U.S. Department of Transportation
Federal Highway Administration

OpenRoads Designer User Manual

Chapter 9

CORRIDORS

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Chapter 9 Corridors

This chapter covers the creation and modification of Corridors and Linear Templates.

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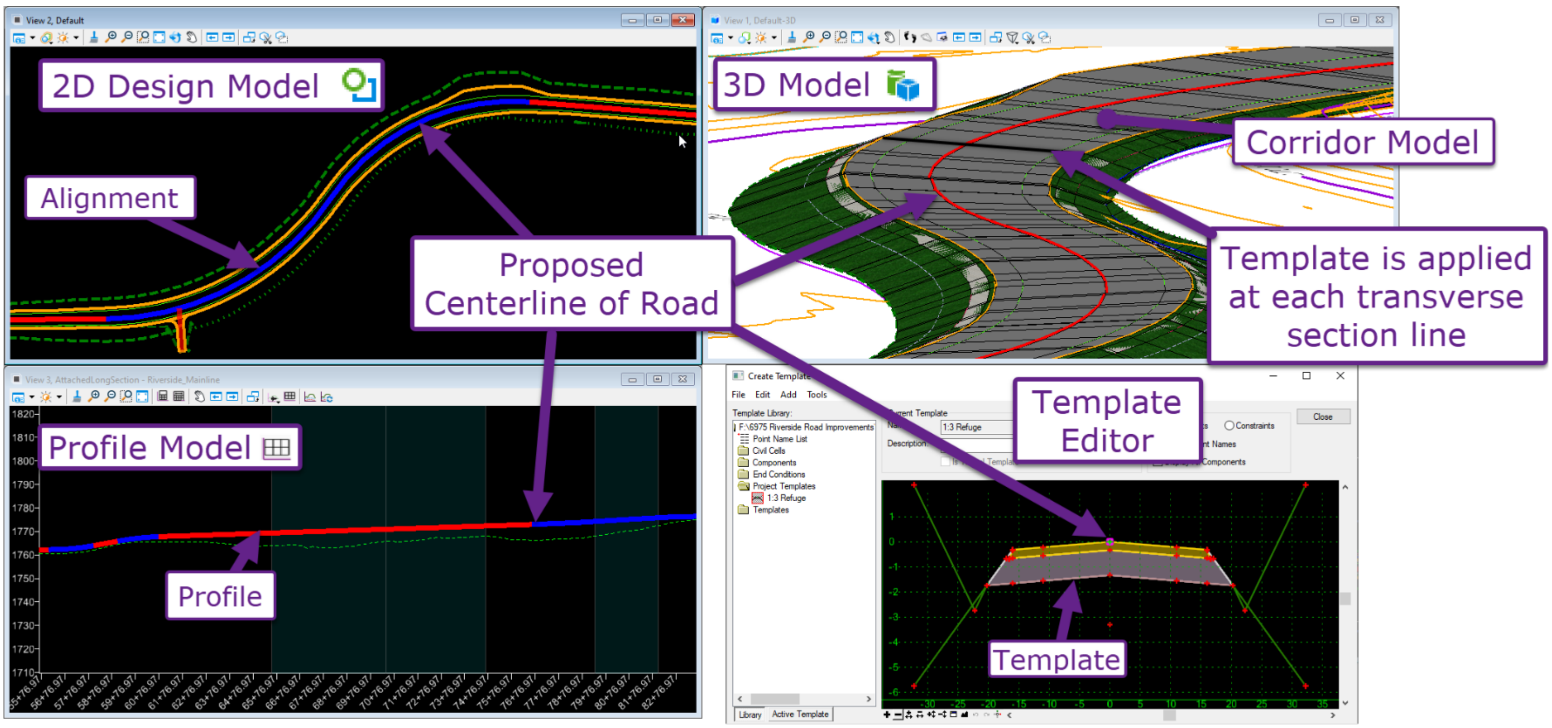
9A – INTRODUCTION TO CORRIDOR MODELING

Before creating a Corridor model, the User must create an Alignment, Profile, and Template. For a high-level overview of a Corridor model and the elements used to build a Corridor model, see *8A - Introduction to Templates and the Corridor*.

For detailed information on the elements used to create a Corridor, see the listed sections:

Alignment – See *7D – Horizontal Geometry*
Profile – See *7F – Vertical Geometry*
Template – See *Chapter 8 – Templates*



9A.1 Corridor Processing Considerations

9A.1.a Maximum Corridor Length Recommendation

For the current version of the ORD Software, it is recommended that a single Corridor entity does NOT exceed **2 Miles** in length. For example, if the mainline length of the project is 6-miles, it is recommended that three separate Corridors are created. See *2F.2.a Alignment and Corridor Maximum Length Recommendation*.

Corridors that are longer than **2 Miles** may experience LONG processing times when edits are made directly to the Corridor or elements associated with the Corridor (i.e., the Alignment and Profile). The complexity of the Alignment, Profile, and Templates used for a Corridor will affect processing times. For example, if the Template contains numerous Points, Components, and Display Rules, the Corridor processing times will be affected. See *2F.2.c ORD Element Processing Speed Considerations*. Similarly, when Corridor Objects are used to manipulate the Corridor (i.e., Point Control, Parametric Constraints, End Condition Exceptions, Curve Widening, Superelevation, etc..), processing times will increase.

9A.1.b   Multiple ORD Files for Corridors

To increase speeds and allow multiple Users to work on a Project, it is recommended that longer Corridors and mainline Corridors are placed in their own individual ORD Files.

All intersections and approach roads along the length of the mainline can be placed in a single ORD File (typically named the _cvc.dgn file). However, it may be prudent to place more complex intersection models in an individual ORD File. Similarly, if a project contains numerous approaches/intersections along the mainline, it may be prudent to group together 10-15 approach models into a single ORD File.

If a roadway project contains a major site design feature – such as a parking lot – it is recommended that the site design model be given its own ORD File.

9A.1.c   Internal Processing of the Corridor

This subsection will explain the sequence in which the Corridor processes the Template and external elements – such as Point Controls. This information can be inciteful when trying to troubleshoot a Corridor that uses advanced Templates and numerous Corridor Objects (See *9C.1 Corridor Graphical Elements: Template Geometry & Corridor Objects*).

When a Corridor is processed, the sequence at which Template data is applied at each Template Drop location is as follows:

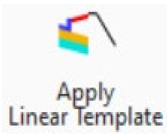
1. The Template is ”dropped” at a particular station location using the Template Point geometry set in the Template Editor.
2. **Parametric Constraints** are applied (See *9G.4 Parametric Constraints*). If the Corridor has been setup with Parametric Constraints, then Template Points are rearranged according to the set Parametric Constraints values.
3. **Horizontal Feature Constraints** are applied (See *8C.6.a.xiv Horizontal Feature Constraint*). If Horizontal Feature Constraints are setup in the Corridor Template to seek out horizontal elements in the *2D Design Model*.
4. **Point Controls** are applied (See *9G.5 Point Control*). The Template Points are repositioned to meet Corridor set Point Controls.
5. **Display Rules** are analyzed based on the current position of Template Points (See *8D.2 Display Rules*).
6. **End Condition** Template Points seek out the Target (which is typically the Existing Ground Terrain Model).

9A.2   Civil Models: Corridors vs Linear Template vs Surface Template

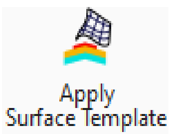
Corridors and **Linear Templates** are very similar in concept. They are both used to model features that are linear in nature - such as a road or retaining wall. However, Linear Templates are intended for simple modeling operations and do NOT contain advanced functionality that is available for Corridors. Before creating a Corridor or Linear Template, the User must create an Alignment, Profile, and Template.

Surface Templates are generally used to represent non-linear features – such as a parking lot. Surface Templates are applied to a Terrain Model to model the material underneath the surface of the Terrain Model. For example, a proposed Terrain Model may be created to represent the asphalt surface for a parking lot. A Surface Template is then applied to model the material depths under the surface (i.e., 4” of asphalt and 6” of aggregate). Surface Template creation is discussed in *Chapter 11 – Site Modeling*.

Corridors are used to create MAJOR modeling features that are linear in nature - such as mainline roadways, approach/intersection roads, retaining walls, and major culverts. When compared to Linear Templates, Corridors have more manipulation options and functionality.

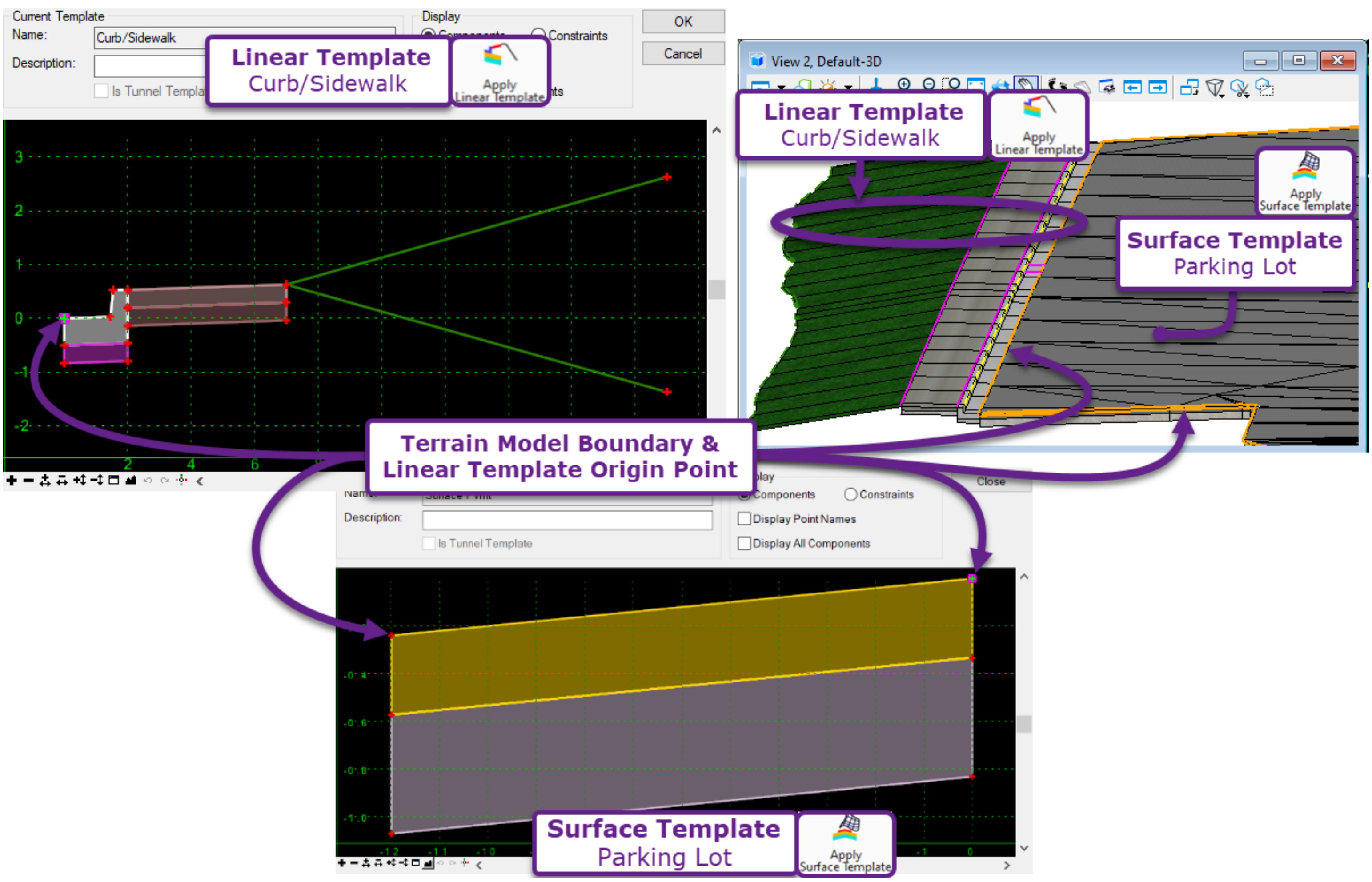


Linear Templates are used to create MINOR modeling features that are linear in nature As shown in the graphic below, a Linear Template can be used to model a curb, sidewalk, and cut/fill end condition. Commonly, Linear Templates are placed along the boundary of a Terrain Model/Surface Template. This configuration is convenient because the boundary element of the Terrain Model also doubles as the Alignment/Profile for the Linear Template.



Surface Templates are used to create modeling features that are non-linear – such a parking lot. Also, the apron of an approach road or driveway is typically modeled with a Surface Template.

Surface Template Models can also be used to model, quantify, and account for existing unsuitable materials, such as existing pavement, topsoil, and duff. The unsuitable material modeling process is shown in *20E – Unsuitable Material Modeling and Calculations*.



9A.3 Strategies for Addressing Deviations to the Corridor

It is extremely unlikely that a simple Corridor, which contains a single Template, can accurately model all design scenarios and typically sections necessary for a roadway project. Most likely, a Corridor will need some modifications to address typical section deviations that may arise along the length of the Corridor.

9A.3.a Major and Minor Deviations to the Corridor

The varying design scenarios encountered along the length of the project are classified as either **MINOR** or **MAJOR** deviations to the Corridor.

> ***BEST PRACTICE:*** Anticipate MINOR and MAJOR deviations when creating the Project Template. See *8A.4.a Project Template Considerations and Best Practice*.

MINOR Deviation: A design scenario that requires a MINOR deviation can be addressed by using Corridor manipulation tools to alter certain Template Point Constraint values. A common example of a MINOR deviation is altering a road lane width. Using either a Point Control or Parametric Constraint, the horizontal constraint value of the lane edge Template Point can be varied to narrow or widen a road lane.

If a Point Control is used, then an ORD Element is drawn out in the *2D Design Model*, and the lane edge Template Point is programmed to follow the horizontal path of the ORD Element. For more information on Point Controls, see *9G.5 Point Control*.

If a Parametric Constraint is used, then the Horizontal constraint value is numerical altered over a specified station range (i.e., changed from 12' to 10' from station 10+50 to 11+00). For more information on Parametric Constraints, see *9G.4 Parametric Constraints*.

MAJOR Deviations: Major Deviations are classified as design scenarios where the Corridor Template is significantly rearranged and/or Template Components are added/subtracted. For example, a MAJOR deviation scenario would be a section of road that will be sub-excavated. To model the sub-excavation, Template Components representing sub-excavation materials would need to be added to the Corridor Template. This example of a MAJOR deviation can be addressed by creating a whole new Template that is only used in the vicinity of the MAJOR Deviation OR by creating a Template that can conditionally display sub-excavation Components using Display Rules that are triggered by Null Points.

Alternatively, a new Template could be created for a MAJOR deviation, but this method is NOT preferred. If possible, create an Advanced Template programmed with Display Rules. See *8F.3 Advanced Road Template with Guardrail and Display Rules*.

A special case of a MAJOR deviation is when the End Conditions Components need to be significantly rearranged for a station range. The *End Condition Exception* tool can be used to add Template Points and change Constraint Types for the End Conditions Components. See *9G.6 End Condition Exception*. Please note that the *End Condition Exception* tool CANNOT add Conventional Template Components to the ends of a Template. For example, it is NOT possible to add retaining wall Components to a Template with this tool.

Tools For Addressing Deviations to the Corridor	
MINOR Deviation tools:	**MAJOR Deviation tools:**
Point Control tool (*9G.5*)	Create a NEW Template to be applied only in the vicinity of the deviation.
Horizontal Feature Constraint tool (*8C.6.a.xiv* & *9G.9*)	Use or create a Template with Display Rules and Null Point triggers. See *11A.5.c Use a Template containing Display Rules to Address Overlap*.
Parametric Constraint tool (*9G.4*)	*End Condition Exception* tool - End Condition Components ONLY (*9G.6*)

9A.3.b Approaches to Common Corridor Modeling Scenarios

In roadway modeling, there are often several tools and/or workflows that can address a single design scenario. The table below lists many design scenarios encountered in roadway modeling and presents solutions to address these scenarios. When possible, the User is encouraged to find a modeling solution that does NOT involve creating a new Template or using *the Edit Template Drop* tool to override a Template.

Common Corridor Modeling Scenarios				
Design Scenario:	**Modeling Tools:**	**Description:**	**Pros:**	**Cons:**
New Typical Section: Significant change in Template dimensions and the need to add Template Points and/or Components. Examples include sub-excavation section or change in roadway width over a substantial length.	Create a New Template Drop Section (*9E.4*)	A new Template is created in the Template Editor to represent the new Roadways section. The New Template Drop tool (9E.4) is used to apply the new Template to the Corridor	All Templates are well organized in both the Template Library and Corridor.	More time consuming when compared to copying and overriding a Template.
	Copy a Template Drop Section (*9E.5*) → Edit (Override) Template Drop tool (*9E.6*)	A new Template Drop Section is made by copying an existing Template. The copied Template is overridden with the Edit Template Drop Tool.	Allows the User to quickly test and experiment with different Template configurations	The overridden Template contains the same name as the original. Also, the overridden is NOT found in the Template Library. See *9E.6.a*.
Transition between differing Road Sections	Create a Transition Section Between Template Sections (*9E.9*)	A gap is placed between two Template Drop Sections. The Create Transition tool is used to automatically facilitate the transition.	Once Transition Sections are setup, they can be easily manipulated.	The Create Transition tool is NOT User friendly and can be difficult to function correctly.
	Point Control (*9G.5*) and/or Parametric Constraints (*9G.4*) to manually configure the transition	Two Template Drop Sections are abutting. Point Controls and Parametric Constraints are used to manually facilitate transition geometry.	Custom transitions can be achieved – Such as non-linear transitions.	Time consuming to set up. Multiple Point Control and/or Parametric needed.
Change in Road Width The road width needs to deviate for a short segments. Examples include tapering roadway or turn outs.	Parametric Constraint (*9G.4*)	The Horizontal Constraint Value of the Template Point that controls width is numerically changed for a specified station range.	Quick to setup.	Only linear transitions and parallel sections can be created. Multiple uses may be required to achieve results similar to Point Control.
	Point Control (*9G.5*) or Horizontal Feature Constraint (*8C.6.a.xiv* & *9G.9*)	A graphical element is manually drawn by the User. The Template Point that controls width will follow the graphical element.	Custom transitions and edge of road shapes can be created	Can be more time consuming to setup.

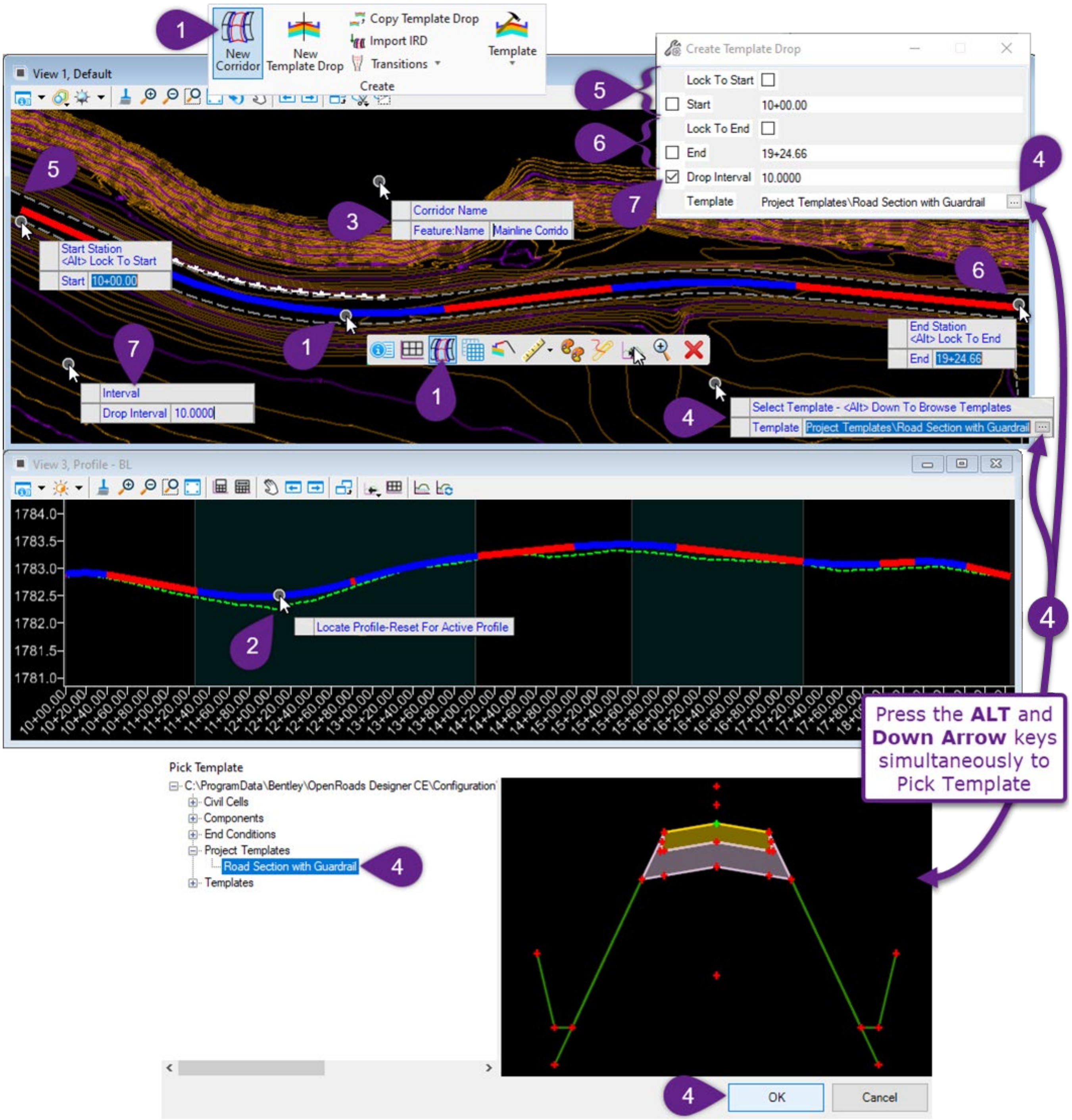
Common Corridor Modeling Scenarios				
Design Scenario:	**Modeling Tools:**	**Description:**	**Pros:**	**Cons:**
Change a Ditch Configuration: The depth, width, and/or slope configuration of a ditch needs to deviate for a short segment.	Parametric Constraint (*9G.4*)	The Horizontal, Vertical, or Slope constraint value for the ditch Template Point are numerically changed for specified station range.	Quick to setup.	Only linear transitions and constant Constraint values can be used.
	Point Control (*9G.5*)	An ORD Element and Profile is manually drawn for custom ditch geometry. The ditch Template Point will follow the horizontal and/or vertical position of the ORD Element.	Custom ditch lines can be created.	Can be more time consuming to setup.
	End Condition Exception (*9G.6*)	The ditch End Condition Component can be completely replaced or reconfigured for a specified station range.	Entirely new ditch geometry can be used without creating a new Template	
Change Steepness of Cut/Fill Slopes The slope of the Cut/Fill needs to deviate for a short segment to avoid an undesirable catch location or sliver fill.	Parametric Constraint (*9G.4*)	The Slope Constraint Values that controls the Cut/Fill Slope steepness is numerically changed for a set station range.	Quick to setup.	
	End Condition Exception (*9G.6*)	The Cut/Fill Slope or End Condition Component can be completely replaced or reconfigured.	Entirely new End Condition geometry can be created without creating a new Template.	
Undesirable Cut/Fill Catch Location for a Short Station Range	Single Station Template Override (Edit Station tool) (*9F.5*)	A single Template Drop location is overridden to manually place the Cut/Fill catch point.	Can quickly rectify sliver fills and single station abnormalities.	The Template Drop location becomes static and will not react to edits to the Corridor. See *9F.5*.
	Parametric Constraint (*9G.4*)	The Slope Constraint Value that controls the Cut/Fill Slope steepness is numerically changed to catch in a desired location. Only applied over a very short segment.	This tool will not make the section static.	
Guardrail Section	Create new Templates with Guardrail and Shoulder specific Components	Multiple Templates are used in the vicinity of the Guardrail. ORD Elements are used to draw the transition geometry. Point Controls are used to follow the transition geometry.	This method is more accessible to the new User.	When guardrail sections are needed on both sides of the road, Template management becomes challenging.
	Create an Advanced Template with Display Rules to conditionally display Guardrail and Shoulder Components. (See *8F.3*)	A single Template is created that can accommodate both Typical road conditions and react to Guardrail segments. Graphical elements are drawn to represent the shoulder and guardrail position. The graphical elements are added to Corridor as Horizontal Feature Constraints.	This method provides a streamlined and organized way to model if multiple guardrail sections are needed for a project.	Can be time consuming and difficult to setup. Advanced Template concepts must be understood by the User.

9B.1 Create a New Corridor

This workflow demonstrates how to create a Corridor for a road with the *New Corridor* tool.

The following procedures must be completed BEFORE a Corridor is created with the *New Corridor* tool:

1. Create a Horizontal Alignment. See *7D – Horizontal Geometry*.
2. Create a Profile and ensure that it is the Active Profile. See *7F – Vertical Geometry*.
3. Create the desired Template(s) for the Corridor. **Ensure that the Project Template Library has been loaded in the Template Editor**. See *Chapter 8 – Template Library*.



1	Left-Click and hover over the Alignment with the mouse cursor to bring up *Pop-Up Icon Menu*. Select *Create Corridor*. **(PREFERED METHOD)**  ***ALTERNATIVELY:*** Select the *New Corridor* tool from the Ribbon: [***OpenRoads Modeling*** → ***Corridor*** → ***Create***].
2	*Prompt: Locate Profile – Reset for Active Profile*. In the Profile Model of the Alignment, Left-Click on the desired Profile ***ALTERNATIVELY:*** Right-Click (reset) in the *View* to automatically select the active Profile assigned to the Alignment..
3	*Prompt: Corridor Name*. Assign the Corridor a Name that meets the FLH Naming Convection for Proposed ORD Features. An example of an appropriate Corridor Name would be "COR_MAIN_Riverside". Left-click in the *View* window to advance to the next prompt. See *3F – Naming Convention for Proposed ORD Features*.
4	*Prompt: Select Template - <ALT> Down to Browse Templates*. Press the ALT key and DOWN ARROW key simultaneously to browse Templates within the currently loaded Project Template Library. Left-Click on the desired Template and press OK. Left-Click in the *View* to advance to the next prompt. ***WARNING:*** Ensure the correct Project Template Library is loaded. If not, exit out of the corridor creation workflow. Enter the Template Editor and load the correct Project Template Library. See *8A.1 Accessing the Template Editor and Template Libraries*.
5	*Prompt: Start Station. <ALT> Lock to Start*. With the mouse cursor, hover over the desired starting point for the corridor and left-click to accept. OR Press the ALT key to lock the start point to the start point of the Horizontal Alignment. Left-Click in the *View* to advance to the next prompt.
6	*Prompt: End Station. <ALT> Lock to End.* With the mouse cursor, hover over the desired ending point for the corridor and left-click to accept. Alternatively, press the ALT key to lock the end point to the end point of the Horizontal Alignment.
7	*Prompt: Interval*. Key-in the desired *Drop Interval*. Left-Click in the *View* to create the corridor. The Template *Drop Interval* controls maximum distance between Corridor processing locations. The *Interval* controls how *dense* the Corridor Model is and affects processing requirements. For example, if the Interval is set to 10, the Corridor will be processed at least once every 10'. ***WARNING:*** The Template Drop Interval will affect which cross section STATIONS are shown in Cross Section sheet production. See *9E.2 Aligning Template Drop Interval for Cross Section Production*. If the desire is to show Cross Sections at even stations of 25' in production (i.e., 10+00, 10+25, 10+50), then the interval should be set to a number divisible by 25 (i.e., 12.5 or 25). ***NOTE:*** When a Corridor is initially created, it will be automatically assigned to the *Design* Feature Definition, which contains a *Template Drop Multiplier* of 2. The Feature Definition of the Corridor will affect Interval frequency due to the *Template Drop Multiplier* and other properties such as *Densify Horizontal*. See *9D.2 Corridor Feature Definitions: Design and Final*.

9B.2 Create a New Linear Template

9B.2.a Linear Templates vs Corridors

Linear Templates operate similarly to Corridors. However, the key advantage to Linear Templates is that they have the ability to be reflected over the Alignment. See *9B.2.c Reflect a Linear Template After Creation*. Using a Linear Template, a single Template can be placed on the right or left side of an Alignment, no matter the arrangement of the Template in the Template Editor.

Also, Corridors have more manipulation functionality than Linear Templates. This is because Linear Templates are intended to model relatively simple features - such as simple curb/sidewalk, minor Culverts, and intersection/approach returns.

The following manipulation tools (Corridor Objects) are available for Corridors but NOT Linear Templates.

- **Template Drop Sections** (Multiple) – Only ONE Template can be used per Linear Template model.
- **Superelevation tools –** Superelevation Lanes CANNOT be applied to Linear Templates
- **Curve Widening –** Curve Widening CANNOT be applied to Linear Templates.
- **Key Station tools –** For Linear Templates, specific Template Drop locations (Key Stations) CANNOT be programmed.
- **End Condition Exceptions –** End Condition Exceptions are NOT available.
- **Secondary Alignments –** Secondary Alignments are NOT available
- **Corridor Reports –** Reports can NOT be generated for Linear Templates
- **Overlay Vertical Adjustment** – This tool is NOT available for Linear Templates.

The ONLY manipulation tools available for Linear Templates are:

- **Parametric Constraints**
- **Point Controls**

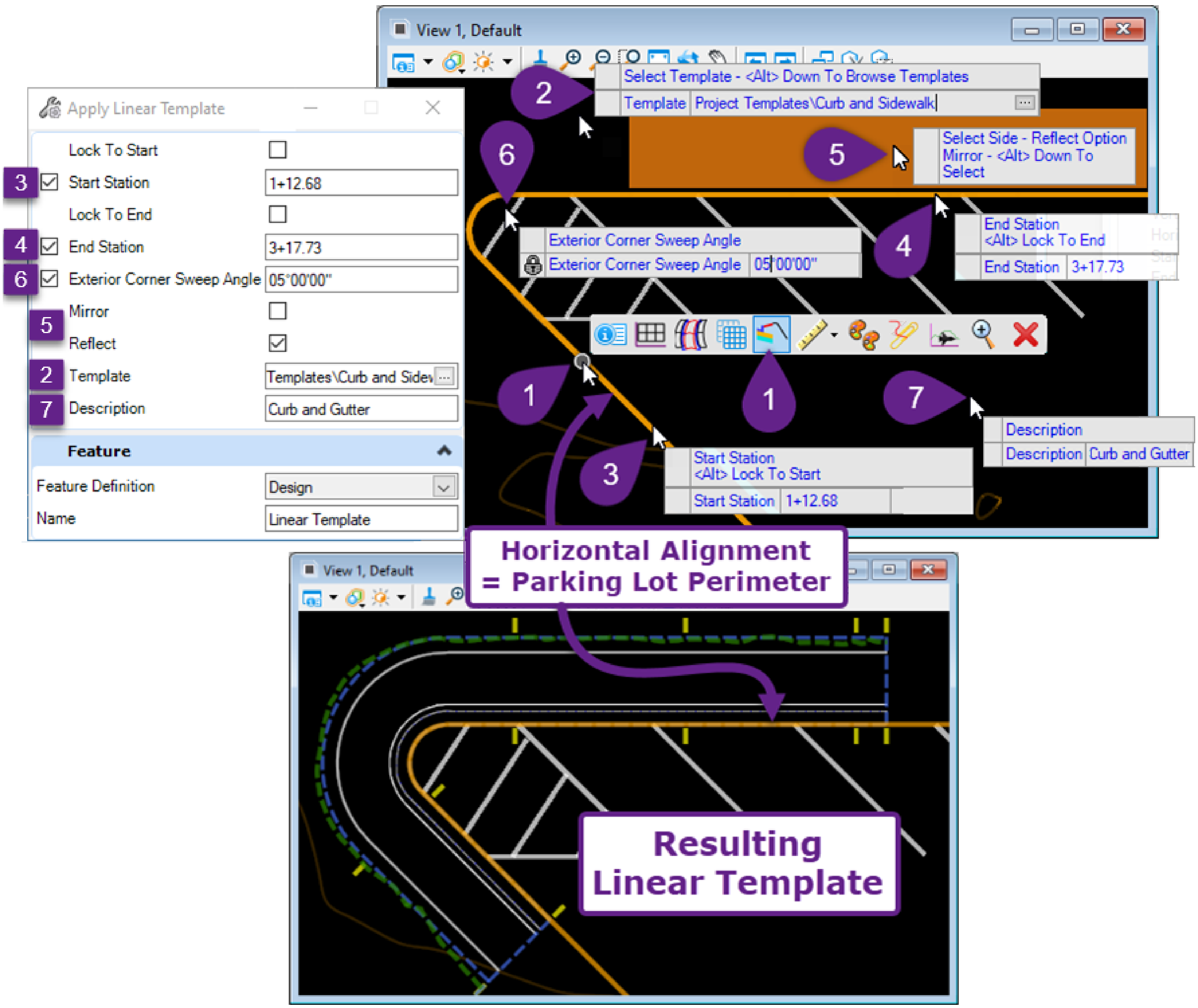
9B.2.b Create a New Linear Template Workflow

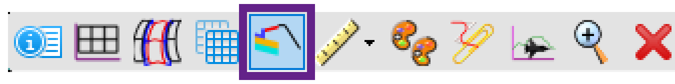
Creating a Linear Template is almost the exact same process as creating a Corridor – with a few notable exceptions:

1. The Profile to be used with a Linear Template CANNOT be manually picked by the User. The *Active Profile* for the Horizontal Alignment is automatically used.
2. The Interval spacing for a Linear Template is NOT specified in creation of the Linear Template. The resulting Interval spacing is based on the **Stroking Definition** properties, which are set in the Properties box when the Horizontal Alignment is selected.
3. Templates can be *reflected* or *mirrored* over the Horizontal Alignment in Linear Template Creation.

TIP: After creation, if the Linear Template is positioned on the wrong side of Horizontal Alignment, then it can be flipped to the correct side in the Properties Box. Access the Properties Box for a Linear Template by selecting the Handle element. See *9B.2.c Reflect a Linear Template After Creation*.

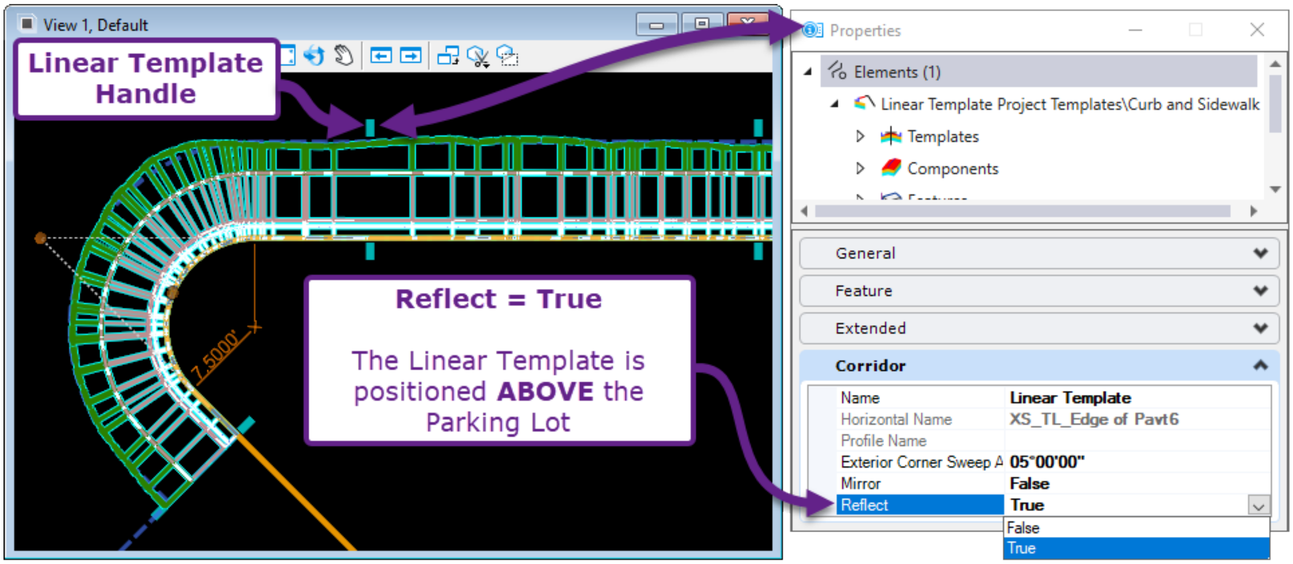
This workflow demonstrates how to create a Linear Template with the *Apply Linear Template* tool. The Linear Template will be used to model a Curb/Sidewalk template that borders a parking lot.

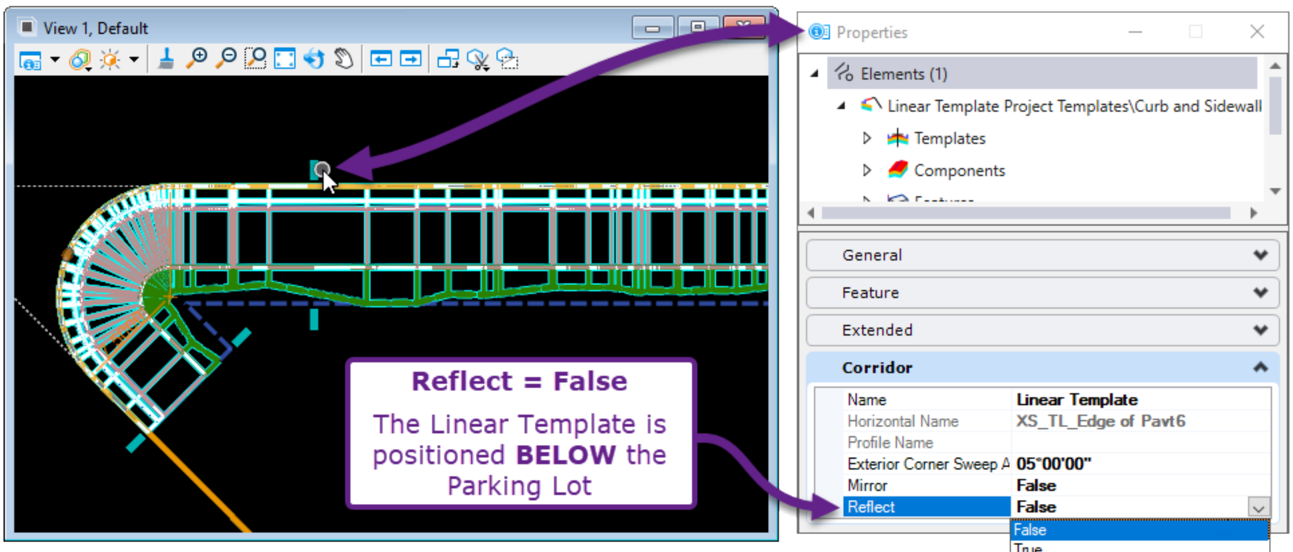


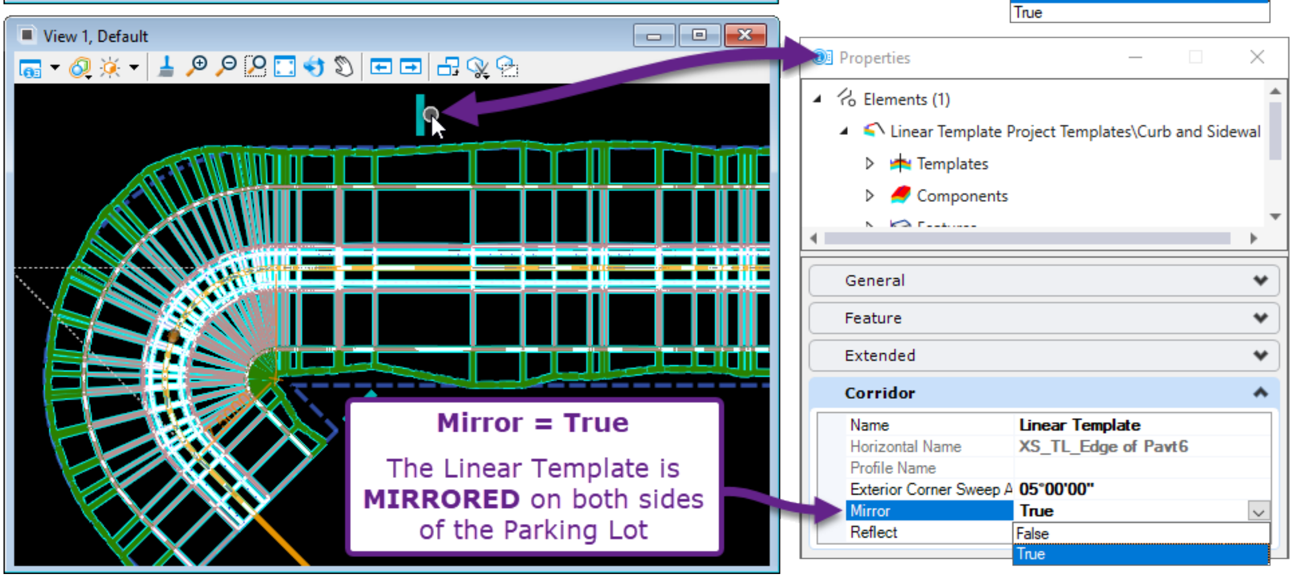
1	Left-Click and hover over the Alignment (in this case the Edge of Parking Lot) with the mouse cursor to bring up *Pop-Up Icon Menu*. Select *Apply Linear Template*. **(PREFERED METHOD)** **ALTERNATIVELY:**  From the Ribbon, select the *Apply Linear Template* tool: [**OpenRoads Modeling** → **Model Detailing** → **3D Tools**].
2	*Prompt: Select Template - <ALT> Down to Browse Templates*. Press the ALT key and DOWN ARROW key simultaneously to select a Template form the Template Library. Left-Click in the *View* to advance to the next prompt. ***WARNING:*** Ensure the correct Project Template Library is loaded. If not, exit out of the Linear Template creation workflow. Enter the Template Editor and load the correct Project Template Library. See *8A.1 Accessing the Template Editor and Template Libraries*.
3	*Prompt: Start Station. <ALT> Lock to Start*. With the mouse cursor, hover over the desired starting point for the Linear Template and left-click to accept. **ALTERNATIVELY:** Press the ALT key to lock the start point to the start point of the Horizontal Alignment. Left-Click in the *View* to advance to the next prompt.
4	*Prompt: End Station. <ALT> Lock to End.* With the mouse cursor, hover over the desired ending point for the Linear Template and left-click to accept. ***WARNING:*** Ensure the *End Station* is greater than the *Start Station* before advancing to the next step.
5	*Prompt: Select Side – Reflect Option Mirror - <Alt> Down To Select* – place the mouse cursor to the desired side of the Alignment for Linear Template placement. The dark orange hatch will signify to which side the Linear Template is placed. If the ALT key and DOWN arrow are pressed simultaneously, then the Linear Template will be mirrored and placed on BOTH sides of the Alignment. ***TIP:*** The Linear Template can be *reflected*, *un-reflected,* or *mirrored* after creation – through the Linear Template Handle Properties Box. See *9B.2.c Reflect a Linear Template After Creation*.
6	*Prompt: Exterior Corner Sweep Angle* – This value has an impact on the model density of Linear Template around curves and corners. It is recommended to use the default value of 5°.
7	*Prompt: Description*. If desired, assign the Linear Template a Description.

9B.2.c Reflect a Linear Template After Creation

Occasionally, the Linear Template is created on the unintended side of the Alignment. Instead of deleting the Linear Template and trying to re-create it on the correct side, the Linear Template can be flipped or *Reflected* over the Alignment. The option to *Reflect* the Linear Template is listed in the Properties Box when the Linear Template Handle is selected. Similarly, the Linear Template can be *Mirrored*.







9C – GRAPHICAL DISPLAY OF CORRIDOR GEOMETRY

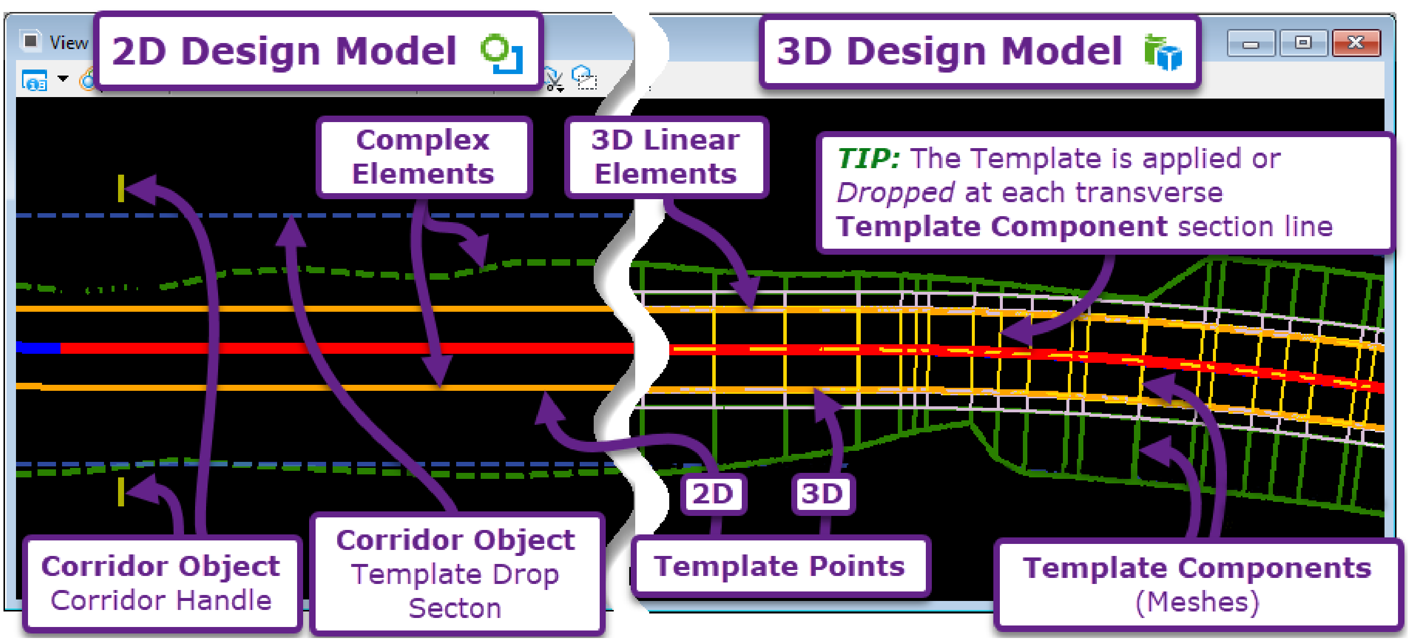
9C.1 Corridor Graphical Elements: Template Geometry and Corridor Objects

When a Corridor is created, **Template Geometry** is created from the selected Corridor Template. Also, **Corridor Objects** are created to manipulate and edit the Corridor.

Template Geometry: Template Geometry are graphical elements that correspond to the Points and Components found in the Template*.* Template Points are converted into 2D and 3D Linear Elements when the Corridor is created. Template Components are converted to 3D Meshes. For a graphical depiction of Template Geometry, see *8A.2.a Template Points and Components*.

> ***NOTE:*** Template Points are created in both the *2D Design Model* and the *3D Design Model*. Template Points created in the *2D Design Model* are referred to as "*Complex Elements*" in the Properties box. Template Points created in the *3D Design Model* are referred to as "*3D Linear Elements*". Template Components are ONLY created in the *3D Design Model*.

Corridor Objects: Corridor Objects are graphical elements that are used to manipulate the Corridor. When a Corridor is created, two *Base Corridor Objects* are created: the *Corridor Handle* and a single *Template Drop* section. The *Corridor Handle* element represents the Corridor entity as a whole. Most edits and manipulations are performed by selecting the *Corridor Handle*. A *Template Drop* Section represent an applied Template. A Corridor may have several Template Drop Sections, with each section element representing a specific Template applied over a set station range. See *9D – The Corridor Handle and Corridor Object Menu*. *Corridor Objects* are only shown in the 2D Design Model.



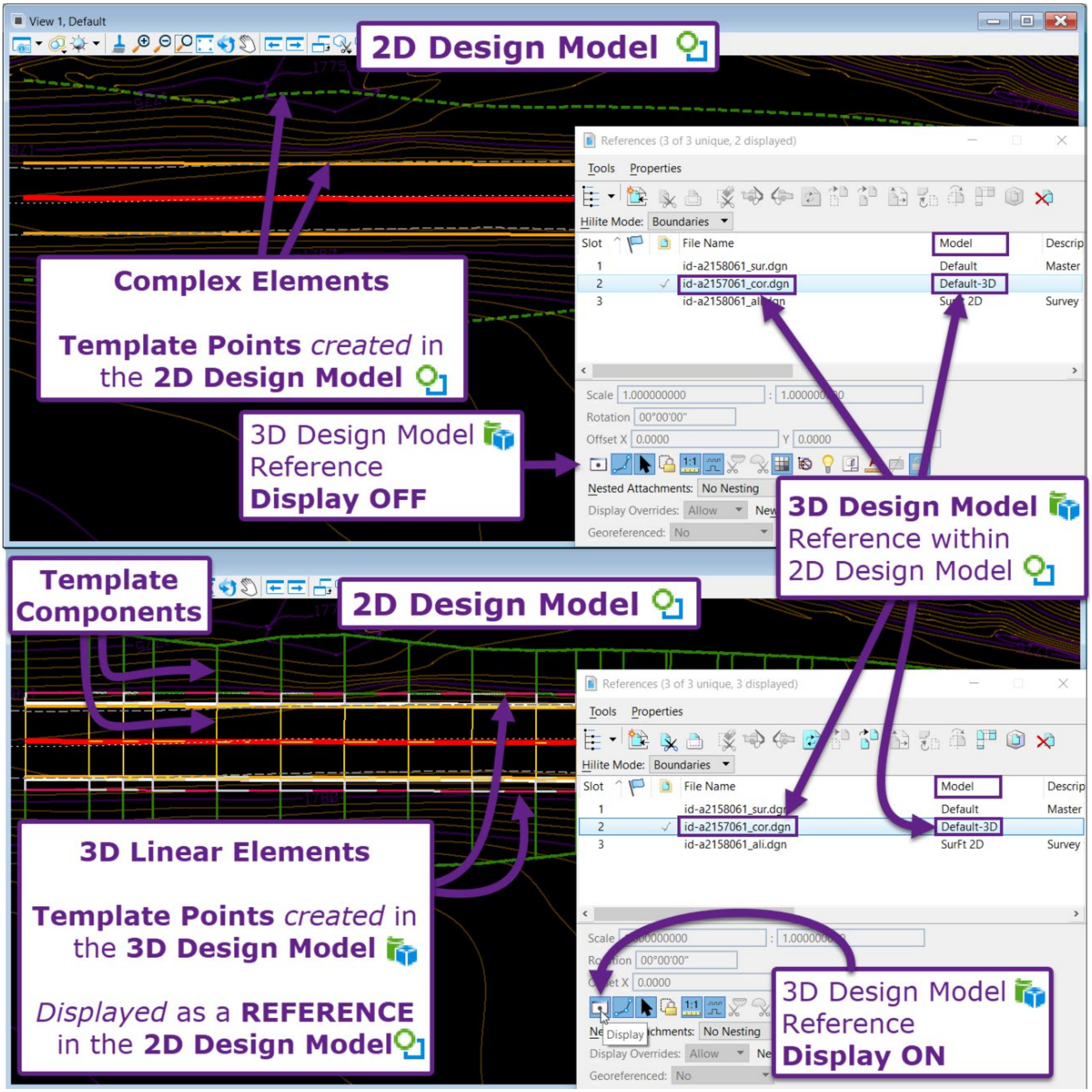
IMPORTANT: Every Point in the Template produces a corresponding 3D Linear Element. However, only a select few Template Points produce Complex Elements in the *2D Design Model*. The **Feature Definition** for a Template Point determines if a 2D Complex Element is created.

Only a select few Feature Definitions in the FLH WorkSpace are setup for 2D Complex Element creation. The select few Feature Definitions correspond with Template Points that are positioned on the top surface of a Template. The process for modifying a Feature Definition to show a Template Point as a 2D Complex Element is shown in *9C.4.a.i Modify a Feature Definition to Create a 2D Complex Element.*

9C.2 Overlapping 2D and 3D Elements in the 2D Design Model

By default, the *3D Design Model* is *referenced* into the *2D Design Model* for an ORD File that contains a Corridor. This means that 3D elements (i.e., 3D Linear Elements and Template Components) can be inadvertently displayed in the 2D Design Model through this reference.

BEST PRACTICE: By default, the *3D Design Model* is turned ON. In the *2D Design Model*, open the References manager and turn OFF the display of the *3D Design Model*. 3D elements displayed in the *2D Design Model* causes distracting and unnecessary clutter.

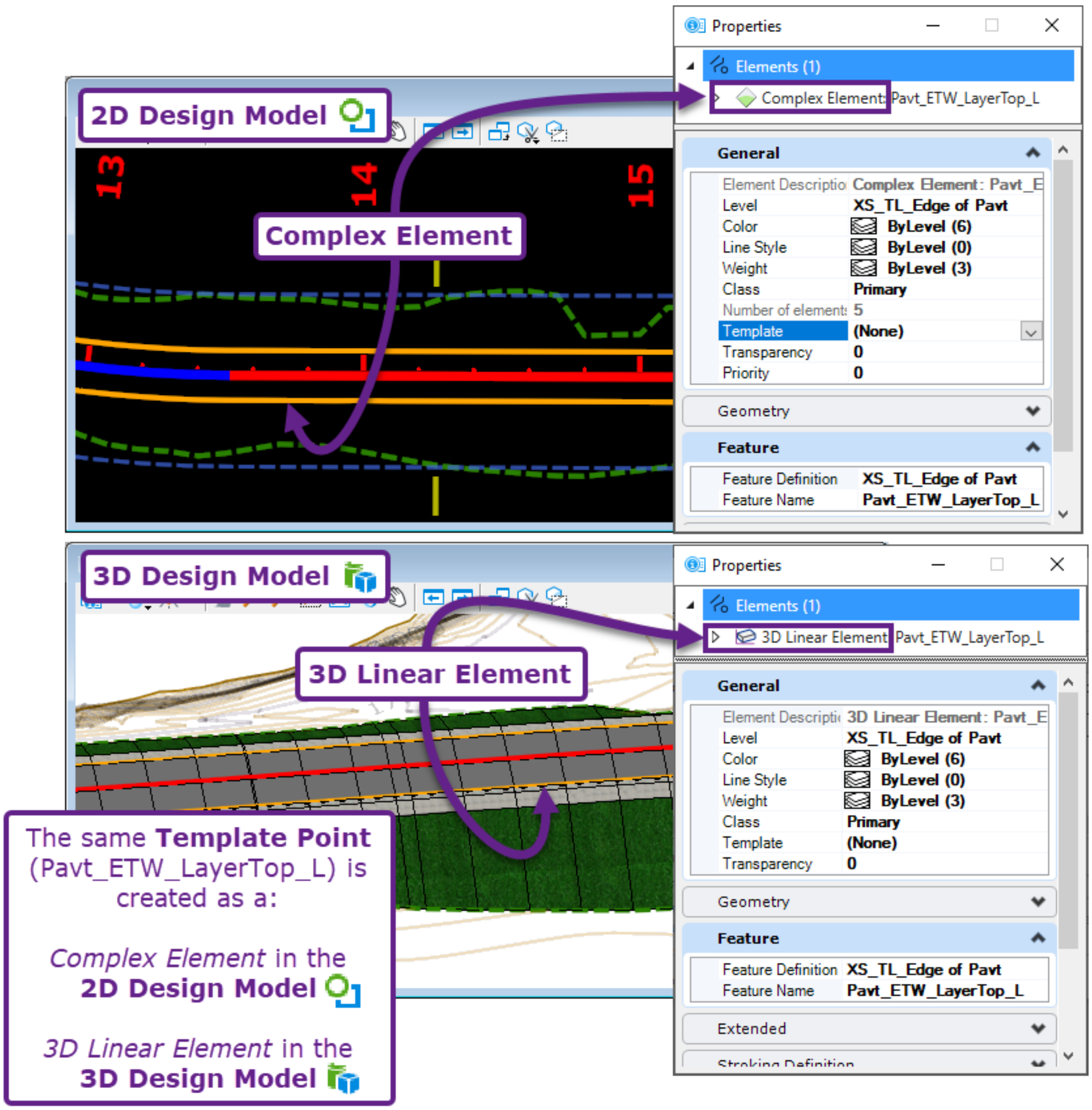


9C.3 2D Complex Elements vs 3D Linear Elements

3D Linear Elements, created by the Corridor, have very little functionality when compared to *2D Complex Elements*. **2D Complex Elements** can be directly used for other modeling task (i.e., intersection design) and are compatible with the following Horizontal and Vertical ORD tools:

- *Offsets and Tapers* tools
- *Project Profile to Element*
- *Profile Intersection Point*
- *Quick Profile Transition*

The tools listed above are commonly used to create supplemental geometry and profiles by referencing a 2D *Complex Element*. For example, the *Profile Intersection Point* can be used to vertically align an Approach Alignment with the *Corridor Complex Element* that represents the Mainline Edge of Road.



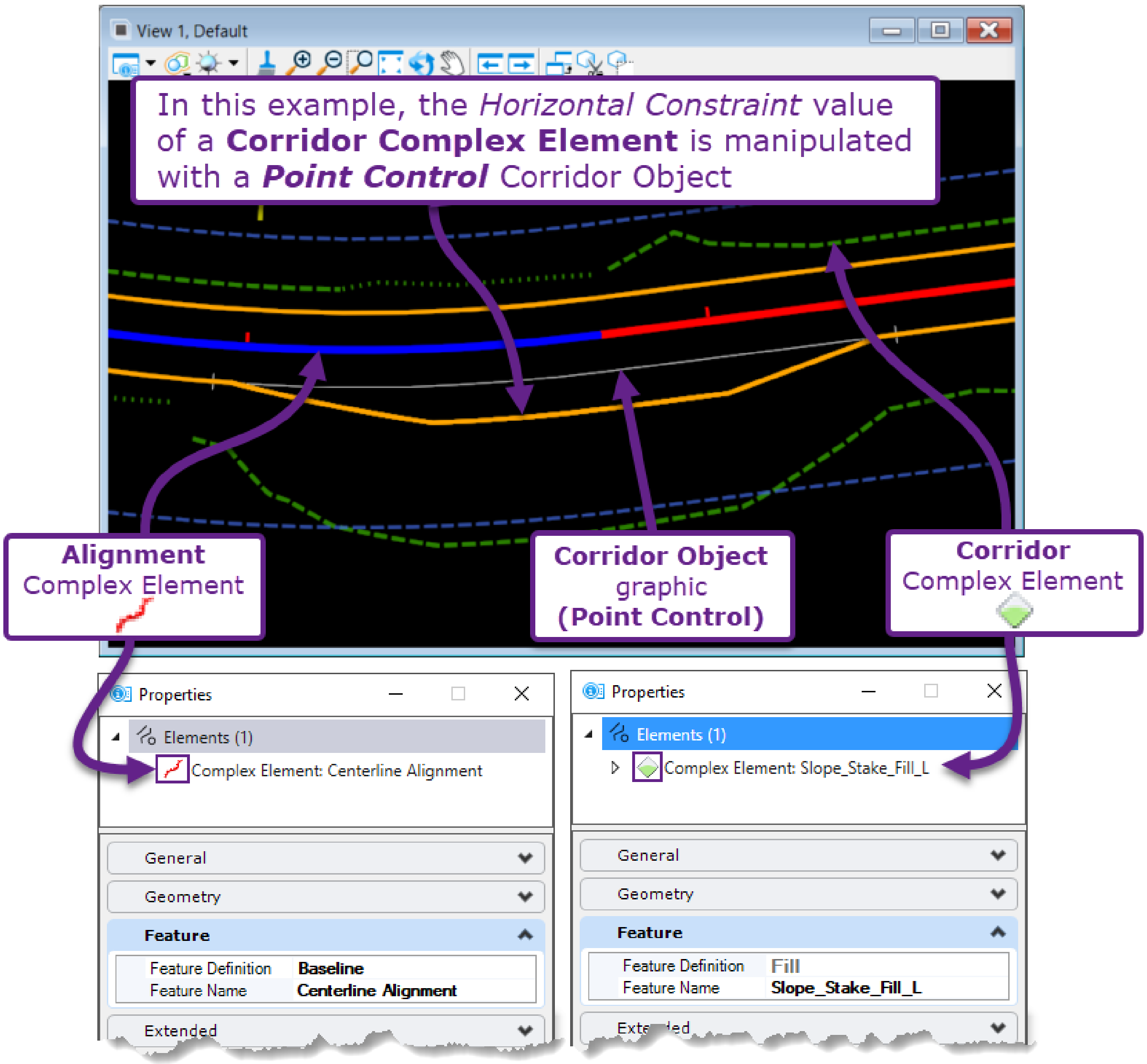
3D Linear Elements are mainly intended for visual reference and are NOT compatible with Horizontal and Vertical ORD tools.

To program a specific Template Point to be created as a *2D Complex Element*, the Feature Definition assigned to the Template Point must be setup appropriately. The procedure for setting up a Feature Definition for 2D Complex Element creation is shown in *9C.4.a.i Modify a Feature Definition to Create a 2D Complex Element.*

9C.3.a Alignment Complex Elements vs Corridor Complex Elements

As opposed to manually created *Alignment* Complex Elements (discussed in *Chapter 7 – Horizontal and Vertical Alignment*), *Corridor* Complex Elements are static elements. *Alignment* and *Corridor* Complex Elements are differentiated and identified in the Properties box. In the Properties box, an *Alignment* Complex Element will have a symbol. A *Corridor* Complex Element will have a symbol.

NOTE: The symbol signifies that a *Complex Element* does NOT contain Civil Rules and therefore is static. These *Complex Elements* CANNOT be directly edited through conventional means, such as grip-edits or Civil Manipulators.

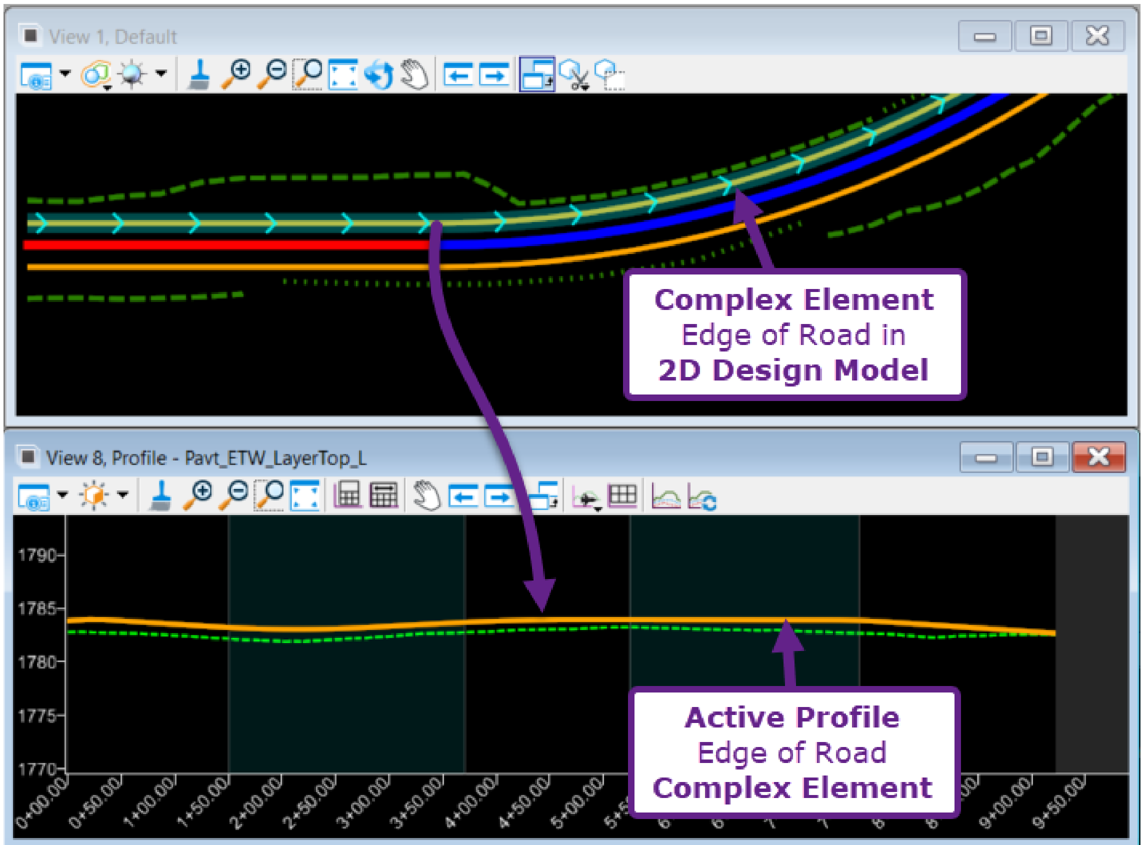


As mentioned above, *Corridor* Complex Elements CANNOT be directly edited. ***Corridor Objects*** are used to manipulate the path of a Complex Element to accommodate minor deviations to the Template geometry configuration. For example, in the graphic shown above, a turn-out is formed in the Edge of Road complex element by using a **Point Control** (Corridor Object). For an explanation of all the different *Corridor Object* tools, see *9G - Corridor Objects – Manipulation of the Corridor*.

9C.3.b Active Profiles for Corridor Complex Elements

Corridor Complex Elements are automatically assigned an *Active Profile* to represent the corresponding Template Point's vertical position. The Profile CANNOT be directly edited.

If the Template Point's vertical position must deviate from the default position in the Template Editor, then the Corridor Object tools are used to manipulate the Profile of a Complex Element. For example, Vertical Point Control and Parametric Constraints can be used to create irregular ditch profiles for a ditch Complex Element. See *9F - Corridor Objects – Manipulation of the Corridor*.



TIP: Because Corridor Complex Elements contain Active Profiles, they can be used with the following *Vertical ORD Element* tools:

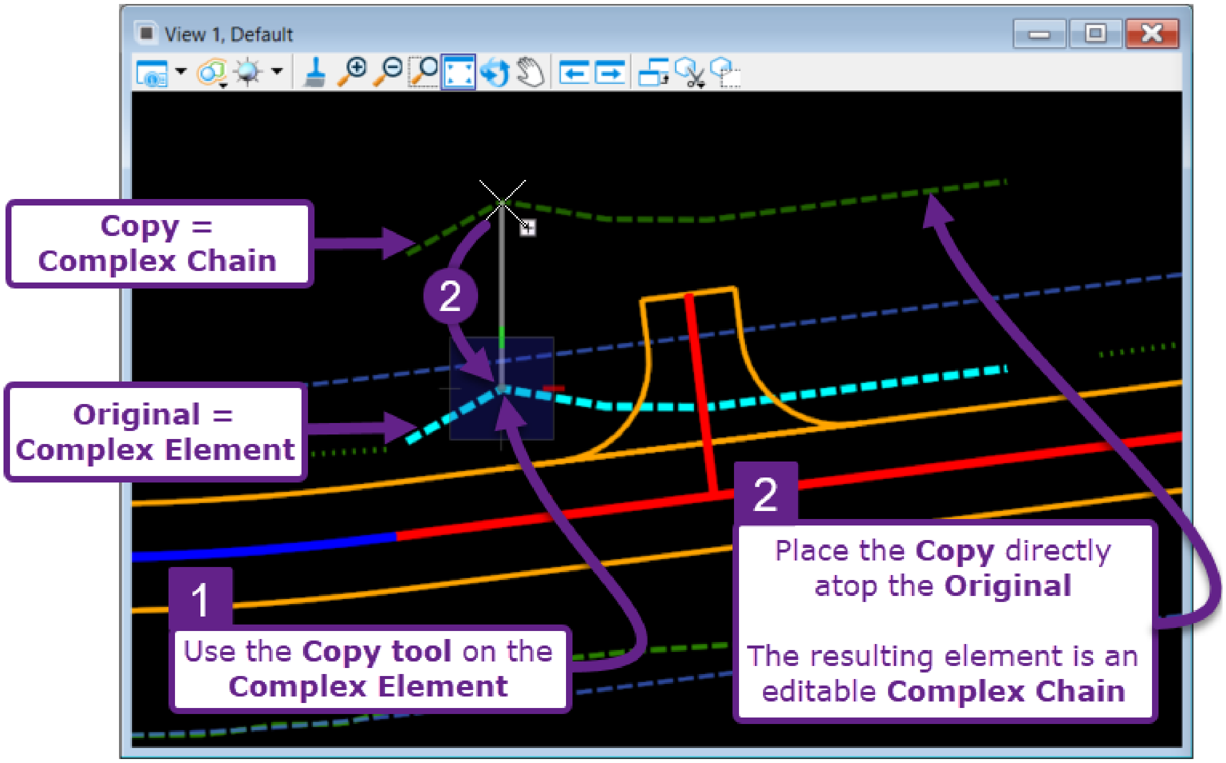
- Project Profile to Element (See *7F.4.c*)
- Project Profile Range to Element (See *7F.4.d*)
- Profile Intersection Point (See *7F.4.f*)
- Quick Profile Transition (See *7F.5.a*)

9C.3.c Convert a Complex Element to a Complex Chain for Direct Manipulation

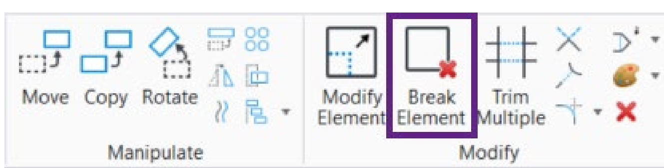
Corridor Complex Elements are ONLY editable with Corridor Objects tools. However, it is possible to use the Copy tool to create a *Complex Chain* from the Corridor Complex Element. The resulting Complex Chain copy has no association with the Corridor or Template, so it can be directly edited, manipulated, and broken.

This process could be used to create linework shapes for calculating quantities or to manually adjust the Cut/Fill around a minor approach – as shown below.

WARNING: This process should only be used if it is unnecessary to create a 3D model of the approach for grading or earthwork calculations.



After this process is performed, *Modify* and *Manipulate* tools can be used on the *Complex Chain*. In this example, the *Break Element* tool would likely be used to split the Fill Slope Stake Limit in the vicinity of the approach.

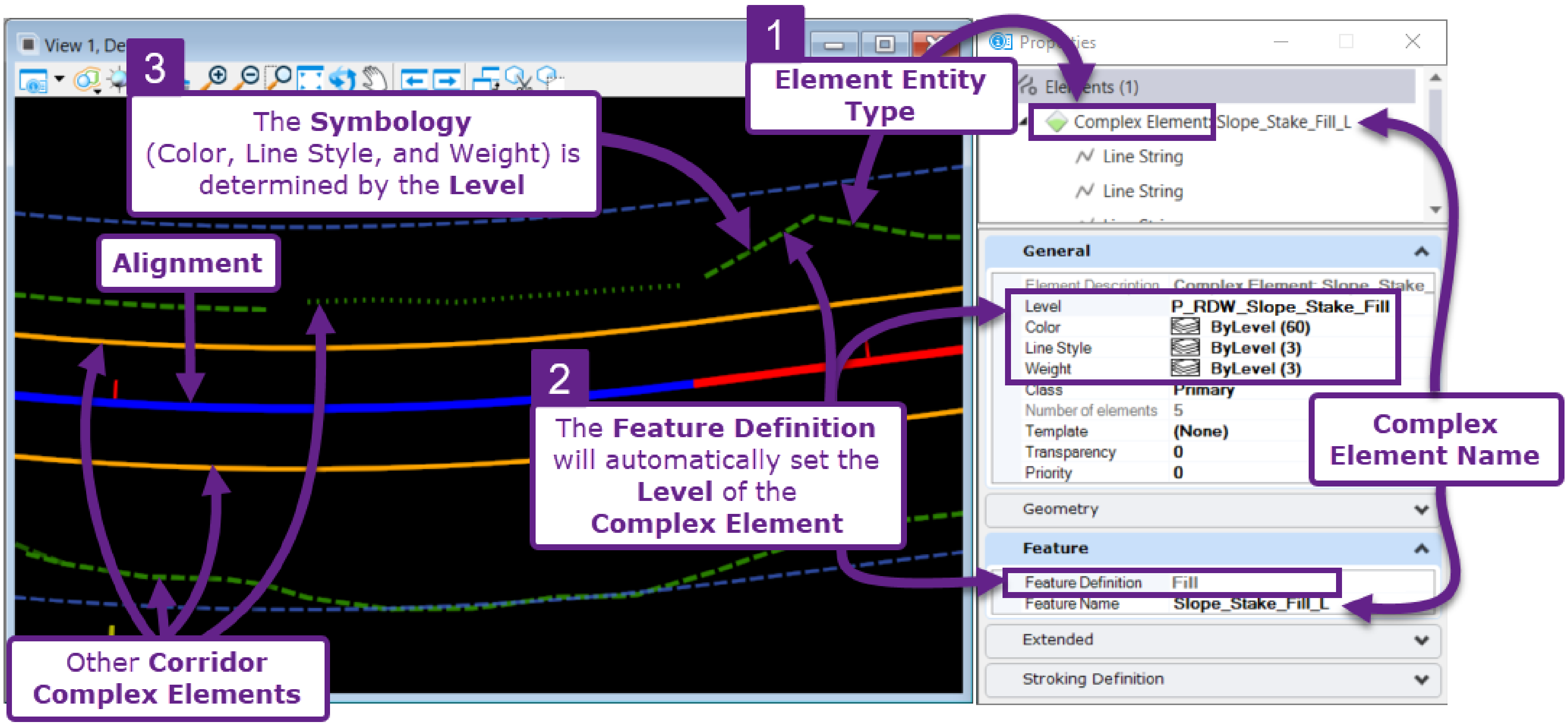


NOTE: After copying a Complex Element, the resulting Complex Chain may need to be dropped using the *Drop Element* tool. See *6H.7 Drop Element tool*. If copying the Cut or Fill Complex Elements, the resulting Complex Chain will contain gaps. Even with gaps present, all segments of the Complex Chain are considered a single entity until the *Drop Element* tool is used. After the *Drop Element* tool, the individual segments can be modified.

