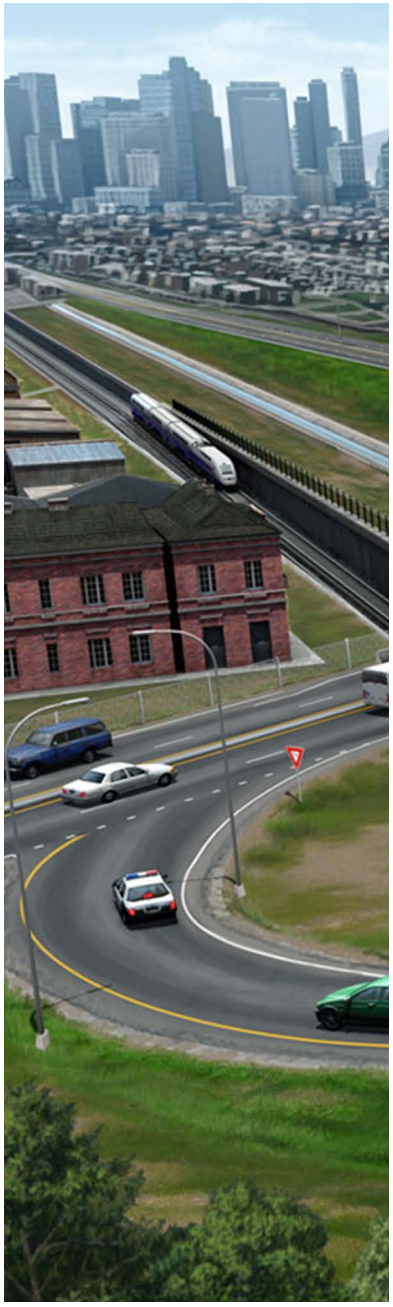


OpenBridge Template Creation

This course is for the **2023** *or newer version of:*

OpenBridge Modeler

About this Practice Workbook...

- This workbook is designed for use in Live instructor-led training and for OnDemand self study. OnDemand videos for this course are available on the **learning.bentley.com**
- This PDF file includes bookmarks providing an overview of the document. Click on a bookmark to quickly jump to any section in the file.
- This course workbook uses the *Imperial (Survey Foot) Standards* WorkSpace delivered with the software.
- The terms “Left-click”, “Click”, “Select”, “Data” and “Data Point” are used interchangeably to represent pressing the left mouse button. The terms “Right-click” and “Reset” are also used interchangeably to represent pressing the right mouse button. If your mouse buttons are assigned differently, such as for left-handed use, you will need to adjust accordingly.

Have a Question? Need Help?

If you have questions while taking this course, you can submit questions to the *Bridge Analysis Forum* on Bentley Communities where peers and Bentley subject matter experts are available to help.

Bentley Institute

Edition: **02-01**

Course Level: **Fundamental**

Course Overview

In this course the user will become proficient with a few of templates used to model bridges. Users will also become familiar with how templates are stored, interacting with template properties, importing templates, exporting templates, and modifying templates.

Objectives

- Modifying bridge templates
- Importing templates
- Exporting templates

Prerequisites

- Navigating the Interface - OpenBridge Modeler.

Exercise 1: Manage Bridge Libraries with OpenBridge Modeler

Description

In this exercise the user will set up OpenBridge Modeler in preparation for bridge modeling. Users will then learn how to create, modify, and manage template libraries within OpenBridge Modeler.

Objectives

- Set OpenBridge Modeler Workspace and WorkSet
- Create a Deck Template
- Create a Barrier Template
- Create a Pier Template
- Create an Abutment Template
- Create Material Definitions

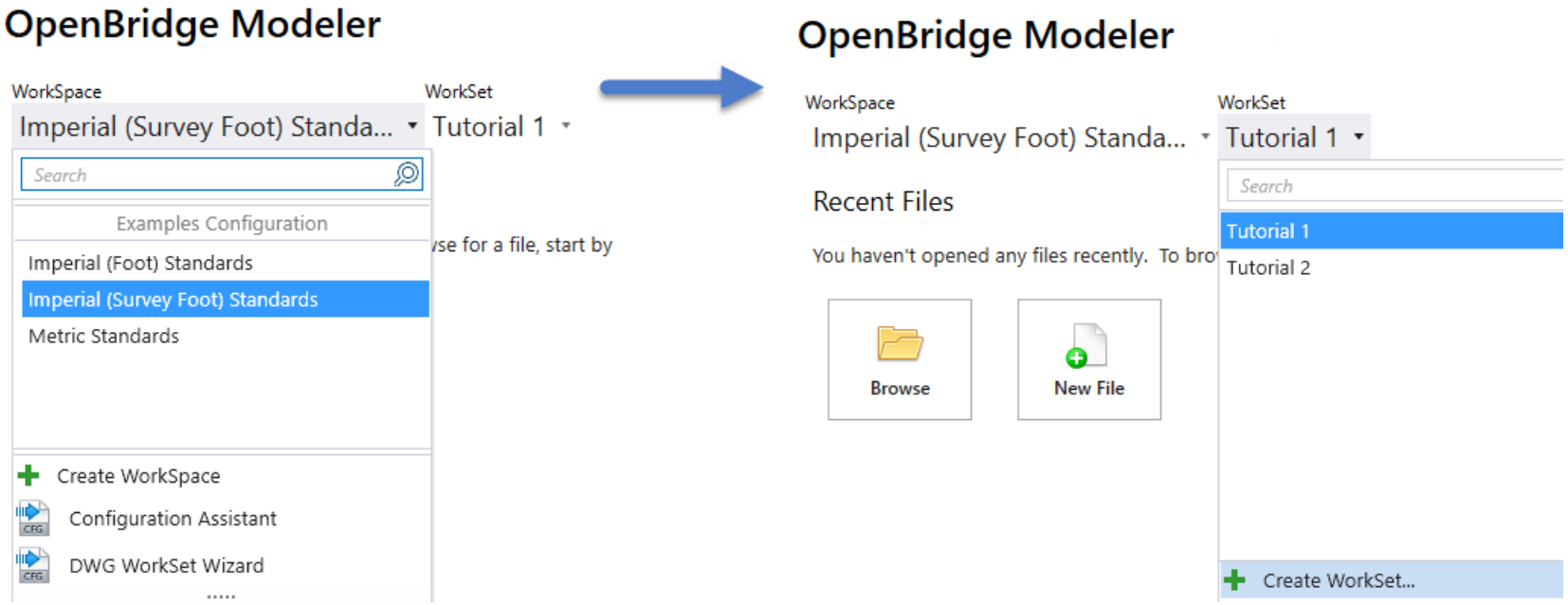
1. Open OpenBridge Modeler.
2. Set the WorkSpace and WorkSet. (Skip creating if WorkSet is already created)

   The WorkSpace and WorkSet define standards that are used by the software, and the ones used for this training are installed during the software installation.

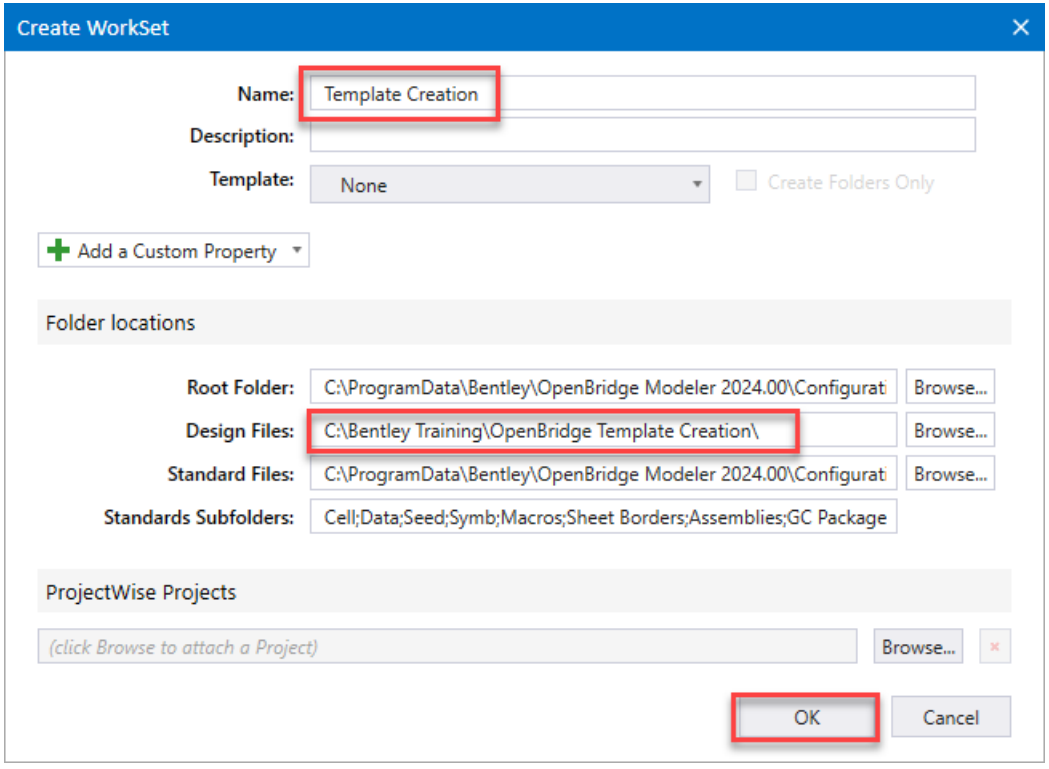
   Typically, the WorkSpace contains organizational standards and the WorkSet contains project standards.

   a. Select **Imperial Standards** from the *WorkSpace* drop-down menu.

   b. Select the current Workset, then click **Create a Workset**.

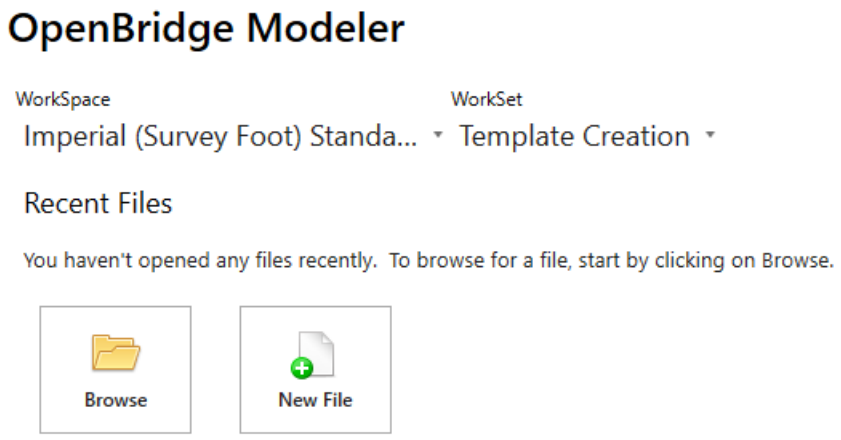


3. Populate the *Name* of the Workset as **Template Creation**.



4. Set the *Design Files* folder as **C:\Bentley Training\OpenBridge Template Creation**

5. Click OK to create the Workset.

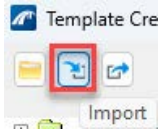


Bentley Civil products are built on top of Bentley's MicroStation CAD platform. MicroStation is Bentley's CAD platform that powers many of our products. The standard file format used by MicroStation and Bentley Civil products is the .dgn file format.

