



# Using Civil Cells

This course is for the **2021 Release 1** version of:

OpenRoads Designer CONNECT Edition

OpenRail Designer CONNECT Edition

## About this Practice Workbook...

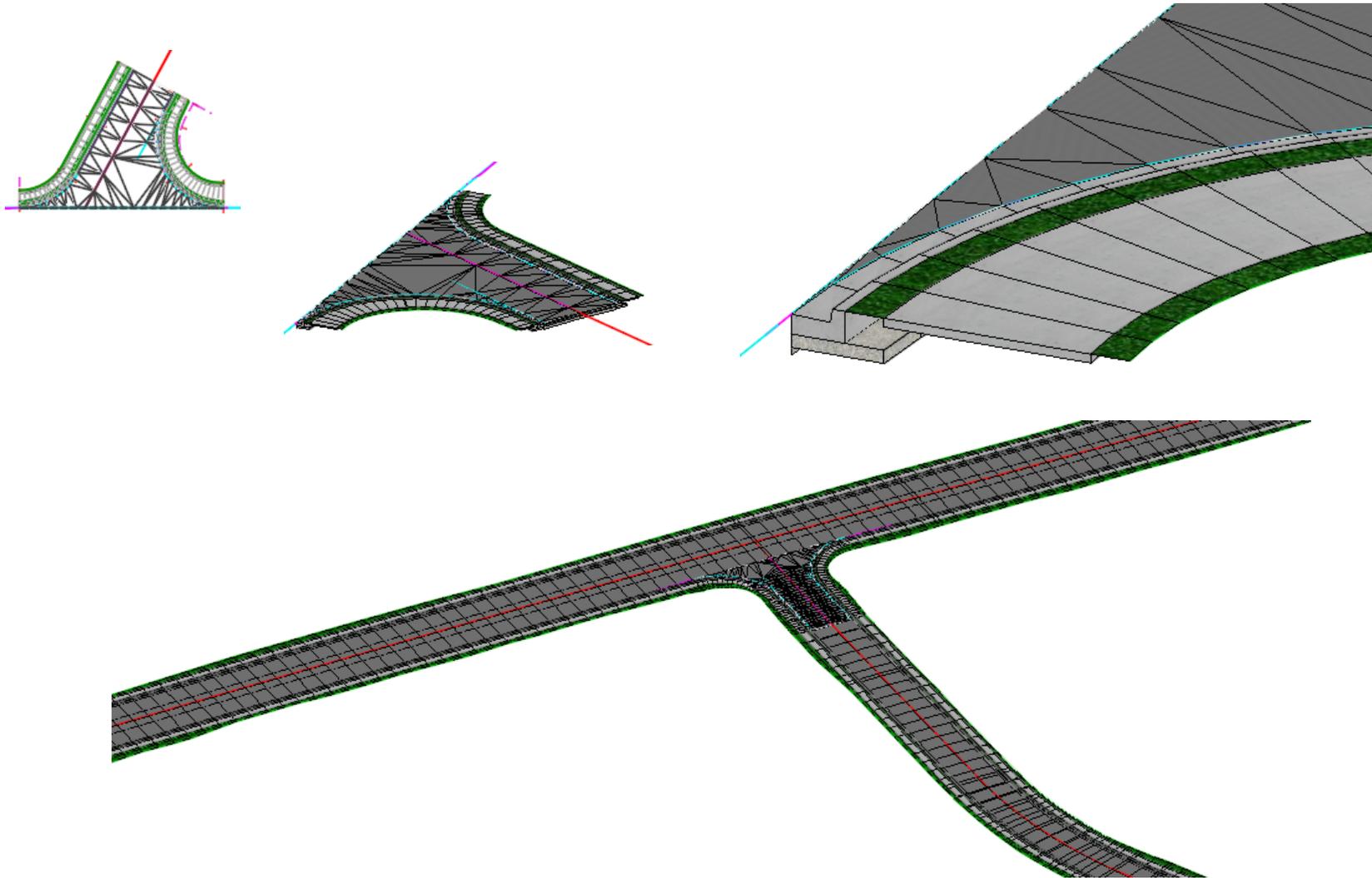
- This workbook is designed for use in Live instructor-led training and for OnDemand self study. OnDemand videos for this course are available on the [LEARNserver](#) and through [CONNECT Advisor](#).
- This PDF file includes bookmarks providing an overview of the document. Click on a bookmark to quickly 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: **12.0'** [3.4m].
- This course workbook uses the [Training and Examples](#) WorkSpace and the [Training-Imperial](#) or [Training-Metric](#) WorkSet delivered with the software.
- 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 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, 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 select and place a civil cell into different configurations and using multiple references. Various civil cells are used to model intersections and ramps. In addition to placing civil cells, you will also learn how to make modifications to the civil cells to change the default values for radius and width, as well as move the location and insert points.



## Exercise 1: Place a T-Intersection Civil Cell and Review

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### Description

In this exercise, you will place a T-intersection civil cell in various planimetric configurations.

### Skills Taught

- Review the available Civil Cells via the Pick Civil Cell dialog
- Select a Civil Cell and Place with varying planimetric configurations
- Review a Civil Cell's 3D Model
- Review the model via the Project Explorer
- Edit Civil Cell Components
- Using Alternatives When Placing a Civil Cell

## Place the T-Intersection Civil Cell

In this exercise, we will select a civil cell and place it into our design using multiple references and configurations. There are four alignment configurations in the design file.

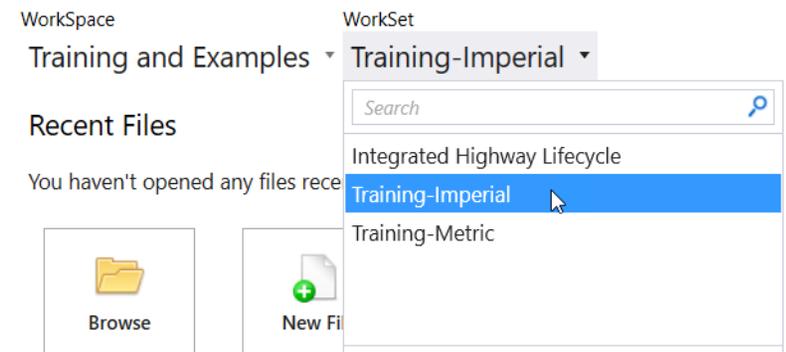
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1. Start the software.
2. Set the WorkSpace and WorkSet.

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

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

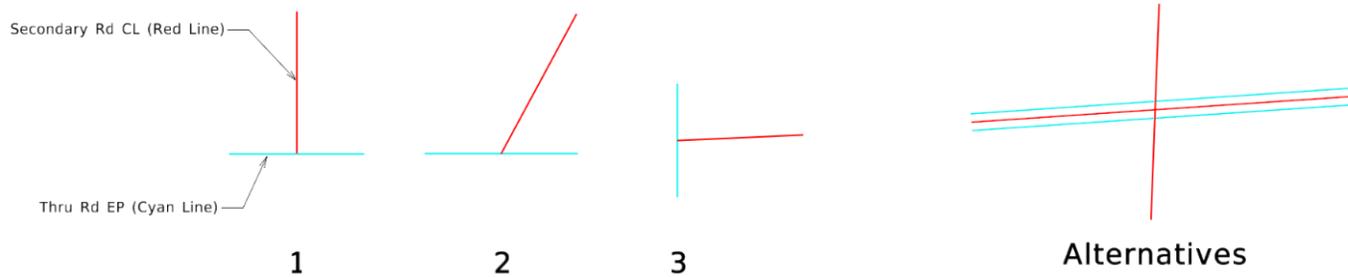
- a. Select **Training and Examples** from the *WorkSpace* drop-down menu.
- b. Select **Training-Imperial** [*Training-Metric*] from the *WorkSet* drop-down menu.



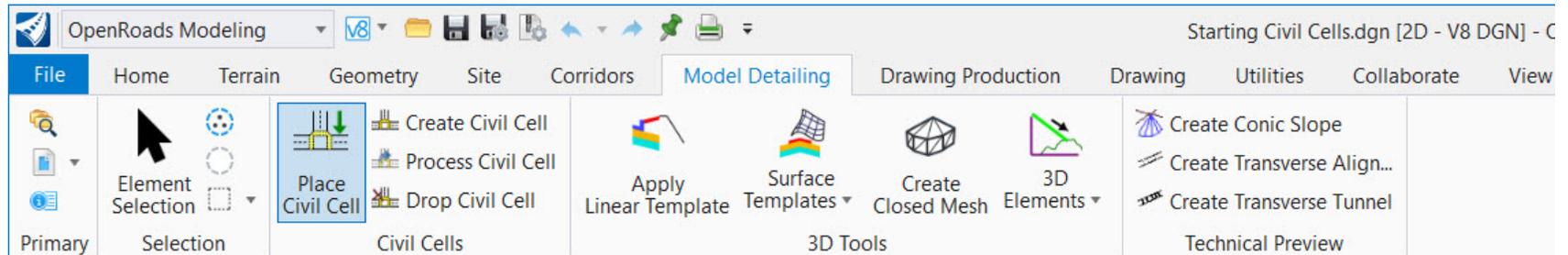
3. Open an existing file.
  - a. Select **Browse**.
  - b. Browse to *C:\Bentley Training\Using Civil Cells* or other folder where you unzipped the dataset files.
  - c. Select the file **Starting Civil Cells.dgn** [*Metric-Starting Civil Cells.dgn*].

**Note:** If you get a message stating “Incompatible Civil Data”, this is because the training files are “aligned” to OpenSite Designer. Clicking *Yes* will align the file to the software you are using (OpenRoads Designer or OpenRail Designer). This will have zero impact for the training courses. However, note that in production, upgrading the file will make the file read-only in OpenSite Designer. Full information is available at [Bentley Communities - Product Realignment](#).

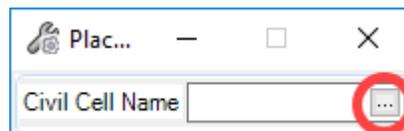
We will use the alignments in the file to place a civil cell within the varying design configurations.



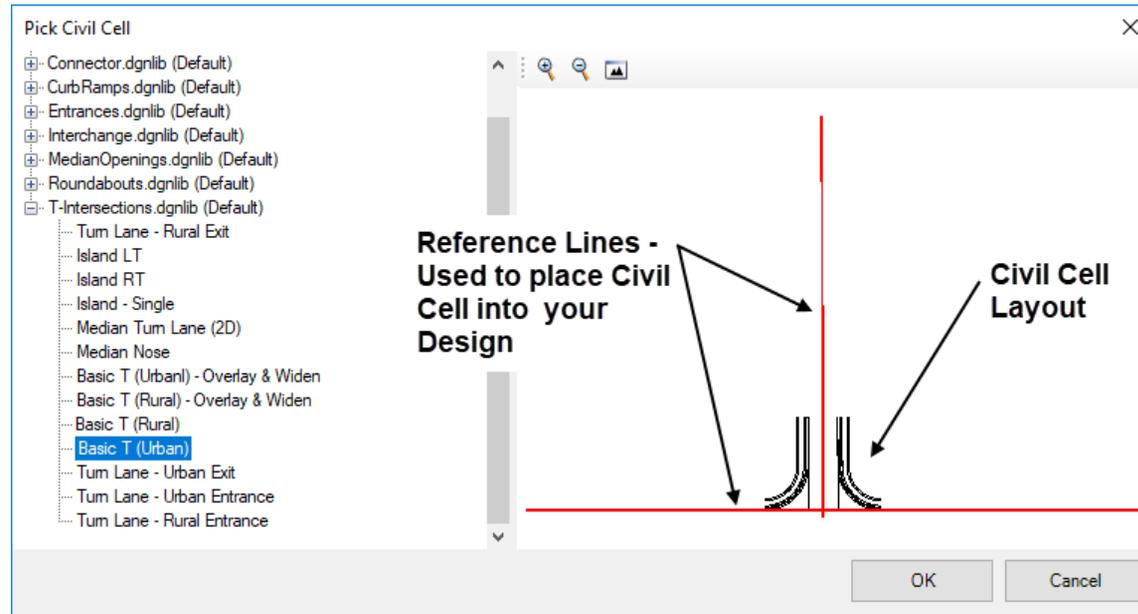
4. In the *OpenRoads Modeling* WorkSpace, select *Model Detailing > Civil Cells > Place Civil Cell*.



5. In the *Settings* dialog, click the **browse** button to open the civil cell library.



d. Expand the *T-Intersections.dgnlib* to see the civil cells stored in that library.



e. Select the **Basic T (Urban)** civil cell.

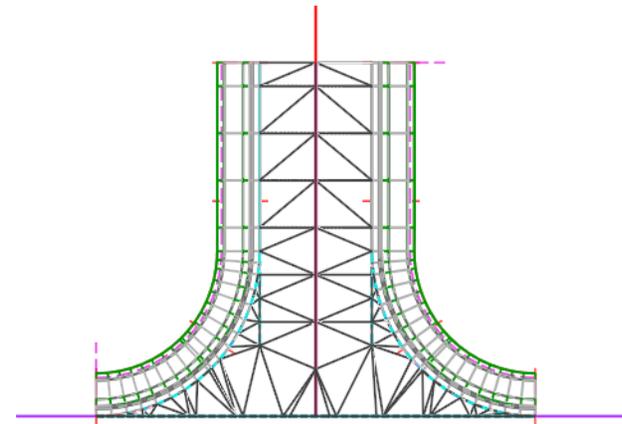
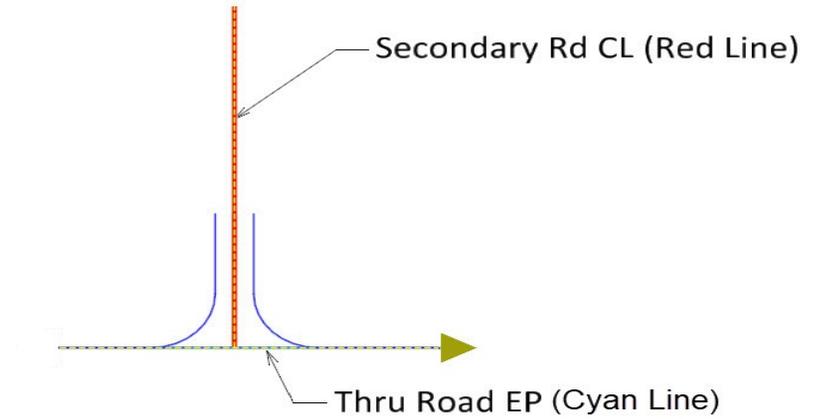
- The dialog displays the planimetric layout of the selected civil cell with black lines
- The dialog also shows the reference lines on which the civil cell is based. These are the red lines and represent the baselines that must be present within the design file to place the civil cell.

**NOTE:** The number of reference elements can vary for each civil cell.

f. Click **OK**.

6. For **Configuration 1**, follow the heads up prompts:
  - a. At the *Locate Reference Element: Thru Rd EP (Profiled)(1/2)* prompt, select the **Thru Road EP** element.
  - b. At the *Locate Reference Element: Secondary Rd CL (Profiled)(2/2)* prompt, select the **Secondary Road CL** element.
  - c. At the *Select Elements to View Alternatives (Reset to Skip)* prompt, **right-click** to reset.
  - d. At the *Select Corridors To Be Clipped (Reset To Complete)* prompt, **right-click** to reset.
  - e. At the *Accept Civil Cell Placement* prompt, **left-click** to accept.

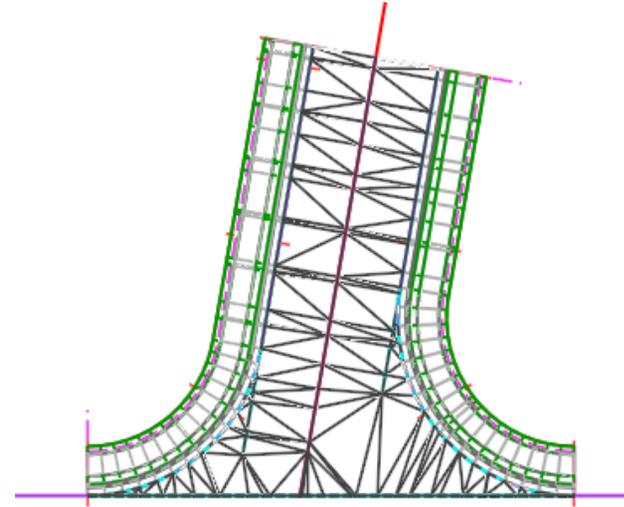
The Civil cell is placed.



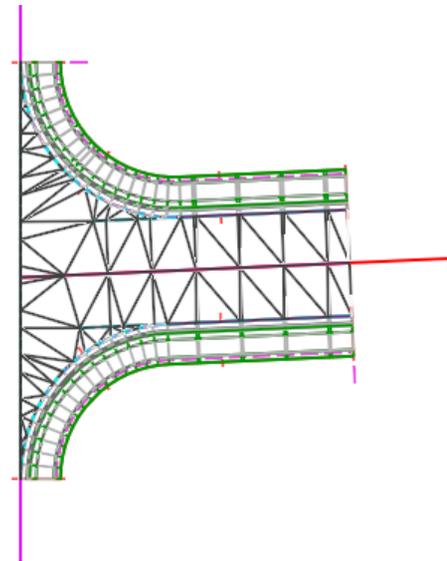
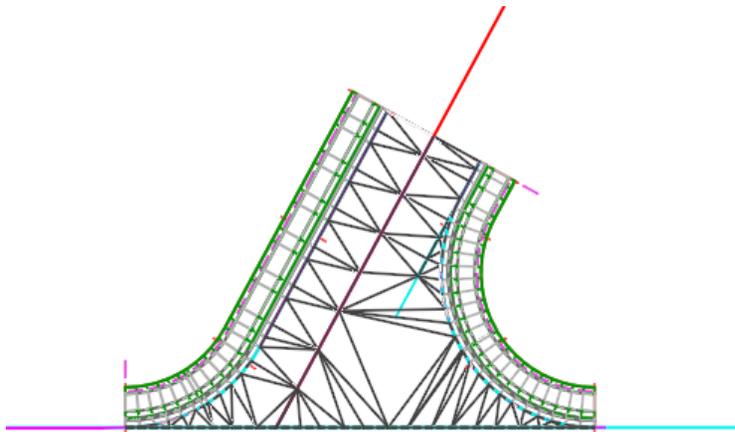
7. We can edit the civil cell placement by editing the reference elements from which it was placed.



