FDOTConnect for OpenRoads Designer

Civil Geometry

COURSE GUIDE

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State of Florida

Department of Transportation

FDOTConnect

for

OpenRoads Designer
Civil Geometry

Course Guide

2024

PRODUCTION SUPPORT / CADD OFFICE

TALLAHASSEE, FLORIDA

http://www.fdot.gov/cadd

FDOTConnect

for

OpenRoads Designer

Civil Geometry

Description

This is a 2-day training course that will go over the fundamentals of 2D design Alignments, 2D-Planimetrics & Profiles. Participants will be introduced to Bentley OpenRoads Designer CONNECT Edition - OpenRoads Technology tools for design and modeling; specifically for Florida Department of Transportation (FDOT) projects using the FDOTConnect WorkSpace. Several new technologies will be introduced including:

- Civil Elements, Civil Features, and Civil Geometry
- Design Intent and Design Standards
- Civil AccuDraw and Civil Cells
- Project *Explorer*: Civil Model
- Ribbon Tabs and Cursor Context Menus

Objectives

- Use Civil Geometry Elements in the design file to calculate and define a proposed centerline of construction.
- 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.

Audience

- FDOT Roadway Designers and Engineers

Prerequisites

Participants need to have a basic understanding of Computer Aided Drafting and Design (CADD) using MicroStation, a basic understanding of OpenRoads Designer CONNECT Edition - OpenRoads Technology tools and a solid understanding of the engineering necessary to design a Roadway.

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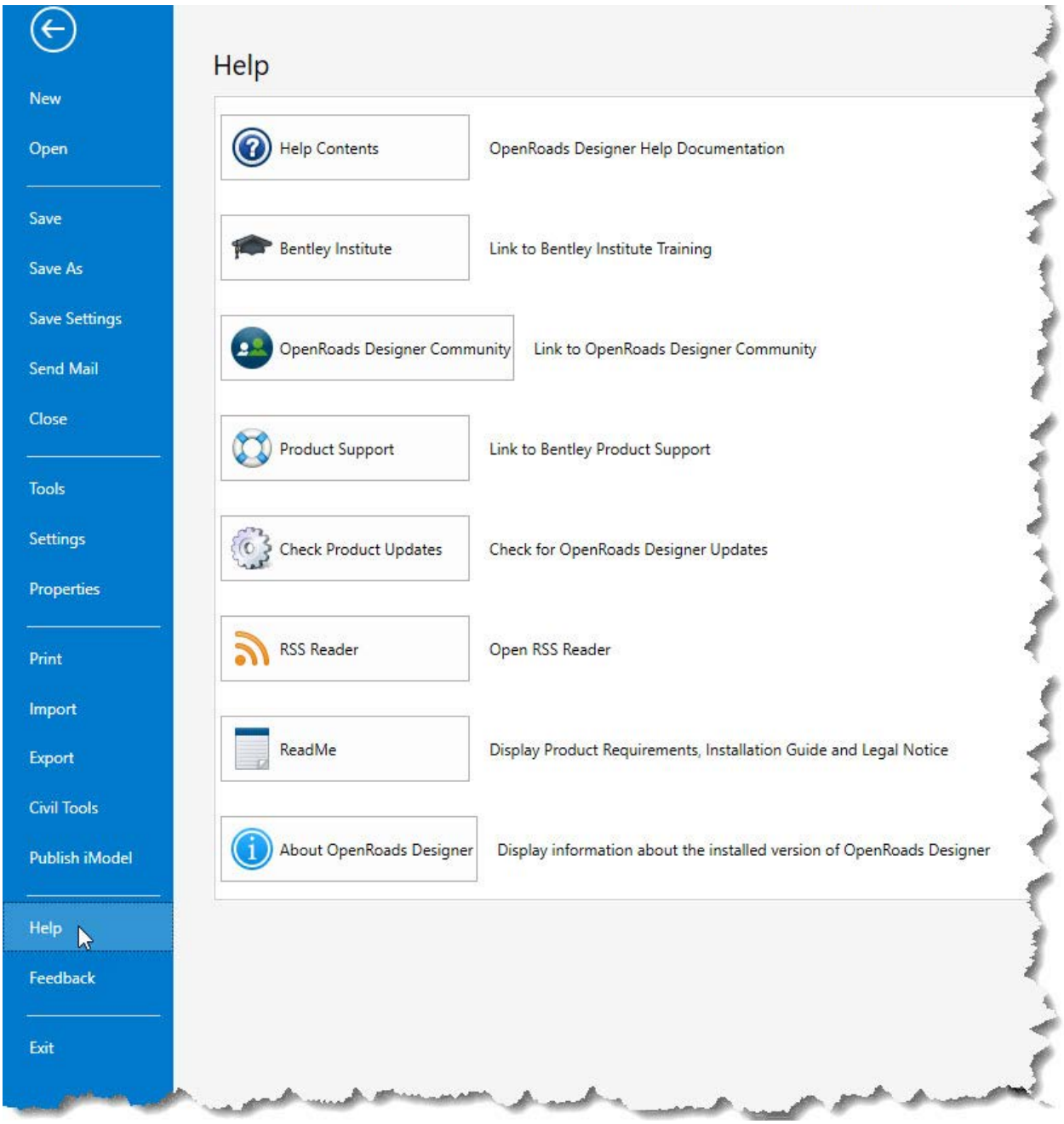
INTRODUCTION

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.

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 backstage and selecting Help to bring up Bentley's ONLINE HELP or from the Ribbon pick the HELP icon.

FILE>HELP


New
Open
Save
Save As
Save Settings
Send Mail
Close
Tools
Settings
Properties
Print
Import
Export
Civil Tools
Publish iModel
Help
Feedback
Exit
Help
Help Contents
OpenRoads Designer Help Documentation
Bentley Institute
Link to Bentley Institute Training
OpenRoads Designer Community
Link to OpenRoads Designer Community
Product Support
Link to Bentley Product Support
Check Product Updates
Check for OpenRoads Designer Updates
RSS Reader
Open RSS Reader
ReadMe
Display Product Requirements, Installation Guide and Legal Notice
About OpenRoads Designer
Display information about the installed version of OpenRoads Designer

DOCUMENT STYLE

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

Item	Convention	Example
Menu names and commands	Bold (Names separated with > symbol)	• General form is **Workflow** (when applicable) **> Tab > Group > Tool** • **File > Open** • **File > Settings > User > Preferences** • **OpenBridge Modeler** (Workflow**) > FDOT > Actions > Create Fil**e
Window 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**.
Window 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 *Working Graphics.dgn* in the C:\Bentley Training\GEOPAK 101\Project Setup\Practice\ folder.
File paths	Underline	• Open the file *Working Graphics.dgn* in the C:\Bentley Training\GEOPAK 101\Project Setup\Practice\ folder.
New terms or emphasis	Italic or Bold	• The Template Library contains *templates*, which represent typical sections of the proposed roadway. • **The user is not to utilize this tool.**

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

Production Support Office | CADD (CADD) Website:

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/UCqbY8kqZuXp1pyYV6IlQw A

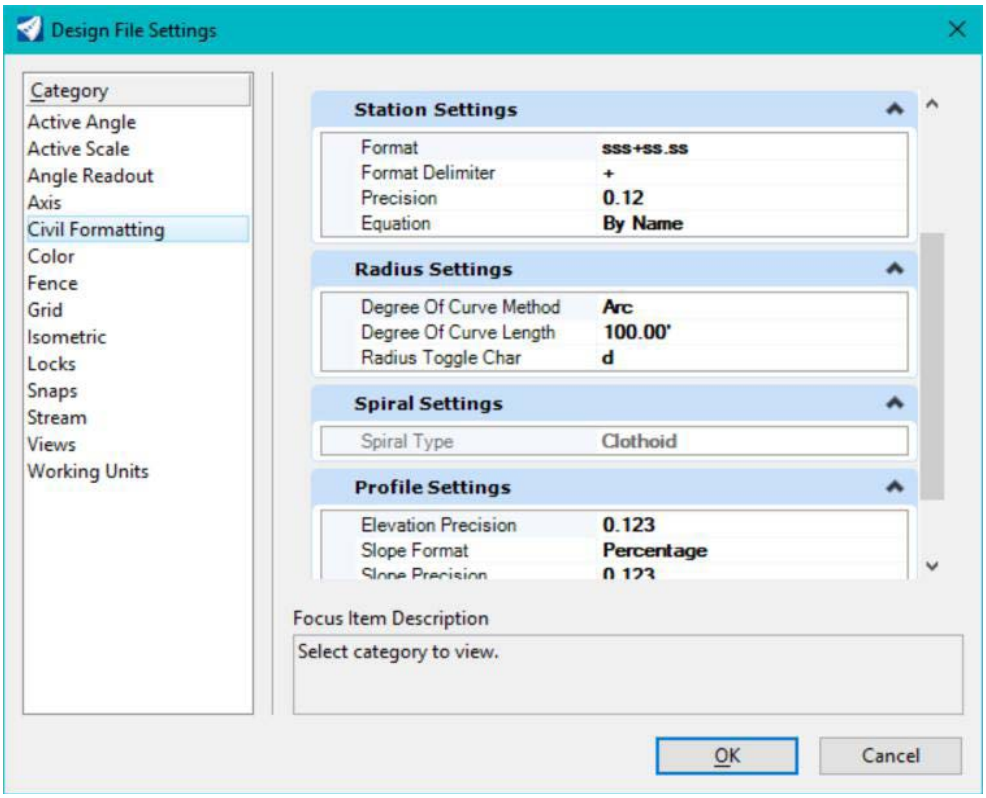
COURSE SUPPORTING FILES

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:

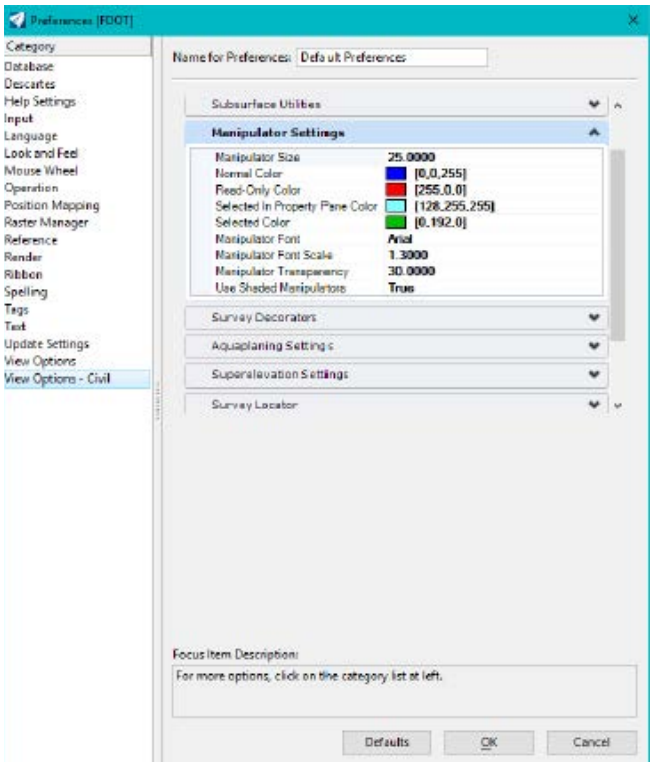
https://www.fdot.gov/cadd/main/fdotcaddtraining.shtm

FDOTConnect PREDEFINED SETTINGS

DESIGN FILE SETTINGS:

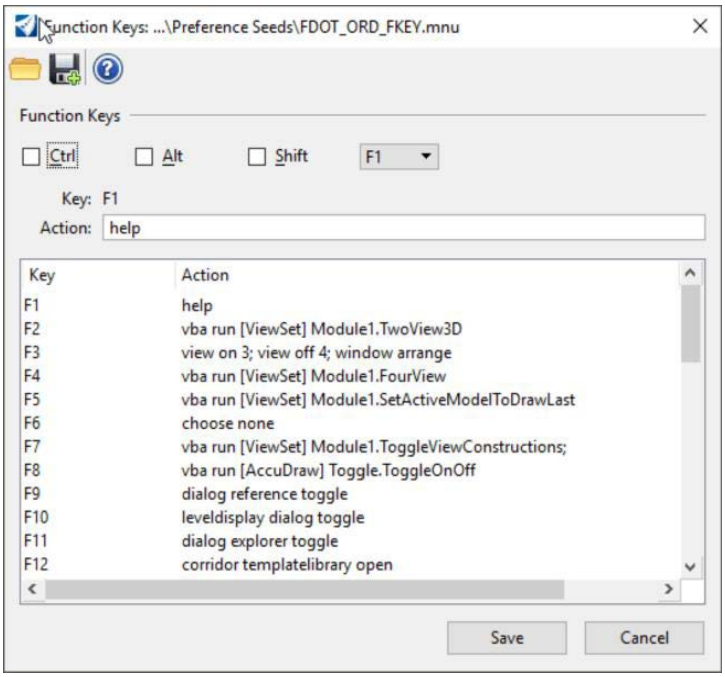


FDOTConnect WORKSPACE PREFERENCES:

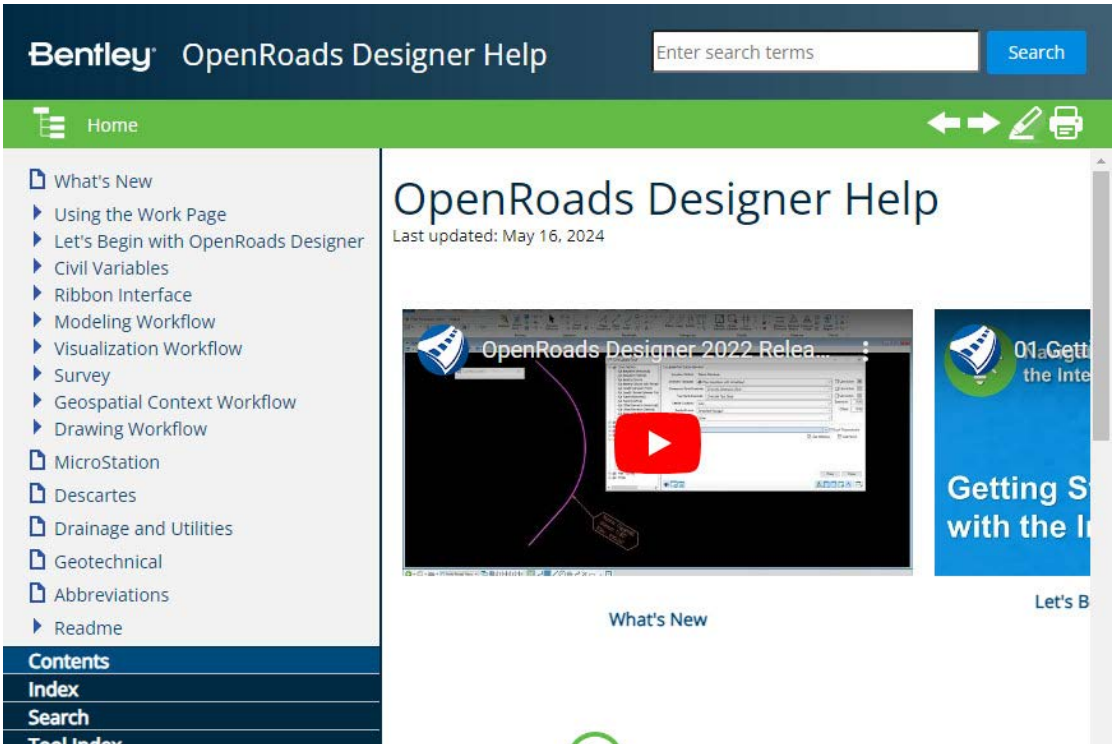


FDOTConnect FUNCTION KEYS

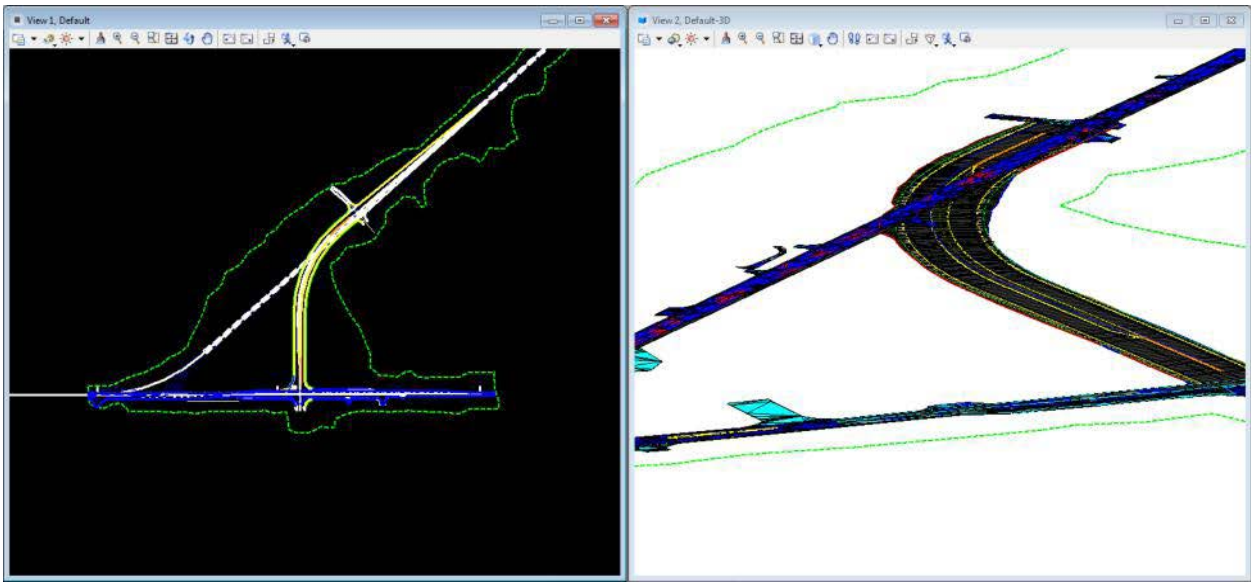
FDOTConnect Function Key Assignments	
F1	Opens the OpenRoads Designer OnLine Help. Ctrl+F1 Closes all Views except View 1.
F2	Open View 1 (2D Plan) and View 2 (3D Isometric) and fits both views.
F3	Opens View 3 (2D Plan), closes all View 4, and arranges all Views.
F4	Open View 1 (2D Plan) , View 2 (3D 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.



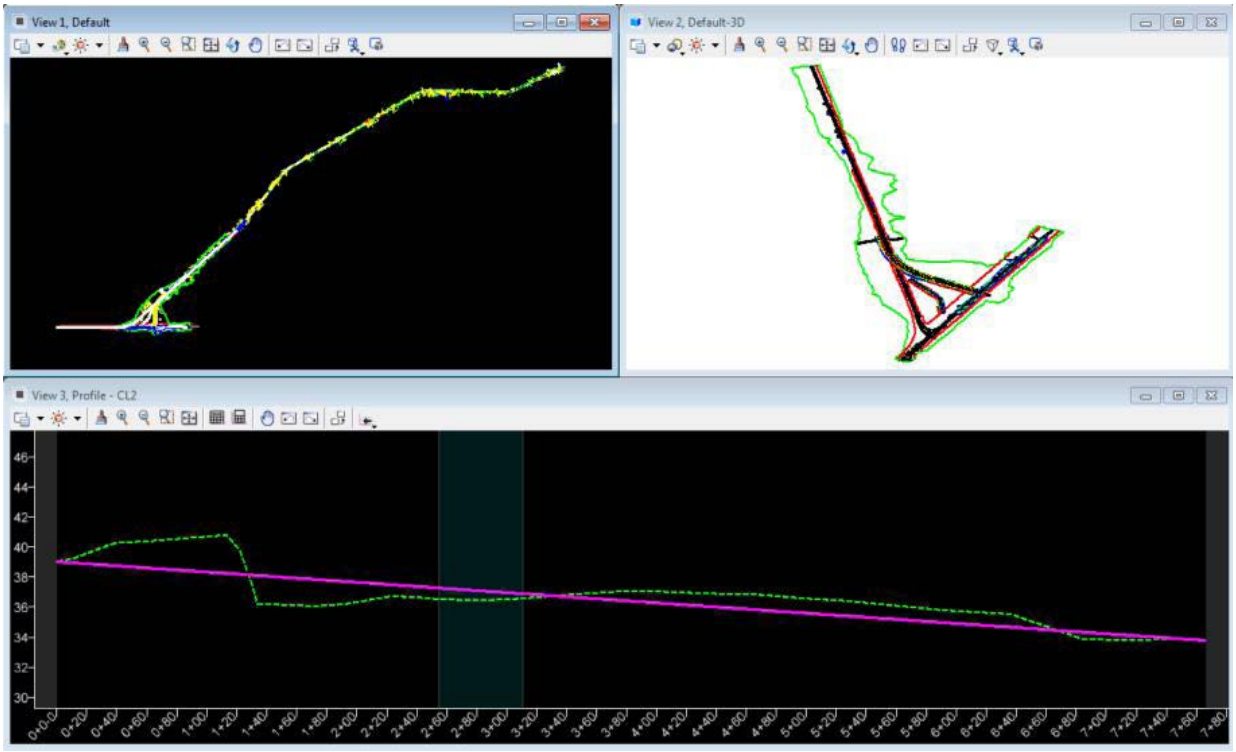
Function Key F1 – Civil Help



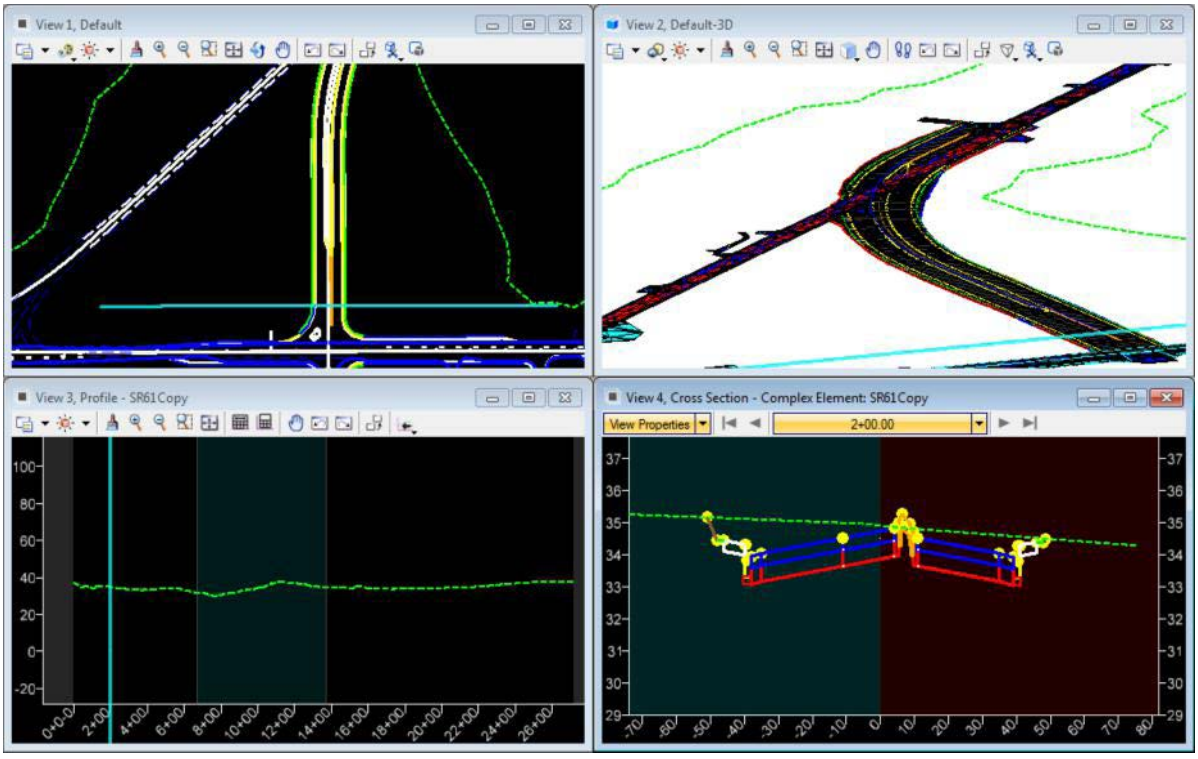
Function Key F2 – Open and Fits Two Views Setup; View 1- 2D Plan, View 2-Isometric.



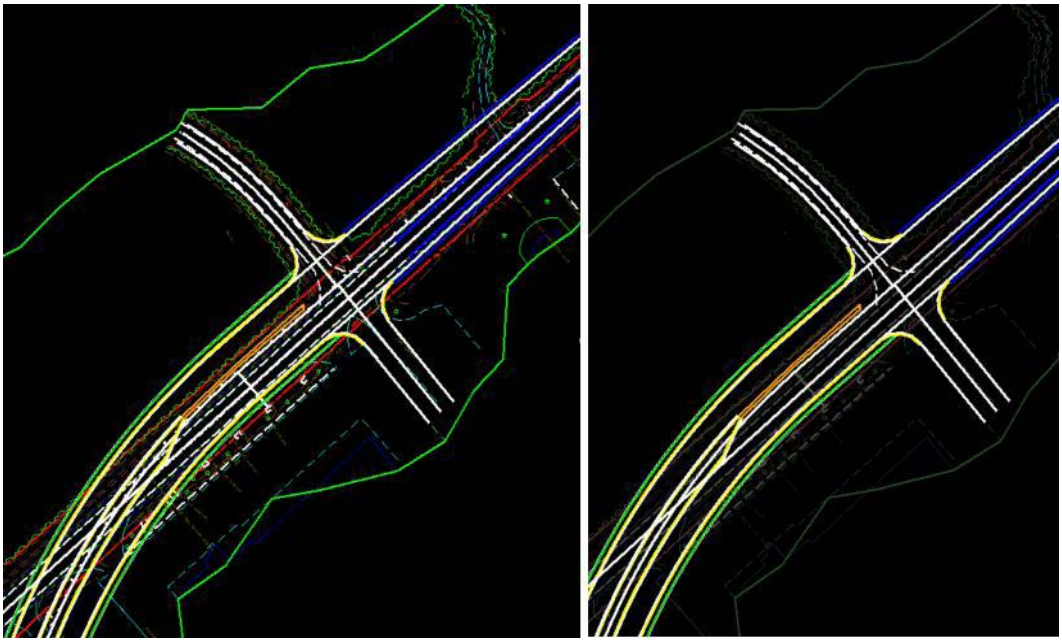
Function Key F3 – Opens View 3; Closes View 4 and Arranges Views.



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

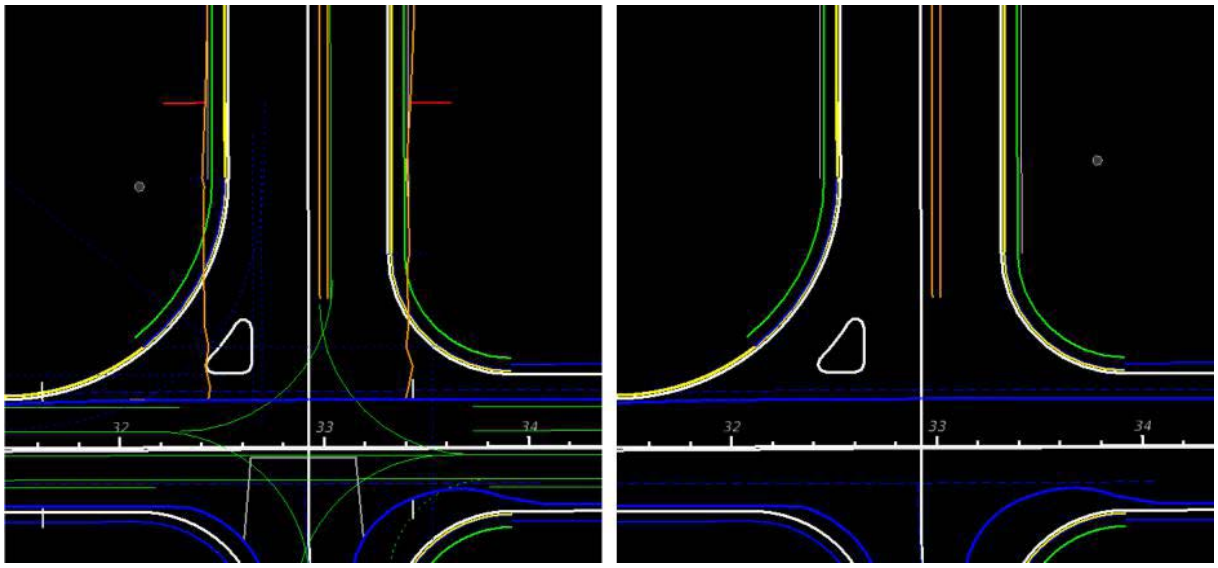


Function Key F5 – Toggle Dim References.

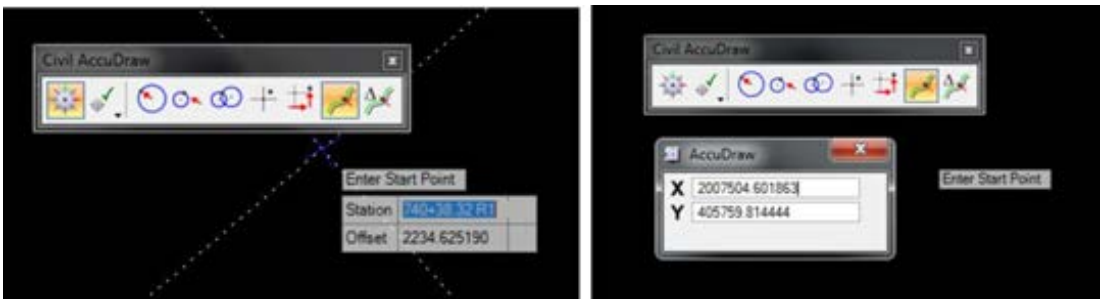


Function Key F6 – Resets Out of Any Ongoing Commands.

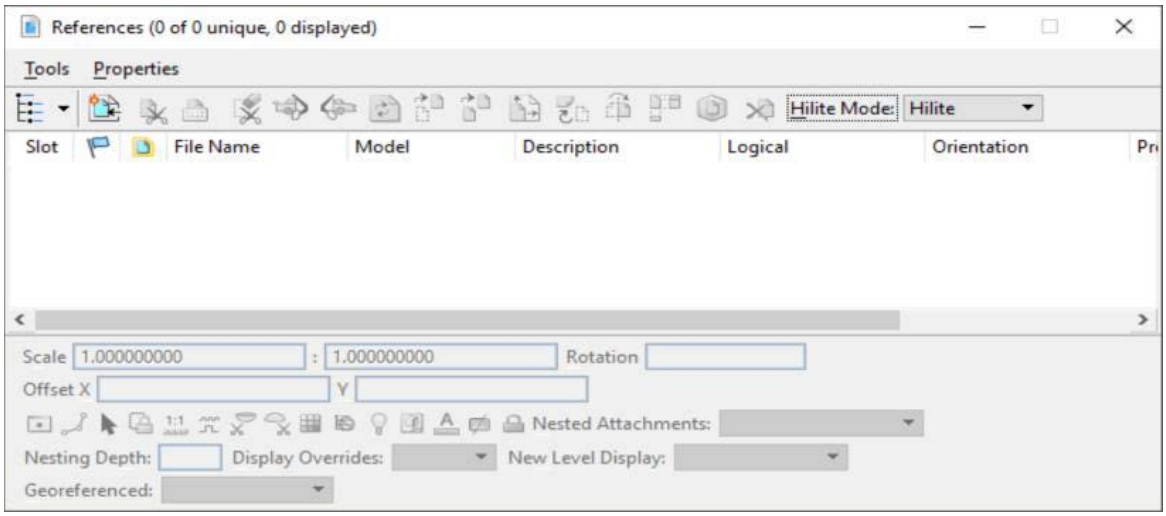
Function Key F7 – Toggles On/Off Construction View Attributes.



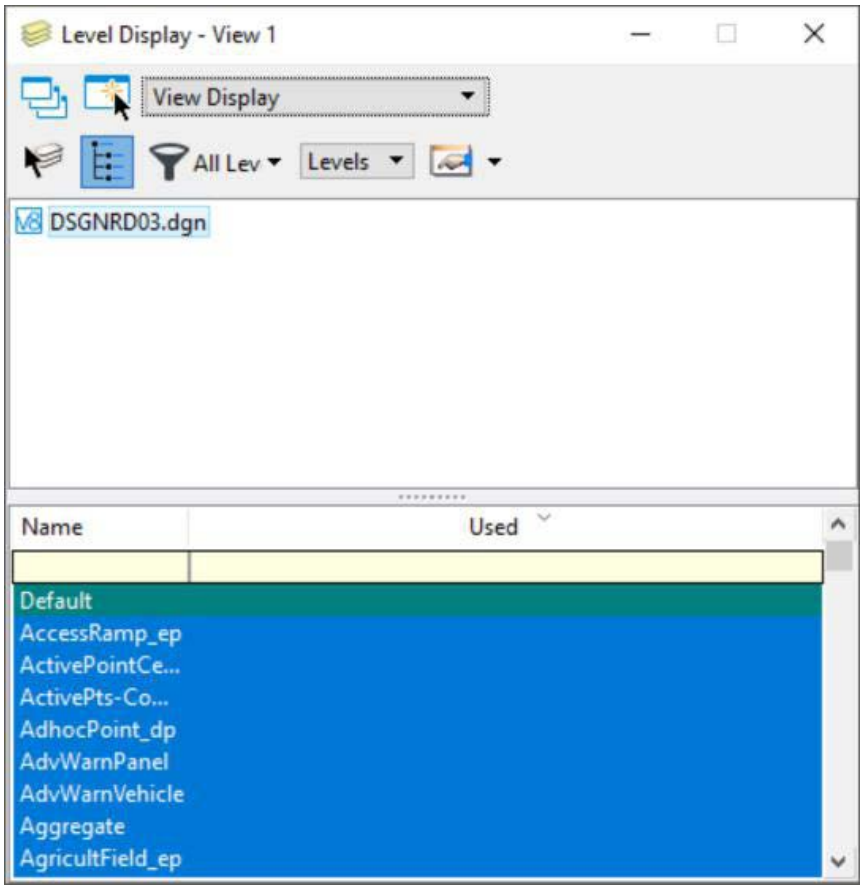
Function Key F8 – Toggles Between MicroStation AccuDraw and Civil AccuDraw.



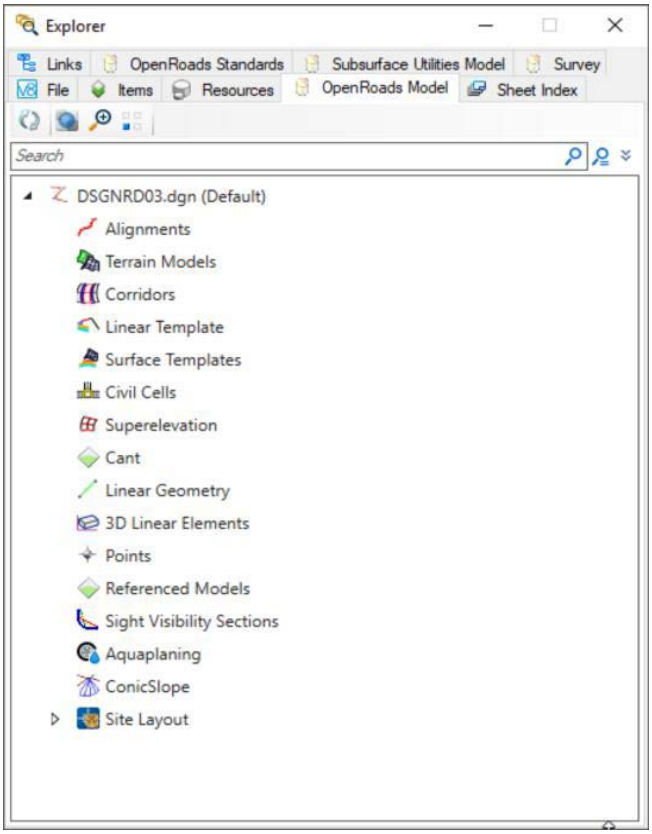
Function Key F9 – Toggles *Reference* Dialog Open\Close.



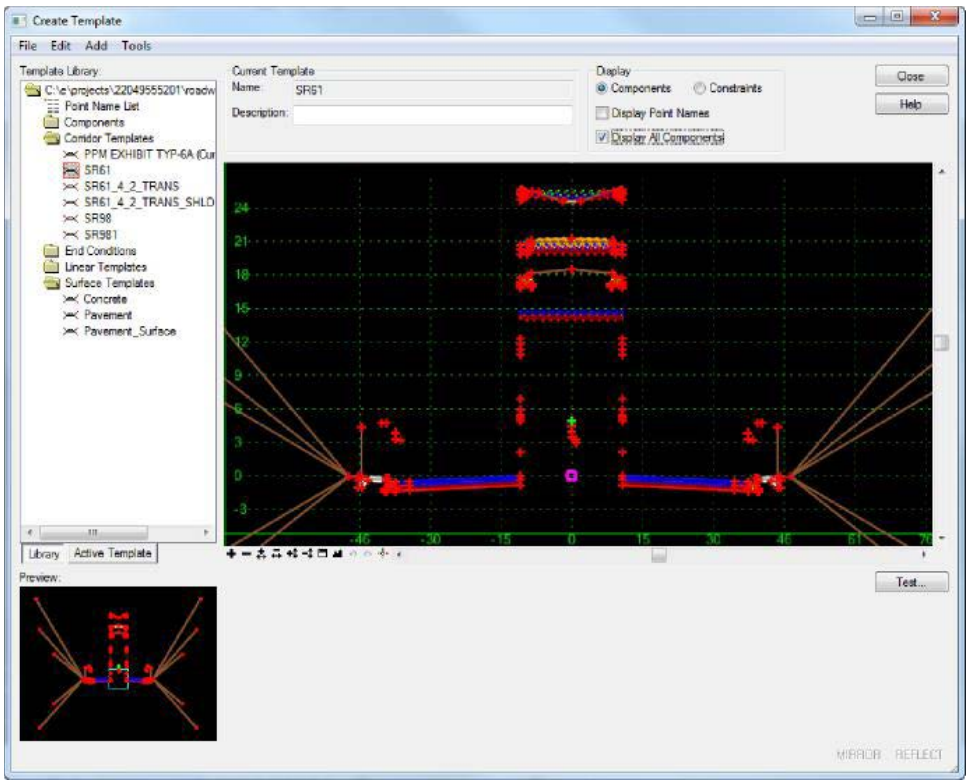
Function Key F10 – Toggles *Level Display* Dialog Open\Close.



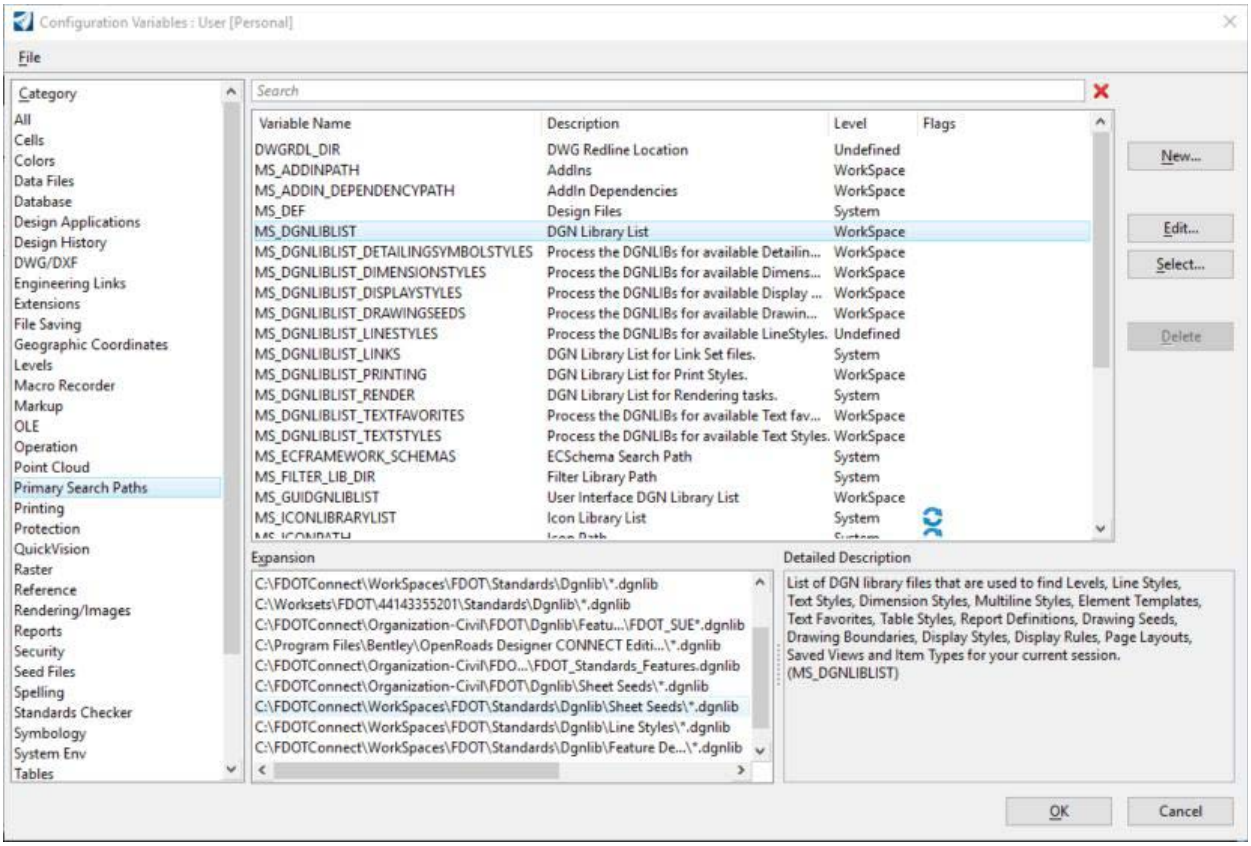
Function Key F11 - Toggles *Explorer* Dialog Open/Close.



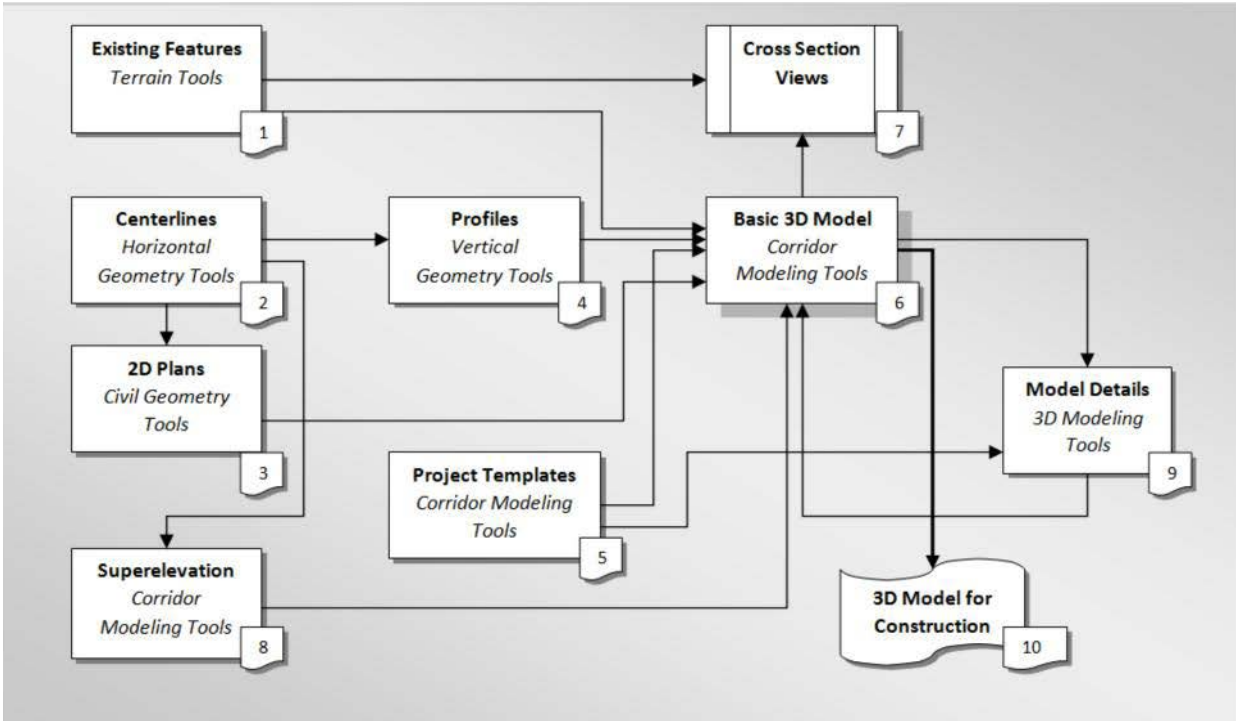
Function Key F12 - Corridor Modeling, Opens *Create Template* Dialog.



FDOTConnect USER CONFIGURATION VARIABLES



FDOTConnect DESIGN AND 3D MODELING OVERVIEW



GENERAL WORKFLOW AND CHAPTER OUTLINE

1. Design Centerlines Alignments
2. Prepare 2D Plan Layout
3. Design Profiles

RECOMMENDED MICROSTATION SETTINGS

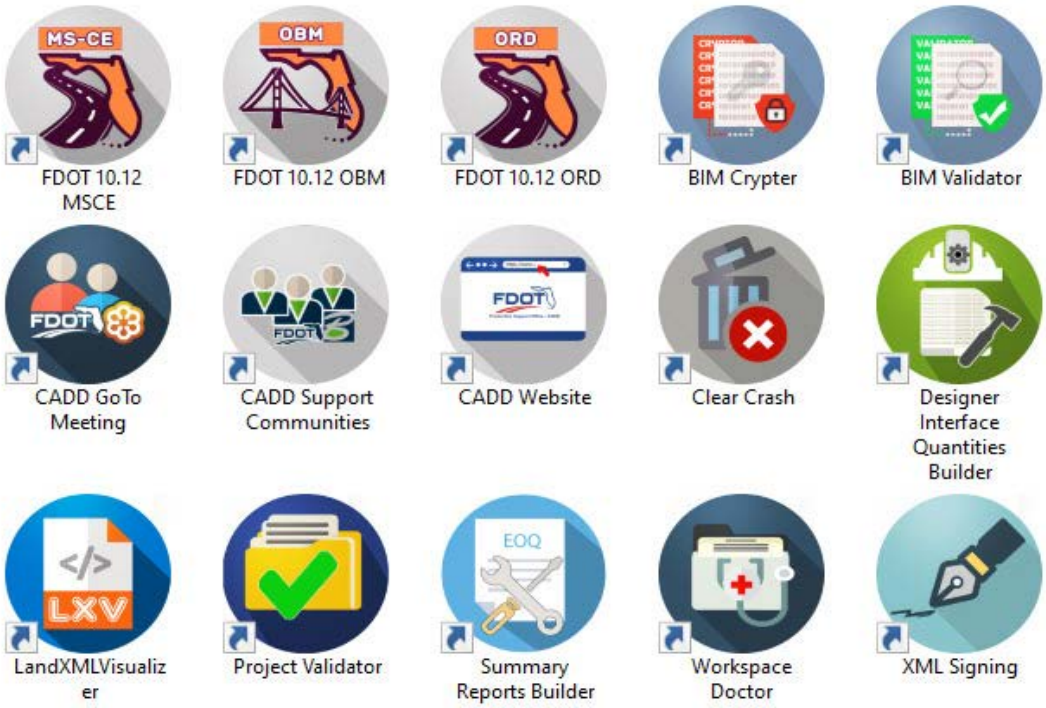
Various tools and settings will be used throughout the workshop. Therefore, for quick accessibility, several of the dialogs are better docked on the sides the MicroStation view.

LAUNCHING FDOTConnect FOR OPENROADS DESIGNER

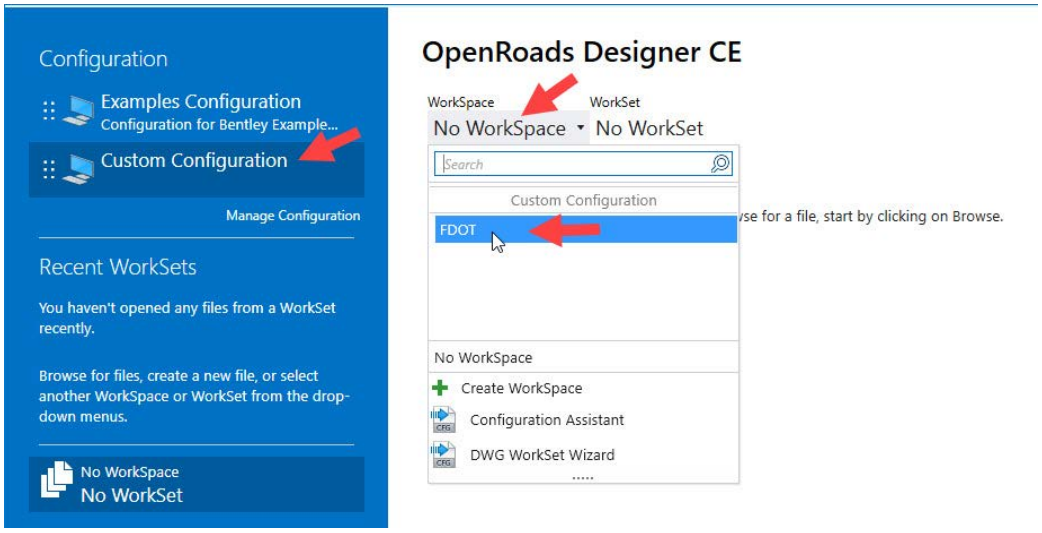
FDOTConnect can be launched from the icons located in the FDOTConnect folder on your desktop. The first time it is launched, it is important to select the Custom Configuration and the FDOT WorkSpace from the WorkSpace dropdown.

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

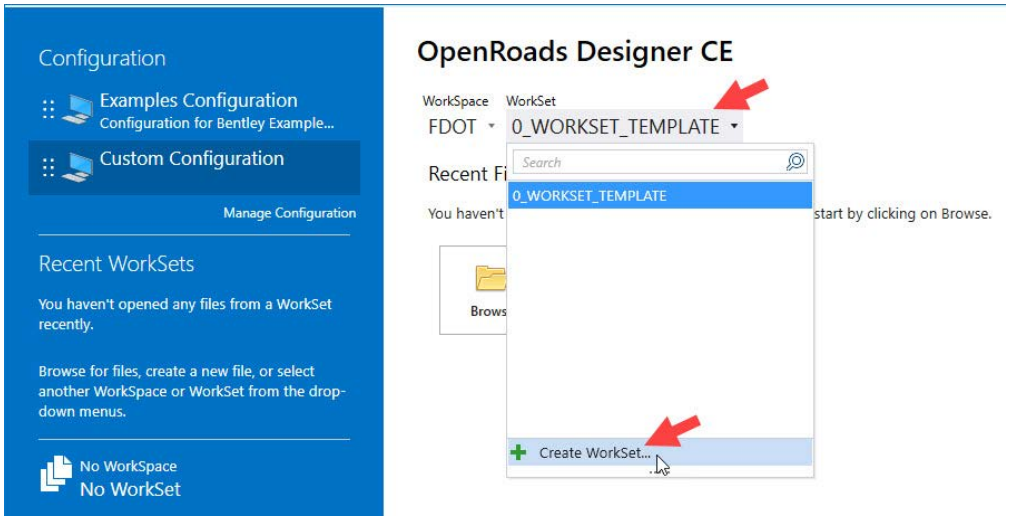
2. Launch FDOTConnect for OpenRoads Designer by double-clicking one of the FDOT icons. Note that your FDOTConnect launch icons will vary depending on which Bentley Connect Edition platforms you have installed. FDOTConnect will create an icon for OpenRoads Designer, an icon for Microstation Connect Edition (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.



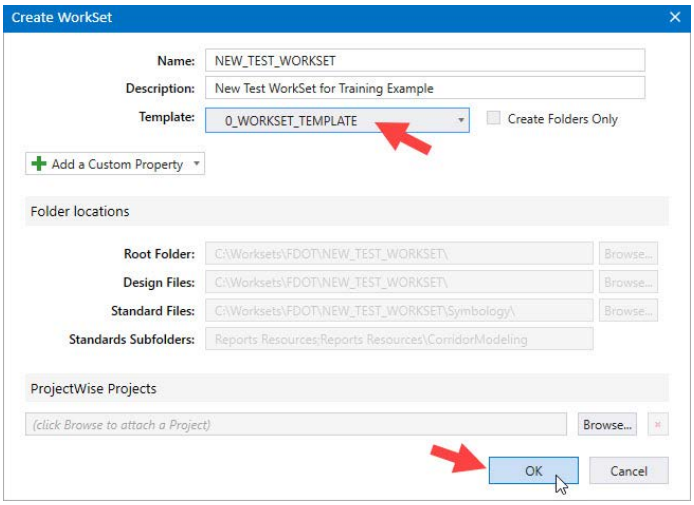
1. In the Configuration section, select *Custom Configuration*, then in the *WorkSpace* drop down menu, select *FDOT*.



