FDOTConnect

for

OpenRoads Designer

Introducing WorkFlows *for* 2D Design & 3D Modeling *with* Plans Development

Table of Contents

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INTRODUCTION

This course was developed to introduce OpenRoads Designer CONNECT Edition - OpenRoads Technology tools for design and modeling on Florida Department of Transportation (FDOT) projects. The curriculum was developed within the FDOTCONNECT Workspace to provide sample exercises for most of the new Civil Tools on a sample project data set.

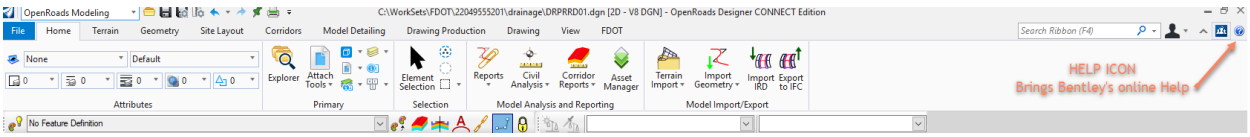
COURSE OBJECTIVES

Participants of this course will be introduced to the newest OpenRoads Technology and a Workflow for designing two dimensional (2D) Plans, Profiles, Cross Sections and three dimensional (3D) Models for Construction Deliverables. At successful completion they will have learned how to:

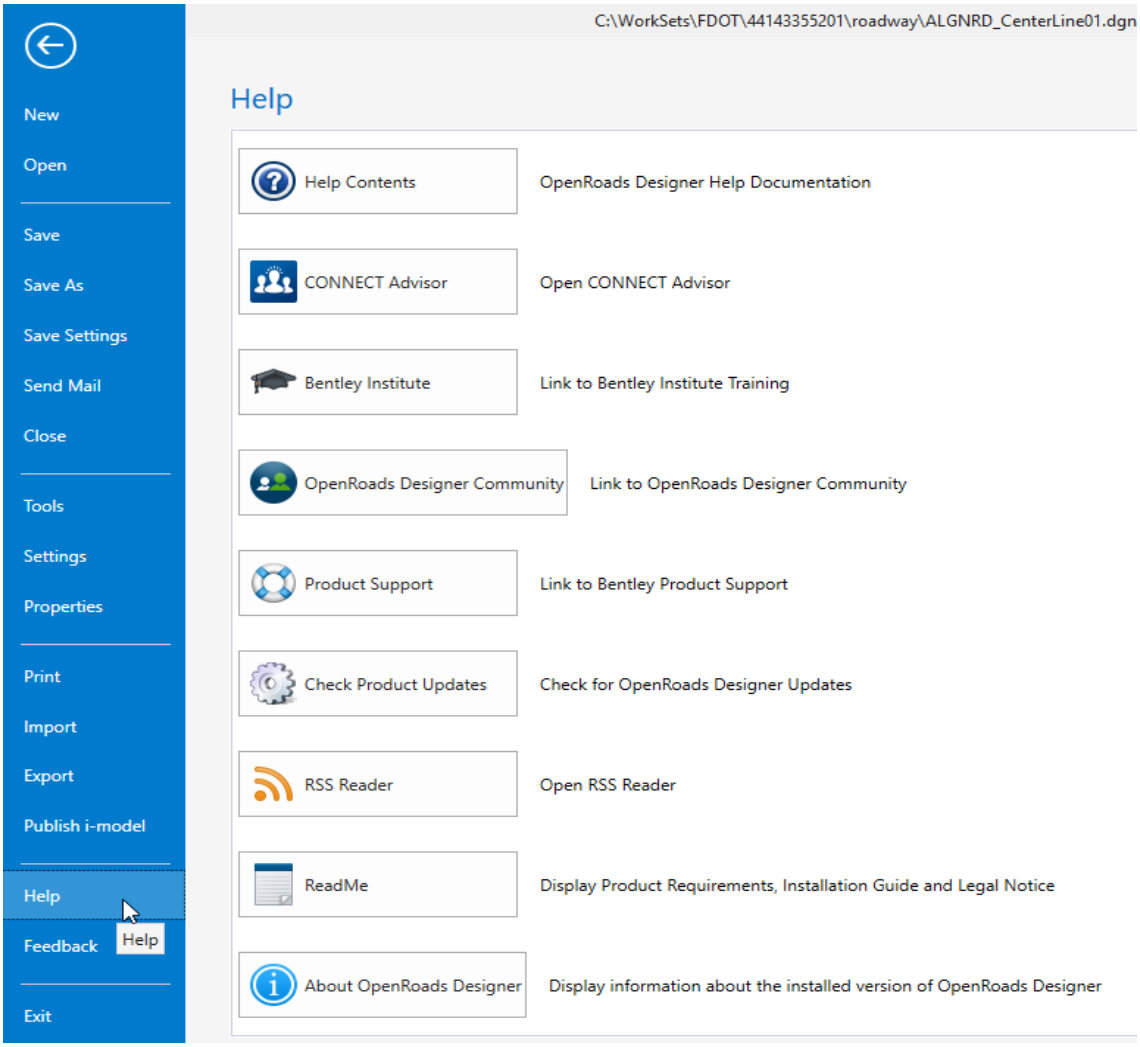
- Create a Terrain Element from the existing surface to be used as a reference for the project.
- Develop Existing Feature Terrain Surfaces to be shown on cross sections and used in earthwork calculations.
- Use Civil Geometry Elements in the design file to calculate and define a proposed centerline of construction and while using the built in Design Standards Criteria checking.
- Use Civil Geometry Elements in the design file to define the roadway features of the proposed design.
- Apply Civil Cells delivered within the FDOTCONNECT Civil Cell DGN library.
- Use Civil Geometry Elements in the design file to define the vertical profiles of a proposed centerline.
- Use the Standard Components and Templates within the FDOTCONNECT Template library.
- Create a 3D Model of the existing and proposed Roadways.
- Reference 2D Civil Geometry Elements to a Corridor Model by adding the elements for use as design model control lines.
- Apply varying Typical Section conditions along the project, including: variable medians, special ditches, handrail checks, gravity wall placement, slope conditions, left and right turns, etc.
- Define the Superelevation Standards along a corridor.
- View Dynamic Cross Sections for review, updates, and design checks along the project before cross sections are created for printing.
- Create and display 3D Models for better designing and visualization.
- Use the Milling Overbuild and Overlay Components on a project corridor.
- Apply Corridor Modeling Techniques used for developing driveways and intersection, etc.

EXPECTATIONS – WHAT THIS COURSE PROVIDES

This course provides a standard workflow for designing a project with Bentley Systems OpenRoads Designer CONNECT Edition - OpenRoads Technology within the FDOTCONNECT Workspace. Although the majority of tools are used throughout, this course does not provide a description of every Bentley Systems OpenRoads Designer CONNECT Edition - OpenRoads Technology Civil Tool. Integrated help for each of the tools can be found by selecting FILE then going to the backstage and selecting Help to bring up Bentley's ONLINE HELP or from the Ribbon pick the HELP icon.



FILE > HELP



DOCUMENT STYLE

Style conventions used throughout the course guide are shown in the following table.

Item	Convention	Example
Menu names and commands	Bold N *(Names separated with > symbol)*	• **File > Open** • **File > ComSelect > Design**
Dialog box Actions	Bold	• Click the **Apply** button. • Click the **Graphic Select** button to the right of the *Horizontal Alignment Include* box. • In the *Segment Type* list, click **Lines**.
Dialog box Field Names	Italic	• Key in **Hemfield Road** in the *Alignment Name* field. • Click the **Graphic Select** button to the right of the *Horizontal Alignment Include* field. • In the *Segment Type* list, click **Lines**.
Key-ins	Bold	• Key in **Hemfield Road** in the *Alignment Name* field.
File Names	Italic	• Open the file *ALGNRD01.dgn* in the C:\WorkSets\FDOT\22049555201\Roadway.
File Paths	Non italic	• Open the file *_Blank.dgn* in the C:\WorkSets\FDOT\22049555201
New Terms or Emphasis	Italic	• The Template Library contains *templates*, which represent typical sections of the proposed roadway.

We would like to introduce the user to a new workflow terminology using the Ribbon. If you see a direction like this:

OPENROADS MODELING > GEOMETRY > HORIZONTAL > Lines > Line From Element > **Simple Line From Element**

This means we are in the **WorkFlow** of **OpenRoads Modeling** which has a **Tab** named **Geometry** and has tools that are located in the **Horizontal Group**. Now that we are in the right workflow, Tab and Group we may need to click on a tool that has more than one option.

FILE TYPES

The Bentley Systems GEOPAK OpenRoads Technology road design process now uses a single source file type, the *DGN* file. All pertinent design data is stored in the design file. This information can be viewed through the Project Explorer and reported on in the Civil Report Browser.

Below is a brief description of the legacy file types used in GEOPAK which can be imported or exported **(i/o)** with OpenRoads Technology.

File Type Description:

- *Surface.tin* (i/o) - A binary file, also known as a GEOPAK digital terrain model (DTM),that stores features made up of random points, break lines, and boundary data along with triangulated surface model. The features and the triangles together represent an existing ground surface.
- *Surface.dat (i)* - A binary (or ASCII) file containing string and point information that is used for digital terrain model construction.
- *Surface.dtm (i/o)* – A binary file, also known as a Roadway Designer digital terrain model that stores features made up of components, break lines, and boundary data along with triangulated surface model. The features and the triangles together represent either existing ground surface or the proposed roadway corridor model.
- *Template Library.itl (i)* - Stores templates and template components. Different components can be assembled to build templates, which define the typical sections of a roadway. Only one Template Library file may be open for editing at a given time.

LEARNING RESOURCES

There are several resources available for learning about the various Bentley Systems OpenRoads Designer CONNECT edition OpenRoads Technology tools. Among them are:

- Bentley Communities:

  https://communities.bentley.com/products/road___site_design/w/road_and_site_design__wiki/33435/openroads-designer

  http://communities.bentley.com/products/road___site_design/w/road_and_site_design__wiki/7021.openroads-support-clips-technotes-faqs.aspx

- Bentley Learn:

  Bentley Institute site is for registered user and may require a Select Server site license to participate: https://learn.bentley.com

- Bentley Product OpenRoads:

  Videos are available on a variety of topics: https://www.Bentley.com

- YouTube:

  Bentley OpenRoads Videos are available on a variety of topics:http://www.youtube.com/user/BentleyCivil

- YouTube Search - Google:

  Bentley OpenRoads returns several sites with videos for learning how to apply the technology on project specific situations.

- Production Support Office | CADD (CADD) Website: http://www.fdot.gov/cadd/

  Webinar training recordings are available on many of the subjects covered in this manual:

  http://www.fdot.gov/cadd/main/FDOTCaddTraining.shtm

  http://www.fdot.gov/cadd/downloads/webinars/Posted.shtm#loadSection

  https://www.youtube.com/channel/UCqbY8kqZuXp1pyYV6lIQw_A

COURSE SUPPORTING FILES

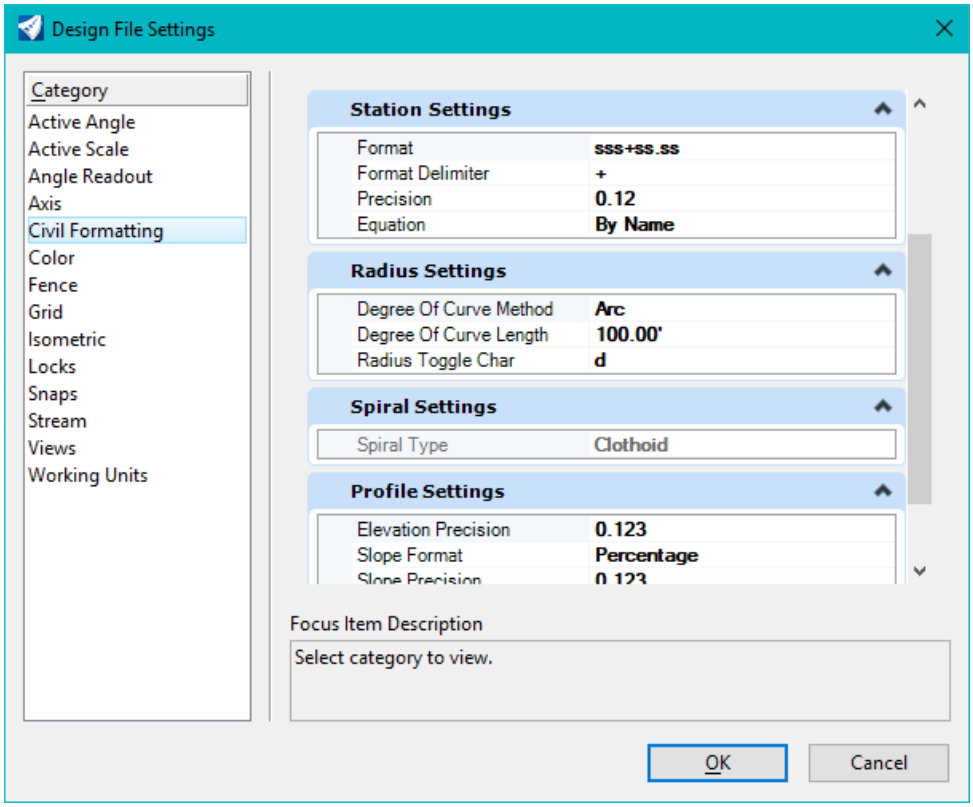
The exercises for each chapter are independent of one another and can be used without having to complete the exercises in previous modules. The exercise files are organized into separate completed Selected zip files for each chapter. All files used in this course are located also at this link:

http://www.fdot.gov/cadd/downloads/documentation/FDOTRDAnd3DM/FDOTRDAnd3DM.shtm

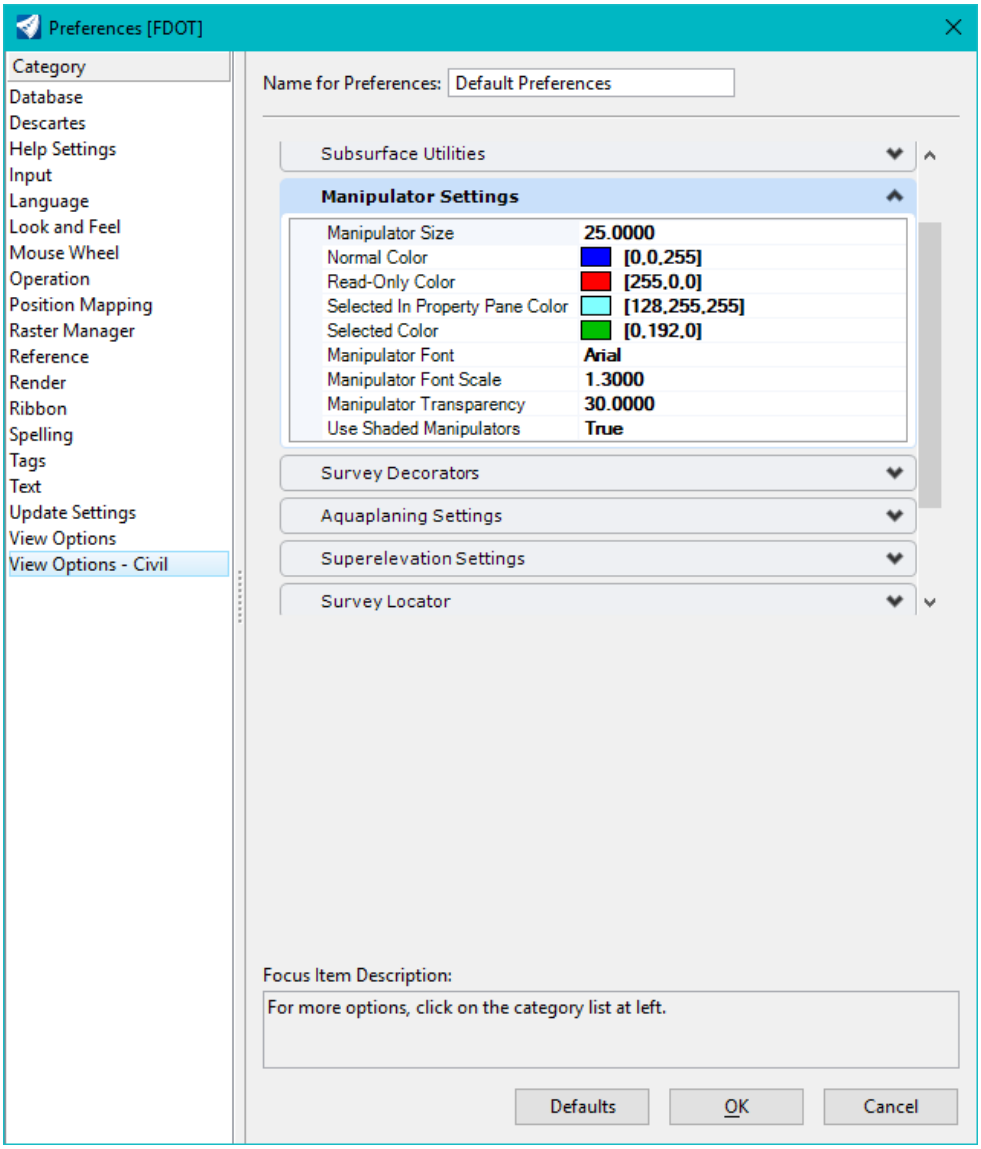
INTRODUCING A NEW WORKSPACE

FDOTCONNECT PREDEFINED SETTINGS

DESIGN FILE SETTINGS:

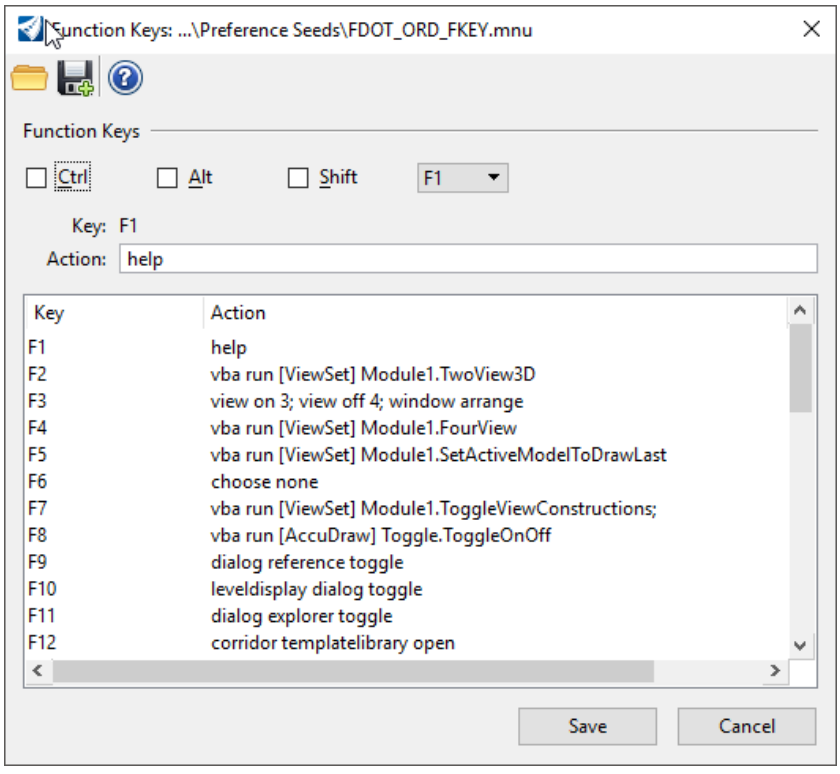


FDOTCONNECT WORKSPACE PREFERENCES:

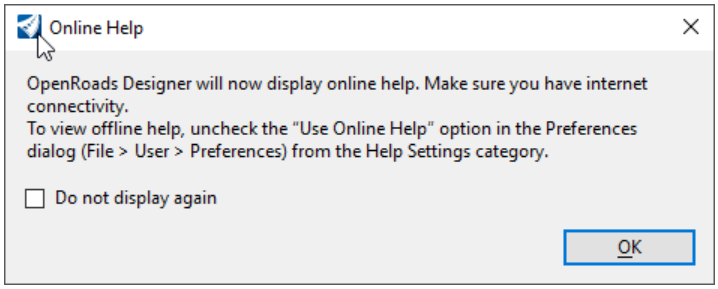


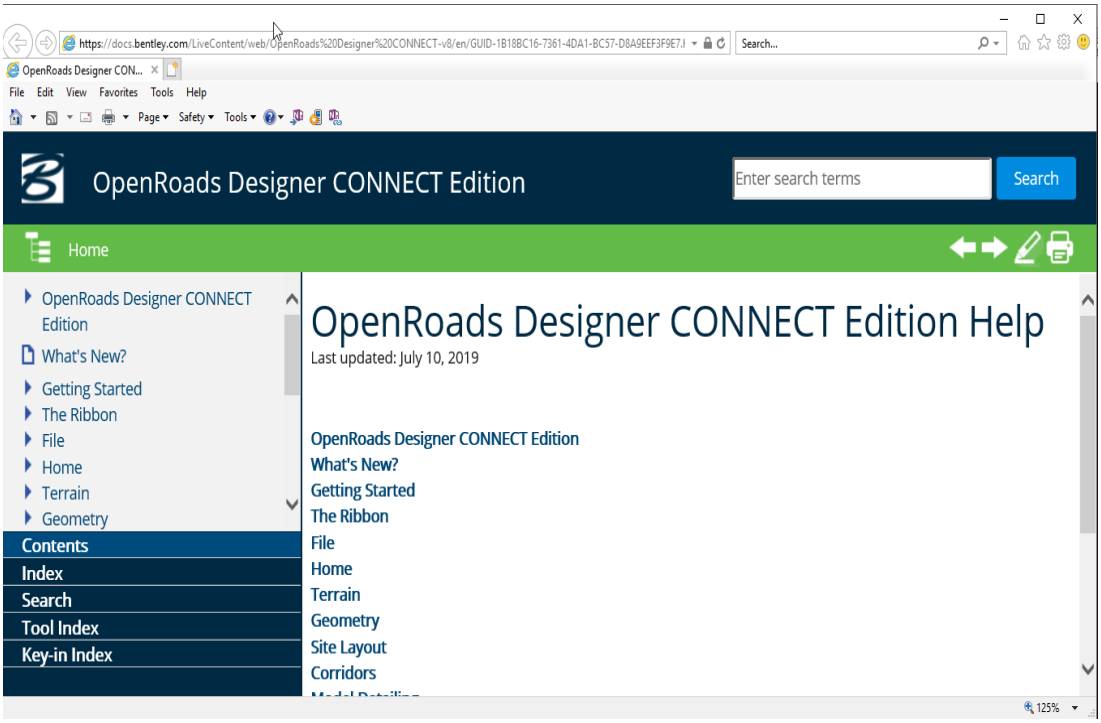
FDOTCONNECT FUNCTION KEYS

FDOTCONNECT Function Key Assignments	
F1	Opens the OpenRoads Designer OnLine Help. Ctrl+F1 Closes all Views except View 1
F2	Open View 1 (2D Plan) and View 2 (3D Isometric) and fits both views.
F3	Opens View 3 (2D Plan), closes all View 4, and arranges all Views.
F4	Open View 1 (2D Plan) , View 2 (3D Isometric), View 1 (2D Plan), View 1 (2D Plan) & Fits All views
F5	Toggles Dim References ON/OFF
F6	Resets out of any ongoing commands.
F7	Toggles the Construction view attribute ON/OFF.
F8	Toggles between MicroStation AccuDraw and Civil AccuDraw.
F9	Toggles (opens or closes) the Reference dialog.
F10	Toggles (opens or closes) the Level Display dialog.
F11	Toggles (opens or closes) the Project Explorer dialog.
F12	Opens the Create Template dialog.

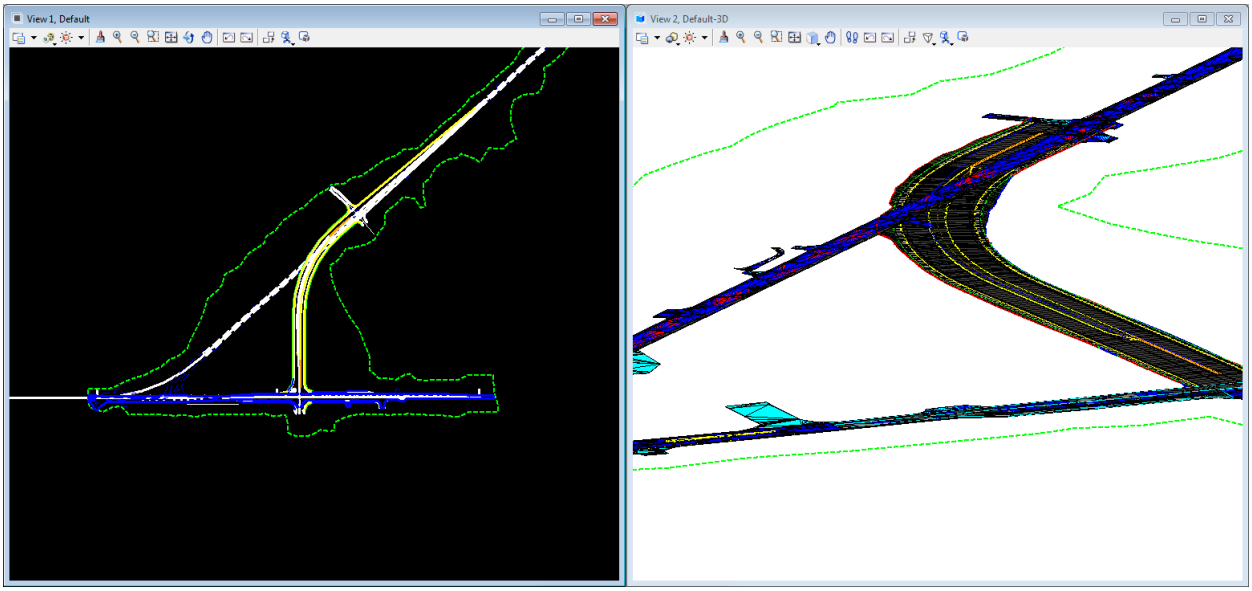


- Function Key **F1** – Civil Help

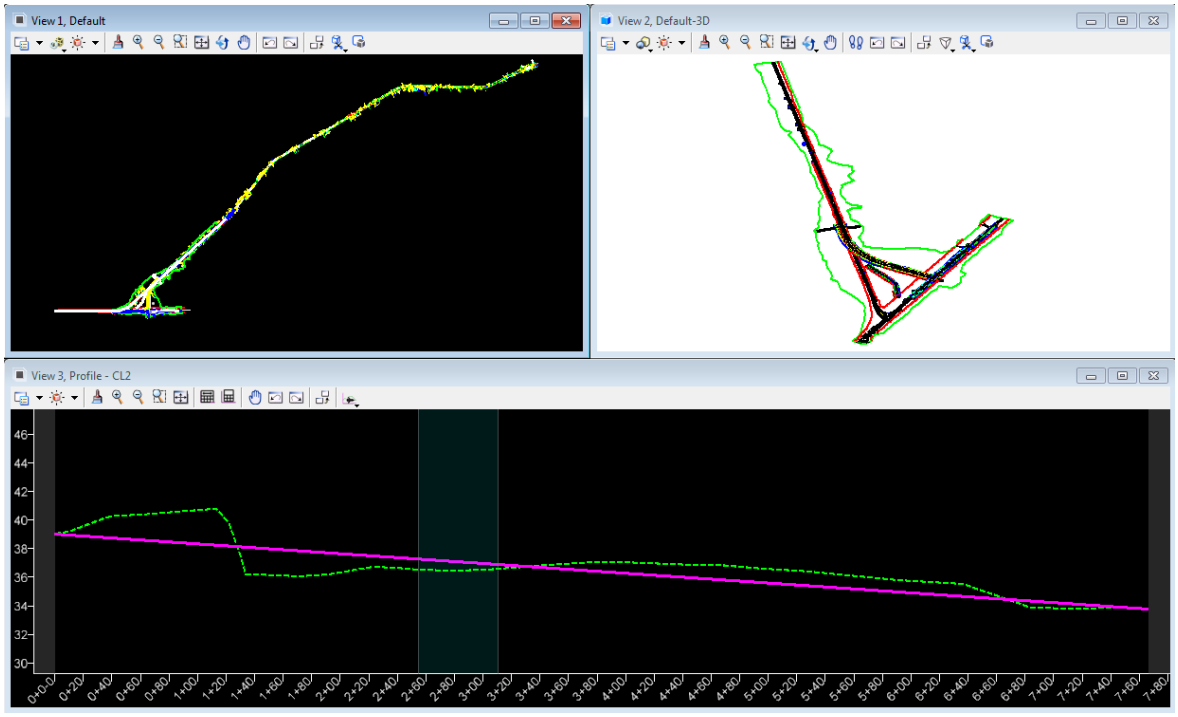




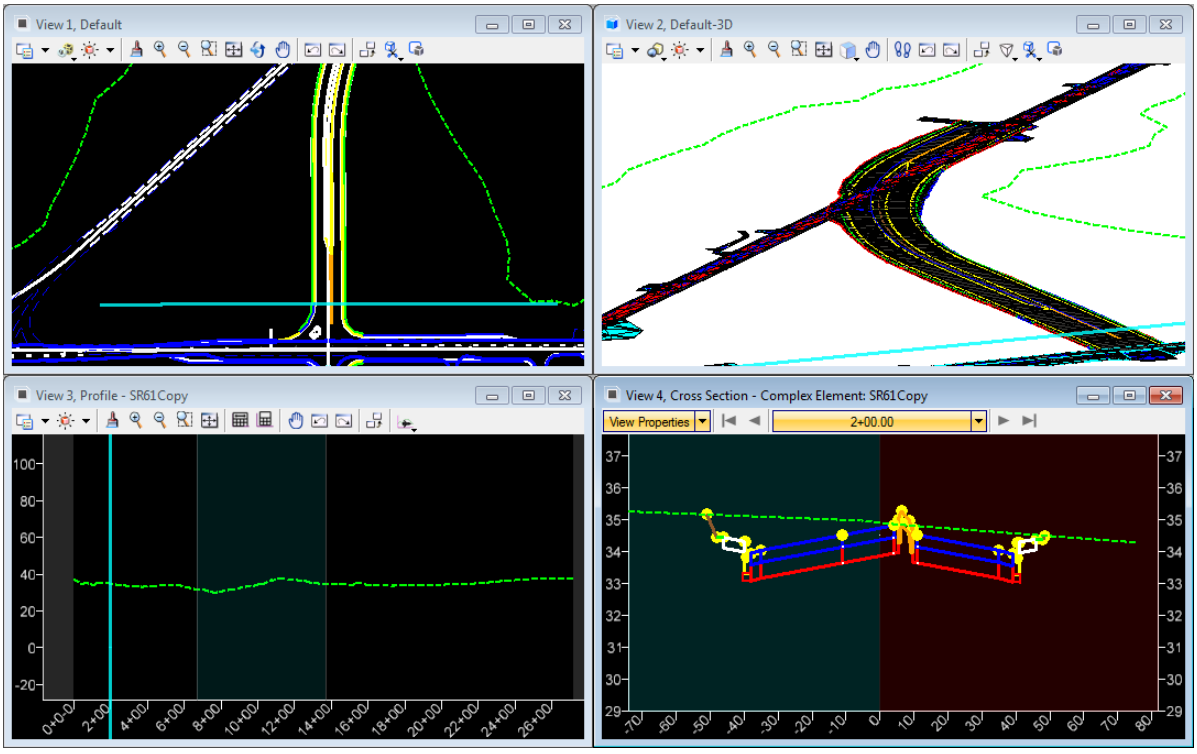
- Function Key **F2** – Open and Fits Two Views Setup; View 1- 2D Plan, View 2-Isometric



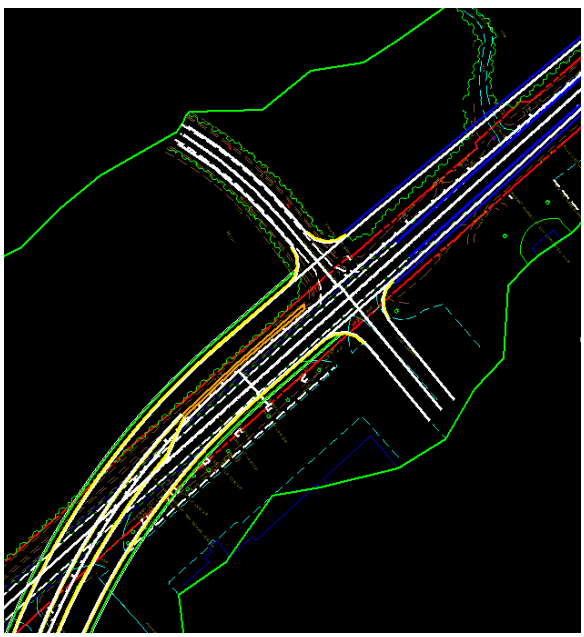
- Function Key **F3** – Opens View 3; Closes View 4 and Arranges Views

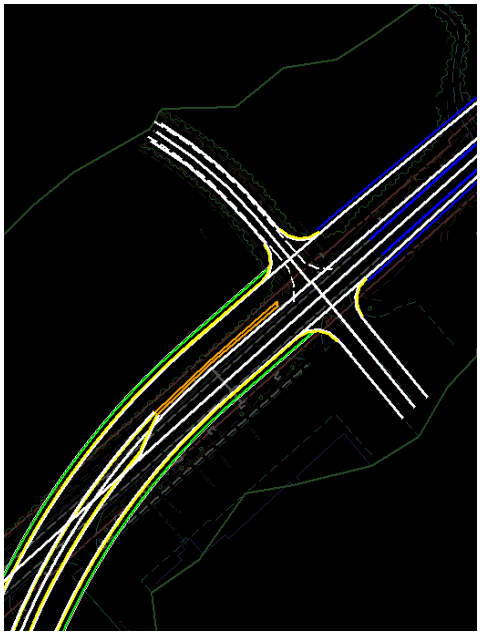


- Function Key **F4** – Opens and fits Four View Setup; View 1- 2D Plan, View 2-Isometric, View 3,4 - custom

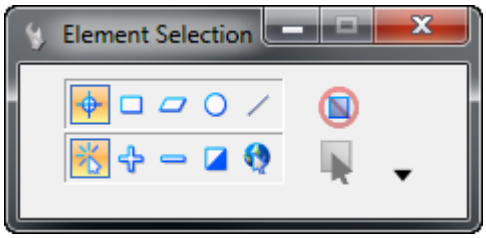


- Function Key **F5** – Toggle Dim References

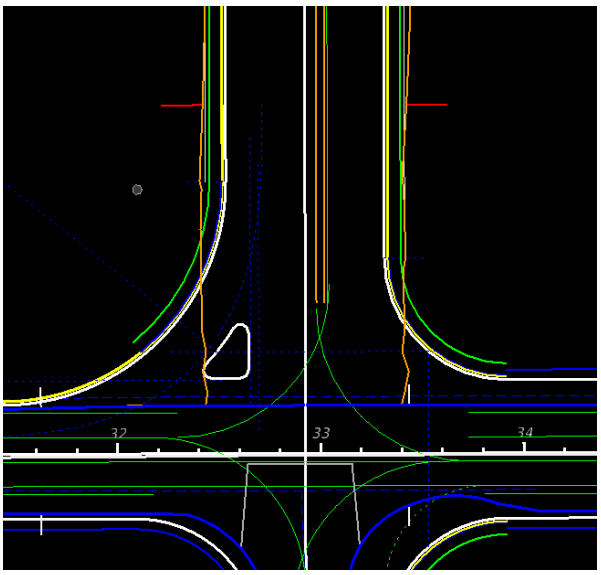


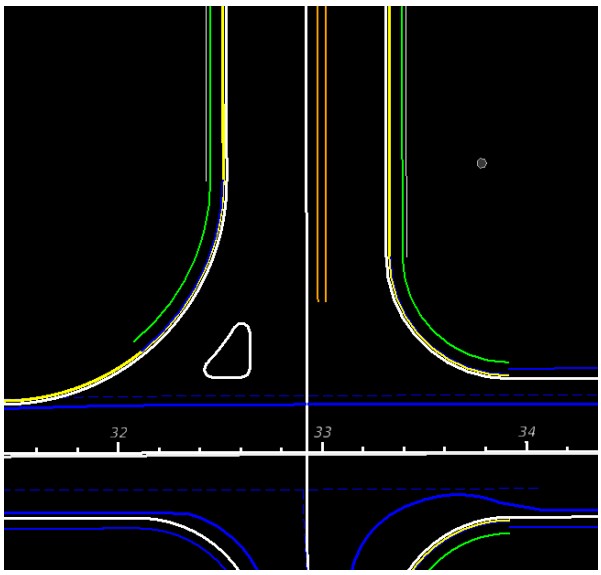


- Function Key **F6** – Resets Out of Any Ongoing Commands.

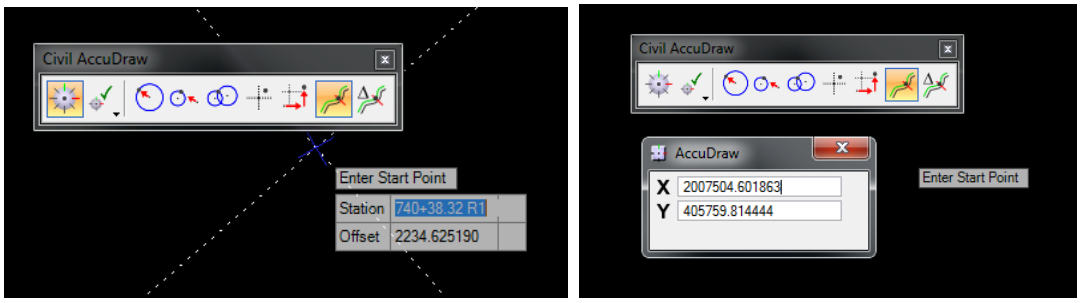


- Function Key **F7** – Toggles On/Off Construction View Attributes

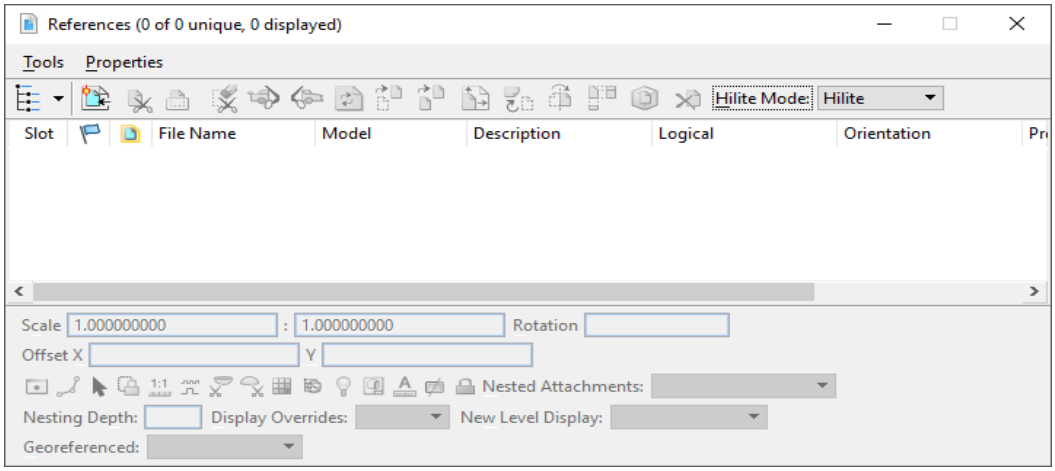




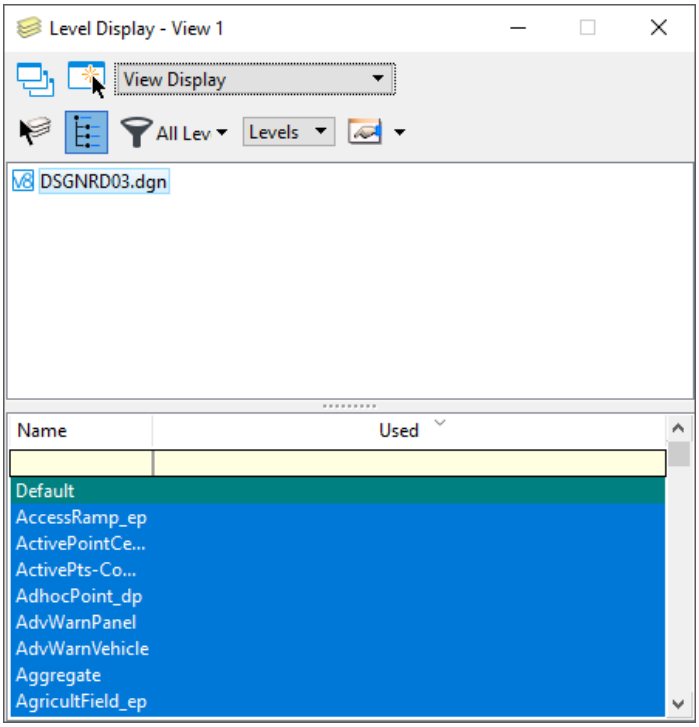
- Function Key **F8** – Toggles Between MicroStation AccuDraw and Civil AccuDraw



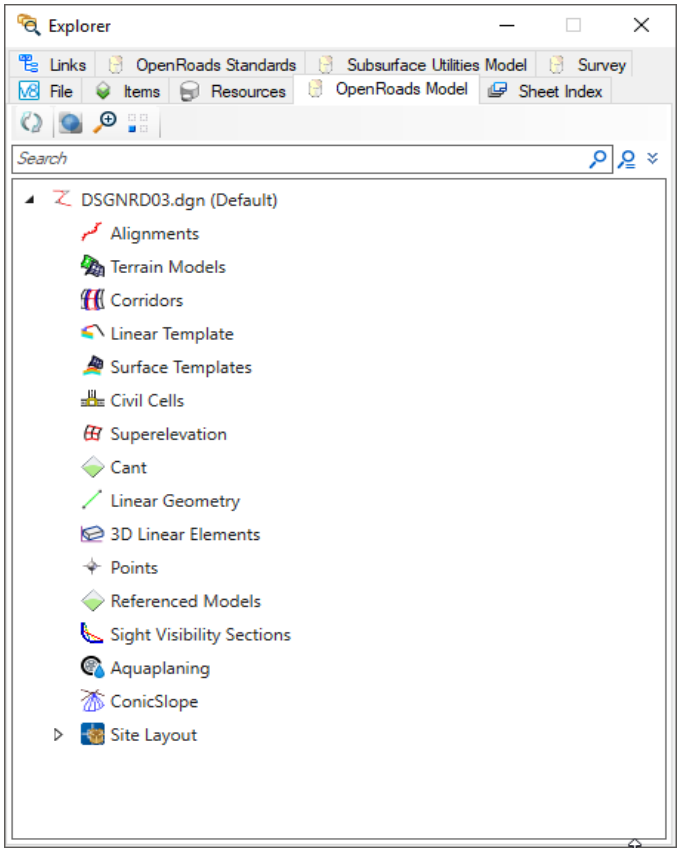
- Function Key **F9** – Toggles Reference Dialog Open\Close.



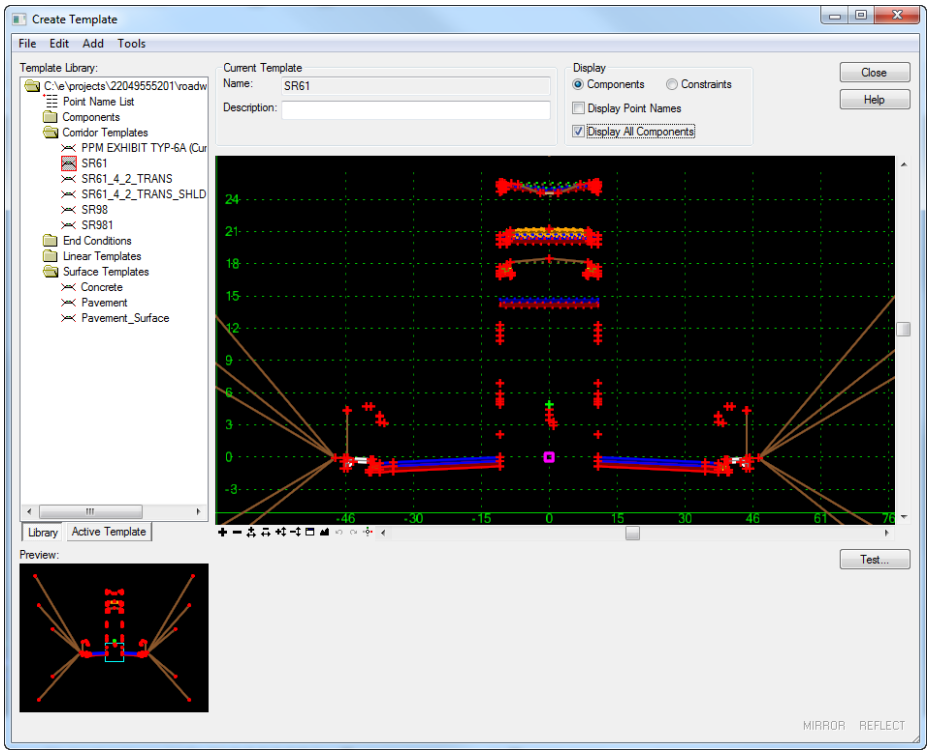
- Function Key **F10** – Toggles Level Display Dialog Open\Close.



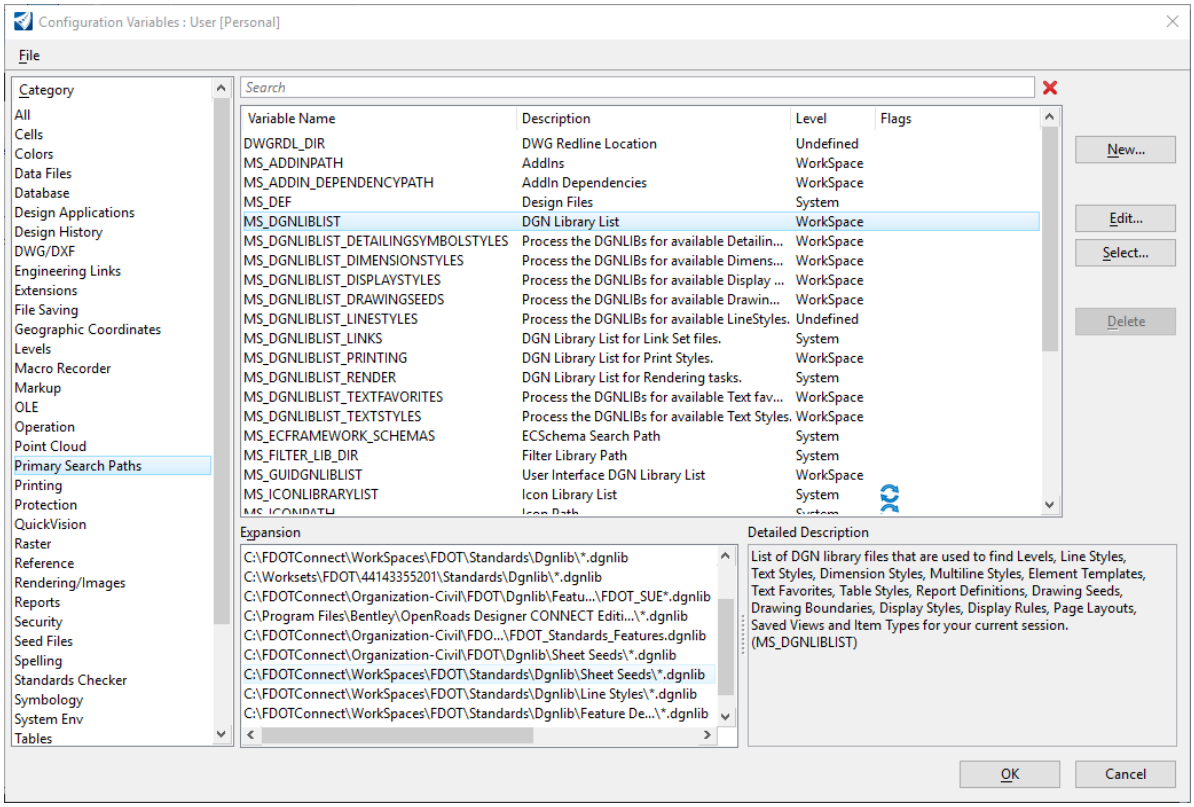
- Function Key **F11** Toggles Project Explorer Dialog Open/Close.



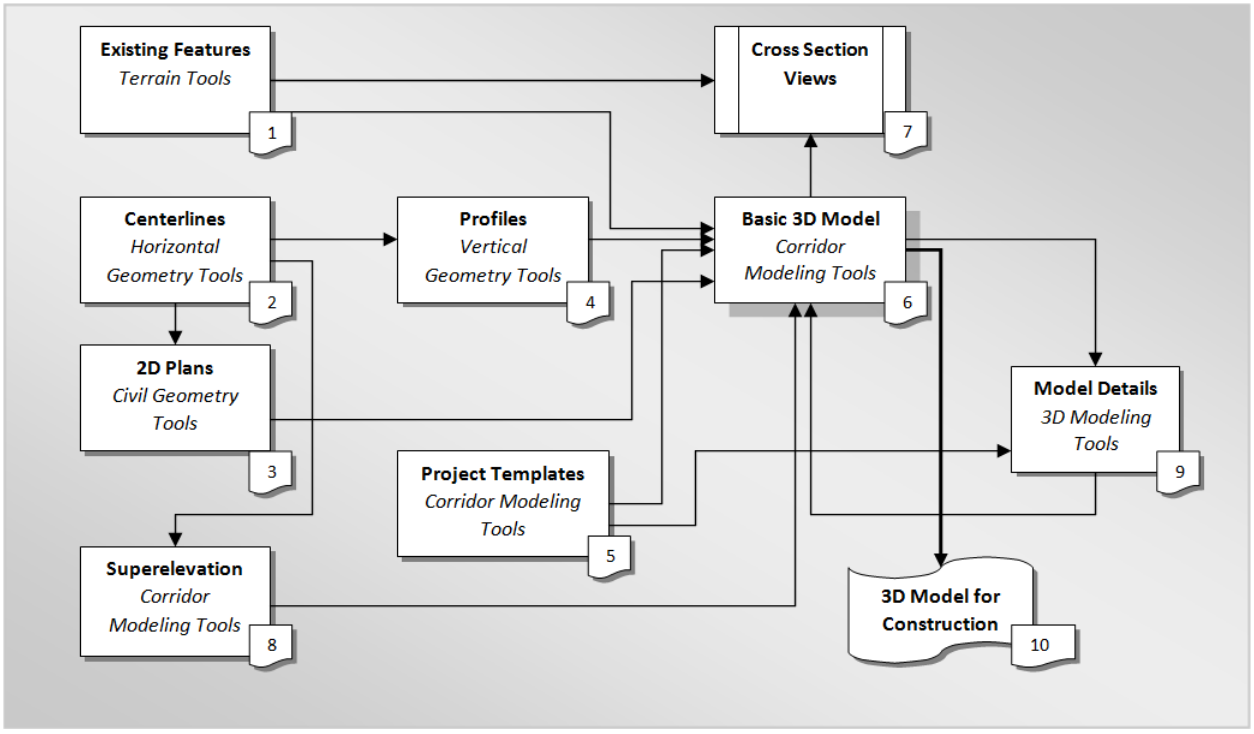
- Function Key **F12** Corridor Modeling, Opens Create Template Dialog.



FDOTCONNECT USER CONFIGURATION VARIABLES



FDOTCONNECT DESIGN AND 3D MODELING OVERVIEW



GENERAL WORKFLOW AND CHAPTER OUTLINE

1. Existing Terrain and Existing Features
2. Design Centerlines Alignments
3. Prepare 2D Plan Layout
4. Design Profiles
5. Define Project Templates
6. Create 3D Design Model and add 2D References
7. Create Cross Section View
8. Define Superelevation and Assign to the Corridor Model
9. Detail Modeling for Intersections, Median Traffic Separator Nose, Side Roads, Driveways, Curbs Ramps, etc.
10. Prepare Construction Deliverables.

RECOMMENDED MICROSTATION SETTINGS

Various tools and settings will be used throughout the workshop. Therefore for quick accessibility, several of the dialogs are better docked on the sides the MicroStation view.

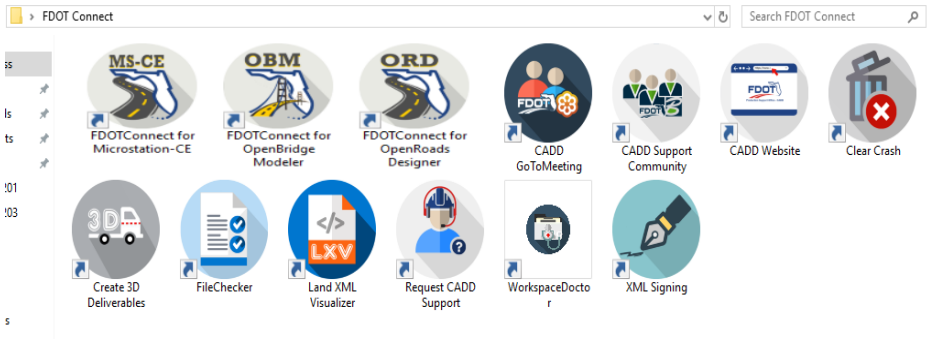
GETTING STARTED

LAUNCHING FDOTCONNECT FOR OPENROADS DESIGNER

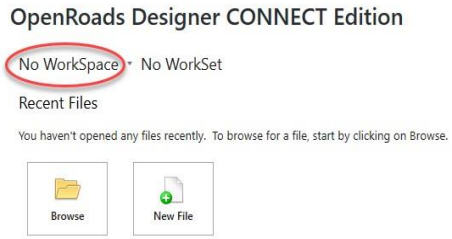
FDOT Connect can be launched from the FDOT – Roadway and FDOT – ROW icons located in the FDOTConnect folder on your desktop. The first time it is launched, it is important to select the FDOT workspace from the workspace dropdown.

1. Find the FDOT Connect launch icons on your desktop or locate the "FDOTConnect" folder on your desktop.

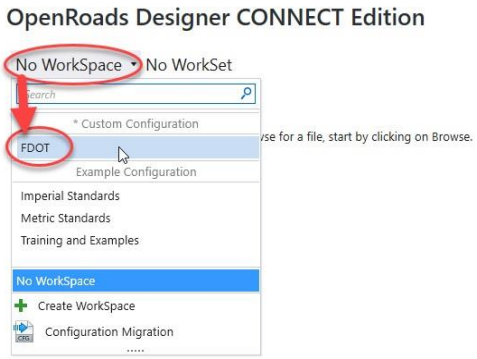
2. Launch FDOTConnect for OpenRoads Designer by double-clicking one of the FDOT icons. Note that your FDOTConnect launch icons will vary depending on which Bentley Connect Edition platforms you have installed. FDOTConnect will create an icon for OpenRoads Designer, an icon for MicroStation Connect Edition (MSCE), and an icon for OpenBridge Modeler (OBM) depending on which of these applications is present on your machine during installation of the Workstation or Client. (This release of FDOT Connect is the "Alpha test" version for OpenBridge Modeler).



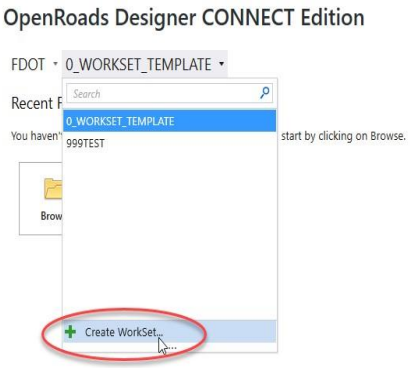
3. In the Workspace/Workset select screen of OpenRoads Designer, select the Workspace selection drop-down menu by clicking on “No Workspace.”



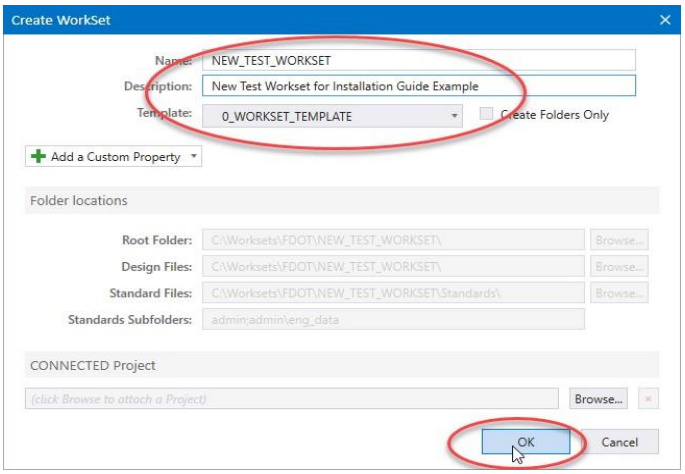
4. Select “FDOT” from the drop-down menu to select the FDOTConnect workspace.



5. From here, you can now create a new WorkSet,,this is done by selecting the drop-down menu, being sure to select the FDOT’s “0_WORKSET_TEMPLATE” as the workset template.

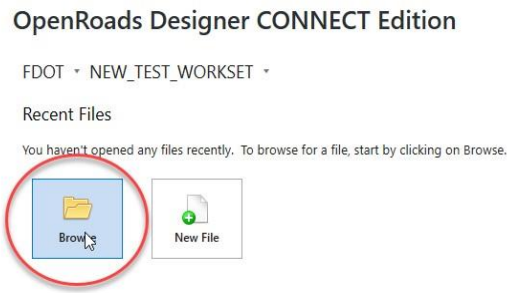


6. Click "**OK**" after filling in the Create Workset dialog.

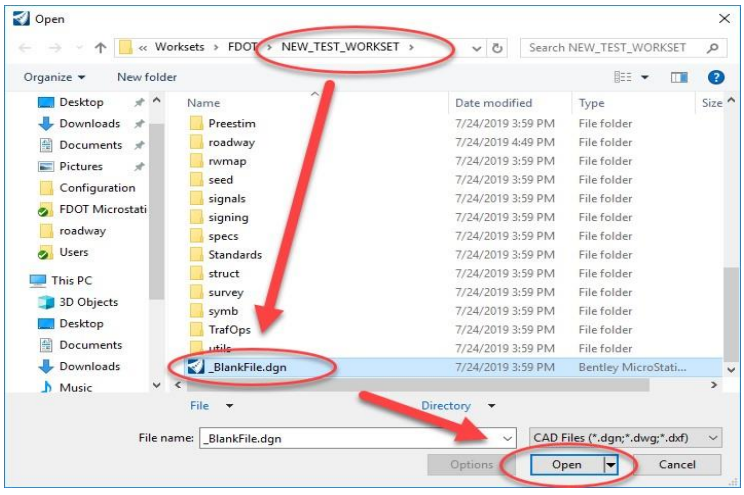


7. After creating a new project using the FDOT Workset Template, you can create new files using the FDOT Create File tool. This tool is launched from within the FDOTConnect workspace, so you must first open a file. The FDOT Workset template includes a blank starting file from which to launch the Create File tool.

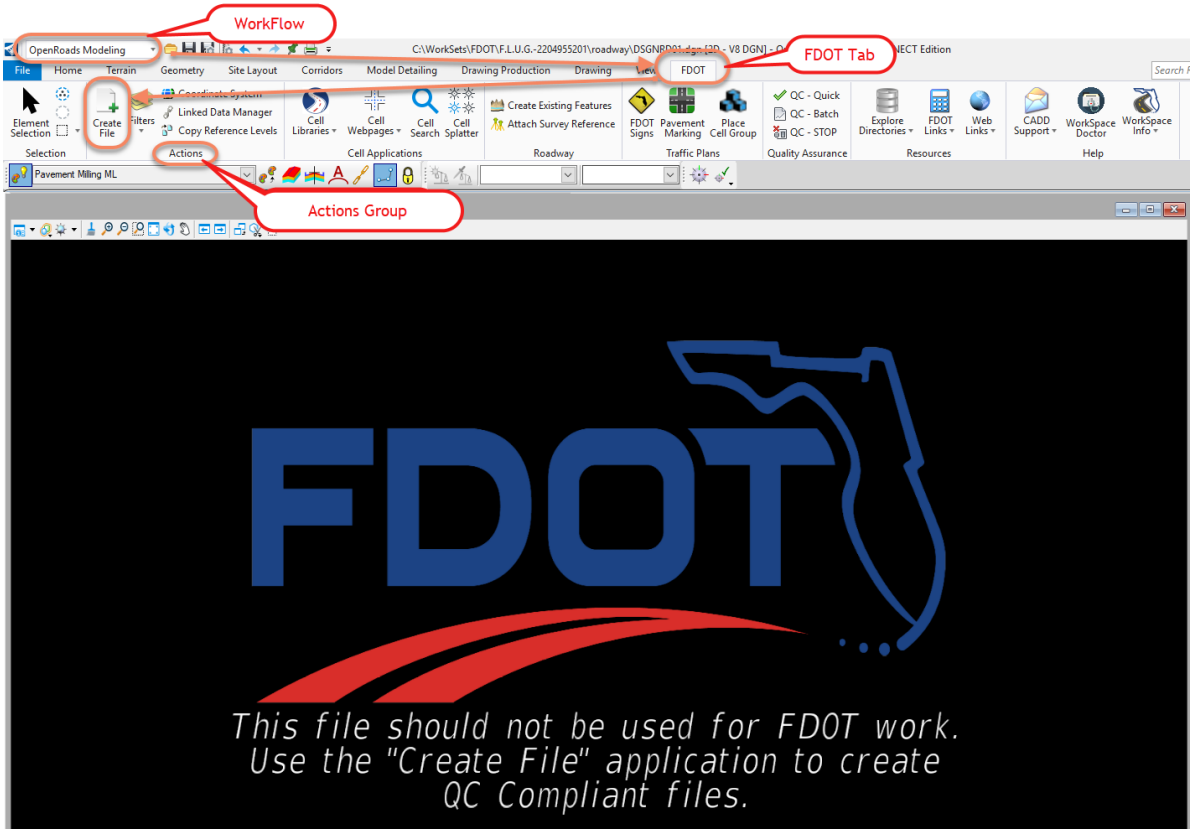
8. From the OpenRoads Designer file open dialog, select "Browse" to browse the contents of your new workset.



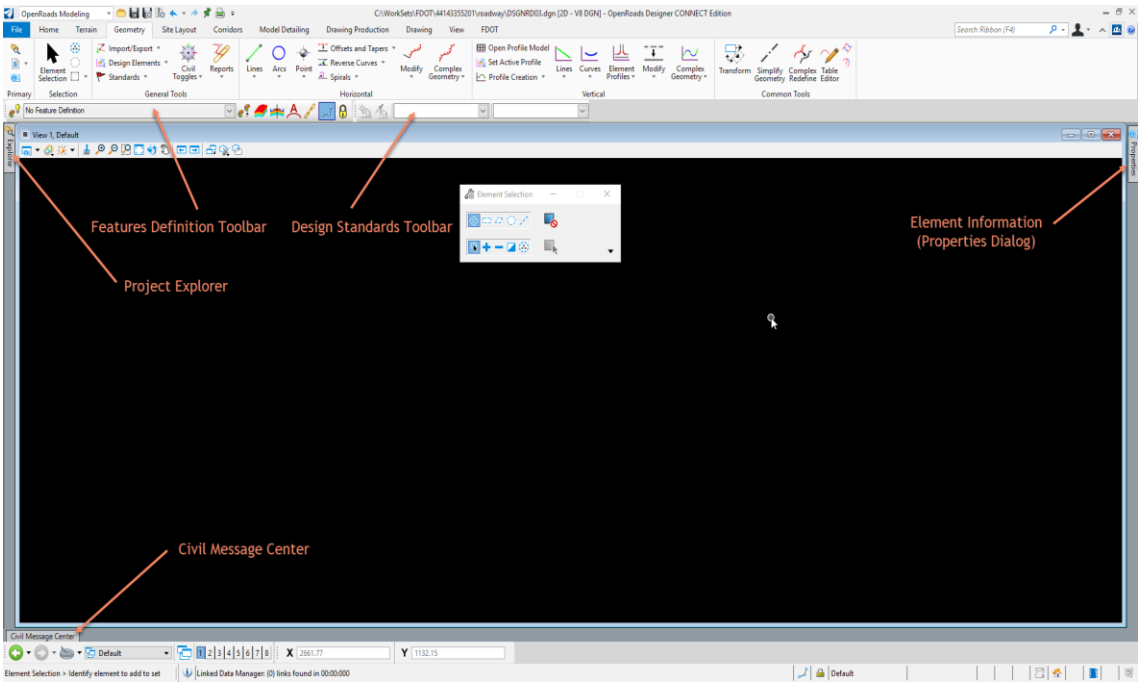
9. Locate "_Blankfile.dgn" at the root of your workset folder structure. Select this file and then select "OPEN" to open it.



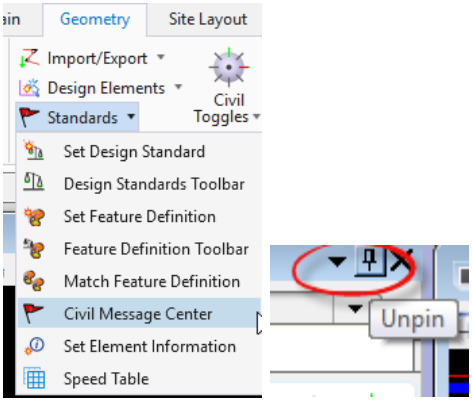
10. When the FDOTConnect Workspace opens, you can locate the FDOT ribbon by selecting the "OpenRoads Modeling" workflow from the menu at the top left of the screen. The FDOT tab is located at the far right of this ribbon. Select "Create File" to launch the Create File tool for creating FDOT project files.



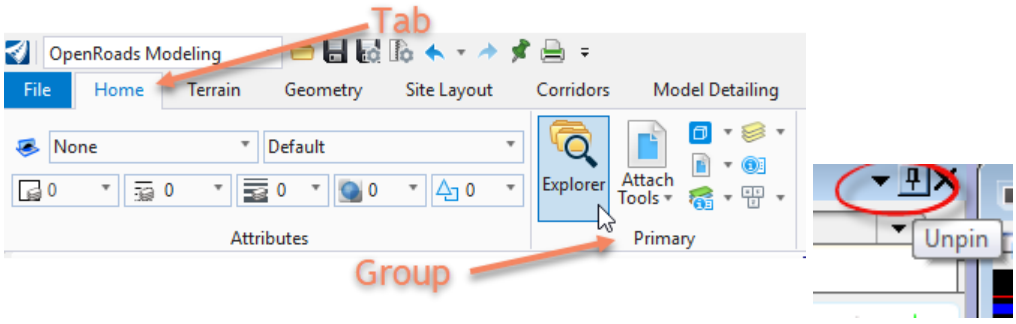
MENU DOCKING



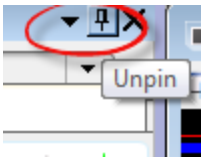
1. Verify that the *Civil Message Center* tool is already docked on the bottom; if not, select it from the *General Geometry Task* group, dock and unpin.



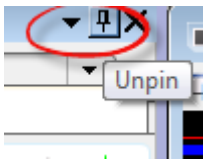
2. Verify that the *Project Explorer* is docked on the left side; if not, from the Ribbon select the Home tab then in the group named primary click on the explorer icon…Or use the F11 function key to toggle ON/OFF the dialog.



3. Verify that the *Level Display* is docked on the right side; if not, from the FDOT-Function Keys press F10, dock and unpin.



4. Verify that the *Element Information* is docked on the right side; if not, this can be brought up by selecting Ctrl+I , dock and unpin.



HINT Many of the dialog settings are stored in user preferences defined in xml data files located in the users data folders i.e. C:\Users\rd964vd\AppData\Local\Bentley\OpenRoadsDesigner\10.0.0\prefs.

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1 CENTERLINE ALIGNMENTS

INTRODUCTION

This chapter will introduce three (4) important OpenRoads Technologies for creating geometry/line work while designing in FDOTCONNECT. They are:

- Feature Definitions
- Civil Geometry Design Intent
- Design Standards
- Annotation Groups

We would like to introduce the user to a new workflow terminology using the Ribbon if you see a direction like this

OPENROADS MODELING>GEOMETRY>HORIZONTAL>Lines>Line From Element>**Simple Line From Element**

This means we are in the **WorkFlow** of **OpenRoads Modeling** which has a **Tab** named **Geometry**, and has tools that are located in the **Horizontal Group**. Now that we are in the right workflow, Tab and Group we may need to click on a tool that has more than one option.

FEATURE DEFINITIONS

As defined in the Bentley Civil Tools help files:

> *"Feature Definitions are used to control symbology, annotation, and various other properties that are applied to the geometric elements. . The feature definitions are used to:*
>
> - *Define what the geometric elements actually are. What is being modeled such as curb, centerline, edge of pavement, etcetera.*
> - *Control symbology in various views, including capability to define differing symbology in plan, profile, and 3D spaces*
> - *Define terrain modeling attributes (spot, break line, void, etcetera)*
> - *Define surface display characteristics*

An extensive *FDOT_Standards_Features.dgnlib* has been developed for the FDOTCONNECT Workspace to be used for all FDOT projects. All elements placed in the design file should have a defined Feature definition. The Civil Geometry tools can be set with an Active FDOT Civil Features for element creation and assignment. They can be viewed in the Project Explorer and in the Feature Toggle Bar.

CIVIL GEOMETRY - DESIGN INTENT

As defined in the Bentley Civil Tools help file:

> *"Design intent builds associations and relationships between civil elements. Object information (how, where, and by what method it was created) is stored with the object to insure the original intent is retained and honored in the design. If an element is modified, any related elements will recreate themselves based on these stored relationships.*

Civil Geometry or rule-base elements are created intelligently as the tools are used and elements are constructed. The FDOTCONNECT Workspace and design development workflow is highly dependent on using Civil Geometry for the 2D plan layout rather than traditional MicroStation place elements tools.

CIVIL GEOMETRY DESIGN STANDARDS

Also known as Design Geometrics and Criteria and as defined in the Bentley Civil Tools help files:

> *"Design standards can be used to maintain required curvature and other alignment checks when performing geometric layouts. They work at two levels:*
>
> - *Provide values for the element creation tools (for example, minimum radius and transition lengths)*
> - *Check the suitability of complex elements (for example, check for kinks in the alignment)*
>
> *Design standards are very alignment oriented. You may find limited value for using design standards for non-alignment computations.*
>
> *When a design standard is violated, feedback is provided in two ways:*
>
> - *An icon in the graphics on the element that has the problem. Hover over the icon to reveal a tool tip report of the error.*
> - *In the Civil Message Center*

An extensive FDOT_DesignGeometricsCriteria.dgnlib has been developed for the FDOTCONNECT Workspace to be used for all FDOT projects. Alignments created in the design file either with Civil Geometry Tools or Imported should have a set Design Geometrics Criteria. FDOT Design Geometrics Criteria can be viewed in the Project Explorer and in the Design Standard Toggle Bar.

EXERCISE OVERVIEW

In this chapter exercise, the existing roadway Baselines for SR61 and US98 will be imported from a provided (*LandXML)* file. A new Centerline of Construction for the SR61 roadway is required to improve the intersection with US98. The new intersection will be located across from the School entrance on US98. It will be a 90 degree angled intersection from US98. The centerline will require a new horizontal curve following the FDM design guidelines as follows. In order to provide minimal property impacts to a local business on SR61 the alignment will be offset from existing baseline to the west 30 feet and will re-join SR61 at a small skew that does not require a horizontal curve.

Design Geometrics and Criteria	FDOT Design Manual (FDM), Part 2 Chapter 210
Design Speed	45 MPH
Facility	Low Speed Desired Length
Maximum Tangent Deflection w/out curve	1 Degree Section 210.8.1
Minimum Horizontal Radius	694 feet Table 210.9.2
Minimum Length of Curve	675 feet Table 210.8.1
Context Class	C3 Max Grade Table 210.10.1

- Low Speed Minimum Length – This will give a minimum Radius at Max Super (emax = .05)
- Low Speed Desired Length – This will give a desired length of curve at Normal Crown

Note Refer to the FDM for Tables

1.1 Import Baseline

1.2 Design New SR61 Centerline

1.3 Import Side Roads

1.4 Baseline Side Road Design from BL98

1.5 Using Annotation Groups to Label Your Alignment Features

Exercise 1.1 Import Baseline

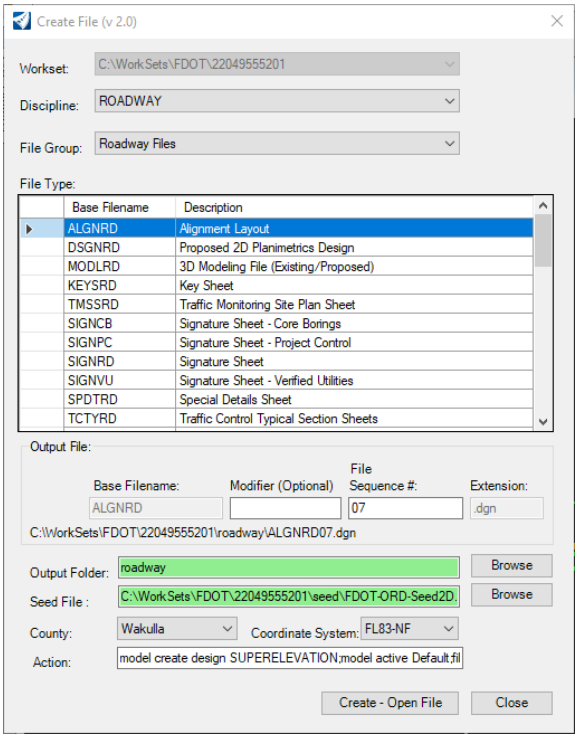
Import Baseline In this exercise, the user will create a new design file and import chains from the LandXML file provided from the survey.

1. From the desktop FDOTCONNECT folder, double-click on the **FDOTConnect for OpenRoads Designer** icon.

2. Navigate to FDOT Ribbon Tab of the OpenRoads Modeling WorkFlow looking for the Actions Group click on the create file.

   *OPENROADS MODELING>FDOT>**ACTIONS***

3. Create a ***ALGNRD01.dgn*** file with the dialog as shown below.



   a. From the Create File Dialog box pick the Base Filename of ***ALGNRD***

   b. Select your County, by selecting this the correct coordinate system will be selected.

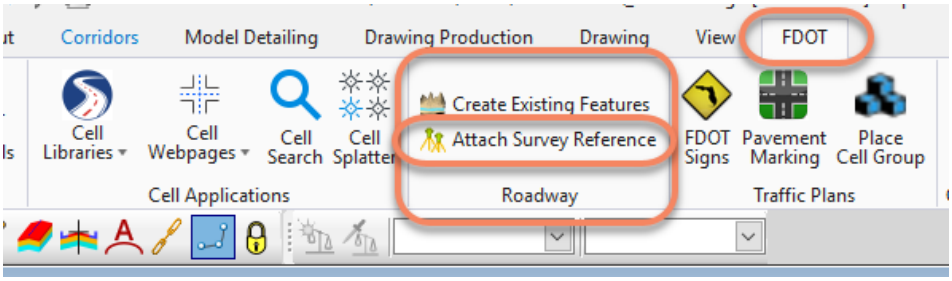
   c. Click **Create - Open File** to create the file, *ALGNRD01.dgn*.

   d. You are now in the *ALGNRD01.dgn* Click **Close**.

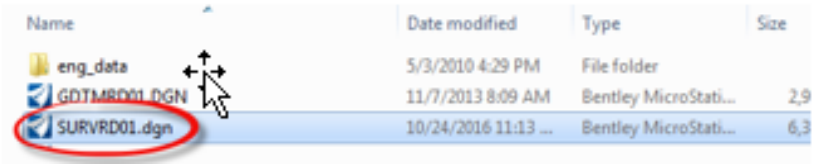
   e. Navigate to the models Dialog, you will notice that during the creation of the ALGNRD a new model of SUPERELEVATION was created.

4. If the SURVRD file exists use the **Attach Survey Reference** tool which is located on the FDOT Tab, with in the Roadway Group. These Tabs and Groups can be found within the OpenRaods Modeling WorkFlow. Otherwise, skip to step 7.

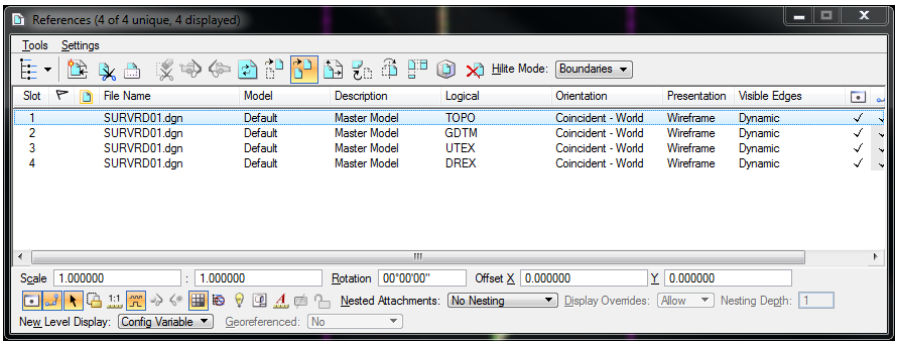
   *OPENROADS MODELING>FDOT>**ROADWAY***



5. Select the *SURVRD01.dgn* file.



6. From the Function key F9 (toggles on the Reference Dialog) to view the attached files:



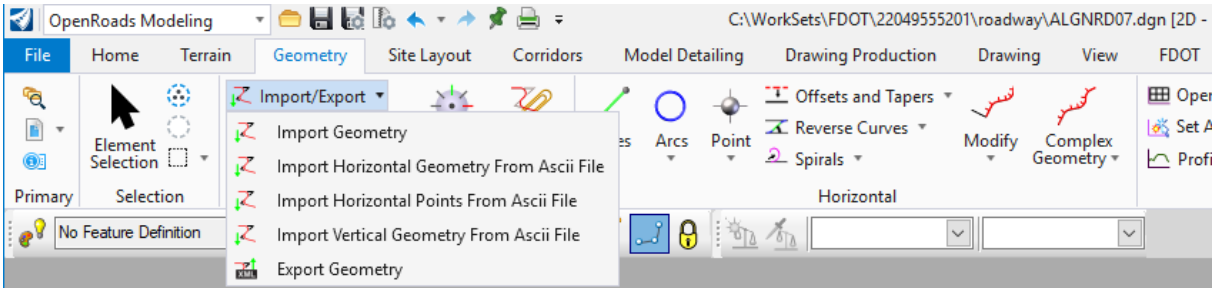
7. From the Function key F9 (toggles on the Reference Dialog) and attach the following files:

   - C://e/projects/survey/*TOPORD01.dgn (disregard if SURVRD exists)*
   - C://e/projects/rwmap/*RWDTRD01.dgn - Set the Logical Name to RWDTRD*
   - C://e/projects/roadway/*AERIALS.dgn - Set the Logical Name to AERIALS*

8. Fit View and Save Settings, select Ctrl F.

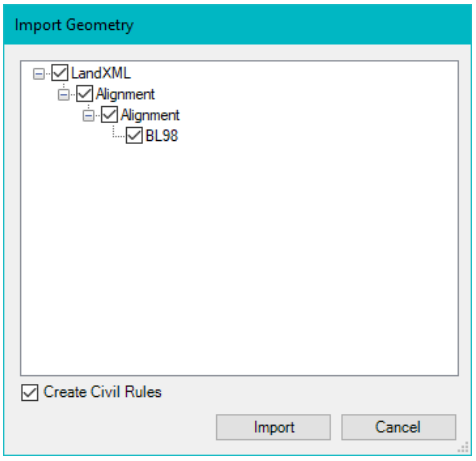
9. Use *the OpenRoads Modeling workflow to locate the Geometry Tab, then in the General Tools Group is where you will find import tools,* **Import/Export** tool – import Geometry and select the Landxml file in the *Roadway* folder to import alignments. We are looking for the file name BL98.xml.

   *OPENROADS MODELING>GEOMETRY>GENERAL TOOLS>Import/Export>**Import Geometry***



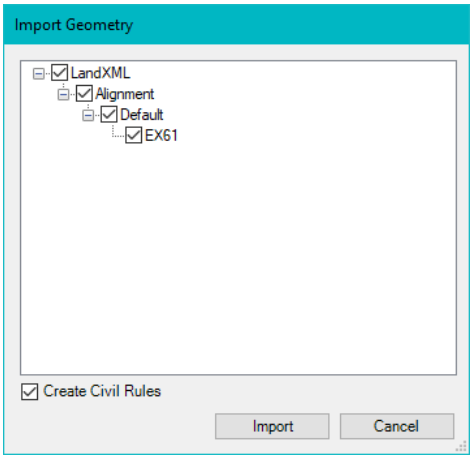
a. Navigate to the **Alignment > Alignment>BL98** folder.

b. Click in the box to select **BL98.**



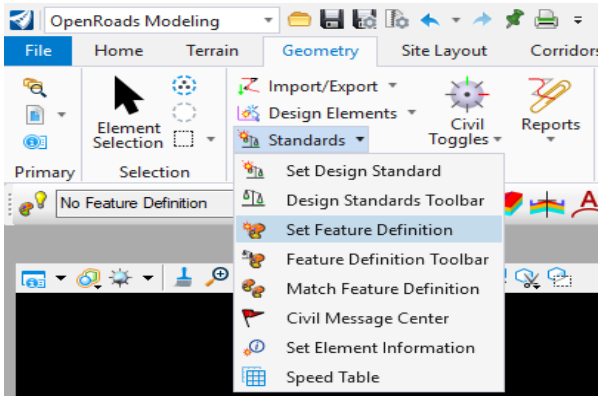
c. Click **Import.**

d. Repeat this process to import the existing baseline for SR61. The file name of this LandXML is EX61.xml.



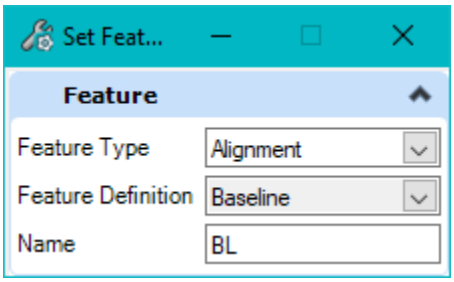
10. Zoom to the intersection of EX-SR61 and US98, hover over the baseline to verify the alignment imported in the previous step. You will notice that the Baseline for US98 already has a Feature Definition assigned to it.

11. Use *Geometry Tab, and the General Tools Group*, and then click on the Standards icon bring up the dropdown list that for the Set Feature Definition Tool. OPENROADS MODELING>GEOMETRY>GENERAL TOOLS>Standards>Set Feature Definition



a. Set the *Feature Type to Alignments.*

b. *Set the Feature Definition* to **Baseline.**

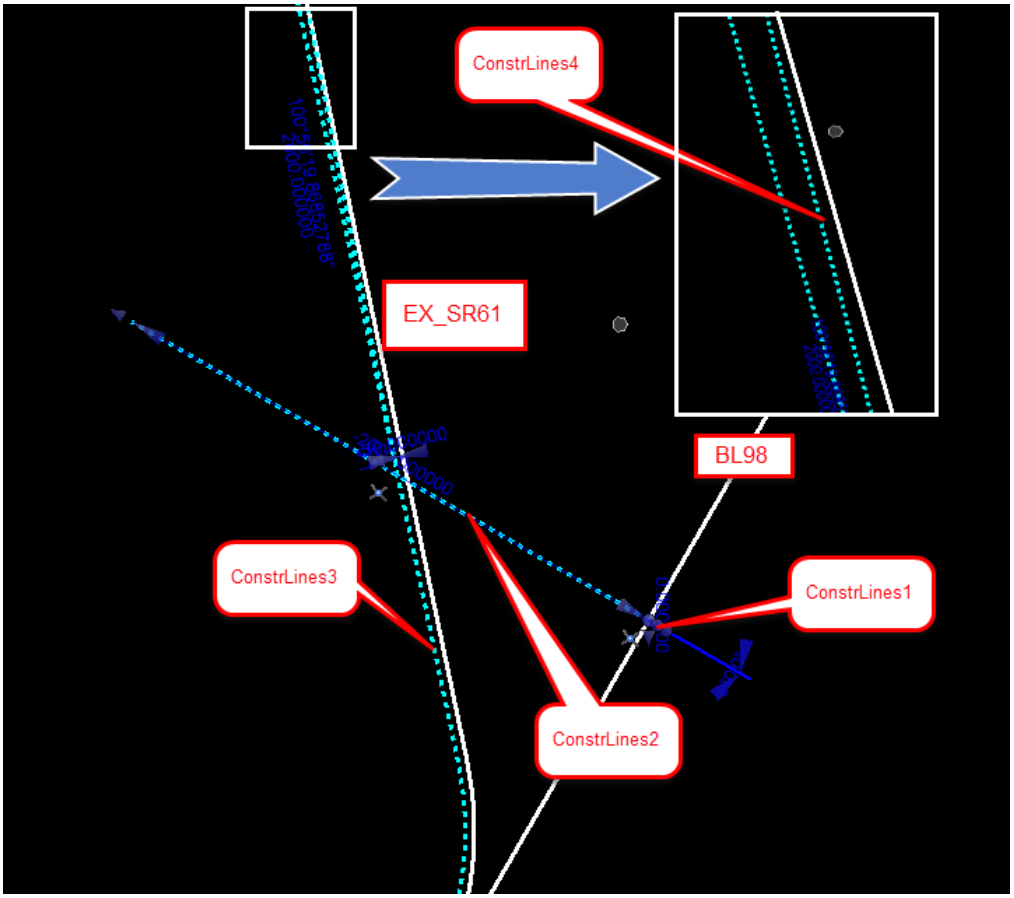


c. Select the **EX-SR61**, then click **Reset** to set the **Baseline** *feature* on the line.

12. Select the **Element Selection** to exit the command, you can also do this by the function Key F6.

Exercise 1.2 Design New SR61 Centerline

This exercise will use several Construction lines to create the final Centerline as shown below.

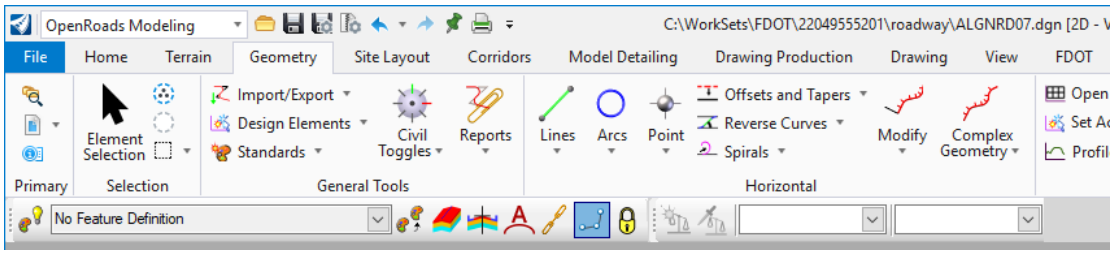


➢ ***ConstLines1***

1. Locate the **Driveway** into the school off US98 between the baseball field and the parking lot.

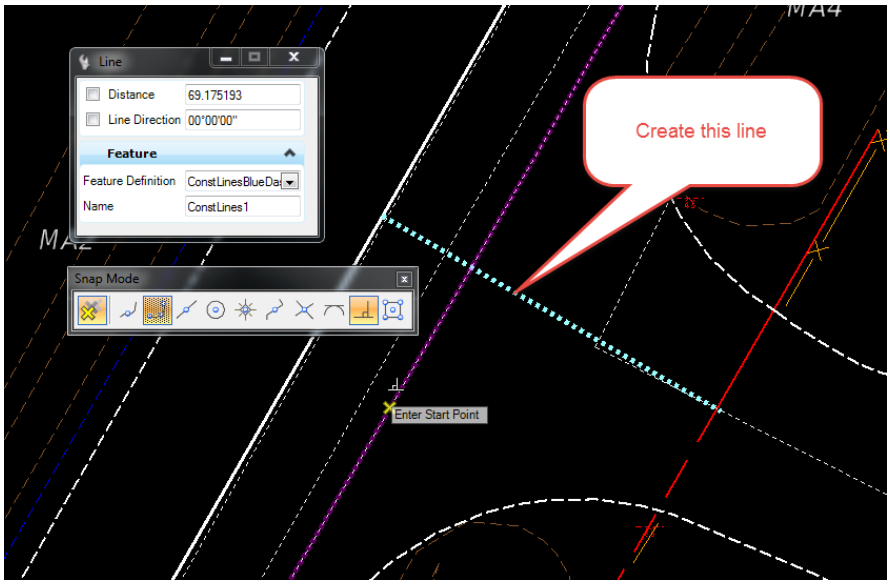
2. Now that the new intersection is located, turn the *display* **OFF** for the *Aerial Reference file.*

3. Use the *Geometry Tab and the Horizontal Group*, to select the **Line Between Points** tool. *OPENROADS MODELING>GEOMETRY>HORIZONTAL>Lines>**Line Between Points***



a. Use *Feature Definition* **Const Lines Blue Dash** and a *Name of* **ConstLines1.** You will have to add the 1 to the name.