- a. Using the **Element Selection** tool, select the *Secondary Rd CL* (the red line).
- b. Move the end point of the red line by using the element handlers, (the circles and arrows on the selected element). Click on the circle at the end point of the *Secondary Rd CL* element and modify the angle of the intersection.
- c. The civil cell updates.



8. Let's reinforce our skills: place the **Basic T (Urban) T-Intersection** civil cell for **Configurations 2 and 3**. The steps are identical to Configuration 1.



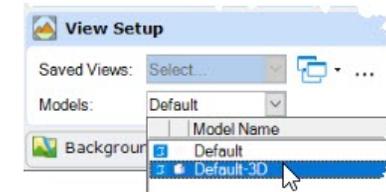
## View the Intersection models in 3D

### 1. View the Intersection models in 3D

#### a. Using the view buttons, open *View 2*.



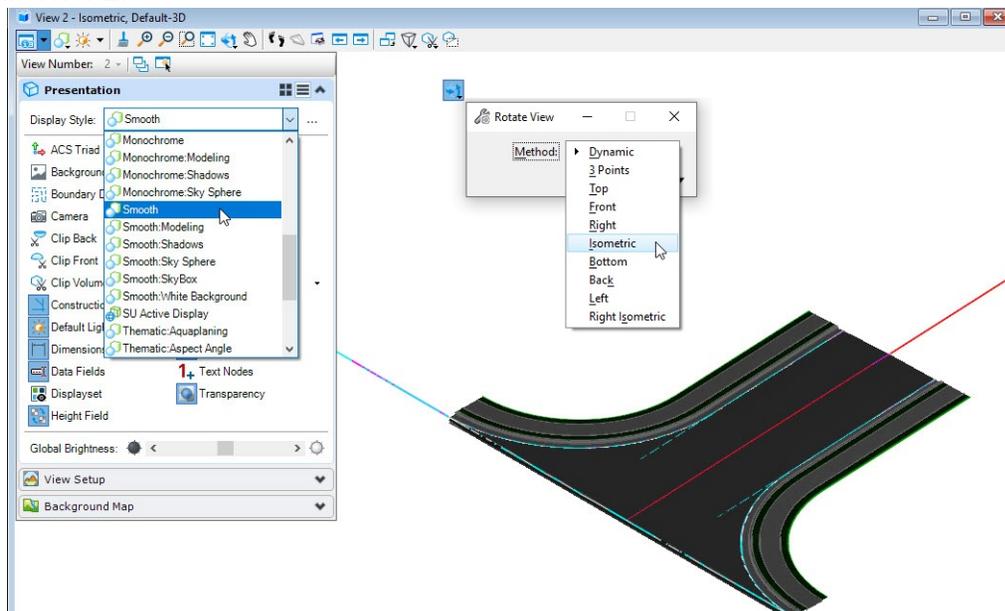
*View 2* is set to the 3D Model.



**NOTE:** The model's display properties can be changed under the *View Attributes* menu within *View 2*. Any View can be set to view any Model via the *View Attributes > View Setup >> Models* list

#### b. Make *View 2* active and **zoom in** to review one of the intersection models.

**NOTE:** You can change the display style and view rotation using *View Attributes > Display Style* and *View Rotation* tools from the menu within *View 2*.



You may also experiment with the *Display Settings*.

### 2. Close *View 2* when you have completed examining the display options.

## View the Civil Cells using the Explorer



1. Click *Primary* > **Explorer**.

The Explorer provides a tabular interface into the data structure to review and manage data within the drawing. It provides mechanisms to build link sets to external content, manage CAD standards, and access drawing files and models. These mechanisms are used as a direct interface into the survey, civil design data, and standards.

We will use the Explorer to review the civil cells we have placed into our design.

The Explorer may be docked or floating.

- a. Click the *OpenRoads Model* group and **expand** *Starting Civil Cells.dgn (Default)* [*Metric-Starting Civil Cells.dgn (Default)*] to see the active file's civil features.
- b. Expand the *Civil Cells* heading.

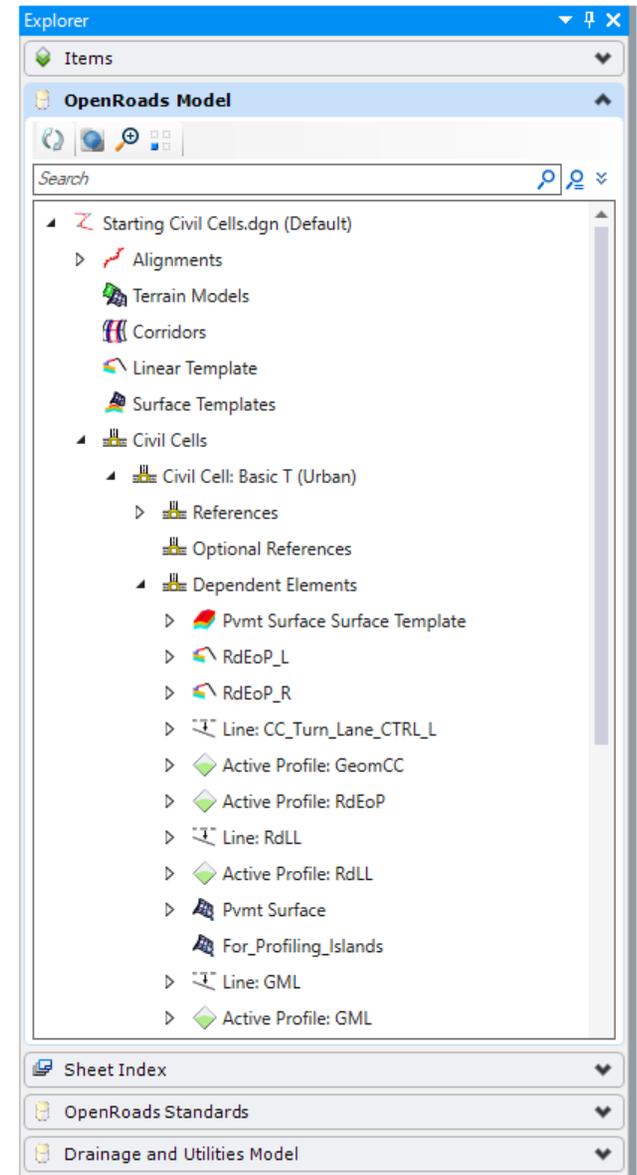
The civil cells in the active design file are listed.

- c. Continue through the hierarchy and expand **Civil Cell: Basic T (Urban)**
- d. Expand the *Dependent Elements* heading.

Civil cells store the “design intent” as well the graphical elements.

Each of the design features that make up the civil cell are listed. Note that the features are preceded with an icon that indicates the tool they were created with. This is a visual indicator that the software remembers how features were created and retains the rules and relationships they were created with.

Editing the components of the Civil Cell is identical to editing elements not part of a civil cell. Updates conform to the tools used to create them (choosing the correct tool when creating is how you communicate your Design Intent).



## Use Alternatives When Placing a Civil Cell

You may have noticed the prompts for selecting **Alternatives**. In this exercise, we'll see why we need alternatives.

Remember that the automatic geometry updates are based on relationships. One subtle, but important property, is offset direction, left or right. This is standard Civil Engineering convention. Left and Right implies a direction to an element, and the software remembers and stores each element's direction.

"Viewing Alternatives" in essence allows you to switch the direction of a new reference element to match the direction of the original reference in the Civil Cell.

1. Click *Model Detailing* > *Civil Cells* > **Place Civil Cell**.

*Basic T (Urban)* should still be active.

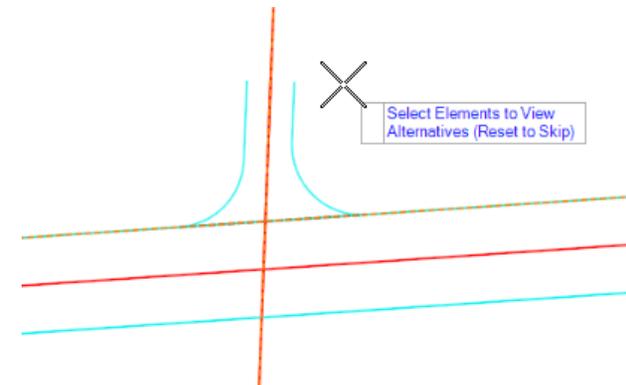
2. Following the prompts, place the T-Intersection civil cell on the north side of the **Alternatives** configuration.

- a. At the *Locate Reference Element: Thru Rd EP* prompt, select the **Thru Rd North EOP** element.

- b. At the *Locate Reference Element: Secondary Rd CL* prompt, select the **Secondary Road CL** element.

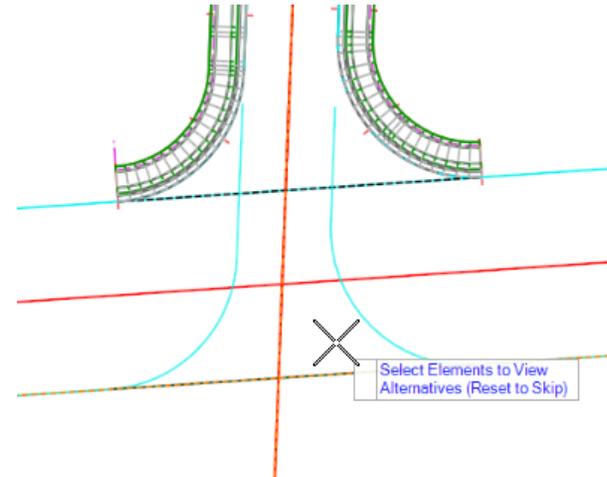
The Preview looks as we expect it should. The directions of the source references and the "destination" references match. No need to View Alternatives.

- c. At the *Select Elements to View Alternatives (Reset to Skip)* prompt, **right-click** to reset.
- d. At the *Select Corridors to be Clipped (Reset To Complete)* prompt, **right-click** to reset.
- e. At the *Accept Civil Cell Placement* prompt, **left-click** to accept.



3. Following the prompts, place the T-Intersection civil cell on the **south side** of the *Alternatives* configuration.
  - a. At the *Locate Reference Element: Thru Rd EP* prompt, select the **Thru Rd South EOP** element.
  - b. At the *Locate Reference Element: Secondary Rd CL* prompt, select the **Secondary Road CL** element.

The Preview is NOT what we want, even though it follows the exact same rules and the exact same way as before. We need to make it go to the south. We need to flip a direction.



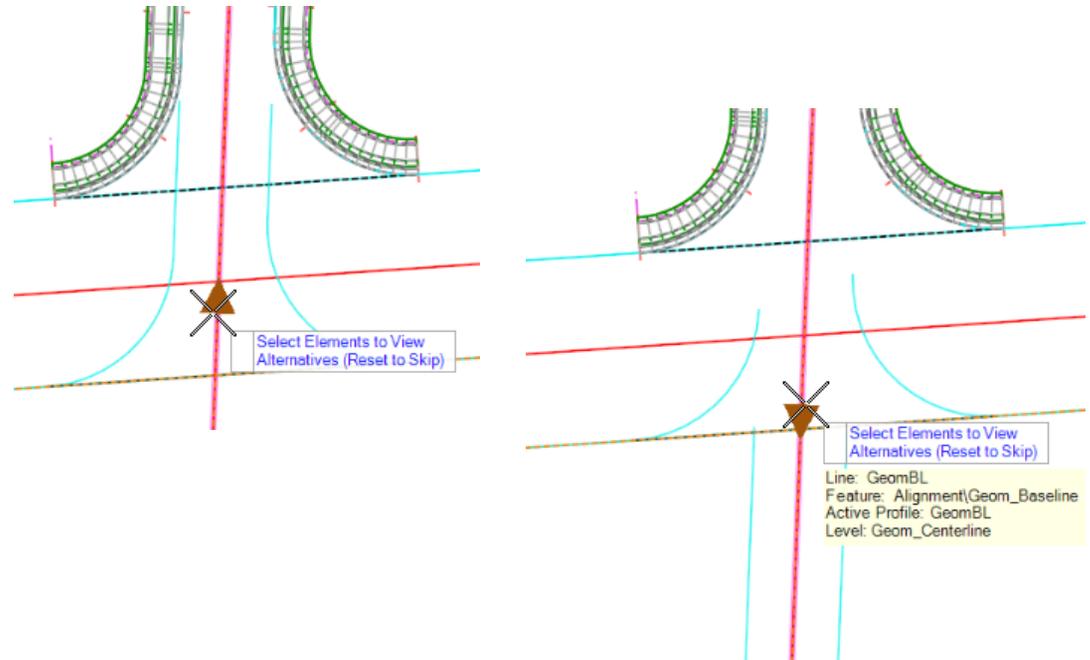
- c. At the *Select Elements to View Alternatives (Reset to Skip)* prompt, **hover** over the *secondary* road centerline.

The arrow indicates the direction of the element. We can “reverse” the direction of how the relationship is defined in the new Civil Cell by selecting the element.

- d. **Left-click** on the *secondary* centerline.

The arrow changes direction and the preview of the civil cell updates accordingly.

It’s still not what we want.



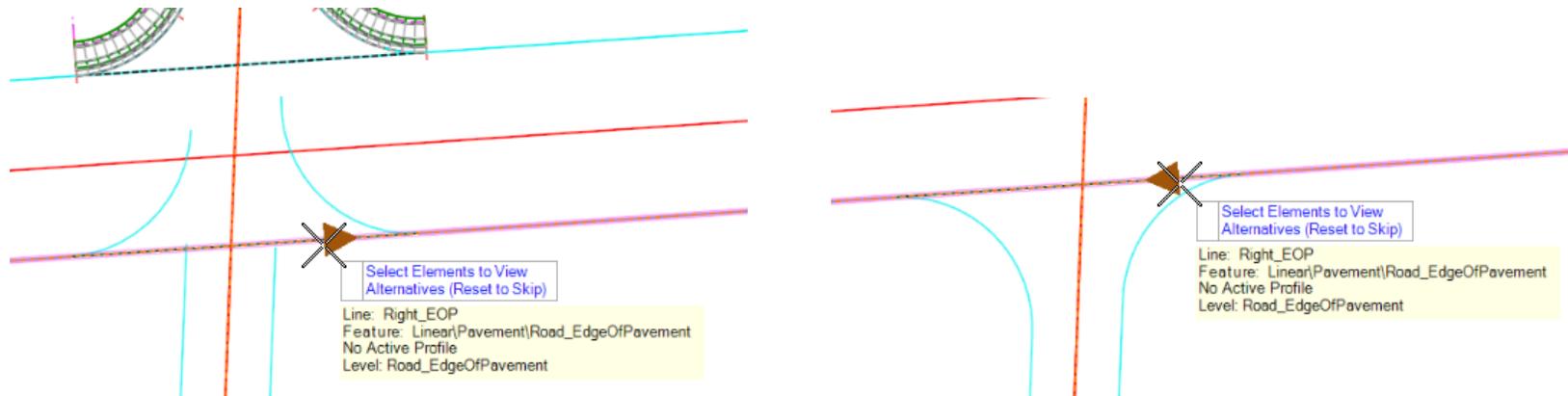
e. **Hover** over the *south* Edge of Pavement.

Note that the arrow points to the *right*. The centerline and the edge of pavement offsets run from left to right.

The curb returns are still going to the “left” of the edge of pavement (as they did on the north side, and as they did in the original Civil Cell definition).

We will need to have them on the other side, so we need to flip the direction of the edge of pavement.

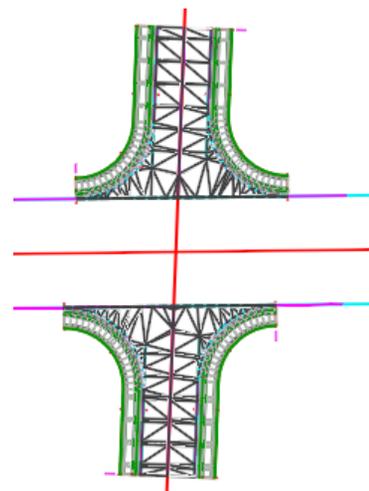
f. **Left-click** on the *south* edge of pavement. This should cause the curb returns to flip to the correct side.



g. The prompt is still *Select Elements to View Alternatives (Reset to Skip)*, now that the T looks good, **right-click** to reset and move forward.

h. At the *Select Corridors to be Clipped (Reset To Complete)* prompt, **right-click** to reset.

i. At the *Accept Civil Cell Placement* prompt, **left-click** to accept.



## Exercise 2: Adjust the Placed Civil Cells

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### Description

In this exercise, we will edit placed Civil Cells to show the flexibility of the product and its relationship-honoring architecture.

