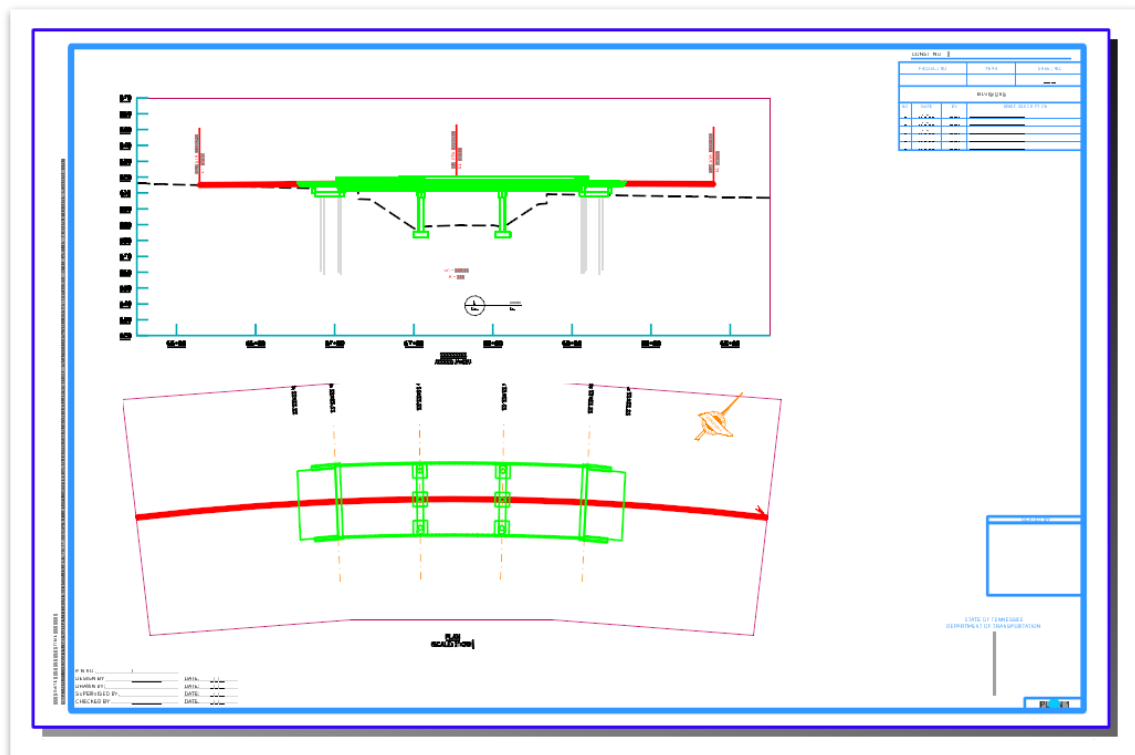




# BRIDGE SHEET PRODUCTION

OpenBridge Modeler

CONNECT Edition



TDOT  
Structures Division  
March 2024





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## Preface

### Purpose & Need

The **BRIDGE SHEET PRODUCTION** OpenBridge Modeler (OBM) Manual is the second document in a series of training manuals to be released by the Tennessee Department of Transportation (TDOT) that will be available through a digital, interactive **flipbook** format. Bentley's OBM software is being adopted and implemented statewide by TDOT as the new **3D modeling** design software, which will ultimately replace MicroStation V8i. This manual provides information and introductory exercises using OBM for 2D and 3D model-centric workflows to produce plans. Further workspace customization, standards, and naming conventions will be released in the future. For standardized naming conventions for bridge files, refer to the [TDOT ORD File Naming Convention Standards](#) document, which can be found on the TDOT CADD Support website under [ORD Resources](#).

### Disclaimer

The **BRIDGE SHEET PRODUCTION** Manual is developed based on OpenBridge Designer CONNECT Edition 2022 Release 1, Version 10.11.00.40 (OpenBridge Modeler CONNECT Edition 2022 Release 1, Version 10.11.00.310). The combined TDOT OpenRoads Designer (ORD)/OpenBridge Modeler (OBM) workspace (**10.11.00.40**) should be used in conjunction with this manual, as it is configured for OBM. If you have any technical issues or recommendations for this manual, please contact TDOT CADD Support at [TDOT.ORD@tn.gov](mailto:TDOT.ORD@tn.gov).

When new versions of OpenBridge Modeler are released, there may or may not be a schema change. For example, when going from 10.10 to 10.11, there is a schema change. However, when going from 10.10 R1 to 10.10 R2, there is no schema change. When attempting to open an older file in a newer version of the program, the file will automatically be upgraded to the latest file format. A back-up file with an extension of .bak will be automatically created to preserve the file in the previous version.

### Revisions

The **BRIDGE SHEET PRODUCTION** Manual will be revised over time as a result of future OBM software releases and procedural & workspace updates. All revisions will be documented by WSP/TDOT and included on the Revision History page at the end of the manual. TDOT CADD support will announce updated manual versions when they become available via emailed announcements.



## Chapter 1. Course Overview

### Course Description and Objectives:

This course introduces users to the plans production functionality of the OpenBridge Modeler (OBM) CONNECT software, which is Bentley's current drafting and design platform that has been adopted for use by TDOT. This course was designed to be lecture-based when discussing general plans production tools and exercise-only when working with 3D model-centric plans. While tips and notes are present throughout, users who are not familiar with Bentley CONNECT software (MicroStation, OpenRoads Designer, etc.), may find it helpful to review TDOT's [Fundamentals \(ORD\) Manual](#) since many of the non-bridge concepts and workspace setup are identical.

At the conclusion of this course, participants will be able to:

1. Create a new WorkSet, a new OBD file, and a new OBM file using the proper seed files.
2. Understand how to create, use, and modify saved views in 2D and 3D model-centric plans.
3. Understand the process required to set up a plan set from scratch utilizing a fully 2D workflow.
4. Create a Layout of Bridge sheet, a Bridge Deck Typical Section and Overhang Detail, a Bent sheet, and a Bent Details sheet in a 3D model-centric workflow.

The topics covered in this class are:

1. Model Types
2. Element Templates
3. Scales
4. Sheet Index
5. Sheet Border
6. Printing
7. Place Named Boundary
8. Section Callout
9. Detail Callout
10. Saved Views
11. Clip Volume

### Target Audience:

This course is designed for Project Development staff, or anyone using the modeling tools for bridge design.

### Pre-Requisites:

- Familiarity with TDOT's design policies, procedures, and standards.
- A working knowledge of Windows 10.
- Completion of the [3D Modeling I \(OBM\) Manual](#) Exercises
- While not required, a review of the [Fundamentals \(ORD\) Manual](#) may be helpful.



## Chapter 2. General Plans Production

The topics in this chapter will discuss the different plans production tools that can be used in the creation of 2D plans with and without a 3D model. A procedure to create plans without a 3D model using a 2D design file is laid out in the latter portion of this chapter. This procedure demonstrates how the built-in plans production tools are used to create the necessary models for an individual sheet.

### 2.1 Objectives

At the conclusion of this chapter, participants will be able to:

1. Use Element Templates to properly access element attributes and cell libraries.
2. Understand how to create, use, and modify saved views in 2D and 3D model-centric plans.
3. Properly adjust scales within a sheet file, to keep text and symbol sizes compliant with TDOT requirements.
4. Understand the process required to set up a plan set from scratch utilizing a fully 2D workflow.

### 2.2: Lecture: General Plans Production Tools and Procedures

Within OBM, there are many tools that are used in the general plans production process—most of which are used regardless of the presence of a 3D bridge model. The tools contained within this section can be used in either a 2D workflow or a 3D model-centric workflow.

#### 2.2.1 Model Management within an OBM File

An OBM dgn file effectively acts as a container which can hold several different models that contain project data. That project data can range from a 3D bridge model to simple linework. Each model within a dgn is a unique component and can be one of the following types: a design model, a drawing model, or a sheet model.

##### 2.2.1.1 Design Model

When an OBM dgn file has been created, generally it will only contain an empty design model, which can be 2D or 3D capable. The design model is where design geometry and all related linework for the plans should be placed and manipulated in a 2D workflow, and it is where a bridge model is created when working in a 3D model-centric workflow.

##### 2.2.1.2 Drawing Model

A drawing model is a 2D model that can either contain a reference to a design model or live linework. The drawing model is used to add annotations and notes to the bridge geometry and details originated in the file's design model. This model is created once all linework for the drawing has been placed in the design model—of course, you can always go back to revise the linework after the drawing model has been created.



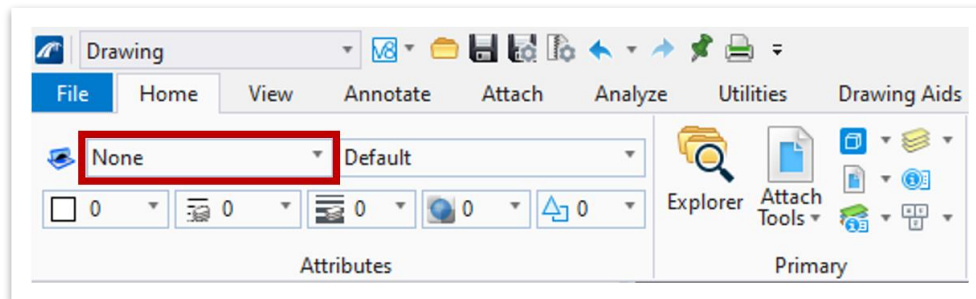
### 2.2.1.3 Sheet Model

A sheet model is a 2D model that contains the sheet border with all project information and houses the references to one or more drawing models that make up a plan sheet. When creating a sheet model within the TDOT workspace and with a TDOT seed file, a TDOT-specific sheet border will be automatically be populated within the file.

### 2.2.2 Element Templates

Element Templates are used to manage CADD standards by setting the symbology (level, color, line style, line weight, cell linkage, etc.) for all CADD objects. When using drawing tools in a 2D or 3D workflow, all standard TDOT levels can be accessed through the **Element Templates** found by navigating to **Drawing (Workflow) >> Home >> Attributes >> Element Template** (Figure 1).

FIGURE 1. ELEMENT TEMPLATES DROP-DOWN



By selecting the appropriate Element Template, all associated attributes will automatically populate. For example, as shown in Figures 2 and 3 on the following page, if the **Structures Object** element template is accessed and selected under the **2D Plans** folder in the **Structures** templates, the correct level, line style, and line weight are all automatically selected. All necessary properties used for TDOT bridge plans can be found within the **Structures** template folder.



FIGURE 2. 2D PLANS ELEMENT TEMPLATES

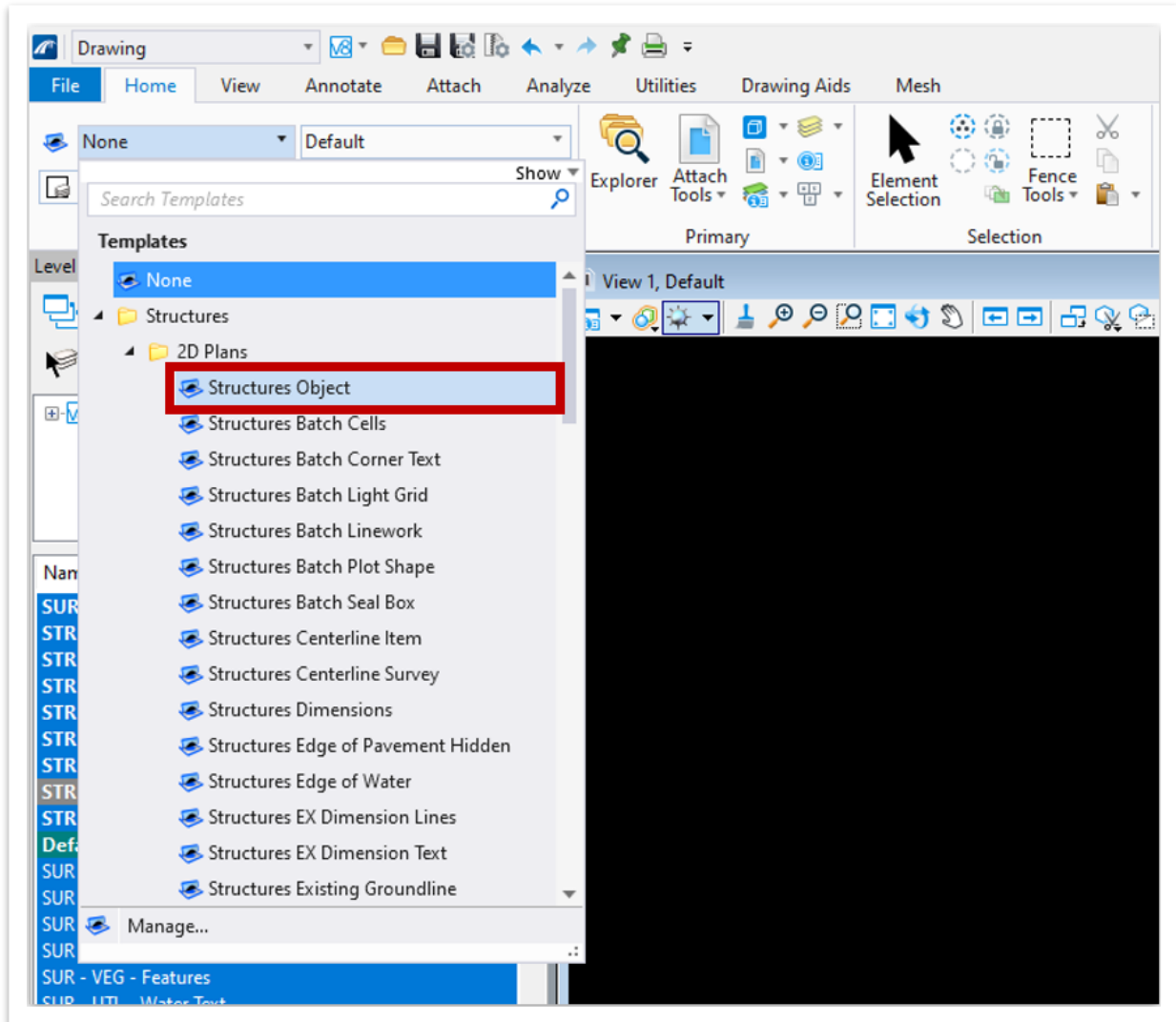
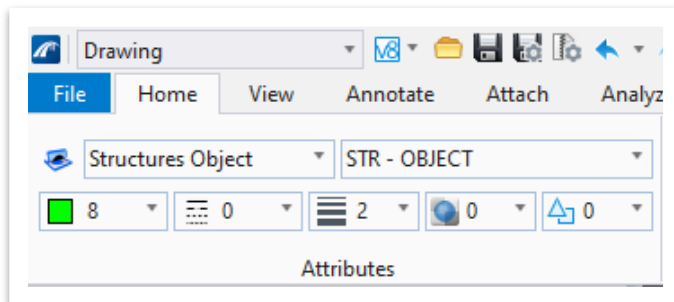


FIGURE 3. ATTRIBUTES GROUP



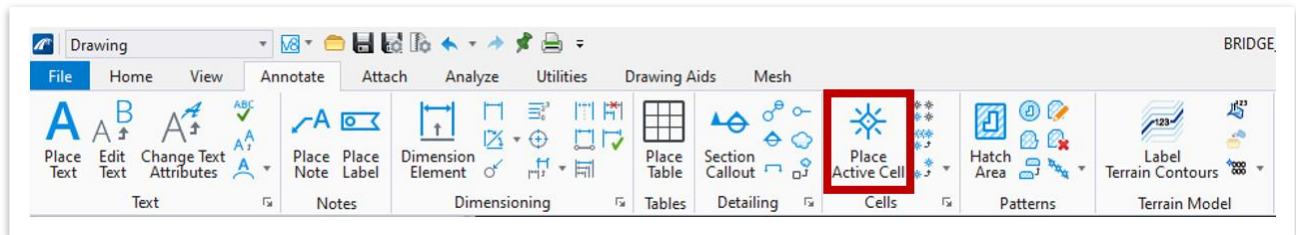




### 2.2.3 Cell Placement

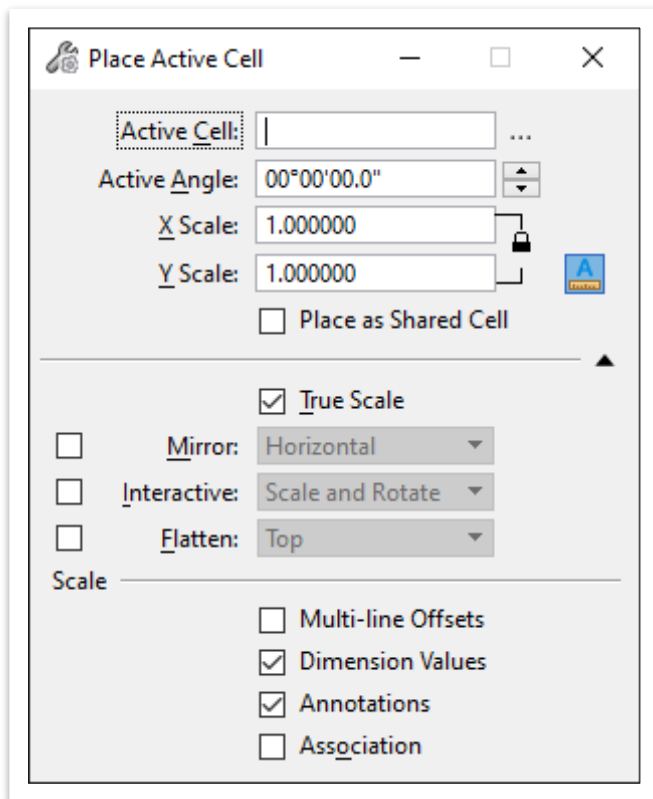
If any cells are needed within a particular drawing, they can be placed in the file by navigating to **Drawing (Workflow) >> Annotate >> Cells >> Place Active Cell** (Figure 4).

FIGURE 4. PLACE ACTIVE CELL TOOL



After clicking on the tool, the **Place Active Cell** window will open. No active cell should be selected yet, as shown in Figure 5.

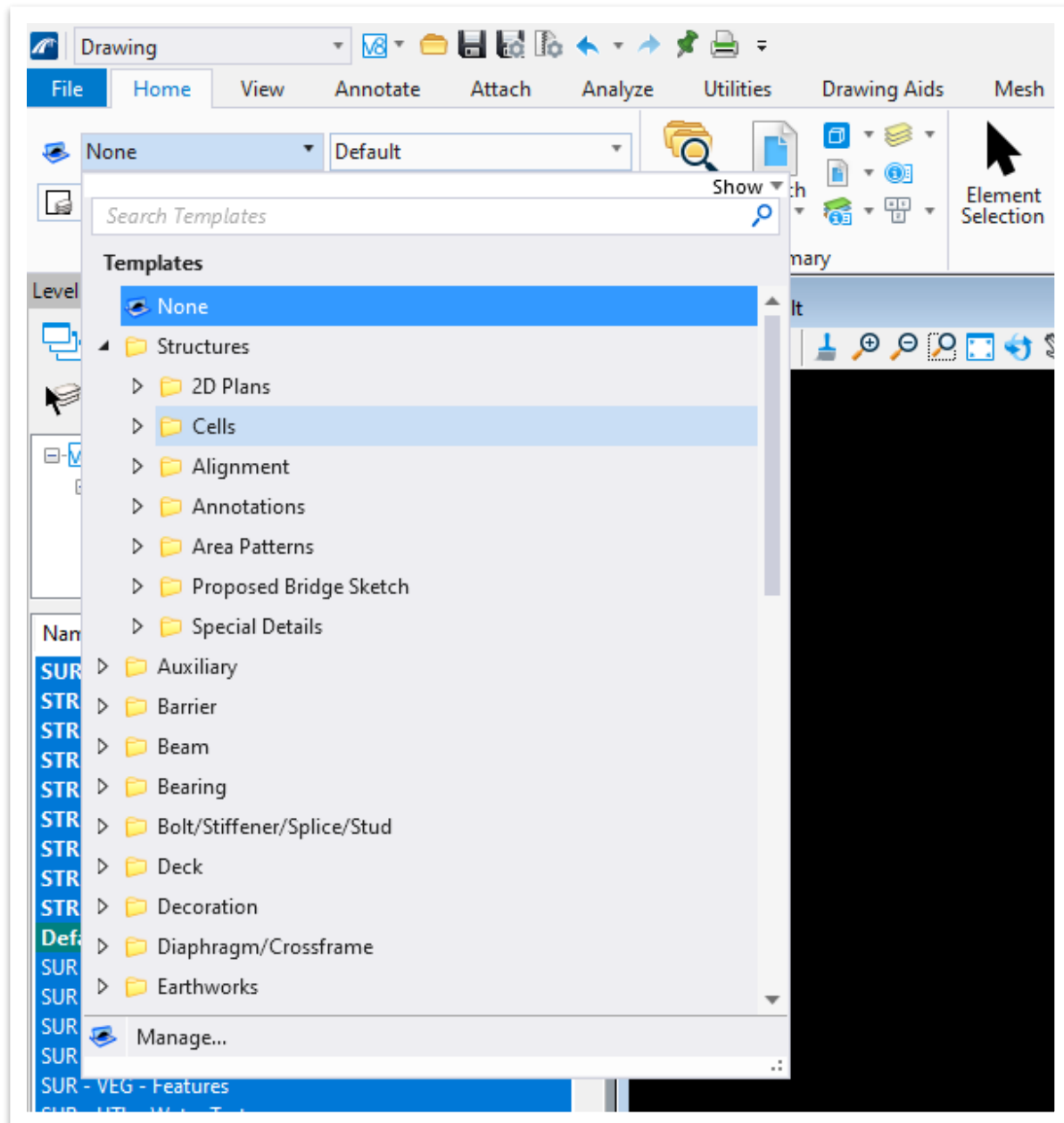
FIGURE 5. PLACE ACTIVE CELL WINDOW





All TDOT Structures cells can then be accessed through the previously discussed **Element Templates**. By using the element templates, all cells are assigned the proper level, line style, etc. and will be placed at the scale selected at the beginning of the exercise. Additionally, accessing cells through this method removes the need to open multiple cell libraries to locate a necessary cell since they can all be found within the element templates. To locate structures cells within the **Element Templates** drop-down, navigate to the **Structures >> Cells** subfolder (Figure 6).

FIGURE 6. TDOT CELLS ELEMENT TEMPLATE LOCATION





Click on whichever cell is desired, and the cell will then populate in the **Active Cell** field of the **Place Active Cell** window. In Figure 7, the **Arrow** cell has been chosen and is ready for placement as soon as the element template is selected, as shown in Figure 8 on the next page.

FIGURE 7. TDOT CELL SELECTION

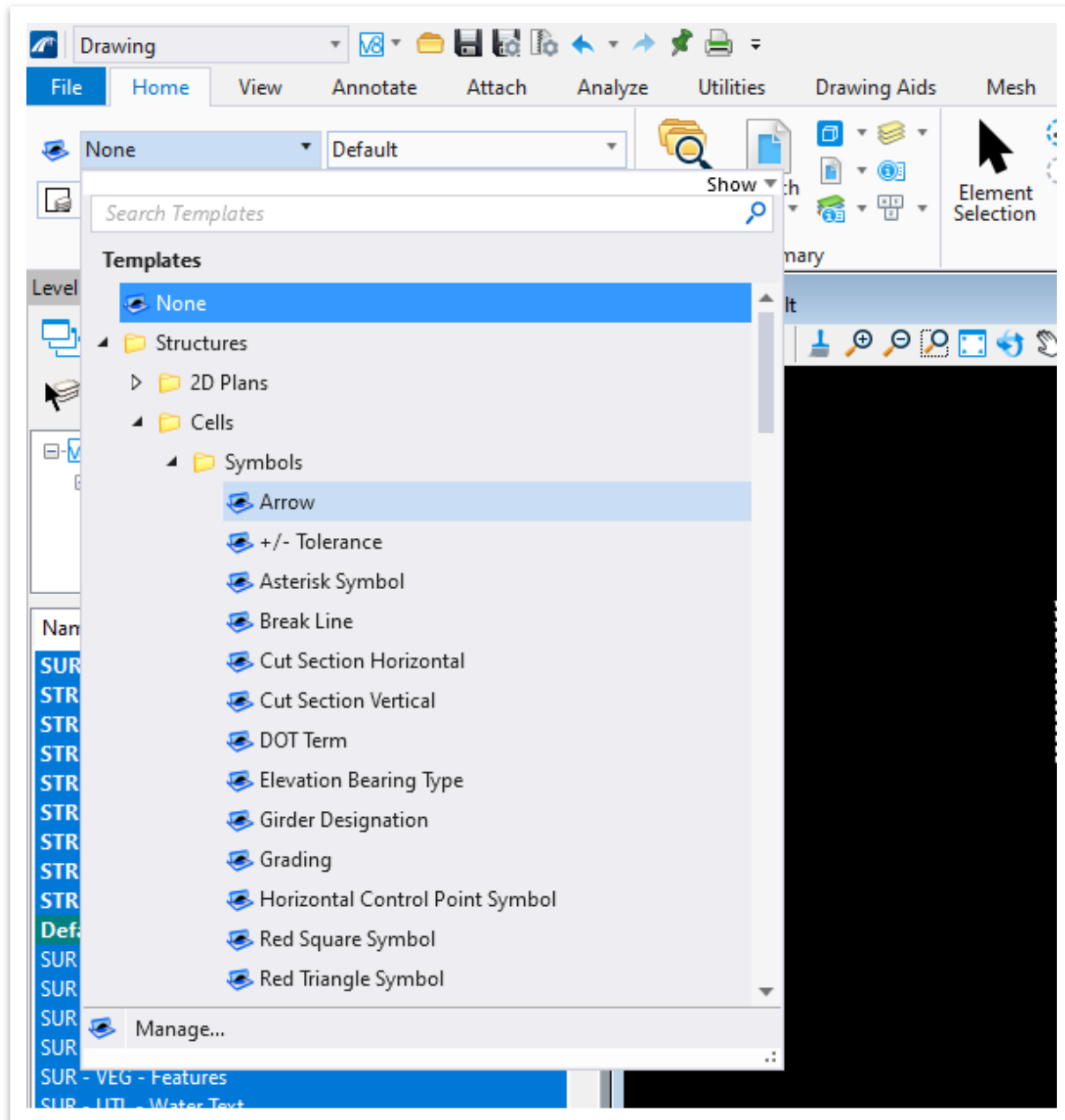
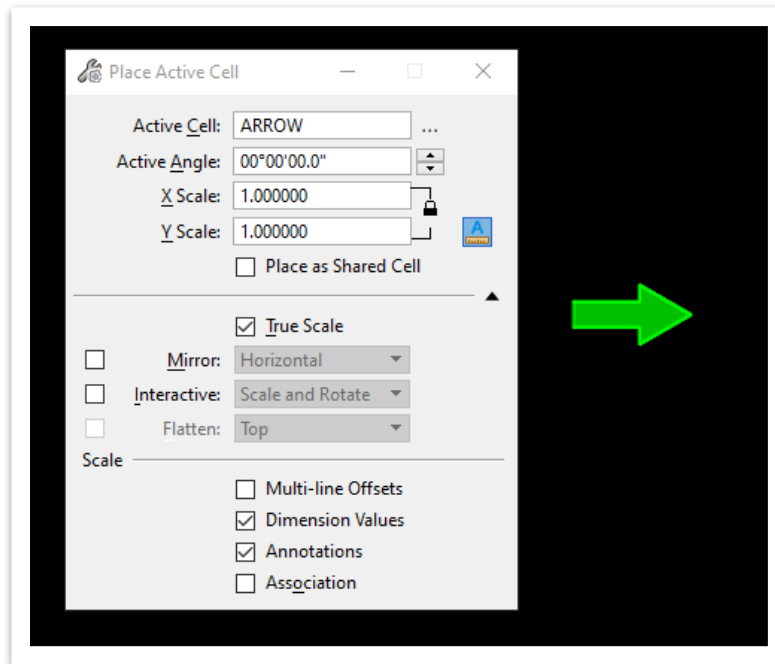




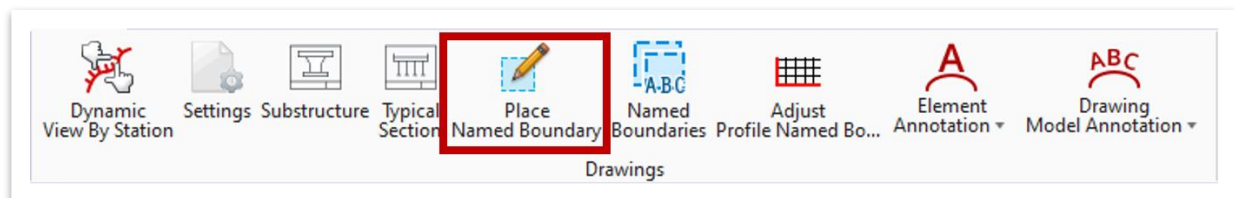
FIGURE 8. CELL SELECTED IN PLACE ACTIVE CELL WINDOW



### 2.2.4 Place Named Boundary

In both 2D and 3D plans production, the **Place Named Boundary** tool is useful when creating the different views typically used in plans. This tool is used to create a boundary (or multiple boundaries, depending on the method selected) for a planar dynamic view of a 2D drawing or 3D model. Additionally, it streamlines the process of incorporating that dynamic view into a drawing model and sheet model. The tool can be accessed from the **OpenBridge Modeler (Workflow) >> Reports and Drawings >> Drawings >> Place Named Boundary**. It is also found in the **View** tab of the **Reality Modeling** and **Drawing** workflows (Figure 9).

FIGURE 9. PLACE NAMED BOUNDARY TOOL LOCATION



While flexible for use with both 2D and 3D workflows, the **Place Named Boundary** tool has some options that can be more conducive to one workflow over another. For example, when working in a fully 2D workflow, civil data may not be present in a model. In this case, boundaries can be placed manually by using any of the last four options.



From left to right these options are as follows:



1. **By Element:** The user selects an existing element as a boundary.
2. **By 2 Points:** The user selects two points (top left and bottom right) that define the limits of a rectangular boundary. *This is the most straightforward and preferred method of boundary placement in a 2D workflow.*
3. **By Polygon:** The user clicks several points to create a non-uniform multi-sided closed shape as a boundary. The boundary must contain at least three sides.
4. **By Length:** The user selects a path element (typically a line or arc) along which to place a boundary. Then a boundary length, left offset, and right offset must be defined.

The manual boundary placement options may also be used in a 3D model-centric workflow. However, because civil data must be present for a 3D model, the civil options are better alternatives and are designed to place one or more named boundaries. The following options from left to right are available for use with civil geometry:



1. **Civil Plan:** The user selects a horizontal alignment with which to associate the named boundary. A TDOT custom drawing seed should be selected along with a detail scale. Boundary length, left offset, and right offset are predefined but may be changed. *This is the preferred method of boundary placement for plan views of a 3D bridge model.*
2. **Civil Plan By Element:** The user selects a horizontal alignment with which to associate the named boundary, along with an existing element as a boundary for a plan view. A TDOT custom drawing seed should be selected along with a detail scale.
3. **Civil Profile:** The user selects an alignment's vertical profile with which to associate the named boundary. A TDOT custom drawing seed should be selected along with a detail scale. Users can either select the boundary limits from an existing civil plan boundary or by explicit station definitions. *This is the preferred method of boundary placement when constructing elevation views of a 3D bridge model.*



4. **Civil Cross Section:** The user selects a horizontal alignment with which to associate the named boundaries. Left and right offsets and intervals must be defined. This tool can create multiple cross sections along a defined alignment. However, no TDOT drawing seeds have been created for this option as it is not the preferred tool when creating bridge cross sections. The **Section Callout**, which will be discussed and used later in this manual, and the **Dynamic View by Station** tools are generally more useful for bridge cross sections.
5. **Civil Cross Section By 2 Points:** The user selects a horizontal alignment with which to associate the named boundary. Click a point on either side of the selected alignment to form a line that crosses the alignment and create a cross section. Like the previous cross section option, no TDOT drawing seeds have been created for this option as it is not the preferred tool when creating bridge cross sections.

**Take Note!**

*The civil options within **Place Named Boundary** tool used in 3D model-centric plans require more inputs than the simpler manual options used in the 2D workflow. Step-by-step exercises demonstrating the full capability of the civil options are included in [Chapter 3](#) of this manual.*

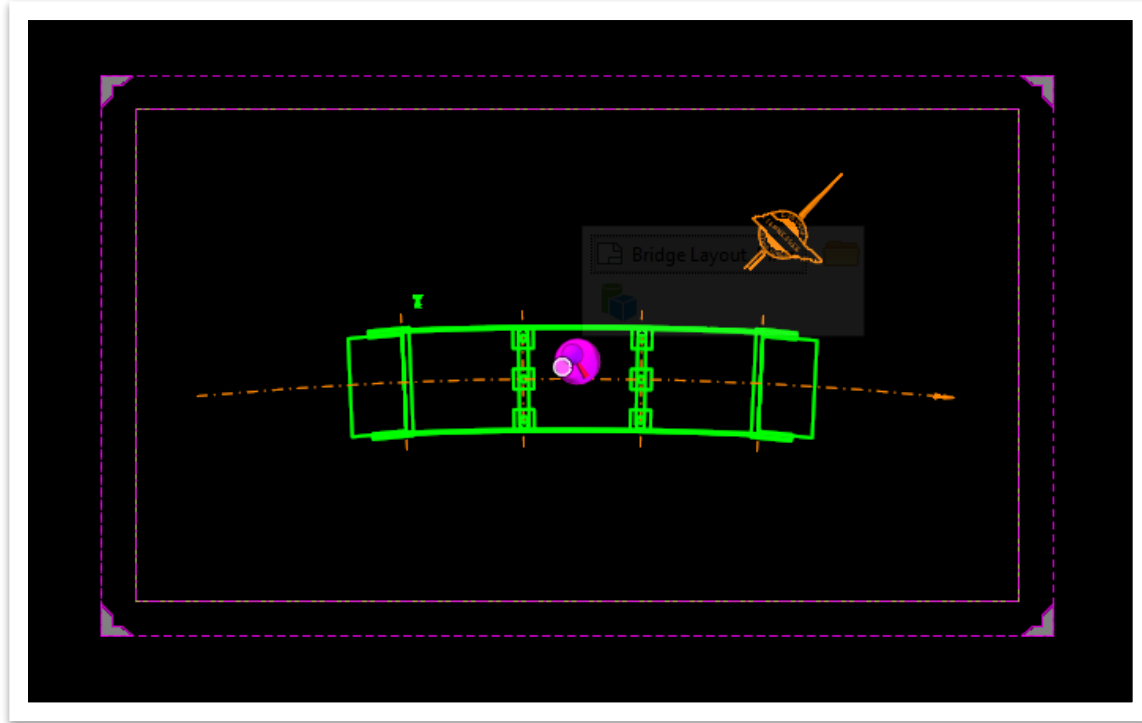
### 2.2.5 Saved Views

Saved Views are planes or volumes that dynamically capture an area within a model space (2D or 3D) and are essential in the plans production process. Once created, these views can be used within drawings that are annotated like any basic drawing. While they can be manually created by navigating to **View >> Saved Views >> Create Saved Views**, the most automated and intuitive way to set up saved views is through the various detailing tools. Working on TDOT plans, these views will most commonly be created by using the **Place Named Boundary** tool or **Section Callout** tools.

As discussed in the previous section, the **Place Named Boundary** tool creates a planar 2D saved view of its subject, as shown in Figure 10 on the following page.

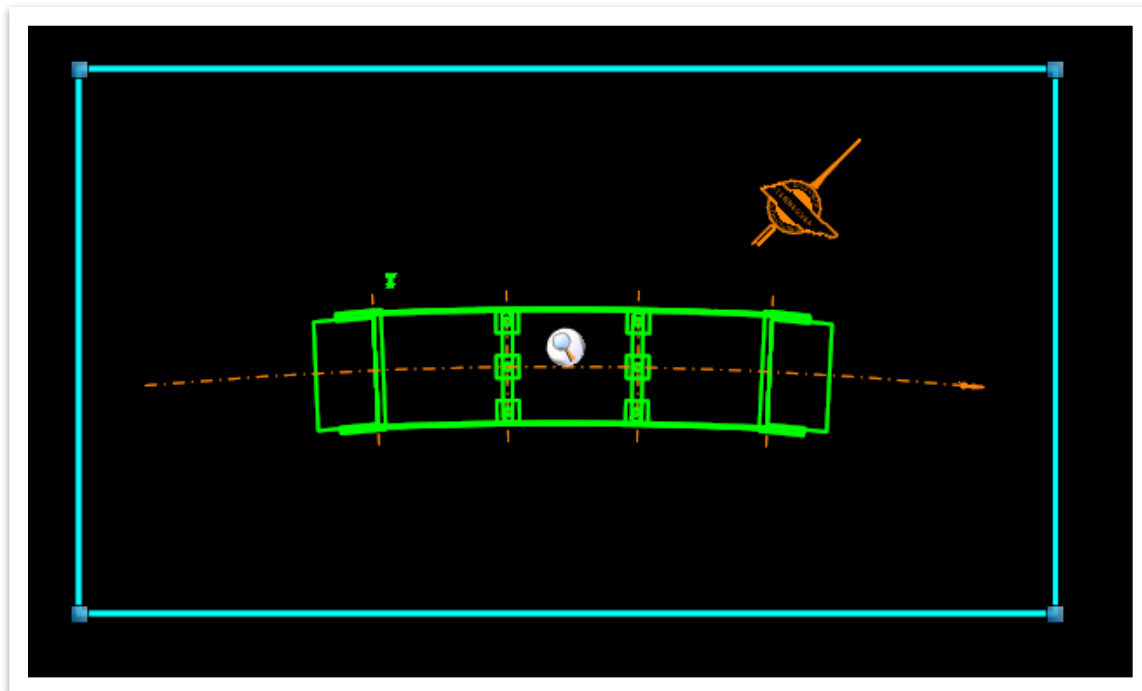


FIGURE 10. SAVED VIEW USING PLACE NAMED BOUNDARY TOOL



The limits of the 2D view can be manipulated by simply clicking on the boundary, and moving the blue nodes in whatever direction is desired. The boundary limits are shown as selected in Figure 11 below.

FIGURE 11. BOUNDARY LIMITS SELECTED





Because this saved view is dynamic, any shifting of the view's limits that cuts off a piece of the linework will remove that portion from view in the associated drawing model. This is demonstrated in Figures 12 and 13.

FIGURE 12. DESIGN MODEL SAVED VIEW LIMITS MODIFIED

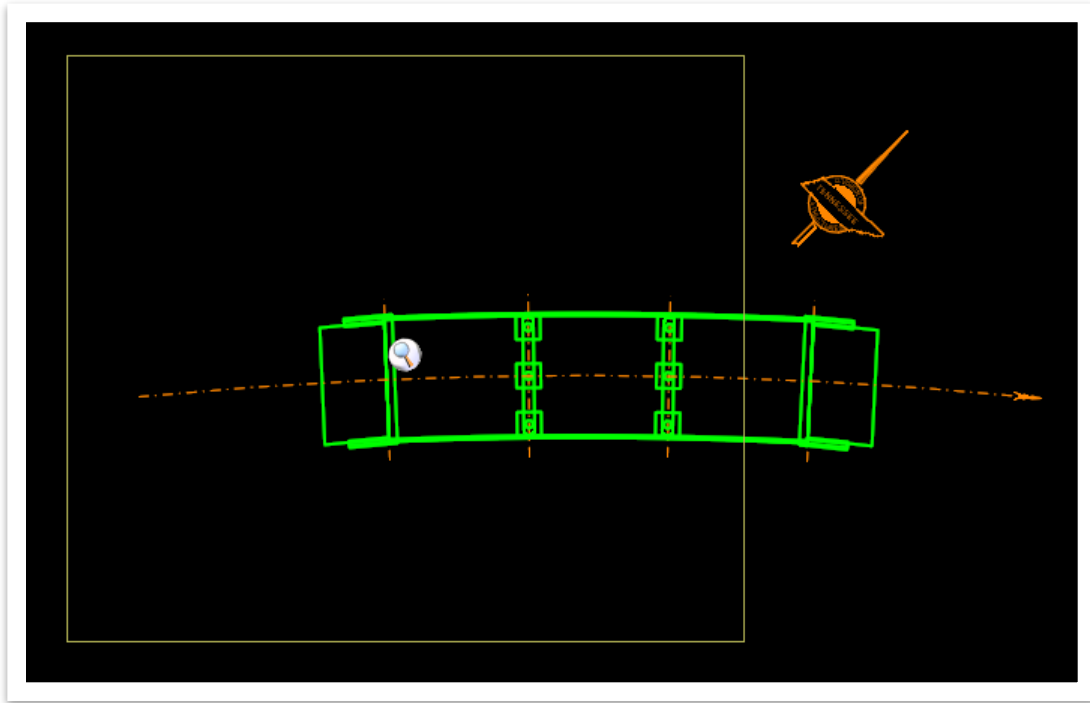
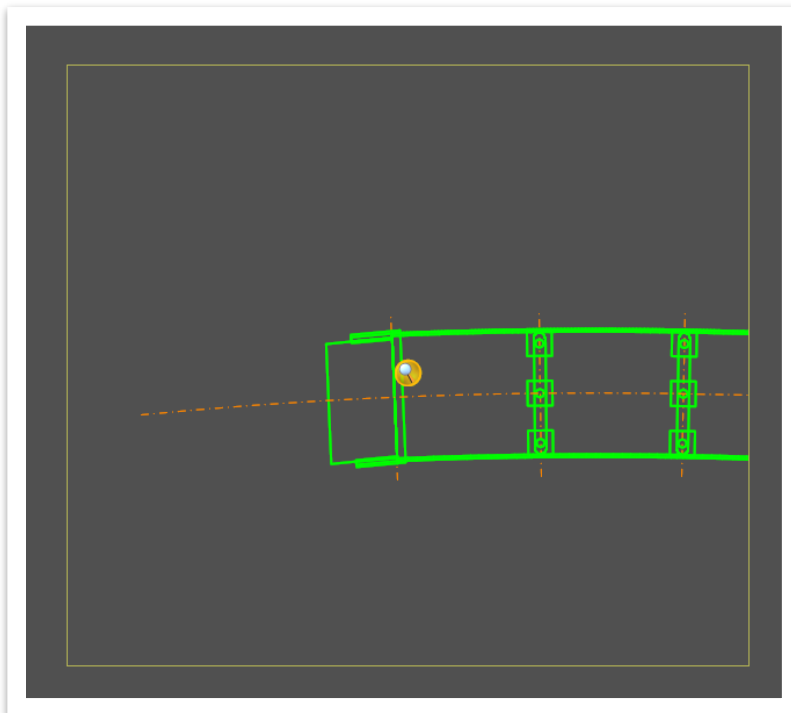


FIGURE 13. ASSOCIATED DRAWING MODEL

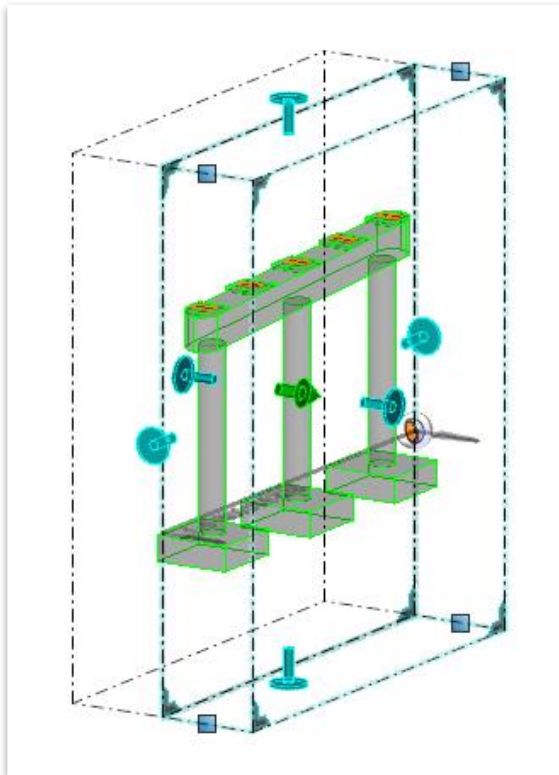






When using the **Section Callout** tool, a Saved View is created from a 3D clip volume around the specified limits of the callout, as shown below. Much like the 2D saved views, the limits of the 3D clip volumes can be manipulated easily by clicking on any of the blue handles and moving it to the desired location. These limits and handles are shown in Figure 14. Clip volume limits can also be numerically set or adjusted in the clip volume properties.

FIGURE 14. CLIP VOLUME LIMITS AND HANDLES



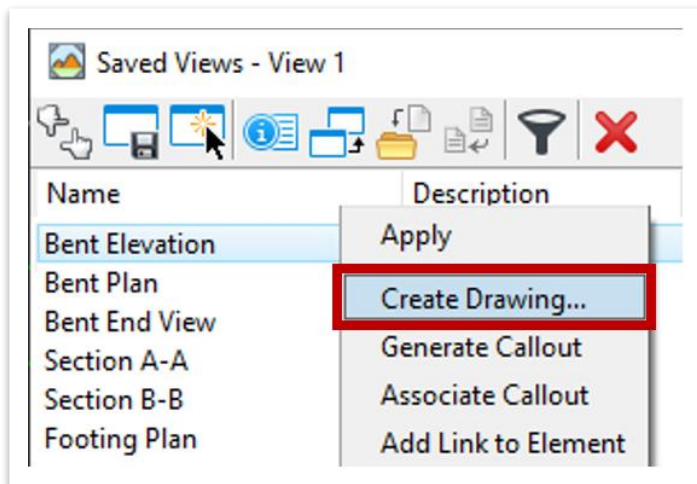


Existing saved views can be accessed in the **Saved Views** window by navigating to **Drawing (Workflow) >> View >> Saved Views >> More** (Figure 15). Once in the **Saved Views** window, the existing saved views can be used to generate drawings by selecting the desired view, right clicking, and selecting **Create Drawing** (Figure 16). This will open the **Create Drawing** window for drawing and sheet model creation.

FIGURE 15. SAVED VIEWS GROUP



FIGURE 16. SAVED VIEWS WINDOW





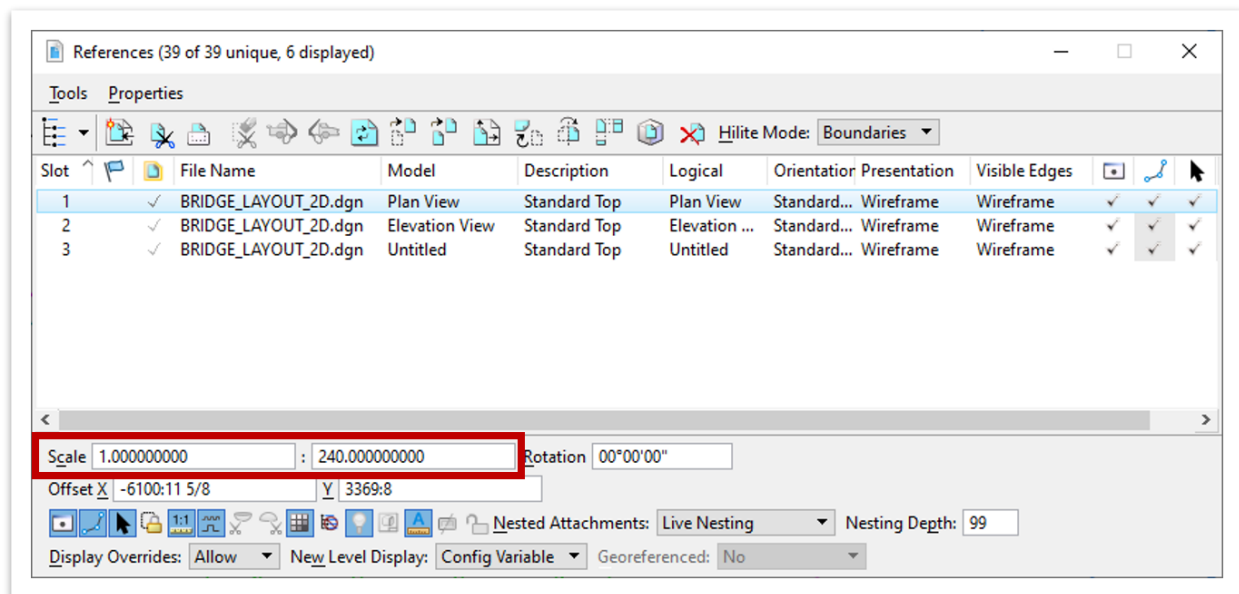
## 2.2.6 Adjusting Scales

The active scale for the design model is set to 1. The TDOT OBM workspace is set up such that all sheet seed files have been created with a 1:1 scale for 34" by 22" sheets. The software then relies on this 1:1 scale relationship to allow the user to set an appropriate scale by scaling up the geometry and annotations in the sheet model.

Even after a drawing or sheet model has been created with a specific scale in mind, the scale can always be adjusted, as necessary. To do this the scale must be adjusted in two locations. First the user must identify the appropriate reference detail scale for the drawing model in the sheet model. Then, the annotation scale used in the drawing model must be updated to match to ensure text sizes and linework appear to scale when printed from the sheet model.

Changing the reference detail scale for the drawing model in the sheet model changes the apparent size of the drawing model in relation to the sheet model border. While the scale for a selected/highlighted reference is shown and editable in the **References** window, as shown in Figure 17, the best practice for changing a detail scale is through the reference's settings.

FIGURE 17. REFERENCE DETAIL SCALE WITHIN REFERENCES WINDOW



By changing the detail scale in the settings, the user can select standard scales without having to calculate it. As shown in Figure 18 on the following page, the settings for a reference can be accessed by right clicking on the reference and selecting **Settings**. This opens the **Attachment Properties** window shown in Figure 19 on the following page, where the scale can be chosen from the **Detail Scale** drop-down.



FIGURE 18. ACCESS REFERENCE SETTINGS

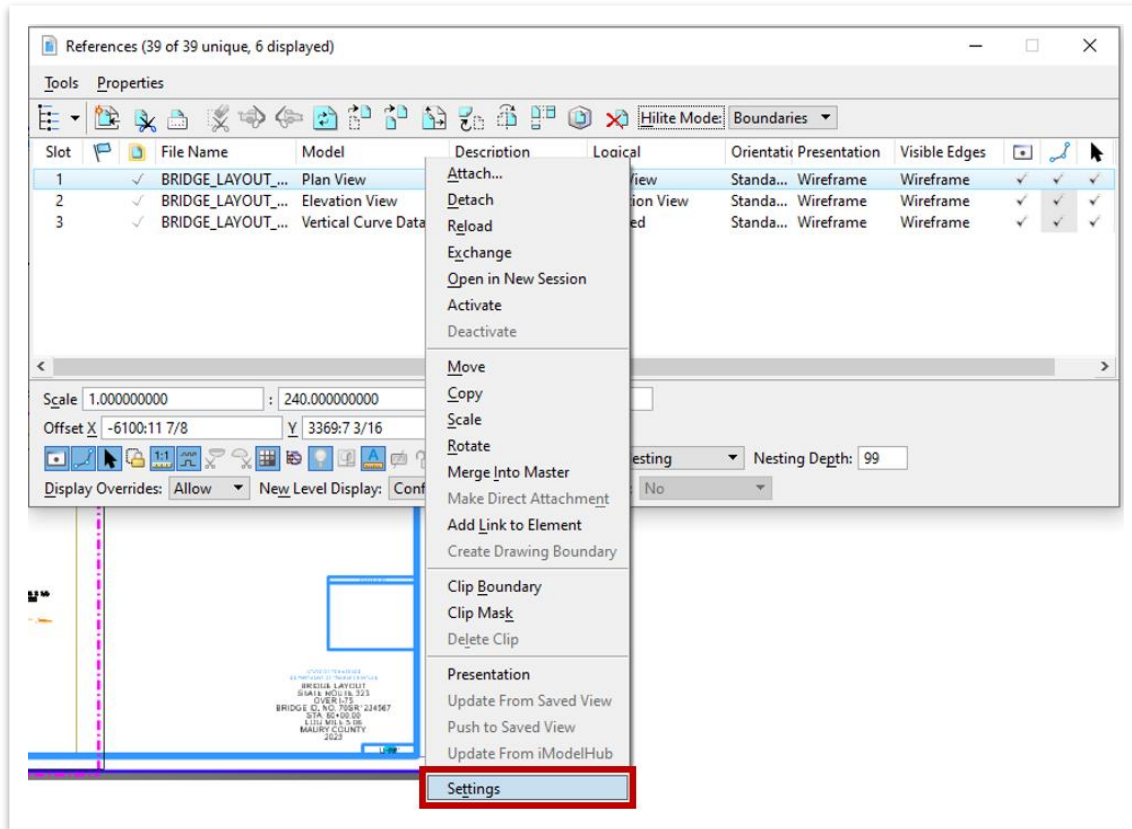
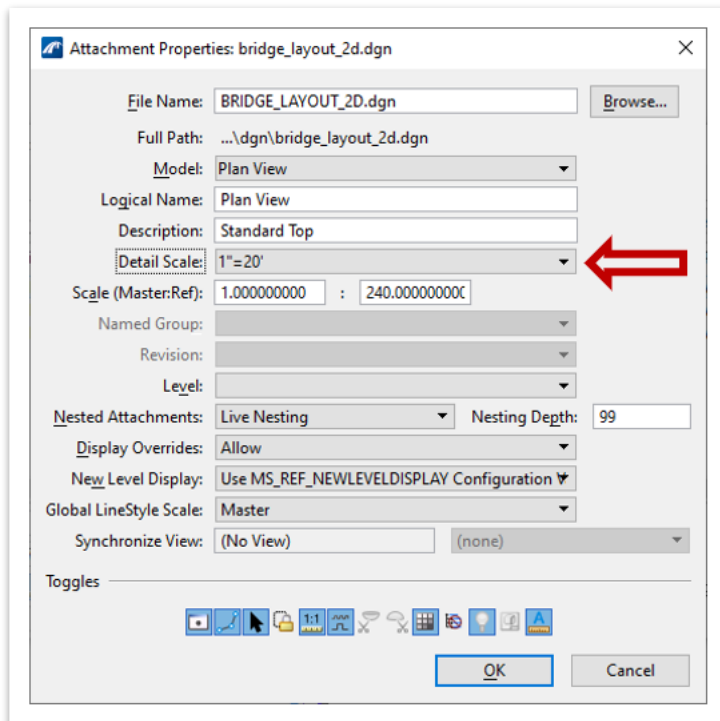


FIGURE 19. CHANGE THE DETAIL SCALE





Once a reference detail scale has been changed within the sheet model, the drawing model’s annotation scale must then be adjusted to match the desired reference detail scale. This can be found and adjusted in the **Model Properties** for the drawing model. Updating the drawing model annotation scale will automatically adjust the text and symbols to TDOT requirements. See Figures 20 and 21 for how to access the **Models** window and the **Model Properties**. See Figure 22 on the following page for how to adjust the drawing model annotation scale.

FIGURE 20. ACCESS THE MODELS WINDOW

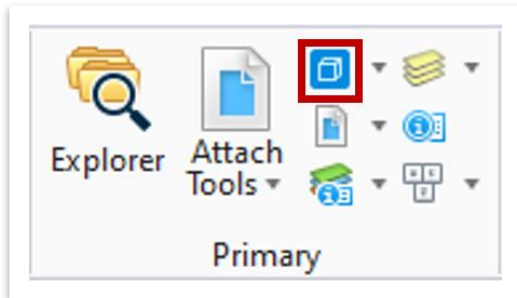


FIGURE 21. ACCESS THE MODEL PROPERTIES

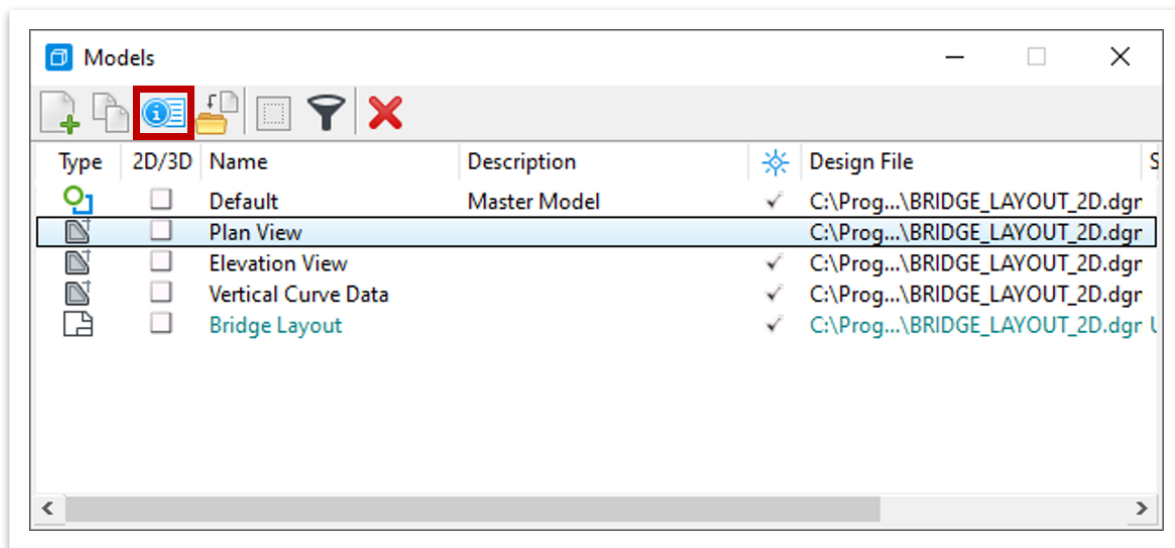
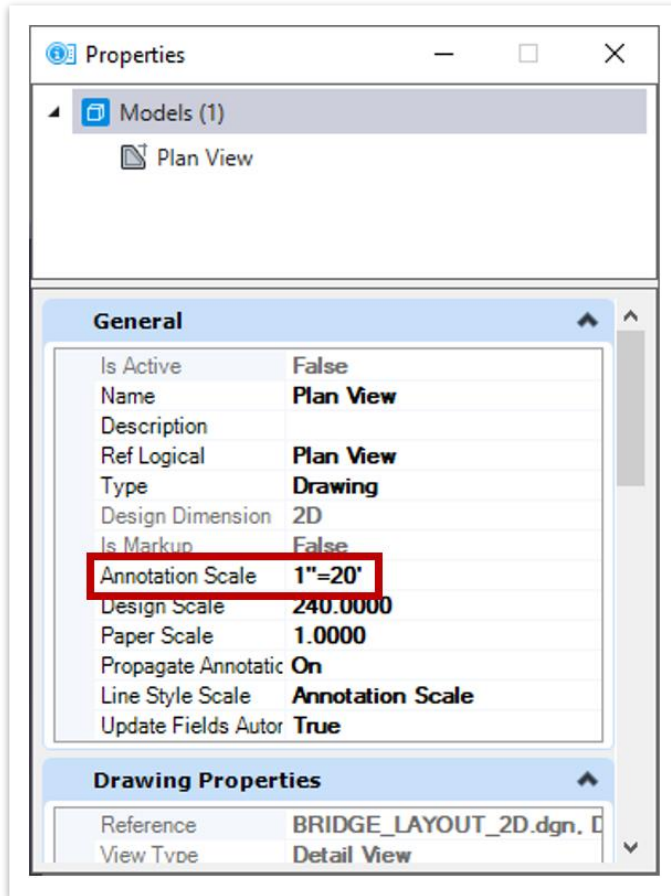




FIGURE 22. CHANGE DRAWING MODEL ANNOTATION SCALE IN MODEL PROPERTIES



**Take Note!**

Regardless of what the detail scale of drawing is, the sheet model annotation scale should always be set as **Full Size 1=1** to ensure that the text for selected drawing annotation scale comes through correctly.



## 2.2.7 Sheet Index

For any given WorkSet, a **Sheet Index** acts as a central location to house all plan sheet models created in OBM. The three primary uses of a sheet index are to add/remove sheets to a set of plans, to modify sheet index properties that control sheet border information, and to print several sheets at once. The process of adding and removing sheets will be covered in this section, while the latter two uses will be discussed in the two upcoming sections.

Sheet indices can be accessed within **Explorer** tool (Figure 23). Once the **Explorer** window is open, the sheet index for the file's associated WorkSet can be found in the **Sheet Index** tab (Figure 24).

FIGURE 23. EXPLORER

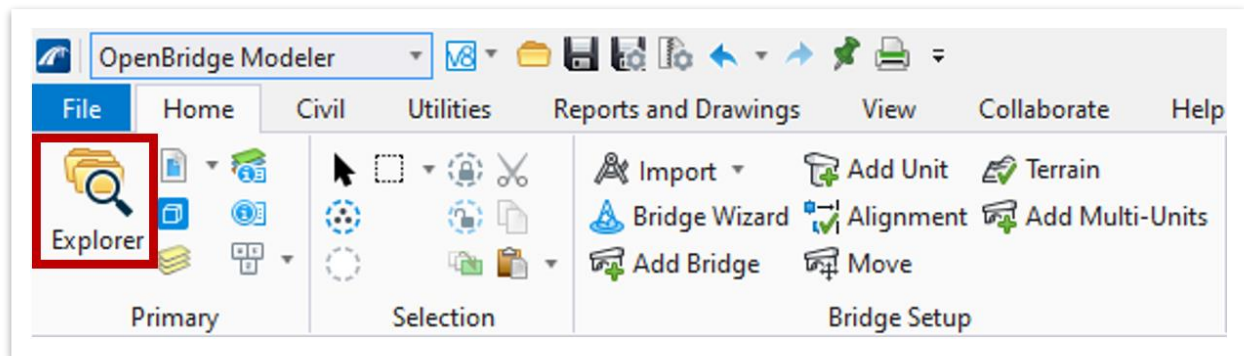
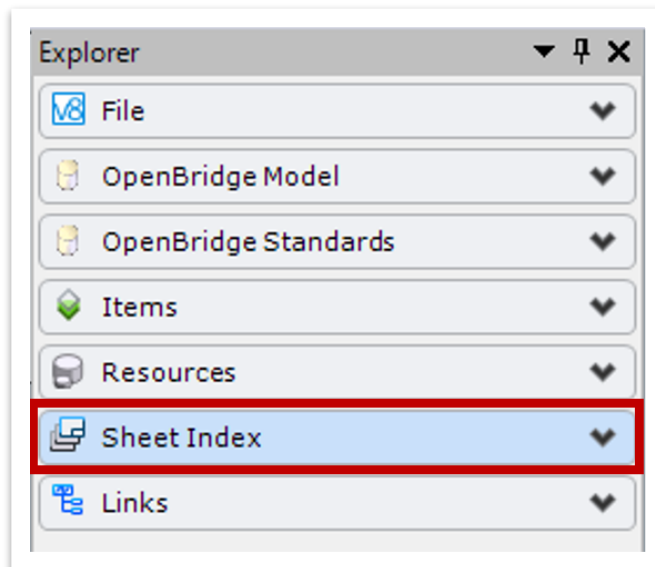


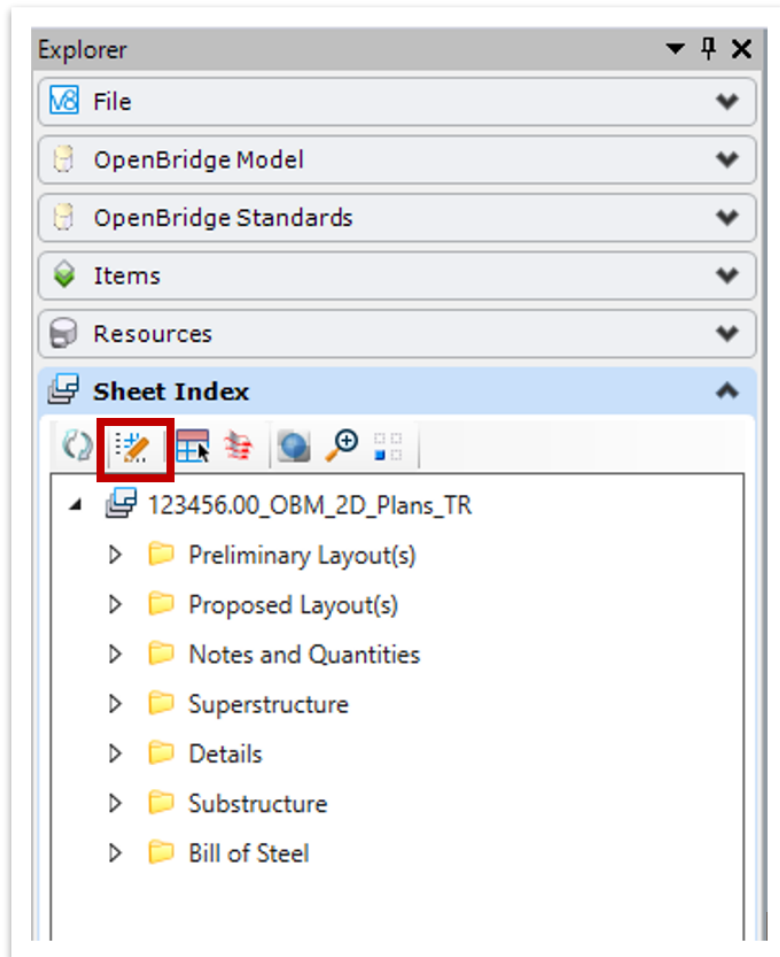
FIGURE 24. LOCATION OF SHEET INDEX





By default, the sheet index is locked in **Read Only** mode whenever a file is opened. Therefore, to manage and make edits to the sheet index, it must be opened within the **Explorer** window by clicking the **Open Sheet Index for Edit** button shown in Figure 25 below.