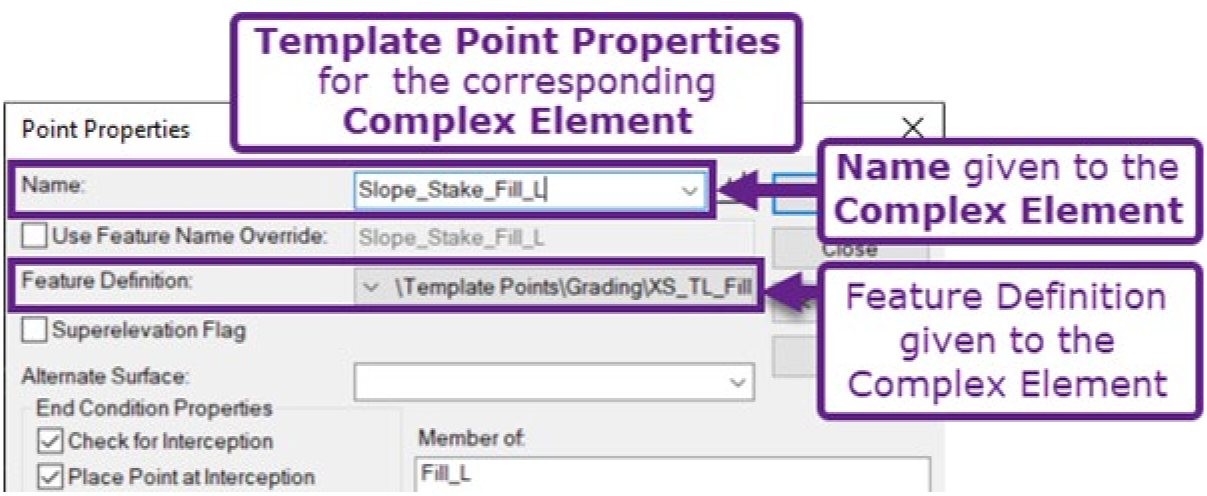
9C.4 Complex Element Feature Definitions and Symbology

The Symbology for a Complex Element is displayed in the Properties box. Symbology refers to the Feature Definition, Level, Color, Line Weight, and Line Style of an element. Symbology Properties are set by the Feature Definition of the Template Point.

1	**Element Entity Type:** For 2D Corridor Elements, the term "Complex Element" should be shown.
2	**Feature Definition:** The Feature Definition determines the Level the Complex Element is placed on.
3	**Level:** The Level will in turn Color, Line Style, and Weight of the Complex Element.



WARNING: It is possible to manually change the Level of a Complex Element in the Properties box. However, when the next time the Corridor is processed, the Level will revert back.



9C.4.a Effect of Feature Definition and Feature Name for a Complex Element

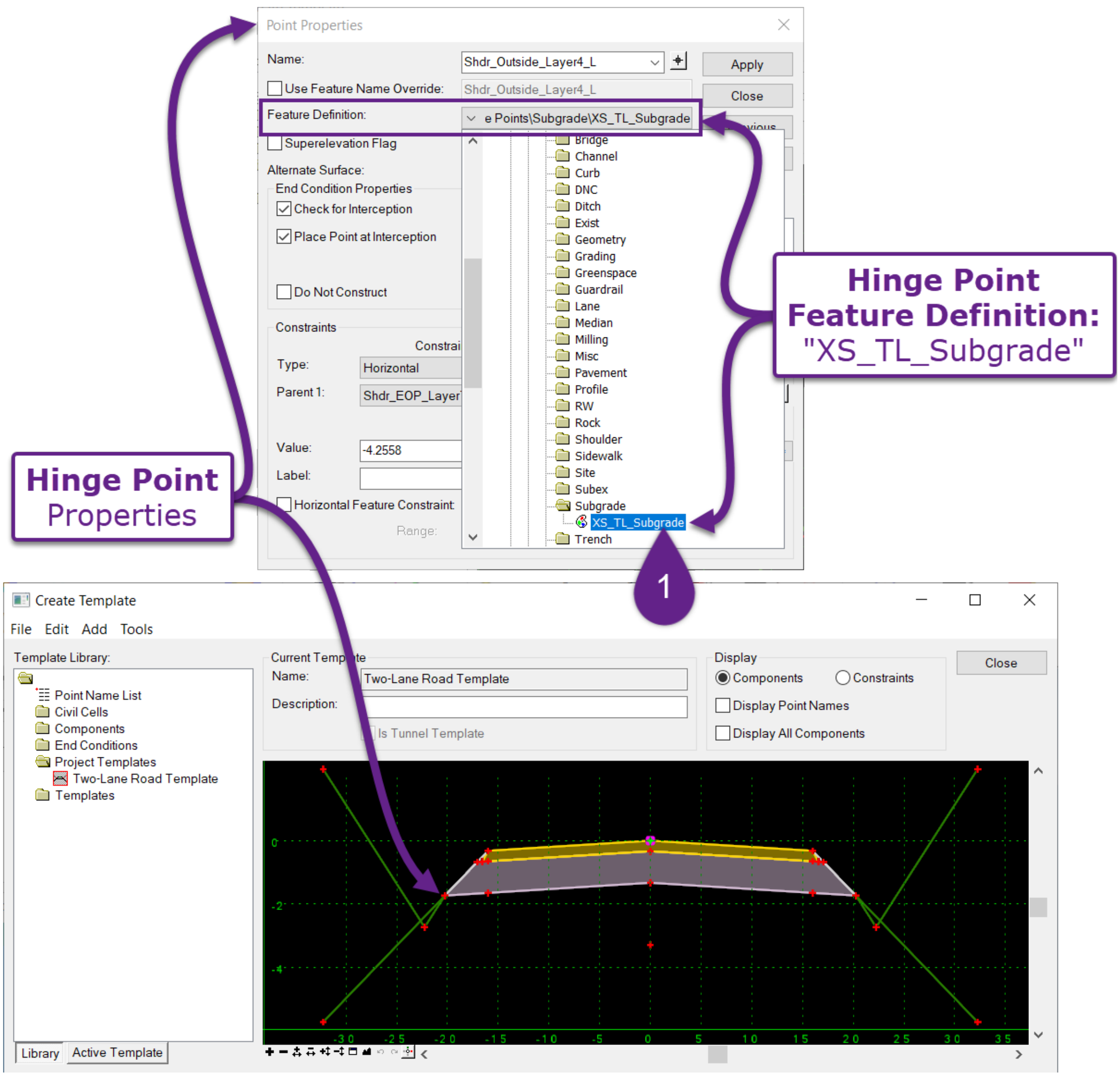
The following sub-sections demonstrate the functional effects of the **Feature Definition** and **Feature Name** assigned to a Template Point.

9C.4.a.i Modify a Feature Definition to Create a 2D Complex Element

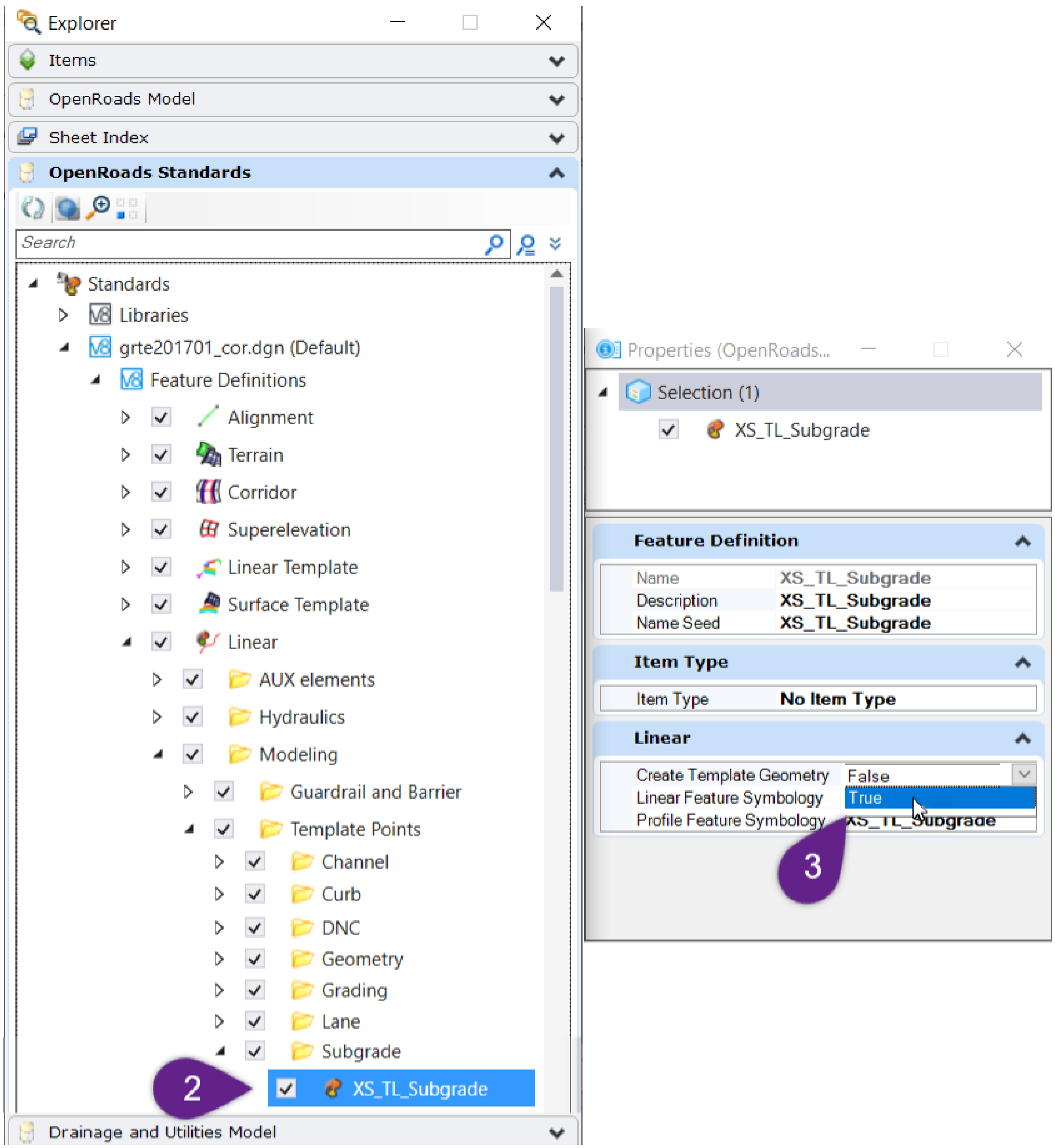
This workflow demonstrates how to create a Complex Element from a Template Point, if the Feature Definition is NOT already set up to do so. In this demonstration, the Feature Definition for the road Hinge Point (*XS_TL_Subgrade*) is altered Complex Element in the 2D Design Model .

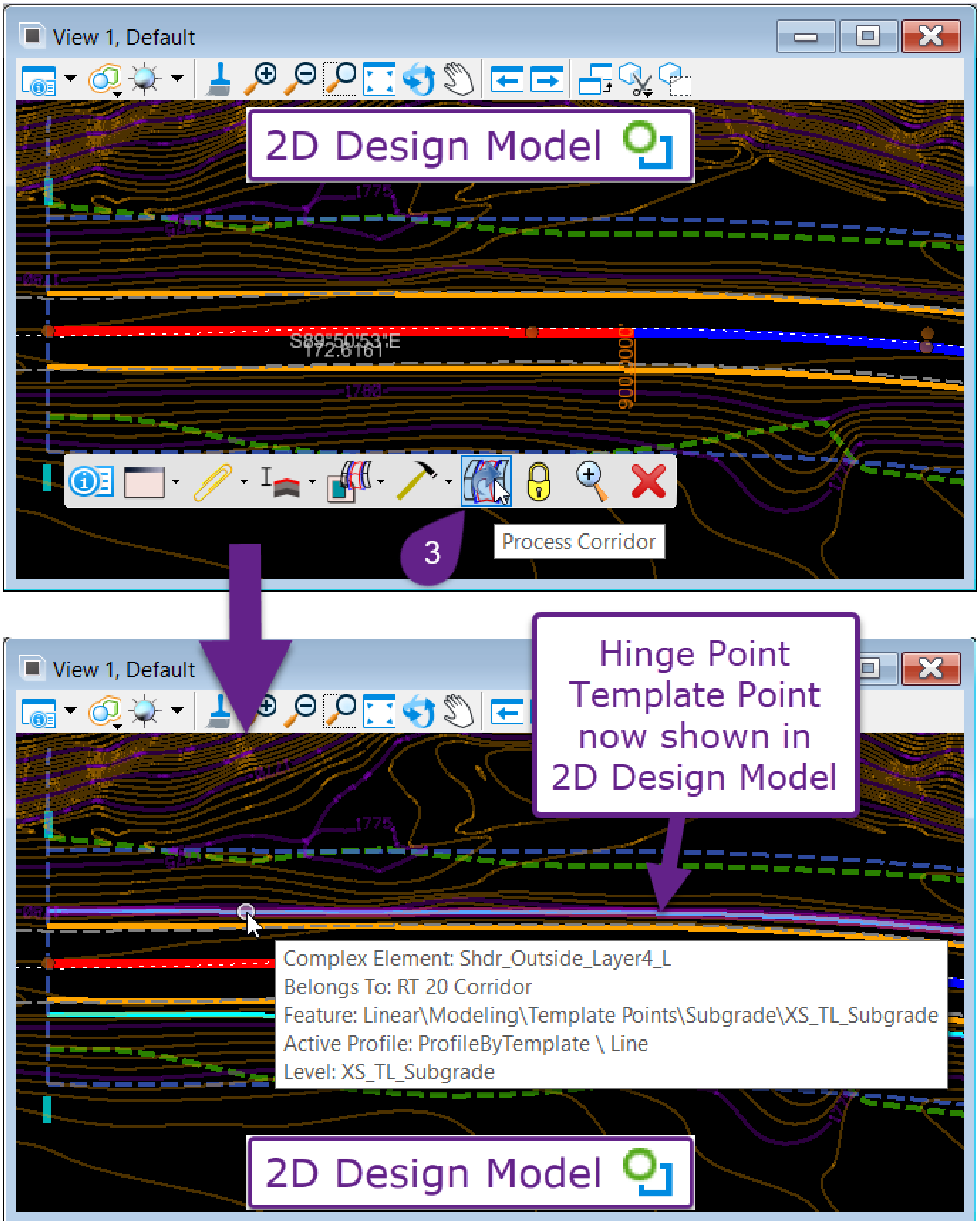
If the *XS_TL_Subgrade* Feature Definition was left unaltered, then the Hinge Point would ONLY be created as a *3D Linear Element* in the 3D Design Model .

1	Determine the Feature Definition of the Template Point to be displayed. The Feature Definition is identified and changed in the Point Properties in the Template Editor. In this example, the Feature Definition is *XS_TL_Subgrade*.



2	Locate the Feature Definition in the Project Explorer. Template Point Feature Definition settings are located under: *Project Explorer → OpenRoads Standards → Current DGN Name (Default) → Linear* In this example, the XS_TL_Subgrade Feature Definition is located under: *OpenRoads Standards → Current DGN Name (Default) → Linear → Modeling → Template Points → Subgrade* Left-Click on *XS_TL_Subgrade* to bring up the Feature Definition properties in the Properties Box.
3	In the Properties Box, change *Create Template Geometry* from *False* to *True.* When the Corridor is reprocessed the Hinge Point will be created as a Complex Element in the 2D Design Model.

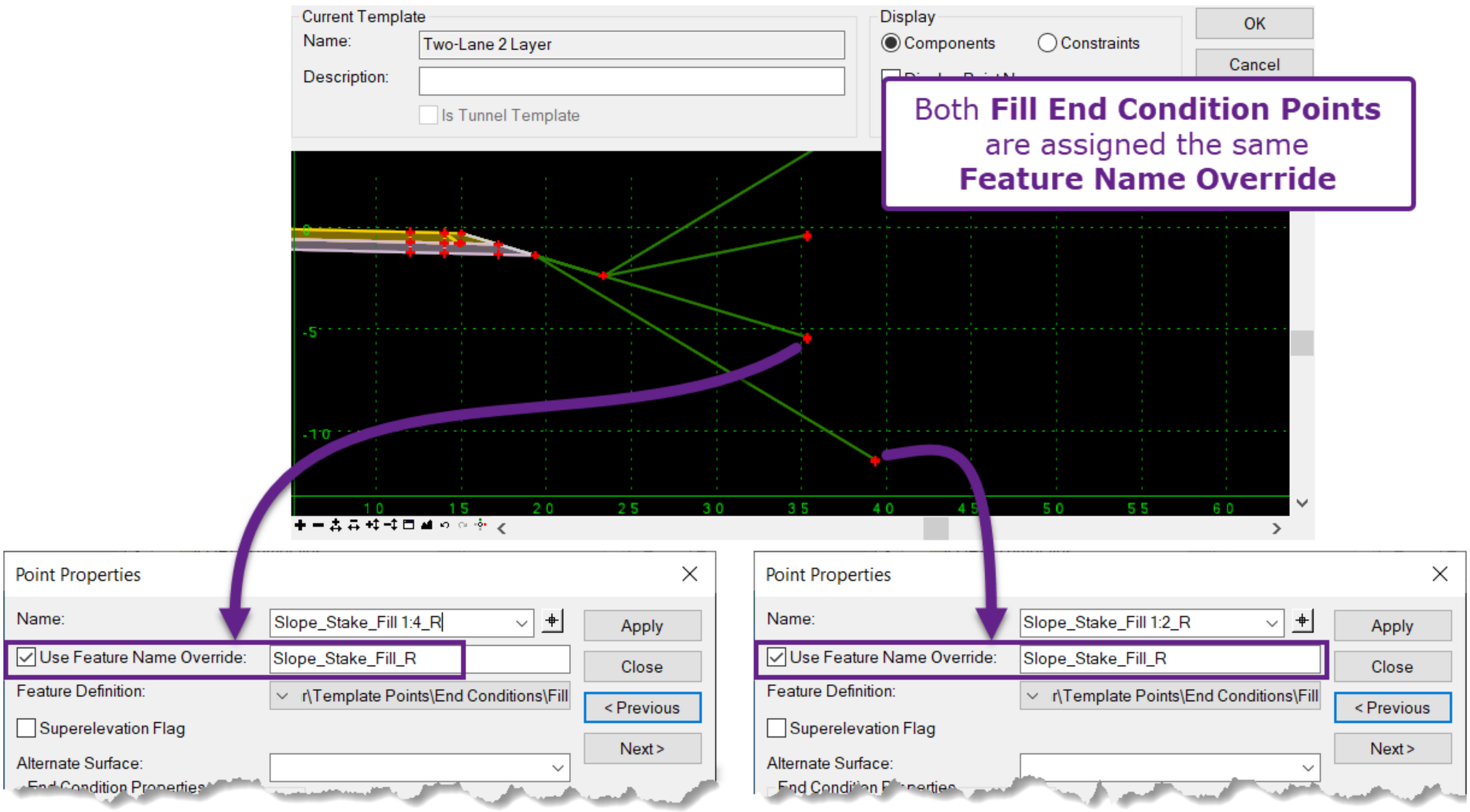



View 1, Default
2D Design Model
S89°50'53"E
172.8161
Process Corridor
3
View 1, Default
Hinge Point Template Point now shown in 2D Design Model
Complex Element: Shdr_Outside_Layer4_L
Belongs To: RT 20 Corridor
Feature: Linear\Modeling\Template Points\Subgrade\XS_TL_Subgrade
Active Profile: ProfileByTemplate \ Line
Level: XS_TL_Subgrade
2D Design Model

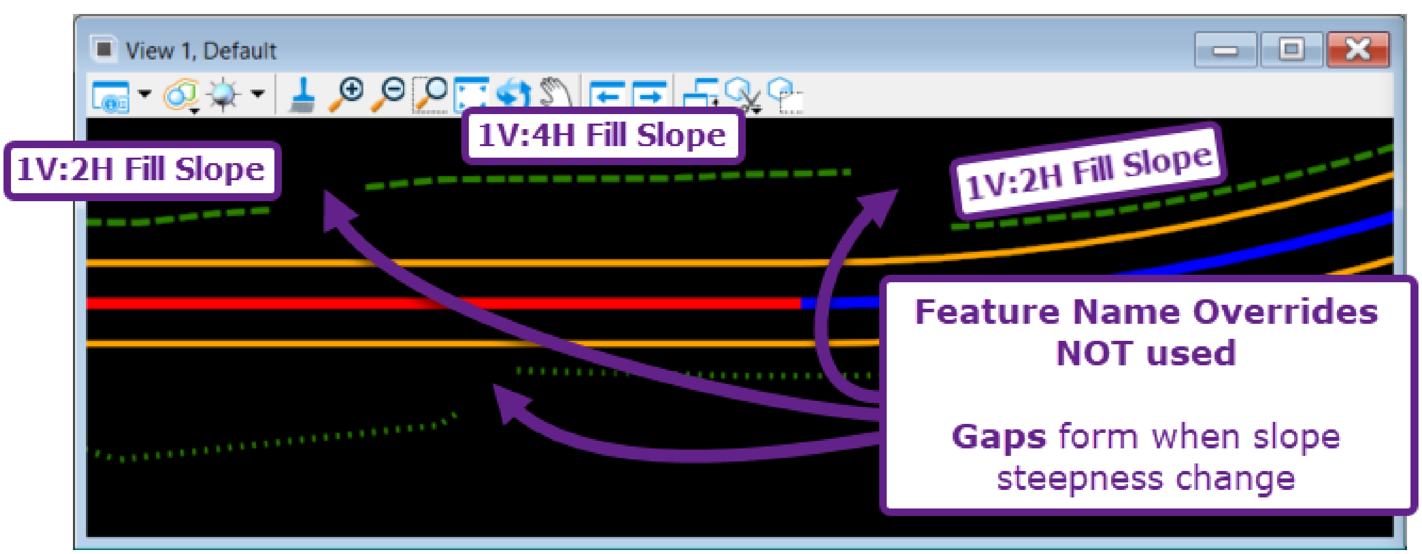
9C.4.a.ii Effect of Template Point Name Overrides on Corridor Complex Elements

The *Name Override* assigned to Template Point (see *8C.2 Point Feature Definition and Name Properties*) is used to join multiple End Condition Template Points into a single 2D Complex Element.

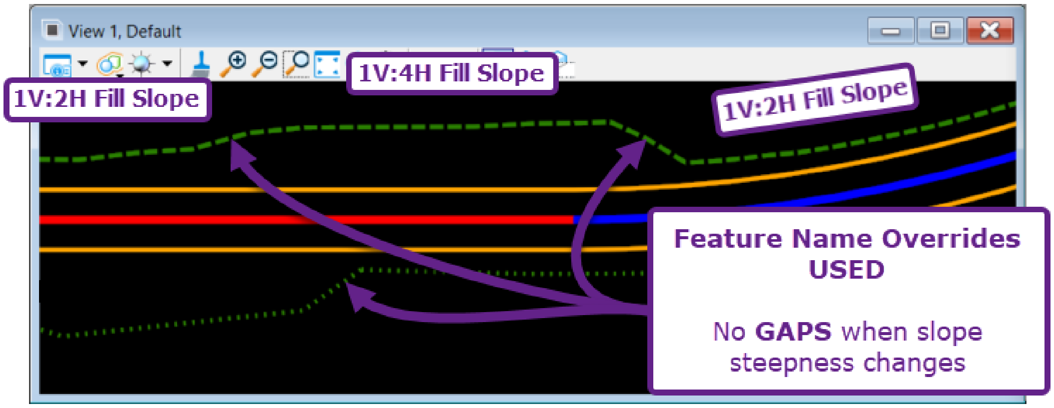
As shown below, both **Fill End Condition** points are assigned the same **Feature Name Override**: "Slope_Stake_Fill_R". The point on the left represents a 1V:4H fill slope. The Point on the right represents a 1V:2H fill slope.



If Fill End Condition points did NOT have identical Feature Name Overrides, then a gap would form where the fill slope transitions from 1V:2H to 1V:4H or vice versa. In the graphic shown below, the **Feature Name Override** boxes are UNCHECKED and disabled.



In the graphic shown below, the **Feature Name Override** boxes are CHECKED and enabled. Notice how the Fill line is continuous through the slope transition locations.



Feature Name Overrides are needed to create a continuous Cut element and Fill element which span the entire length of the Corridor. If NOT used, each Fill Slope used in the Corridor (i.e., 1H:2V and 1H:4V) would be created as a separate element

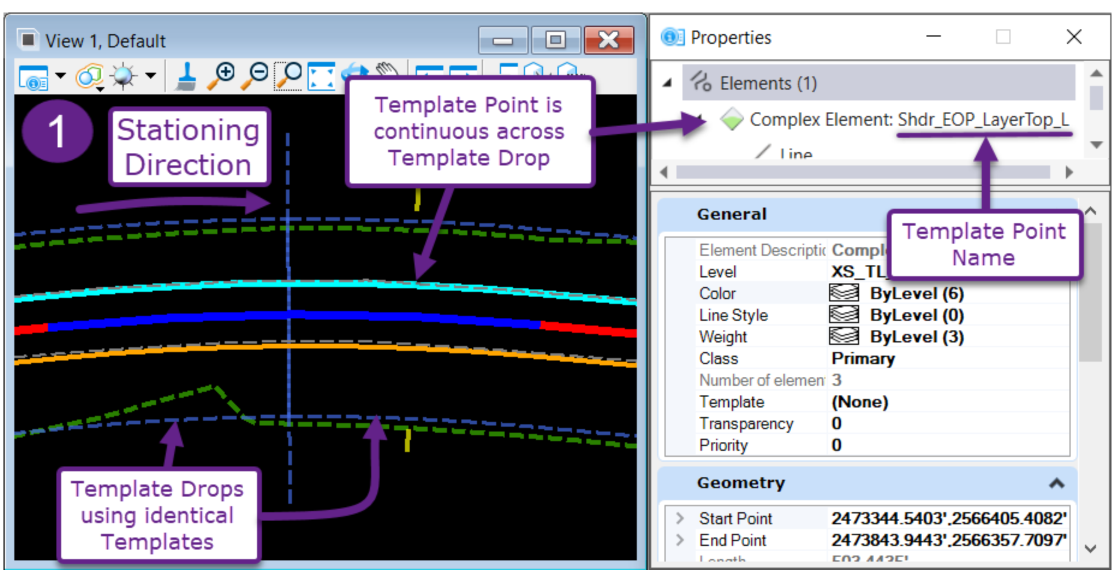
NOTE: The software currently does NOT have an automatic method for creating *transition* lines between Cut and Fill elements. If *transition* lines between Cut and Fill elements must be shown in the plan set, the User will have to manually draft them.

Identical Template Point Names across multiple Template Drop Sections:

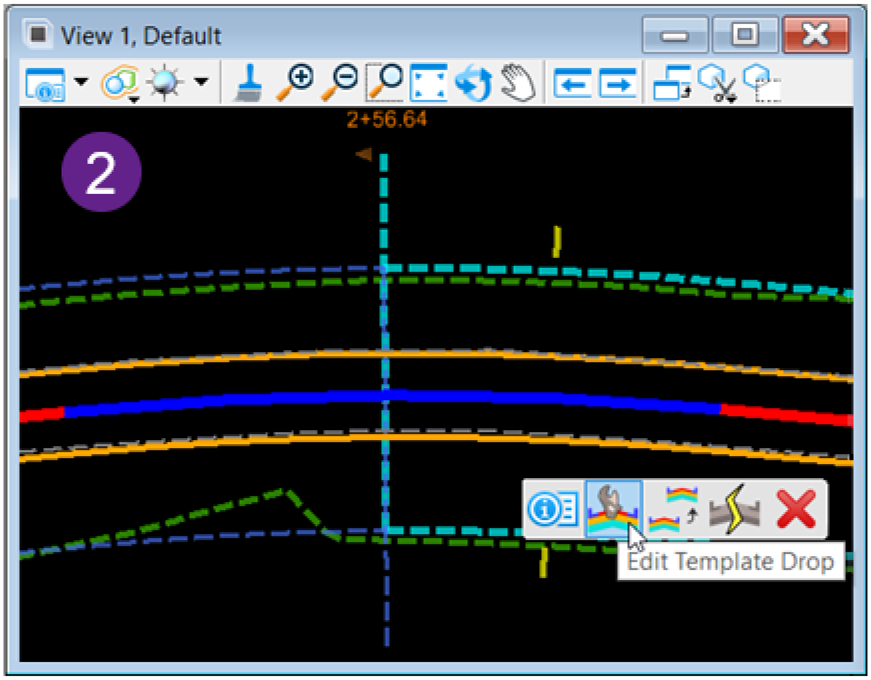
When a corridor uses multiple Template sections that contain Template Points with identical *Names*, then a SINGLE Complex Element will be created across the different Template sections.

If Template Points are *Named* identically, then the corridor will process the Template Points as a single, continous Complex Element entity – even if the Feature Defintions are different across a Template Drop section. To demonstrate this concept, the Feature Defintion and Name for the Template Point corresponding to Edge of Road is altered. ***NOTE:*** The demonstration below uses the Feature Definition library used prior to FLH WorkSpace 10.10.21.04. "XS_TL_..." Feature Definitions are currently NOT used.

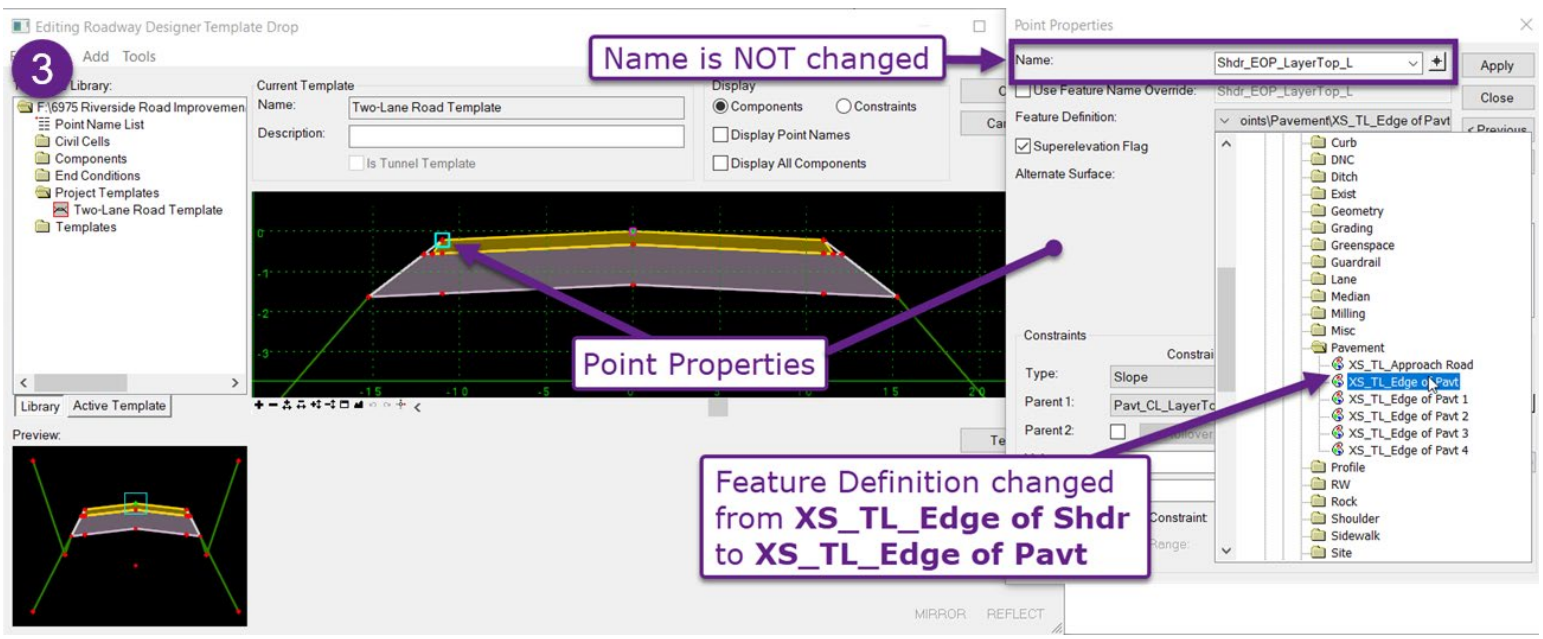
1 To begin this demonstration – the Corridor shown below contains two Template Drops – BUT – these Template Drops are using identical Templates. Notice that the Template Point that represents the Edge of Road is continuous – even across the Template Drop change. This is because the Name for this Particular Template Point is identical.



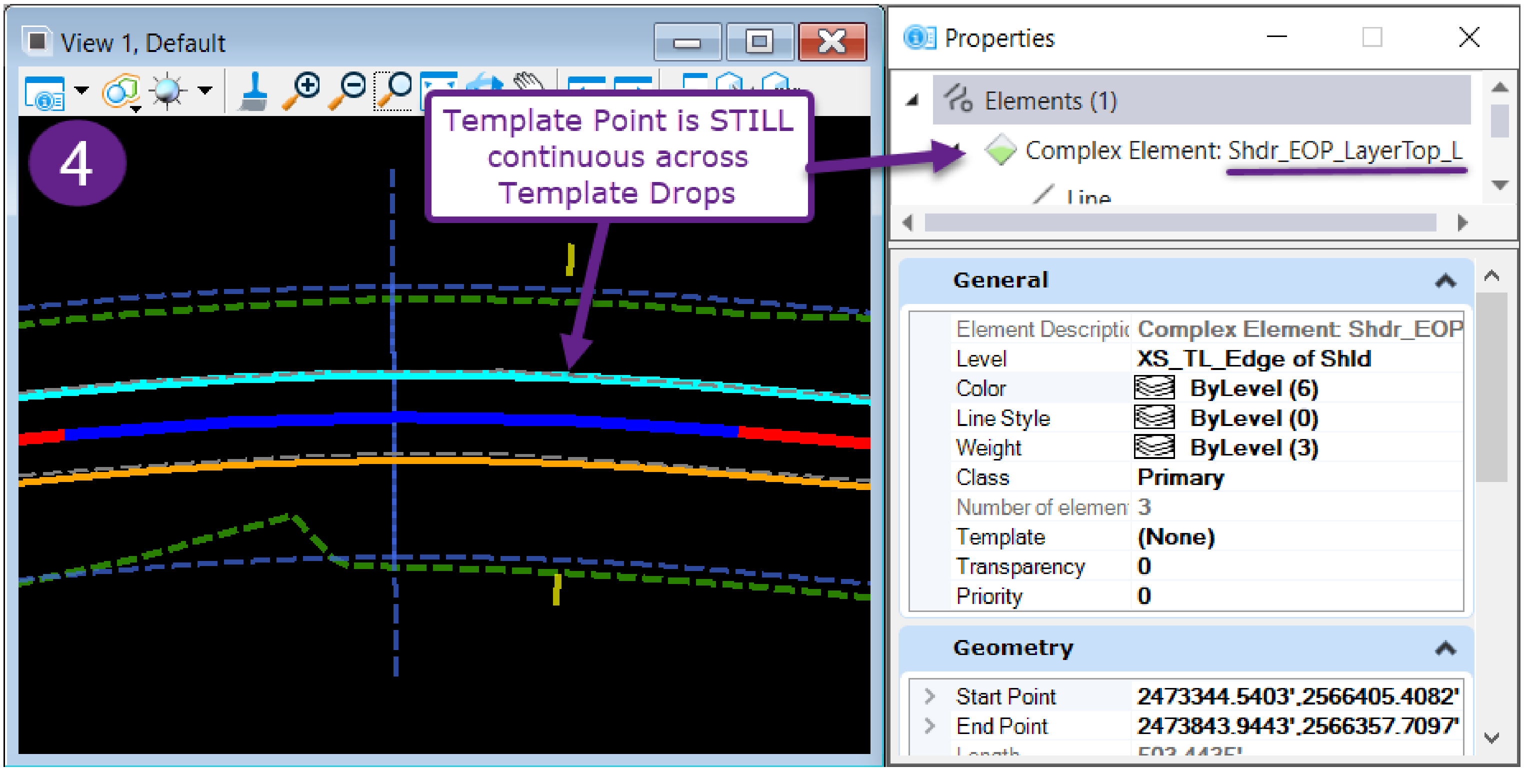
2 Next, the Template in the right Template Drop (down station) is edited with the Edit Template Drop tool.



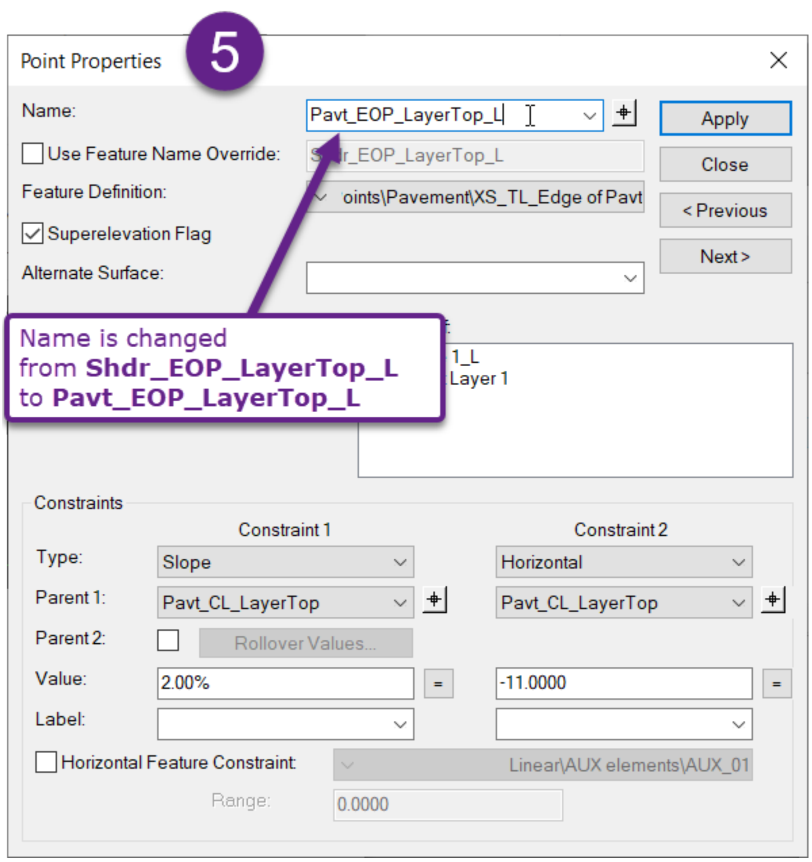
3 The Feature Definition of the Template Point is changed – but the Name remains the same for this point across both Template Drops.



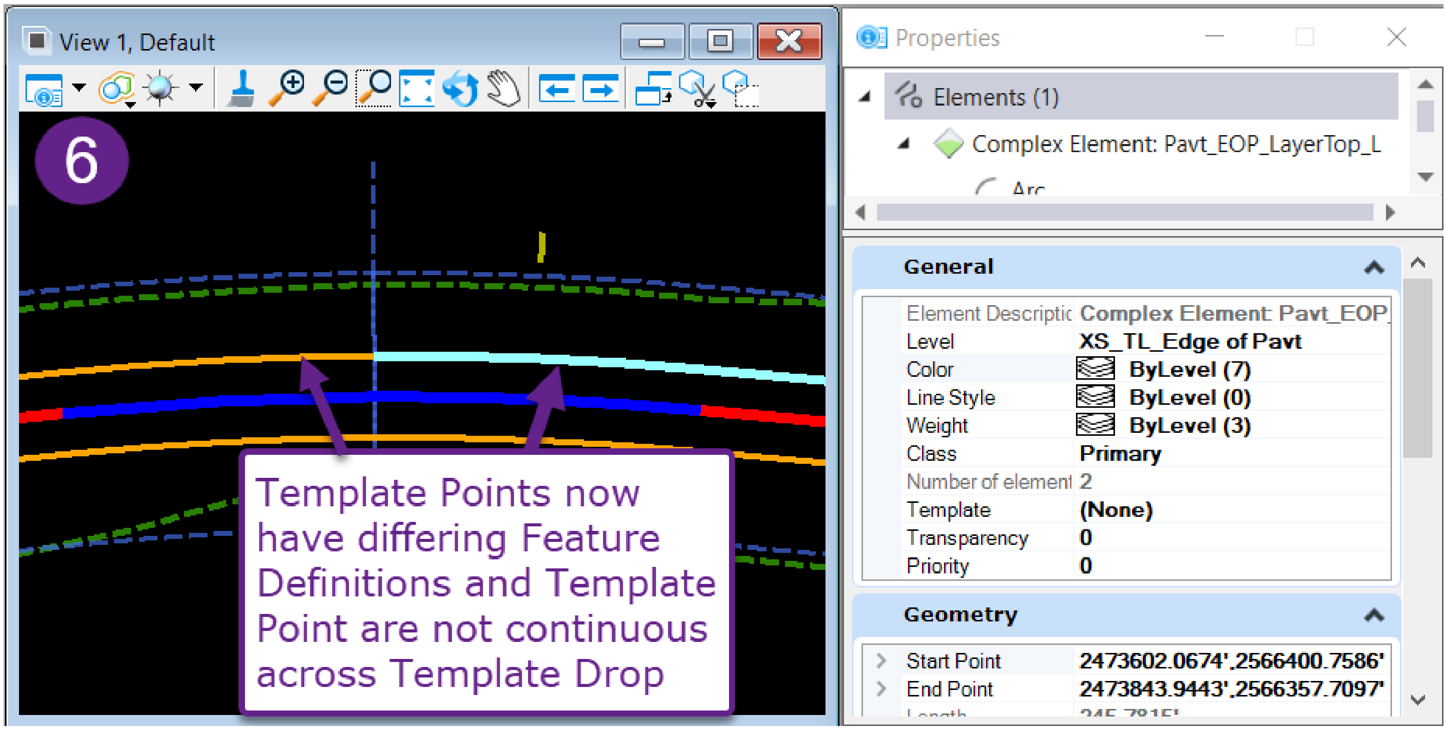
4 Despite the edit made to Feature Definition, there is no change in the symbology of the Template Point for the down station Template drop. Also, the Template Point remains continuous across the Template Drop.



5 The down station Template Drop is edited again. The Name of the Template Point is changed.

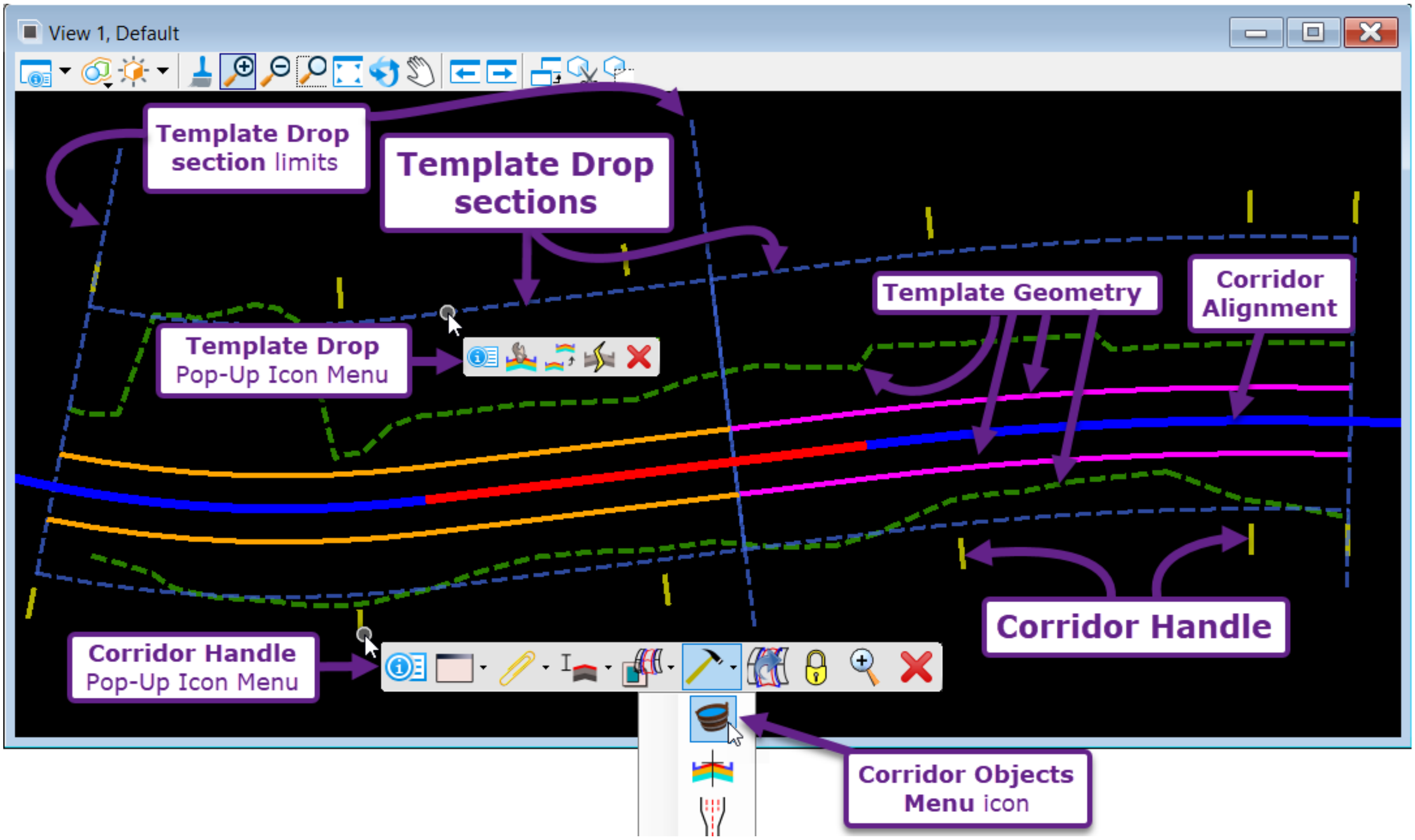


6 After the Name is changed, the Template Points are seperated across the Template Drop.



9D – THE CORRIDOR HANDLE AND CORRIDOR OBJECT MENU

Corridor Models are manipulated in the 2D Design Model with graphical elements called *Corridor Objects.* When a Corridor is initially created, two *Base Corridor Objects* are automatically created: the **Corridor Handle** and a single **Template Drop** section.



Corridor Handle: The Corridor Handle is the master *Corridor Object* for manipulating the corridor. The Corridor Handle is represented by yellow or red ticks (handles) that surrounds the Corridor. The *Corridor Handle* provides access to the **Corridor Object Menu***,* which houses and organizes all Corridor Objects. Additionally, selecting the Corridor Objects Menu provides access to the Corridor Feature Definition through the Properties box. The Corridor Feature Definition determines if a Multiplier is applied to the Template Interval Spacing of the Corridor. For more information on the Template Interval Multiple, see *9D.2 Corridor Feature Definitions: Design and Final*.

Template Drop Section: A Template Drop Section represents the stationing range which a single *Template* is applied. Template Drop sections are represented by the blue dashed boxes that surround the Corridor. Typically, a Corridor will have multiple Template Drop Sections, with each section representing a different Template. For more information on Template Drop Sections, see *9E – Template Drops*.

TIP: Access tools pertaining to the Corridor Handle and Template Drop sections through the *Pop-Up Icon Menu*. See *1A.2.c Popup Icon Menu*. The preferred method for accessing Corridor tools is through the *Pop-up Icon Menu*.

9D.1 Corridor Object Menu

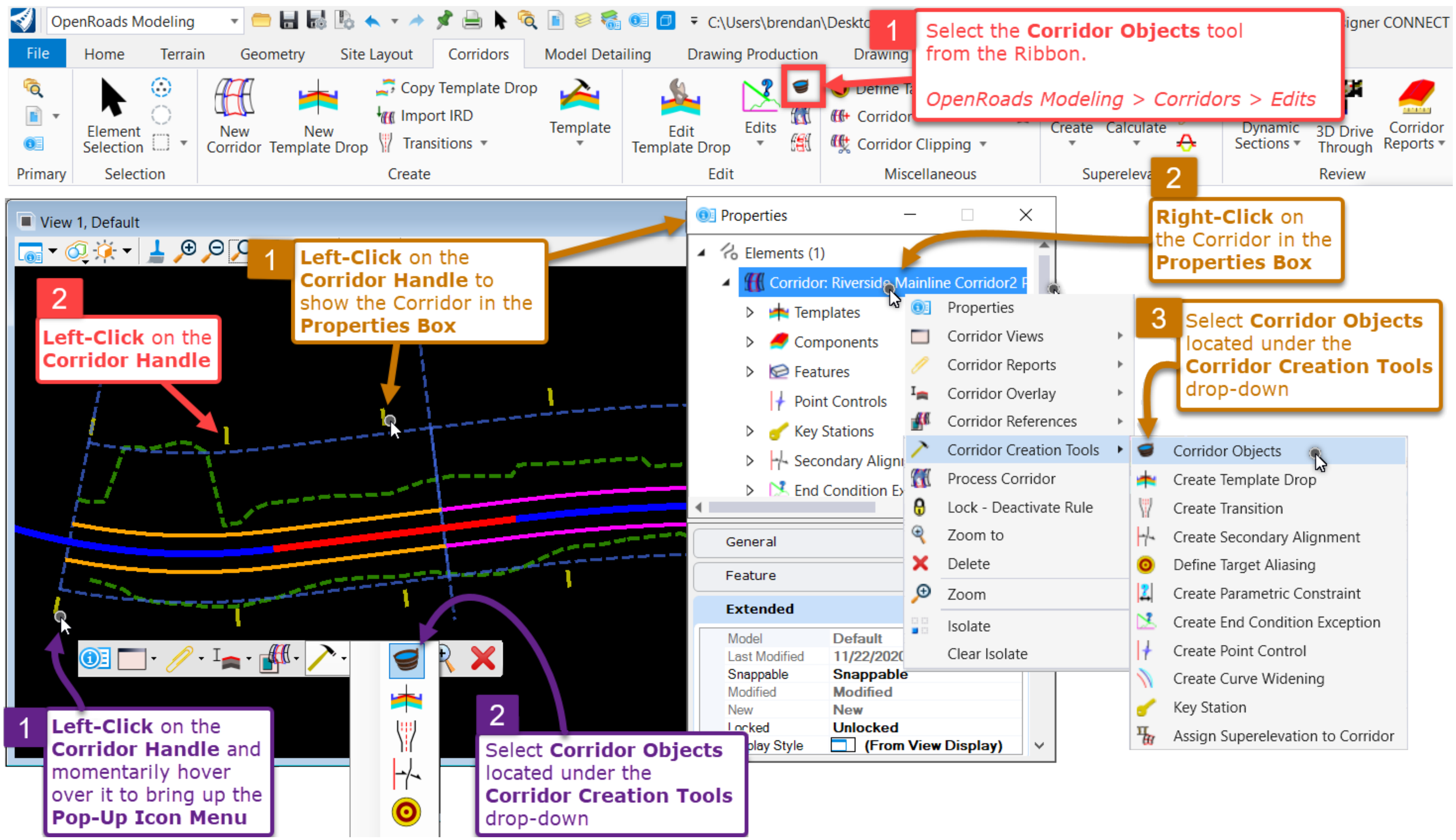
The *Corridor Objects Menu* organizes and lists all Corridor Objects, such as all Templates used and Point Controls. The Corridor Objects Menu is divided into nine sub-menus, with each sub-menu corresponding to a different type of Corridor Object. See *9G – Corridor Objects – Manipulation of the Corridor*. Corridor Objects can be created, edited, and deleted from within the Corridor Objects Menu.

9D.1.a Access the Corridor Objects Menu

The Corridor Objects Menu is accessed through the **Corridor Objects** tool, which is represented with a *bucket* icon .

The **Corridor Objects** tool is found under the **Corridor Creation Tools** drop-down, which is represented with a *hammer* icon .

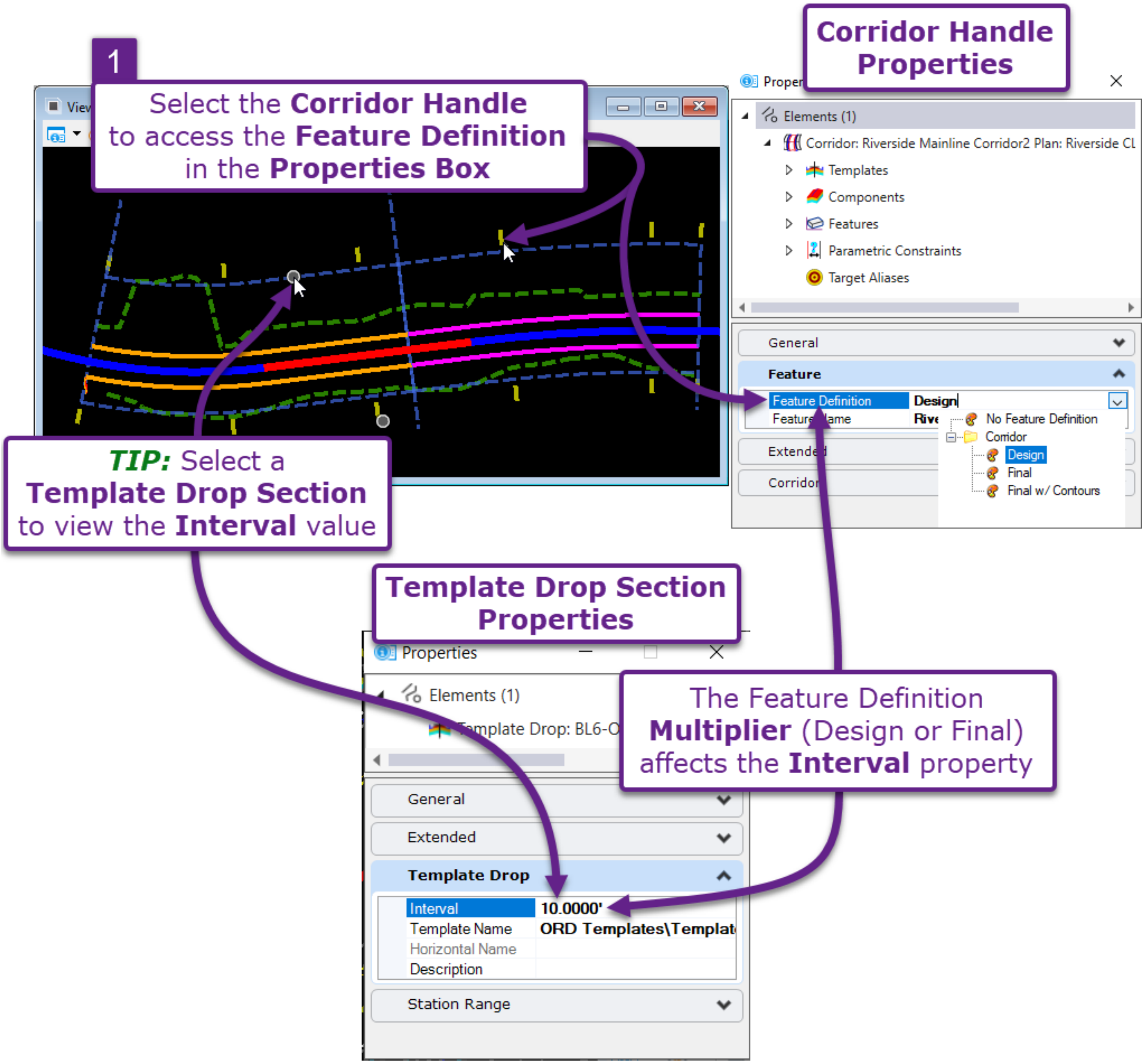
There are THREE ways to access the Corridor Objects Menu – as shown in three colors below:



9D.2 Corridor Feature Definitions: Design and Final

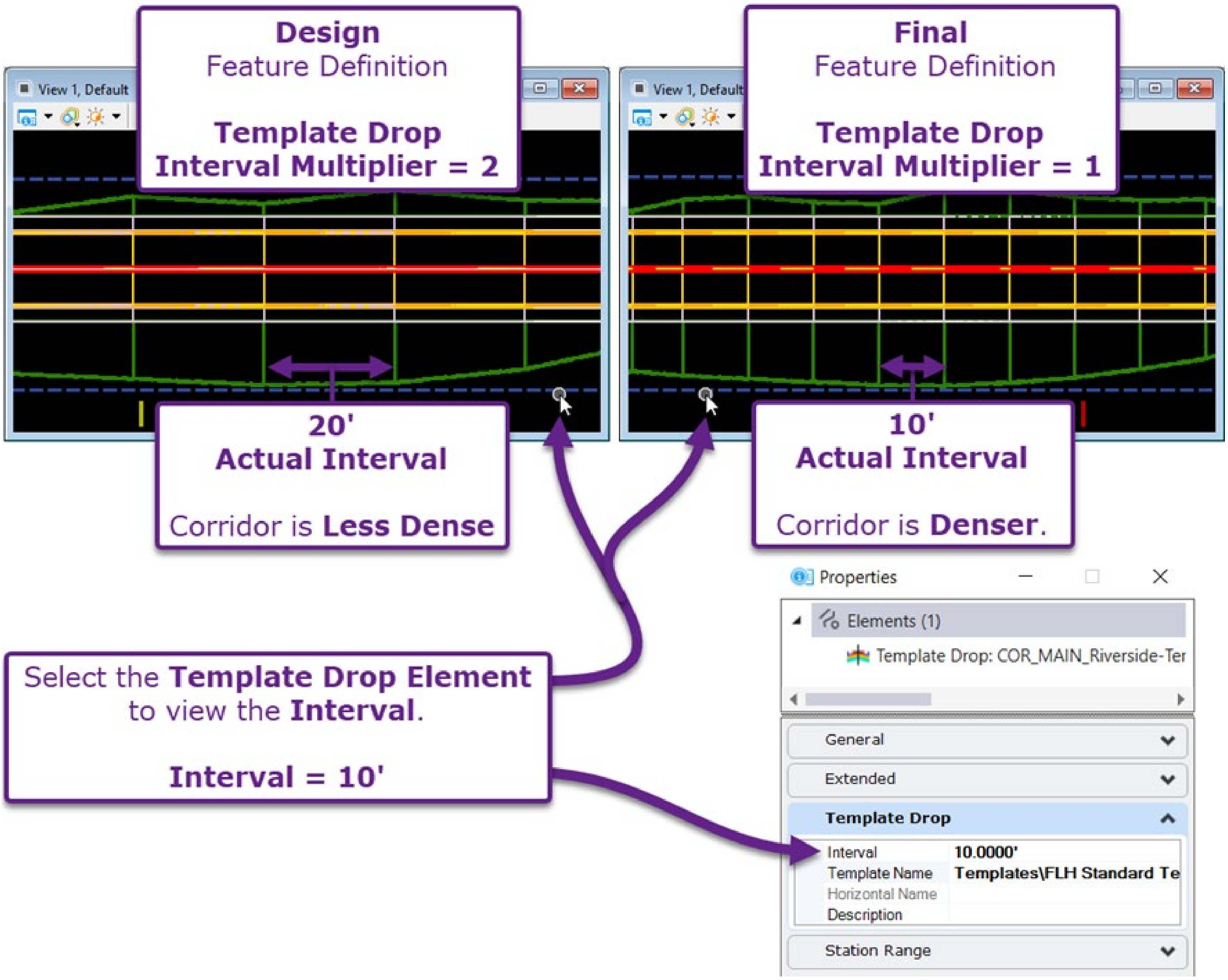
Corridors contain a Feature Definition, which is shown in the Properties box when the Corridor Handle is selected. The Feature Definition controls processing settings for the Corridor model. The primary function of the Corridor Feature Definition is to control the **multiplier** applied to the **Interval** spacing of Template Drops. Corridor Feature Definitions are categorized as **Design** or **Final**.

TIP: The **Interval** setting is shown and edited through the Properties box when a Template Drop Section is selected. The Corridor Feature Definition is accessed through the Corridor Handle.



Design: Contains a Template Drop Interval **multiplier** of 2. For example, if the Template Section Interval is set to 10, then the maximum spacing between Template applications is 20' (10 x 2 multiplier). The Design Feature Definition is intended for earlier stages of the corridor modeling process to speed up processing times. When the Feature Definition is set to Design, the Corridor Handle is shown in **YELLOW**.

Final: Contains a Template Drop Interval **multiplier** of 1. This means the maximum spacing between Template applications is true to the set Interval value. The **Final** Feature Definition produces a *denser* Corridor model then the **Design** Feature Definition. When the Feature Definition is set to Final, the Corridor Handle is shown in **RED**.



NOTE: For both the Design and Final Feature Definitions, the Interval spacing around curves is automatically densified to model the curve more closely. Only in straight (tangent) sections is the Template frequency truly dictated by the Template Section Interval and the (Feature Definition) multiplier.

BEST PRACTICE: The **Final** Feature Definition is easier to work with because there is no multiplier applied to the Template Drop Interval. However, the **Final** Feature Definition may increase processing times because the Corridor is denser. When set to the **Design** Feature Definition, the Corridor is less dense and will process faster.

It is acceptable to set and leave the Corridor Feature Definition assigned to **Final** if processing times are acceptable. For example, relatively simple Corridors will NOT suffer a significant performance decline when set to the **Final** Feature Definition.

For complex Corridors, it is recommended that the Corridor Feature Definition is set to **Design** when edits are being made to the Corridor, Alignment, Profile, and all elements that interact with the Corridor. Set the Corridor to the **Final** Feature Definition when performing the following tasks:

- **Calculating Quantities:** Quantities will be more accurate if the Corridor is denser.
- **Creating Proposed Terrain Models from the Corridor:** The Proposed Terrain Model will be smoother, and a more accurate surface is produced.
- **Printing Road Plan and Profile Sheets:** When the Corridor is set to **Final**, the Cut/Fill linework will slightly alter because more Template Drop sections are added. It is advised that the Cut/Fill linework aligns with the resulting Proposed Terrain Model and Quantities Calculations.

After performing the tasks listed above, change the Corridor Feature Definition back to **Design**.

Other Final Feature Definitions: There are two other **Final** Feature Definitions that are used for specific tasks.

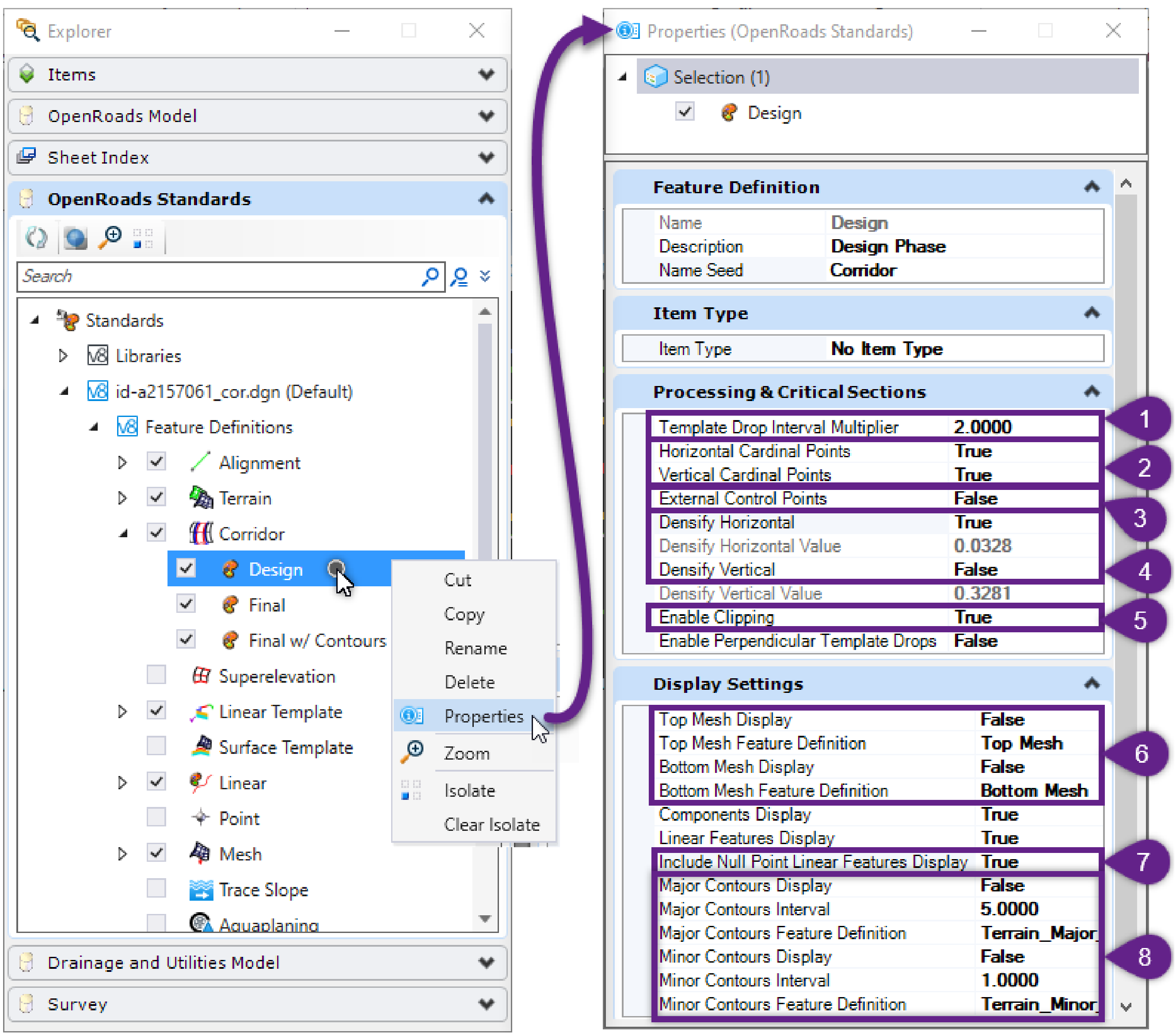
Final Breaklines Only: This Feature Definition is ONLY utilized when generating the 3D Breaklines DXF File for Physical Data package. See *23H – Proposed 3D Breaklines in DXF File Format*. When switched to this Feature Definition, ONLY 3D breaklines are shown from the Corridor in the *3D Design Model*. All other Corridor elements (i.e., Components and Meshes) are hidden, making it easy to select the 3D Breaklines.

Final w/ Contours: When switched to this Feature Definition, elevation contours are shown around the Corridor Model. ***NOTE:*** The contours are placed in *3D Design Model*. The contours can only be seen in the *2D Design Model* if the display for the *3D Design Model* **reference** is toggled ON.

9D.2.a Corridor Feature Definition Properties

Corridor Feature Definitions control processing settings for the Corridor. The processing settings for a Corridor Feature Definition are shown and edited through the Explorer in the following location:

Explorer → *OpenRoads Standards*→ *Standards* → <Current DGN Name> → *Feature Definitions* → *Corridor*



The table below shows some key Corridor Feature Definition Properties that effect corridor processing speeds and model density.

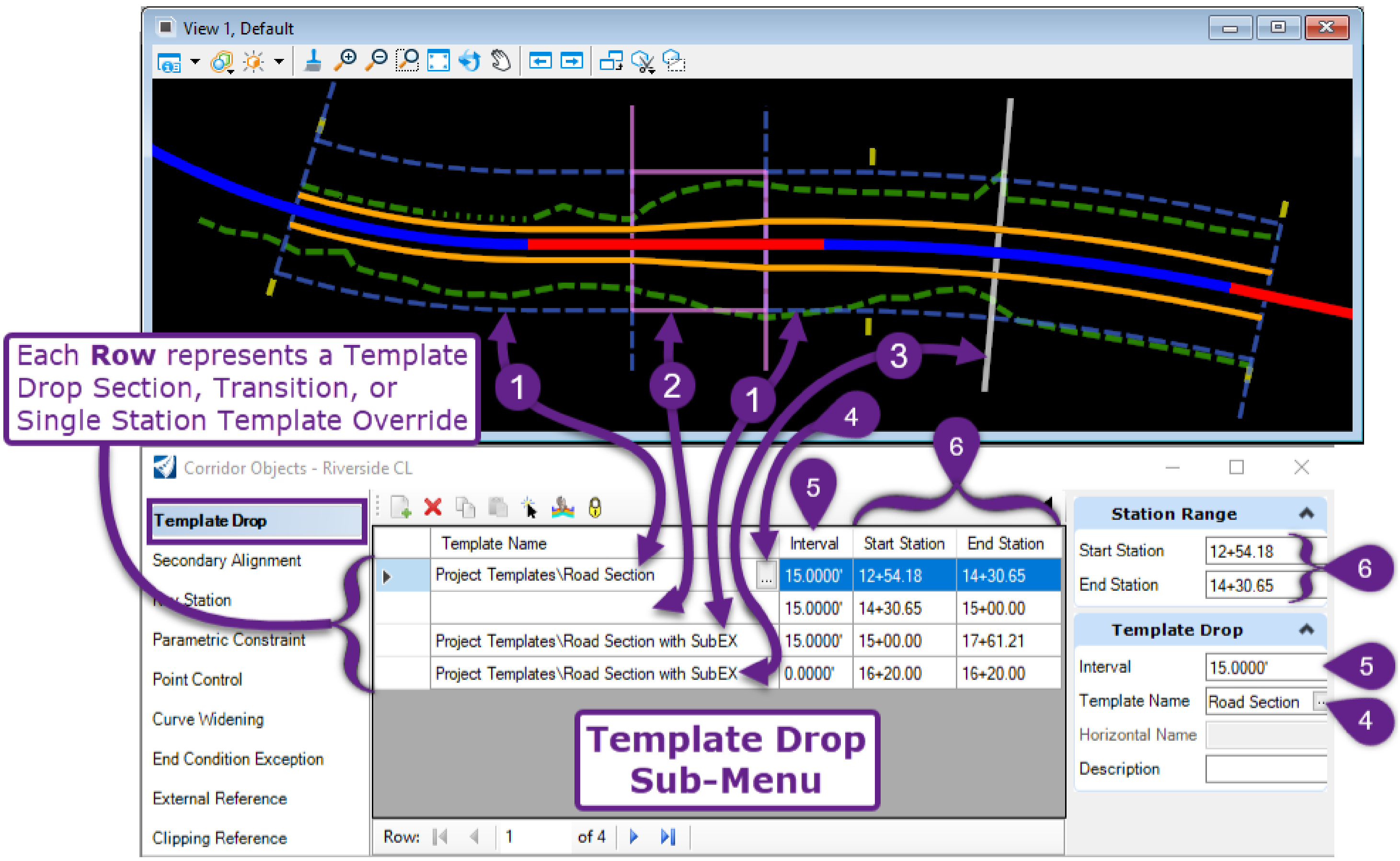
Corridor Feature Definition Properties		
	Property:	**Description:**
1	**Template Drop Interval Multiplier**	If set to a value other than 1, the Template Interval spacing will be increased or decreased.
2	**Horizontal/Vertical Cardinal Points**	If set to TRUE, a Template is applied at all horizontal and vertical cardinal points on the alignment and profile, such as: PC, PT, VPC, VPT, PI, VPI.
3	**External Control Points**	External Control Points refer to the cardinal points for Point Controls and other elements that interact with the Corridor. If set to True, a Template is applied at all horizontal and vertical cardinal points found on an Externally Referenced alignment.
4	**Densify Horizontal and Vertical**	If set to TRUE, Template Interval spacing in the vicinity of horizontal and vertical curves is automatically decreased to provide more density to the Corridor model in curved segments. Setting these properties to TRUE increases corridor model processing requirements and times. Setting these properties to False results in Template Point lines that appear jagged or "chorded" around Horizontal Curves.
5	**Enable Clipping**	If set to TRUE, Clipping References are shown. If set to FALSE, Clipping References can still be added as Corridor Objects, but will not be processed and shown. Corridor will not be clipped until set to TRUE. ***TIP:*** For the *Design* Feature Definition, set *Enable Clipping* to FALSE. For the *Final* Feature Definition, set *Enable Clipping* to TRUE.
6	**Top/Bottom Mesh Display**	If set to TRUE, the Top or Bottom Mesh will be displayed in the 3D Design Model. For more information on the Top and Bottom Mesh, see *9I.1 Top and Bottom Meshes*.
7	**Include Null Point Linear Features Display**	If set to TRUE, Null Points are created as *Complex Elements* in the 2D Design Model. If set to FALSE, a 2D Complex Element is NOT created for Null Points. This needs to be set to TRUE to display Null Points that represent guardrails. For more information on Null Points, see *8C.1 Template Point Types and Identification*.
8	**Major/Minor Contour Display**	If set to TRUE, proposed contours will be created in the 3D Design Model.

9E – TEMPLATE DROPS

Template Drop sections represent the station range which a specific Template is applied. Template Drop sections can be manipulated in the *2D Design Model* through the Pop-Up Icon Menu and Properties box. Additionally, all information relating to Template Drop sections in a Corridor can be found and manipulated in the Template Drops sub-menu of the Corridor Object Menu.

9E.1 Template Drop Sub-Menu Overview

NOTE: **Template Names** are shown in **Black**, **Red**, or **Blue** text depending if the Template Drop is **synchronized** with the currently loaded Template Library. See *9E.8.a Template Synchronization in the Corridor Objects Menu*.