How often is your repetitive engineering always identical? You often need to adjust one or more aspects of the “standard” engineering template (Civil Cell). The purpose of Civil Cells is to save time. Making small or large edits and adjustments is fast and easy.

For example, your Tee Civil Cell may be built with 35' [10m] radii for the curb returns. You may need 25' [8m] curb returns. Maybe your Civil Cell has a 6' sidewalk and you need 4' or no sidewalk. Maybe your Civil Cell has barrier gutters and you need mountable curbs. All of these changes are easy to make.

If you have worked with the geometry tools in the product, you know that the elements are based on engineering rules and values stored in the data structure. The values are visible and editable in the Heads Up Display and in the Properties dialog. Civil Cells are a collection of normal or standard geometry features and their inherent rules and values. As such, the components of a placed Civil Cell are editable, just as if they are “normal” components.

We will work through a series of edits to demonstrate the flexibility of Civil Cells and the ability to edit their components.

Note that should you still find these wide open capabilities of Civil Cells confining, you can use the Drop Civil Cell tool to drop the placed Civil Cell into the components that make it up.

### Skills Taught

- Edit an Intersection's Horizontal Geometry
- Remove everything behind a curb
- Swap out Side-slope Tie-ins
- Show that full “corridor-level” editing/modification tools are available, like parametrically constraining a component width

## Edit Horizontal Geometry

Here, we'll assume that our new intersections have size requirements that differ from that delivered by the source Civil Cell.

It's important to note that there is a difference between "Changing the Rules" and "Changing the Values of the Rules."

For example, we will widen the right lane of the first Intersection from one lane to two. We will be changing the *Value* of the Offset from 12' [3.6m] to 24' [7.2m].

We will **NOT** be changing the *rules* for the Edge of Pavement from an Offset of the Centerline to a different type of geometry (independent or based on a different offset reference element). This is not particularly difficult, and there are tools to do this, but it's outside the focus of this class. Classes on these concepts include *Beyond Centerline Geometry* and *Introduction to Creating Civil Cells*.

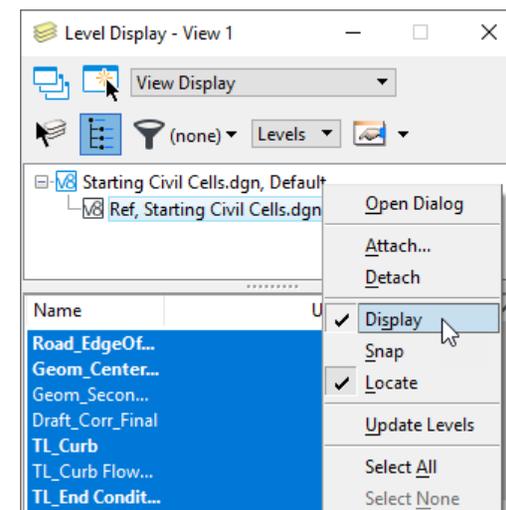
1. Turn *off* the display of the Referenced 3D model.

One "challenge" in editing Civil Cells is that sometimes it is hard to select what you want to select, especially with full 3D Civil Cells. You may have multiple overlapping 2D features overlapped with multiple overlapping 3D Features in the reference 3D Model. You may have to *right-click* a couple times to select your intended element.

Depending on your needs, you can turn off the Locate of the 3D Model Reference or turn off its Display entirely. You can also turn off levels with graphics you find "unnecessary" right now, like triangles. Construction Class element display can be turned on and off via View Attributes.

- a. Select *Home > Primary > Level Display*.
- b. **Right-click** on the *Ref, Starting Civil Cells.dgn, Default-3D [Ref, Metric-Starting Civil Cells.dgn, Default 3-D]* file.
- c. **Left-click** on the *Display* option to toggle the display **Off**.

The terrain model triangles and other Civil Cell graphics are no longer displayed.



2. Widen the Right Lane of **Configuration 1**. (Your graphics may appear different based on how you edited this intersection earlier.)

a. Use the Element Selection tool and **Click** on the *right Edge of Pavement* of the first intersection.

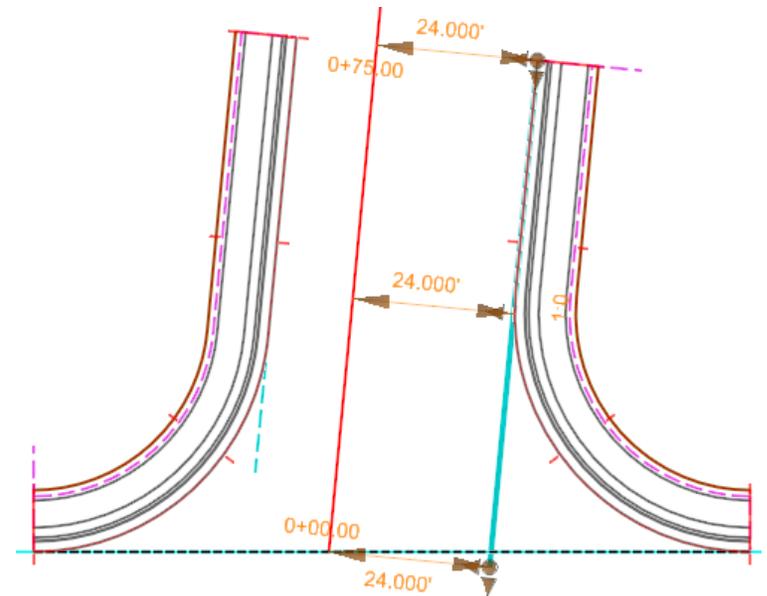
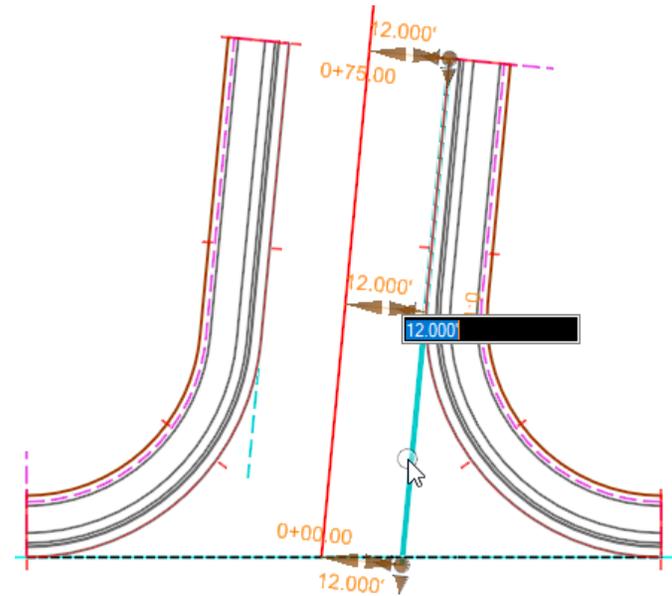
**Tip:** It may be easier to select it by hovering over its “gap”. A gap is not visible until you hover over it.

The Edges of Pavement are full-length offsets from the centerline. The curb returns create “gaps” where the edges are trimmed back, but trimmed features are still able to be selected in its “gaps”.

b. Once the edge is selected, **click** on the *midpoint Offset text manipulator*.

c. Type **24 [7.2]** and hit **Return**.

The pavement is widened and all dependent geometry and modeling is updated.

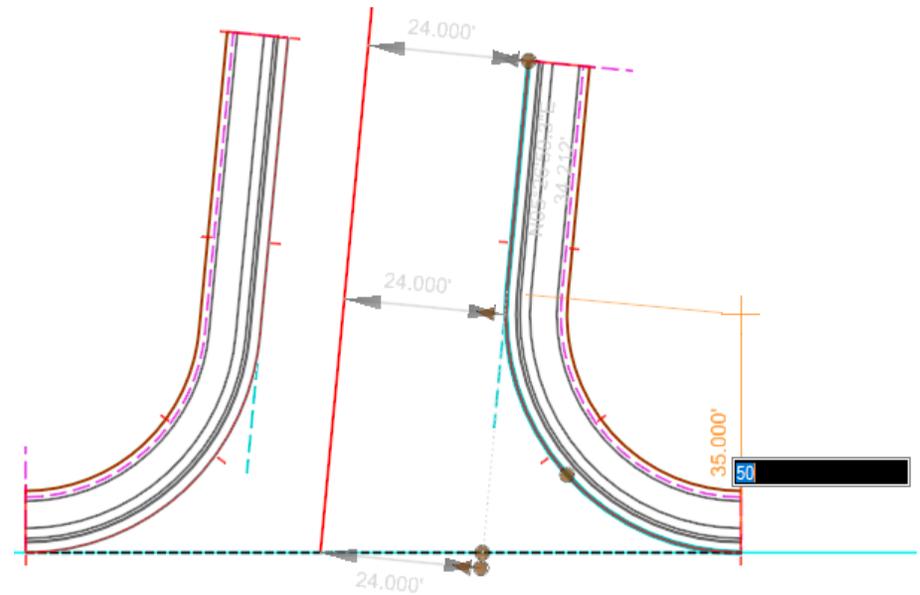


3. Change the Curb Return Radius

a. Click on the *right Edge of Pavement curb return*.

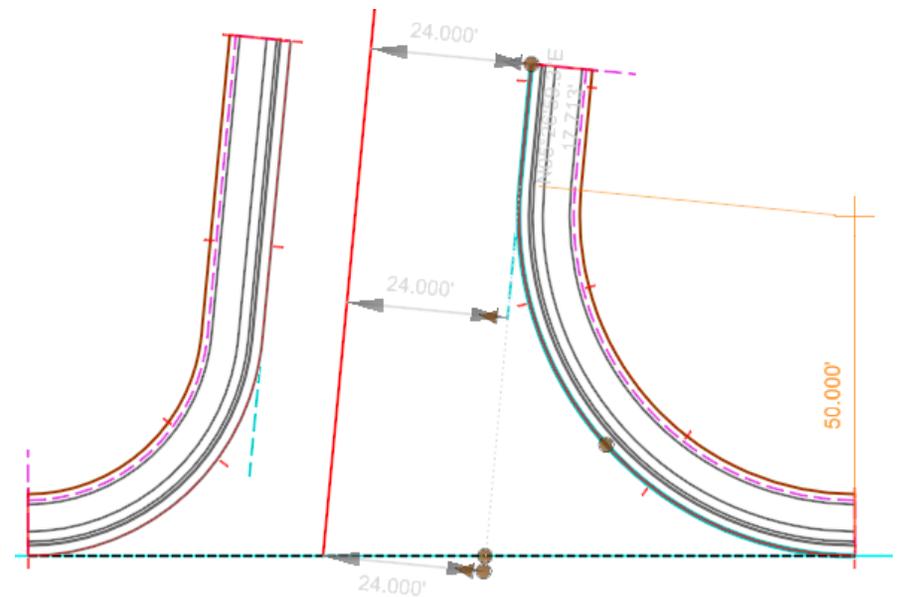
This might require multiple right-clicks.

b. Click on the *Radius text manipulator*.

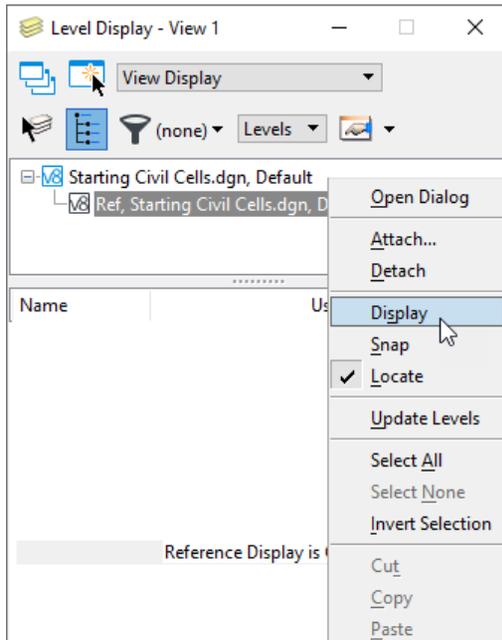


c. Type **50 [15]** and hit **Return**.

The Curb Return Radius and all dependent geometry and modeling is updated.

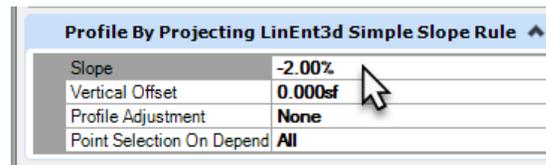


d. Select *Home > Primary > Level Display* and toggle the display of the 3D model back **On**.



All the Values used in building the Civil Cell are editable.

An example might be the cross slope of the side road. The Edge of Pavements were defined as 2% below the centerline. If you wanted to change the cross slope to 1.5%, you could edit that value and everything would be updated automatically.



Next we'll tackle some edits more complex than changing numbers.

## Drop Everything Outside a Curb

To demonstrate the integration between the data, the graphics, and the interface, let's edit the Civil Cell to drop everything behind the curb along one side of the intersection.



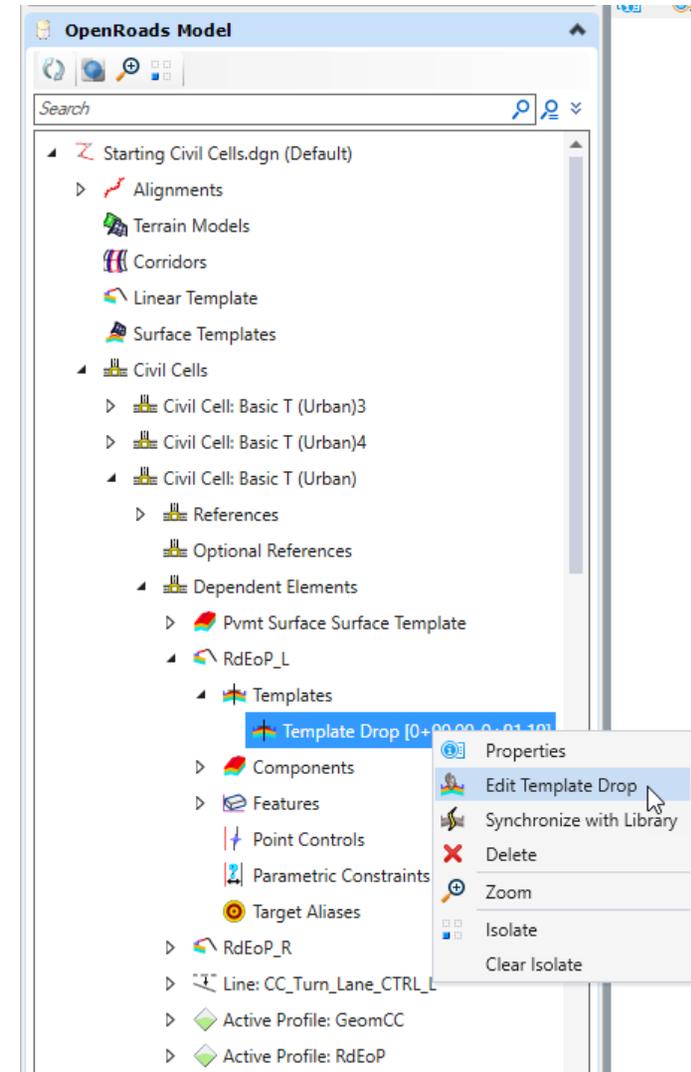
1. Click *Primary > Explorer*.
2. In the *OpenRoads Model* group, expand the folders.
3. Under the **Civil Cells** folder, click on *Civil Cell: Basic T (Urban)*.

This should be Configuration 1.

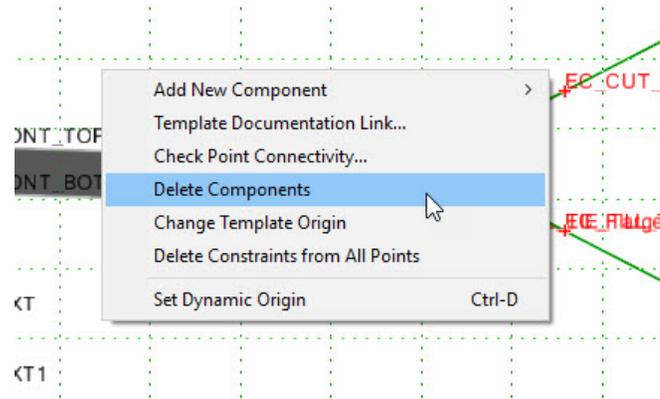
- a. Expand the *Dependent Elements* and then expand the **RdEoP\_L Linear Template**, indicated by the Linear Template Icon.
- b. Expand the *Templates* heading and **right-click** on the *Template Drop* entry.

**NOTE:** The station range may vary based on the modifications that we made to the reference elements earlier in the exercise.

