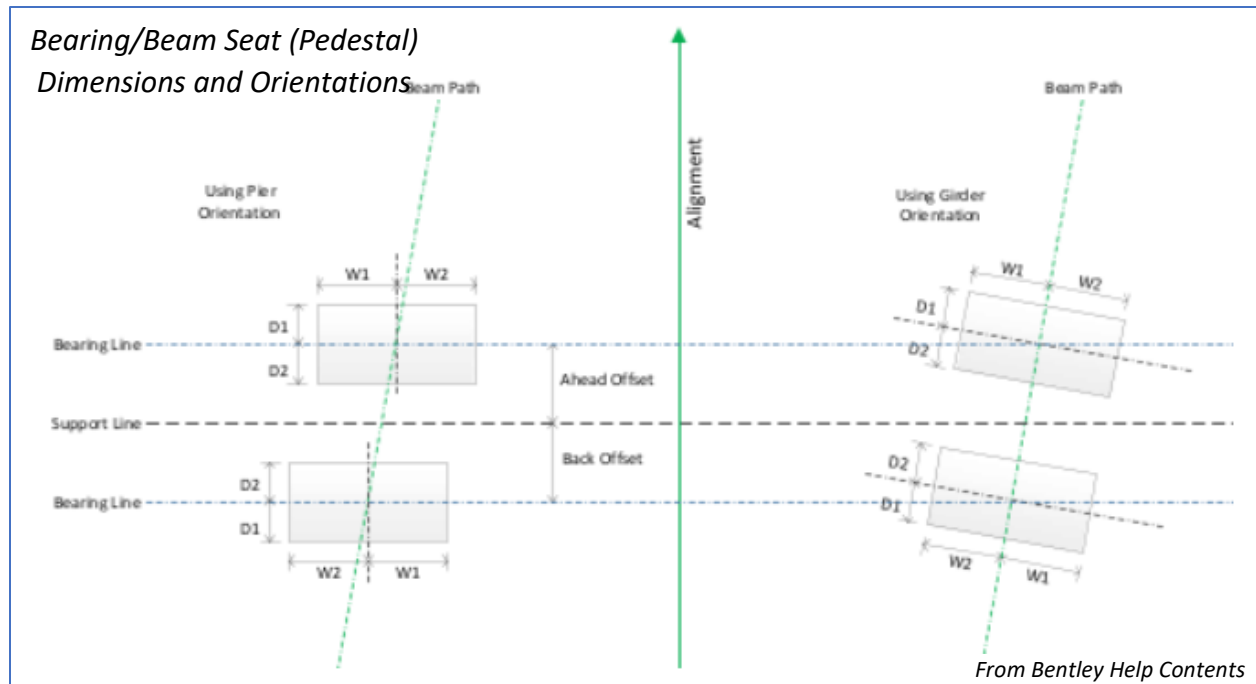
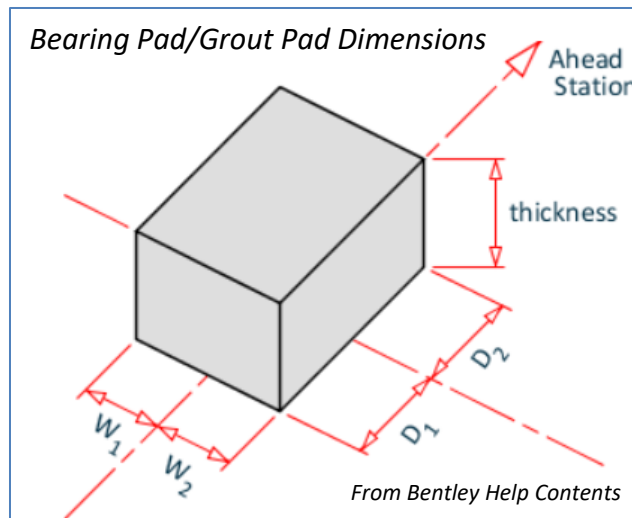
The Feature Definition can be changed if desired. It will determine the attributes and how the component looks in the model.

Note Bearing seats (or beam seats or pedestals) can be added in this step. However, sloped beam seats are not possible with the standard options. Users will need to develop parametric cells or use solids editing tools if this level of detail is desired in the model.

Checking the box next to *Has Pad or Plate* or *Has Bearing Seat* will extend that portion of the dialog box with additional options for that component. The example below shows the fields that display once *Has Pad or Plate* or *Has Bearing Seats* is selected. See figures for graphical representations of variables used.

Grout Pad/Bevel Plate	
Has Pad or Plate	<input checked="" type="checkbox"/>
Pad Thickness at Center	0:5 7/8
Pad D1	0:2 15/16
Pad D2	0:2 15/16
Pad W1	0:3 15/16
Pad W2	0:3 15/16
Pad Orientation	Girder

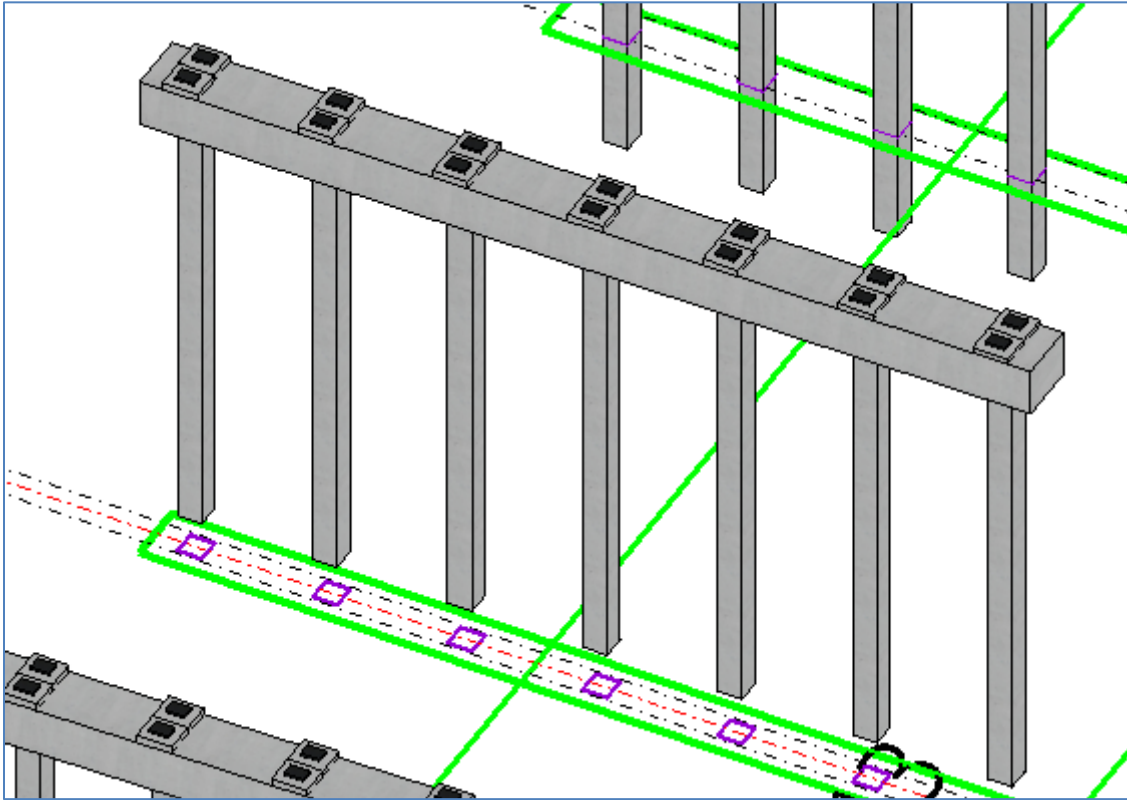
Bearing Seat	
Has Bearing Seats	<input checked="" type="checkbox"/>
Model Stepped Cap	<input type="checkbox"/>
Seat Min. Thickness	0:4
Seat D1	0:11
Seat D2	0:11 1/2
Seat W1	1:1
Seat W2	1:1
Seat Orientation	Pier



The D dimensions determine the longitudinal distances of the Pad or Plate along the length of the bridge. D1 is the distance ahead of the Supportline, and D2 is distance behind the Supportline.

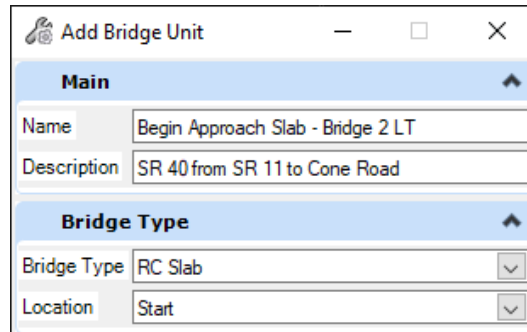
The W dimensions determine the transverse dimensions of the Pad or Plate across the width of the support. W1 is the Pad or Plate dimension left of the centerline of the girder (looking upstation). W2 is the dimension to the right of the centerline of the girder (looking upstation).

To place the bearings, select the desired Substructure Supportlines and right click to end the selection. Left click again to place the bearings.



APPROACH SLABS

As described in the Add Bridge section above, approach slabs can be modeled as: a separate deck in an existing unit, a separate unit, or a separate bridge as there is no tool to add approach slabs to beam-slab bridges currently in OBM, but will be in an upcoming release. If modeling as an additional unit or bridge, the approach slabs should be added as Reinforced Concrete (RC) slab bridges using the **Add Unit** or **Add Bridge** tools. If modeling within an existing unit, simply add additional supportlines and model the deck only.



The approach is very similar to adding a deck slab discussed in previous sections. Placing barriers and adding superelevation also follows a similar workflow.

When the top of slab elevation varies across the length of the approach slab, such as those with an asphalt overlay, a vertical offset from the alignment can be used in conjunction with multiple deck segments/station offsets to accommodate the stepped approach slab elevations. In cases where the bottom of slab varies, such as those with an increased depth at the backwall, variable constraints can be applied for deck thickness, see below.

Variable Constraints

Variable	Active	Default	Errors
LT_Slope_	<input checked="" type="checkbox"/>	0.0200000000000000	
LT_Width_	<input checked="" type="checkbox"/>	-20.0	
Rotation E	<input type="checkbox"/>	00°00'00"	
Rotation E	<input type="checkbox"/>	0.0000000000000000	
RT_Slope_	<input checked="" type="checkbox"/>	-0.0200000000000000	
RT_Width_	<input checked="" type="checkbox"/>	20.0	
Thickness	<input checked="" type="checkbox"/>	-0.9 13/16	

Location Type	Relative Location	From	Start Distance	End Distance	Interval Length	Start Value	End Value	Transition
SupportLine	0:0	SupportLine1	341+73.5300	341+74.5300	1:0	-1:1 1/2	-1:1 1/2	Linear
SupportLine	1:0	SupportLine1	341+74.5300	341+75.5300	1:0	-1:1 1/2	-1:0	Linear
SupportLine	2:0	SupportLine1	341+75.5300	342+03.5300	28:0	-1:0	-1:0	Linear

EXERCISE OVERVIEW

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Note Materials shown in the following bridge modeling exercises are based on a previous material library. For training purposes, users can select materials that are available in their current material library. In practice, users will need to select the materials with the appropriate pay item numbers.

Exercise 5.1 Model a Bridge Deck & Barriers, and Add Superelevation

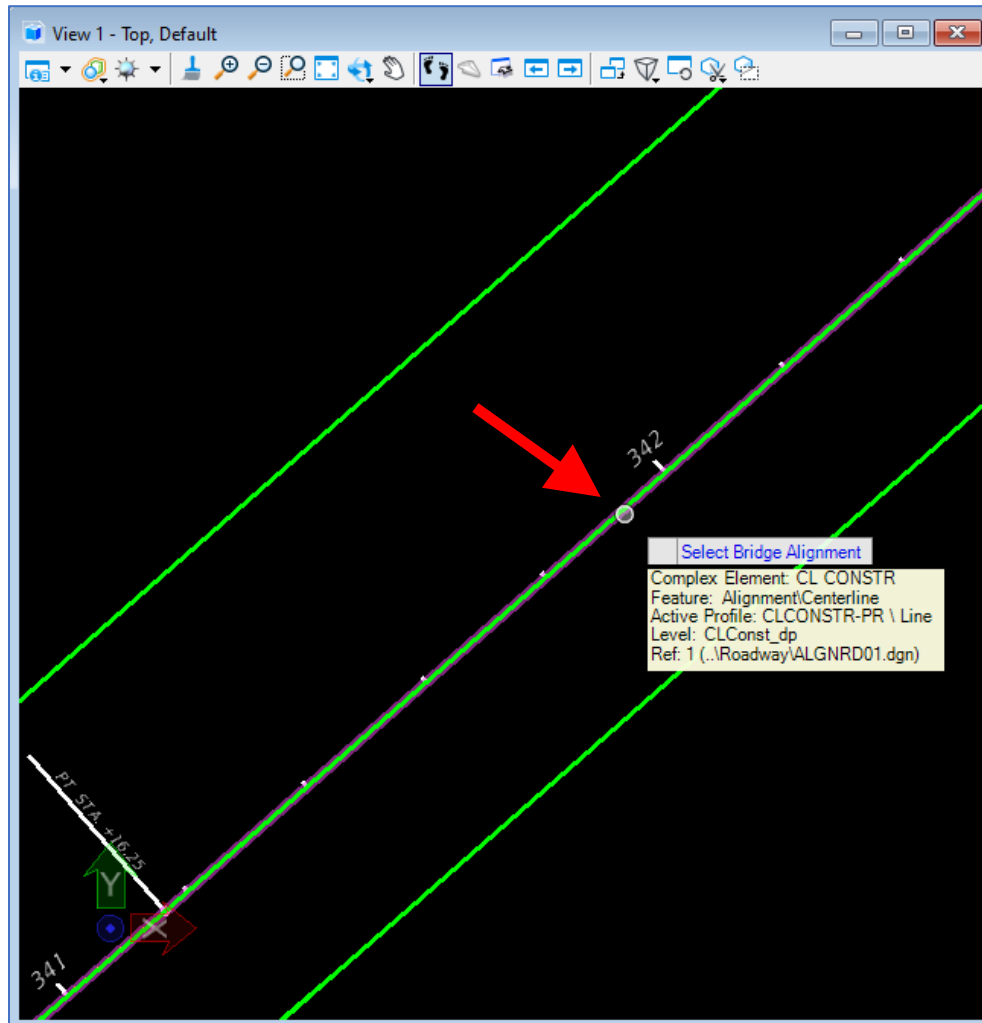
➤ **Create a Bridge and Add a Bridge Deck:**

1. Open the data set file: **B01MODLBRTR01_5.1_Begin**

Create Bridge by selecting **Home > Bridge Setup > Add Bridge**. Use the input parameters noted below for the dialog box. The Bridge 2 LT will be created as a result. Note that the Beam Slab (P/S or RC Concrete Girders) bridge type is selected here.

Main	
Description	SR 40 from SR 11 to Cone Road
Requires Road Alignment	<input type="checkbox"/>
Use Road Alignment For Stationing	<input type="checkbox"/>
Unit	
Name	Bridge 2 LT
Description	
Bridge Type	Beam Slab (P/S or RC Concrete Girders)
Feature	
Feature Definition	Bridge Decorations
Name Prefix	Bridge

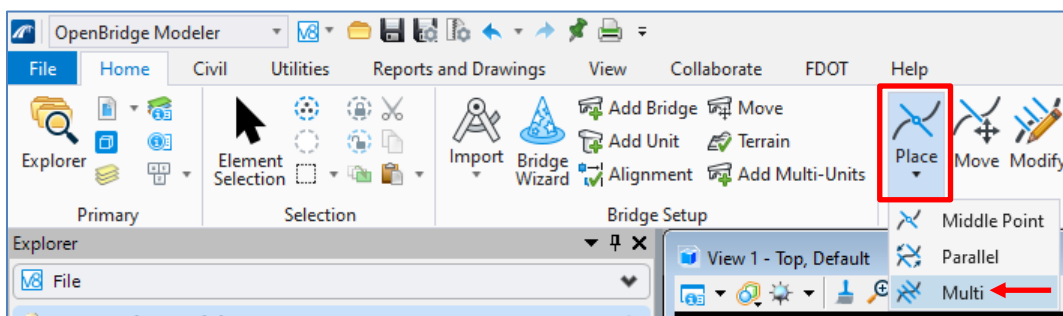
Select the “CL CONSTR” alignment indicated below. Note that the reference to the superelevation models can be turned off to better view the alignments.



Left click to accept the selection.

Note Which alignment and corresponding profile are selected to use with the bridge model will depend on how Roadway sets up the alignment/profile. In this example, the CL Construction is the control line for dual bridges, but often there will be one alignment/profile for each bridge.

2. Create the Supportlines by going to **Home > Supportline > Place (Multi)**.

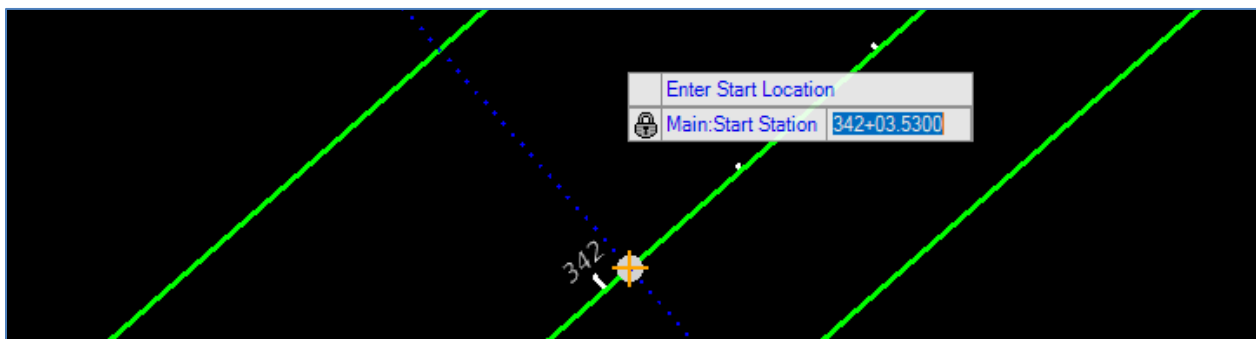


Input the parameters shown below in the dialog box.

Main	
<input checked="" type="checkbox"/> Skew Angle	00°00'00"
<input checked="" type="checkbox"/> Length	200:0
<input type="checkbox"/> Span Length	0:0
<input checked="" type="checkbox"/> Start Station	342+03.5300
<input checked="" type="checkbox"/> End Station	343+53.5300
SupportLines Number	
Number of SupportLines	4
Direction Mode	
Direction Mode	Skew
Feature	
Feature Definition	SupportLine
Name Prefix	SupportLine

Note The length of the supportline is important because the width of the deck cannot go outside the limits of the supportline. The supportline will by default always be centered on the alignment. If used for plans production, the supportlines can be modified in the Properties after placement or trimmed using Microstation tools as needed in the bridge model.

After this information is entered the user can data point (left click) in open space to “Enter Start Location.”

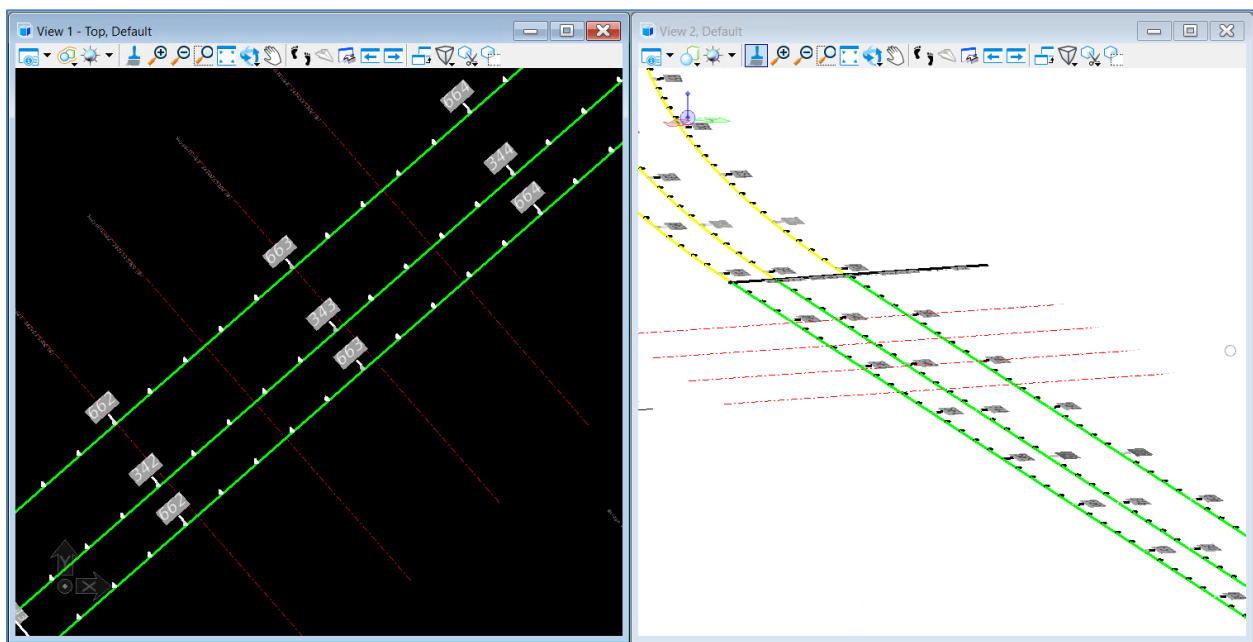


Data point again to “Enter Skew.” Data point again to “Enter End Location”

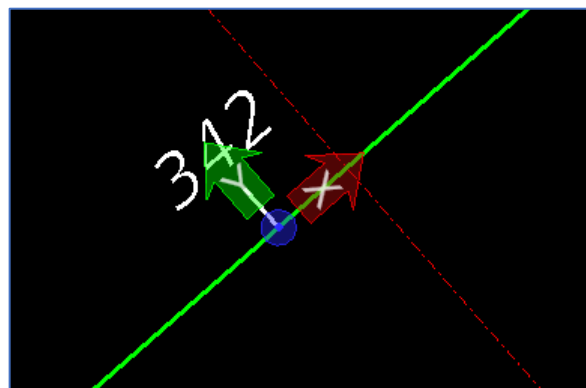
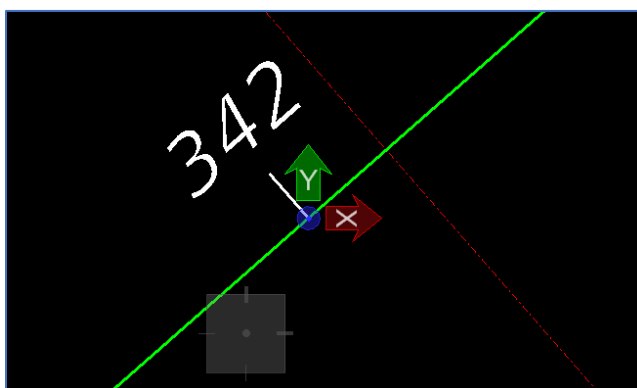
The box in the following figure will open, where the user can modify each characteristic of these Supportlines. For this exercise make sure that all the values match those shown in the figure. Replace the default "Supportline#" name to match the FDOT nomenclature for substructure numbering. This will make it easier to identify the supportlines and match them with the substructure locations.

#	Name	Station	Angle	Span Length	Length
1	FFBW End Bent 1	342+03.5300	00°00'00"	0:0	200:0
2	CL Intermediate Bent 2	342+53.5300	00°00'00"	50:0	200:0
3	CL Intermediate Bent 3	343+03.5300	00°00'00"	50:0	200:0
4	FFBW End Bent 4	343+53.5300	00°00'00"	50:0	200:0

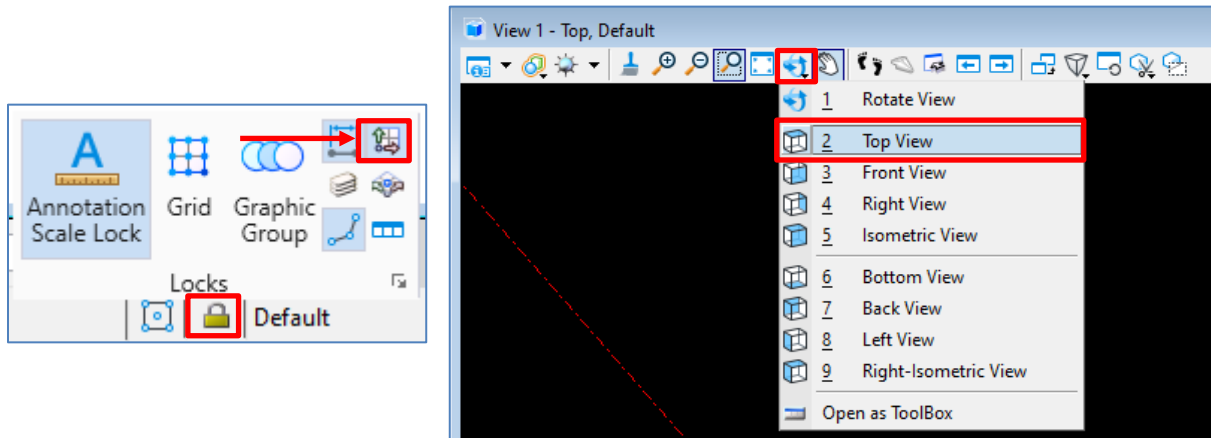
The Supportlines should show as seen below. The **Place Multi SupportLines** tool will automatically allow the user to start the placement of another set of supportlines, but the user can end the placement by right clicking in the view window or by selecting another tool.



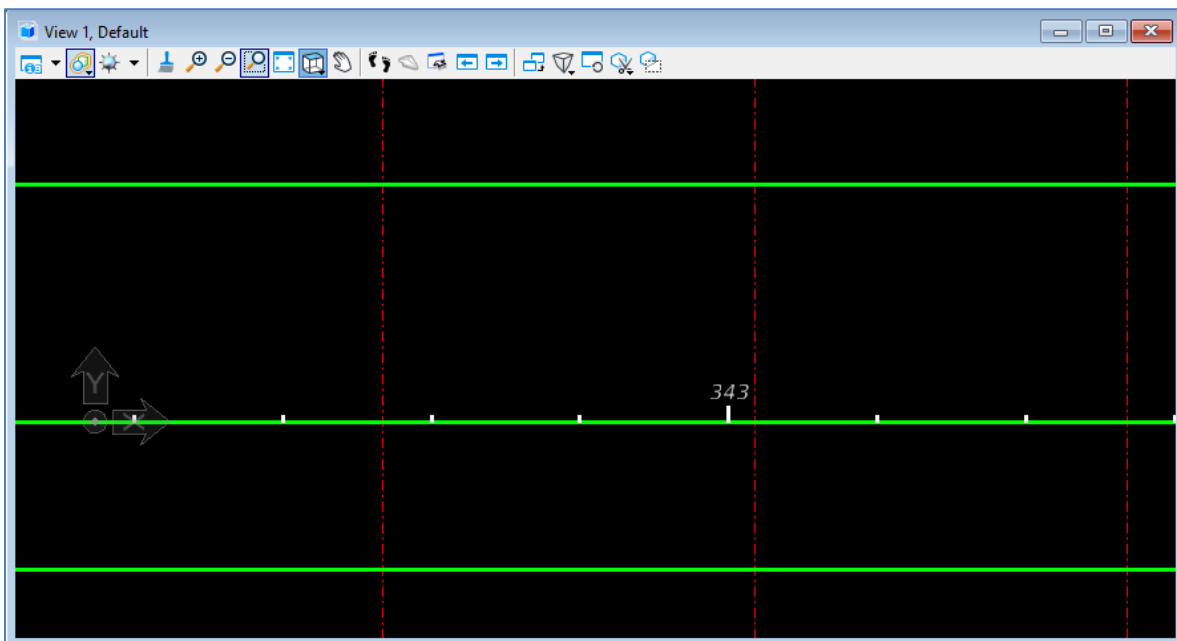
3. Rotate the orientation of View 1 to be parallel with the screen. First set the ACS: **Utilities (tab) > ACS > Define ACS by Points** <OR> **[type] R + [type] A**, then place the ACS at the intersection of the STA. 342 tick mark and the alignment line. Select a point on the alignment to define the x-axis. Then select a point on the tick mark line to define the y-axis.



Once the ACS is defined, click the Locks on the bottom bar and select ACS Plane Lock. Once the ACS Plane Lock is enabled, on the View toolbar, select **View Rotate > Top View**. <OR> **[Hold Shift] + [Right Click] + [type] T**.



View 1 of the alignment should now be parallel with the screen.

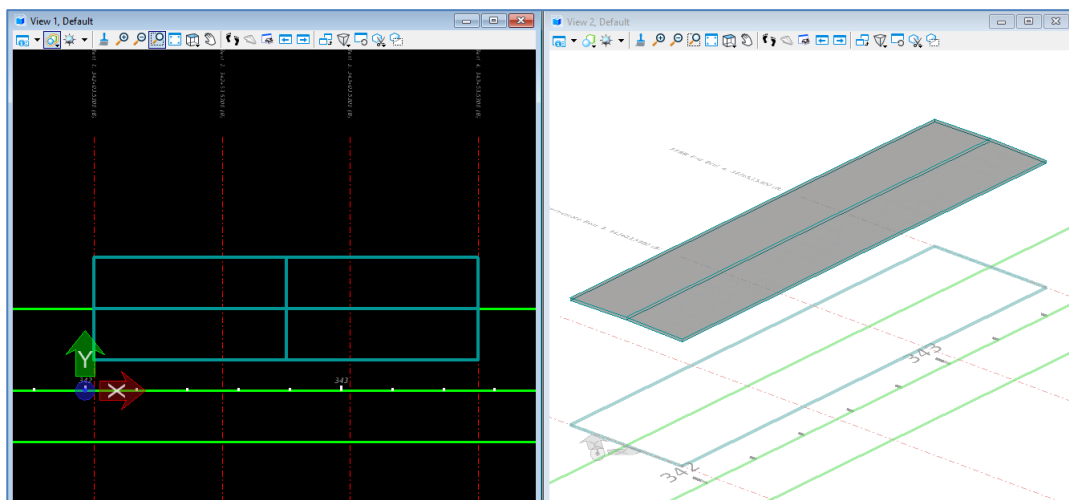


4. Create the deck by selecting: **Home > Superstructure > Place Deck**. Select the “Slab w/ constraints” deck template and use the additional parameters shown below. Note that the *Max Dist Between Sections* was changed from the default value to **1:0**. Ensure **Concrete Deck** is selected as the Feature Definition. Set the Deck Material to **Deck Concrete, Class II**. Deselect the *Add Constraints* box.

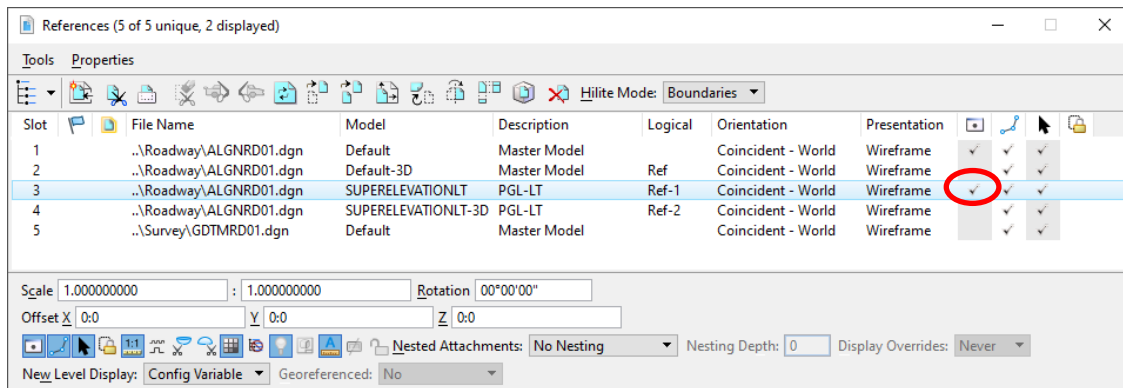
Place Deck	
Deck	
Template Name	Slab w/ constrain ...
Start Station Offset	0:0
End Station Offset	0:0
Horizontal Offset	-32:0
Vertical Offset	0:0
Add Constraints	<input type="checkbox"/>
Chord Tolerance	0.1000000000000000
Max Dist Between Sections	1:0
Analytical Deck	<input type="checkbox"/>
Material	
Deck Material	Deck Concrete, C ...
Build Order	
Build Order	1
Feature	
Feature Definition	Concrete Deck ▾
Name Prefix	Deck

Note An alternative method to selecting a default deck template and modifying the constraints would be to build a deck template in the library ahead of time. This would be helpful if the same deck template will be used on multiple spans on the same bridge or multiple bridges. See Exercise 5.5 for how to create and modify a deck template.

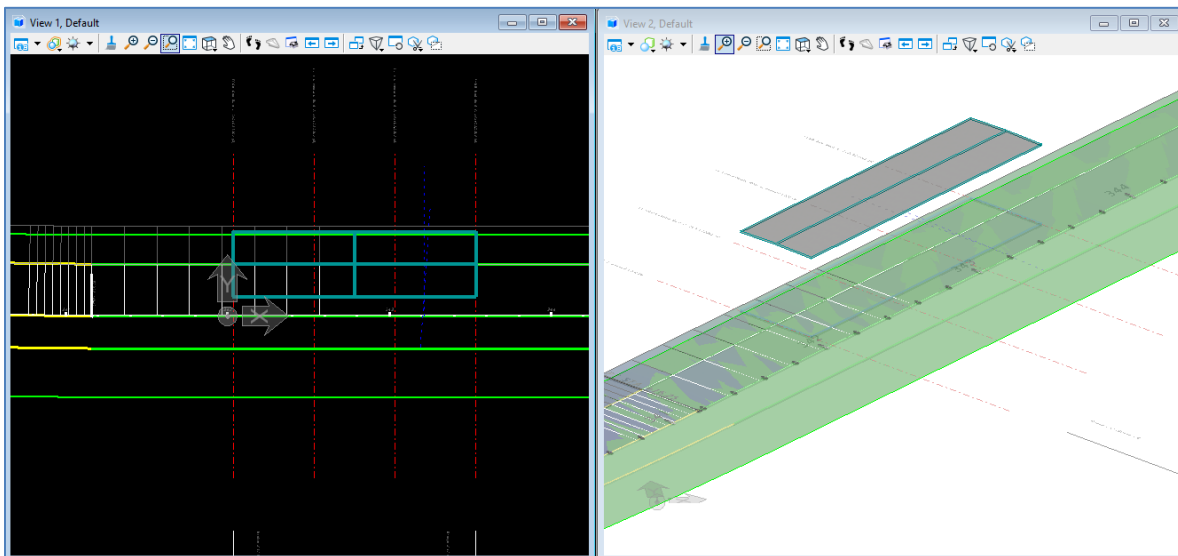
Select “FFBW End Bent 1” as the slab beginning, and “FFBW End Bent 4” as the slab end. Left click to accept. The deck will be created as seen below. The deck will be modified to fit the proper dimensions in the following steps.



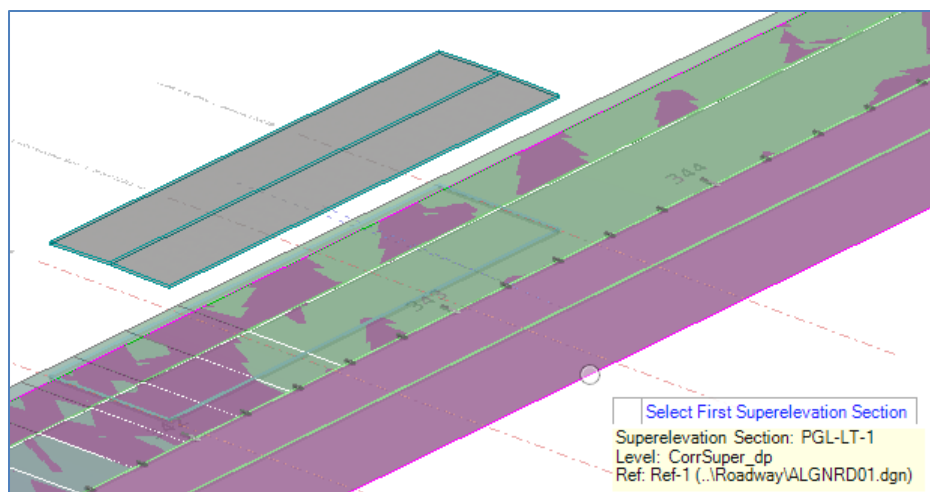
- Begin the Assign Superelevation process by turning on the Superelevation reference in **References**. See below.



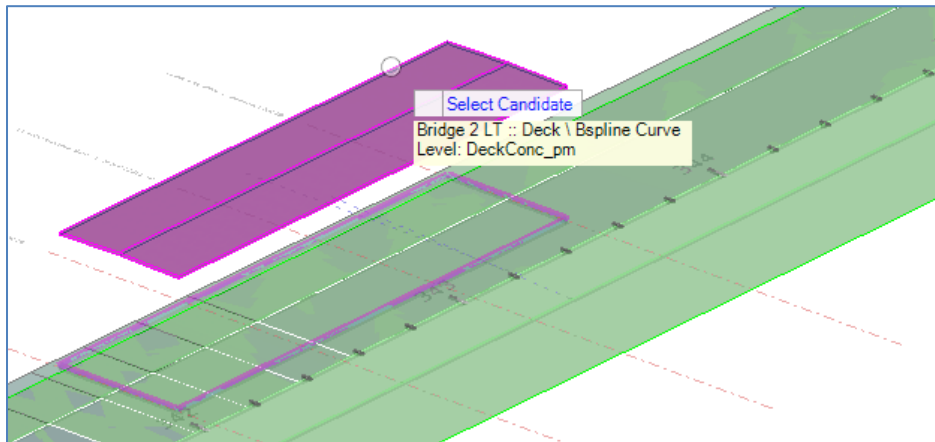
The Superelevation will be displayed in the model view.



- Navigate to and select **Home > Superstructure > Assign Superelevation**.
- Select **PGL-LT-1** as the *First Superelevation Section* and right click to end the selection.



8. Select the Deck created in the previous step as the *Candidate*.



9. The *Superelevation Assignment* dialog box will open. The *Template Point* and *Pivot Point* need to be changed to match the screenshot below. To do this:
 - a. Change the *Template Point* in the second row to **P_5**.
 - b. Change the *Pivot Point* to **P_0**.
 - c. Change the *Template Point* back to **P_1**.

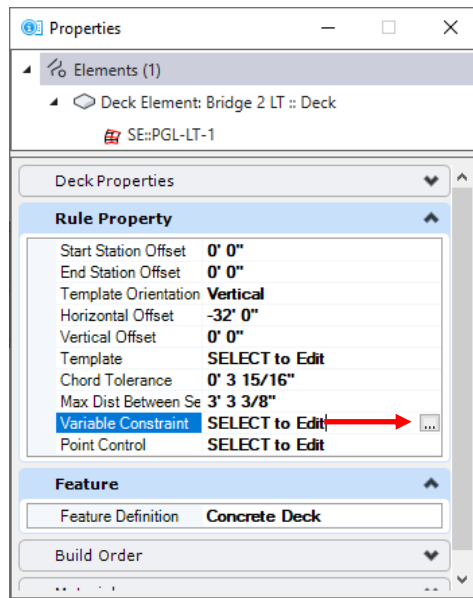
For more information about this step, see the Assign Superelevation section.

Superelevation Assignment										
	Lanes	Lane Detail	Offset	Pivot Point	Start Station	End Station	Start Slope	End Slope	Station & Slope Detail	Template Point
▶	LeftOuter	Station ...	-55:6 1/2	P_0	342+03.53...	343+53.53...	0.04424510...	0.02000...	Station ...	P_5
	LeftInner	Station ...	-32:0	P_0	342+03.53...	343+53.53...	0.04424510...	0.02000...	Station ...	P_1

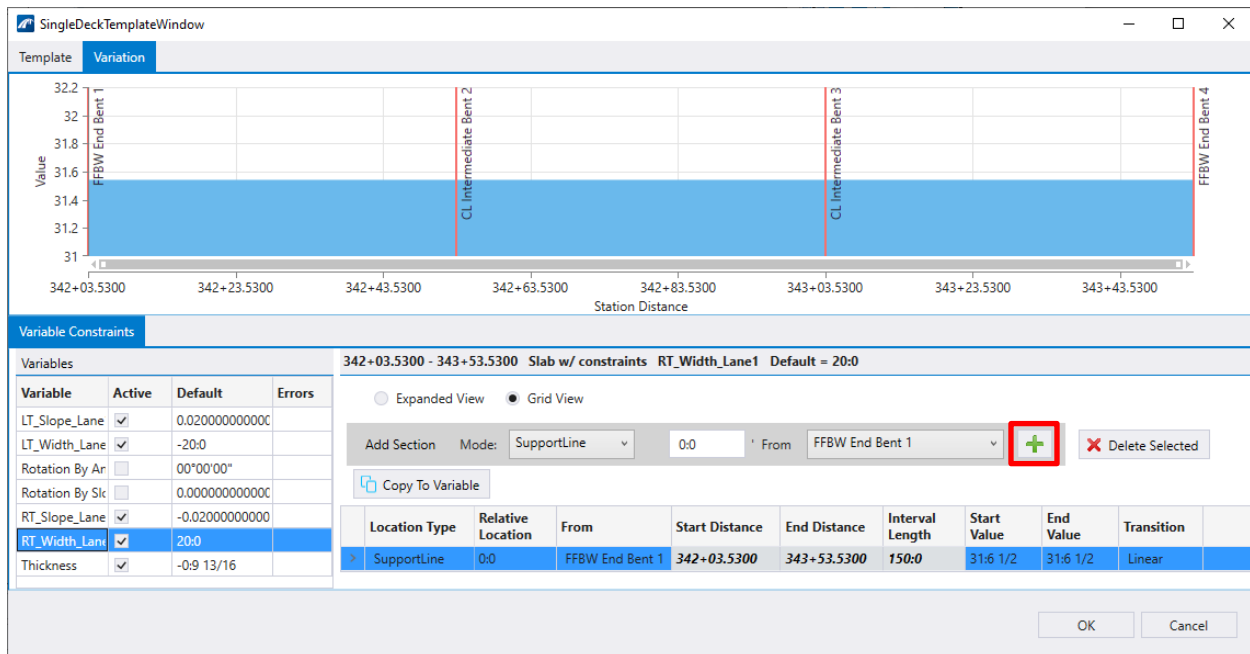
OK Cancel

10. Select **OK** to assign the Superelevation. If a Warning box shows up with a warning about the superelevation point x value simply click **Yes** to close it.

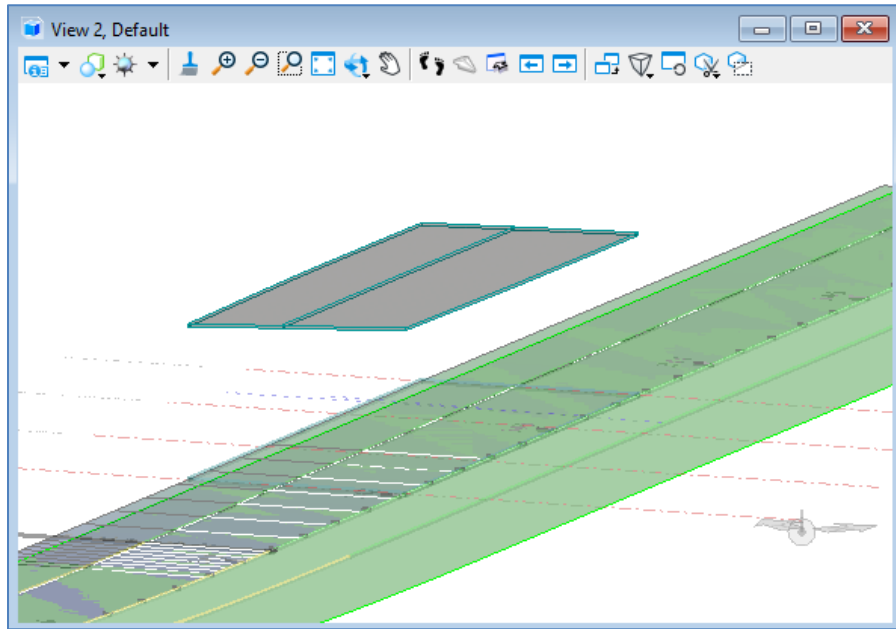
- The variable constraints of the deck can now be modified. Select the deck and open the properties window. Open the variable constraints by selecting the “...” next to the *Variable Constraints* field.



- In the variable constraints window, assign the **RT_Width_Lane 1** a value of 31:6.5, **Thickness** of -0:8.5, and **LT_Width_Lane 1** a value of -23:6.5. See the Place Deck section for more information about the variable constraints window. With the Variable selected from the list on the left, click the green + to modify the default value. If there were a transition in the values along the bridge, you could add multiple sections.

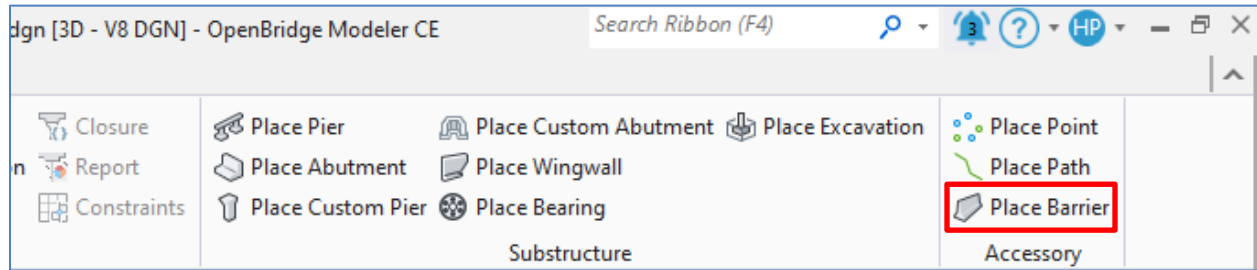


13. The result of this exercise is the following bridge deck. The Superelevation Reference file is still turned on in the following figure, but it can be turned off to simplify the viewing window.

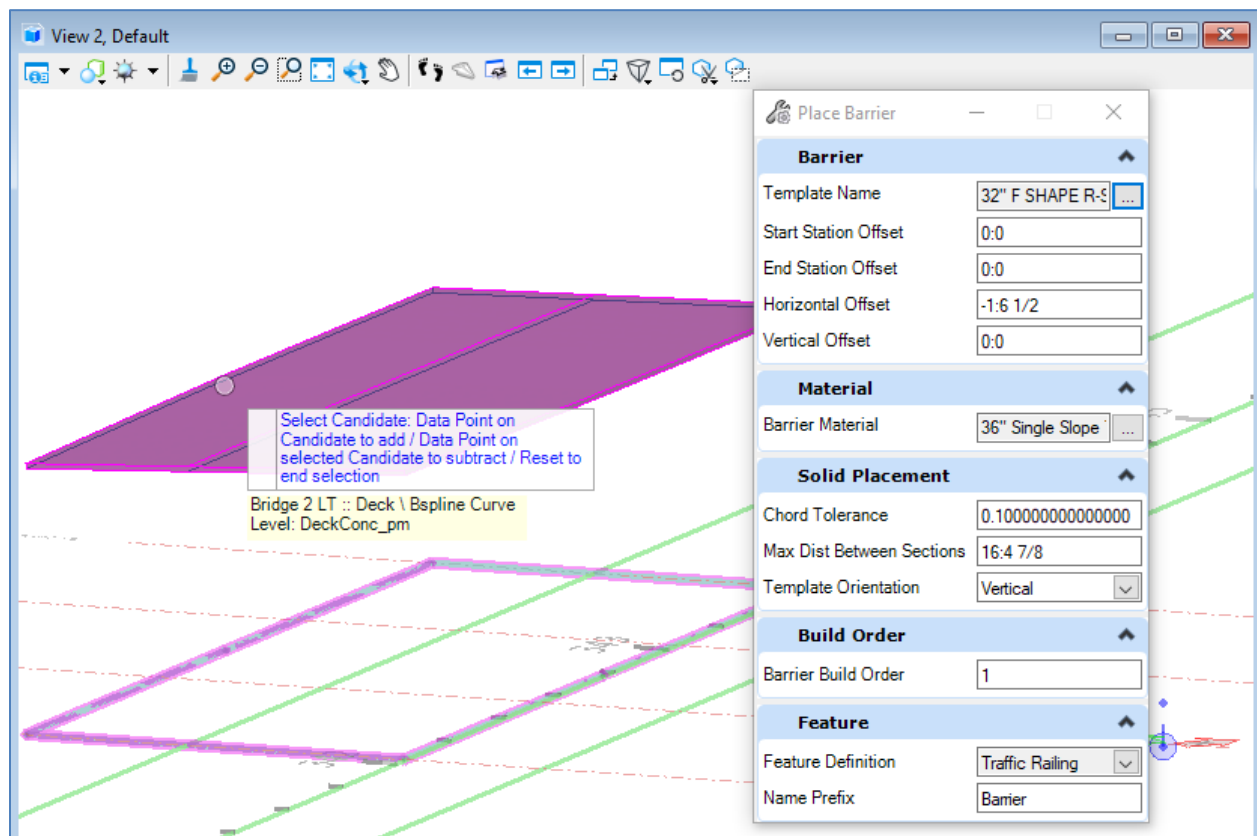


➤ Create Barriers:

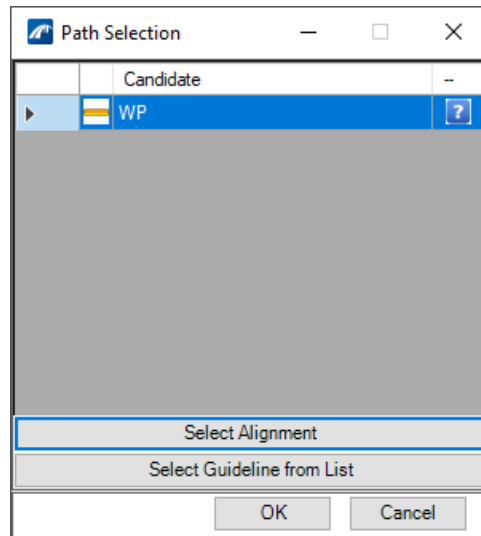
1. Create the bridge barriers by navigating to **Home > Accessory > Place Barrier**



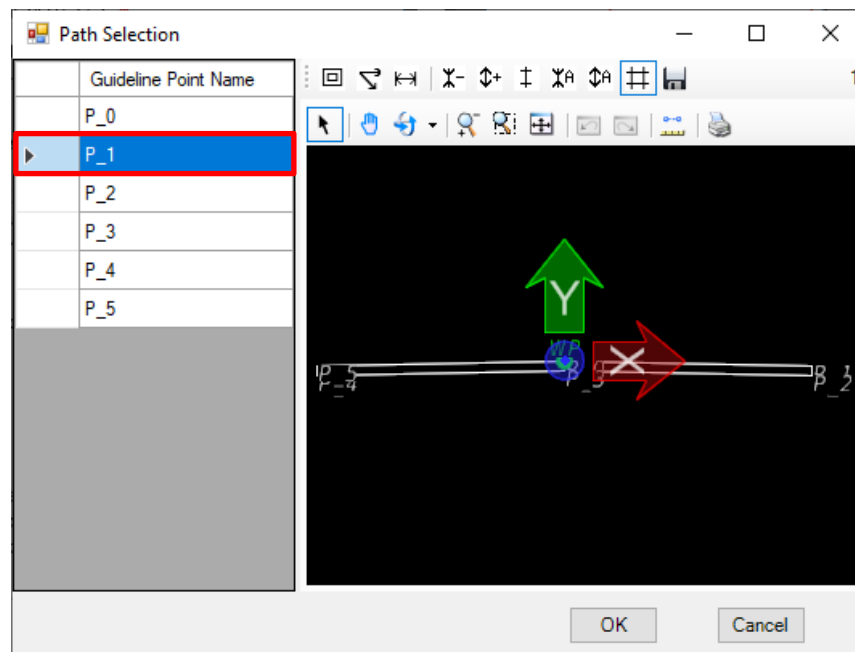
2. Next select the deck that was just created as the “Candidate” and fill out the **Place Barrier** dialog box as shown in the figure below. For **Template Name** Select the “32” F SHAPE R-SE” template under the FDOT Legacy folder. Note that the WP for this barrier is at the gutterline, which is why there is an offset value. There is no legacy barrier option for Barrier Material, so the “36” Single Slope Traffic Railing” was chosen as the material for this exercise, which is in the Miscellaneous section.



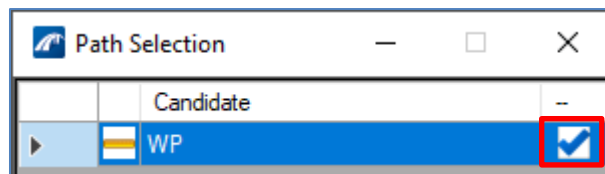
3. End the candidate selection by right-clicking and then left-clicking in open space. This will open the Path Selection window.



4. Click on **Select Guideline from List** to open the selection window
5. Select **P_1** from the list and hit "OK".

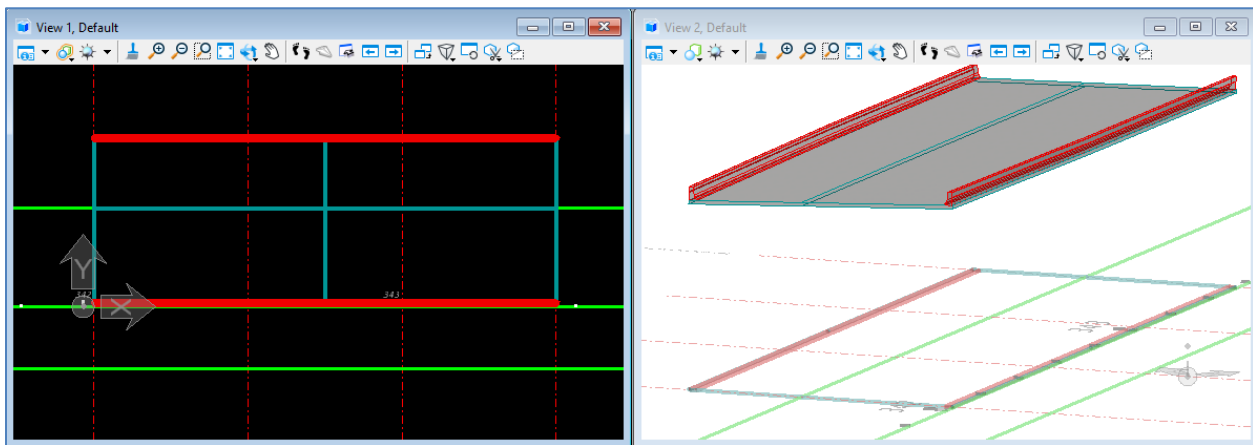


6. Verify that the blue check mark is showing and hit "OK".



7. The barrier will be displayed on top of the deck.

8. Repeat Step 1 – Step 7 to place the Left Barrier. In Step 2 change the selected template to “32” F SHAPE L-SE” and change the horizontal offset to **1:6.5**. In Step 5 select **P_5** as the **Guideline Point**.



Exercise 5.2 Create a Beam Layout and Model Beams

➤ **Create a Beam Layout:**

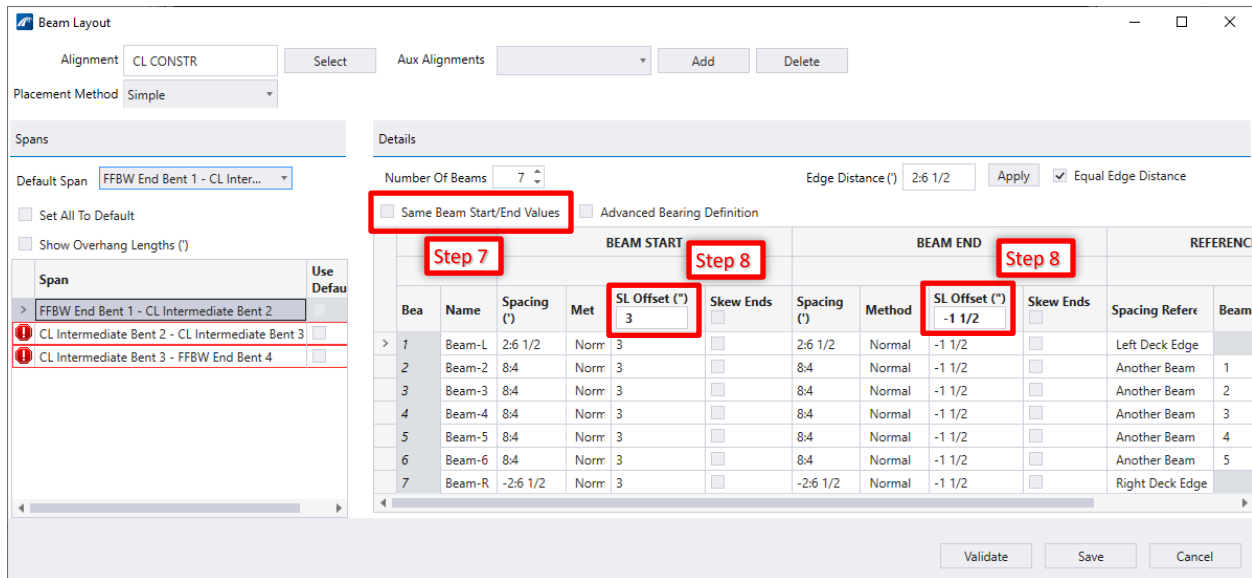
1. Open the data set file: **B01MODLBRTR01_5.2_Begin**
2. Create Beam Layout by navigating to and selecting **Home > Superstructure > Beam Layout**.
3. Select “FFBW End Bent 1” and “FFBW End Bent 4” as the **Start Limit Line** and **End Limit Line** respectively.



4. Data Point to **Accept** the Limit Lines and open the *Beam Layout* window.
5. In the *Beam Layout* window change the *Number of Beams* to **7**.
6. Notice that there are errors shown in the table of beams. In the *Edge Distance* field enter **2:6.5**, make sure that the *Equal Edge Distance* box is checked, and click **Apply**. Note that the Beam-L and Beam-R now have a Spacing of **2:6 ½** and **-2:6 ½** respectively.

		BEAM START				BEAM END				REFERENC	
Bea	Name	Spacing (')	Met	SL Offset (")	Skew Ends	Spacing (')	Method	SL Offset (")	Skew Ends	Spacing Refer	Beam
> 1	Beam-L	2:6 1/2	Norm	3	<input type="checkbox"/>	2:6 1/2	Normal	-1 1/2	<input type="checkbox"/>	Left Deck Edge	
2	Beam-2	8:4	Norm	3	<input type="checkbox"/>	8:4	Normal	-1 1/2	<input type="checkbox"/>	Another Beam	1
3	Beam-3	8:4	Norm	3	<input type="checkbox"/>	8:4	Normal	-1 1/2	<input type="checkbox"/>	Another Beam	2
4	Beam-4	8:4	Norm	3	<input type="checkbox"/>	8:4	Normal	-1 1/2	<input type="checkbox"/>	Another Beam	3
5	Beam-5	8:4	Norm	3	<input type="checkbox"/>	8:4	Normal	-1 1/2	<input type="checkbox"/>	Another Beam	4
6	Beam-6	8:4	Norm	3	<input type="checkbox"/>	8:4	Normal	-1 1/2	<input type="checkbox"/>	Another Beam	5
7	Beam-R	-2:6 1/2	Norm	3	<input type="checkbox"/>	-2:6 1/2	Normal	-1 1/2	<input type="checkbox"/>	Right Deck Edge	

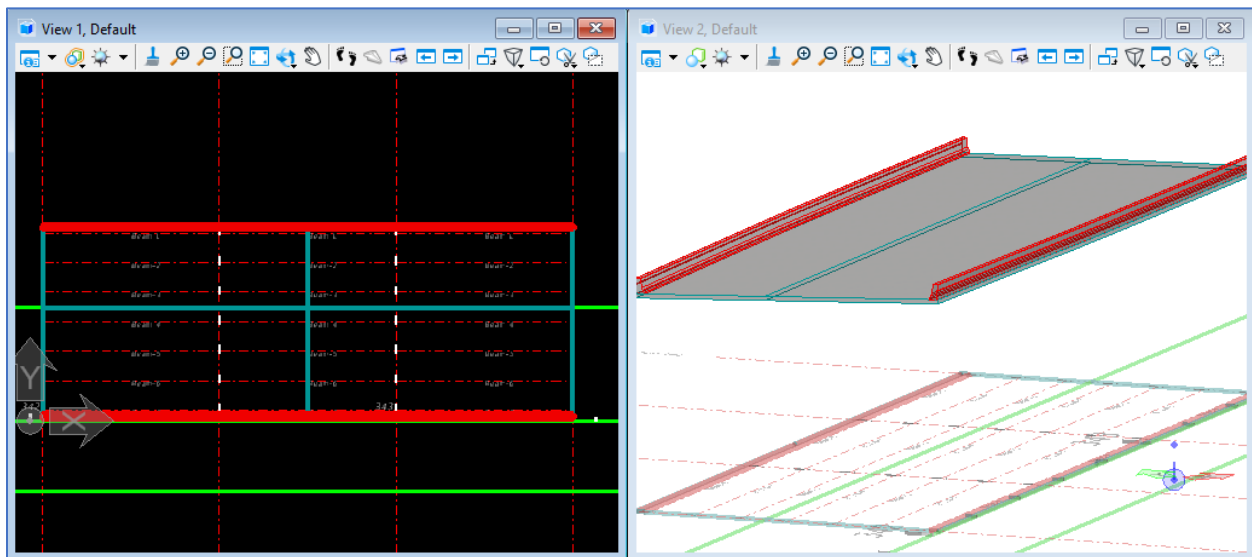
7. Uncheck the *Same Beam Start/End Values* box.
8. In the **Beam Start** section of the table, type **3** into the *SL Offset* and click on the empty cell or press [Tab]. The SL Offset at the Beam Start should now be **3"** for all 7 beams. Repeat the same process to change the SL Offset at the Beam End to **-1.5"**. See the image below to verify the inputs.



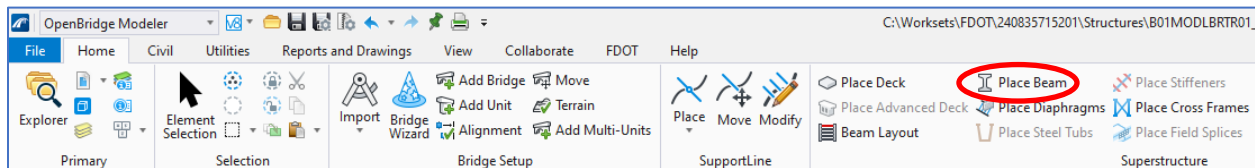
9. Repeat Steps 5-8 for the other two spans in the **Spans** section of the **Beam Layout** window. The SL offsets will be different for each span. The values used are shown in the following table. Once completed, the errors should go away from the **Spans** section.

Span	Beam Start SL Offset (")	Beam End SL Offset (")
CL Intermediate Bent 2 - CL Intermediate Bent 3	2.25	-2.25
CL Intermediate Bent 3 - FFBW End Bent 4	1.5	-3

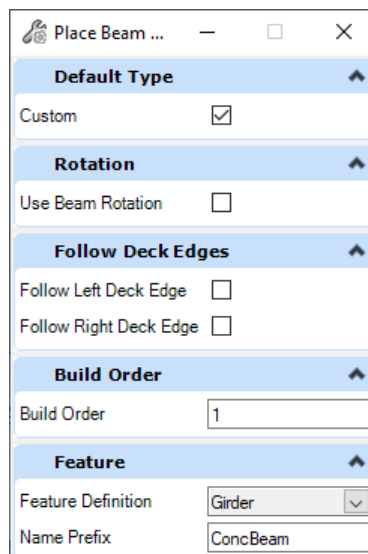
10. Click **Save** at the bottom of the window to place the Beam Layout in the model. Notice that the Layout is placed at a 0 elevation. Placing the beam layout is required before the 3D beam elements can be placed.



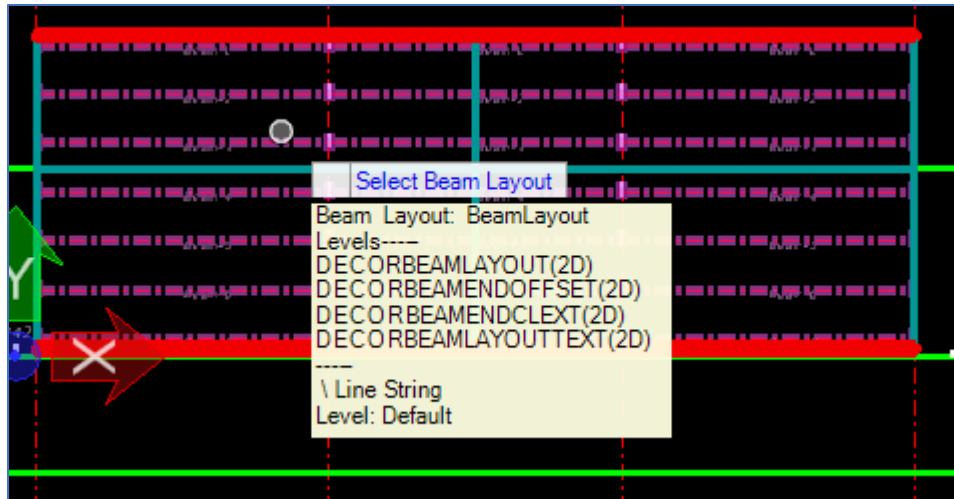
11. Next, add the actual beams to the bridge. Navigate to and select **Home > Superstructure > Place Beam**.



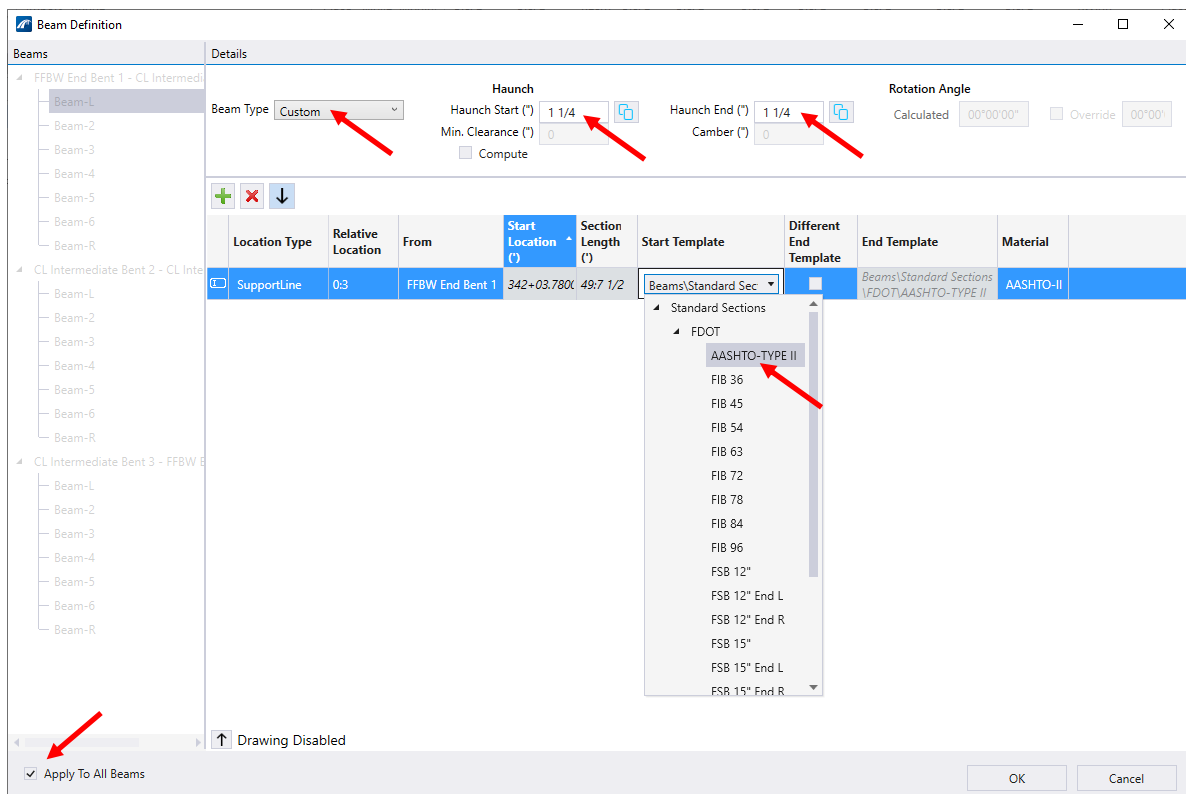
12. Verify that the *Feature Definition* shows **Girder** and use a *Name Prefix* of **ConcBeam**.



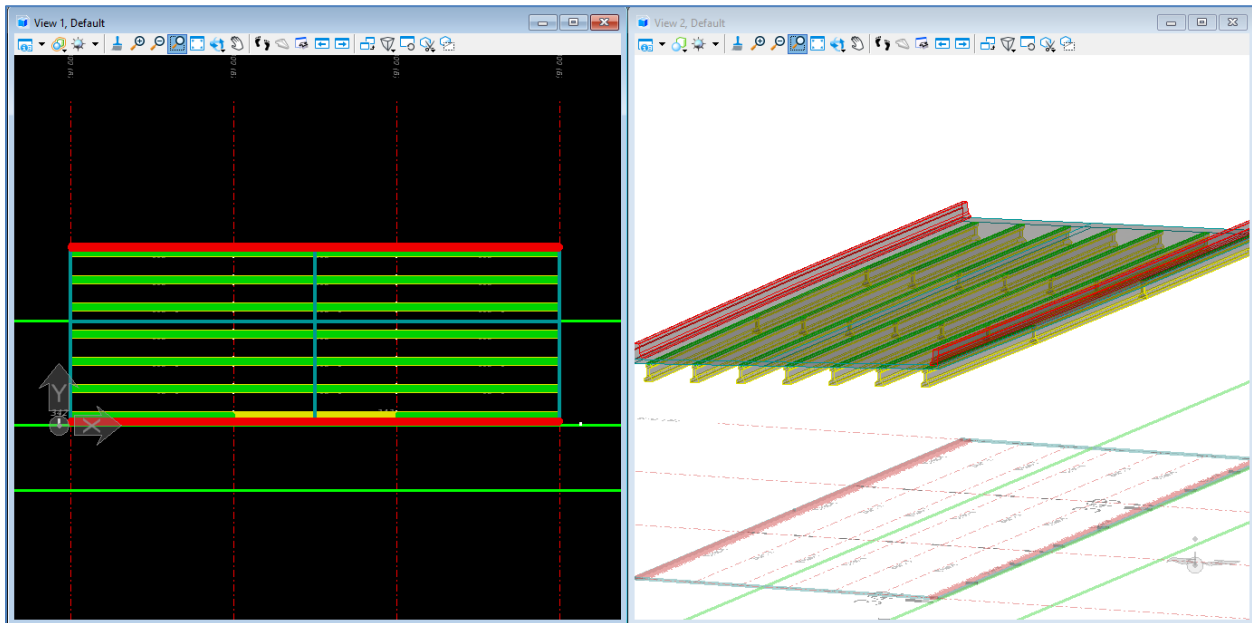
13. Select the beam layout created in Step 9 as the beam layout.



14. Left Click to **Accept** the Beam Layout. The **Beam Definition** window will open to allow the user to modify the beam properties.
15. Change the *Beam Type* from **LEAP Concrete** to **Custom**.
16. Change the *Haunch Start* and *Haunch End* to **1.25"**. The symbol next to the haunch input gives the option to copy a haunch value from another beam.
17. Change the *Start Template* to **AASHTO-TYPE II**
18. Verify that all inputs match with the image below.
19. At the bottom left of the window, verify that the *Apply To All Beams* box is checked.

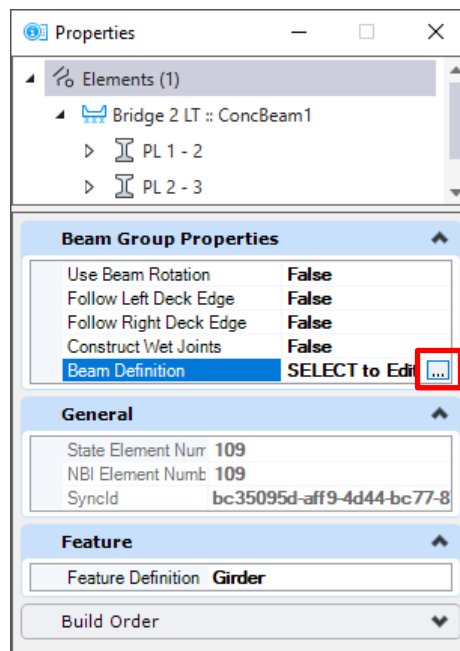


20. Select **OK** and see the beam group that was just created.



21. For this particular bridge the haunch for each beam must be changed based on design. Navigate back to the *Beam Definition* window by selecting the beam group and opening the **Properties** dialog box.

22. Select the “...” in the *Beam Definition* field.



23. With the *Beam Definition* window reopened, uncheck the *Apply To All Beams* checkbox.

24. The haunch for each beam must be modified according to the table of inputs below. Haunch values can be copied from one beam to another by right clicking the beam and selecting **Copy To...** and selecting which beams to copy the selected beam haunch to.

