

# 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 through [CONNECT Advisor](#) and on the [LEARNserver](#).

## QuickStart - OpenRoads ConceptStation

*This course is suitable for the **Update 10 (10.00.10.17)** and later versions of:*  
OpenRoads ConceptStation CONNECT Edition

### About this Practice Workbook...

- This PDF file includes bookmarks providing an overview of the document. Click on the bookmark to quickly jump to any section in the file.
- Both Imperial and Metric files are included in the dataset. Throughout this practice workbook Imperial values are specified first and the metric values second with the metric values enclosed in square brackets. For example: **12'** [\[3.4m\]](#)
- The terms **Left-click**, **Click**, **Select** and **Data** are used interchangeably to represent pressing the left mouse button. The terms **Right-click** and **Reset** are also used interchangeably. 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, search in [CONNECT Advisor](#) for related courses and topics. You can also submit questions to the Civil Design Forum on Bentley Communities where peers and Bentley subject matter experts are available to help.

## Course Overview

In this course you will learn how to create a conceptual design including roads, bridges, ramps, street markings, lights and guardrails using predefined components and settings. You will then learn how to calculate, and review the quantities and associated costs, as well as how to modify the default cost rates.

You will also learn how to create and edit a roadway template, and how to modify the intersections and lane markings.



## Exercise 1: Create Roads

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### Description

In this exercise you will learn how to place a new road, select the road class, the template, and edit the geometry of the newly created road.

### Skills Taught

- Navigate the software
- Use the Place Road tool
- Select Road Class and Template
- Edit Curve Radius

## Open Project File

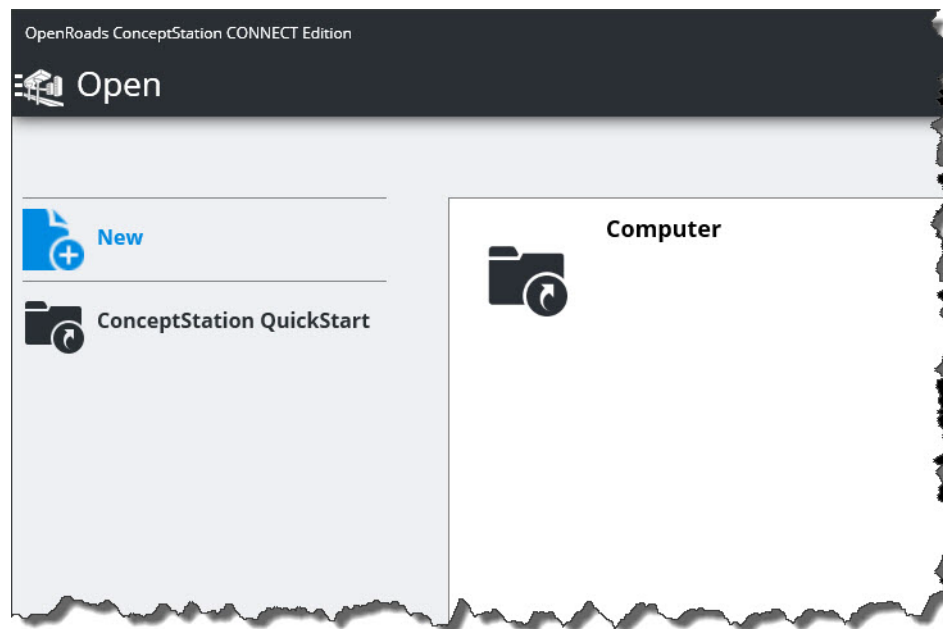
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1. Start the **OpenRoads ConceptStation** application.
2. Open an existing file.



- a. From the **Open** page, click **Computer**.
- b. Browse to *c:\Bentley Training\QuickStart - OpenRoads ConceptStation* or other location where the dataset was installed.
- c. Select the file named **Intersection.dgn** and click **Open**.

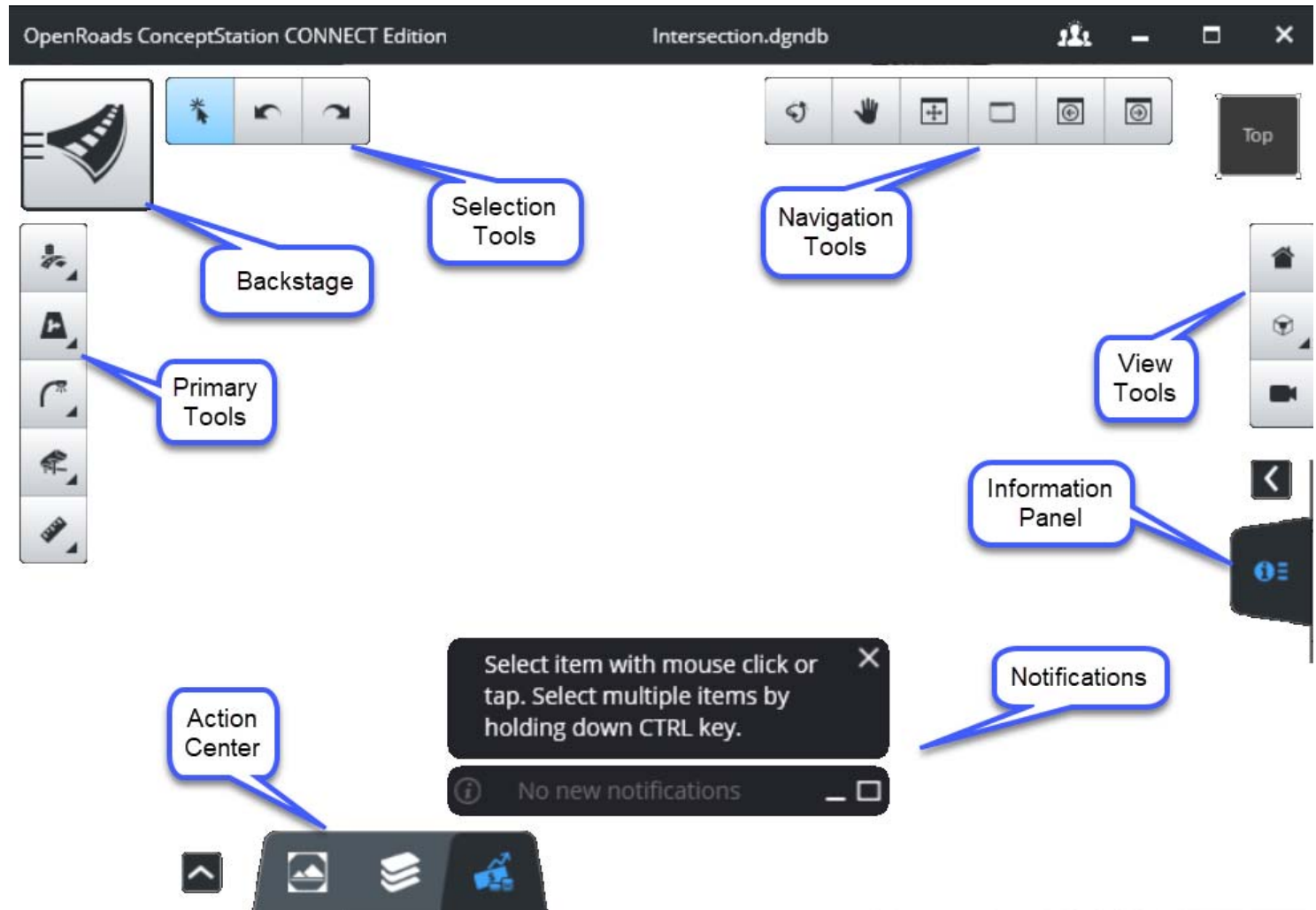
**TIP:** Once a file has been opened from a folder, the *folder name* appears in the Recent Folder list on the left as shown below for the “ConceptStation QuickStart” folder. This Recent Folder list allows you to select that folder quickly without having to browse in the future.



## Explore the Interface

1. The ConceptStation interface includes icons and display panels around all four sides of the screen.

- **Upper Left** - Tools for creating and manipulating elements, such as roads and bridges.
- **Upper Right** - View navigation
- **Right Side** - View orientations and information about elements
- **Bottom** - Notifications and Actions such as saved views, quantity calculations, and profiles.



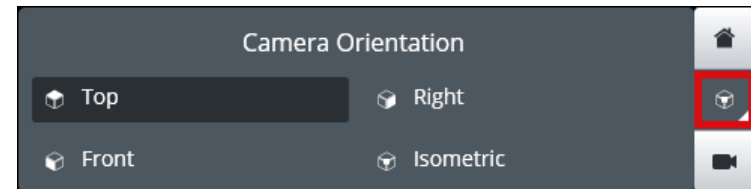


2. Select the **Home View** icon located in the view control menu on the *right side* of the application to change the perspective of the view to a left isometric orientation.



3. Select **Camera Orientation > Top** to return to the top view.

The Camera Orientation options are used to set the view to a Top, Front, Right, or Isometric view.