FIGURE 25. OPEN SHEET INDEX FOR EDITING

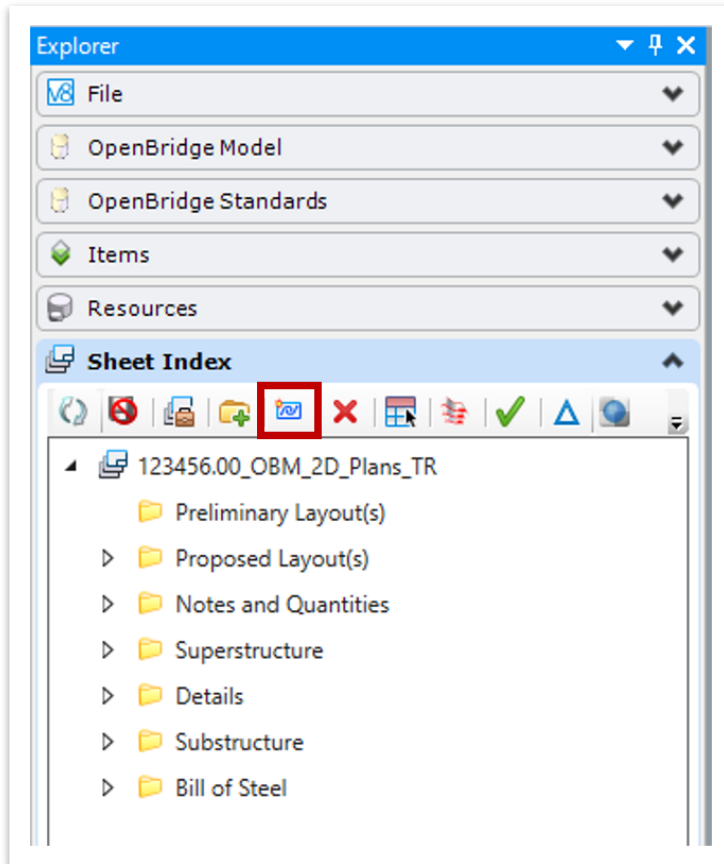






Specific sheet models can now be added to the index by clicking on the **Add Sheet** button (Figure 26).

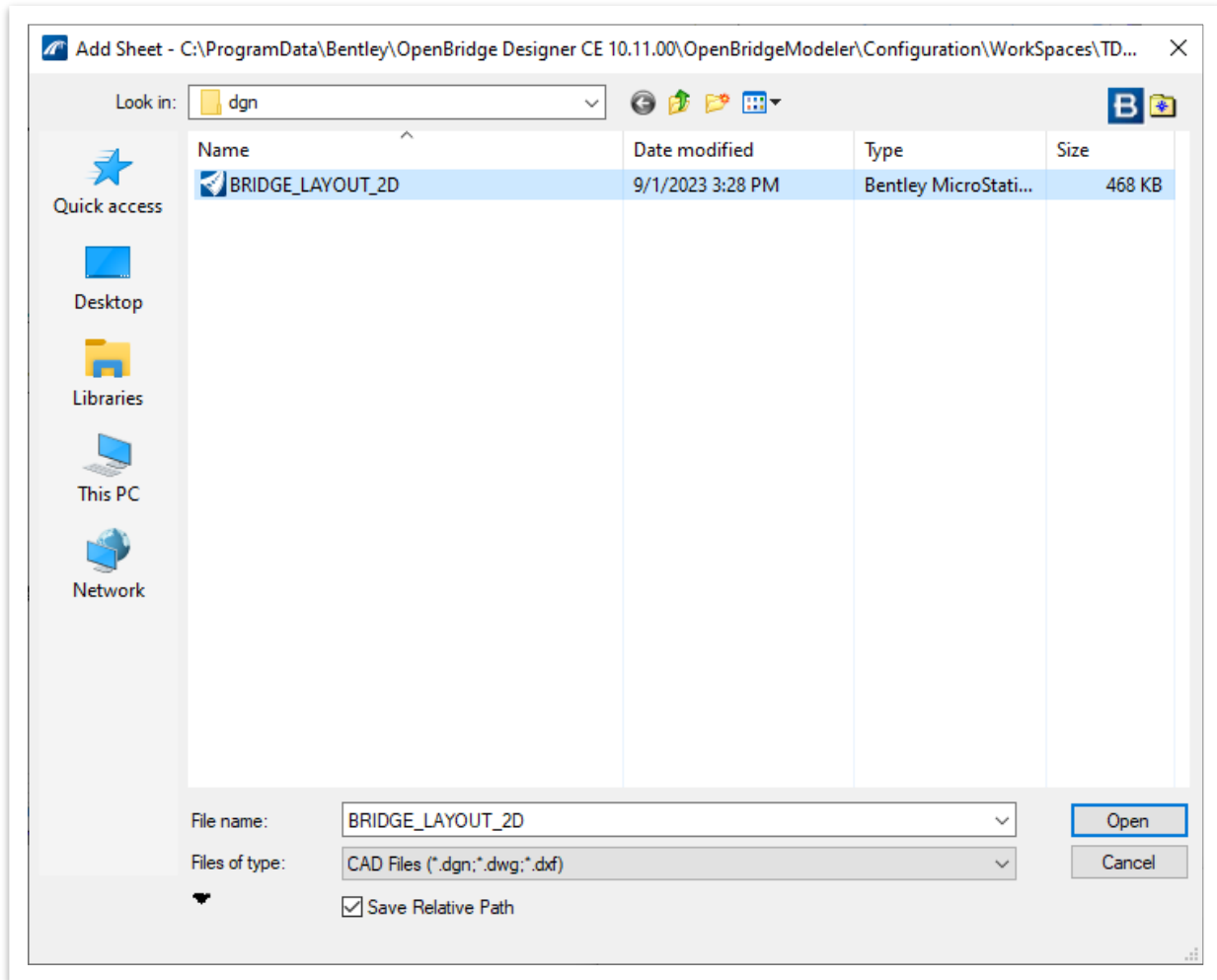
FIGURE 26. ADD SHEET TO SHEET INDEX





Here the user is prompted to open the file that is to be added to the sheet index (Figure 27). For this example, the **BRIDGE\_LAYOUT\_2D.dgn** file is selected.

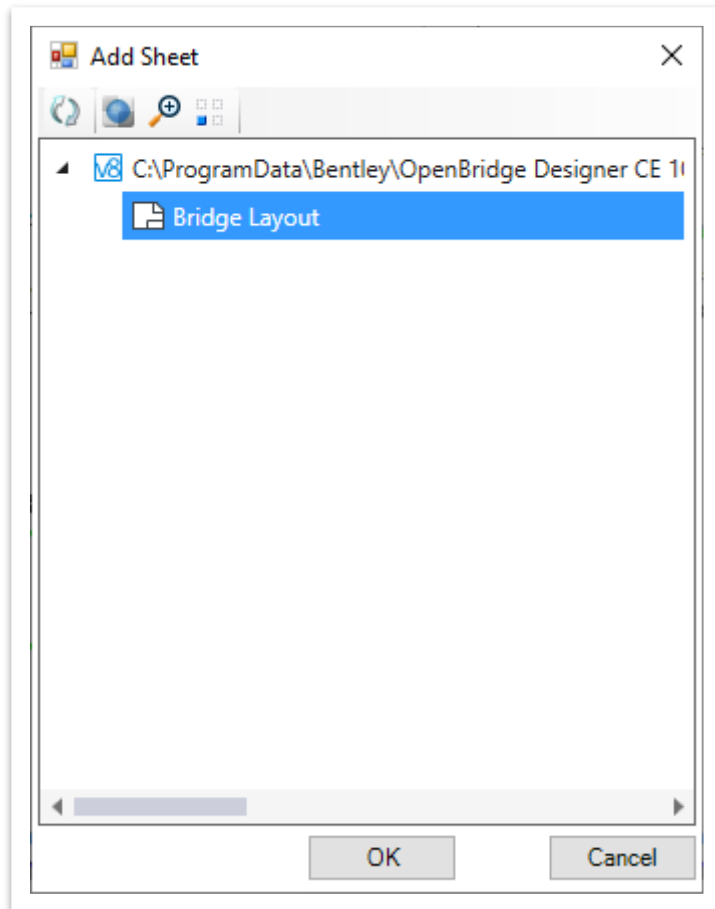
FIGURE 27. SELECT THE FILE TO BE ADDED TO THE SHEET INDEX





After clicking **Open** for the selected file, an additional **Add Sheet** window will open. Because several sheet models can reside within a file, the user must choose the specific sheet model that is desired and click **OK** (Figure 28). Multiple sheet models can be selected and added to the sheet index at the same time, if needed.

FIGURE 28. SELECT SHEET MODEL

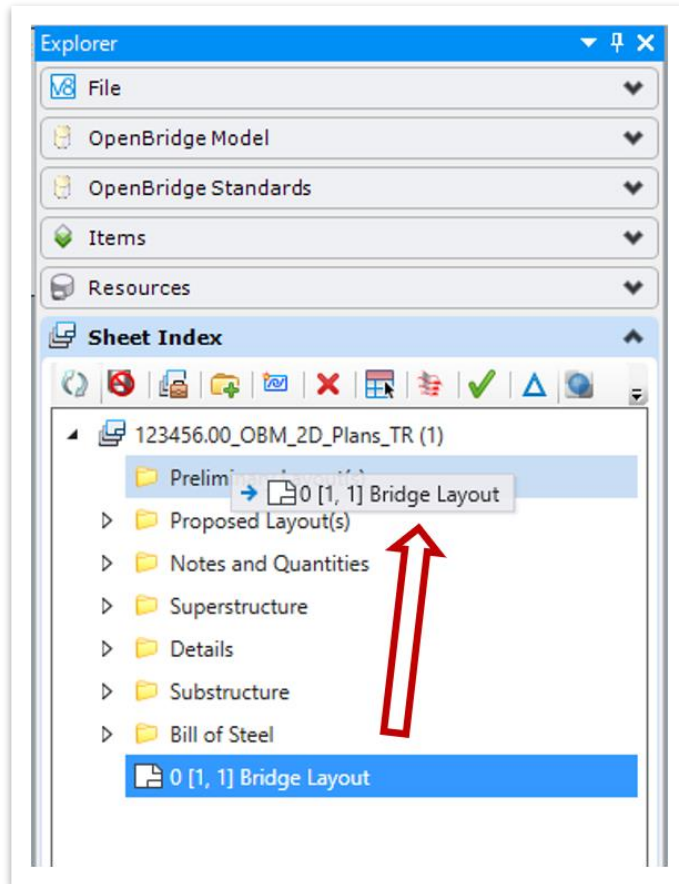
**Take Note!**

*When seeking to add a file to the sheet index, only sheet models will be made available. Even though a design and drawing model may be present within a file, they cannot be selected for inclusion in a sheet index.*



To organize and group the sheets within the sheet index, a sheet can simply be dragged and dropped into one of the plan set subfolders provided (Figure 29).

FIGURE 29. MOVE SHEET TO PLAN SET SUBFOLDER

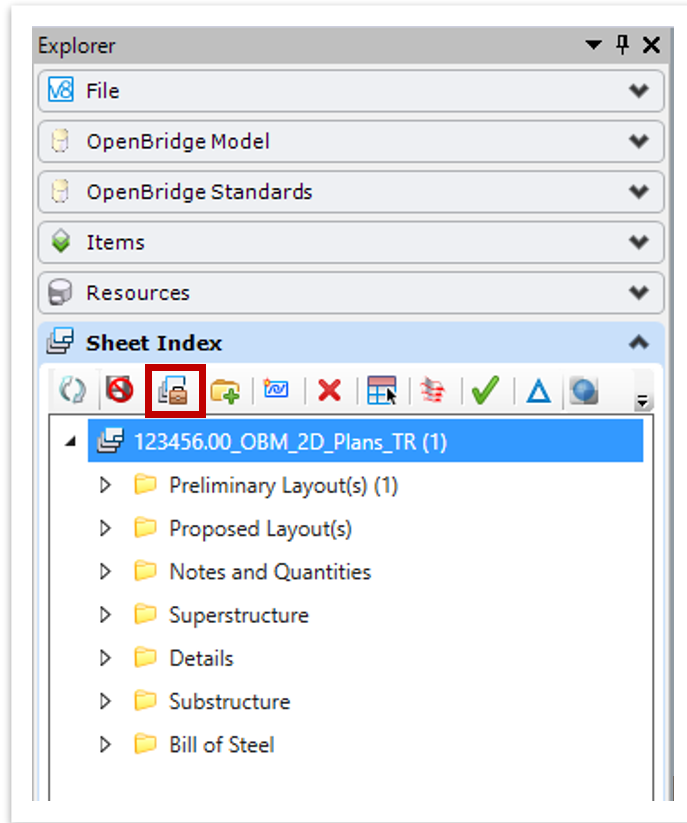


### 2.2.8 Sheet Borders

Within the sheet model, a TDOT standard sheet border is included. This border uses data fields controlled by custom sheet index properties to populate necessary information for the project, such as the project's location, Construction #, and PIN #. These sheet index properties can be accessed and modified by clicking the **Manage Sheet Index** button in the **Sheet Index** tab of the **Explorer** window, as shown in Figure 30 on the next page.

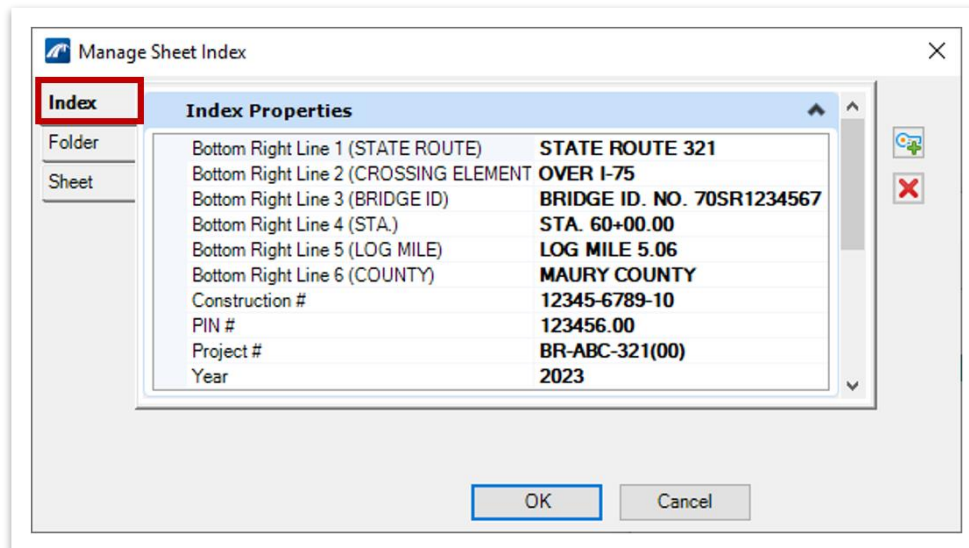


FIGURE 30. MANAGE SHEET INDEX



The majority of the project data can be found and edited in the **Index** tab (Figure 31). There the user will find data fields to input bridge location information, construction/contract information, and the year. This information will propagate through to the borders of all the sheet models included in the sheet index.

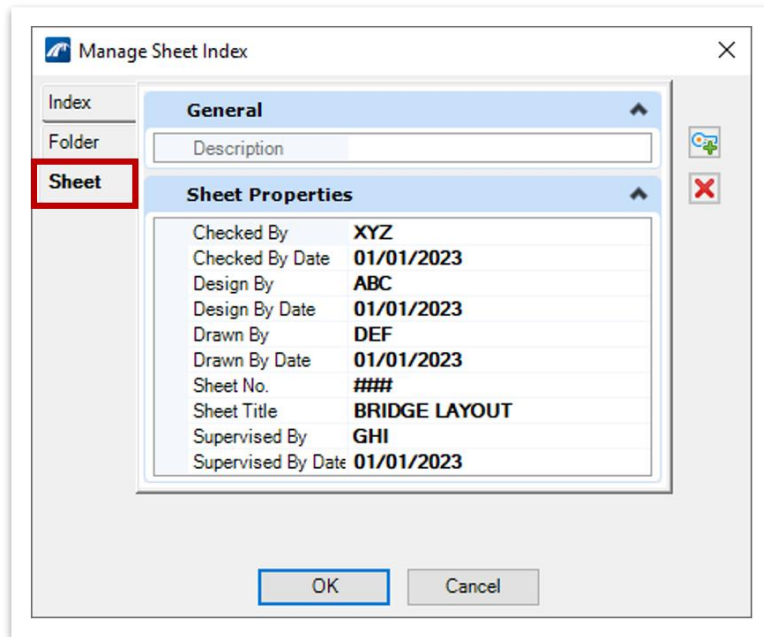
FIGURE 31. INDEX PROPERTIES





To edit the sheet title and designer/checker information of an open sheet, access the **Sheet** tab and update the data fields (Figure 32). Because these are sheet properties and not index properties, these data fields will not be included in other sheets within the sheet index and will only apply to the file that is open at the time.

FIGURE 32. SHEET PROPERTIES



After clicking **OK** in the **Manage Sheet Index** window, all data fields will update. For this example, the project information within the border can be seen in Figure 33 below and Figure 34 on the following page.

FIGURE 33. TOP RIGHT OF SHEET BORDER

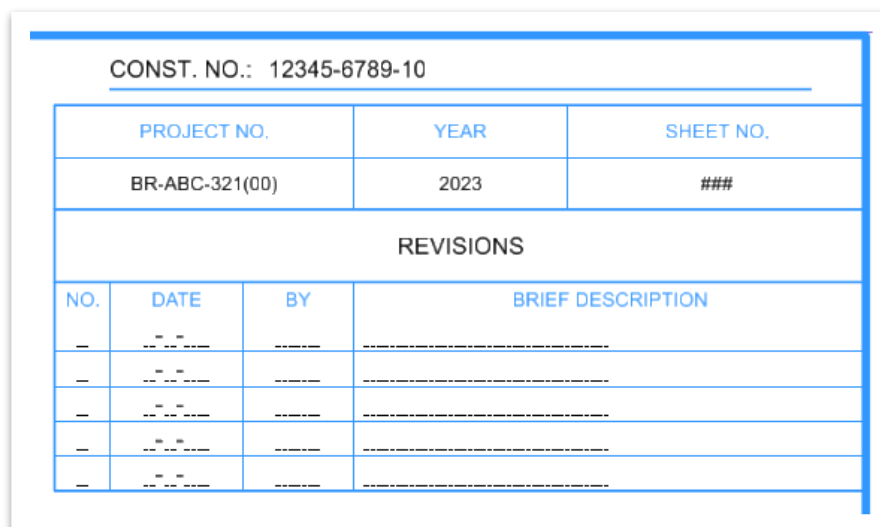




FIGURE 34. BOTTOM LEFT AND BOTTOM RIGHT OF SHEET BORDER

PIN NO.:	123456.00		
DESIGN BY:	ABC	DATE:	01/01/2023
DRAWN BY:	DEF	DATE:	01/01/2023
SUPERVISED BY:	GHI	DATE:	01/01/2023
CHECKED BY:	XYZ	DATE:	01/01/2023

STATE OF TENNESSEE  
 DEPARTMENT OF TRANSPORTATION  
**BRIDGE LAYOUT**  
**STATE ROUTE 321**  
**OVER I-75**  
**BRIDGE ID. NO. 70SR1234567**  
**STA. 60+00.00**  
**LOG MILE 5.06**  
**MAURY COUNTY**  
**2023**

**Take Note!**

For information regarding sheet numbering, refer to Chapter 10 the [Fundamentals \(ORD\) Manual](#).

### 2.2.9 Printing

When looking to print sheets in OBM, the user has the option of printing a single sheet at a time or batch printing a group of sheets. The former of these options is the **Print** tool, which will only print the sheet model that is currently open, whereas **Print Organizer** allows the user to create a print set that contains all of the sheets included in the sheet index.

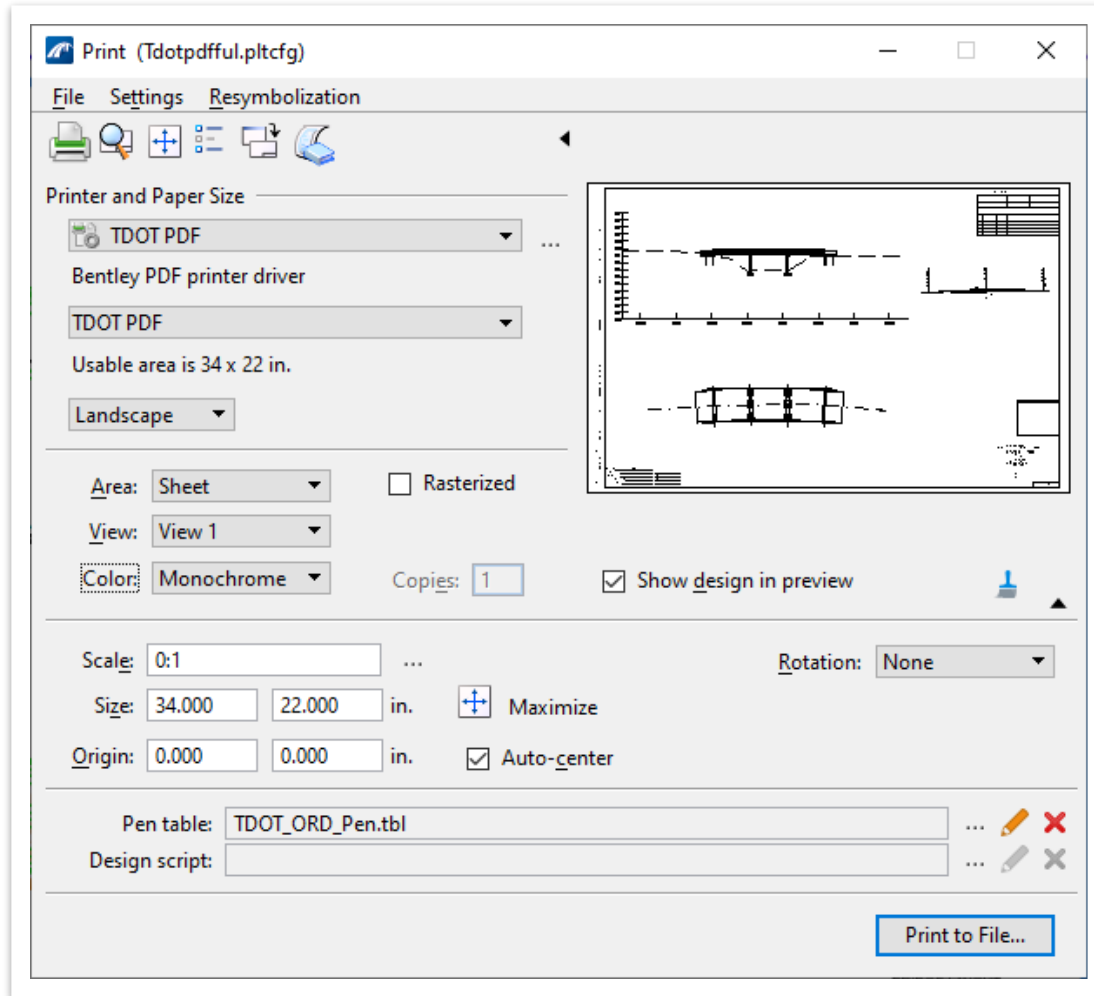
In the first method, open the sheet model that is to be printed and access the **Print** tool by navigating to **File >> Print**. This will open the **Print** window shown in Figure 35 shown on the following page. When printing for a TDOT project, the following settings should be generally selected in the **Print**:

1. **Printer Driver Configuration File:** Tdotpdfpl.pdf
2. **Print Style:** TDOT PDF
3. **Area:** Sheet
4. **Pen Table:** TDOT\_ORD\_Pen.tbl

Once all settings and files have been confirmed, click **Print to File** to name, save, and create the pdf of the sheet.



FIGURE 35. PRINT WINDOW

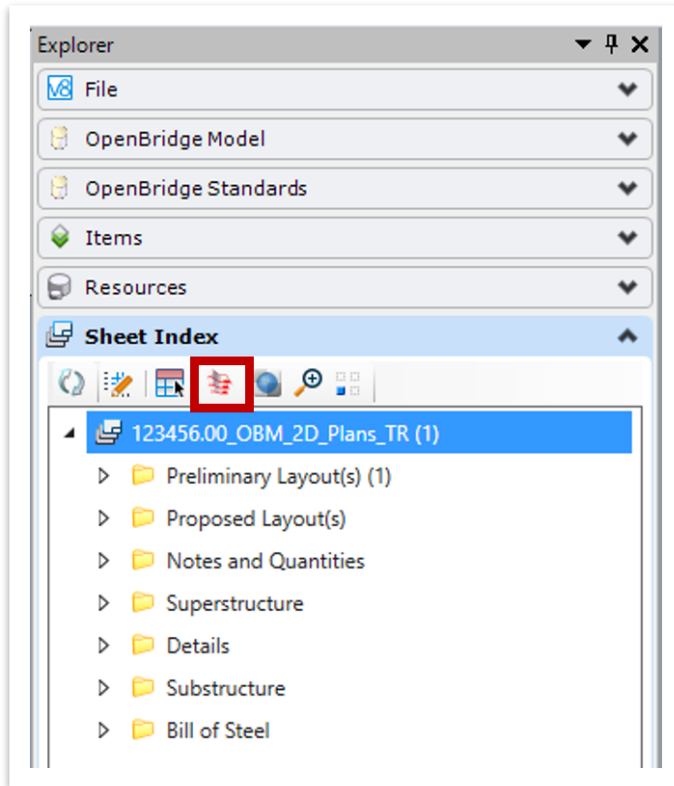


The second method, using the **Print Organizer**, can be accessed through the **Sheet Index**. To ensure all sheets within the sheet index are included in the pdf, the WorkSet must be highlighted. Then click the **Print Organizer** icon shown in Figure 36 on the following page.



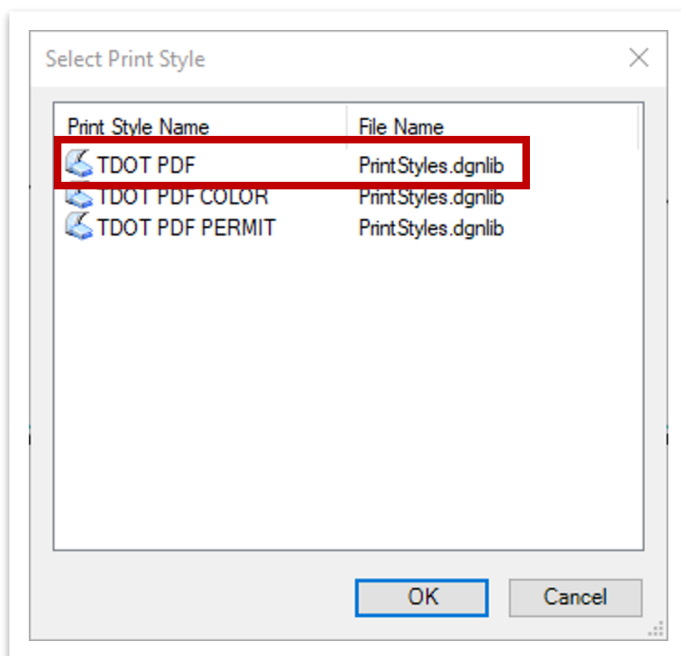


FIGURE 36. ACCESS PRINT ORGANIZER



A print style must then be selected. In most cases, the standard **TDOT PDF** print style will be the necessary print style (Figure 37).

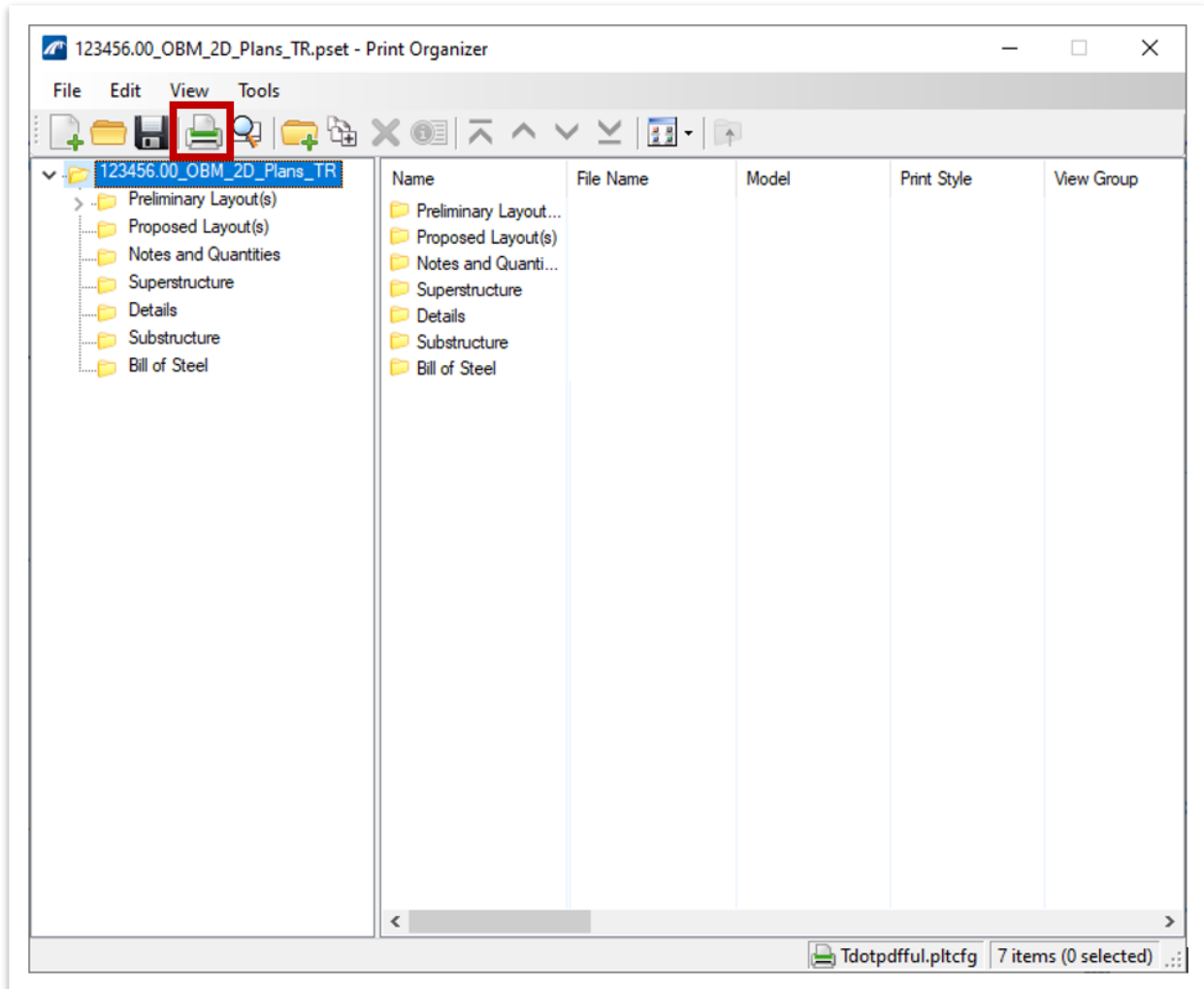
FIGURE 37. SELECT A PRINT STYLE





After the print style is chosen and **OK** is clicked, the **Print Organizer** window will open and show all the files in the sheet index. Once ready to print the plans, the user clicks the **Print** button to open the **Print** window (Figure 38).

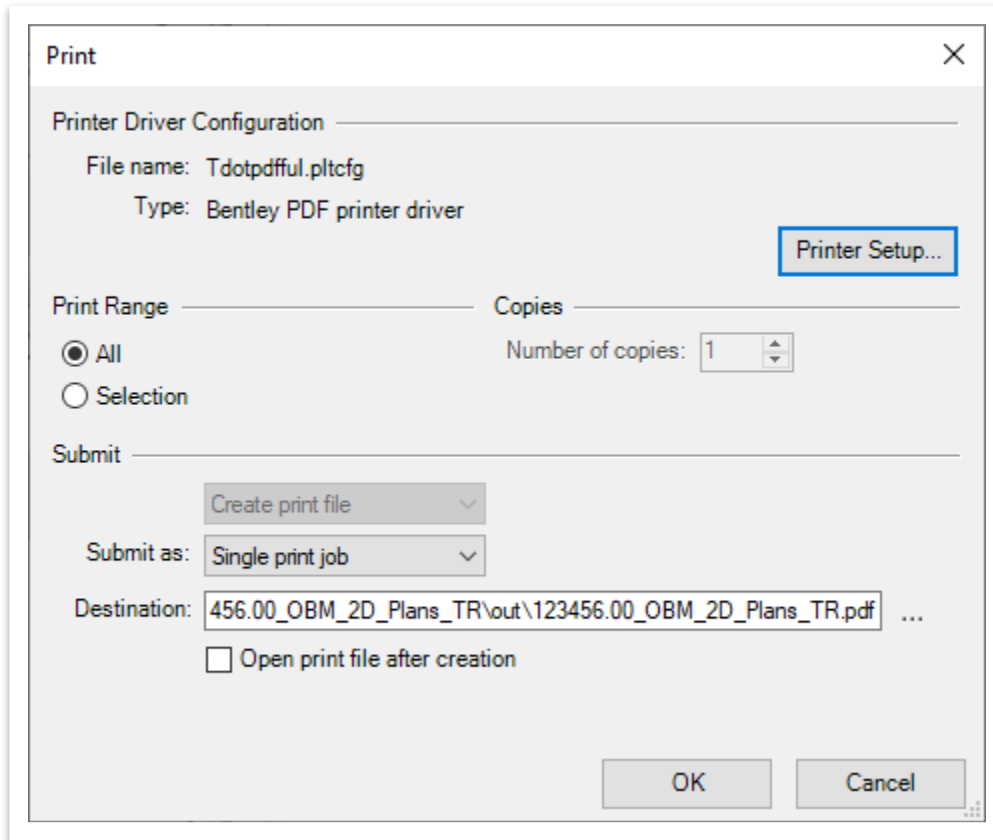
FIGURE 38. PRINT USING THE PRINT ORGANIZER





In the **Print** window, the default name will be the WorkSet name, and the destination will be the **out** folder in the WorkSet folder (Figure 39). After clicking **OK**, the pdf will save in the specified destination.

FIGURE 39. SET DESTINATION AND PRINT





## 2.3: Lecture: 2D Plans Production Procedure

In the sections of this chapter, we will learn to how to use OBM to create 2D plans without the use of a 3D bridge model.



### Take Note!

*The file names used in this manual serve as general guidance for training purposes only. The procedures are intended to teach the necessary tools and TDOT's OBM workspace. On an actual project, remember to use the TDOT ORD naming convention when creating all design files. For more information, refer to the [TDOT ORD File Naming Convention Standards](#) document.*

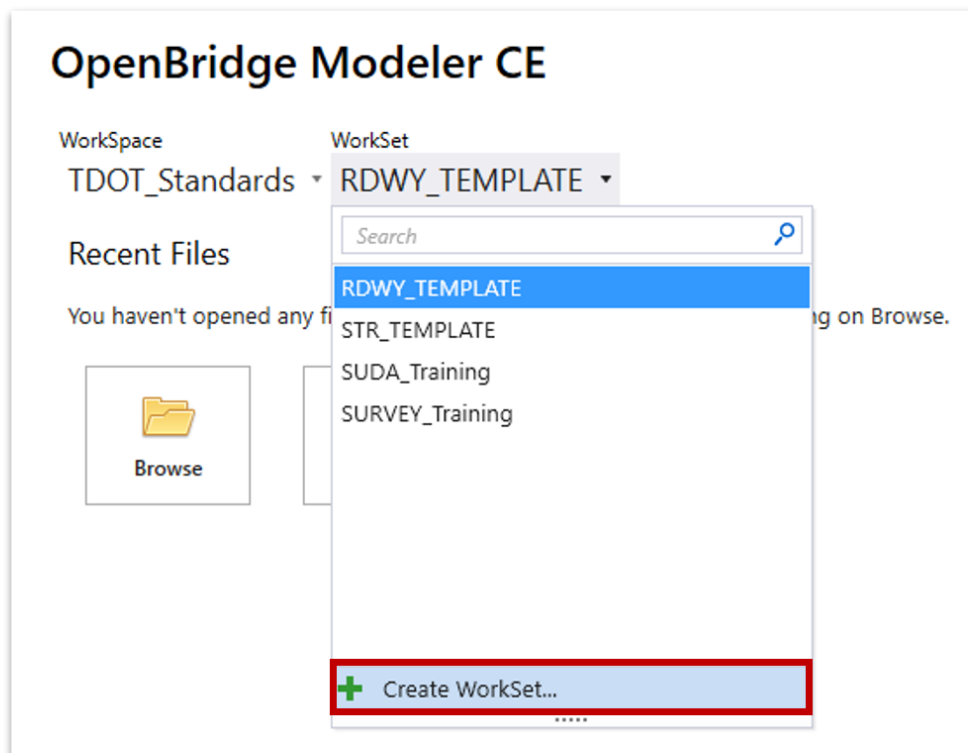
### 2.3.1 WorkSet and File Creation

As covered in the TDOT 3D Modeling I Manual, OBM can be accessed through OpenBridge Designer. Upon opening, the user will create a new .obdx file, which is where OBM and LEAP Concrete can be accessed.

#### 2.3.1.1 OpenBridge Modeler WorkSet Creation

When creating a WorkSet for 2D files, the process is no different than with 3D files. So with OBM open, the **TDOT\_Standards** WorkSpace needs to be selected from the WorkSpace drop-down menu. Then click **Create WorkSet...** from the WorkSet drop-down menu (Figure 40).

FIGURE 40. CREATE A WORKSET





Once the **Create WorkSet** dialog appears, the user needs to name the WorkSet, for this example was chosen, and use the **STR\_TEMPLATE** as the WorkSet template as should be done anytime structural plans are being created (Figure 41).

FIGURE 41. NAME THE WORKSET AND SELECT TEMPLATE

### 2.3.1.2 2D File Creation

Once a WorkSet has been created, a 2D file can be created using the **New File** button, similar to the process for 3D files. Additionally, the default folder location is the dgn folder within the WorkSet that was just created. In the case of the WorkSet created in the previous section, it will be in the following location: **C:\ProgramData\Bentley\OpenBridge Designer CE 10.11.00\OpenBridgeModeler\Configuration\WorkSpaces\TDOT\_Standards\WorkSets\123456.00\_OBM\_2D\_Plans\_TR\dgn\**.

After clicking the **New File** button, the user will name the file. Now, where the 2D workflow deviates from the 3D model-centric workflow is that a 2D seed file must be selected for the file that is to be created (Figure 42). The 2D seed file is located at **C:\ProgramData\Bentley\OpenBridge Designer CE 10.11.00\OpenBridge Modeler\Configuration\Organization-Civil\TDOT\_Standards\OpenBridge Modeler\Seed\**.

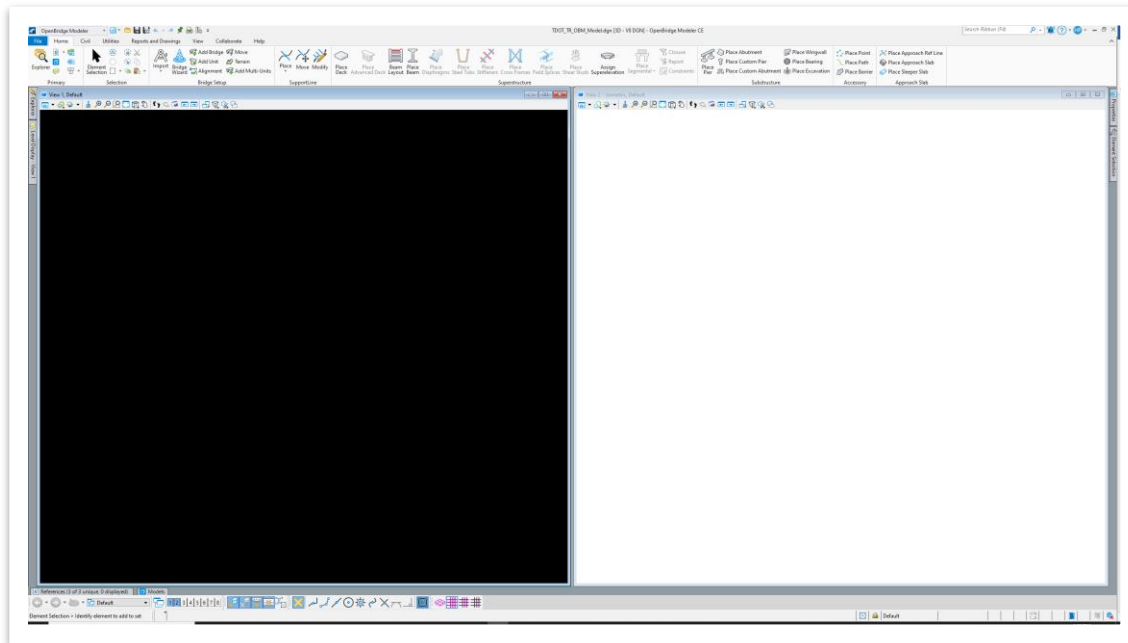
FIGURE 42. SAMPLE NEW FILE CREATION WITH 2D SEED FILE



## Chapter 2. General Plans Production

Once the file has been named and the 2D Seed file has been selected, the file just needs to be saved and the new dgn will open (Figure 43).

FIGURE 43. NEW 2D DGN FILE

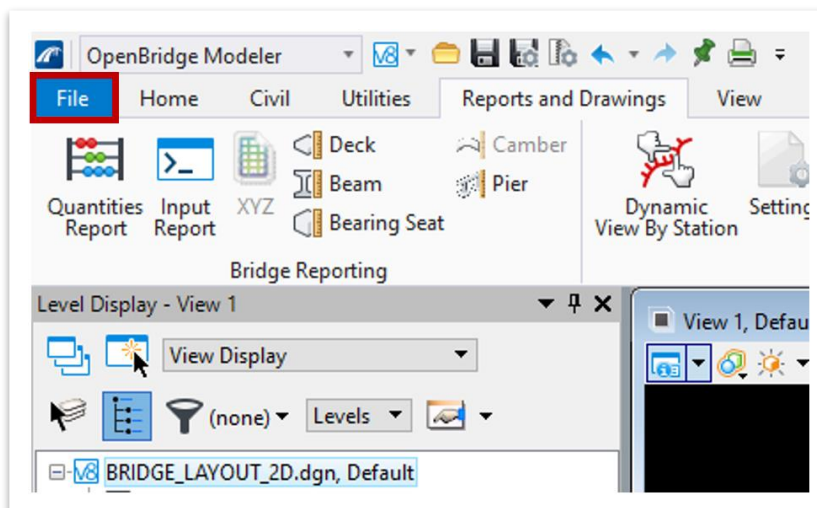


### 2.3.2 Design Model

#### 2.3.2.1 Settings

Before working on any file, it may be prudent to verify that the settings selected are as desired. File settings and user preferences can be changed by accessing the **File** tab within any workflow (Figure 44).

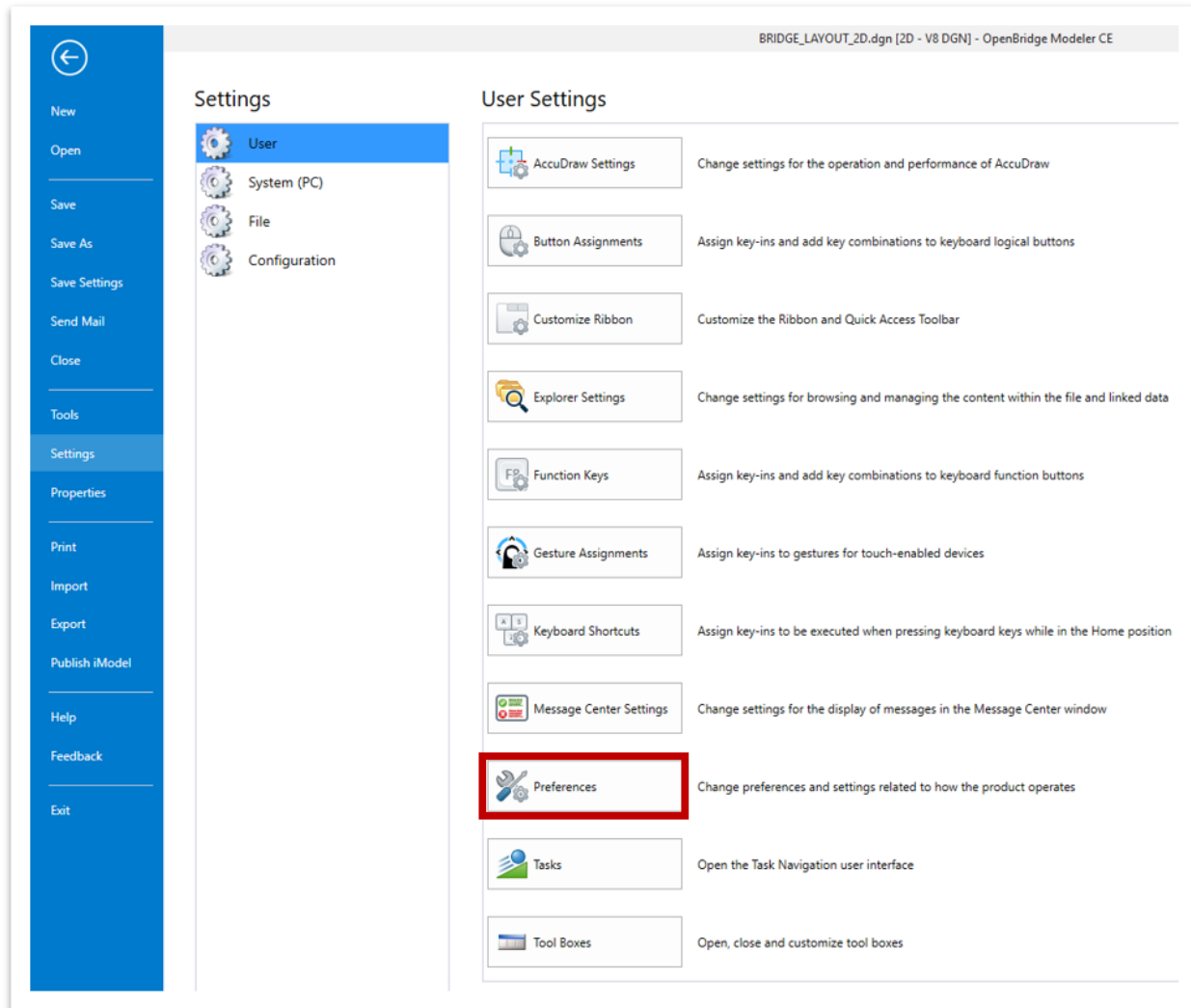
FIGURE 44. LOCATION OF THE FILE TAB





After clicking **File**, the **Preferences** button within the **User** group can be selected to access and change user preferences across all drawings, which will not affect any other user that opens the file (Figure 45). These include settings such as changing the background color of models in the View Options.

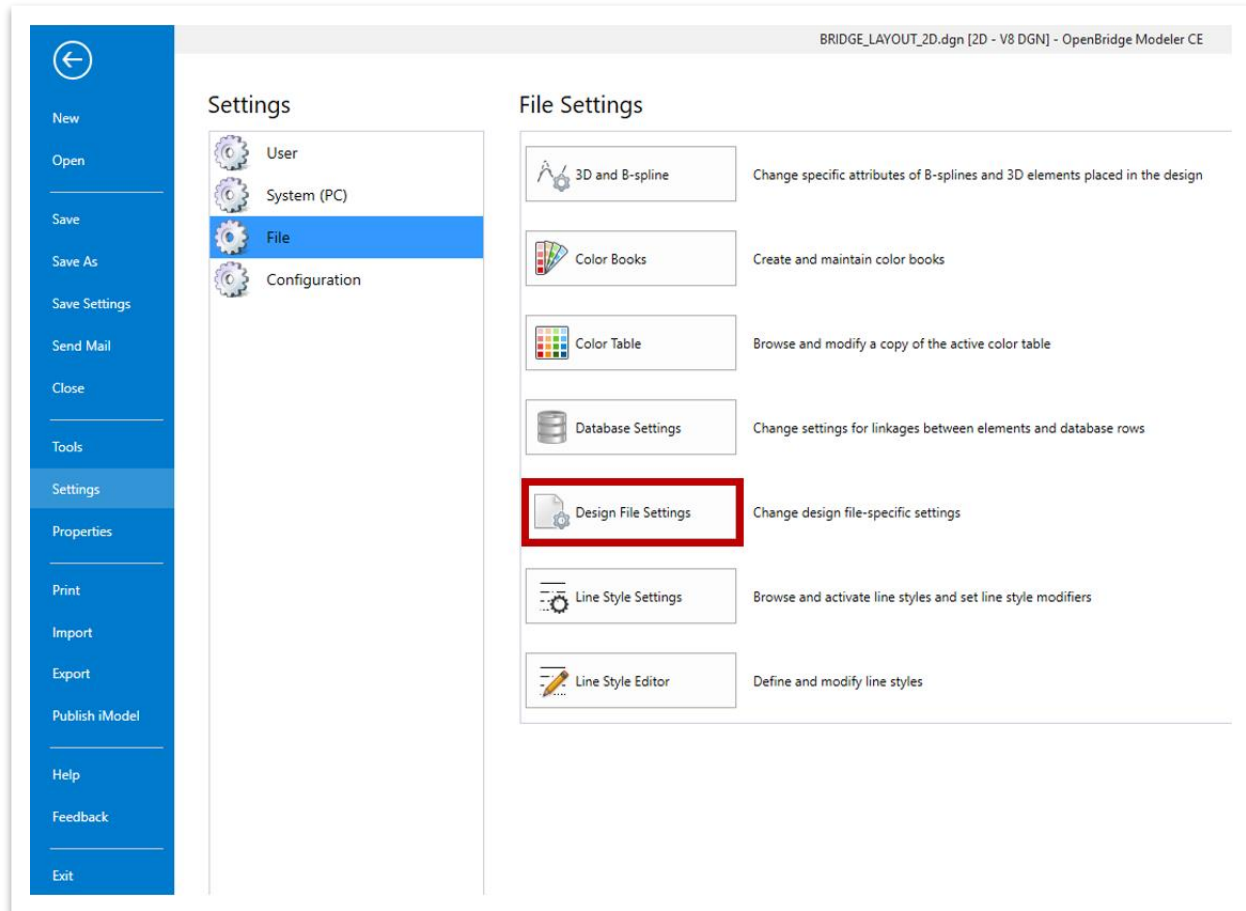
FIGURE 45. USER PREFERENCES





If the **Design File Settings** button in the **File** group is selected (Figure 46), specific file settings will be changed. For instance, if the Working Units are modified, any user that opens the file afterwards will use the modified units.

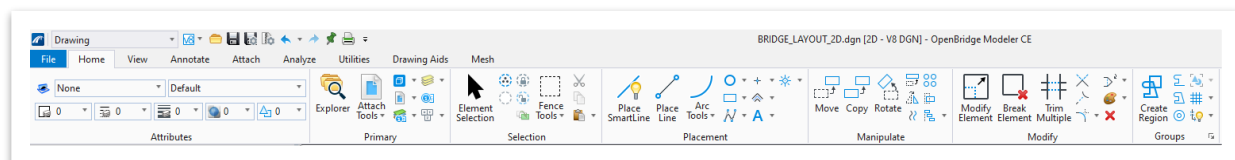
FIGURE 46. DESIGN FILE SETTINGS



### 2.3.2.2 Drawing Tools

Once the necessary element template has been selected and you are ready for drawing, all traditional drawing and manipulation tools can be found in the **Home** tab of the **Drawing** workflow (Figure 47).

FIGURE 47. ALL DRAWING AND MANIPULATION TOOLS

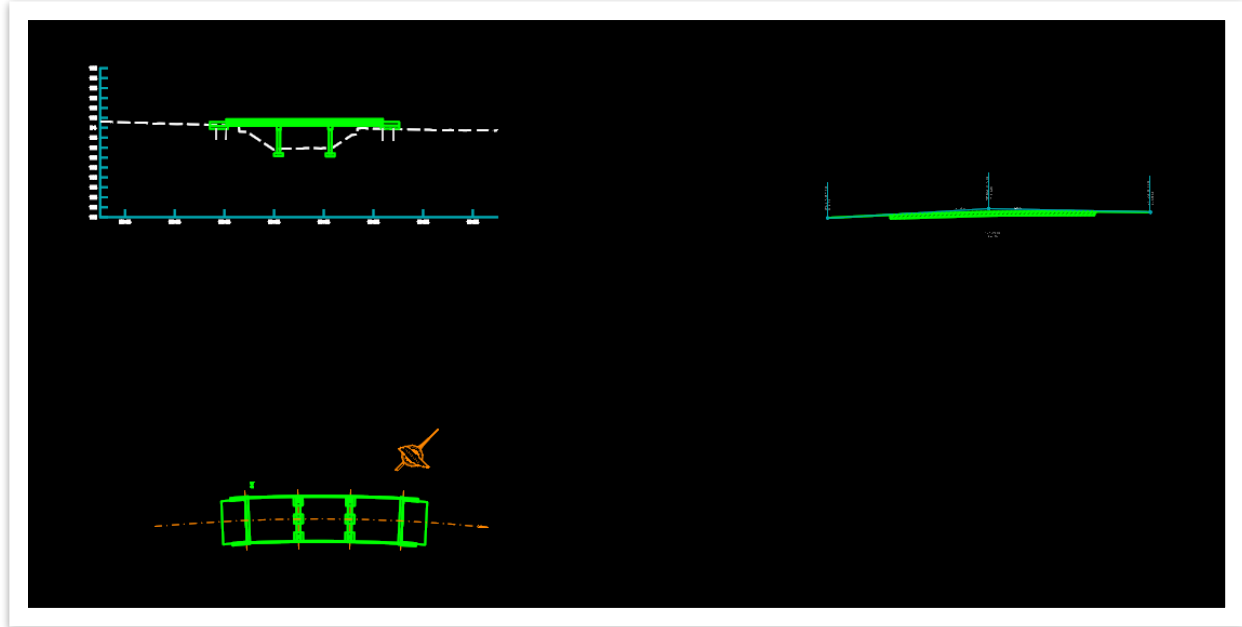


All bridge geometry and details should be drawn in the design model using these tools as shown in the example on the following page (Figure 48). The drawing can then be annotated within the drawing model that will be created later.





FIGURE 48. SAMPLE LINEWORK IN THE DESIGN MODEL

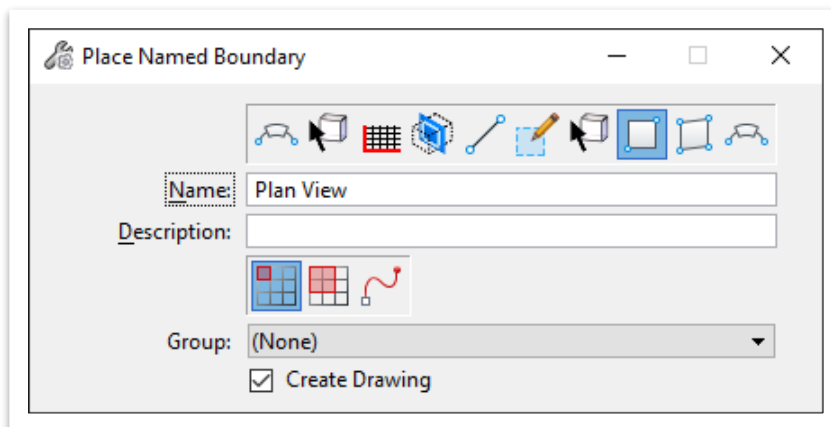


### 2.3.3 Drawing Model

#### 2.3.3.1 Drawing Model Creation

Once the **Place Named Boundary** tool has been opened by navigating to **OpenBridge Modeler (Workflow) >> Reports and Drawings >> Drawings >> Place Named Boundary**, choose a placement method. As shown in Figure 49, the preferred placement method option of **By 2 Points** is utilized and will be walked through. Other non-civil options are used similarly. Here a name can be given to the Named Boundary within the **Name** field. To ensure that only one boundary is created the leftmost option should be selected. Lastly and most importantly, toggle on the **Create Drawing** option to make the program create a drawing model along with the named boundary.

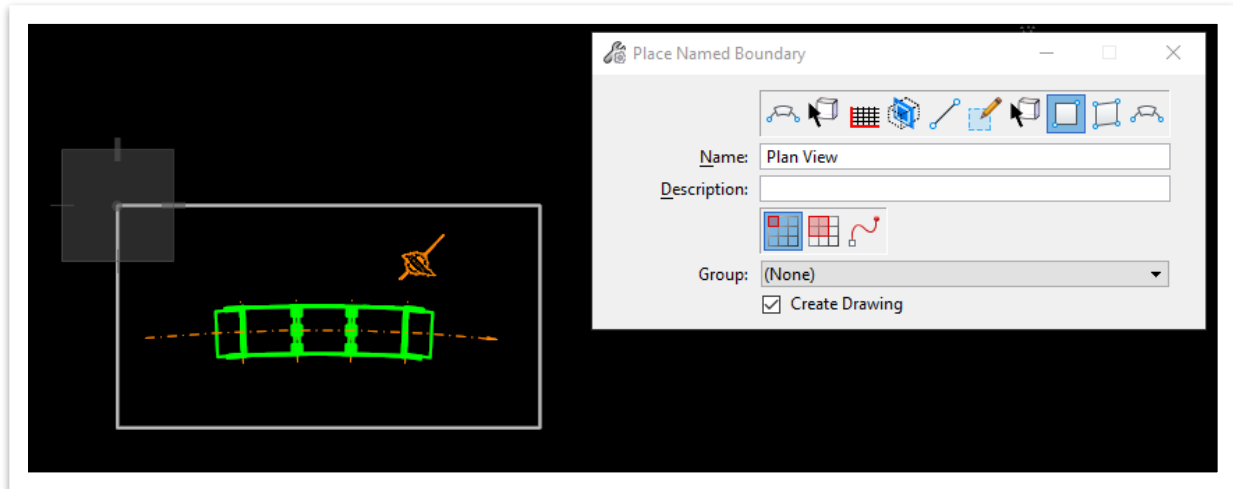
FIGURE 49. PLACE NAMED BOUNDARY - BY 2 POINTS





After all preferences are set within the **Place Named Boundary** window, click two points around the drawing that you wish to include in the drawing model to create the named boundary (Figure 50). Then left click one last time to accept the location and limits of the new named boundary.

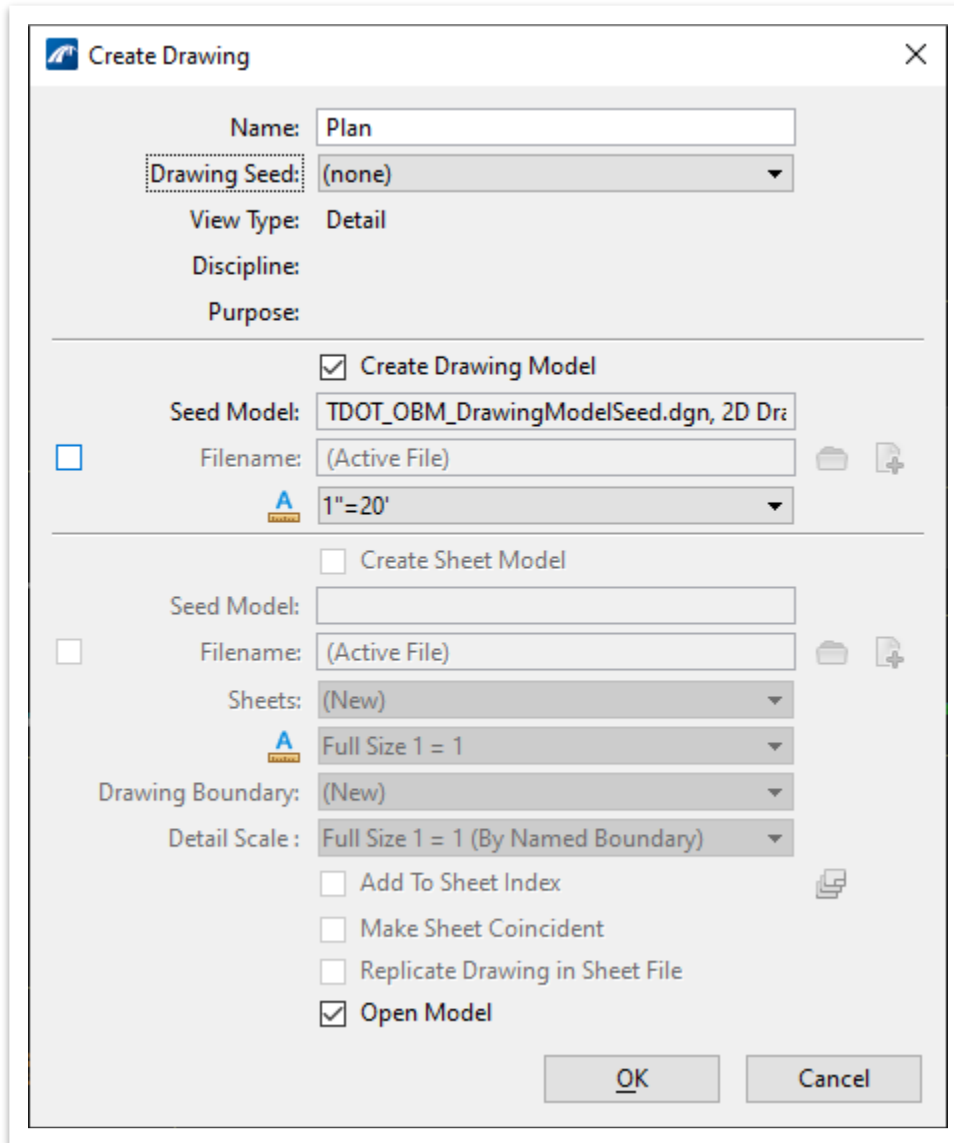
FIGURE 50. FINALIZE NAMED BOUNDARY PLACEMENT





The **Create Drawing** window (Figure 51) will then open and settings can be set for the drawing model. Notice that the correct TDOT drawing seed model for the drawing is automatically selected (**TDOT\_OBM\_DrawingModelSeed.dgn**).

