# Bentley OpenBridge Workshop

# 2017 FLUG Spring Training Event

435 - Using Open Bridge Modeler and Lumenr RT

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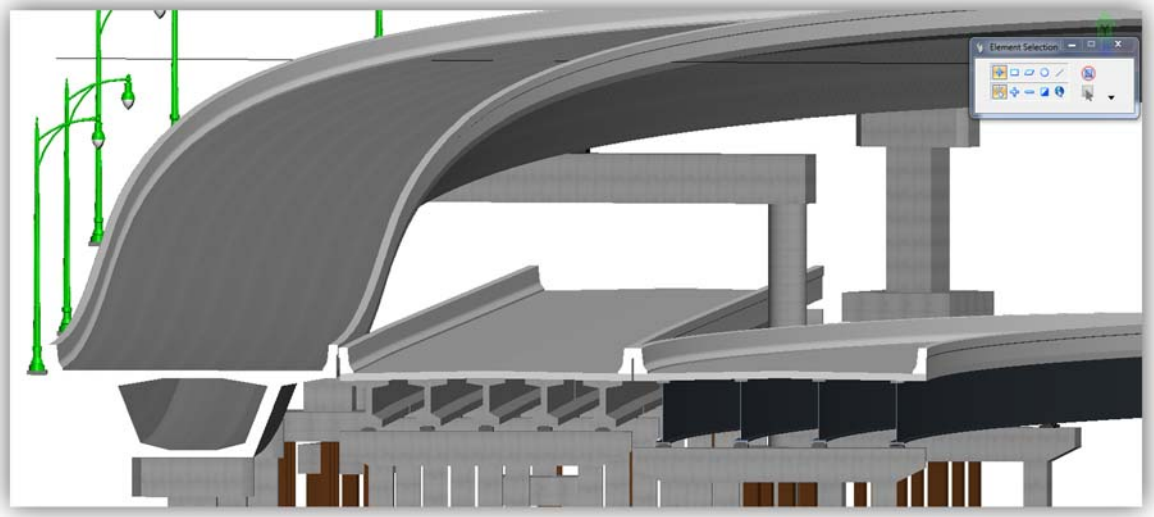
# Practice Workbook

This workbook is designed for use in Live instructor-led training and for OnDemand self-study. The explanations and demonstrations are provided by the instructor in the classroom, or in the OnDemand videos for this course available on the Bentley LEARN Server (*learn.bentley.com*).

## Using OpenBridge Modeler and Lumen RT

V8i Version 08.11.12.xxx or newer



TRNC01xxx-1/0001

Bentley Institute

# Precast Girder Bridge Modeling using OpenBridge Modeler

## Description

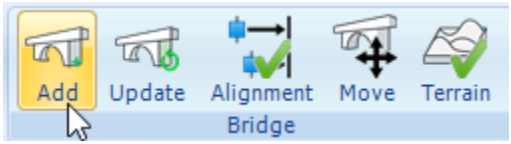
In this exercise you will perform tasks related to modeling a precast girder bridge. This includes modeling the deck, beams, piers and abutments, bearings and barrier.

## Skills Taught

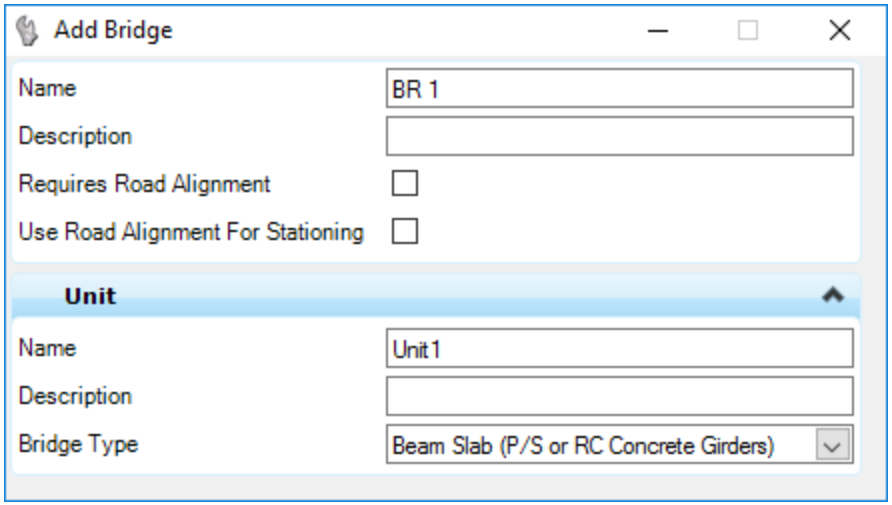
- How to utilize OpenRoads geometry and terrain models
- Model the superstructure of a bridge
- Model the substructure of a bridge
- Model a barrier along both edges of the deck

## Exercise 1: Add a Bridge and set Pier Locations

1. Start OpenBridge Modeler.
2. Browse to the class folder *c:\Bentley Training\OBM and Lumen*. Select the file **OpenBridge Modeler.dgn.**
3. Fit the view and review the attached references. One contains the OpenRoads geometry, the highway corridors and the other contains the terrain model for the bridge.
4. Select the **Add** tool from the **Bridge Setup** tab.

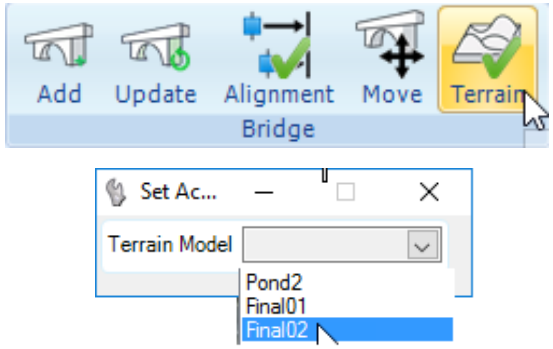



5. Set the bridge name and bridge type as shown.



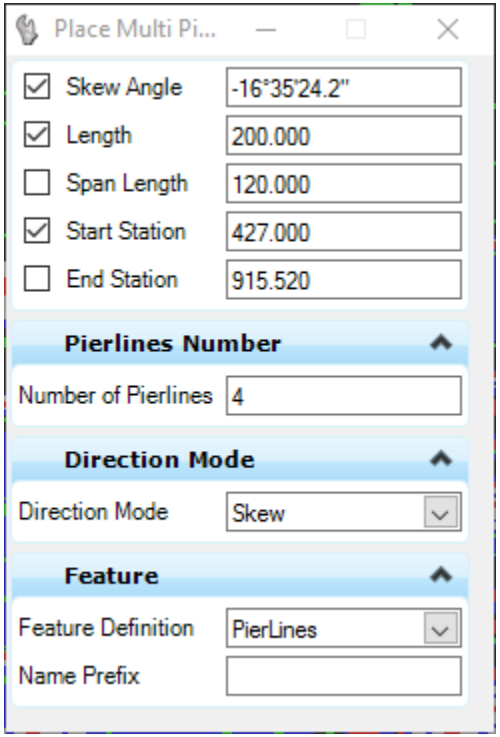
6. When prompted, select the alignment that crosses the divided highway: **GarrisonvilleRoad**


7. Data point to accept the alignment.
8. Select the **Terrain** tool from the **Bridge Setup** tab.



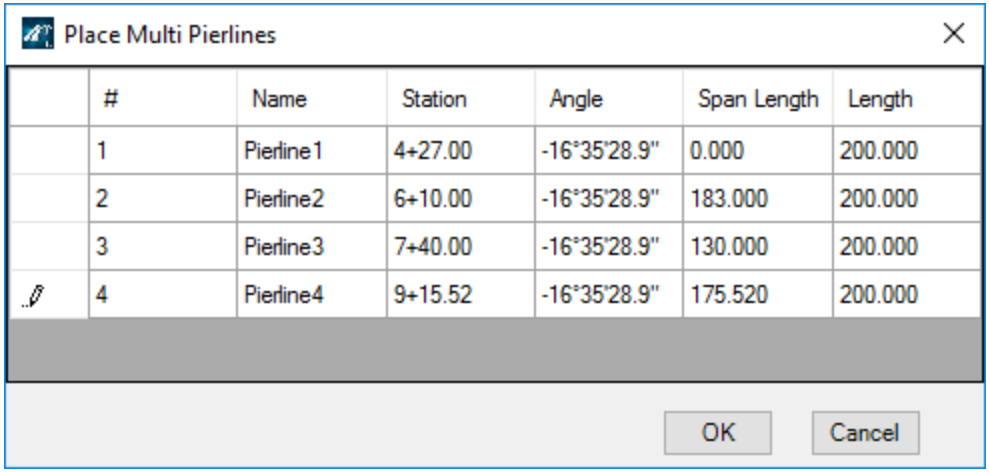
9. Select the **Pierline** tab.
10. Select the **Multi** tool.


11. Populate the tool settings as shown, where the length of the auxiliary pierline is set to *200* with a variable bridge span length.



12. Data point just past the end of the alignment to set the End Station as shown above in the view and accept the values input. When the **Place Multi Pierlines** window opens, review the values, then select **OK** to place the pierlines.

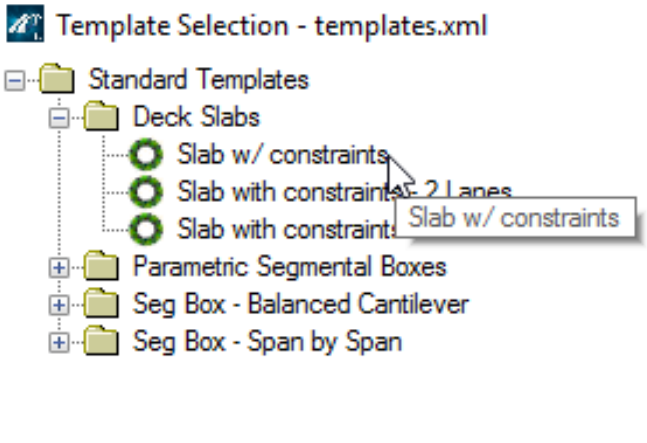
*Note:* Turn off the raster images to better visualize the pierlines



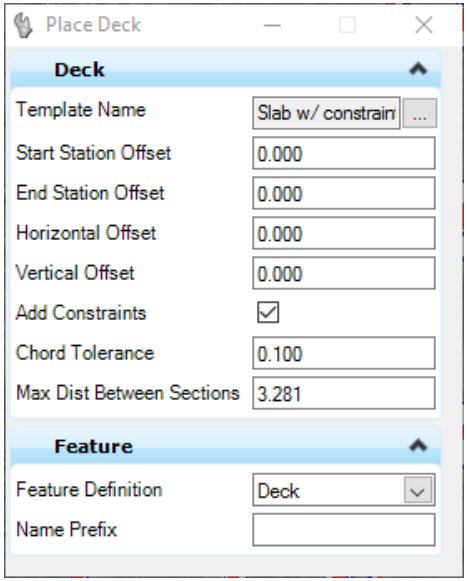
## Exercise 2: Superstructure Modeling

1. Click on the **Superstructure** tab.
2. Click the **Place Deck** tool.


3. Click the **…** icon to select a template to model the deck.
4. Select the template shown below then click **OK**.



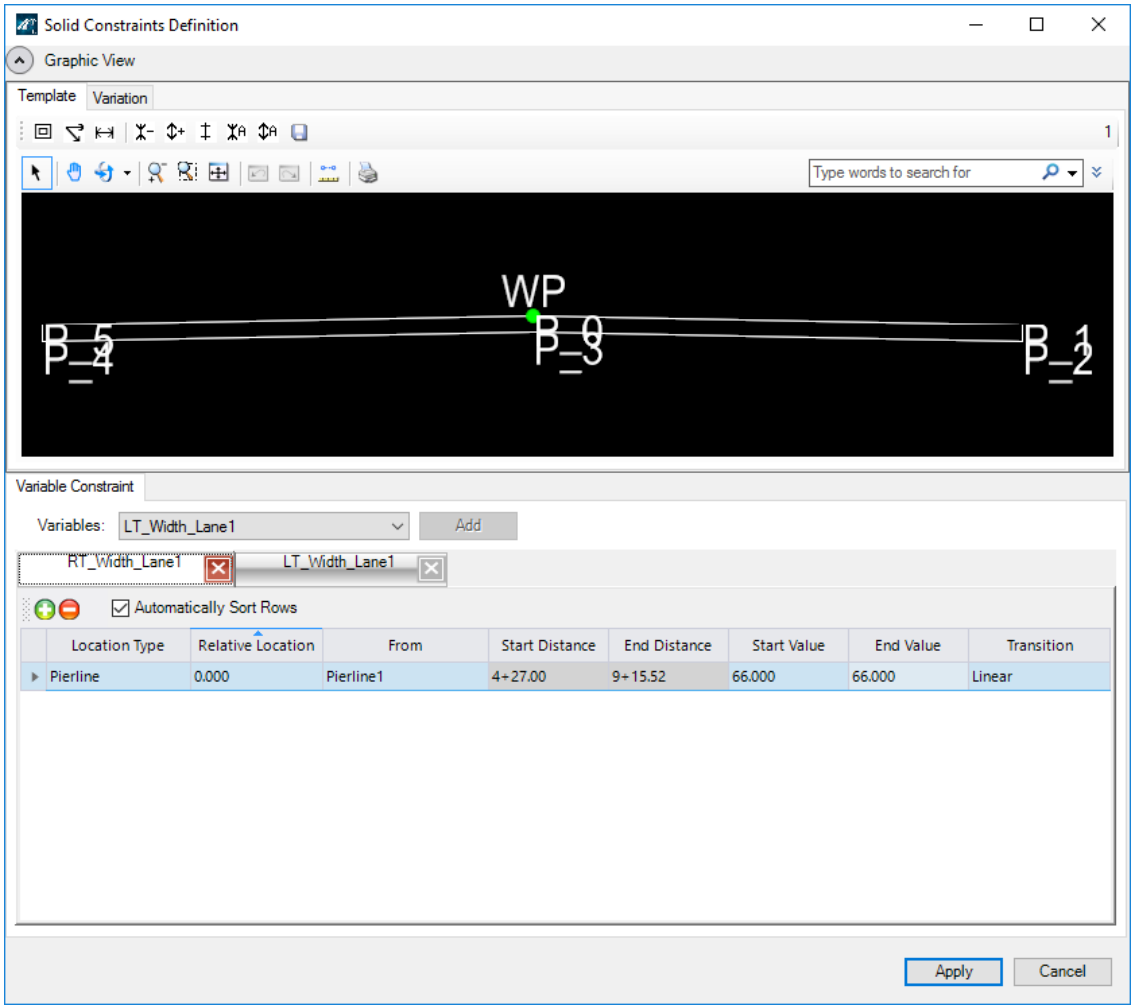
5. Set the Feature Definition to **Deck**.




