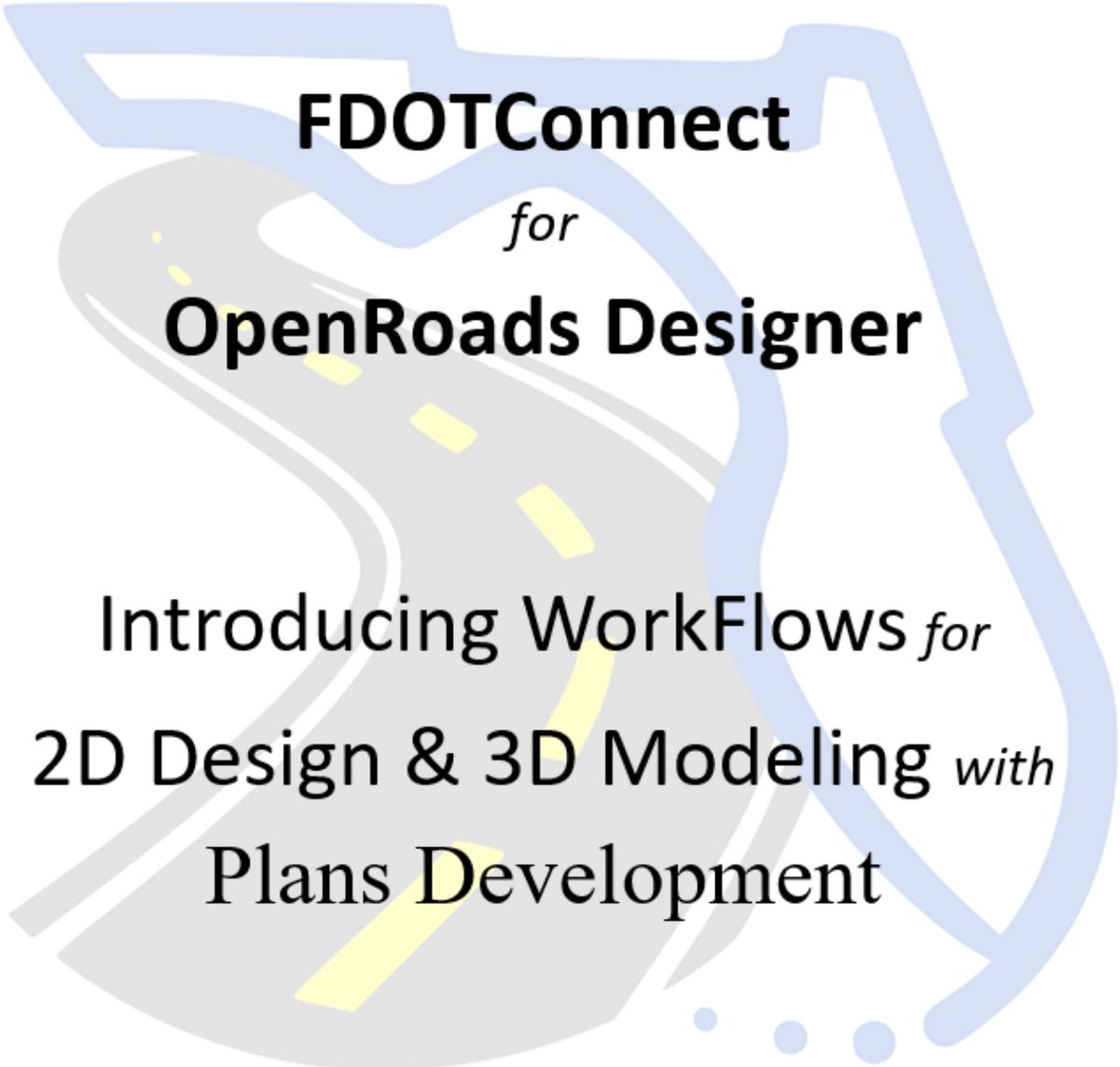


State of Florida
Department of Transportation



FDOTConnect
for
OpenRoads Designer

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

Training Guide
2020

PRODUCTION SUPPORT CADD OFFICE
TALLAHASSEE, FLORIDA
<http://www.fdot.gov/cadd/>

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FDOT CONNECT WORKSPACE OVERVIEW

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.

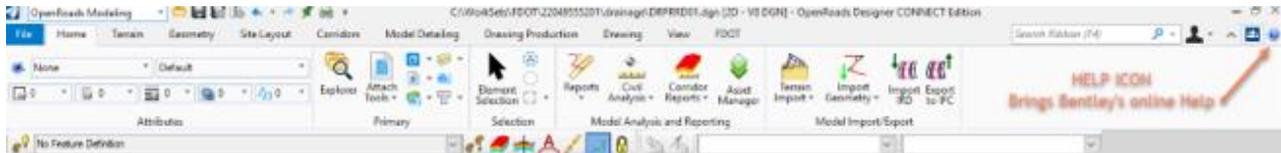
INTRODUCTION

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

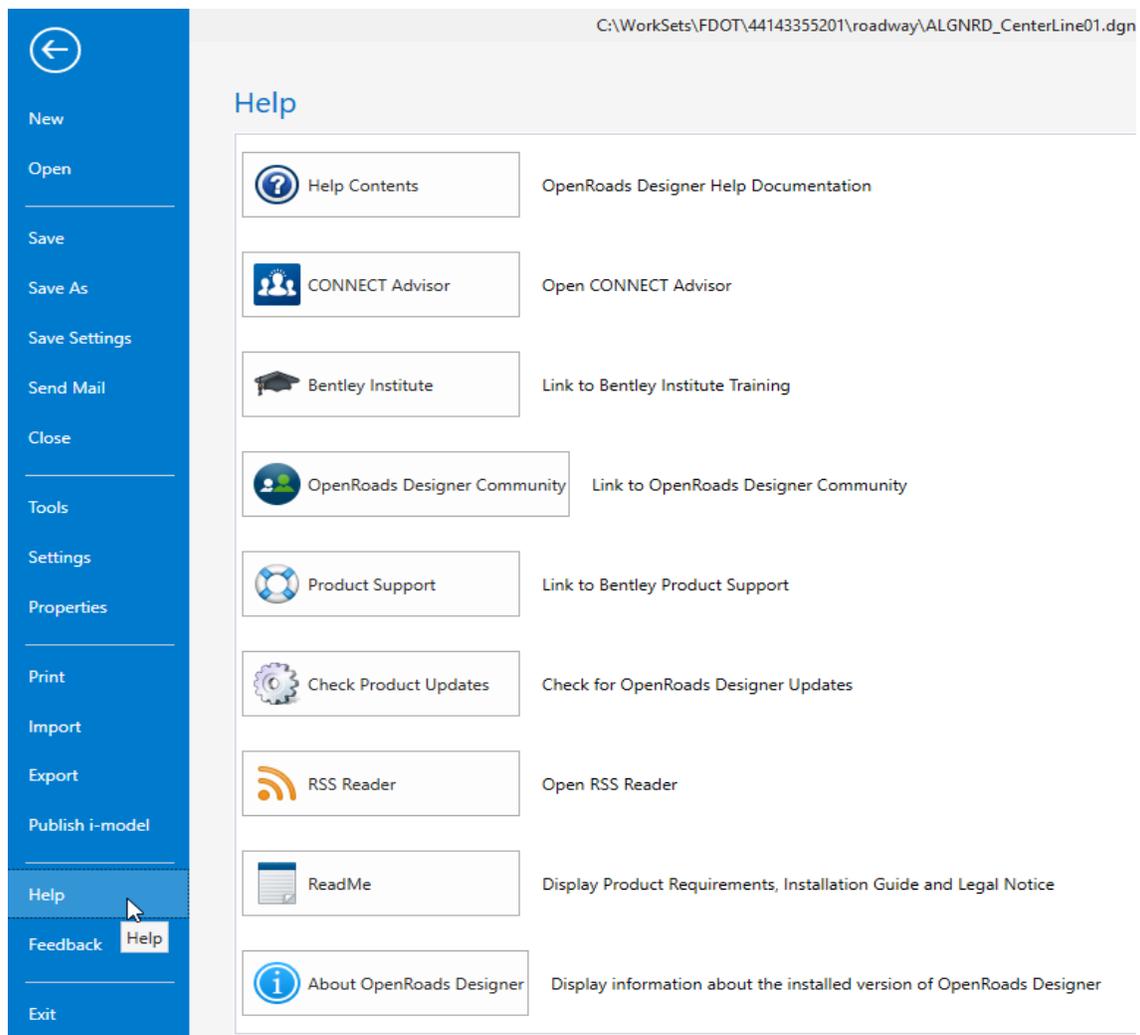
- Create a Terrain Element from the existing surface to be used as a reference for the project.
- Develop Existing Feature Terrain Surfaces to be shown on cross sections and used in earthwork calculations.
- Use Civil Geometry Elements in the design file to calculate and define a proposed centerline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

EXPECTATIONS – WHAT THIS COURSE PROVIDES

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



FILE > HELP



DOCUMENT STYLE

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

| Item | Convention | Example |
|-------------------------|---|--|
| Menu names and commands | Bold N <i>(Names separated with > symbol)</i> | <ul style="list-style-type: none"> • File > Open • File > ComSelect > Design |
| Dialog box Actions | Bold | <ul style="list-style-type: none"> • Click the Apply button. • Click the Graphic Select button to the right of the <i>Horizontal Alignment Include</i> box. • In the <i>Segment Type</i> list, click Lines. |
| Dialog box Field Names | Italic | <ul style="list-style-type: none"> • Key in Hemfield Road in the <i>Alignment Name</i> field. • Click the Graphic Select button to the right of the <i>Horizontal Alignment Include</i> field. • In the <i>Segment Type</i> list, click Lines. |
| Key-ins | Bold | <ul style="list-style-type: none"> • Key in Hemfield Road in the <i>Alignment Name</i> field. |
| File Names | Italic | <ul style="list-style-type: none"> • Open the file <i>ALGNRD01.dgn</i> in the C:\WorkSets\FDOT\22049555201\Roadway. |
| File Paths | Non italic | <ul style="list-style-type: none"> • Open the file <i>_Blank.dgn</i> in the C:\WorkSets\FDOT\22049555201 |
| New Terms or Emphasis | Italic | <ul style="list-style-type: none"> • The Template Library contains <i>templates</i>, which represent typical sections of the proposed roadway. |

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

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

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

FILE TYPES

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

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

File Type Description:

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

LEARNING RESOURCES

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

- Bentley Communities:

https://communities.bentley.com/products/road_site_design/w/road_and_site_design_wiki/33435/openroads-designer

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

- Bentley Learn:

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

Bentley Product OpenRoads: Videos are available on a variety of topics: <https://www.Bentley.com>

- YouTube:

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

- YouTube Search - Google:

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

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

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

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

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

https://www.youtube.com/channel/UCqbY8kqZuXpIpyYV6IIQw_A

COURSE SUPPORTING FILES

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

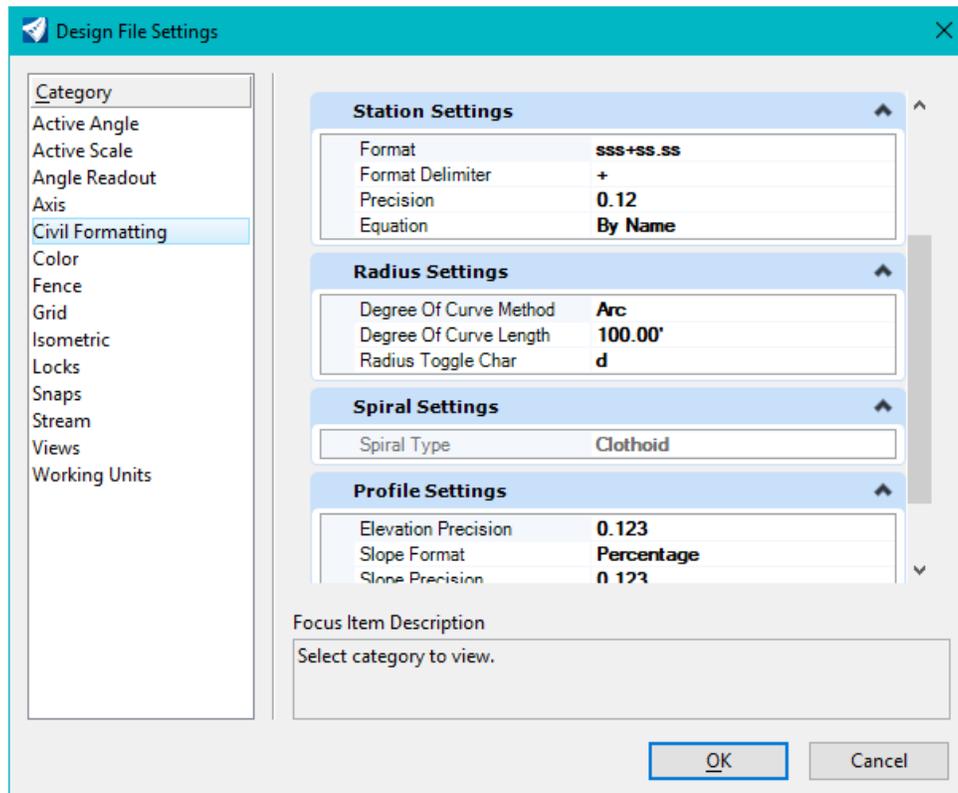
<http://www.fdot.gov/cadd/downloads/documentation/FDOTRDAnd3DM/FDOTRDAnd3DM.shtm>

INTRODUCING A NEW WORKSPACE

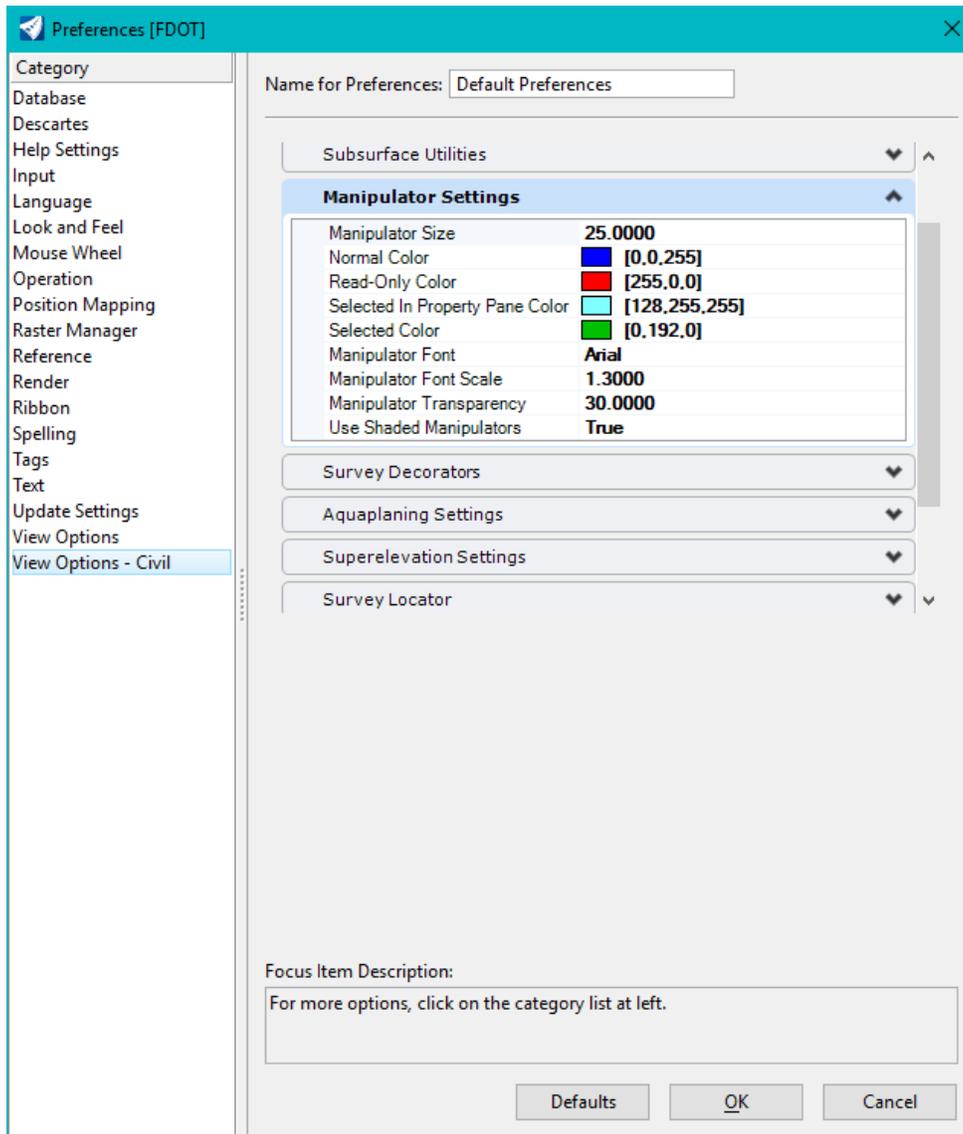
FDOTCONNECT PREDEFINED SETTINGS



DESIGN FILE SETTINGS:

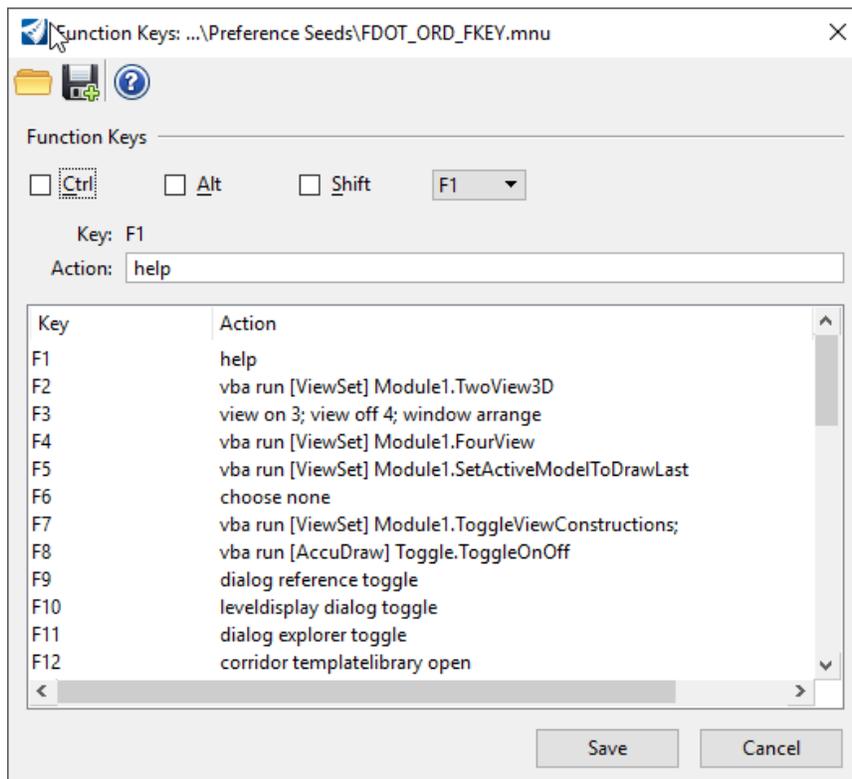


FDOTCONNECT WORKSPACE PREFERENCES:

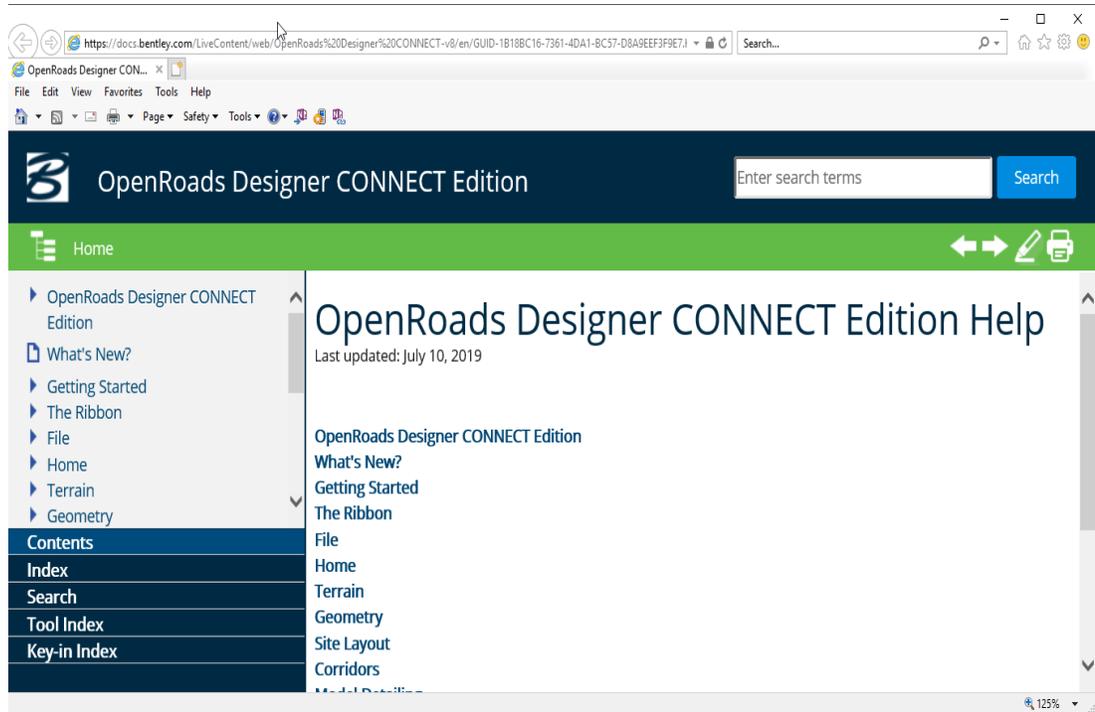
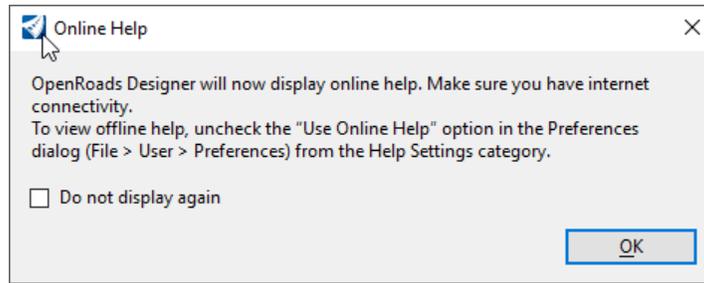


FDOTCONNECT FUNCTION KEYS

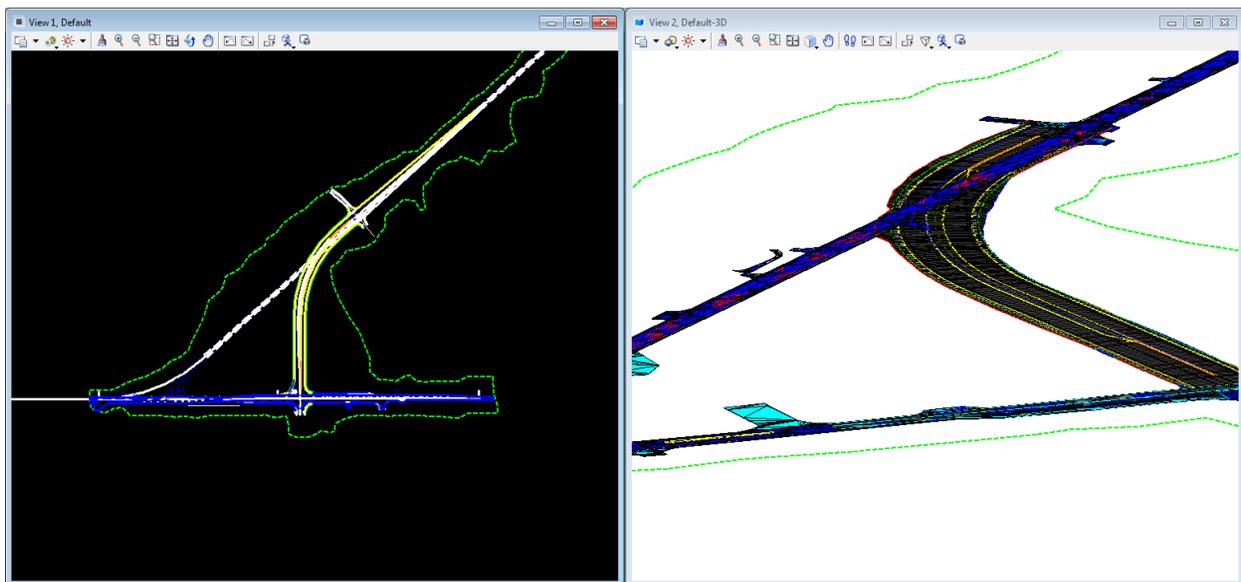
| FDOTCONNECT Function Key Assignments | |
|--------------------------------------|--|
| F1 | Opens the OpenRoads Designer OnLine Help. Ctrl+F1 Closes all Views except View 1 |
| F2 | Open View 1 (2D Plan) and View 2 (3D Isometric) and fits both views. |
| F3 | Opens View 3 (2D Plan), closes all View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



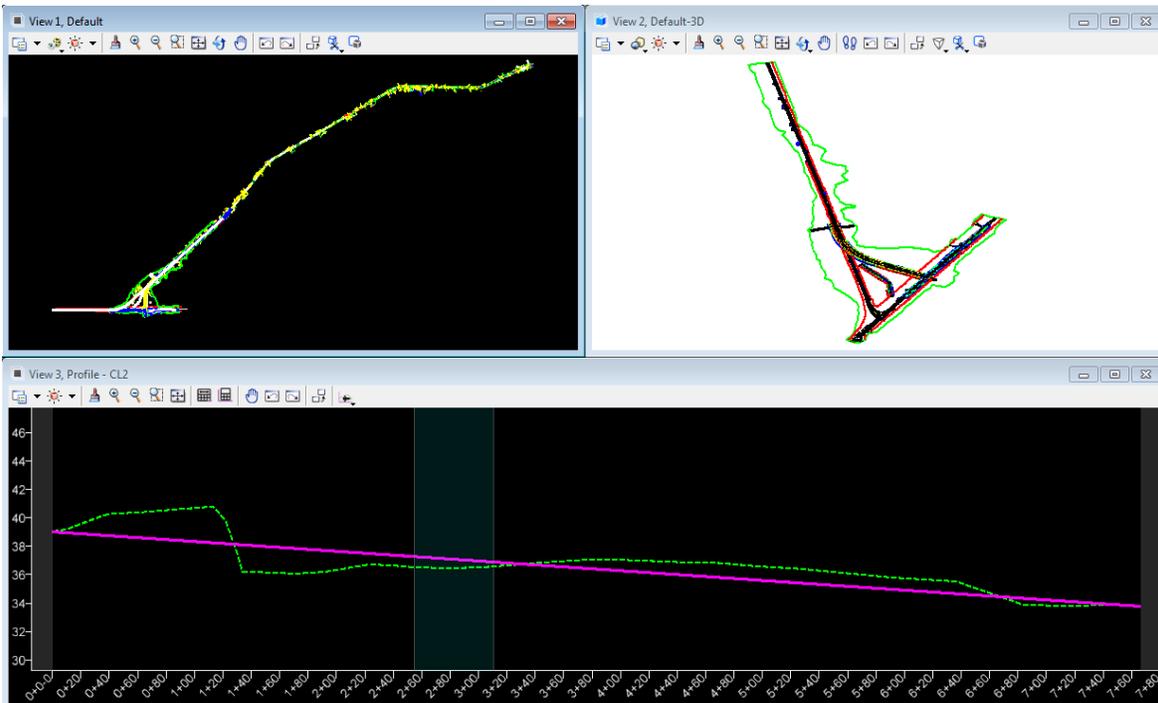
- Function Key **F1** – Civil Help



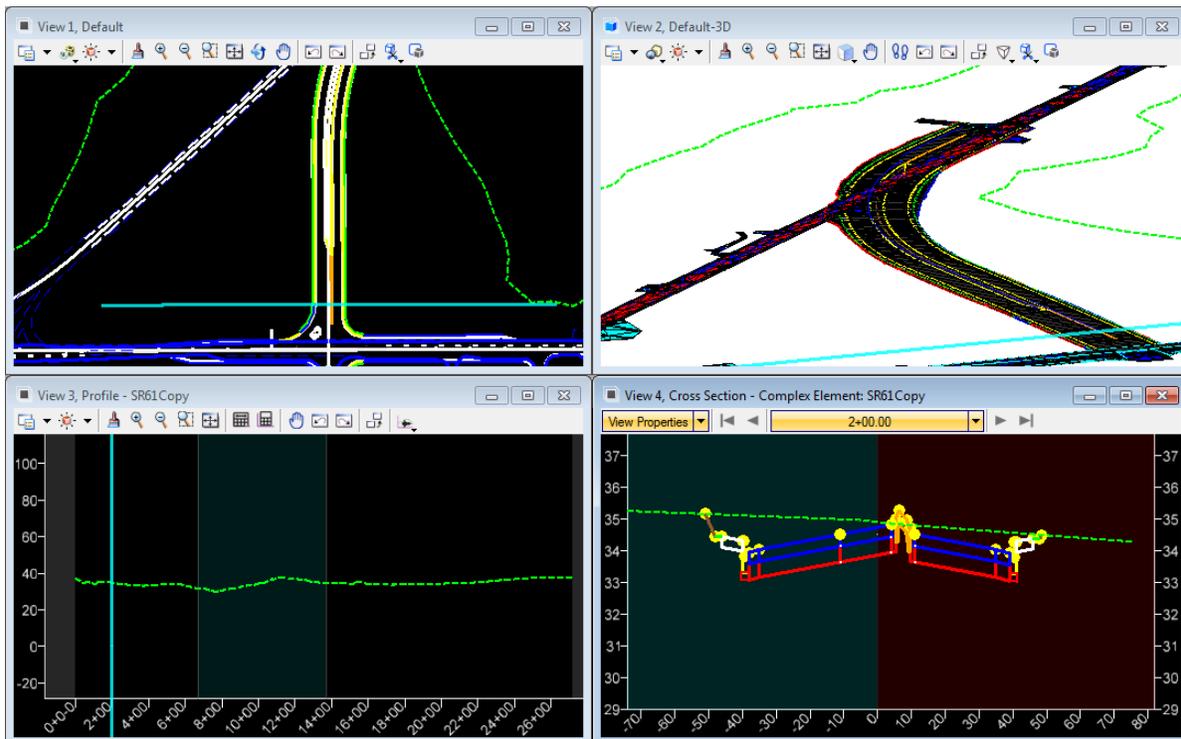
- Function Key **F2** – Open and Fits Two Views Setup; View 1- 2D Plan, View 2-Isometric



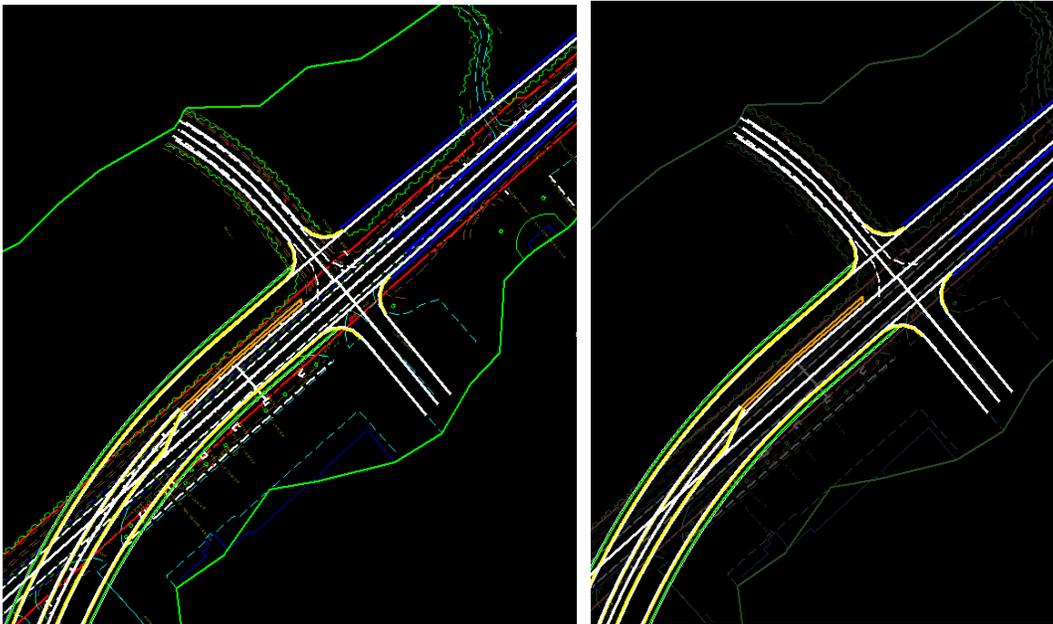
- Function Key **F3** – Opens View 3; Closes View 4 and Arranges Views



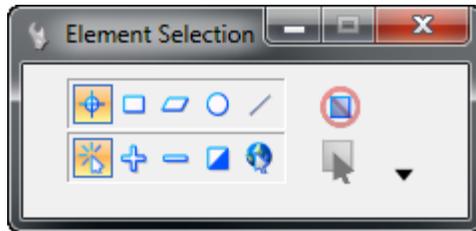
- Function Key **F4** – Opens and fits Four View Setup; View 1- 2D Plan, View 2-Isometric, View 3,4 - custom



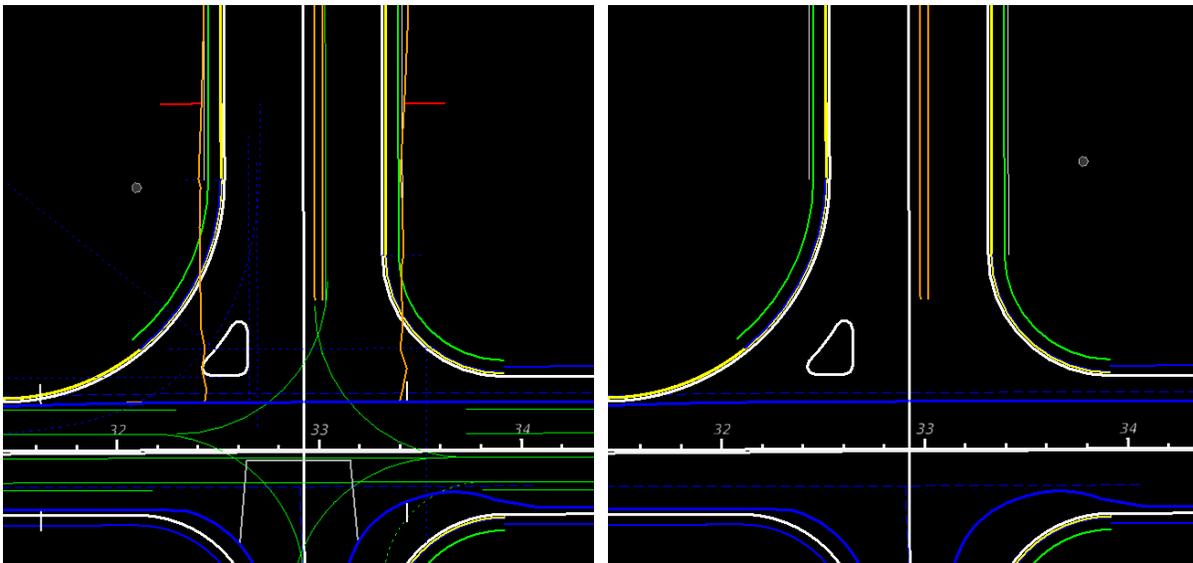
- Function Key **F5** – Toggle Dim References



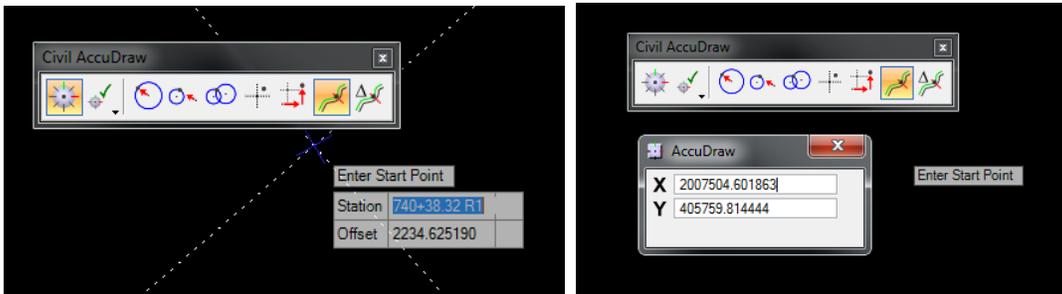
- Function Key **F6** – Resets Out of Any Ongoing Commands.