FIGURE 51. CREATE DRAWING WINDOW

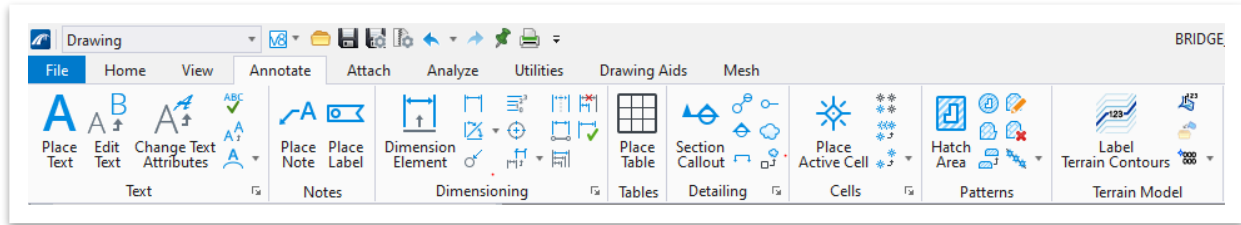




### 2.3.3.2 Annotation

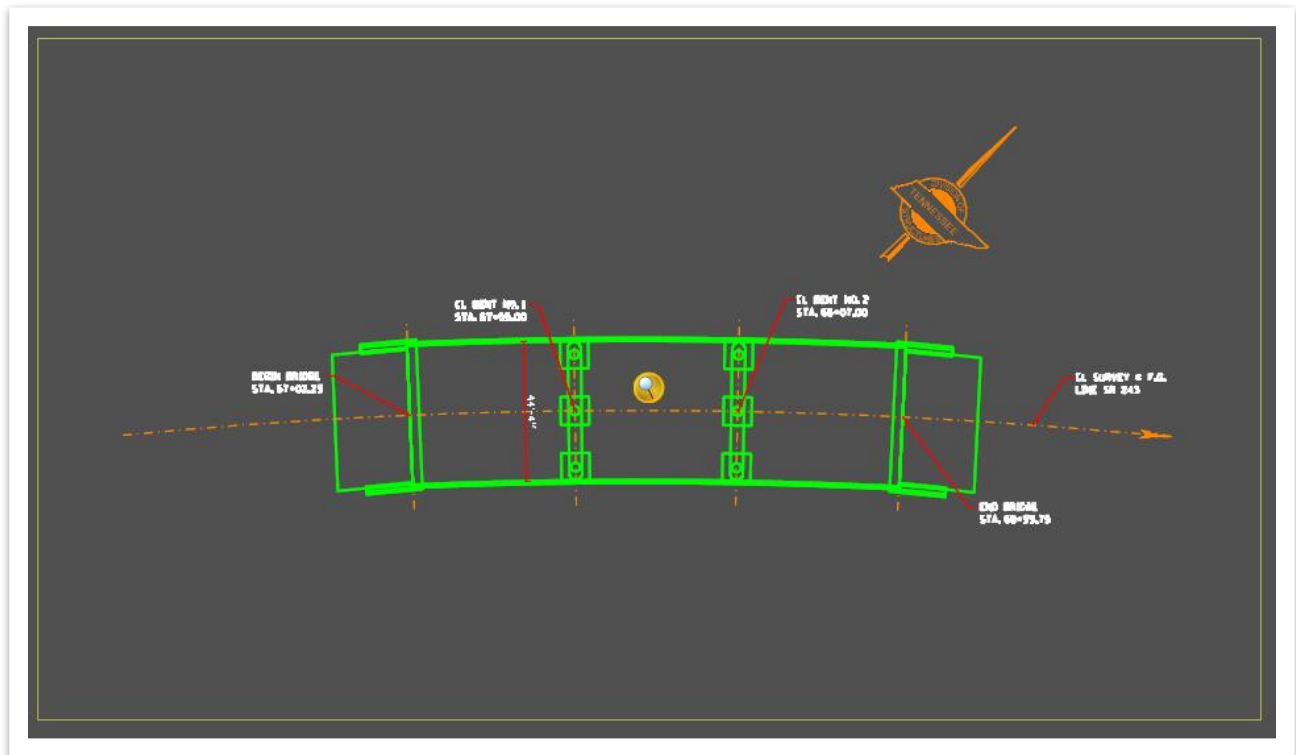
All traditional annotation tools can be found in the **Annotate** tab of the **Drawing** workflow (Figure 52).

FIGURE 52. ANNOTATE TAB



Annotations (dimensions, callouts, notes, etc.) can now be placed within the newly created drawing model, as shown in Figure 53 below.

FIGURE 53. SAMPLE OF PLAN VIEW ANNOTATION





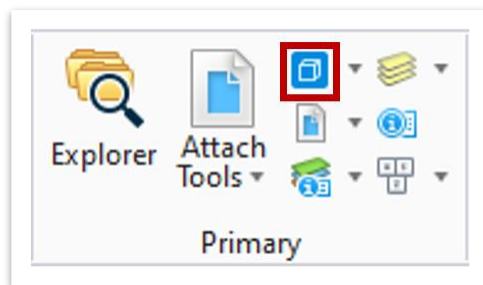
### 2.3.4 Sheet Model

A sheet model is a 2D model that contains the sheet border with all project information and houses the references to one or more drawing models that make up a plan sheet. When creating a sheet model within the TDOT workspace and seed file, a TDOT-specific sheet border will be automatically be populated within the file.

#### 2.3.4.1 Sheet Model Creation

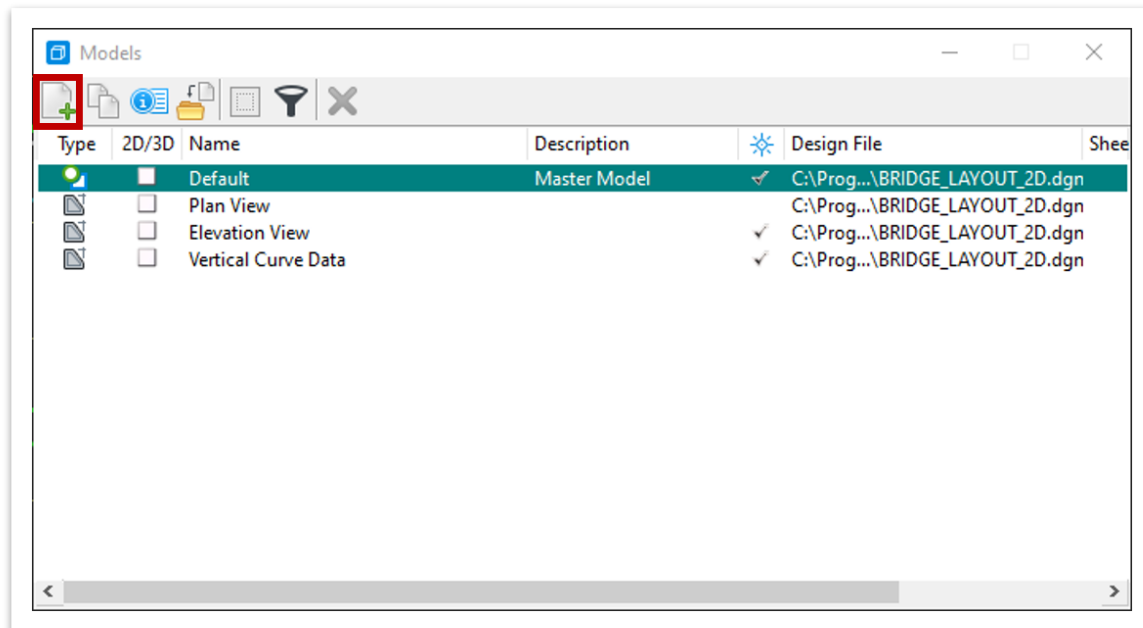
When looking to create a new sheet model within an existing design file, the **Models** window must be accessed by navigating to **OpenBridge Modeler (Workflow) >> Home >> Primary >> Models** or to **Drawing (Workflow) >> Home >> Primary >> Models**, as shown in Figure 54 below.

FIGURE 54. MODELS LOCATION



In the **Models** window (Figure 55), click the **Create a New Model** tool to choose a method by which to create the new model.

FIGURE 55. MODELS WINDOW





With the **Create Model** window now open (Figure 56), select **Sheet from Seed** as the Type of model from the drop-down list at the top. Then the seed model from the appropriate seed file should be automatically selected in the **Seed Model** data field. If it is not selected automatically or a different seed is preferred, a file can be selected by clicking on the ellipsis to the right of the **Seed Model** data field, as shown below and on the following pages.

FIGURE 56. CREATE SHEET FROM SEED

The screenshot shows the 'Create Model' dialog box with the following settings:

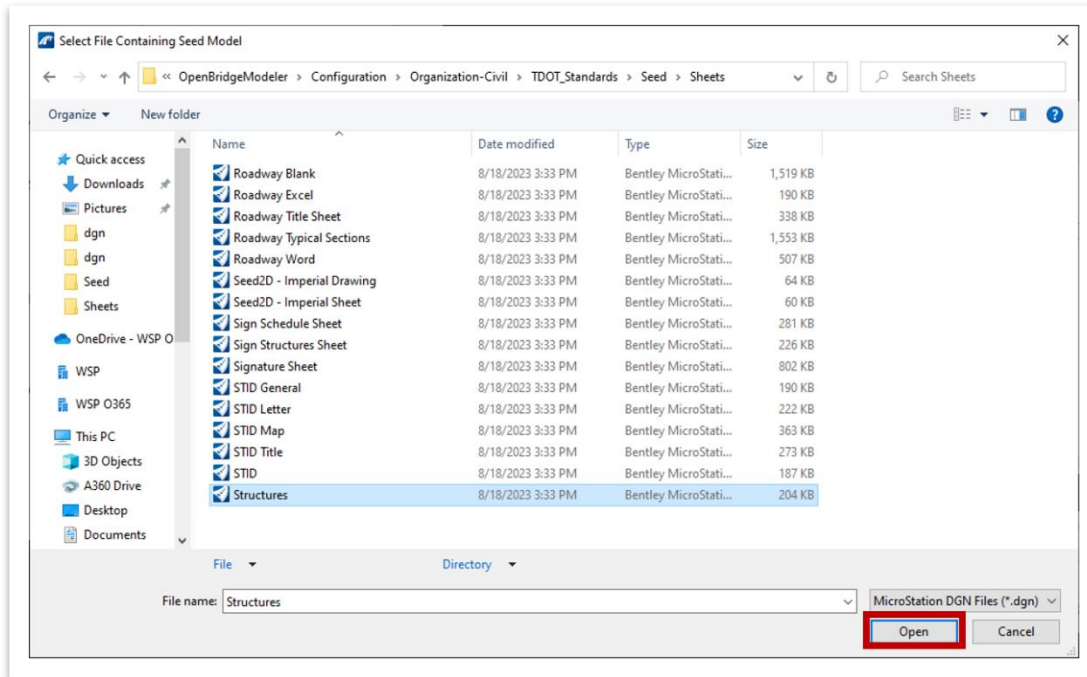
- Type:** Sheet From Seed (dropdown), 2D (dropdown)
- Seed Model:** <Not using seed> (text field with an ellipsis button highlighted in a red box)
- Name:** Bridge Layout (text field)
- Description:** (empty text field)
- Ref Logical:** (empty text field)
- Line Style Scale:** Annotation Scale (dropdown)
- Auto-Update Fields
- Annotation Scale:** 1"=20' (dropdown)
- Propagate
- Sheet Properties:**
  - Add To Sheet Index
  - Sheet Number:** 000 (text field)
  - Sequence Number:** 0 (text field)
  - Show Sheet Boundary
  - Border Attachment:** (none) (dropdown)
  - Size:** ANSI A (dropdown)
  - Origin:** X: 0.000000, Y: 0.000000 (text fields)
  - Rotation:** 0°0'0" (text field)
- Cell Properties:**
  - Ability to Place:**  As Cell,  As Annotation Cell
  - Cell Type:** Graphic (dropdown)
  - Create a View Group

Buttons: OK, Cancel



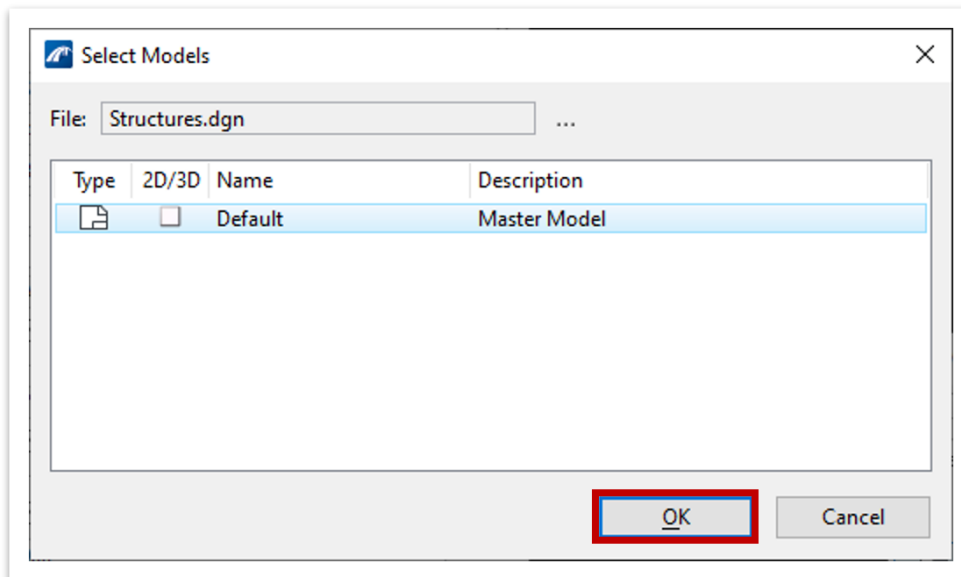
Navigate to **C:\ProgramData\Bentley\OpenBridge Designer CE 10.11\OpenBridge Modeler\Configuration\Organization-Civil\TDOT\_Standards\Seed\Sheets** and select the **Structures.dgn** file (Figure 57).

FIGURE 57. LOCATION OF SHEET SEED



In the **Select Models** window (Figure 58), select the lone sheet model named **Default** and click **OK**.

FIGURE 58. SELECT SHEET MODEL FROM SEED FILE





The settings for the new sheet model will then populate with the settings from the seed file. Then click **OK** (Figure 59) to open the new sheet model, as shown in Figure 60 on the following page.

FIGURE 59. SHEET SEED INFORMATION





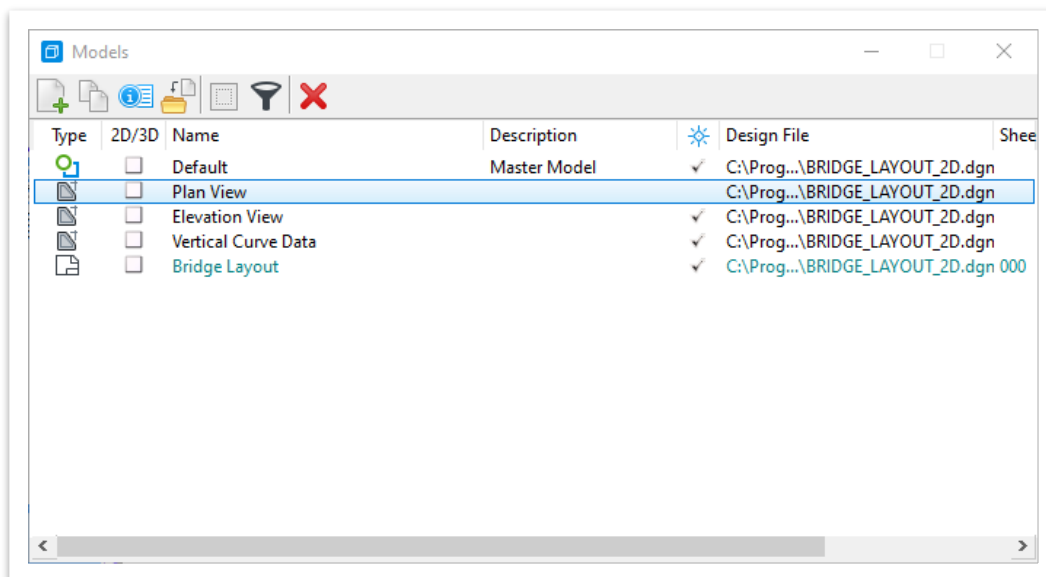
FIGURE 60. NEW SHEET MODEL



### 2.3.4.2 Referencing Drawing Models into Sheet Model

To begin the process of referencing an existing drawing model into an empty sheet model, open the **Models** window. In the **Models** window, double click on the empty sheet model to activate it. Then click and drag the necessary drawing model from the window (in Figure 61, it is the **Plan View** drawing model) and drop it into the sheet model border limits.

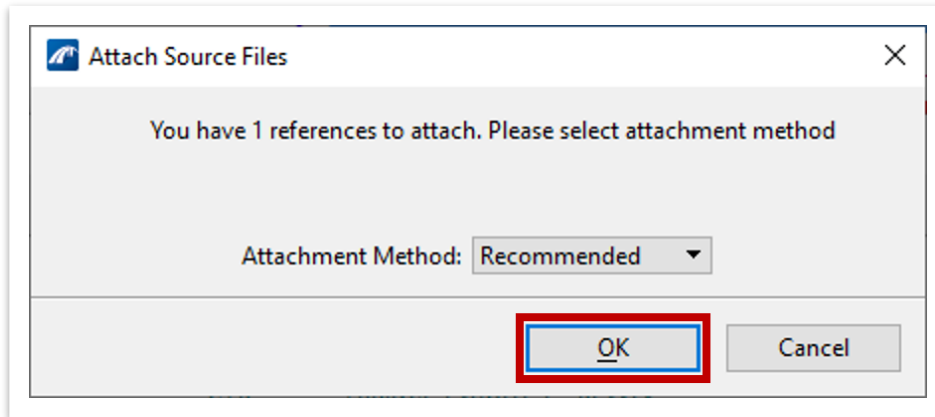
FIGURE 61. DRAG AND DROP DRAWING MODEL INTO SHEET MODEL





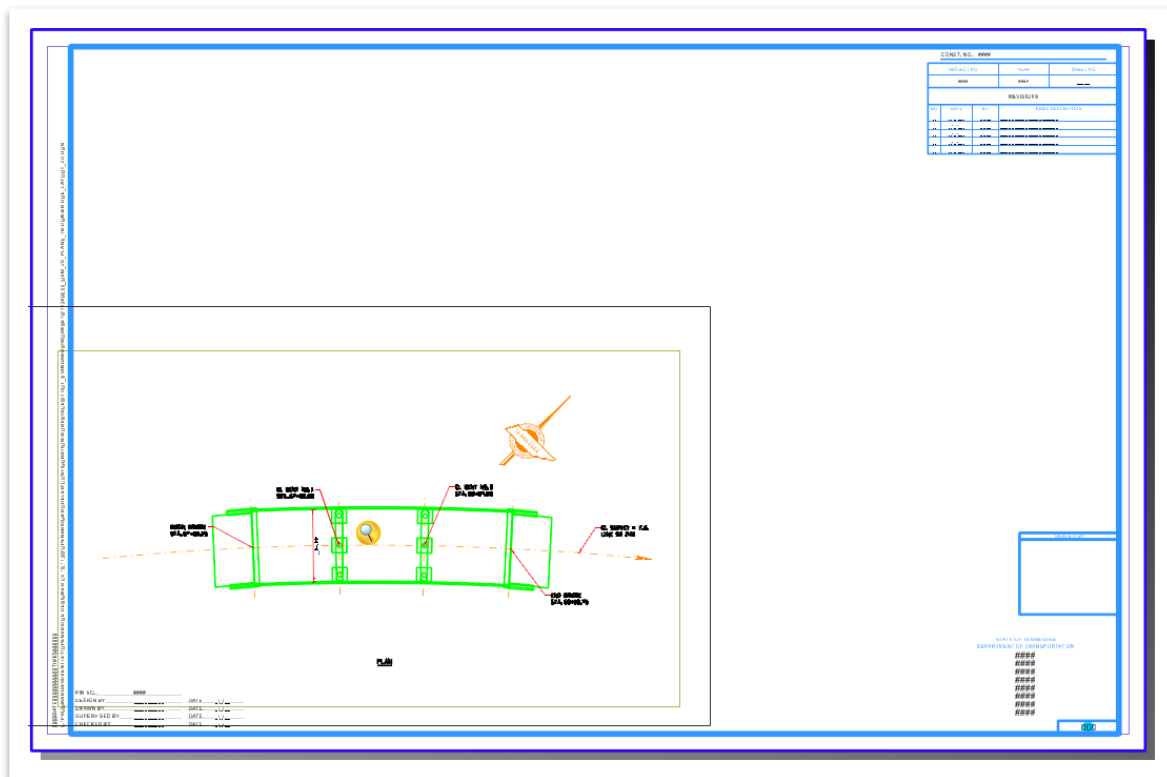
Next, the **Attach Source Files** window will automatically open (Figure 62). The Attachment Method should be set to **Recommended**. Click **OK**.

FIGURE 62. ATTACH REFERENCE TO SHEET MODEL



Lastly, click at the point within the border at which that the drawing model reference will be placed. Use the **Move Reference** and **Move** tools to position the sections and section drawing boundary titles similar to Figure 63.

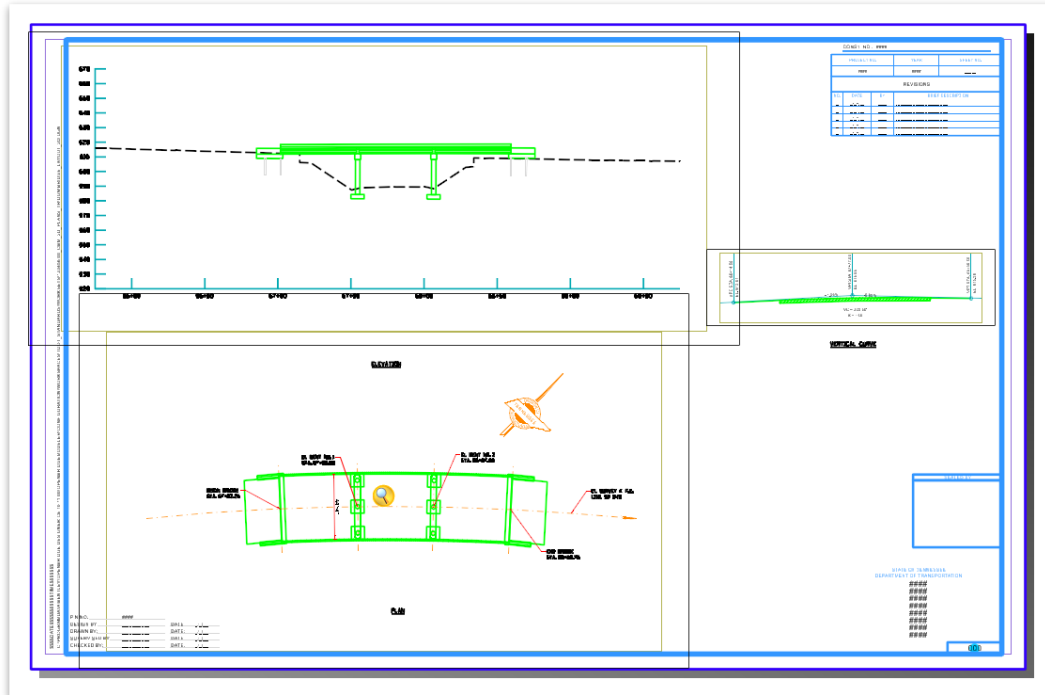
FIGURE 63. SAMPLE OF A DRAWING MODEL REFERENCE IN A SHEET MODEL





As shown in Figure 64, additional drawing models can be added to the sheet model by following the same drag and drop process, if desired.

FIGURE 64. SAMPLE FINAL BRIDGE LAYOUT





## Chapter 3. Model-Centric Plans Production

The exercises in this chapter are intended to give users a basic understanding of the process for creating 2D views of a 3D bridge model within **OpenBridge Modeler (OBM)**. The goal is to learn to use several different tools in OBM to create 3D model-centric plans that will be dynamic in nature.

In this case, we will access **OpenBridge Modeler (OBM)** within **OpenBridge Designer (OBD)**. However, the process would be similar if accessing OBM separately.

### 3.1 Objectives

At the conclusion of this chapter, participants will be able to:

1. Create a new WorkSet, a new OBD file, and a new OBM file using the proper seed files.
2. Create views used in a Layout of Bridge sheet.
3. Create a Bridge Deck Typical Section and create an Overhang Detail.
4. Create plan and elevation views for an Intermediate Bent Sheet.
5. Create a Bent Details sheet.

### 3.2: Create a Layout of Bridge Sheet using the Place Named Boundary Tool

In the following exercises, we will create a plan view and elevation view that will make up a Layout of Bridge sheet for the OBM model.



#### Take Note!

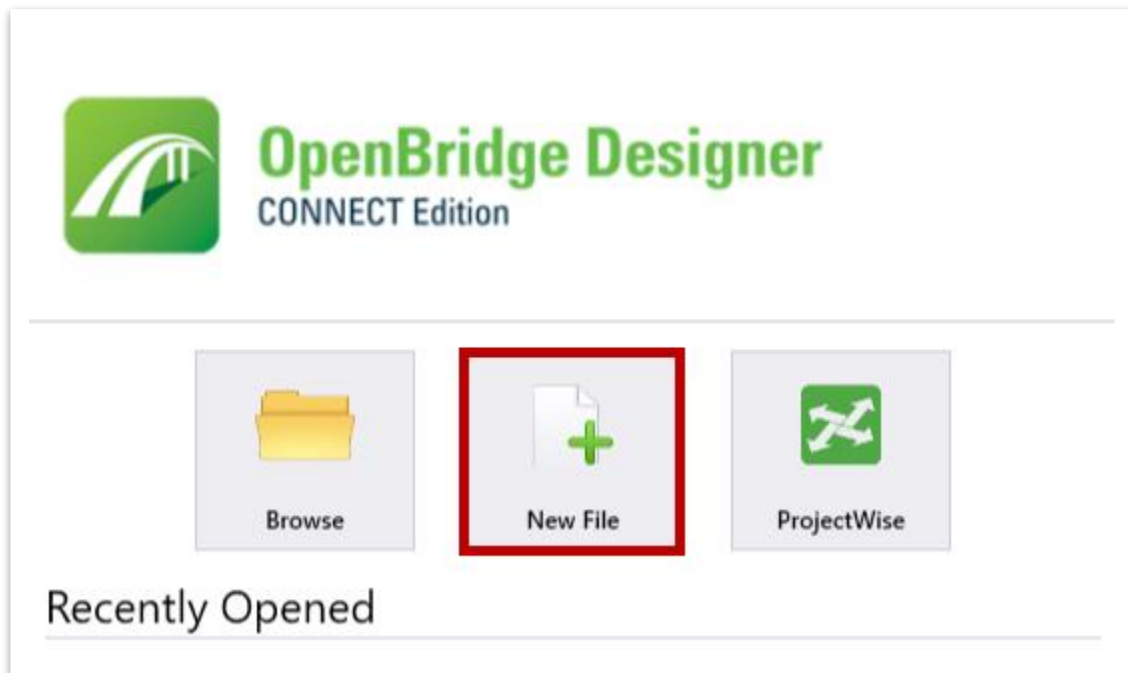
*The file names used in this manual serve as general guidance for training purposes only. The procedures are intended to teach the necessary tools and TDOT's OBM workspace. On an actual project, remember to use the TDOT ORD naming convention when creating all design files. For more information, refer to the [TDOT ORD File Naming Convention Standards](#) document.*



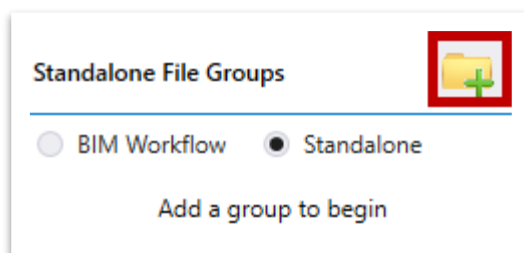
### 3.2.1 Exercise: OBD File, WorkSet, and Sheet File Creation

In the following exercise, we will create a WorkSet and OBD file both named **123456.00\_OBM\_Plans\_TR** which will then be used for the upcoming exercises. Afterwards we will create a sheet file named **BRIDGE\_LAYOUT.dgn**, that will be used for creating the plan and elevation views of the 3D bridge model.

1. Launch OBD from your desktop or Windows menu. Select **New File** and enter the name of the OBD file: **123456.00\_OBM\_Plans\_TR.obdx**. Save the file to your desktop.

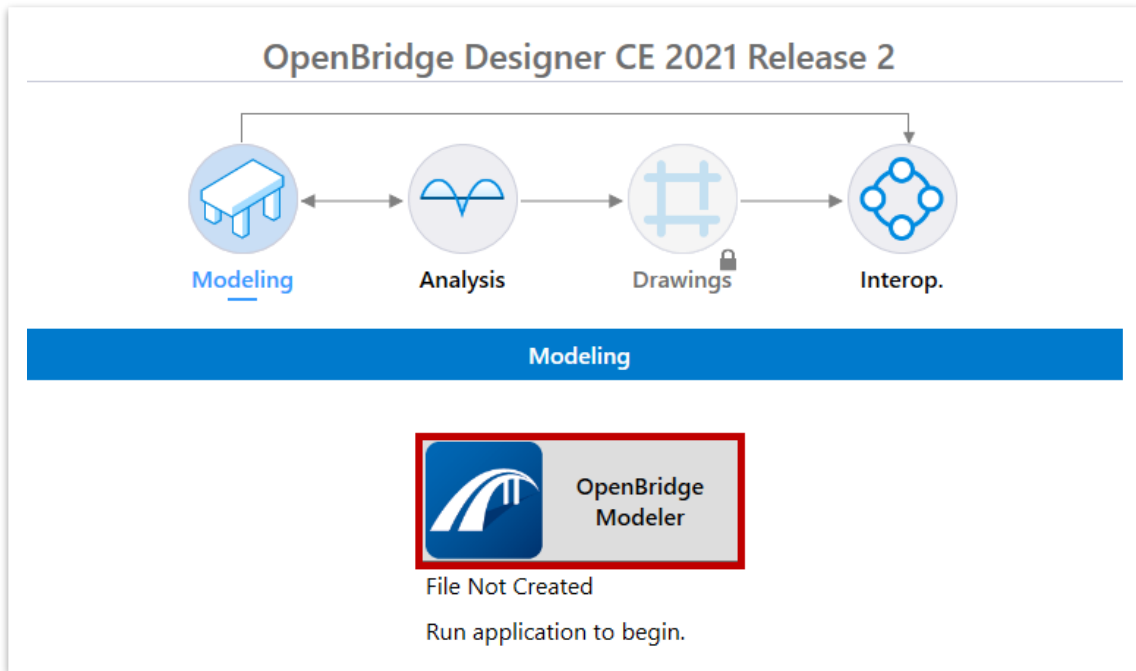


2. Select **Standalone** in the left panel and then select the **Add Standalone Group** button. Name the group **TDOT\_OBM\_Plans\_TR** and click **OK**.

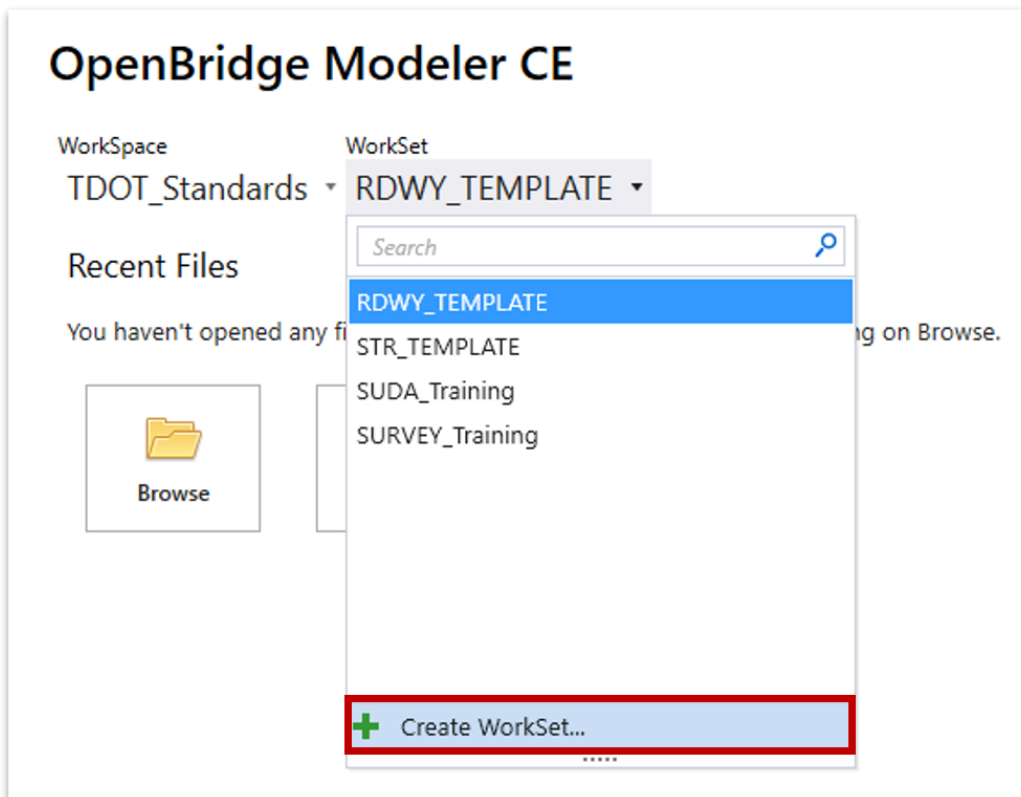




3. Select the **OpenBridge Modeler** button and OBM will launch in another window. If not using OBD, simply select the OBM icon from your desktop or Windows menu.



4. Select the **TDOT\_Standards** WorkSpace from the drop-down menu. Select **Create WorkSet** from the WorkSet drop-down menu.



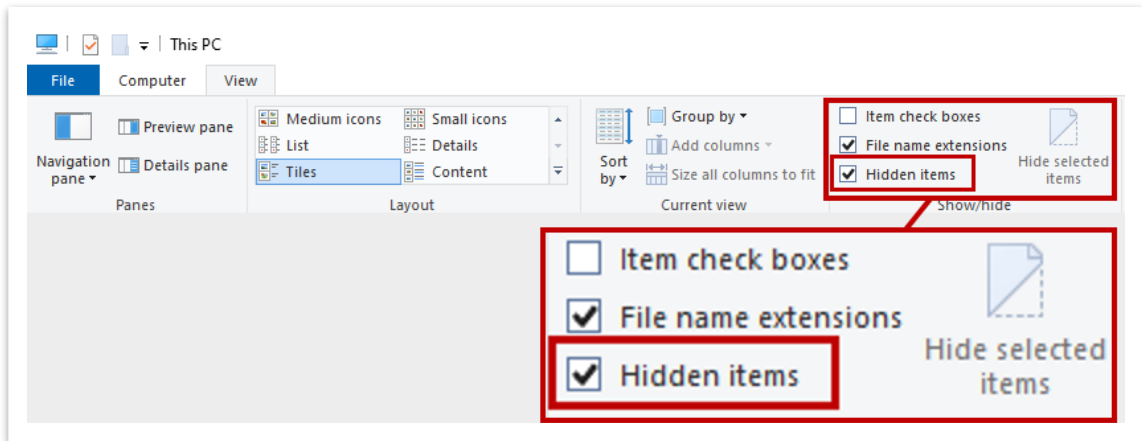


5. The **Create WorkSet** dialog will appear.
  - a. Type the name **123456.00\_OBM\_Plans\_TR**.
  - b. Select the **STR\_TEMPLATE** as the template.
  - c. Leave the **Create Folders Only** option in the top right section unchecked and click **OK**.

6. Notice your new project **WorkSet** is now populated.



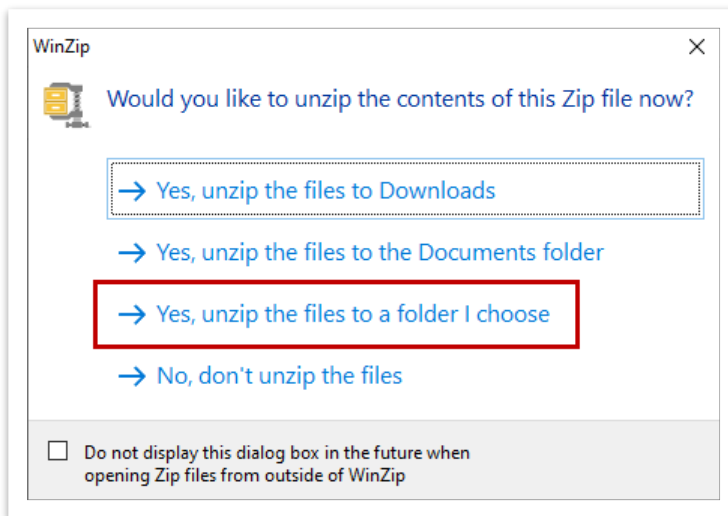
- Now that we have created a WorkSet, the applicable project folders have been created on the **C** drive. Go ahead and download the provided **class zip file** and set **Hidden Items** to be shown within **File Explorer**.



**Take Note!**

The **Program Data** folder where the **WorkSets** are located is a hidden folder by default. In your **C** drive folder, make sure that **Hidden Items** is checked under **View >> Show / Hide**, as shown below.

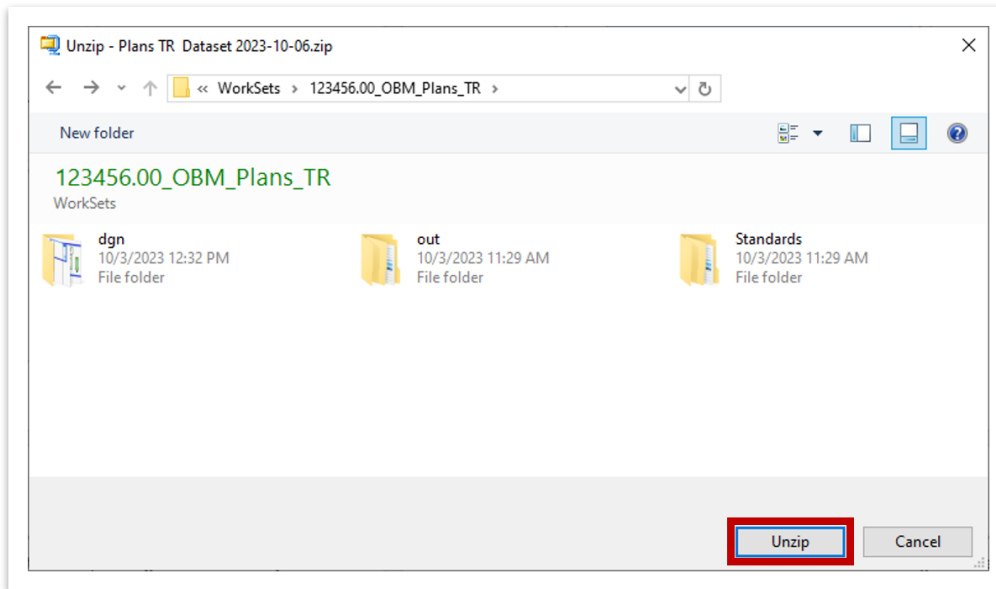
- Unzip the training files. Select the option to choose the folder they are unzipped to. This option must be selected to place the files in the correct location.



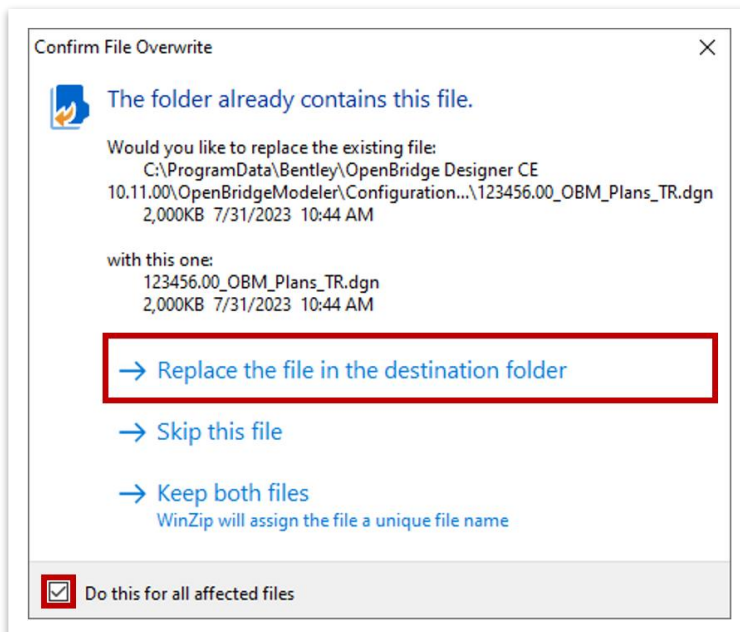




- Unzip the files to the newly created project folder (C:\ProgramData\Bentley\OpenBridge Designer CE 10.11\OpenBridge Modeler\Configuration\Work Spaces\TDOT\_Standards\WorkSets\123456.00\_OBM\_Plans\_TR\).



- Check the **Do this for all affected files** option at the bottom and then select **Replace the file in the destination folder**. **Note:** Your options may look slightly different if using a different application to unzip the class files.

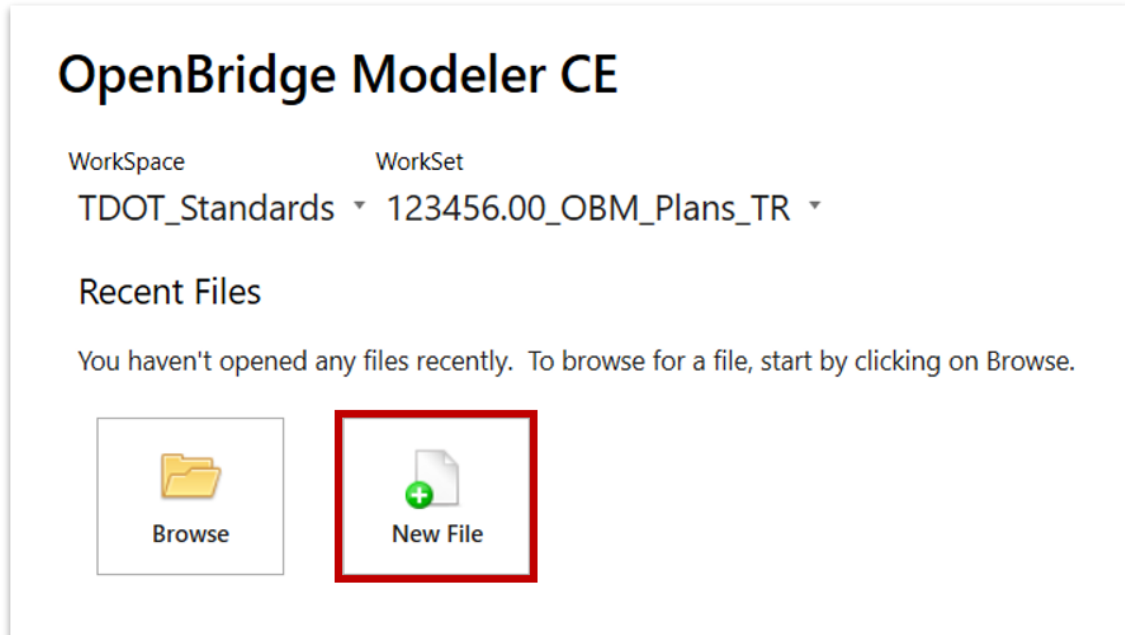


- The files have been updated and you are ready to begin.

**Take Note!**

Any pre-created class file that is opened in this manual will likely yield an alert about not belonging to a WorkSet. Always select your **123456.00\_OBM\_Plans\_TR** WorkSet and then click **Open**.

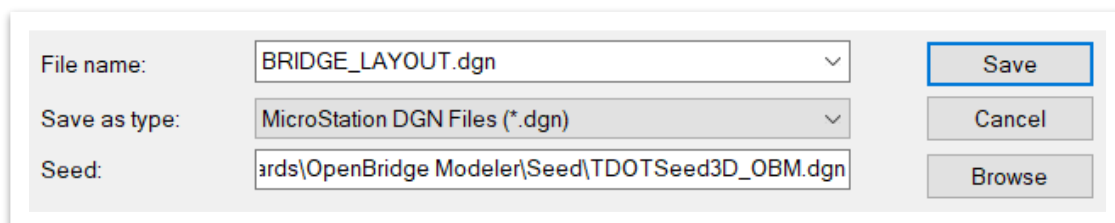
12. Let's now create a **New File** to use for the remaining exercises.

**Take Note!**

To open a previously created file, select the appropriate WorkSpace and WorkSet, and select the **Browse** button.

13. Notice that the default folder location is the dgn folder within the **123456.00\_OBM\_Plans\_TR** WorkSet that was just created. **C:\ProgramData\Bentley\OpenBridge Designer CE 10.11\OpenBridgeModeler\Configuration\WorkSpaces\TDOT\_Standards\WorkSets\123456.00\_OBM\_Plans\_TR\dgn\**.

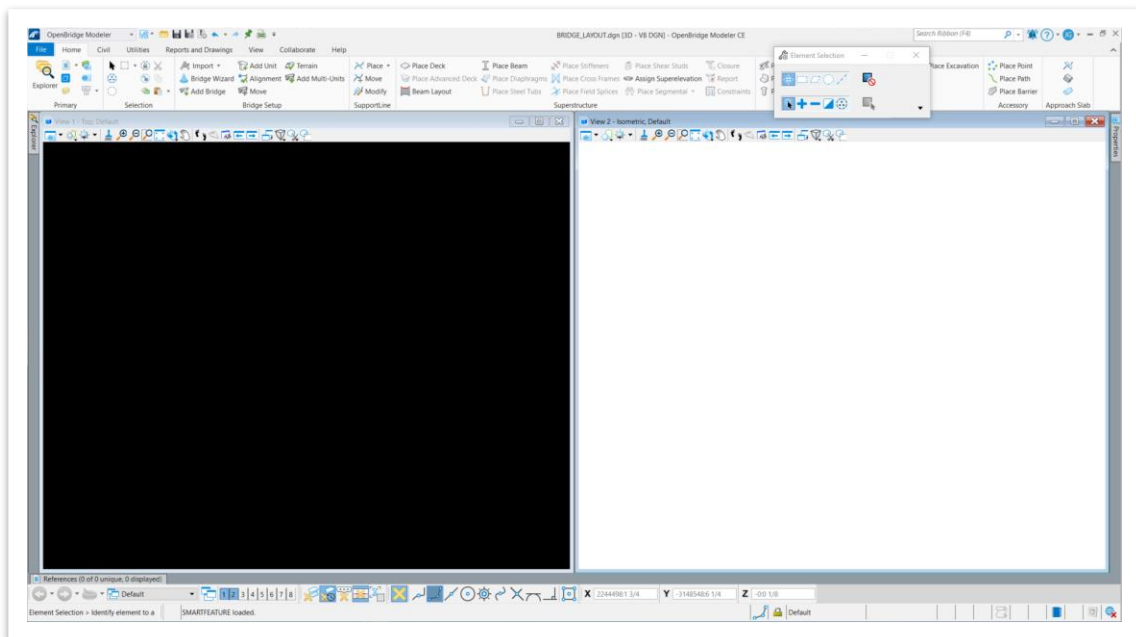
14. In the **File name** field, type in **BRIDGE\_LAYOUT**.





15. Ensure that the **TDOTSeed3D\_OBM.dgn** is selected as the **Seed**. If it is not selected, click **Browse**. This will open another window. Navigate to **C:\ProgramData\Bentley\OpenBridge Designer CE 10.11\OpenBridgeModeler\Configuration\Organization-Civil\TDOT\_Standards\OpenBridgeModeler\Seed\**. This is where the OBM seed files are located.

16. Select the **TDOTSeed3D\_OBM.dgn** seed file and click **Open**.
17. Notice that by default, the **BRIDGE\_LAYOUT** file that you just created will be saved in the DGN folder under the **123456.00\_OBM\_Plans\_TR** WorkSet. Click **Save** and the file will open.



### Take Note!

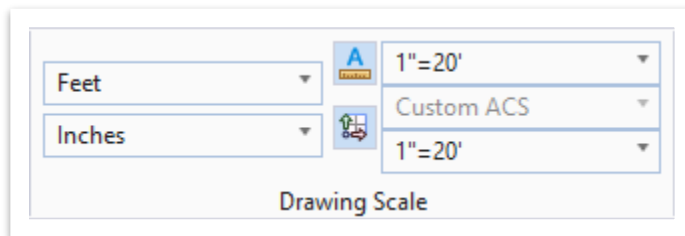
*In this manual, we will not discuss interface setup. Refer to the [Fundamentals \(ORD\) Manual](#) for information.*



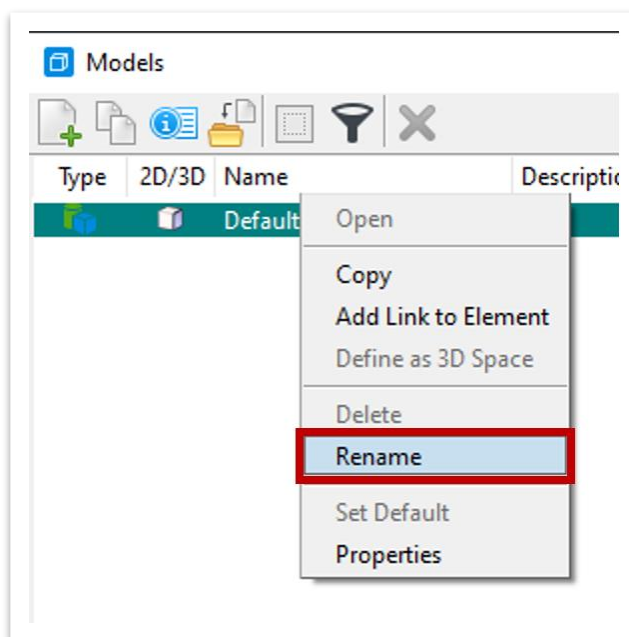
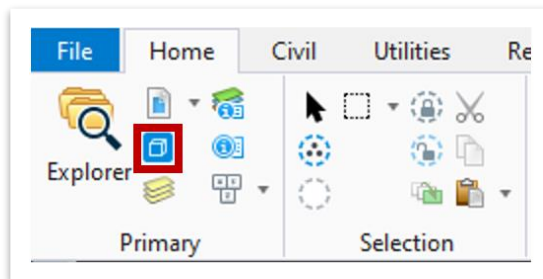
### 3.2.2 Exercise: Generate a Plan View

In this exercise, we will create a plan view of the OBM bridge model to be used in the Layout of Bridge sheet by using the **Place Named Boundary - Civil Plan** tool.

1. Ensure that the Annotation Scale is set to **1"=20'** by navigating to **OpenBridge Modeler (Workflow) >> Reports and Drawings >> Drawing Scale >> Annotation Scale**.

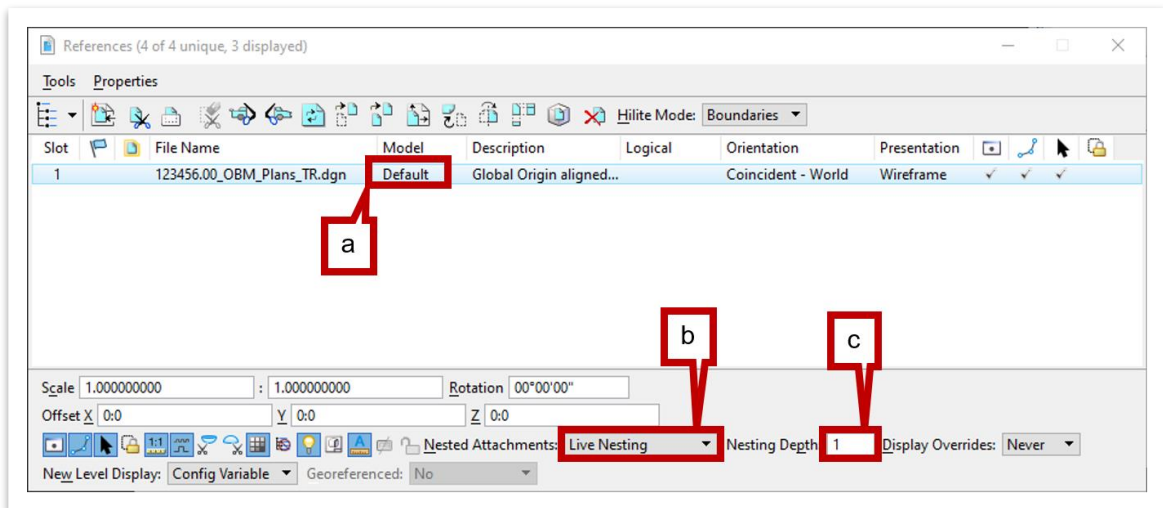


2. Open the **Models** window by going to **OpenBridge Modeler (Workflow) > Home >> Primary >> Models**. Right click on the **Default** model and click **Rename**. Then change the Name to **PLAN**.



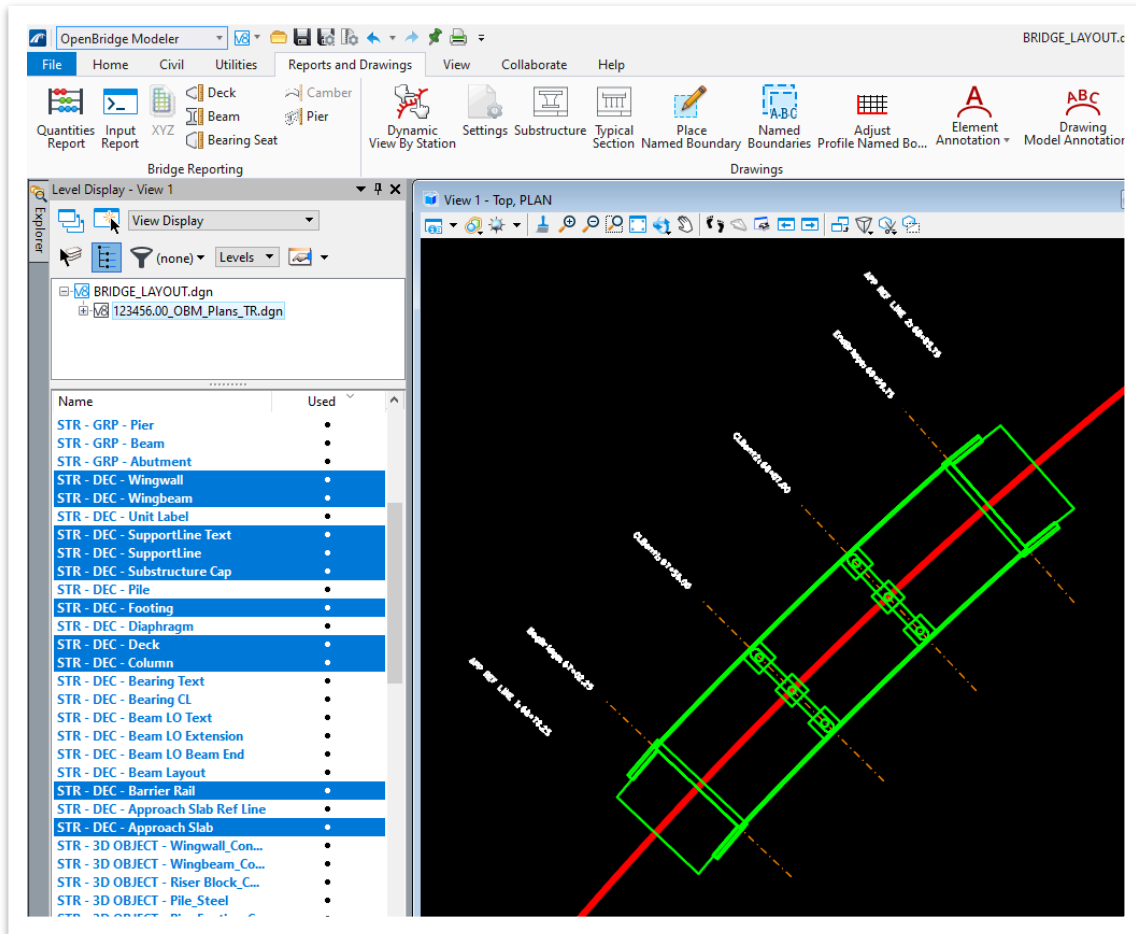


3. Go into the References window and attach the main bridge model file **123456.00\_OBM\_Plans\_TR.dgn**
4. Update the settings for the main bridge model reference as shown below.
  - a. **Model:** Default
  - b. **Nested Attachments:** Live Nesting
  - c. **Nesting Depth:** 1



5. **Fit View** to locate the bridge in View 1 and View 2.
6. Open the **Level Display** window, expand the drop-down, select the **123456.00\_OBM\_Plans\_TR.dgn** reference file, and turn off all levels except the following:
  - STR - DEC - Wingwall
  - STR - DEC - Wingbeam
  - STR - DEC - SupportLine Text
  - STR - DEC - SupportLine
  - STR - DEC - Substructure Cap
  - STR - DEC - Footing
  - STR - DEC - Deck
  - STR - DEC - Column
  - STR - DEC - Barrier Rail
  - STR - DEC - Approach Slab
  - DES - CL - Proposed

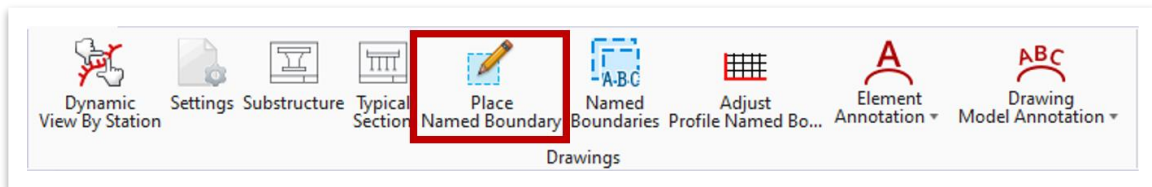
Then **Save Settings (Ctrl+F)**.



**Take Note!**

All 3D levels are turned off in the previous step 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 provide the desired plan view.

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 **SR243** alignment by clicking on the alignment. This will automatically fill the **Name** field with the alignment name, but you can change the name, if desired.





9. In the **Place Named Boundary Civil Profile** window, select the following settings:
  - a. **Drawing Seed:** Structures Plan-Elevation - PLAN
  - b. **Detail Scale:** 1' = 20'
  - c. **Name:** PLAN 1
  - d. Ensure that the **Create Drawing** option is toggled off.

Place Named Boundary Civil Plan

Drawing Seed: Structures Plan-Elevation - PLAN

Detail Scale: 1"=20'

Name: PLAN 1

Description:

Group: (New)

Name: SR 243

Description:

Start Location: 65+ 71.48

Stop Location: 70+ 16.09

Length: 400.000000

Left Offset: -75.000000

Right Offset: 75.000000

Overlap: 0.000000

Boundary Chords: 3

Create Drawing

Show Dialog



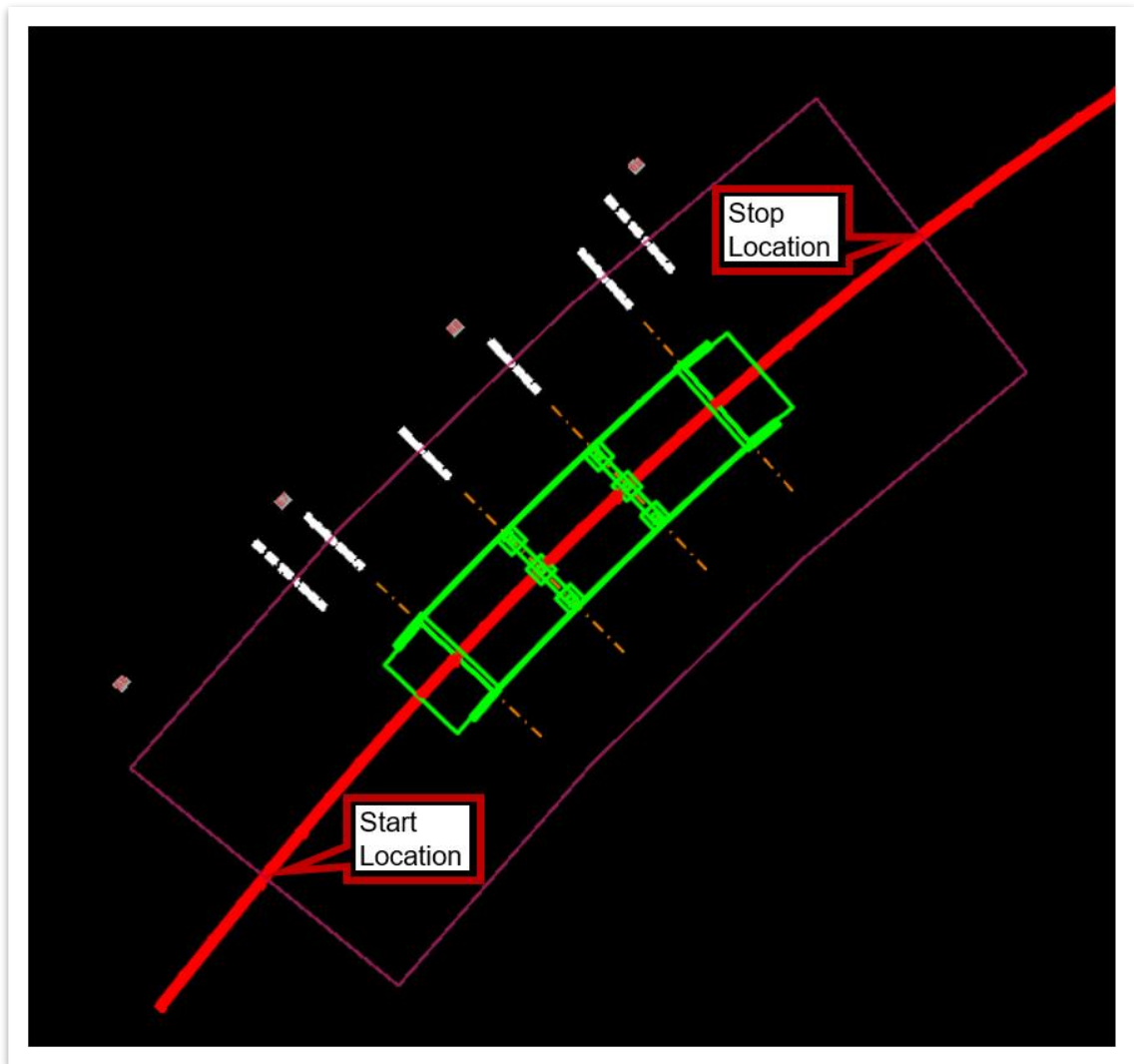
### Take Note!

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.





- Next, we will set the limits of the named boundary. First, find a point before the beginning approach slab (approximate **Station 65+75.00**), and then click to select the **Start Location**. Move the cursor to a location that only creates one boundary and click.

**Take Note!**

The **Place Named Boundary** tool can create multiple boundaries at the length input in the Length field by the drawing seed. The cursor can be moved along the alignment to see a preview of the boundaries that can be created depending on where the Stop Location is selected.

- Click one last time in space to confirm your selection and finalize your named boundary location.



### 3.2.3 Exercise: Generate Elevation View of Terrain and Create Drawing and Sheet Models

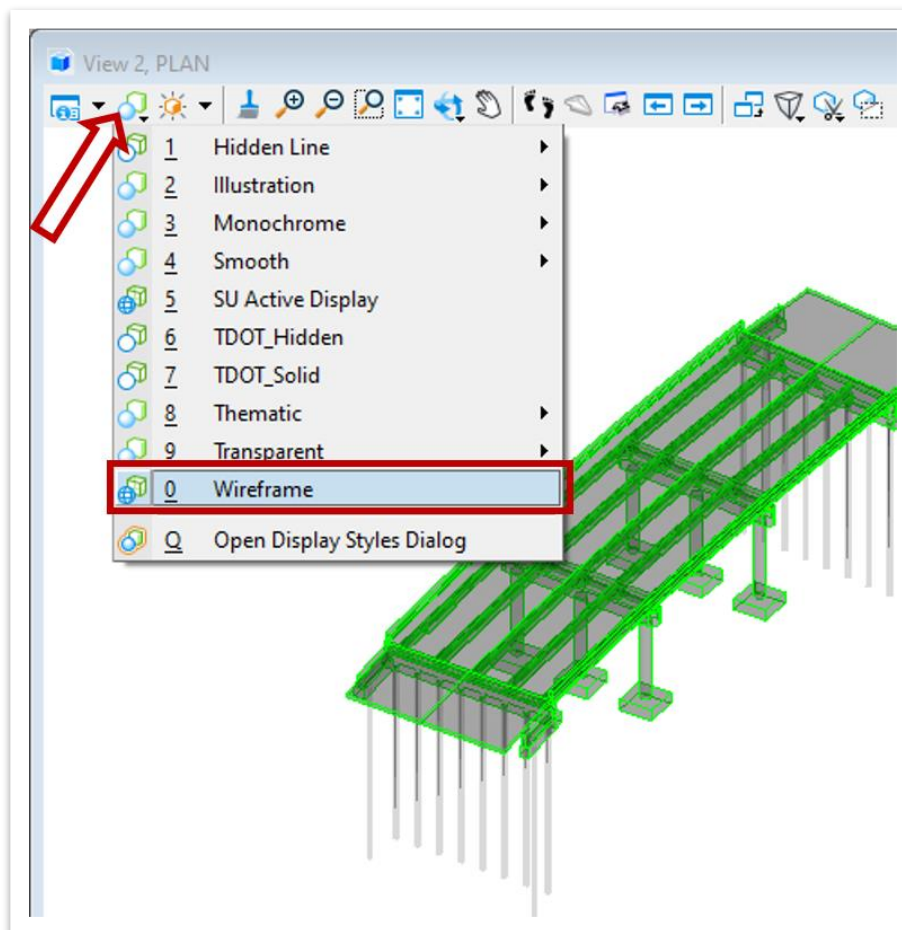
In this exercise, we will create an elevation view of the terrain using the **Place Named Boundary – Civil Profile** tool. We will create the drawing and sheet models for the plan view and elevation view, multiple models of a roadway geometry file, as well as a terrain file that we will later use to set footing elevations. We will continue to utilize the same **BRIDGE\_LAYOUT.dgn** file.