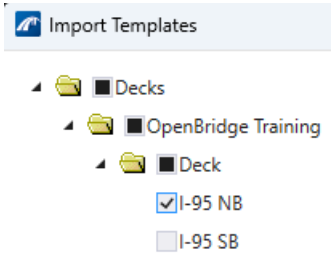
- All civil data (survey, terrain models, geometry, superelevation, drainage, corridors, etc.) is stored in a .dgn file and the.dgn file can be defined as 2D or 3D.
- A .dgn file also will contain one or more models 2D Models and/or 3D Models (which we will discuss later in the course).
- When you create a .dgn file, it gets branded to the current application you are using and also gets associated to the current WorkSet.

Create a Deck Template

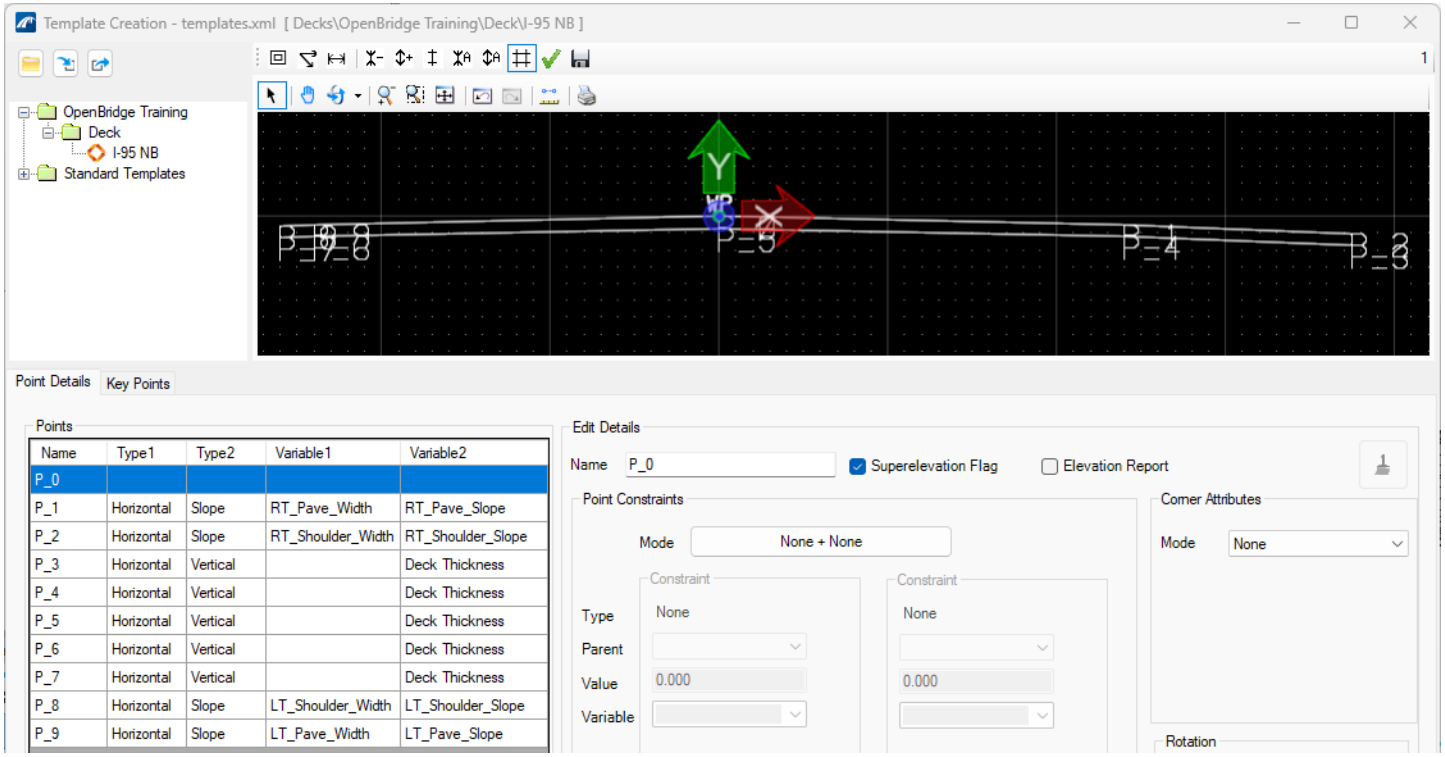
1. Select **Browse**, and open the file **Libraries.dgn** from the *Bentley Training > Introduction to OpenBridge > Imperial > 06_Libraries* folder.
2. Select *Utilities* > *Libraries* > **Decks** to open the Template Creation window for decks.
3. Select the **Import** templates icon.



4. Browse to the class folder and select the *Deck_Template.xml* file, then click **Open**.
5. Select the *I-95 NB* template only and click **Import**.

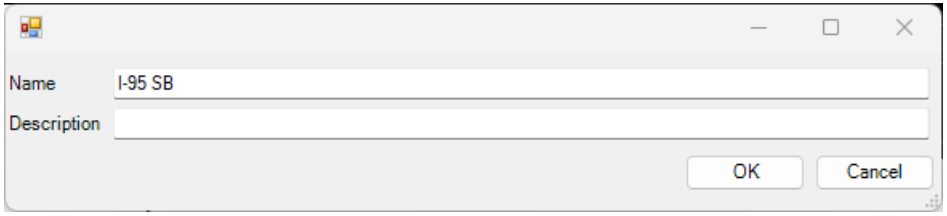


6. Select template *OpenBridge Training* > *Deck* > **I-95 NB.** Review the template properties. This is the template we will recreate and mirror.



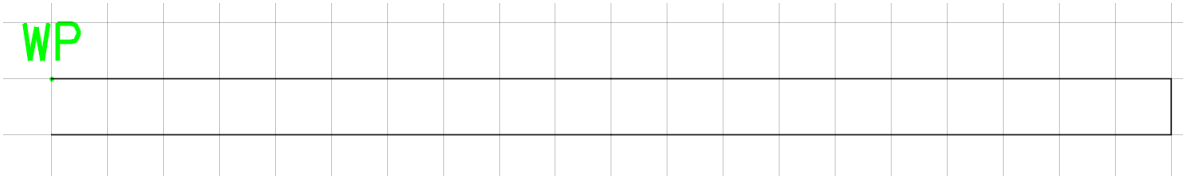
7. Right click the *Deck* folder and select **Add Template**.

8. Key-in a *I-95 SB* for the template name. and click **OK**.



9. Data point in View 1.

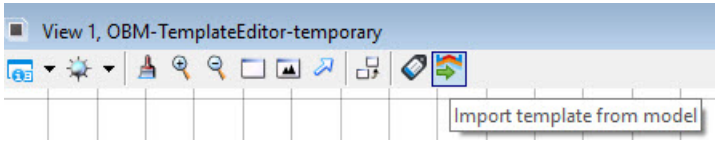
10. Starting with the green dot representing the working point (WP), place a line to the right roughly 10’ long. Next, continue from the end of that line, and add another line roughly 10’ long. Next, add a vertical line down about 9-12” long. Then add two lines, each 10’ long, representing the bottom half of the deck as shown.



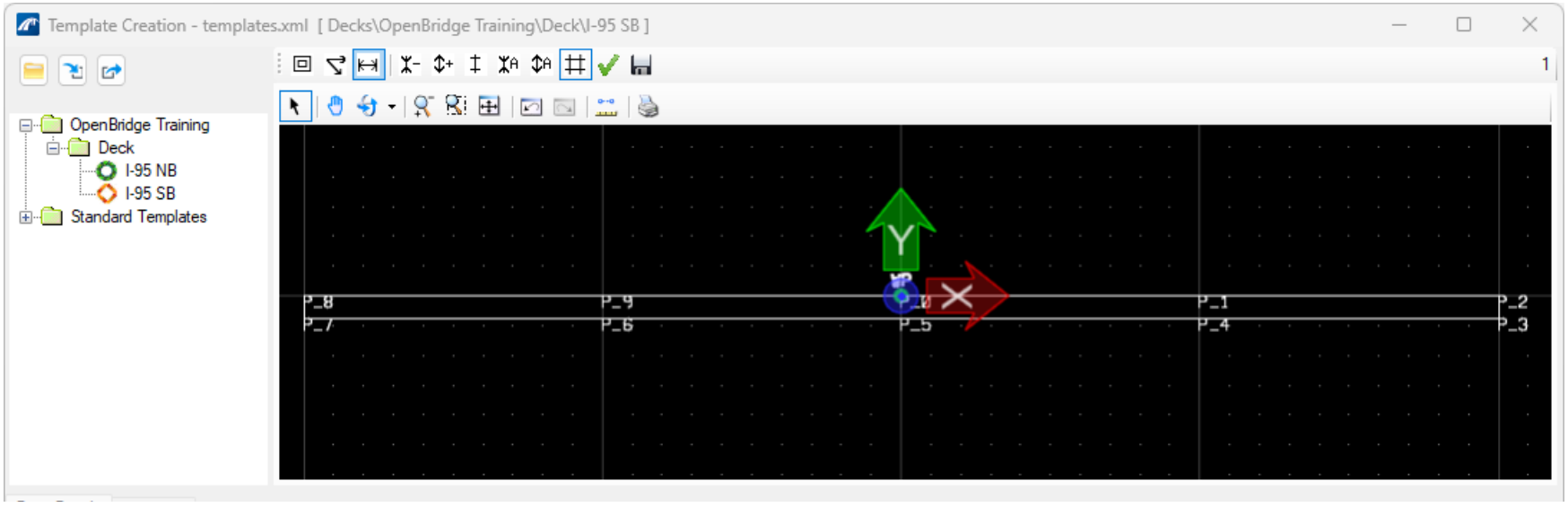
11. Repeat the previous steps to draw the left half of the template. Note that slopes and distances are not important at this time. The key to the process is that the lines that make up the template must form a closed boundary with no gaps or overlapping elements.

    Note: Can also be accomplished by selecting the 5 lines, then mirroring a copy about the vertical line at the working point location as long as this creates a closed template.