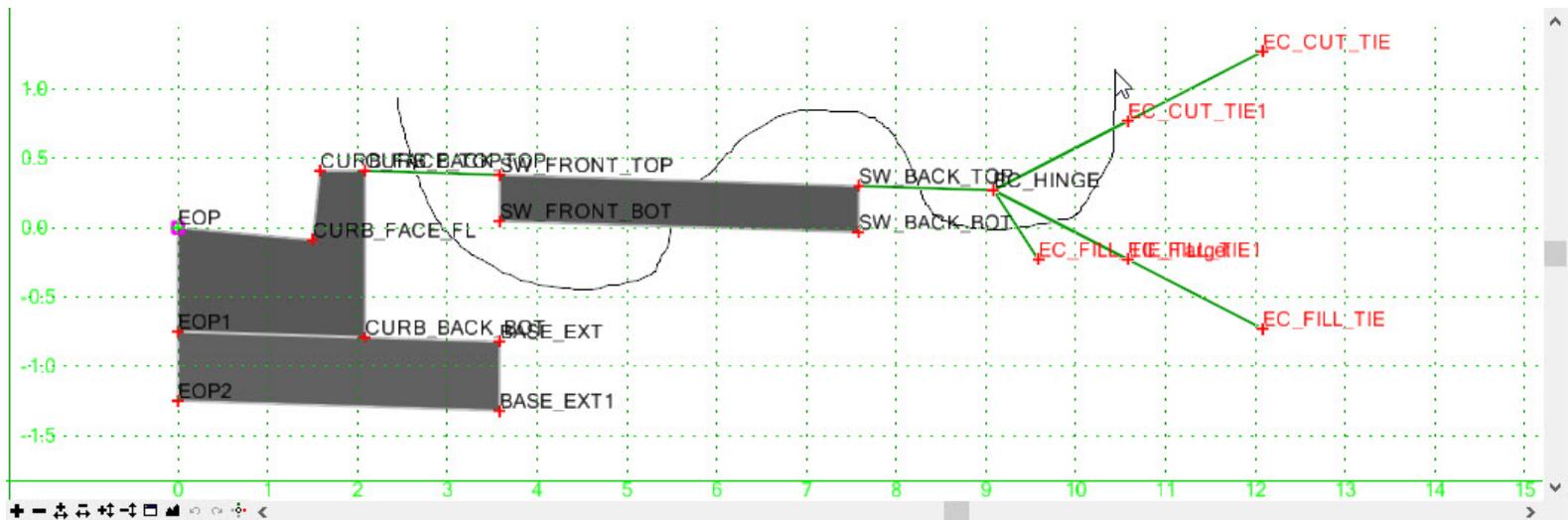
- c. Select **Edit Template Drop**.



4. Delete the end conditions and the sidewalk components from the template.
  - a. **Right-click** in the template window and select **Delete Components** from the drop down menu.

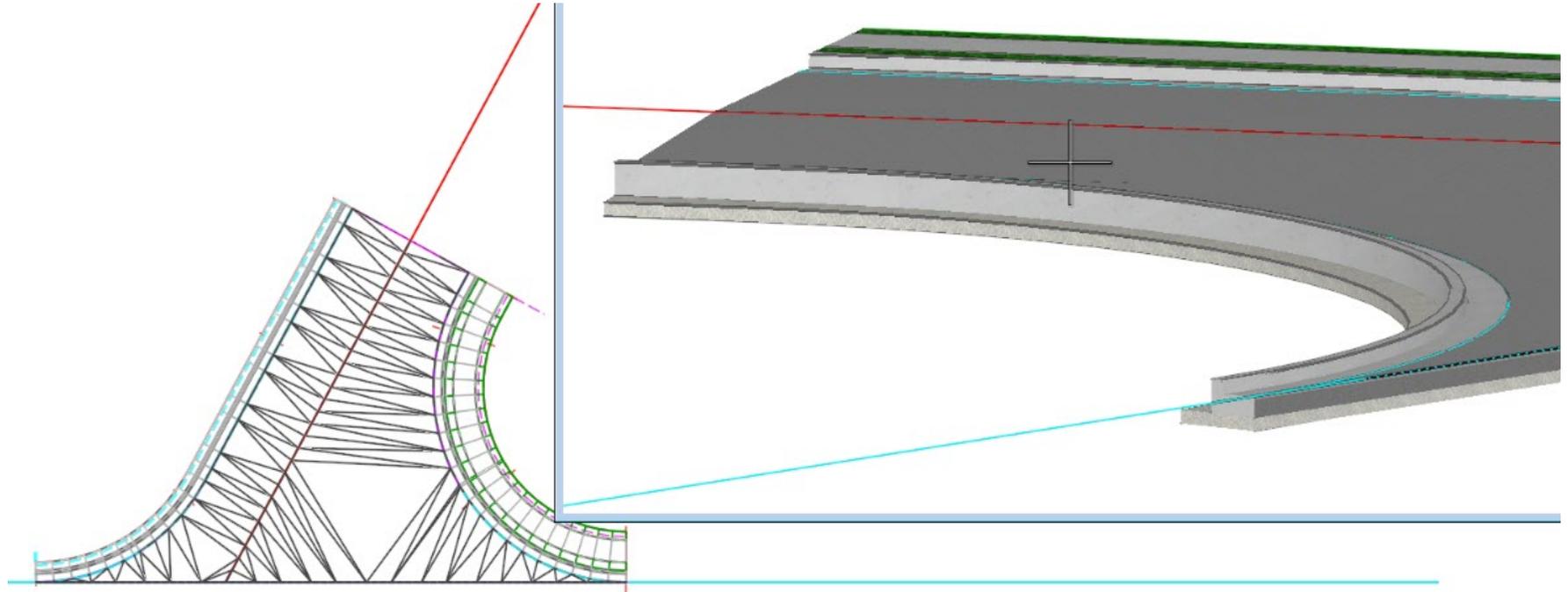


- b. **Draw a line** across each of the elements you wish to delete.



- c. Click **OK** to close the *Editing Roadway Designer Template Drop* dialog.

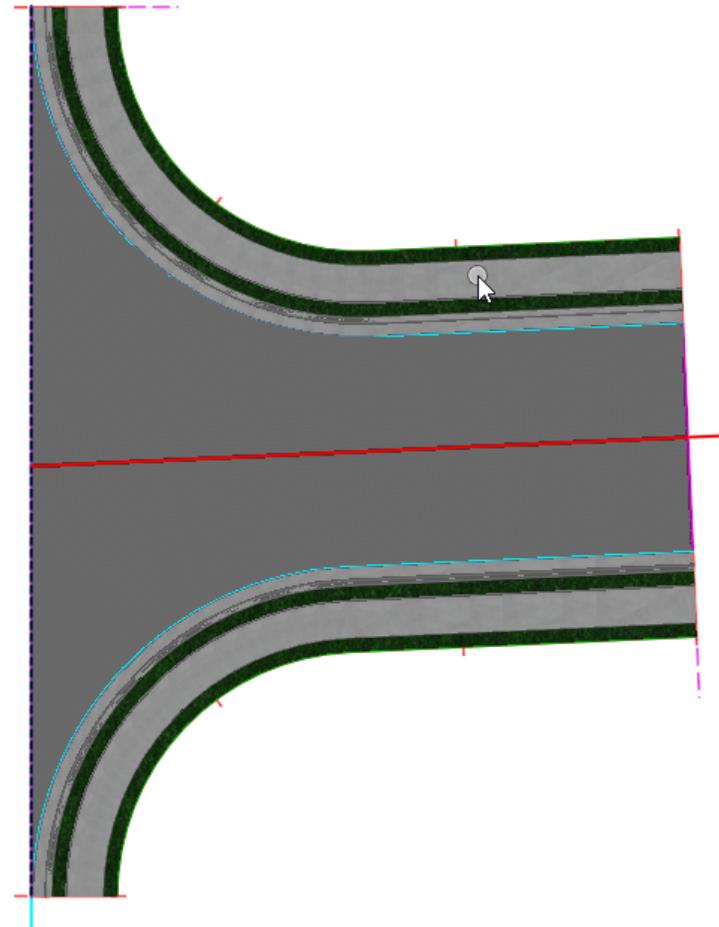
5. Review the T-Intersection model. Notice the sidewalk and side slopes have been removed along the left side.



## Swap out the Tie-in Solution

Let's assume that a placed Civil Cell is perfect except that one side should tie into the existing ground, but without a sidewalk adjacent to the curb.

The simplest way to do that is to simply switch to a different template in the linear template that makes up the area outside the edge of pavement.



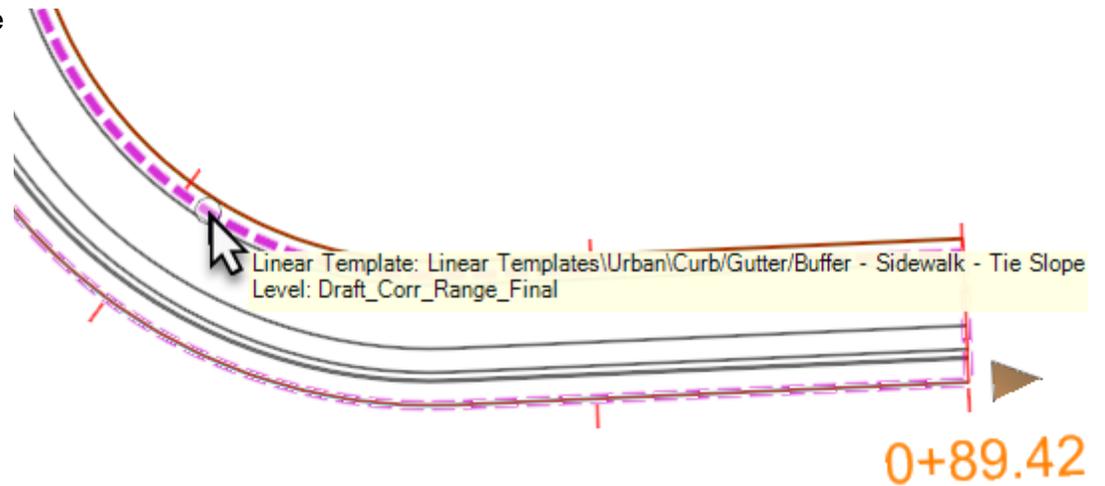
This narrative will use the **Configuration 3 Tee**, but you can edit any one you want.

1. **Click** on a *Linear Template* in View 1, the 2D View.

The Linear Template is a 2D shape shown in this file as a dashed fuchsia line.

If you do not see it, it is a Construction Class Element: make sure that the View Attributes has **Constructions ON**.

**Tip:** Zoom in tight to get clear access to it.

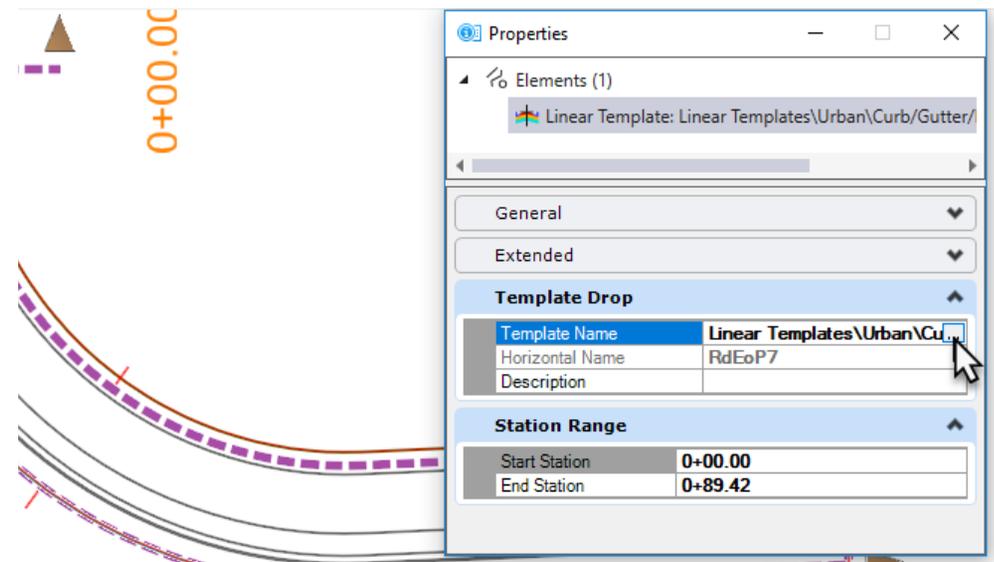


2. Open the *Properties* dialog, and expand the **Template Drop** group.

The current template is Linear Templates > Urban > Curb/Gutter/Buffer - Sidewalk - Tie Slope.

3. Click the **Browse** button in the right side of the *Template Name* label.

This opens the *Pick Template* dialog.

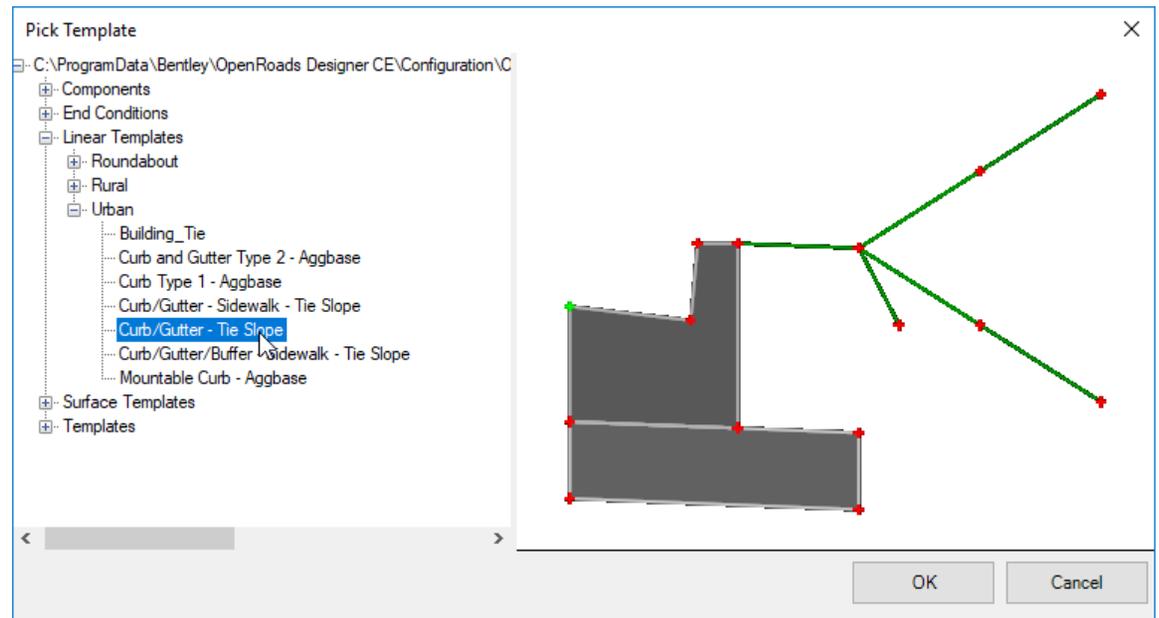


4. *Double-click* the **Curb/Gutter - Tie Slope** template.

This is similar, but without a sidewalk and the buffer between it and the curb.

This is the Template we'll use, but feel free to review the other templates. The *Curb/Gutter - Sidewalk - Tie Slope*, for example, eliminates only one component, the grass buffer between the curb and the sidewalk.

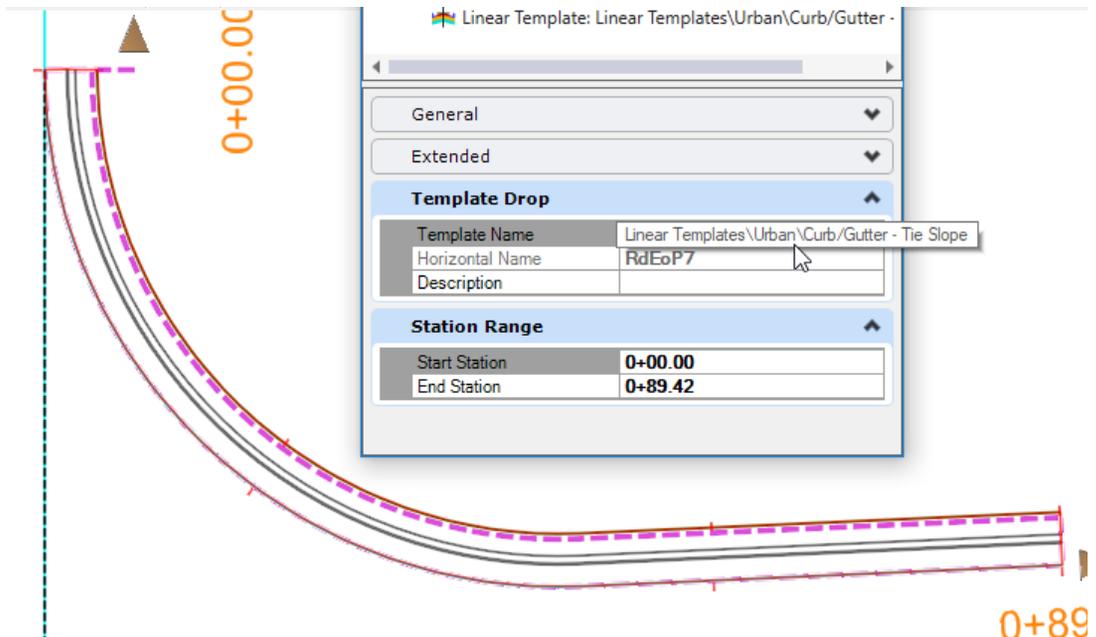
5. Click **OK**.



The linear template processes with the new Template.

Note that there is no sidewalk.

Note also that, because this file has no active Terrain, the side slopes that tie into the ground are not drawn. This is true for all the Civil Cells in this drawing.



## Use Parametric Labels to Change Geometry

Parametric Labels (also known as Parametric Constraints) are Named Relationships between points in a template. Parametric Labels are useful for a variety of reasons, including simplifying managing complex templates, “permanent” geometry changes (within the Edit Template dialog) and overriding Template Geometry for a placed corridor, surface template or linear template.

Parametric Labels can set pavement widths, pavement slopes, pavement thickness, sidewalk width, barrier gutter face height, side slope, etc. The possibilities are endless.