#### Take Note!

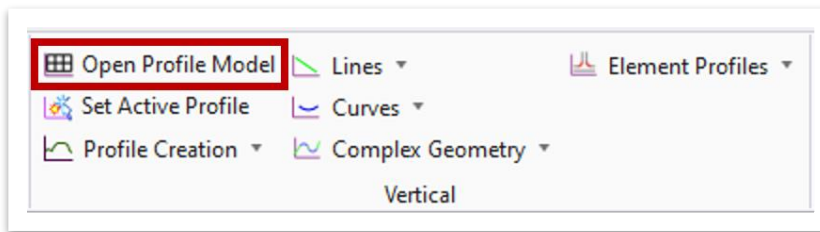
The **Place Named Boundary – Civil Profile** tool will be used to create the elevation view. Since this tool is limited to creating a “slice” through the bridge along the profile and no depth can be applied, it is not sufficient to create a complete Elevation View drawing by itself in a lot of cases. It will still be used to create the slice through the terrain model as well as to automatically generate the elevation scales. The **Section Callout** tool will be used last to create a side elevation view of the bridge.

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

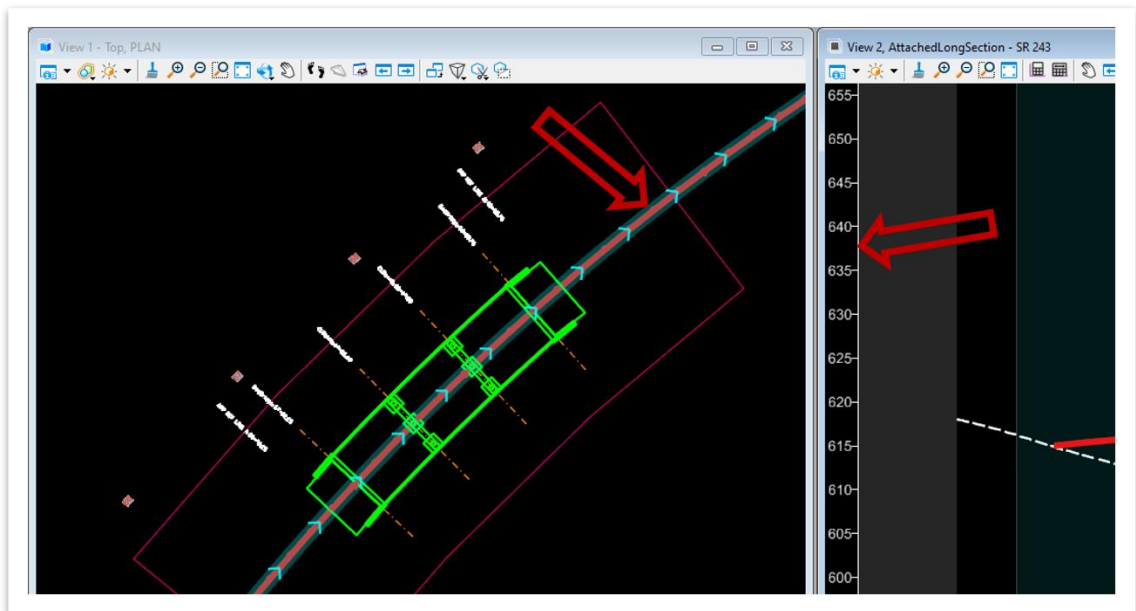




2. Access **OpenBridge Modeler (Workflow) >> Civil >> Vertical >> Open Profile Model** to start opening the profile model.



3. With the tool now active, select the **SR243** 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.

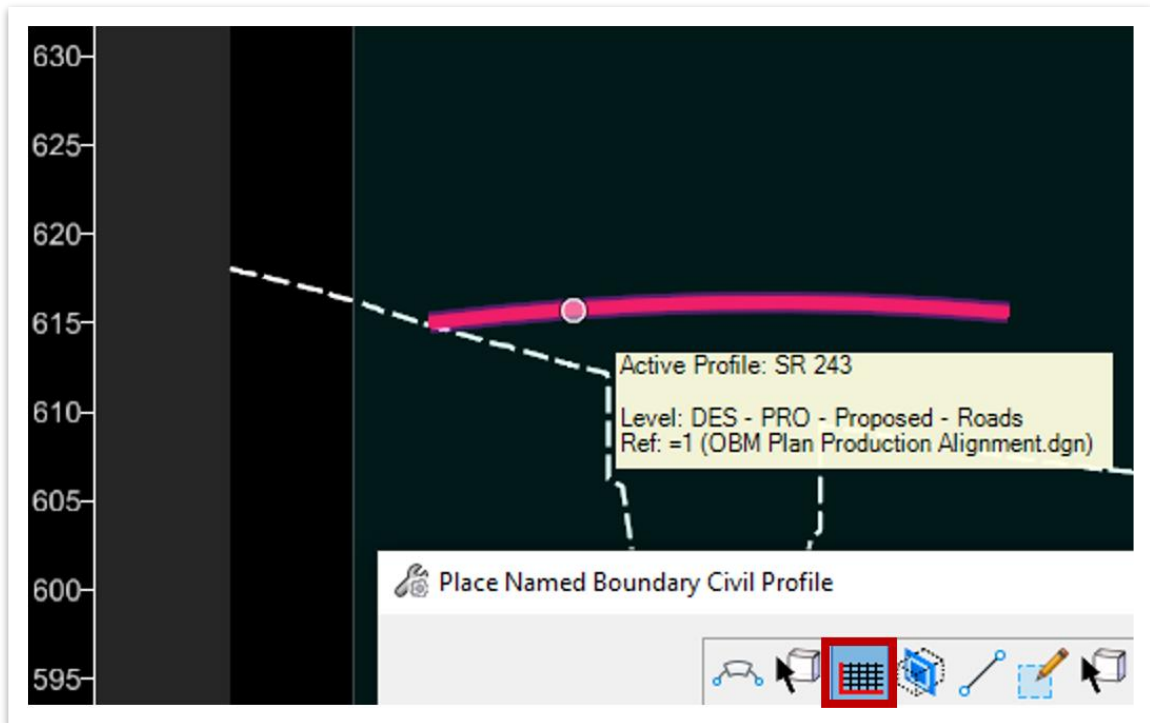


### Take Note!

*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. Conversely, 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. This can be done with the **Create 3D Cut** tool within the Profile Model by defining the limits of the cut.*



4. Access the **Place Named Boundary** tool by navigating to **OpenBridge Modeler (Workflow) >> View >> Named Boundaries >> Place Named Boundary**. Once the window opens, click on the third tool from the left at the top called **Civil Profile** until it is highlighted and click on the **SR 243** profile in the profile view.





5. In the **Place Named Boundary Civil Profile** window, select the following settings:
  - a. **Drawing Seed:** Structures Plan Elevation - ELEVATION
  - b. **Detail Scale:** 1' = 20'
  - c. **Name:** TERRAIN 1
  - d. **Method:** From Plan Group. This will align the elevation named boundary limits with those of the plan named boundary created in the previous exercise.
  - e. Ensure that the **Use Terrains**, **Use Active Vertical**, **Create Drawing**, and **Show Dialog** options are all toggled on.

6. Left click within **View 2** to accept the boundary and open the **Create Drawing** window.



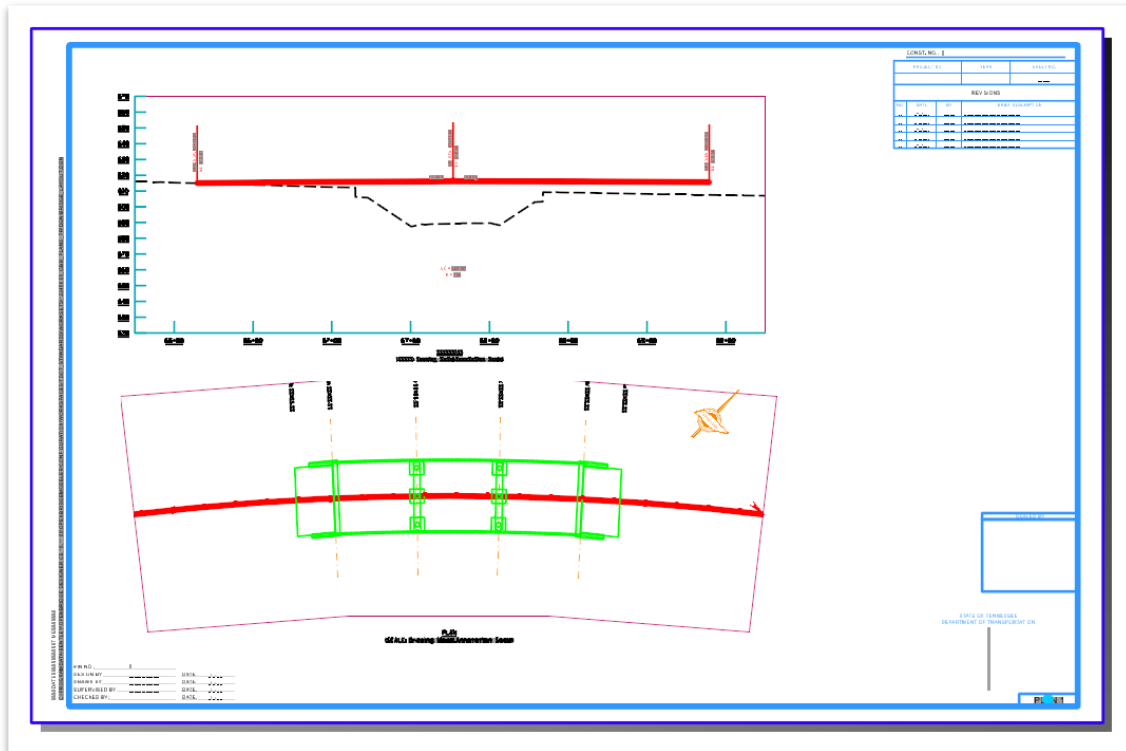
- With the Create Drawing window now open, ensure all scales and annotation groups are correctly selected as shown below and the **Open Model** option is toggled on. By default, the tool combines the named boundary group name and the view names in this dialogue. You will need to rename them as shown below. Click **OK** and the drawing and sheet models will be created.

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

- Mode:** Plan and Profile
- One Sheet Per Dgn:** (unchecked)
- Left Column (PLAN 1):**
  - View Name:** PLAN 1
  - Drawing Seed:** Structures Plan-Elevation - PLAN
  - View Type:** Civil Plan
  - Discipline:** (empty)
  - Purpose:** (empty)
  - Drawing Model:**
    - Model Name:** PLAN 1
    - Seed Model:** TDOT Structures Plan-Profile.dgnlib, Stru
    - Filename:** (Active File)
    - Scale:** 1"=20'
    - Annotation Group:** Plan Annotation - Structures
  - Sheet Model:**
    - Model Name:** PLAN 1
    - Seed Model:** TDOT Structures Plan-Profile.dgnlib, Stru
    - Filename:** (Active File)
    - Sheets:** (New)
    - Scale:** Full Size 1 = 1
    - Drawing Boundary:** Structures Plan-Elevation - PLAN
    - Detail Scale:** 1"=20'
    - Options:**
      - Add To Sheet Index
      - Make Sheet Coincident
      - Open Model
- Right Column (TERRAIN 1):**
  - View Name:** TERRAIN 1
  - Drawing Seed:** Structures Plan Elevation - ELEVATION
  - View Type:** Civil Profile
  - Discipline:** (empty)
  - Purpose:** (empty)
  - Drawing Model:**
    - Model Name:** TERRAIN 1
    - Seed Model:** TDOT Structures Plan-Profile.dgnlib, Stru
    - Filename:** (Active File)
    - Scale:** 1"=20'
    - Annotation Group:** Structures Profile
  - Sheet Model:**
    - Model Name:** TERRAIN 1
    - Seed Model:** TDOT Structures Plan-Profile.dgnlib, Stru
    - Filename:** (Active File)
    - Sheets:** (New)
    - Scale:** Full Size 1 = 1
    - Drawing Boundary:** Structures Plan Elevation - ELEVATION
    - Detail Scale:** 1"=20'



8. The following sheet model will be displayed in the view window as shown below.



**Take Note!**

To change the sheet model background color, navigate to **User Preferences >> View Options >> Sheet Background** and select the preferred color.

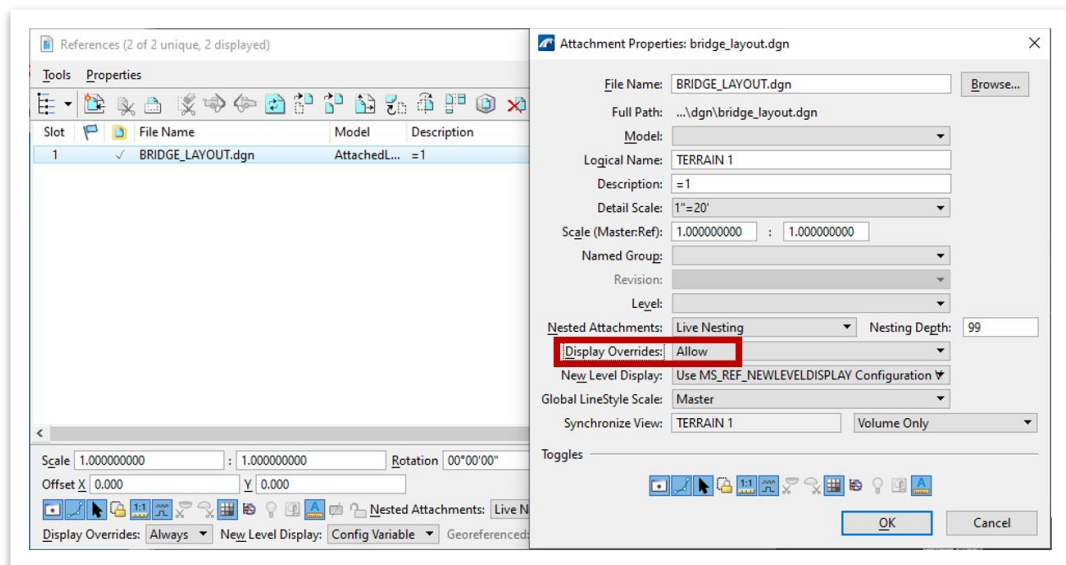


9. This will conclude the exercise, however, in the actual plans production process, you would complete the following:
  - a. The scales in the titles under each view should populate to with the scale of each respective view (1" = 20'). However, if the scales do not automatically populate but instead match what is shown below, one additional step must be added.



One at a time, open each of the drawing models--first the **PLAN** drawing model and then the **TERRAIN** one. After each has been opened, return to the sheet model, where the scales will now be populated in the titles.

- b. Enter the **PLAN** drawing model and add all annotations and dimensions.
- c. 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.
- d. Turn off undesired levels 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 by clicking **File >> Save Settings** or **(Ctrl+F)**.



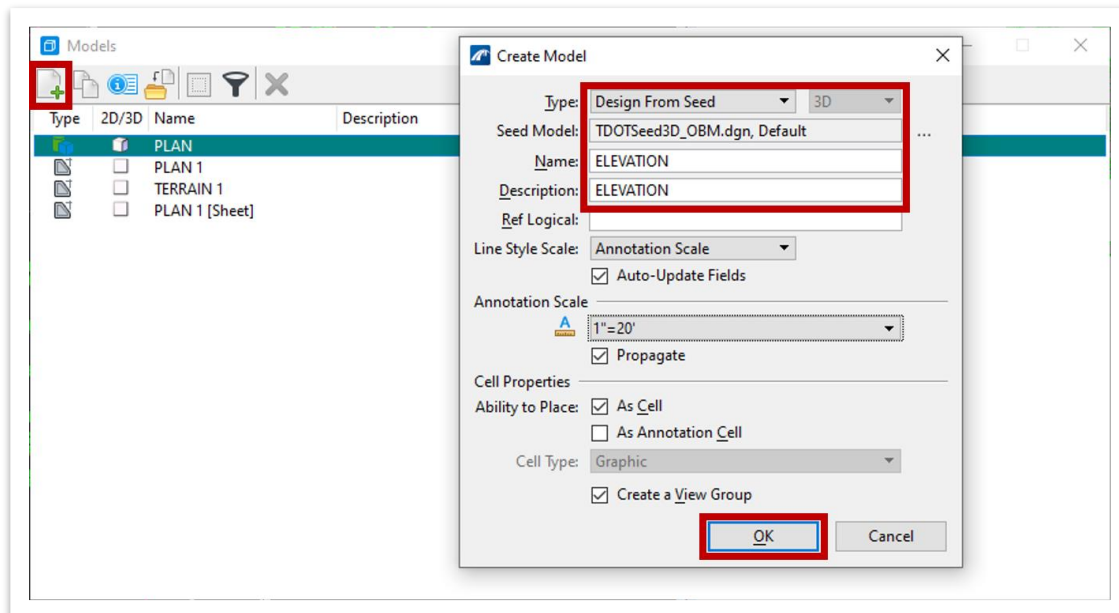




### 3.2.4 Exercise: Create Bridge Elevation View and Add to Sheet Model

In this exercise, we will add an elevation view of the bridge to the previously created sheet model that contains the plan view and terrain elevation view. The bridge elevation view will be created using the **Section Callout** tool.

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** window then:
  - a. Click on **Create Model**.
  - b. Set the **Type** to "Design From Seed" which will automatically select the correct model in the **Seed Model** data field.
  - c. Change the **Name** and **Description** fields to "ELEVATION."
  - d. Once everything within the **Create Model** window matches, click **OK** and the ELEVATION design model will be created in the dgn.

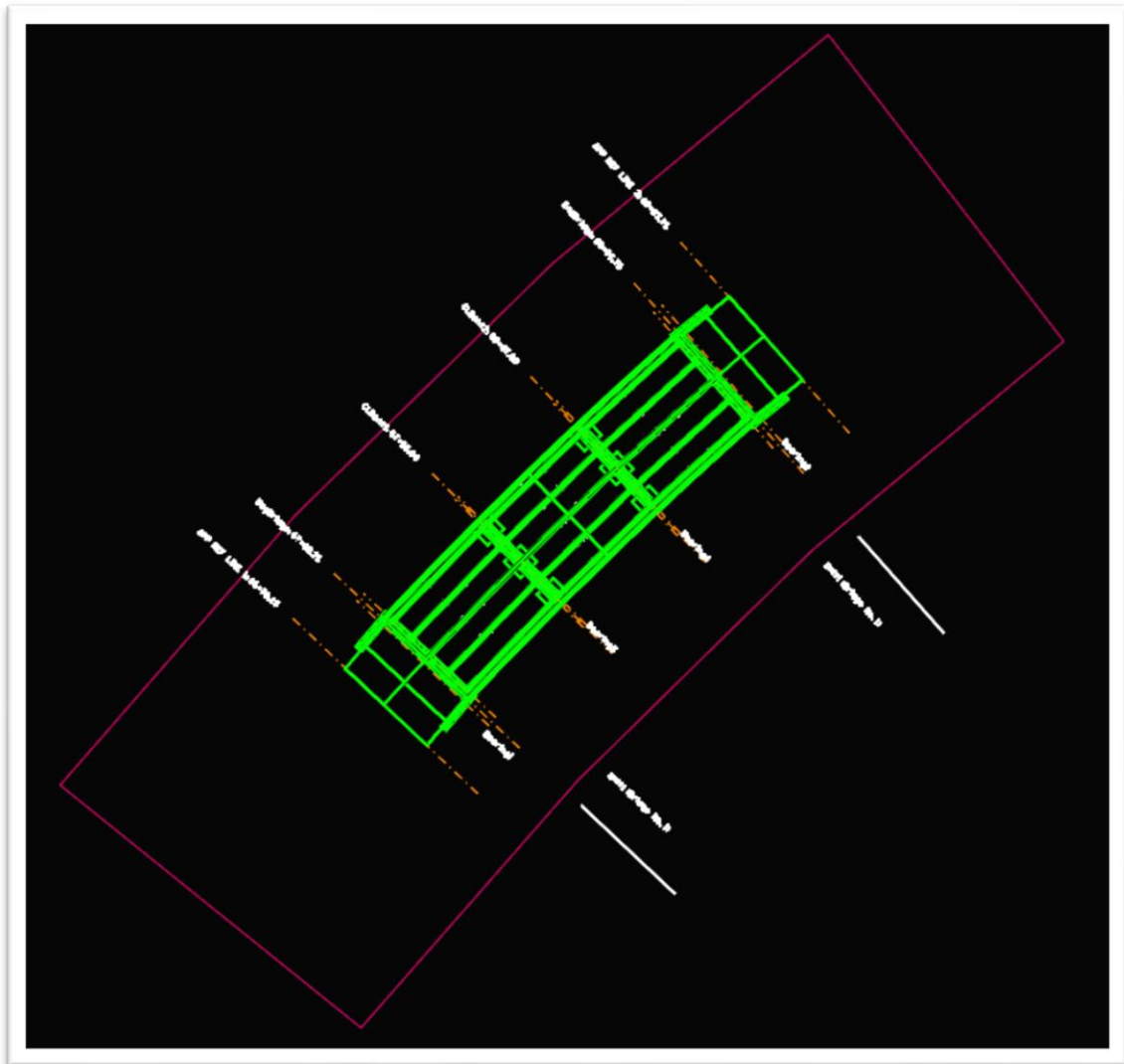




2. Once the **ELEVATION** design model opens, close **View 2** and maximize **View 1**. Open your Reference manager and attach the following models:
  - a. The main bridge model: **123456.00\_OBM\_Plans\_TR.dgn**
    - i. **Model:** Default
    - ii. **Nested Attachments:** No Nesting
    - iii. Click **OK** to attach the bridge model.
  - b. The sheet file: **BRIDGE\_LAYOUT.dgn**
    - i. **Model:** PLAN
    - ii. **Nested Attachments:** No Nesting
    - iii. Click **OK** to attach the **PLAN** model.

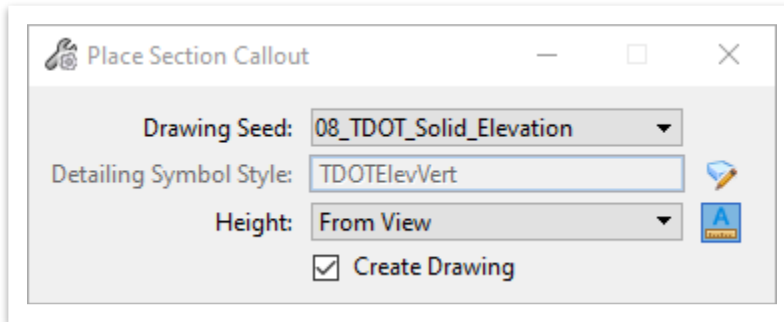
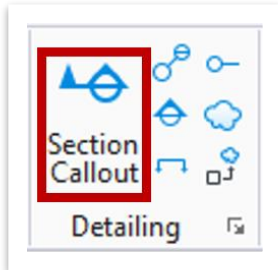


3. Once your files are referenced in, click **Fit View**, make sure you are in a top view, and you see what is shown below:



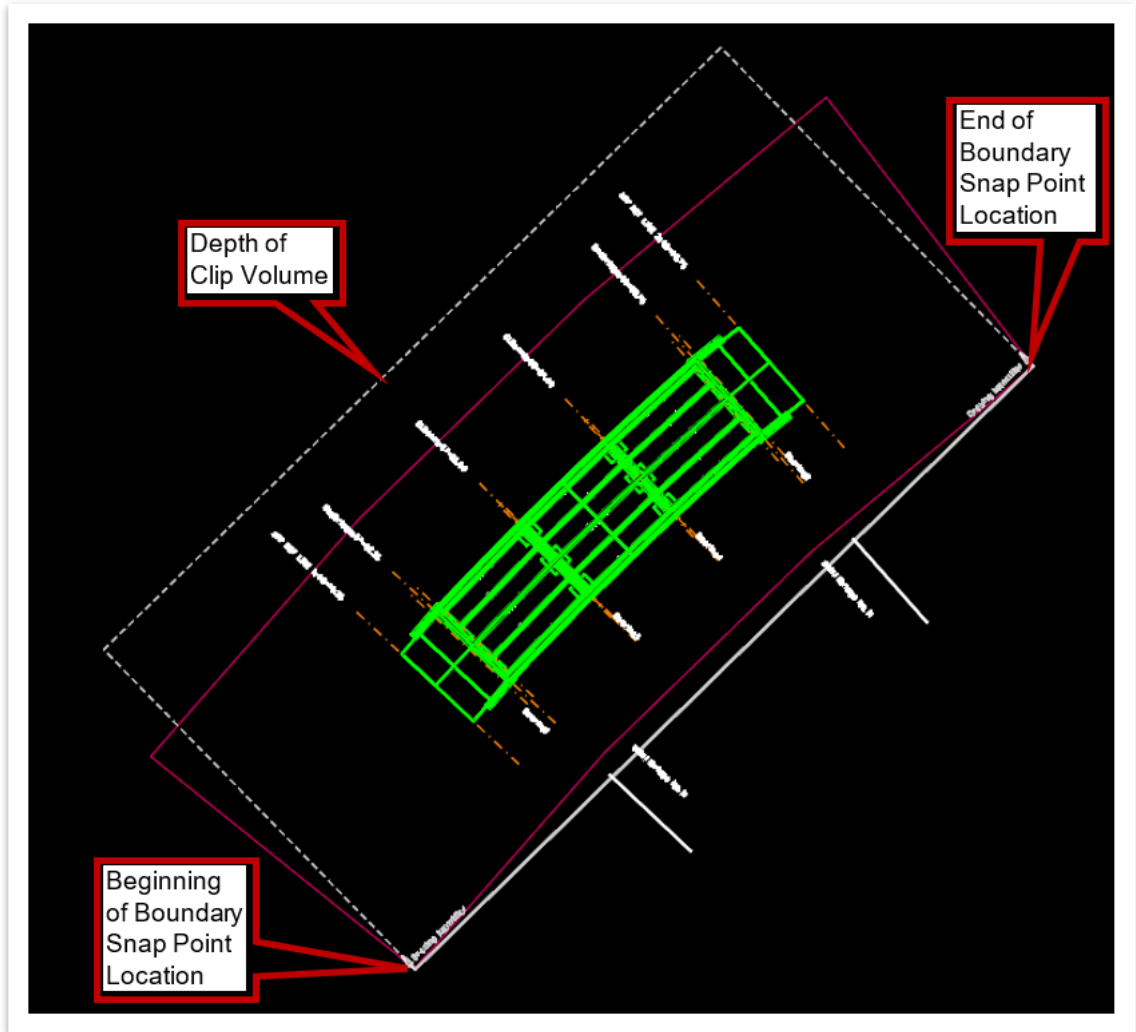


- The typical bridge elevation view shows the bridge from the side with “solid” elements, in the sense that we don’t see through elements like we do in wireframe. Because of this, we need to make sure we use a section callout seed file that used a “solid” display style. Access the section callout tool through **Drawing (Workflow) >> Annotate >> Detailing >> Section Callout**. Select the Drawing Seed of **08\_TDOT\_Solid\_Elevation** and check the Create Drawing box.





5. 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.





6. In the **Create Drawing** window, change the following settings:
  - a. **Name:** ELEVATION 1
  - b. **Drawing Annotation Scale:** 1" = 20'
  - c. Toggle off the **Create Sheet Model** box so a sheet model is not automatically created for this section. This will gray out the Create Sheet Model portion of the window.
  - d. Click **OK**.

**Create Drawing**

Name: ELEVATION 1

Drawing Seed: 08\_TDOT\_Solid\_Elevation

View Type: Section

Discipline: Structural

Purpose: Section View

Create Drawing Model

Seed Model: TDOT Structures Detailing Seed\_OBM.dgnlib

Filename: (Active File)

Annotation Scale: 1"=20'

Visible Edges: Dynamic

Create Sheet Model

Seed Model: TDOT Structures Detailing Seed\_OBM.dgnlib

Filename: (Active File)

Sheets: (New)

Full Size 1 = 1

Drawing Boundary: (New)

Detail Scale: Full Size 1 = 1

Add To Sheet Index

Make Sheet Coincident

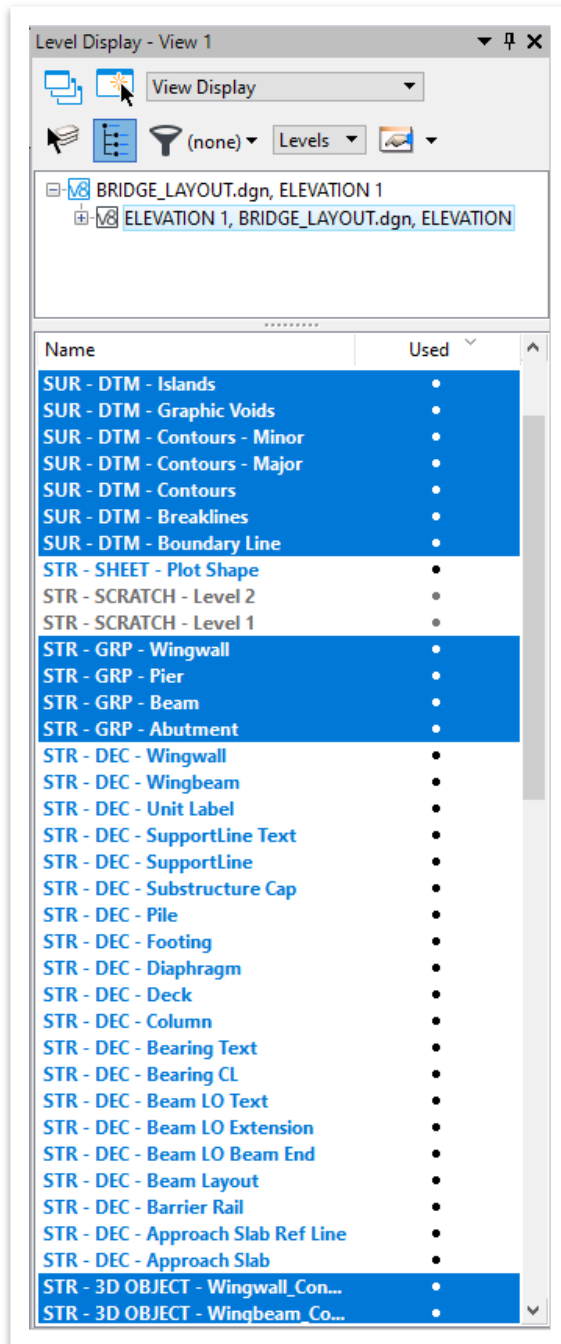
Replicate Drawing in Sheet File

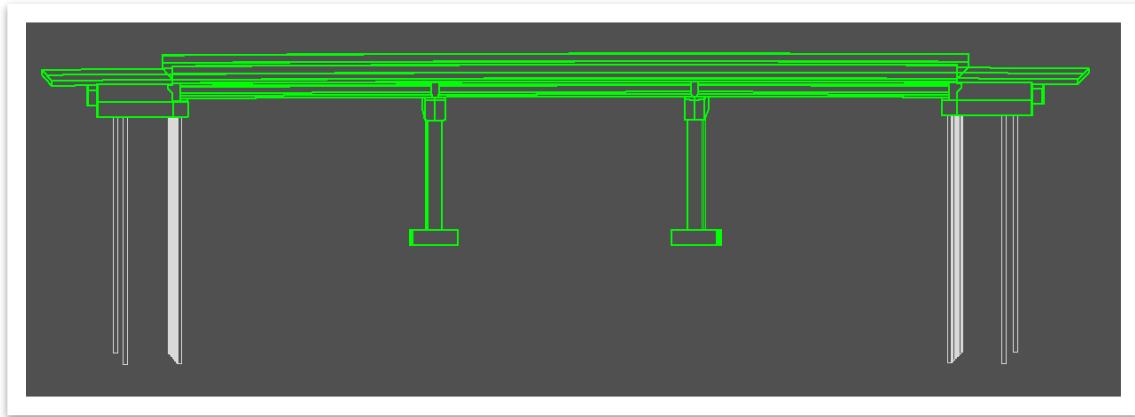
Open Model

**OK** Cancel

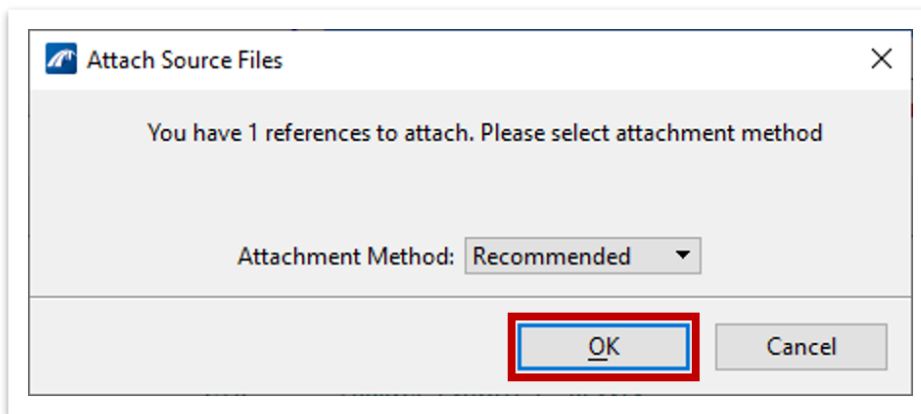


- Once the drawing model is created, open the **ELEVATION** design model you were just in, and open the Level Display. Turn off all the 2D Decor (DEC) levels as well as the **STR - SHEET - Plot Shape** level so that you only see the 3D bridge elements in the elevation view and save settings. These level 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.





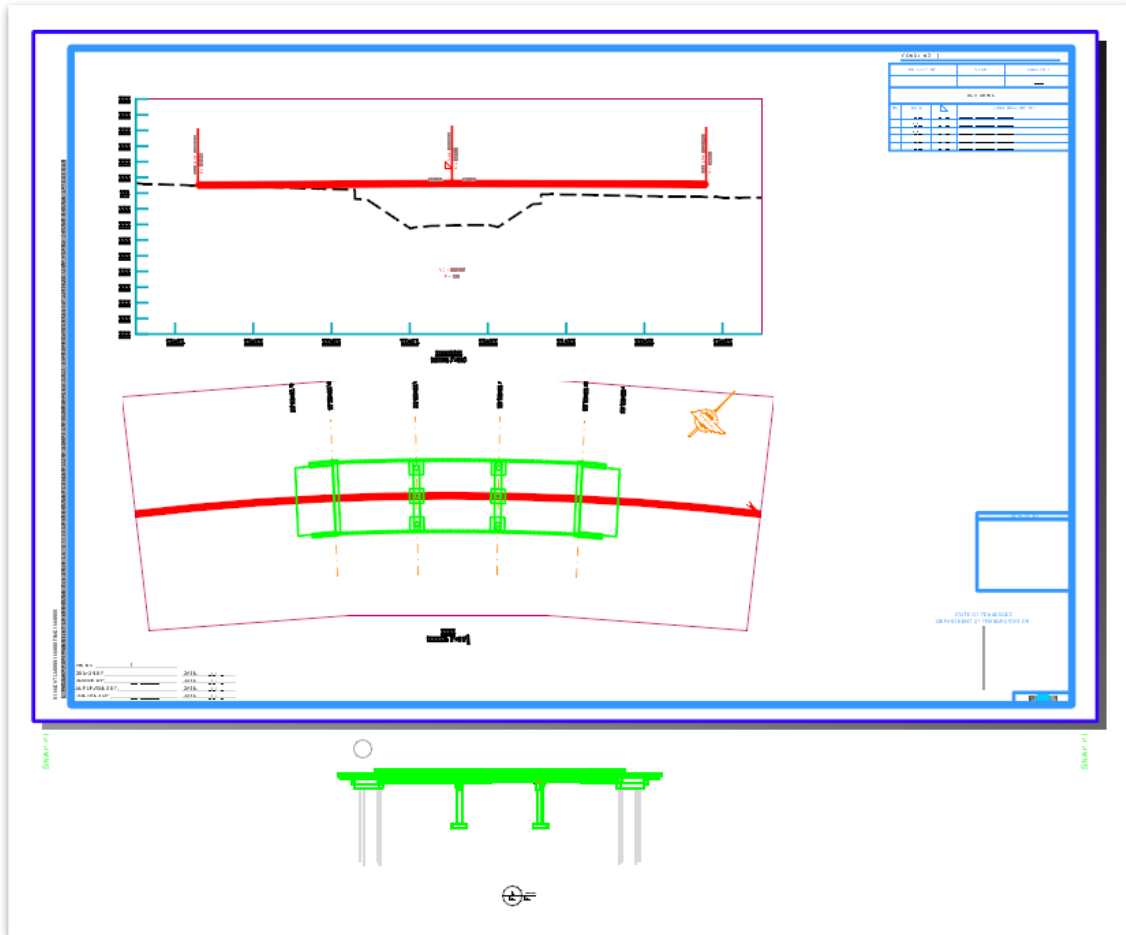
8. Open the **PLAN 1** sheet model and open the **Models** window. Then, click and drag the **ELEVATION 1** drawing model onto the sheet model.
9. Next the **Attach Source Files** window will automatically open. The Attachment Method should be set to **Recommended**. Click **OK**.





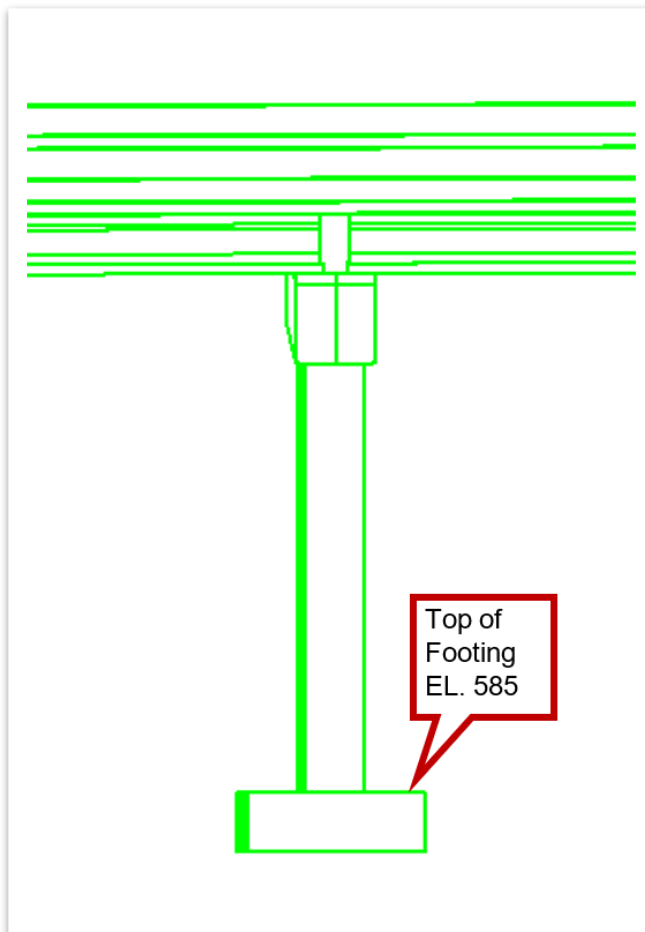


- Click on a point just below the sheet border. The elevation view will then be referenced into the sheet model as shown below.



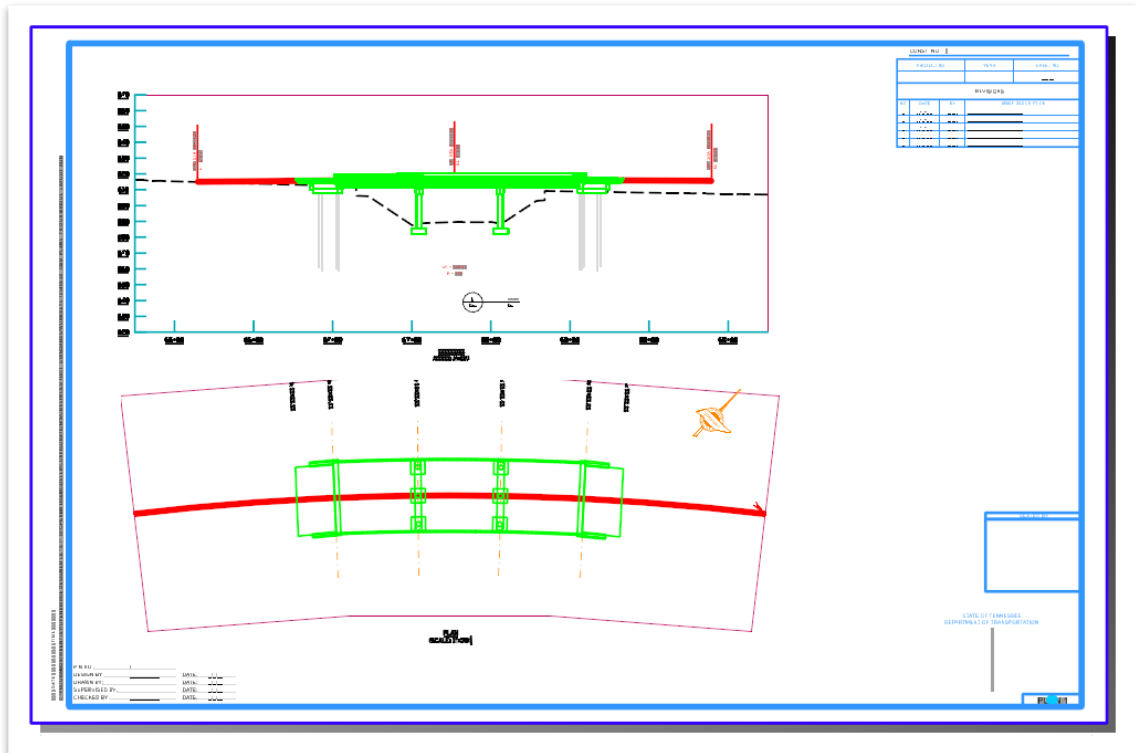


11. Right click and hold on the **ELEVATION 1** reference and use the **Move Reference** command, snap to an element on the **ELEVATION 1** reference you can line up with the plan view (begin of left/first approach slab), lock in your Accudraw compass (**Enter**) so that the reference can only be moved horizontally, and snap to the same point on that element in the plan view to line up the elevation view horizontally.
12. 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 (all bent footing have a top of footing elevation of El. 585'), 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.





13. The final sheet should look like the following image.





### 3.3: Create a Superstructure Sheet with a Deck Section

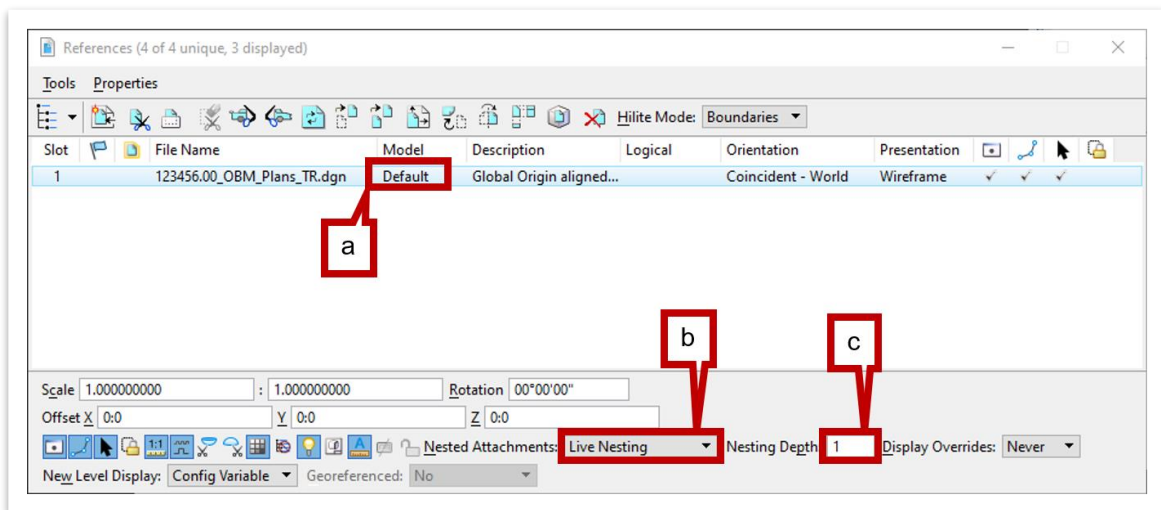
In the following exercises, we will create a superstructure sheet with a deck section depicting half of the deck at a bent and the other half of the deck section at midspan. Once this view is created, we will create a detail view showing an isolated overhang detail.

#### 3.3.1 Exercise: Create a Typical Cross Section and Sheet

In this exercise, we will create a superstructure sheet with a deck section to be used in the Superstructure sheet by using the **Section Callout** tool.

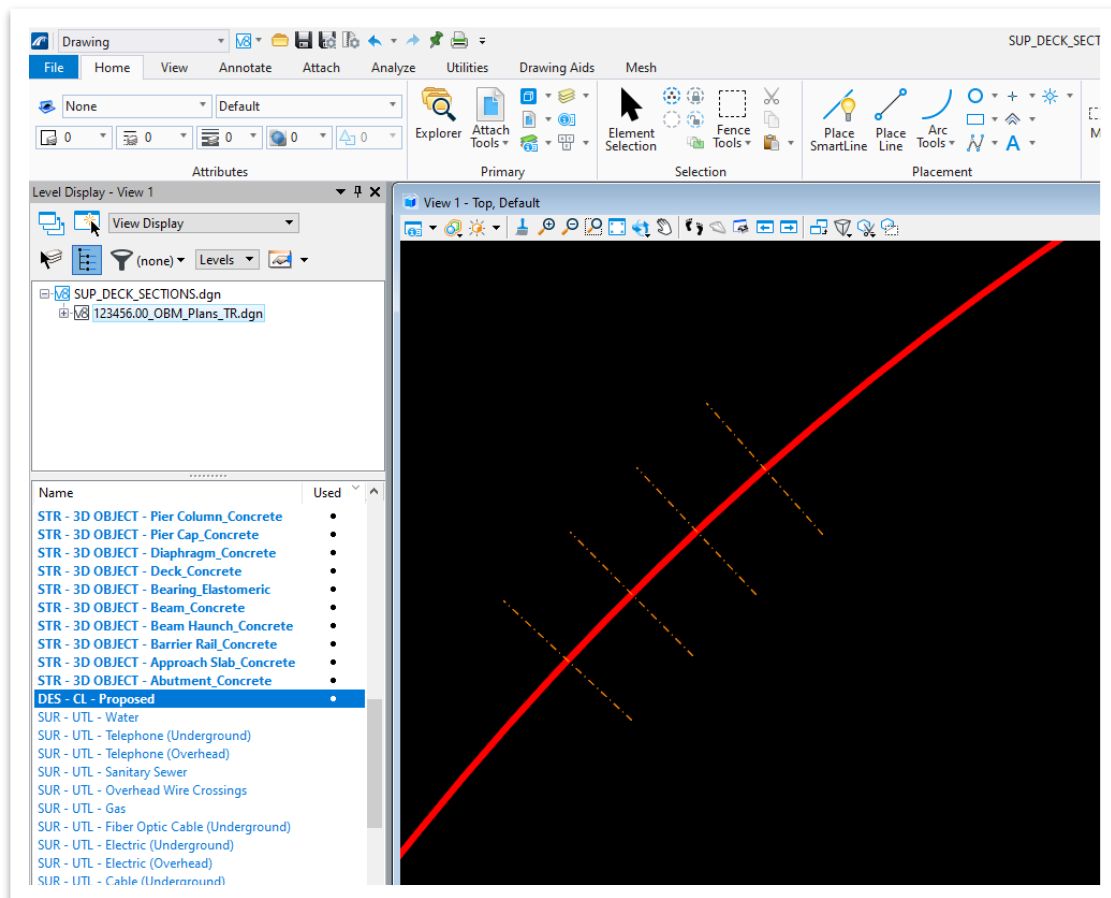
1. Begin by creating a **New File** to use for this sheet file and name it: **SUP\_DECK\_SECTIONS**. Select the **TDOTSeed3D\_OBM.dgn** seed file and click **Save**. **Note:** Save this file in **dgn** folder under the **123456.00\_OBM\_Plans\_TR** WorkSet

2. Go into the References window and attach the main bridge model file **123456.00\_OBM\_Plans\_TR.dgn**
3. Update the settings for the main bridge model reference as shown below.
  - a. **Model:** Default
  - b. **Nested Attachments:** Live Nesting
  - c. **Nesting Depth:** 1

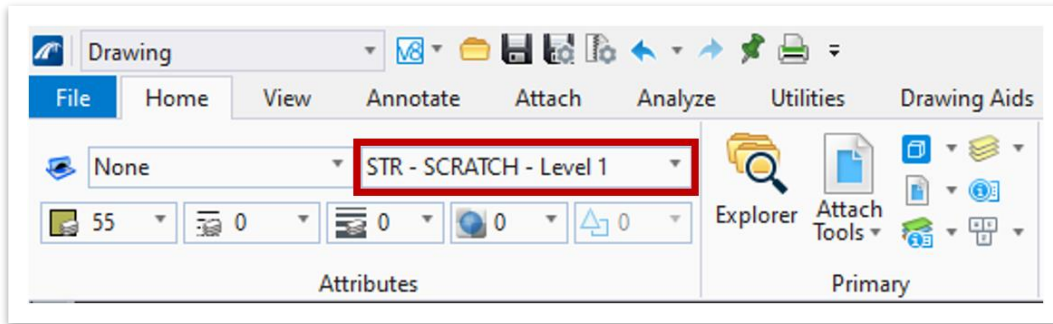




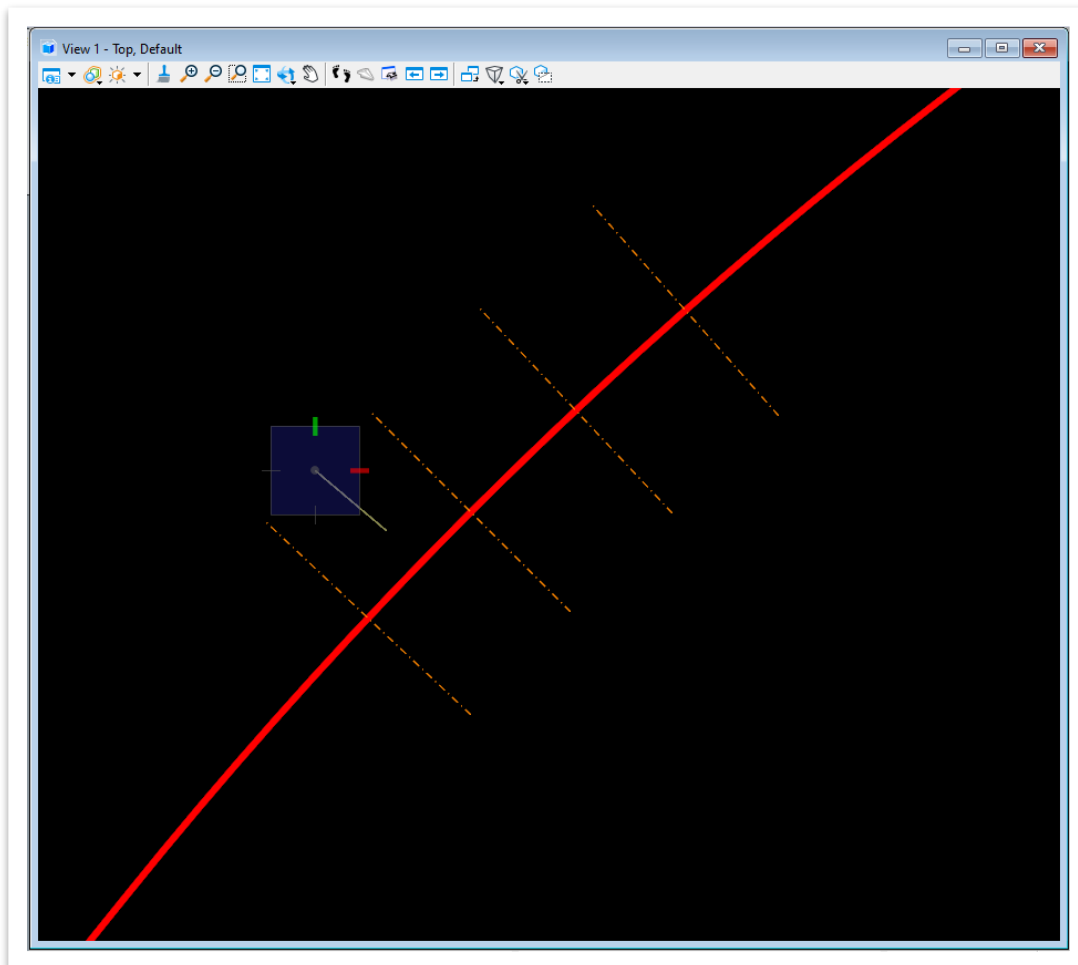
4. Once attached, click the **Fit View** tool at the top of the view window, then click within the view window to fit the reference within the view. Locate the bridge and zoom in.
5. We will be using the **Section Callout** tool to create this deck section. However, to ensure that the section is cut perpendicular to the deck a construction line must be created. The simplest way to create a line perpendicular to the alignment is to first turn off all other levels besides the alignment and supportline levels.
6. With the **View 1** window set as active, open the **Level Display** window, and expand the **SUP\_DECK\_SECTIONS.dgn** drop-down. Select **123456.00\_OBM\_Plans\_TR.dgn**, and turn off all levels except the following:
  - STR - DEC - SupportLine
  - DEC - CL - Proposed



7. Set the active level to **STR - SCRATCH - Level 1** from the **Level** drop-down list found at **Drawing (Workflow) >> Home >> Attributes >> Level**.

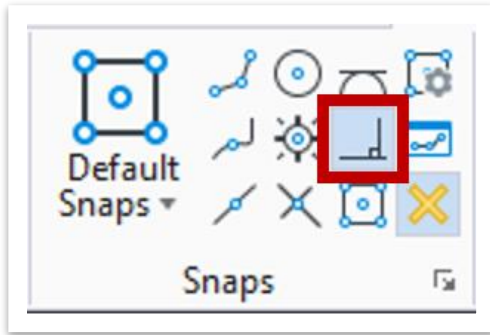


8. Next, navigate to **Drawing (Workflow) >> Home >> Attributes >> Place Line** tool so we can create a construction line.
9. Once the **Place Line** tool is active, click a point to the left of the alignment that is around midspan of Span 1.

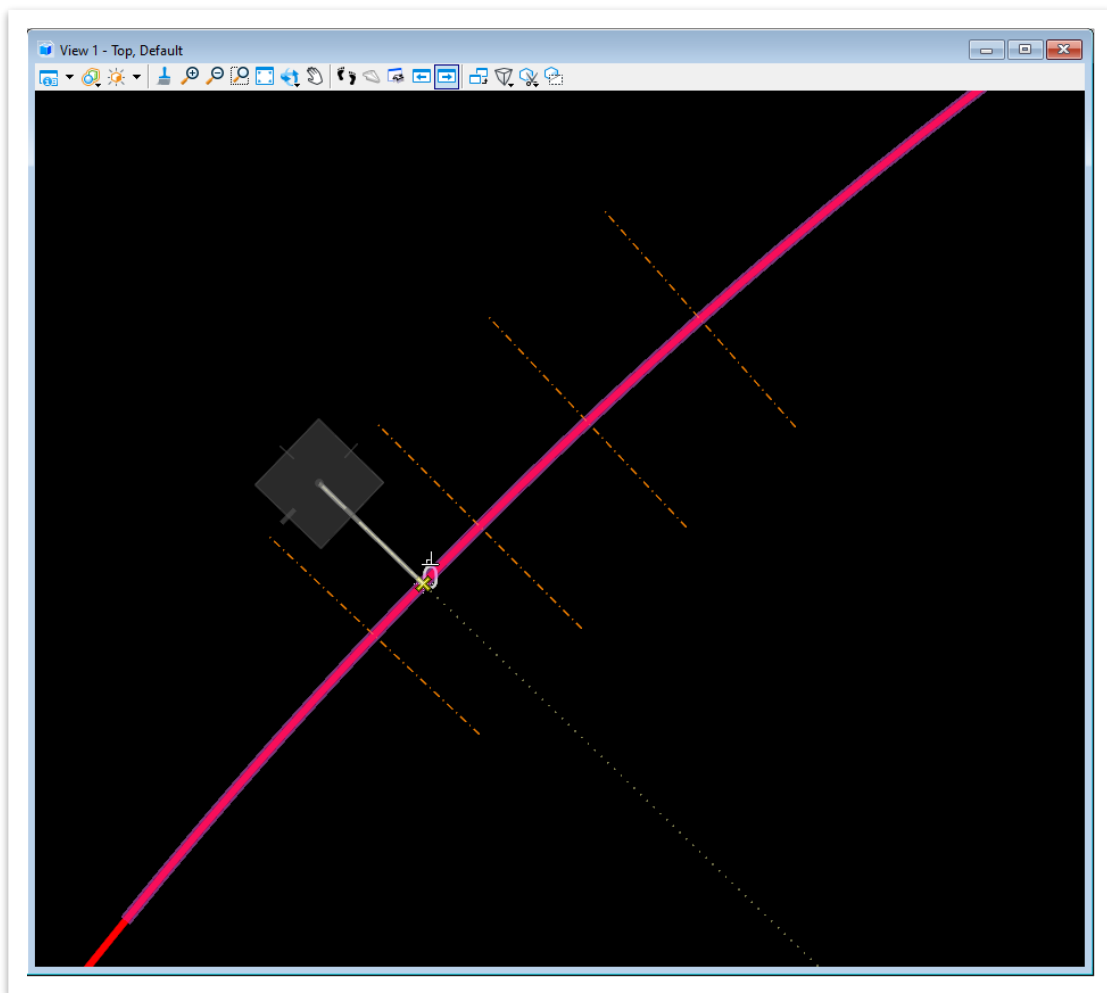




10. Before identifying the end of the line, navigate to **Drawing (Workflow) >> Drawing Aids >> Snaps** and select the **Perpendicular** snap mode.

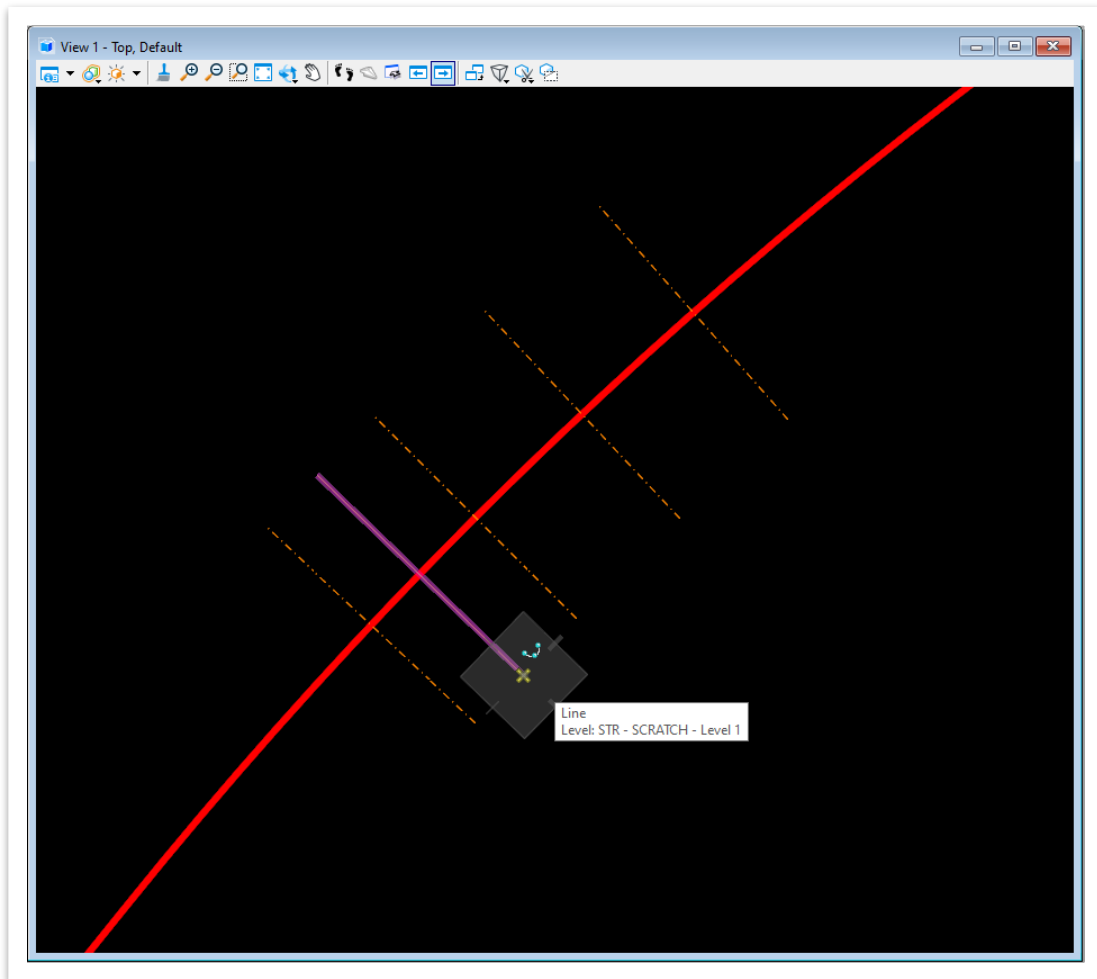


11. Then, click on the alignment to create a perpendicular line.

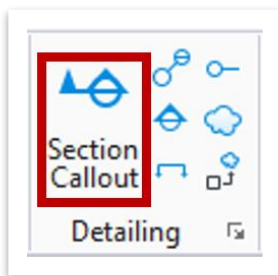




12. With a perpendicular line created, navigate to **Drawing (Workflow) >> Home >> Modify >> More >> Extend Line**. Then, extend the end of the line to a point beyond the alignment, as shown below.



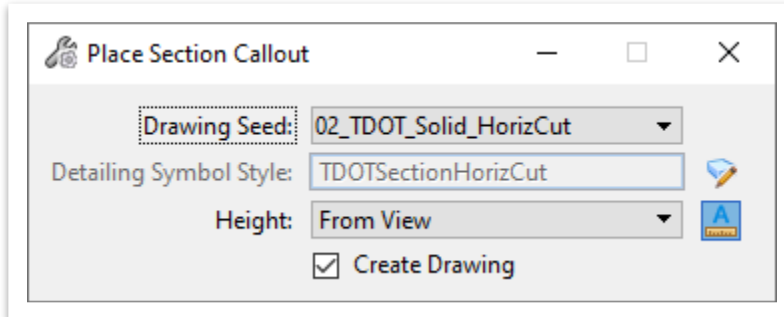
13. Now that a construction line has been accurately placed, open the **Level Display** window, and turn on all the levels in **View 1**.
14. To begin creating the Superstructure sheet, access the **Section Callout** tool found at **Drawing (Workflow) >> Annotate >> Detailing >> Section Callout**.