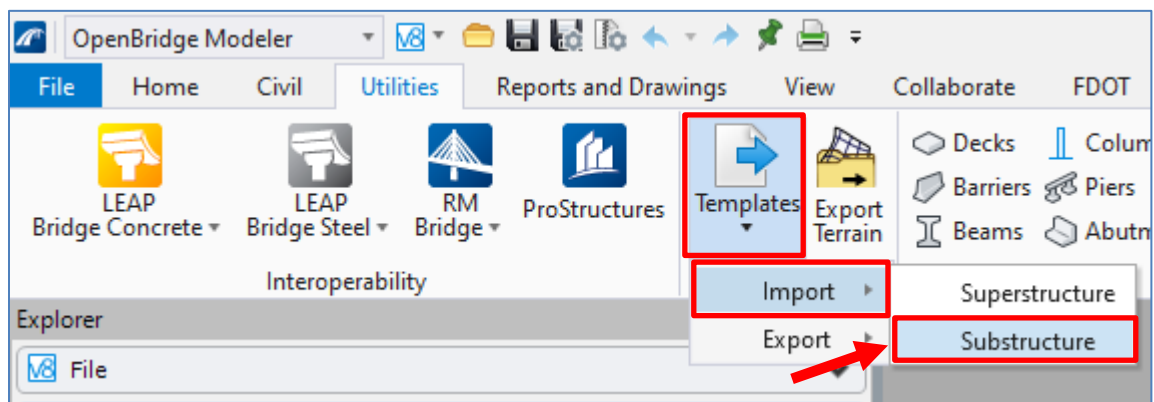
Table of Haunch Values		
Span	Haunch Start (")	Haunch End (")
FFBW End Bent 1 - CL Intermediate Bent 2		
Beam-L	1.25	1.25
Beam-2	1.125	1.125
Beam-3	1.125	1.125
Beam-4	1.1875	1.1875
Beam-5	1.5625	1.5625
Beam-6	1.125	1.125
Beam-R	1.25	1.25
CL Intermediate Bent 2 - CL Intermediate Bent 3		
Beam-L	1.25	1.25
Beam-2	1.125	1.125
Beam-3	1.125	1.125
Beam-4	1.1875	1.1875
Beam-5	1.5625	1.5625
Beam-6	2	2
Beam-R	2.5	2.5
CL Intermediate Bent 3 - FFBW End Bent 4		
Beam-L	1.25	1.25
Beam-2	1.125	1.125
Beam-3	1.125	1.125
Beam-4	1.1875	1.1875
Beam-5	1.5625	1.5625
Beam-6	2	1.0625
Beam-R	2.5	1.5625

25. Apply changes by selecting **OK**.

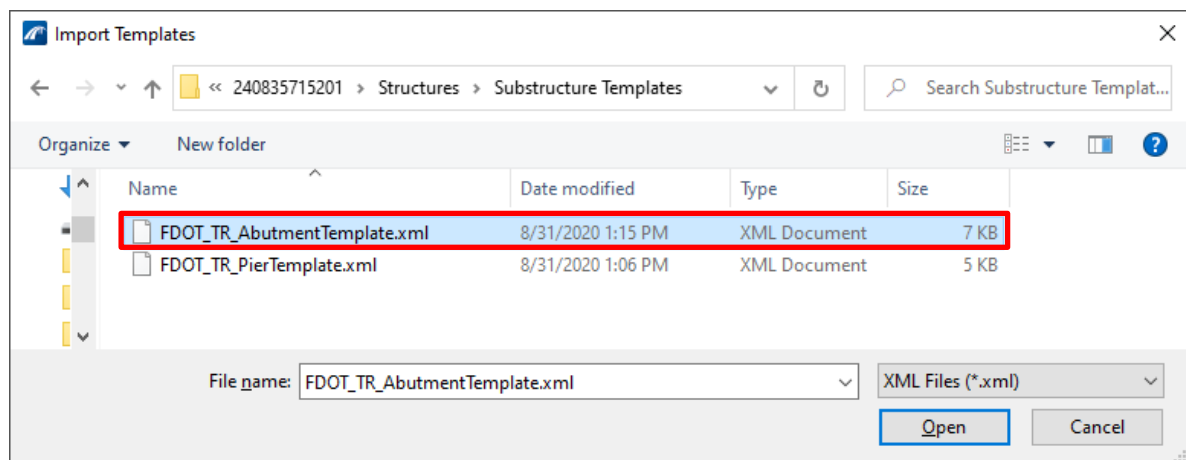
Exercise 5.3 Model an Abutment, Pier, and Bearing

➤ Create an Abutment:

1. Open the data set file: **B01MODLBRTR01_5.3_Begin**
2. Next we will import an abutment template that has been pre-modified for the training model. In this exercise we will learn how to use the provided templates in the model. See additional Chapter 5 exercises on how to create and modify templates for use on projects. To import templates, navigate to **Utilities > Import/Export > Templates > Import > Substructure**.



The Import Templates window will open. Navigate to where the data set files are located and select the “FDOT_TR_AbutmentTemplate.xml” file under ... > **240835715201 > Structures > Substructure Templates** and select “Open” in the lower right corner.



The Select Substructure Templates window will automatically open. Select the “Pile Cap” checkbox and click “Import” in the lower right corner.

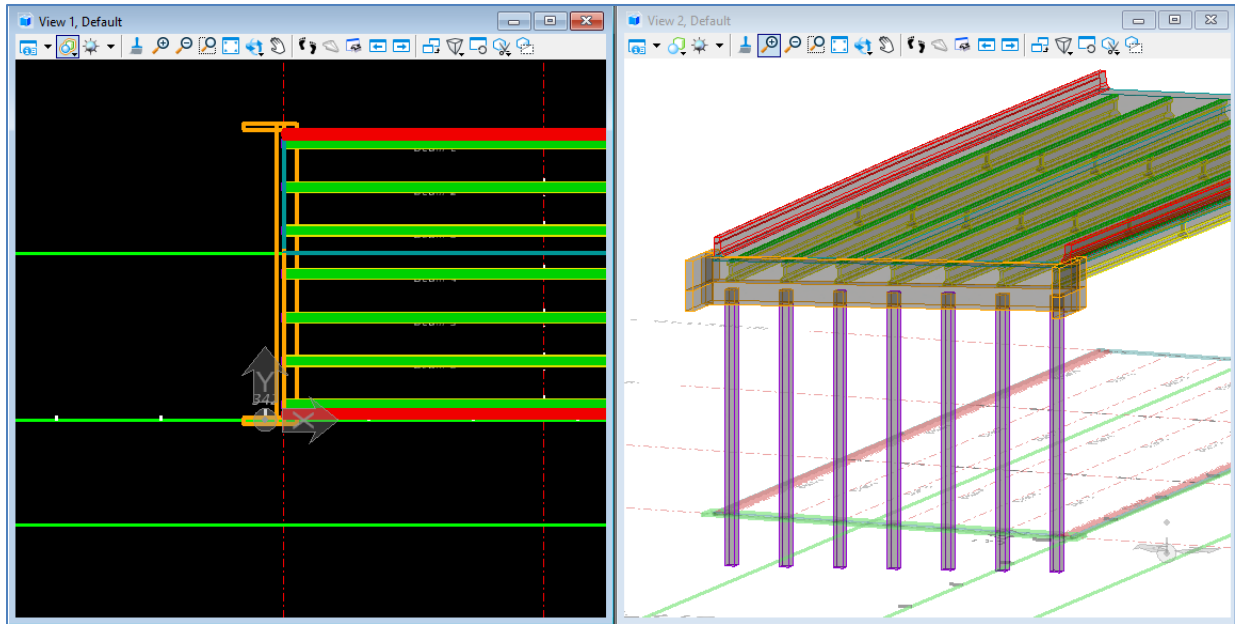
3. To begin the abutment placement, navigate to and select **Home > Substructure > Place Abutment**.

4. In the **Place Abutment** dialog box change the *Template Name* to **FDOT End Bent_TRModel_1**. This is the imported template and will be located in the "FDOT Templates" folder under the "Pile Cap" folder of the templates library.
5. Verify that rest of the dialog box inputs match the image below. Note that the *Feature Definition* should be **Endbent with Concrete Pile**. Note that **Cap, Column, Footing, and Pile Material** options are all available even if not all elements exist in the chosen abutment template. For components not in the selected template, they can be left blank or filled in as placeholders by the user.

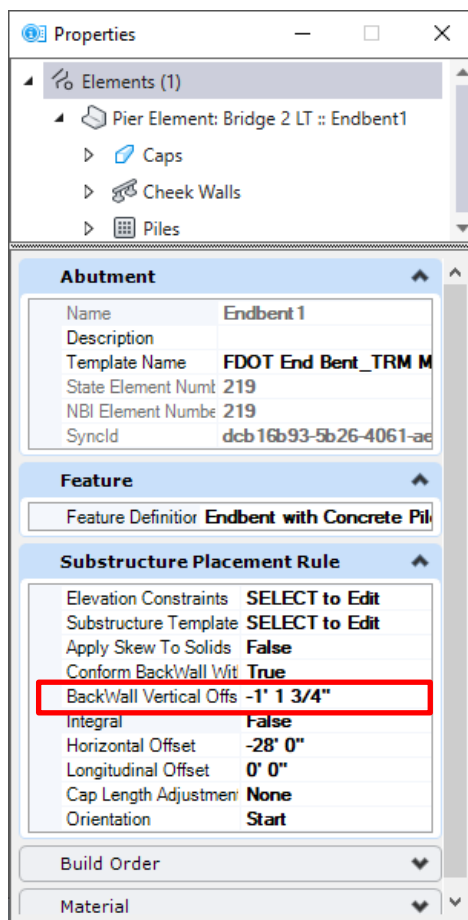
The screenshot shows the 'Place Abutment' dialog box with the following settings:

Solid Placement	
Template Name	PileCap\FDOT End Bent_1
Integral	<input type="checkbox"/>
Horizontal Offset	-28:0
Longitudinal Offset	0:0
Apply Skew To Solids	<input type="checkbox"/>
Conform BackWall With Deck Top	<input checked="" type="checkbox"/>
Edit Elevation Constraints	<input type="checkbox"/>
Orientation	Start
Cap Length Adjustment	None
Build Order	
Pier Cap Build Order	1
Column Build Order	1
Footing Build Order	1
Pile Build Order	1
Material	
Cap Material	Substructure Concrete
Column Material	
Footing Material	
Pile Material	18 inch Carbon Driven Pile
Feature	
Feature Definition	Endbent with Concrete Pile
Name Prefix	Endbent

6. Select **FBW End Bent 1** as the abutment location (*Select SupportLine*) and then left click again in open space to accept. The abutment should now be visible in the model view window.



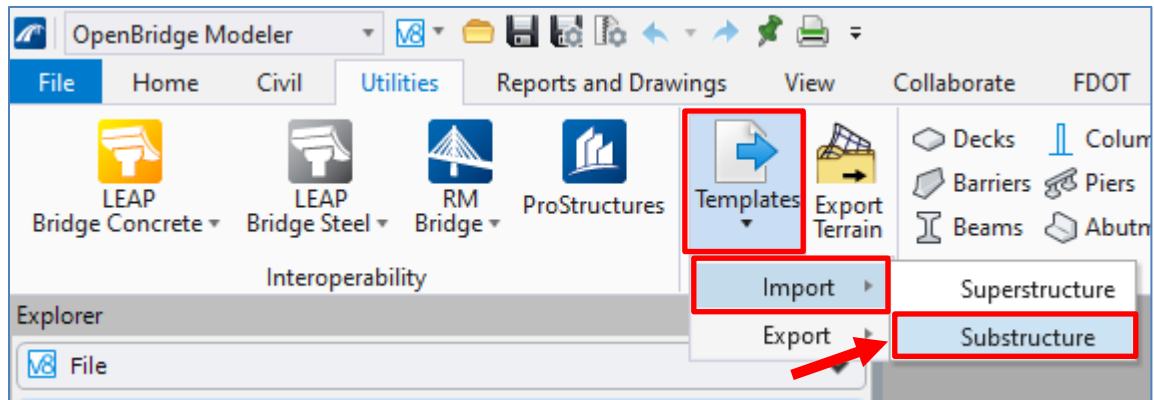
7. Go into the **Properties** window for the abutment and change the *Backwall Vertical Offset* to **-1:1.75** to accommodate the thickened portion of the approach slab resting on the backwall.



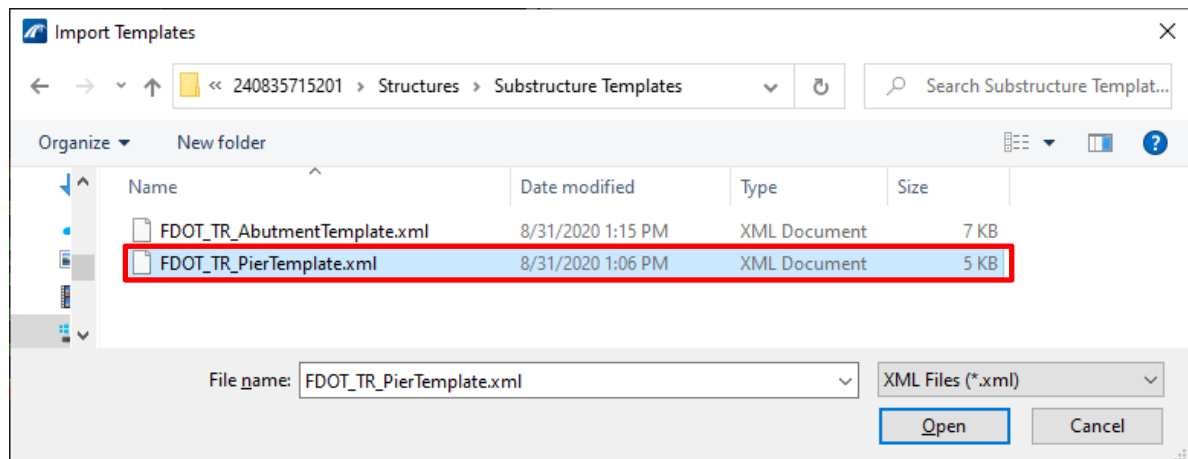
8. Place the end bridge end bent by repeat Steps 3-7, but selecting the *Orientation* as **End** in Step 5 and selecting **FFBW End Bent 4** as the Supportline in Step 6.

➤ **Create a Pier:**

- Next we will import a pier template that has been pre-modified for the training model. In this exercise we will learn how to use the provided templates in the model. See additional Chapter 5 exercises on how to create and modify templates for use on projects. To import templates, navigate to **Utilities > Import/Export > Templates > Import > Substructure**.



The Import Templates window will open. Navigate to where the data set files are located and select the “FDOT_TR_PierTemplate.xml” file under ... > **240835715201 > Structures > Substructure Templates** and select “Open” in the lower right corner.

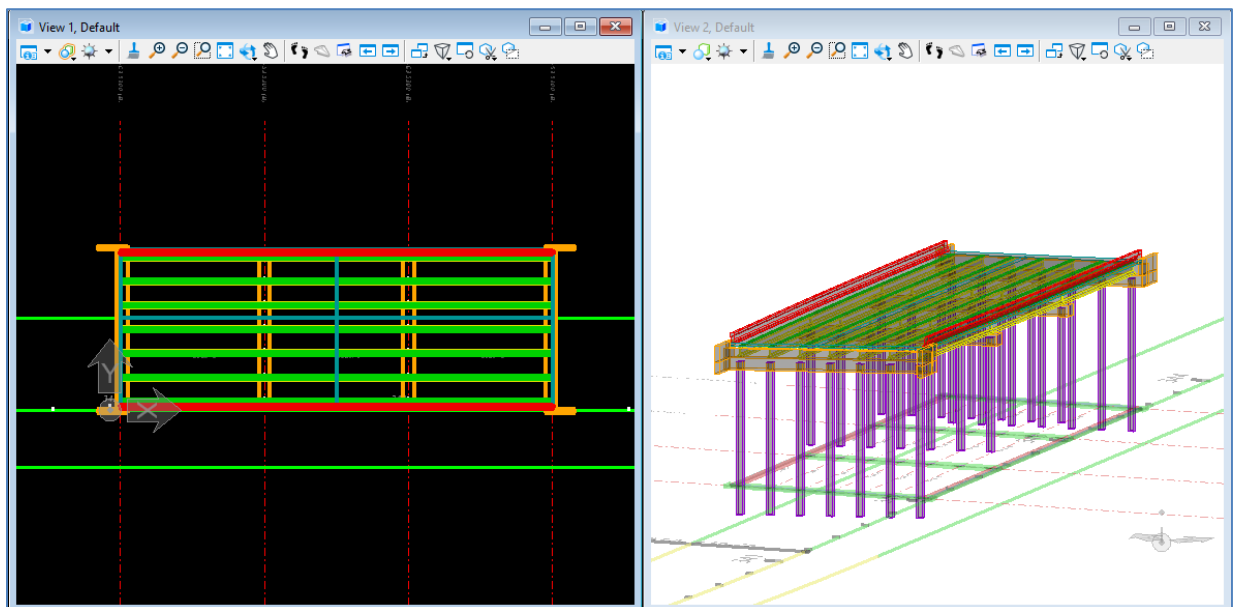


The Select Substructure Templates window will automatically open. Select the “Pile Bent” checkbox and click “Import” in the lower right corner.

- To begin the Pier Placement, navigate to and select **Home > Substructure > Place Pier**.
- In the **Place Pier** dialog box, change the *Template Name* field to **FDOT Pier – 3ft Deep x 3.75ft Wide x 55ft Long**. This is the previously imported template and is available in the “Pile Bent” folder of the templates library.
- Fill in the rest of the inputs shown in the image below. Make sure that the *Feature Definition* is changed to **Intermediate Bent with Concrete Pile** and the *Name Prefix* changed to **Intbent**. Note that Cap, Column, Footing, and Pile Material options are all available even if not all elements exist in the chosen pier template. For components not in the selected template, they can be filled in as placeholders by the user.

Place Pier	
Solid Placement	
Template Name	PileBent\FDOT Pier - 3ft Deep x 3.1
Integral	<input type="checkbox"/>
Horizontal Offset	-28:0
Cap Length Adjustment	None
Edit Elevation Constraints	<input type="checkbox"/>
Apply Skew To Solids	<input type="checkbox"/>
Material	
Cap Material	Substructure Concrete
Column Material	Substructure Concrete
Footing Material	Substructure Concrete
Pile Material	18 inch Carbon Driven Plumb
Build Order	
Pier Cap Build Order	1
Column Build Order	1
Footing Build Order	1
Pile Build Order	1
Feature	
Feature Definition	Intermediate Bent with Concrete Pile
Name Prefix	Intbent

5. Select **CL Intermediate Bent 2** and **CL Intermediate Bent 3** as the pier locations, and then right click to end the location selection. Note that more than one Supportline can be selected to create multiple identical piers.
6. Left click to create the piers.



➤ **Create Bearing Elements:**

1. Add bearings by navigating to **Home > Substructure > Place Bearing**.
2. Fill in the **Place Bearing** dialog box as shown below.

Bearing	
Bearing Type	Cube
Cube Width, W	1:2
Cube Depth, D	0:10
Cube Height	0:2 9/16
Orientation	Girder
Grout Pad/Bevel Plate	
Has Pad or Plate	<input type="checkbox"/>
Bearing Seat	
Has Bearing Seats	<input type="checkbox"/>
Path	
Back Offset	-0:11 1/2
Ahead Offset	0:11 1/2
Material	
Pad or Plate Material	...
Bearing Material	Neoprene Bearing I ...
Bearing Seat Material	Substructure Concre ...
Build Order	
Pad or Plate Build Order	1
Bearing Build Order	1
Beam Seat Build Order	1
Feature	
Feature Definition	Neoprene Composite
Name Prefix	Bearing

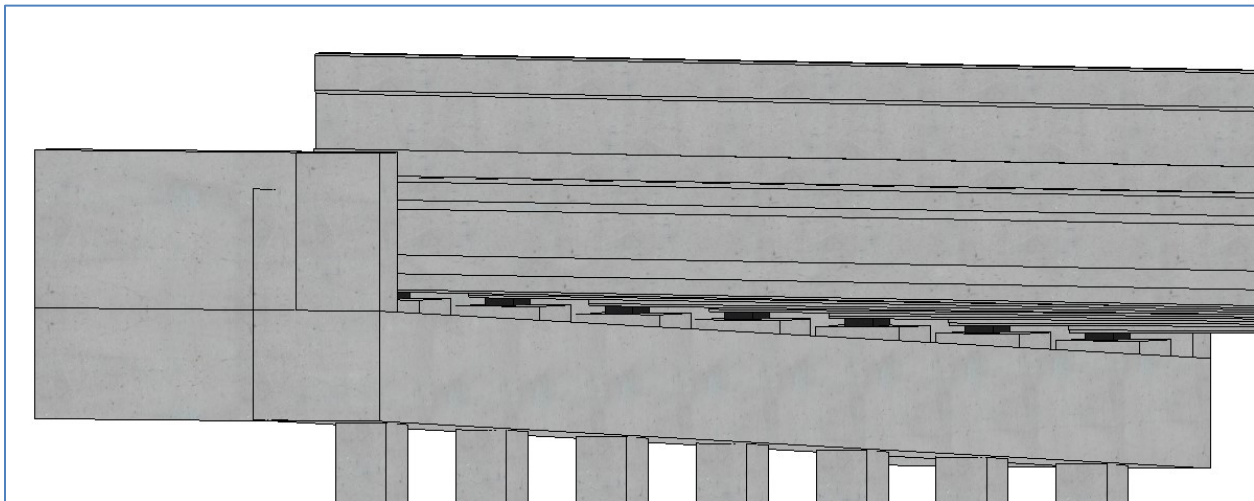
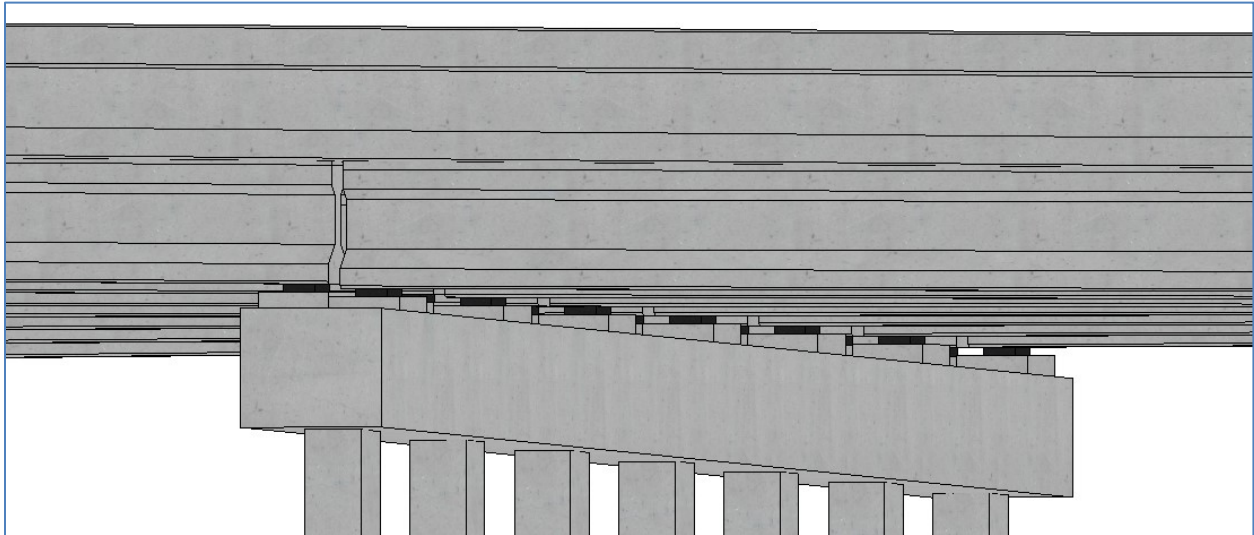
3. Check the box next to *Has Bearing Seats* and fill in the following inputs.

Bearing Seat	
Has Bearing Seats	<input checked="" type="checkbox"/>
Model Stepped Cap	<input type="checkbox"/>
Seat Min. Thickness	0:4
Seat D1	0:11
Seat D2	0:11 1/2
Seat W1	1:1
Seat W2	1:1
Seat Orientation	Pier

4. Select **CL Intermediate Bent 3** and **CL Intermediate Bent 4** as the bearing locations.
5. Right click to end Supportline selection.
6. Left click to place the bearings.
7. Now add the bearing pads and beam seats (pedestals) to the end bents. Navigate again to **Home > Substructure > Place Bearing**. Fill in the dialog box as shown below.

Place Bearing ...	
Bearing ^	
Bearing Type	Cube
Cube Width, W	1:2
Cube Depth, D	0:10
Cube Height	0:2 9/16
Orientation	Girder
Grout Pad/Bevel Plate ^	
Has Pad or Plate	<input type="checkbox"/>
Bearing Seat ^	
Has Bearing Seats	<input checked="" type="checkbox"/>
Model Stepped Cap	<input type="checkbox"/>
Seat Min. Thickness	0:4
Seat D1	1:5
Seat D2	1:1
Seat W1	1:1
Seat W2	1:1
Seat Orientation	Pier
Path ^	
Back Offset	-1:1
Ahead Offset	1:1
Material ^	
Pad or Plate Material	<input type="text"/> ...
Bearing Material	Neoprene Bearing I ...
Bearing Seat Material	Substructure Concre ...
Build Order ^	
Pad or Plate Build Order	1
Bearing Build Order	1
Beam Seat Build Order	1
Feature ^	
Feature Definition	Neoprene Composite
Name Prefix	Bearing

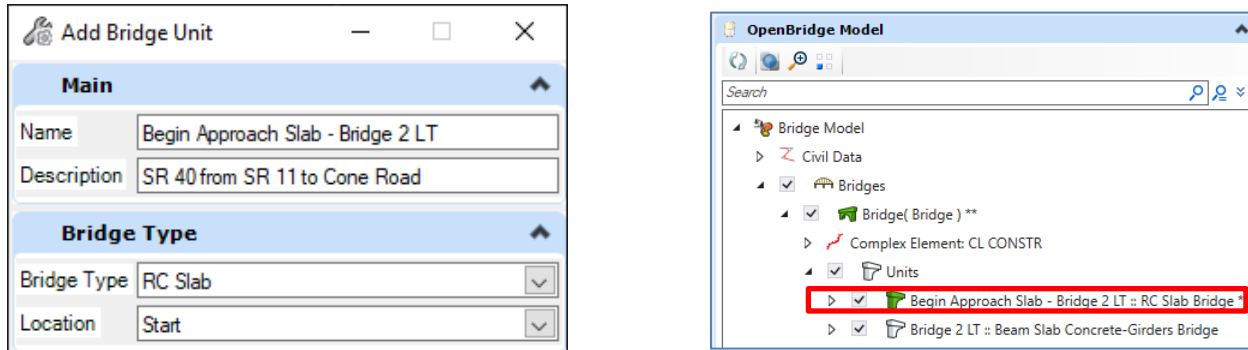
8. Select **FFBW End Bent 1** and **FFBW End Bent 2** as the bearing locations. Left click to place the bearings. Note that the program only sets one row of bearings for end bents (either back or ahead) based on whether placed as a **Start** or **End** abutment.



Exercise 5.4 Create Approach Slabs

➤ **To Create Approach Slabs:**

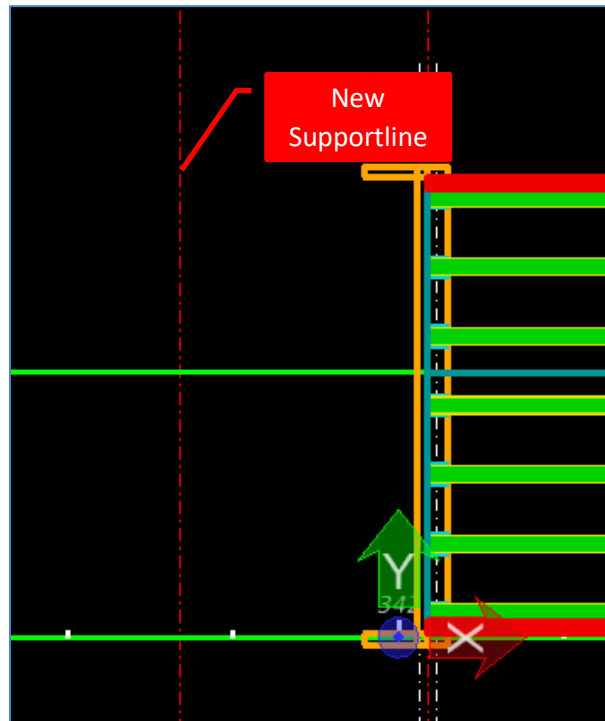
1. Open the data set file: **B01MODLBRTR01_5.4_Begin**
2. Create Approach Slab at beginning of bridge by navigating to **Home > Bridge Setup > Add Unit**. Use the figure below to define the unit. Left click to accept. The new unit appears in the OpenBridge Model menu (shown below on the right).



3. Create one new supportline by navigating to and selecting **Home > SupportLine > Place > Multi**. The approach slab only requires one additional supportline for the two sections of deck: one section at the vertical offset required for the asphalt cover and one section for a 0 offset. This will be accomplished by placing two segments of deck and start/end station offsets in a later step. When a new unit is added with **Start** as the *Location*, the first supportline is automatically added to *OpenBridge Model* in the Explorer for the new unit.
4. Use the Supportline Dialog box and table to verify the Supportline information below. See the previous manual section **Place Supportline** for more details on how to do this.

Main	
<input checked="" type="checkbox"/> Skew Angle	00°00'00"
<input checked="" type="checkbox"/> Length	200:0
<input type="checkbox"/> Span Length	0:0
<input checked="" type="checkbox"/> Start Station	341+73.5300
<input type="checkbox"/> End Station	341+73.5300
SupportLines Number	
Number of SupportLines	1
Direction Mode	
Direction Mode	Skew
Feature	
Feature Definition	SupportLine
Name Prefix	SupportLine

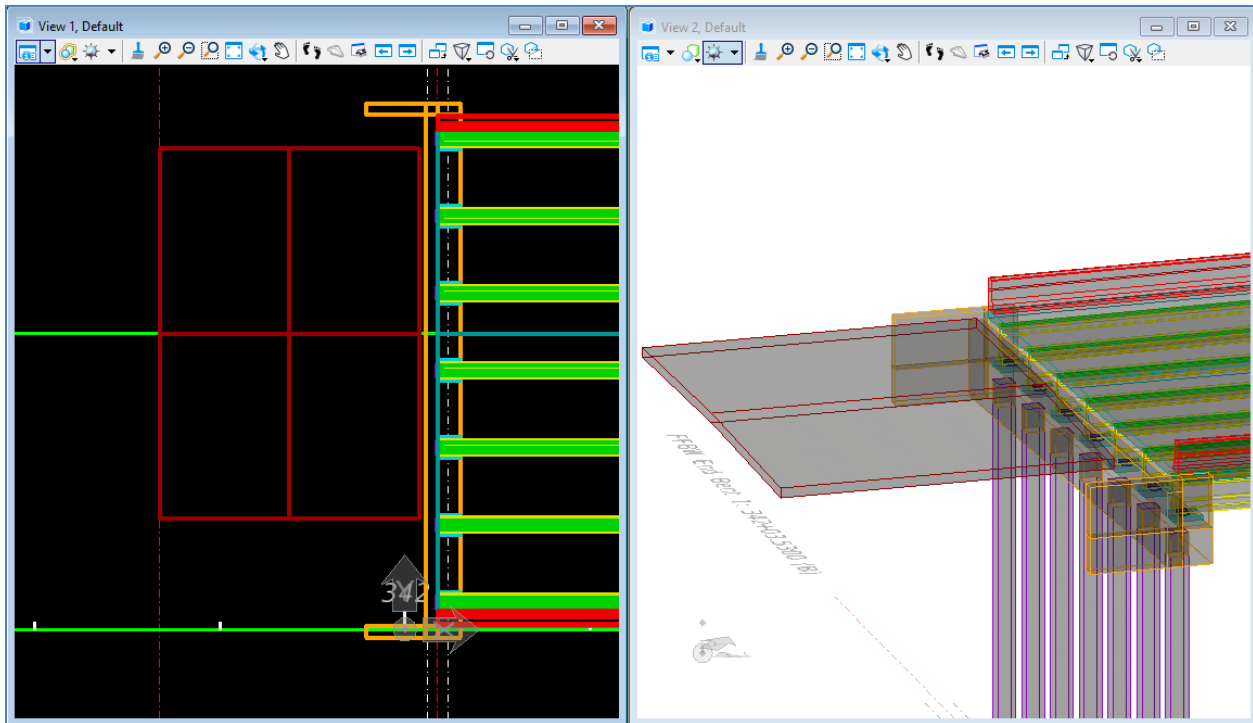
- Select OK when the **Modify Multi SupportLines** dialog box comes up to place the Supportline. Supportline could be renamed, but the default will be kept for the exercise.



- Create Approach Slab by navigating to and selecting **Home > Superstructure > Place Deck**. This approach slab will span from the newly created **Supportline1** to **FFBW End Bent 1** and will use a negative vertical offset to account for the 1.75" asphalt layer. Use appropriate Template and Approach Slab features definition. Match the deck dialog box below.

Deck	
Template Name	Slab w/ constraints
Start Station Offset	0:0
End Station Offset	-2:0
Horizontal Offset	-32:0
Vertical Offset	-0:1 3/4
Add Constraints	<input type="checkbox"/>
Chord Tolerance	0.1000000000000000
Max Dist Between Sections	3:3 3/8
Analytical Deck	<input type="checkbox"/>
Material	
Deck Material	Approach Slab Concrete
Build Order	
Build Order	1
Feature	
Feature Definition	Approach Slab
Name Prefix	AppSlab

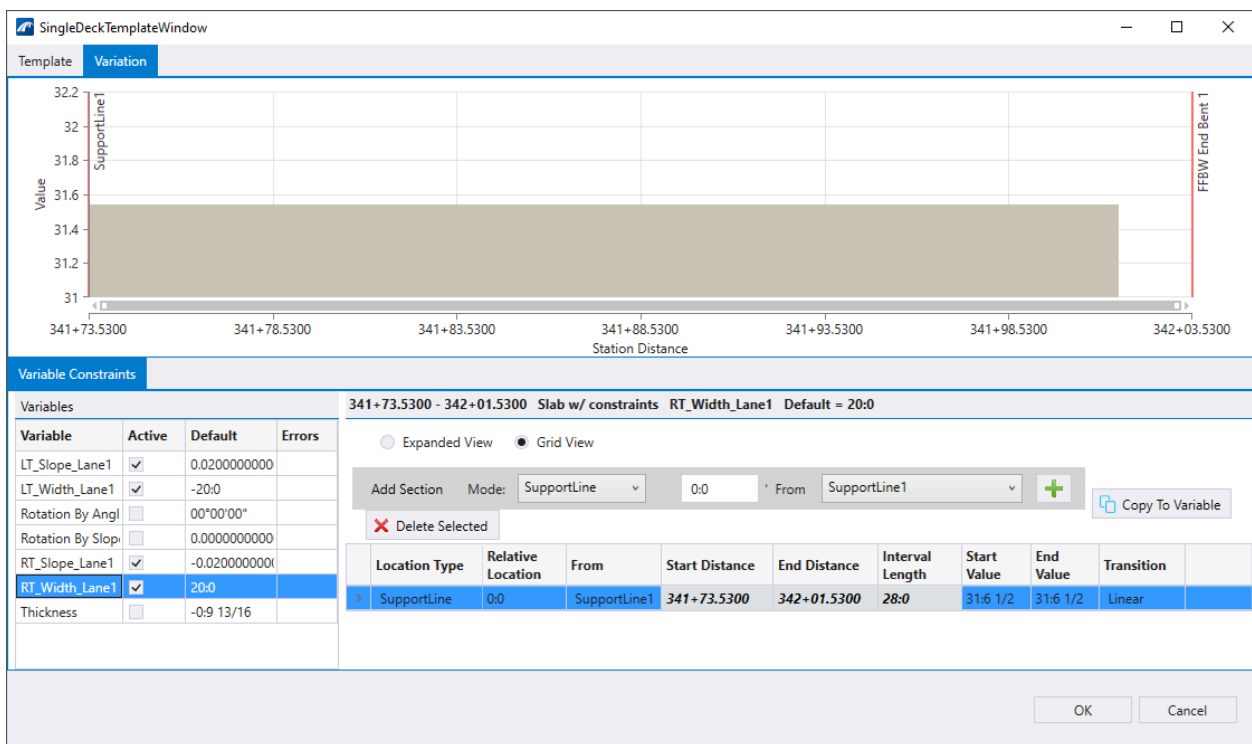
- Place the deck by left clicking to accept the orientation. The deck should show in the model.



- Repeat the process for the 2ft deck segment, using the information below. Note that since the start/end station offsets are used, there is no need for another supportline within the approach slab.

Place Deck	
Deck	
Template Name	Slab w/ constraints
Start Station Offset	28:0
End Station Offset	0:0
Horizontal Offset	-32:0
Vertical Offset	0:0
Add Constraints	<input type="checkbox"/>
Chord Tolerance	0.100000000000000
Max Dist Between Sections	3:3 3/8
Analytical Deck	<input type="checkbox"/>
Material	
Deck Material	Approach Slab Concrete
Build Order	
Build Order	1
Feature	
Feature Definition	Approach Slab
Name Prefix	AppSlab

9. Note that the decks do not match the lane widths or superelevation of the main bridge deck. The following steps will modify the approach slab to match the main bridge deck.
10. The Assign Superelevation tool must be used before changing any other variable constraints. Repeat Step 5 through Step 11 in the “Create a Bridge and Add a Bridge Deck” portion of Exercise 5.1 for both segments of the begin approach slab deck.
11. Next, change the lane widths and thickness for both segments. The user must go into the variable constraints of the deck just placed to change the lane widths by activating the *RT_Width_Lane1* and *LT_Width_Lane1* variables and changing them to **31.5417** and **-23.5417** respectively. Next activate the thickness variable: -1 for the 28ft segment and -1.1458 for the 2ft segment. See the image below for an example of the *RT_Width_Lane1* variable change for the 28ft segment.



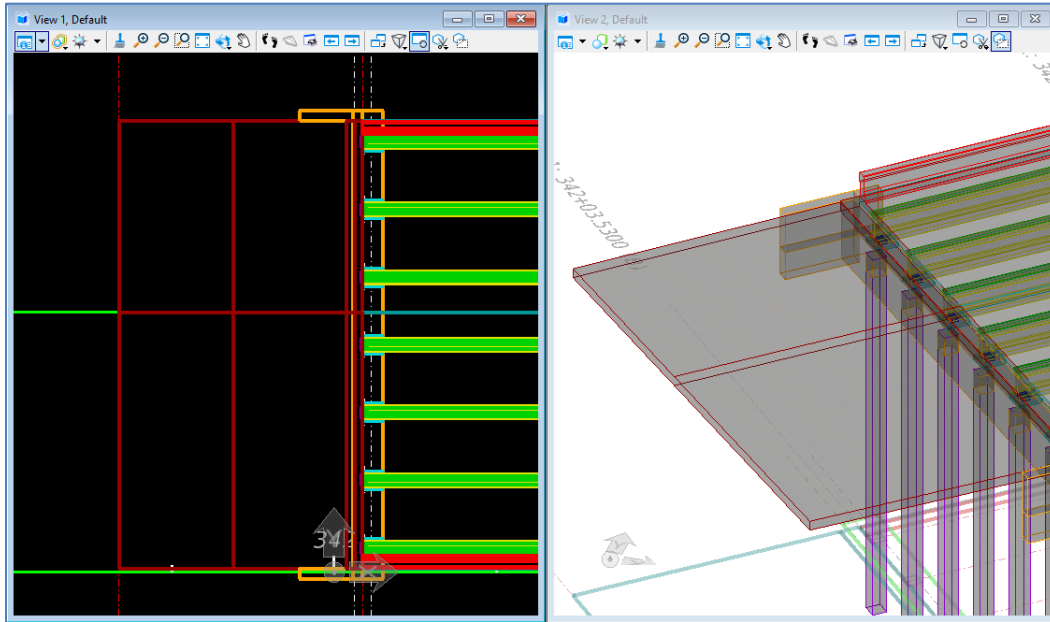
Note 1) Check mark Active indicates that the variable is changed. Highlighted in blue means in editing mode. 2) Use the green plus button to add additional constraints. 3) Top graphical view verifies accuracy.

See below for summary of approach slab data used in the exercise.

Span	Approach Slab Data (ft)			
	Vertical Offset	RT_Width_Lane1	Thickness	LT_Width_Lane1
28ft Segment	-0.1458	31.5417	-1	-23.5417
2ft Segment	0	31.5417	-1.1458	-23.5417

Span	Approach Slab Data (ft)			
	Vertical Offset	RT_Width_Lane1	Thickness	LT_Width_Lane1
SupportLine 1 to SupportLine 2	-0.1458	31.5417	-1	-23.5417
SupportLine 2 to SupportLine 3	0	31.5417	-1.1458	-23.5417

12. The slab segments should appear as shown below.



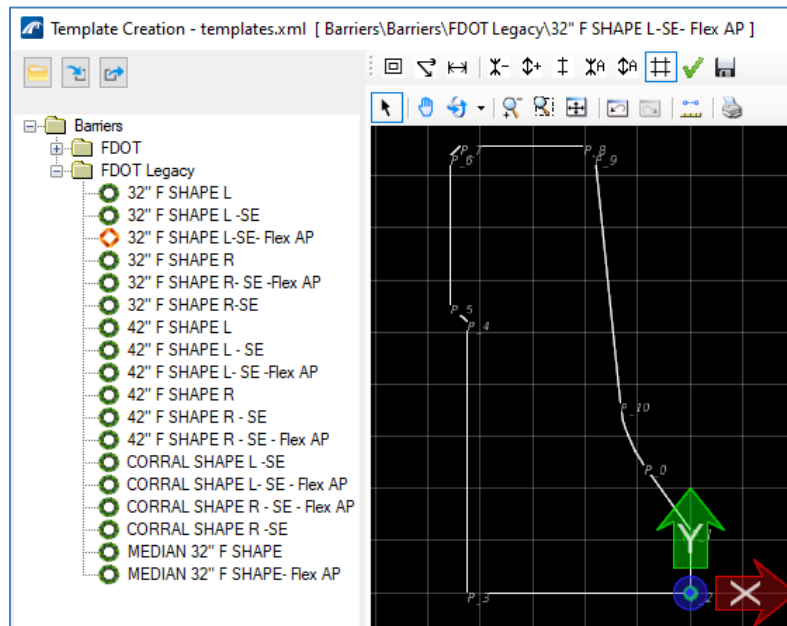
13. Repeat Steps 2 through 11 for the end bridge approach slab. Use inputs from the table below.

Exercise 5.4 - Create Approach Slabs			
<i>To Create Approach Slabs</i>			
Step	Dialog Box	Field Name (Section)	Field Input
13	Add Unit	Name (Main)	End Approach Slab - Bridge 2 LT
		Description (Main)	SR 40 from SR 11 to Cone Road
		Bridge Type (Bridge Type)	RC Slab
		Location (Bridge Type)	End
	Place Multi SupportLines	Skew Angle (Main)	00° 00' 00"
		Length (Main)	200:0
		Start Station (Main)	343+83.53
		Number of SupportLines (SL Number)	1
		Direction Mode (Direction Mode)	Skew
		Feature Definition (Feature)	SupportLine
		Name Prefix (Feature)	SupportLine
	Place Deck (End Approach Slab - 2ft Segment)	Template Name (Deck)	Slab w/constraints
		End Station Offset (Deck)	-28:0
		Horizontal Offset (Deck)	-32:0
		Vertical Offset (Deck)	0:0
		Deck Material (Material)	Approach Slab Concrete
		Feature Definition (Feature)	Approach Slab
		Name Prefix (Feature)	AppSlab
		Supportlines	FFBW End Bent 4 to Supportline1
	Place Deck (End Approach Slab - 28ft Segment)	Template Name (Deck)	Slab w/constraints
		End Station Offset (Deck)	2:0
		Horizontal Offset (Deck)	-32:0
		Vertical Offset (Deck)	-0:1.75
		Deck Material (Material)	Approach Slab Concrete
		Feature Definition (Feature)	Approach Slab
		Name Prefix (Feature)	AppSlab
		Supportlines	FFBW End Bent 4 to Supportline1

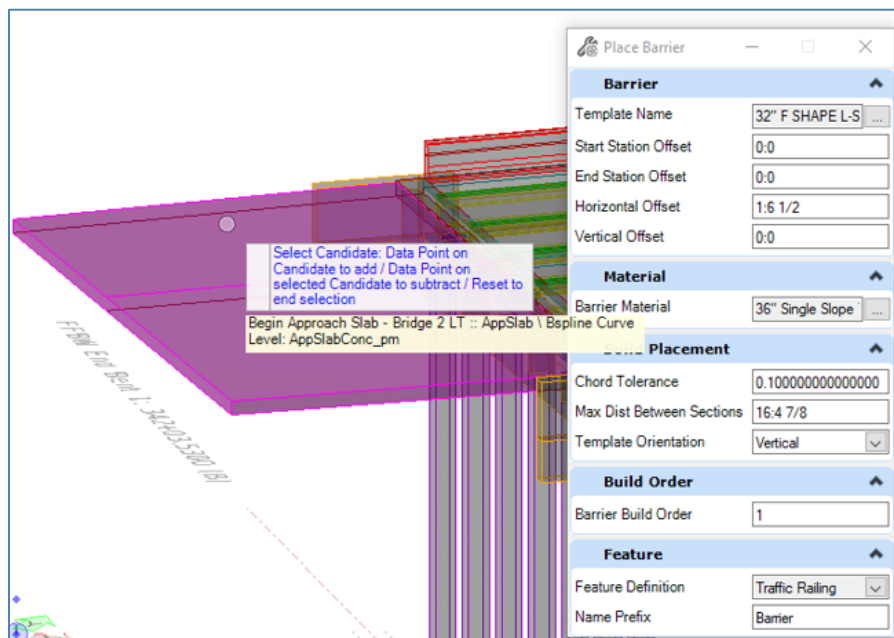
14. The last step is to place the barriers on the approach slabs. To accommodate for the vertical offset of the 28ft segment of the approach slabs, there is a special barrier template created for each side that is slightly thicker at the base.

Select **Place Barrier** and go into the template selection. Select **32" F Shape L-SE-Flex AP** from the *FDOT Legacy* folder.

Elements can only be added to the Active Unit. In the *OpenBridge Model* menu of the Explorer, right click on the "Begin Approach Slab - Bridge 2 LT" and select **Set Active**.



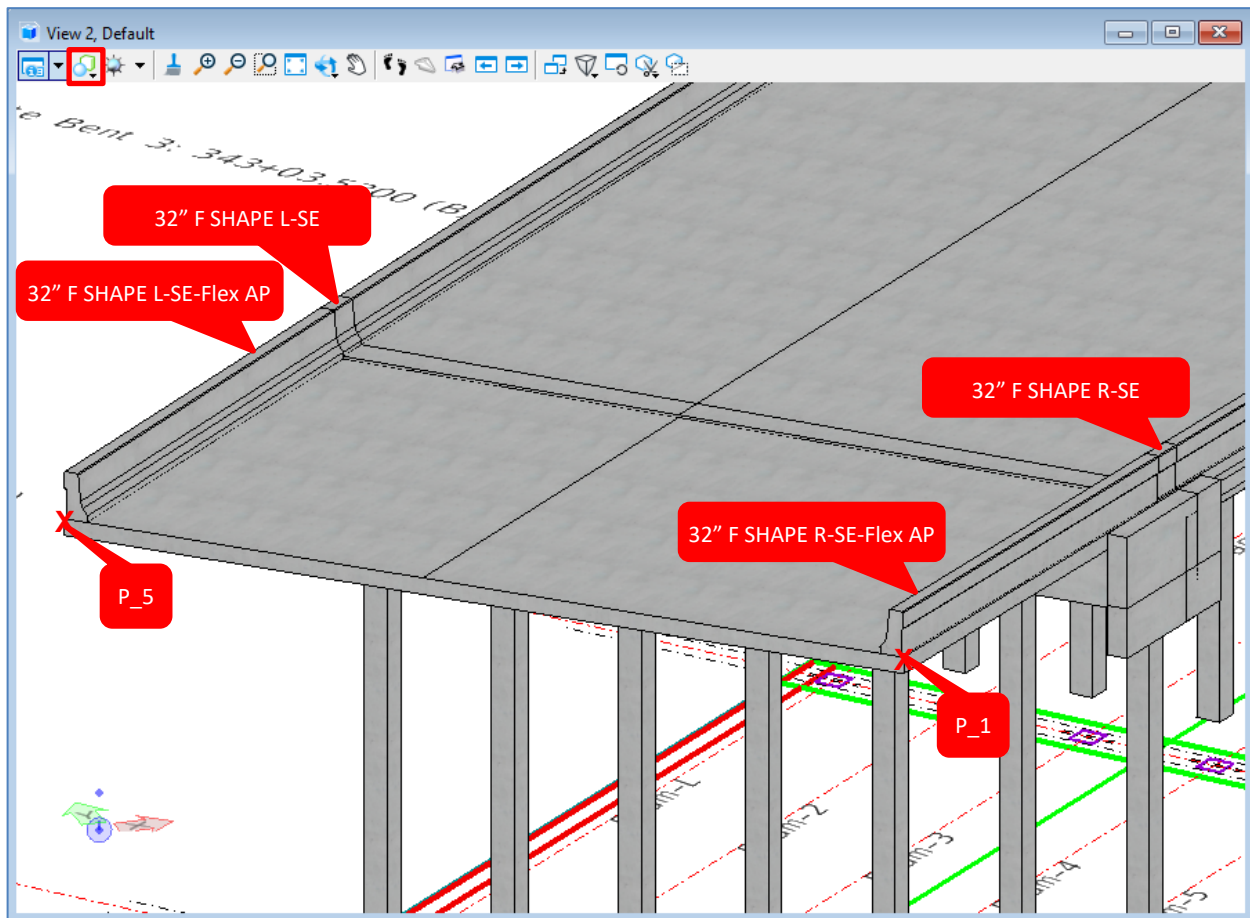
Select the 28ft segment of the begin approach slab from the view window as the "Candidate" and change the *Horizontal Offset* to **1:6.5**. Reset (right click) to end selection and then data point (left click) to continue.



In the **Path Selection** window, Select **P_5** from the *Select Alignment from List* window.

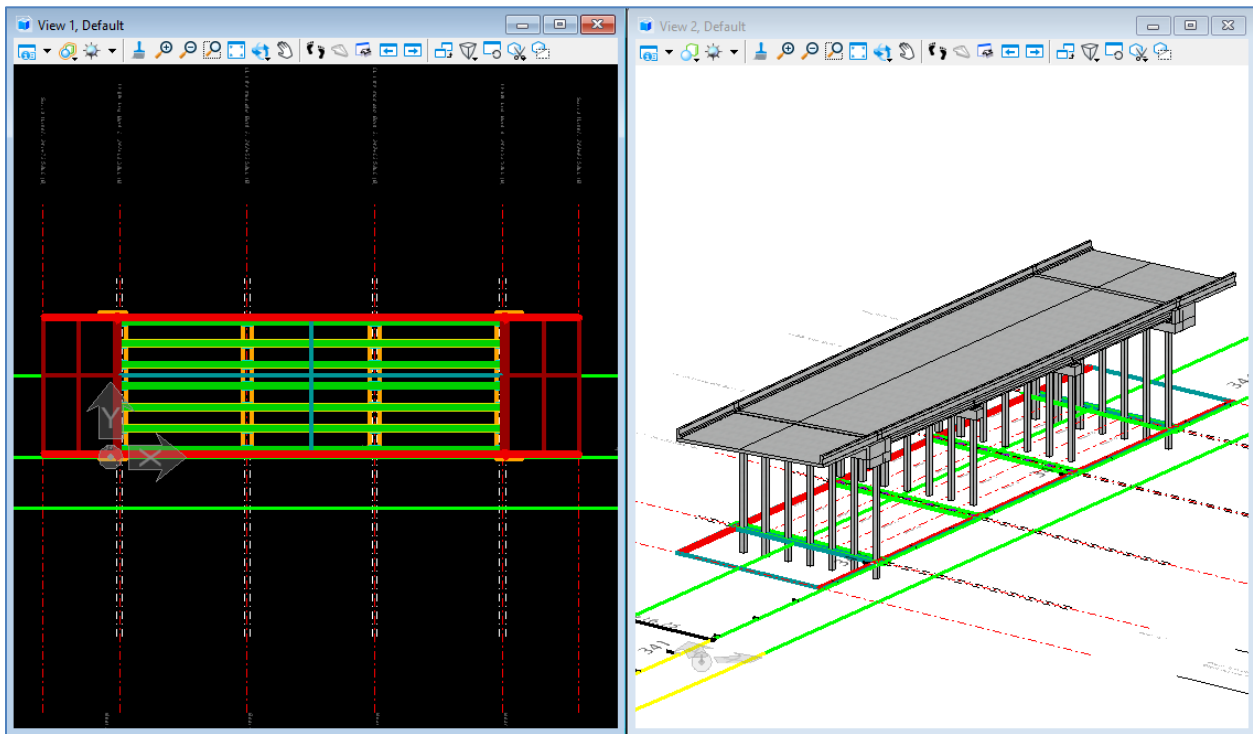
Click **OK** to place the barrier.

Repeat the barrier placement option until all four sections of barrier are placed on the approach slab. Use a **1:6.5** horizontal offset for the L templates and a **-1:6.5** horizontal offset for the R templates. Use the image below to guide the creation process. The Display Style of View 2 has been changed to **Illustration: Ignore Lighting**. This is found in the Display Style List, with a red box on it below.



Use the above image to place the barriers on the end approach slab after setting it active in the OpenBridge Model menu.

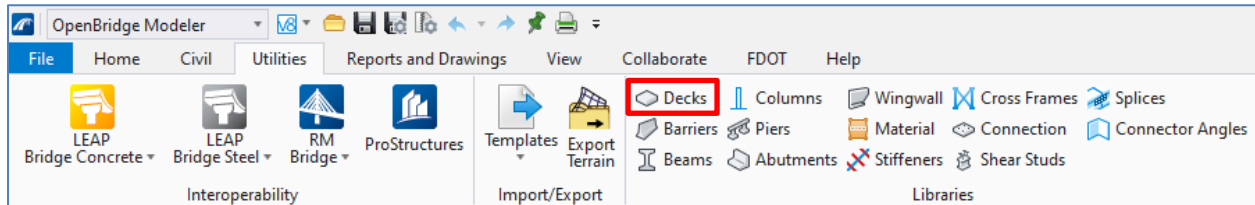
15. The final product of Exercises 5.1 – 5.4 is shown below, with the Superelevation reference turned off. Note that, if required, the asphalt pavement can be modeled as another deck on top of the 28ft segments. Approach Slab Asphalt Pavement has its own Feature Definition.



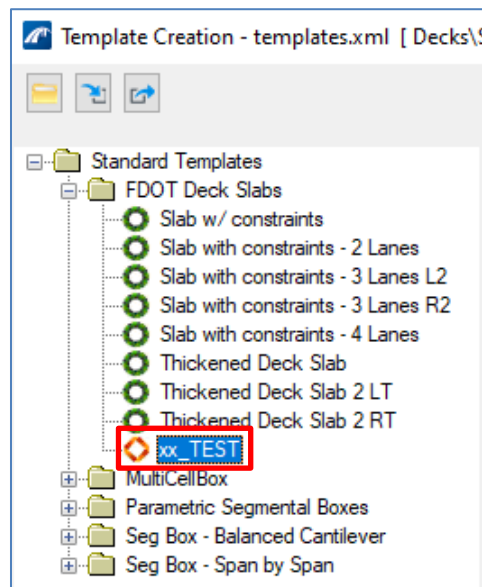
Exercise 5.5 Create and Modify Deck and Barrier Templates

➤ Create and Modify a Deck Template:

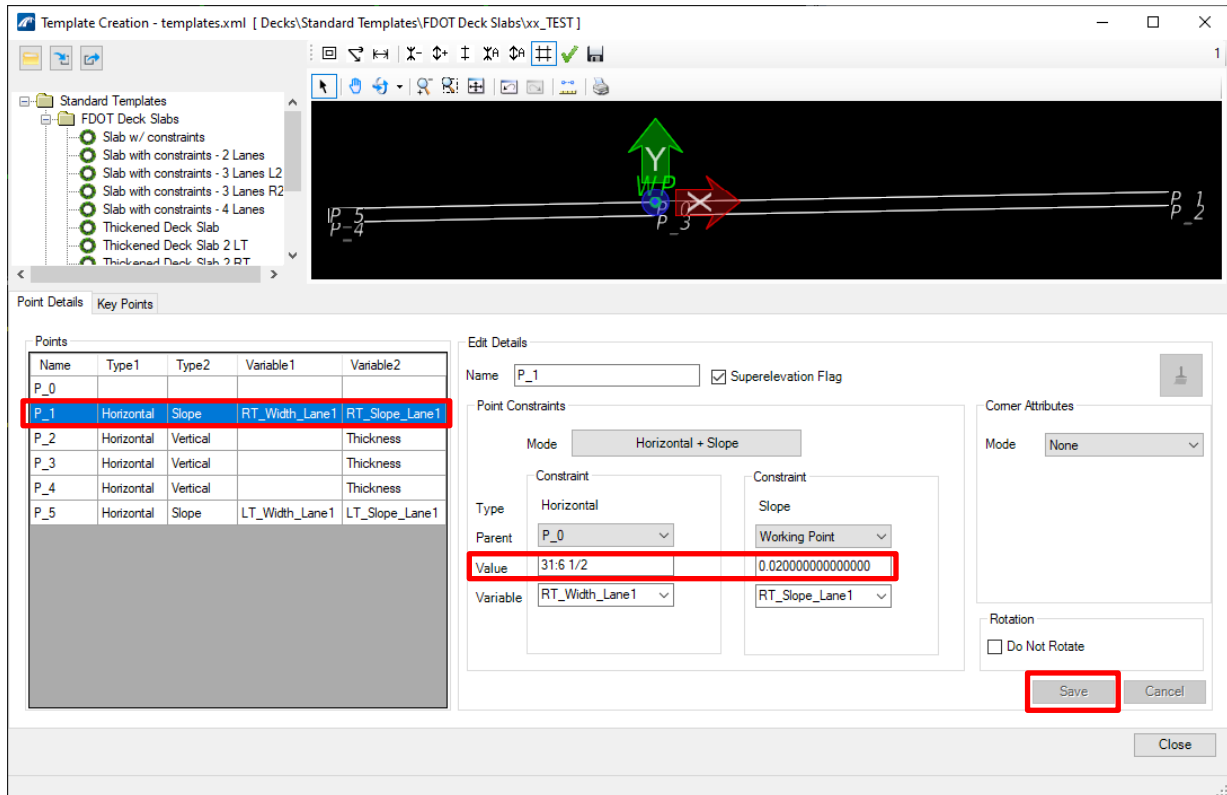
1. Open the data set file: **B01MODLBRTR01_5.5_Begin**
2. Open the deck template library by navigating to **Utilities > Libraries > Decks**.



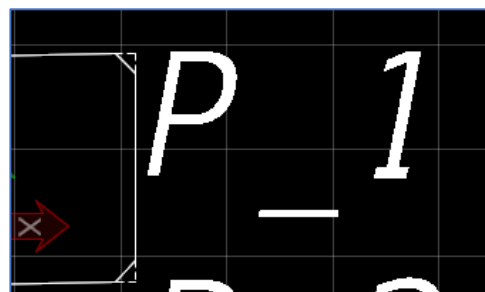
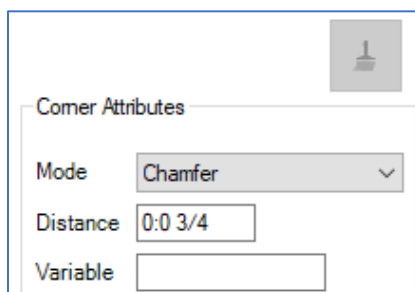
3. Expand the **Standard Templates** and **FDOT Deck Slab** folders, right click on **Slab w/ constraints** and select **Copy**. Right click the copied template and select **Rename**. Rename the template to **xx_TEST**.



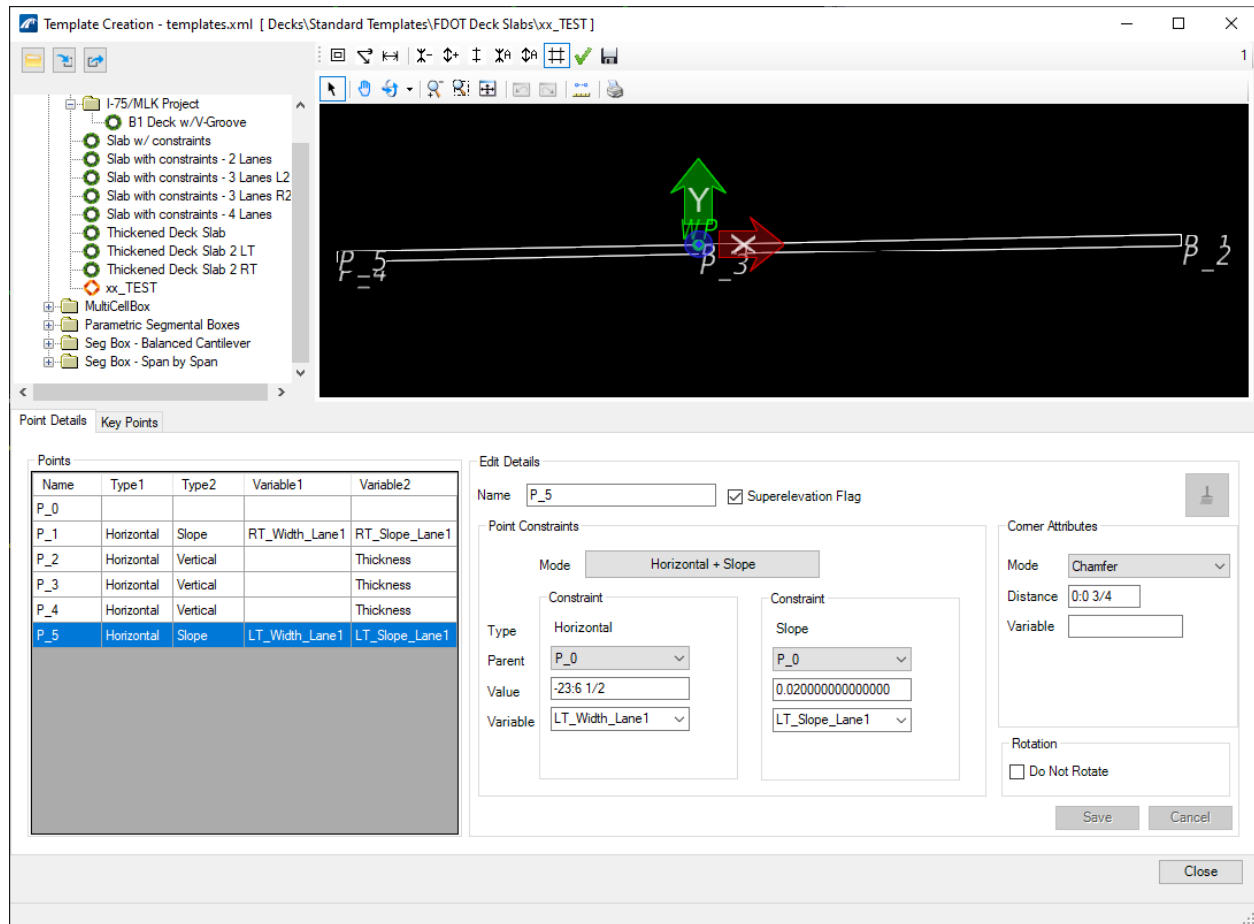
4. Highlight **P_1** in the *Points* section, change the *Horizontal* constraint *Value* to **31:6.5** for the **RT_Width_Lane1** variable and the *Slope* constraint to **0.02** for the **RT_Slope_Lane1** variable. Click **Save** to update the graphical view.



- Highlight **P_2** and update the *Vertical* constraint *Value* to **-0:8.5** for the **Thickness** variable. Click **Save** to update the graphical view. Note that the *Horizontal* constraint is set to a value of **0:0** from P_1, so the adjustment made in the previous step resulted in P_2 also shifting further from the WP.
- Highlight **P_3** and update the *Vertical* constraint *Value* to **-0:8.5** for the **Thickness** variable. Click **Save** to update the graphical view.
- Highlight **P_4** and update the *Vertical* constraint *Value* to **-0:8.5** for the **Thickness** variable. Click **Save** to update the graphical view.
- Highlight **P_5** and update the *Horizontal* constraint *Value* to **-23:6.5** for the **LT_Width_Lane1** variable. Click **Save** to update the graphical view. Notice that the horizontal offset of P_4 was updated automatically with the change to P_5.
- For **P_1**, **P_2**, **P_4**, and **P_5**, update the *Mode* of the *Corner Attribute* section to **Chamfer** and enter **0:3/4** as the value. Click **Save**. Zoom into one of the corners and notice the chamfers that are now showing in the graphical view.



10. Select **Close** to close the *Template Creation* window. The new deck template is now complete and would be ready to be used with the **Place Deck** tool. See the Deck Template section of the guide for additional options within the *Template Creation* window.



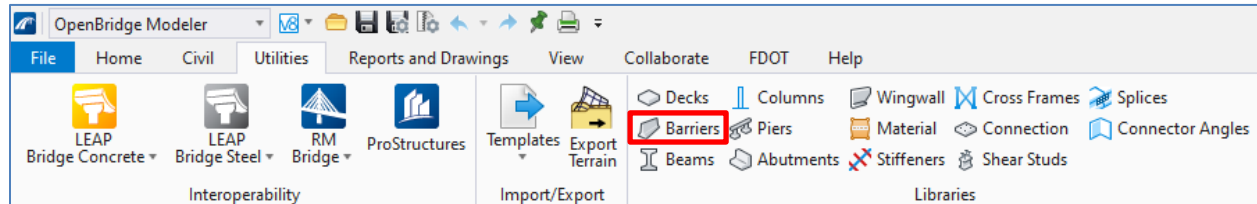
See the following page for summary of input used in the exercise.

Exercise 5.5 - Create and Modify Deck and Barrier Templates			
<i>Create and Modify a Deck Template</i>			
Step	Dialog Box	Field Name (Section)	Field Input
4	Template Creation	Point	P_1
		Mode	Horizontal
		Parent	P_0
		Value	31:6.5
		Variable	RT_Width_Lane1
		Mode	Slope
		Parent	Working Point
		Value	0.02
		Variable	RT_Slope_Lane1
5	Template Creation	Point	P_2
		Mode	Horizontal
		Parent	P_1
		Value	0:0
		Variable	-
		Mode	Vertical
		Parent	P_1
		Value	-0:8.5
		Variable	Thickness
6	Template Creation	Point	P_3
		Mode	Horizontal
		Parent	P_0
		Value	0:0
		Variable	-
		Mode	Vertical
		Parent	P_0
		Value	-0:8.5
		Variable	Thickness
7	Template Creation	Point	P_4
		Mode	Horizontal
		Parent	P_5
		Value	0:0
		Variable	-
		Mode	Vertical
		Parent	P_5
		Value	-0:8.5
		Variable	Thickness
8	Template Creation	Point	P_5
		Mode	Horizontal
		Parent	P_0
		Value	-23:6.5
		Variable	LT_Width_Lane1
		Mode	Slope
		Parent	P_0
		Value	0.02
		Variable	LT_Slope_Lane1
9	Template Creation	Mode (Corner Attributes)	Chamfer
		Distance (Corner Attributes)	0:0.75
		Variable (Corner Attributes)	-

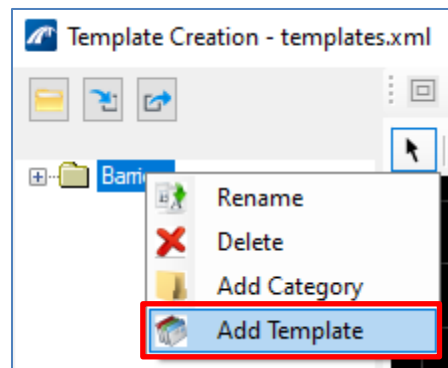
➤ **Create and Modify a Barrier Template:**

This exercise will create a new barrier template from scratch rather than copying an existing template. There are very few occasions where the user will need a custom barrier since the FDOT barrier library encompasses all the standard barriers.

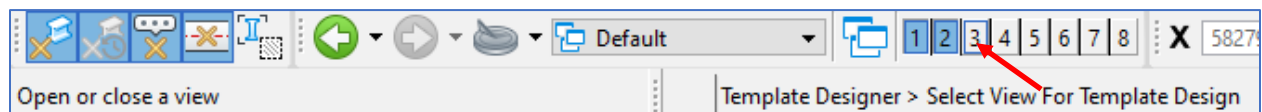
1. Continue with the file from the deck template exercise, **B01MODLBRTR01_5.5_Begin**.



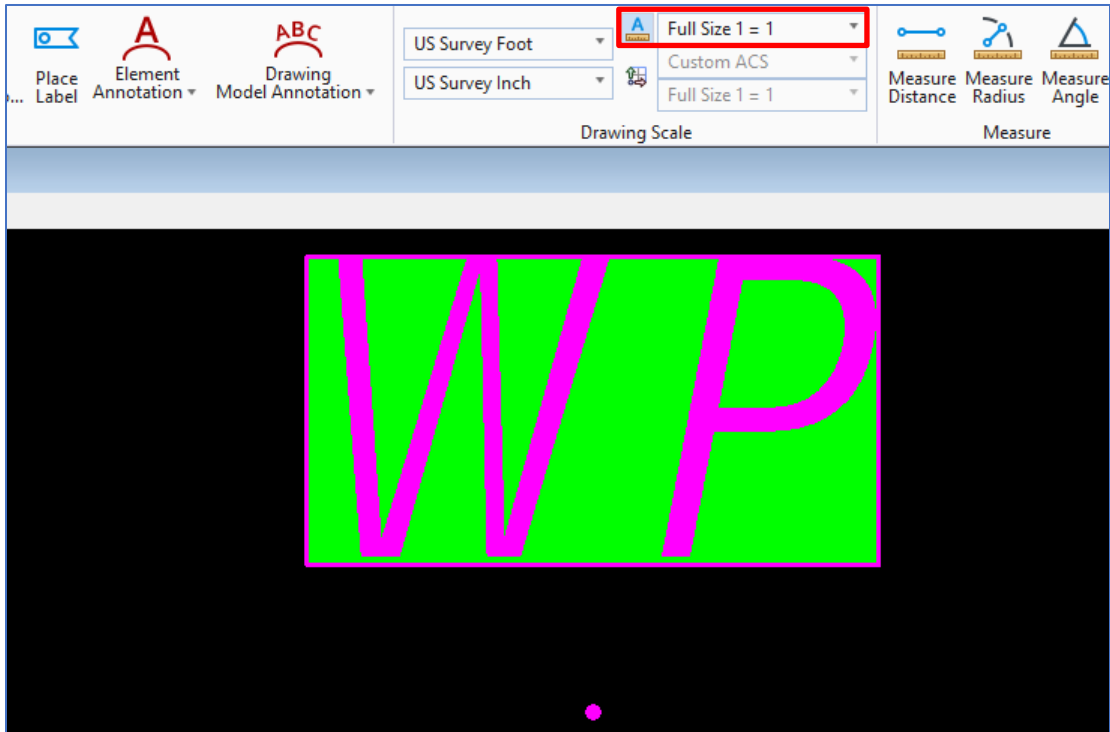
2. Open the barrier template library by navigating to **Utilities > Libraries > Barriers**.
3. Right click on the main *Barriers* folder and select **Add Template**.



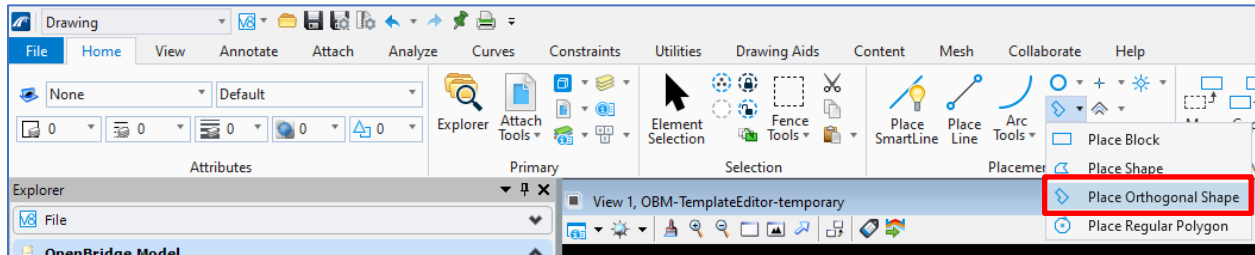
4. Enter **xx_TEST_Barrier** for *Name* and **Test Barrier for Guide** for *Description*. Click **OK**.
5. The dialog box will go into the background and prompt to select a view for Template design. Open **View 3** in the *View Toggle* area on the bottom left of the window.



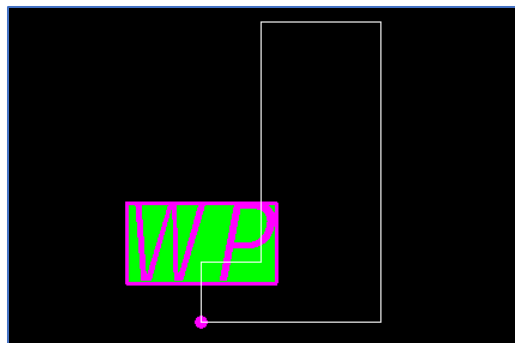
6. Click a space within the newly opened *View 3* window. A temporary *View 1* window with open. This temporary view is used to allow users to utilize Microstation tools to draw the template. Users can either reference and merge existing linework or draw linework in live.
7. Often the temporary view windows will need the Drawing Scale adjusted from the default. Navigate to **Reports and Drawings > Drawing Scale Annotation Scale**, select **Full Size 1 = 1**. The only point in the window is a Working Point (WP). Note that the text and background are the same color in the following clips when not selected. This can be avoided by changing the active text style to Structures rather than Structures Annotation prior to opening the template editor.



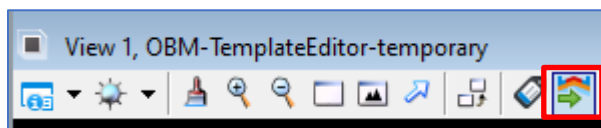
8. Navigate to **Drawing (Workflow) > Home > Placement > Place Orthogonal Shape**.



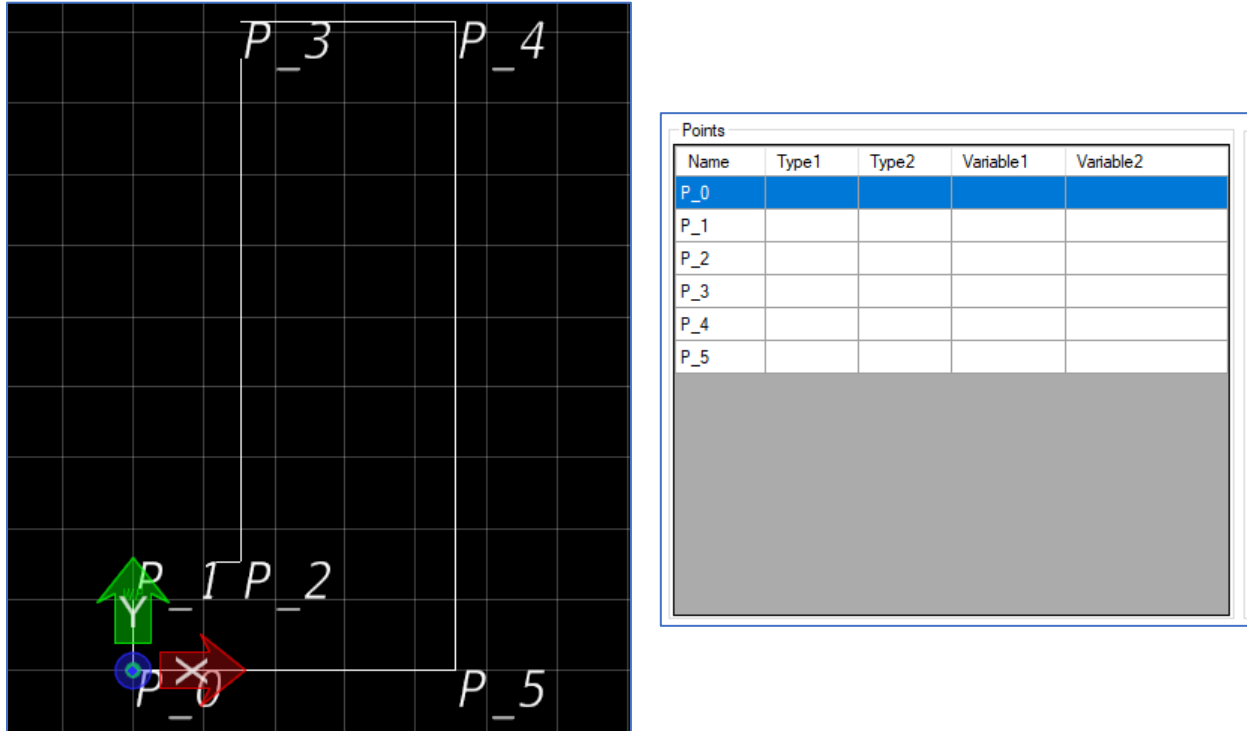
9. Draw an L-Shape barrier with six points, starting at the WP and moving up. The actual shape is not important, but rather the process. Generally, the WP would be at the gutterline.