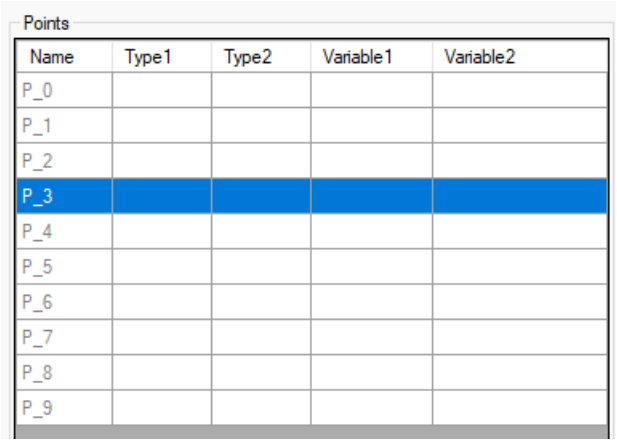
12. Select the **Import Template from model** icon to save the template to the library. Select Yes when prompted to accept.



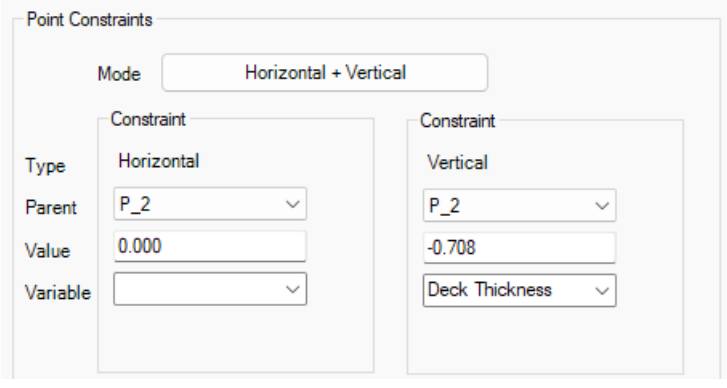
13. The new template now shows in the library.



14. Select point **P_3** in the *Points Table*.

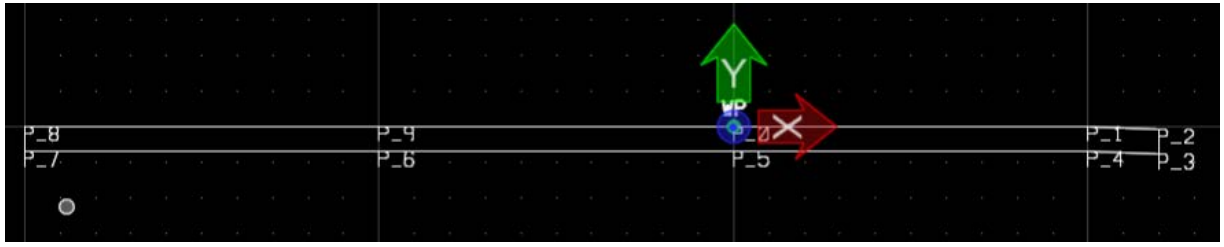


15. Set the *Point Constraints* to **Horizontal + Vertical**.
16. Set *Parent* points:
    - *Horizontal* = **P_2**
    - *Vertical* = **P_2**
17. Change the *Vertical Value* to **-0.708** and set the *Variable* as shown.



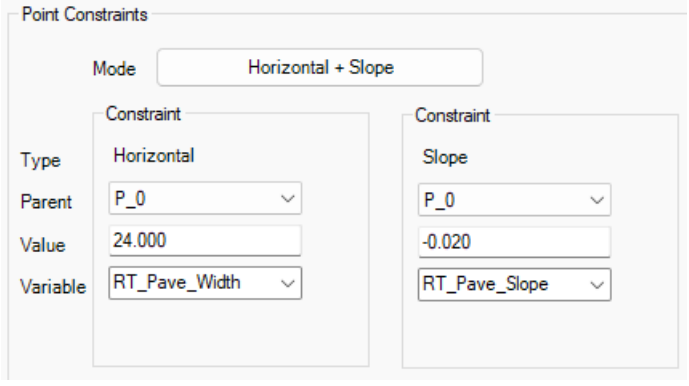
18. Click **Save** to save the constraints.
19. Repeat the previous 4 steps for points **P_4**, **P_5**, **P_6**, and **P_7** setting the Parent point to *P_1*, *P_0*, *P_9*, and *P_8* respectively.
20. Select point **P_2** in the *Points Table*.

21. Populate the Point Constraints as shown. Click **Save** to save the slope and width value and variables. Note that the slope needs to be a negative number based on the updated graphic.

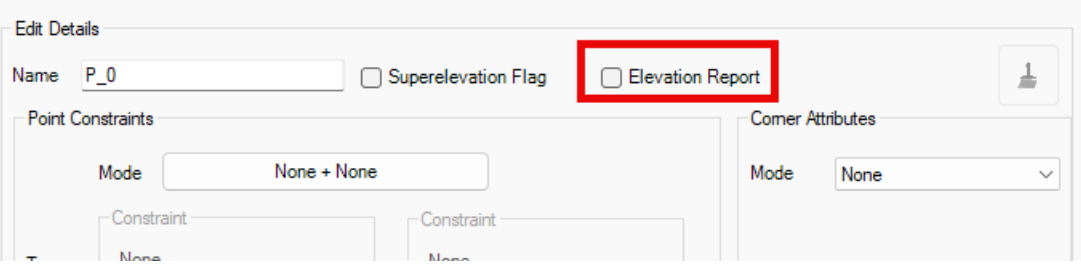


22. Select point **P_1**.

23. Set the point constraints as shown and save.



Note: As we continue to modify variables for the deck, observe that starting in version 10.12, we have the option to select which points of our deck template will automatically be read to the *Deck Elevation Reporting* tool. This becomes important when it comes to creating reports,

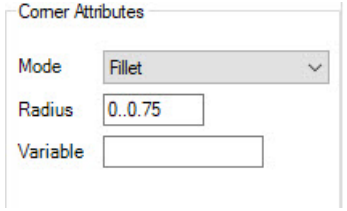


With this toggle, we can set locations such as face of barriers, face of medians, and face of sidewalks as points to be automatically considered as long as the deck has a point at the top of the deck to reference that location.

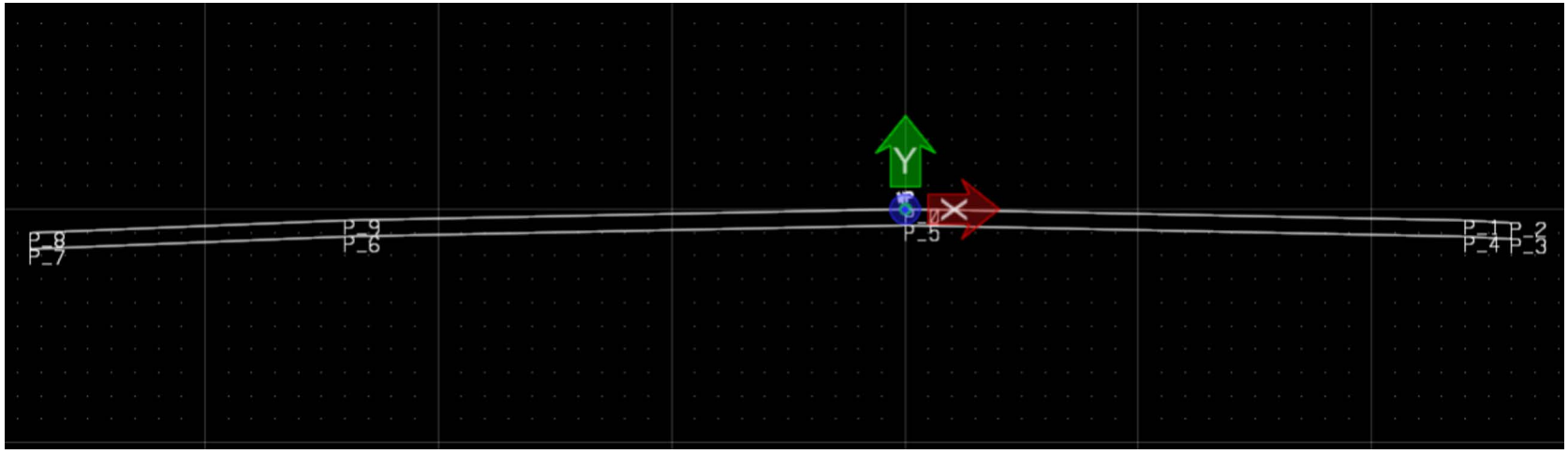
24. Select point **P_8**, set the point constraints as follows:
25. Mode = Horizontal + Slope
    - Horizontal: *Parent* = **P_9**, *Value* = **-13.5**, *Variable* = **LT_Shoulder_Width**
    - Slope: *Parent* = **P_9**, *Value* = **0.04**, *Variable* = **LT_Shoulder_Slope**
    - Verify the inputs for the point Constraints and save.
26. Select point **P_9**, set the point constraints as shown and save.
    - Horizontal: *Parent* = **P_0**, *Value* = **-24.0**, *Variable* = **LT_Pave_Width**
    - Slope: *Parent* = **P_0**, *Value* = **0.02**, *Variable* = **LT_Pave_Slope**
    - Verify the inputs for the point constraints and save.

Note: If the deck will be used on a superelevated structure, points *P_0, P_1, P_2, P_9* and *P_8* should have the **Superelevation Flag** enabled so the left and right lanes can rotate as needed.

27. Add **Corner Attributes** to points *P_2* and *P_8*. Set as shown for a 3/4” chamfer. Select **Save** for each point.



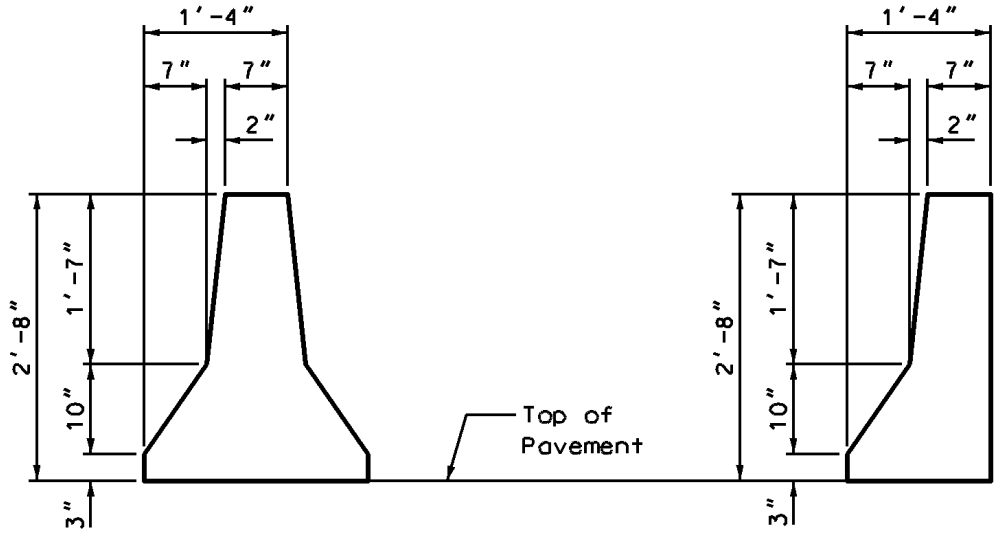
28. Select the Verify icon to try different variable values to see how the typical reacts.