Parametric Labels are also able to provide transitioning geometry. For linear templates the variables have a start and stop value. A Pavement Width Transition looks like this:

Station	Width
0+00	12
10+00	12
12+00	16
99+99	16

We will widen a sidewalk and thicken a pavement layer.

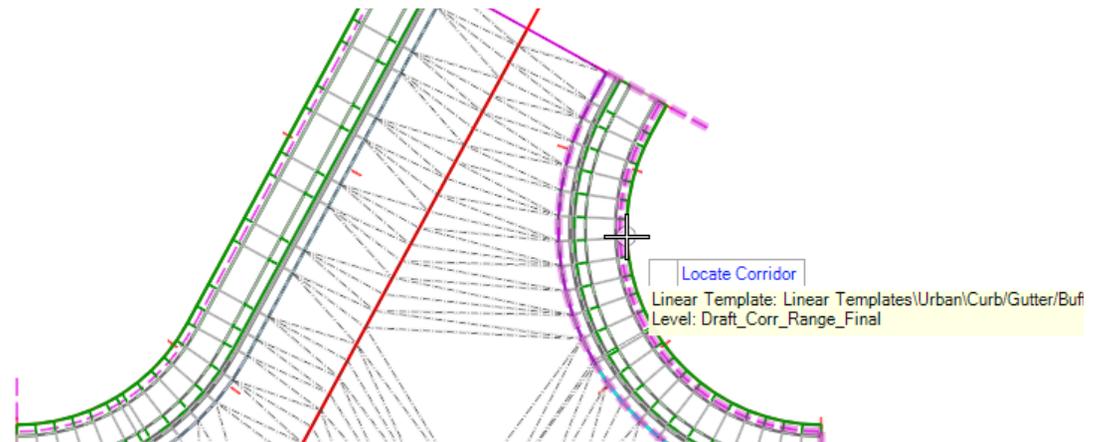
### 1. Provide a Sidewalk Transition.

We’ve selected the **Configuration 2** intersection for this example, but you can select whichever one you want.



- Click *Corridors > Edit > Edits > Create Parametric Constraint*.
- At the *Locate Corridor* prompt, click a **linear template**.

These are outside the curbs, the dashed fuchsia line.



c. In the Settings dialog, open the **Constraint Label** list.

These are the already-defined Constraints in the Linear Template. In a well-managed environment, the names are clear and intuitive.

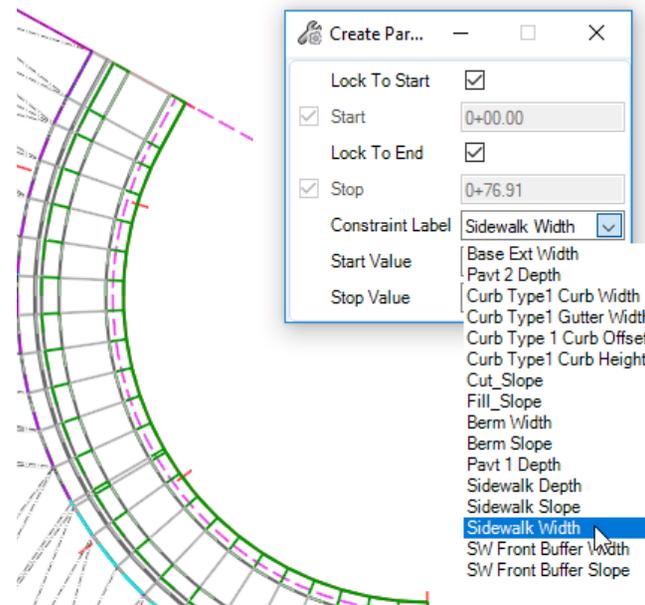
d. Select **Sidewalk Width**.

e. **Set** the *Lock to Start* and *Lock to End* toggles **On**.

If you needed to Start or End the transitions somewhere else, you would leave the Locks unlocked and use data points, snaps, or Stations to designate the locations.

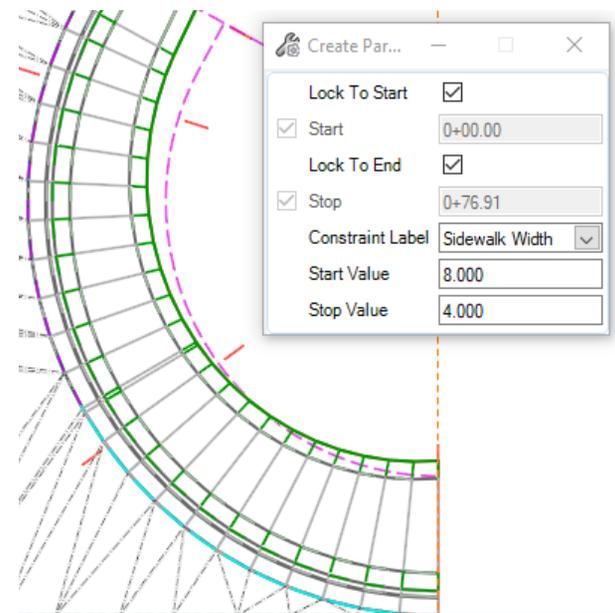
f. For *Start Value*, type **8 [2.5m]**.

g. For *Stop Value*, type **4 [1m]**.

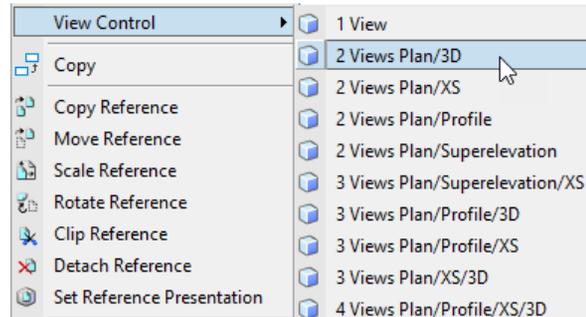


2. **Accept** all the prompts, with data points.

The sidewalk is widened.



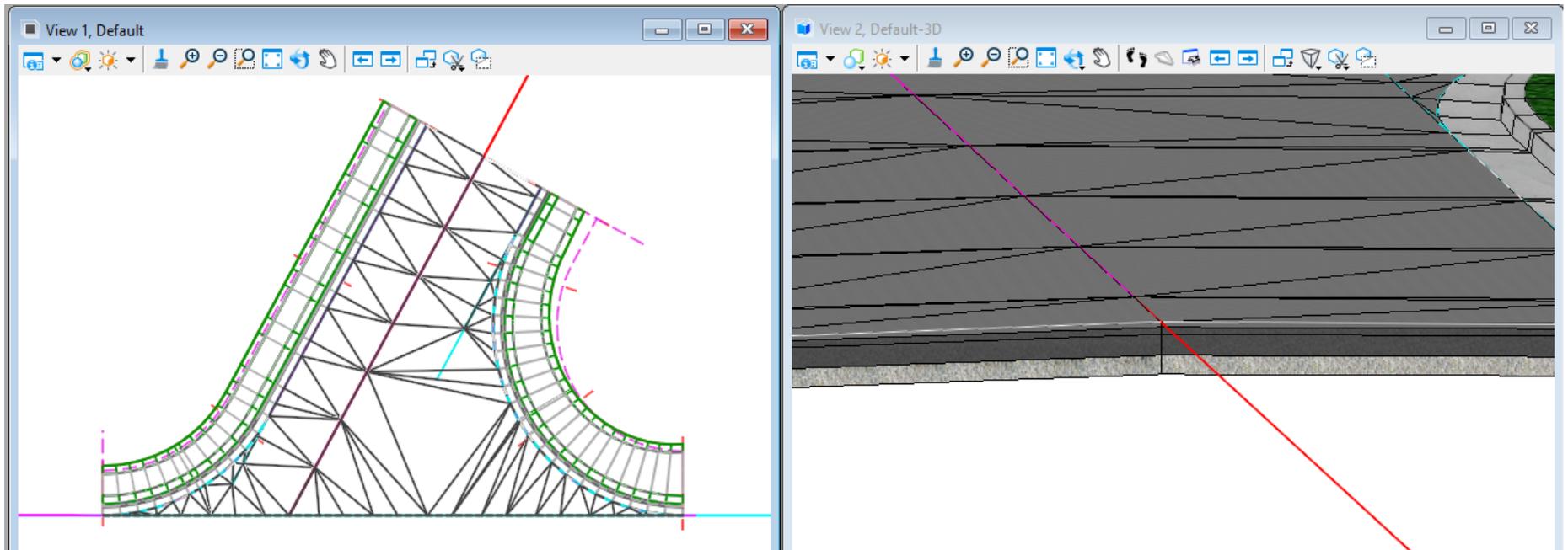
1. Configure your screen views so that the top view of **Configuration 2** is visible in View 1, and the end of the 3D pavement section is visible in View 2.
  - a. In an open view, **right-click and hold**, and then select *View Control > 2 Views Plan/3D*.



- b. In *View 1*, window area so that Configuration 2 is visible.



- c. In *View 2*, use the **View Rotation** tool to rotate the view to the end of the pavement section.

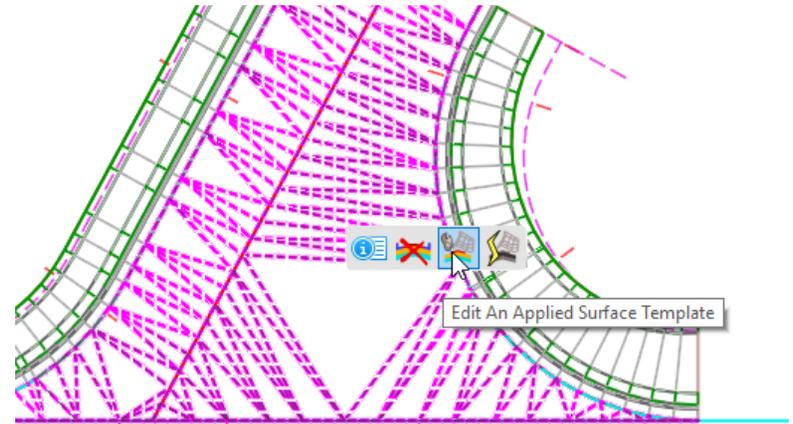


2. Change the Pavement Depth.

- a. *Click and hover* over the civil cell **terrain model**.

**NOTE:** You may have to *right-click* so that the surface template is selected.

- b. From the Context Tool Bar, select **Edit An Applied Surface Template**.



3. In the *Editing Roadway Designer Template Drop* dialog...

- a. Click the **Active Template** tab.

- b. Expand **Parametric Constraints**.

- c. Expand and then double-click **Pavt 4 Depth**.

Note the highlighted two points “controlled” by this Constraint

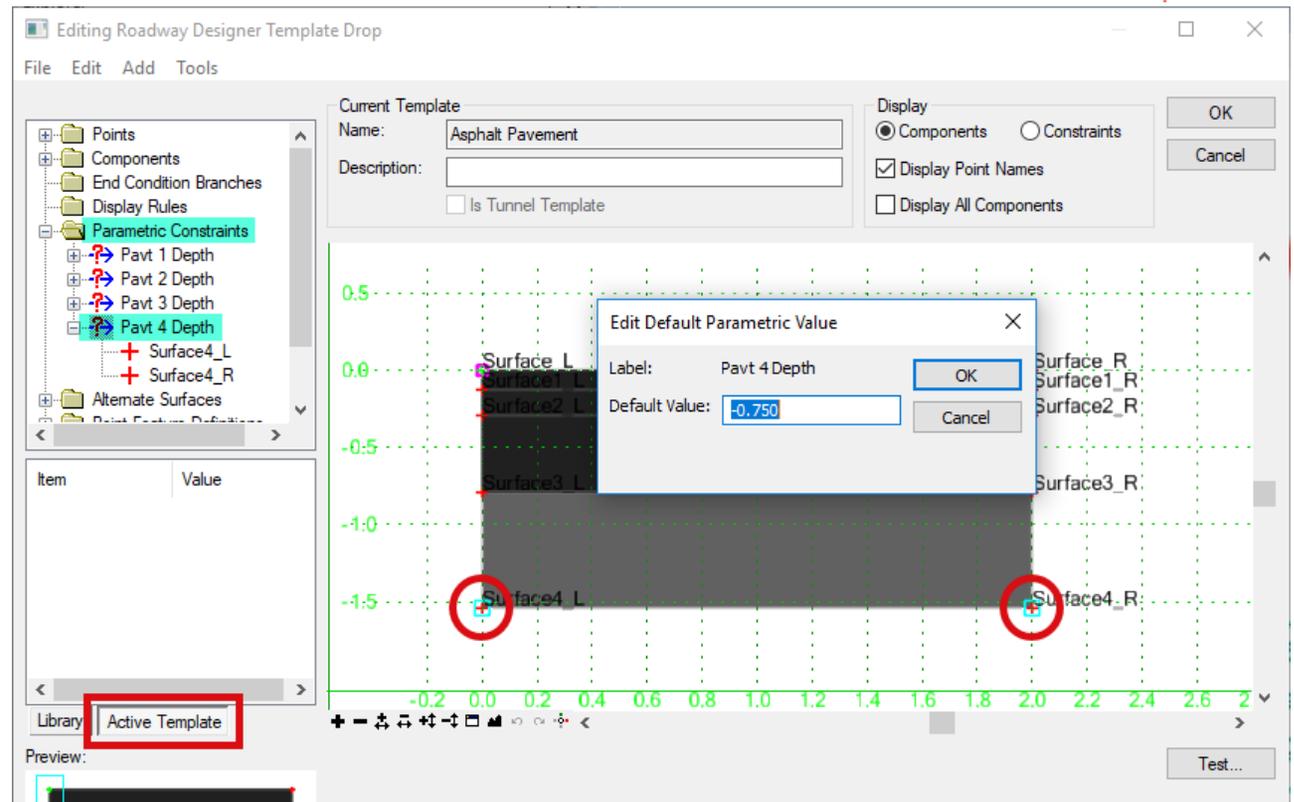
- d. Type **-0.75 [-0.25]** for *Default Value*.

- e. Click **OK** to close the *Edit Default Parametric Value* dialog.

- f. Click **OK** to close the *Editing Roadway Designer Template Drop* dialog.

The Depth of the bottom layer of the surface template is updated to the new value.

You can see the change in the 3D view.



## Exercise 3: Place the T-Intersection Civil Cell in a Design Scenario

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### Description

In this exercise, you will place a T-intersection civil cell in a more real-world design scenario.

### Skills Taught

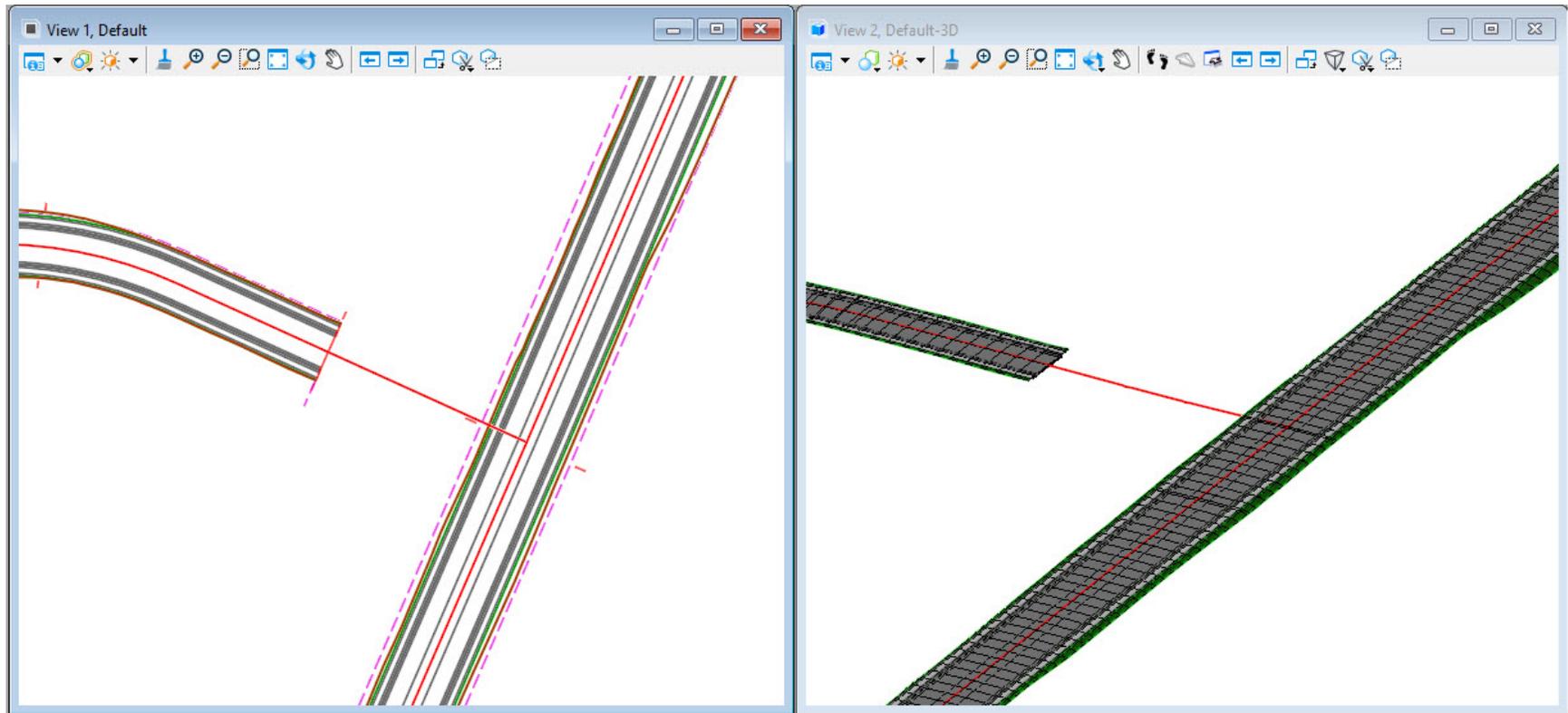
- Placing an intersection civil cell
- Clipping an existing corridor with the civil cell
- Combining the civil cell model with a roadway corridor model

## Place the Civil Cell and Model the Intersection

In the following exercise you will use the basic T-Intersection civil cell to construct the model between two intersecting corridors. We will clip the existing corridor when we place the civil cell. Also, it's important to recognize that we will place the civil cell in View 1, the 2D view, and the 3D model will be constructed from it's placement.