10. Once completed, click **Import template from model** on the right side of the view toolbar.

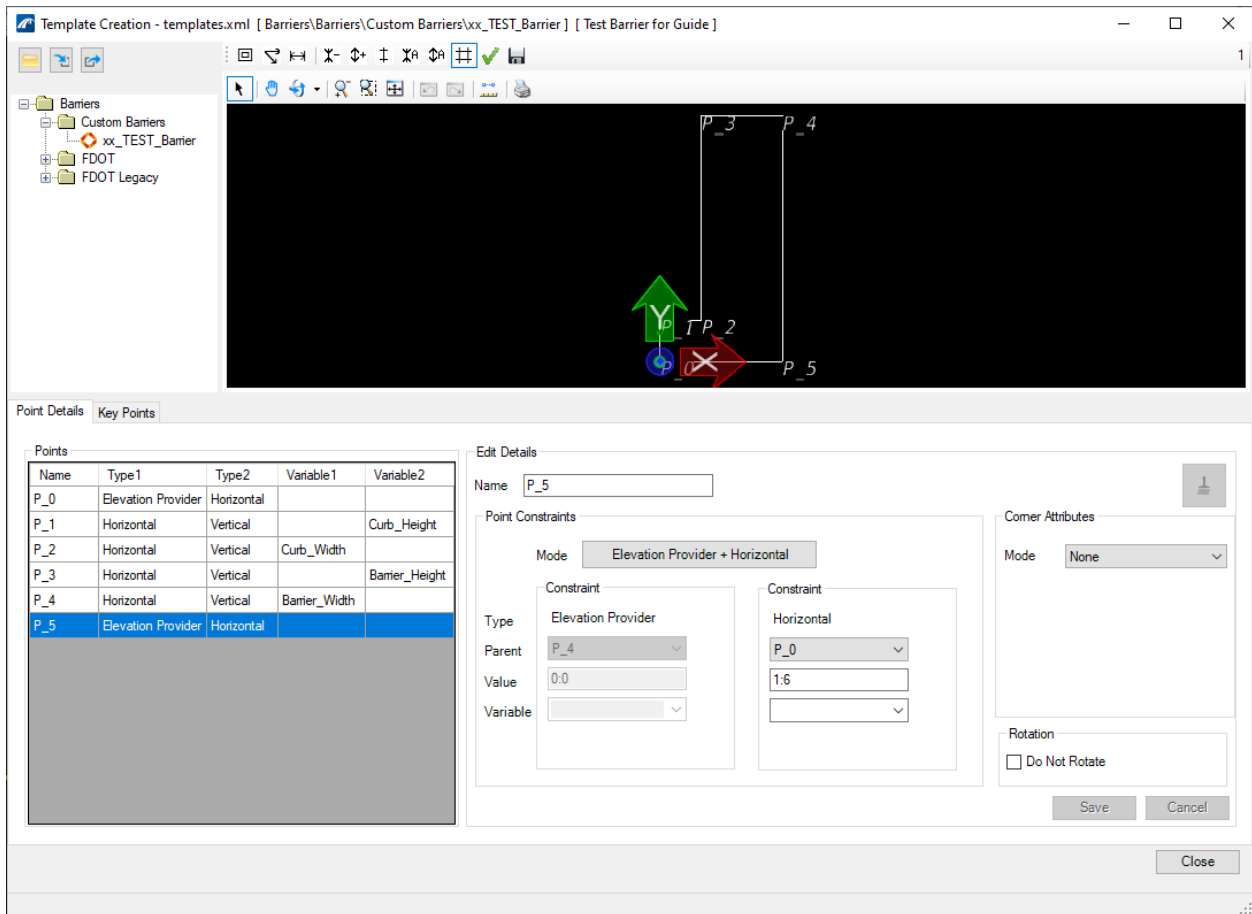


11. Click **Yes** when the *Import Template From Model* dialog box opens. The *Template Creation* window can be opened again to view the shape. Select the newly created barrier.
12. Points will be automatically generated based on the created shape but Point Constraints will all be blank by default.



13. Select **P_0**, which should coincide with the WP. Select **Elevation Provider + Horizontal** for the *Mode*. The *Parent* should be set to **Working Point** and the *Value* will be set to **0:0**. Keep these selections. Click **Save**.
14. If the barrier shape was drawn using actual geometry, any *Mode* selected will automatically fill in *Parent* and *Value* selections based on the linework. Select **P_1** (the point above WP/P_0) and select **Horizontal + Vertical** for the *Mode*. For the Horizontal constraint, the *Parent* can be **Working Point** or **P_0**, with a value of **0:0**. For the Vertical constraint, the *Parent* can be **Working Point** or **P_0**, with a value of **0:6** and input the *Variable* as **Curb_Height**. Click **Save**.
15. Select **P_2** (the point to the right of P_1) and select **Horizontal + Vertical** for the *Mode*. For the Horizontal constraint, select **P_1** as the *Parent*, with a value of **0:6** and input the *Variable* as **Curb_Width**. For the Vertical constraint, select **P_1** as the *Parent*, with a value of **0:0**. Click **Save**.
16. Select **P_3** (the point above P_2) and select **Horizontal + Vertical** for the *Mode*. For the Horizontal constraint, select **P_2** as the *Parent*, with a value of **0:0**. For the Vertical constraint, select **P_0** as the *Parent*, with a value of **3:0** and input the *Variable* as **Barrier_Height**. Click **Save**.

17. Select P_4 (the point to the right of P_3) and select **Horizontal + Vertical** for the *Mode*. For the Horizontal constraint, select P_0 as the Parent, with a value of **1:6** and input the *Variable* as **Barrier_Width**. For the Vertical constraint, select P_3 as the Parent, with a value of **0:0**. Click **Save**.
18. Select P_5 (the point below P_4) and select **Elevation Provider + Horizontal** for the *Mode*. For the Horizontal constraint, select P_0 as the Parent, with a value of **1:6**. Click **Save**.
19. Select **Close** to close the *Template Creation* window. The new barrier template is now complete and would be ready to be used with the **Place Barrier** tool.



See the following page for a summary of the Point input used in the exercise.

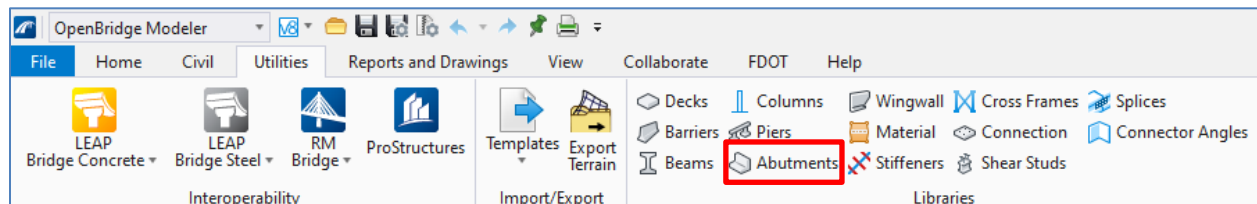
Exercise 5.5 - Create and Modify Deck and Barrier Templates			
<i>Create and Modify a Barrier Template</i>			
Step	Dialog Box	Field Name (Section)	Field Input
4	Add Template Pop-up	Name	xx_TEST_Barrier
		Description	Test Barrier for Guide
13	Template Creation	Point	P_0
		Mode	Elevation Provider
		Parent	-
		Value	-
		Variable	-
		Mode	Horizontal
		Parent	Working Point
		Value	0:0
14	Template Creation	Point	P_1
		Mode	Horizontal
		Parent	Working Point
		Value	0:0
		Variable	-
		Mode	Vertical
		Parent	Working Point
		Value	0:6
15	Template Creation	Point	P_2
		Mode	Horizontal
		Parent	P_1
		Value	0:6
		Variable	Curb_Width
		Mode	Vertical
		Parent	P_1
		Value	0:0
16	Template Creation	Point	P_3
		Mode	Horizontal
		Parent	P_2
		Value	0:0
		Variable	-
		Mode	Vertical
		Parent	P_0
		Value	3:0
17	Template Creation	Point	P_4
		Mode	Horizontal
		Parent	P_0
		Value	1:6
		Variable	Barrier_Width
		Mode	Vertical
		Parent	P_3
		Value	0:0
18	Template Creation	Point	P_5
		Mode	Elevation Provider
		Parent	-
		Value	-
		Variable	-
		Mode	Horizontal
		Parent	P_0
		Value	1:6
		Variable	-

Exercise 5.6 Create and Modify Substructure Templates

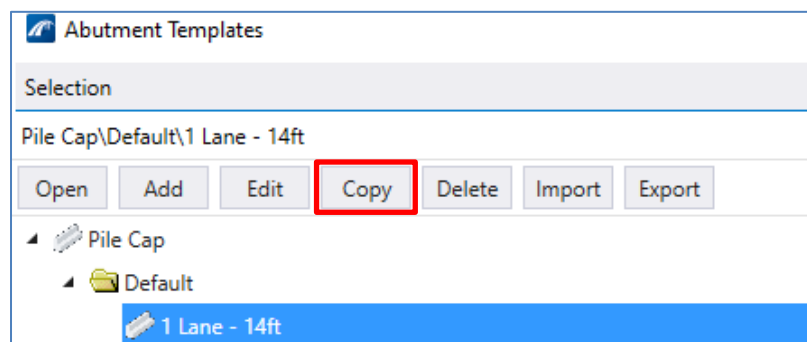
➤ Create and Modify an Abutment Template:

This exercise will create the same abutment template that was imported in a previous exercise.

1. Open the data set file: **B01MODLBRTR01_5.6_Begin**
2. Open the abutment template library by navigating to **Utilities > Libraries > Abutments**.



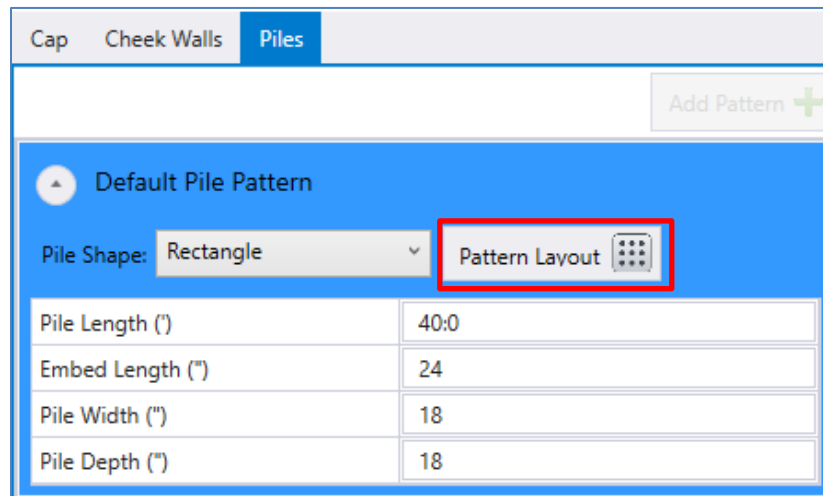
3. Expand the **Pile Cap** and **Default** folders, click on **1 Lane - 14ft** and select **Copy** from the top of the *Selection* section.



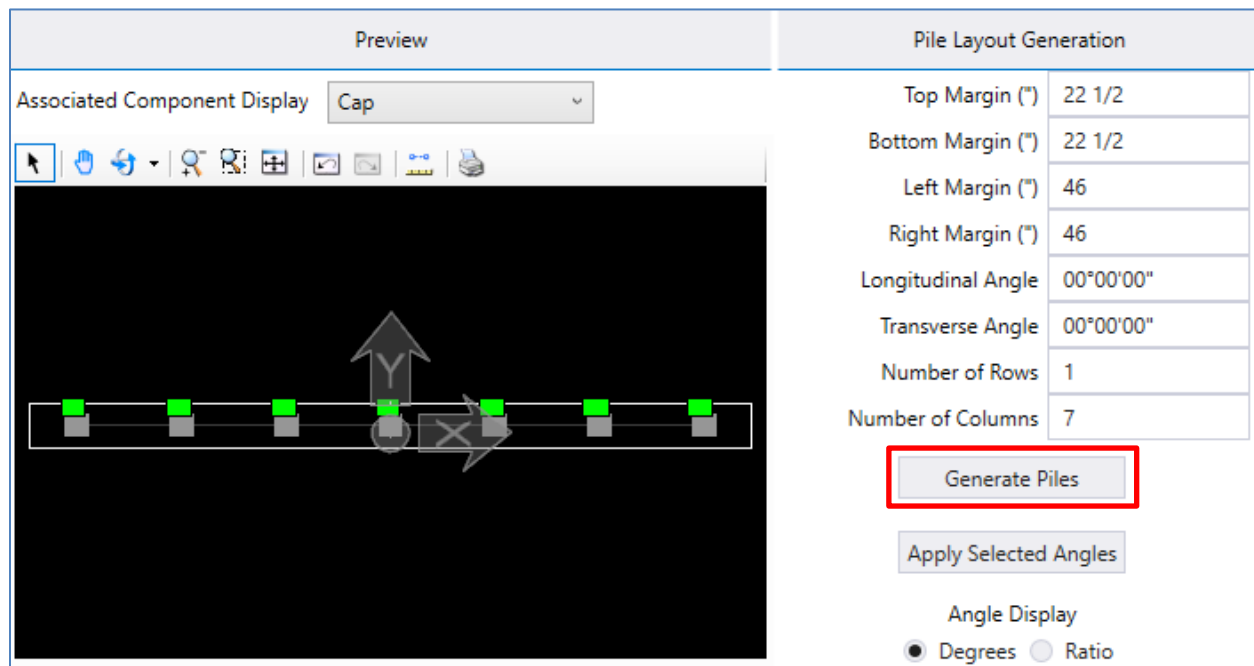
4. In the *Create Template Copy* dialog box that comes up, enter **xx_TEST_EB** as the *Name*. A copy of the original end bent template will now appear on the list under the new name.
5. Select the **xx_TEST_EB** template and click **Edit** from the top of the *Selection* section. For a pile bent, the available categories are *Cap*, *Cheek Walls*, and *Piles*.
6. In the *Cap* tab, select **Front Face of Back Wall** as the *Supportline Alignment* since that is what FDOT uses to represent the begin of bridge in terms of stationing. Fill in the rest of the input shown based on the image below. Note that the units vary across input.

Cap	Cheek Walls	Piles
SupportLine Alignment	Front Face of Back Wall	
Cap Length (')	57:8	
Pile Cap Depth (")	36	
Pile Cap Width (")	45	
Back Wall Depth (")	39 5/8	
Back Wall Width (")	15	
Back Wall Horizontal Offset (")	0	

7. In the *Piles* tab, select **Rectangular** as the *Pile Shape*. Enter **40:0** as the *Pile Length*, **24** as the *Embed Length*, and **18** as the *Pile Width* and *Pile Depth*. Again, note the units for each input.
8. To the right of the *Pile Shape* input, click the **Pattern Layout** button.

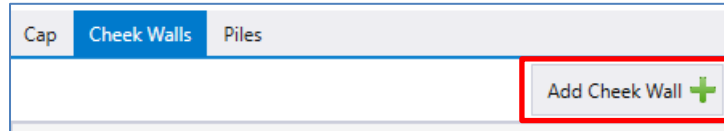


9. A new window will open, the *Pile Pattern Layout*. In the *Pile Layout Generation* section, enter the input based on the image below. One filled in, select **Generate Piles** to update the *Preview* section that shows a graphical representation of the cap and pile locations. Note that the margin distances are from face of cap to CL pile.

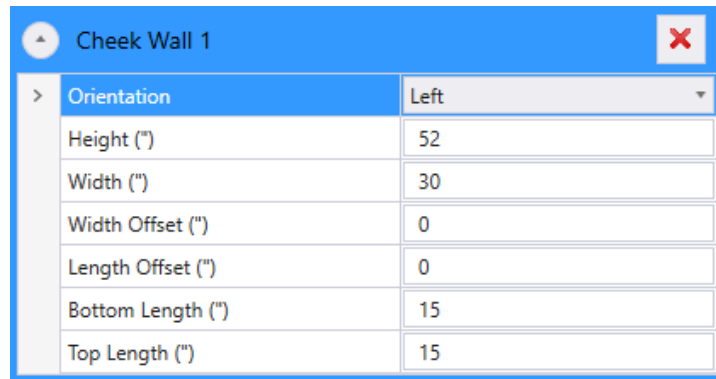


10. Note that the *Pile Positions* section at the bottom is filled in automatically. If the pile spacing was not uniform, the **Manual** checkbox could be checked and the individual pile spacing could be specified. For this example, the piles are uniform, so click **OK** to save and close the *Pile Pattern Layout* window.

- This template will use multiple cheekwall elements to model wingwalls, which results in slight overestimate of concrete quantities. See the Place Abutment section for more information. In the *Cheek Walls* tab, click the **Add Cheek Wall** button to add a segment of cheekwall. There will be three segments of cheekwalls on each side, six per abutment template.



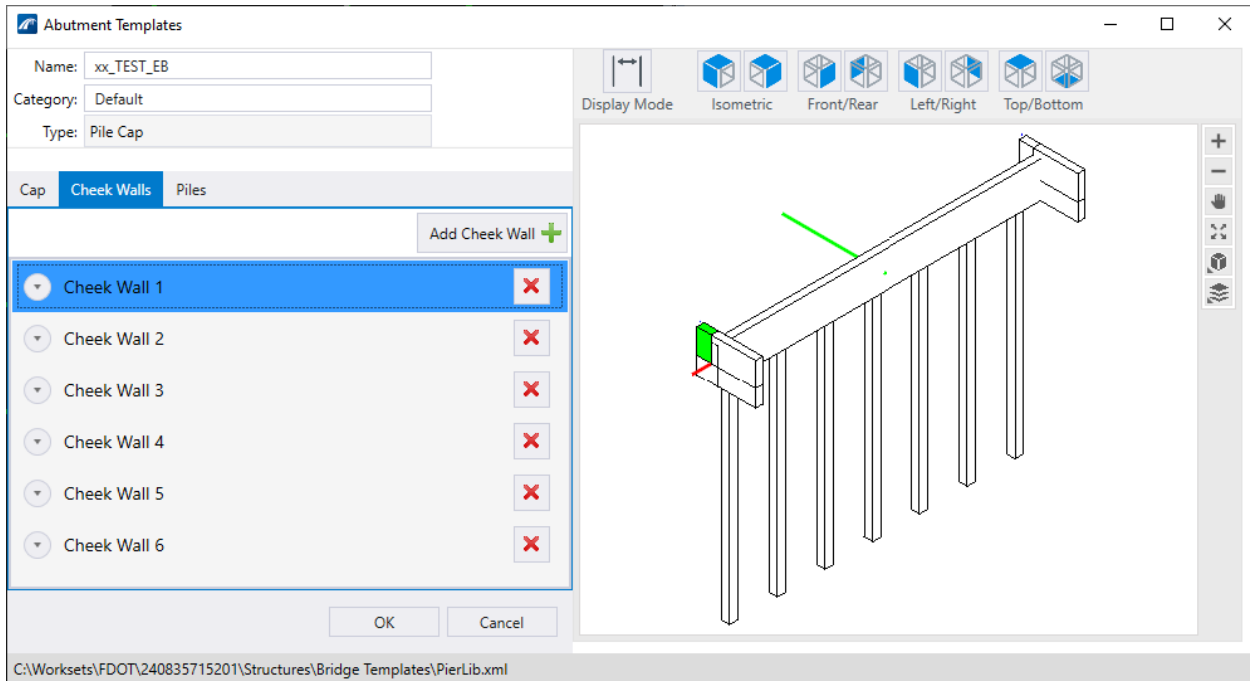
- In the *Cheek Wall 1* section, enter the input based on the image below.



- Add the five additional cheekwall segments based on the table below.

Exercise 5.6 - Create and Modify Deck and Barrier Substructure Templates			
Create and Modify an Abutment Template			
Step	Dialog Box	Field Name (Section)	Field Input
13	Abutment Template (Cheek Wall 2)	Orientation (Cheek Wall)	Right
		Height (") (Cheek Wall)	52
		Width (") (Cheek Wall)	30
		Bottom Length (") (Cheek Wall)	15
		Top Length (") (Cheek Wall)	15
	Abutment Template (Cheek Wall 3)	Orientation (Cheek Wall)	Left
		Height (") (Cheek Wall)	52
		Width (") (Cheek Wall)	-93
		Bottom Length (") (Cheek Wall)	15
		Top Length (") (Cheek Wall)	15
	Abutment Template (Cheek Wall 4)	Orientation (Cheek Wall)	Left
		Height (") (Cheek Wall)	-36
		Width (") (Cheek Wall)	-93
		Bottom Length (") (Cheek Wall)	15
		Top Length (") (Cheek Wall)	15
	Abutment Template (Cheek Wall 5)	Orientation (Cheek Wall)	Right
		Height (") (Cheek Wall)	52
		Width (") (Cheek Wall)	-93
		Bottom Length (") (Cheek Wall)	15
		Top Length (") (Cheek Wall)	15
Abutment Template (Cheek Wall 6)	Orientation (Cheek Wall)	Right	
	Height (") (Cheek Wall)	-36	
	Width (") (Cheek Wall)	-93	
	Bottom Length (") (Cheek Wall)	15	
	Top Length (") (Cheek Wall)	15	

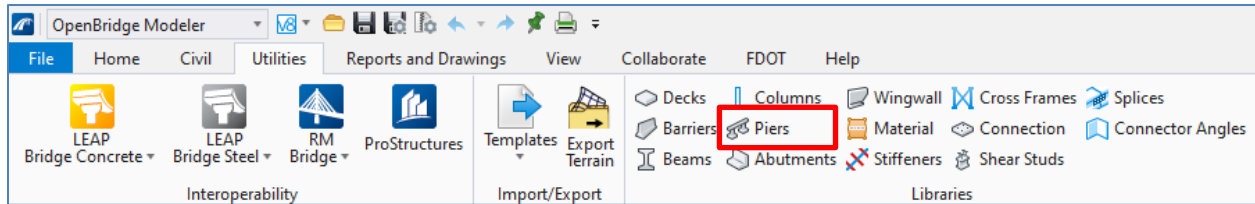
14. Once all cheekwalls segments are entered, the abutment template preview should appear as below. Select **OK** to save the template and close the *Abutment Templates* window. The new abutment template is now complete and would be ready to be used with the **Place Abutment** tool.



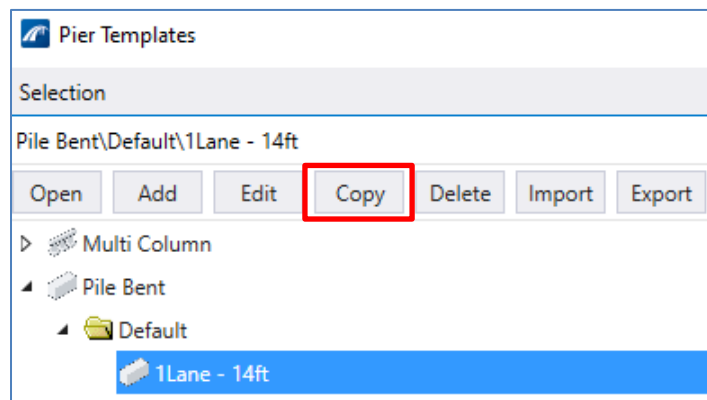
➤ **Create and Modify a Pier Template:**

This exercise will create the same pier template that was imported in a previous exercise.

1. Continue with the file from the abutment template exercise, **B01MODLBRTR01_5.6_Begin**.
2. Open the abutment template library by navigating to **Utilities > Libraries > Piers**.



3. Expand the **Pile Bent** and **Default** folders, click on **1Lane - 14ft** and select **Copy** from the top of the *Selection* section.

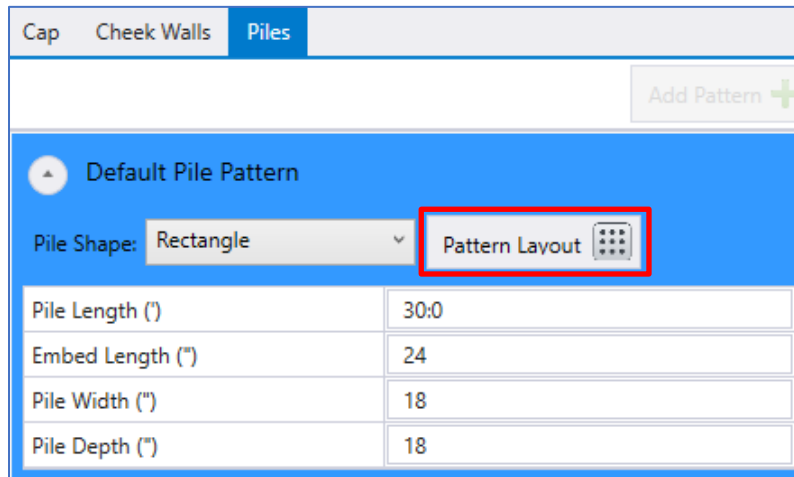


4. In the *Create Template Copy* dialog box that comes up, enter **xx_TEST_IB** as the *Name*. A copy of the original end bent template will now appear on the list under the new name.
5. Select the **xx_TEST_IB** template and click **Edit** from the top of the *Selection* section. For a pile bent, the available categories are *Cap*, *Cheek Walls*, and *Piles*.
6. In the *Cap* tab, keep the *Type* as **Rectangle** and fill in the rest of the input shown based on the image below. Note that the units vary across input.

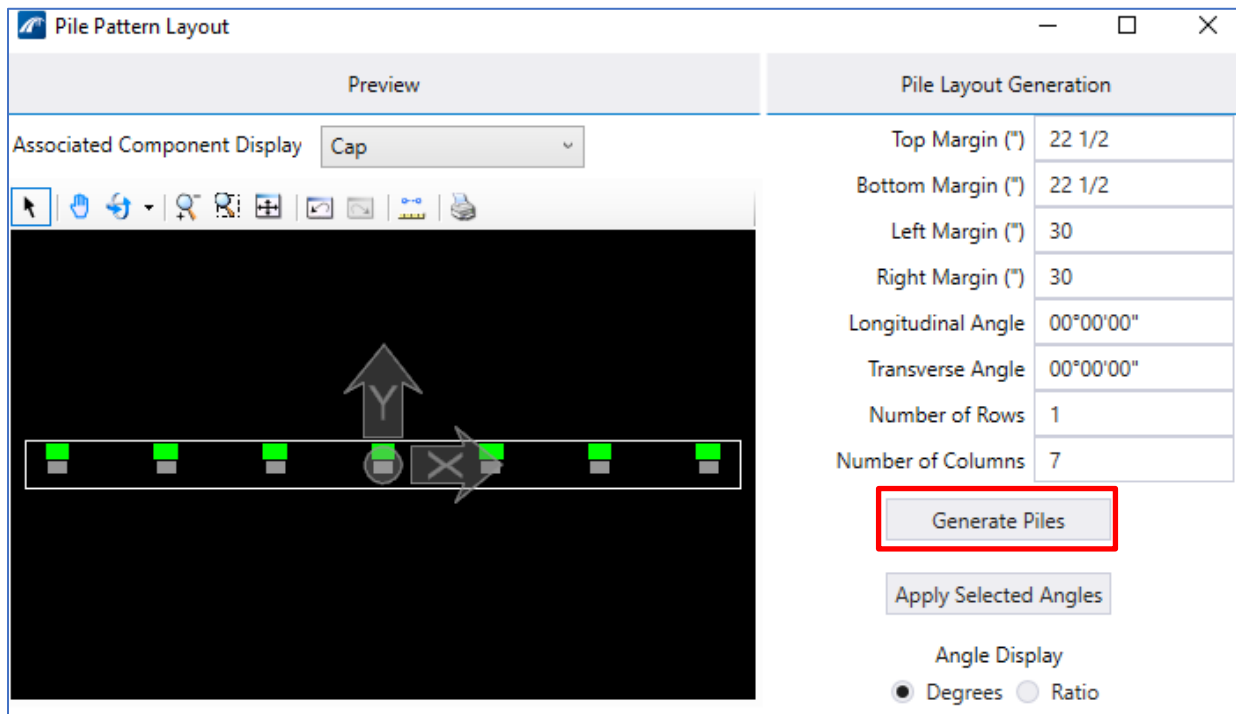
Cap	Cheek Walls	Piles
Type:	Rectangle	
Cap Length (')	55:0	
Cap Height (")	36	
Cap Width (")	45	
Edge	None	

7. In the *Piles* tab, select **Rectangular** as the *Pile Shape*. Enter **40:0** as the *Pile Length*, **24** as the *Embed Length*, and **18** as the *Pile Width* and *Pile Depth*. Again, note the units for each input.

8. To the right of the *Pile Shape* input, click the **Pattern Layout** button.

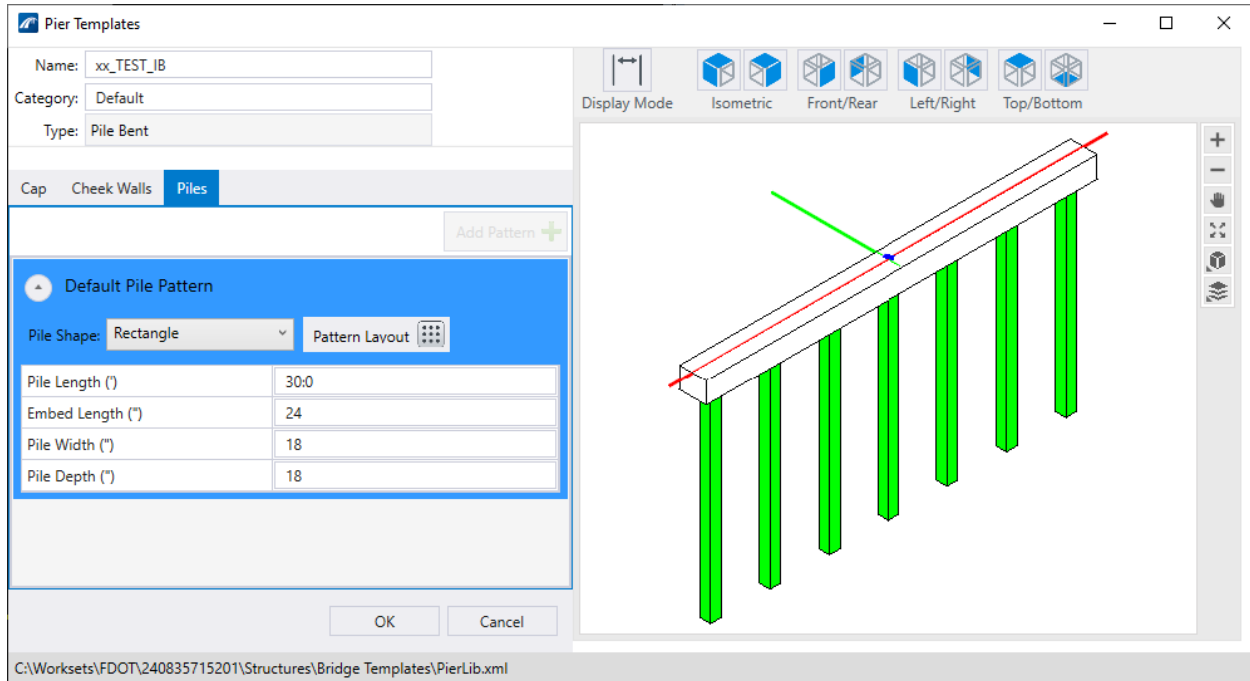


9. A new window will open, the *Pile Pattern Layout*. In the *Pile Layout Generation* section, enter the input based on the image below. One filled in, select **Generate Piles** to update the *Preview* section that shows a graphical representation of the cap and pile locations.



10. Note that the *Pile Positions* section at the bottom is filled in automatically. If the pile spacing was not uniform, the **Manual** checkbox could be checked and the individual pile spacing could be specified. For this example, the piles are uniform, so click **OK** to save and close the *Pile Pattern Layout* window.

11. The intermediate bent template from the exercise does not have any cheekwalls. The pier template preview should appear as below. Select **OK** to save the template and close the *Pier Templates* window. The new abutment template is now complete and would be ready to be used with the **Place Pier** tool.



6 PLANS DEVELOPMENT

OVERVIEW

Creating a set of bridge plans has been around for as long as bridges have been built. However, model-centric workflows are beginning to change what the industry considers “plans” to be. The shift to 3D digital models offers numerous advantages over a set of traditional 2D graphic plans, but there are still many challenges to overcome until all stakeholders are consistently and completely utilizing 3D digital data efficiently as the primary contract document. As the industry transitions to this exciting future, a model-centric workflow allows for more options and enhancements to the 2D plans development workflows, while still preserving the ability to utilize traditional methods where they are advantageous. The key is finding the balance to convey design intent in the most effective manner possible.

Recent OBM enhancements in this area are a result of the search for this balance. There are many tools through the OBM software, some are MicroStation tools which are available in OBM, that users can utilize to produce bridge plans and associated content. This chapter provides an overview of these tools and examples of how they can be used in typical bridge project applications.

OBJECTIVES

The objectives of this chapter are to provide options to enhance and add value to plans production workflows in OBM with the following tools and methods:

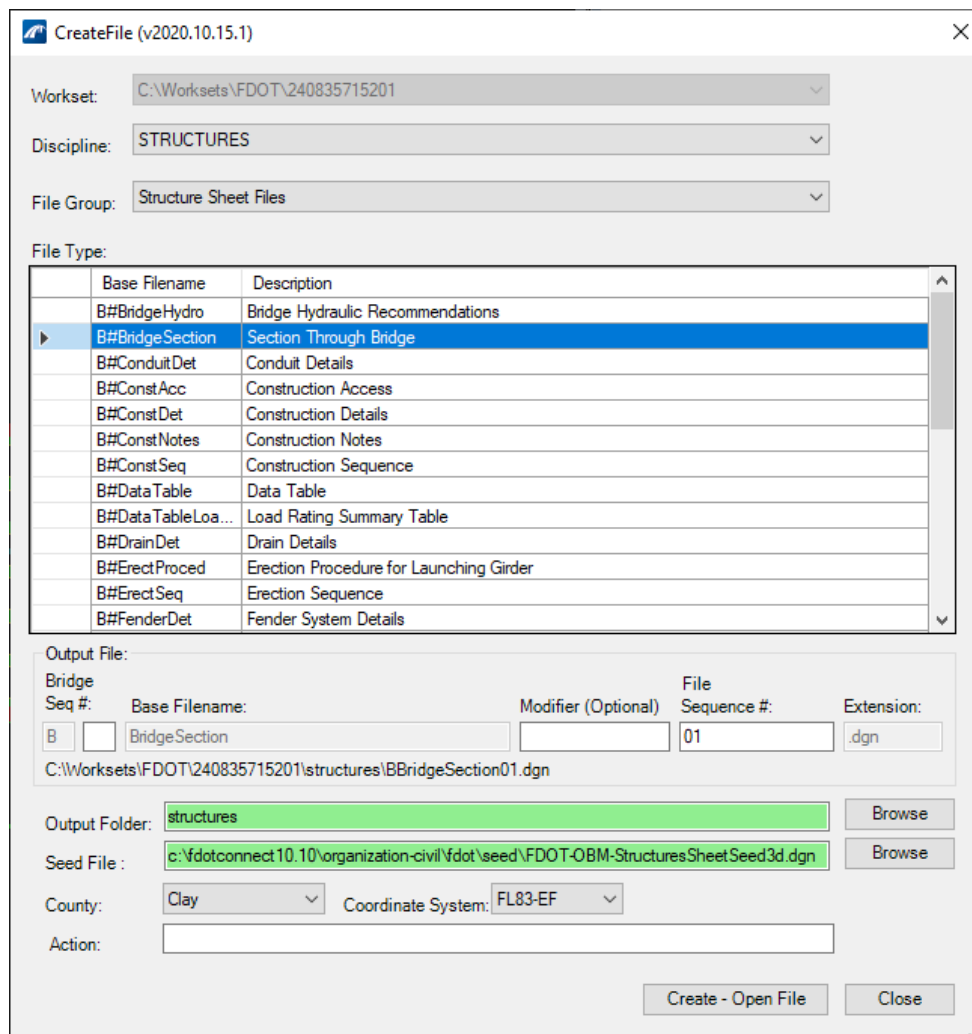
- Detailing Tools (Section Callout and Detail Callout)
- Dynamic View by Station
- Place Named Boundary
- Drawing Boundary Tool
- Saved Views
- Text Favorites

STARTING A NEW DRAWING & WORKFLOW

See Chapter 3 for a discussion on design models, drawing models, and sheet models. Plans production will utilize drawing models and sheet models, which will be contained within a sheet file (dgn). A new Drawing or Sheet Model can either be created directly within a Design file or in a separate sheet file. For the models in a separate file, the OBM model is referenced from the Design file (with the bridge model). This workflow utilizing references allows for several advantages in plans development and is the

recommended workflow by FDOT. First, a team of users can work separately on multiple workstations on the model file and the drawing files simultaneously. This can help increase efficiency as one user can be developing plans drawings while another can be developing the model or adding additional detail at the same time. Note that only one user can be editing a single DGN file at a time, but the separate files created in this approach provides a workflow in which multiple users can be developing various content for the same bridge. Second, this separates the sheets and the model files so that if one file becomes unstable or corrupt, loss of data and efforts is likely to be minimized. Alternatively, having all the models and sheets in one file may result in loss of most if not all of the data when corruption occurs.

The **FDOT > Create File** tool should be used to create all sheet files. When **STRUCTURES** is selected as the *Discipline* and **Sheet Files** is selected as the *File Group*, there are many sheet Base Filenames which may be selected for the *File Type*. The user should select the applicable sheet file for the current plans production activity to stay in compliance with FDOT CADD standard per FDOT CADD Manual.

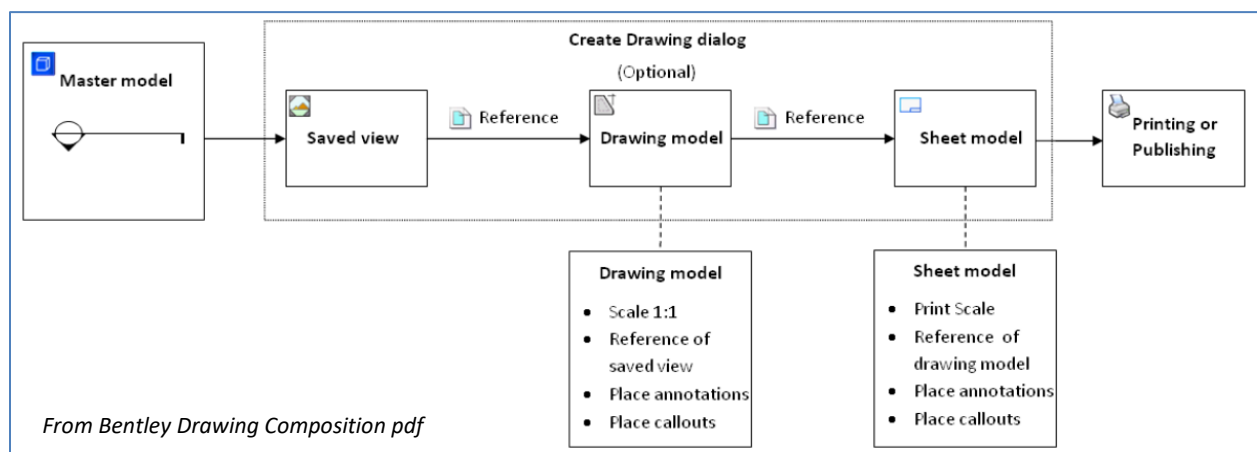


In general, sheet files that would reference the 3D bridge model will use a 3D sheet seed file so that any Saved Views will be able to reside in the sheet file itself. For other sheet files that will not utilize 3D Saved Views, those can use a 2D sheet seed file. Users can change which seed file is used by selecting

Browse next to the *Seed File*.

Once a sheet file is created, the user can create sections and views from the model directly into these new files. This creates an active reference to the model in which additional detailing and annotation can be generated to prepare for plans development.

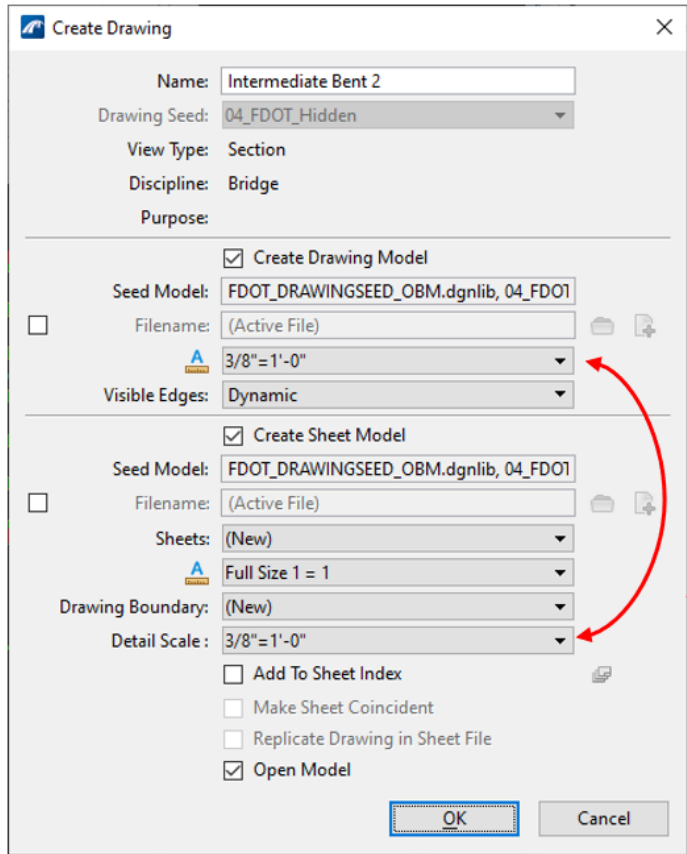
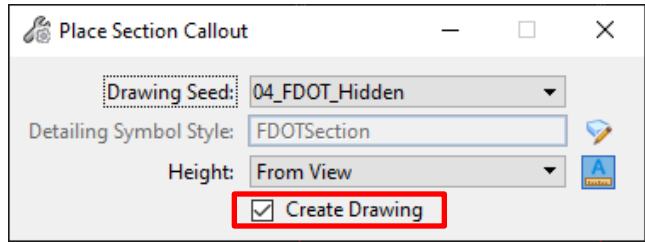
Although they can be placed in either Drawing or Sheet Models, FDOT recommends that all dimensioning and annotation shall be generated in the Drawing Model created using Annotation Scale. There are some exceptions such as notes, which could be placed in either model, or Section Callout/Detail Callout symbols that should be placed directly in the sheet model or they will not plot. The Drawing Model is then referenced into the Sheet Model for plans development. See below for a diagram that Bentley developed to help visualize the relationship between Design Models (Master model), Drawing Models, and Sheet Models.



Note that there is some uniqueness in model-centric plans development compared to traditional plan production. First, the linework is essentially a “view” of the model, so it will reflect exactly what is in model as lines are references directly from the design model. Although this is advantageous over traditional methods in many situations for both efficiency and quality, the user must be aware of this, as the tools used and processes followed are likely altered. For example, lines cannot just be simply deleted as they are references from the model; instead, display rules and masking tools must be used if certain linework is to be shown differently or not shown in a particular detail.

CREATE DRAWING DIALOG BOX

There are various tools within OBM that include the option to create a Drawing Model and a Sheet Model while using the tool. These tools include Create Drawings, Create, Dynamic View By Station, Place Named Boundary, Section Callout, and Section Detail tools. The specific tools will be discussed later in the chapter, but they all share the Create Drawing dialog box. With these tools, there is either a check box to Create Drawing or the dialog box will open automatically within the course of using the tool.

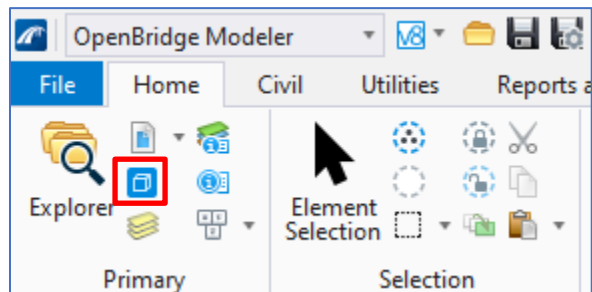


Enter a name – this will be used as the name of the new models. The FDOT Drawing Seed selected for the tool will be displayed.

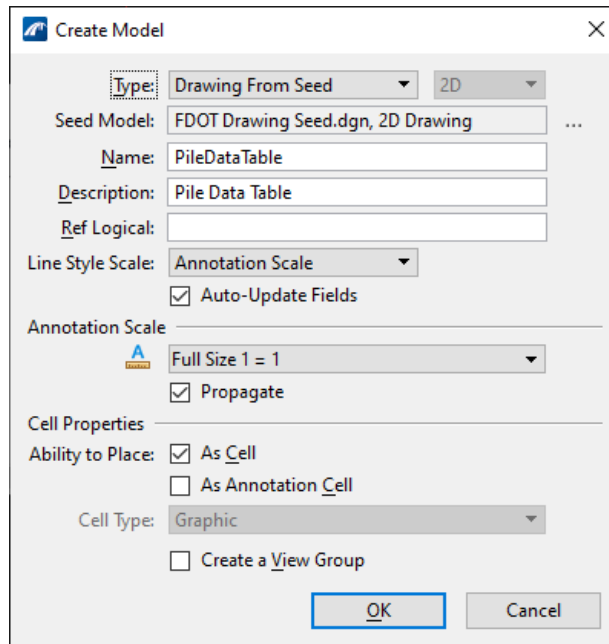
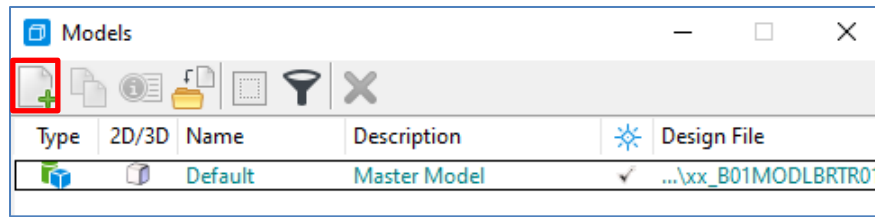
This section is for a Drawing Model. Models can either be placed in the Active File or sent to another existing DGN. The annotation scale and Visible Edge setting is set here but can be adjusted later.

This section is for a Sheet Model. If only a Drawing Model is needed for placement in an existing Sheet Model, this section can be unchecked. Sheet Model annotation scale should always be set to Full Size, but the Detail Scale should match the Drawing Model annotation Scale. Drawing Boundary can be used if set up ahead of time. Check the Open Model box to open immediately after creation.

For certain sheet files where none of the mentioned tools are anticipated to be used to link the Design Model to the plans, the FDOT **Create File** tool will have an *Action* key-in to create a drawing and sheet model upon file creation. However, there may be situations where users must manually create these models. In this situation, the *Models* dialog box can be used to create Drawing Models and Sheet Models. In no case should any plans production work be done in a Design Model, as the border is set up to be automatically placed within a Sheet Model. FDOT borders should never be added as a reference or placed as a cell in OBM.

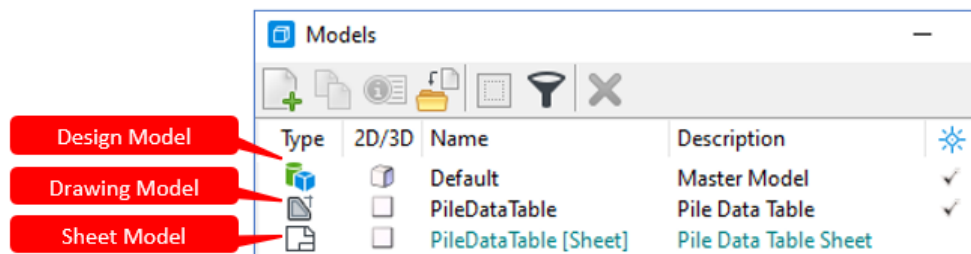


From within the sheet file, open the *Models* dialog box by navigating to **Home > Primary > Models**. Once open, select **Create new model** and a *Create Model* window will open. Fill in the information as needed for the new sheet and select **OK**.

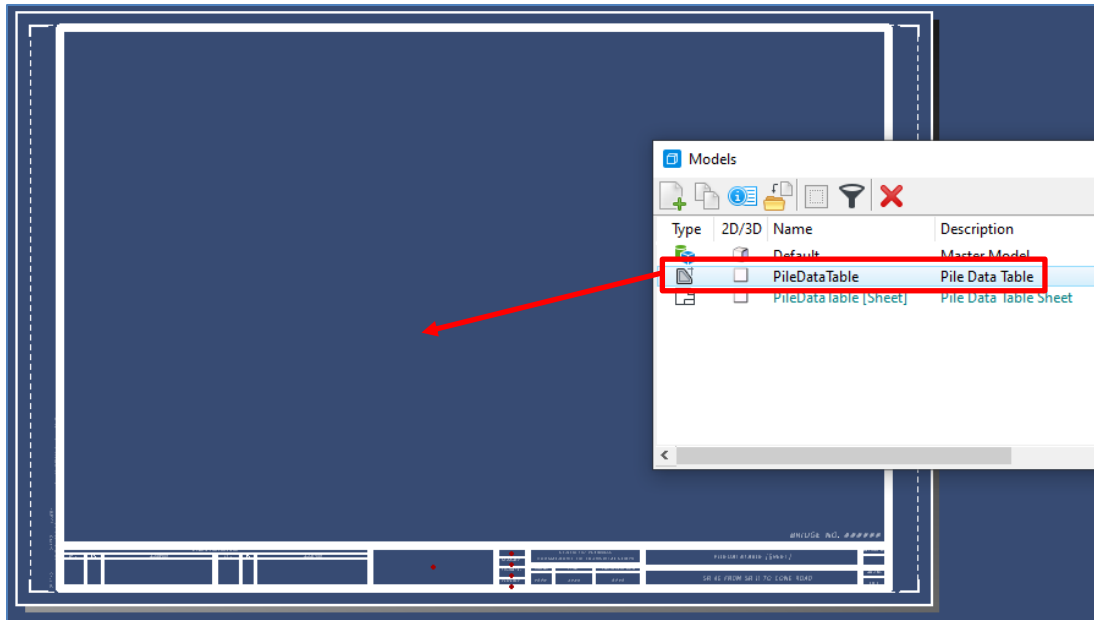


Note The *Type* selected should match the required model and should always be **XXXXX From Seed**, with the XXXXXX being either Design, Drawing, or Sheet. This ensures proper FDOT seed files are used in the creation of the models. Using the **Sheet From Seed** option will display additional *Sheet Properties*, which will be filled by the FDOT seed. The *Drawing Boundary* for sheets can be **(New)** or can be placed within an existing sheet model.

This process should be completed one at a time for each drawing model and sheet model. In the FDOTConnectXX.XX workspace, the background for drawing models is set to a **gray color** and for sheet models is set to a **navy/blueprint color**. The different models can also be distinguished within the Models dialog box by the symbol under the *Type* column. See below for symbols and the corresponding models.

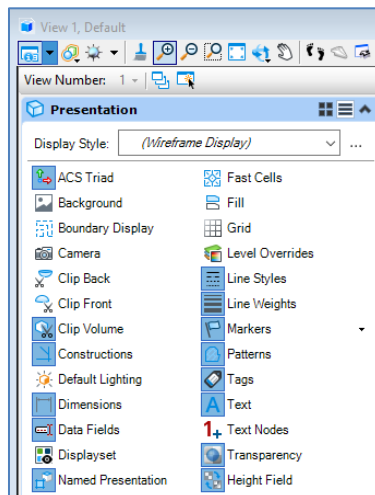


When the models are created using the Models dialog box, they will not be automatically linked together. Once content/linework has been placed in the drawing model, the link to the sheet model can be made from the Models dialog box by dragging and dropping the drawing model into the sheet model.



An *Attach Source Files* window will open with various *Attachment Method* options. **Recommended** can be used. Once accepted, the drawing model outline can be used to place the drawing model into the sheet model. With a left click to confirm the location, a reference of the drawing model will be made in the sheet model. The newly created reference can be viewed and manipulated in the References dialog box.

There are display symbols for section and model cut lines produced when creating views in the Design Model, Drawing Model or Sheet Model. The **View Attributes** tool (at the top left of the view window) is a critical tool to control how certain elements are displayed. These attributes include clip volume lines, markers, and dimensions. If the model is brought in as a reference these changes can be made by right clicking on the file in the *References* window and selecting **Presentation** from the drop-down list.



DETAILING TOOLS

There are various detailing tools available in OBM, but the most versatile one is the **Section Callout** tool. This tool can be used to replicate the function of various other detailing tools, such as **Plan Callout** and **Elevation Callout**. The detailing tools can be found in **Drawing (Workflow) > Annotate > Detailing**. The detailing tools discussed below have FDOT seeds set up to control the detailing symbol style and the display style. See below for a list of FDOT drawing seeds and the tools they are used with.

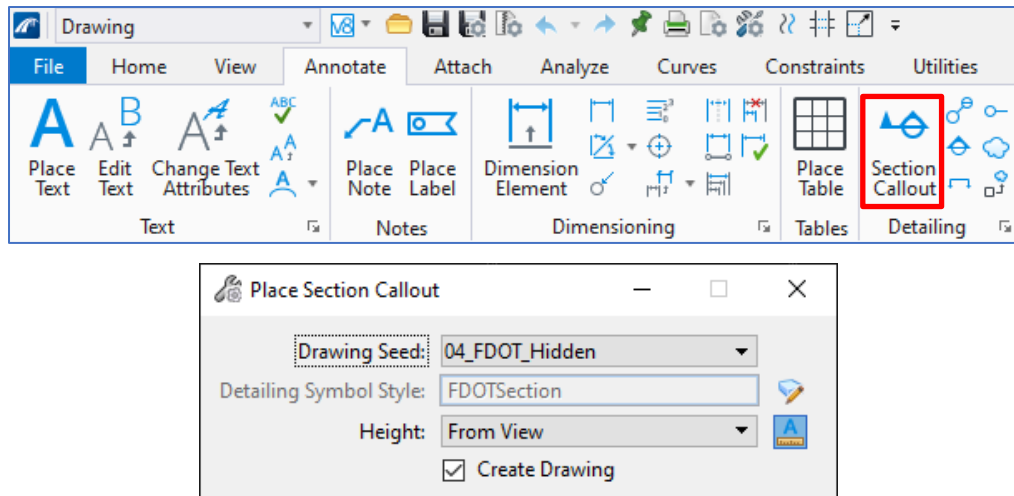
Drawing Model Name	Description
00_FDOT_Solid	Section Callout Solid Horiz
01_FDOT_Solid_NoSheet#	Section Callout Solid Horiz No Sheet #
02_FDOT_Solid_Vert	Section Callout Solid Vert
03_FDOT_Solid_VertNoSheet#	Section Callout Solid Vert No Sheet #
04_FDOT_Hidden	Section Callout Hidden Horiz
05_FDOT_Hidden_NoSheet#	Section Callout Hidden Horiz No Sheet #
06_FDOT_Hidden_Vert	Section Callout Hidden Vert
07_FDOT_Hidden_VertNoSheet#	Section Callout Hidden Vert No Sheet #
08_FDOT_Wireframe	Section Callout Wireframe Horiz No Sheet #
11_FDOT_Solid	3D Named Boundary Solid
12_FDOT_Hidden	3D Named Boundary Hidden
13_FDOT_Wireframe	3D Named Boundary Wireframe
14_FDOT_ByView	3D Named Boundary ByView
15_FDOT_ByView	2D Named Boundary ByView
20_FDOT_Solid	Detail Callout Solid
21_FDOT_Hidden	Detail Callout Hidden
22_FDOT_Wireframe	Detail Callout Wireframe

Detailing tools can be used directly in a Design File, but the recommended workflow is to create a sheet file, reference in the bridge model into the design model, and then to use the detail tools to generate the drawing model and sheet model within the sheet file. This process will be demonstrated in the exercises accompanying this chapter.

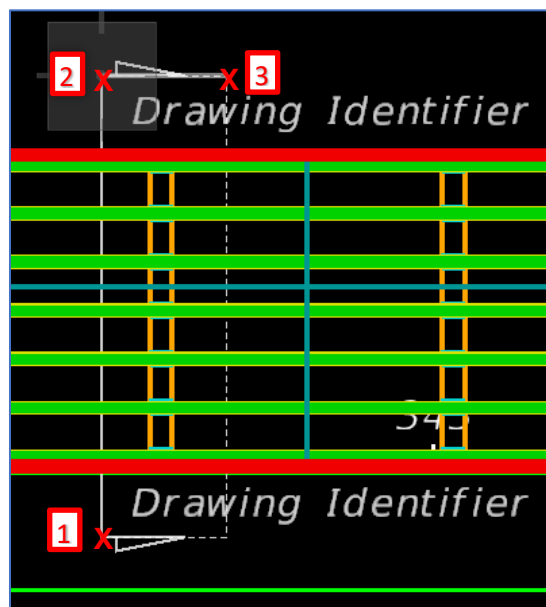
SECTION CALLOUT

Once the bridge model is referenced into the sheet file (in the Default model, which can be renamed as desired), the **Section Callout** tool can be used to create a section or view with a user-defined depth. This will in turn create a Saved View within the file and provide the option to open a Create Drawing dialog box for plans production.

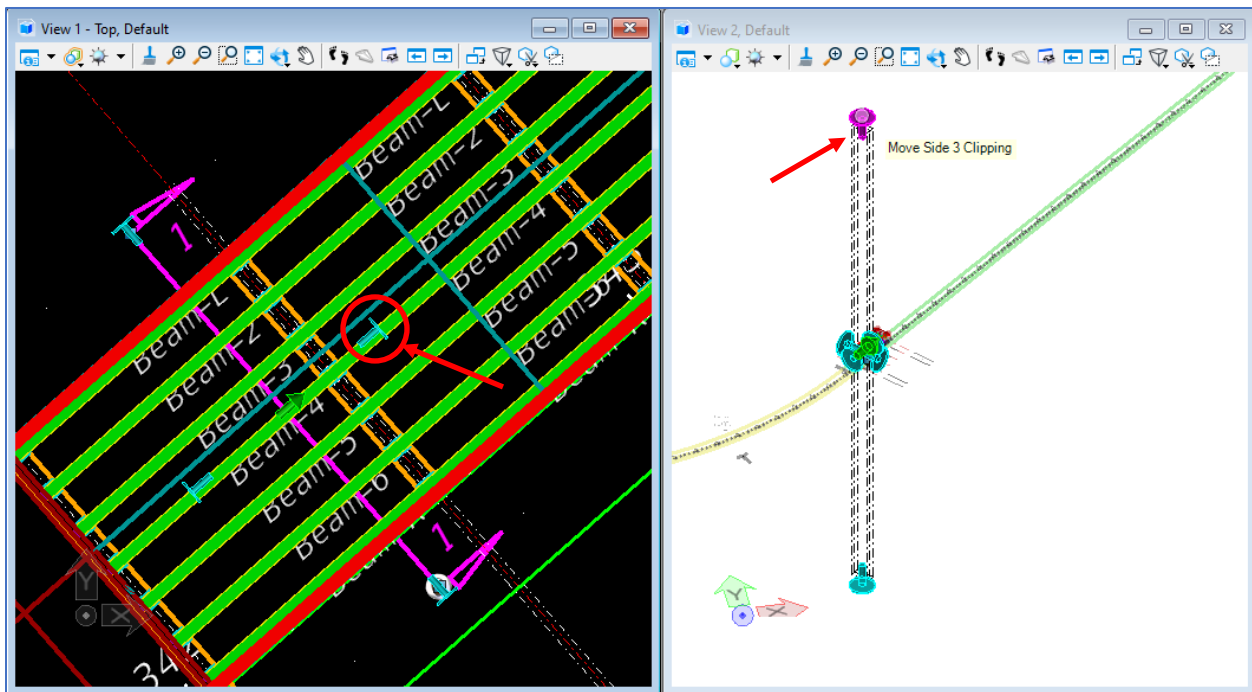
To use the **Section Callout** tool, navigate to **Drawing (Workflow) > Annotate > Detailing > Section Callout**. Place Section Callout dialog box will appear for the user to select the *Drawing Seed*, which will be one of the several seeds FDOT has developed. The *Height* settings will allow the user to define a specific height or allow the program to automatically select a height. This can always be adjusted after placement. As discussed previously, the *Create Drawing* box can be checked to create drawing and sheet models.



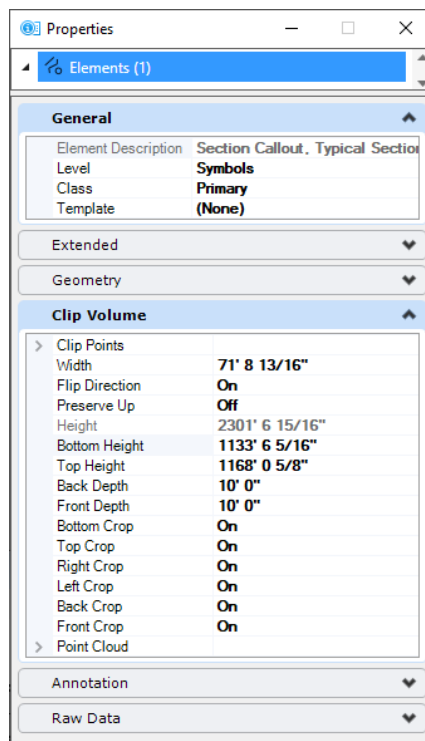
The section cut will show everything that is currently displayed in the view, so the user can control the elements shown by toggling on and off levels. This can also be adjusted afterward within the level display of the drawing and sheet models, if needed. After the settings are selected, the section itself can be placed. Within a top view, the first click will define the start point for the section and the second click will determine the end point. The third point will define the depth, which can also be keyed in. Follow the prompts in the message section at the bottom left of the screen. Following the third click that completes the volume definition, a *Create Drawing* window will appear for the user to select the drawing and sheet model settings if the *Create Drawing* box is checked, discussed in a previous section.



The Section Callout symbol will be placed in the model. In top view, the plan view limits of the clip volume can be adjusted. In an isometric view, the height of the clip volume can be adjusted. Select the callout symbol to reveal the dashed lines that represent the clip volume, see below.

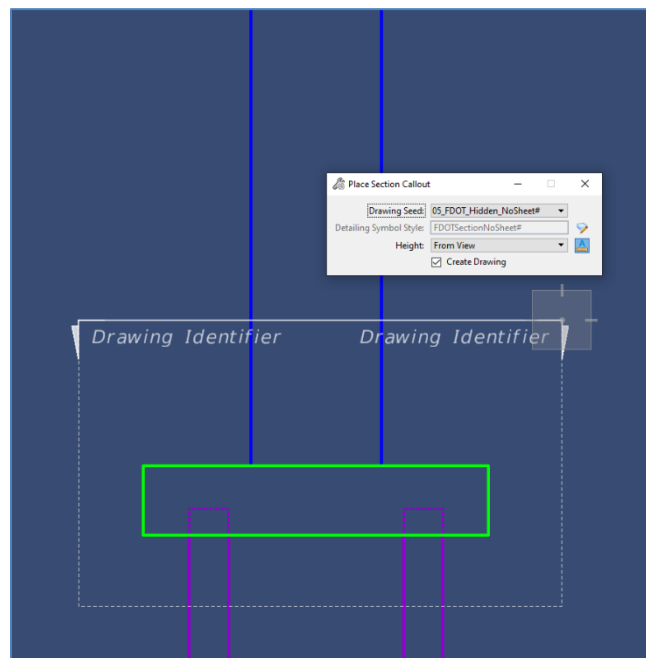


Selecting the callout and opening the Properties will also allow the user to edit various *Clip Volume* settings such as the heights, depths, and direction of the cut. Keep in mind that any linked drawing models will display exactly as the clip captures the elements, which will need to be taken into account for skewed or curved bridges.

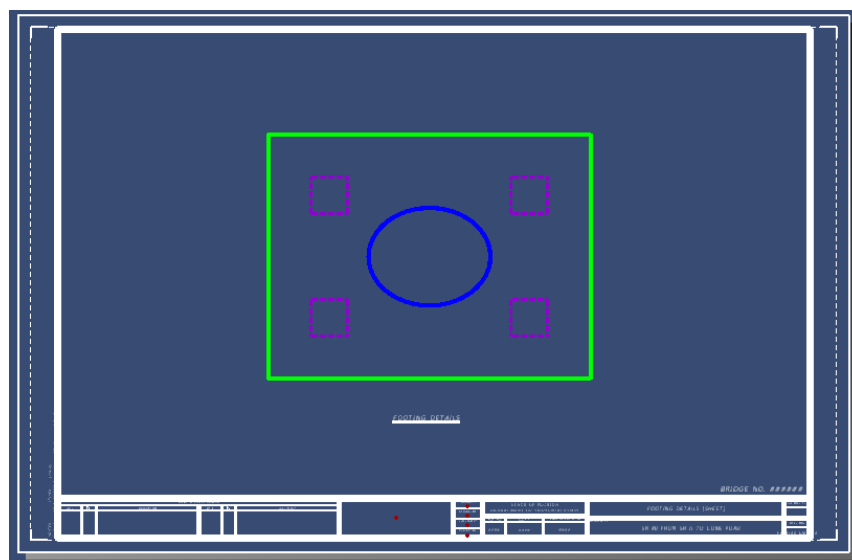


Section callouts can be placed directly in a drawing or sheet model to create additional views. For example, a section callout could be placed above an elevation view (itself created with a section callout) to create a top view, as will be done in a later exercise. One could also be cut through an element, such as through a column and through a footing to create a footing plan. The section callout can be placed in the drawing model or sheet model. If the section callout symbol is to be visible when plotted and the section callout was placed in the drawing model, simply hover over the marker, click, and select Show Callout.

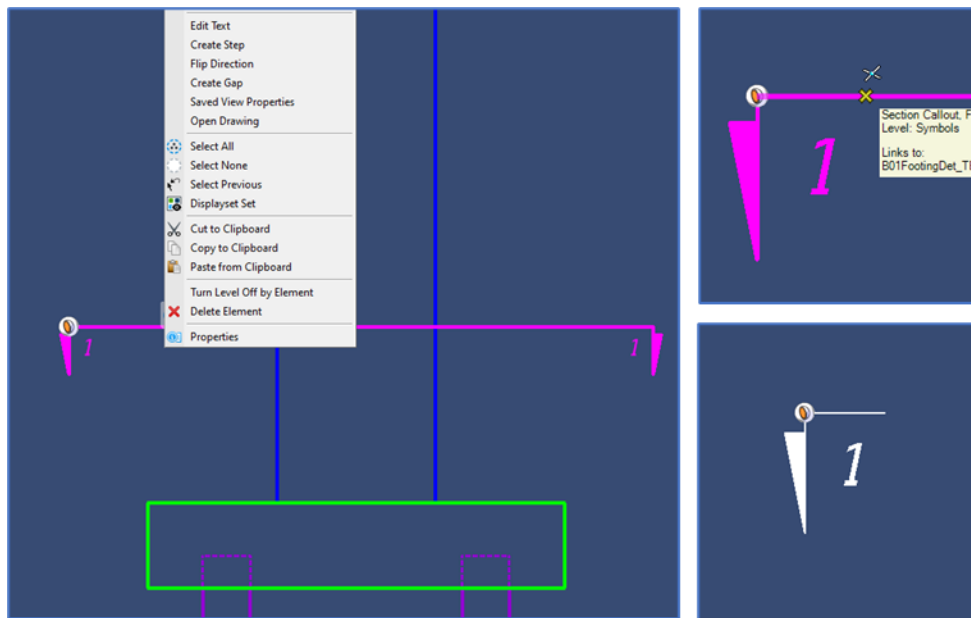
Below is an example of placing a section callout within a sheet model to create a footing plan. Note that the `..._NoSheet#` version of the *Drawing Seed* was chosen, which controls what information is shown on the section callout symbol.



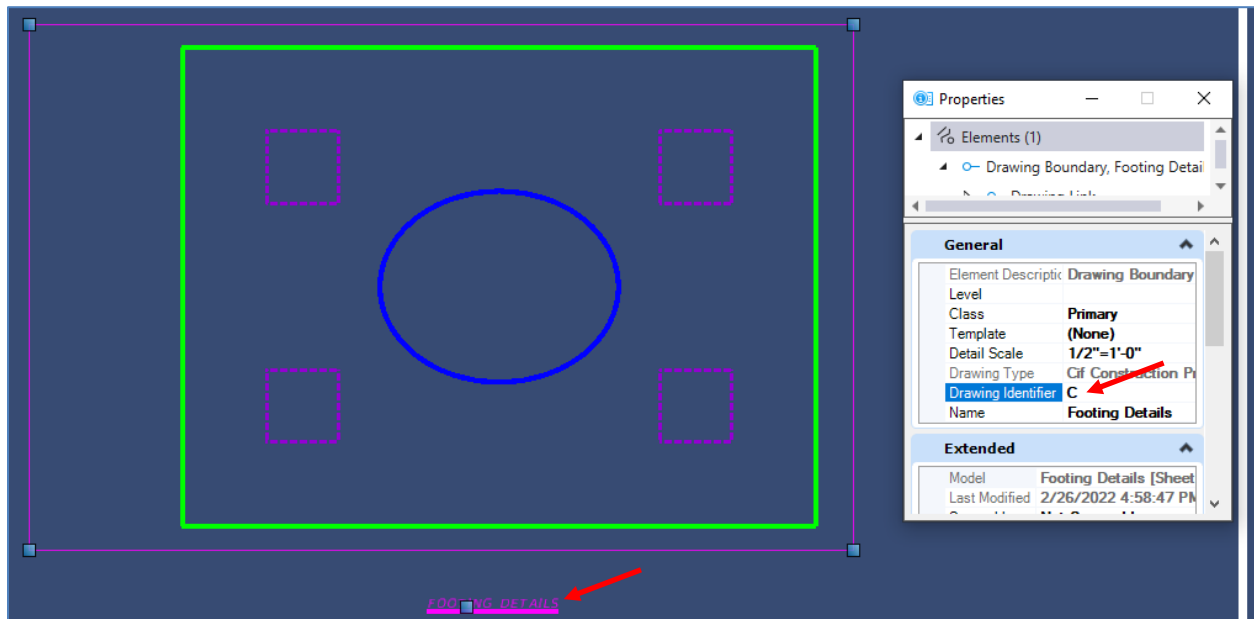
After placement, a Create Drawing dialog will come up. Once all the information is filled in and accepted, the new sheet model with the footing plan will be created.



Back in the original sheet model of the pier, by right clicking on the section callout and selecting **Create Gap**, the continuous line can be adjusted to display with the desired gap. Snap to the points at the end of the arrow symbols to control where to start and stop gaps.

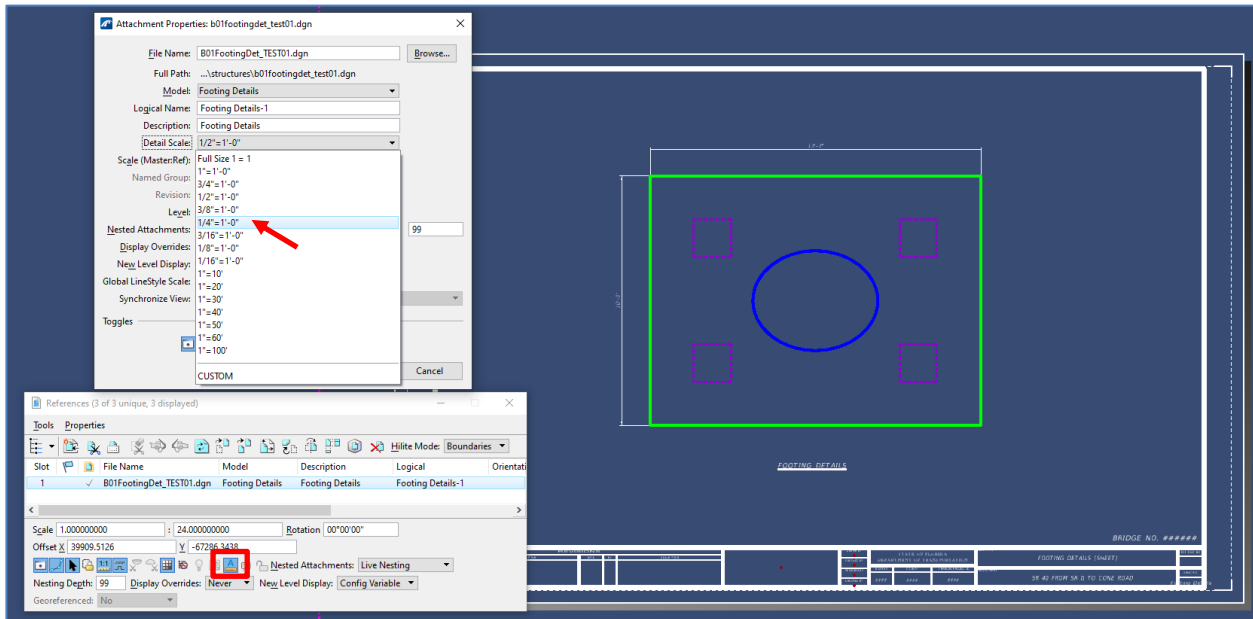


After the gap is created, the drawing identifier text can be updated by going into the sheet model created by the section callout, clicking the label to reveal the drawing boundary, opening the properties, and changing the *Drawing Identifier* as needed.