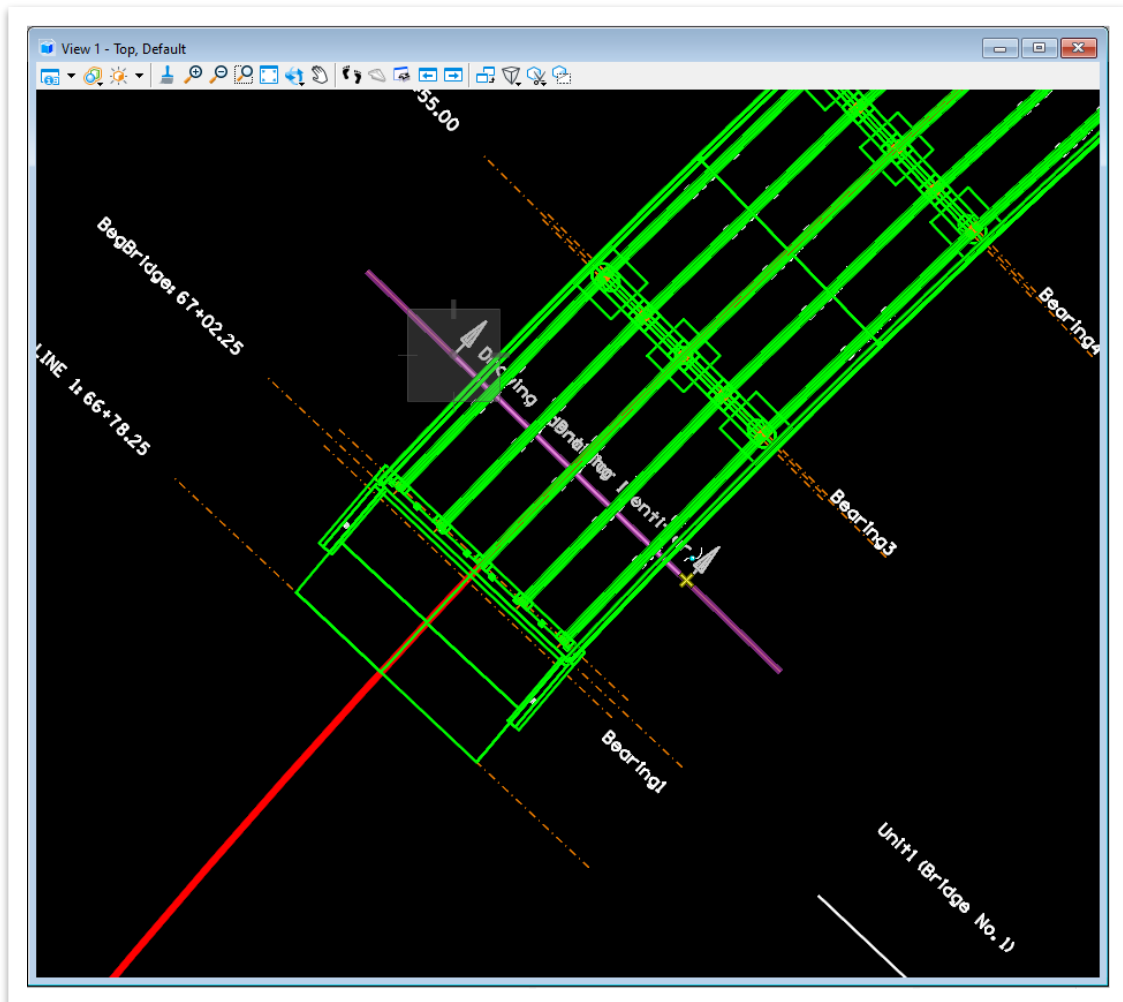




15. The **Place Section Callout** window will then open where the **02\_TDOT\_Solid\_HorizCut** Drawing Seed should be selected. Since there are no hidden or embedded elements, there is no need to display any hidden linework in the newly created view.

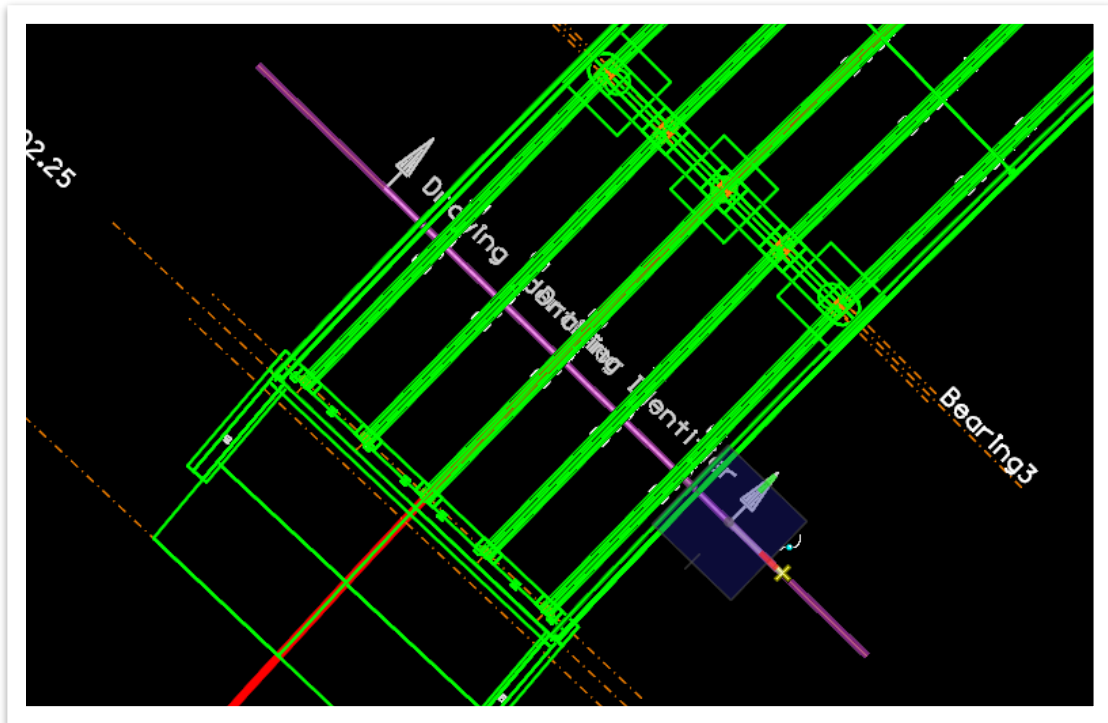


16. Define the start and end points of the cut on the construction line, on the left and right sides of the bridge deck respectively.





17. Then, click on a point on the construction line to define the direction as upstation and provide no depth to the cut.





18. In the **Create Drawing** window, change the following settings:
- Name:** Typical Cross Section
  - Drawing Annotation Scale:** 1/4' = 1'-0"
  - Sheet Detail Scale:** 1/4' = 1'-0"
  - Click **OK**.

**Create Drawing**

Name: Typical Cross Section

Drawing Seed: 02\_TDOT\_Solid\_HorizCut

View Type: Section

Discipline: Structural

Purpose: Section View

Create Drawing Model

Seed Model: TDOT Structures Detailing Seed\_OBM.dgnlib

Filename: (Active File)

1/4" = 1'-0"

Visible Edges: Dynamic

Create Sheet Model

Seed Model: TDOT Structures Detailing Seed\_OBM.dgnlib

Filename: (Active File)

Sheets: (New)

Full Size 1 = 1

Drawing Boundary: (New)

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

Add To Sheet Index

Make Sheet Coincident

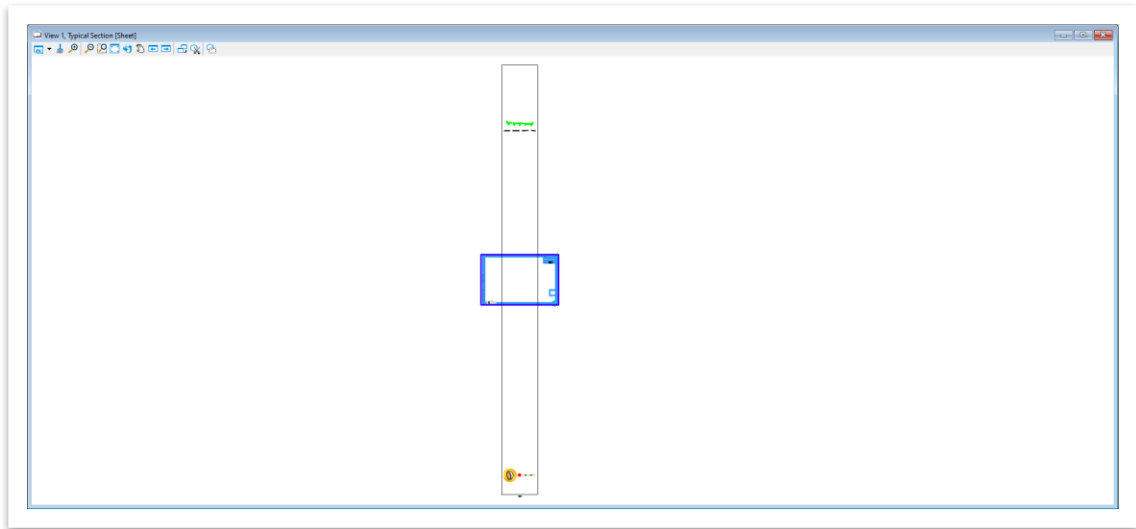
Replicate Drawing in Sheet File

Open Model

**OK** Cancel

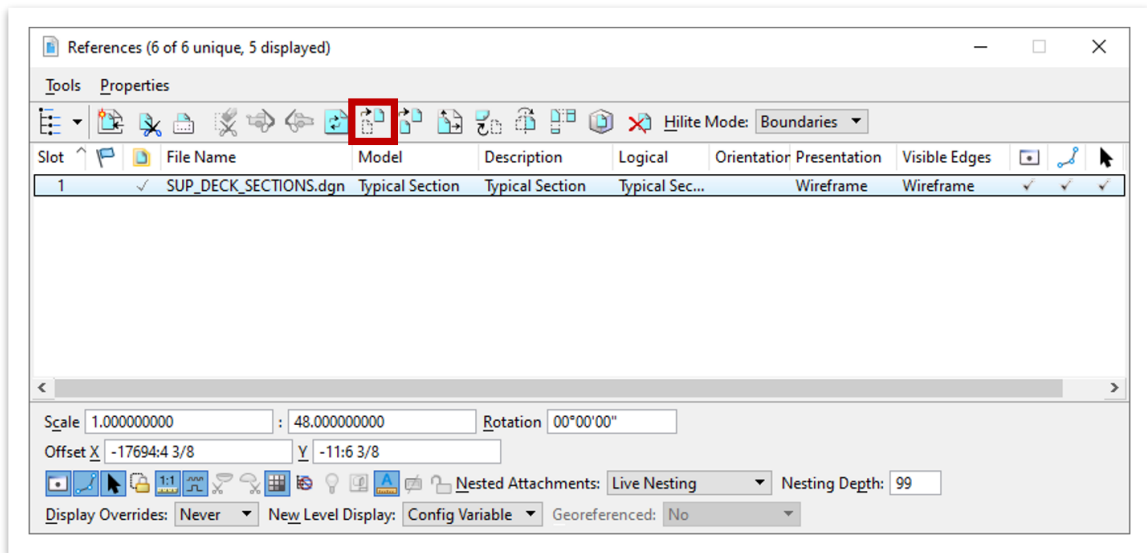


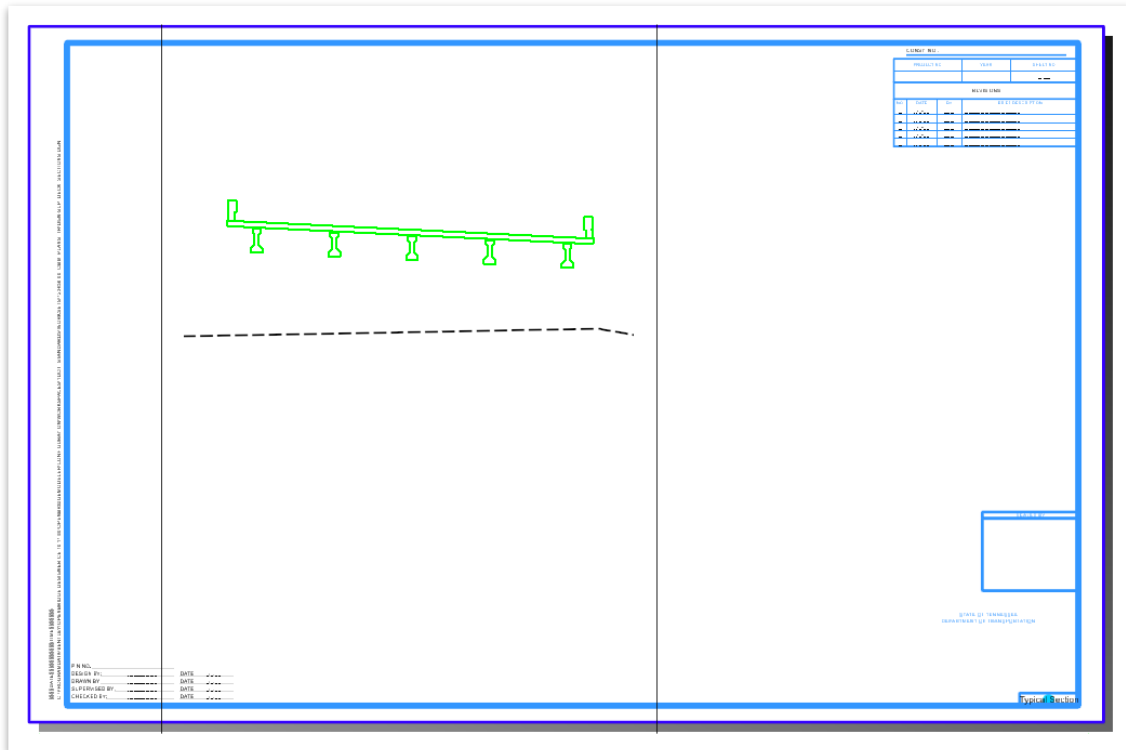
19. The sheet model with the elevation view will automatically open in the file.



20. Notice that the typical section will need to be moved as is not located in the sheet border. The model reference will need to be moved using the **Move Reference** tool at the top of the **References** window.

21. In the **References** window, highlight the reference that will be moved, as shown below. Then, click **Move Reference** and move the highlighted Typical Cross Section model reference inside of the border.

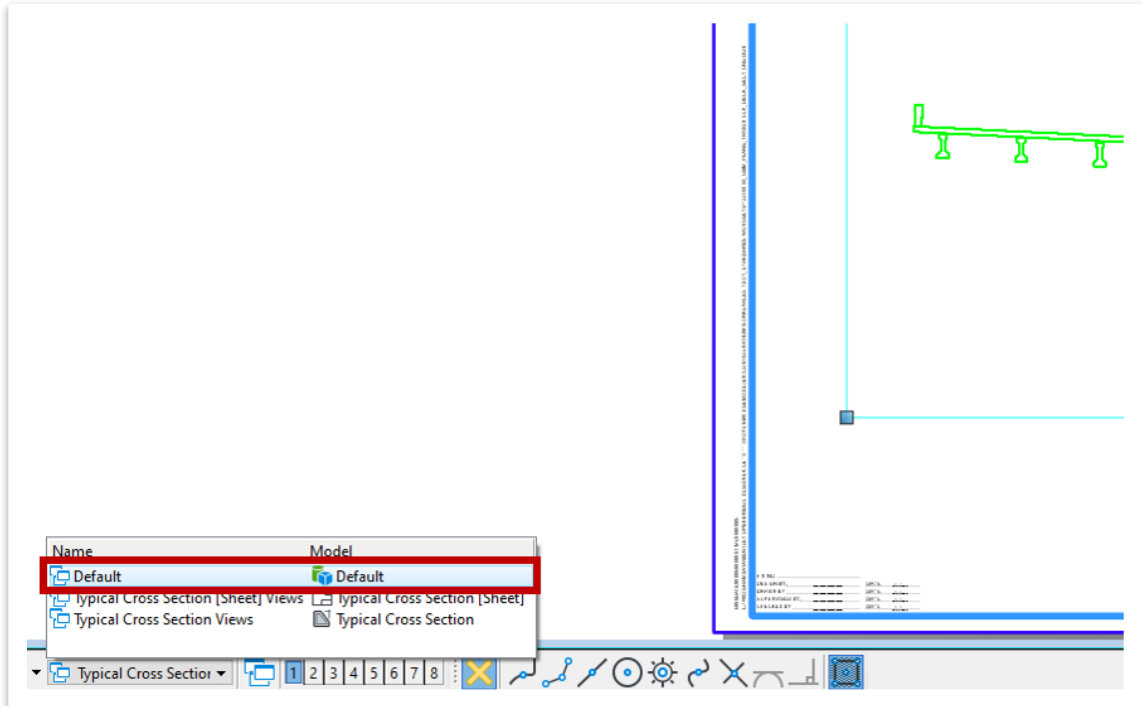




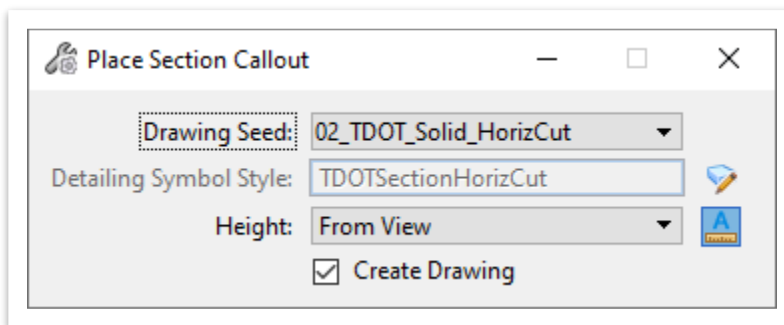
22. For this section, the 2D Decoration levels and existing groundline do not need to be visible and can be turned off. This level management must be completed in the **Typical Cross Section** drawing model.
23. Open the **Level Display** window and expand the drop-down. Select the **Typical Cross Section, SUP\_DECK\_SECTIONS.dgn** reference file, and turn off the following levels:
  - All “STR - DEC” levels
  - All “SUR - DTM” levels
  - DES - CL - Proposed
24. 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)**.



25. With the full deck section completed, a section at the typical bent is needed to depict the half of the typical cross section that is shown at a support. Therefore, we will return to the **Default** design model by clicking on it in the **Active View Groups** drop-down list.

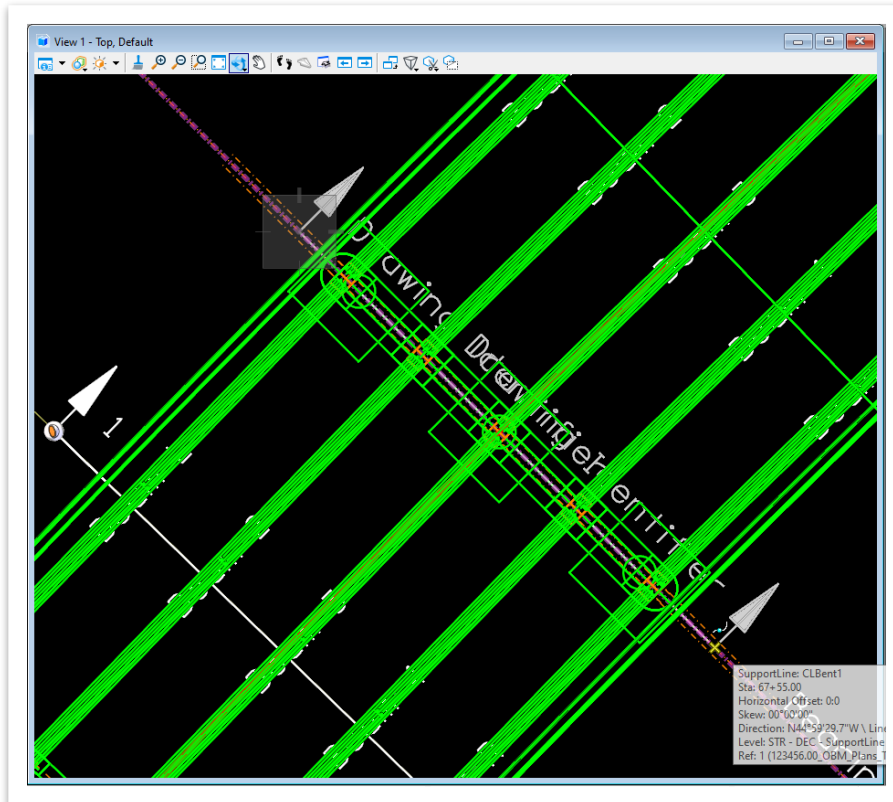


26. Access the **Section Callout** tool by navigating to **Drawing (Workflow) >> Annotate >> Detailing >> Section Callout**. The **Place Section Callout** window will then open where we will again select the **02\_TDOT\_Solid\_HorizCut** Drawing Seed since there are no hidden or embedded elements that need to be displayed.

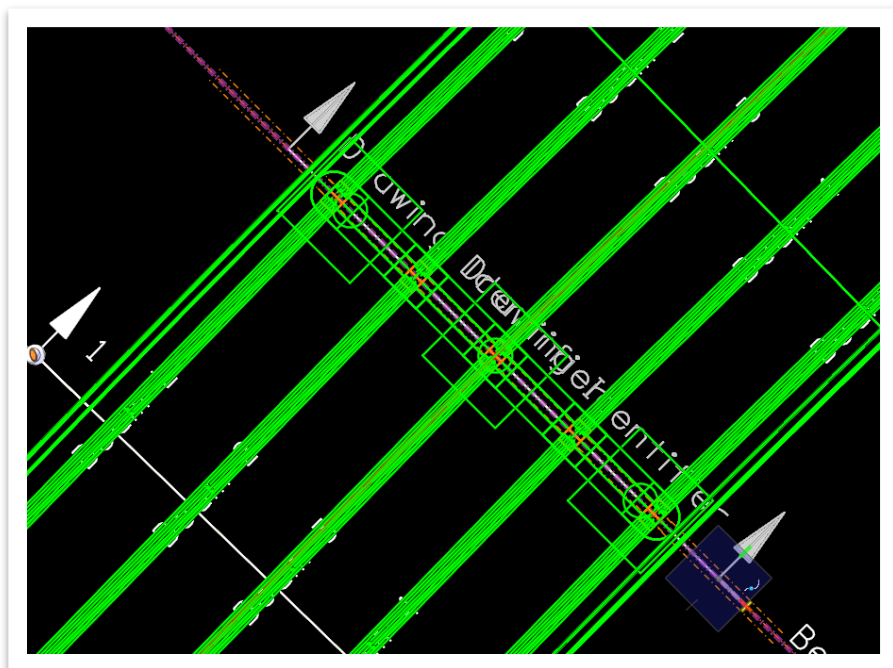




27. Define the start and end points of the cut on the SupportLine for Bent No. 1, on the left and right sides of the bridge deck respectively.

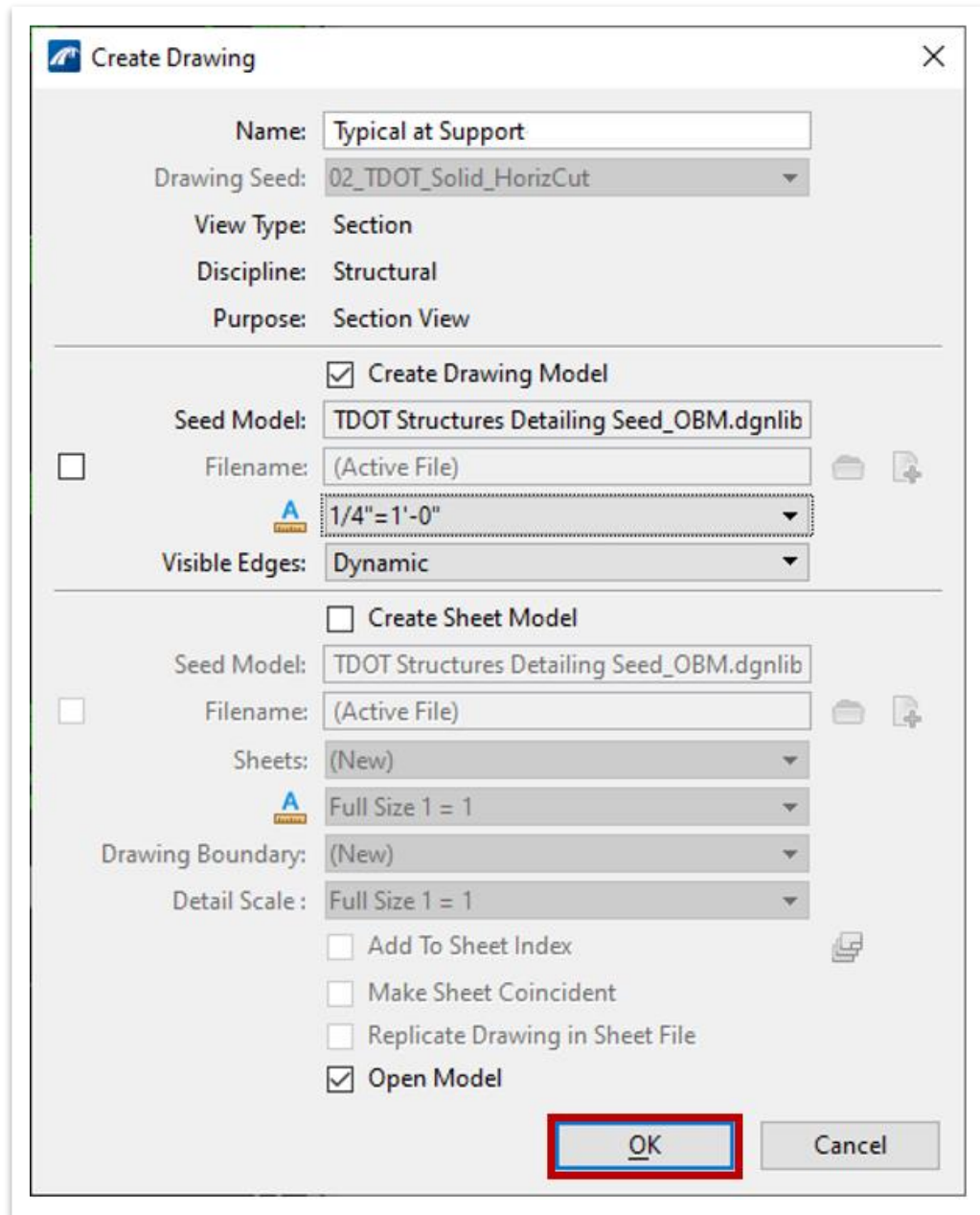


28. Then, click on a point on the SupportLine for Bent No. 1 to define the direction as upstation and provide no depth to the cut.





29. Once the **Create Drawing** window opens, change the following settings:
- Name:** Typical at Support
  - Drawing Annotation Scale:** 1/4" = 1'-0"
  - Toggle off the **Create Sheet Model** box so a sheet model is not automatically created for this section. This will gray out the Create Sheet Model portion of the window.
  - Click **OK**.



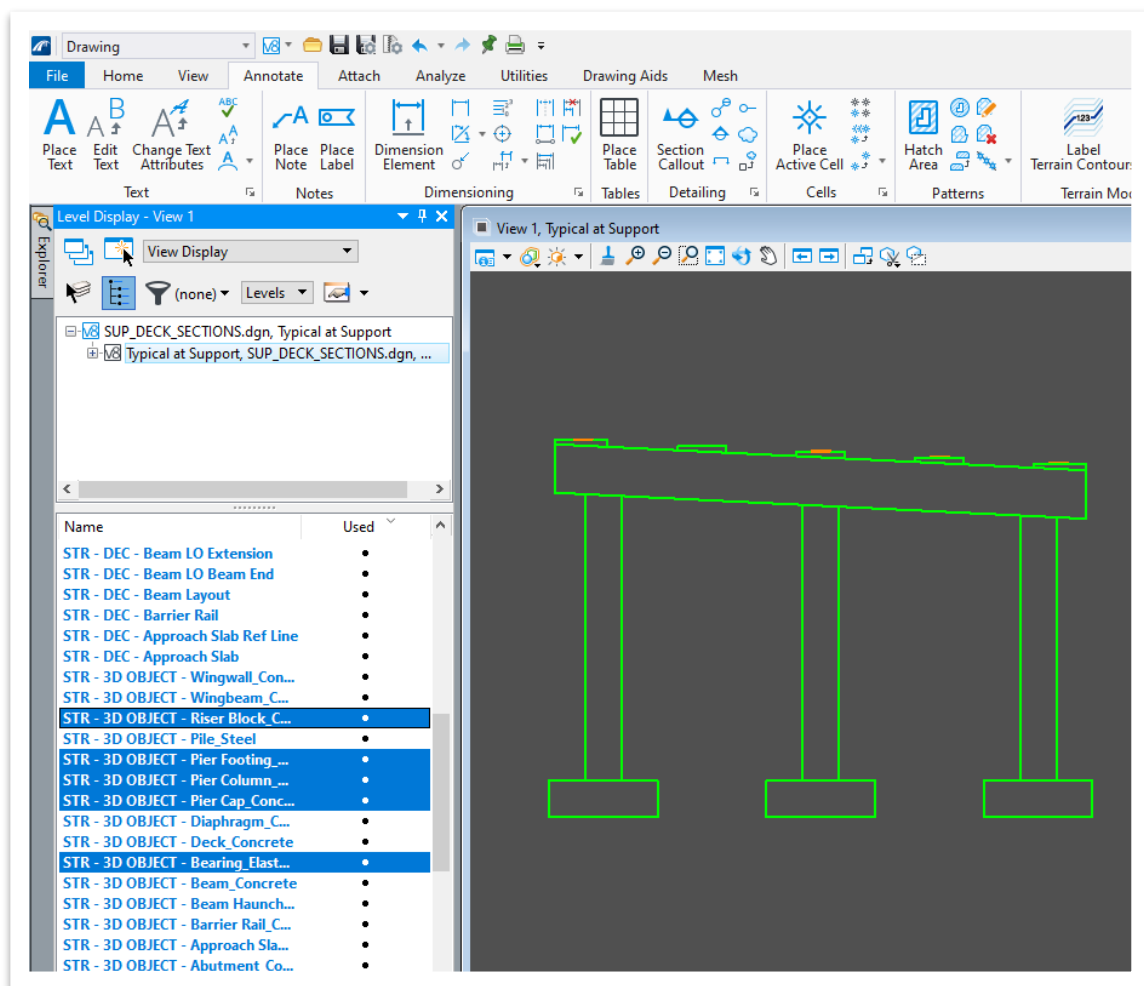




30. In the newly created **Typical at Support** drawing model, open the **Level Display** window, and expand the **SUP\_DECK\_SECTIONS.dgn** drop-down. Select **Typical at Support** and turn off all levels except the following:

- STR - 3D OBJECT - Riser Block\_Concrete
- STR - 3D OBJECT - Pier Footing\_Concrete
- STR - 3D OBJECT - Pier Column\_Concrete
- STR - 3D OBJECT - Pier Cap\_Concrete
- STR - 3D OBJECT - Bearing\_Elastomeric

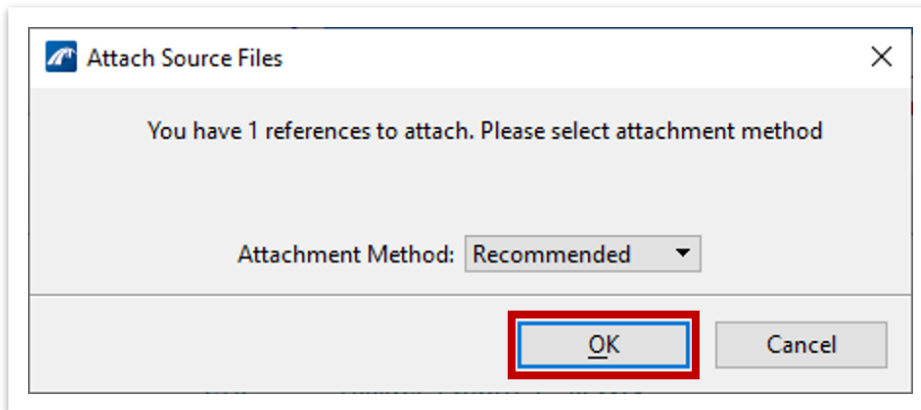
This will leave just the bent visible, which will be used in the Typical at Support half of the typical section.



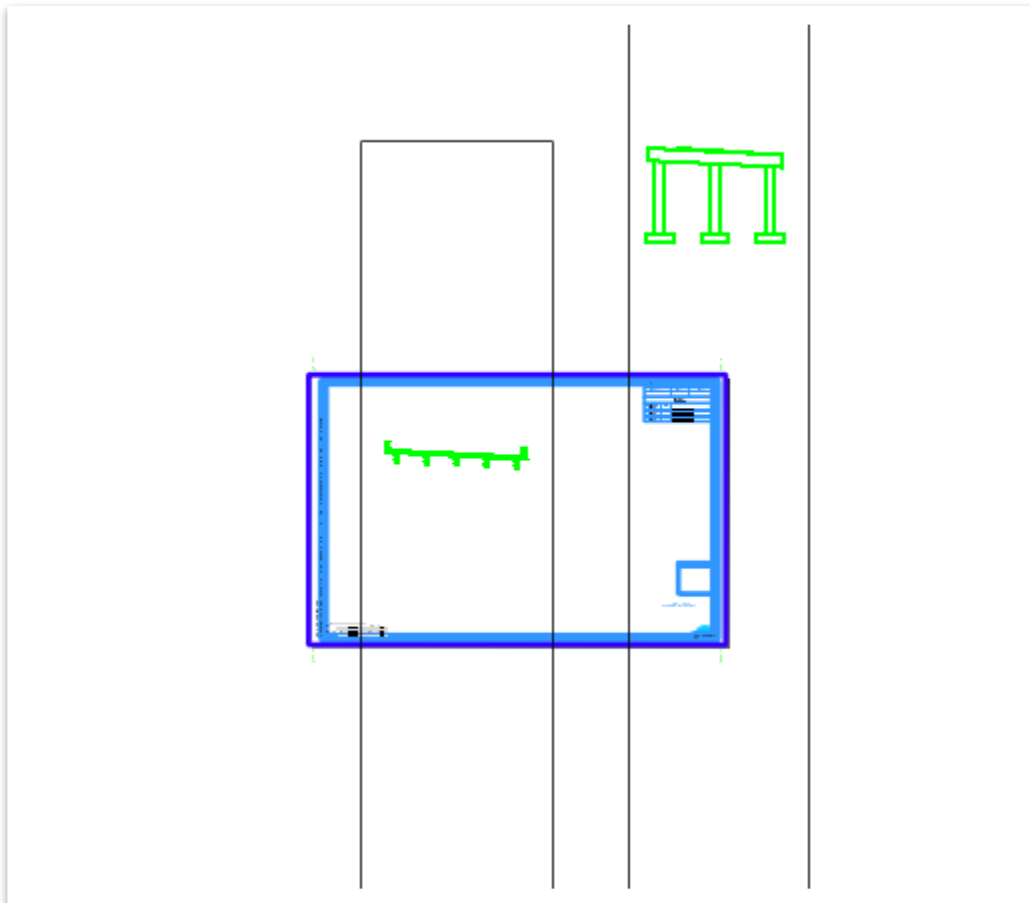
31. Return to the **Typical Cross Section [Sheet]** sheet model by clicking on it in the **Active View Groups** drop-down list so we can add the bent to the typical section.



32. Once back in the sheet model, open **Models** window by navigating to **Drawing (Workflow) >> Home >> Primary >> Models**. Click and drag the **Typical at Support** 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**. Click **OK**.

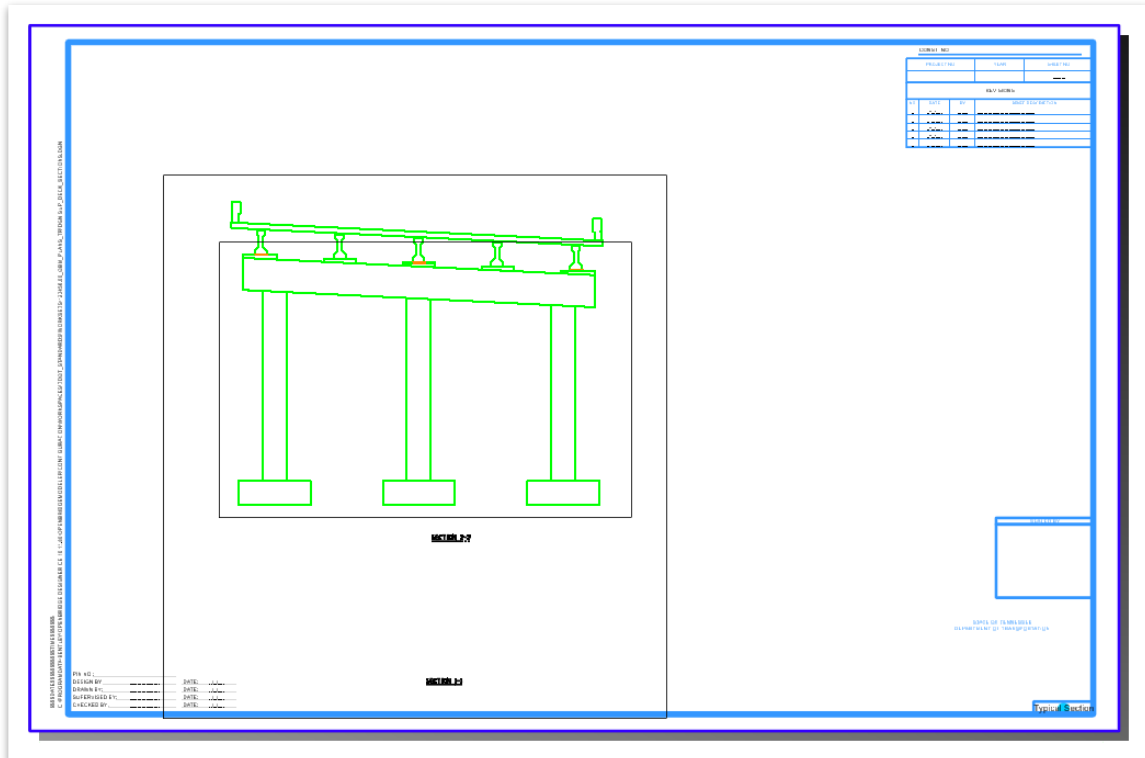


34. Next, click at the point within the border at which that the section will be placed.

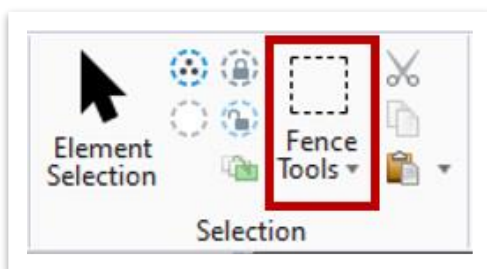




35. Once the Bent Section has been placed in this sheet model, use the **Move Reference** tool to position the leftmost beam riser of the **Bent Section** model reference directly below the leftmost beam, similar to the following image.

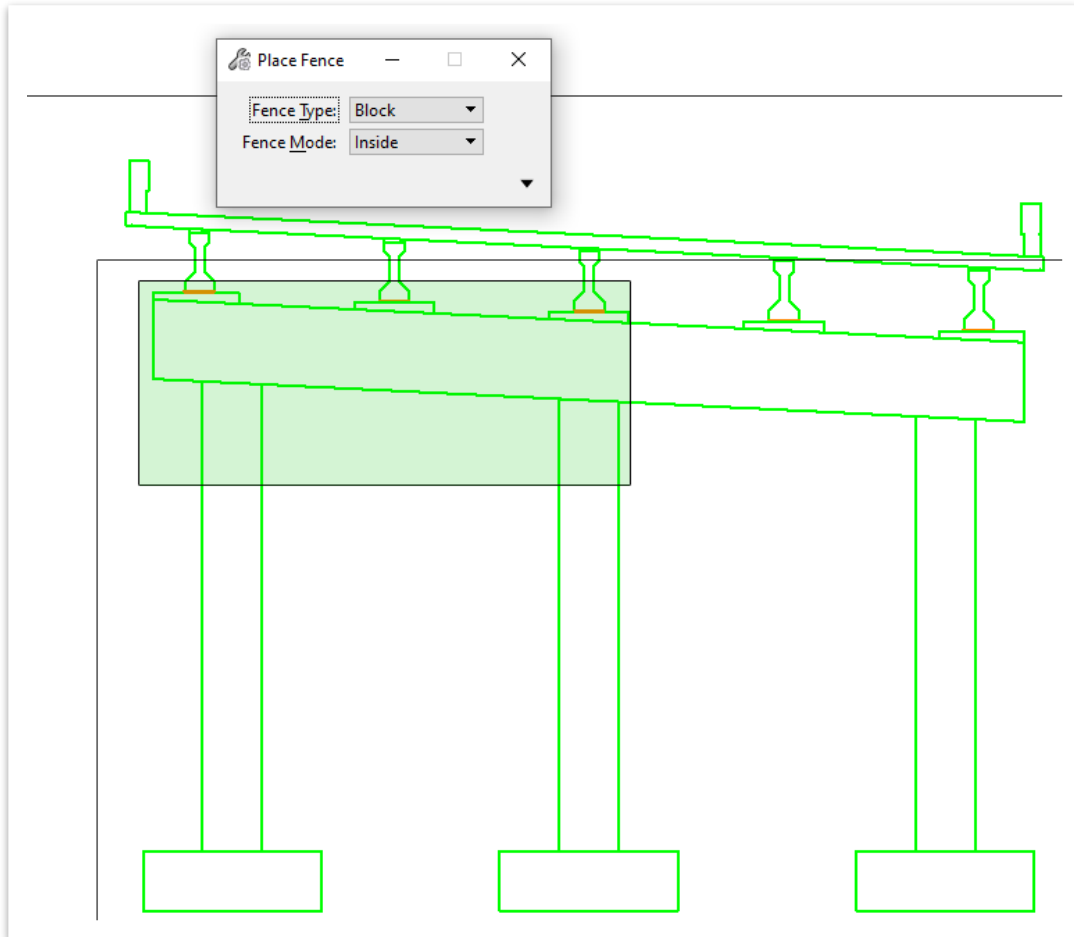


36. With the bent in place, the last modification is to clip the bent reference so that it is only shown on the left half of the section. First, we will set up the fence that will be used to clip the reference by navigating to **Drawing (Workflow) >> Home >> Primary >> Fence Tools >> Place Fence**.

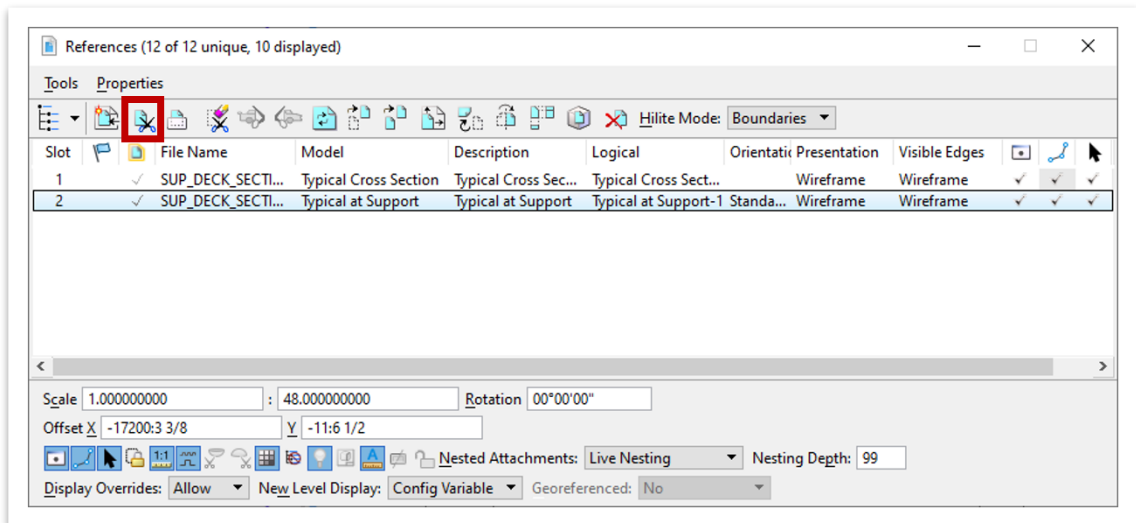




37. Place the fence so that it fully encompasses the left three beam risers and the top portion of the left two columns, as shown in the following image.

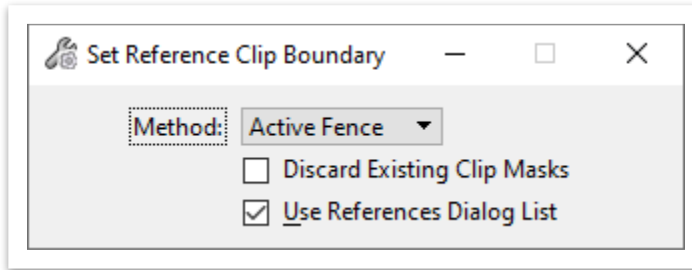


38. Open the **References** window and highlight the Bent Section model reference. Then, click on the **Clip Reference** tool at the top of the **References** window.

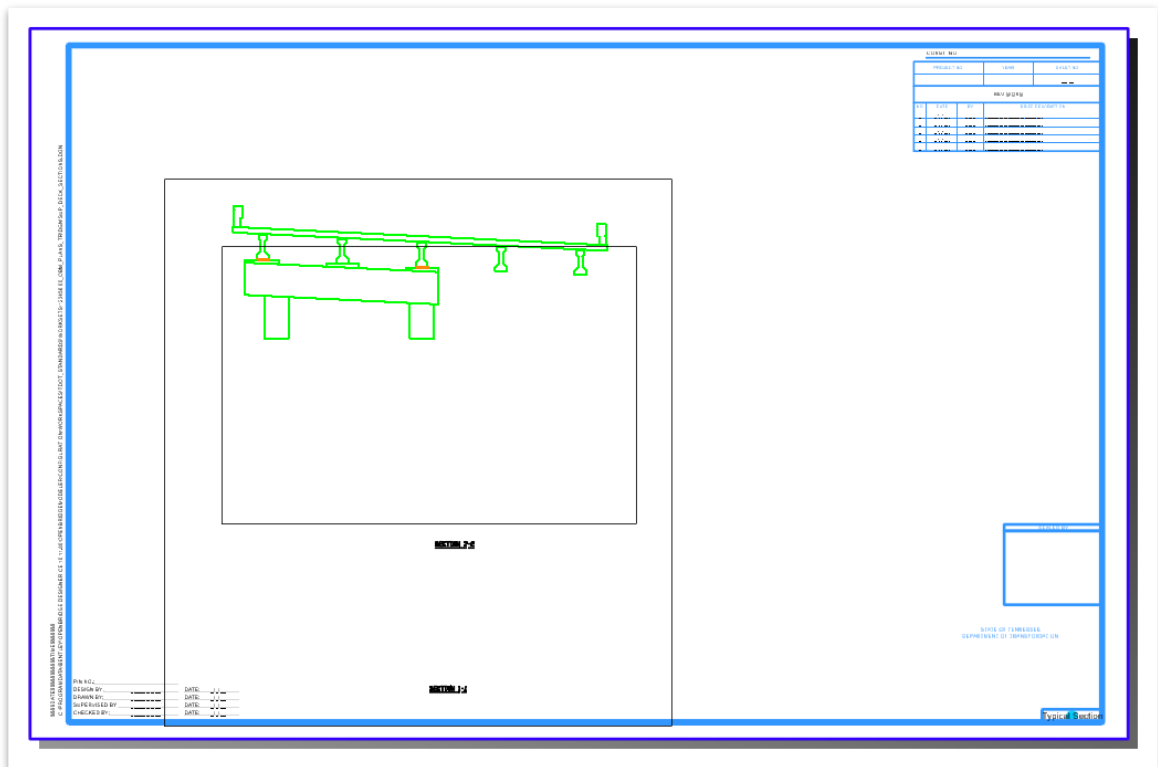




39. Use the **Active Fence** method when setting the clip boundary and click on the active fence to confirm the clip.



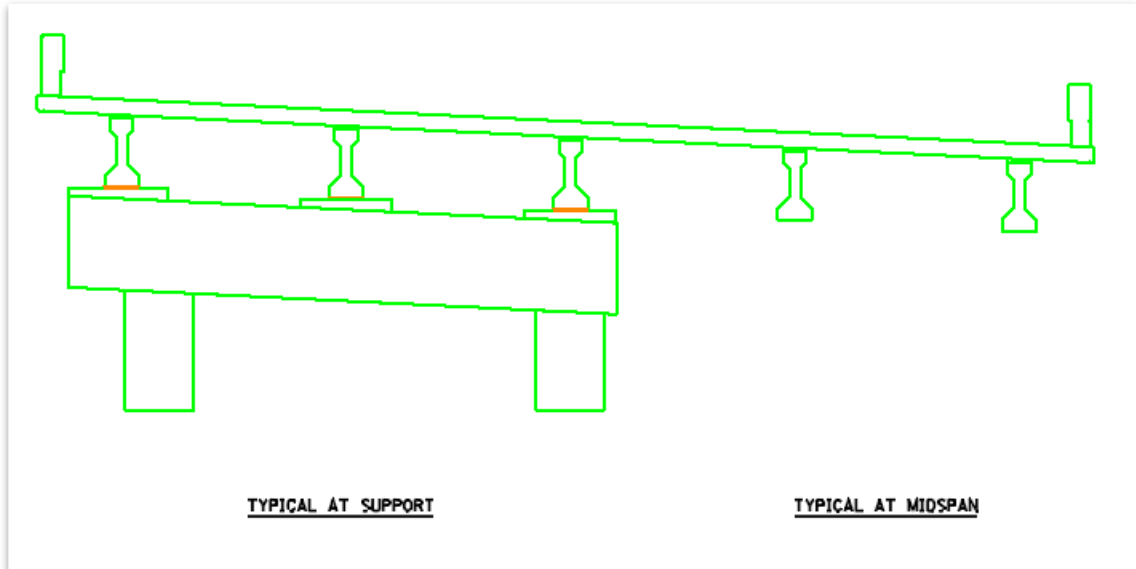
40. The sheet should now look like the image below.



41. Double click on each drawing boundary title annotations (**SECTION 1-1** and **SECTION 2-2**) and rename to **TYPICAL AT MIDSPAN** and **TYPICAL AT SUPPORT** respectively.



42. Use the **Move** tool to place the drawing boundary titles (i.e., TYPICAL SECTION AT SUPPORT) directly below their respective views. Navigate to **Drawing (Workflow) >> Home >> Manipulate >> Move** and then select the text to be moved. The text placement should look like the image below.



**Take Note!**

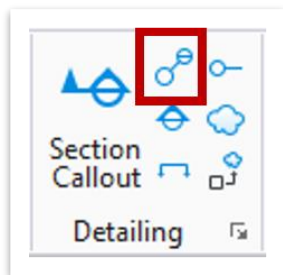
*In this example, the diaphragms are not modeled. However, because the diaphragms run from the bottom of the deck to the top of the bent cap no additional linework is required. The only thing that would need to be added for the diaphragm is the rebar within it, which can be drawn live into the typical cross section drawing model.*



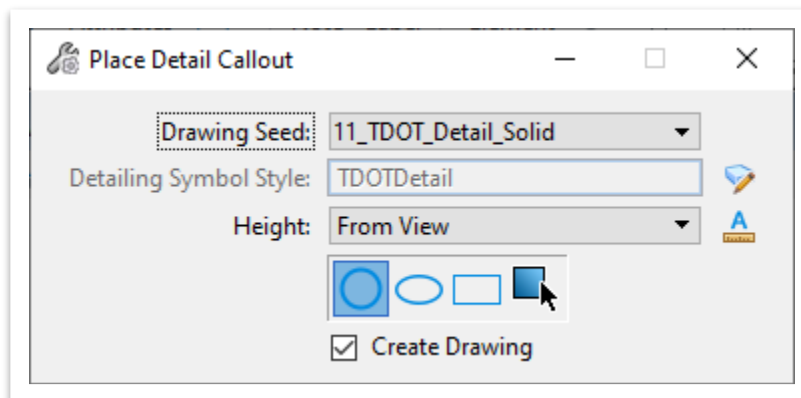
### 3.3.2 Exercise: Create a Deck Overhang Detail

In this exercise, we will create a deck overhang detail using the **Detail Callout** tool. This annotation will be completed in the sheet model to ensure that the detail bubble is visible in the plan sheet when printed. The additional view will be created in the previously created sheet file named **SUP\_DECK\_SECTIONS.dgn**.

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

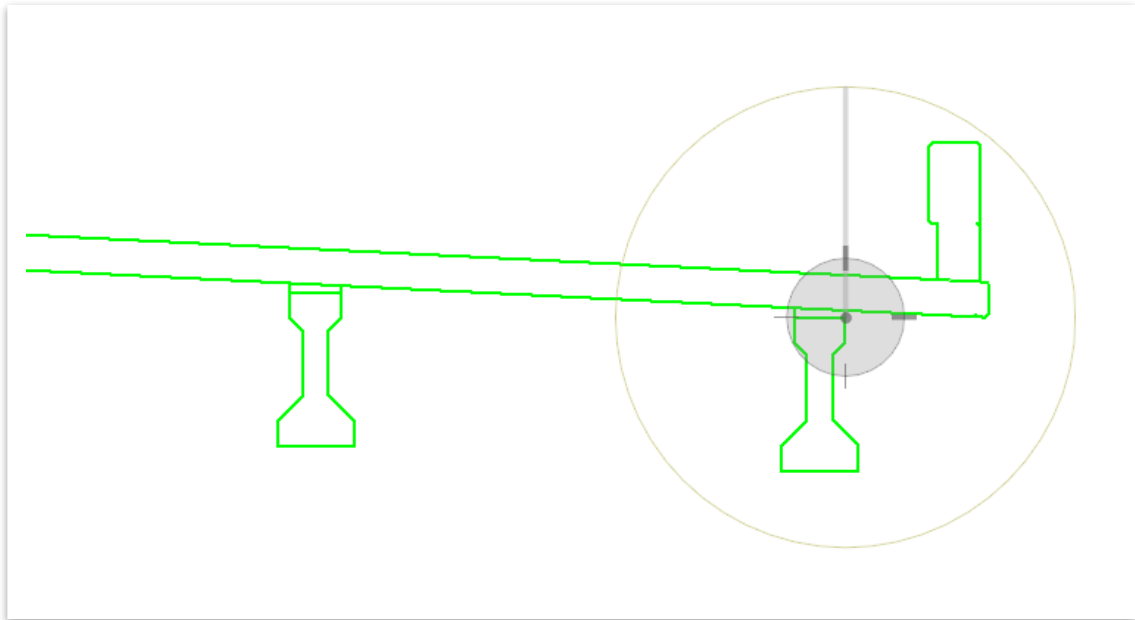


2. Select the **11\_TDOT\_Detail\_Solid** Drawing Seed, and use the circle boundary to create the detail.

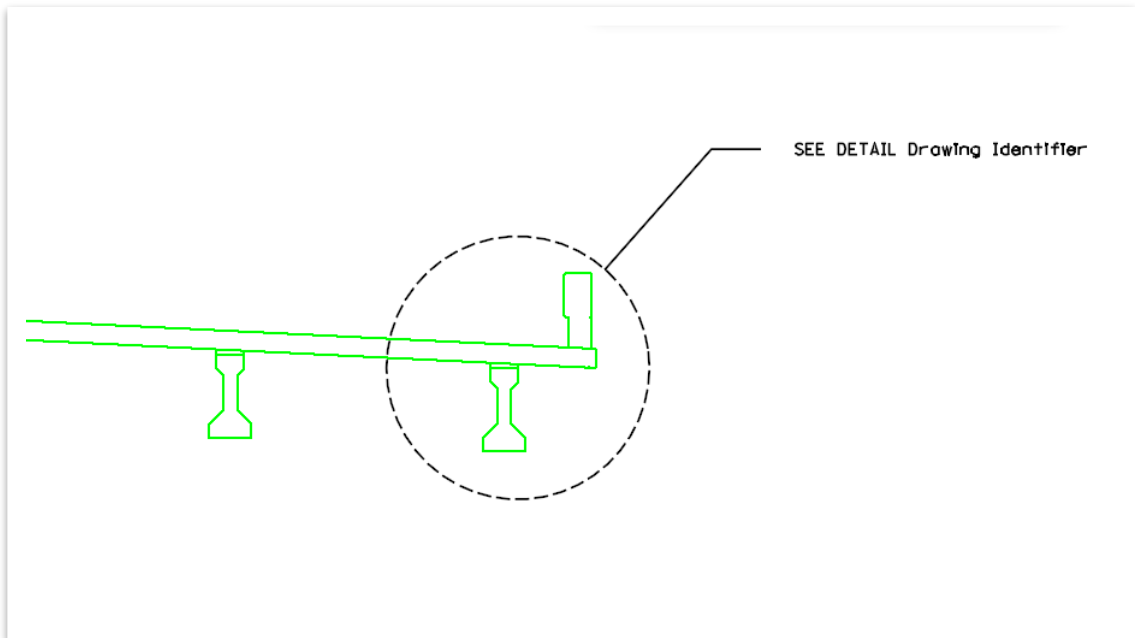




- Click on the top right corner of the rightmost beam to place the center of the circular callout. Then click a point directly above to define the edge of the detail circle so that it fully encompasses the overhang and barrier.



- 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. Once the **Create Drawing** window opens, change the following settings:
  - a. **Name:** Detail A
  - b. **Drawing Annotation Scale:** 3/4" = 1'-0"
  - c. **Sheets:** Typical Cross Section [Sheet].  
Note, this will send the reference into the existing sheet model instead of creating an entirely new model.
  - d. **Sheet Detail Scale:** 3/4" = 1'-0"
  - e. Click **OK**.

**Create Drawing**

Name: Detail A

Drawing Seed: 11\_TDOT\_Detail\_Solid

View Type: Detail

Discipline: Structural

Purpose: Enlarged Detail

---

Create Drawing Model

Seed Model: TDOT Structures Detailing Seed\_OBM.dgnlib

Filename: (Active File)

**A** 3/4" = 1'-0"

Visible Edges: Dynamic

---

Create Sheet Model

Seed Model: TDOT Structures Detailing Seed\_OBM.dgnlib

Filename: (Active File)

**Sheets:** Typical Cross Section [Sheet]

**A** Full Size 1 = 1

Drawing Boundary: (New)

Detail Scale: 3/4" = 1'-0"

Add To Sheet Index

Make Sheet Coincident

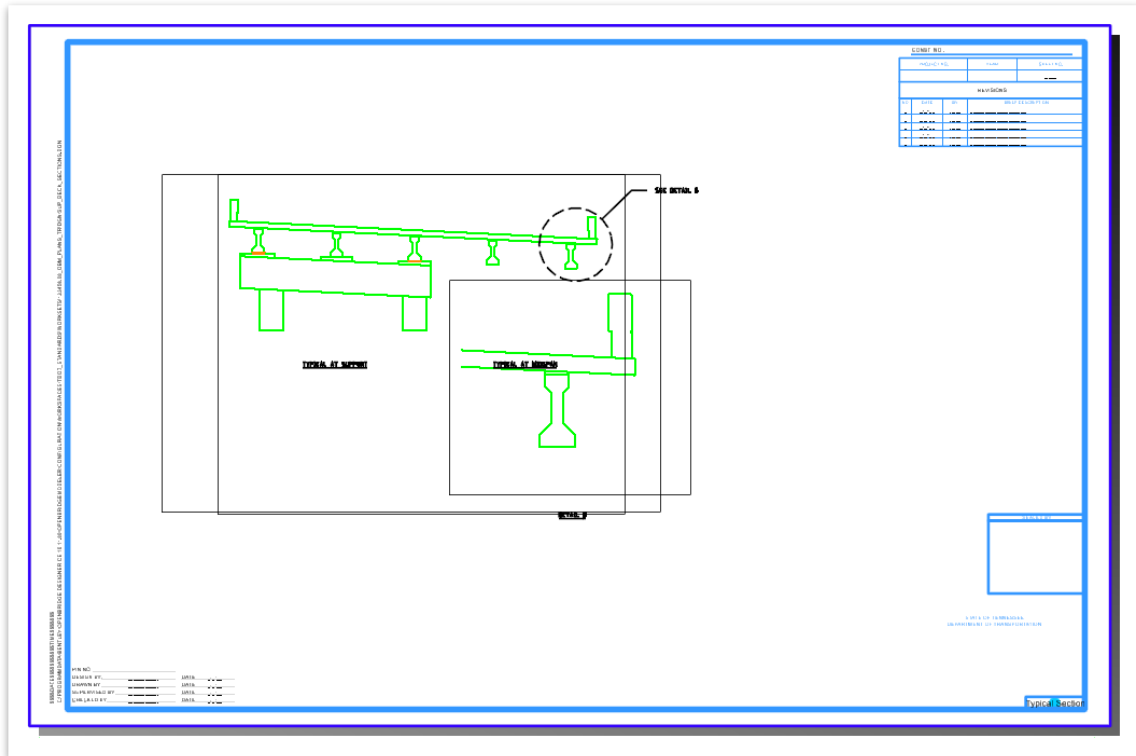
Replicate Drawing in Sheet File

Open Model

**OK** Cancel



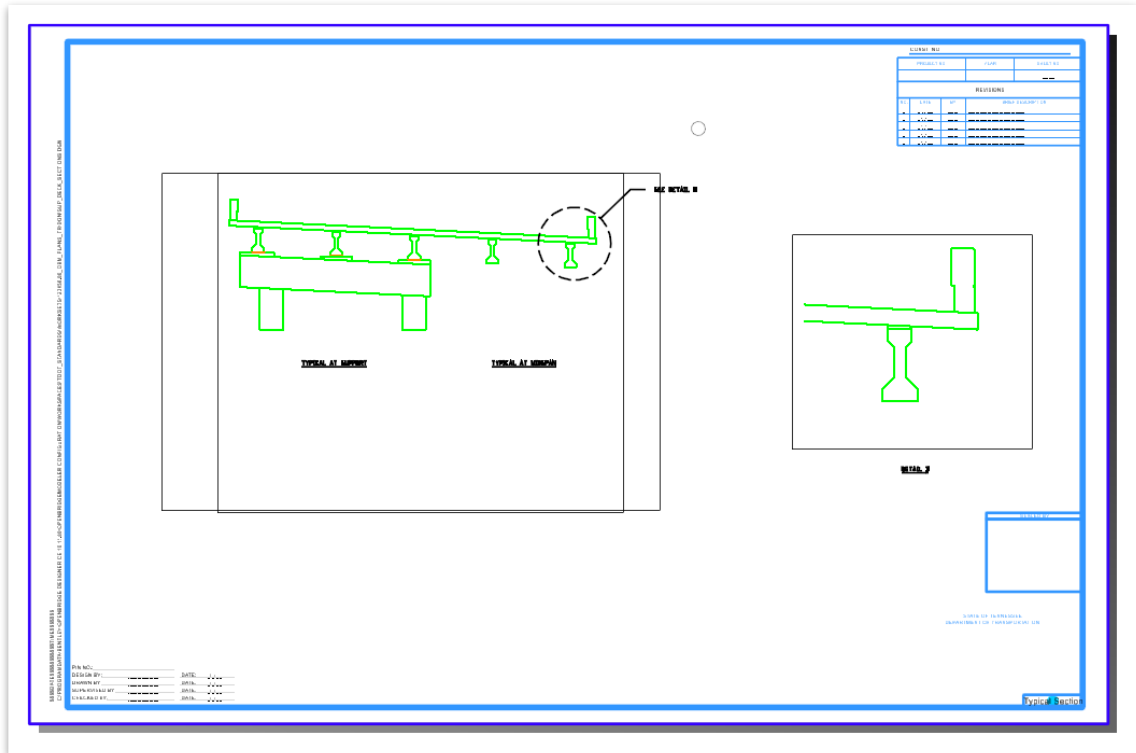
- The **Typical Cross Section [Sheet]** sheet model now has the Detail A view within the border, as shown in the following image.



- Use the **Home >> Primary >> References >> Move Reference** tool to move the overhang detail to avoid any overlapping with the typical section.



- Then, use the **Drawing (Workflow) >> Home >> Manipulate >> Move** tool to place the drawing boundary title (i.e., DETAIL 3) directly below the overhang detail. The sheet should look like the following image.