29. Close the template verification window.
30. Select **Close** to finish.

Create a Barrier Template

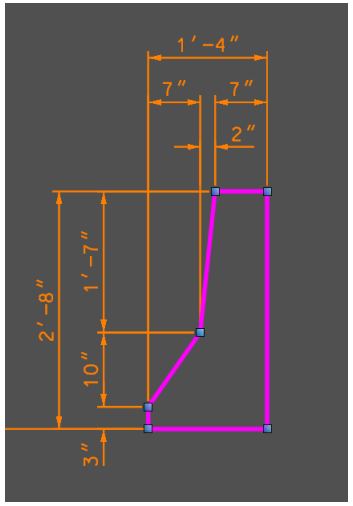
1. Continuing in the **Libraries.dgn** file.
2. Open the Reference tool window and attach the **Barrier.dgn** Coincident World, then fit the view.



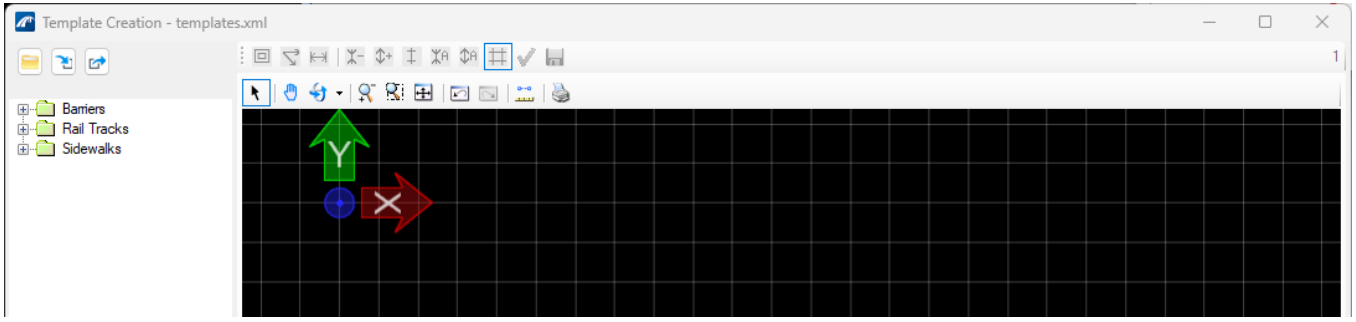
Note: Change the **Annotation Scale** to *Full Size 1 = 1* if you are not able to see the image above from a top view.

3. From a Top view, highlight all of the line-work for the barrier on the right using the **Element Selection** tool (deselect any dimensions that were highlighted, if any), and save to your clipboard with **Ctrl+C** or with a click-and-hold of the right mouse button, then select **Copy to Clipboard**.

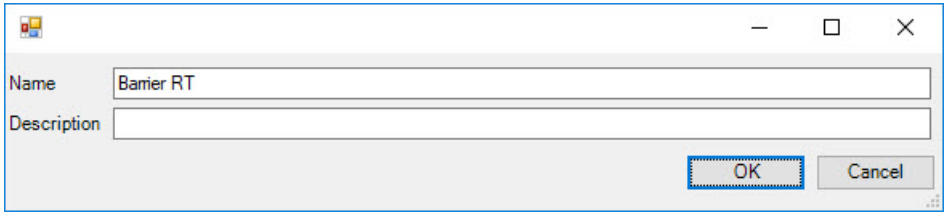
   Note: Turning off the level that the dimensions is also a method that could be used to ensure selection of only the barrier.



4. Select *Utilities* > *Libraries* > **Barriers** to open the Template Creation window for barriers.



5. Select template *Barriers* > *VDOT* > **BPB-3 L.** Review the template properties.
6. Right click the *Barriers* folder and select **Add Category**.
7. Key-in *Class* for the category name, then click **OK**.
8. Right click the *Class* folder and select **Add Template**.
9. Key-in a *Name* for the Barrier and click **OK**.



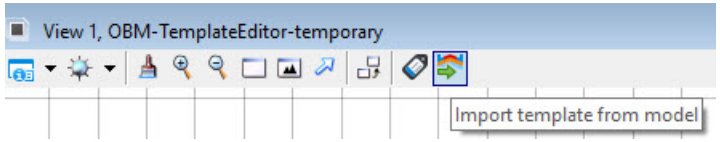
10. Data point in View 1 to open the template editing window.
11. With the template editing window open and with the barrier linework in stored in the clipboard, Key-in **Ctrl+V** (or right-click and hold, then select **Paste from Clipboard** from the dropdown menu) and left click to paste the linework into the template editing window.

Note: When conducting a paste command, make sure to verify that the scale in the tool dialog shows and *X-scale* of **1.0**, and *Y-scale* of **1.0**, and an *Angle* of **0.00°**.

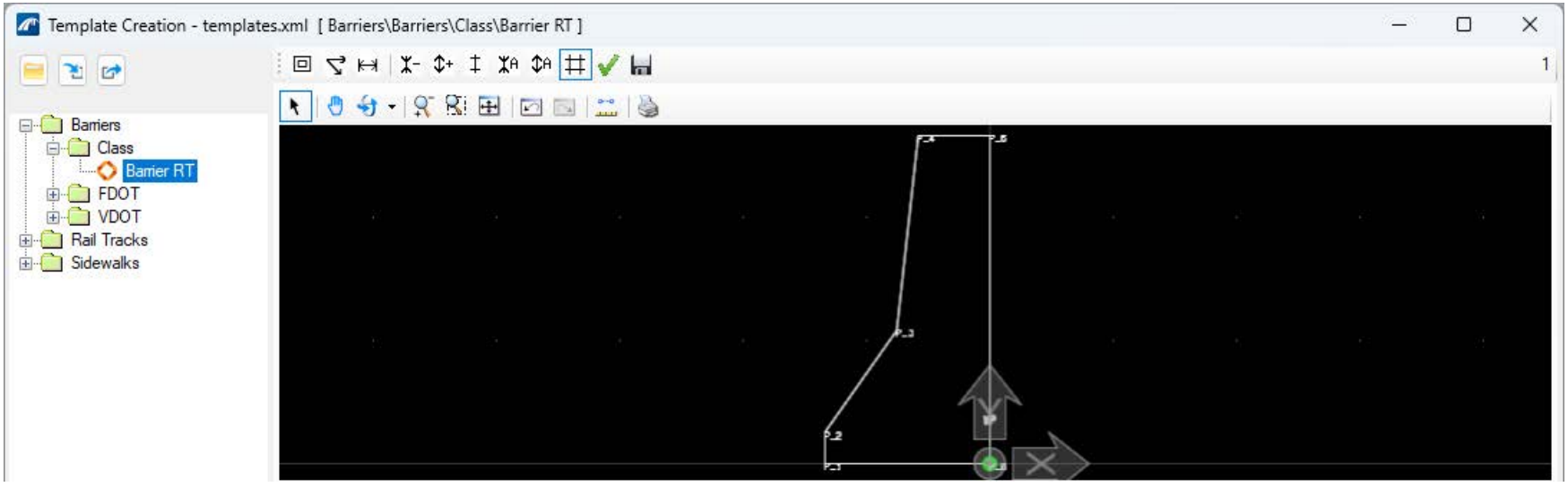
12. Highlight the barrier linework, then select the **Move** command. Select the bottom right corner of the barrier with a left click, and move the linework towards the green dot representing the *working point (WP)*. Snap to the green dot, and left click to confirm the placement.

    Note: Placing linework similar to the deck template exercise is also acceptable, with the assistance of AccuDraw, we can ensure the lines are the correct length and in the correct place in space. If placing linework, start from the working point and proceed to the left, towards the roadway face of the barrier. We want to ensure *P_1* is the front face of barrier.

13. Select the **Import Template from model** icon to save the template to the library. Select **Yes** when prompted to Import template geometry.



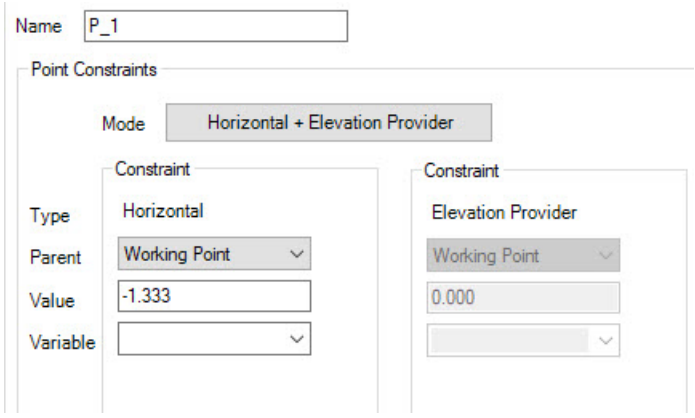
14. The new template now shows in the library.



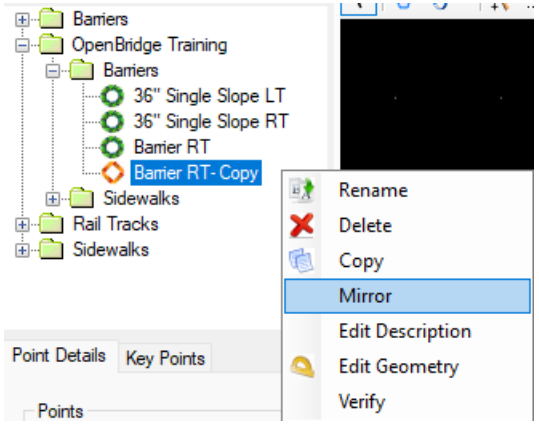
15. Select point **P_1** in the *Points Table*.