2. From here, you can now create a new WorkSet. This is done by selecting the *WorkSet* drop-down menu and choosing **Create Workset.**

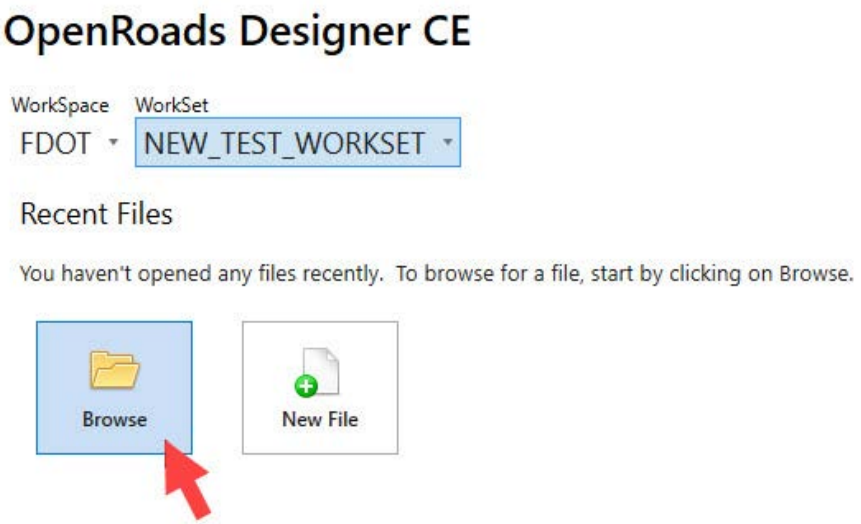


4. Click **OK** after filling in the *Create Workset* dialog.

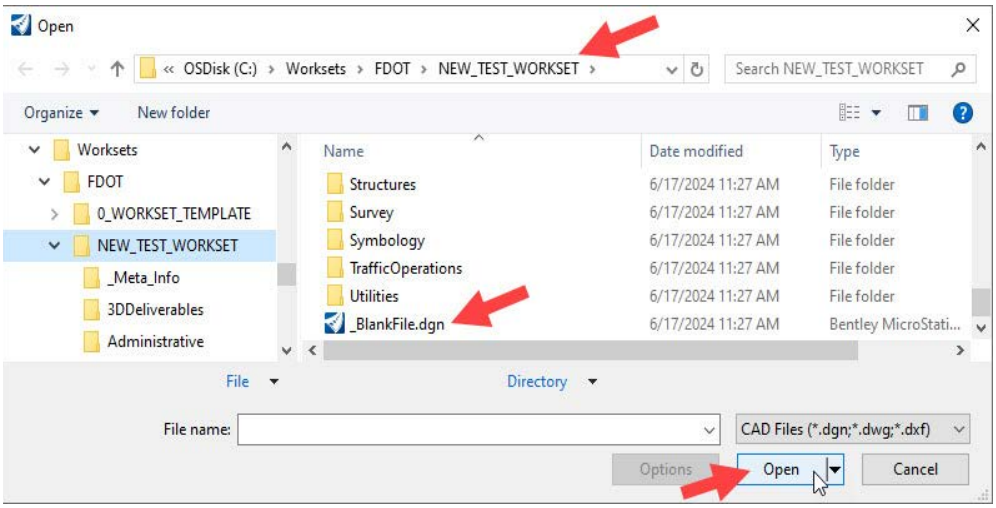


5. After creating a new project using the FDOT Workset Template, you can create new files using the **FDOT Create File** tool. This tool is launched from within the FDOTConnect WorkSpace, so you must first open a file. The FDOT Workset template includes a blank starting file from which to launch the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

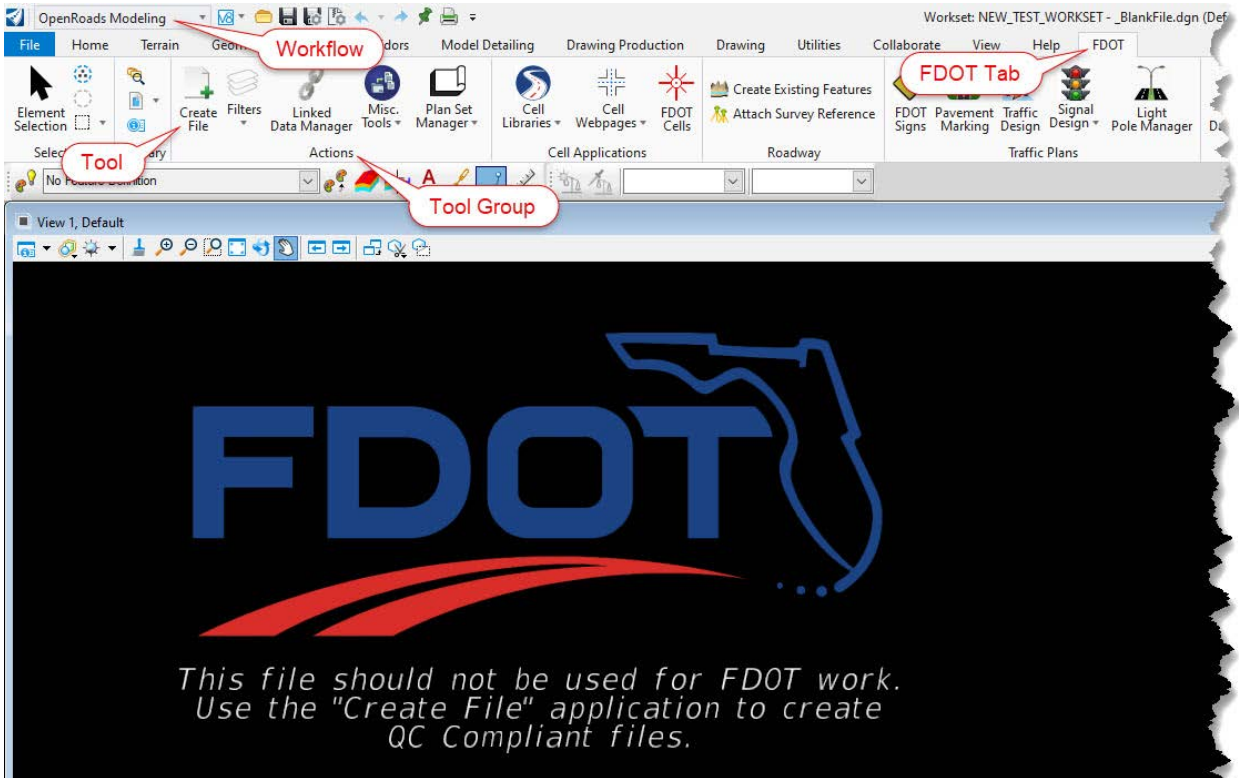
6. From the OpenRoads Designer file *Open* dialog, select **Browse** to browse the contents of your new Workset.



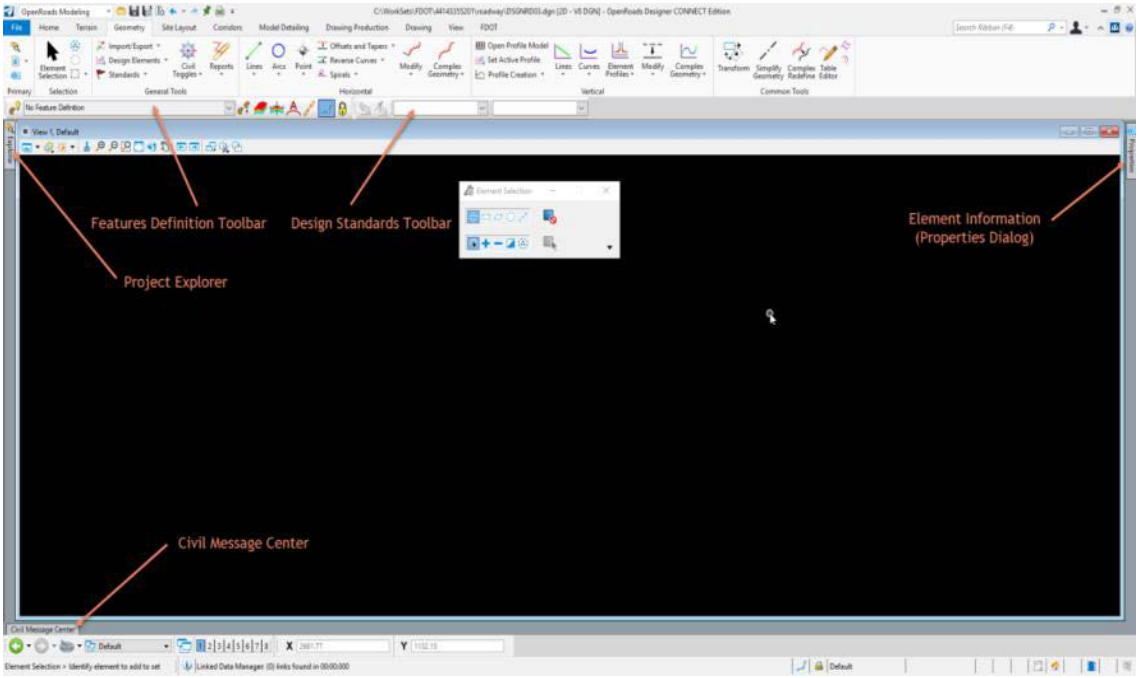
7. Locate *_Blankfile.dgn* at the root of your workset folder structure. Select this file and then select **OPEN** to open it.



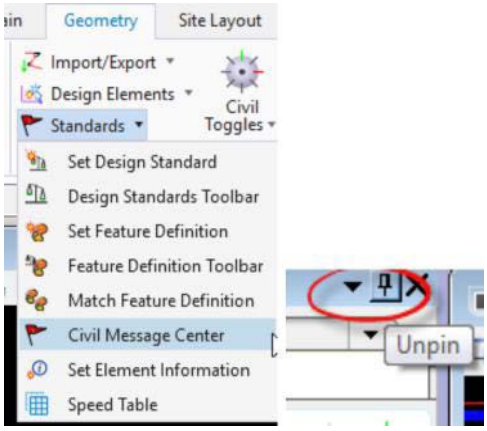
8. When the FDOTConnect WorkSpace opens, you can locate the FDOT ribbon by selecting the *OpenRoads Modeling* workflow from the menu at the top left of the screen. The **FDOT** tab is located at the far right of this ribbon. Select **Create File** to launch the **Create File** tool for creating **FDOT**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



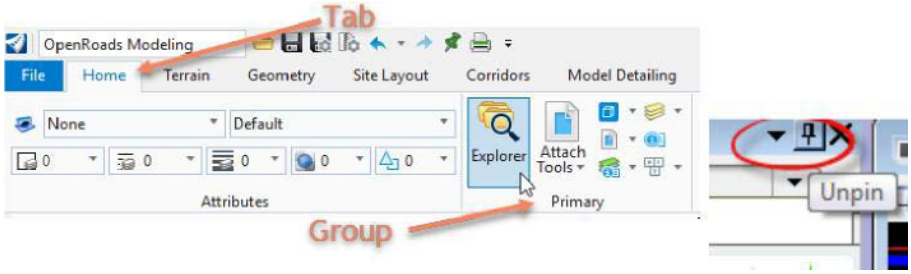
MENU DOCKING



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.

NOTE ***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.***

1 2D DESIGN GEOMETRICS ALIGNMENTS

INTRODUCTION

This chapter will introduce four (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

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.*dgn*lib 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.

OBJECTIVES

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 210.12.1

- 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***

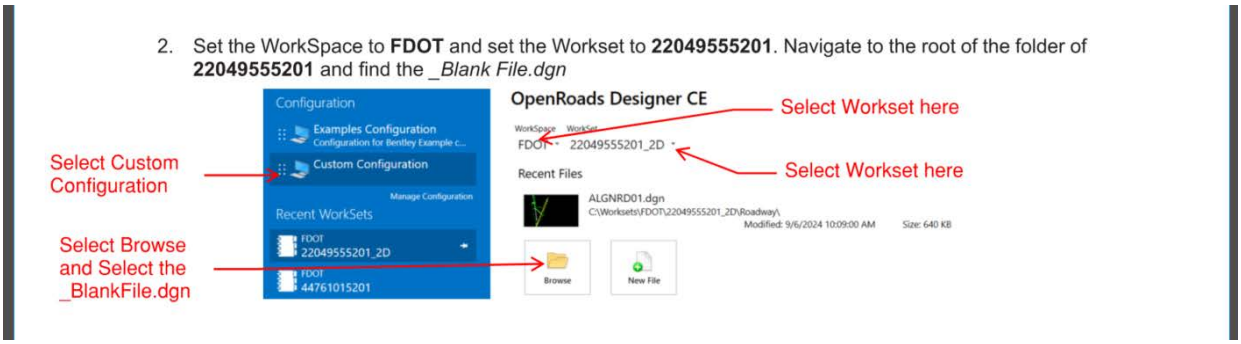
EXERCISE OVERVIEW

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.

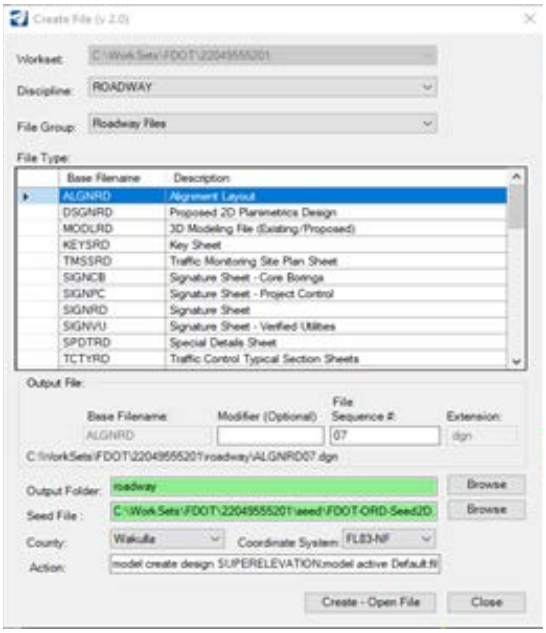
1. From the desktop FDOTConnect folder, double-click on the **FDOTConnect for OpenRoads Designer** icon.

2. Set the WorkSpace to **FDOT** and set the Workset to **22049555201**. Navigate to the root of the folder of **22049555201** and find the *_Blank File.dgn*



3. Once the file opens navigate to FDOT Ribbon Tab of the OpenRoads Modeling WorkFlow looking for the Actions Group click on the **Create File**. **OpenRoads Modeling > FDOT > Actions**

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



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

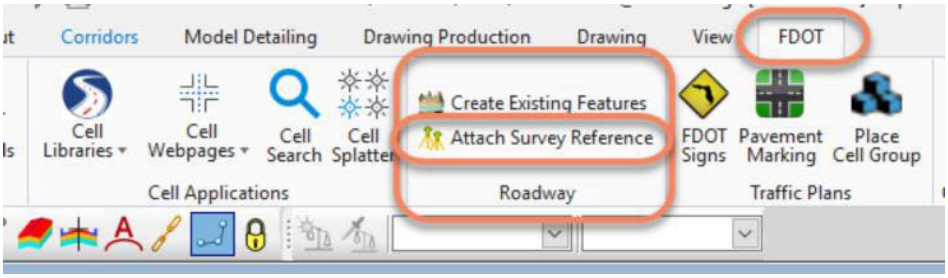
b. Select your County, by selecting this the correct coordinate system will be selected.

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

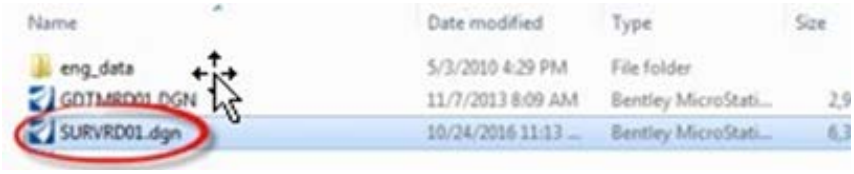
d. You are now in the *ALGNRD01.dgn* Click **Close***.*

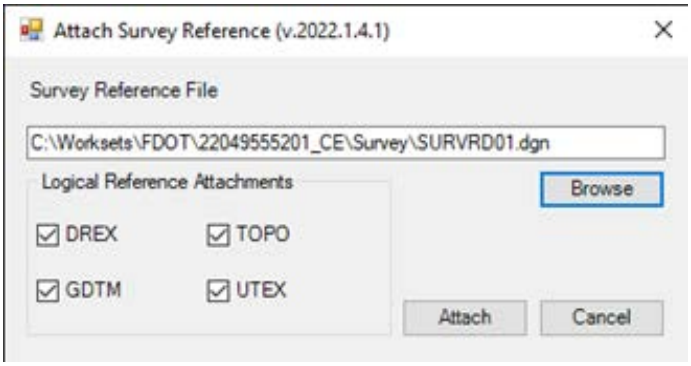
e. Navigate to the models Dialog, you will notice that during the creation of the ALGNRD a new model of **SUPERELEVATION** was created.

5. 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**

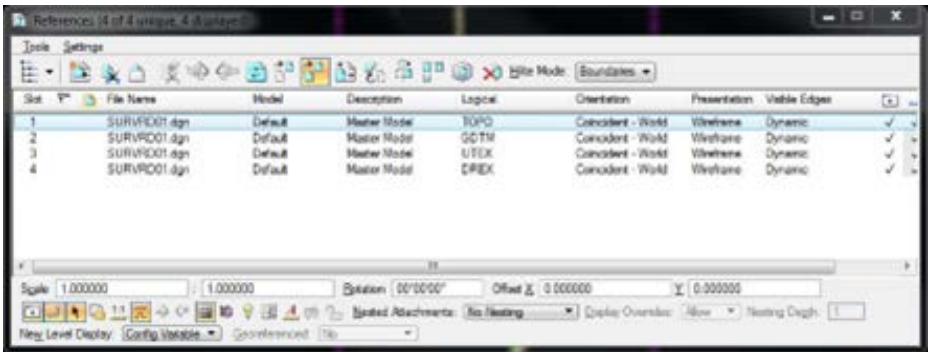


6. Select the *SURVRD01.dgn* file located in the Survey folder then select **Attach**.





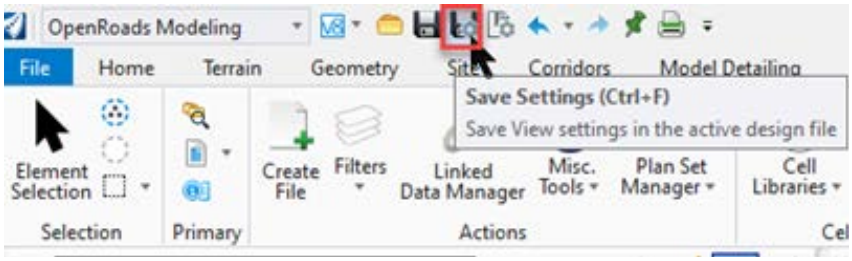
7. From the Function key F9 (toggles on the Reference Dialog) to view the attached files:



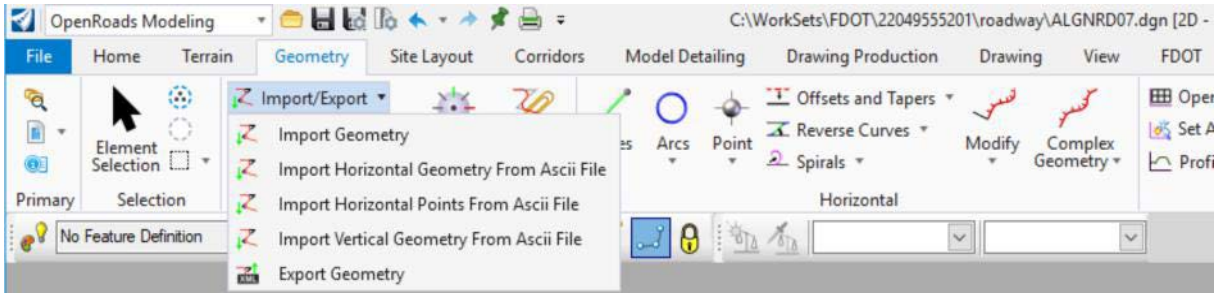
8. From the Function key F9 (toggles on the Reference Dialog) and attach the following files:

   - C:/Workset/FDOT/22049555201/Survey/*TOPORD01.dgn (disregard if SURVRD exists)*
   - C:/Workset/FDOT/22049555201/ROWMap/*RWDTRD01.dgn*
     Set the Logical Name to **RWDTRD**
   - C:/Workset/FDOT/22049555201/Roadway/*AERIALS.dgn*
     Set the Logical Name to **AERIALS**

9. Fit View and the select Save Settings.

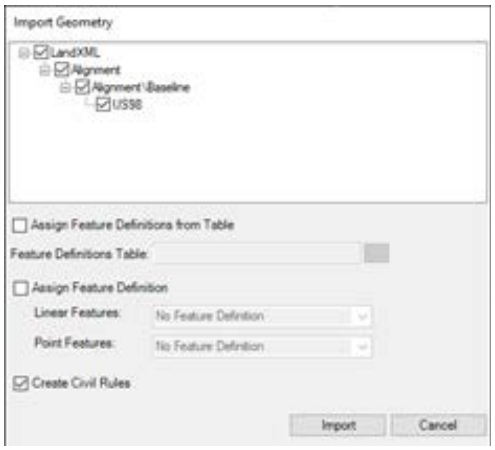


10. Use the OpenRoads Modeling workflow to locate the Geometry Tab, then in the General Tools Group is where you will find import tools, Import/Export tool – import Geometry and select the Landxml file in the Roadway folder to import alignments. We are loOKing for the file name US98. xml. **OpenRoads Modeling > Geometry > General Tools > Import/Export > Import Geometry**



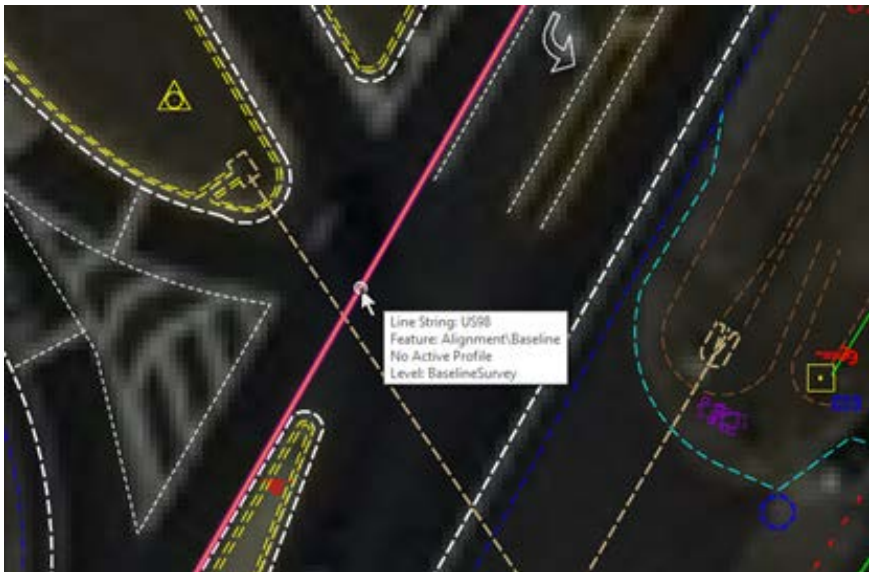
   a. Navigate to the **Roadway > US98.xml**.

b. Click in the box to select **US98**. Select **Import.**

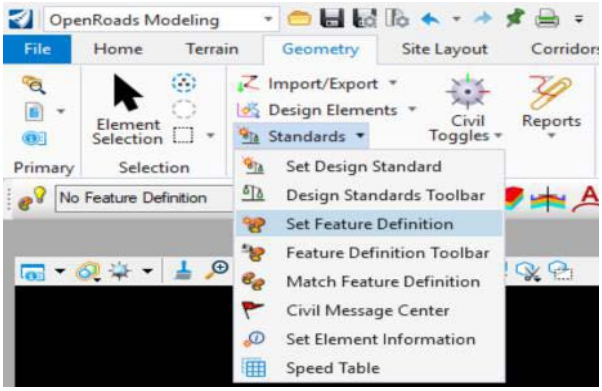


c. Repeat this process to import the existing baseline for SR61. The file name of this LandXML is *EX61.xml.*

11. 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.

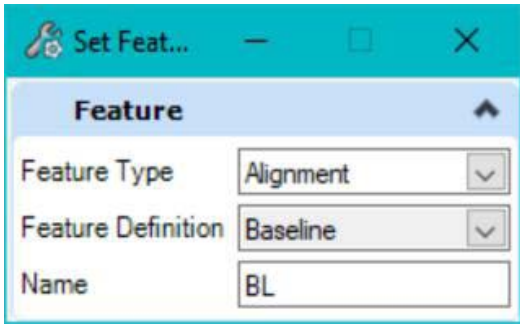


12. Use *Geometry Tab, and the General Tools Group*, and then click on the Standards icon bring up the dropdown list that for the Set Feature Definition Tool. **OpenRoads Modeling > Geometry > General Tools > Standards > Set Feature Definition**

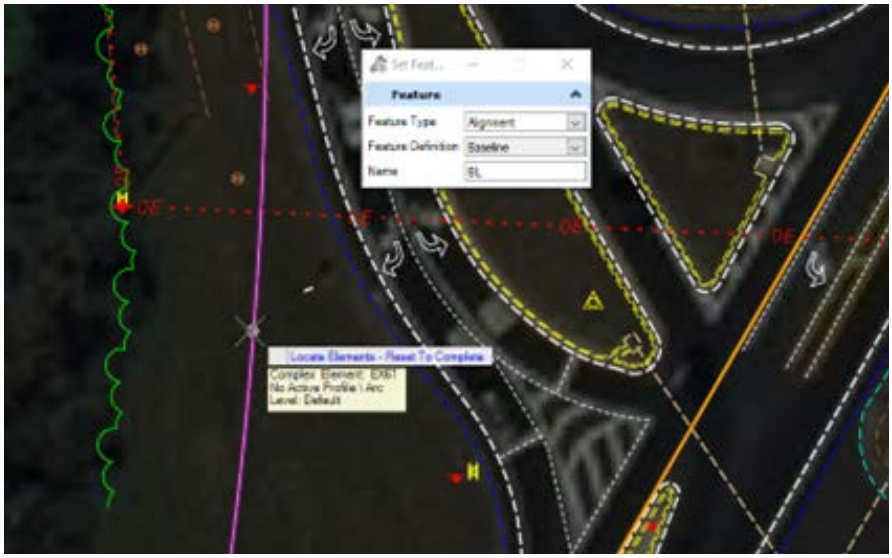


a. Set the *Feature Type to* **Alignments**.

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



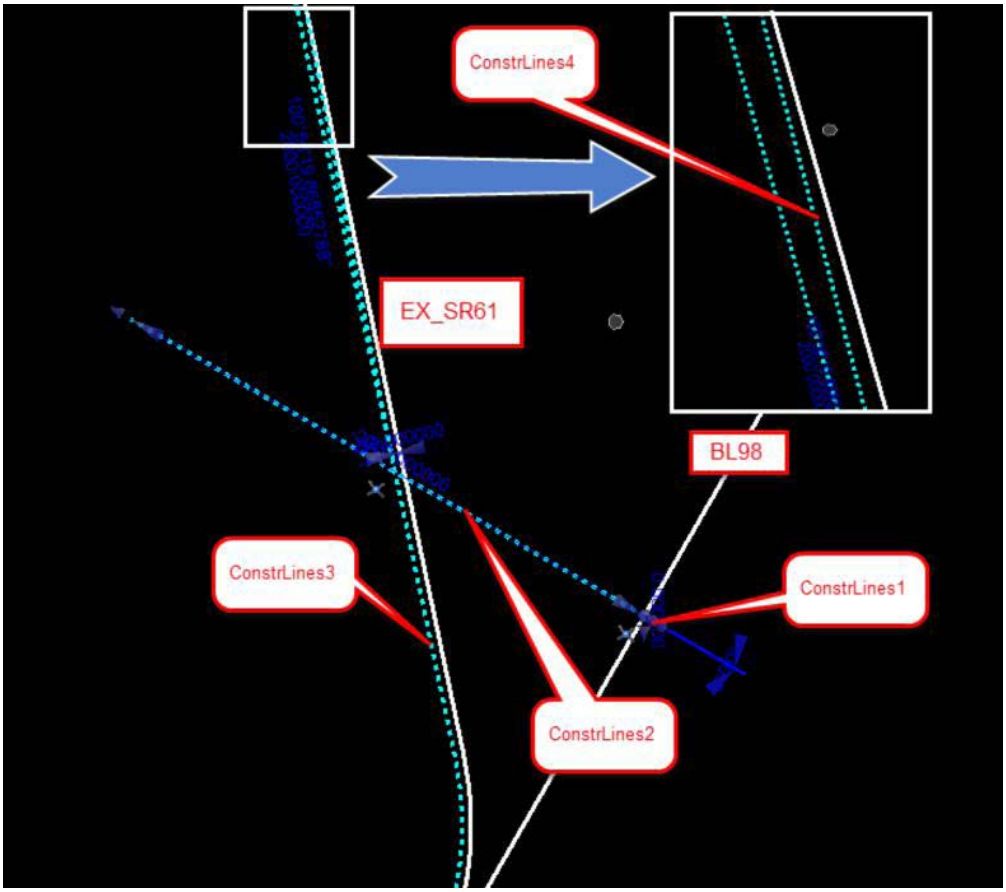
c. Select the **EX-SR61**, then click **Reset** to set the *Baseline Feature* on the line.



13. 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.

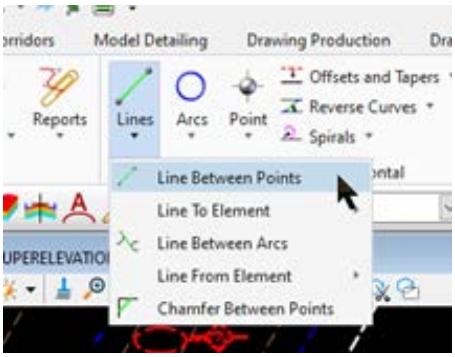


ConstrLines1

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

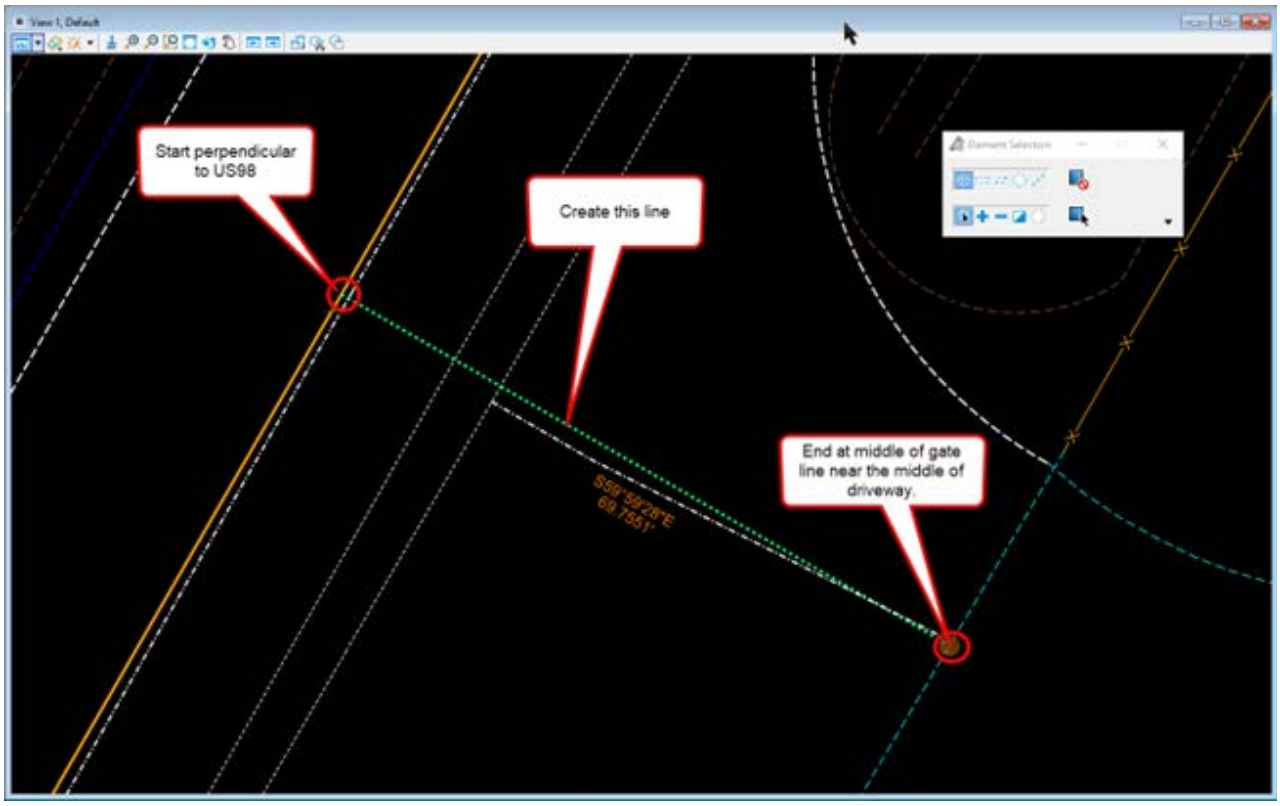
2. Now that the new intersection is located, turn the *display* **OFF** for the *Aerial Reference file*.

3. Use the Geometry Tab and the Horizontal Group, to select the Line dropdown menu and 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.

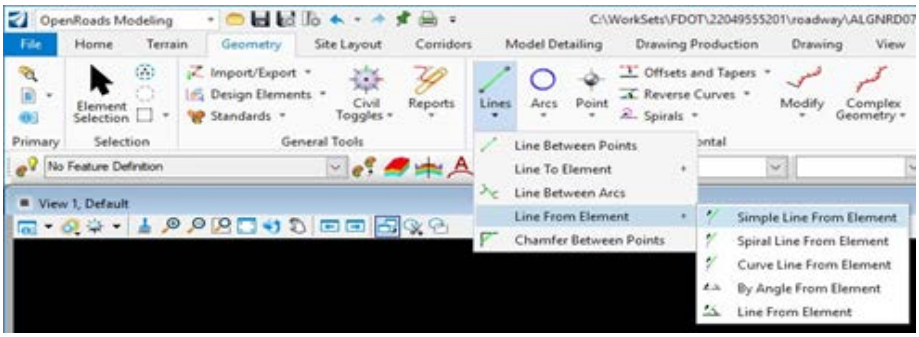
b. Start a line perpendicular to US98 and ending at the middle of the Gate line near the middle of the Driveway.



ConstrLines2

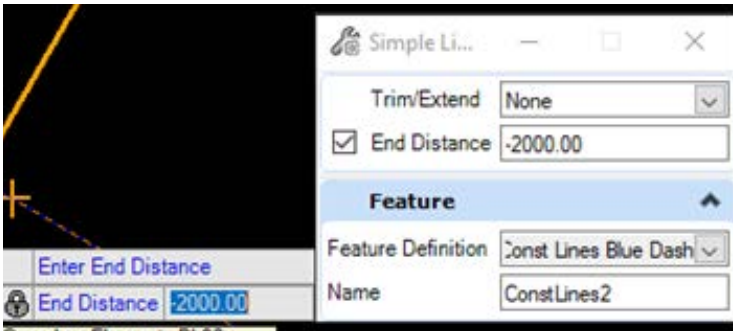
1. Use *the Geometry Tab and the Horizontal Group*, to select the **Simple Line From Element** tool.

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 *US98.*



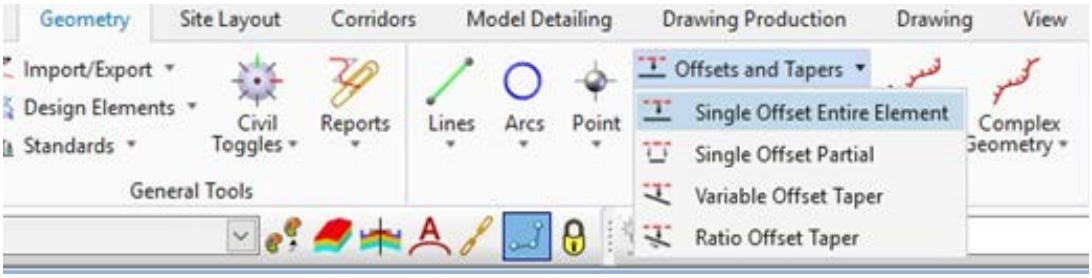
4. Enter a *Distance* of **-2000 feet**. **Data point** in the View to accept the *Distance*.

5. Data point to accept Trim None.

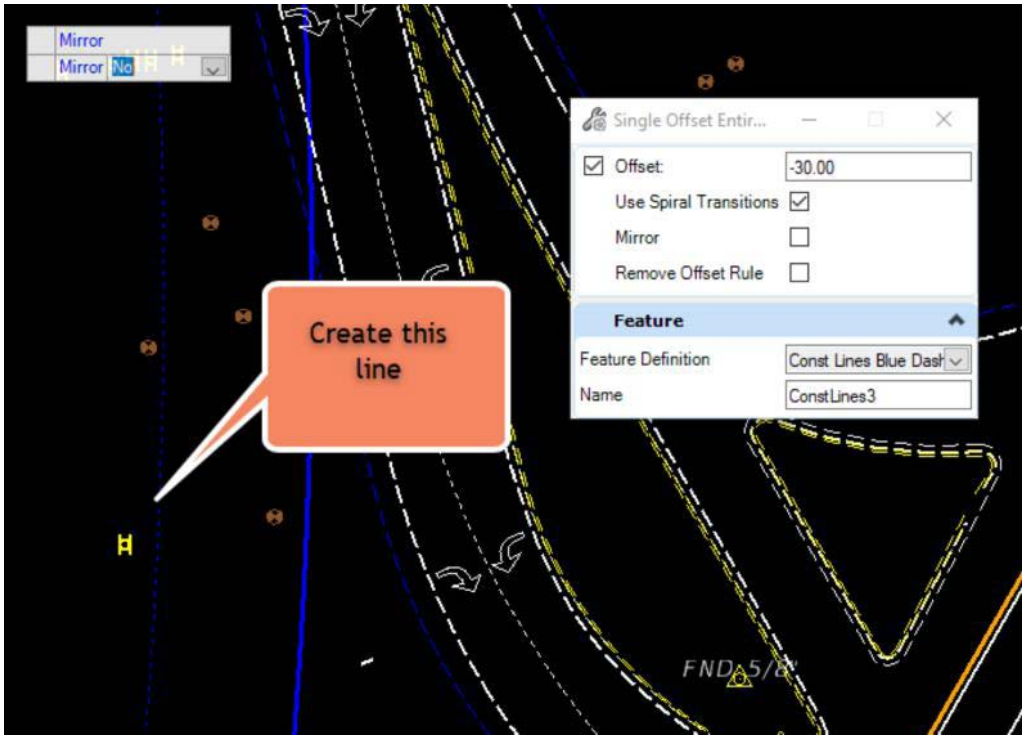
ConstrLines3

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

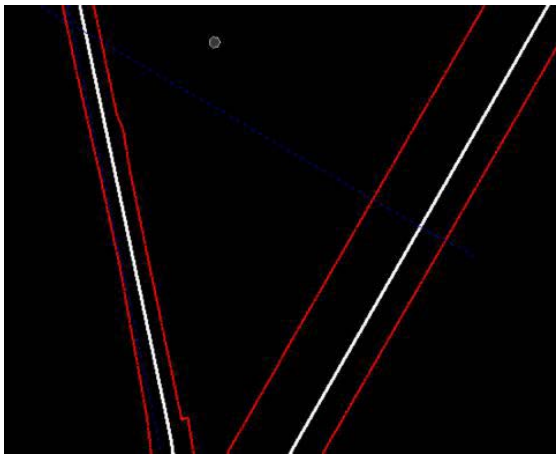
OpenRoads Modeling > Geometry > Horizontal > Offsets And Tapers > Single Offset Entire Element



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**.



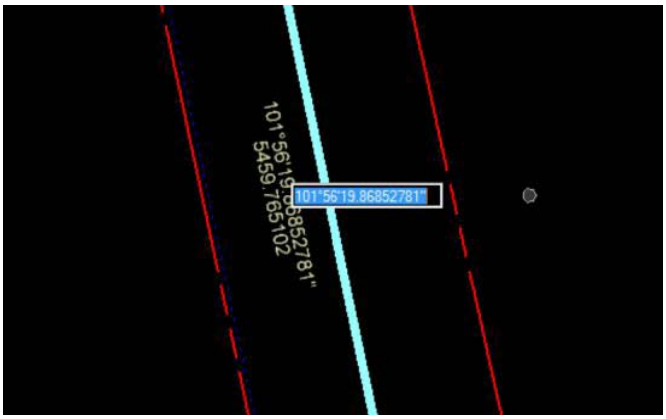
5. Once the new line is created, turn the *Display* **OFF** for the SURVRD with Logical Name TOPO in the *Reference dialog*.



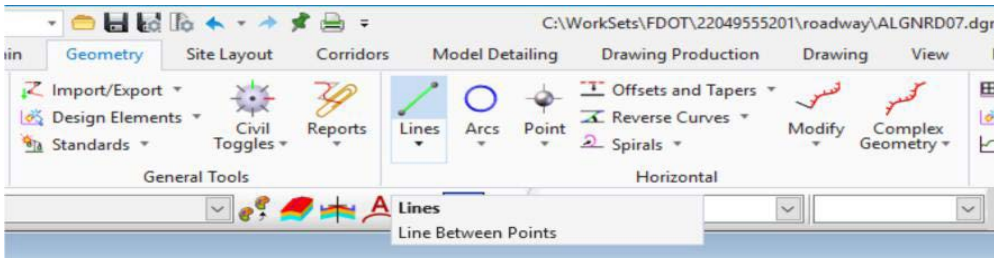
ConstrLines4

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.

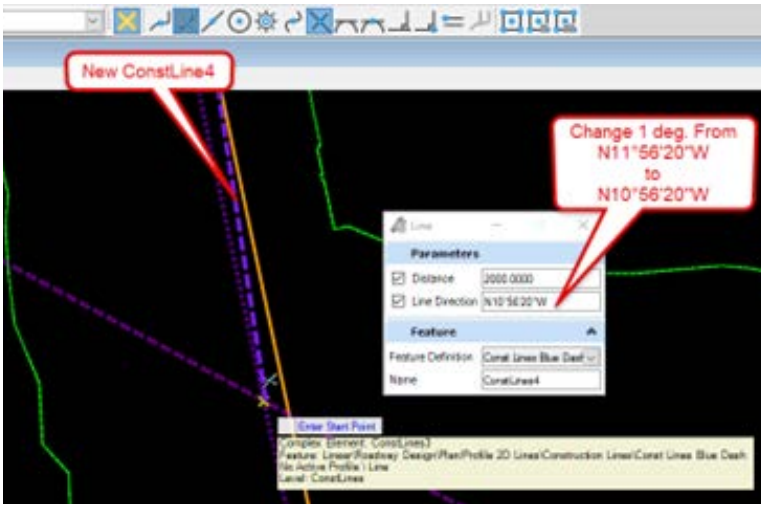


2. Use the Geometry Tab and Horizontal Group, to select the Line Between Points tool. **OpenRoads Modeling > Geometry > Horizontal > Lines > Line Between Points**

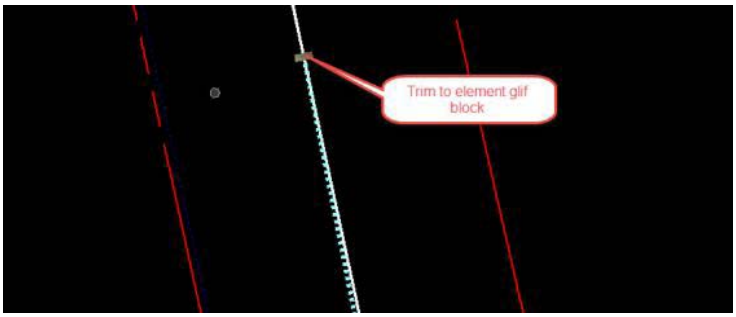


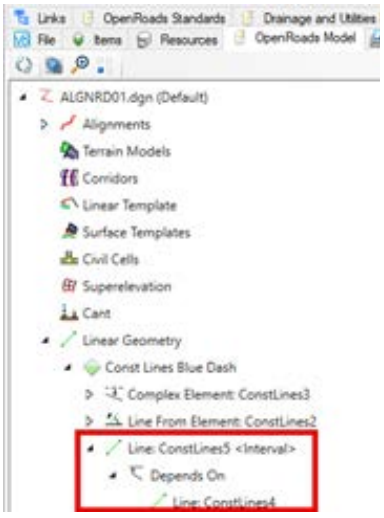
3. Use Feature Definition Const Lines Blue Dash and Name ConstLines4.

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.



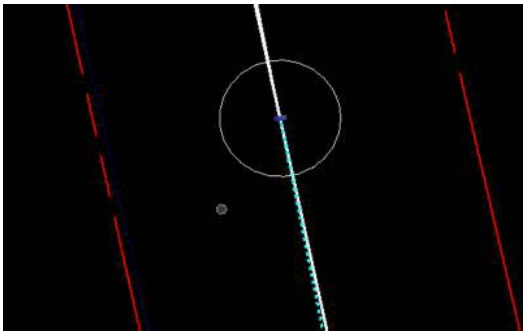
5. Use MicroStation Trim to Element and to Trim ConstLines4 line to intersect EX-61. This step will create an interval element with a new Name of ConstLines5.





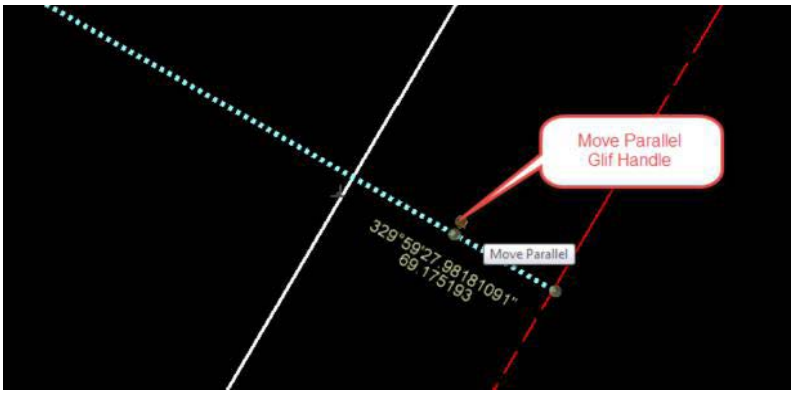
►*Verify the Construction Lines Maintain Design Intent*

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



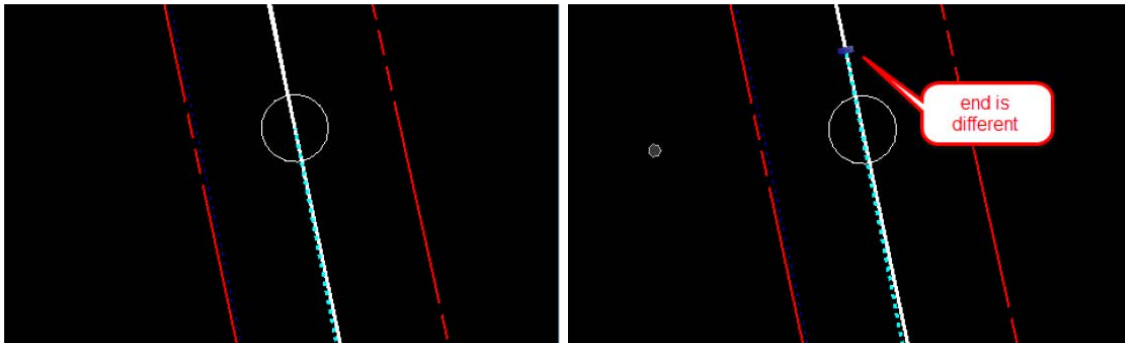
2. Open View 4 and use Copy View from View 1. Zoom into the School Entrance in View 4

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



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

5. Select ConstLines5, Use MicroStation Undo/ Redo to see the end change location.



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

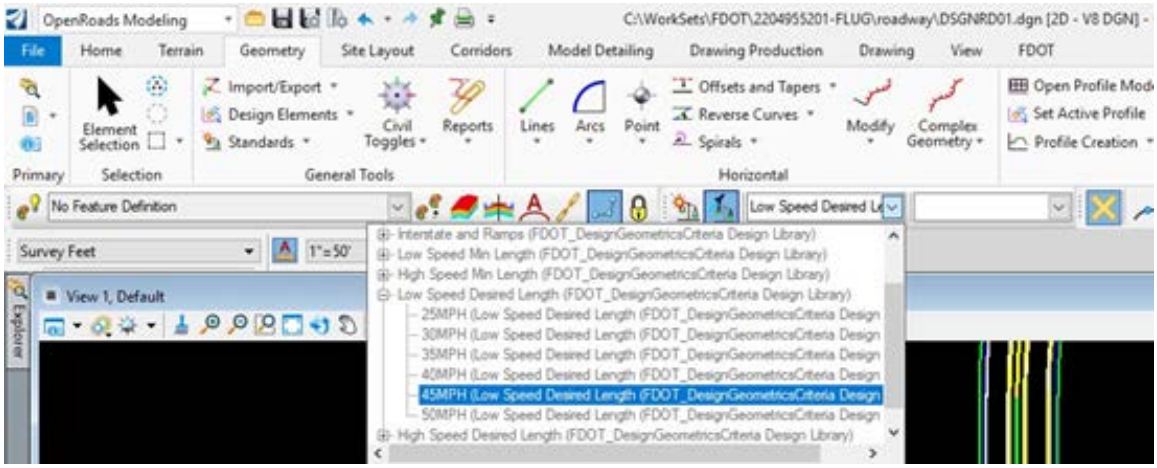
7. (Extra Exercise) Change the Offset Distance of ConstrLines3 from -30 to -40 to verify that the end of ConstrLines4 will change.

8. Select Ctrl Z to undo change.

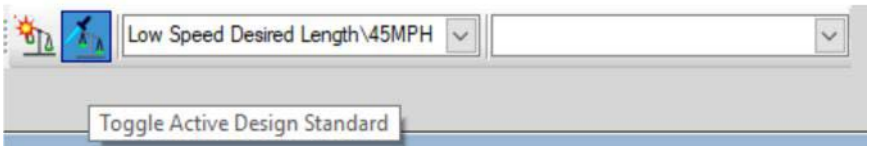
►*Construct a Horizontal Curve between ConstLines2 and ConstLines5 to Meet Geometric Standards.*

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

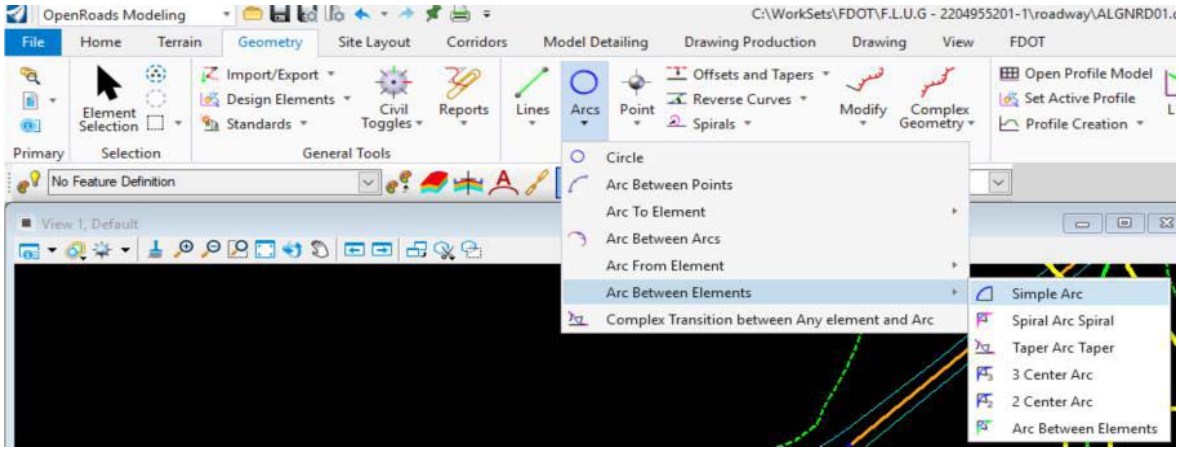
2. Set Active the Design Facility Standard to: Low Speed Desired Length, 45 MPH.



3. Activate the Toggle Active Design Standard icon.

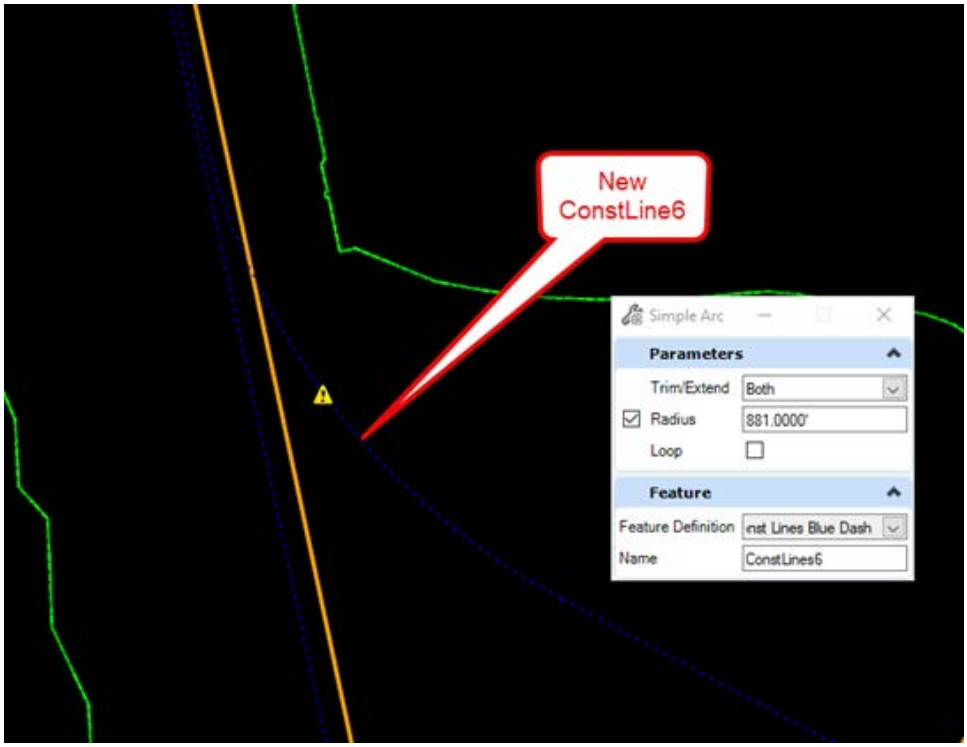


4. Use the *Geometry Tab and the Horizontal Group to select the* **Simple Arc** tool. This tool can be found using the Arcs button then selecting Arcs between Elements Simple Arc. **OpenRoads Modeling > Geometry > Arcs > Arcs Between Elements > Simple Arc**



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

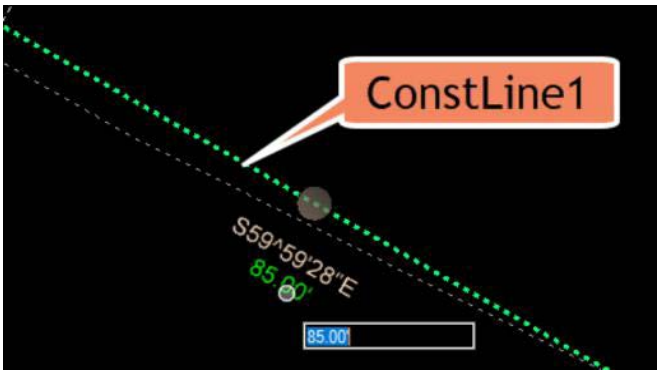
6. Create a Radius between ConstLine2 and ConstLine5 you will notice that setting the Design Standard has set a default value of 2083.00' for the Radius, be sure to change this to 881.00. Set Trim/Extend to Both.