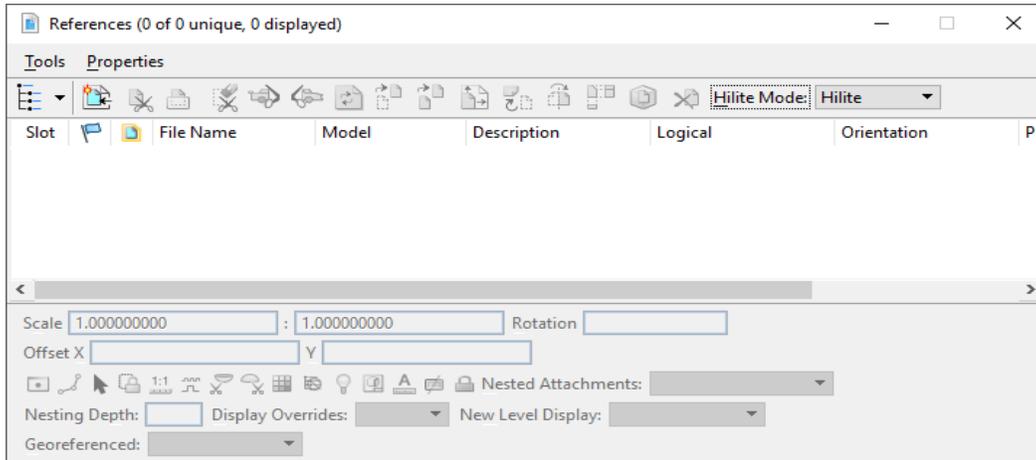
- Function Key **F7** – Toggles On/Off Construction View Attributes



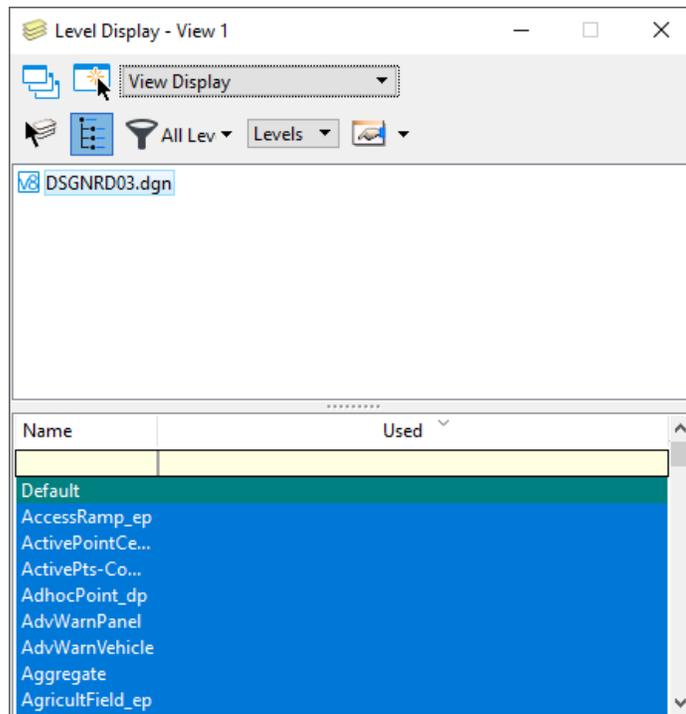
- Function Key **F8** – Toggles Between MicroStation AccuDraw and Civil AccuDraw



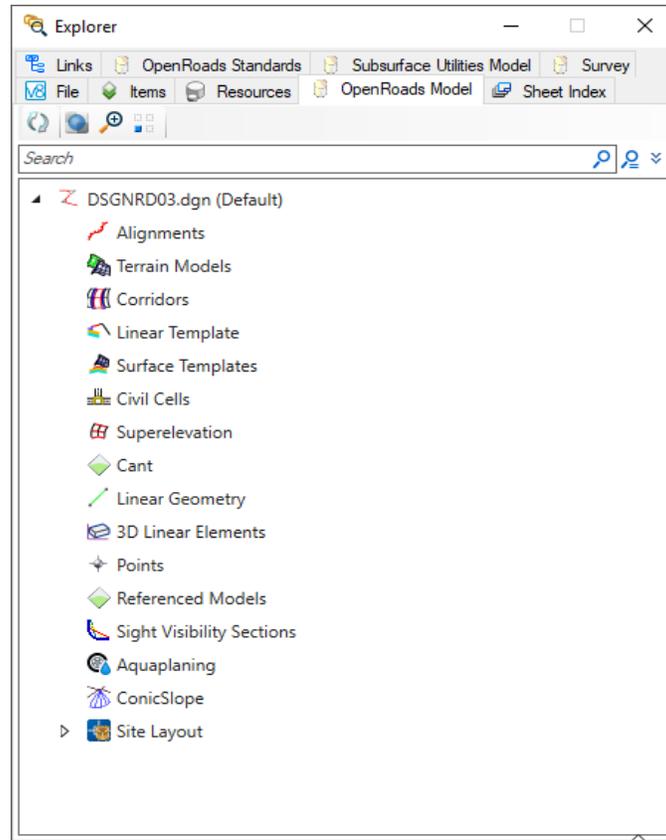
- Function Key **F9** – Toggles Reference Dialog Open\Close.



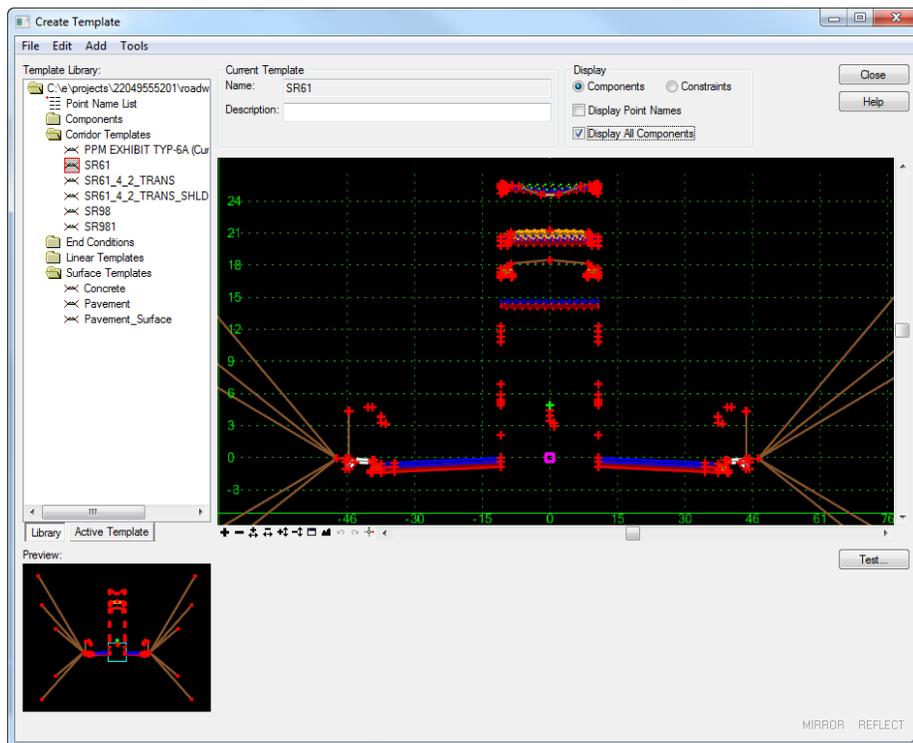
- Function Key **F10** – Toggles Level Display Dialog Open\Close.



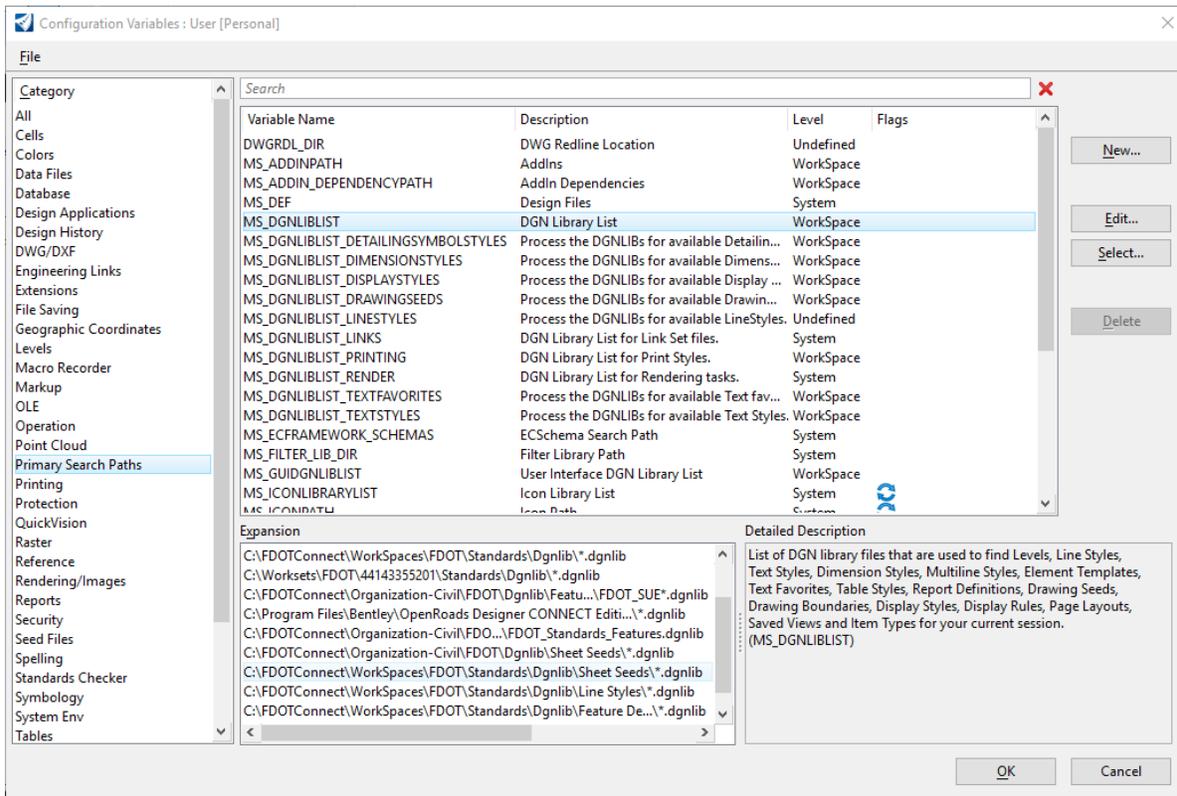
- Function Key **F11** Toggles Project Explorer Dialog Open/Close.



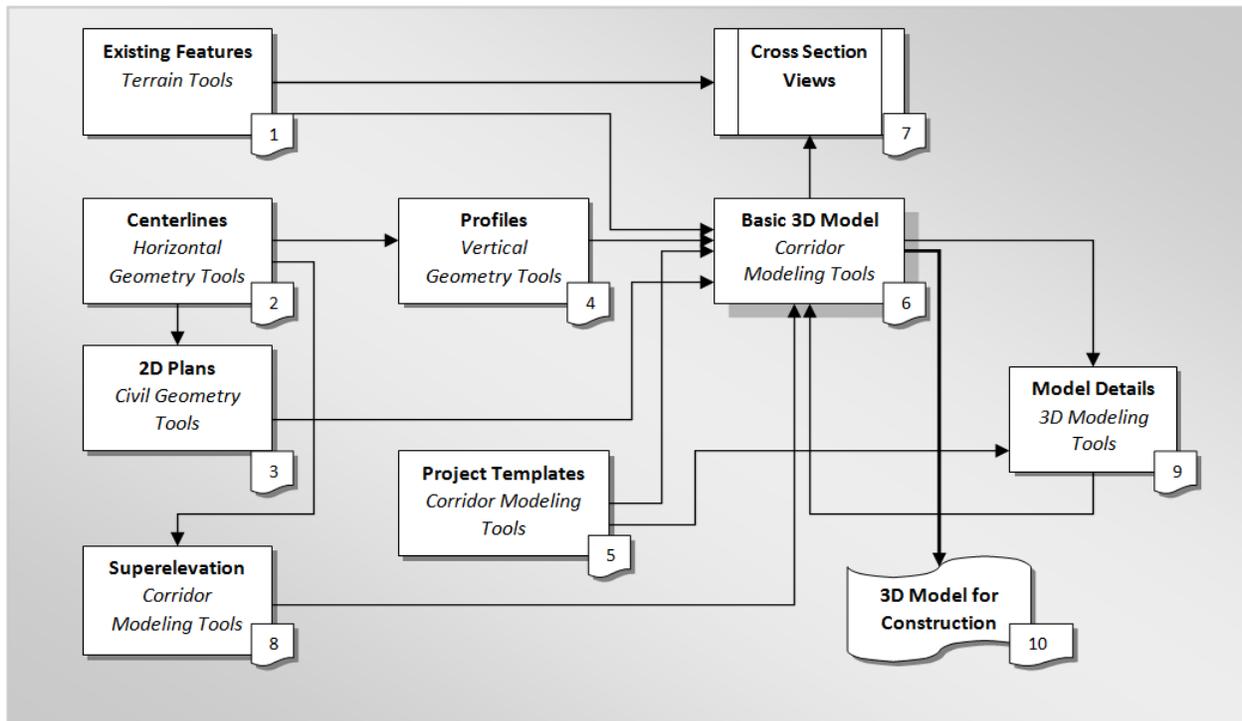
- Function Key **F12** Corridor Modeling, Opens Create Template Dialog.



FDOTCONNECT USER CONFIGURATION VARIABLES



FDOTCONNECT DESIGN AND 3D MODELING OVERVIEW



GENERAL WORKFLOW

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

RECOMMENDED MICROSTATION SETTINGS

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

GETTING STARTED

LAUNCHING FDOTCONNECT FOR OPENROADS DESIGNER

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

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

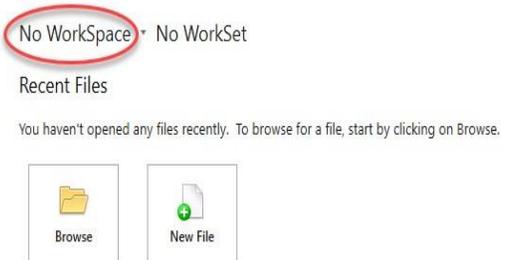


2. Launch FDOTConnect for OpenRoads Designer by double-clicking one of the FDOT icons. Note that your FDOTConnect launch icons will vary depending on which Bentley Connect Edition platforms you have installed. FDOTConnect will create an icon for OpenRoads Designer, an icon for MicroStation Connect Edition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

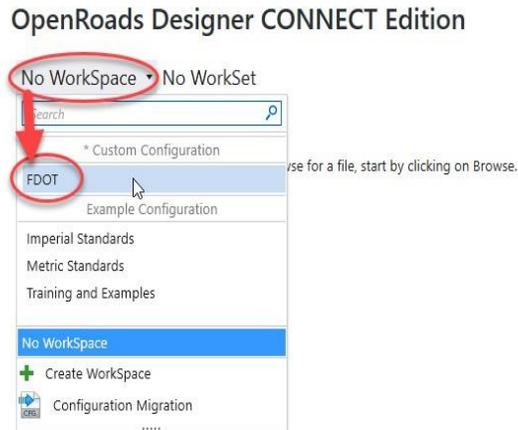


3. In the Workspace/Workset selection screen of OpenRoads Designer, select the Workspace selection drop-down menu by clicking on “No Workspace.”

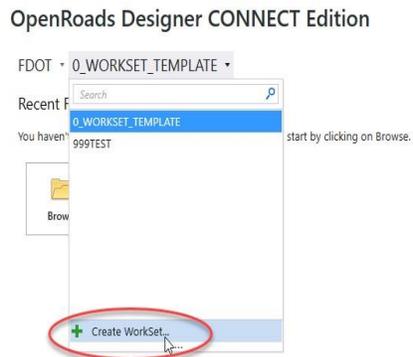
OpenRoads Designer CONNECT Edition



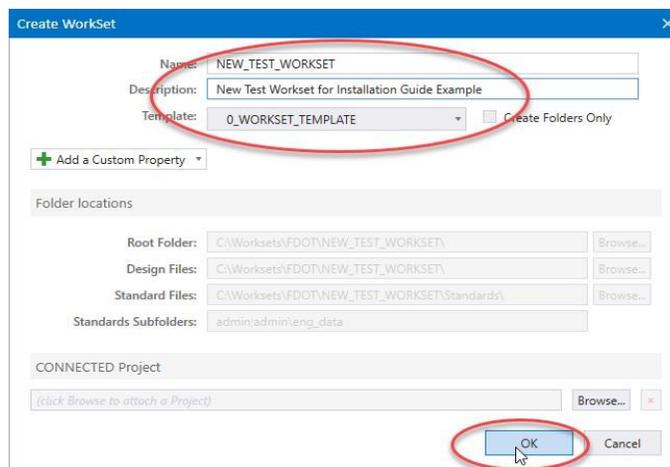
4. Select “FDOT” from the drop-down menu to select the FDOTConnect workspace.