16. Set the *Point Constraint* to **Horizontal + Elevation Provider**.

17. Click **Save** to save the constraints as shown.



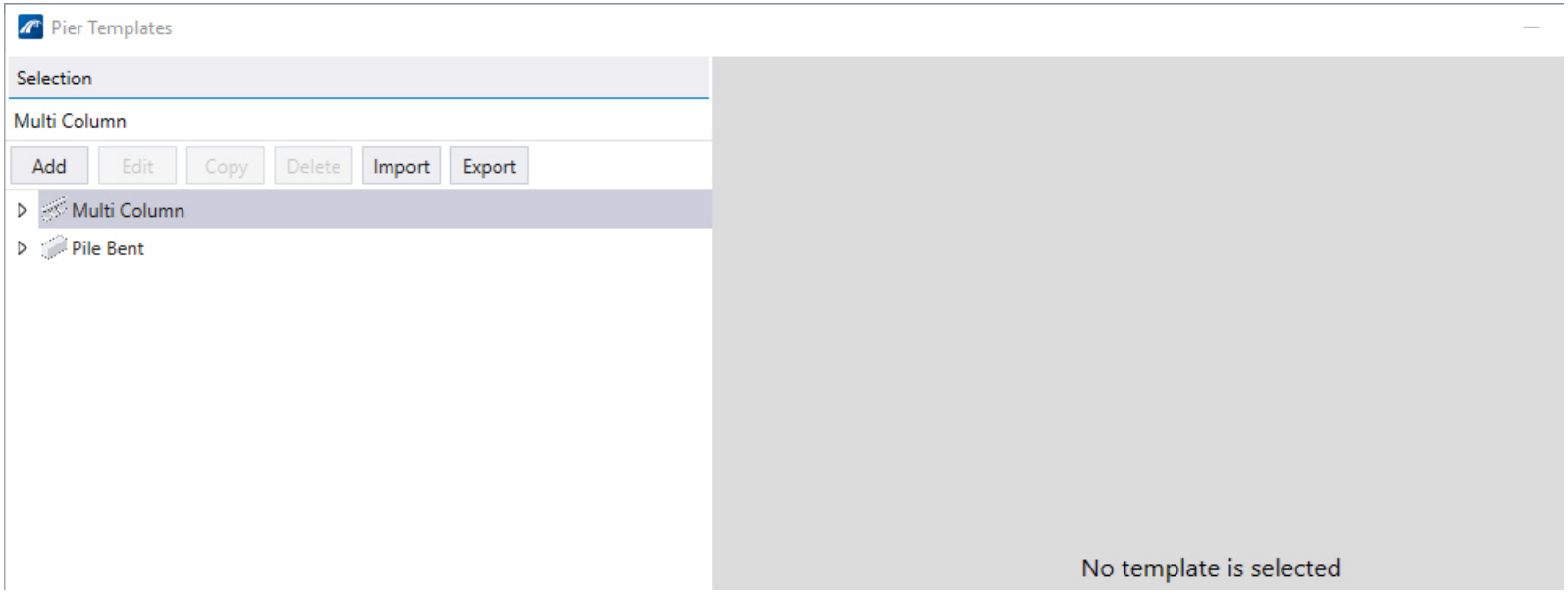
18. Right click the *Barrier RT* and select **Copy** to make a copy of the barrier.
19. Right click the *Barrier RT-Copy* and select **Mirror** to create a barrier for the left side of the deck.



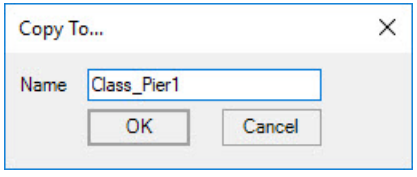
20. Right click the *Barrier RT-Copy* and select **Rename** to rename the barrier to **Barrier LT**.
21. Select **Close** to close the *Template Creation* window.

Create a Pier Template

1. Continuing in the **Libraries.dgn** file.
2. Select *Utilities* > *Libraries* > **Piers** to open the Pier Template window.

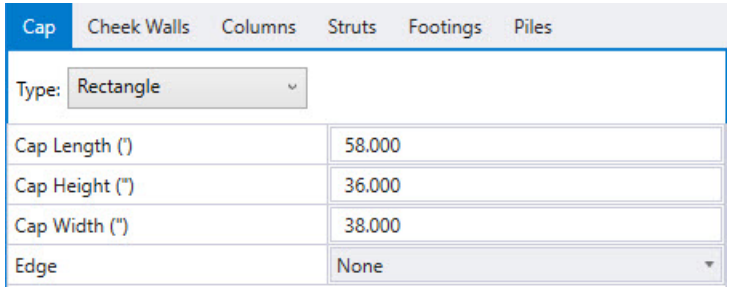


3. Select template *Multi Column* > *Default* > **3Lane_40ft.** Review the template properties. This is the template we will copy and modify.
4. Select **Copy** to create a new pier called *Class_Pier1*. Click **OK**.

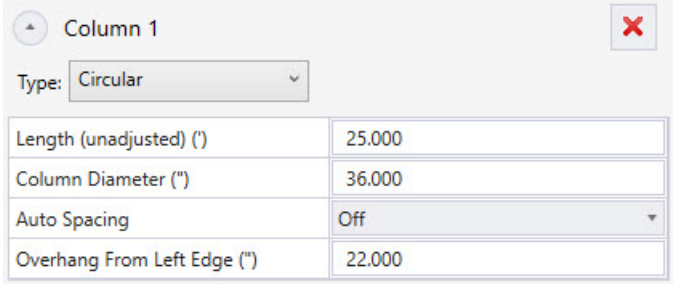


5. Select **Edit** to modify the pier.
6. Set the Cap Properties as shown.
   - *Cap Length* = **58**

- *Cap Height* = **36**
- *Cap Width* = **38**

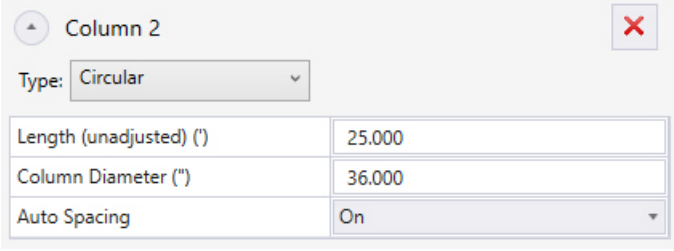


7. Select the **Columns** tab.
8. Select **Add Column** to add a column.
9. Set Columns 1 & 4 as shown:
   - *Length* = **25**
   - *Column Diameter* = **36**
   - *Auto Spacing* = **Off**
   - *Overhang* = **22**



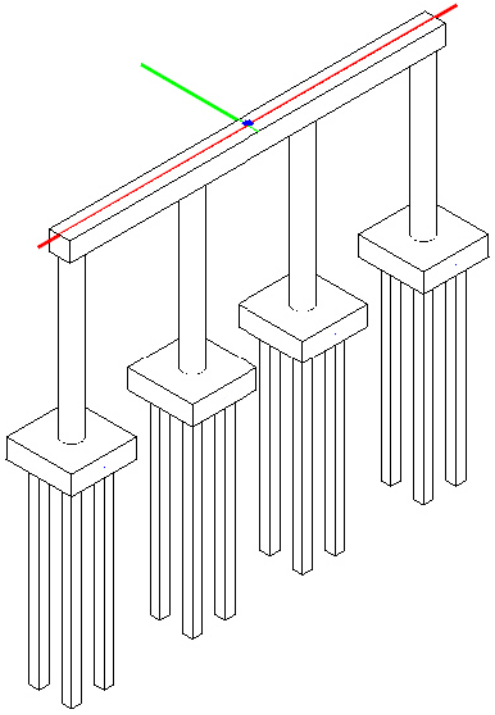
10. Set Columns 2 & 3 as shown:
    - *Length* = **25**
    - *Column Diameter* = **36**

- *Auto Spacing* = **On**



11. Select the **Footing** tab and set the *Default Footing Definition*.
    - *Footing Type* = **Rectangular Isolated**
    - *Footing Length* = **10**
    - *Footing Height* = **36**
    - *Footing Width* = **10**

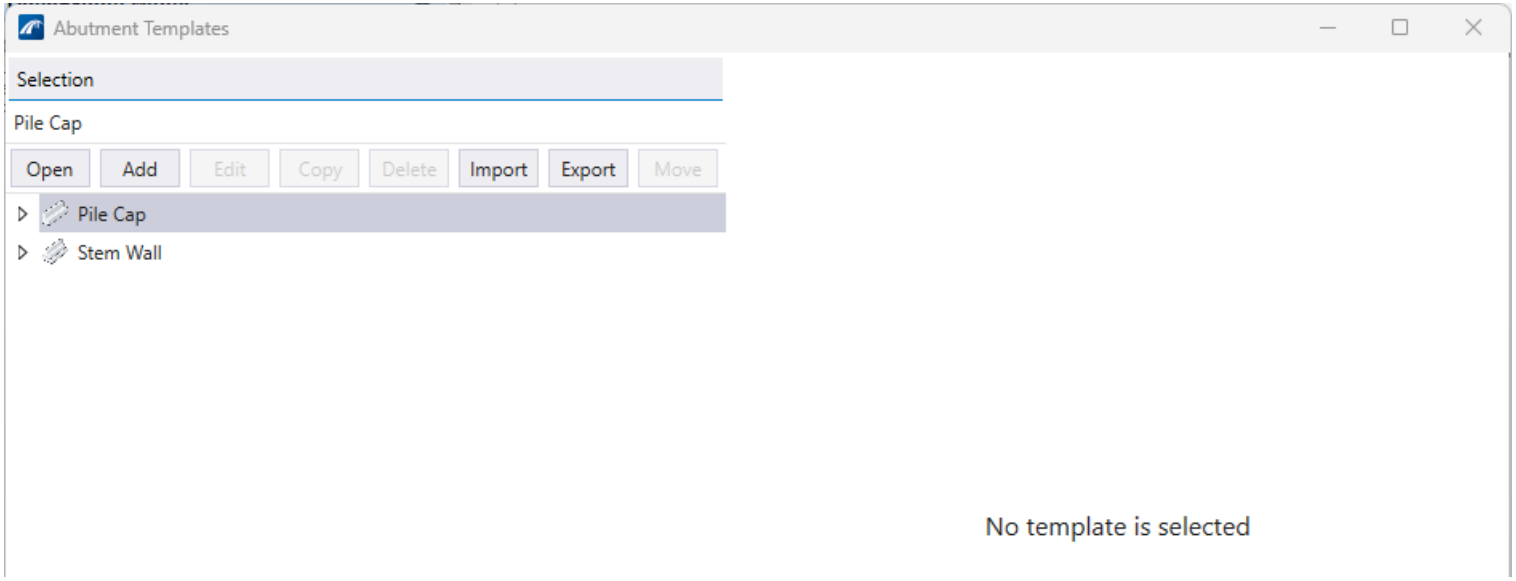
12. Select **OK** to accept the pile layout changes.



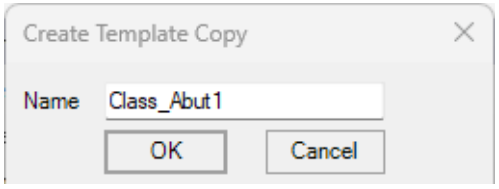
13. Select **OK** to accept the pier changes.
14. Review the **Florida Pier_Variable cap.** Review the variable cap and variable pier columns to see a more advanced pier configuration.
15. Close the *Pier Templates* window.