1	**Template Drop Section**	Represents a single section in which a single Template Drop is applied.
2	**Transition Section**	Represents a transition between two different Template Drop sections. ***NOTE:*** Transition Sections will NOT be named. The Transition Section cell will be blank under the Template Name list.
3	**Single Station Template Override**	Single Station Overrides are created with the Edit Station tool. This tool creates a Template override at a single station. An example usage is to alter the Fill Slope for a single station that slightly misses the top of the targeted embankment (i.e., a sliver fill). Single Station Template Overrides are always listed at the end of the Template Drop list.
4	**Switch Template Button** ...	This button is used to access the Template Library to switch the Template for the section.

5	**Template Drop Interval**	This sets the interval spacing which the Template. The Template Drop Interval is also affected by the Corridor Feature Definition. See *9D.2 Corridor Feature Definition: Design and Final*.
6	**Template Drop Section Station Range**	Displays the Station Range along the alignment in which a Template Drop Section is applied.

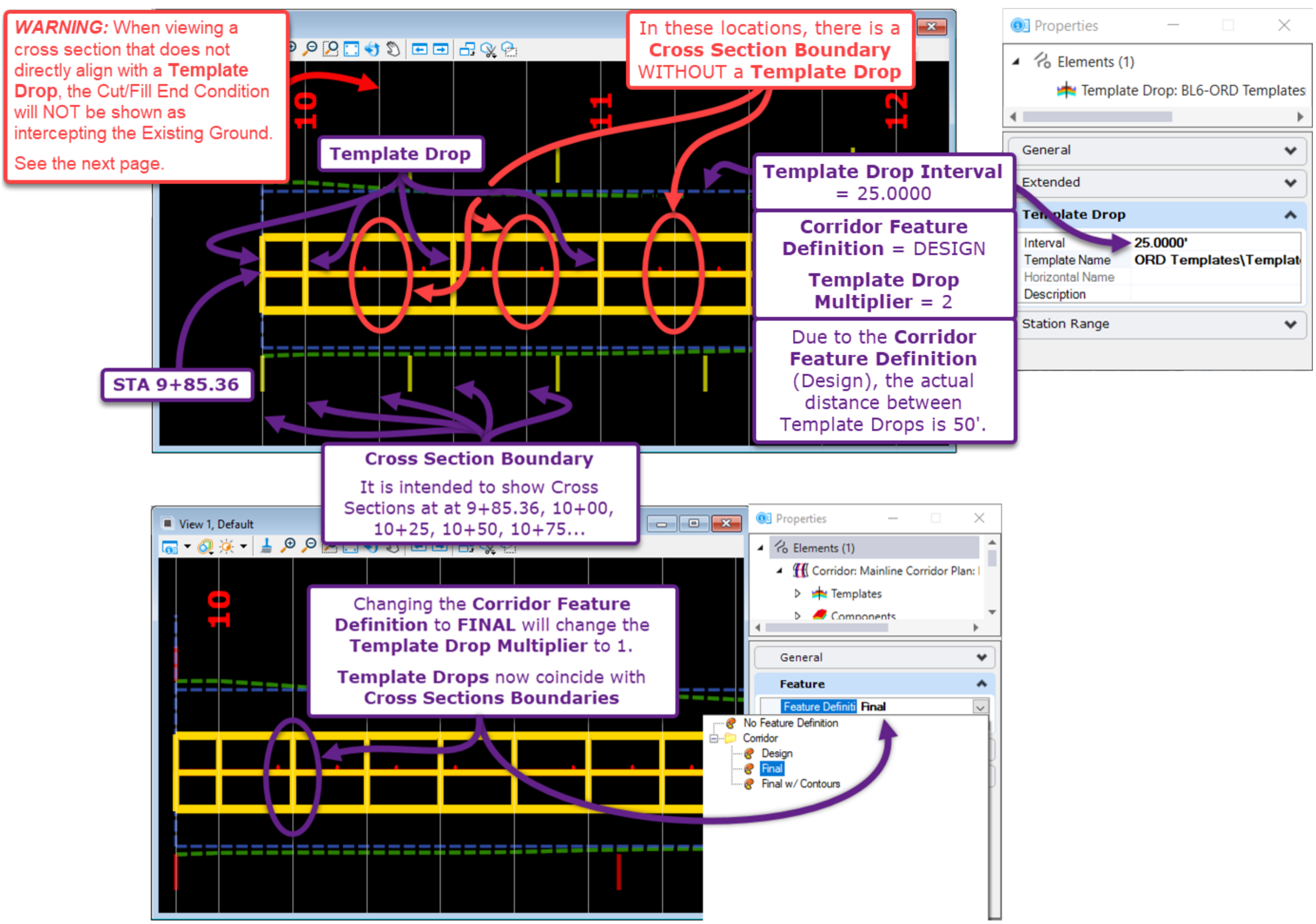
9E.2 Aligning Template Drop Interval for Cross Section Production

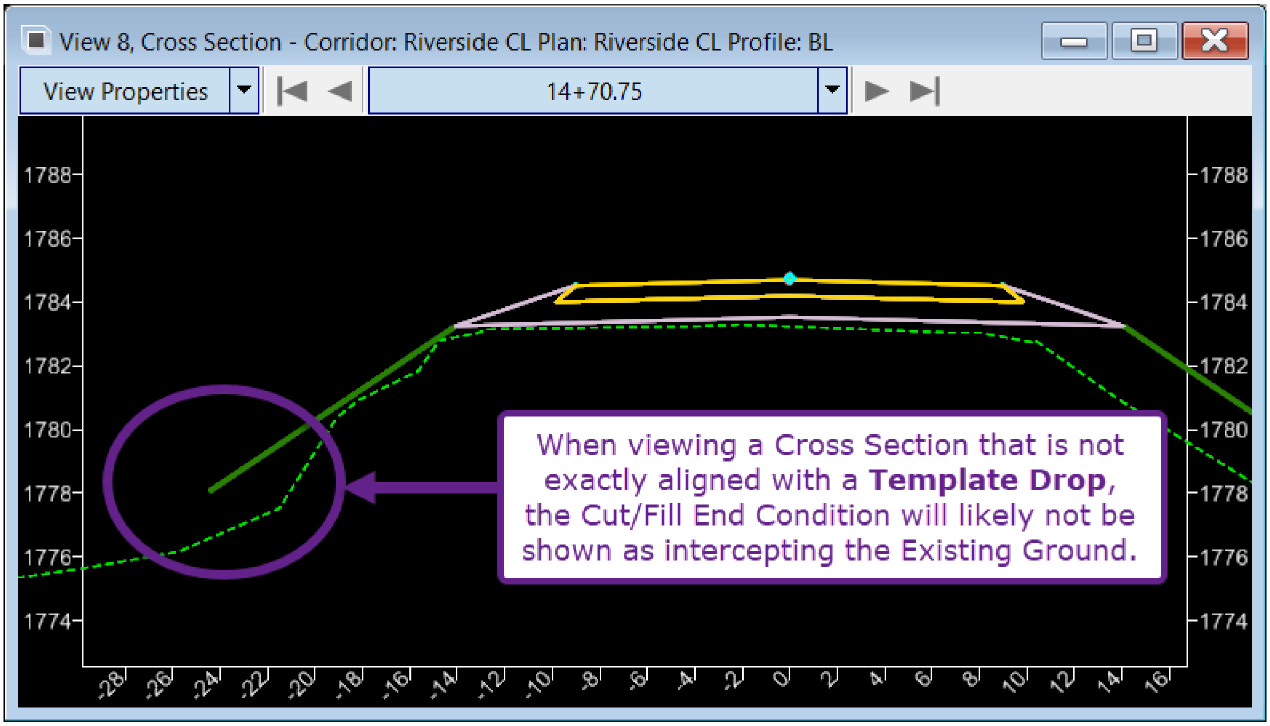
Template Drops must coincide with the station values that will be shown in Cross Section Sheet Production. This is accomplished by manipulating the *Template Drop Interval* value. For more information on producing Cross Section Sheets, see *Chapter 16 – Cross Sections*.

For example, if the intent is to produce Cross Section Sheets every 25' (i.e., STA 10+00, 10+25, 10+50), then the *Interval* must be set to a number divisible by 25 (i.e., 25, 12.5, 5). To show Cross Section Sheets every 25', do NOT set the *Interval* to 10, 15, 50, or 100.

WARNING: The Corridor Feature Definition also affects the placement of Template Drops due to the *Template Drop Multiplier*. See *9D.2 Corridor Feature Definitions: Design and Final*.

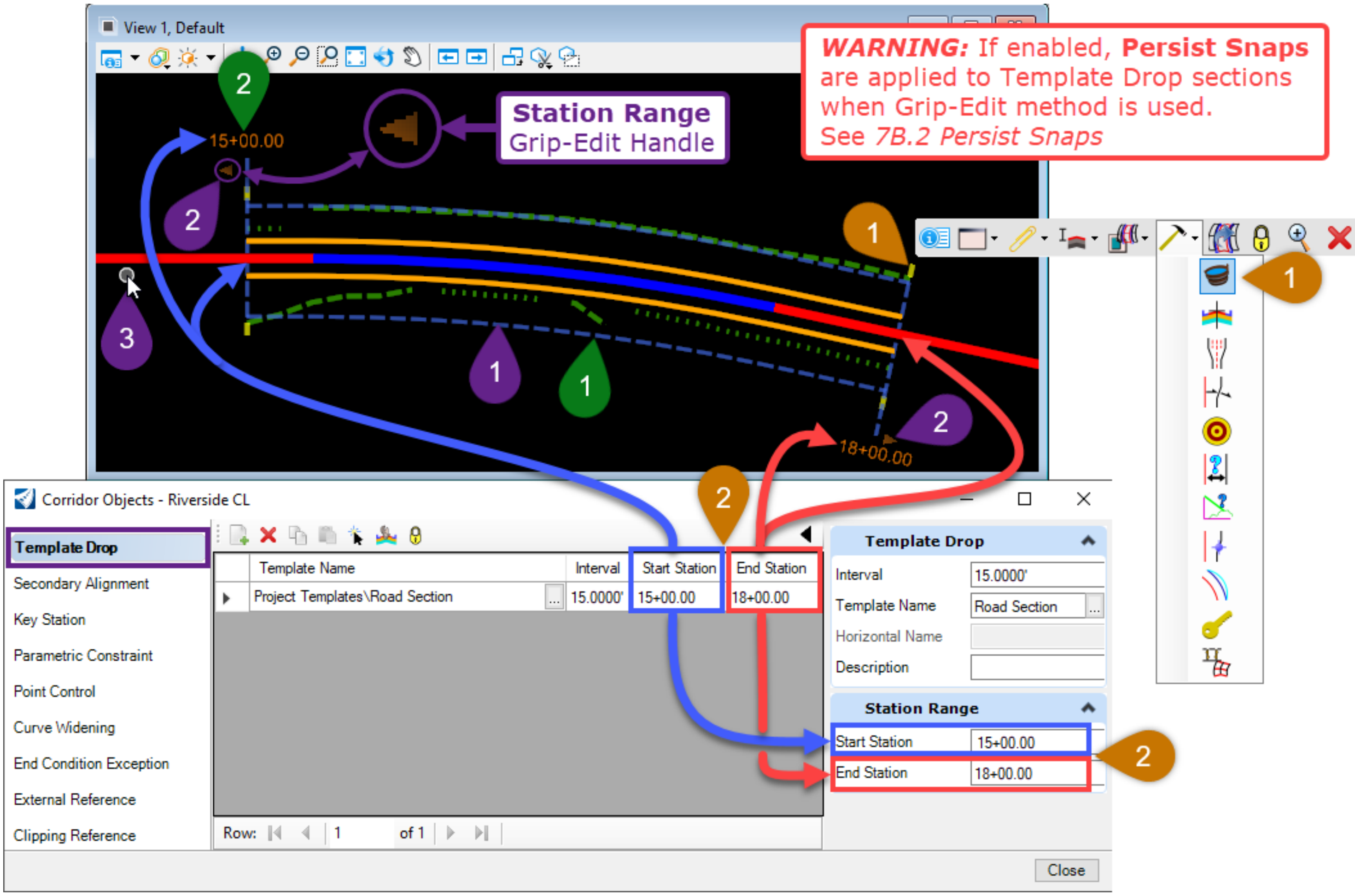
Occasionally, the beginning station limit for a project may be an odd value – such as 9+85.36. In that case, it is conventional to show a cross section at the beginning 9+85.36 – and show all subsequent cross sections at round station values (i.e., 10+00, 10+25, 10+50). In that case, the Template Drop Interval should still be a divisible value of the round station. The software will place a Template Drop at the odd beginning station and then automatically adjust to place subsequent Template Drops at round stations.




View 8, Cross Section - Corridor: Riverside CL Plan: Riverside CL Profile: BL
View Properties
14+70.75
When viewing a Cross Section that is not exactly aligned with a **Template Drop**, the Cut/Fill End Condition will likely not be shown as intercepting the Existing Ground.

9E.3 Adjust the Station Range of a Template Drop Section

The Station Range for a Template Drop Section can be adjusted graphically using grip-edits. Alternatively, a new Station Range can be keyed-in numerically in the Template Drop sub-menu.



Graphically change the Start or End Station of the Template Drop section with Grip-Edits

1	In the 2D Design Model, *Select* the Template Drop Section that is to be adjusted.
2	Left-Click on the Station Range Grip-Edit Handle – shown above as an orange arrow.
3	Place the mouse cursor in the desired new location for the Start or End Station. Left-Click to accept the new position.

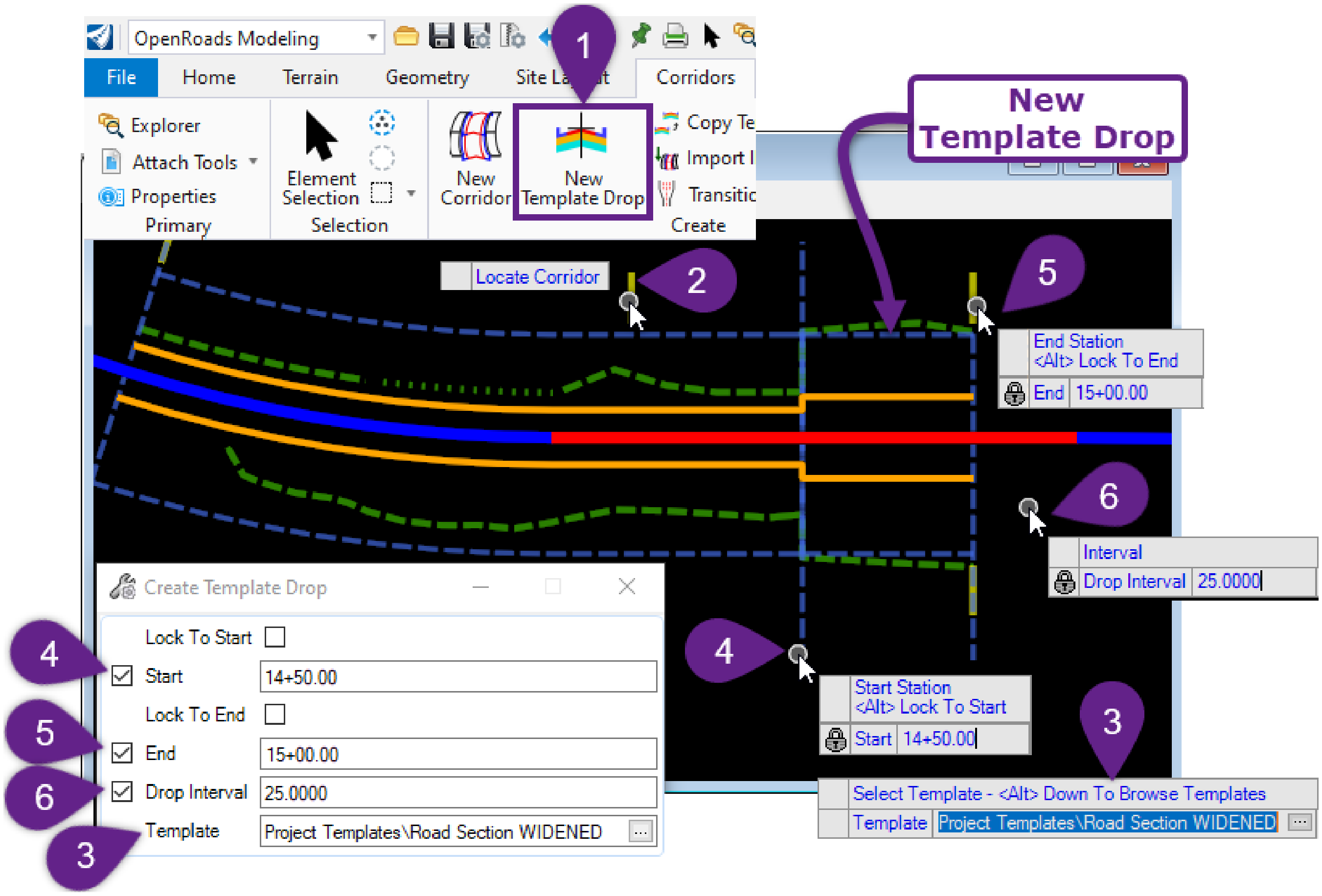
Numerically change the Start or End Station

1	Access the Corridor Objects menu through the Corridor Handle Pop-Up Icon Menu. See *9D.1.a Access the Corridor Objects Menu*.
2	In the Template Drop sub-menu, highlight the desired Template Section and key-in the new Start or End Station. Press the Enter key to accept.

1	In the 2D Design Model, *Select* the Template Drop Section that is to be adjusted.
2	Left-Click on the **Orange Text** near the Start or End of the Template Drop Section. Key in the desired new Start/End Station value. Press the Enter key to accept.

9E.4 Create a New Template Drop Section

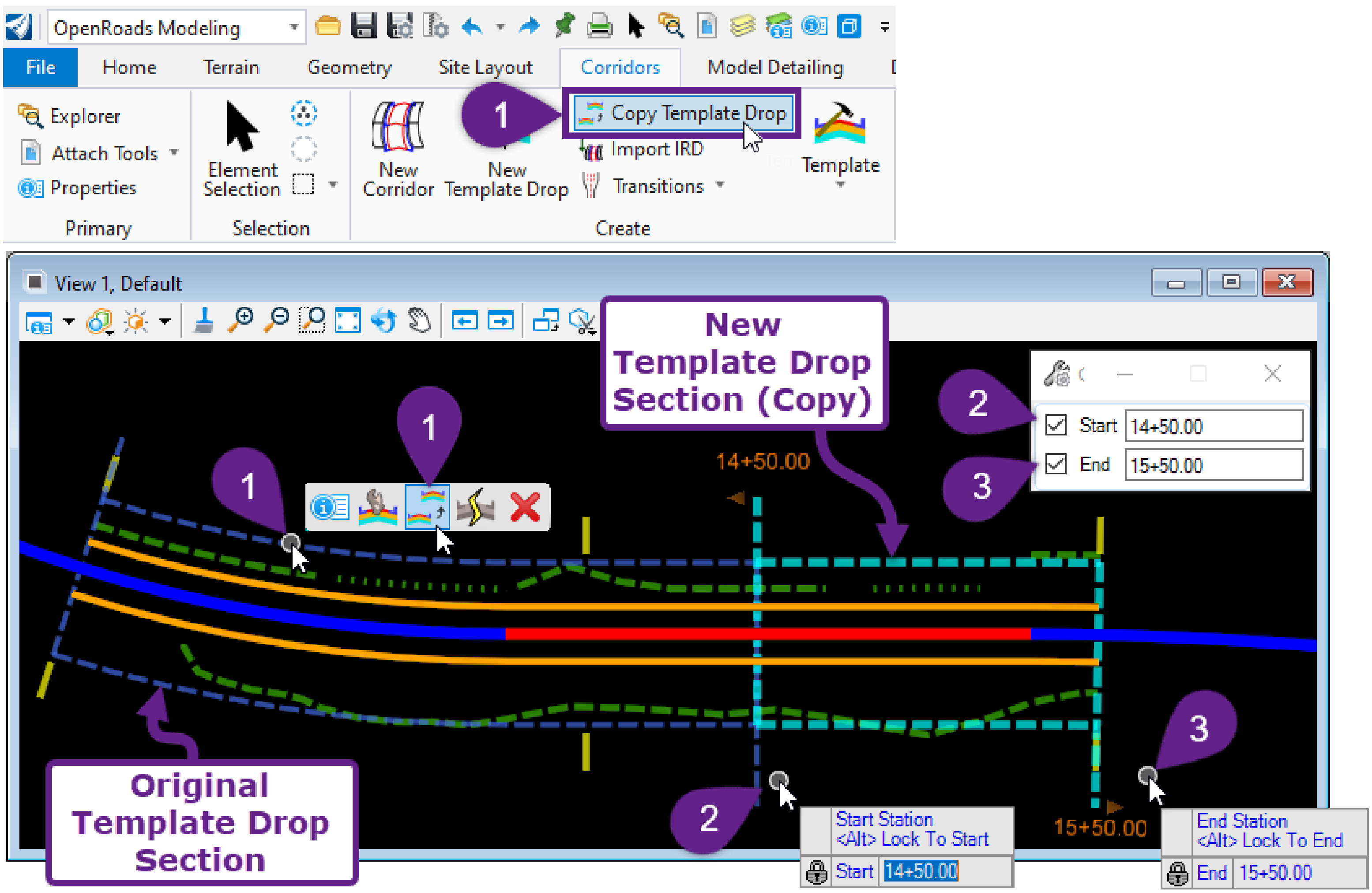
A new Template Drop section can be created directly in the 2D Design Model with the *New Template Drop* tool. Alternatively, a Template Drop section can be created through the Template Drop sub-menu with the *Add New* button . **Prior to this workflow, ensure that the Project Template Library has been loaded in the Template Editor.**



1	In the Ribbon, Left-Click on the *New Template Drop* tool. Ribbon Location: **OpenRoads Modeling** workflow → **Corridor** tab → **Create** panel.
2	*Prompt: Locate Corridor* – Select the Corridor that will receive the new Template Drop Section.
3	*Prompt: Select Template - <Alt> Down To Browse Templates* – Simultaneously press the ALT and Down Arrow key to view the Project Template Library. Select the desired Template and press OK. If the desired Template is displayed in the Dialogue Box, then Left-Click in the View to advance.
4	*Prompt: Start Station <Alt> Lock To Start* – Key-in the desired starting station for the new Template Drop section and press the Enter key to lock it. Left-Click in the View to accept. **Alternatively:** Graphically select the Start Station by placing the mouse cursor in the desired location and then left-click to accept. When doing so, ensure that the Start Station is not LOCKED in the Dialogue Box
5	*Prompt: End Station <Alt> Lock To End* - Key-in the desired end station for the new Template Drop section and press the Enter key to lock it. Left-Click in the View to accept. **Alternatively –** Graphically select the End Station.
6	*Prompt: Interval* – Key-in the desired Template Drop Interval for the section and Left-Click in the View.

9E.5 Copy a Template Drop Section

Instead of creating a whole new Template Drop Section, it may be more convenient to COPY a Template Drop found in the Corridor. The result is a new Template Drop section that contains the same Template configuration. This workflow is commonly performed as a precursor to editing/overriding a Template within a Template Drop section. See *9E.6 Edit (Override) Template Drop*.



1	**Preferred Method:** Left-Click on the Template Drop section to be copied and summon the Pop-Up Icon Menu. Left-Click on the *Copy Template Drop* tool **Alternatively:** Left-Click on the *Copy Template Drop* tool in the Ribbon: [**OpenRoads Modeling** workflow → **Corridor** tab → **Create** panel]
2	*Prompt: Start Station <Alt> Lock To Start* – Key-in the desired starting station for the new Template Drop section and press the Enter key to lock it. Left-Click in the View to accept. **Alternatively:** Graphically select the Start Station by placing the mouse cursor in the desired location and then left-click to accept. When doing so, ensure that the Start Station is not LOCKED in the Dialogue Box
3	*Prompt: End Station <Alt> Lock To End* - Key-in the desired end station for the new Template Drop section and press the Enter key to lock it. Left-Click in the View to accept. **Alternatively:** Graphically select the End Station.

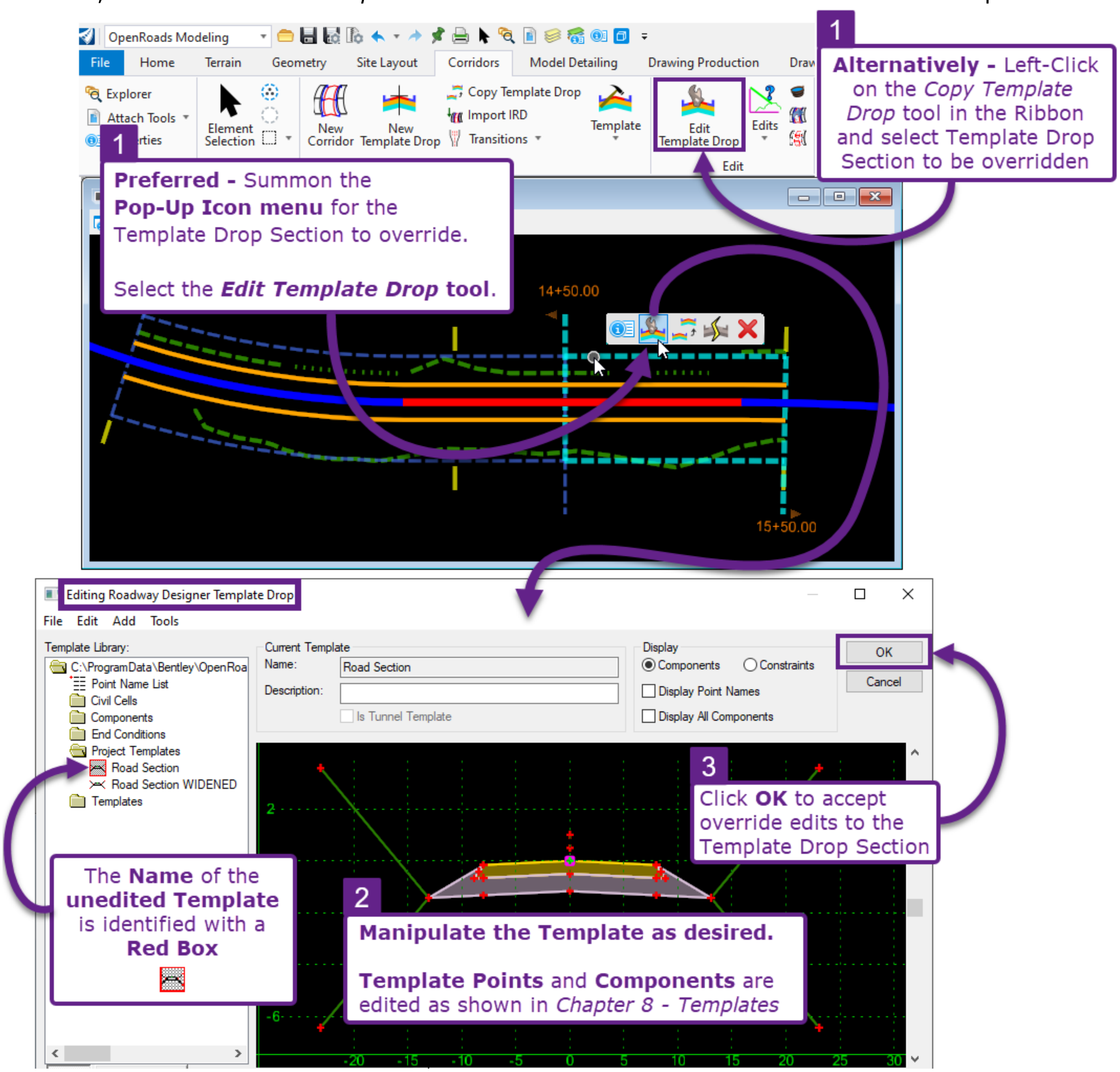
9E.6 Edit (Override) Template Drop tool

The *Edit Template Drop* tool is used to directly edit a Template configuration (i.e., Point and Component layout) for a Template Drop Section. The original Template found in the Project Template Library is NOT affected when this tool is used. Nor is the overridden Template automatically exorted into the Project Template Library.

WARNING: The *Edit Template Drop* tool should be with caution. See *9E.6.a Overriding Template Drop Sections WARNING and BEST PRACTICE*. This tool is great for quickly testing or experiment with a new Template configuration. If the overridden Template experiment is successful, then the User should incorporate the overridden Template into the Template Library. See *8B.5 Transfer Templates between Project Template Libraries*. If the overridden Template experiment is unsuccessful, the User can return to the original Template configuration by resyncing with the Library. See *9E.8 Synchronize with Library tool*.

BEST PRACTICE: Instead using this tool to override a Template, make edits/adjustments to a Template in the *Project Template Library* (in the Template Editor). Next, use the *Synchronize with Library* tool to sync the Template in the Library with the in the Template Drop section.

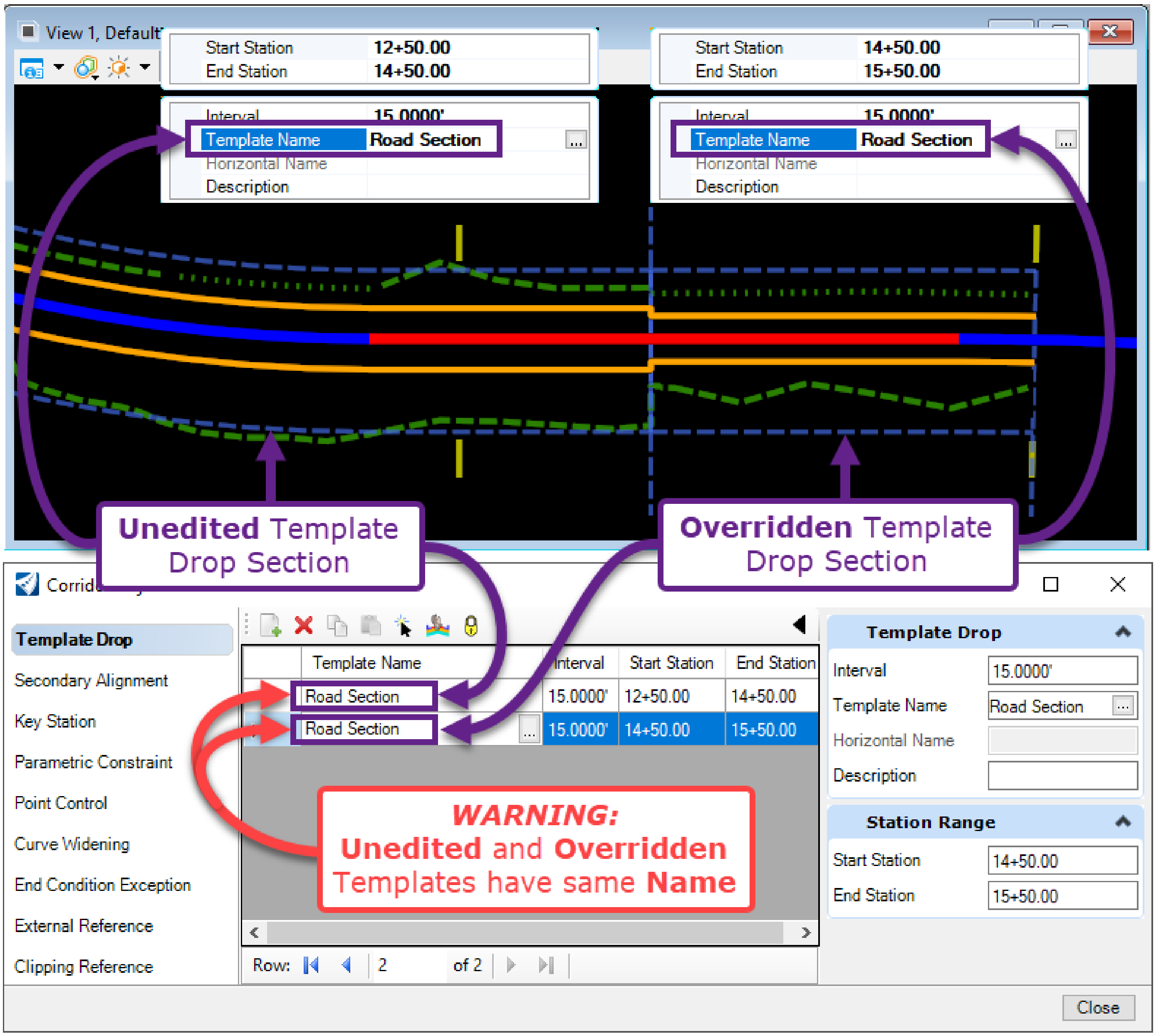
BEST PRACTICE: Instead of overriding or creating a new Template, use *Point Controls*, *Parametric Constraints*, or *End Condition Exceptions* to accommodate minor deviations from the Template.



9E.6.a Overriding Template Drop Sections WARNING and BEST PRACTICE

WARNING: The *Edit Template Drop* tool should be used with caution because an overridden Template Drop section is NOT readily identifiable. The overridden Template retains the EXACT same Name as the original, unaltered version found in the Template Project Library or in other sections of the Corridor.

This is problematic because the User must remember which Template Drop Sections have been overridden when viewing the Template Drop. Similarly, a different User working on the Corridor could only identify the overridden Template Drop section by inspecting Points and Components in the Editor.



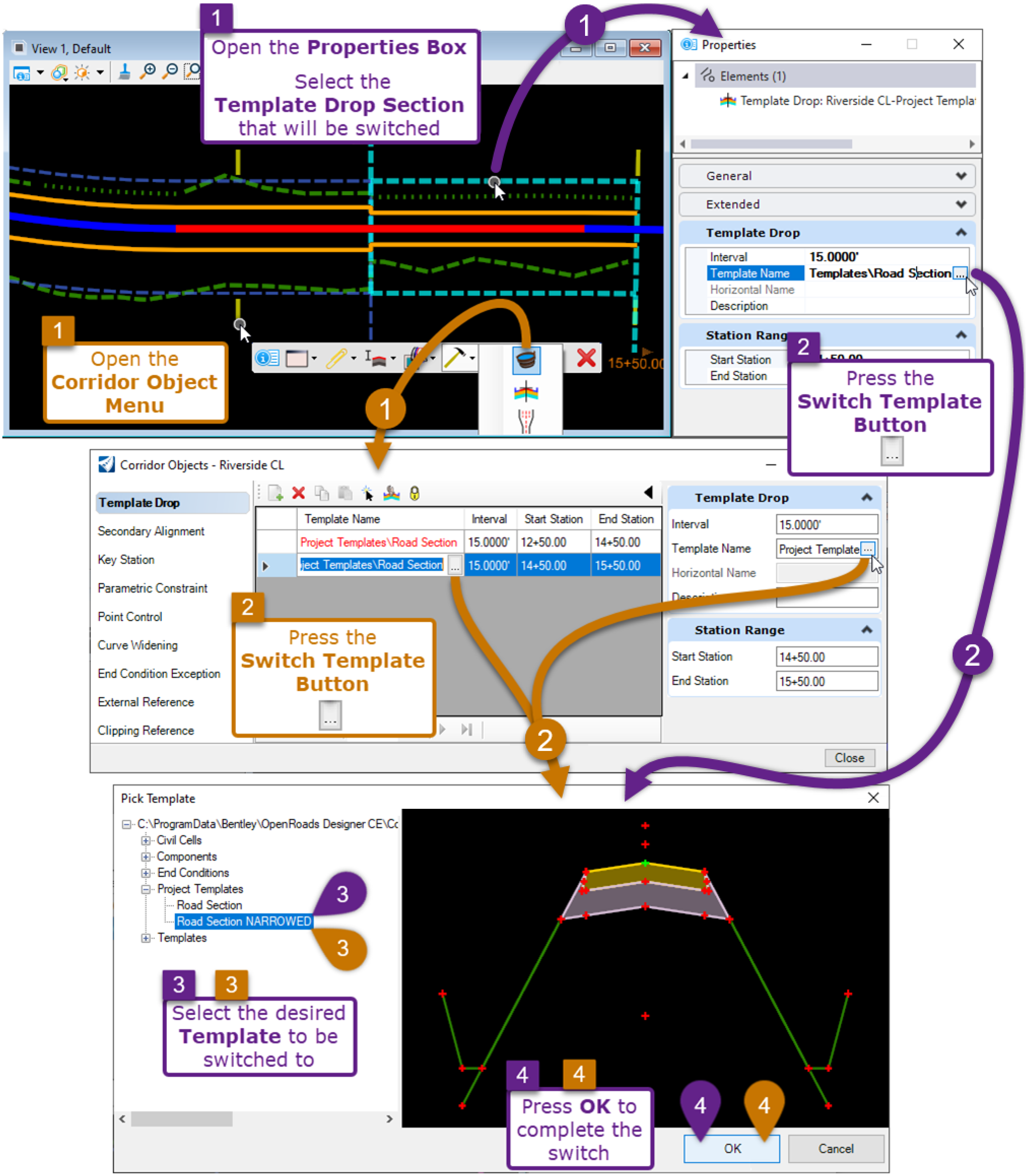
BEST PRACTICE: If a Template is overridden, transfer it into the Project Template Library with the *Template Library Organizer* tool. See *8B.5 Transfer Templates between Project Template Libraries*.

Once the overridden Template is transferred into the Project Template Library, rename the overridden Template appropriately.

For the overridden Template Drop Section, change the Template to the corresponding overridden Template in the Project Template Library

9E.7 Switch the Template for a Template Drop Section

The Template for a Template Drop Section can be switched in the Template Drop sub-menu (in the Corridor Objects Menu) or in the Properties Box when a Template Drop Section is selected.

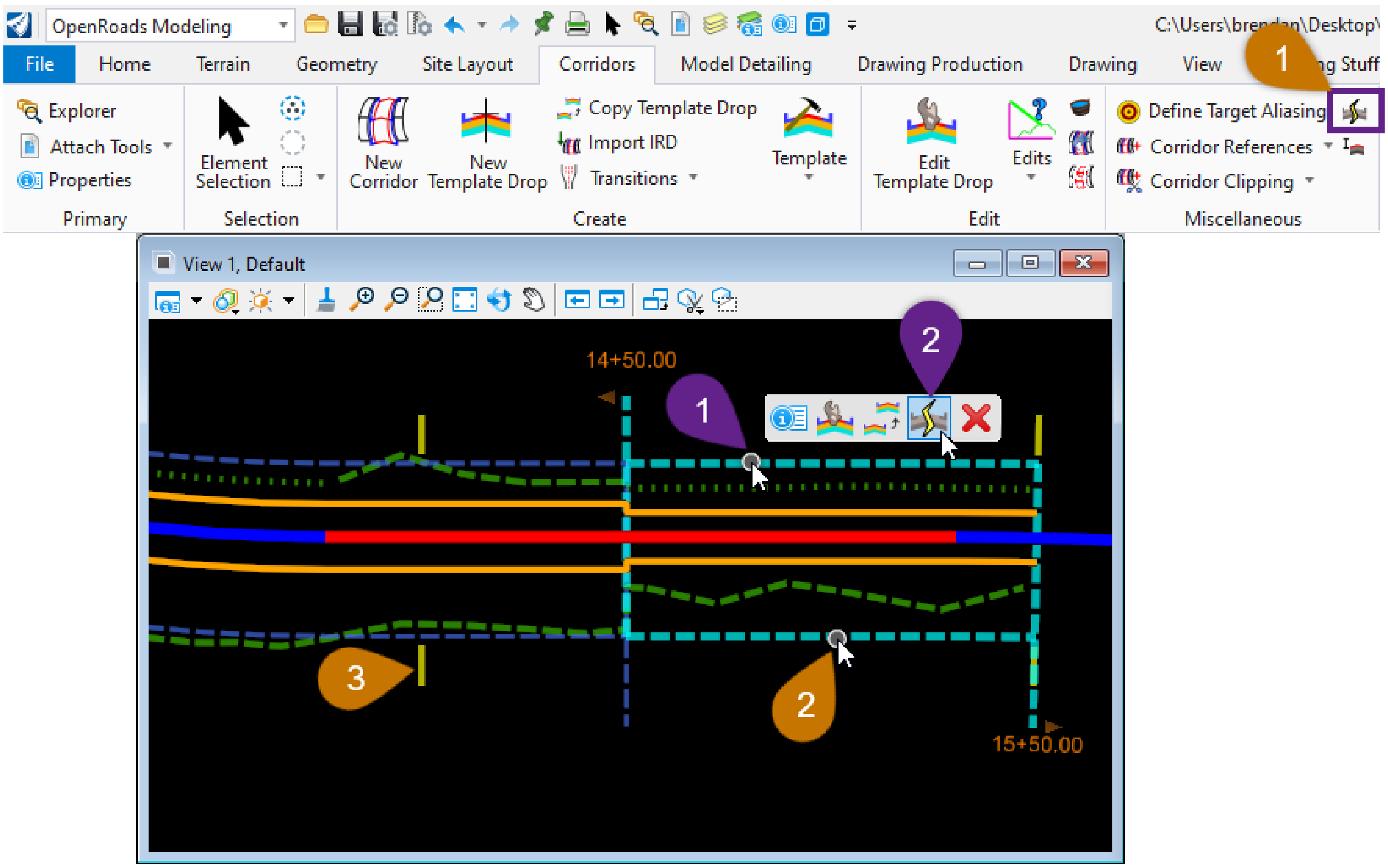


9E.8 Synchronize with Library tool

If a Template is edited in the *Project Template Library*, then the *Synchronize with Library* must be used to update the corresponding Template used in the Corridor. The *Synchronize with Library* tool updates Templates used in the Corridor to reflect the Template configuration shown in the Project Template Library.

TIP: Every Template used in the Corridor will be synchronized if the tool is accessed through the Ribbon. See the orange step markers in the graphic below 1.

TIP: In the Corridor Objects Menu, the User can determine if Templates out of sync with the currently loaded Template Library. See the next page.



Access the *Synchronize with Library* tool through the Pop-Up Icon Menu

1	Select the Template Drop Section to synchronize and summon the Pop-Up Icon Menu.
2	Select the *Synchronize with Library* tool.

Synchronize Every Template in the Library:

1	Select the *Synchronize with Library* tool from the Ribbon. Ribbon Location: OpenRoads Modeling workflow → Corridor tab → Miscellaneous panel.
2	*Prompt: Locate Template Drop or Corridor* – Left-Click on the Template Drop Section to synchronize.
3	**Alternatively –** Left-Click on the Corridor Handle to synchronize all Template Drop sections in the Corridor.

9E.8.a Template Synchronization in the Corridor Objects Menu

In the Corridor Objects Menu, Corridor Templates that match or do NOT match the corresponding Template within the Project Template Library can be identified.

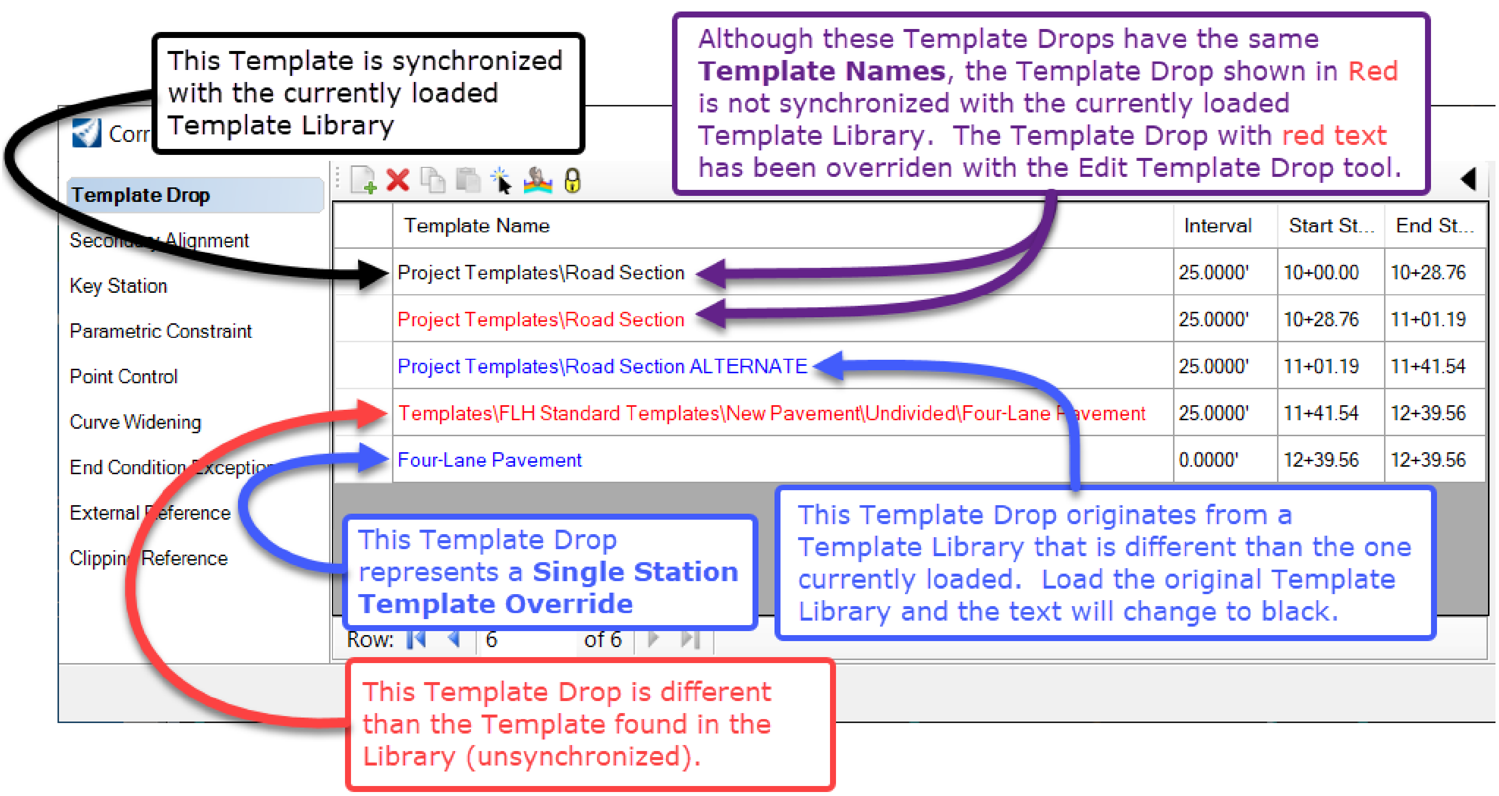
Templates listed in the in the Corridor Objects Menu are **color-coded** to signify which Templates are synchronized with the currently loaded Template Library. ***NOTE:*** The Project Template Library must be loaded to perform this analysis. See *8A.1 Accessing the Template Editor and Template Libraries.*

Black *Template Name* Text: If the Template name is shown in black, then the Corridor Template exactly matches the corresponding Template found in the currently-loaded Template Library.

Red *Template Name* Text: If the Template name is shown in red, then the Corridor Template does NOT match any Templates found in the currently-loaded Template Library. There are three reasons why a Template is shown in red:

- The Project Template Library is NOT loaded.
- The Project Template Library is loaded, but an edit has been made to the Template in the Template Library. The *Synchronize with Library* tool must be used to update the Corridor Template to match the corresponding Template in the Template Library.
- The Corridor Template has been edited (overridden) with the *Edit Template Drop* tool. In this case, the Corridor Template must be transferred to the Project Template Library with the process shown in *8B.5 Transfer Templates between Project Template Libraries*.

Blue *Template Name* Text: Blue Template Name text can signify two different scenarios. The first scenario is when a Corridor Template does NOT exist within the currently loaded Template Library. In the loaded Template Library, there is no Template that contains the same name as the Corridor Template. The second scenario is when a single cross-section has been edited in the Dynamic Cross Section Viewer with the *Edit Station* tool (see *9F.5*). Single Station Template Overrides will always be shown with a Blue Template Name.



9E.9 Create a Transition Section between Template Drop Sections

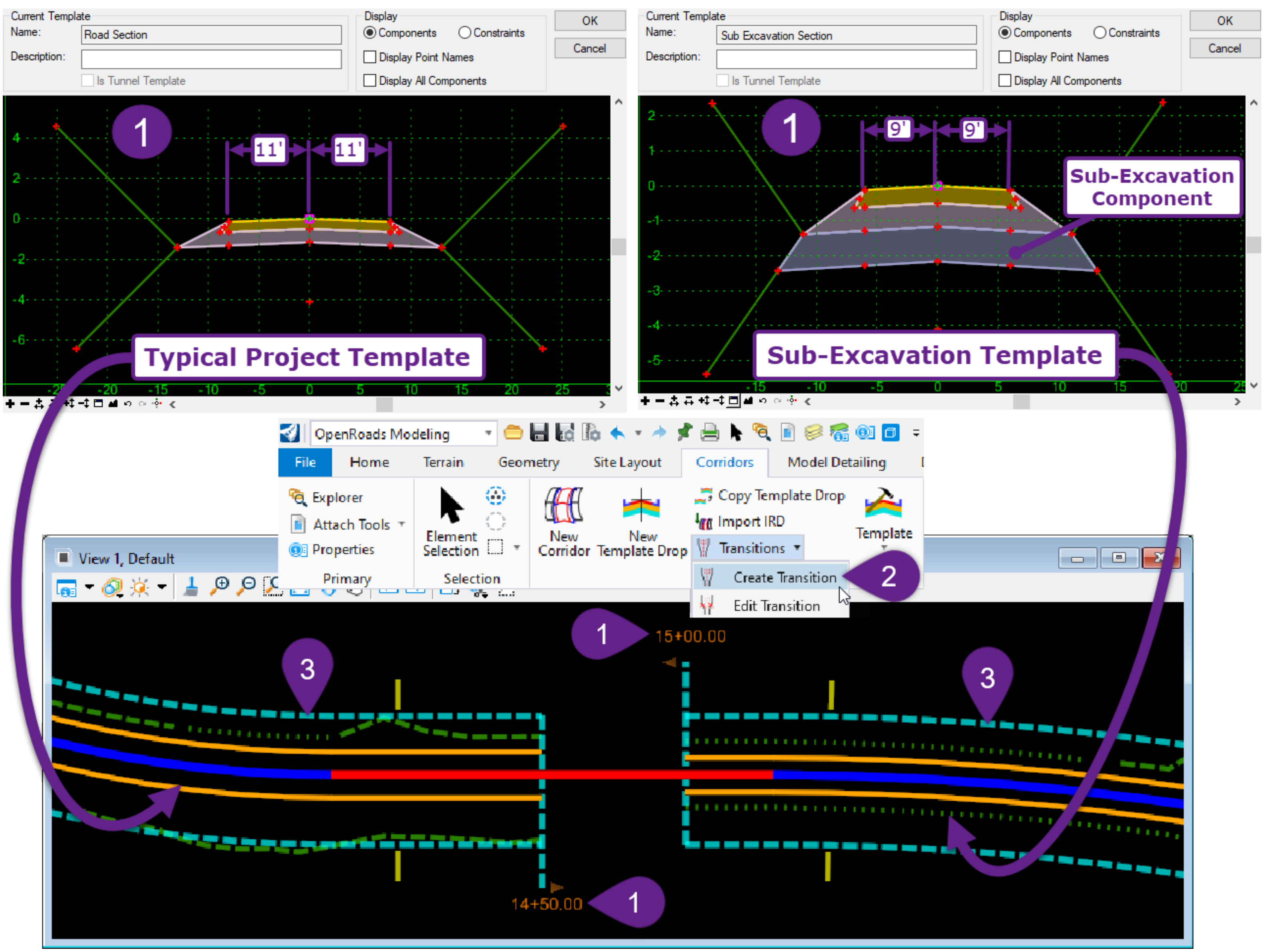
Transition Sections are used between two Template Drop Sections that are *relatively similar* - in terms of *Template Point and Component* configurations and naming. For example, it would be inappropriate to use a Transition Section if the surfacing material changes from asphalt to gravel between two Template Drop sections.

NOTE: It is NOT required to have a Transition Section between Template Drop Sections. Corridor Objects, such as Point Controls can be used to facilitate a transition between two abutting Template Drop Sections.

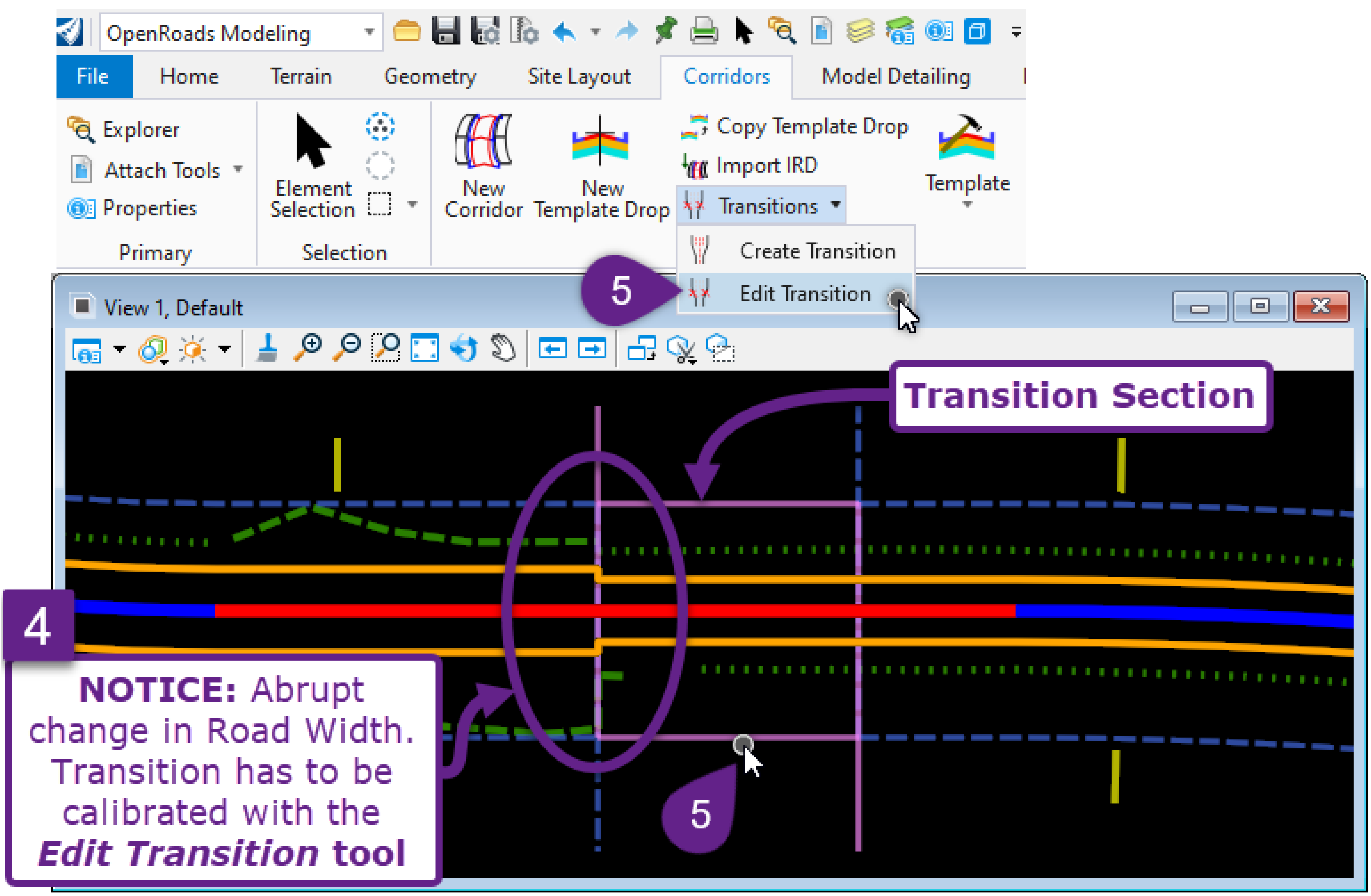
Transition Sections work well in the following situations:

- Change (taper) in road width between Templates.
- Transition between Templates with different shoulder configurations.
- Transition from a typical Template into a Template with Sub-excavation components.

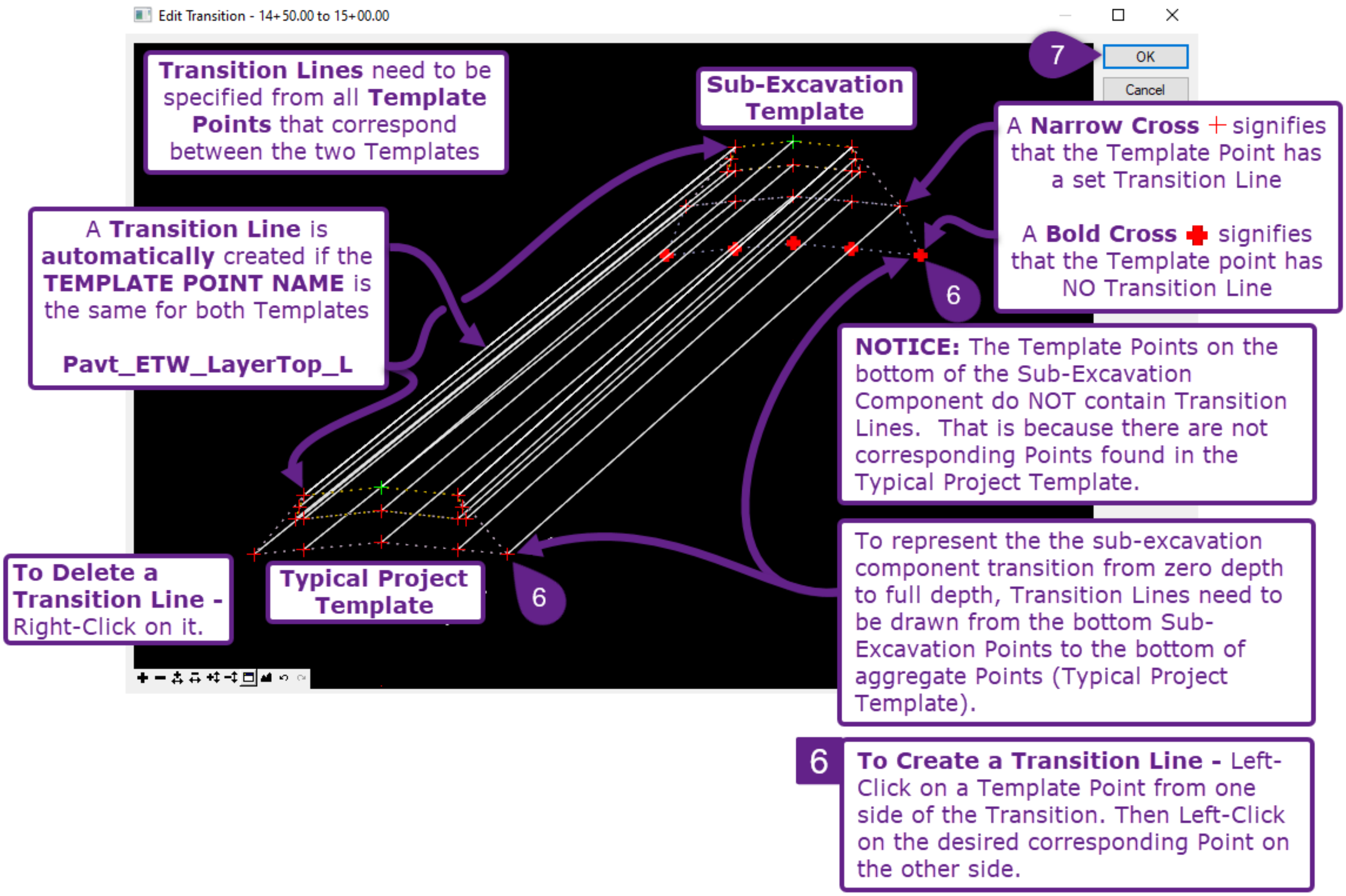
In this workflow, a Transition Section is created between a "Typical Project Template" and a Sub-Excavation Template. The Sub-Excavation Template contains a narrower road width and an additional sub-excavation component. The Transition Section will taper the road width and transition the sub-excavation component from zero depth to full sub-excavation depth.



1	Ensure the two Templates are configured as desired. Also, ensure that the Template Drop Section stations are set as desired.
2	Select the *Create Transition* tool from the Ribbon. Ribbon Location: **OpenRoads Modeling** workflow → **Corridor** tab → **Create** panel.
3	*Prompt: Locate First Template Drop* – select the Template Drop Section that is down station. *Prompt: Locate Second Template Drop* – select the Template Drop Section that is up station.
4	After Step 3, the Transition Section has been created. However, requires an addition configuration process to select which Points are transitioning. The *Edit Transition* tool is used to define how Template Points will behave in the Transition.
5	Select the *Edit Transition* tool from the Ribbon and Left-Click on the Transition Section. Ribbon Location: **OpenRoads Modeling** workflow → **Corridor** tab → **Create** panel. The *Edit Transition* tool will bring up the *Edit Transition* screen.

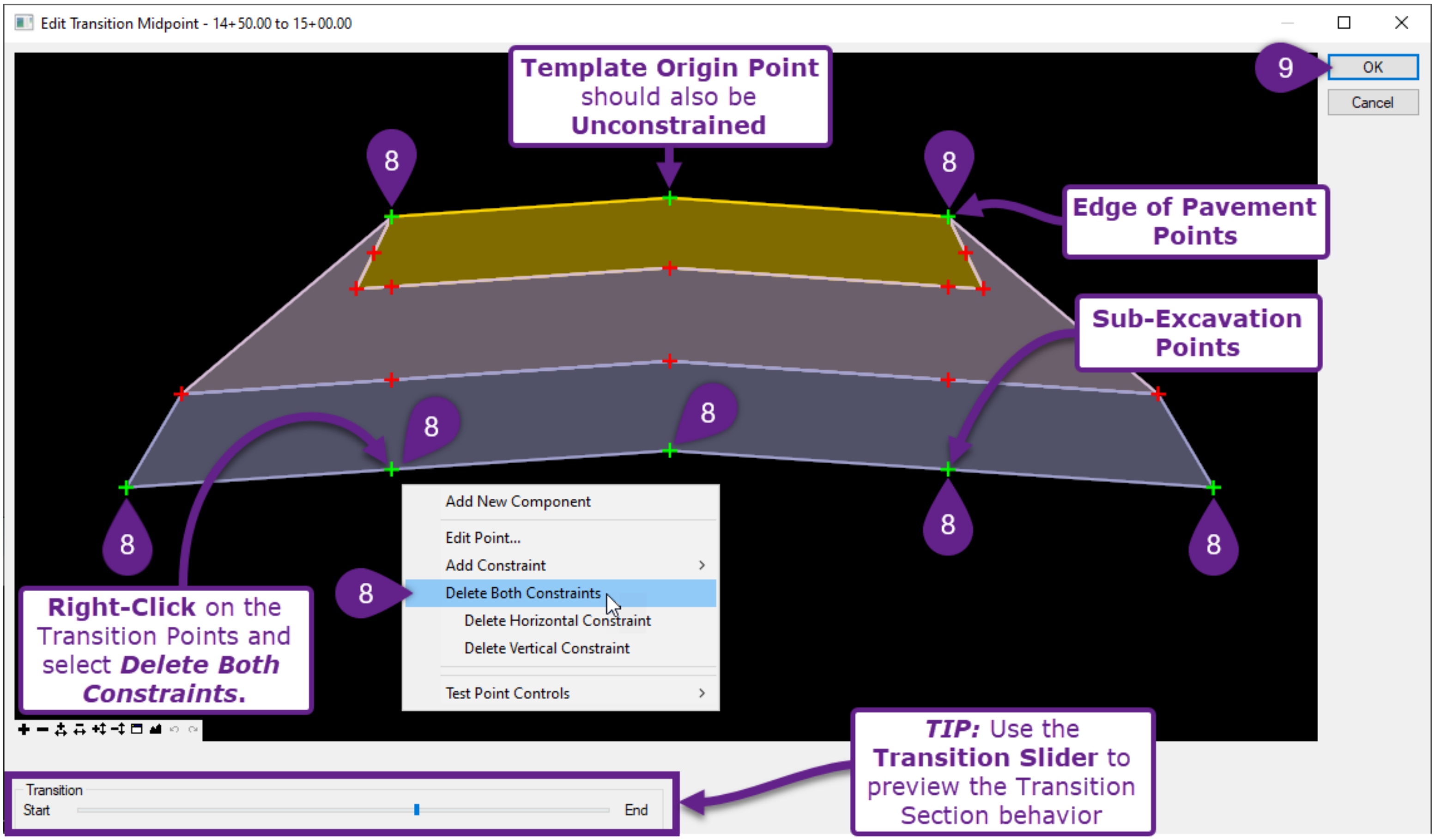


9E.9.a Edit Transition Menu

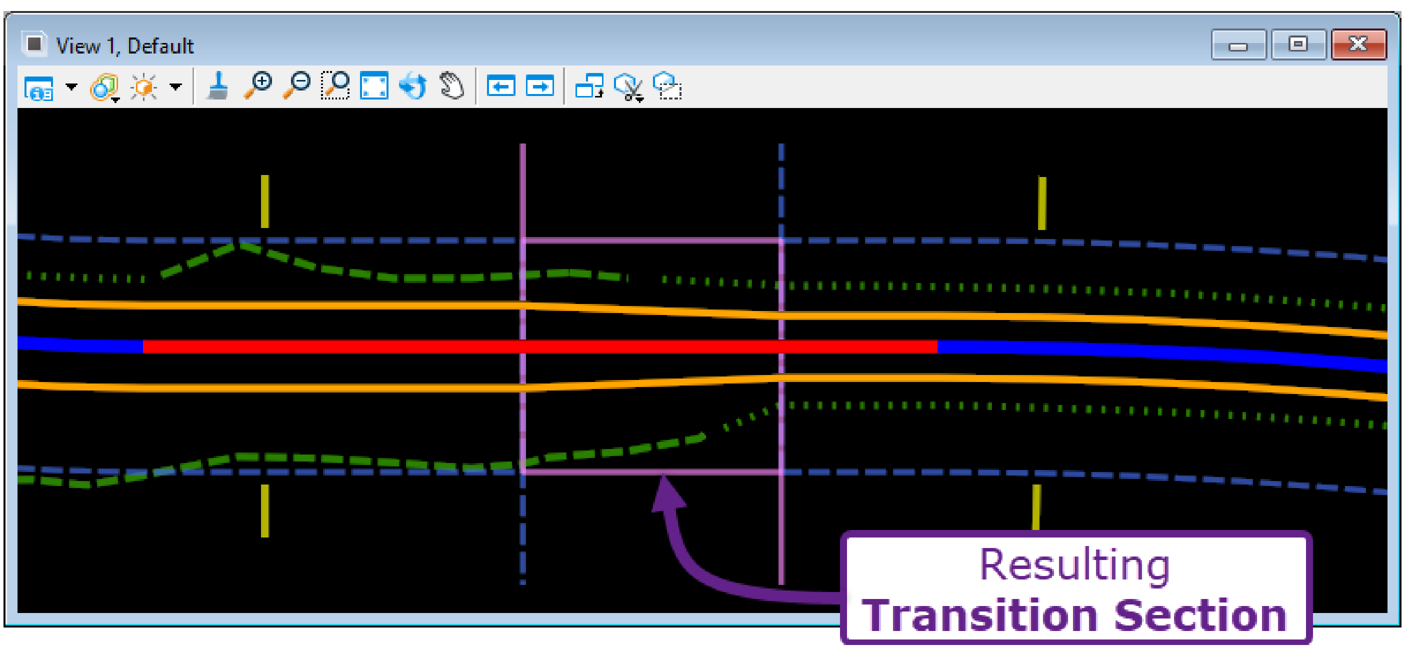


6	In the *Edit Transition Screen*, draw a Transition Line for each Template Point at the bottom of the Sub-Excavation Component. The Transition line need to go from the bottom Sub-Excavation Points (Sub-Excavation Template) to the bottom of aggregate Points (Typical Project Template). Create six new Transition Lines in total.
7	If all Transition Lines appear in order, select OK.

9E.9.b Edit Transition Midpoint Menu



8	In the *Edit Transition Midpoint Screen*, Delete Both Constraints from the Template Points shown. **IMPORTANT:** The Template Points that are transitioning/moving NEED to be UNCONSTRAINED ✚. In this case, the bottom Sub-Excavation Points and Edge of Pavement Points are transitioning.
9	If all Constraints appear in order, select OK.

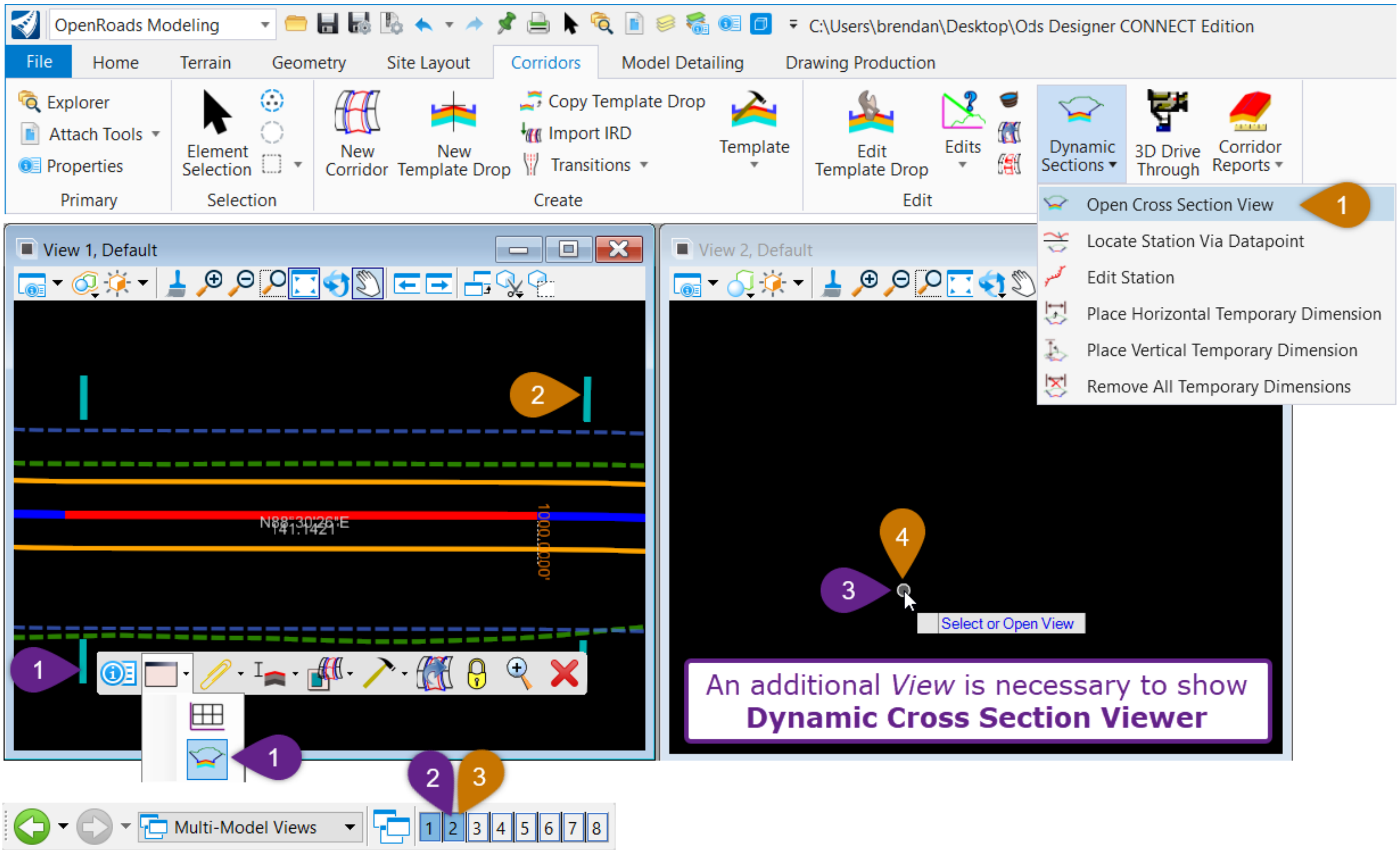


9F – DYNAMIC CROSS SECTION VIEWER

The *Dynamic Cross Section Viewer* is used to view the cross sections of a Corridor.

9F.1 Accessing the Dynamic Cross Section Viewer

There are two ways to access the *Dynamic Cross Section Viewer* for a Corridor.



Access the Dynamic Cross Section Viewer through the Pop-Up Icon Menu

1	Select the Corridor Handle to summon the Pop-Up Icon Menu. Select the *Open Cross Section Model* icon. →
2	Open an additional *View* window. This *View* window will show the Corridor Cross Sections.
3	Left-Click in the newly opened *View* window.