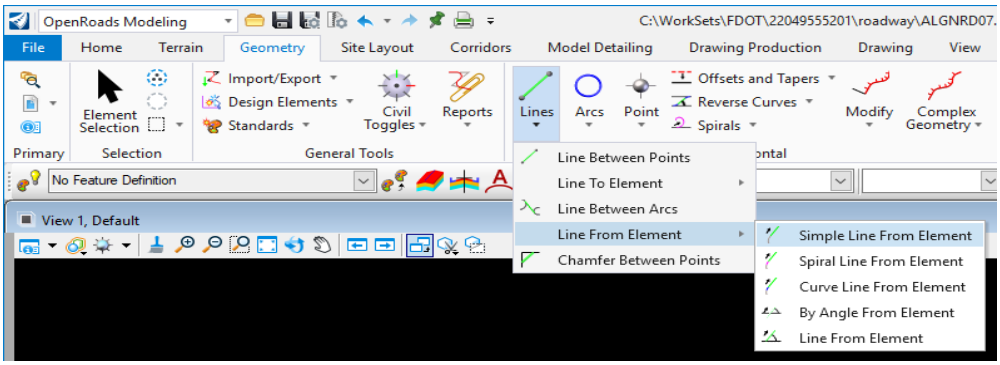
b. Start a line perpendicular to *BL98* and ending at in the middle of the *Driveway*. Be careful not to snap to anything on the second point.



➢ ***ConstrLines2***

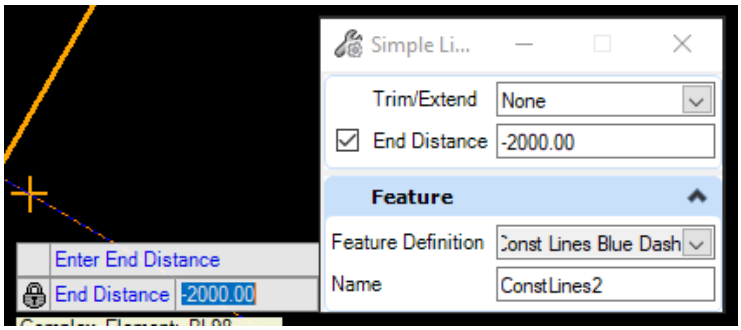
1. Use *the Geometry Tab and the Horizontal Group*, to select the **Simple Line From Element** tool.

OPENROADS MODELING>GEOMETRY>HORIZONTAL>Lines>Line From Element> ***Simple Line From Element.***



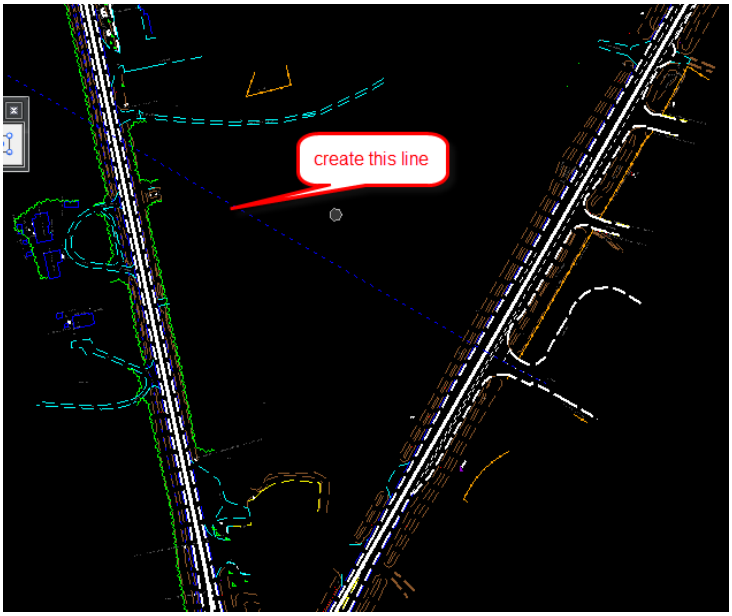
2. Use *Feature Definition* **Const Lines Blue Dash** and *Name* **ConstLines2**

3. First select **ConstLines1,** then use the AccuSnap to locate the beginning of the line at *BL98.*



4. Enter a *Distance* of **-2000 feet**. **Data point** in the View to accept the *Distance*.

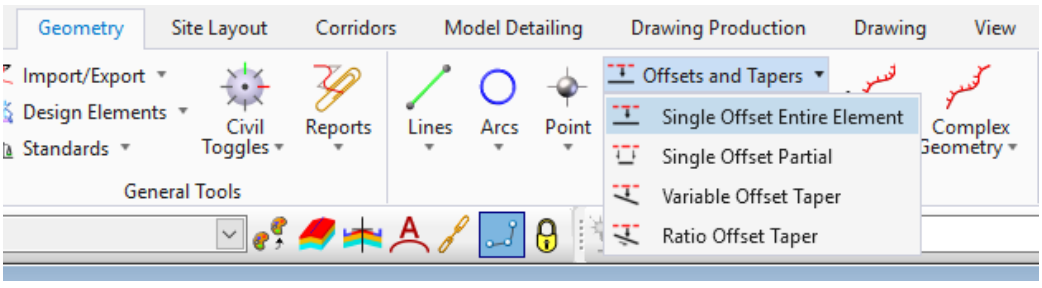
5. Data point to accept Trim None.



➢ ***ConstrLines3***

1. Use the *Geometry Tab and Horizontal Group*, to select the **Single Offset Entire Element** tool.

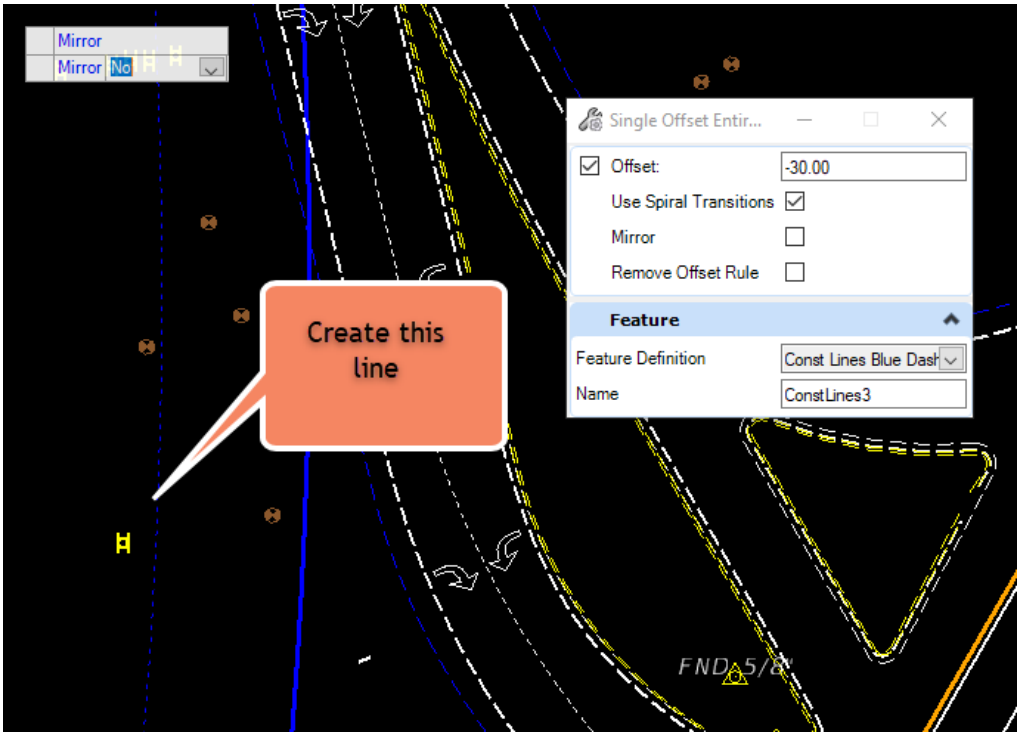
   *OPENROADS MODELING>GEOMETRY>HORIZONTAL>Offsets and Tapers>**Single Offset Entire Element***



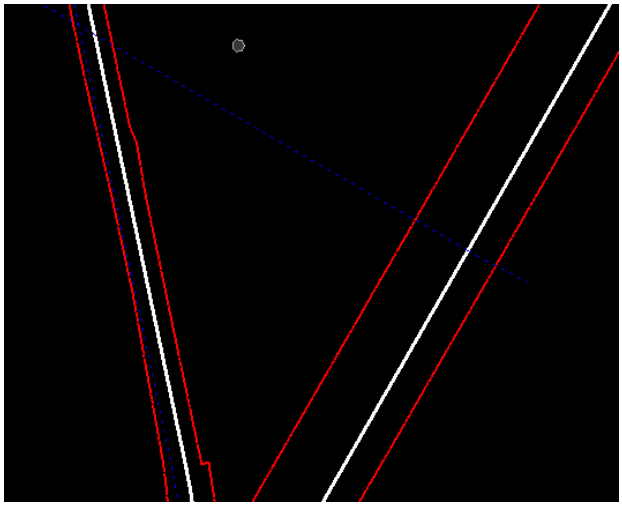
2. Use *Feature Definition* **Const Lines Blue Dash** and *Name* **ConstLines3.**

3. **Data point** in the View to create a line **-30 feet** *Offset* to **EX-61**.

4. Uncheck the *mirror option* to **No**, and click in the **View**.



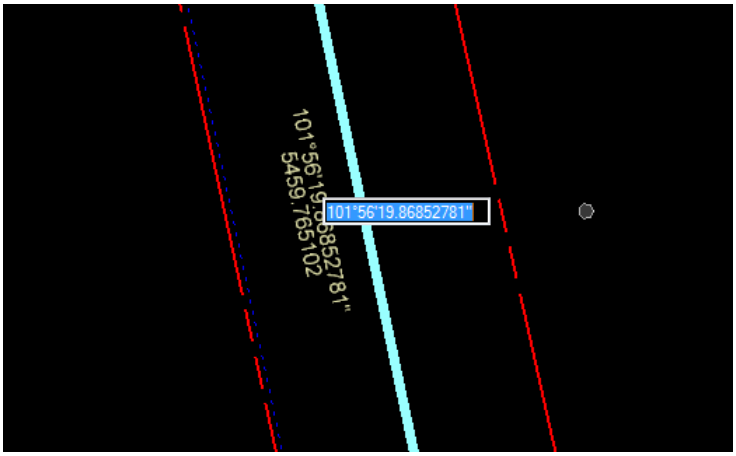
5. Once the new line is created, turn the *Display* **OFF** for the SURVRD with Logical Name TOPO in the *Reference dialog*.



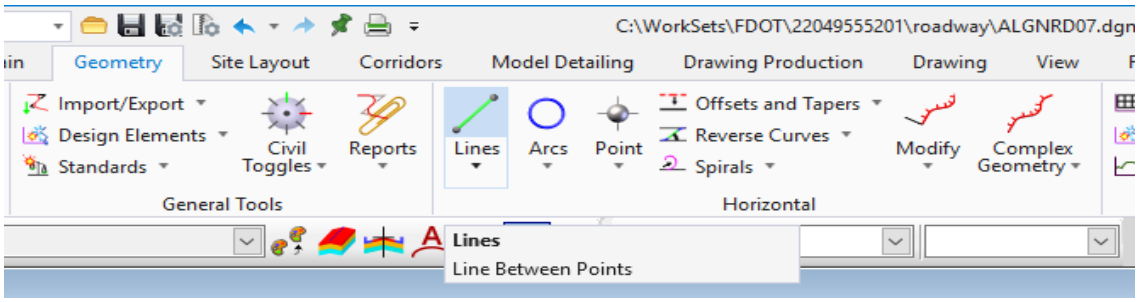
➢ *ConstrLines4*

Next step, create a line from the Offset line to intersect the EX-SR61 line at a 1 degree deflection angle.

1. Find the Bearing *Angle* of **EX-61**, select the element and click the Context Menu **Description**. Copy the *Bearing value* into the buffer space selecting **Ctrl C** <OR> right-click **Copy**. Note: You may have to right click on the element to make the bearing value active in order to copy from it.

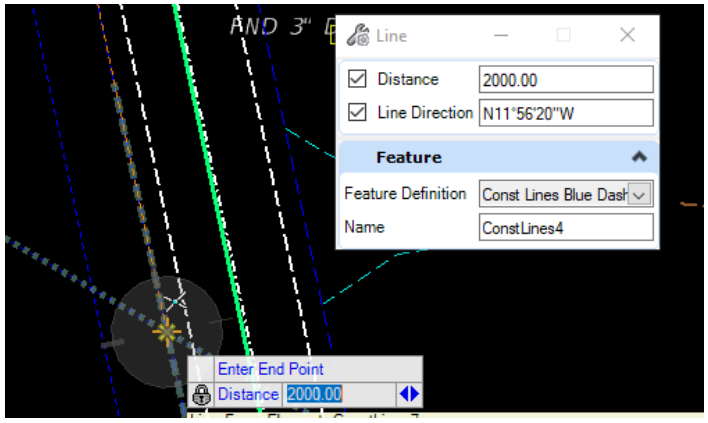


2. Use the *Geometry Tab and Horizontal Group*, to select the **Line Between Points** tool. *OPENROADS MODELING>GEOMETRY>HORIZONTAL>Lines>**Line Between Points***

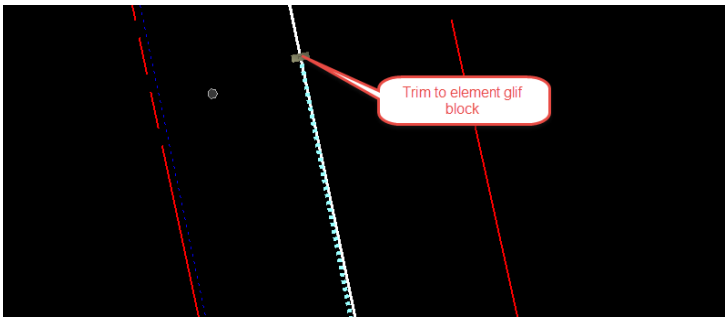


3. Use *Feature Definition* **Const Lines Blue Dash** and *Name* **ConstLines4.**

4. Start a line at the *intersection* of **ConstLine2** and **ConstLine3** (this can be done by selecting the intersection snap) then enter a value of **2000 feet** for the *Length* and use the **Bearing** in the buffer as the *Line Direction* **minus 1 degree**.

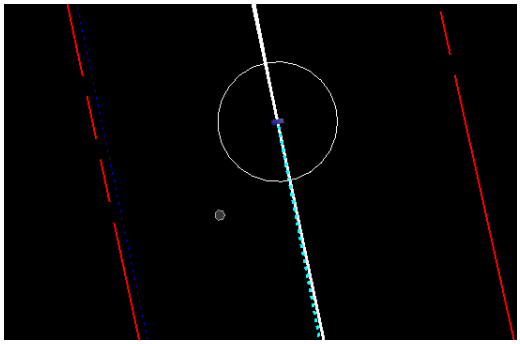


5. Use MicroStation **Trim to Element** and to Trim **ConstLines4** line to intersect **EX-61**. This step will create an interval element with a new Name of ConstLines5.



➢ ***Verify the Construction Lines Maintain Design Intent***

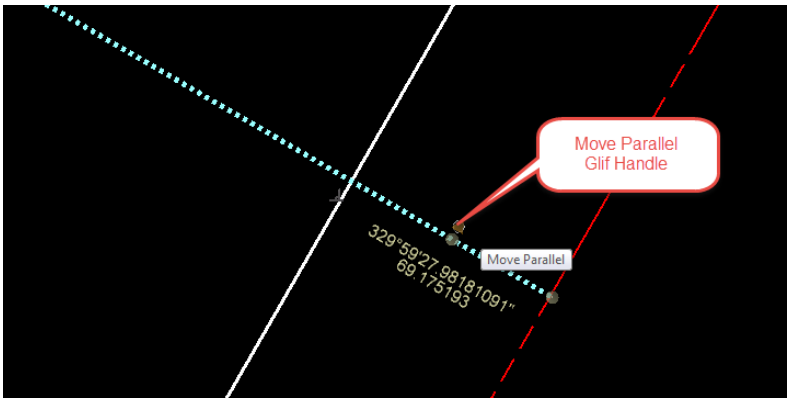
1. Change the Active Level to Scratch1_dp. Use MicroStation Drawing to Place Circle with MicroStation with a center at the end of **ConstrLines5**



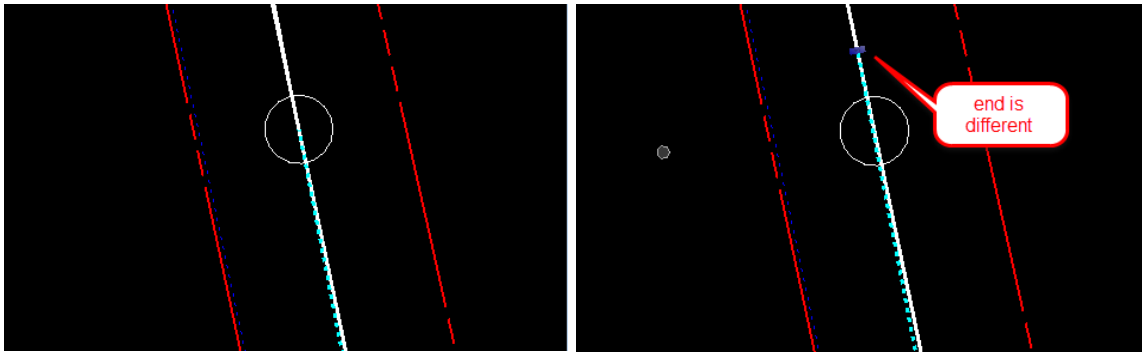
2. Open View 4 and use Copy View from View 1. Zoom into the School Entrance in View 4

3. Move the location of the **ConstLines1** and check the end of **ConstLines5** to see if the location has been corrected.

HINT 1: Select the first line and Use the manipulator tool handle in the middle to move parallel location.



HINT 2: Select ConstLines5, Use MicroStation Undo/ Redo to see the end change location.



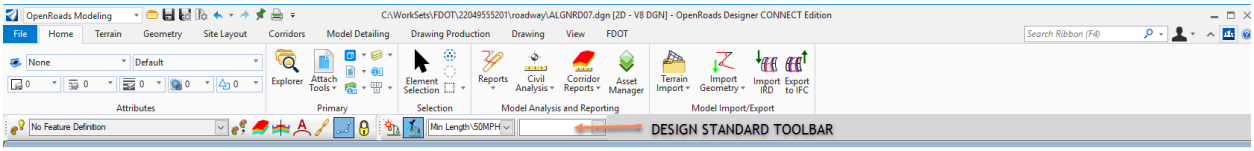
4. Select **Ctrl Z** to undo change.

5. (Extra Exercise) Change the *Offset Distance* of **ConstrLines3** from **-30** to **-40** to verify that the end of **ConstrLines4** will change.

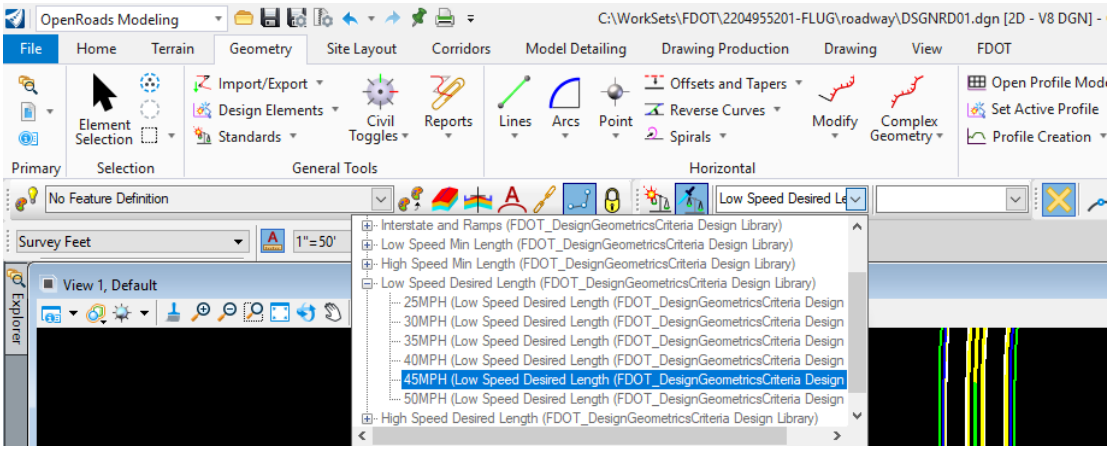
6. Select **Ctrl Z** to undo change.

➢ ***Construct a Horizontal Curve between ConstLines2 and ConstLines5 to Meet Geometric Standards***.

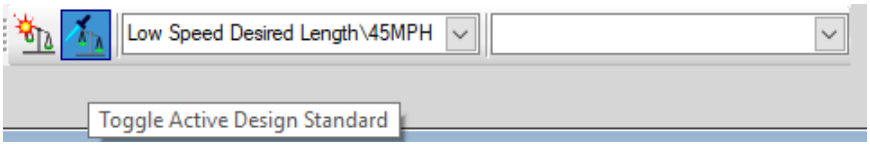
1. Use the **Design Standards Toolbar** that is already docked at the top of the screen.



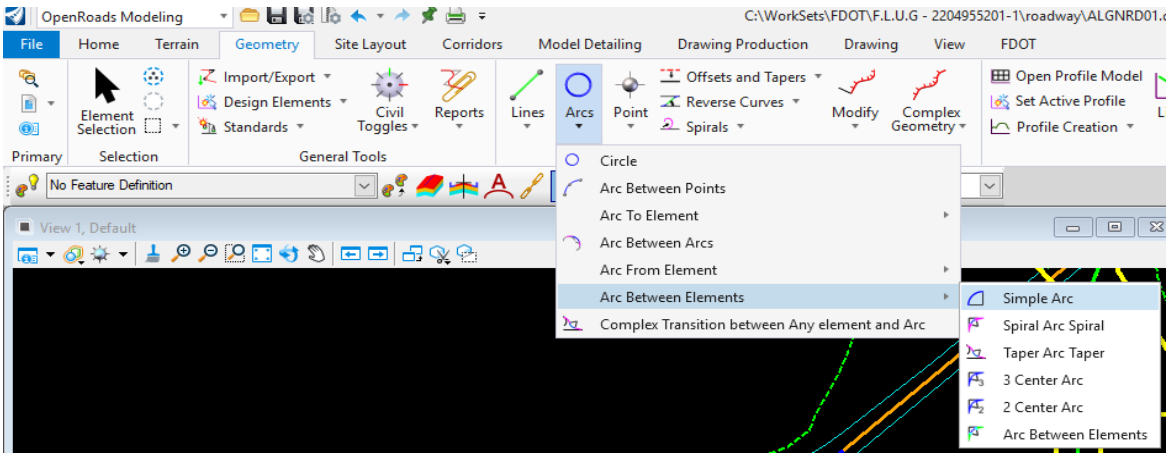
2. Set Active the Design Facility Standard to: Low Speed Desired Length, 45 MPH.



3. Activate the Toggle Active Design Standard icon.

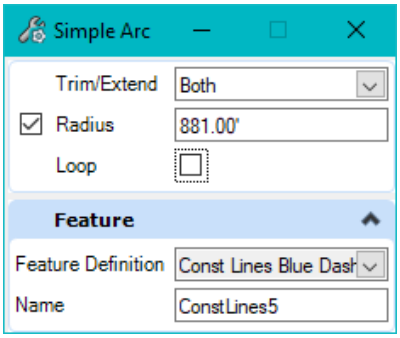


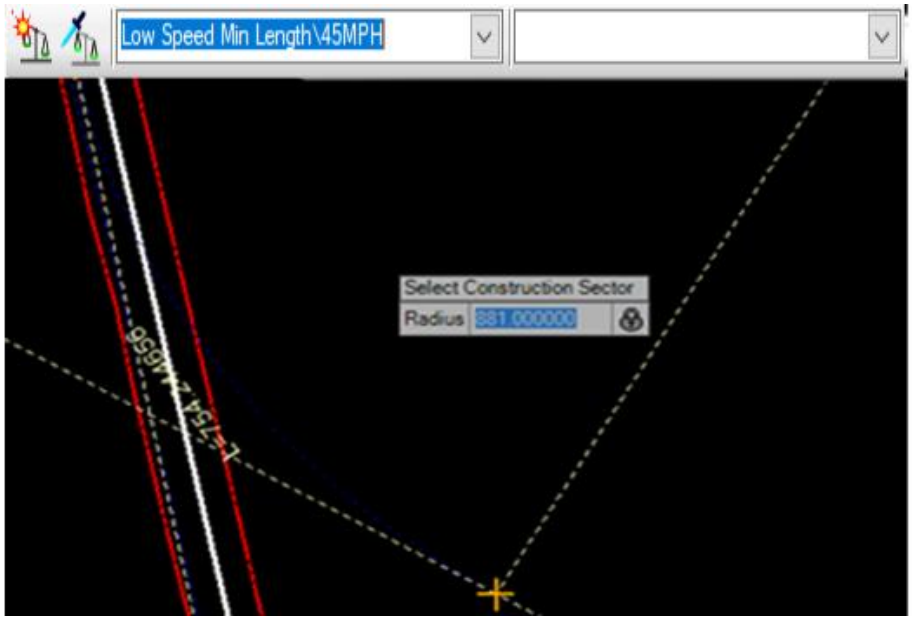
4. Use the *Geometry Tab and the Horizontal Group to select the* **Simple Arc** tool. This tool can be found using the Arcs button then selecting Arcs between Elements Simple Arc *OPENROADS MODELING>GEOMETRY>Arcs>Arcs Between Elements>**Simple Arc***



5. Use *Feature Definition* **Const Lines Blue Dash** and *Name* **ConstLines6.**

6. Create a *Radius* between **ConstLine2** and **ConstLine5** you will notice that setting the Design Standard has set a default value of 2083.00' for the Radius, be sure to change this to 881.00. Set *Trim/Extend* to **Both**.

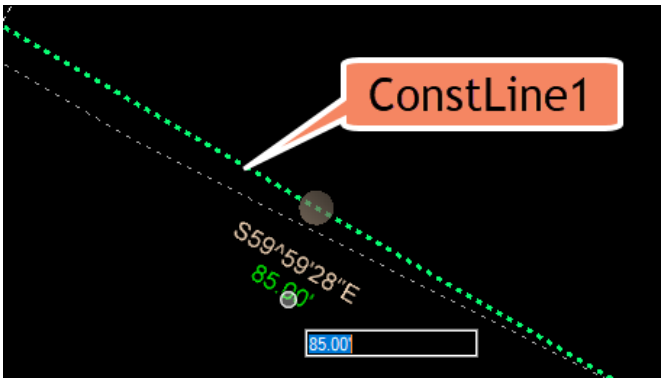




➢ ***Make a Longer Driveway into the School.***

1. Select ConstLine1 using the element selection tool.

2. Select the manipulator for length, click it and change the length from 85 to 105

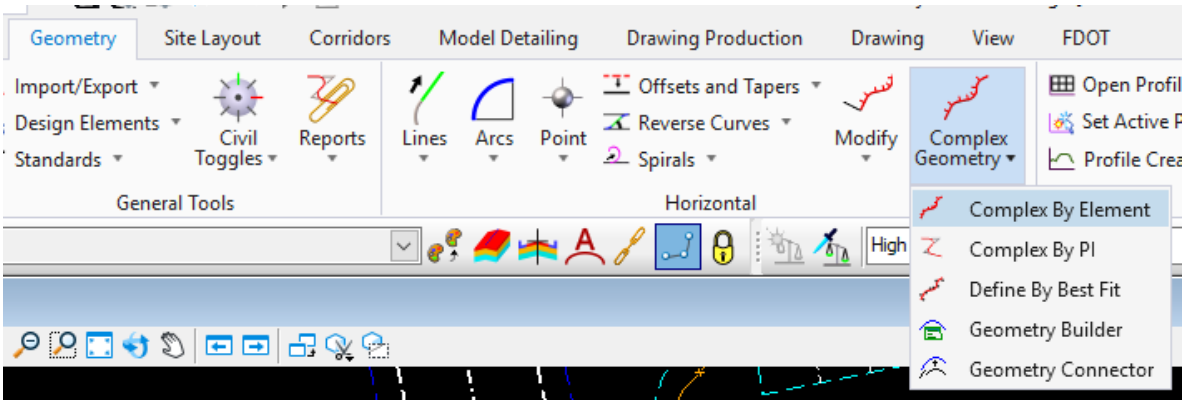


Note After the line is constructed a *Warning* icon may appear on the line because the *Active Design Standard* icon is being toggled **ON** and the *tangent length* may be *less than the minimum* **100 feet**.

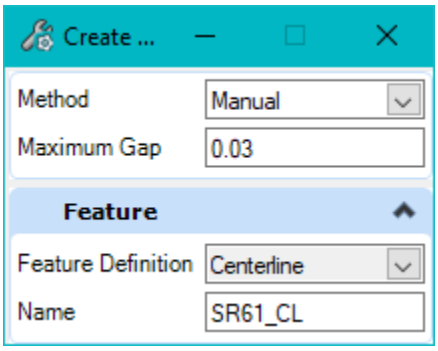
➢ ***Next, Create a Centerline of All the ConstrLines.***

1. Use the *Geometry Tab and Horizontal Group*, **Complex by Element** tool.

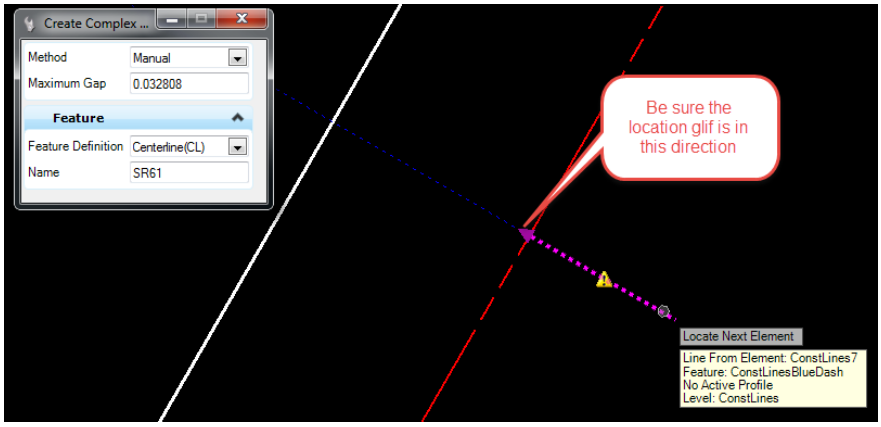
   *OPENRAODS MODELING>GEOMETRY>HORIZONTAL>Complex Geometry>**Complex By Element***



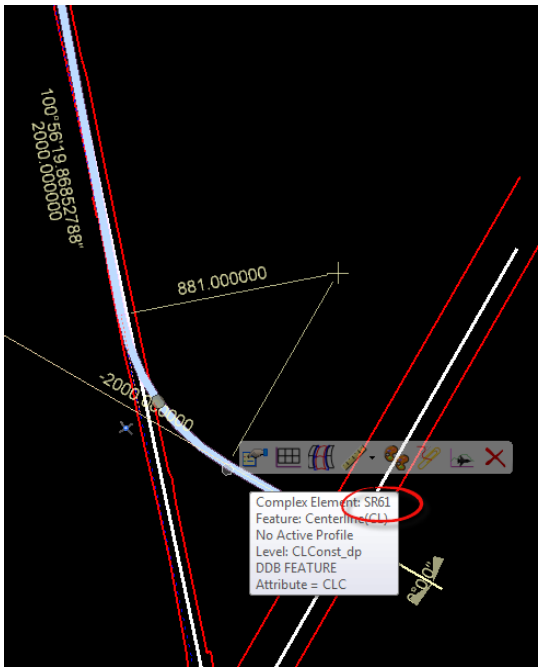
2. Create the new *Alignment* by connecting the elements. Use *Feature Definition* **Centerline** and *Name* **SR61_CL**, with no spaces. Use the **Manual** *Method.*



3. Be careful to select at the school side first and near the start of the line.

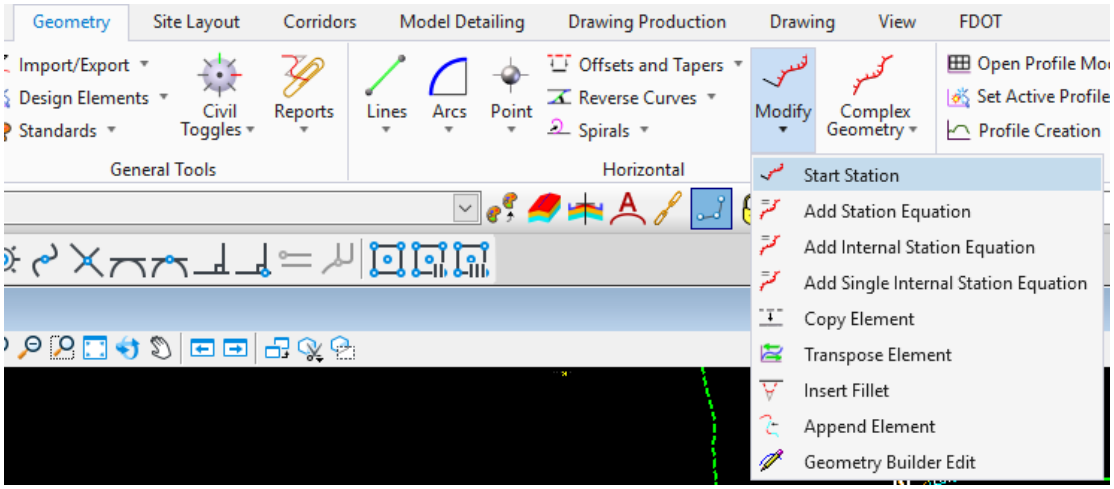


4. Continue until New Centerline is constructed as shown below.

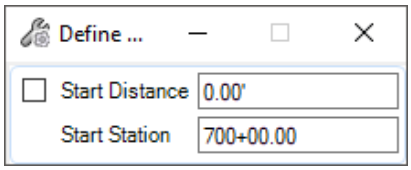


➢ *Set a Begin Station Value at the Intersection of BL98*

1. Use the Geometry Tab and Horizontal Group, Start Station tool under the Modify icon. *OPENROADS MODELING>GEOMETRY>HORIZONTAL>Modify>**Start Station***



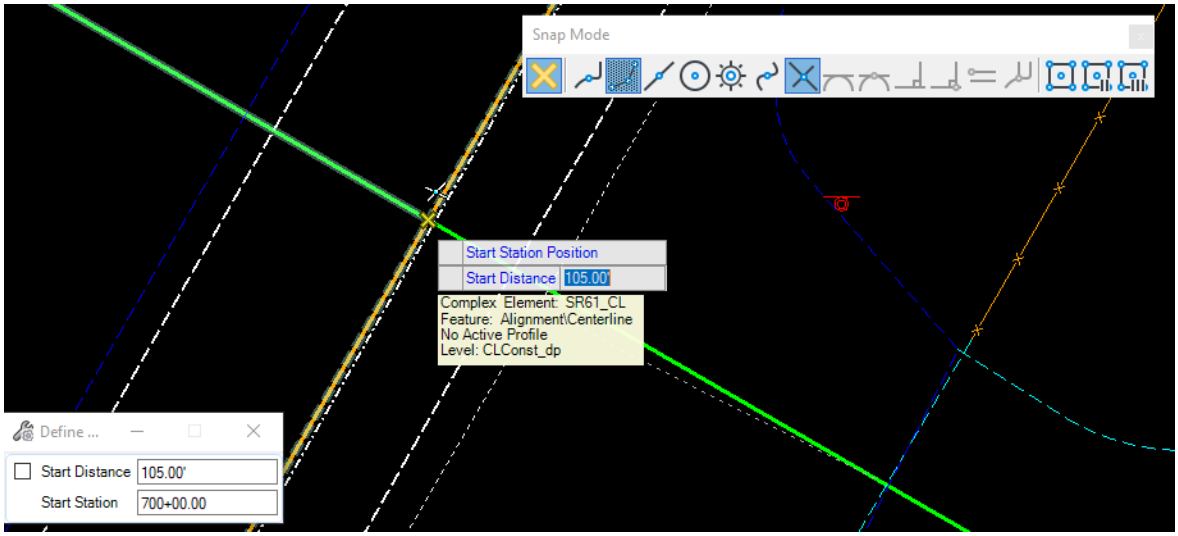
2. Set a *Begin Station* value of **700+00** at the intersection of **SR61** and **BL98**.



3. Select the new **SR61** *Centerline(CL).*

4. Use **AccuSnap** to locate the *Intersection* with **BL98** and **data point** to accept.

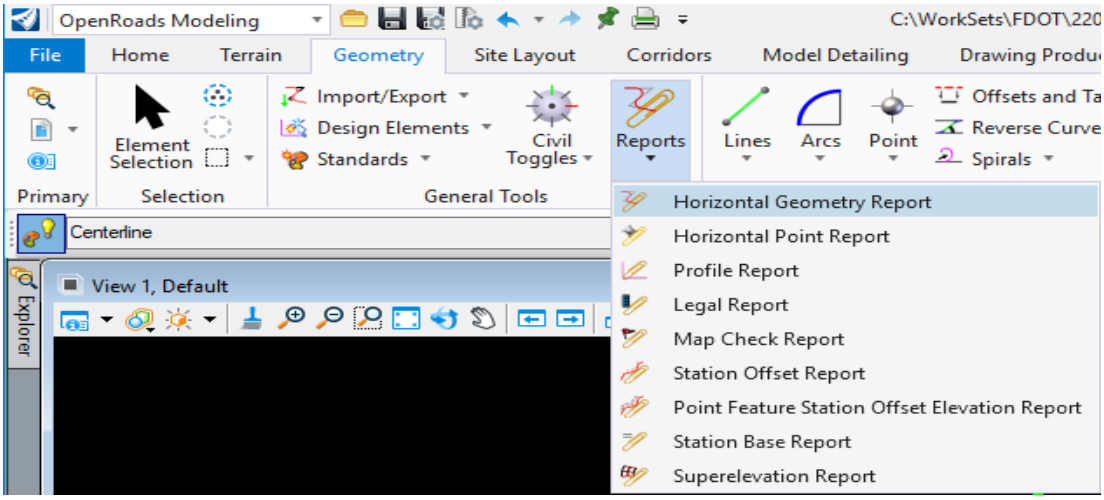
5. Enter **70000** and select **Enter** <OR> **data point** to accept.



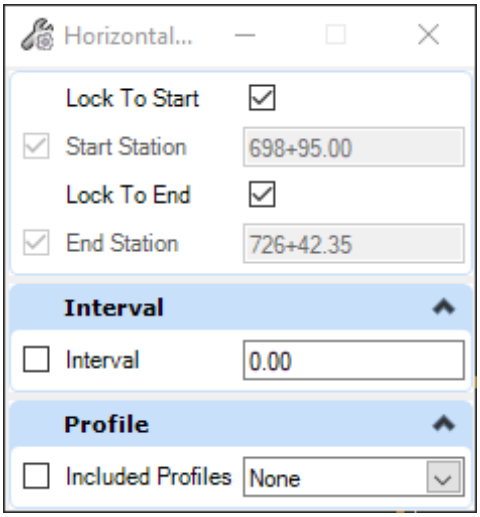
➢ *Describe the New Centerline Geometry*

1. Use *the Geometry Tab and General Tools Group*, **Horizontal Geometry Report** tool under the Reports icon.

   *OPENROADS MODELING>GEOMETRY>HORIZONTAL>Reports>**Horizontal Geometry Report***



2. Select the **SR61_CL** C*enterline*. Use the settings below at the prompt to generate the report shown.



Horizontal Alignment Review Report

Report Created: Tuesday, August 13, 2019
Time: 3:18:06 PM

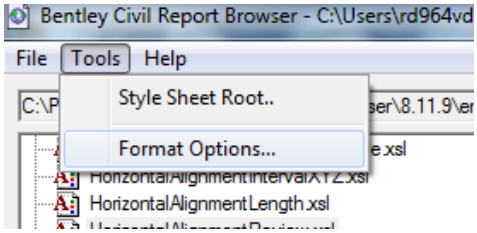
Project: Default
Description:
File Name: C:\WorkSets\FDOT\22049555201\roadway\ALGNRD08.dgn
Last Revised: 8/13/2019 15:13:46

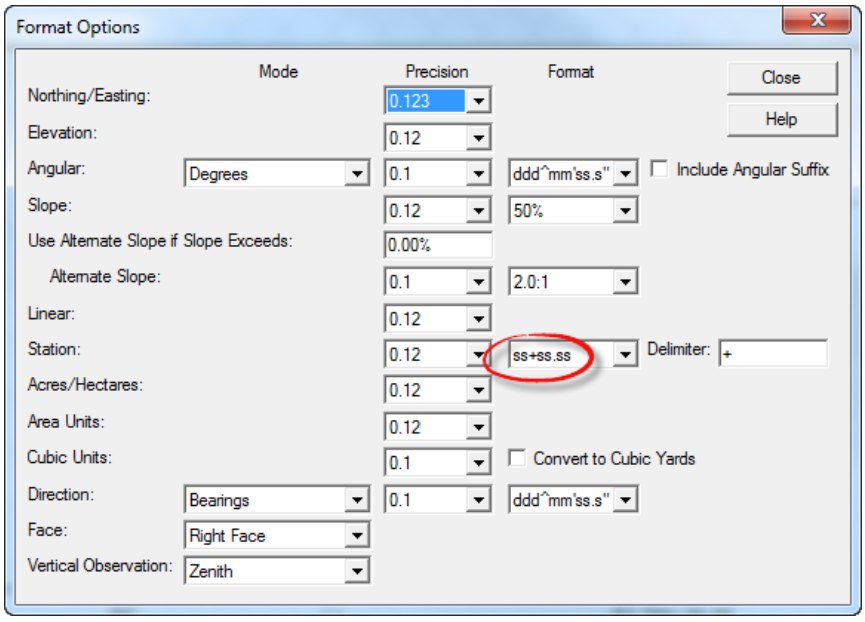
Note: All units in this report are in feet unless specified otherwise.

Alignment Name: SR61_CL
Alignment Description:
Alignment Style: Alignment\Centerline

		Station	Northing	Easting
Element: Linear				
START	( )	700+00.000	402643.279	2006833.823
HPI	( )	698+95.000	402590.765	2006924.748
Tangential Direction:		S59.991°E		
Tangential Length:		105.000		
Element: Linear				
HPI	( )	700+00.000	402643.279	2006833.823
PC	( )	705+71.067	402928.889	2006339.309
Tangential Direction:		N59.991°W		
Tangential Length:		571.067		
Element: Circular				
PC	( )	713+25.311	403524.609	2005914.935

HINT If the Stationing format is not displayed correctly, In the *Bentley Civil Report Browser*, select **Tools Format Options**



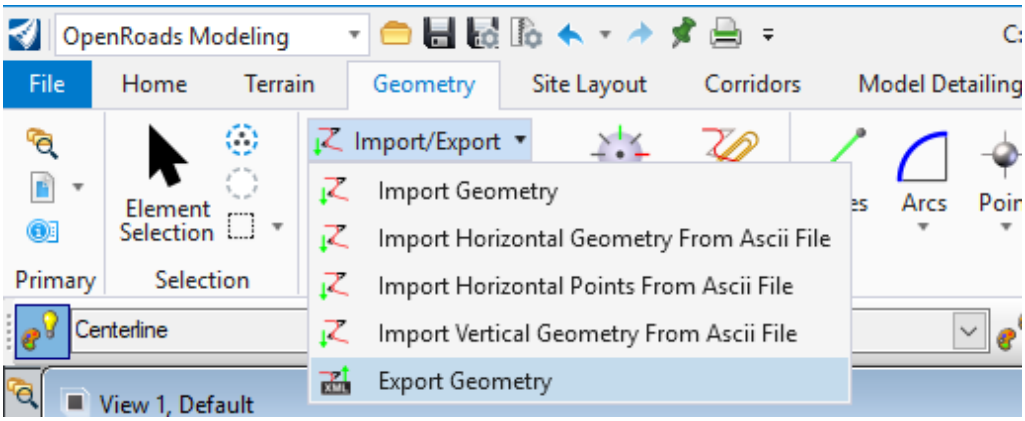


➢ ***Save the SR61 Centerline to a Landxml for a back up.***

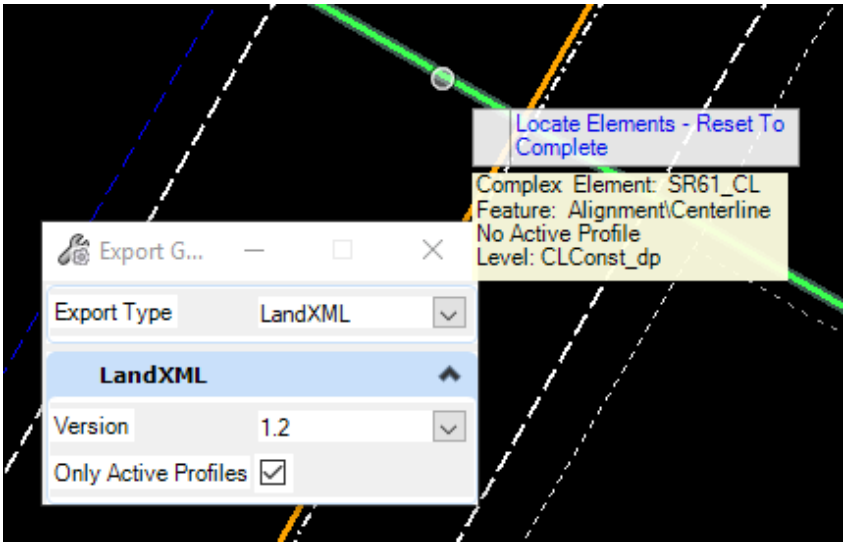
1. Use the *Geometry Tab and the General Tools Group*, to select the **Export to Native** tool and save the **SR61_CL** *Centerline* to a *Landxml* file.

   *OPENROADS MODELING>GEOMETRY>GENERAL TOOLS>Import/Export>**Export Geometry***

2. This will bring the Export Dialog up which gives you the option to export as a LANDXML

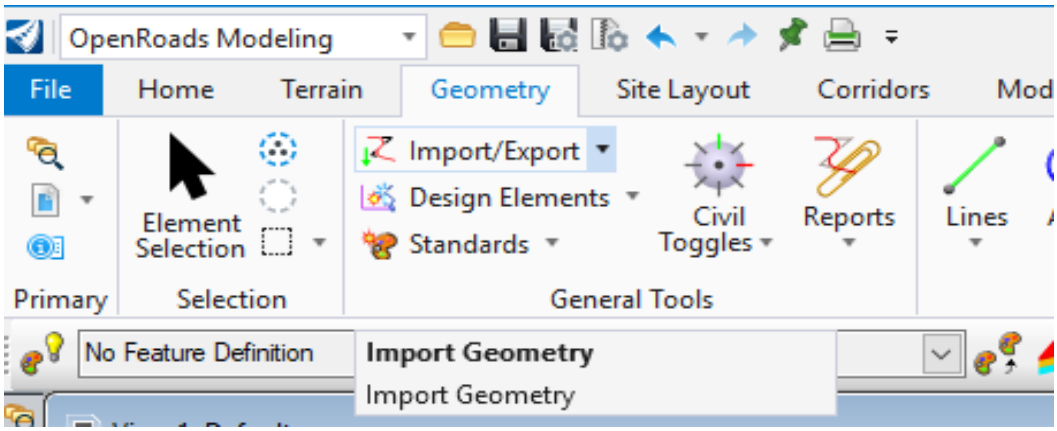


3. Select the Alignment you wish to export, select Version 1.2 for export, when prompted save as SR61_CL.xml

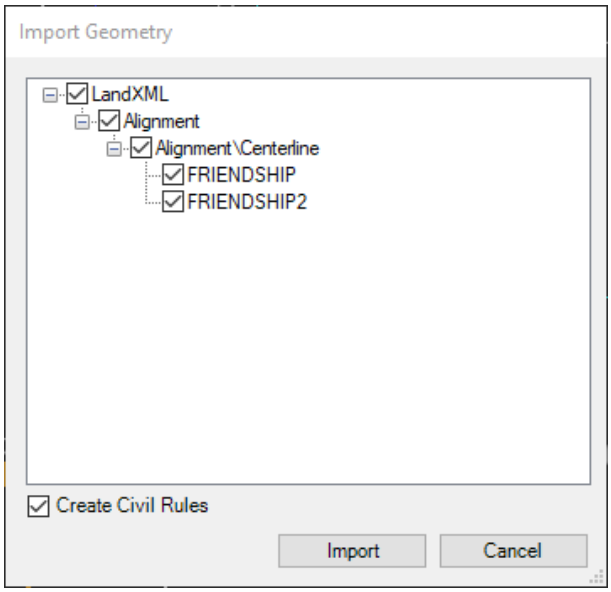


Exercise 1.3 Import Side Roads

1. Use *the Geometry Tab under the General Tools Group*, to select the **Import Geometry** tool. *OPENROADS MODELING>GEOMETRY>HORIZONTAL>GENERAL TOOLS>Import/Export>**Import Geometry***



2. Select the following *LandXML(FRIENDSHIP.xml)* file: **Friendship, Friendship2.** click the **Import** button.

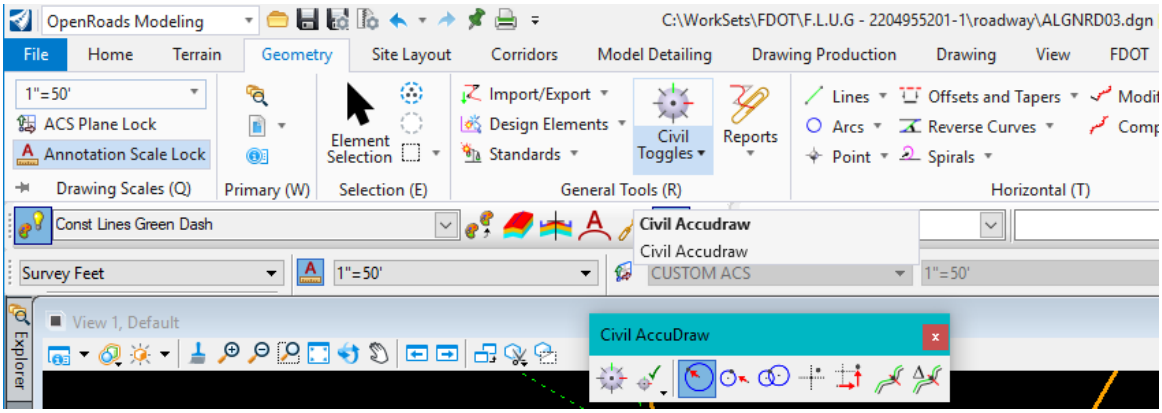


3. Notice from the LandXML a Feature Definition for CenterLine is defined for each alignment.

Exercise 1.4 Baseline Side Road Design from US98

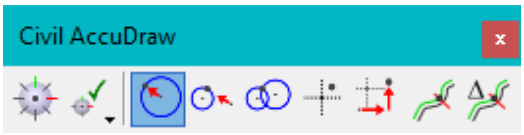
In this exercise Civil AccuDraw is used to help construct a side road centerline on BL98.

1. OpenRoads AccuDraw and Civil AccuDraw should never be toggled **ON** at the same time because both use some of the same *Shortcut Key-ins*. Toggle **OFF** the OpenRoads AccuDraw.

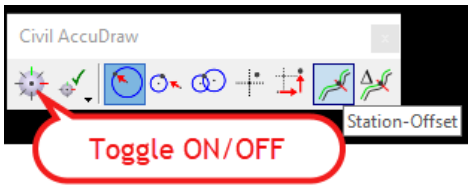


2. Use *Geometry Tab and the General Tools Group*, to select the **Civil Toggles icon** to call Civil AccuDraw tool to activate the Civil AccuDraw toolbar.

   *OPENROADS MODELING>GEOMETRY>GENERAL TOOLS>Civil Toggles>**Civil Accudraw***

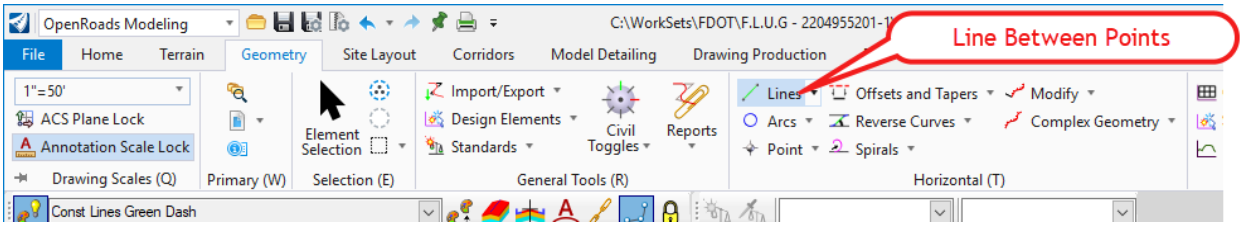


3. Click on the *Mode* **Station-Offset** to toggle **ON.**

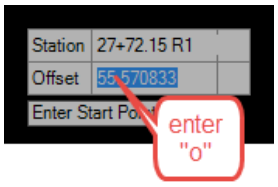


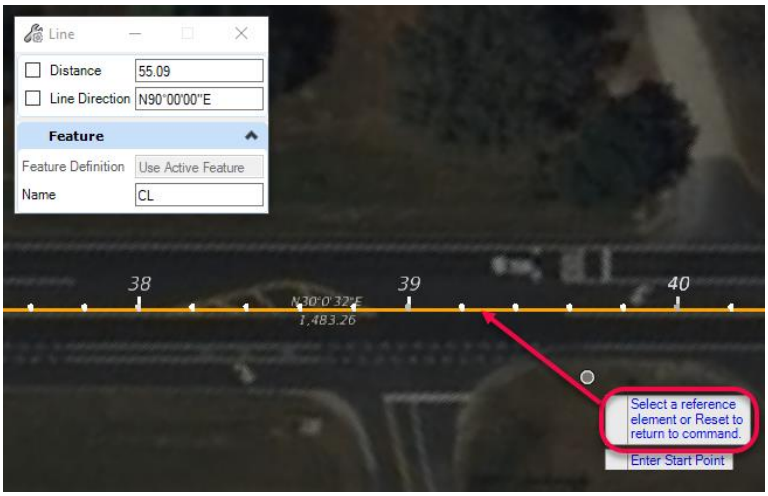
4. Use the *Geometry Tab and Horizontal Group*, to select the **Line Between Points** tool to create a **Centerline** perpendicular to the *BL98* at *Station* **39+00** for a *Length* of **80 feet** used as a side road centerline. Here are the steps to use Civil AccuDraw with the *Station Offset* option:

   *OPENROADS MODELING>GEOMETRY>HORIZONTAL>Lines>**Line Between Points***

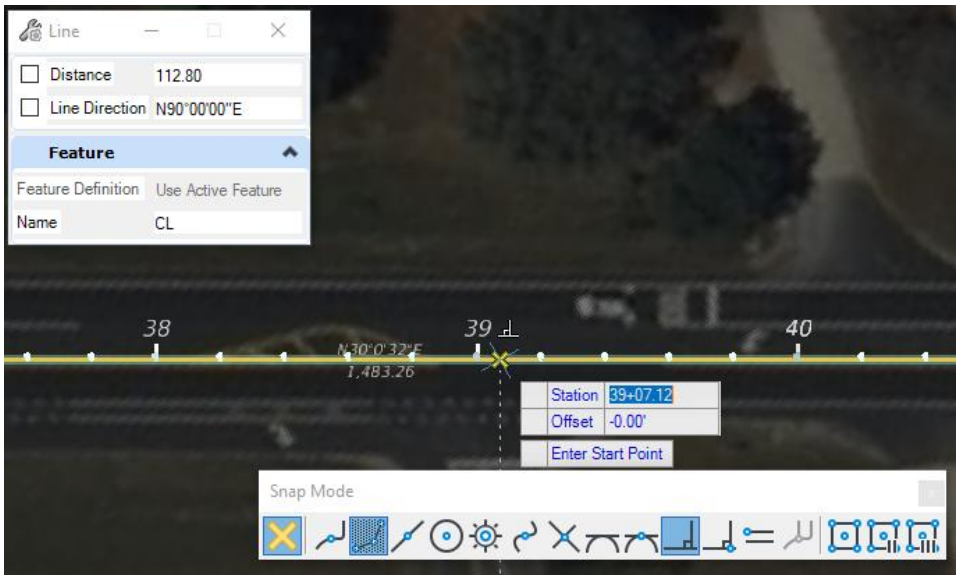


Important! *On the cursor prompt, tab to the offset field and use the Shortcut Key-in **o**, and select the reference line **BL98**. The cursor will now track the station and offset.*

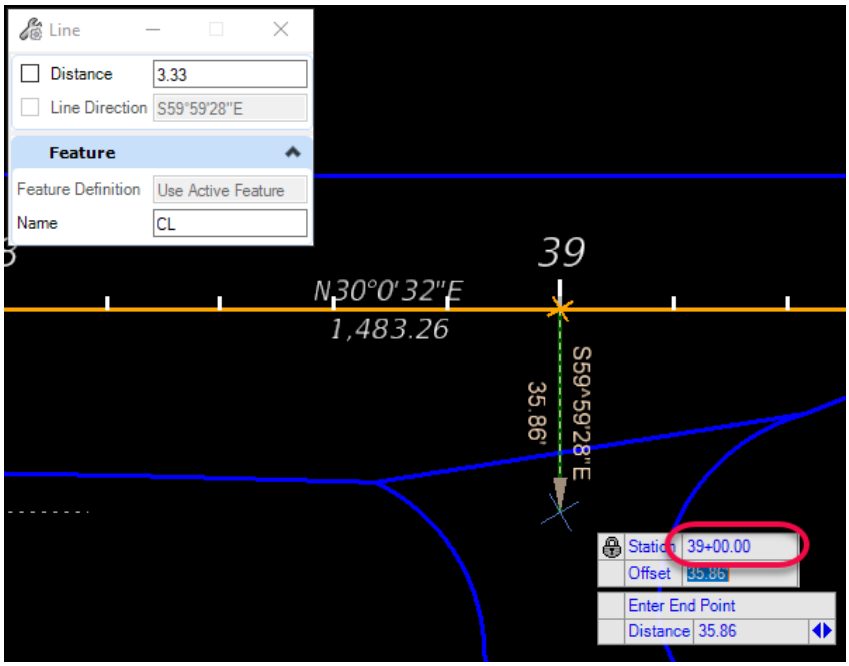




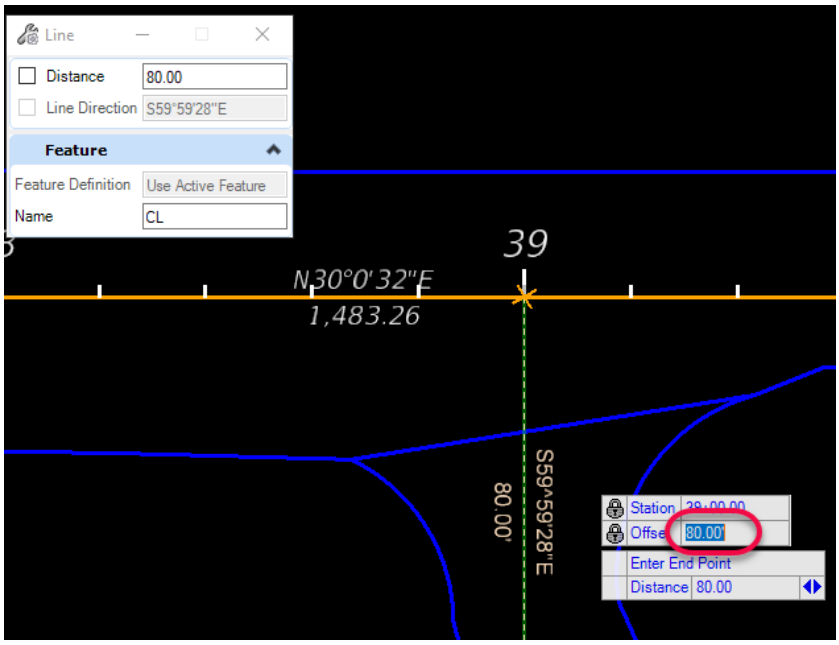
a. For the first data point, set the *Snap Locator* button to **Perpendicular**, and select on the **BL98.**



b. For the second point tab to the *Station* field in the AccuDraw Cursor Prompt dialog, enter *Station* value **39+00**, select **Enter** to lock in on the station.



c. Tab to the *Offset* field in the AccuDraw Cursor Prompt dialog, Enter *Offset* value **80**, select **Enter** to lock.

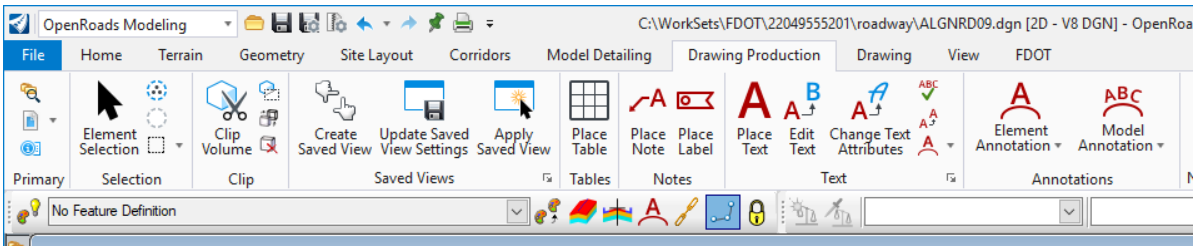


d. **Data point** in **View** to place the point. Repeat these steps for the Centerline at Station 36+40.0

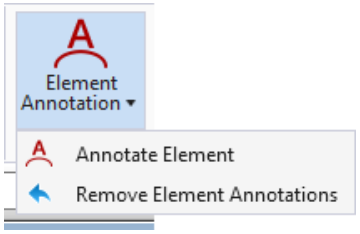
Exercise 1.5 Using Annotation Groups to Label Your Alignment Features

1. In the ALGNRD file that has been created in the previous exercises. From the **OpenRoads Modeling WORKFLOW** navigate to the DRAWING PRODUCTION TAB and the Annotations Group. There are two icon buttons for Annotating.

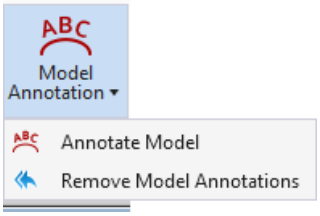
   *OPENROADS MODELING>DRAWING PRODUCTION>**ANNOTATIONS***



   a. Element Annotation – This will annotate the element and remove the element Annotation Group.

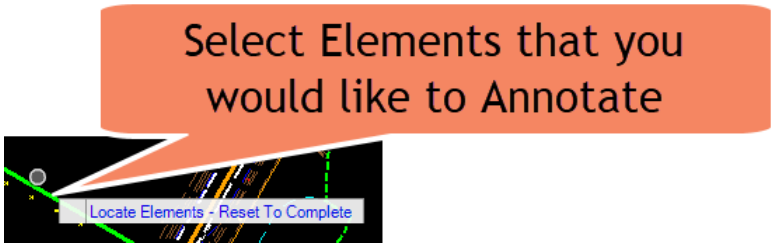


   b. Model Annotation – This will annotate all the elements in the model and remove the element Annotation Group.

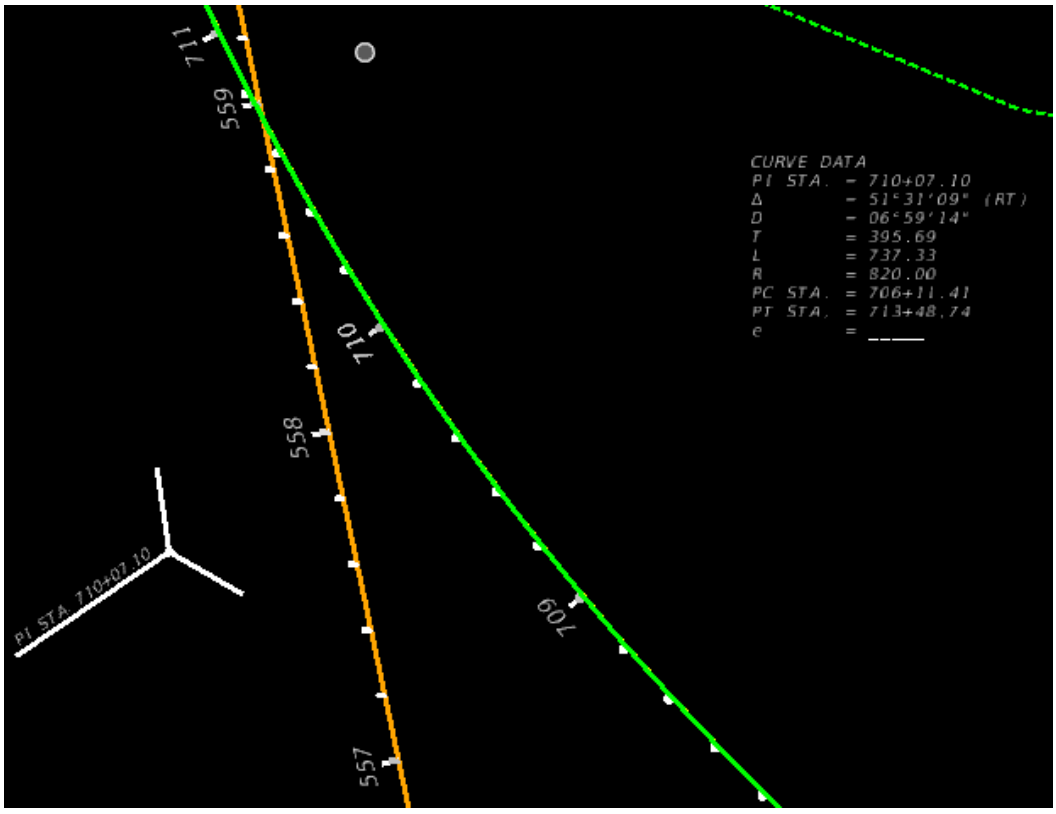


2. From the Drawing Production Tab and the Annotations Group, Select the Annotate Element button then following the prompts by the cursor. Select SR61 Centerline (optional you may select multiple alignments if you like) The n reset the tool by right click.

   *OPENROADS MODELING>DRAWING PRODUCTION>ANNOTATIONS>**Annotate Element***

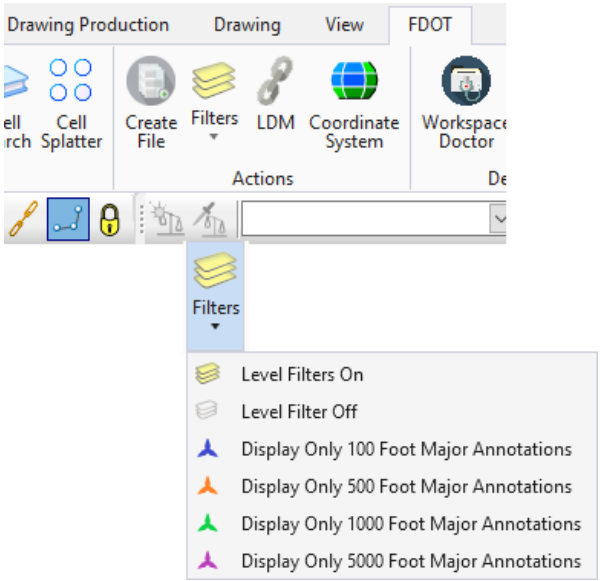


3. You have now just Annotated your Alignments.



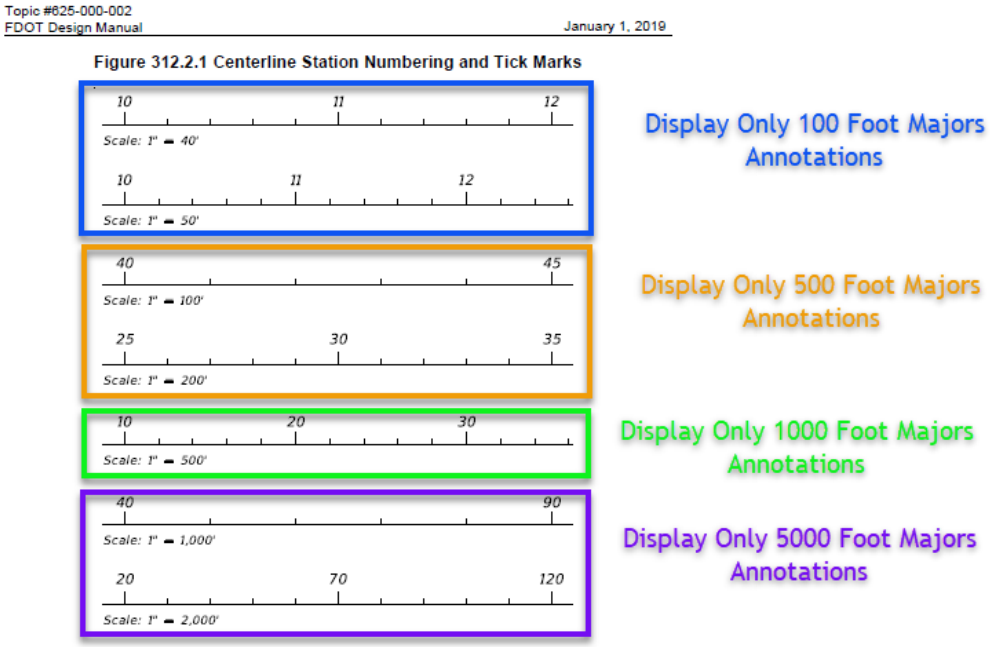
a. If you Navigate to the FDOT Tab on the Ribbon, in the Actions Group will be the Filters Icon Button with a Drop Down list.

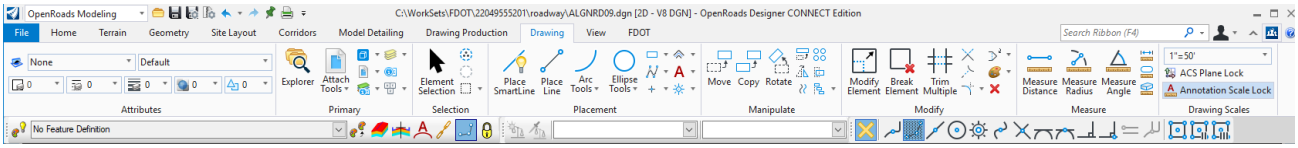
*OPENROADS MODELING>FDOT>ACTIONS>**Filters***



b. From this list you will now be able to control what levels will be displayed for the Annotation Group.

c. When you first Annotate the alignments in the level display all levels will be turned on. When using the Level Filters for annotation group be sure to change the Drawing Scale to match the applicable scale.





Example: For drawing scales from 1”=10’ to 1”=60’ use the Level Filter for Display Only 100 Foot Major Annotations

2 2D PLANIMETRICS

INTRODUCTION

This chapter will continue to use the OpenRoads Technology for Horizontal Geometry. Rather than use traditional MicroStation element creation tools, these exercises will provide participants with practice using the Civil Tools. Using Civil rule-based Feature Definitions assures *design intent* is incorporated into the two dimensional (2D) plan layout. This will, in turn, prove valuable when design changes or "what if scenarios are needed or tested.

This chapter also introduces two (2) important new OpenRoads Technologies for creating geometry / line work while designing in FDOTCONNECT. They are:

- Civil AccuDraw
- Civil Cells

CIVIL ACCUDRAW

As defined in the Bentley Civil Tools help files:

"Use Civil AccuDraw to allow precise input of points, whether the points are physical points or end points of linear geometry. The Civil AccuDraw values can be persisted as rules on the points by locking both values in the Civil AccuDraw input. Several methods can be used, among them are:

- *Distance and Direction, to set the order of ordinate entry to distance then direction, with both sharing a common point of origin.*
- *Dist-Dir, to set the order of entry to distance for the first ordinate then direction for the second ordinate, without a common point of origin.*
- *Dist-Dist, to set the order of entry to distance for the first ordinate then distance for the second ordinate, without a common point of origin.*
- *XY, to set the order of ordinate entry to X-axis then Y-axis, with the two sharing a common point of origin.*
- *DX DY, to set the order of ordinate entry to the difference in X coordinate then the difference in the Y coordinate, with the two sharing a common point of origin.*
- *Station-Offset, to set the order of ordinate entry to station identification then offset value, with both sharing a common point of origin*

The delivered methods are those configured by default. These defaults can be edited, removed, or additional methods may be added.

CIVIL CELLS

As defined in the Bentley Civil Tools help files:

> *"A civil cell is a collection of civil elements - geometry, templates, and terrain models - which can be placed repeatedly in a design. The collection of civil elements will have been created relative to one or more reference elements. When you place the civil cell, you choose the new reference elements, and a new collection of civil elements is then created relative to them. A civil cell can therefore be thought of as a copy of the original collection of civil elements, relative to the geometry of the new reference elements. Civil cells can be 2D or 3D. They can consist of 2D (plan) elements only, or 3D elements (2D elements with profiles), and can include terrains, linear templates, area templates, and simple corridors.*
>
> *When the new civil elements are created, all of the rules associated to them are also created. This means that the new civil elements retain their relationships, both with each other and with the reference elements, and therefore know how to react when these relationships change. In addition, the Civil and MicroStation toolsets can still be used on the new civil elements, to adjust and further refine the design as required, because there is no difference between a civil element created by a civil tool, and one created by placing a civil cell.*
>
> *Civil cells can save a lot of time and effort, because they replicate the complete series of steps needed to create the civil elements. They also help to ensure compliance with design standards, by making a civil cell available to the design team.*

EXERCISE OVERVIEW

2.1 Preparation for 2D Plans

2.2 BL98 Milling Limits

2.3 BL98 Widening

2.4 BL98 Widening Taper Line

2.5 For SR61 New Construction Template Lines

2.6 Add Right Turn lane on BL98

2.7 Add the School Entrance Right Turn Lane off BL98 Intersection

2.9 Create/Edit the Intersection Curve Radii

2.9 Trim Back Sidewalk and Curb Lines to the Curve Radii

2.10 Use Civil Cell Technology to Place Curb and Sidewalk Around the Radii

2.11 Create a Custom Civil Cell for Other Radii

2.12 Place Left Turn with Traffic Separator

2.13 Place Right Turn Island

2.14 For BL98 Intersection Crosswalks Lines

2.15 Create BL98 Turnouts

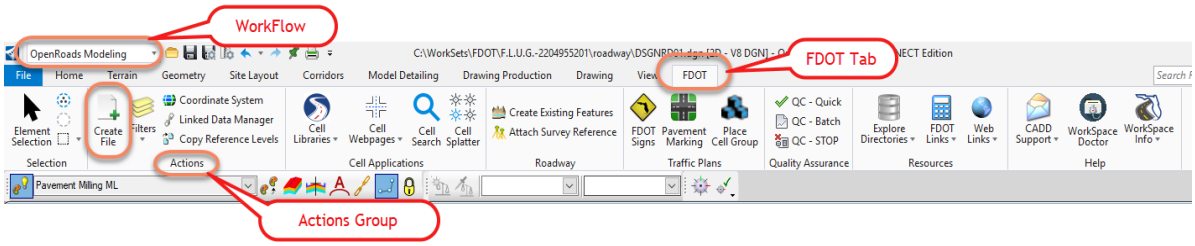
2.16 For BL98 Intersection Shoulders

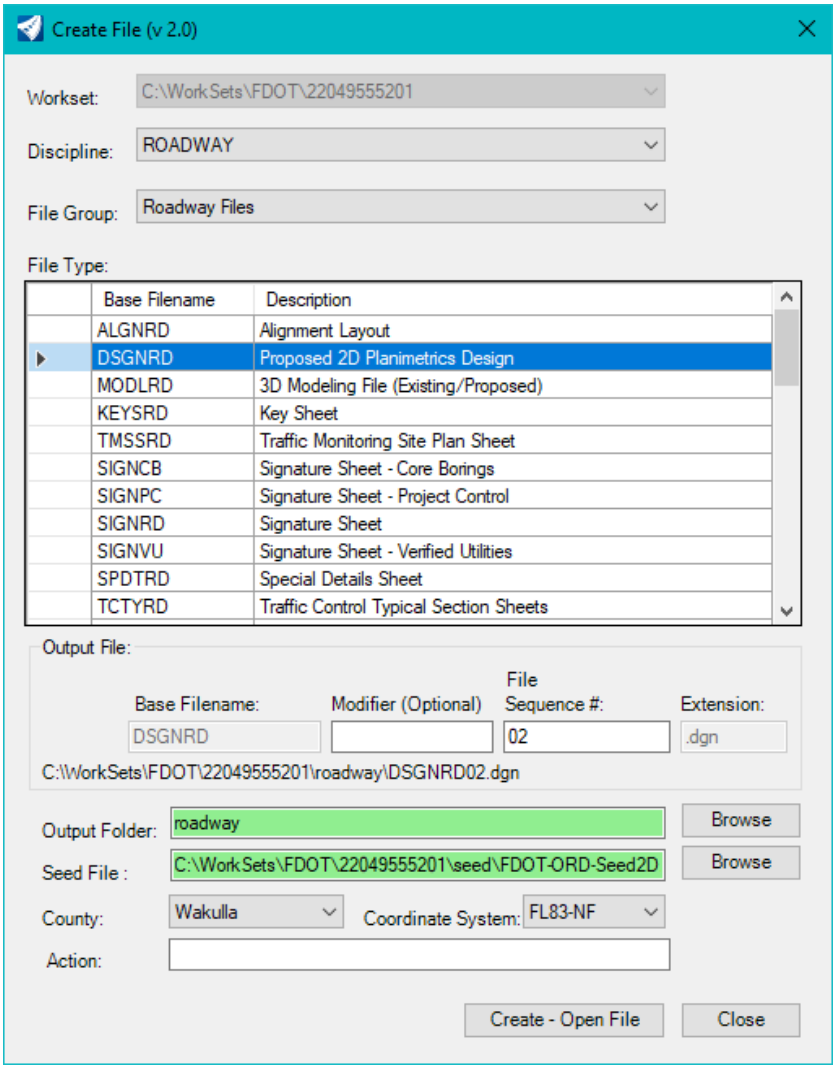
2.17 For Friendship Intersection

Exercise 2.1 Preparation for 2D Plans

1. Create the *DSGNRD01.dgn* file from the FDOT Tab under the Actions Group using the Create File Tool (This tool is always the starting point to create QC compliant design files for your workset/project.

   *OPENROADS MODELING>FDOT>ACTIONS>**Create File***



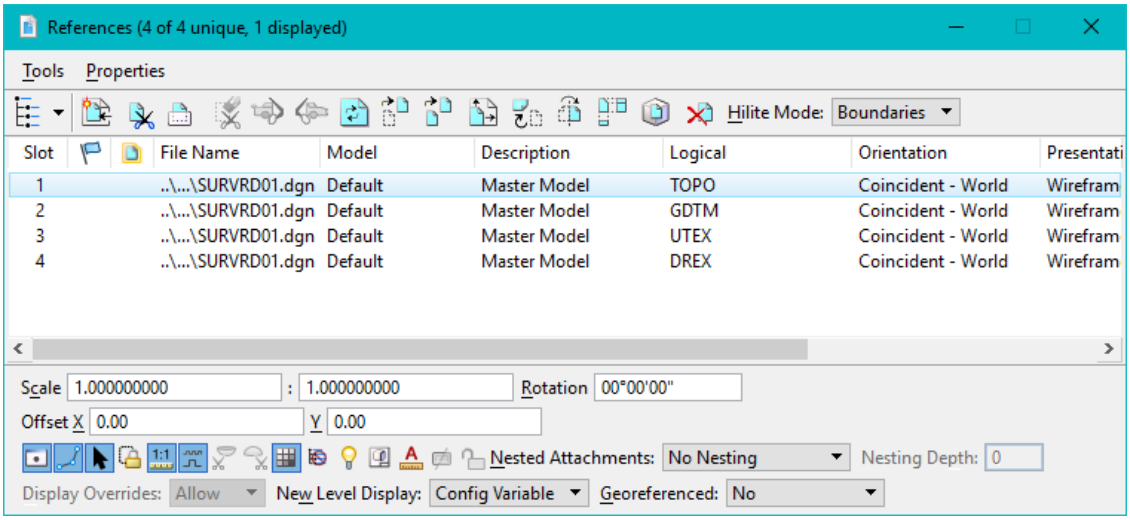


Exercise 2.2 BL98 Milling Limits

In this exercise the existing pavement edge lines from the TOPORD or SURVRD file are copied to be used as the Milling Lines for the proposed improvements. If the SURVRD does not exist and you only have a TOPORD skip to step 5.

1. Use the **Attach Survey Reference** from the FDOT Tab within the Roadway Tools Group. (This tool will attach a SURVRD file 4 times with different Logical names of **TOPO, GDTM, UTEX, DREX** which apply to different level filters.)

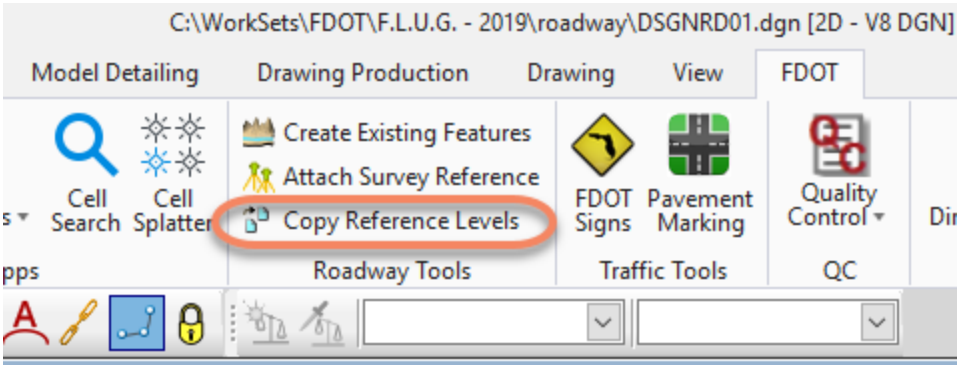
   *OPENROADS MODELING>FDOT>ROADWAY>**Attach Survey Reference***



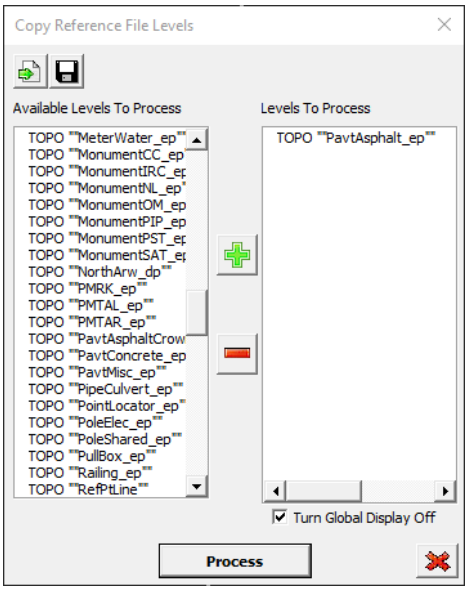
2. Once the SURVRD is attached, open your Reference Dialog (Function Key F9) and Detach the reference files with logical names of GDTM, UTEX, DREX. This will only leave the TOPO.

3. Now we need to copy or merge the elements that are on the PavtAsphalt_ep level. This can be done by using the **Copy Reference Levels** tool from the FDOT Tab with in the Roadway Tools Group

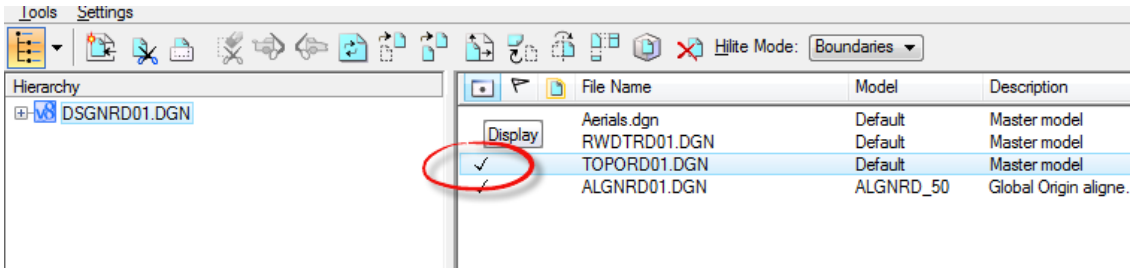
   *OPENROADS MODELING>FDOT>ACTIONS>**Copy Reference Levels***



4. This will open a dialog for the Copy Reference File Levels tool. On the left side of the dialog choose PavtAsphalt_ep level. Then click on the plus  to add the level to the right side of the dialog. Click the process button to merge/copy the elements with this level in to the file.



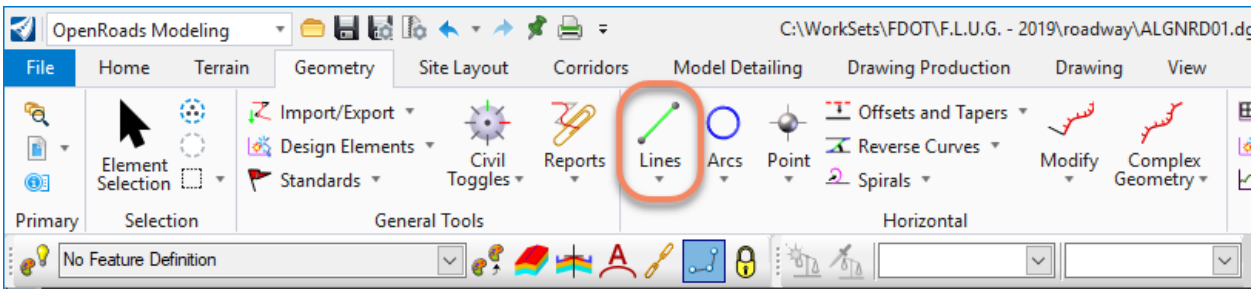
5. This step if no SURVD Exists Use OpenRoads **References (Function Key F9)** to attach and display the *TOPORD01* and RWDTRD01 *Reference* files.



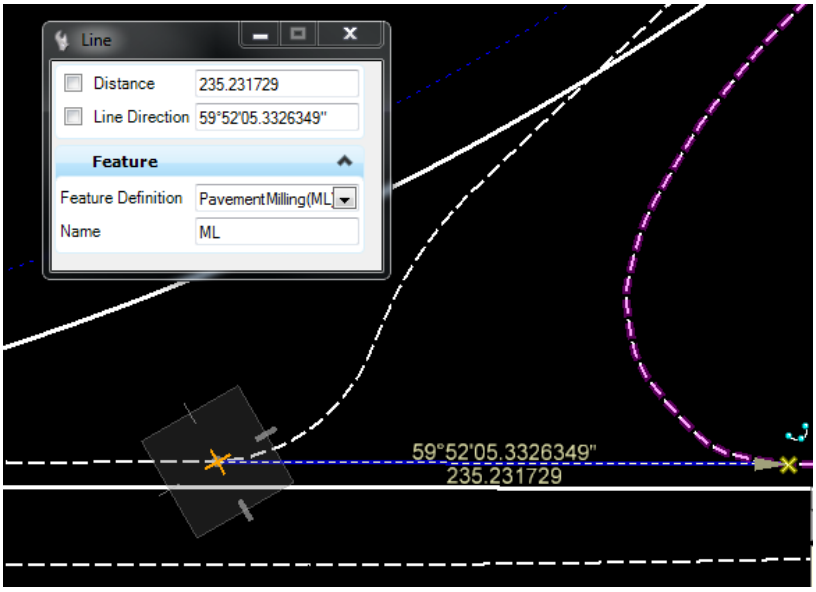
6. Use OpenRoads **Level Display** to turn **OFF** all the *TOPORD01 Levels* except the **PavtAsphalt_ep**.