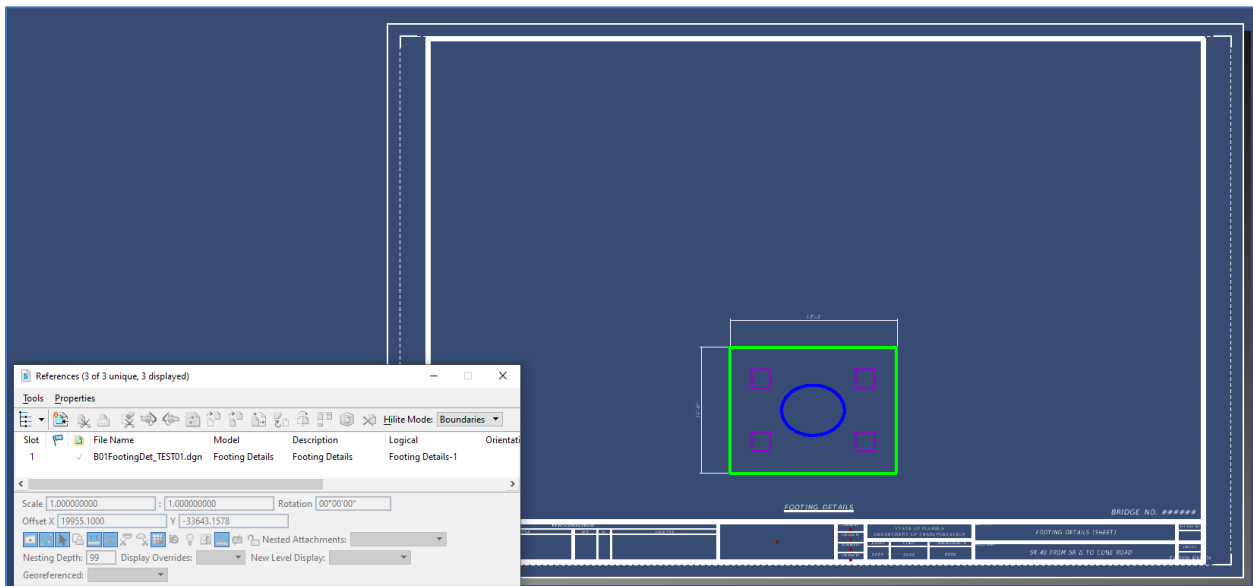


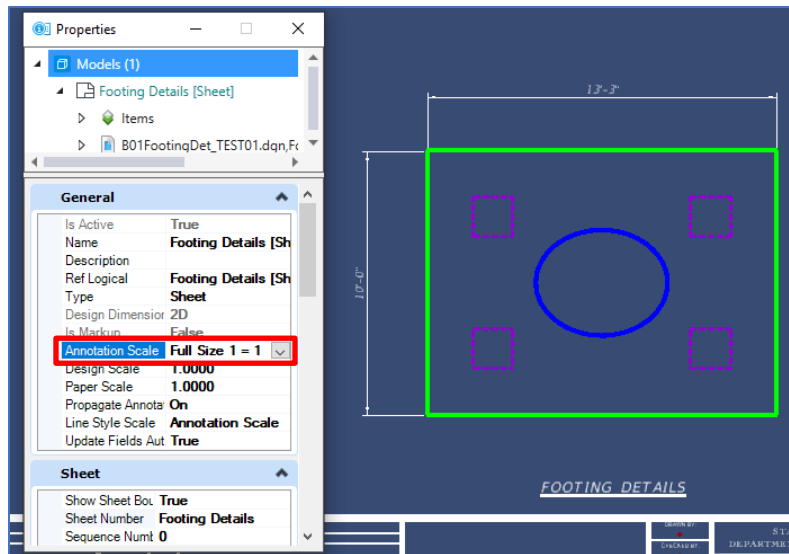
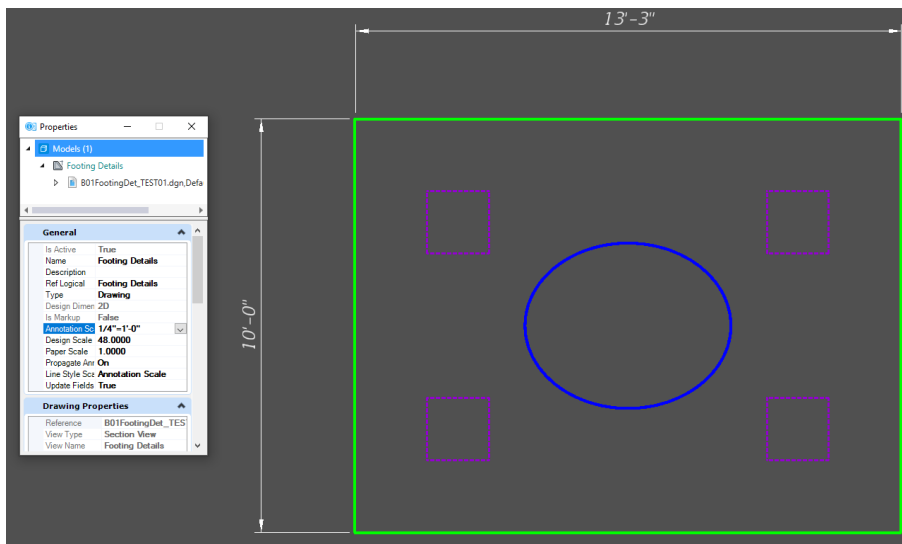
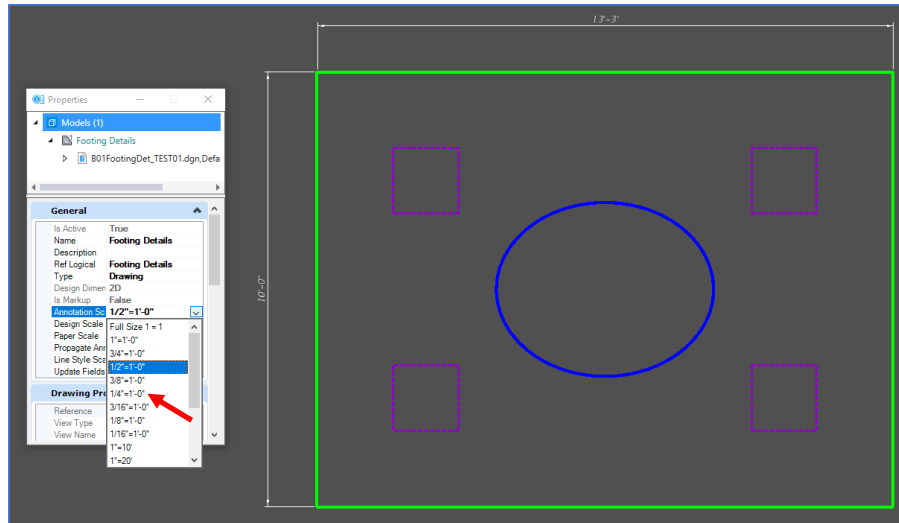
ADJUSTING SCALES

After a drawing or sheet model has been created, the scale can be adjusted, if needed. This can be accomplished by first adjusting the reference detail scale for the drawing model in the sheet model. This will make the drawing model appear smaller or larger in the sheet model border. Once the desired reference scale is updated, the detail scale in the drawing model should be adjusted to match the selected reference detail scale. This will adjust the text and symbols so that they match FDOT requirements for size. The dimension offsets from elements may need to be adjusted when changing scales. See below images for this process.



If the reference from the drawing model into the sheet model has **Use Active Annotation Scale** enabled (in the red box above), the text and symbol size in the sheet model will be adjusted with the change to the reference detail scale. However, updating the annotation in the drawing model will allow users to better set the dimension line offsets.

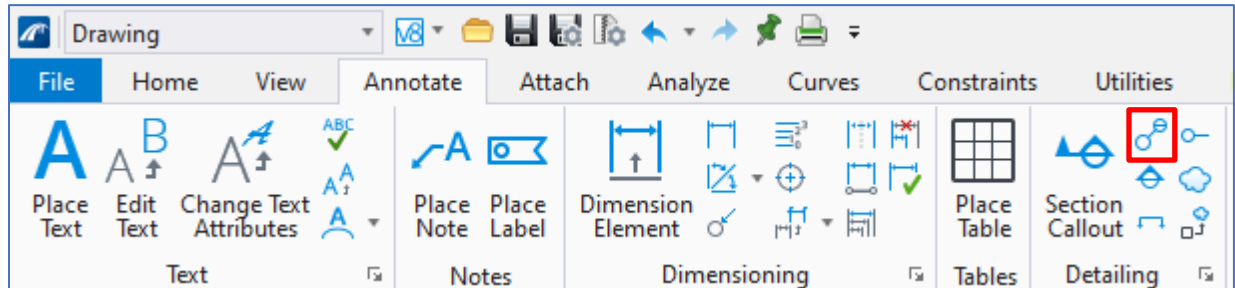




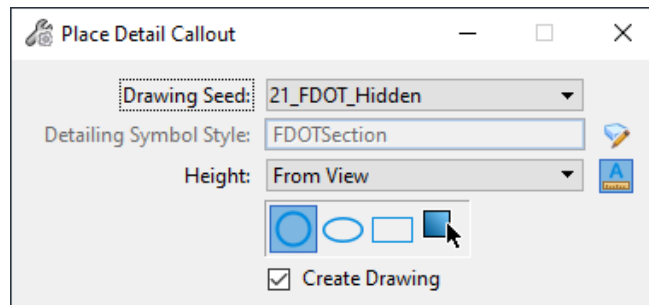
Note that the sheet model annotation scale should always be set as **Full Size 1=1**.

DETAIL CALLOUT

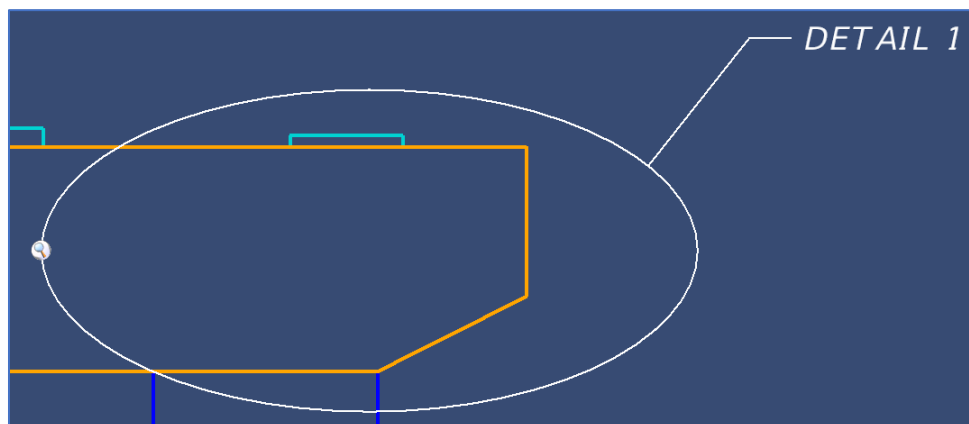
Another helpful detailing tool is the **Detail Callout** tool. This tool can be used to create an enlarged detail if a certain area needs to be isolated for clarification. The tool can be accessed by navigating to **Drawing (workflow) > Annotate > Detailing > Detail Callout**.



The *Place Detail Callout* window will appear for selection of the *Drawing Seed*, *Height*, shape, and the option to *Create Drawing* like the **Section Callout** tool. The available shape options are circle, ellipse, rectangle, or to use a previously drawn boundary.



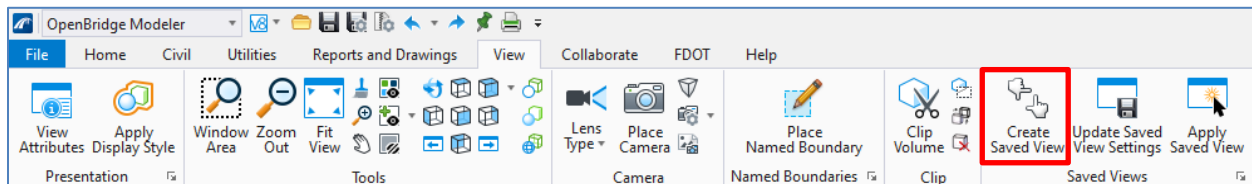
The next click will start to define the detail boundary. For the circle and ellipse options, the first click will be the center of the detail. For the rectangle, the first click will be a corner. The next click will fully define the size and extents of the shape. The final click will be to place the detail callout text with the drawing identifier and any desired leaders. Right clicking will end the placement and bring up the *Create Drawing* window if the corresponding box was checked. The remaining steps are similar to the **Section Callout** tool. See exercise for use of the detail callout.



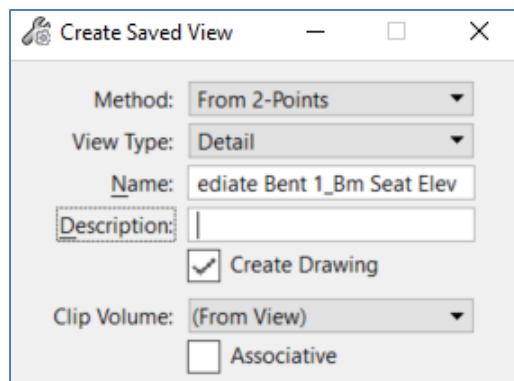
SAVED VIEWS

Saved Views are an excellent way to convey design intent in a 3D model. The views can be used directly in the 3D model space or for placement on sheets. The views can be annotated like any other view or detail.

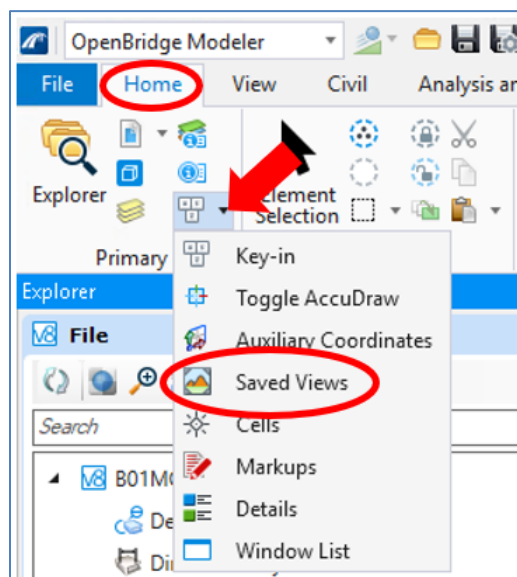
The user can add a saved view through various detailing tools discussed earlier, or directly by navigating to **View > Saved Views > Create Saved View**.



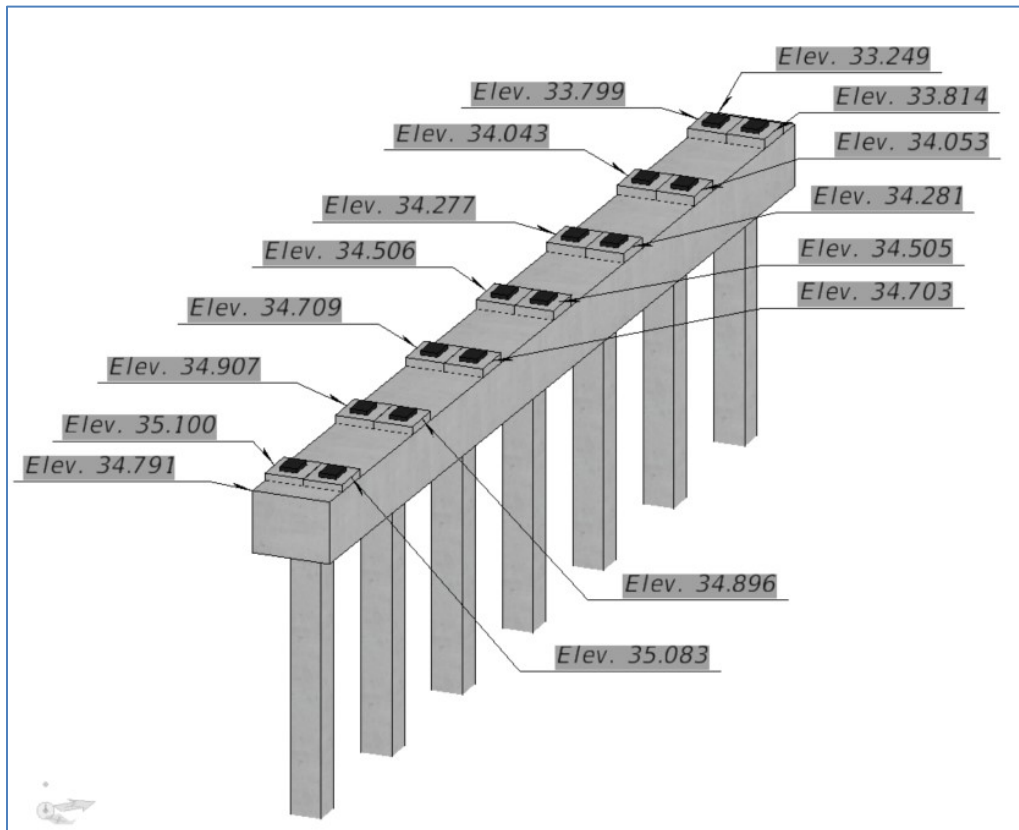
The Create Saved Views dialog box allows for several inputs including the *Method* (from the current view or 2-Point Box), adding a View Type (including Section, Elevation, Plan, Detail, etc.), naming the view and creating a Drawing Model as the view is created.



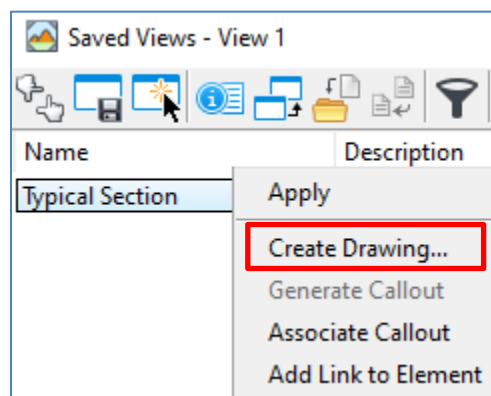
The saved views can be accessed through **Home > Primary > (More) Saved Views**.



Below is a 3D isometric view of an intermediate bent with all pedestal elevations included using Text Favorites for automatic elevations (see Text Favorites section).

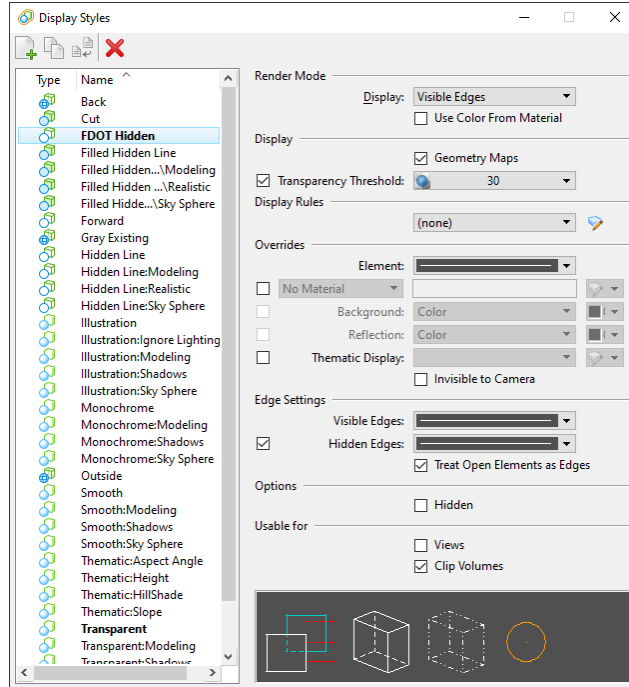


Existing saved views can be used to generate drawings by opening the Saved View dialog box, selecting the desired view, right clicking and selecting **Create Drawing**. This will open the Create Drawing dialog box for drawing and sheet model creation.



DISPLAY STYLES

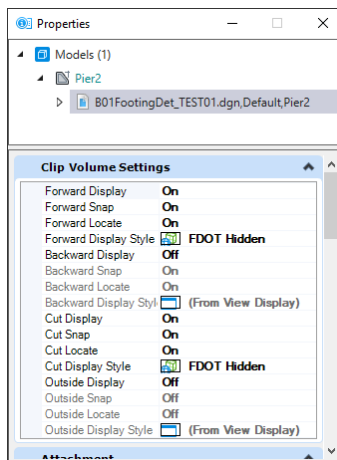
Display Styles are predefined render overrides and optional settings that can be applied to views, sections, or reference attachments. OBM has default display styles and FDOT has developed display styles for use on FDOT projects.



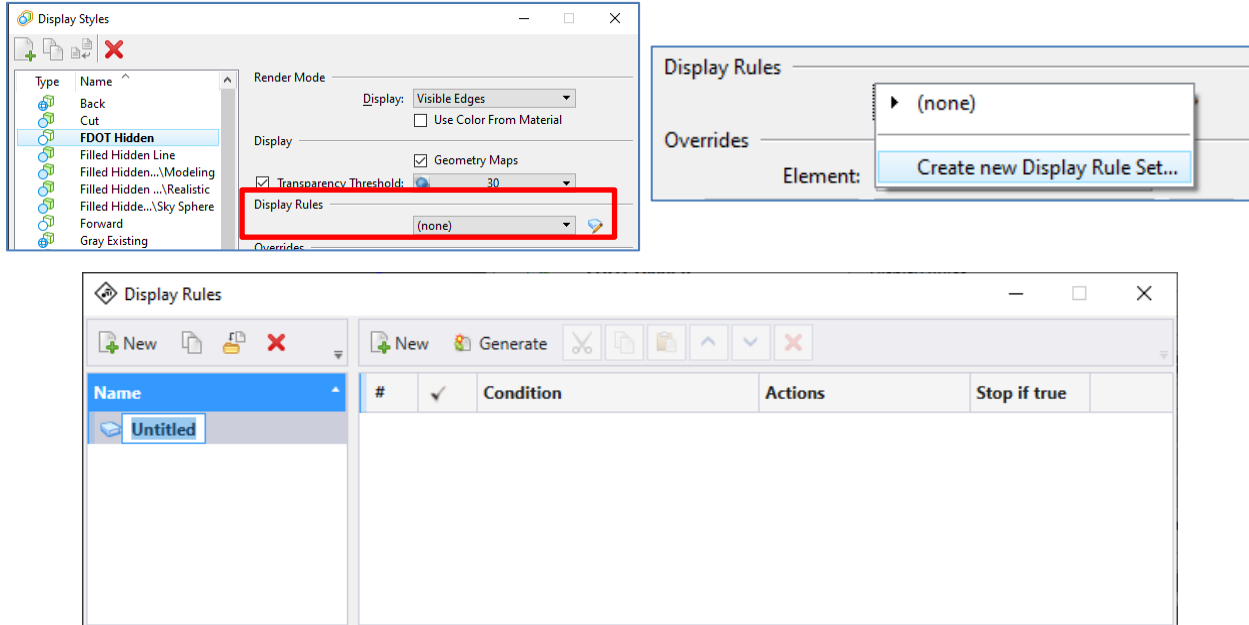
The display style for a design model can be selected directly from the top of the view window by clicking and holding the button indicated below. Clicking the button once will open the Display Styles dialog box.



For drawing models, the display style will be set based on the drawing seed selected. If the display style needs to be changed for one or more directions of the clip volume (forward, backward, cut, or outside), it can be adjusted in the model properties. The display style selected for the drawing model will be reflected in the corresponding sheet model.



For a given display style, one or more display rule can be created. Display rules allow the user to specifically control the symbology, appearance, and display of design elements based on the property of an element, named group, view, model reference, or file. They are found within the *Display Styles* window. Display rules are an advanced topic and outside the scope of this guide, but there is documentation about them in the Bentley Help Content available online.

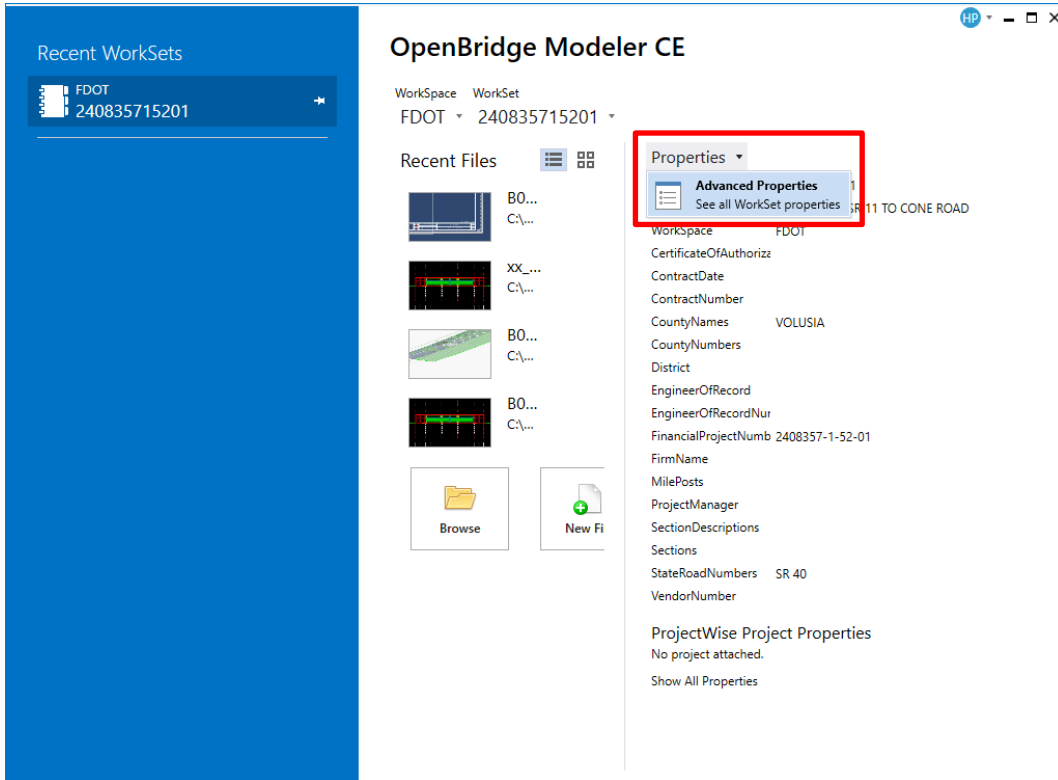


SHEET BORDER INFORMATION (OBSOLETE – REPLACED BY PLAN SET MANAGER)

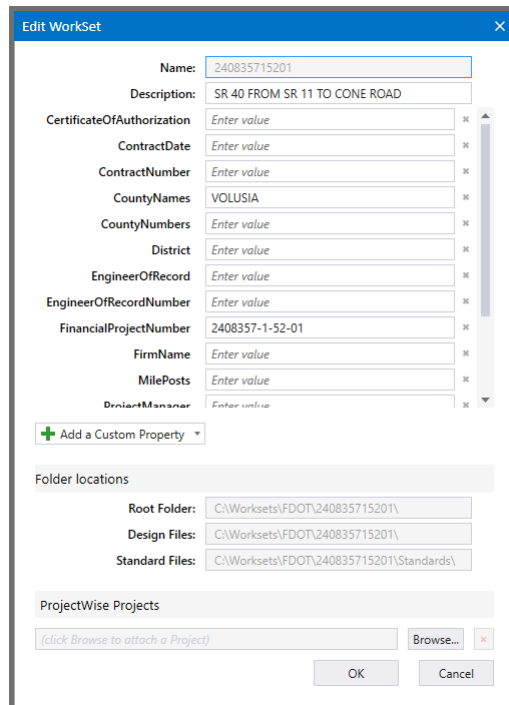
When plans are part of the final deliverables, it is important to understand how to manage the sheet border information. With OBM, much of the sheet border information is managed with data fields and is dynamic. See below for a graphic of key border information and where it is pulled from.

5 BRIDGE NO. 123456				
2 STATE DEPARTMENT FLORIDA TRANSPORTATION			3 SHEET TITLE FOOTING DETAIL	
ROAD NO.	COUNTY	FINANCIAL PROJECT ID	1 PROJECT NAME SR 40 FROM SR 11 TO CONE ROAD	
SR 40	VOLUSIA	2408357-1-52-01	4 SHEET NO. BI-25	

1. **Project Name** – Workset Property that is controlled by the information entered in the File Open dialog. This can be accessed by navigating to **File > Close** when in an active design file. See graphic following list for Advanced Properties/Edit Workset where the information is entered.
2. **Road No., County, and FPID** – Workset Property found in same location as Project Name.
3. **Sheet Title** – Model Property that is set to the Model Name. Can be edited in the Model properties or Models dialog box.
4. **Sheet No.** – Model Property that can be edited directly in the Model properties or Models dialog box, but can also be automatically numbered using the Sheet Index tool.

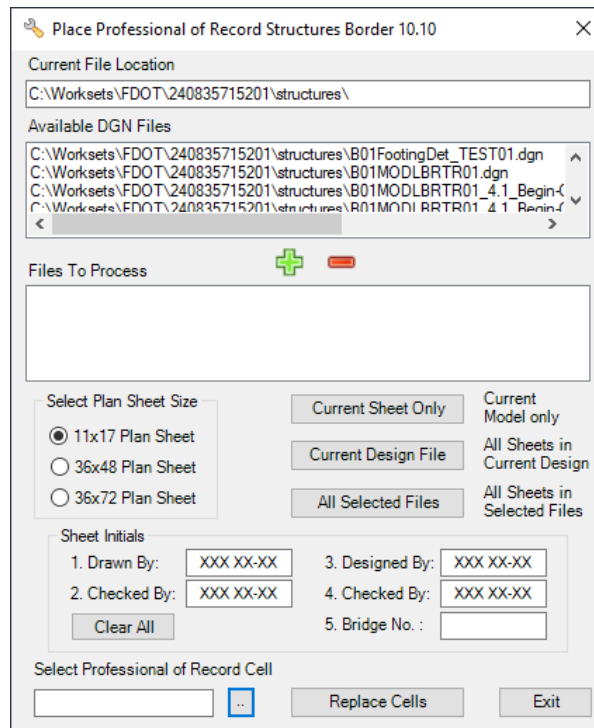
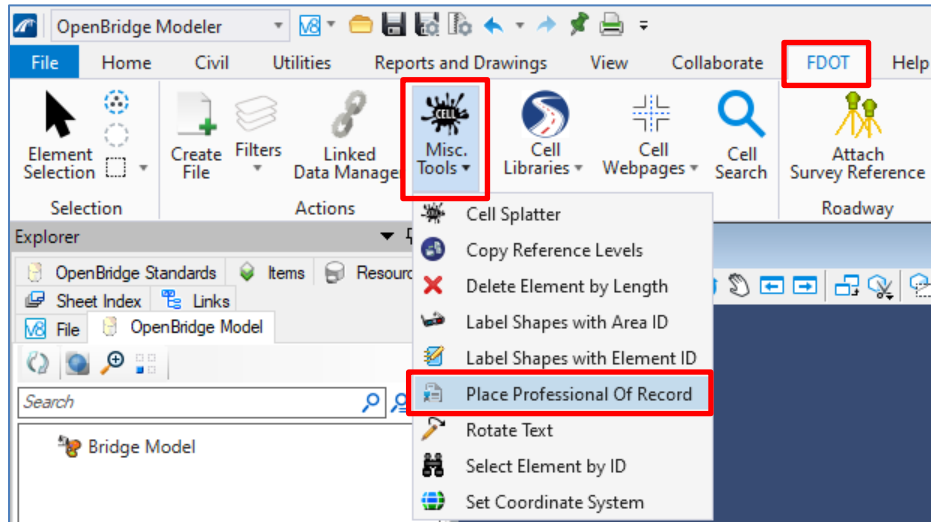


5. **Bridge No.** – Sheet Model Property that can be edited in the Model properties. The above information is stored in the #####.dgnws file (where ##### is the Project/Workset Name) located in the Workset project folder, generally C:\Worksets\FDOT. Note that this file is for the entire project, not just one discipline.



PLACE PROFESSIONAL OF RECORD TOOL (OBSOLETE – REPLACED BY PLAN SET MANAGER)

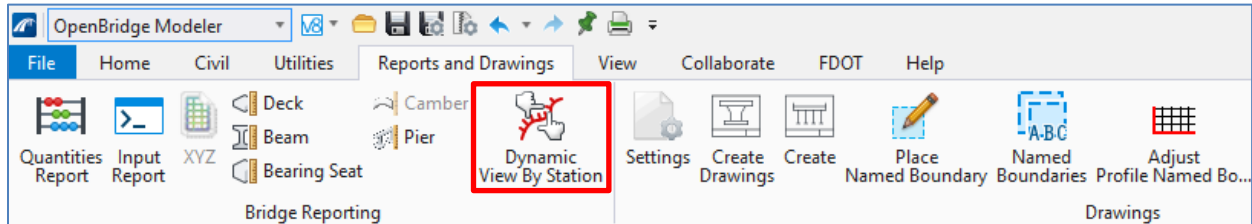
FDOT is still developing and improving the intelligence built into the sheet borders. One of the latest tools is the **Place Professional of Record** tool, which can be accessed by navigating to **FDOT > Actions > Misc. Tool > Place Professional Of Record**.



This tool can be used to place the *Drawn By/Checked By* and *Designed By/Checked By* fields in the border, as well as the Engineer of Record information, which must be developed as a cell. If the Bridge No. field is entered, it will override the border field that uses the Sheet Model Property discussed above. The tool will place the information in the current sheet model, or a number of sheet models depending on the *Files To Process* that are selected.

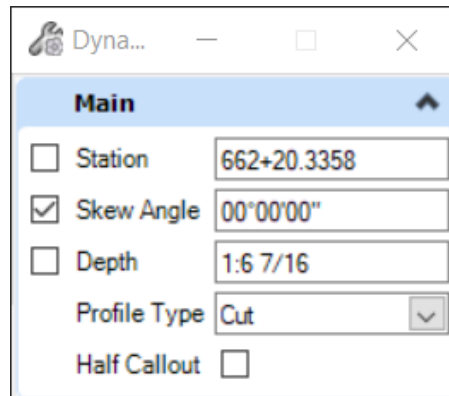
OBM DYNAMIC VIEW BY STATION

The Dynamic View by Station tool is one of the most flexible OBM drawing tools available. Users can take a section view normal to any station point or at any skew angle. The views can even be rotated after creation to create horizontal sections. The tool is accessed from the **Reports and Drawings > Bridge Reporting > Dynamic View By Station**.



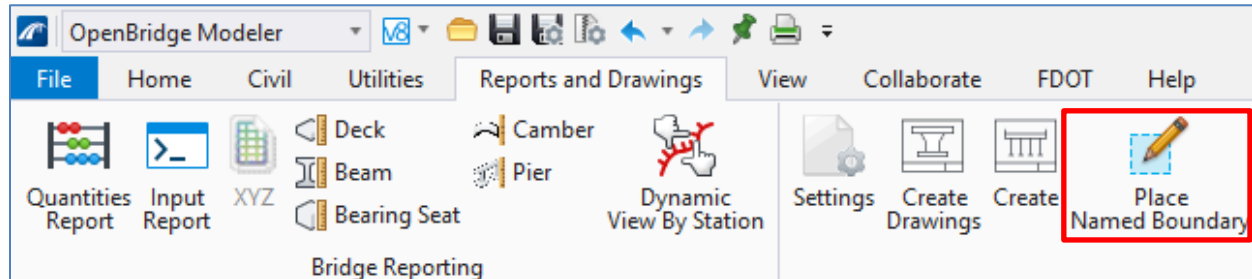
Once an alignment on the bridge is selected, any station can then be entered to cut a section at that location. A skew must then be specified for the section. For a section to be cut longitudinal along the alignment, a skew of 90°-00'-00" would be entered, whereas a transverse section—like a superstructure typical section—would use a 0°-00'-00" skew. With the location and skew set, a direction of the cut (i.e., upstation or downstation) can be set by clicking a data point in the direction the user would like the cut to face.

Depending on what needs to be included in the drawing, the user can either choose for the *Profile Type* to be set as **Cut** (just the section with the elements that are at that cut line) or **Cut With Depth** (includes additional members contained beyond the cut line up to the specified *Depth*.) The **Cut With Depth** selection is useful, for instance, if a longitudinal cut with a beam in view is need, but the selected alignment is not atop a beam.



PLACE NAMED BOUNDARY

The Place Named Boundary is a flexible plans development tool that is highly used in both 3D and 2D plans production. The tool is accessed from the **Reports and Drawings > Drawings > Place Named Boundary**. It is also available in View Tab of any of the workflows.

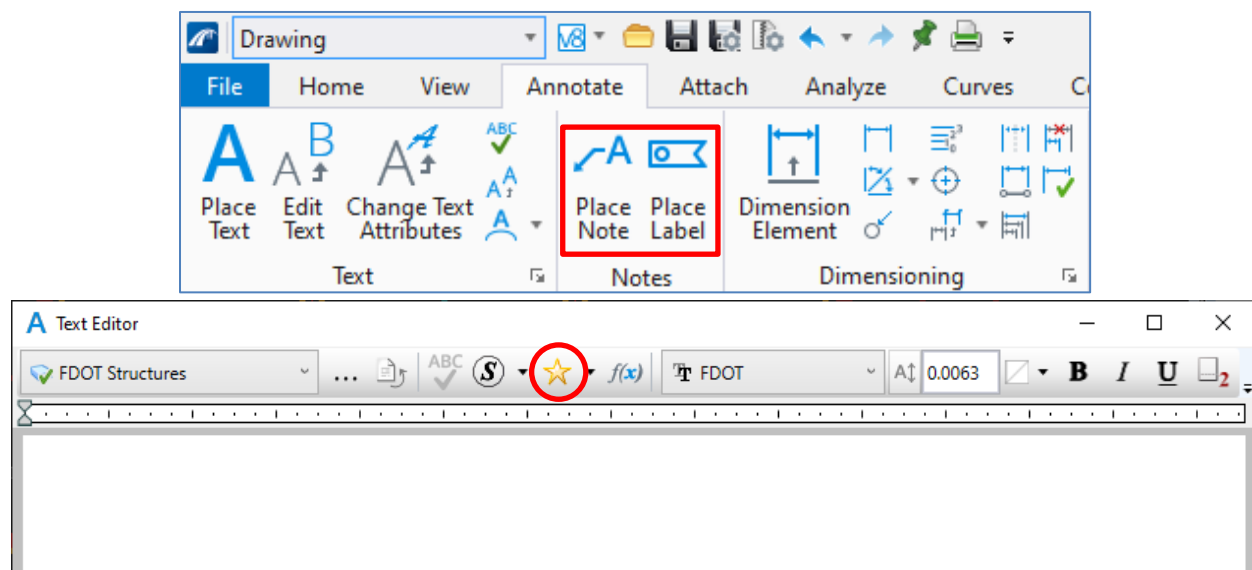


This tool is designed to place one or more named boundaries and automate the dynamic view, drawing model, and sheet model creation process. Boundaries can be placed utilizing the alignment/civil data or they can be placed manually. The process for creating these boundaries and the subsequent drawings using the alignment can be seen in the following exercise.

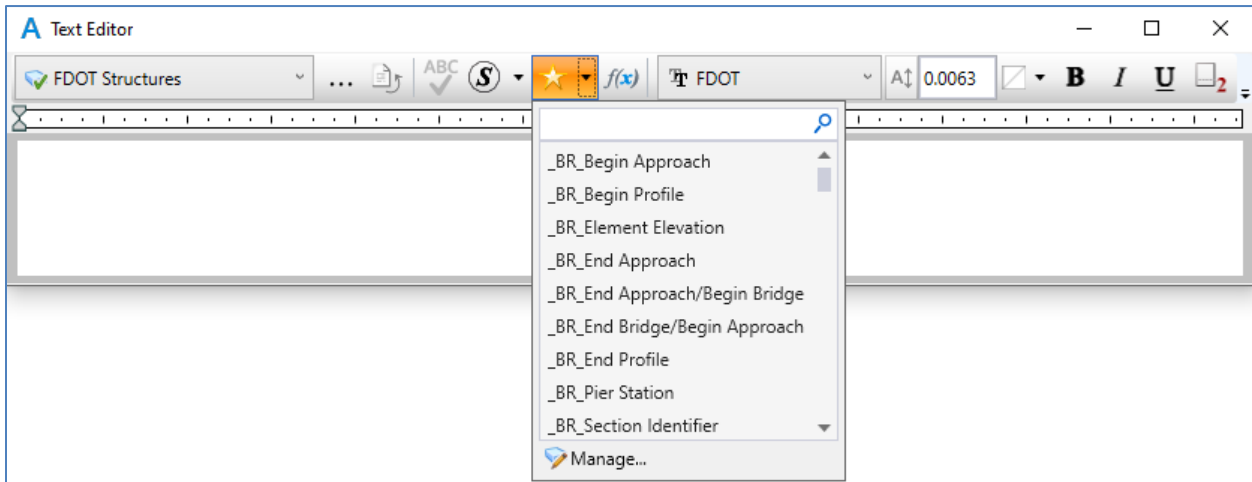
TEXT FAVORITES

Text Favorites can be utilized to take advantage of annotation automation available when using accurate 3D models for plans production. Common annotations can be saved as “Favorites” and accessed for repetitive annotations using model properties such as elevation values.

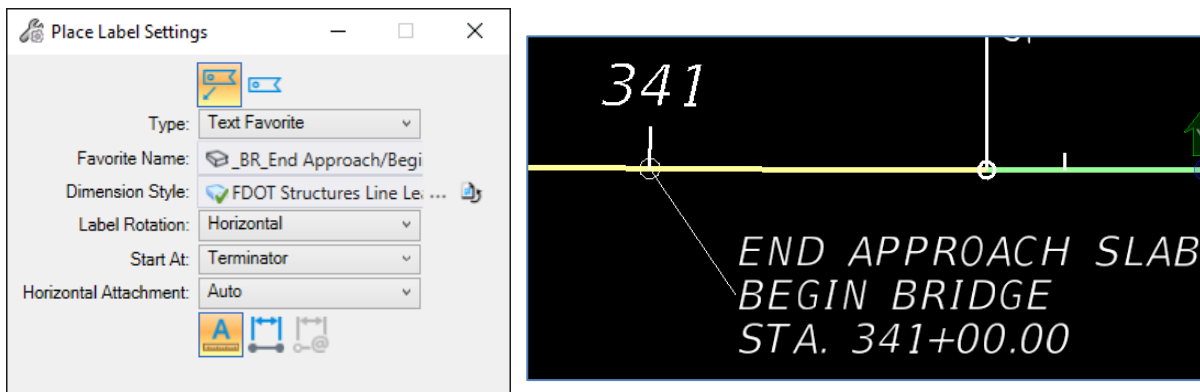
The Text favorites are accessed through the **Text Editor** dialog box when the **Place Note** or **Place Label** tool is selected under **Reports and Drawings > Placement > Place Note <OR> Place Label**. Place Label must be used if Civil data needs to be pulled for a Text Favorite (i.e. stations) and Place Note can be used for all other applications. For Place Label, either a **Cell** or **Text Favorite** can be used for the *Type* and an *Element* or *DataPoint* must be selected prior to placement.



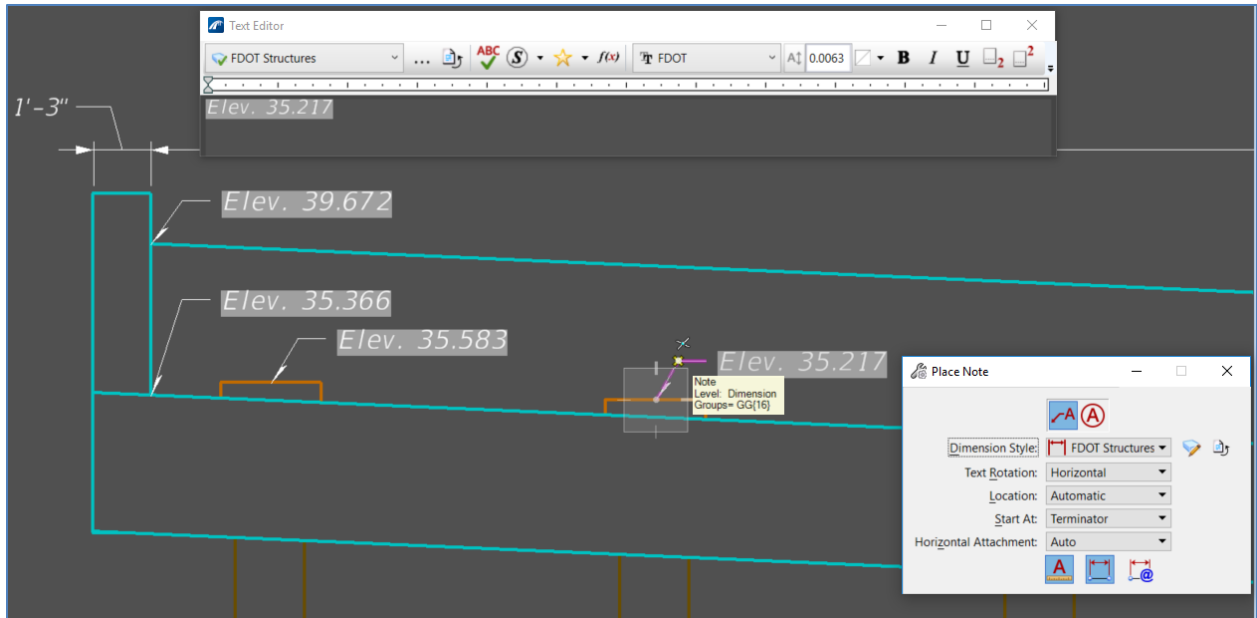
There are several Text Favorites provided in the current workspace for use as shown in the following image.



The notes save the text for common labels but also access model properties that can be used to automate actual dimensions or value placement in the note. The example below shows a Begin Bridge station Text Favorite that will automatically input the station based on the point selected in the plan view.



The use of Text Favorites is more common in the ORD workflows. Many Text Favorites are setup and can be taken advantage of, including for stationing of specific points such as start and end of bridge on our General Plan view. Custom Text Favorites can be created for personal use to automate certain note and text placement and will be used more heavily in the future as the tool develops and more model properties are exposed in OBM for plans production use.



EXERCISE OVERVIEW

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Exercise 6.2 Create a Section Detail from the Dynamic View by Station Tool.....	6-55
Exercise 6.3 Create a Plan and Elevation View with the Place Named Boundary Tool	6-70
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Exercise 6.1 Use Section Callout Tool to Make Substructure Sheets

➤ **Create a Pile Bent Sheet:**

1. Open the data set file: **B01MODLBRT01_6.1_Begin**
2. Access the **FDOT > Actions > Create File** tool and create a sheet file with the inputs indicated below.

Workset: C:\Worksets\FDOT\240835715201

Discipline: STRUCTURES

File Group: Substructure Sheet Files

File Type:

	Base Filename	Description
	B#DrillShaftDet	Drilled Shaft Details
	B#EndBent	End Bent
	B#EndBentDet	End Bent Details
	B#Footing	Footing
	B#FootingDet	Footing Details
	B#FoundLay	Foundation Layout
▶	B#IntBent	Intermediate Bent
	B#IntBentDet	Intermediate Bent Details
	B#Pier	Pier
	B#PierDet	Pier Details
	B#PileData	Pile Data Table

Output File:

Bridge Seq #:	Base Filename:	Modifier (Optional)	File Sequence #:	Extension:
B 01	IntBent		01	.dgn

C:\Worksets\FDOT\240835715201\structures\B01IntBent01.dgn

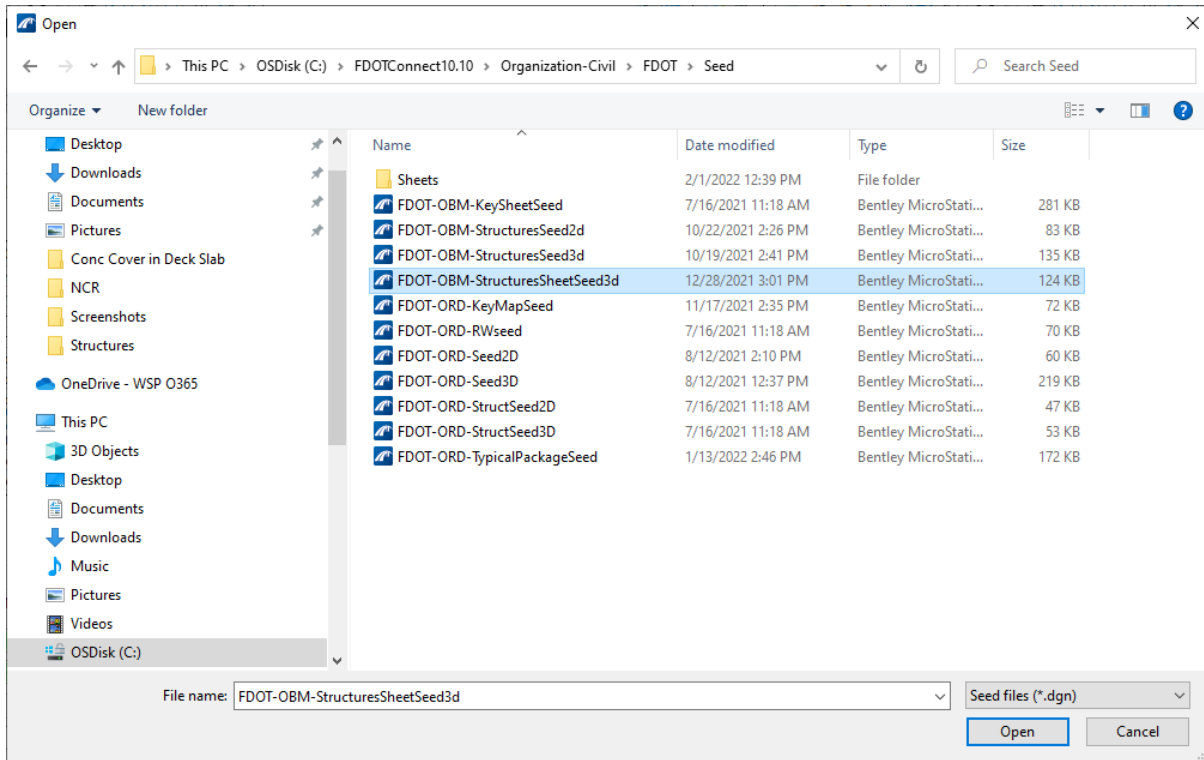
Output Folder: structures

Seed File: C:\FDOTConnect10.10\Organization-Civil\FDOT\Seed\FDOT4

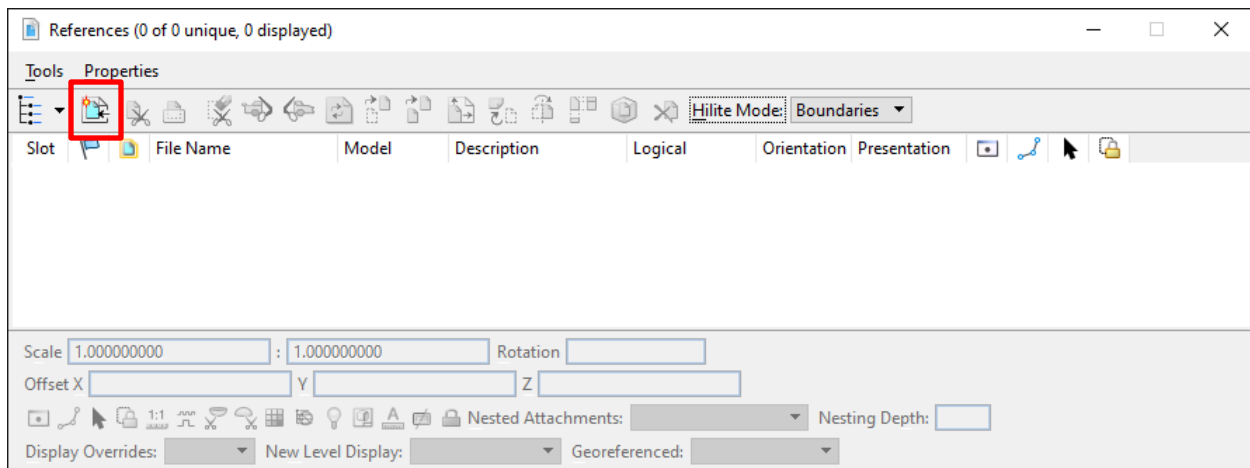
County: Volusia Coordinate System: FL83-EF

Action:

3. Ensure that the seed file being used is the *FDOT-OBM-StructuresSheetSeed3d.dgn* file. If it is not, click the **Browse** button next to the *Seed File* field to navigate to Seed folder. Select the correct file and click **Open**.



4. Once all inputs are set and the correct seed file is selected, click **Create – Open File** to create the sheet file.
5. The new sheet file will automatically be opened. In the **Default** model, open the **References** tool by navigating to and selecting **Home > Primary > References**.
6. Attach the **B01MODLBTR01_6.1_Begin.dgn** file as a reference in the **Default** model by using the **Attach Reference** tool at the top of the *References* window and then selecting the file.



7. Once all inputs for the incoming reference are set, click **OK** to attach the reference.

Reference Attachment Properties for B01MODLBRTR01_6.1_Begin.dgn

File Name: B01MODLBRTR01_6.1_Begin.dgn
 Full Path: ...\\240835715201\Structures\B01MODLBRTR01_6.1_Begin.dgn
 Model: Default
 Logical Name:
 Description: Master Model


Orientation:

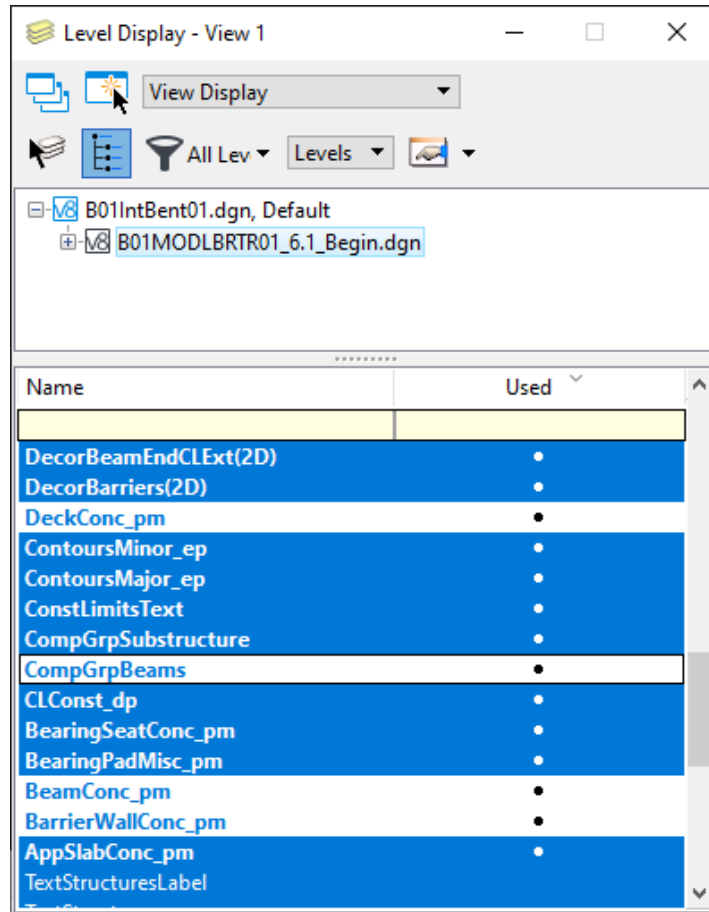
View	Description
Coincident	Aligned with Master File
Coincident - World	Global Origin aligned with Master File
Geographic - AEC Transform	Calculated Transform, max error 6.308e-07'
Geographic - Reprojected	Reproject reference data to Master GCS
Standard Views	
Saved Views	
Named Boundaries (none)	

Detail Scale: Full Size 1 = 1
 Scale (Master:Ref): 1.000000000 : 1.000000000
 Named Group:
 Revision:
 Level:
 Nested Attachments: Live Nesting Nesting Depth: 3
 Display Overrides: Never
 New Level Display: Use MS_REF_NEWLEVELDISPLAY Co
 Global LineStyle Scale: Master
 Synchronize View: Volume Only

Toggles

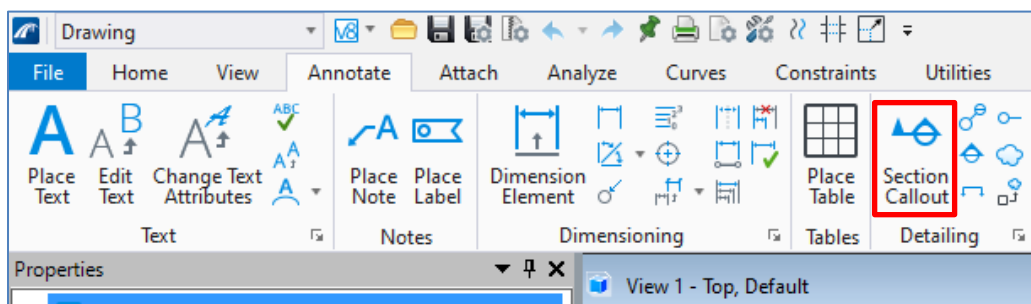
OK Cancel

8. Once attached, click the **Fit View** tool at the top of the view window, then click within the view window to fit the reference within the view. Locate the bridge and zoom in.
9. Note that the annotations are difficult to see. To change the annotation scale of the model, access the **Properties** tool at **Home > Primary > Properties**.
10. Next, open the **Models** tool in the same group by selecting **Home > Primary > Models**.
11. Once the *Models* window has opened to show all the models present in the file, highlight the model titled **Default**. The model's properties will all be accessible in the *Properties* window. Here, change the *Annotation Scale* field to **1"=20'**.
12. To turn off any bridge superstructure levels, access **Home > Primary > Level Display**. Here, we can turn off all deck, beam, haunch, and barrier levels to allow for easier placement of the section callouts on Bent 2. Make sure to save settings by clicking the  icon at the top left or **(Ctrl + F)** to keep all level display changes.

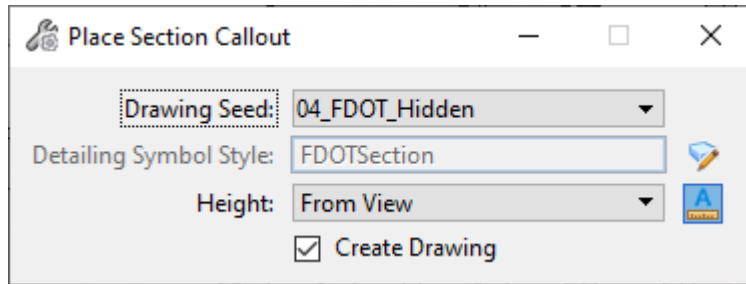


13. The view can be rotated

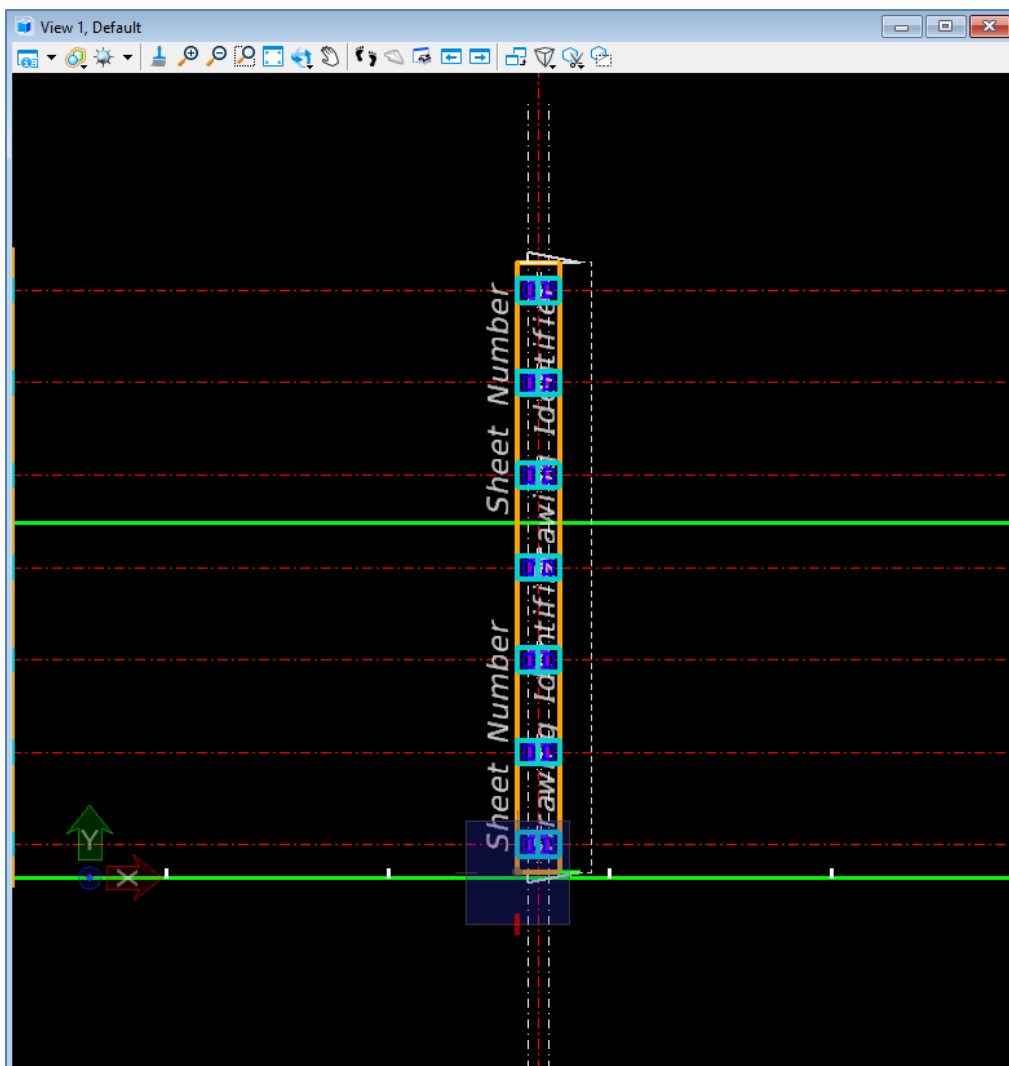
14. To begin creating the Pile Bent Sheet, access the “Section Callout” tool found at **Drawing (workflow) > Annotate > Detailing > Section Callout**.



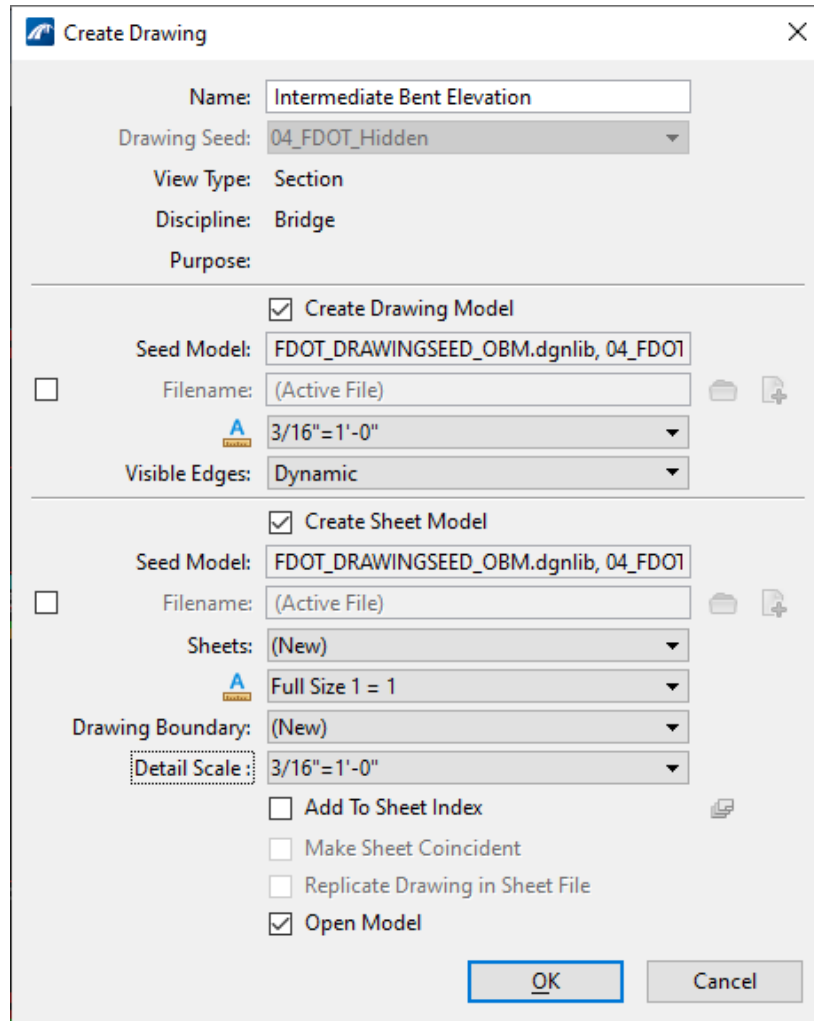
15. Select the **04_FDOT_Hidden** Drawing Seed. This will allow the pile embedment and any other hidden lines to be shown as dashed in the newly created view.



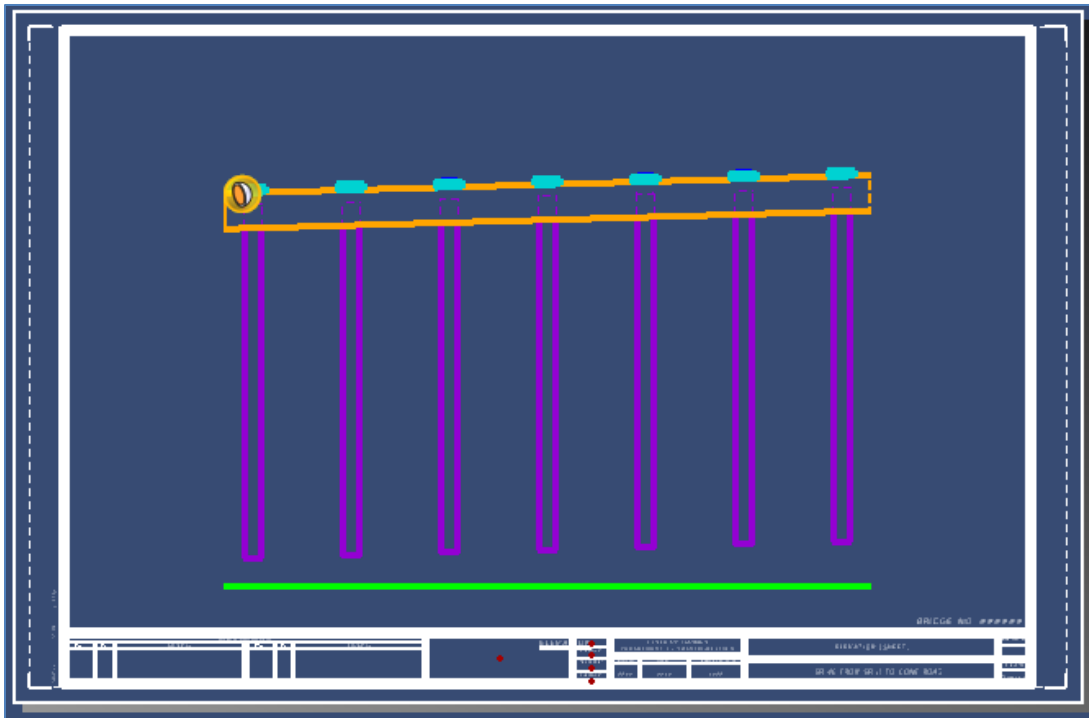
16. Snap to each end of the cap of Bent 2 to begin creating the elevation view of the bent.
17. Define the direction and depth of the section callout by moving the cursor to the other side of the bent and left clicking to ensure the section boundary fully encapsulates the bent cap.



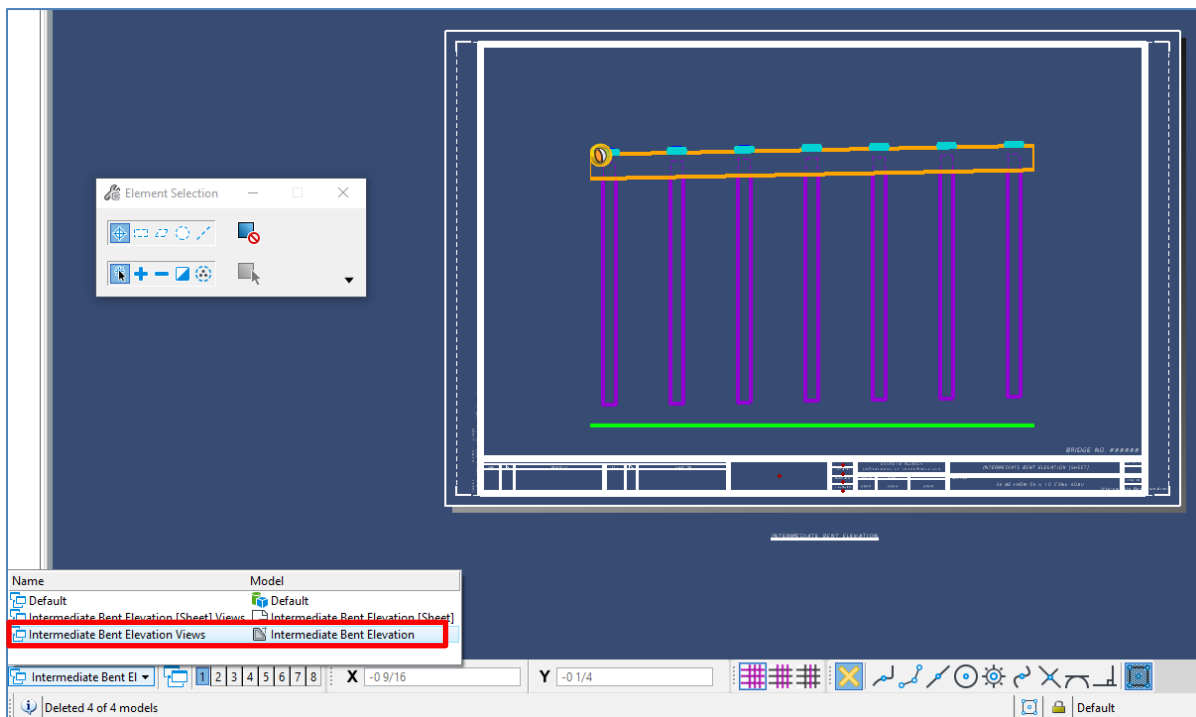
18. Set the name of the view to be **Intermediate Bent Elevation**. The *Drawing Seed* is already set as **04_FDOT_Hidden**. Set the annotation scale for the Drawing Model and the detail scale of the Sheet Model to **3/16" = 1'-0"**. Note that the annotation scale of the sheet model should be **Full Size 1 = 1**.
19. Verify that the rest of the dialog box matches the following image and click **OK**.



20. The sheet model with the elevation view will automatically open in the file.

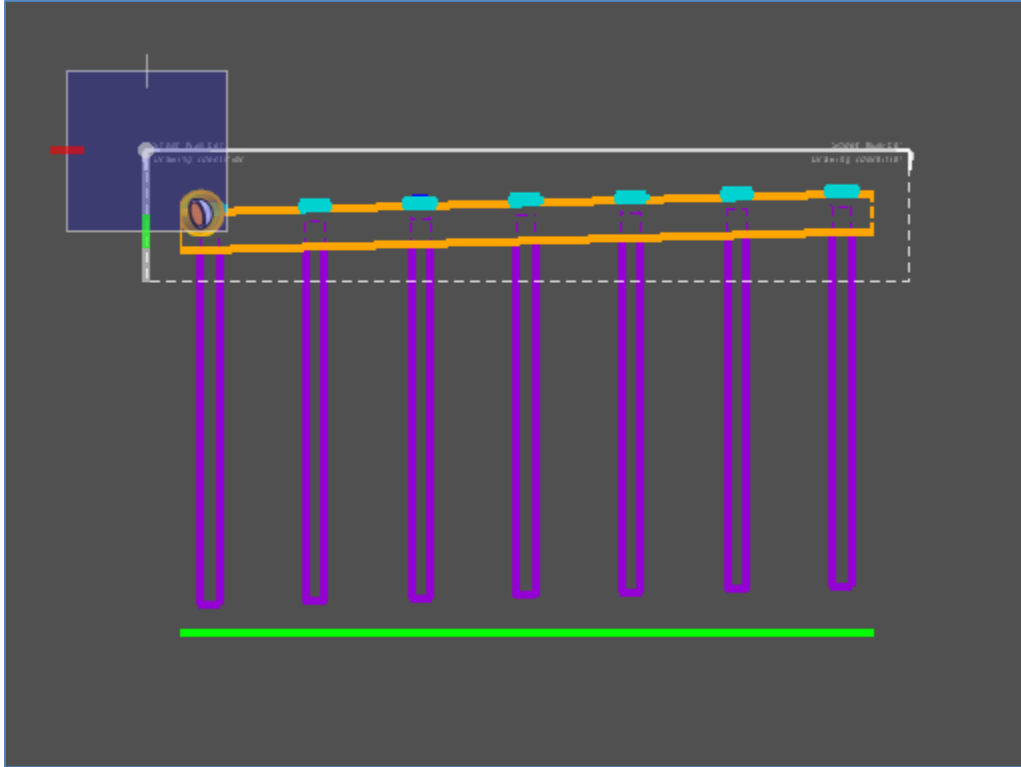


21. To create other views using the section callout tool without showing the arrow annotations, the additional section cuts should be done in the drawing model. Navigate to the **Intermediate Bent Elevation** drawing model in the *Active View Groups* drop-down list.



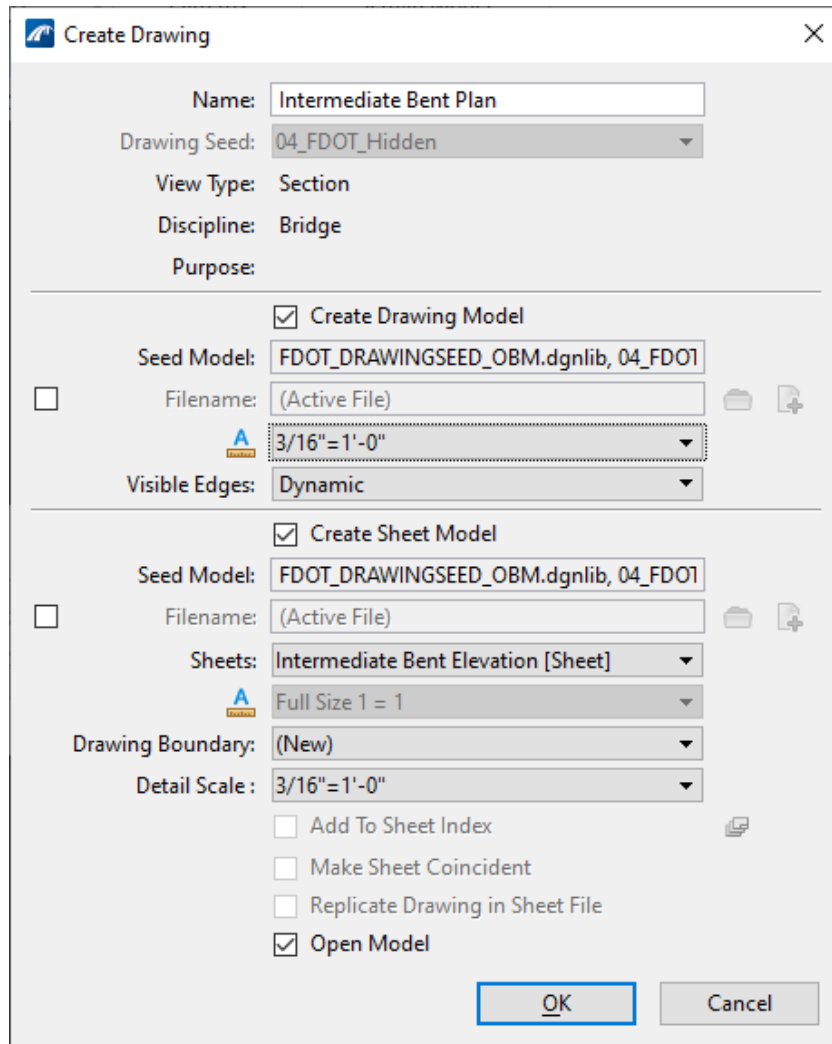
22. Open the **Section Callout** tool again using the **04_FDOT Hidden** drawing seed to create a plan view.