►*Make a Longer Driveway into the School.*

1. Select **ConstLine1** using the element selection tool.

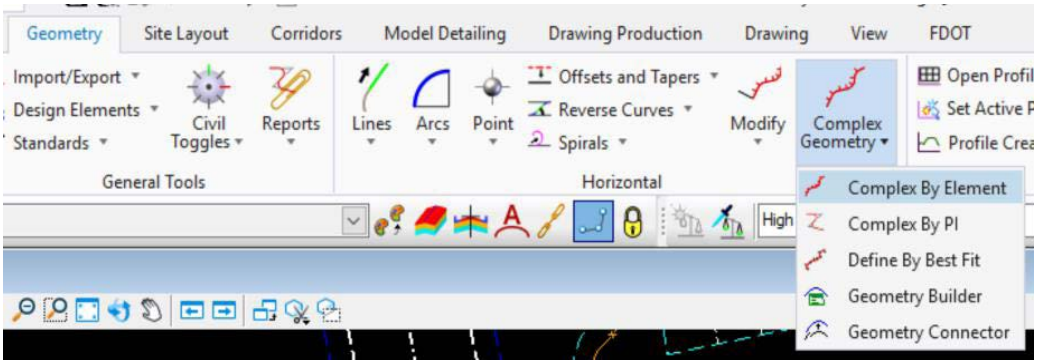
2. Select the manipulator for length, click it and change the length from **85** to **105**



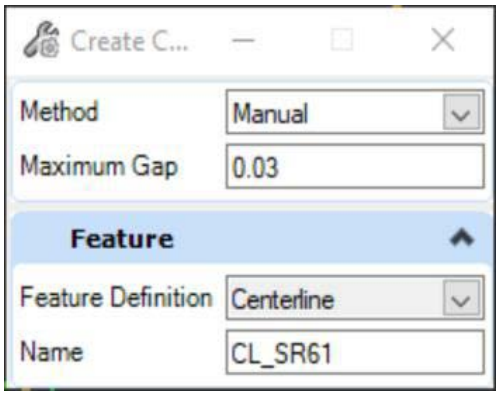
NOTE *After the line is constructed a Warning icon may appear on the line because the Active Design Standard icon is being toggled ON and the tangent length may be less than the minimum 100 feet.*

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

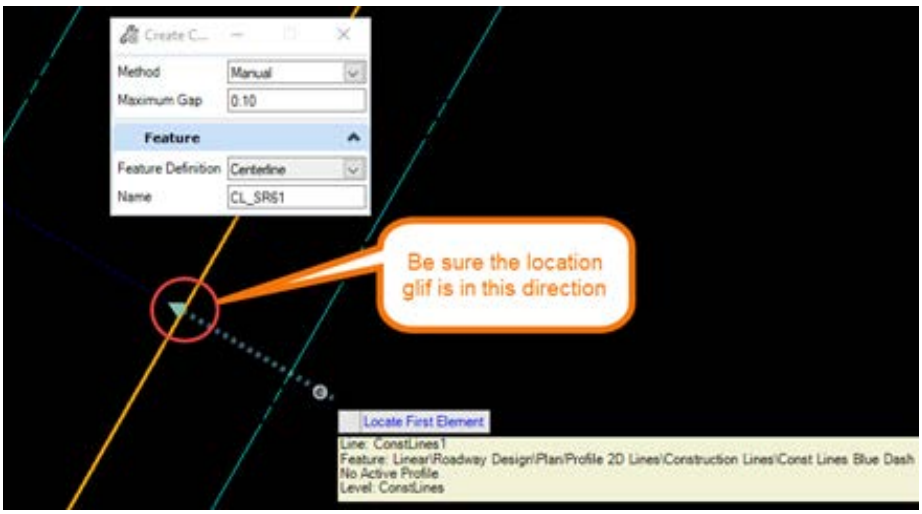
1. **Use the Geometry Tab and Horizontal Group, Complex by Element tool. OpenRoads Modeling > Geometry > Horizontal > Complex Geometry > Complex By Element**



2. Create the new *Alignment* by connecting the elements. Use *Feature Definition* **Centerline** and *Name* **CL_SR61**, with no spaces. Use the **Manual** *Method.*



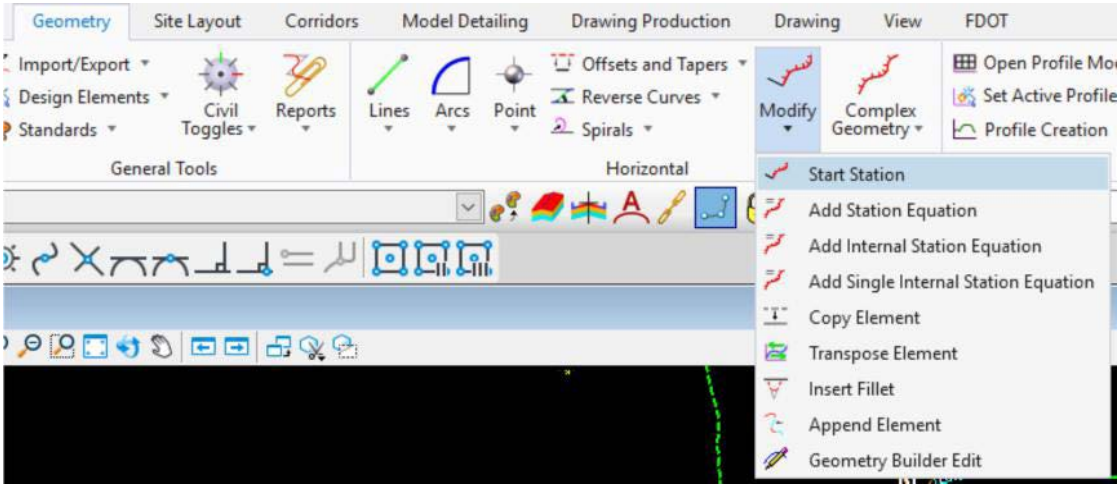
3. Be careful to select at the school side first and near the start of the line.



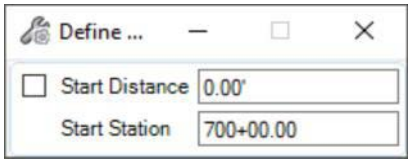
4. Continue until New Centerline is constructed as shown below.

►*Set a Begin Station Value at the Intersection of US98*

1. Use the Geometry Tab and Horizontal Group, Start Station tool under the Modify icon. **OpenRoads Modeling > Geometry > Horizontal > Modify > Start Station**



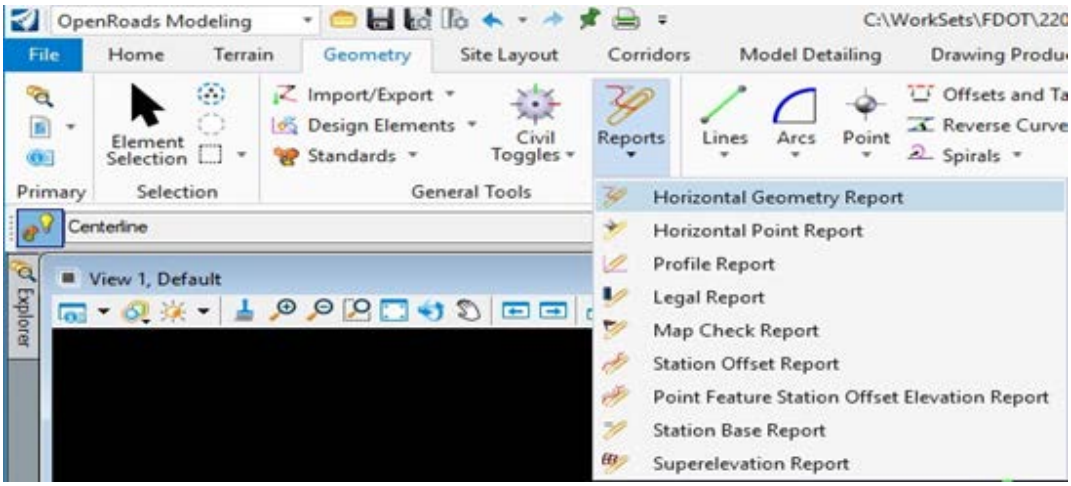
2. Set a Begin Station value of **700+00** at the intersection of SR61 and US98.



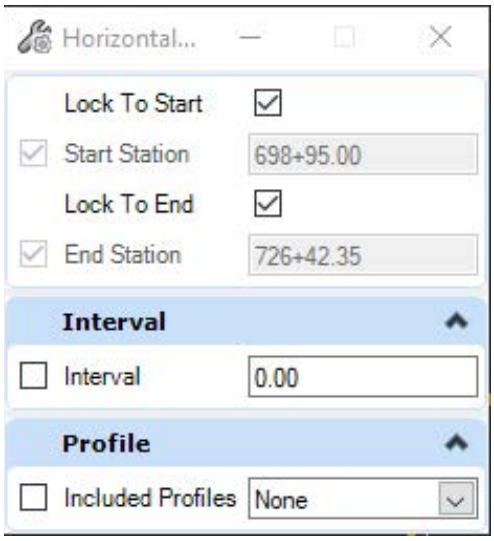
3. Select the new **SR61** Centerline(CL).
4. Use AccuSnap to locate the Intersection with US98 and data point to accept.
5. Enter **70000** and select Enter <OR> data point to accept.

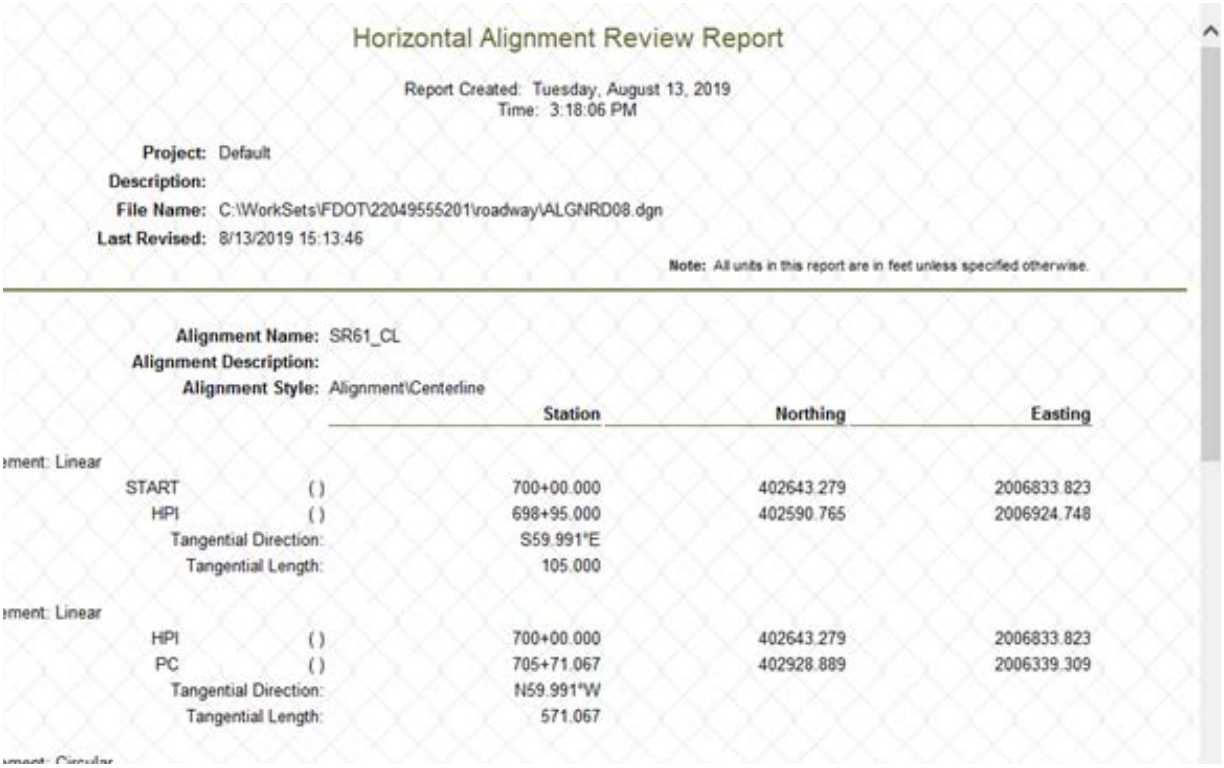
►*Describe the New Centerline Geometry*

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 CL_SR61 Centerline. 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

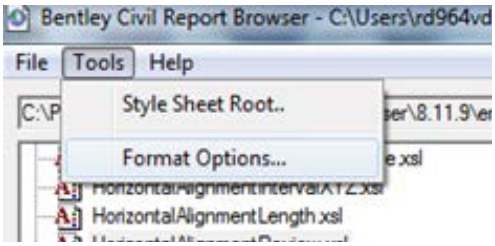
Project: Default
Description:
File Name: C:\WorkSets\FDOT\22049555201\roadway\ALGNRD08.dgn
Last Revised: 8/13/2019 15:13:46

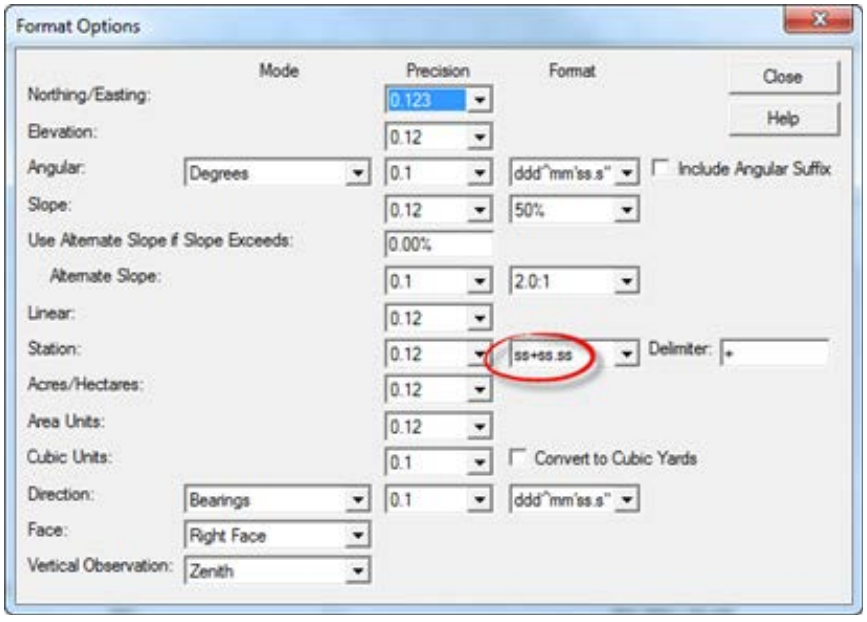
Note: All units in this report are in feet unless specified otherwise.

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

		Station	Northing	Easting
ement: 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		
ement: 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		

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

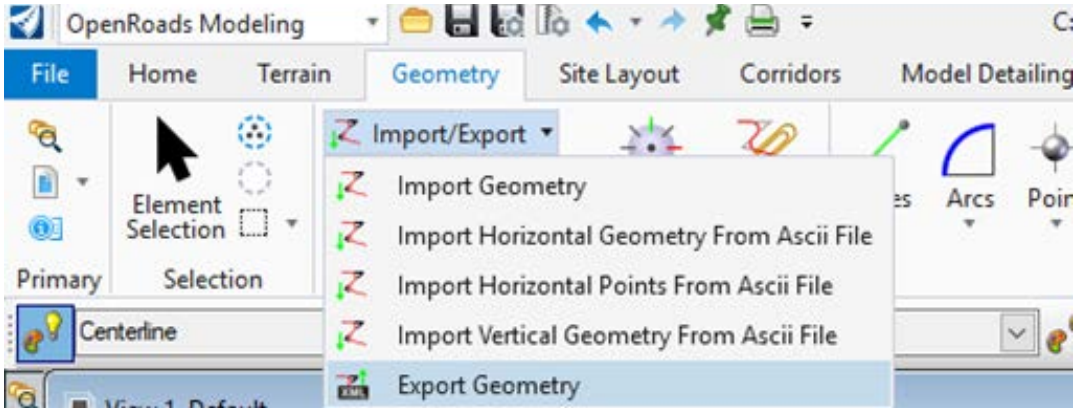




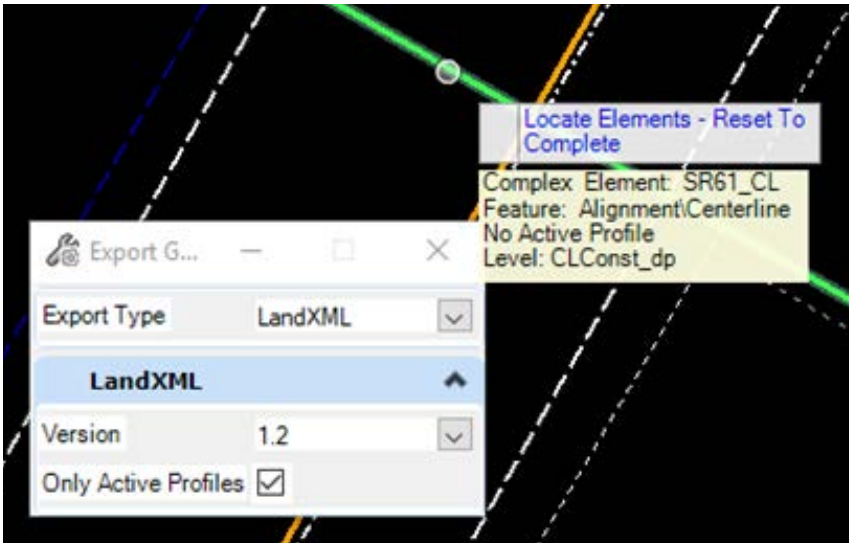
►*Save the SR61 Centerline to a Landxml for a back up.*

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

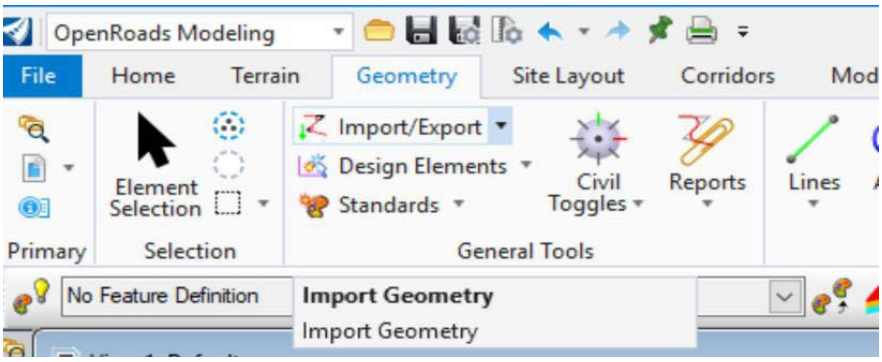


3. Select the Alignment you wish to export, select **Version 1.2** for export, when prompted save as *SR61_CL.xml*.

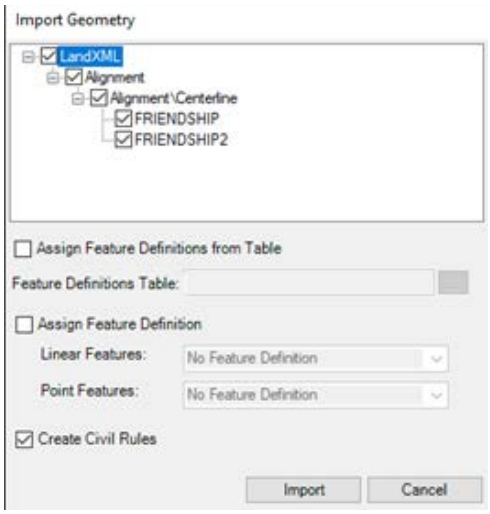


Exercise 1.3 *Import Side Roads*

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.

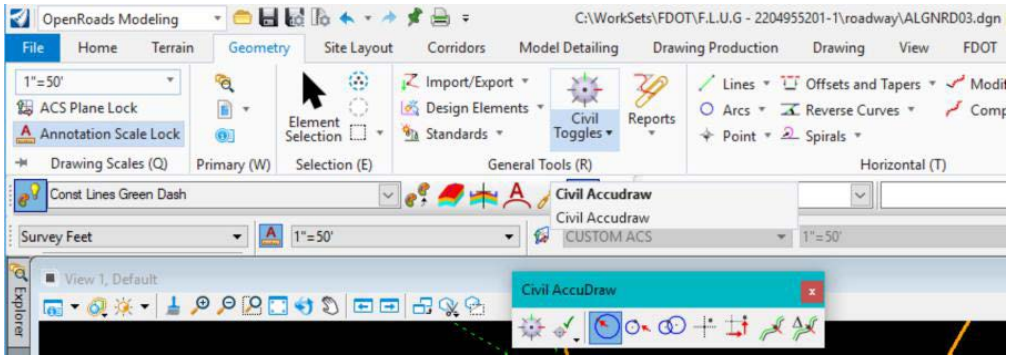


3. Notice from the LandXML a Feature Definition for CenterLine is defined for each alignment.

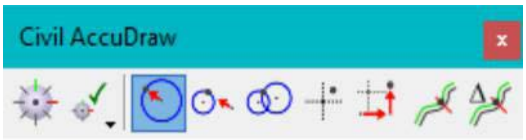
Exercise 1.4 *Baseline Side Road Design from US98*

In this exercise Civil AccuDraw is used to help construct a side road centerline on US98.

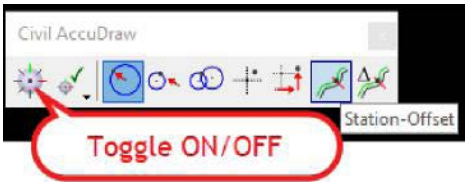
1. OpenRoads AccuDraw and Civil AccuDraw should never be toggled **ON** at the same time because both use some of the same Shortcut Key-ins. Toggle **OFF** the OpenRoads AccuDraw.



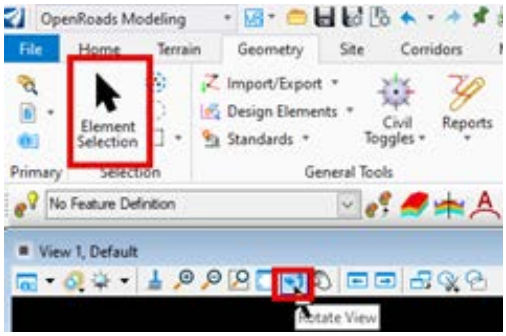
2. Use Geometry Tab and the General Tools Group, to select the Civil Toggles icon to call Civil AccuDraw tool to activate the Civil AccuDraw toolbar. **Openroads Modeling > Geometry > General Tools > Civil Toggles > Civil Accudraw**

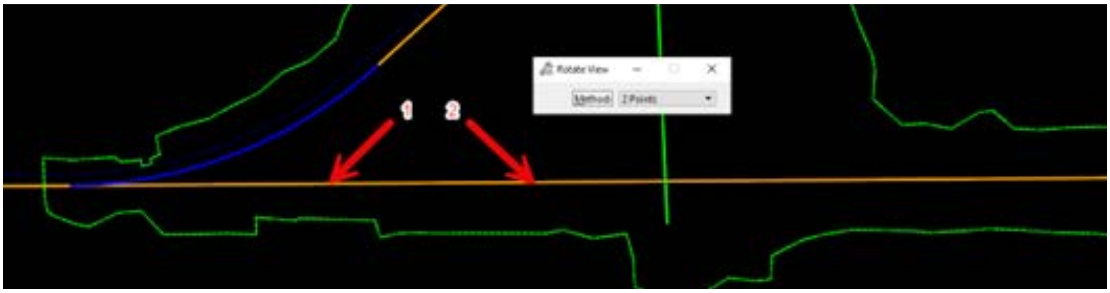


3. Click on the Mode Station-Offset to toggle **ON.**

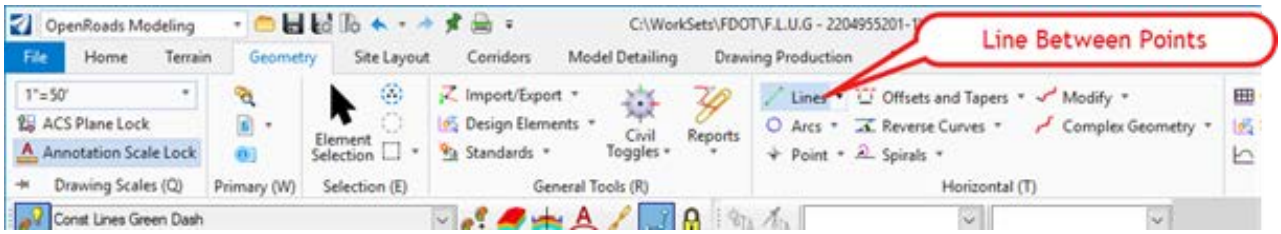


4. Next lets Rotate the view by first selecting the Element Selection tool then selecting the Rotate View option. Change the Method to **2 Points** then select **US98** on two places to rotate the view Horizontal.

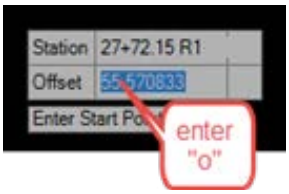




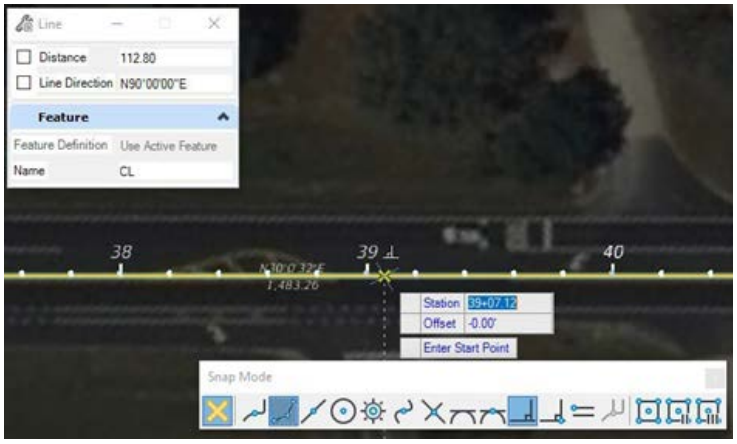
5. Use the Geometry Tab and Horizontal Group, to select the Line Between Points tool to create a Centerline perpendicular to the US98 at Station 39+00 for a Length of 80 feet used as a side road centerline. Here are the steps to use Civil AccuDraw with the Station Offset option: **OpenRoads Modeling > Geometry > Horizontal > Lines > Line Between Points**



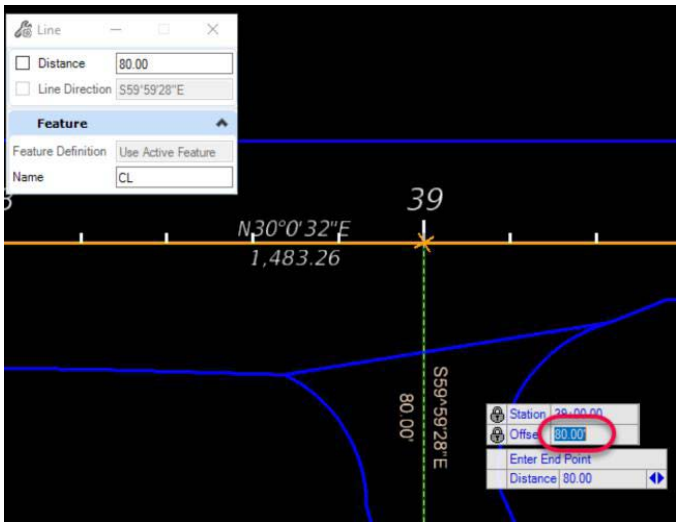
On the cursor prompt, tab to the offset field and use the Shortcut Key-in o, and select the reference line US98. The cursor will now track the station and offset.



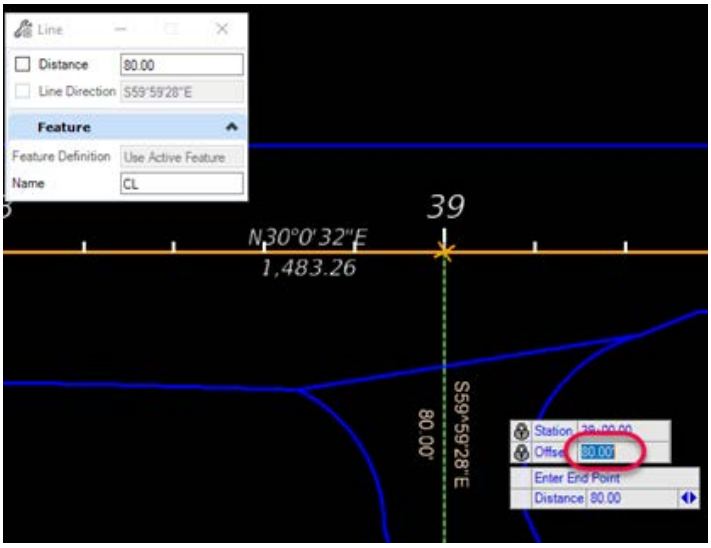
a. For the first data point, set the *Snap Locator* button to **Perpendicular**, and select on the **US98**.



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.



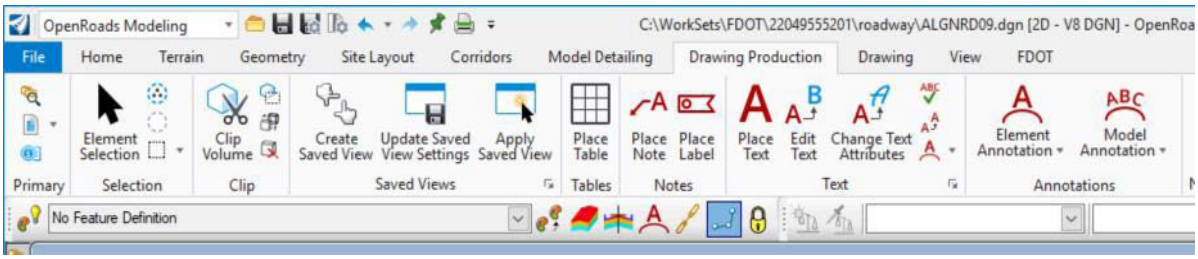
c. Tab to the Offset field in the AccuDraw Cursor Prompt dialog, Enter Offset value **80**, select Enter to lock.



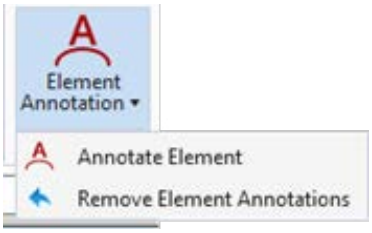
d. Data point in View to place the point. Repeat these steps for the Centerline at Station 36+40.0

Exercise 1.5 *Using Annotation Groups to Label Your Alignment Features*

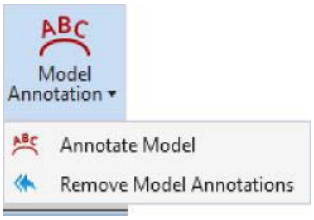
1. Open the ALGNRD file that has been created in the previous exercises. From the **OpenRoads Modeling WORKFLOW** navigate to the DRAWING PRODUCTION TAB and the Annotations Group. There are two icon buttons for Annotating. **Openroads Modeling > Drawing Production > Annotations**



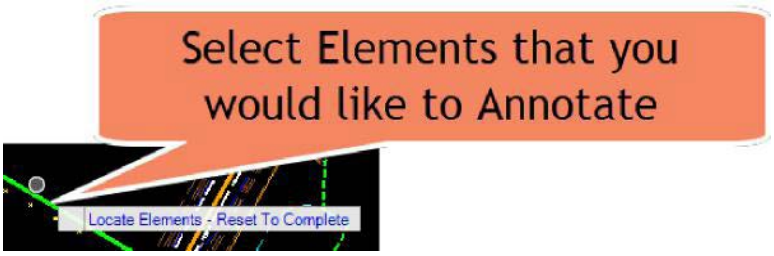
a. Element Annotation – This will annotate the element and remove the element Annotation Group.



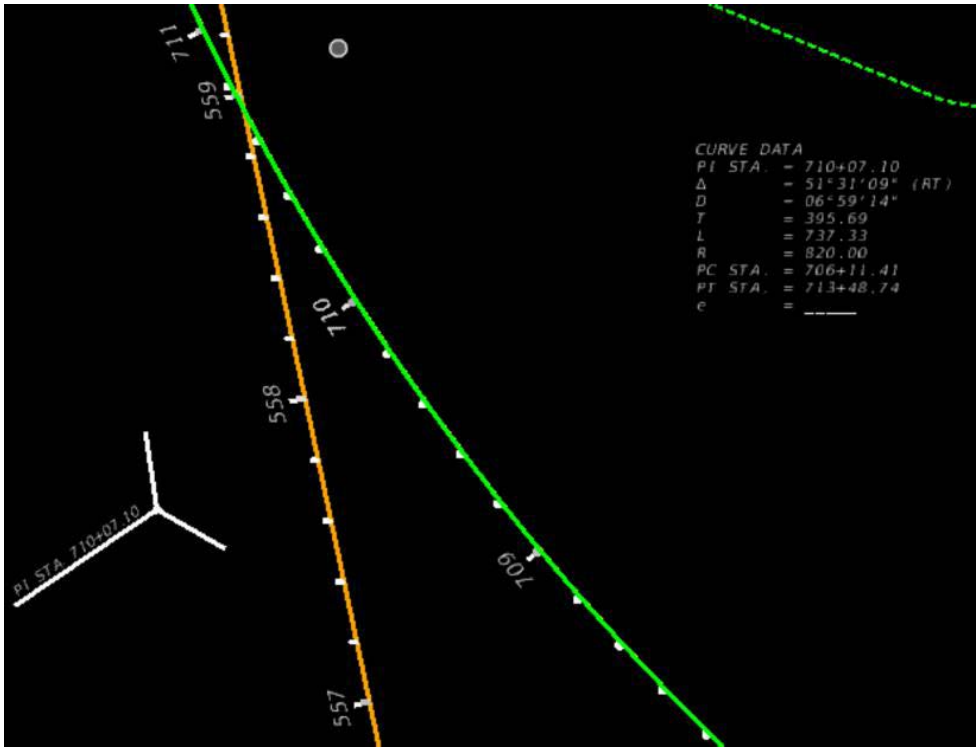
b. Model Annotation – This will annotate all the elements in the model and remove the element Annotation Group.



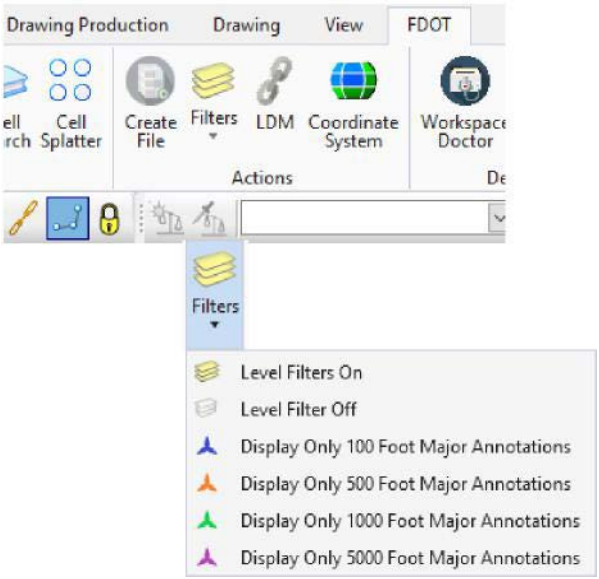
2. From the Drawing Production Tab and the Annotations Group, Select the Annotate Element button then following the prompts by the cursor. Select SR61 Centerline (optional you may select multiple alignments if you like) Then reset the tool by right click. **Openroads Modeling > Drawing Production > Annotations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



3. You have now just Annotated your Alignments.

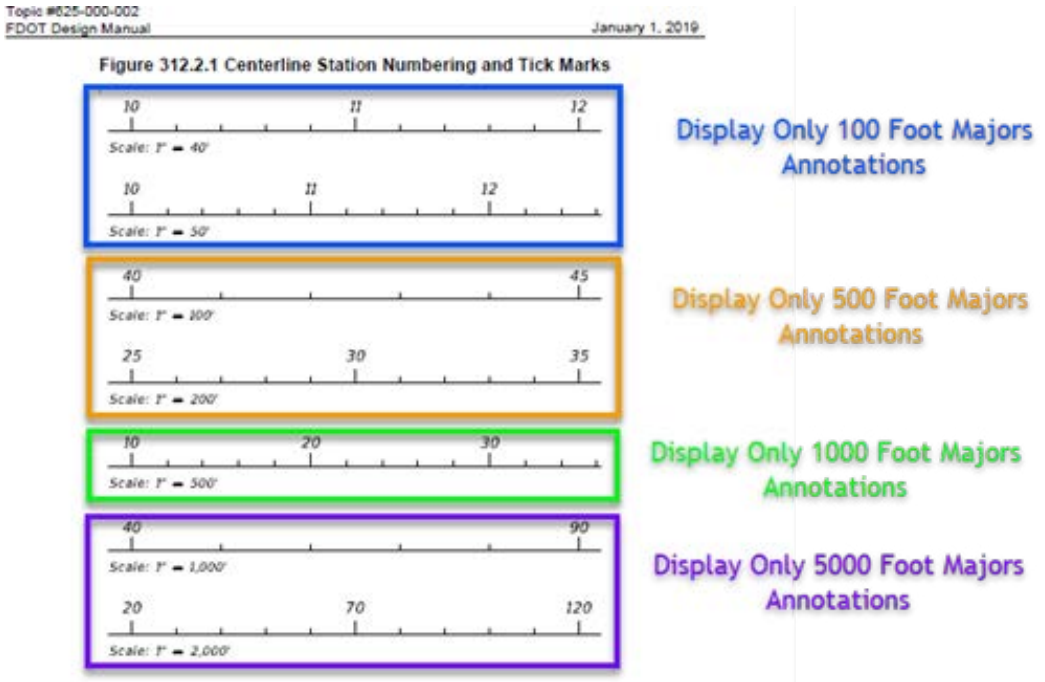


a. If you Navigate to the FDOT Tab on the Ribbon, in the Actions Group will be the Filters Icon Button with a Drop Down list. **Openroads Modeling > FDOT > Actions > Filters**



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.



NOTE ***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.

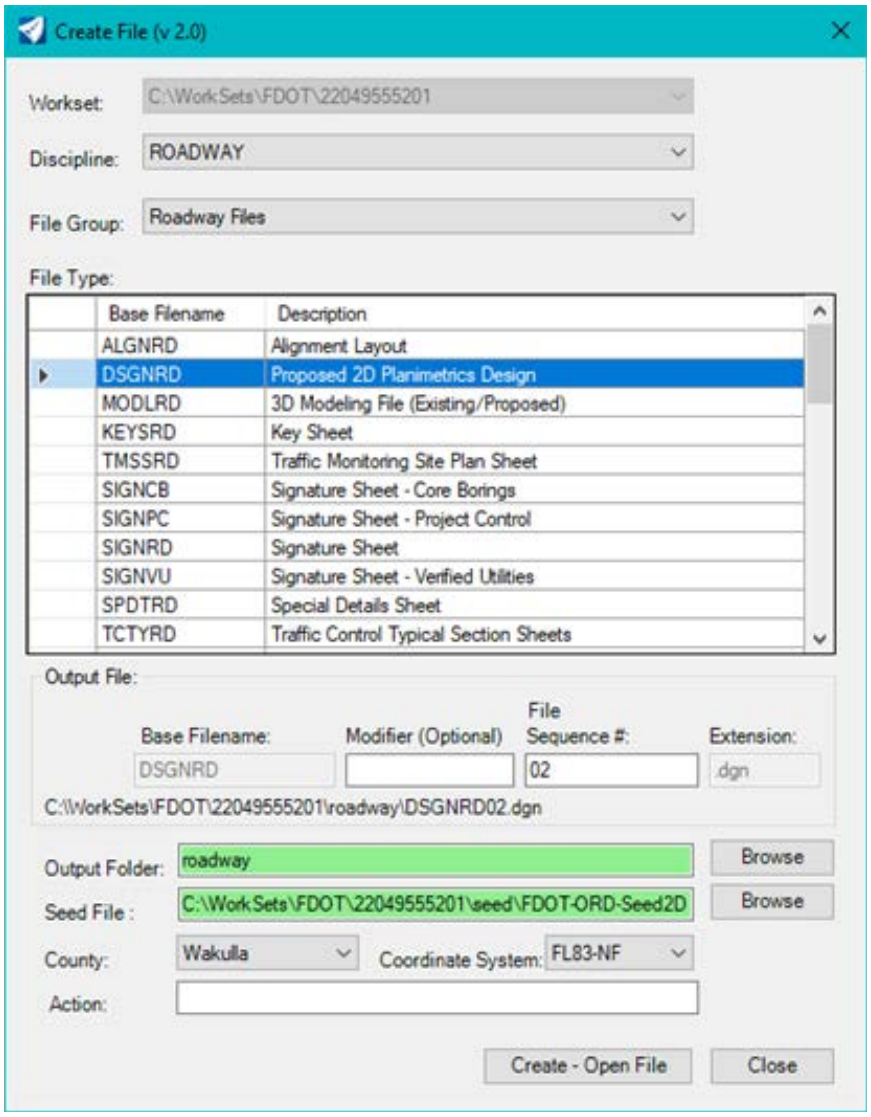
CIVIL CELLS

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

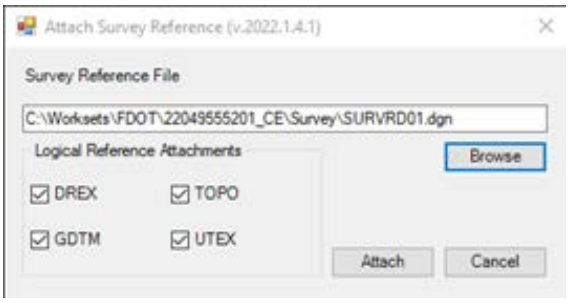
1. File Tool: This tool is always the starting point to create QC compliant design files for your workset/project. **Openroads Modeling > FDOT > Actions > Create File**



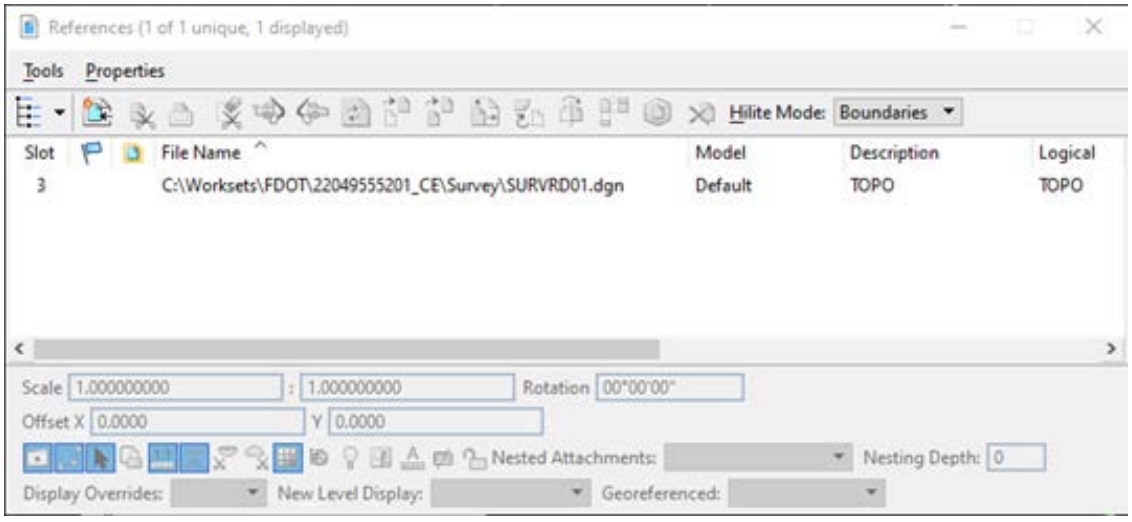
Exercise 2.2 *US98 Milling Limits*

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.

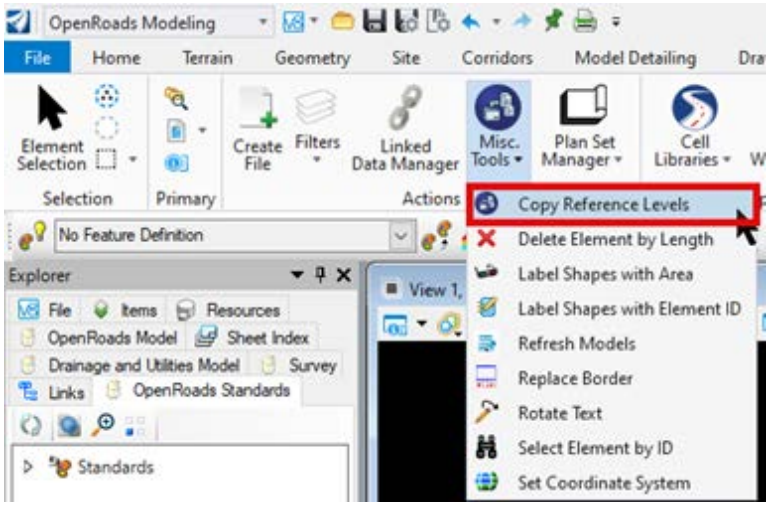
1. Use the **Attach Survey Reference** from the FDOT Tab within the Roadway Tools Group. (This tool will attach a SURVRD file 4 times with different Logical names of **TOPO, GDTM, UTEX, DREX** which apply to different level filters.) **OpenRoads Modeling > FDOT > Roadway > Attach Survey Reference**



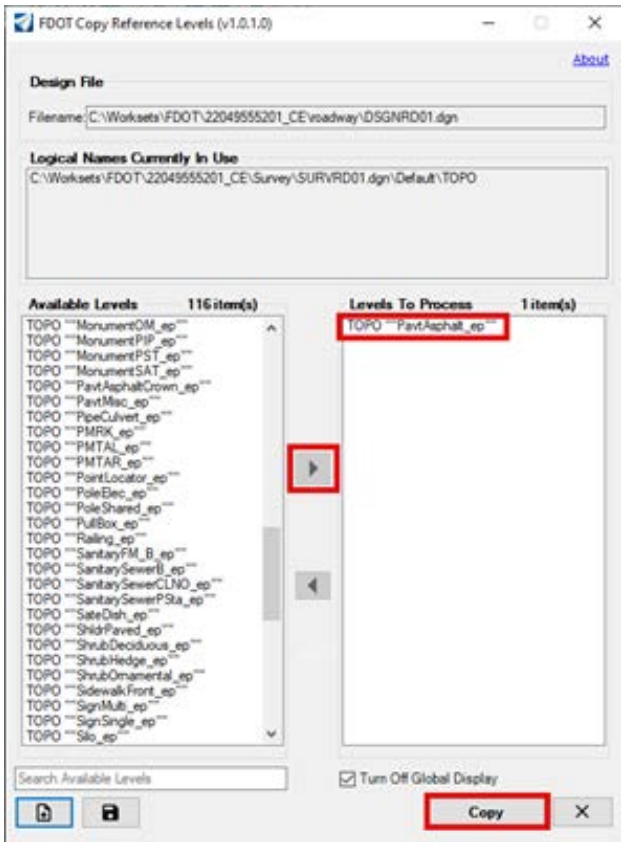
2. Once the SURVRD is attached, open your Reference Dialog (Function Key F9) and Detach the reference files with logical names of **GDTM**, **UTEX**, **DREX**. This will only leave the **TOPO**.



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 within the Roadway Tools Group **Openroads Modeling > FDOT > Actions > Misc. Tools > Copy Reference Levels**



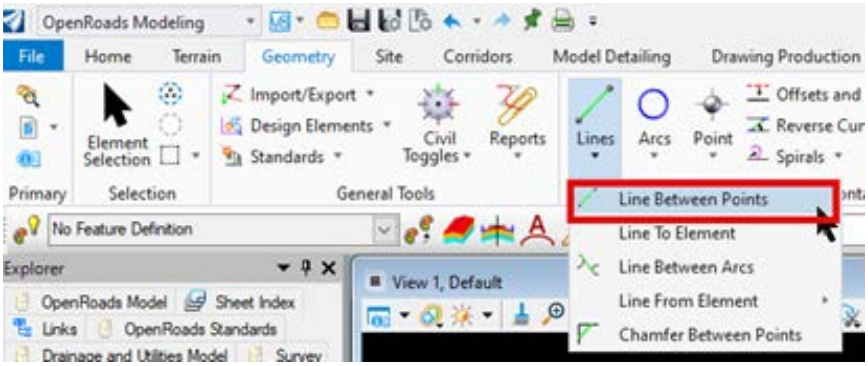
4. This will open a dialog for the Copy Reference File Levels tool. On the left side of the dialog choose PavtAsphalt_ep level. Then click on the **>** to add the level to the right side of the dialog. Click the **Copy** button to merge/copy the elements with this level into the file.



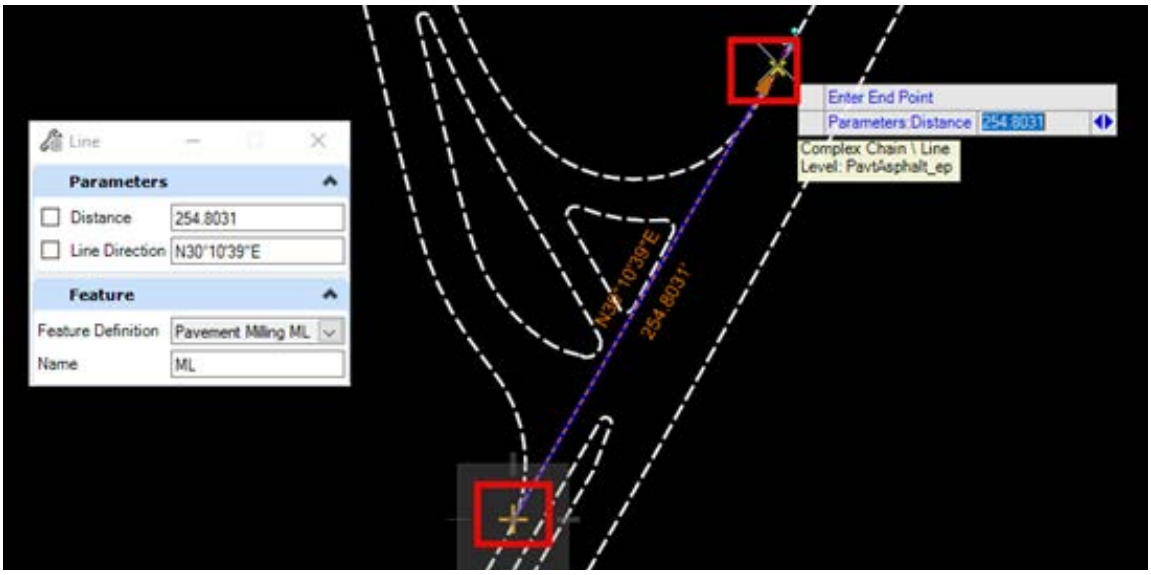
5. This step only. If no **SURVD** Exists. Use OpenRoads References (Function Key F9) to attach and display the *TOPORD01* and *RWDTRD01* Reference files.