4. Use the **Window Area** tool from the *upper right* of the screen to zoom.



5. Select **Fit** to fit the project to the view.



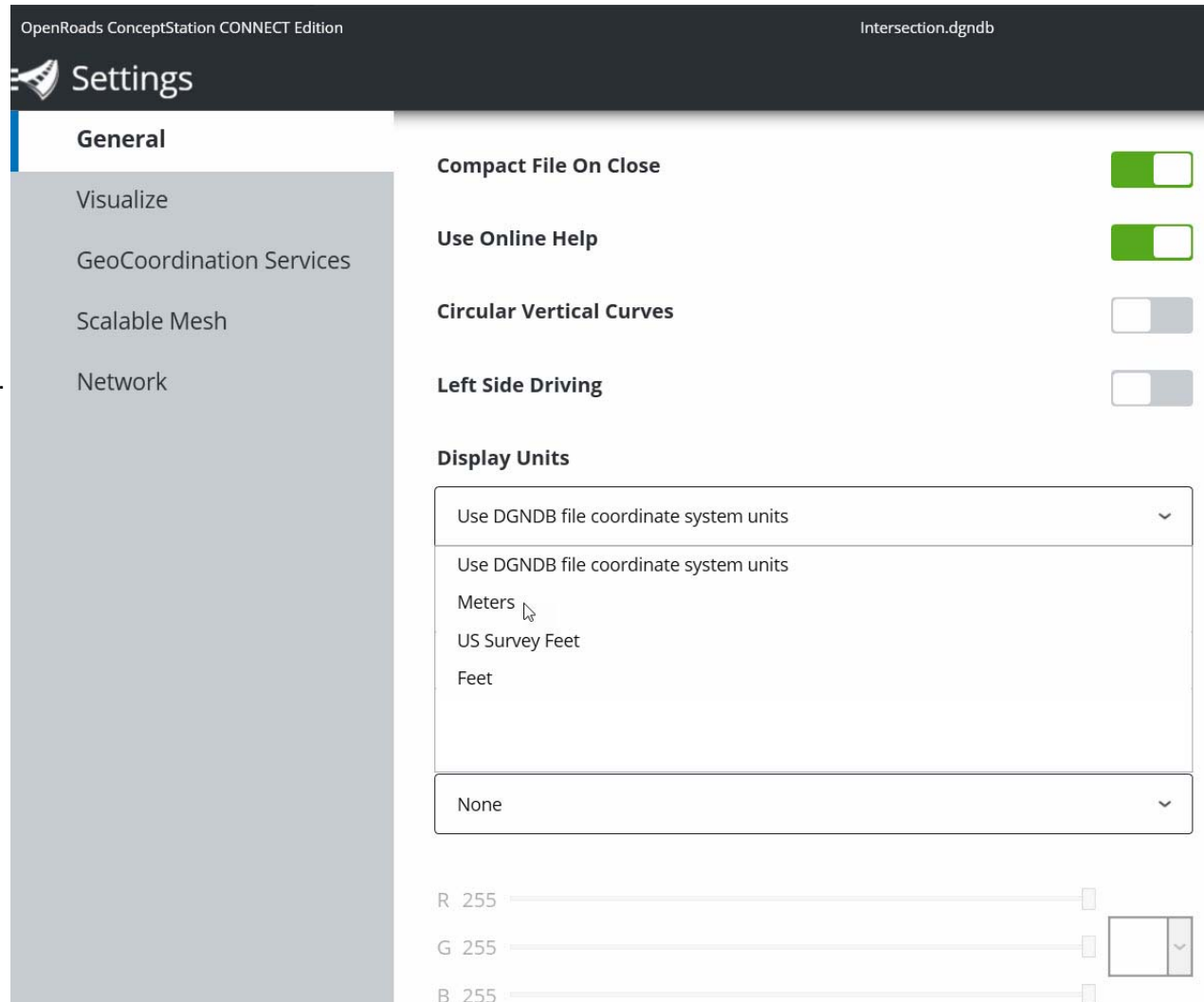


## Setting Metric Display Units (Optional)

The display units can be changed to your desired measurement system.

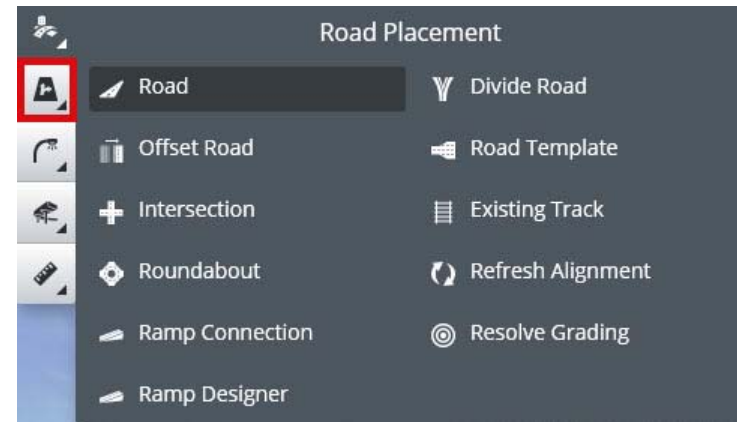
Note that this workbook uses imperial units in the screen shots. Learner workflow is the same regardless of units.

1. If you wish to work in *Imperial Units*, skip this section and continue on the following page.
2. If you wish to work in *Metric Units*...
  - a. Select the **Backstage**.
  - b. Select **Settings**.
  - c. Change the *Display Units* to **Meters**.
3. To return to the modeling environment.
  - a. Select the **Backstage**.
  - b. Select **Conceptualize**.



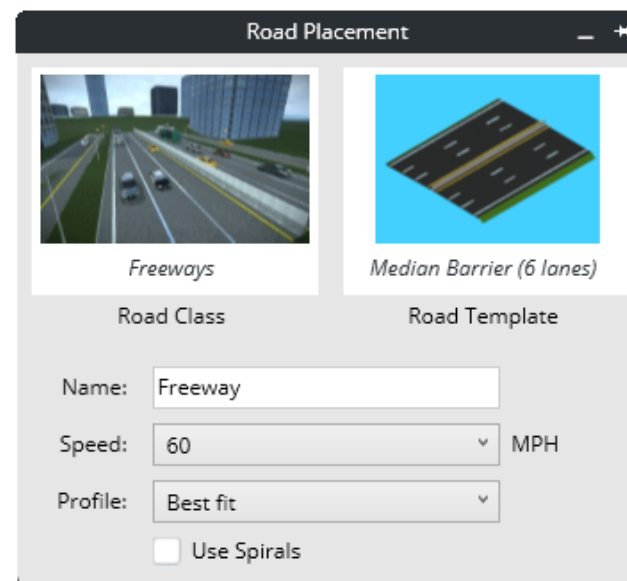
## Place a Freeway

1. Set the *Camera Orientation* to **Top**.
2. Select **Placement Tools**.
3. Select **Road**.



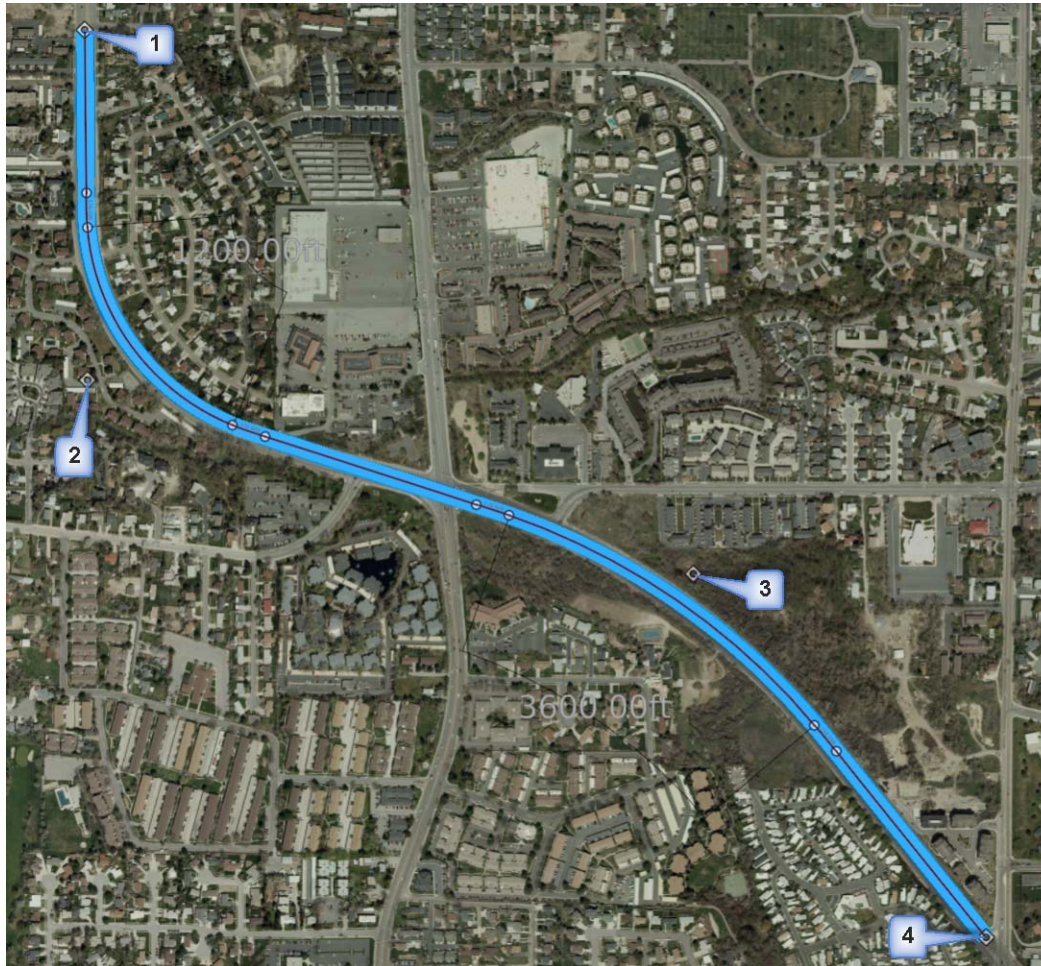
The Road Placement tool settings opens.

4. Click on the *Road Class* image and set it to **Freeways**.
5. Set the Road Template.
  - a. Click on the **Road Template** image.
  - b. Navigate to and select the template named **Road > 6 Lanes > Median Barrier (6 lanes)**.
  - c. Type **Freeway** as the *Name*.
  - d. Set the *Design Speed* to **60 mph [95km/h]**.
  - e. Set *Profile* to **Best fit**.
  - f. If you want spirals between the tangents and circular arcs, set *Use Spirals*.





- Place the road by clicking in the view to place four PIs approximately as shown in the following image.



- When finished placing the fourth PI, **right-click** to create and store the geometry.
- Select the **Element Selection** tool or press the **Esc** key to exit the command.



**TIP:** The Esc key will exit any command and return to the Element Selection tool.



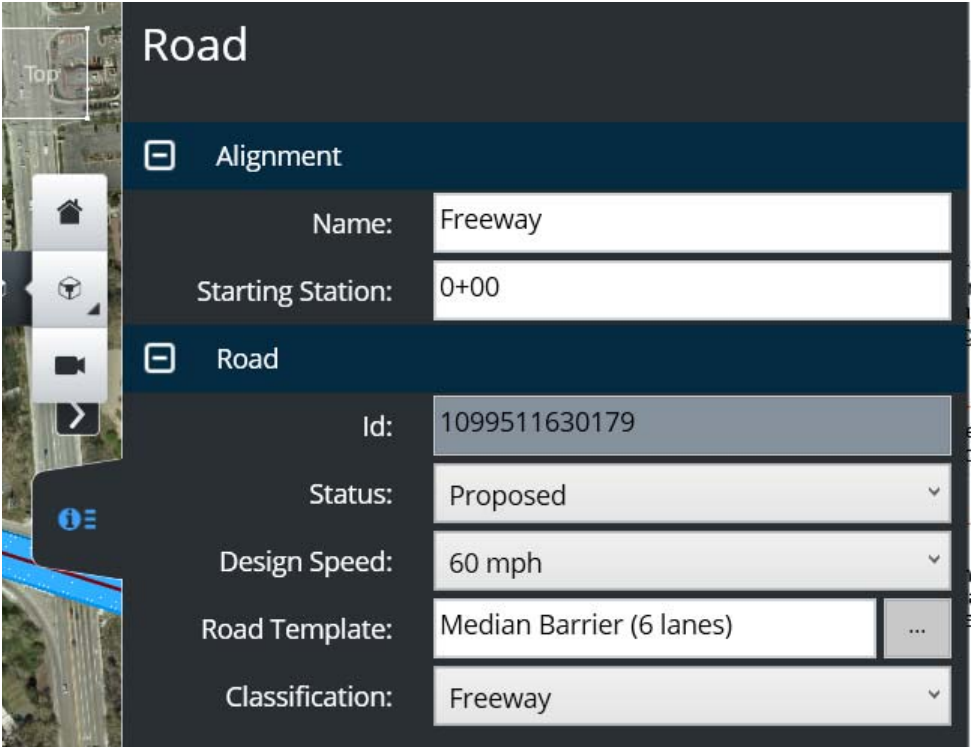
9. Use the **Element Selection** tool to select the Freeway.