7. Use the *Geometry Tab and the Horizontal Group*, **Line Between Points** tool.

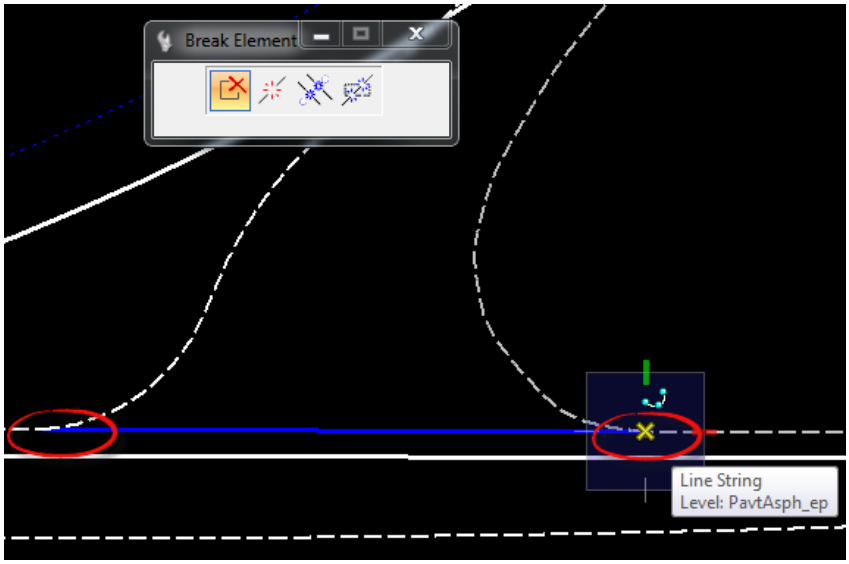
*OPENROADS MODELING>GEOMETRY>HORIZONTAL>Lines>**Line Between Points***



8. Create a **PavementMilling ML** line across the *existing intersection* of **SR61** and **BL98.**

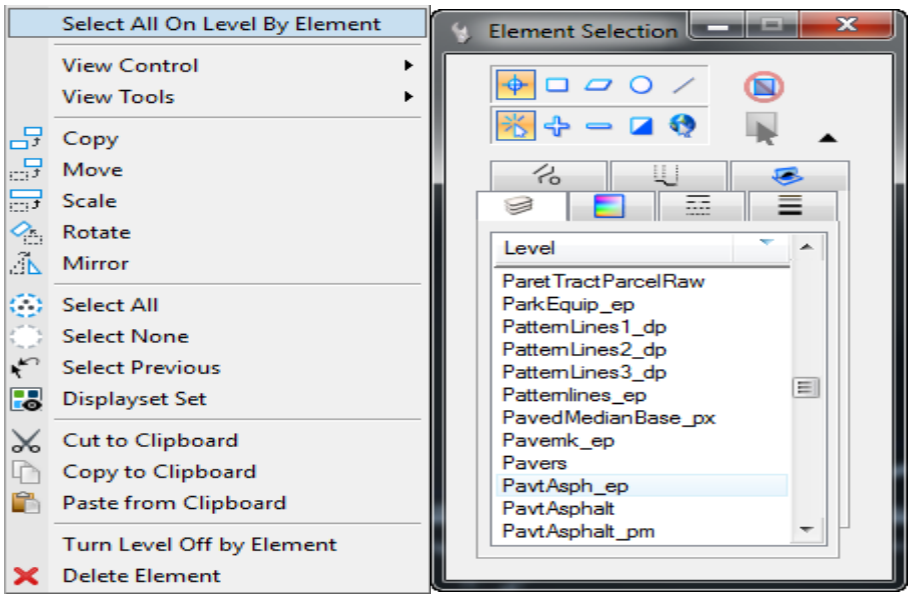


9. Use OpenRoads **Break Elemen**t on the **PavtAsphalt_ep** line string elements where the new *PavementMilling(ML)* line intersects.

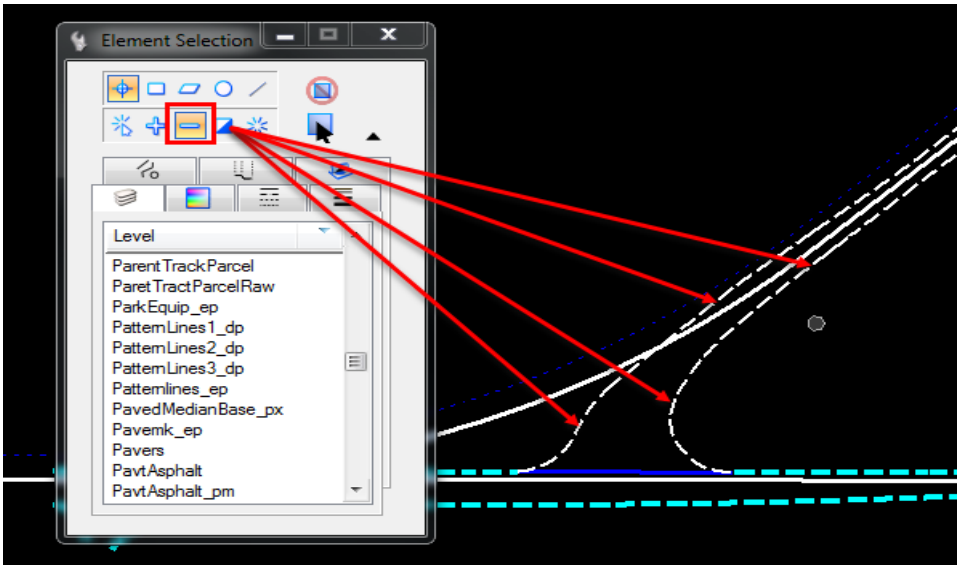


10. Repeat these steps for the other **side roads** along *BL98*.

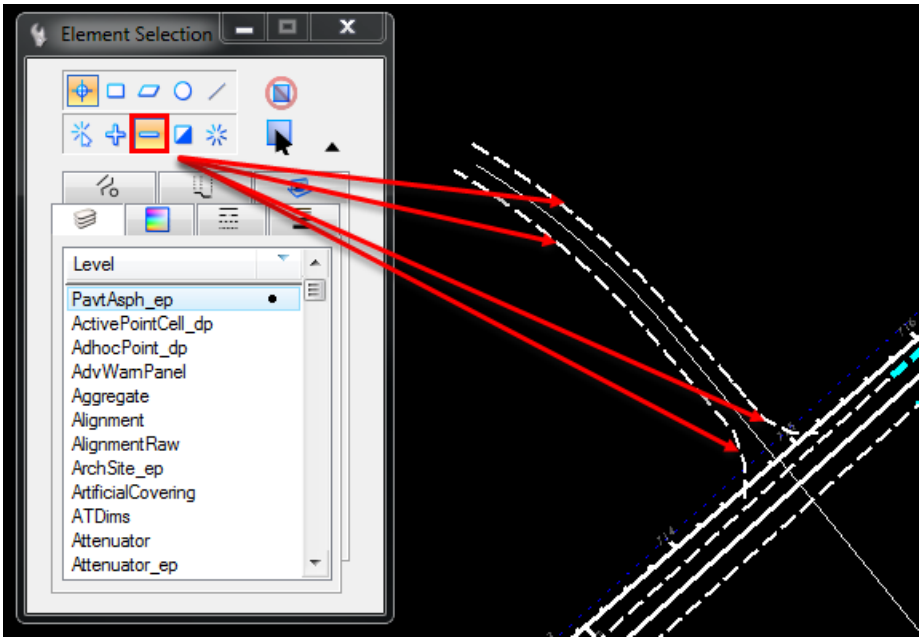
11. Create a *Selection Set* of the **PavtAsphalt_ep** by level. This can be done with the right click function of the mouse, by holding down and Selecting All On Level By Element. Then selecting an element.



a. Subtract out of the *Selection Set* the **Intersection lines at SR61**; these will not be *PavementMilling ML* lines.

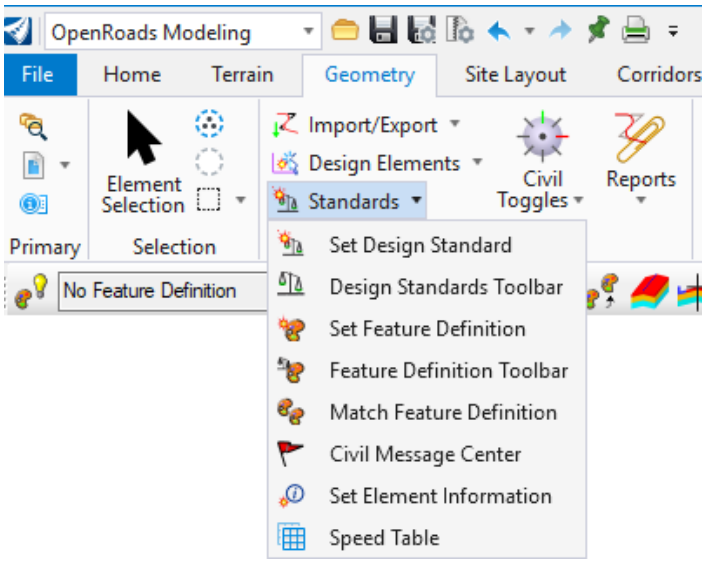


b. Also subtract out of the *Selection Set* the **Intersection lines at Friendship Road.**

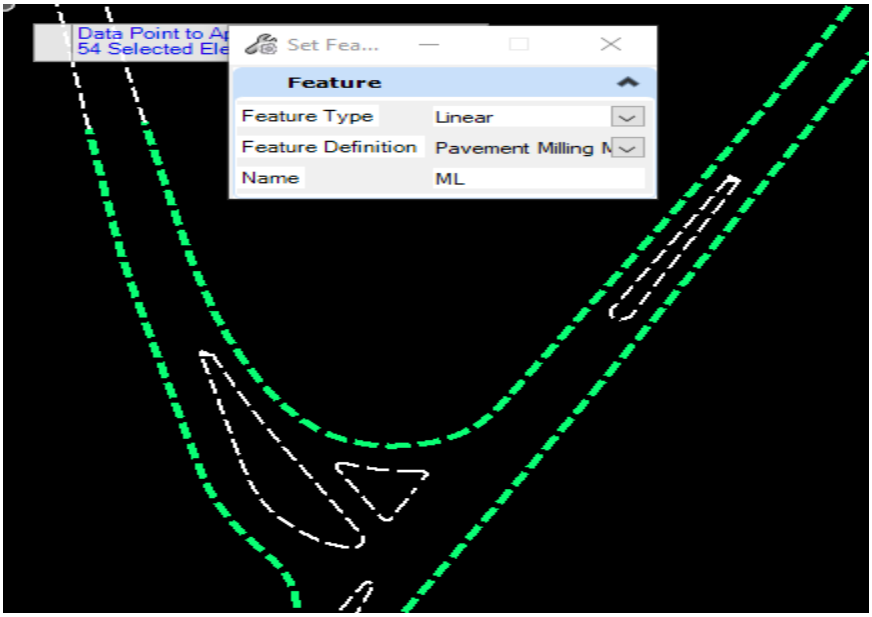


12. Use the Geometry Tab and the General Tools Group, Click on the Standards button to bring up a drop down that has the Set Feature Definition tool.

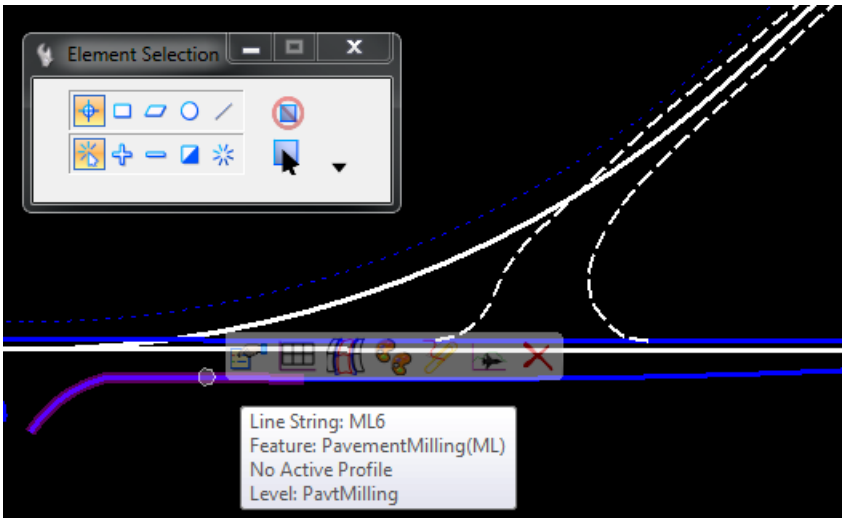
*OPENROADS MODELING>GEOMETRY>GENERAL TOOLS>Standards>**Set Feature Definition***



13. **Data point** to change the elements to the *Feature Definition*, **Pavement Milling ML.**



14. Change the *Selector* tool back to **New** and verify the *New Feature Definition* by hovering over a line until the Context Menu displays.

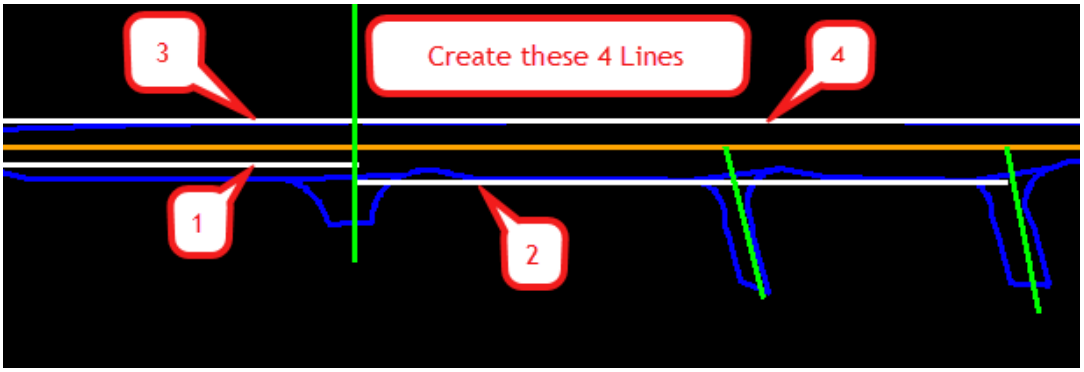


Exercise 2.3 BL98 Widening

Before we start, the ALGNRD will need to be attached as a reference into the DSGNRD file. Making sure when you attach the ALGNRD it is the Default Model. With a Detail scale of 1"=50'.

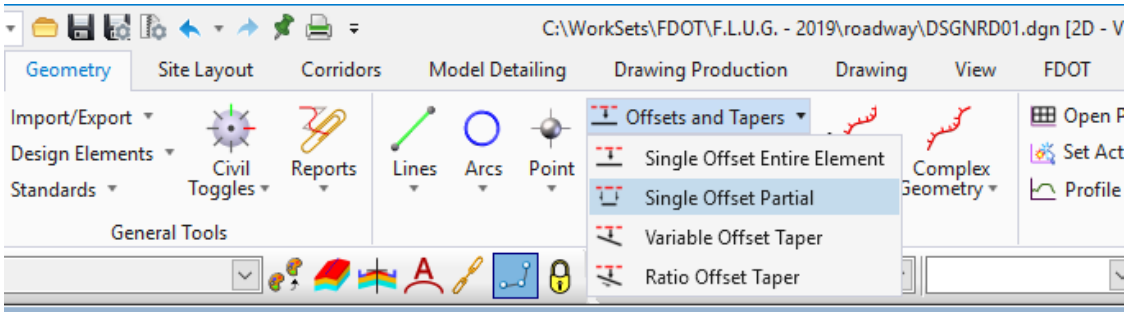
In this exercise, the proposed Pavement Lines used for widening on BL98 are created at the following locations:

	START STATION	OFFSET	LENGTH	FEATURE NAME
1	28+00	16 feet	500 feet	SW_EOPA
2	33+00	32 feet	600 feet	SE_EOPA
3	30+00	-24 feet	300 feet	NW_EOPA
4	33+00	-24 feet	1000 feet	NE_EOPA



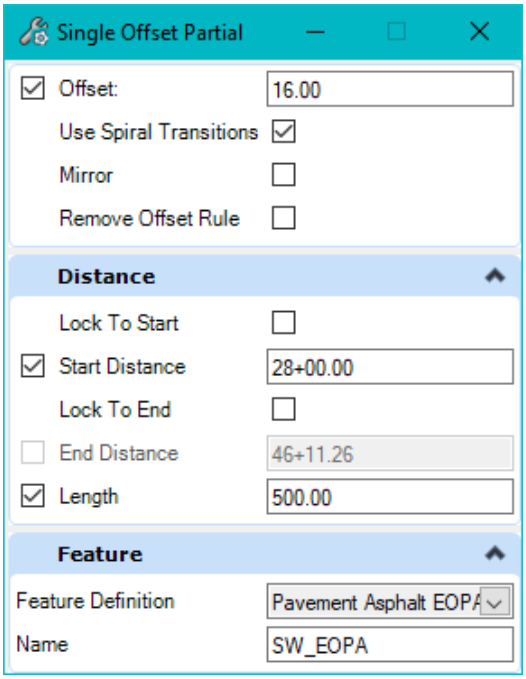
1. Use the *Geometry Tab and the Horizontal Group*, to select **Single Offset Partial** tool located in the Offsets and Tapers button.

   *OPENROADS MODELING>GEOMETRY>HORIZONTAL>Offsets and Tapers>**Single Offset Partial***



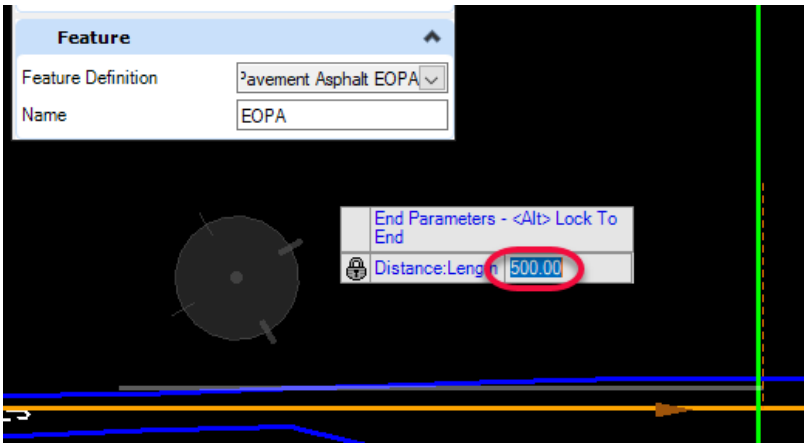
   a. Select the **BL98** line at the prompt to **Locate Element**.

b. Fill in the Single Offset Partial dialog as shown below.



c. **Data point** in the **View** to accept the *Offset*.

d. **Data point** in the **View** to accept *Length*.



e. **Data Point** in the **View** to accept **No** at the *Mirror* option prompt.

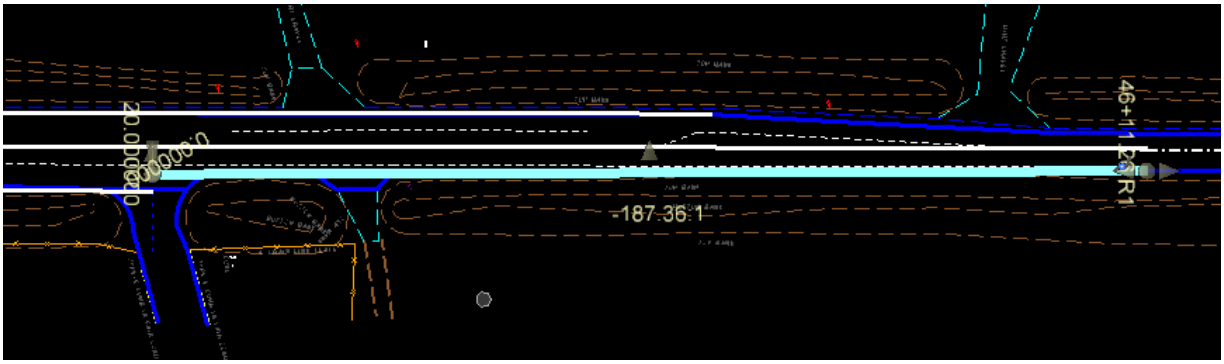
2. Repeat this procedure for each of the **Pavement Asphalt EOPA** widening lines diagram and table above.

Exercise 2.4 BL98 Widening Taper Line

In This exercise a tapered Pavement Asphalt EOPA line off BL98 is created at the following location.

Select **Alt** to enter the *End Station*.

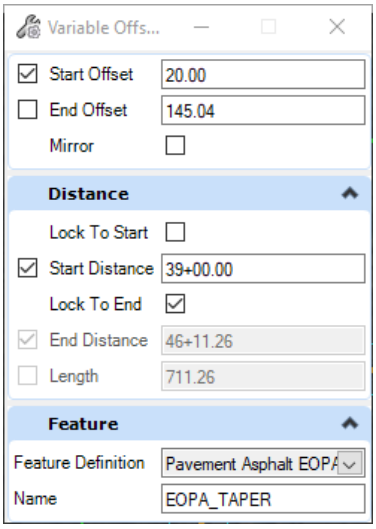
START STATION	START OFFSET	END STATION	END OFFSET	FEATURE NAME
39+00	20 feet	Alt to end Station Lock	Snap Nearest	EOPA_TAPER



HINT Toggle On the Civil AccuDraw.

1. Use the *Geometry Tab and the Horizontal Group*, to select **Variable Offset Taper** tool located in the Offsets and Tapers button.

   *OPENROADS MODELING>GENERAL >HORIZONTAL>Offsets and Tapers>**Variable Offset Taper***

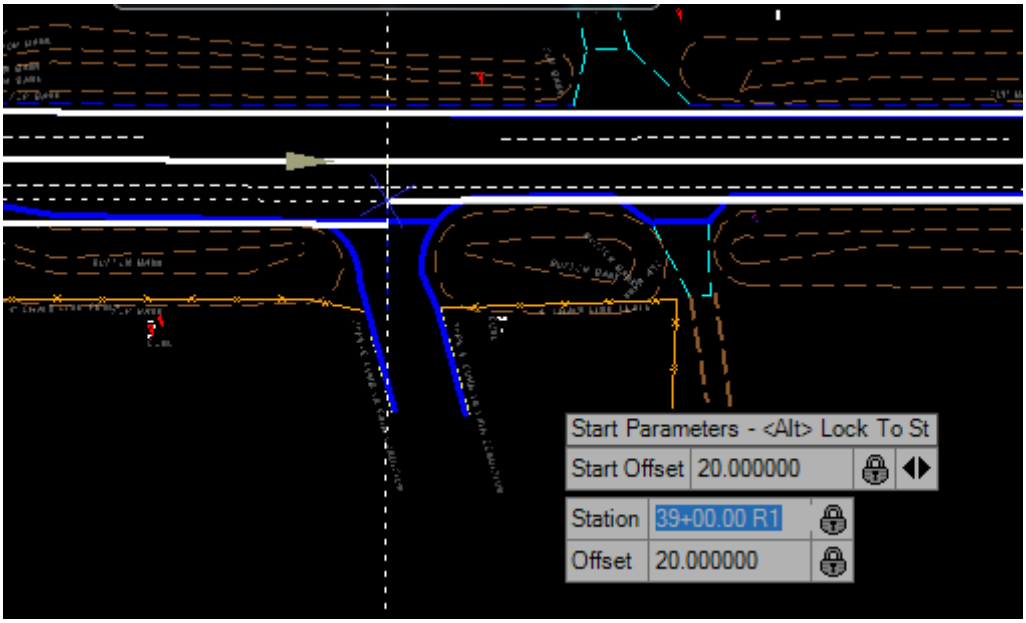


2. Select the **BL98** element to *offset* from.

3. Enter the *Station* at **39+00** and select **Enter** to lock the value.

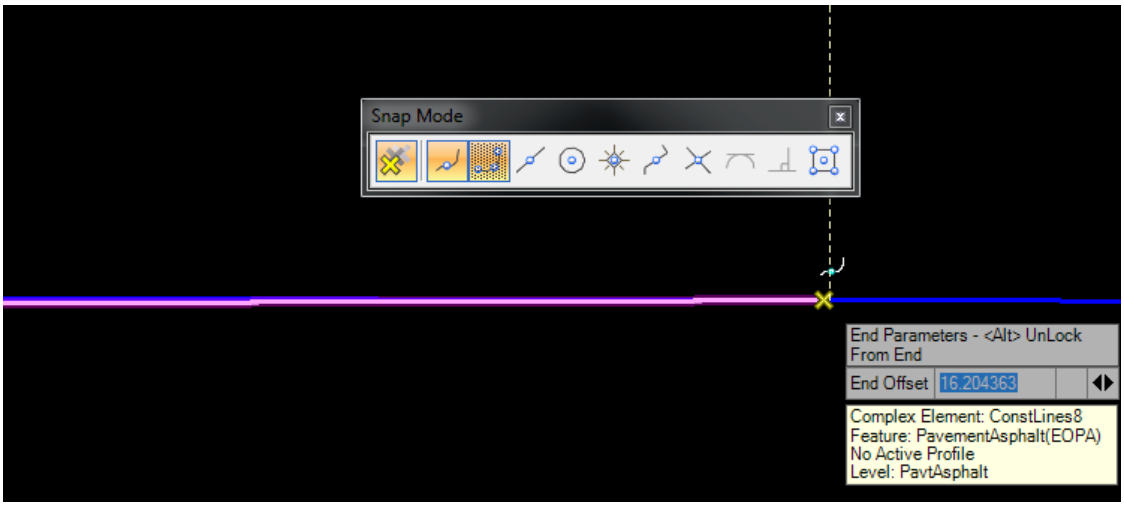
4. Tab to the *Offset*, enter **20** and select **Enter** to lock the value.

5. **Data Point** in the View to set the first point.



6. Select **Alt** key to lock the *End Station* value.

7. Set the *AccuSnap tool* to **Nearest**, hover over the right **Pavment Milling ML** until the *Snap Mode* displays.

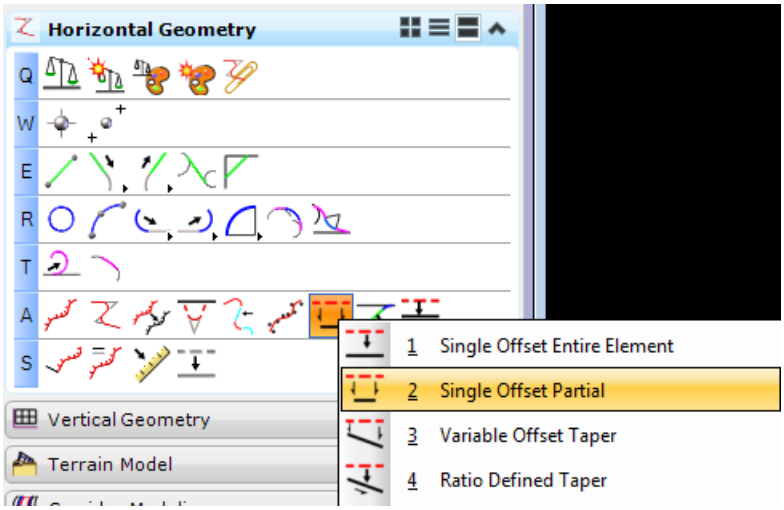


8. **Data Point** to place the second point and complete the command.

Exercise 2.5 For SR61 New Construction Template Lines

First, it is necessary to create a Template Limits line for the Project Typical FDM Civil Cell. This is a Construction type element which is used to define the Begin and End Station limits.

1. Use the *Geometry Tab and the Horizontal Group*, to select the **Single Offset Partial** tool. *OPENROADS MODELING>GEOMETRY>HORIZONTAL>Offsets and Tapers>**Single Offset Partial***

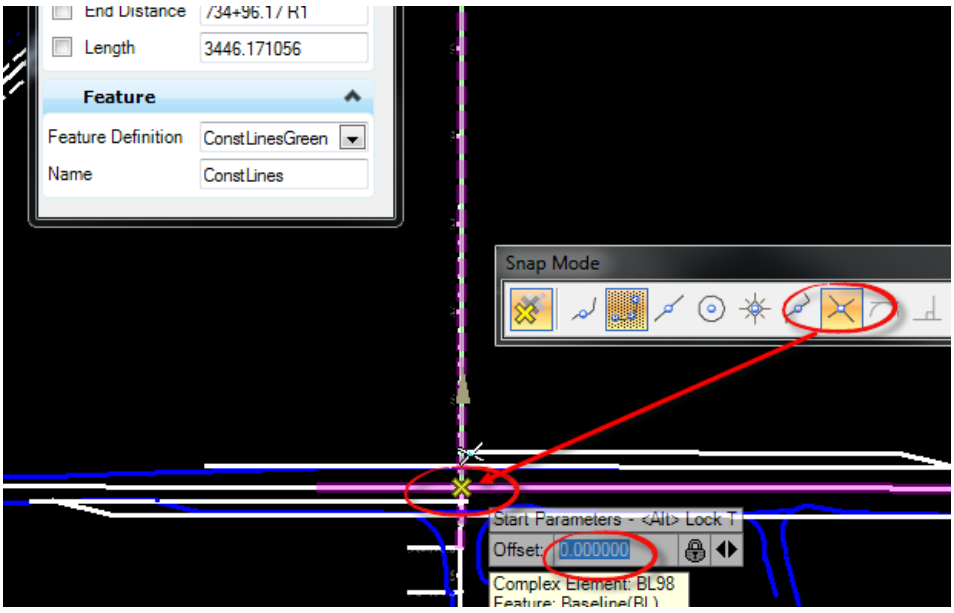


2. Create a *Feature line*, **Const Lines Green**.

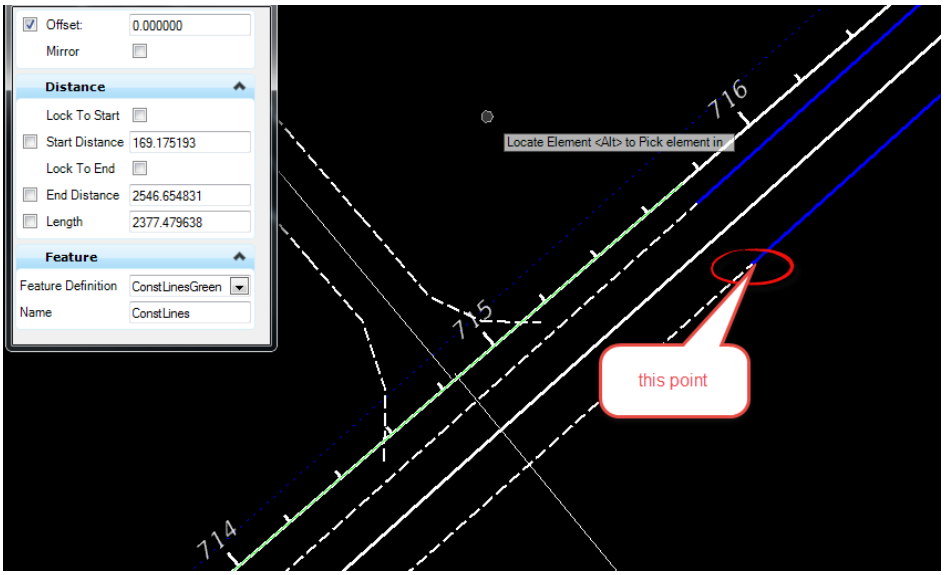
   a. Select the SR61 Centerline CL.

   b. Set the Offset to 10.00.

   c. For the first point, set AccuSnap to Intersection and select the intersection of SR61 and BL98.



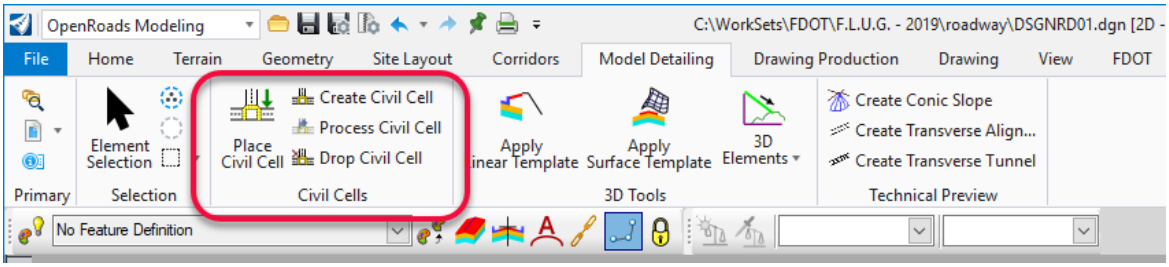
d. For the second point, zoom out to the first *intersection* after the end of the *SR61* curve and snap to the right **Pavement Milling ML** of existing SR61 <OR> Key in *Station* **716+50**.



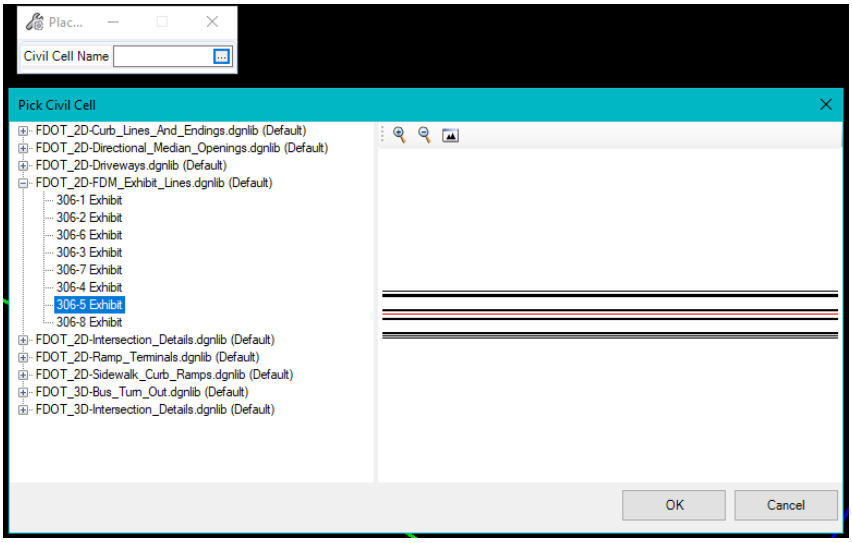
HINT Use Intersect Snap and to place first point and Key Point snap for the second point.

3. Use the Model Detailing Tab and the *Civil Cells Group*, to find the **Place Civil Cell** tool.

*OPENROADS MODELING>MODEL DETAILING>CIVIL CELLS>**Place Civil Cell***



4. Navigate to the FDOT_2D-FDM_Exhibit_Lines.dgnlib, and select 306-5 Exhibit civil cell to place.



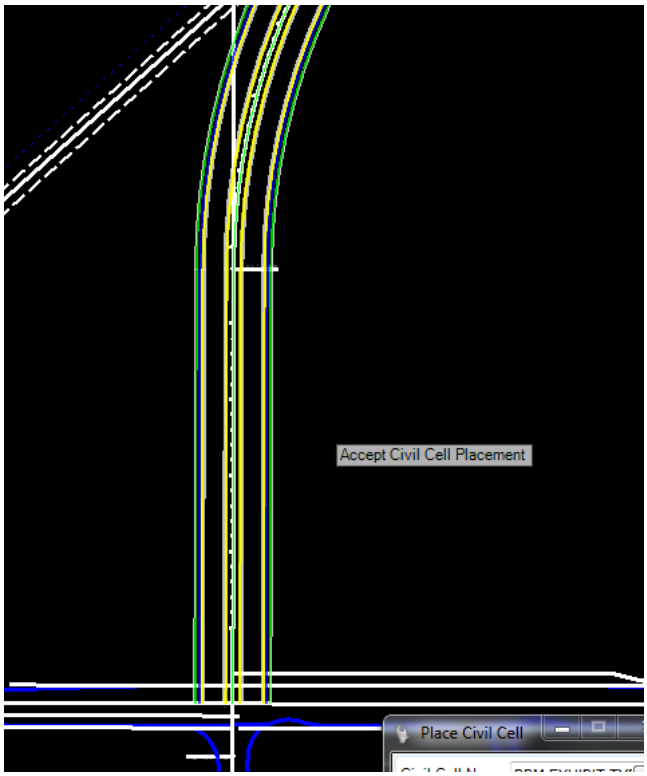
a. Click **OK** and follow the prompts to complete the *Place Civil Cell* command.

b. Locate *Reference Element*, select the **Green Const Line.**

HINT Use the tab key to after clicking on an element to get to the last place Green Const Line.

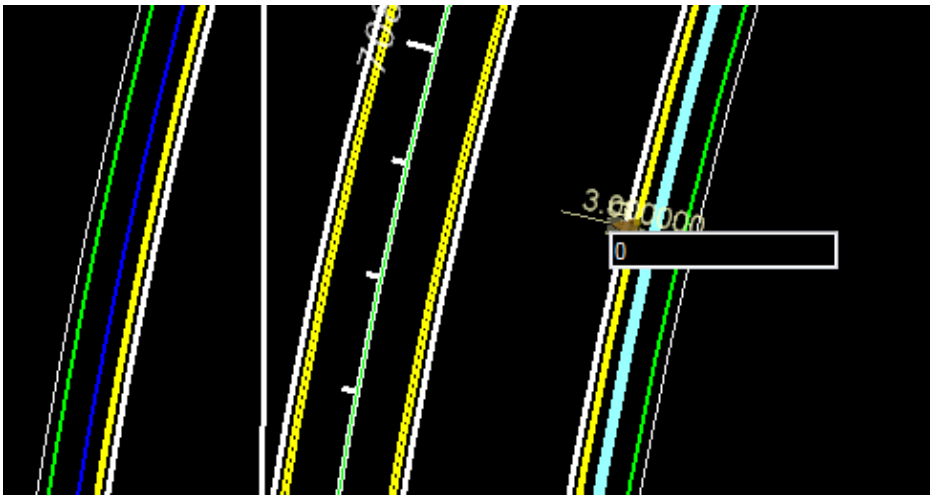
c. **Reset** to Skip View Alternates.

d. Data point to accept **Civil Cell Placement**



5. Change the Front Sidewalk Utility Strip Width to **0ft** and verify that the Sidewalk Width is set to **6ft**,

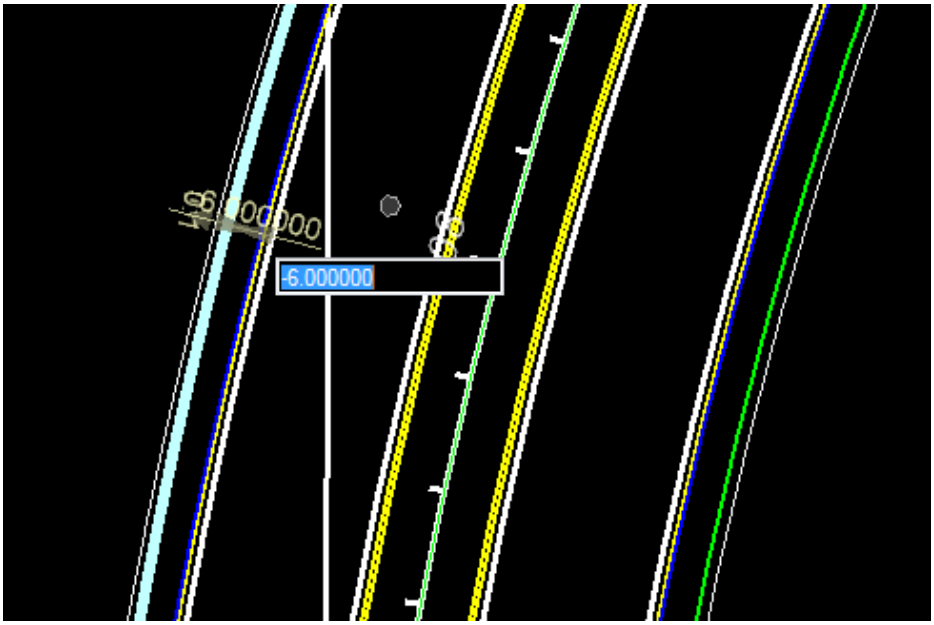
    a. Select the **Sidewalk Front FSW** *Feature* and zoom to find the Context Menu near the middle of the element.



    b. Change the *SidewalkFront Dimension* from **4** to **0**.

    c. Verify that the *SidewalkBack* is set to **6**.

    d. Repeat this for *both sides* of the roadway.

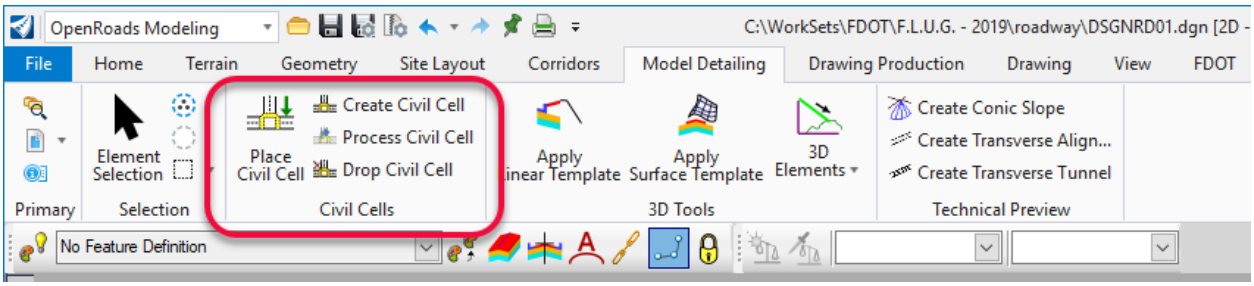


Exercise 2.6 Add Right Turn Lane on BL98

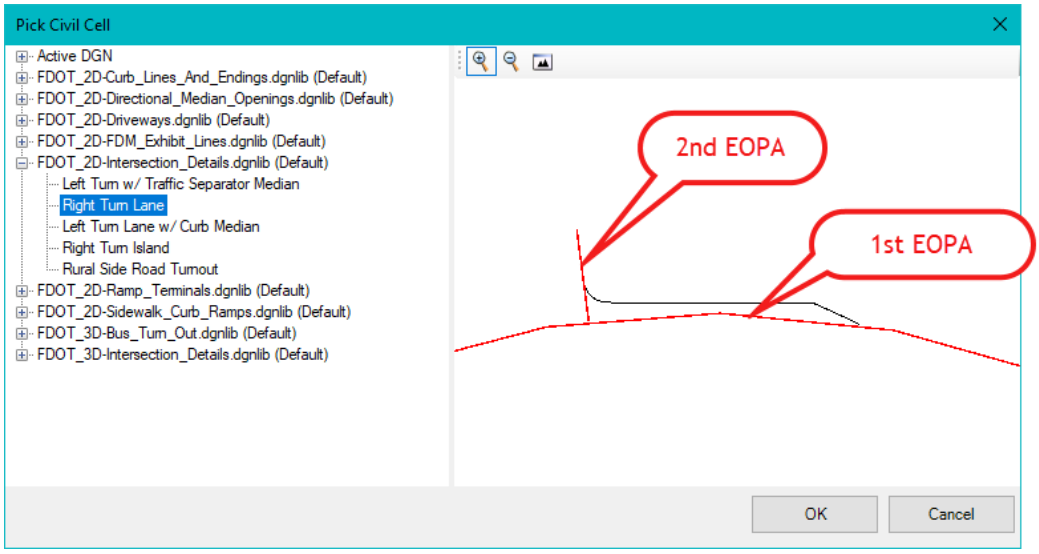
This exercise uses Civil Cells to add a right turn lane to the BL98.

1. Use Model Detailing Tab and the Civil Cells Group, **Place Civil Cell** tool**.**

   *OPENROADS MODELING>MODEL DETAILING>CIVIL CELLS>**Place Civil Cell***



2. From the Place Civil Cell dialog, navigate to the *FDOT _2D-Intersection_Details.dgnlib* and select **Right Turn Lane.**

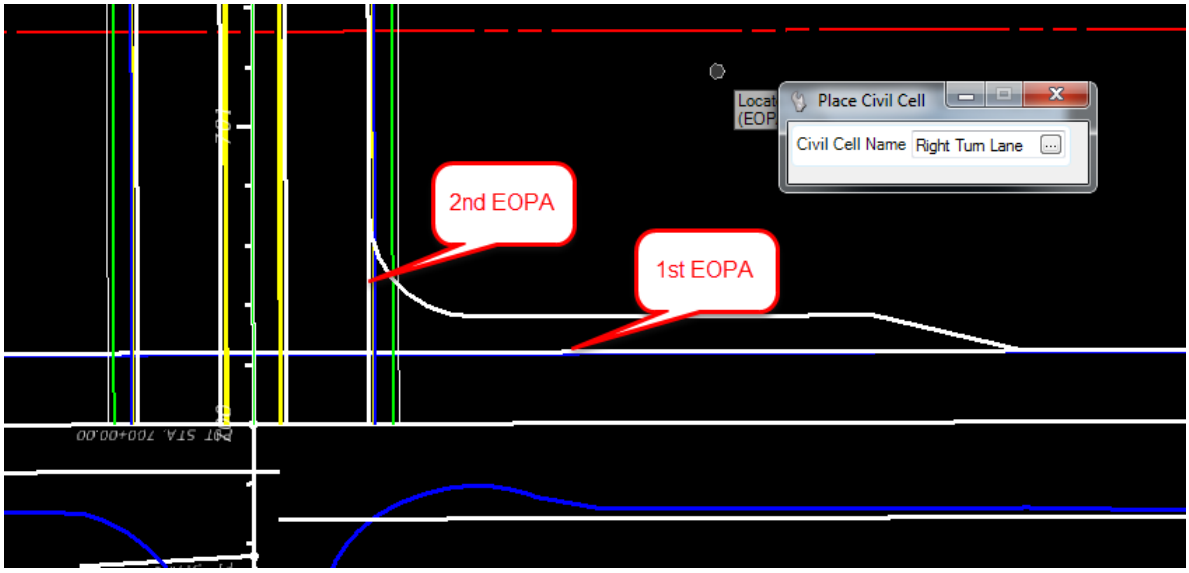


3. At the prompt, for the first *Reference*, select the **widening Pavement Asphalt EOPA** line.

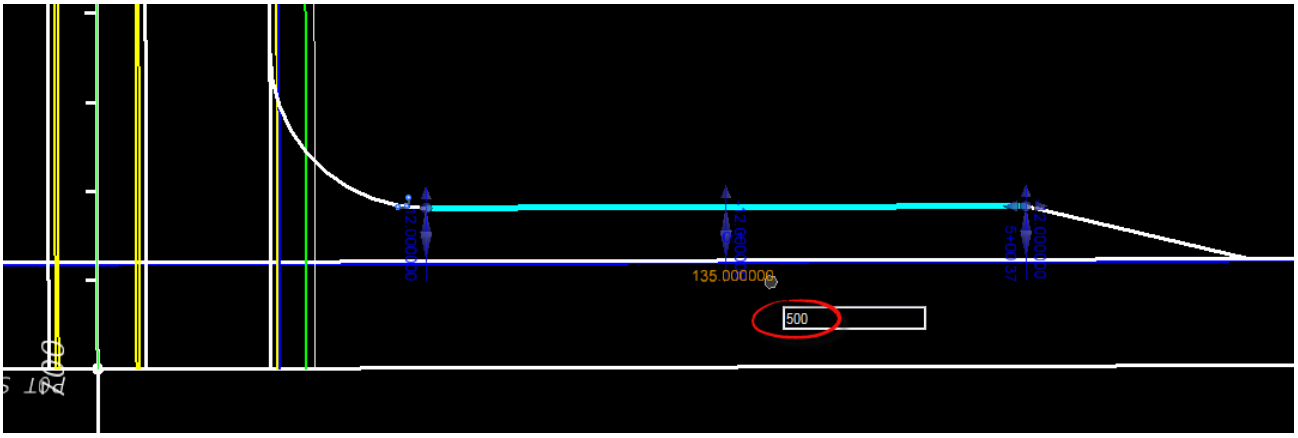
4. For the second *Reference*, select the **SR61 Right EOP Out Pavement Asphalt EOPA.**

5. Reset to Skip Elements to View Alternatives.

6. **Data point** to accept *Civil Cell Placement*. The right turn lane is added.



7. Edit the storage length for first *Right Turn Lane* placed, select the **tangent line** and change the *Length* from **200** to **500 feet**.

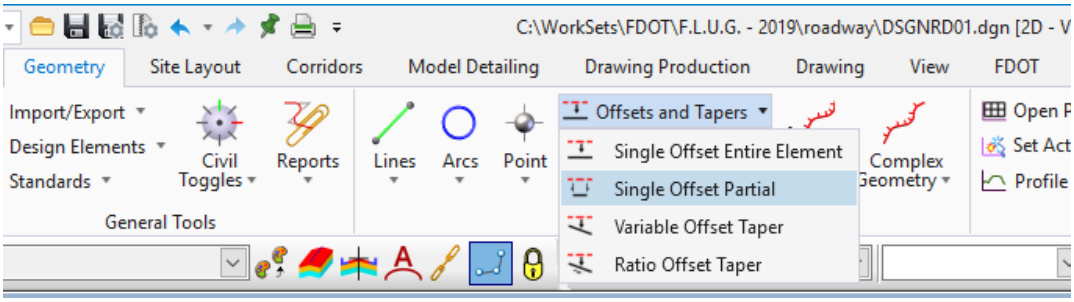


8. Use OpenRoads *Trim to Intersection* to correct the Pavement Asphalt EOPA lines.

Exercise 2.7 Add the School Entrance Right Turn Lane off BL98 Intersection

1. Use the *Geometry Tab and the Horizontal Group*, to select **Single Offset Partial** tool located in the Offsets and Tapers button.

   *OPENROADS MODELING>GEOMETRY>HORIZONTAL>Offsets and Tapers>**Single Offset Partial***

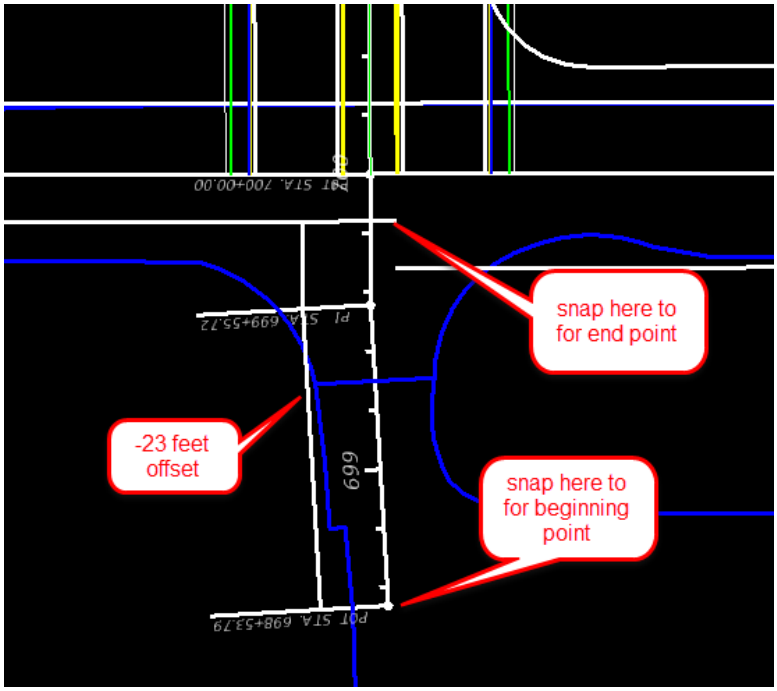


2. Create the side road **Pavement Asphalt EOPA** opposite *SR61* left *offset* **-23 feet**.

   a. For the *beginning*, snap to beginning of **SR61**.

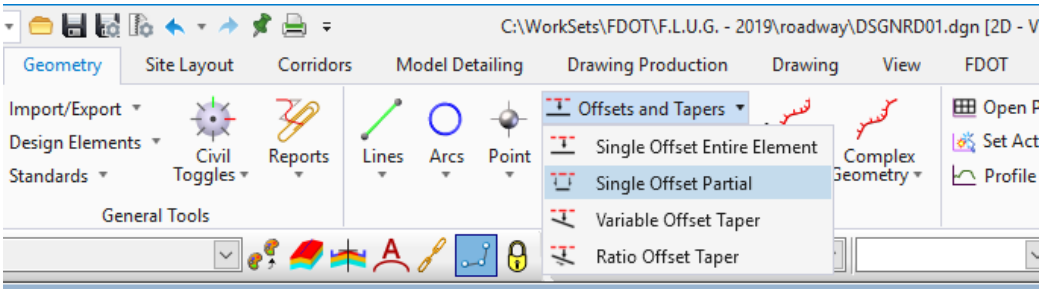
   b. For the *end*, snap to the BL98 widening line end point at **SR61**.

   c. Uncheck *Mirror* to set to **No**.



3. For the opposite side, use the *Geometry Tab and the Horizontal Group*, to select **Single Offset Partial** tool located in the Offsets and Tapers button.

   *OPENROADS MODELING>GEOMETRY>HORIZONTAL>Offsets and Tapers>**Single Offset Partial***



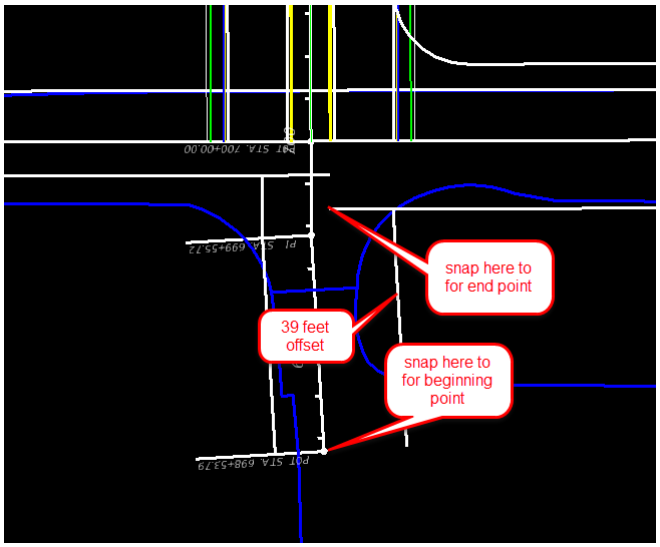
4. Create the side road **Pavement Asphalt EOPA** opposite *SR61 Left Offset* **39 feet**.

   a. For the *beginning*, snap to beginning of **SR61**.

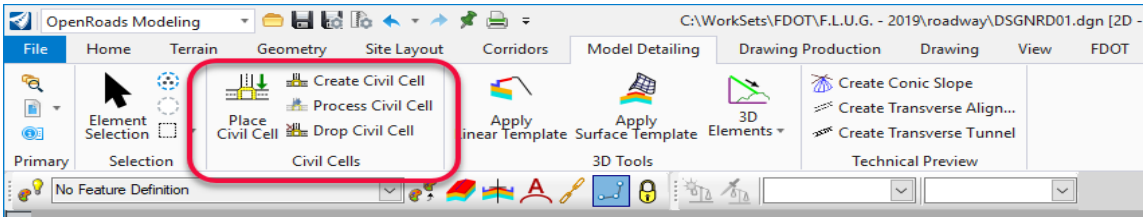
   b. For the *end*, snap to the BL98 widening line end point at SR61.

   c. Uncheck *Mirror* to set to **No**.

HINT If necessary, Let the tool place the line on the opposite side and edit it after it is placed

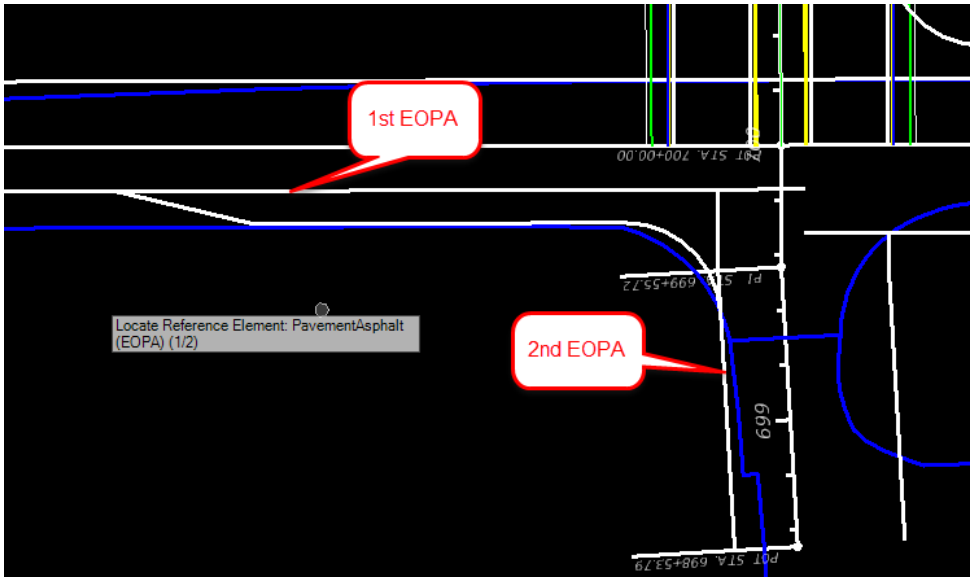


5. Add another **Right Turn Lane** Civil Cell on the opposite side of the intersection.



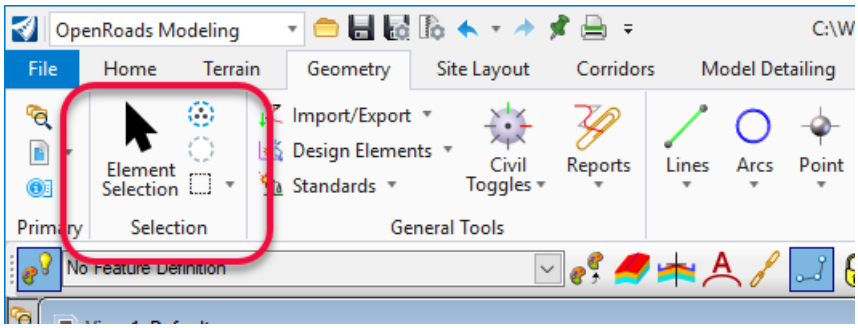
   a. At the prompt, for the first *Reference*, select the **widening Pavement Asphalt EOPA** line.

b. For the second *Reference*, select the **intersection Pavement Asphalt EOPA** line.

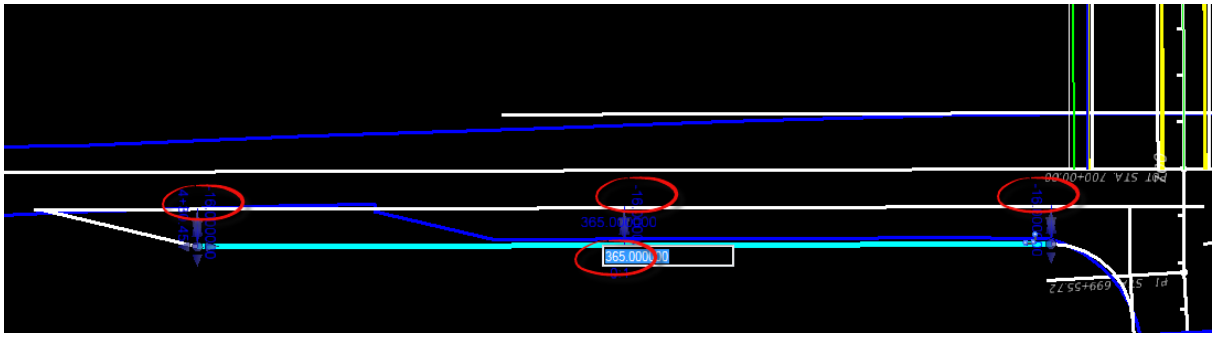


c. **Data point** to accept **Civil Cell Placement.** The Right Turn Lane is added.

6. Click on the Select Tool Set icon to exit the Place Civil Cell command <OR> F6 Function Key.

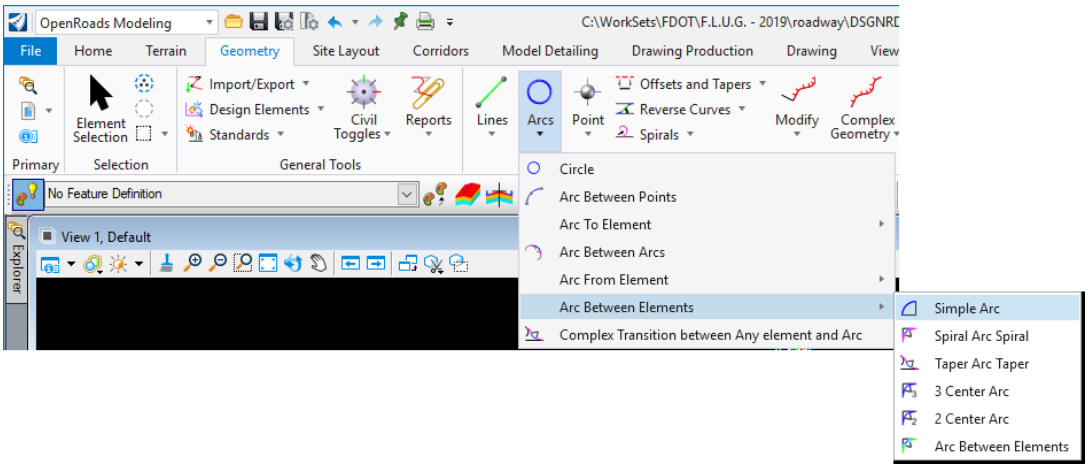


7. Edit the storage length for the second Right Turn Lane placed, select the tangent line and change the Length from 200 to 365 feet. Verify the Change the lane width is -16 feet.



Exercise 2.8 Create/Edit the Intersection Curve Radii

1. Use the *Geometry Tab and the Horizontal Group***,** to select the **Simple Arc** tool located in the ARCS button then the drop down of Arc Between Elements**.**



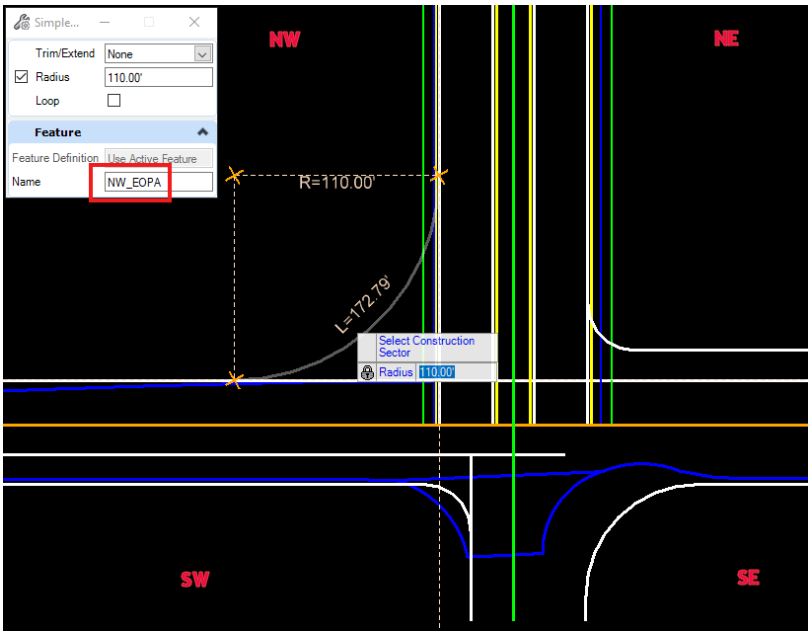
1. Create/Edit the **Curve** returns.

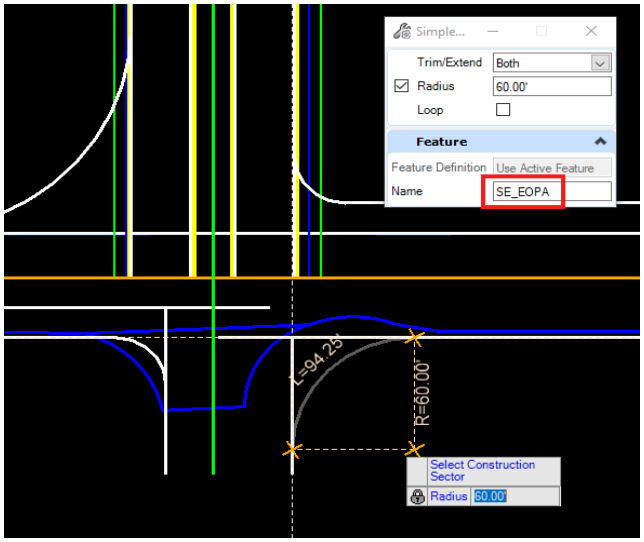
2. Select *Feature Definition*, **Pavement Asphalt EOPA** to place remaining curve radii.

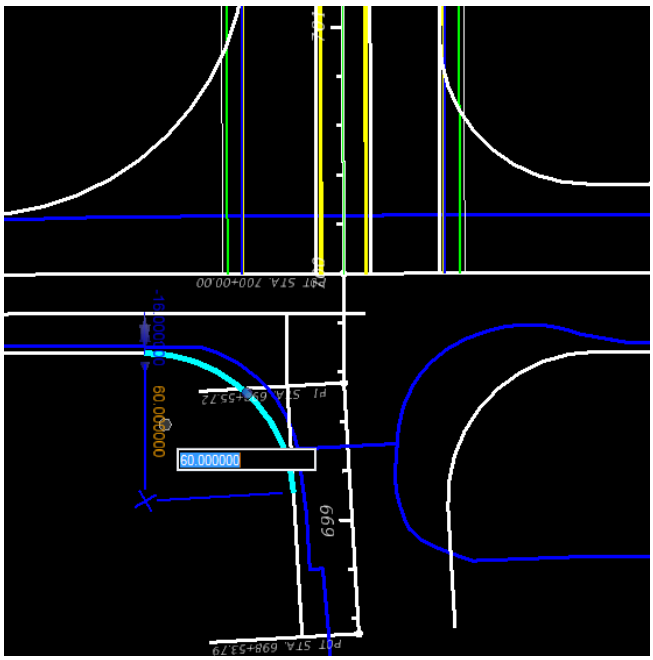
3. Follow the cursor prompt to select the two Roadway **Pavement Asphalt EOPA** *reference lines*.

HINT Rotating the view along the BL98 BaseLine will set the Top of the screen as North giving a quandrant as shown below.

HINT Select the two Pavement Asphalt EOPA in each quadrant. Use the value shown and trim both for each of the following quadrants: NorthWest 110 feet,
NorthEast 60 feet,
SouthWest 60 feet,
SouthEast 60 feet




Simple...
Trim/Extend
Both
Radius
60.00'
Loop
Feature
Feature Definition
Use Active Feature
Name
SE_EOPA
L=94.25'
R=60.00'
Select Construction Sector
Radius
60.00'

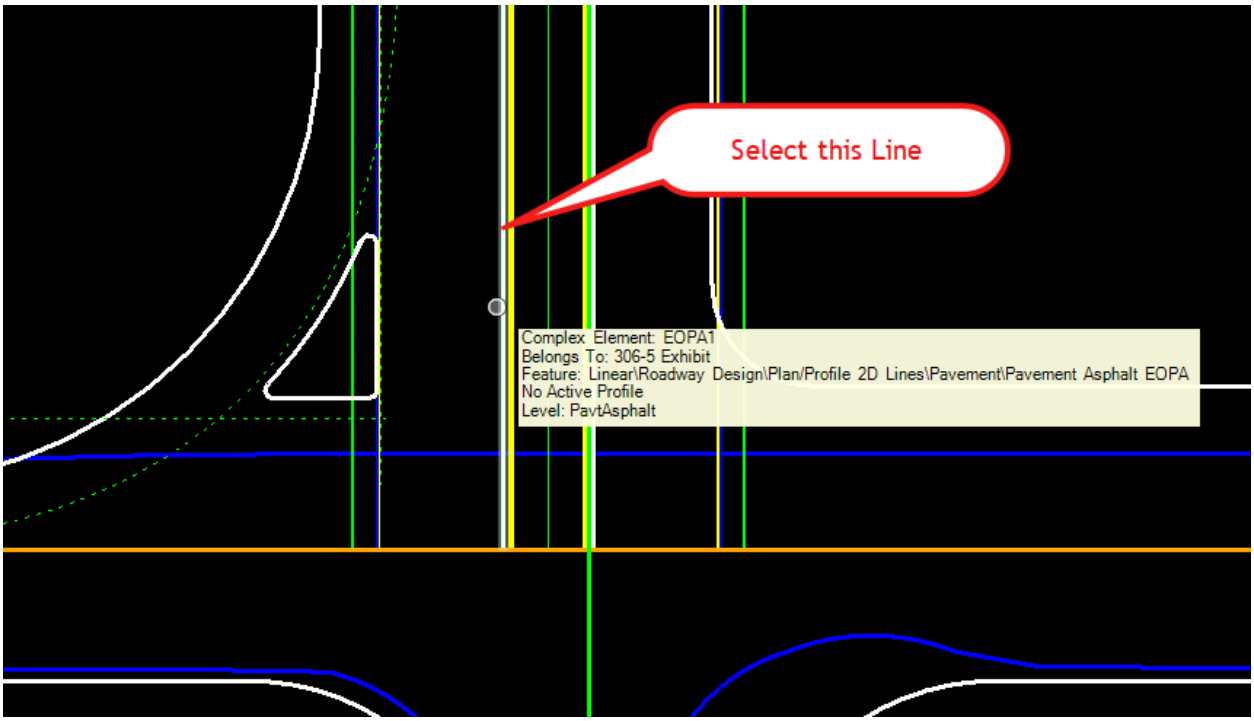

60.000000
699


699

Exercise 2.9 Trim Back Sidewalk and Curb Lines to the Curve Radii

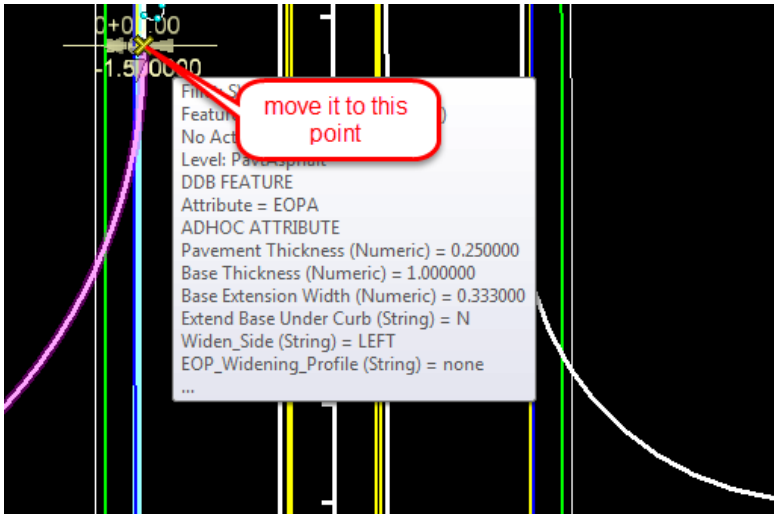
This exercise takes advantage of design intent to modify the curb and sidewalk lines off SR61 to the new curve radius end point.

1. Select the **LT_PVT_EOP_IN** line (Pavement Asphalt EOPA Feature).

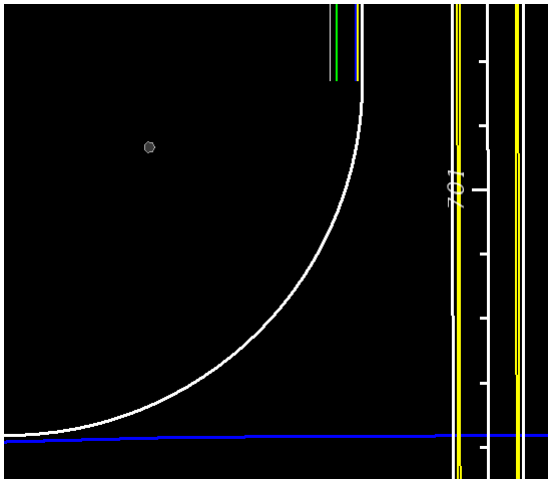


2. When the *Context Manipulators* display, zoom into the beginning point and select the **Start Station** *handle* OR the *Station* value to move the end.

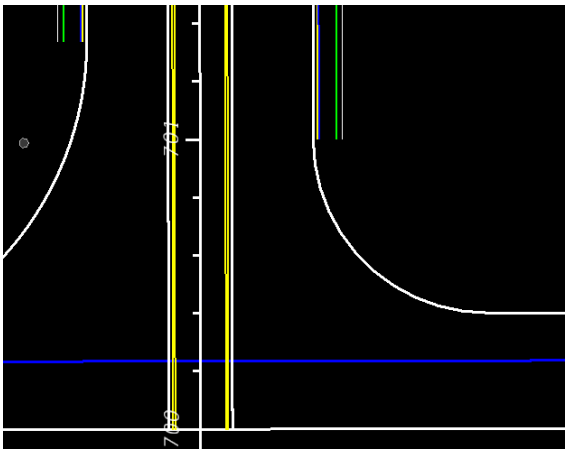
3. Drag the handle while zooming out and select the **End Radius** point to move the point.



4. Notice the results. The curb and sidewalk move as one because of the built in design intent relationship.



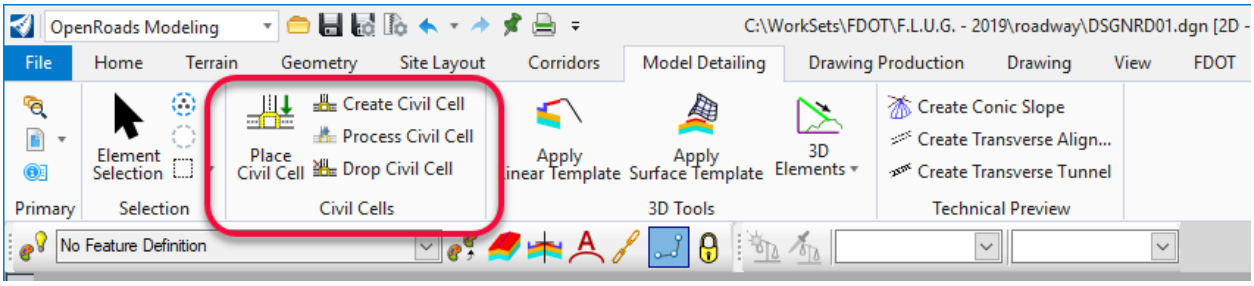
5. Repeat these steps to move the **RT_PVT_EOP_IN** line (Pavement Asphalt EOPA Feature) back to the *curve radius* on the right Roadway.



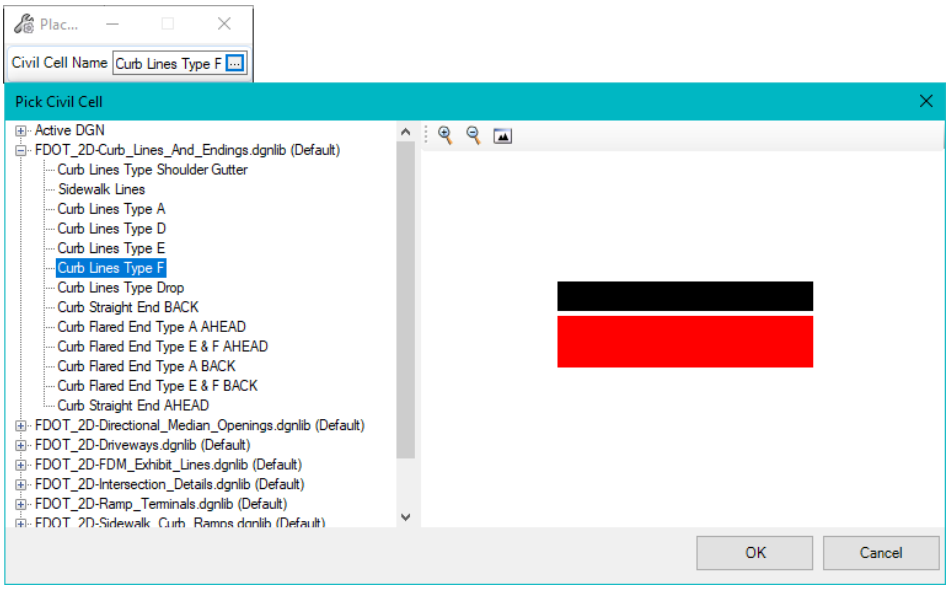
Exercise 2.10 Use Civil Cell Technology to Place Curb and Sidewalk Around the Radii

1. Use Model Detailing Tab and the Civil Cells Group**,** to select the **Place Civil Cell** tool.

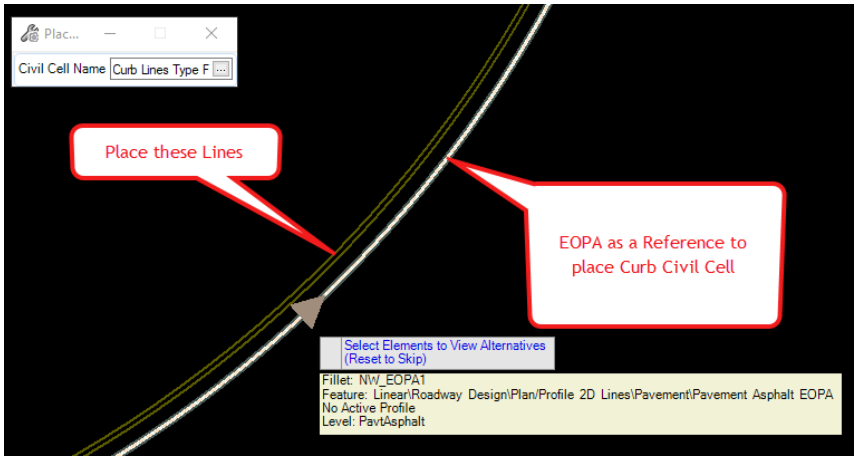
   *OPENROADS MODELING>MODELING DETAILING>**Place Civil Cell***



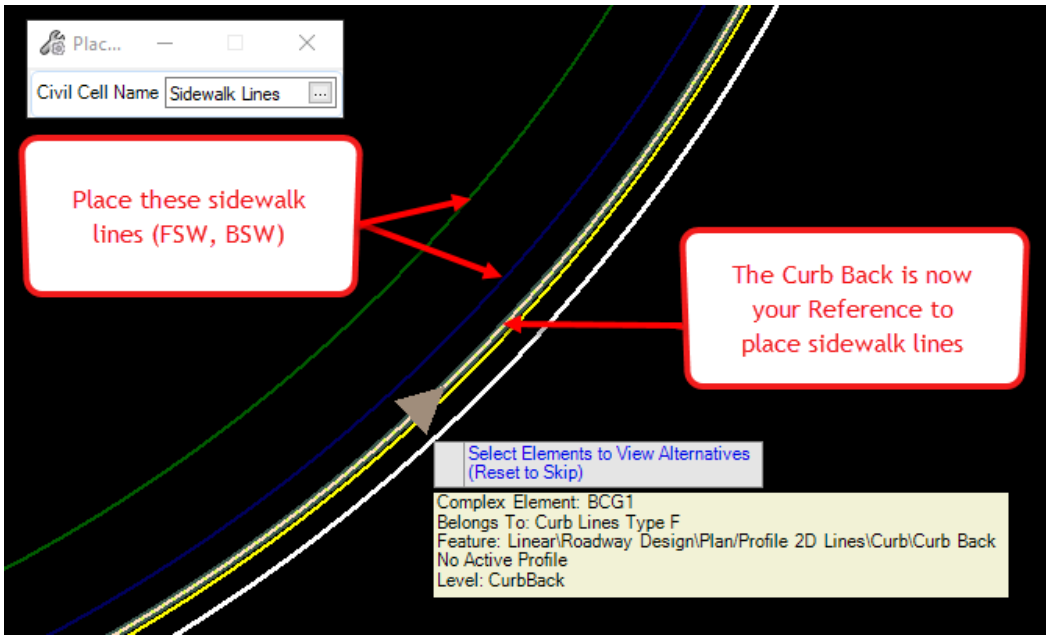
2. Navigate to the *FDOT _2D-Curb_Lines_And_Endings.dgnlib* and select the **Curb Lines Type F** *civil cell*.



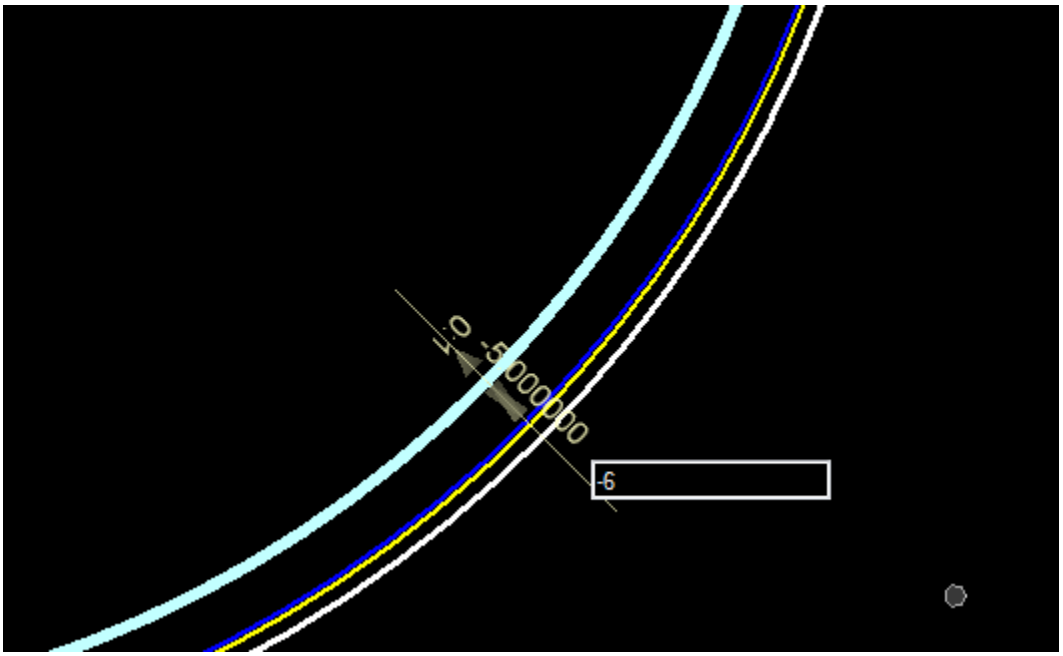
3. At the prompt, select the **NW_EOPA** *radius line*, reset to **View Alternates** and then data point to accept the **Civil Cell Placement**.



4. Navigate back to the Place Civil cell dialog select the SideWalk Civil cell from the the *FDOT _2D-Curb_Lines_And_Endings.dgnlib. Place this civil cell off of the back of curb line that you just placed in the previous step.*



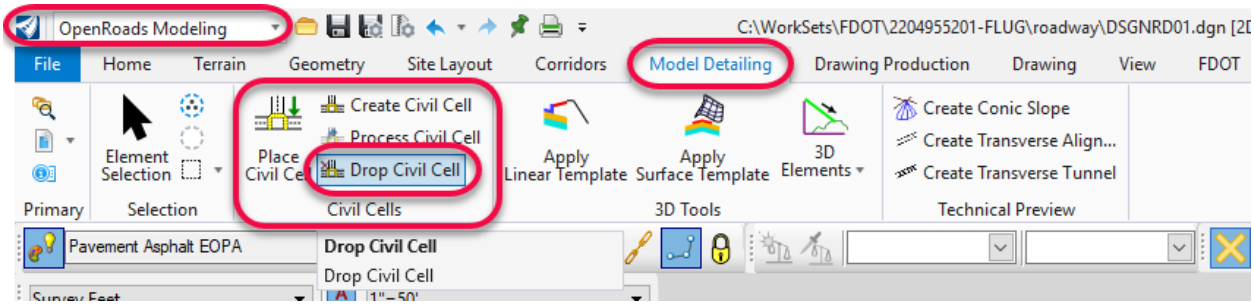
5. Edit the *SidewalkBack* line from -5 to -6 **feet** from the **SidewalkFront** line of the element. Also the SidewalkFront needs to be set from -4 to 0 feet.



Exercise 2.11 Create a Custom Civil Cell for Other Radii

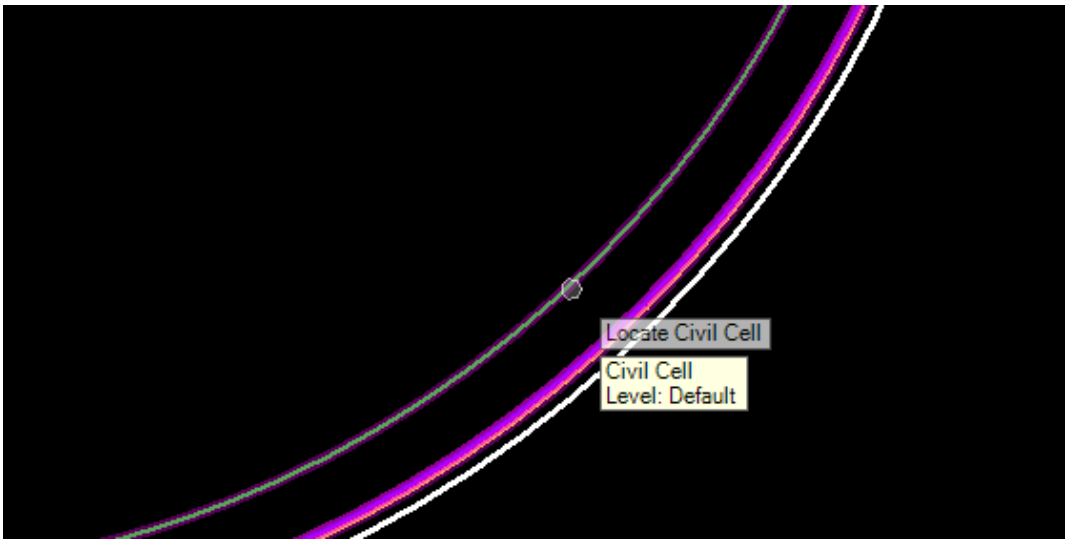
1. From the Model Detailing Tab and the Civil Cells Group, select the **Drop Civil Cell** tool.

   *OPENROADS MODELING>MODEL DETAILING>CIVIL CELLS>**Drop Civil Cell***



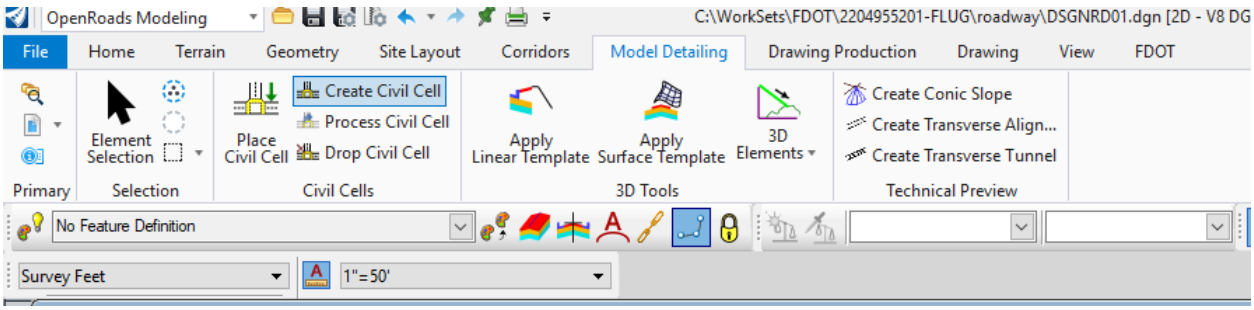
2. Select the SidewalkLines *Civil Cell* in the *View* and data point to drop the Civil Cell. Repeat this for the Curb Civil Cell.

HINT Move the cursor over the curb or sidewalk lines to see it highlight

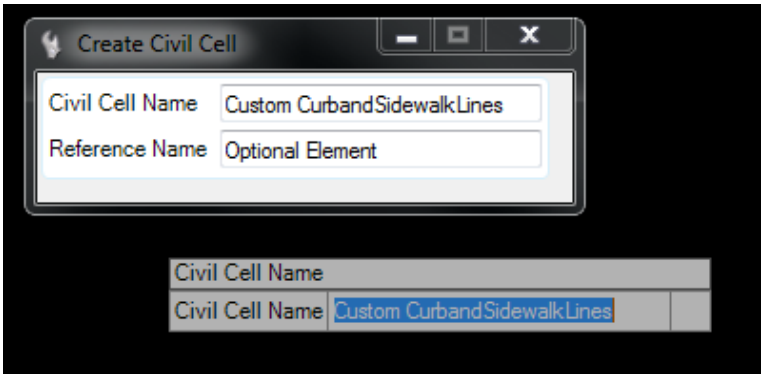


3. Use *Civil Cells*, **Create Civil Cell** tool. This can be found in the Model Detailing Tab and the Civil Cells Group of the Ribbon.

   *OPENROADS MODELING>MODEL DETAILING>CIVIL CELLS>**Create Civil Cell***

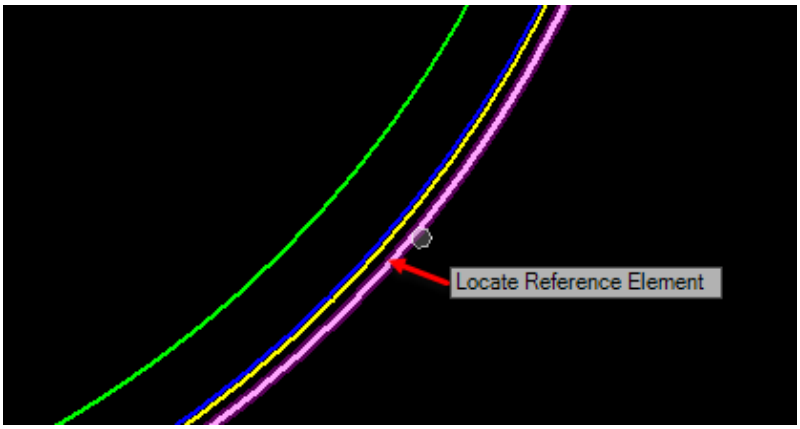


a. Enter the *Civil Cell Name*: **Custom CurbandSidewalkLines**.



b. Data point to accept the new *Name*.

c. At the prompt, locate *Reference Element* and select the **NW_EOPA** line.