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

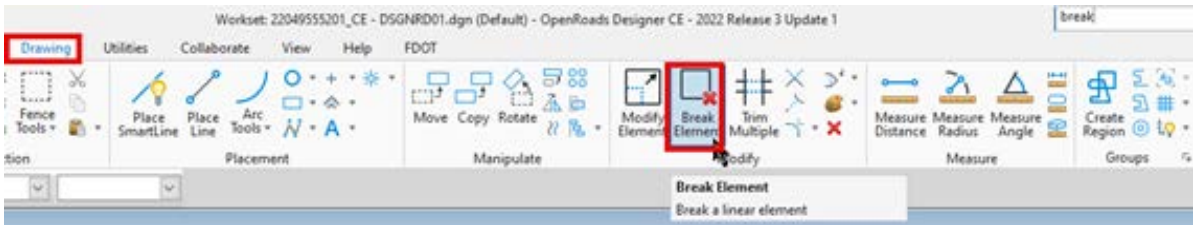
7. On the Geometry Tab and the Horizontal Group, Line Between Points tool. **Openroads Modeling > Geometry > Horizontal > Lines > Line Between Points**

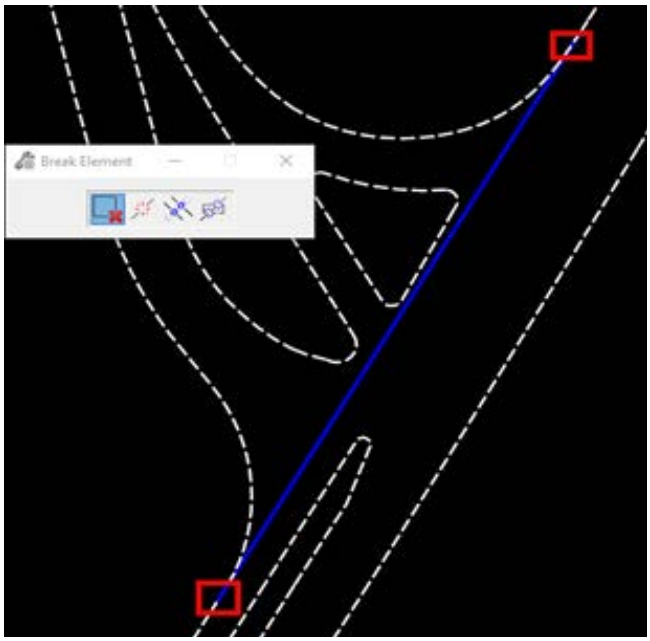


8. Create a PavementMilling ML line across the existing intersection of SR61 and US98.

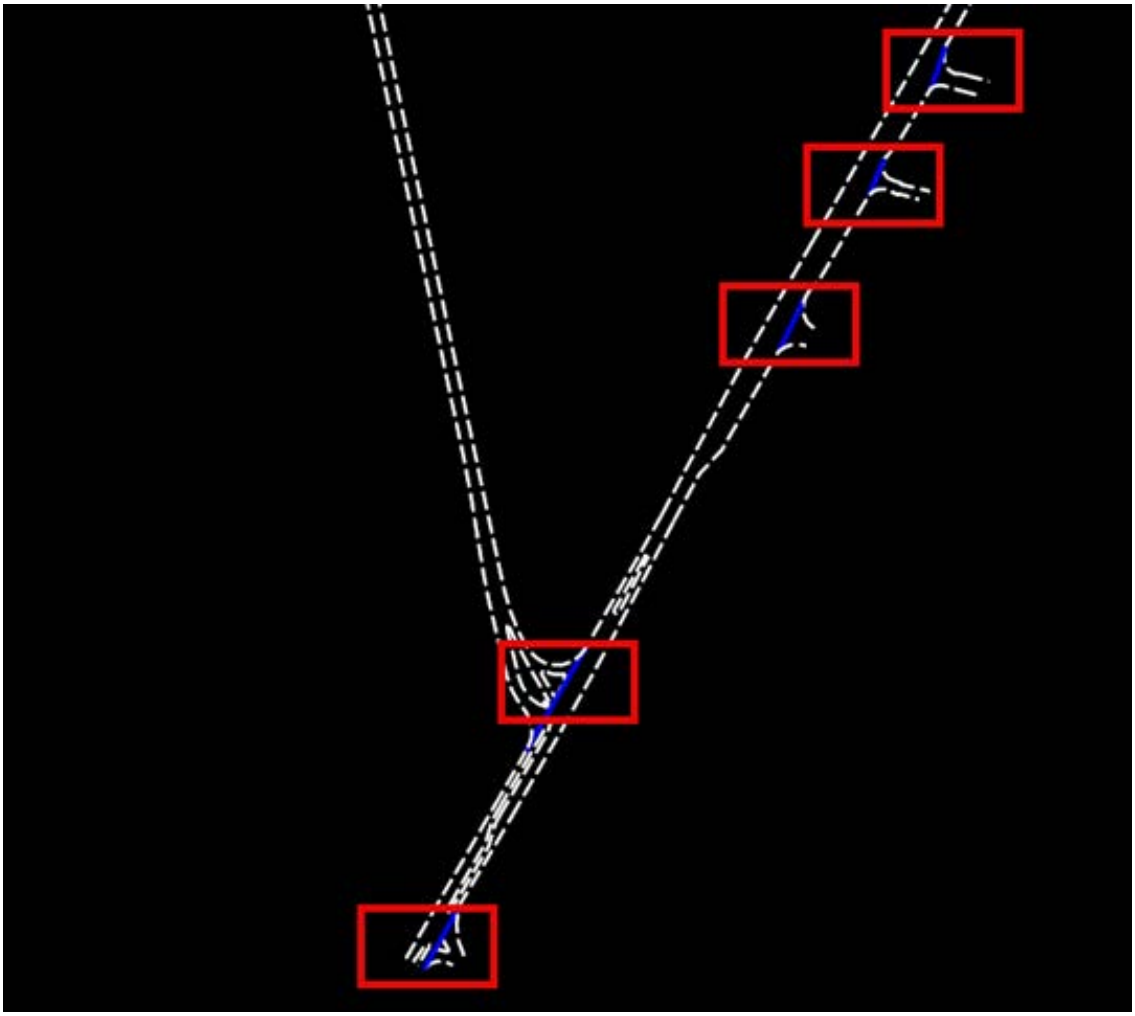


9. Use OpenRoads Break Element on the PavtAsphalt_ep line string elements where the new PavementMilling(ML) line intersects.

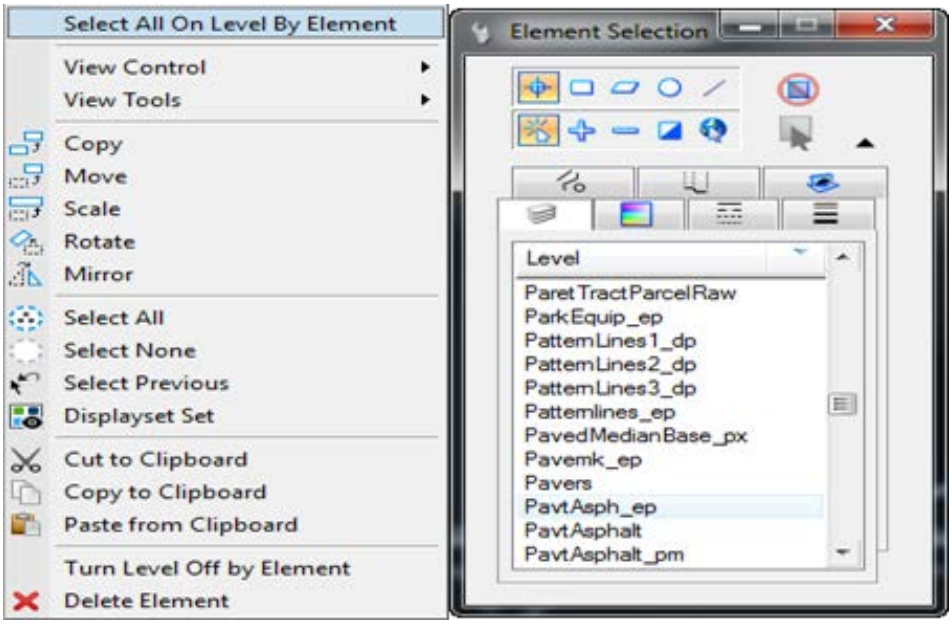




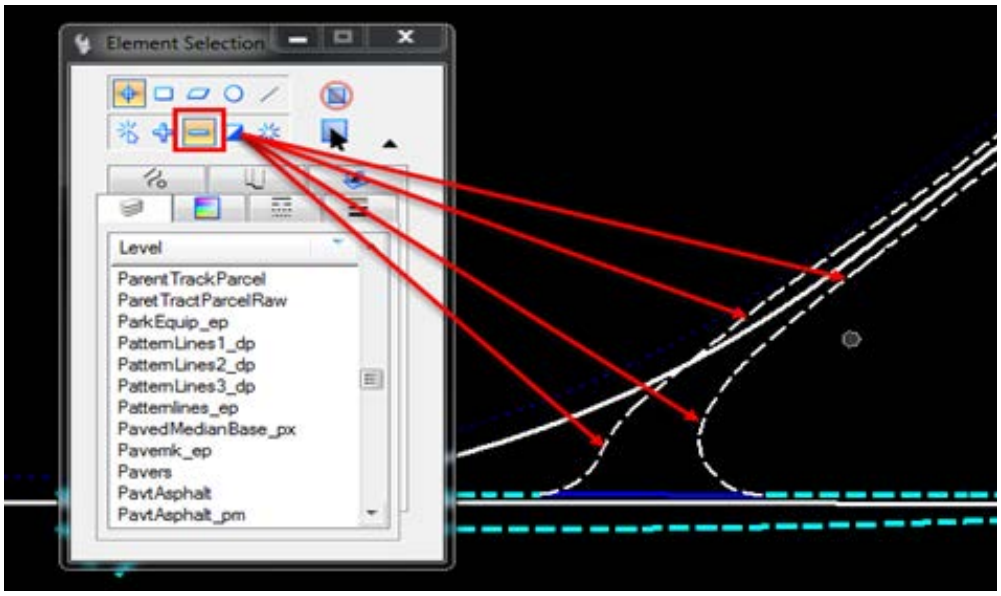
10. Repeat these steps for the other side roads along US98.



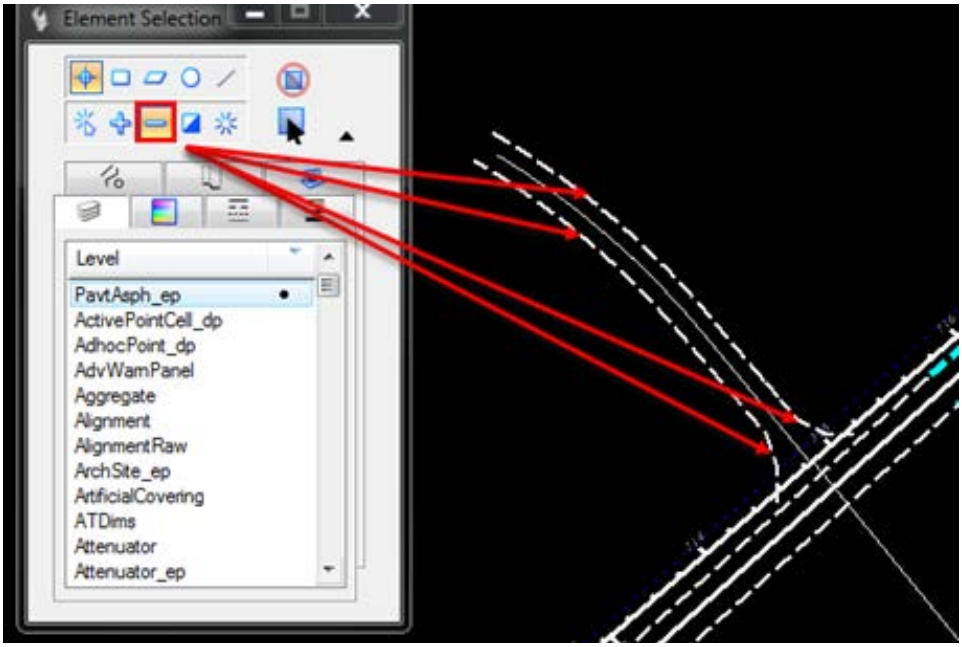
11. Create a Selection Set of the PavtAsphalt_ep by level. This can be done with the right click function of the mouse, by holding down and ***Selecting Select All On Level By Element***. Then selecting an element.



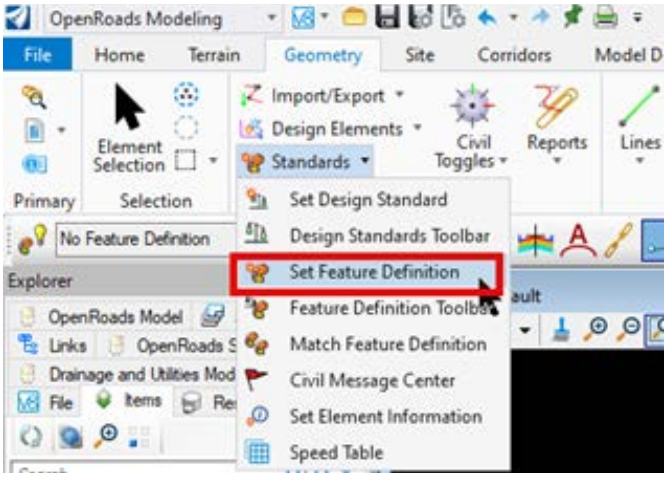
a. Subtract out of the Selection Set the Intersection lines at SR61; these will not be PavementMilling ML lines.



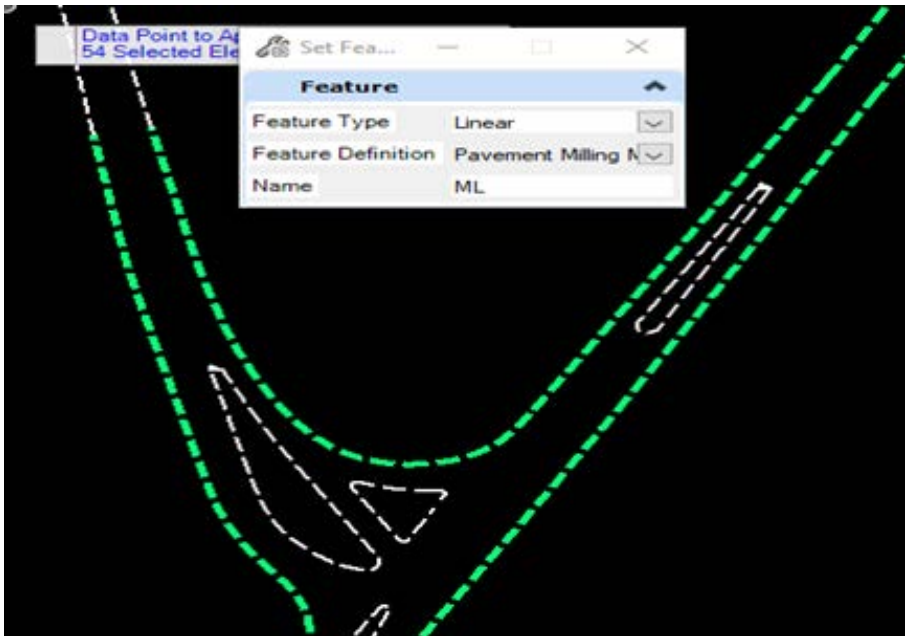
b. Also subtract out of the Selection Set the Intersection lines at Friendship Road.



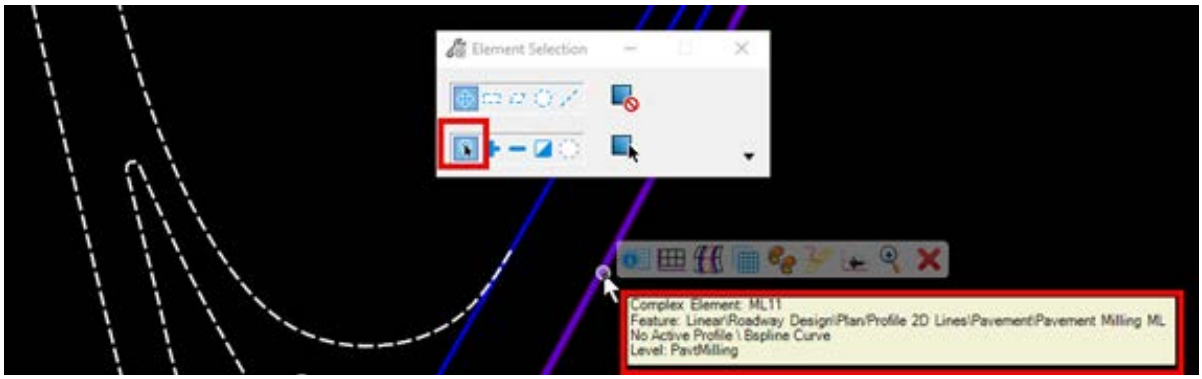
12. Use the Geometry Tab and the General Tools Group, click on the **Standards** button to bring up a drop down that has the Set Feature Definition tool. **OpenRoads Modeling > Geometry > General Tools > Standards > Set Feature Definition.**



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



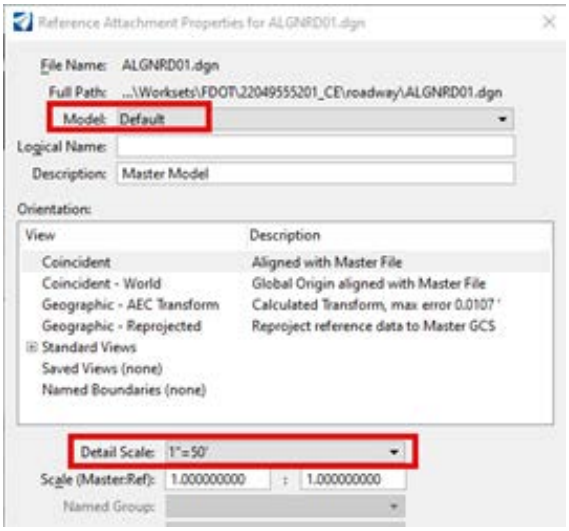
14. Change the *Selector* tool back to **New** and verify the *New Feature Definition* by hovering over a line until the Context Menu displays.



Exercise 2.3 *US98 Widening*

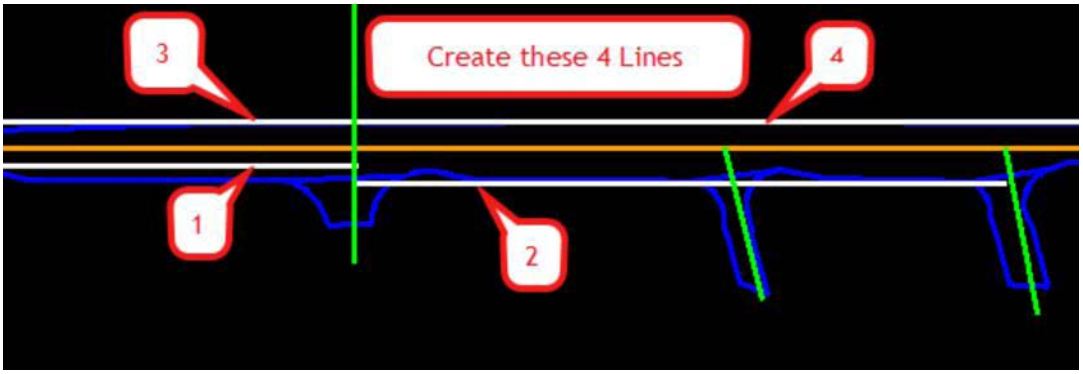
Before we start, the ALGNRD will need to be attached as a reference into the DSGNRD file. Making sure when you attach the ALGNRD it is the Default Model. With a Detail scale of 1”=50’.

1. Select the **Attach Tools** option on the, select the *ALIGNRD.dgn*. Make sure that Model is set to Default, and Detail scale it set to 1”=50’.

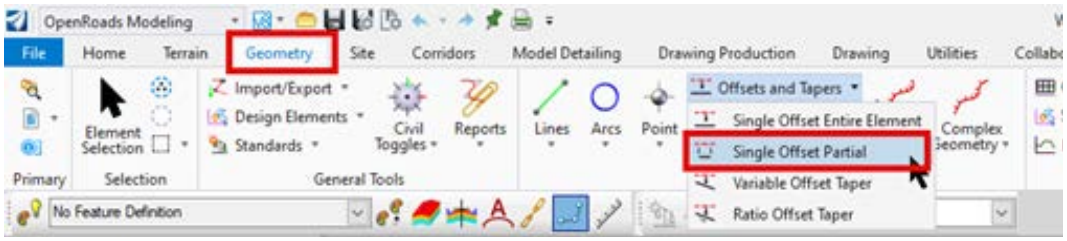


In this exercise, the proposed Pavement Lines used for widening on US98 are created at the following locations:

	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

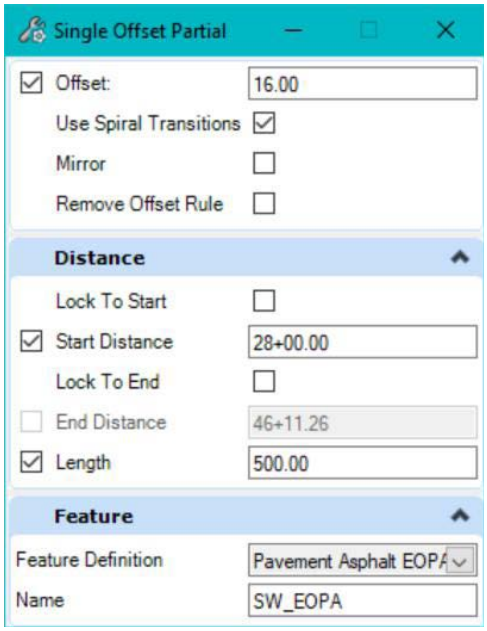


2. Use the *Geometry Tab and the Horizontal Group*, to select **Single Offset Partial** tool located in the Offsets and Tapers button. **OpenRoads Modeling > Geometry > Horizontal > Offsets And Tapers > Single Offset Partial**

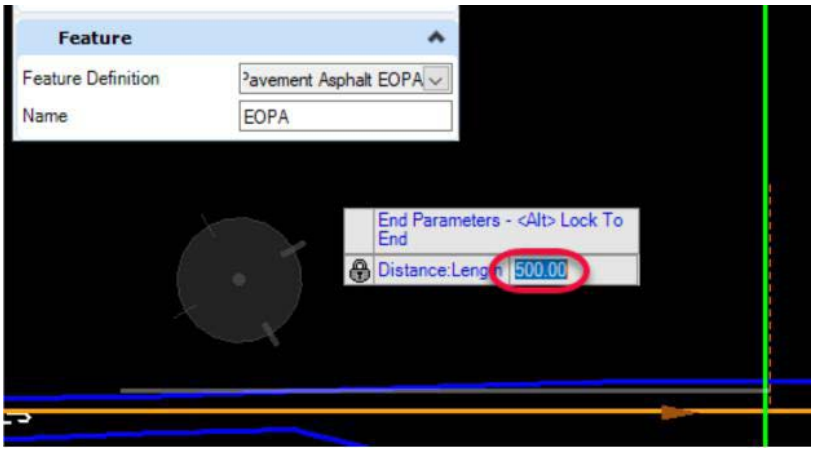


Select the **US98** line at the prompt to **Locate Element**.

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



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



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

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

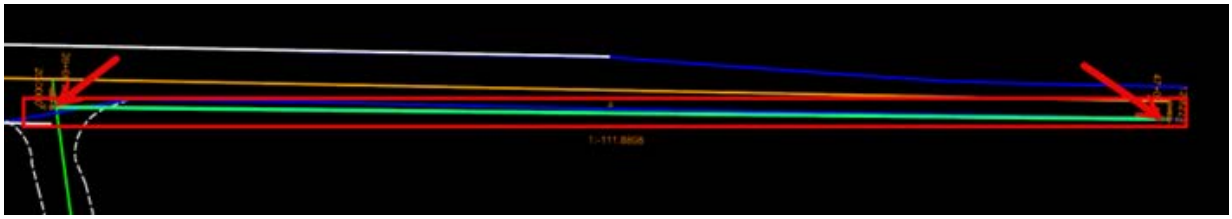
2. Repeat this procedure for each of the **Pavement Asphalt EOPA** widening lines diagram and table above.

Exercise 2.4 *US98 Widening Taper Line*

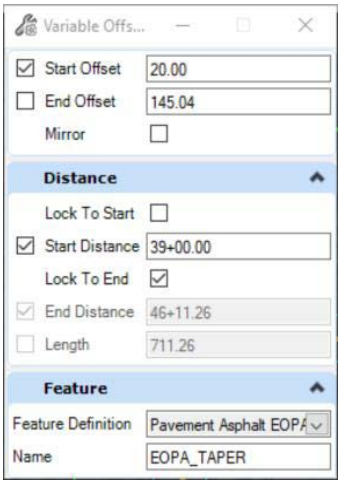
In This exercise a tapered Pavement Asphalt EOPA line off US98 is created at the following location.

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



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**

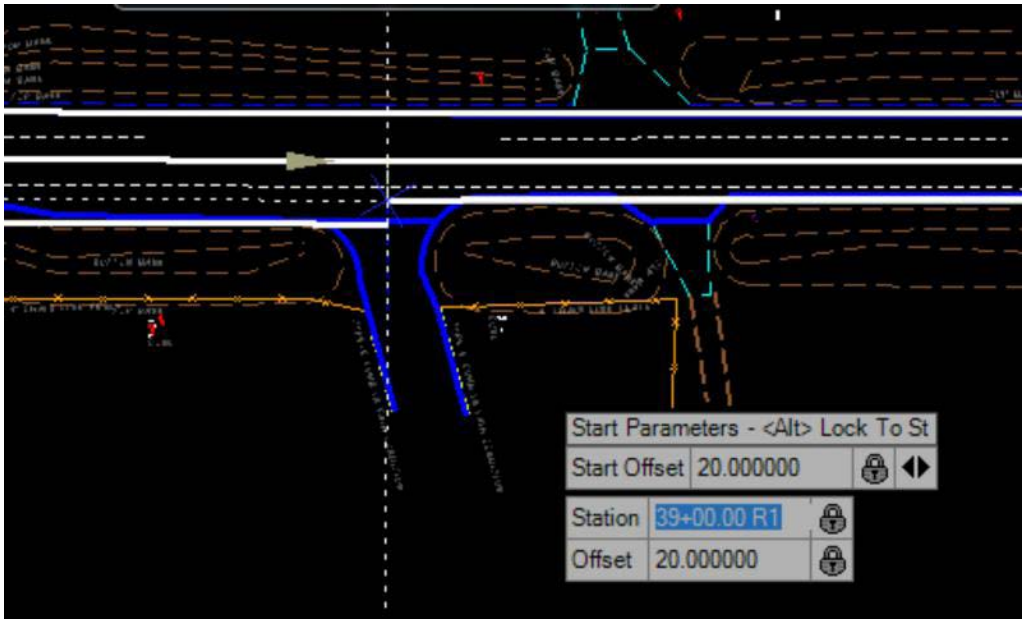


2. Select the **US98** element to *offset* from.

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

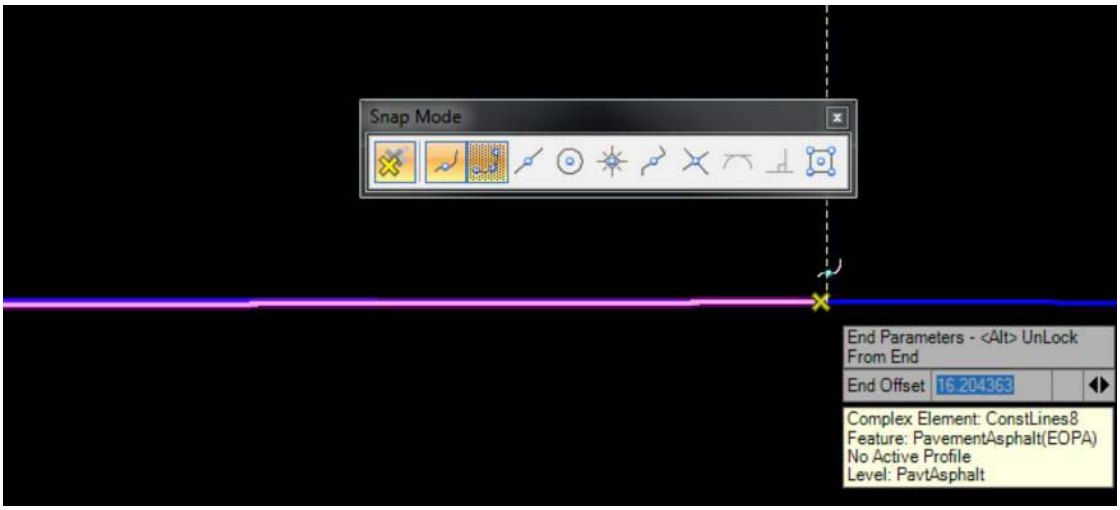
4. Tab to the *Offset*, enter **20** and select **Enter** to lock the value.

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.

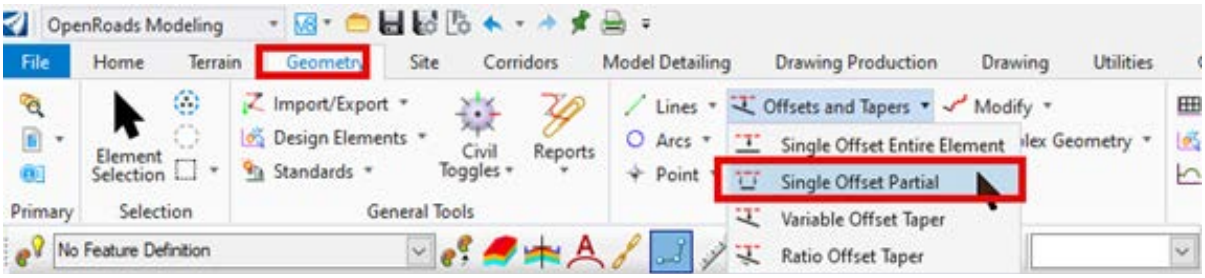


8. **Data Point** to place the second point and complete the command.

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**.

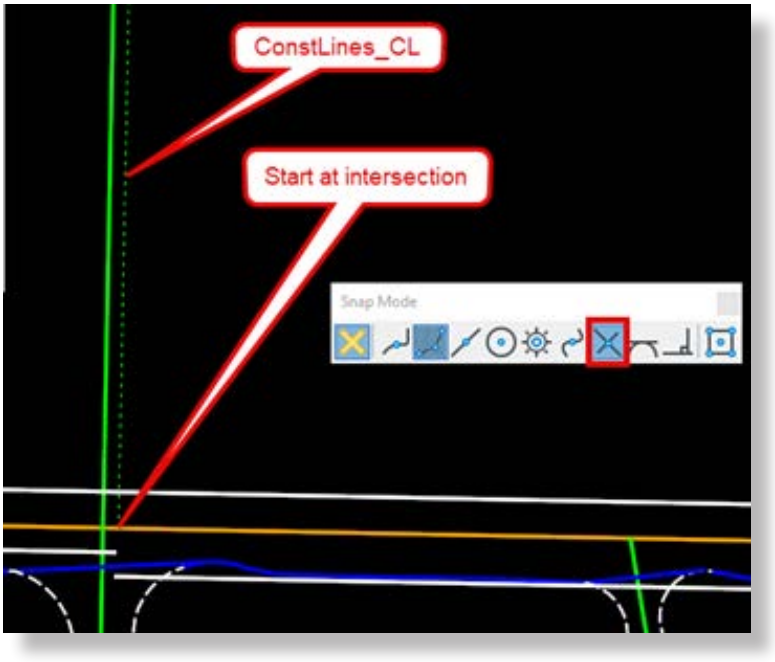
   a. Select the **SR61** Centerline CL.

   b. Set the *Feature Definition* to **Const Lines Green Dashed**

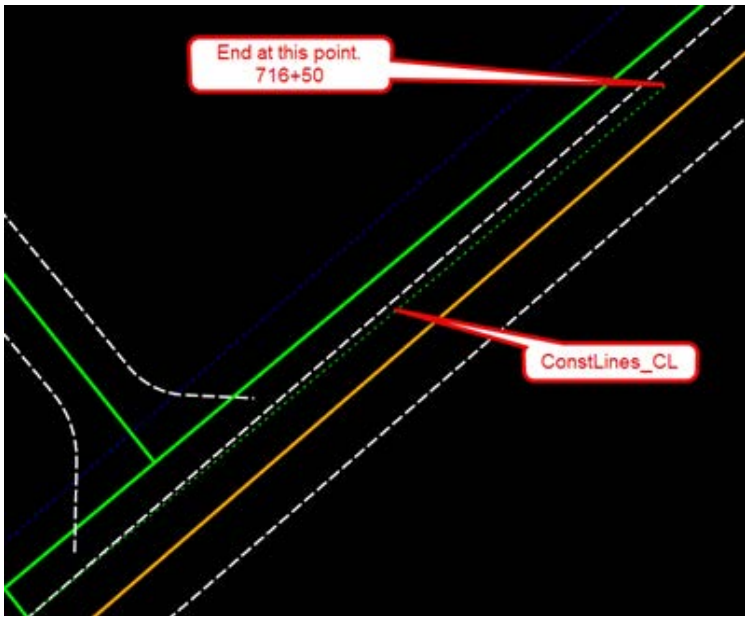
   c. Set the *Name* to ConstLines_CL

   d. Set the *Offset* to 10.00.

   e. For the first point, set *AccuSnap* to Intersection and select the intersection of SR61 and US98.



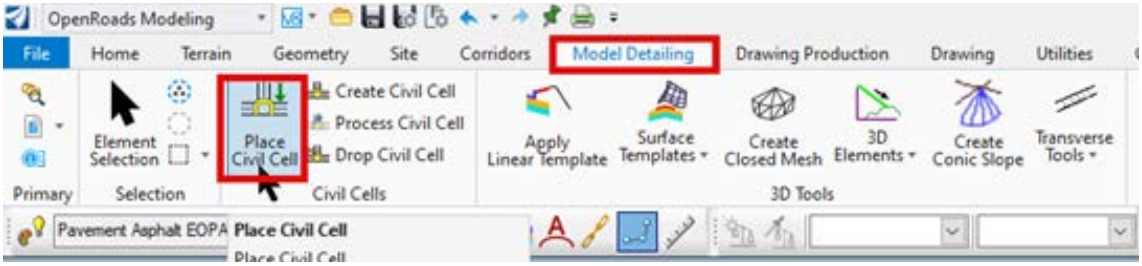
f. For the second point, zoom out to the first intersection after the end of the SR61 curve and snap to the right Pavement Milling ML of existing SR61 <OR> Key in Station 716+50.



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

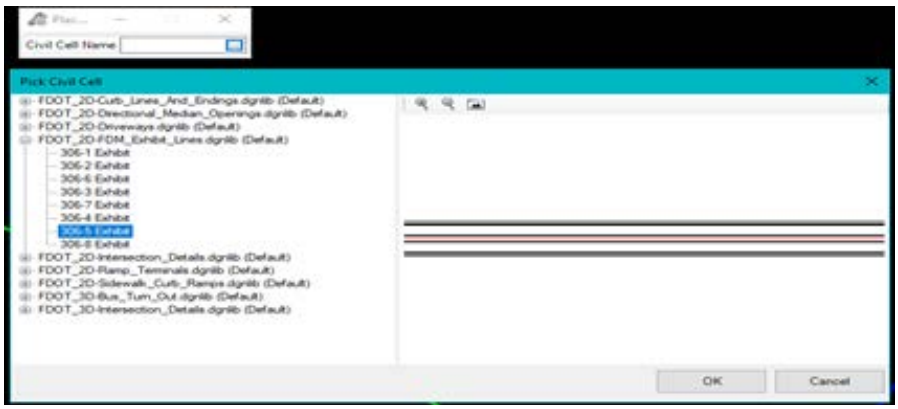
3. Use the Model Detailing Tab and the Civil Cells Group, to find the Place Civil Cell tool

Openroads Modeling > Model Detailing > Civil Cells > Place Civil Cell



4. Navigate to the FDOT_2D-FDM_Exhibit_Lines.*dgn*lib and select **306-5** Exhibit civil cell to place.

NOTE ***Notice the red line in the Civil Cell, that is the reference line that is used line up with the ConstLine_CL that was created in the previous step.***



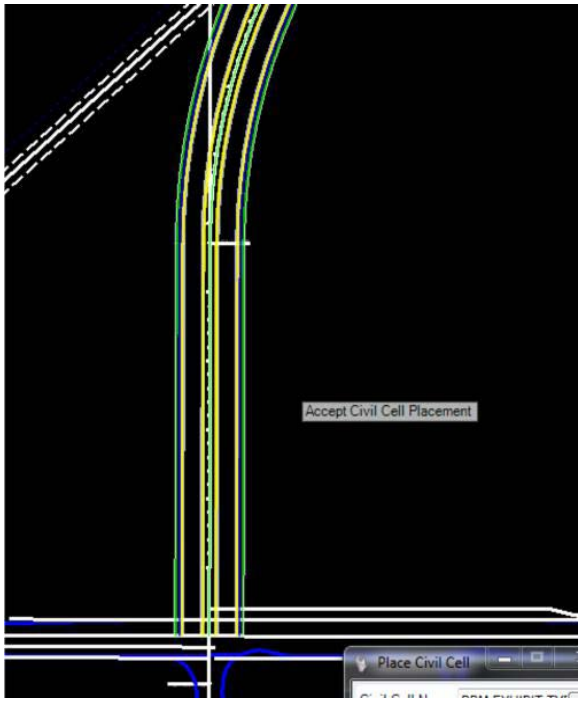
a. Click **OK** and follow the prompts to complete the *Place Civil Cell* command.

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

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

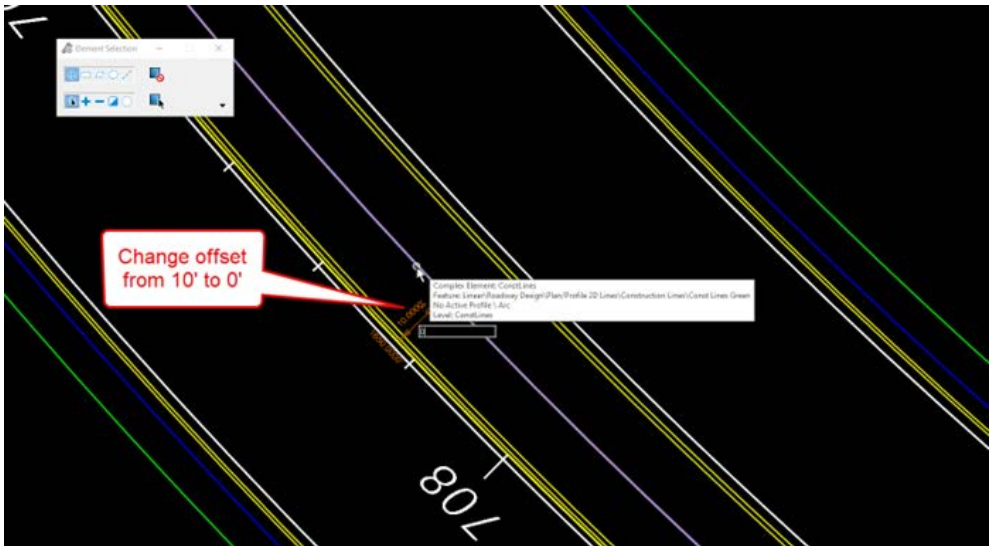
c. Reset to Skip View Alternates.

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

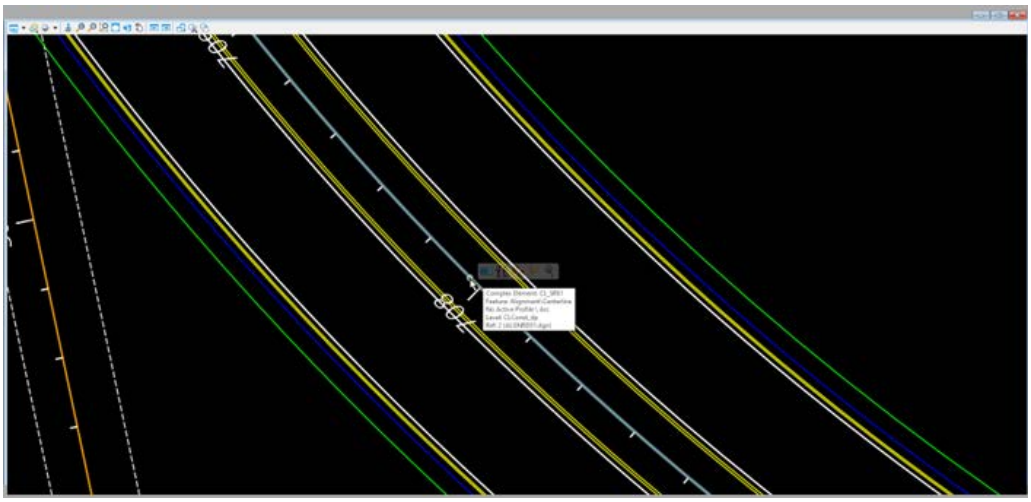


d. Select the Constlines element near station 708 and change offset from **10'** to **0'**. This will align the Construction line and Civil Cell up with CL_SR61 roadway alignment.

BEFORE

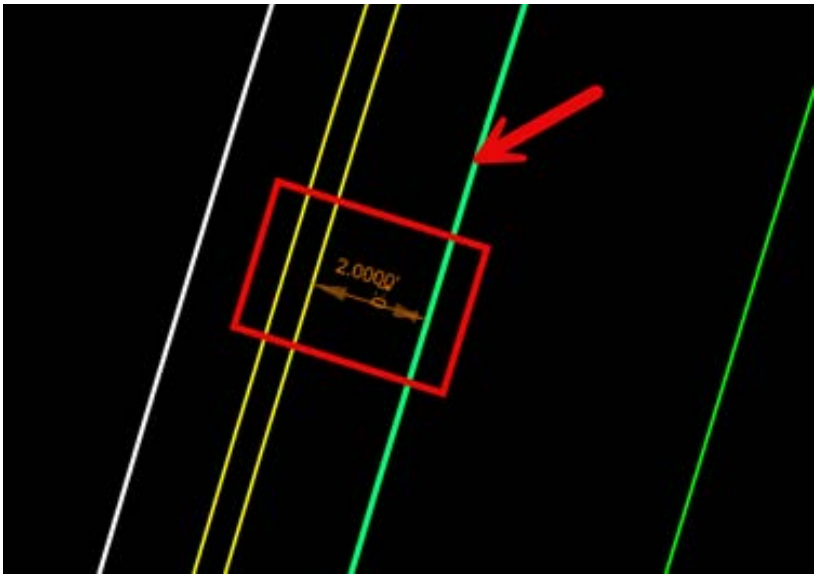


AFTER



e. Change the **Front Sidewalk Utility Strip Width** to **2 ft** and set the **Sidewalk Width** to **5 ft**.

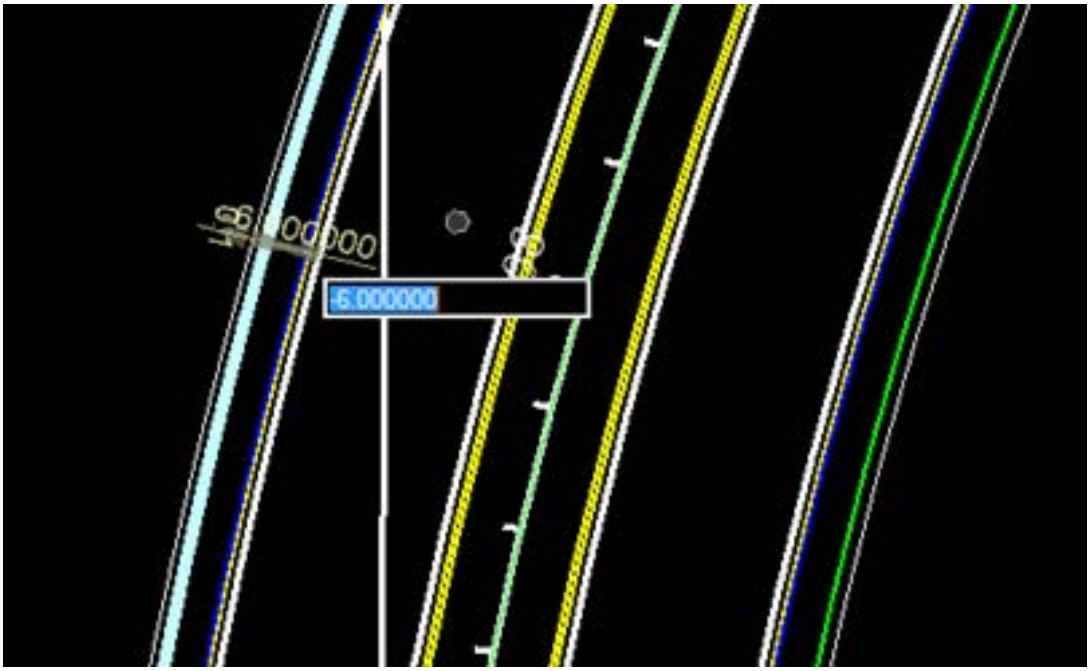
f. Select the **Sidewalk Front FSW** *Feature* and zoom to find the Context Menu near the middle of the element.



b. Change the *SidewalkFront offset Dimension* from **6** to **5**.

c. Verify that the *SidewalkBack* is set to **5.**

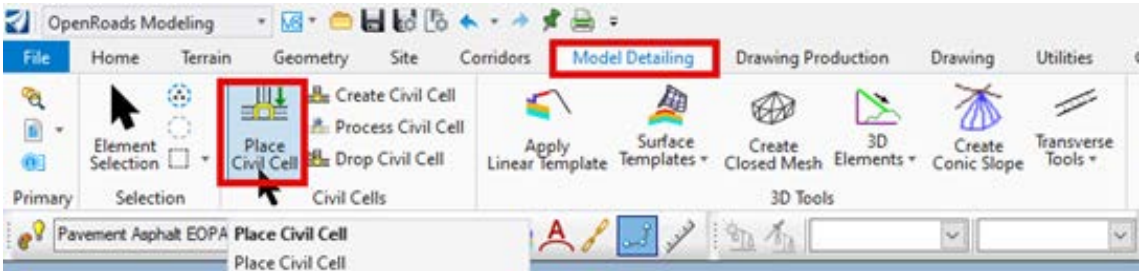
d. Repeat this for both sides of the roadway



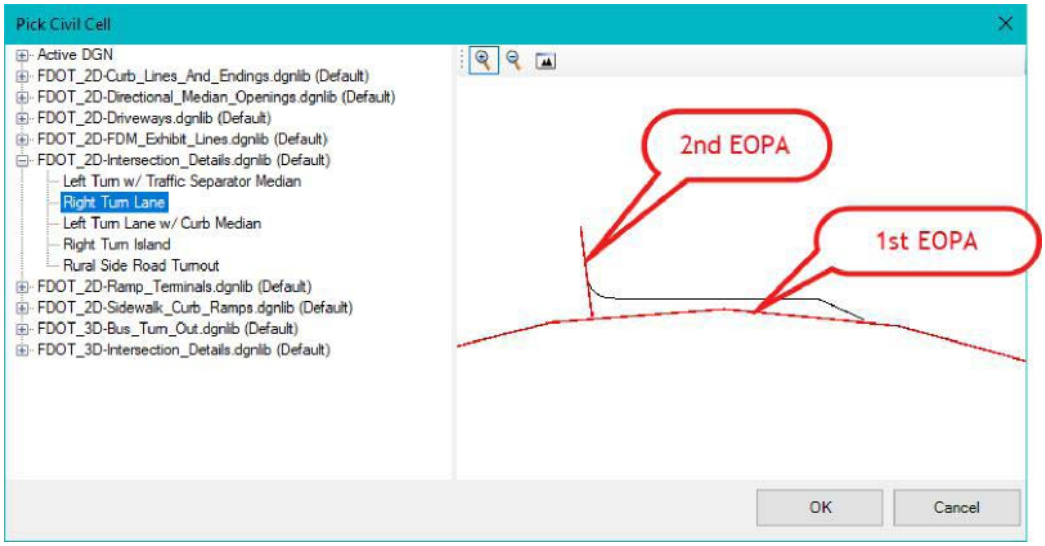
Exercise 2.6 *Add Right Turn Lane on US98*

This exercise uses Civil Cells to add a right turn lane to the US98.

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

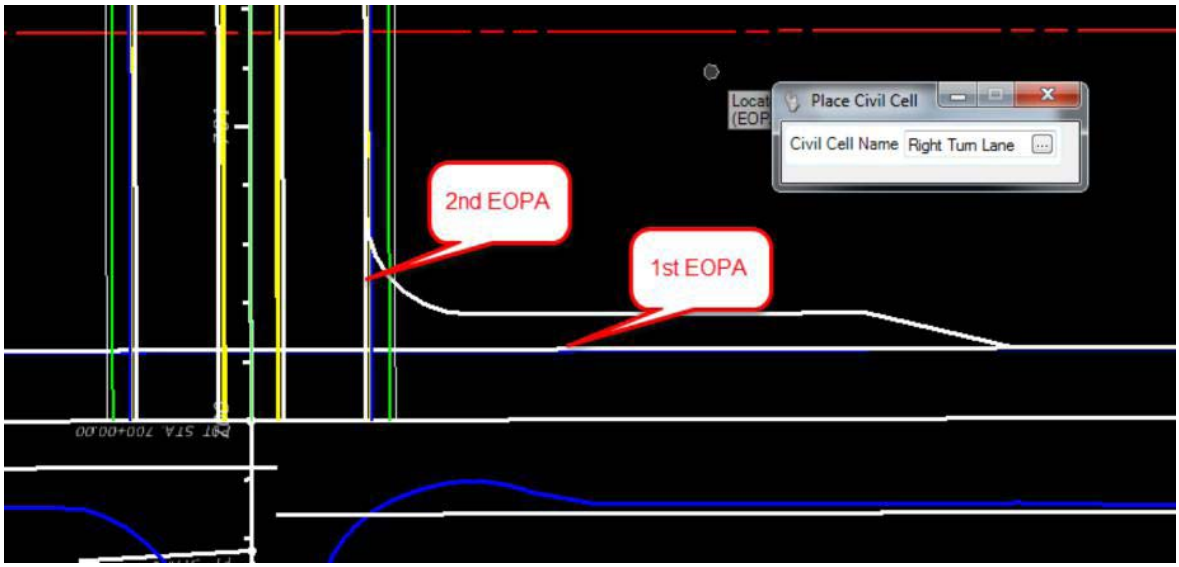


2. From the Place Civil Cell dialog, navigate to the FDOT_2D-Intersection_Details.dgn lib and select **Right Turn Lane.**

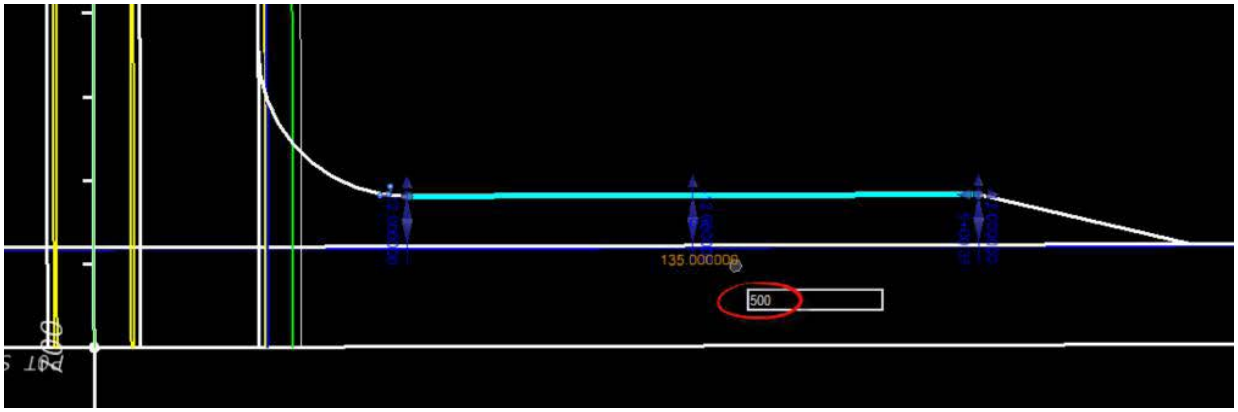


3. At the prompt, for the first Reference, select the widening Pavement Asphalt EOPA line.
4. For the second Reference, select the SR61 Right EOP Out Pavement Asphalt EOPA.
5. Reset to Skip Elements to View Alternatives.

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



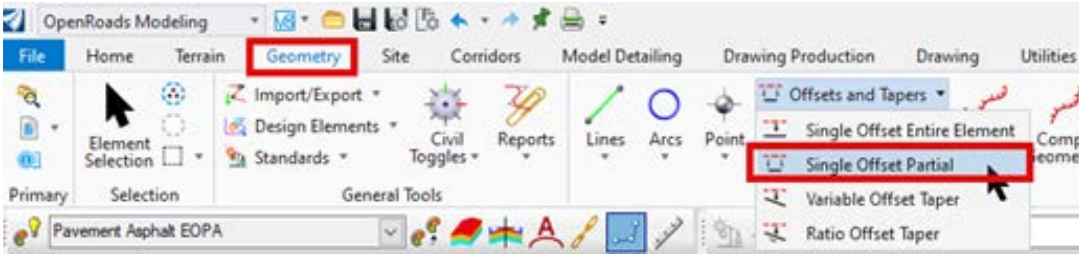
7. Edit the storage length for first Right Turn Lane placed, select the tangent line and change the Length from 200 to 500 feet.



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

Exercise 2.7 *Add the School Entrance Right Turn Lane off US98 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**



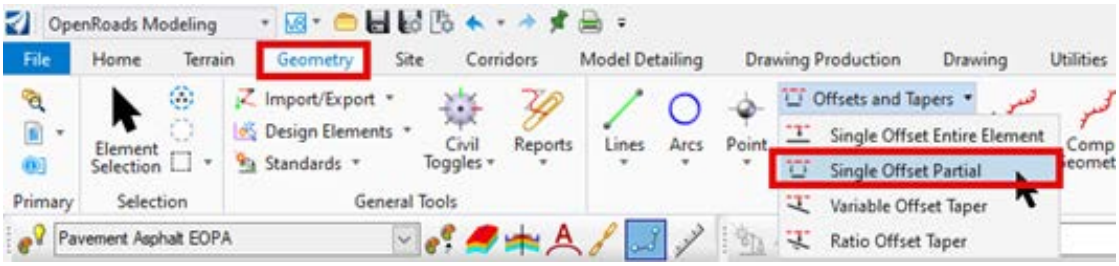
2. Create the side road EOPA_SCH_ENT opposite SR61 left and right offsets at -23 feet.