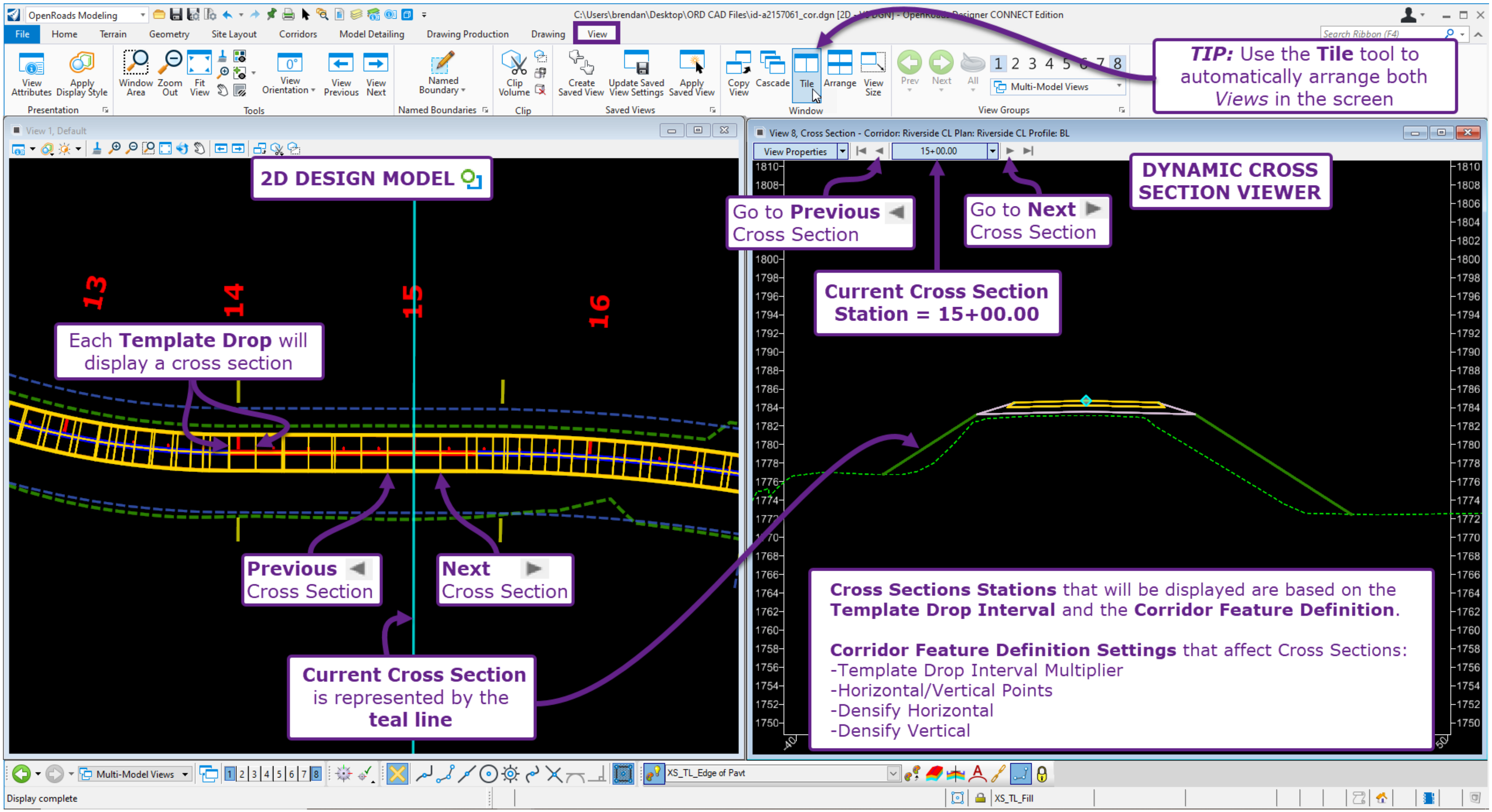
Access the Dynamic Cross Section Viewer through the Ribbon

1	In the Ribbon, Left-Click on the *Open Cross Section View* tool. Ribbon Location: **OpenRoads Modeling** workflow → **Corridor** tab → **Review** panel.
2	*Prompt: Locate Corridor or Alignment* – Left-Click on the Corridor Handle that belongs to the desired Corridor.
3	Open an additional *View* window. This *View* window will show the Corridor Cross Sections.
4	Left-Click in the newly opened *View* window.

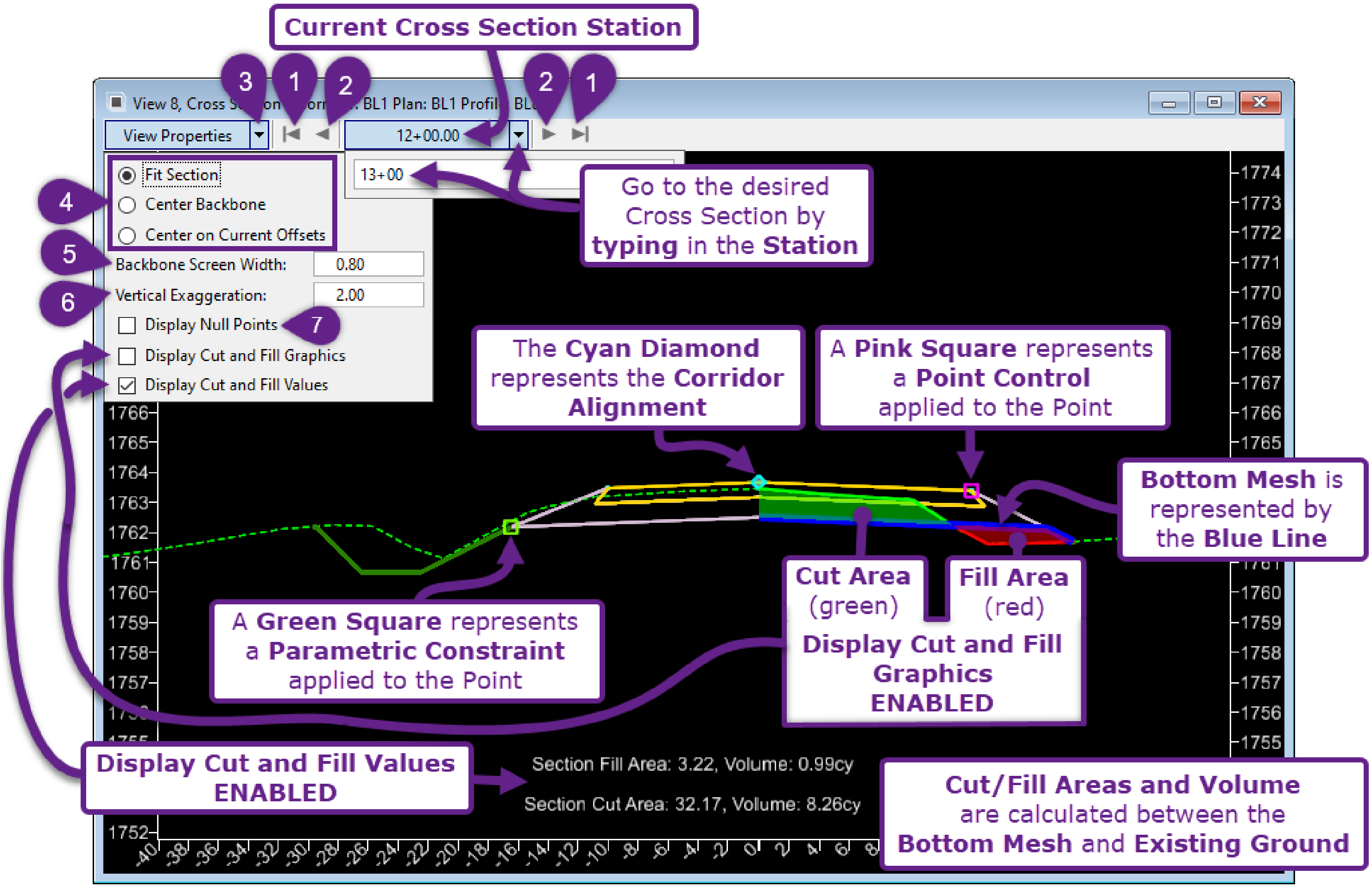
9F.2 Dynamic Cross Section Viewer Basics

When reviewing Corridor Cross Sections in the *Dynamic Cross Section Viewer*, it is advised to also have open a *View* showing the *2D Design Model* .

The two *Views* can be automatically arranged in the screen using the *Tile* tool.
Ribbon Location: **OpenRoads Modeling** workflow → **View** tab → **Window** panel.



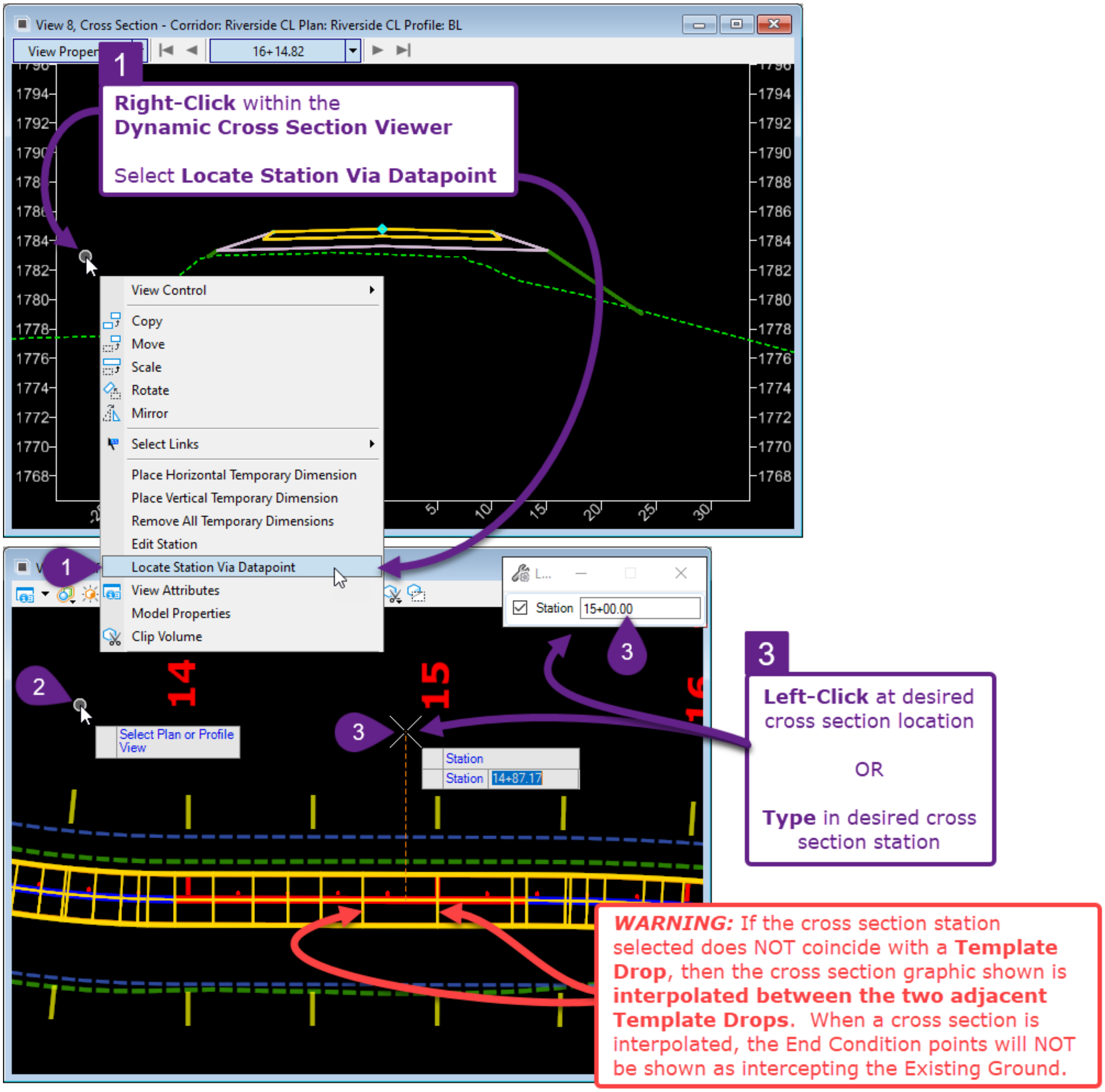
9F.3 Dynamic Cross Section Viewer Overview



1	**Go to First/Last Cross Section**	The buttons will go to the first or last cross section station in the Corridor.
2	**Go to Preceding/ Next Cross Section**	The buttons will go to the preceding or next cross section station.
3	**Dynamic Cross Section Properties**	Press the button to reveal the Dynamic Cross Section Properties.
4	**Zoom Options**	**Fit Section:** The zoom is automatically adjusted to fit the entire Corridor Cross Section in the View
		Center Backbone: The zoom is automatically adjusted according to the **Backbone Screen Width**.
		Center on Current Offset: When changing between Cross Section stations, the zoom is NOT automatically adjusted.
5	**Backbone Screen Width**	Works in conjunction with the **Center Backbone** *Zoom Option*. The Backbone refers to the width of the corridor cross section. For example, if the value is 0.8, then 80% of the View width will be occupied by the corridor cross section.
6	**Vertical Exaggeration**	The vertical axis of the cross-section grid is exaggerated by typing in the desired factor. Alternatively, the exaggeration can be changed by holding down the CTRL key and scrolling with the Mouse Wheel.
7	**Display Null Points**	If ENABLED, *Null Points* will be shown with a red cross.

9F.4 Graphically Go to a Cross Section with Locate Station Via Datapoint

The *Locate Station Via Datapoint* tool is used to graphically select a cross section station by clicking in the *2D Design Model* or *Profile Model* of the Corridor Alignment. Before using this workflow, open a *View* for the *Dynamic Cross Section Viewer* and a *View* for either the *2D Design Model* or *Profile Model*.



1	Right-Click anywhere within the *Dynamic Cross Section Viewer* and select the *Locate Station Via Datapoint* tool.
2	*Prompt: Select Plan or Profile View* – Left-Click in the *2D Design Model* or *Profile Model* of the Corridor Alignment. In this example, a *View* showing Corridor within the *2D Design Model* is used.
3	**Select the Station Graphically –** Left-Click at anywhere in the *2D Design Model* *View* to display the cross section at that point. **Select the Station Numerically -** Type in the desired cross section station and press the *Enter* Key. Left-Click anywhere in the *2D Design Model* *View* to complete the command.

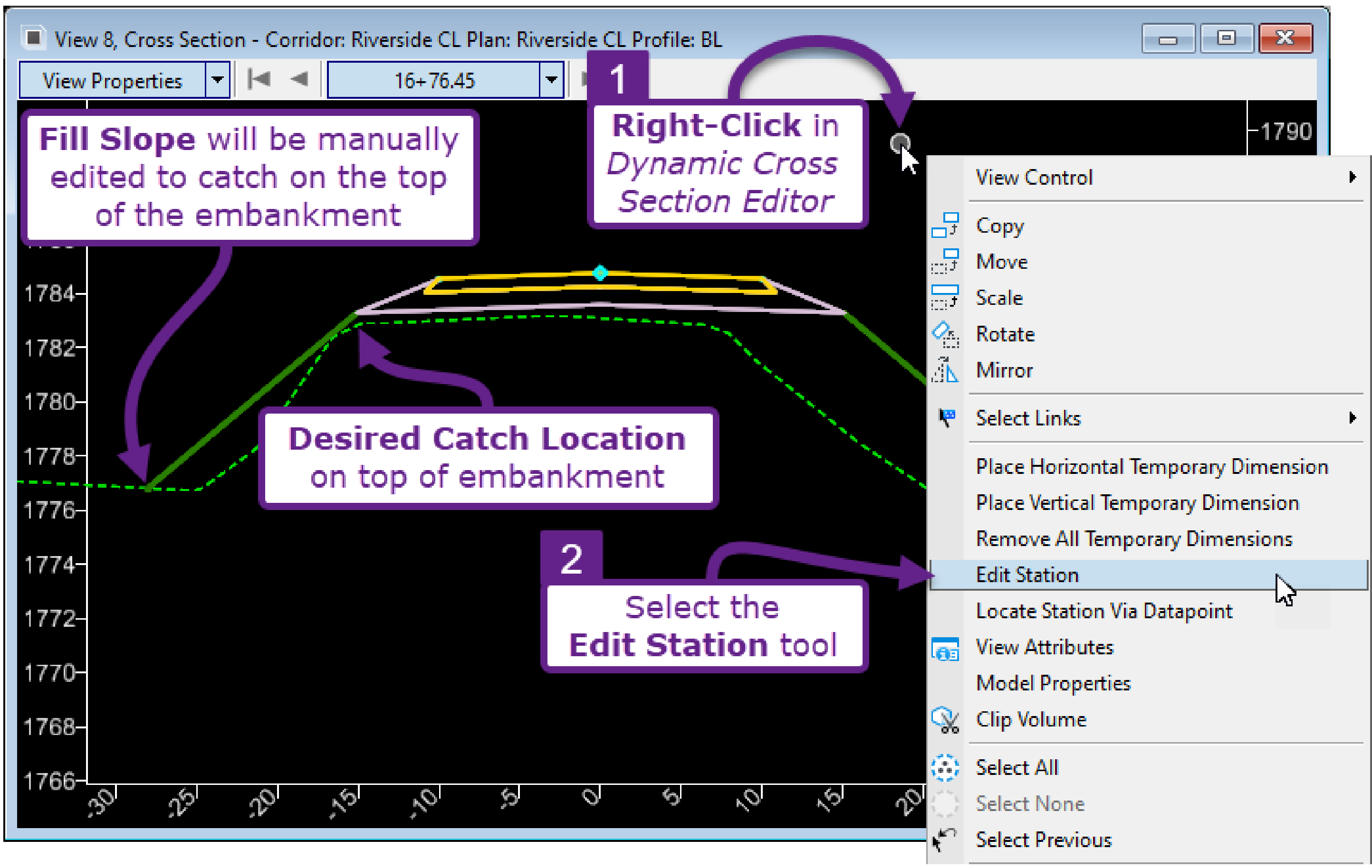
9F.5 Single Station Template Override (Edit Station tool)

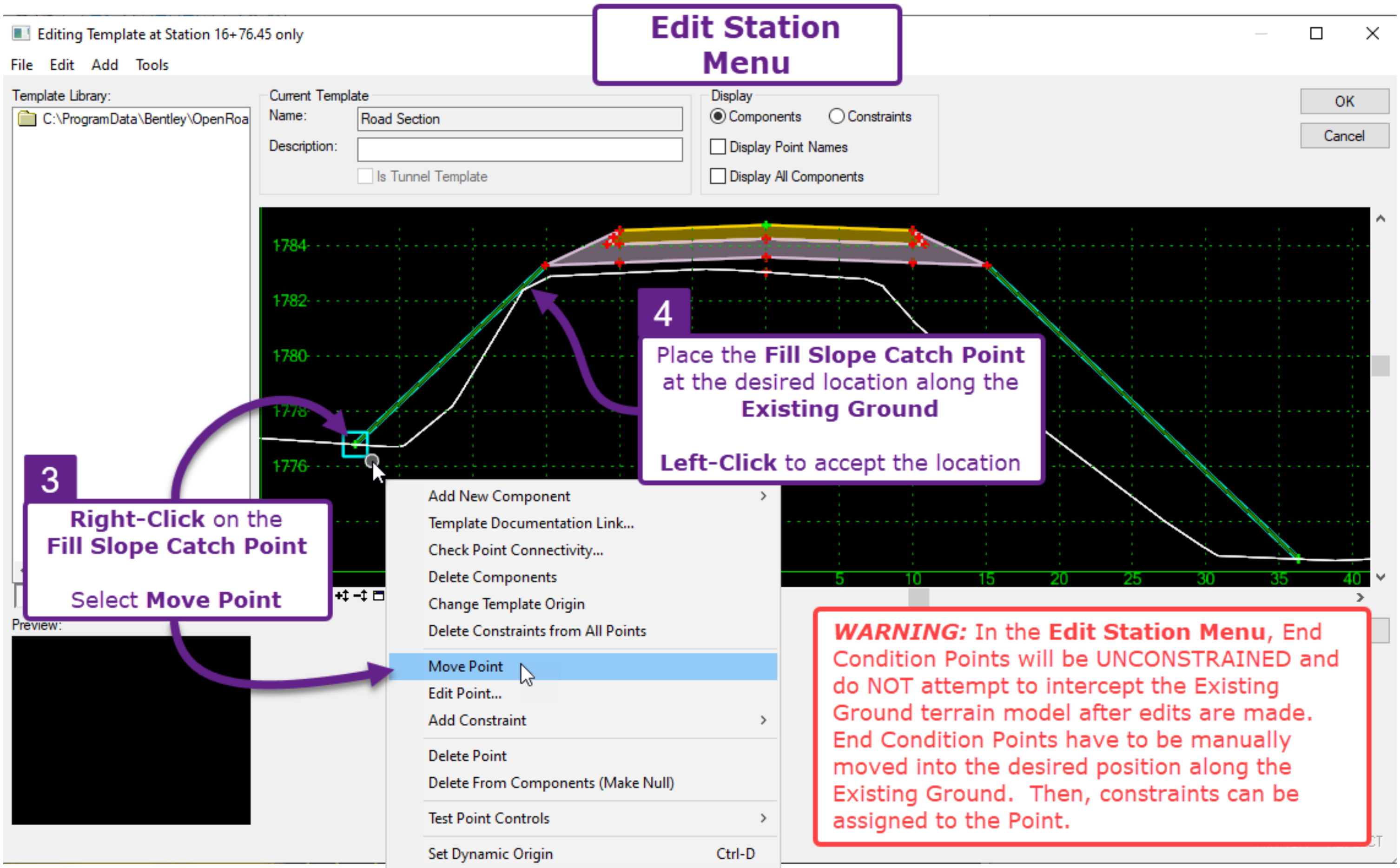
The *Edit Station* tool is used to manually override a single cross section station. This tool can be used to manually rectify a sliver fill that overshoots the road embankment at a single station.

WARNING: When the *Edit Station* tool is used, the Cross Section becomes **STATIC**. The Cross Section will remain in the overridden position even when changes to the Alignment, Profile, or Template are made. **This tool should only be used in the later stages of design, when it's certain that the Alignment, Profile, and Template will NOT be altered.**

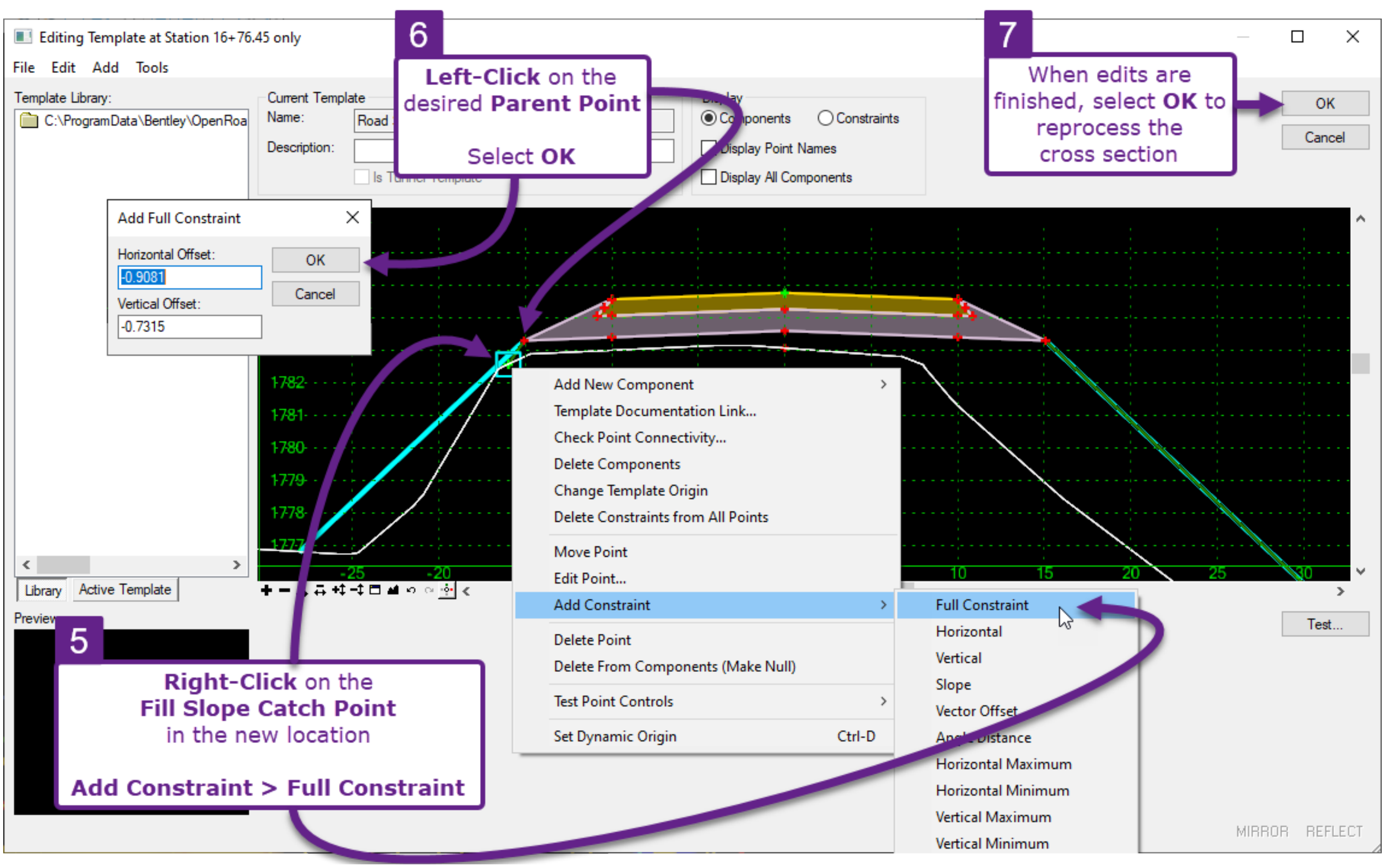
BEST PRACTICE: When possible, use *Parametric Constraints* or *End Condition Exceptions* to make slight override edits to an individual cross section or range. Using these Corridor Objects tool will still allow cross sections to react to changes to the Alignment, Profile, and/or Template.

TIP: Cross Sections that have been overridden with the *Edit Station* tool will be marked with a white line in the *2D Design Model*. Similarly, the overridden cross sections can be identified in the Template Drop Sub-Menu. See *9E.1 Template Drop Sub-Menu Overview*.





Edit Station Menu
Editing Template at Station 16+76.45 only
File Edit Add Tools
3
Right-Click on the Fill Slope Catch Point
Select Move Point
4
Place the Fill Slope Catch Point at the desired location along the Existing Ground
Left-Click to accept the location
Add New Component
Template Documentation Link...
Check Point Connectivity...
Delete Components
Change Template Origin
Delete Constraints from All Points
Move Point
Edit Point...
Add Constraint
Delete Point
Delete From Components (Make Null)
Test Point Controls
Set Dynamic Origin Ctrl-D
WARNING: In the Edit Station Menu, End Condition Points will be UNCONSTRAINED and do NOT attempt to intercept the Existing Ground terrain model after edits are made. End Condition Points have to be manually moved into the desired position along the Existing Ground. Then, constraints can be assigned to the Point.



Editing Template at Station 16+76.45 only
6
Left-Click on the desired Parent Point
Select OK
7
When edits are finished, select OK to reprocess the cross section
Add Full Constraint
Horizontal Offset:
-0.9081
Vertical Offset:
-0.7315
OK
Cancel
Add New Component
Template Documentation Link...
Check Point Connectivity...
Delete Components
Change Template Origin
Delete Constraints from All Points
Move Point
Edit Point...
Add Constraint
Delete Point
Delete From Components (Make Null)
Test Point Controls
Set Dynamic Origin Ctrl-D
Full Constraint
Horizontal
Vertical
Slope
Vector Offset
Angle Distance
Horizontal Maximum
Horizontal Minimum
Vertical Maximum
Vertical Minimum
5
Right-Click on the Fill Slope Catch Point in the new location
Add Constraint > Full Constraint

9F.6 Horizontal and Vertical Dimensions

In the Dynamic Cross Section Viewer, *Temporary Dimensions* can be placed. The *Temporary Dimensions* are only displayed in the Dynamic Cross Section Viewer. They are NOT displayed in Cross Section Sheet Production. Cross Section Sheets are labeled with Cross Section Model Annotations. See *Chapter 16 - Cross Sections*.

Horizontal and Vertical Dimensions will provide distance and slope information between two Template Points in a cross section. Temporary Dimensions will adjust in values when scrolling through Cross Section stations.

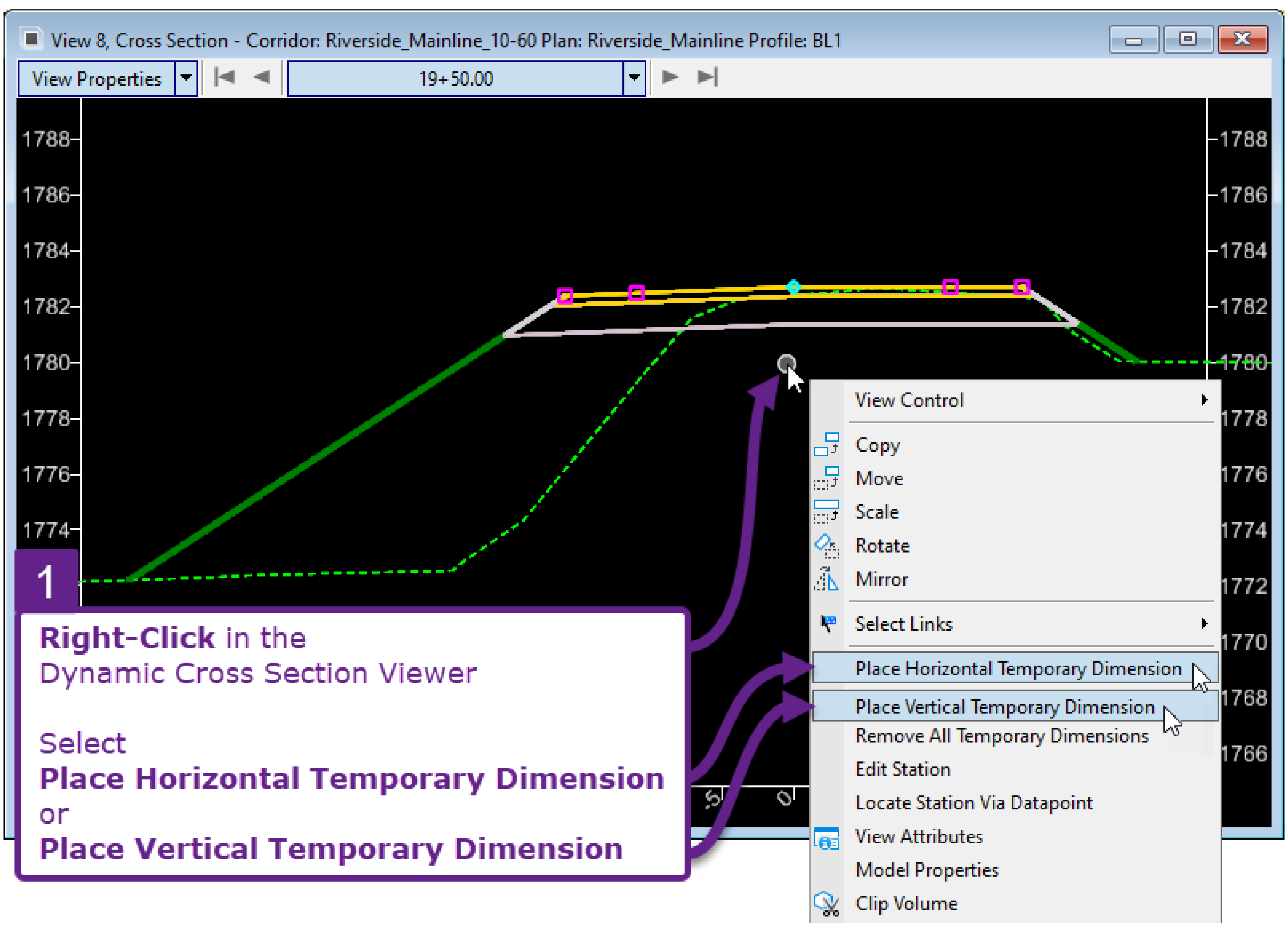
Horizontal Dimensions: Horizontal Dimensions provide the horizontal distance and slope between two selected Template Points. The horizontal distance is measured along the X-axis of the Dynamic Cross Section Viewer Grid.

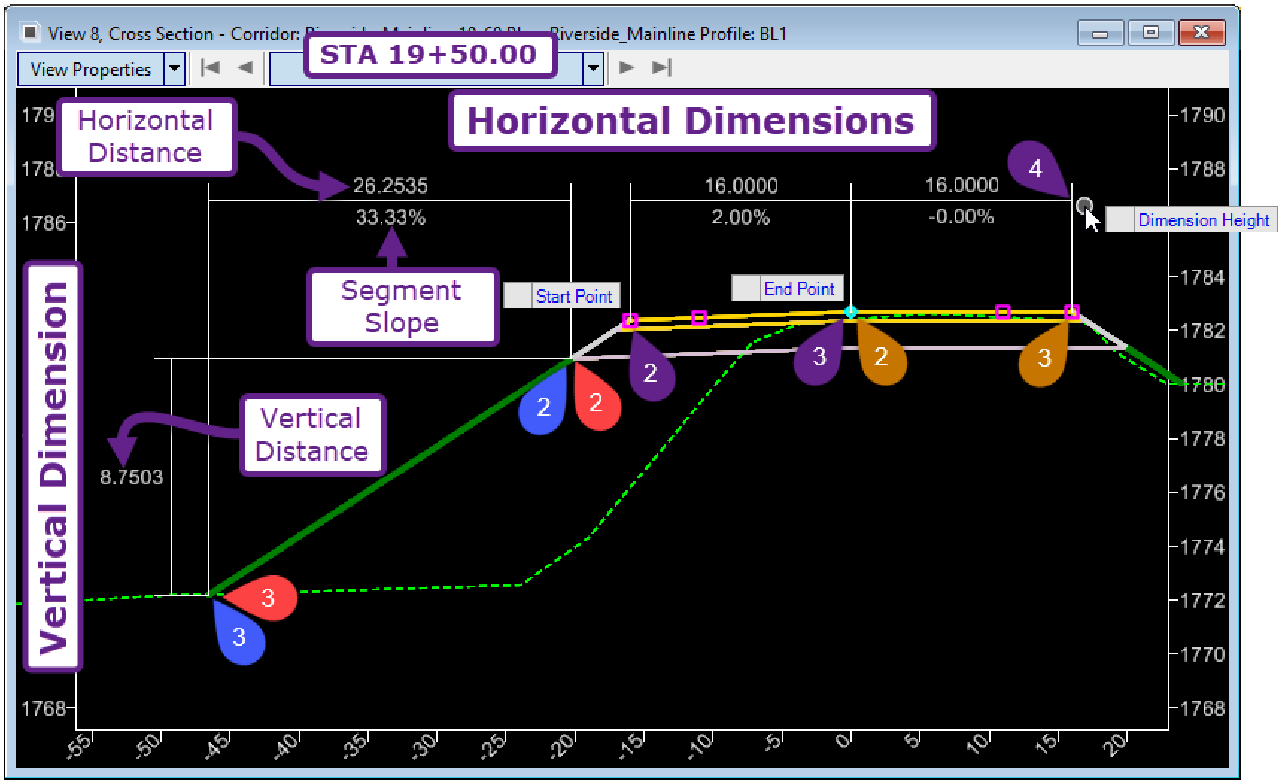
Vertical Dimensions: Vertical Dimensions only provide the vertical distance between two selected Template Points.

> ***NOTE:*** Horizontal and Vertical *temporary dimensions* can only be placed on the Corridor shown in the currently active ORD File. Corridors shown from referenced files cannot be dimensioned.

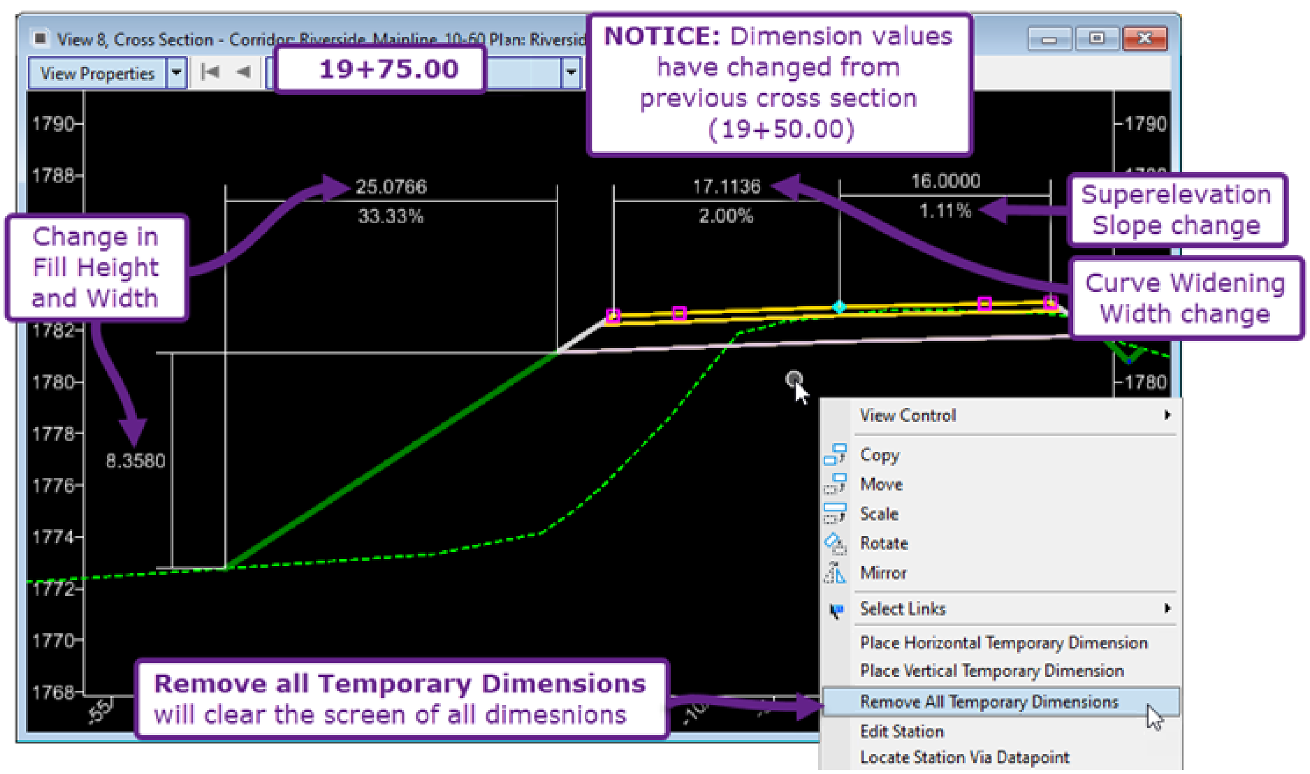
Temporary Dimensions are useful to monitor Template Point values that change when scrolling through cross sections. Template Point values that are subject to change include: pavement slope due to superelevation, pavement widths due to curve widening, and cut/fill heights and widths.

Placing Horizontal and Vertical Dimensions:





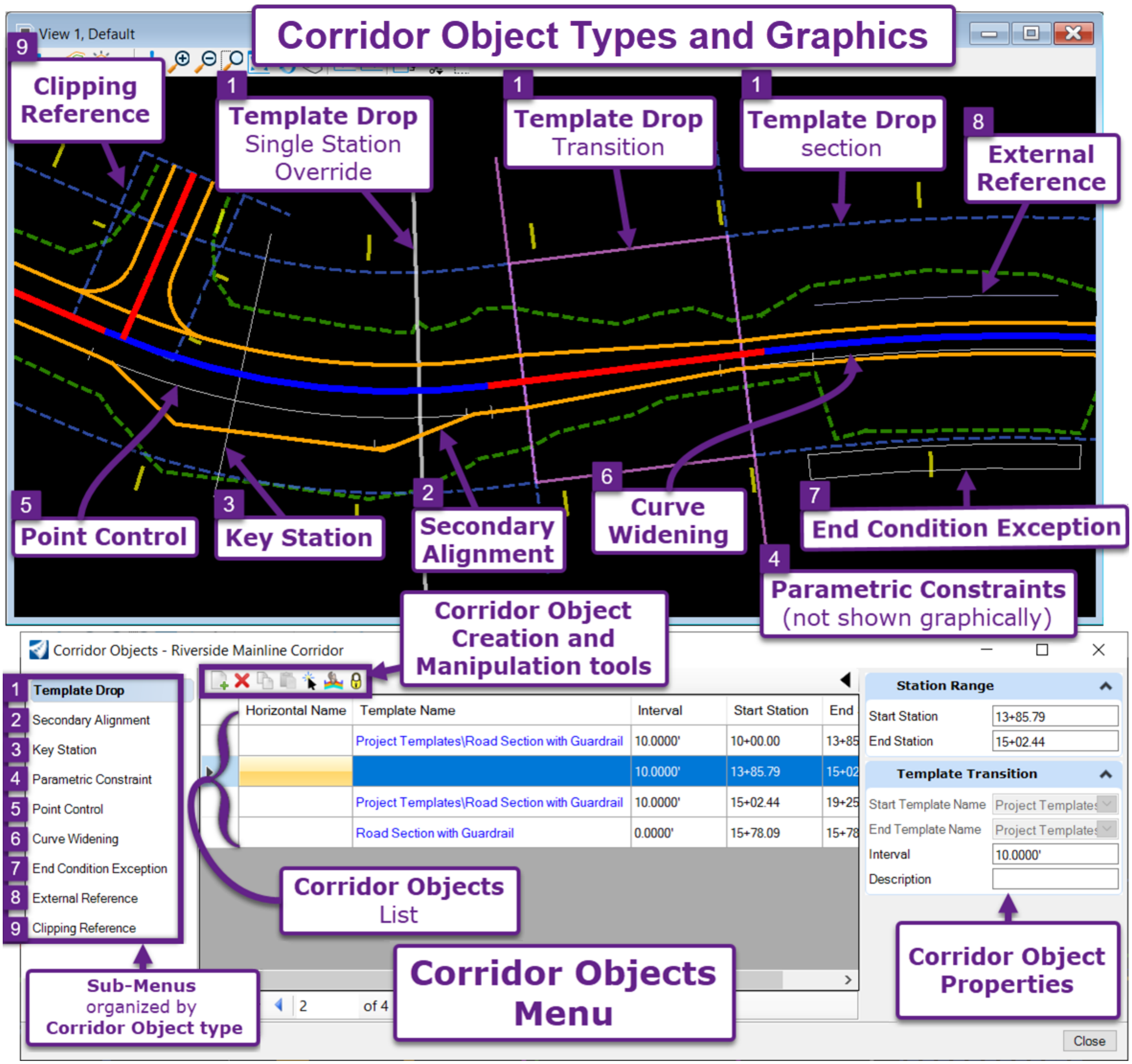
2	*Prompt: Start Point* – Left-Click near the first Template Point to define the dimension. ***WARNING:*** Ensure that the intended Template Point is selected. It is a common mistake to inadvertently select a Template Point directly beneath the intended Point.
3	*Prompt: End Point* - Left-Click on the second Template Point to define the dimension.
4	*Prompt: Dimension Height* – Left-Click at the desired text placement location for the dimension.



9G – CORRIDOR OBJECTS – MANIPULATION OF THE CORRIDOR

Corridor Objects are used to manipulate the Corridor in situations where the Template must deviate from the geometry set in the Template. There are nine types of Corridor Objects which correspond to the nine Sub-Menus found within the Corridor Objects Menu. When a Corridor Object is created, it will be listed in the corresponding Sub-Menu within the Corridor Objects Menu. Corridor Objects can be created, edited, and deleted from the Corridor Objects Menu.

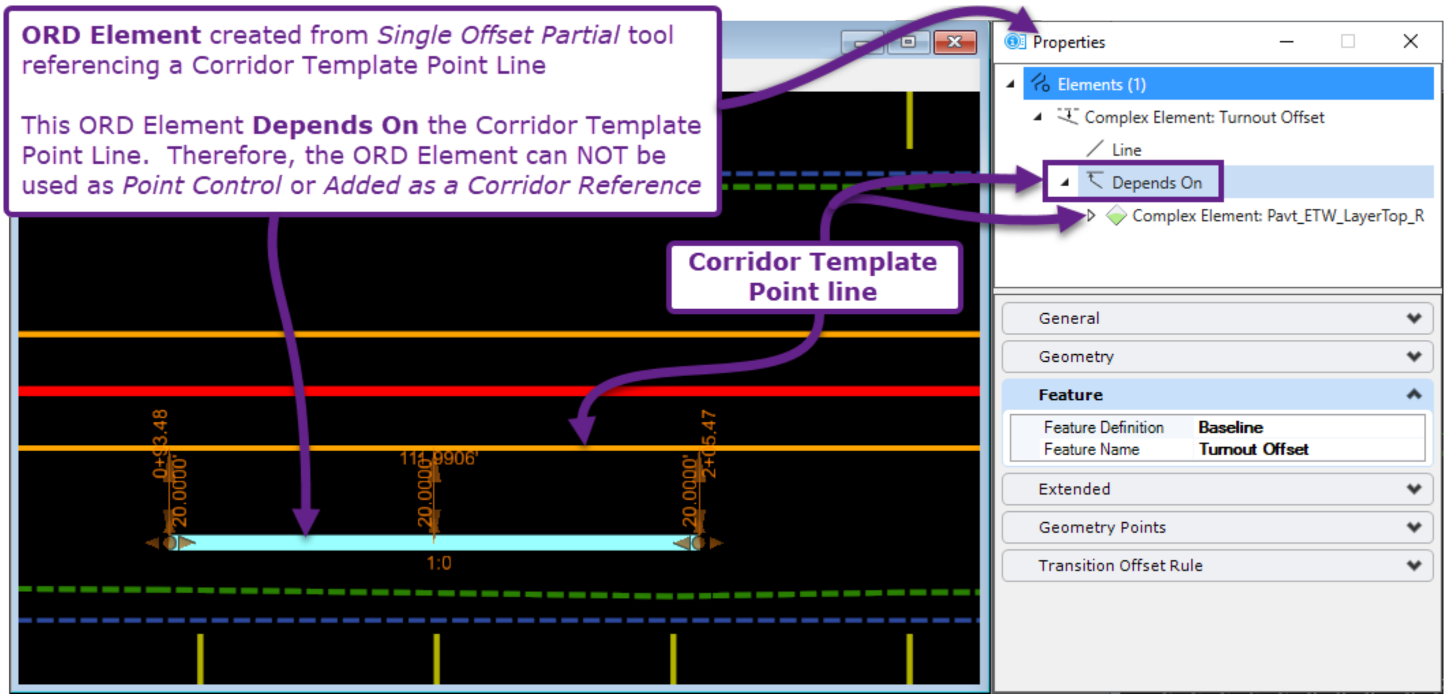
When a Corridor Object is created, a corresponding Corridor Object graphic is also created in the 2D Design Model. The Corridor Object graphic signifies the station range and location to which the Corridor Object is applied. The Corridor Object graphic is also interactive – meaning it can be selected and manipulated through grip-edits or Property box edits. The exceptions are Parametric Constraints, External Reference, and Clipping References – which do NOT generate Corridor Object graphics – but can be edited through the Corridor Objects Menu.

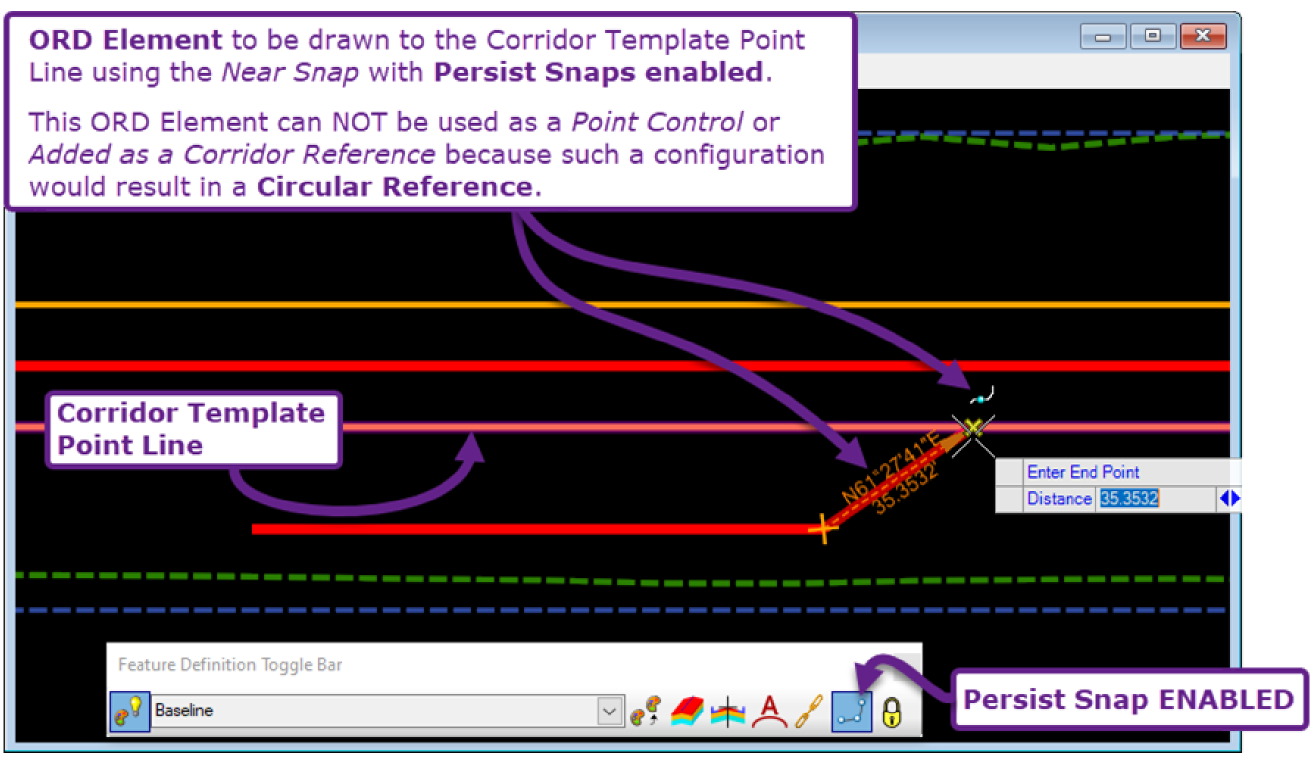


9G.1 WARNING – Creating Circular References (Recursive Solutions)

Corridor Object tools, such as *Point Control* and *Add Corridor Reference*, require the User to manually create ORD Elements that will interact with the Corridor. Do NOT create ORD Elements by using a Corridor Complex Element as a Reference. Similarly, do NOT *Persist Snap* an ORD Element to a Corridor Complex Element that will later interact with the Corridor through Point Controls.

For example, when creating ORD Elements for a turnout, it may be tempting to use the *Offset and Tapers* tools in conjunction with the proposed edge of road Corridor Complex Element. The resulting ORD Elements should NOT be used by the Corridor as Point Controls or Added as a Corridor Reference, because such a configuration would be considered a circular reference.

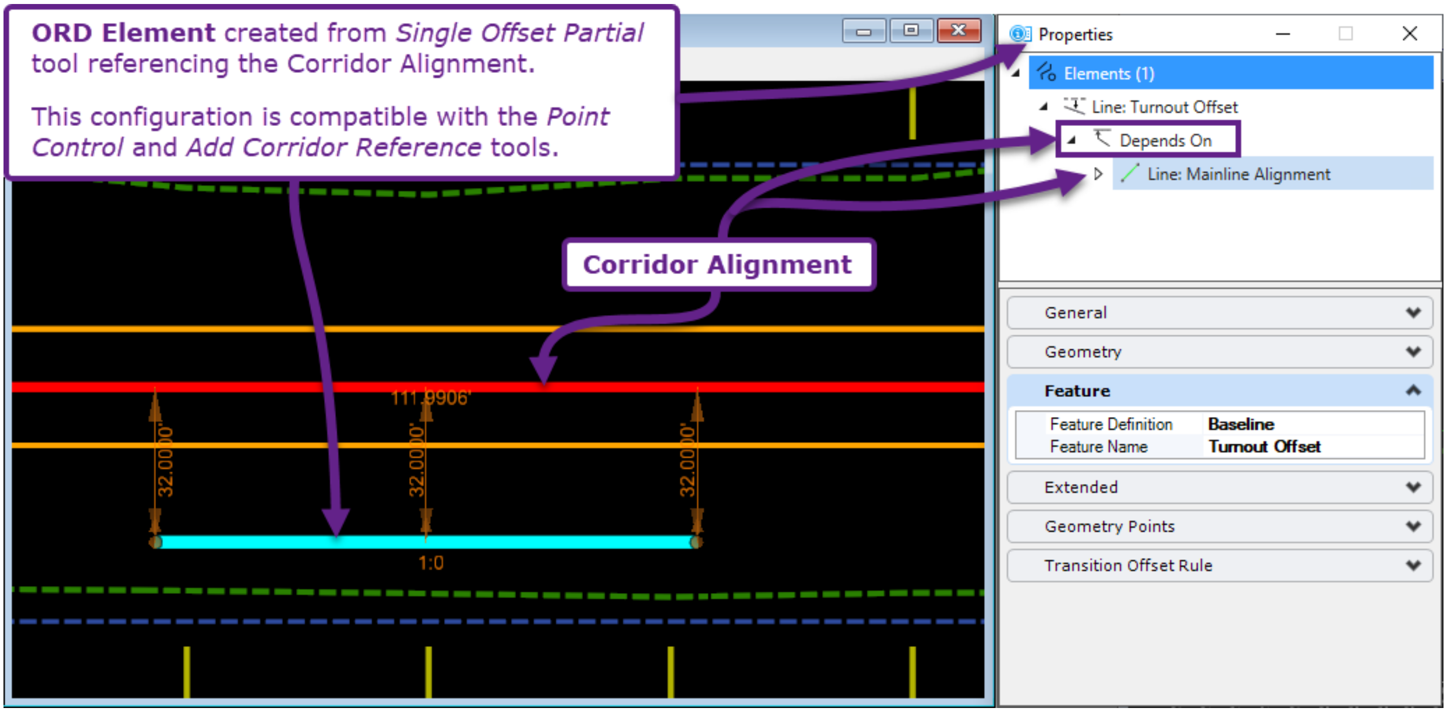




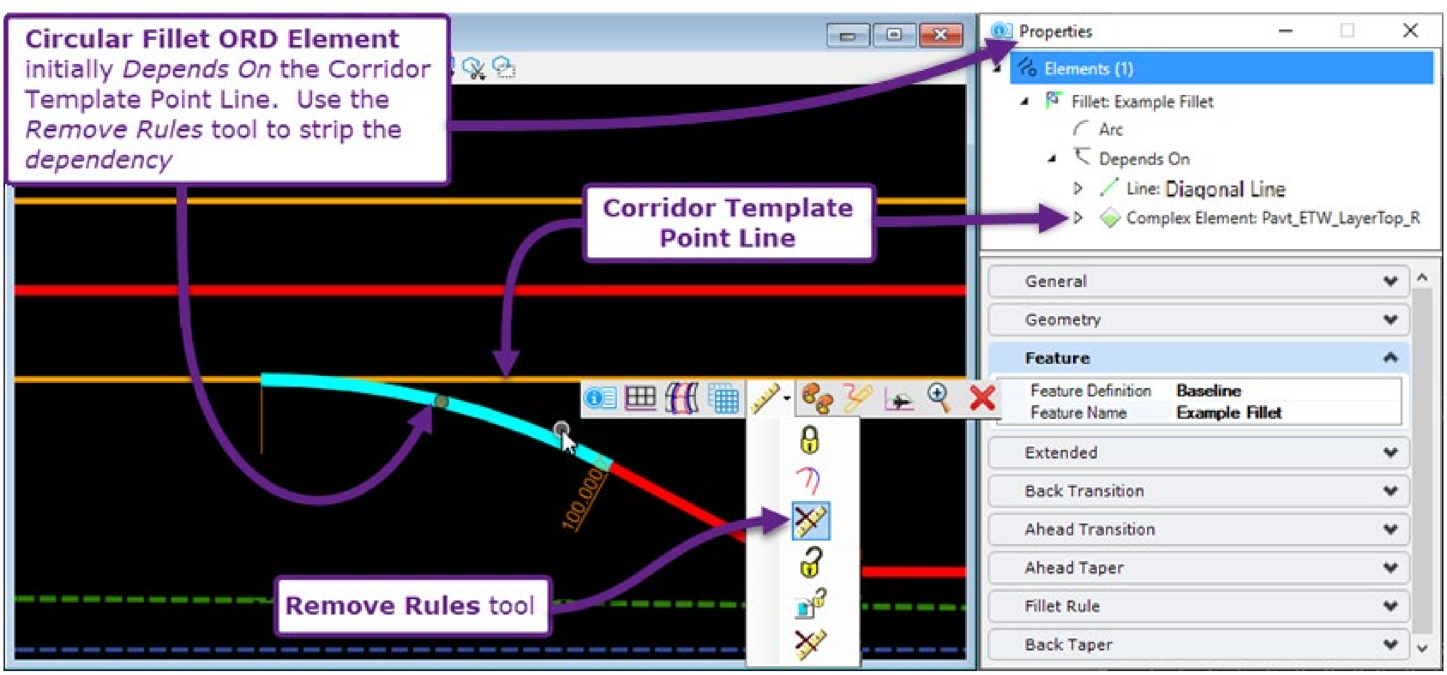
9G.1.a Circular Reference Tips and Workarounds

TIP 1: Disable *Persist Snaps* when creating ORD Elements for use with *Point Control* or *Add Corridor Reference* tools. See *7B.3 Feature definition Toolbar*.

TIP 2: Use the Corridor Alignment in conjunction with the *Offset and Tapers* tools to create ORD Elements for Corridor interaction. ORD Elements that *depend on* the Corridor Alignment will not be considered Circular References by the Corridor.



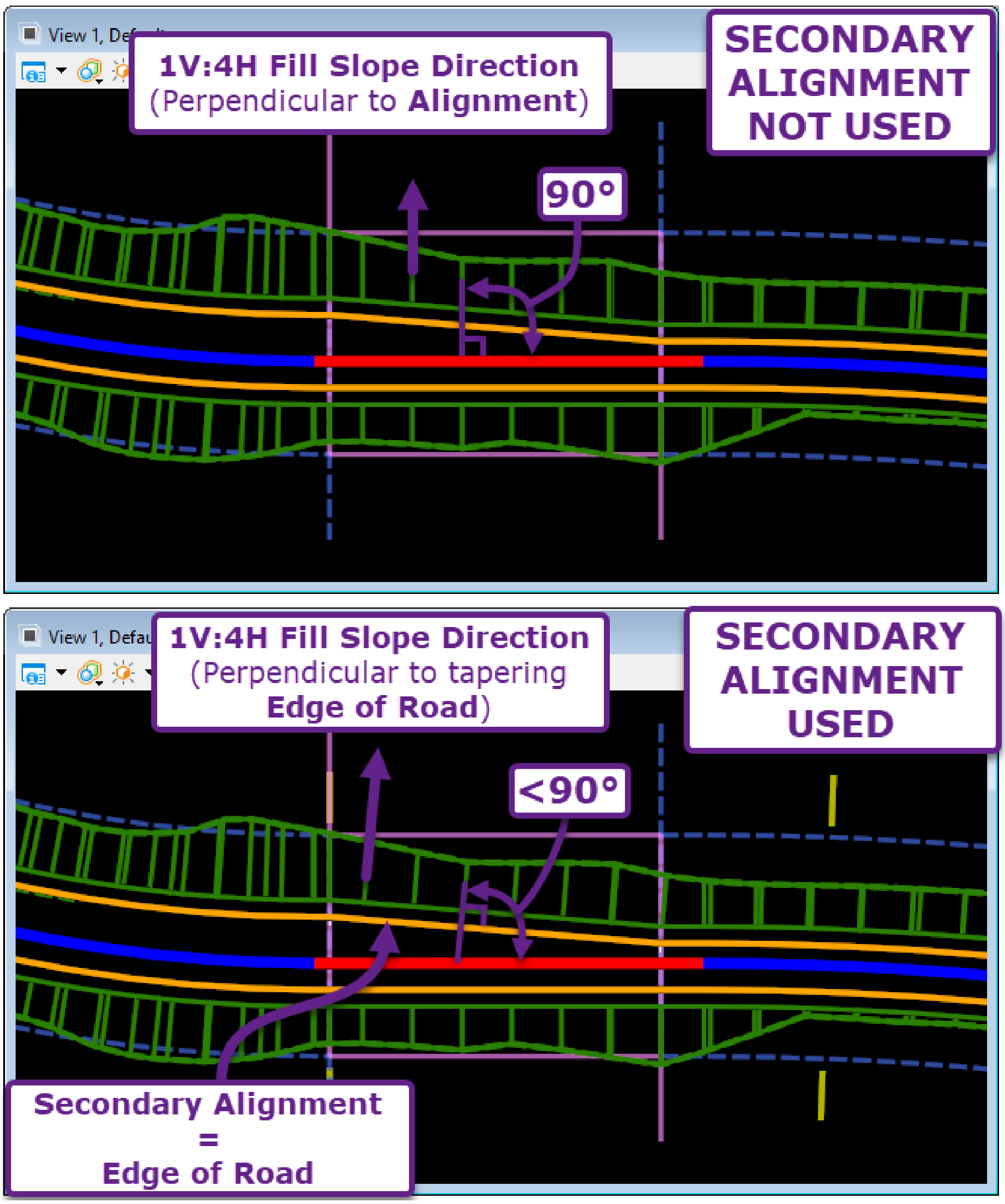
TIP 3: Sometimes it is necessary to create ORD Elements that initially *depend on a* Corridor Template Point line. An example would be using a Corridor Template Point line to create a circular fillet with the *Arc Between Element – Simple Arc* tool. Use the *Remove Rule* tool to strip the ORD Element of *Dependencies* BEFORE use with *Point Control* or *Add Corridor Reference* tools. See *7C.3.c.i Remove Civil Rules (Convert an ORD Element into a MicroStation element)*.



9G.2 Secondary Alignments

By default, Template Drops are processed *perpendicular* to the Alignment. A *Secondary Alignment* is used to skew the processing direction of the Template drop. If a Secondary Alignment is used, then the Template Drop processing will be perpendicular to the Secondary Alignment – as opposed to the main Alignment.

For example, if an Edge of Road tapers and is not parallel to the main Alignment, the tapered Edge of Road element can be used as a secondary alignment to process the embankment slope perpendicular to the taper (instead of perpendicular to the Alignment).

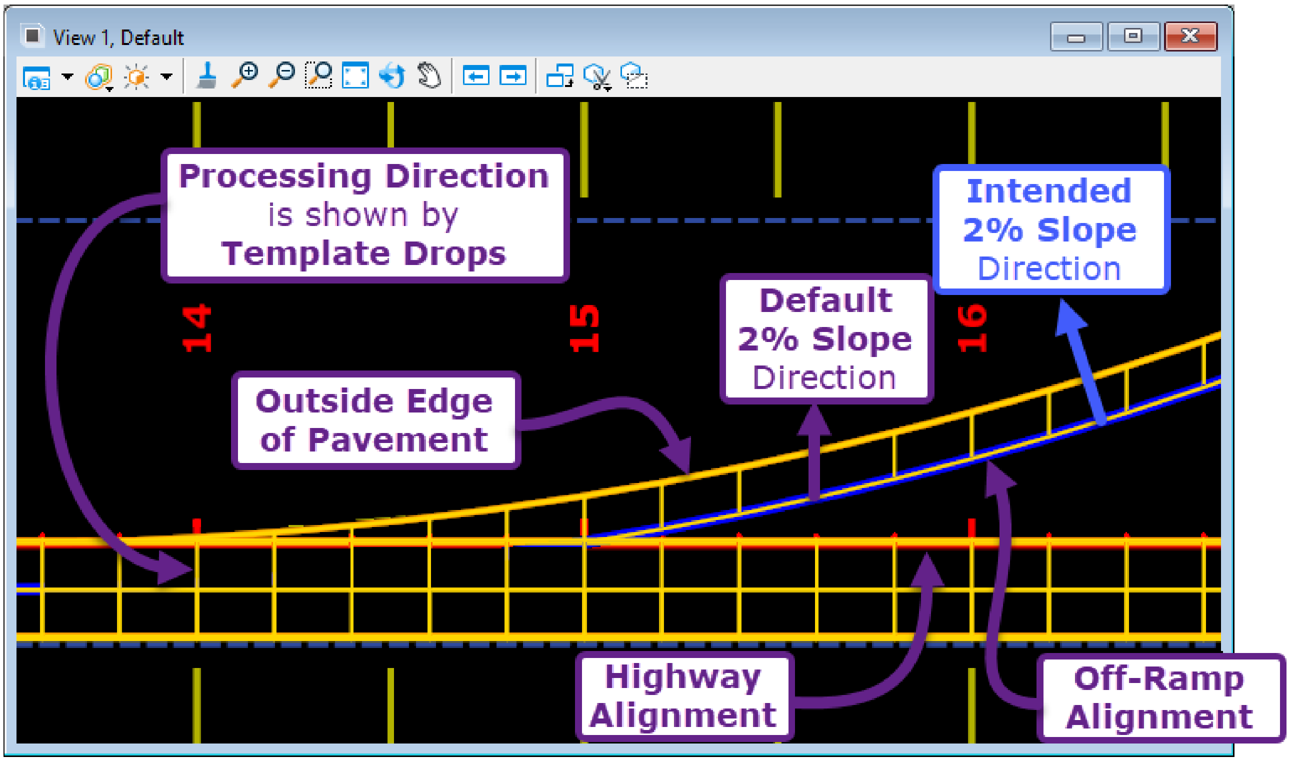


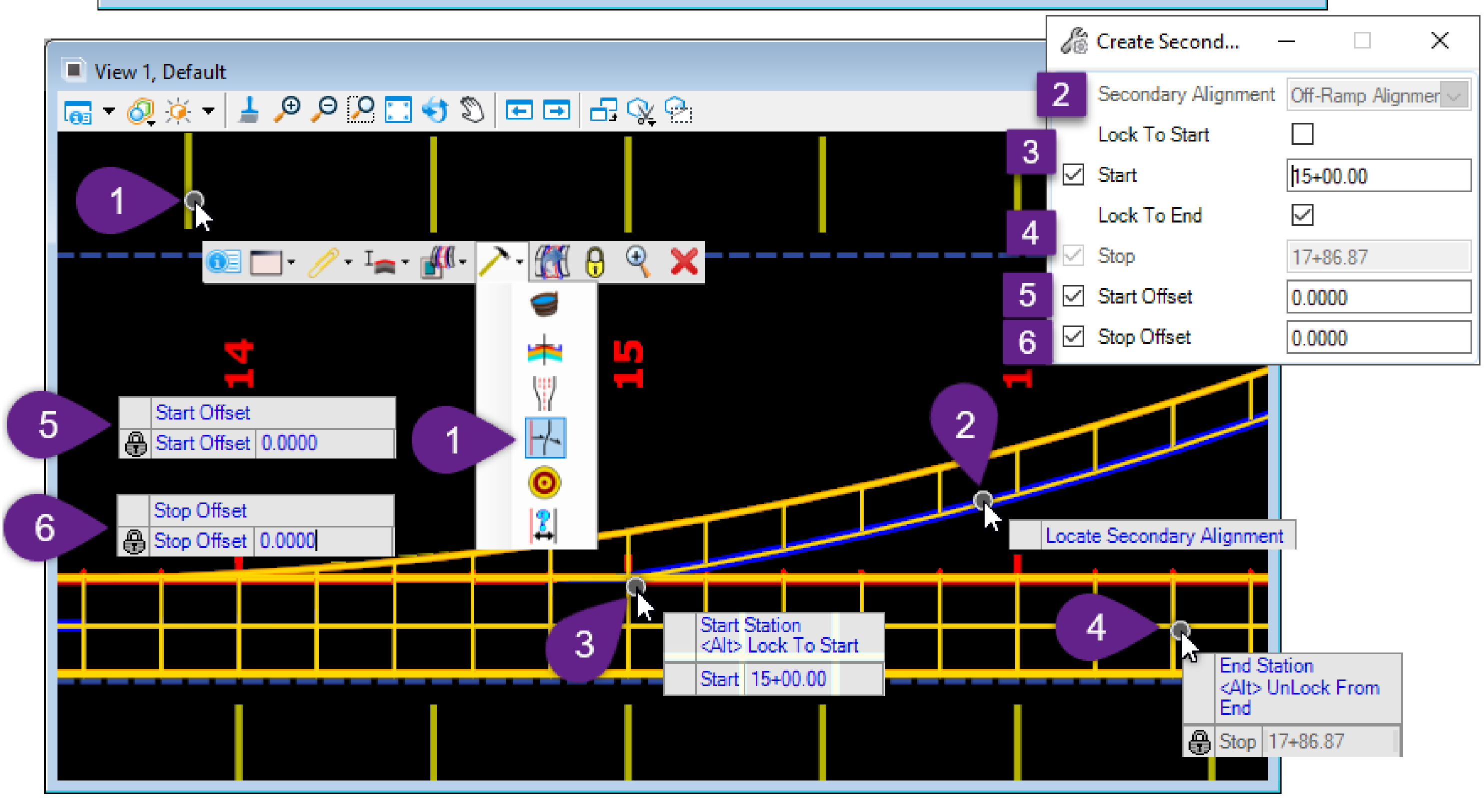
The *Point Control* tool has optional *Secondary Alignment* functionality built in. The *Secondary Alignment* tool is used with other tools that have the capability of skewing a Template Point Line relative to the Alignment. These tools include Horizontal Feature Constraints, Parametric Constraints, and Template Transitions.

9G.2.a Secondary Alignment - Workflow

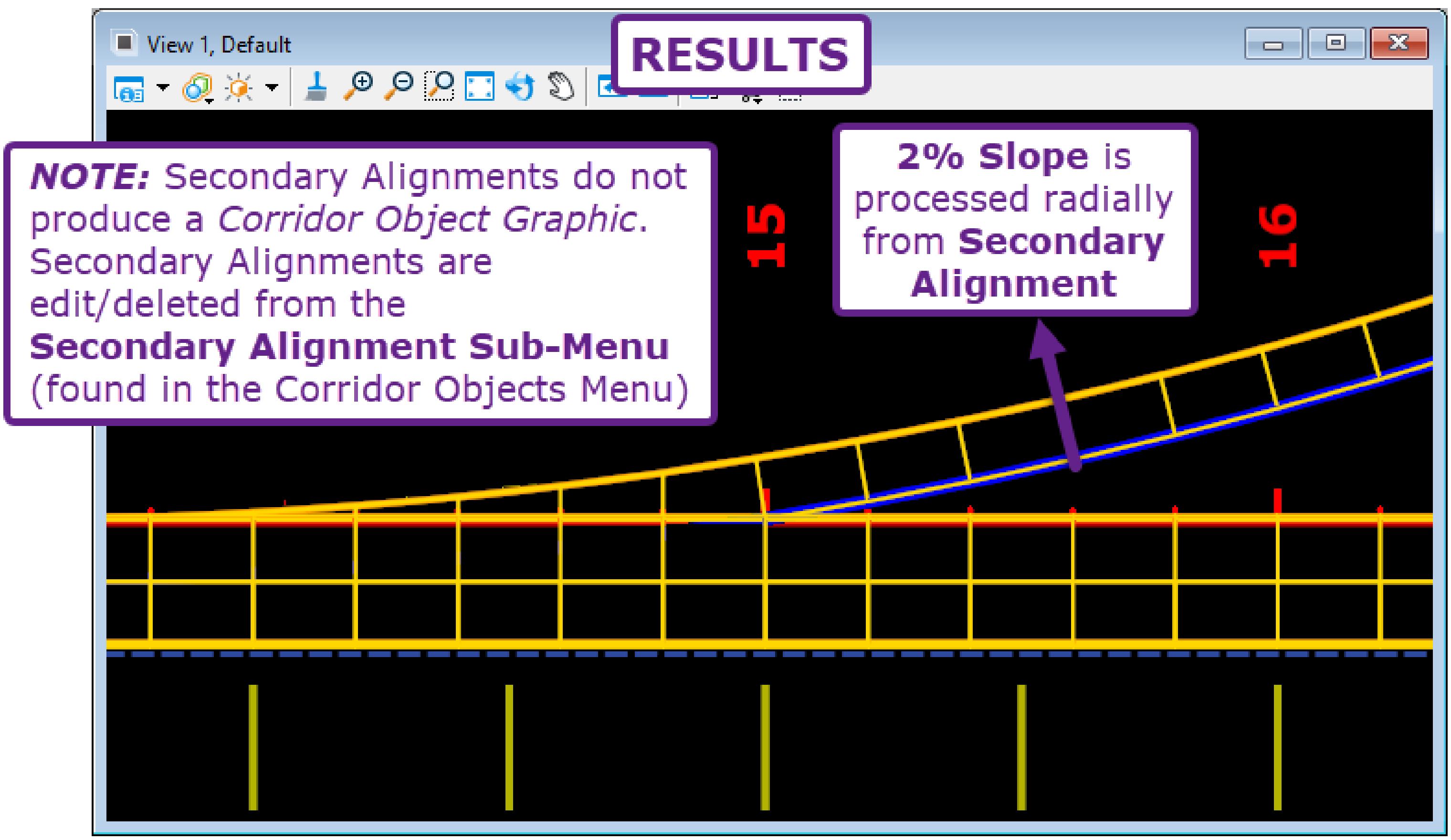
In this workflow, a single Template (using Horizontal Feature Constraints and Display Rules) is used to model both the highway and the off-ramp.