Create an Abutment Template

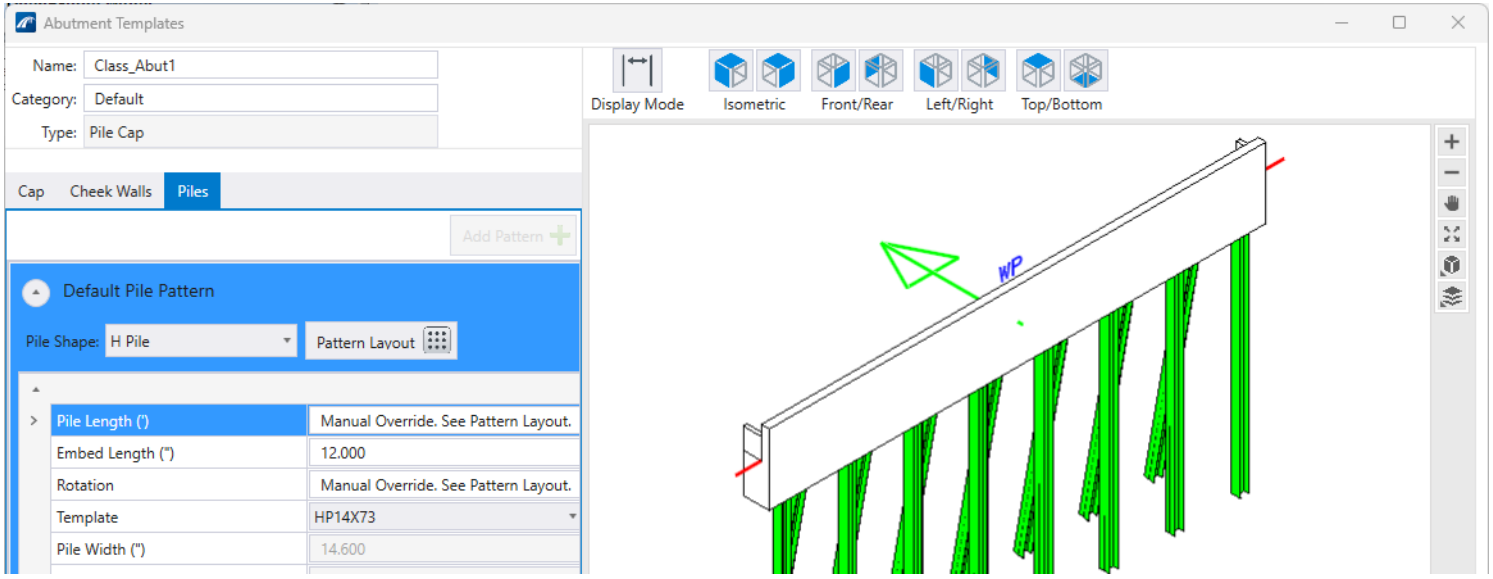
1. Continuing in the **Libraries.dgn** file.
2. Select *Utilities* > *Libraries* > **Abutments** to open the Abutment Template window.



3. Select the Import Icon and navigate to the *Imperial* > *06_Libraries* folder within the training directory. Select the *Abutment_Templates.xml* file and then select **Open**.
4. Enable the **Pile Cap** toggle to select all the templates present in the .xml file. Then select **Import**.
5. Select template *Pile Cap* > *Default* > **I-95_Abutment_NB.** Review the template properties. This is the template we will copy and modify.
6. Select **Copy** to create a new pier called *Class_Abut1*. Click **OK**.

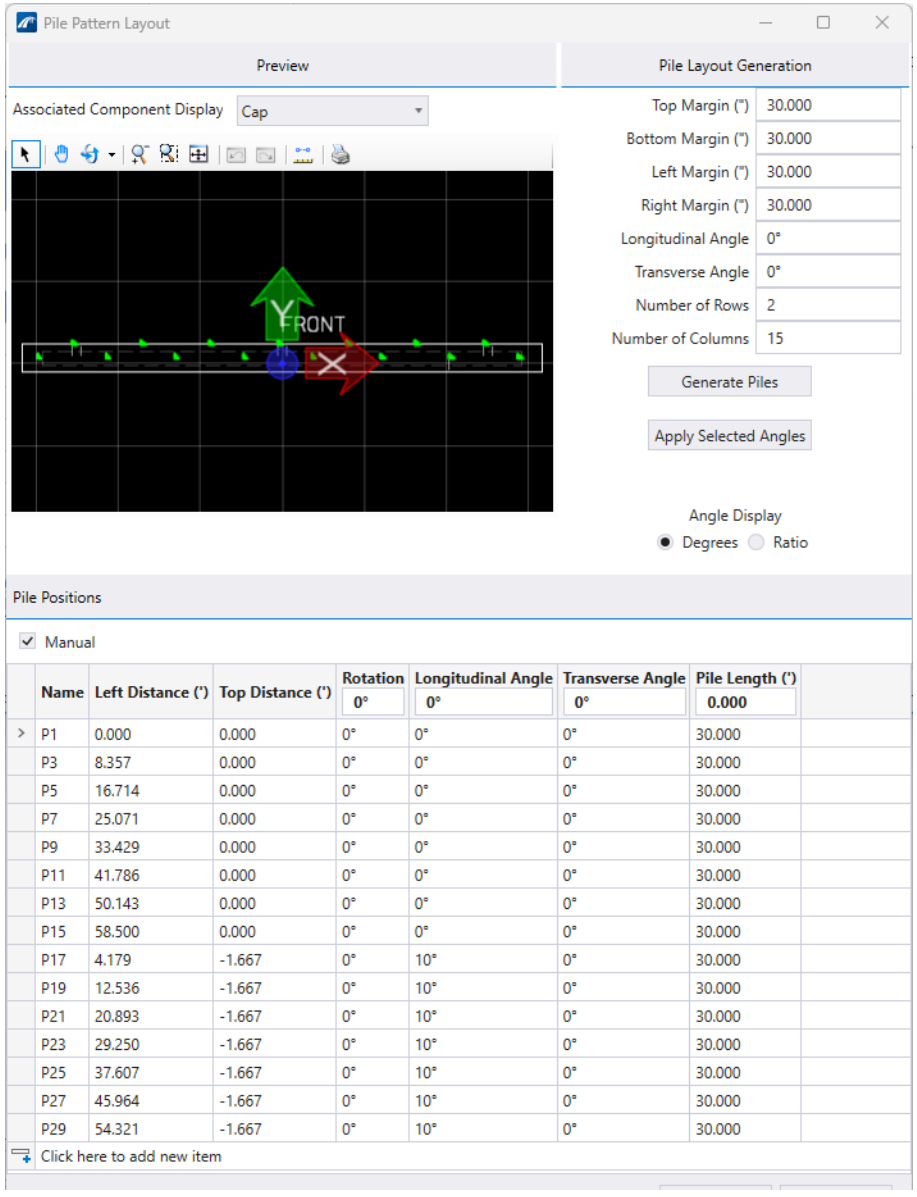


7. Select **Edit** to modify the abutment.
8. Select the Piles tab, and observe the Pile Length and Rotation state “Manual Override. See Pattern Layout.”



9. Select the **Pattern Layout** icon to open the Pile Pattern Layout window.
10. Observe the in the Pile Positions, the *Manual* toggle is checked. Also observe that the front and back piles are alternating, with a total of 15 piles, although the Pile Layout Generation section shows 2 rows and 15 columns.

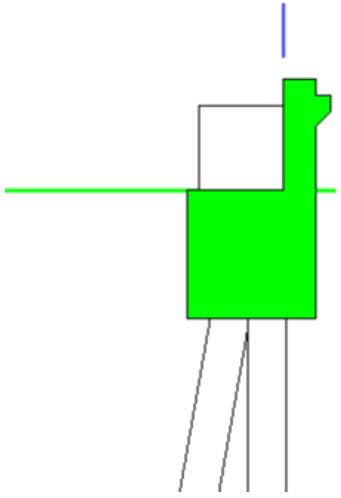
11. Take note of this configuration, we will be back to generate a similar alternating layout once we have defined our abutment geometry properties.



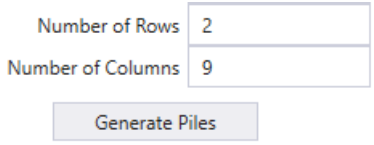
	Name	Left Distance (')	Top Distance (')	Rotation	Longitudinal Angle	Transverse Angle	Pile Length (')
				0°	0°	0°	0.000
>	P1	0.000	0.000	0°	0°	0°	30.000
	P3	8.357	0.000	0°	0°	0°	30.000
	P5	16.714	0.000	0°	0°	0°	30.000
	P7	25.071	0.000	0°	0°	0°	30.000
	P9	33.429	0.000	0°	0°	0°	30.000
	P11	41.786	0.000	0°	0°	0°	30.000
	P13	50.143	0.000	0°	0°	0°	30.000
	P15	58.500	0.000	0°	0°	0°	30.000
	P17	4.179	-1.667	0°	10°	0°	30.000
	P19	12.536	-1.667	0°	10°	0°	30.000
	P21	20.893	-1.667	0°	10°	0°	30.000
	P23	29.250	-1.667	0°	10°	0°	30.000
	P25	37.607	-1.667	0°	10°	0°	30.000
	P27	45.964	-1.667	0°	10°	0°	30.000
	P29	54.321	-1.667	0°	10°	0°	30.000
	Click here to add new item						

12. Exit the *Pile Pattern Layout* window by selecting **Cancel** and select the *Cap* Tab in our *Abutment Templates* window.