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

   b. For the *end*, snap to the US98 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**



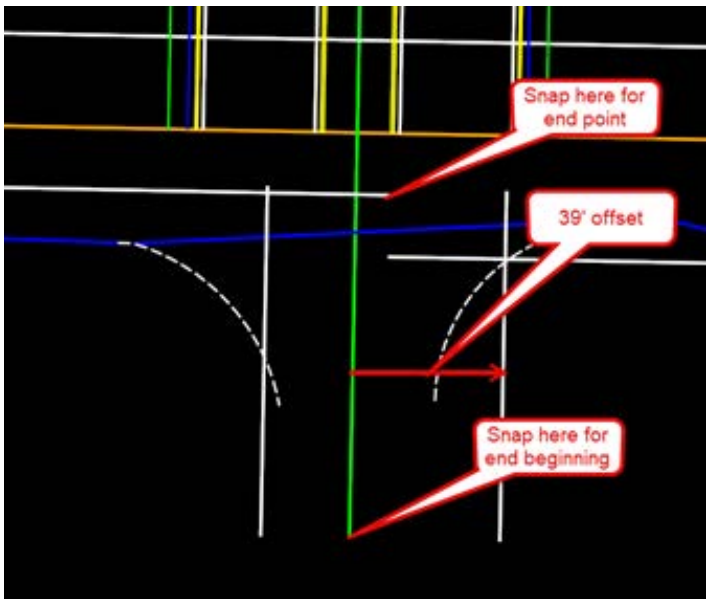
4. Create the side road **Pavement Asphalt EOPA** opposite *SR61 Left Offset* **39 feet**.

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

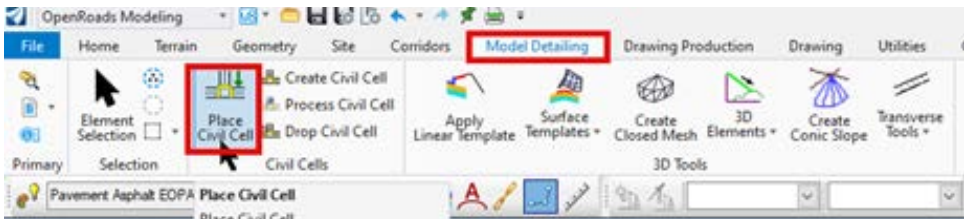
   b. For the *end*, snap to the US98 widening line end point at SR61.

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

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

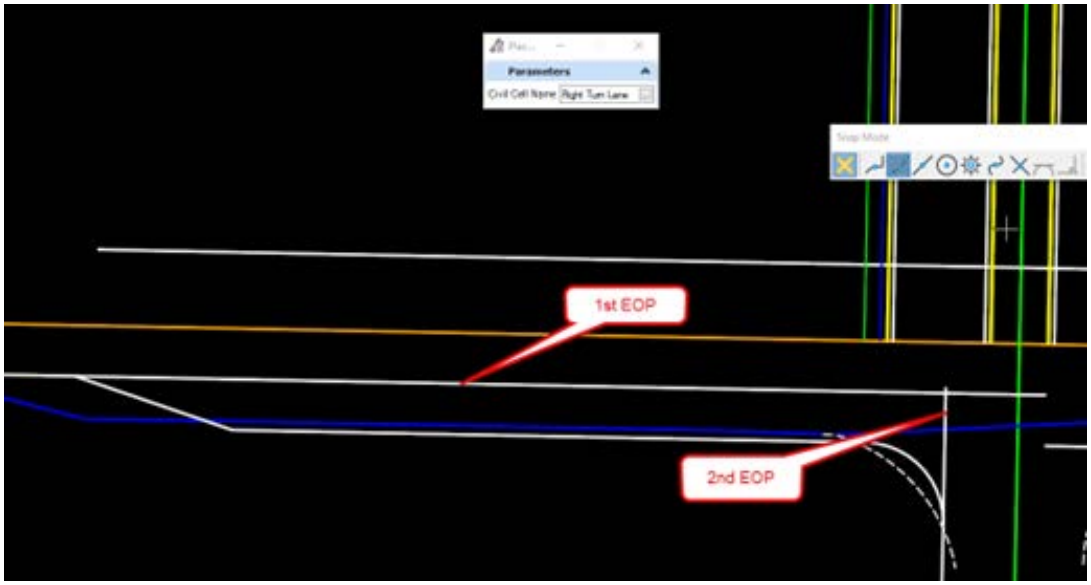


5. Add another **Right Turn Lane** Civil Cell on the opposite side of the intersection.



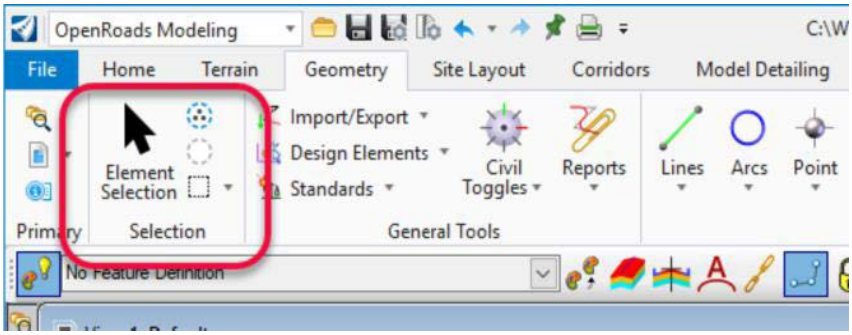
a. At the prompt, for the first *Reference*, select the **widening Pavement Asphalt EOPA** line.

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

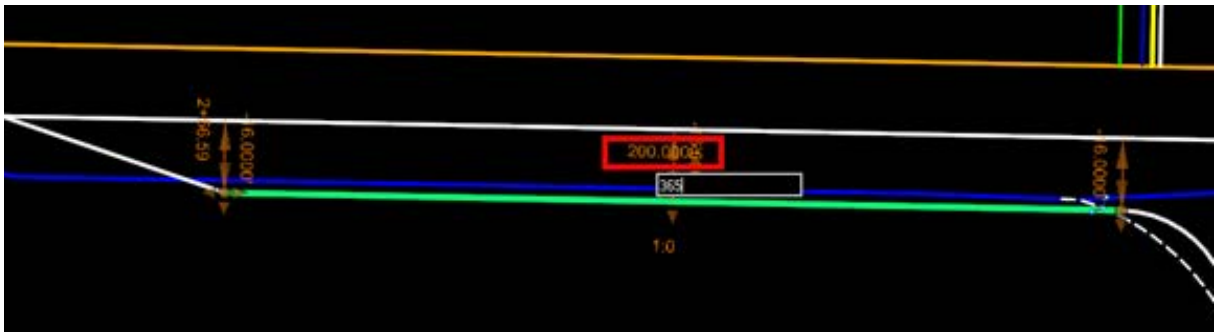


c. Data point to accept **Civil Cell Placement.** The Right Turn Lane is added.

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

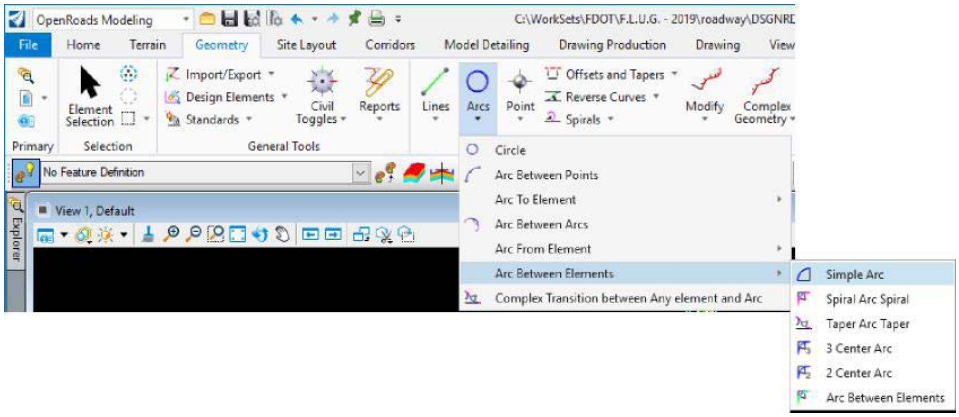


7. Edit the storage length for the second Right Turn Lane placed, select the tangent line and change the Length from **200** to **365** feet. Verify the Change the lane width is -16 feet.



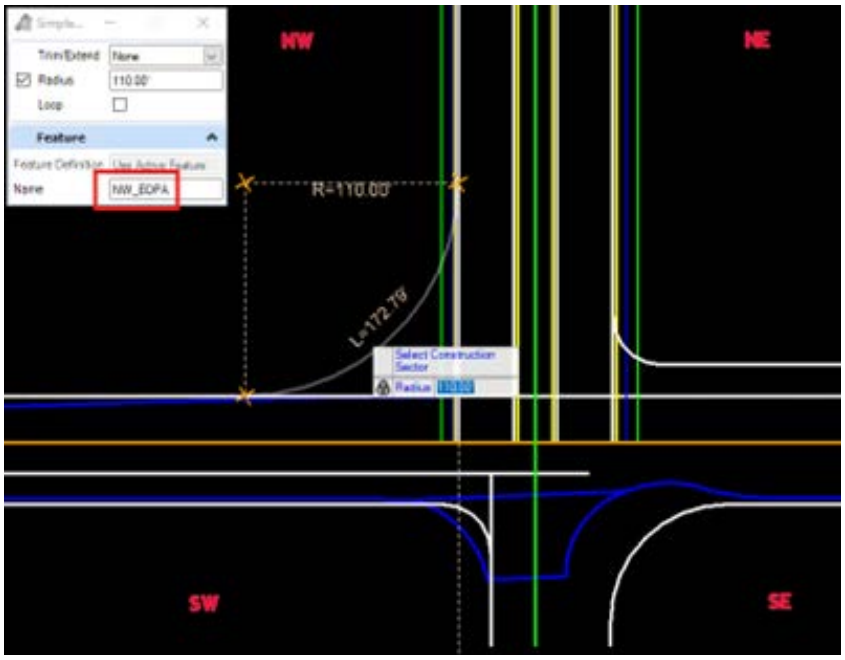
Exercise 2.8 *Create/Edit the Intersection Curve Radii*

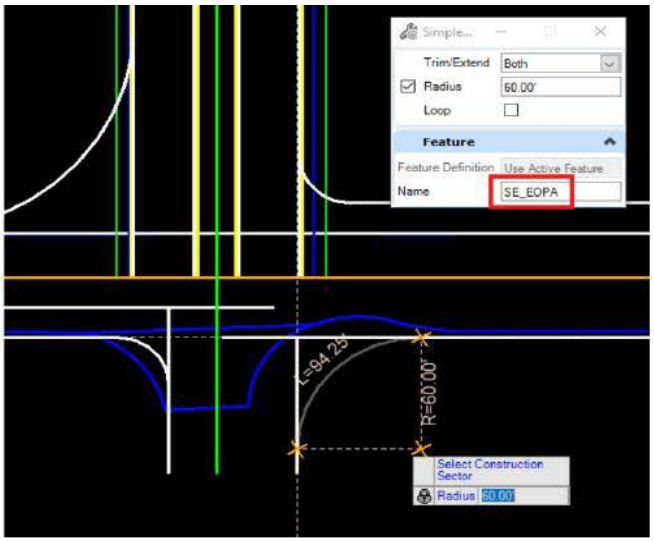
1. Use the *Geometry Tab and the Horizontal Group*, to select the **Simple Arc** tool located in the ARCS button then the drop down of Arc Between Elements**.**

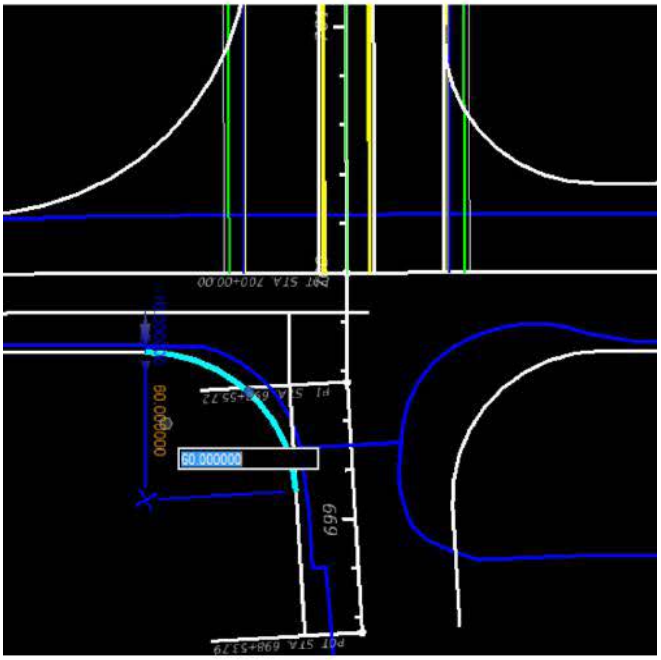


2. Create/Edit the Curve returns.
3. Select Feature Definition, Pavement Asphalt EOPA to place remaining curve radii.
4. Follow the cursor prompt to select the two Roadway Pavement Asphalt EOPA reference lines.
5. Rotating the view along the US98 BaseLine will set the Top of the screen as North giving a quandrant as shown below.
6. 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



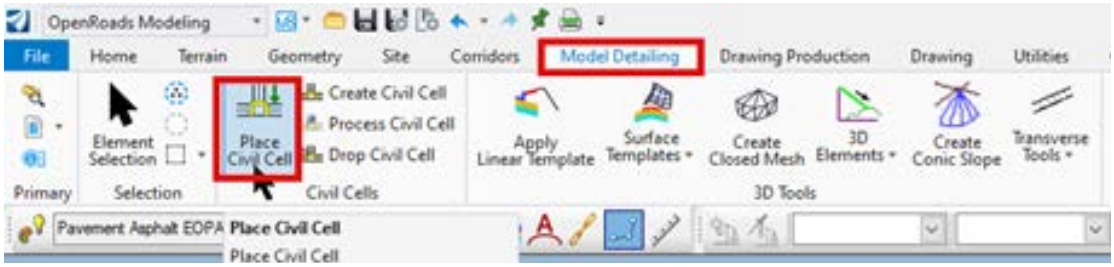

Simple...
Trim/Extend
Both
Radius
60.00'
Loop
Feature
Feature Definition
Use Active Feature
Name
SE_EOPA
L=94.25'
R=60.00'
Select Construction Sector
Radius
30.00


60.000000
60.000000
669

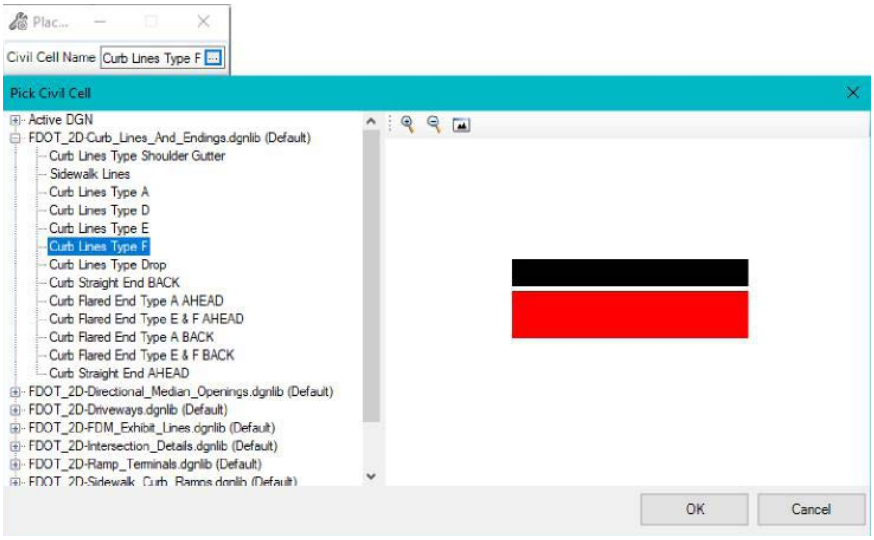

669

Exercise 2.9 *Use Civil Cell Technology to Place Curb and Sidewalk Around the Radii*

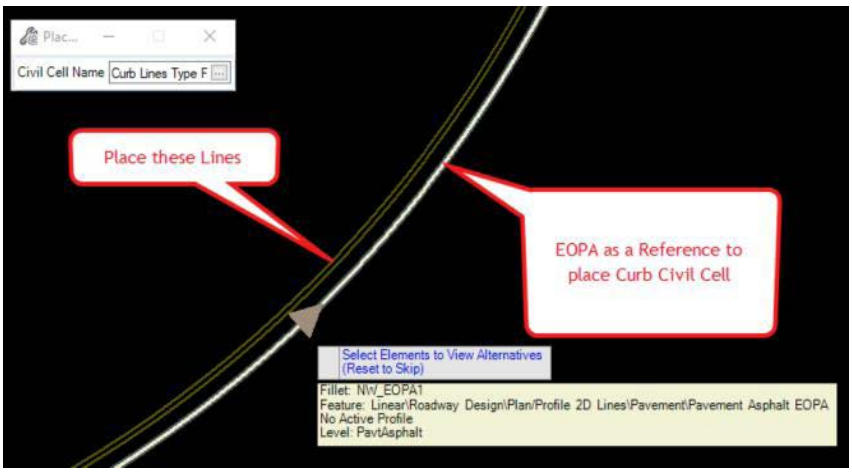
1. Use Model Detailing Tab and the Civil Cells Group**,** to select the **Place Civil Cell** tool. **OpenRoads Modeling > Modeling Detailing > Place Civil Cell**



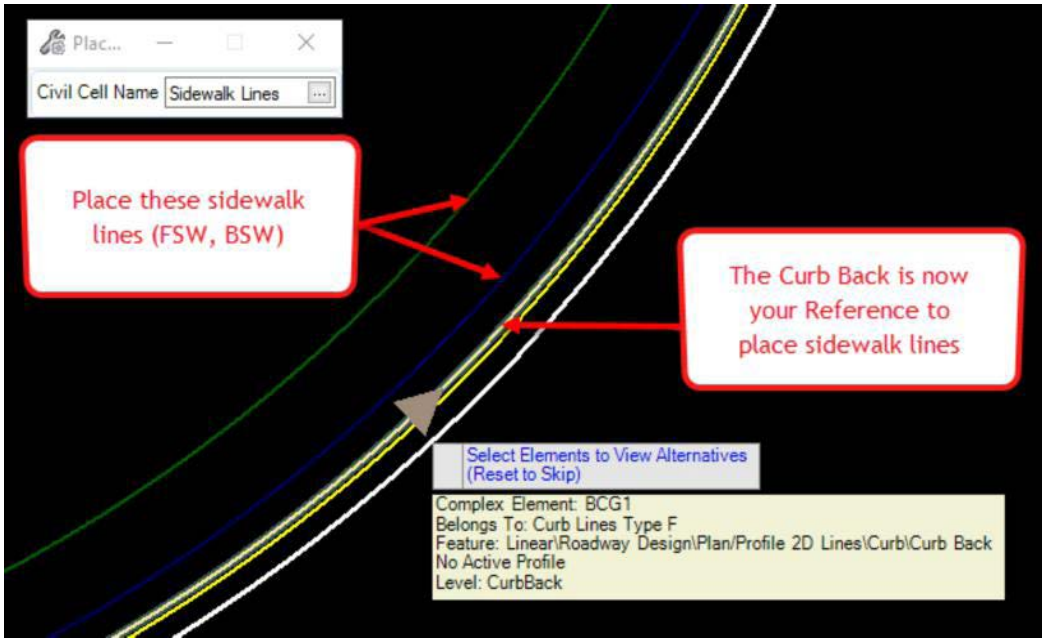
2. Navigate to the *FDOT _2D-Curb_Lines_And_Endings.dgn* lib and select the Curb Lines Type F civil cell.



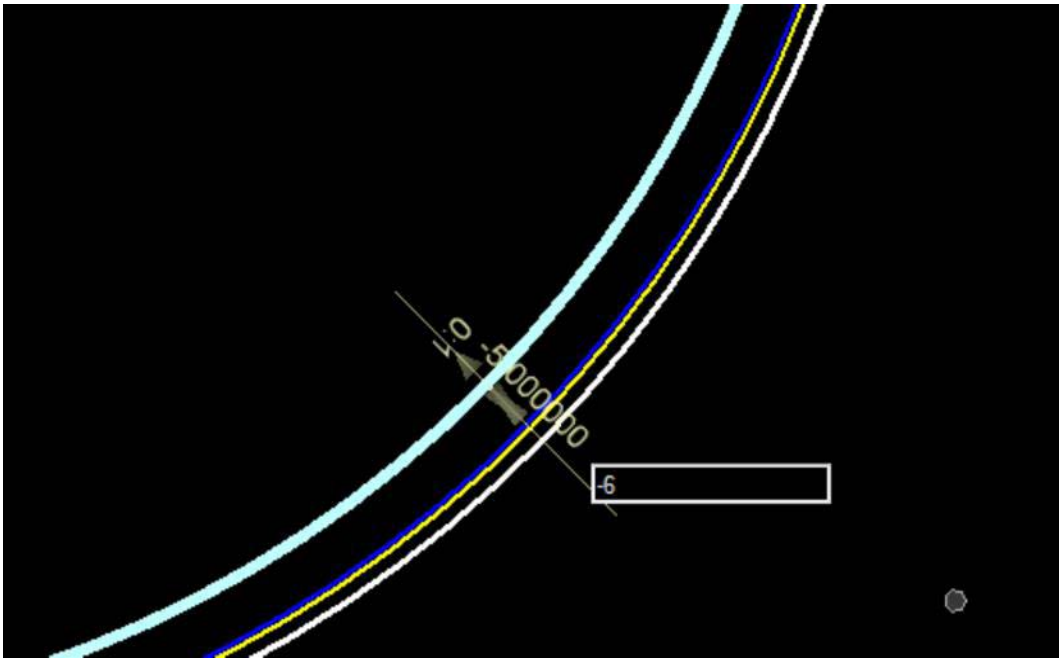
3. At the prompt, select the **NW_EOPA** *radius line*, reset to **View Alternates** and then data point to accept the **Civil Cell Placement**.



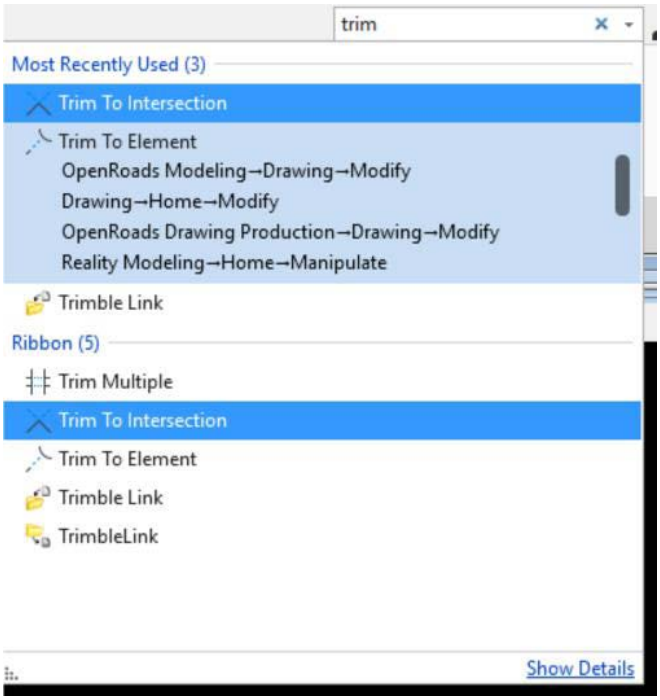
4. Navigate back to the Place Civil cell dialog select the SideWalk Civil cell from the *FDOT _2D-Curb_ Lines_And_Endings.dgnlib. Place this civil cell off the back of curb line that you just placed in the previous step.*



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.

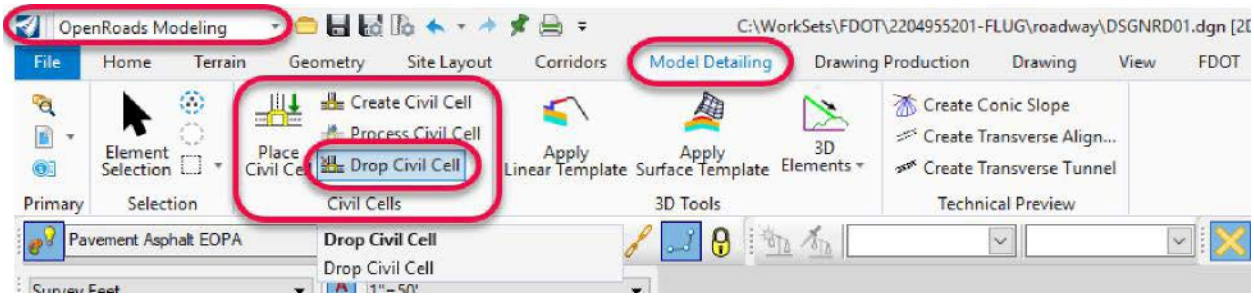


6. Use OpenRoads **Trim to Intersection** tool. A quick way to find a tool is to use the search ribbon.



Exercise 2.10 *Create a Custom Civil Cell for Other Radii*

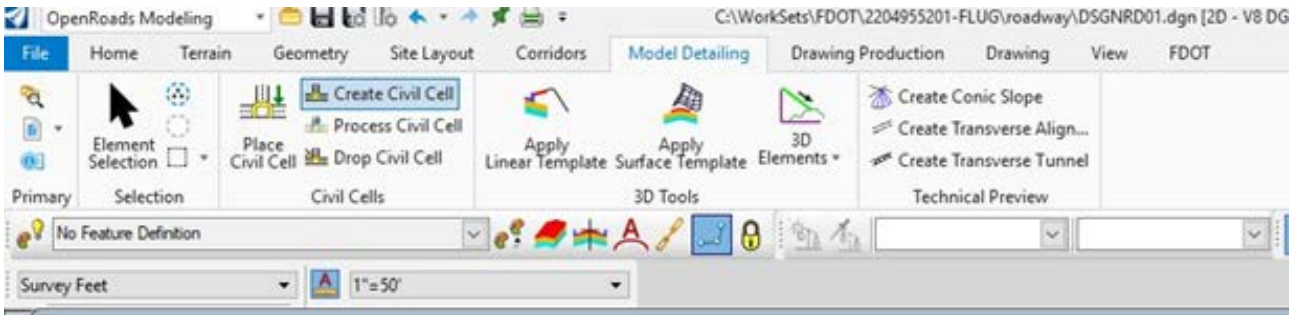
1. From the Model Detailing Tab and the Civil Cells Group, select the **Drop Civil Cell** tool. **OpenRoads Modeling > Model Detailing > Civil Cells > Drop Civil Cell**



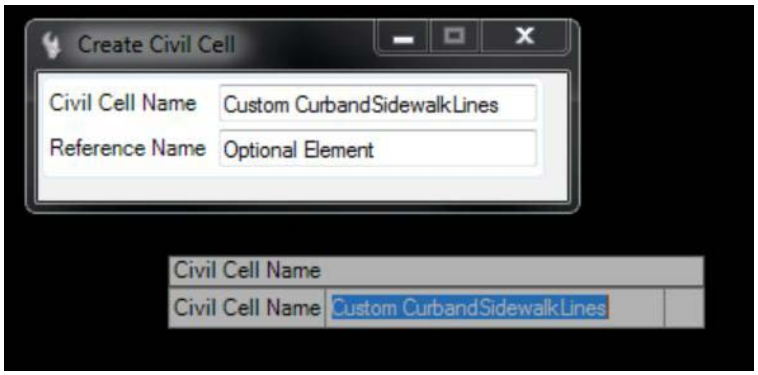
2. Select the SidewalkLines *Civil Cell* in the *View* and data point to drop the Civil Cell. Repeat this for the Curb Civil Cell.

NOTE ***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**

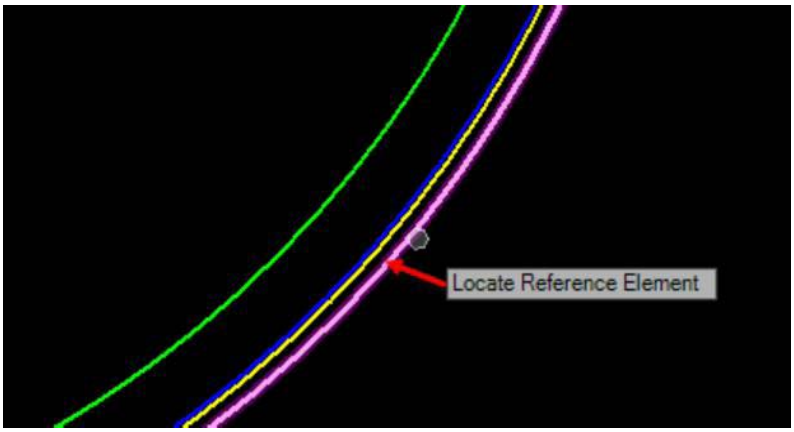


a. Enter the *Civil Cell Name*: **Custom CurbandSidewalkLines**.



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

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

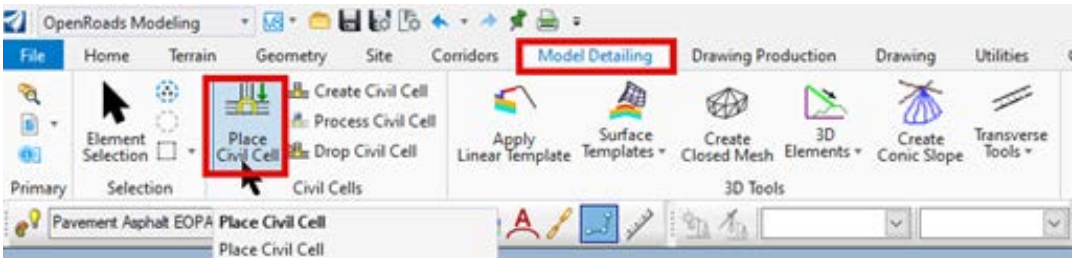


d. Reset to Locate Reference Element.

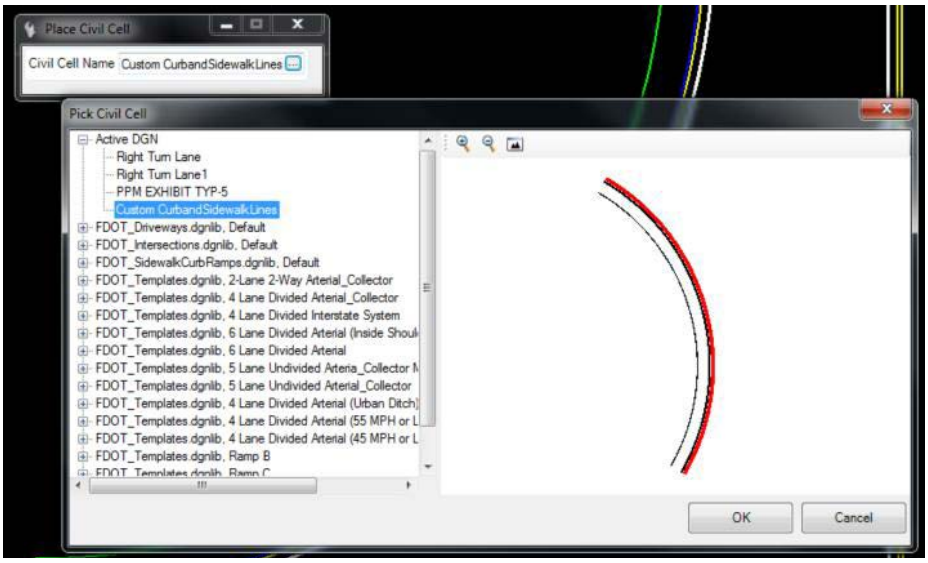
e. Reset to Optional Reference.

f. Data Point to accept Civil Cell.

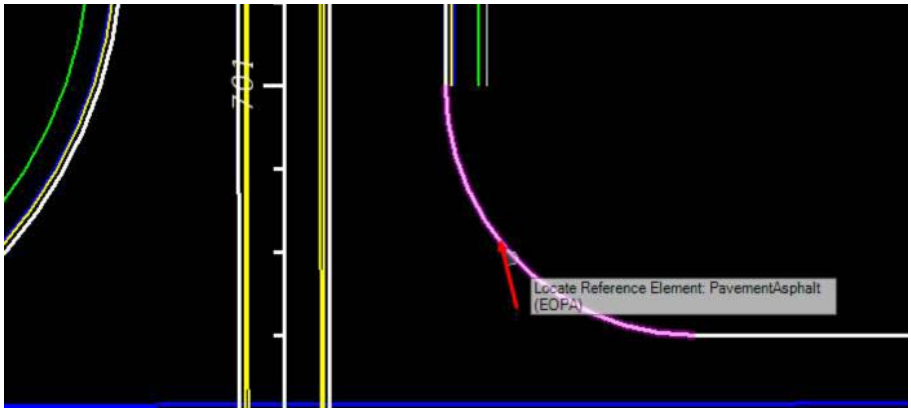
4. Use the new *Civil Cell* to place for the other *Radii*; use *Place Civil Cell*. This can be found in the Model Detailing Tab and the Civil Cells Group of the Ribbon. **OpenRoads Modeling > Model Detailing > Civil Cells > Place Civil Cell.**



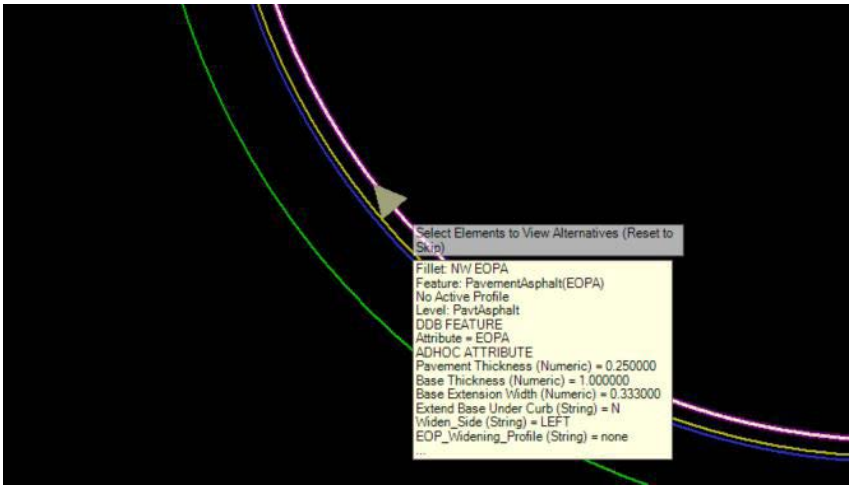
a. If the Custom CurbandSidewalkLines is not active, navigate to the *Active.dgn* and select it from the list. Click **OK**.



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

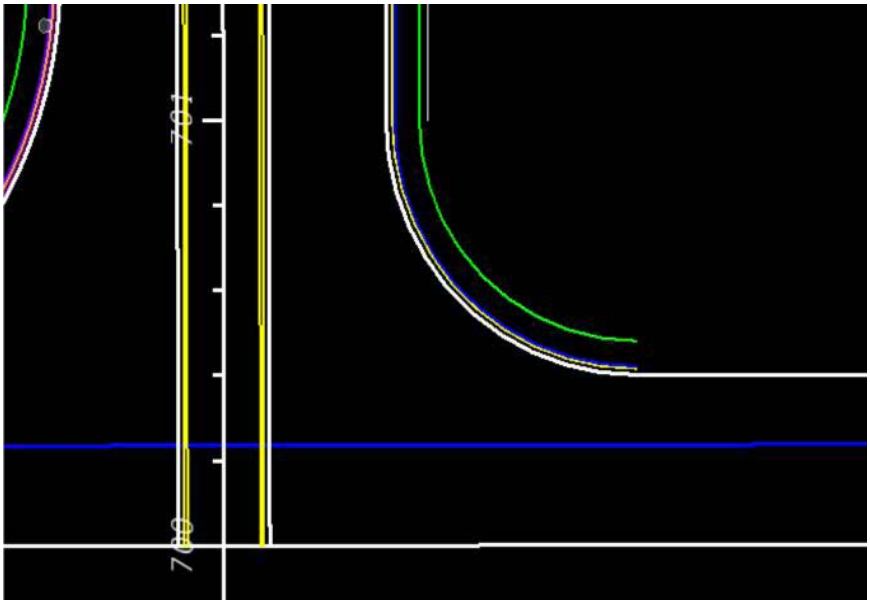


c. At the prompt, select Element to View Alternatives, move the cursor over the EOPA line and click on the **Arrow** to reflect the Civil Cell to the correct side.



d. Reset to View alternates.

e. Data Point to accept the Civil Cell Placement.

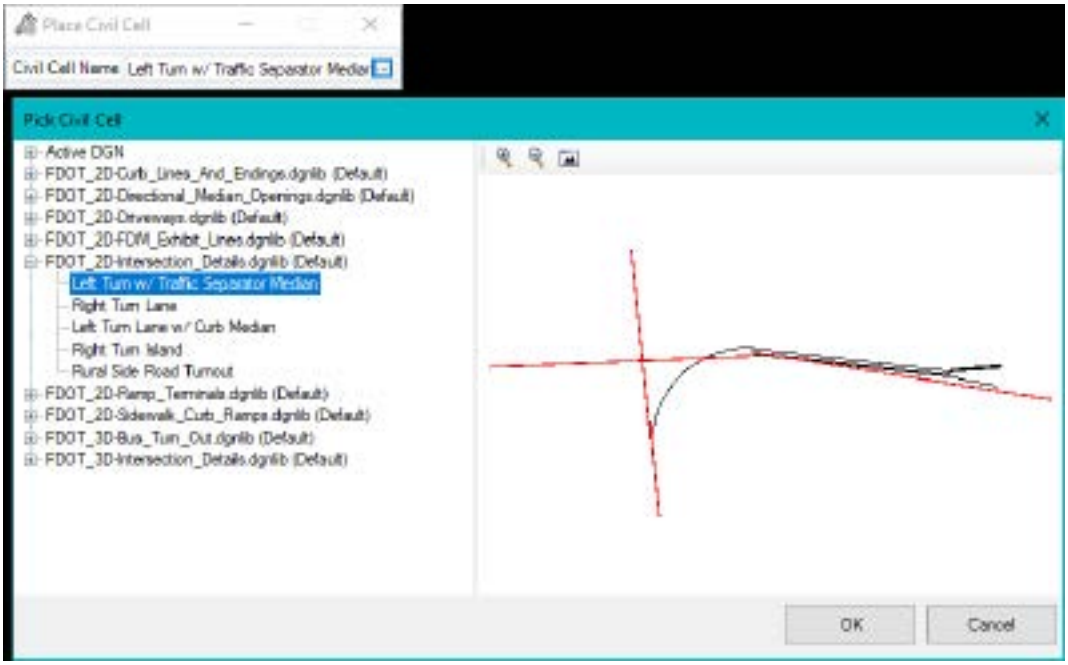


5. Repeat these steps to place the **Custom CurbandSidewalkLines** *Civil Cell* on the **NE EOPA** *Radius*.

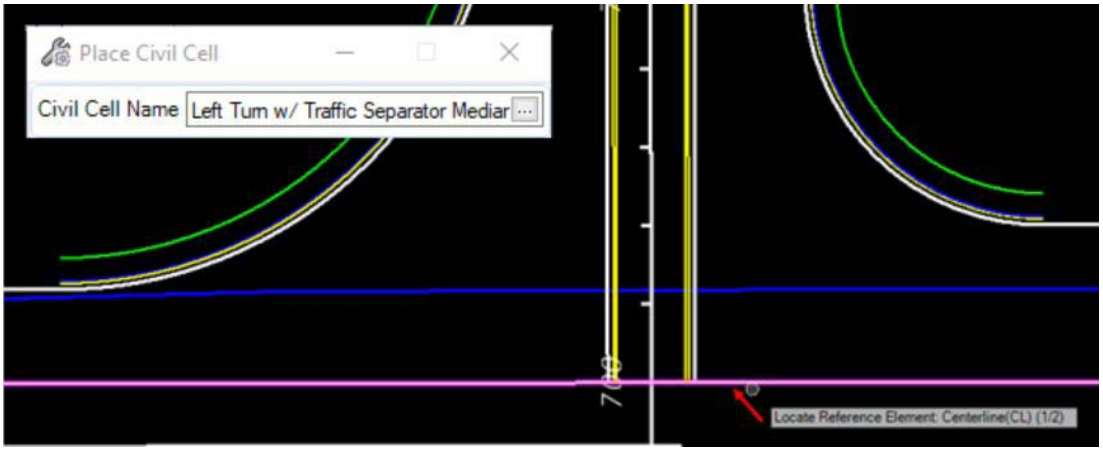
6. Leave the **SE Radius** without curb and sidewalk.

1. Use Model Detailing Tab and the Civil Cells Group, to select the Place Civil Cell tool. NOTE: After the placement of any Civil Cell be sure to verify the Feature Definition on elements in order to add as a Corridor Reference. **OpenRoads Modeling > Model Detailing > Civil Cells > Place Civil Cell.**

a. Navigate to the FDOT_Intersections.*dgn* lib and select Left Turn with TS civil cell.

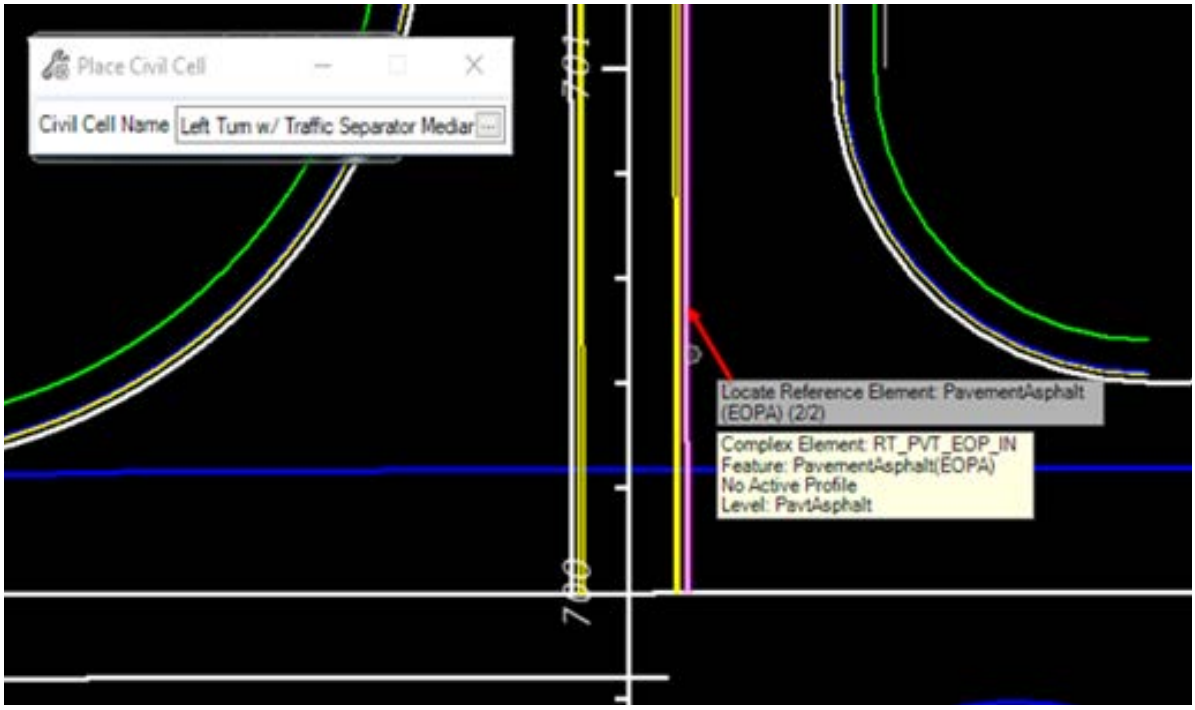


b. At the *Locate Reference Element Pavement Asphalt EOPA*, select the **RT_PVT_EOP_IN** line in the View.

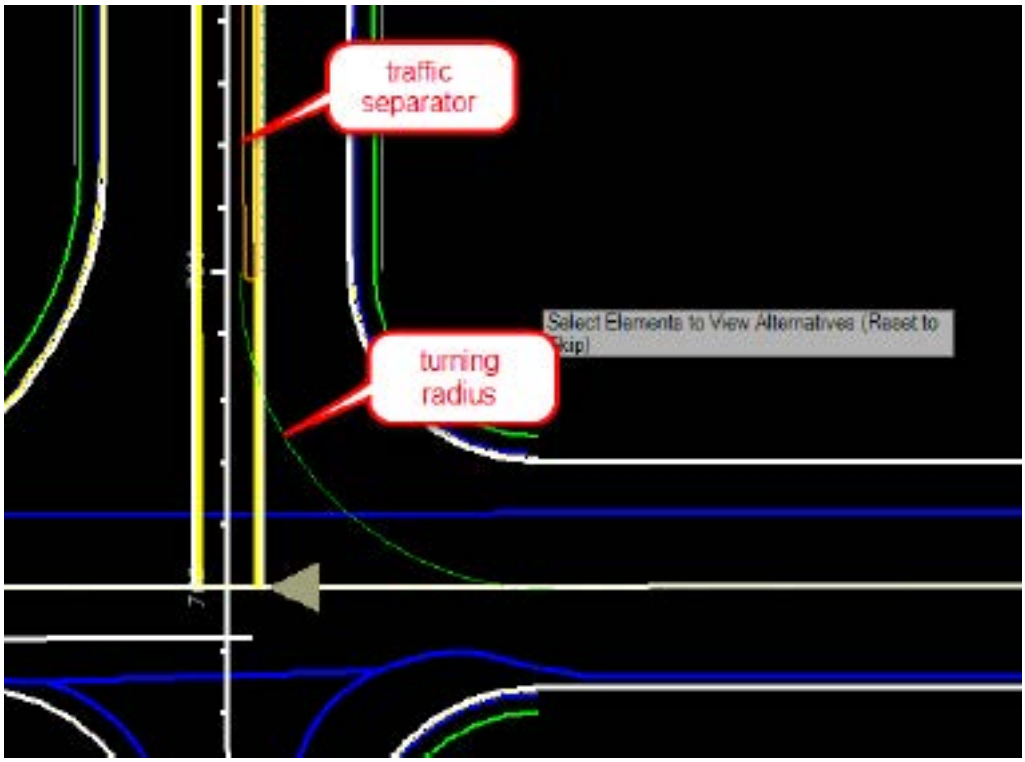


c. At the Locate Reference Element Pavement Asphalt EOPA, select the RT_PVT_EOP_IN line in the View.

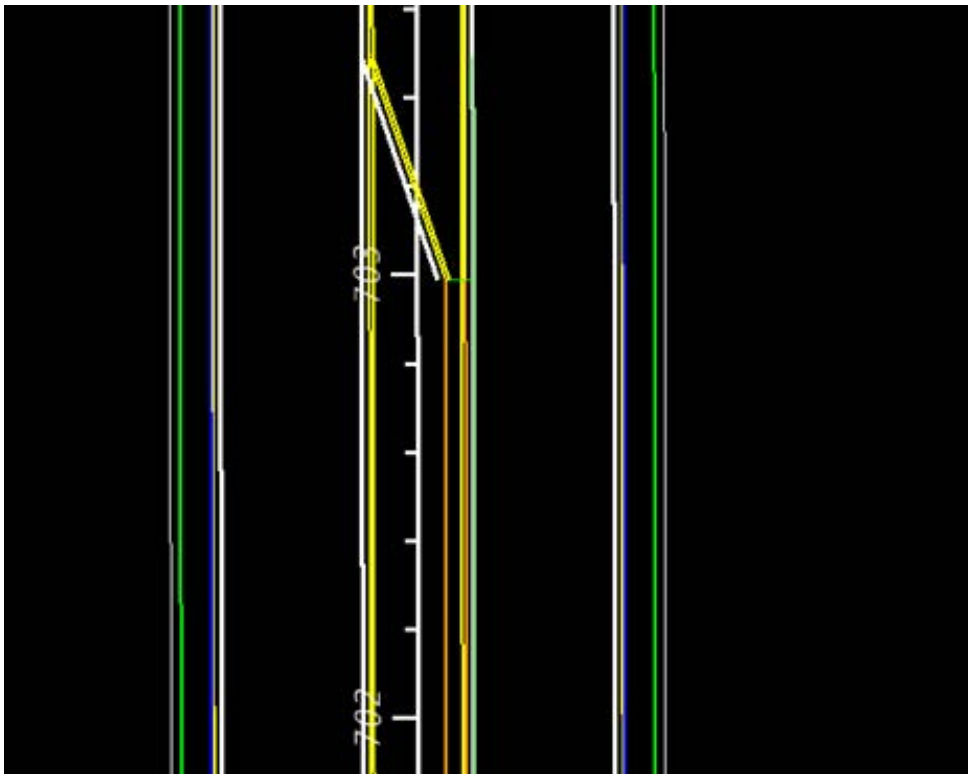
NOTE ***For the direction of travel I, this is always the left median EOP line.***



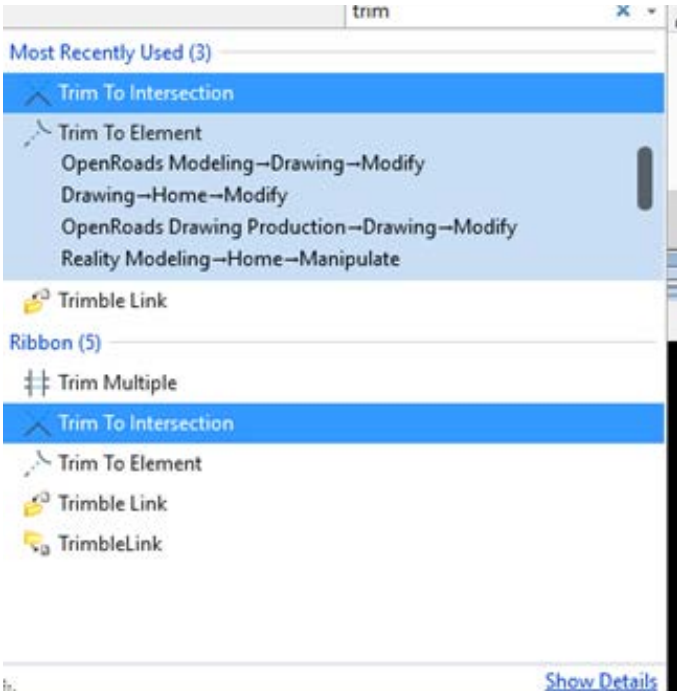
d. Click on the Arrow of both Reference Elements to View Alternates, when the Green Turning Radius and Traffic Separator are both in the correct place, Reset to skip.



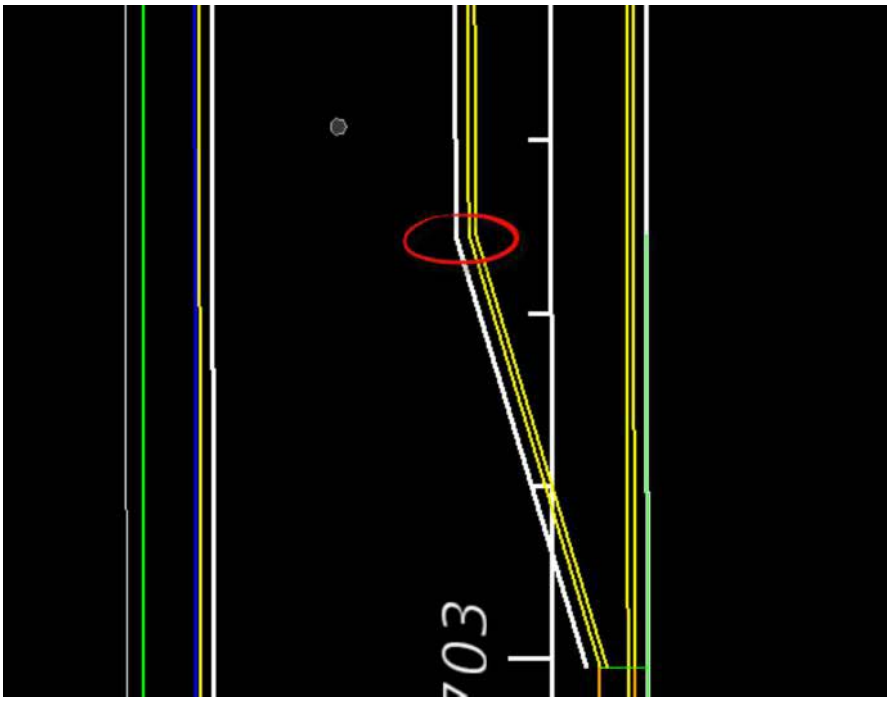
e. Data point to accept the **Civil Cell Placement** and view the left turn lane on **SR61** at *US98 Intersection*.