23. Next, click above and to the right side of the bent cap to define a start point for the callout. Then, define an end point for the callout by clicking at a point at the same elevation and beyond the left side of the cap.
24. Define a direction and depth to the callout by clicking at a point below the cap.



25. Once the *Create Drawing* dialog box opens, set the name of the view to be **Intermediate Bent Plan**.
26. Set the Annotation Scale for the Drawing Model and the Detail Scale for the Sheet Model to be **3/16"=1'-0"**. Additionally, change the *Sheets* drop-down to the existing **Intermediate Bent Elevation [Sheet]** sheet model.

27. Verify that the rest of the dialog box matches the following image and click **OK**.

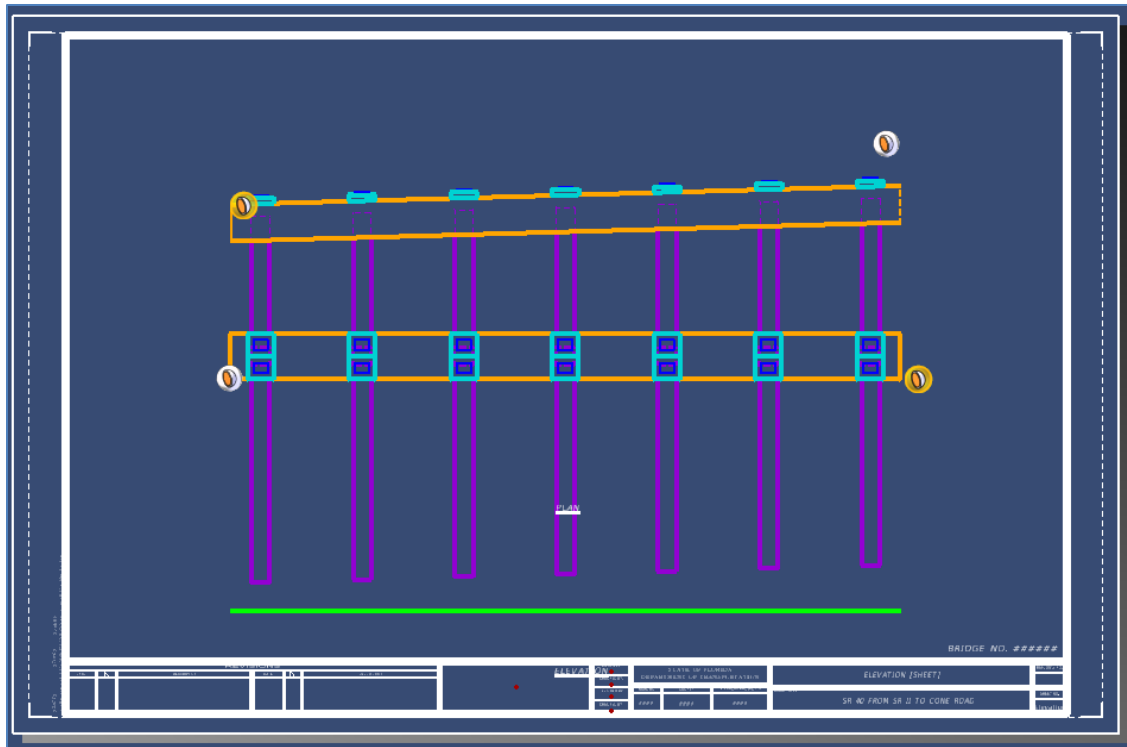


The screenshot shows the "Create Drawing" dialog box with the following settings:

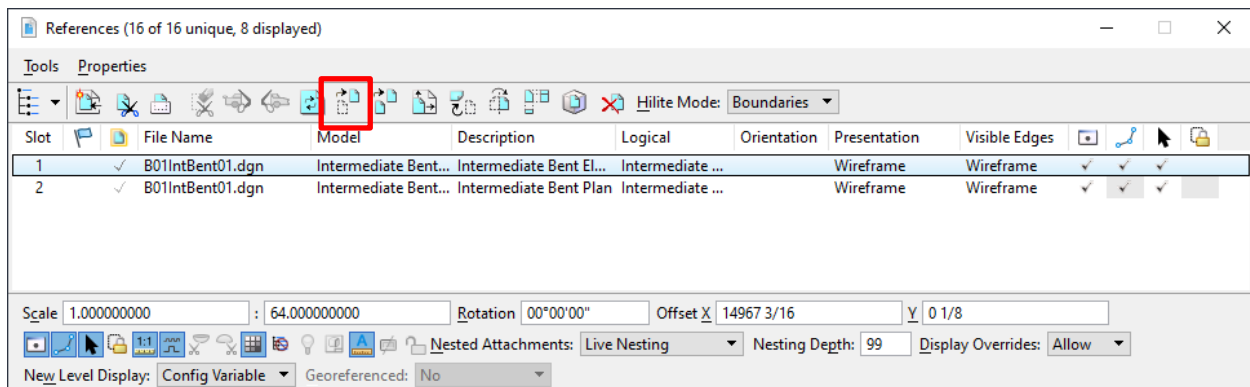
- Name: Intermediate Bent Plan
- Drawing Seed: 04_FDOT_Hidden
- View Type: Section
- Discipline: Bridge
- Purpose: (empty)
- Create Drawing Model
- Seed Model: FDOT_DRAWINGSEED_OBM.dgnlib, 04_FDOT1
- Filename: (Active File)
- Visible Edges: 3/16" = 1'-0"
- Visible Edges: Dynamic
- Create Sheet Model
- Seed Model: FDOT_DRAWINGSEED_OBM.dgnlib, 04_FDOT1
- Filename: (Active File)
- Sheets: Intermediate Bent Elevation [Sheet]
- Full Size 1 = 1
- Drawing Boundary: (New)
- Detail Scale: 3/16" = 1'-0"
- Add To Sheet Index
- Make Sheet Coincident
- Replicate Drawing in Sheet File
- Open Model

Buttons: OK, Cancel

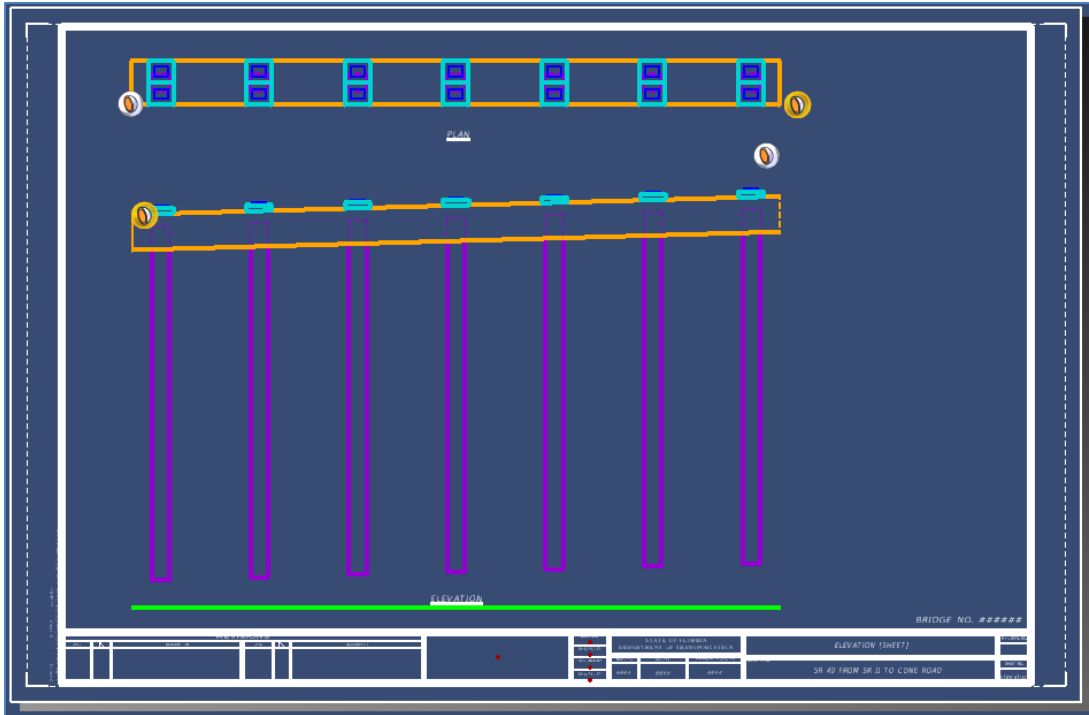
28. Notice that upon returning to the **Intermediate Bent Elevation [Sheet]** sheet model, a plan view is now found within the limits of the border. However, the plan view is overlapping the elevation view.



29. Open the **References** tool by navigating to and selecting **Home > Primary > References**.
30. In the *References* window, notice that each view has its own reference (Elevation View = Intermediate Bent Elevation, Plan View = Intermediate Bent Plan).
31. To move each view so they are not overlapping, they will need to be moved using **Move Reference** at the top of the *References* window.
32. Highlight the view that will be moved, as shown below. Then, click **Move Reference** and move the highlighted view. Move the **Elevation** model reference slightly to the left side of the sheet. Then, move the **Plan** model reference to be directly above the **Elevation** model reference so both views are horizontally aligned.

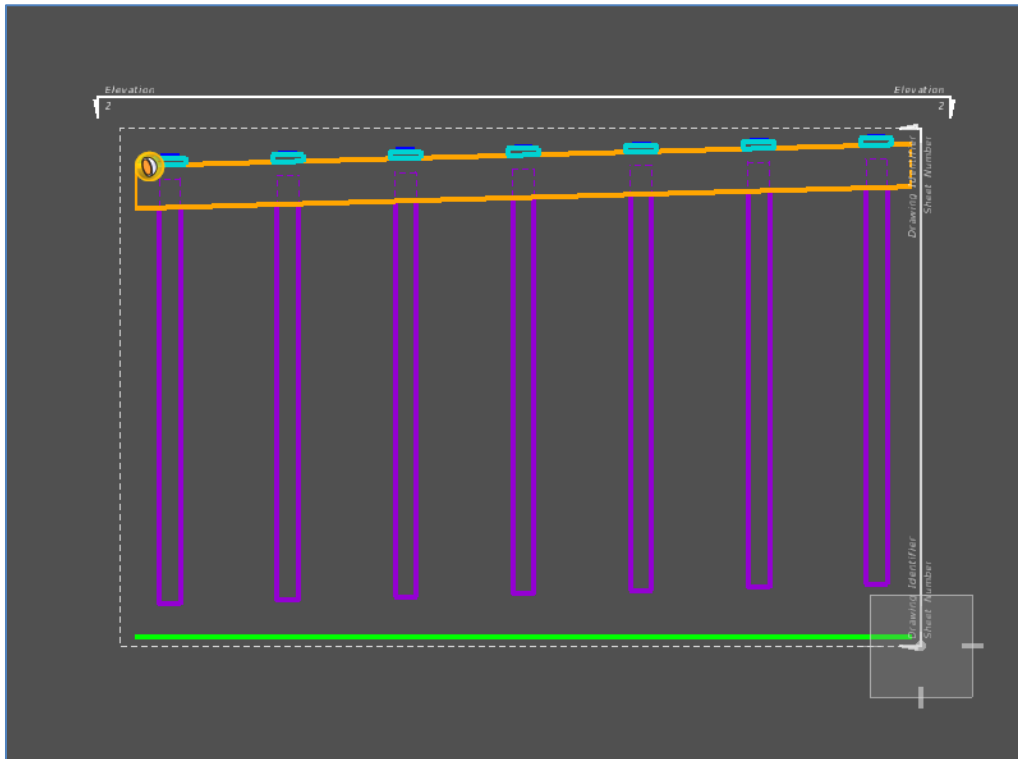


33. Use the **Move** tool to place the view titles (i.e., INTERMEDIATE BENT PLAN and INTERMEDIATE BENT ELEVATION) directly below their respective views. Navigate to **Home > Manipulate > Move** and then select the text to be moved. The sheet should look like the image below.



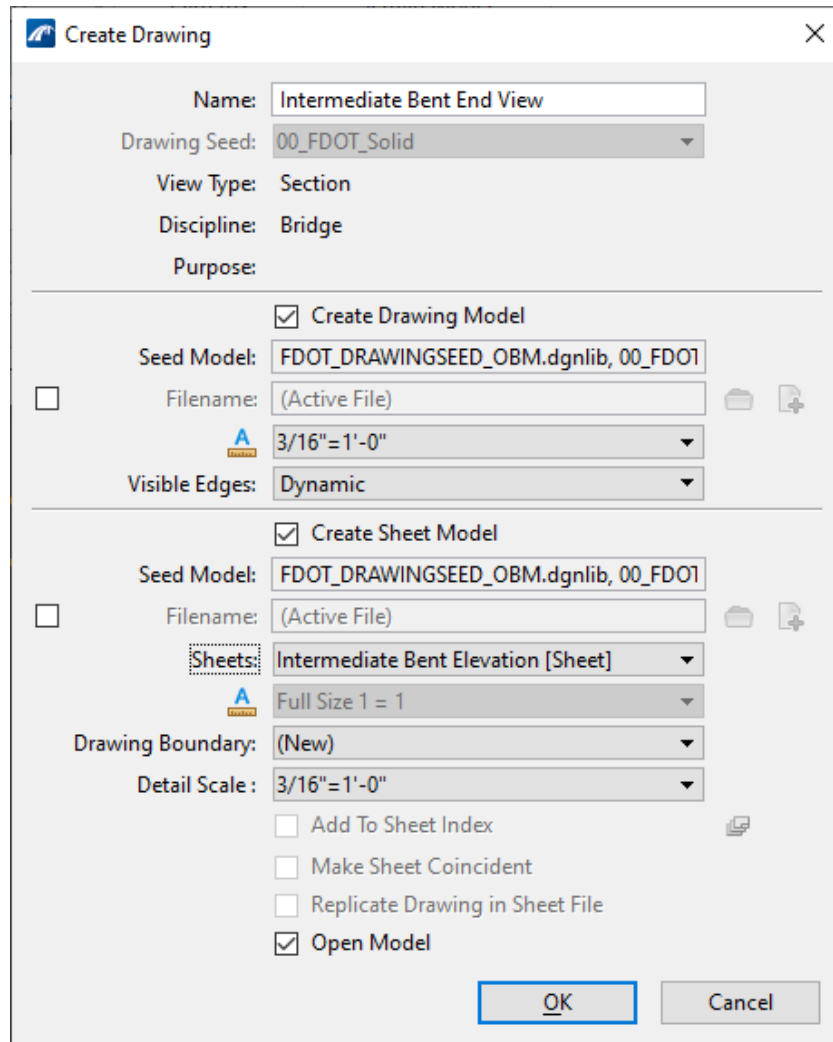
34. Return to the **Intermediate Bent Elevation** drawing model in the *Active View Groups* drop-down list to create an end view.
35. Open the **Section Callout** tool using the **00_FDOT_Solid** drawing seed and click above and to the right side of the bent cap to define a start point for the callout. Then, define an end point for the callout at a point below the tip of the piles.

36. Define a direction and depth to the callout by clicking at a point beyond the other end of the cap.

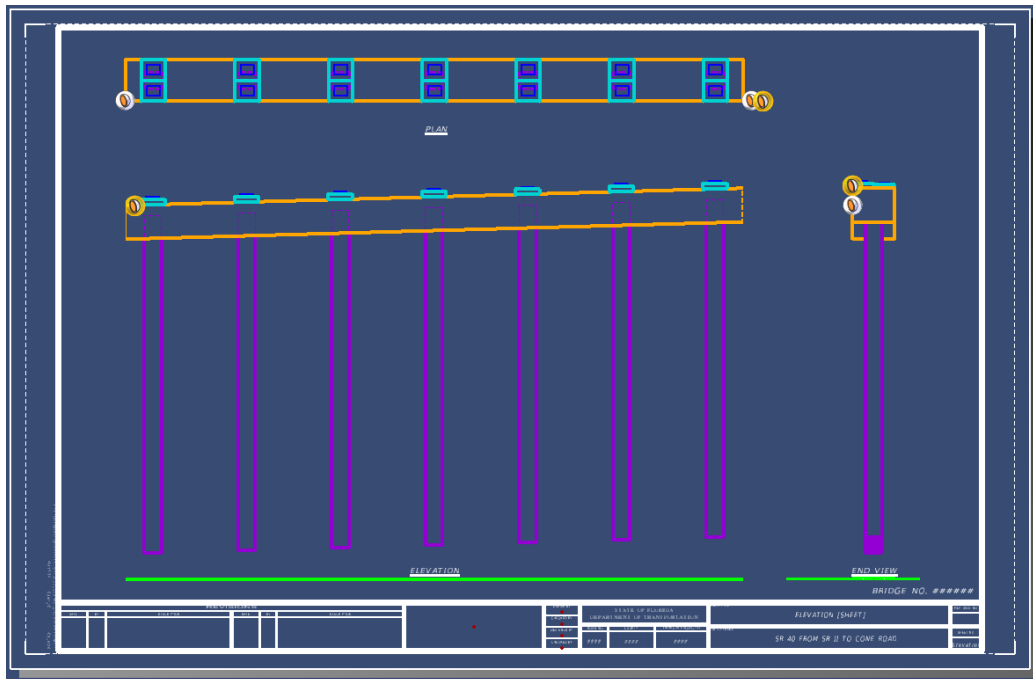


37. Once the *Create Drawing* dialog box opens, set the name of the view to be **Intermediate Bent End View**. Match the annotation and detail scales used for the previous view, and change the *Sheets* drop-down to the existing **Intermediate Bent Elevation [Sheet]** sheet model.

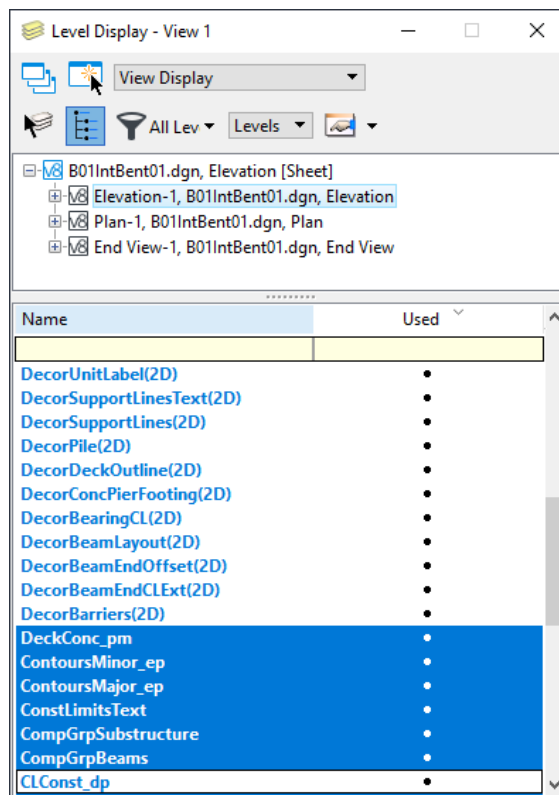
38. Verify that the rest of the dialog box matches the following image and click **OK**.




39. Return to the **Intermediate Bent Elevation [Sheet]** sheet model, to ensure the new end view model reference is now located in the sheet model.
40. Use the **Move Reference** and **Move** tools described in Steps 31 through 33 to place the **Intermediate Bent End View** model reference and view title to the right of the Elevation view, as shown in the following image.
41. Double click on each view title annotations (Intermediate Bent Plan, Intermediate Bent Elevation, and Intermediate Bent End View) and remove the “Intermediate Bent” portion. The view title annotations should now read **PLAN**, **ELEVATION**, and **END VIEW**.

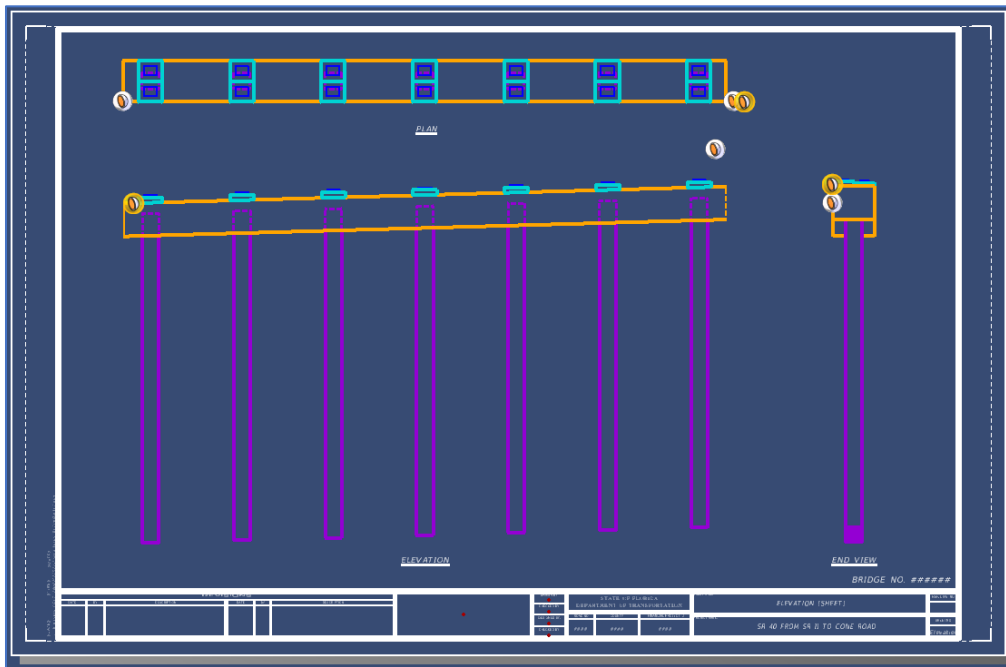


42. To turn off any remaining undesired levels in the drawing models, access **Home > Primary > Level Display**. Here, we can turn off all **DecorXXXX(2D)** levels and the **CLConst_dp** level in both the **Elevation** and **End View** model references



43. Lastly, save settings by clicking the  icon at the top left or **(Ctrl + F)** to keep all level display changes.

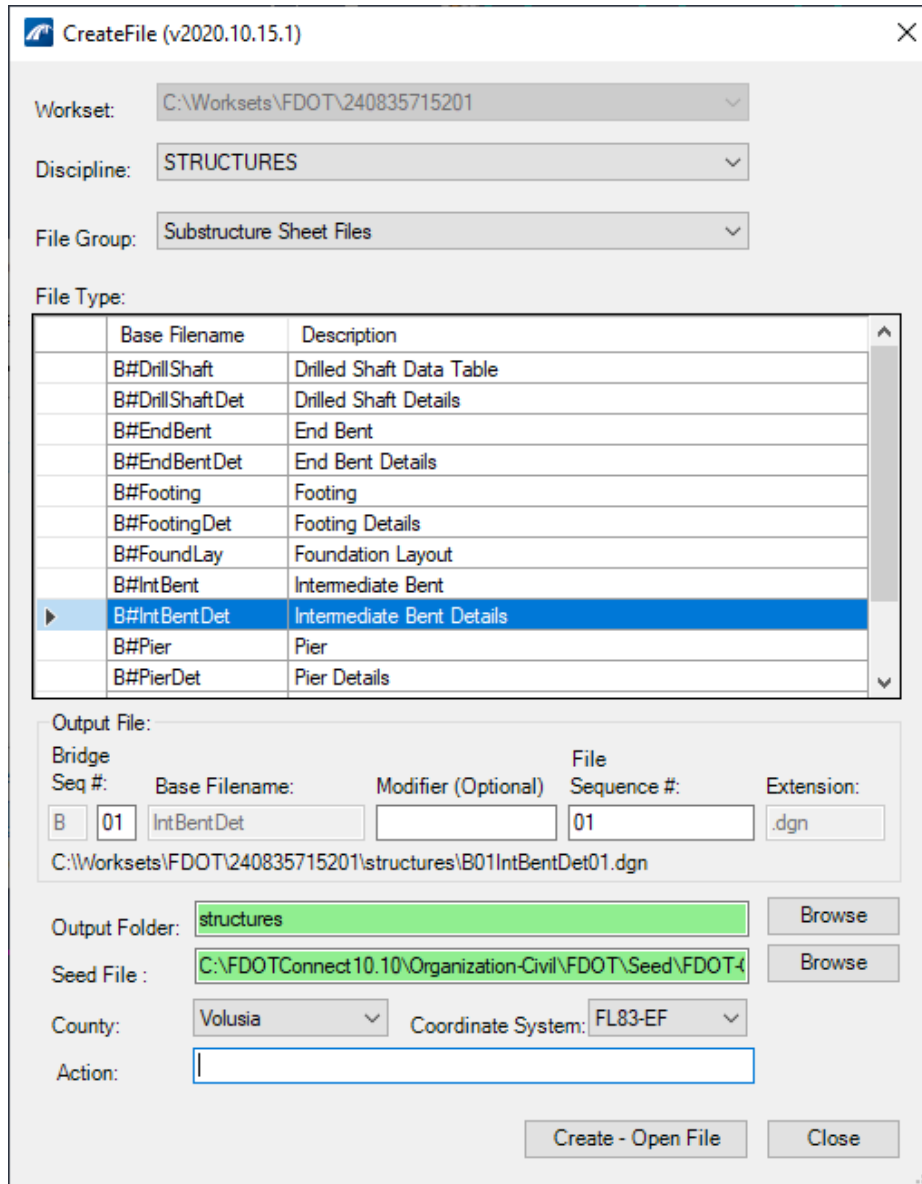
44. The final view should look like the image below.



➤ **Create a Pile Bent Details Sheet:**

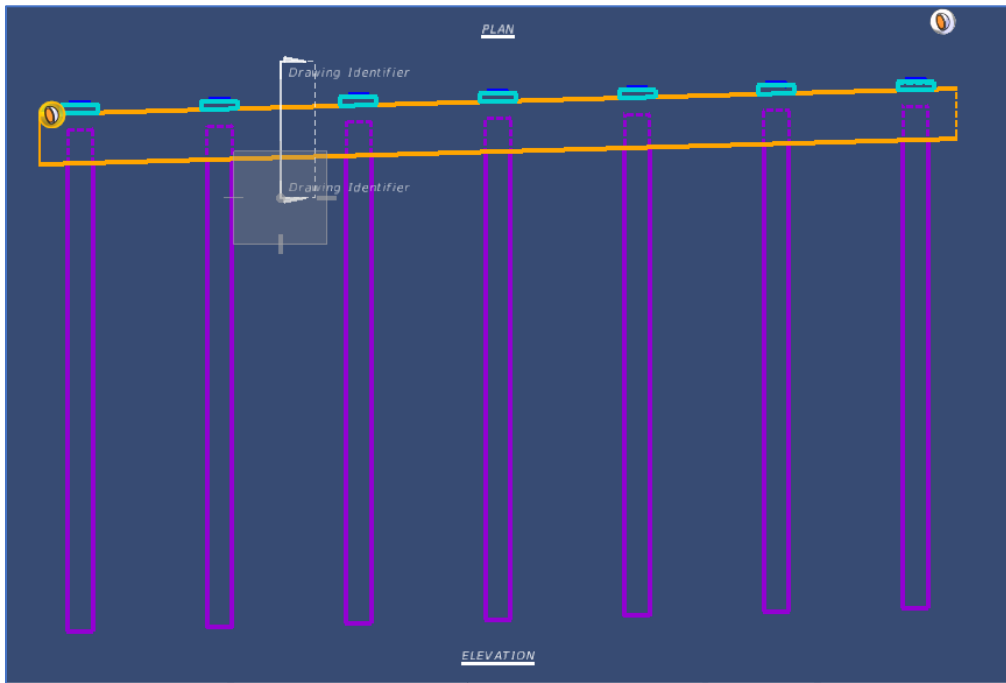
1. Access the **FDOT > Actions > Create File** tool and create a sheet file.
2. Ensure that the seed file being used is the *FDOT-OBM-StructuresSheetSeed3d.dgn* file. If it is not, click the **Browse** button next to the *Seed File* field to navigate to Seed folder. Select the correct file and click **Open**.

- Once all inputs are set as shown below and the correct seed file is selected, delete any text in the *Action* field. Click **Create – Open File** to create the sheet file.



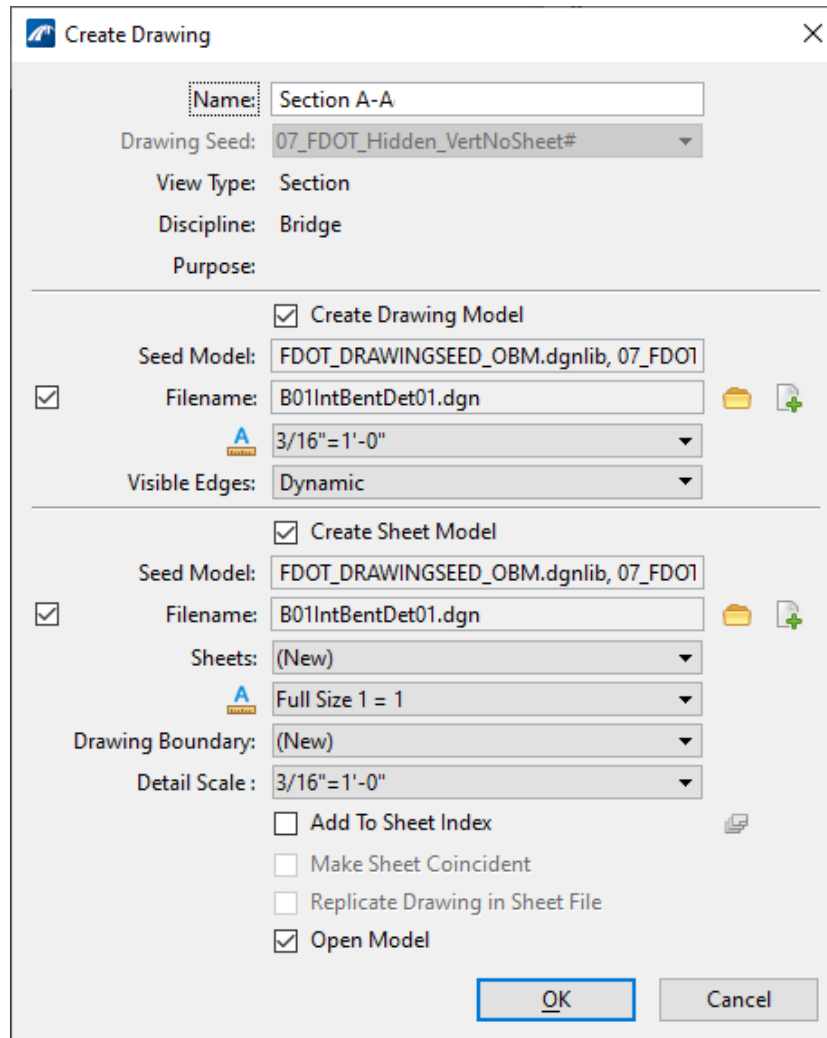
- The new sheet file will automatically be opened. Re-open pile bent sheet file created at the beginning of Exercise 6.1 by selecting **File > Open** and select **B01IntBent01.dgn**
- To create section views for the newly created details sheet, the section callout tool will again be utilized. However, in this case, we want to show the arrow annotations to denote where and what direction each section is cut. The subsequent section cuts will be done in the sheet model.
- Navigate to the **Intermediate Bent Elevation [Sheet]** sheet model in the *Active View Groups* drop-down list.

7. Access the **Section Callout** tool found at **Drawing (workflow) > Annotate > Detailing > Section Callout** and select the **07_FDOT_Hidden_VertNoSheet#** Drawing Seed. This seed will create a callout that is displayed more as a traditional FDOT section cut annotation.
8. Locate a point in the elevation view between piles. At this location, click at a point above the bent cap to define a start point for the callout. Then to create a vertical section, define an end point for the callout at a point straight down from the start point and below the bent cap, as shown below.
9. Define a direction and depth by clicking at a point to the right of the cut, as shown below.

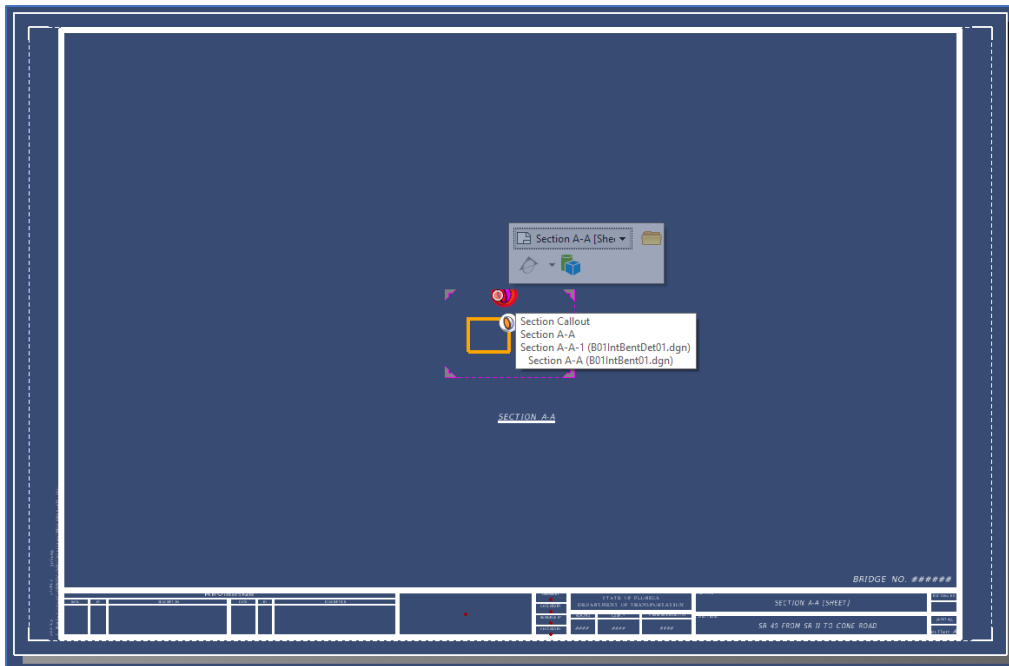


10. Once the *Create Drawing* dialog box opens, set the name of the view to be **Section A-A**. Then, set the annotation scale for the drawing model and the detail scale of the sheet model to **3/16" = 1'-0"**.
11. Check the boxes next to the *Filename* fields and click the folder button to select the file created in Steps 1 through 3 (**B01IntBentDet01.dgn**) to send the new drawing and sheet models to the specified file.

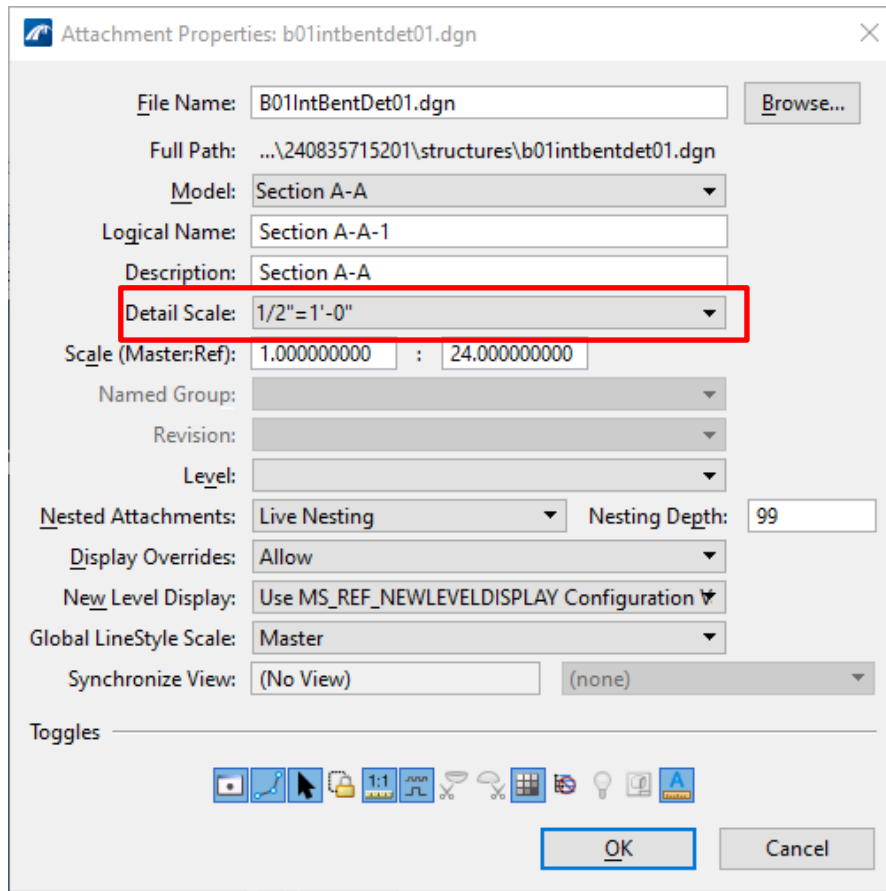
12. Verify that the rest of the dialog box matches the following image and click **OK**.



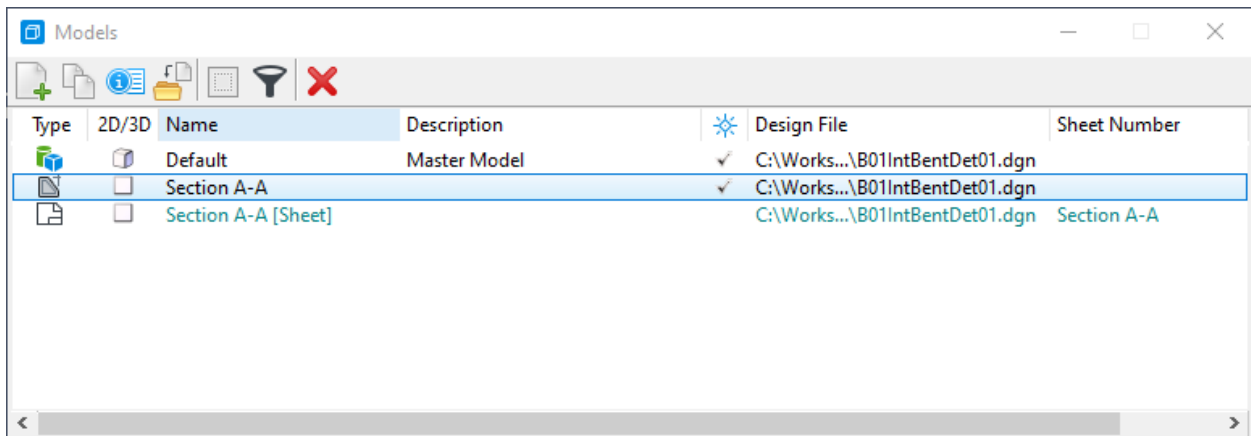
13. Notice that, once the new sheet model has opened, that Section A-A is small in relation to the sheet border. The scale of the section can be changed to increase the section size within the border. However, both the annotation scale for drawing model and the detail scale of the sheet model must be changed for consistency.



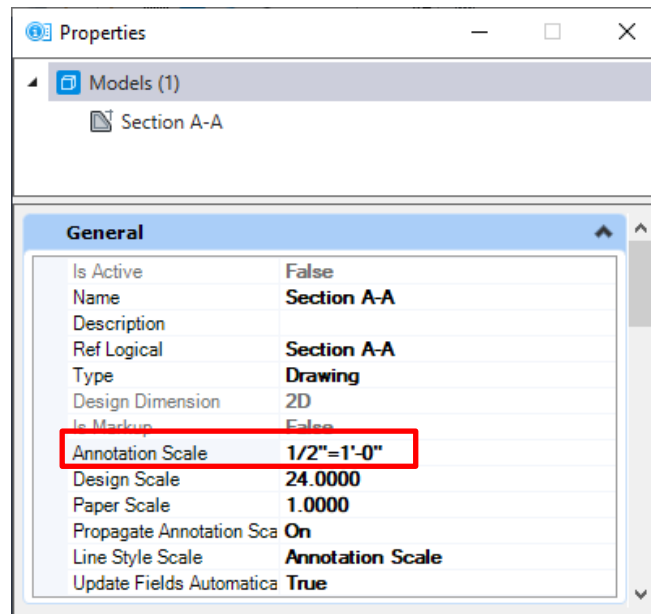
14. To change the detail scale of the sheet model, open the **References** tool by navigating to and selecting **Home > Primary > References**.
15. In the *References* window, highlight the drawing model reference. Then right click and select **Settings**.
16. This will open the *Attachment Properties* window to open where the *Detail Scale* should be changed to **1/2"=1'-0"**. The *Scale* of the reference is now set to be **1:24**.



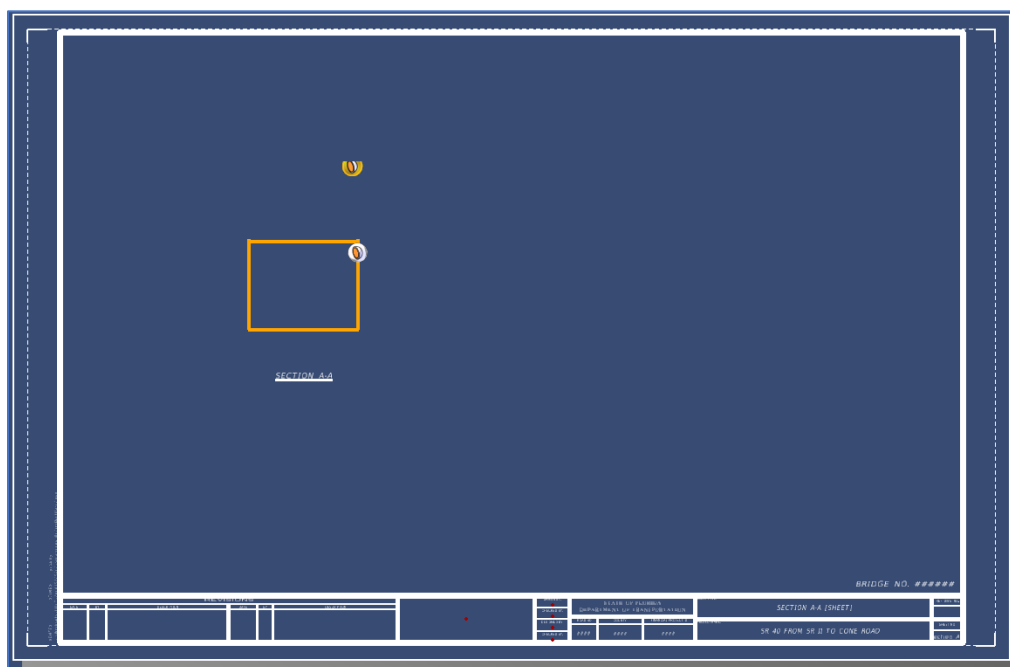
17. Now, to change the annotation scale of the drawing model, access the **Properties** tool at **Home > Primary > Properties**.
18. Next, open the **Models** tool in the same group by selecting **Home > Primary > Models**.
19. Once the has opened to show all the models present in the file, highlight the drawing model titled **Section A-A**.



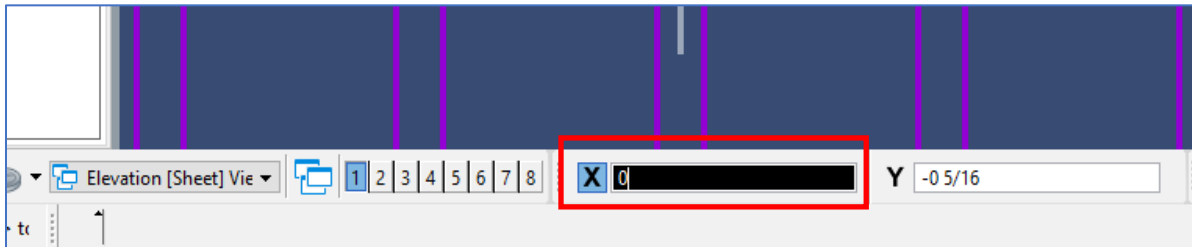
20. With the **Section A-A** drawing model highlighted, the model's properties will all be accessible in the *Properties* window. Here, change the *Annotation Scale* field to **1/2"=1'-0"** as shown below.



21. Now that both scales have been set, Section A-A needs to be moved to make room for an additional section. Returning to the *References* window, use the **Move Reference** tool to move the Section A-A view slightly to the left side of the sheet.
22. Use the **Drawing (workflow) > Home > Manipulate > Move** tool to place the view title (SECTION A-A) directly below the section view. The sheet should look like the image below.

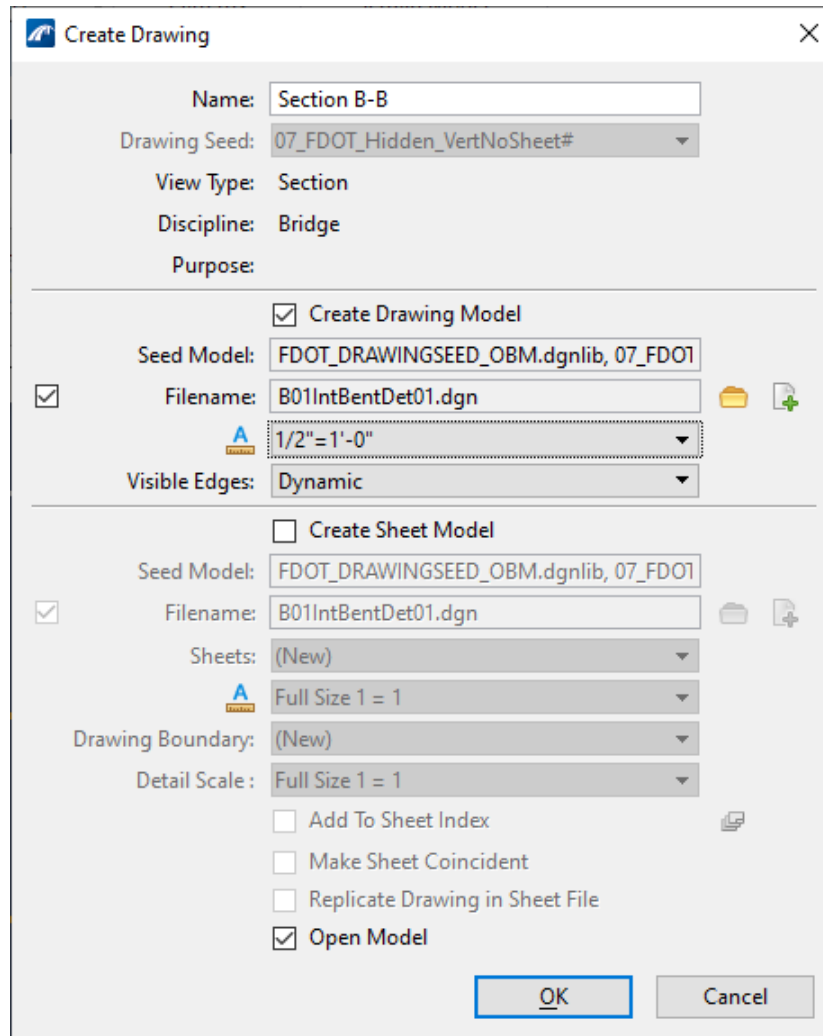


23. Re-open the Pile Bent file by selecting **File > Open** and select **B01IntBent01.dgn**. Here we will create one additional section of the bent cap at the pile.
24. In the **Intermediate Bent Elevation [Sheet]** sheet access the **Section Callout** tool at **Drawing (workflow) > Annotate > Detailing > Section Callout** and select the **07_FDOT_Hidden_VertNoSheet#** Drawing Seed.
25. This time, locate a point in the elevation view directly above a pile. At this location, click at a point above the bent cap to define a start point for the callout. To ensure the section cut will be perfectly vertical, click in the *X-Axis* data field in the AccuDraw Toolbar, input "0" and hit "Enter". Then define an end point for the callout at a point below the bent cap.

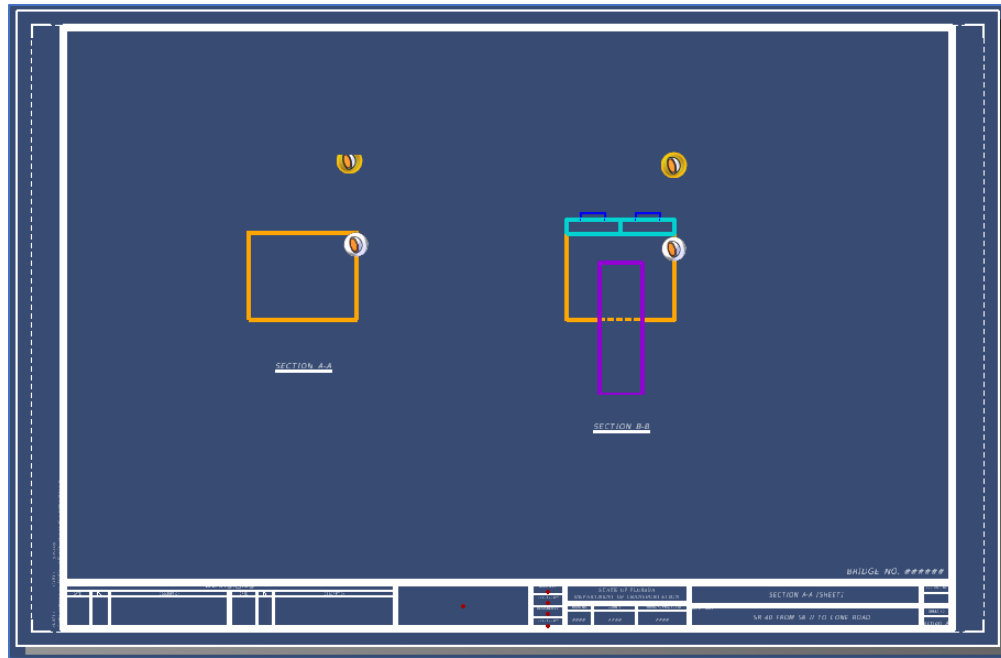


26. Define a direction and depth by clicking at a point to the right of the cut.
27. Once the *Create Drawing* dialog box opens, set the name of the view to be "Section B-B". Then, set the annotation scale for the drawing model to $1/2" = 1'-0"$ to match the re-scaled Section A-A.
28. Next, toggle off the *Create Sheet Model* box so a sheet model is not automatically created for this section. Instead, we will learn how to manually place a created section into an existing sheet model without the use of the *Create Drawing* window.
29. Check the box next to the *Filename* field and click the folder button to select the file created in Steps 1 through 3 (**B01IntBentDet01.dgn**) to send the new drawing model to the specified file.

30. Verify that the rest of the dialog box matches the following image and click **OK**.

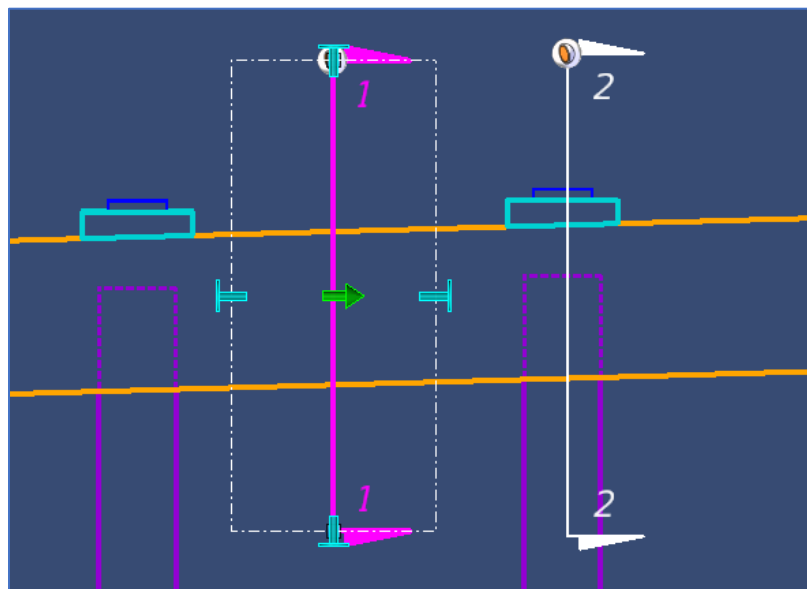


31. The **B01IntBentDet01.dgn** will open where a **Section B-B** drawing model has been created. However, the **Section B-B** model reference has not been included in the **Section A-A [Sheet]** model.
32. To add **Section B-B** to the **Section A-A [Sheet]** model, open the *Models* window. Here click and drag the **Section B-B** drawing model from the window and into the sheet model border limits.
33. Next the *Attach Source Files* window will automatically open. The *Attachment Method* should be set to **Recommended**. Then, click at the point within the border that the section will be placed.
34. Once **Section B-B** has been placed in this sheet model, use the **Move Reference** and **Move** tools to position the new section similar to the following image.

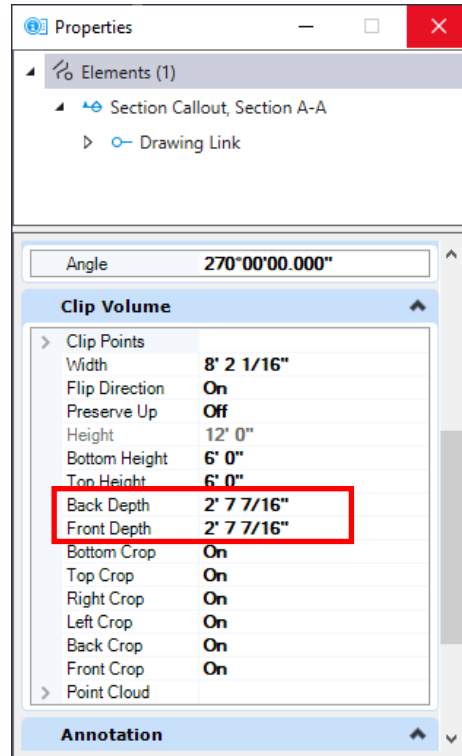


While these Sections look like a traditional section included in FDOT plans, they are currently shown with depth. For this exercise, the sections are only meant to be cuts without any depth. Fortunately, these model references are dynamic and the views can be modified after creation.

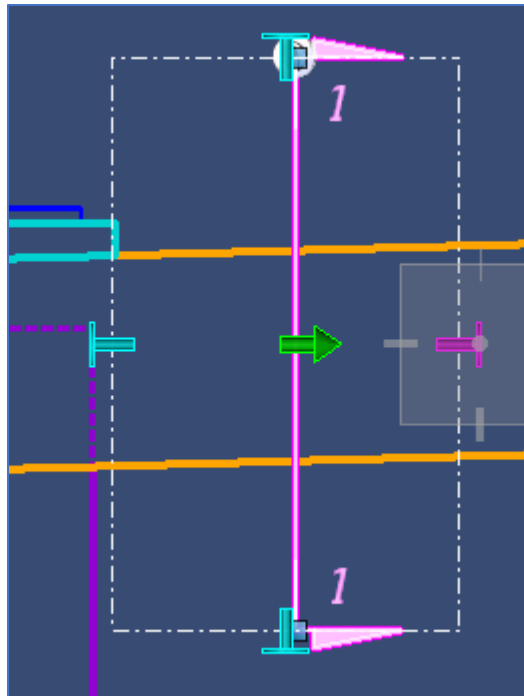
35. To modify the section cuts, return to the **B1IntBent01.dgn** file. Once the file has opened in the **Intermediate Bent Elevation [Sheet]** model, move the cursor to the Section A-A section callout and click on it to select it.



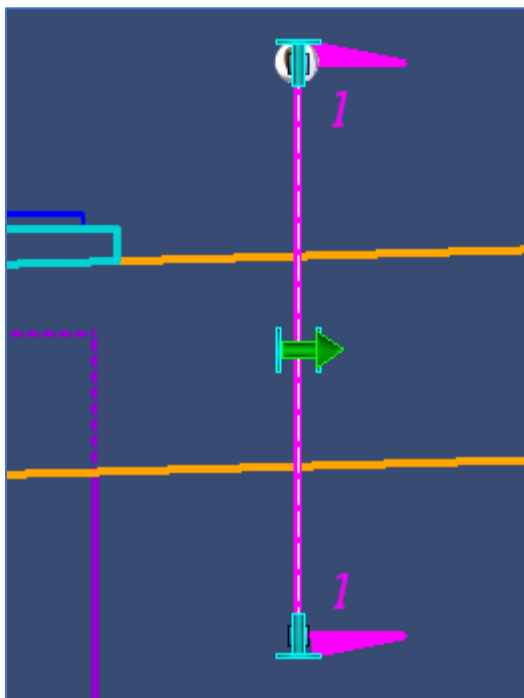
36. The dashed white line denotes the limits of the clip volume. The depth can be manipulated in two ways. The first method is to access the **Properties** tool by navigating to and selecting **Home > Primary > Properties**. If the section callout is selected, its properties will show up in the window. Scroll down to the *Clip Volume* section of the window and change the *Front Depth* and the *Back Depth* fields to **0' 0"**.



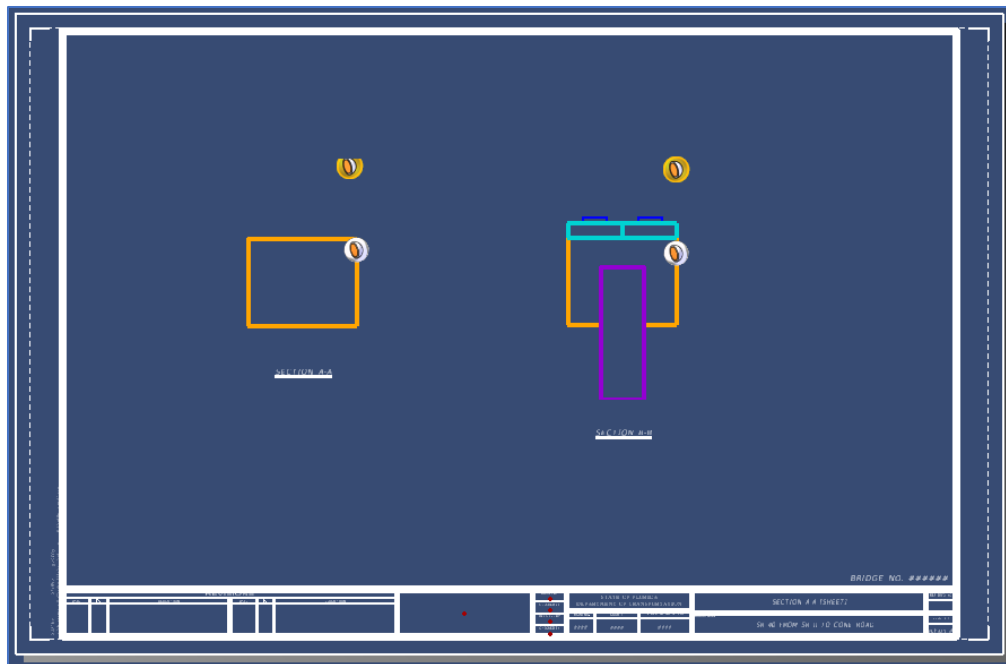
37. Alternatively, the clip volume can be manually manipulated by clicking the horizontal handles on the limits of the clip volume. Once selected, the handle will turn purple.



38. Move the handle to the center of the clip volume. Click once more on section callout line to release the handle. Then repeat for the opposite handle to remove all depth.

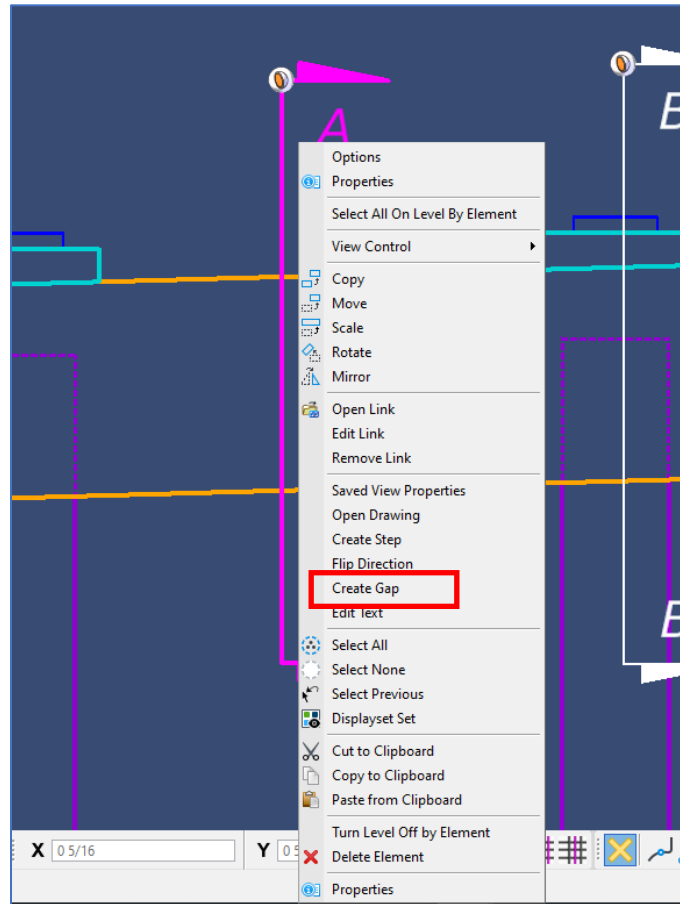


39. Repeat this process for the Section B-B section callout.
40. These changes will now be reflected in the **B01IntBentDet.dgn** sheet file and should look like the following image. Note that reinforcing bars and annotations could be added to the drawing models.

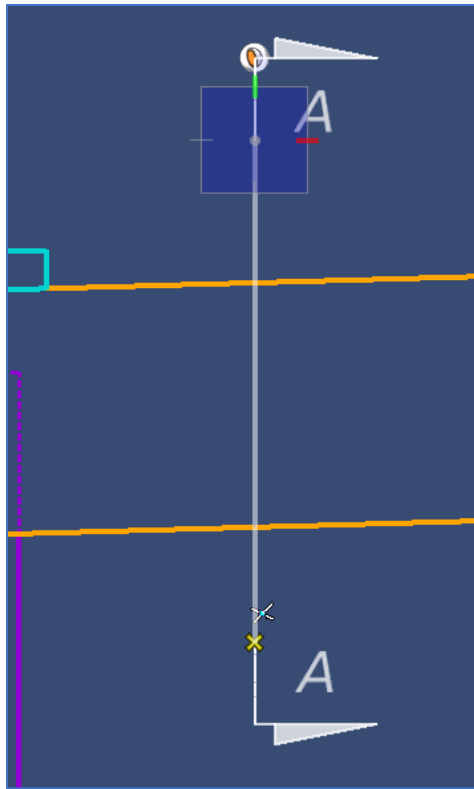


41. Now that Pile Bent Details sheet (**B01IntBentDet01.dgn**) has been completed, the section callout annotations in the Pile Bent sheet (**B01IntBent01.dgn**) need to be updated to match the titles of the sections in the details sheet. This is accomplished by changing the properties of the drawing boundary for each section within the sheet model.
42. In the **Section A-A [Sheet]** model, click on the SECTION A-A view title to select the drawing boundary. Then, access the **Home > Primary > Properties** tool and change the *Drawing Identifier* field in the *General* section to **A**.
43. Repeat this with the Section B-B section callout, but instead type **B** in the *Drawing Identifier* field.
44. Re-open the **B01IntBent01.dgn** and notice that the section callout annotations found in the **Intermediate Bent Elevation [Sheet]** model now show the correct A-A and B-B callouts.

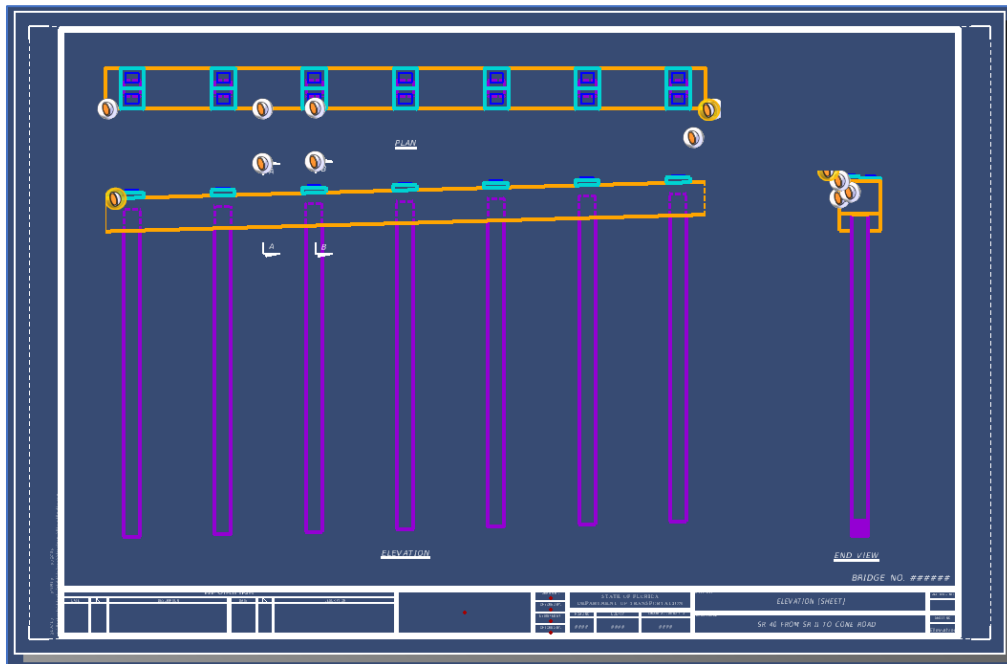
45. Lastly to get the section callouts to look like they would in a traditional FDOT plan sheet, there should be a gap between the arrows. To achieve this, first right-click and hold on the Section A-A section callout to get a list of options to pop up, as shown in the following image. Select **Create Gap**.



46. Next, click at the tail of the top arrow. Then click again at the tail of the bottom arrow, as shown in the following image.



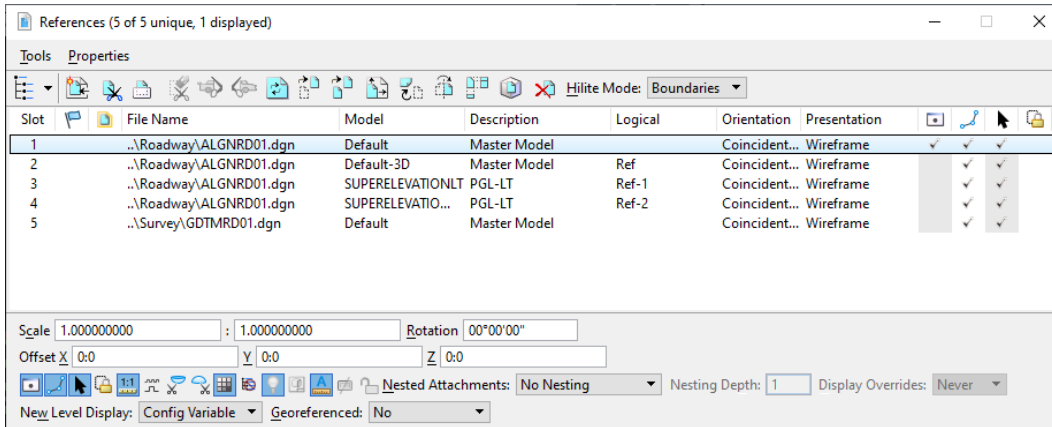
- 47. Repeat this with the Section B-B section callout.
- 48. The final sheet should look like the image below.



Exercise 6.2 Create a Typical Section from the Dynamic View by Station Tool

➤ **Generate a Typical Section View:**

1. Open the data set file: **B01MODLBRT01_6.2_Begin**
2. Ensure the 2D Alignment reference is toggled on. The Alignment file for the bridge must be attached and toggled on in order to use the “Dynamic View By Station” tool. This can be turned on inside the References dialog box.



3. Access the **FDOT > Actions > Create File** tool and create a sheet file with the inputs indicated below and delete any text in the *Action* field.

Workset: C:\Worksets\FDOT\240835715201

Discipline: STRUCTURES

File Group: Superstructure Sheet Files

File Type:

	Base Filename	Description
	B#SegLayout	Segment Layout
	B#SidewalkDet	Sidewalk Details
	B#SlidingPlate	Traffic / Pedestrian Railing Sliding Plate Assembly
	B#SteelDet	Steel Girder Details
	B#SteelGirder	Steel Girder
	B#Stiffener	Stiffener Details
	B#Superst	Superstructure
	B#SuperstDet	Superstructure Details
	B#TrafficRailing	Traffic Railing
▶	B#TypicalSection	Typical Section Through Bridge Deck
	B#TypSegDet	Typical Segment Details

Output File:

Bridge Seq #: B | 01 | TypicalSection | Modifier (Optional) | File Sequence #: 01 | Extension: .dgn

C:\Worksets\FDOT\240835715201\structures\BTypicalSection01.dgn

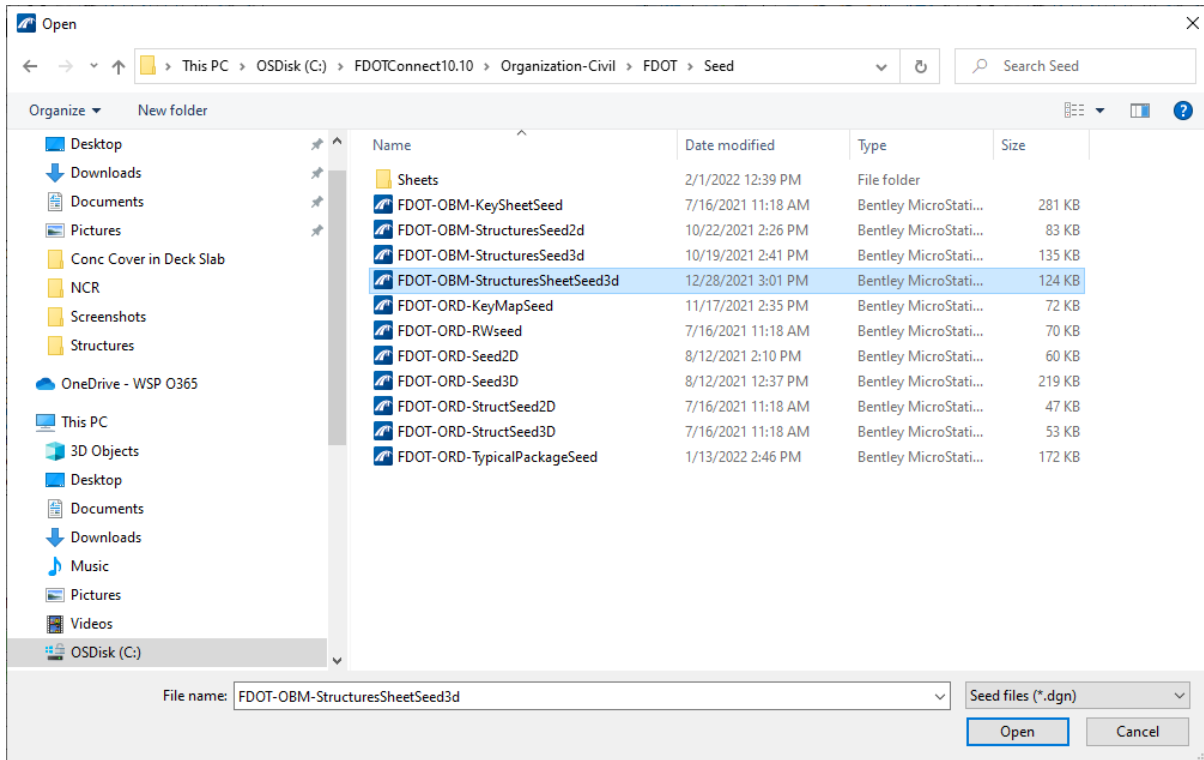
Output Folder: structures

Seed File: ion-Civil\FDOT\Seed\FDOT-OBM-StructuresSheetSeed3d.dgn

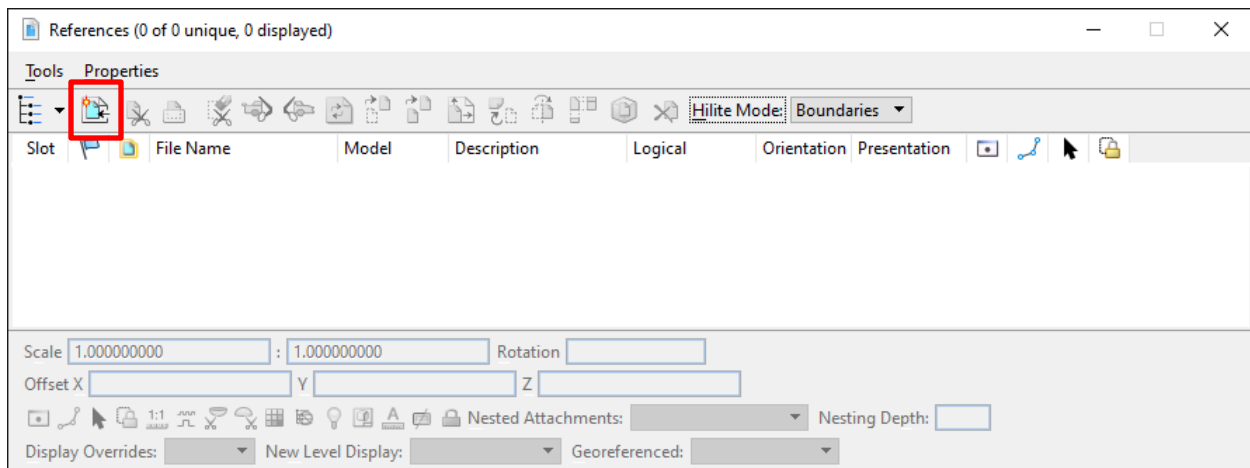
County: Volusia | Coordinate System: FL83-EF

Action:

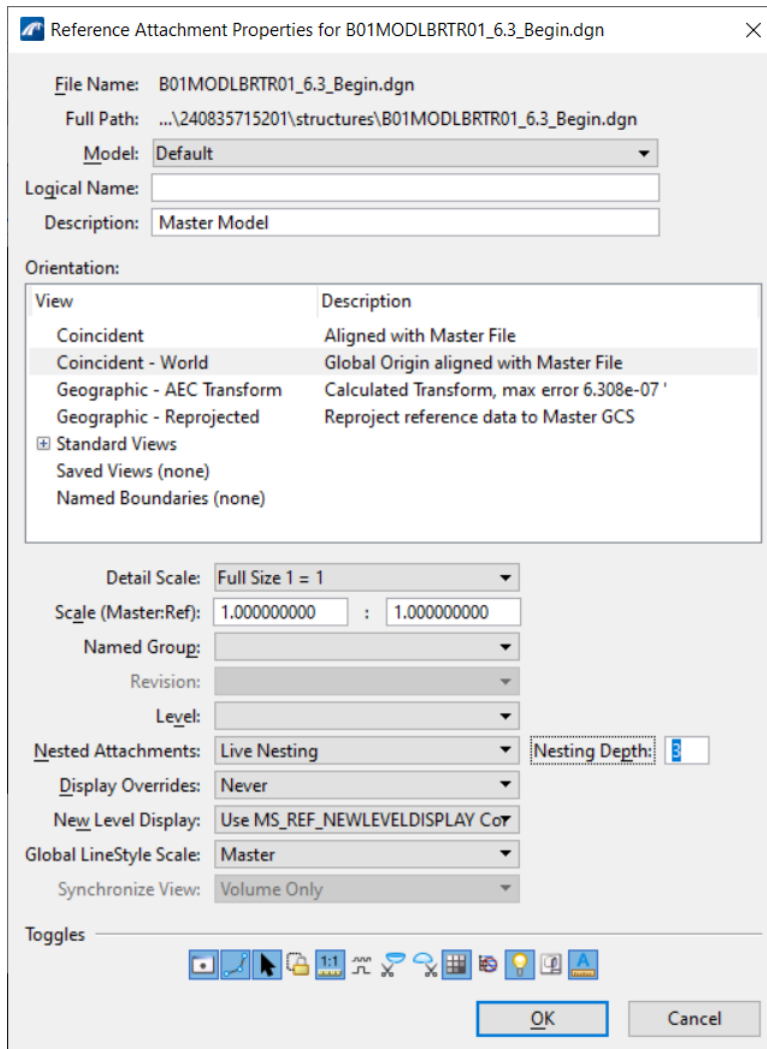
4. Ensure that the seed file being used is the *FDOT-OBM-StructuresSheetSeed3d.dgn* file. If it is not, click the **Browse** button next to the *Seed File* field to navigate to Seed folder. Select the correct file and click **Open**.