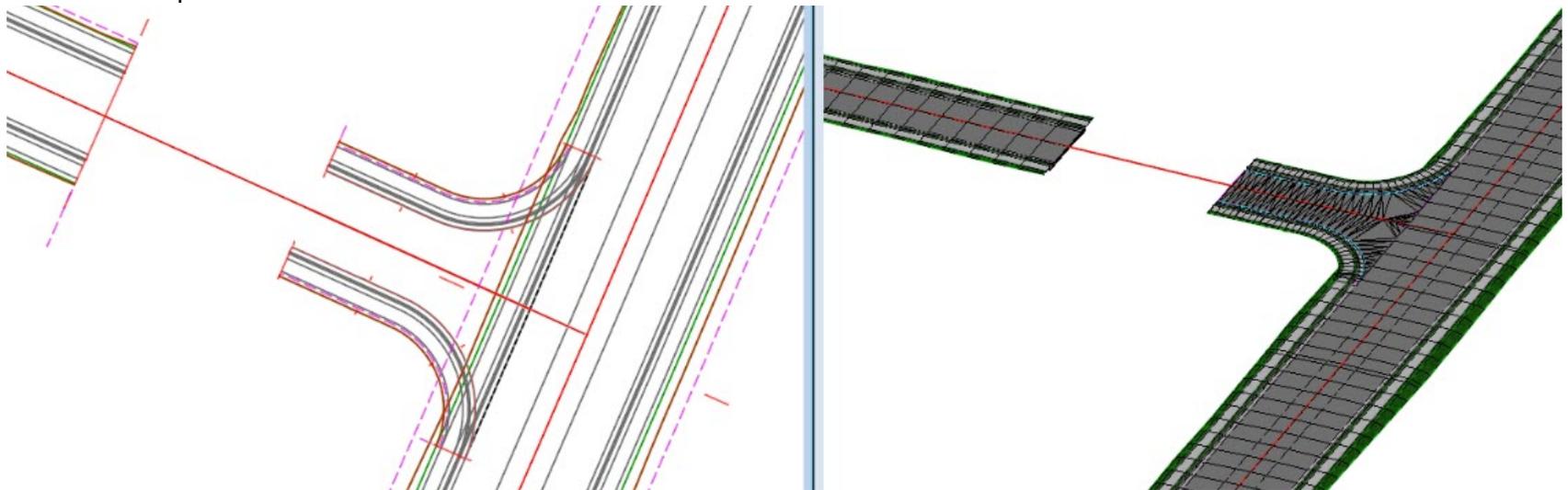
1. Select **File > Browse** and open the file *T-Intersection.dgn* [*Metric-T-Intersection.dgn*] from *C:\Bentley Training\Using Civil Cells* or other folder where you unzipped the dataset files. There is an existing terrain model already attached to this file.



2. Click *Model Detailing > Civil Cells > Place Civil Cell*.
3. Select the civil cell in the *T-Intersections.dgnlib* folder named **Basic T (Urban)**.

4. In View 1, follow the heads up prompts:
  - a. At the *Locate Reference Element: Thru Rd EP (Profiled) (1/2)* prompt, select **EOP\_L** for the Thru Road EP element.  
Take care to pick the edge of pavement, not one of the curb lines.
  - b. At the *Locate Reference Element: Secondary Rd CL (Profiled) (2/2)* prompt, select **ForestCt** for the Secondary Road CL element.
  - c. At the *Select Elements to View Alternatives (Reset to Skip)* prompt, **right-click** to reset.
  - d. At the *Select Corridors to be Clipped (Reset To Complete)* prompt, click the **LondonRd** corridor.  
After selecting the LondonRd corridor, the *Select Corridors to be Clipped (Reset To Complete)* prompt returns allowing the selection of multiple corridors.
  - e. **Right-click** to reset and *complete* the Corridor Clipping.  
The Civil Cell can automatically clip the LondonRd corridor where it overlaps the civil cell. In some situations, such as if the corridor exists in a referenced dgn file, the corridor may need to be clipped manually.
  - f. At the *Accept Civil Cell Placement* prompt, **left-click** to accept.

The Civil cell is placed.



**NOTE:** Civil cell clipping does not clip out the 2D graphics of the corridor in View 1. In the image above, View 1 (2D view) on the left represents the visual interface in which we interact with the model.

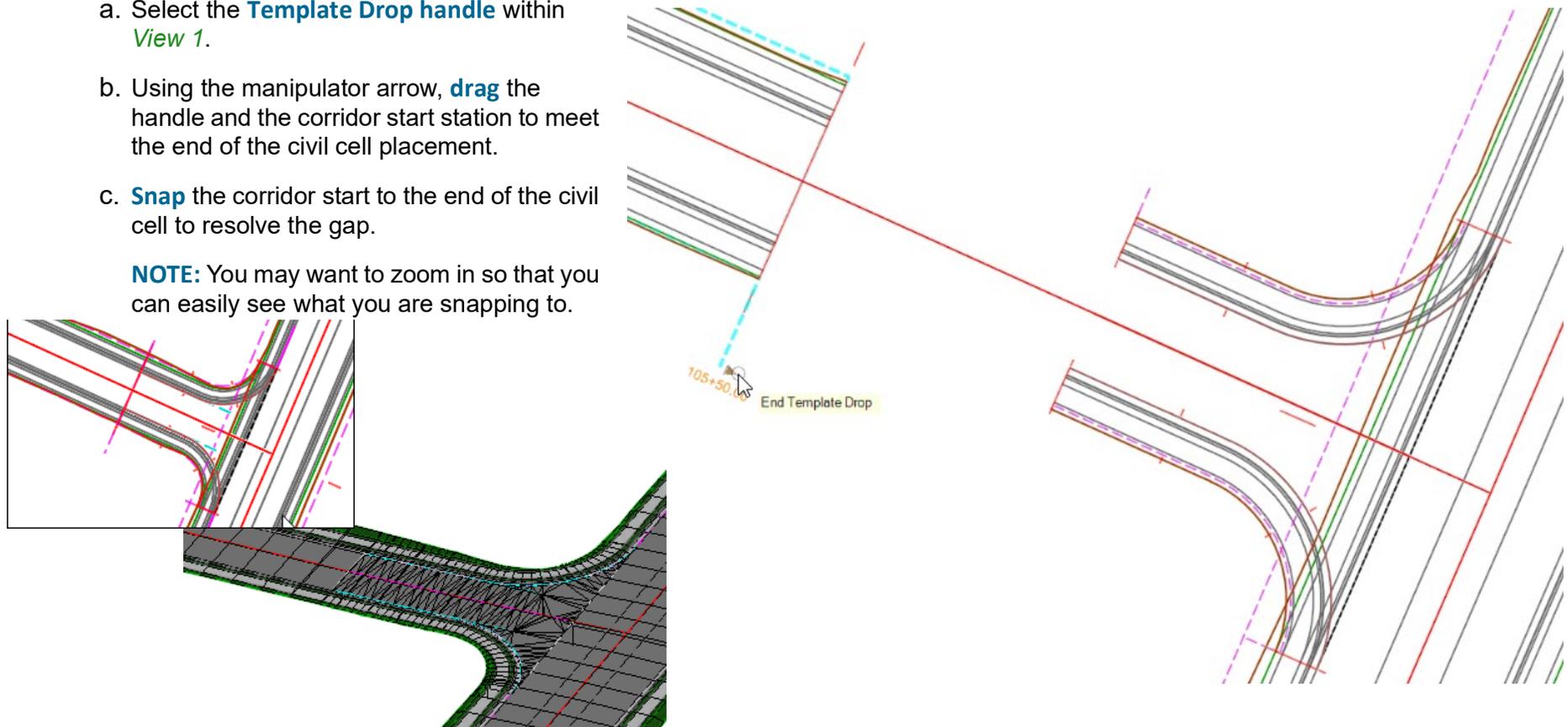
5. Review the civil cell placement. Verify that your intersection is aligned properly as shown in the image above.
  - If the cell is placed incorrectly, you may have mistakenly selected the wrong reference element during the placement.
  - To undo the civil cell placement, select *Undo* from the Quick Access tool bar or key in *CTL+z*.
  - Place the civil cell again.

**NOTE:** The graphic handles displayed with the civil elements, such as the corridors and template drops, as well as other features can be defined as Construction Class elements. Their display can be turned On or Off for clarity via the Constructions toggle in the View Attributes menu. The definition of these elements as construction elements is specified within the WorkSpace and can be changed.

6. Remove the gap between the intersection and the existing two-lane corridor ForestCt.

- a. Select the **Template Drop handle** within *View 1*.
- b. Using the manipulator arrow, **drag** the handle and the corridor start station to meet the end of the civil cell placement.
- c. **Snap** the corridor start to the end of the civil cell to resolve the gap.

**NOTE:** You may want to zoom in so that you can easily see what you are snapping to.



## Exercise 4: Place Sidewalk Ramps Within the Intersection Model

---

### Description

In this exercise, you will place sidewalk ramps within the intersection model using a civil cell.

### Skills Taught

- Drawing the Centerline required for the Ramp Civil Cell
- Placing a Sidewalk Ramp Civil Cell
- Clipping the Sidewalk from under the Ramp
- Moving the Sidewalk Ramp within the model

## Draw the Sidewalk Ramp Centerline

This civil cell contains three reference elements and requires they be identified in the design model as the civil cell is placed. The gutter line and the back of sidewalk exist - they were created as part of the Civil Cell, but the ramp centerline does not. We will create a ramp centerline to be the basis for our ramp location within the model.

1. Select *Home > Primary > Level Display* and turn **On** level *Civil\_Cell\_Pts\_Labels*.

2. Click *Geometry > Horizontal > Lines > Line Between Points*.

a. In the settings dialog, select or enter the following:

- *Feature Definition: Linear > Miscellaneous > Geom\_Civil\_Cell\_Control*
- *Name: RampCL*

b. **Left-click** the *Center* snap and snap to the center of **Pt 1** to place the *Start Point* near the middle of the north curb return of the intersection.

c. **Left-click** the *Perpendicular* snap.

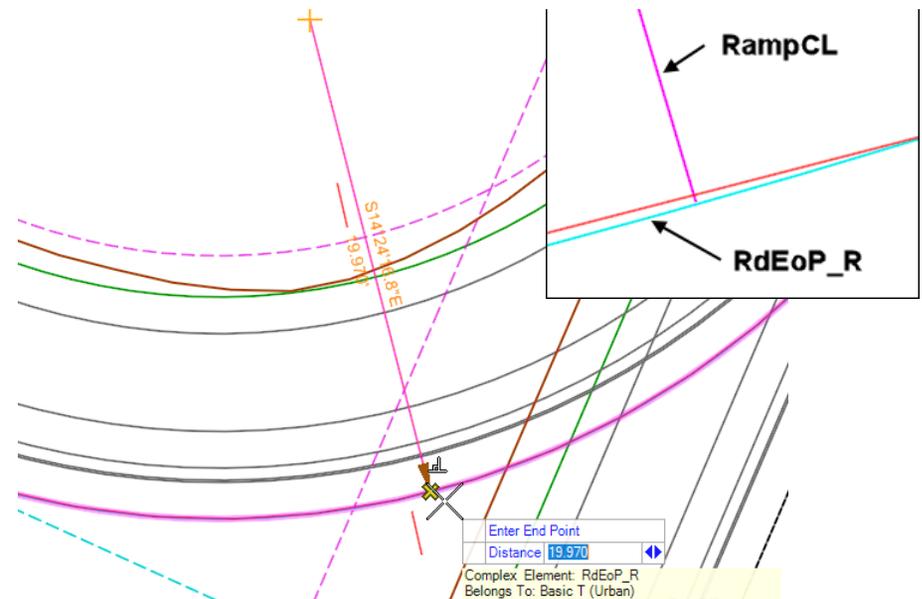
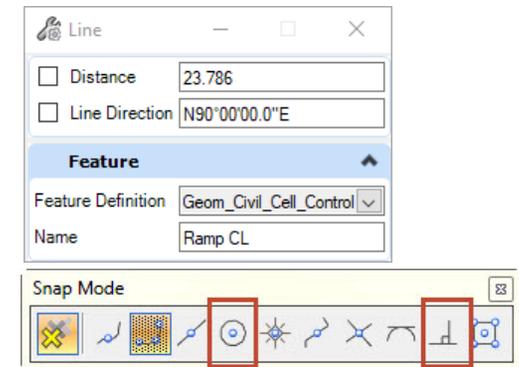
d. And **left-click** to place the line perpendicularly along the Complex Element **RdEoP\_R** (cyan line). You may need to zoom in closely to see the cyan line or toggle off the Constructions in View Attributes.

### NOTE:

As an alternate technique, we could have placed the ramp centerline using the Place Smartline or Place Line drawing tools. These tools also honor the Perpendicular snap.

The difference is that the drawing tools have no memory of a Perpendicular relationship.

The Line Between Points command and other Designer product tools remember that the centerline has a Perpendicular relationship with the edge of pavement and honors the relationship during a change in geometry.



## Select and Place the Ramp Civil Cell into the Intersection Model

We will select the referenced civil cell and place it into our intersection model.



1. Click *Model Detailing* > *Civil Cells* > **Place Civil Cell**.
2. In the *CurbRamps.dgnlib (Default)* folder, select the civil cell named **Curb Ramp - Perpendicular**.

This ramp is built from three geometry references:

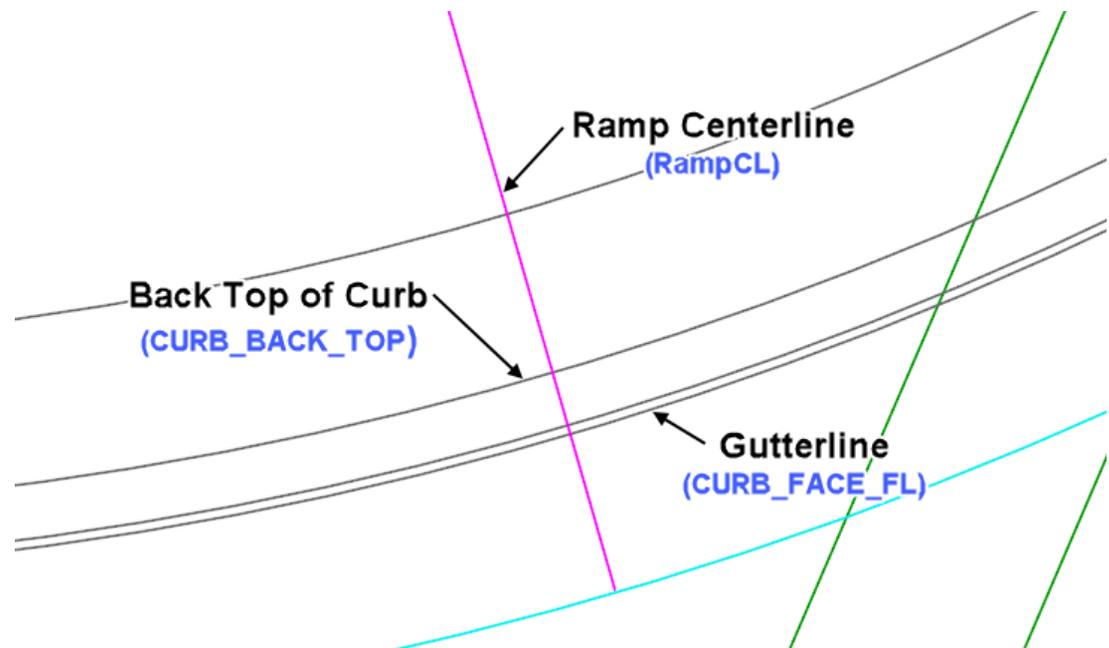
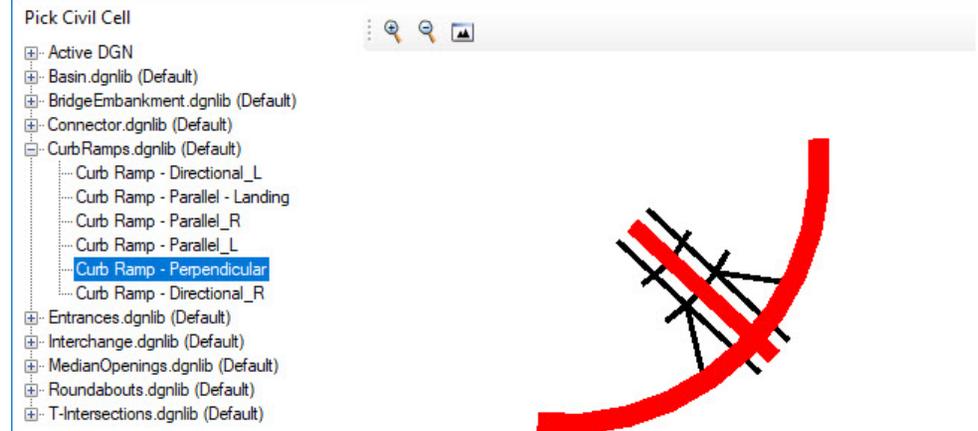
- The Bottom of the Curb Face or Flowline
- The Top of Curb Face
- The Ramp Centerline

Note that the sequence and the Prompt verbiage is flexible and was defined by the creator of the Civil Cell.