6. Select the first and last pierlines then enable the **Add Constraints** toggle. Data point to accept.

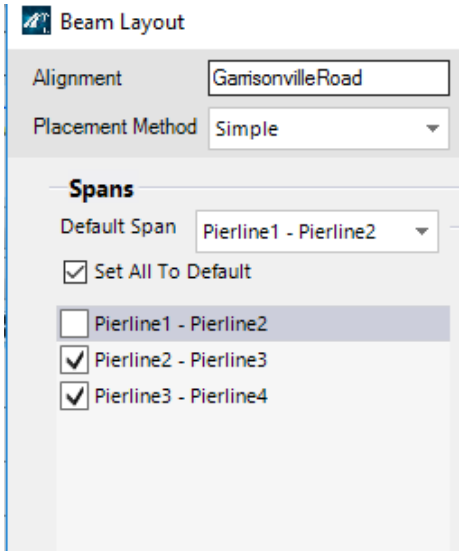
7. Click the **Variable Constraint** tab.
8. Set the following variables:

| | |
|---|---|
| **RT_Width_Lane1** | **66** |
| **LT_Width_Lane1** | **-52** |

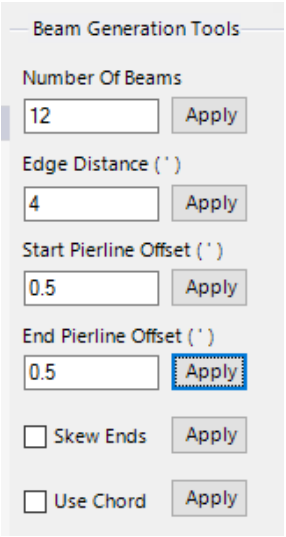


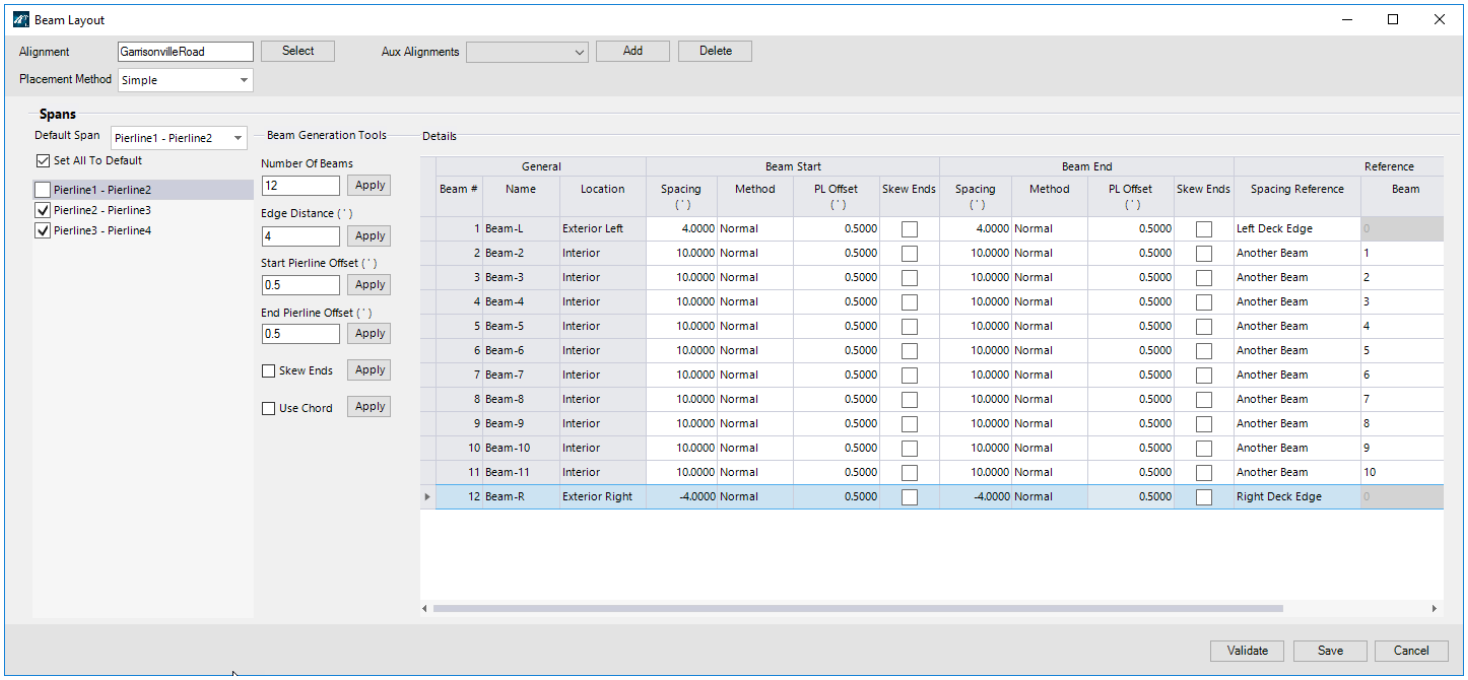

9. Click **Apply** to model the deck.
10. Click **Layout** from the **Superstructure Beam** tab.

11. Select the first and last pierline, then data point to accept.
12. Click toggle to enable **Set All to Default**.

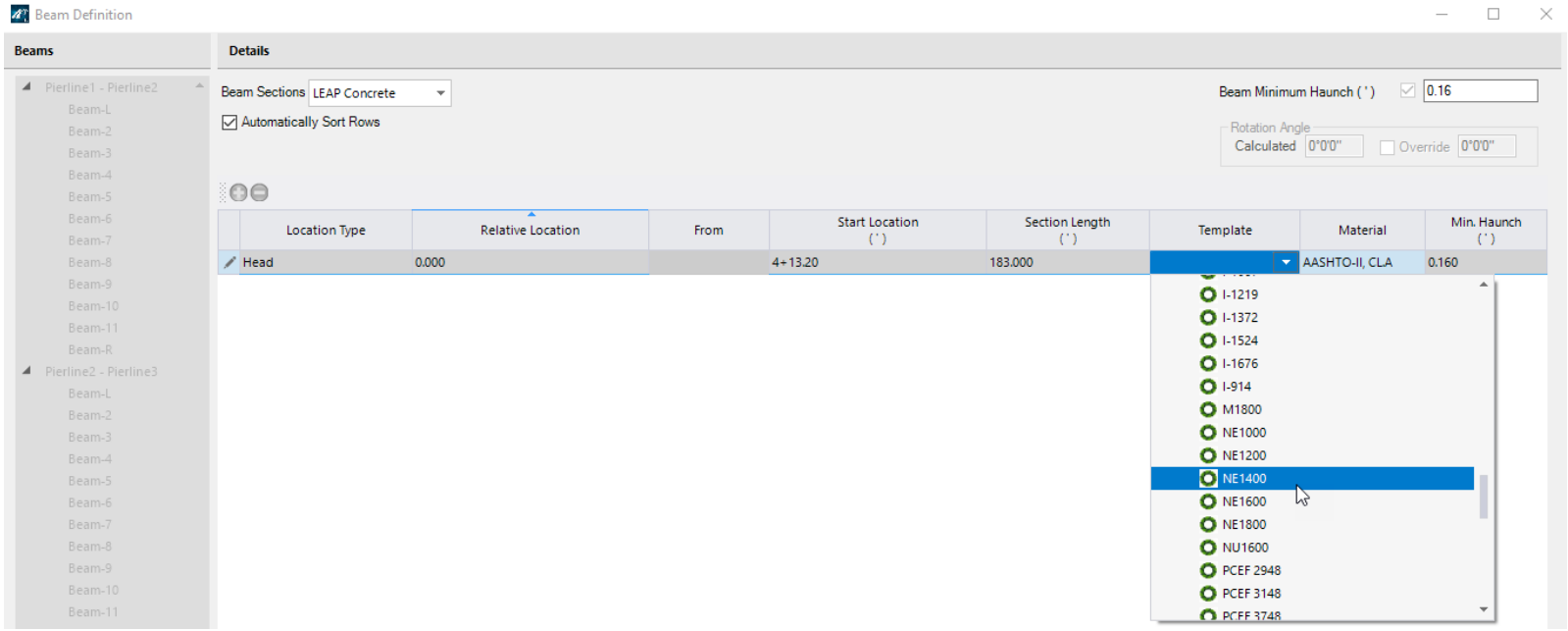



13. Set the Number of Beams to **12** and click **Apply**.
14. Set the Edge Distance to **4** and click **Apply**.
15. Set the Start Pierline Offset and End Pierline Offset to **0.5** and click **Apply**.

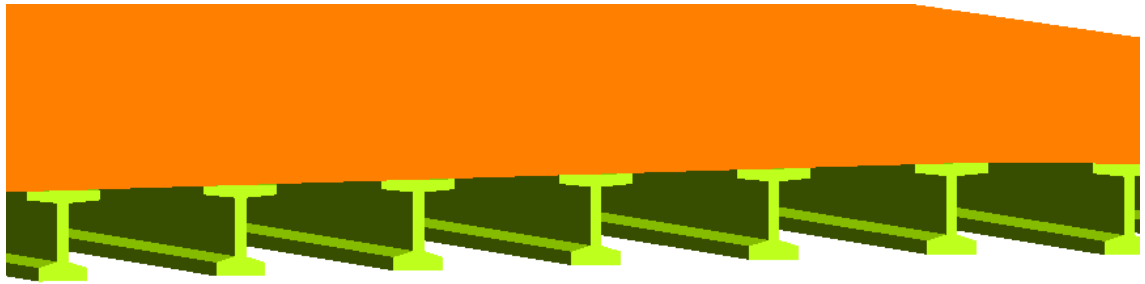





16. Click **Validate** then review the beam lines in the view.
17. Click **Save** to accept.
18. Click **Place** from the **Superstructure Beam** tab.
19. Set the Feature definition to **Girder**.
20. Select the Beam Layout and accept with a data point.
21. Set the **Beam Minimum Haunch** to **0.16**.

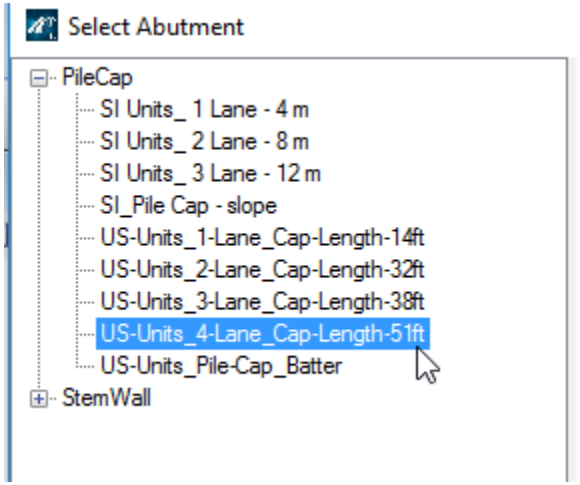



22. Set the beam **Template** to **I_GIRDER\NE 1400**.
23. Click **OK** to model the beams.

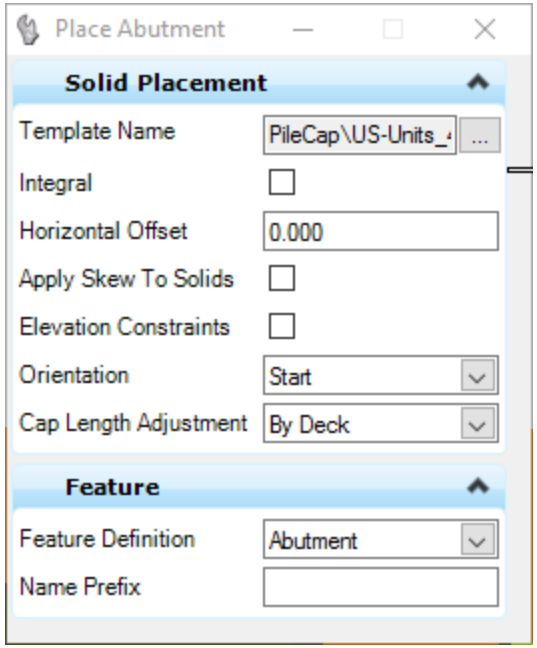


## Exercise 3: Substructure Modeling

1. Click the **Place Abutment** tool on the **Substructure** tab.
2. Select **…** icon to select a template.
3. Select the abutment shown below then click **Close**.