The Off-Ramp Alignment (drawn by the User) represents the inside Edge of Pavement. It is intended for the Outside Edge of Pavement to be set at a 2% slope relative to the Off-Ramp Alignment. By default, the 2% slope is processed perpendicularly to the Highway Alignment. The Off-Ramp Alignment must be added to the Corridor as a *Secondary Alignment* in order to process the 2% slope in the intended direction – which is radially from the Off-Ramp Alignment





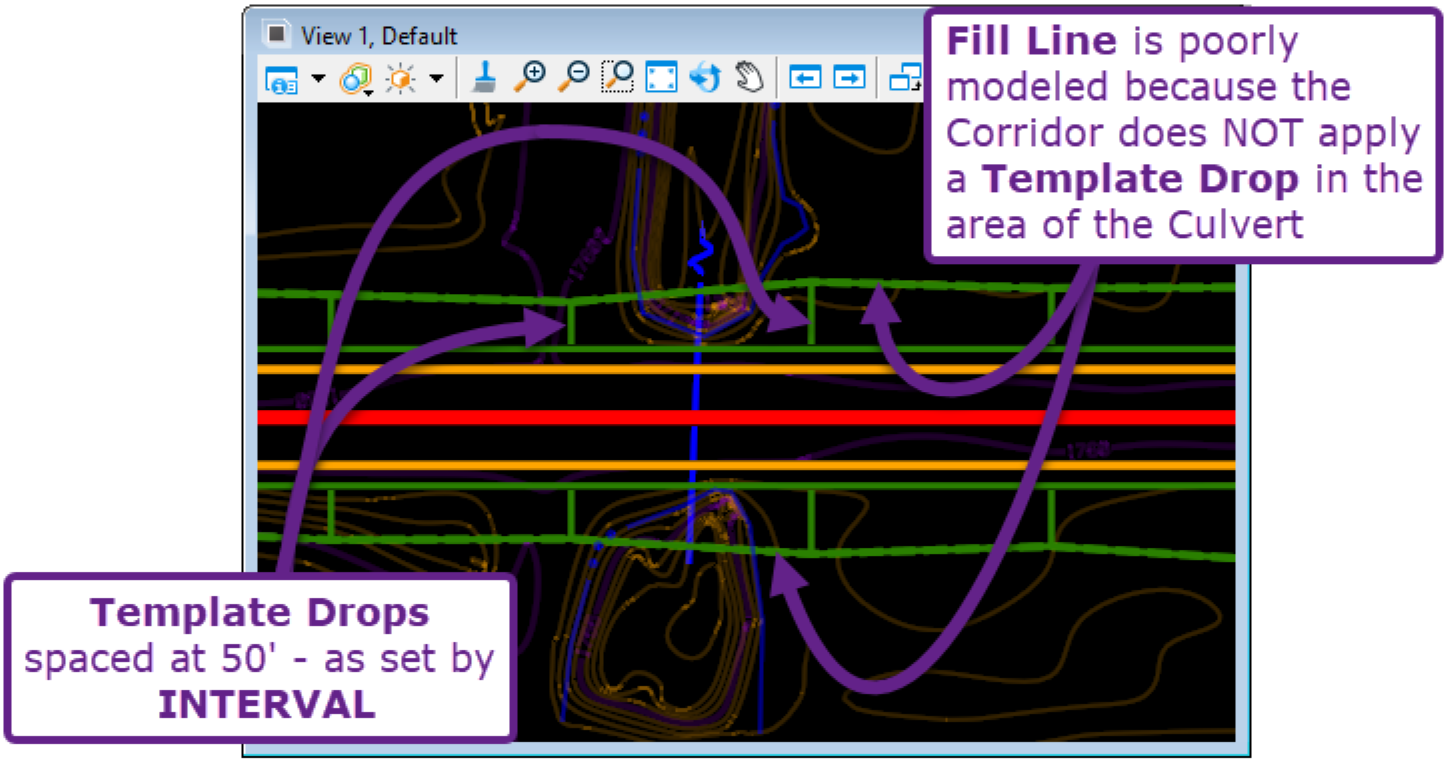
1	Select the Corridor Handle to summon the Pop-Up Icon Menu. Select the *Create End Condition Exception* icon. →
2	*Prompt: Locate Secondary Alignment* - Left-Click on the ORD Element to be used as the Secondary Alignment. In this case, the Off-Ramp Alignment is selected.
3	*Prompt: Start Station <Alt> To Start* – Key-In the desired Start Station for the Secondary Alignment and press the ENTER key to lock. Left-Click in the *View* to advance to the next prompt. In this case, the Off-Ramp Alignment begins at exactly 15+00.00 (relative to the Highway Alignment).
4	*Prompt: End Station <Alt> To End* - Key-In the desired End Station for the Secondary Alignment and press the ENTER key to lock. Left-Click in the *View* to advance to the next prompt. In this case, the ALT key was pressed to Lock to the mainline End Station.
5	*Prompt: Start Offset* = 0.0000. The *Start* and *End Offset* are used to horizontally offset where the Secondary Alignment processing directions starts and end. In this case, a value of 0.0000 is used for both Start and End Offset because the intent is to change the processing direction exactly at the Off-Ramp Alignment.
6	*Prompt: End Offset* = 0.0000.

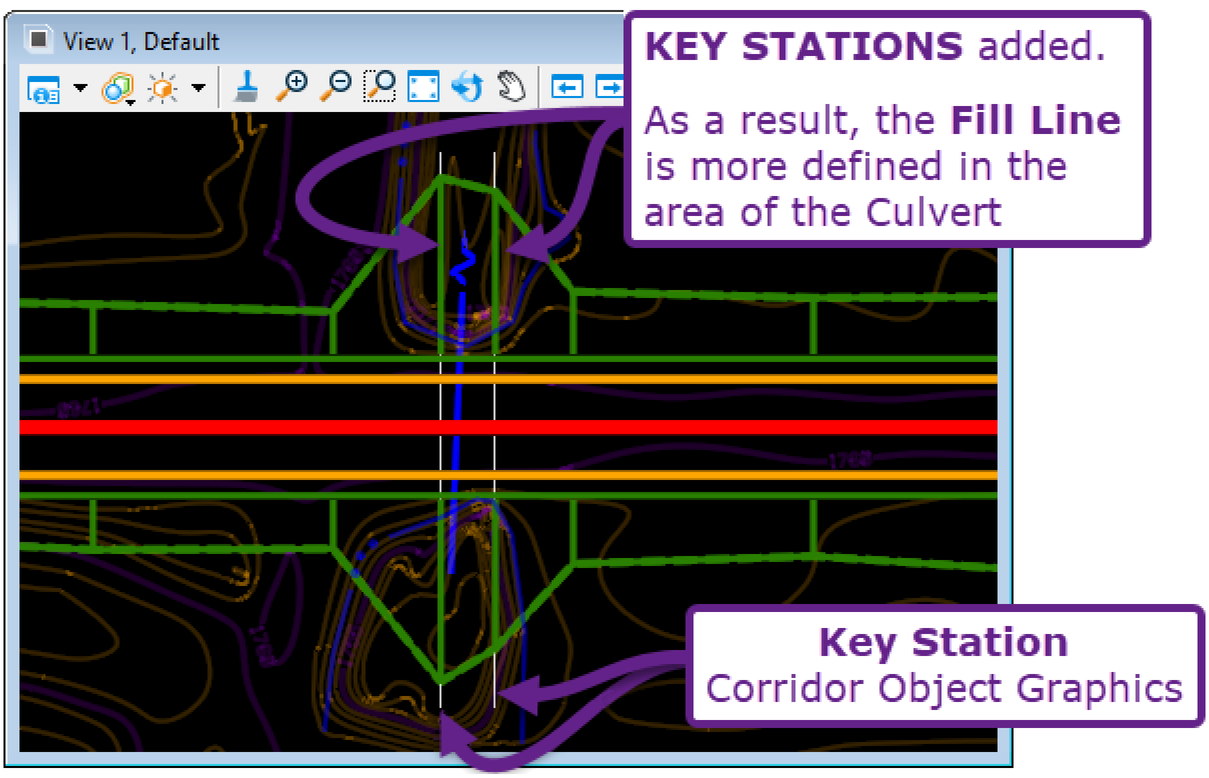


9G.3 Key Station

A *Key Station* is a User-specified location for the Corridor to process a Template Drop. This tool allows the User to better define and densify the Corridor model in specific areas, which can be usefully when the Template Drop Interval is spaced at large increments.

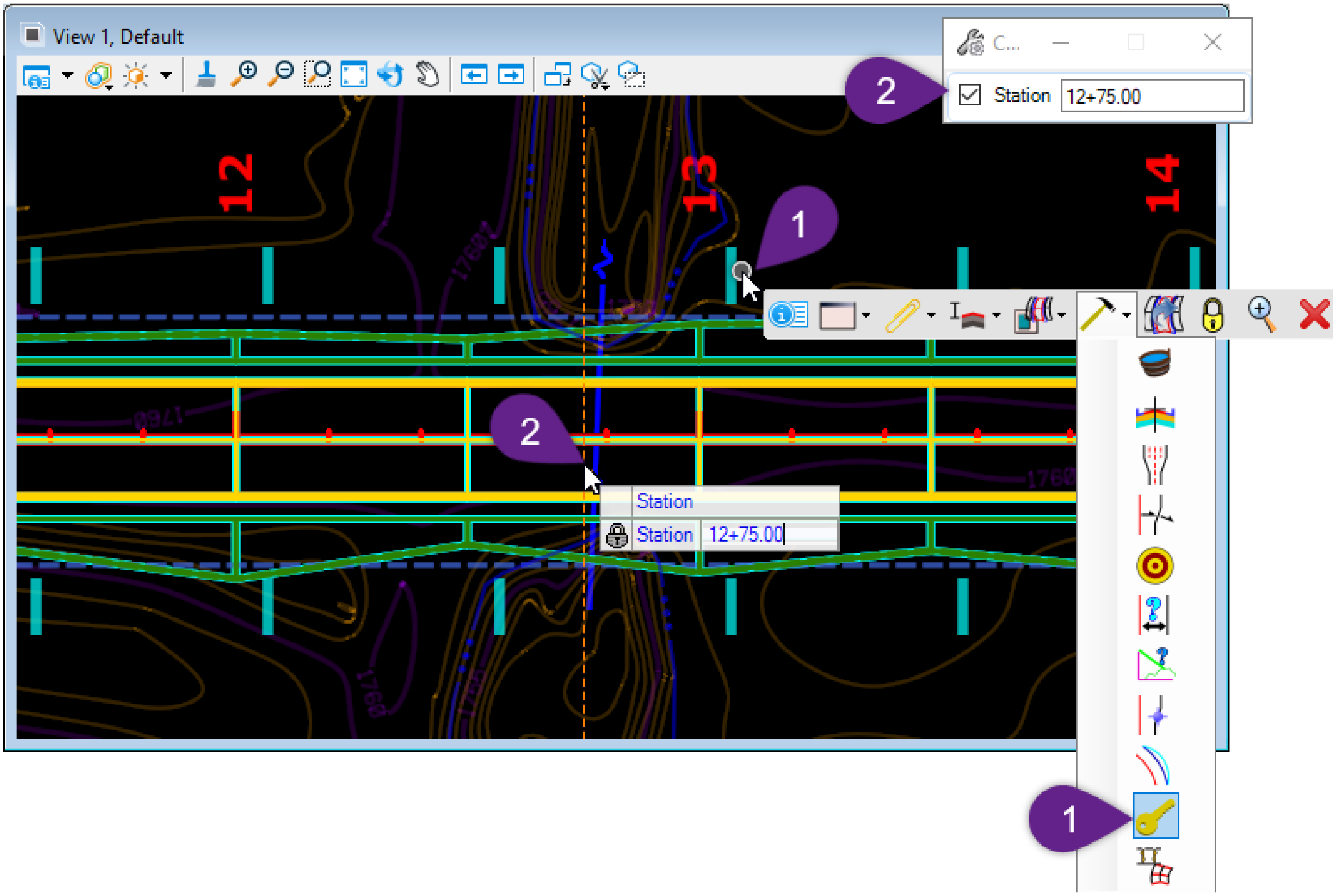
As shown below, it is possible for the Corridor to skip over areas of importance that do not align with the set Template Drop Interval. This often happens in the vicinity of culvert/stream crossings. *Key Stations* are added around the culvert to provide a *denser* model in this area. As shown below, *Key Stations* help to refine the model to portray the Fill Line more accurately in the culvert area.





9G.3.a Key Station - Workflow

This workflow demonstrates how to place a *Key Station.*



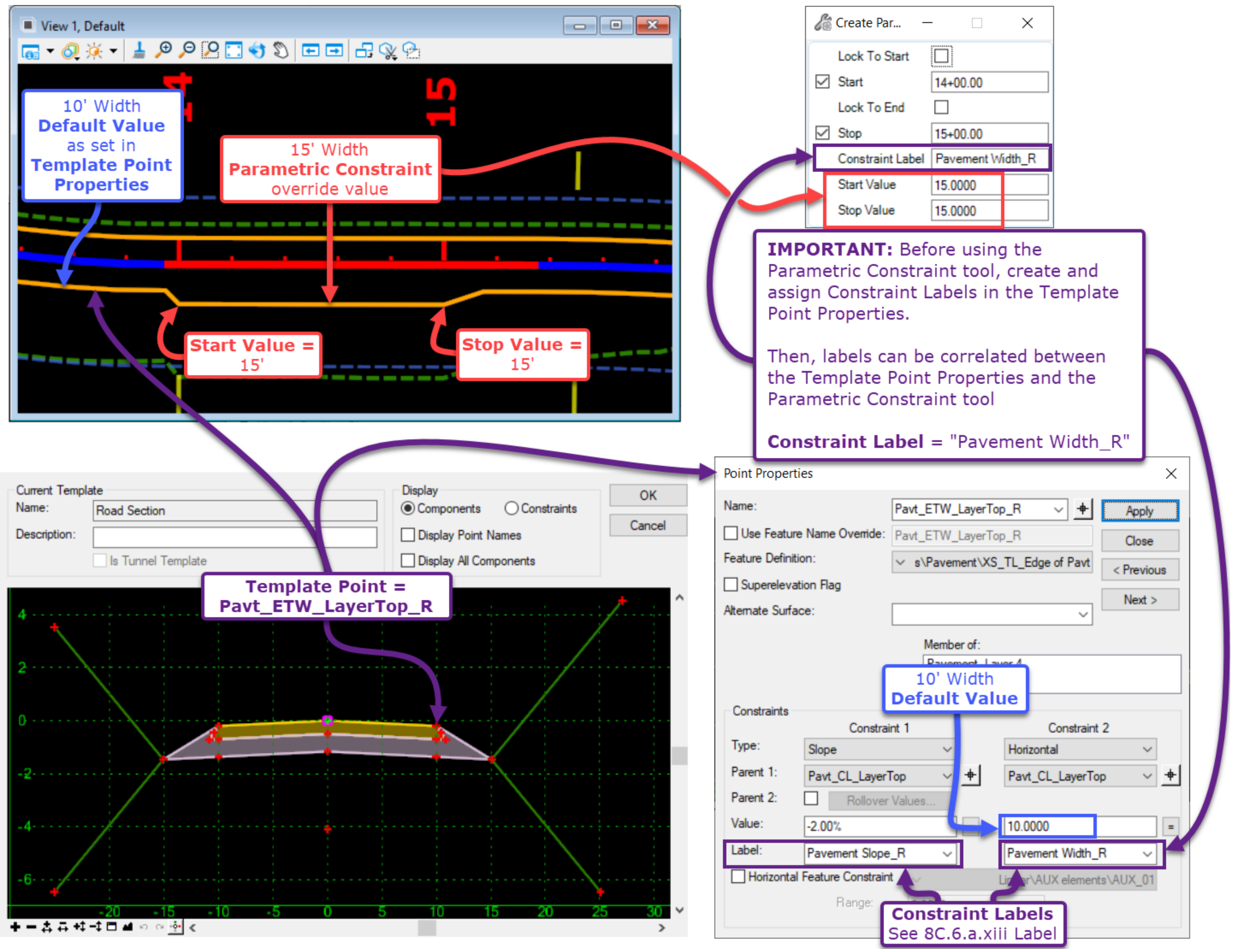
1	Select the Corridor Handle to summon the Pop-Up Icon Menu. Select the *Key Station* icon. →
2	*Prompt: Station -* Key-In the desired Station for the *Key Station* and press the ENTER key to lock. Left-Click in the *View* to place the *Key Station*. Alternatively, ensure the Station value is unlocked. Left-Click in the desired location for the *Key Station*.

9G.4 Parametric Constraints

A Parametric Constraint is used to override a default *Constraint Value* belonging to a Template Point. *Constraint Types* and *Constraint Values* are found in the *Template Point Properties* and they determine the position of a Template Point line. See *8C.6.a Constraint Types*.

The Parametric Constraints tool works by referencing a *Constraint Label*. Each *Constraint Type* and *Value* can be assigned a label. Most pre-made FLH Templates will already have *Labels* created; however, the User can also create new *Labels* or edit pre-made *Labels*. See *8C.6.a.xiii Label* for the creation and manipulation of *Constraint Labels*.

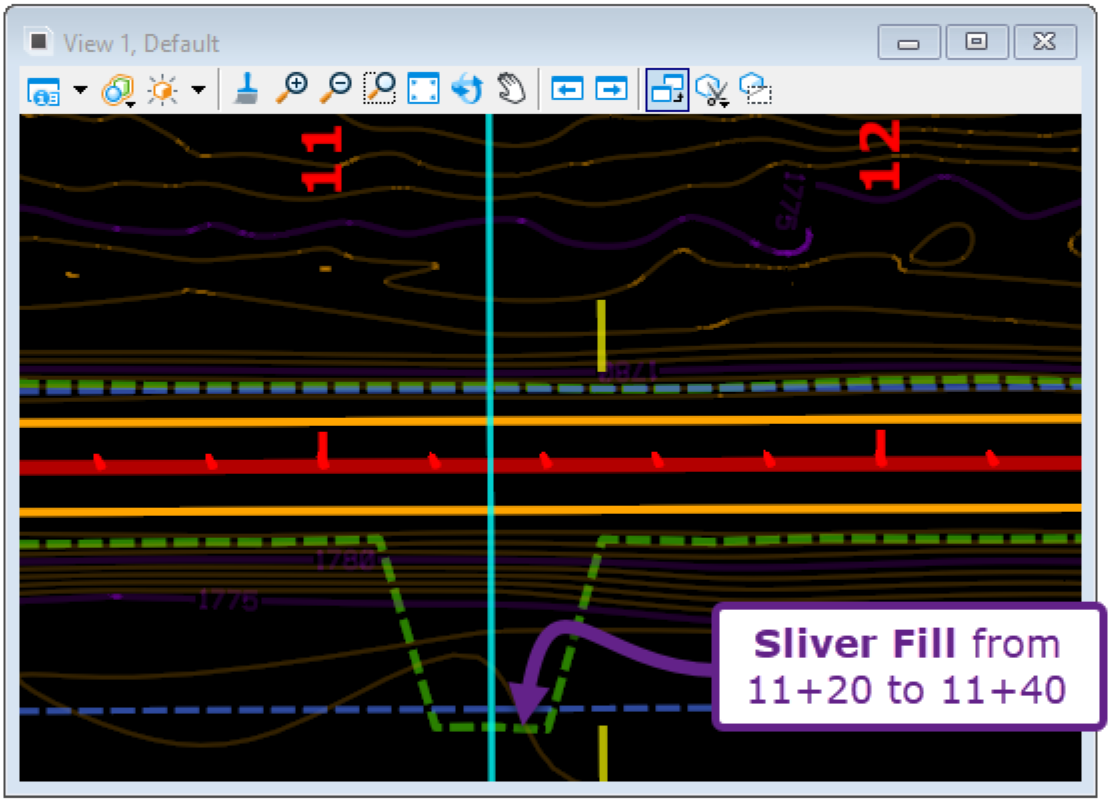
In the graphic shown below, the right-side pavement width is overridden from 10' to 15' from 14+00 to 15+00.

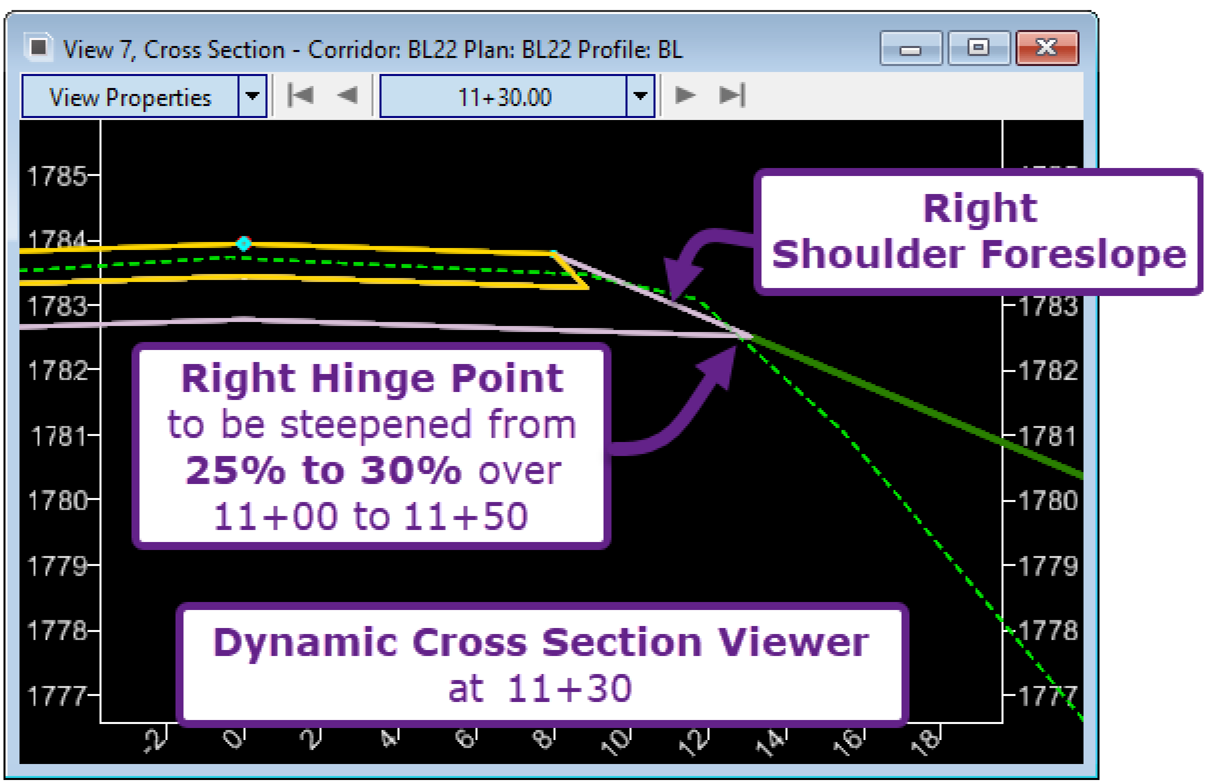


In the demonstration shown above, the pavement width changes abruptly from 10' to 15. It would be practical to create two additional Parametric Constraints to model the back and ahead tapers. Tapering sections are created by varying the Parametric Constraint *Start* and *Stop Values*.

9G.4.a Parametric Constraint - Workflow

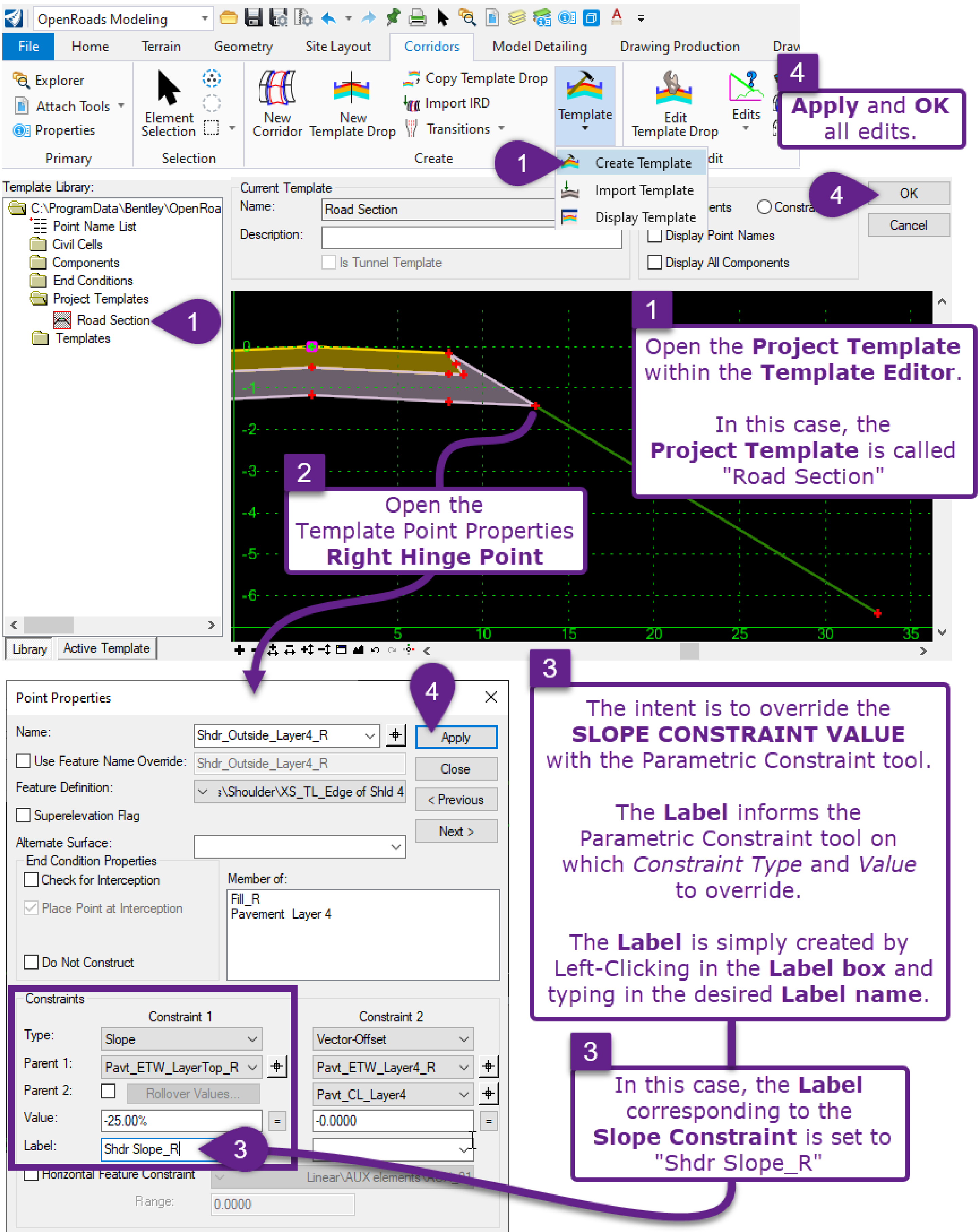
In this workflow, a sliver fill is eliminated by slightly steeping the right Shoulder Foreslope over a short range. To accomplish this, a Parametric Constraint is applied to the Right Hinge Point from 11+00 to 11+50. The Slope Constraint Value for the Right Hinge Point will be changed from 25% to 30% over this range.



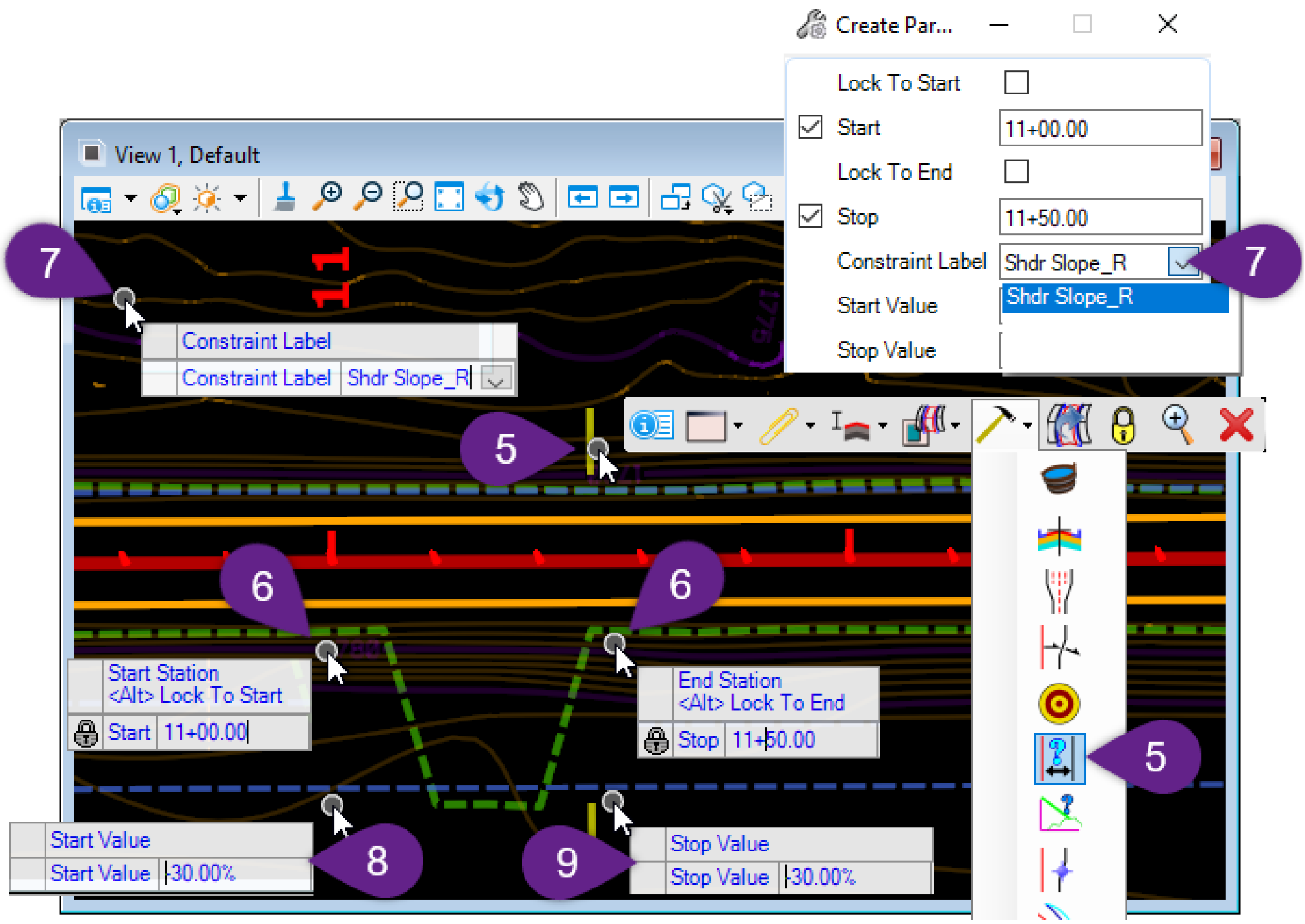


Create the Constraint Label in the Template Editor:

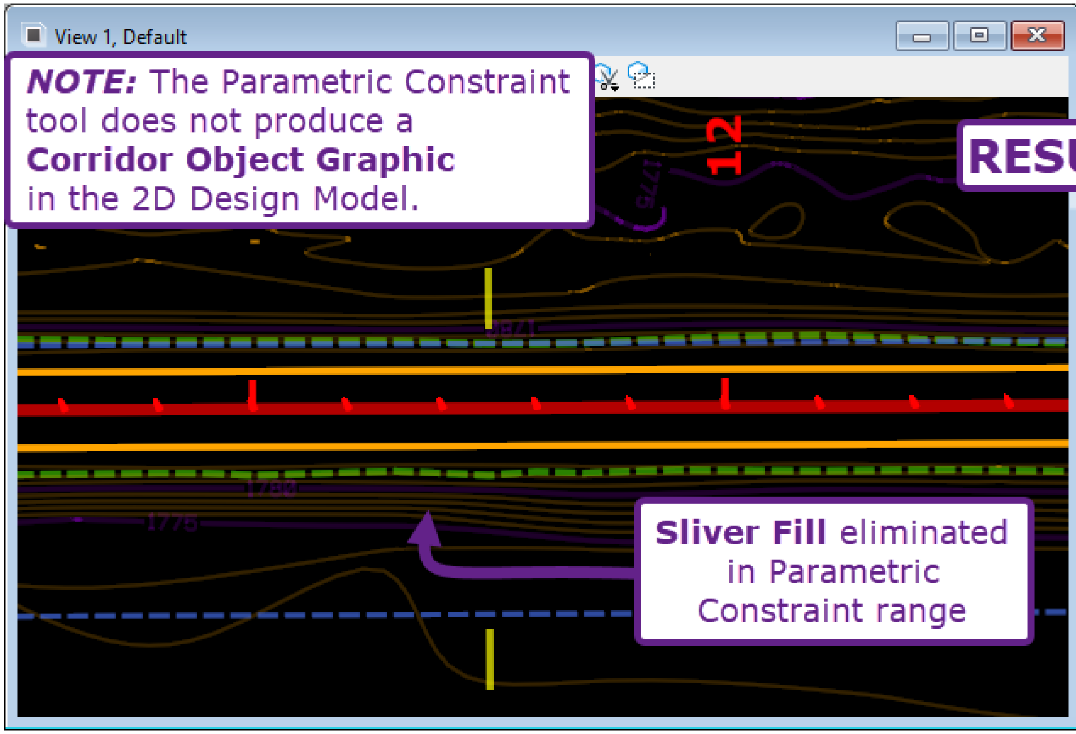
For more information on Constraint Labels, see 8C.6.a.xiii Label.

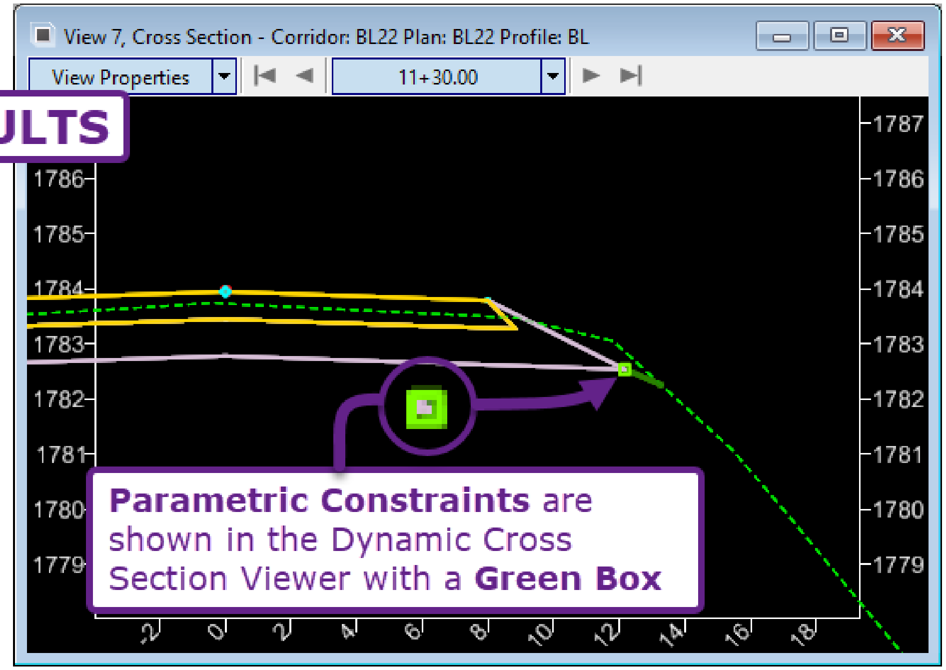


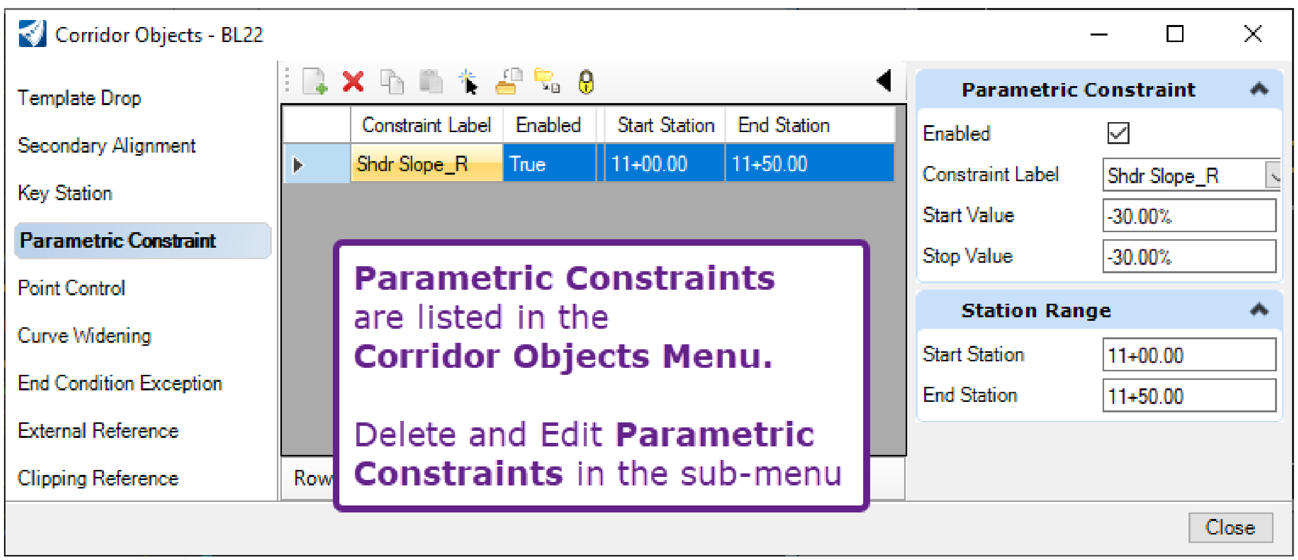
Use the Parametric Constraint tool to Override the Constraint Value :



5	Select the Corridor Handle to summon the Pop-Up Icon Menu. Select the *Create Parametric Constraint* icon. →
6	*Prompt: Start Station* = 11+00.00 *Prompt: End Station* = 11+50.00 Key-in the desired Start and End Station (press the ENTER key to Lock) to set the override range for the Parametric Constraint. Left-Click in the *View* to advance to the next Prompt.
7	*Prompt: Constraint Label* In the **Dialogue Box**, expand the *Constraint Label* drop-down and select the appropriate Label. This is the SAME Label created in STEP 3. In this case, the *Constraint Label* is "Shdr Slope_R". When the appropriate Label is displayed, Left-Click in the *View* to advance to the next Prompt.
8	*Prompt: Start Value* = 30%. The *Start Value* sets the Constraint Value at the Start Station of the Parametric Constraint. Key-in the desired value and press the ENTER key to Lock. In this case 30% is used to override the default value of 25%.
9	*Prompt: Stop Value* = 30%. The *Stop Value* sets the Constraint Value at the End Station of the Parametric Constraint. In this case 30% is used to override the default value of 25%.

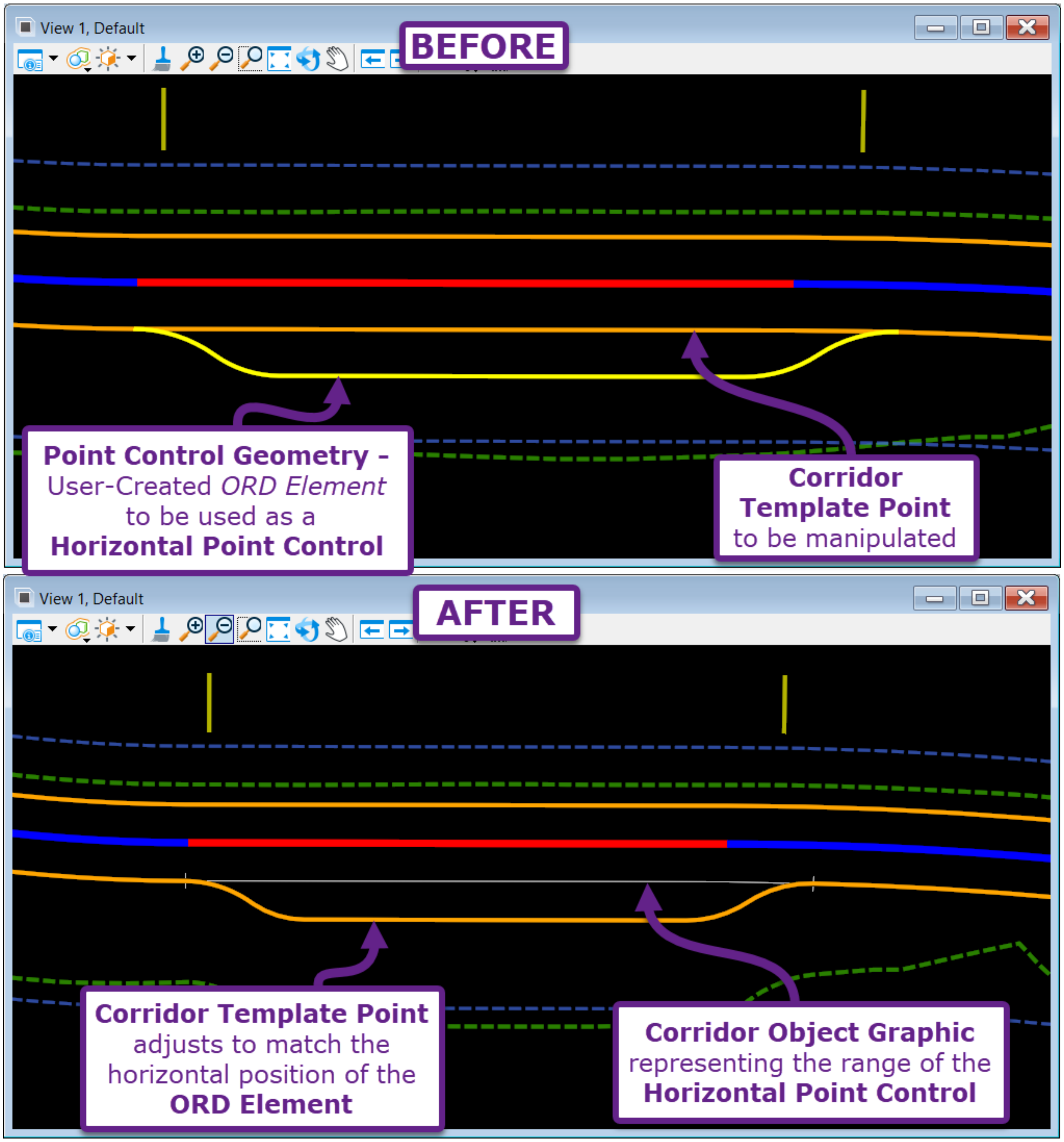

View 1, Default
NOTE: The Parametric Constraint tool does not produce a Corridor Object Graphic in the 2D Design Model.
Sliver Fill eliminated in Parametric Constraint range


View 7, Cross Section - Corridor: BL22 Plan: BL22 Profile: BL
View Properties
11+30.00
RESULTS
Parametric Constraints are shown in the Dynamic Cross Section Viewer with a Green Box


Corridor Objects - BL22
Template Drop
Secondary Alignment
Key Station
Parametric Constraint
Point Control
Curve Widening
End Condition Exception
External Reference
Clipping Reference
Constraint Label
Enabled
Start Station
End Station
Shdr Slope_R
True
11+00.00
11+50.00
Parametric Constraints are listed in the Corridor Objects Menu.
Delete and Edit Parametric Constraints in the sub-menu
Parametric Constraint
Enabled
Constraint Label
Shdr Slope_R
Start Value
-30.00%
Stop Value
-30.00%
Station Range
Start Station
11+00.00
End Station
11+50.00
Close

9G.5 Point Control

Point Controls are used to manipulate the horizontal and/or vertical position of a Template Point line to match the position of a User-created ORD Element and/or Profile. In this sub-section, *Point Control Geometry* refers to the User-created ORD Elements to be used as Point Controls for the Corridor. The graphic below shows a simple application of a *Horizontal* Point Control – to accommodate a deviation in road width.



NOTE: Point Controls are only compatible with ORD Elements that contain a Feature Definition and Name. Point Controls are not *initially* compatible with MicroStation Elements (i.e., Smart Lines), because they do not contain Feature Definitions and Names. However, the User can create Point Control geometry with MicroStation Elements and then assign the MicroStation Elements a Feature Definition and Name by using the *Complex By Element* tool or *Set Feature Definition* tool.

WARNING: When creating Point Control Geometry, do NOT create ORD Elements that will result in a Circular Reference. See *9G.1 WARNING – Creating Circular References (Recursive Solutions)*.

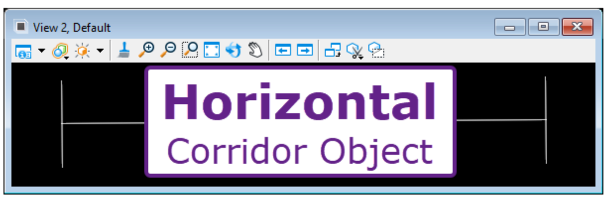
9G.5.a Point Control - Modes

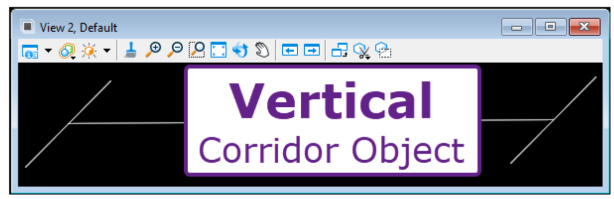
There are three types of Point Controls that are available in Corridor modeling: **Horizontal**, **Vertical**, and **Both**. All three types require the User to create a Horizontal ORD Element. However, the **Vertical** and **Both** modes require the Horizontal ORD Elements to contain an *active* Profile.

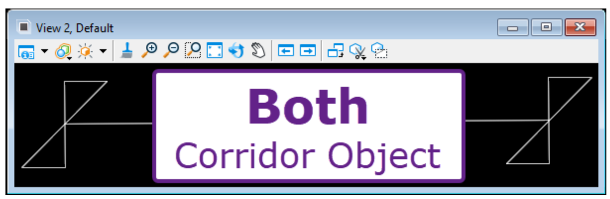
Horizontal Mode: The Template Point will widen, narrow, or taper to match the horizontal position of the Point Control ORD Element. The Template Point will continue to honor its *slope vector* when widening or narrowing from its default position. The Corridor Object Graphic for Horizontal Point Controls is identified with a perpendicular tick mark.

Vertical Mode: The Template Point will raise or lower to match the vertical position of the Profile within the Point Control ORD Element. The Template Point will continue to honor its *slope vector* when raising or lowering from its default position. The Corridor Object Graphic for Horizontal Point Controls is identified with a diagonal tick mark.

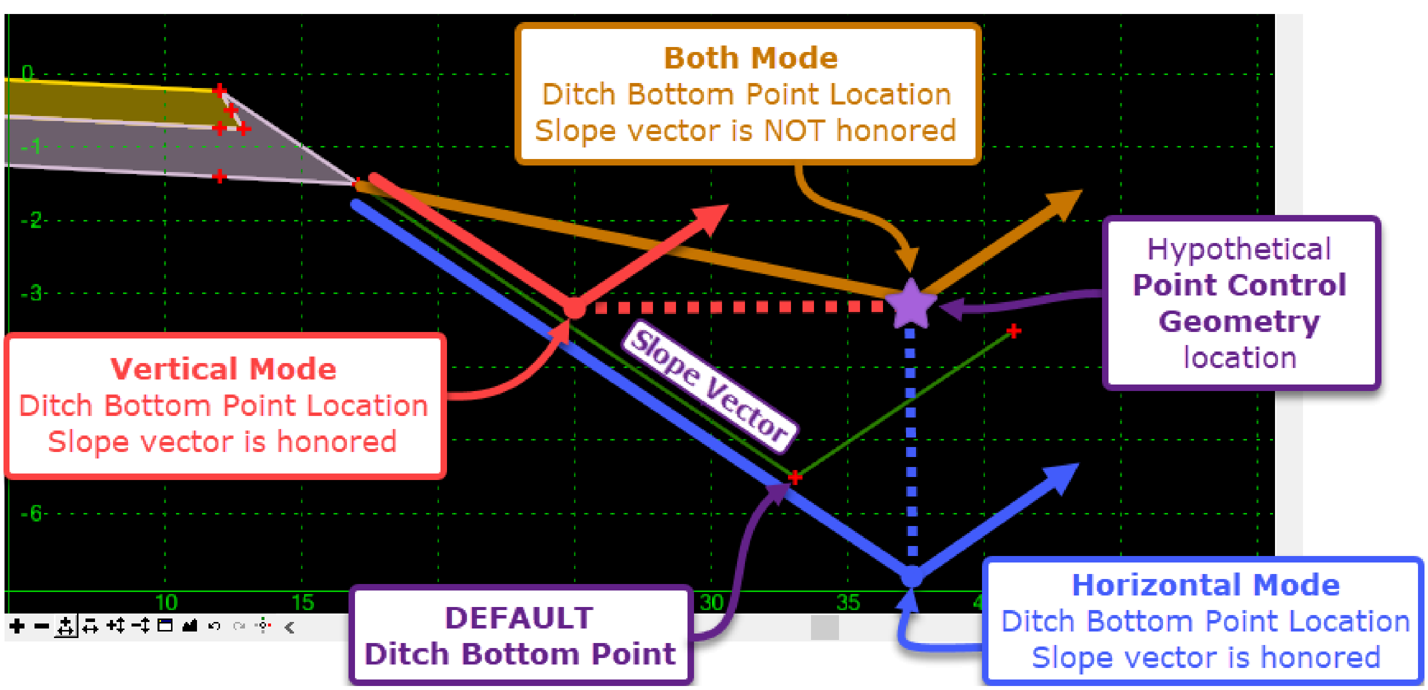
Both Mode: The Template Point will match both the horizontal and vertical position of the Point Control ORD Element. The Template Point will move in any direction necessary and NOT honor the *slope vector.* The Corridor Object Graphic for Horizontal Point Controls is identified with a bow-tie shaped tick mark:







A common application of Point Control is to manipulate the Flow Line of a Ditch – as represent below by the Ditch Bottom Point – with Point Control Geometry. The graphic below shows how the different **Modes** of would hypothetically affect the location of the Ditch Bottom Point when subjected to Point Control.



9G.5.b Point Control – Control Types

The Control Types determine how Point Control Geometry is selected.

> ***IMPORTANT:*** For the *Feature Definition* and *Corridor Feature* Control Types, all Point Control Geometry elements must be added to the corridor as a reference using the *Add Corridor Reference* tool. See *9G.9 Corridor References*.

Using different Control Types will present the User with different Dialogue Options.

Linear Geometry: The User must manually create a Point Control Geometry element. The Point Control element is then manually selected by the User in Point Control creation.

The Dialogue Options available for the *Linear Geometry* Control Type are discussed in the following sections: *9G.5.c* and *9G.5.d*.

Feature Definition: This Control Type is used to automatically select *multiple* Point Control Geometry elements that are placed on a common Feature Definition.

> **Example Use:** The User creates multiple Point Control Geometry elements to represent road widening segments at different locations along the corridor. A single usage of the *Point Control* tool can then be used to incorporate the multiple widening segments into the Corridor Model.

Feature Definition – Dialogue Options	
Option	**Description**
Feature Definition	Only the elements contained on the specified Feature Definition will be used as a Point Control.
Range	Specifies the offset from the Corridor Alignment in which elements of the specified Feature Definition are used as Point Controls. If an element (on the specified Feature Definition is beyond this range, then it won't be used as a Point Control.

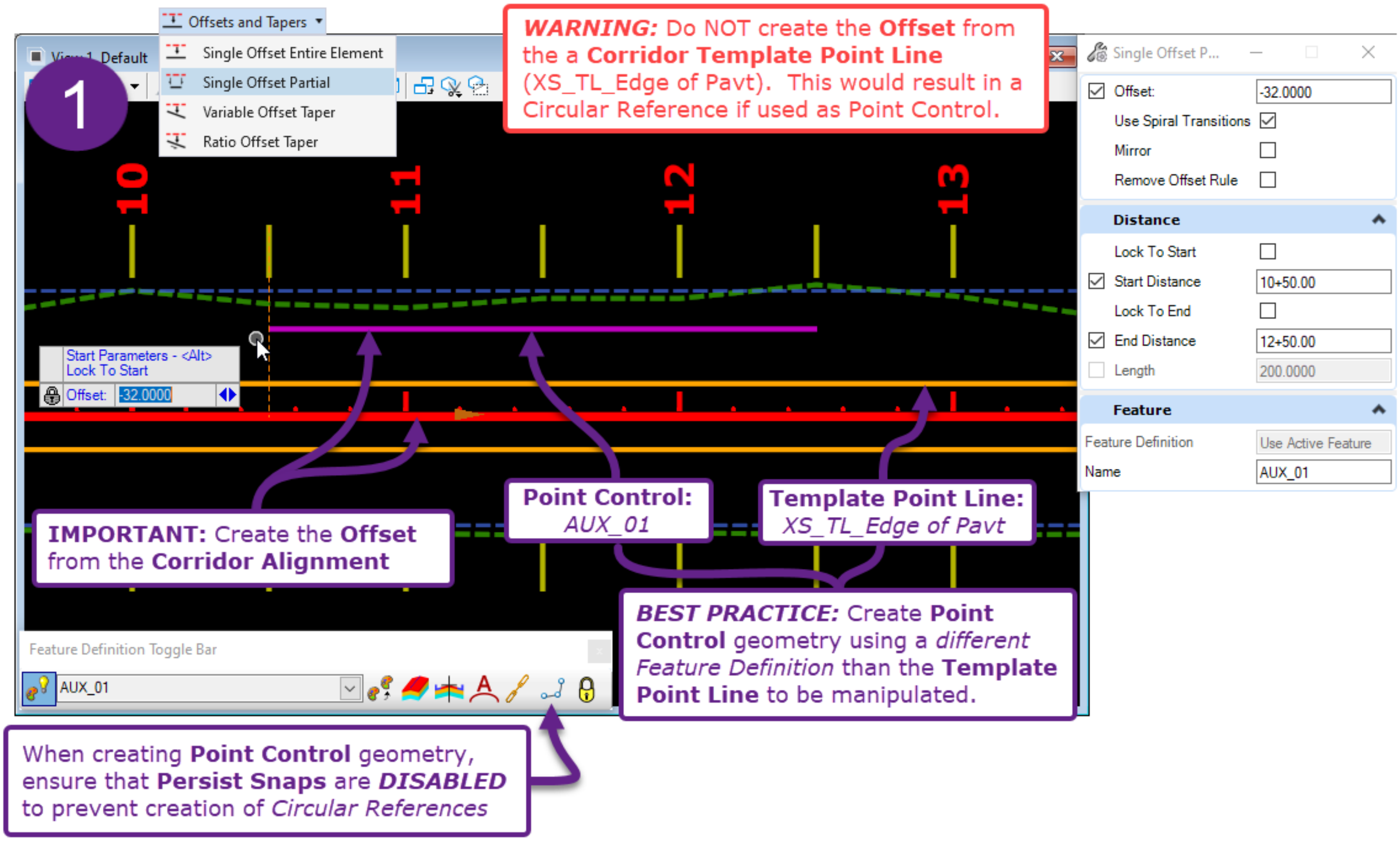
Corridor Feature – This Control Type is used to locate Point Control geometry from a DIFFERENT CORRIDOR. For this Control Type, a Template Point line from a different Corridor is used as the Point Control Geometry.

> **Example Use:** If two Corridors are generally running in parallel (i.e., a Corridor representing the Road and the other representing a Trail), then the *Corridor Feature* type can be used for interaction between the Corridors. For example, if the Road Corridor already has an established Ditch Line, then the Trail Corridor can use the Road Ditch Line as a Point Control geometry element.

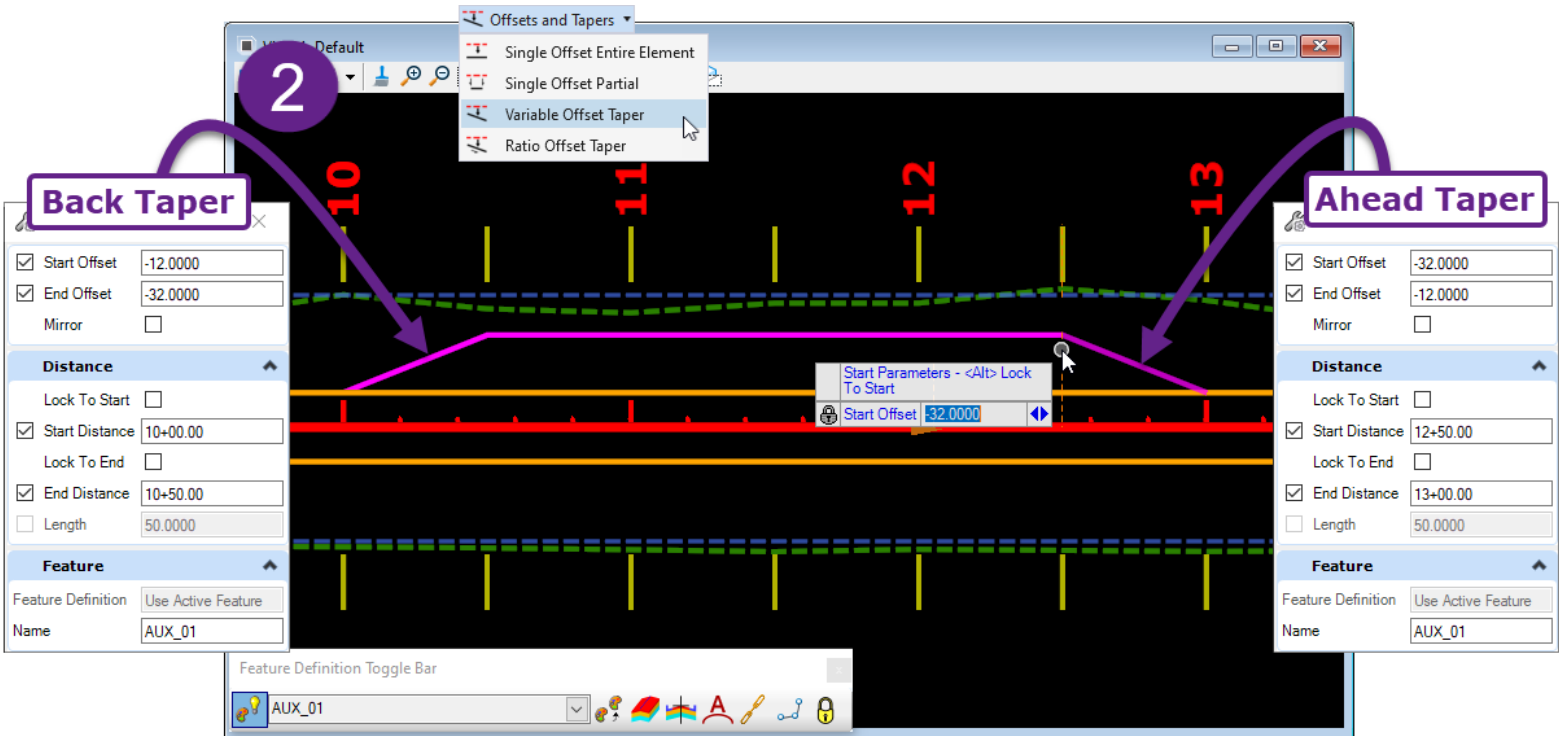
Corridor Feature Definition – Dialogue Options	
Option	**Description**
Corridor	From the drop-down, the Corridor to target as a Point Control needs to be specified.
Reference Feature	The Reference Feature specifies which Template Point from the referenced Corridor to target as a Point Control geometry.

9G.5.c HORIZONTAL Point Control Workflow – Turnout

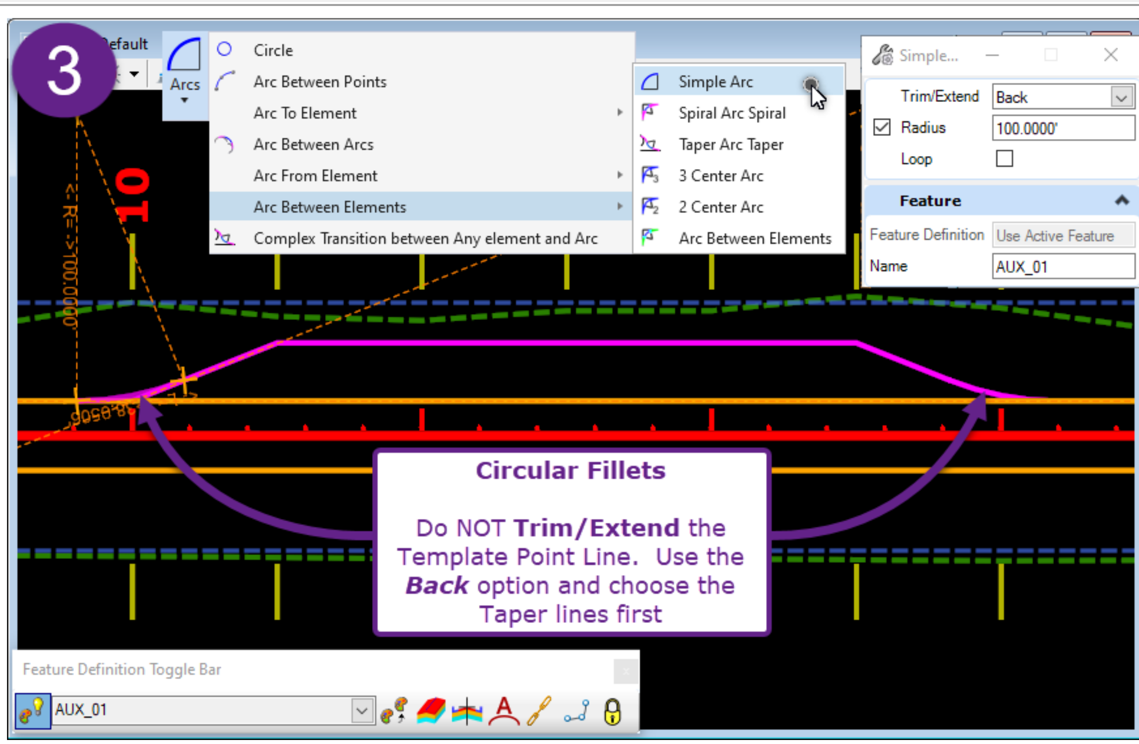
In this workflow, a road turnout is created using Horizontal Point Control.

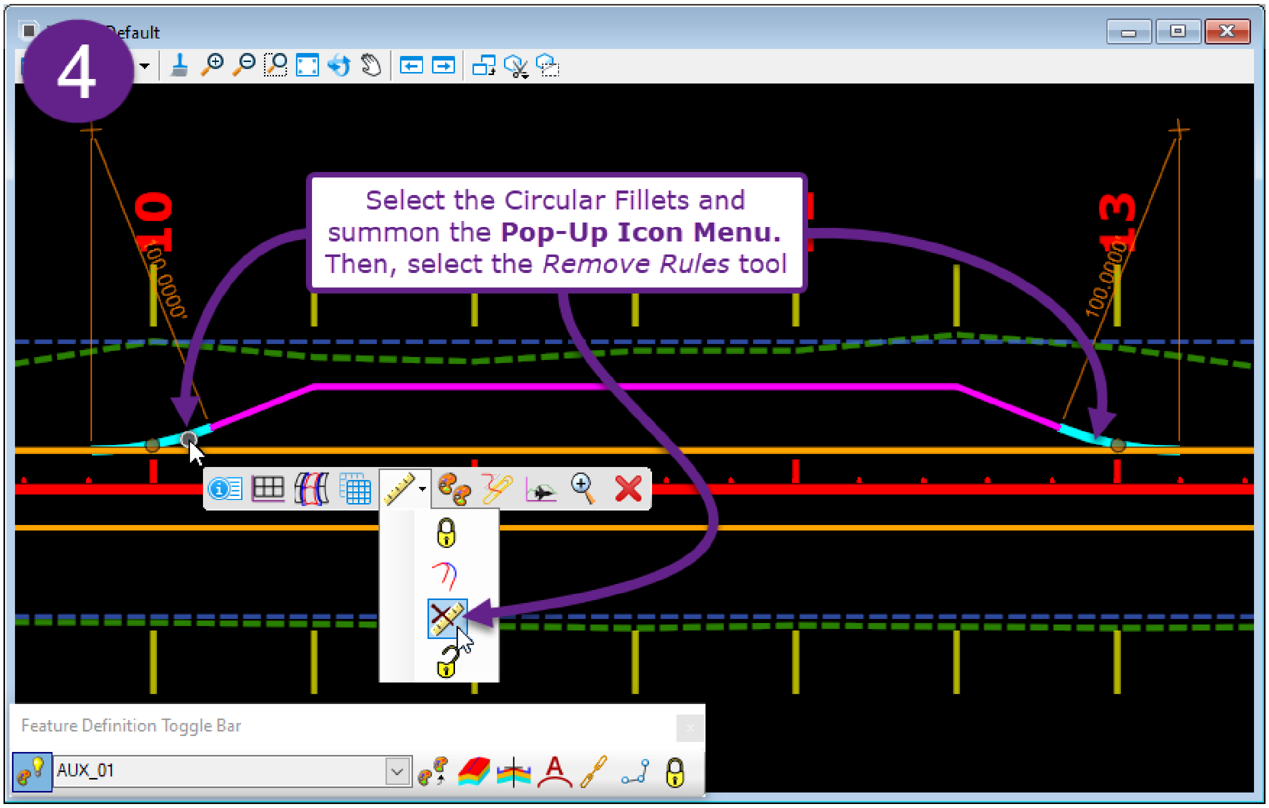


1	**Create the Point Control Geometry:** Using the *Single Offset Partial* tool, create the back edge of the turnout. The CORRIDOR ALIGNMENT is offset -32.0000 from 10+50 to 12+50. Do NOT offset the edge of road Corridor Element. ***WARNING:*** When creating Point Control geometry, do NOT create ORD Elements that will result in a Circular Reference. See *9G.1 WARNING – Creating Circular References (Recursive Solution)*. ***BEST PRACTICE:*** Place Point Control Geometry on a different Feature Definition than the Template Point Line. This makes the Point Control Geometry and Template Pont Line more easily distinguishable.

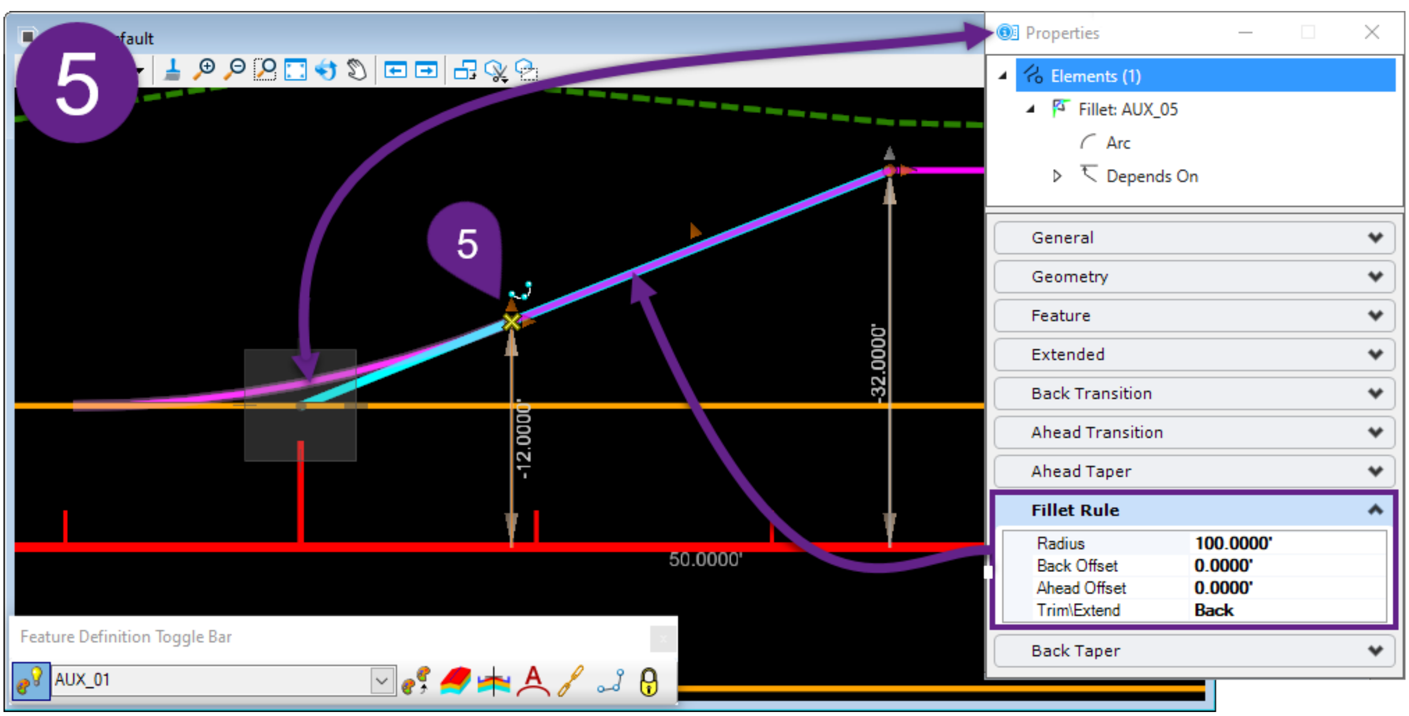


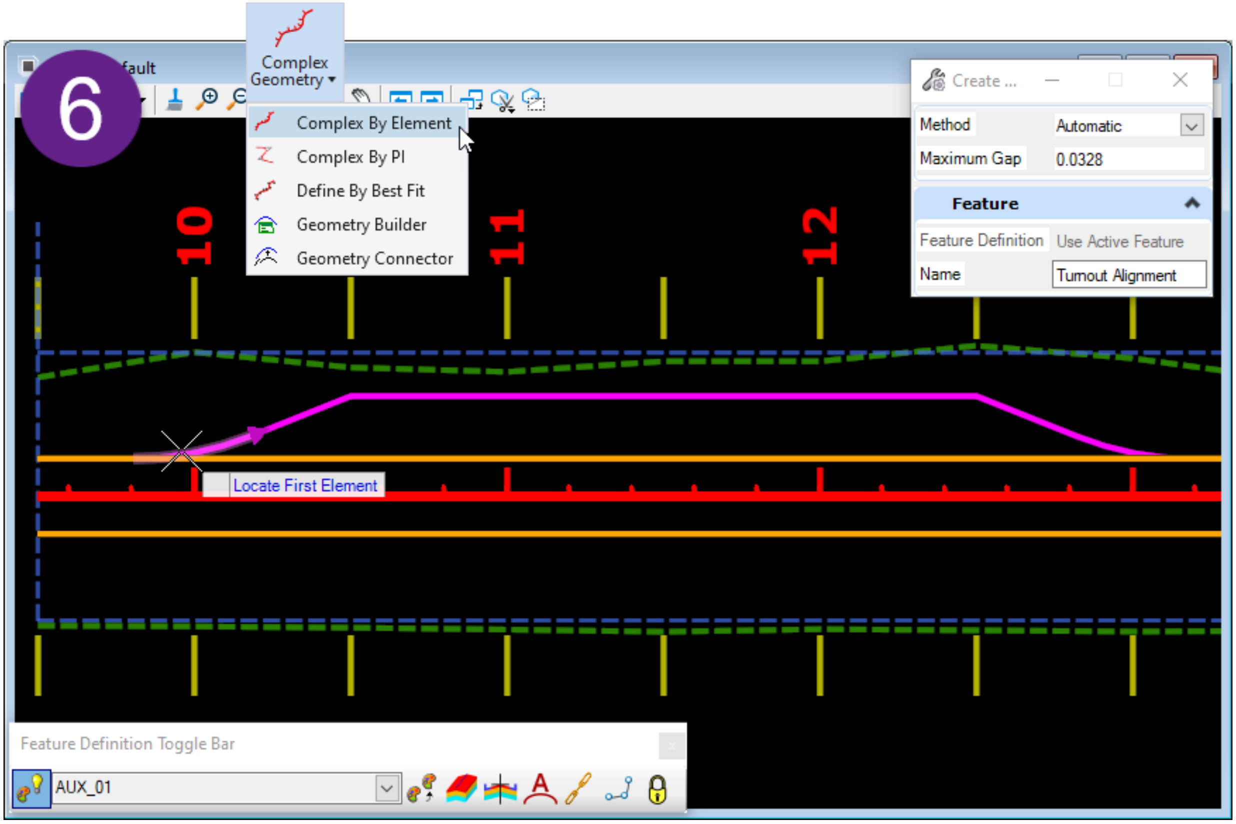
2	**Create the Point Control geometry:** Using the *Variable Offset Partial* tool, create the back and ahead tapers for the turnout. Ahead Taper: The CORRIDOR ALIGNMENT is offset -12.0000 from 10+00 and -32.000 from 10+50. **Back Taper:** The **CORRIDOR ALIGNMENT** is offset **-32.0000** from **12+50** and -**12.000** from **13+00.**
3	**Create the Point Control Geometry:** For demonstration purposes, the *Simple Arc* tool is used to create Circular Fillets (with 100.0000 radii) between the tapers and the Template Point Line (Edge of Road). If left as is, the Circular Fillets would result in a Circular Reference because they *Depend On* the Template Point Line. The *Dependency* is removed in the next step.