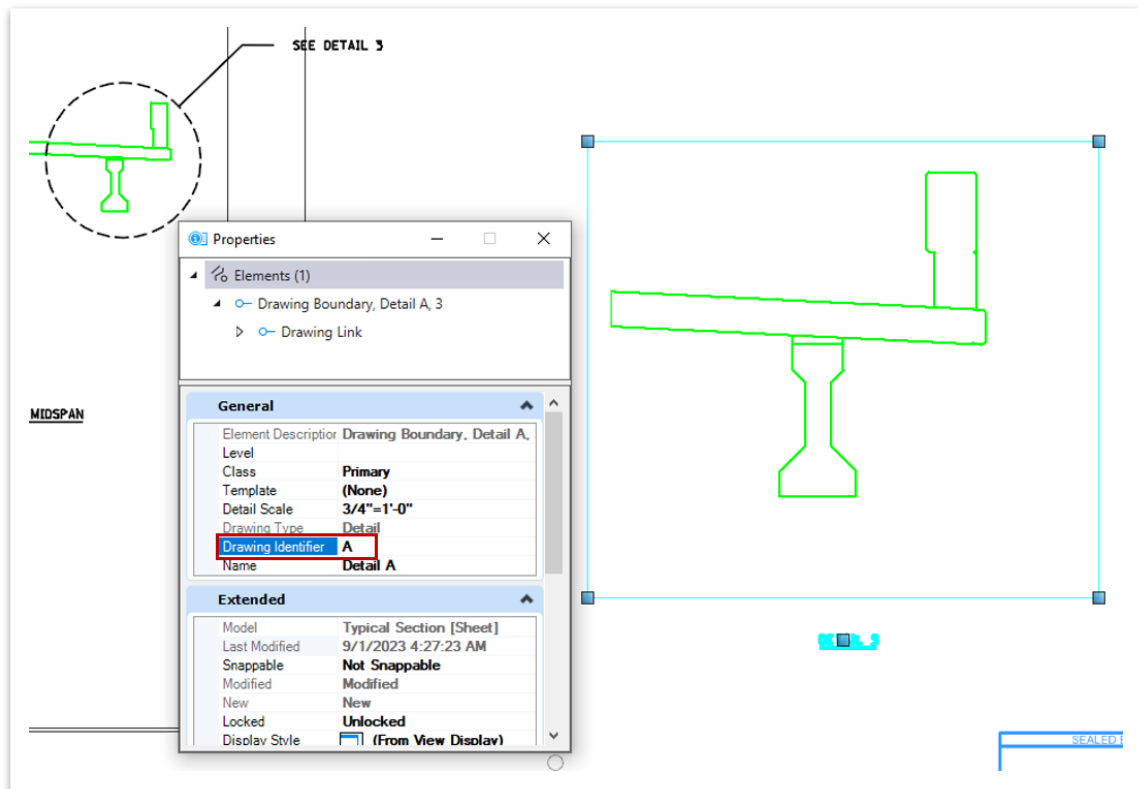


**Take Note!**

When a reference that has a detail callout associated with it is moved, the boundary that encompasses the detail (in this case a dashed circle) will move with the reference. However, the detail callout text will not move with it. The text must manually be moved along with any additional nodes in the leader line.



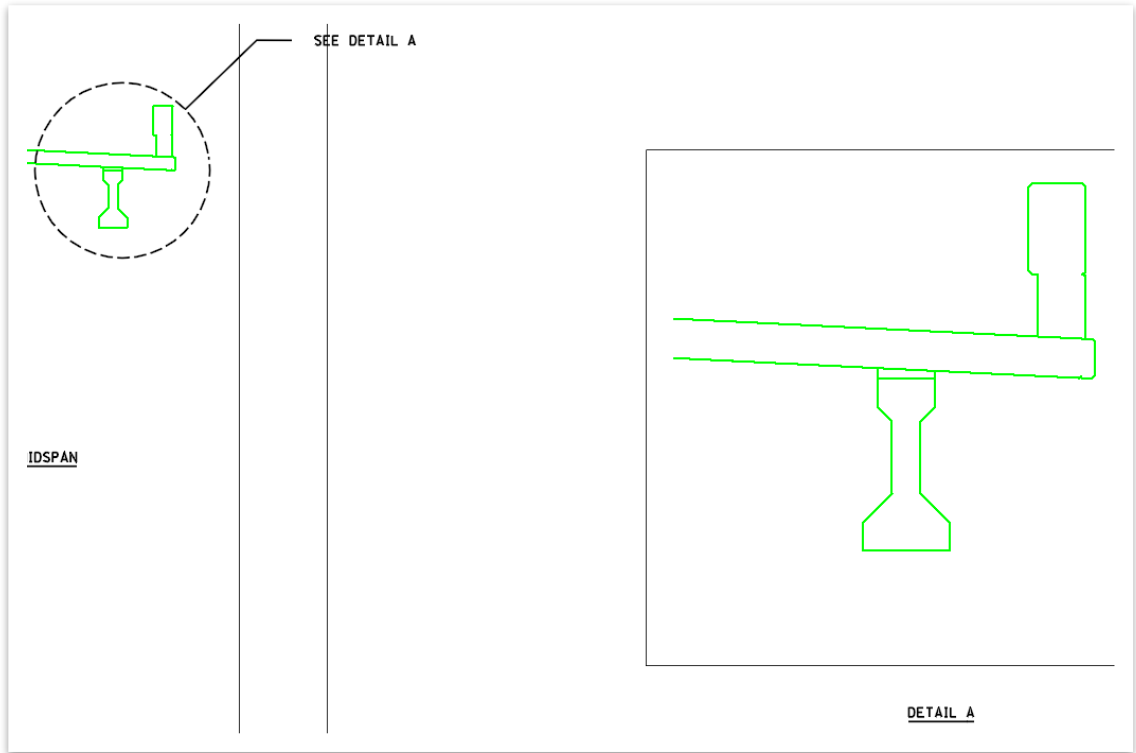
9. Lastly, the detail drawing boundary title and detail callout need to be updated to show the correct name. So, in the **Typical Cross Section [Sheet]** sheet model, click on the **DETAIL 3** drawing boundary title to select the drawing boundary. Then, access the **Home >> Primary >> Properties** tool and change the **Drawing Identifier** field in the General section from **3** to **A**.



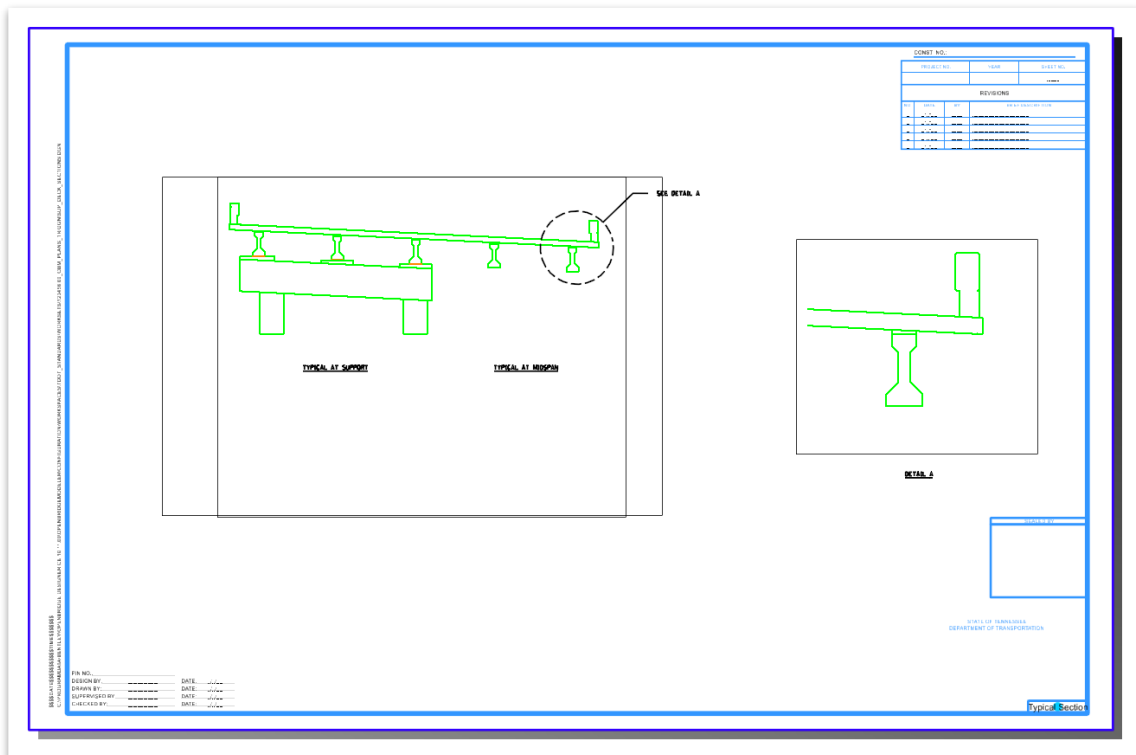
10. Notice that once the **Drawing Identifier** was updated the drawing boundary title was immediately changed, but the detail callout still reads “SEE DETAIL 3”. That is because the **Detail A** drawing model must be opened for the detail callout to populate. Therefore, we will open the **Detail A** drawing model by clicking on it in the **Active View Groups** drop-down list.
11. Then, immediately return to the **Typical Cross Section [Sheet]** sheet model where the detail callout will now correctly read “SEE DETAIL A”.



12. The updated drawing boundary title and detail callout should match the image below.



13. The final sheet should look like the image below.





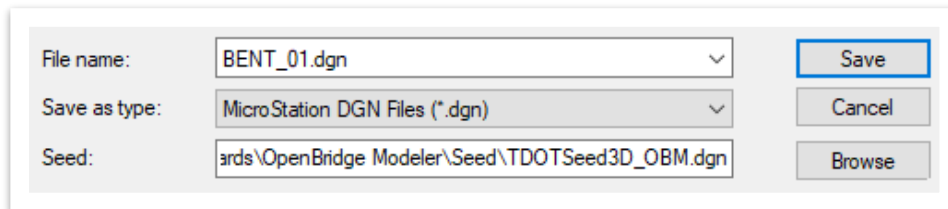
## 3.4: Create a Bent Sheet

In the following exercises, we will use the **Section Callout** tool to create the three views that are used in a bent plan sheet—a plan view, a front face elevation view, and a side elevation view.

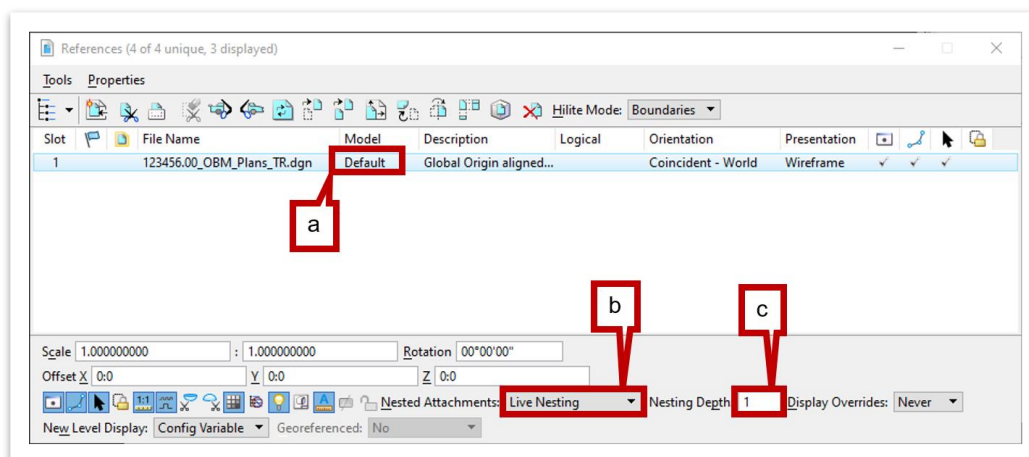
### 3.4.1 Exercise: Create a Sheet and Front Elevation View of the Bent

In this exercise, we will create a sheet file named **BENT\_01.dgn** in which the different views of Bent No. 1 will be placed. Using the **Section Callout** tool, we will first create a front elevation view of Bent No.1 from the 3D bridge model. We will continue to utilize the same WorkSet and OBD file, both of which named **123456.00\_OBM\_Plans\_TR**.

1. Begin by creating a **New File** to use for this sheet file and name it: **BENT\_01.dgn**. Select the **TDOTSeed3D\_OBM.dgn** seed file and click **Save**. **Note:** Save this file in **dgn** folder under the **123456.00\_OBM\_Plans\_TR** WorkSet



2. Go into the References window and attach the main bridge model file **123456.00\_OBM\_Plans\_TR.dgn**
3. Update the settings for the main bridge model reference as shown below.
  - a. **Model:** Default
  - b. **Nested Attachments:** Live Nesting
  - c. **Nesting Depth:** 1



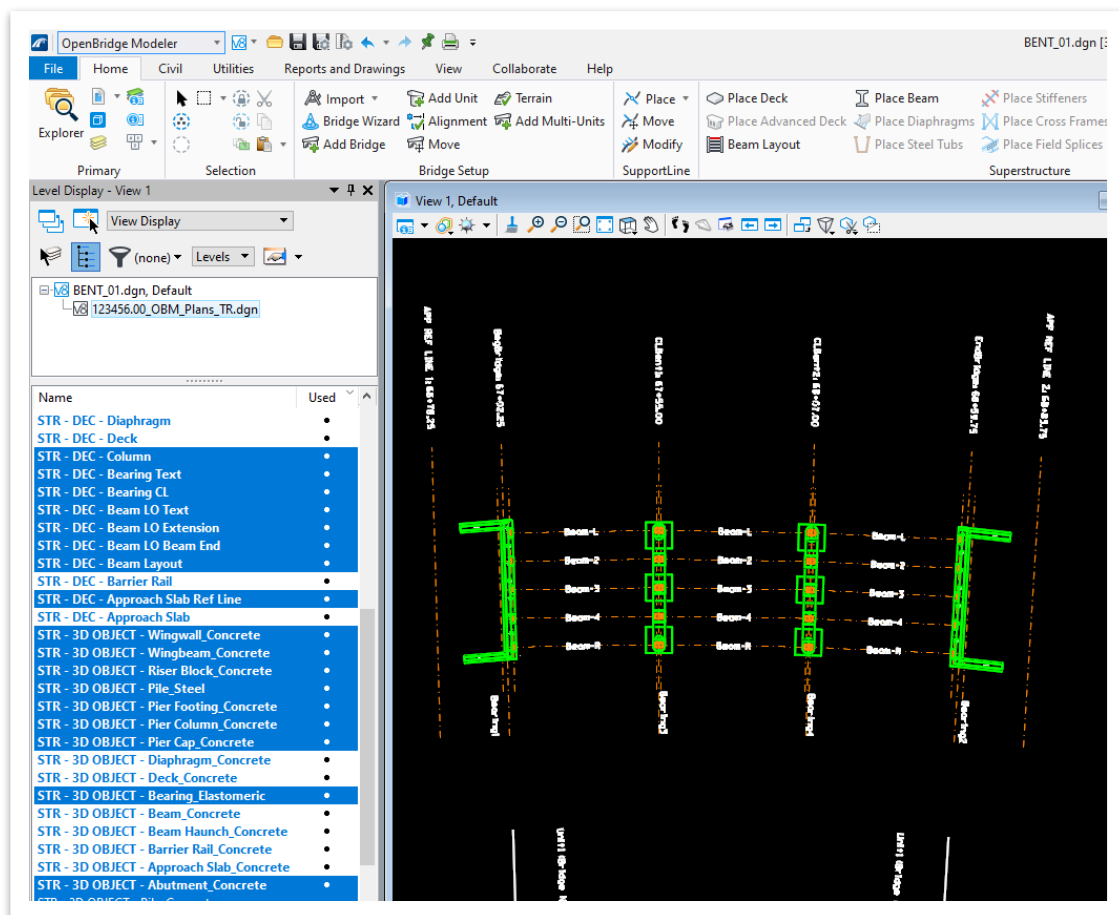
4. Click **Fit View** to locate the bridge in View 1 and View 2. You can then rotate the plan view in View 1, as needed. Refer to Exercise 2.3.1 of TDOT's [Bridge Modeling I \(OBM\) Manual](#), for information on how to rotate the view.



- Open the **Level Display** window, expand the **BENT\_01.dgn** drop-down, and turn off any bridge superstructure levels. This will allow for easier placement of the section callouts on Bent No.1. Select the **123456.00\_OBM\_Plans\_TR.dgn** reference file, and turn off the following levels:

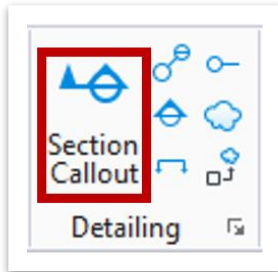
- STR - DEC - Diaphragm
- STR - DEC - Deck
- STR - DEC - Barrier Rail
- STR - DEC - Approach Slab
- STR - 3D OBJECT - Diaphragm\_Concrete
- STR - 3D OBJECT - Deck\_Concrete
- STR - 3D OBJECT - Beam\_Concrete
- STR - 3D OBJECT - Beam Haunch\_Concrete
- STR - 3D OBJECT - Barrier Rail\_Concrete
- STR - 3D OBJECT - Approach Slab\_Concrete

Then **Save Settings (Ctrl+F)**.

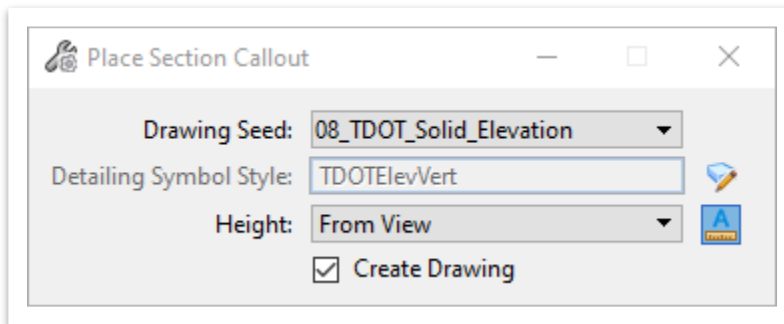




- To begin creating the Bent Sheet, access the **Section Callout** tool found at **Drawing (Workflow) >> Annotate >> Detailing >> Section Callout**.



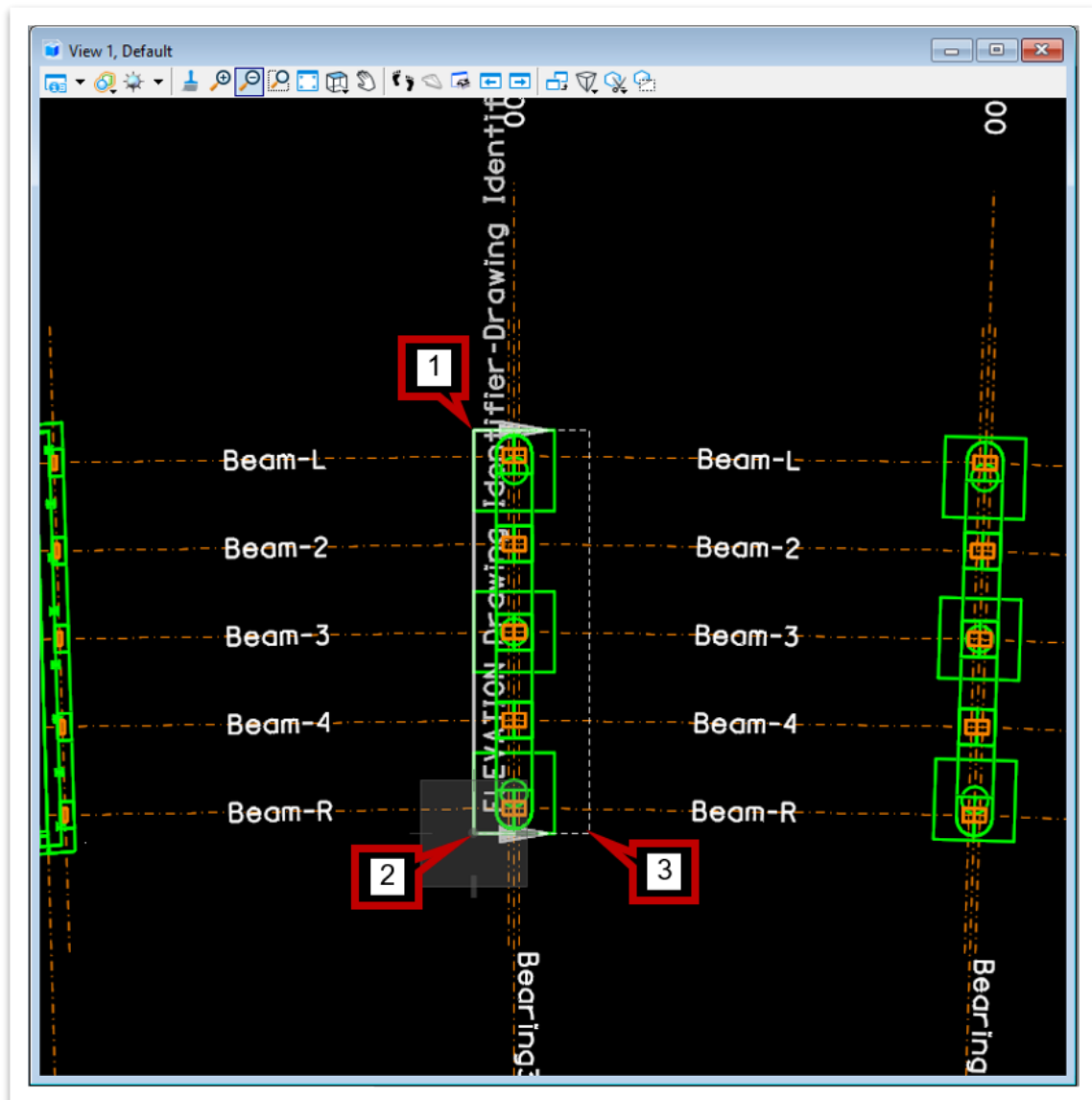
- The **Place Section Callout** window will then open where the **08\_TDOT\_Solid\_Elevation** Drawing Seed should be selected. Since there are no piles or embedded elements, there is no need to display any hidden linework in the newly created view.





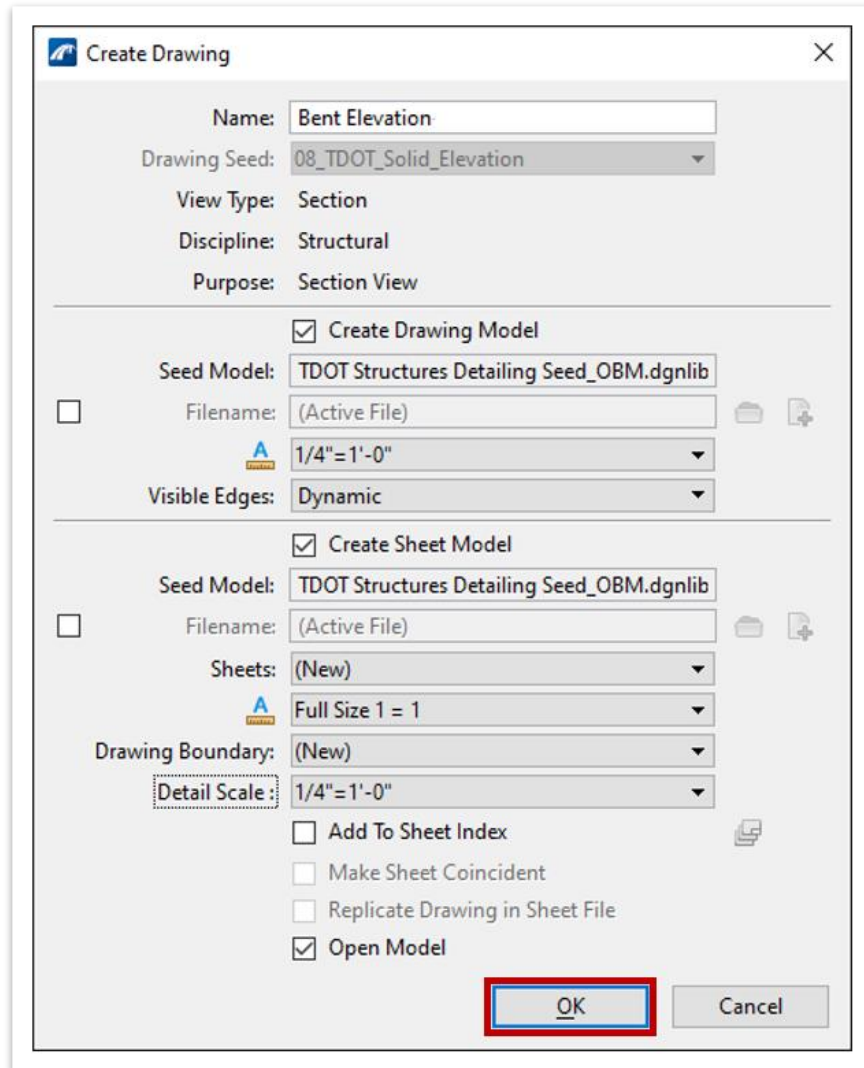


8. Snap to the outside corner on top of the leftmost footing of Bent No. 1 to define a start point for the callout. Then, define an end point for the callout by clicking on the outside corner on top of the rightmost footing of the same bent. Lastly, we will define the direction and depth of the section callout. Move the cursor upstation to the other side of the bent and left click in a location that ensures the section boundary fully encapsulates the bent. If the full section boundary is not visible, as shown below, the view window may need to be zoomed out slightly.



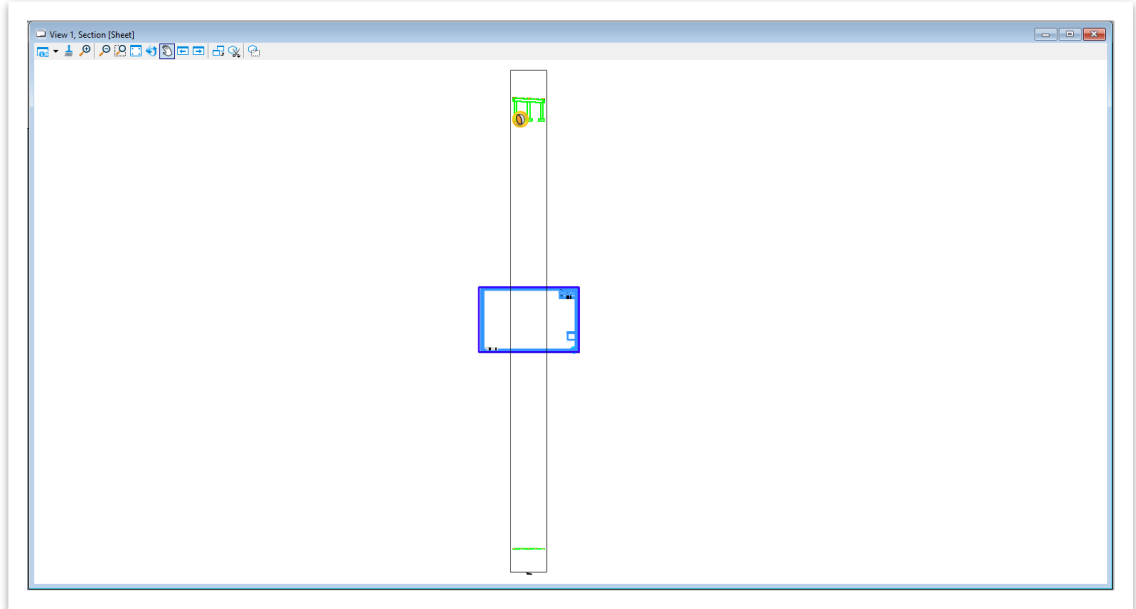


9. In the **Create Drawing** window, change the following settings:
  - a. **Name:** Bent Elevation
  - b. **Drawing Annotation Scale:** 1/4' = 1'-0"
  - c. **Sheet Detail Scale:** 1/4' = 1'-0"
  - d. Click **OK**.





10. Click **OK** and the sheet model with the front elevation view will automatically open in the file. Notice that the bent elevation is not centered in the sheet border. The bent will need to be moved using the **Move Reference** tool at the top of the References window.

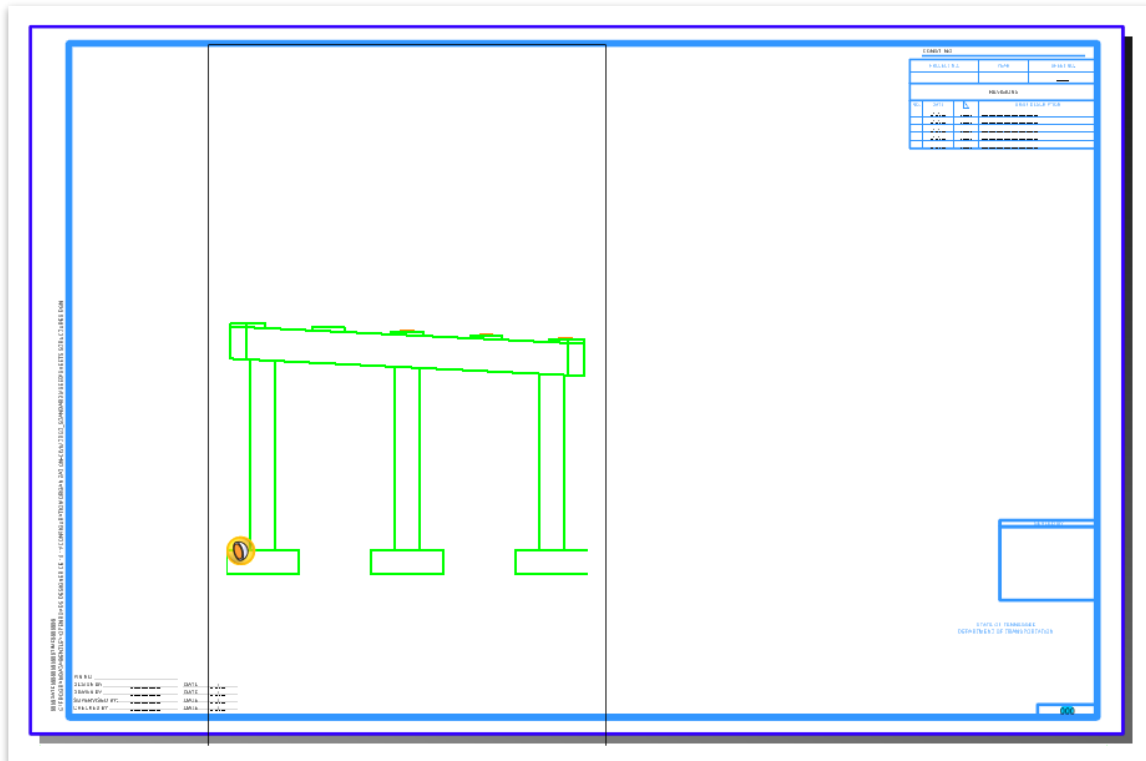
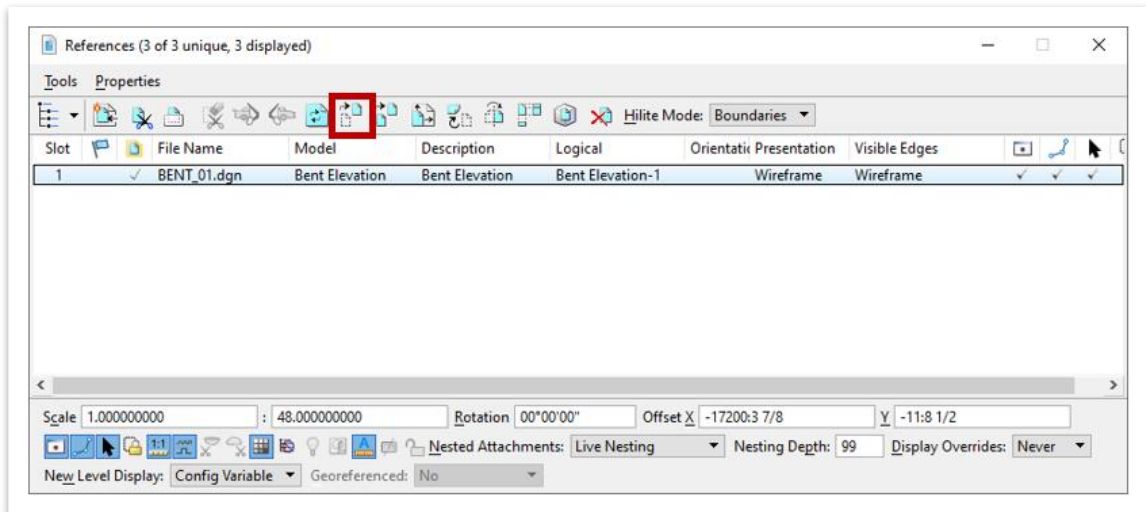


### Take Note!

*When the Section Callout tool creates a saved view, the program seeks to include all displayed levels in the new view. This includes the 2D decorator levels located at EL. 0'. To avoid this issue, prior to using the Section Callout tool, all decorator levels can be turned off. However, if the user does not remember to turn these levels off before creating the view, the clip volume encompassing the view can be modified after its creation, which will be addressed in the following steps.*

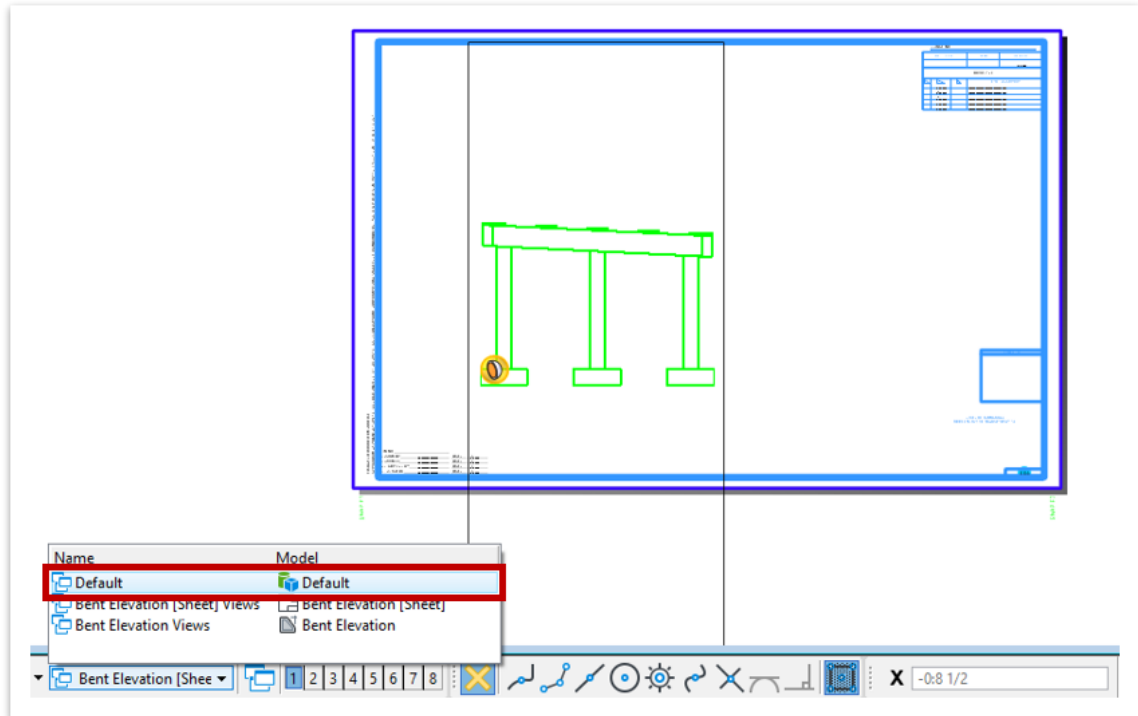


- Highlight the view that will be moved, as shown below. Then, click the **Move Reference** tool and move the highlighted view. Move the Bent Elevation model reference slightly to the bottom left side of the sheet.



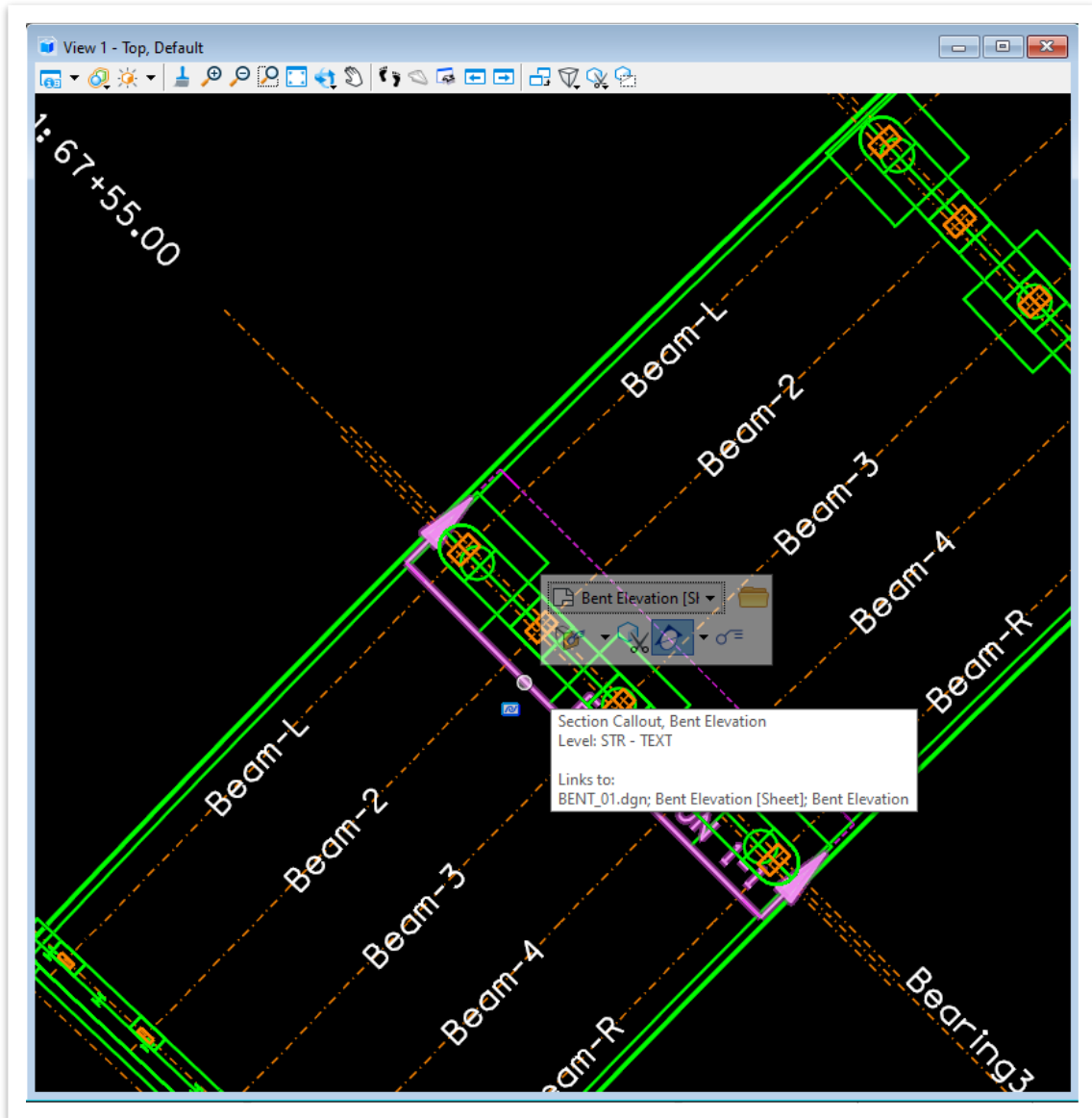


12. Notice that the outside edges of the footings are faint or non-existent, which is due to the limits of the original section callout being placed directly on these points. This can be remedied by modifying the limits of the saved view in the design model. Therefore, we will return to the **Default** design model by clicking on it in the **Active View Groups** drop-down list.



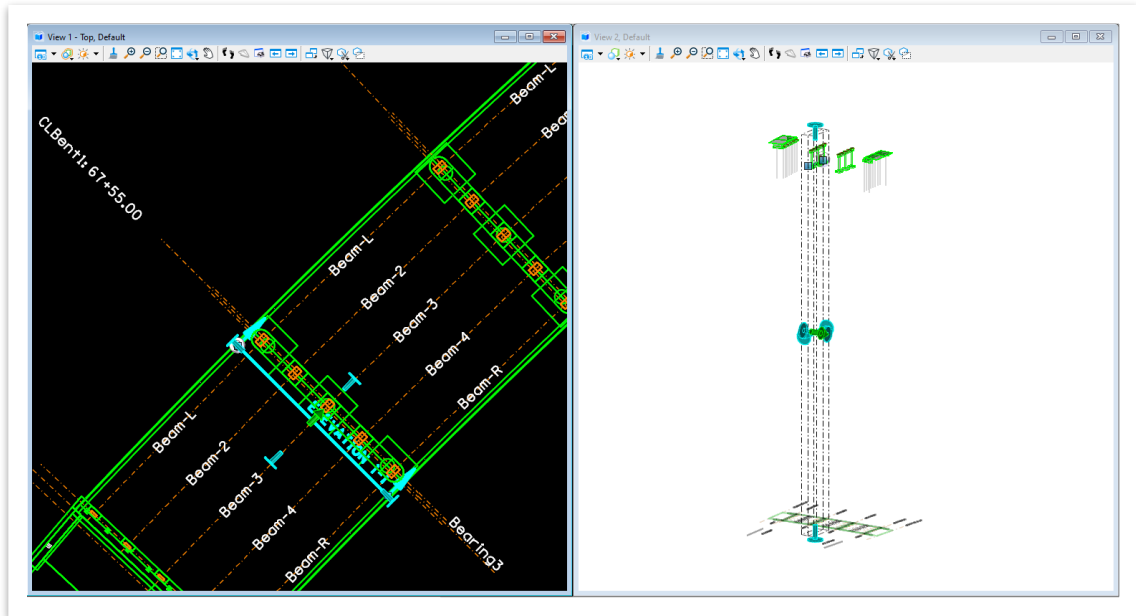


- In the **View 1** window, hover over the previously placed section callout located at Bent No. 1, and it will turn pink.



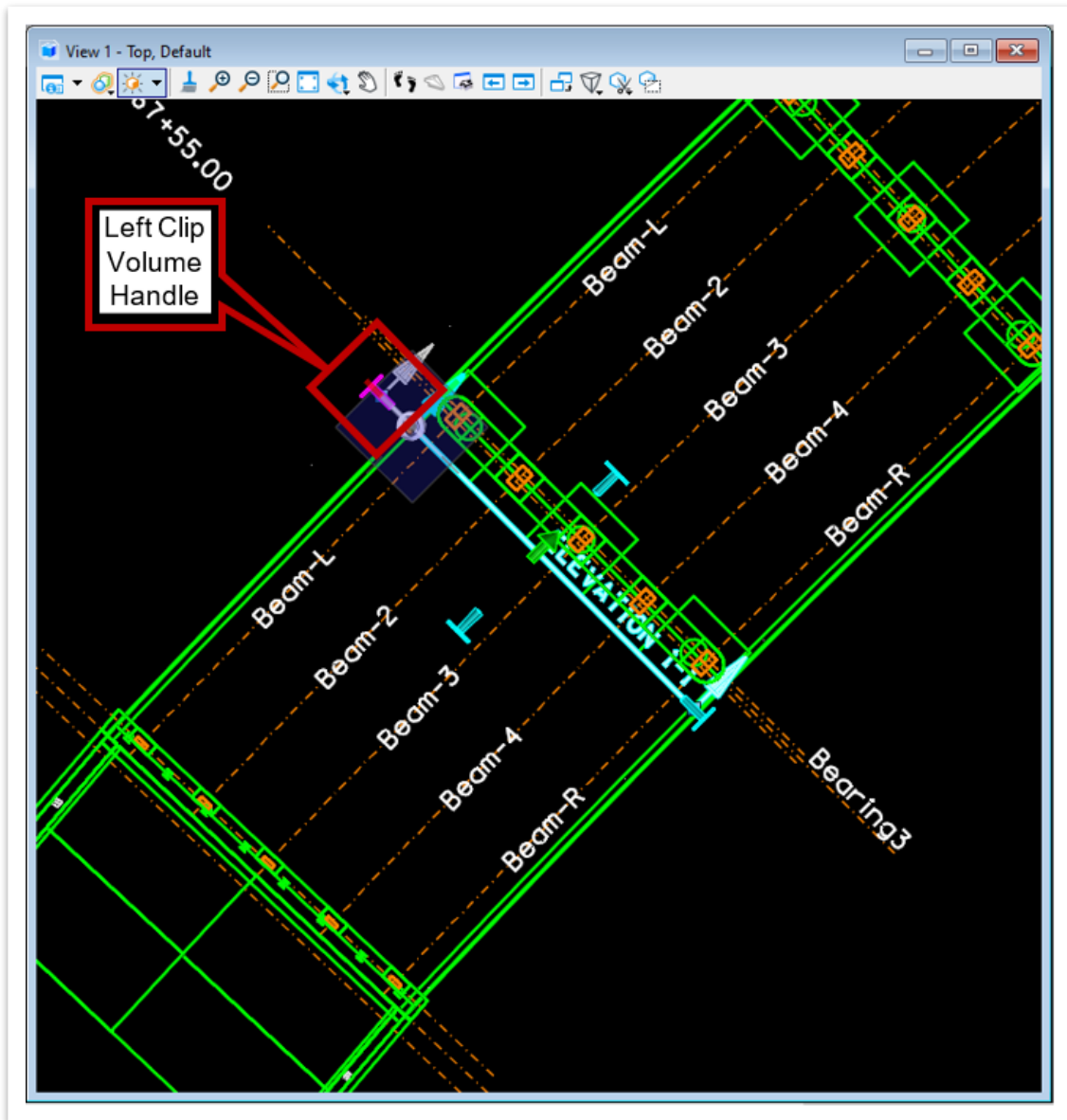


14. Then click on the section callout and the limits of the clip volume will be displayed in both the plan view in **View 1** and the isometric view in **View 2**, as shown in the following image.





- Next, in the plan view in **View 1**, click on the left clip volume handle, move it beyond the limits of the deck, and click again to lock in the new location of the left side of the clip volume.

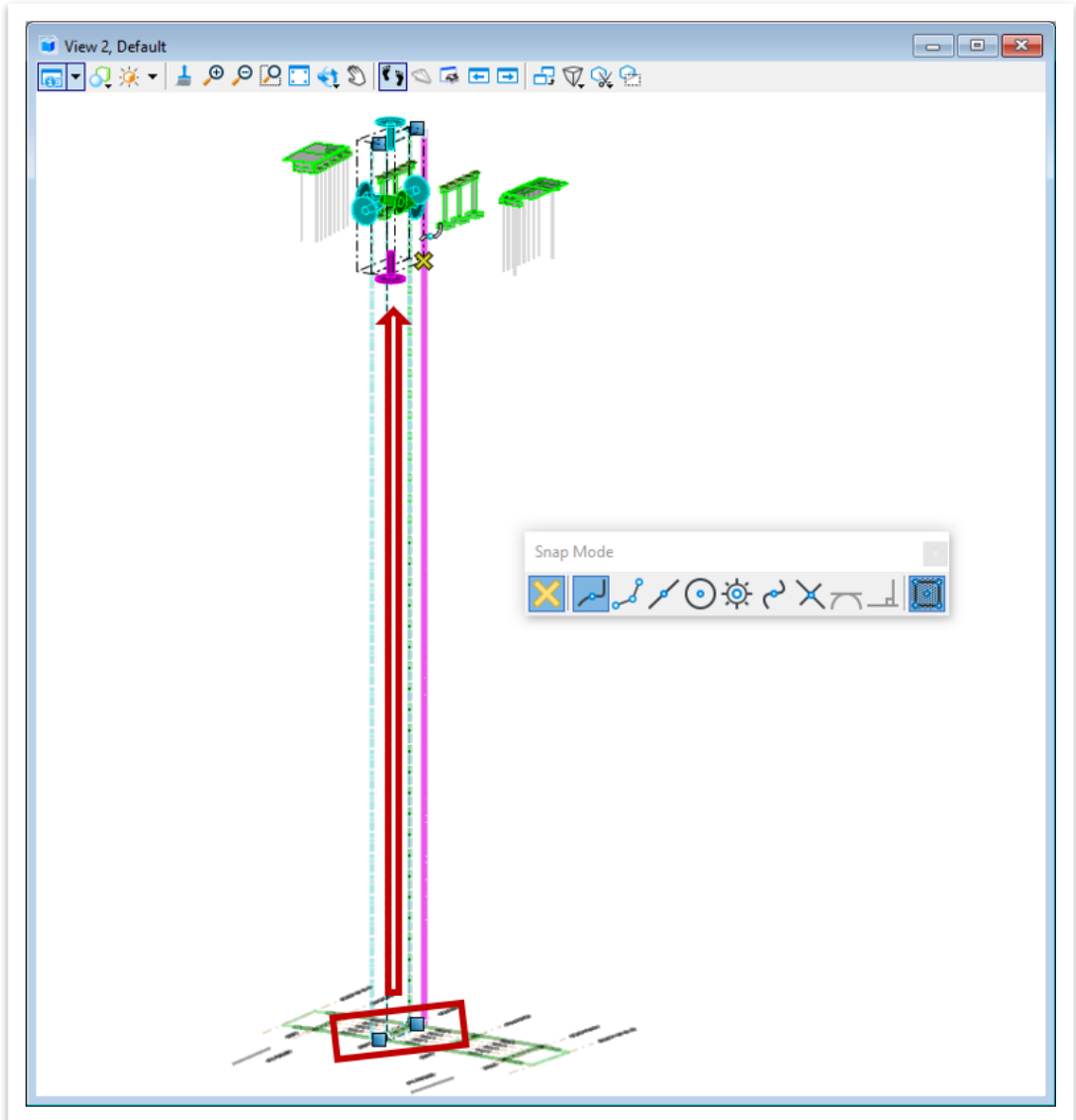


- Repeat with the right side by clicking on the right clip volume handle, moving it beyond the limits of the deck, and clicking again.



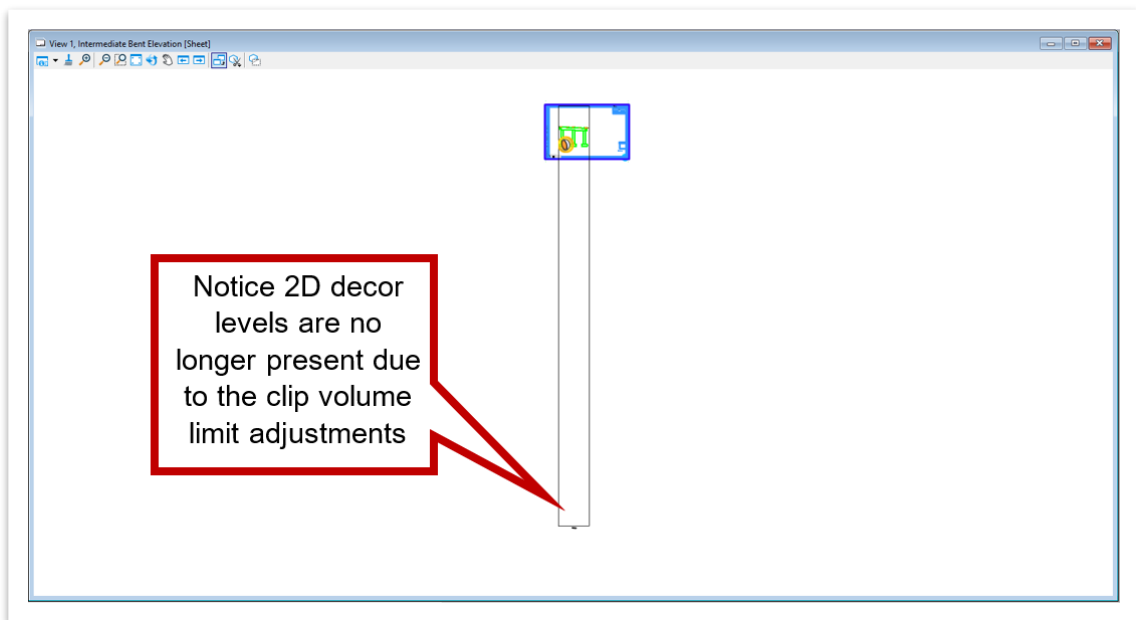
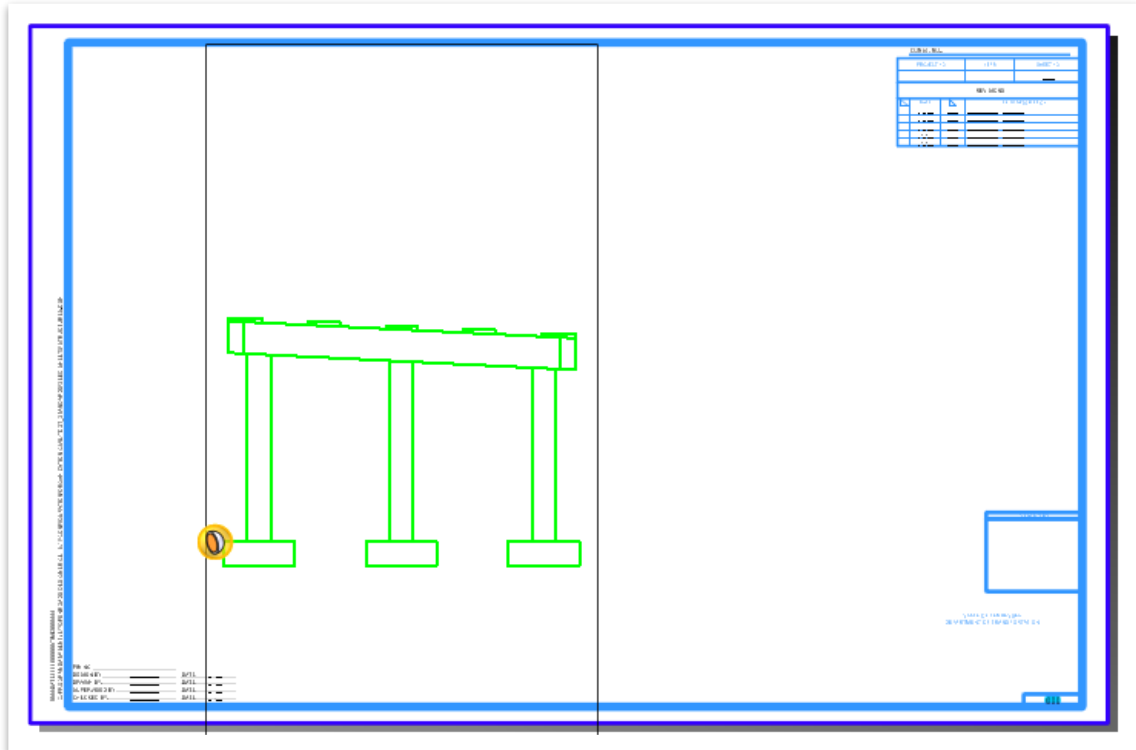


17. Lastly, with the clip volume still selected, move over to isometric view in the **View** 2. Click on the bottom clip volume handle, then select the **Nearby** Snap Mode. Move the handle up to a point just below the footings and click once more to lock in the new location for the bottom of the clip volume.



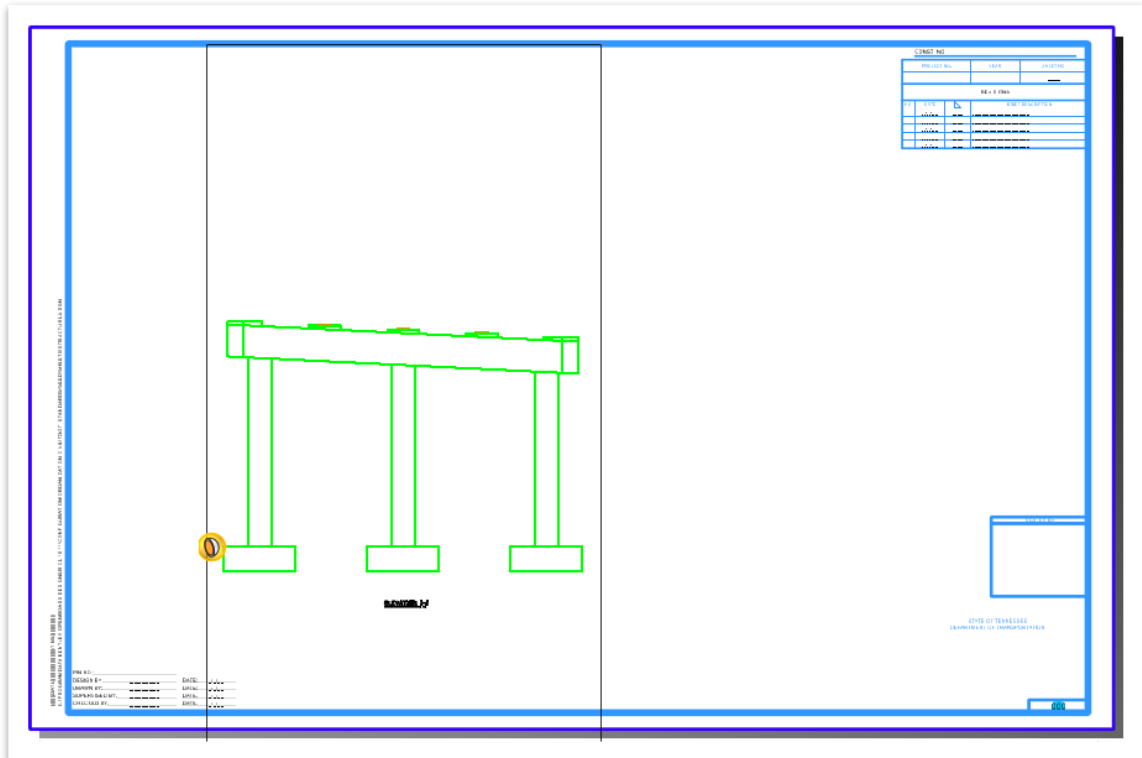


- Return to the to the **Bent Elevation [Sheet]** sheet model by clicking on it in the **Active View Groups** drop-down list. There, you will notice that the outside edges of the bent footings now have the proper linework and 2D decorator levels are no longer present.



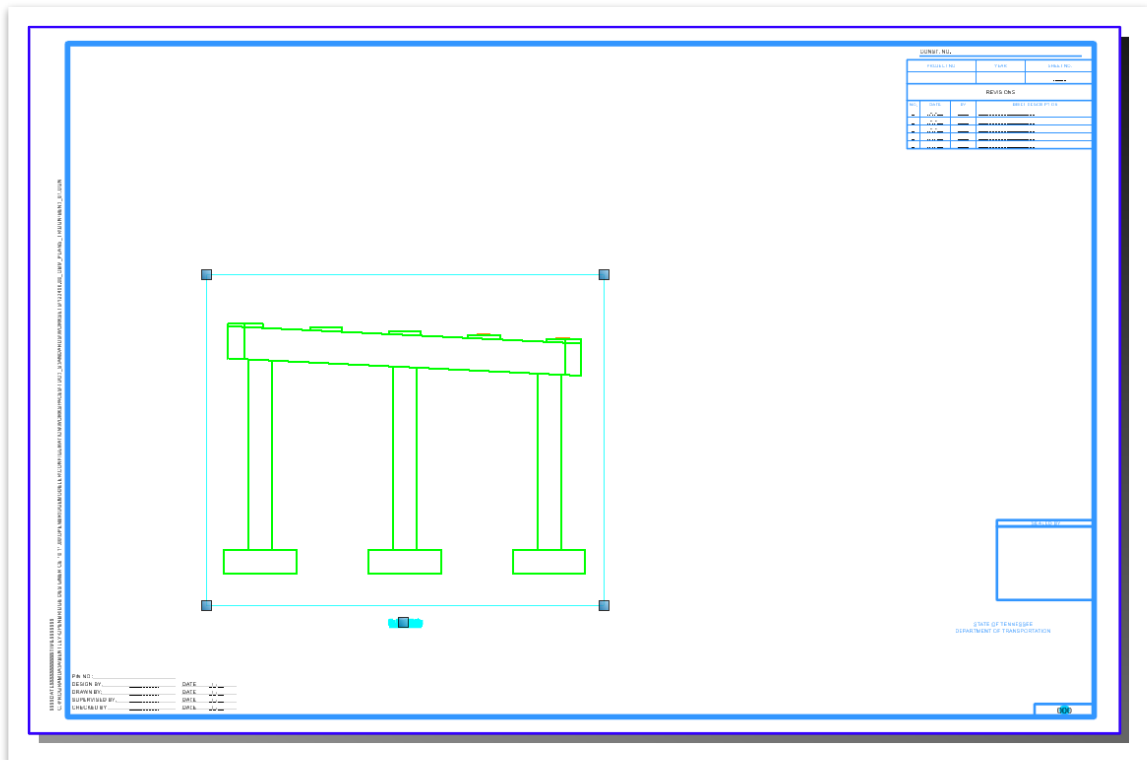


- Use the **Move** tool to place the drawing boundary title (i.e., **ELEVATION 1-1**) directly below its view. Navigate to **Home >> Manipulate >> Move** and then select the text to be moved. The sheet should look like the image below.





20.If desired, the black drawing boundary limits can be manually manipulated by clicking on it to highlight it and moving the vertices to the preferred locations, as shown below.

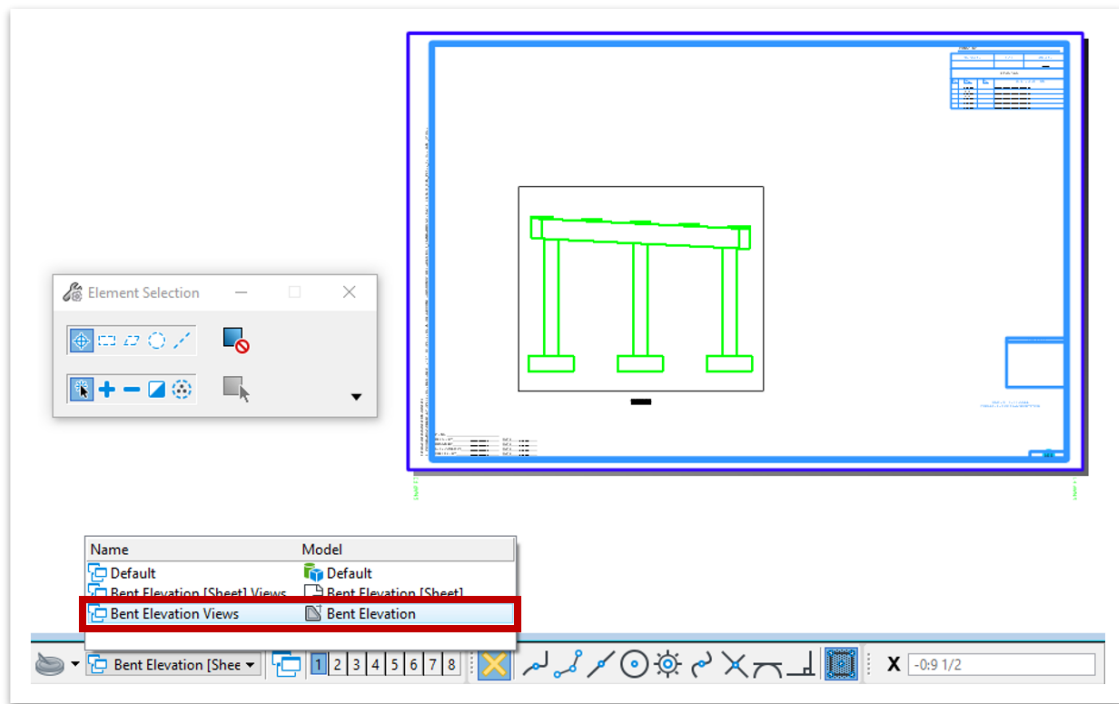




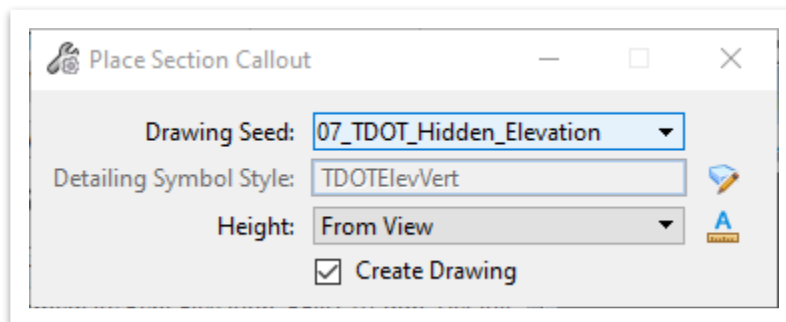
### 3.4.2 Exercise: Create a Plan View and End Elevation View of the Bent

In this exercise, we will create additional views using the section callout tool without showing the arrow annotations. To accomplish this, the additional section cuts should be done in the drawing model rather than the sheet model. The additional views will be created in the previously created sheet file named **BENT\_01.dgn**

1. 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 rather than the sheet model. Navigate to the **Bent Elevation** drawing model in the **Active View Groups** drop-down list.