The image to the right shows the reference elements in the north curb return.

**NOTE:** Civil Cells work by replicating geometry rules from the reference element's geometry, NOT from their Names or Feature Definitions.

**NOTE:** You can Place a Civil Cell on geometry based on completely different Workspace definitions: it's the geometry that matters. For example, if Bentley or a Department of Transportation has a Civil Cell that would work on a non-conforming project: the Civil Cell will still work if the Geometry is correct (the resulting feature's symbology will match the source, not the destination's conventions).

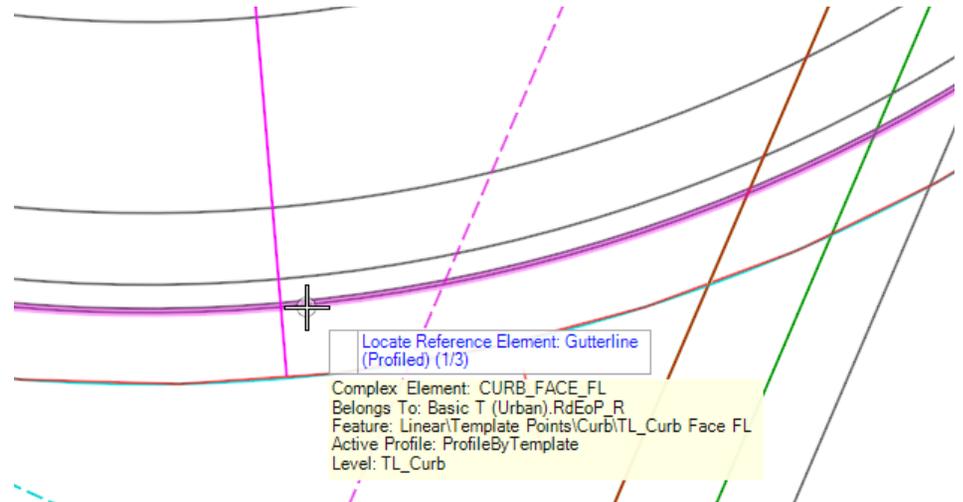


3. Follow the heads-up prompts:

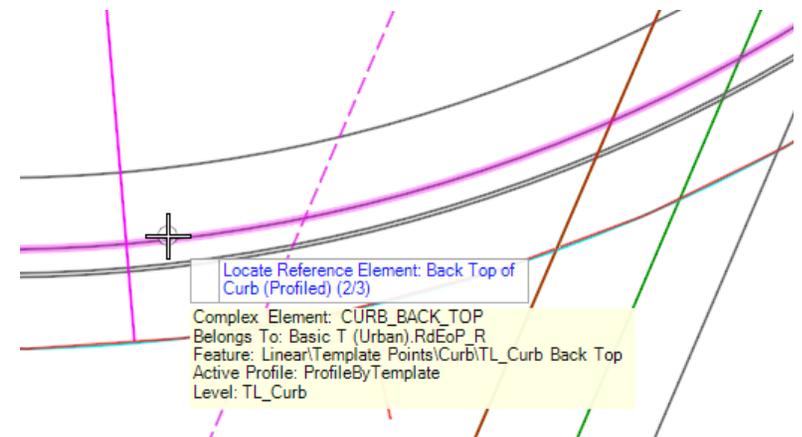
- a. At the *Locate Reference Element: Gutterline (Profiled) (1/3)* prompt (the first of three prompts for reference), select **CURB\_FACE\_FL** for the Gutterline element.

**NOTE:** if you mistakenly pick the Top of Curb, your ramp elevations will be incorrect.

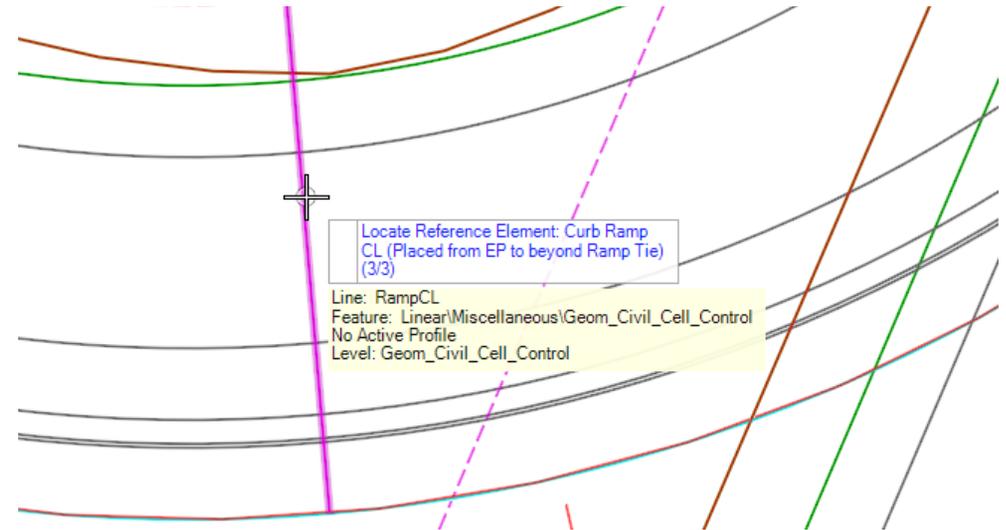
**NOTE:** “(Profiled)” is simply a convention the Civil Cell creator adopted to indicate to the user that the element must have an active Profile (so that it has a vertical reference).



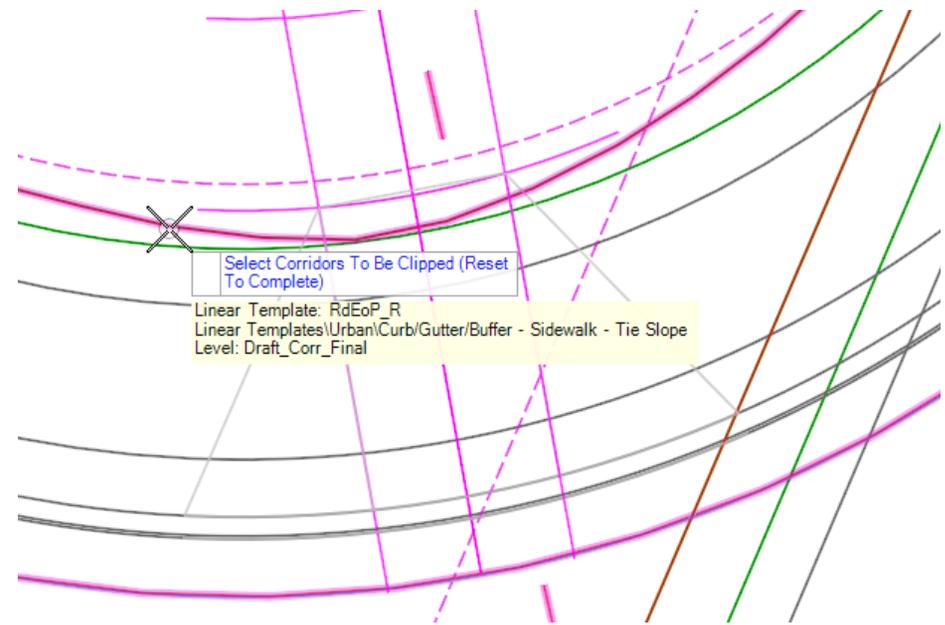
- b. At the *Locate Reference Element: Back Top of Curb (Profiled) (2/3)* prompt, click the **CURB\_BACK\_TOP** element (it is just inside the gutter line).



- c. At the *Locate Reference Element: Ramp CL (Placed from EP to beyond Ramp Tie) (3/3)* prompt, click on the ramp centerline element **RampCL** we recently placed.



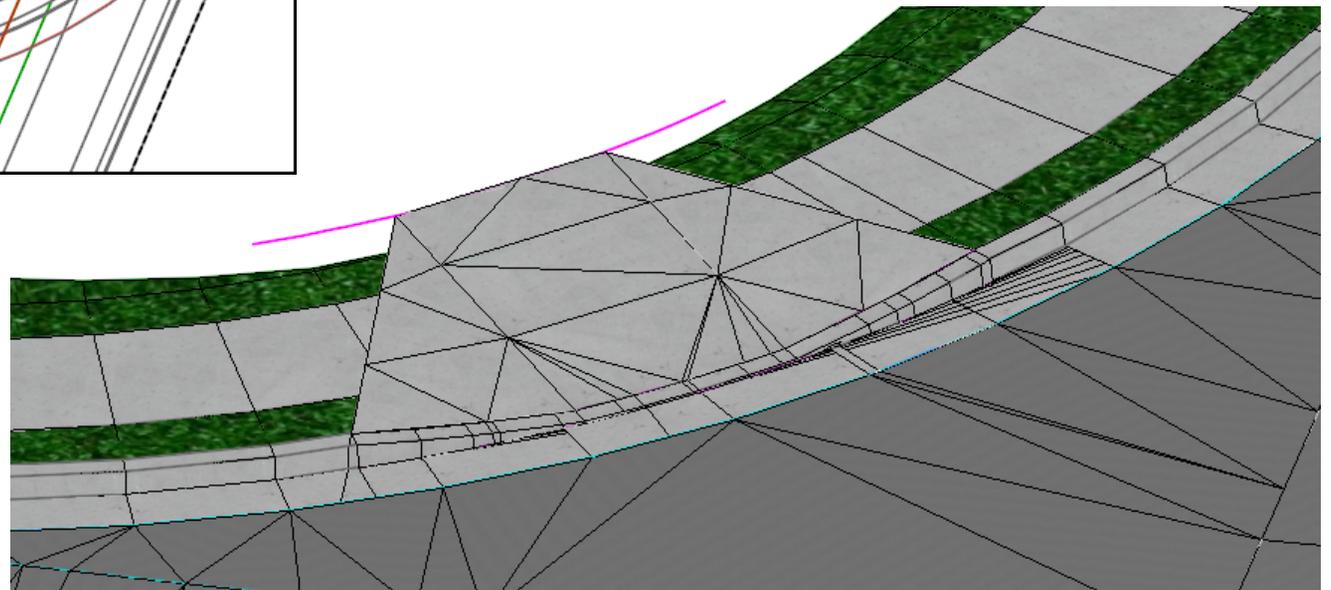
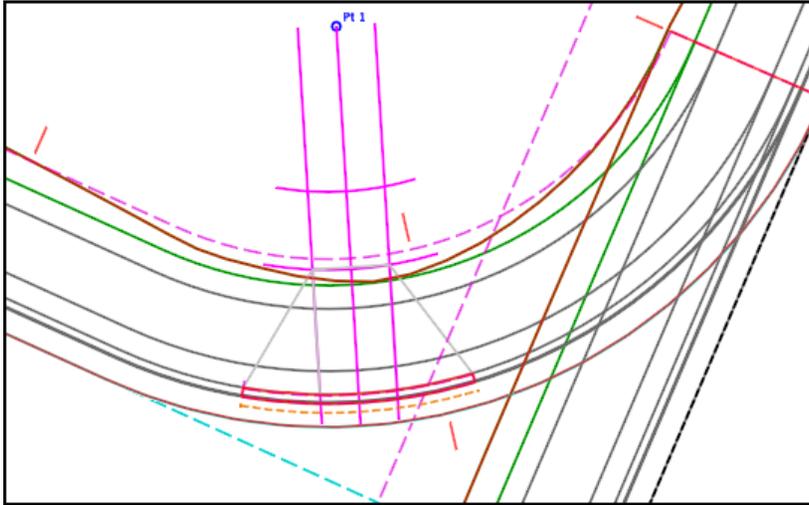
- d. At the *Select Elements to View Alternatives (Reset to Skip)* prompt, click **Reset** because the ramp schematic looks correct.
- e. At the *Select Corridors to clip (Reset to Complete)* prompt, click **Left-Click** on the **Linear Template: RdEoP\_R**, then **Reset** to accept the clipping.
- f. **Left-Click** to *Accept* the civil cell placement



The sidewalk ramp is placed into the model.

**NOTE:** If the civil cell's placement is not correct, undo the command by going to *Undo* from the Quick Access tool bar or key in **CTRL+z**. You can also delete the Civil Cell from the *Explorer*.

The final clipped ramp should look similar to the following images.

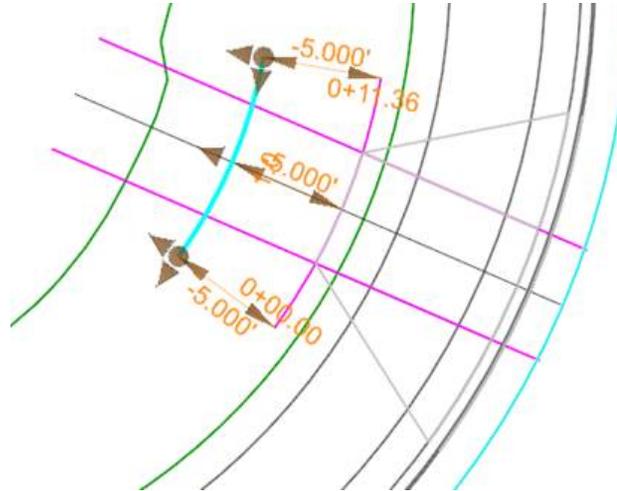


## Review and Edit the Cell Landing Area

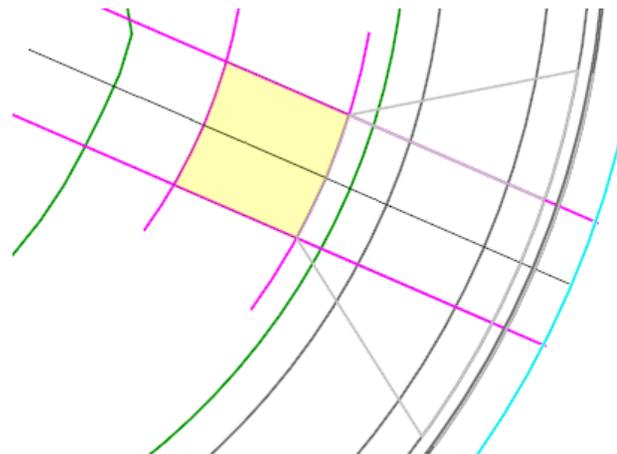
Review the results of the ramp placement and modify the ramp slopes and depth.



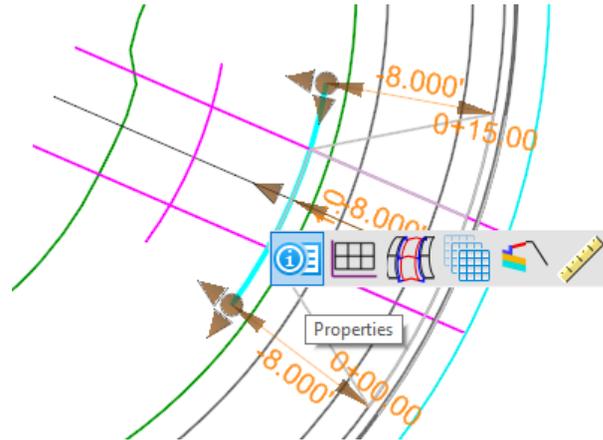
1. **Select** the *CC\_TurningSpace* element as shown highlighted below.



2. Observe the **-5.00'** [-1.500m] dimension. This element is meant as a guide for the landing area beyond the ramp. The landing area is shown highlighted below.



3. Select the element *CC\_Slope-Ctrl* as shown highlighted below and choose **Properties** from the context menu.



4. Change the *Slope* from 2% to **-2%** to match the slope of the template through the sidewalk from the Back Top of Curb (**CURB\_BACK\_TOP**).