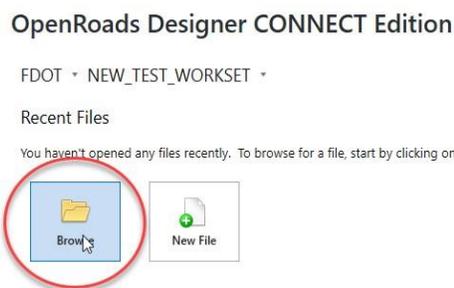
- From here, you can now create a new WorkSet,,this is done by selecting the drop-down menu, being sure to select the FDOT’s “0_WORKSET_TEMPLATE” as the workset template.



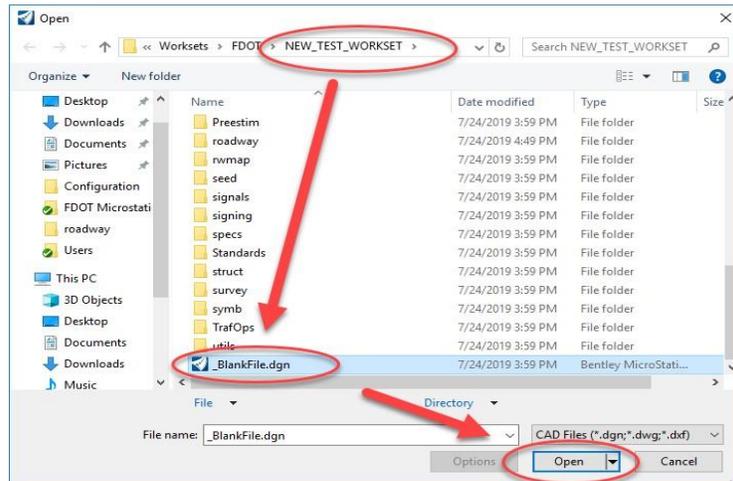
- Click “OK” after filling in the Create Workset dialog.



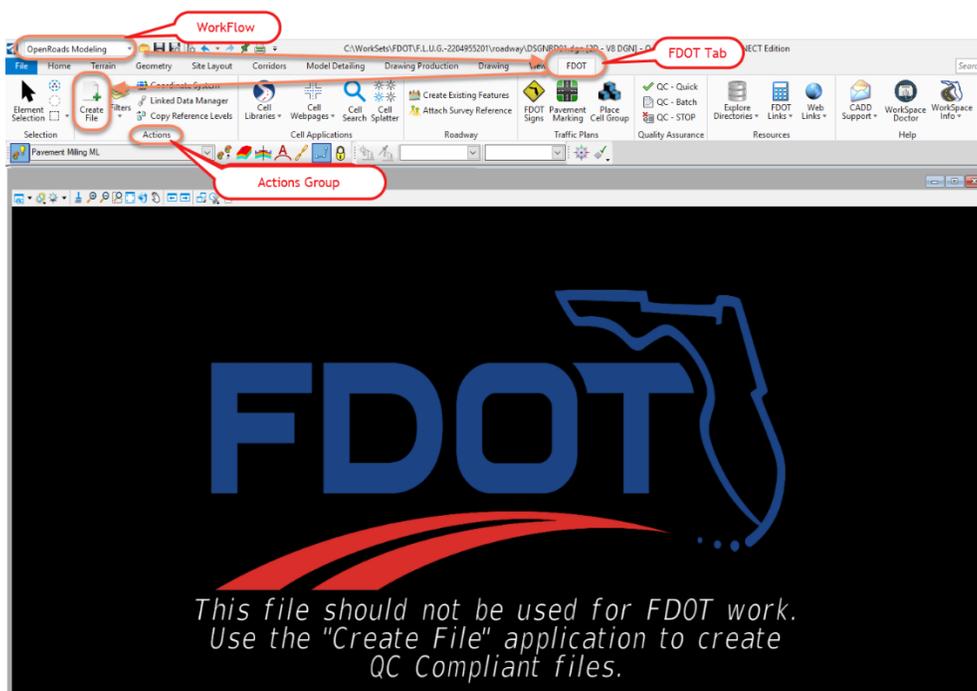
- After creating a new project using the FDOT Workset Template, you can create new files using the FDOT Create File tool. This tool is launched from within the FDOTConnect workspace, so you must first open a file. The FDOT Workset template includes a blank starting file from which to launch the Create File tool.
- From the OpenRoads Designer file open dialog, select “Browse” to browse the contents of your new workset.



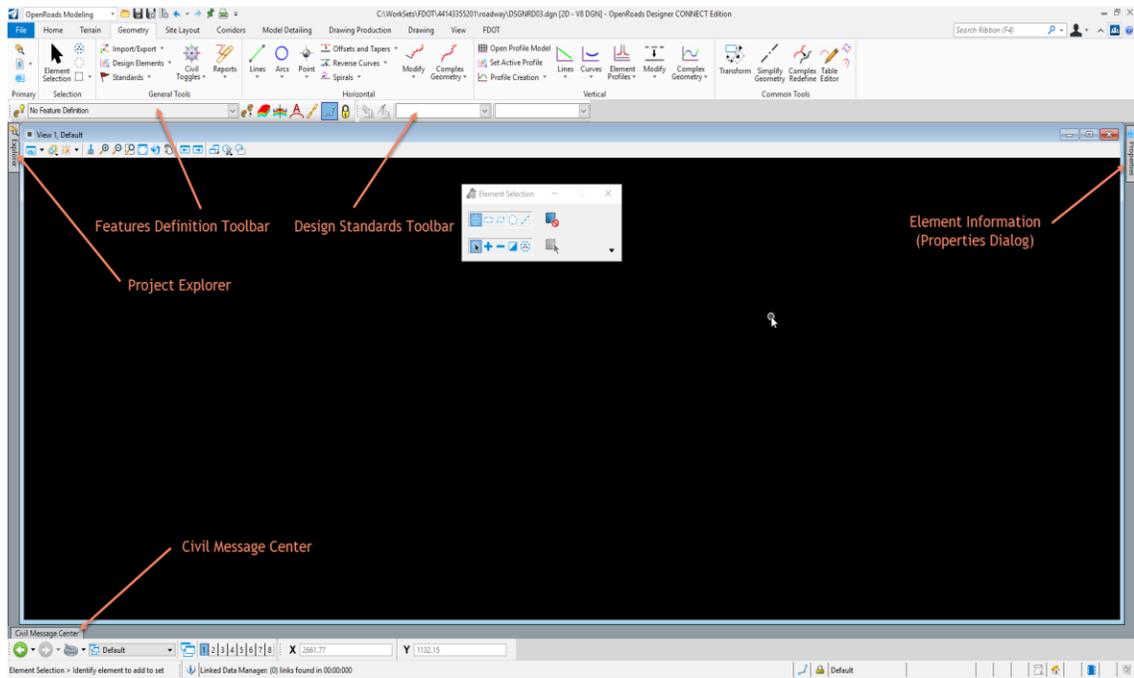
- Locate “_Blankfile.dgn” at the root of your workset folder structure. Select this file and then select “OPEN” to open it.



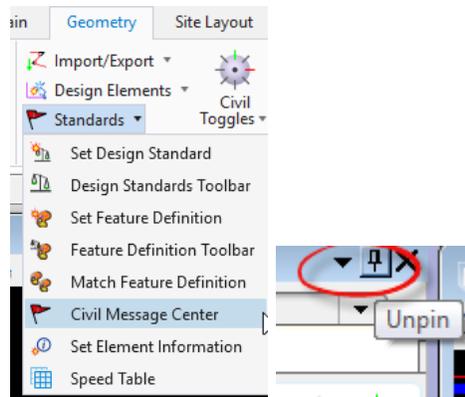
- When the FDOTConnect Workspace opens, you can locate the FDOT ribbon by selecting the “OpenRoads Modeling” workflow from the menu at the top left of the screen. The FDOT tab is located at the far right of this ribbon. Select “Create File” to launch the Create File tool for creating FDOT project files.



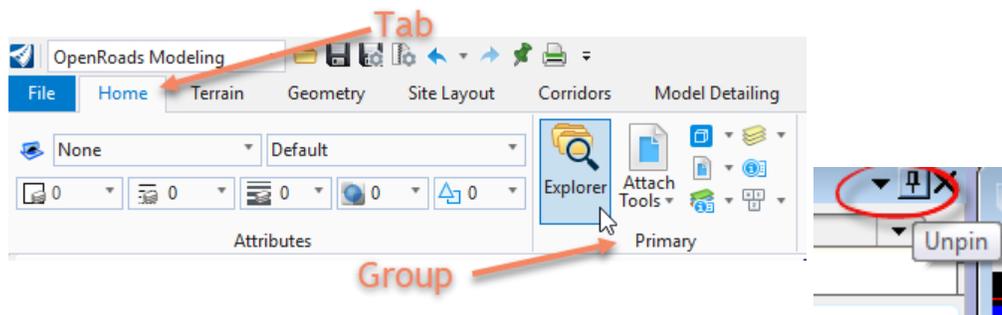
MENU DOCKING



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



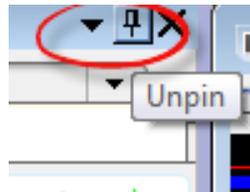
2. Verify that the *Project Explorer* is docked on the left side; if not, from the Ribbon select the Home tab then in the group named primary click on the explorer icon...Or use the F11 function key to toggle ON/OFF the dialog.



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



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



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

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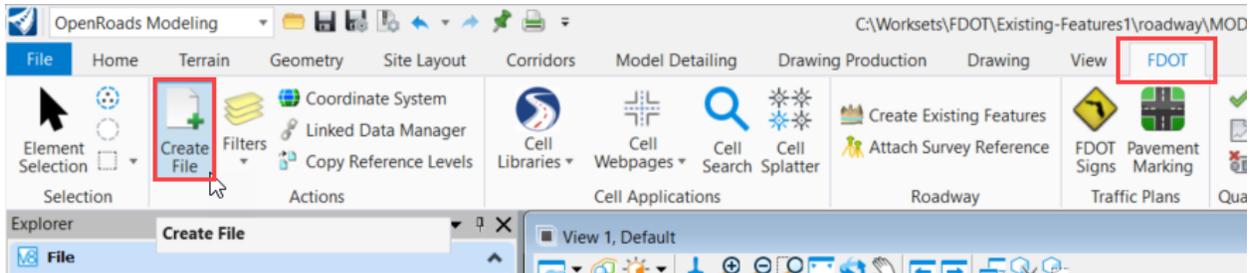
1 EXISTING FEATURES MODELING WORKFLOW

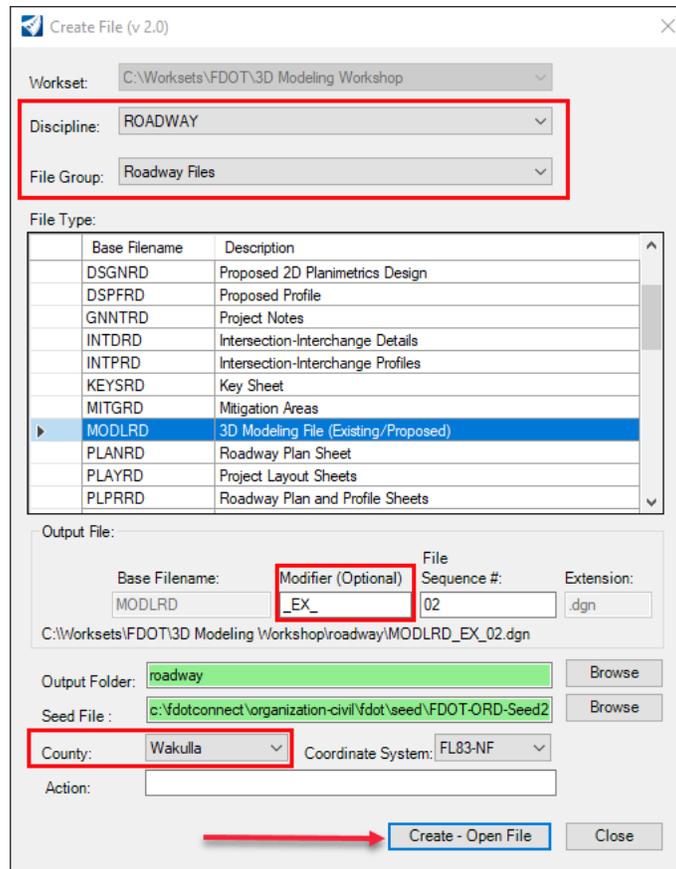
EXERCISE OVERVIEW – EXISTING FEATURES ORD

- 1.1 Create Polygons (Closed Complex Shapes/Line Strings)
- 1.2 Create Clipped Terrain Models from Clipping Elements
- 1.3 Creating a 3D Terrain Model Boundary by Active Profile
- 1.4 CONCLUSION

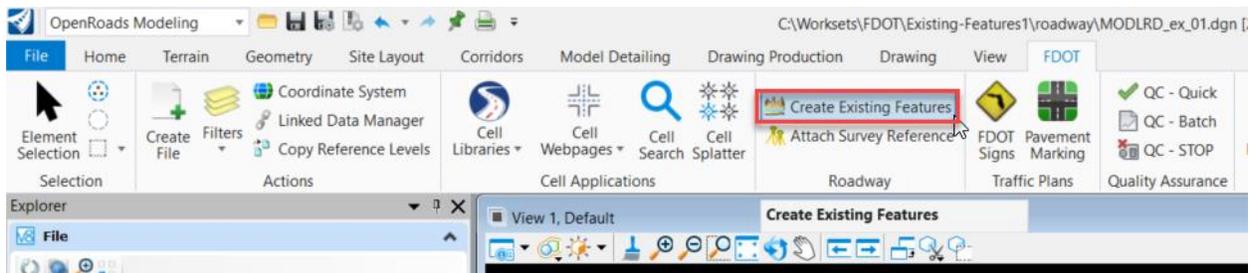
Exercise 1.1 *Create Polygons (Closed Complex Shapes/Line Strings)*

1. Open FDOTConnect, set the Workspace to “FDOT” and select the Workset – “3D Modeling Workshop”.
2. Browse to the “_BlankFile.dgn” and open.
3. On the FDOT Ribbon Tab in the Actions Group, select “Create File.”
 - Discipline = “ROADWAY”
 - File Group = “Roadway Files”
 - File Type = “MODLRD”
 - Modifier (Optional) = “_EX_”
 - County = “Wakulla” (Coordinate System = FL83-NF)
4. Click on the “Create – Open File” button. Close the Create File Dialogue box.



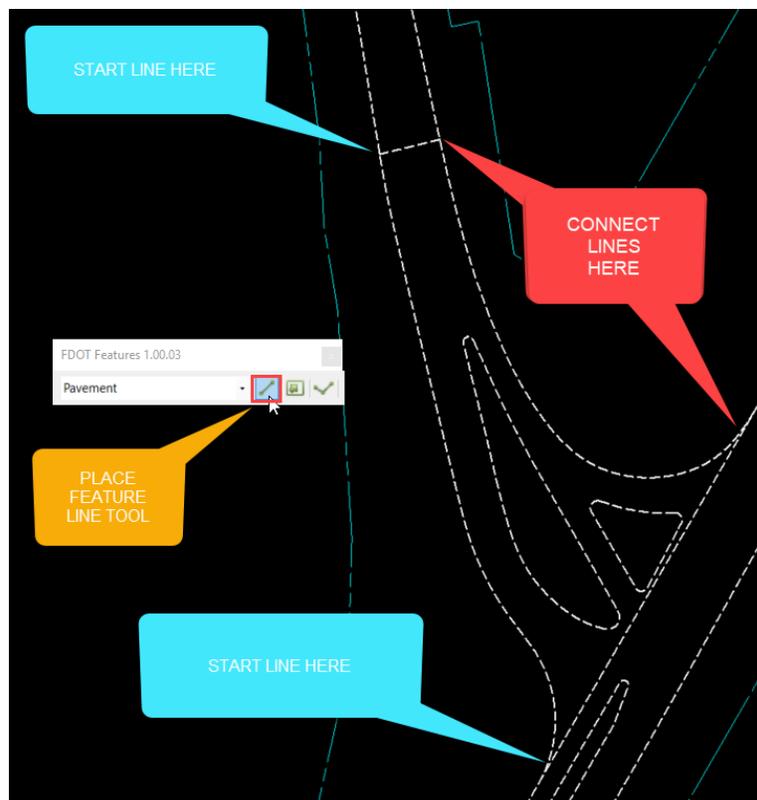
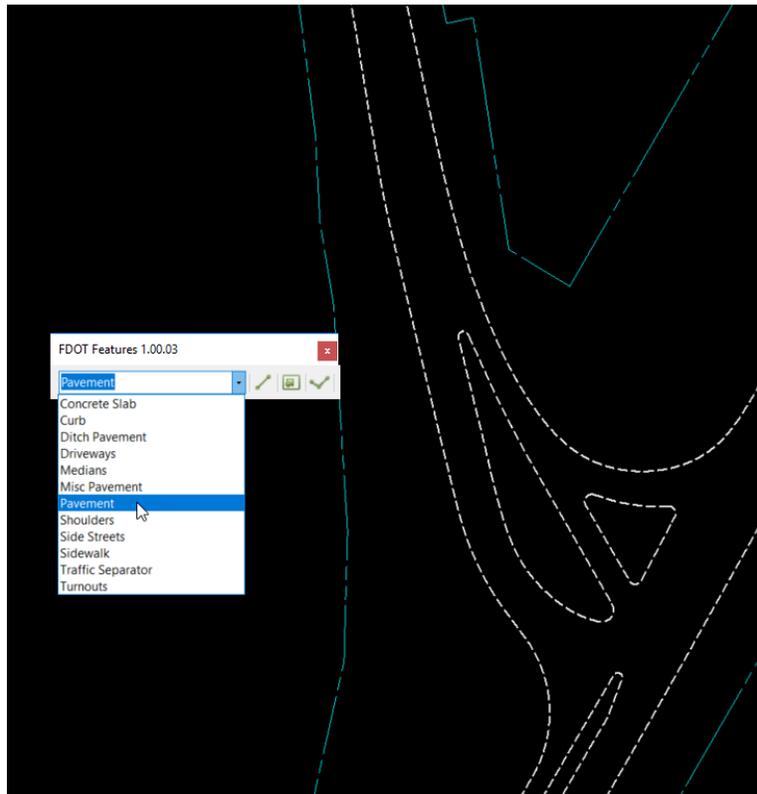


5. On the FDOT Ribbon Tab select in the **Roadway** Group select **“Create Existing Features”**.



6. When prompted, attach the project survey SURVRD01.dgn. Note that this will attach the SURVRD01.dgn as a reference file (visualization is set to off) and copy into the active 2D MODLRD file the existing pavement and curbing features only.
7. Use the drop down in the FDOT Features dialogue to select **“Pavement”**. This tool will visualize only the applicable features for the selected hard surface categories. In this case turning on only the “PavtAsphalt_ep” level.