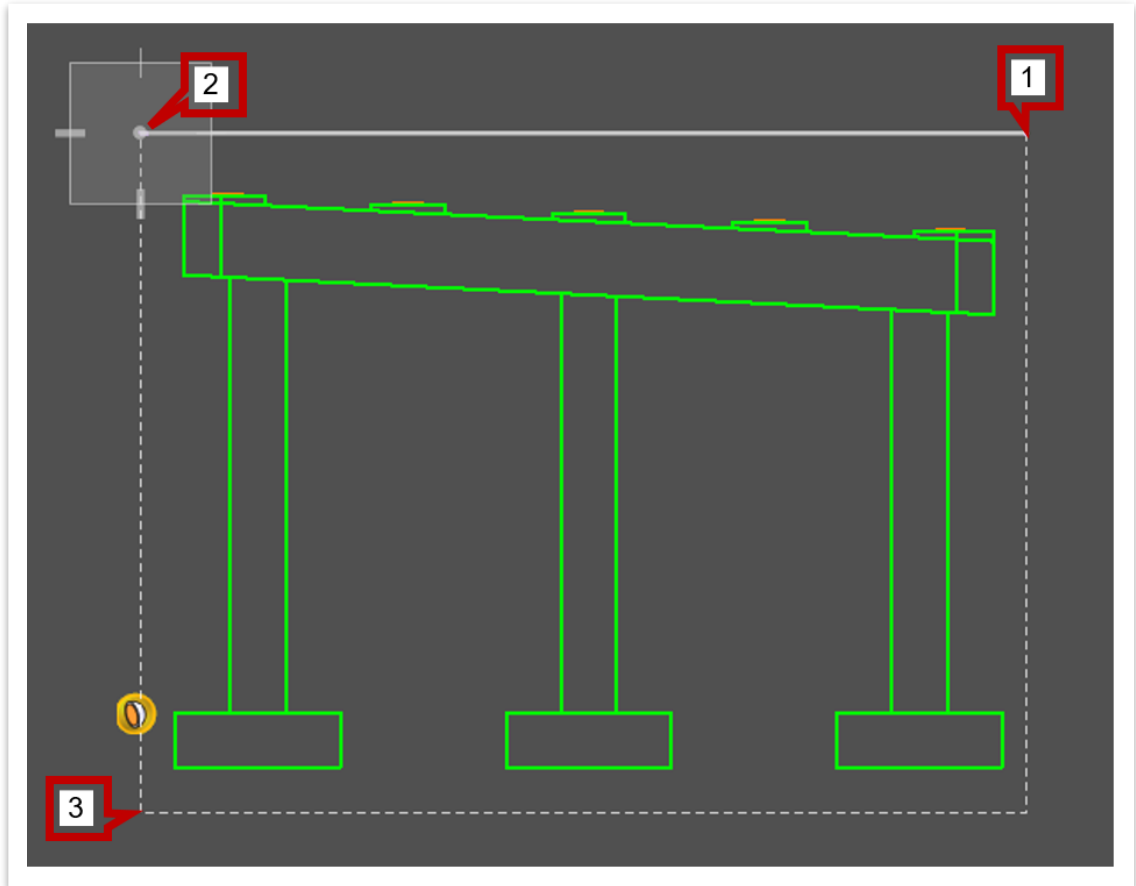


2. Open the Section Callout tool using the **07\_TDOT\_Hidden\_Elevation** drawing seed to create a plan view. Using the hidden drawing seed will allow the hidden display style to be used and depict any linework that is not at the section cut as dashed hidden lines.





3. 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. Lastly, define a direction and depth to the callout by clicking at a point below the footings.





4. Once the **Create Drawing** window opens, select the following settings:
  - a. **Name:** Bent Plan
  - b. **Drawing Annotation Scale:** 1/4' = 1'-0"
  - c. **Sheets:** Bent Elevation [Sheet].  
Note, this will send the reference into the existing sheet model instead of creating an entirely new model.
  - d. **Sheet Detail Scale:** 1/4' = 1'-0"
  - e. Click **OK**

**Create Drawing**

Name: Bent Plan

Drawing Seed: 07\_TDOT\_Hidden\_Elevation

View Type: Section

Discipline: Structural

Purpose: Section View

Create Drawing Model

Seed Model: TDOT Structures Detailing Seed\_OBM.dgnlib

Filename: (Active File)

1/4" = 1'-0"

Visible Edges: Dynamic

Create Sheet Model

Seed Model: TDOT Structures Detailing Seed\_OBM.dgnlib

Filename: (Active File)

Sheets: Bent Elevation [Sheet]

Full Size 1 = 1

Drawing Boundary: (New)

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

Add To Sheet Index

Make Sheet Coincident

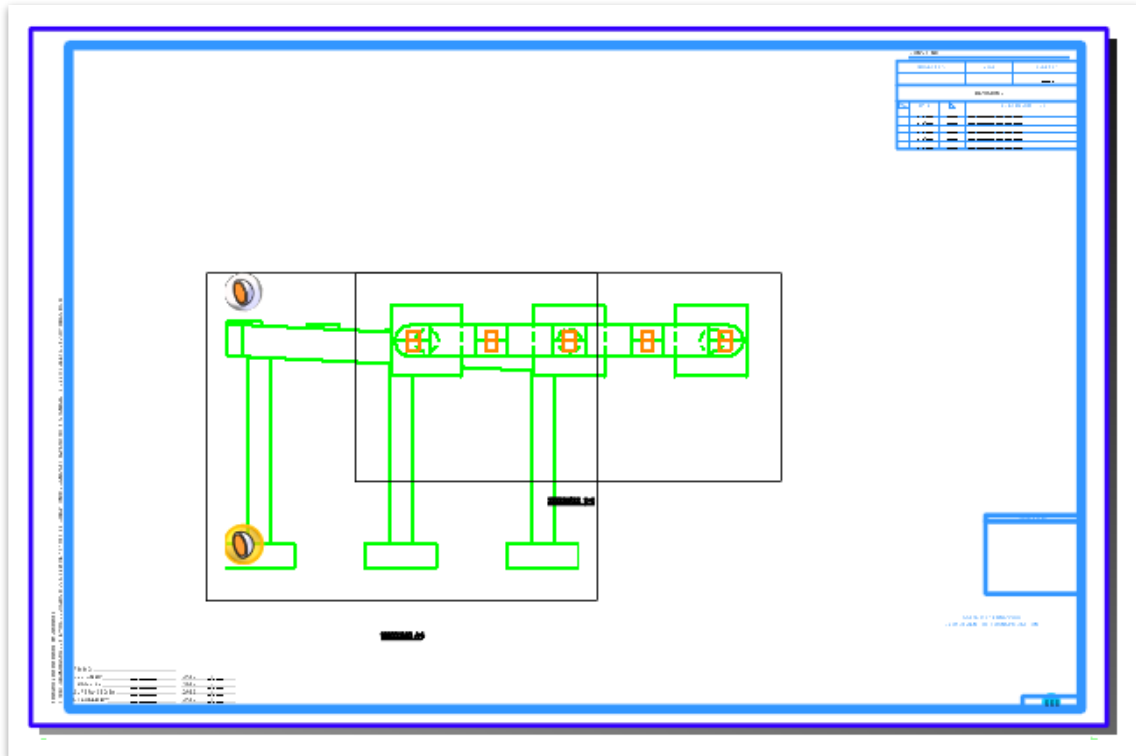
Replicate Drawing in Sheet File

Open Model

**OK** Cancel



- Notice that upon returning to the **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.

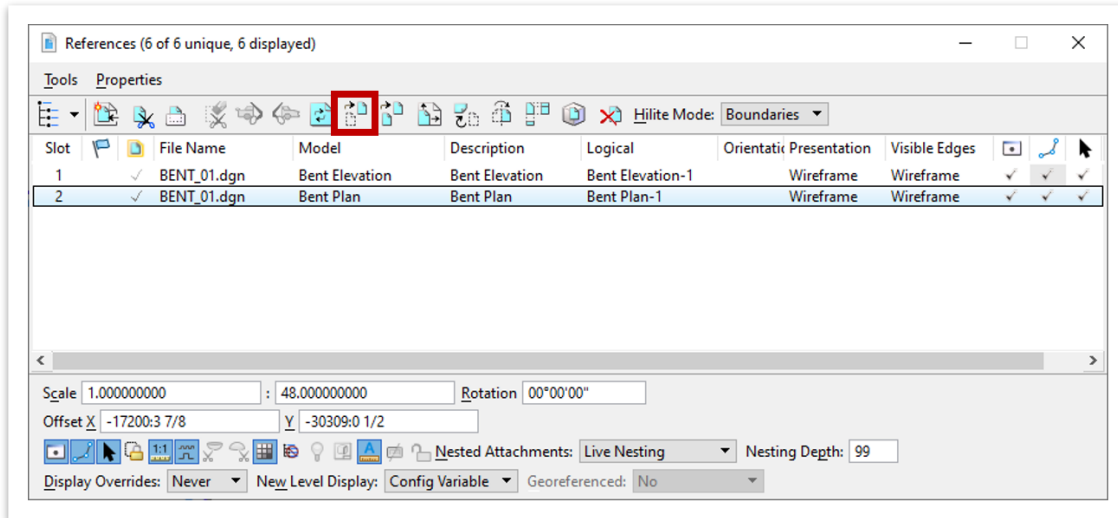


- Open the References tool by navigating to and selecting **Home >> Primary >> References**. Once the **References** window opens, notice that each view has its own reference (Front Elevation View = Bent Elevation, Plan View = Bent Plan).

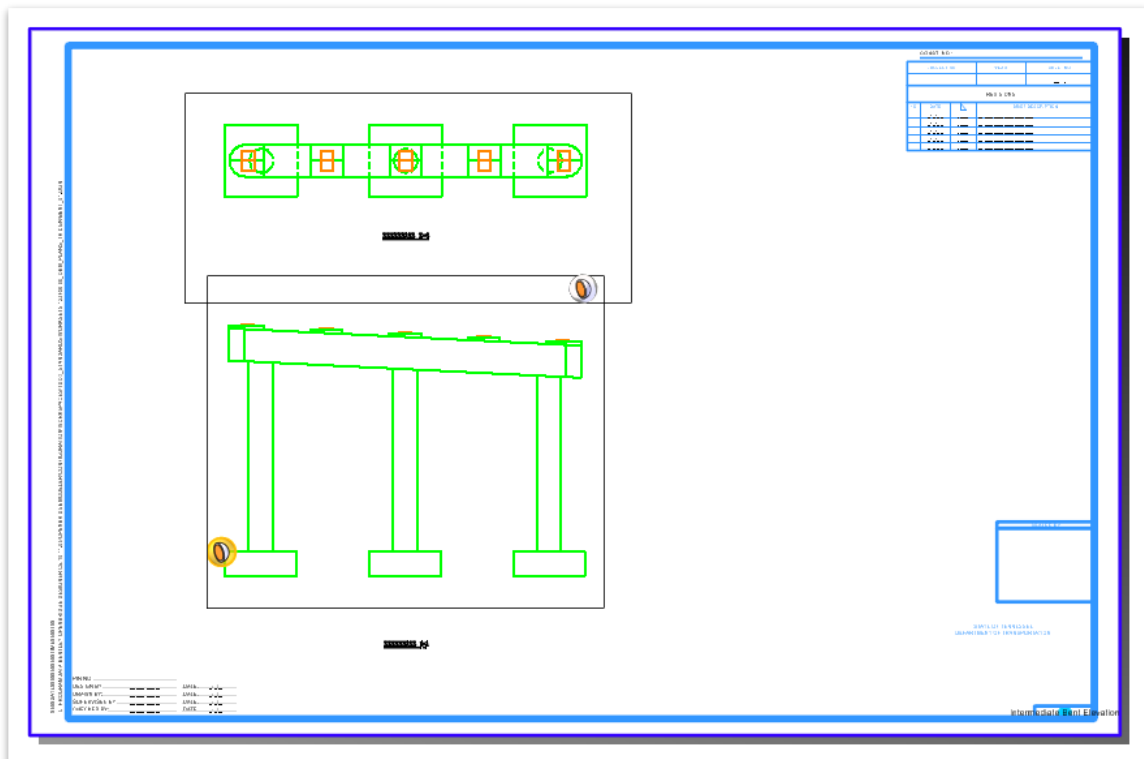




- Highlight the view that will be moved, as shown below. Then, click **Move Reference** and move the highlighted view. Move the Plan drawing model reference to be directly above the Elevation drawing model reference so both views are horizontally aligned. Since the Elevation drawing model reference was moved in the previous exercise, that reference can remain untouched.

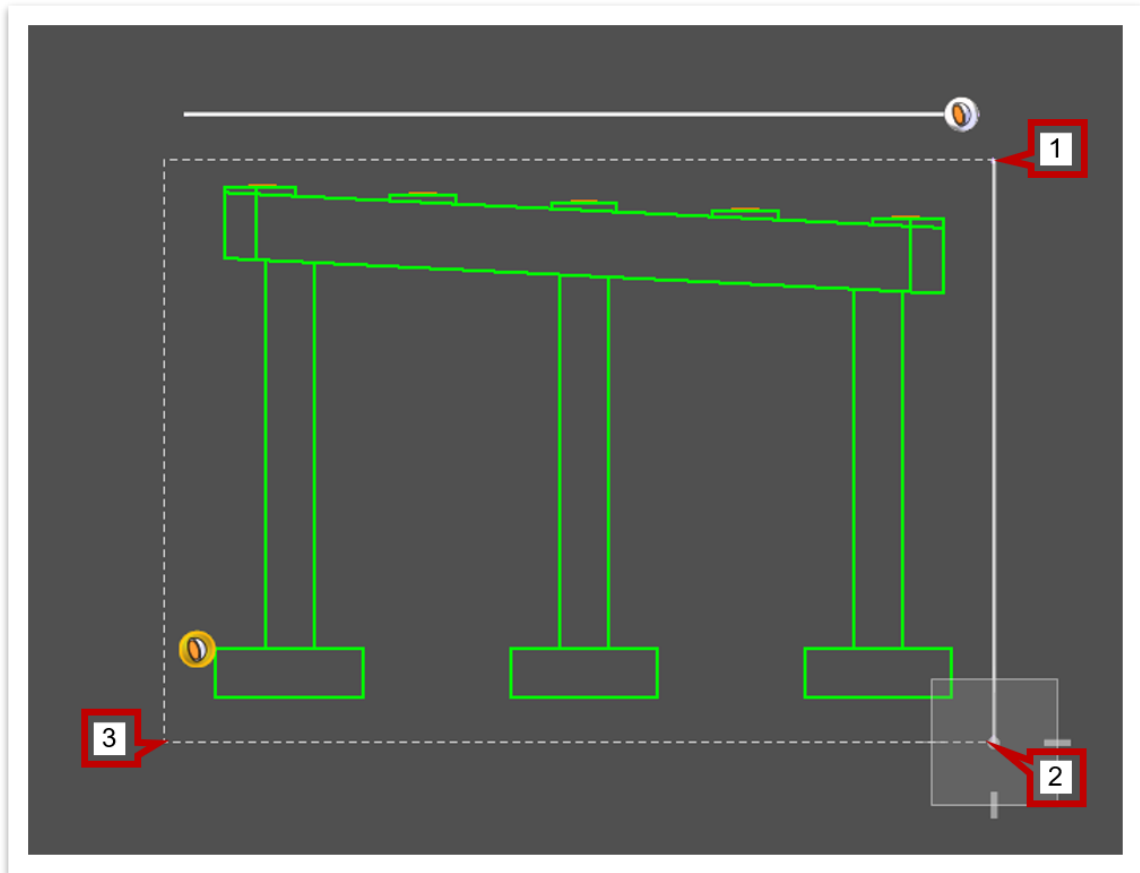


- Use the **Move** tool to place the plan drawing boundary title (i.e., **ELEVATION 2-2**) directly below its view. Navigate to **Home >> Manipulate >> Move**, select the text to be moved, and click the desired new location. The sheet should look like the image below.





9. Return to the **Bent Elevation** drawing model by selecting it in the **Active View Groups** drop-down list. There we will create an end view elevation.
10. Open the **Section Callout** tool using the **08\_TDOT\_Solid\_Elevation** drawing seed.
11. 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 bottom of the footings. Lastly, define a direction and depth to the callout by clicking at a point beyond the other end of the cap.





12. Once the **Create Drawing** window opens, select the following settings:
  - a. **Name:** Bent End View
  - b. **Drawing Annotation Scale:** 1/4' = 1'-0"
  - c. **Sheets:** Bent Elevation [Sheet].
  - d. **Sheet Detail Scale:** 1/4' = 1'-0"
  - e. Click **OK**

**Create Drawing**

Name:

Drawing Seed:

View Type:

Discipline:

Purpose:

---

Create Drawing Model

Seed Model:

Filename:

Visible Edges:

---

Create Sheet Model

Seed Model:

Filename:

**Sheets:**

Drawing Boundary:

Detail Scale:

Add To Sheet Index

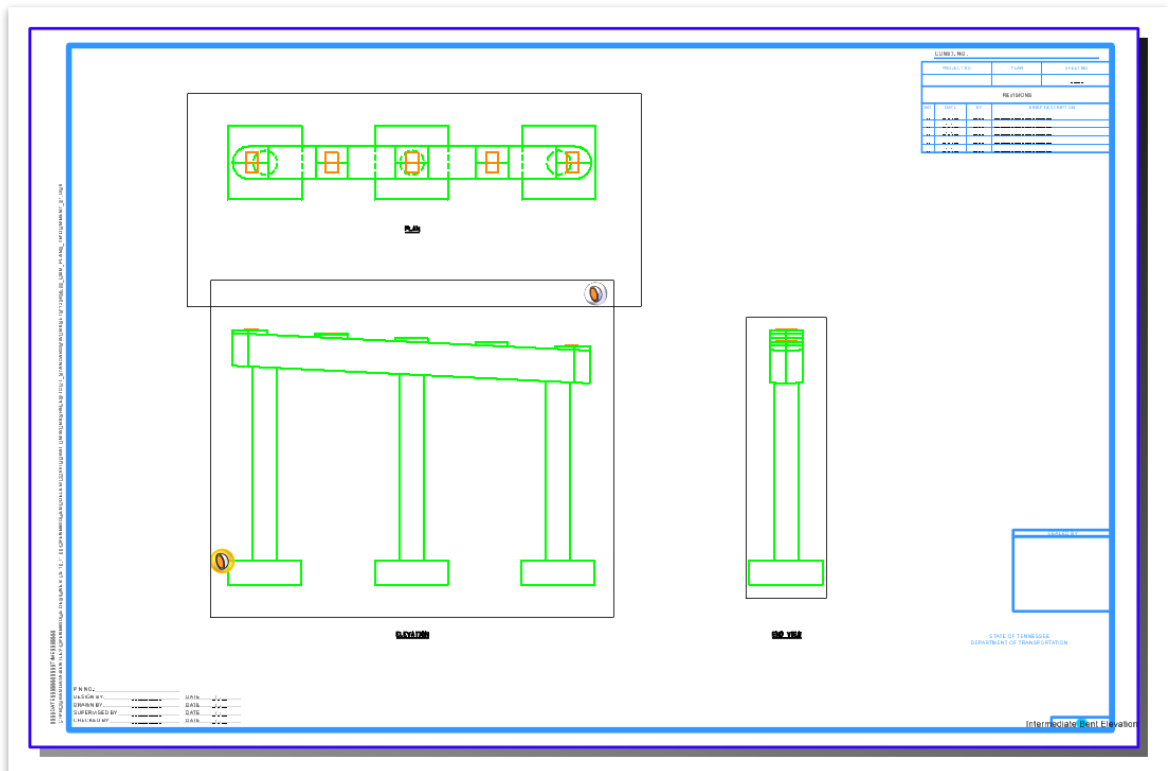
Make Sheet Coincident

Replicate Drawing in Sheet File

Open Model



13. Return to the **Bent Elevation [Sheet]** sheet model by selecting it in the **Active View Groups** drop-down list. Ensure the new end view model reference is included in the sheet model.
14. Use the **Move Reference** and **Move** tools described in Steps 7 through 9 to place the **Bent End View** model reference and drawing boundary title to the right of the **Elevation** view.
15. Double click on each drawing boundary title annotations (**ELEVATION 1-1**, **ELEVATION 2-2**, and **ELEVATION 3-3**) and rename to **ELEVATION**, **PLAN**, and **END VIEW** respectively. The final view should look like the image below.



**Take Note!**

*If any undesired levels remain, the level must be turned off in each view's respective drawing model. Once all level management has been completed in the drawing models, save settings (**Ctrl + F**) to ensure that all changes are saved.*



## 3.5: Create an Intermediate Bent Details Sheet

In the following exercises, we will create a new sheet file where section views of the bent cap and column and a footing layout will be created using the **Section Callout** tool. These sections will need to be cut in the previously created sheet file named **BENT\_01.dgn** and sent to the new sheet file. As is done in traditional plans, these cuts need to show the arrow annotations in the **BENT\_01.dgn** sheet file. To accomplish this, the section callouts should be done in the sheet model.

### 3.5.1 Exercise: Create a New Sheet File and Bent Cap Sections

In this exercise, we will create a sheet file named **BENT\_DET\_01.dgn** that will be used for creating the section views of the bent cap and column from the 3D bridge model. We will continue to utilize the same WorkSet and OBD file, both of which named **123456.00\_OBM\_Plans\_TR**.

1. Begin by creating a **New File** to use for this sheet file and name it: **BENT\_DET\_01.dgn**. Select the **TDOTSeed3D\_OBM.dgn** seed file and click **Save**. **Note:** Save this file in **dgn** folder under the **123456.00\_OBM\_Plans\_TR** WorkSet

2. Now that the details sheet file has been created, the bent sheet file that was created in Exercise 3.4.1 can now be re-opened. Staying within the OpenBridge Modeler window that is currently open, select **File >> Open** and select **BENT\_01.dgn**. Opening the file this way will ensure that the newly created **BENT\_DET\_01.dgn** closes.



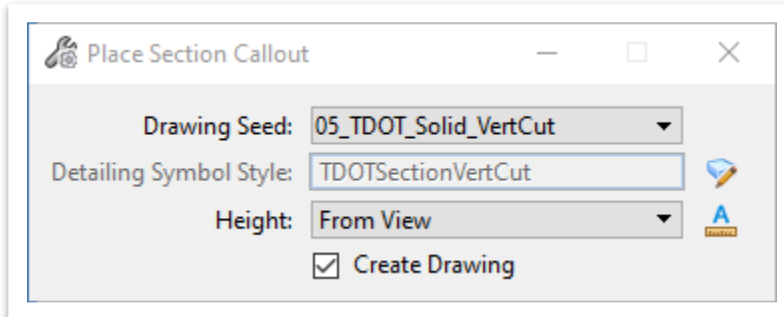
#### Take Note!

*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. Therefore, the subsequent section cuts should be done in the sheet model of the **BENT\_01.dgn**.*

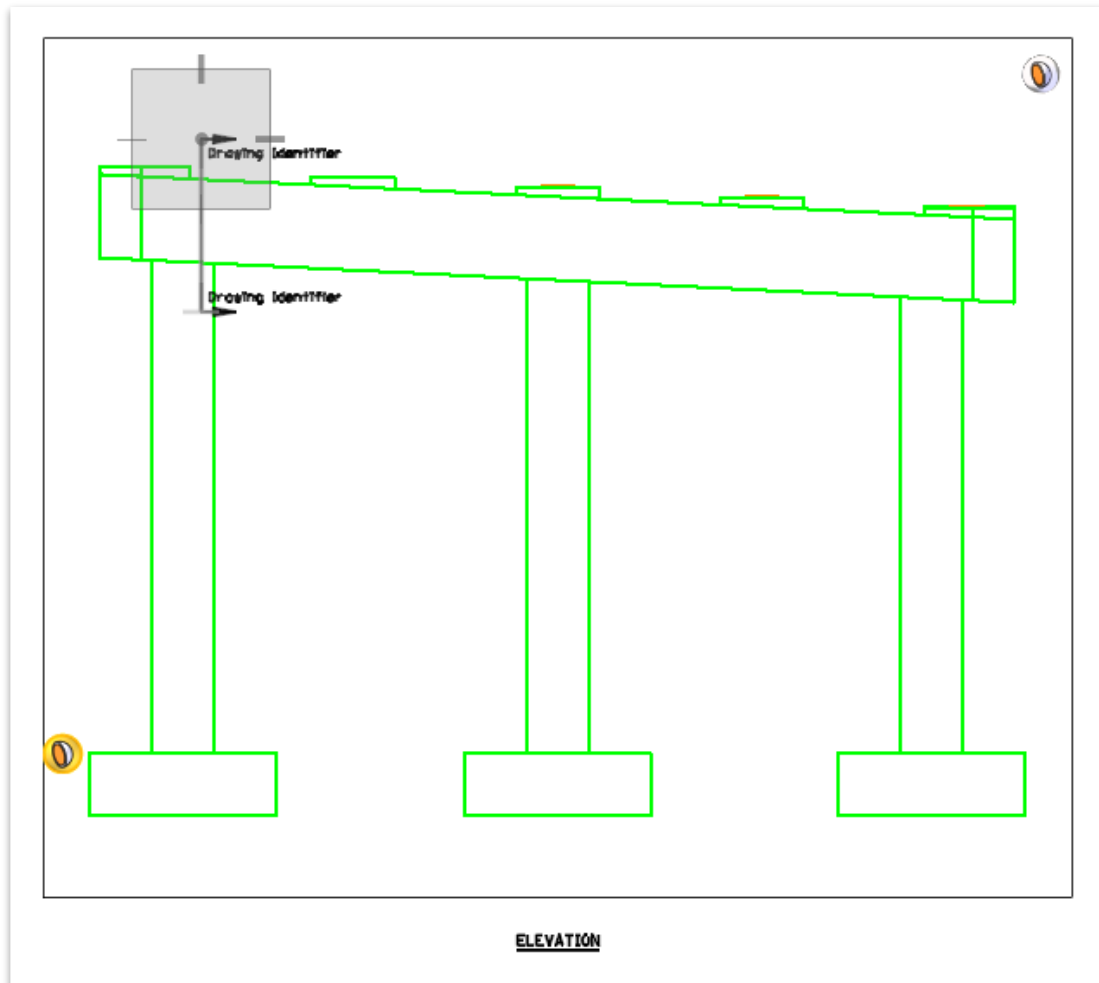
3. Navigate to the **Bent Elevation [Sheet]** sheet model in the Active View Groups drop-down list.



4. Access the **Section Callout** tool found at **Drawing (Workflow) >> Annotate >> Detailing >> Section Callout** and select the **05\_TDOT\_Solid\_VertCut** Drawing Seed. This seed has been customized to create a callout that displays a traditional TDOT section cut annotation.

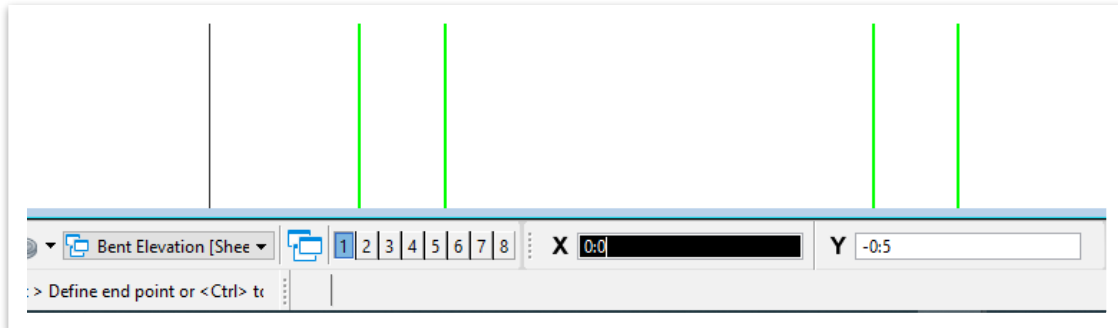


5. Locate a point above the leftmost column in the elevation view and click at a point above the bent cap to define a start point for the callout.

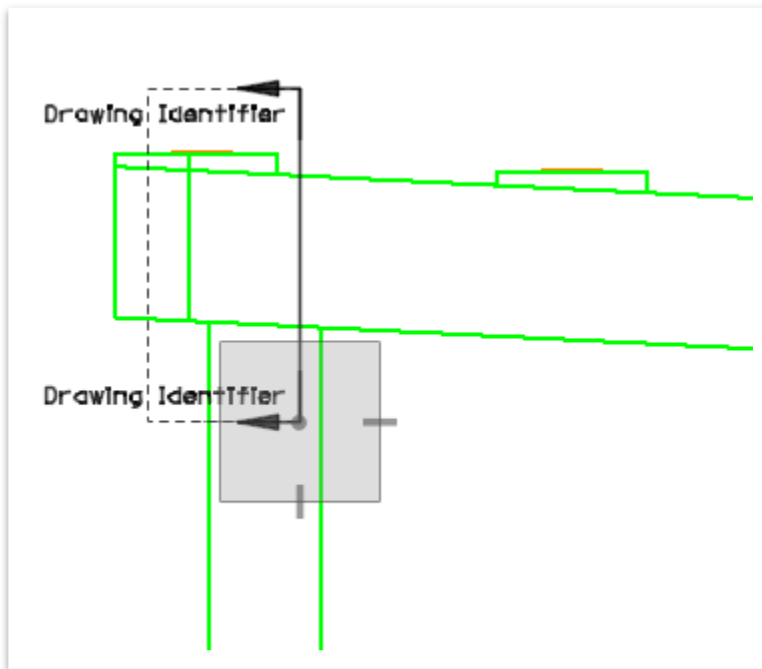




- To ensure the section cut will be perfectly vertical, click in the X-Axis data field in the AccuDraw Toolbar, input “0” and hit “Enter”. Then click at a point below the bent cap to define an end point for the callout.



- Define a direction and depth by clicking at a point to the left of the cut.





8. Once the **Create Drawing** window opens, change the following settings:
  - a. **Name:** Section A-A
  - b. **Drawing Annotation Scale:** 1/4' = 1'-0"
  - c. **Sheet Detail Scale:** 1/4' = 1'-0"
9. Check the boxes next to the Filename fields and click the folder button to select the file **BENT\_DET\_01.dgn** created in Step 1 and located in the following folder: **C:\ProgramData\Bentley\OpenBridge Designer CE 10.11.00\OpenBridge Modeler\Configuration\WorkSpaces\TDOT\_Standards\WorkSets\123456.00\_OBM\_Plans\_TR\dgn**. This will send the new drawing and sheet models to the specified file.
10. Ensure that only the **BENT\_01.dgn** is open as the **BENT\_DET\_01.dgn** cannot be open while creating the drawing and sheet models.
11. Click **OK** to create the drawing and sheet models in the **BENT\_DET\_01.dgn** file.

**Create Drawing**

Name: Section A-A

Drawing Seed: 05\_TDOT\_Solid\_VertCut

View Type: Section

Discipline: Structural

Purpose: Section View

---

Create Drawing Model

Seed Model: TDOT Structures Detailing Seed\_OBM.dgnlib

Filename: BENT\_DET\_01.dgn

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

Visible Edges: Dynamic

---

Create Sheet Model

Seed Model: TDOT Structures Detailing Seed\_OBM.dgnlib

Filename: BENT\_DET\_01.dgn

Sheets: (New)

Sheet Size: 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

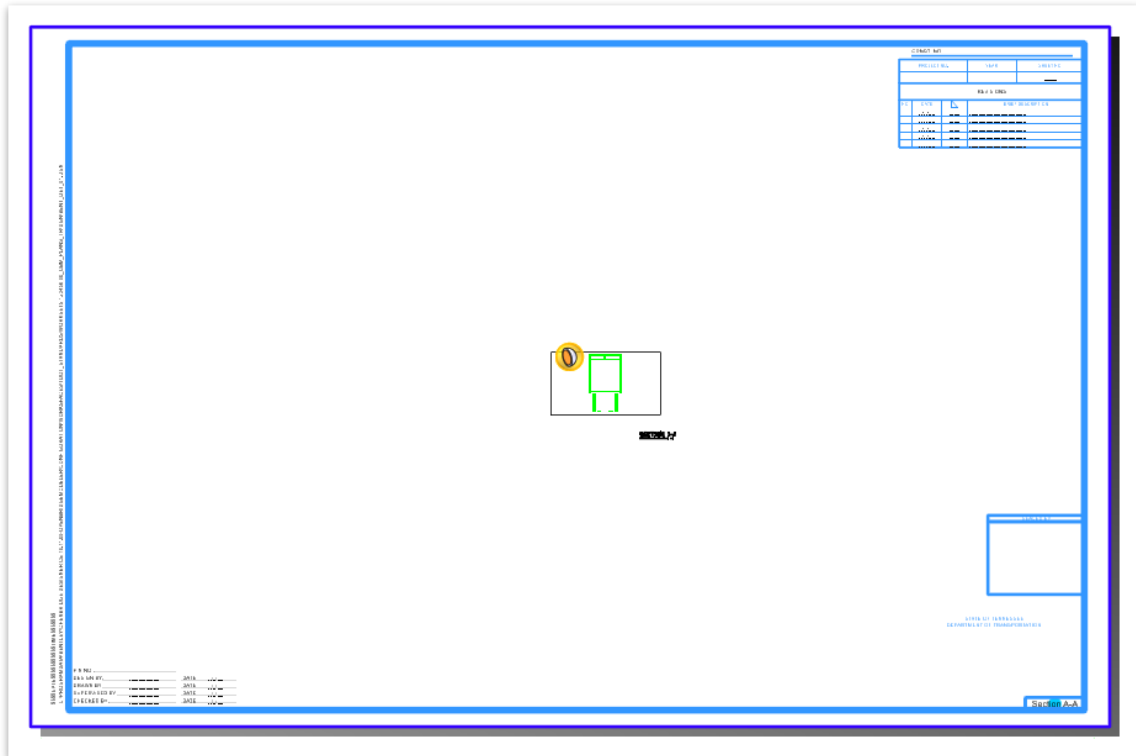
Open Model

**OK** Cancel





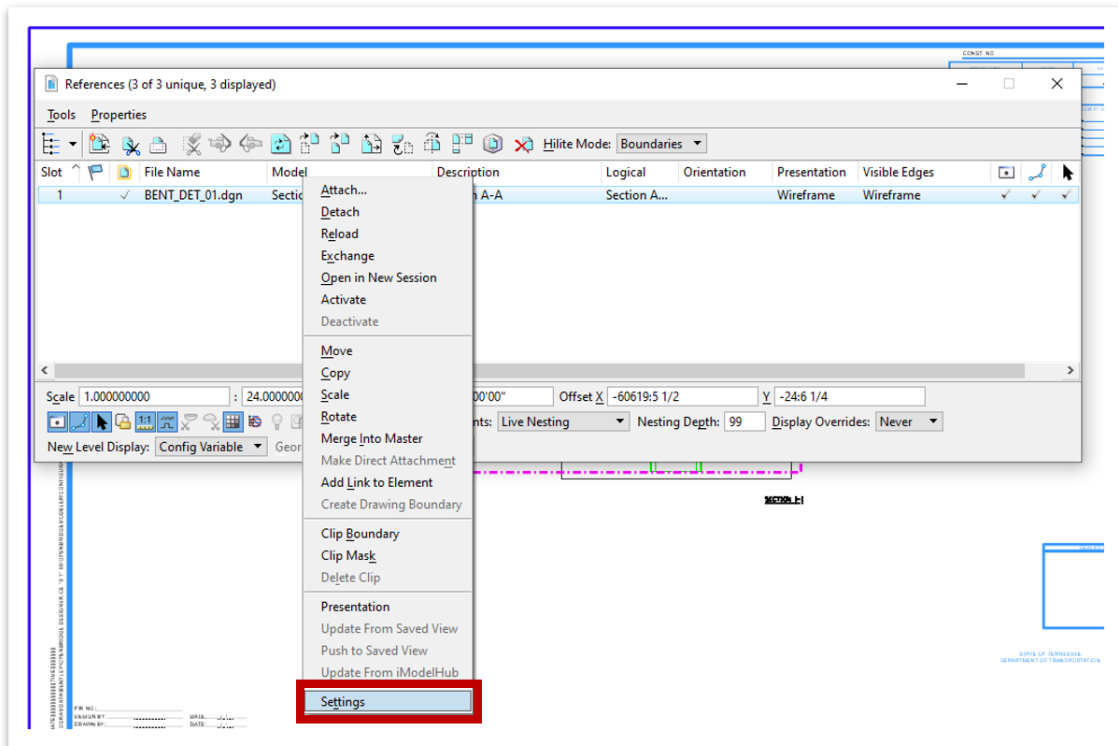
- The **BENT\_DET\_01.dgn** file then opens showing the new sheet model. However, the section appears quite small in relation to the sheet border. The scale of the section can be changed to increase the section size within the border. However, both the annotation scale for drawing model and the detail scale of the sheet model must be changed for consistency.



- To change the detail scale of the sheet model, open the **References** tool by navigating to and selecting **Home >> Primary >> References**.

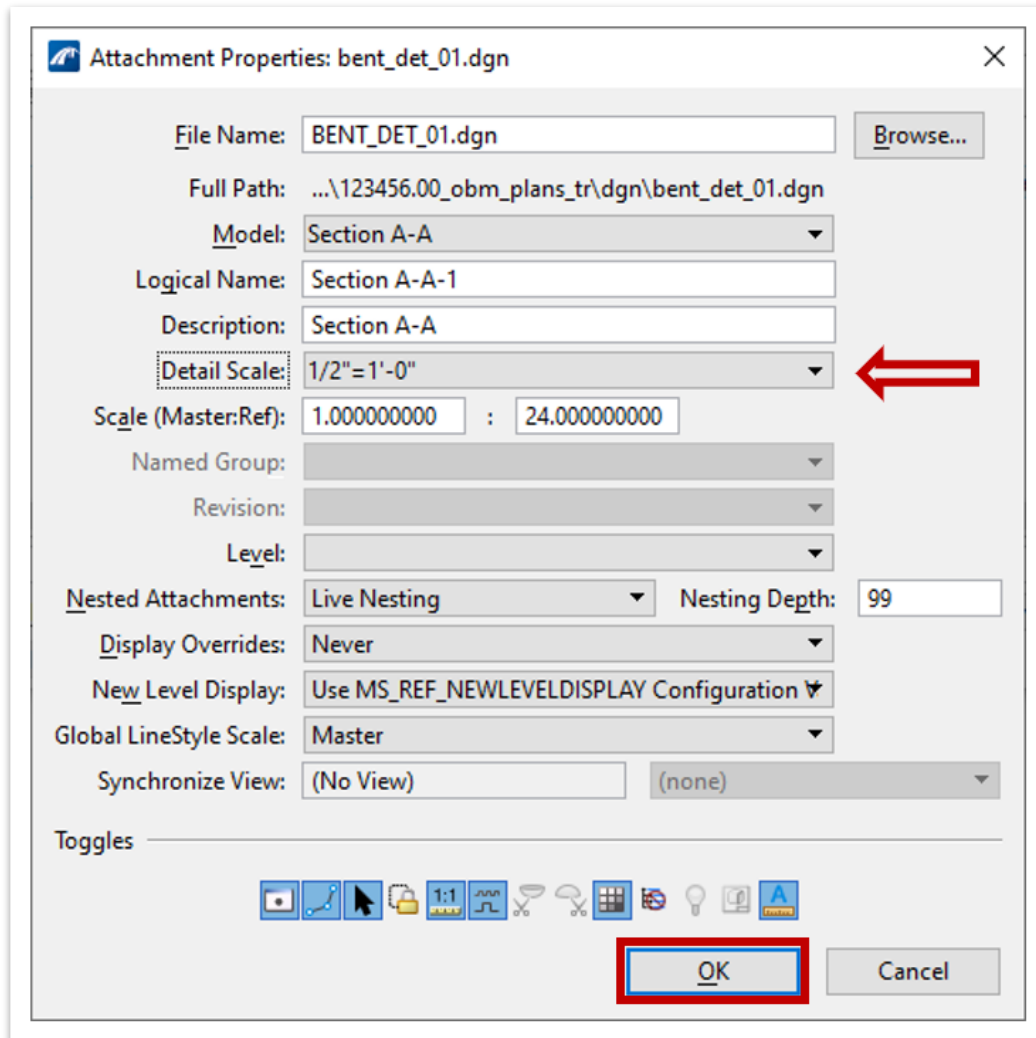


14. In the **References** window, highlight the drawing model reference. Then right click and select **Settings**.





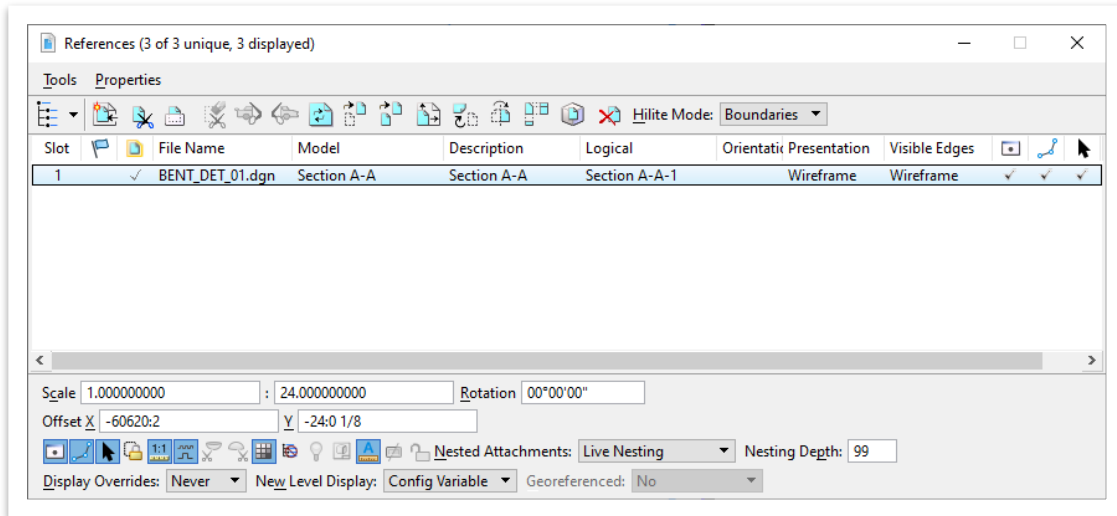
15. This will open the **Attachment Properties** window to open where the Detail Scale should be changed to **1/2"=1'-0"**. Click **OK** and the scale of the reference will be set to 1:24.



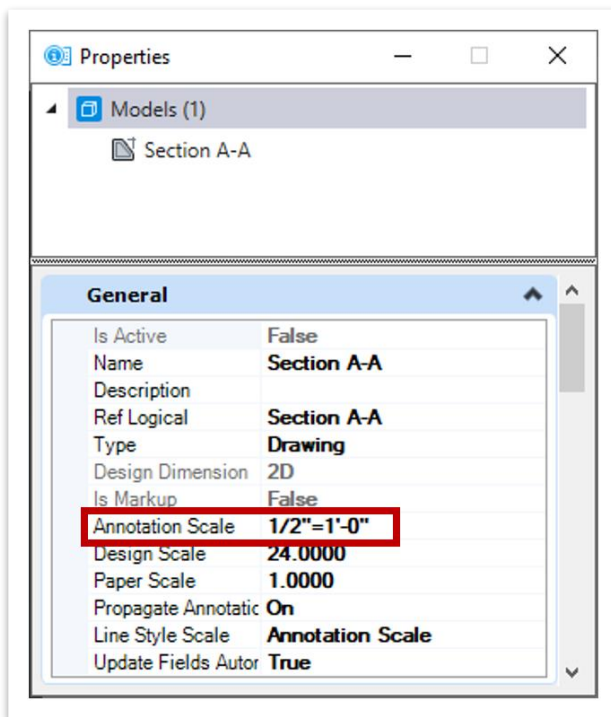
16. With the detail scale updated, the annotation scale of the drawing model must be changed to match. Access the **Properties** tool at **Home >> Primary >> Properties**.
17. Next, open the **Models** tool in the same group by selecting **Home >> Primary >> Models**.



18. With the **Models** window open, highlight the drawing model titled **Section A-A**.



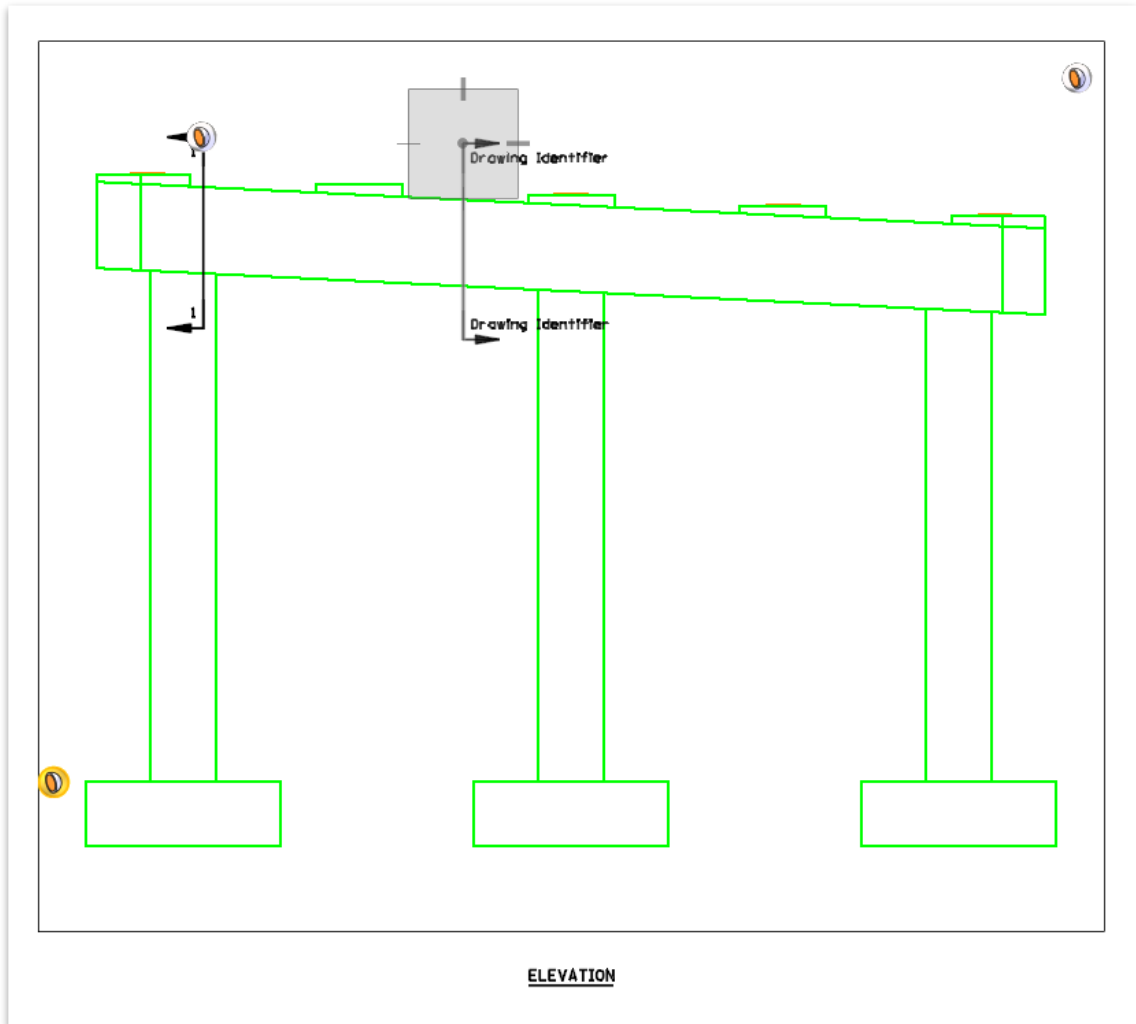
19. Once the drawing model has been highlighted, the model's properties will all be accessible in the **Properties** window. Here, we will update the **Annotation Scale** field to **1/2"=1'-0"**.



20. Now that the bent cap section at the column has been placed completed, we still need to create a section between the columns. Re-open the Intermediate Bent file by selecting **File >> Open** and select **BENT\_01.dgn**.

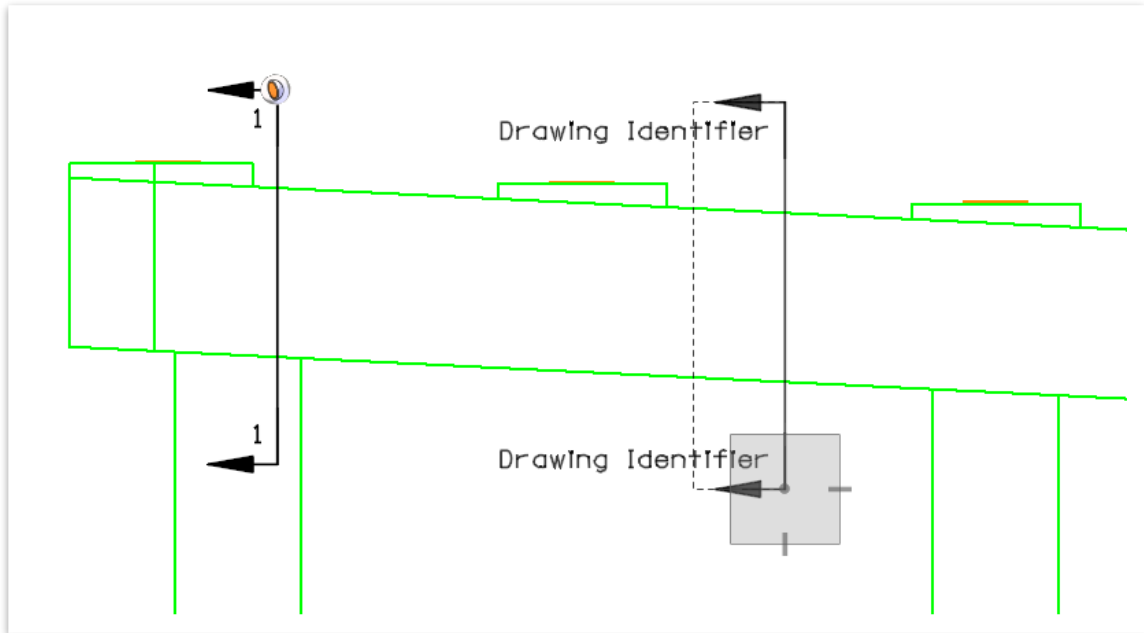


21. Navigate to the **Bent Elevation [Sheet]** sheet model in the Active View Groups drop-down list. Access the **Section Callout** tool found at **Drawing (Workflow) >> Annotate >> Detailing >> Section Callout** and select the **05\_TDOT\_Solid\_VertCut** Drawing Seed.
22. Locate a point between the first two columns in the elevation view and click at a point above the bent cap to define a start point for the callout. Then, define an end point for the callout at a point straight down from the start point and below the bent cap, as shown below.



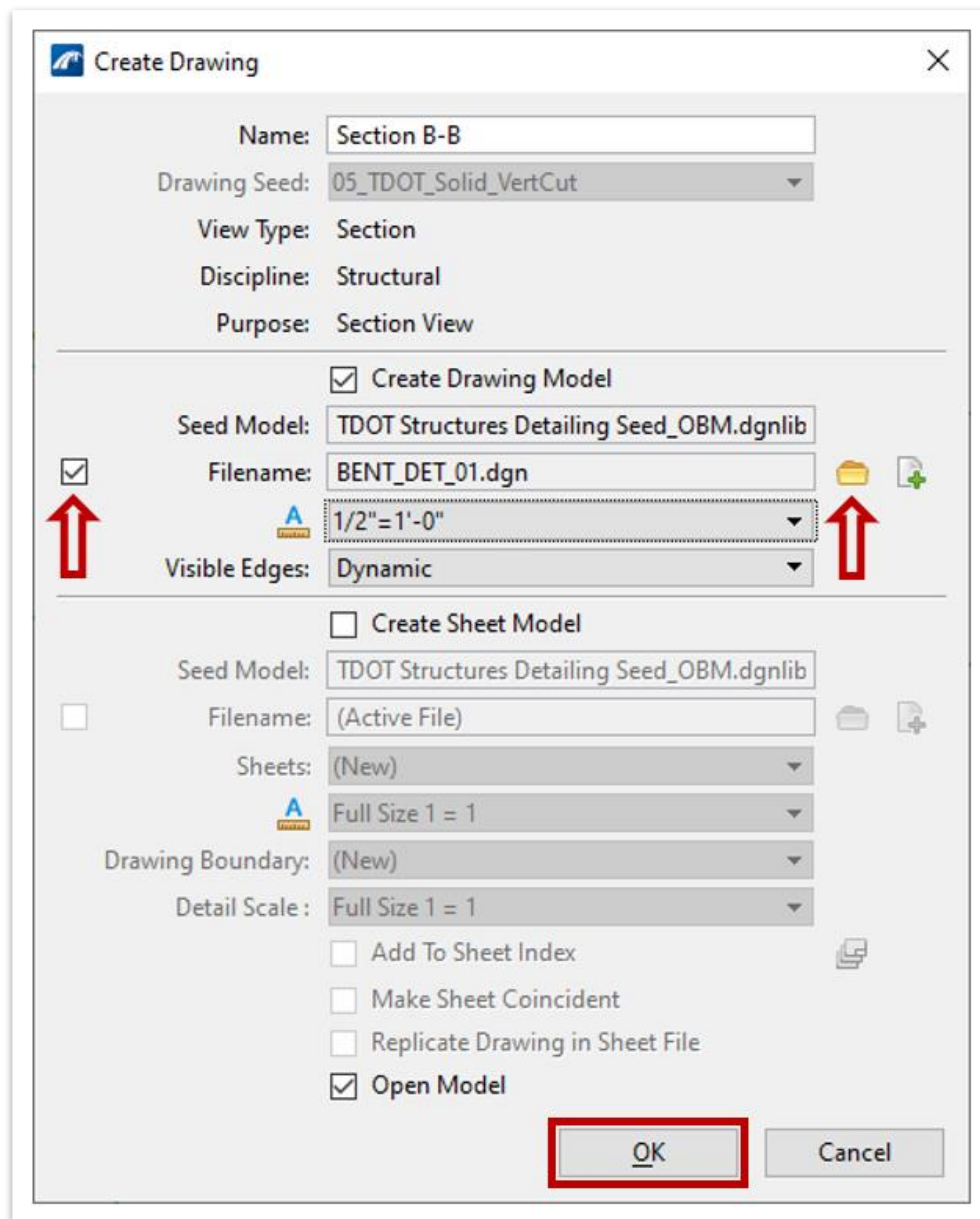


23. Define a direction and depth by clicking at a point to the right of the cut, as shown below.



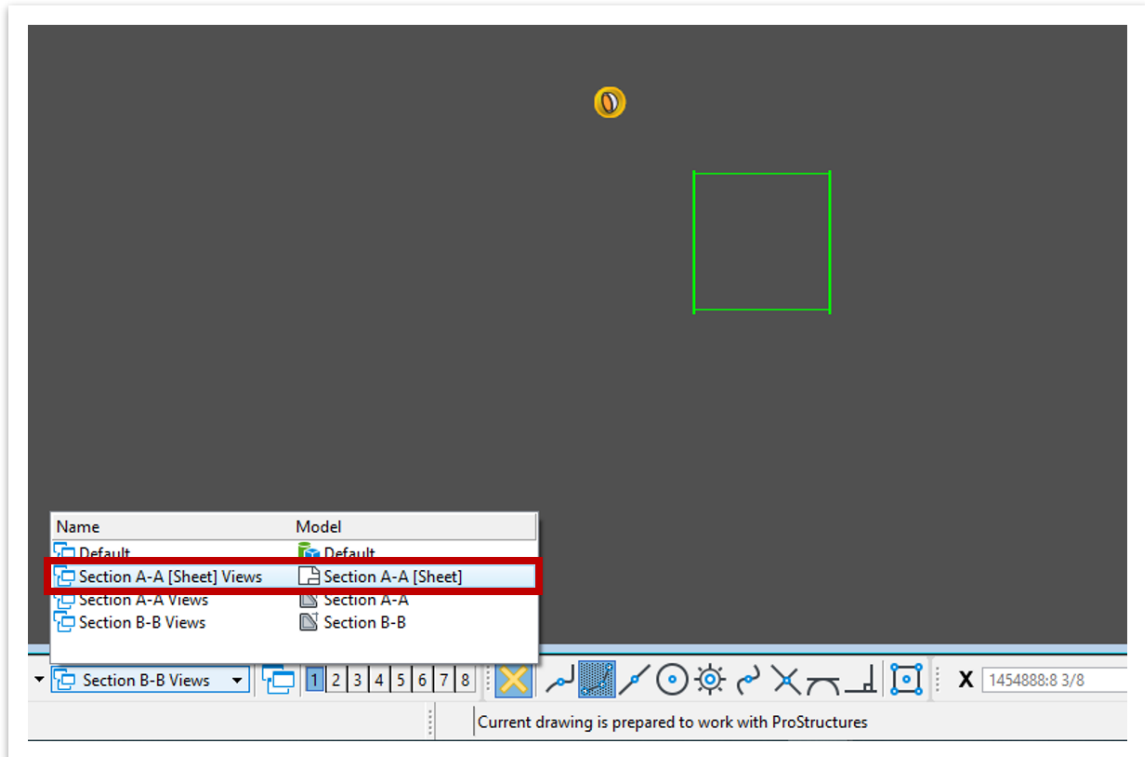


24. Once the **Create Drawing** window opens, change the following settings:
- Name:** Section B-B
  - Drawing Annotation Scale:** 1/2" = 1'-0"
  - Toggle off the **Create Sheet Model** box so a sheet model is not automatically created for this section. This will gray out the Create Sheet Model portion of the window.
  - Check the box next to the Filename field in the Create Drawing Model section and click the folder button to select the file **BENT\_DET\_01.dgn**.
  - Click **OK** to create the drawing model in the **BENT\_DET\_01.dgn** file.

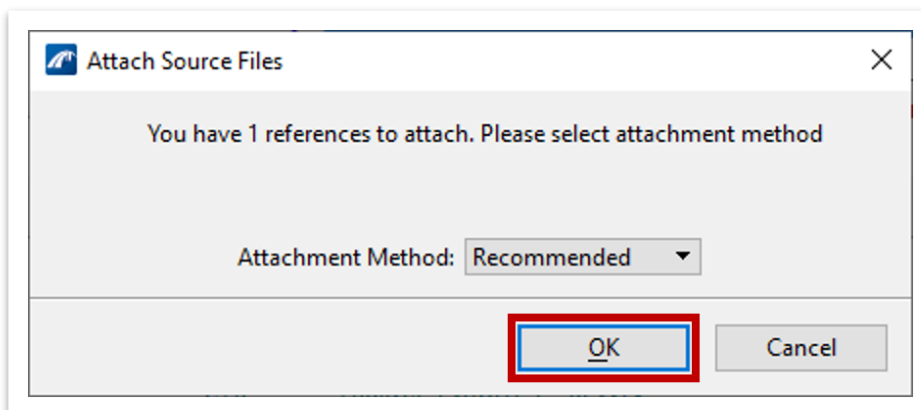




25. The **BENT\_DET\_01.dgn** file will now open to the newly created Section B-B drawing model.
26. Navigate to the **Section A-A [Sheet]** sheet model in the **Active View Groups** drop-down list. Notice that the Section B-B model reference has not been included in the sheet model.



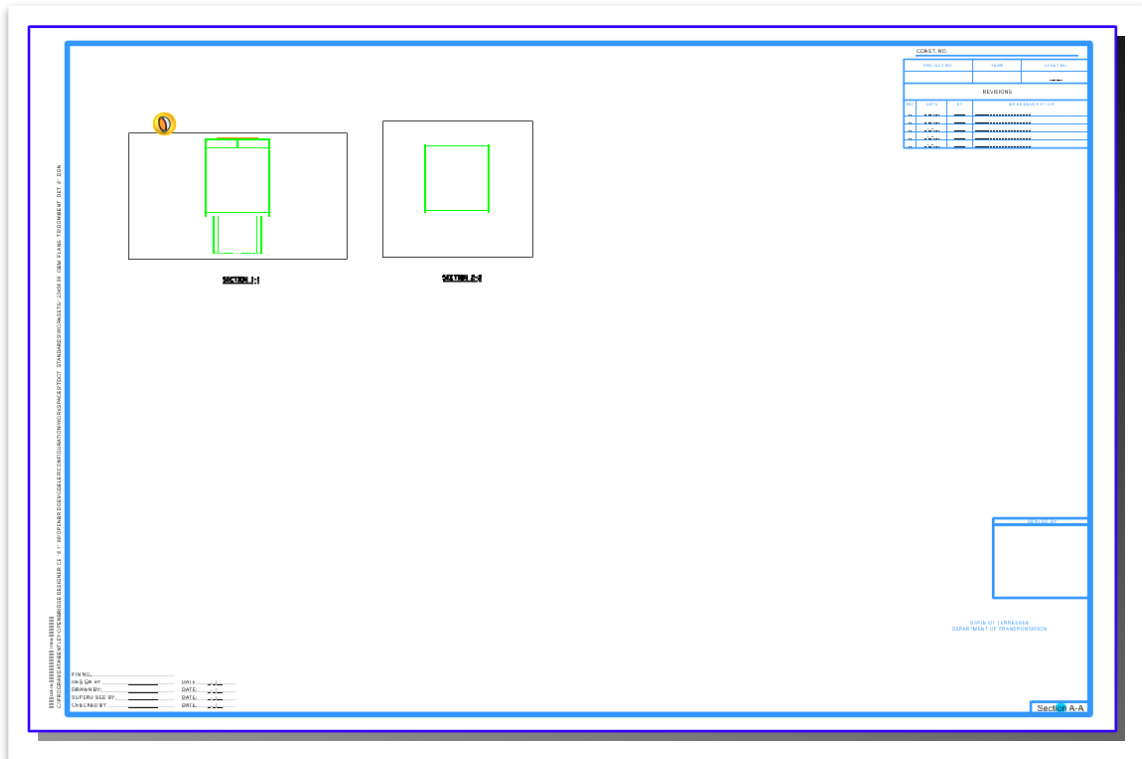
27. We will manually add Section B-B to the Section A-A [Sheet] model. Start by opening the **Models** window.
28. Within the **Models** window, click and drag the Section B-B drawing model from the window and into the sheet model border limits.
29. Next the **Attach Source Files** window will automatically open. The Attachment Method should be set to **Recommended**. Click **OK**.