When an element is selected, its properties appear in the **Information Panel** along the right side of the screen. Properties of the element such as the Name, Classification, Template, and Design Speed of the road can be changed here.

**Note:** Take care when selecting the road. Either the road or the lane marking might be selected. To switch between the road and the lane marking selection, right-click on the segment until the road is selected, then accept the selection with a left-click.

**TIP:** Click  to expand or  to collapse the Information Panel.

10. Click in a blank area of the drawing to clear the selection of the road.



Road	
Alignment	
Name:	Freeway
Starting Station:	0+00
Road	
Id:	1099511630179
Status:	Proposed
Design Speed:	60 mph
Road Template:	Median Barrier (6 lanes) ...
Classification:	Freeway

11. Adjust the radius of the first (West) curve.



a. Use the **Element Selection** tool to select the road.



b. Click the manipulator at the **PC** or **PT** of the curve.

c. Move the cursor until the radius is approximately **1200 ft [365m]**

- OR -

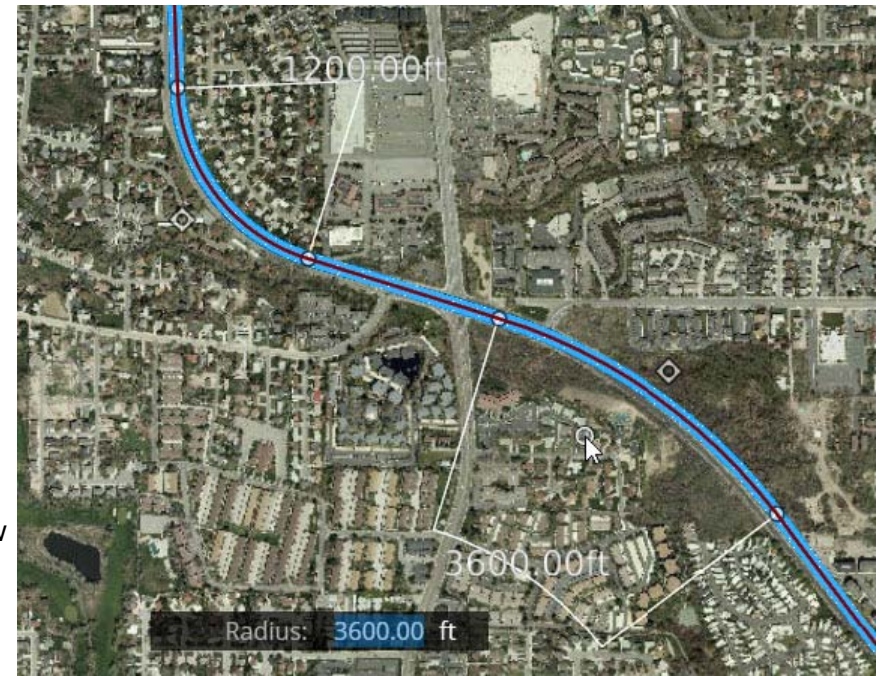
Click on the **Radius** text and enter **1200 ft [365m]** for a precise radius value.

d. **Left-click** to confirm and save the change.

12. Adjust the radius of the second (East) curve to **3600 ft [1100m]**.



13. Use the **PI Manipulators** to adjust the location of the PIs to fit the new alignment closely over the roadway visible in the image.





## Place an Arterial Street

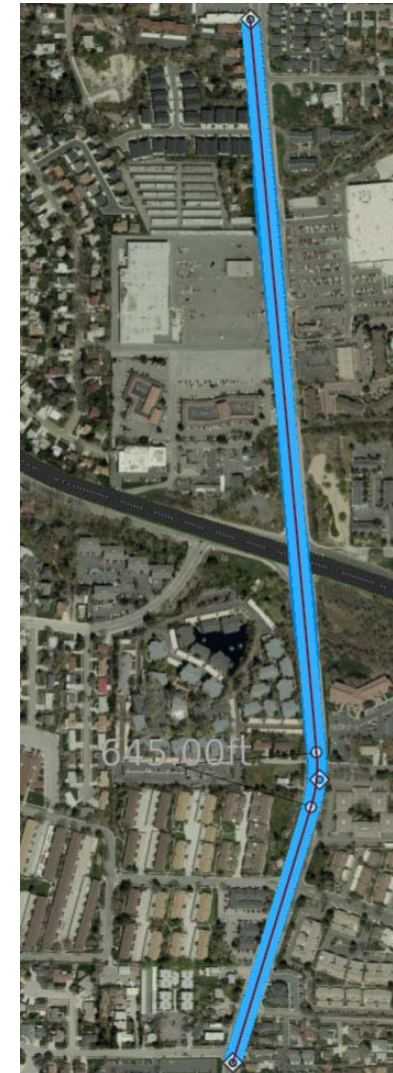


1. Select the **Road** icon from the *Placement Tools*.
2. Set the *Road Class* to **Urban Principal Arterial**.
3. Set the *Road Template* to **Curb (6 lanes)**.
4. Set the *Name* to **Bell Road**.
5. Set the *Design Speed* to **45 mph [70km/h]**.
6. Place the road by PI approximately as shown in the image.

**Note:** This book (and the videos) place the road from North to South.



7. When finished placing the last PI, **right-click** to save the geometry.
8. Exit the command by clicking on the **Element Selection** tool.



## Exercise 2: Place a Bridge

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### Description

In this exercise you will learn how to place a bridge, edit the profile and edit the bridge piers.

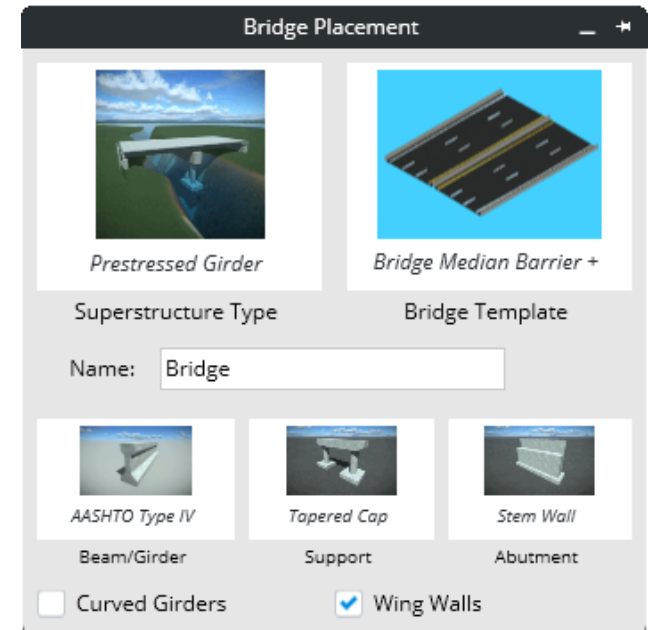
### Skills Taught

- Use the Place Bridge tool, select the bridge template and structure type
- Edit the profile
- Use the Measure Bridge Clearance tool
- Edit the bridge

## Place the Bridge



1. Prepare the Bridge Settings:
  - a. Select **Bridge** from the *Placement Tools*.  
The Bridge Placement settings dialog opens.
  - b. Set the *Superstructure Type* to **Prestressed Girder**.
  - c. Set the *Bridge Template* to **Templates > Road > Bridge > Bridge Median Barrier + Barrier (6 lanes)**.
  - d. Type **Bridge** for *Name*.
  - e. Set the *Beam/Girder* to **I-Girder > AASHTO Type IV (AASHTO-IV)**.
  - f. Set the *Support* to **Tapered Cap**.
  - g. Set the *Abutment* to **Stem Wall**.
  - h. Enable the *Wing Walls* check box.



2. Place the Bridge:
  - a. As prompted, *click* on the **Freeway** to select it, then to place the start of the bridge at approximately Location 1 shown in the following image
  - b. Click at approximately location (2) for the end of the bridge.
3. Exit the command by clicking on the **Element Selection** tool.



**Note:** The bridge may not be visible right now. When we created both the freeway and Bell Road, the Profiles were created with the Best Fit option. Both roads will be at or near the existing ground. The upper of the two roads will show.

We will raise the road profile - and thus the bridge - in the next exercise.





## Edit the Bell Road Profile




1. Use **Element Selection** to select *Bell Road*.

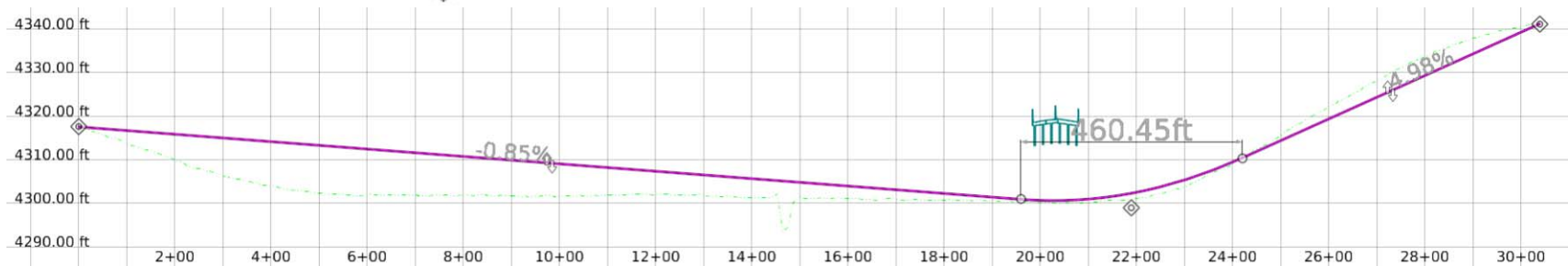
Once selected, the profile displays in the Action Center.

The existing ground is shown with the green line, the profile of the active road is the white line and the blue lines show other elements such as crossing roads.

2. Edit the *Bell Road* profile so that it closely follows the existing ground.

- a. Select the vertical alignment.

- b. Move existing PVI by selecting the  icon.




3. Add a new VPI to the Bell Road profile so that it closely follows the existing ground.

- a. **Select** the **vertical alignment**.

- b. Position the cursor where the new PVI will be located.

- c. **Right-click** and select **Insert PVI**.