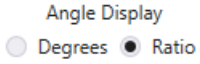
13. Modify the Cap Properties to be as shown:
    - *Cap Length* = **40**
    - *Pile Cap Depth* = **48**
    - *Pile Cap Width* = **48**
    - *Back Wall Depth* = **42**
    - **Enable** *Corbel* toggle
    - *Corbel Width* = **6**
    - *Corbel Depth* = **6**
    - *Corbel Slope Depth* = **6**
    - *Corbel Vertical Offset* = **8.5**



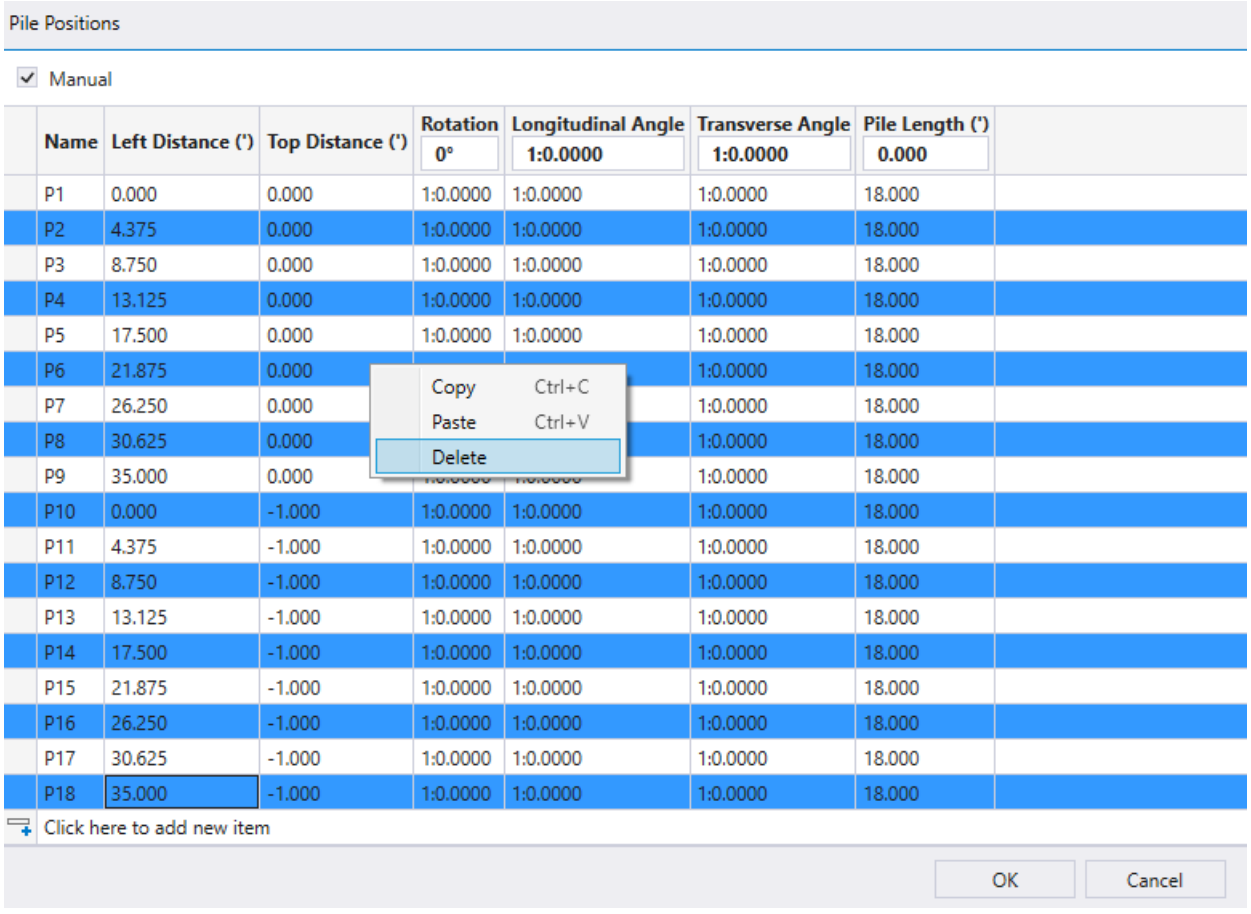
14. Select the **Check Walls** tab.
15. Set the following parameters for *Check Wall 1*
    - *Height* = **35.5**
    - *Width* = **36**
16. Set the following parameters for *Check Wall 2*
    - *Height* = **35.5**
    - *Width* = **36**
17. Select the **Piles** Tab
18. Observe that now, with the change of the cap setting, our piles are no longer located correctly. Select the **Pattern Layout** icon.
19. Change the following parameters in the **Pile Layout Generation** section.
20. *Top Margin* & *Bottom Margin* = **30**
21. *Left Margin* & *Right Margin* = **30**
22. *Number of Columns* = **9**



23. Select **Generate Piles**.
24. Now that we have our pile spacing and offsets located correctly, **enable** the *Manual* toggle.
25. Change the *Angle Display* from **Degrees** to **Ratio** with the radio toggle.

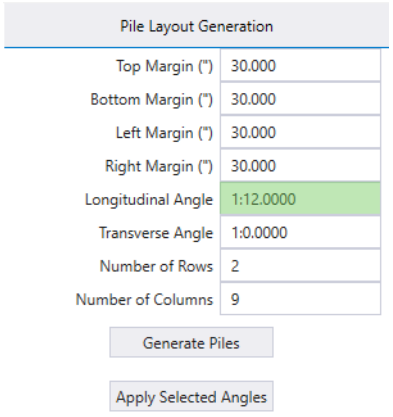


26. Select each *even-numbered* pile with a *Ctrl + left-click*, then *right-click* and select **delete**.



27. The resulting pile configuration shall be shown as alternating piles with both exterior pile destined to be vertical.

28. Key-in **1:12** in the *Longitudinal Angle* input within the *Pile Layout Generation* section.



29. Select piles *P11*, *P13*, *P15*, *P17* in the *Pile Positions* table, and select the button **Apply Selected Angles**.

Pile Positions

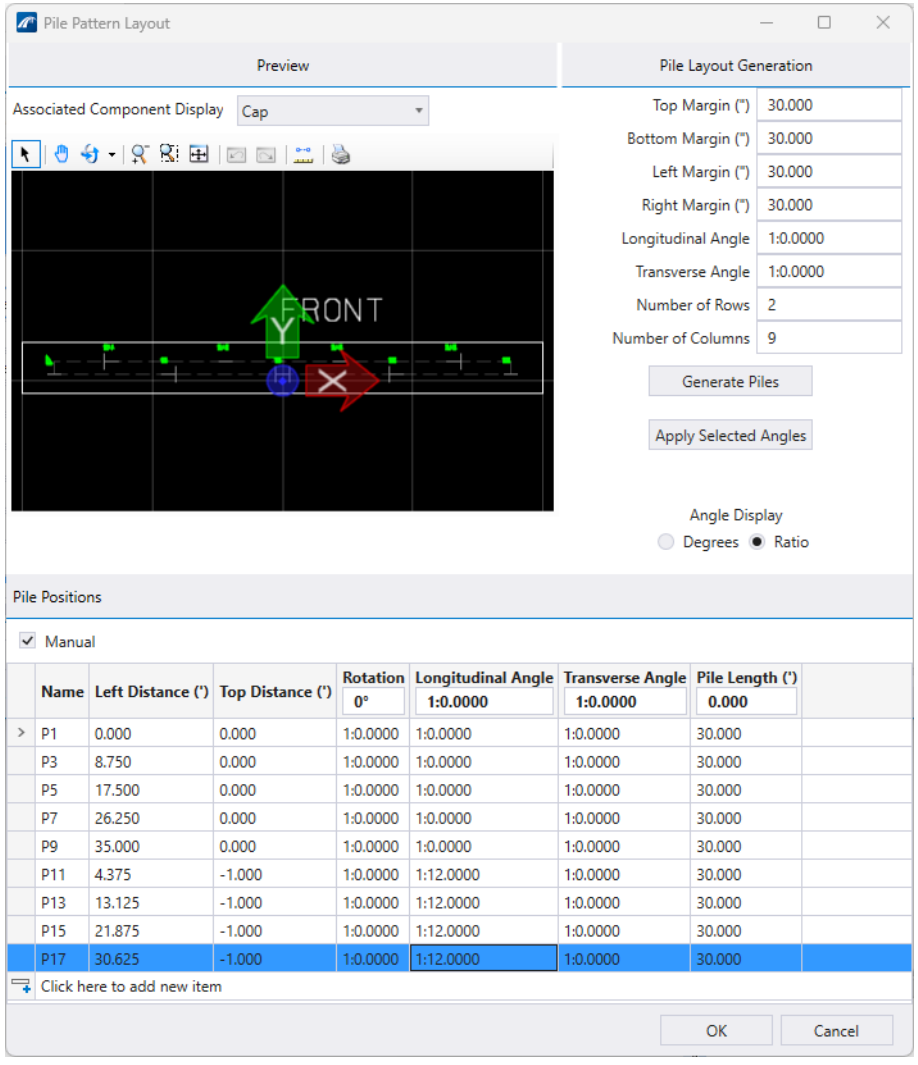
Manual

	Name	Left Distance (')	Top Distance (')	Rotation 0°	Longitudinal Angle 1:0.0000	Transverse Angle 1:0.0000	Pile Length (') 0.000
	P1	0.000	0.000	1:0.0000	1:0.0000	1:0.0000	18.000
	P3	8.750	0.000	1:0.0000	1:0.0000	1:0.0000	18.000
	P5	17.500	0.000	1:0.0000	1:0.0000	1:0.0000	18.000
	P7	26.250	0.000	1:0.0000	1:0.0000	1:0.0000	18.000
	P9	35.000	0.000	1:0.0000	1:0.0000	1:0.0000	18.000
	P11	4.375	-1.000	1:0.0000	1:12.0000	1:0.0000	18.000
	P13	13.125	-1.000	1:0.0000	1:12.0000	1:0.0000	18.000
	P15	21.875	-1.000	1:0.0000	1:12.0000	1:0.0000	18.000
	P17	30.625	-1.000	1:0.0000	1:12.0000	1:0.0000	18.000

Click here to add new item

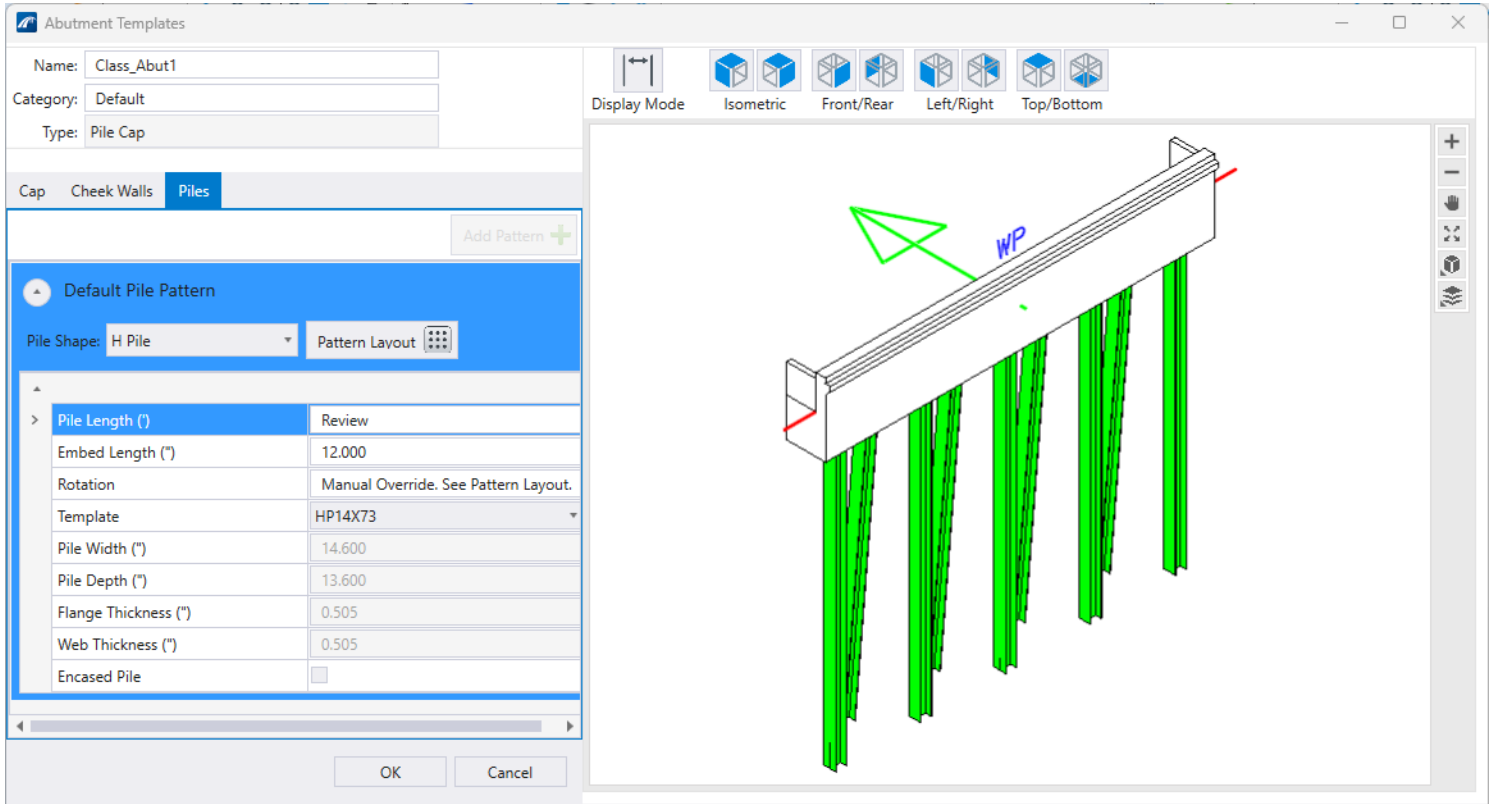
30. In the header row, key-in **30.0** for *Pile Length*.