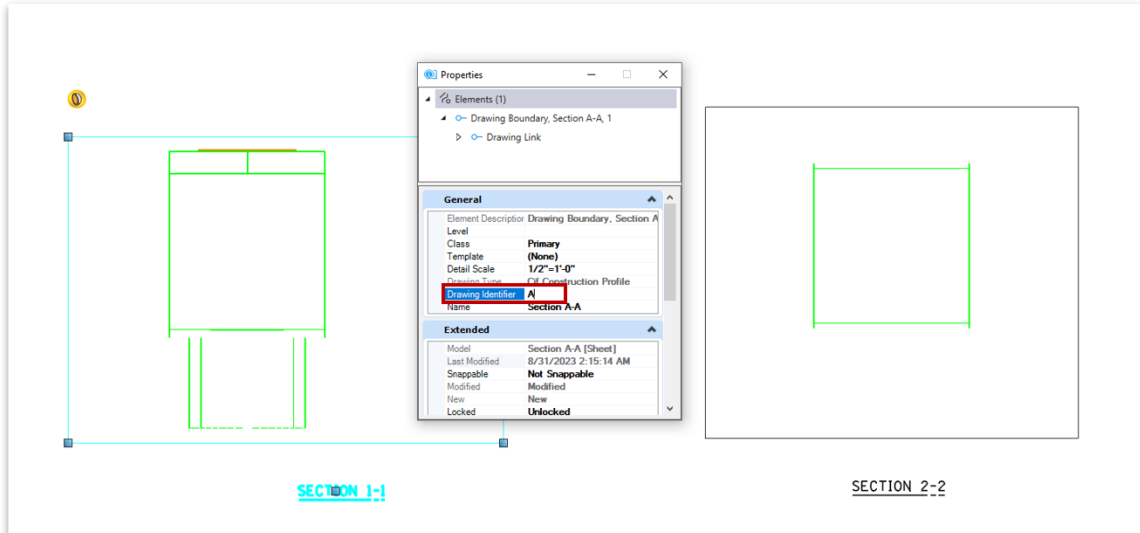
30. Next, click at the point within the border at which that the section will be placed.
31. Once Section B-B has been placed in this sheet model, use the **Move Reference** and **Move** tools to position the sections and section drawing boundary titles similar to the following image.



32. Now that both bent cap sections have been placed in the bent details sheet, the section drawing boundary titles (and by association, the section callout annotations in the **BENT\_01.dgn** file) need to be updated to match the names of the sections. This is accomplished by changing the properties of the drawing boundary for each section within the sheet model.



33. In the **Section A-A [Sheet]** sheet model, click on the **SECTION 1-1** drawing boundary title to select the drawing boundary. Then, access the **Home >> Primary >> Properties** tool and change the **Drawing Identifier** field in the General section from **1** to **A**.



34. Repeat this with the **SECTION 2-2** drawing boundary title, but instead type **B** in the Drawing Identifier field. The updated drawing boundary titles should match the image below.

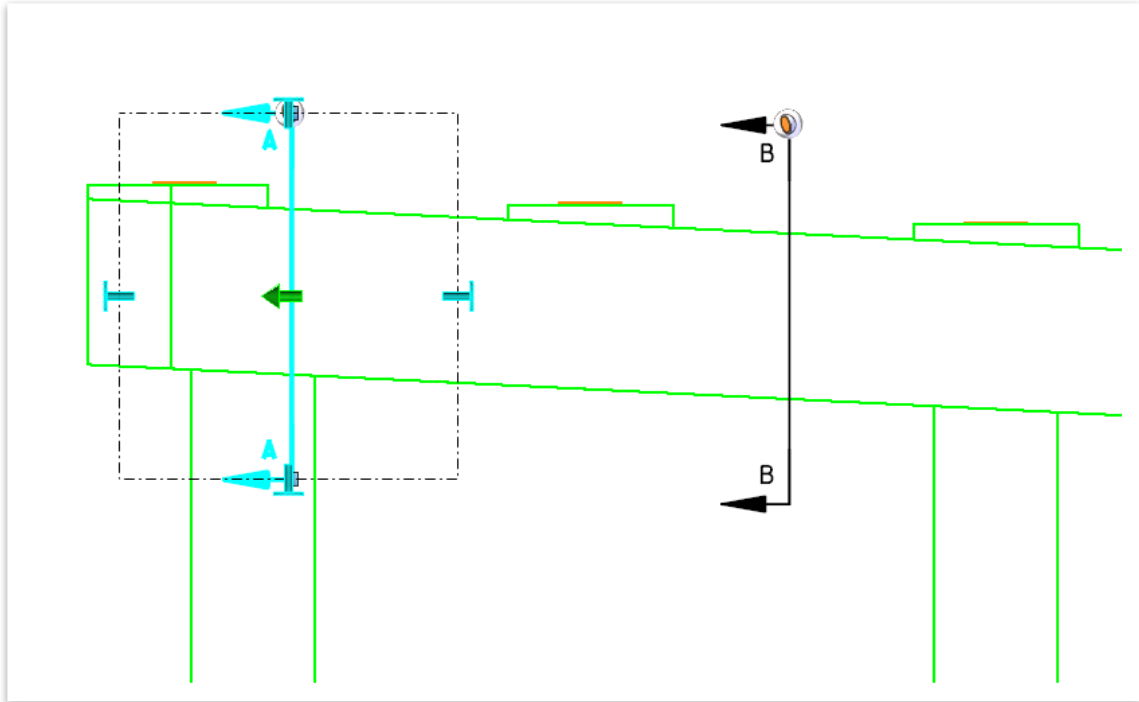


### Take Note!

*While these sections are cut correctly and look like traditional sections used, they clearly have extra linework since they are 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.*

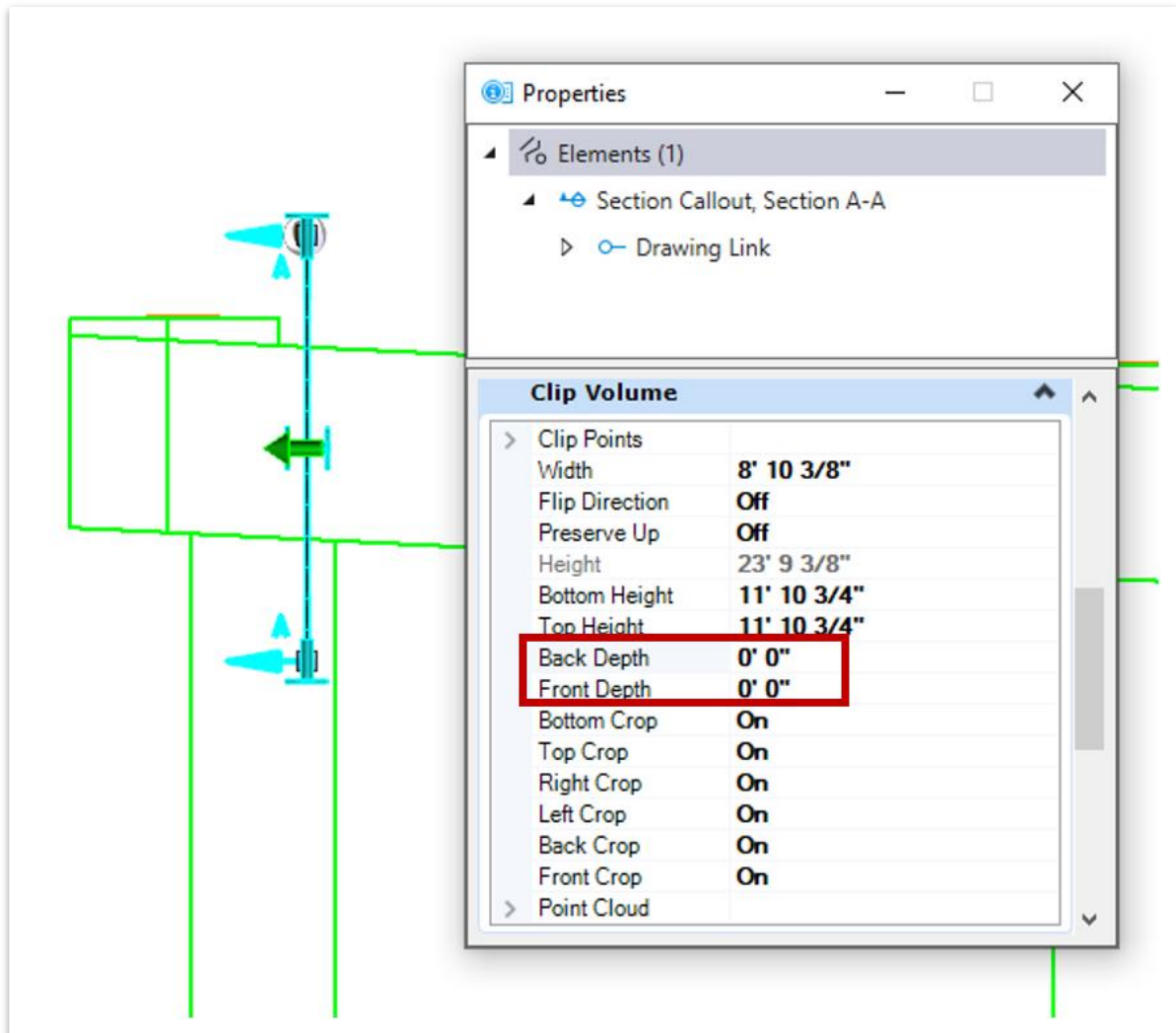


35. Next, we need to modify the section cuts to remove their depth and allow for the sections to have the correct appearance. To do this, return to the **BENT\_01.dgn** file.
36. Within the **Bent Elevation [Sheet]** model, click on the Section A-A section callout to select it. The dashed line with blue handles denotes the limits of the clip volume.





37. With the clip volume still selected access the **Properties** tool at **Home >> Primary >> Properties**. Scroll down to the Clip Volume section of the window and change the **Front Depth** and the **Back Depth** fields to **0' 0"**.



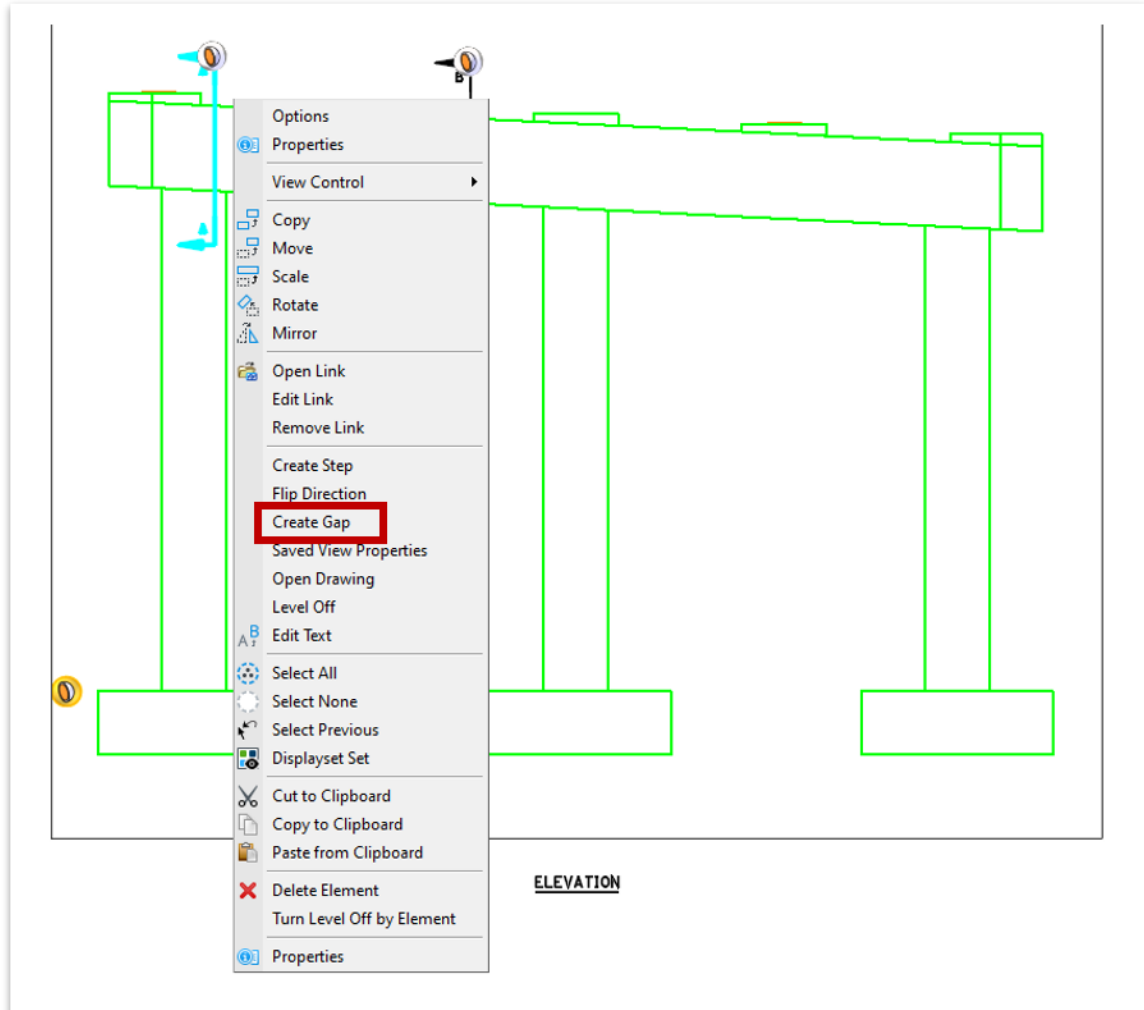
### Take Note!

Alternatively, the clip volume can be manually manipulated by clicking the horizontal handles on the limits of the clip volume, similar to how the clip volume was manipulated in Exercise 3.4.1. Once selected, the handle will turn pink. 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.

38. Repeat this process for the Section B-B section callout.
39. The depth removal of these sections will now be reflected in the sheet model of the **BENT\_DET\_01.dgn** file.

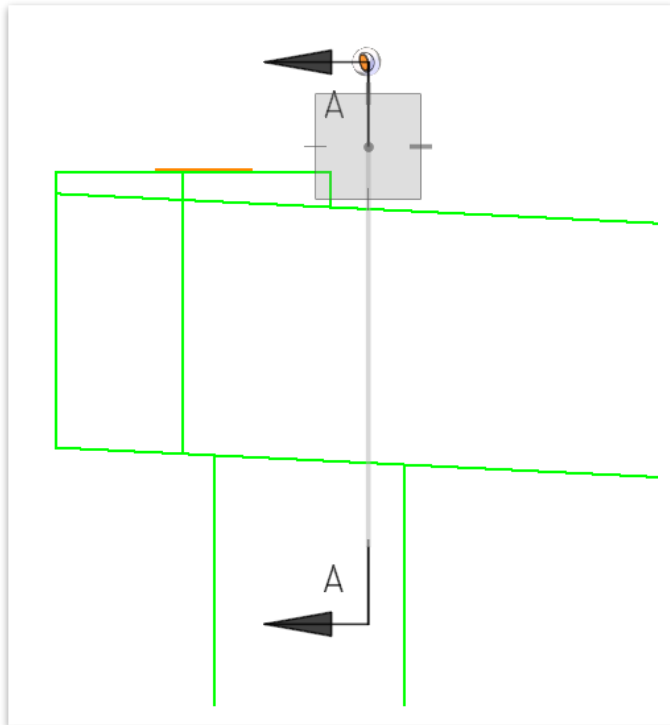


40. Lastly to get the section callouts to look like they would in a traditional TDOT plan sheet, there should be a gap between the arrows. To achieve this, first right-click and hold on the Section A-A section callout to get a list of options to pop up, as shown in the following image. Select **Create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

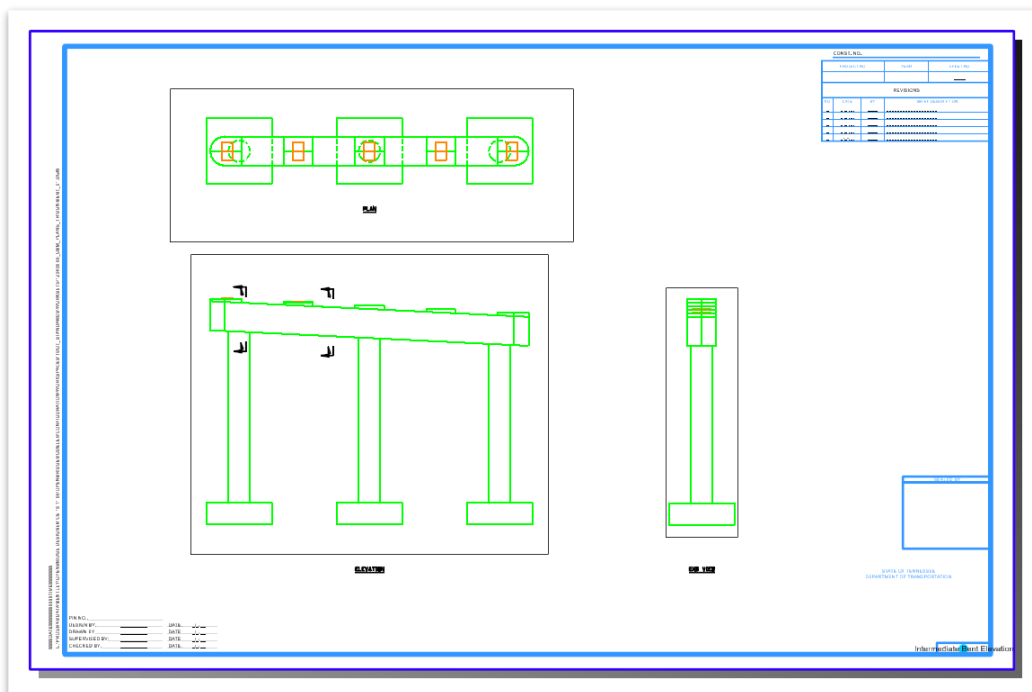




41. Next, click at the tail of the top arrow. Then click again at the tail of the bottom arrow, as shown in the following image.

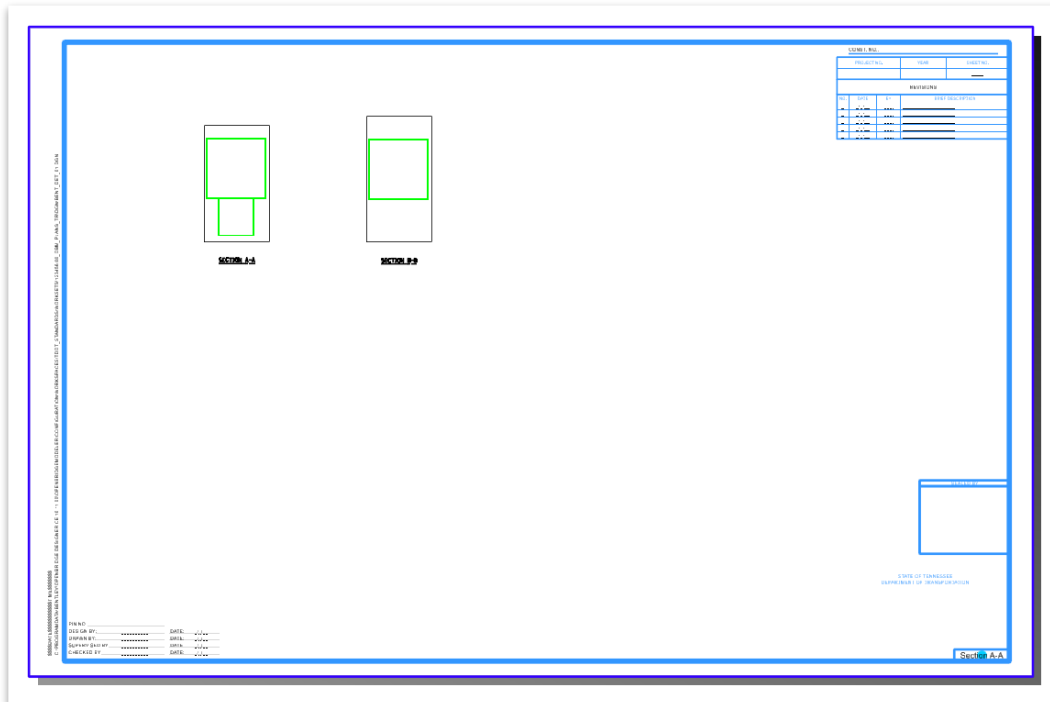


42. Repeat this with the Section B-B section callout.  
 43. The two sheets should look like the images below.  
 BENT\_01.dgn:





BENT\_DET\_01.dgn:



  
**Take Note!**

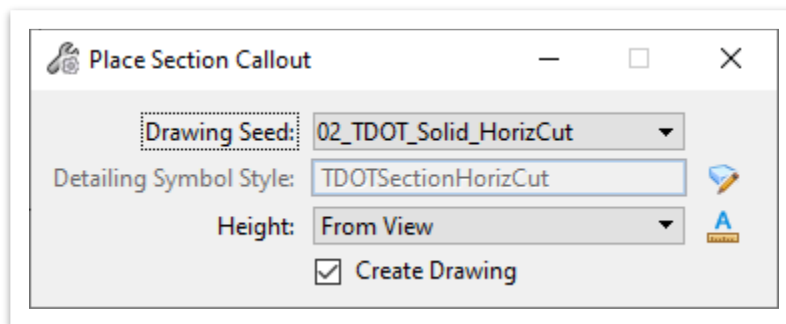
After removing the depth from bent cap sections, the locations of the sections' references may shift. If that occurs, simply utilize the **Move Reference** and **Move** tools to match the section locations shown in the image above. Additionally, it is important to note that any reinforcing bars and annotations can be added for each section in their respective drawing models.



### 3.5.2 Exercise: Generate a Column Section and Plan of Footing

In this exercise, we will continue to use the sheet files named **BENT\_01.dgn** and **BENT\_DET\_01.dgn** for creating a typical section view of the columns and a typical plan view of the footings in the 3D bridge model. We will continue to utilize the same WorkSet and OBD file, both of which named **123456.00\_OBM\_Plans\_TR**.

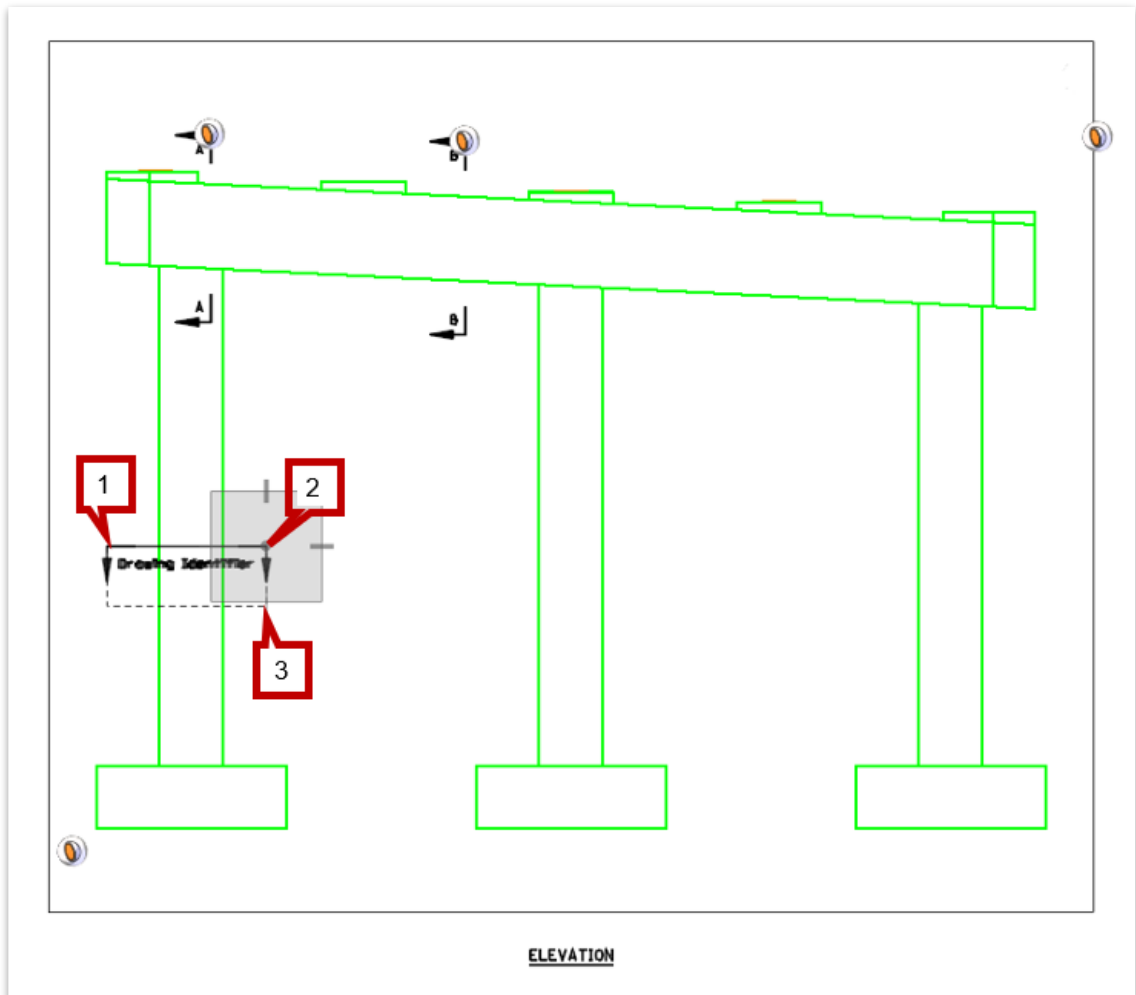
1. Open the **BENT\_01.dgn** file and navigate to the **Bent Elevation [Sheet]** sheet model in the Active View Groups drop-down list.
2. Access the **Section Callout** tool found at **Drawing (Workflow) >> Annotate >> Detailing >> Section Callout** and select the **02\_TDOT\_Solid\_HorizCut** Drawing Seed. This seed has been customized to create a callout that is displays a traditional TDOT section cut annotation.







3. Locate a point about halfway up the leftmost column in the elevation view and click at a point left of the column to define a start point for the callout. Then, click at a point to the right of the column to define an end point for the callout. Lastly, define a direction and depth by clicking at a point to the below the cut.

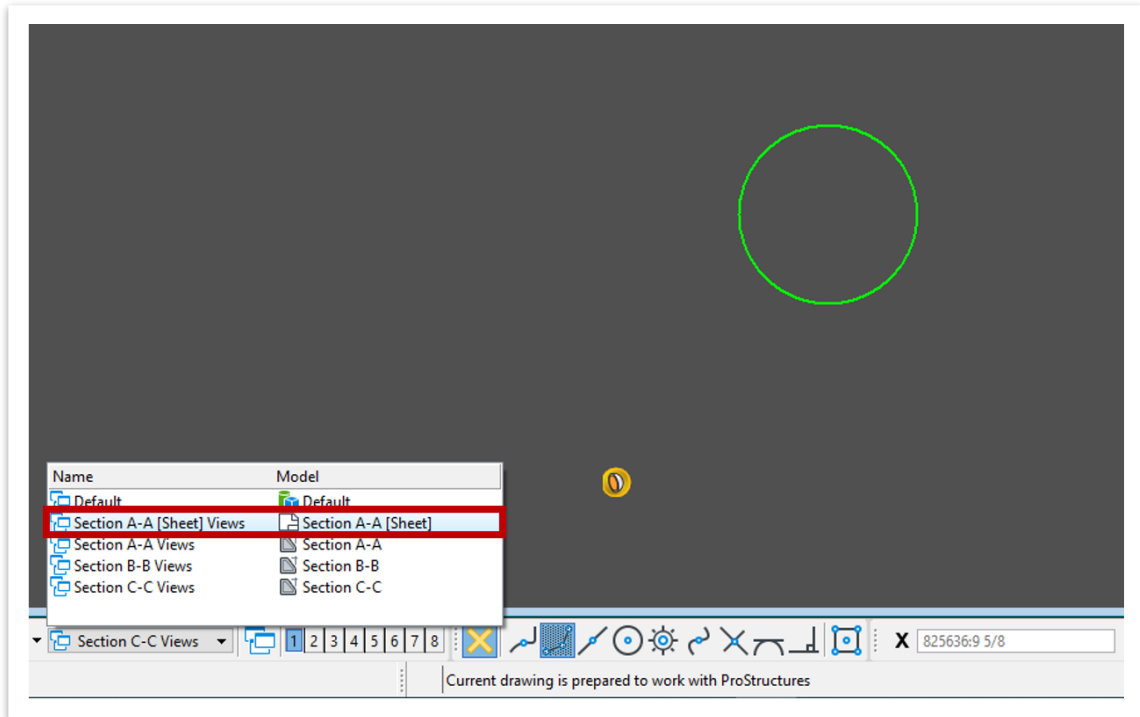




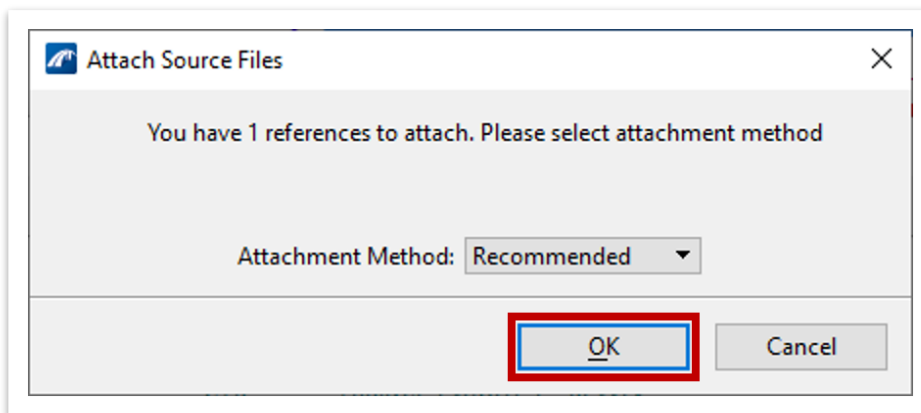
4. Once the **Create Drawing** window opens, change the following settings:
  - a. **Name:** Section C-C
  - b. **Drawing Annotation Scale:** 1/2" = 1'-0"
  - c. Toggle off the **Create Sheet Model** box so a sheet model is not automatically created for this section. This will gray out the Create Sheet Model portion of the window.
  - d. Check the box next to the Filename field in the Create Drawing Model section and click the folder button to select the file **BENT\_DET\_01.dgn**.
  - e. Click **OK** to create the drawing model in the **BENT\_DET\_01.dgn** file.



- The **BENT\_DET\_01.dgn** file will now open to the newly created **Section C-C** drawing model.
- Navigate to the **Section A-A [Sheet]** sheet model in the **Active View Groups** drop-down list where we will have to manually add Section C-C to the **Section A-A [Sheet]** model.



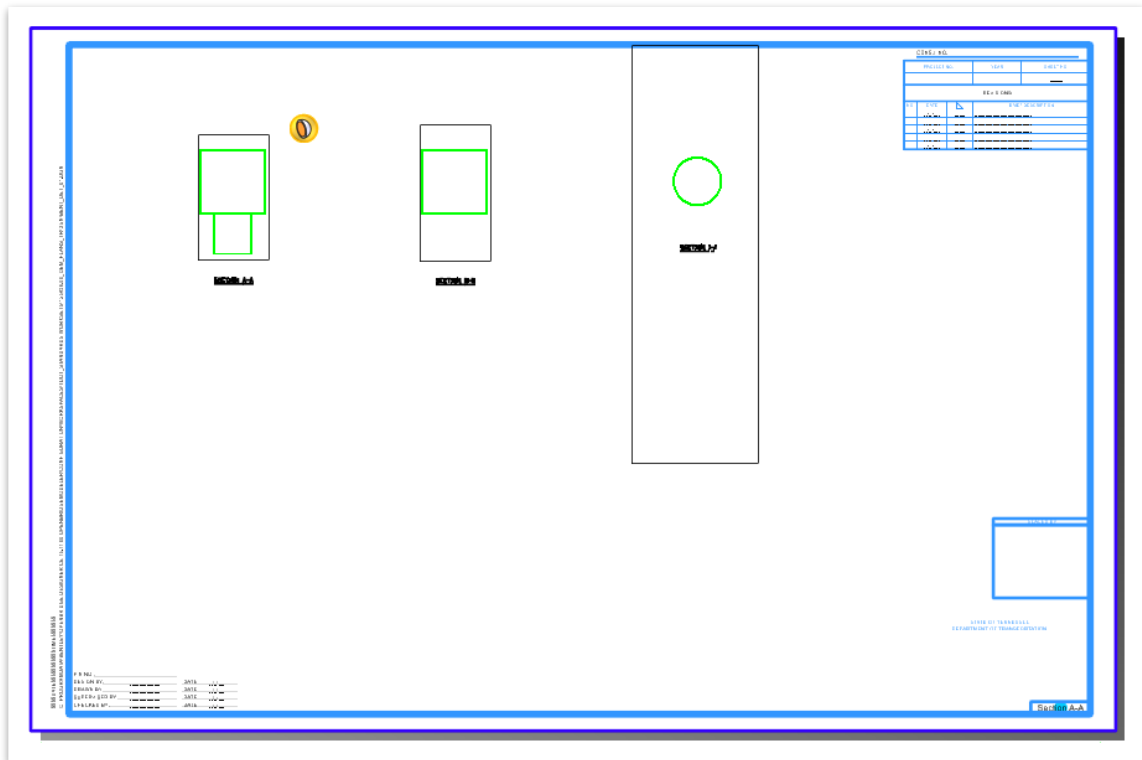
- Open the **Models** window. Then click and drag the **Section C-C** drawing model from the window and into the sheet model border limits.
- Next the **Attach Source Files** window will automatically open. The Attachment Method should be set to **Recommended**. Click **OK**.



- Next, click at the point within the border at which that the section will be placed.



- Once Section C-C has been placed in this sheet model, use the **Move Reference** and **Move** tools to position the sections and section drawing boundary titles similar to the following image.



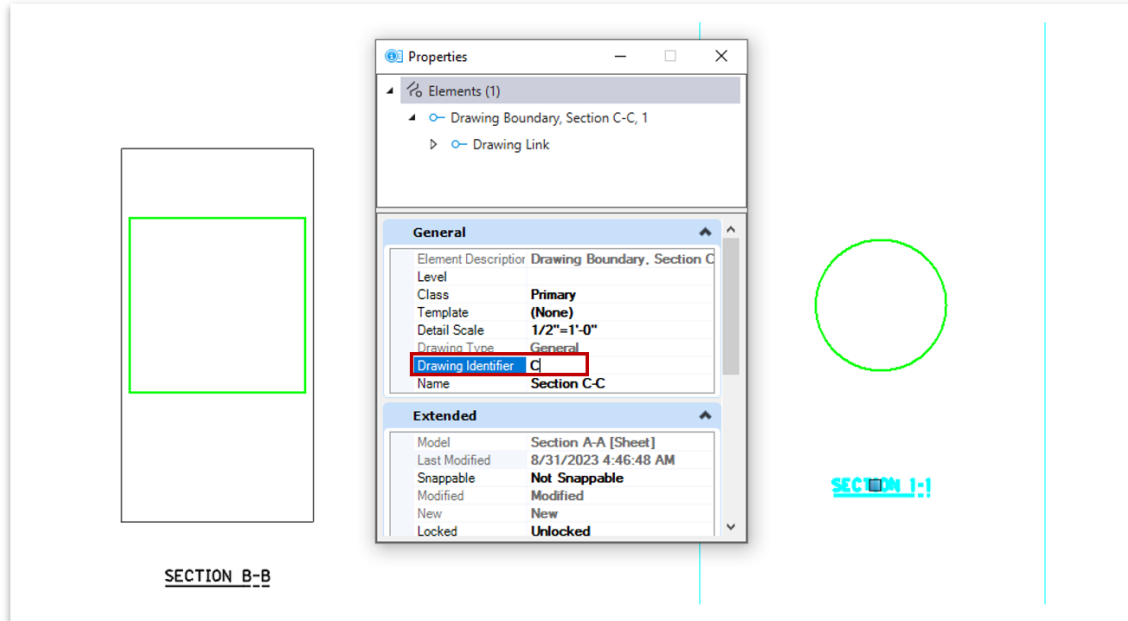
**Take Note!**

*Because the column is vertical without any slope and the section callout was placed perpendicular to it, there is no need to remove the depth from the cut. Without any sloping elements the section will not pick up any linework beyond the cut location.*

- The section drawing boundary title and associated section callout annotations in the **BENT\_01.dgn** file need to be updated to match the names of the sections. This is accomplished by changing the properties of the drawing boundary for each section within the sheet model.



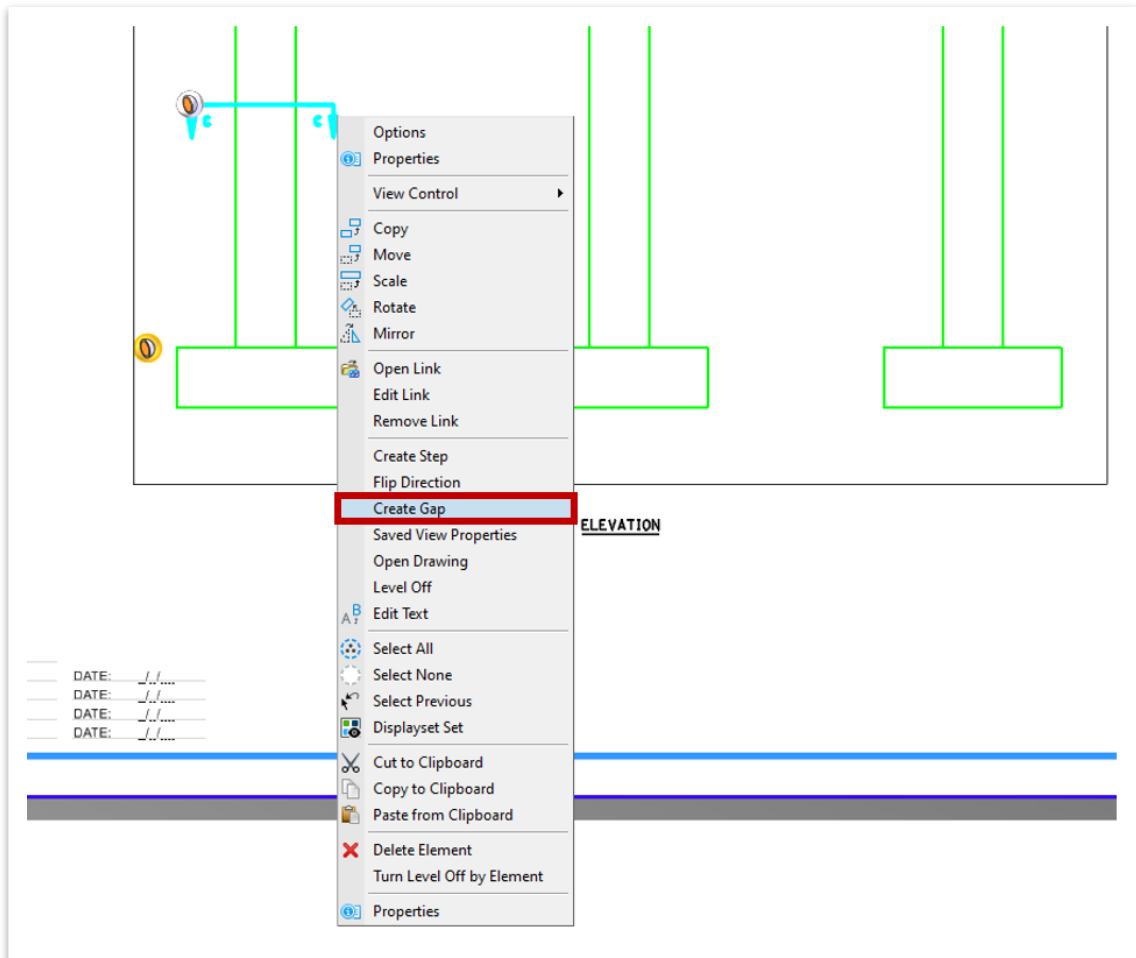
12. In the **Section A-A [Sheet]** sheet model, click on the **SECTION 1-1** drawing boundary title to select the drawing boundary. Then, access the **Home >> Primary >> Properties** tool and change the **Drawing Identifier** field in the General section from **1** to **C**.



13. With the column section now placed in the sheet model, we need to move back into the **BENT\_01.dgn** file to provide the gap in the section callout annotation. Re-open the Bent file by selecting **File >> Open** and selecting **BENT\_01.dgn**.

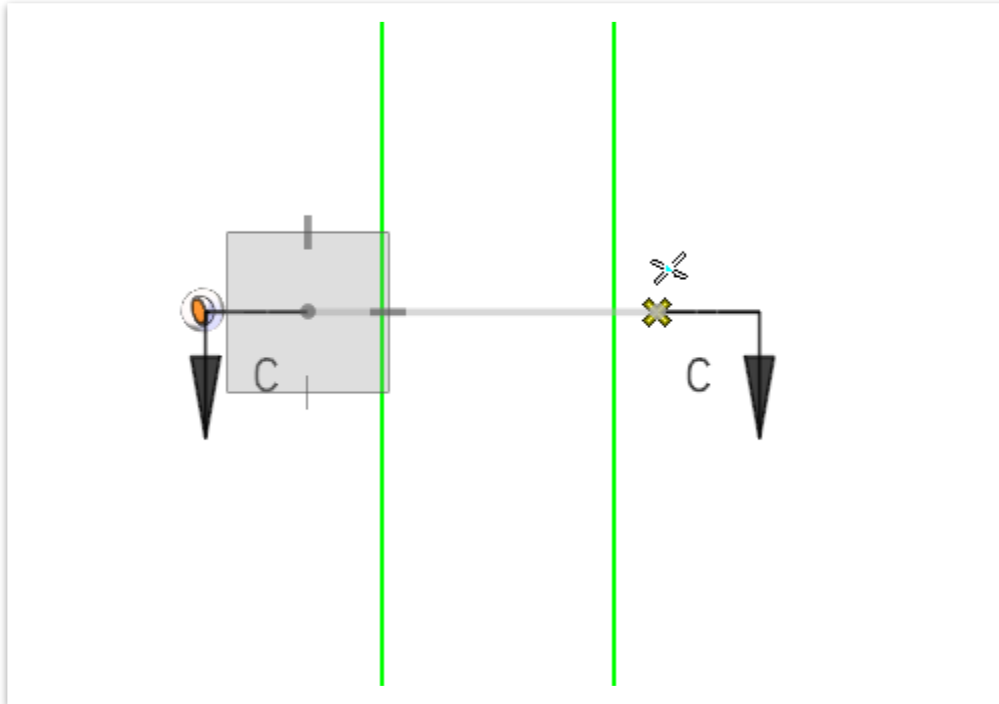


14. Within the **Bent Elevation [Sheet]** model, right-click and hold on the Section C-C section callout to get a list of options to pop up, as shown in the following image. Select **Create Gap**.

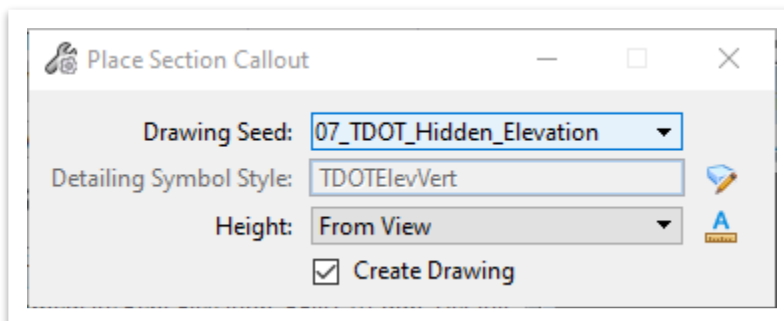




15. Click at the tail of the left arrow. Then click again at the tail of the right arrow, as shown in the following image.

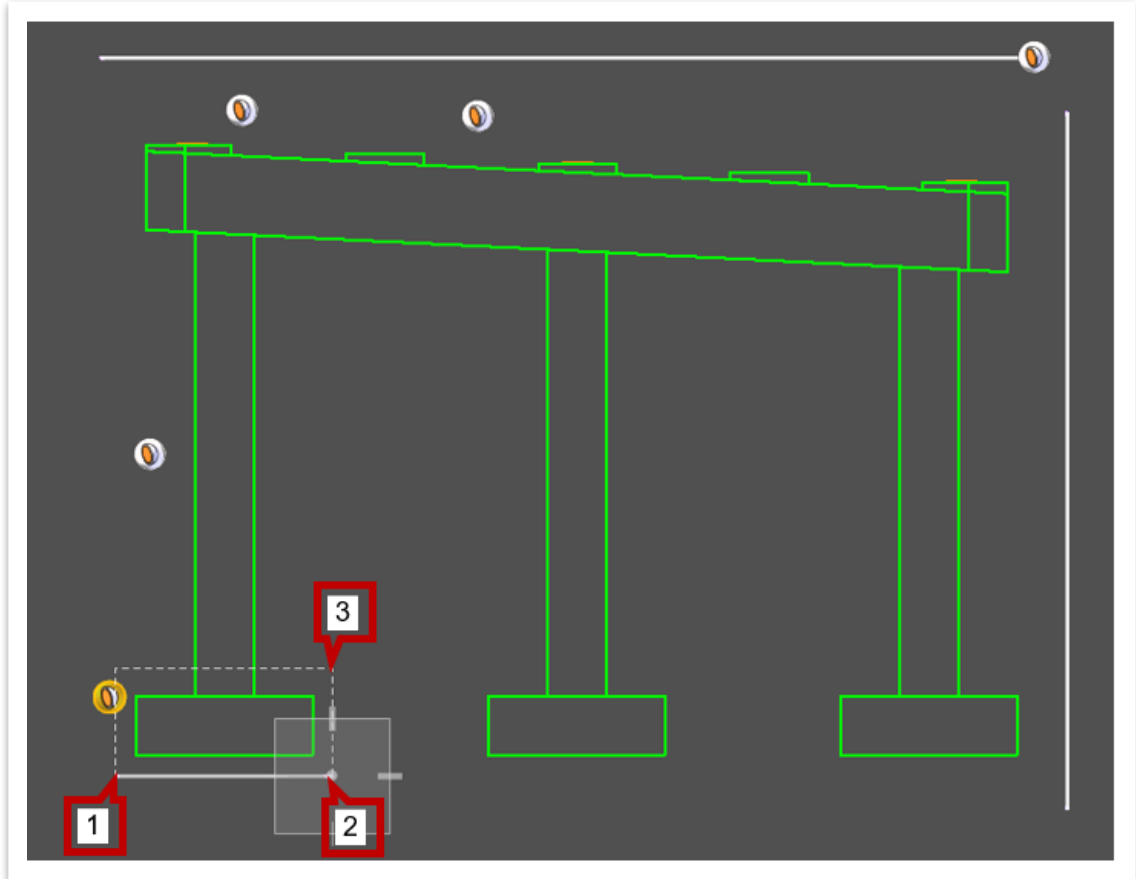


16. With the column section now placed in the sheet model and the section callout annotation modified, we need to move onto the creation of a footing plan view.
17. As was done with the plan view of the bent, the section callout for the footing plan will be placed in bent elevation drawing model since we do not need to see the arrows associated with that view. Navigate to the **Bent Elevation** drawing model in the **Active View Groups** drop-down list.
18. Open the Section Callout tool again using the **07\_TDOT\_Hidden\_Elevation** drawing seed to create a plan view. Using the hidden drawing seed will allow the column to be shown with the hidden display style.





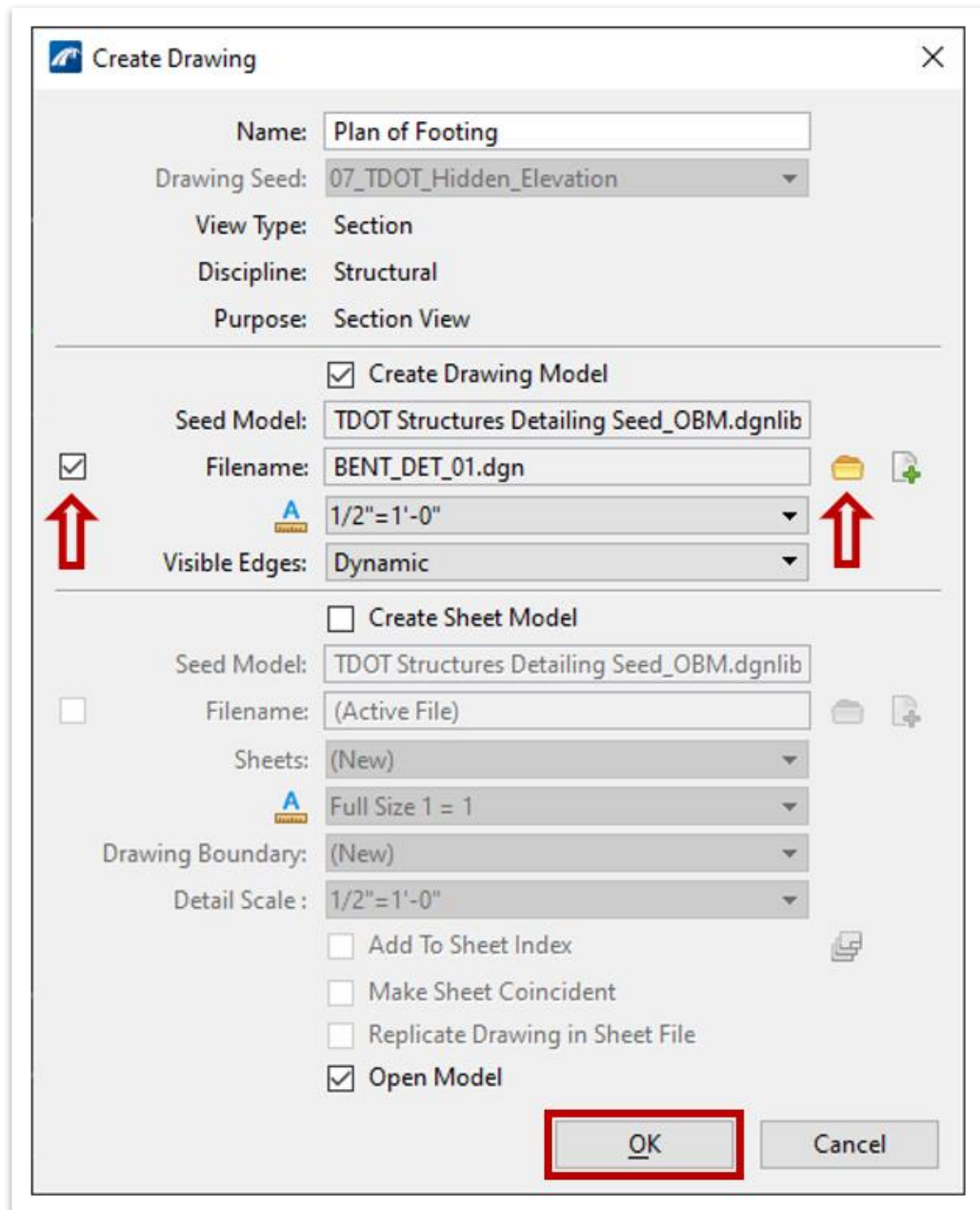
19. Click below and to the left side of the leftmost footing to define a start point for the callout. Then, define an end point for the callout by clicking at a point at the same elevation and beyond the right side of the footing. Lastly, define a direction and depth to the callout by clicking at a point above the top of the footing.





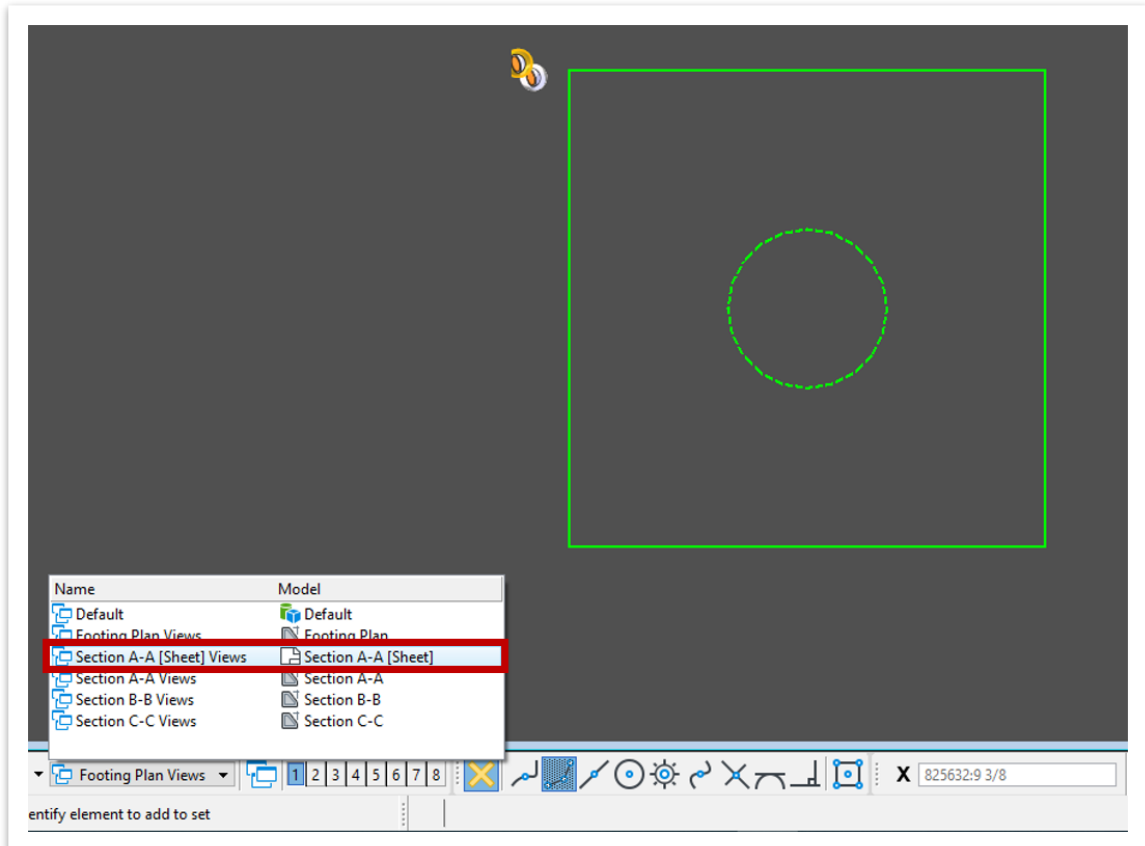


20. Once the **Create Drawing** window opens, change the following settings:
- Name:** Plan of Footing
  - Drawing Annotation Scale:** 1/2" = 1'-0"
  - Toggle off the **Create Sheet Model** box so a sheet model is not automatically created for this section. This will gray out the Create Sheet Model portion of the window.
  - Check the box next to the Filename field in the Create Drawing Model section and click the folder button to select the file **BENT\_DET\_01.dgn**.
  - Click **OK** to create the drawing model in the **BENT\_DET\_01.dgn** file.

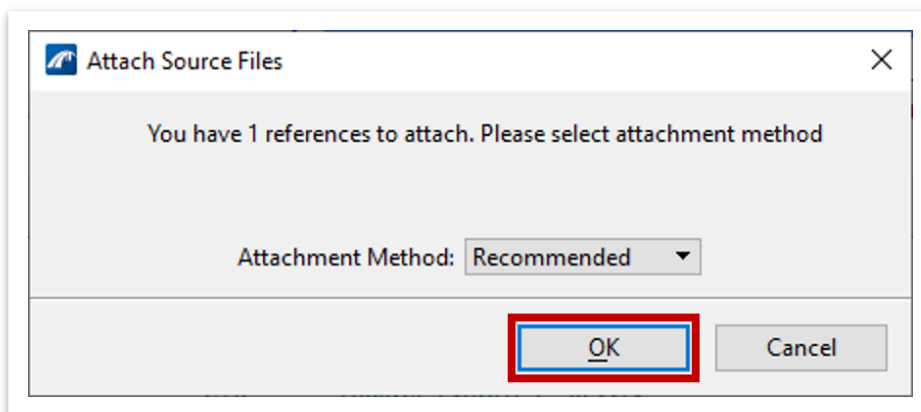




21. The **BENT\_DET\_01.dgn** file will now open to the newly created **Plan of Footing** drawing model.
22. Navigate to the **Section A-A [Sheet]** sheet model in the **Active View Groups** drop-down list. We will have to manually add the Footing Plan to the **Section A-A [Sheet]** model.

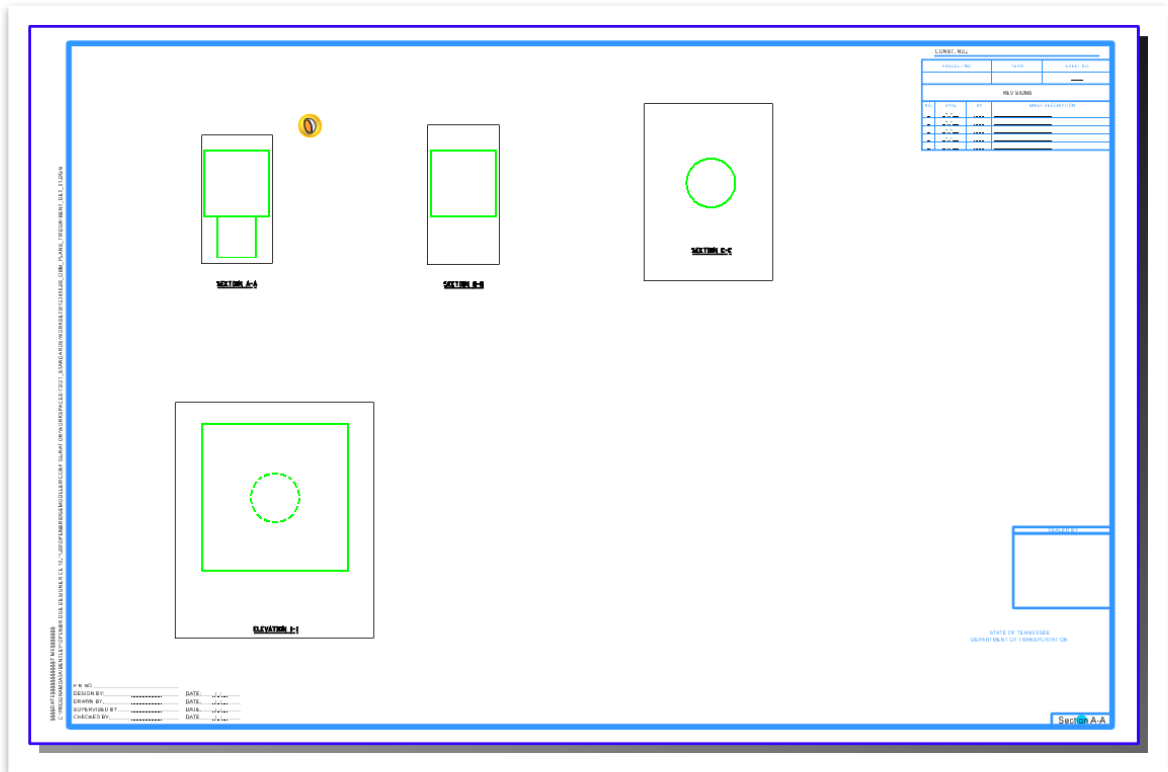


23. Open the **Models** window. Here click and drag the **Plan of Footing** drawing model from the window and into the sheet model border limits.
24. Next the **Attach Source Files** window will automatically open. The Attachment Method should be set to **Recommended**. Click **OK**.





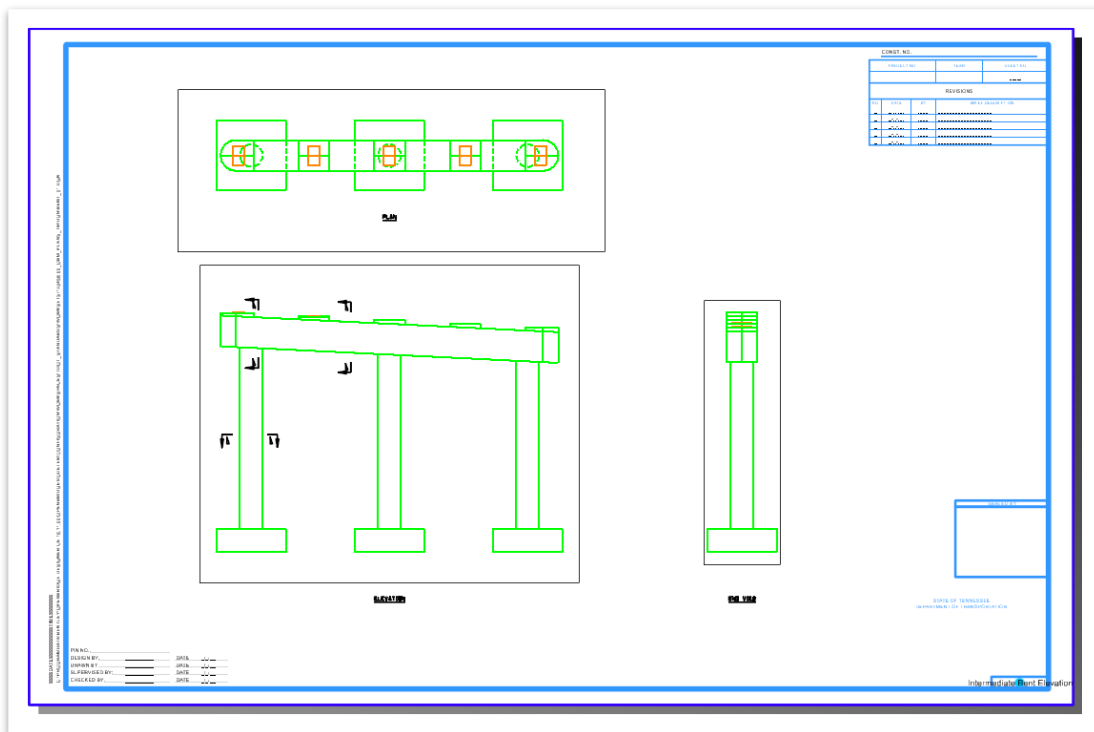
25. Next, click at the point within the border at which that the section will be placed.
26. Once the Plan of Footing has been placed in this sheet model, use the **Move Reference** and **Move** tools to position the sections and section drawing boundary titles similar to the following image.



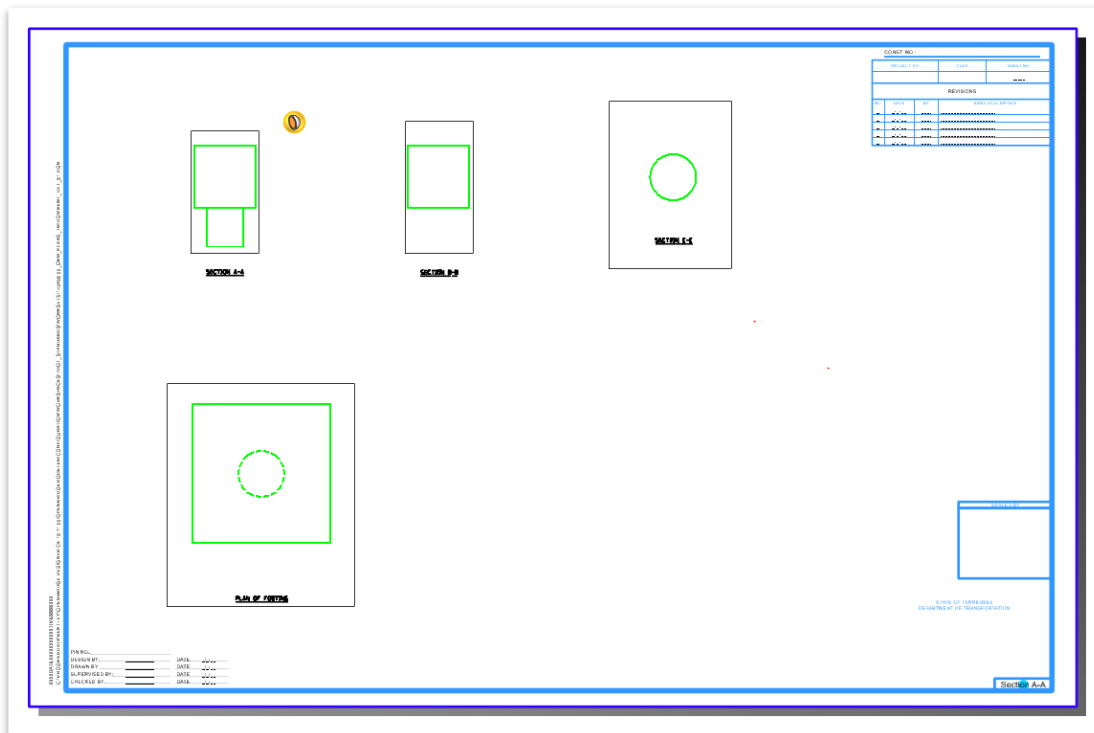
27. Lastly, double click on the Plan of Footing drawing boundary title annotation (**ELEVATION 1-1**) and rename to **PLAN OF FOOTING**.



28. The two sheets should look like the images below.  
 BENT\_01.dgn:



BENT\_DET\_01.dgn:





## Revision History

DATE (MONTH/YEAR)	AUTHOR/EDITOR	IB #	SECTIONS MODIFIED