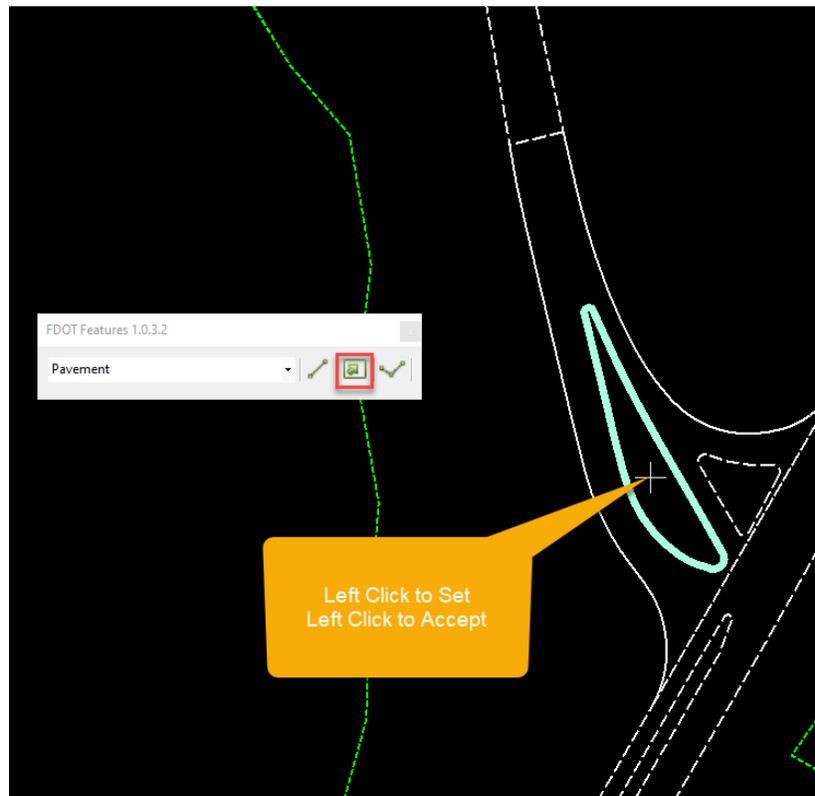
- Use the **“Place Feature Line”** tool to draw asphalt pavement lines at the points indicated below. *These lines will be the limits of the polygons (closed complex shapes/line strings).*

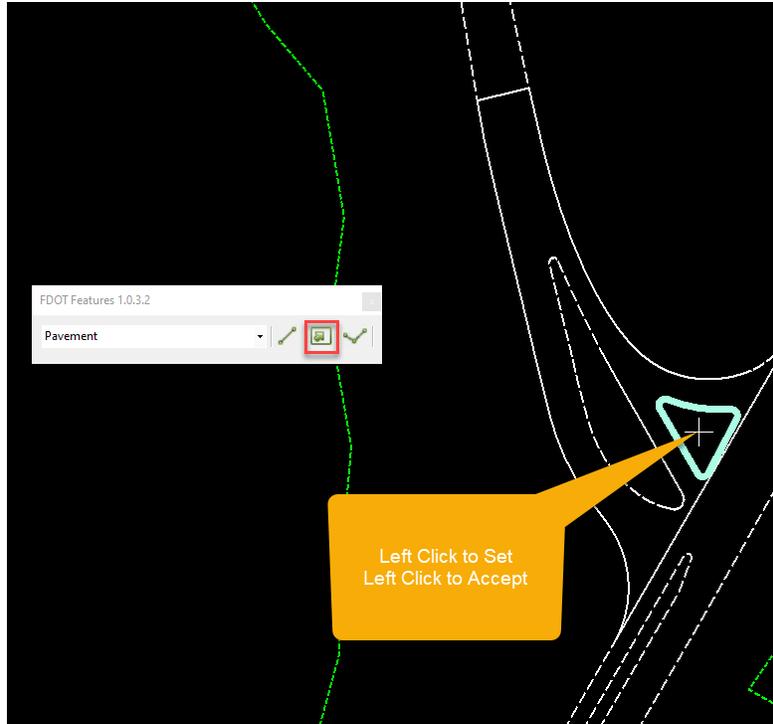


- Use the **“Create Feature Shape By Flood”** tool to create the 2D polygon to the limits defined by the added pavement lines. Left-click inside the Roadway and left-click again to accept the polygon.



10. Again, use the “Create Feature Shape By Flood” tool to Left-click in each of the median areas to define those polygons. *All of these newly created polygons are known as “Clipping Elements”.*





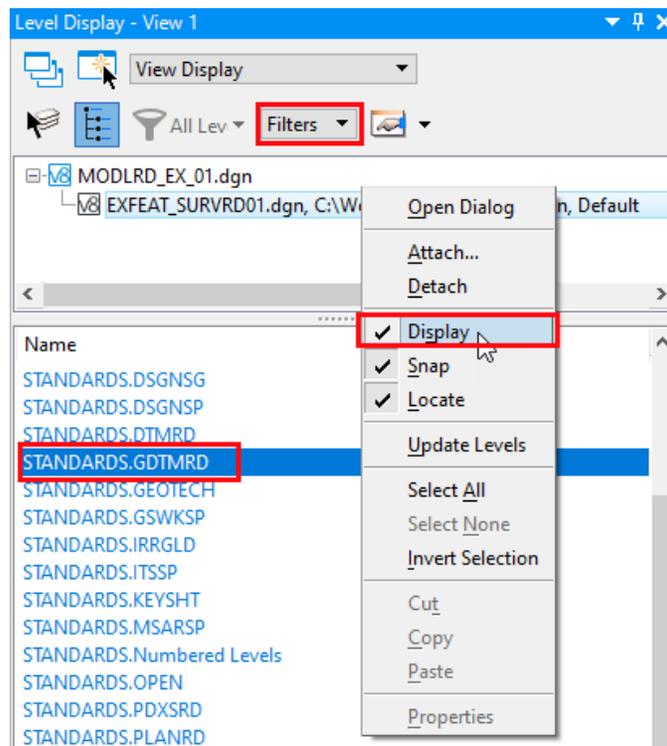
11. You are now done creating “Clipping Elements”. It is important to **turn off/shut down the Create Existing Features tool.**

WARNING: Leaving this tool on and opening a file could damage the new file by copying in 2D pavement lines.

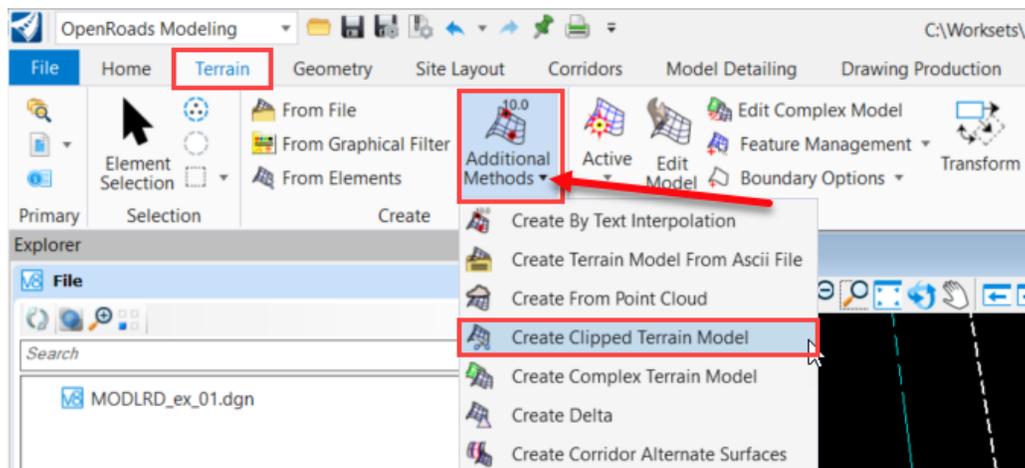
Exercise 1.2 Create Clipped Terrain Models from Clipping Elements

Note When the “Create Existing Features” tool is used and the Survey (SURVRD01.dgn) is attached, the survey is automatically displayed with only the DTM_ex level on. Exercise numbers 12 and 13 can be skipped unless needed to redisplay the Survey with the Terrain Model only.

1. Open the Level Display dialogue and select the SURVRD01.dgn reference file and right click to **turn on the reference file “Display”**.
2. Use the Standards file level filters to **select the GDTMRD levels**. *This will display the SURVRD01.dgn Terrain Model only.*

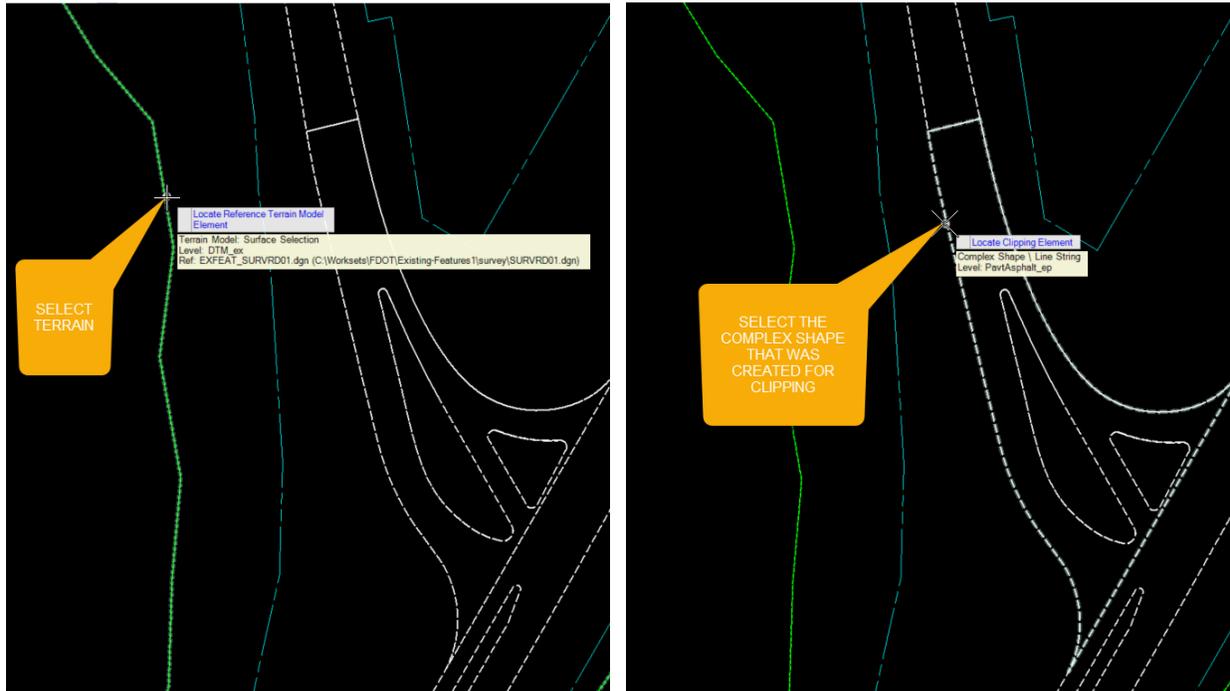


3. In the Terrain Ribbon Tab in the Create Group use the “Additional Methods” drop down to **find the “Create Clipped Terrain Model” tool**. Use this tool to create an “External” Terrain Model of the shape that was created above.

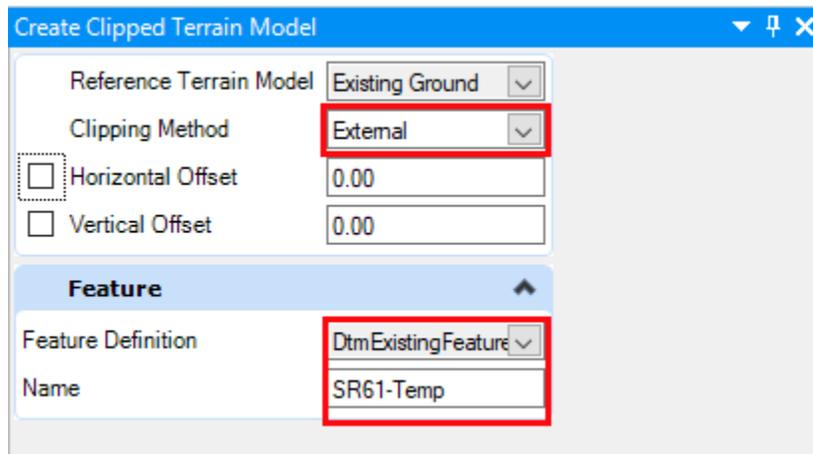


Note Once the Clipped Terrain Model tool has been used it will be the default tool until another is used.

- When prompted to “**Locate Reference Terrain Model Element**”, select the boundary of the Existing Ground from the referenced SURVRD01.dgn. When prompted to “**Locate Clipping Element**”, select the SR61 polygon (Clipping Element).

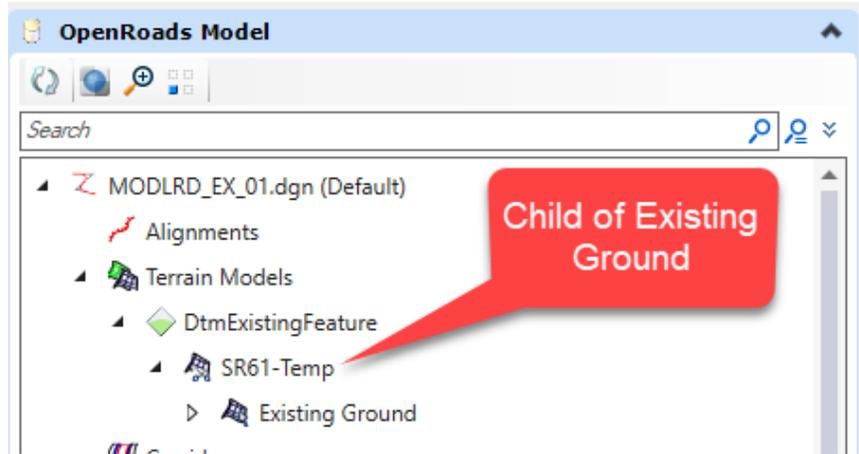


- Make sure in the contextual dialogue box, that the Clipping Method is set to “**External**”. Set the Feature Definition to “**DTMExistingFeature**”. Give the clipped terrain model a Name, in this case “**SR61-Temp**”. Right-click (Reset) in the view when you are done. Give your clipped terrain a horizontal and vertical offset or continue to left-click to default these offsets to zero (0).



6. Your final left-click in the view should clip out the Roadway into a **Terrain Model named “SR61-Temp”**. This process also creates a 3D Design File Model containing the clipped Terrain Model and references it to the 2D Model.

Note Clipping creates a Parent – Child relationship between the referenced Terrain Model (Existing Ground) and the newly created clipped Terrain Model (SR61-Temp). The two terrain models are dynamically linked. If the parent Terrain Model changes then the child Terrain model will change.



Exercise 1.3 *Creating a 3D Terrain Model Boundary by Active Profile*

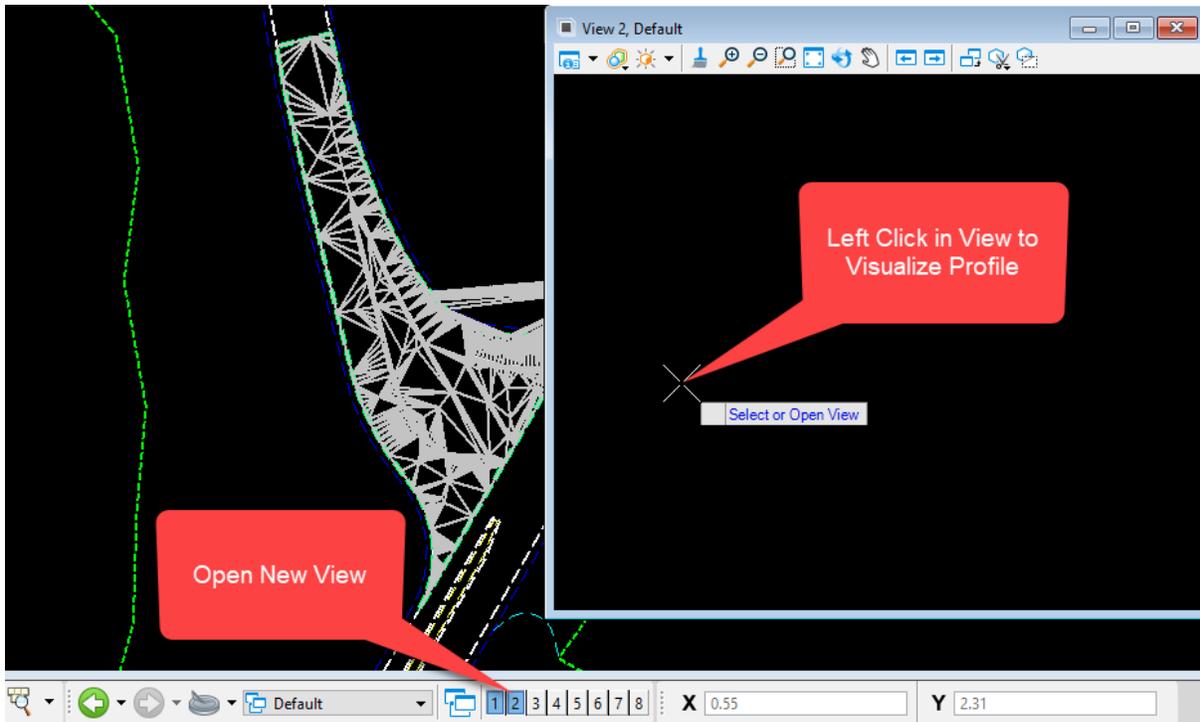
1. Set the parent Terrain Model (**Existing Ground**) to the active Terrain Model by selecting hovering over the boundary of the Terrain Model to open the contextual menu. Select “Set as Active Terrain Model”.