- d. To see the new PVI, select the vertical alignment again. The new PVI is indicated with the  icon.

4. Continue adding and moving VPI as necessary for Bell Road to closely follow the existing ground.

5. Adjust Vertical Curve lengths as necessary.

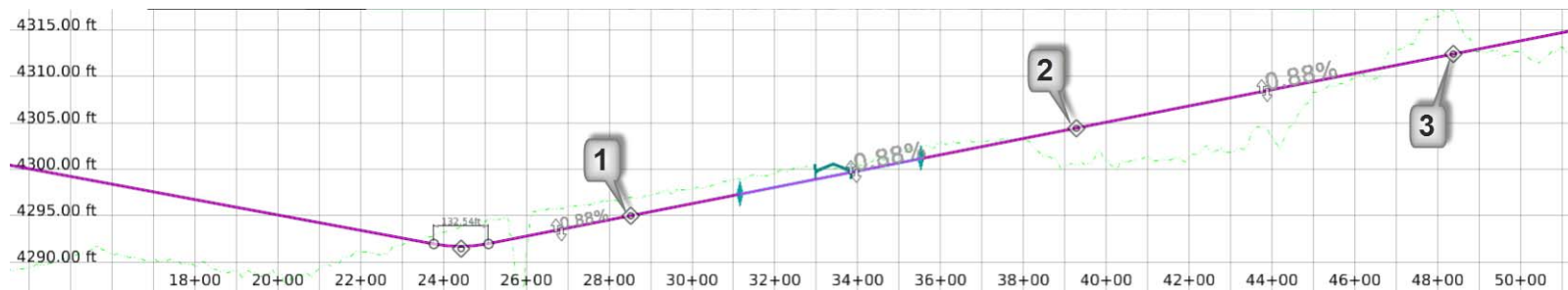
When a *Curve Length* or *K value* is selected a key-in field appears to define a new value.


**TIP:** The PC and PT of the vertical curve can also be moved to graphically change the curve definition.

## Edit the Freeway Profile



1. Use *Element Selection* to select the **Freeway** in the Main scene.
2. Add three new PVI to where the profile will curve over the Bell Road.
  - a. Select the vertical alignment.
  - b. Position the cursor to the left of the bridge at approximately location 1 in the following image.
  - c. *Right-click* and select **Insert PVI**.



- d. To see the new PVI, select the vertical alignment again. The new PVI is indicated with the  icon.
  - If necessary, the PVI can be selected and moved to the desired position.
  - e. Create the second and the third new PVI at approximately **positions (2)** and **(3)** in the image.
3. Adjust the height of the Action Center where the profile is shown.
  - a. Position the cursor over the Action Center icons until the double vertical arrow appears.



- b. Hold the left mouse button and increase the height of the Action Center.

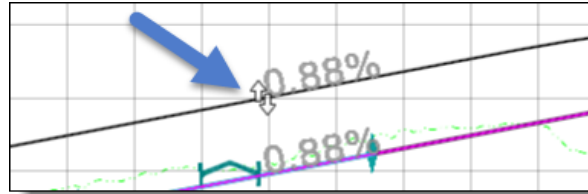
4. **Zoom** to the area of the **bridge** over Bell Road.

**TIP:** the blue graphics show the crossing road and the beginning and end of the bridge.

5. Adjust the Freeway profile to be approximately **20 ft [7.5m]** above Bell Road.

a. **Select** the **profile**.

b. **Select** the **double arrows** to move the tangent section **vertically** so that the Freeway is approximately **20 ft [7.5m]** above Bell Road.



6. Cleanup the profile

a. **Move VPI** as necessary for a reasonable profile.

b. Set the **Vertical Curve Lengths** for the curves adjacent to the bridge to **500 ft [150m]**.

c. Set the **Vertical Curve Lengths** for the other curves to **1000 ft [300m]**.



7. **Minimize** the Action Center (profile view).

## Adjust Bridge Piers



1. Use the **Rotate** and **Zoom** tools to view the bridge in the isometric view.
2. Review Bridge's properties.



- a. Select the bridge.

**TIP:** Click again to display the manipulators to adjust the start and stop stations of the bridge.



- b. Click the **Information** icon along the right side to view the Bridge Properties.
- c. Verify or set the following parameters to the specified values.

- *Number of Spans:* **4**
- *Girder Type:* **AASHTO Type IV (AASHTO-IV)**
- *Number of Girders:* **6**



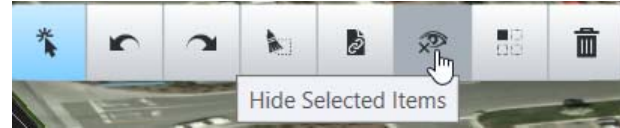
- d. Minimize the *Information Panel*.

3. Hide the bridge deck to make the piers easier to see and manipulate.

a. Select the bridge if it is not already selected.

b. Select **Hide Selected Items** from the *Selection Tools*.

The bridge deck (selected item) is hidden in the view.



4. Set the *Camera Orientation* to **Top**.

5. Rotate the piers to be parallel with Bell Road.

a. *Select* the **pier** on the *west* side of Bell Road.

Manipulators appear to position and rotate the pier.

b. **Rotate** the pier to be approximately *parallel* with Bell Road by clicking on the *circular* arrow manipulator.

c. **Move** the pier to a desirable position using the *arrow* manipulators.

d. Repeat for the remaining piers to make sure no pier is in the middle of Bell Road.

**HINT:** The pier skew angle can also be typed in the information panel.



## Adjust Bridge Abutments

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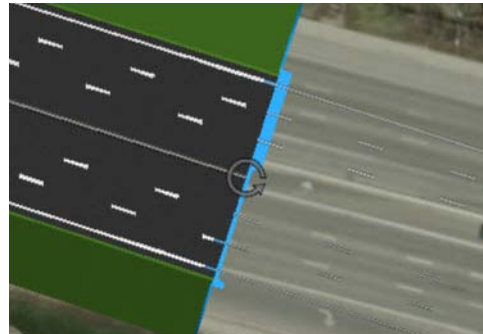
1. Rotate and position the abutments to be parallel with Bell Road.



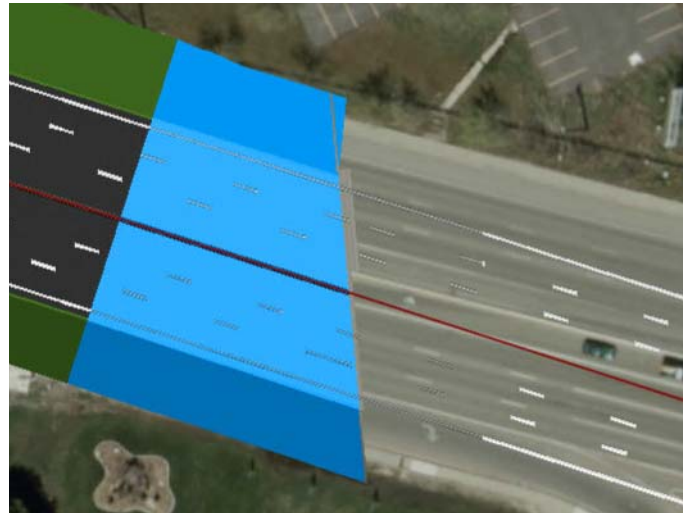
- a. *Select* the **west abutment**.

A Rotation Manipulator appears.

**Rotate** the abutment to be *parallel* with Bell Road.



- b. *Select* the **approach** adjacent to the abutments.
- c. *Click* on the selected approach a second time and the location manipulators appear.
- d. Using the location manipulators, **adjust** the location of the abutment.





2. Edit the east abutment.
  - a. *Select* the **east abutment**.
  - b. Edit the abutment properties on the Information panel to set the following parameters to the specified values.
    - *Abutment Skew: 0*
    - *Left-side Wingwall - Skew: 45*
    - *Right-side Wingwall - Skew: 45*

### Abutment

Abutment

Id: 1099511627793

Name:

Status: Proposed

Skew (°): 0

Left-side WingWall

Include: True

Type: Regular

Skew (°): 45

Long-side Width (ft): <auto>

Short-side Width (ft): <auto>

Right-side WingWall

Include: True

Type: Regular

Skew (°): 45

Long-side Width (ft): <auto>

Short-side Width (ft): <auto>

3. Unhide the Bridge Deck.



- a. *Select* **Item Display** on the right side of the screen.

This information panel lists all elements that are currently hidden.

- b. *Select* **X** for the **Bridge** item.

The bridge deck appears again in the Main stage.

### Item Display

Unhide All

Bridge

✕

## Measure Bridge Clearance

1. Use the **Rotate** and **Zoom** tools to view the bridge in the isometric view.



2. Select **Bridge Clearance** from the *Measure Tools*.

The Bridge Clearance settings dialog appears.

A screenshot of the 'Bridge Clearance' settings dialog box. It has a title bar 'Bridge Clearance' with a close button and a help icon. Below the title bar, there is a label 'Expected Clearance:' followed by a text input field containing '16.50' and a unit dropdown menu set to 'ft'.

3. Set the *Expected Clearance* to **16.5 ft [5 m]**.
4. *Select* the **Bridge**.
5. *Select* the **Road** below the bridge.

The actual value of the clearance is shown.

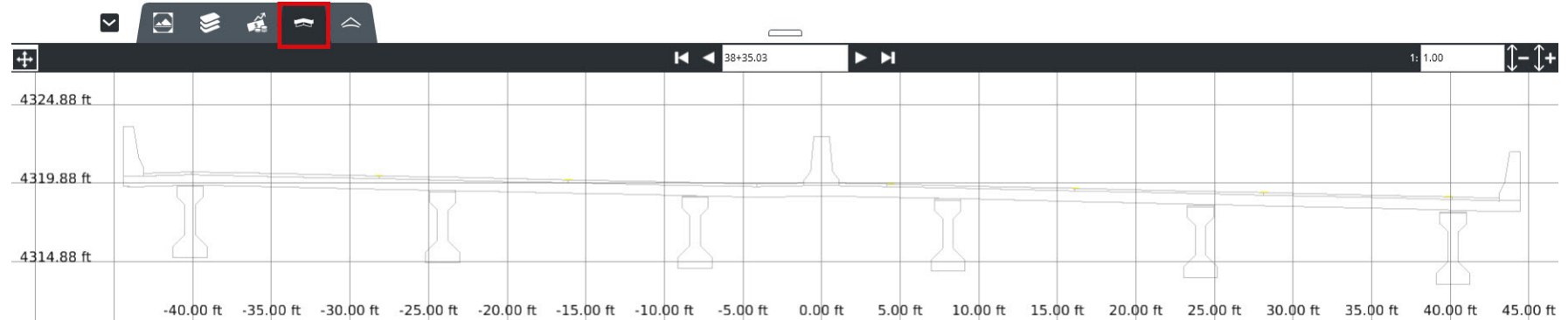


6. If the actual clearance value is less than the expected clearance of **16.5 ft [5 m]**, adjust the bridge profile to meet the expected clearance value.