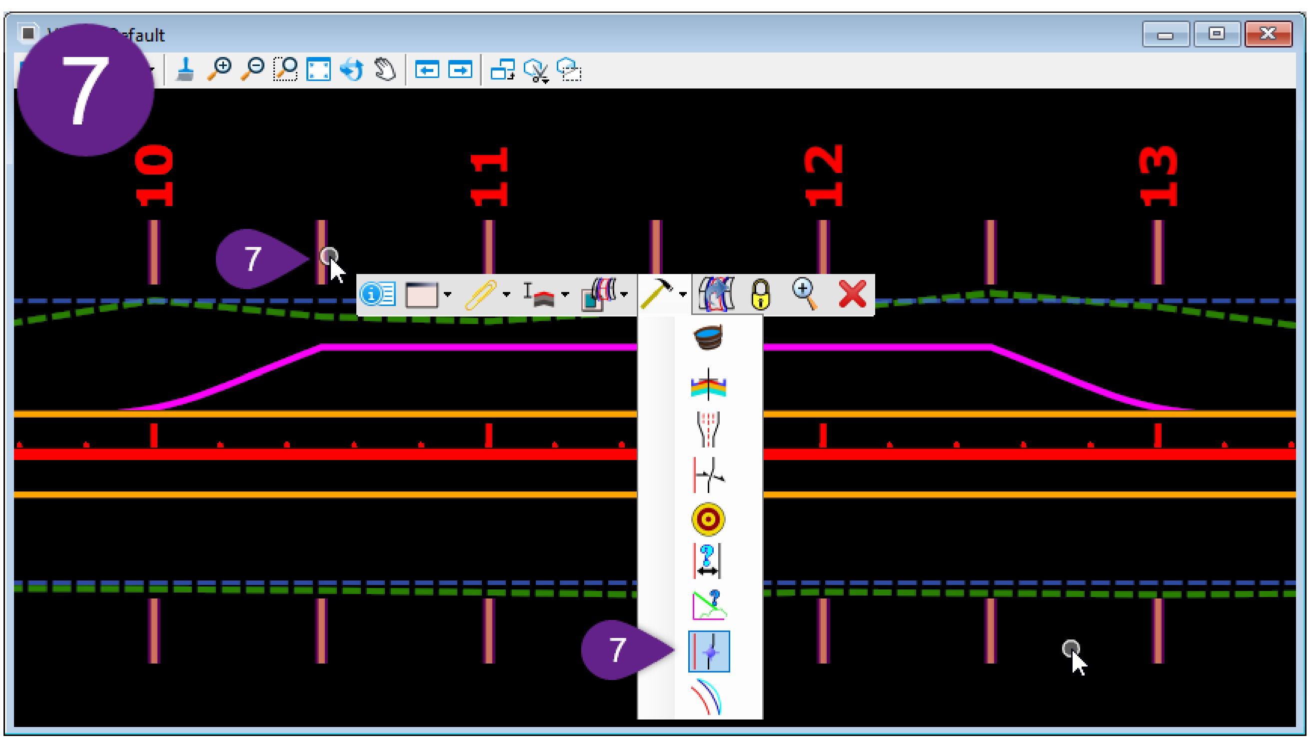


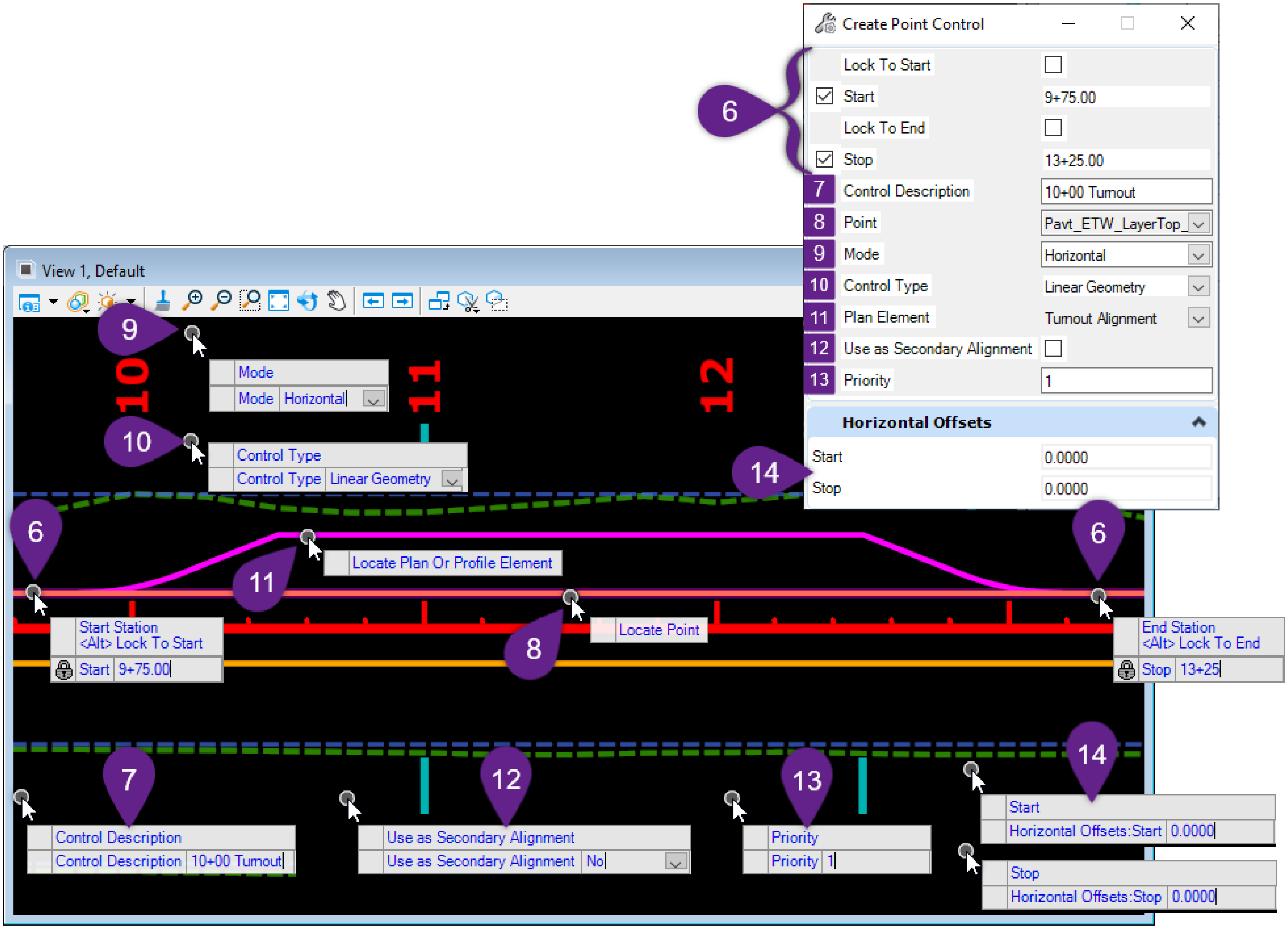
4	**Create the Point Control Geometry:** Use the *Remove Rules* tool to remove the *Dependencies* from the Circular Fillets.
5	**Create the Point Control Geometry:** After the *Remove Rules* tools is used, the trimmed portions of the tapers reappear. Use Grip-Edits to manually re-position the Taper on the end point of the Circular Fillet. **Explanation:** The *Remove Rules* tool removes the all *Civil Rules* for Circular Fillet - including the *Fillet Rule* that controls the *trimming* of the Taper *Interval*. See *7C.2 Civil Rules* and *7C.3 Base ORD Elements and Intervals*.





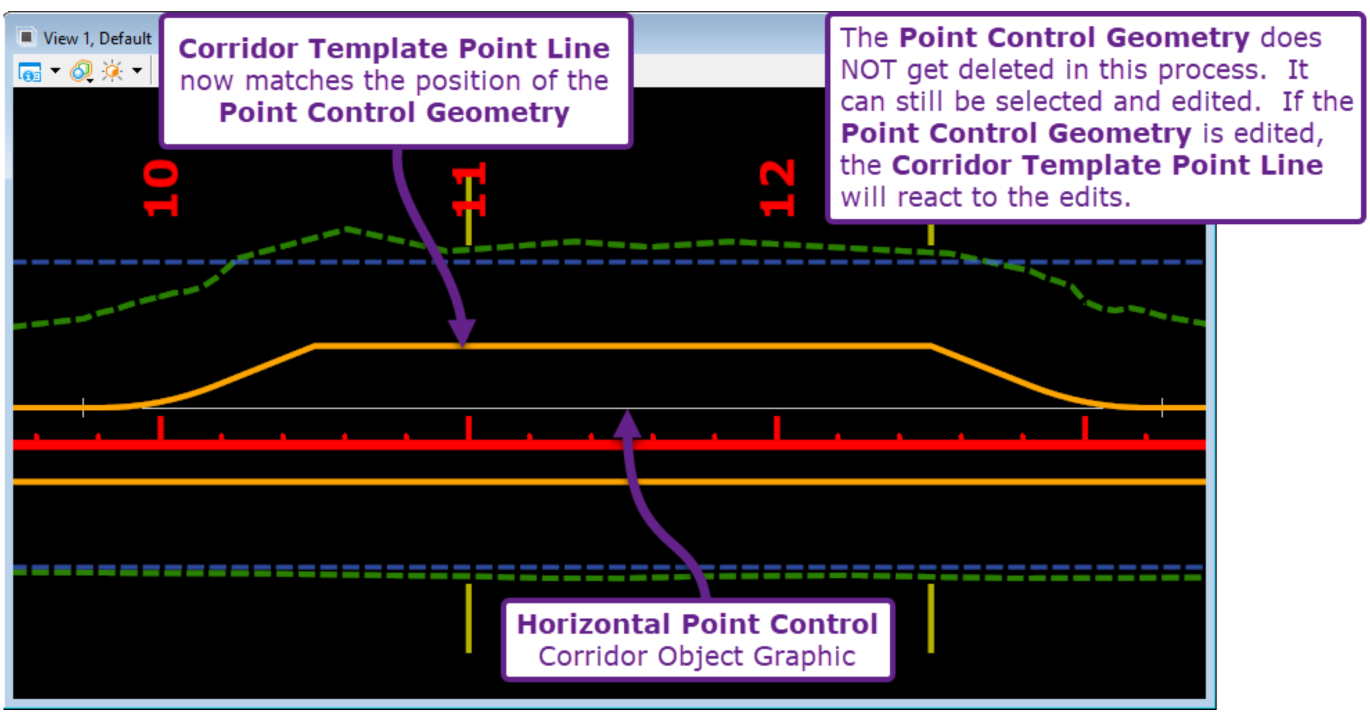
6	**Create the Point Control Geometry:** Using the *Complex By Element* tool, combine all elements created thus far into a single Point Control alignment. ***BEST PRACTICE:*** Give the Point Control alignment an identifiable Name. This will help to organize Point Control entities within the Point Control Sub-Menu (found in the Corridor Objects Menu).
7	**Point Control Creation:** Select the Corridor Handle and summon the Pop-Up Icon Menu. Select the *Create Point Control* tool. →





6	*Prompt: Start Station* = 9+75.00 *Prompt: End Station* = 13+25.00 Key-in the *desired* Start and End Station (press the Enter key to Lock) for the Point Control or graphically select the Start and End locations. Left-Click to accept the location and advance to the next prompt. ***TIP:*** It is not necessary for the Start and End Station to exactly match the Start and End of the Point Control Geometry element. If the Start and End station overshoots the Point Control Geometry element, the Template Point line will remain in its default position in the overshot segments. In this example, the Start and End Station is intentionally overshot to ensure the entire Pont Control Geometry element is completely encompassed in the Point Control range.
7	*Prompt: Control Description* – If desired, give the Point Control a description. The description will be viewable in the Point Control Sub-Menu within the Corridor Objects Menu.
8	*Prompt: Locate Point* – Graphically select the Corridor Template Point line to be manipulated OR select the Template Point by Name from the *Point* drop-down in the *Dialogue Box.* In this case, the *Pavt_ETW_LayerTop_L* is the desired Template Point.

9	*Prompt: Mode* – Use the UP and DOWN arrow keys to select the desired Point Control Mode. See *9G.5.a Point Control - Modes*. Left-Click in the *View* to advance to the next prompt. In this case, the **Horizontal** Mode is used.
10	*Prompt: Control Type* - Use the UP and DOWN arrow keys to select the desired Control Type. See *9G.5.b Point Control – Control Types*. Left-Click in the *View* to advance to the next prompt. In this case, the **Linear Geometry** Control Type is used.
11	*Prompt: Locate Plan or Profile Element* - Graphically select the Point Control Geometry element OR select the Point Control Geometry element by Name from the *Plan Element* drop-down in the *Dialogue Box.* In this case the "Turnout Alignment" is selected.
12	*Prompt: Use as Secondary Alignment* - Use the UP and DOWN arrow keys to select either YES or NO. If YES is selected, the Point Control Geometry element is used as a *Secondary Alignment*. See *9G.2 Secondary Alignments* for the definition of a *Secondary Alignment*. Left-Click in the *View* to advance to the next prompt.
13	*Prompt: Priority* – The *Priority* is only applicable if the Template Point is used as a Point Control for multiple elements. The Point Control Geometry element with the numerically lower *Priority* value will be targeted first. The default *Priority* value of 1 is used. In this case, the *Priority* value is inconsequential since there will not be overlapping Point Control Geometry elements.
14	*Prompt: Horizontal Offset Start* = 0.0000. *Prompt: Horizontal Offset End* = 0.0000. If this value is NOT 0.0000, then Template Point line is Horizontally Offsets from the Point Control Geometry element by the specified value. In this case, a value of 0.0000 is used for both Start and End Horizontal Offset because the intent is to place the Template Point line in the same horizontal position as the Point Control Geometry element.

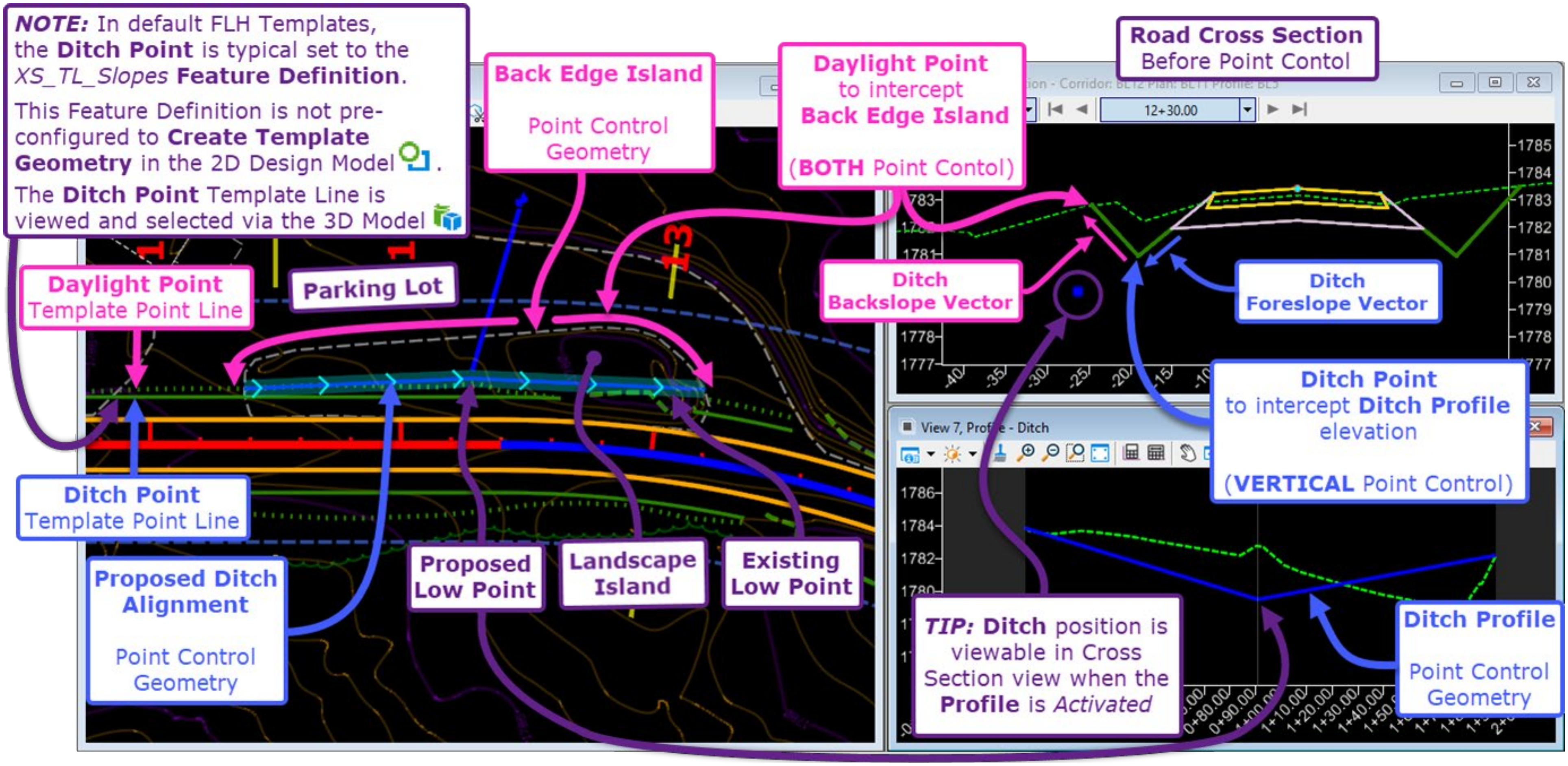


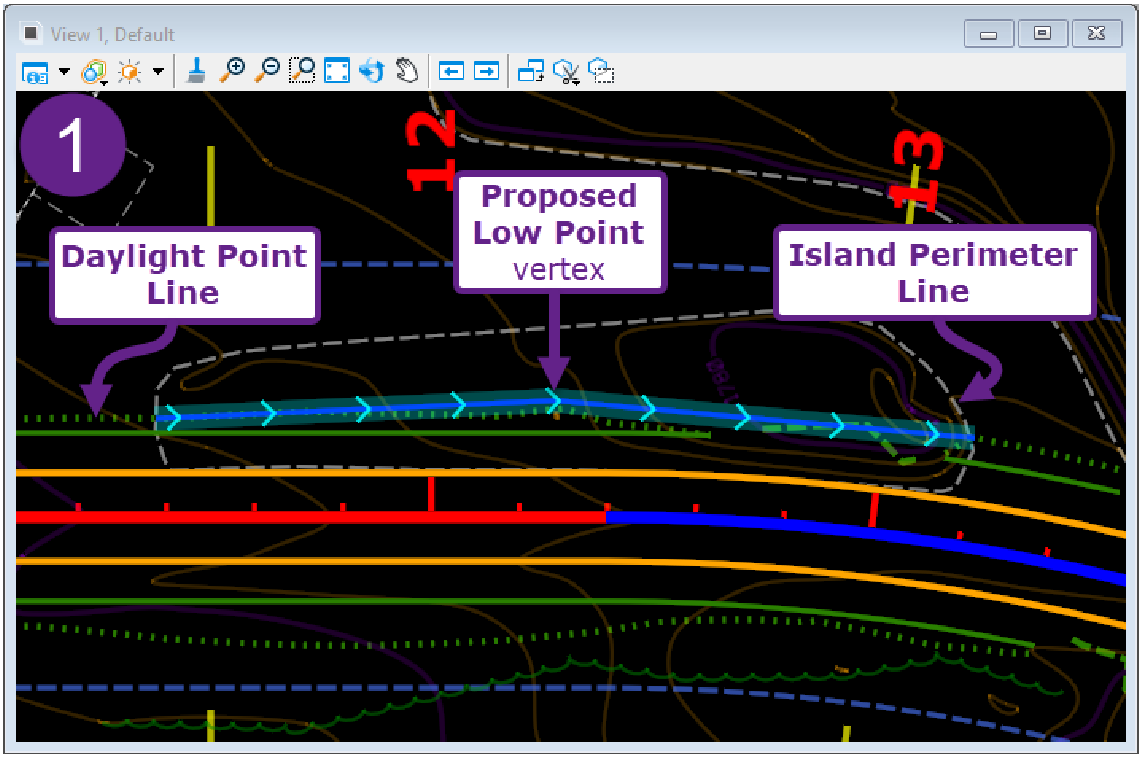
9G.5.d VERTICAL and BOTH Point Control Workflow – Ditch

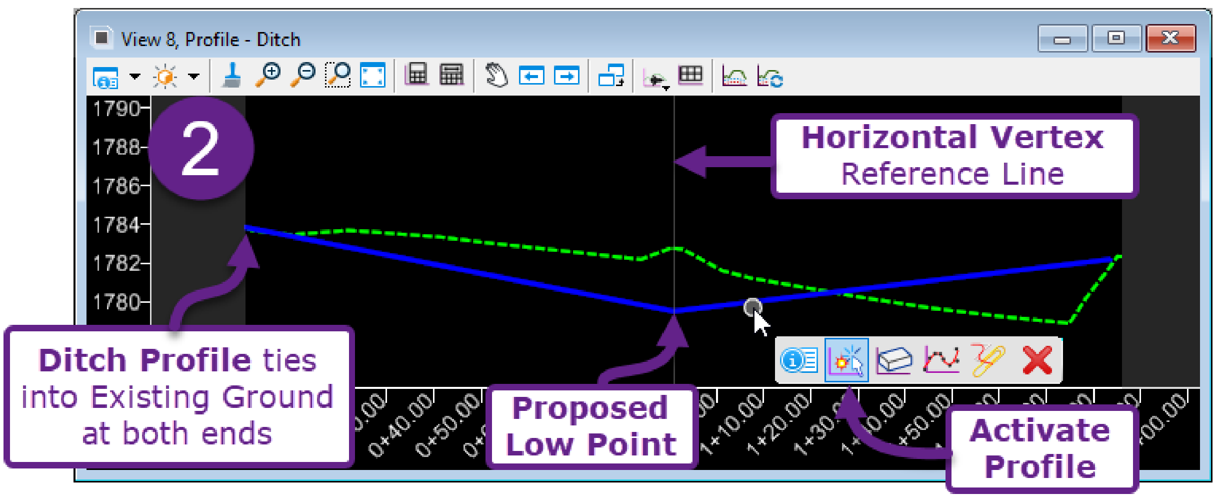
In this workflow, the Landscape Island located directly adjacent to the road will be re-graded to drain to the center of the island to the "Proposed Low Point". Two instances of the Point Control tool will be used to manipulate the **Ditch Point** and the **Daylight Point**.

POINT CONTROL 1 (Vertical): The **Ditch Point** (Template Point Line) will extend along the Ditch Foreslope Vector to intercept the elevation of the **Ditch Profile** (Point Control Geometry). VERTICAL Point Control will be used to maintain the default Ditch Foreslope of 1V:4H (25%).

POINT CONTROL 2 (Both): The **Daylight Point** (Template Point Line) will intercept the Horizontal and Vertical position of the existing **Back Edge Island** (Point Control Geometry). The BOTH Point Control mode will be used, which means the default Ditch Backslope Vector will be varied as necessary to intercept the Back Edge Island horizontal and vertical position.





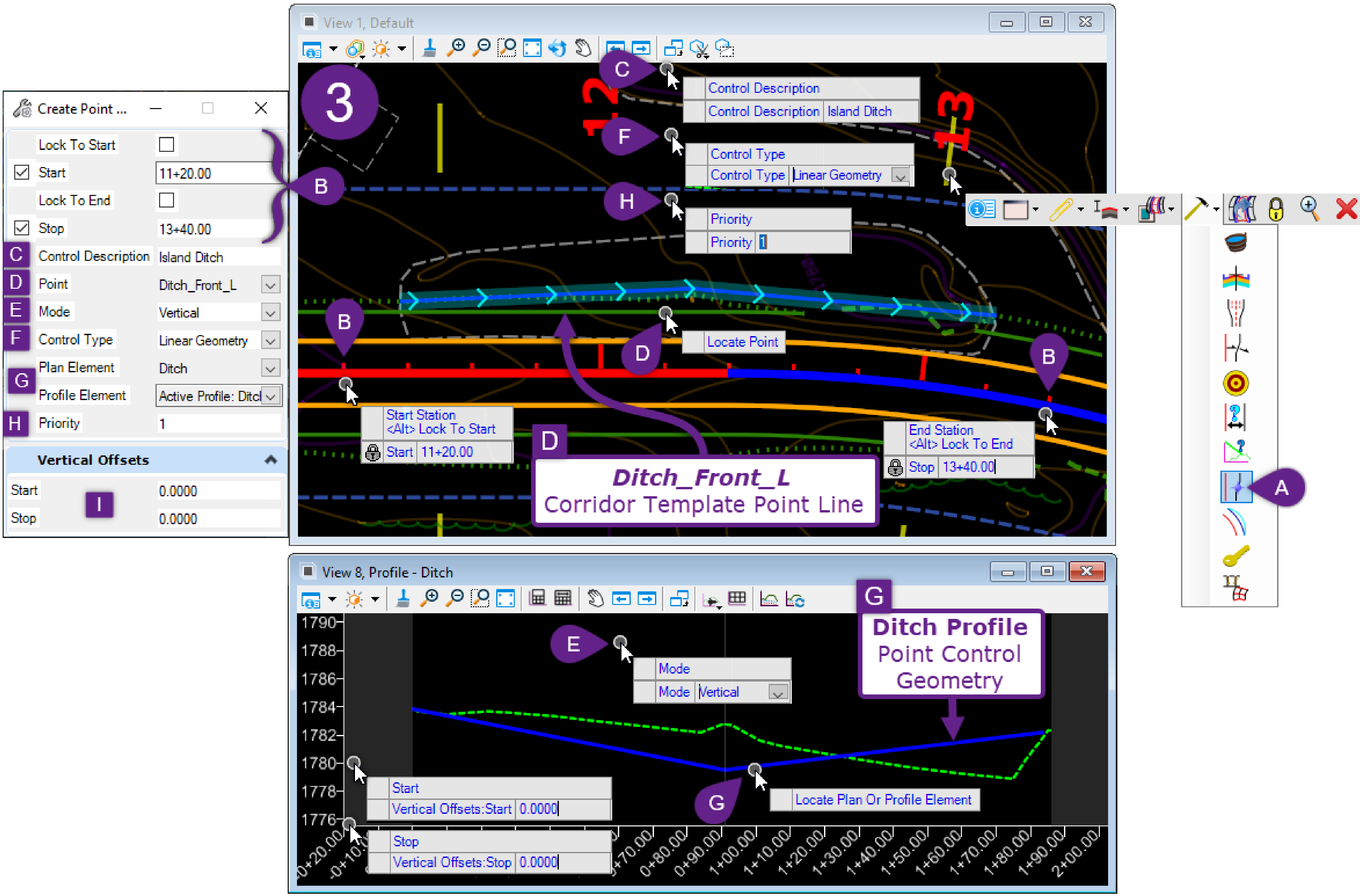


Create the Point Control Geometry for the Ditch Alignment and Profile Elements:

1	**Use Horizontal ORD Elements to create the Ditch Alignment:** Since a **Vertical Point Control** will be used, the horizontal position of the **Ditch Alignment** is not of critical importance. The ends of the Alignment are placed at the intersection of the Daylight Point Line and Island perimeter line. A PI (vertex) is placed at the desired location of the Proposed Low Point. By doing so, a reference line will be provided in the Profile grid.
2	**Use Vertical ORD Elements to create the Ditch Profile:** The Ditch Profile ties into the existing ground at either end, with a VPI (vertex) placed at the desired Proposed Low Point elevation. *Activate* the Ditch Profile before moving on to the next step.

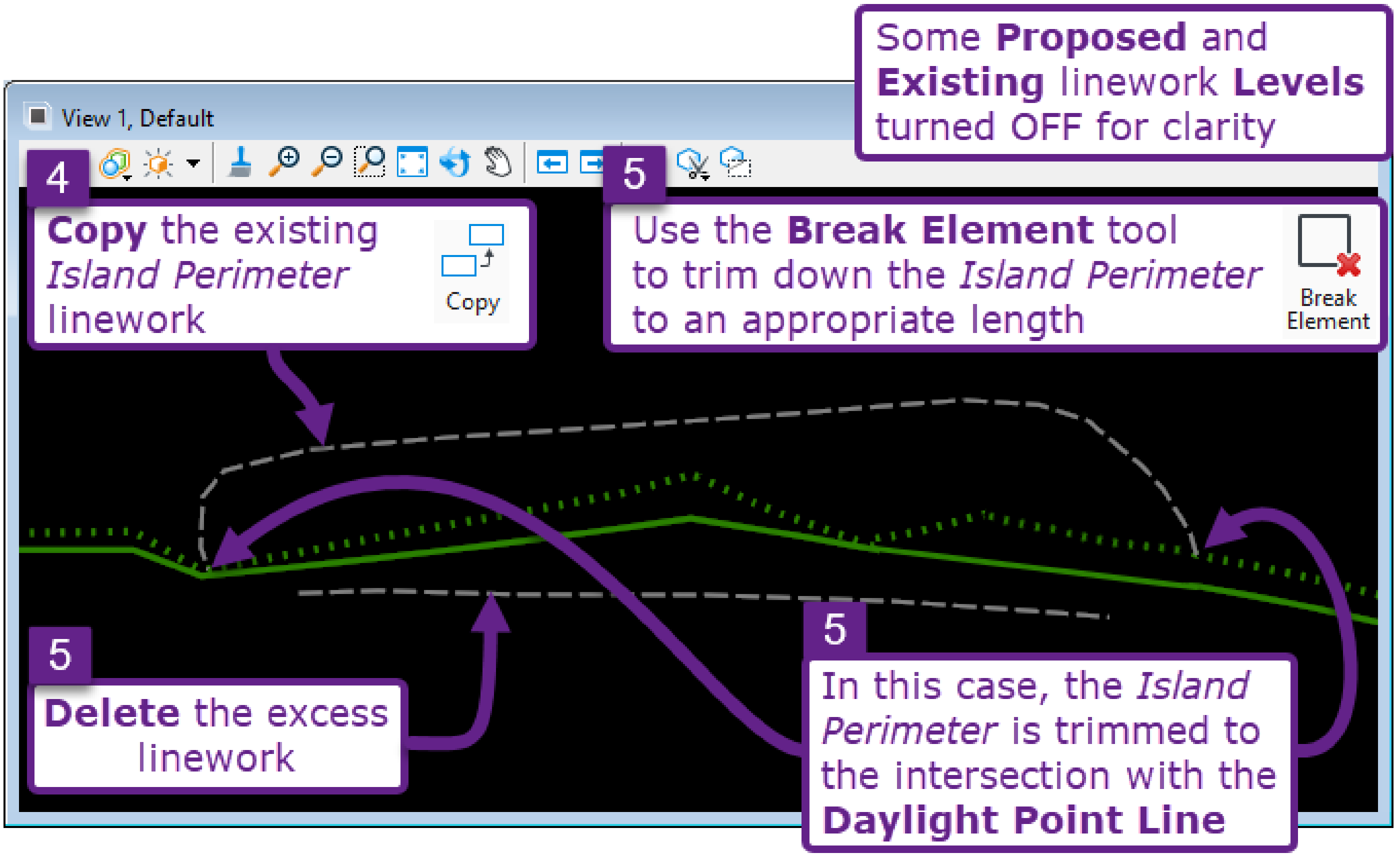
TIP: To help in determining the proper horizontal and vertical locations for Ditch Alignments and Profiles, the *Dynamic Cross Section Viewer* can be conveniently related to *2D Design Model* using Horizontal ORD Lines (Line Between Points tool).

3 **Create the VERTICAL Point Control for the Ditch Point:**

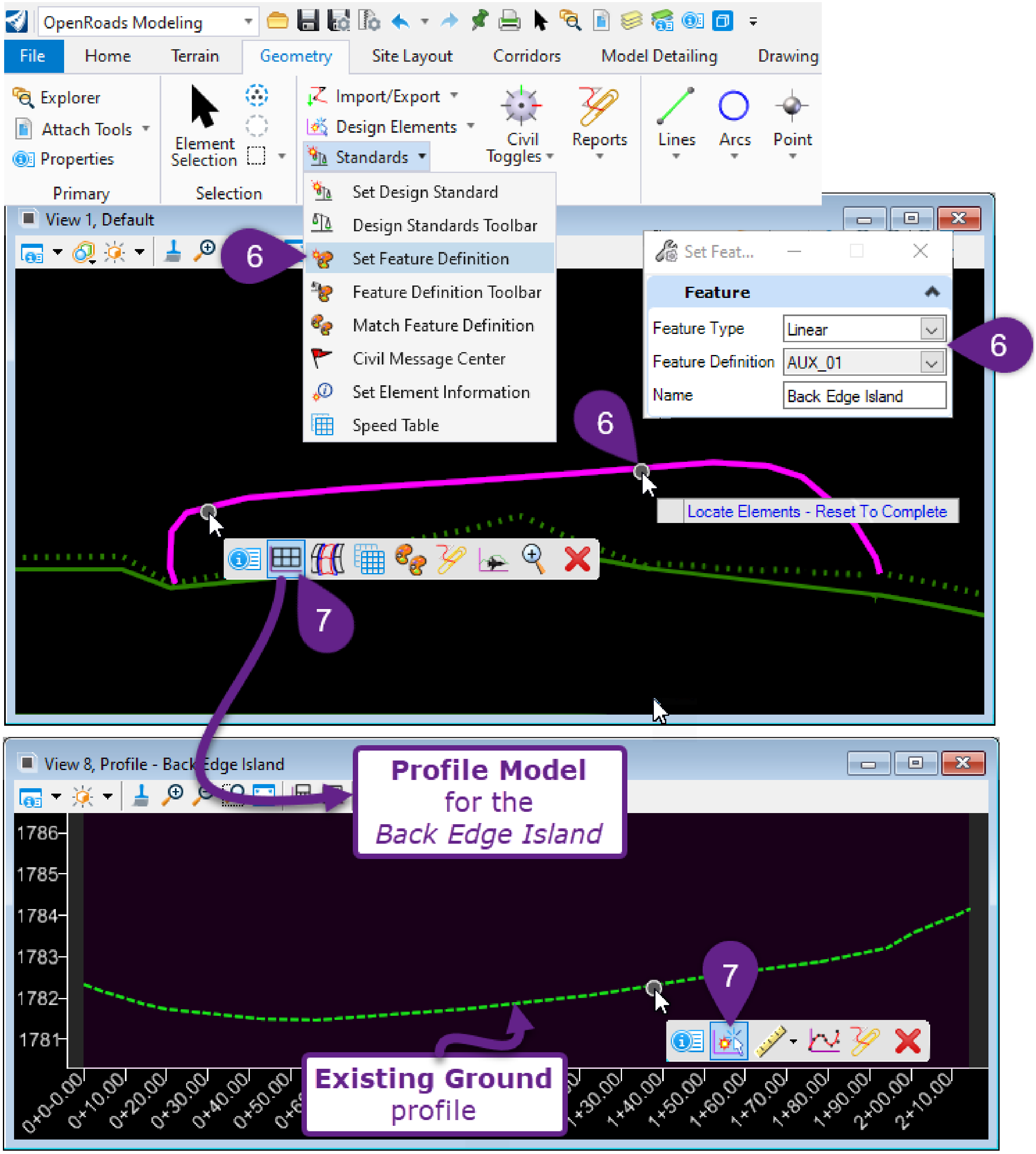


A	**Point Control Creation:** Select the Corridor Handle and summon the Pop-Up Icon Menu. Select the *Create Point Control* tool. →
B	*Prompt: Start Station* = 11+20.00 *Prompt: End Station* = 13+40.00 Key-in the *desired* Start and End Station (press the Enter key to Lock) for the Point Control or graphically select the Start and End locations. Left-Click to accept the location and advance to the next prompt. ***TIP:*** In this case, the Start and End Station are intentionally placed beyond the Start and End Points of the Point Control Geometry. This configuration is acceptable. The Point Control is only applied in the range which the Point Control Geometry is found.
C	*Prompt: Control Description* – If desired, give the Point Control a description. In this case, the description is "Island Ditch".
D	*Prompt: Locate Point* – Either graphically select the Corridor Template Point line to be manipulated OR select the Template Point by Name from the *Point* drop-down in the *Dialogue Box*. In this case, the *Ditch_Front_L* is the desired Template Point.
E	*Prompt: Mode* – Use the UP and DOWN arrow keys to select the desired Point Control Mode. See *9G.5.a Point Control - Modes*. Left-Click in the *View* to advance to the next prompt. In this case, the **Vertical** Mode is used.
F	*Prompt: Control Type* - Use the UP and DOWN arrow keys to select the desired Control Type. See *9G.5.b Point Control – Control Types*. Left-Click in the *View* to advance to the next prompt. In this case, the **Linear Geometry** Control Type is used.
G	*Prompt: Locate Plan or Profile Element* - Graphically select the **Ditch Profile** Point Control Geometry element from the *Profile Model* of the **Ditch** alignment.
H	*Prompt: Priority* – Use the default Priority of 1. Left-Click in the *View* to advance to the next prompt.
I	*Prompt: Vertical Offset Start* = 0.0000 *Prompt: Vertical Offset End* = 0.0000 Use the default values of 0.0000. Left-Click in the *View* to advance to the next prompt.

Create the Point Control Geometry for the Back Edge Island Element:

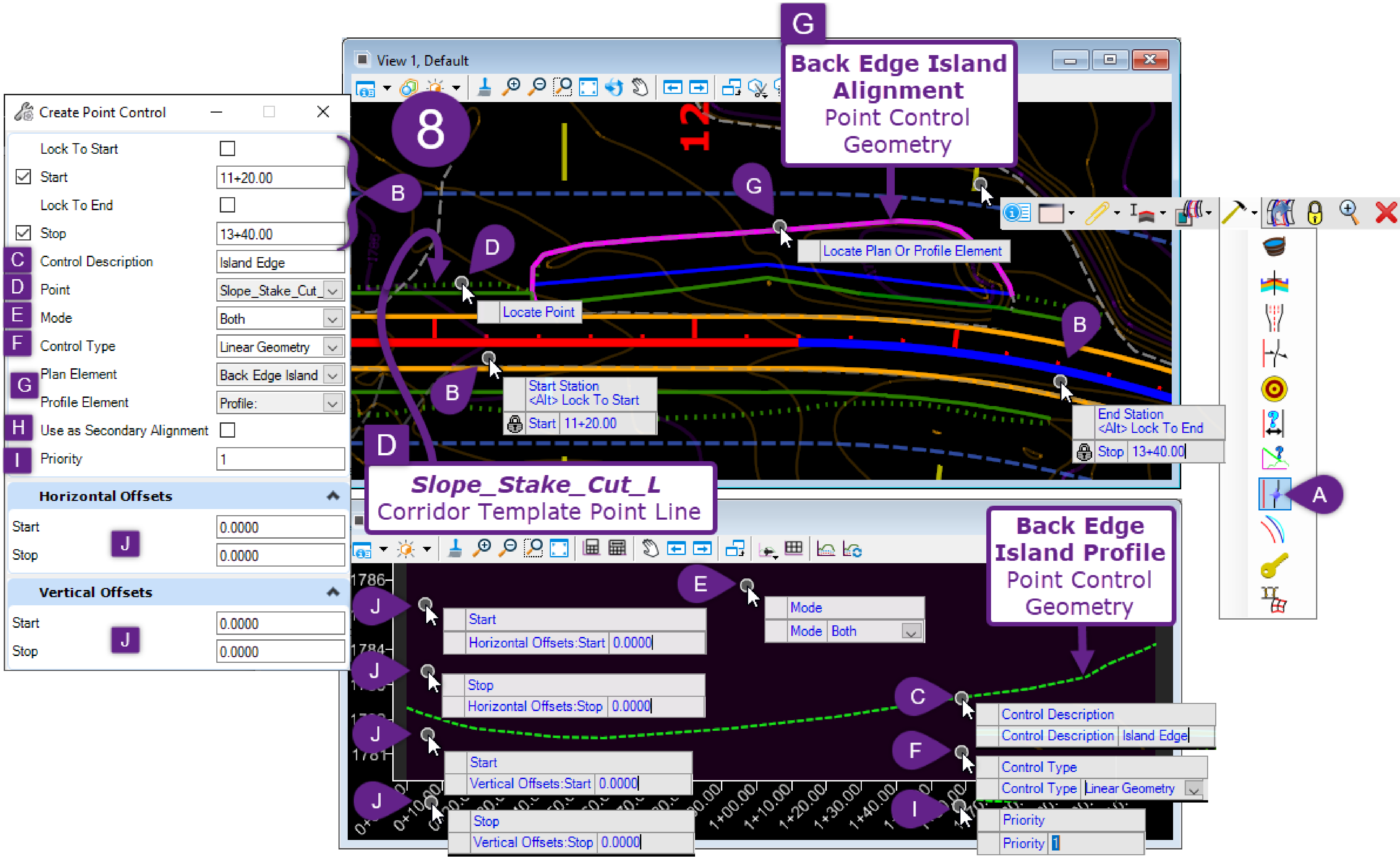


4	Use the *Copy* tool on the existing *Island Perimeter* line to copy it into the active ORD File. ***NOTE:*** The resulting line is an unnamed MicroStation Element with no Feature Definition. A Name and Feature Definition is necessary for an Element to be used as Point Control Geometry.
5	Use the *Break Element* tool with the *Island Perimeter* line to trim it down to the appropriate length for Point Control. *Delete* the excess linework.



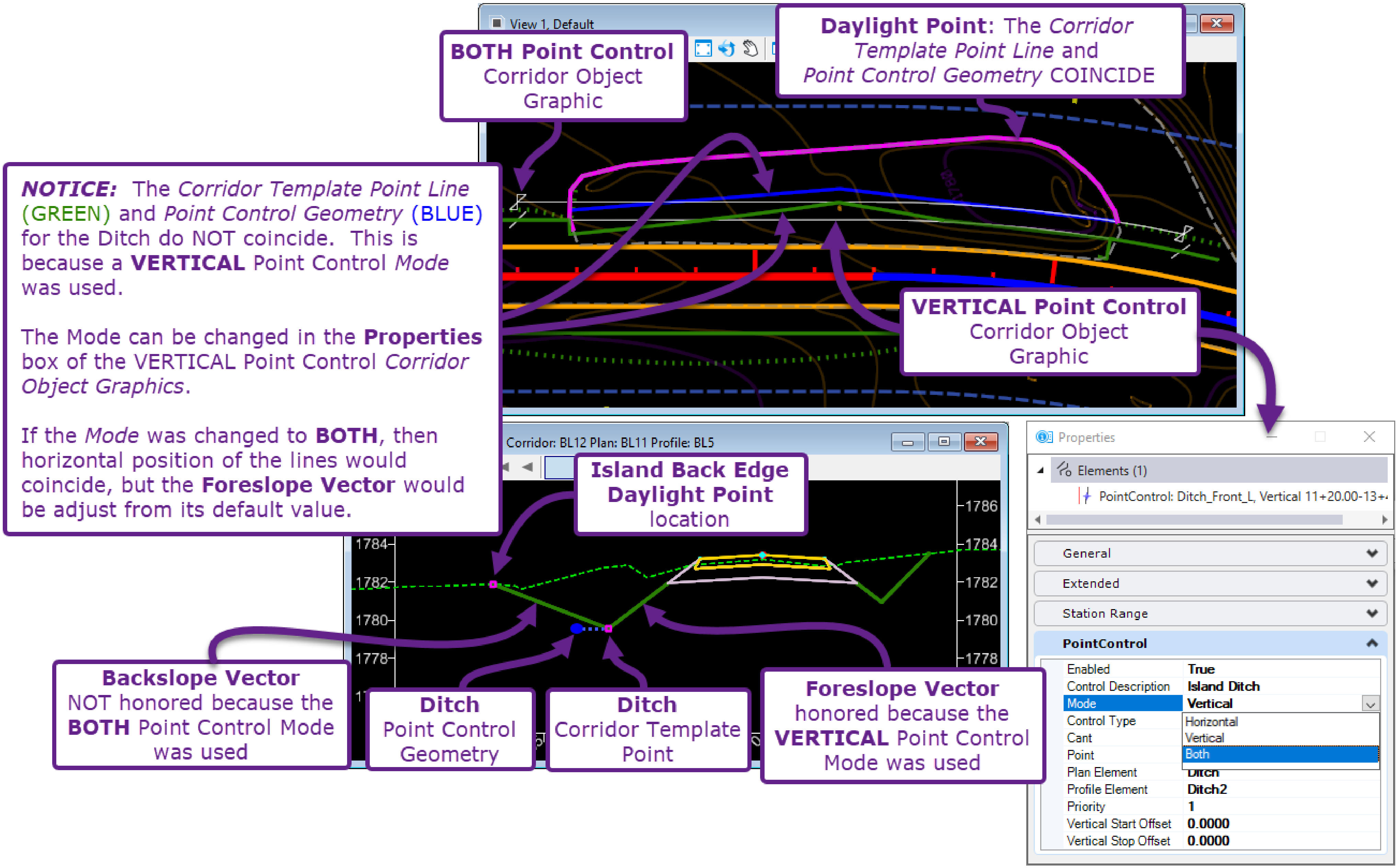
6	Use the *Set Feature Definition* tool to give the Element a Name and Feature Definition. In this case, the Name is set to *Back Edge Island*. The Feature Definition is set to *AUX_01*. **The Point Control Geometry element must be assigned a Feature Definition.**
7	Enter the *Profile Model* for the Back Edge Island element. Assign the Existing Ground profile as the *Active Profile.*

8 **Create the Point Control for the Daylight Point:**



A	**Point Control Creation:** Select the Corridor Handle and summon the Pop-Up Icon Menu. Select the *Create Point Control* tool.
B	*Prompt: Start Station* = 11+20.00 *Prompt: End Station* = 13+40.00 Key-in the *desired* Start and End Station (press the Enter key to Lock) for the Point Control or graphically select the Start and End locations. Left-Click to accept the location and advance to the next prompt.
C	*Prompt: Control Description* – If desired, give the Point Control a description. In this case, the description is "Island Edge".
D	*Prompt: Locate Point* – Graphically select the Corridor Template Point line to be manipulated OR select the Template Point by Name from the *Point* drop-down in the *Dialogue Box.* In this case, the *Slope_Stake_Cut_L* is the desired Template Point*.*
E	*Prompt: Mode* – Use the UP and DOWN arrow keys to select the desired Point Control Mode. See *9G.5.a Point Control - Modes*. Left-Click in the *View* to advance to the next prompt. In this case, the **Both** Mode is used.
F	*Prompt: Control Type* - Use the UP and DOWN arrow keys to select the desired Control Type. See *9G.5.b Point Control – Control Types*. Left-Click in the *View* to advance to the next prompt. In this case, the **Linear Geometry** Control Type is used.
G	*Prompt: Locate Plan or Profile Element* - Graphically select the **Island Back Edge** Point Control Geometry element from the 2D Design Model .
H	*Prompt: Use as Secondary Alignment* - Select NO. A Secondary Alignment would have no effect in this case, because there is no Template Points past the *Slope_Stake_Cut_L* point being used. Left-Click in the *View* to advance to the next prompt.
H	*Prompt: Priority* – Use the default Priority of 1. Left-Click in the *View* to advance to the next prompt.
J	*Prompt: Horizontal Offset Start* = 0.0000 *Prompt: Horizontal Offset End* = 0.0000 *Prompt: Horizontal Offset Start* = 0.0000 *Prompt: Horizontal Offset End* = 0.0000 Use the default values of 0.0000. Left-Click in the *View* to advance to the next prompt.

9G.5.e Results



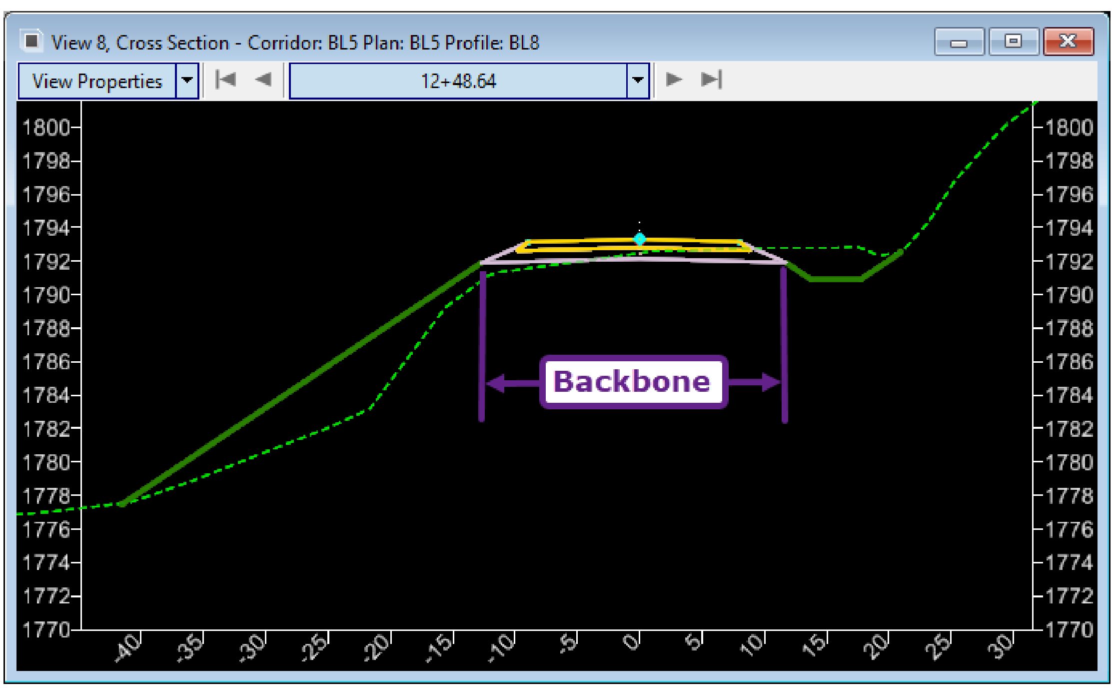
9G.6 End Condition Exception

End Condition Exceptions are used to reconfigure the End Condition Components of a Template, without modifying the Backbone* of the Template. End Condition Exceptions can be used for minor changes to an End Condition. For example, an End Condition Exception can be used to change the steepness of a Fill Slope from 25% to 50% for a set station range. Also, End Condition Exceptions can be used to completely reconfigure an End Condition for a set station range.

There are three types of End Condition Exceptions that can be applied to either the right or left side of the Template:

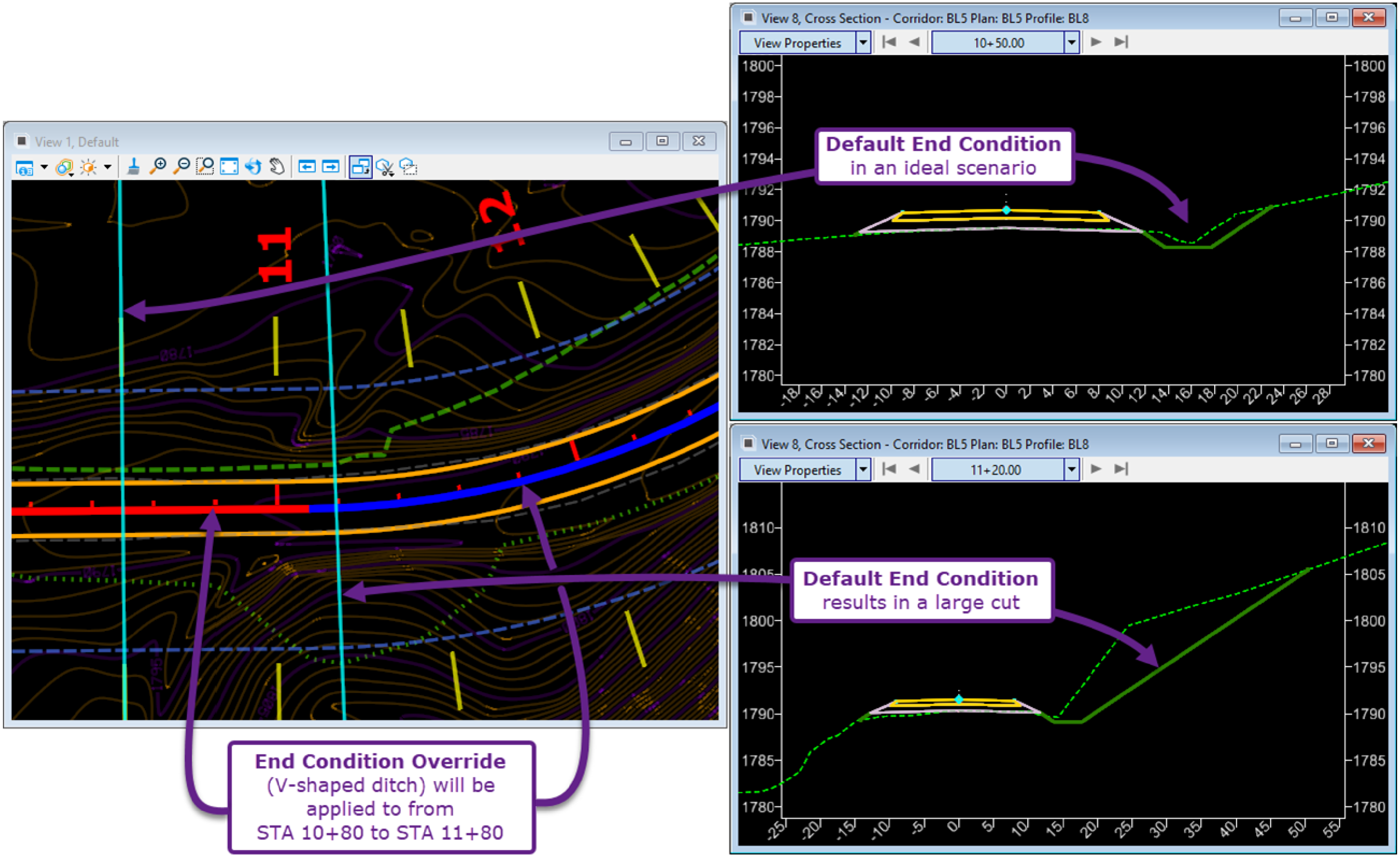
End Condition Exception Type	
Type:	**Description:**
Left Override / Right Override	The default End Condition can be reconfigured or completely recreated for a specified range along the corridor. Override changes to the End Condition can be minor or major in nature.
Left Transition / Right Transition	Used to transition from an End Condition Override (Left or Right) back to the default End Condition or vice-versa. If Transitions are NOT used between the default and overridden End Conditions, then an abrupt change in the Slope Stake Limits line will be present. **IMPORTANT:** Left/Right Transitions are created and operate under the same principles as Template Drop Transitions. See *9E.9 Create a Transition Section between Template Drop Sections*. Both tools use a similar Edit Transition Menu and an Edit Transition Midpoint Menu to facilitate the transition.
Backbone Only (Left) / Backbone Only (Right)	This End Condition Exception type will completely DELETE an End Condition Component for a specified range along the corridor. An example of where this might be used is for a bridge section – where cut/fill earthwork will not be performed.

NOTE*: The *Backbone* refers to all Components EXCEPT for the Cut/Fill End Conditions Components within a Template.

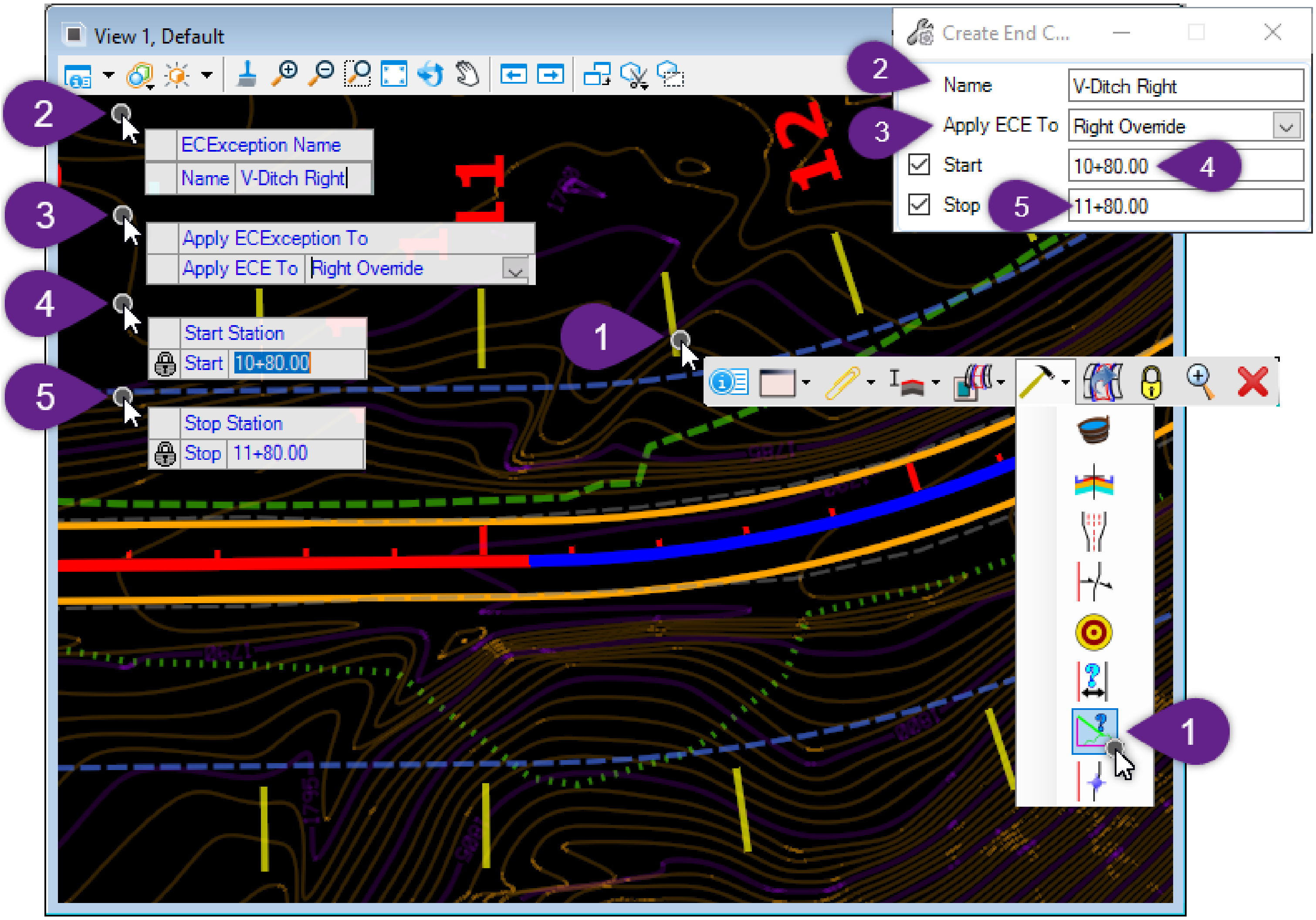


9G.6.a End Condition Exception Override and Transition Workflow

In this workflow, the right End Condition will be Overridden to change the ditch type. The default ditch type (in this case, a trapezoidal flat bottom ditch) will be overridden to a V-shaped ditch from 10+80 to 11+80. For this scenario, the purpose of the End Condition Exception Override is to avoid a large cut into the hillside that results when the default End Condition is used – as shown below.

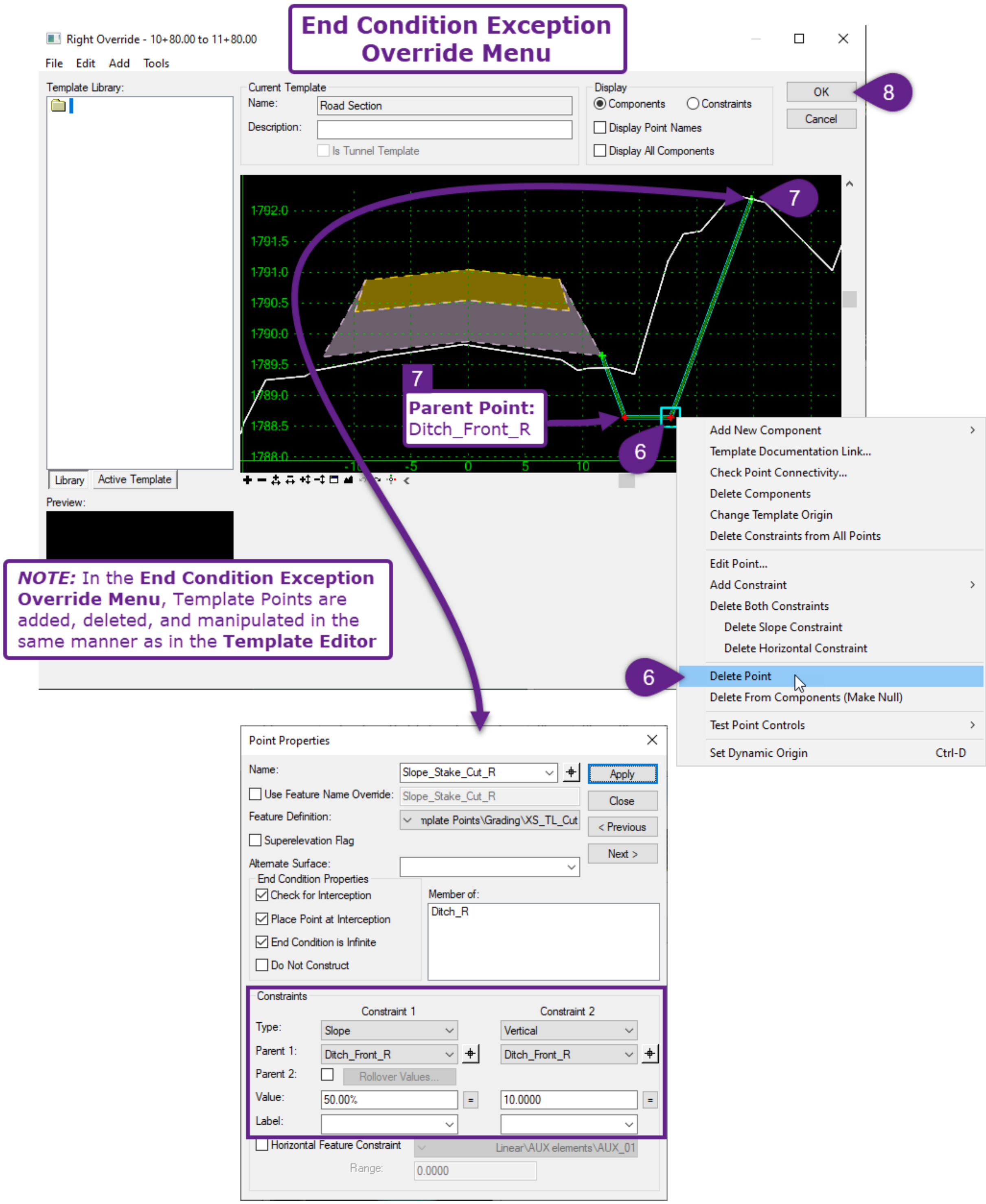


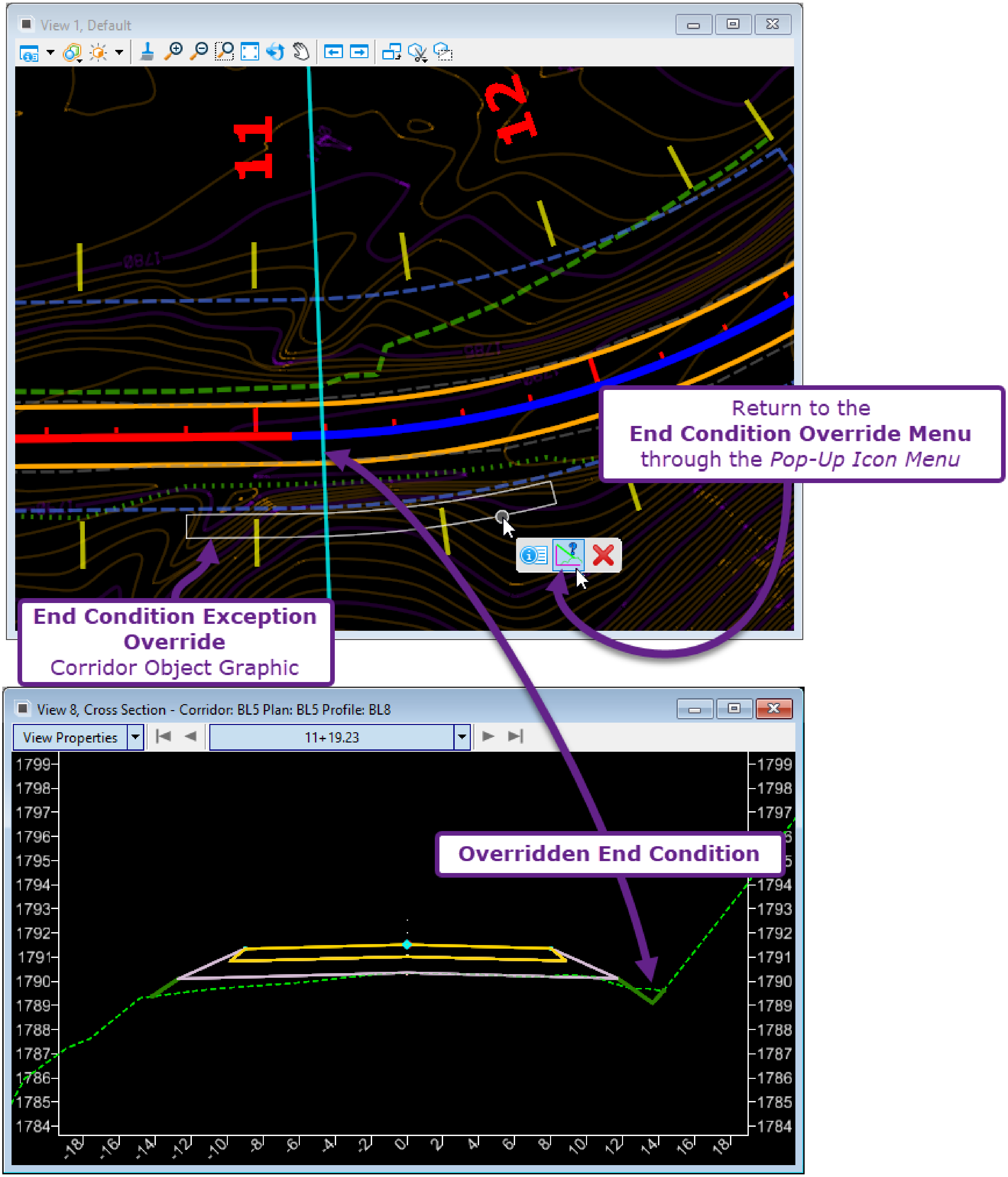
9G.6.a.i End Condition Exception Override:



1	Select the Corridor Handle to summon the Pop-Up Icon Menu. Select the *Create End Condition Exception* icon. →
2	*Prompt: ECException Name* – Assign the End Condition Exception a Name. In this case, the Name assigned is "V-Ditch Right". Left-Click in the *View* to advance to the next *Prompt.*
3	*Prompt: Apply ECException To* – Using the UP and DOWN arrow keys, choose the End Condition Exception Type. In this case, the **Right Override** type is used. Left-Click in the *View* to advance to the next *Prompt.*
4	*Prompt: Start Station* – Key-in the desired Start Station and press the ENTER key to lock. In this case, 10+80 is used. Left-Click in the *View* to advance to the next *Prompt.*
5	*Prompt: End Station* – Key-in the desired End Station and press the ENTER key to lock. In this case, 11+80 is used. Left-Click in the *View* to advance to the next *Prompt.*
6	To create the V-shape, one of the Template Points from the flat bottom part of the ditch must be deleted. In this case, the Template Point on the back-slope is deleted. Right-Click on the ditch back-slope Template Point and select *Delete Point.*

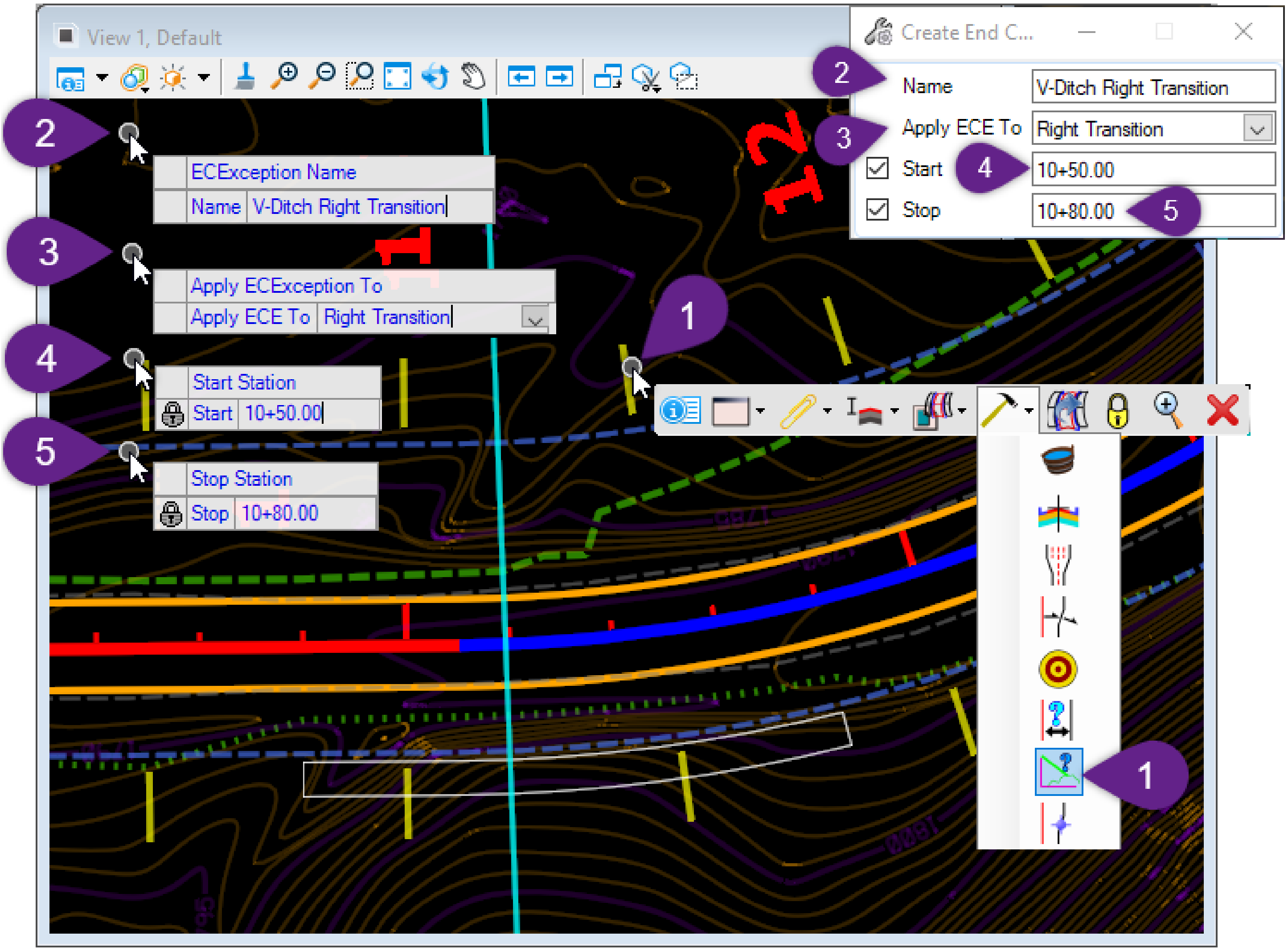
7	The End Condition interception point is UNCONSTRAINED. Assign Constraints to the Interception Point to define the V-shaped ditch geometry. The **Slope Value** is set to 50% relative to the *Ditch_Front_R* (Parent 1) point. The **Vertical Value** is set to 10.0000 relative *Ditch_Front_R* (Parent 1) point. ***NOTE:*** Since the *End Condition is Infinite* box is checked, the **Vertical Value** is inconsequential. The End Condition interception point will extend infinitely to intercept the Existing Ground Terrain Model.
8	Left-Click on *OK* to complete the End Condition Exception command.