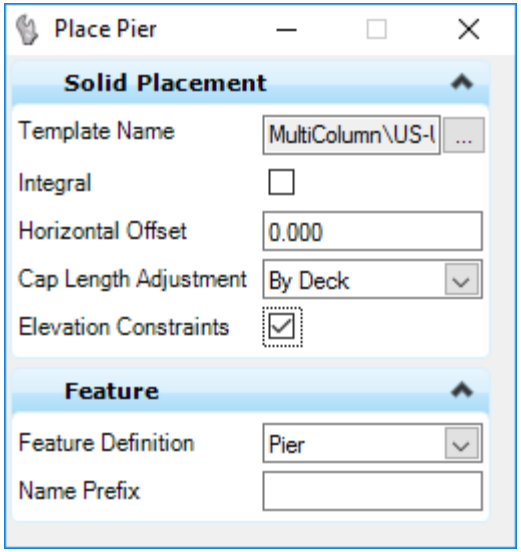
4. Populate the **Place Abutment** tool settings window as shown.



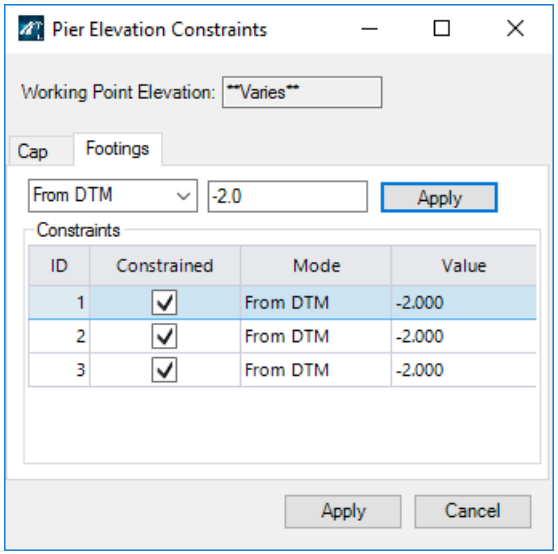

5. Select the pierline at station *4+27* then accept with another data point off the pierline.
6. Select the **Place Pier** tool.
7. Select **…** icon to select a template.

8. Select the pier shown below then click **Close**.

9. Populate the **Place Pier** tool settings window as shown.

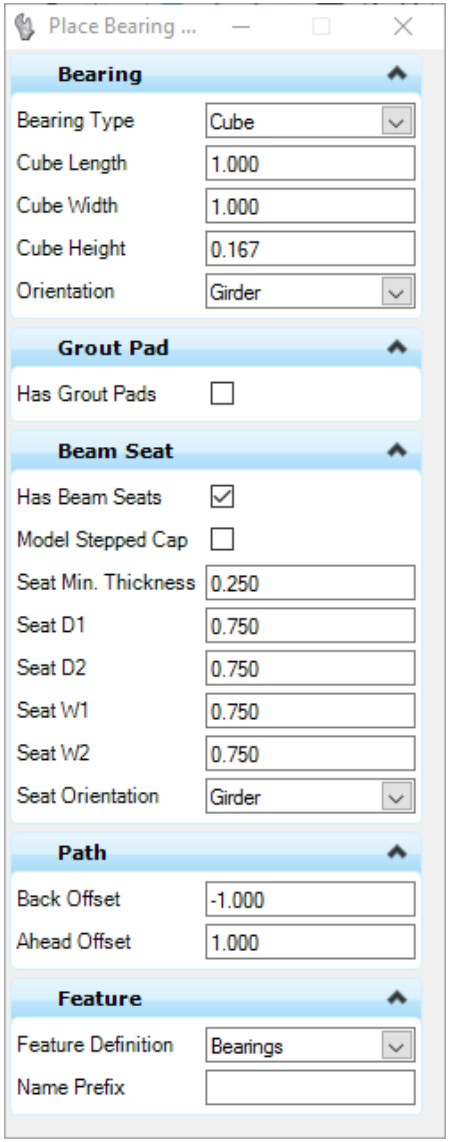



10. Select the remaining pierlines with a data point on each one, then click reset to finish selecting piers then one more data point.
11. Set the **Pier Elevation Constraints** as shown. Click **Apply** to accept.




12. Review the results by rotating your bridge around in View 2.

13. Select the **Place Bearing** tool and populate the dialog as shown.

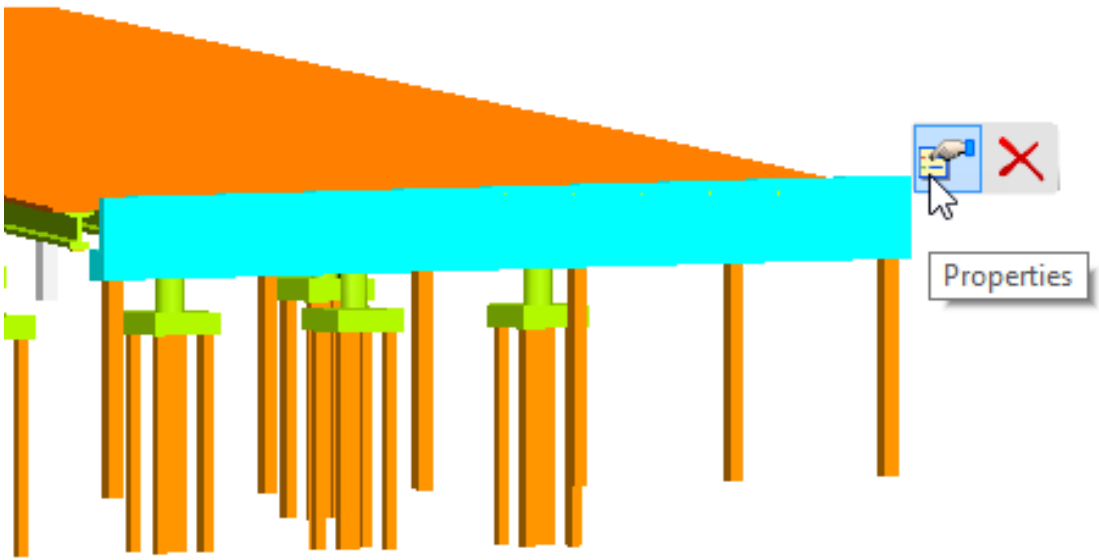



14. Select all of the pier lines, click reset then data point to accept.

15. Review the resulting substructure elements.

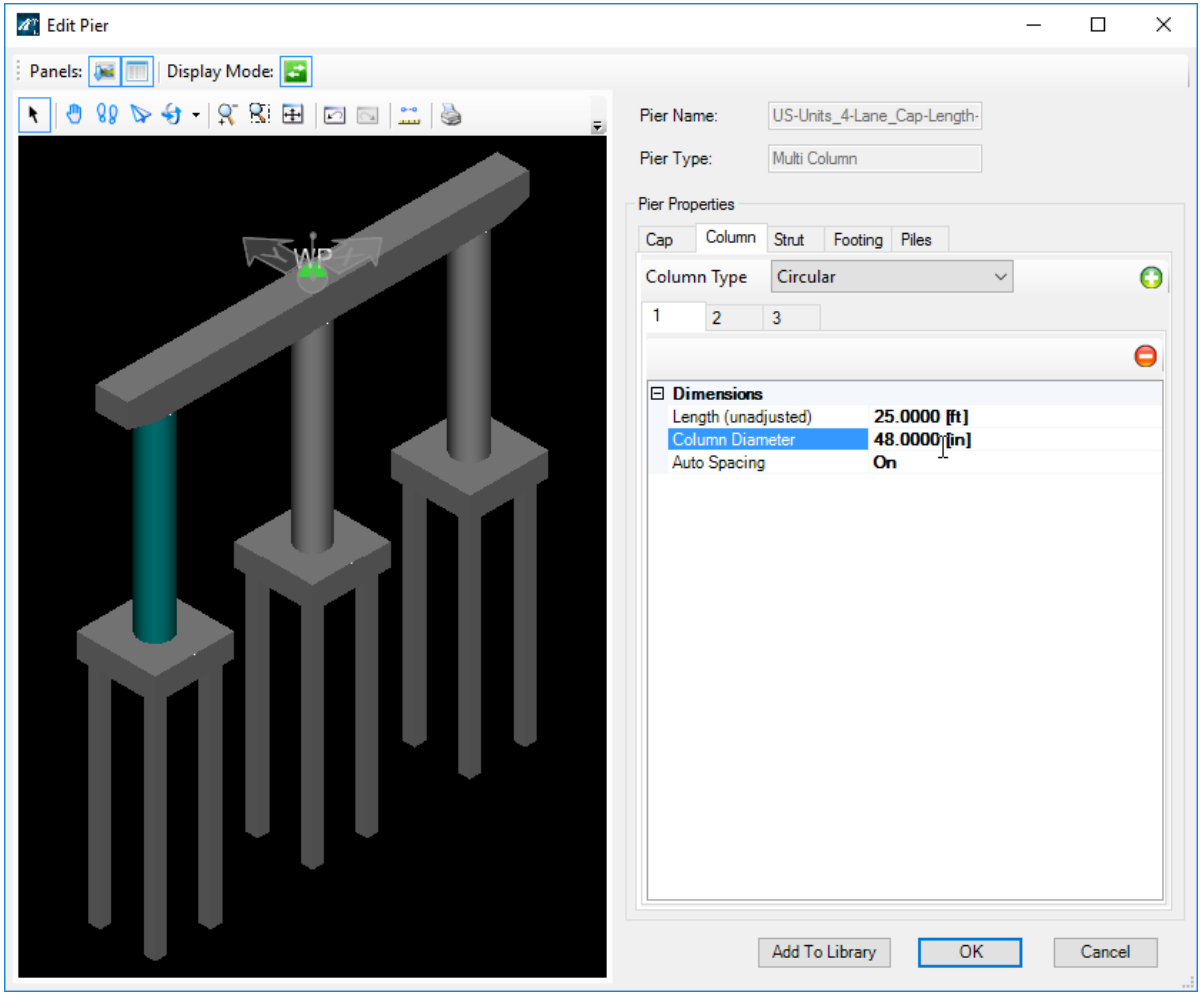
## Exercise 4: Editing Bridge Elements

1. As the bridge deck is not symmetrical to the alignment, the abutments and piers are off-center. Select the first abutment.

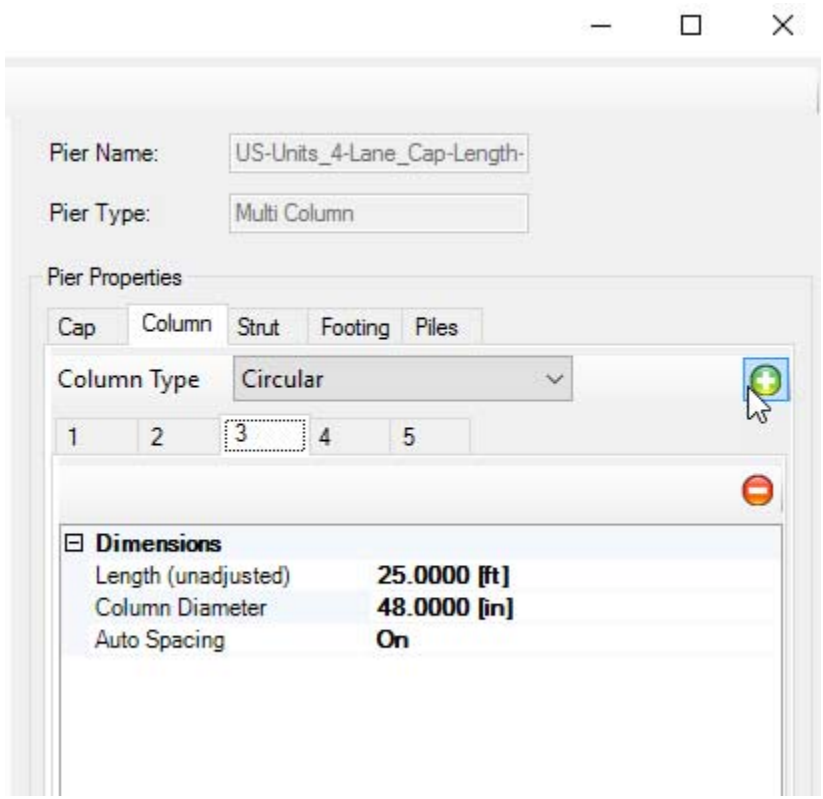



2. Adjust the horizontal offset to **7.0.** The structure will update.
3. Apply the same offset to the other abutment and all the piers.
4. Select the first pier and **SELECT to Edit** the Substructure Template.