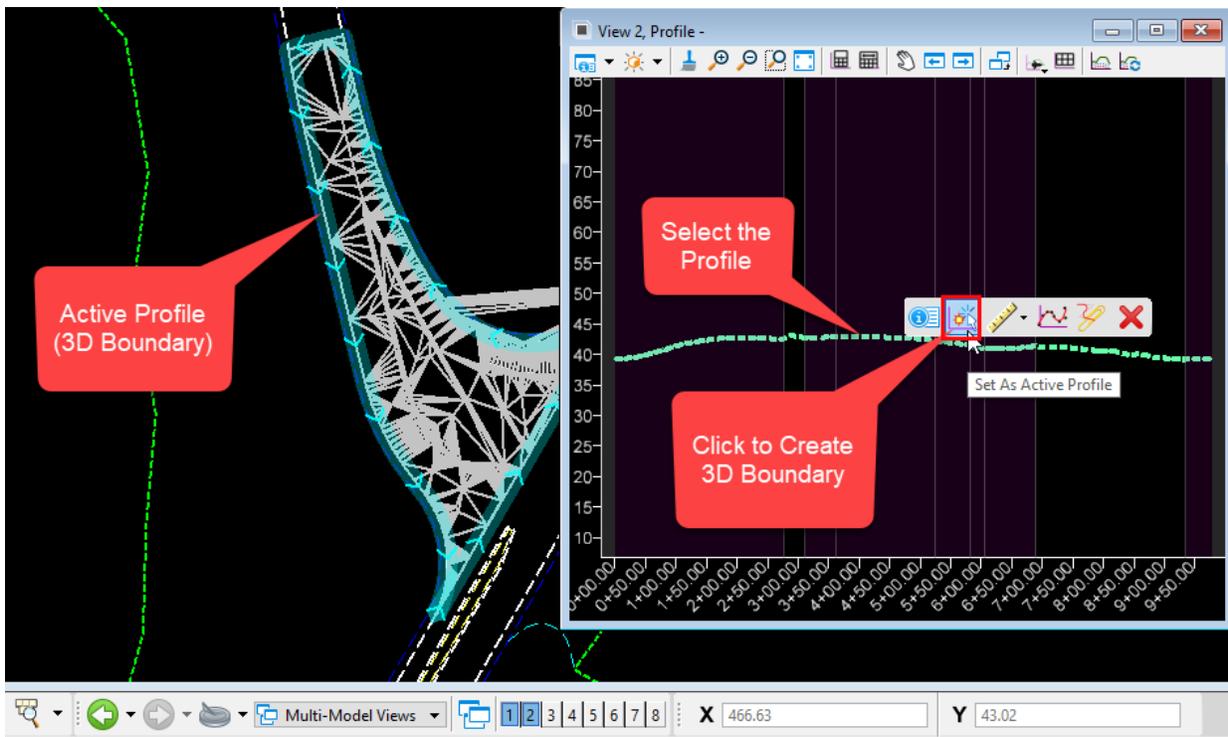
2. Select the **2D Clipping Element** and hover to get the contextual menu. Click on “Open Profile Model”.



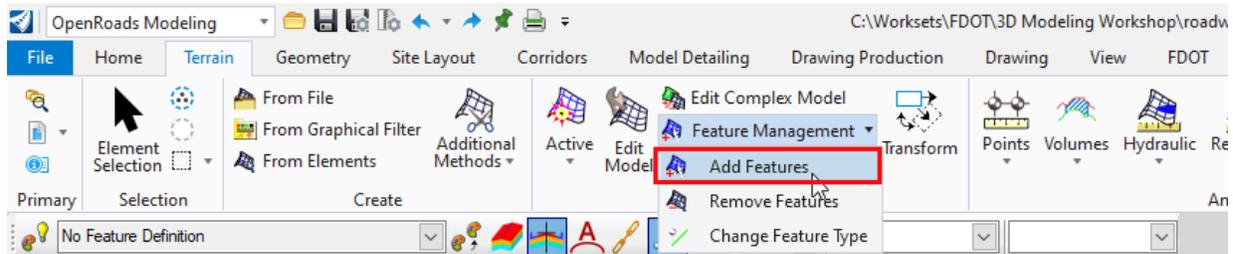
3. Open a new view to display the profile model and left click in the new view to visualize the profile.



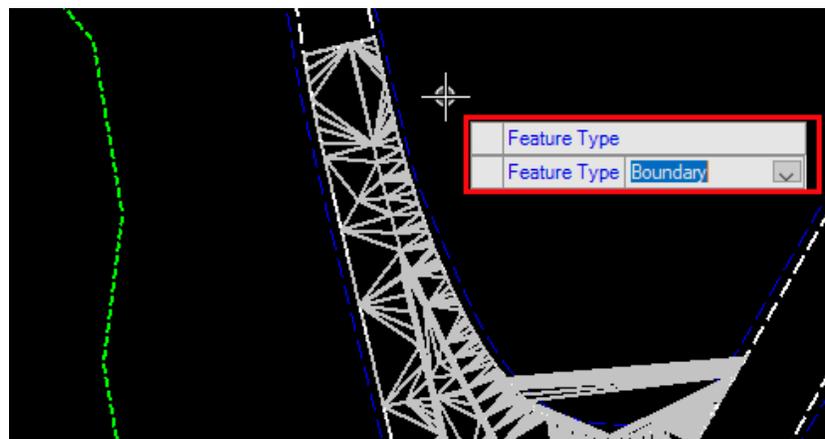
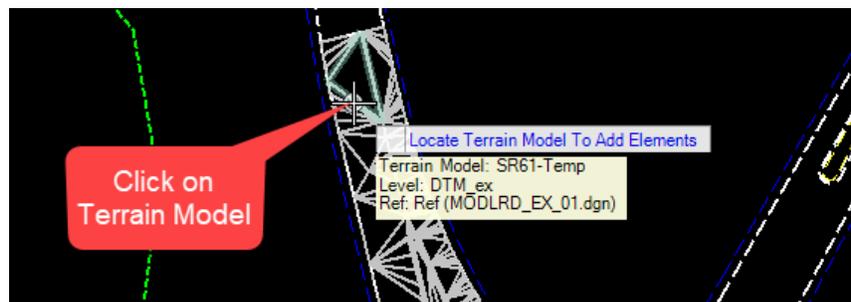
4. In the new view, select the profile and hover to show the contextual menu. Click on the “Set As Active Profile” tool. *Setting the Active Profile creates a 3D boundary out of the 2D Clipping Element.*



5. Close the profile view. You are now ready to add the newly created 3D boundary to the clipped Terrain Model (SR61-Temp) as a **Boundary Feature**.
6. In the **Terrain Model** Ribbon tab in the **Edit** group, select the **Feature Management** drop down and click on the “Add Features” tool.

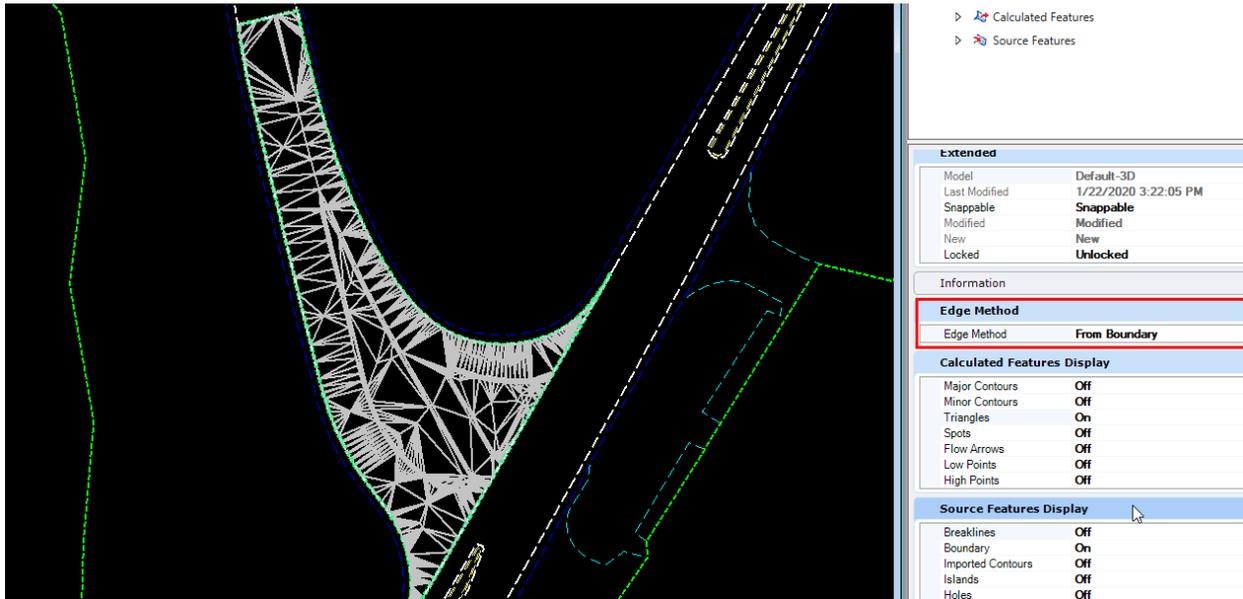


7. **Locate** the Clipped **Terrain Model (SR61-Temp)** to **Add Elements**. **Locate** the newly created 3D boundary as the “**Element to Add**”. Set the **Feature Type** to “**Boundary**” and left click in the view.



8. Adding the 3D boundary to the Terrain Model has constrained the triangles to inside the Clipping Element.

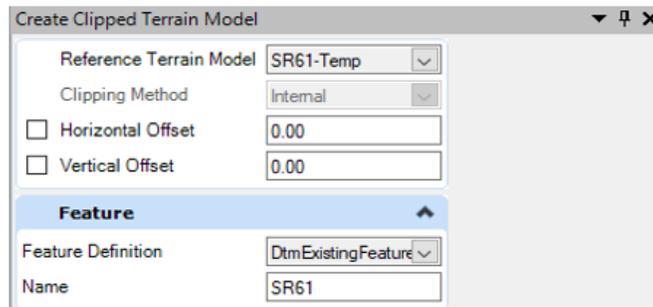
NOTE: The Edge Method for this Terrain Model is now defined as **“From Boundary”**.



9. Select the **SR61-Temp** Terrain Model and in the Properties Dialogue box, turn off triangles.

10. Use the “**Create Clipped Terrain Model**” tool again to clip out a new Terrain Model using the **SR61-Temp** as the **Reference Terrain Model Element** and the two medians as **Clipping Elements**. You may select both medians as clipping elements in the same clip. Set the Feature Definition to “**DtmExistingFeature**” and name the Terrain Model “**SR61**”.

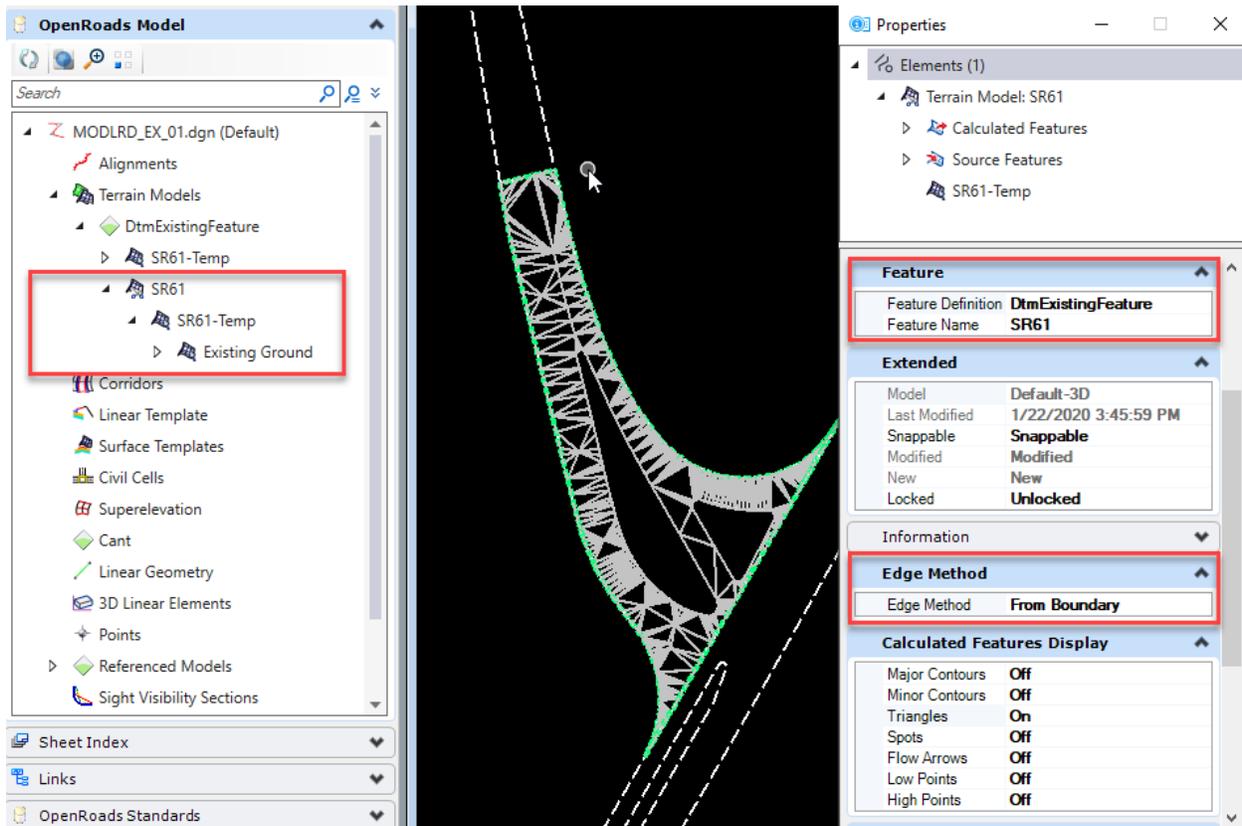
Note When multiple clipping elements are selected the Clipping Method automatically defaults to “Internal” and cannot be changed.



When Selecting Multiple Clipping Elements the Clipping Method Will Default to "Internal"

Exercise 1.4 CONCLUSION:

Clipping SR61 a second time internally, excludes the Medians from the SR61 Terrain model. The Terrain Model **SR61** is a child of **SR61-Temp** which is a child of the **Existing Ground** Terrain Model. All are dynamically linked. If the Existing Ground Terrain Model changes then the SR61 Terrain Model will change too. Also note that the **Edge Method** for **SR61** inherited the “**From Boundary**” setting from **SR61-Temp**. The SR61 Existing Feature Model is ready for a surface template to add depth to the model.



2 2D DESIGN GEOMETRICS WORKFLOW

CENTERLINE ALIGNMENTS AND RIGHT OF WAY

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

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

We would like to introduce the user to a new workflow terminology using the Ribbon. If you see a direction like this: OPENROADS MODELING>GEOMETRY>HORIZONTAL>Lines>Line From Element>**Simple Line From Element**, it means we are in the **WorkFlow** of **OpenRoads Modeling** which has a **Tab** named **Geometry**, and has tools that are located in the **Horizontal Group**. Now that we are in the right workflow, Tab and Group we may need to click on a tool that has more than one option.

FEATURE DEFINITIONS

As defined in the Bentley Civil Tools help files:

“Feature Definitions are used to control symbology, annotation, and various other properties that are applied to the geometric elements. . The feature definitions are used to:

- *Define what the geometric elements actually are. What is being modeled such as curb, centerline, edge of pavement, etcetera.*
- *Control symbology in various views, including capability to define differing symbology in plan, profile, and 3D spaces*
- *Define terrain modeling attributes (spot, break line, void, etcetera)*
- *Define surface display characteristics*

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

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-based 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 STANDARDS

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

“Design standards can be used to maintain required curvature and other alignment checks when performing geometric layouts. They work at two levels:

- *Provide values for the element creation tools (for example, minimum radius and transition lengths)*
- *Check the suitability of complex elements (for example, check for kinks in the alignment)*

Design standards are very alignment oriented. You may find limited value for using design standards for non-alignment computations.

When a design standard is violated, feedback is provided in two ways:

- *An icon in the graphics on the element that has the problem. Hover over the icon to reveal a tool tip report of the error.*
- *In the Civil Message Center*

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

ANNOTATIONS

EXERCISE OVERVIEW – CENTERLINE ALIGNMENTS

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

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

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

Note Refer to the FDM for Tables

- 2.1 Import Baseline
- 2.2 Copy Baseline of Survey into ALGNRD
- 2.3 Design New SR61 Centerline
- 2.4 Import Side Roads
- 2.5 Baseline Side Road Design from BL98
- 2.6 Using Annotation Groups to Label Your Alignment Features
- 2.7 Geometry Builder

Exercise 2.1 Import Baseline

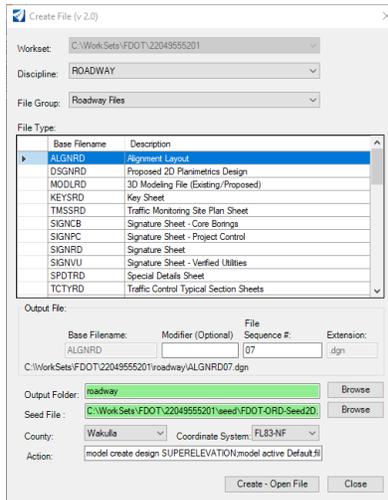
Import Baseline In this exercise, the user will create a new design file and import chains from the LandXML file provided from the survey.