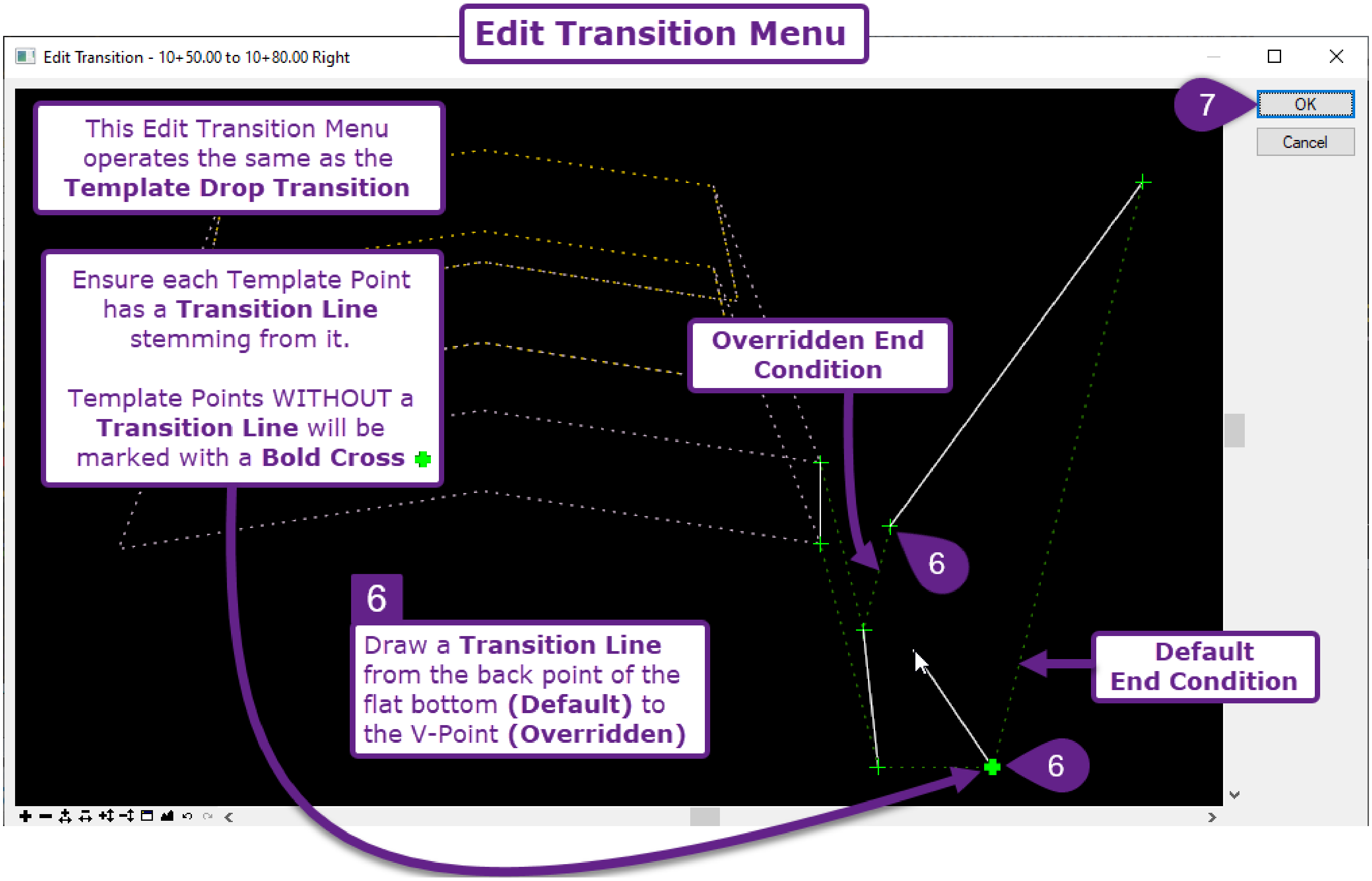

View 1, Default
11
12
Return to the
End Condition Override Menu
through the Pop-Up Icon Menu
End Condition Exception
Override
Corridor Object Graphic
View 8, Cross Section - Corridor: BL5 Plan: BL5 Profile: BL8
View Properties
11+19.23
Overridden End Condition
1799
1798
1797
1796
1795
1794
1793
1792
1791
1790
1789
1788
1787
1786
1785
1784
-18 -16 -14 -12 -10 -8 -6 -4 -2 0 2 4 6 8 10 12 14 16 18

9G.6.a.ii End Condition Exception Transition

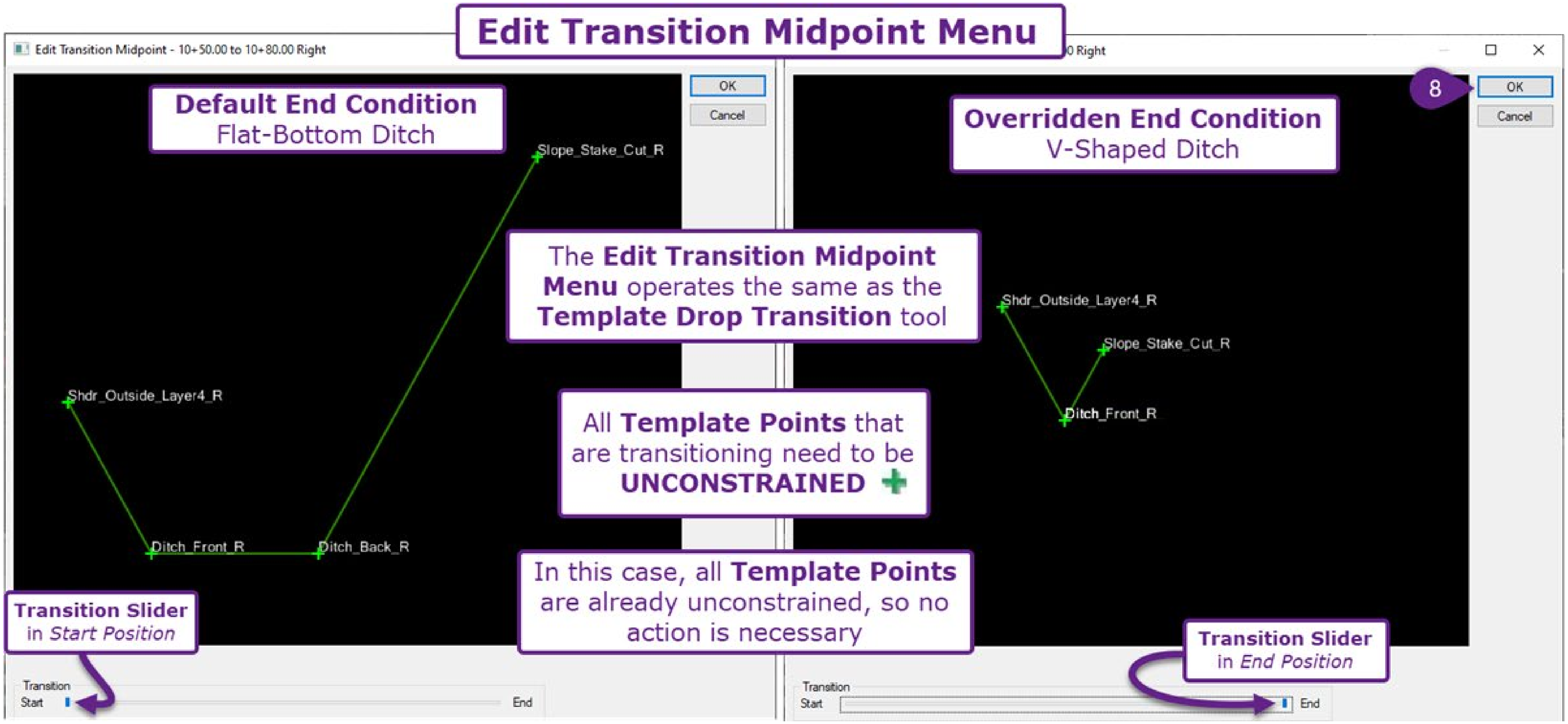
In this workflow, the **Transition** type of End Condition Exception is demonstrated.



1	Select the Corridor Handle to summon the Pop-Up Icon Menu. Select the *Create End Condition Exception* icon. →
2	*Prompt: ECException Name* – Assign the End Condition Exception a Name. In this case, the Name assigned is "V-Ditch Right Transition". Left-Click in the *View* to advance to the next *Prompt.*
3	*Prompt: Apply ECException To* – Using the UP and DOWN arrow keys, choose the End Condition Exception Type. In this case, the type to be used is the *Right Transition*. Left-Click in the *View* to advance to the next *Prompt.*
4	*Prompt: Start Station* – Key-in the desired Start Station and press the ENTER key to lock. In this case, 10+50 is used. Left-Click in the *View* to advance to the next *Prompt.*
5	*Prompt: End Station* – Key-in the desired End Station and press the ENTER key to lock. In this case, 10+80 is used. Left-Click in the *View* to advance to the next *Prompt.*



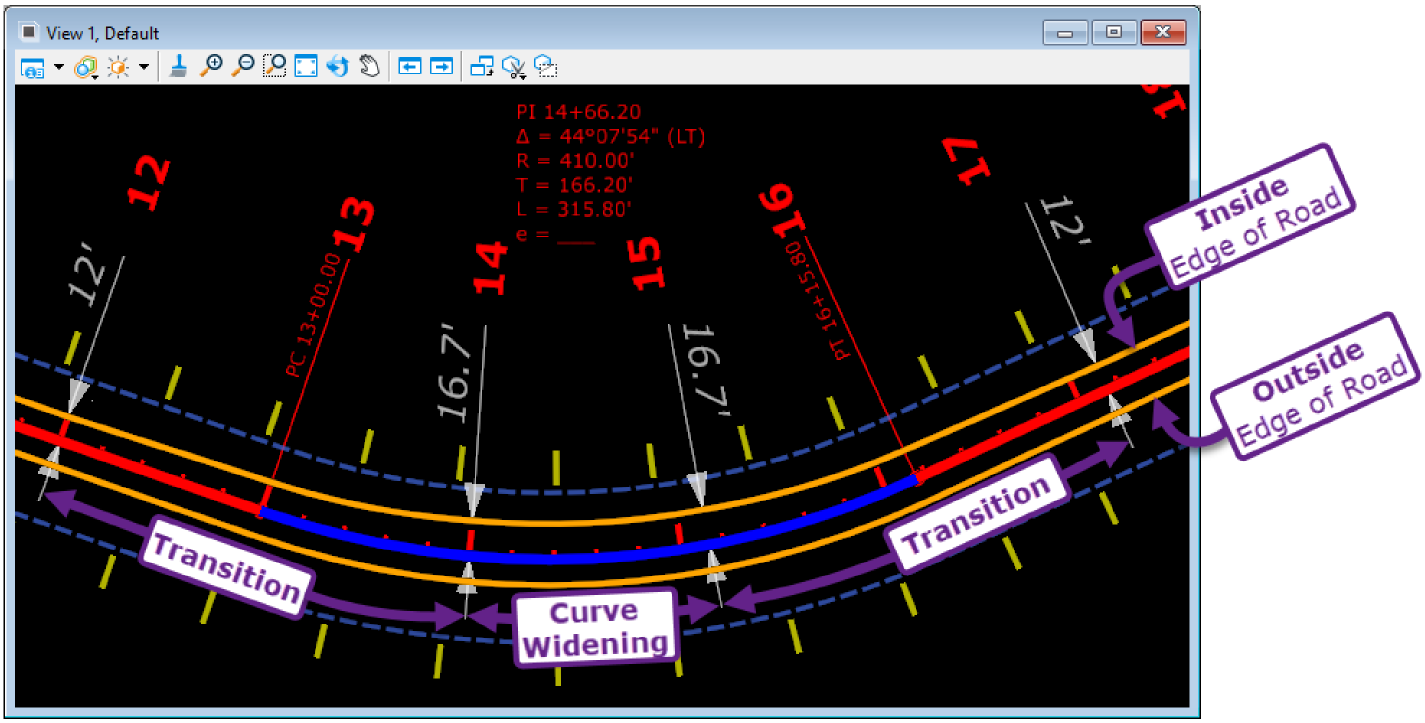
6	Draw a *Transition Line* from the back point of the flat bottom (Default) to the V-point (Overridden). Left-Click on the Template Points shown above to draw the *Transition Line.* **NOTE:** For more information on the Edit Transition Menu, see *9E.9.a Edit Transition Menu*.
7	When each Template Point has at least one *Transition Line*, select OK.
8	See the next page for graphic. Ensure that all Template Points that need to transition are UNCONSTRAINED. In this case, all Template Points are already unconstrained, so no action is necessary. Use the *Transition Slider* to preview the transition. If the transition looks appropriate, select OK. **NOTE:** For more information on the Edit Transition Midpoint Menu, see *9E.9.b Edit Transition Midpoint Menu*.



Edit Transition Midpoint Menu
Edit Transition Midpoint - 10+50.00 to 10+80.00 Right
OK
Cancel
Default End Condition
Flat-Bottom Ditch
Slope_Stake_Cut_R
Shdr_Outside_Layer4_R
Ditch_Front_R
Ditch_Back_R
Transition Slider
in Start Position
Transition
Start
End
The Edit Transition Midpoint Menu operates the same as the Template Drop Transition tool
All Template Points that are transitioning need to be UNCONSTRAINED
In this case, all Template Points are already unconstrained, so no action is necessary
0 Right
8
OK
Cancel
Overridden End Condition
V-Shaped Ditch
Shdr_Outside_Layer4_R
Slope_Stake_Cut_R
Ditch_Front_R
Transition Slider
in End Position
Transition
Start
End

9G.7 Curve Widening

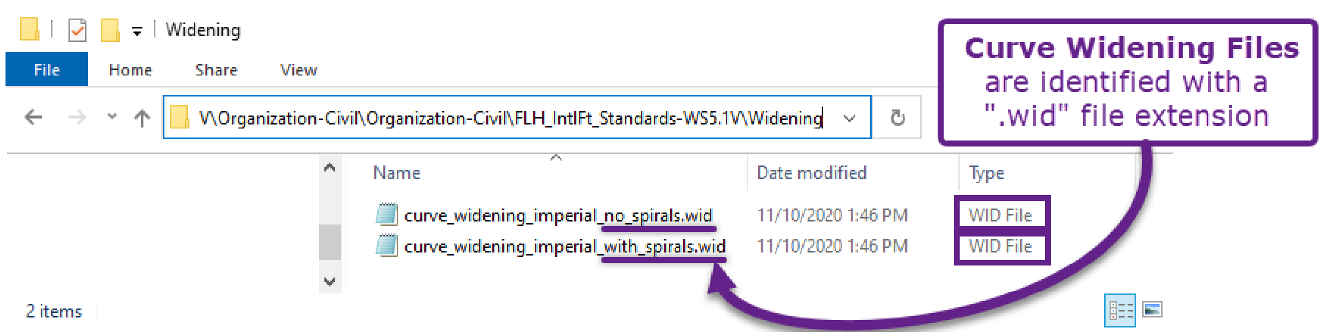
The Curve Widening tool is an automated form of Point Control used to widen an edge of the road around curves. The Curve Widening tool references the curve radius and relates it to a Curve Widening table, which must be created for by the User. The Curve Widening table automatically returns the appropriate curve widening value. Also, transitions sections are created to transition from the typical lane width to the full Curve Widening width.



The Curve Widening tool works in conjunction with an external text file which contains a ".wid" file extension type and is referred to as the Curve Widening File. The Curve Widening File contains a simple Curve Widening Table which determines the additional width to be added to a curve and the length needed for transitions.

Curve Widening Files are in the FLH WorkSpace folder in the following location:
C:\OpenRoads Designer CE 10.10\Configuration\Organization-Civil\FLH_Stds-WS10.10.21.00V\Widening

Currently there are two Curve Widening Files in the FLH Workspace – a file for Simple Curves (No Spirals) and a file for Spiral Curves. These files are templates that need to be edited to fit project curve widening requirements. Curve widening values are derived from Design Speed, Design Vehicle, Lane Width, Number of Lanes, and whether Simple/Spiral Curves are used.

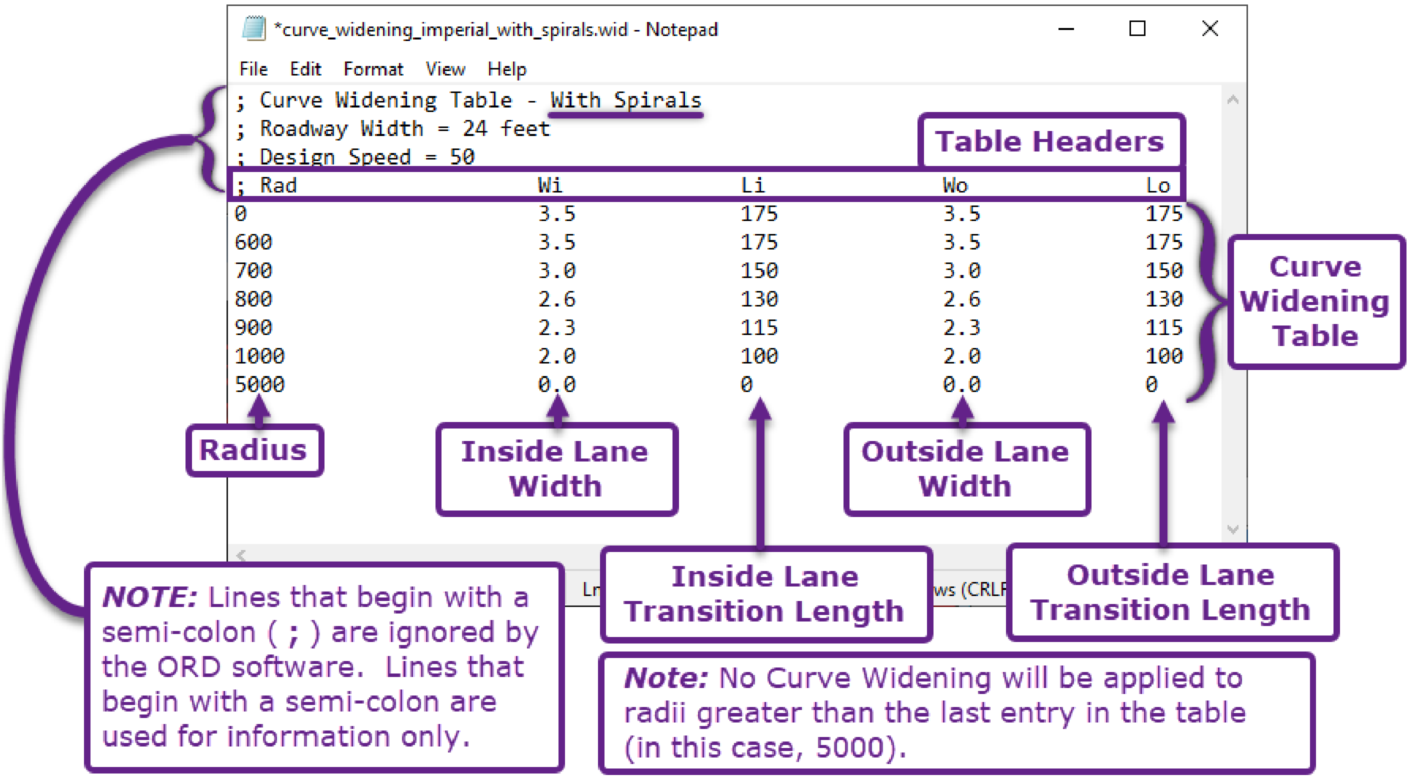


WARNING: **Do NOT directly edit or use the Curve Widening Files stored on the FLH WorkSpace.** Instead, copy the appropriate Curve Widening File from the FLH WorkSpace to appropriate project file folder.

9G.7.a Modifying the Curve Widening File for Project Requirements

Before making modifications, copy the appropriate Curve Widening File (i.e., "…_with_spirals.wid" or "…no_spirals.wid") from the FLH Workspace and place it in the appropriate project file folder. See the ***WARNING*** on the previous page.

To make edits to the Curve Widenign File, open it with the *Notepad* software.

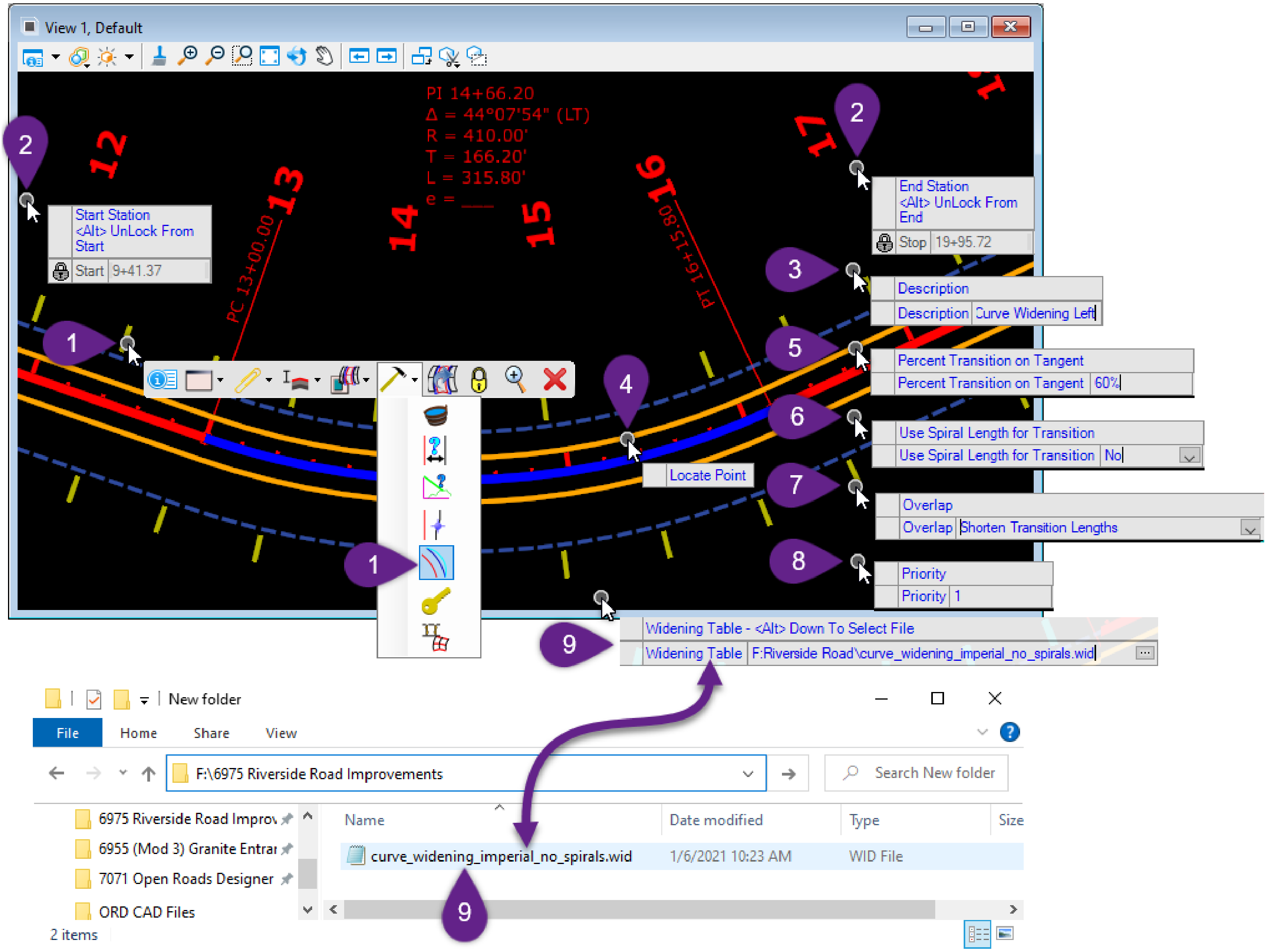


How the Table Works: The **Radius** value of a curve (Rad) is inputted to the Curve Widening table and values for Wi, Li, Wo, and Lo are returned and used to widen and transition the curve accordingly.

> **Radius (Rad) –** The Radius value of the Curve.
> **Inside Lane Width (Wi) –** The curve widening width that will be *added* to the default inside lane.
> **Inside Lane Transition Length (Li) –** The length along the alignment to transition from the default INSIDE lane width to the fully curve widened width.
> **Outside Lane Width (Wo) –** The curve widening width that will be *added* to the outside lane.
> **Outside Lane Transition Length (Lo) -** The length along the alignment to transition from the default inside lane width to the fully curve widened width.
>
> ***WARNING:*** In conventional highway design, a *simple* curve is widened only for the *inside* edge of road. *Spiral* curves are generally widened on both the inside and outside edge. **For simple curves (no spirals), the "Wo" and "Lo" columns should have a value of 0.0 for all entries.** This ensures that curve widening does NOT take place on the outside edge of road.
>
> ***NOTE:*** For Radii value that fall between rows, Return Values (Wi, Li, Wo, and Lo) are not interpret. For example, if a radius of 750' was inputted in to the table shown above, then the return values would be Wi=3.0, Li=150, Wo=3.0, and Lo=150. These values correspond to a 700' radius in the table above.

Before using the *Curve Widening* tool in the ORD software, ensure the Curve Widening Table values are adjusted for Project requirements. Curve Widening values can be found in the AASHTO Green Book.

9G.7.b Curve Widening - Workflow



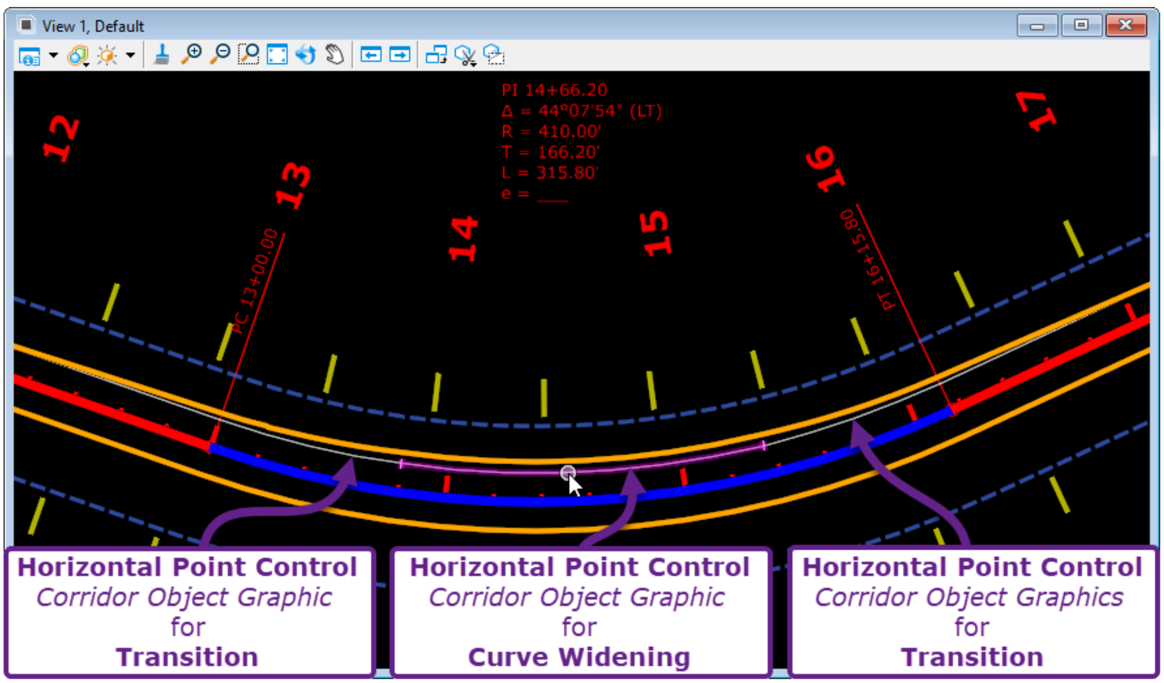
1	Select the Corridor Handle and summon the Pop-Up Icon Menu. Select the *Create Curve Widening* tool. →
2	*Prompt: Start Station <ALT> Lock To Start* = 9+41.37 (Locked to Start) *Prompt: End Station <ALT> Lock To End* = 14+46.91 (Locked to End) ***NOTE:*** Curve Widening is only applied if the Curve is completely enveloped within the Station range. In this case, the intention is to apply the Curve Widening to every qualifying Curve in the corridor. This is accomplished by locking the Station range to the Start and End of the alignment. ***TIP:*** If an alignment contains a mixture of simple and spiral curves, it may be necessary to apply separate Curve Widening Tables to the different curve types. In that case, the Curve Widening tool would be used as many times as necessary to isolate station ranges that contain simple curves and station ranges that contain spiral curves.

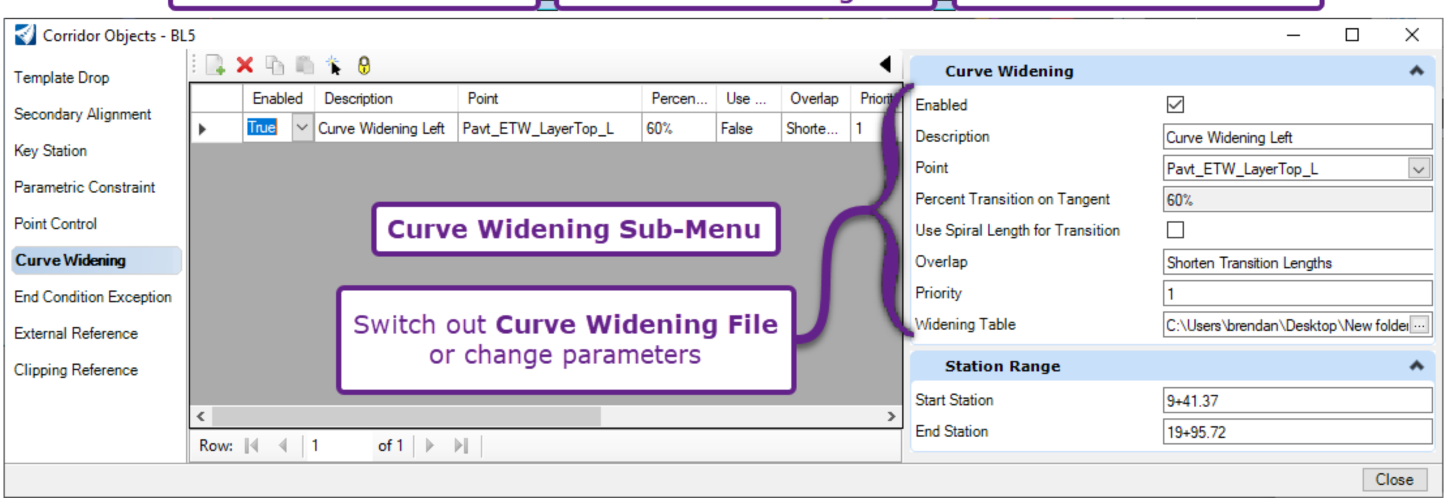
3	*Prompt: Control Description* – Provide a description for the type of Curve Widening to be used. The description will be viewable in the Point Control Sub-Menu within the Corridor Objects Menu.
4	*Prompt: Locate Point* – Either graphically select the Corridor Template Point line that the Curve Widening will be applied to OR select the Template Point by Name from the *Point* drop-down in the *Dialogue Box.* In this case, the *Pavt_ETW_LayerTop_L* is the desired Template Point*.* ***NOTE:*** Since only one Corridor Template Point can be selected per usage, the Curve Widening tool must be used twice. The Curve Widening tool must be used for both the left side of the road and ride side of the road.
5	*Prompt: Percent Transition on Tangent* – Specify the location for the transitions. In this case 66.66% is used If 100% is used, then the entire transition takes place on the tangent. For example, for the entry transition, the Lane would be at full curve widening width at the PC of the curve. If 0% is used, then the entire transition takes place within the curve. The transition would start at the PC of the curve. If 50% is used, half of the transition to full curve widening width would be on the tangent and the other half would occur along the curve. ***TIP:*** In conventional highway design, typically the transitions for superelevation and curve widening begin at the same station location.
6	*Prompt: Use Spiral Length for Transition* – This prompt is only consequential if the alignment contains spirals. If YES is used and the alignment contains spirals, then the transition will begin at the Tangent/Spiral point and end at the Spiral/Curve point. The *Percent Transition on Tangent* value (specified in the last step) and Transition Lengths found in the Curve Widening File is ignored. If NO is used and the alignment contains spirals, then the *Percent Transition on Tangent* value and Transition Lengths from the Curve Widening File are used and applied relative to the Spiral/Curve point.
7	*Prompt: Overlap* – This prompt is only consequential if the alignment contains curves in close proximity – such that transition lengths would overlap. *Shift Maximum Widening Points onto Curve* – The transition lengths for the overlapping curves are NOT altered from the values found in the Curve Widening File. The overlapping transition are shifted in the direction of their respective curves – such that they do not overlap. In this case, the *Percent Transition on Tangent* value specified in Step 5 is ignored. *Shorten Transition Lengths* - The transition lengths for the overlapping curves are altered and shortened as necessary so they do NOT overlap. The Transition Length values found in the Curve Widening File are ignored but the *Percent Transition on Tangent* value specified in Step 5 is ignored.

8	*Prompt: Priority* – The *Priority* is only consequential if the curve widening Template Point (in this case, *Pavt_ETW_LayerTop_L)* is also assigned to a different Point Control in the vicinity of a curve. For example, if there is a road turnout near a curve, then the edge of road Template Point CANNOT follow the road turnout Point Control Geometry AND simultaneously widen. The Point Control Geometry element with the numerically lower *Priority* value will be targeted first.
9	*Prompt: Widening Table - <Alt> Down To Select File* – Simultaneously press the ALT and DOWN ARROW key to summon a File Explorer window. Navigate to the Project Folder and select the project Curve Widening File.

Results: The Curve Widening tool is an automated form of Point Control. There are three *Horizontal Point Controls* are created per curve. A *Point Control* for the full Curve Widening section and a *Point Controls* for each of the Transition sections. The individual Point Controls are shown in the *Point Control Sub-Menu* (found in the Corridor Objects menu) but CANNOT be edited or manipulated – except for the Station Range.

The parameters and Curve Widening File in the Curve Widening tool preliminary usage can be viewed and changed in the *Curve Widening Sub-Menu*.



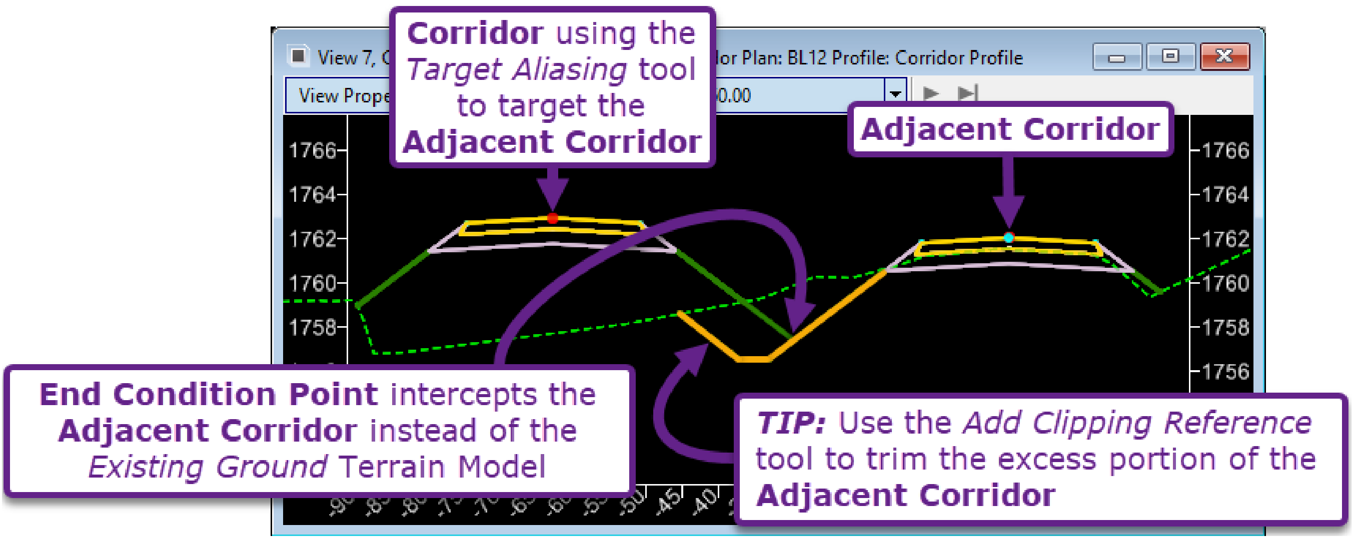


9G.8 Target Aliasing

By default, End Condition Points will ONLY intercept the *Target Type* listed in the End Condition Component Properties, which is typically set to the *active* Terrain Model*.* See *8D.7.a End Condition Target Types*. The *Target Aliasing* tool is used to specify MULTIPLE Targets for the Corridor End Conditions to seek out. The *Target Aliasing* tool can be used to specify a combination of the following Target Types:

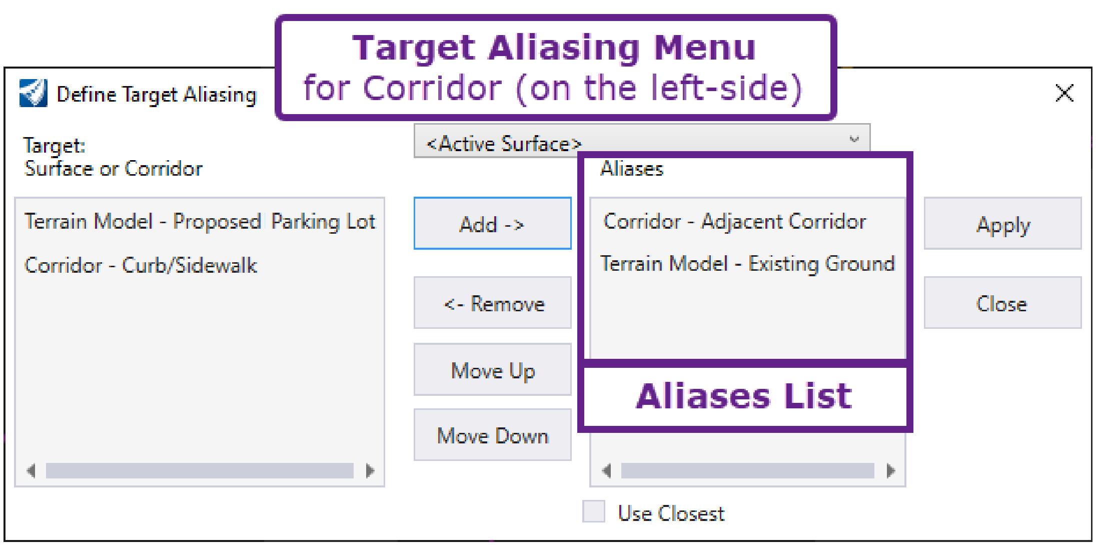
- **Corridors, Linear Template Models, and Surface Templates**
- Additional Terrain Models
- ORD Elements/Profiles (See *8D.7.a.i Target and ORD Element with End Conditions – Workflow*)

A very useful feature of the *Target Aliasing* tool is the ability to target an adjacent Corridor model – which is not possible through conventional End Condition Components. In the graphic below, the Target Aliasing tool is used with Corridor (on the left-side) to target and intercept the Adjacent Corridor model.



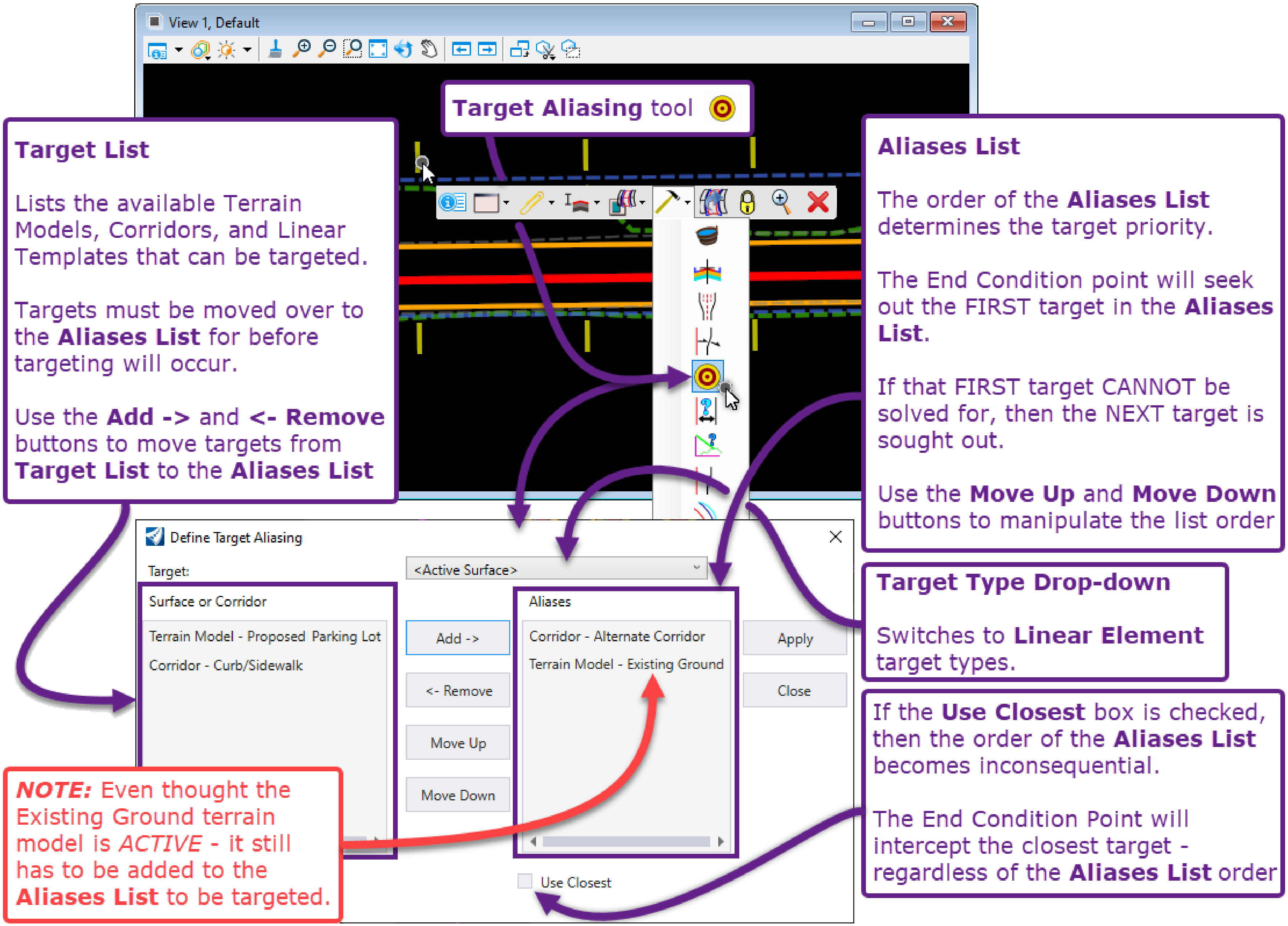
The *Target Aliasing Menu* is used to specify and prioritize Targets that a Corridor will attempt to intercept. When it is possible to solve for more than one target, then the order of the Aliases List (found in the Target Aliasing Menu) determines which target is used.

In the example shown above, the Existing Ground Terrain Model and Adjacent Corridor are both specified as targets – but the Adjacent Corridor has priority because it is further up in the Aliases List. If possible, the Corridor will solve for and intercept the Adjacent Corridor. If the Corridor CANNOT solve the Adjacent Corridor, then the Existing Ground Terrain Model will be used. The order of Targets in the **Aliases List** determines the which Target is solved if it's possible to solve for multiple targets.



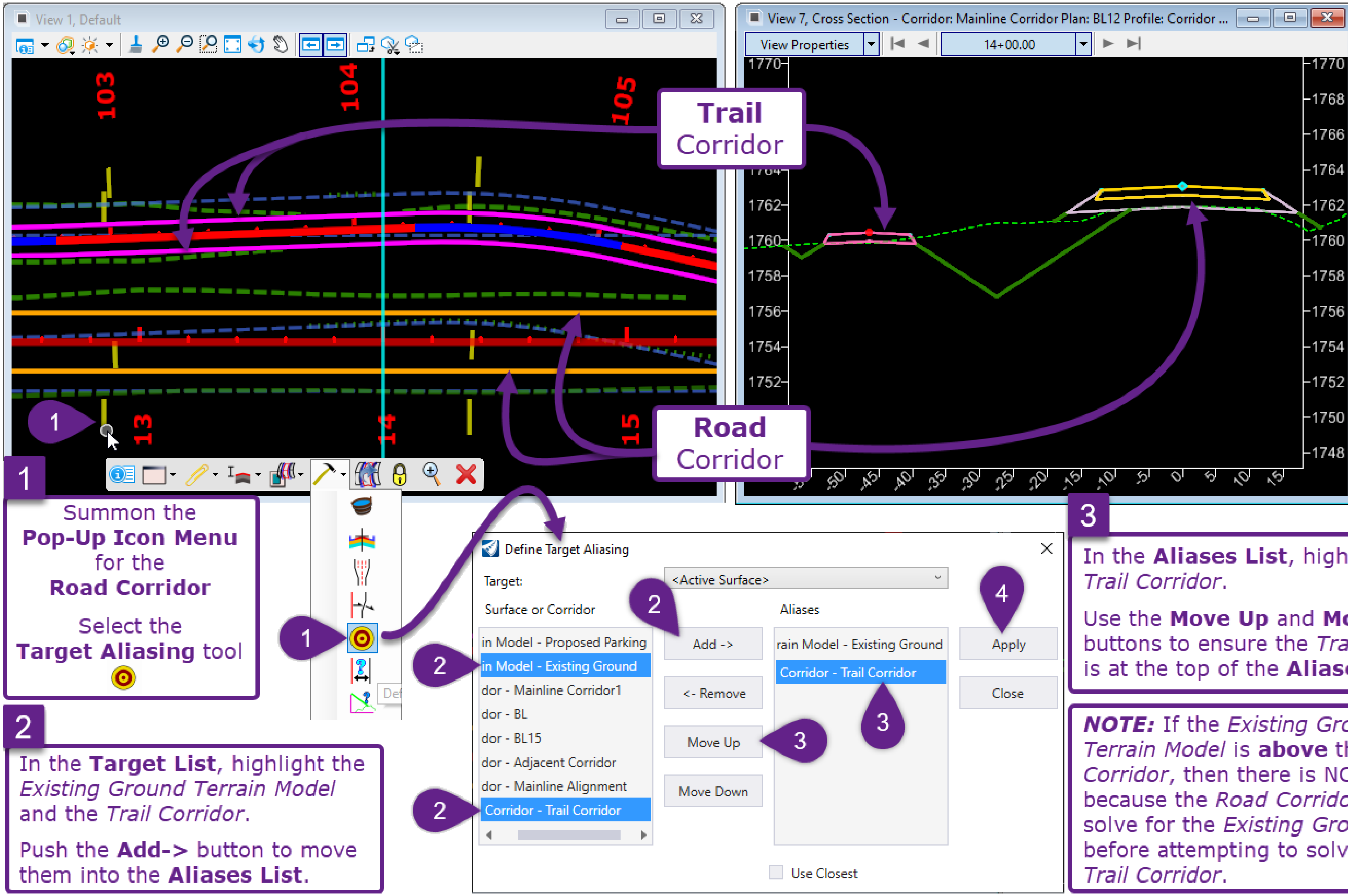
9G.8.a Target Aliasing Menu

The *Target Aliasing Menu* is used to choose and prioritize End Condition Targets. The Target Aliasing Menu is accessed through the Pop-Up Icon Menu of the Corridor Handle.



9G.8.b Target Aliasing and Add Corridor Clipping Reference - Workflow

In this workflow, the *Target Aliasing* tool will be used with the **Road Corridor** to target and intercept upon the **Trail Corridor.** The excess portion of the **Trail Corridor** will then be clipped with the *Add Corridor Clipping Reference* tool. See *9G. 10 Corridor Clipping Refences*.



1

Summon the **Pop-Up Icon Menu** for the **Road Corridor**

Select the **Target Aliasing** tool

2

In the **Target List**, highlight the *Existing Ground Terrain Model* and the *Trail Corridor*.

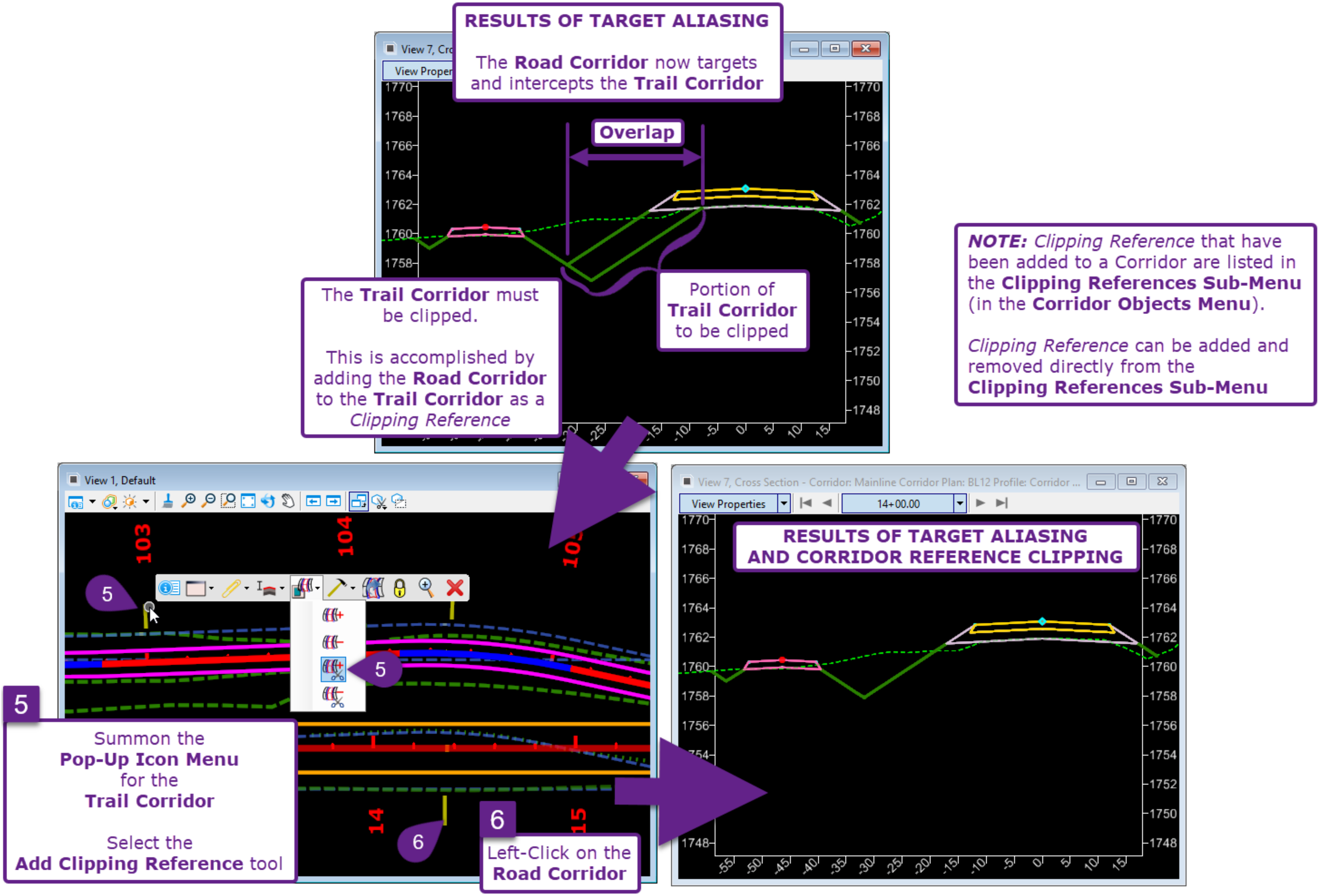
Push the **Add->** button to move them into the **Aliases List**.

3

In the **Aliases List**, highlight the *Trail Corridor*.

Use the **Move Up** and **Move Down** buttons to ensure the *Trail Corridor* is at the top of the **Aliases List**.

NOTE: If the *Existing Ground Terrain Model* is **above** the *Trail Corridor*, then there is NO EFFECT because the *Road Corridor* will solve for the *Existing Ground* before attempting to solve for the *Trail Corridor*.


RESULTS OF TARGET ALIASING
The Road Corridor now targets and intercepts the Trail Corridor
Overlap
The Trail Corridor must be clipped.
This is accomplished by adding the Road Corridor to the Trail Corridor as a Clipping Reference
Portion of Trail Corridor to be clipped
NOTE: Clipping Reference that have been added to a Corridor are listed in the Clipping References Sub-Menu (in the Corridor Objects Menu).
Clipping Reference can be added and removed directly from the Clipping References Sub-Menu
View 1, Default
5
Summon the Pop-Up Icon Menu for the Trail Corridor
Select the Add Clipping Reference tool
6
Left-Click on the Road Corridor
View 7, Cross Section - Corridor: Mainline Corridor Plan: BL12 Profile: Corridor ...
View Properties
14+00.00
RESULTS OF TARGET ALIASING AND CORRIDOR REFERENCE CLIPPING

9G.9 Corridor References

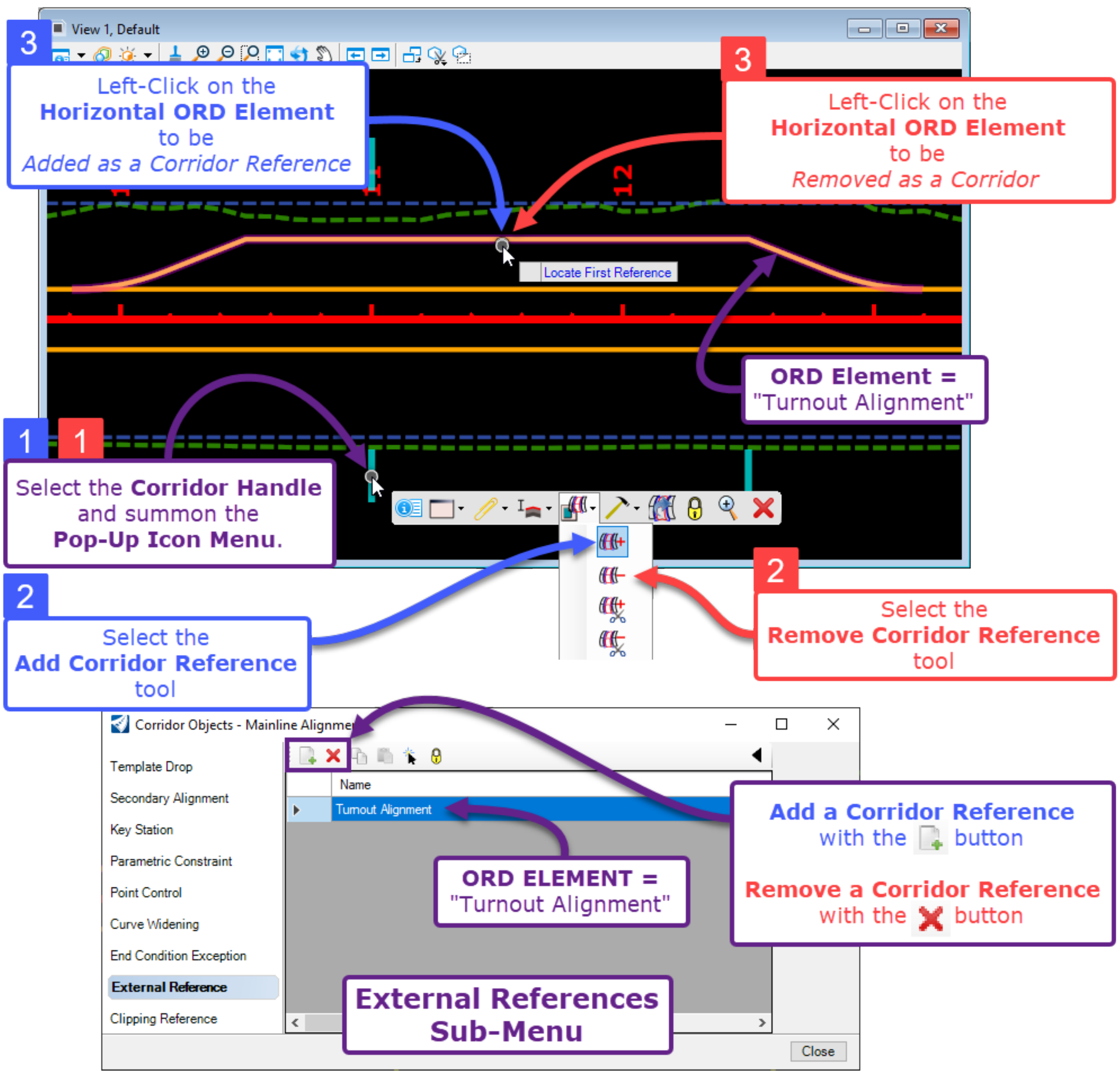
The *Add* and *Remove Corridor References* tools work in conjunction with the *Horizontal Feature Constraint* tool found in the Template Point Properties. When an ORD Element is added as a *Corridor Reference*, then the element is eligible for use with *Horizontal Feature Constraints*. See *8C.6.a.xiv Horizontal Feature Constraint*.

IMPORTANT: If a Horizontal ORD Element is NOT *Added as a Corridor Reference*, then the *Horizontal Feature Constraint* functionality will NOT work.

Horizontal Feature Constraints and Corridor References are most commonly used with Templates that contain Display Rules. See *11A.5.c Use a Template containing Display Rules to Address Overlap*.

To Add or Remove a Corridor Reference:

NOTE: After a Corridor Reference has been added, it will be listed in the External Reference Sub-Menu (found in the Corridor Objects Menu).



9G.10 Corridor Clipping References

The *Add* and *Remove Clipping References* tools are used to trim out unwanted portions of a Corridor model. The *Add Clipping References* tool is used when the Corridor overlaps with a different modeling feature; such as a Corridor, Linear Template, or Surface Template. See *9G.8.b Target Aliasing and Add Corridor Clipping – Workflow*.

Additionally, the User can create a custom clipping shape by creating an enclosed SmartLine and converting it to a *Complex Shape*. This technique is shown in *9G10.a Corridor Clipping References – Workflow* to clip a skewed bridge from a Corridor.

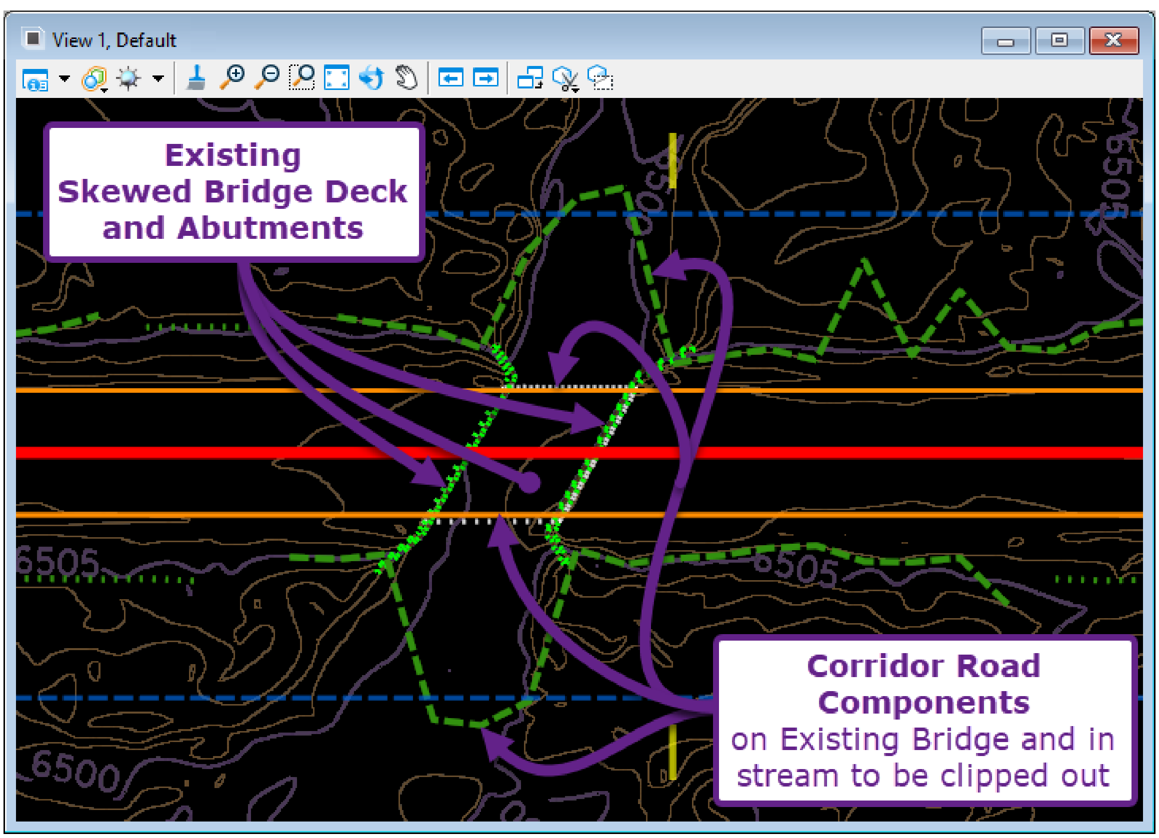
WARNING: Excessive use of *Corridor Clipping References* may significantly increase Corridor processing times; or in some cases, corrupt a Corridor model and/or Corridor File (_cor.dgn). For the current version of the software, Bentley intends that a Corridor Model is clipped no more than 4-5 times.

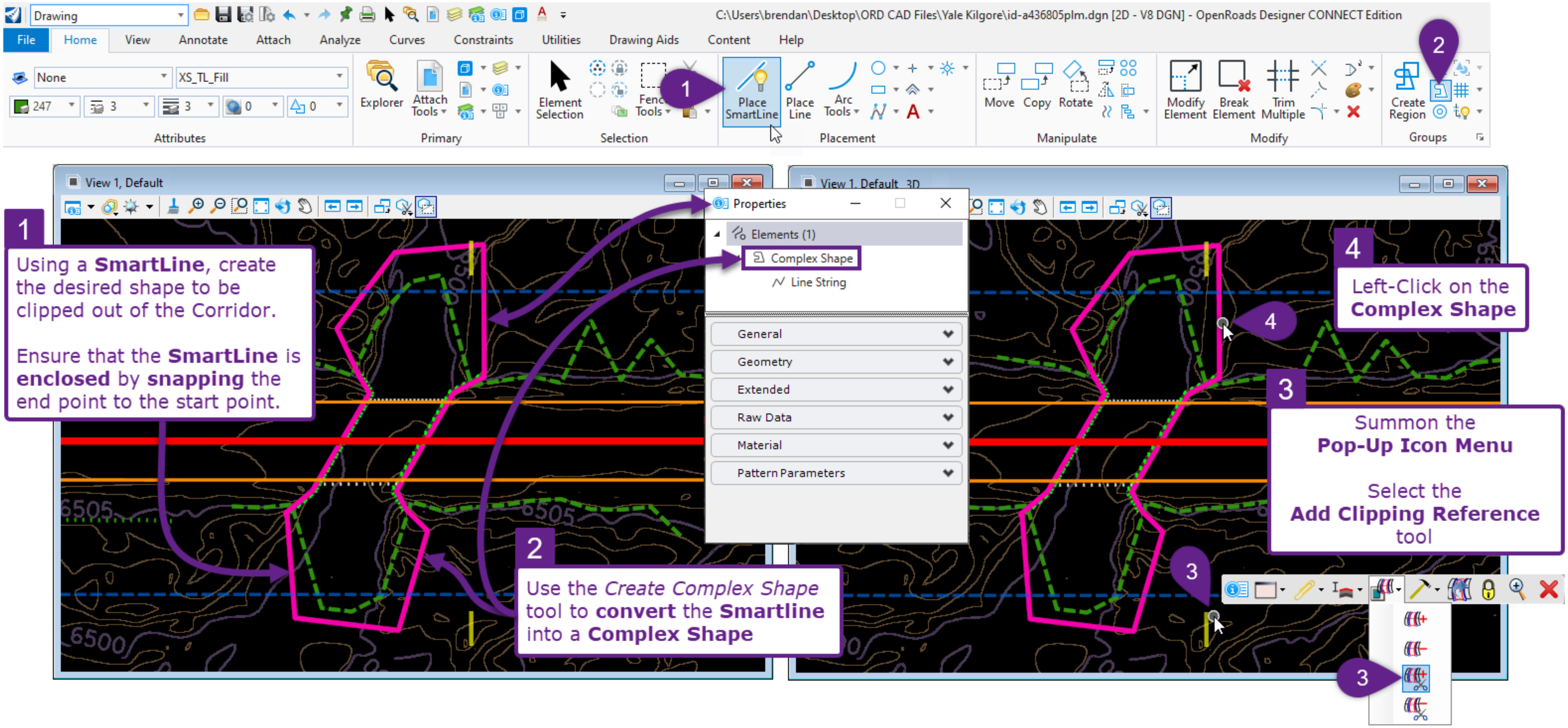
WARNING: After the *Add Corridor Clipping Reference* tool is used, Corridor Complex Elements shown in the 2D Design Model are NOT visually clipped. Corridor Complex Elements appear unchanged, even with a successful usage of the *Corridor Clipping References* tool. ONLY *3D Linear Elements*, created in the 3D Design Model, are shown as "clipped". See *9G.10.b Displaying Corridor Clipping References – WARNING*. The difference between Corridor Complex Elements and 3D Linear Elements is discussed in *9C.3 2D Complex Elements vs 3D Linear Elements*

It is NOT recommended the Corridor Clipping is used to clip out a portion of the Corridor to accommodate an approach road, intersection, or driveway. Instead, use a Template with Display Rules that removes the End Condition Components in the vicinity of the approach, intersection, or driveway. See *11A.5.c Use a Template containing Display Rules to Address Overlap*.

9G.10.a Corridor Clipping References - Workflow

In this example, custom clipping shape is used to clip a skewed bridge out of the Road Corridor.



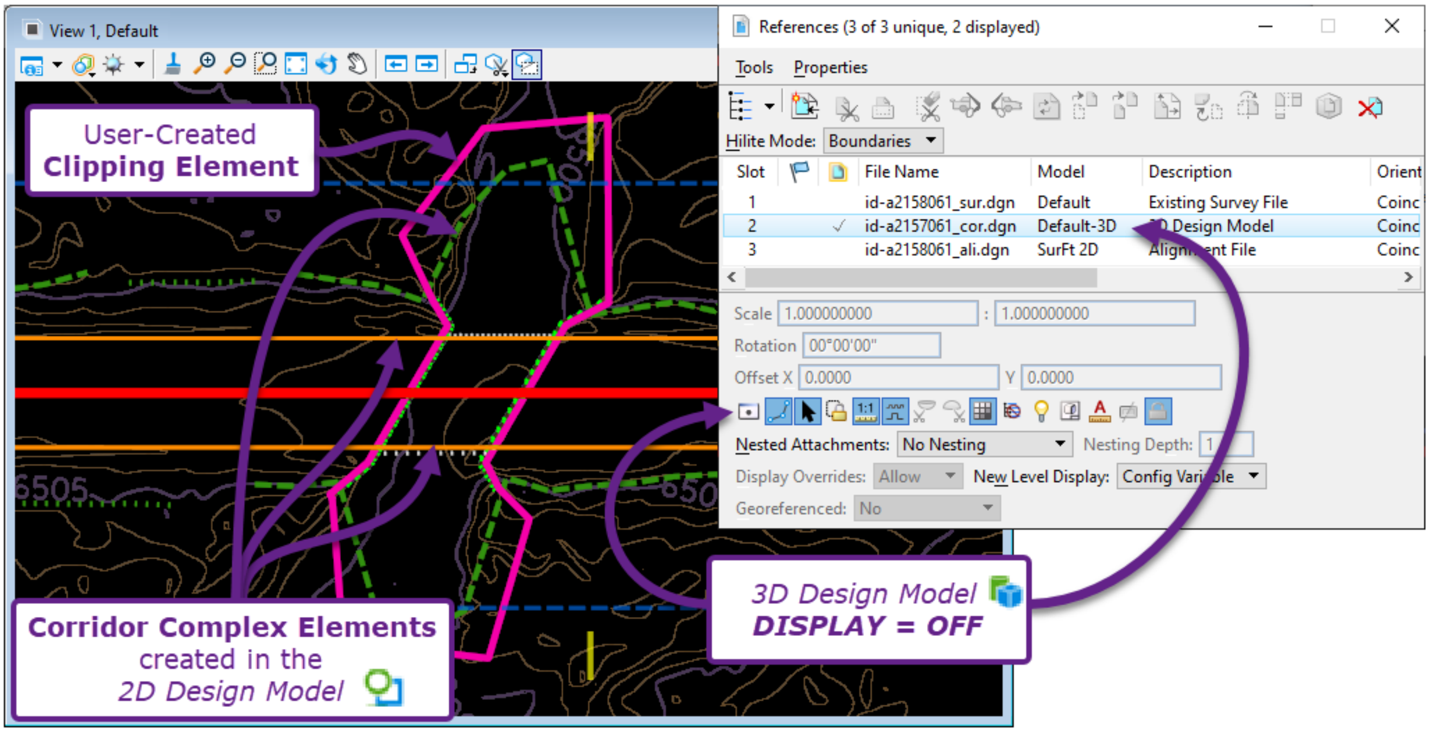


See the next page for the results and Displaying Corridor Clipping References - WARNING

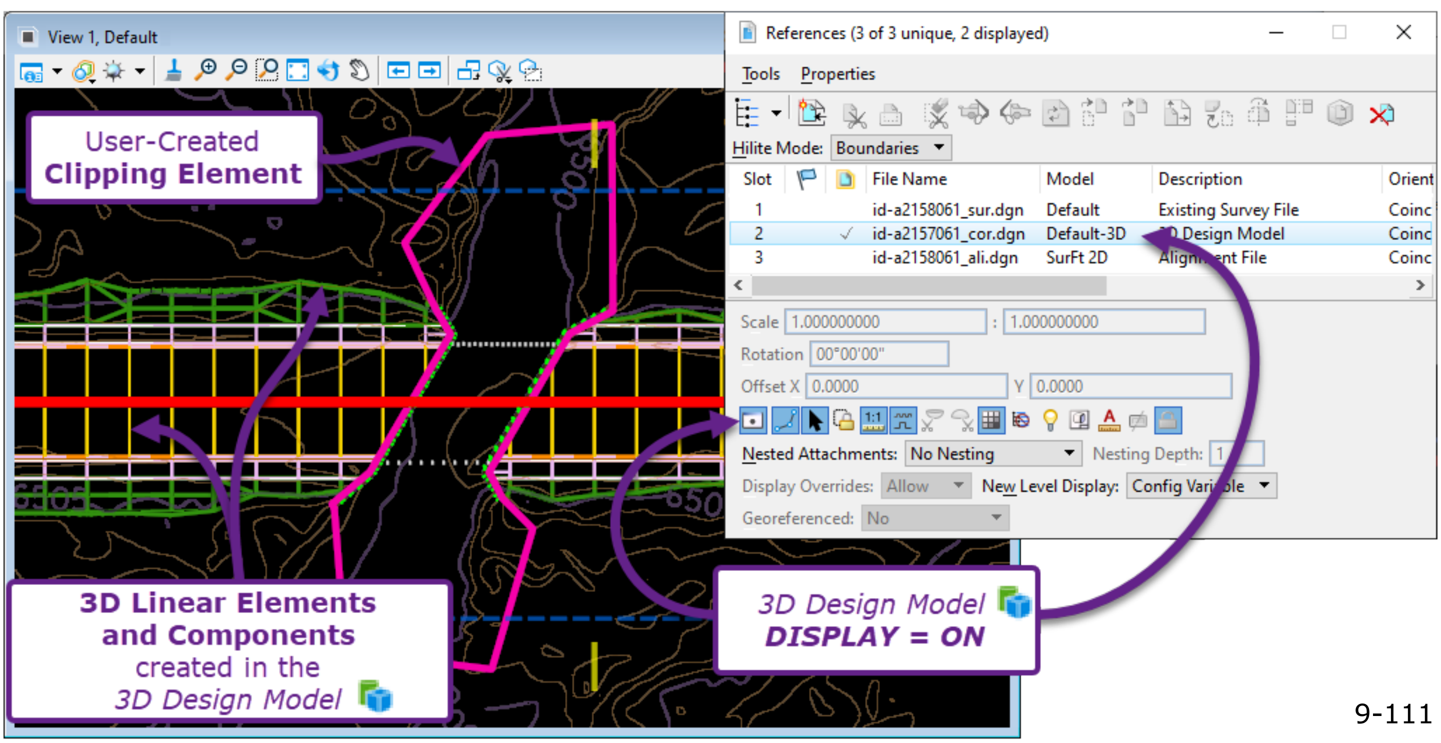
9G.10.b Displaying Corridor Clipping References - WARNING

Corridor Complex Elements, which are created in the 2D Design Model, are NOT visually affected by Corridor Clipping References.

The graphic below, shows the results of the workflow on the previous page. Only *Corridor Complex Elements* (created in the 2D Design Model) are displayed. The 3D Design Model reference DISPLAY is turned OFF. The Corridor was successfully clipped – however- the *Corridor Complex Elements* are visually unaffected. Notice below, that the Slope Stake Fill Line appears unclipped.



The 2D Design Model is still shown in graphic below. However, the display for all *Corridor Complex Elements* has been turned OFF. The 3D Design Model reference display has been turned ON. Notice, that all the 3D geometry from the corridor is correctly clipped.



9H.1 Locking and Processing the Corridor

When the Corridor is *locked*, it means the Corridor will not process or update, even when edits are made or new Corridor Objects are created. When in the *locked* position, the Corridor model will remain static. Edits and manipulations can be applied to the Corridor will not be processed until the Corridor is *unlocked* and the *Process the Corridor* tool is used.

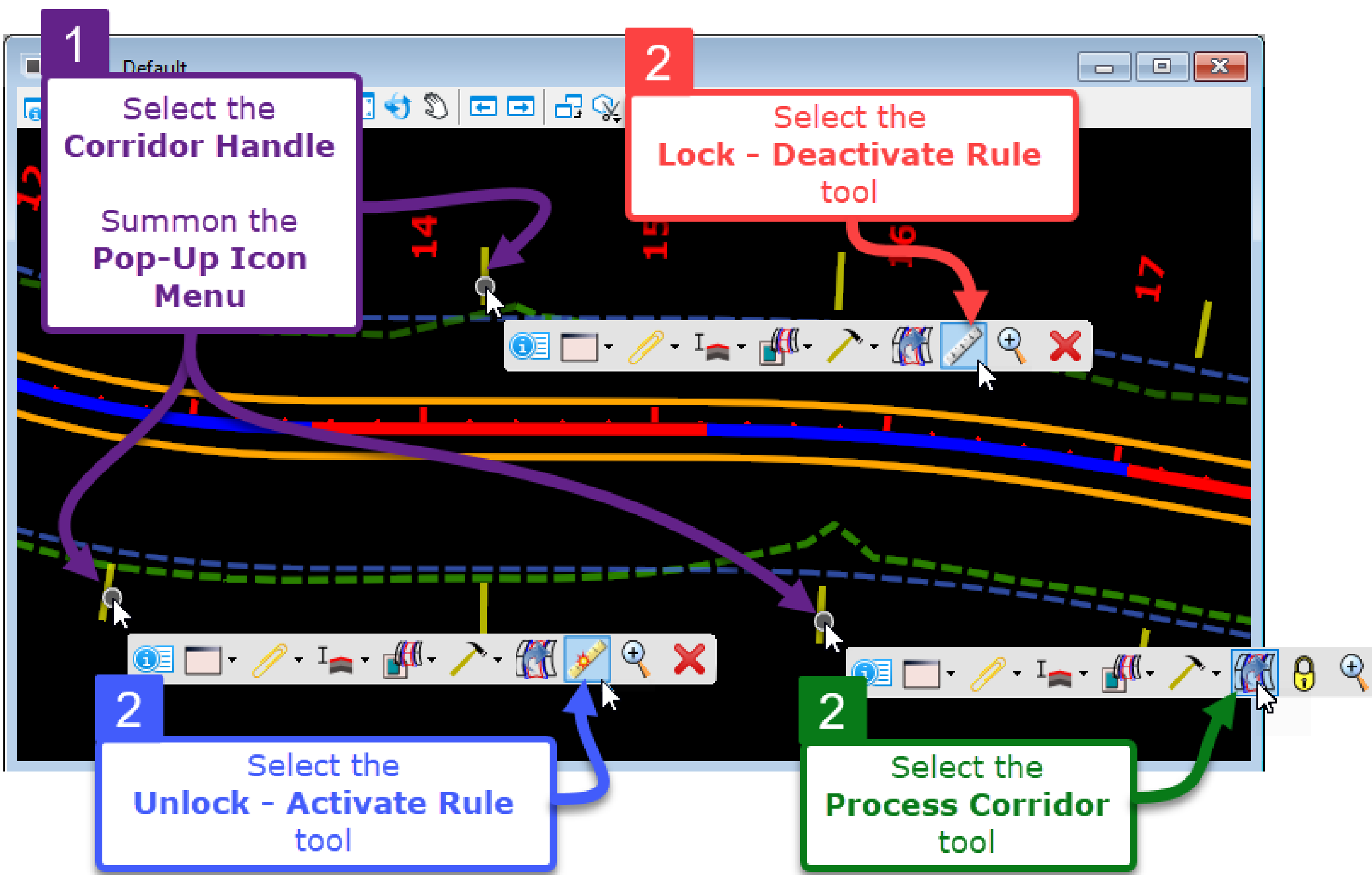
Corridors that are long and/or contain a high degree of complexity will suffer from long processing times when edits are made to the Corridor or any element that interacts with the corridor, such as the Alignment or Point Control geometry.