31. Review the Preview and the table to ensure the proper input.



32. Select **OK** to accept the changes.

33. Review the changes to the abutment template

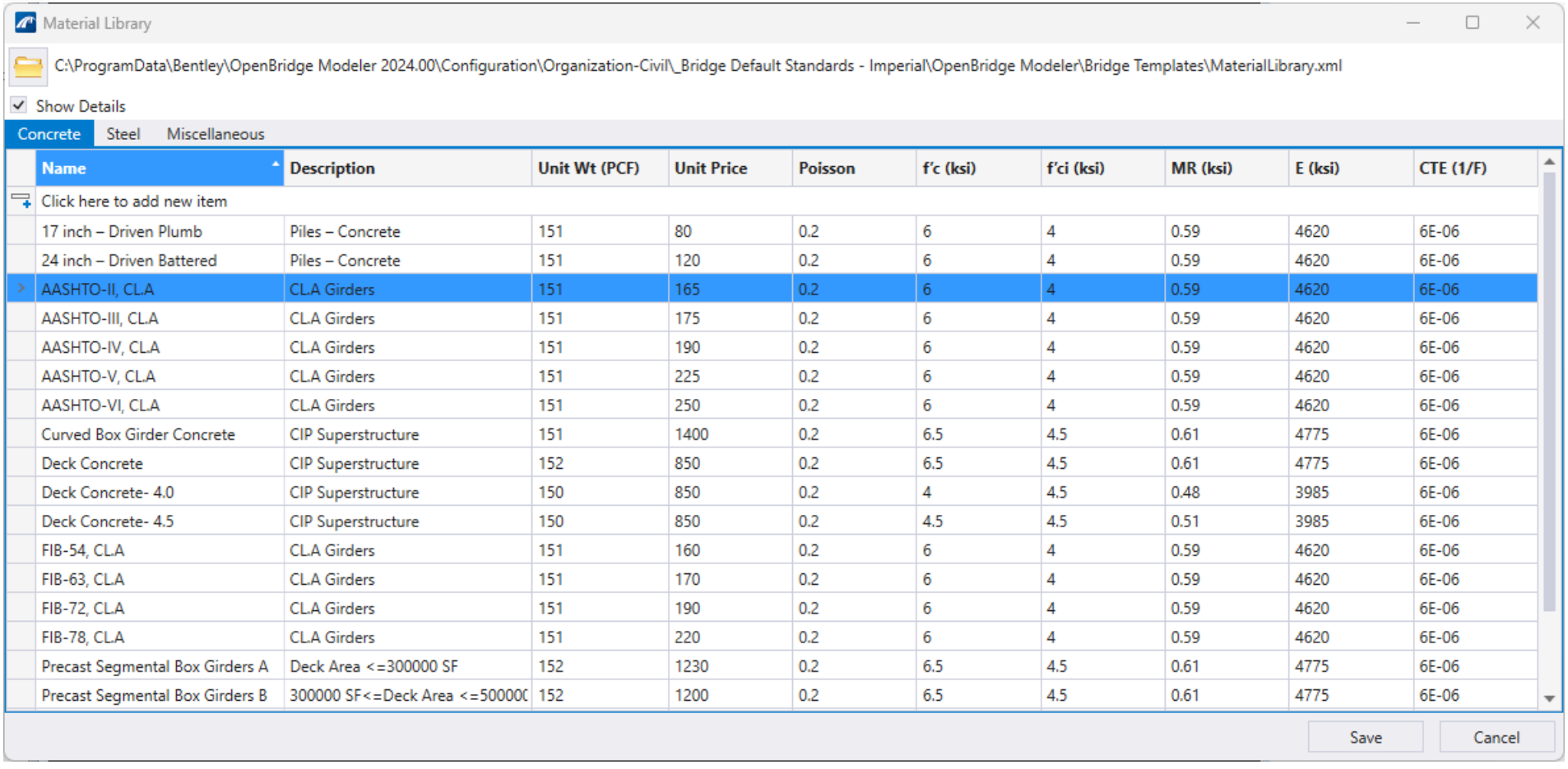


34. Select **OK** to accept the changes.

35. Close the *Abutment Templates* window.

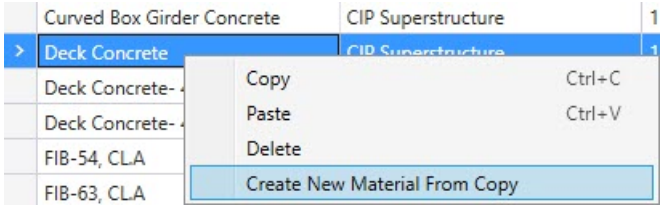
Create a Material Library Entry

1. Continuing in the **Libraries.dgn** file.
2. Select *Utilities* > *Libraries* > **Material** to open the Material Library window.



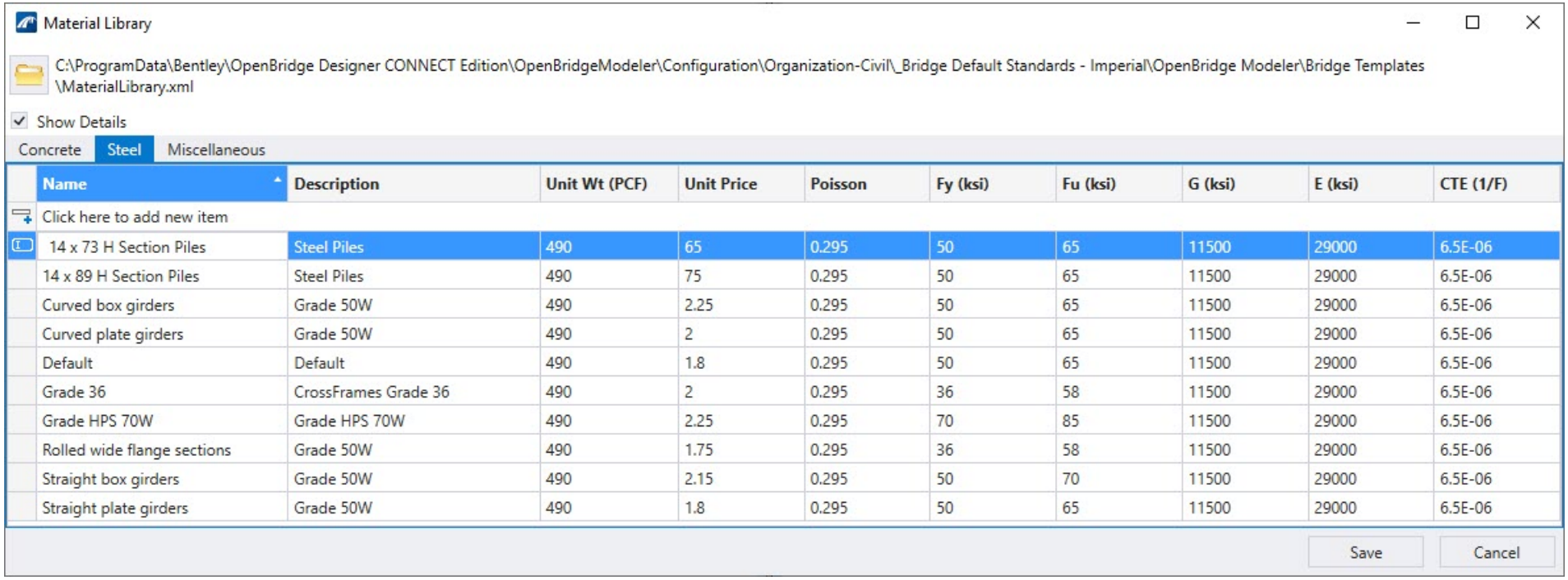
3. Right click on the *Deck Concrete* entry.

4. Select **Create New Material from Copy**.



5. Set the *Name* to **Deck Concrete 2**.
6. Change the following:
   - *Unit Price* = **750**
   - *f'c* = **4.0**
   - *f'ci* = **3.5**
7. Select the **Steel** tab.
8. Click on the first row to add a new entry. Add the following:
   - *Name* and *Description* = **Grade HPS 70W**
   - *Unit Weight* = **490.00**
   - *Unit Price* = **2.25**
   - *Poisson* = **0.2950**
   - *Fy* = **70.00**
   - *Fu* = **85.00**
   - *G* = **11,500.00**
   - *E* = **29,000.00**
   - *CTE* = **0.0000065**

9. Click **Save** to save the new entry.



Note: The material library does not have import/export features similar to other libraries. However libraries other than the library that comes with the workspace can be viewed. Material properties can also be selected and copied to text editors/spreadsheet software such as Microsoft Excel.

10. **Save** and **Close** OpenBridge Modeler.

Summary

In this course learned the types of properties specific to a few of the templates, and how they relate to bridge modeling and bridge reporting. User learned how to:

- Manage project files with OpenBridge Designer (if applicable)
- Create an OpenBridge WorkSet (if applicable)
- Create Templates
- Modify Templates
- Import/Export Bridge Templates Libraries

Throughout the course, users were guided on how to edit and create templates, as well as modify the variables within templates, ensuring a thorough understanding of the bridge template creation process.