## Review Cross Sections

1. Zoom to see the entire Freeway alignment.
2. Use **Element Selection** to select the *Freeway*.
3. Select **Cross Section** in the *Action Center*.

The cross section view appears.



4. Use the *Forward* and *Back* arrows, or the key-in field, at the top to navigate through the cross sections.
  - Change the vertical exaggeration of the cross section with the controls in the upper right corner of the cross section window.
  - Zoom in or out of the cross section by scrolling the mouse wheel.

## Exercise 3: Create a Ramp

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### Description

In this exercise you will learn how to create ramps.

### Skills Taught

- Create Ramp Connections
- Create an Intersection

## Create a Ramp in the South-West Quadrant of the Interchange



1. Set the *Camera Orientation* to the **Top** view.



2. Temporarily remove the pavement markings from the display.

a. Select **Categories and Models** from the *Action Center*.

b. Select **Markings** to turn off display of all elements in that category.



3. Create a Ramp roadway

a. Select **Road** from the *Placement Tools*.

b. Set the *Road Class* to **Urban Principal Arterial**.

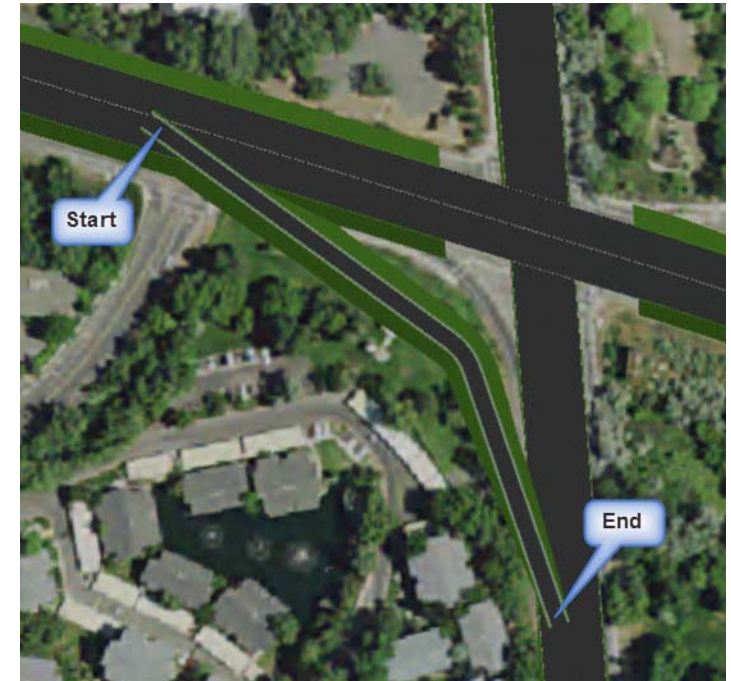
c. Set the *Road Template* to **Ramp > Ramp 1 Lane (Left Origin)**.

d. Set the *Name* to **Ramp A**.

e. Set the *Design Speed* to **20 mph [30 km/h]**.

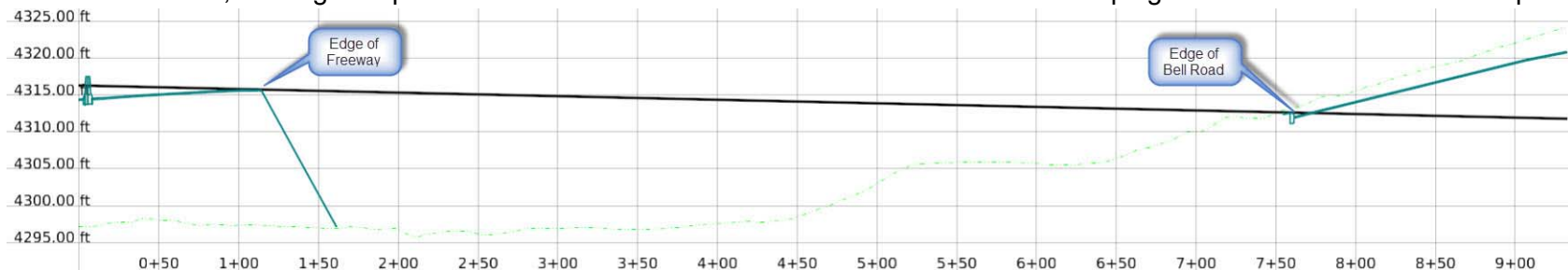
f. Place a ramp to connect the Freeway and Bell Road as shown in the image.

**TIP:** The start and end ramp alignment should *overlap* the Freeway and Bell Road *centerlines*. Doing so, it will be easier to adjust the ramp vertical alignment in the profile view.



4. Adjust the ramp profile so it approximately intersects the edges of the Freeway and Bell Road.

The profile of the ramp does not need to be exact, it will automatically be adjusted when the ramp is connected to the Freeway and Bell Road. However, starting with profile elevations close before the connection is created helps generate a more accurate ramp.



## Create a Ramp in the North-West Quadrant of the Interchange

1. Create a second ramp in the north-west quadrant of the interchange using the following parameters.

- *Road Template* = **Ramp > Ramp 1 Lane (Left Origin)**.
- *Name* = **Ramp B**.
- *Design Speed* = **20 mph [30 km/h]**.

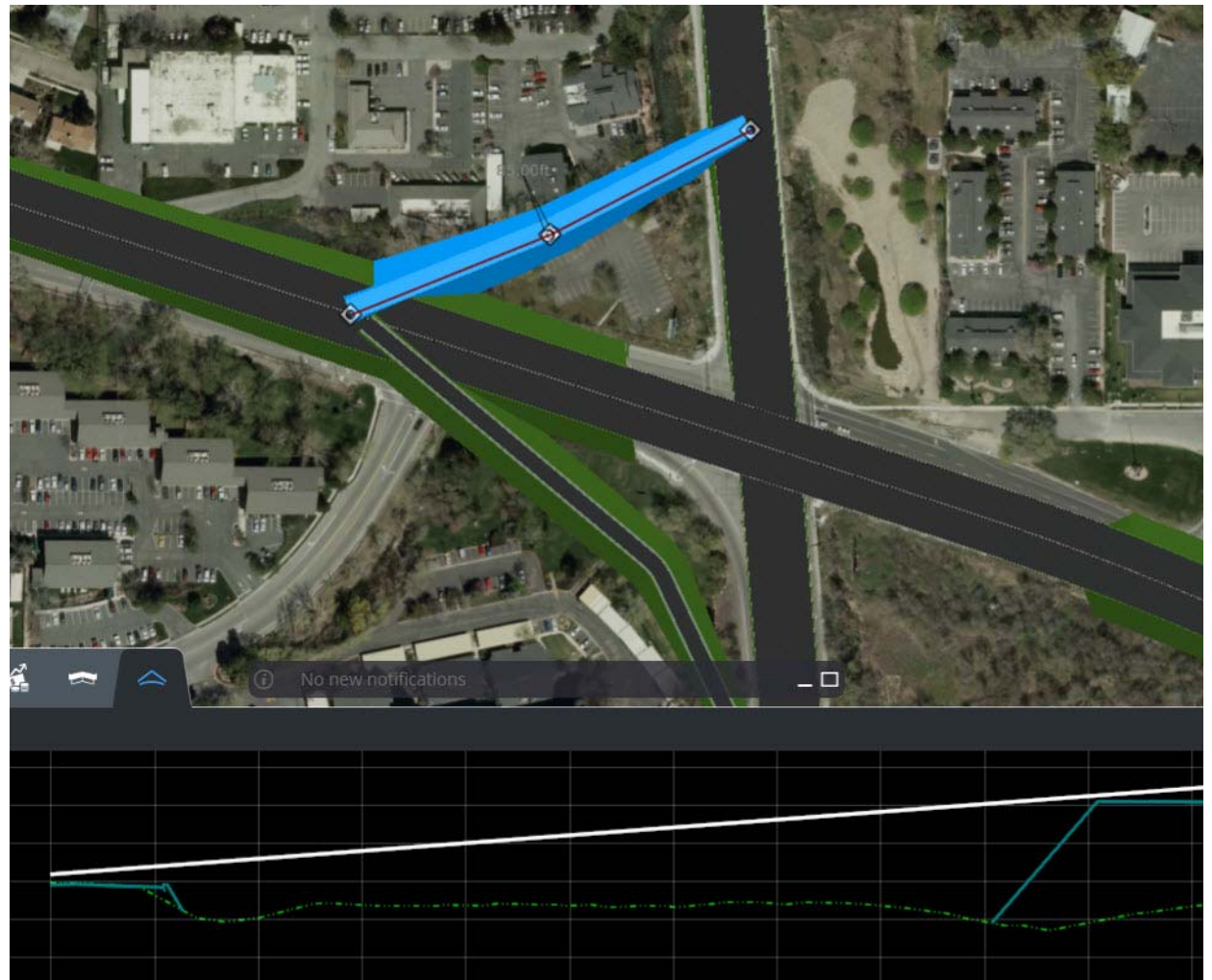
The finished ramps should be similar to the image.







2. Adjust the ramp profile so it intersects the edges of the Freeway and Bell Road.



## Connect Ramps to Freeway and Bell Road

1. Define a ramp connection between Ramp A and Bell Road.
  - a. Select **Ramp Connection** from the *Road Placement Tools*.

The Place Ramp Intersection settings dialog appears.
  - b. Select **Tapered** from the *Ramp Terminal* list.
  - c. Click on **Bell Road** for the *primary road*.
  - d. Click on **Ramp A** for the *secondary road*



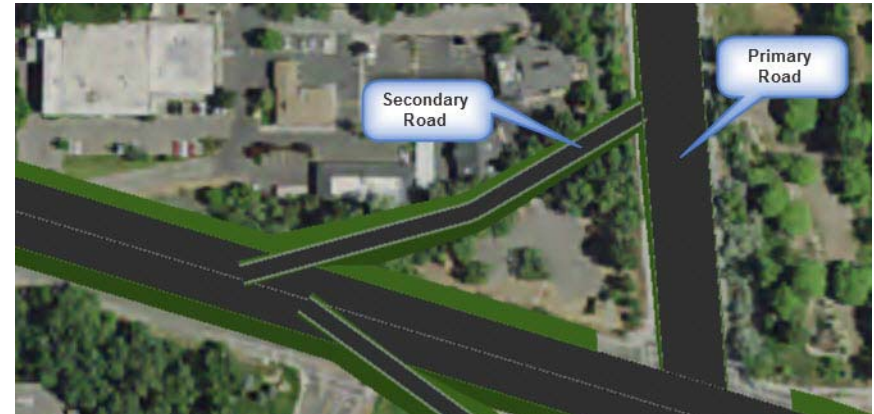
- e. **Right-click** to create the connection..