- Once all inputs are set and the correct seed file is selected, click **Create – Open File** to create the sheet file.
- The new sheet file will automatically be opened. In the **Default** model, open the **References** tool by navigating to and selecting **Home > Primary > References**.
- Attach the **B01MODLBTR01_6.2_Begin.dgn** file as a reference in the **Default** model by using the **Attach Reference** tool at the top of the **References** window and then selecting the file.

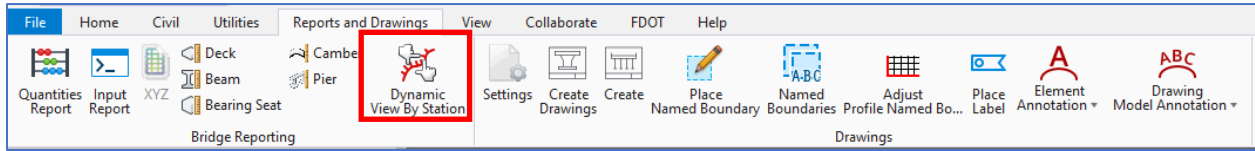


8. Once all inputs for the incoming reference are set, click **OK** to attach the reference.

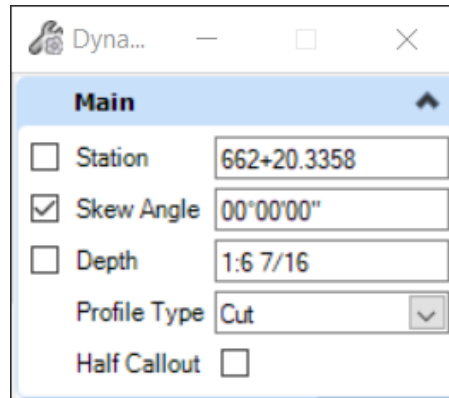


9. Once attached, click the **Fit View** tool at the top of the view window, then click within the view window to fit the reference within the view. Locate the bridge and zoom in.
10. Note that the annotations are difficult to see. To change the annotation scale of the model, access the **Properties** tool at **Home > Primary > Properties**.
11. Next, open the **Models** tool in the same group by selecting **Home > Primary > Models**.
12. Once the *Models* window has opened to show all the models present in the file, highlight the model titled **Default**. The model's properties will all be accessible in the *Properties* window. Here, change the *Annotation Scale* field to **1"=20'**.

13. Select the “Dynamic View By Station” tool by navigating to and selecting **Reports and Drawings > Bridge Reporting > Dynamic View By Station**



14. In the *Dynamic View Report* dialog box the *Profile Type* should be set to **Cut** to only show any elements that directly intersect with the cut line. Additionally, only the *Skew Angle* checkbox should be selected with an angle of 00°-00'-00”, as shown in the following image.



Note If the *Profile Type* is changed to **Cut with Depth**, the section will also be able to show elements not directly intersecting the cut line. Any elements encapsulated by the defined depth will be shown in the created view, as the section will show up more as a volume instead of a plane with no depth.

15. Select Alignment where Section Will Be Cut. To create a view with the **Dynamic View By Station** tool, the alignment where the drawing will be cut must be selected. Select “PGL LT”.

16. Select Location of Section Cut. Move cursor to a point in Span 1 between *FFBW End Bent 1* SupportLine and the *CL Intermediate Bent 2* SupportLine and click to select this location along the alignment "PGL LT".



17. Determine Orientation and Length of Section Cut. Position the orange crosshairs outside the limits of the bridge, as shown in the following image. Note that sections can be cut with different skews. For instance, to create a longitudinal cross section of a bent, a skew of 90°-00'-00" can instead be used.

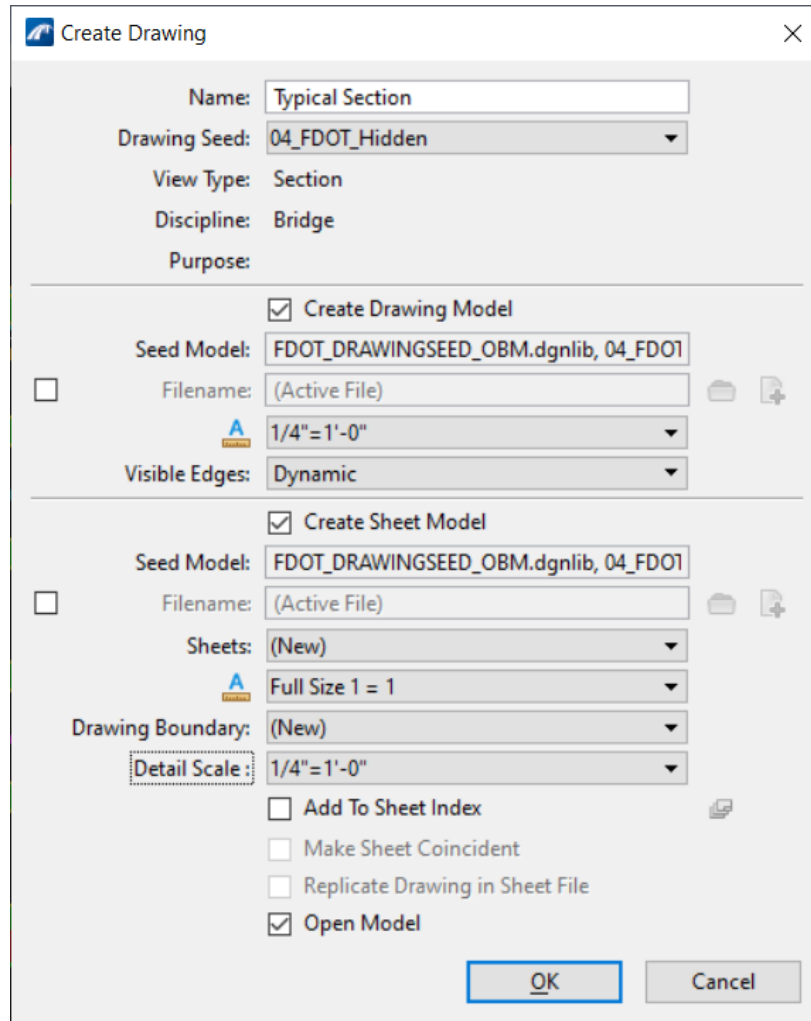


18. Determine Direction of Section Cut. Click a location upstation from the defined cut line to specify what direction the cut should show.



19. After selecting the direction, the *Create Drawing* window will appear. Set the name of the view to be **Typical Section** and the *Drawing Seed* to be **04_FDOT_Hidden**. Set the annotation scale for the drawing model and the detail scale of the sheet model to **1/4" = 1'-0"**.

20. Verify that the rest of the dialog box matches the following image and click **OK**.



Create Drawing

Name: Typical Section

Drawing Seed: 04_FDOT_Hidden

View Type: Section

Discipline: Bridge

Purpose:

Create Drawing Model

Seed Model: FDOT_DRAWINGSEED_OBM.dgnlib, 04_FDO1

Filename: (Active File)

Visible Edges: 1/4" = 1'-0"

Visible Edges: Dynamic

Create Sheet Model

Seed Model: FDOT_DRAWINGSEED_OBM.dgnlib, 04_FDO1

Filename: (Active File)

Sheets: (New)

Drawing Boundary: Full Size 1 = 1

Drawing Boundary: (New)

Detail Scale: 1/4" = 1'-0"

Add To Sheet Index

Make Sheet Coincident

Replicate Drawing in Sheet File

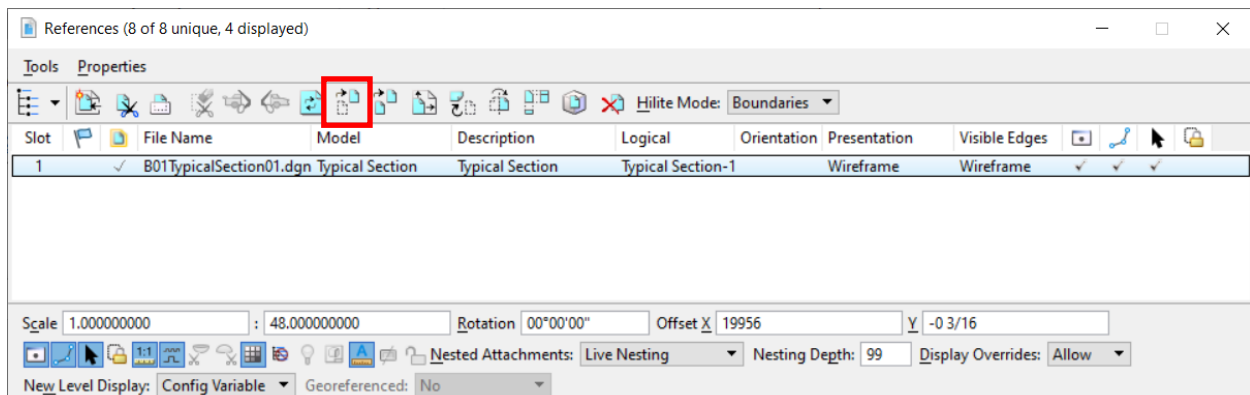
Open Model

OK Cancel

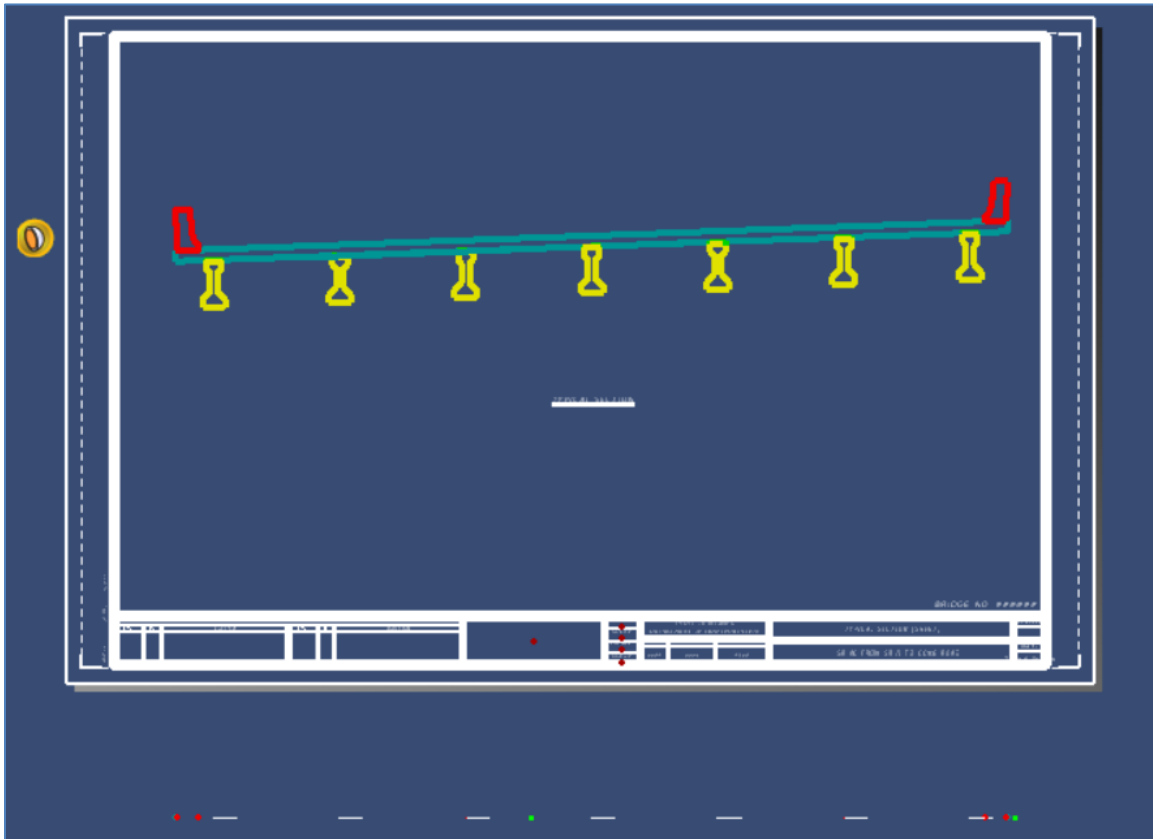
21. The following window should open, showing the section created.



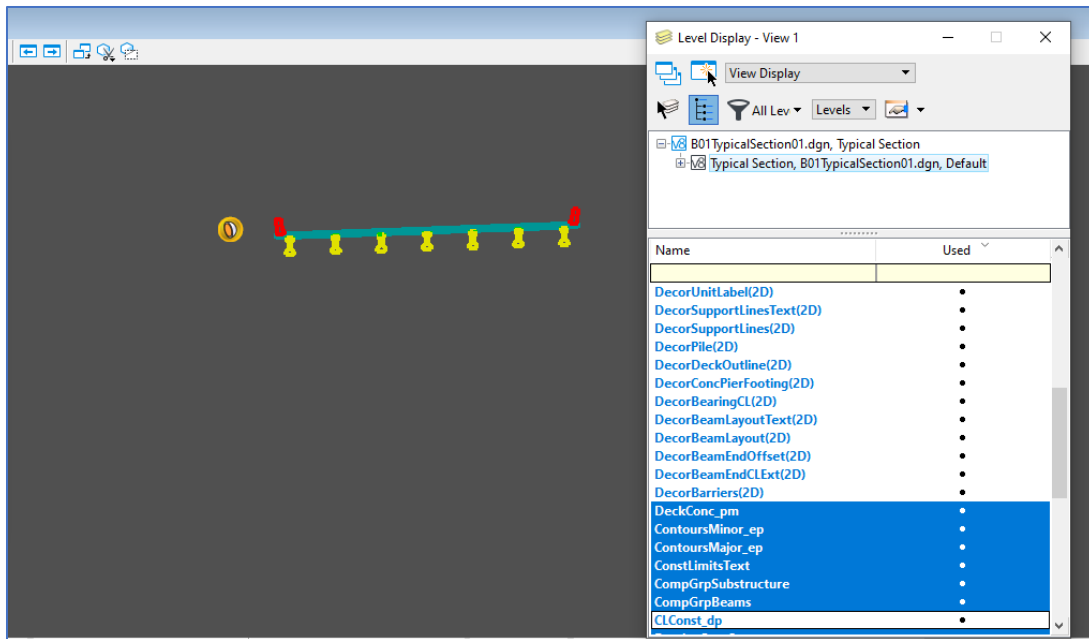
- 22. In the newly created sheet model, open the **References** tool by navigating to and selecting **Home > Primary > References**.
- 23. To center the section in the sheet border, the model reference will need to be moved using **Move Reference** at the top of the **References** window.
- 24. Highlight the view that will be moved, as shown below. Then, click **Move Reference** and move the highlighted Typical Section model reference to be centered in the border.



25. Use the **Move** tool to place the view titles (i.e., TYPICAL SECTION) directly below their respective views. Navigate to **Drawing (workflow) > Home > Manipulate > Move** and then select the text to be moved. The sheet should look like the image below.



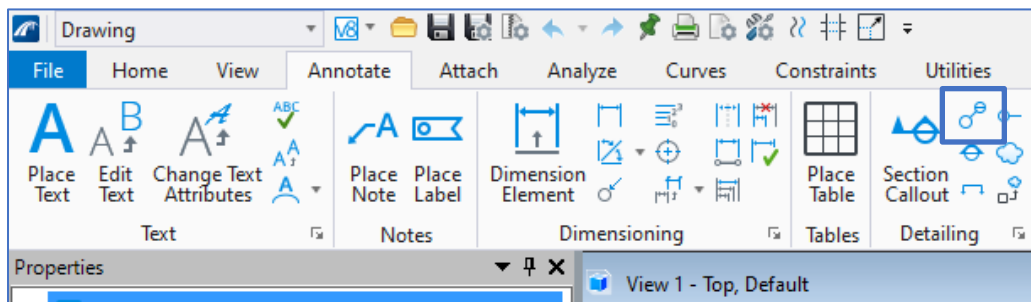
26. For this section, the 2D Decoration levels do not need to be visible. Therefore, these unneeded levels can be toggled off. While in the **Typical Section** drawing model, navigate to **Home > Primary > Level Display**. The dots in the image below show the components that are active in the model. Order the components by clicking on **Used** until all active components are at the top of the list. Undesired items can be hidden by clicking on the list item to remove the blue highlight. Note that this process could also be done prior to using the **Dynamic View by Station** tool.



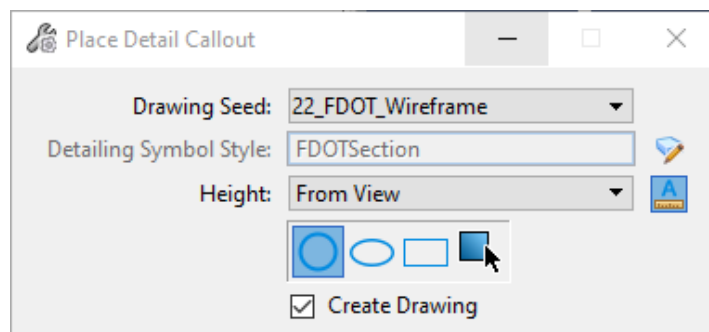
27. To ensure that the levels remain toggled off the next time the file is opened, save the settings by accessing **File > Save Settings** or **(Ctrl + F)**. Reinforcing bars and annotations could be added to the drawing model.

➤ **Generate an Overhang Detail:**

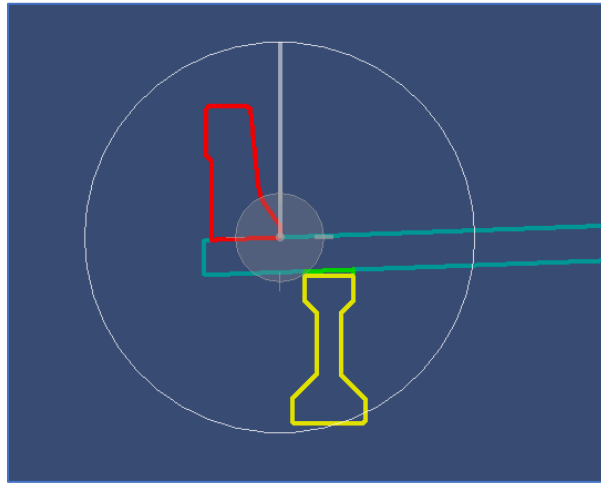
1. Within the **Typical Section [Sheet]** model, access the **Detail Callout** tool by navigating to **Drawing (workflow) > Annotate > Detailing > Detail Callout**.



2. Select the **22_FDOT_Wireframe Drawing Seed**, and use the circle boundary to create the detail.

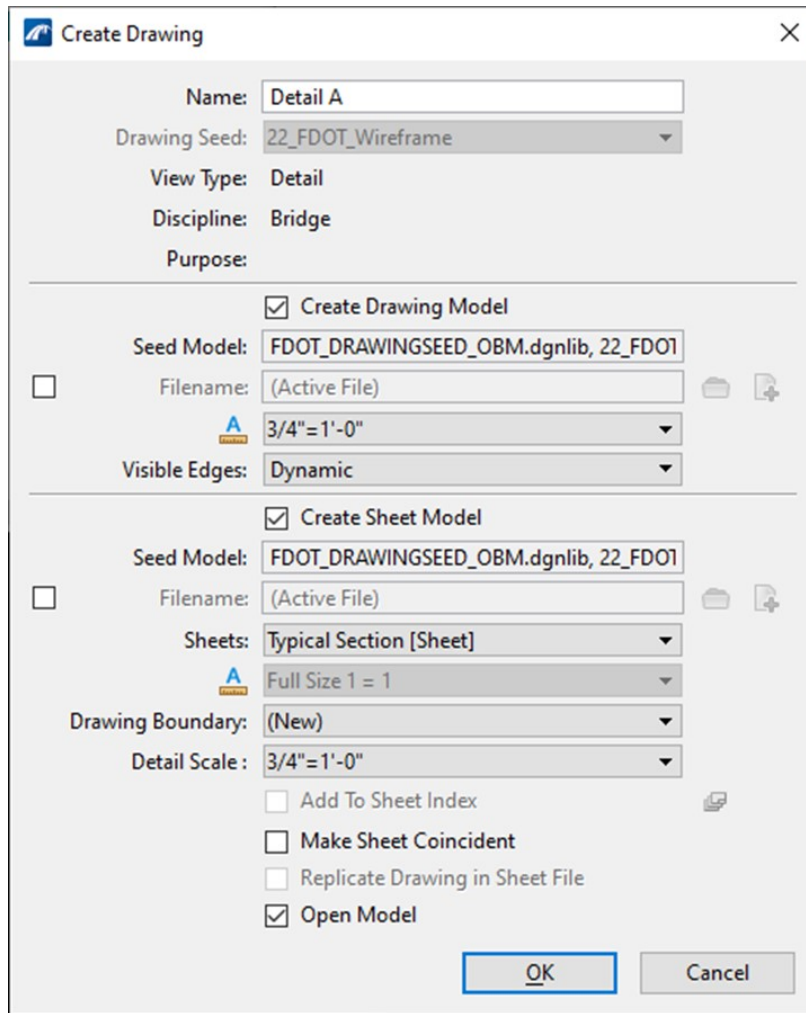


3. Click on the left gutterline to place the center of the circular callout. Then click a point directly above to define the edge of the detail circle so that it fully encompasses the overhang and barrier.

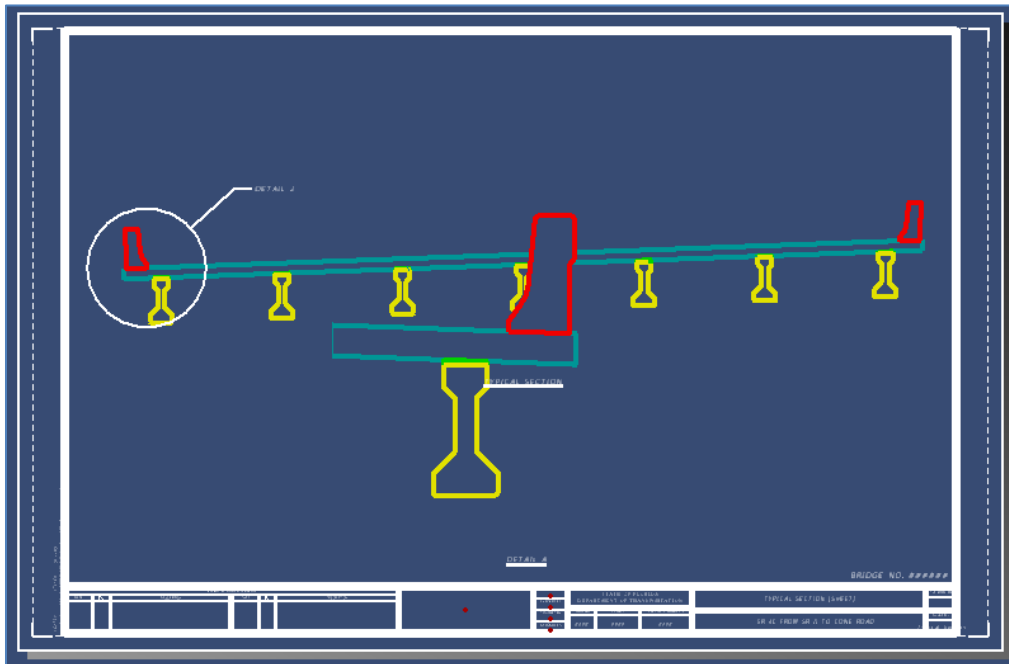


4. Click once more to define the end point for the callout above the circle and to the right. Click one final time to provide a leader for the callout and then, right-click to reset and finish the detail callout placement.
5. Set the name of the view to be **Detail A**. The *Drawing Seed* is already set as **22_FDOT_Wireframe**. Set the annotation scale for the drawing model and the detail scale of the sheet model to **3/4" = 1'-0"**. Additionally, change the *Sheets* drop-down to the existing **Typical Section [Sheet]** sheet model.

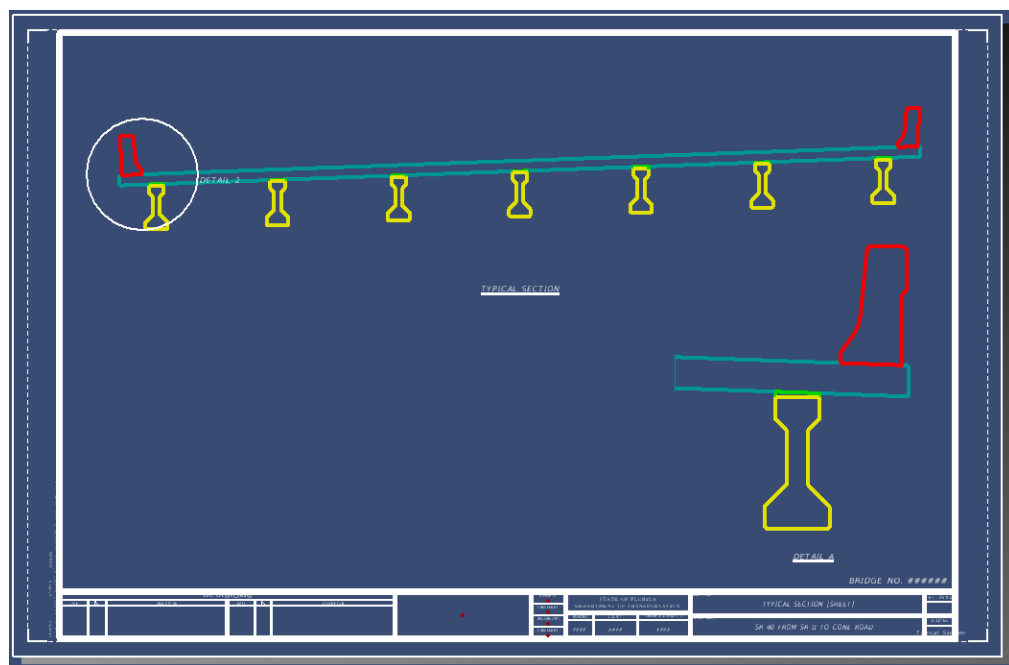
- Verify that the rest of the dialog box matches the following image and click **OK**.



- The **Typical Section [Sheet]** sheet model now has the Detail A view within the border. Note that the detail shown is a mirror of the area with the detail callout. This issue has been filed with Bentley and will be updated in an upcoming release.

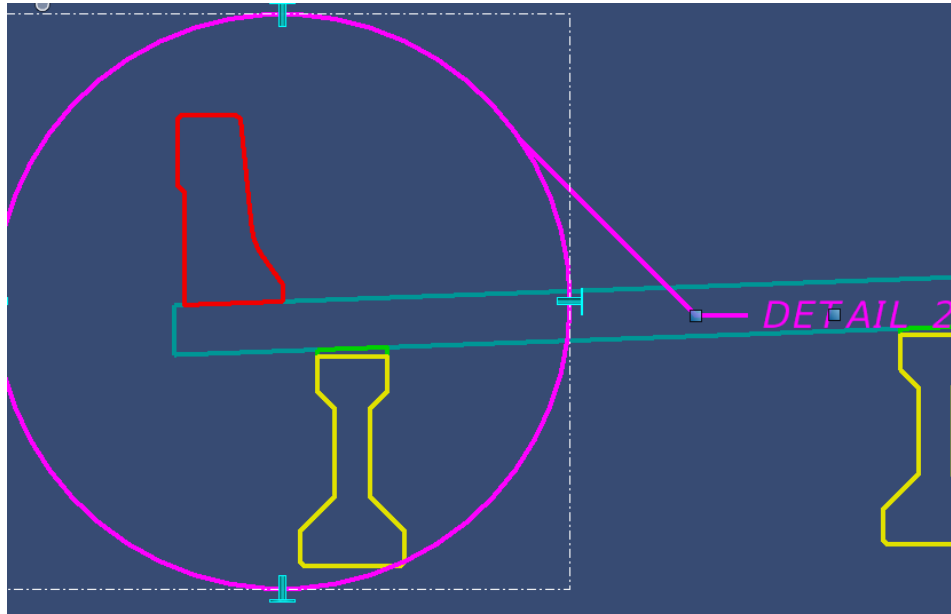


8. Use the **Home > Primary > References > Move Reference** tool to move the different views a bit to avoid any overlapping.
9. Then, use the **Drawing (workflow) > Home > Manipulate > Move** tool to place the view titles (i.e., TYPICAL SECTION and DETAIL A) directly below their respective views. The sheet should look like the following image.

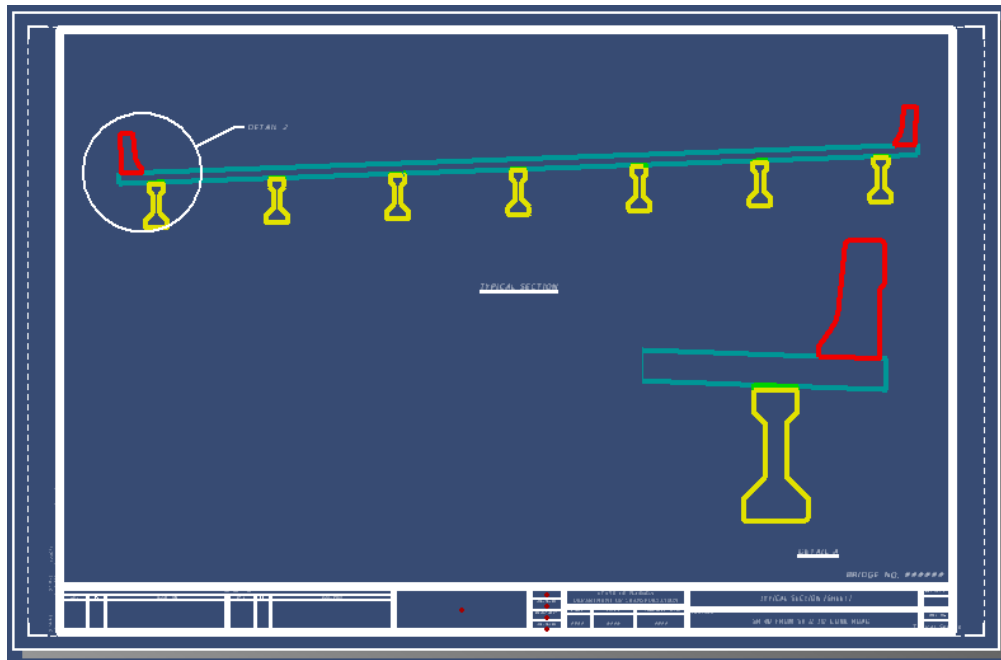


10. Notice that the detail callout text did not move. Click the detail callout text to select the callout.

- Click once more on the text handle, then move the text up into open space and click one last time to release the text. Do the same with the additional node for the leader line.



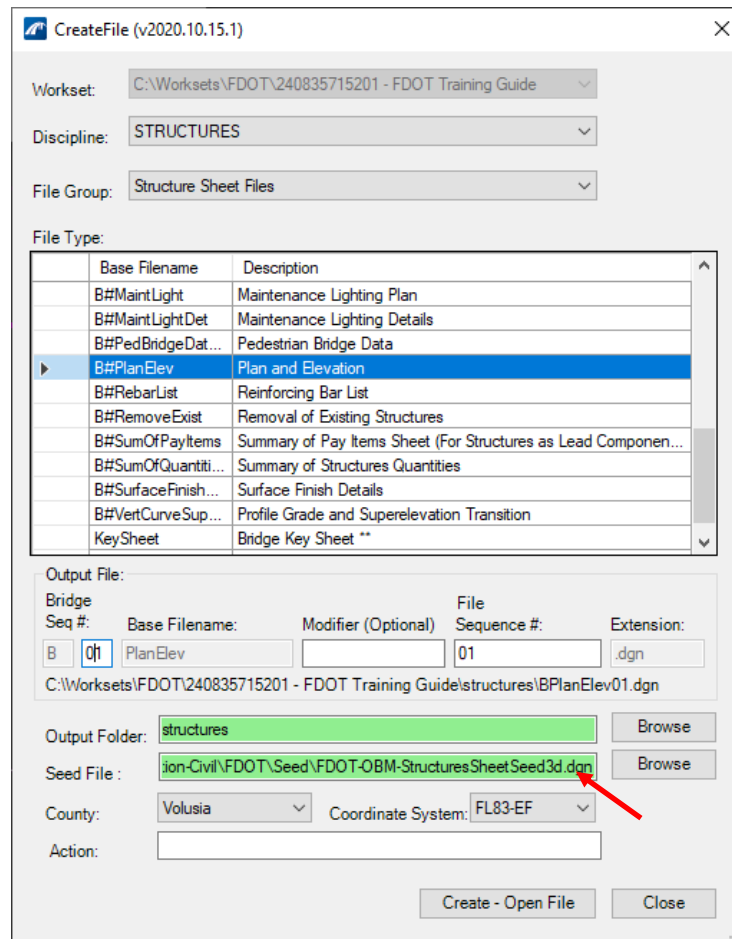
- Lastly, using the **Drawing** (workflow) > **Annotate** > **Text** > **Edit Text** tool, change the text in the detail callout to read "DETAIL A"
- The final sheet should look like the image below.



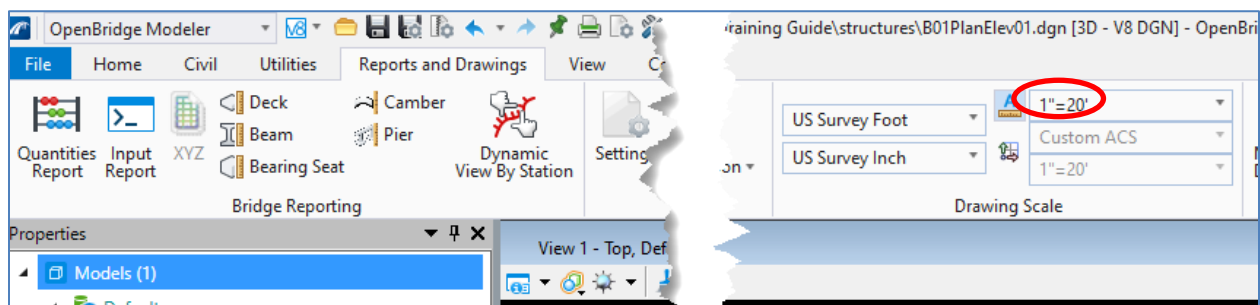
Exercise 6.3 Create a Plan and Elevation View with the Place Named Boundary Tool

➤ Generate a Plan View:

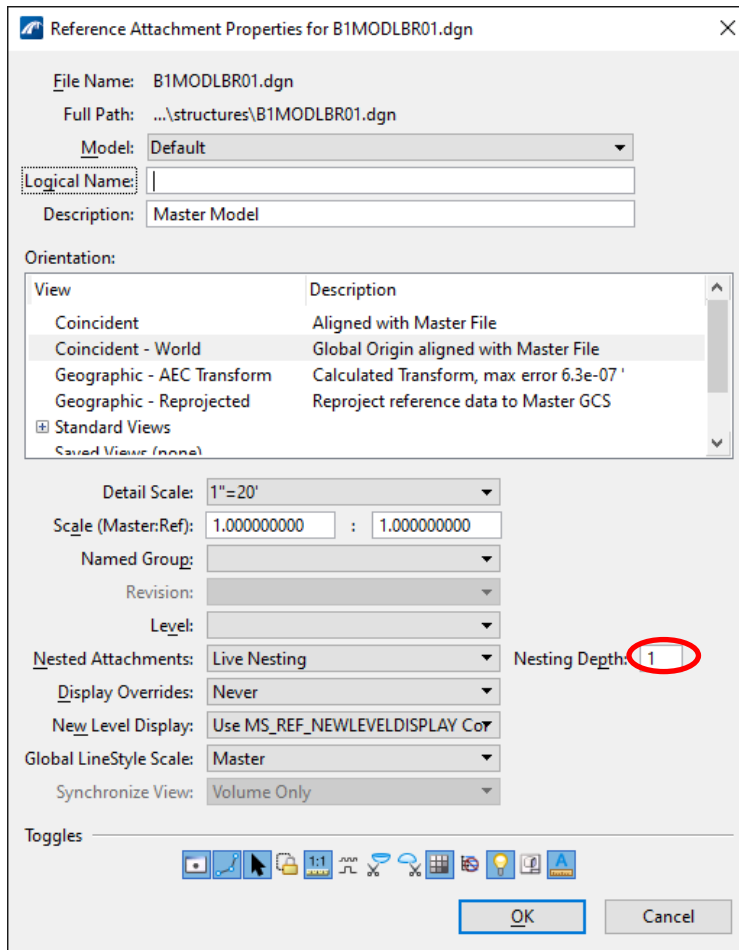
1. Open the data set file: **B01MODLBRTR01_6.3_Begin**
2. Access the **FDOT > Actions > Create File** tool and create a sheet file with the inputs indicated below. Make sure to change the seed file to **FDOT-OBM-StructuresSheetSeed3d.dgn**, located in the same folder that the 2D seed file is.



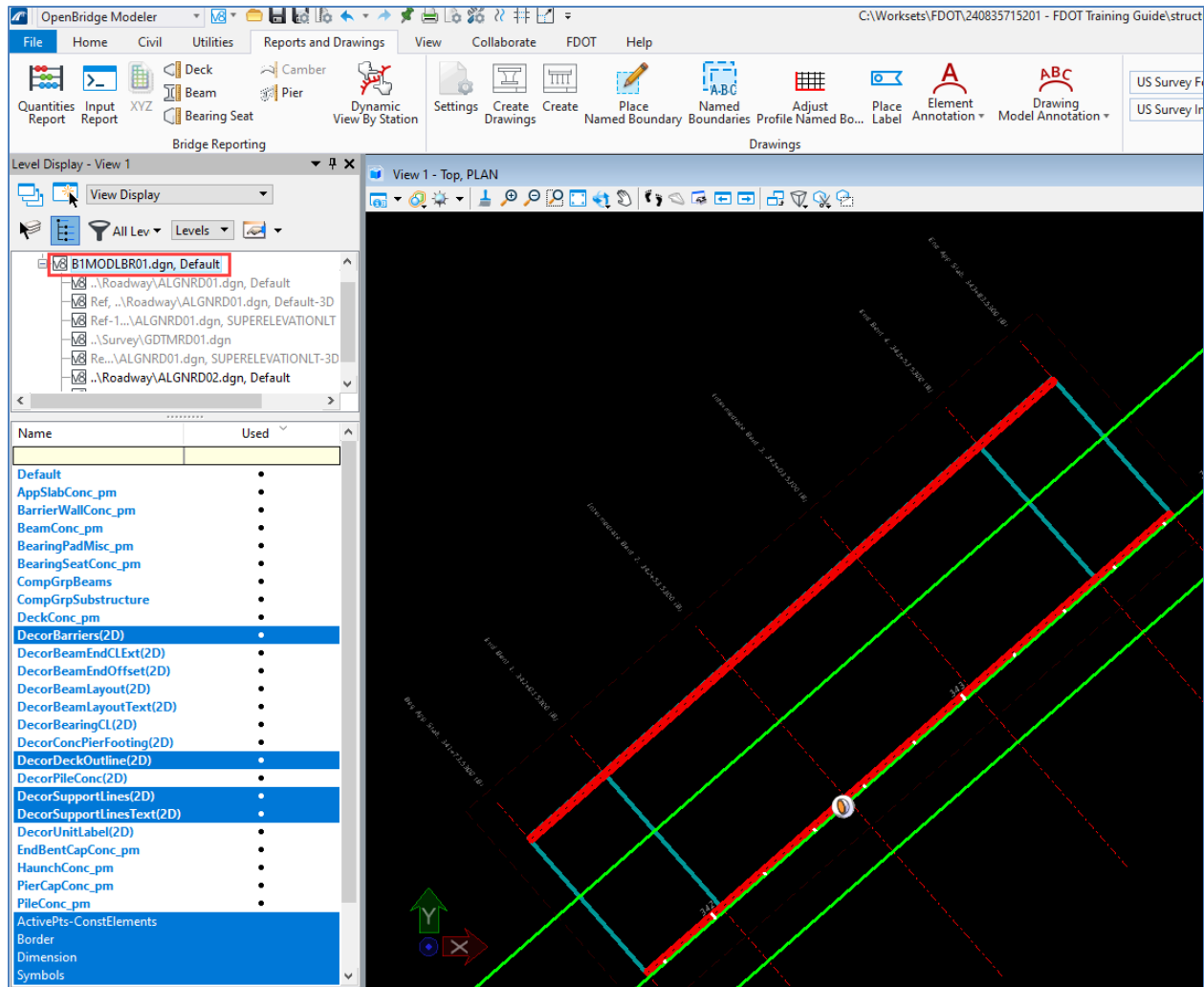
3. Set the Annotation Scale to **1"=20'**. Go into the Model properties and change the *Name* and *Description* to **PLAN**.



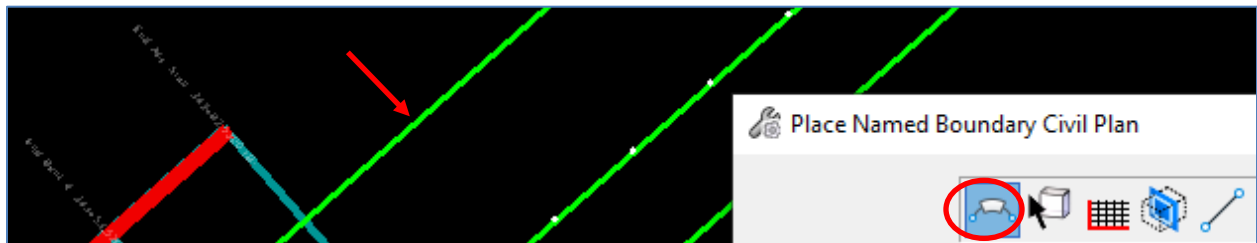
- Go into the References window and attach the main bridge model file **B1MODLBR01_6.3_Begin.dgn** with the settings shown below. Make sure to turn on **Live Nesting** with a *Nesting Depth* of **1**.



- Change your active level to **ClipDrawingBound_dp** by navigating to **Drawing (Workflow) > Attributes > Level**. This will put the named boundary on a non-plotting level. Fit View and locate the bridge.
- Open the Level Display window, expand the dropdowns, select the **B1MODLBR01_6.3_Begin.dgn** reference file, and turn off all levels except: DecorBarriers(2D), DecorDeckOutline(2D), DecorSupportLines(2D), and DecorSupportLinesText(2D), and **Save Settings (Ctrl+F)**. The reason for doing this is because complex 3D elements such as the deck will display internal “lofting” lines in the wireframe display style which we do not want to show up in the plan view. Turning off the 3D elements and only keeping on the 2D projection elements will yield the desired result for the plan view as seen below.



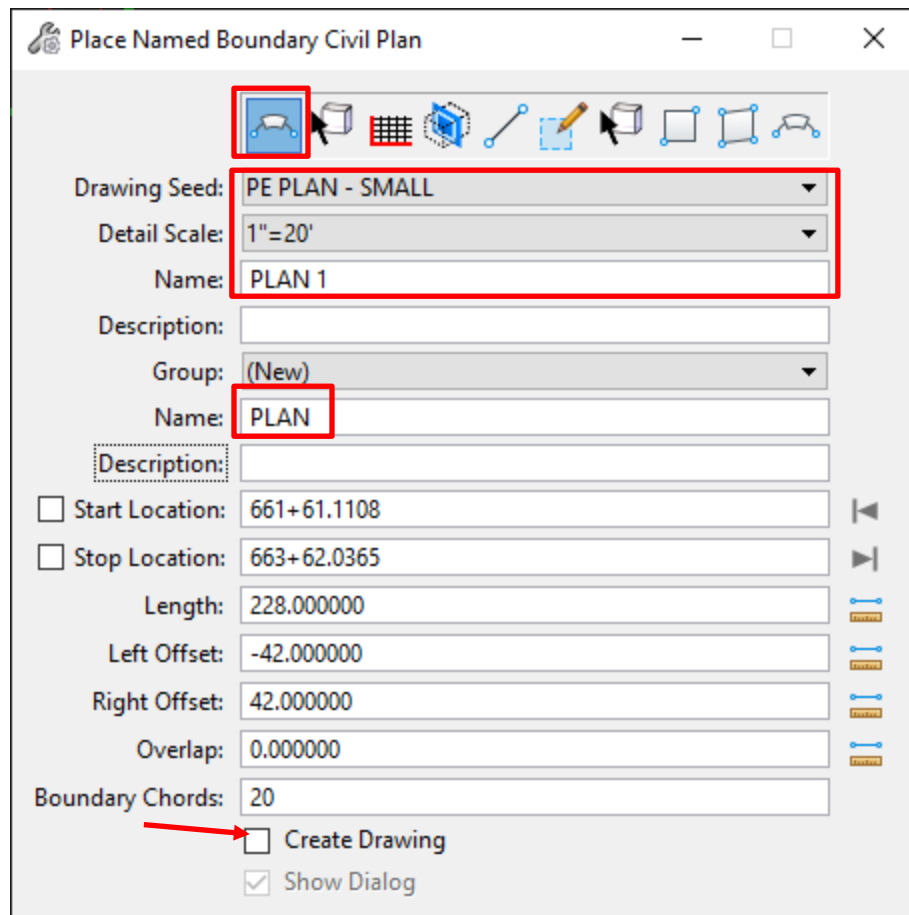
7. Access the Place Named Boundary tool through the Reports and Drawings > Drawings > Place Named Boundary or through the View > Named Boundaries > Place Named Boundary.
8. Select the **Civil Plan** option in the top left of the window and select the **PGL LT** alignment by clicking on the alignment. Notice that this automatically fills the *Name* field, however you will change the name in a subsequent step. Note that this is the 2D alignment, not the 3D alignment.



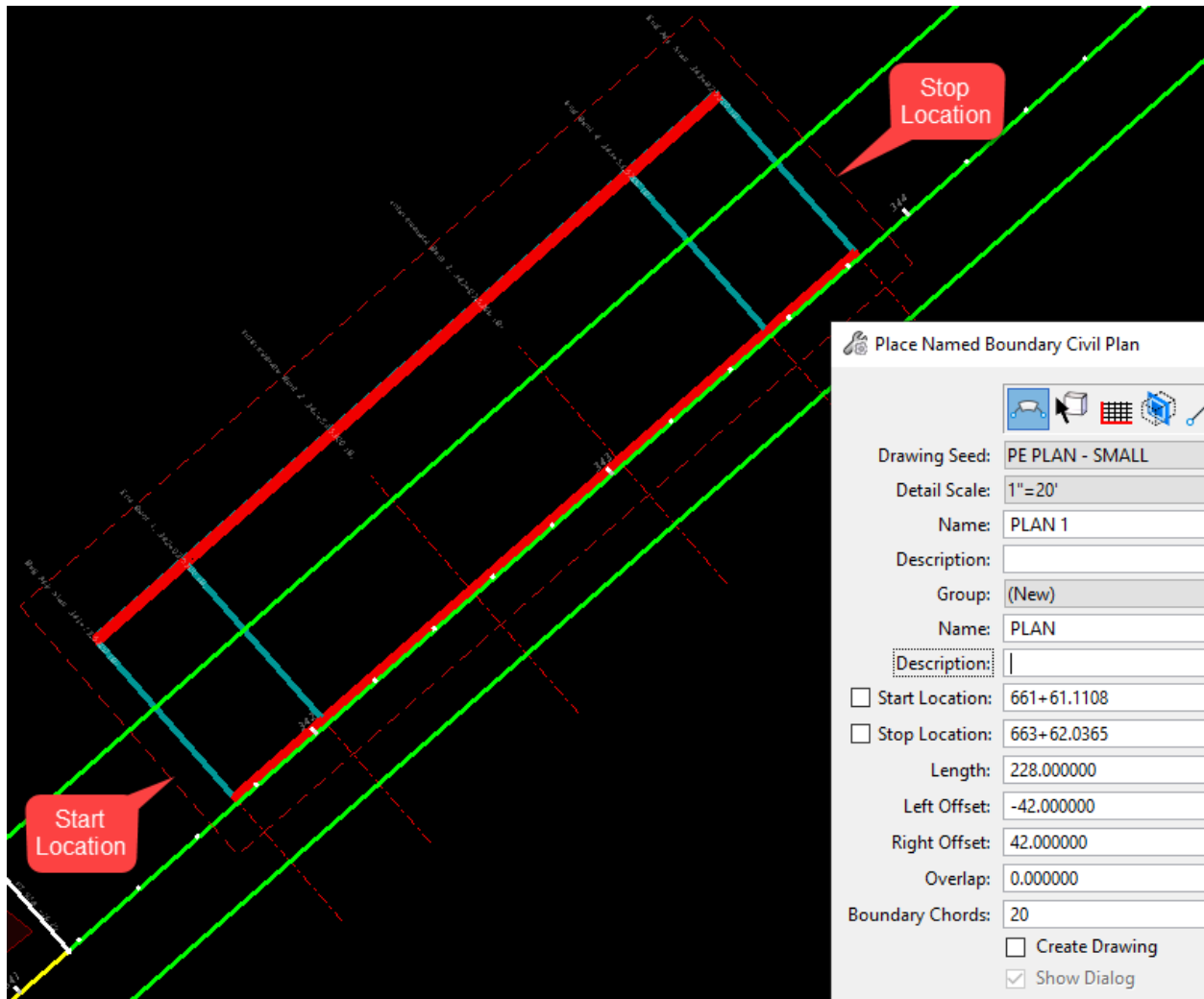
9. Set the *Drawing Seed* to the PE **PLAN - SMALL** and the *Detail Scale* to **1" = 20'**. The three seed files for P&E sheets are PE PLAN: SMALL, MEDIUM, and LARGE. These different sizes correlate to the width of the drawing boundary on the sheet model. The LARGE seed file will have the drawing boundary take up the full available width of the sheet border boundary.

The MEDIUM seed file drawing boundary will leave about an inch between the boundary and sheet border on both sides, and the SMALL will leave about two inches. The *Length*, *Left Offset*, and *Right Offset* values are automatically calculated based on the lengths of the drawing boundaries in the seed file and the Detail Scale selected. Changing the Detail Scale will automatically change those values to maintain the aspect ratio of the drawing boundary in the seed file. However, users can change those values manually if desired.

- Once the alignment is selected, go ahead and change the view name and group name as shown below, and uncheck the **Create Drawing** box. For drawings requiring more than one plan sheet, the number at the end of the view name will automatically update on subsequent sheets.



- The user's next click will select the *Start Location* of the boundary. Select a point just before the Start Approach Slab. The **Place Named Boundary** tool is actually set up to create multiple boundaries at the length automated in the *Length* field by the drawing seed. Move the cursor into the Model view to see the preview of the boundaries that can be created depending on where the *Stop Location* is selected. Move the cursor to a location that only creates one boundary and left click.

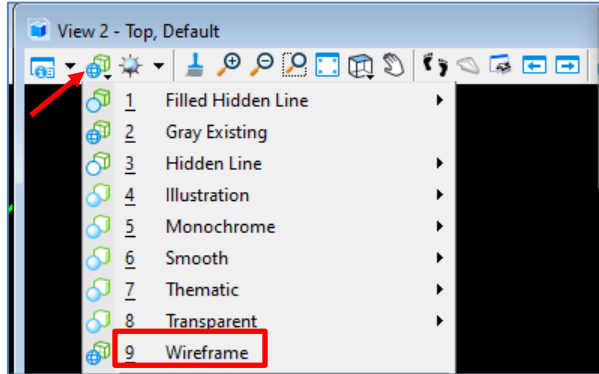


12. Left click one last time in space to confirm your selection. The boundary should appear slightly transparent once placed. Note that if your bridge requires multiple plan sheets an Overlap value of 0' as shown in this example would result in no overlap of the plan views and would require match lines. If you enter a value for Overlap then the named boundaries would have an overlap equal to that value and would not require match lines.

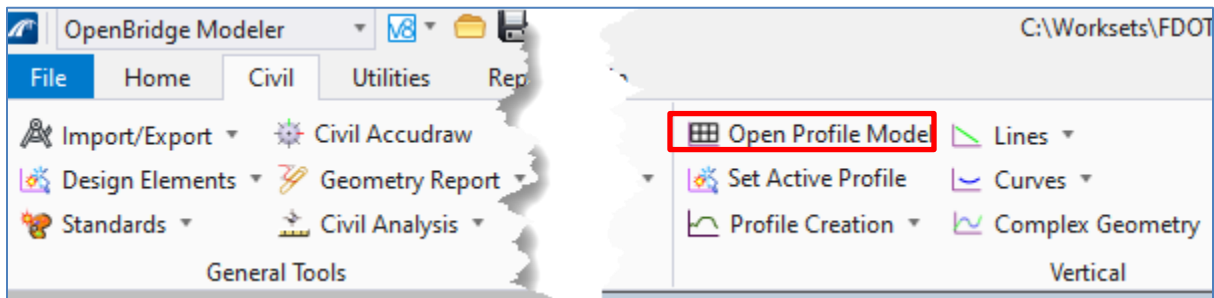
➤ **Generate Terrain Elevation View and Create Drawing & Sheet Models:**

The Named Boundary – Civil Profile tool will be used to create the elevation view. However, since this tool is limited to creating a “slice” through the bridge (not able to specify depth), it will not be adequate to create our typical Elevation View drawing by itself in a lot of cases. It will still be used to create the slice through the terrain model as well as to automatically generate the elevation scales however. The Section Callout tool will be used last to create a side elevation view of the bridge.

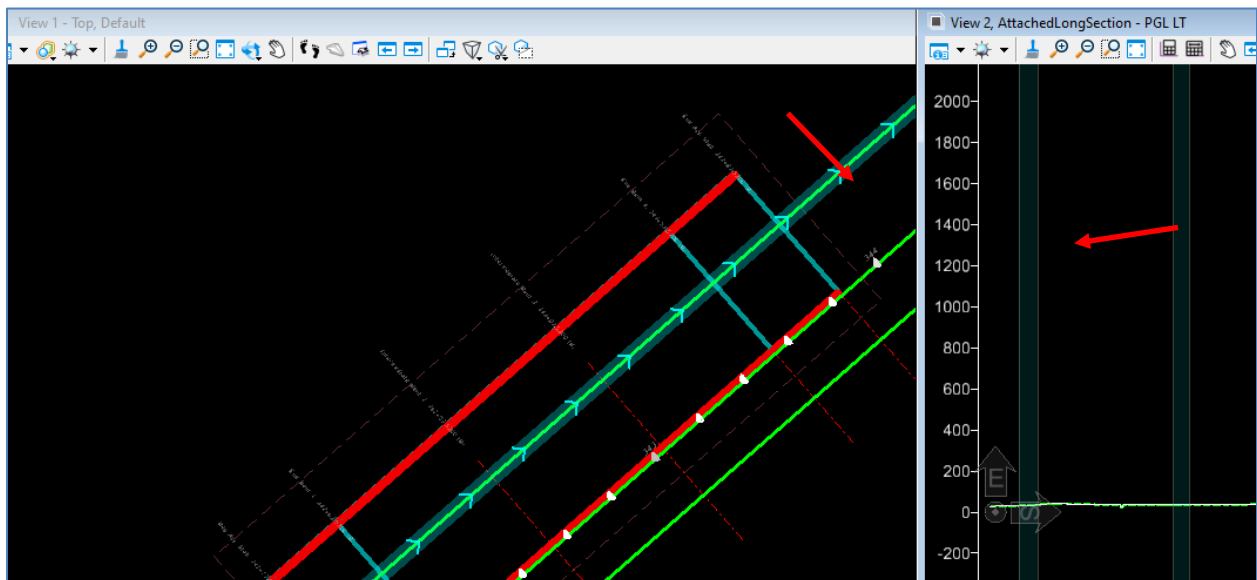
1. Open View 2, switch to a Top View, and set the *Display Style* to **Wireframe**.



2. Access **Civil > Vertical > Open Profile Model** to start opening the profile model.



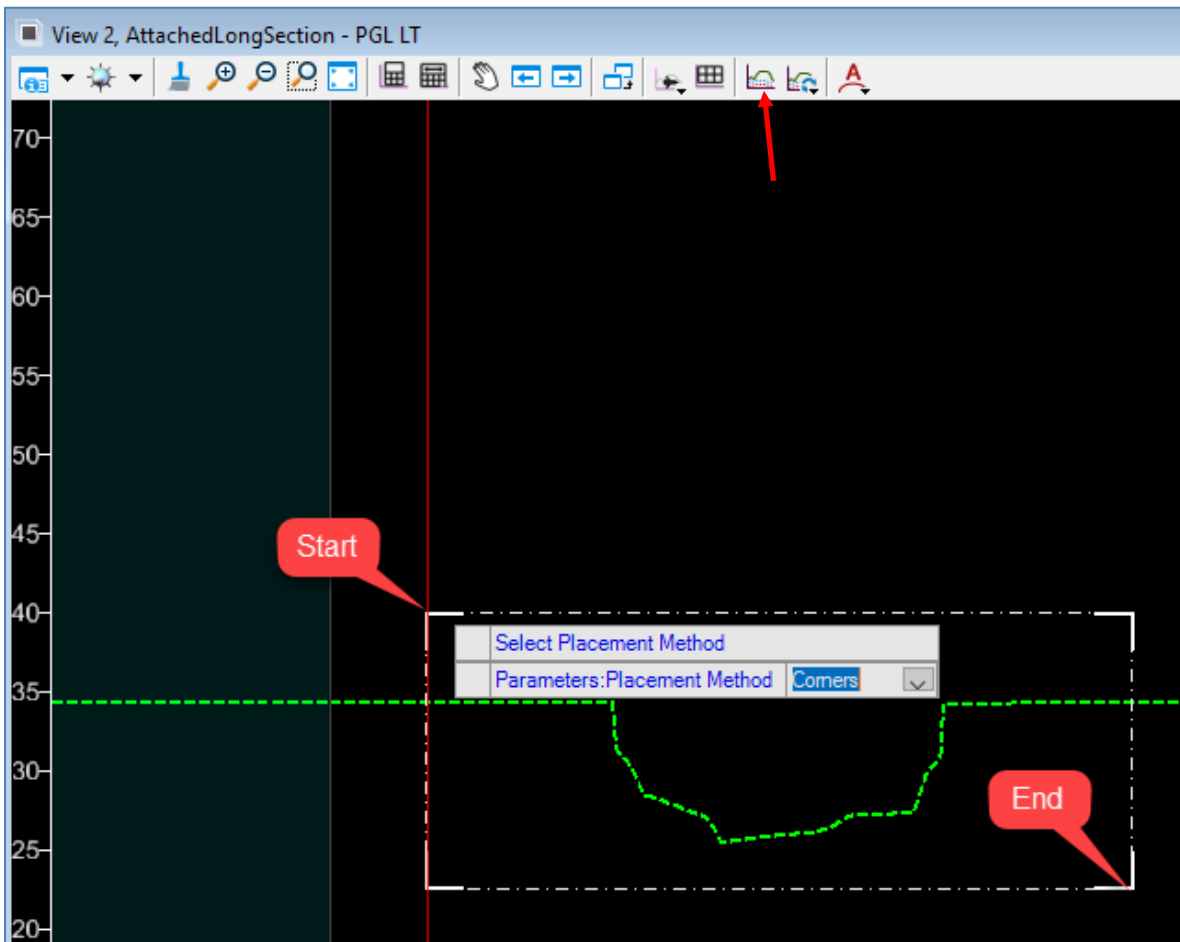
3. Once the tool is active, select the **PGL LT** alignment within the limits of the bridge to *Locate Plan Element*. Left click in an open area of View 2 to confirm and open the profile model.



4. In this example and in most cases, the alignment file will have a terrain file referenced in and set active to the alignment. When an alignment has an active terrain associated with it, the terrain will automatically show up in the profile view as it does in this example. However, if the alignment file does not have an active terrain set, you will need to create a

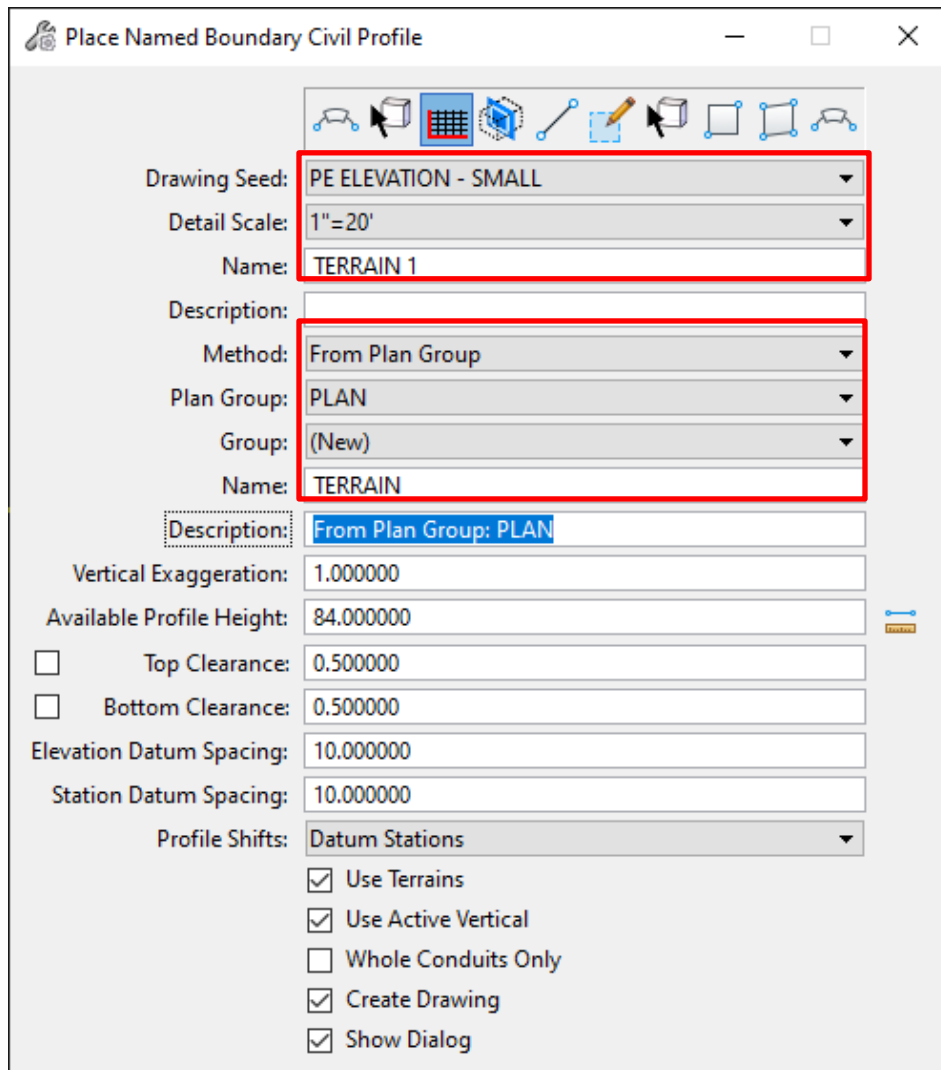
3D slice to generate the terrain profile in the profile view. That scenario is shown below, but can be skipped for this training as our alignment has a terrain associated with it.

To create that 3D cut you will start off by setting your active level to **ClipDrawingBound_dp**. Start the **Create 3D Cut** tool in the top of the profile view and select the “Corners” Placement Method. Place the start at a station before the start of the first approach slab and above the profile. Then place the end at a station beyond the second approach slab and near elevation 20. Leaving the View 1 plan view open will help show you where the 3D cuts are being made relative to the bridge. As you move your cursor in the profile view you will see the position line moving in the plan view as well. Once the 3D cut has been made turn off all levels in the profile view except **DTM_ex** and save settings. The resulting view should look similar to the image below.

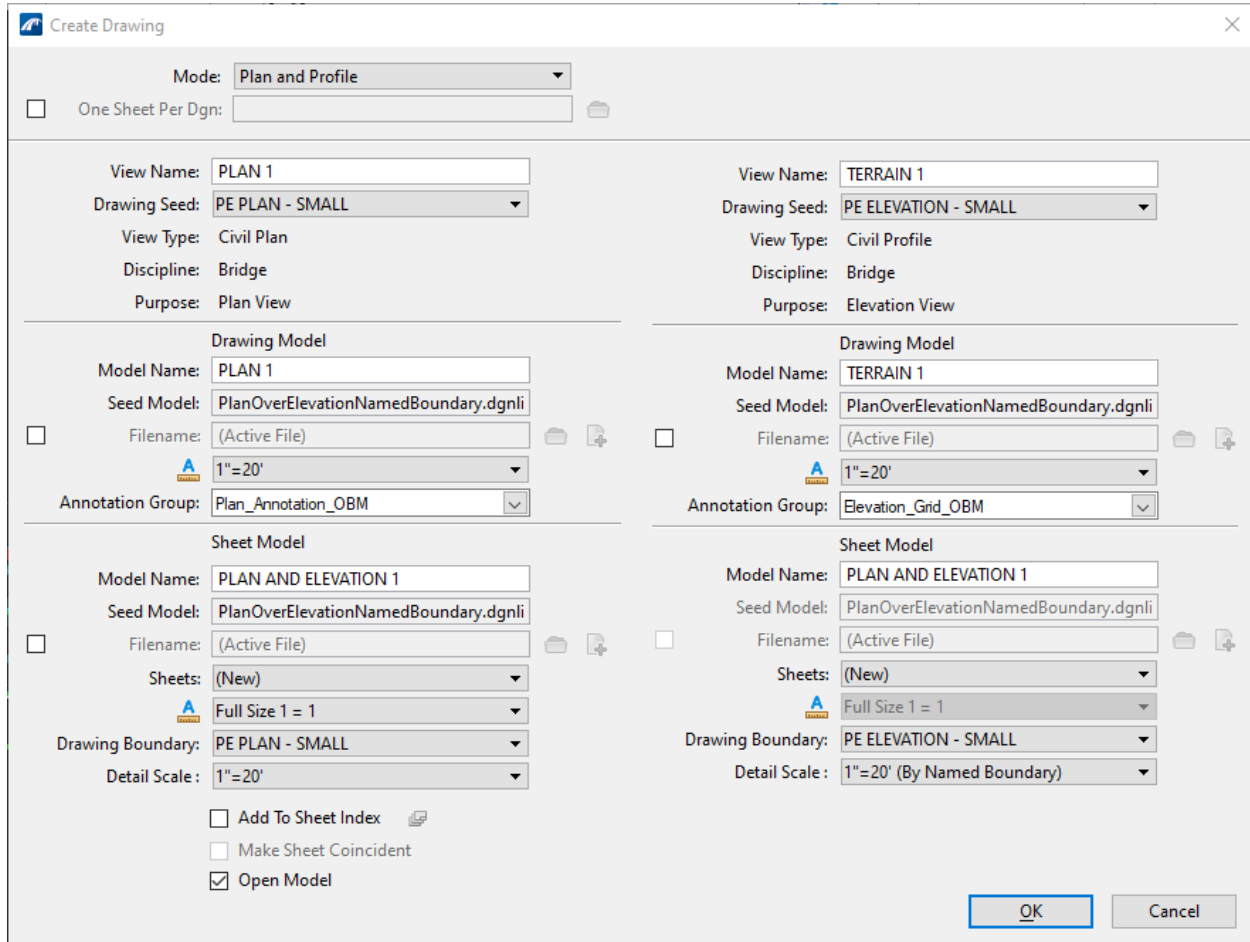


5. Use the Place Named Boundary tool through the **Drawing (workflow) > View > Named Boundaries > Place Named Boundary**. Notice that the **Place Named Boundary** tool can be found in either the **Drawing** or the **OpenBridge Modeler** workflow. This time click on the third tool at the top called **Civil Profile** until it is highlighted and click on the **PGL LT PR** profile in the profile view.

- Set the *Drawing Seed* to the **PE ELEVATION - SMALL** and the *Detail Scale* to **1" = 20'**. Since this profile tool is mainly being used to create the elevation view of the terrain, change the view *Name* to **TERRAIN 1** and the group *Name* to **TERRAIN**. Make sure the *Method* is set to **From Plan Group** so that the elevation will line up with the plan view. The rest of the settings should be automatically populated from the seed file, but can be adjusted by the user as desired. Note that if you chose to use Overlap on the Plan boundaries, the "Profile" boundaries will not take that into account automatically and will require you to adjust those manually in the profile view. Make sure to match the remaining settings as shown below:



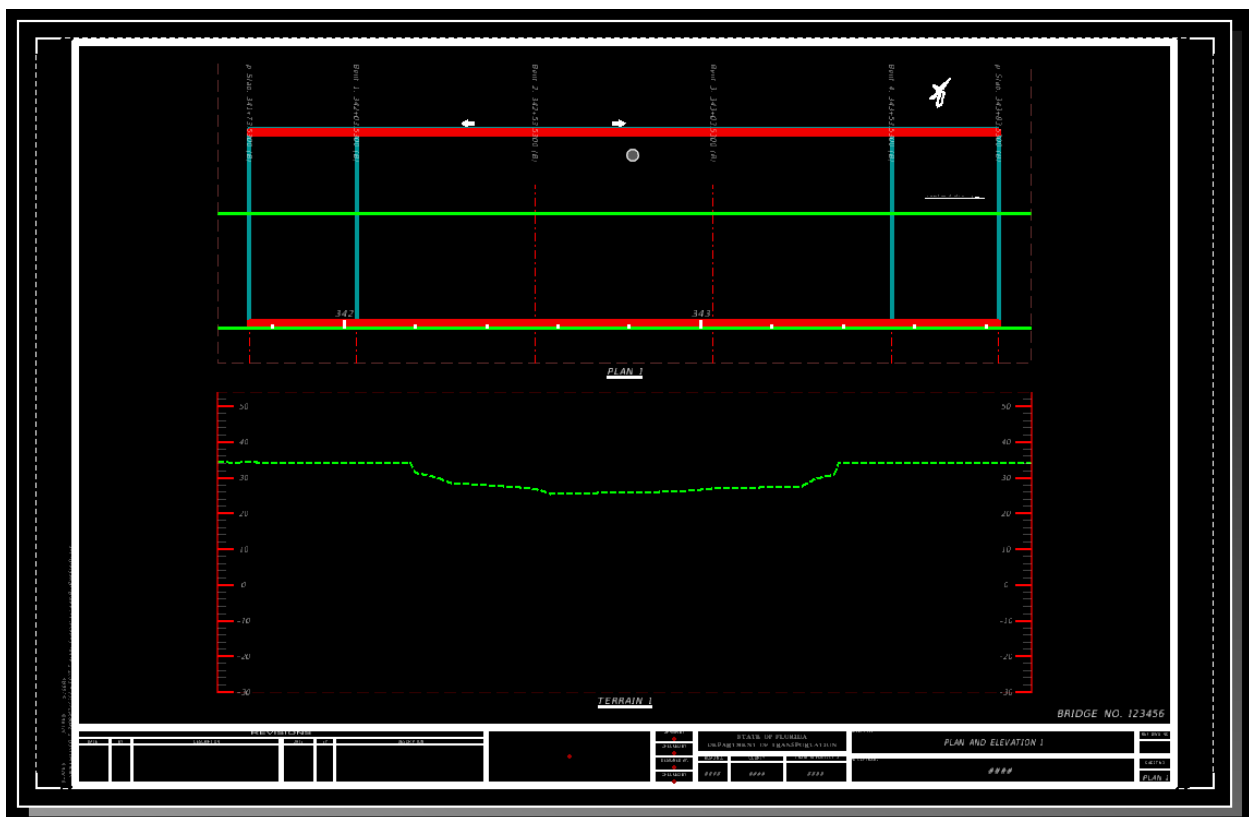
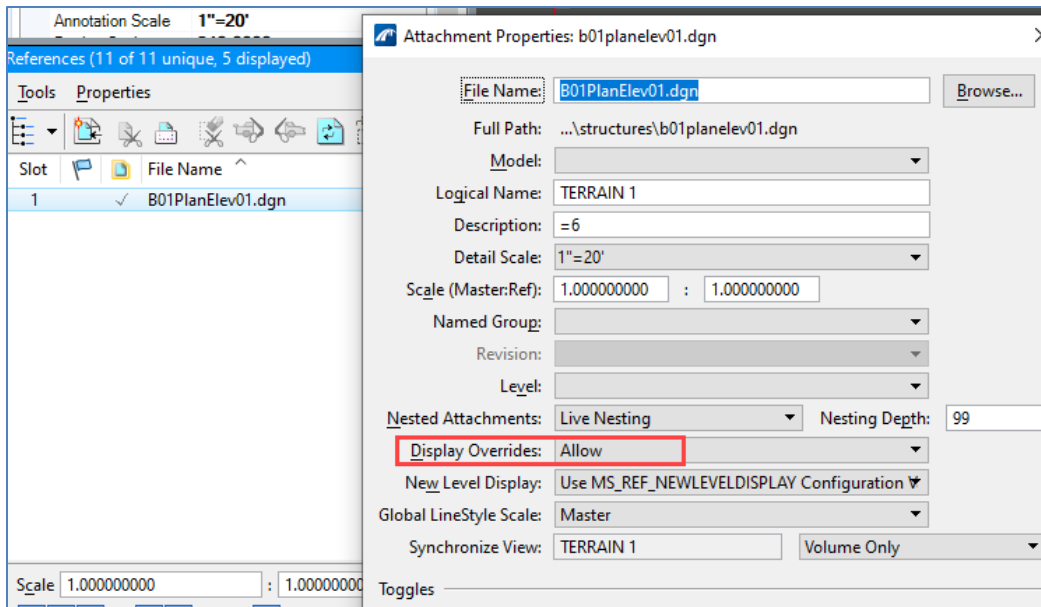
- Left click within View 2 to accept the boundary. Once the Create Drawing dialog box pops up, be sure that all scales and annotation groups are correctly set and the "Open Model" toggle is on. By default, the tool combines the named boundary group name and the view names in this dialogue. You will need to rename them as shown below. Select OK and the drawing will be created.