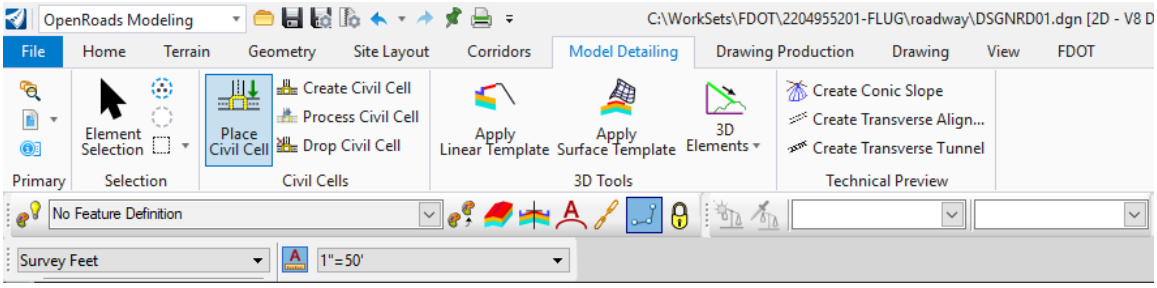
d. Reset to Locate Reference Element.

e. Reset to Optional Reference.

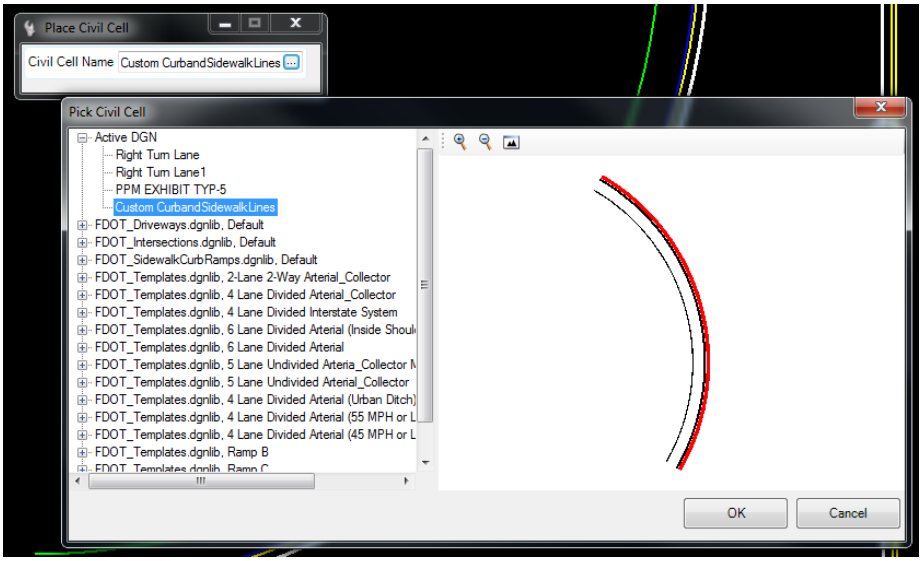
f. Data Point to accept **Civil Cell**.

4. Use the new *Civil Cell* to place for the other *Radii*; use *Place Civil Cell*, This can be found in the Model Detailing Tab and the Civil Cells Group of the Ribbon.

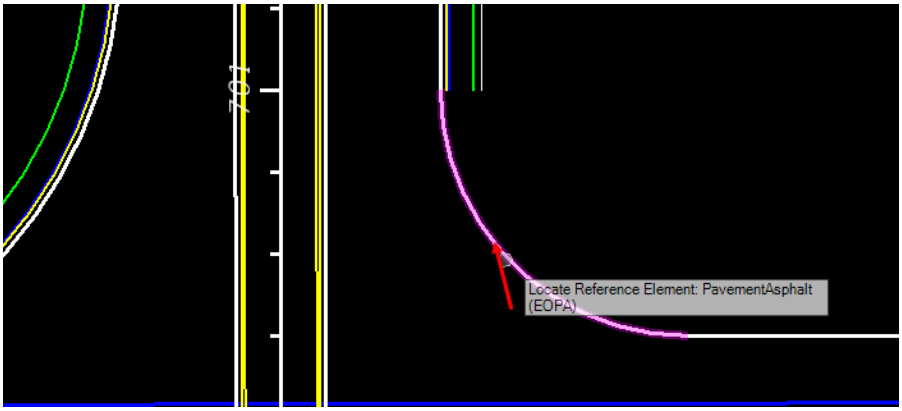
*OPENROADS MODELING>MODEL DETAILING>CIVIL CELLS>**Place Civil Cell.***



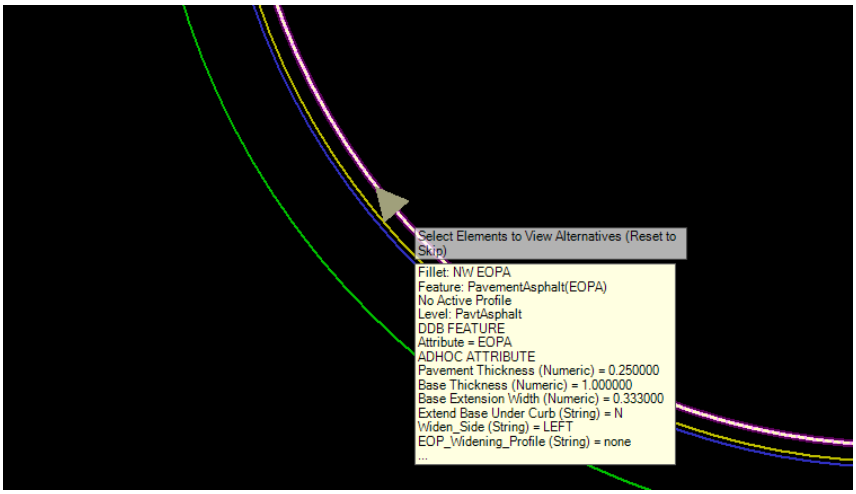
a. If the **Custom CurbandSidewalkLines** is not active, navigate to the *Active DGN* and select it from the list. Click **OK.**



b. At the prompt, select the **NE_EOPA** *Radius line.*

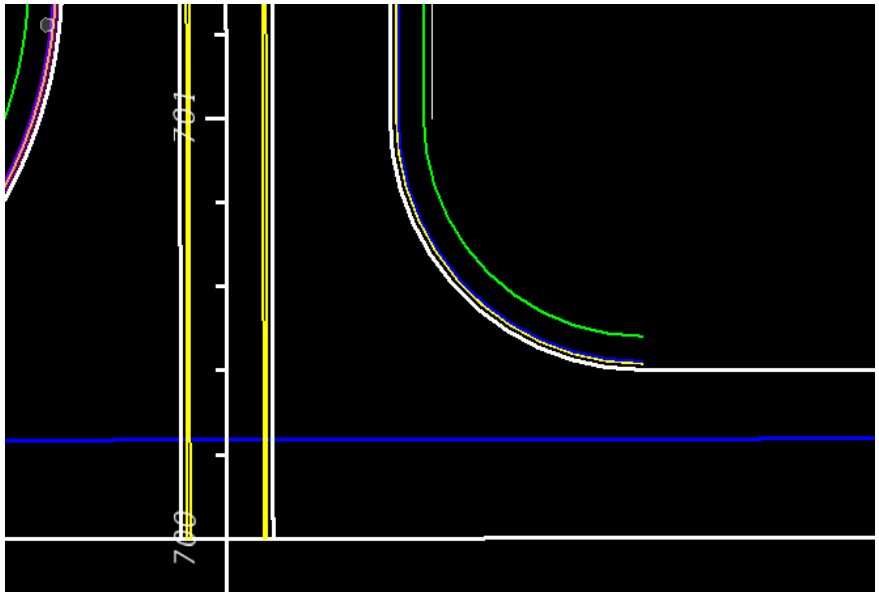


c. At the prompt, select **Element to View Alternatives**, move the cursor over the *EOPA line* and click on the **Arrow** to reflect the Civil Cell to the correct side.

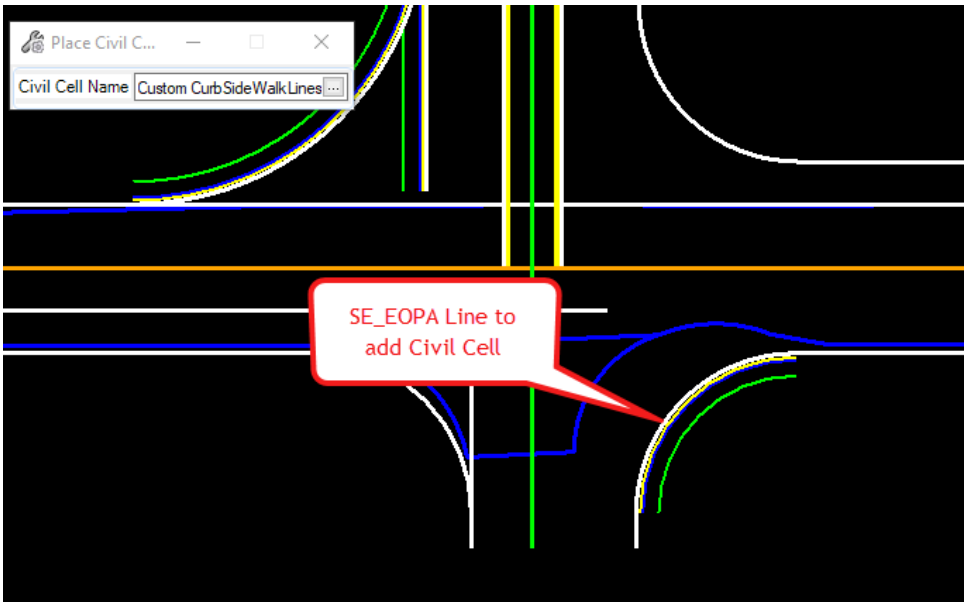


d. Reset to View alternates.

e. Data Point to accept the **Civil Cell Placement**.



5. Repeat these steps to place the **Custom CurbandSidewalkLines** *Civil Cell* on the **NE EOPA** *Radius*.

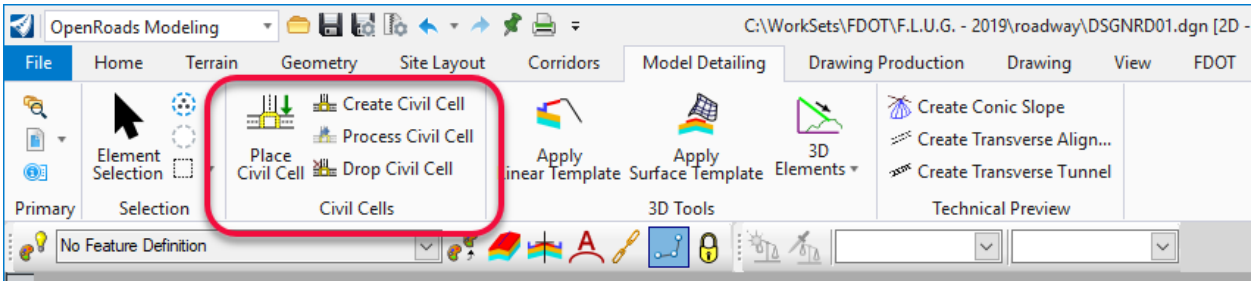


6. Leave the **SE Radius** without curb and sidewalk.

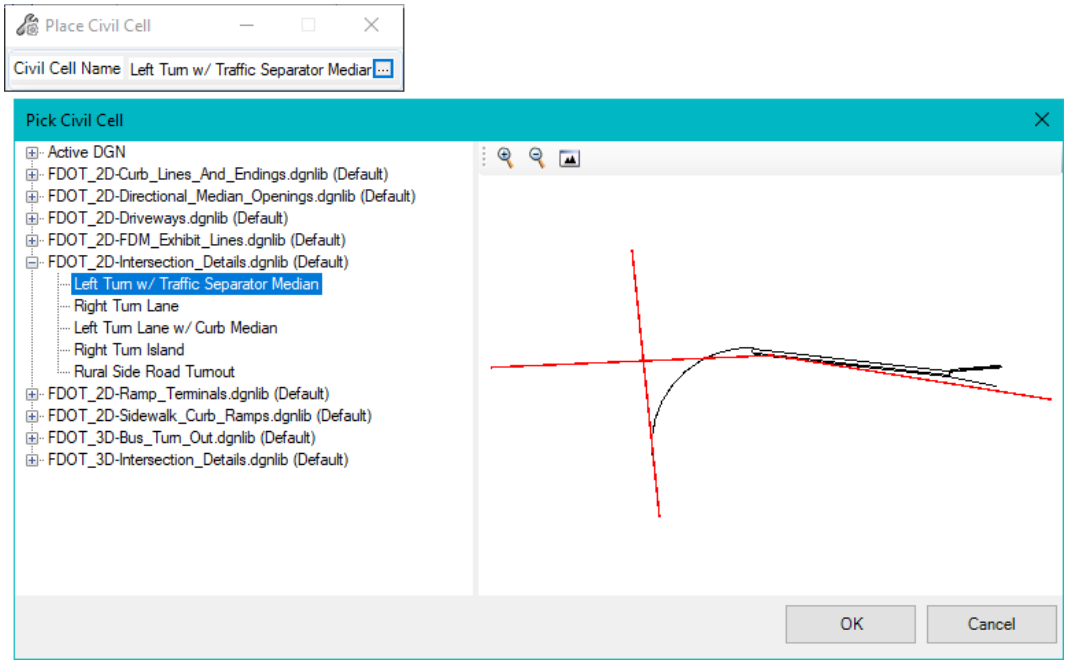
Exercise 2.12 Place Left Turn with Traffic Separator

1. Use Model Detailing Tab and the Civil Cells Group**,** to select the **Place Civil Cell** tool.

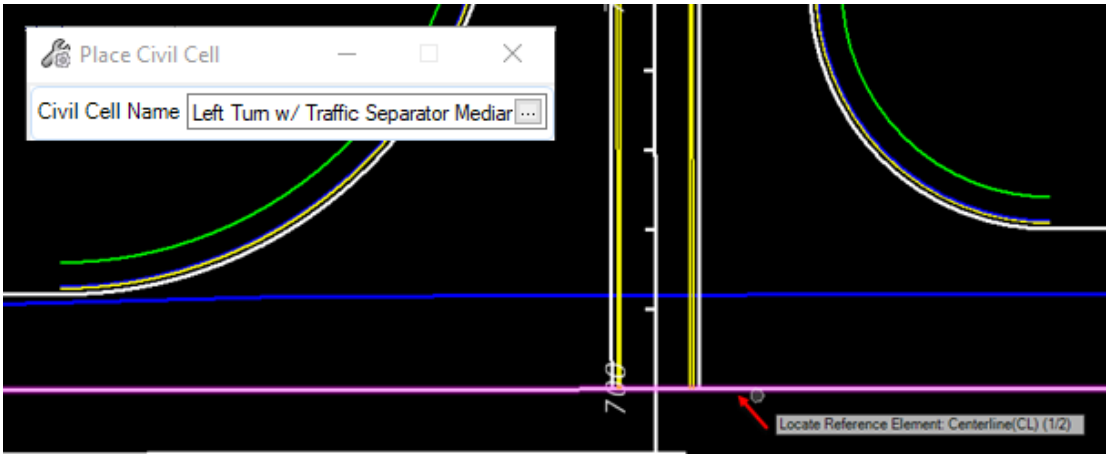
*OPENROADS MODELING>MODEL DETAILING>CIVIL CELLS>**Place Civil Cell***



a. Navigate to the *FDOT _Intersections.dgnlib* and select **Left Turn with TS** *civil cell*.

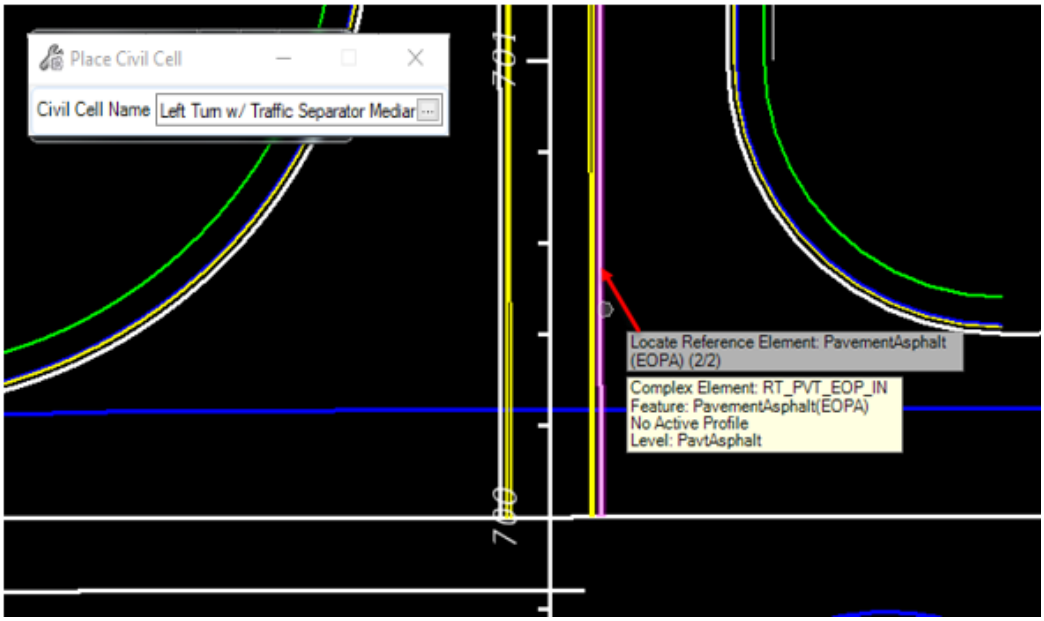


b. At the *Locate Reference Element Centerline*, select the **BL98** line in the View.

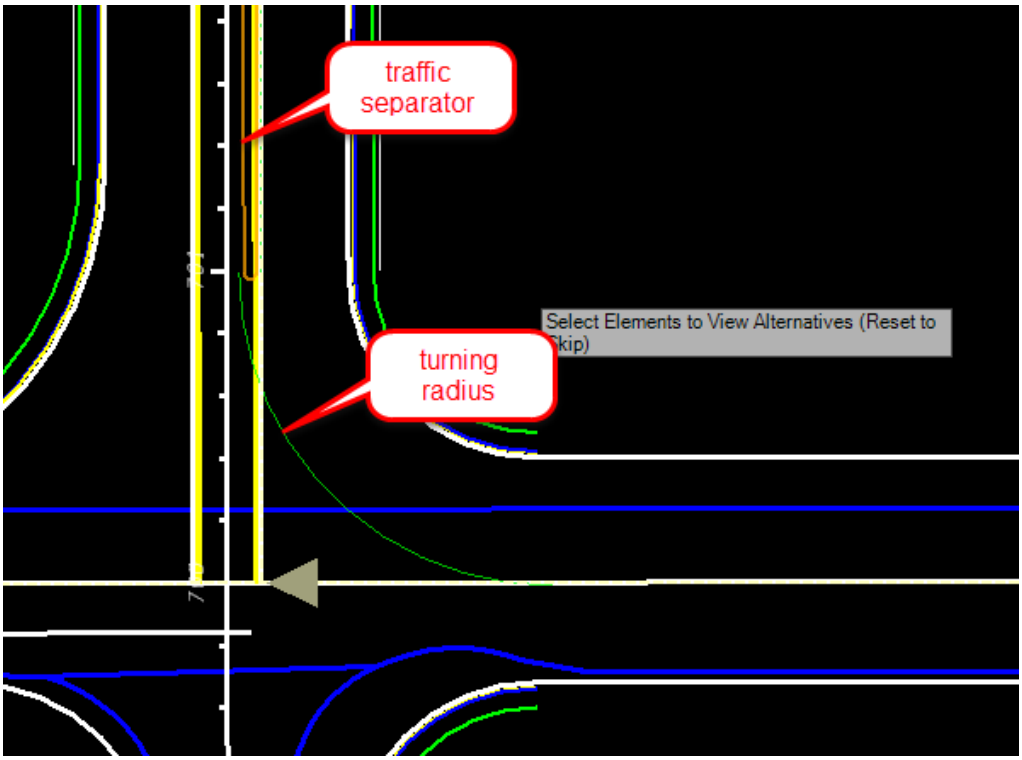


c. At the *Locate Reference Element Pavement Asphalt EOPA*, select the **RT_PVT_EOP_IN** line in the View.

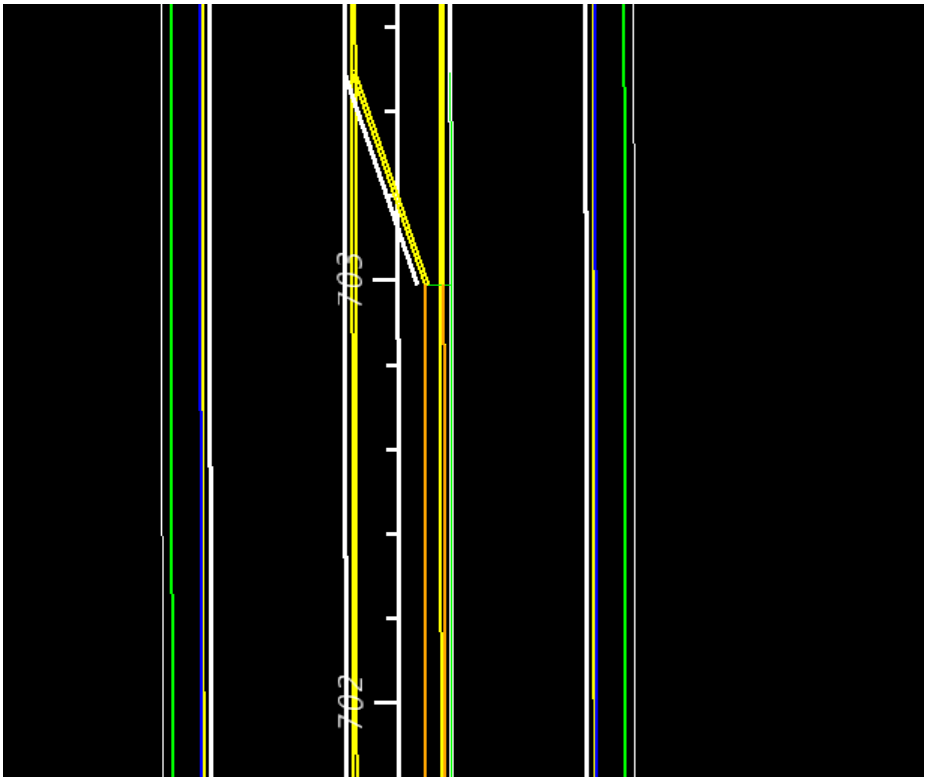
HINT For the direction of travel I, this is always the left median EOP line



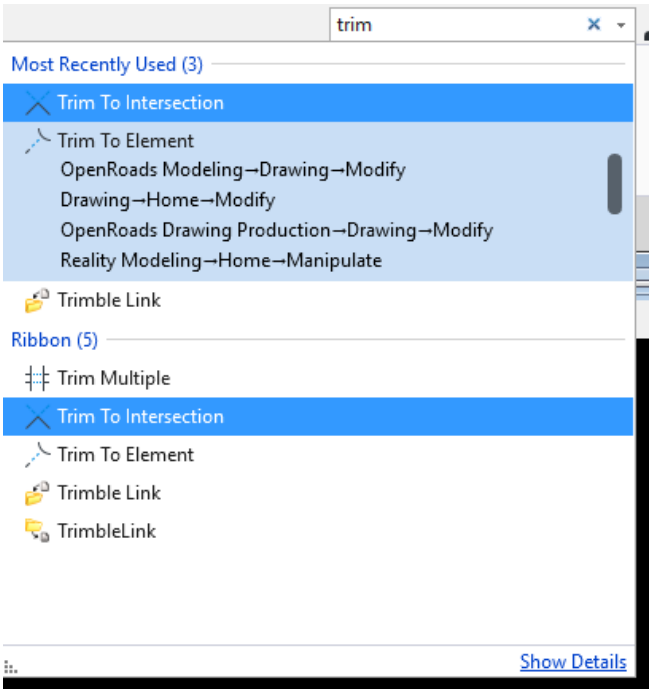
d. Click on the **Arrow** of both *Reference Elements* to **View Alternates**, when the *Green Turning Radius* and *Traffic Separator* are both in the correct place, **Reset** to skip**.**



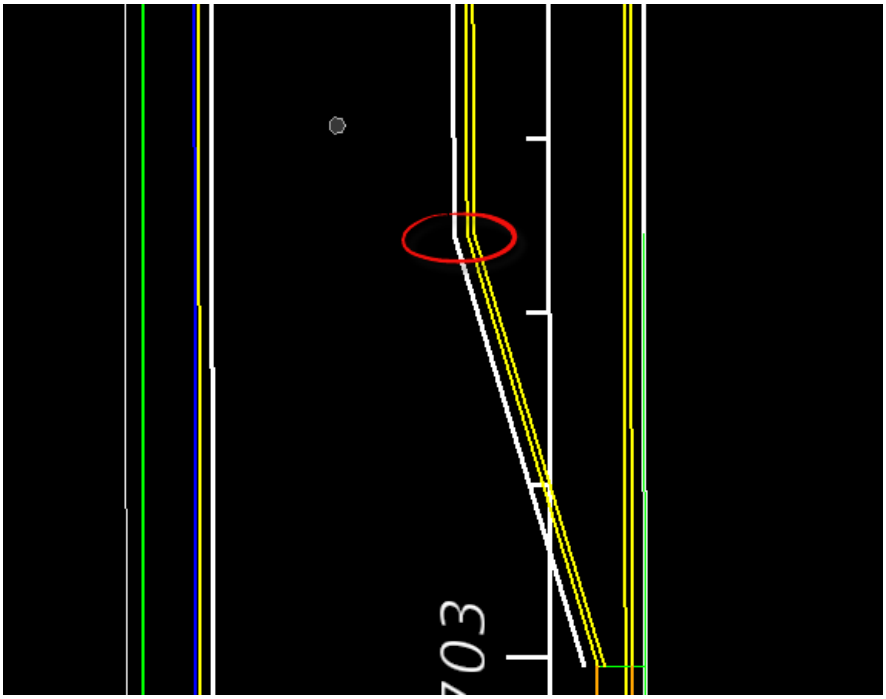
e. Data point to accept the **Civil Cell Placement** and view the left turn lane on **SR61** at *BL98 Intersection*.



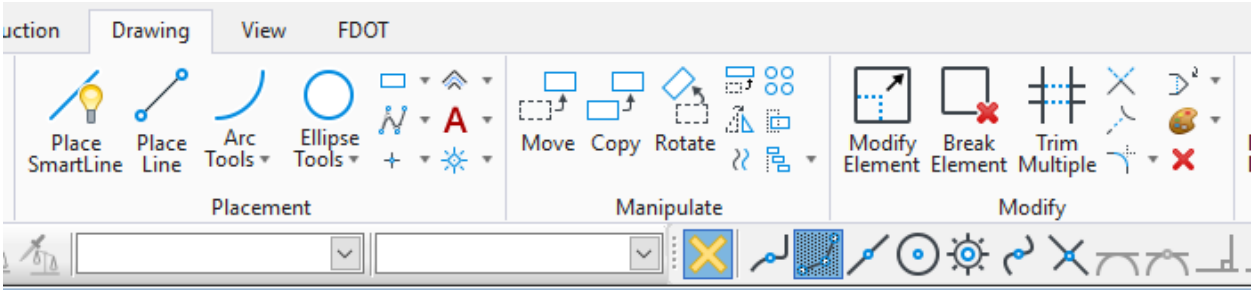
2. Use OpenRoads **Trim to Intersection** tool. A quick way to find a tool is to use the search ribbon.



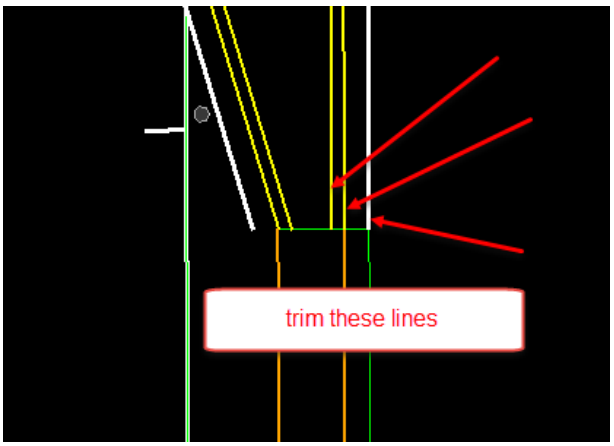
3. Trim the *curb median elements* at the **begin taper** as shown.



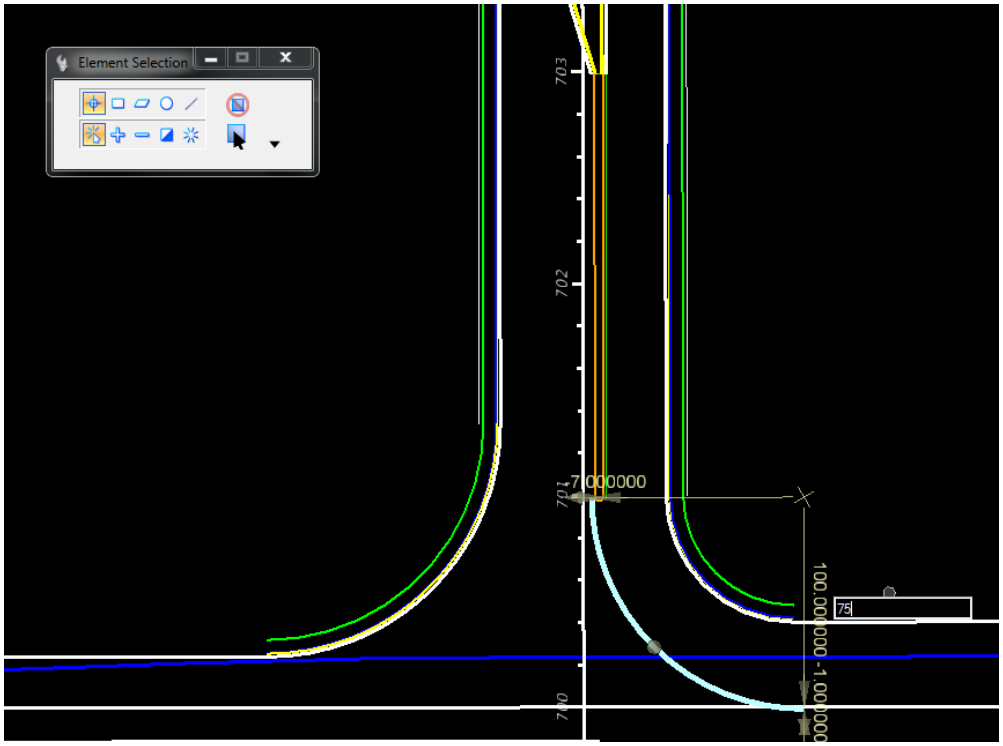
4. Use OpenRoads **Trim to Element** tool. Which can found in the Drawing Tab, and the Modify Group



5. Trim the elements at the *Curb Median lines* at the **Traffic Separator** as shown, leave the *green line.*

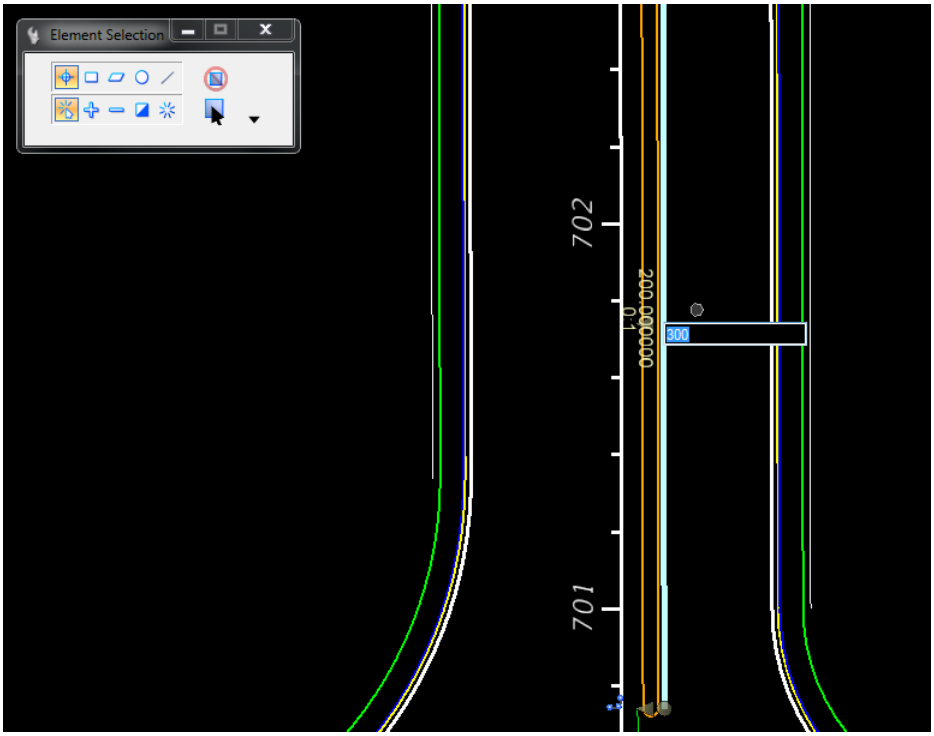


6. View the placed left turn, change the *Turning Radius* from **100 feet** to **75 feet**.

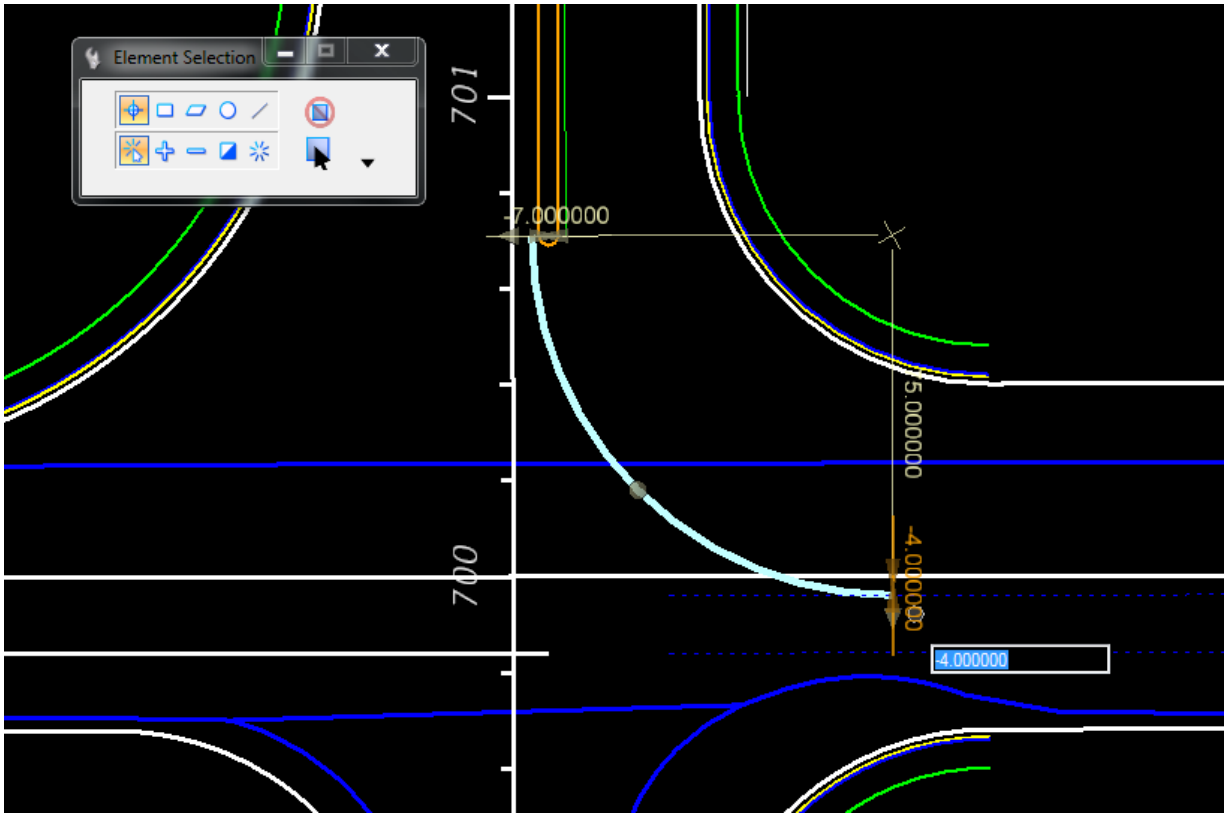


7. View the placed left turn, change the *Storage Length* from **200 feet** to **300 feet**.

HINT Select the green line, then select the length text.



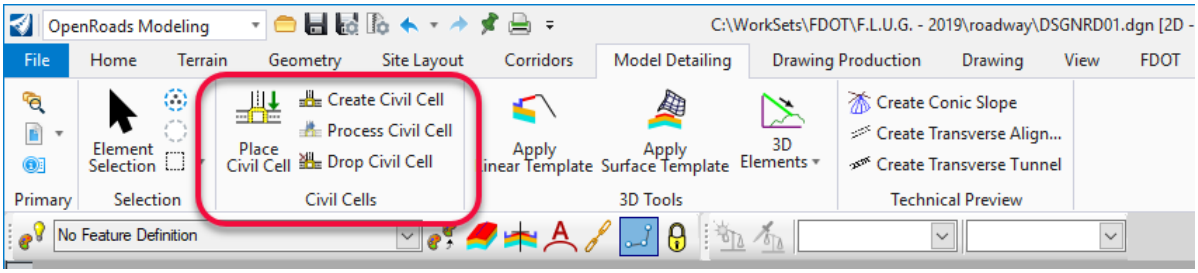
8. Zoom to the *Turning Radius Offset Dimension*, change the *value* from -1 **feet** to **-4 feet**.



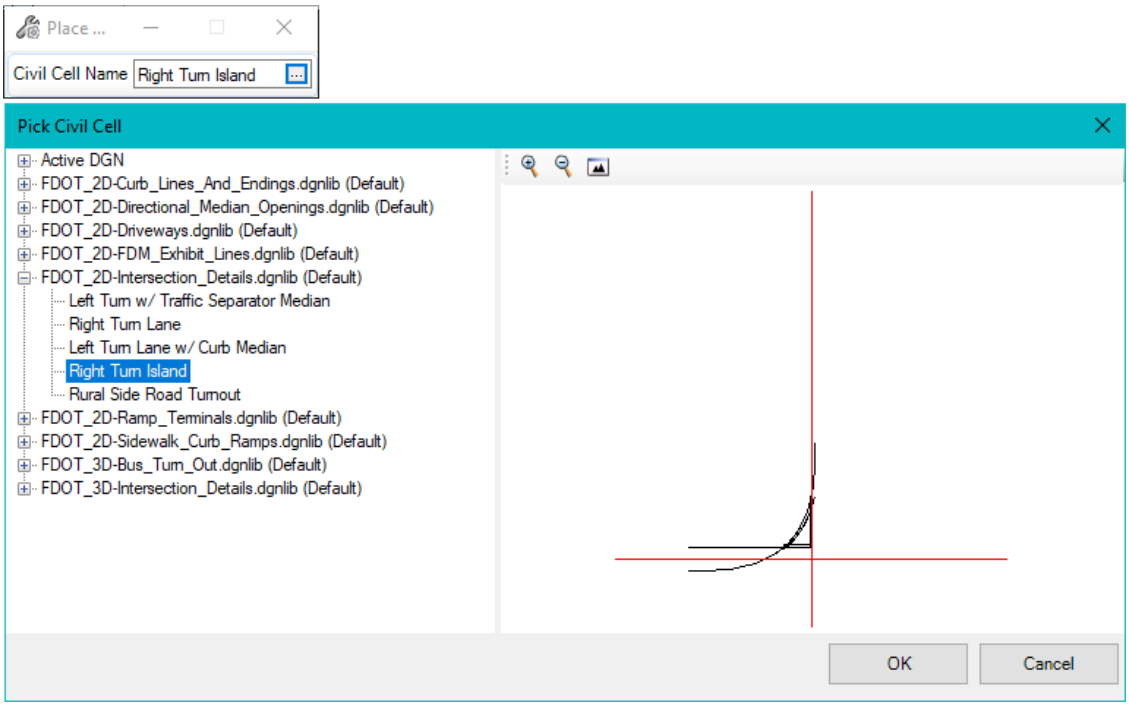
Exercise 2.13 Place Right Turn Island

1. Use Model Detailing Tab and the Civil Cells Group**,** to select the **Place Civil Cell** tool.

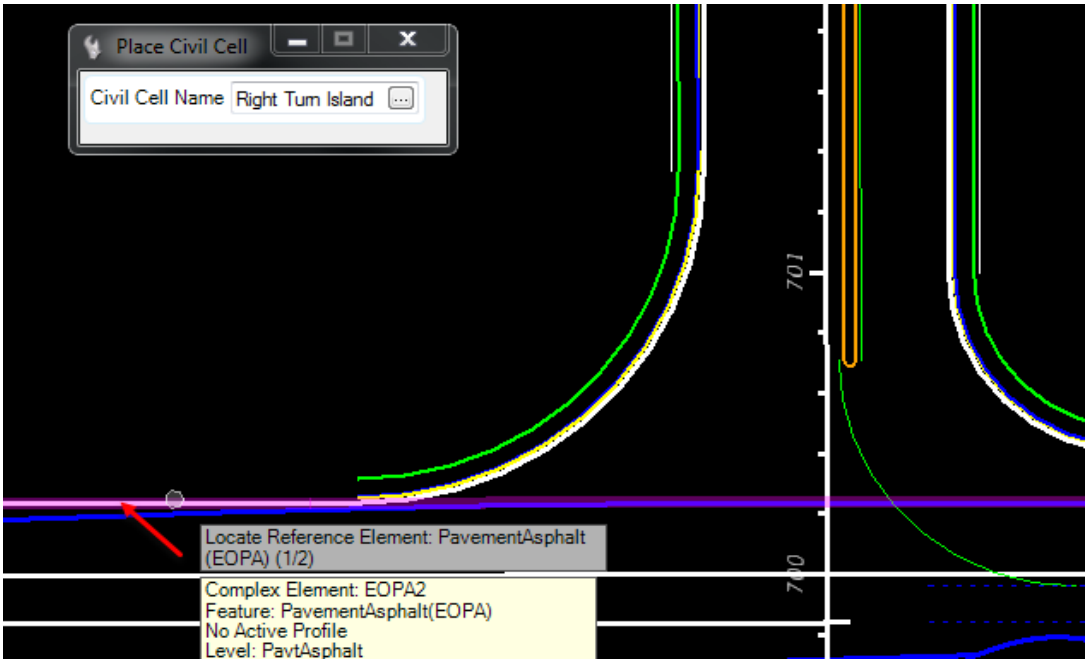
   *OPENROADS MODELING>MODEL DETAILING>CIVIL CELLS>**Place Civil Cell***



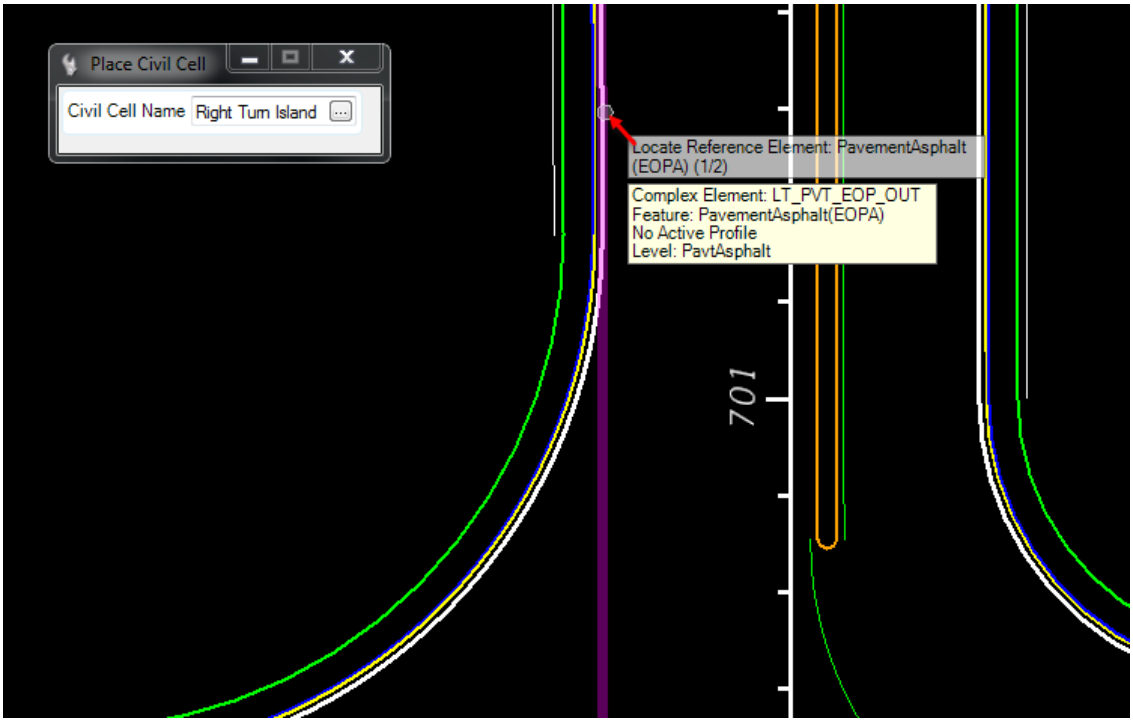
2. Navigate to the *FDOT_2D-Intersection_Details.dgnlib*, select **Right Turn Island**. Click **OK.**



3. Select the first **Pavement Asphalt EOPA** lines.

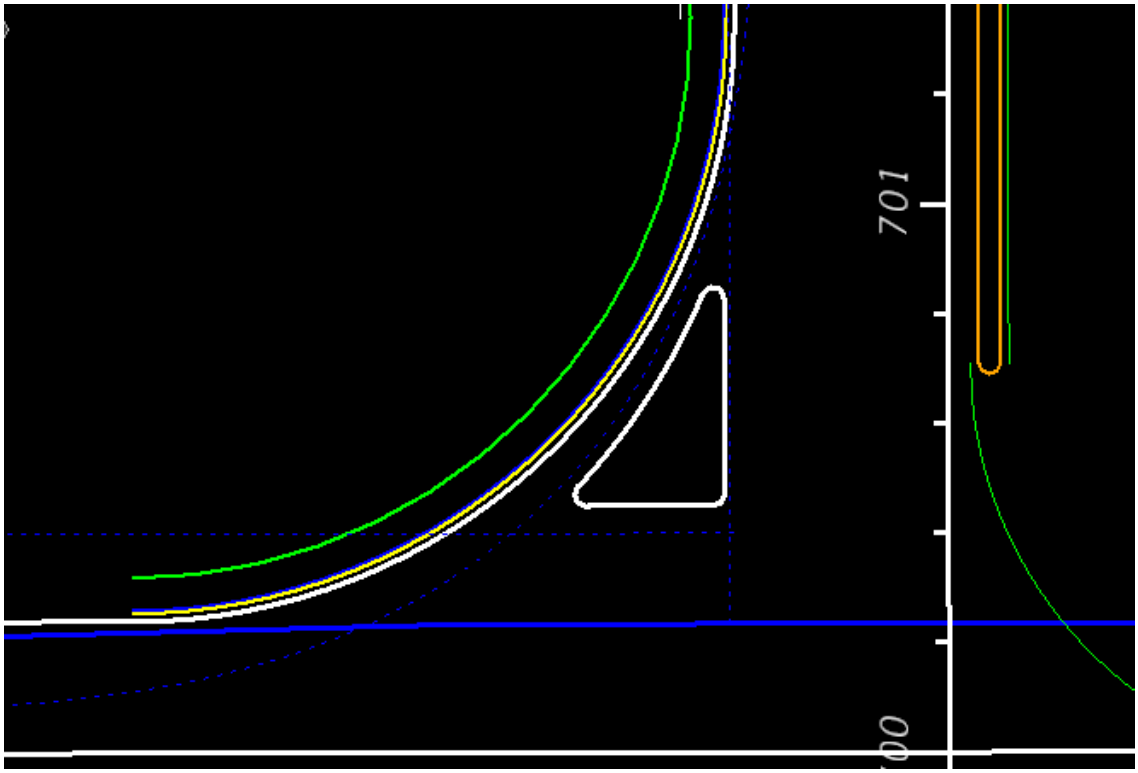


4. Select the second **Pavement Asphalt EOPA** line.



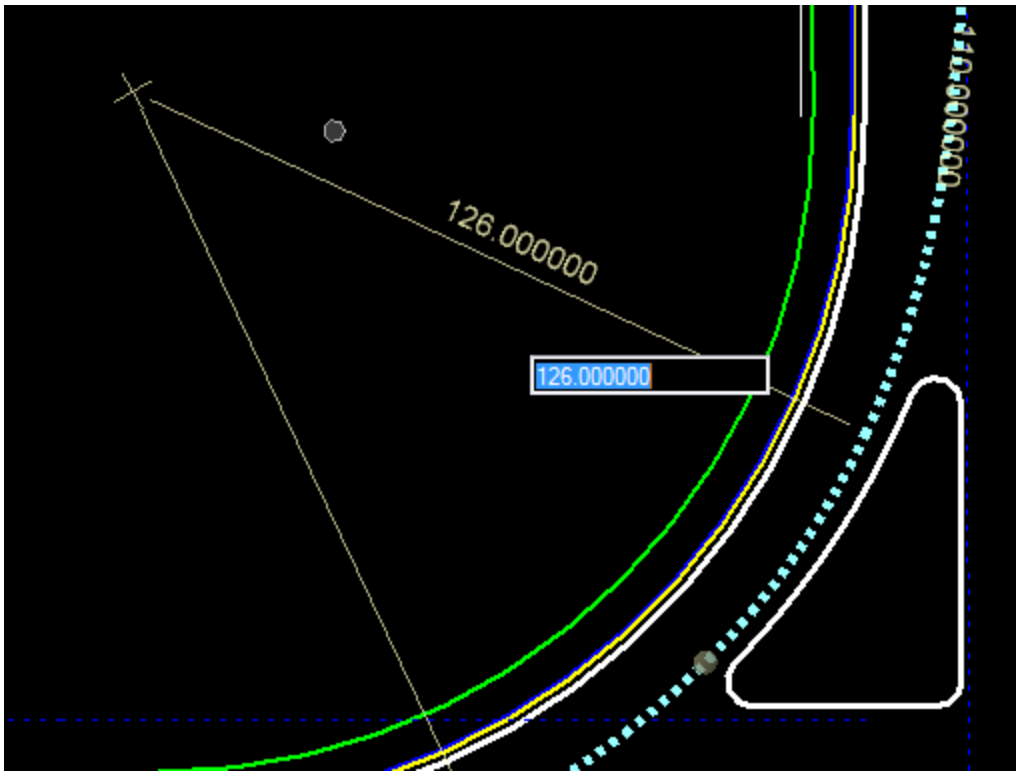
5. Reset to Skip Alternates.

6. Data Point to accept the **Civil Cell**.

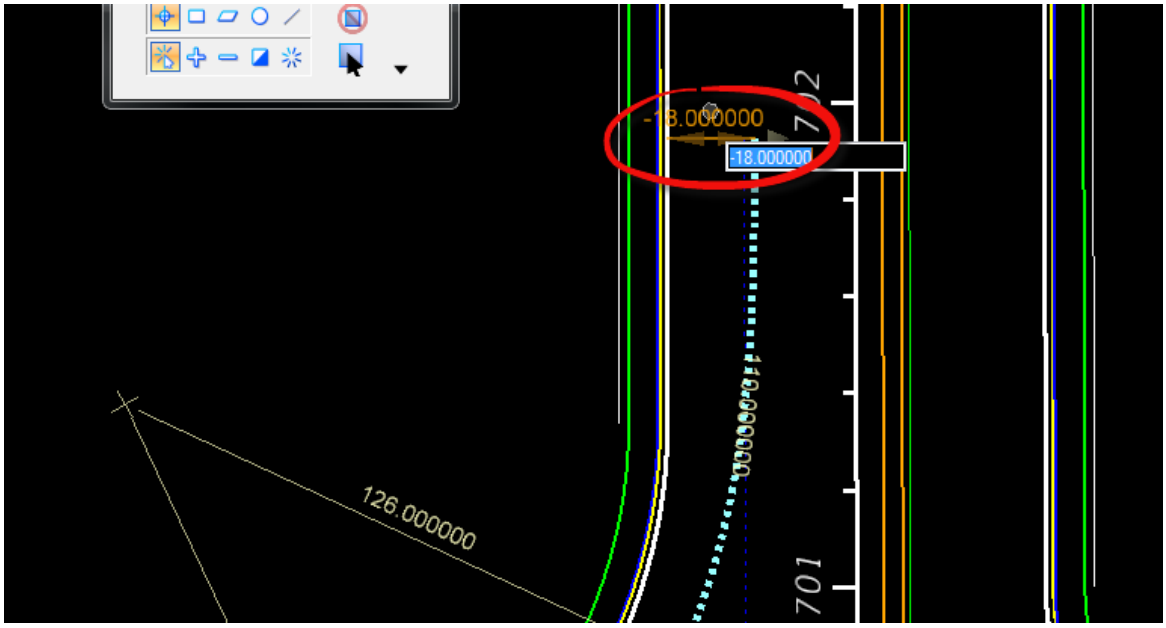


➢ ***Change the Right Turn Island Parameters***

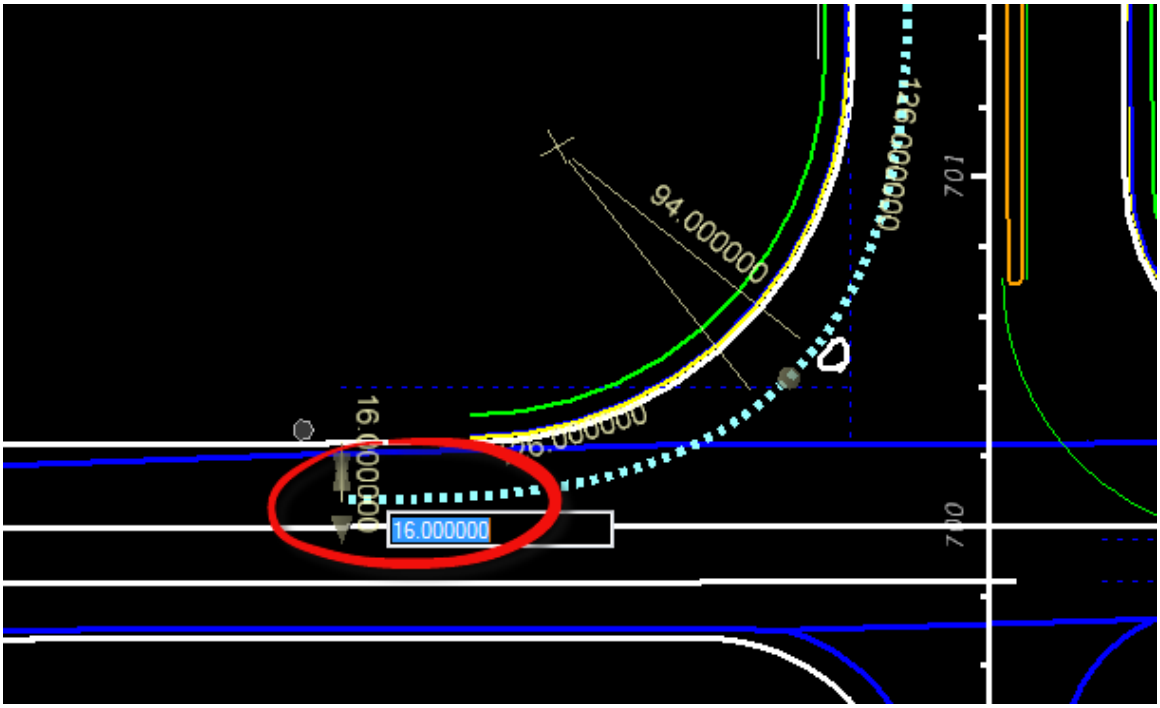
1. Change *Const Lines Blue Dashed Arc Radius* from **110 feet** to **126 feet**.



2. Check Const Lines Blue Dashed Begin Arc Offset is **-18 feet**.

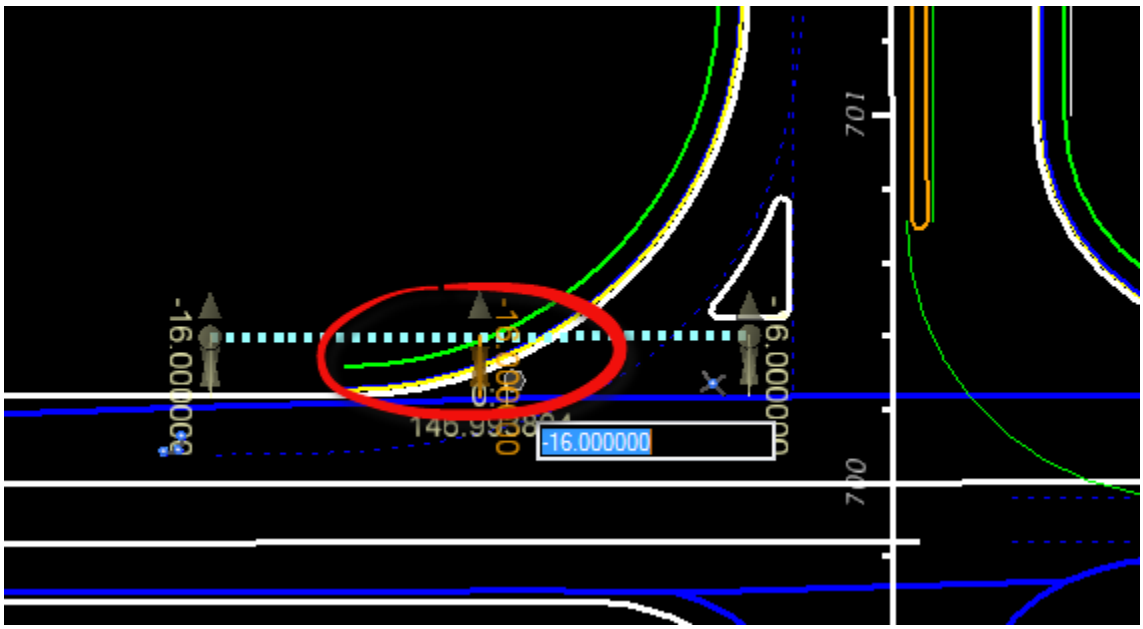


3. Check Const Lines Blue Dashed End Arc Offset is **-16 feet**.

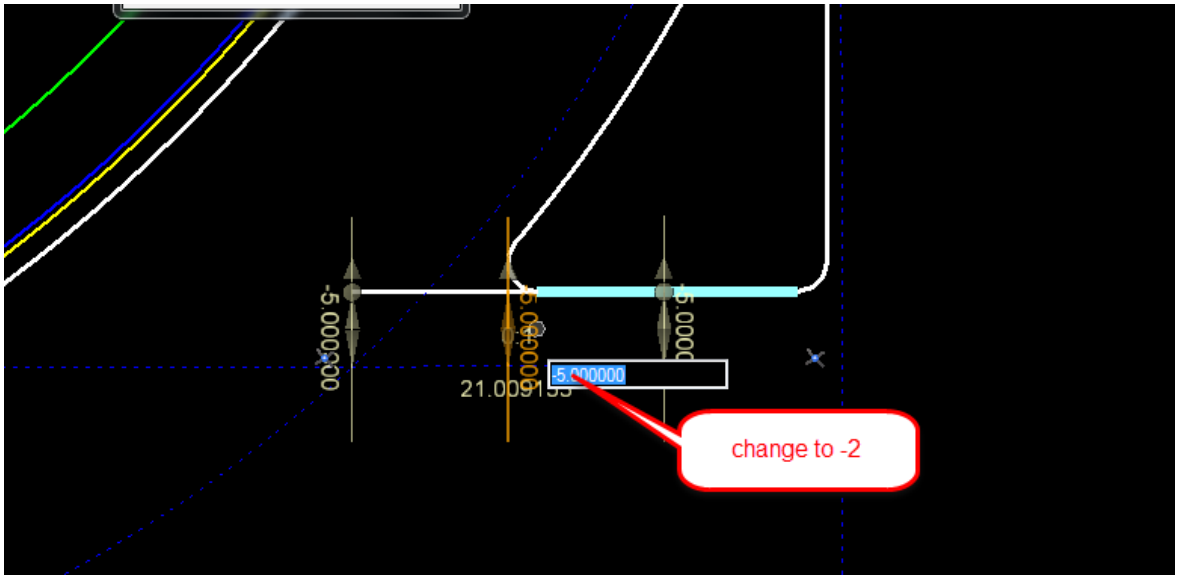


4. Change the straight *Const Lines Blue Dashed SR61 EOP Offset* from **1 foot** to **-16 feet.**

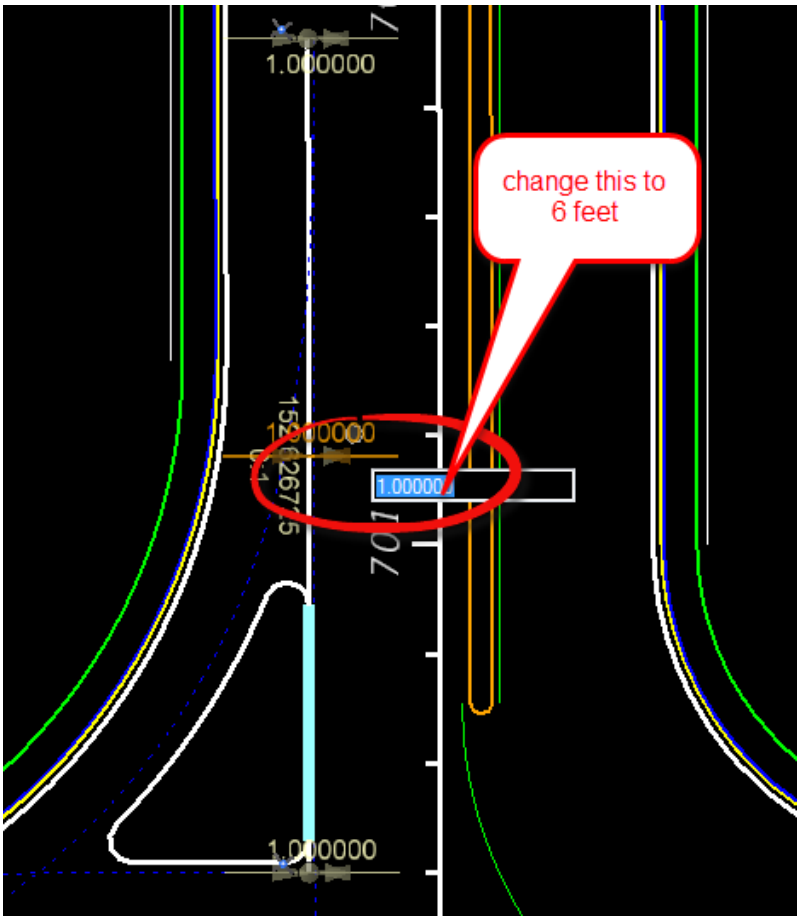
5. Check Const Lines Blue Dashed BL98 EOP Offset is **-16 feet**.



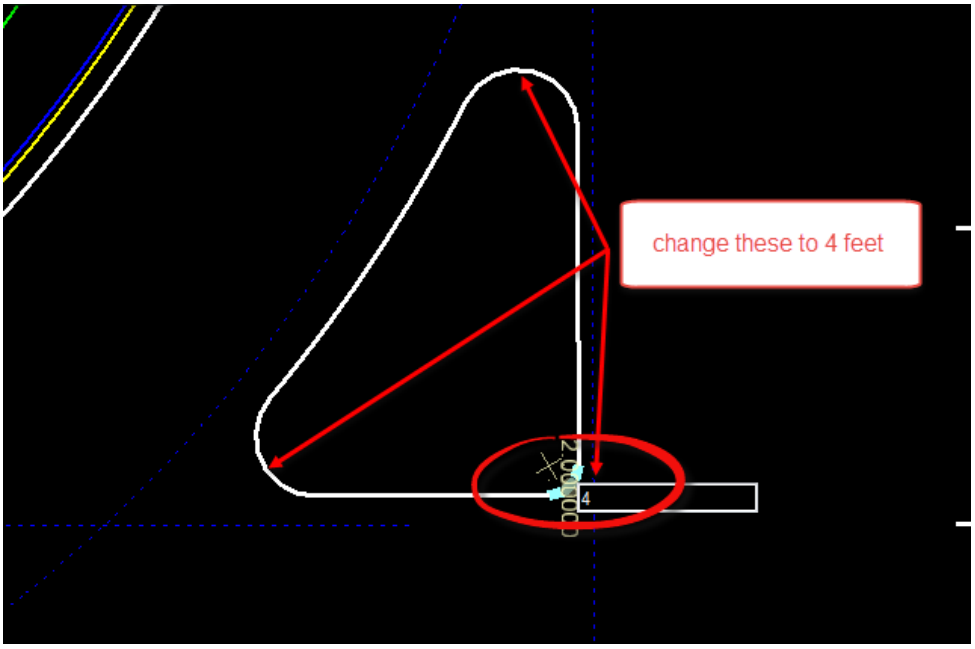
6. Change *Island EOPA Offset* from the Const Lines Blue Dashed BL98 from **-5 feet** to **-2 feet**.



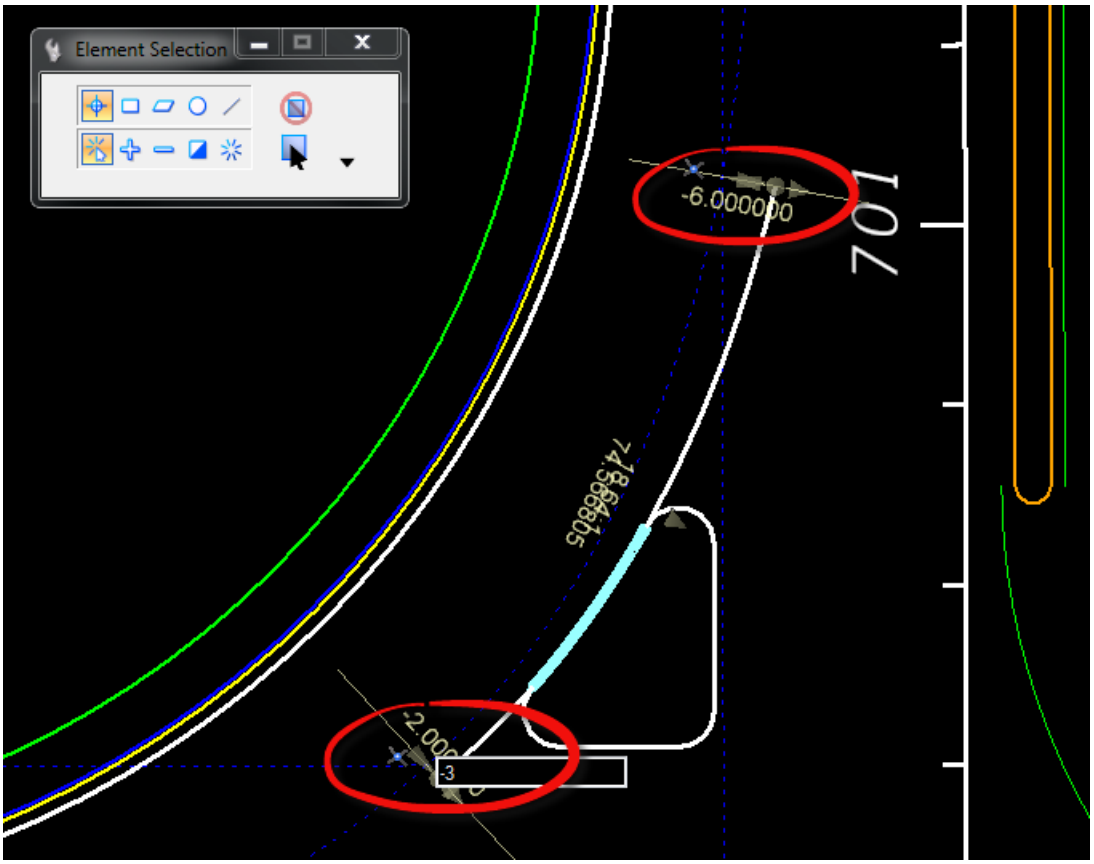
7. Change *Island EOPA Offset* from the Const Lines Blue Dashed SR61 from **1 foot** to **6 feet.**



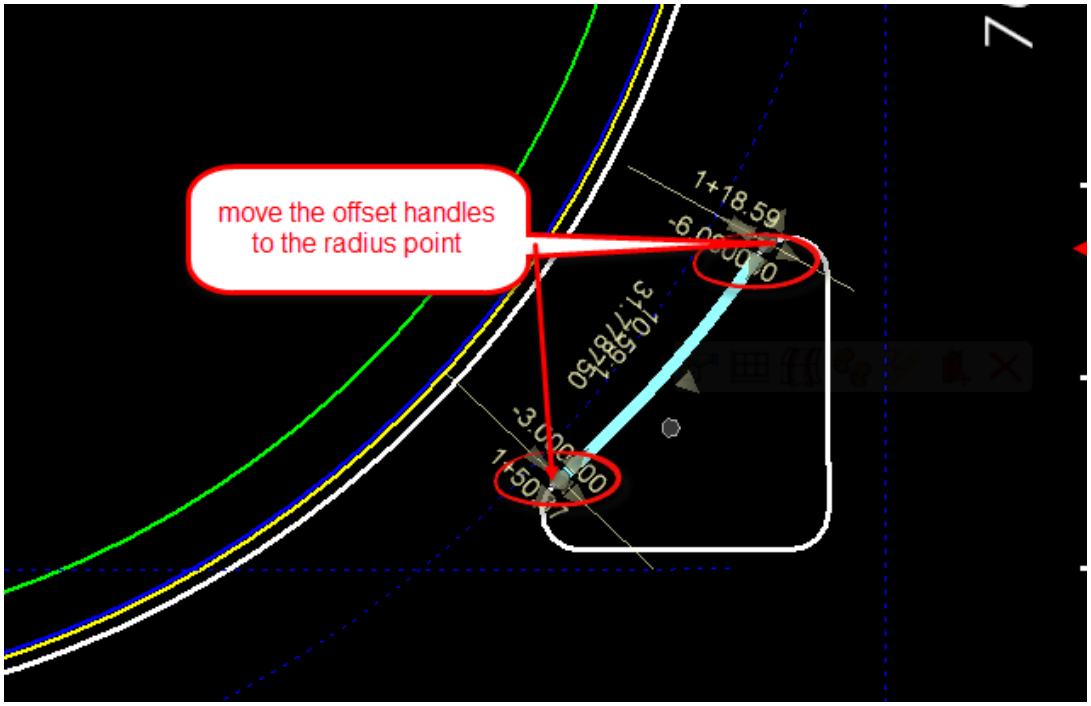
8. Change *Island Radii* to **4 feet.**



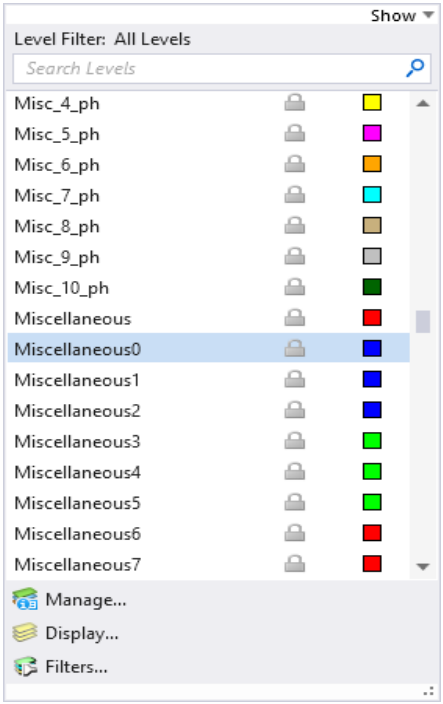
9. Change the Island ingress Offset **-4 feet** and Island Egress Offset **-3 feet.**



10. Move the *Offset* handles to the **Radius Point**.



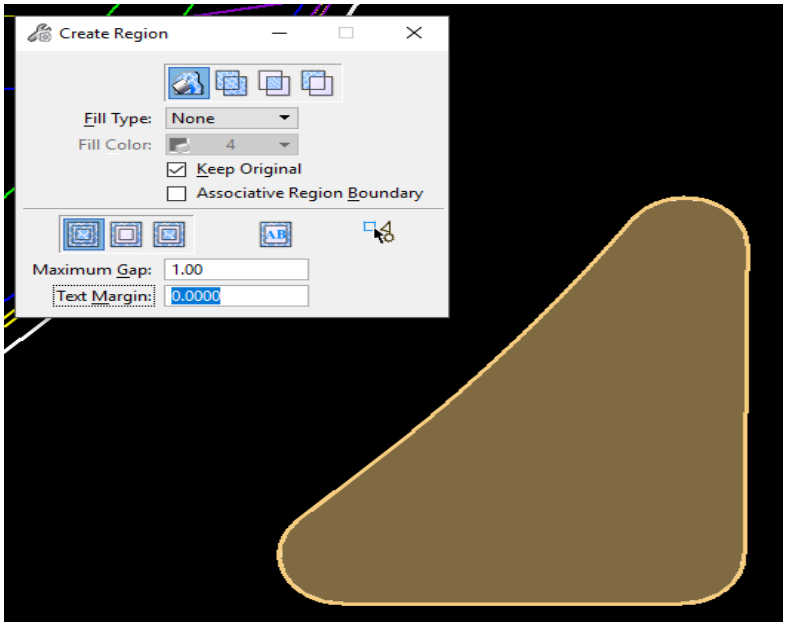
11. Change the *Active Level* to **Miscellaneous0.**



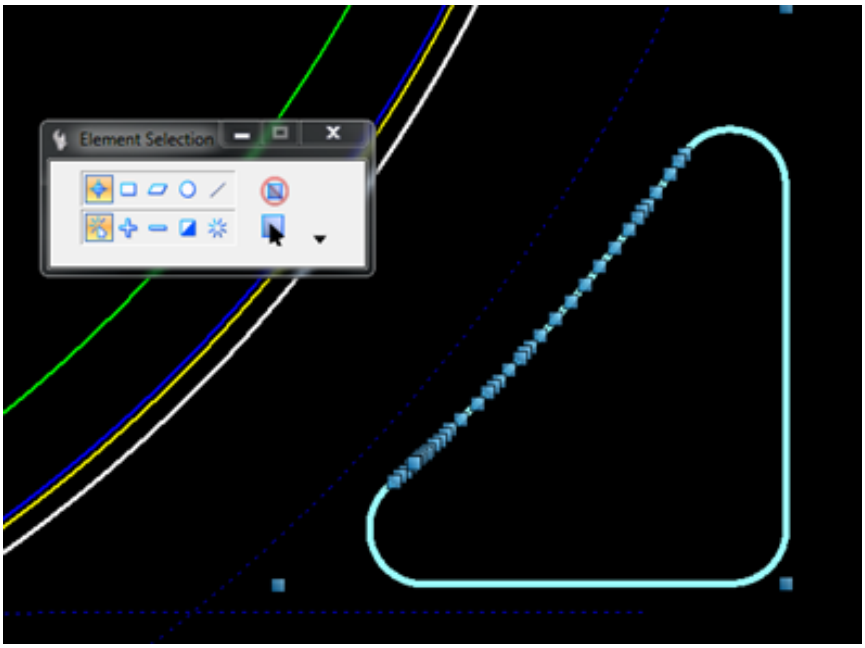
12. Use the OpenRoads **Crate Region Flood** tool, this tool can be found by switching to the Drawing Workflow and then the Home Tab and with in the Groups Group will be the Create Region

    *DRAWING>HOME>GROUP>**Create Region***

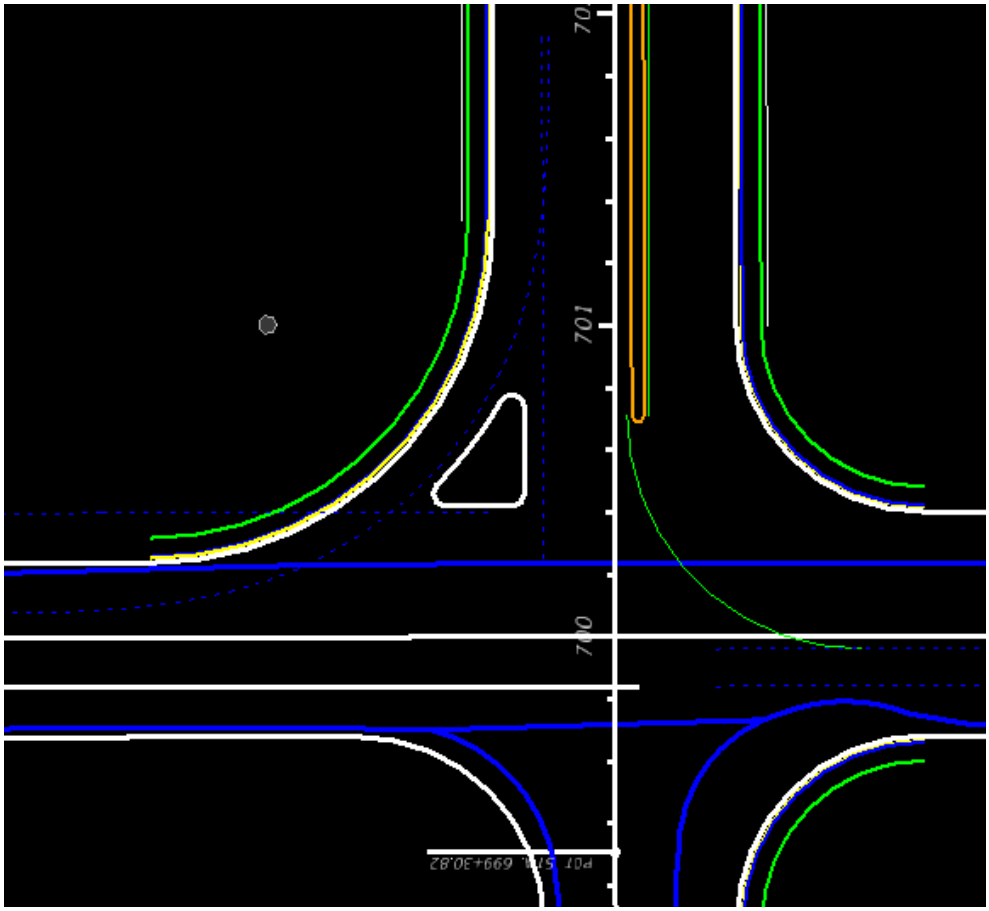
13. Select the Center of the Island, and then data point to accept the closed element.



14. Use the OpenRoads **Select** tool to view the properties of the new island. Record the Area _____.



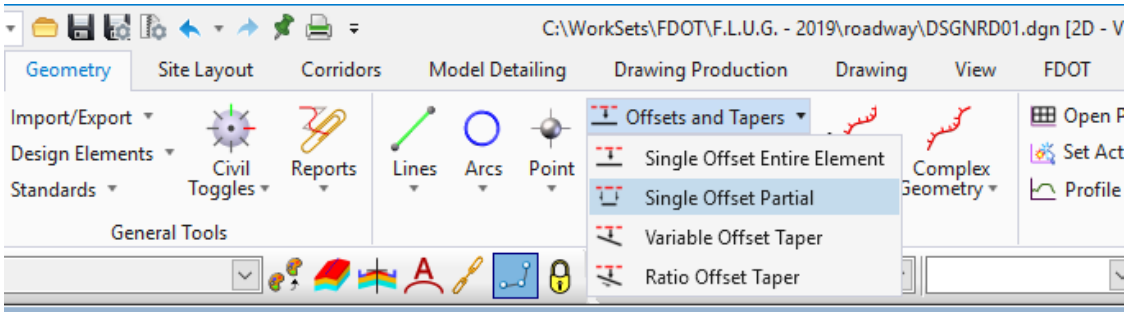
15. View the modified **Right Turn Island.**



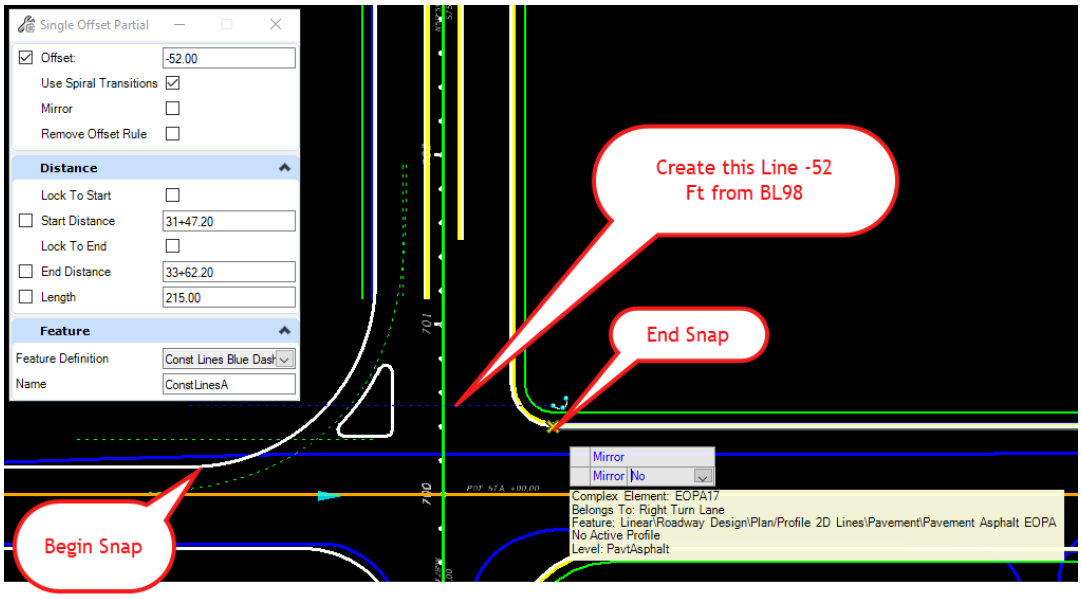
Exercise 2.14 For BL98 Intersection Crosswalks Lines

1. Use the *Geometry Tab and the Horizontal Group*, to select **Single Offset Partial** tool located in the Offsets and Tapers button.

   *OPENROADS MODELING>GEOMETRY>HORIZONTAL>Offsets and Tapers>**Single Offset Partial***

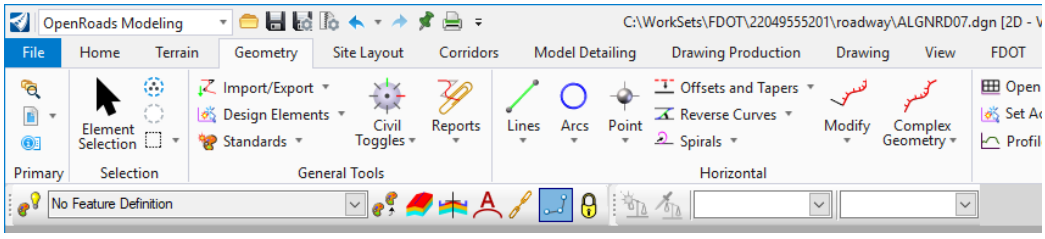


2. Create a **Partial Offset** line from *BL98* **-52 feet** across the intersection. Use *Feature Definition* **Const Lines Blue Dash** and *Name* **ConstLineA.**

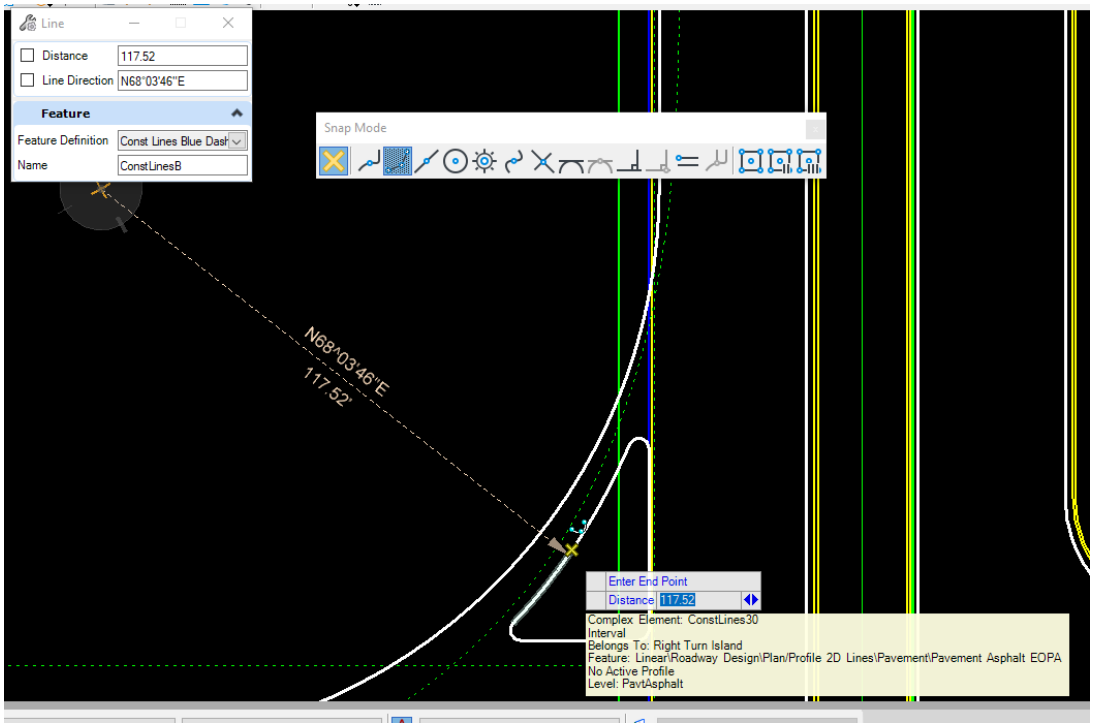


3. Use *Geometry Tab and the Horizontal Group*, to select the **Line Between Points** tool.

   *OPENROADS MODELING>GEOMETRY>HORIZONTAL>Lines>**Line Between Points***

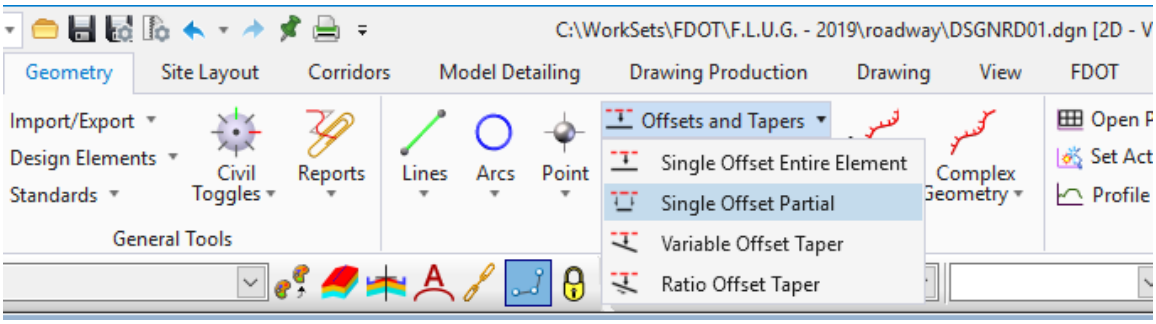


4. Create a line from the curve center to the midpoint of the *Island Radius EOP*. Use *Feature Definition* **Const Lines Blue Dash** and *Name* **Line B.**



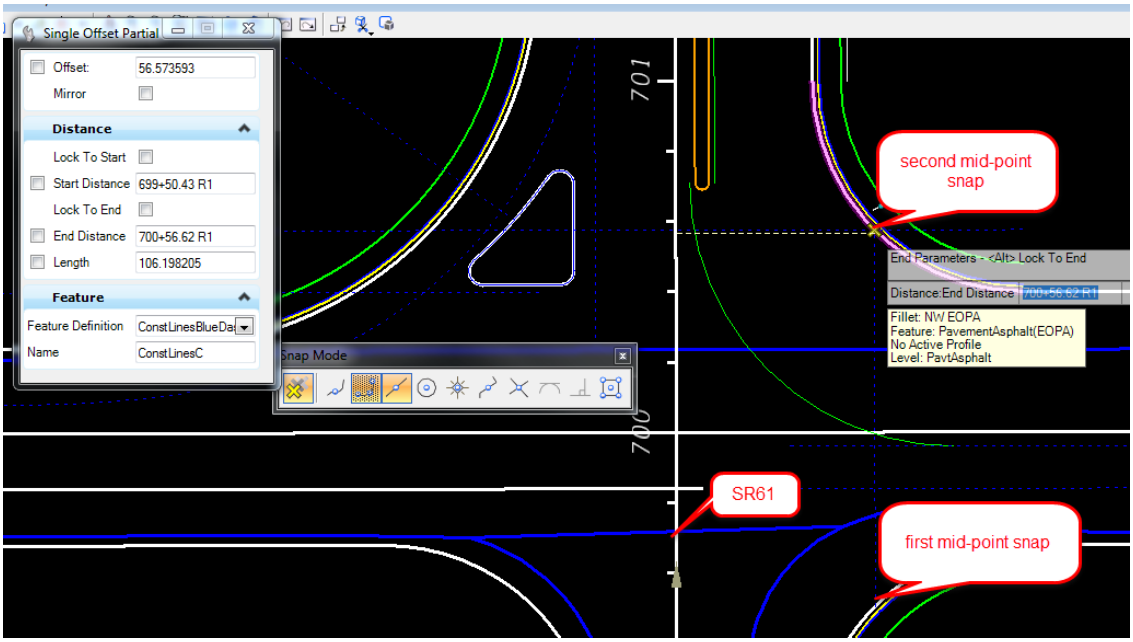
5. Use the *Geometry Tab and the Horizontal Group*, to select **Single Offset Partial** tool located in the Offsets and Tapers button.