Locking the corridor is recommended prior to making a series of edits to a slow processing Corridor.

Lock the Corridor: The *Lock – Deactivate Rule* tool  is used to Lock the Corridor (shown in **Red**).

Unlock the Corridor: The *Unlock - Active Rule* tool  is used to Unlock the Corridor (shown in **Blue**).

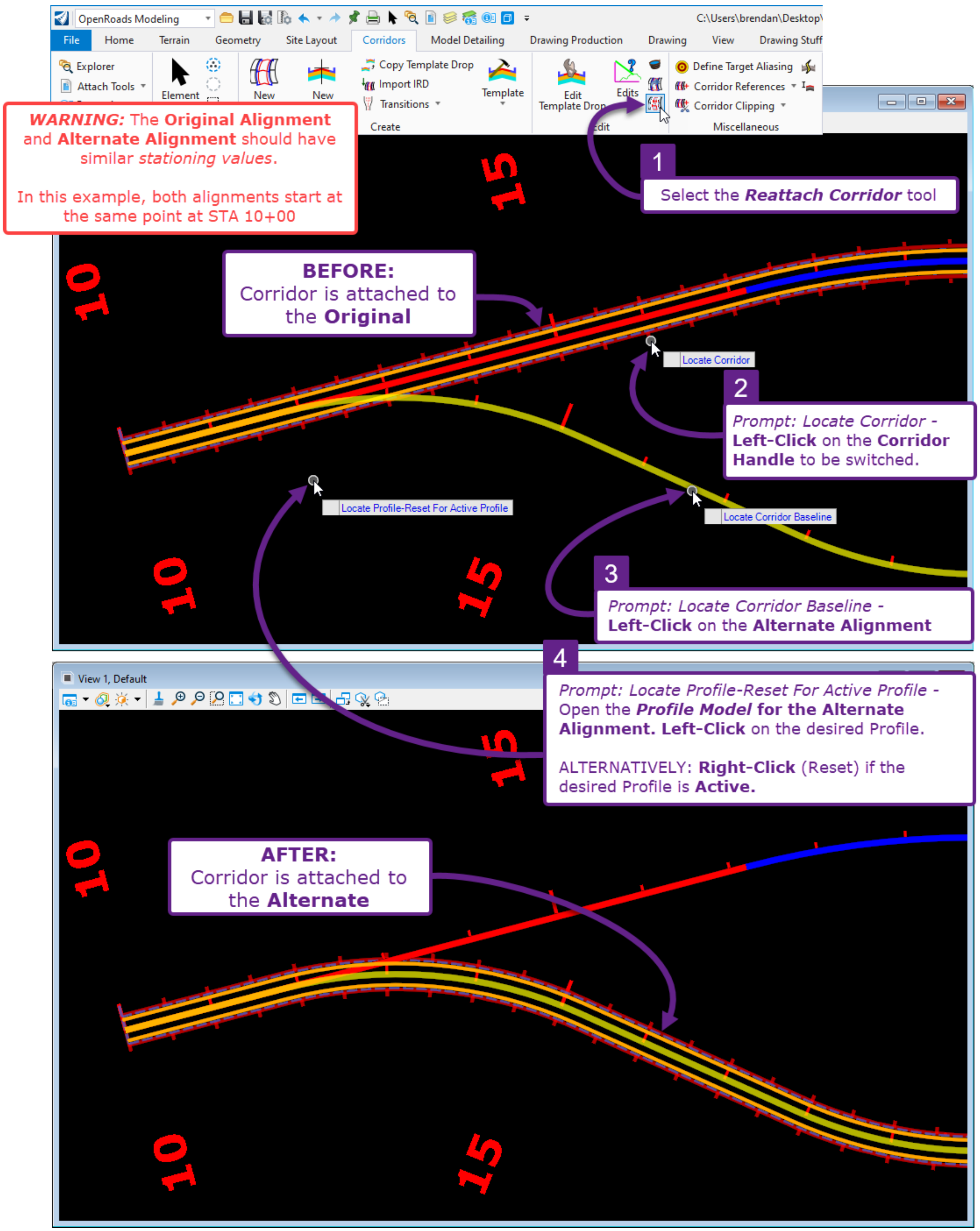
Process the Corridor: The *Process Corridor* tool  is used to Process the Corridor (shown in **Green**).



9H.2 Change the Alignment or Profile for a Corridor (Reattach Tool)

The *Reattach* tool has two operational usages relating to switching out the Corridor Alignment and Profile:

1. The *Reattach* tool can be used to entirely switch the Alignment for the Corridor. For example, if an alternate Alignment is created, the *Reattach* tool is then used to switch the original Corridor onto the alternate Alignment. All *Template Drop* sections and *Corridor Objects* are transferred to the Alternate Alignment – with the Station Ranges kept intact.
2. The Corridor Alignment is unchanged but the Profile is switched. This is used to apply an alternate Profile to the Corridor.



9H.3 Overlay Vertical Adjustment tool

Similar in concept to the *Define Profile By Best Fit* tool (See *7F.3.d Define Profile By Best Fit*), this tool is used to automatically and optimally calculate a Profile – specifically intended for Milling/Overlay designs.

DISTINCTION: The *Define Profile By Best Fit* tool only analyzes the mainline Profile Point. This tool analyzes all Template Points in a processed cross-section (Template Drop) in relation to the Existing Ground. The result is a vertically adjusted Profile that does not exceed specified Milling and Overlay tolerances at any lateral point in a given processed cross-section.

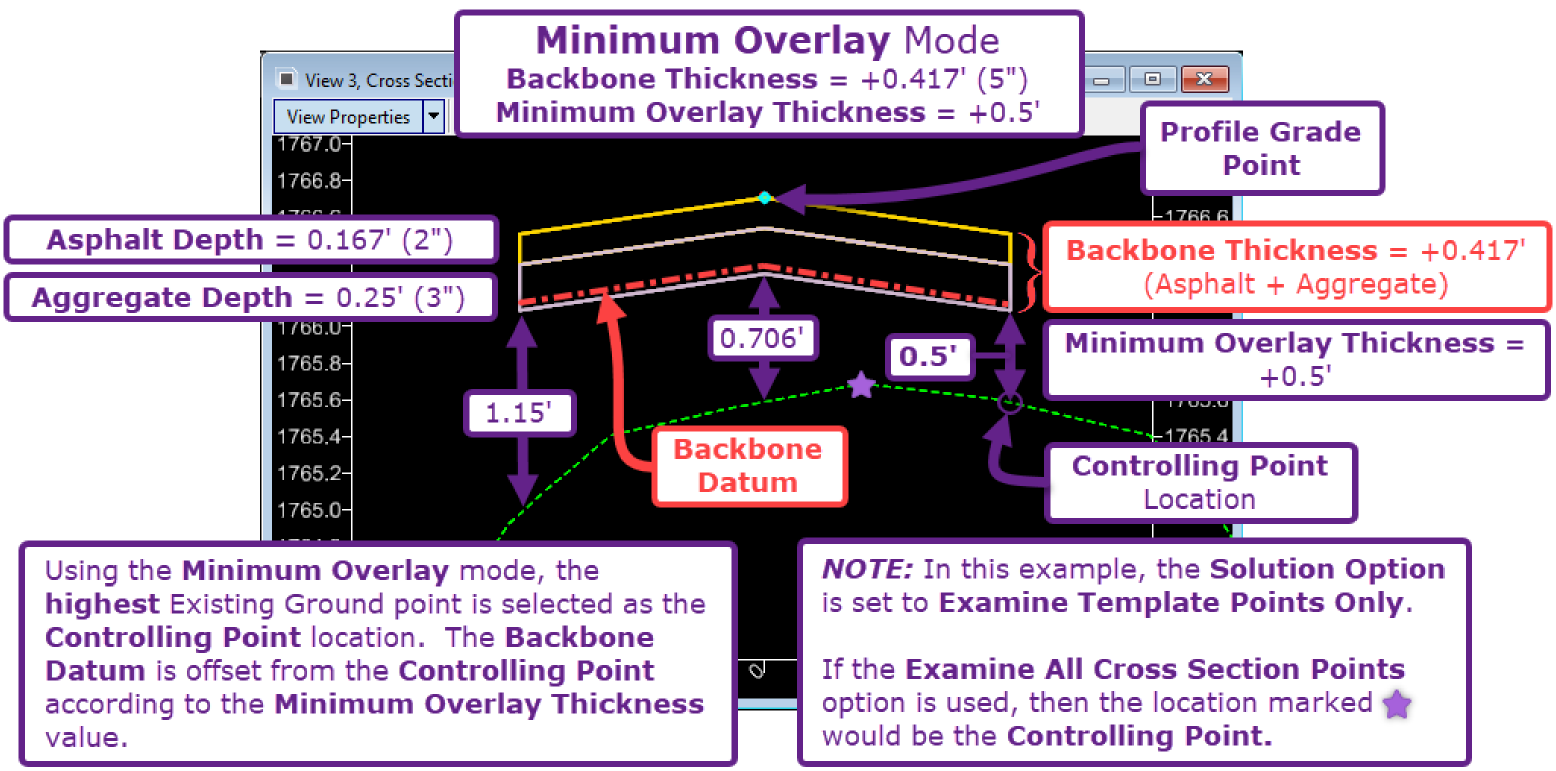
WARNING: Do NOT access this tool through the *Pop-Up Icon Menu* of the Corridor – because the software will likely abort the tool operation midway through. Instead, access this tool through the Ribbon.

WARNING: This tool can be useful for creating a graphic that for visual reference. However, it is unlikely that this tool will create a Profile that is appropriate to show in a plan set. The resulting Profile element from this tool will be a series of serrated Lines segments, NOT smooth Lines connected by Curves.

WARNING: This tool only works if the Alignment and Corridor are created in the same ORD File. In other words, this toll will NOT work if the Alignment is in [_ali.dgn] file and the Corridor is a [_cor.dgn] file.

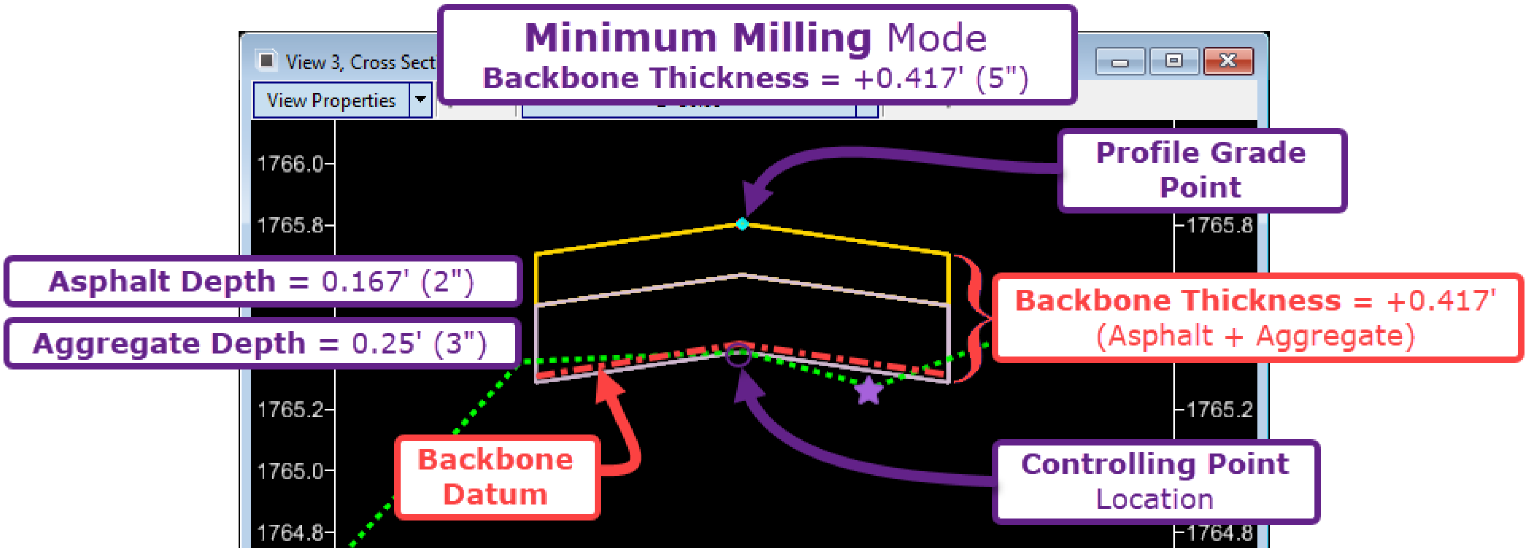
NOTE: Although, this tool is intended for Milling/Overlay designs, it is NOT necessary for the Corridor Template to contain Milling/Overlay Template Components for this tool to function. However, Milling/Overlay quantities will NOT be correct unless the proper Components are used. For more information on Milling/Overlay Components, see *8D.8 Overlay/Striping Components*.

The *Overlay Vertical Adjustment* tool contains two operational modes: **Minimum Overlay** mode and **Minimum Milling** mode. Both modes analyze the *Backbone Datum* in relation to the Existing Ground to automatically place the *Profile Grade Point*. In the cross-sectional view, the vertical position of the *Backbone Datum* is manually set by the User by specifying the *Backbone Thickness* parameter value. For the intended usage of this tool, the *Backbone Datum* should be placed at the subgrade or at the top of the leveling component. The table on the next page explains all parameters used in this tool, including the different types of *Modes* and *Backbone Thickness*.



Vertical Overlay Adjustment Dialogue Options	
Options:	**Description:**
Vertical Name	Name given to the resulting vertically adjusted Profile created with this tool.
Start/Stop	Sets the Station range limits for the resulting vertically adjusted Profile.
Backbone Thickness	The *Backbone* is the Overlay section. Examples of a *Backbone* may consist of: • A single asphalt component layer • Multiple asphalt component layers of different binder courses • An asphalt component and an aggregate component The *Backbone Thickness* should equal the combined thickness of the all layers in the Overlay section. Although the Backbone is intended to correspond with the Overlay section, the User can any value – regardless of the actual Component depths found in the Template. The *Backbone Thickness* is measured relative to the Profile Grade Point. ***NOTE:*** This value should be **POSITIVE**, but can also be negative or zero. If the *Backbone Thickness* value is **POSITIVE**, the Backbone Datum will be offset in the direction **BELOW** the Profile Grade Point. If the *Backbone Thickness* value is **NEGATIVE**, the Backbone Datum will be offset in the direction **ABOVE** the Profile Grade Point. If the *Backbone Thickness* value is **ZERO**, the Backbone Datum will be directly atop the Profile Grade Point.
Backbone Parametric Label	If a Backbone Parametric Label is used, then the *Parametric Constraint* tool can be used to change the Backbone Thickness value for a station range. ***WARNING:*** This functionality is broken in the current version of the ORD Software.
Minimum Mode	**Minimum Overlay:** The **highest** Existing Ground point in each processed cross-section is selected as the **Controlling Point location**. The Backbone Datum is offset from the Controlling Point according to the Minimum Overlay Thickness value.
	Minimum Milling: The **lowest** Existing Ground point in each processed cross-section is selected as the **Controlling Point location**. The Backbone datum is placed directly atop of the Controlling Point. All Points along the Backbone Datum will be placed below or directly atop of the existing ground. This Mode is intended to produce the least amount of milling across the full width the Backbone Datum.
Minimum Overlay Thickness (Only available in *Minimum Overlay* mode)	Sets the distance between the **Controlling Point location** (placed at the highest Existing Ground point in each processed cross section) and the Backbone Datum. ***NOTE:*** This value should be **POSITIVE**, but can also be negative or zero. If the *Minimum Overlay Thickness* value is **POSITIVE**, the Backbone Datum will be placed in the direction **ABOVE** the Controlling Point Location. If the *Minimum Overlay Thickness* value is **NEGATIVE**, the Backbone Datum will be placed in the direction **BELOW** the Controlling Point Location. If the *Minimum Overlay Thickness* value is **ZERO**, the Backbone Datum will be placed directly atop the Controlling Point Location.

Vertical Overlay Adjustment Dialogue Options	
Options:	**Description:**
Use Maximum Milling	This box can be enabled for both *Minimum Modes*. If this box is enabled, the *Maximum Milling Thickness* parameter can be enabled.
Maximum Milling Thickness	This parameter sets a maximum distance between any point along the Backbone Datum and the Existing Ground. First, the software attempts to set the vertically adjusted Profile according to the *Backbone Thickness*, *Minimum Mode*, and *Minimum Overlay Thickness* values used. Then, the software analyzes if the distance between any point along the Backbone Datum and Existing Ground exceeds the *Maximum Milling Thickness* value. If no points exceed the *Maximum Milling Thickness*, then no adjustments are made to the Profile. If there is any point that exceed the *Maximum Milling Thickness*, then the Profile is again adjusted (typically upwards) such that *Maximum Milling Thickness* is NOT exceeded. ***NOTE:*** This value needs to be **POSITIVE**.
Maximum Milling Parametric Label	If a Maximum Milling Label is used, then the *Parametric Constraint* tool can be used to change the Maximum Milling value for a station range. ***WARNING:*** This functionality is broken in the current version of the ORD Software.
Left/Right Template Range Point	The Left and Right Template Range Points are used to set the width of the Backbone for each processed cross section. Existing Ground points outside of the Left and Right Template Range will NOT be analyzed. The Left and Right Template Range is typically set to the left and right proposed edge of pavement.
Existing Ground Range	**Match Template Range:** The Existing Ground is only analyzed between the Left and Right Template Point Range.
	Match Existing Linear Geometry: Linear Elements – such as Existing Edge of Road linework – is used to set the Left and Right Range in which the Existing Ground is analyzed.
	Fixed Offsets: The User numerically specifies the Left and Right Range in which the Existing Ground is analyzed.
Solution Option	**Examine All Cross Section Points:** For each processed cross-section view, the Existing Ground is analyzed at each Existing Ground vertex. Only the vertices within in the Existing Ground Range are analyzed.
	Examine Template Points Only: The Existing Ground is ONLY analyzed in locations directly above or below Template Points. Only the Template Points within the Template Point Range is analyzed.
Maximum Vertical Difference	The resulting vertically adjusted Profile will be created such that the difference in elevation for each consecutive Profile Grade Point does NOT exceed the specified *Maximum Vertical Difference* value. In other words, the elevation between each processed-cross section will not exceed the *Maximum Vertical Difference*. This may help to prevent sharp deflection angles in the resulting profile. If this value is set to the default value of zero, then consecutive Profile Grade Points for each processed cross-section will NOT be analyzed and adjusted for.



Using the **Minimum Milling** mode, the **lowest** Existing Ground point is selected as the **Controlling Point** location. The **Backbone Datum** is placed directly atop of the **Controlling Point.**

In the graphic shown above, the two outside points on the Backbone Datum are placed below the Existing Ground and the center point is placed directly on the Existing Ground (Controlling Point).

NOTE: In this example, the **Solution Option** is set to **Examine Template Points Only**.

If the **Examine All Cross Section Points** option is used, then the location marked ★ would be the **Controlling Point.**

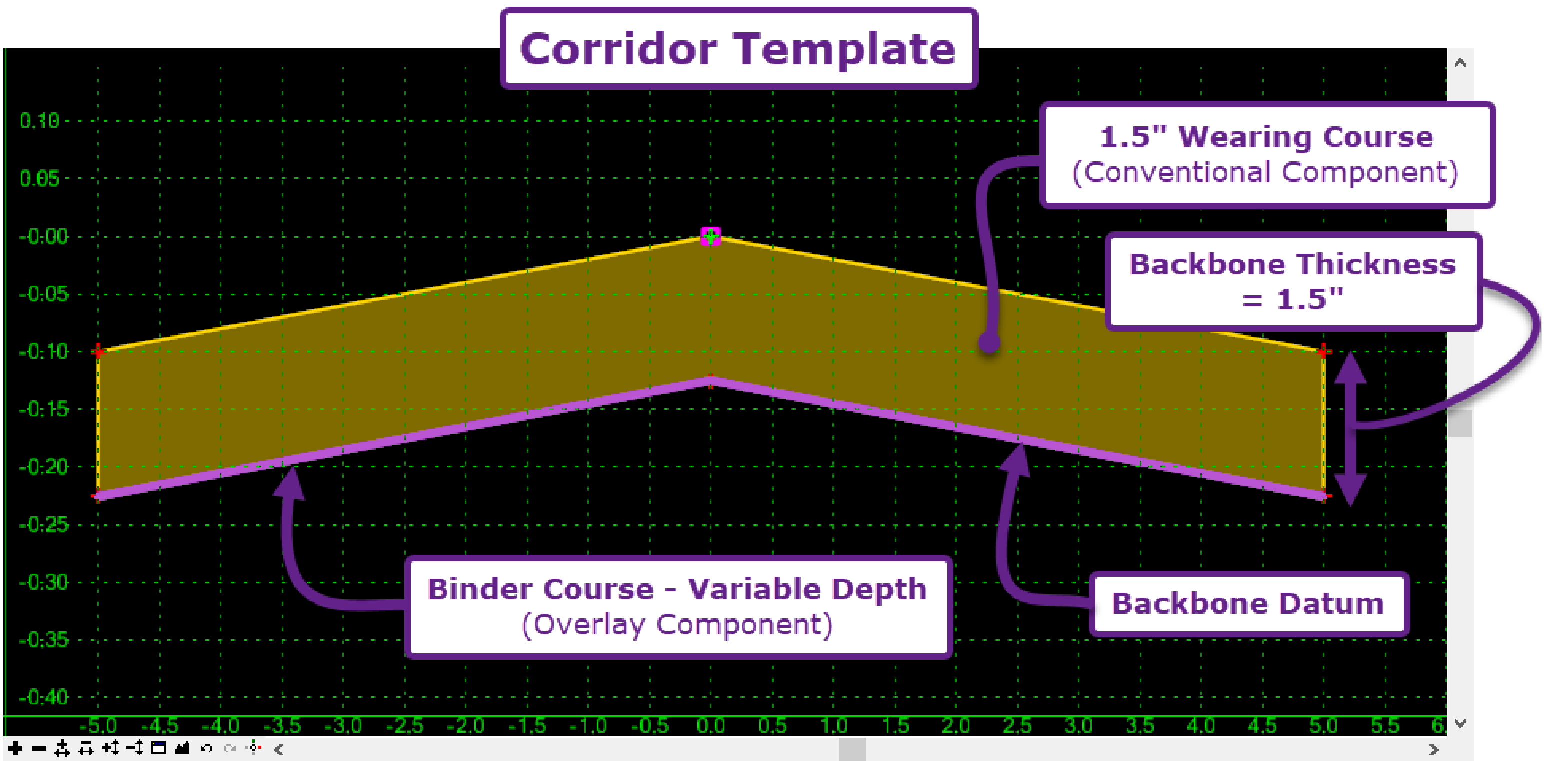
9H.3.a Overlay Vertical Adjustment Tool - Workflow

In this workflow, the Overlay Vertical Adjustment tool is used to automatically create a Profile for an asphalt overlay design.

The project requires a pavement section consisting of **1.5” Asphalt Wearing Course** - placed on top of an **Asphalt Binder Course**. The Binder Course is placed directly on the Existing Ground – which means it will have variable depth. For structural integrity, the Binder Course is required to be at least 2” in depth at all locations.

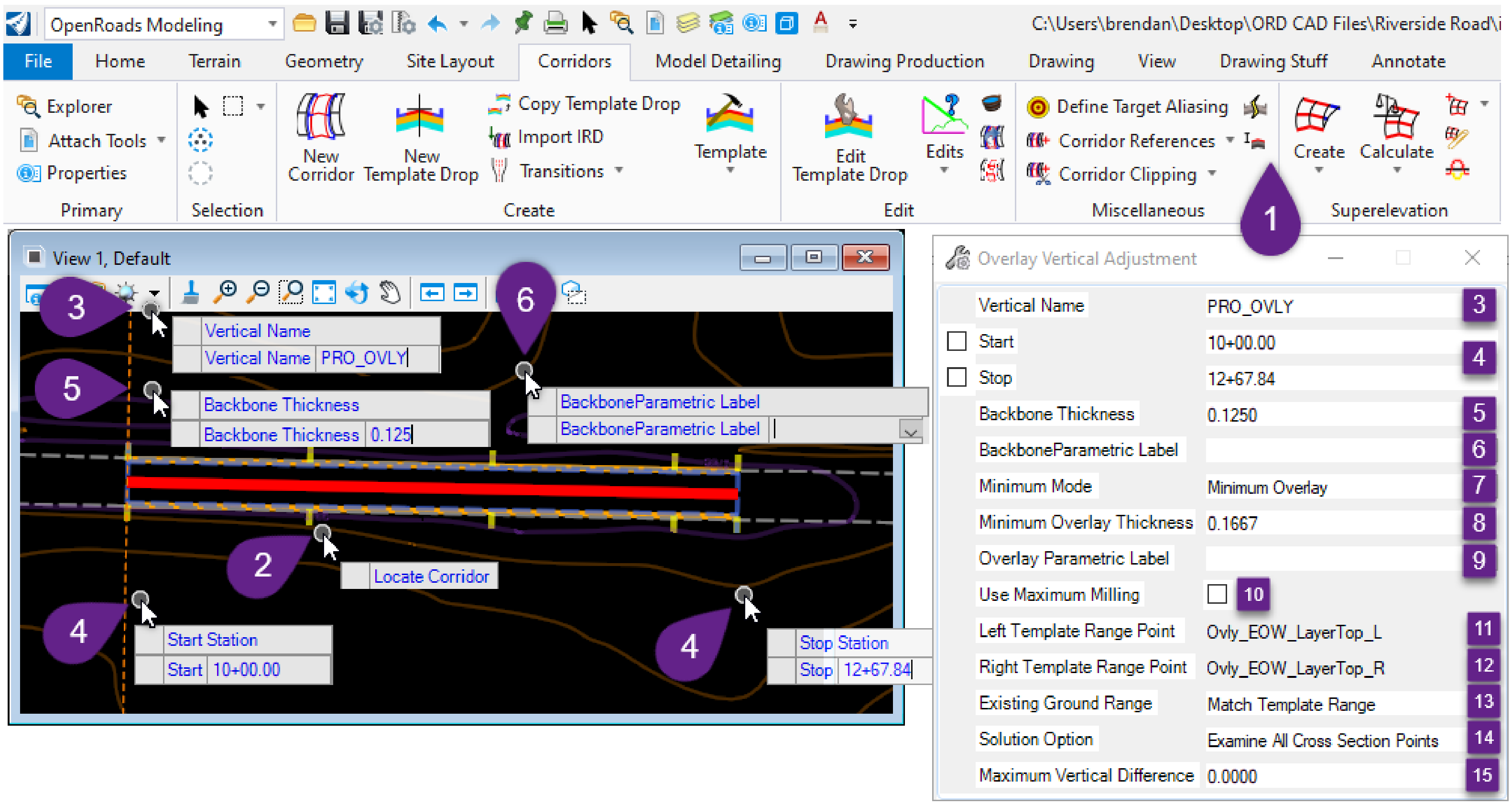
This type of workflow is accomplished with the **Minimum Overlay** mode. The **Minimum Overlay** mode will ensure that the **Backbone Datum** is always a fixed distance above the Existing Ground. The fixed distance is set by **Minimum Overlay Parameter** value – which will be set to 2”. The vertical space between the Existing Ground and **Backbone Datum** will be automatically filled with the Binder Course Overlay Component.

The Corridor Template is created with a Conventional Template Component to represent the 1.5” Wearing Course. The Binder Course is created with an Overlay Component – which allows for variable depth. See *8D - Template Components*. See page 122, for the end results of this workflow.

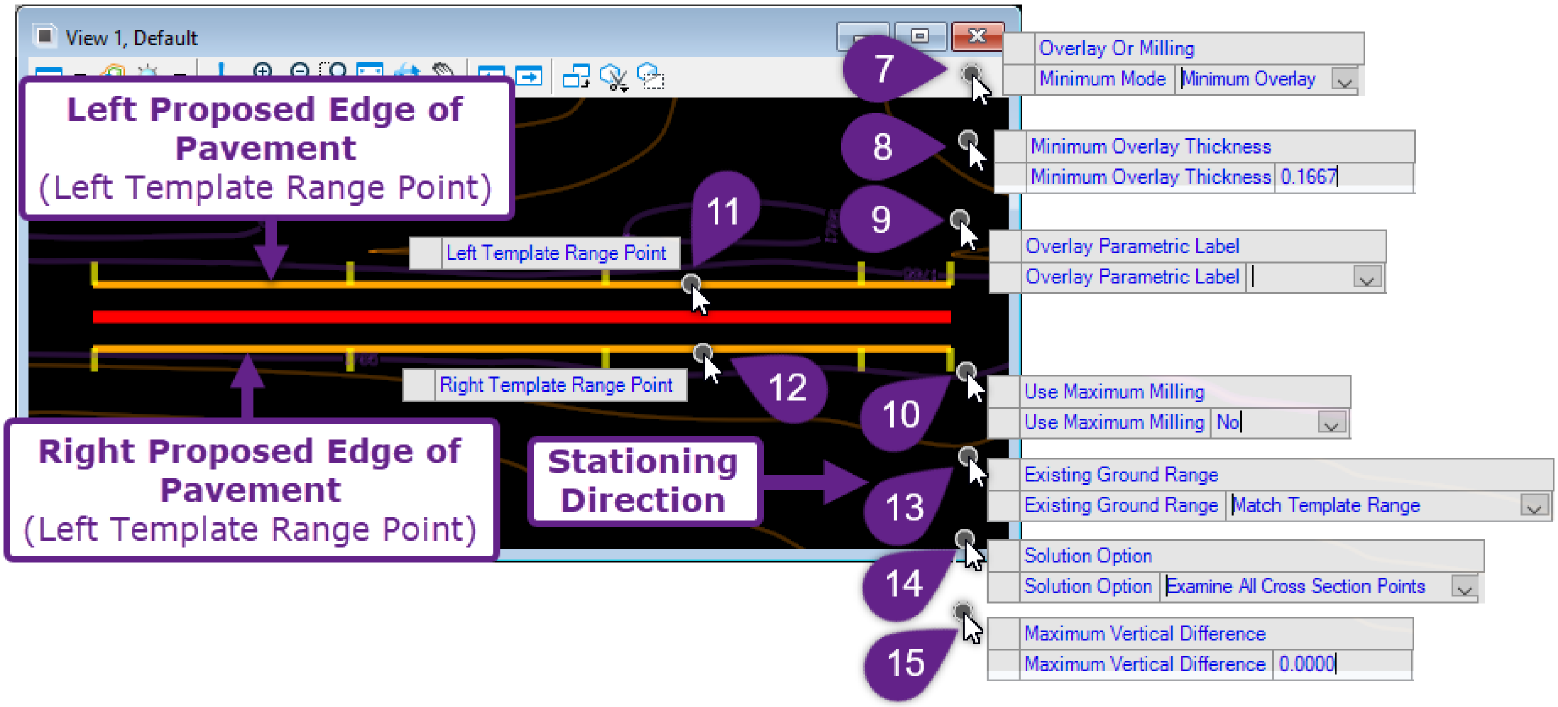


PREREQUISITE: Before this tool can be used, a Corridor must be created by the User. The Corridor must be created in the same ORD File as the Alignment and Profile for this tool to work.

A temporary Profile is created to create a Corridor. The temporary Profile can be deleted after the *Overlay Vertical Adjustment* tool is used and the resulting Profile is *Activated*.



1	Select the *Overlay Vertical Adjustment* tool from the Ribbon: **Ribbon Location:** [***OpenRoads Modeling*** → ***Corridor*** → ***Miscellaneous***]  ***WARNING:*** Do NOT access this tool through the *Pop-Up Icon Menu* of the Corridor – because the software will abort the tool operation midway through. Instead, access this tool through the Ribbon.
2	*Prompt: Locate Corridor* – Left-Click on the Corridor.
3	*Prompt: Vertical Name* – Assign a Name to the Profile to be automatically created.
4	*Prompt: Start* – Select the Starting location for the Profile to be automatically created. *Prompt: Stop* – Select the Ending location for the Profile to be automatically created.
5	*Prompt: Backbone Thickness* – Key-in the Backbone Thickness and left-click to advance to the next prompt. In this case, the Backbone Thickness is set +0.125′ (1.5″) to match to the **1.5″ Surfacing Course**. The Backbone Thickness is measured from the top of the **Surfacing Course** to the **Top of the Binder Course** (Leveling Component).
6	*Prompt: Backbone Parametric Label* – From the drop-down in the Dialogue Box, select the desired *Parametric Label* to be assigned to the *Backbone Thickness*. In this case, the Labels is left blank.

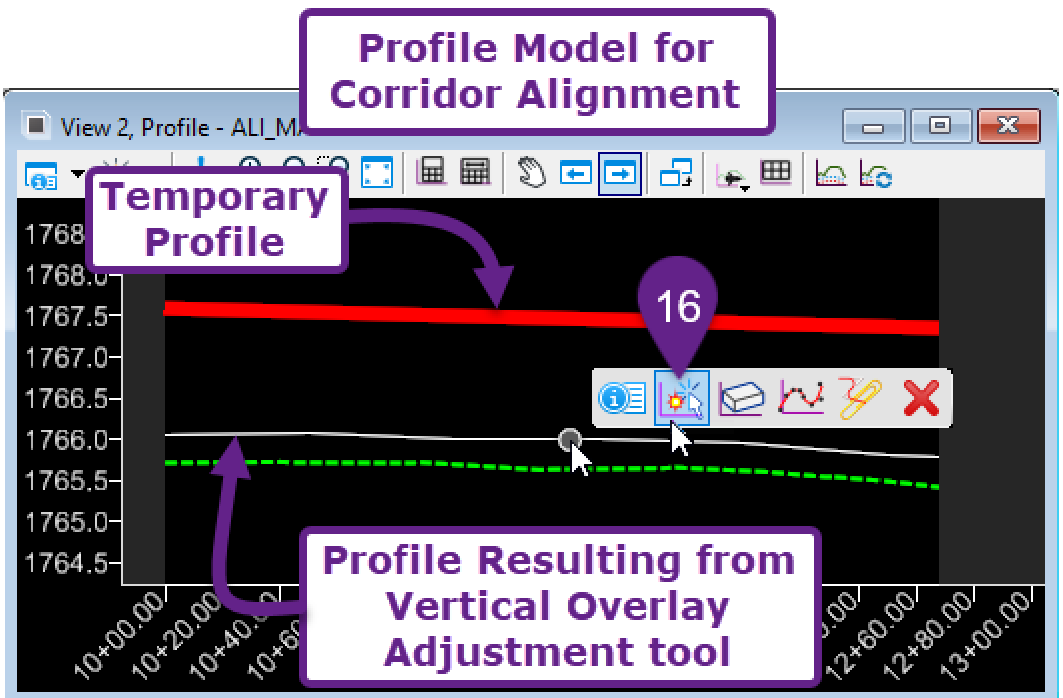


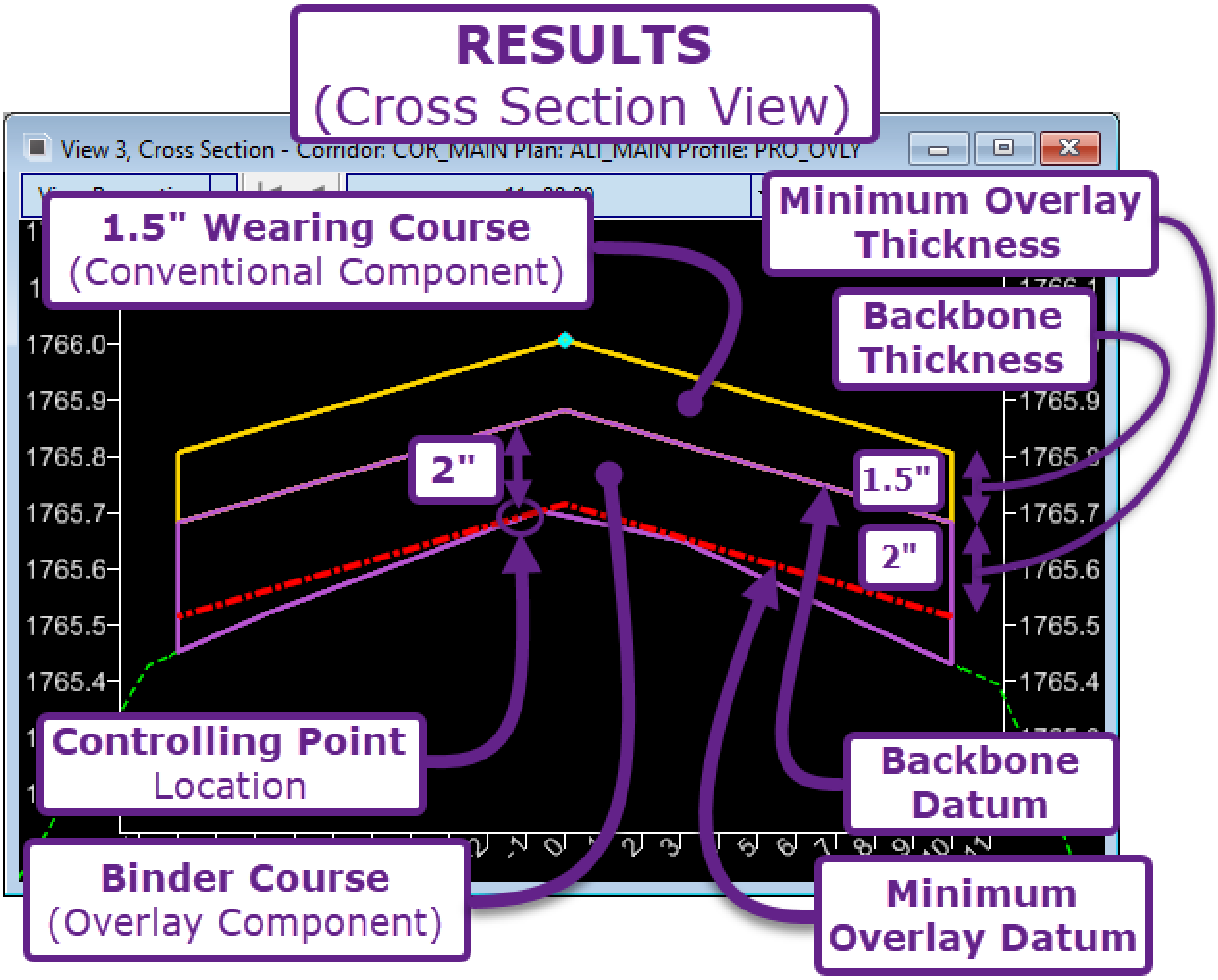
7	*Prompt: Overlay Or Milling* – Using the Up and Down Arrow Keys to select. In this case, the *Minimum Overlay* mode is selected.
8	*Prompt: Minimum Overlay Thickness* - Key-in the Minimum Overlay Thickness and left-click to advance to the next prompt. In this case, the Minimum Overlay Thickness is set to +0.1667' (2")
9	*Prompt: Overlay Parametric Label* - From the drop-down in the Dialogue Box, select the desired *Parametric Label* to be assigned to the *Minimum Overlay Thickness*. In this case, the Labels is left blank.
10	*Prompt: Using Maximum Milling* – Use the Up and Down Arrow Keys to select *Yes* or *No*. In this case, the *No* is selected because there is not Maximum Milling depth requirement.
11	*Prompt: Left Template Point Range* – In the 2D Design Model, left-click on the Template Point line to define the left edge of the Backbone Datum. In this case, the left proposed edge of pavement line is selected.
12	*Prompt: Right Template Point Range* - Left-click on the Template Point line to define the right edge of the Backbone Datum. In this case, the right proposed edge of pavement line is selected.
13	*Prompt: Existing Ground Range* - Use the Up and Down Arrow Keys to select the desired type. In this case, *Match Template Range* is selected because the desire is to only analyze Existing Ground Points within the Left/Right Template Point Range

14	*Prompt: Solution Option* – Use the Up and Down Arrow Keys to select the desired type. In this case, *Examine All Cross Section Points* is selected to analyze all Existing Ground vertices in the Left/Right Template Point Range. This type ensures that minimum 2" overlay is achieved at all locations in the Left/Right Template Point Range. If *Examine Template Points Only* was selected, then only the Existing Ground elevation directly above/below Template Points are analyzed. If between Template Points, there was a high point in the existing ground, then it is possible that the minimum 2" overlay would not be achieved at the high point.
15	*Prompt: Maximum Vertical Distance* – In this case, it is not anticipated that there will be sudden changes in the Profile Grade between each processed cross section. Therefore, this value is set to 0.

After Step 15, the Vertical Adjusted Overlay Profile should have been automatically created in the Profile Model of the Corridor Alignment. The Vertical Adjusted Overlay Profile must be *Activated* to be applied to the Corridor

16	Enter the Profile Model for the Corridor Alignment and *Activate* the resulting Profile.



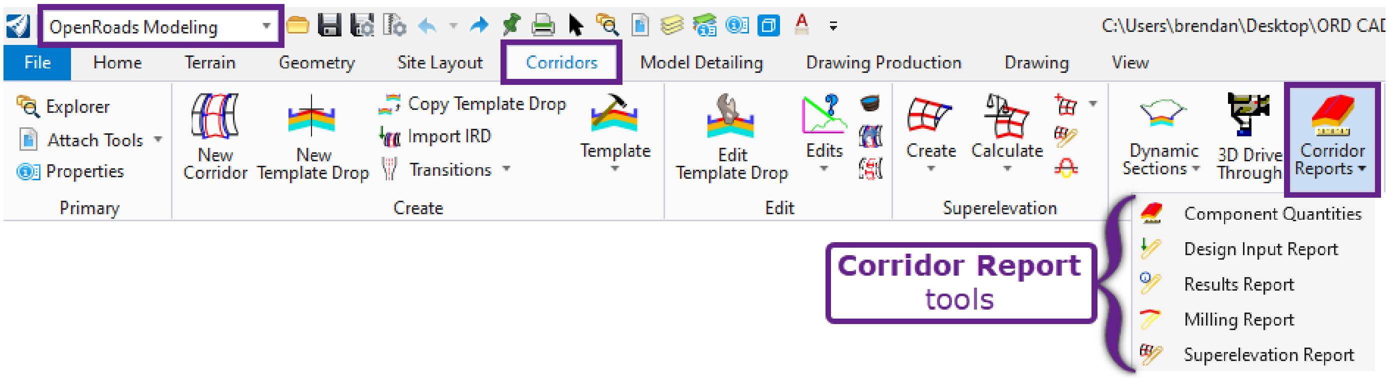


RESULTS
(Cross Section View)
View 3, Cross Section - Corridor: COR_MAIN Plan: ALI_MAIN Profile: PRO_OVLY
1.5" Wearing Course
(Conventional Component)
Minimum Overlay Thickness
Backbone Thickness
1766.0
1765.9
1765.8
1765.7
1765.6
1765.5
1765.4
2"
1.5"
2"
Controlling Point Location
Backbone Datum
Binder Course
(Overlay Component)
Minimum Overlay Datum

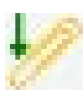
9H.4 Corridor Reports

All Corridor Reports are accessed through the Ribbon in the following location:

[OpenRoads Modeling workflow → **Corridor** tab → **Review** panel]

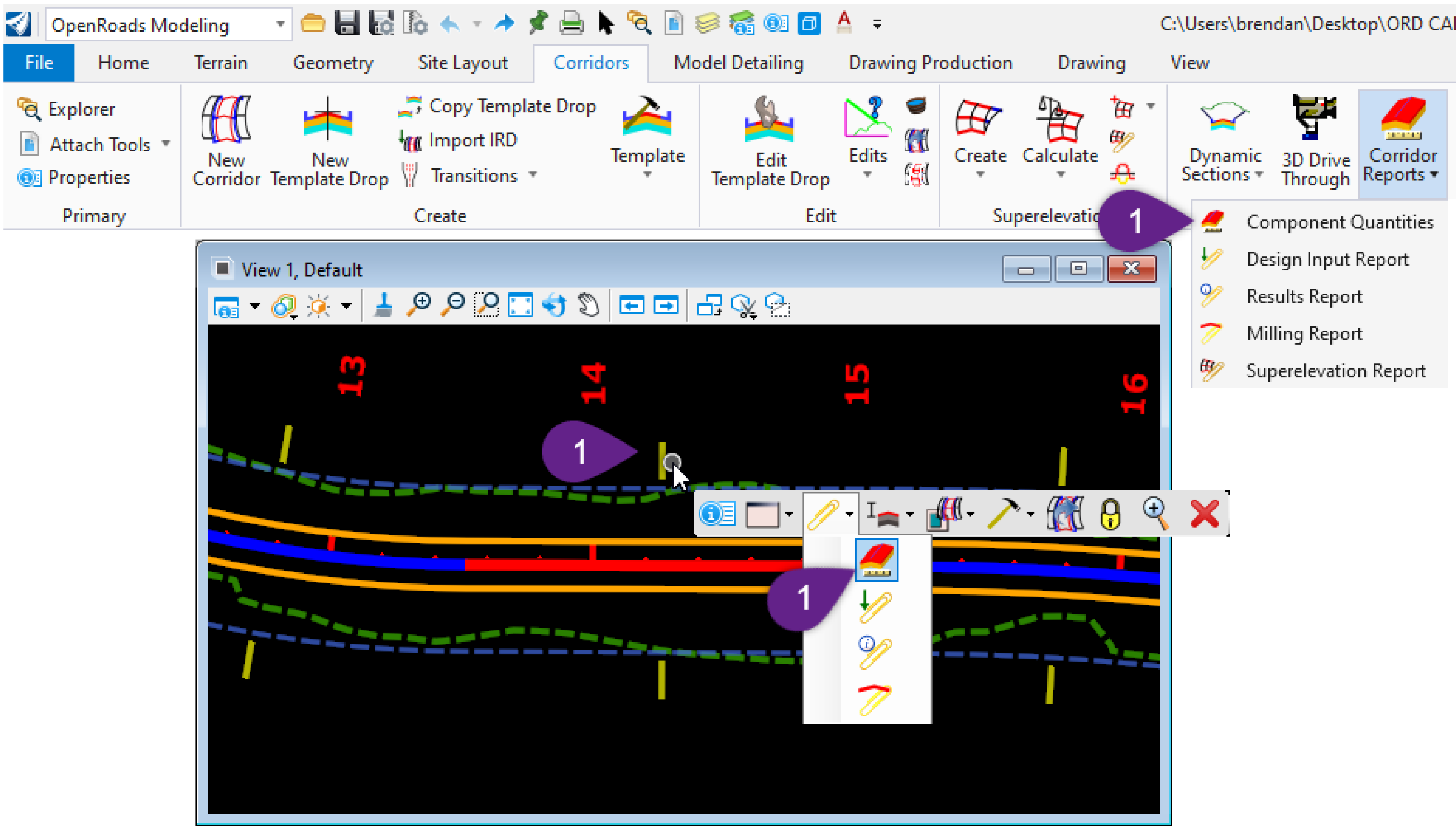


In general, most of the reports are rarely used, except for the **Components Quantities** report. This report can be used to quickly check quantities for a **single** Corridor. The process of calculating quantities for multiple Corridors or a combination of Corridors, Linear Templates, and Surface Templates is discussed in *Chapter 20 – Quantities*.

Corridor Report Tool		Description
	**Component Quantities**	Generates material (Component) and earthwork quantities for a single Corridor. This tool is useful for quickly calculating component quantities, such as pavement, aggregate, and cut/fill volumes for an individual corridor. See the next page for a demonstration of this tool ***WARNING:*** This report will NOT generate accurate quantities if the Corridor has been *Clipped*. See *9G.10 Corridor Clipping References*.
	**Design Input Report**	Generates a list of all *Corridor Objects* used to manipulate the Corridor. In essence, this report itemizes all contents in the *Corridor Objects Menu* and *Submenus* into a single report. See *9G - Corridor Objects – Manipulation of the Corridor*.
	**Results Report**	Generates a report that lists all Templates used in the Corridor. This Results Report is NOT very inciteful and may take a very long period of time to generate.
	**Milling Report**	This Report is only relevant for Corridors and Templates that utilize *Overlay* and *Milling Components*. See *8D.8 Overlay/Stripping Components*. For pavement milling, this Report will calculate the left/right offset and elevation for at every Template Drop station. The pavement milling area between each Template Drop Station is also calculated.
	**Superelevation Report**	Differing from other Corridor Report tools which is used in conjunction with the Corridor Handle, this tool is used with a *Superelevation Section* to generate a report. See *Chapter 10 – Superelevation*. The Report will list all input parameters used to calculate superelevation - such as design speed, maximum E value, runoff length tables used. This Report also lists the station locations and corresponding E values of each instance of where superelevation is applied.

9H.4.a Component Quantities for a Single Corridor – Workflow

In this workflow, the *Component Quantities* tool is used to generate quantities for a Corridor.

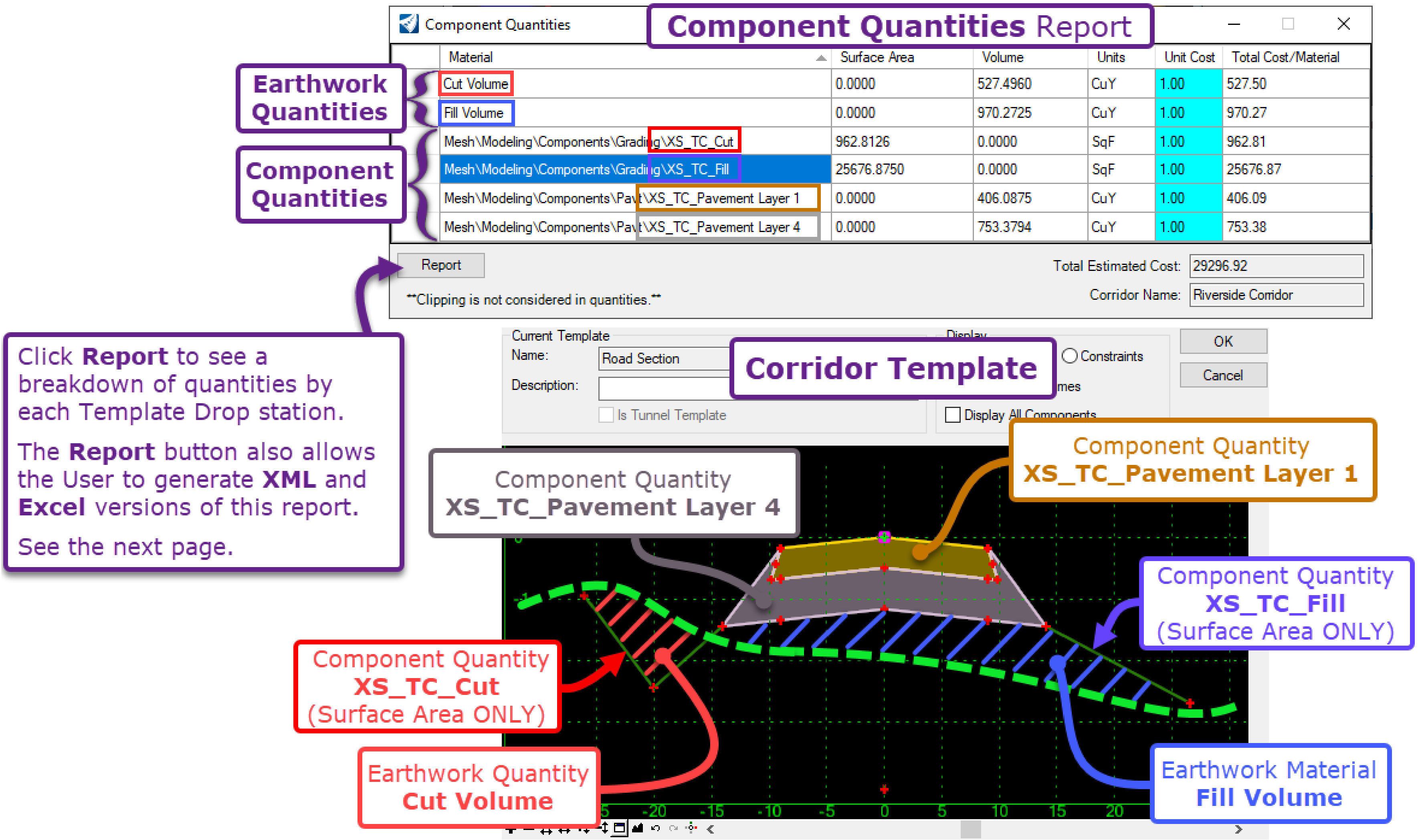


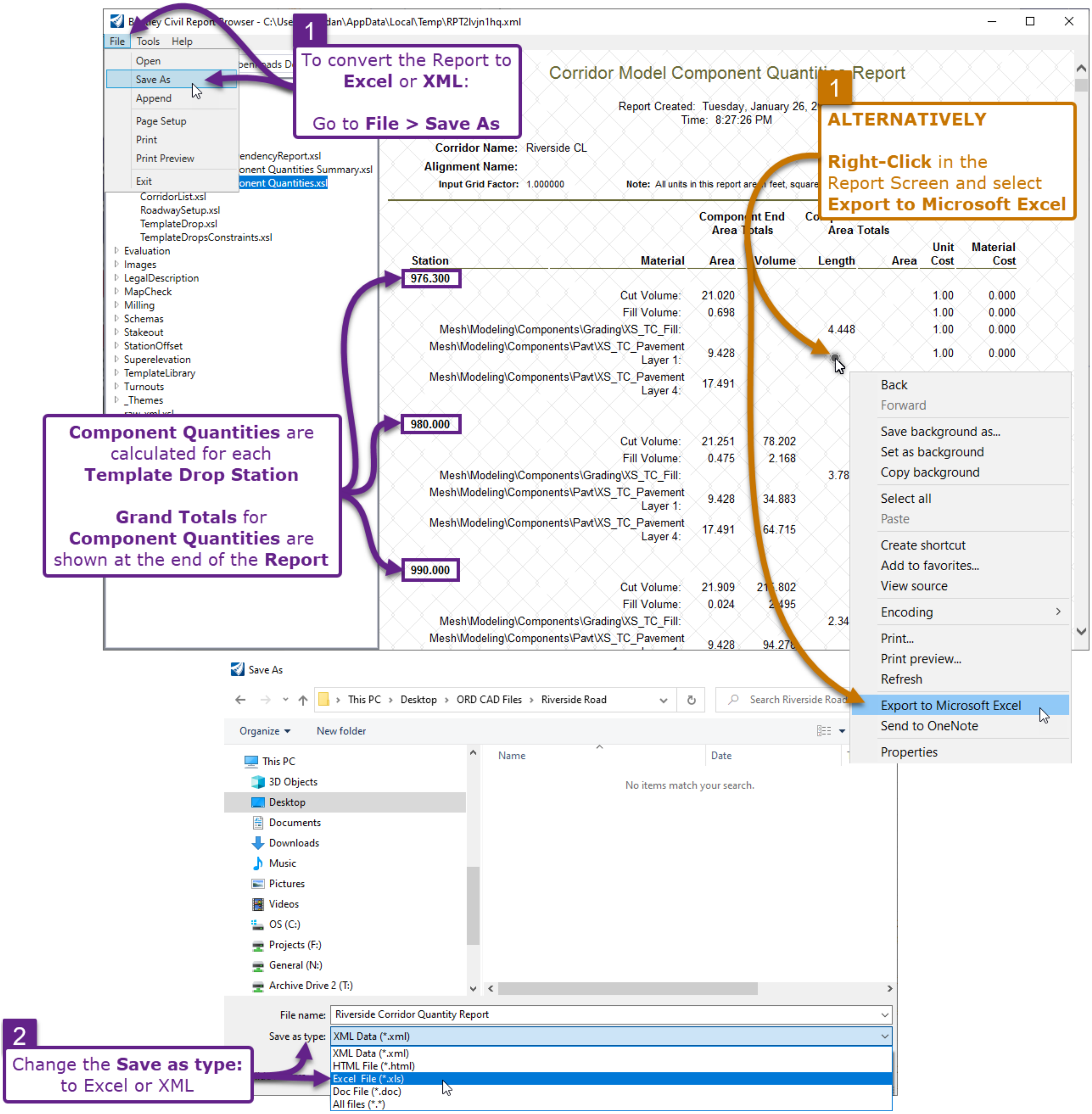
1	In the Ribbon, Left-Click on the *Component Quantities* tool. Ribbon Location: **OpenRoads Modeling** workflow → **Corridor** tab → **Review** panel. **Alternatively** Select the Corridor Handle and summon the Pop-Up Icon Menu. Select the *Component Quantities* → tool.

An example **Component Quantities Report** is shown below. There are two types of quantities that are calculated:

1. **Earthwork Quantities –** include *Cut* and *Fill Volumes*. Earthwork Quantities are calculated as the volumetric difference between the Bottom Mesh and Existing Ground. For more information on the Bottom Mesh, see *9I.1 Top and Bottom Meshes*.
2. **Component Quantities –** are calculated from Template Components found in the Templates used to create the Corridor. Component Quantities can be planar (Surface Area) or Volumetric.

NOTE: *"Cut Volume"* and "*Fill Volume*" (Earthwork Quantities) are NOT interchangeable with "*Cut*" and "*Fill*" Component Quantities. The "Cut" and "Fill" quantities correspond with the End Condition Components, which are *Planar Components*. The "Cut/Fill" Component quantities represents the embankment *Surface Area*.




1
To convert the Report to Excel or XML:
Go to File > Save As
File
Tools
Help
Open
Save As
Append
Page Setup
Print
Print Preview
Exit
Corridor Model Component Quantities Report
1
ALTERNATIVELY
Right-Click in the Report Screen and select Export to Microsoft Excel
Corridor Name: Riverside CL
Alignment Name:
Input Grid Factor: 1.000000
Station
Material
Area
Volume
Length
Area
Unit Cost
Material Cost
976.300
980.000
990.000
Component Quantities are calculated for each Template Drop Station
Grand Totals for Component Quantities are shown at the end of the Report
Back
Forward
Save background as...
Set as background
Copy background
Select all
Paste
Create shortcut
Add to favorites...
View source
Encoding
Print...
Print preview...
Refresh
Export to Microsoft Excel
Send to OneNote
Properties
Save As
This PC > Desktop > ORD CAD Files > Riverside Road
No items match your search.
File name: Riverside Corridor Quantity Report
Save as type: XML Data (*.xml)
XML Data (*.xml)
HTML File (*.html)
Excel File (*.xls)
Doc File (*.doc)
All files (*.*)
2
Change the Save as type: to Excel or XML

9I – CREATING TERRAIN MODELS FROM THE CORRIDOR

NOTE: The process for creating proposed Terrain Models from Corridors, Linear Templates, and Surface Templates is discussed in greater detail in *Chapter 22 - Proposed Terrain Model Creation*.

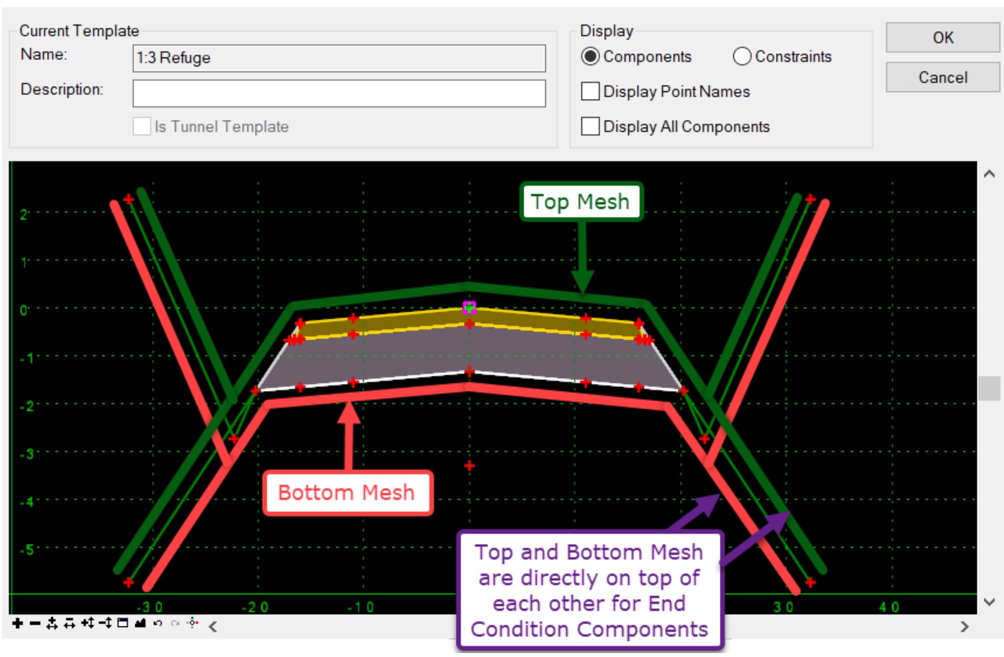
9I.1 Top and Bottom Meshes

A Corridor automatically creates a Top Mesh and Bottom Mesh that traces the top and bottom of the Template.

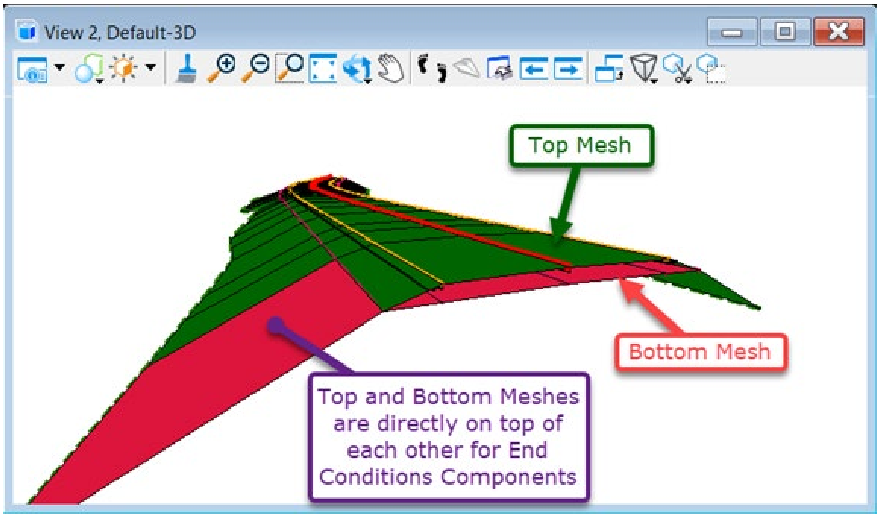
NOTE: Top and Bottom Mesh elements are rarely utilized in recent versions of the ORD Software. For versions of the software released before the year 2020, the Top and Bottom Mesh elements were used to calculate earthwork quantities and create Finished Grade and Subgrade Terrain Models. Using the Top and Bottom Mesh elements to create a Terrain Model is shown in *22A.2 Select Mesh Elements to Create the Terrain Model*. However, this workflow is discouraged.

Top Mesh: The Top Mesh is a single element that traces the 'Top' surface of a Corridor model. All Template Points at the top of a Template are automatically connected to create the Top Mesh. The Top Mesh is considered the Finished Grade for a Corridor model.

Bottom Mesh: The Bottom Mesh is a single element that traces the 'Bottom' surface of a Corridor Model. The Bottom Mesh is considered Subgrade for a Corridor model. **IMPORTANT:** Cut and Fill Earthwork is calculated by the volumetric difference between the Bottom Mesh and Existing Ground Terrain Model.



NOTE: Mesh Elements are found in the 3D Design Model and can be used to create Finished Grade and Subgrade Terrain Models. By default, Top and Bottom Meshes are not displayed. Top and Bottom Mesh display settings are found in the Feature Definition properties for Corridors – within the Project Explorer.

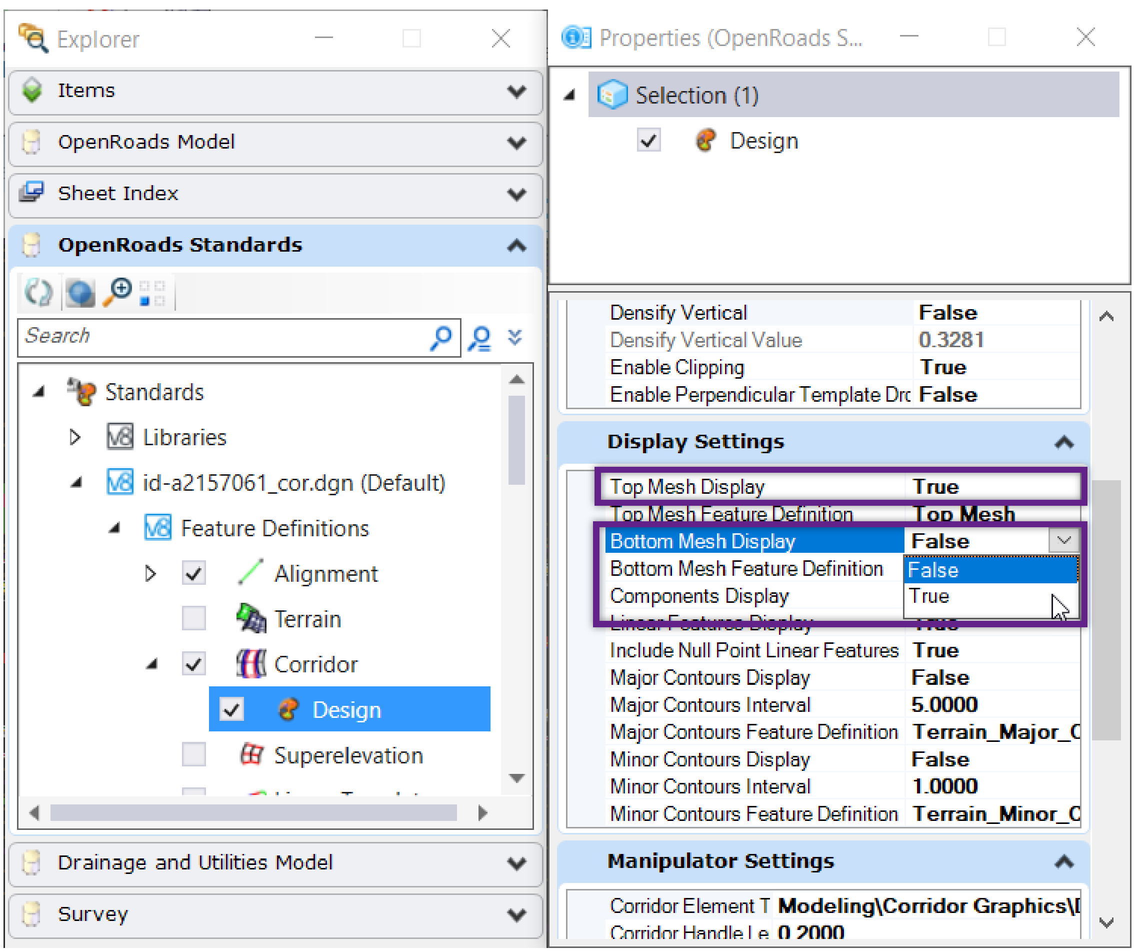


9I.1.a Display Top and Bottom Meshes

By default, the display of Top and Bottom Meshes is DISABLED. To display the Top and Bottom Mesh in the 3D Design Model, the Corridor Feature Definition settings must be edited in the Project Explorer. Corridor Mesh settings are in the Project Explorer under:

OpenRoads Standards > Current DGN Name (Default) > Feature Definitions > Corridor > Current Corridor Feature Definition.

The *Top Mesh Display* and *Bottom Mesh Display* must be changed from *False* to *True.*

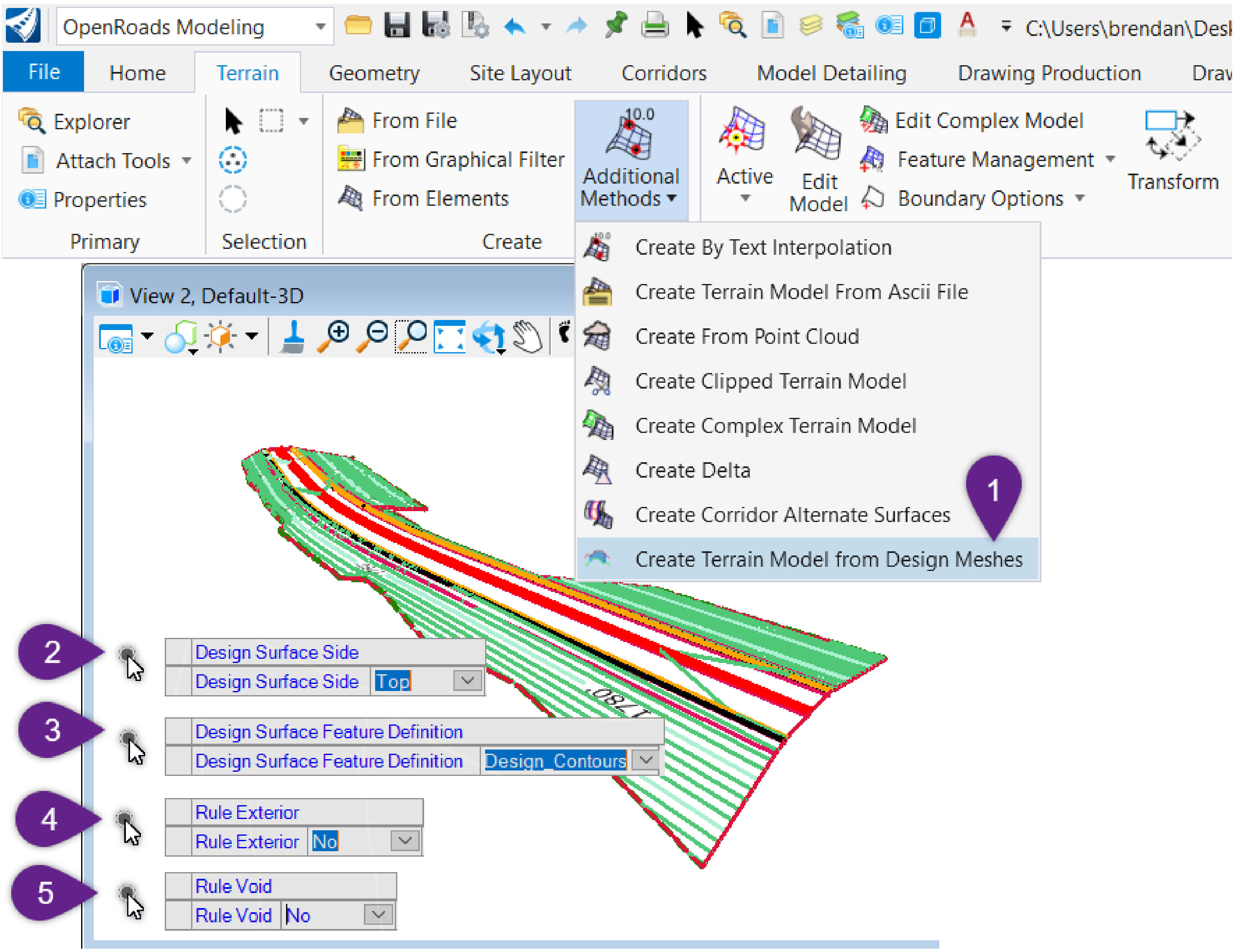


After Corridor Feature Definition display settings are edited, the Corridor must be reprocessed for the Top and Bottom Mesh to finally be displayed.

9I.2 Create Finished Grade and Subgrade Terrain Models from Corridor

Using the *Create Terrain Model from Design Meshes* tool, Terrain Models can be created from the Top and Bottom Meshes of a Corridor.

NOTE: This tool and the process for creating intricate proposed Terrain Models is discussed in more detail in *Chapter 22 - Proposed Terrain Model Creation*.



NOTE: When this tool is used, a Terrain Model is created for every Corridor, Linear Template, and Surface Template contained in the ORD File. This tool does NOT allow the User to select an individual Corridor.

1	Left-Click the *Create Terrain Model from Design Meshes* tool from the *Additional Methods* dropdown. The *Create Terrain Model* tool is found in the Ribbon at the following location: ***OpenRoads Modeling*** → ***Terrain*** → ***Create***
2	*Prompt: Design Surface Side* – Select the desired Mesh from which to create a Terrain Model from. *Top* corresponds to Finished Grade. *Bottom* corresponds to Subgrade. Left-Click in the *View to* advance to the next prompt.

3	*Prompt: Design Surface Feature Definition* – Select an appropriate Feature Definition for the Terrain Model to be created. Left-Click in the *View to* advance to the next prompt.
4	*Prompt*: *Rule Exterior* – Select *Yes* or *No* and Left-Click in the *View* to complete the command. If *Yes* is selected, then a *3D Linear Element* is created around the exterior boundary of the resulting Terrain Model.
5	*Prompt*: *Rule Void* – Select *Yes* or *No* and Left-Click in the *View* to complete the command. If *Yes* is selected, then a *3D Linear Element* is created for each *void* or holes present in the Corridor.