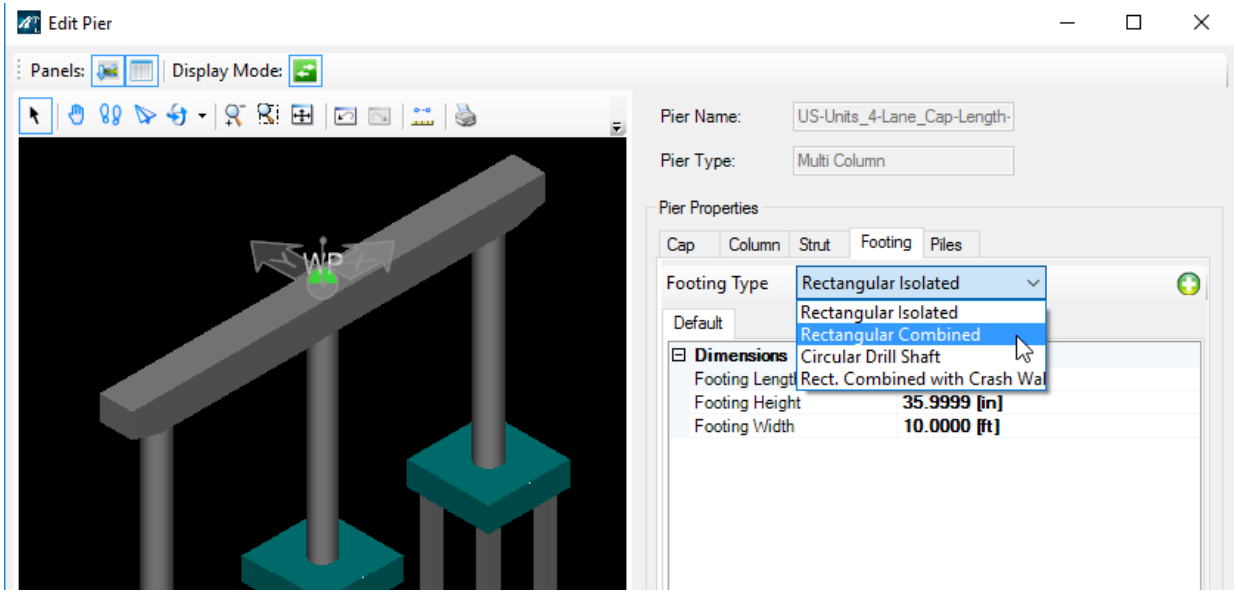
5. Adjust the column diameter to **48**



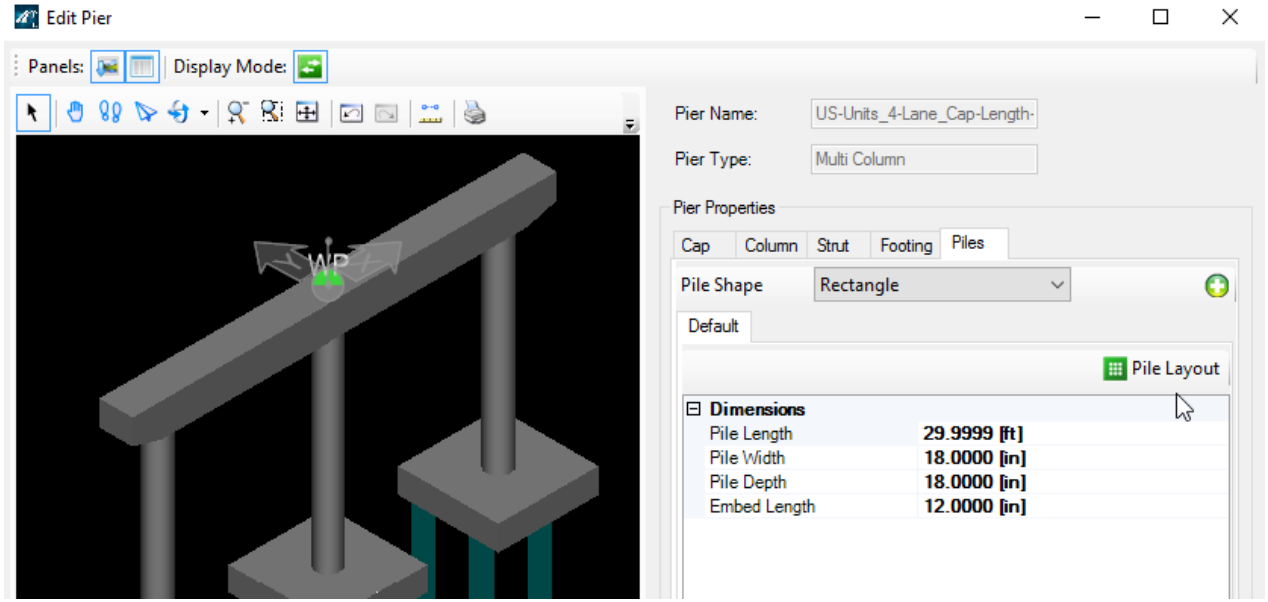
6. Click the **Add** icon twice to add 2 more columns



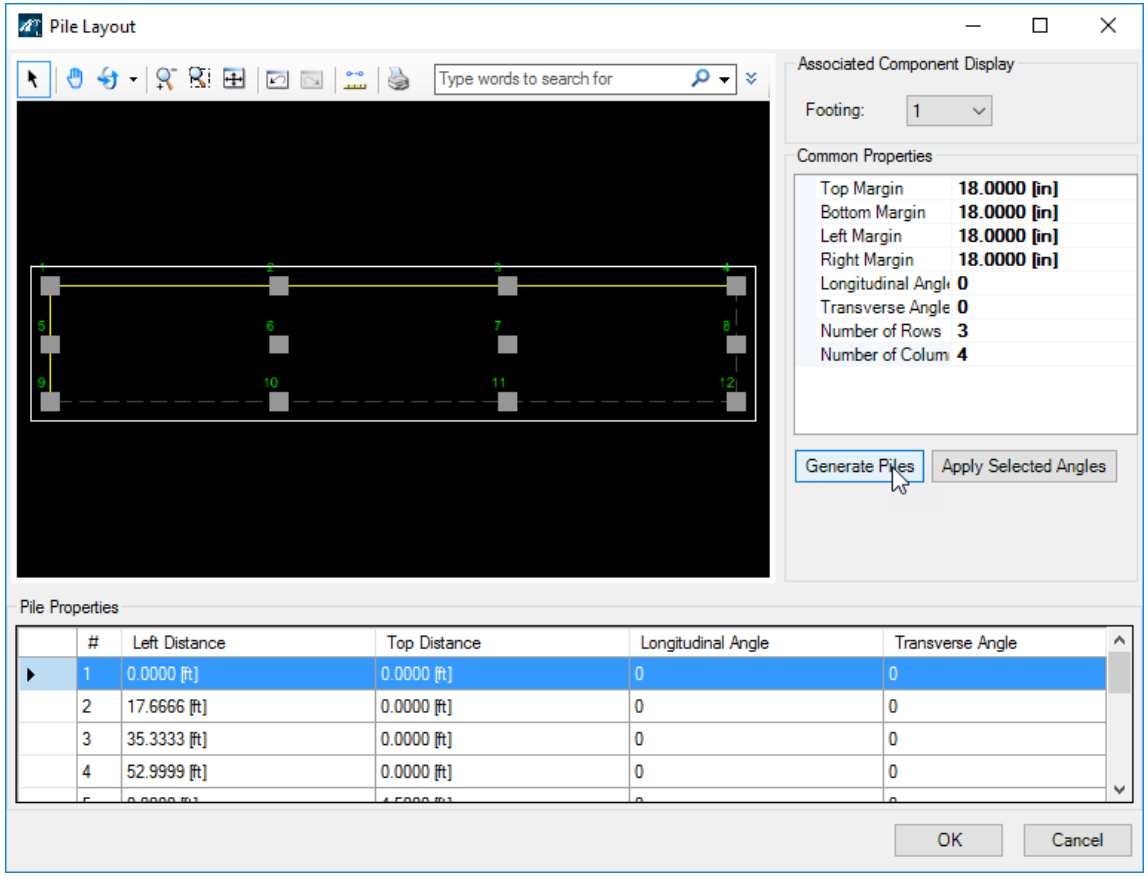
7. Select the **Footing** tab, and change the **Footing Type** to **Rectangular Combined**




8. Select the **Piles** tab, and click on the **Pile Layout** icon.



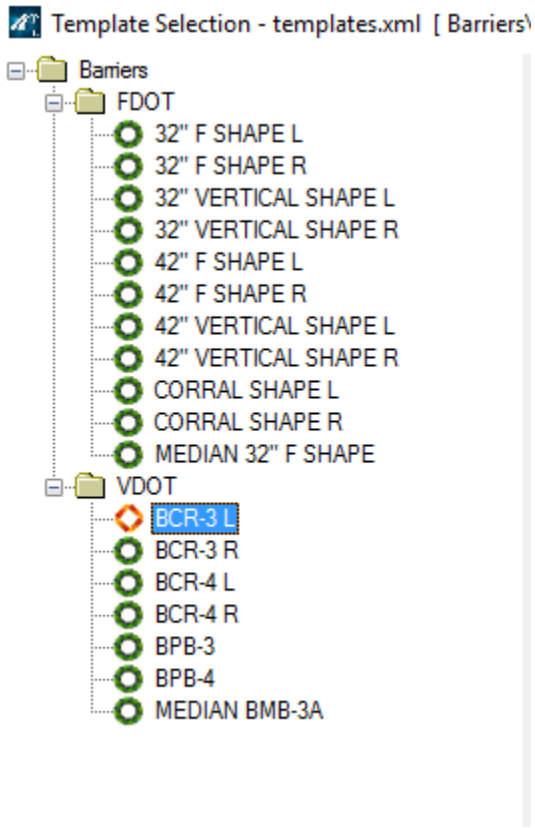
9. Adjust the number of rows and columns as shown below.




10. Select **Generate Piles**
11. Select **OK** .
12. Select **Add to Library**, to save the new pier configuration under a new name: **GarrisonPier**
13. Delete the previously placed piers and apply the new **GarrisonPier** configuration.

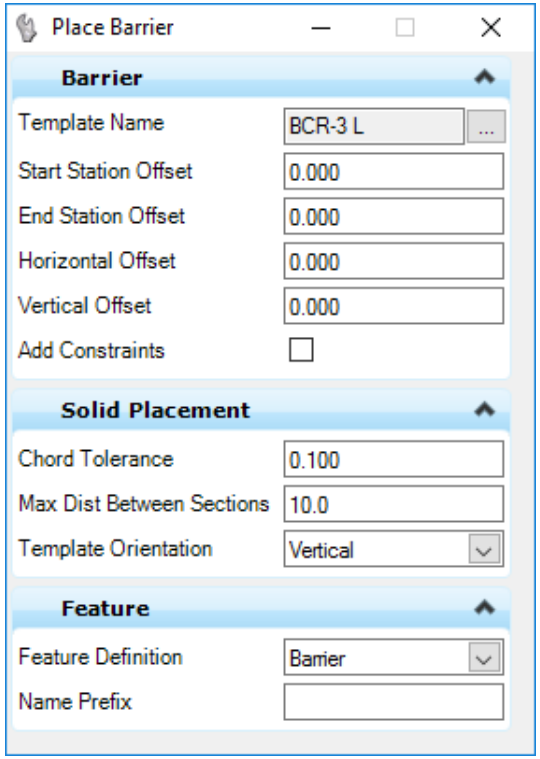
## Exercise 5: Place Barrier

1. On the **Auxiliary** ribbon tab, select the **Place** tool in the **Barrier** group.
2. Click **[…]** adjacent to the Template Name setting. The Template Selection dialog opens.




3. Select the barrier template shown above and click **OK**.

4. Fill out the **Place Barrier** settings window as shown.




5. Data point on the deck as seen in the top view, reset to accept the selection then data point to place the barrier.
6. Click **Select Guideline from List** to open a Path Selection dialog displaying the cross-section. Select the top left point of the deck template of the section.
7. Click **OK** to accept the point you selected.
8. Click **OK** to complete. The left barrier is now placed.
9. Repeat the steps above to place the right barrier. Use the following:
   a. Template Name: **BCR-3 R** and
   b. Guideline Point Name: Top right point of deck template.
10. Model is complete.

# Visualization with OpenBridge Modeler

## Description

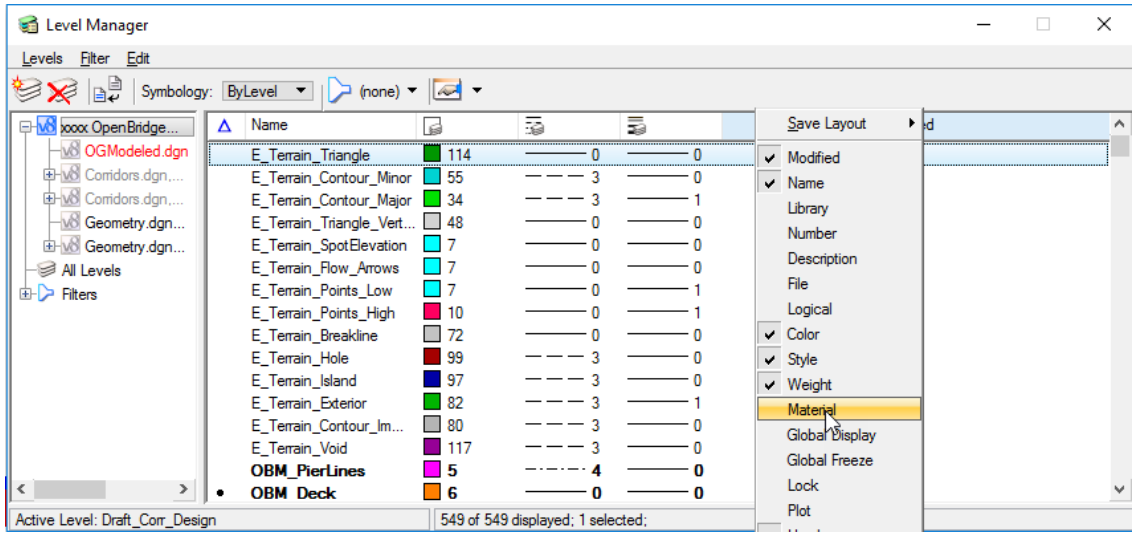
In this exercise you will perform tasks related to setup the camera view for the model, so it can be exported to LumenRT for further visualization enhancements.