*OPENROADS MODELING>GEOMETRY>HORIZONTAL>Offsets and Tapers>**Single Offset Partial***



6. Create a **Partial Offset** line from *SR61* across the intersection. Use *Feature Definition* **Const Lines Blue Dash** and *Name* **ConstLineC**.

HINT Snap to the mid-point of the radii.



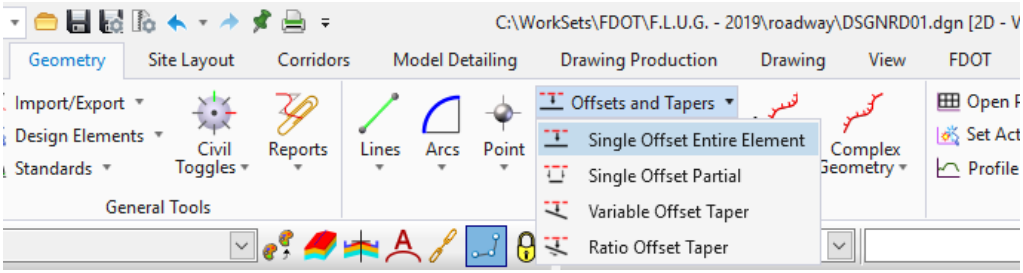
Note Use these lines in later exercises to place *3D Sidewalk Ramp Civil Cells*.

Exercise 2.15 Create BL98 Turnouts

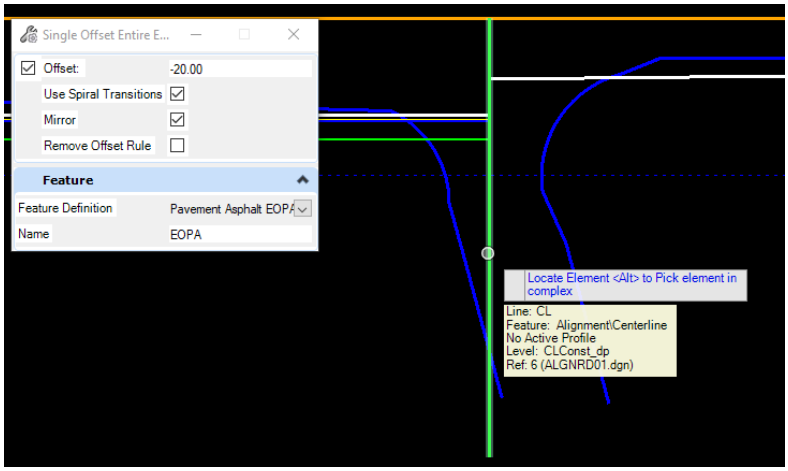
In this exercise the additional rural turnouts can be added to BL98.

1. Use the *Geometry Tab and the Horizontal Group*, to select **Single Offset Entire Element** tool located in the Offsets and Tapers button.

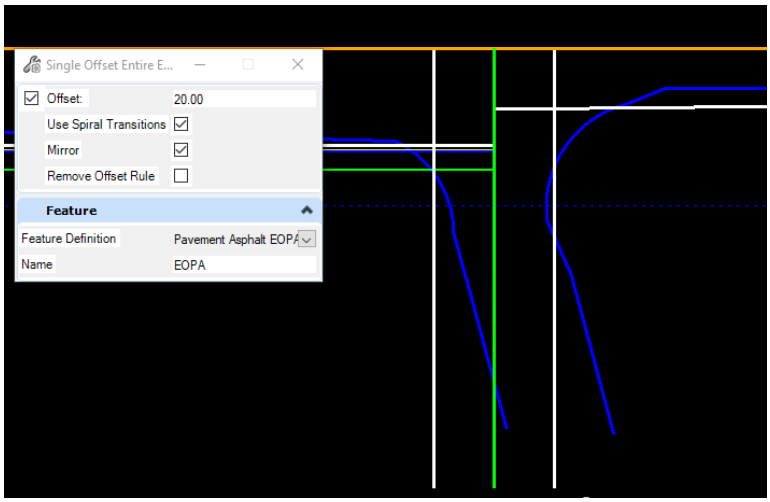
   *OPENROADS MODELING>GEOMETRY>HORIZONTAL>Offsets and Tapers>**Single Offset Entire Element***



   a. Select the **CenterLine** of the second *Turnout*. (This Turnout is at Sta. 39+00.00 of BL98)

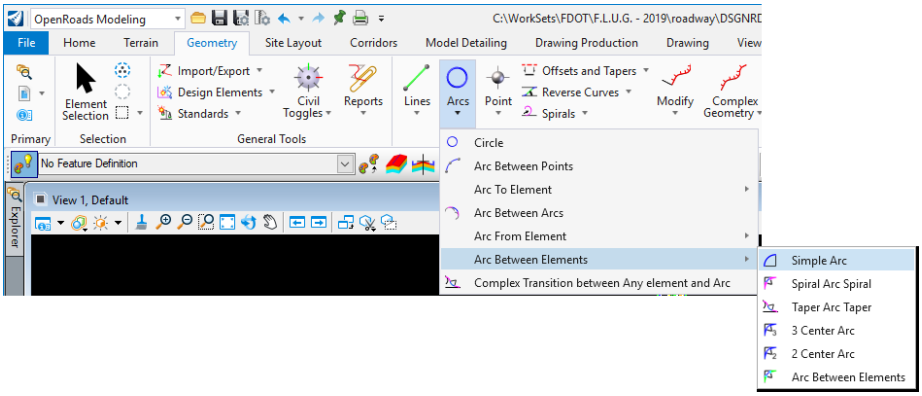


   b. Accept the **-20 feet** *Offset* and *Mirror*.

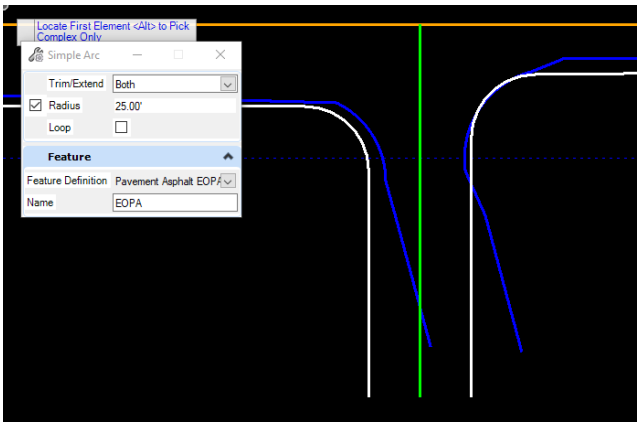


2. Use the *Geometry Tab and the Horizontal Group*, to select the **Simple Arc** tool located in the ARCS button then the drop down of Arc Between Elements.

   *OPENROADS MODELING>GEOMETRY>HORIZONTAL>Arcs>Arc Between Elements>**Simple Arc***

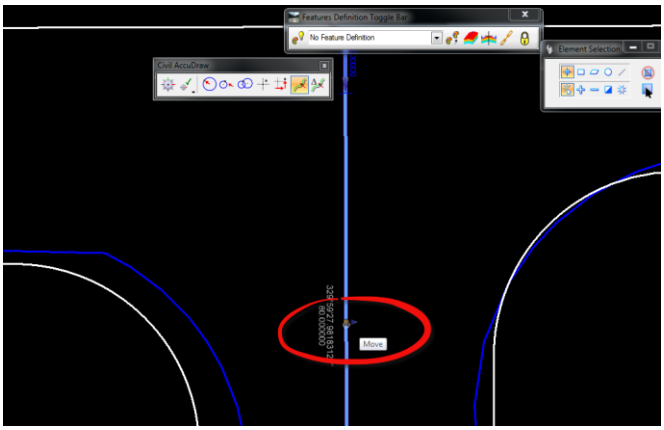


   a. In the Simple Arc tool set *Trim/Extend* to **Both, then** set the Radius to **25.0'**. Be sure to set a Feature Definition of Pavement Asphalt EOPA**.** Then place the *Radius* on both sides.



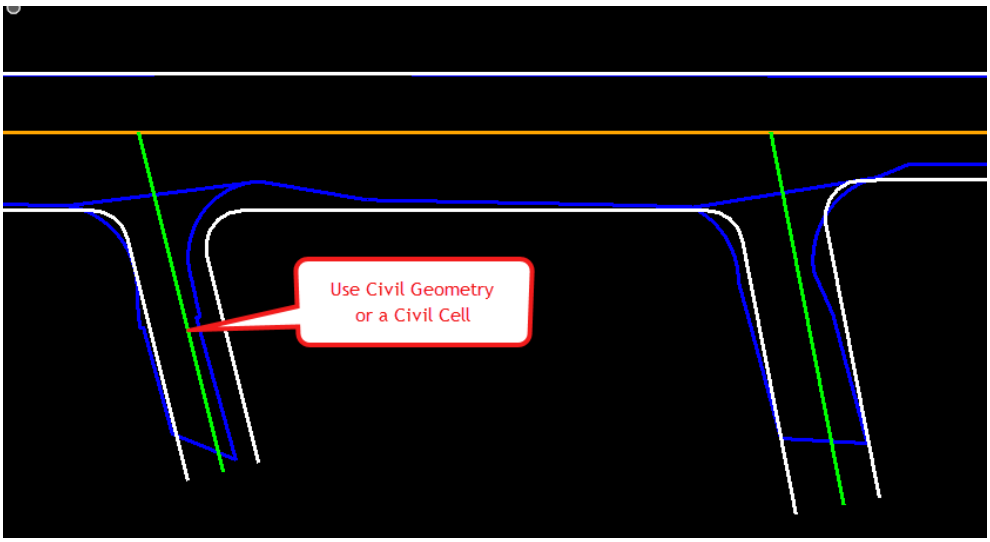
   b. Change the *Geometry* to fit the existing driveway.

HINT Use the centerline snap and dimensions to modify the location, length and angle. Use the Offset Pavement Asphalt EOPA Dimensions to change the width.



3. (EXTRA Exercise) Repeat the steps above to create an addition Turnout as shown below <OR> use the Civil Cell, FDOT_2D-Intersection_Details.dgnlib, and Side Road Turnout.

4. First place the Side Road Centerline make sure to go back into the ALGNRD file to adjust the centerline feature.

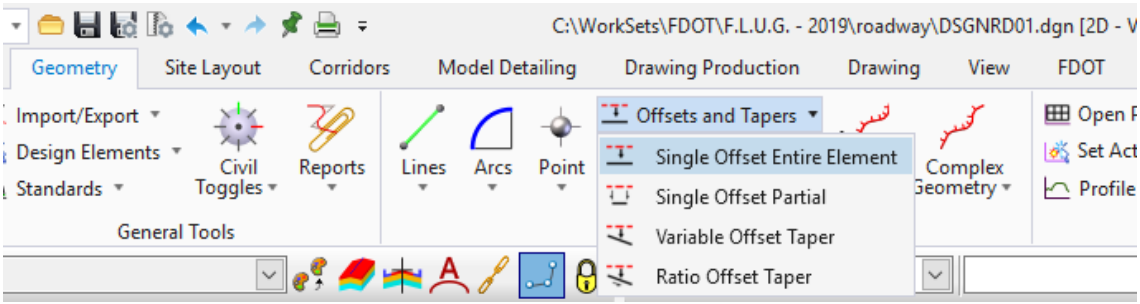


Exercise 2.16 For BL98 Intersection Shoulders

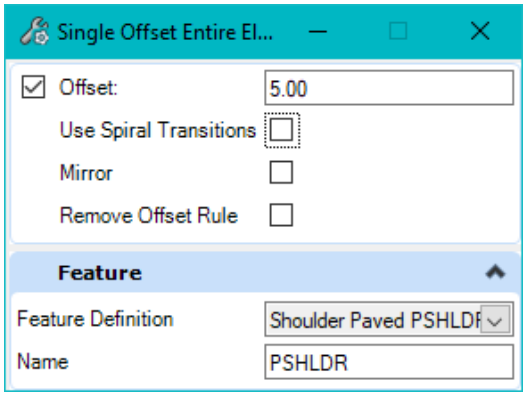
This exercise uses the Pavement Asphalt EOPA to create the **5 feet Shoulder Paved PSHLDR** Offset lines.

1. Use the *Geometry Tab and the Horizontal Group*, to select **Single Offset Entire Element** tool located in the Offsets and Tapers button.

   *OPENROADS MODELING>GEOMETRY>HORIZONTAL>Offsets and Tapers>**Single Offset Entire Element***



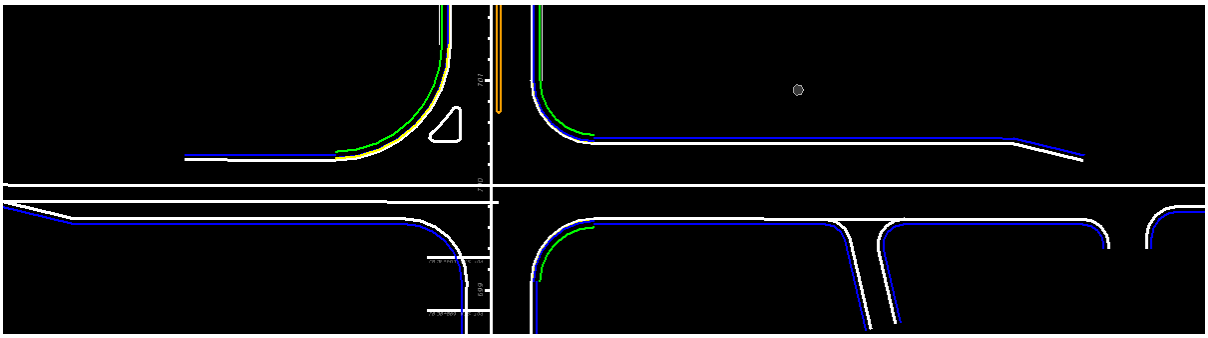
2. Set the *Offset* to **5 feet** and the *Feature Definition* to **Shoulder Paved PSHLDR.**



3. Select the **Pavement Asphalt EOPA** lines from the previous steps.

4. Repeat these steps to add the remaining *Shoulder lines* for the widening along BL98.

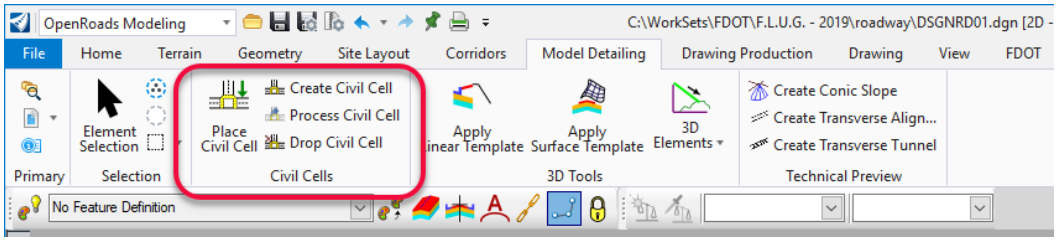
5. View the intersection below for complete details.



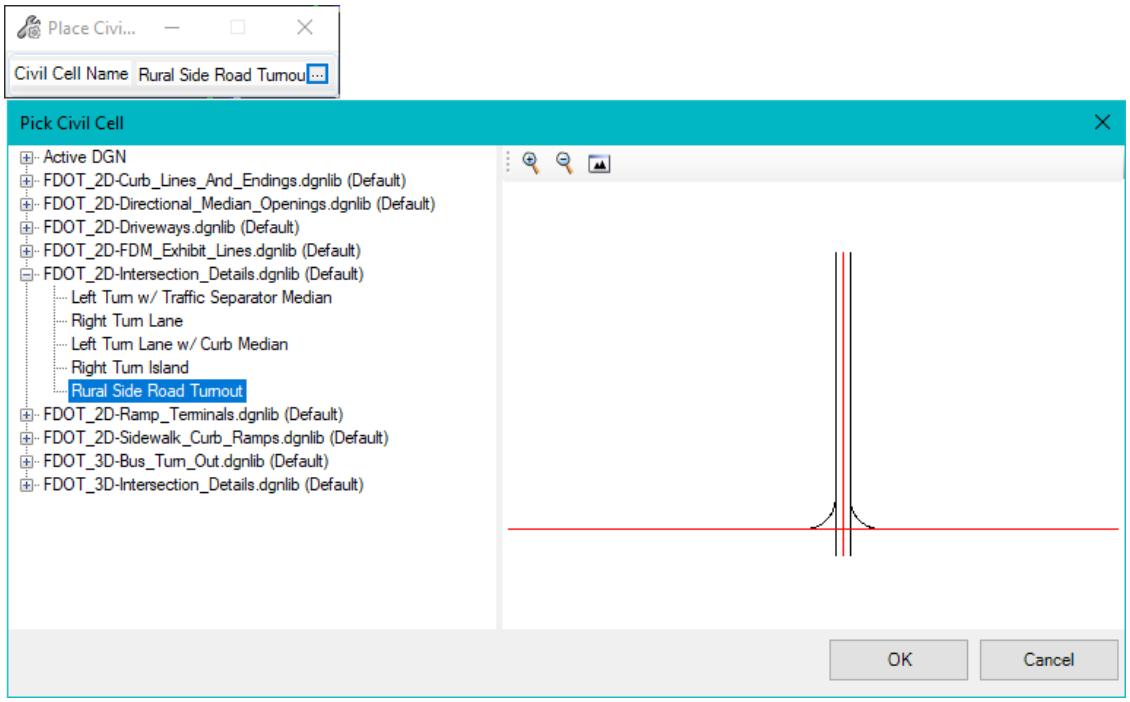
Exercise 2.17 For Friendship Intersection

1. Use Model Detailing Tab and the Civil Cells Group**,** to select the **Place Civil Cell** tool.

   *OPENROADS MODELING>MODEL DETAILING>CIVIL CELLS>**Place Civil Cell***



   a. From the Place Civil Cell dialog, navigate to the *FDOT_2D-Intersection_Details.dgnlib* and select **Rural Side Road Turnout**.



   b. Add **Rural Side Road Turn Out** *civil cell* to both sides of the Intersection with *Friendship* and *Friendship 2 Centerlines*.

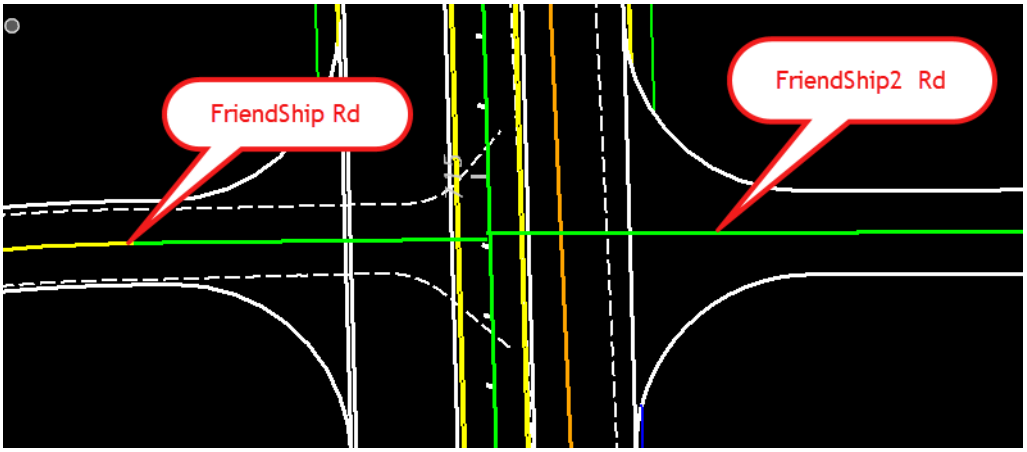
   c. Use the trim commands located in the Drawing Tab and the Modify Group, to clean the extra curb line and sidewalk lines across the intersection.

      *OPENROADS MODELING>DRAWING>MODIFY>**Trim to Element***

   d. Change all *Radii* to **35 feet.**

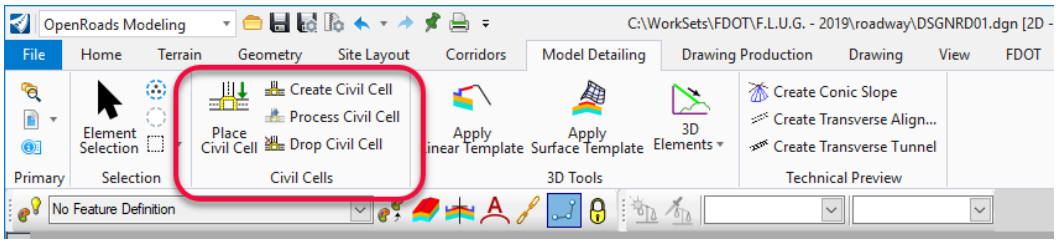
   e. Change Friendship2 Side Road Offsets to **20 feet**.

f. Change *Centerline Length* to **100 feet**. This step will need to be done in the ALGNRD File.

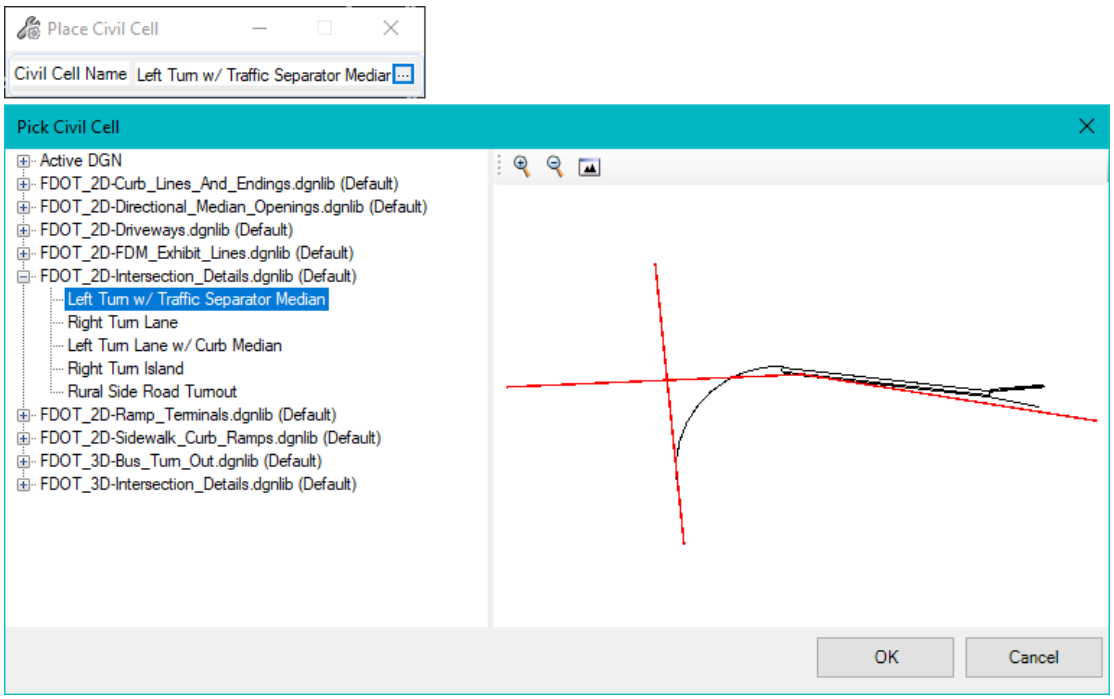


2. Use Model Detailing Tab and the Civil Cells Group**,** to select the **Place Civil Cell** tool.

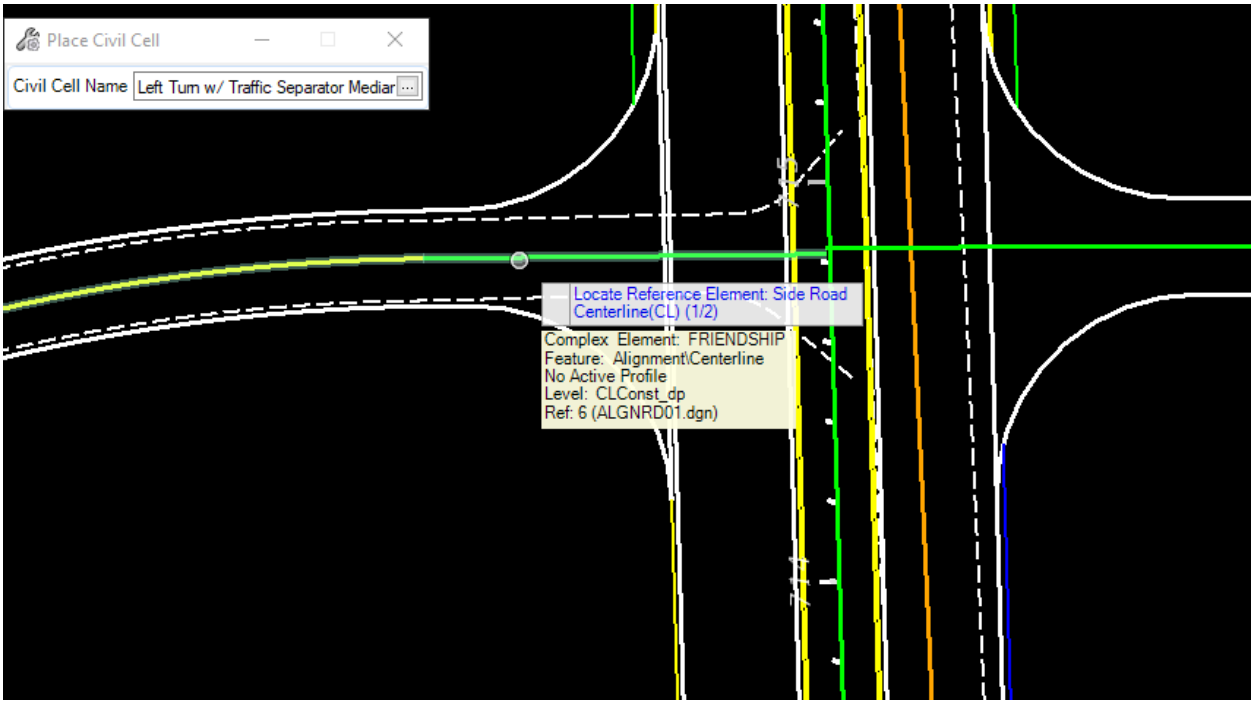
*OPENROADS MODELING>MODEL DETAILING>CIVIL CELLS>**Place Civil Cell***



a. From the Place Civil Cell dialog, navigate to the *FDOT_2D-Intersection_Details.dgnlib* and select **Left Turn w/ Traffic Separator Median**.



b. For the first *Reference* element, select the **Friendship Rd Centerline.**



c. For the second *Reference* element, select the *left median* **Pavement Asphalt EOPA** line.

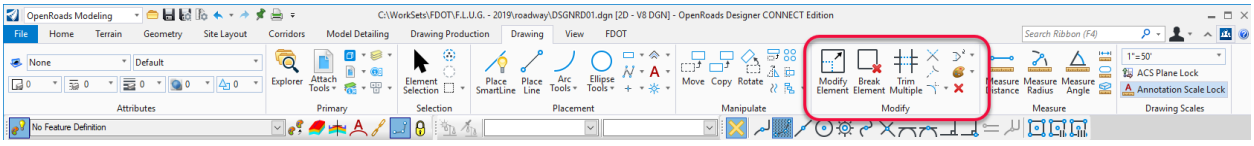
d. Reset to Skip Alternates and data point to accept Civil Cell Placement.

e. Change the turning *Radius* to **50 feet.**

f. Change the turning lane storage length to 300 feet.

3. Use OpenRoads **Trim to Element** tool**.** This can be found using the **Drawing Tab** and the **Modify Group**. **You can also use the Search on the Ribbon.**

*OPENROADS MODELING>DRAWING>MODIFY>**Trim to Element***

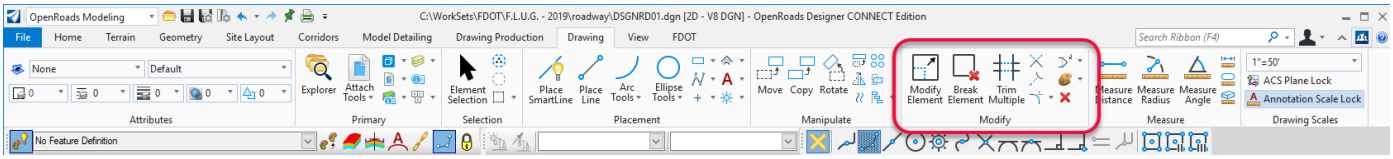


4. Move the **LT_PVT_EOP_IN** to the beginning of the *Traffic Separator*.

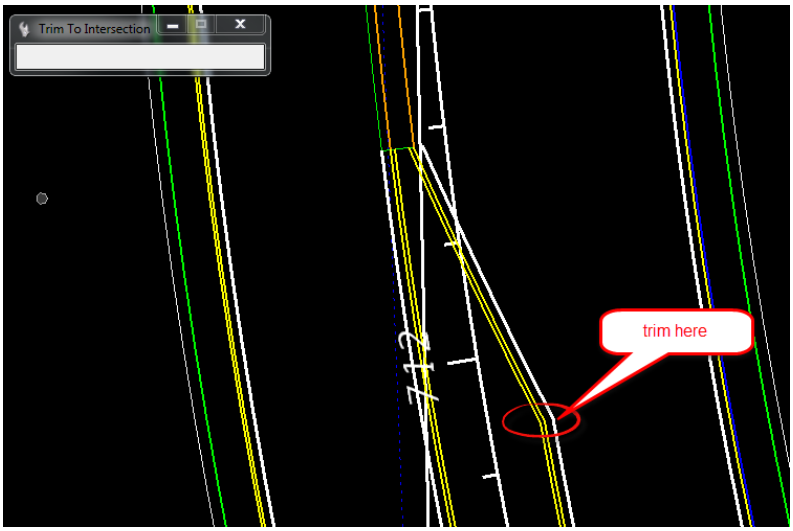
HINT Use the Const Lines Green as the cut element

5. Use OpenRoads **Trim to Element** tool**.** This can be found using the **Drawing Tab** and the **Modify Group**. **You can also use the Search on the Ribbon.**

*OPENROADS MODELING>DRAWING>MODIFY>**Trim to Element***



6. Trim the **Curb** and **EOP** lines to the beginning of the *median Taper line*.



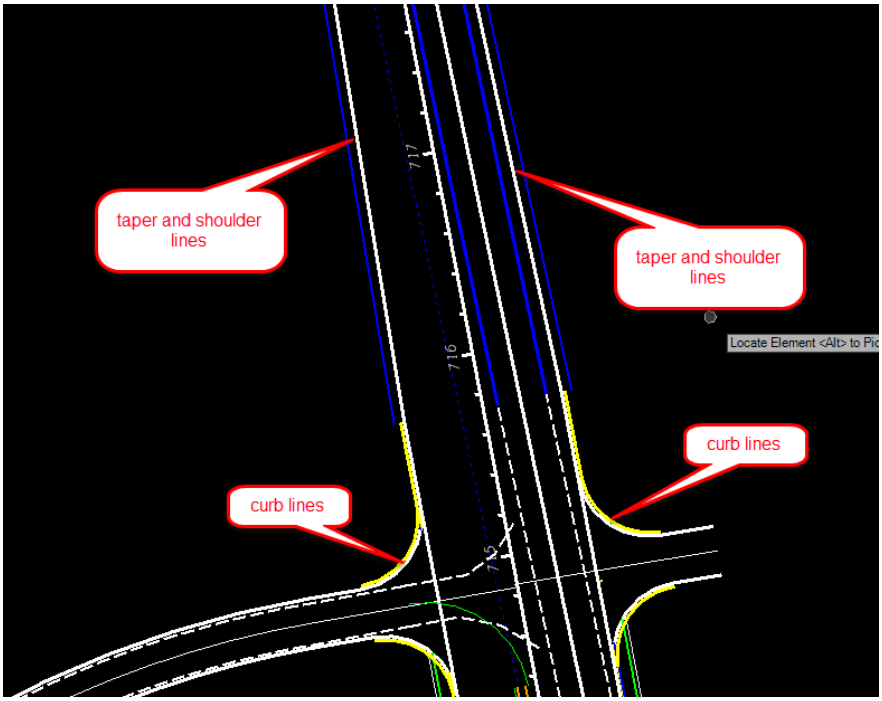
7. (EXTRA Exercises) Complete the *Intersection* with *Civil Geometry* tools as follows below:

    a. Add **Curb lines** for each of the *Radius*.

    b. Trim **Sidewalk lines** into the *Radius Curb* lines. There is no sidewalk along SR61 north of Friendship Road.

    c. Add **Pavement Asphalt EOPA Taper lines** from the Intersection Radii at Friendship to the End Station of SR61 11 left.

    d. Add **Shoulder Paved PSHLDR** lines to both sides along the *Taper*.



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3 PROFILES

INTRODUCTION

This chapter will continue to use the OpenRoads Technology Civil Tools, Vertical Geometry. These exercises will provide participants with practice using the Civil Tools. Using Civil rule-based Feature Definitions assures *design intent* is incorporated into the vertical geometry layout. This will be beneficial for design when changes need to be reflected and considered throughout the development process. This will be beneficial for designs when alternatives need to be evaluated throughout the development process.

This chapter introduces important new OpenRoads Technologies for creating vertical geometry line work while designing in FDOTCONNECT workspace.

OPEN PROFILE MODEL

The Open Profile Model generates an OpenRoads View that presents the desired feature in profile thus enabling the Vertical Geometry tools to interact with the chosen feature.

Open the Civil Tools Task pane to the Vertical Geometry section then click the Open Profile Model icon. Move the cursor into the Workspace and note that it is accompanied by a command prompt requesting that you, "Locate Plan Element". Select the element with which you wish to work in profile. The cursor is now equipped with a prompt that says, "Select or Open View". Data point or left-click in it a view to present a profile of the selected element. If no other view is open, click one of the view icons on the View Groups toolbar then click again in the new View. Vertical Geometry tools can then be used to edit/create vertical profile data in the design.

EXERCISE OVERVIEW

3.1 Preparation for SR61 Profile

3.2 Create SR61 Profile

3.3 Edit SR61 Profile

3.4 BL98 Profile

3.5 Friendship Profile

CIVIL GEOMETRY - DESIGN INTENT

As defined in the Bentley Civil Tools help file:

> *"Design intent builds associations and relationships between civil elements. Object information (how, where, and by what method it was created) is stored with the object to insure the original intent is retained and honored in the design. If an element is modified, any related elements will recreate themselves based on these stored relationships.*

Civil Geometry or rule-base elements are created intelligently as the tools are used and elements are constructed. The FDOTCONNECT Workspace and design development workflow is highly dependent on using Civil Geometry for the 2D plan layout rather than traditional MicroStation place elements tools.

Design Geometrics and Criteria	FDOT Design Manual (FDM), Part 2 Chapter 210
Design Speed	45 MPH
Facility	Low Speed Desired Length
Maximum Tangent Deflection w/out Curve	1 Degree Section 210.8.1
Minimum Horizontal Radius	694 feet Table 210.9.2
Minimum Length of Curve	675 feet Table 210.8.1
Context Class	C3 Max Grade Table 210.10.1

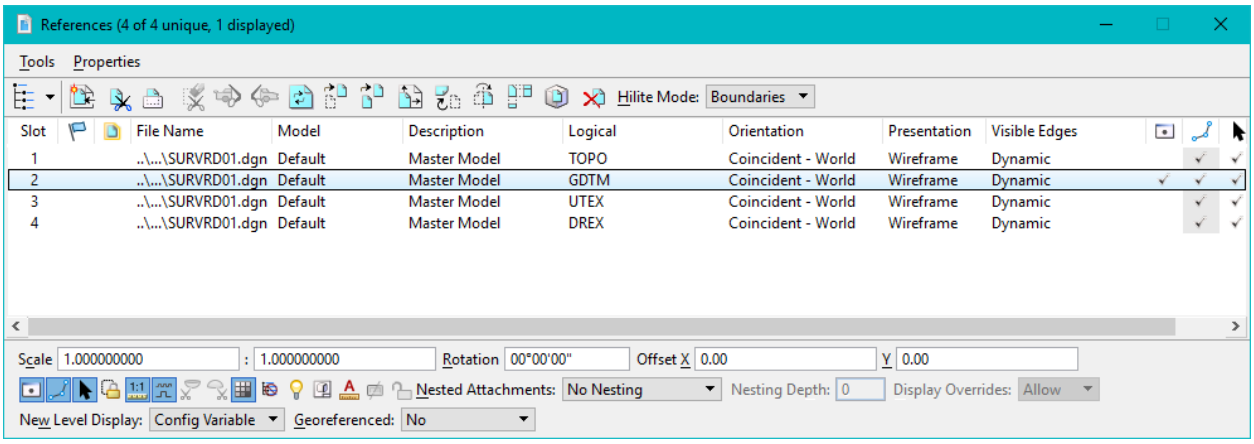
- Low Speed Minimum Length – This will give a minimum Radius at Max Super (e^{max} = .05)
- Low Speed Desired Length – This will give a desired length of curve at Normal Crown.

Note Refer to the FDM for Tables

Exercise 3.1 Preparation for SR61 Profile

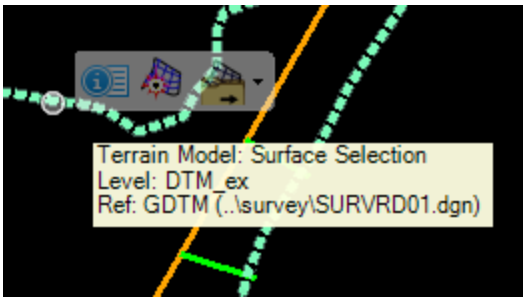
1. Open the ALGNRD01.dgn that was created in Exercise 2.1. C:\WorkSets\FDOT\22049555201\roadway.

2. From the Function key F9 (toggles on the Reference Dialog) to view the attached files: Turn the display off on all the reference files except the SURVRD file with a logical name of GDTM. This file will be used to create Profiles of the Existing Ground.



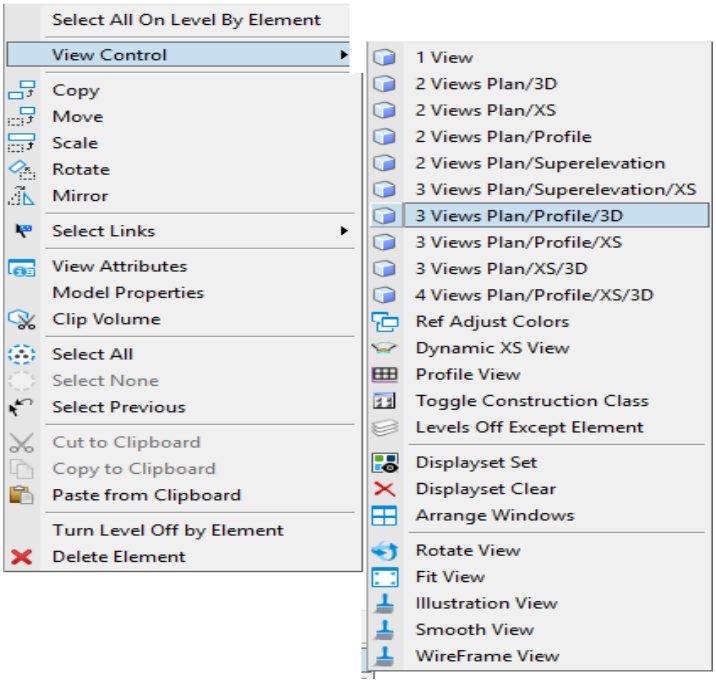
Note If the SURVRD file exists, the **SURVRD01 -GTMRD** logical can be used

3. Once you have the turned off the SURVRD files, we now need to set the terrain Active. To do this select the boundary to bring up the context menu and select the second icon in the menu.

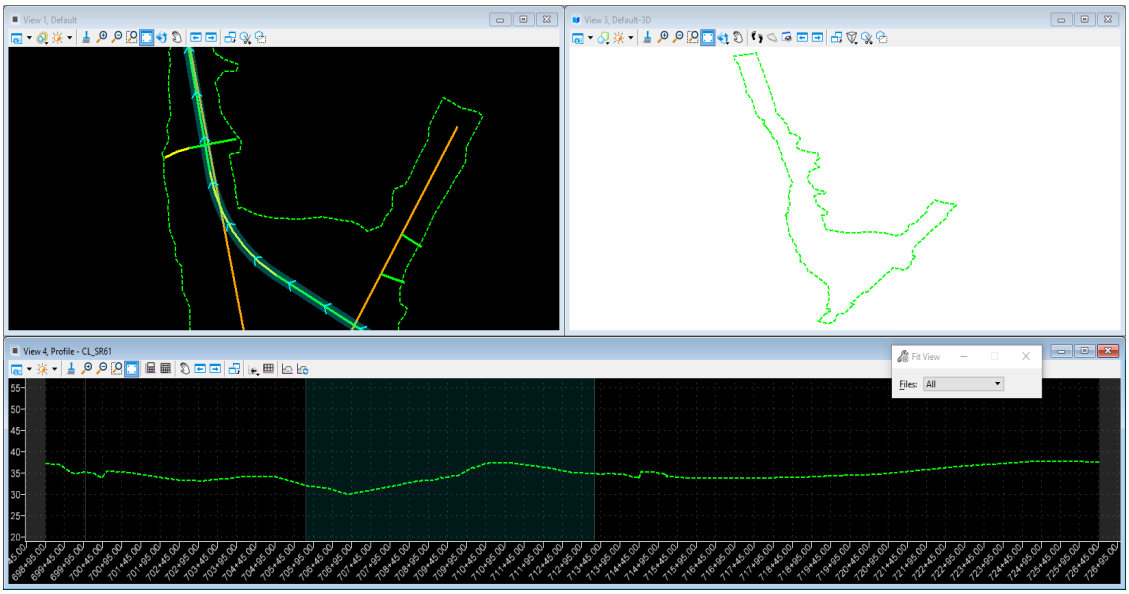


Note Setting the terrain to Active will create a new Model that is 3D we will use this Model to view our Profiles

4. To set up the correct views to design profiles we will use the View Controls located with the right click and hold function of the Right mouse. Right Click and Hold on the mouse and navigate to the View Control then arrow over to bring up a second dialog to find different view control functions select on the (3 Views Plan/Profile/3D) then follow the prompts by the cursor to complete.



5. At the cursor prompt, select the OK then it will ask you to select a plan element this will be the SR61 Centerline. Once you are done your view windows should look like this.

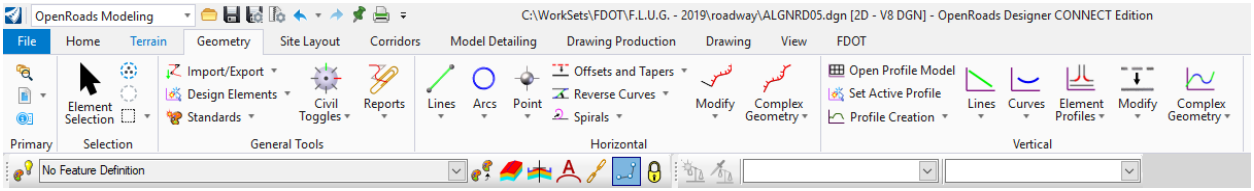


Exercise 3.2 Create SR61 Profile

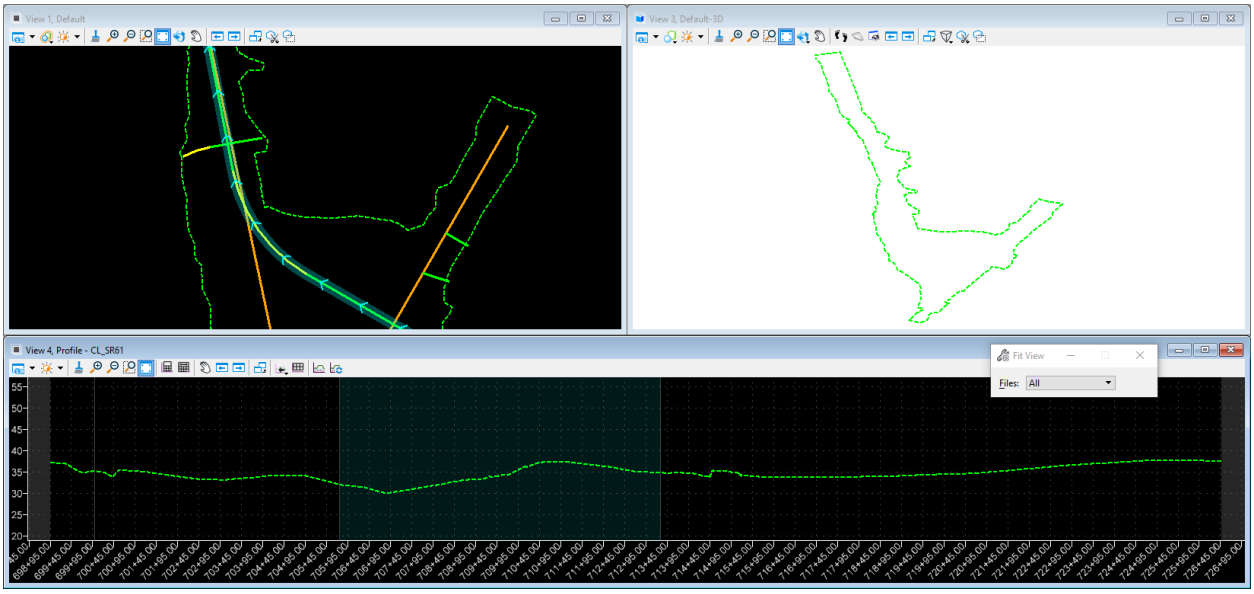
In this exercise, several Vertical Geometry tools are used to create a proposed profile for SR61.

1. Use the *Geometry Tab and the Vertical Group* of the OpenRoads Modeling WorkFlow.

   OPENROADS MODELING>GEOMETRY>VERTICAL

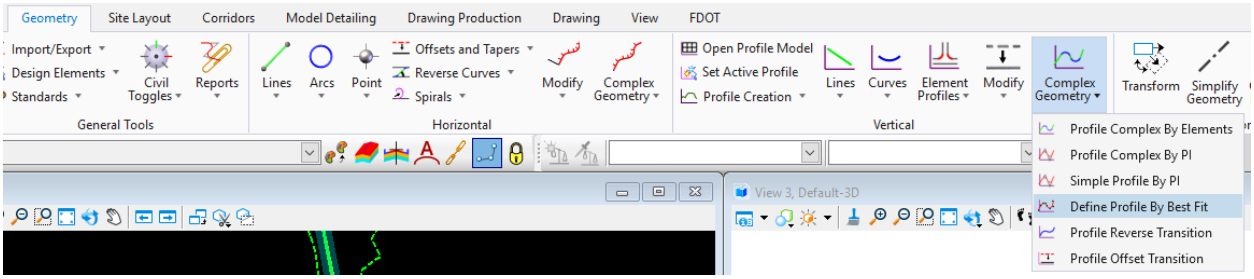


2. From the previous exercise select View 4 to make the Profile window active.

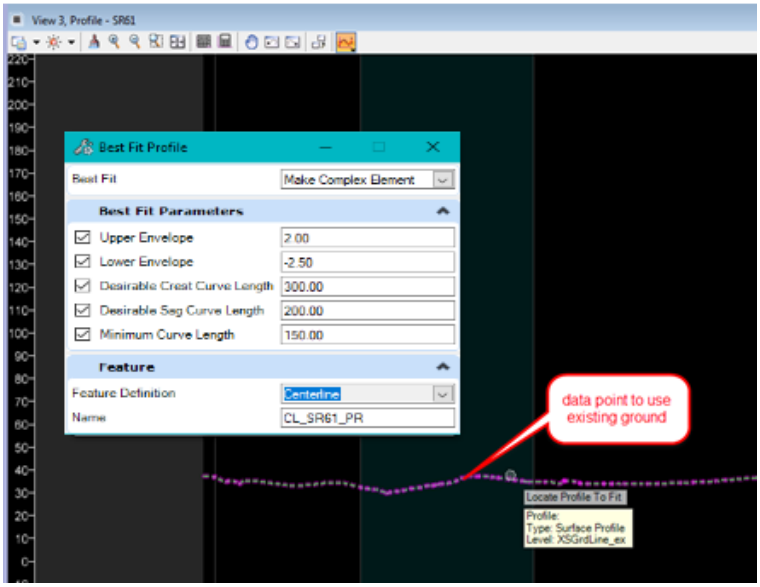


3. Use the *Geometry Tab and the Vertical Group*, to select the **Define Profiles by Best Fit** tool that is located within the Complex Geometry pull down.

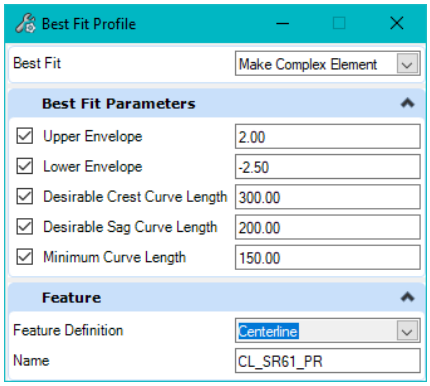
   *OPENROADS MODELING>GEOMETRY>VERTICAL>Complex Geometry>**Define Profile By Best Fit***

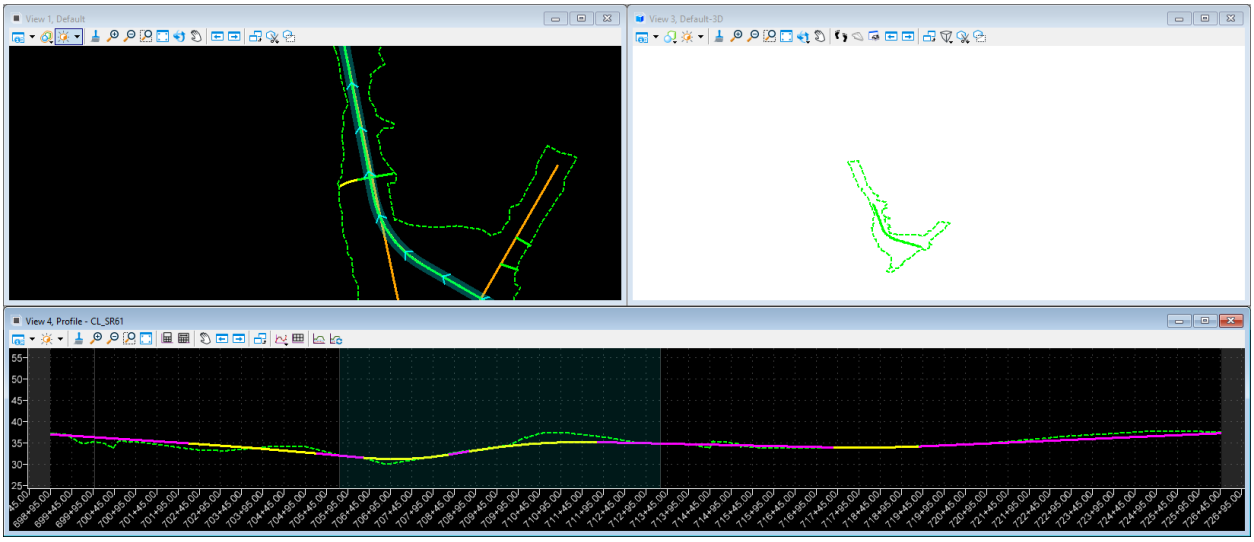


a. At the cursor prompt, data point to **Make Complex Element** option. Enter the *Profile Name* , SR61-PR, and then data point on the green line in the profile.

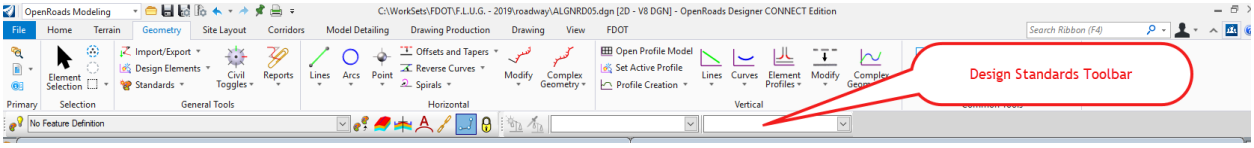


b. Follow the prompts to enter the **Best Fit Parameters** as shown. Make sure to pick the Feature Definition of CenterLine.



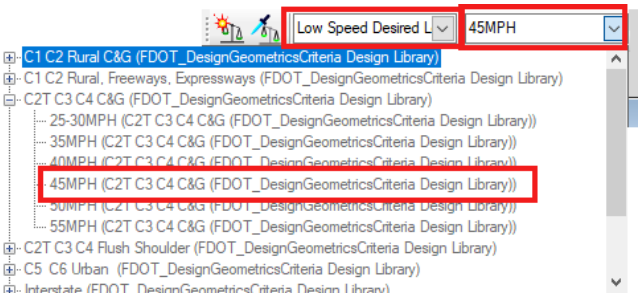


4. Using the **Design Standards Toolbar** that is already docked at the top of the screen.

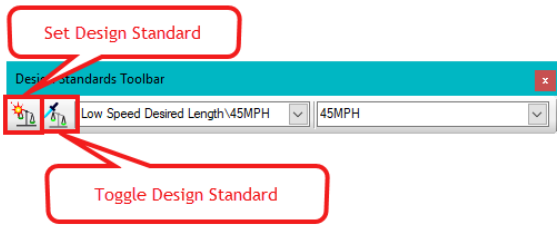


5. On the Design Standards Toolbar, using the second drop down list navigate to the C2T C3 C4 C&G (FDOT_DesignGeometrics Criteria Design Library and select **45 MPH**. Toggle **On** the Active Design Standard.

HINT Be sure to set the left field (Horizontal Design Standard) in order to set the right field (Vertical Desgin Stnadard) to 45 MPH

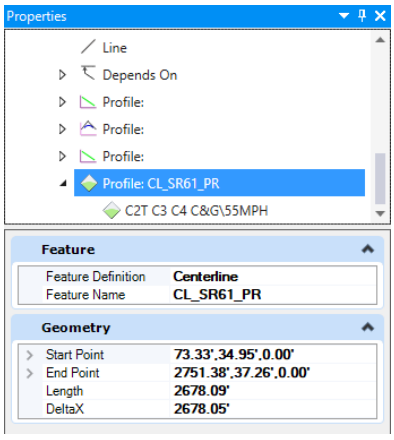


6. Use the Design Standards Toolbar,to select the **Set Design Standard** tool.

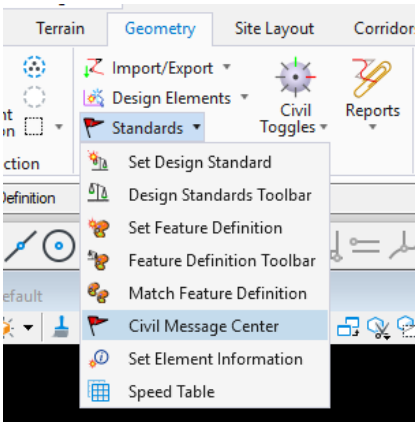


a. At the prompt, select the **Best Fit Profile** created in the previous steps. The profile now has *a Vertical Design Standard rule* placed on it.

b. Using the Element Select Tool, select the profile element and view its properties in the **Element Information** dialog.

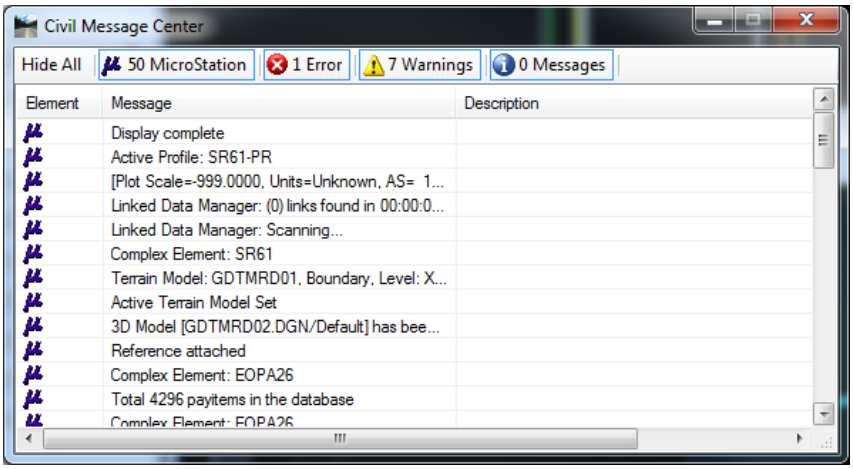


7. Use the **Civil Message Center** tool that is located on the Geometry Tab and General Tools Group in the Standards drop down menu.

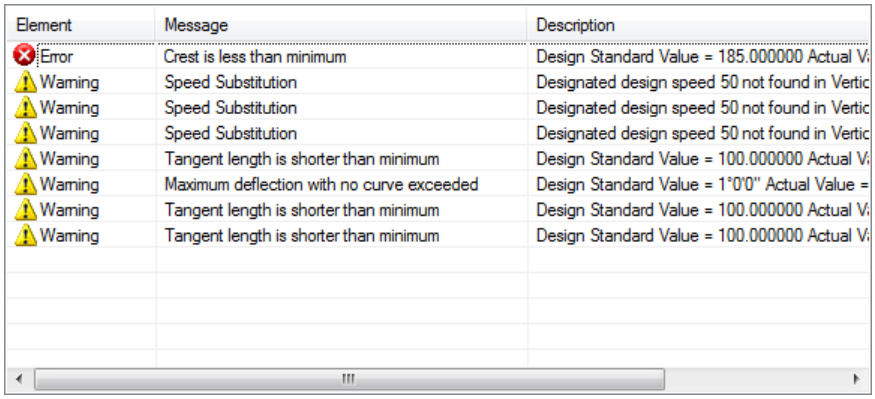


a. The Civil Message Center dialog displays to view the results.

Note It may be docked at the bottom of the screen, click on the Tab

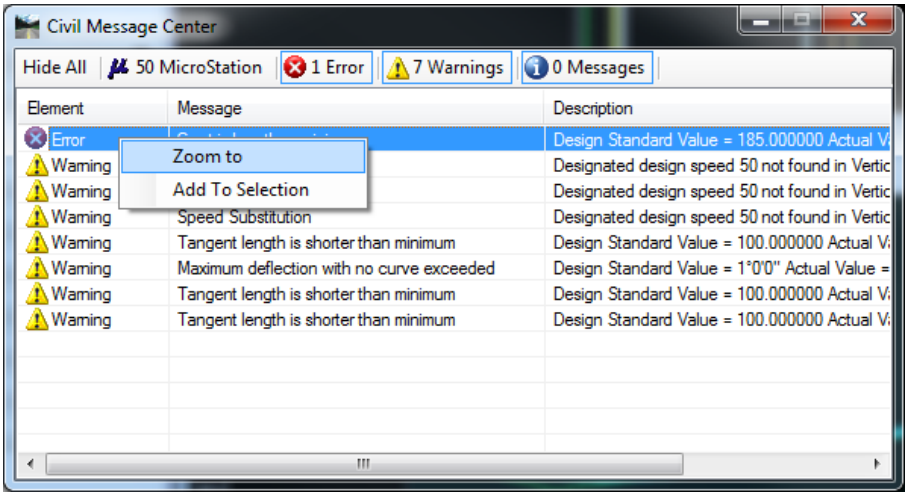


b. In the Civil Message Center dialog, select on the **MicroStation** tab. This will toggle **Off** all the general messages for MicroStation and leave only *Error messages* and *Warnings* in the list.

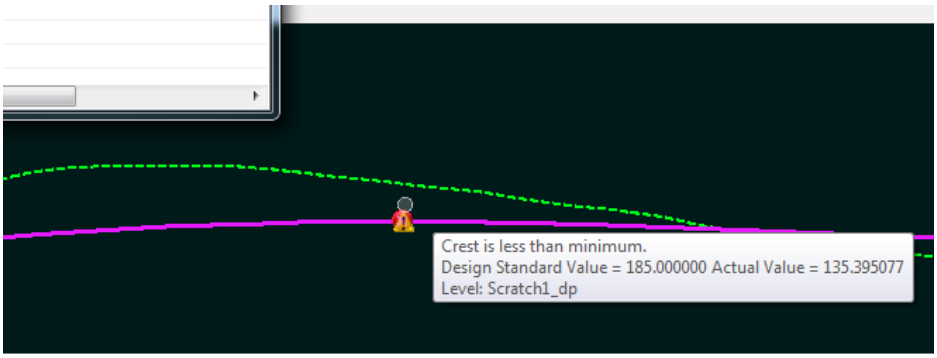


c. In the Civil Message Center, review the *Errors* and *Warnings*.

d. Select the **first error**, then right click over the error and select **Zoom To** from the popup box.



e. Notice the *Error* is now centered in the profile view. Hover the cursor over the *Error* icon to display the *Error Message* description.

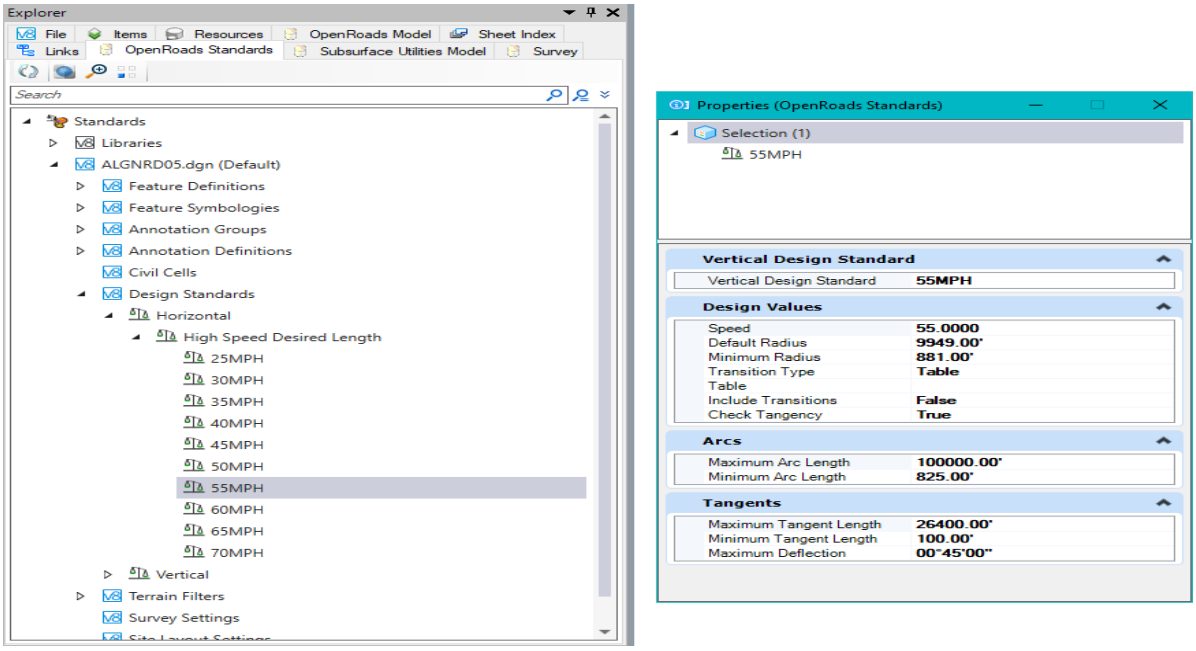


Note The values are given in whole stations, i.e. 3.5 station equals 350 feet.

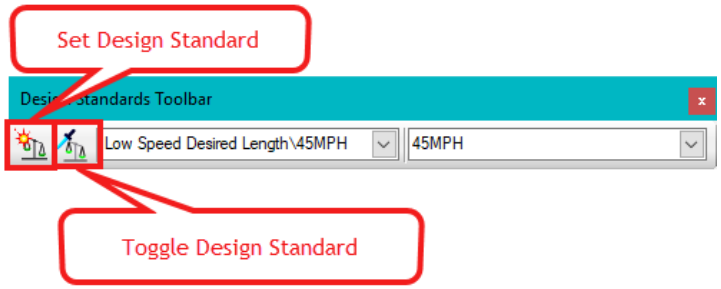
8. Since there can be a number of different situations for both the horizontal and vertical curve depending on Context classification and Desi.gn Speed, we will now set the vertical in the Explorer Dialog.

a. Using the Explorer Dialog (Function Key F11) if you do not have it docked. Navigate to the **OpenRoads Standards Tab** then click on Standards to open the current file you are in to see the Design Standards Category to view the Design Standard applied the Alignments in the file**.**

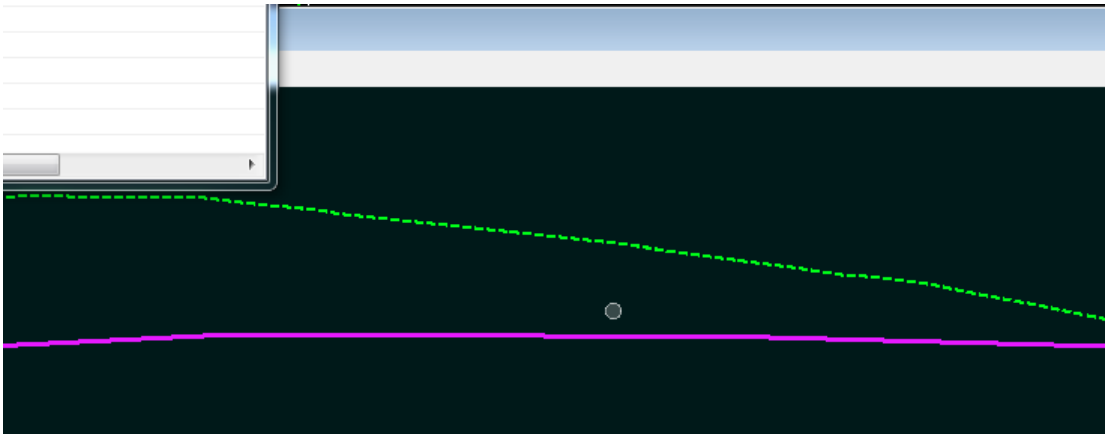
b. Select the Horizontal Design Section to see which design standard is applied to the Alignment, next select the desired speed. Now using the Ctrl+I keys to bring up the properties dialog lets link a vertical design speed to the horizontal.



9. Use the Design Standards Toolbar that is docked to toggle on the Set Design Standards.

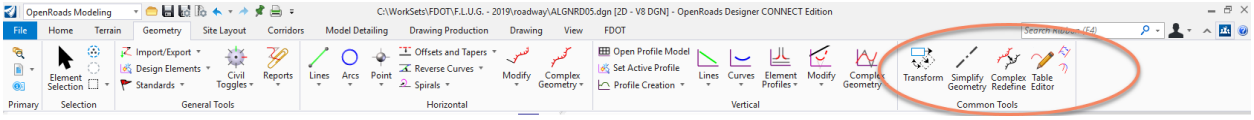


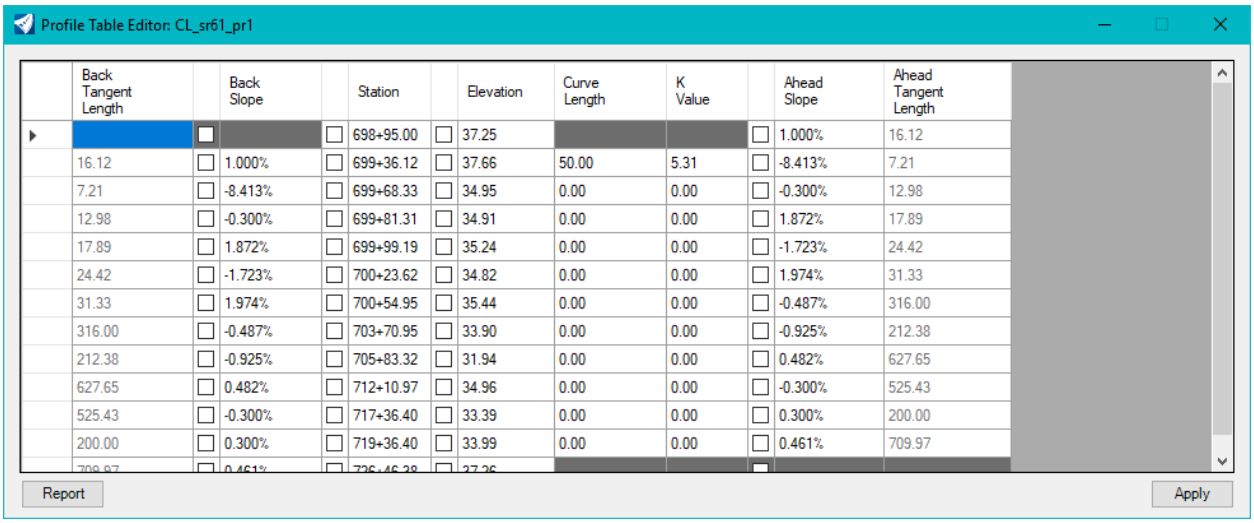
10. At the prompt, select the **Best Fit Profile** created in the previous steps. Notice the *Error* icons are no longer displayed.



Note A new tool to OpenRoads Designer is the Table Editor Tool. This tool can be found on the Geometry Tab and the Common Tools Group. With this tool a selection of the alignment (Horizontal or Vertical) will bring up a table for easy editing.

OPENROADS MODELING>GEOMETRY>COMMON TOOLS>**Table Editor**





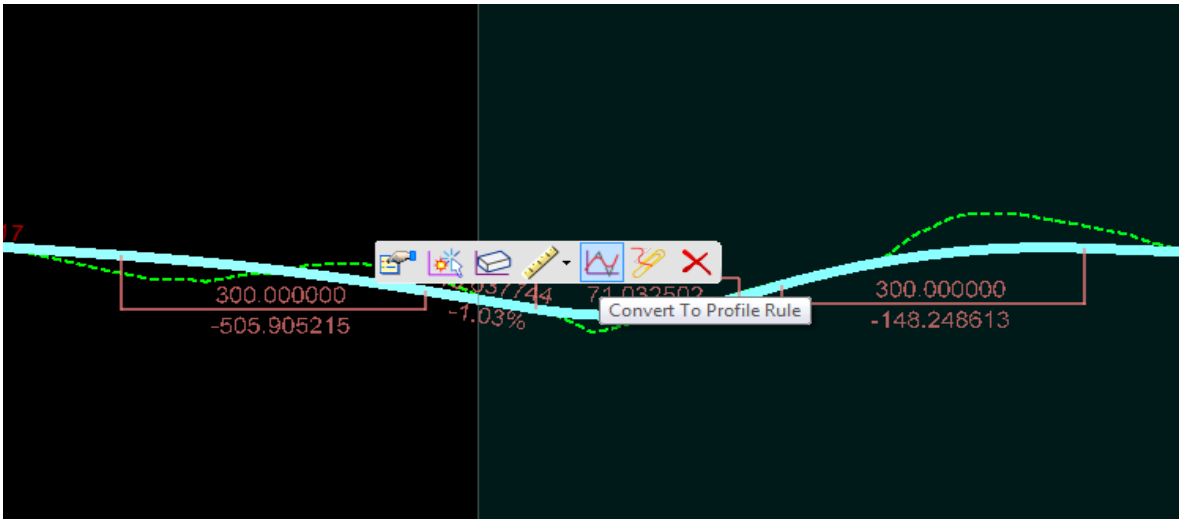
Exercise 3.3 Edit SR61 Profile

This exercise changes the profile using Civil AccuDraw and MicroStation Modify Element.

➢ *Edit the Best Fit Profile*

In order to edit this profile, because it was created from the "Profile by BestFit" the rule must first be removed.

1. Select the **Profile Element** and hover over the element to display the Context Menu.

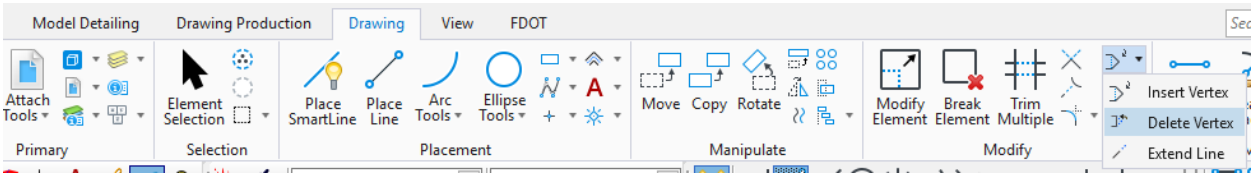


2. Select the Convert to Profile Rule tool.

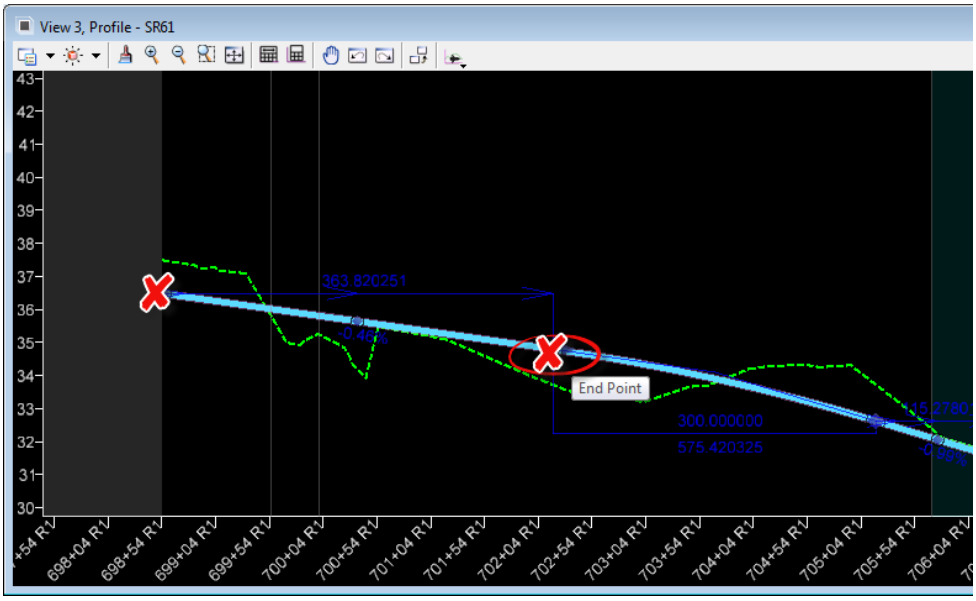
➢ *Delete PIs*

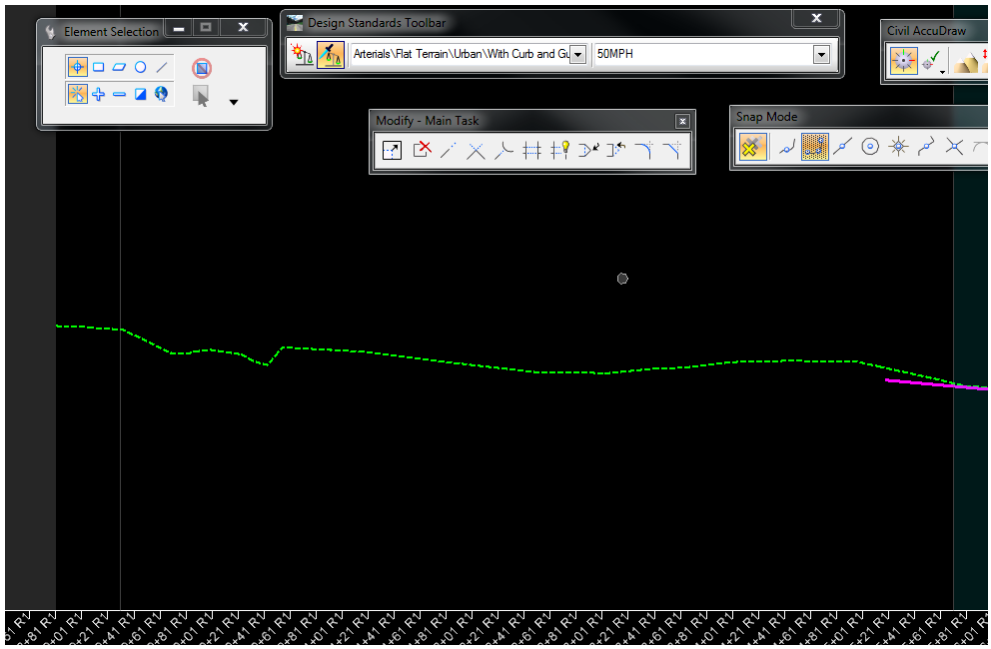
1. Use MicroStation *Modify*, **Delete Vertex** tool**.** This tool can be found in the **Drawing Tab** and the Modify Group

   *OPENROADS MODELING>DRAWING>MODIFY>**Delete Vertex***



2. Zoom to the *beginning* of the Profile and delete the first two **Vertical Elements**.



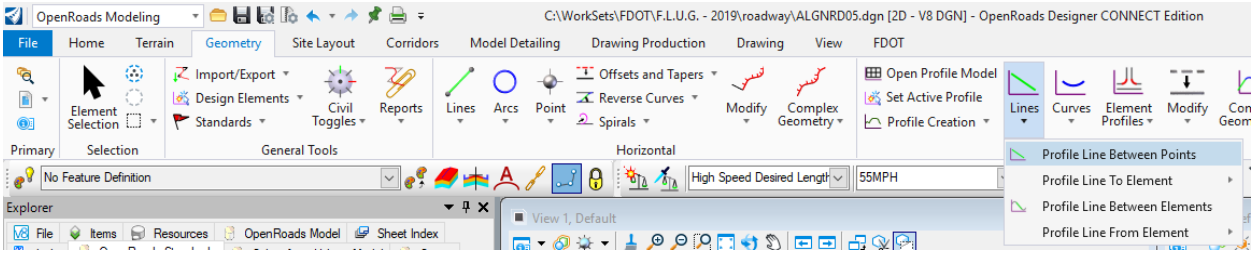


➢ *Create Profile with Place Vertical Line*

New vertical civil profile elements are added to match the existing profile across US98.

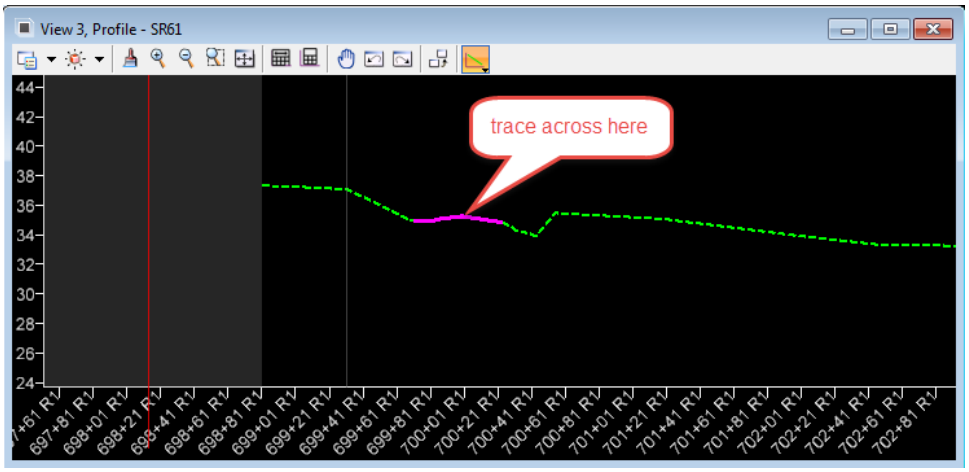
1. Use *Geometry Tab and the Vertical Group*, to select the **Profile Line Between Points** tool located in the Lines Tools**.**

   *OPENROADS MODELING>GEOMETRY>VERTICAL>Lines>**Profile Line Between Points***



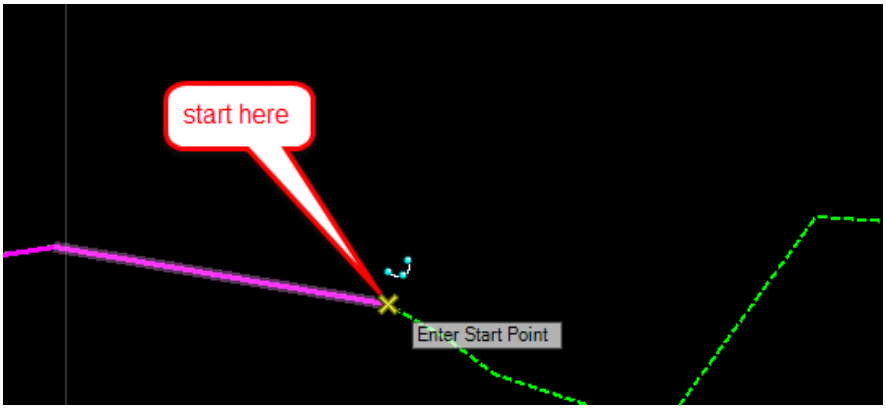
2. Place **Line Elements** on the *Existing Ground* points to trace the Profile across BL98.

Note This is not exact, simply trace a few lines.

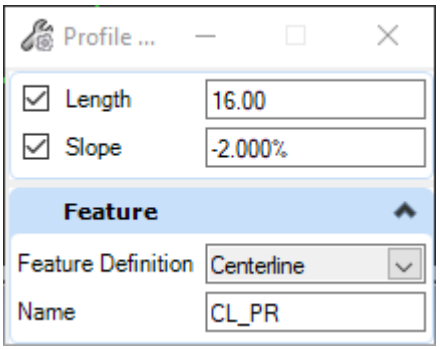


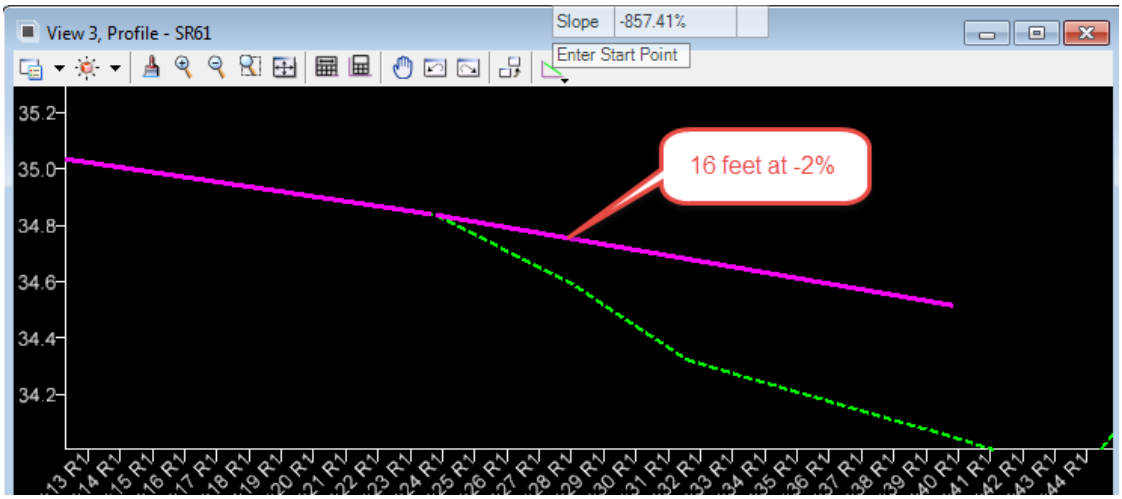
3. Continue using the Profile Line Between Points tool

   a. Begin at the edge of the existing pavement or connect to the proposed profile line from the step above.

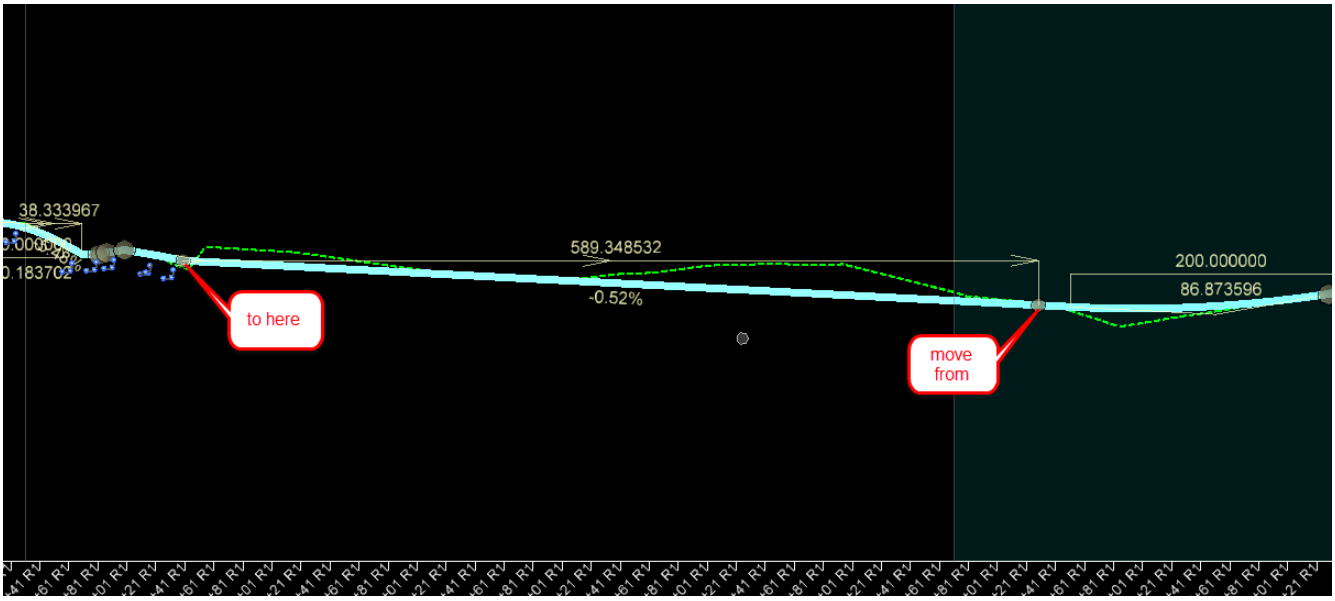


b. In the Profile Line Between Points dialog, check the *length* and *slope*, *length* of **16 feet** and *slope* of **-2%. Click a data point in the view to create the line as defined in the dialog.**





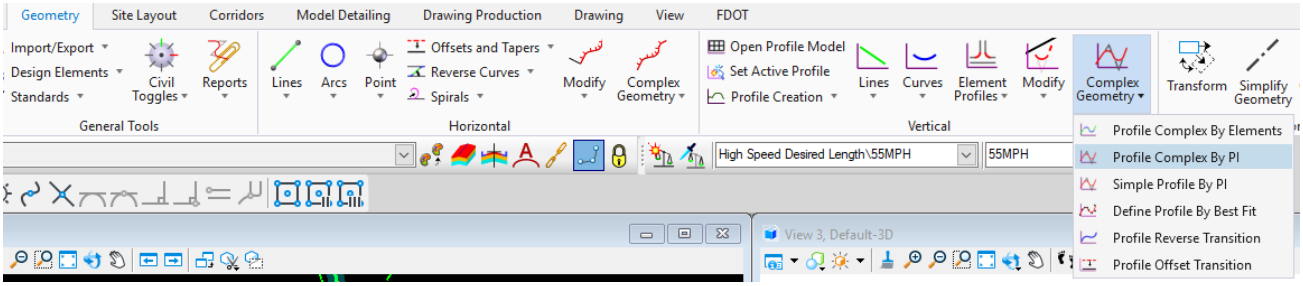
c. Using *Line Between Points* to join the two profiles, place another **Profile line** between the *"16' at 2%"* line and the *Best Fit Profile*.



➢ *Profile by VPI's*

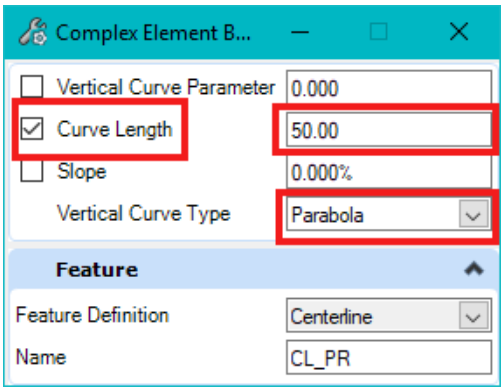
1. Zoom to the Beginning of the profile, Use *the Geometry Tab and the Vertical Group*, to select the **Profile Complex By VPI or PI** tool located in the Complex Geometry tool Group.