Note that the Annotation Groups are being actively worked on and tailored to OBM. You may see the ones shown above but without the “_OBM” at the end of the name. The OBM specific ones will be available in a future release. Some of the automatically placed annotations may need to be removed if not needed.

The following sheet model will be displayed in the view window as shown below. Note that the sheet model background of the image shown below is black because **User Preferences > View Options > Sheet Background** was changed to black.

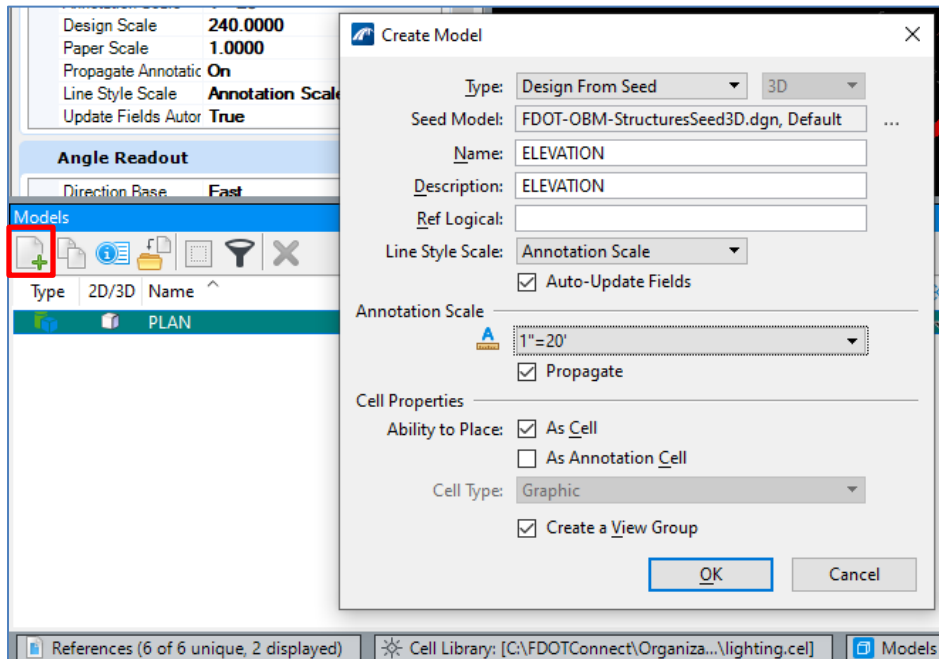
The next step in the typical plans production process which is not shown in this exercise is to go into the PLAN drawing models and add annotations and dimensions as you normally would. You may also need to go into the TERRAIN drawing model and move the elevation scales horizontally as needed so that they are positioned where you want them in the sheet model. You may also need to turn off levels you don't want to see in the TERRAIN drawing model. Before you turn levels off in the TERRAIN drawing model make sure the reference settings for *Display Overrides* is set to **Allow**. Once you verify that and turn off the unwanted levels, be sure to save settings (**Ctrl+F**).



➤ **Create the Bridge Elevation View and Combine Views:**

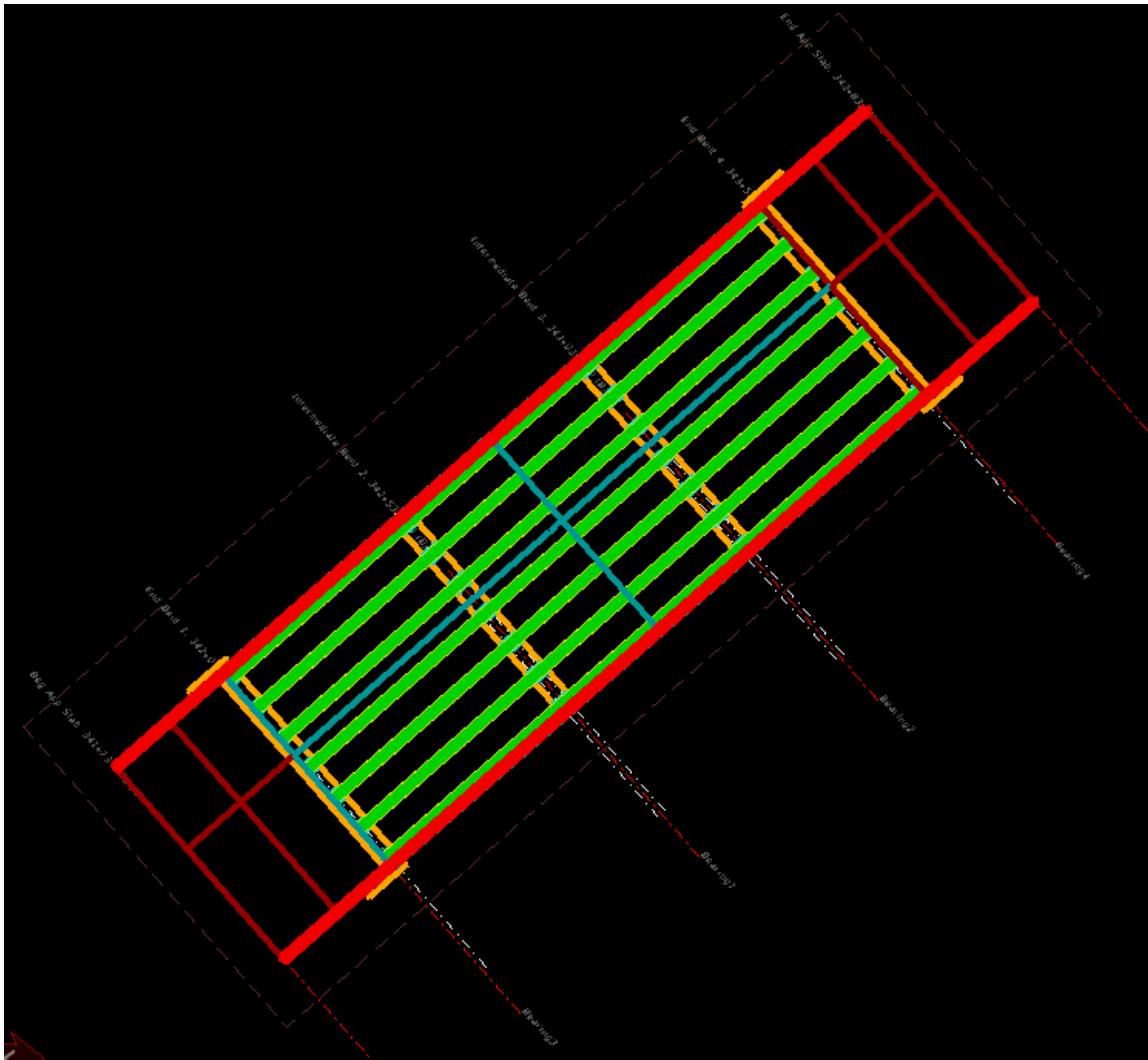
1. Once the Plan and Terrain Elevation: views, drawing models, and sheet models are created, the last step is to create the bridge elevation view using the section callout tool. Since we turned off our 3D elements in the PLAN design model to create the plan view, we will need

to add a new design model for the Elevation view with the 3D elements turned on. Open up the Models dialog, Create Model, and follow the settings below:

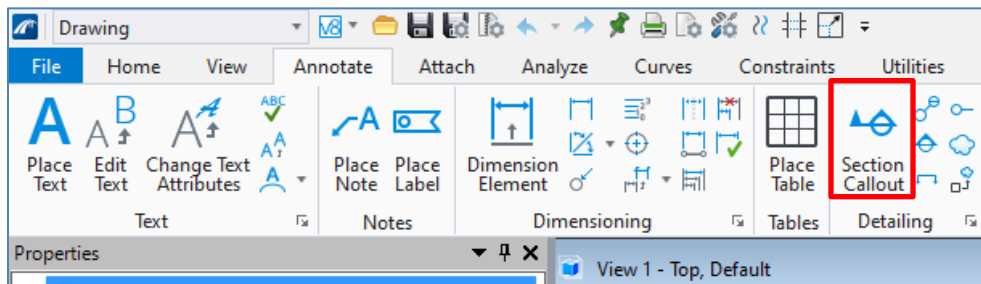


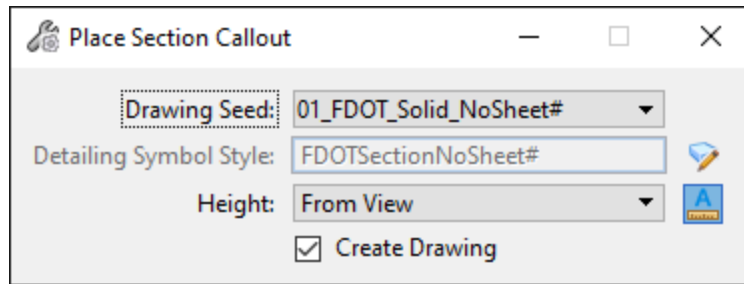
2. Once the ELEVATION design model opens up close View 2 and maximize View 1. Open your Reference manager and attach:
 - a. The main bridge model: **B1MODLBR01.dgn_6.3_Begin** with *Nested Attachments* set to **No Nesting** (we will use this for our elevation view)
 - b. The PLAN model of the file you are in: **B01PlanElev01.dgn** with *Nested Attachments* set to **No Nesting** (we will use this to help us place our section callout later)

Once your files are referenced in do a “fit view”, make sure you are in a top view, and you see what is shown below:

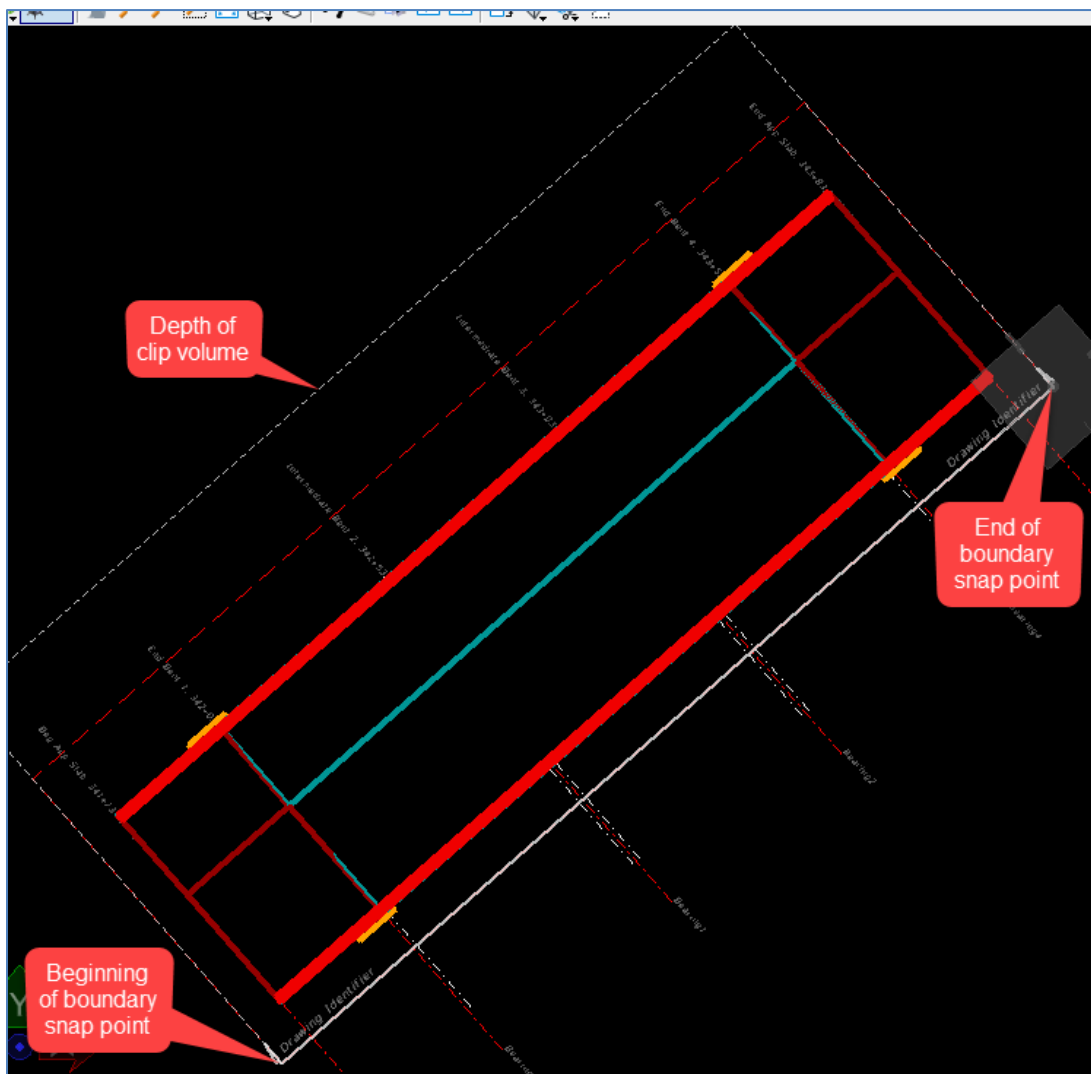


3. The typical bridge elevation view shows the bridge from the side with “solid” elements, in the sense that we don’t see through elements like we do in wireframe. Because of this, we need to make sure we use a section callout seed file that used a “solid” display style. Access the section callout tool through **Drawing (workflow) > Annotate > Detailing > Section Callout**. Select the Drawing Seed of **01_FDOT_Solid_NoSheet#** and check the Create Drawing box.

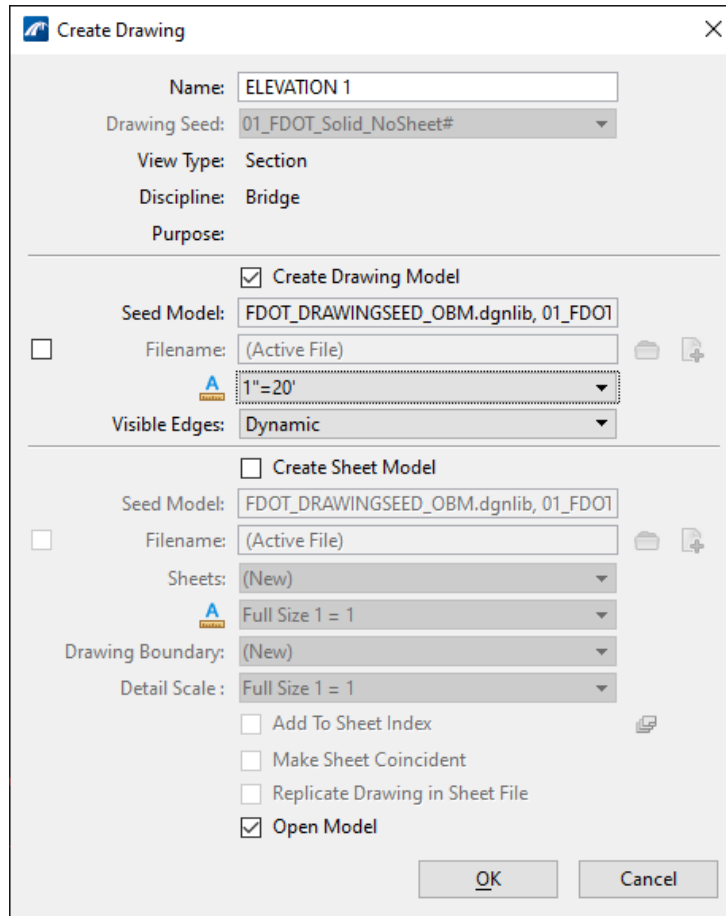




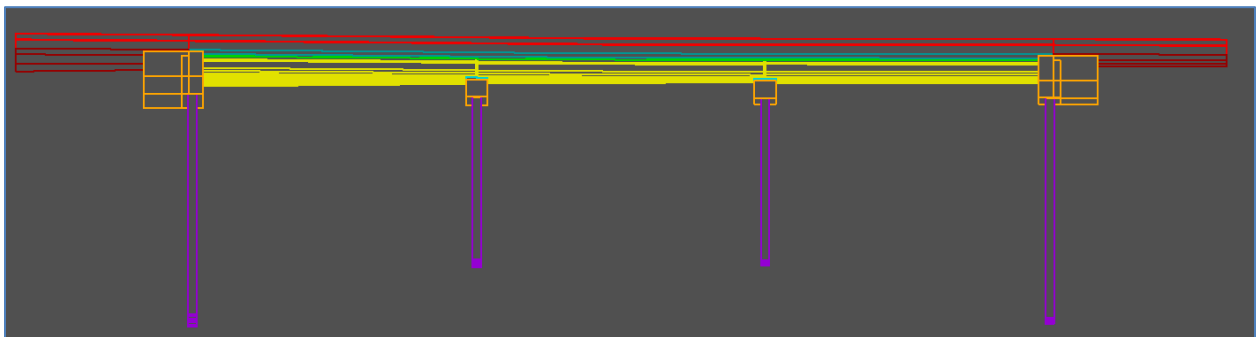
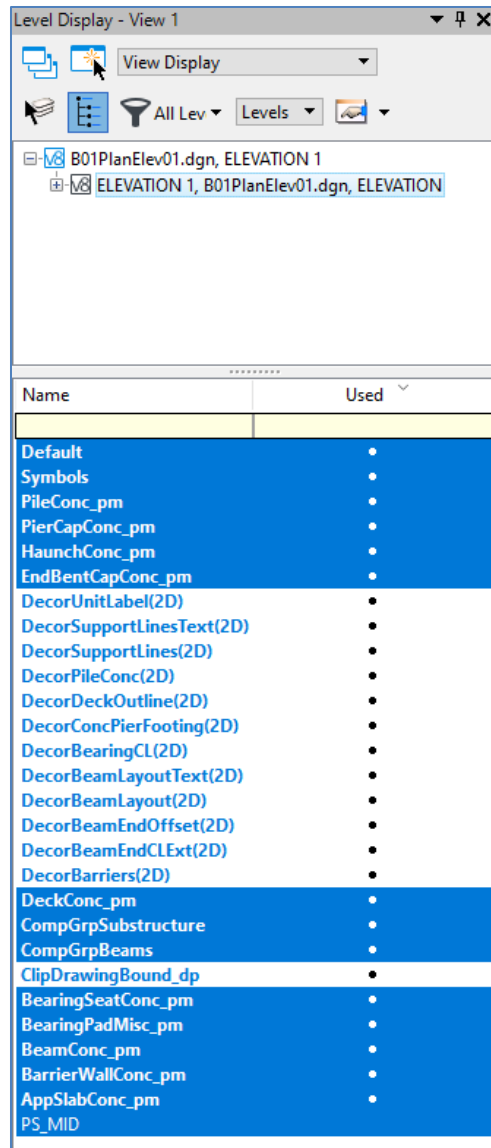
4. Snap to the beginning of the drawing boundary and left click to start the section callout placement, snap to the end of the drawing boundary and left click to end the section callout placement, move your cursor to set the depth of the clip volume past the extents of the bridge, and left click to accept.



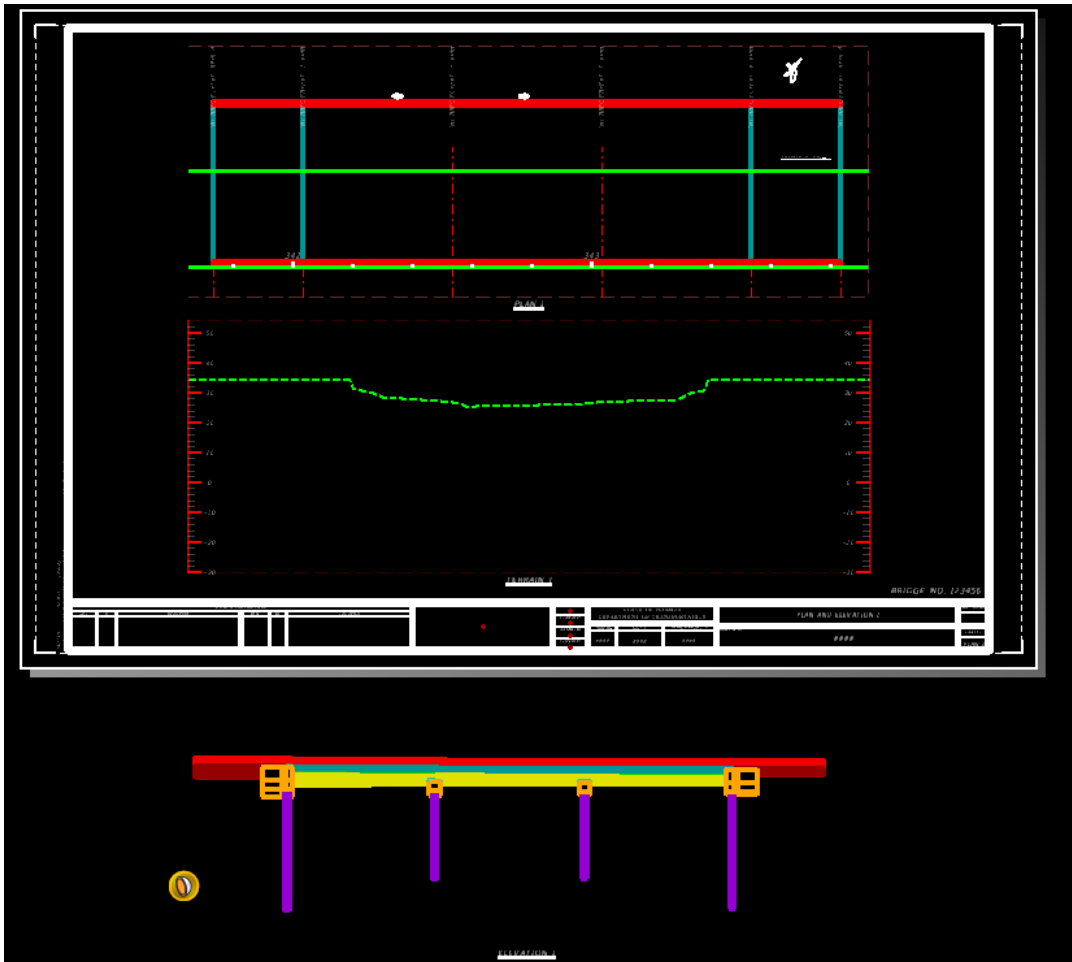
5. Change the view name to ELEVATION 1 to match the plan view naming convention, change the Annotation Scale to **1"=20'**, and uncheck **Create Sheet Model**.



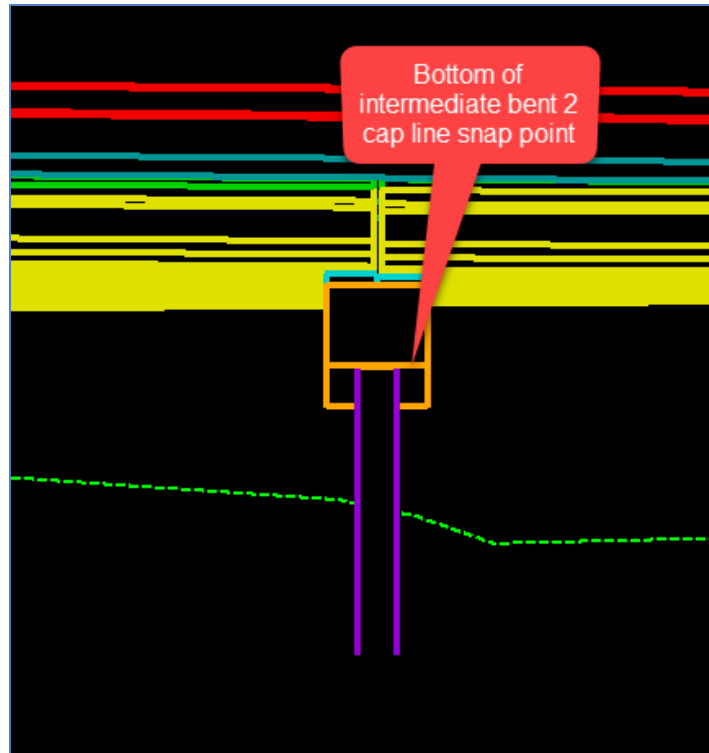
6. Once the drawing model opens up, open the ELEVATION design model you were just in, open up the Level Display and turn off all the 2D Decor levels as well ClipDrawingBound_dp level so that you only see the bridge elements you want to see in the elevation view, and save settings. These level settings in the design model will propagate to the drawing and sheet models. The next step in the typical plans production process which is not shown in this exercise is to place the typical annotations and dimensions in this elevation view drawing model as you normally would.

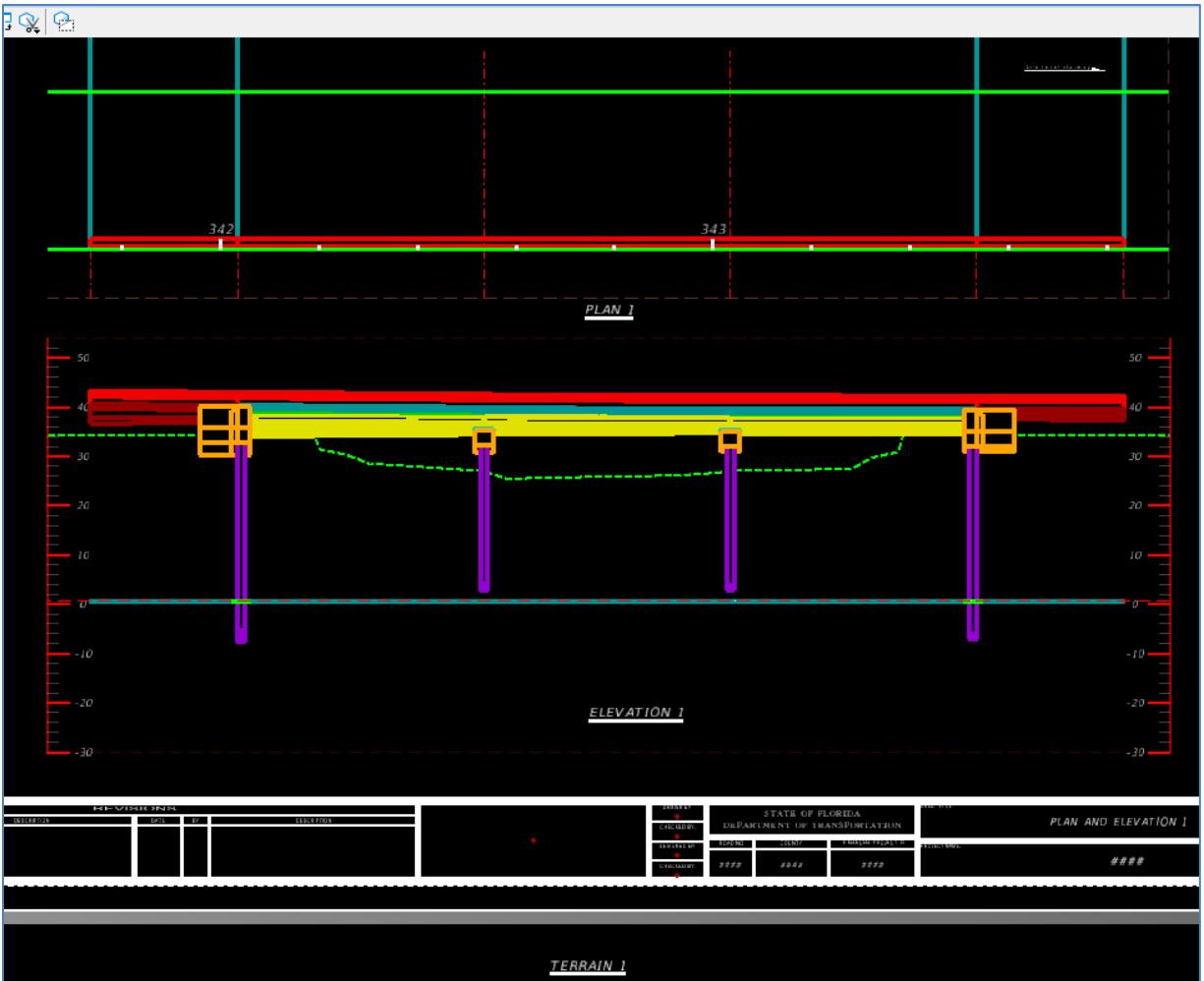


- Open the PLAN AND ELEVATION 1 sheet model, open your Models dialog, and click & drag ELEVATION 1 drawing model onto the sheet model. Attachment method will be Recommended, and click below the sheet to initially place it below the sheet.

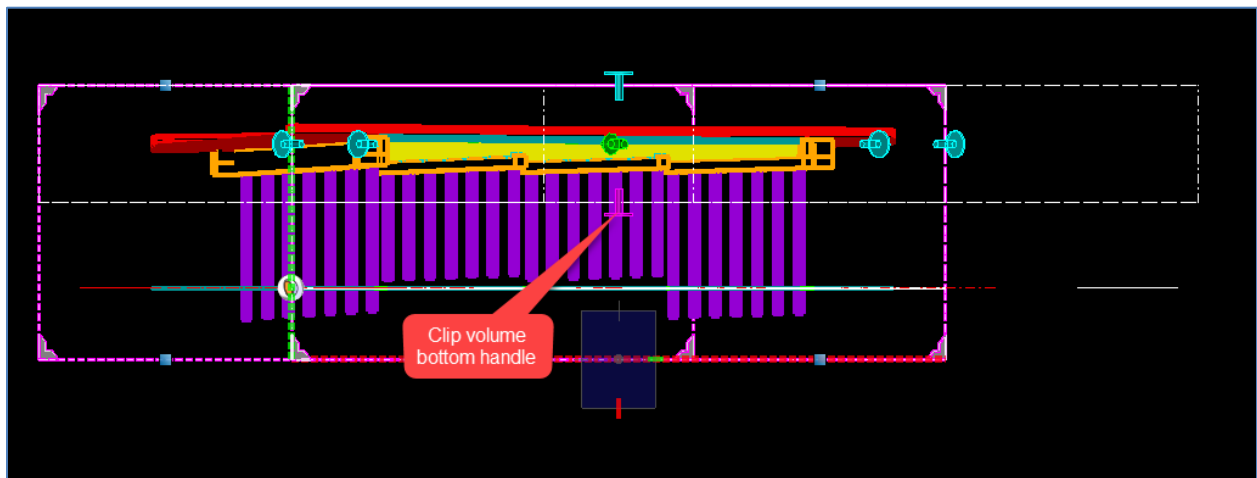


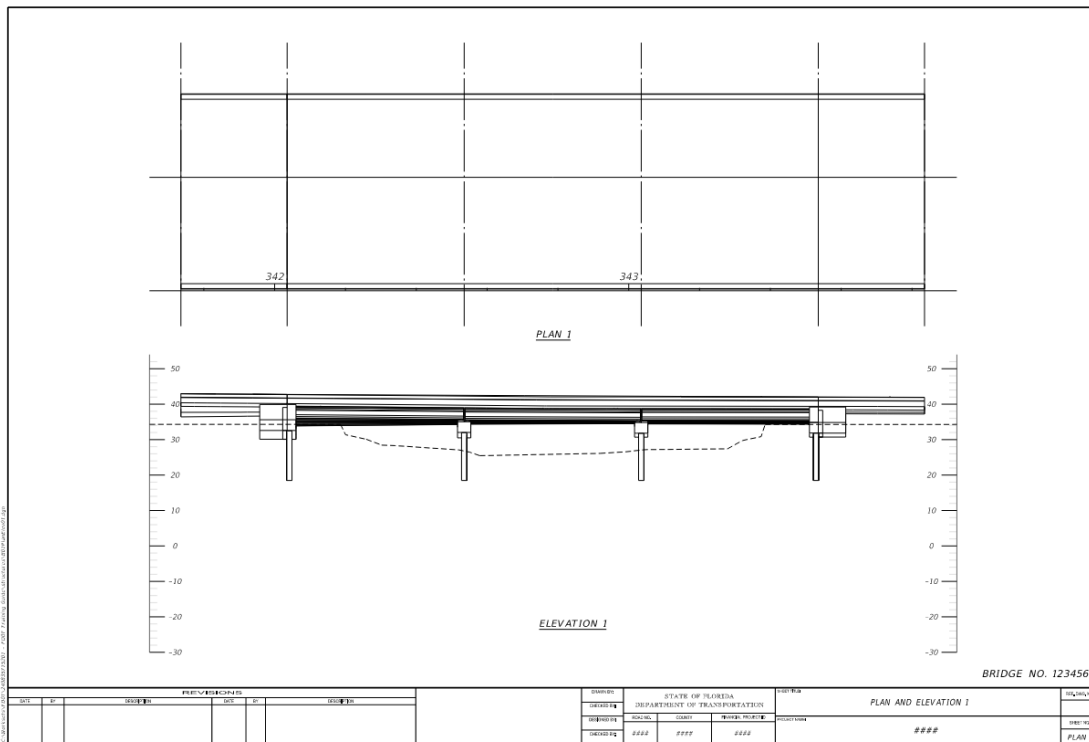
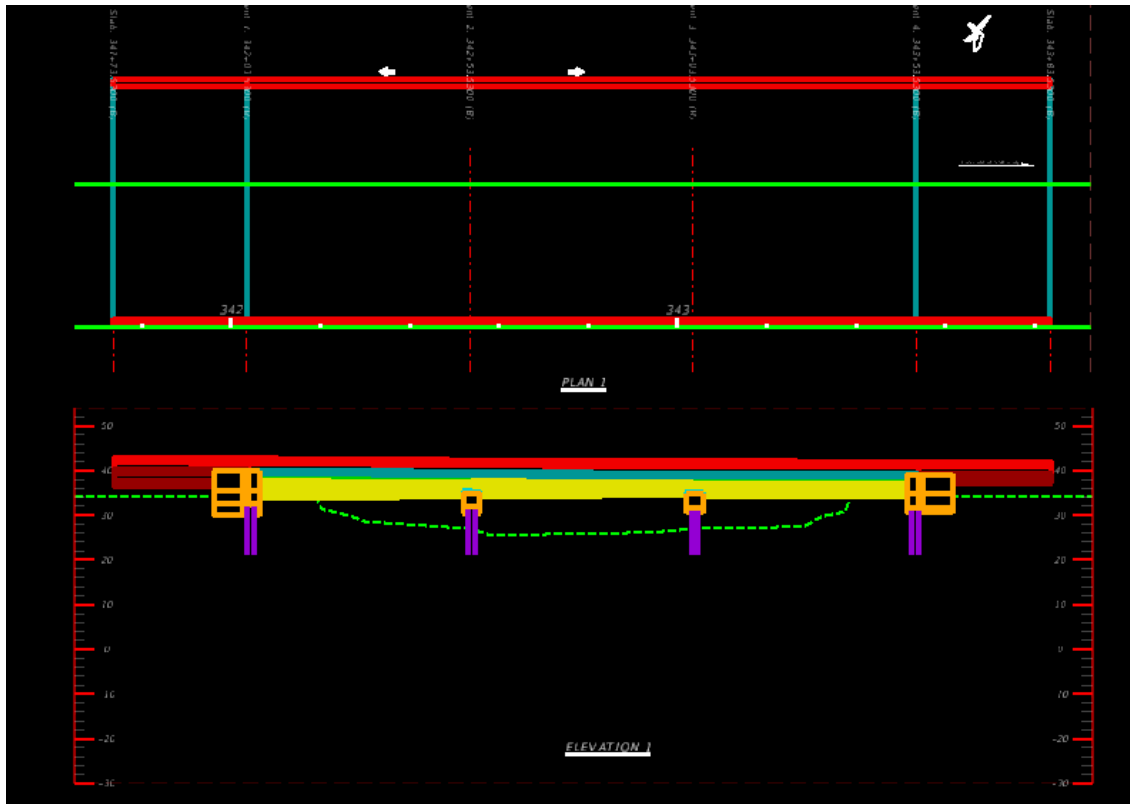
8. Right click and hold on the ELEVATION 1 reference and use the **Move Reference** command, snap to an element on the ELEVATION 1 reference you can line up with the plan view (begin of left/first approach slab), lock in your Accudraw compass (**Enter**) so that the reference can only be moved horizontally, and snap to the same point on that element in the plan view to line up the elevation view horizontally.
9. Right click and hold on the ELEVATION 1 reference and use the **Move Reference** command, snap to an element on the ELEVATION 1 reference you know the elevation of (Intermediate Bent 2 bottom of cap line as shown below = 31.59'), lock in your Accudraw compass (**Enter**) so that the reference can only be moved vertically, and move the reference vertically to the known elevation using the elevation scale from the TERRAIN 1 reference (this may be approximate as the elevation scale is in 2' increments). Move the TERRAIN 1 drawing boundary view name down below the sheet.





10. It may be desirable to adjust the clip volume of the bridge elevation view so that it clips off a portion of the pile. To do this, go back into the ELEVATION design model, click on the section callout that was placed previously, switch to a front view (**Shift + Right Click, F**), grab the bottom handle of the clip volume and move up to where you want the elevation view to clip through the piles. Navigate back to the sheet model to see the result.





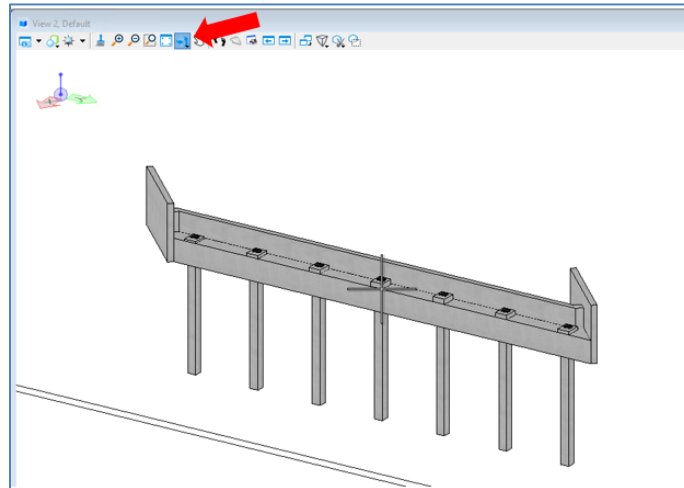
Exercise 6.4 Use Text Favorites and Saved Views to Create 3D View

➤ **Create an Elevation Label from Text Favorites:**

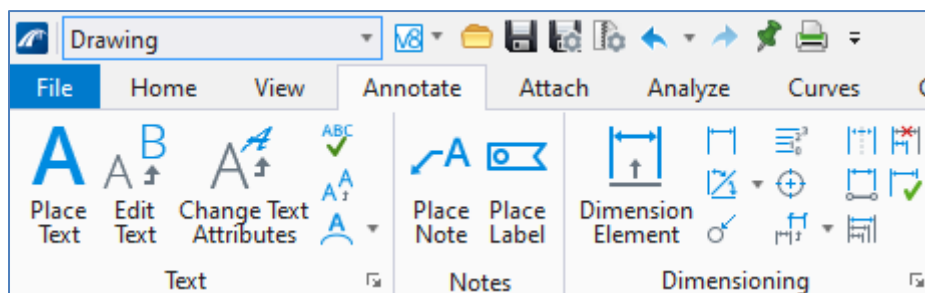
1. Open the data set file: **B01MODLBRTR02_6.4_Begin**

This is a different data set for a skewed bridge. The superstructure and supports other than the first end bent are not shown for the purpose of this exercise.

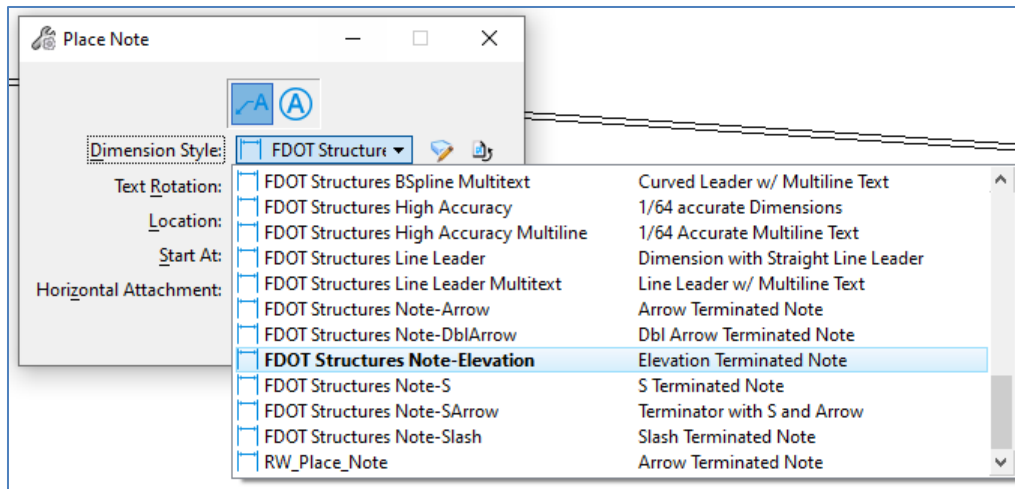
2. Rotate the view of the end bent in the right side view window (View 2) to an isometric showing all of the pedestals similar to the view shown below.



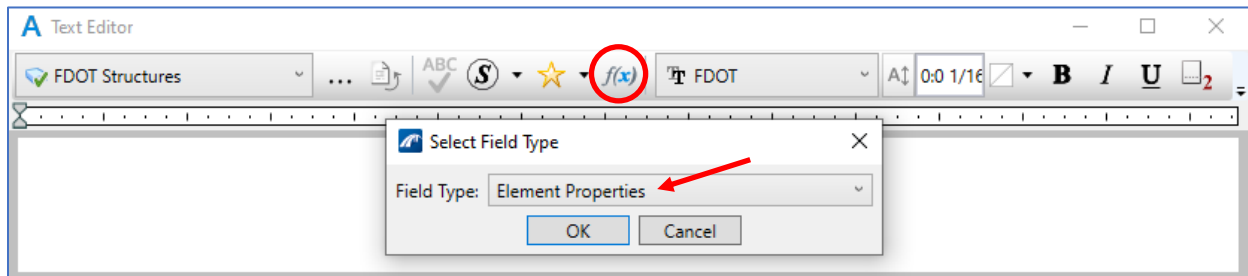
3. Access the Place Note tool under **Drawing (workflow) > Annotate > Notes > Place Note**.



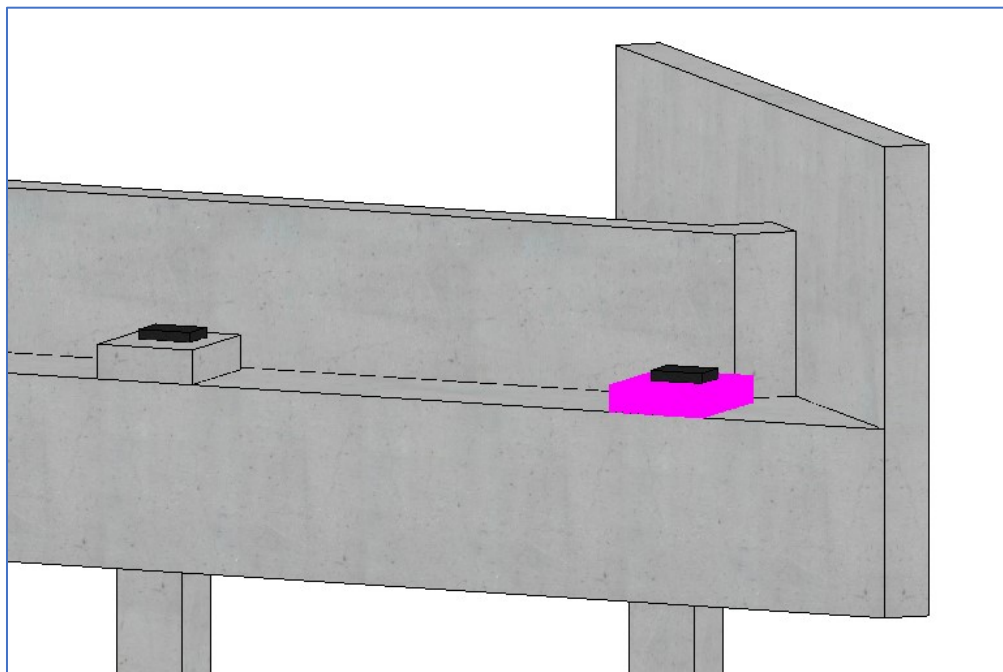
4. Select the **FDOT Structures Note-Elevation Dimension Style** in the Place Note dialog box.



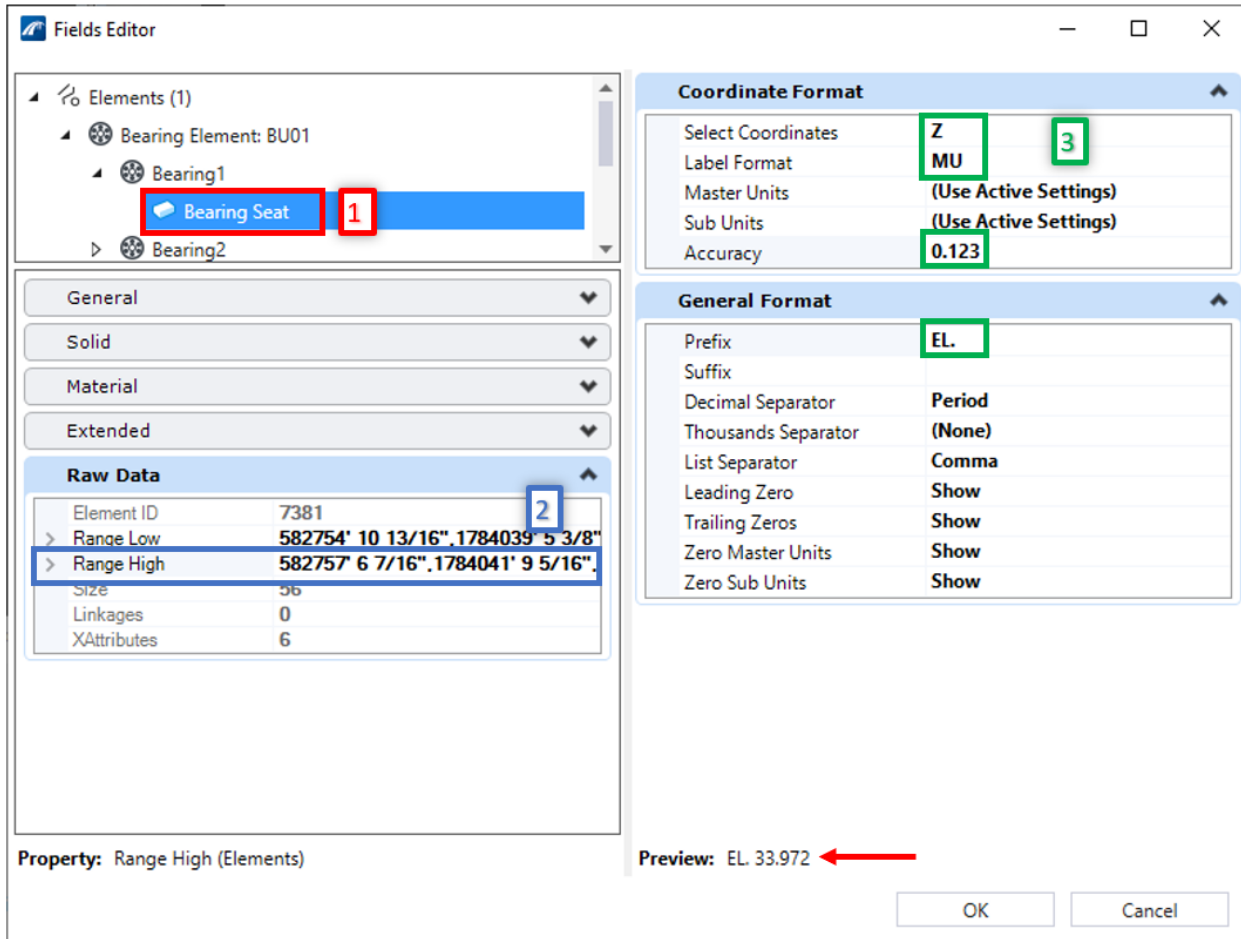
5. Click on the **Insert Field** function in the Text Editor window and select **Element Properties** for the *Field Type* and click **OK**.



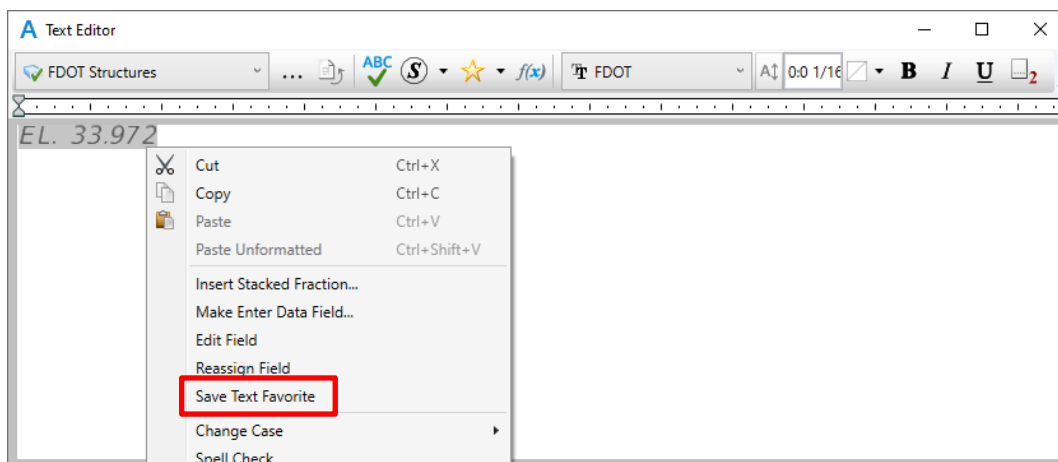
6. Select the rightmost of the bearing seat elements. Prior to selecting it, note which bearing number it is by checking in the OpenBridge Model tab of the Explorer. Bearing 1 is on the right in this view.



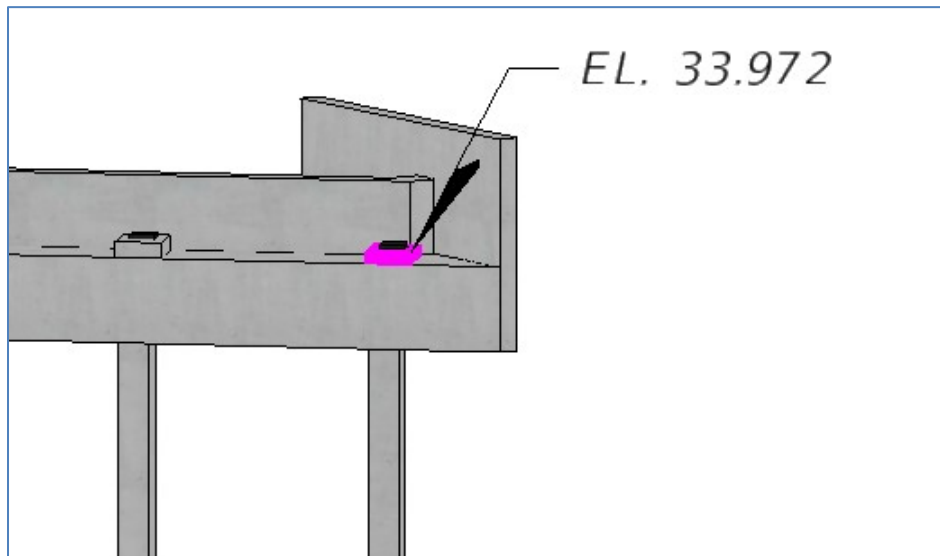
- The Fields Editor window will appear after the element is selected. Select **Bearing Seat** under **Bearing 1** under the Elements and scroll down to select the "Range High" in the Raw Data menu, and make the following changes to the Coordinate Format and General Format Menus. Remember to add a space after the "EL." in the Prefix category. Note the *Preview*: item at the bottom of the window. Click **OK**.



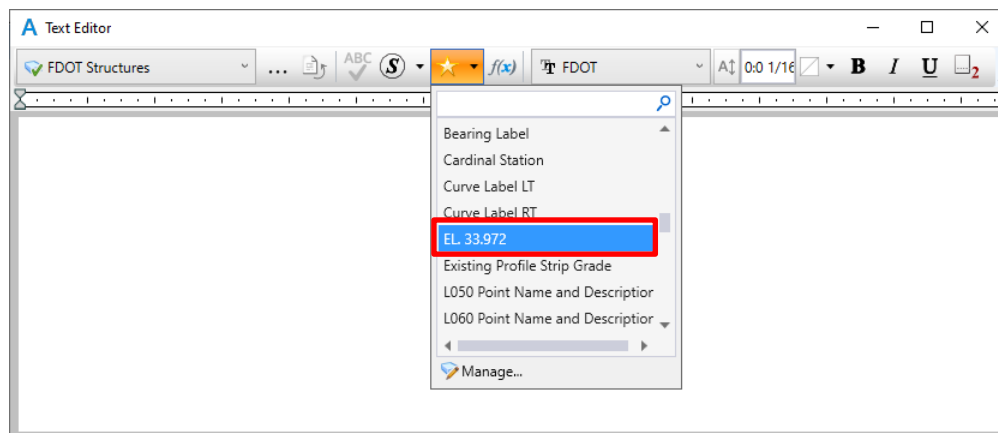
- Highlight the text and elevation value in the Text Editor Window. Right click and select **Save Text Favorite** from the options provided.



9. Snap to a corner of the bearing seat element and then click again to place the note.

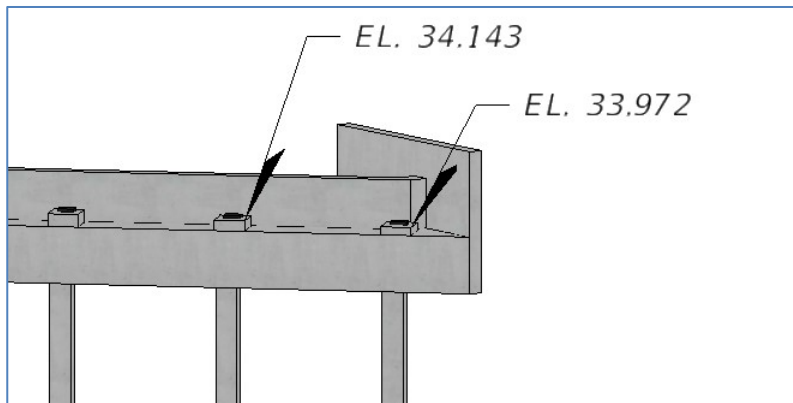


10. Close out of the Text Editor box and restart the Place Note tool by again selecting **Drawing** (workflow) > **Annotate** > **Notes** > **Place Note**. Make sure the Dimension Style “FDOT Structures Note-Elevation” is still selected.
11. Select the Insert Favorite function and scroll down to the Text Favorite starting with **EL.** **XX.XXX**. OBM automatically uses the label text as the title for the Text Favorite.

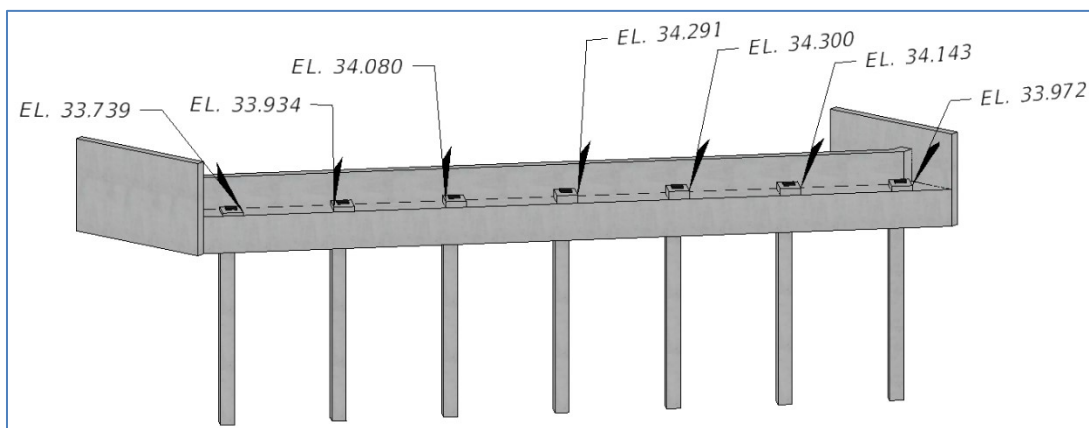


Note Any saved text favorite can be renamed by right-clicking the text favorite to be updated and then left-clicking the **Rename** option.

12. Now snap to the corners of another bearing seat and click again to place the new note.

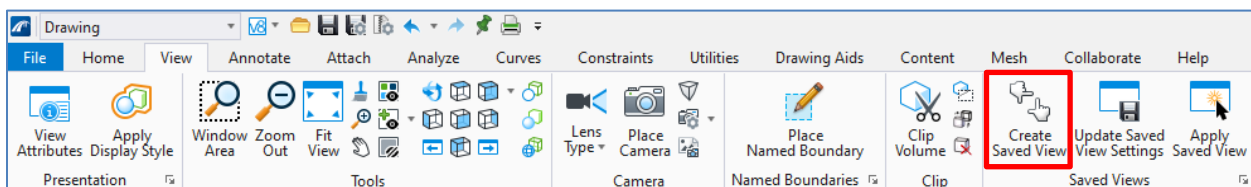


13. Repeat Step #12 for the rest of the bearing seats.

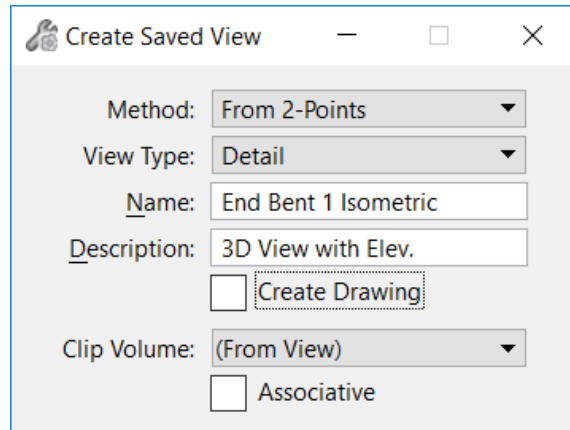


➤ **Create a 3D Saved View:**

1. Select the Create Saved View tool from **View > Saved Views > Create Saved View**.

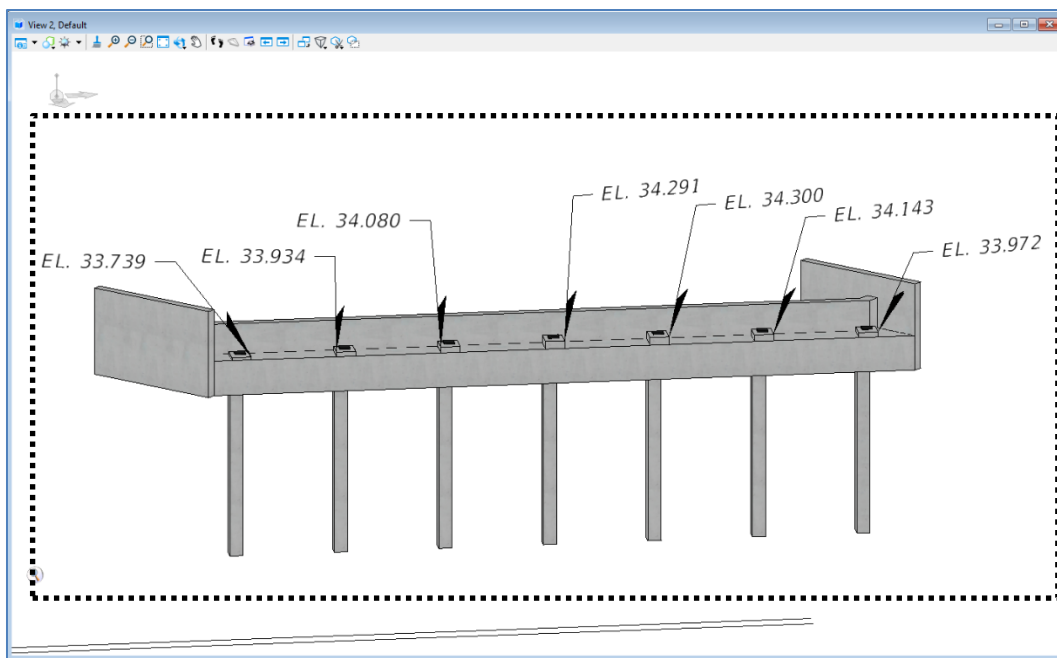


2. The Create Saved View dialog box is opened. Make the following changes to the settings.

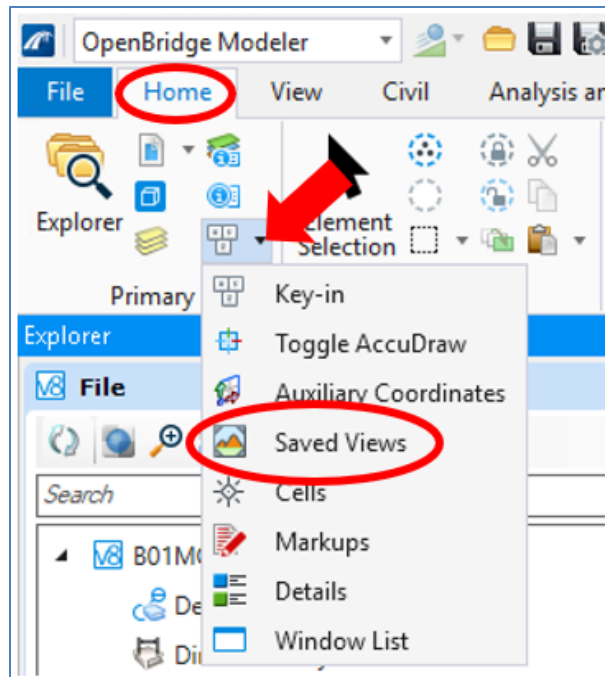


Note A drawing view can be created directly from a saved view by checking the box **Create Drawing** in the Create Saved View dialog box.

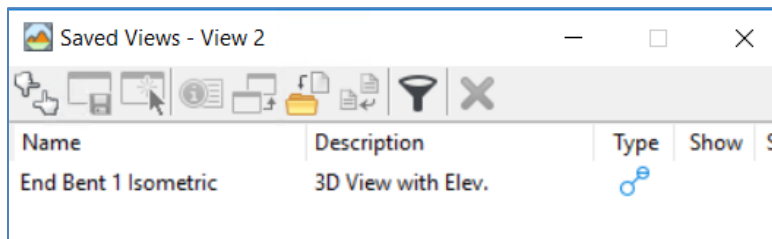
3. Create a “box” around the end bent view by clicking on the upper left corner and then the bottom right corner of the view. Once the second point is selected the view is automatically created but the outline will not be shown in the view window.



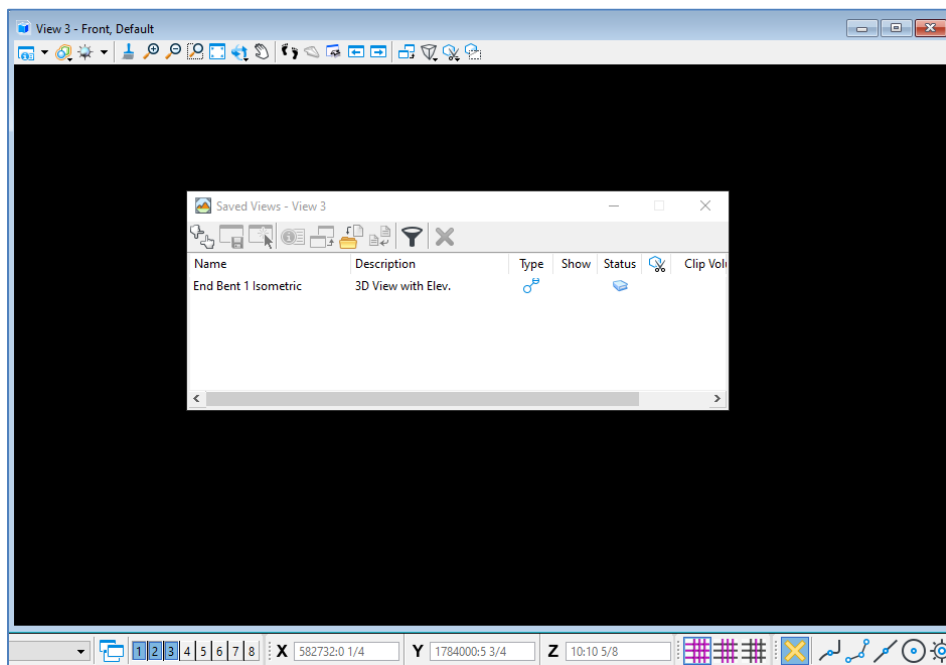
4. Open the Saved Views dialog box at **Home > Primary > (More) Saved Views**.



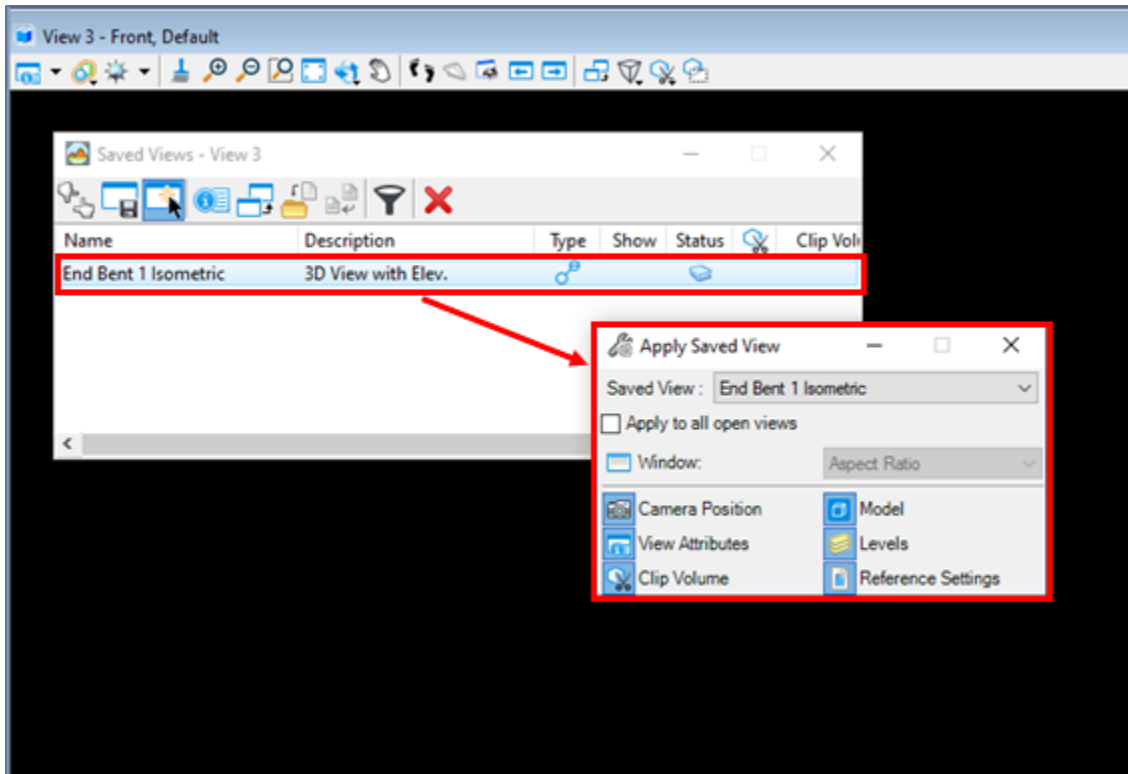
The view is visible in the menu.



- 5. Open View 3 in the View Toggle at the bottom of the screen and maximize the window.



6. Double click on **End Bent 1 Isometric** in the Saved Views dialog box, and the Apply Saved Views dialog box opens automatically. The settings listed here can be changed, but for this example, leave it as is and then click anywhere in View 3. The view is recreated in this view window.



Multiple Saved Views can be created and this list can be used for drawing development and also can be very beneficial in model delivery to convey design intent without 2D plans. It may also be placed on a 2D plan sheet similarly as other views

7 QUANTITIES AND REPORTS

OVERVIEW

Model-centric bridge workflows produce additional deliverables beyond plans production. Quantities and elevations are a by-product of working in 3D. OBM has built-in tools to create some of these deliverables. There are also reports generated to aid in QA/QC. Value can be added to workflows in terms of both efficiency and quality when using this model-centric process. FDOT is currently working to develop more FDOT-specific quantity tools to help users generate and format required quantity information.

OBJECTIVES

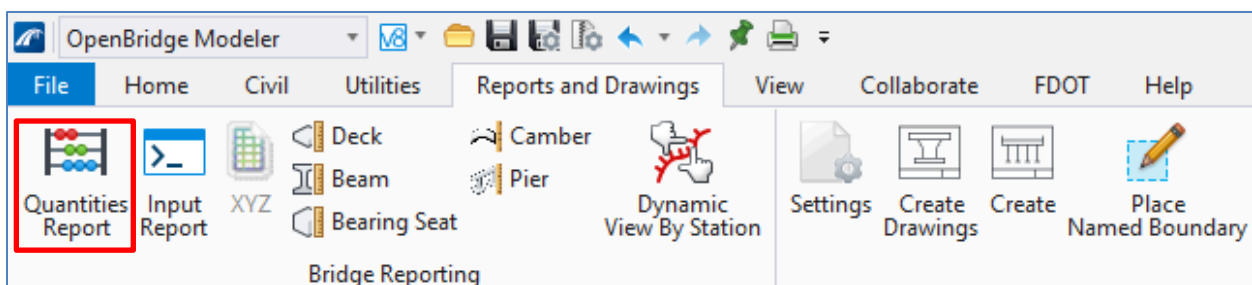
The objectives of this chapter are to introduce the available tools to generate additional deliverables including:

- Quantities
- Elevation Reports
- Input Report
- Custom Reports and Tables

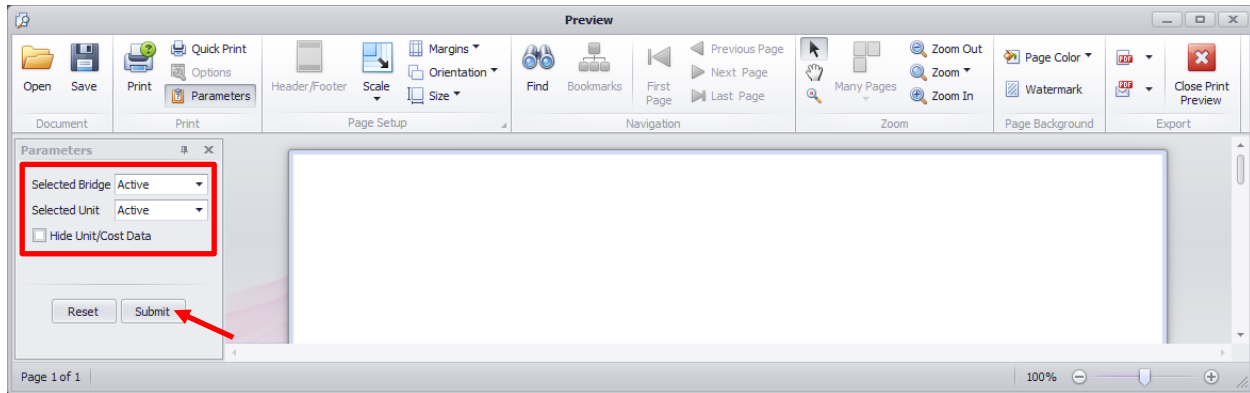
QUANTITIES

There are several built-in quantities reports available in OBM. These include superstructure, substructure, and miscellaneous categories. Also, the volume can be extracted from any solid created in OBM.

The **Quantities Report** tool can be accessed through **Reports and Drawings > Bridge Reporting > Quantities Report**.



The resulting print preview dialog box opens. The report can include only the active bridge or all the bridges in the file, as well as the active or all of the units. The user can also choose to show or hide cost information. The parameters can be selected in the red box below and then click **Submit** to retrieve the print preview of the quantities report.



The Materials Quantities Report is generated for the active bridge or all bridges (listed separately) depending on the parameters selected. The report is broken down by superstructure (deck and beams), substructure (in this case end bents and intermediate bents with caps/piles/bearing seats), and miscellaneous items (barriers and bearings). The Component Type, Material Name, and Material Type are all linked directly to the model and will reflect the information input into the model during its development through the templates, materials, etc. selected when creating the model. Therefore, the user should consider these factors during creation of the model so that the quantities report accurately reflects the desired parameters.

Bridge Name: Bridge
Bridge Unit: Begin Approach Slab - Bridge 2 LT :: RC Slab Bridge

Materials Quantity Report

Superstructure Quantities

Component Name	Component Type	Material Name	Material Type	Pay Unit	Unit Price	Quantity	Cost
Approach Slab	Deck (Slab w/ constraints)	Approach Slab Concrete	Concrete	Cubic Yards	400.00	4.675	1870.10
Approach Slab	Deck (Slab w/ constraints)	Approach Slab Concrete	Concrete	Cubic Yards	400.00	87.124	2348.95
						Total	61.799 24719.85

Substructure Quantities

Component Name	Component Type	Material Name	Material Type	Pay Unit	Unit Price	Quantity	Cost
EndBent1	Cap	Substructure Concrete	Concrete	Cubic Yards	950.00	31.654	30071.66
Cheek Walls	Substructure Concrete	Concrete	Concrete	Cubic Yards	950.00	6.266	5952.20
Piles	18 inch Carbon Driven Pile	Concrete	LF	90.00	280.000	28000.00	28000.00
						Total	61223.85

Miscellaneous Quantities

Component Type	Material Name	Pay Unit	Unit Price	Quantity	Cost	
Barrier	30' Single Flood Traffic Barrier	LF	65.00	60.000	3900.00	
					Total	3900.00

Grand Total

Cost
61043.50

Bridge Deck Area, sq ft: 1652.51

Note The Materials Quantity Report currently assumes the haunch build-up is linear between bearings and does not account for variations from parabolic prestressed beam camber. This is conservative for quantities for every Build-up Case except Case 4. See FDOT Standard Index 450-199 for more information.

Note that BDR bridge element unit price is also included in the FDOT specific materials that can then be used to generate preliminary BDR cost estimates. See Structure Manual, Volume 1, Structures Design Guideline, Chapter 9 for details. The Material Quantities Report includes a chart of the bridge cost estimate broken down by component percentage. Initial information is included in the workspace **Material Library** but can be adjusted for individual projects if necessary.