## Skills Taught

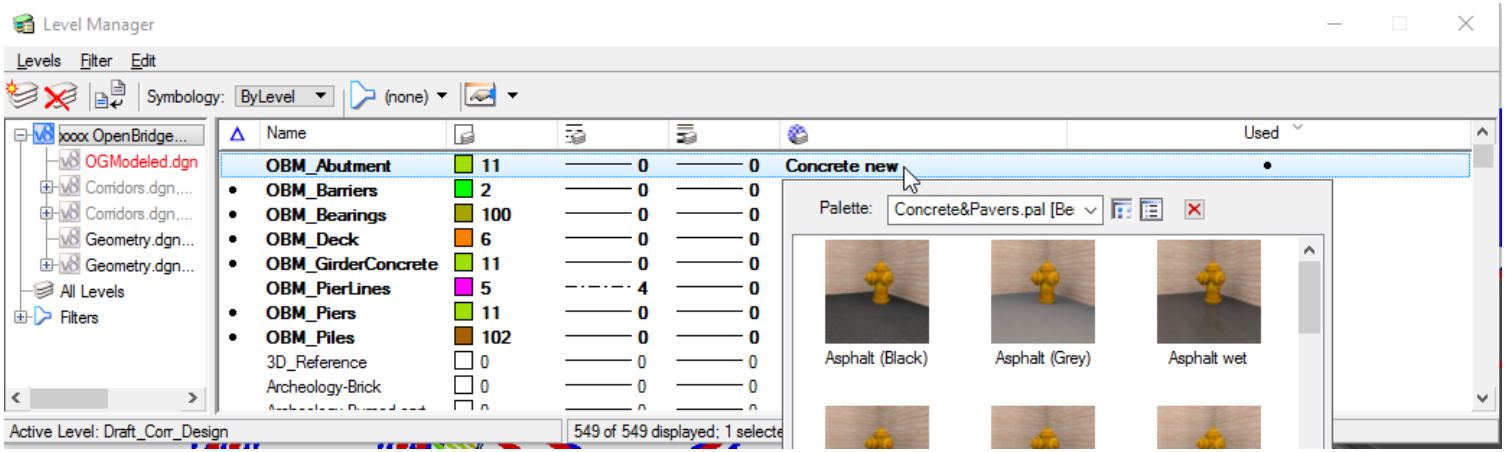
- Assign materials to elements
- Attach pavement markings to the bridge model
- Setup a camera view for the bridge
- Adjust camera target and angles

## Exercise 6: Assign Materials to Elements

1. Select *Settings > Levels > Manager* in the MS menu
2. Right-Click in the list box to activate **Material**.



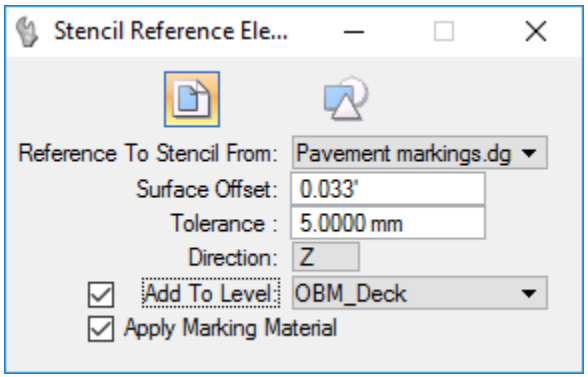

3. Select the appropriate material for each level




4. Apply the materials to *Corridors.dgn* following the steps above.

## Exercise 7: Pavement Marking

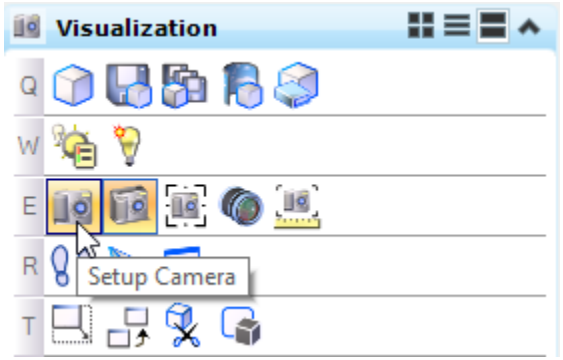
1. Attach as a reference file *Pavement Markings.dgn* to **OpenBrige Modeler.dgn**
2. Pavement markings are drawn in 2D. We need to place them on top of our bridge model. From the MicroStation menu Select *Tools > Visualization > Populate > Stencil 2D Elements on 3D Geometry*.
3. Populate the dialog as shown below.



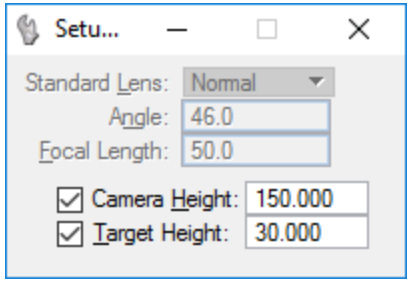

4. Click a data point on the screen to Start Processing. All 2D pavement marking will be placed on top of the corresponding surface.

## Exercise 8: Setting up a Camera View

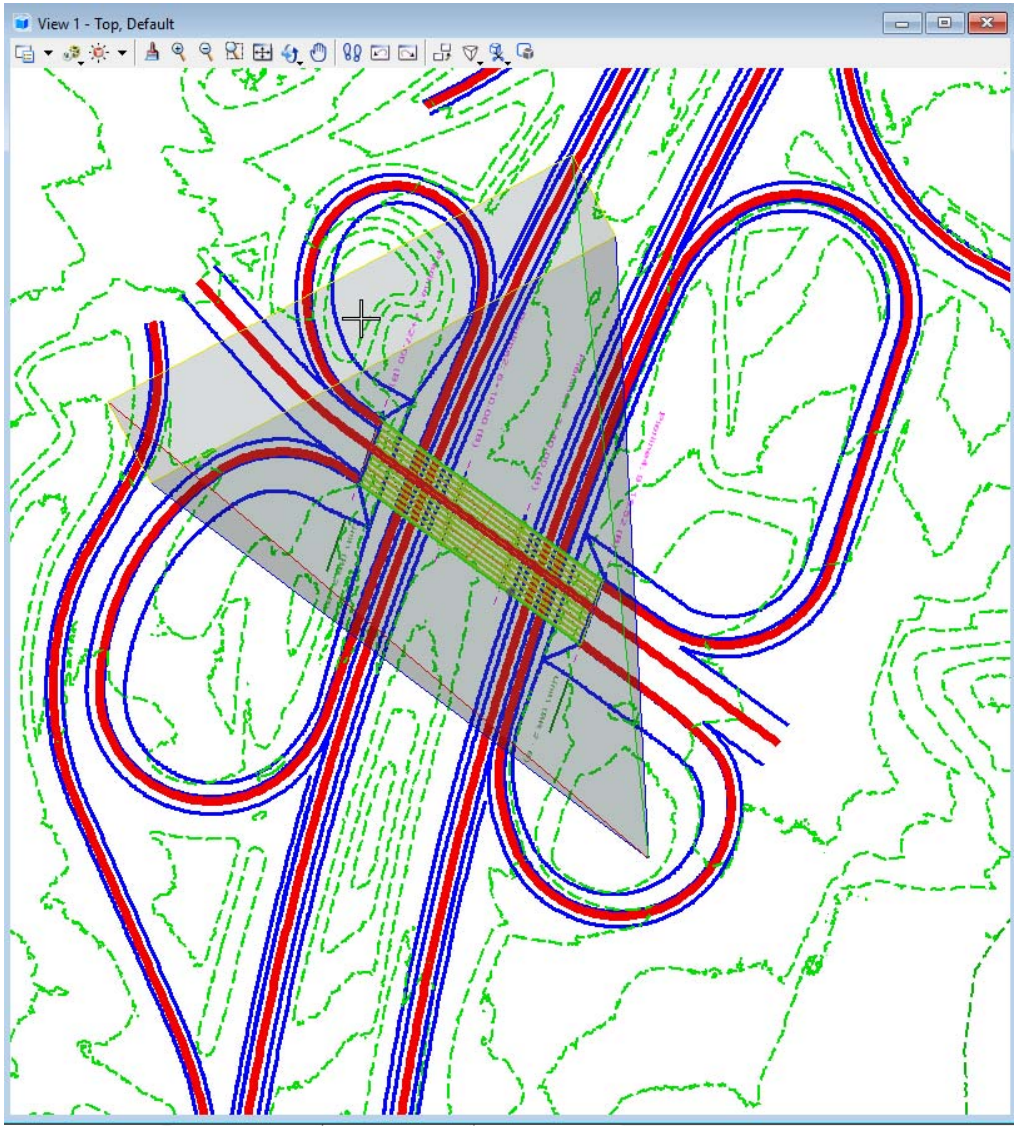
1. From the Visualization task pane click on the *Setup Camera* tool.



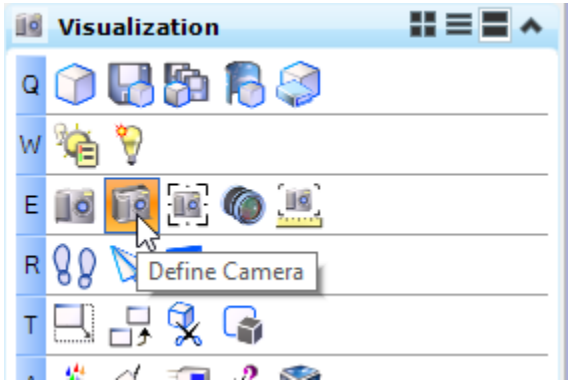

2. Enter a data point in view 5 (the 3D view). This will be the view that perspective will be applied to.
3. In the *Setup Camera* tool settings dialog, set the following:



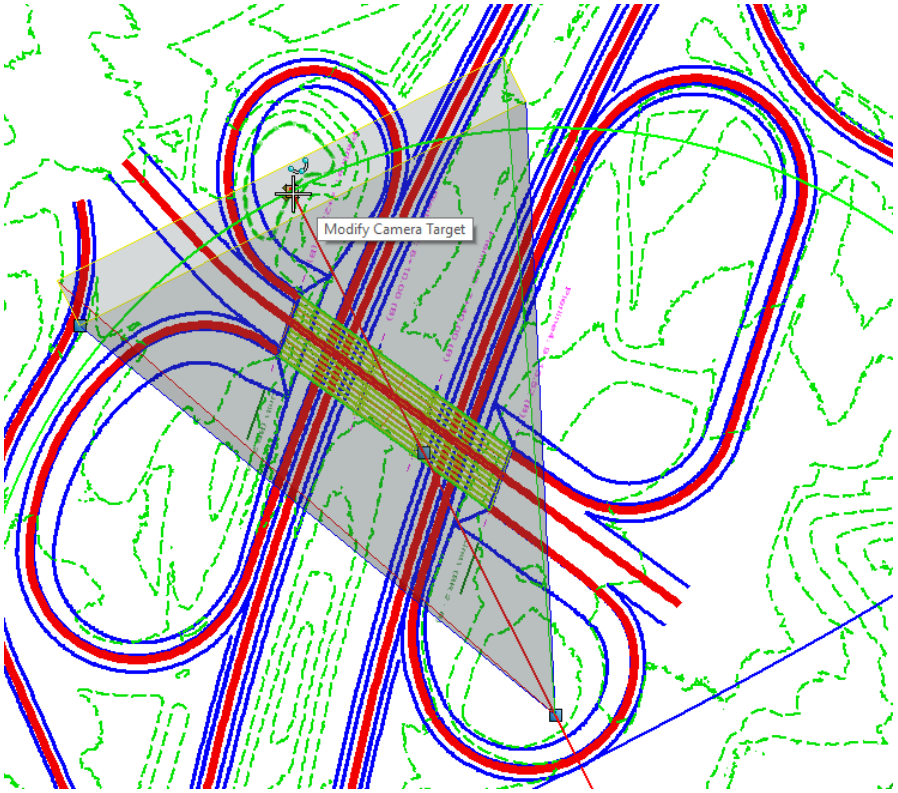
4. In the Top view enter a data point where you want to be standing with your camera to define the camera position and then enter another data point in the Top view where you want to be looking to define the camera's target point.



5. Adjust the camera position by selecting the *Define Camera* icon.

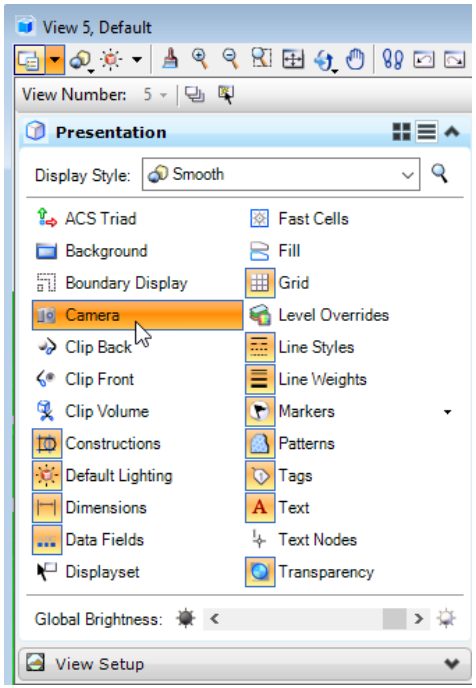



6. Select the handles on the camera view to modify different aspects of the camera position.

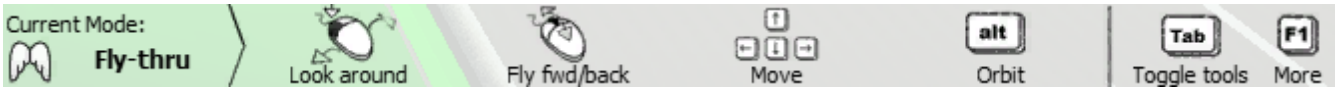


## Exercise 9: Export to LumenRT

1. Once the camera is setup, make View 5 (3D view) the active one by clicking on the view.
2. Activate the *Camera* attribute in the View Attributes list box in View 5.