2. Define a intersection connection between Ramp B and Bell Road.

- a. Select **Intersection** from the *Placement Tools*.
- b. Select the **Bell Road** for the *primary road*.
- c. Select the **Ramp B** for the *secondary road*.



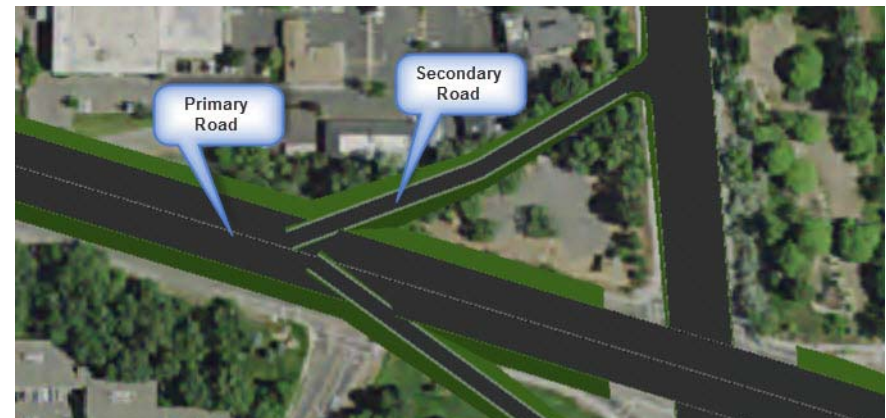
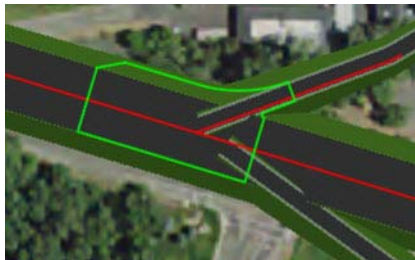
d. **Right-click** to create the intersection.

**TIP:** Intersections are created between alignments that are almost perpendicular. If the angle between the alignments is too flat it might not be possible to create an intersection connection.



3. Define a ramp connection between Ramp B and the Freeway.

- a. Select **Ramp Connection** from the *Placement Tools*.
- b. Set *Ramp Terminal* to **Parallel** option to create an auxiliary lane parallel to the primary road (Freeway).
- c. Select the **Freeway** for the *primary road*.
- d. Select the **Ramp B** for the *secondary road*.



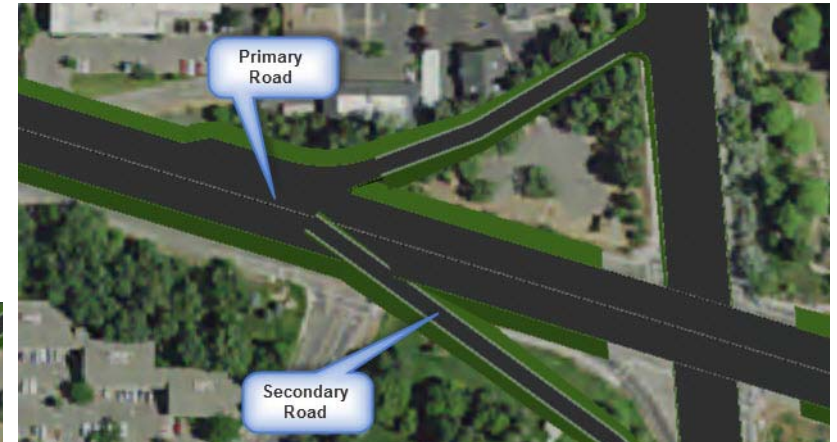
e. **Right-click** to create the connection.



4. Define a ramp connection between Ramp A and the existing Ramp Connector on the Freeway.



- Select **Ramp Connection** from the *Placement Tools*.
- Set *Ramp Terminal* to **Parallel**.
- Select the **Existing Ramp Connector on the Freeway** for the *primary road*.
- Select the **Ramp A** for the *secondary road*.
- Right-click** to create the connection..



5. Turn On the **Markings** categories from the *Action Center* at the bottom of the application to show the pavement markings.



## Exercise 4: Create Bridge Ramp

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### Description

In this exercise you will learn how to create a bridge ramp.

### Skills Taught

- Import alignment (alg file)
- Edit road template
- Edit bridge abutment
- Create Bridge Ramp

## Create a Bridge Ramp in the North-East Quadrant of the Interchange



1. Set the *Camera Orientation* to the **Top** view.
2. Temporarily remove the pavement markings from the display.



- a. Select **Categories and Models** from the *Action Center*.
- b. Select **Markings** to turn off the displays of all pavement marking elements.

3. Import the bridge ramp alignment

**Note:** This ramp alignment could be manually created exactly like in the ramp creation exercise. In the interest of time, however, we will import it from an .alg geometry file.



- a. Select **Import** from the *Backstage*.
- b. Select the **Other** tab.



- c. Click **Add Data** and browse for the *Bridge Ramp.alg* file.
- d. Click **Next**.
- e. Click **Import**.
- f. Once completed, click **Done**.

The new road that will become a bridge ramp is displayed.





4. Change the road template used for the ramp.

a. Select the ramp we just imported.

b. Click the **Information** icon along the right side to view the *Road Properties*.

c. Set the *Road Template* to **Ramp > Ramp 1 Lane (Left Origin)**.

5. Create the Bridge Ramp

a. Select **Bridge Ramp** from the *Structure Tools*.

b. Set the *Bridge Template* to **Bridge > Bridge 1 Lane (Left Origin)**.

c. At the *Select primary road* prompt, click on the existing bridge.

d. At the *Select secondary road* prompt, click the imported ramp.

The ramp is computed and visual feedback provided for what it is about to create.

e. **Drag along the ramp** to define the length of the bridge ramp and **left-click** again to accept and complete.

6. Turn on the Markings category.

7. Rotate the view to see the result.



## Exercise 5: Adding City Furniture

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### Description

In this exercise you will learn how to place lighting and the guardrail in the model.

### Skills Taught

- Place Furniture Along Path
- Place Linear Furniture

## Place the Lighting



1. Set the *Camera Orientation* to the **Top** view.



2. Select **Furniture Along Path** from the *Furniture Tools*.
3. Set *Furniture* to **Street Lights > Lamp\_double\_9X2,7**.
4. Set the *Spacing* to **150 ft [20m]**.
5. Set the *Angle from alignment* to **0° 00' 00"**.
6. **Clear** the *Force last insertion* option.
7. Place the lights by Start and End Station along the centerline of the entire length of the Freeway.

- a. *Start Station* = Position the cursor near the beginning of the Freeway centerline and at an *Offset* = **0** and **Left-click**.

**Note:** press the **Tab** key to move the focus to the *Offset* prompt. Once it has the focus, you can type the Offset value. Press the **Enter** key to lock the offset value.

- b. *End Station* = Position the cursor near the end of the Freeway centerline and at an *Offset* = **0** and **Left-click**.

8. **Right-click** to create the lights.



9. Exit the command by clicking on the **Element Selection** tool.

10. Rotate the view to review the street lights.



## Place Guardrail



1. Set the *Camera Orientation* to the **Top** view.



2. Select **Linear Furniture** from the *Furniture Tools*.
3. Set *Furniture* to **Guardrail Type B (Steel Post)**.
4. Set the *Spacing* to **6.25 ft [1.905m]**.
5. Set the *Angle* to **0° 00' 00"**.
6. **Clear** the *Force last insertion* option check box.
7. Place the first Guardrail on the north side of the Freeway between the ramp and the bridge.

**TIP:** To ensure the rail and posts are drawn on the correct side the guardrail should be created in the direction of traffic.

- a. **Left-click** at the location to *start* the guardrail.

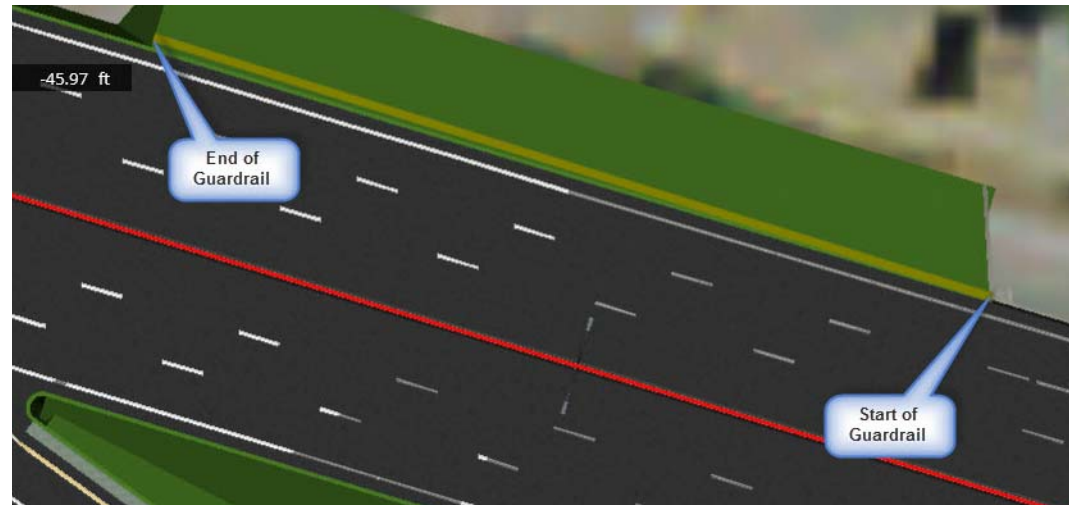
This position does not need to be exact. You will adjust it in the next step.

- b. **Left-click** at the location to *end* the guardrail.
- c. **Right-click** to create the guardrail.

8. Adjust the guardrail location.



- a. Select the guardrail.
- b. Use the *station manipulators* to adjust the start and end stations of the guardrail.
- c. Select the guardrail again to change from the *station* to the *offset* manipulators.
- d. Use the *offset manipulator* or text fields to place the guardrail at a **-45 ft [-13.7m]** offset.



9. Place the second guardrail on the south side of the Freeway between the ramp and the bridge.
10. Rotate the view to review the guardrail.





## Exercise 6: Adding Street Markings

---

### Description

In this exercise you will learn how to place street markings.

### Skills Taught

- Place street markings

## Place Left Turn Street Marking at the Intersection



1. Set the *Camera Orientation* to the **Top** view.
2. Zoom to the intersection at the end of Ramp B.

Make sure the street markings are visible. If not, turn on in *Categories and Models* in the *Action Center*.



3. Select **Street Marking** from the *Marking Tools*.
4. Set the *Street Marking Template* to **Left Turn Lane-Use**.
5. **Left-click** to position the marking in the lane as shown in the image.
6. Once the pavement marking is located, **move** the mouse to *rotate* the marking to the desired orientation and **Left-click** to confirm the placement.
7. Press the **Esc** key to exit the command.