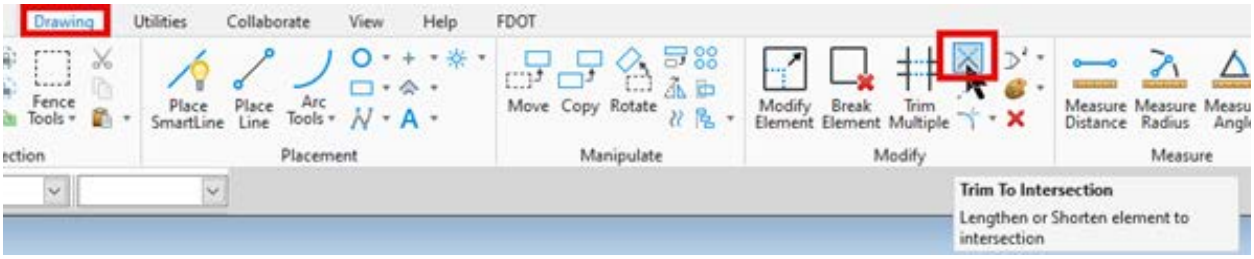
2. Use OpenRoads Trim to Intersection tool. A quick way to find a tool is to use the search ribbon.



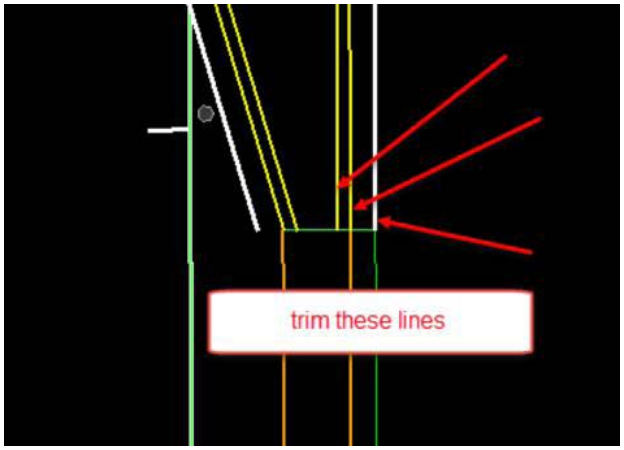
3. Trim the curb median elements at the begin taper as shown.



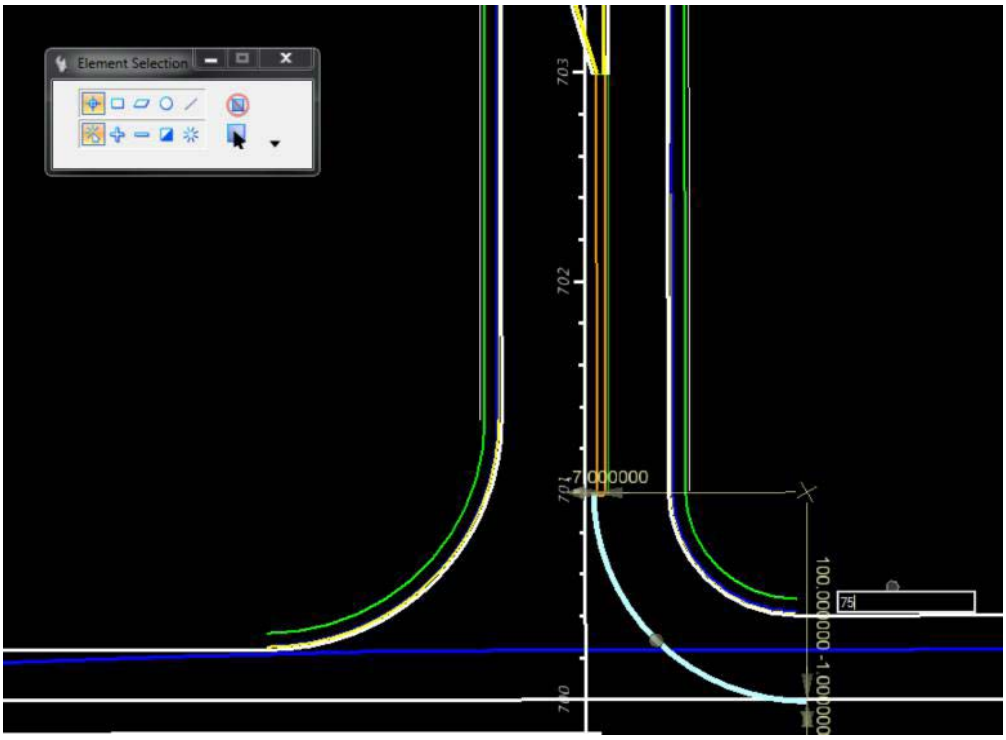
4. Use OpenRoads **Trim to Element** tool. Which can found in the Drawing Tab, and the Modify Group



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

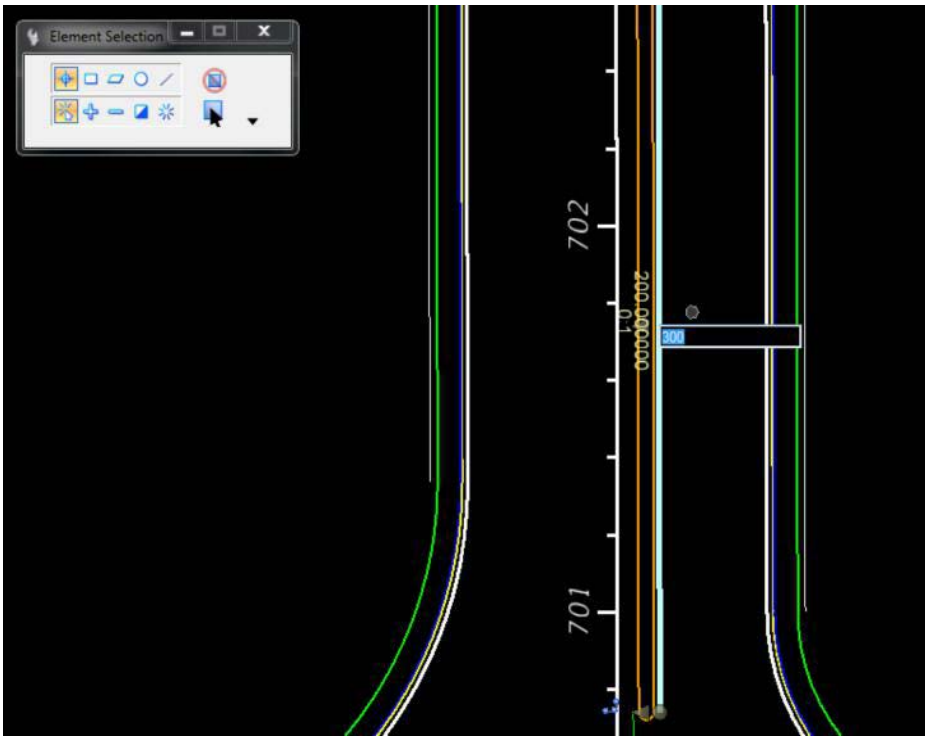


6. View the placed left turn, change the *Turning Radius* from **100 feet** to **75 feet**.

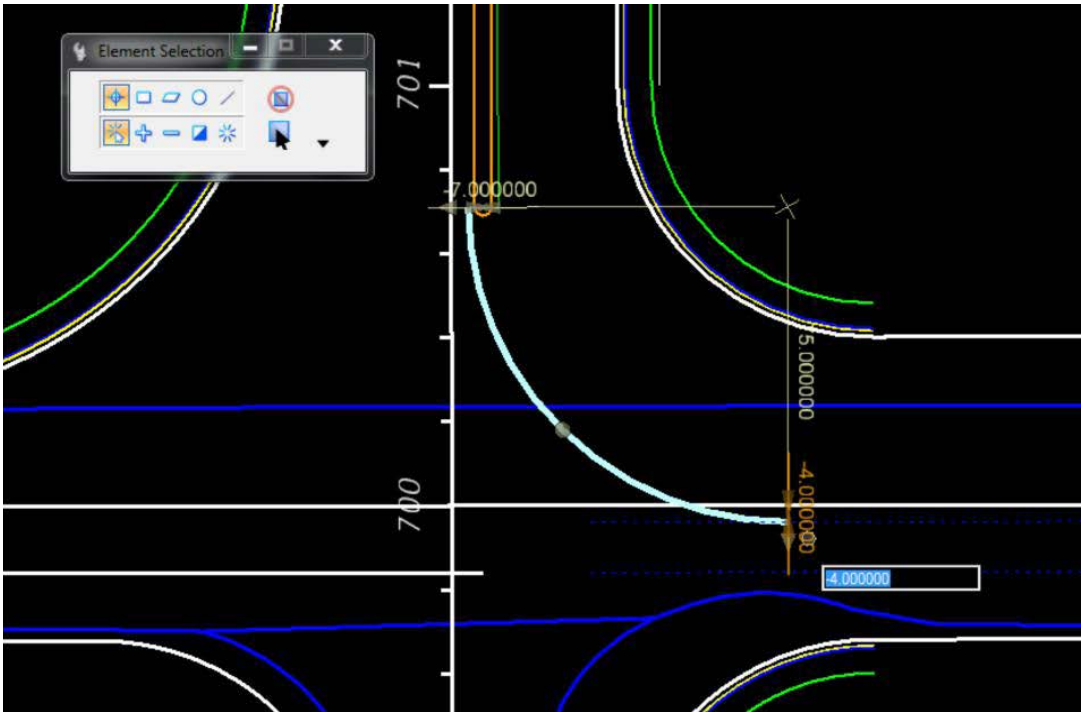


7. View the placed left turn, change the *Storage Length* from **200 feet** to **300 feet**.

NOTE ***Select the green line, then select the length text.***

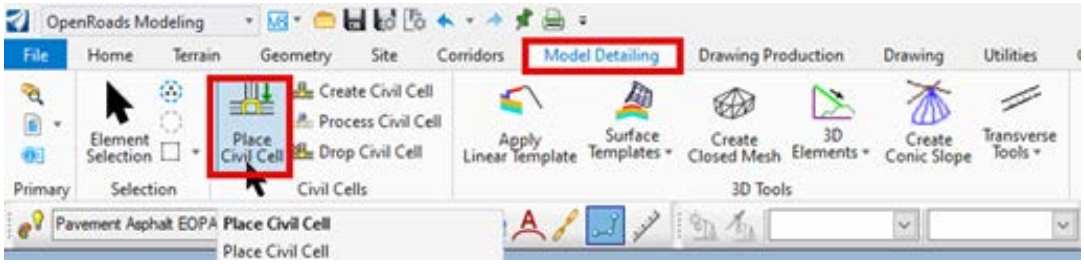


8. Zoom to the *Turning Radius Offset Dimension*, change the *value* from **-1 feet** to **-4 feet**.

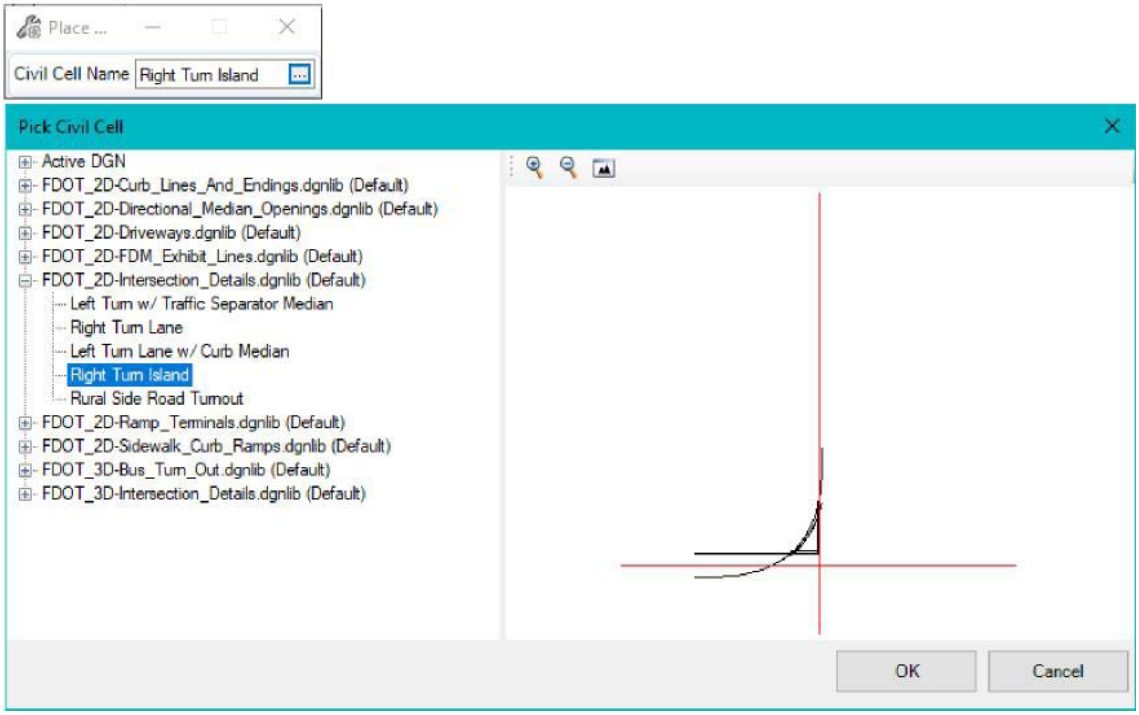


Exercise 2.12 *Place Right Turn Island*

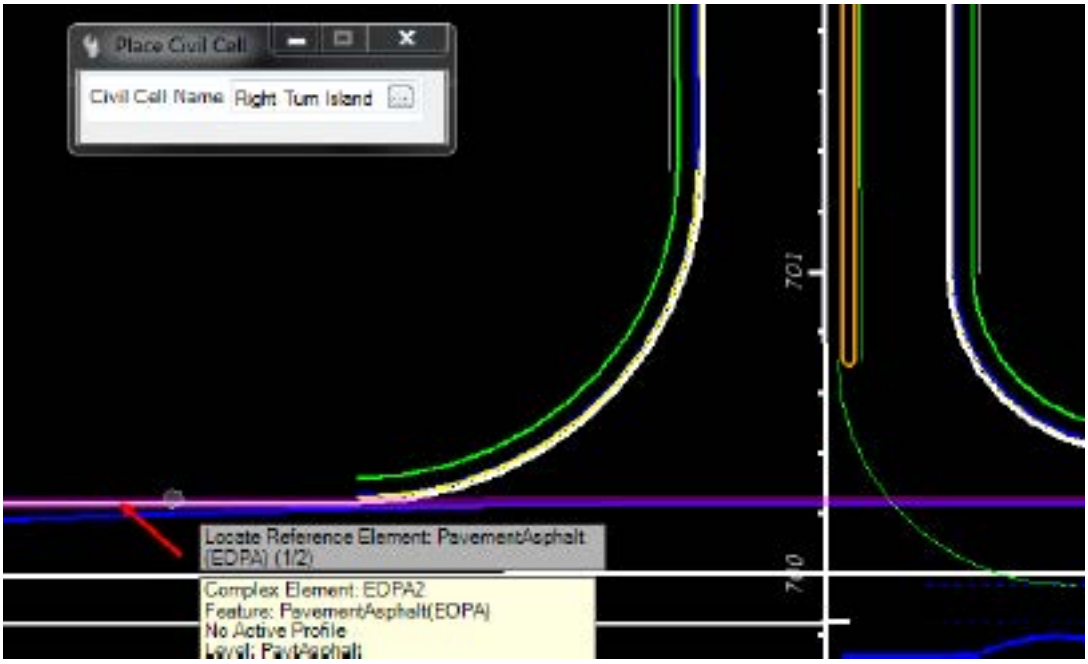
1. Use Model Detailing Tab and the Civil Cells Group**,** to select the **Place Civil Cell** tool. **OpenRoads > Model Detailing > Civil Cells > Place Civil Cell**



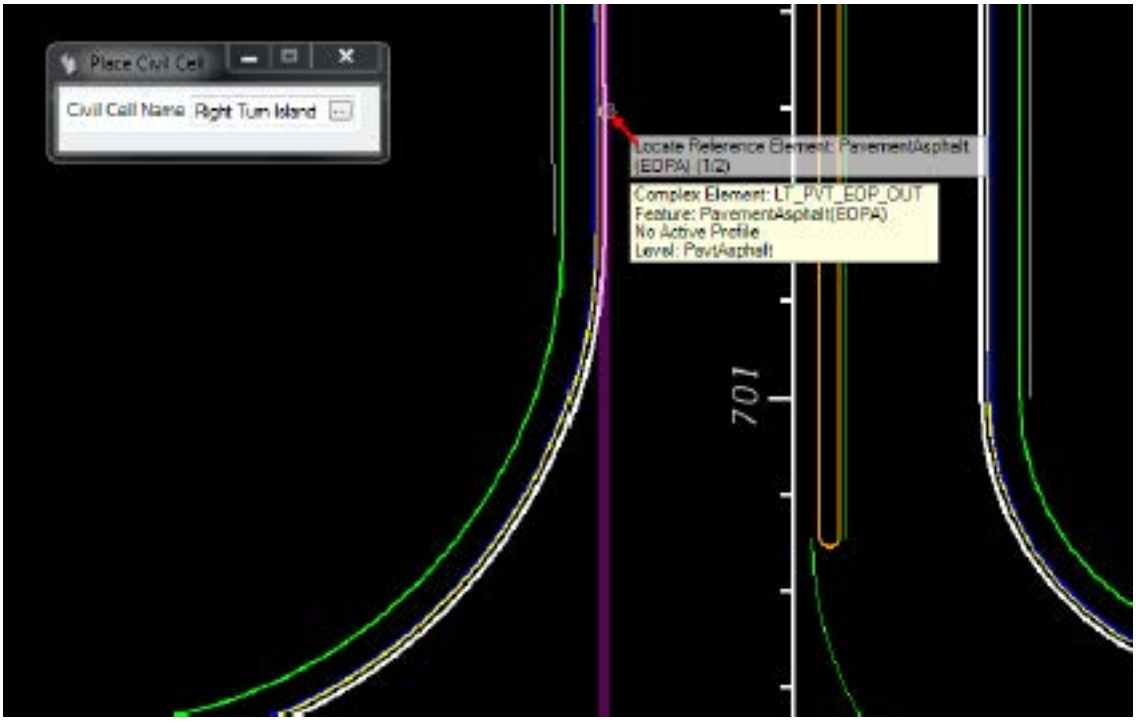
2. Navigate to the *FDOT_2D-Intersection_Details.dgnlib*, select **Right Turn Island**. Click **OK.**



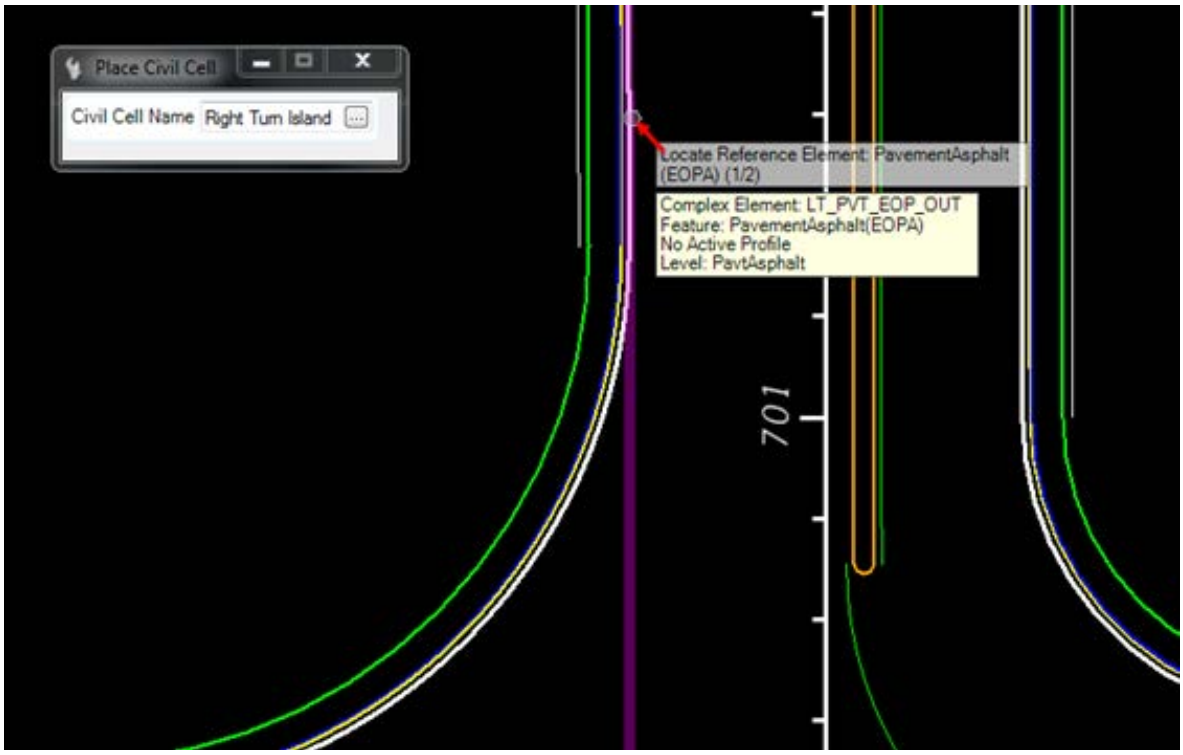
3. Select the first **Pavement Asphalt EOPA** lines.



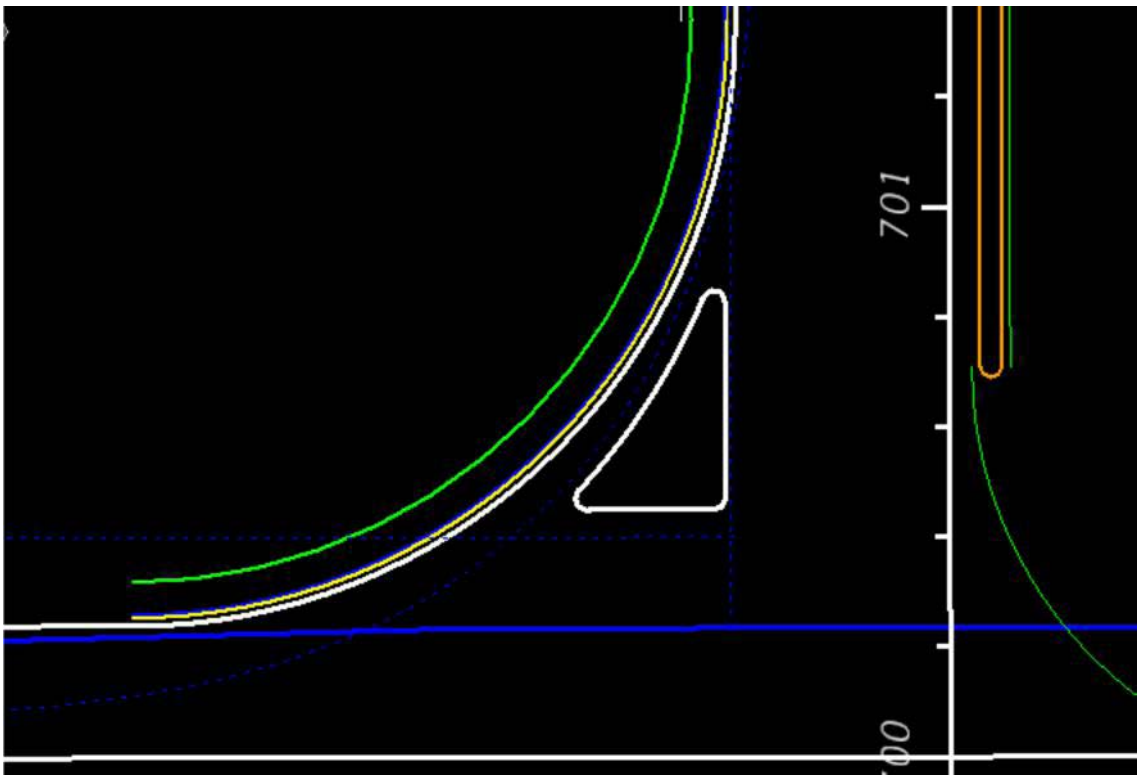
4. Select the second Pavement Asphalt EOPA line.



5. Reset to Skip Alternates.

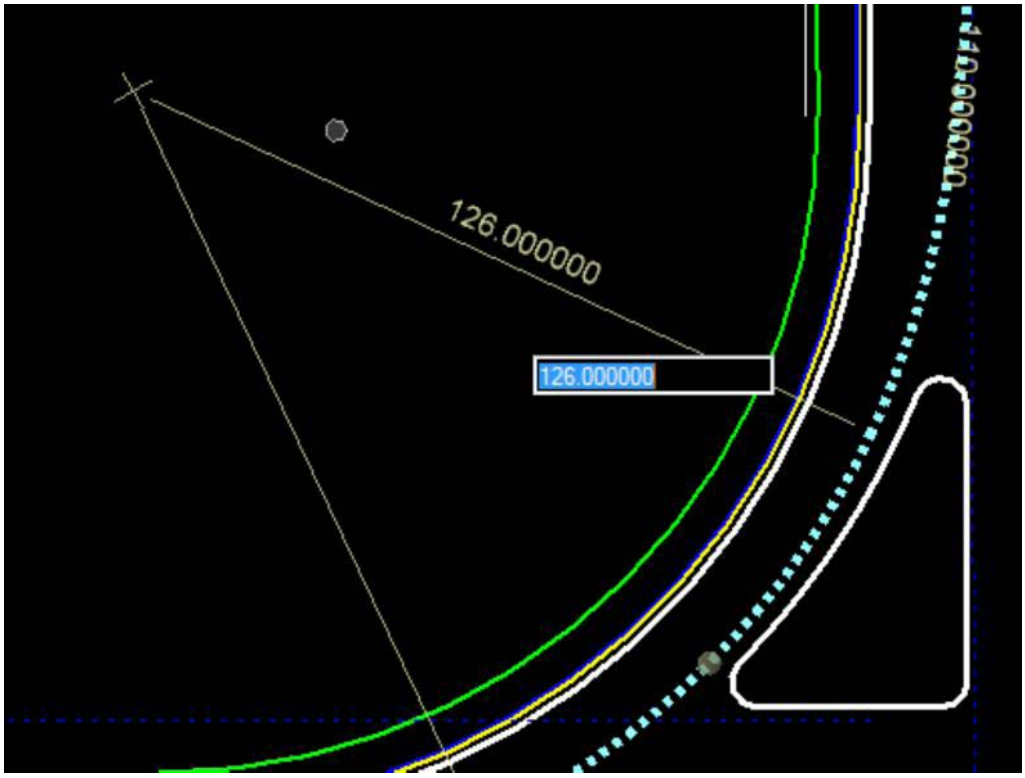


6. Data Point to accept the Civil Cell.



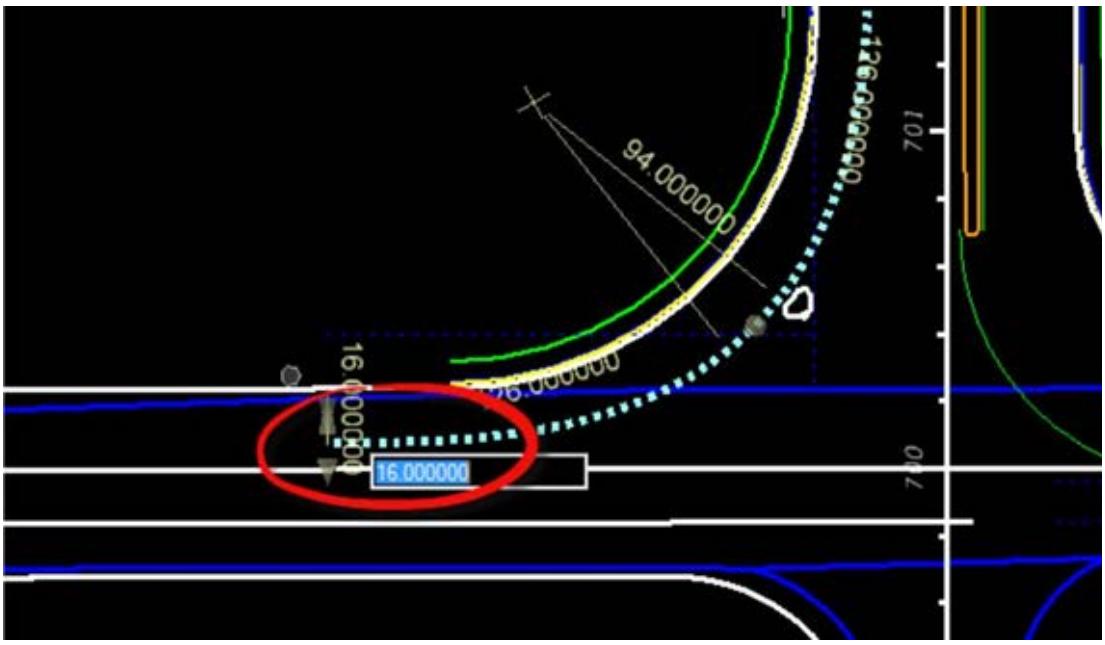
► ***CHANGE THE RIGHT TURN ISLAND PARAMETERS***

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



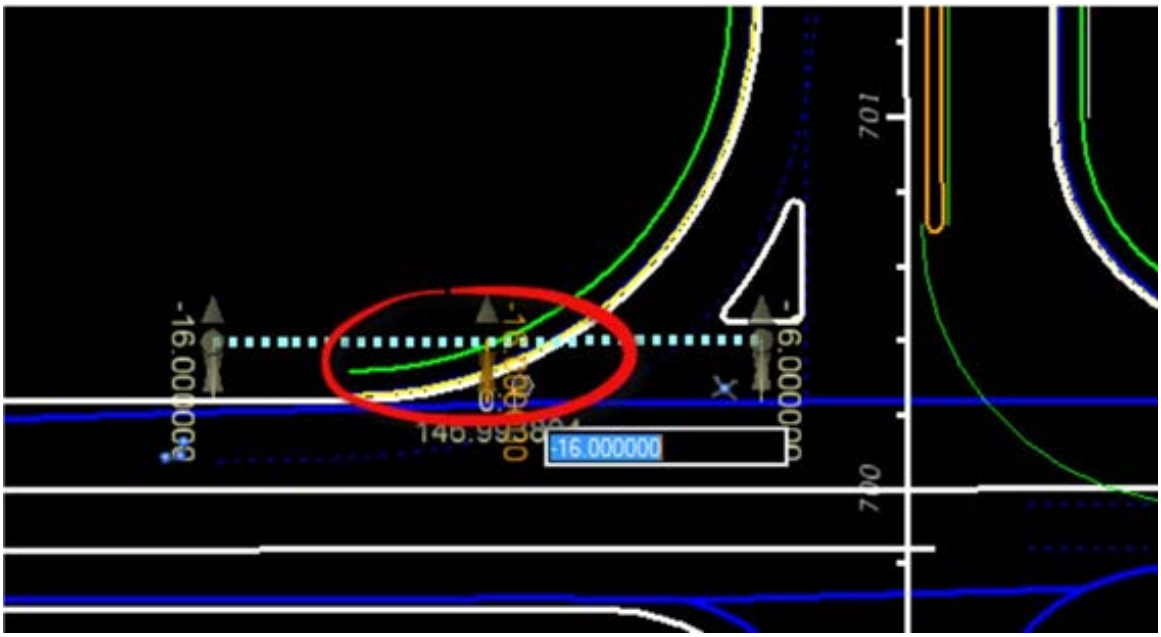
2. Check Const Lines Blue Dashed Begin Arc Offset is **-18 feet**.

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

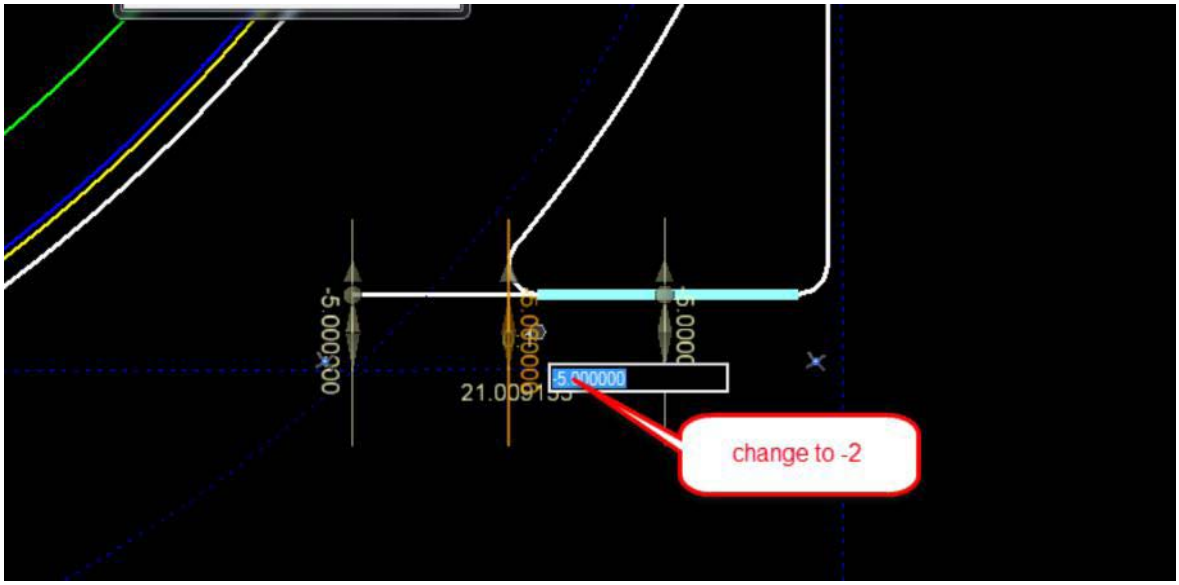


4. Change the straight *Const Lines Blue Dashed SR61 EOP Offset* from **1 foot** to **-16 feet**.

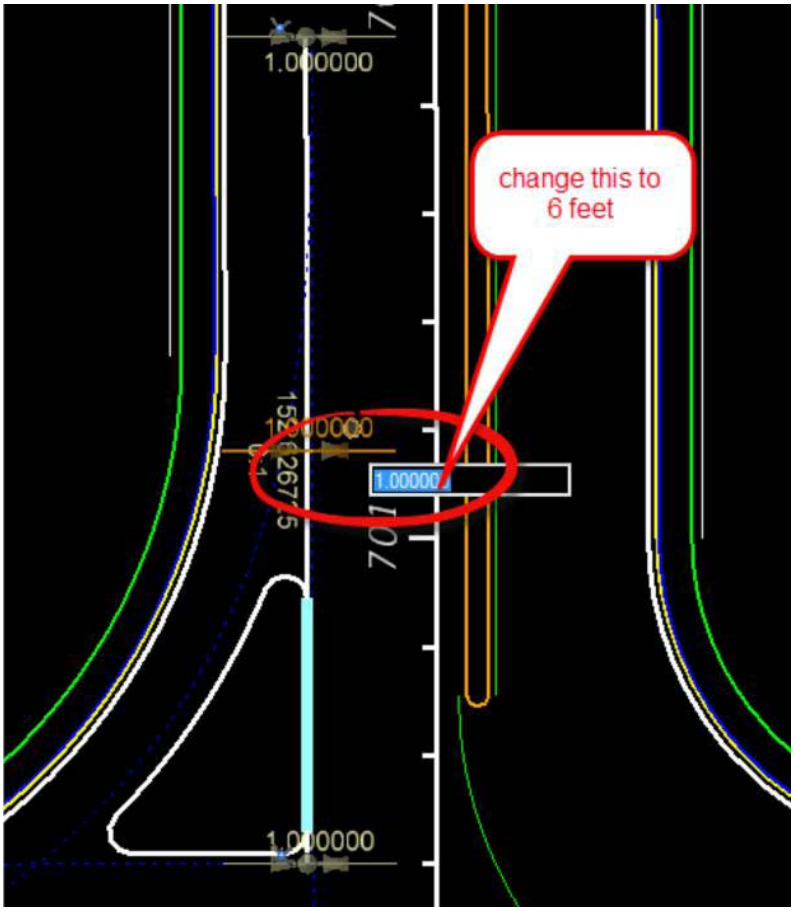
5. Check Const Lines Blue Dashed US98 EOP Offset is **-16 feet.**



6. Change *Island EOPA Offset* from the Const Lines Blue Dashed US98 from **-5 feet** to **-2 feet.**



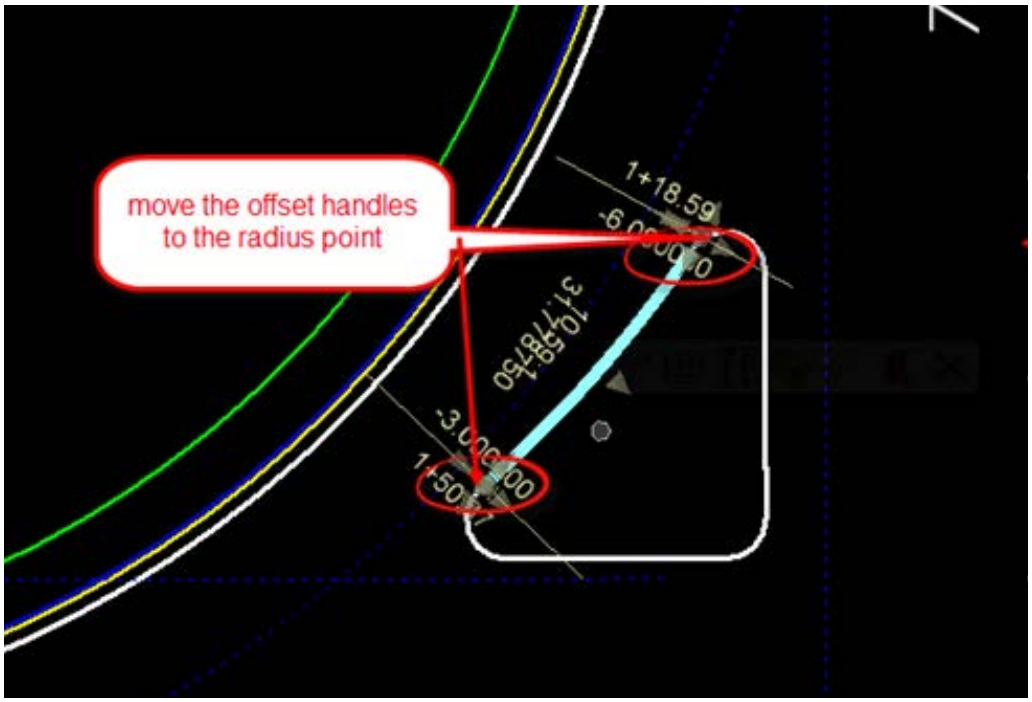
7. Change *Island EOPA Offset* from the Const Lines Blue Dashed SR61 from **1 foot** to **6 feet.**



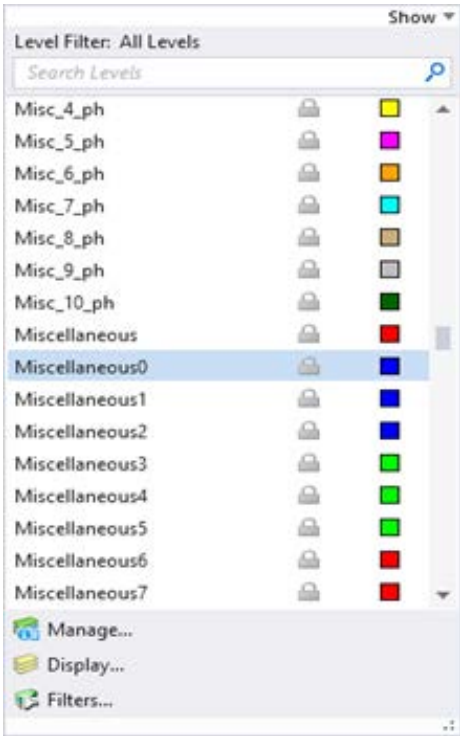
8. Change *Island Radii* to **4 feet.**

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

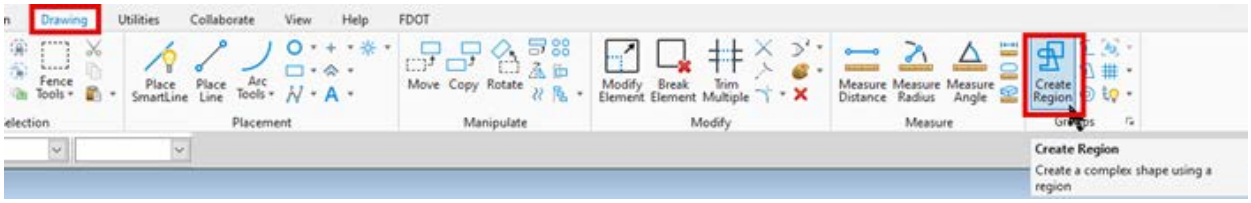
10. Move the *Offset* handles to the **Radius Point**.



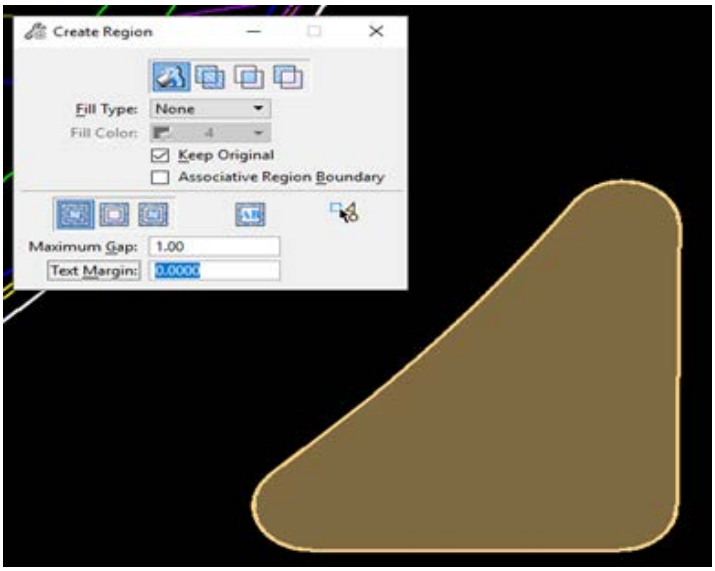
11. Change the *Active Level* to **Miscellaneous0.**



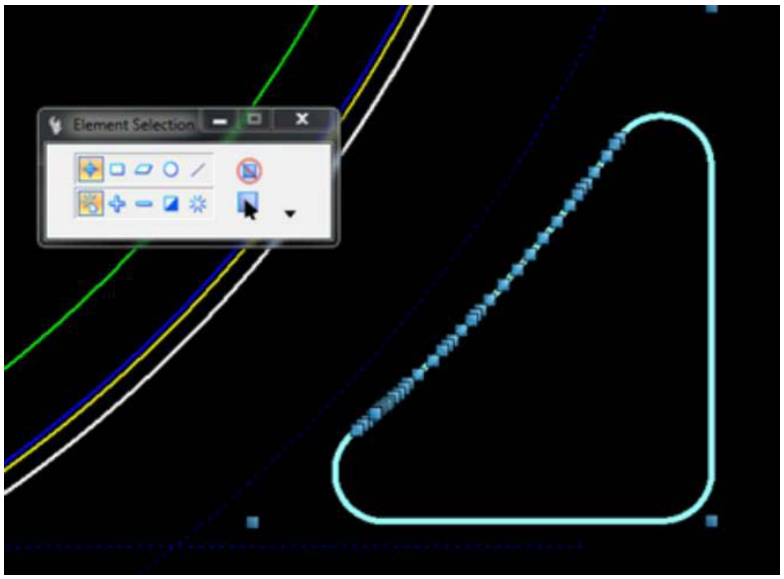
12. Use the OpenRoads **Create Region Flood** tool, this tool can be found by switching to the Drawing Workflow and then the Home Tab and with in the Groups Group will be the Create Region. **Drawing > Home > Group > Create Region**



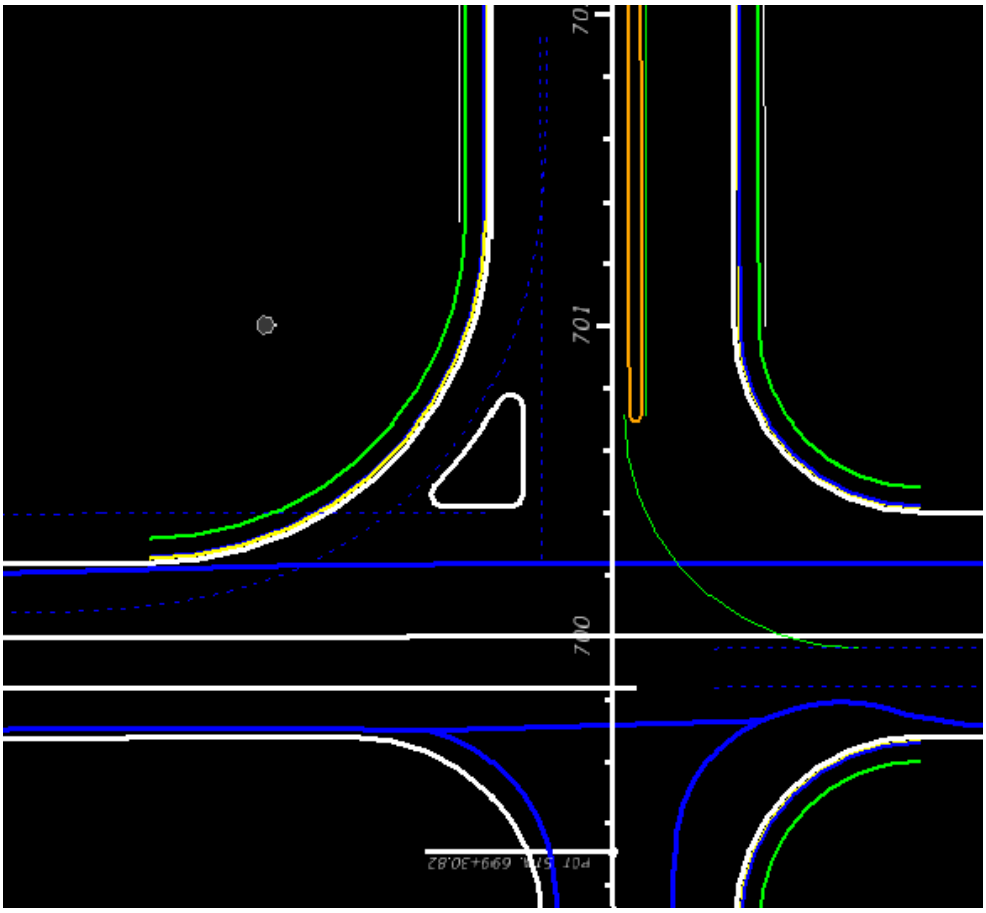
13. Select the Center of the Island, and then data point to accept the closed element.



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

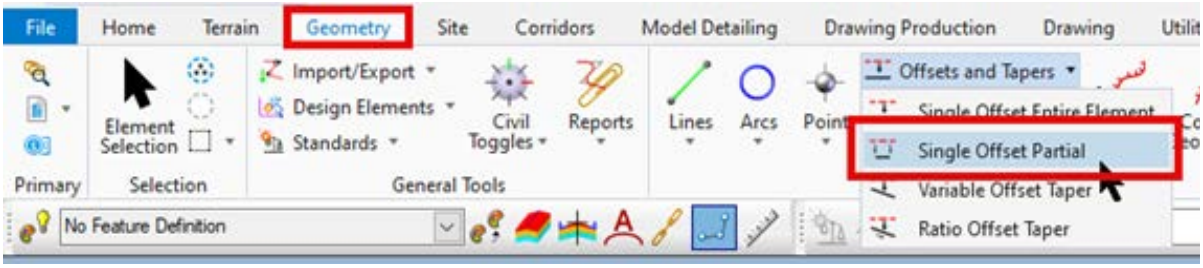


15. View the modified **Right Turn Island.**

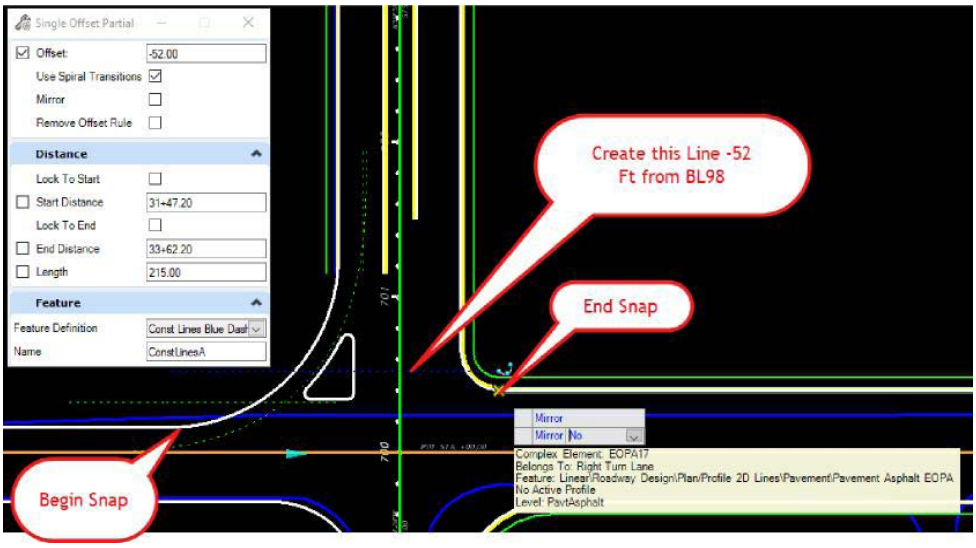


Exercise 2.13 *For US98 Intersection Crosswalks Lines*

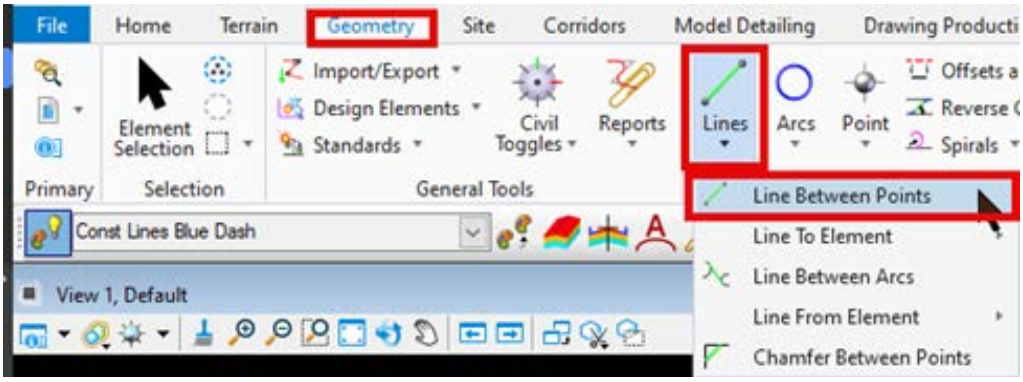
1. Use the *Geometry Tab and the Horizontal Group*, to select **Single Offset Partial** tool located in the Offsets and Tapers button. **OpenRoads Modeling > Geometry > Horizontal > Offsets And Tapers > Single Offset Partial**



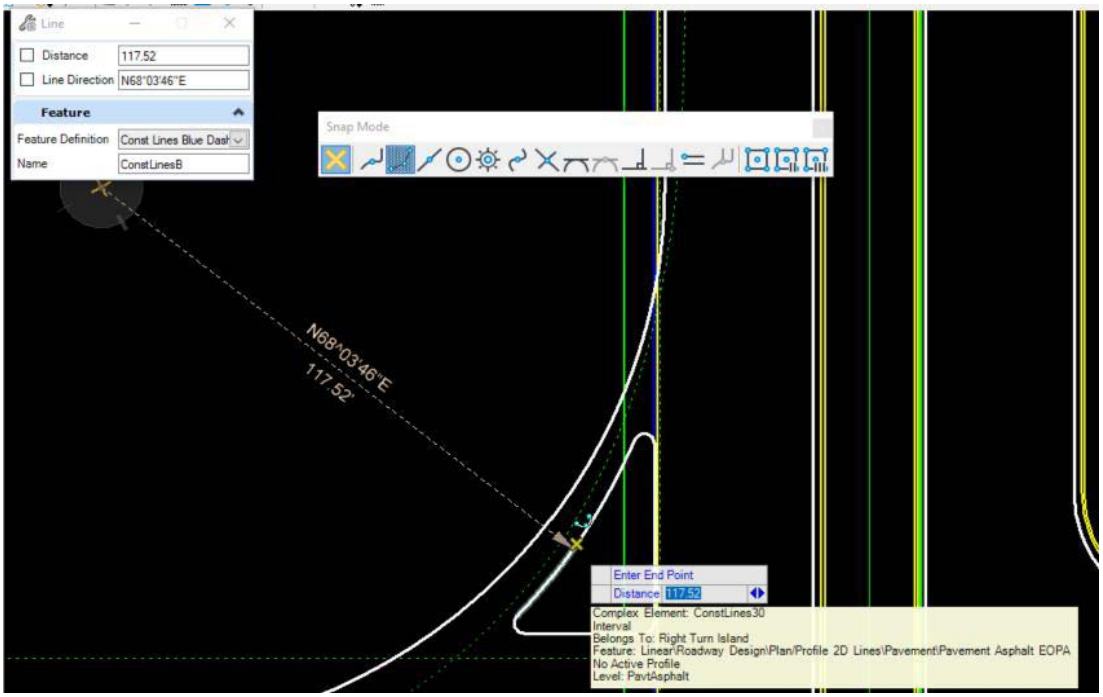
2. Create a **Partial Offset** line from *US98* **-52 feet** across the intersection. Use *Feature Definition* **Const Lines Blue Dash** and *Name* **ConstLineA.**



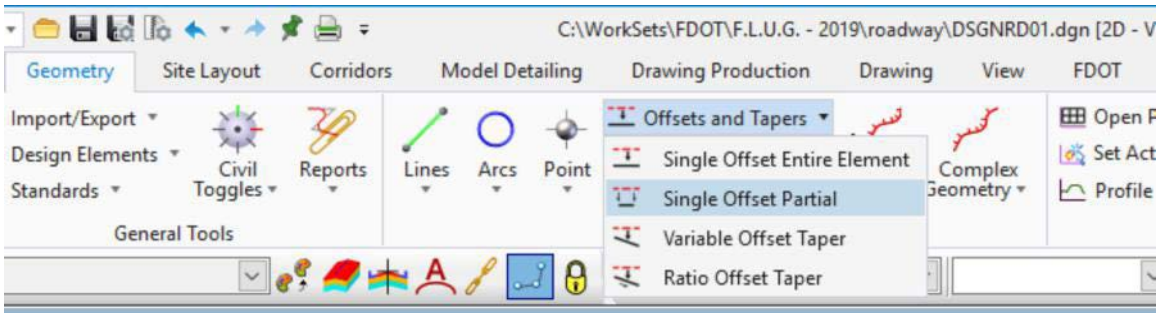
3. Use Geometry Tab and the Horizontal Group, to select the Line Between Points tool. **OpenRoads Modeling > Geometry > Horizontal > Lines > Line Between Points**



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.**

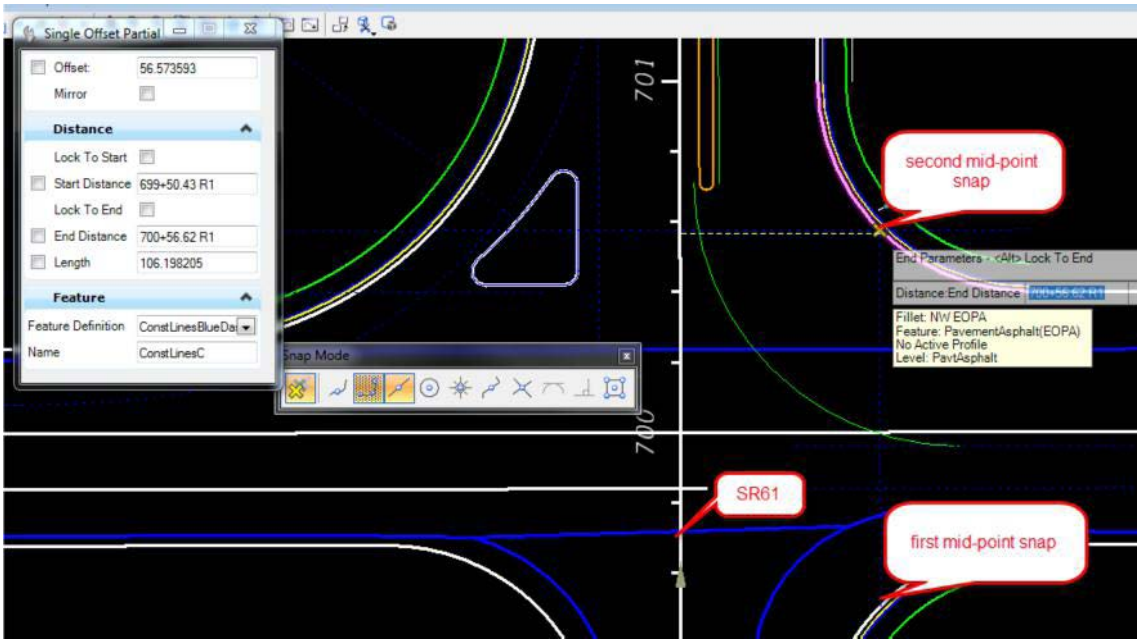


5. Use the *Geometry Tab and the Horizontal Group*, to select **Single Offset Partial** tool located in the Offsets and Tapers button. **OpenRoads Modeling > Geometry > Horizontal > Offsets And Tapers > Single Offset Partial**



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

NOTE ***Snap to the mid-point of the radii.***

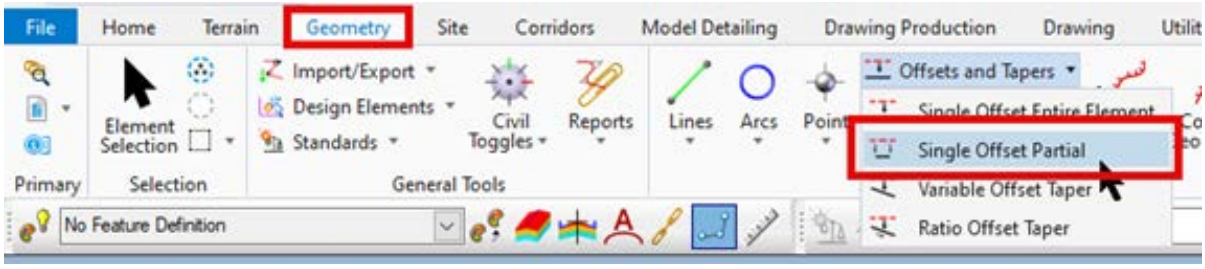


NOTE ***Use these lines in later exercises to place 3D Sidewalk Ramp Civil Cells.***

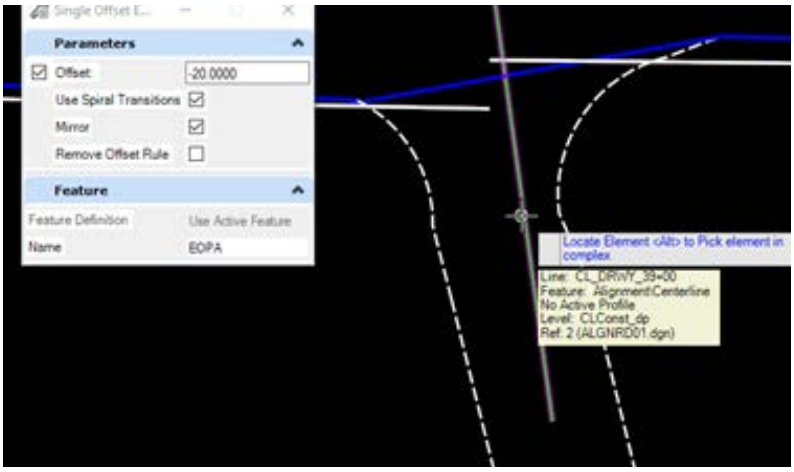
Exercise 2.14 *Create US98 Turnouts*

In this exercise the additional rural turnouts can be added to US98.