Name	Description	Unit Wt (PC)	Unit Price	Poisson	f'c (ksi)	f'ci (ksi)	MR (ksi)	E (ksi)	CTE (1/F)
Click here to add new item									
8 feet, in water, casing salvaged	Drilled Shaft - Concrete	150	1650	0.2	6	4	0.48	3844	6E-06
8 feet, in water, permanent casing	Drilled Shaft - Concrete	150	2200	0.2	6	4	0.48	3844	6E-06
8 feet, on land, casing salvaged	Drilled Shaft - Concrete	150	1550	0.2	6	4	0.48	3844	6E-06
9 feet, in water, casing salvaged	Drilled Shaft - Concrete	150	1900	0.2	6	4	0.48	3844	6E-06
9 feet, in water, permanent casing	Drilled Shaft - Concrete	150	2400	0.2	6	4	0.48	3844	6E-06
9 feet, on land, casing salvaged	Drilled Shaft - Concrete	150	1800	0.2	6	4	0.48	3844	6E-06
AASHTO-II	Prestressed Precast Girders	150	160	0.2	6	4	0.48	3844	6E-06
Approach Slab Concrete	CIP Superstructure	150	400	0.2	6.5	4.5	0.48	3844	6E-06
Box Culvert Class II Concrete	Substructure	150	950	0.2	6.5	4.5	0.48	3844	6E-06
Box Culvert Class IV Concrete	Substructure	150	990	0.2	6.5	4.5	0.48	3844	6E-06
Box Girder Concrete, Curved	CIP Superstructure	150	1200	0.2	6.5	4.5	0.48	3844	6E-06
Box Girder Concrete, Straight	CIP Superstructure	150	950	0.2	6.5	4.5	0.48	3844	6E-06
Deck Concrete, Class II	CIP Superstructure	150	600	0.2	6.5	4.5	0.48	3844	6E-06
Deck Concrete, Class IV	CIP Superstructure	150	1200	0.2	6.5	4.5	0.48	3844	6E-06

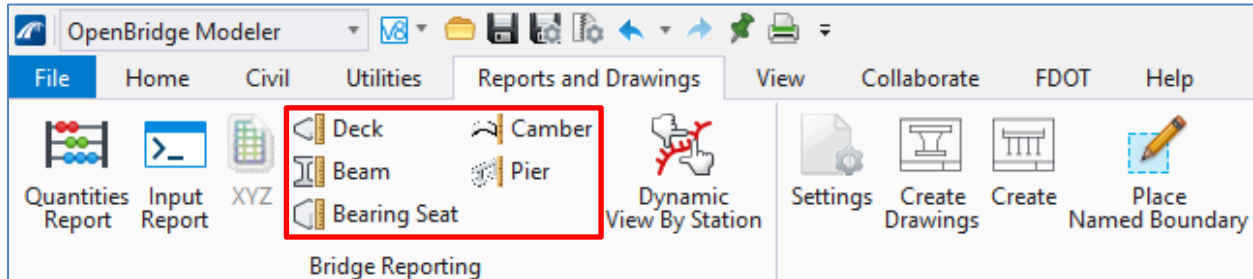
It is important to note that these quantities are built upon the accuracy of the model. There are certain details, especially with substructure units, that cannot be easily modeled in OBM currently with the template limitations. An example of this would be skewed end bents with “squared-off” concrete edges to eliminate the acute corners or the thickened deck slab portions. These elements would then need to be supplemented with additional quantity calculations to account for the discrepancies if these portions are not modeled to a high level of development. Additionally, if any OBM elements are modified with solids modeling tools (outside of the OBM specific modeling tools), this will not be reflected in the quantity report. Below is a list of known situations in which it is recommended that the user verify and supplement the quantity reports as necessary:

- Skewed end bents
- End bent and combined wingwalls (overlap of concrete volumes)
- Thickened deck slabs (if not modeled)
- Any element that has been modified outside of the OBM-specific tools

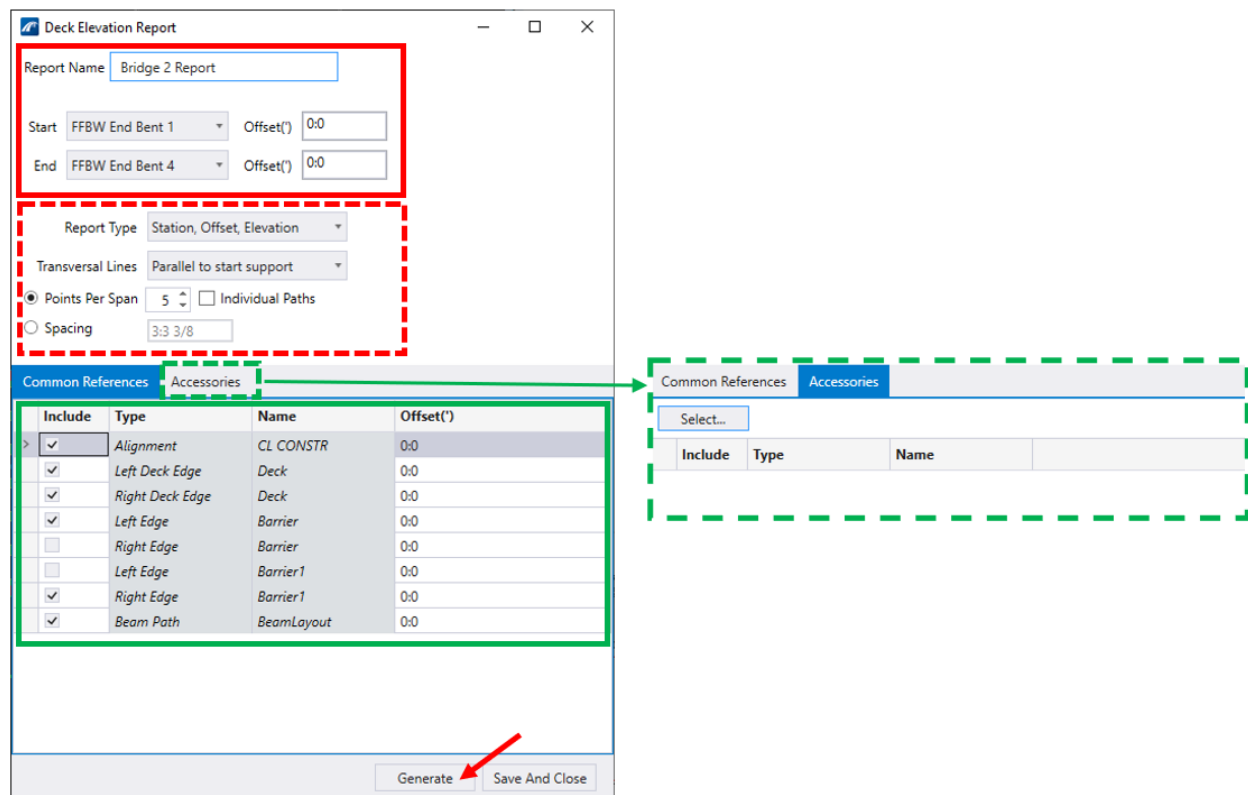
In summary, it is recommended that the user take advantage of this functionality within OBM but carefully verify the report is generating the quantities expected and supplement the report as necessary. Note that all solid elements within a DGN file, generated by OBM or not, can be analyzed and a volume reported. There is currently not a way to incorporate this into the Materials Quantity Report, but the values can be utilized to enhance the quantity calculations.

ELEVATION REPORTS

Another reporting functionality within OBM is automated elevation reports. There are tools available for the following components: Deck, Beam, Bearing Seat, Camber, and Pier. The tools can be accessed in the **Reports and Drawings** tab in the Bridge Reporting group.

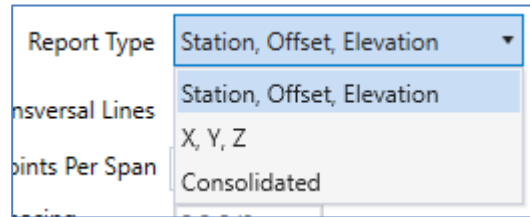


The **Deck Elevation Report** (commonly known as Finish Grade Elevation for FDOT) tool starts with prompts to select the start and end supportline for consideration. Note that only the active bridge and unit can be selected. The Deck Elevation Report dialog box then is provided. The inputs are shown and described in detail below.



Solid Red Box – This section includes inputs for the Report Name, Start & End Supportlines and Offsets. This can be used to modify the supportlines selections and to choose a starting point different from the supportlines. Supportlines are typically at the front face of backwall and centerline of pier, while a starting point may be at the centerline of bearings.

Dashed Red Box – These inputs provide additional reporting variables and formatting. The number of elevations generated can be entered by a number of points in the span or an equal spacing between the start and end points. Additionally, the Report Type offers several format and reporting options including station, offset, and elevations; x,y,z coordinates; and a consolidated report option.



Solid Green Box – This selection input for **Common References** allows the user to select longitudinal lines for which to report the deck elevations. The inputs include the alignments, deck edges, barriers (curb), and beam centerlines. Note that offsets can be added to any of these points to capture additional points such as beam flange edges. Select the checkboxes for the desired points to include them in the report. Note that naming the elements during or after placement can aid in recognizing the reference elements.

Dashed Green Box – The **Accessories** tab allows the user to select additional elements in the model to include in the deck elevation report. This input is not typically used for common bridges and reports.

The resulting report is generated in the Print Preview window. The elevations are grouped by point and sorted by span.

Bridge Name: Bridge 2 LT
 Bridge Unit: Bridge 2 LT :: Beam Slab Concrete-Girders Bridge

Deck Elevation Report

Parallel to start support
 DeckEdgeLeft with offset = 0.000 (Deck)
 P_5

Span 1

Point Of Interest	Station - Bridge Alg()	Offset - Bridge Alg()	Elevation()
0 / 4 L	342+03.5300	-55.542	37.294
1 / 4 L	342+16.0300	-55.542	37.419
2 / 4 L	342+28.5300	-55.542	37.538
3 / 4 L	342+41.0300	-55.542	37.652
4 / 4 L	342+53.5300	-55.542	37.762

Span 2

Point Of Interest	Station - Bridge Alg()	Offset - Bridge Alg()	Elevation()
0 / 4 L	342+53.5300	-55.542	37.762
1 / 4 L	342+66.0300	-55.542	37.886
2 / 4 L	342+78.5300	-55.542	37.954
3 / 4 L	342+91.0300	-55.542	37.952
4 / 4 L	343+03.5300	-55.542	37.944

Note For Report Type “Station, Offset, Elevation,” the Deck Elevation Reports cannot accurately provide elevations at the begin bridge stations/centerline interior support locations AND at the centerline of bearing locations in the same report. These values will need to be generated separately and combined.

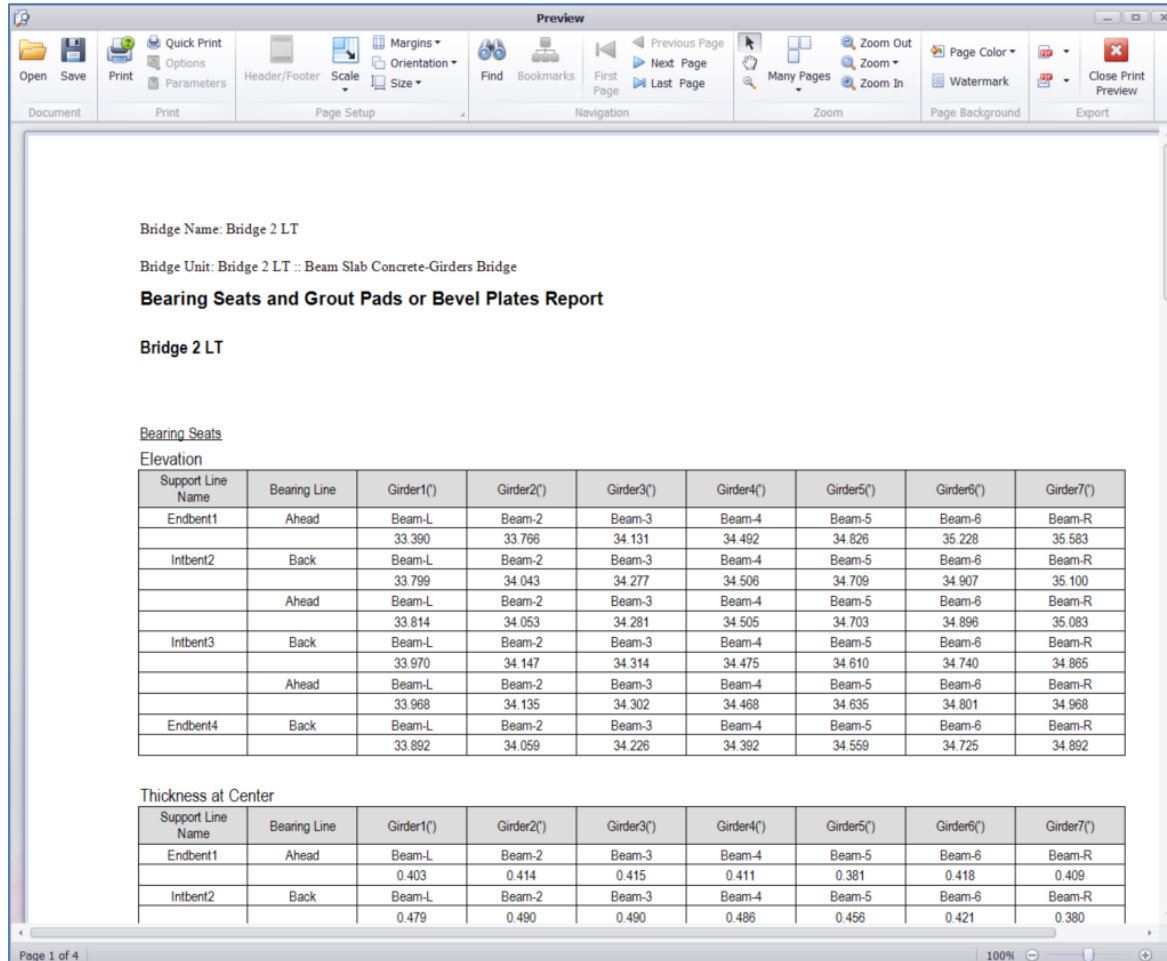
The **Beam Report Tool** provides a set of parameters for each beam line including the length, grade, direction (bearing), and rotation. It provides beam haunch thickness and haunch elevations based on selected number of points. Currently, the haunch thickness and elevations include cross slope/superelevation; however, they do not include camber (even if it is entered in the **Camber Report Tool** or read from LEAP Bridge). This limitation is pending enhancements on prestressed beam camber/deflection definitions and elevations at erection.

Haunch Thickness
Span SupportLine1 - SupportLine2

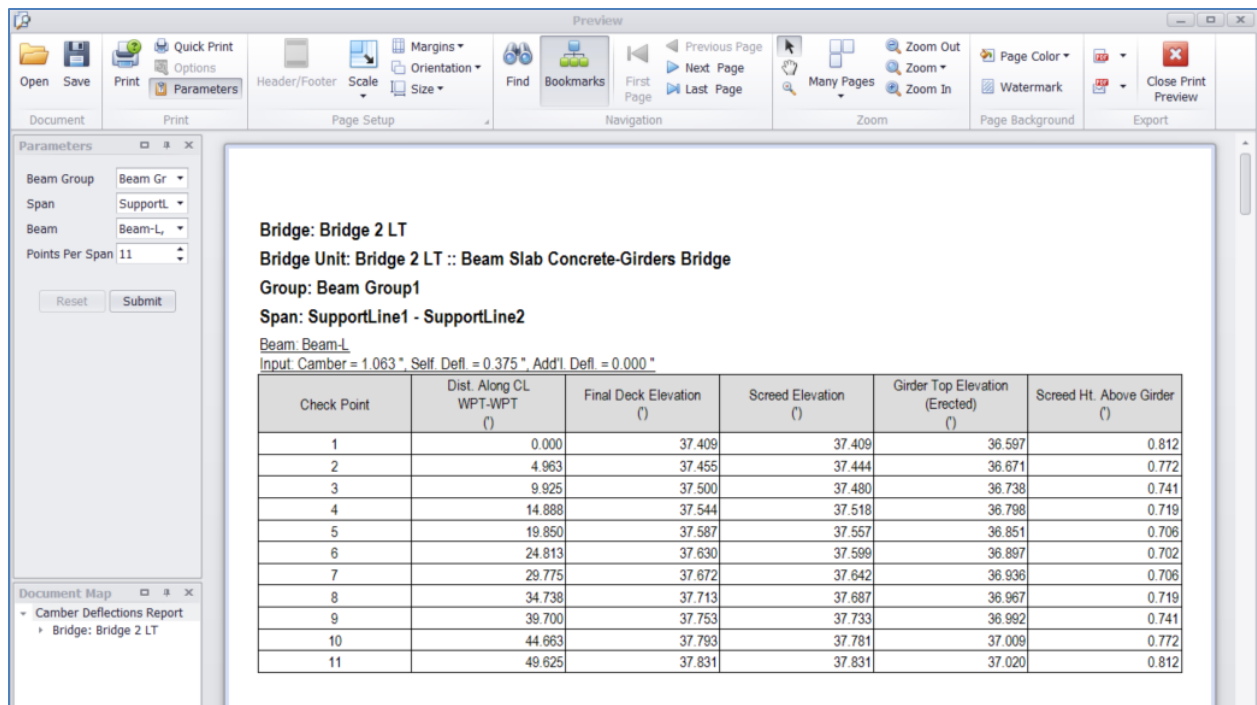
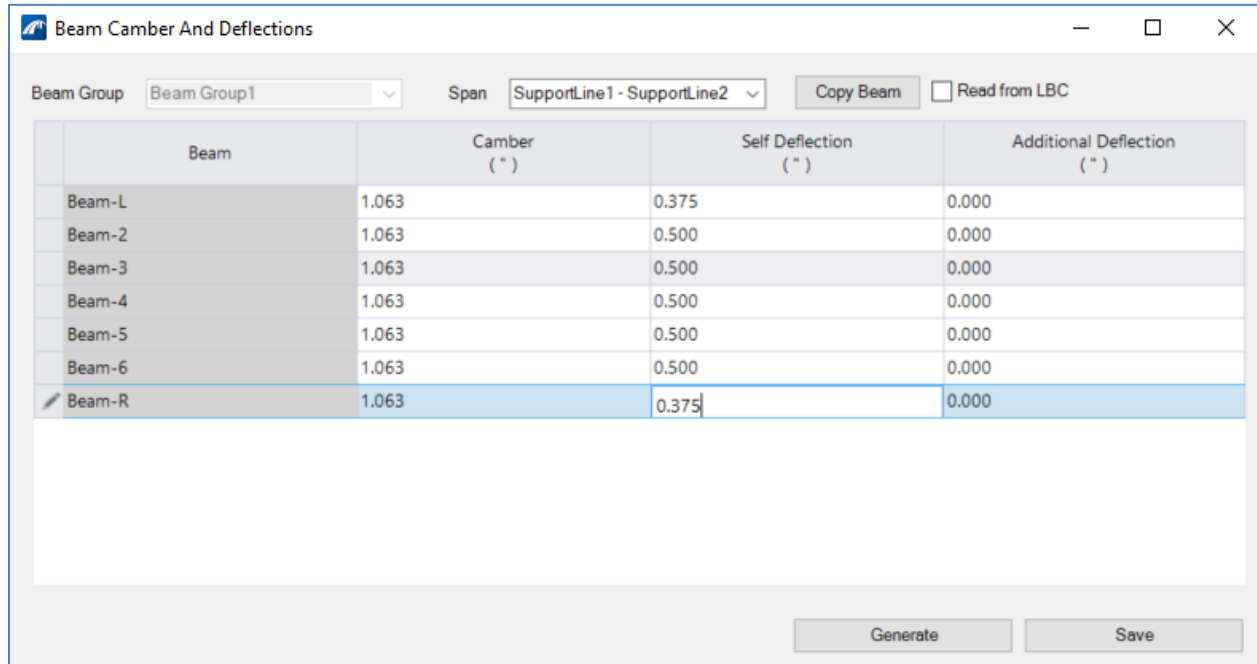
Beam Name /Reference	0/10L	1/10L	2/10L	3/10L	4/10L	5/10L	6/10L	7/10L	8/10L	9/10L	10/10L
Beam-L	0:0	4:9 9/16	9:7 1/8	14:4 5/8	19:2 3/16	23:11 3/4	28:9 5/16	33:6 7/8	38:4 3/8	43:1 15/16	47:11 1/2
Left	1	1 1/16	1 1/16	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/16
Beam CL	1 1/4	1 5/16	1 5/16	1 5/16	1 3/8	1 3/8	1 3/8	1 5/16	1 5/16	1 5/16	1 1/4
Right	1 1/2	1 9/16	1 9/16	1 9/16	1 9/16	1 9/16	1 9/16	1 9/16	1 1/2	1 7/16	1 7/16
Beam-2	0:0	4:9 9/16	9:7 1/8	14:4 5/8	19:2 3/16	23:11 3/4	28:9 5/16	33:6 7/8	38:4 3/8	43:1 15/16	47:11 1/2
Left	0 7/8	0 15/16	0 15/16	1	1	1	1	1	1	1	0 15/16
Beam CL	1 1/8	1 3/16	1 3/16	1 3/16	1 1/4	1 1/4	1 1/4	1 3/16	1 3/16	1 3/16	1 1/8
Right	1 3/8	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 3/8	1 5/16	1 5/16
Beam-3	0:0	4:9 9/16	9:7 1/8	14:4 5/8	19:2 3/16	23:11 3/4	28:9 5/16	33:6 7/8	38:4 3/8	43:1 15/16	47:11 1/2
Left	0 7/8	0 15/16	0 15/16	1	1	1	1	1	1	1	0 15/16
Beam CL	1 1/8	1 3/16	1 3/16	1 3/16	1 1/4	1 1/4	1 1/4	1 3/16	1 3/16	1 3/16	1 1/8
Right	1 3/8	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 3/8	1 5/16	1 5/16
Beam-4	0:0	4:9 9/16	9:7 1/8	14:4 5/8	19:2 3/16	23:11 3/4	28:9 5/16	33:6 7/8	38:4 3/8	43:1 15/16	47:11 1/2
Left	0 15/16	1	1	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16	1
Beam CL	1 3/16	1 1/4	1 1/4	1 1/4	1 5/16	1 5/16	1 5/16	1 1/4	1 1/4	1 1/4	1 3/16
Right	1 7/16	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 7/16	1 3/8	1 3/8
Beam-5	0:0	4:9 9/16	9:7 1/8	14:4 5/8	19:2 3/16	23:11 3/4	28:9 5/16	33:6 7/8	38:4 3/8	43:1 15/16	47:11 1/2
Left	1 5/16	1 3/8	1 3/8	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 3/8
Beam CL	1 9/16	1 5/8	1 5/8	1 5/8	1 11/16	1 11/16	1 11/16	1 5/8	1 5/8	1 5/8	1 9/16
Right	1 13/16	1 7/8	1 7/8	1 7/8	1 7/8	1 7/8	1 7/8	1 7/8	1 13/16	1 3/4	1 3/4
Beam-6	0:0	4:9 9/16	9:7 1/8	14:4 5/8	19:2 3/16	23:11 3/4	28:9 5/16	33:6 7/8	38:4 3/8	43:1 15/16	47:11 1/2
Left	0 7/8	1	1 1/8	1 1/4	1 3/8	1 7/16	1 9/16	1 5/8	1 11/16	1 3/4	1 13/16
Beam CL	1 1/8	1 1/4	1 3/8	1 1/2	1 9/16	1 11/16	1 3/4	1 13/16	1 7/8	1 15/16	2
Right	1 3/8	1 1/2	1 5/8	1 11/16	1 13/16	1 7/8	1 15/16	2	2 1/16	2 1/8	2 3/16

Note The Beam Report Tool currently assumes the haunch build-up is linear between bearings and does not account for variations from parabolic prestressed beam camber.

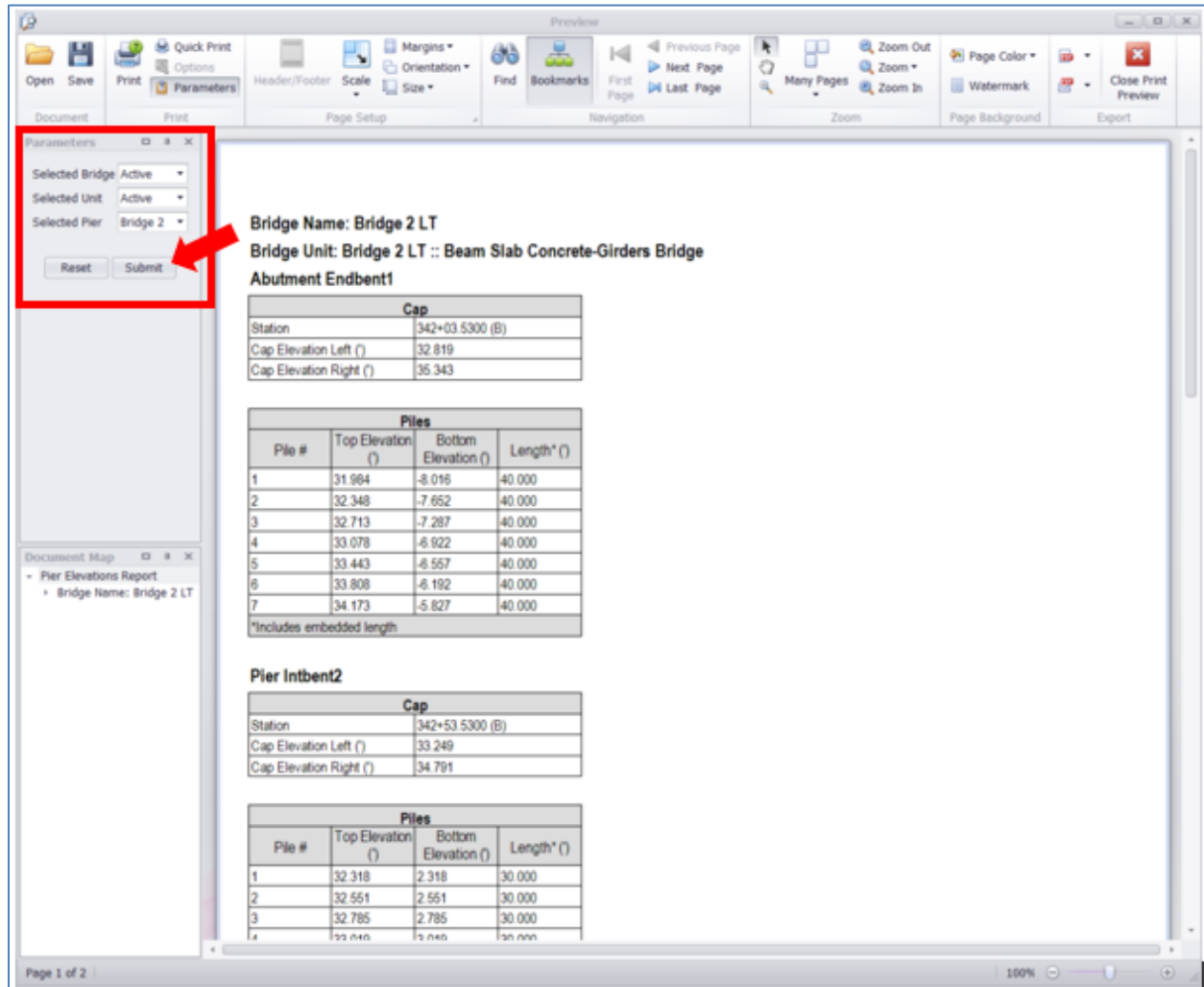
The **Bearing Seat Elevations Report Tool** provides the bearing seat elevations or grout pad/bevel plates elevations. The report has no settings and provides the elevations for each beam seat (assumes level beam seats in all situations) and thicknesses at bearing center, minimum, and at each corner. Note that both bearing lines will be reported at interior supports. This report can be beneficial but is only accurate for situations in which the beam seat is to be constructed level as mentioned above. Enhancement has been requested to model sloped bearing seats.



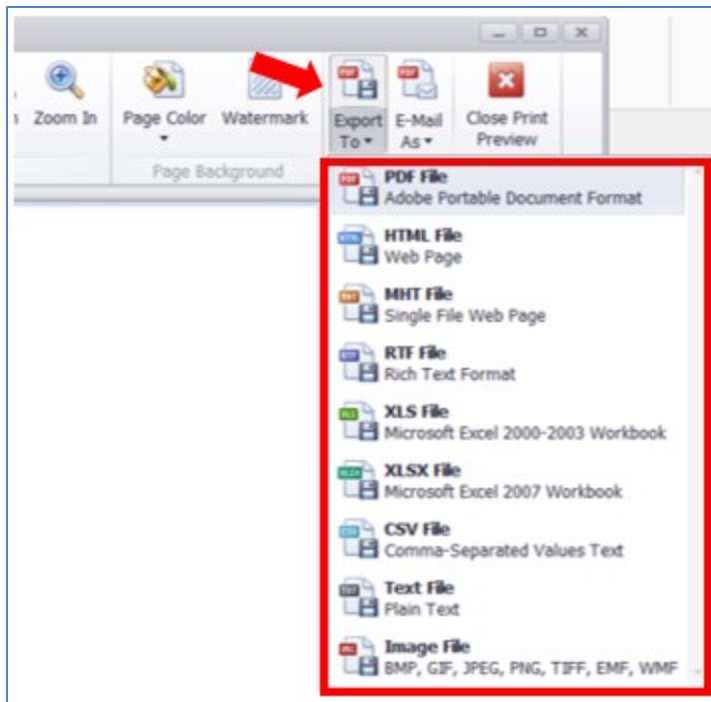
The **Beam Camber Report Tool** allows the user to enter the beam camber, the beam Self Deflection and Additional Deflection for all beams of the active bridge at midspan. Note that this information can be read from a LEAP Bridge Concrete file if the analysis is performed using the Bentley workflow. For construction information, these inputs are used to generate reports of deck elevations and screed elevations at user defined intervals assuming a parabolic profile. Enhancements have been filed to include Net Beam Camber @ 120 days and Dead Load Deflection During Deck Pour @ 120 days for prestressed beams as defined per the FDOT Structures Manual.



When the **Pier Elevation Report Tool** is selected, all bridges/units in the file, whether active or not, may be options to include in the report. Additionally, the user has the ability to select an individual support (end bent or intermediate supports) or all the substructure units. The list of elevations includes top of cap elevations at the left and right ends, as well as pile cutoff and bottom elevations. If applicable, column elevations at the top and bottom are also reported for piers.



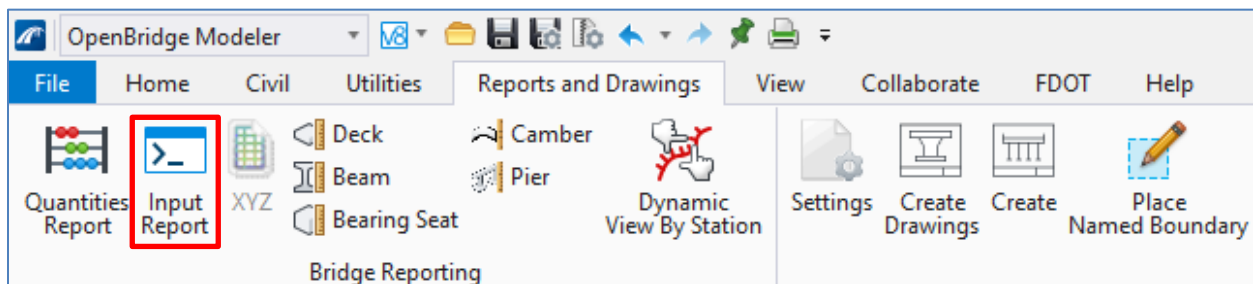
All of the elevation and associated reports are generated with the OBM report tool and are opened in the Print Preview window as shown. These reports can be exported to many common file formats including PDF, XLS, XLSX, TXT, CSV, and more. The **Export To** drop down menu on the **Print Preview** menu group lists all available choices. Note that the *Working Units* set within **File > Settings > File > Design File Settings** controls what units are displayed in the reports.



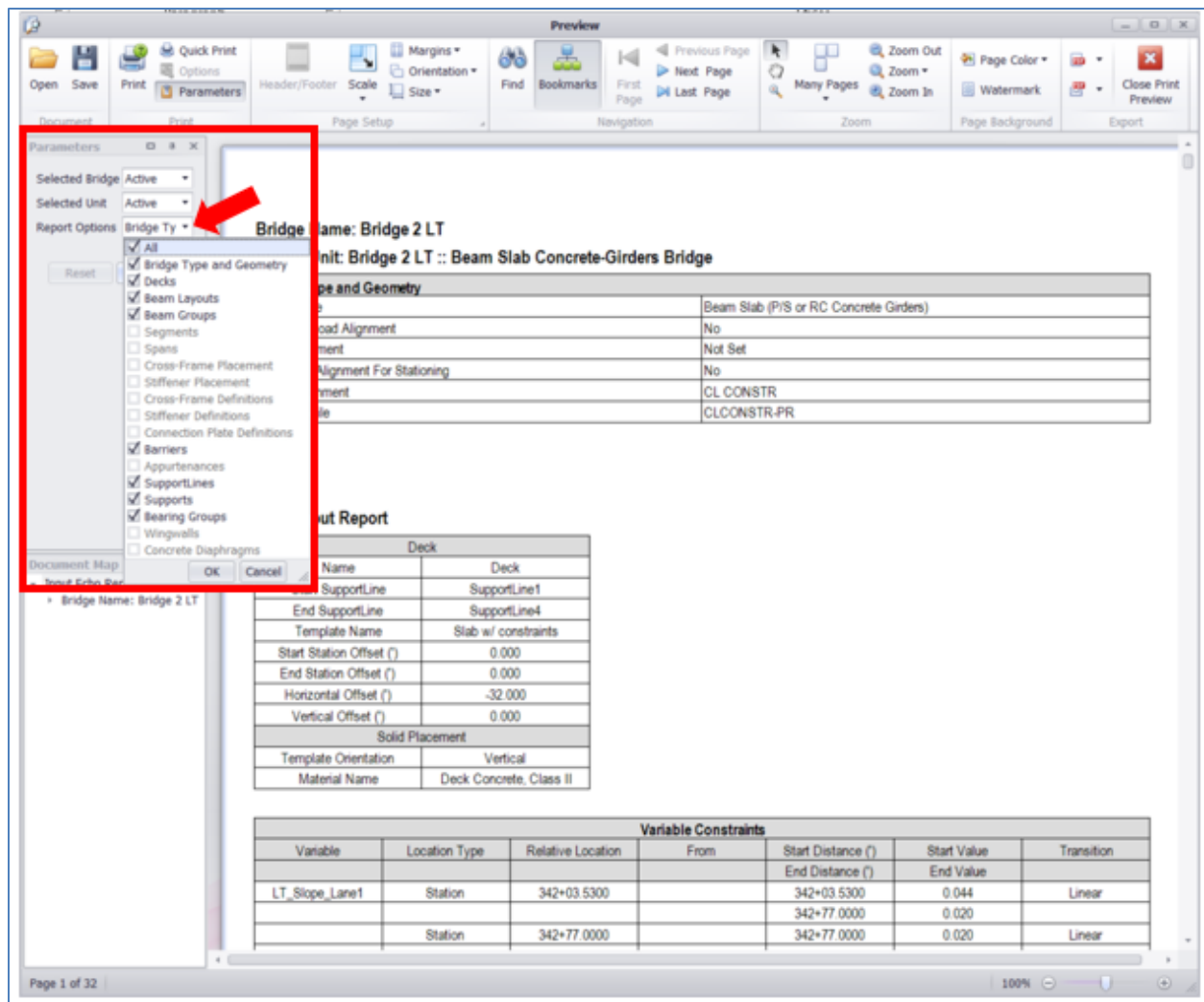
This allows for flexibility to incorporate these report values, especially considering spreadsheet exports, to generate quantities and elevations as needed or for further calculations.

INPUT REPORT

Input Echo Report in OBM list all input data user provides. All input data is recorded in the report that may be used for verification and as checkprints for the model creation. This tool may be accessed from the **Reports and Drawings > Input Report** in the Bridge Reporting group.



The resulting print preview dialog box opens. The report may include only the active bridge or all the bridges in the file, as well as the active or all of the units. Also, the user can control which elements are included in the report. These options are shown in the red box below, and the user may view the print preview of the Input Report of the selected elements.



It is recommended that the 3D bridge model be viewed along with this Input Report. Using this approach, the input can be verified visually as well as numerically.

CUSTOM TABLES

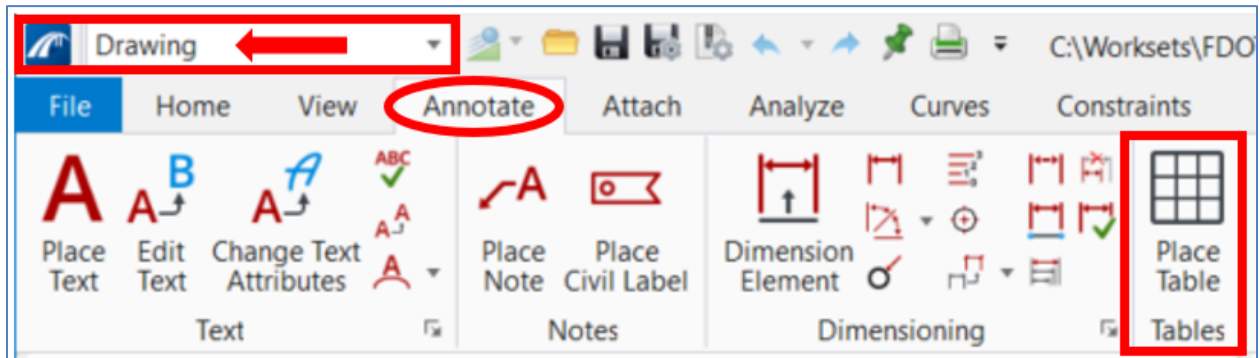
As a basic MicroStation tool, the **Table** tool holds promise, although its practical functionality is currently limited. One of the advantages of this tool is to be able to access data via Item Types and other preset element categories. This may become an efficient way to report data in lieu of third-party applications (such as Autotable or Axiom) under current practice. However, there are a few limitations with its functionality. For example, the tool may not be formatted in design or drawing model space as well as in sheet model space. Also, it won't take a merged cell format from a seed file. FDOT will continue to monitor the development of this tool.

There are several potential options for creating custom tables within OBM that may be useful to users. For the time being, this section focuses on the option that offers the most value for current bridge workflows which is generating tables from Excel files. This process will create tables in a DGN file that is

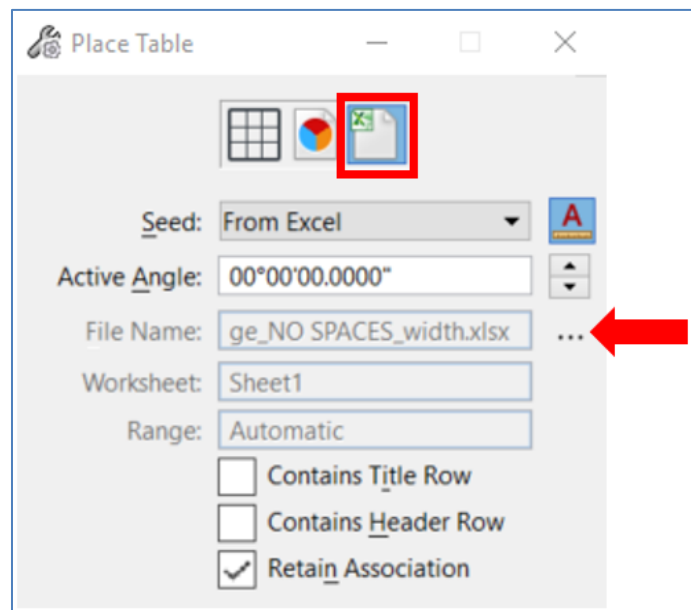
linked directly to an Excel file. These tables keep an active link that can be updated dynamically when changes are made in the spreadsheet.

Prior to placing a table from an excel file, an Excel file with the data must preexist. If this is a common table, it is recommended that the user create a template that can be re-used for multiple projects. FDOT is in the process of developing a library of commonly used templates to be used as seed files for future use.

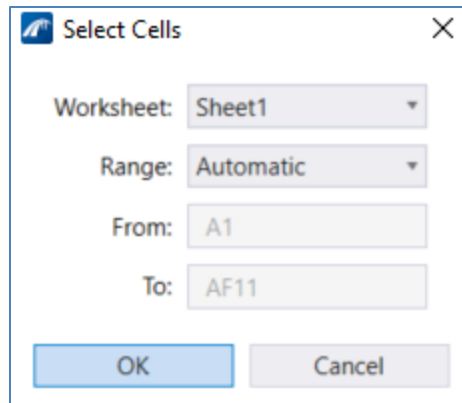
The **Place Table Tool** can be accessed from **Drawing (workflow) > Annotate > Place Table** in the Tables group.



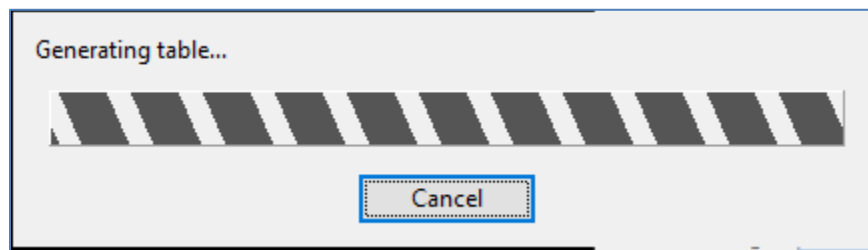
The **Place Table** dialog box is then opened. Select the Excel file tool and navigate to the file with the data that is planned as the table content.



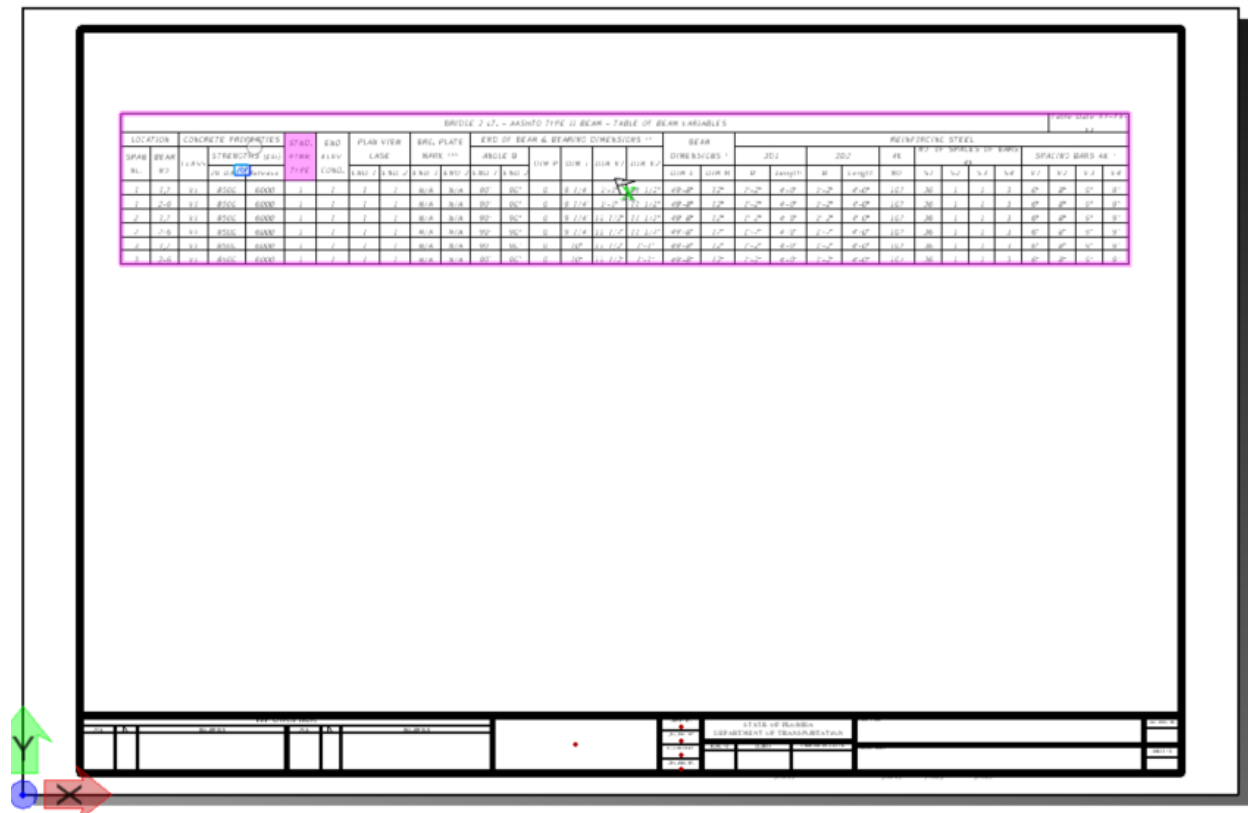
Once the file is selected, the **Select Cells** dialog box is opened. Select the cells for the table by selecting the worksheet and the range of cells to include.



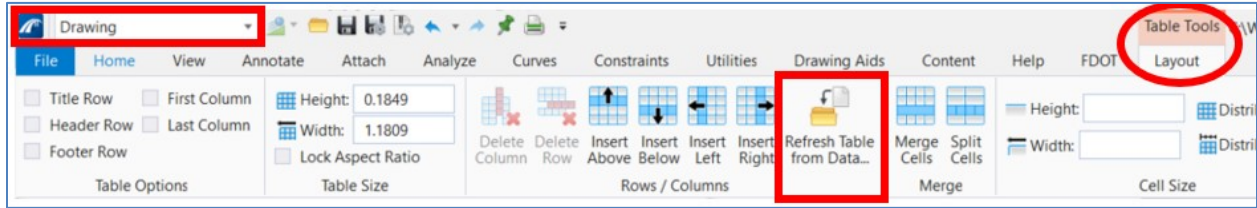
After the user clicks ok, the status window shown below generates the table. Depending on the size of the Excel file, the program may take a minute or more to create the table.



The table can be placed in any model; however, it is recommended that these tables be placed directly onto Sheet Models to ensure formatting and sizing of the table fits. Once the table is placed, conduct additional formatting, e.g. change the text style etc.



The table can be refreshed at any time with updated data by selecting the table and accessing the Table Tools options in the **Layout > Refresh Table from Data Source** tool under the Rows / Columns group. However, note that any formatting that was executed after the table was placed in the DGN file will need to be repeated as the settings for the table will also be reset.



As mentioned, though the table tool currently offers limited functionality, it has potential to become an integral part in the future of the model-centric workflows. FDOT continues to develop the **Linked Data Manager** tool as an alternative with FDOT-specific templates and formatting.

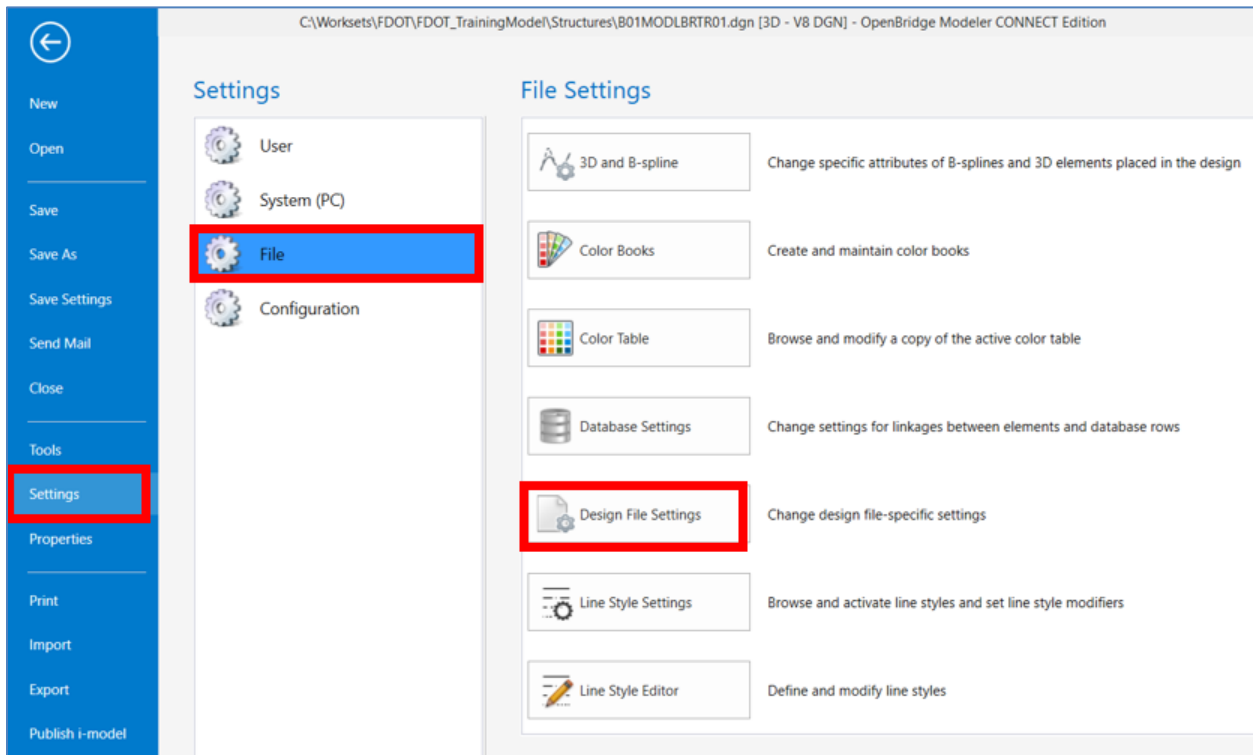
EXERCISE OVERVIEW

Exercise 7.1 Generate Quantity, Elevations, and Input Reports..... [7-15](#)

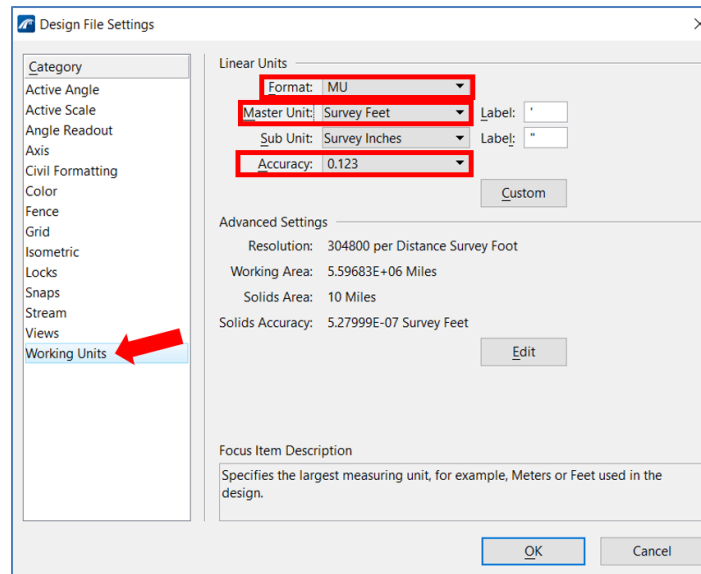
Exercise 7.1 Generate Quantity, Elevations, and Input Reports

➤ **Create a Bridge Quantity Report:**

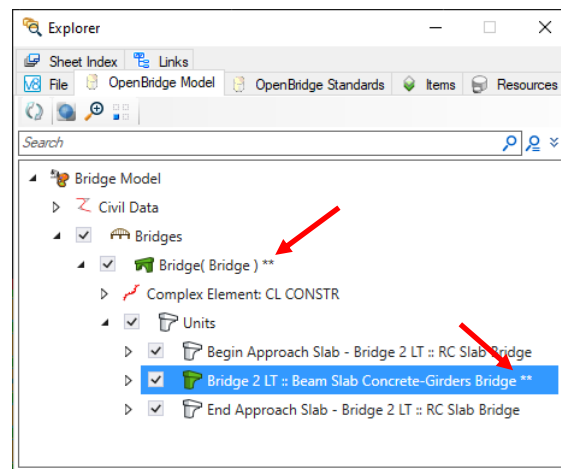
1. Open the data set file: **B01MODLBRTR01_7.1_Begin**
2. Change the working units to Survey Feet with accuracy to three decimal places via commands **File > Settings > File > Design File Settings**.



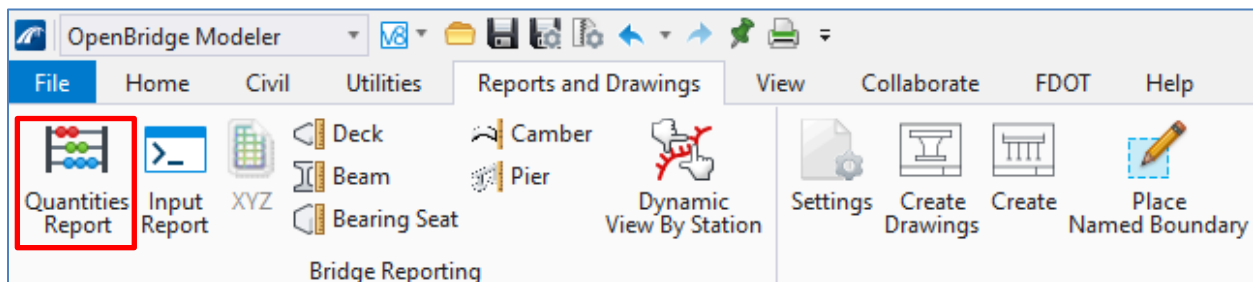
Within the **Design File Settings** window, select the *Working Units* window and change the *Format*, *Master Unit*, and *Accuracy* dialog boxes as shown below.



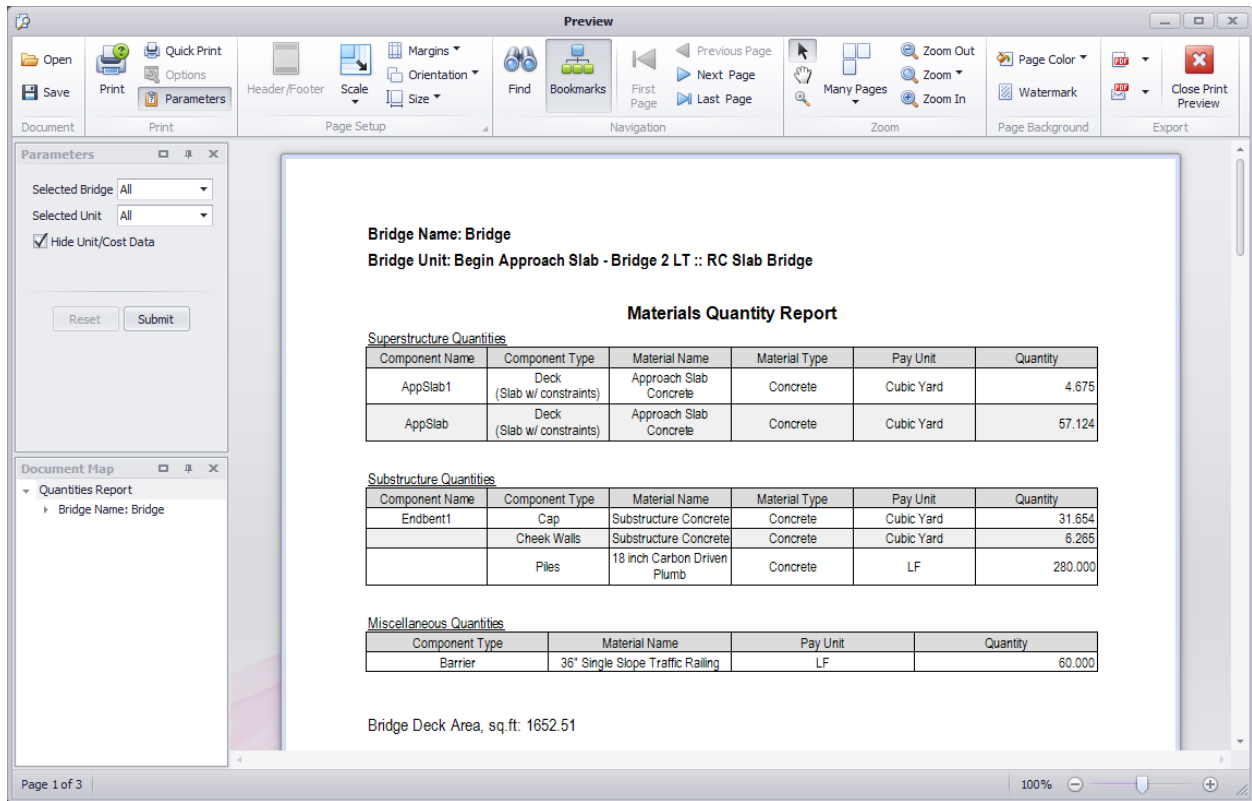
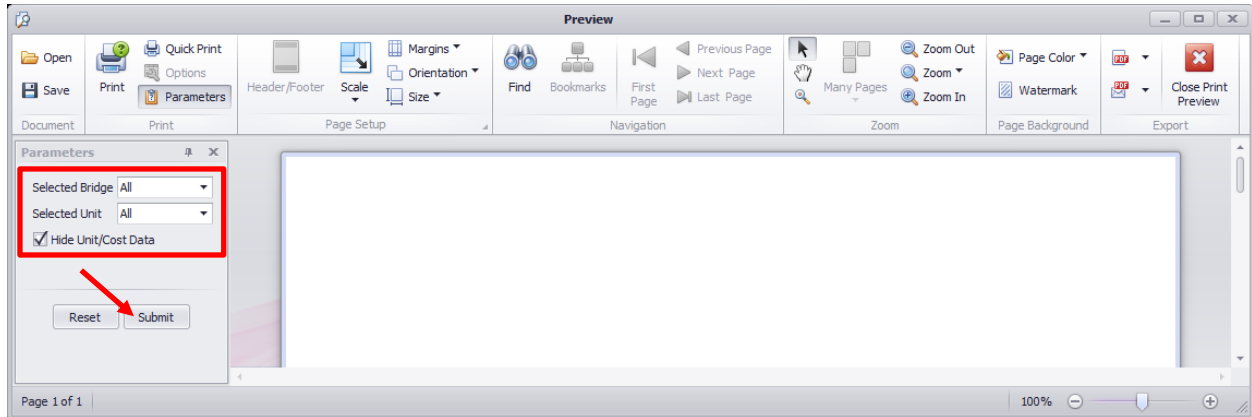
3. The quantity report may only be created for the active bridge model (or all bridge models), so make sure that **Bridge 2 LT** is set as the active bridge and unit. This can be verified in the **Explorer > OpenBridge Model > Bridge Model > Bridges**.



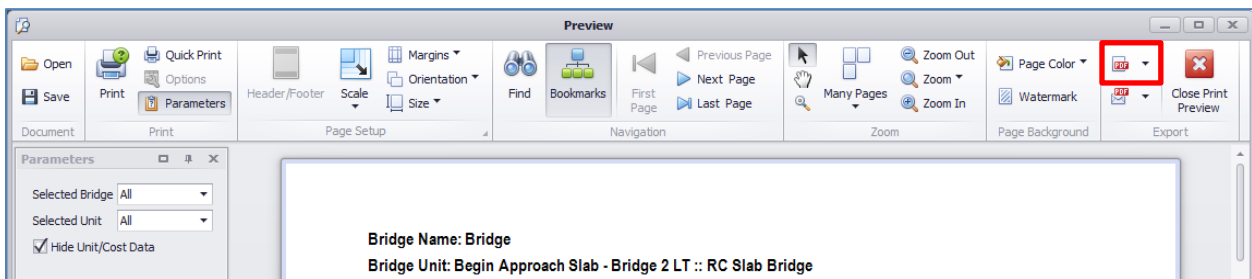
4. Open the Material Quantity Report Print Preview dialog box by selecting **Reports and Drawings > Quantities Report** under the Bridge Reporting group.

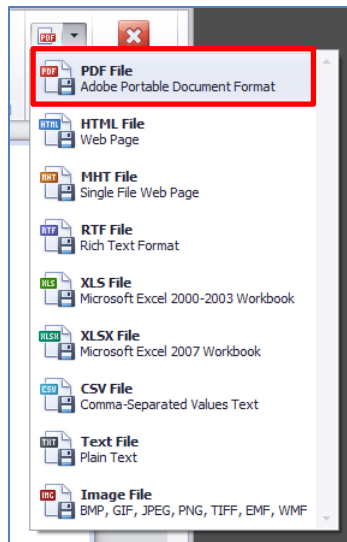


Select **All** under the *Selected Bridge* input in the Print Preview window and click **Submit** to generate the report.



5. Select the **Export To** drop down menu and select **PDF File** as the file type.

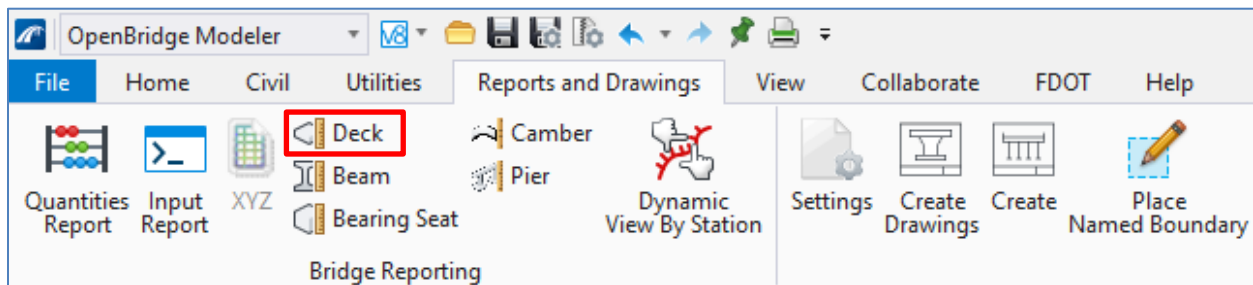




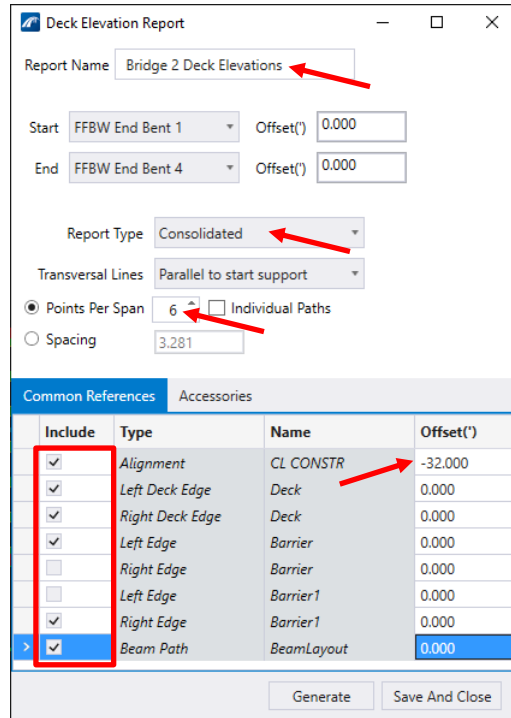
6. Select **OK** in the **PDF Export Options** dialog box and save the file as *QuantitiesReport_Bridge2.pdf* in the *... Structures\eng_data* folder. Open the file and view the results with a PDF viewer to verify.

➤ **Create a Deck Elevation Report:**

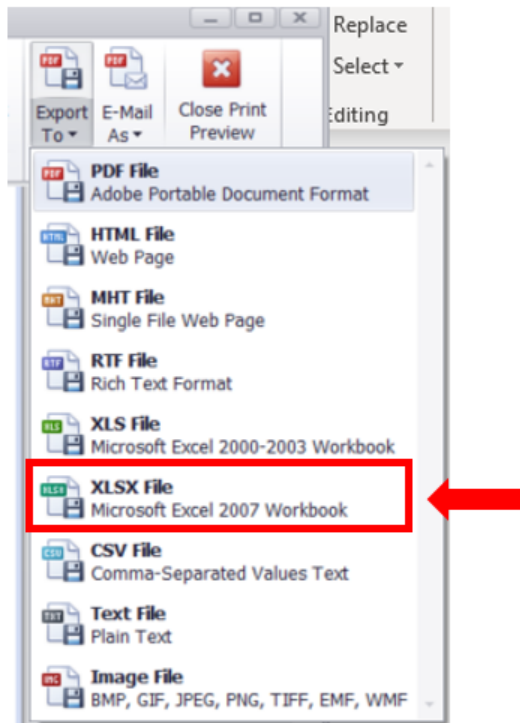
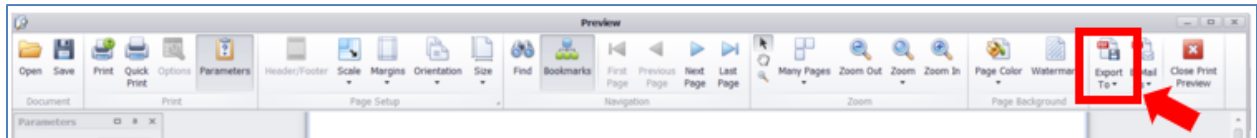
1. Open the Deck Elevation Report Print Preview dialog box by selecting **Reports and Drawings** > **Bridge Reporting** > **Deck** tool. Select **FFBW End Bent 1** and **FFBW End Bent 4** to capture the entire bridge deck then left click one more time to accept the selection.



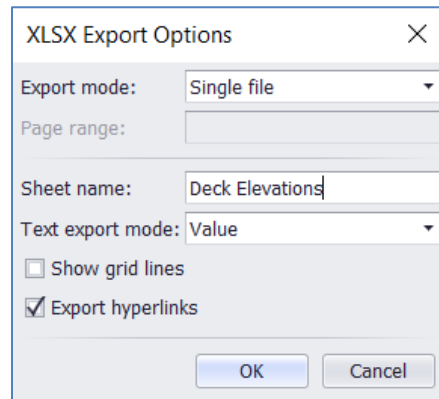
2. Make the following selections in the Deck Elevation Report dialog box as shown and click **Generate** to access the Print Preview of the report.



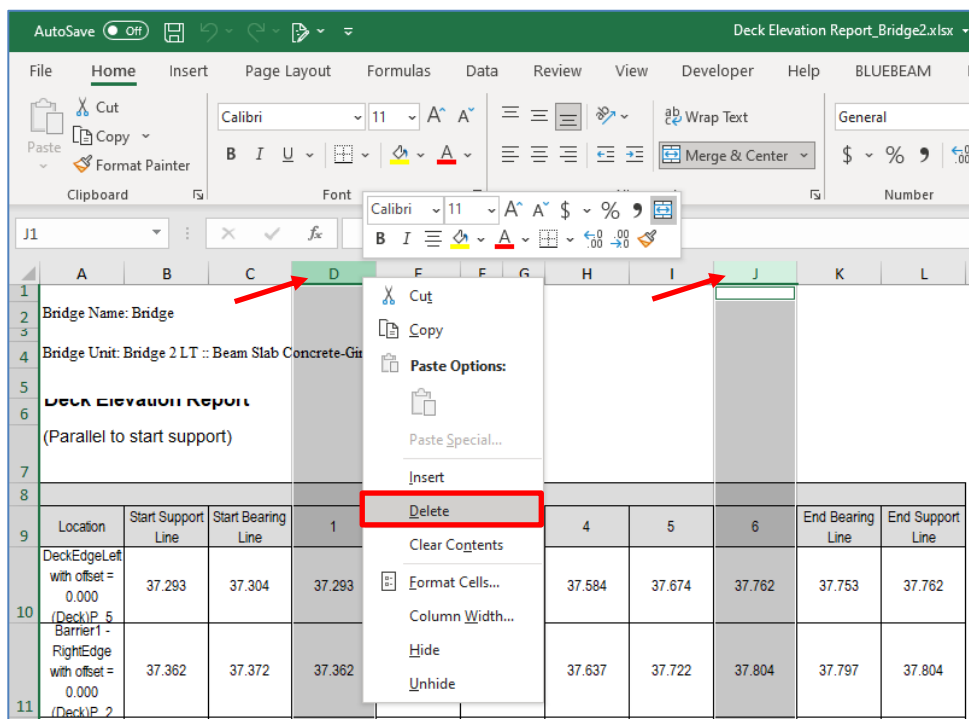
3. Select the **Export To** drop down menu and select XLSX File as the file type.



- Change the *Sheet name* to **Deck Elevations** and select **OK** in the **XLSX Export Options** dialog box. Save the file as *Deck Elevation Report_Bridge2.xlsx* in the ... Structures > eng_data folder. Open the file and view the results with Microsoft Excel.



- Delete Columns D and K by highlighting them and selecting **Delete** from the right-click menu. These are redundant values for the start and end support lines.



- Right-click on the Column B heading and select **Insert** to add a column. Add the location names to the newly created column for Span 1 as shown below.

	A	B	C	D	E	F	G	H	I	J	K
8	Span 1 (')										
9	Location		Start Support Line	Start Bearing Line	2	3	4	5	End Bearing Line	End Support Line	
10	DeckEdgeLeft with offset = 0.000 (Deck)P_5	Left Coping	37.293	37.304	37.393	37.49	37.584	37.674	37.753	37.762	
11	Barrier1 - RightEdge with offset = 0.000 (Deck)P_2	Left Gutterline	37.362	37.372	37.456	37.548	37.637	37.722	37.797	37.804	
12	BeamPath with offset = 0.000 (Deck)Beam-L	CL Beam 1	37.406	37.416	37.497	37.586	37.671	37.753	37.825	37.832	
13	BeamPath with offset = 0.000 (Deck)Beam-2	CL Beam 2	37.775	37.782	37.839	37.9	37.957	38.012	38.058	38.063	
14	BeamPath with offset = 0.000 (Deck)Beam-3	CL Beam 3	38.143	38.147	38.18	38.213	38.244	38.271	38.292	38.294	
15	Alignment with offset = -32.000 (Deck)CL CONSTR	PGL	38.335	38.338	38.357	38.376	38.392	38.405	38.414	38.415	
16	BeamPath with offset = 0.000 (Deck)Beam-4	CL Beam 4	38.512	38.513	38.521	38.527	38.53	38.529	38.526	38.526	
17	BeamPath with offset = 0.000 (Deck)Beam-5	CL Beam 5	38.881	38.879	38.862	38.841	38.816	38.788	38.76	38.757	
18	BeamPath with offset = 0.000 (Deck)Beam-6	CL Beam 6	39.249	39.245	39.203	39.154	39.102	39.047	38.994	38.988	
19	BeamPath with offset = 0.000 (Deck)Beam-R	CL Beam 7	39.618	39.61	39.545	39.468	39.388	39.305	39.228	39.219	
20	Barrier - LeftEdge with offset = 0.000 (Deck)P_2	Right Gutterline	39.662	39.654	39.586	39.506	39.423	39.336	39.256	39.247	
21	DeckEdgeRight with offset = 0.000 (Deck)P_1	Right Coping	39.731	39.722	39.649	39.564	39.476	39.384	39.299	39.29	

Copy and paste these cells to Spans 2 and 3.

7. Revise the column headings as shown below.

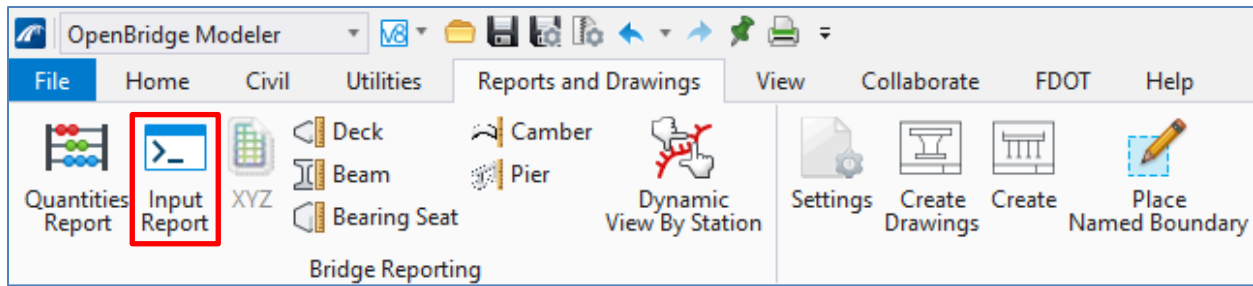
Span 1 (')									
Location	Location	Begin Bridge	CL Bearing	1	2	3	4	CL Bearing	CL Int. Bent 2
DeckEdgeLeft with offset = 0.000 (Deck)P_5	Left Coping	37.293	37.304	37.393	37.49	37.584	37.674	37.753	37.762
Barrier1 - RightEdge with offset = 0.000 (Deck)P_2	Left Gutterline	37.362	37.372	37.456	37.548	37.637	37.722	37.797	37.804

Copy and paste these cells to Spans 2 and 3 and make the necessary changes for Column C and K (change the start and end location names per span).

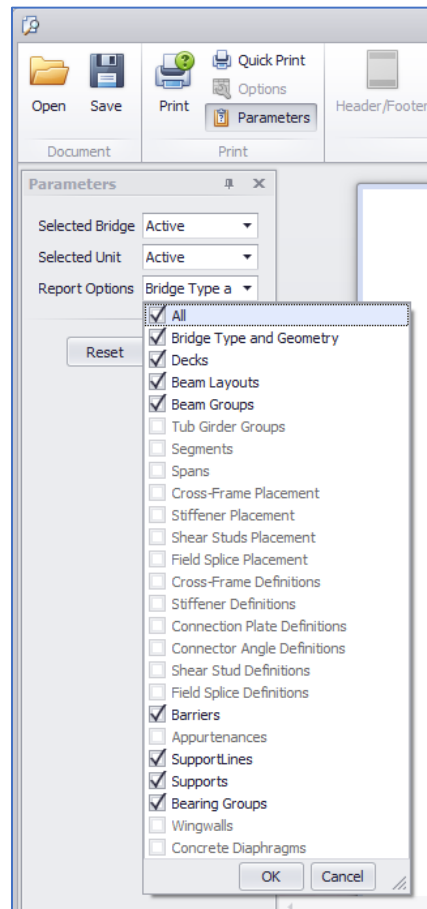
8. This file now contains the base information needed for the deck elevation tables for plans sheet development. The data can be further manipulated for format (changing the order of the rows if needed, removing merged columns, etc.) and then imported to the proper DGN file using FDOT Linked Data Manager tool, the OBM Place Table tool (see corresponding section of manual), or other third-party software.

➤ **Create an Input Echo Report:**

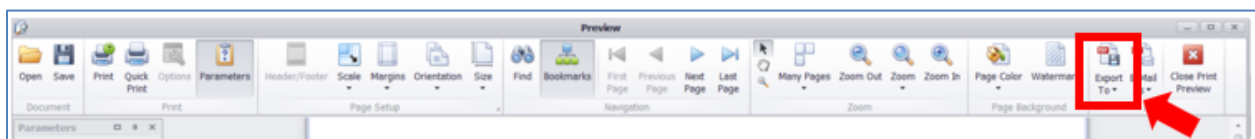
1. Open the Input Report Print Preview dialog box by selecting **Reports and Drawings > Bridge Reporting > Input Echo Report** tool.



2. Make the following selections for the Print Preview Parameters and click **Submit** to access the Print Preview of the report.



3. Select the **Export To** drop down menu and select **PDF File** as the file type.





4. Select **OK** in the **PDF Export Options** dialog box and save the file as *InputEchoReportPopulate_Bridge 2.pdf* in the `... Structures\eng_data` folder. Open the file and view the results in a PDF viewer.