**TIP:** To edit the marking, use the Selection tool and pick the marking to be edited. Use the arrow manipulators to move the marking along the alignment. To move the marking perpendicular to the alignment click twice on it and use the arrow to move it.



## Exercise 7: Quantities and Cost

---

### Description

In this exercise you will learn how to view, edit, and export cost and quantity information.

### Skills Taught

- View Cost and Quantity
- Export Cost and Quantities to a Microsoft Excel file
- Setup how cost and quantities are computed.

## Review Estimated Cost of Concept Model



1. Select **Concept Estimated Cost** from the *Action Center*.

The estimated costs are updated by clicking the Refresh tool. Whenever something changes in the design, it is necessary to use the Refresh tool to update the estimated costs.



2. Click **Refresh** to update the concept estimated costs.

Concept estimated cost: \$11,107,436			
Category	Cost		Source
Earthwork		\$4,594,166	Design
Pavement		\$2,070,885	Design
Structure		\$1,659,727	Design
Drainage		\$540,536	Allowance
Electrical		\$66,651	Allowance
Incidental Items		\$1,366,335	Allowance



3. Click **Detailed Quantities and Cost Report** (next to the Refresh tool) to view a more detailed report.

4. This detailed report can be exported to Microsoft Excel by clicking **Export to XLSX**.

5. Click **<** in the upper left corner to return to the Conceptualize view.



6. Minimize the *Action Center*.

## Configuring Quantities and Cost Calculations

The Quantities and Costs settings define how cost estimates are computed.



1. Activate the **Backstage**.
2. Select **Quantities and Costs**.

The *Quantities and Cost Report Configuration* page displays.

3. Select the **Detailed cost** tab.

Allowances		Detailed cost		
Category	Code	Item	Unit	Rate
Earthwork	CO-001	Roadway Excavation	yd <sup>3</sup>	22.50
	CO-002	Fill - Generic material	yd <sup>3</sup>	30.00
Pavement	CO-003	Concrete Pavement	yd <sup>3</sup>	157.41
	CO-004	Asphalt - All layers combined	Ton(US)	100.00
	CO-005	Concrete Jersey Barrier	ft	32.00
	CO-006	Curb and Gutter	ft	25.00
	CO-007	Sidewalk	yd <sup>2</sup>	40.00
	CO-008	Bridge Deck	yd <sup>3</sup>	945.81
	CO-009	Girder - Concrete	yd <sup>3</sup>	647.13
Structure	CO-010	Bridge Cap	yd <sup>3</sup>	945.81
	CO-011	Bridge Piles	yd <sup>3</sup>	945.81
	CO-012	Bridge Columns	yd <sup>3</sup>	945.81
	CO-013	Foundation	yd <sup>3</sup>	945.81
	CO-014	Bearings	Each	1150.00

*Detailed costs* are items that can be directly computed from the conceptualized design including earthwork, pavement, retaining walls, and structure items.

- The values in the **Rate** column can be changed to define the value that will be used to compute these costs.



4. Select the **Allowances** tab.

Allowances		Detailed cost		
Code	Item	Unit	Rate	Use Allowance
AW-01	Drainage	%	8.11	<input checked="" type="checkbox"/>
AW-02	Environmental	%	6.57	<input checked="" type="checkbox"/>
AW-03	Traffic Control	%	3.42	<input checked="" type="checkbox"/>
AW-04	Electrical	%	1	<input checked="" type="checkbox"/>
AW-05	Signing and Marking	%	2.15	<input checked="" type="checkbox"/>
AW-06	Roadway Incidentals	%	20.5	<input checked="" type="checkbox"/>

**Allowance costs** are for items that are not specifically modeled in the concept but are known to be part of the cost of a project. They are calculated as a percentage of the total Earthwork and Pavement (everything except Structural) detailed item costs.

For example, if the estimated cost of the Earthwork and Pavement for the concept is \$1,000,000, the Drainage allowance would be \$81,100 ( $\$1,000,000 \times 8.11\% = \$81,100$ )

- The values in the **Rate** column can be changed to define the percentage rate used to calculate the allowance.
- The Use Allowance column determines if the allowance item is included in the cost estimate. Only those allowances that are enabled are included in the cost estimate.

5. To return to the modeling environment.



a. Select the **Backstage**.



b. Select **Conceptualize**.

## Exercise 8: Creating and Modifying Templates

---

### Description

In this exercise you will learn how to edit existing templates and how to create a new one.

### Skills Taught

- Create new template
- Edit a template

## Create a New Template



1. Activate the **Backstage**.



2. Select **Templates**.

The *Template Manager* dialog appears.

3. Create a new road template.



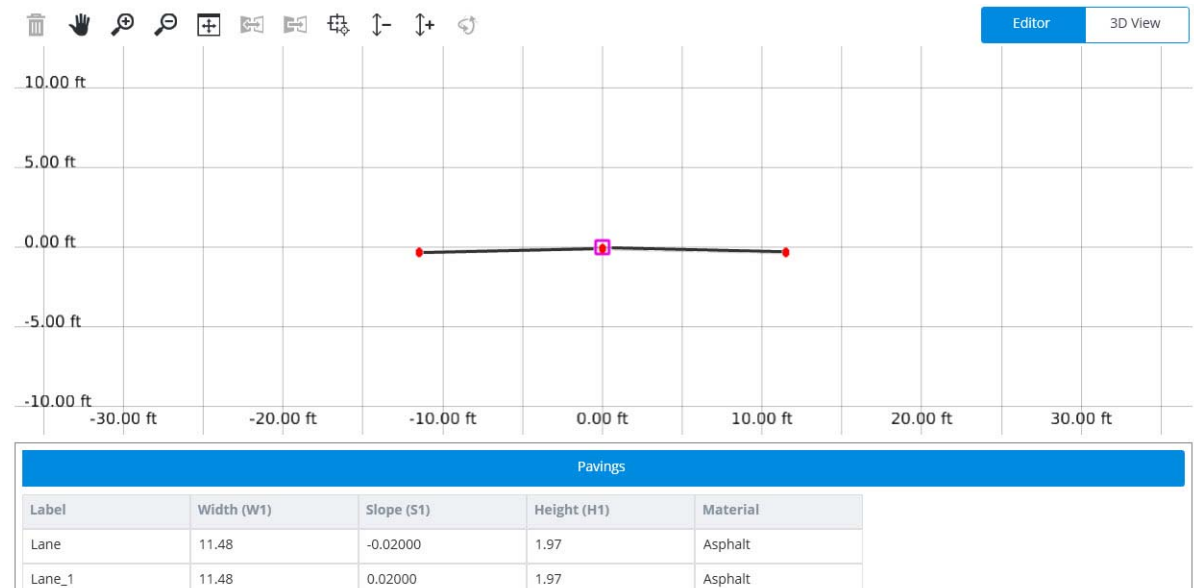
- a. Click **New**.
- b. Set the *Template Name* to **Bell Road**.
- c. Set the *Description* to **Training Template**.
- d. Set the *Template Type* to **Road Template**.
- e. Click **OK**.

The new template is created and the *Template Editor* dialog appears.

4. Add a lane to the template



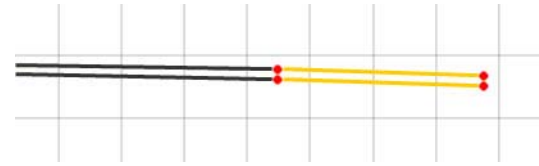
- a. Click the Image for the **Lane** component.
- b. Click the **Mirror Component** tool in the template editor toolbar to place a lane on each side of the template at the same time.
- c. Click at the **0,0** position to define the location of the new lanes.



5. Add a second lane to the template.

a. Select the Image for the **Lane** component.

b. Place the lane to the **right** of the existing right lane being sure to align the top of the lanes.

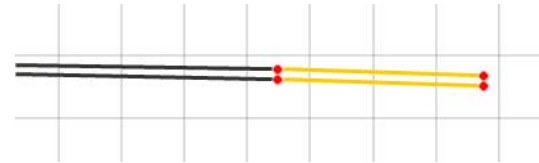


6. Add a shoulder to the template.

a. Select the Image for the **Shoulder** component.

**HINT:** It may be necessary to scroll the components list to get to the Shoulder components near the bottom of the list.

b. Place the shoulder to the **right** of the right lane being sure to align the top of the lane and the top of the shoulder.



7. Add a sidewalk to the template.

a. Open the **Sidewalks** component folder.

**HINT:** It may be necessary to scroll the components list to get to the folders near the top of the list.

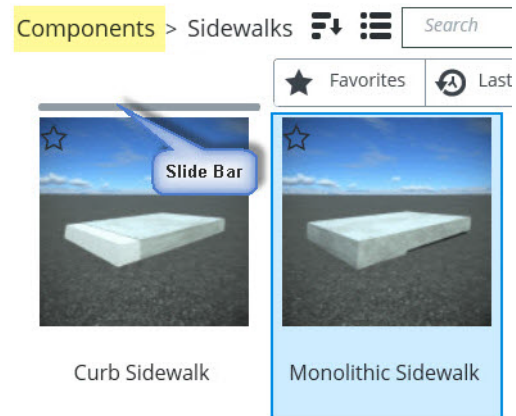
b. Select the Image for the **Monolithic Sidewalk**

c. Place the sidewalk beside the right shoulder aligning the placement point with the top of the shoulder pavement.

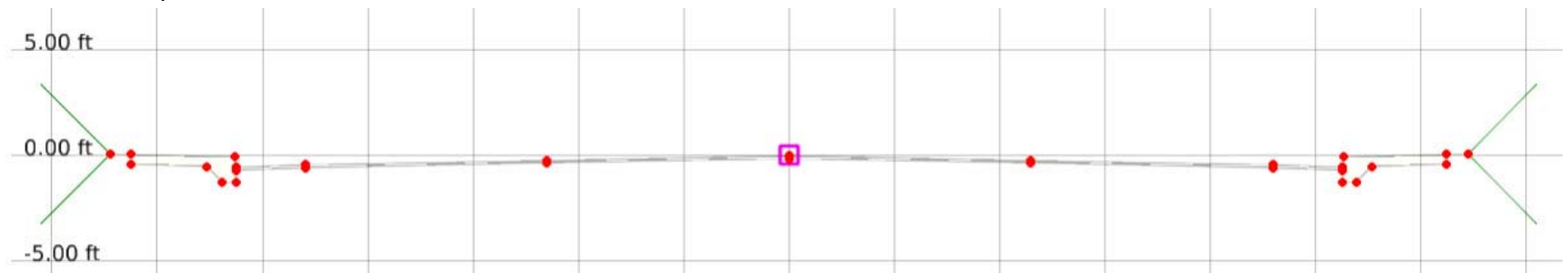


8. Return to the Templates folder by selecting **Components**.

**HINT:** If Components is not visible, move the slide bar to the left.



9. Select the **Segment** component and place it beside the right sidewalk.
10. Select the **Cut** component from the *End Conditions* folder and place it at the end of the right segment.
11. Select the **Fill** component from the *End Conditions* folder and place it at the end of the right segment.
12. **Right-click** to stop the creation.