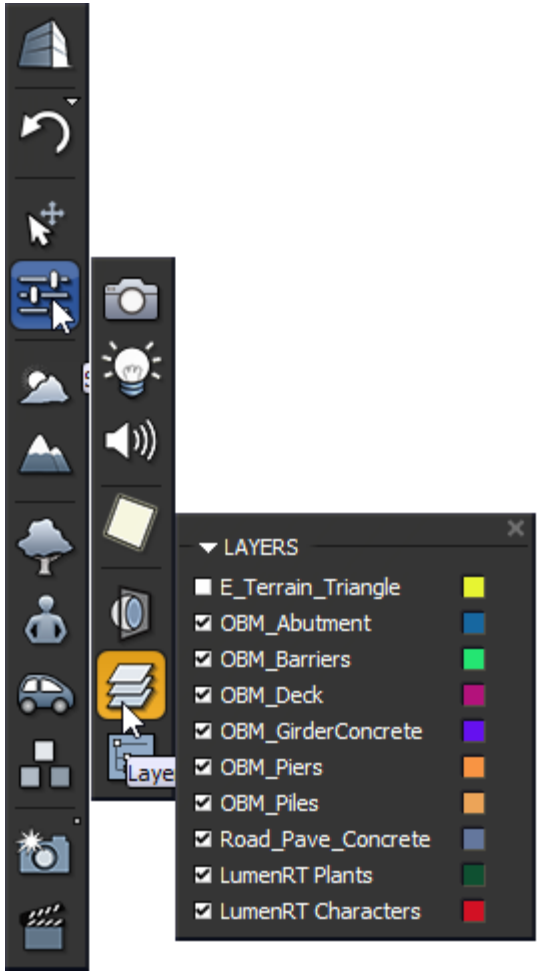

3. Adjust the Level Display and Reference files to display in the view to show only the elements to be exported to LumenRT.
4. Select *LumenRT > LumenRT Export* in the MS Menu.
5. Familiarize yourself with the LumentRT navigation tools.



# Exercise 10: Apply Materials in LumenRT

## Using LumenRT materials

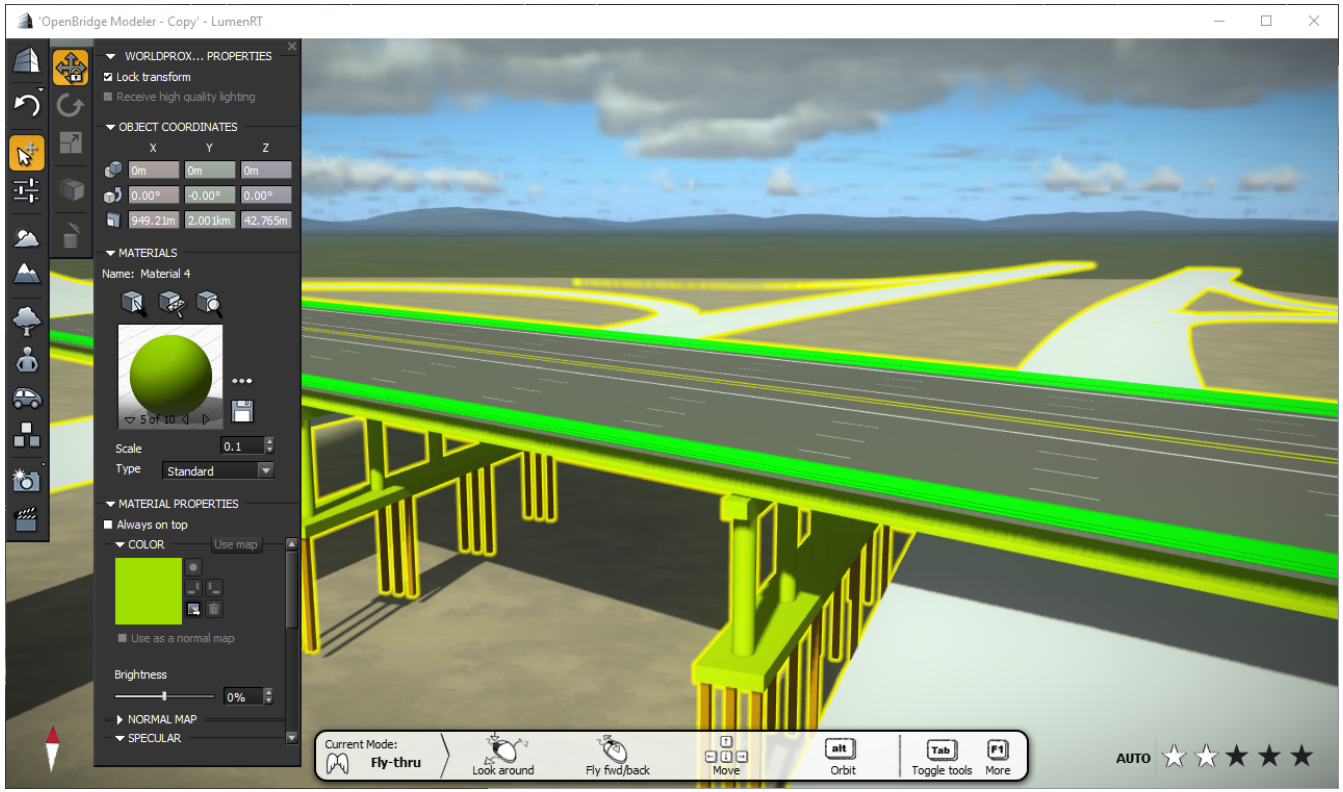
1. Select the *Setup* tool and deactivate the level for the terrain, to facilitate the selection of the bridge elements.



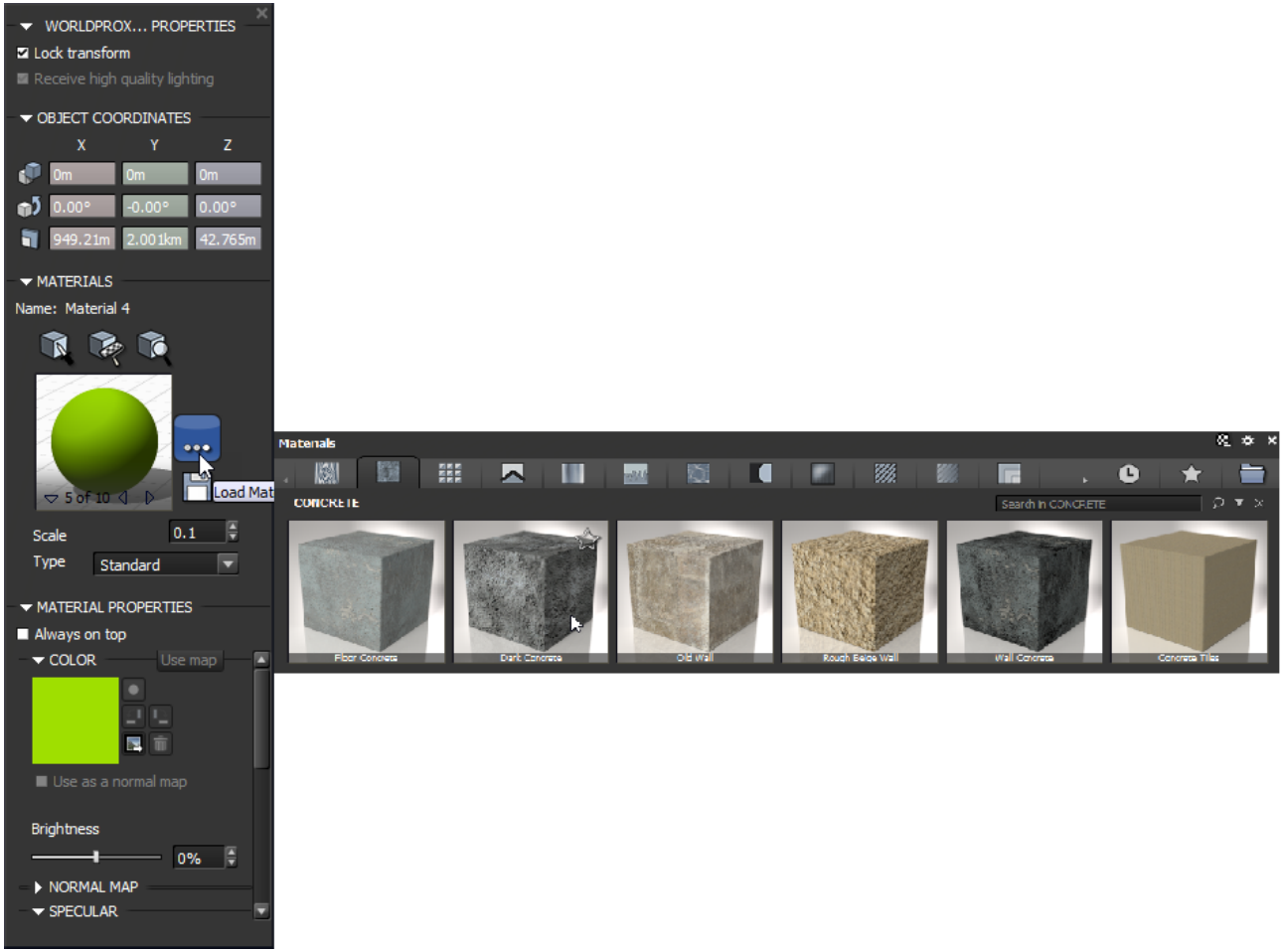

2. Close the dialog.

3. Click on the *Selection* tool.

4. Click on one of the pier elements. The Materials dialog box is displayed.



5. Select the *Load Material* icon, and navigate to the concrete material.

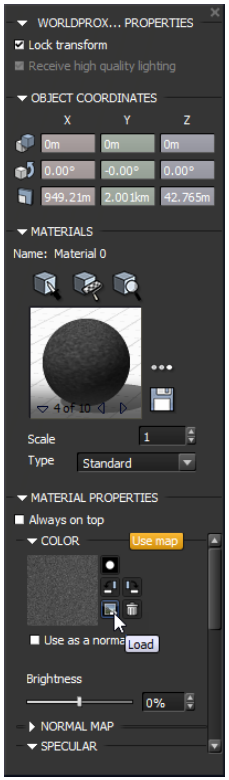



6. Accept the concrete material and the image will be update automatically.
7. Apply different concrete types to other bridge elements following the steps above.

## Using Custom Materials

1. Click on the *Selection* tool.

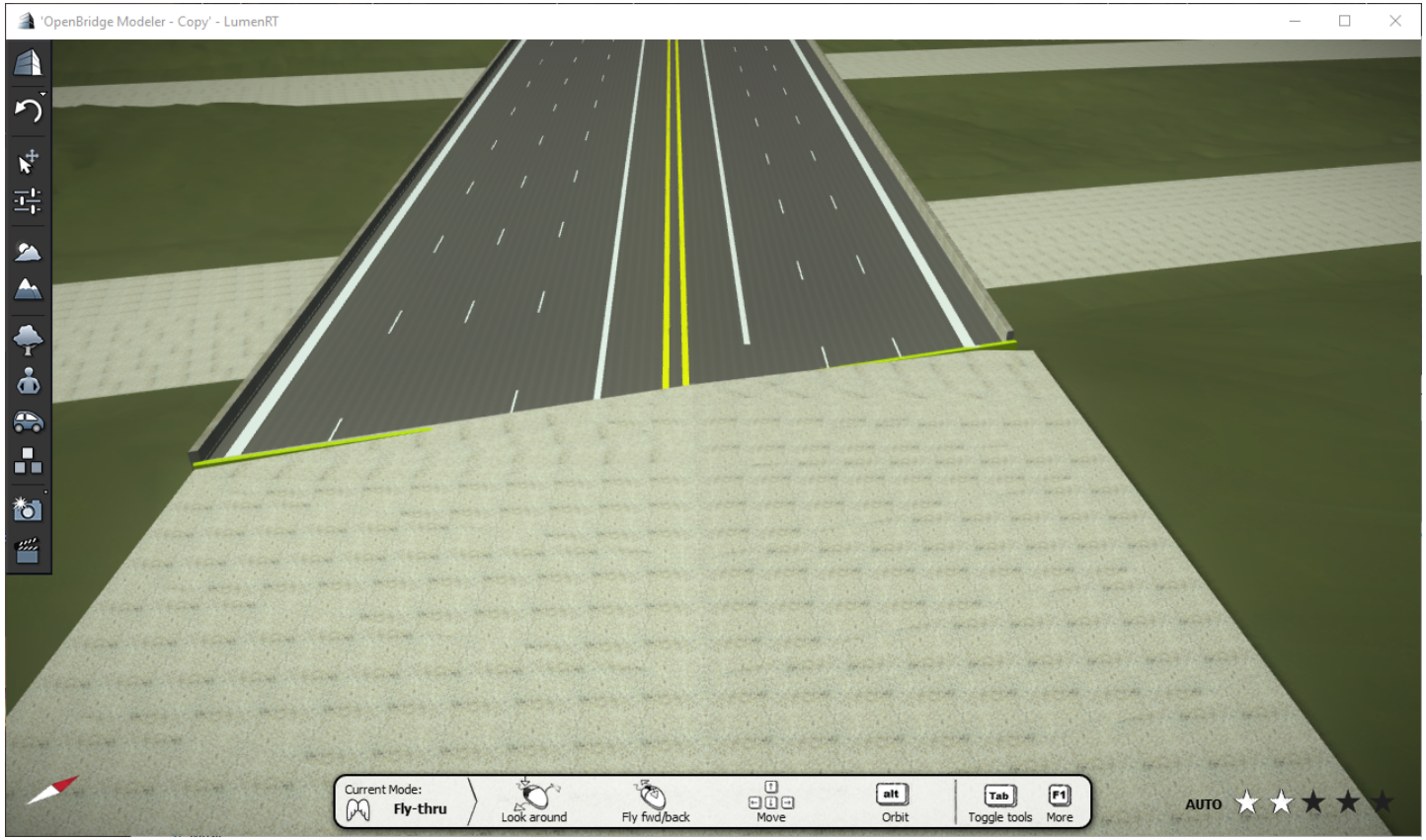
2. Click on the bridge deck. The Materials dialog box is displayed.
3. Select the *Load* icon, in the **Color** group.