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



2. Navigate to FDOT Ribbon Tab of the OpenRoads Modeling WorkFlow looking for the Actions Group click on the create file. Create a **ALGNRD01.dgn** file with the dialog as shown below

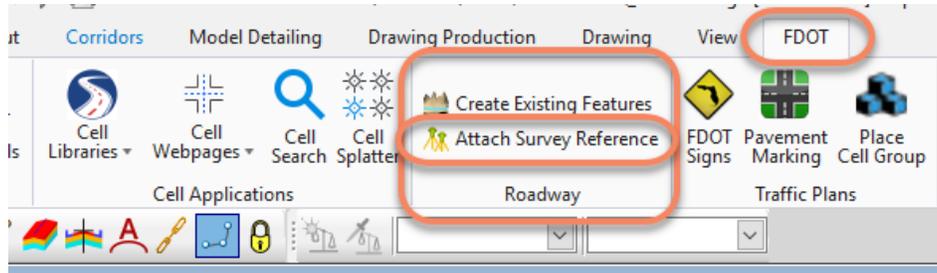
OPENROADS MODELING>FDOT>ACTIONS>Create File



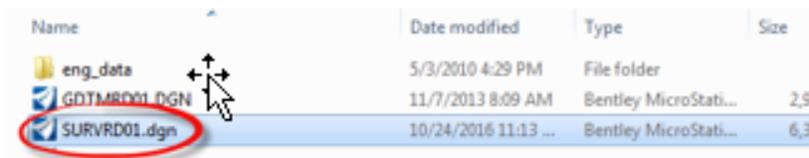
- a. From the Create File Dialog box pick the Base Filename of **ALGNRD**
- b. Select your County, by selecting this the correct coordinate system will be selected.
- c. Click **Create - Open File** to create the file, **ALGNRD01.dgn**.
- d. You are now in the **ALGNRD01.dgn** Click **Close**.
- e. Navigate to the models Dialog, you will notice that during the creation of the ALGNRD a new model of SUPERELEVATION was created.

3. 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 OpenRoads Modeling WorkFlow; otherwise, skip to step 7.

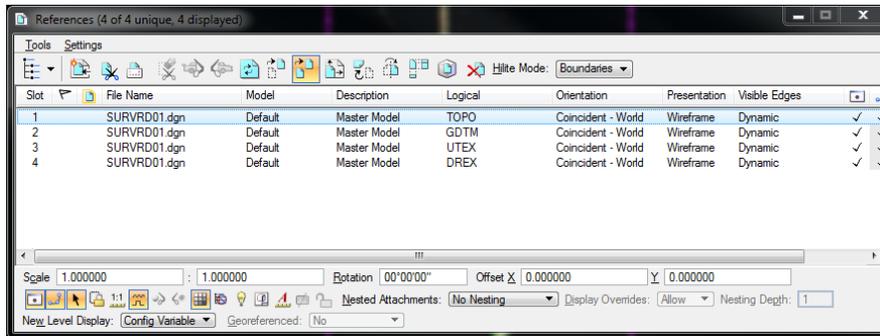
OPENROADS MODELING>FDOT>ROADWAY



4. Select the *SURVRD01.dgn* file.



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



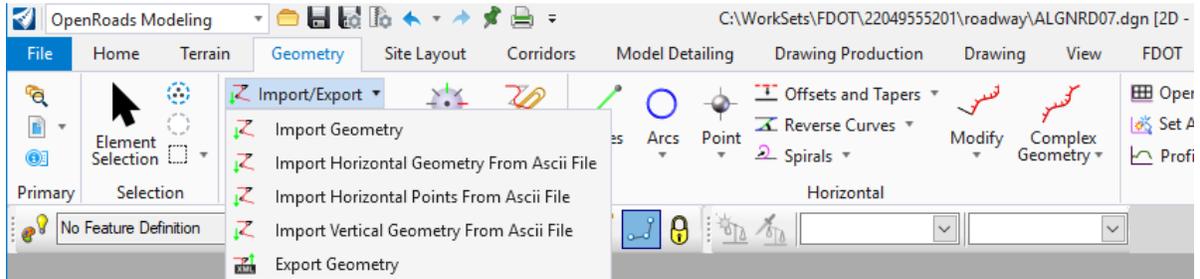
6. From the Function key F9 (toggles on the Reference Dialog) and attach the following files:
 - *C://e/projects/survey/TOPORD01.dgn* (disregard if *SURVRD* exists)
 - *C://e/projects/rwmap/RWDTRD01.dgn* - Set the Logical Name to *RWDTRD*
 - *C://e/projects/roadway/AERIALS.dgn* - Set the Logical Name to *AERIALS*
7. Fit View and Save Settings, select Ctrl F.

8. From the Home tab, set Active Level to BaselineSurvey before you import.

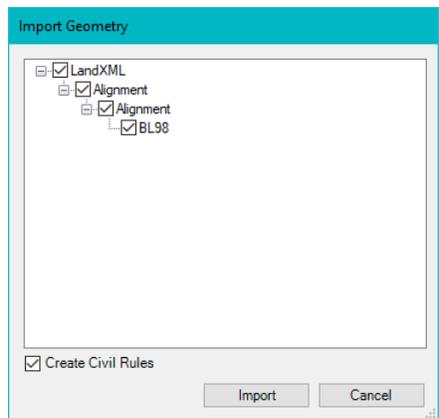
Note Active Level needs to be set to BaselineSurvey or CLConst_dp before you import.

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

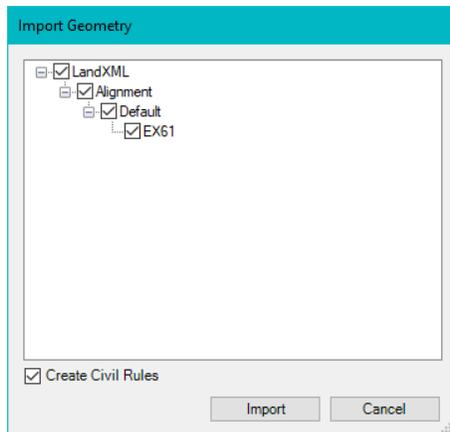
OPENROADS MODELING>GEOMETRY>GENERAL TOOLS>Import/Export>Import Geometry



- a. Navigate to the Alignment > Alignment>BL98 folder.
- b. Click in the box to select **BL98**.



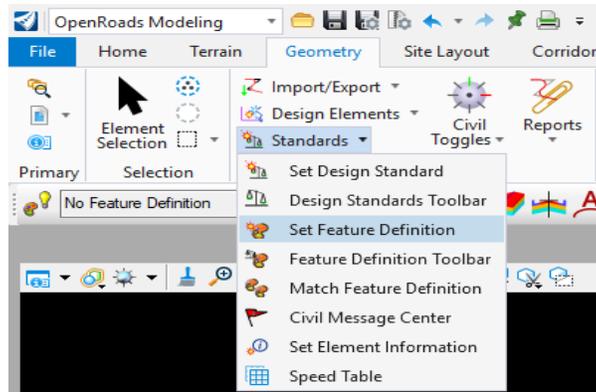
- c. Click **Import**.
- d. Repeat this process to import the existing baseline for SR61. The file name of this LandXML is EX61.xml.



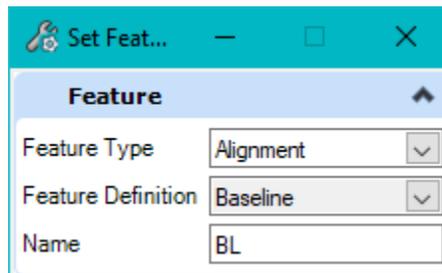
10. Zoom to the intersection of EX-SR61 and US98, hover over the baseline to verify the alignment imported in the previous step. You will notice that the Baseline for US98 already has a Feature Definition assigned to it.



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



- a. Set the Feature Type to Alignments.
- b. Set the Feature Definition to **Baseline**.



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

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

Exercise 2.2 Copy Baseline of Survey into ALGNRD

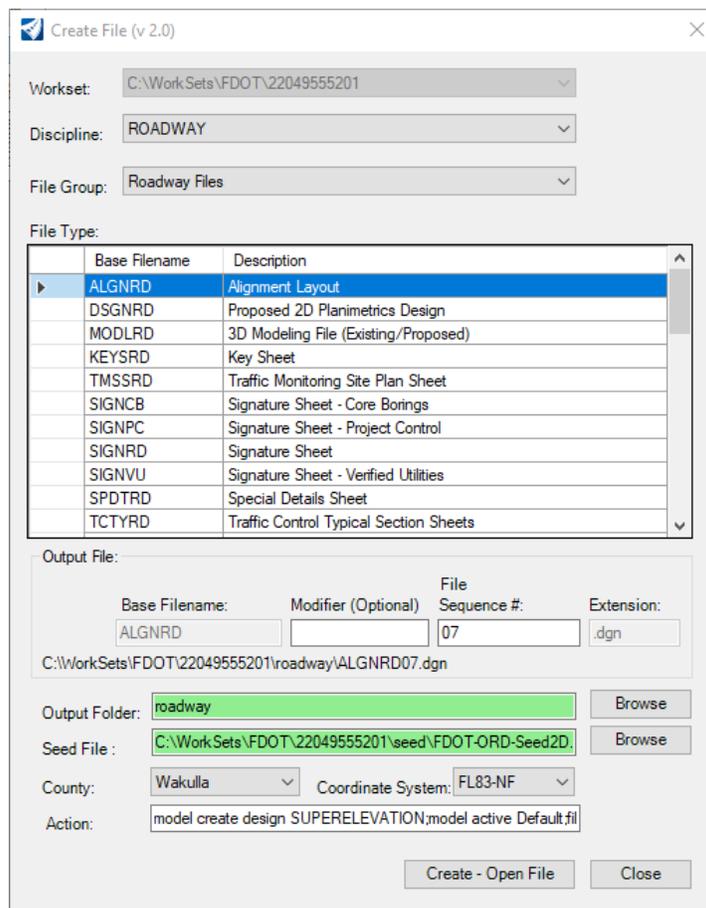
This exercise will copy the Baseline of Survey into Alignment file and be used for the controlling alignment low.

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



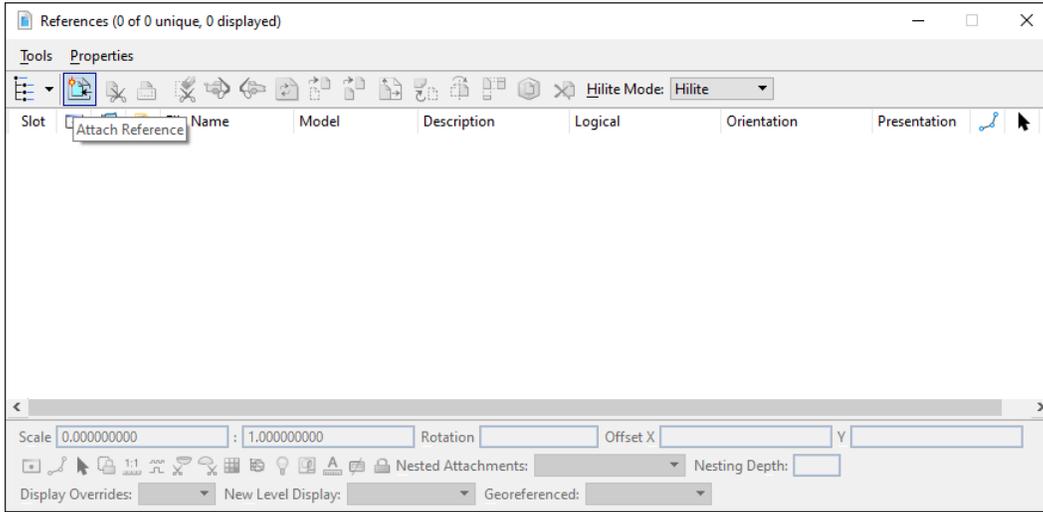
2. Navigate to FDOT Ribbon Tab of the OpenRoads Modeling WorkFlow looking for the Actions Group click on the create file. Create a **ALGNRDxx.dgn** file with the dialog as shown below

OPENROADS MODELING>FDOT>ACTIONS>Create File

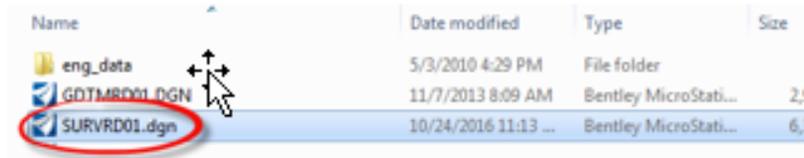


- a. From the Create File Dialog box pick the Base Filename of **ALGNRD**
- b. Select your County, by selecting this the correct coordinate system will be selected.
- c. Click **Create - Open File** to create the file, **ALGNRD01.dgn**.
- d. You are now in the **ALGNRD01.dgn** Click **Close**.
- e. Navigate to the models Dialog, you will notice that during the creation of the ALGNRD a new model of SUPERELEVATION was created.

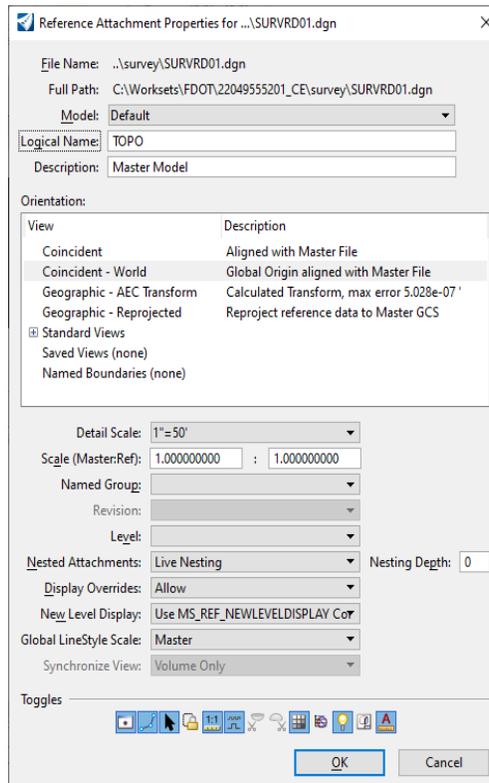
- Attach the SURVRD as a Reference file through the Reference Dialog (Press the function key F9 to bring the dialog up). Select the attach reference and navigate to the survey folder of the project and select the SURVRD.



- Select the *SURVRD01.dgn* file.

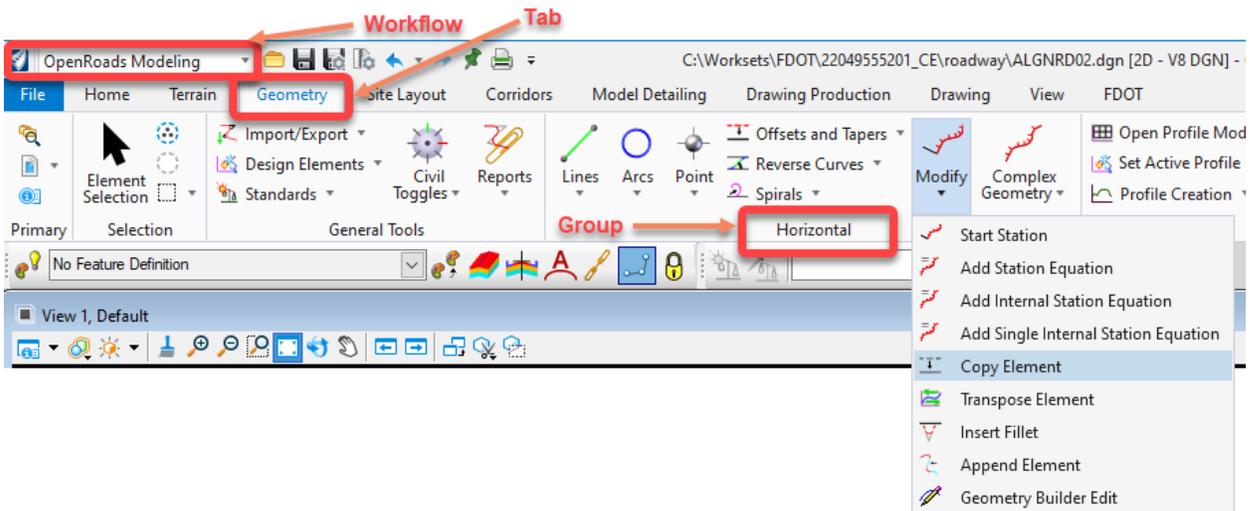


- In the Attach Reference dialog give the SURVRD a Logical name of TOPO all other setting should be set as dialog below.



6. Once the SURVRD is attach click the fit view button to view the survey.
7. Next press the function F10 to bring up the level Display dialog. Selecting the SURVRD turn all levels off by right clicking but leave on the BaselineSurvey.
8. In the OpenRoads Modeling workflow select the Geometry Tab, then locating the Horizontal Group select the split button arrow under Modify to select the COPY Element Tool.