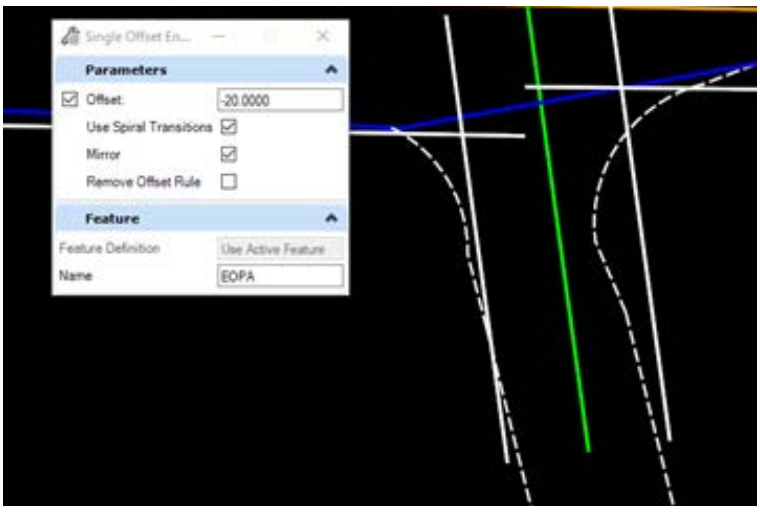
1. Use the *Geometry Tab and the Horizontal Group*, to select **Single Offset Entire Element** tool located in the Offsets and Tapers button. **OpenRoads Modeling > Geometry > Horizontal > Offsets And Tapers > Single Offset Entire Element**



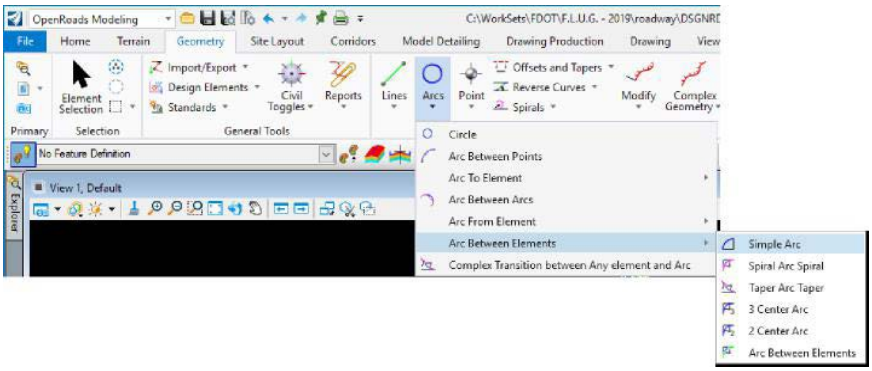
   a. Select the **CenterLine** of the second *Turnout*. (This Turnout is at Sta. 39+00.00 of US98)



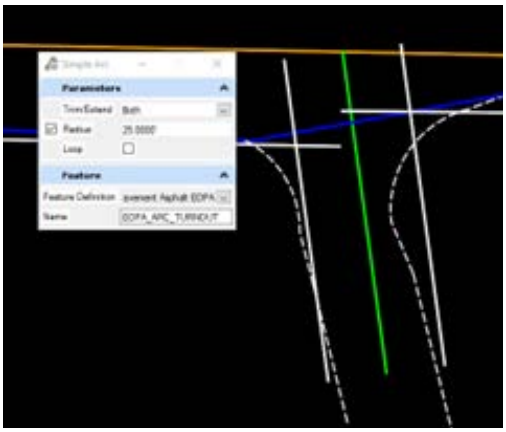
   b. Accept the **-20 feet** *Offset* and *Mirror.*



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**

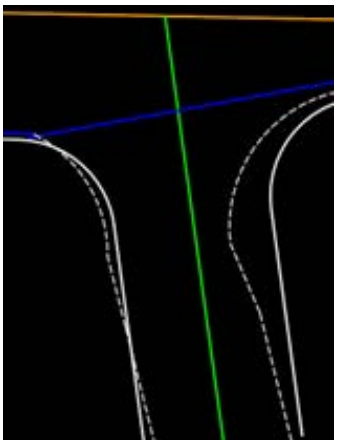


a. In the Simple Arc tool set *Trim/Extend* to **Both, then** set the Radius to **25.0'**. Be sure to set a Feature Definition of Pavement Asphalt EOPA**.** Then place the *Radius* on both sides.



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

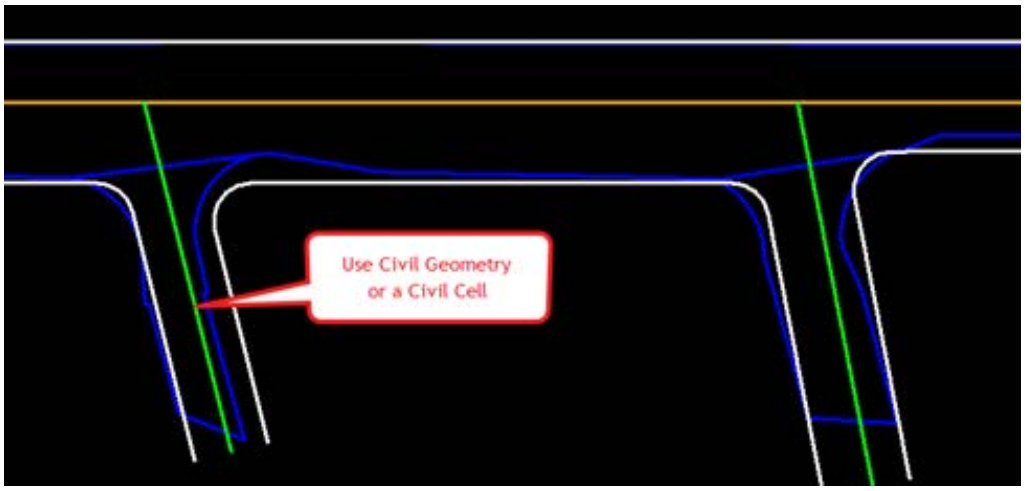
NOTE ***Use the centerline snap and dimensions to modify the location, length and angle. Use the Offset Pavement Asphalt EOPA Dimensions to change the width.***



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

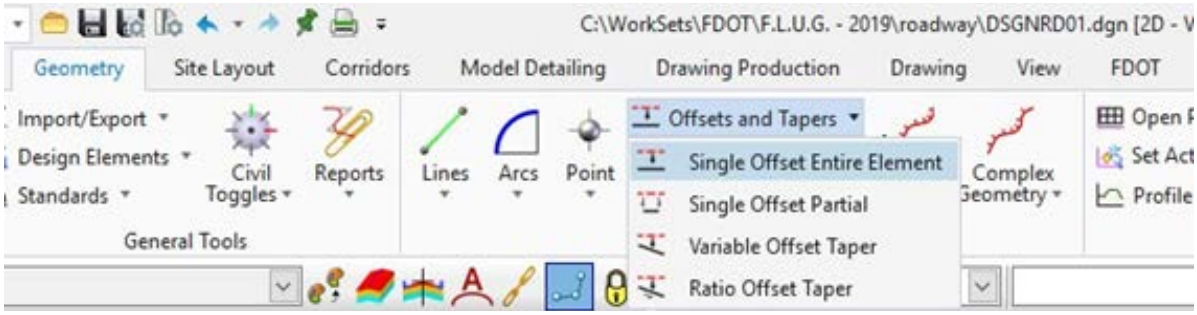
.



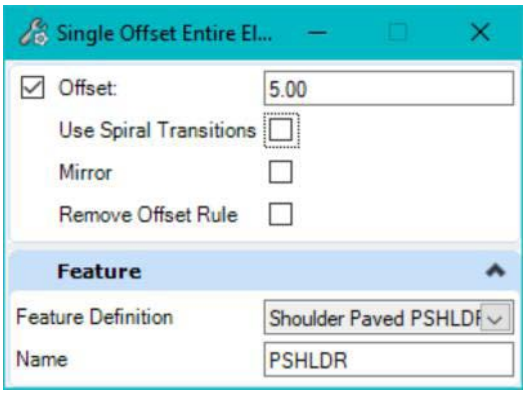
Exercise 2.15 *For US98 Intersection Shoulders*

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**



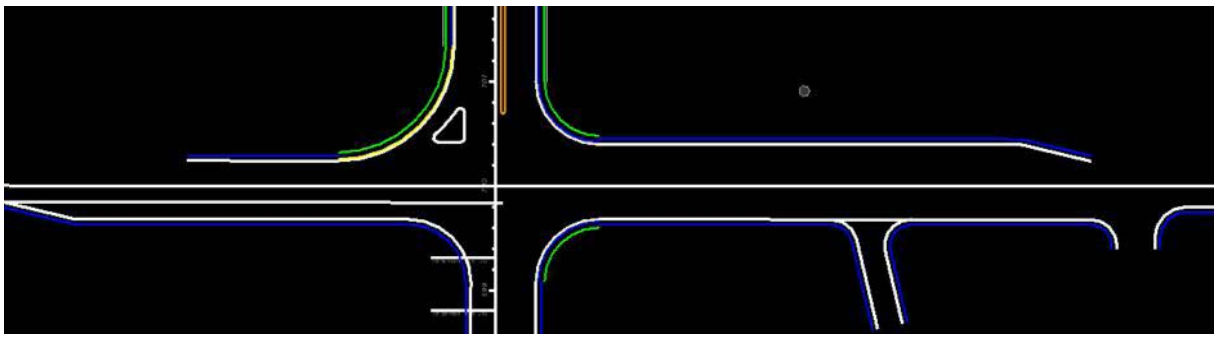
2. Set the *Offset* to **5 feet** and the *Feature Definition* to **Shoulder Paved PSHLDR.**



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

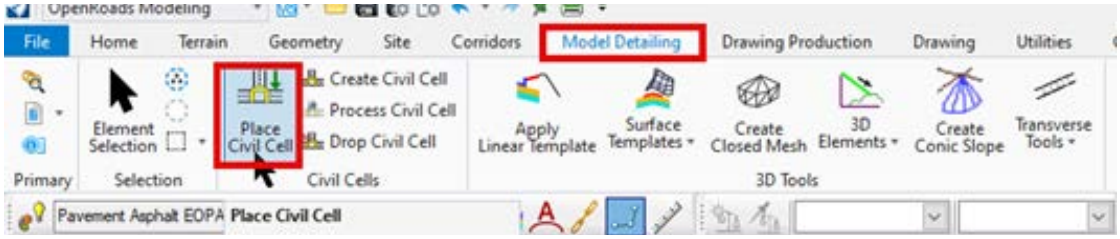
4. Repeat these steps to add the remaining *Shoulder lines* for the widening along US98.

5. View the intersection below for complete details.

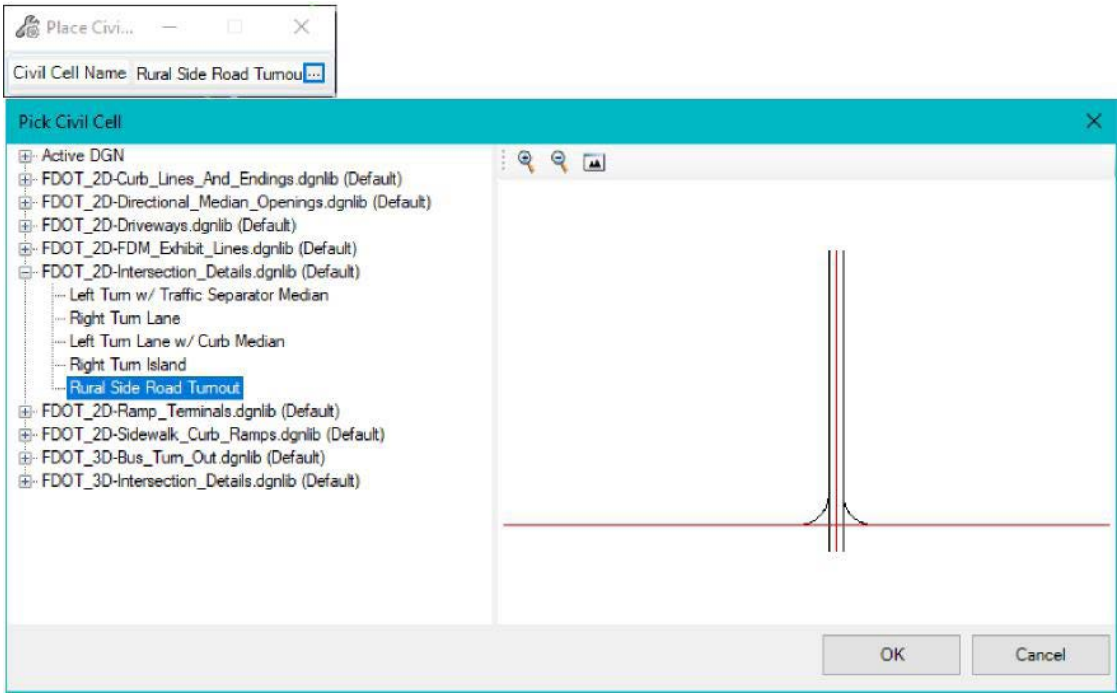


Exercise 2.16 *For Friendship Intersection*

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**.



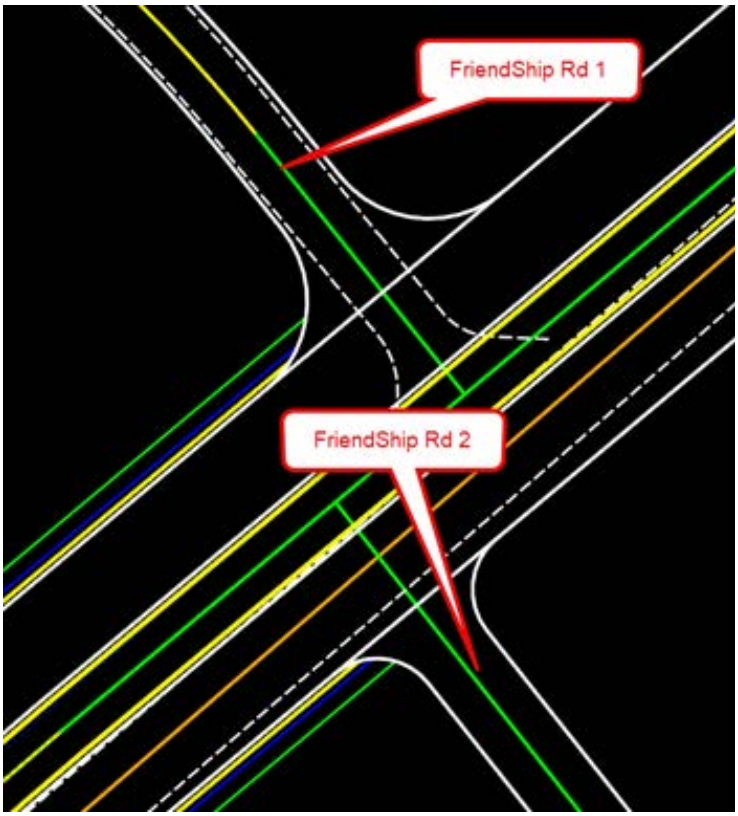
b. Add **Rural Side Road Turn Out** *civil cell* to both sides of the Intersection with *Friendship* and *Friendship 2 Centerlines*.

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**

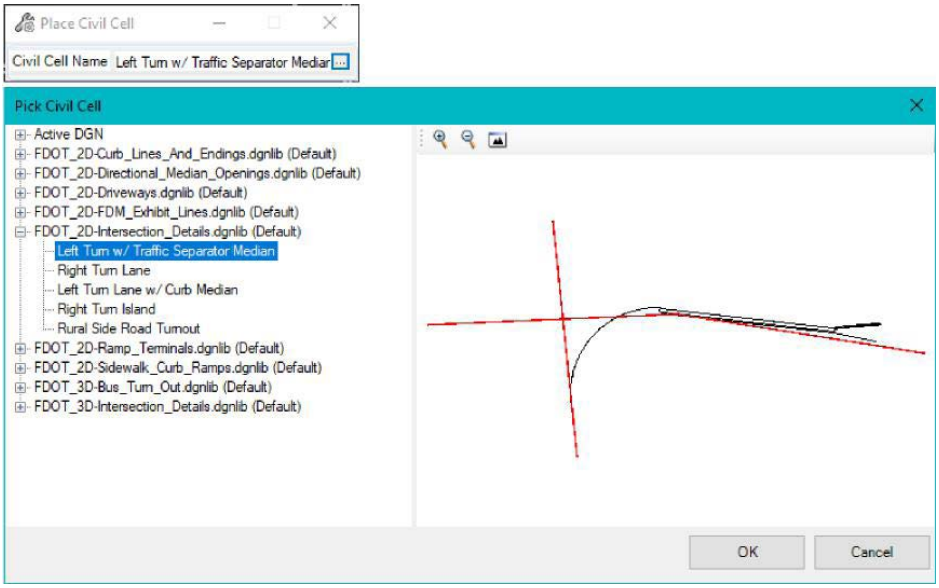
d. Change all *Radii* to **35 feet.**

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.

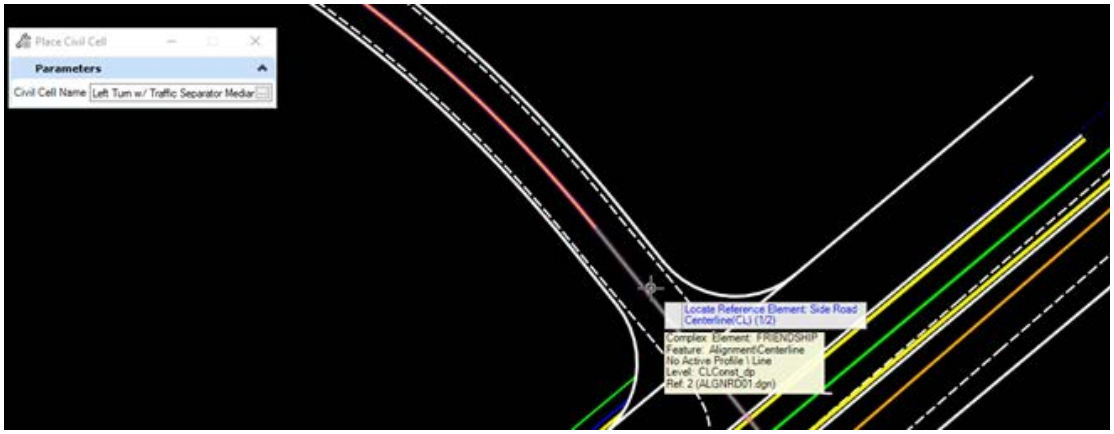


2. Use Model Detailing Tab and the Civil Cells Group**,** to select the **Place Civil Cell** tool. **OpenRoads Modeling > Model Detailing > Civil Cells > Place Civil Cell**

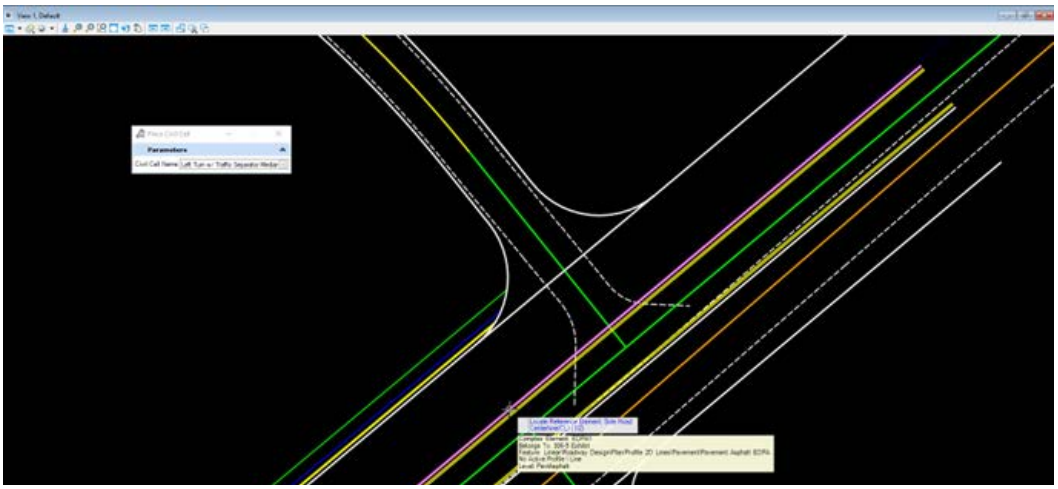


a. From the Place Civil Cell dialog, navigate to the *FDOT_2D-Intersection_Details.dgnlib* and select **Left Turn w/ Traffic Separator Median**.

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



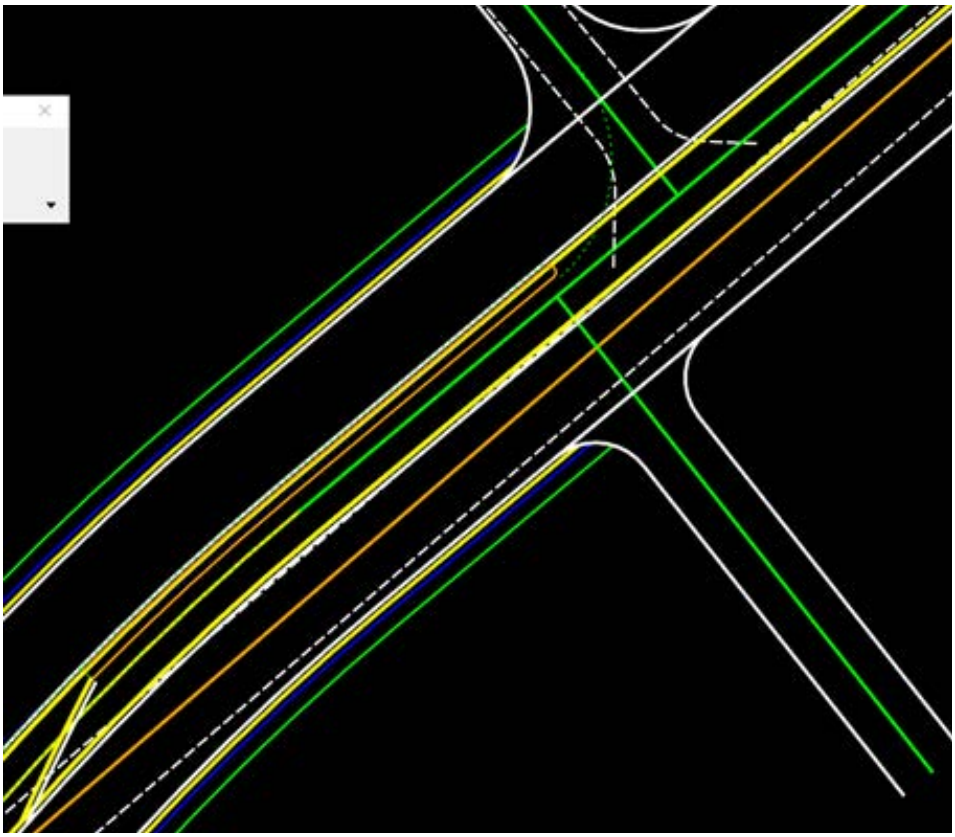
c. For the second *Reference* element, select the *left median* **Pavement Asphalt EOPA** line.



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

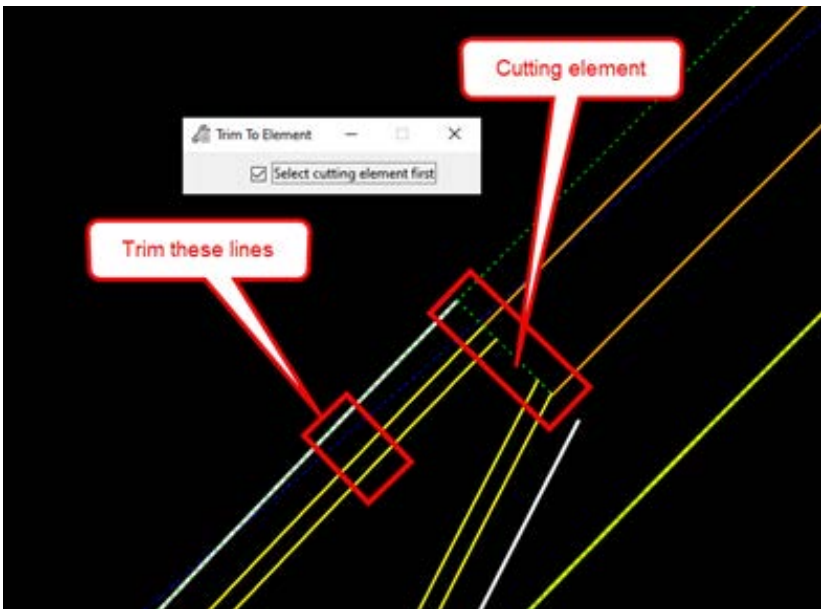
e. Change the turning *Radius* to **50 feet.**

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



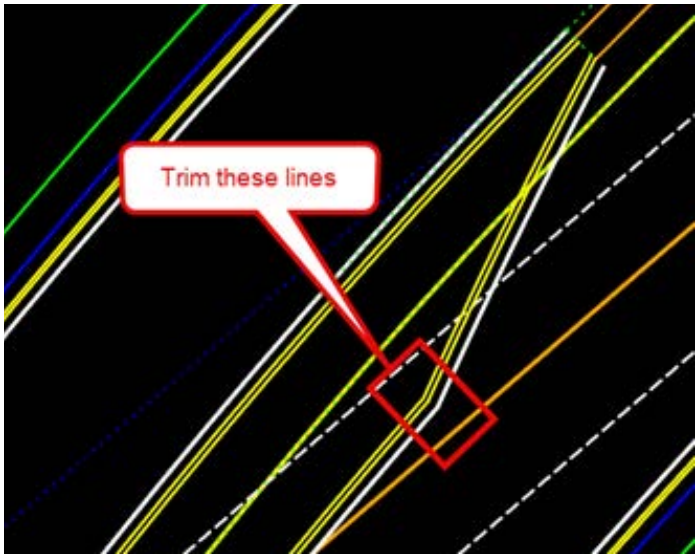
3. Use OpenRoads **Trim to Element** tool**.** This can be found using the **Drawing Tab** and the **Modify Group**. You can also use the Search on the Ribbon. **OpenRoads Modeling > Drawing > Modify > Trim To Element**

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



NOTE ***After the placement of any Civil Cell be sure to verify the Feature Definition on elements in order to add as a Corridor Reference.***

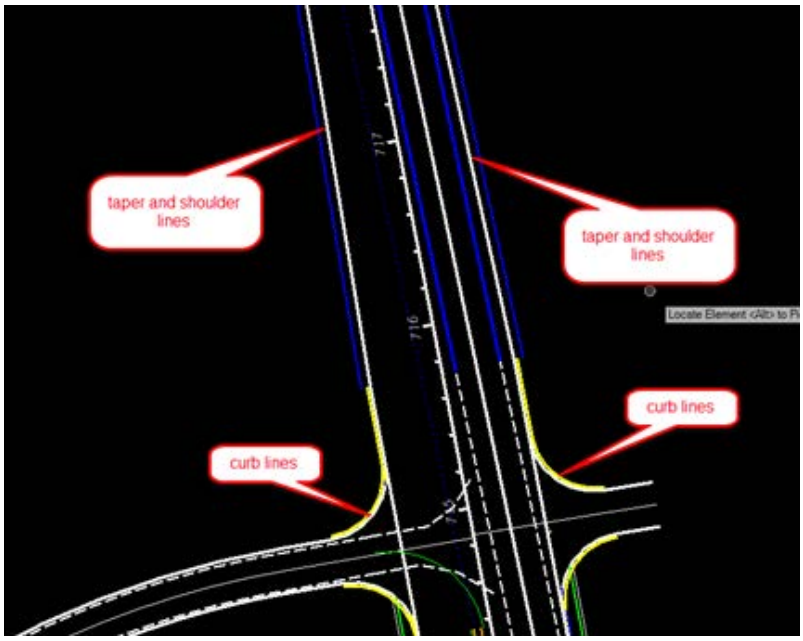
7. (EXTRA Exercises) Complete the *Intersection* with *Civil Geometry* tools as shown below:

   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*.



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 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

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 210.12.1

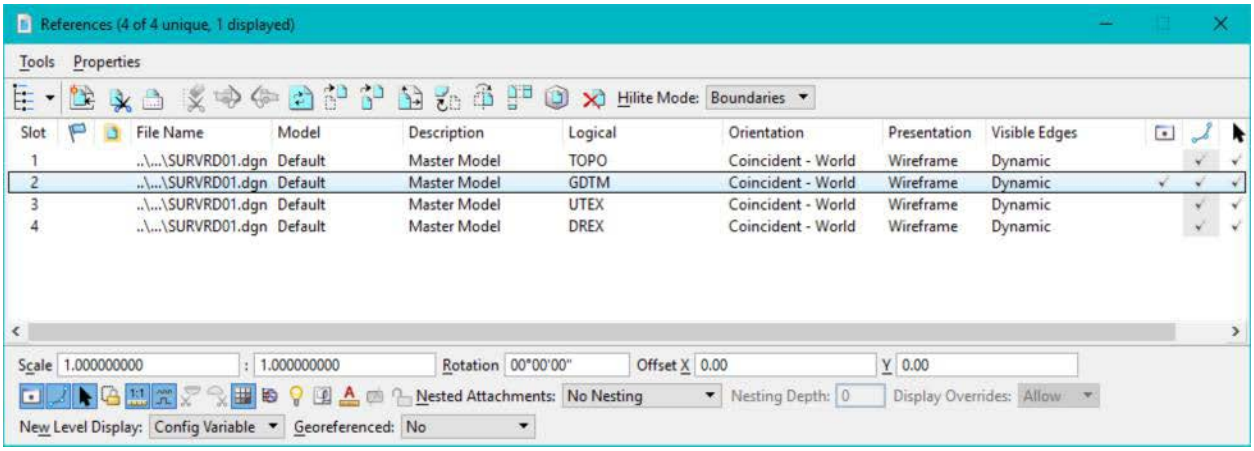
- **Low Speed Minimum Length** – This will give a minimum Radius at Max Super (e_{max} = .05).
- **Low Speed Desired Length** – This will give a desired length of curve at Normal Crown.

NOTE ***Refer to the FDM for Tables.***

Exercise 3.1 Preparation for SR61 Profile

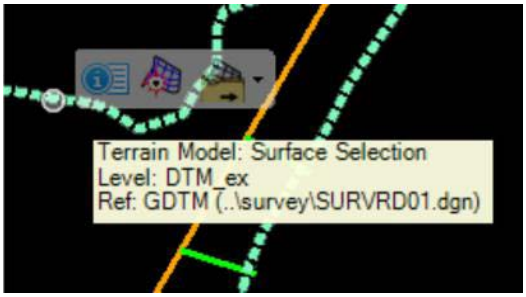
1. Open the *ALGNRD01.dgn* that was created in Exercise 2.1. C:\WorkSets\FDOT\22049555201\Roadway.

2. Use 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.



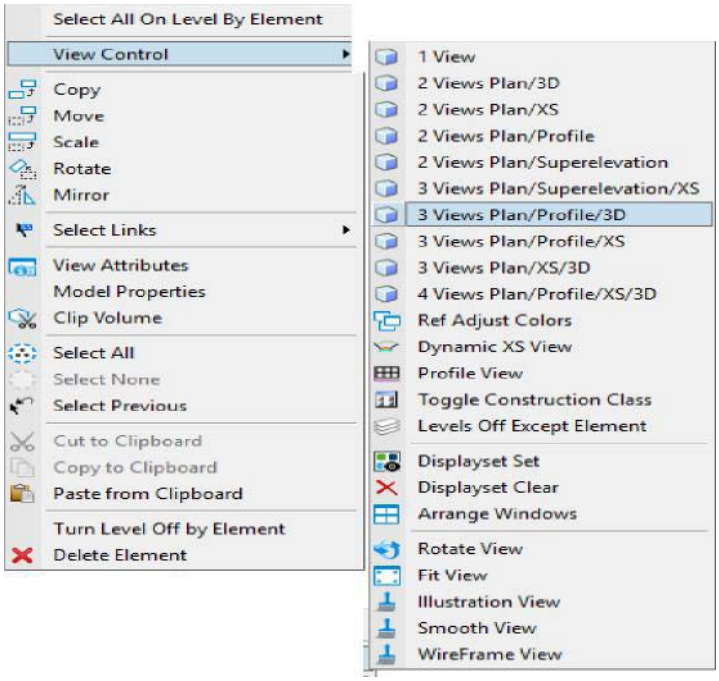
NOTE ***If the SURVRD file exist, the SURVRD01 -GTMRD logical can be used.***

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.

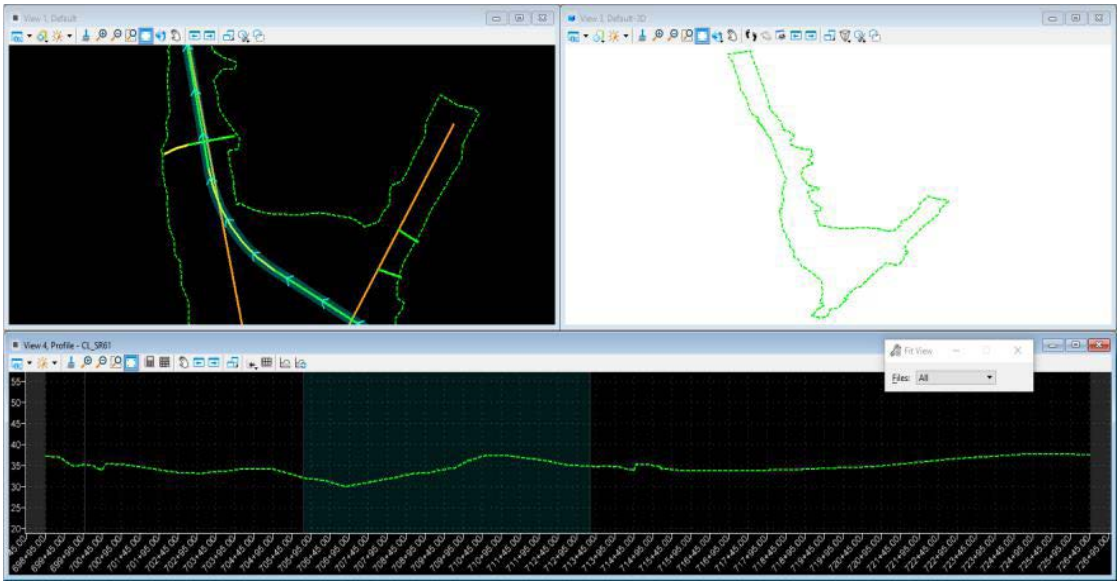


NOTE ***Setting the terrain to Active will create a new Model that is 3D we will use this Model to view our Profiles.***

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.

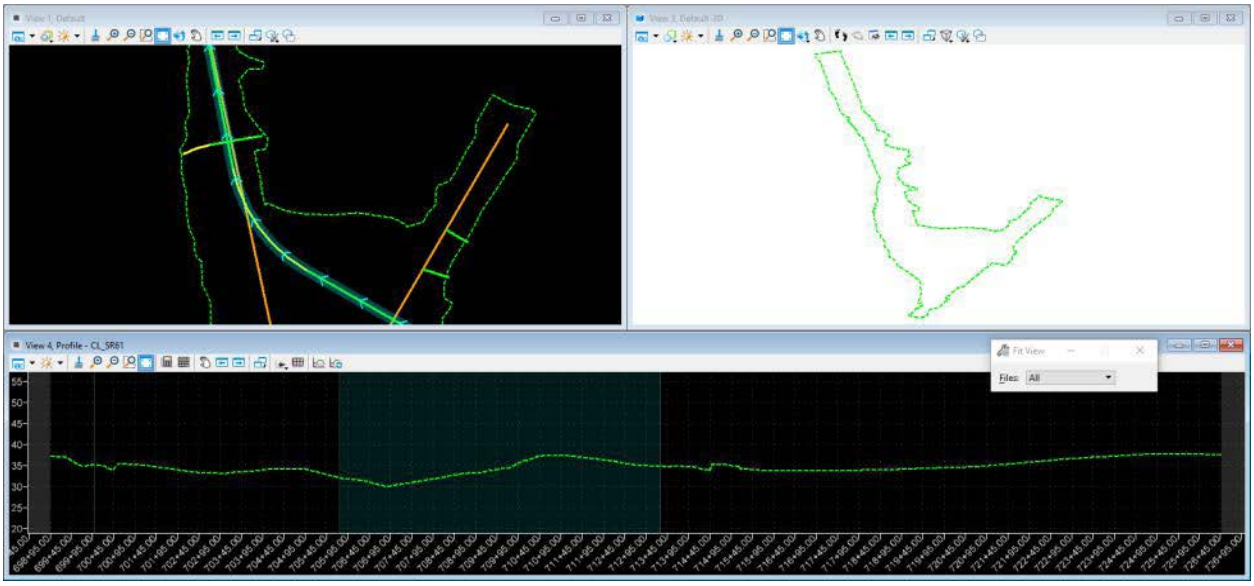


Exercise 3.2 *Create SR61 Profile*

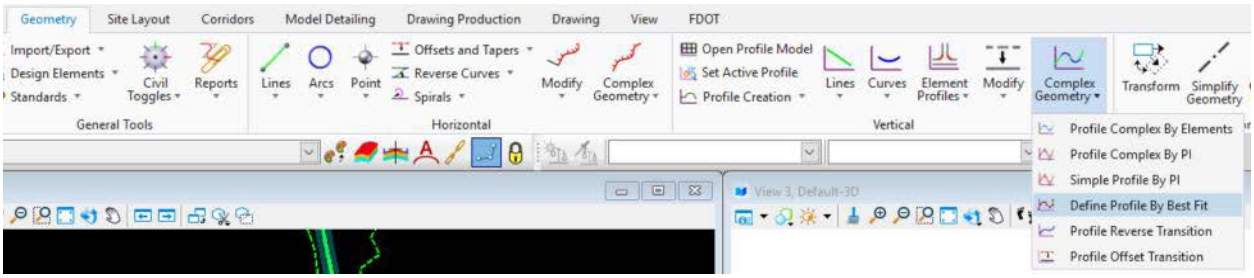
In this exercise, several Vertical Geometry tools are used to create a proposed profile for SR61.

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

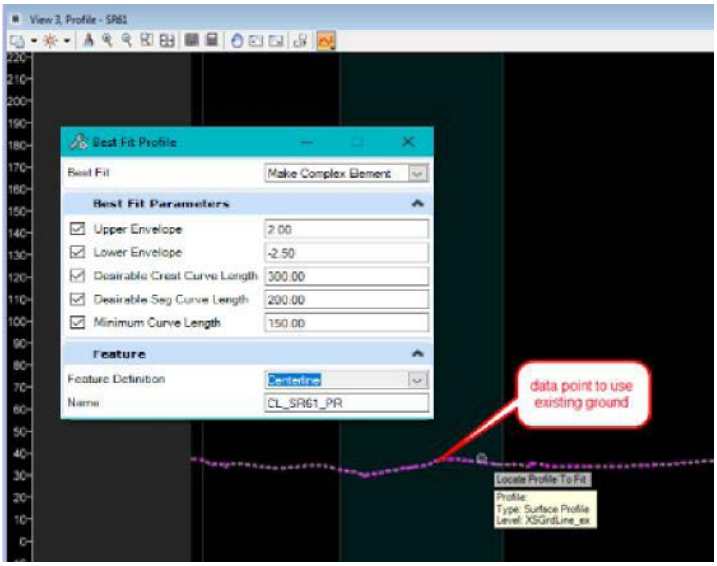
2. From the previous exercise select **View 4** to make the Profile window active.



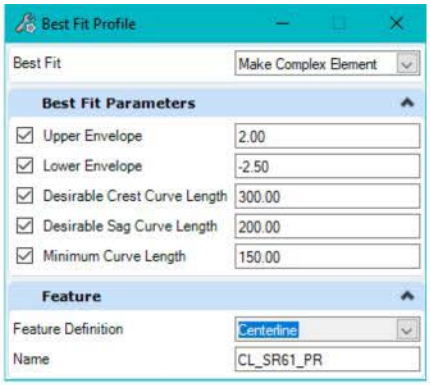
3. Use the *Geometry Tab and the Vertical Group*, to select the **Define Profiles by Best Fit** tool that is located within the Complex Geometry pull down. **OpenRoads Modeling > Geometry > Vertical > Complex Geometry > Define Profile By Best Fit**

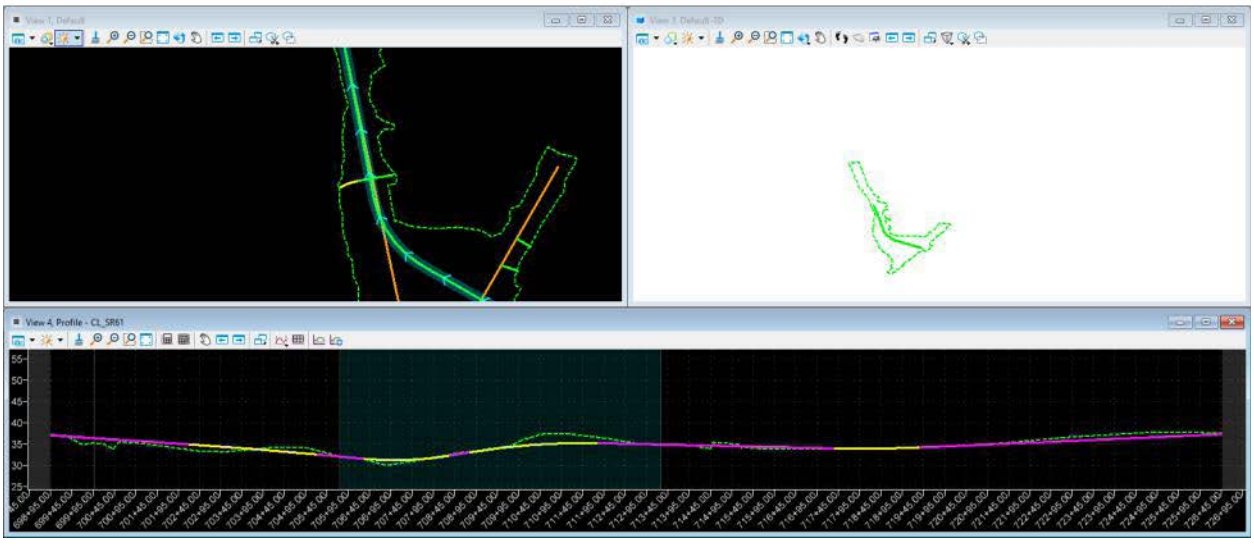


a. At the cursor prompt, data point to **Make Complex Element** option. Enter the *Profile Name*, SR61-PR, and then data point on the green line in the profile.

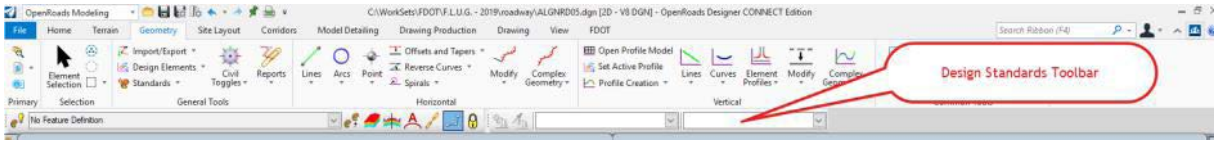


b. Follow the prompts to enter the **Best Fit Parameters** as shown. Make sure to pick the Feature Definition of CenterLine.





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



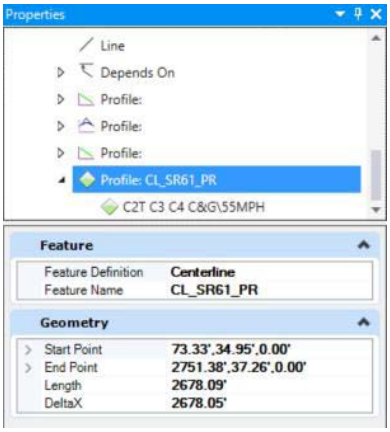
5. On the Design Standards Toolbar, using the second drop down list navigate to the C2T C3 C4 C&G (FDOT_ DesignGeometrics Criteria Design Library and select **45 MPH**. Toggle **On** the Active Design Standard.)

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

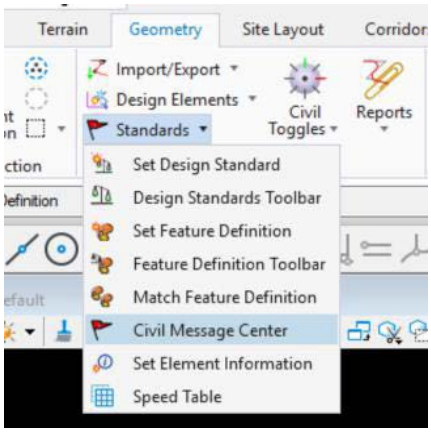
6. Use the Design Standards Toolbar, to select the **Set Design Standard** tool.

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.

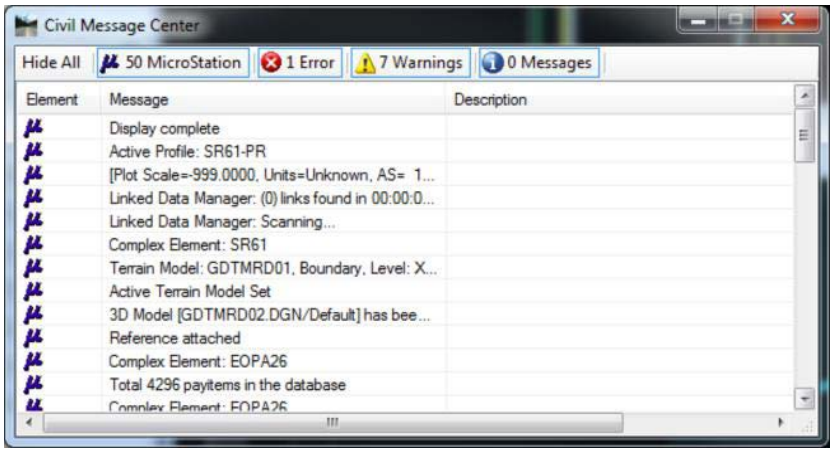


7. Use the **Civil Message Center** tool that is located on the Geometry Tab and General Tools Group in the Standards drop down menu.

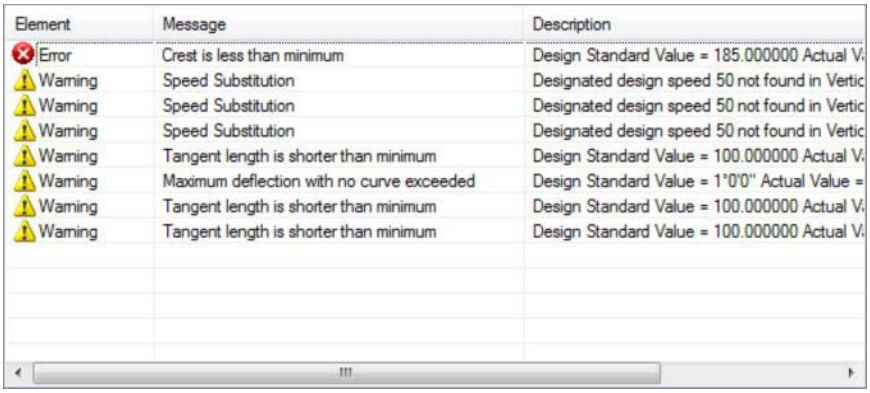


a. The Civil Message Center dialog displays the results.