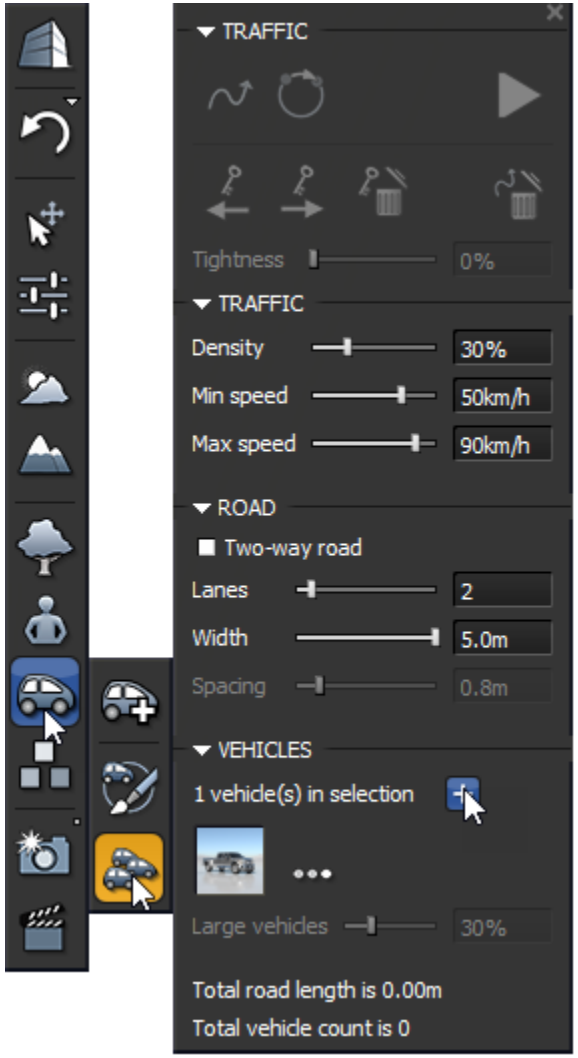

4. Select the *Asphalt* material image located in **C:\Bentley Training\OBM and Lumen\standards\Materials\Patterns**
5. Apply the *Concrete* material image for the bridge barriers using the steps above.

## Exercise 11: Adding Traffic on the Bridge

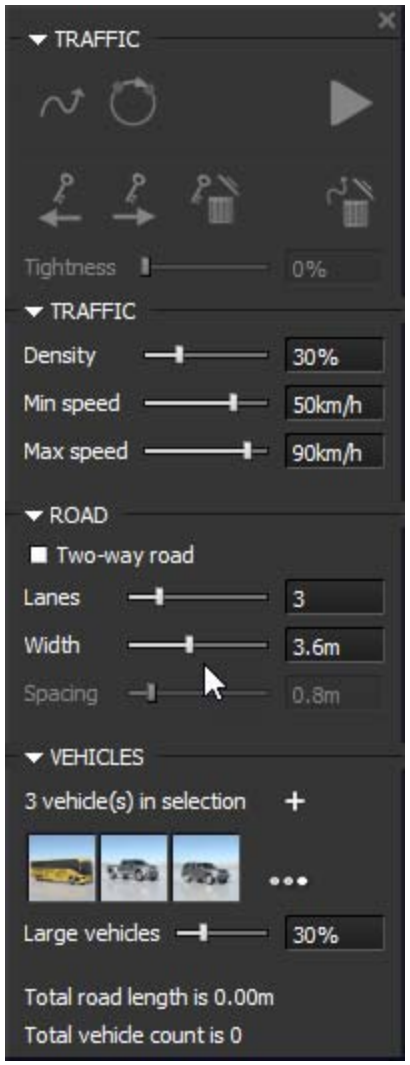
1. Adjust the view to visualize the traffic lanes on the bridge.



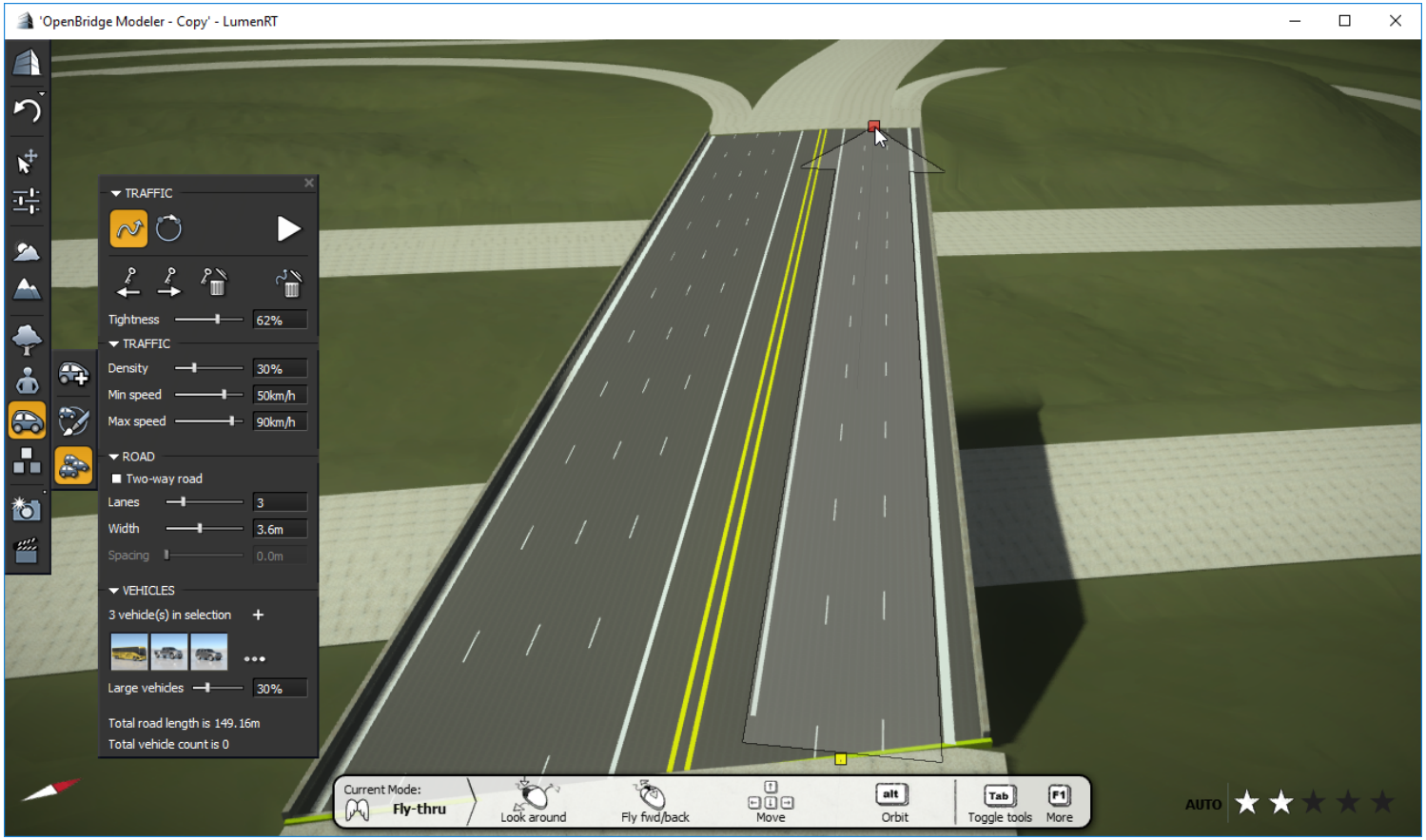
2. Add different types of vehicles to the traffic flow.



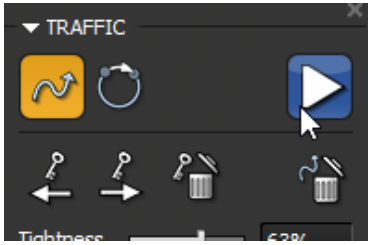
3. Adjust the dialog for the number of lanes and lane width.



4. Click at the beginning of the bridge and define the arrow for the traffic flow to the end of the bridge.

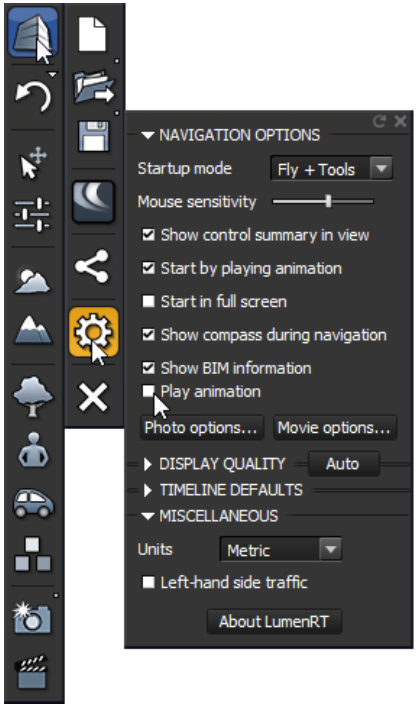



5. Click on the animation icon.



6. Traffic will populate the bridge deck.
7. Repeat the same steps to add traffic on the other side of the bridge.

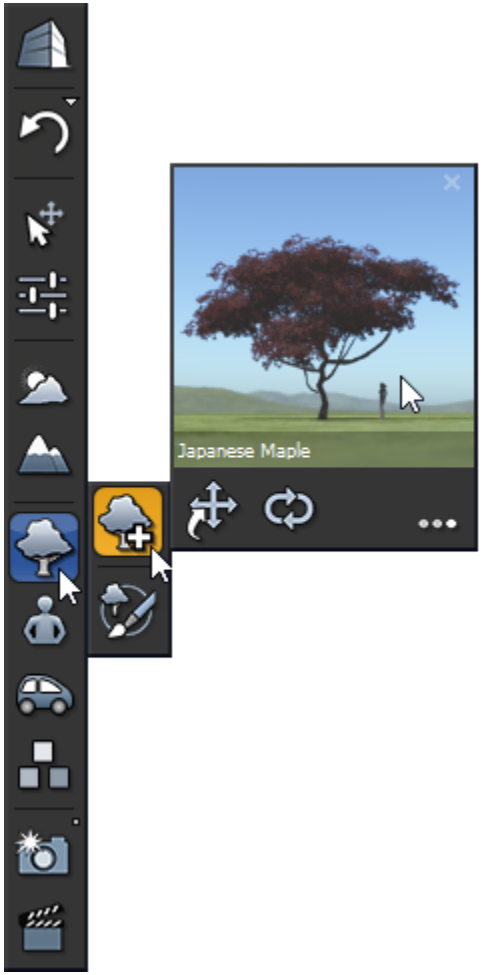
8. The automatic animation can be stopped in the *Settings* menu shown below.



## Exercise 12: Adding Trees

1. Activate the level for the terrain.
2. Adjust the view to visualize the traffic lanes on the bridge.

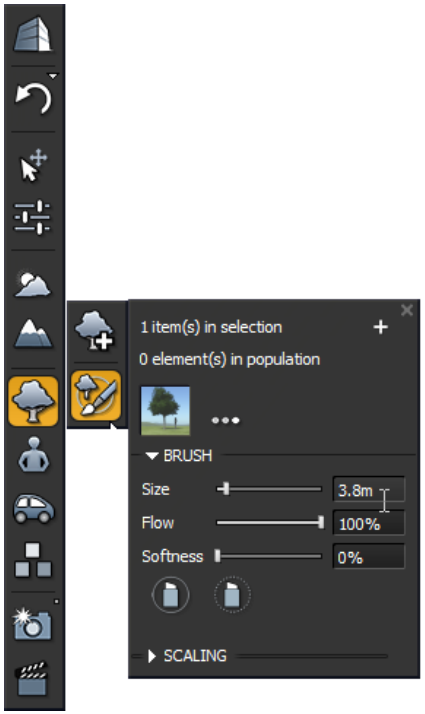
3. Select the *Add Plant* icon, and pick the type of tree to add.




4. Click on the terrain to place the tree.

5. Select the *Add Multiple Items* to “plant” more trees into the terrain.


6. Click on the terrain to continuously place trees.
7. Select the *Paint Instances* icon to brush the trees into the terrain.



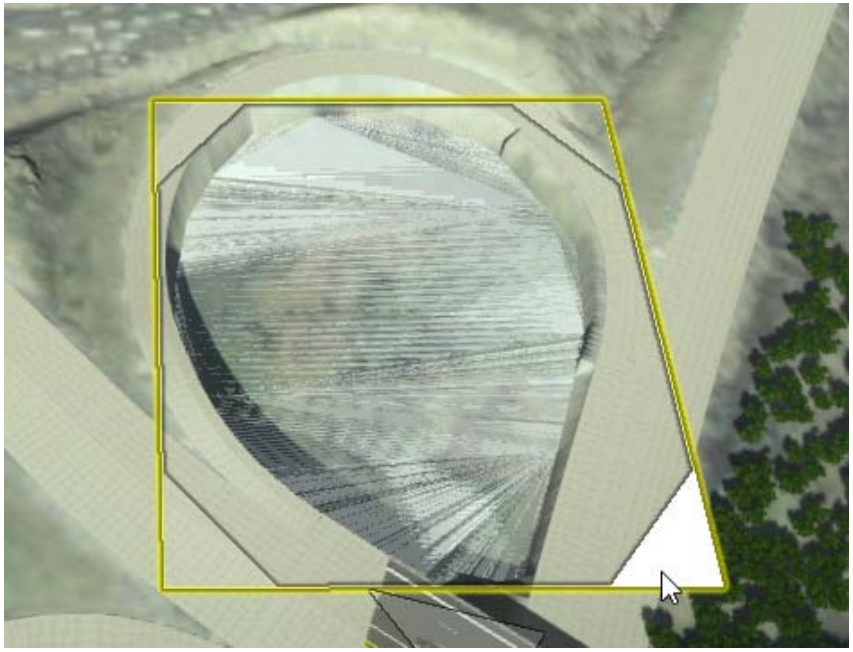
8. Click on the terrain and drag the cursor across the terrain.