   *OPENROADS MODELING>GEOMETRY>VERTICAL>Complex Geometry>**Profile Complex By PI***



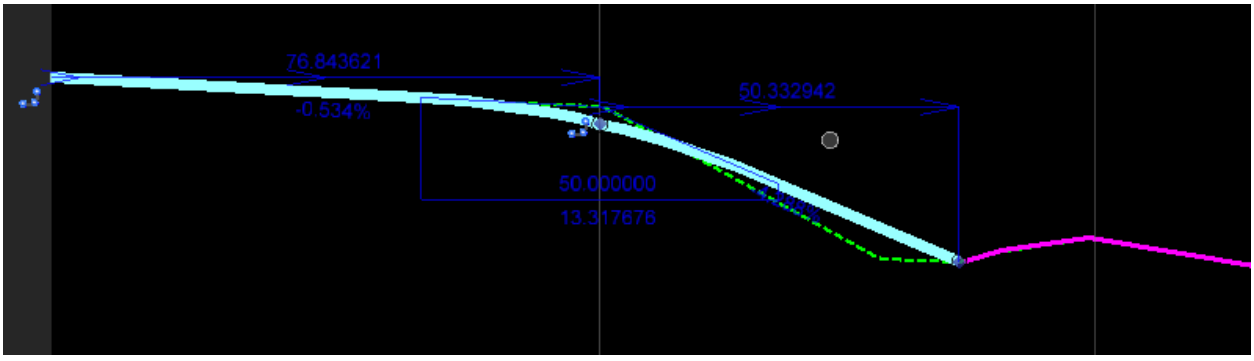
2. Toggle **OFF** the *Active Design Standard*, set the *Curve length* to **50 feet.**

HINT Check that the Vertical Curve Type is set to Parabola

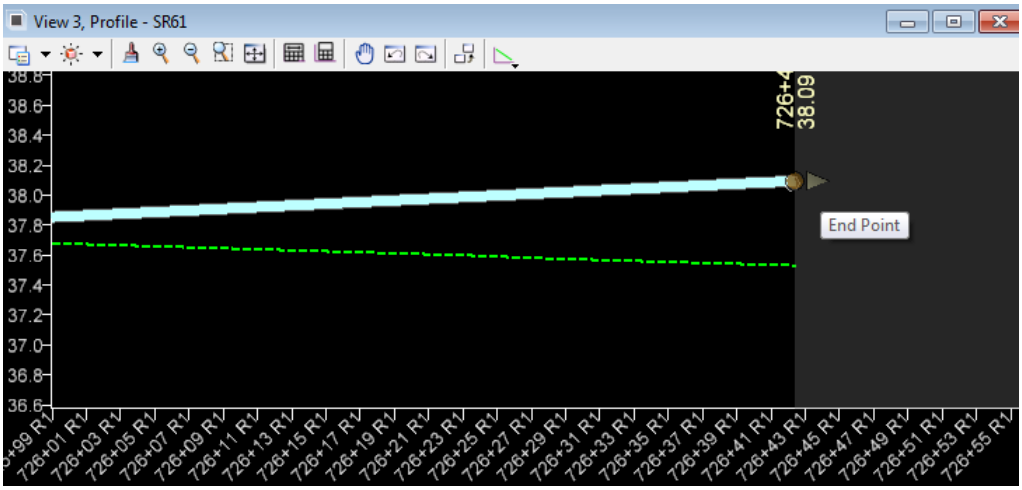


3. Start by snapping to the **Beginning Point** on the ground and complete the *Profile Segment* as shown below.

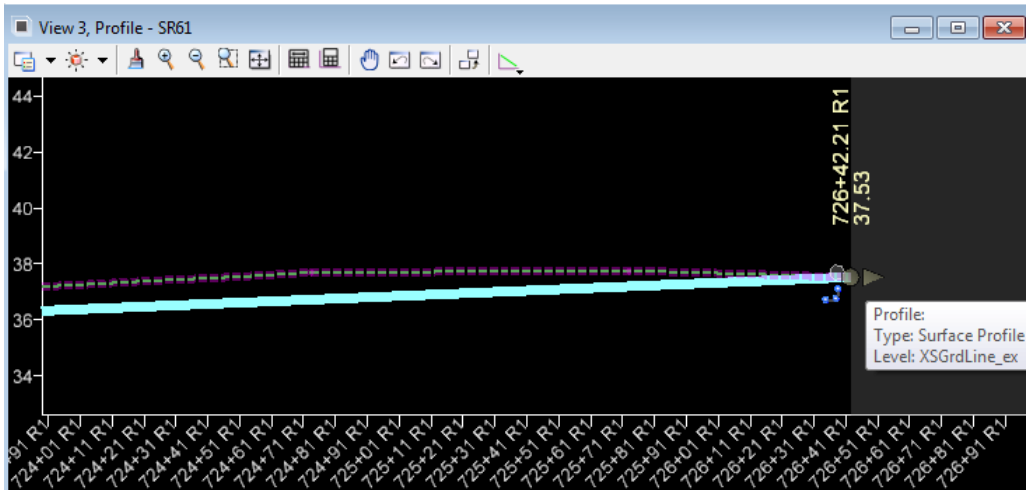
HINT This is not exact, snap to 3 points



4. Zoom to the End of the Profile, select the **Line** and move the last **End Point** to snap to the *Existing Ground*.



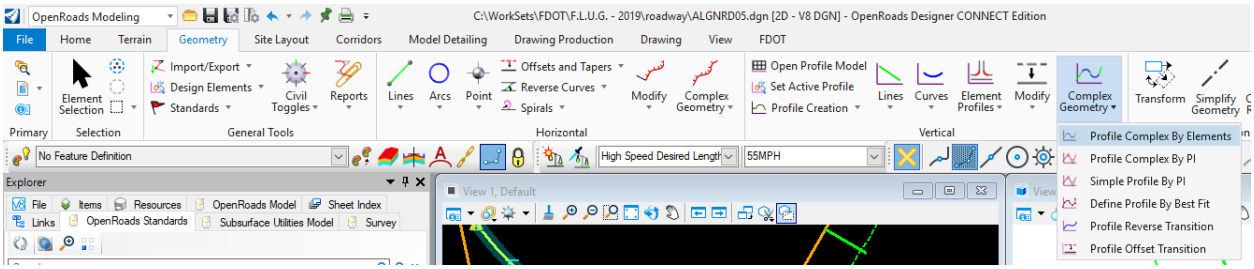
HINT Click on the solid ball manipulator at the end of the line to move it in both directions



➢ *Complex Profile Elements*

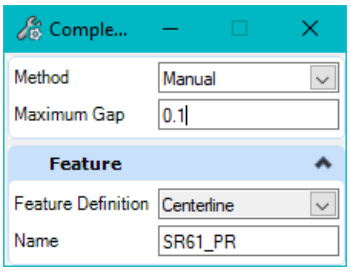
1. Use *Geometry Tab and the Vertical Group*, to select the **Profile Complex by Elements** tool located within the Complex Geometry tool Group**.**

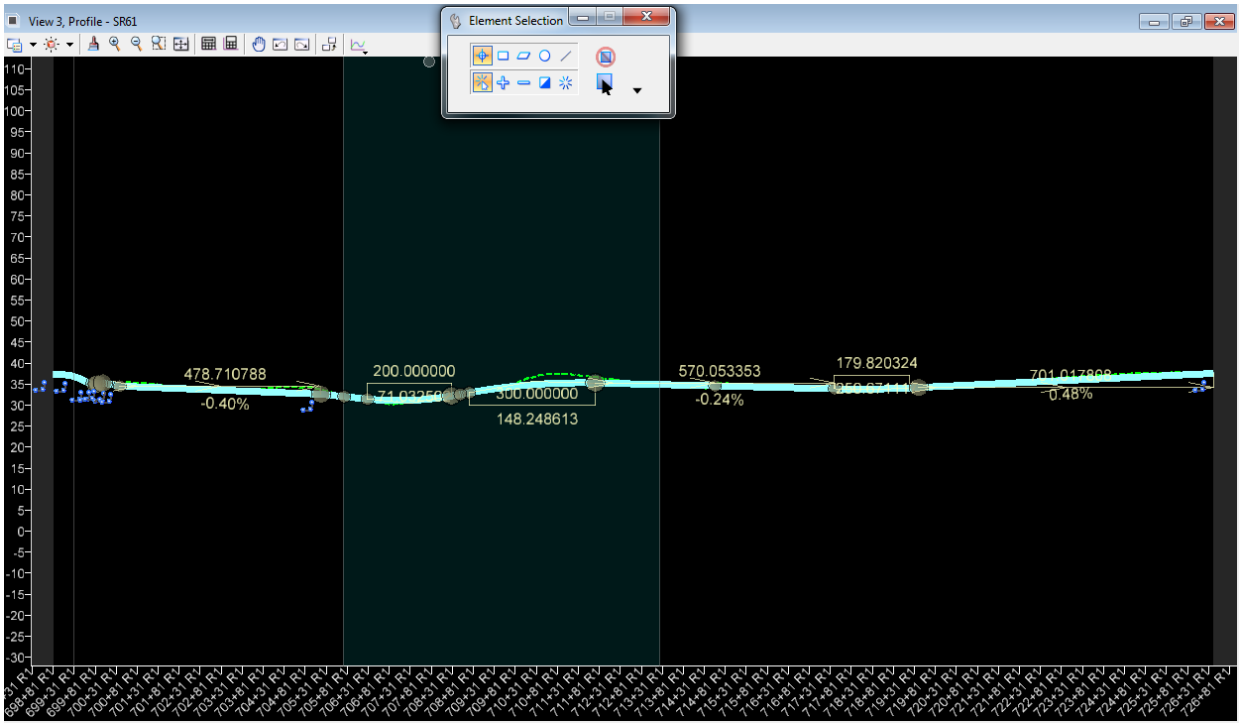
   *OPENROADS MODELING>GEOMETRY>VERTICAL>Complex Geometry>**Profile Complex By Elements***



2. Key-in the name SR61_PR on the dialog and Start at the Beginning Profile line and create a new **Connected Profile**.

HINT On the Profile Complex by Element tool setting, enter the **Feature Name.** This is the *Profile Name* assigned to the Profile.

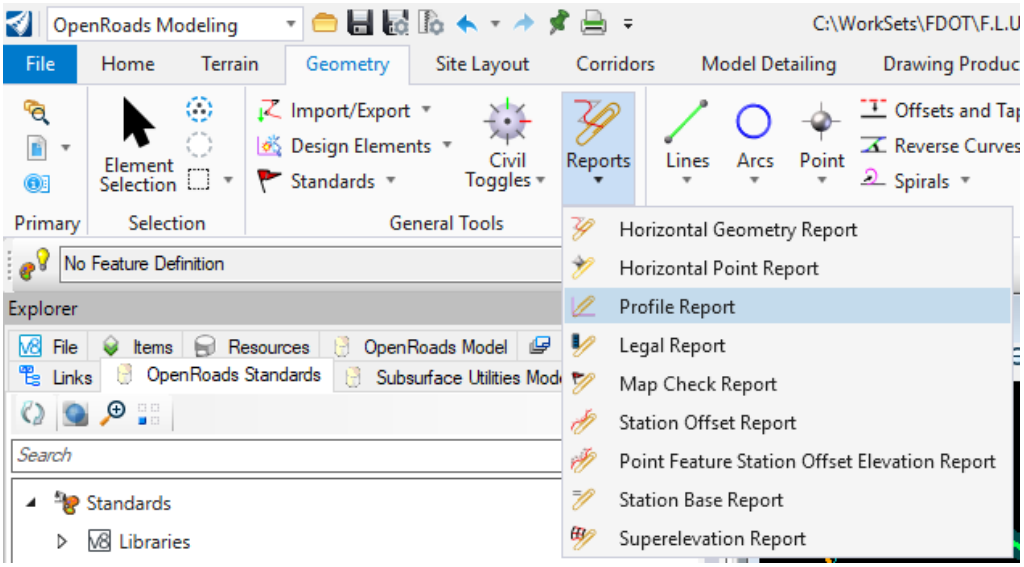




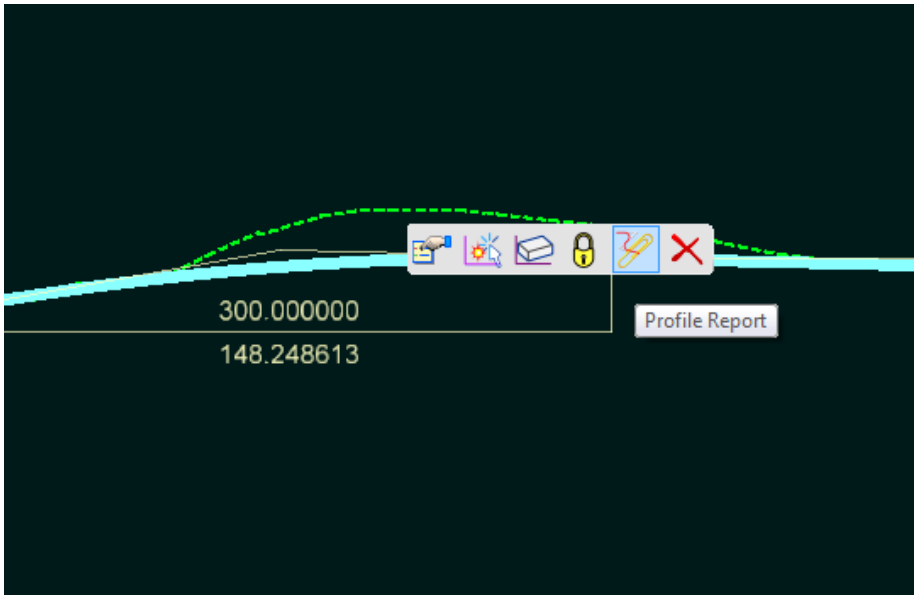
➢ *Profile Report*

1. Use *the Geometry Tab and the General Tolls Group*, to select the **Profile Report** tool located within the Reports tool Group**.**

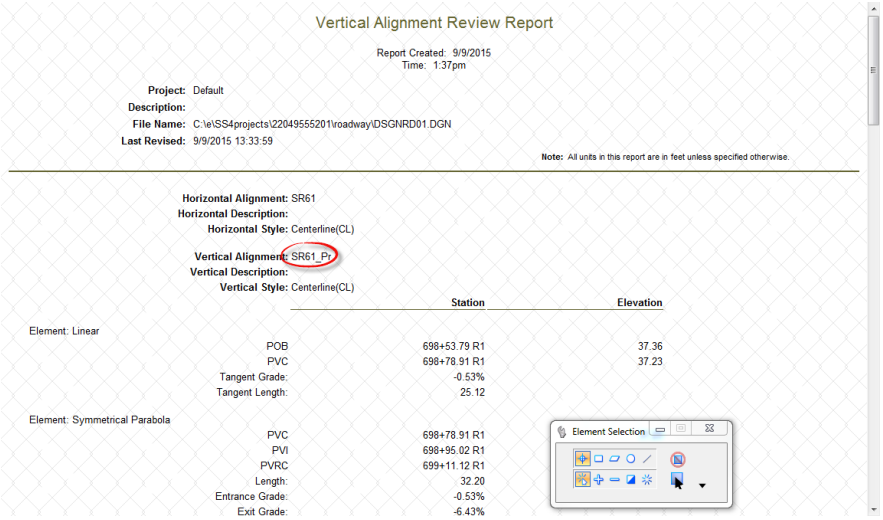
   *OPENROADS MODELING>GEOMETRY>GENERAL TOOLS>Reports>**Profile Report***



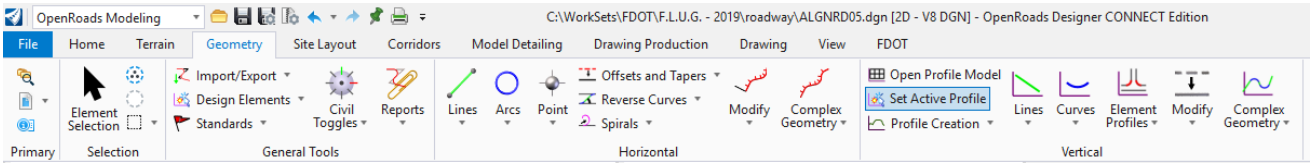
<OR> With the *Profile* selected, hover over the element to display the Context Menu and select the **Profile Report**.



2. The Bentley Civil Report browser displays the Vertical Alignment Review Report for the Profile. Close the Civil Report browser.



3. Use *Geometry Tab and the Vertical Group*, to select the **Set Active Profile** tool**.**



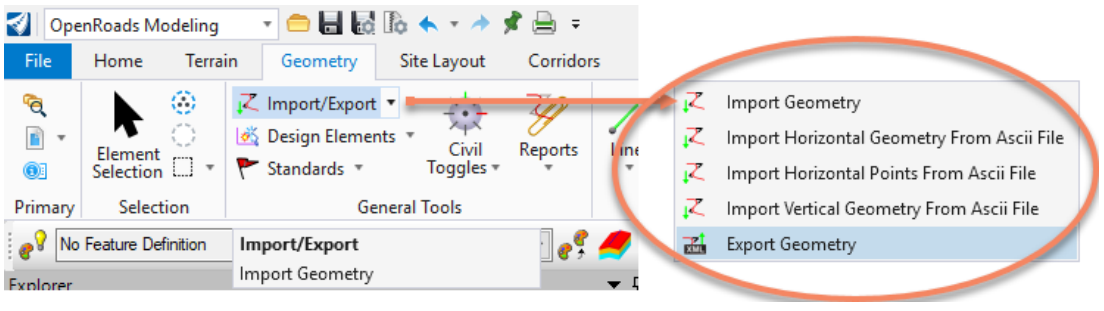
<OR> With the **Profile** selected, hover over the element to display the Context Menu and select **Set Active Profile**.

Note The ALGNRD file is your single source for both your Horizontal and Vertical Geometry. This file is now more important than ever in your design. This file will be referenced in to your DSGNRD and MODLRD files to control the 2D Planimetrics (DSGNRDxx.dgn) and your Corridor (MODLRDXX.dgn).

➢ *Optional Export Profile*

1. Use the *Geometry Tab and the General Tools Group*, to select the **Export Geometry** tool located within the Import/Export tool Group.

*OPENROADS MODELING>GEOMETRY>GENERAL TOOLS>Import/Export>**Export Geometry***



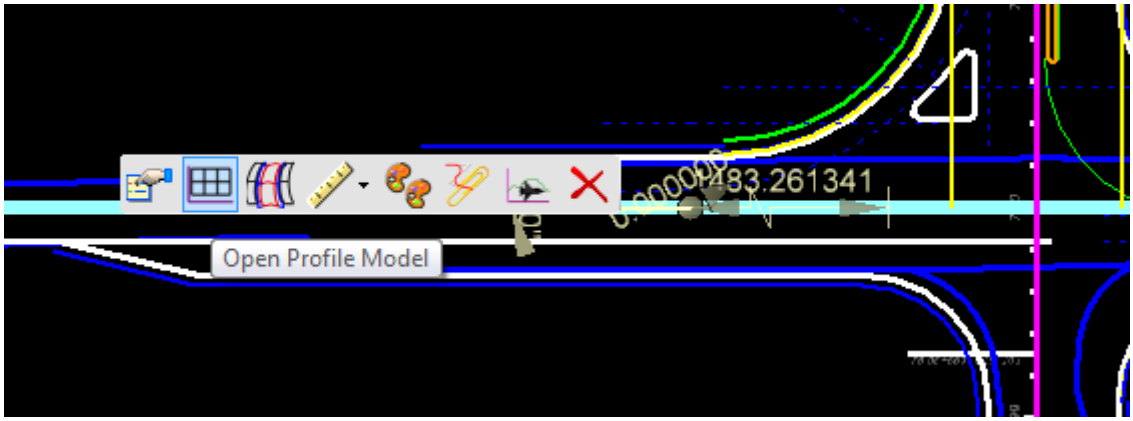
HINT Always check that the profile has a **Feature Name** before saving to the LandXML file

2. Select the **SR61 Horizontal Alignment** and save as SR61_Alignment.xml for a backup.

Exercise 3.4 BL98 Profile

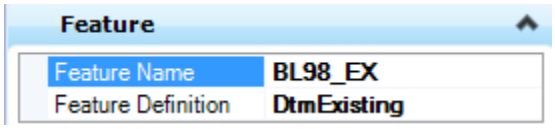
1. With the **BL98** alignment selected in the *Plan View*, hover over the element to display the Context Menu and select the **Open Profile Model**. (Optional Method - Using the Right Click Menu under View Control navigate and pick **2 Views Plan\Profile** then follow the prompts to setup a Plan and Profile views.)

2. Select **View 3** to view the *Existing Ground Profile* for the mainline **BL98** *Centerline*.

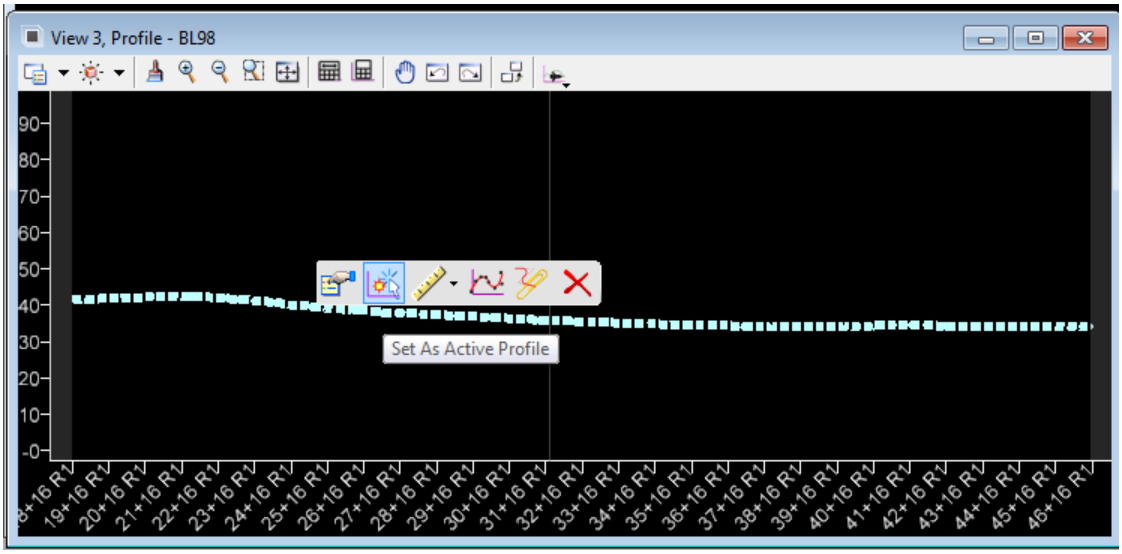


3. With the **Profile** selected, hover over the element to display the Context Menu and select the first icon **Properties**

4. In the name field enter **BL98_EX**

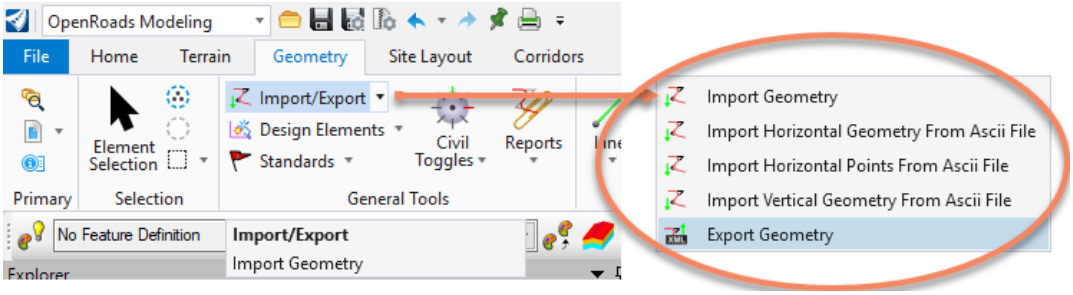


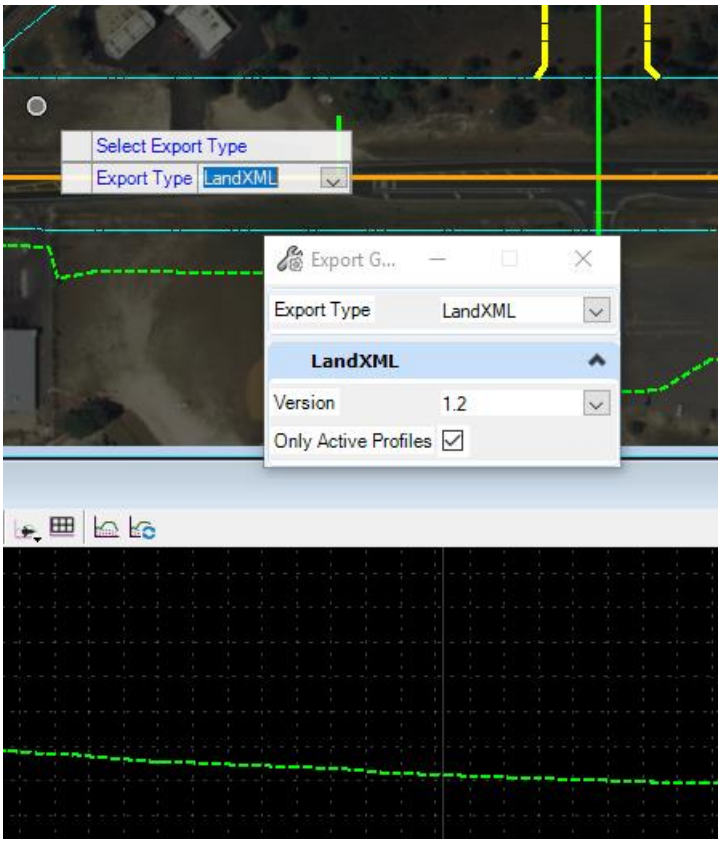
5. With the **Profile** selected, hover over the element to display the Context Menu and select **Set As Active Profile**.



6. Use the *Geometry Tab and the General Tools Group*, to select the **Export Geometry** tool, select the **BL98_EX** plan element and save as a LandXML file. (Ex. BL98_EX.xml).

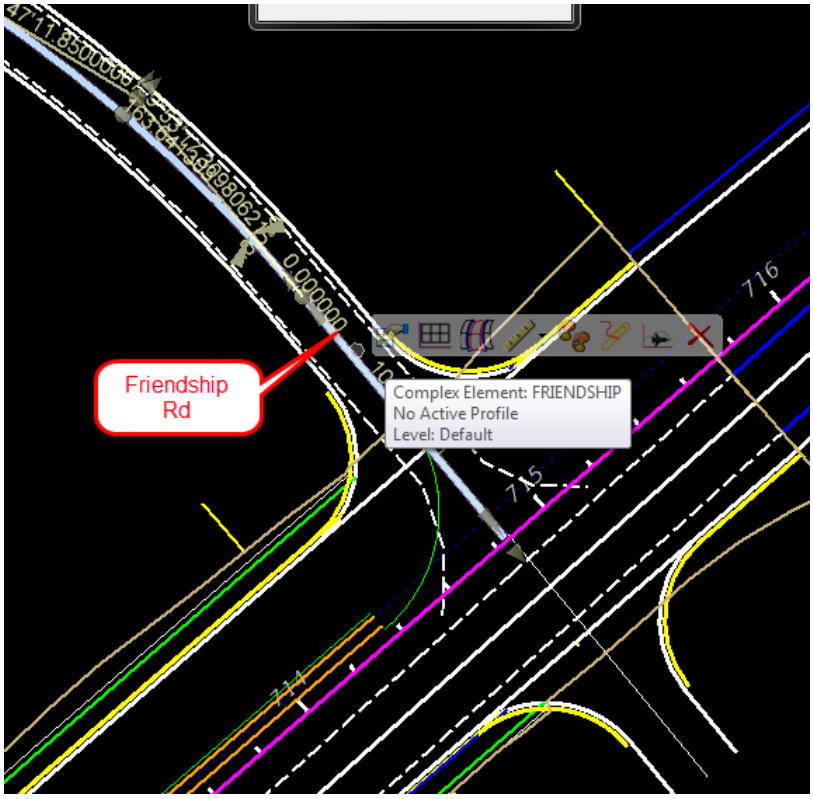
*OPENROADS MODELING>GEOMETRY>GENERAL TOOLS>Import/Export>**Export Geometry***



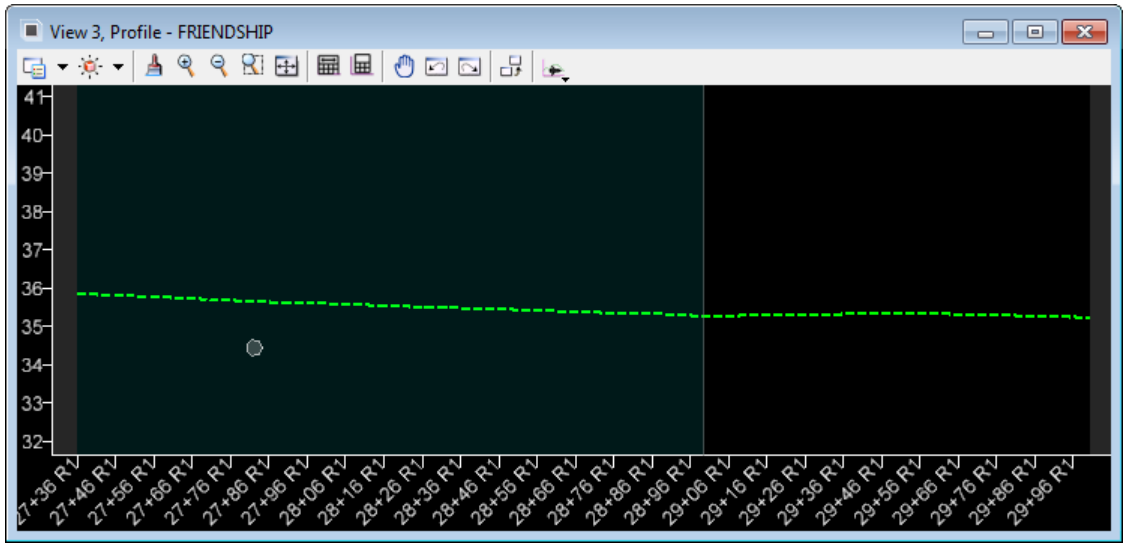


Exercise 3.5 Friendship Profile

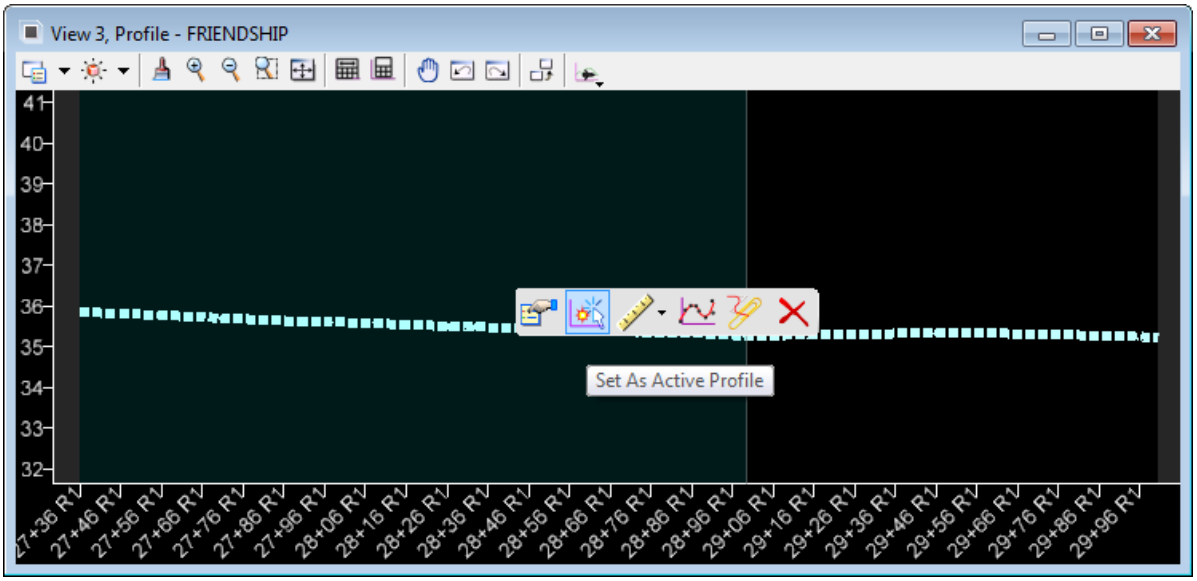
1. With the **Friendship alignment** selected in the *Plan View*, hover over the element to display the Context Menu and select the **Open Profile Model.** (Optional Method - Using the Right Click Menu under View Control navigate and pick **2 Views Plan\Profile** then follow the prompts to setup a Plan and Profile views.)



2. Select **View 3** to view the *Existing Ground Profile* for the mainline *Friendship Centerline*.



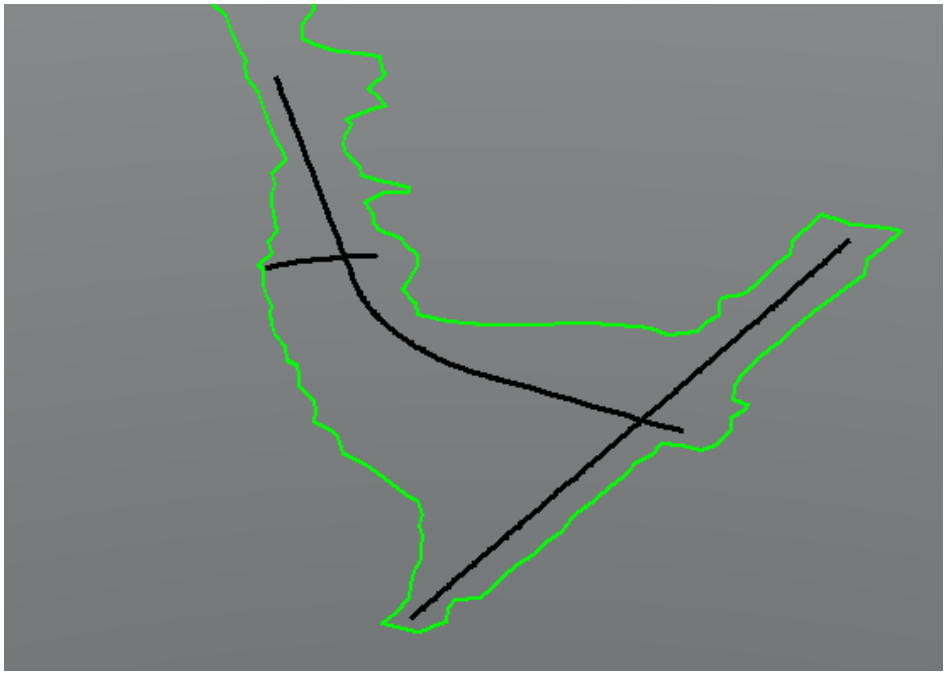
3. With the **Profile** selected, hover over the element to display the Context Menu and select **Set As Active Profile**.



4. Repeat the steps for **Friendship2 Rd.**

5. Open View 2 using the F2 Function Key to see the 3D alignment cernterlines for the project (**Optional Method** - Using the Right Click Menu under View Control navigate and pick **2 Views Plan\Profile** then follow the prompts to setup a Plan and Profile views.)

6. Notice the 3D lines displays in *View 2*.



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4 BASIC CORRIDORS MODELS

CORRIDOR MODELING OVERVIEW

As defined in the Bentley Civil Help:

> *"The Corridor Modeling toolset is a group of highly interactive commands to create new design surfaces that represent a new roadway or other type of surface. Tools for creation, modification, management, and report functions are supported.*
>
> *Corridor Modeling tools aggregates a variety of civil data. The geometry is created with the Horizontal and Vertical Geometry tools, while the existing ground is defined by a MicroStation mesh or Civil Terrain Model. Plan view elements, such as edges of pavement, shoulders, curbs, etc. can be 2D or 3D. Superelevation information is defined within a design file using standards or imported data. Templates are utilized from one or more template libraries.*
>
> *Reference files can be used extensively with Corridor Modeling. On a simple project, the data may be all in one file; larger projects may have geometry in one file, plan view graphics in a second, terrain in another, superelevation in a fourth and the actual model in a fifth. All files can reference the others, to present a complete picture of the project.*
>
> *When working with Corridor Modeling, you can draw in 2D or 3D. When using 2D (such as for plan-view graphics), a 3D view is automatically created and maintained. For example, when a vertical geometry element is initially defined for a horizontal geometry element, the Default-3D model is created, if there isn't one already. The 3D baseline (combination of horizontal and vertical element) is drawn into the 3D model. As template drops are added, and progressed, they are added to the 3D model automatically.*
>
> *When starting to create a corridor, basic information can be used. A single template can be used, along with preliminary geometry and a high level terrain model. As the design progresses, more detail can be added. Instead of a single template drop, perhaps more templates better define the roadway. Transitions can be added to smoothly move from one template to another. There may be multiple roadways all interconnected using the target aliasing tools. All the while, as changes are made, the corridor model is updating, so you see up-to-the minute results. Simple projects may not require all the tools, and a basic corridor model may be sufficient. But all the tools are available to handle basic to complex, small-scale to large-scale projects.*

The following are minimum requirements to use Corridor Modeling.

- Civil horizontal element
- Civil vertical element
- Template stored in a template library

A terrain model is not required for corridor modeling. If the template includes end conditions and no terrain model is defined, the software generates as much of the model as possiblebut will not complete the end condition that ties to ground and no error message is given.

Corridor models are built at an interval, which determines the level of detail of the model. OpenRoads essentially takes the typical section stored in the template and places it every 25' (or whatever the interval is set to) along the alignment in order to build the 3D model. The FDOT CADD manual section 8.4.7 sets forth the maximum required intervals for a corridor, depending on the Context Classification of the roadway. Corridors can certainly be built at a more frequent interval, but this is at the expense of more computing power (RAM, disk space, and CPU). To optimize the model, the interval spacing should only be made tighter than the maximum when needed.

For this project, the Context Classification is C3C. An excerpt from the table in the CADD manual is shown below, showing the corridor interval requirement for C3C. The interval can be set to the tangent requirement as long as the design stage used decreases the interval spacing on curves.

Maximum Corridor Frequency Interval Spacing (Feet)			
Context Classification	**Tangent**	**Curve**	**Intersection**
C3C	20	10	5

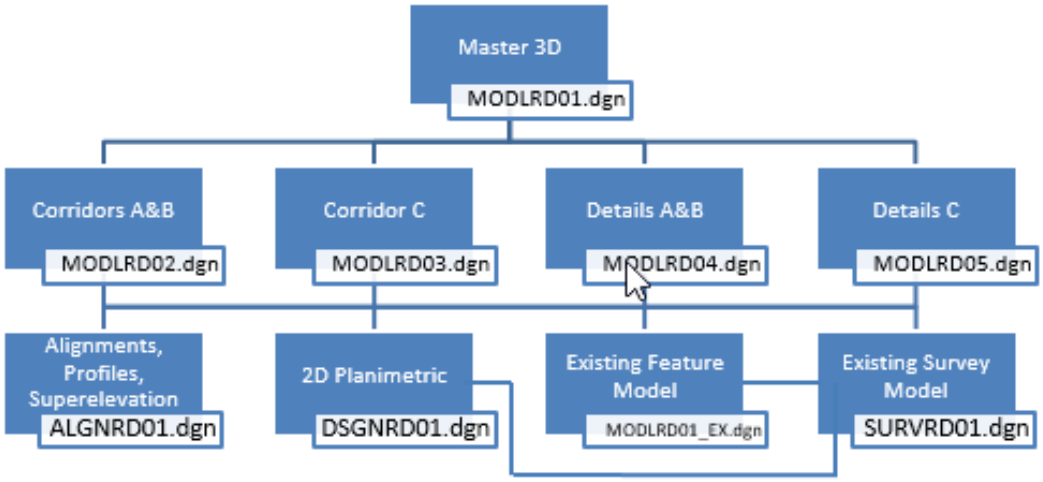
CORRIDOR MODELING PLANNING

It is recommended to plan out the 3D modeling approach on a project. Some have referred to this a Model Management Plan. This plan will attempt to outline the following:

- Determine how to break up the project into logical independent corridors
- Determine which sections of the project are needed for detail modeling and surface modeling
- Determine the files and filenames to be used for corridors and details.

Note The project 3D Model may be in separate files or all combined into one file.: The FDOT file defined to be used for Corridor and Detail Models is MODLRDxx.

Below is a sample diagram of a typical Model Management Plan:



EXERCISE OVERVIEW

4.1 Prepare to Create Corridor Model for SR61

4.2 Create Corridor, SR61

4.3 Create Template, SR61 End Conditions

4.4 Add Corridor Point Controls, SR61

4.5 Add Corridor References, SR61

4.6 Variable Medians, SR61 Templates

4.7 Change Corridor Feature Definition, SR61

4.8 Add Corridor Key Stations, SR61

4.9 Review Corridor Objects, SR61

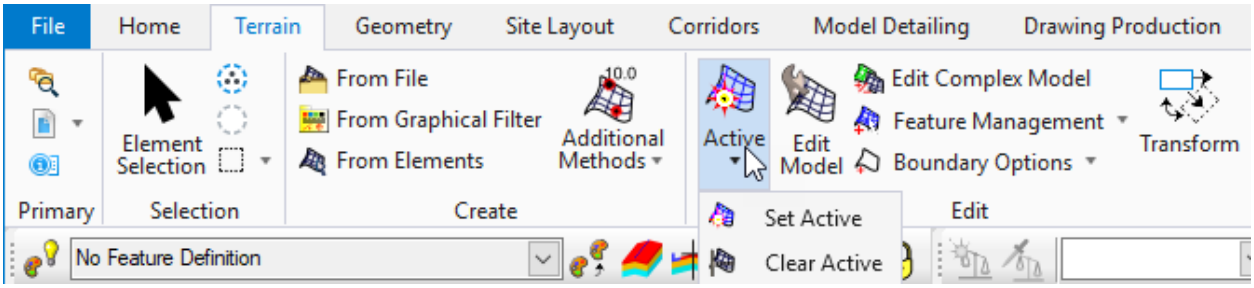
Exercise 4.1 Prepare to Create Corridor Model for SR61

1. (Optional) Extract the *22049555201(6).zip* file in the c:\Worksets\FDOT folder.

2. Open the *MODLRD01.dgn* file of the c:\Worksets\FDOT\22049555201\roadway\ folder in the *FDOTConnect - Roadway* Workspace in OpenRoads Designer.

3. The *SURVRD01, ALGNRD01, DSGNRD01*, and other files are already referenced.

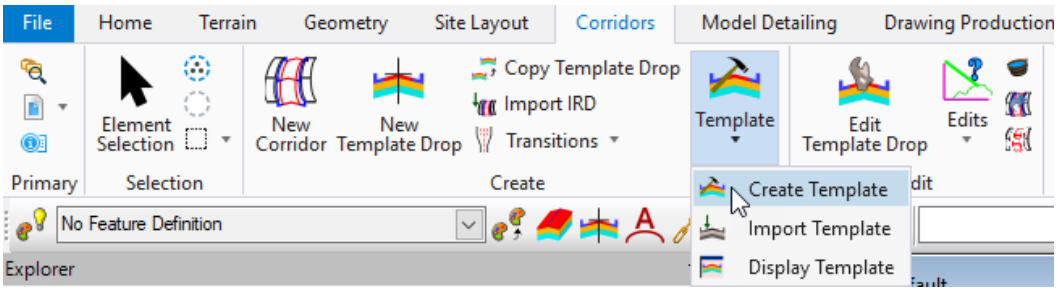
4. Use the *Terrain* tab, **Set Active** tool.



5. At the cursor prompt, select the **Terrain Boundary** green dashed line from the attached *SURVRD01 reference* file. This will set the *terrain model* as **Active**.

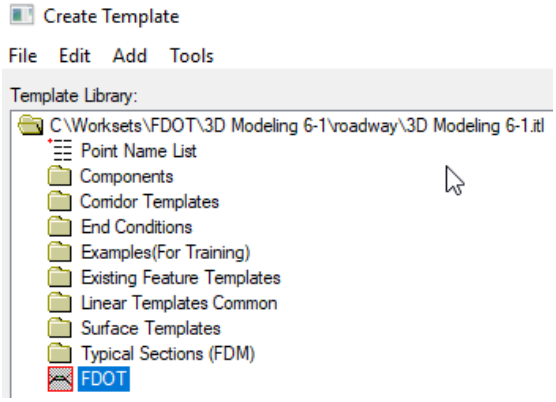
6. Move the cursor over the **SR61** *Centerline Feature* and verify an **Active Profile**.

7. Use the *Corridor Modeling*, **Create Template** tool.

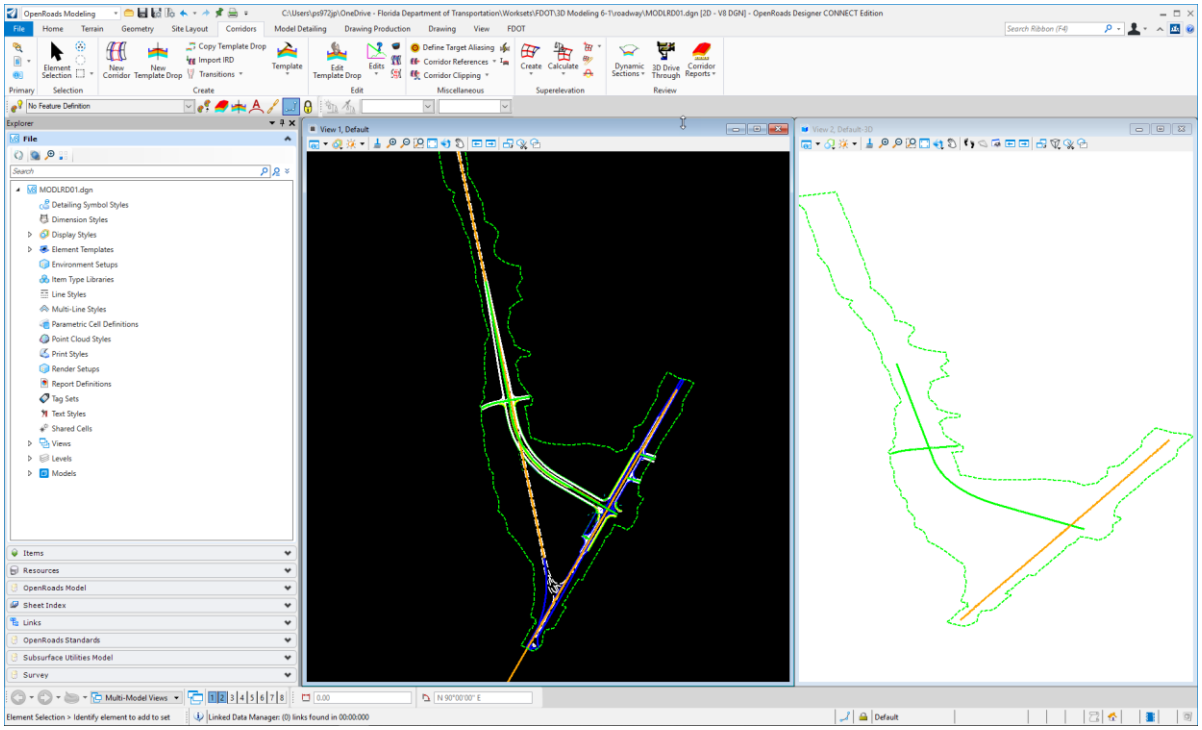


HINT Use the F12 function key to access the Create Template Dialog.

8. Verify that the correct Template Library is loaded. **Close** the Create Template dialog.

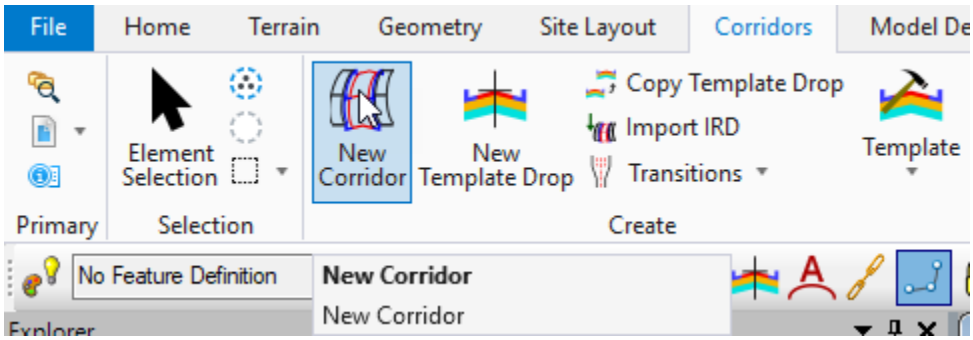


9. To set up the *Views* for viewing the **2D Plan** and **3D Model** simultaneously in the FDOTSS4 Workspace, Select the **F2** *Function Key* on the keyboard. This will open an *Isometric View* of the project.



Exercise 4.2 Create Corridor, SR61

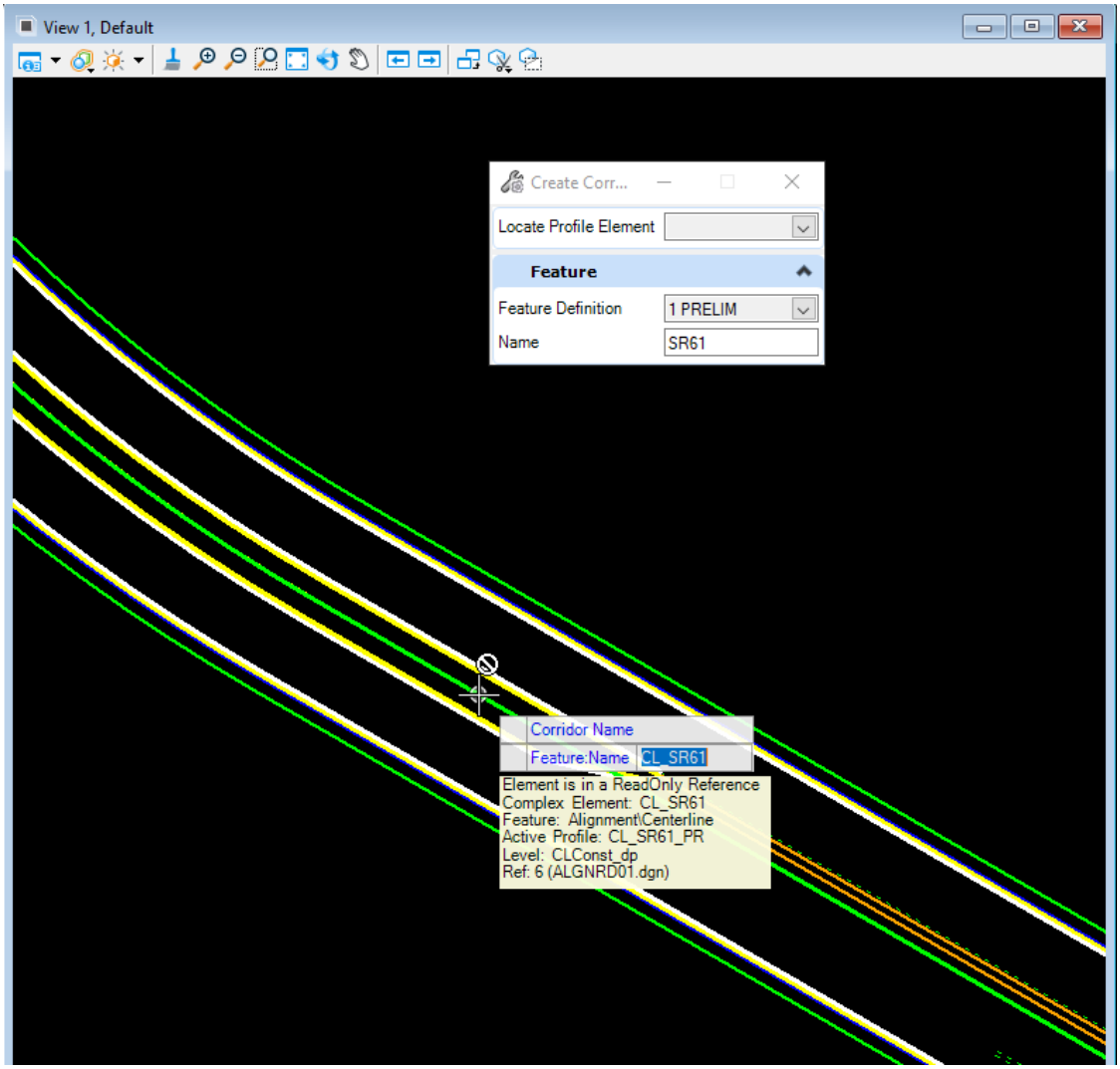
1. Use the *Corridors*, **New Corridor** tool.



2. Select the **SR61 Centerline** in the Plan View when the "Locate Corridor Baseline" prompt comes up.

3. Reset to accept the **Active Profile**. This profile resides with the *SR61 Civil Feature Centerline*.

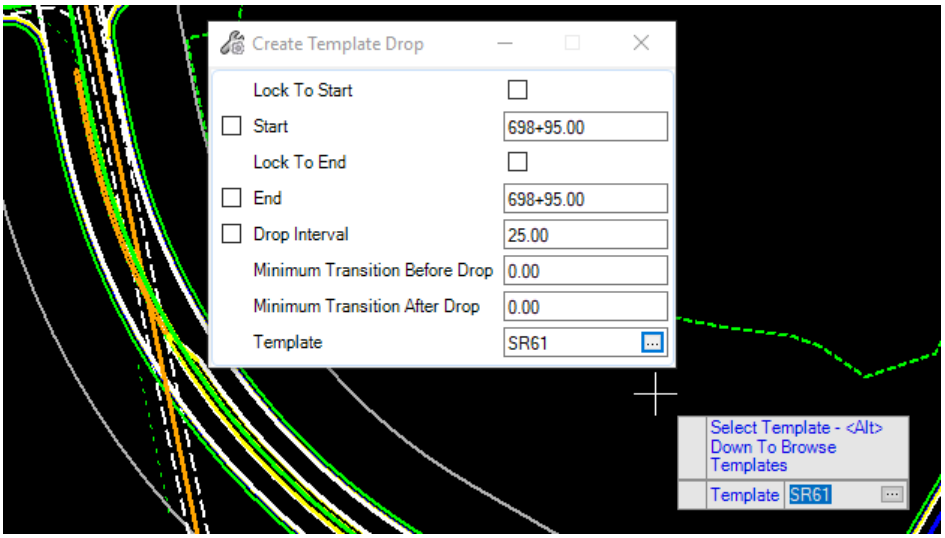
4. Enter the *Corridor Name*, **SR61**, in the Create Corridor dialog.



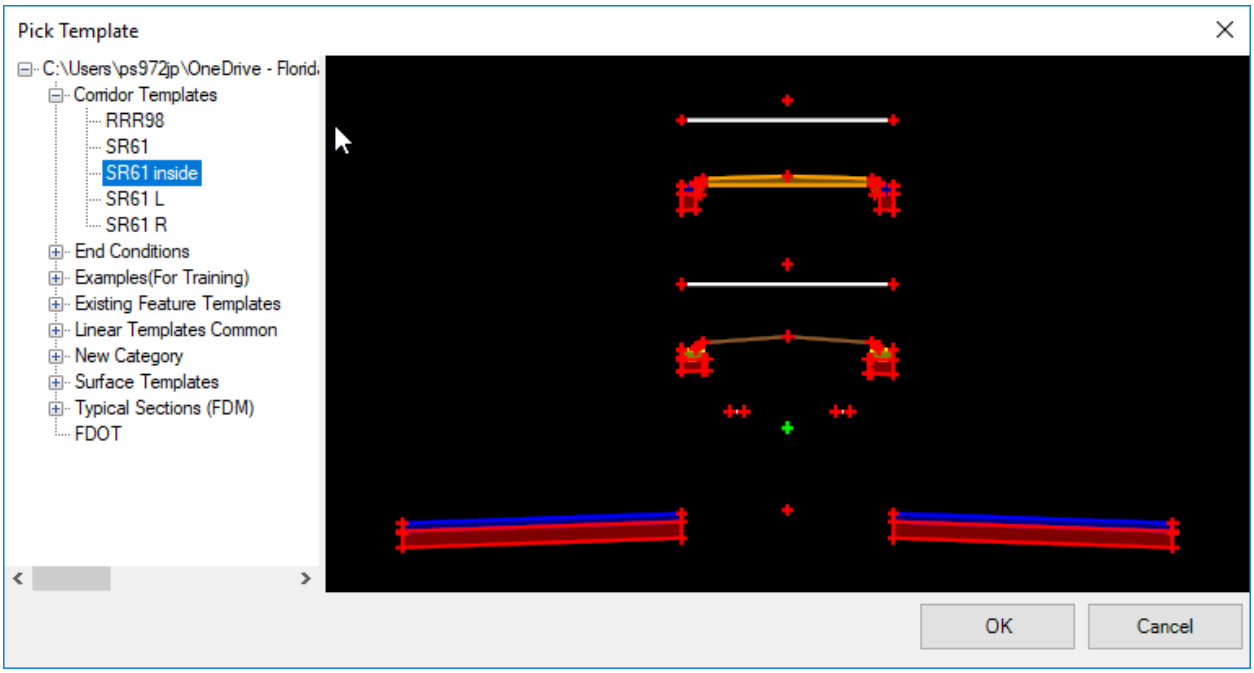
5. Data point to accept the *Name of the Corridor*, **SR61**. The corridor is created AND the integrated Create Template Drop dialog launches.

Note Once a Corridor is created, a shape boundary is placed in the Plan View representing its outline. This shape is initially placed on the CorrHndlStg1_dp level. It has several properties which can be seen by clicking on the shape and choosing first icon. One of the properties is the Feature Definition (Design Stage).

6. Once the Create Template Drop dialog is opened, first select the **corridor template** to be placed on the corridor. Either use the **icon** on the dialog <OR> select **ALT down arrow** to pick a template.



7. Find the **SR61 Inside** *template* in the *Corridor Templates* folder of the active Project Template Library. Select it and click "OK."



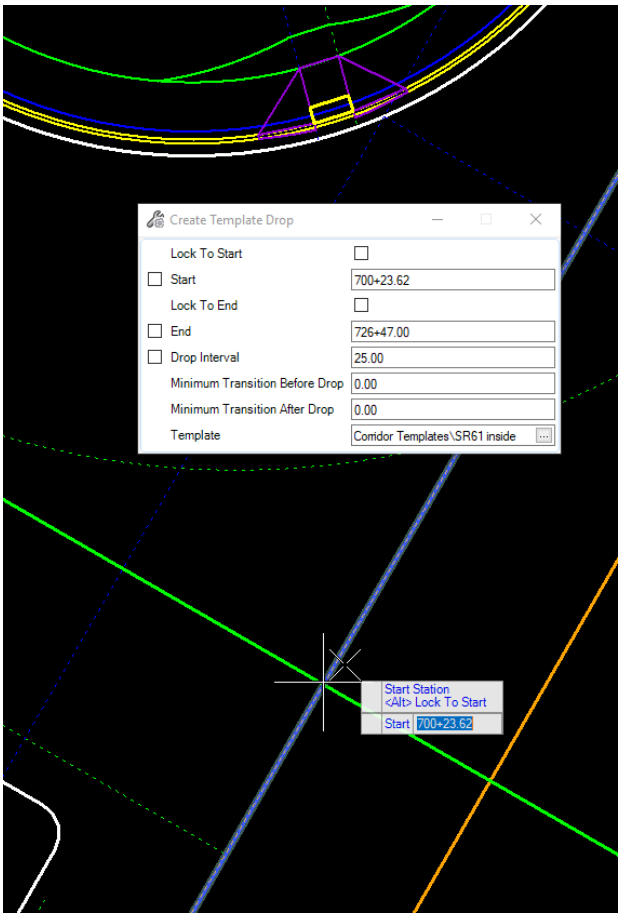
8. Data point to accept the **Template** and move to the next setting.

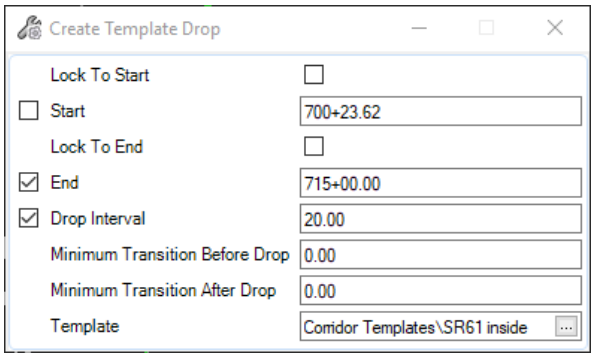
9. Continue to define the Create Template Drop dialog information entering and accepting the following for the **SR61** *Corridor*:

   a. *Start* – Use keypoint or intersect snap click to the *ML line* on 98, *Station* **700+23.62** as shown on the right.

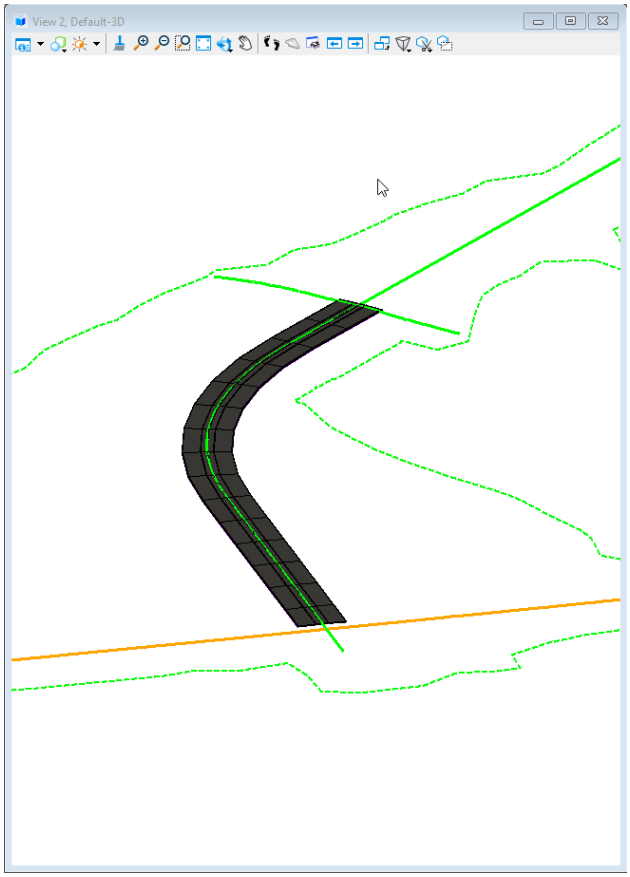
   b. *End* – type in *Station* **715+00** as shown below.

   c. Set the Drop Interval to 20 as shown below.

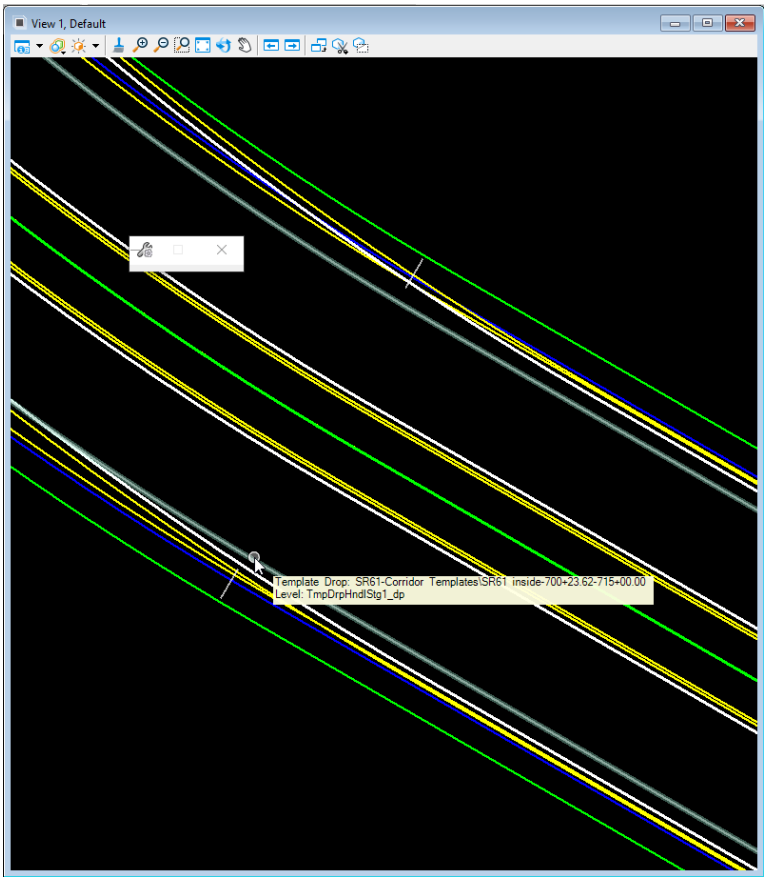




10. Upon completion of the *Corridor Processing* bar in the lower right hand side of the OpenRoads status bar, the **3D model** will be displayed in **View 2**.



Note Once a Template Drop is created, a shape boundary is placed in the Plan View represent its outline. This shape is initially placed on the TmpDrpHndlStg1_dp level. It has several properties which can be seen by clicking on the shape and choosing first icon. Properties include the Template Drop Interval and the Template Name.



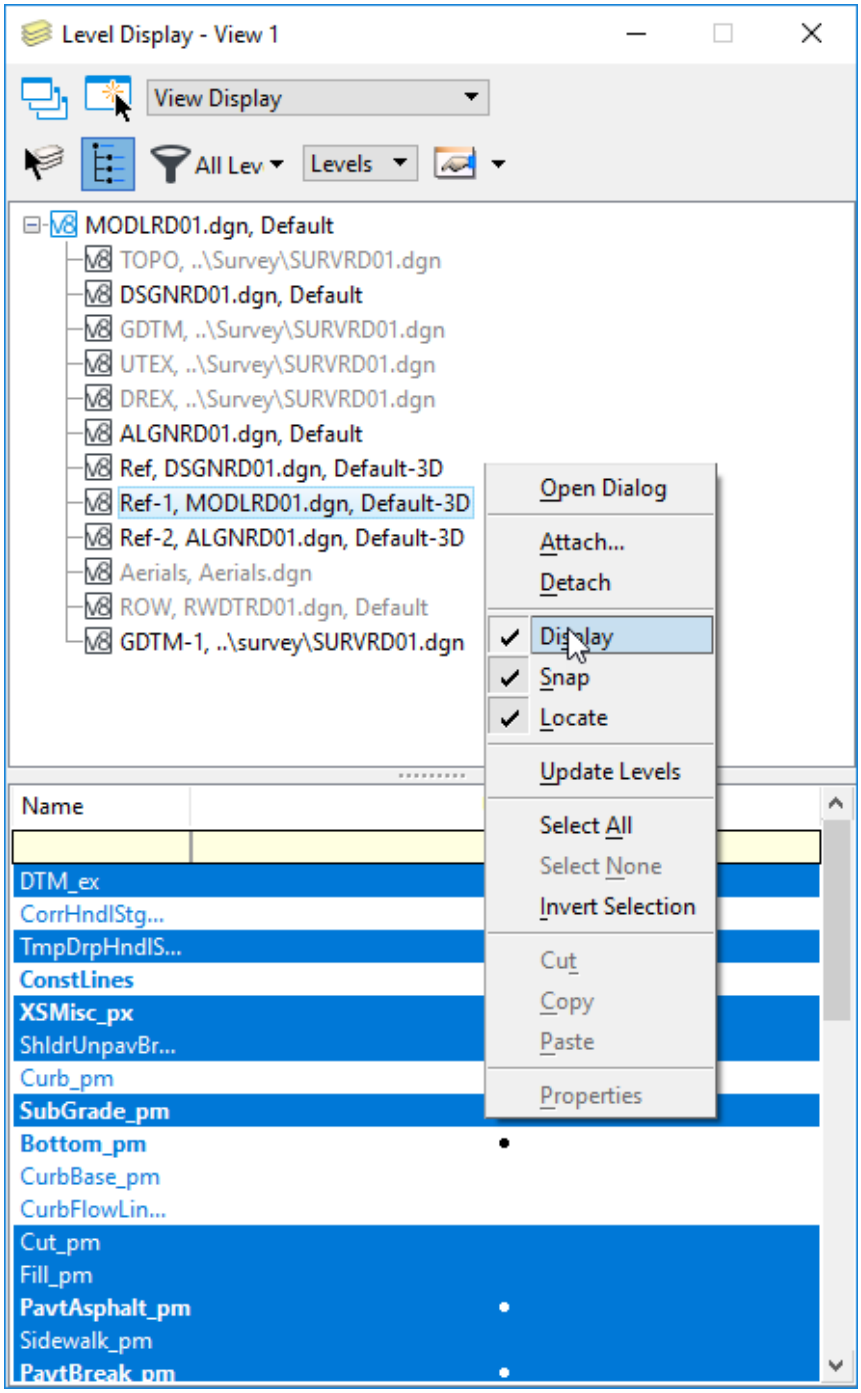
➢ *Turn 3D Reference File Display Off in the Plan View*

At times the line work in the Plan View can become confusing with 3D lines over top of the 2D lines. This View can be simplified by turning the 3D Model Reference file display Off.

1. Data Point somewhere in **View 1** to make it active.

2. On the OpenRoads Level Display dialog, navigate to the **Ref. MODLRD01.DGN Default-3D** file.

3. Right click on the file and un-check the **Display** option.



Exercise 4.3 Create Template, SR 61 End Conditions

Splitting the template allows more flexibility when adding driveways and side streets, as the end condition (outside) template can change at those locations without affecting the mainline. The template for the previous exercise only extended to the edge of pavement and did not include curb. In this exercise we will add the curb and the end conditions.

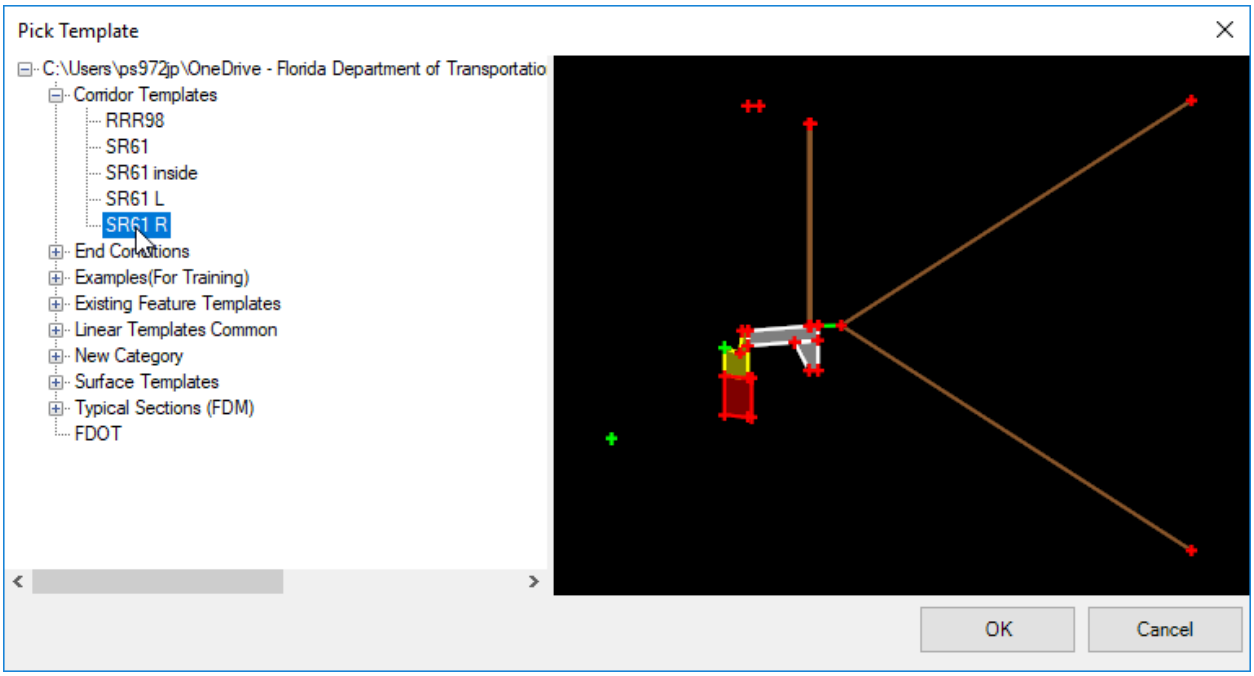
1. Use the *Corridors*, **New Corridor** tool.

2. Select the **SR61 Centerline** in the Plan View when the "Locate Corridor Baseline" prompt comes up.

3. Reset to accept the **Active Profile**. This profile resides with the *SR61 Civil Feature Centerline*.

4. Enter the *Corridor Name***, SR61 R**, in the Create Corridor dialog.

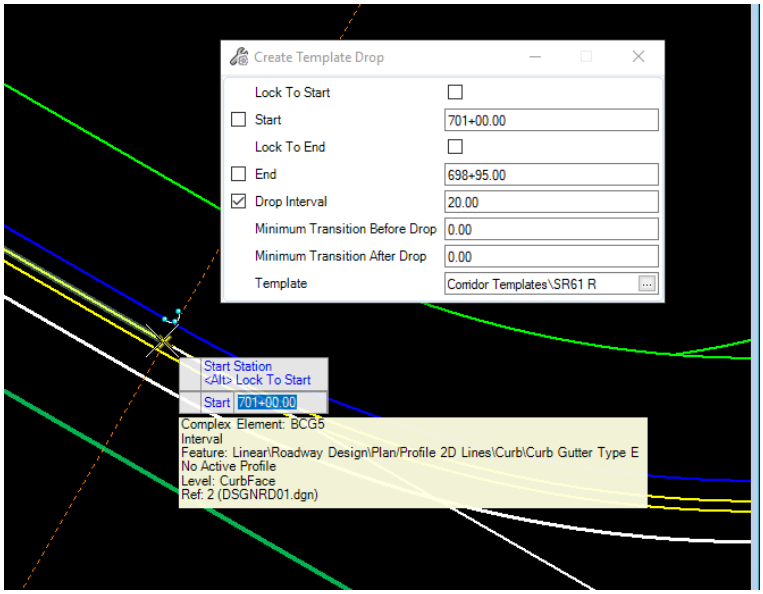
5. OpenRoads will continue on to the **Create Template Drop** command. Either use the **icon** on the dialog <OR> select **ALT down arrow** to pick a template.



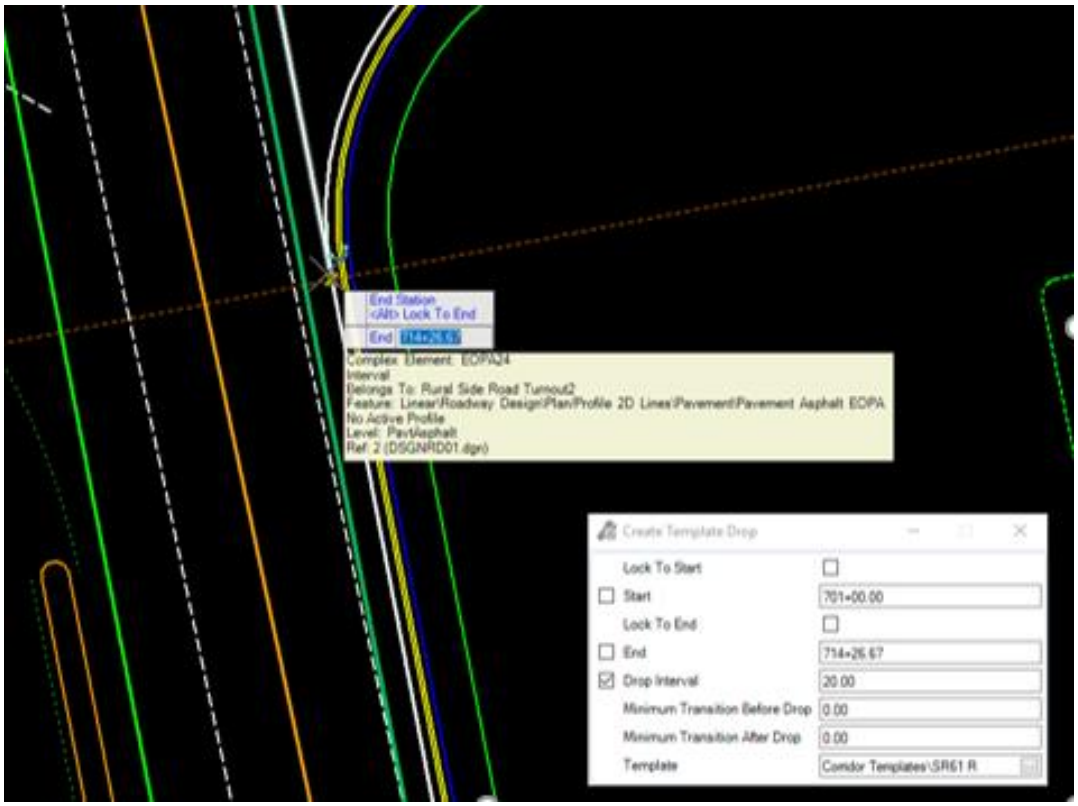
6. Pick the **SR61 R** *template* in the *Corridor Templates* folder of the active Project Template Library.

7. Continue to define the Create Template Drop dialog information entering and accepting the following for the **SR61** *Corridor*:

   a. *Start* – Snap to the end of the curb radius return on the right side of SR 61 at the T intersection, *Station* **701+00,** as shown below.



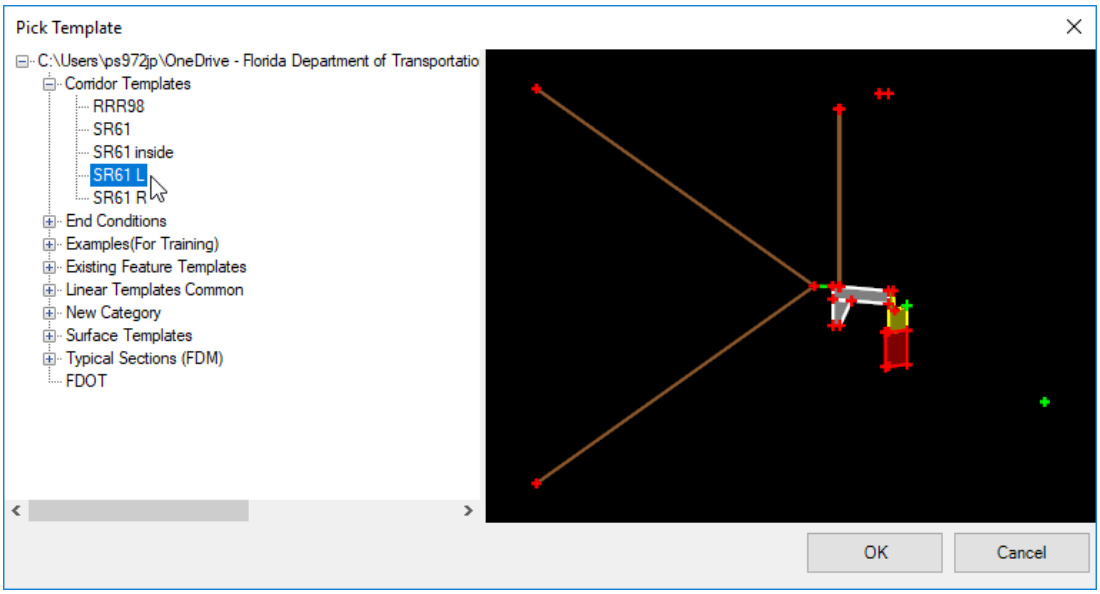
   b. *End* – Snap to the beginning of the curb radius return on the right side of SR 61 at the intersection, *Station* **714+26.67,** as shown below.



   c. Set the Drop Interval to 20 and accept the remaining prompts.

8. Repeat Steps 1-7 for the left side.

    a. Name the Corridor SR 61 L and pick the SR 61 L Template.

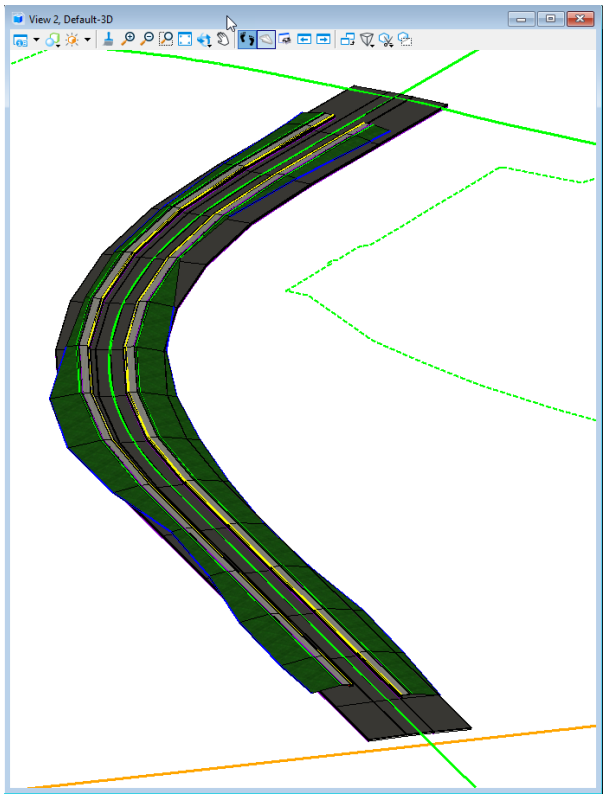


    b. Select the start and end points of the template drop based on the curb radius return points on the left side of the roadway. The stationing is listed below:

        i. *Start* – Station **701+34.00**

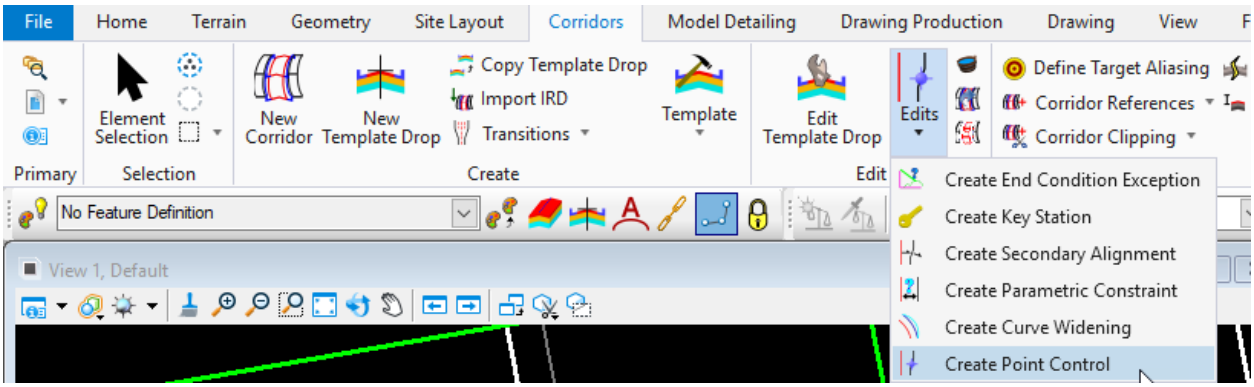
        ii. *End* – Station **714+29.06**

9. The corridor models will display in the 3D View but will be on top of the previously placed pavement model. This will be addressed in Exercise 6.4.

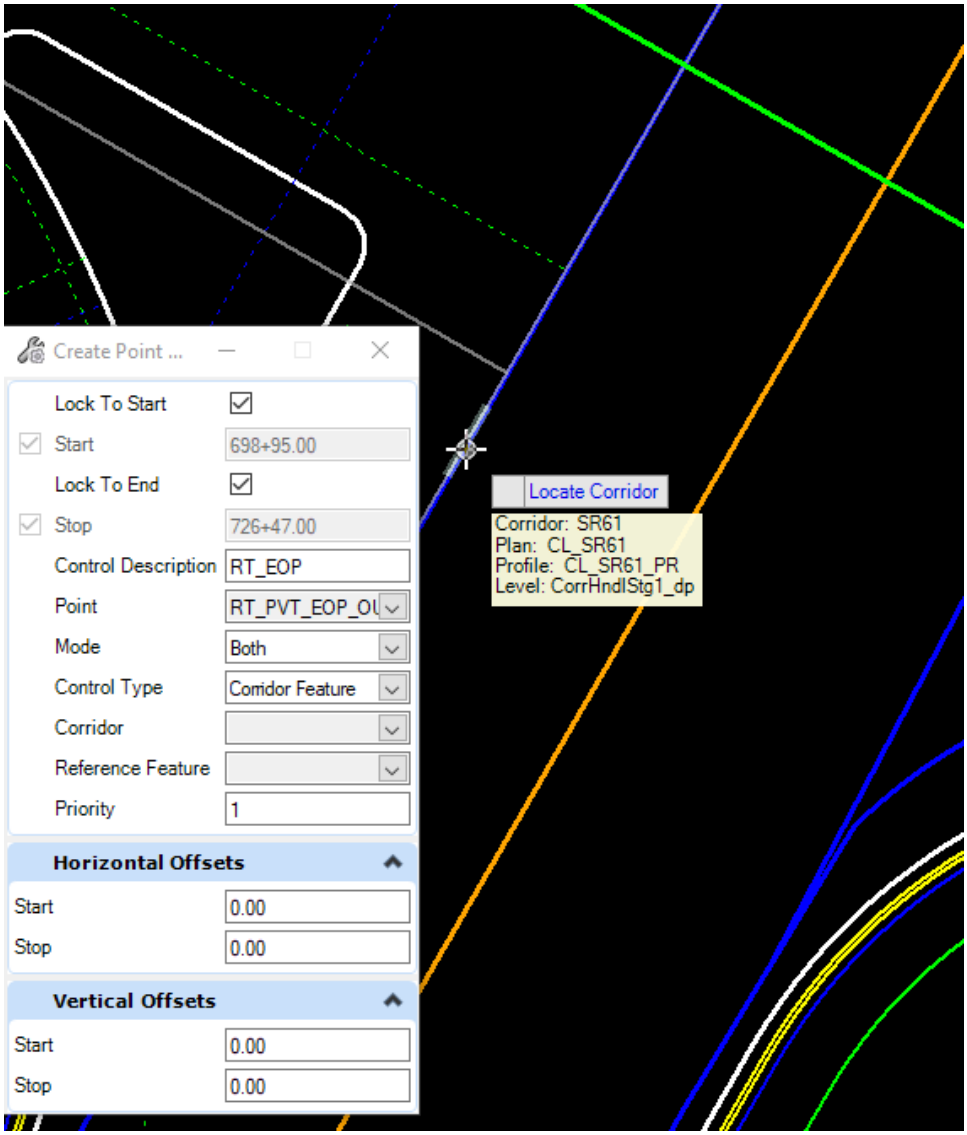


Exercise 4.4 Add Corridor Point Control, SR 61 L and R

1. Use the *Corridors, Edits*>**Create Point Control** tool.



2. Identify the **Corridor Boundary** *handle* for the **SR 61 R** corridor. Continue to define the Create Point Control dialog information.



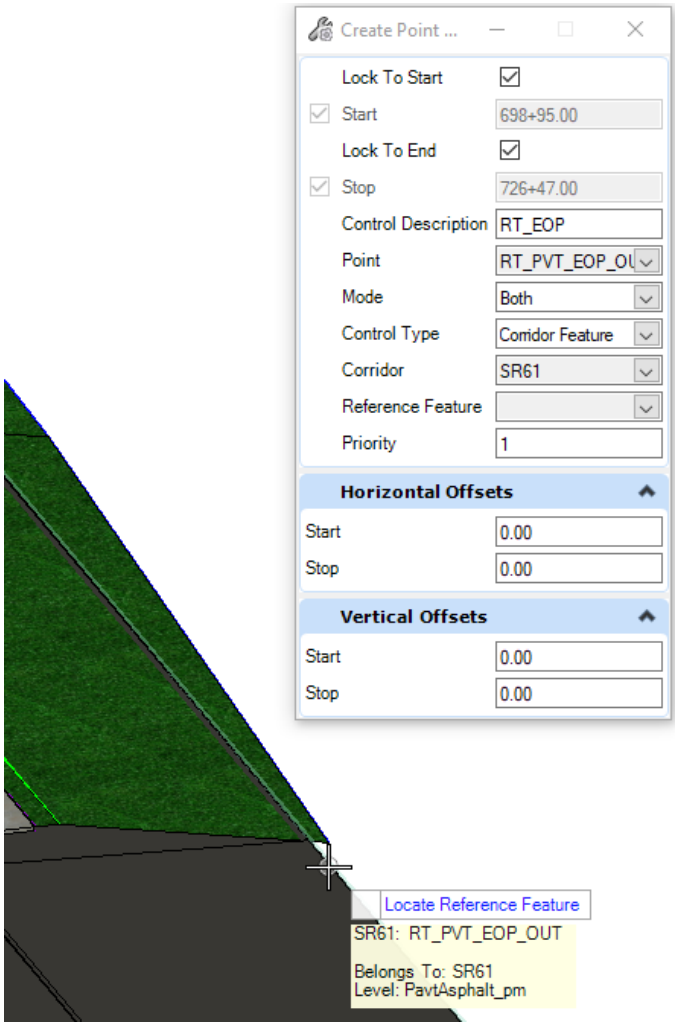
3. Enter and accept the following for the **SR61 R** Corridor:

   - *Start Station* **Lock to Start**
   - *End Station* **Lock to End**
   - *Control Description* **RT_EOP**
   - *Point* **RT__PVT_EOP_OUT**
   - *Mode* **Both**
   - *Control Type* **Corridor Feature**

4. For the Corridor, select a handle on SR 61 corridor developed for the inside.

5. For the Reference Feature, select from the drop down list or select the **RT__PVT_EOP_OUT** line on the **SR 61** corridor (inside) in the 3D view, as shown on the right.