NOTE ***It may be docked at the bottom of the screen, click on the Tab.***

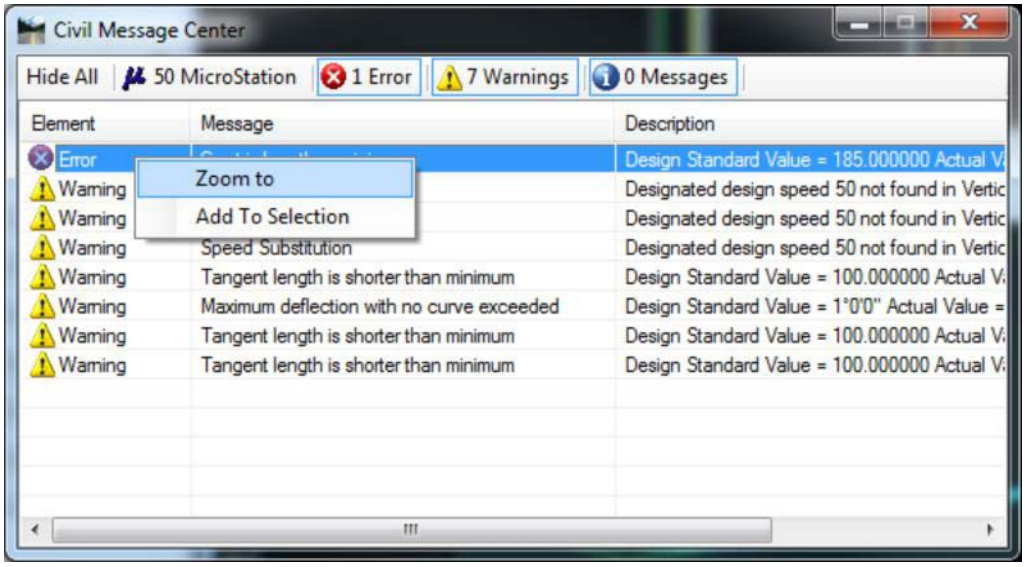


b. In the Civil Message Center dialog, select on the **MicroStation** tab. This will toggle **Off** all the general messages for MicroStation and leave only *Error messages* and *Warnings* in the list.



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.



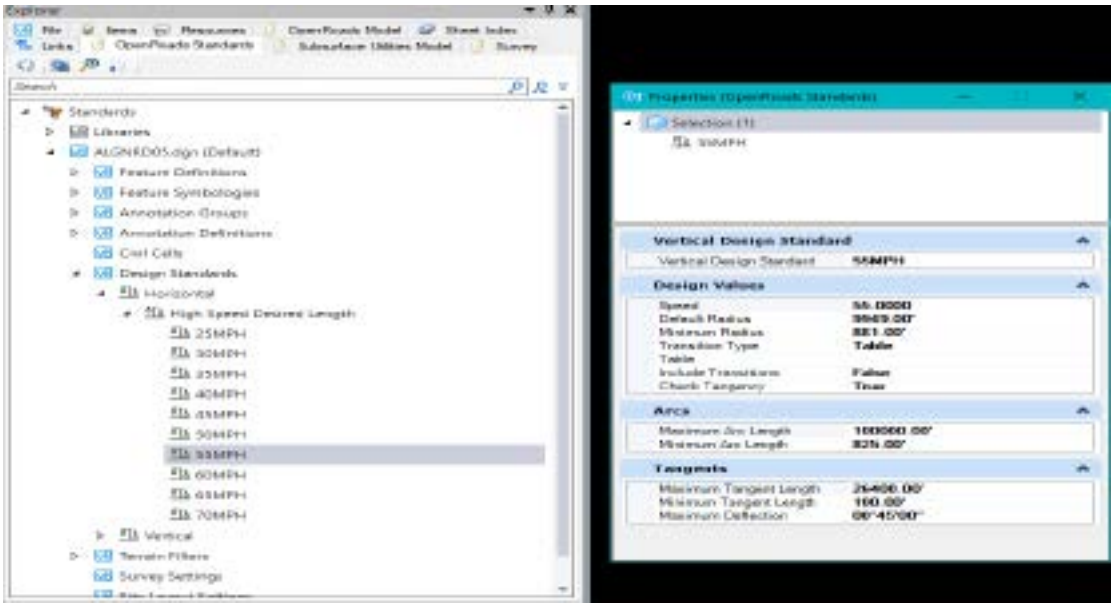
e. Notice the *Error* is now centered in the profile view. Hover the cursor over the *Error* icon to display the *Error Message* description.

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

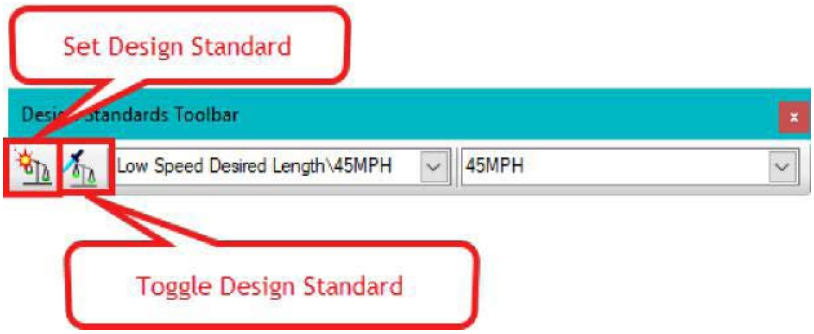
8. Since there can be a number of different situations for both the horizontal and vertical curve depending on Context classification and Design Speed we will now set the vertical in the *Explorer* Dialog.

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**.**

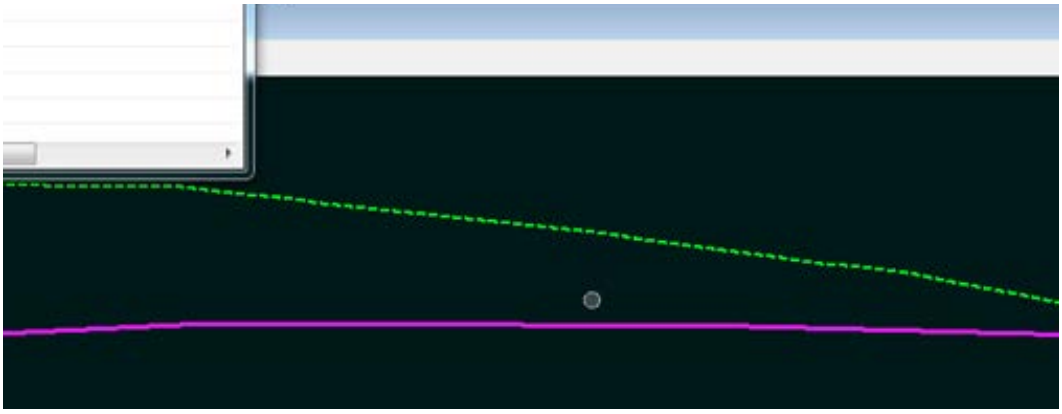
b. Select the Horizontal Design Section to see which design standard is applied to the Alignment, next select the desired speed. Now using the Ctrl+I key to bring up the properties dialog lets link a vertical design speed to the horizontal.



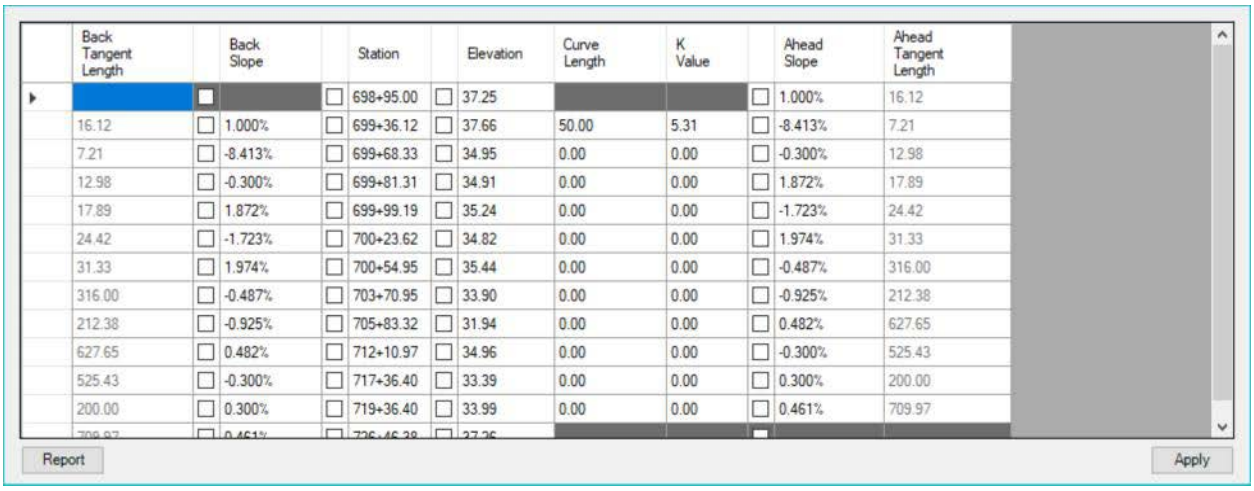
9. Use the Design Standards Toolbar that is docked to toggle on the Set Design Standards.



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.***



Back Tangent Length	Back Slope	Station	Elevation	Curve Length	K Value	Ahead Slope	Ahead Tangent Length
		698+95.00	37.25			1.000%	16.12
16.12	1.000%	699+36.12	37.66	50.00	5.31	-8.413%	7.21
7.21	-8.413%	699+68.33	34.95	0.00	0.00	-0.300%	12.98
12.98	-0.300%	699+81.31	34.91	0.00	0.00	1.872%	17.89
17.89	1.872%	699+99.19	35.24	0.00	0.00	-1.723%	24.42
24.42	-1.723%	700+23.62	34.82	0.00	0.00	1.974%	31.33
31.33	1.974%	700+54.95	35.44	0.00	0.00	-0.487%	316.00
316.00	-0.487%	703+70.95	33.90	0.00	0.00	-0.925%	212.38
212.38	-0.925%	705+83.32	31.94	0.00	0.00	0.482%	627.65
627.65	0.482%	712+10.97	34.96	0.00	0.00	-0.300%	525.43
525.43	-0.300%	717+36.40	33.39	0.00	0.00	0.300%	200.00
200.00	0.300%	719+36.40	33.99	0.00	0.00	0.461%	709.97
709.97	0.461%	726+46.38	37.26				

Report

Apply

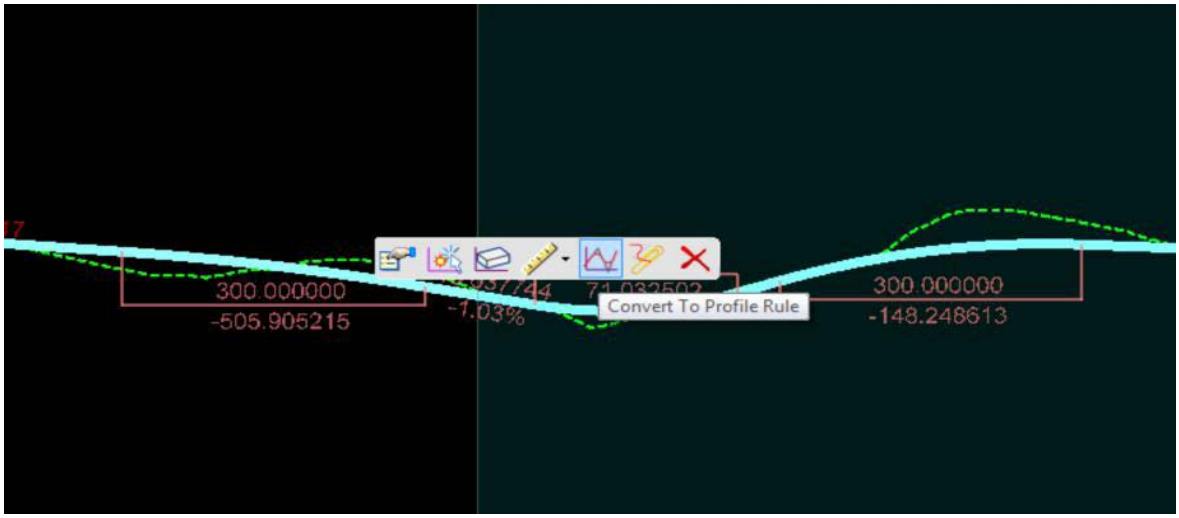
Exercise 3.3 Edit SR61 Profile

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.

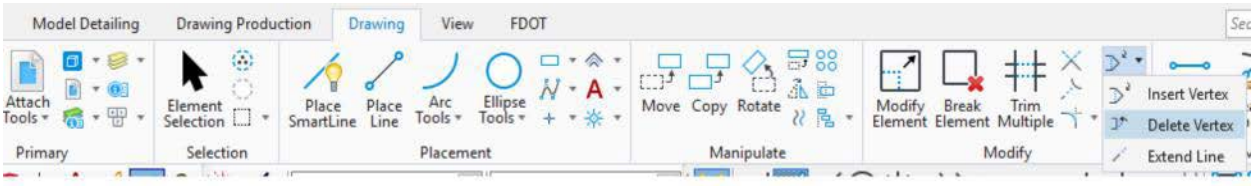
1. Select the **Profile Element** and hover over the element to display the Context Menu.



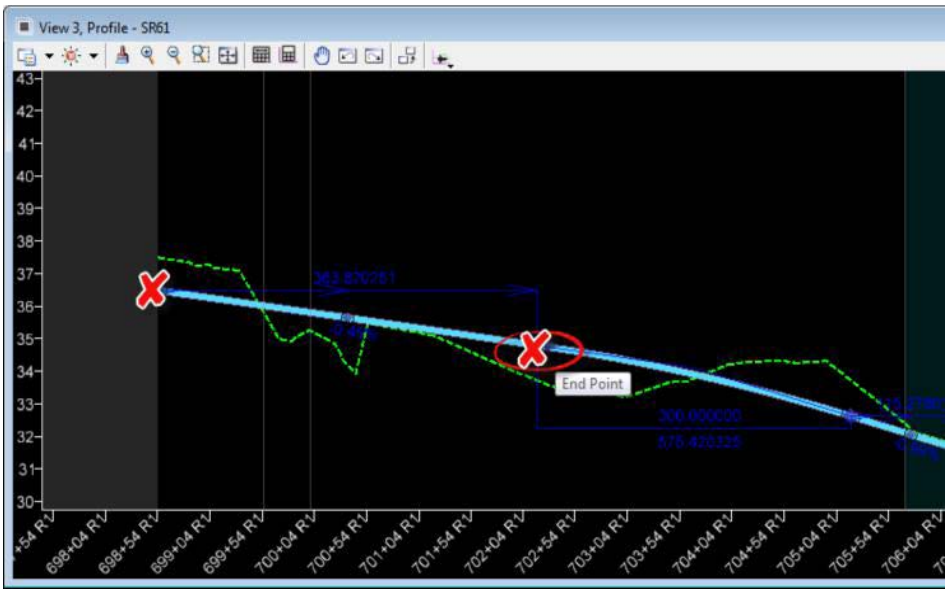
2. Select the **Convert to Profile Rule** tool.

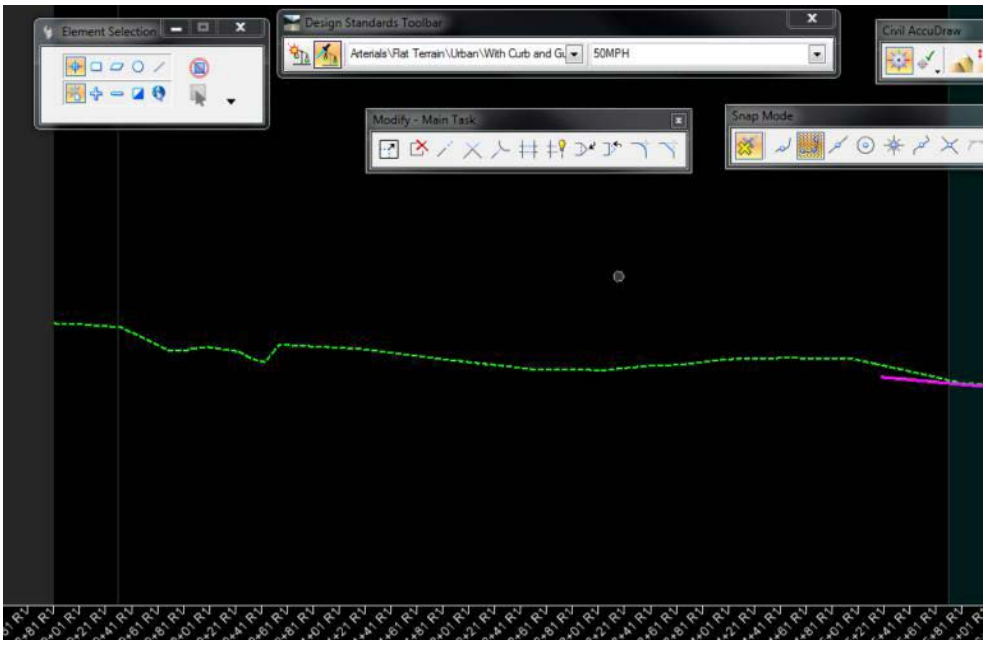
► ***DELETE PIS***

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**.

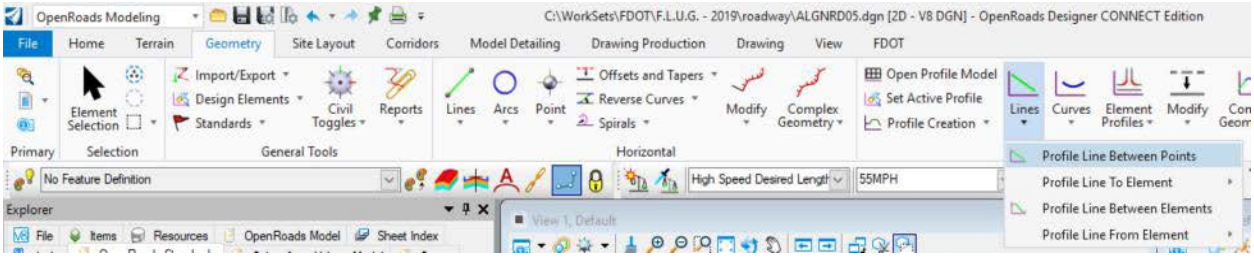




► CREATE PROFILE WITH PLACE VERTICAL LINE

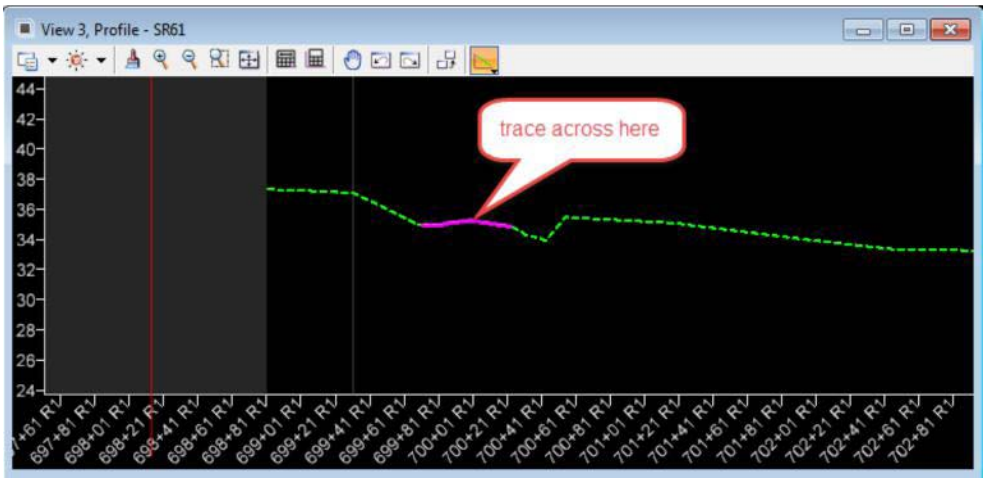
New vertical civil profile elements are added to match the existing profile across US98.

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**



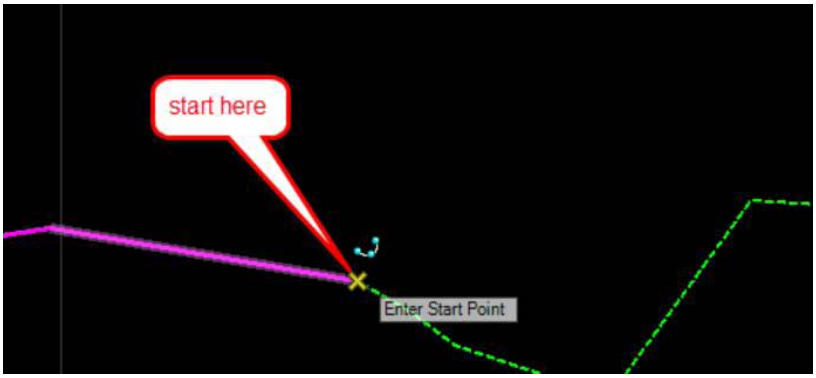
2. Place **Line Elements** on the *Existing Ground* points to trace the Profile across US98.

NOTE ***This is not exact, simply trace a few lines***

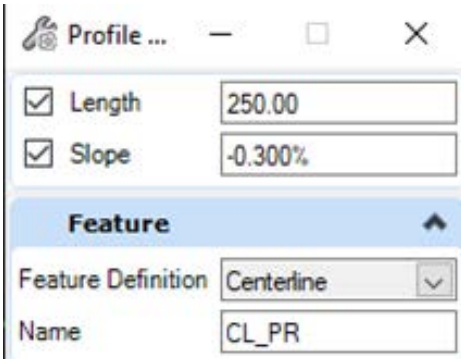


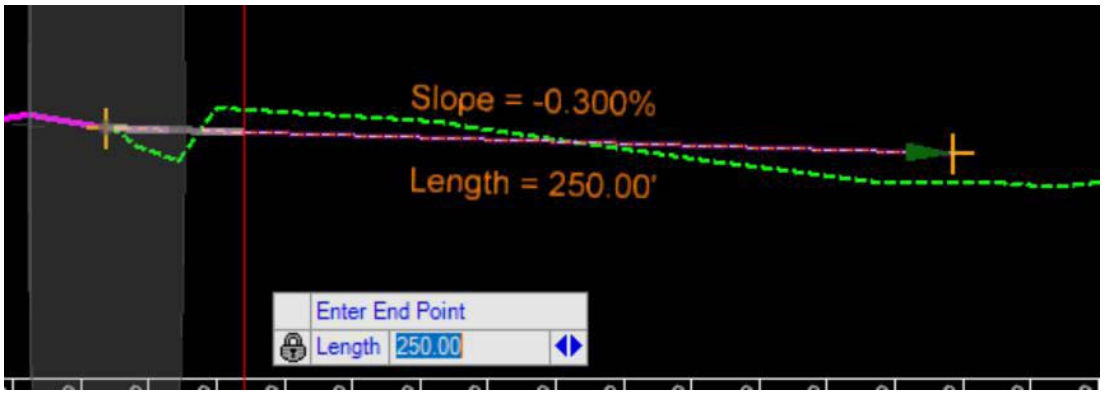
3. Continue using the Profile Line Between Points tool.

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

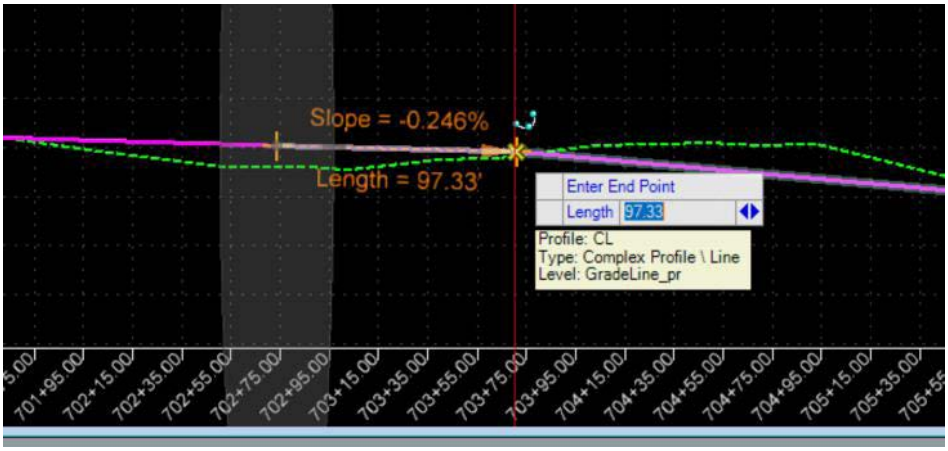


b. In the Profile Line Between Points dialog, check the *length* and *slope*, *length* of **250 feet** and *slope* of **-0.3%. Click a data point in the view to create the line as defined in the dialog.**





c. Using *Line Between Points* to join the two profiles, place another **Profile line** between the *250 at .3%* line and the *Best Fit Profile*.



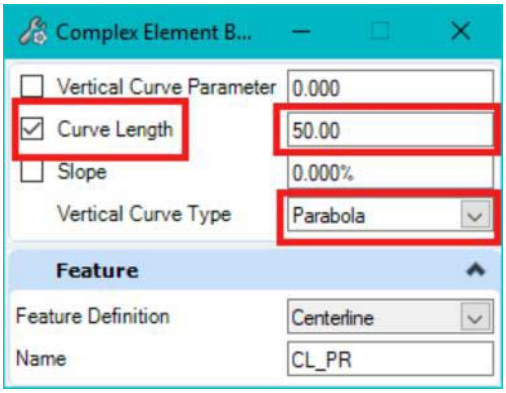
► PROFILE BY VPI'S

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

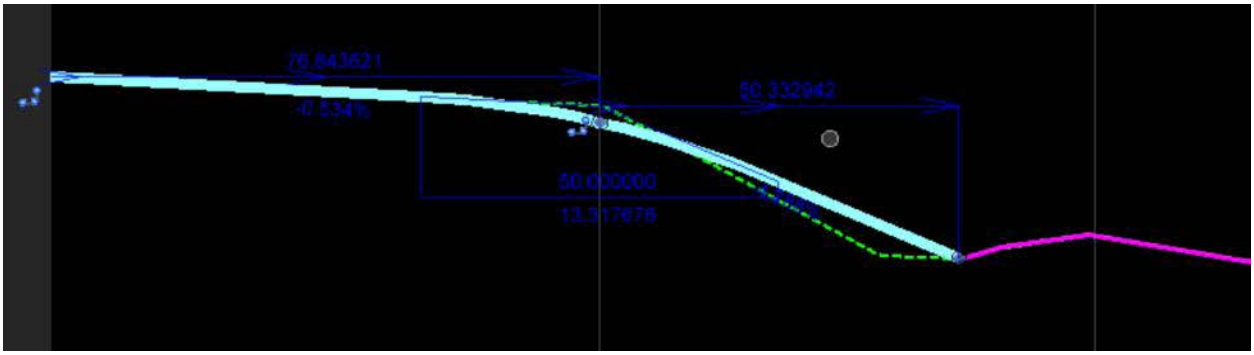
2. Toggle **OFF** the *Active Design Standard*, set the *Curve length* to **50 feet.**

NOTE ***Check that the Vertical Curve Type is set to Parabola.***

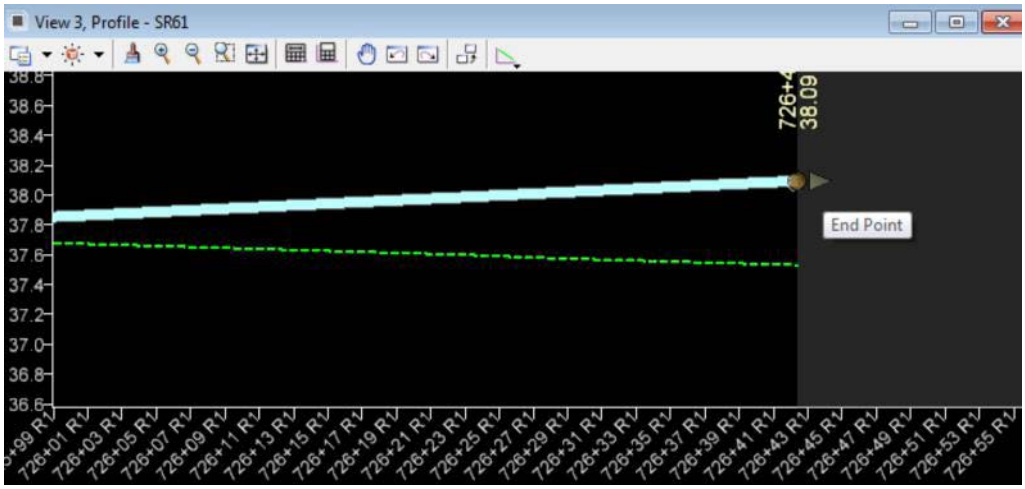


3. Start by snapping to the **Beginning Point** on the ground and complete the *Profile Segment* as shown below.

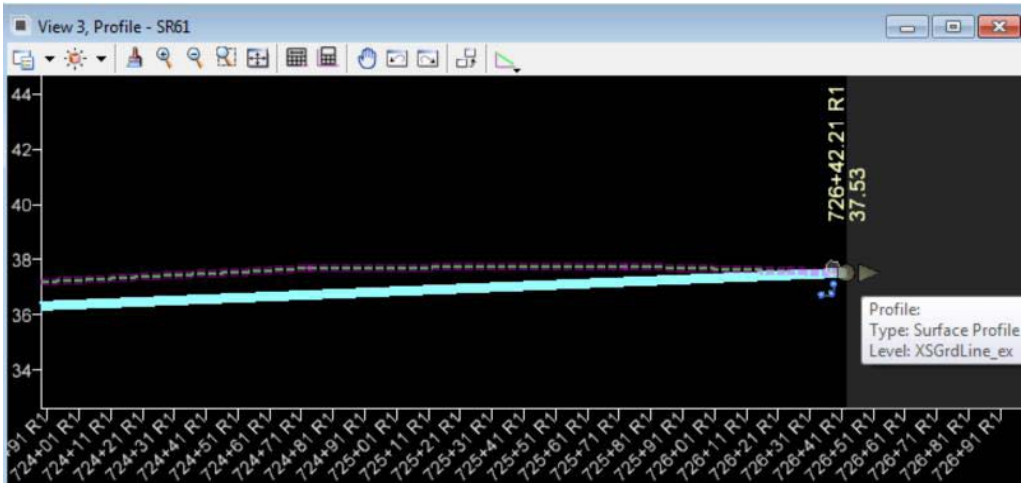
NOTE ***This is not exact, snap to 3 points.***



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



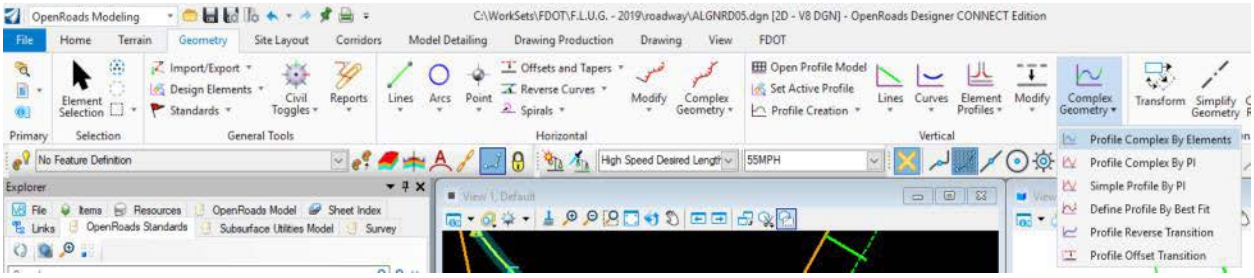
NOTE ***Click on the solid ball manipulator at the end of the line to move it in both directions.***



► ***COMPLEX PROFILE ELEMENTS***

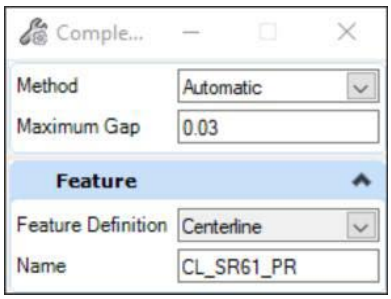
1. Use *Geometry Tab and the Vertical Group*, to select the **Profile Complex by Elements** tool located within the Complex Geometry tool Group**.**

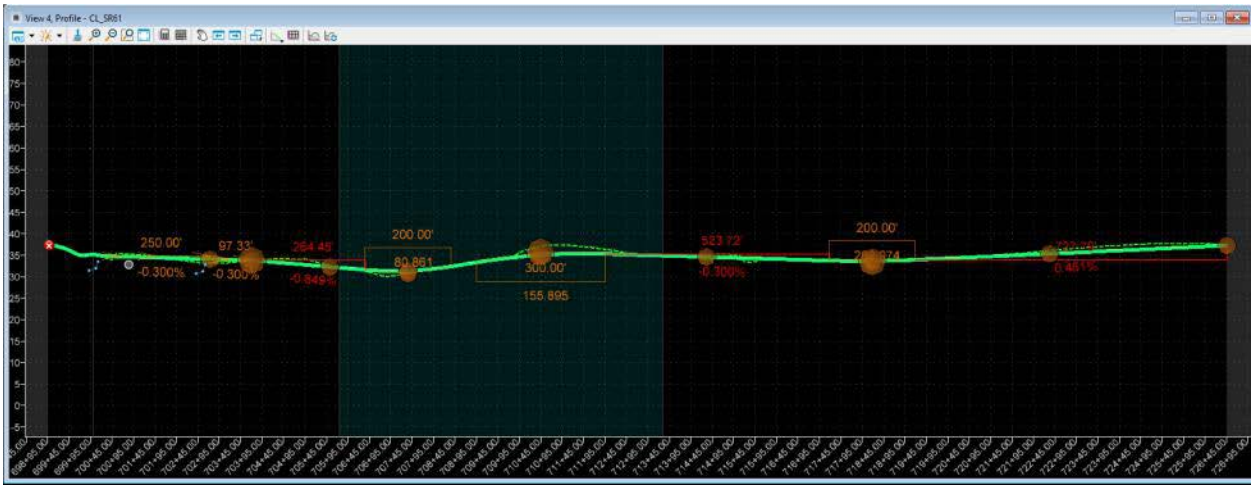
OpenRoads Modeling > Geometry > Vertical > Complex Geometry > Profile Complex By Elements



2. Key-in the name **CL_SR61_PR** on the dialog and Start at the Beginning Profile line and create a new **Connected Profile** of Maximum Gap.

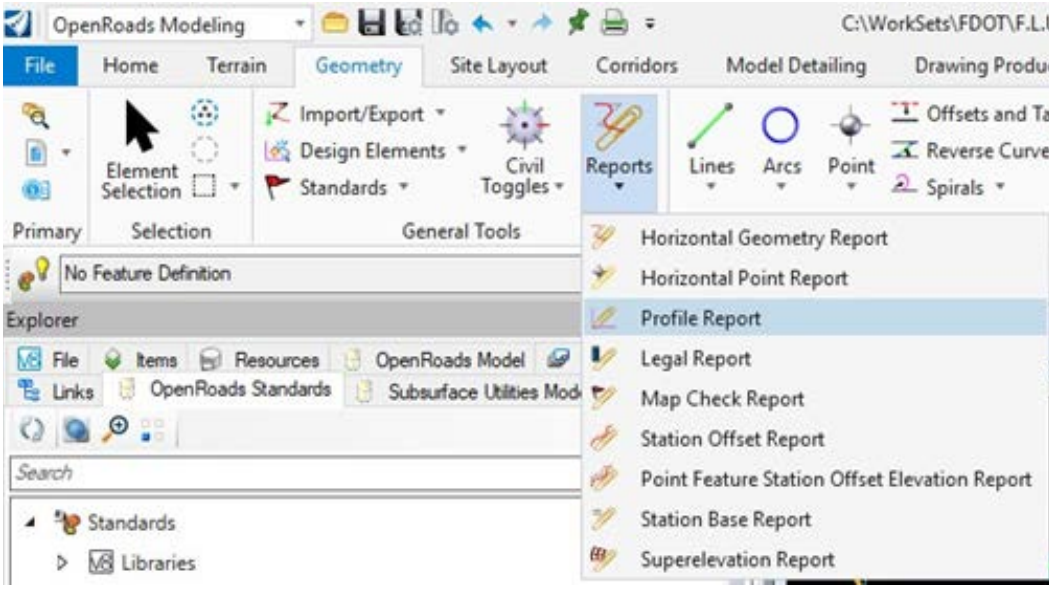
NOTE ***On the Profile Complex by Element tool setting, enter the Feature Name. This is the Profile Name assigned to the Profile. Switching the method should run the entire element if all elements are within the tolerance of Maximum Gap.***





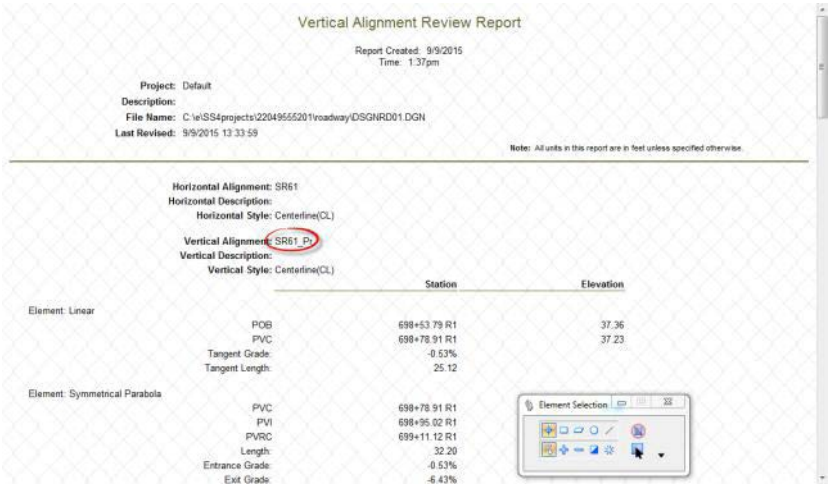
► ***PROFILE REPORT***

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**

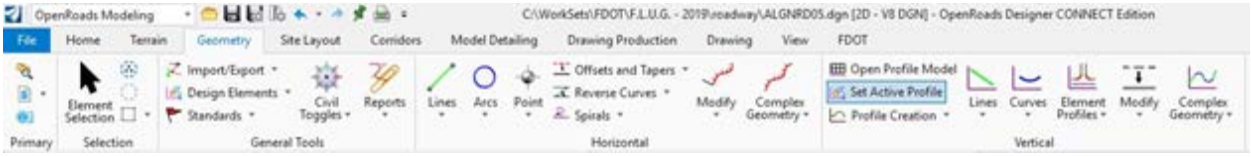


<OR> With the *Profile* selected, hover over the element to display the Context Menu and select the **Profile Report**.

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**.**

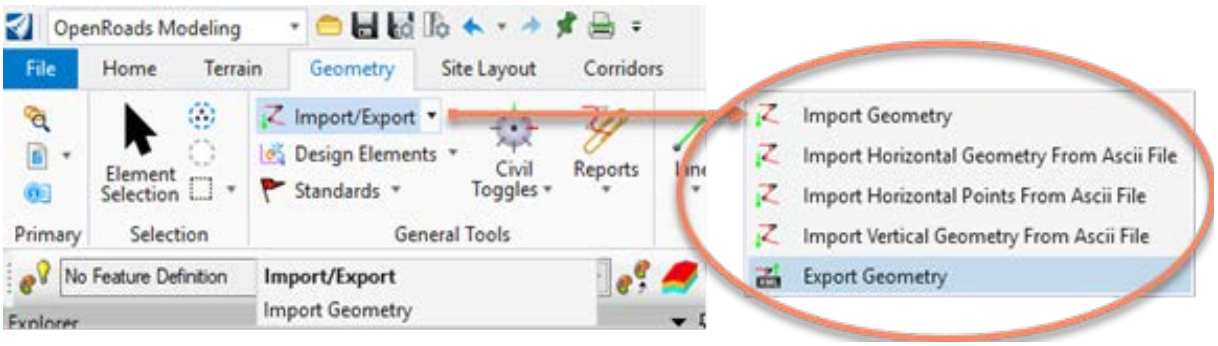


<OR> With the **Profile** selected, hover over the element to display the Context Menu and select **Set Active Profile**.

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**



NOTE ***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.

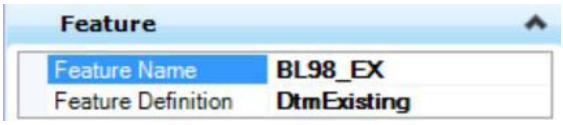
Exercise 3.4 *US98 Profile*

1. With the **US98** 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.)

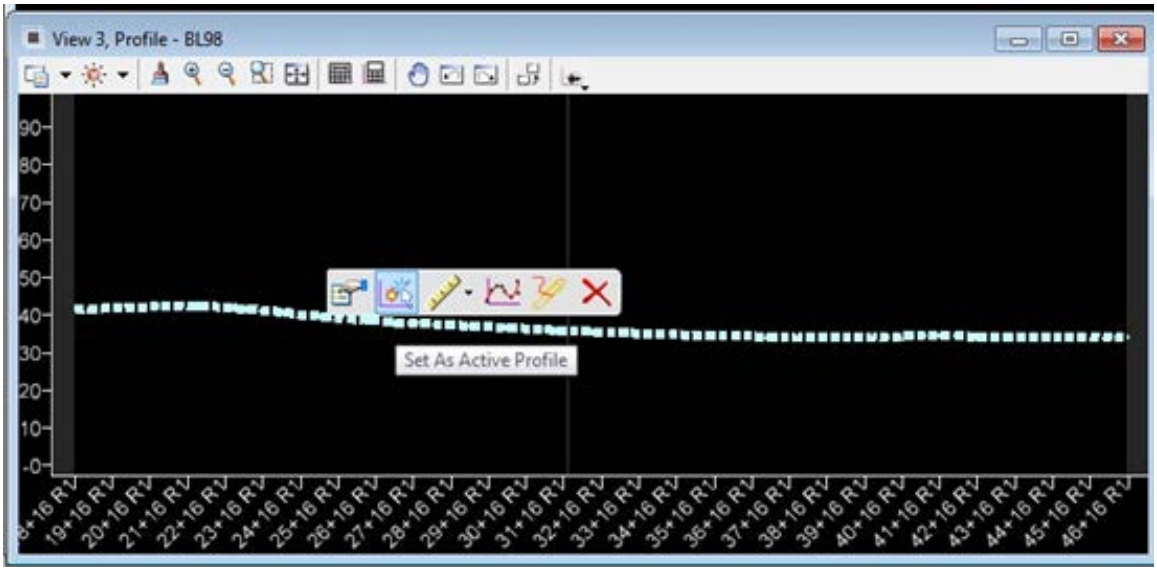
2. Select **View 3** to view the *Existing Ground Profile* for the mainline **US98** *Centerline*.

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

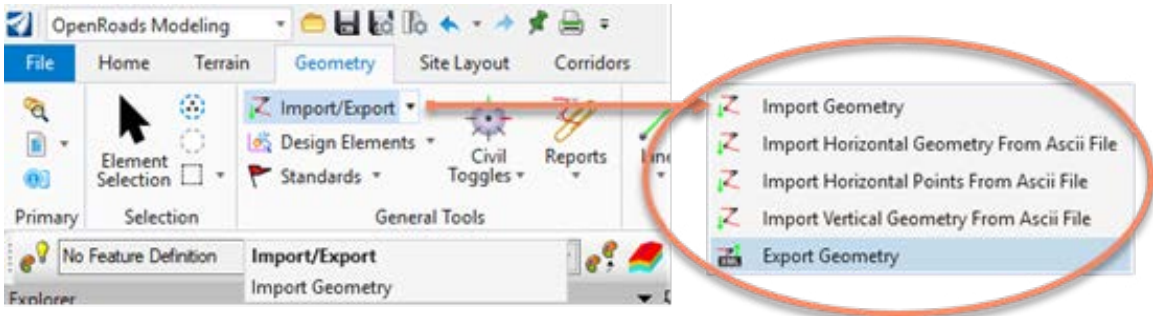
4. In the name field enter **US98_EX.**

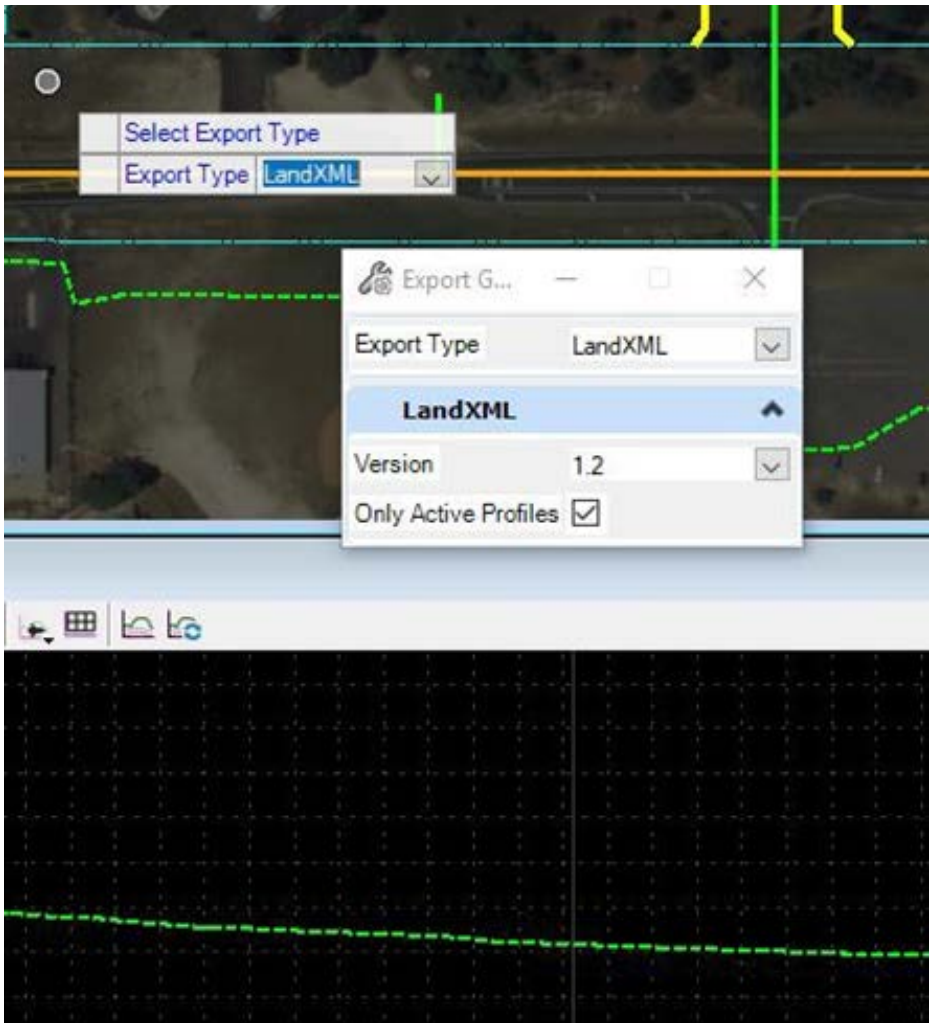


5. With the **Profile** selected, hover over the element to display the Context Menu and select **Set As Active Profile**.



6. Use the *Geometry Tab and the General Tools Group*, to select the **Export Geometry** tool, select the **US98_EX** plan element and save as a LandXML file. (Ex. US98_EX.xml). **Openroads Modeling > Geometry > General Tools > Import/Export > Export Geometry**

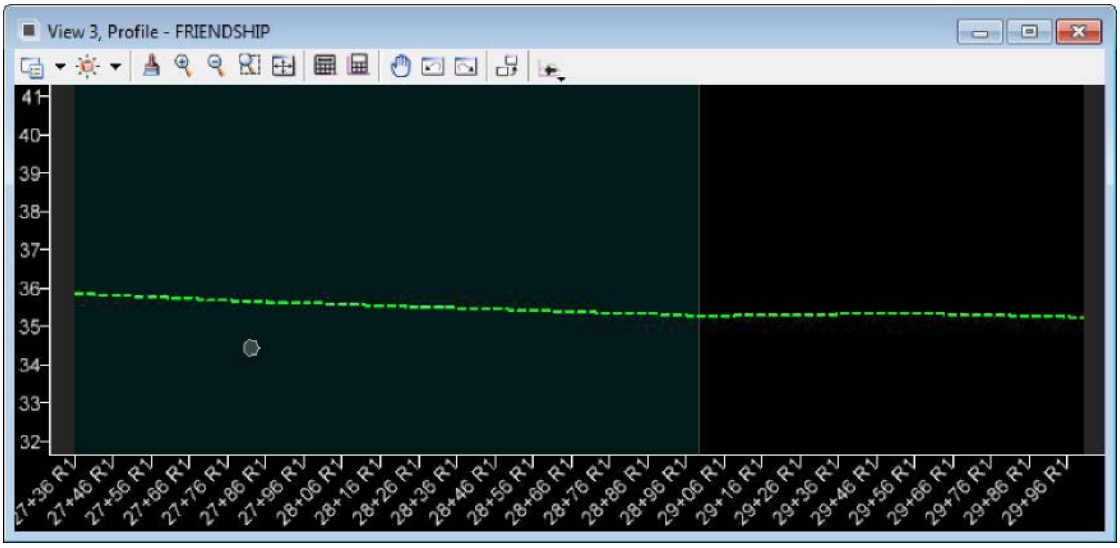




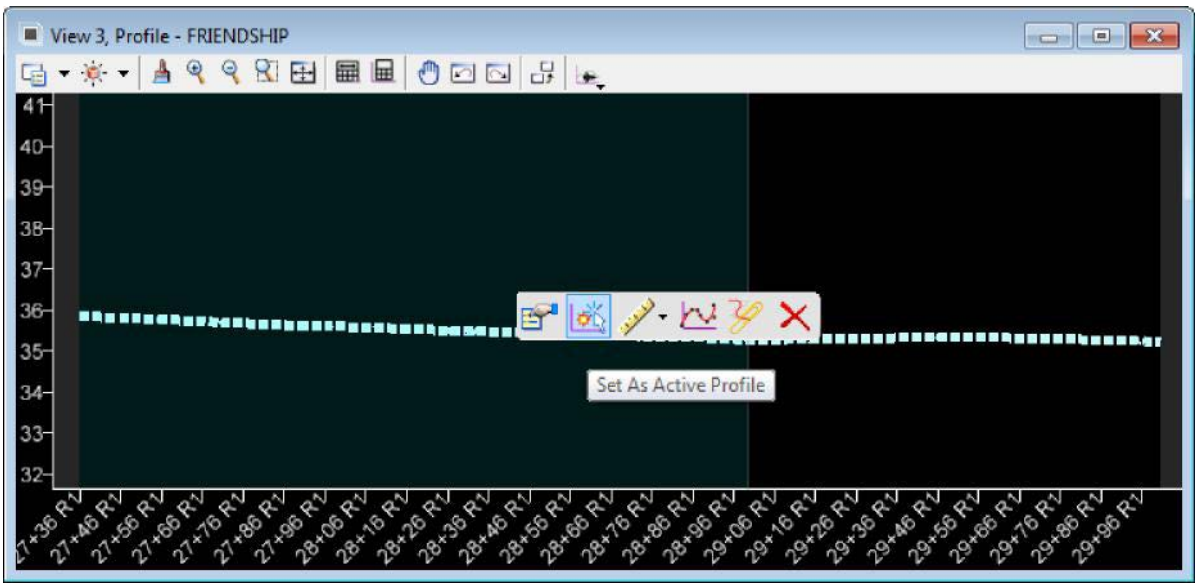
Exercise 3.5 *Friendship Profile*

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*.



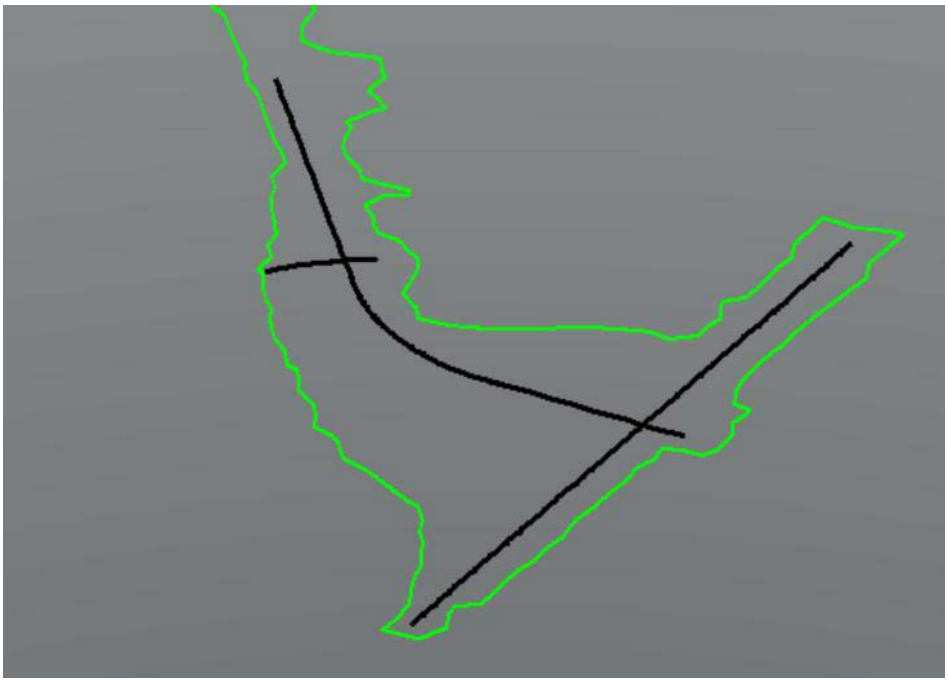
3. With the **Profile** selected, hover over the element to display the Context Menu and select **Set As Active Profile**.



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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Contact
www.fdot.gov/cadd

Address
605 Suwannee St
Tallahassee, FL. 32399

Civil Geometry