13. Click **Save** to finish the creation of the new template.



## Edit Template

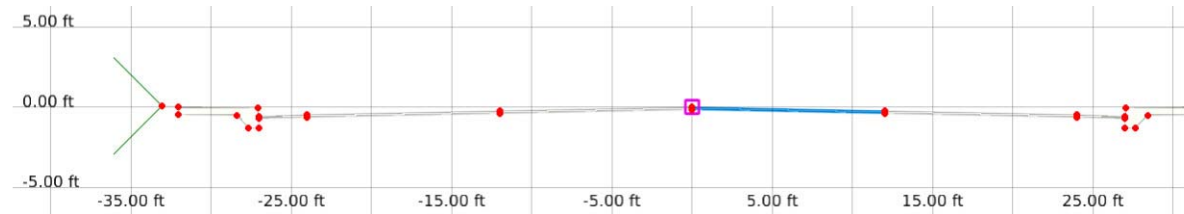


1. Hover the mouse over the *Bell Road* template and select **Edit Template**.

The *Template Editor* appears.

2. Select the **Lane**.

The Grid dialog appears below the template.



3. Change the dimensions of all four Lanes to the following values if they are not already set.

- *Width:* **12.00** [3.6]
- *Height:* **2.00** [50]

End Conditions		Buffers		Pavings	Sidewalks
Label	Width (W1) (ft)	Slope (Hz) (S1)	Height (H1) (in)	Material	
Lane	12.00	-0.02000	2.00	Asphalt	
Lane_1	12.00	0.02000	2.00	Asphalt	
Lane_2	12.00	-0.02000	2.00	Asphalt	
Lane_3	12.00	0.02000	2.00	Asphalt	

4. Click **Save** to complete the edit.



5. To return to the modeling environment.

- a. Select the **Backstage**.
- b. Select **Conceptualize**.



## Exercise 9: Modifying the Design

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### Description

In this exercise you will learn how to modify an intersection and lane markings.

### Skills Taught

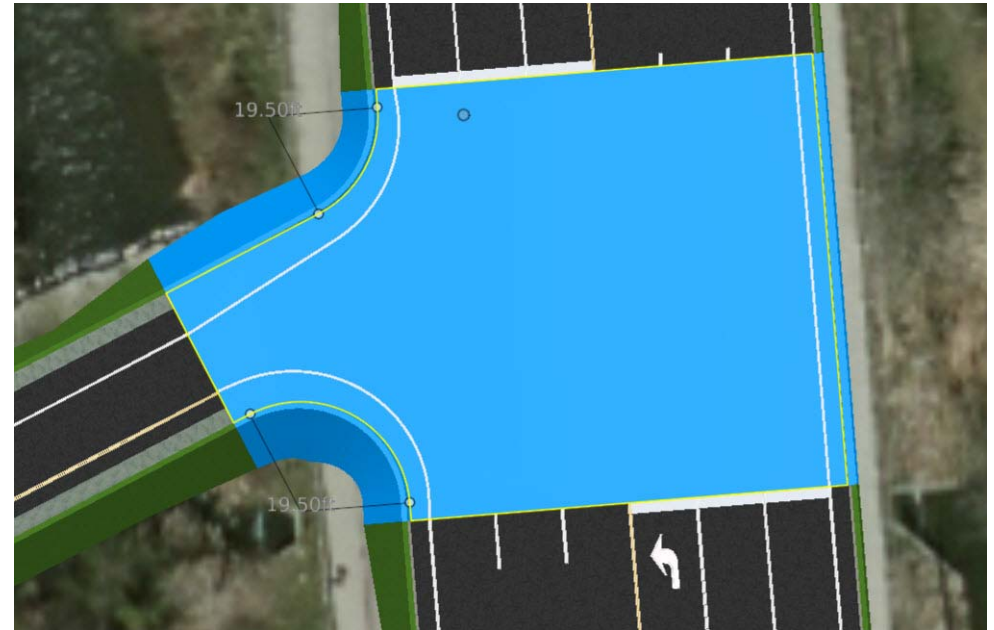
- Modify intersection geometry
- Modify lane markings

## Edit the Intersection

1. Zoom to the intersection of Bell Road and Ramp B.



2. **Select** the intersection.
3. **Right-click** on the *North-West radius* and select **Tapered** to change the simple curve to a taper-curve-taper complex curve.
4. Select the *South-West radius* and change the value to a **20 ft [6m]** radius.



## Edit Lane Markings

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1. Zoom to the Freeway and observe that there is not a yellow stripe along the left edge of the inside lanes.



2. Select the Freeway lane marking.
3. Expand the **Information Properties** panel.



4. Change the *Striping Pattern* to **Two-Way Median 1**.  
The new pattern is applied and the yellow stripe appears along the left edge of the inside lanes.



## Appendix: Creating and CONNECTing Projects

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### Description

This section teaches how to create a new file and import data. You will also learn how to use CONNECTed Projects with ConceptStation.

### Skills Taught

- Create a new file
- Import data from other sources
- CONNECT Project



## Creating a New File



1. Select the **Backstage**.



2. Select **Open** and then from the *Open* page, click **New**.

3. Type the *Name* of the new file.

4. Set the *File Location* to where the new file will be created.

5. Define the project area.



a. Zoom into the area on the map or use the **Search Tool** in the map view to quickly zoom to a city.



b. By default the terrain and raster photo will cover the area of the map.  
You can use the **Define Concept Location** tool to define a sub area.

c. Select the proper *Coordinate System* for the project.

**Note:** An existing ConceptStation file can be used as a seed when creating a new file. The benefit of using a seed is that the new file will inherit the Concept Location, Coordinate System and Settings such as templates of the seed file.

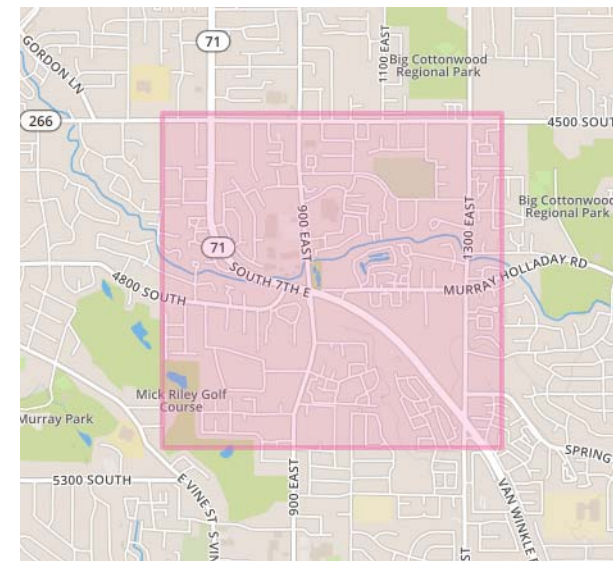
d. Click **Create** to create the new file and begin importing context data.

The *Context Data Import* dialog appears.

e. Select **Use GeoCoordination Services**.

The *GeoCoordination Services* page displays.

f. Select the **Data Classes** to be imported. At a minimum this should include the Terrain but the aerial imagery can also be very useful.



- g. Click **Next**.

The *Results* page appears showing the data that will be downloaded.

- h. Set the *Imagery Resolution*. Higher resolutions take longer to download and take more resources when used.

**Note:** The data downloaded from the GeoCoordination Services can be found in the GeoCoordination Services Download path defined in the *Backstage > Settings > GeoCoordination Services* section. It can be useful to keep a copy of this data for future use. This data can then simply be imported in OpenRoads ConceptStation without having to wait for the download process.

- i. Click **Download and Import** when ready.

## Importing Other Data

Importing Other Data such as MicroStation graphics, geometry from an alg file and GIS data from shp files.

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1. From the Backstage, select **Import**.
2. Select the **Other** tab.
3. Click **Add Data**.
4. Browse to the data file. The following file types can be imported.
  - Open Street Map Files (\*.osm)
  - Design Files (\*.dgn)
  - Shapefiles (\*.shp)
  - Civil Geometry Files (\*.alg)
  - ESRI File Geodatabase (\*.gdb)
  - LandXML Files (\*.xml)
5. Click **Import**.



## Bentley CONNECT Profile

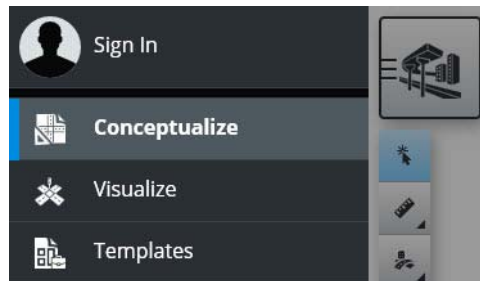
A Bentley CONNECT Profile gives you access to a range of information, support, learning and project services including the ability to use the GeoCoordination Services and to associate ConceptStation files with CONNECT Projects.

- When you are signed in to the CONNECTION client when you launch OpenRoads ConceptStation, you are automatically signed in.  
Your name appears in the upper left corner of the Backstage when you are signed in.
- When you are not signed in, you can sign in or create a new Bentley CONNECT profile as described below.



1. Activate the **Backstage**.

*Sign In* appears in the upper left corner.



2. Click **Sign In**
3. Log into the CONNECTION Client using your e-mail address.  
OR
4. Select **Register Now** from the sign-in dialog to create a new Bentley CONNECT Profile.

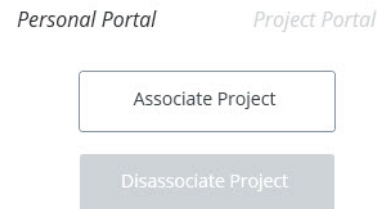
## Associating a ConceptStation file with a Bentley CONNECT Project

ConceptStation files can be associated with Bentley CONNECT projects for improved collaboration and visibility throughout your entire project team.



1. Activate the **Backstage**.
2. Click your *CONNECT Profile name* in the upper left corner.

The CONNECT Profile page appears where you can launch your *Personal Portal*, the *Project Portal* or *Associate* a ConceptStation file with a Project.



3. Click **Associate Project** to associate the open file with a Project within your companies project space.
4. Select the appropriate project from those listed in your companies Project List.

Depending on your permissions within your companies project space, you may be able to create new projects or just assign files to existing projects.

## Summary

In this course you have learned how to layout and edit a conceptual design for a roadway interchange including roads, ramps, bridges, intersections, guardrail and lighting.

You have also learned how to calculate and review the associated quantities and costs.