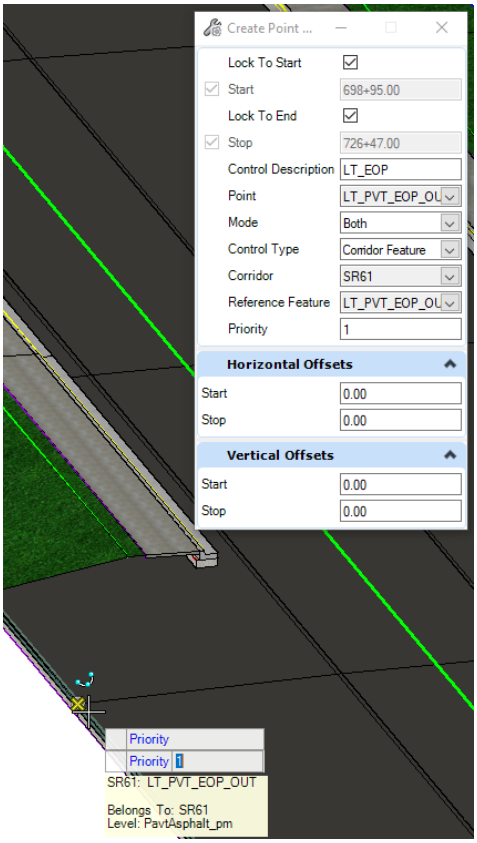
6. Accept the defaults for the remaining items. The 3D view will update to move the curb and sidewalk to match the edge of pavement of the **SR 61** corridor model.



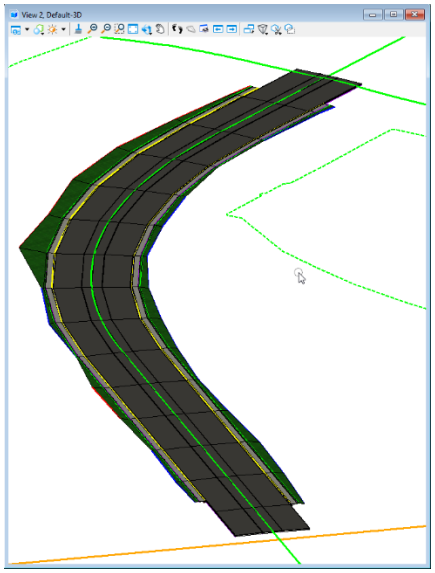
7. Repeat Steps 1 through 4 to set a point control for the **SR 61 L** corridor, with the following differences in the dialog:

   - *Control Description:* LT_EOP
   - *Point*: LT_PVT_EOP_OUT

8. For the Reference Feature, select from the drop down list or select the **LT__PVT_EOP_OUT** line on the **SR 61** corridor (inside) in the 3D view, as shown on the right.



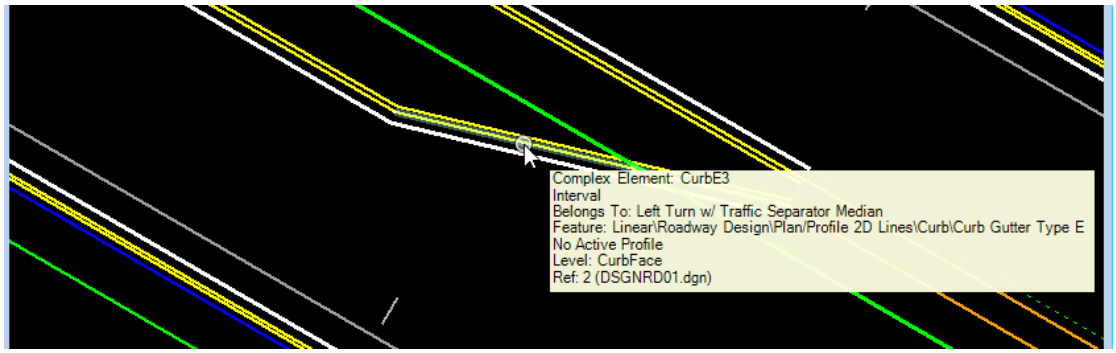
9. Repeat Step 6 to complete the point control. The model should look like below in the 3D view.



Exercise 4.5 Add Corridor References, SR61

Corridor References are related to the template points having a Horizontal Feature Constraint to control the location of the point on the corridor. They are 2D graphical Civil Features that need to be added to a corridor. For the SR61 corridor a selection of median Civil Features are used for template external references.

1. The SR61 template is designed to target Curb Gutter Type E lines in the median. Hover the cursor over one of the median lines to verify that it has the Feature Definition of Curb Gutter Type E.

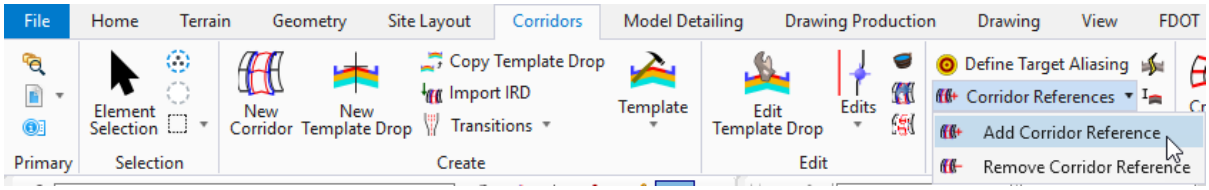


2. Create a selection set of the following 12 features in the plan view:

   - 2 – Pavement Asphalt EOPA lines in the median
   - 4 – Pavement Asphalt EOPA taper lines in the median
   - 2 – Curb Gutter Type E lines in the median
   - 2 – Curb Gutter Type E taper lines in the median
   - 4 – TS Conc Type I 4 ft Wide lines in the median

HINT Modeling the TrafSeparator level, do not add the Nose Radius Element to the Selection Set. This will be modeled in Chapter 9 with a 3D Civil Cell.

3. Use the *Corridors*, **Add Corridor References** tool.



4. Identify the **Corridor** *handle* and then data point to add the selected lines as listed above to the corridor.

5. Once the **Reference Lines** have been added, the Corridor will automatically process to include the new **Horizontal Feature Constraints**. The median features will come in several feet above the pavement, as intended on the template. This will be resolved in the next exercise.

Exercise 4.6 Variable Medians, SR61 Templates

The *FDOTConnect.itl* file contains some FPM Exhibit Templates which are delivered with variable medians included. The median can vary with the following conditions or component sets:

- Curb Median with or without Left Turns
- Crossovers at Intersections
- Traffic Separators with Left Turns

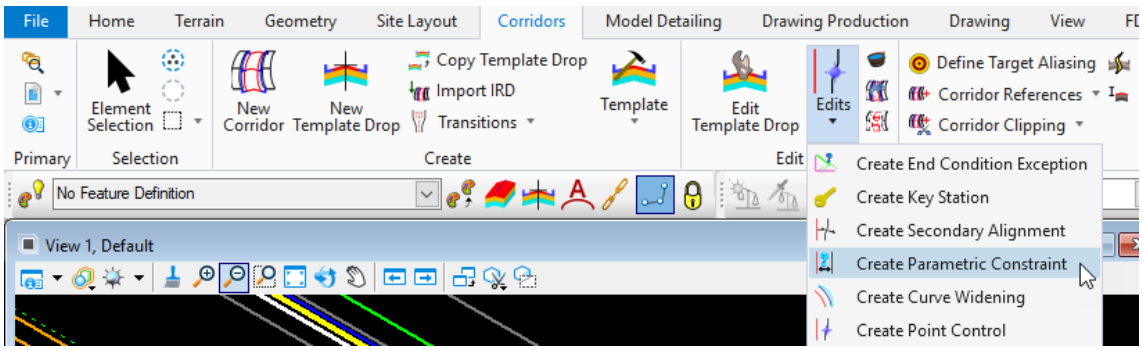
To properly operate the median condition templates, consider the following:

- The various median component sets have a parent end condition search lines that targets plan features; e.g. Curb Gutter Type E, Pavement Asphalt EOPA.
- Each of the median components sets are displayed ONLY if the target is found. This is by the Parent/Child relationship of the Template components.
- The LT and RT PGL Handles, or the LT and RT PGL In points, control the overall width of the median and can be modified to fit any project.
- Many of the median components have Horizontal Feature Constraints (HFC) defined to locate the 2D civil features and the horizontal range will need to be modified to fit the project.

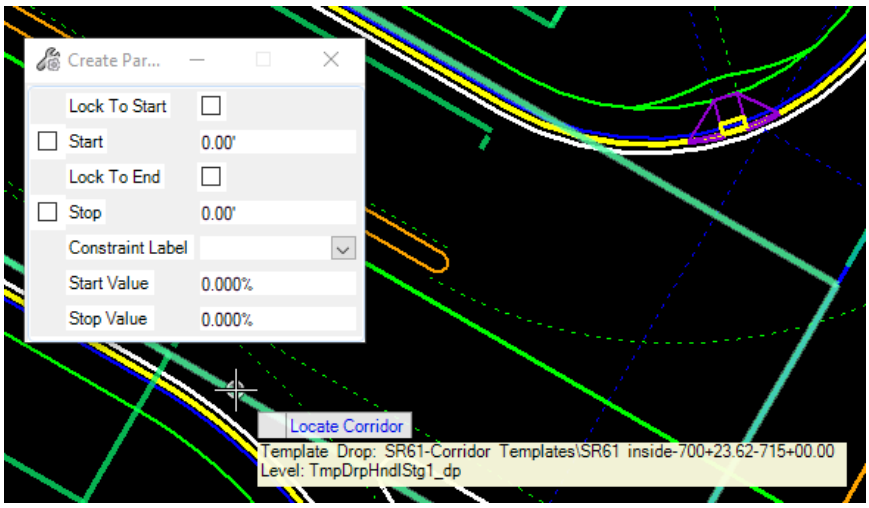
➢ *Add Parametric Constraint for Variable Median, SR61 Template*

The templates used have variable median conditions built within that needs to be set in place for the corridor.

1. Use the *Corridors, Edits*>**Create Parametric Constraint** tool.

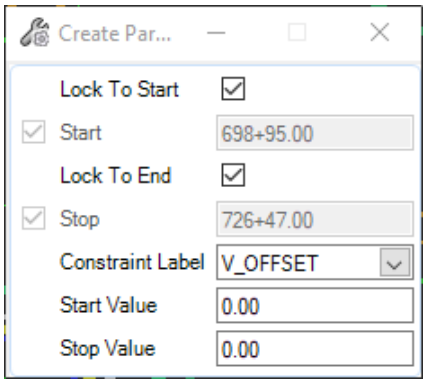


2. Identify the **Corridor Boundary** *handle*. Continue to define the Create Parametric Constraint dialog information.



3. Enter and accept the following for the **SR61 Corridor**:

Start Station	**Alt for Begin**
Stop Station	**Alt for End**
Constraint Label	**V_Offset**
Start Value	**0.0**
Stop Value	**0.0**



4. The variable median conditions are placed at the correct location vertically. This will ensure the median is at the correct elevation for the next exercise.

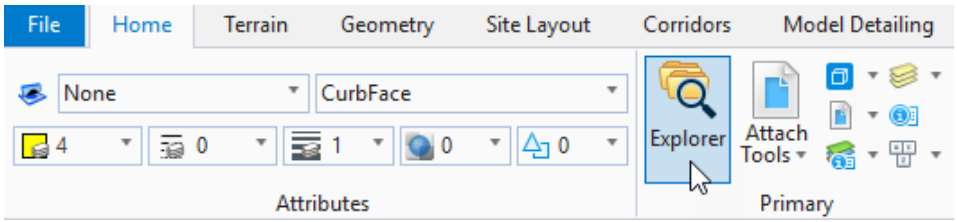
Exercise 4.7 Change Corridor Feature Definition, SR61

The FDOTConnect Workspace includes several Corridor Feature Definitions to help with various tasks for Design and 3D Modeling. Depending on the active Feature Definition, processing the Corridor will take longer.

To optimize model performance, it is recommended that designers wait to change the Feature Definition until later in the design process, as each definition is set up with multipliers that decrease the corridor interval spacing.

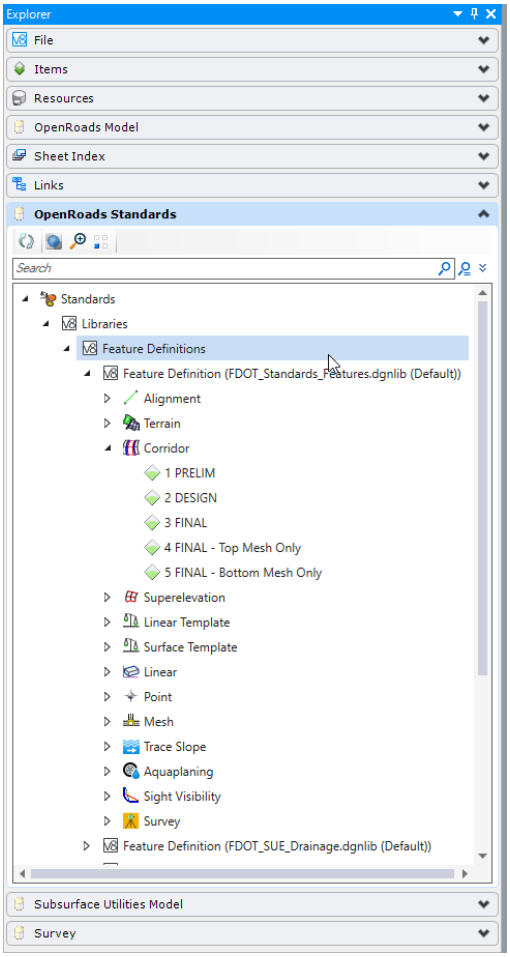
For example, the Design stage might be utilized for a 60% submittal, while the Final stage might be utilized for the 90% and final submittals.

1. Open the Explorer pane from the Home tab or with the **F11** *Function Key*.

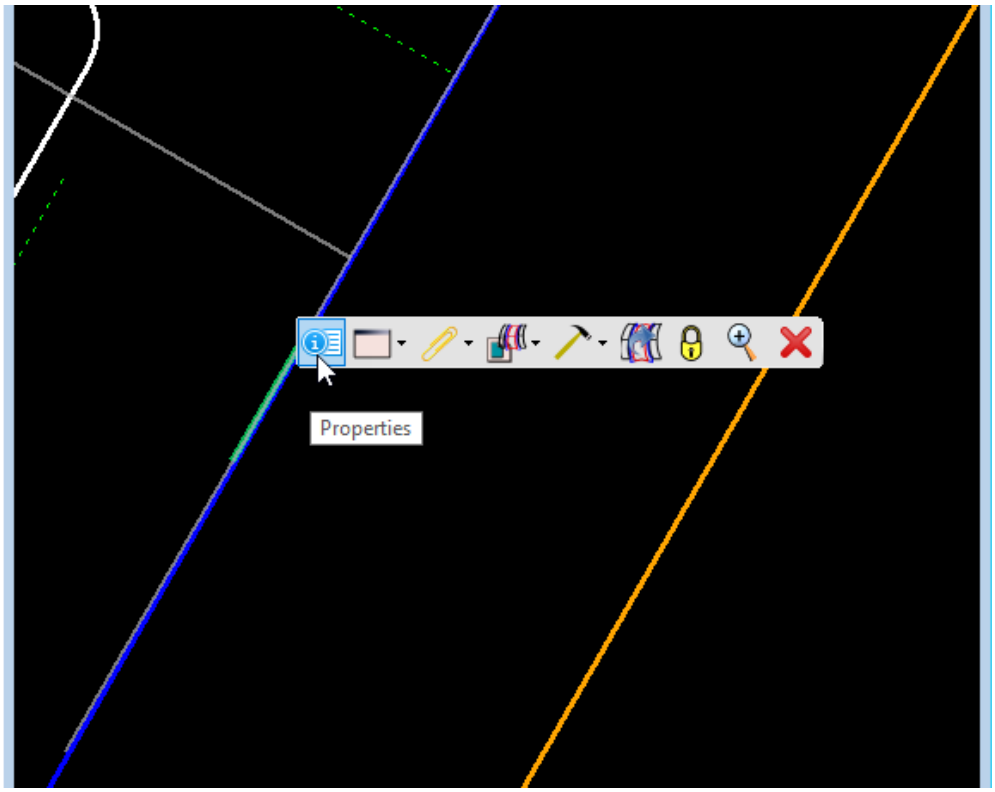


2. Select to expand the **OpenRoads Standards** section and expand the **Standards** option list.

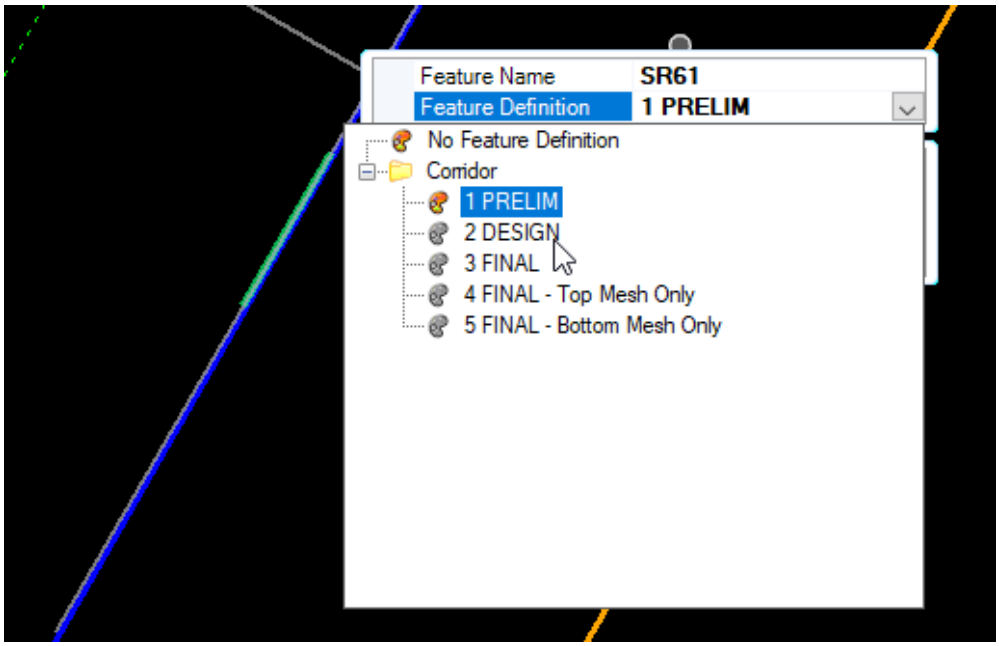
3. Expand **Corridor** under *Libraries* > *Feature Definitions* > *Feature Definition (FDOT_Stanrdards_Features.dgnlib (Default))*. These Feature Definitions are set up for various Design Stages.



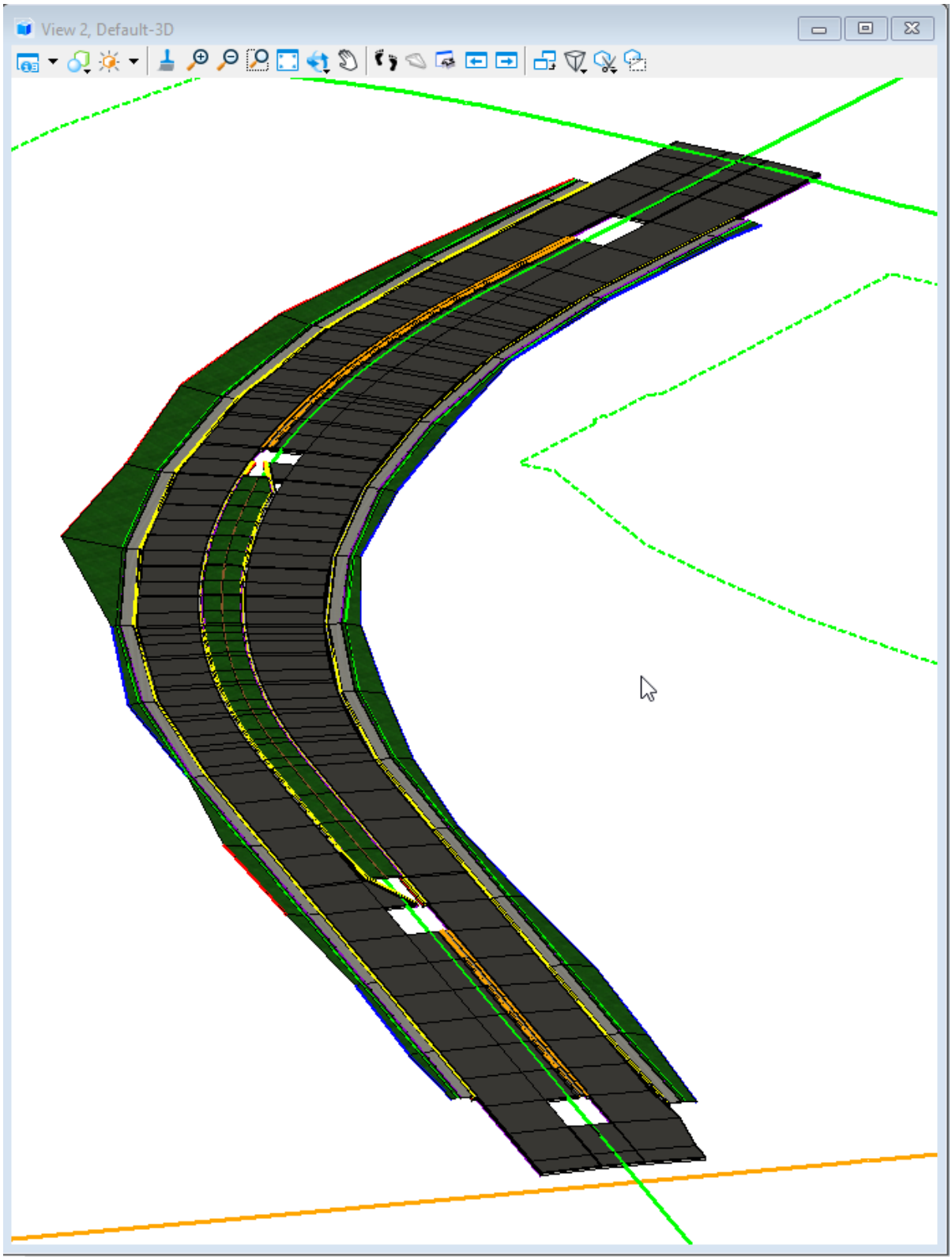
4. Select the **Handle** of the **SR 61** Corridor and locate the **Properties** icon when the menu displays.



5. Select the **Properties** icon and change the *Feature Defintion* from **1 PRELIM** to **2 DESIGN.**



6. The Corridor will re-process and the 3D Model will re-draw with a tighter interval. Notice that the outside corridors remain unchanged.



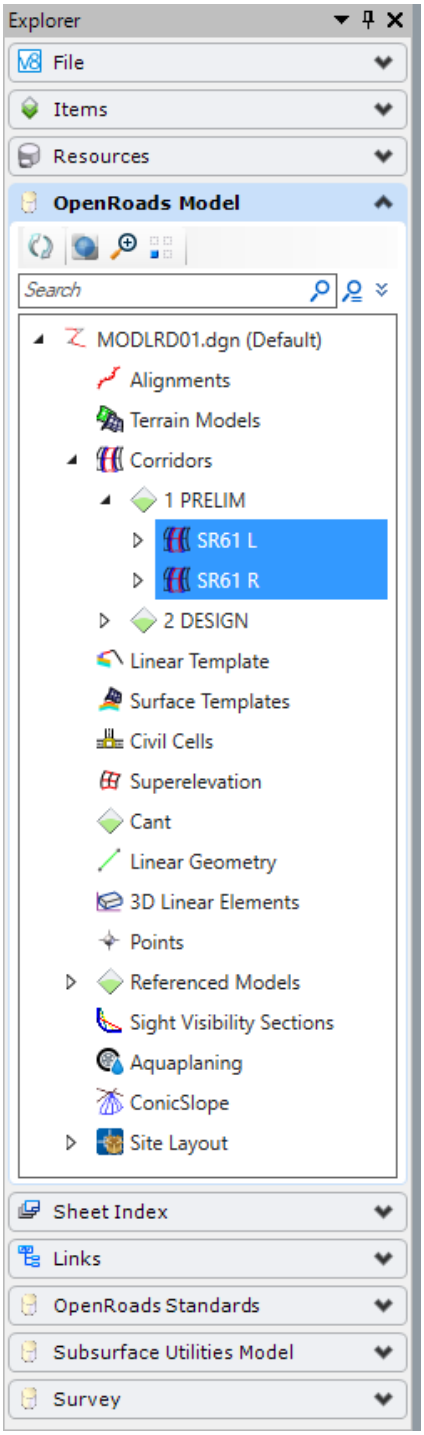
7. Expand the **OpenRoads Model** section of the **Explorer** window.

8. Expand **MODLRD01.dgn (Default).**

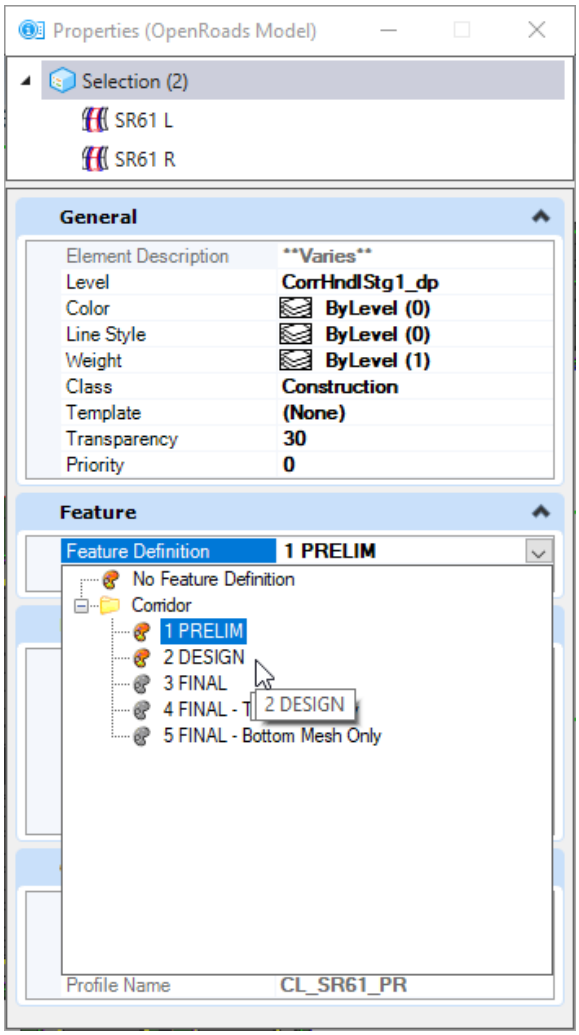
9. Expand **1 PRELIM** under *Corridors.*

10. Right click on SR61 L and select "Properties."

11. Hold down **Shift** or **Ctrl** and select SR61 R. The Properties window changes to show both Corridors selected.



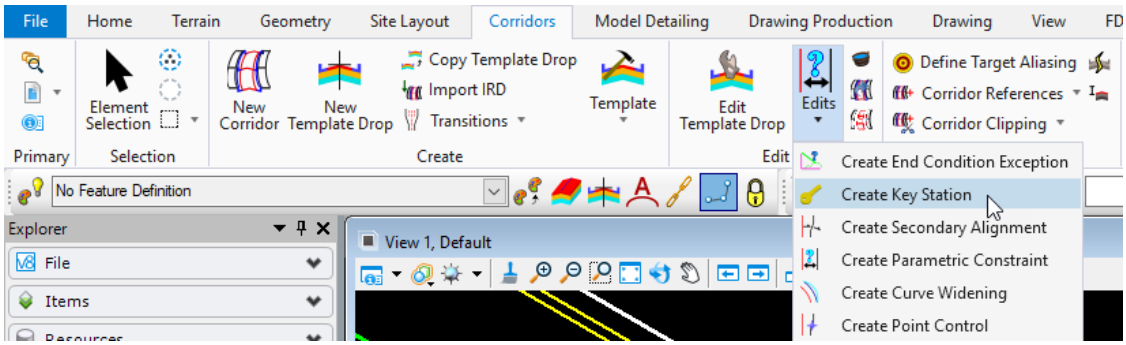
12. Change the *Feature Defintion* from **1 PRELIM** to **2 DESIGN** as shown below. The 3D models for the outside corridors should redraw with a tighter interval.



Exercise 4.8 Add Corridor Key Stations, SR61

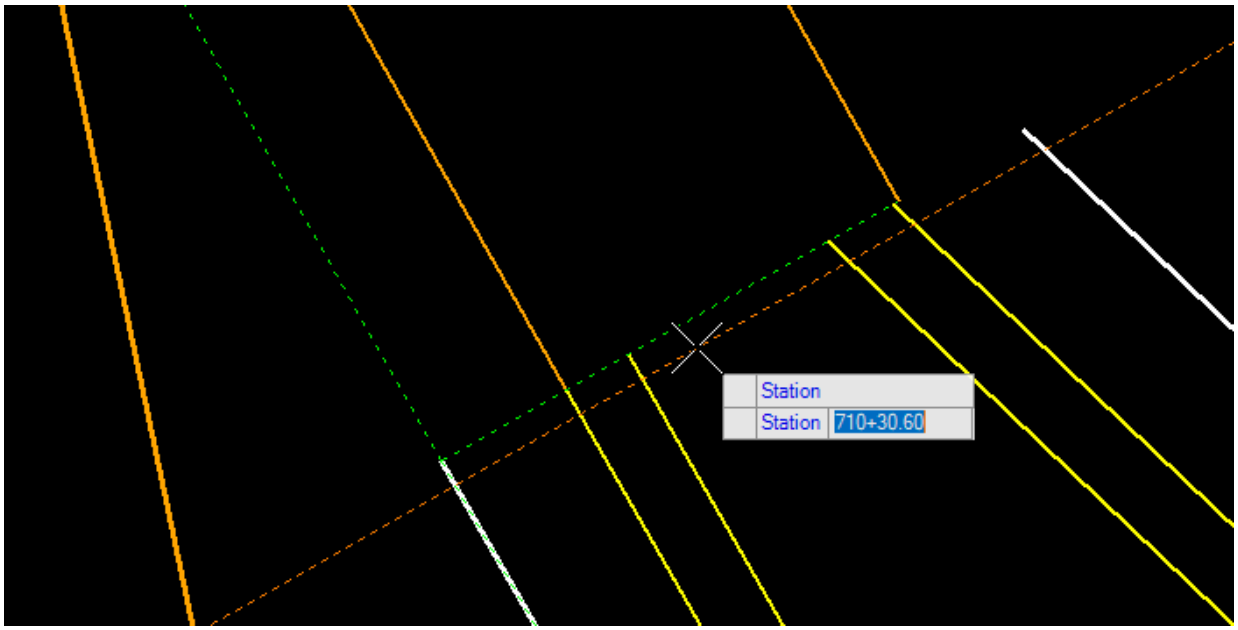
Create Key Station tool is useful to add stations that are not coincident with the template interval. When the median conditions change abruptly, it is desirable to include the station for processing. Otherwise the model may have holes or overlaps, which is not desirable when it is used to generate 3D Deliverables for Automated Machine Guidance (Refer to Chapter 10).

1. Use the *Corridors, Edits*>**Create Key Station** tool.



2. Identify the **Corridor Boundary** *handle* of the **SR61** Corridor.

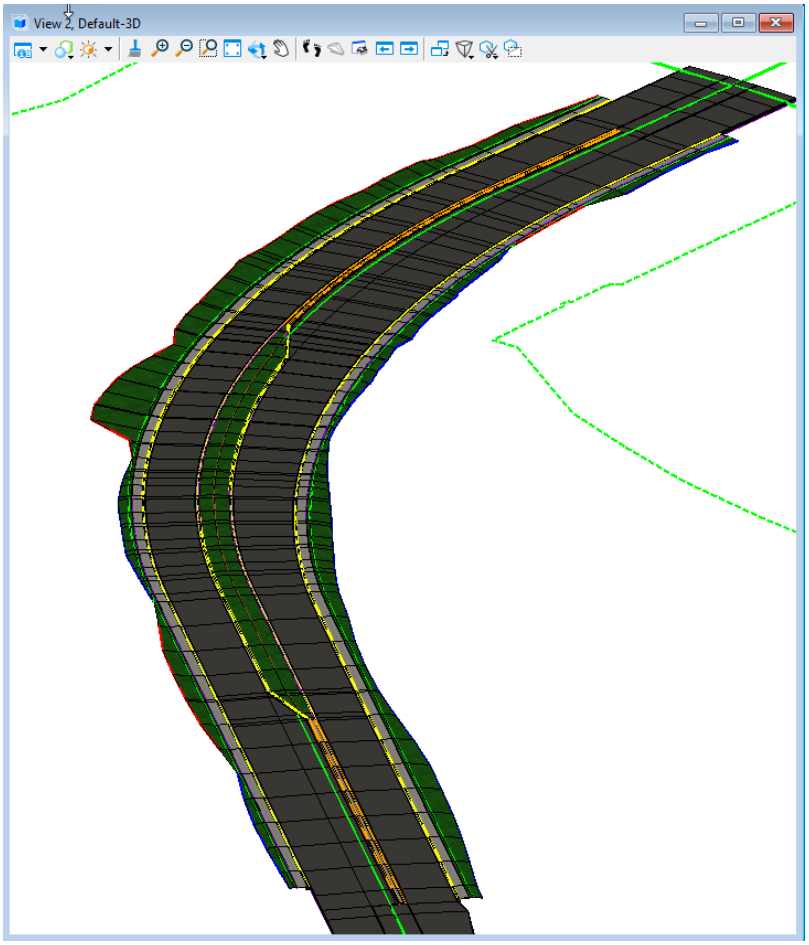
3. Use AccuSnap to locate the Plan View **CurbMedian / Traffic Separator** *division line.* Snap to a point on this line



4. Repeat these steps for both **Traffic Separator** locations in the *Plan View*.

5. Add Key Stations at other transition areas, including where the left turn lane transition begins. If snapping directly on the transition point does not work, sometimes a key station is needed immediately before and/or after the transition point in order to minimize the size of the hole.

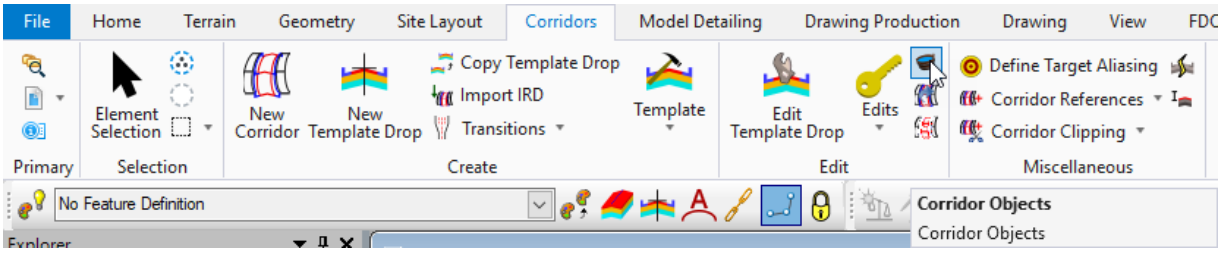
6. (Optional) Rotate the 3D View to a Top-down orientation, as it is sometimes easier to see where to snap to in the 3D view.



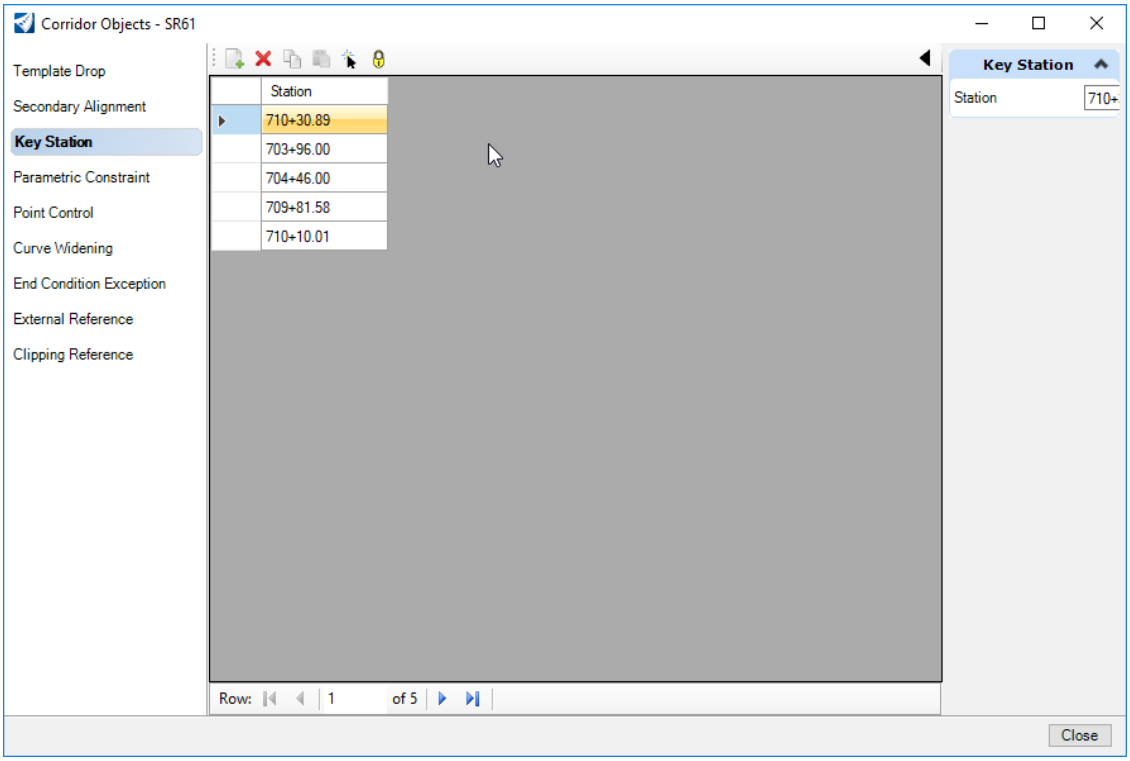
Exercise 4.9 Review Corridor Objects, SR61

The Corridor Objects dialog is a summary of all Corridor Modeling objects and provides an excellent method of managing data.

1. Use the *Corridors*, **Corridor Objects** tool.



2. Identify the **Corridor Boundary** *handle* to open the Corridor Objects dialog.



3. Review the various objects on the corridor. If too many key stations were added in the previous step, they can be deleted or modified in this dialog.

➢ *Additional Template Edits, SR61*

1. Add the sidewalk front and back lines as corridor references to the respective outside corridors.

2. Change the *sidewalk buffer* from **3 feet** to **0 feet** on both roadways.

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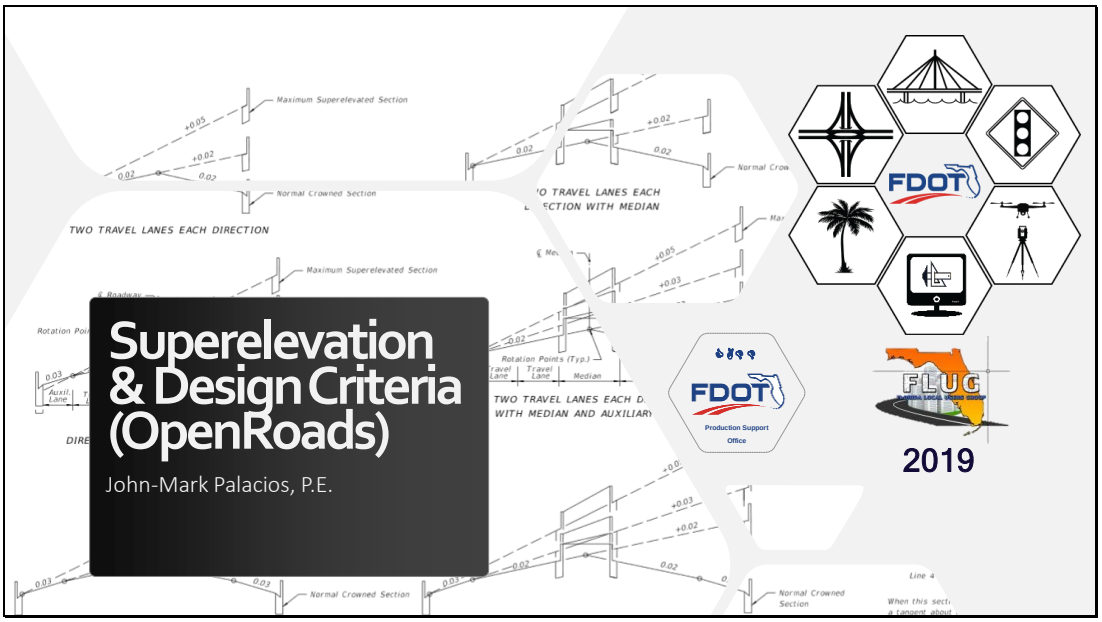
5 SUPERELEVATION

OVERVIEW



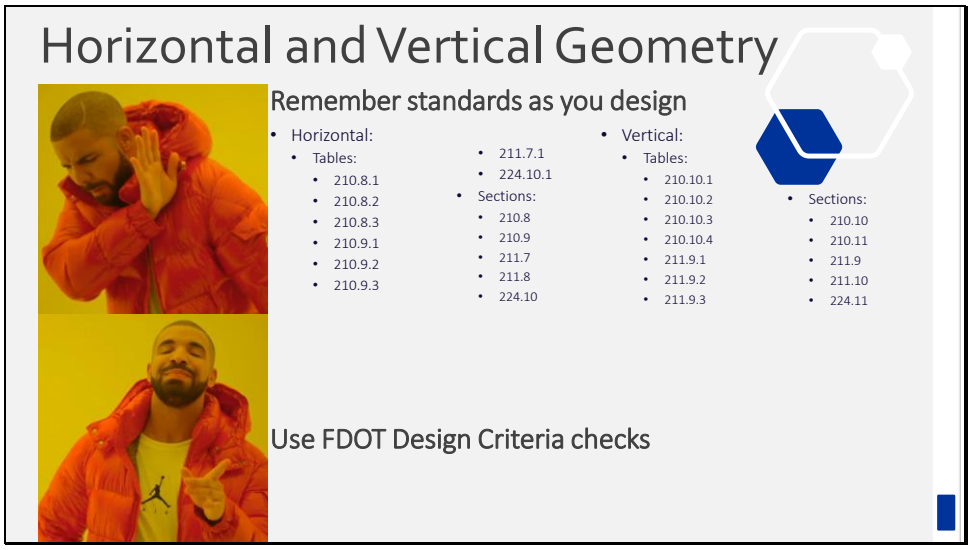
Superelevation rotates the pavement cross slopes through a curve so that vehicles can maintain stability and speed while on a turning roadway. Elevation banking is applied to help offset centrifugal force. Superelevation standards also define the transition length required to rotate from a normal crown to a fully banked curve and back again.

Superelevation can be calculated in two ways:

- *Rules-based* – using a set of preferences (SEP or SRL files) the station and associated cross slopes of the transitions are based on design speed, curvature, and other design parameters. As the design progresses and parameters change (i.e., design speed exceptions) superelevation can be reprocessed to the revised parameter(s).
- *Import* – using a comma separate values (CSV) file to import the station and associated cross slope of each transition. In this option, the rules are not utilized; the data is simply applied to the superelevation lanes.

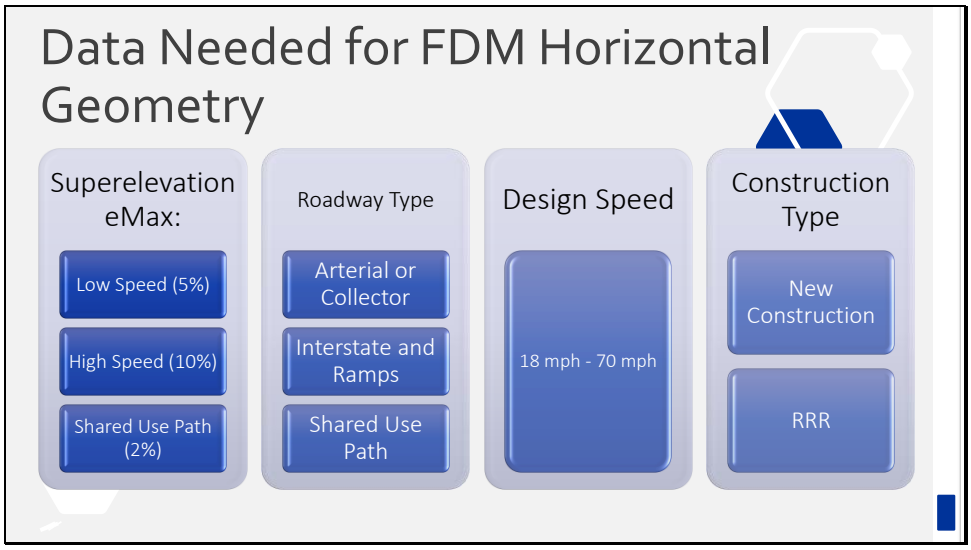
The result of superelevation is a DGN file of graphic superelevation lanes with cross slope attributes. This file can be referenced to a corridor model and associated, so the superelevation transitions are incorporated into the corridor model. The superelevation data can be in its own DGN file, or can be drawn into any of the other project DGN files with geometry, corridor, etc.

HORIZONTAL AND VERTICAL GEOMETRY



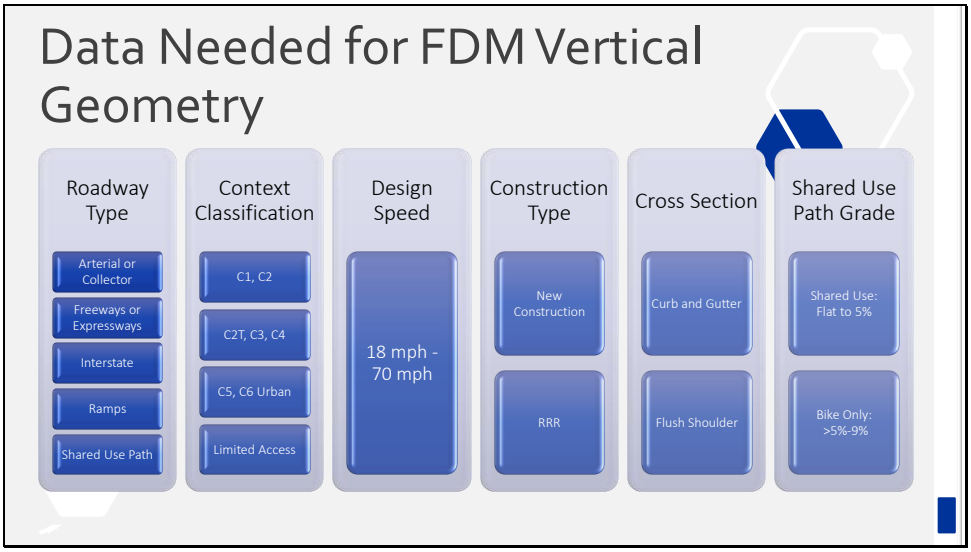
- Photo source: Director X. (2015). *Hotline Bling*. Retrieved from https://www.youtube.com/watch?v=uxpDa-c-4Mc

DATA NEEDED FOR FDM HORIZONTAL GEOMETRY



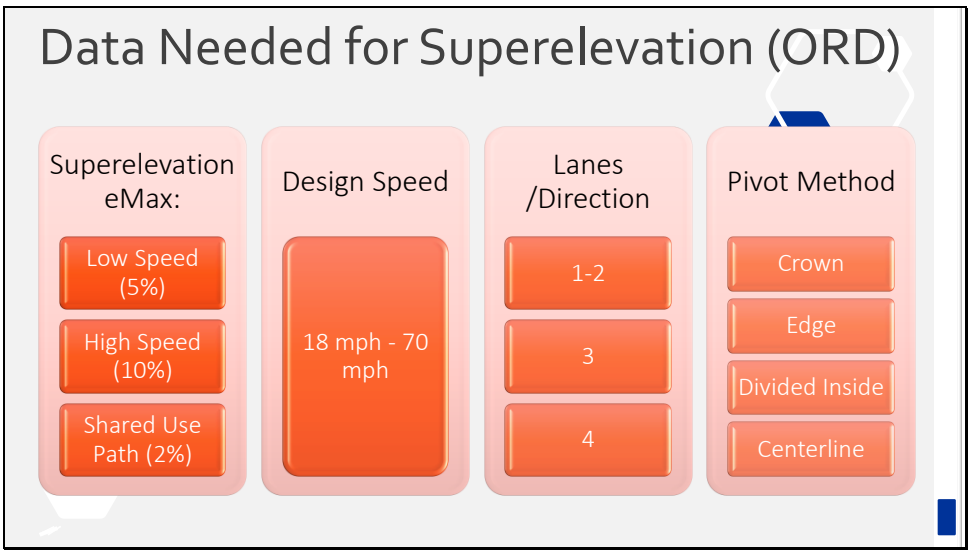
- These are the data inputs you need to begin designing horizontal geometry.
- For roadways there are only two possible max superelevations, and these depend on the speed classification of the roadway. Basically, the FDM defines low speed as 45 mph and below, and high speed anything faster.
- Roadway type is determining which chapter of the FDM the software will be using: 210, 211, or 224.

DATA NEEDED FOR FDM VERTICAL GEOMETRY



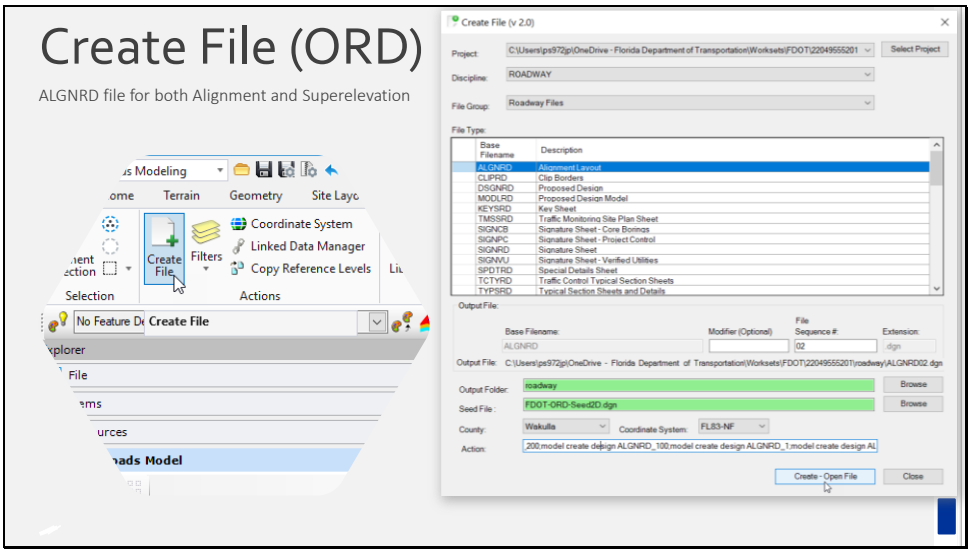
- These are the data inputs you need to begin designing vertical geometry
- For the Shared Use Path criteria, we need the controlling grade (typically the steepest grade).
- We had to make some assumptions and use some work arounds since ORD and Civil 3D are built primarily around the needs of designing a roadway.

DATA NEEDED FOR SUPERELEVATION



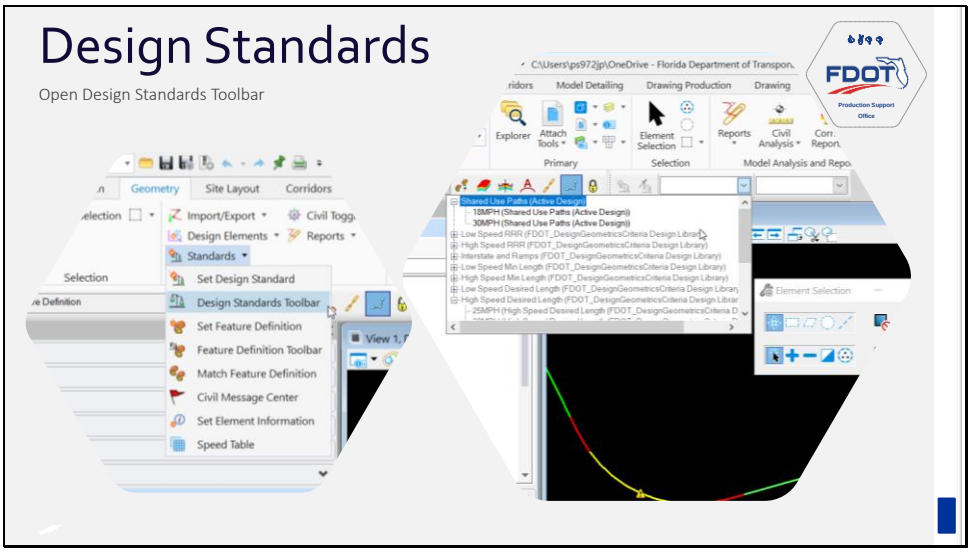
- Shared Use Path would typically be one of the “Edge” methods (inside, outside, left, right)
- Undivided roadway would typically be Crown or Centerline
- Divided roadway might be “Divided Inside”

CREATE FILE



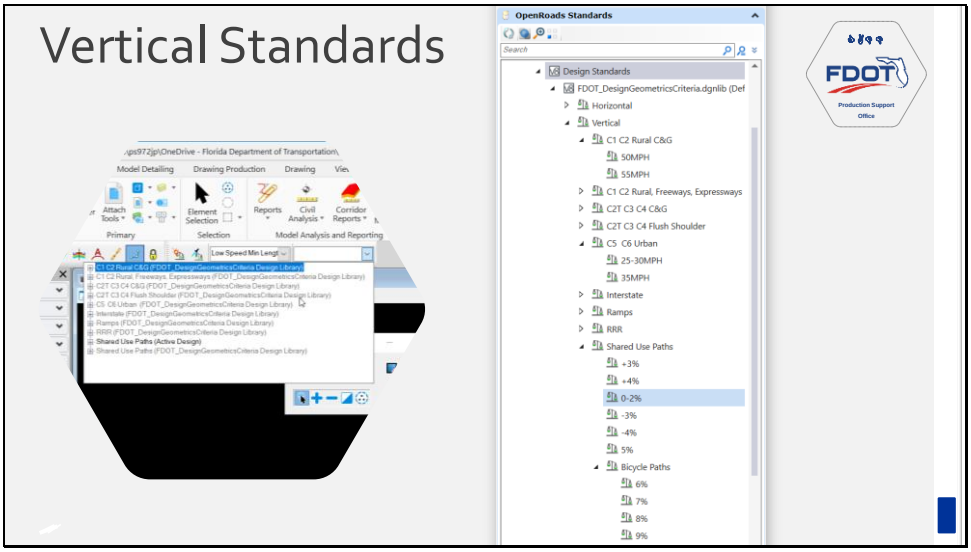
- Superelevation goes in the Alignment file now.

DESIGN STANDARDS



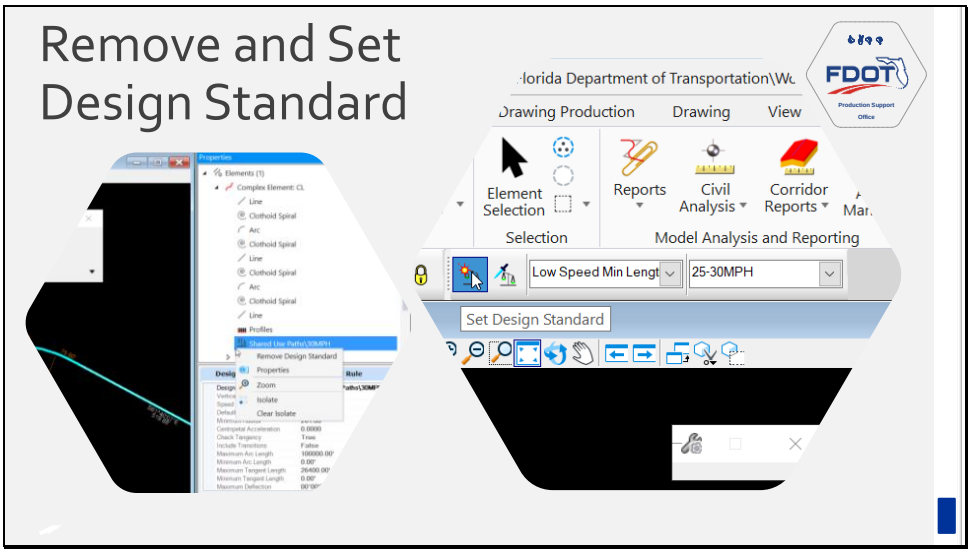
- For horizontal alignment, you just pick the category and the appropriate design speed.

VERTICAL STANDARDS



- Notice how, for the vertical standard for roadway, you select basically the Context Classification and the design speed, but for Shared Use Paths you select the grade. Due to the limitations of the software, we can't show a warning for every scenario. If you're using this tool to do an alignment in ORD for a shared use path, I would recommend double checking the values and not relying too heavily on the warnings. Of course, that's good practice in general.
- You will have to pick whatever steepest grade applies, and if you want you can break the alignment up with different standards whenever a different profile grade applies. In general, the steepest downhill grade applies.
- Select the design standards, then you can toggle it as the active design standard before drawing any alignments.

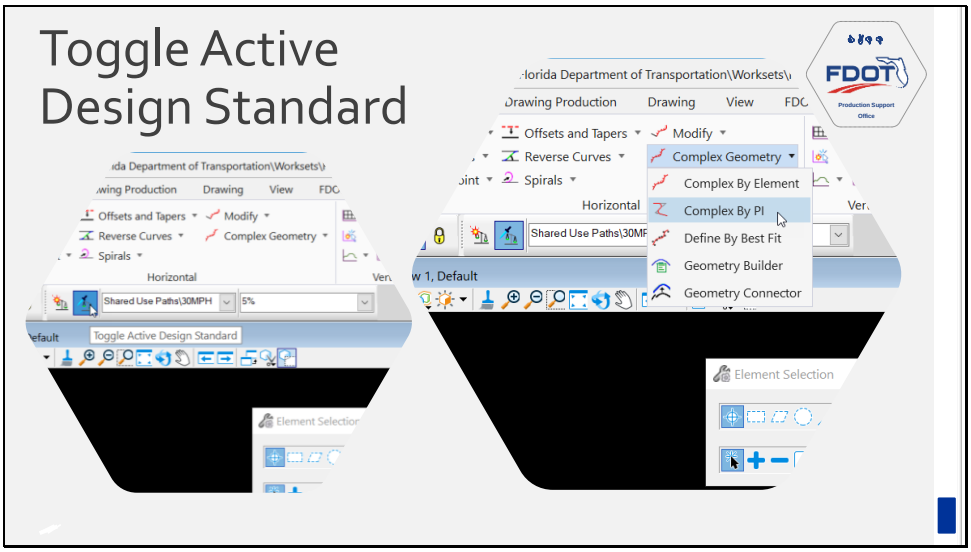
REMOVE AND SET DESIGN STANDARD



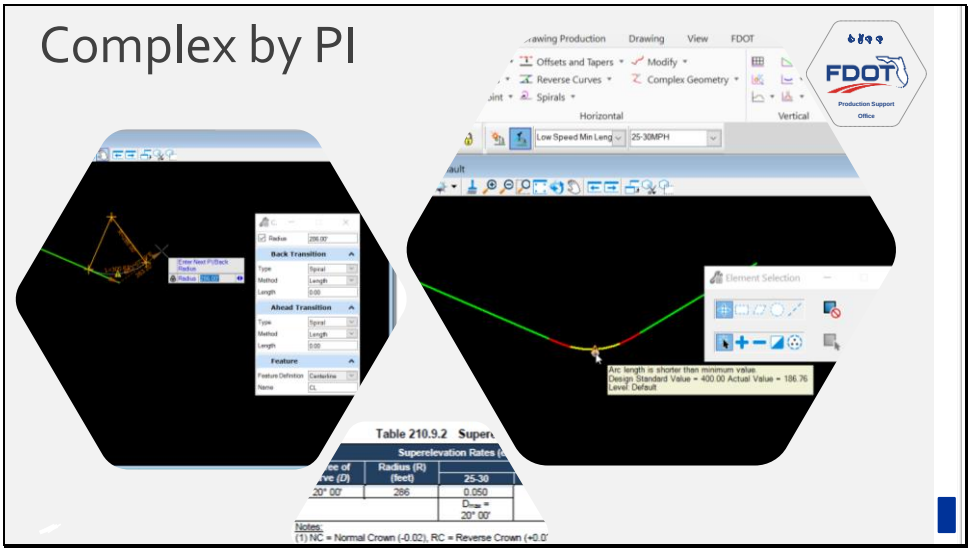
- The first button in the toolbar sets the standard for an existing alignment. If your alignment was already drawn with an active design standard, you used to be able to change the design standard without issue.

- In testing I have seen ORD fail to totally overwrite the standards doing it that way, so I would recommend removing the existing design standard first. Expand out all the dependencies to make sure there is nothing attached to individual lines or curves, either.
- Once you have no design standard attached, select "Set Design Standard" in the Design Standard Toolbar, and then pick the alignment.

TOGGLE ACTIVE DESIGN STANDARD

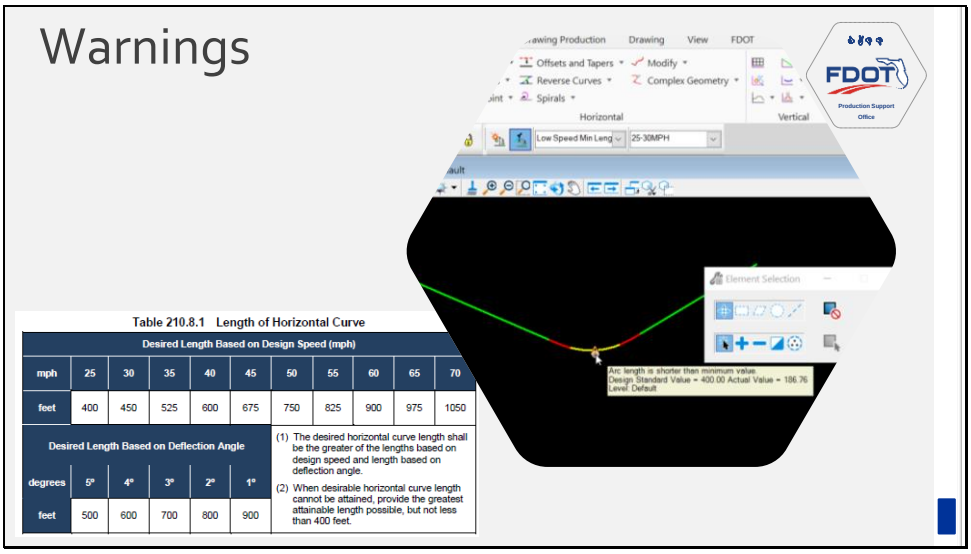


- Can run Complex by PI tool and it will automatically put in the radii. Select from Geometry tab, Horizontal section, choose Complex.



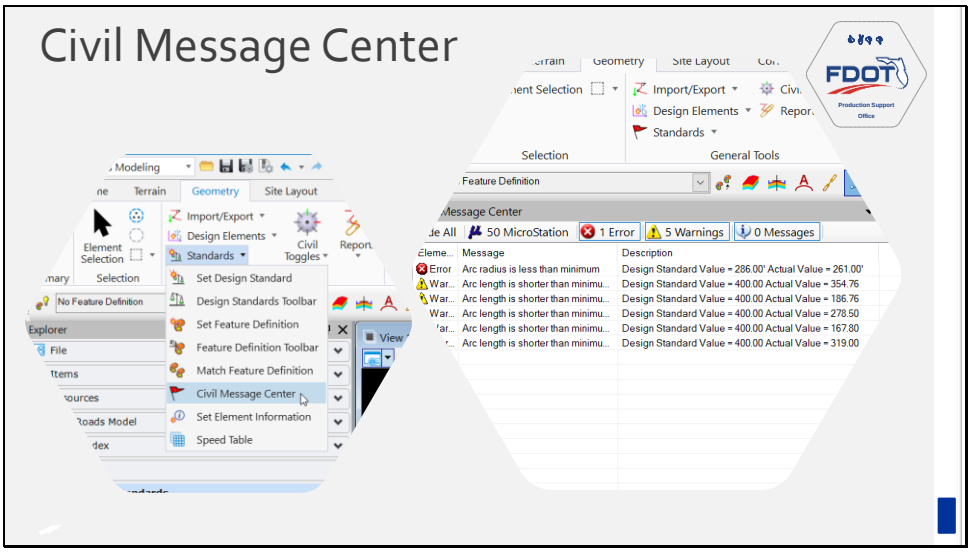
- You can see in this table that it is automatically putting in the minimum radius for the superelevation rate, 286'

WARNINGS



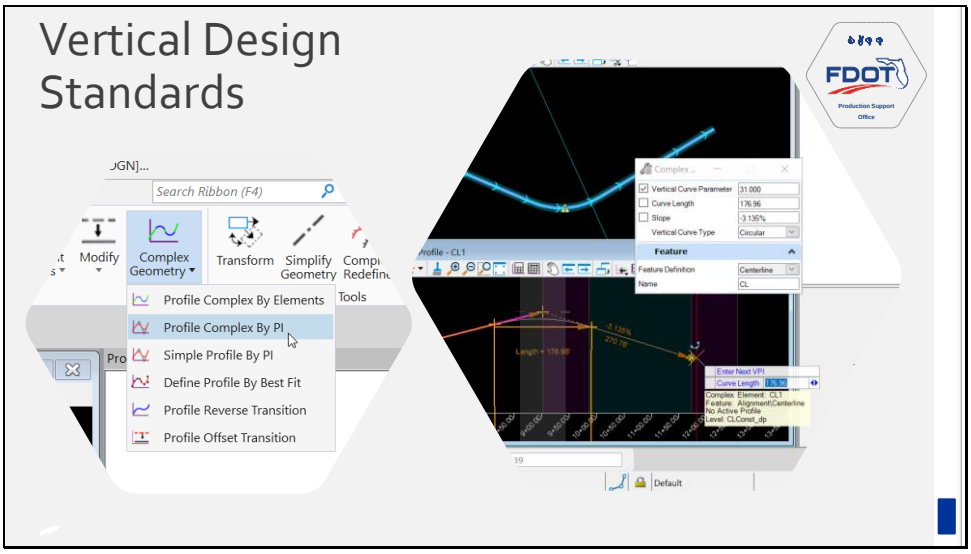
- But--see the warning symbol?
- Warning symbol is for the arc length being shorter than the minimum value.
- The table to the right shows the desired curve lengths, but the minimum is 400 ft.
- If you use the "Desired curve length" horizontal standard, it will pick based on this standard. I would recommend using the "Desired Length" standards first, and then if you can't meet the curve lengths due to constraints on your project, you can change your design standard to the "Min length" standard

CIVIL MESSAGE CENTER



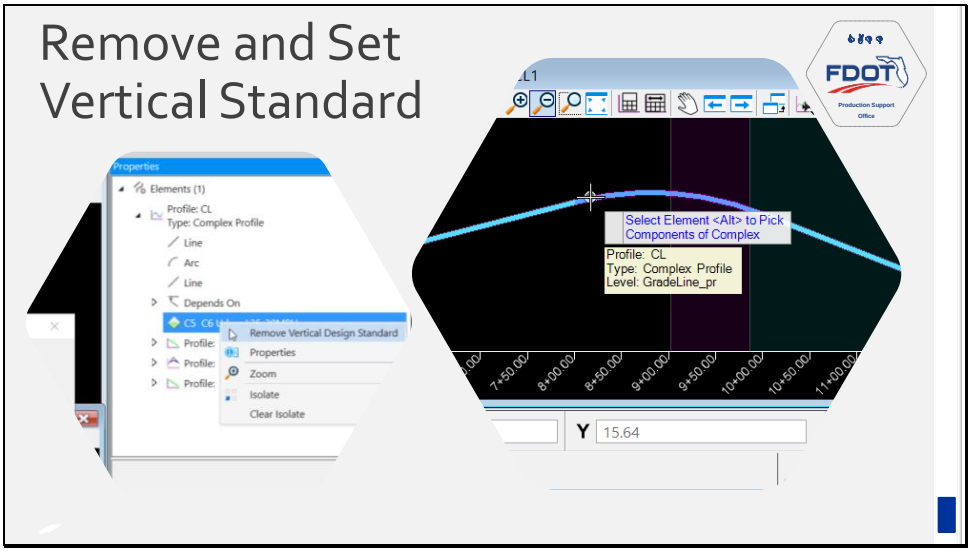
- Hide the MicroStation notification and just display the warnings to see violations of horizontal geometry standards
- Changing geometry is the same as it was in SS4, I won't cover that.

VERTICAL DESIGN STANDARDS



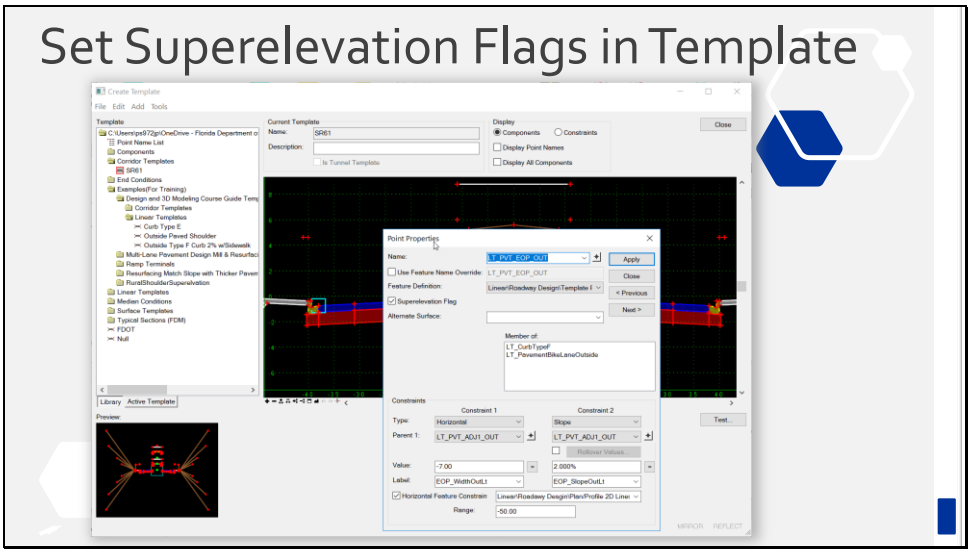
- If you want to draw a new profile, make sure you have a vertical standard selected and Toggle Active Design Standard. Also, open a profile model for the alignment.
- Then you can use the "Profile Complex by PI" tool in the Geometry > Vertical section and it will put the minimum K value in as you draw it.
- Error messages work similarly as for horizontal geometry.

REMOVE AND SET VERTICAL STANDARD



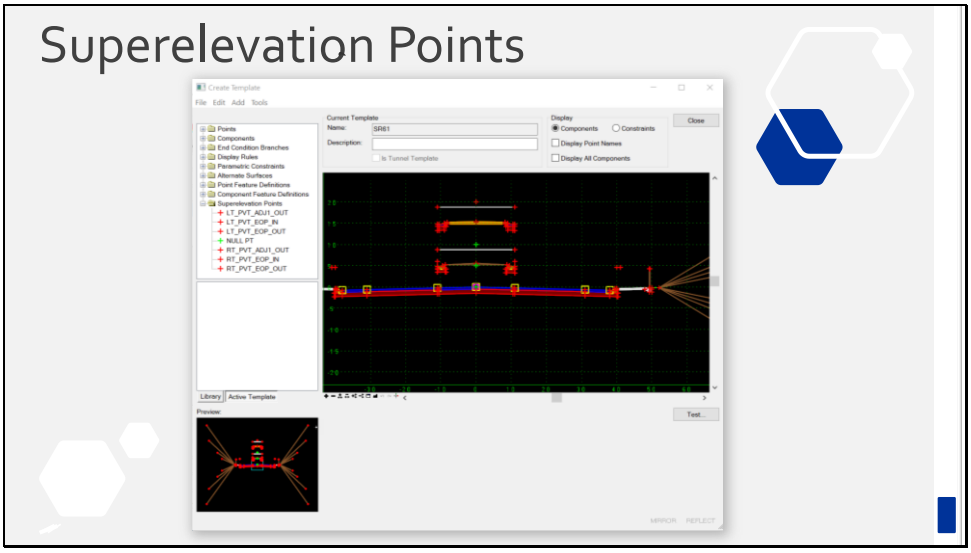
- Apply standard to an existing vertical alignment
- Remember to Remove existing standard first, then set design standard and pick the profile as on the right

SET SUPERELEVATION FLAGS IN TEMPLATE



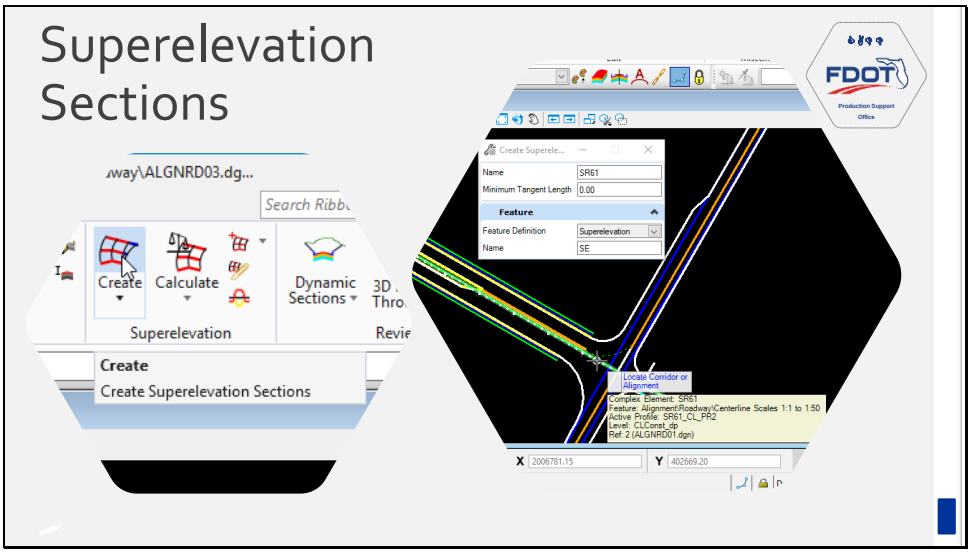
- Now we're skipping ahead, you need your corridor model created before applying superelevation.
- In the SS4 training we could get by with setting superelevation flags after calculating superelevation, but in ORD best practice is to set them ahead of time. This will allow us to use one of the new features I'm going to show you. Before creating superelevation lanes, you will want to make sure to set the Superelevation Flags accordingly by lane. Be sure to synchronize with the template library if needed.

SUPERELEVATION POINTS



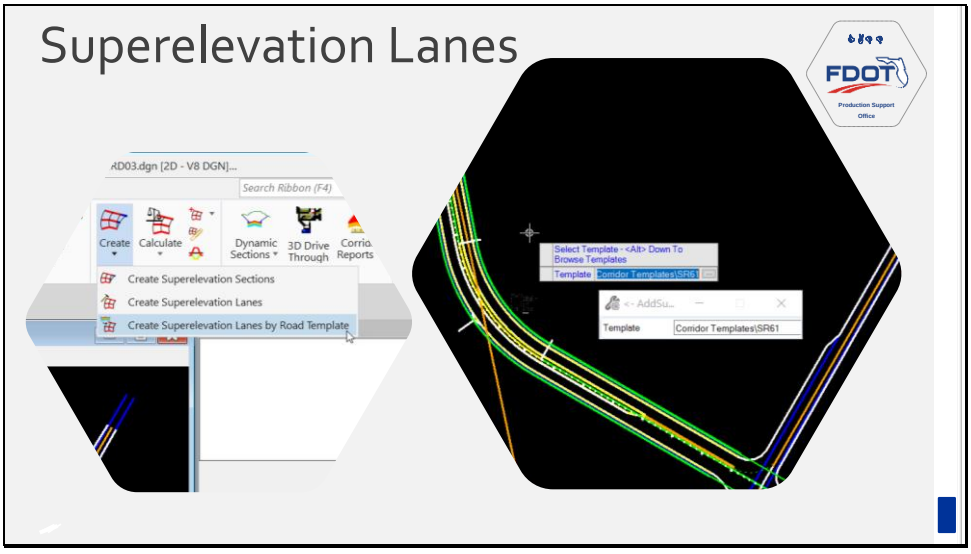
- If you're going to use superelevation by lanes, you can go to "Active Template" and expand "Superelevation Points" to see all the points you have turned the superelevation flags on, which ORD will use to determine the lanes.
- There are several new pivot points available in ORD, and to take advantage of them for a divided roadway you'll want to create a null point on the centerline that the others are tied to, so the slope can be adjusted from there. Just use a vector offset

SUPERELEVATION SECTIONS



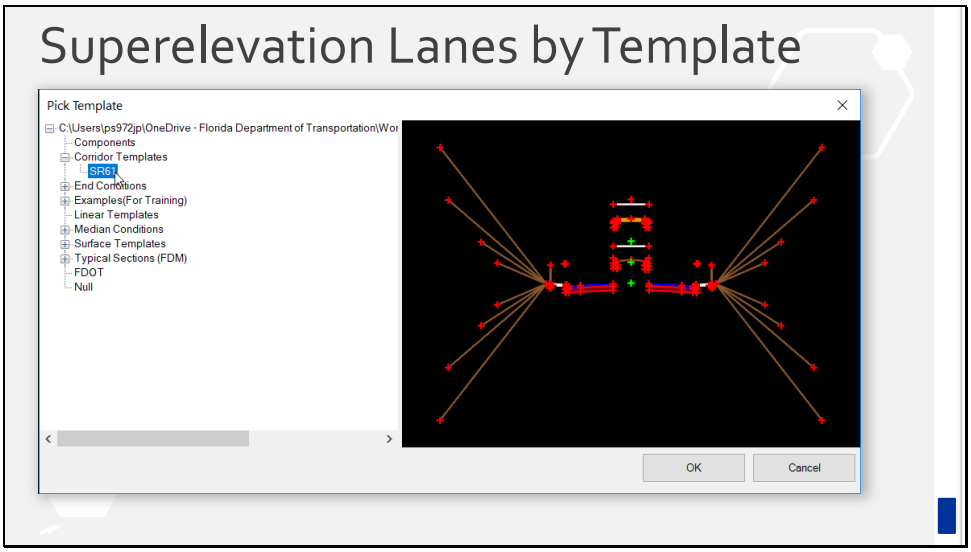
- Select Create in the Superelevation section in the corridors tab.
- Select alignment
- Name and give the Superelevation feature definition.
- Minimum tangent length can split it into multiple sections (ie if you have multiple design speeds) based on the distance between curves.
- Just like in SS4 it goes straight into the create superelevation lanes tool

SUPERELEVATION LANES



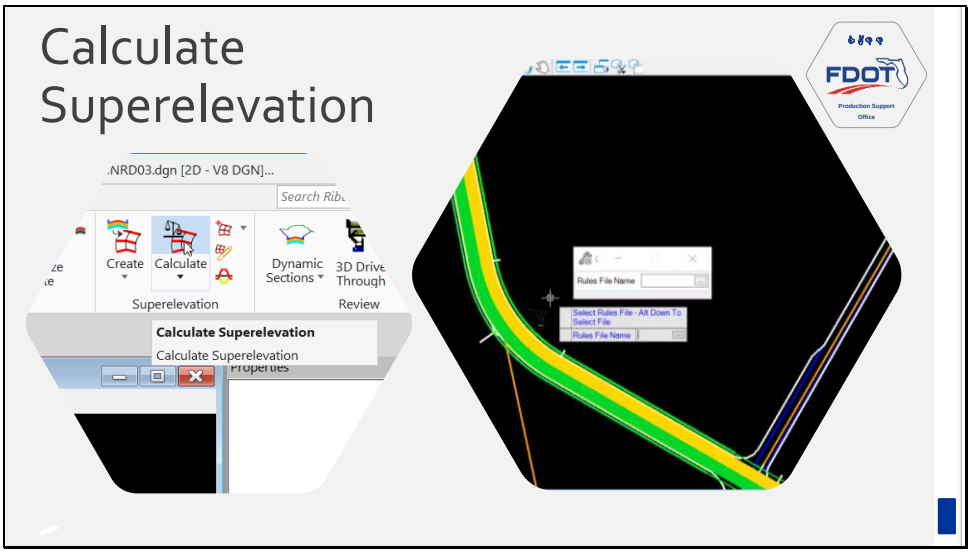
- New feature lets you select your template in order to create superelevation lanes in accordance with the lanes in the template.
- Can use context menu on sections or select from Superelevation section in the Corridors tab of the ribbon
- Choose create by template and it will automatically pick up points based on how your template is set up

SUPERELEVATION LANES BY TEMPLATE



- Pick template

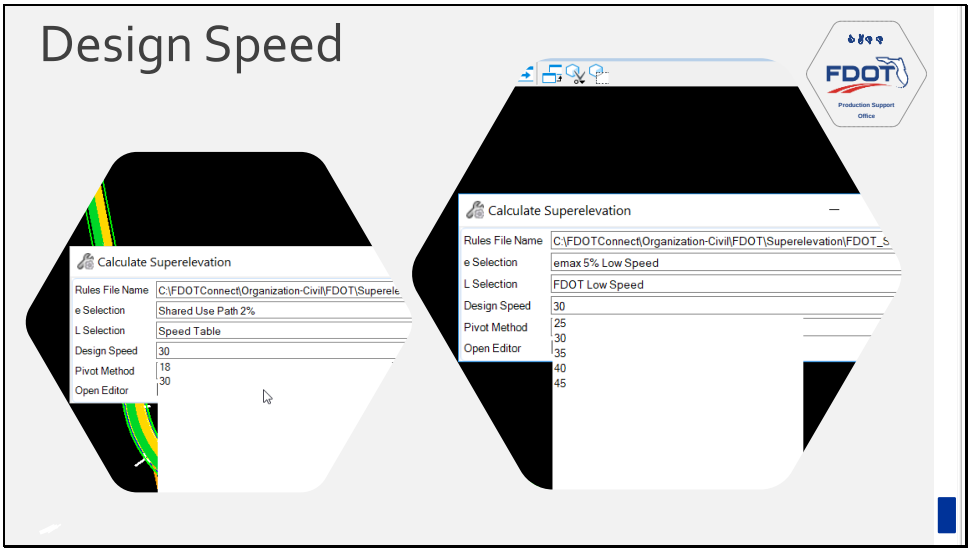
CALCULATE SUPERELEVATION



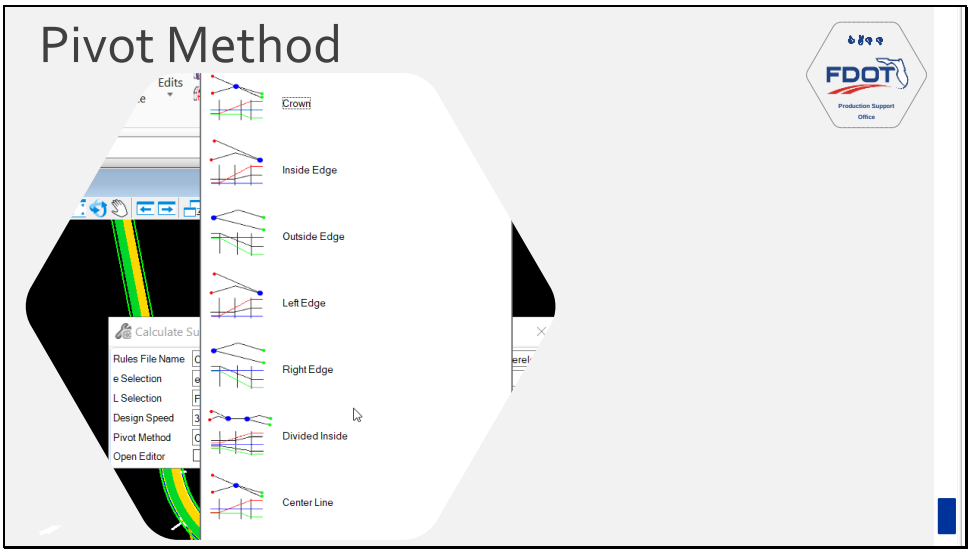
- Go to Corridor tab, Superelevation section. Click “Calculate.”
- Select FDOT superelevation rule file

- Select appropriate settings, e selection is “Low Speed,” “High Speed,” or “Shared Use Path”

- For Shared Use Path, select “Speed Table” under “L.”
- For High Speed you need to know the lanes
- Design speed varies based on e selection. For high speed we have 30-70

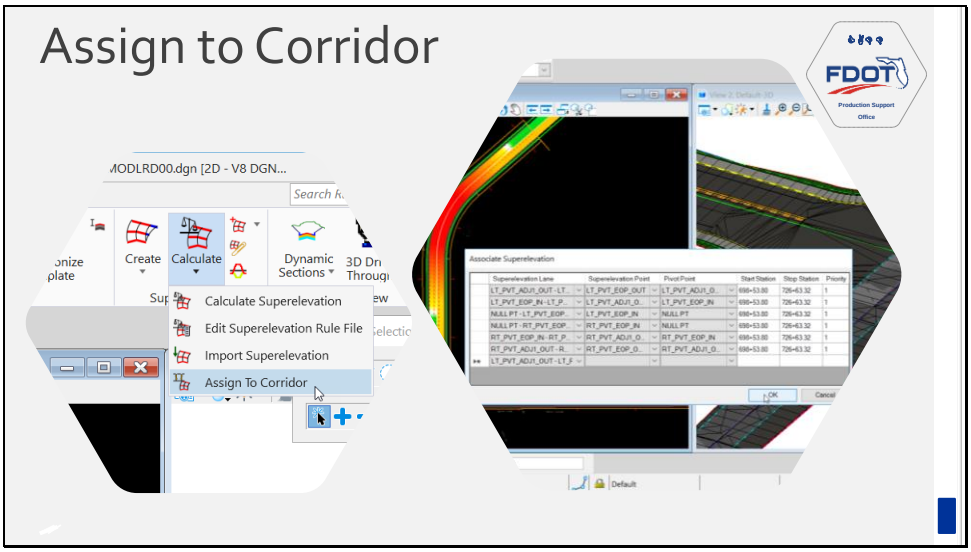


- For Shared Use Paths we have 18 and 30, and for Low Speed we have 25-45

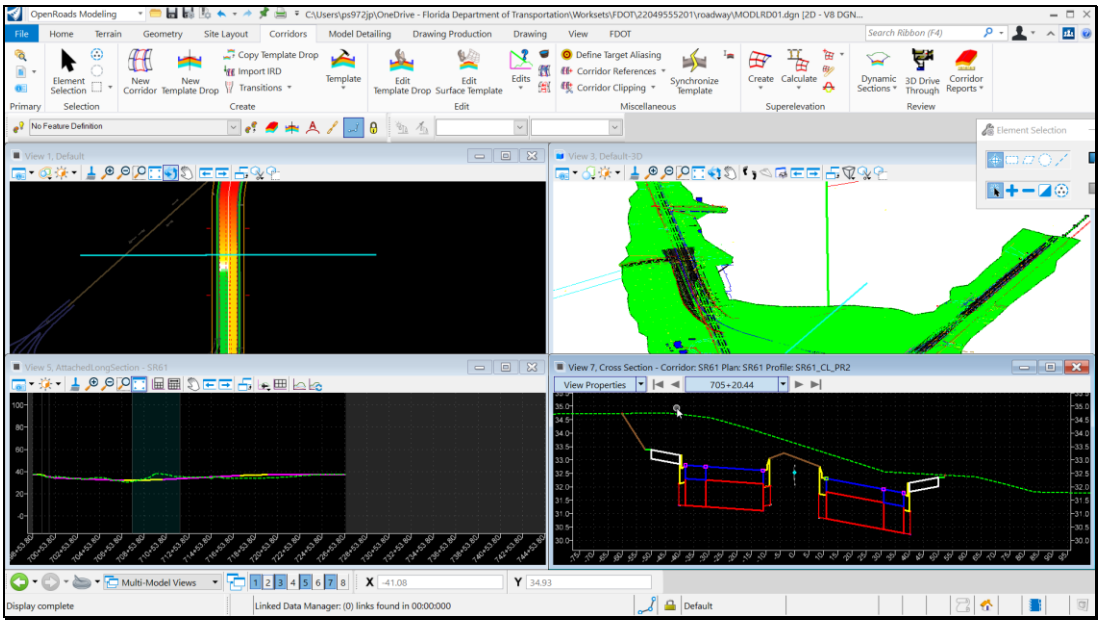


- Here are the new pivot methods. Those should be pretty self-explanatory—just remember that your template needs to be set up in a way that allows for it
- You can optionally open the superelevation editor when complete. The editor is the same as it was in SS4, so I'm not going to go over that part. But you can create a superelevation report to export the superelevation to a .csv file, then import it through the editor. This allows you to make corrections or calculations in Excel if you want to double check that the numbers meet the standards.