Length	11.358'
Length Along	15.005'
> Start Point	512722.847,634865.185'
> End Point	512727.297,634875.528'
Length	11.358'

Feature Name	CC_Slope-Ctrl
Feature Definition	Geom_Civil_Cell_Control

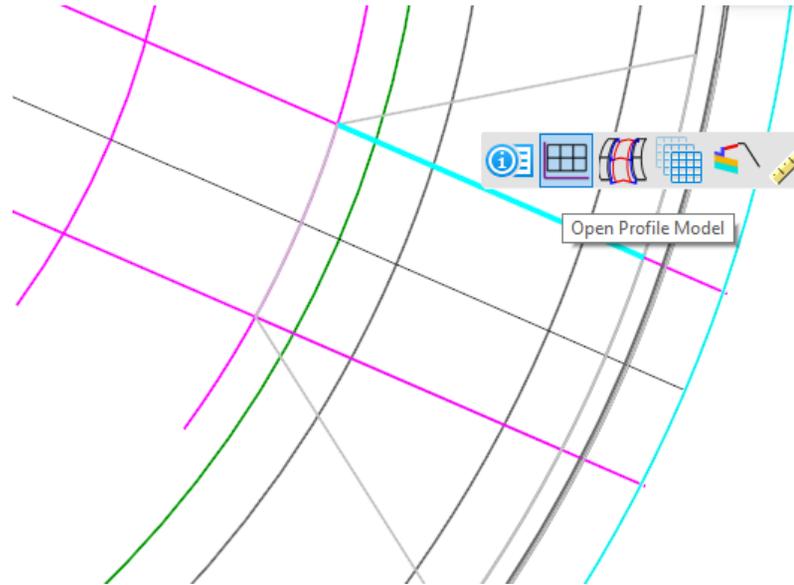
Slope	<b>-2%</b>
Vertical Offset	0.000'
Profile Adjustment	None
Point Selection On De	All

> Start Point	<input type="checkbox"/>	512722.847,634865.1
> End Point	<input type="checkbox"/>	512727.297,634875.5

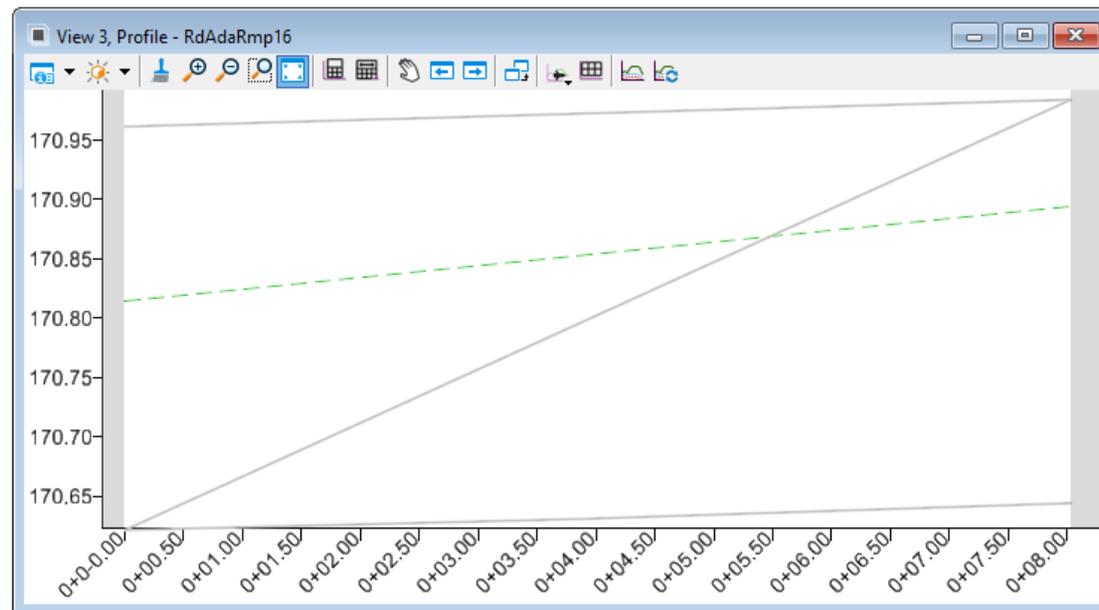
Method	Single Offset
Offset	-8.000'
Start Distance	0+00.00
End Distance	0+15.00
Ratio	1:0
Spiralized	No
Type	Base Geometry



5. Select the highlighted element shown below (*RdAdaRmp16* or similar) and then choose **Open Profile Model** from the context menu.



6. Left-click in **View 3** when prompted to *Select or Open View*.

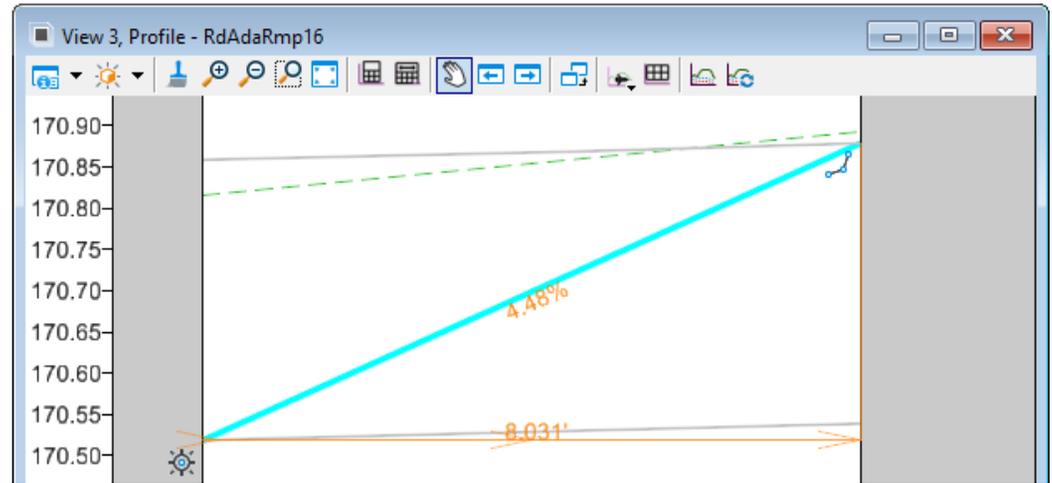




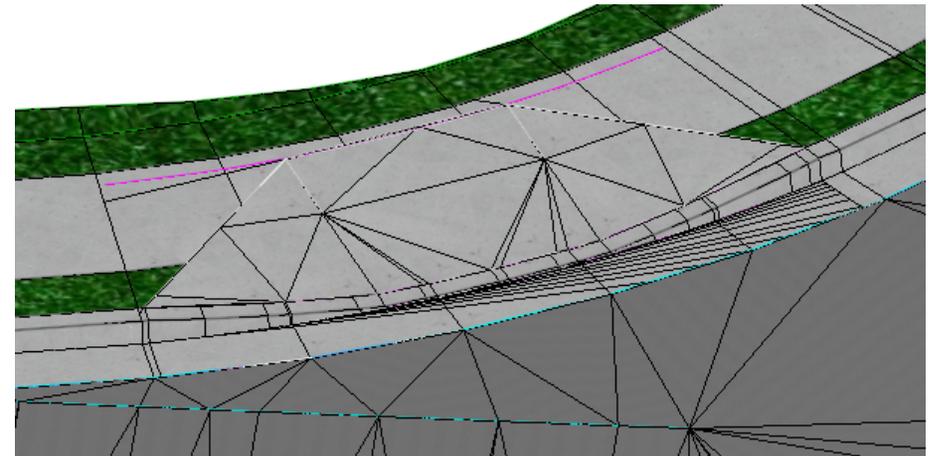
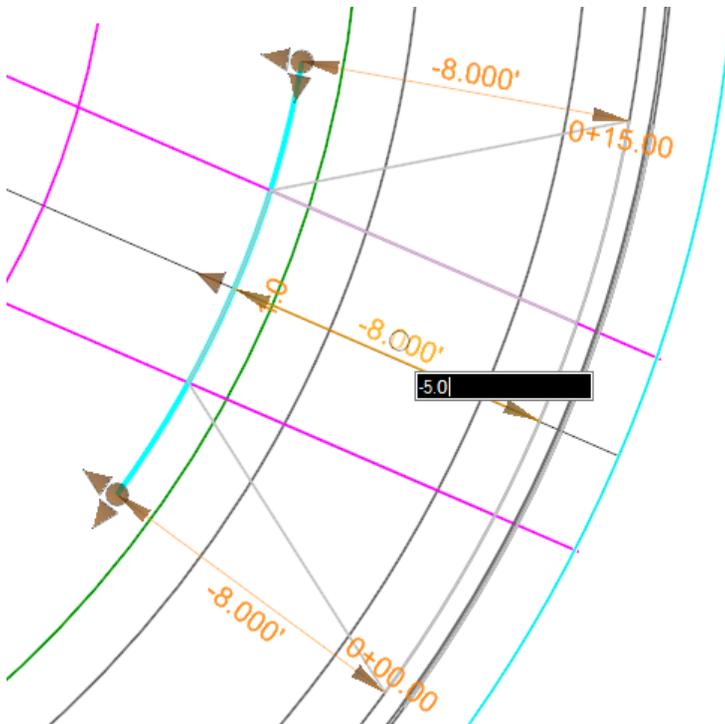
7. Select the **Active Profile** element in *View 3* (shown highlighted below) to review its slope. Your slope will most likely vary slightly from what is shown in the manual because of the different location of the Ramp CL that you created earlier.

In the next two steps, we will show you how to control this slope to achieve the slope you desire.

8. In the plan view, select the *CC-Slope-Ctrl* element again and change its value from **-8.0'** [-2.4m] to **-5.0'** [-1.5m].

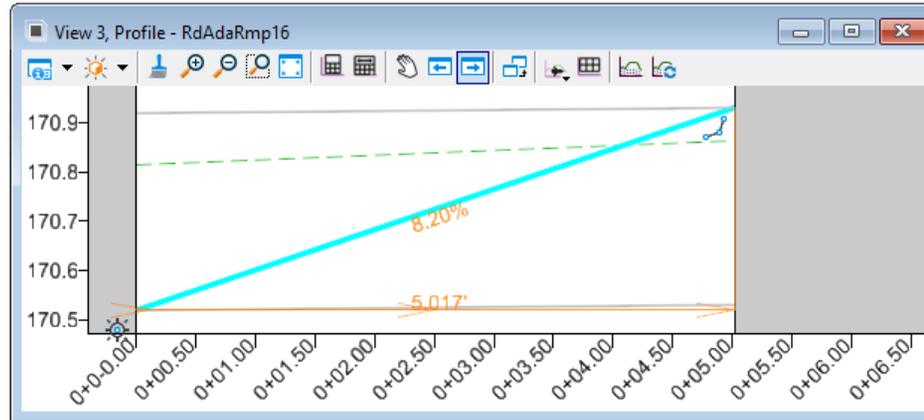


In a later step, we will adjust the sidewalk to match the up properly with the ramp.

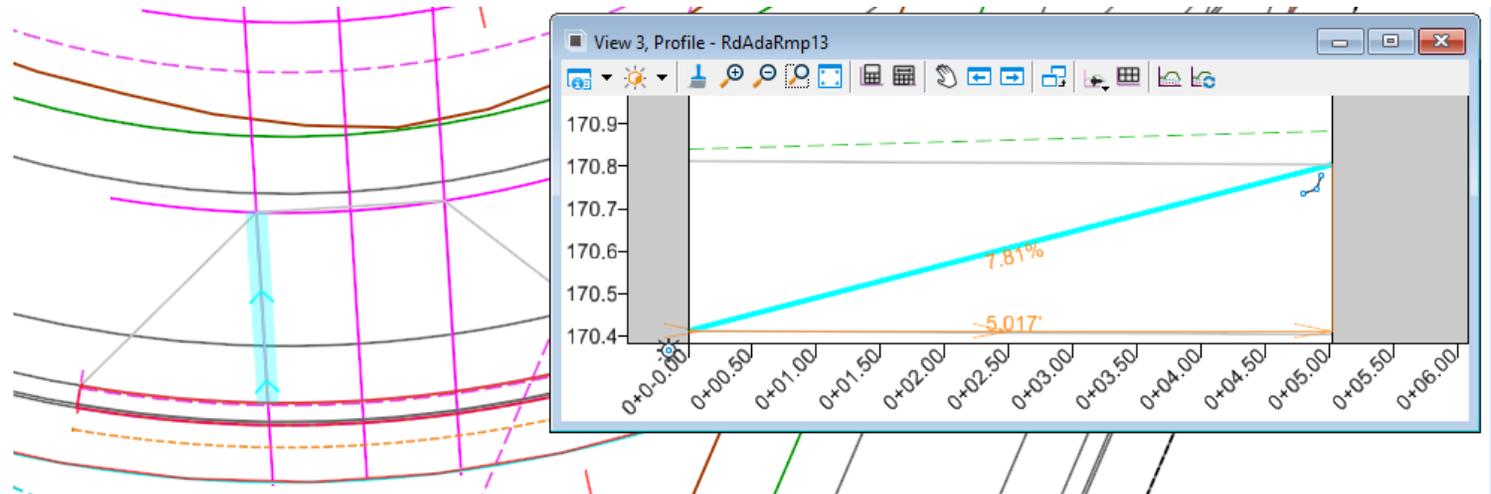




9. Select the **Active Profile** element again in **View 3** and review the slope.



10. Although optional for this class, you would also open the profile view of the plan view element opposite of the one just reviewed as shown below to check its slope as well.



11. **Close View 3.**

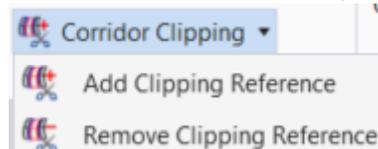
## Move the Sidewalk Ramp and Edit Curb Return

The Sidewalk Ramp was built centered on the ramp center line feature. What happens if we move the center line? What happens if the curb return radius changes?

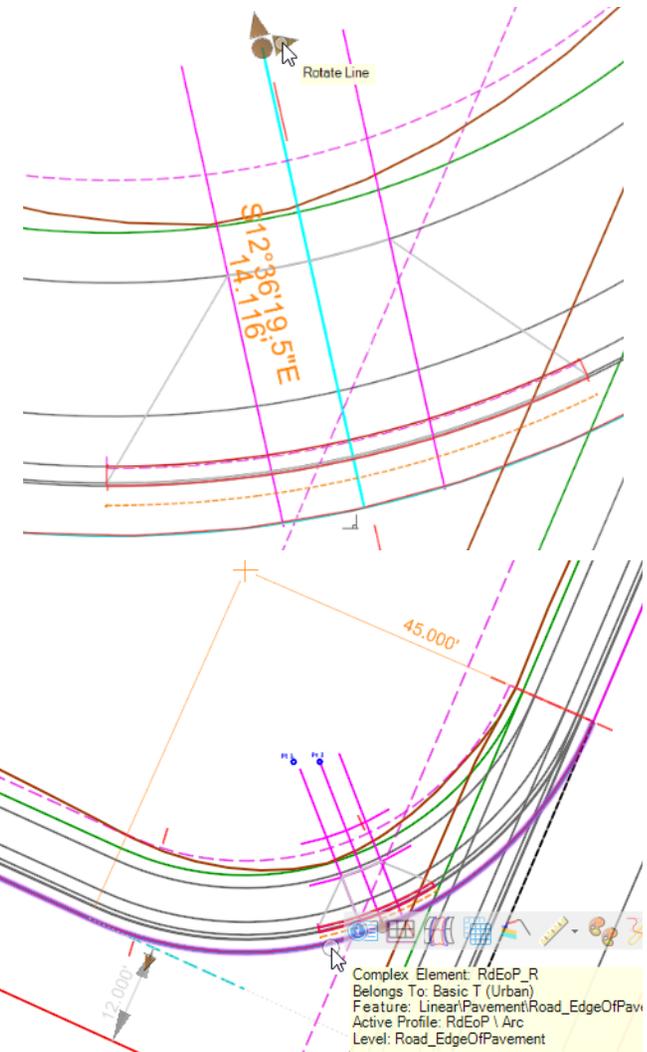
1. Move the sidewalk ramp.
  - a. **Click** the Ramp Centerline
  - b. **Click** onto the circle or the “sideways arrow” at the end of the end of the Ramp centerline.
  - c. Move this to a new position by *snapping* to **Pt 2** to relocate the line and ramp.
2. Click on the Edge of Pavement curb return (**RdEoP\_R**). Change the Radius to **45 ft** [15m].

Notice the ramp slides along with the centerline and that the ramp follows the curb in event of geometry changes (= automatic updates).

3. **Instructor Note:** You may need to re-clip the **London Rd.** corridor and the **Basic T (Urban)** Civil Cell.
  - a. Use the Corridor Clipping tools to remove the London Rd. clipping reference from the **Basic T (Urban)** Civil Cell.



- b. Re-clip **London Rd.** by using **Add Clipping Reference**.
- c. You may also need to re-clip the **Curb Ramp** Civil Cell and the **Linear Template: RdEoP\_R** to clean up the model.
- d. Follow same steps as **3a.** and **3b.** to re-clip.



## Skills Assessment

The questions below will test your retention of the skills covered in this course.

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1. When a Civil Cell is selected for placement the preview window shows red and black lines. Select the statement that best describe these lines..
  - a. The Red lines represent the primary elements and the Black lines represent the secondary elements.
  - b. The Red lines represent reference elements that must exist and be selected when the civil cell is placed and the Black lines represent elements that are created by the civil cell.
  - c. The Red lines represent elements in the civil cell that can be changed after placement, the Black lines cannot be changed.
2. A civil cell will automatically adapt to the geometry even if it is created in a different orientation or direction than was used when defining the civil cell..
  - a. True
  - b. False
3. A Corridor in a reference file can be clipped when placing a civil cell..
  - a. True, Any corridor can be clipped when placing a civil cell.
  - b. False, Only corridors in the active file can be clipped when placing a civil cell.

## Skills Assessment - Answers

The answers to the skills assessment questions are highlighted below.

---

1. When a Civil Cell is selected for placement the preview window shows red and black lines. Select the statement that best describe these lines.
  - a. The Red lines represent the primary elements and the Black lines represent the secondary elements.
  - b. **The Red lines represent reference elements that must exist and be selected when the civil cell is placed and the Black lines represent elements that are created by the civil cell.**
  - c. The Red lines represent elements in the civil cell that can be changed after placement, the Black lines cannot be changed.
2. A civil cell will automatically adapt to the geometry even if it is created in a different orientation or direction than was used when defining the civil cell.
  - a. **True**
  - b. False
3. A Corridor in a reference file can be clipped when placing a civil cell.
  - a. True, Any corridor can be clipped when placing a civil cell.
  - b. **False, Only corridors in the active file can be clipped when placing a civil cell.**

## Summary

In this course you have learned how to select and place a civil cell into different configurations using multiple references. Various civil cells were used to model intersections and ramps. In addition to placing civil cells, you also learned how to make edits to the civil cells to change the default values for radius and width, as well as how to move the location and insert points.