## Exercise 13: Adding a Pond

1. Using the LumenRT control position the display to proper visualize the pond location in the upper right quadrant of the interchange.
2. Select the *Add Water* icon.

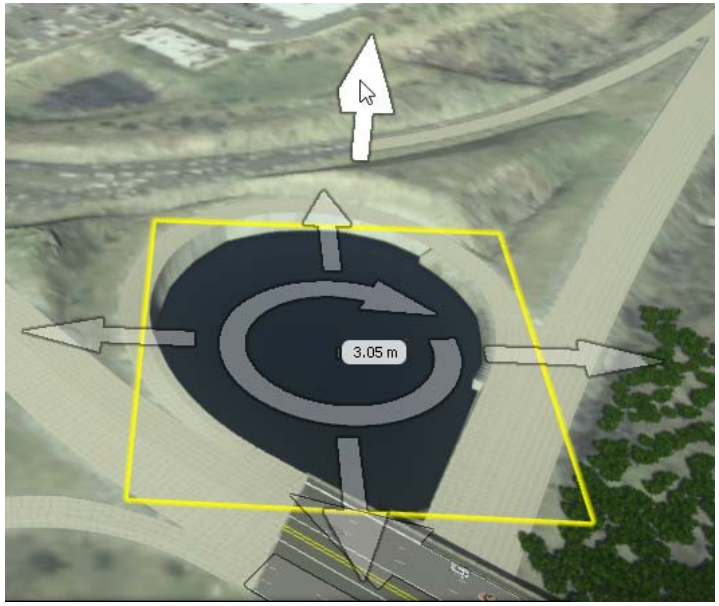
3. Select *Turbulent Pond Water*
4. Place a pond rectangle inside the interchange loop.
5. Select the *Resize* icon to manipulate the geometry of the pond.

6. Grab the corners of the pond rectangle to resize the pond.



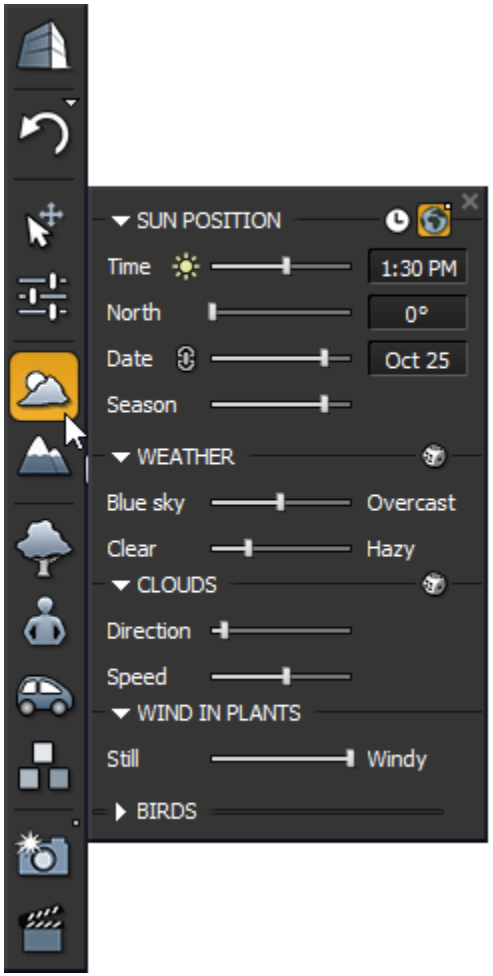
7. Select the *Move* icon.

8. Use the directional arrows in the added pond to raise the water level.

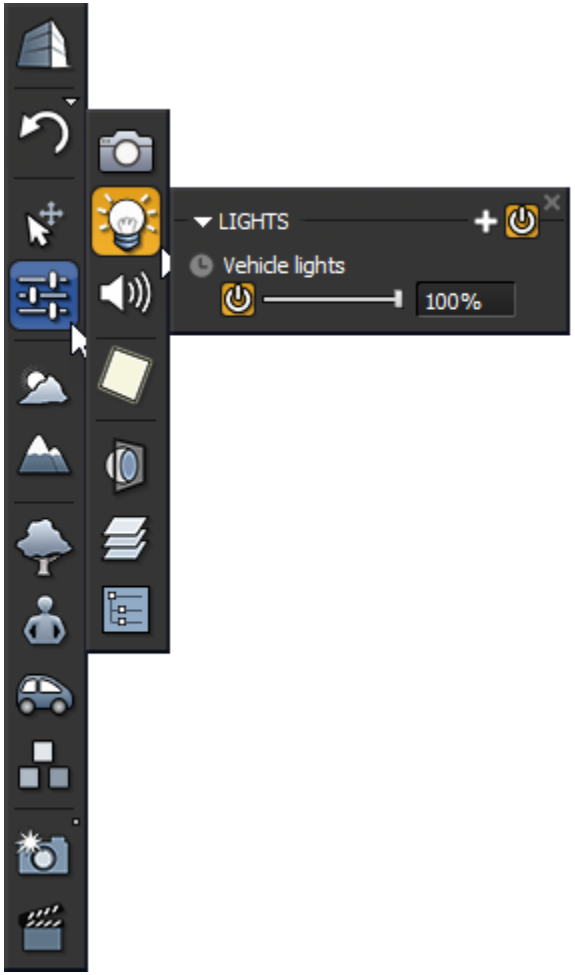



## Exercise 14: Adjusting the Environment

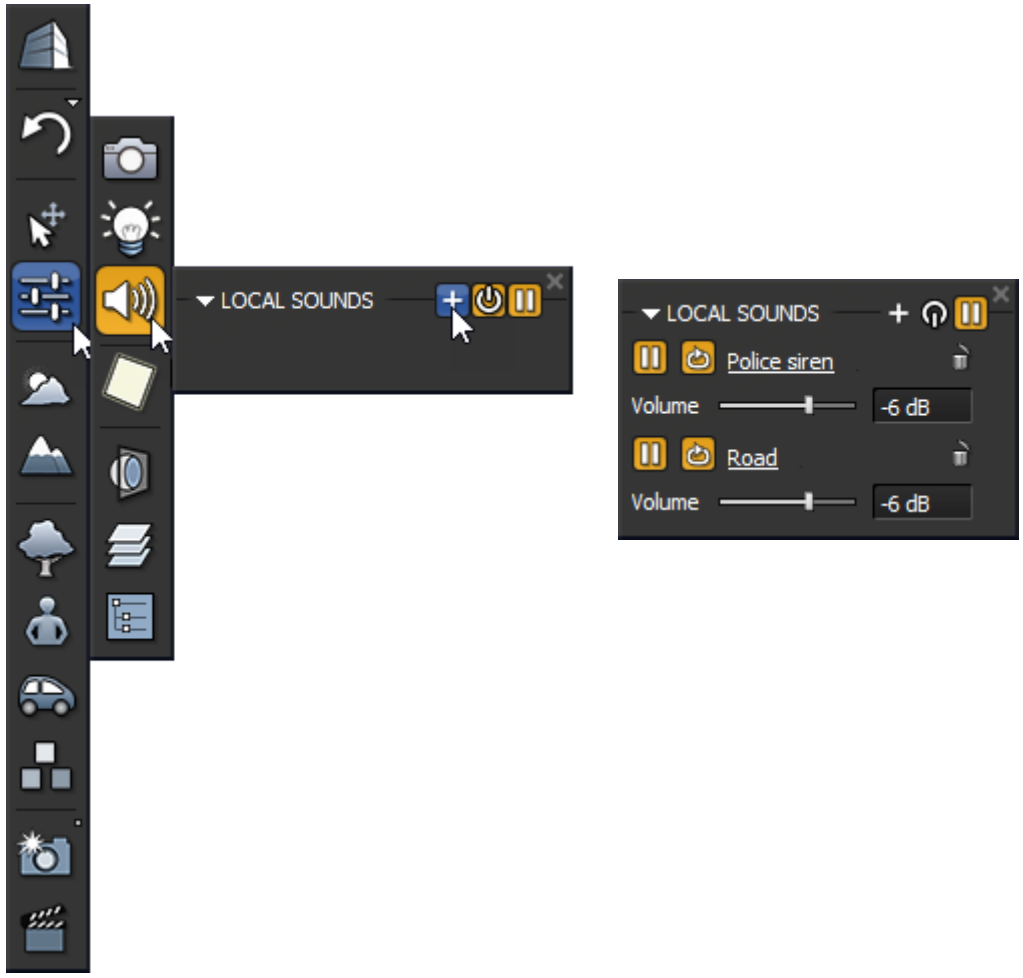
9. Select the *Sun&Atmosphere* settings, and adjust the sun position, weather, clouds and wind in plants.



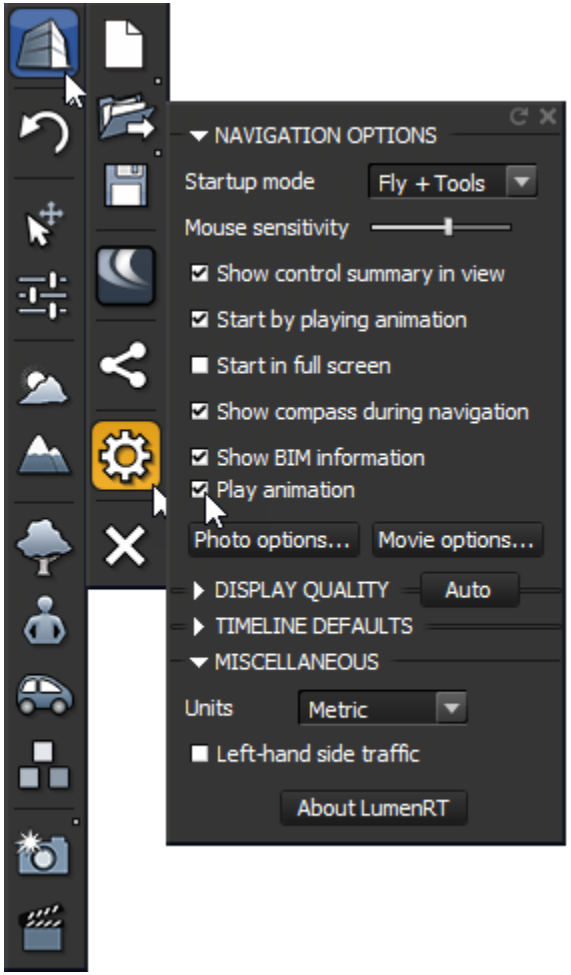
10. Select *Setup > Lights* and activate the vehicle lights during night time.



11. Select *Setup > Sounds* and add sounds to the environment



12. Activate the *Play Animation* option.

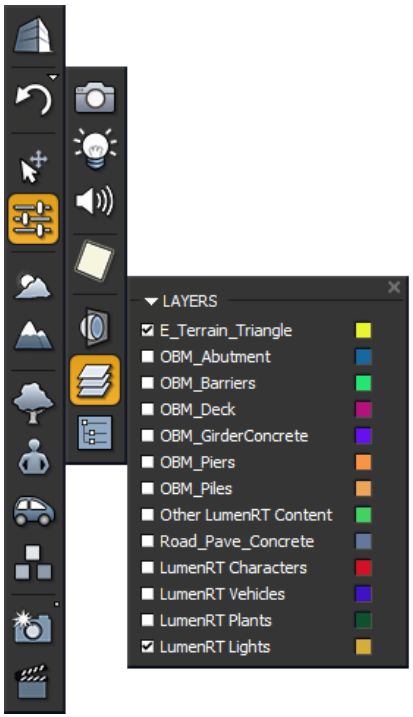



13. Click on the third start to activate the full animation option.

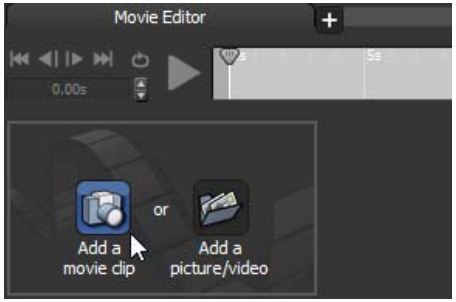
## Exercise 15: Creating Animation

1. Click on the *Movie Editor* icon.

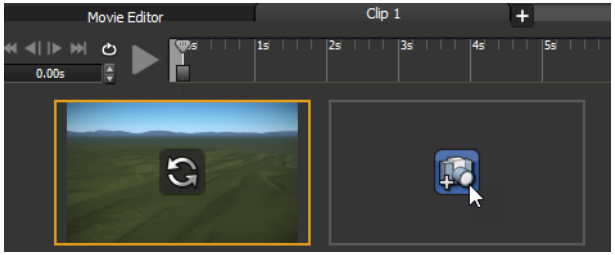
2. Deactivate levels to display only the terrain and the LumenRT lights.



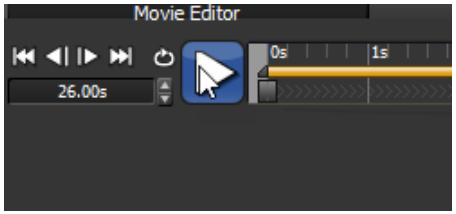
3. Click on *Add a movie clip* to get a screenshot of the scene.




4. Activate the *Road_Pave_Concrete* layer and click on the *Add scene* icon.




5. Activate the *OBM_Piers* layers and click on the *Add scene* icon
6. Using the movement commands change the perspective of the scene, display new layers and *Add scene* icon
7. When done, click on the *Play* icon to animate the clip sequence.




8. Click on *Tools > Export Clip* to save the movie in the format of your preference.