ASSIGN TO CORRIDOR



- Go back into your model file. Make sure you reference in the superelevation model from the alignment file into the the 2D model
- From the Corridors tab, Superelevation section, select “Assign to Corridor.”
- Select the Superelevation section and then the corridor, Verify the points in the dialog, and it should process when you click OK.



- Open a cross section view and verify that the superelevation has been applied

SUMMARY


Summary
• Applicable Standards
• Data for FDOT Workflow
• ORD Design Standards & Superelevation
• Alignment
• Superelevation
FDOT
Production Support Office
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6 KEY SHEET

OBJECTIVES

- Create a Key Sheet DGN File
- Setup Key Sheet with All Necessary Information

KEY SHEET

The Key Sheet is defined as the first sheet in the contract plans. The Key Sheet describes the project, the contents of the plans, and identifies those responsible for preparing the plans. All requirements for the Key Sheet, can be found in ***Part 3, Chapter 302*** of the ***FDOT Design Manual (FDM)***.

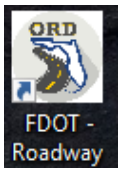
EXERCISE OVERVIEW

Exercise 6.1 Creating the Key Sheet

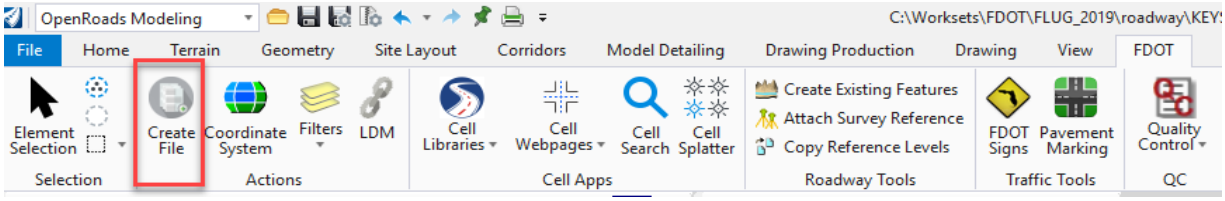
In this exercise, the Key Sheet DGN file will be created, the sheet will be placed with a map, and all of the necessary information will be added to the sheet.

1. Using the FDOT - Roadway icon on your desktop, open the MicroStation design file:

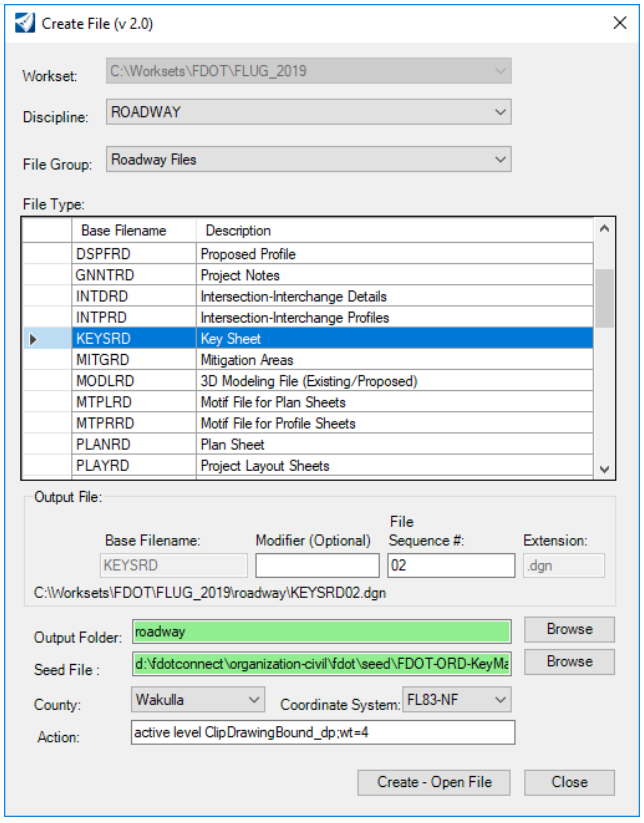
   C:\Worksets\FDOT\FLUG_2019*_BlankFile.dgn*



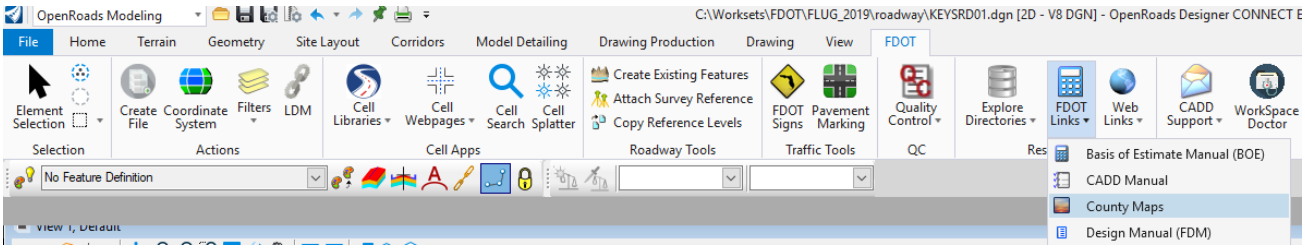
2. On the OpenRoads Modeling Workflow, select **Create File,** from the **FDOT** Tab



3. The Create File (v 2.0) dialog displays. On the Create File dialog set the *Discipline* to **Roadway** and *File Group* to **Roadway Files.** From the File Type list, select KEYSRD. On the Output File section of the dialog, be sure to set the County to Wakulla. Once everything is set up to match the image below, click **Create – Open File** to create and open the Roadway Key Sheet file. Click **Close** to close the Create File (v 2.0) dialog.

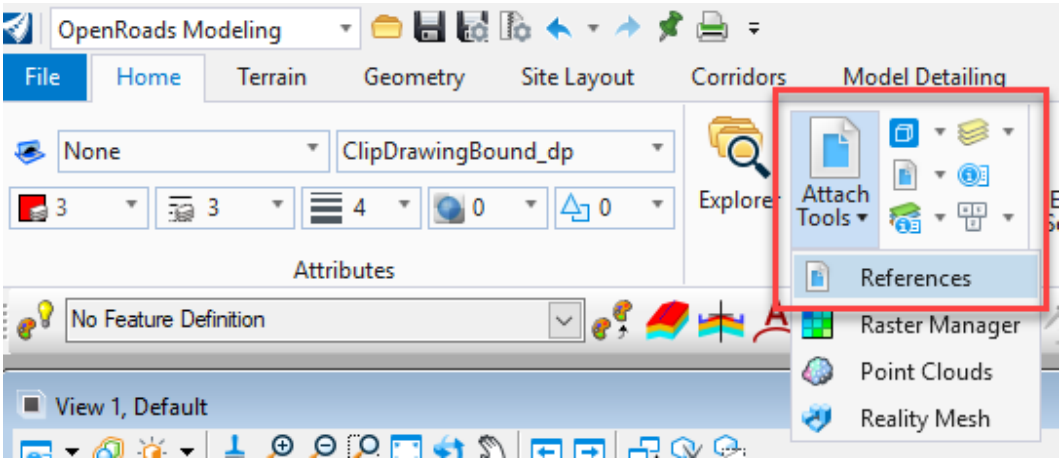


4. Once in the file, download the PDF county map using the County Maps link on the FDOT Tab. **FDOT Links>County Maps.** Scroll to Wakulla and download the Waku-c.pdf to the rwmap folder within your workset.

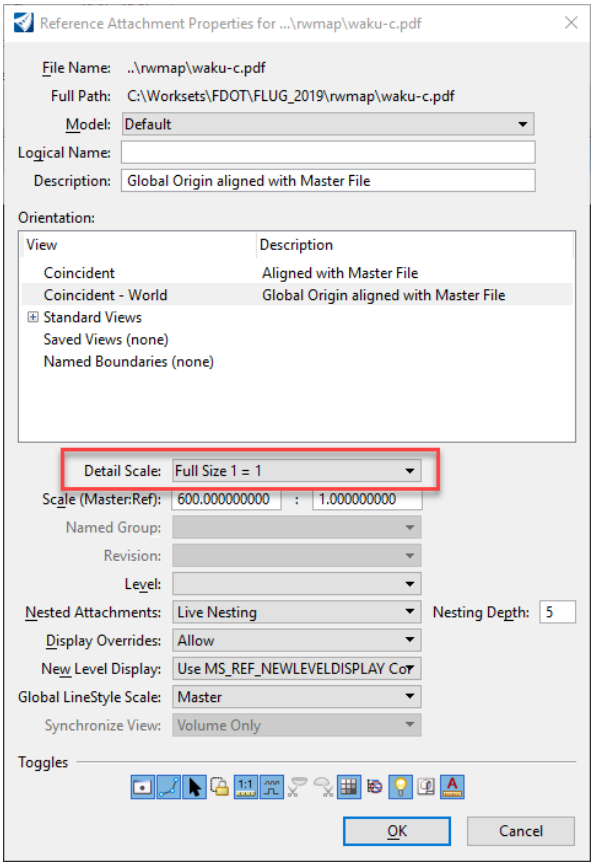


Note All Florida County Maps can be found in MicroStation DGN format and PDF format at: http://www.fdot.gov/geospatial/countymap.shtm

5. Navigate to the Home tab and select References from the Attach Tools button.

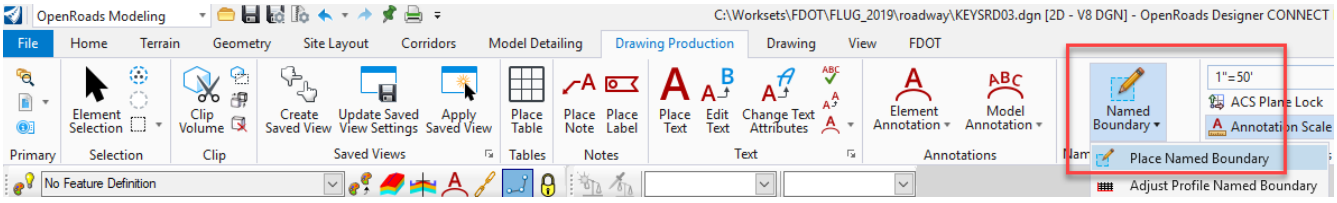


a. Attach the waku-c.pdf as a reference, setting the Detail Scale: Full Size 1 = 1

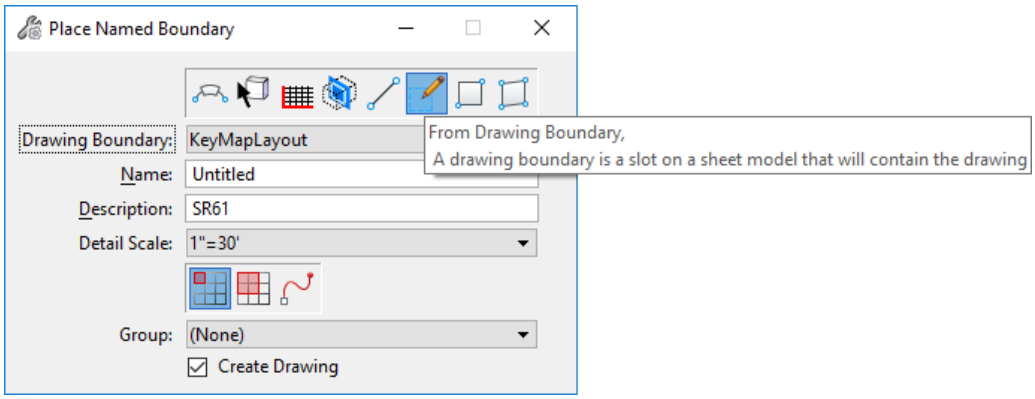


b. Fit view and the zoom into the project location, which is the intersection of SR 61 and US 98.

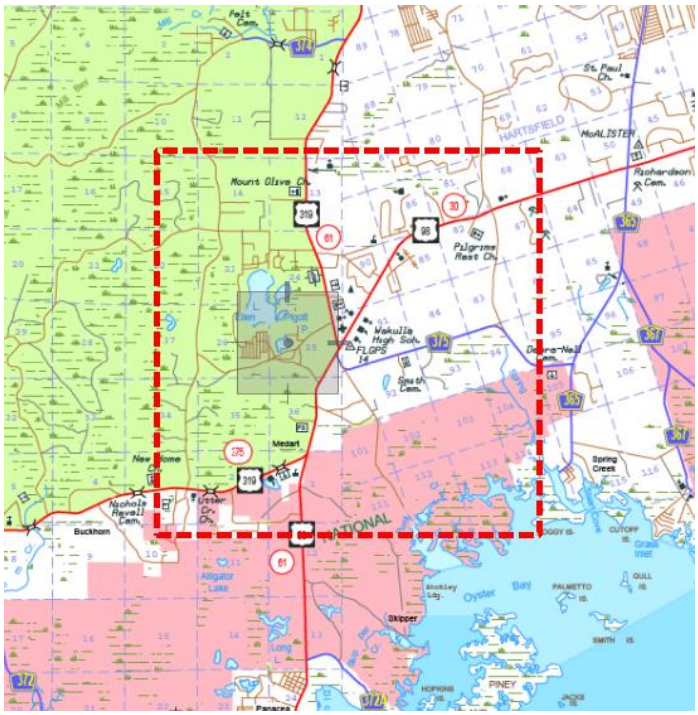
6. Navigate to the Drawing Production tab and select the Place Named Boundary tool.



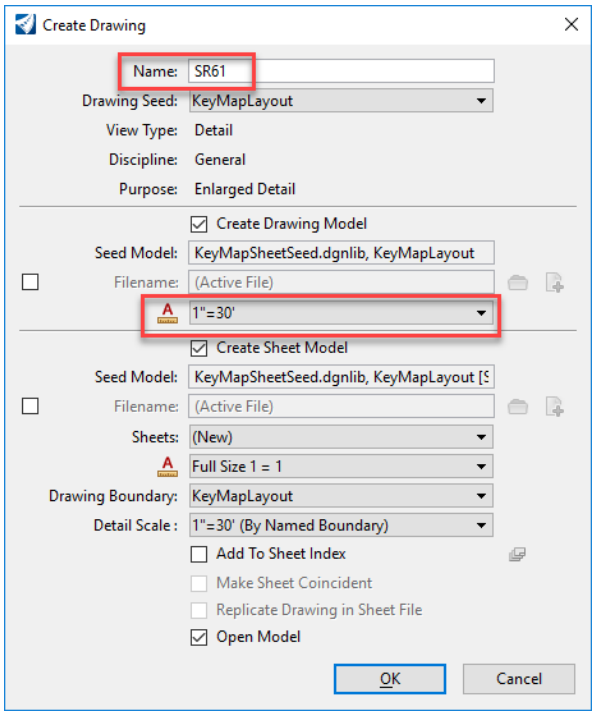
a. Fill out the Place Named Boundary dialog as shown below



b. Place the named boundary in the drawing with the project location in the middle.

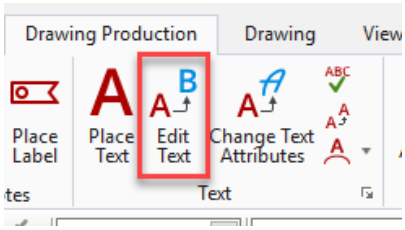


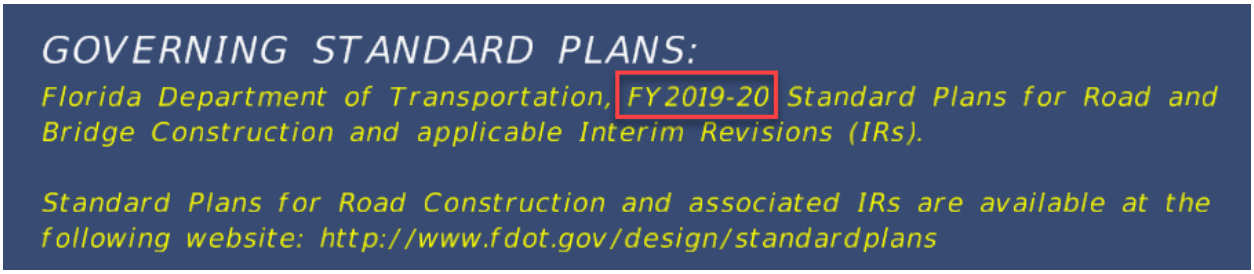
c. Once the named boundary is placed, the Create Drawing dialog will display. Fill this out as shown below, making sure the Drawing Model annotation scale matches the Detail Scale set on the Place Named Boundary dialog. Once filled out, click OK to create the Key Sheet.



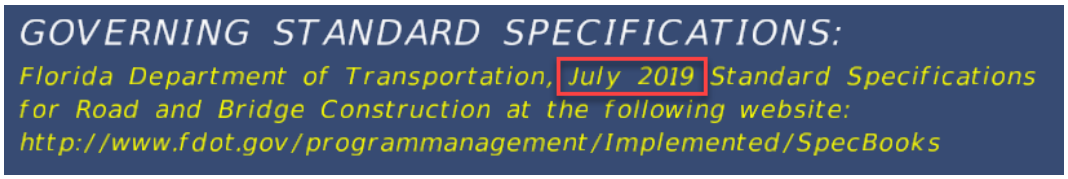
Note There is a Bentley display bug with the map showing up. You may need to zoom in and then out to get the map to show.

7. On the Drawing Production tab, use the Edit Text tool to enter the information *GOVERNING STANDARD PLANS as* **2019-20.**





a. Use the Edit Text tool to enter the information *GOVERNING STANDARD SPECIFICATIONS* as **July 2019.**

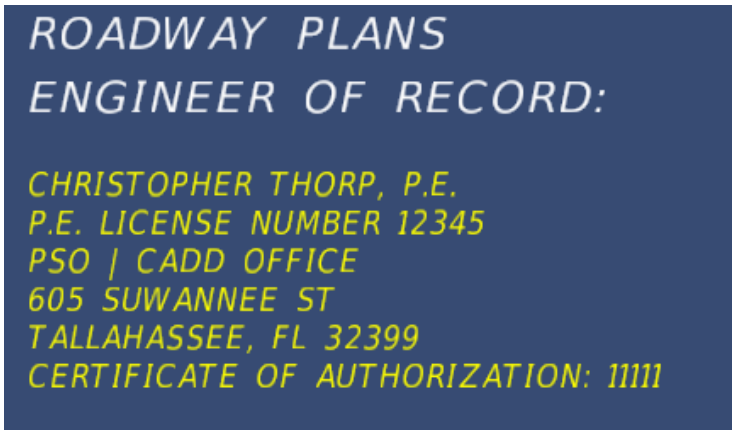


b. Use the Edit Text tool to enter the *Construction Contract No.* as **T-8888**.

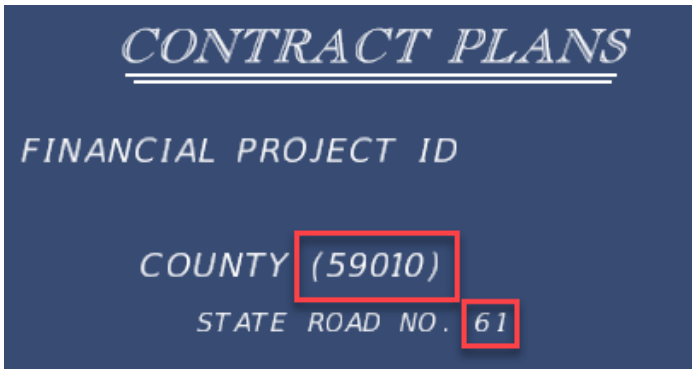
c. Use the Edit Text tool to enter the *Fiscal Year Value* as **19**.

d. Use the Edit Text tool to enter the *FDOT Project Manager*.

e. Use the Edit Text tool to fill out the *ROADWAY PLANS ENGINEER OF RECORD* information.



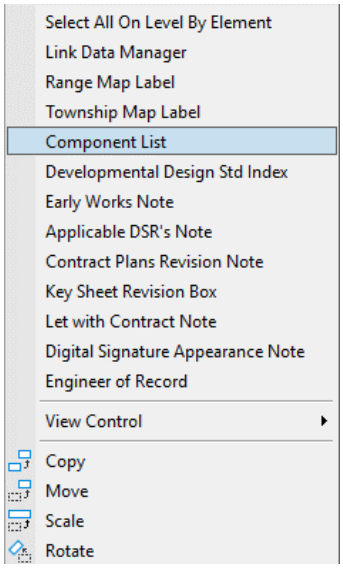
f. Finally, use the Edit Text tool to enter the *Section Number* and *STATE ROAD NO.*, as shown below.



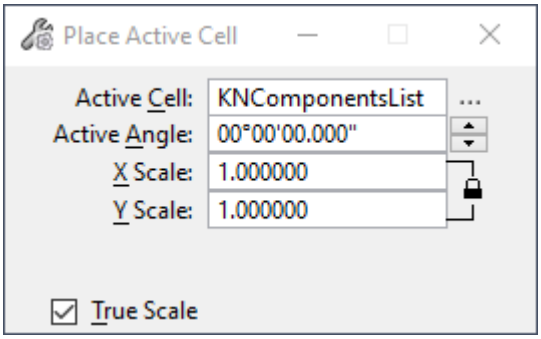
Exercise 6.2 Placing and Editing the Components of Contract Plans Set list

The Components of Contract Plans Set is a list of all the components included in the plan set. This exercise demonstrates how to add this list to the Key Sheet.

1. Once the Key Sheet has been created, right-click and hold to bring up the context menu. From the context menu, select Component List.



2. The MicroStation Place Active Cell command launches with **KNComponentsList** set as the *Active Cell***.**



3. **Data Point** at the upper left corner of the *Key Sheet border* to place the cell.

4. The text appears under the *COMPONENTS OF CONTRACT PLANS SET* on the *Key Sheet*.

5. To edit the list of components, double-click on the text.

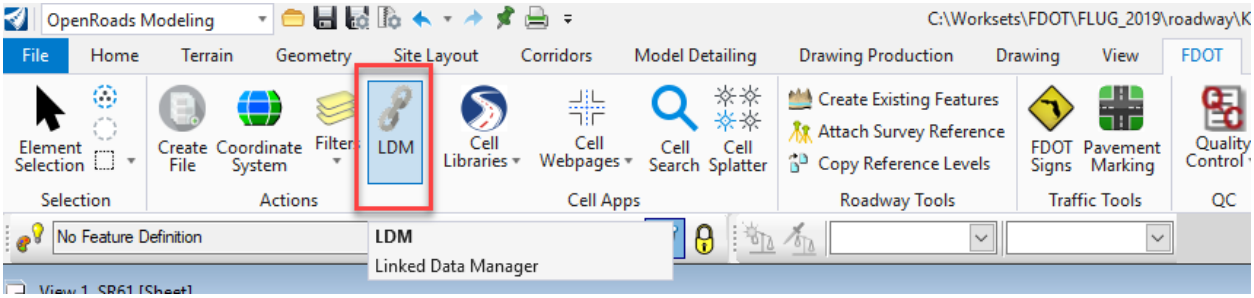
6. Edit the list in the Text Editor dialog. This project should include plans for the following components:

   - ✓ ROADWAY PLANS
   - ✓ SIGNING AND PAVEMENT MARKING PLANS
   - ✓ SIGNALIZATION PLANS

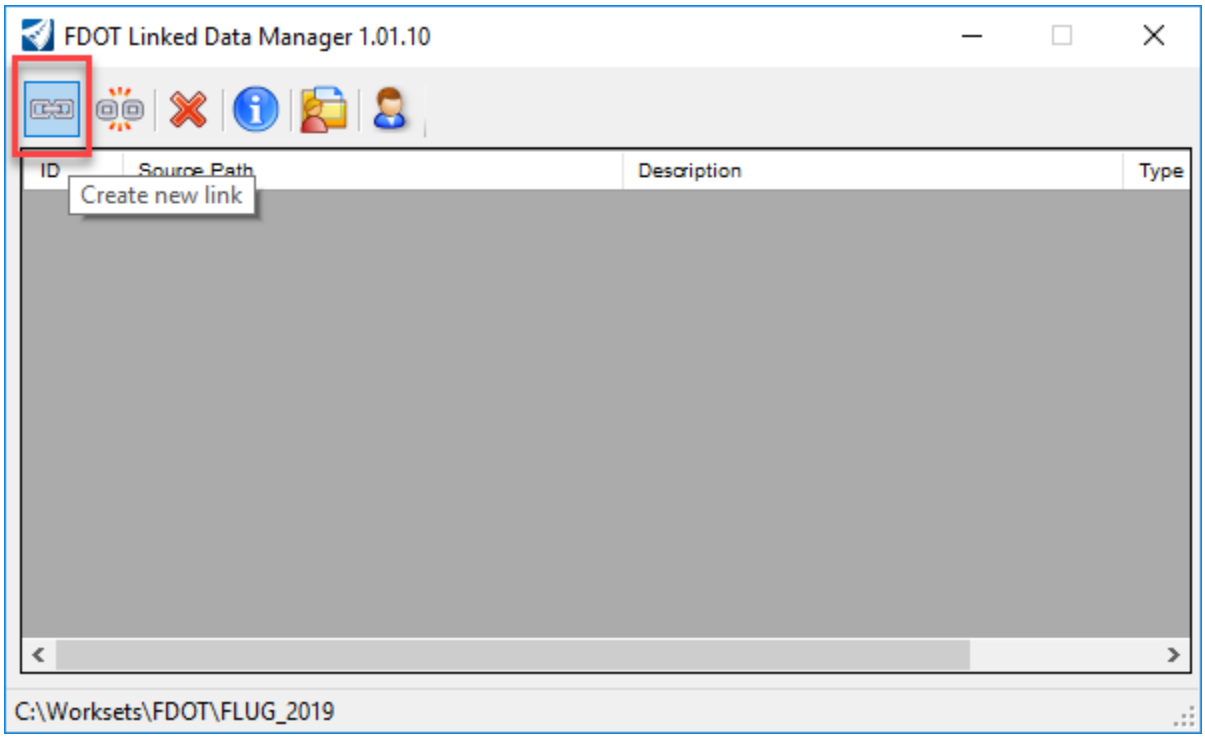
7. Data point in MicroStation when finished editing the text.

Exercise 6.3 Creating and Placing the Key Sheet Index

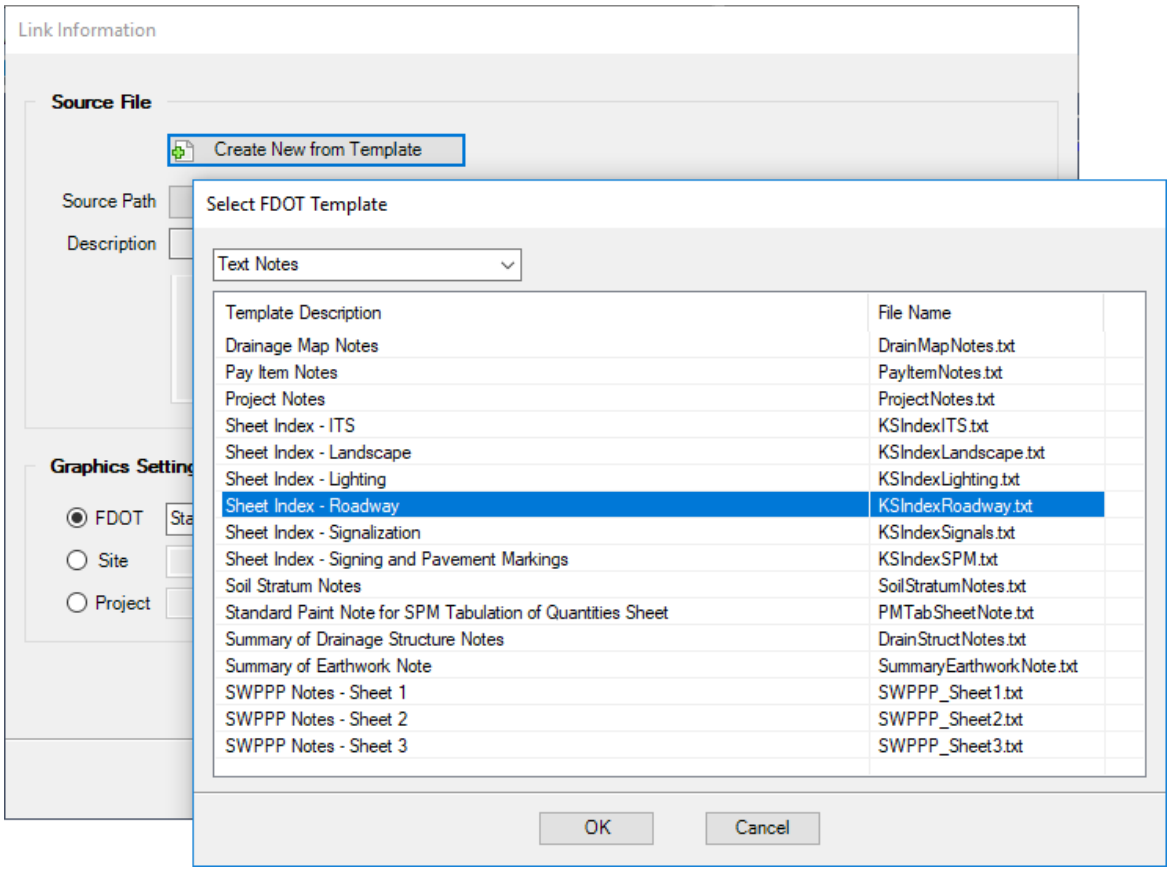
1. On the FDOT Tab, select **LDM** from the Actions group.



2. On the Linked Data Manager dialog, select the Create new link button.

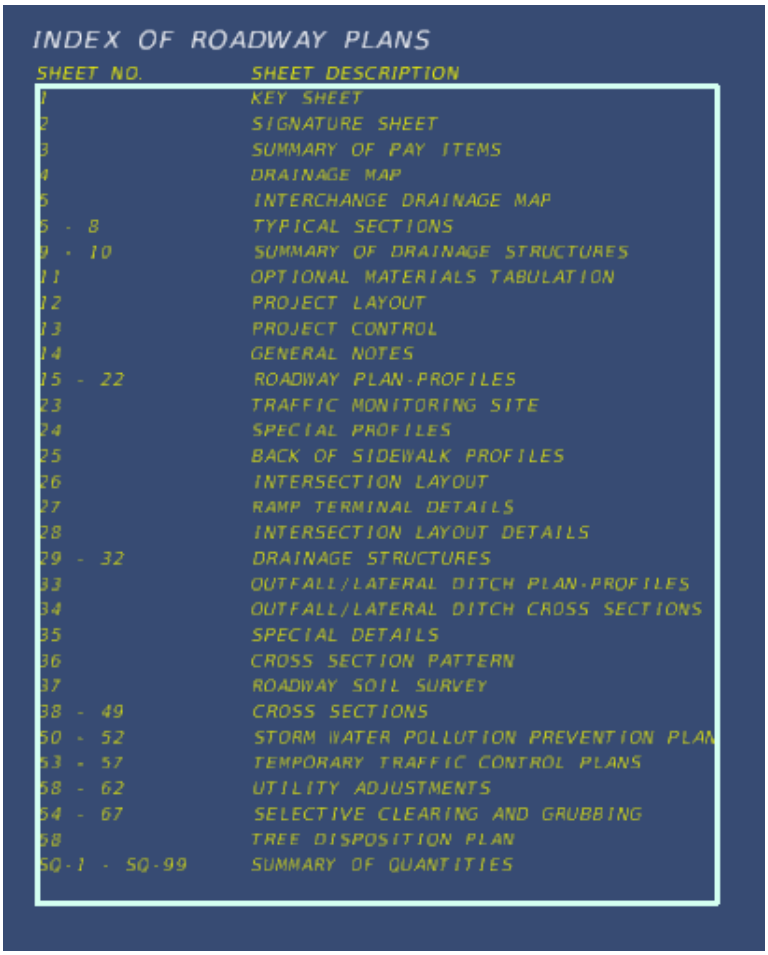


3. From the Link Information dialog, select Create New from Template. On the Select FDOT Template dialog select the Sheet Index - Roadway from the Text Notes category. Click OK and save the KSIndexRoadway.txt file in your roadway folder.



a. Once saved and back on the Link Information dialog, click OK to place the Index.

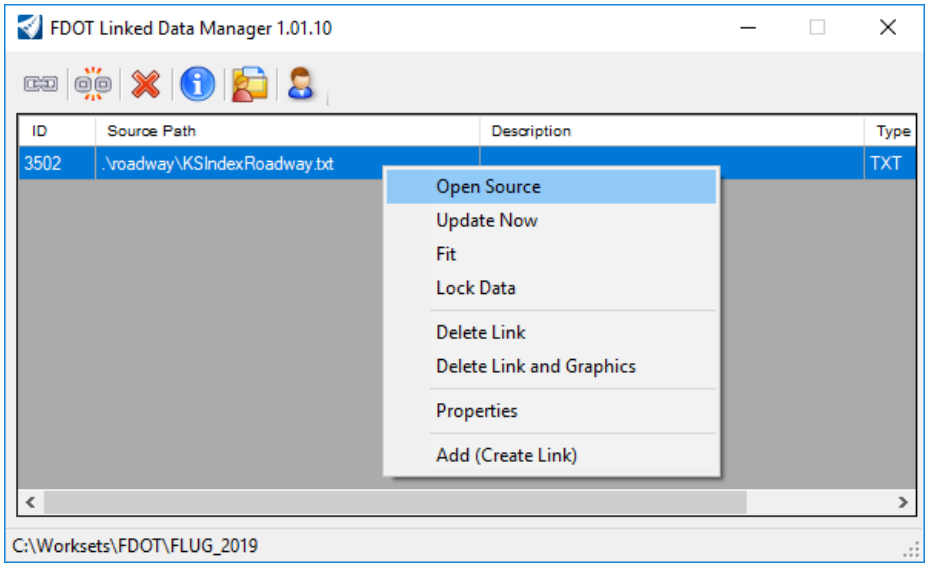
b. Place the Index so that it lines up with the SHEET NO. and SHEET DESCRIPTION headers.



INDEX OF ROADWAY PLANS

SHEET NO.	SHEET DESCRIPTION
1	KEY SHEET
2	SIGNATURE SHEET
3	SUMMARY OF PAY ITEMS
4	DRAINAGE MAP
5	INTERCHANGE DRAINAGE MAP
5 - 8	TYPICAL SECTIONS
9 - 10	SUMMARY OF DRAINAGE STRUCTURES
11	OPTIONAL MATERIALS TABULATION
12	PROJECT LAYOUT
13	PROJECT CONTROL
14	GENERAL NOTES
15 - 22	ROADWAY PLAN-PROFILES
23	TRAFFIC MONITORING SITE
24	SPECIAL PROFILES
25	BACK OF SIDEWALK PROFILES
26	INTERSECTION LAYOUT
27	RAMP TERMINAL DETAILS
28	INTERSECTION LAYOUT DETAILS
29 - 32	DRAINAGE STRUCTURES
33	OUTFALL/LATERAL DITCH PLAN-PROFILES
34	OUTFALL/LATERAL DITCH CROSS SECTIONS
35	SPECIAL DETAILS
36	CROSS SECTION PATTERN
37	ROADWAY SOIL SURVEY
38 - 49	CROSS SECTIONS
50 - 52	STORM WATER POLLUTION PREVENTION PLAN
53 - 57	TEMPORARY TRAFFIC CONTROL PLANS
58 - 62	UTILITY ADJUSTMENTS
54 - 67	SELECTIVE CLEARING AND GRUBBING
68	TREE DISPOSITION PLAN
SQ-1 - SQ-99	SUMMARY OF QUANTITIES

c. Once this is placed in the file, the Index will be modified within the actual text file and not in the ORD dgn file. To get to the Index text file, from within Linked Data Manager, right-click on the Link and select Open Source.

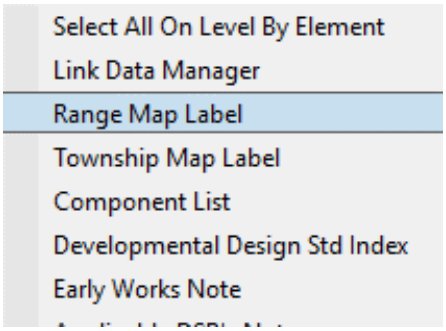


Exercise 6.4 Placing the Range and Township Map Label

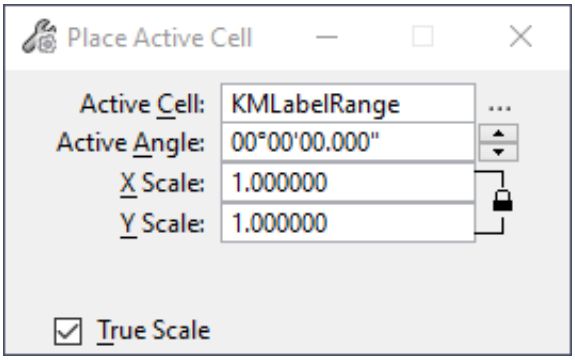
This exercise describes how to place township and range labels on a key sheet. This is a requirement for the Key Sheet.

Note The **Range** and **Township** labels should be known from the Scope of Work. This information can also be found within the county map pdf file.

1. With the Element Selection tool active, right-click and hold to bring up the Context Menu. On the Context Menu, select Range Map Label.

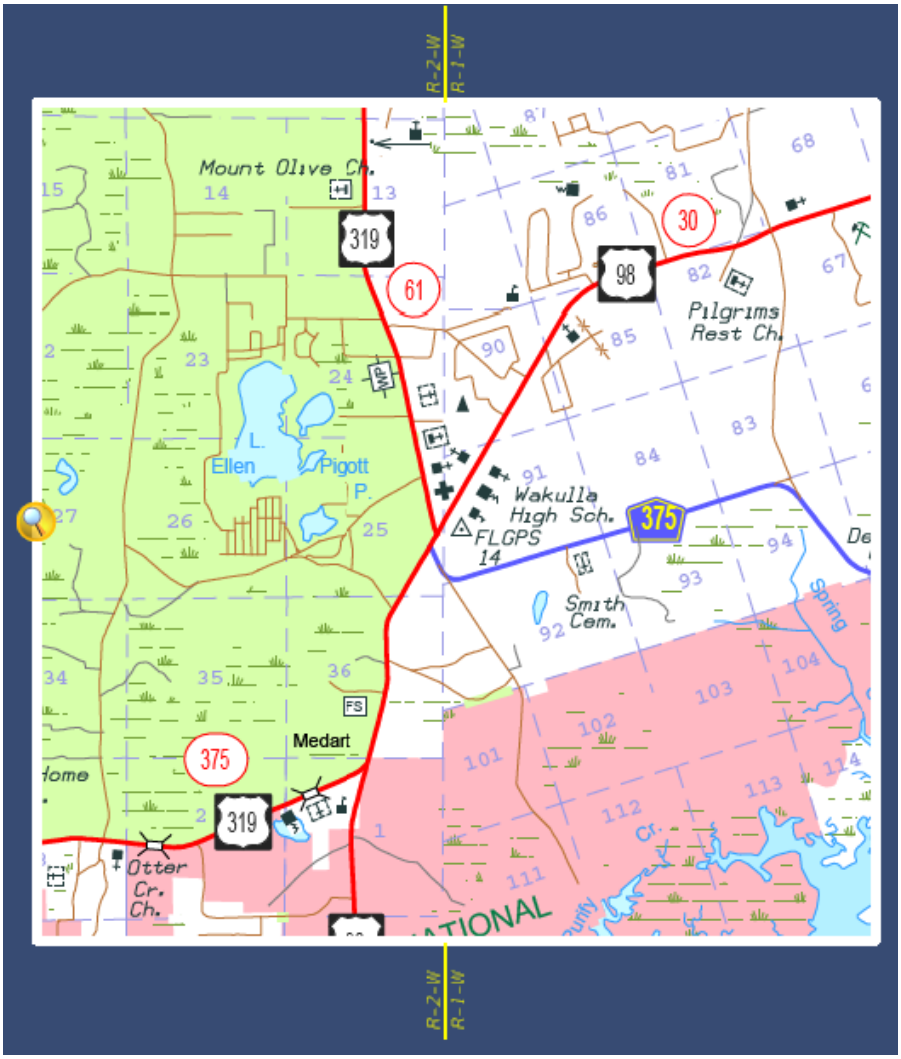


2. The MicroStation Place Active Cell command launches with **KMLabelRange** set as the *Active Cell*.

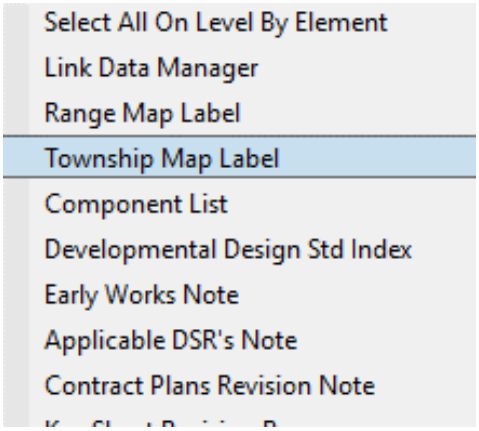


3. **Data point** to place the *Range Map Label* at the correct locations around the map. Place as many labels as needed. **Reset** when finished placing labels.

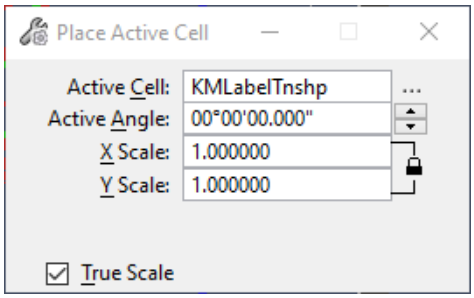
4. Select the Edit Text tool  to edit the labels. See the image below for the correct *Range Values* and *Locations*.



5. With the Element Selection tool active, right-click and hold to bring up the Context Menu. On the Context Menu, select Township Map Label.

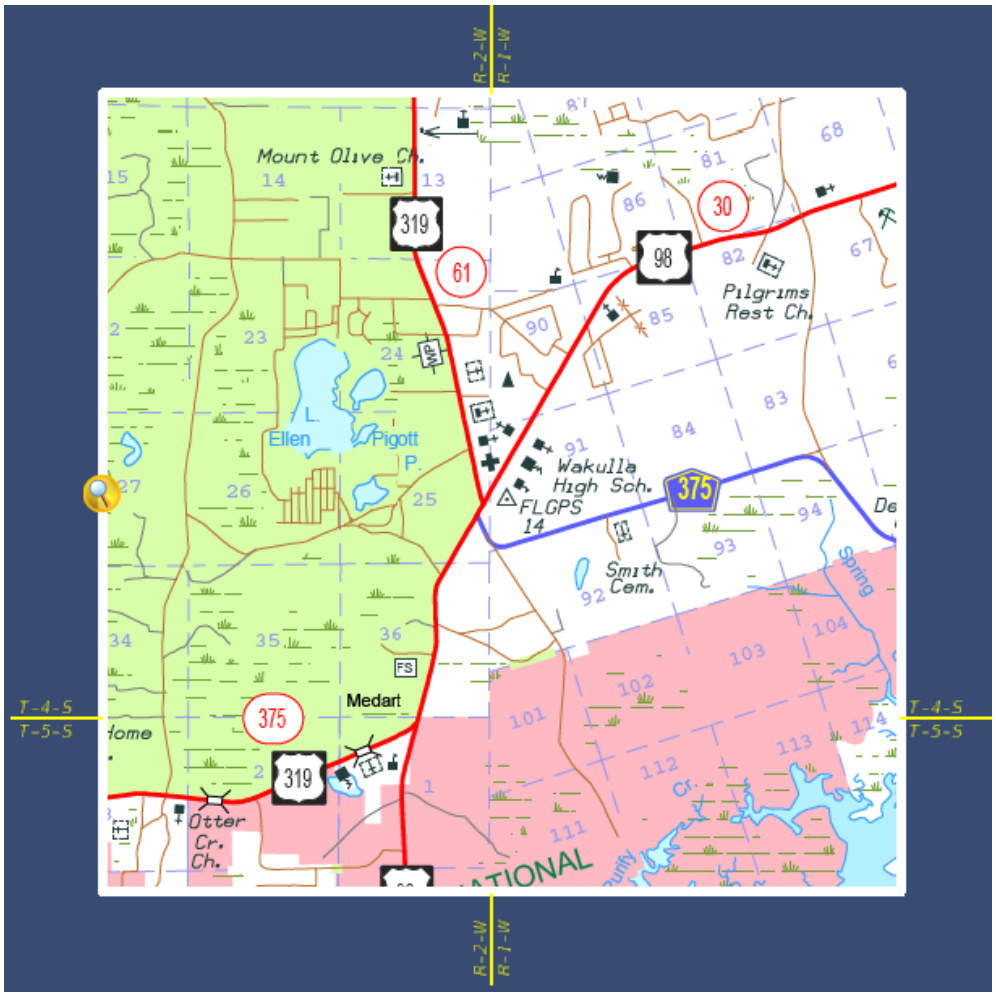


6. The MicroStation Place Active Cell command launches with **KMLabelTnshp** set as the *Active Cell*.



7. **Data point** to place the *Township Map Label* at the correct locations around the map. **Reset** when finished placing labels.

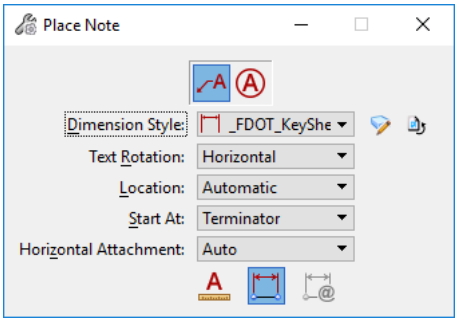
8. Select the Edit Text tool  to edit the labels. See the image below for the correct *Township Values* and *Locations*.



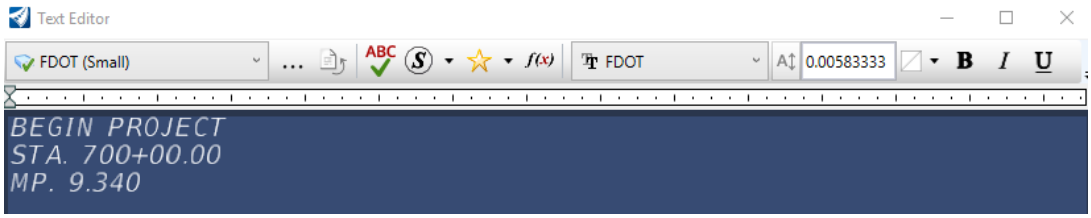
Exercise 6.5 Placing the Project Location Labels

This exercise will demonstrate how to add the Begin and End Project Note.

1. Select the Place Note tool, from the Notes Group on the Drawing Production tab. On the Place Note dialog, set the Dimension Style to _FDOT_KeySheet_BeginProject. Fill the rest out as shown below.



   a. Fill out the Text Editor dialog as shown below.



   b. Position the terminator in the desired location

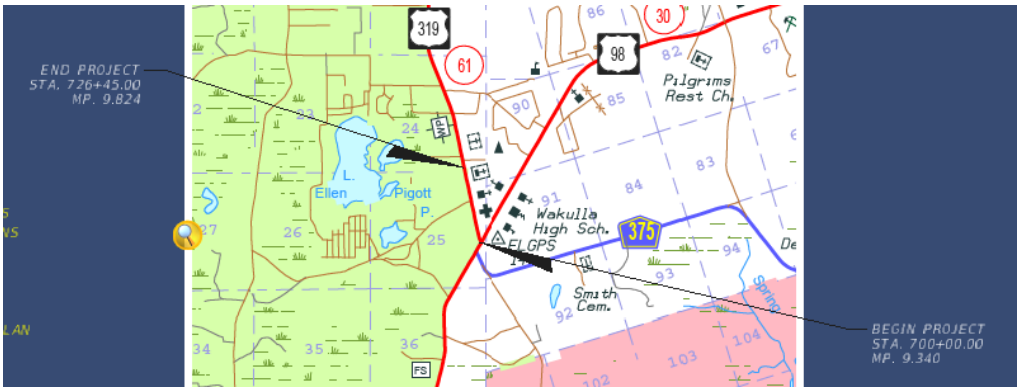
   c. Data point to place the terminator

   d. Position the note in the desired location

   e. Data point to place the note

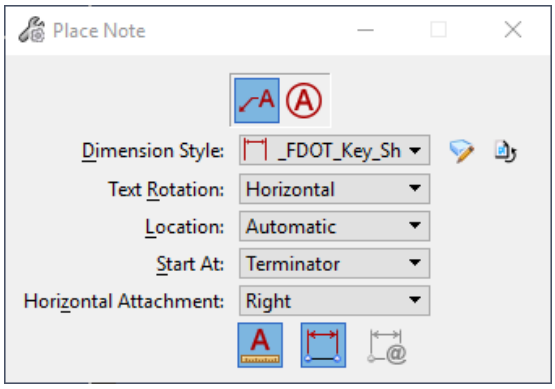
2. Repeat the same process, using the _FDOT_KeySheet_EndProject Dimension Style, to place the End Project Note.

   ✓ END PROJECT
   ✓ STA. 726+45.00
   ✓ MP 9.824

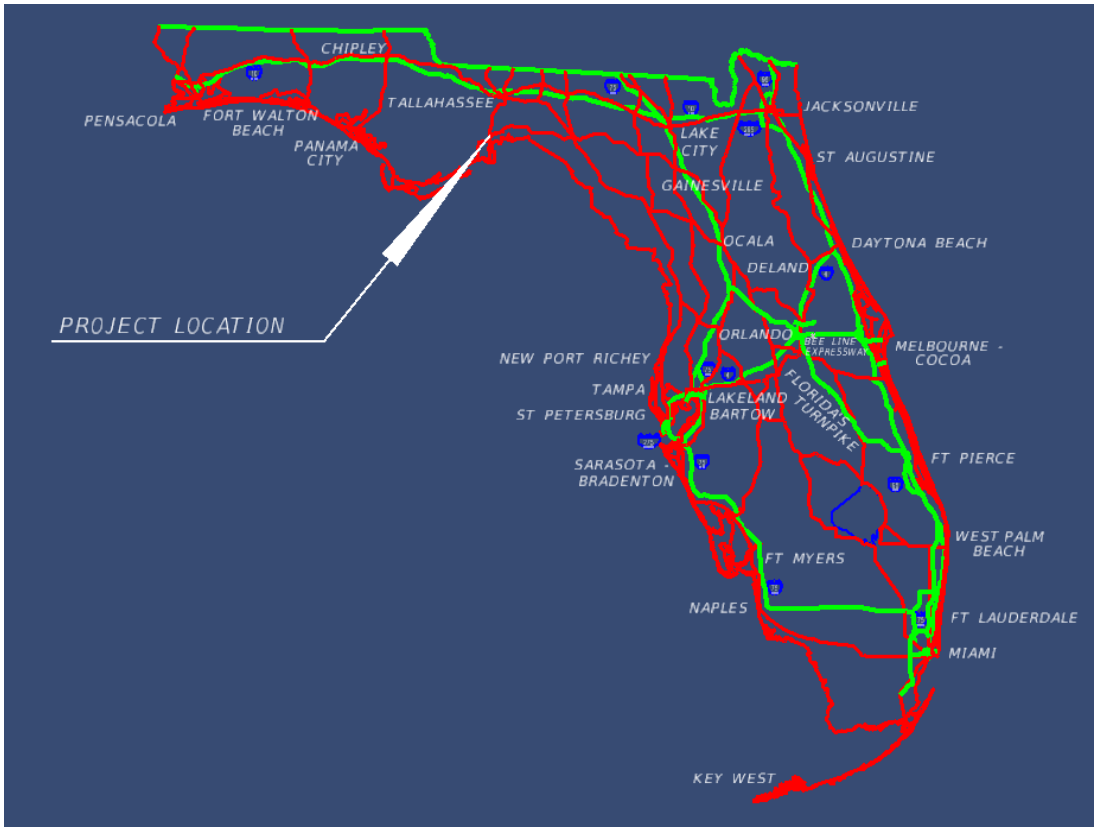


3. There is another *Project Location* label that is required for the Key Sheet that points to the Florida map. From the Drawing Production Tab, select **Place Note.**

4. Set the Place Note Parameters as shown below, with the Dimension Style set to _FDOT_Key_Sheet_Locate:



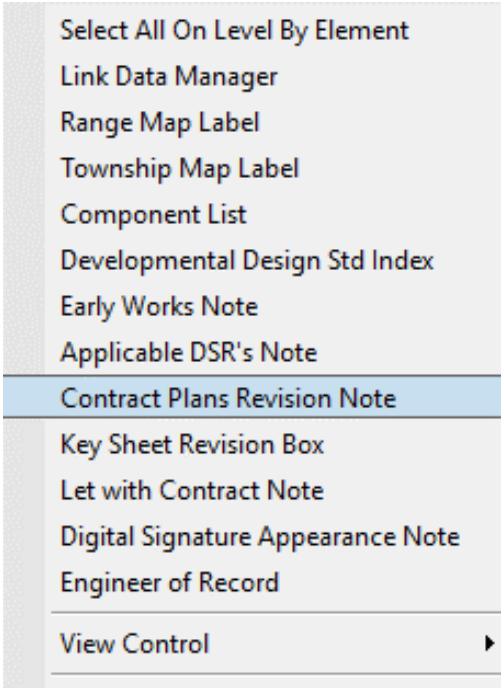
5. Type *PROJECT LOCATION* into the Text Editor, select the general *project location* on the Florida map, position the *label*, and **data point** again to place it. The *label* should display as shown below.



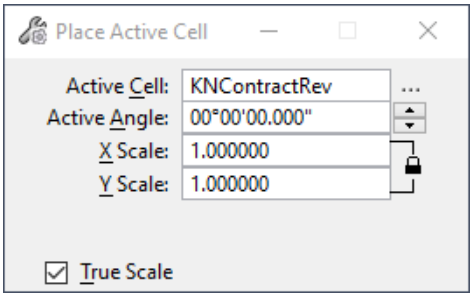
Exercise 6.6 Placing the Contract Revision Note (Optional)

The Contract Plans Revision Note is only placed into the file to document which Component and which Sheets have been revised throughout the project. If there are no revisions this is not required.

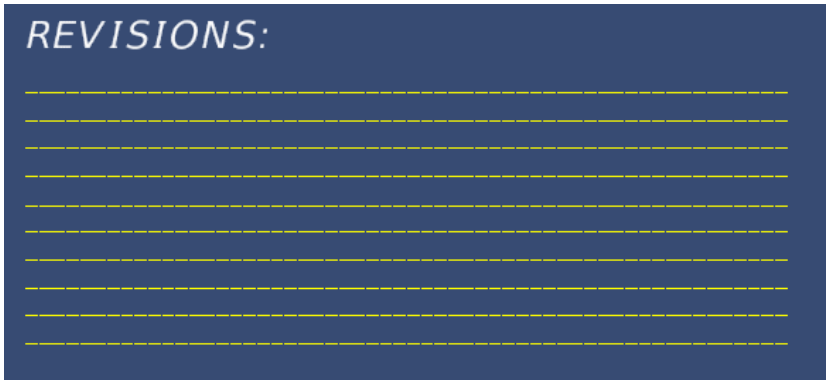
1. With the Element Selection tool active, right-click and hold to bring up the Context Menu. On the Context Menu, select Contract Plans Revision Note.



2. The MicroStation Place Active Cell command launches with **KNContractRev** set as the *Active Cell*.

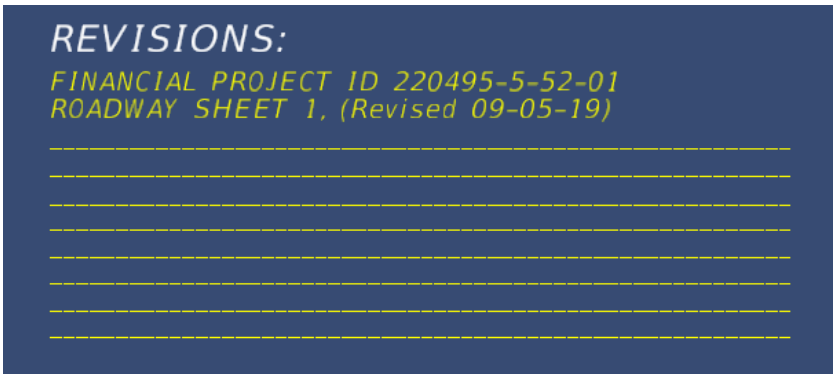


3. **Data point** to the lower left corner of the *Key Sheet border*. The *Note* should display as shown.

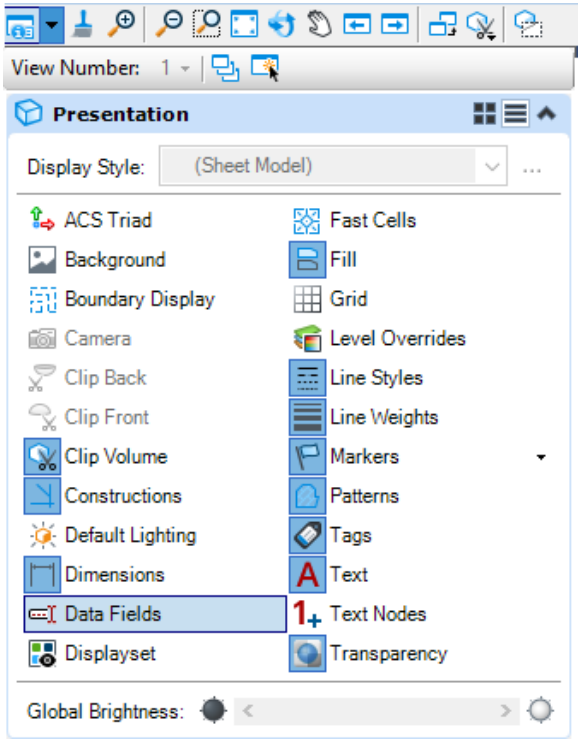


4. Select the Edit Text 

tool to enter the *Financial Project ID*, **220495-5-52-01** as well as the *Revision Number*, the *Component Set*, the *Revised Page Numbers*, and *Date of Revision*. See below.



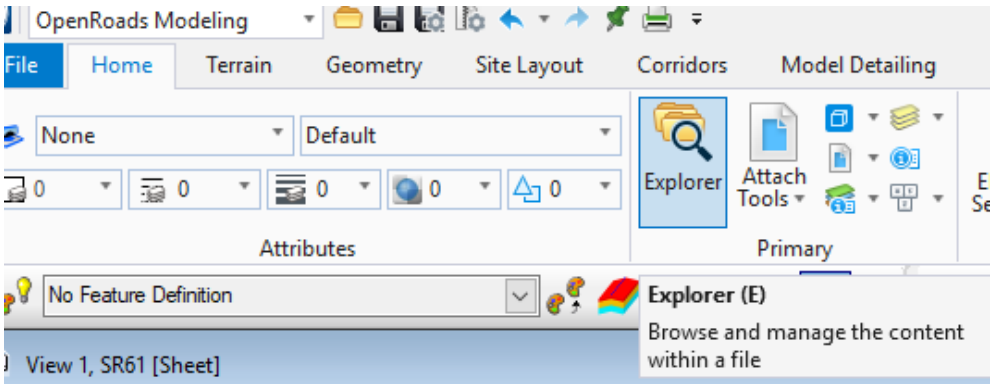
5. Go to the MicroStation *View* options and turn **Off** *Data Fields*.



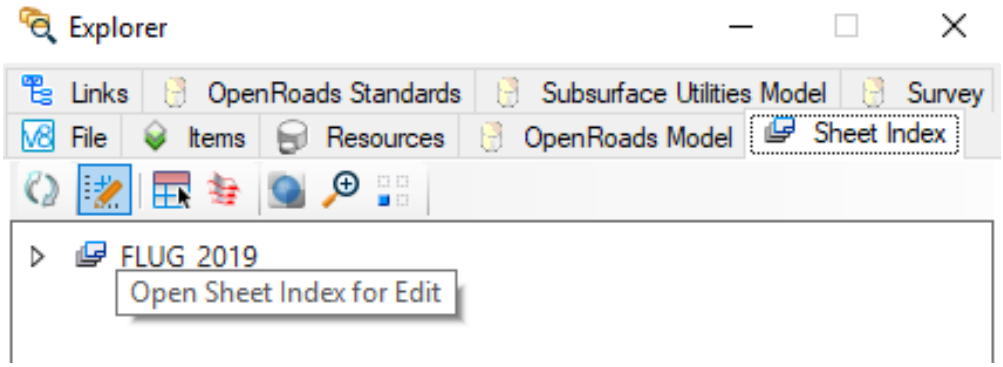
6. **Fit View** in MicroStation.
7. Select **File > Save Setting**.

Exercise 6.7 Indexing the Key Sheet

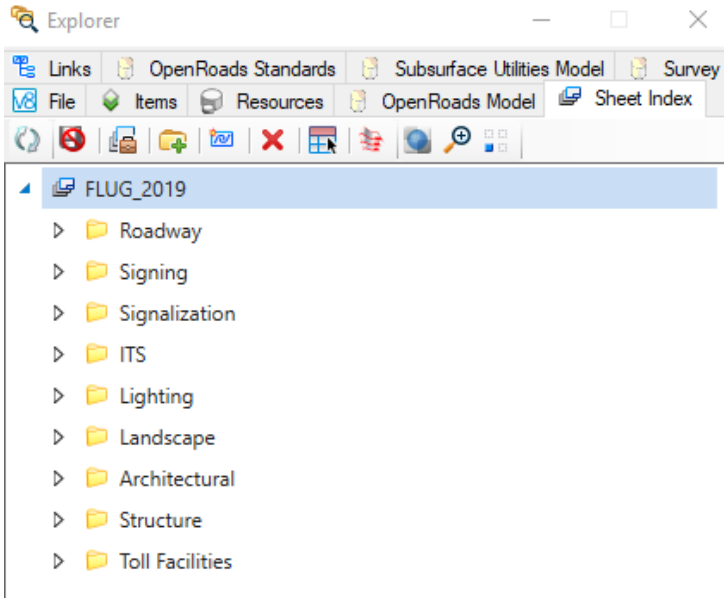
1. Continuing in the *KEYSRD01.dgn* file, go to the Home Tab, select the **Explorer** tool from the Primary Group



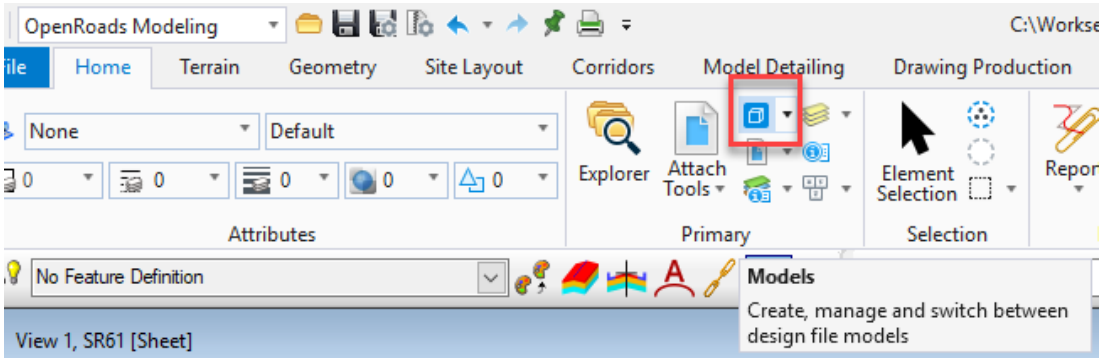
2. Select the **Sheet Index** and then click on the **Open Sheet Index for Edit** button.



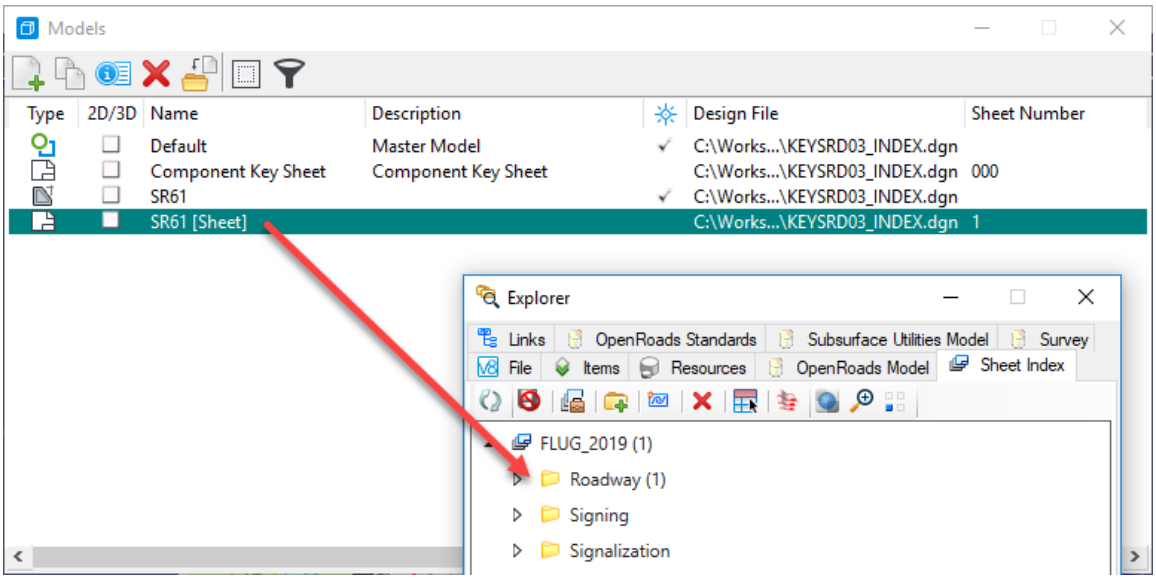
3. With the Sheet Index open for editing, expand out the Index to view the folders for each discipline.



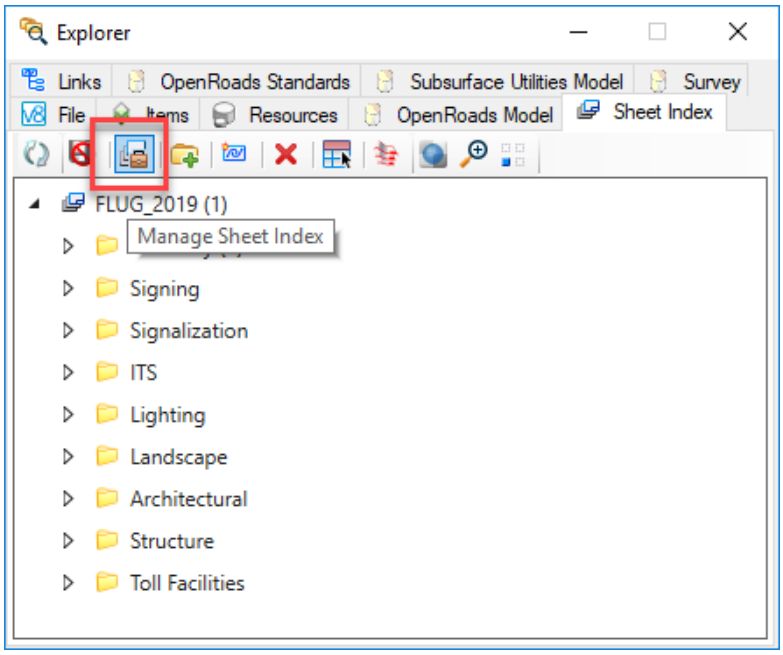
4. From the Home Tab, select the **Models** tool from the Primary Group



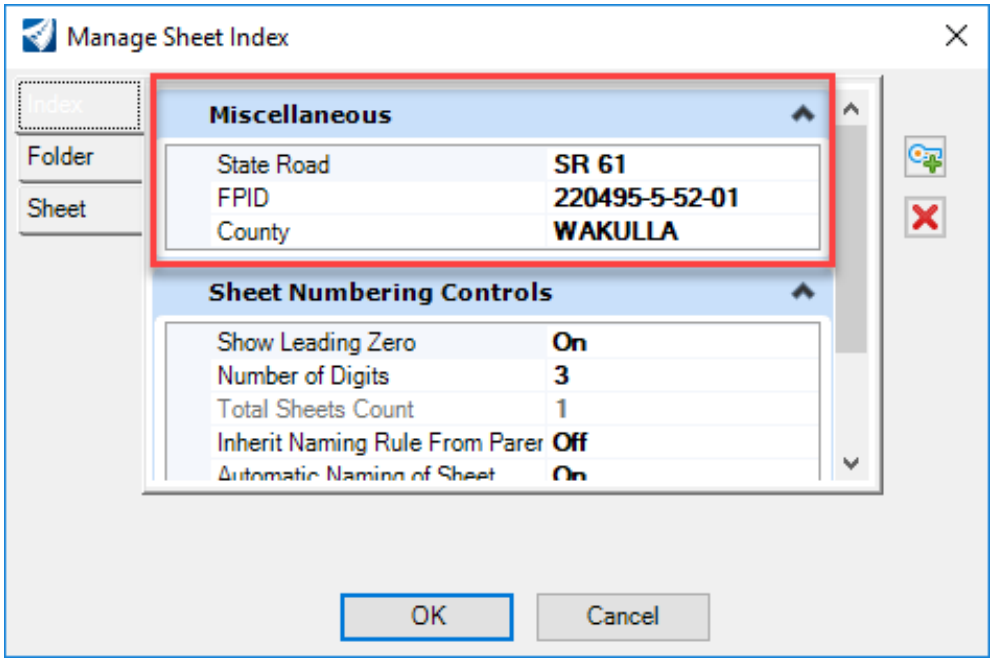
5. With the Models dialog open, drag and drop the SR61 [Sheet] model onto the Roadway folder within the Sheet Index.



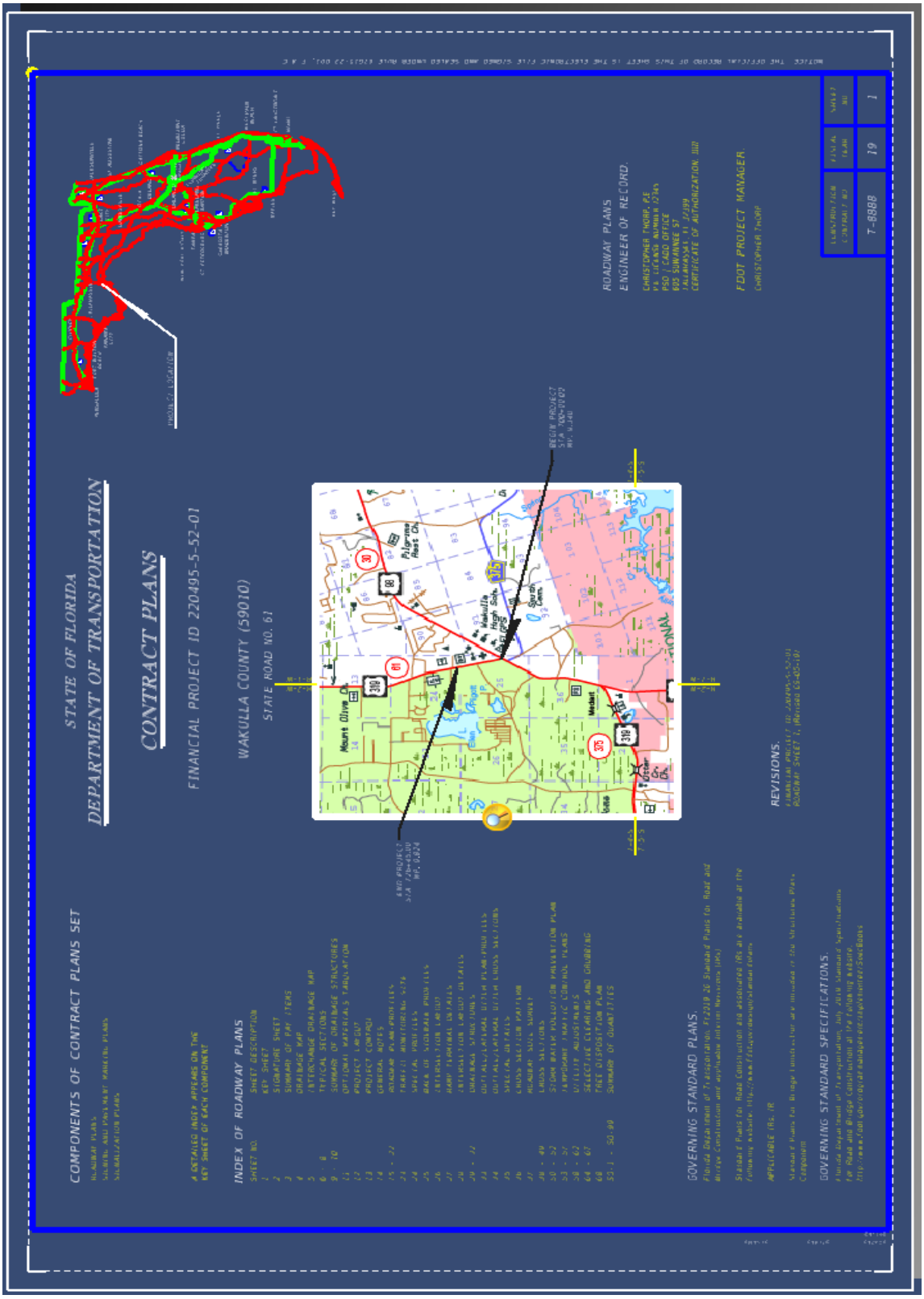
6. Select the **Manage Sheet Index** tool, from the Sheet Index tab in Explorer.



7. On the Manage Sheet Index dialog, fill out the **Miscellaneous** as shown below.



8. Click **OK**.


STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
CONTRACT PLANS
FINANCIAL PROJECT ID 220495-5-52-01
WAKULLA COUNTY (59010)
STATE ROAD NO. 61
COMPONENTS OF CONTRACT PLANS SET
INDEX OF ROADWAY PLANS
GOVERNING STANDARD PLANS.
GOVERNING STANDARD SPECIFICATIONS.
REVISIONS.
ROADWAY PLANS ENGINEER OF RECORD.
FDOT PROJECT MANAGER.

7 PLAN AND PROFILE SHEETS

Part 3, Chapter 312 of the ***FDOT Design Manual (FDM)*** outlines Florida Department of Transportation (FDOT) Roadway Plan and Roadway Plan-Profile Sheets. The Roadway plan sheets show the project's complete horizontal alignment. The plan-profile sheets show the project's complete horizontal and vertical alignment. Various Roadway elements such as pavement width, medians, paved shoulders, curbs, drainage elements, tapers, turn provisions, and intersecting roadways, are also shown on these sheets.

OBJECTIVES

- Create and annotate plan and profile sheets
- Setup Key Sheet with All Necessary Information

EXERCISE OVERVIEW

Exercise 7.1 Creating Plan Sheets

1. Use the **FDOTConnect for OpenRoads Designer** icon to open the C:\Worksets\FDOT\FLUG_2019\PLANRD01.dgn file

2. Select *Drawing Production* > *Annotations* > *Element Annotation* > **Annotate Element**. Left click on the CL_SR61 alignment to select it and then right click to accept and annotate the alignment.

3. From the *Drawing Production* tab, select the **Place Named Boundary** tool.

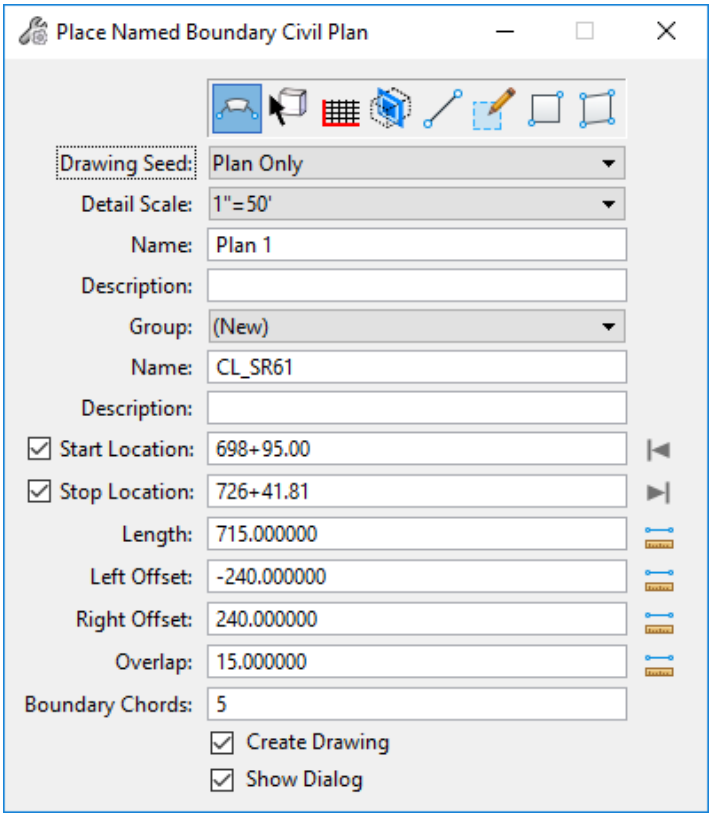
   Drawing Production > *Named Boundaries* > *Named Boundary* > **Place Named Boundary**

   a. Select the **Civil Plan** mode.

   b. Set *Drawing Seed* to **Plan Only**

   c. In the 2D view, select the CL_SR61 alignment along which the plan named boundaries will be created.

   d. Fill out the dialog, as shown



   e. *Follow the prompts* in the lower left corner **left click** to define the named boundaries. *Multiple left clicks may be required*.

   f. Two or three clicks are required to (1) accept the Start Location, (2) accept the Stop Location, and (3) create the Named Boundaries. However, if the Start or Stop Location are selected graphically one or more of these clicks has already been completed.

   g. On the *Create Drawing* dialog, click OK to create the sheets.

Exercise 7.2 Creating Plan and Profile Sheets

1. Use the **FDOTConnect for OpenRoads Designer** icon to open the C:\Worksets\FDOT\FLUG_2019\PLPRRD01.dgn file

2. Select *Drawing Production* > *Annotations* > *Element Annotation* > **Annotate Element**. Left click on the CL_SR61 alignment to select it and then right click to accept and annotate the alignment.

3. Create Named Boundaries for the **plan** portion of the sheets.

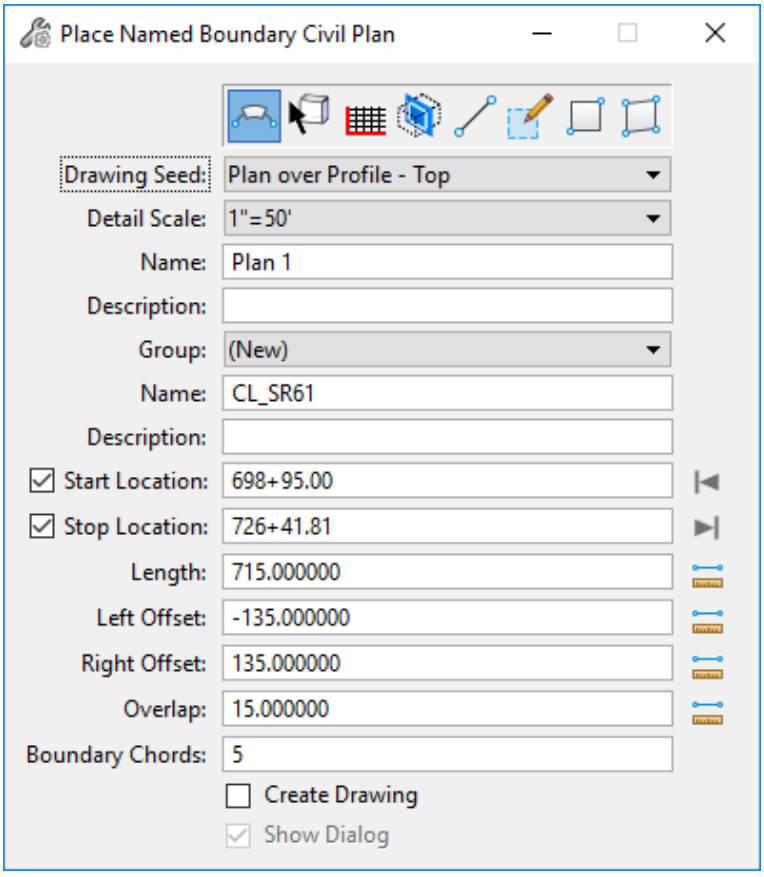
   a. Select Drawing Production > Named Boundaries > Named Boundary > **Place Named Boundary**.

   b. Select the **Civil Plan** mode.

   c. Set *Drawing Seed* to **Plan over Profile - Top**

   d. In the 2D view, select the CL_SR61 alignment along which the plan named boundaries will be created.

   e. Fill out the dialog, as shown, making sure that *Create Drawing* is unchecked.



   f. *Follow the prompts* in the lower left corner **left click** to define the named boundaries. *Multiple left clicks may be required*. A total of two clicks are required to (1) accept the Start Location, (2) accept the Stop Location, and (3) create the Named Boundaries. However, if the Start or Stop Location are selected graphically one or more of these clicks has already been completed.

4. Create Named Boundaries for the **profile** portion of the sheets.

    a. Open a profile view for the CL_SR61 alignment. This can be done using the right click View Control context menus.

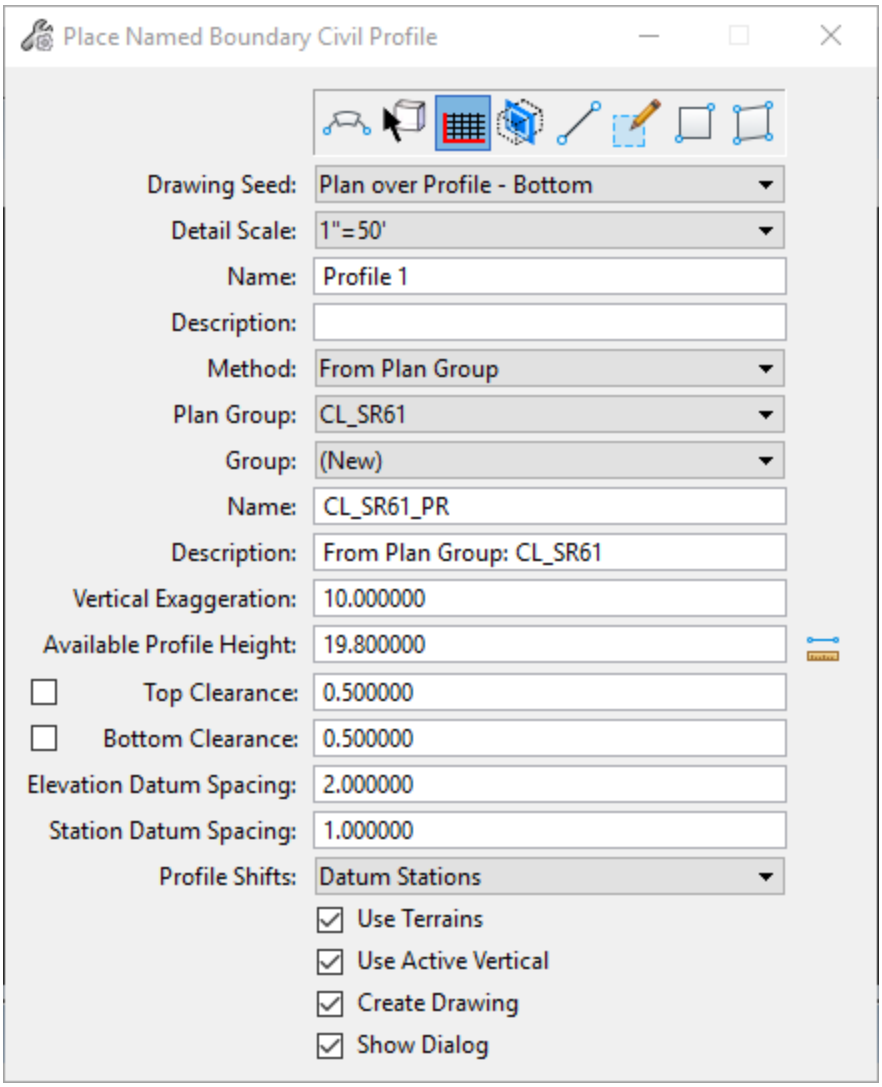
    b. Select *Drawing Production* > *Named Boundaries* > *Named Boundary* > **Place Named Boundary**

    c. Select the **Civil Profile** mode.

    d. Set *Drawing Seed* to **Plan over Profile - Bottom**

    e. In the *profile* view, select the profile along which the named boundaries will be created.

    f. Fill out the dialog, as shown below, this time making sure that *Create Drawing* is enabled.



    g. *Follow the prompts* in the lower left corner **left click** to define the named boundaries. *Multiple left clicks may be required*

    h. On the *Create Drawing* dialog, click OK to create the sheets.

Exercise 7.3 Creating Cross Section Sheets

1. Use the **FDOTConnect for OpenRoads Designer** icon to open the C:\Worksets\FDOT\FLUG_2019\RDXSRD01.dgn file

2. Create Named Boundaries which define the location and extent of each cross section.

Important! *Both the 2D and the 3D models must be open in a view to create cross sections.*

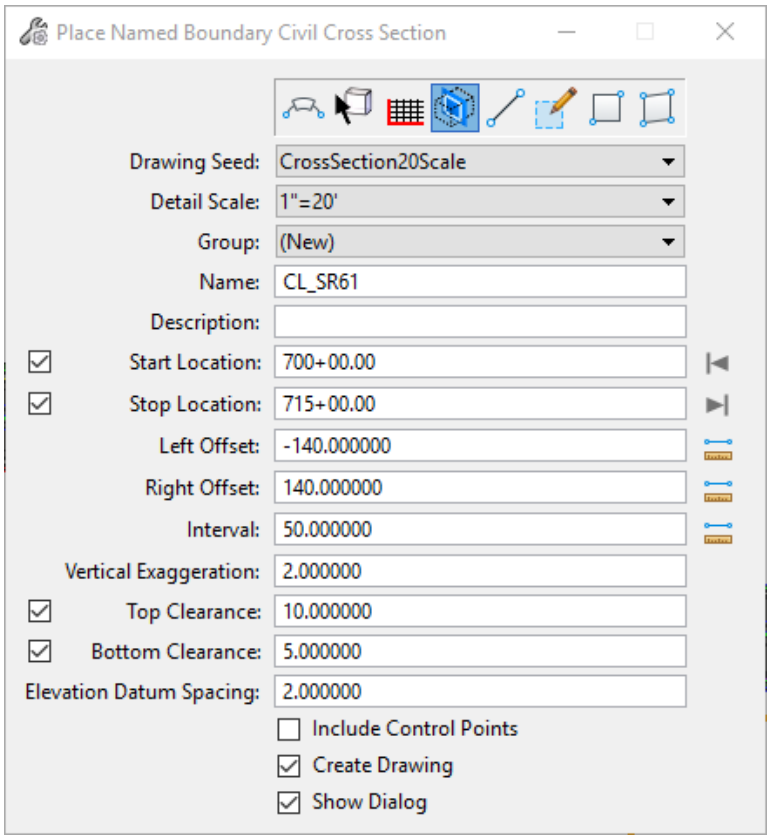
a. Select Drawing Production > Named Boundaries > Named Boundary > **Place Named Boundary**.

b. Select the **Civil Cross Section** mode.

c. Set *Drawing Seed* to **CrossSection20Scale**

d. In the 2D view, select the CL_SR61 alignment along which the cross section named boundaries will be created.

e. Set the *Start Location* to **700+00** and the *Stop Location* to **715+00.** the dialog should be filled out as shown below. The settings from the *Left Offset* down are set based on the applied *Drawing Seed*.



f. *Follow the prompts* in the lower left corner **left click** to define the named

g. boundaries. *Multiple left clicks are probably required*. Once the named boundaries are created they appear in the 3D view.

h. Click **OK** on the *Create Drawing* dialog to create the sheets.