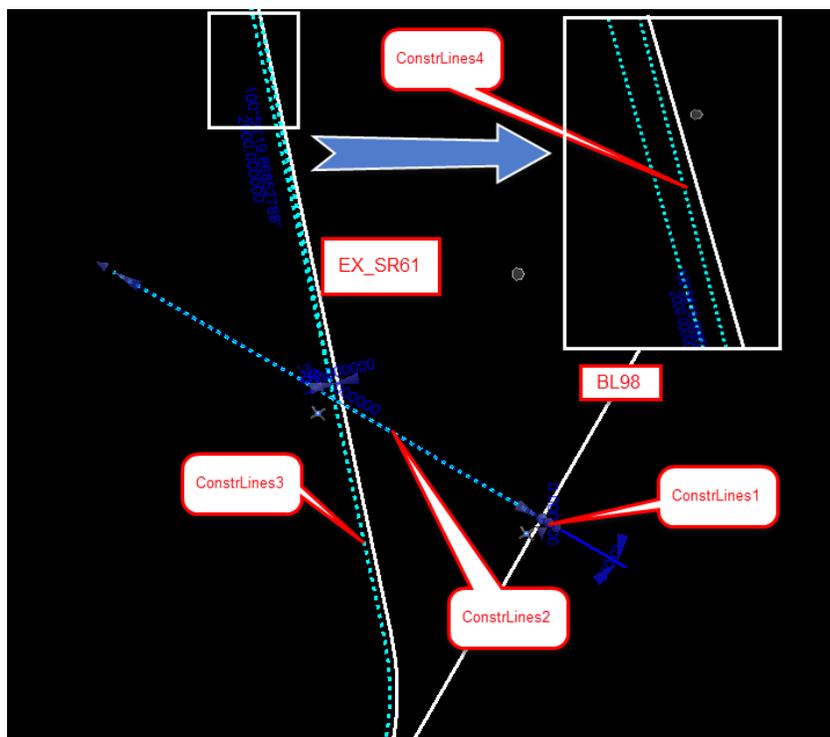
OPENROADS MODELING>GEOMETRY>HORIZONTAL>Copy Element



8. Once the Copy Element Tool is select follow the prompts of the cursor to select the elements that will be copied into the file. Once all elements are selected right click (reset) then data point Left click to accept.
9. To verify that the elements were copied into the file select them. The handles will show.

Exercise 2.3 Design New SR61 Centerline

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

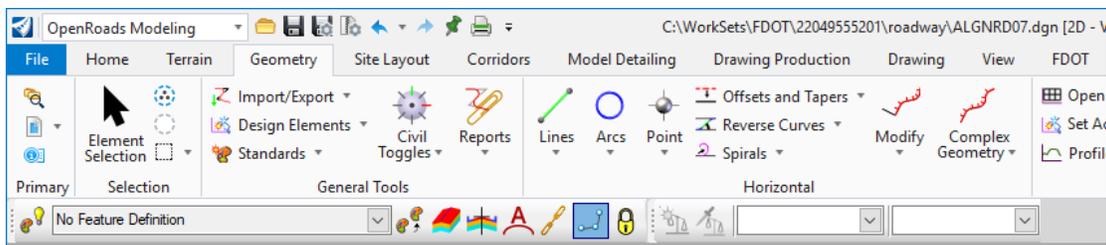


➤ **ConstLines1**

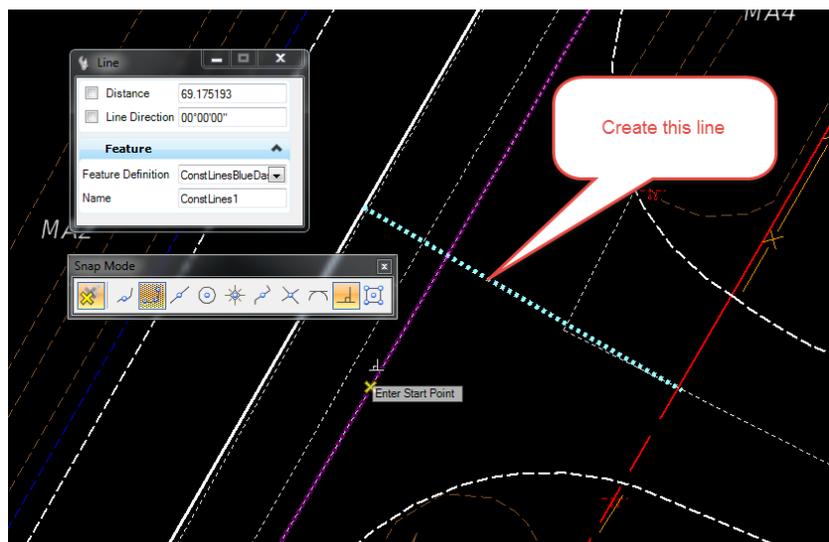
1. Locate the **Driveway** into the school off US98 between the baseball field and the parking lot.



2. Now that the new intersection is located, turn the *display OFF* for the *Aerial Reference* file.
3. Use the *Geometry Tab and the Horizontal Group*, to select the **Line Between Points** tool. *OPENROADS MODELING>GEOMETRY>HORIZONTAL>Lines>Line Between Points*

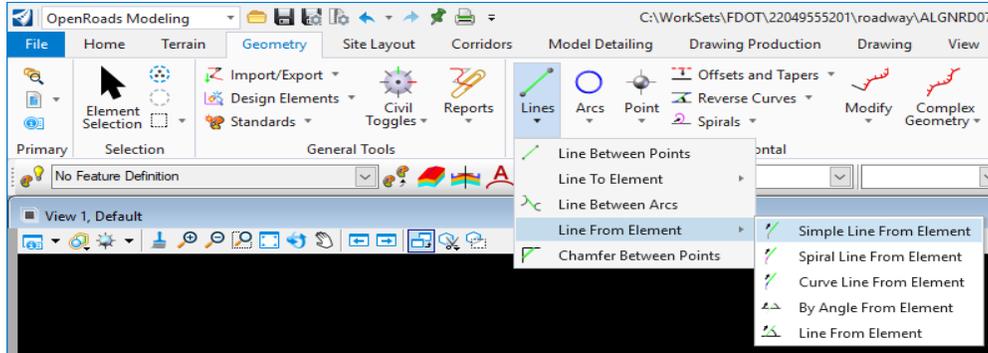


- a. Use *Feature Definition Const Lines Blue Dash* and a *Name of ConstLines1*. You will have to add the 1 to the name.
- b. Start a line perpendicular to *BL98* and ending at in the middle of the *Driveway*. Be careful not to snap to anything on the second point.

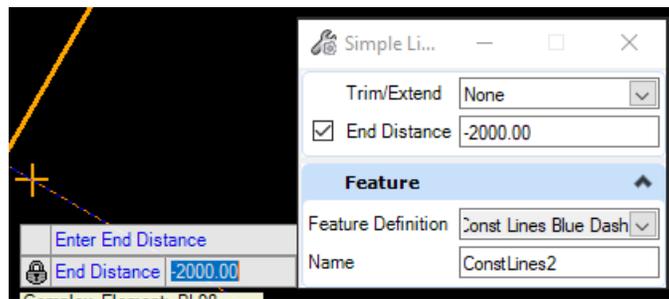


➤ **ConstrLines2**

1. Use the *Geometry Tab and the Horizontal Group*, to select the **Simple Line From Element** tool.
OPENROADS MODELING>GEOMETRY>HORIZONTAL>Lines>Line From Element>Simple Line From Element.



2. Use *Feature Definition Const Lines Blue Dash* and Name **ConstrLines2**
3. First select **ConstrLines1**, then use the AccuSnap to locate the beginning of the line at *BL98*.

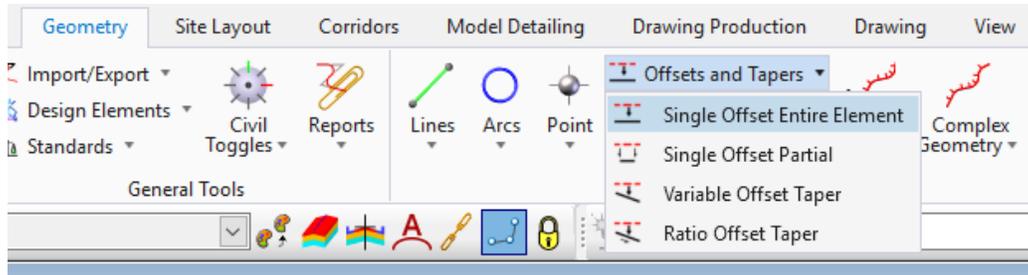


4. Enter a *Distance* of **-2000 feet**. **Data point** in the View to accept the *Distance*.
5. **Data point** to accept Trim None.

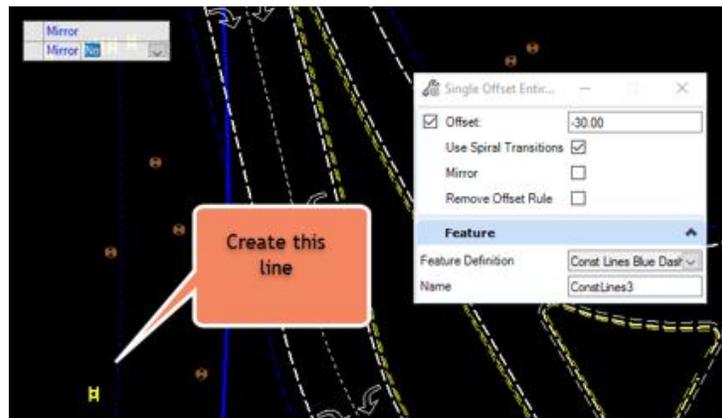


➤ **ConstrLines3**

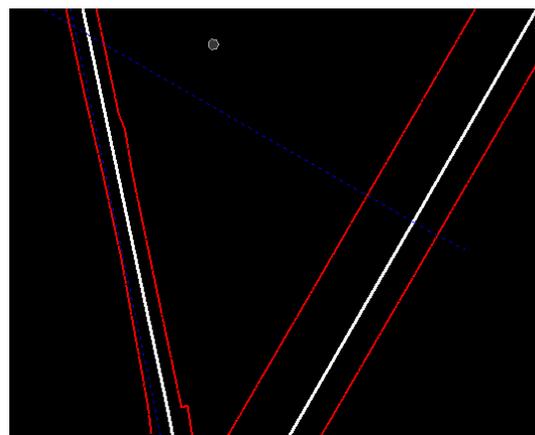
1. Use the *Geometry Tab and Horizontal Group*, to select the **Single Offset Entire Element** tool.
OPENROADS MODELING>GEOMETRY>HORIZONTAL>Offsets and Tapers>Single Offset Entire Element



2. Use *Feature Definition Const Lines Blue Dash* and *Name ConstrLines3*.
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*.



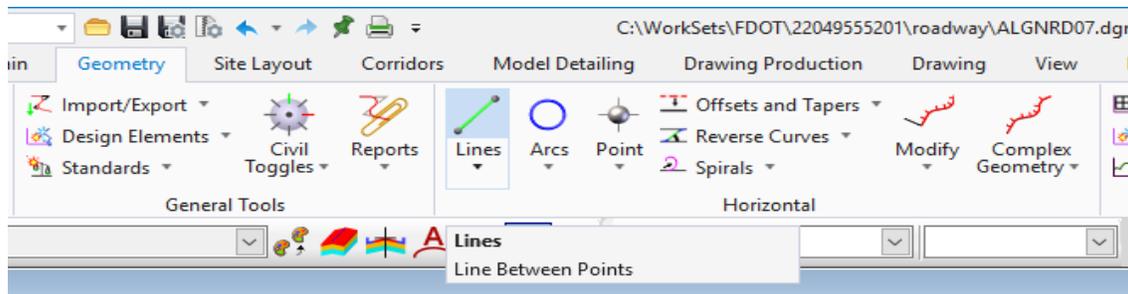
➤ **ConstLines4**

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.

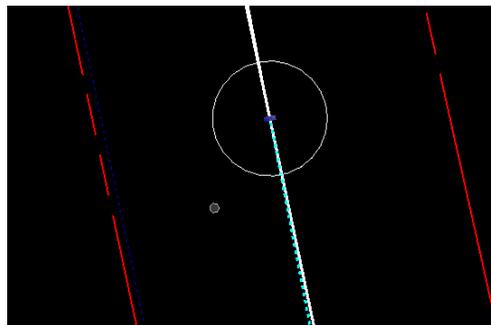


- Use MicroStation **Trim to Element** and to Trim **ConstLines4** line to intersect **EX-61**. This step will create an interval element with a new Name of ConstLines5.



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

- Change the Active Level to Scratch1_dp. Use MicroStation Drawing to Place Circle with MicroStation with a center at the end of **ConstLines5**

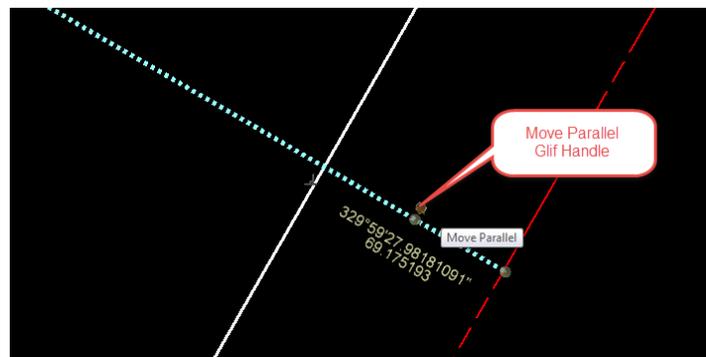


- Open View 4 and use Copy View from View 1. Zoom into the School Entrance in View 4

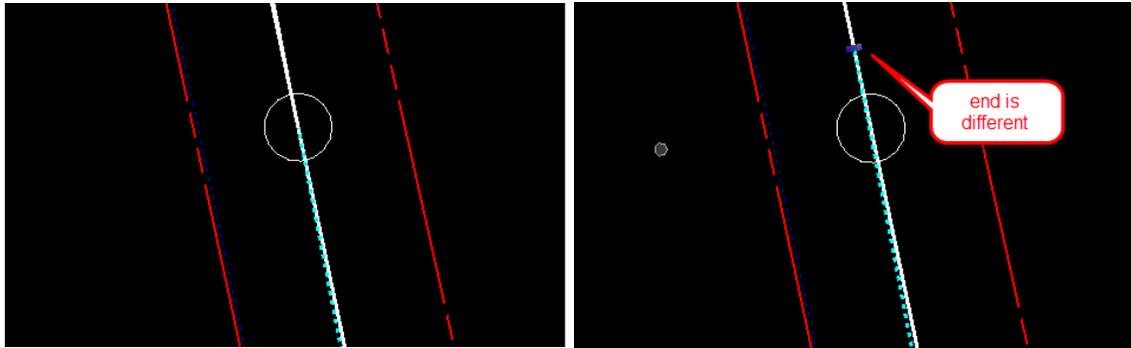


- Move the location of the **ConstLines1** and check the end of **ConstLines5** to see if the location has been corrected.

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



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



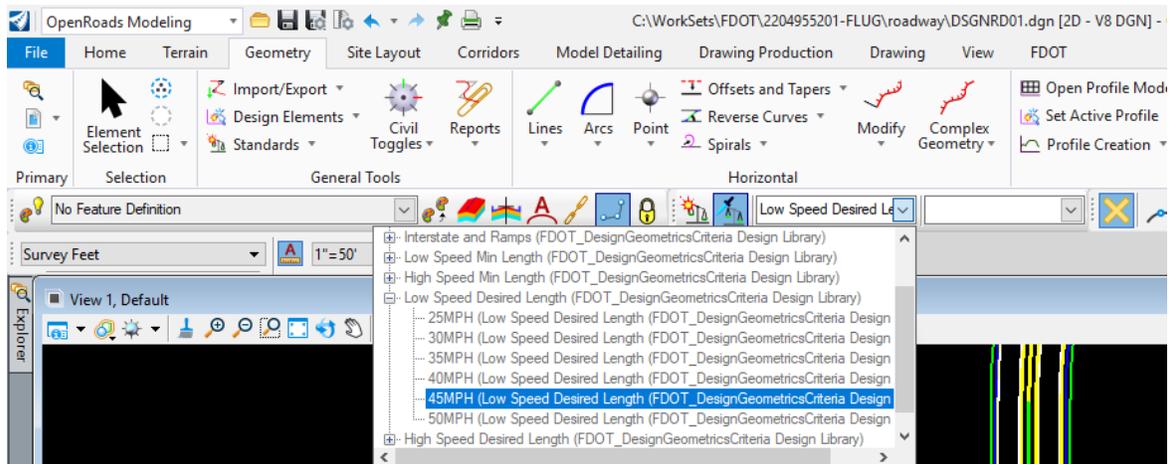
4. Select **Ctrl Z** to undo change.
5. (Extra Exercise) Change the *Offset Distance* of **ConstrLines3** from **-30** to **-40** to verify that the end of **ConstrLines4** will change.
6. Select **Ctrl Z** to undo change.

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

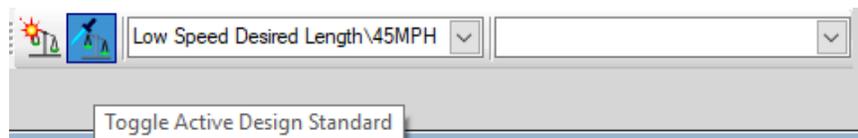
1. Use the **Design Standards Toolbar** that is already docked at the top of the screen.



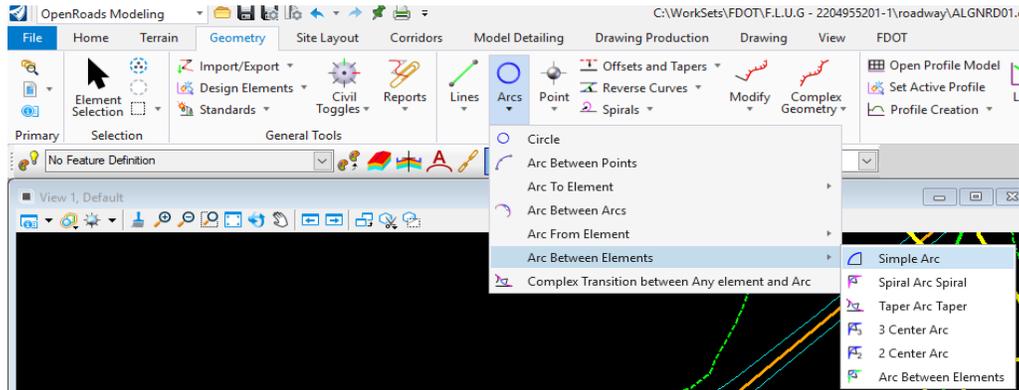
2. Set Active the Design Facility Standard to: **Low Speed Desired Length, 45 MPH.**



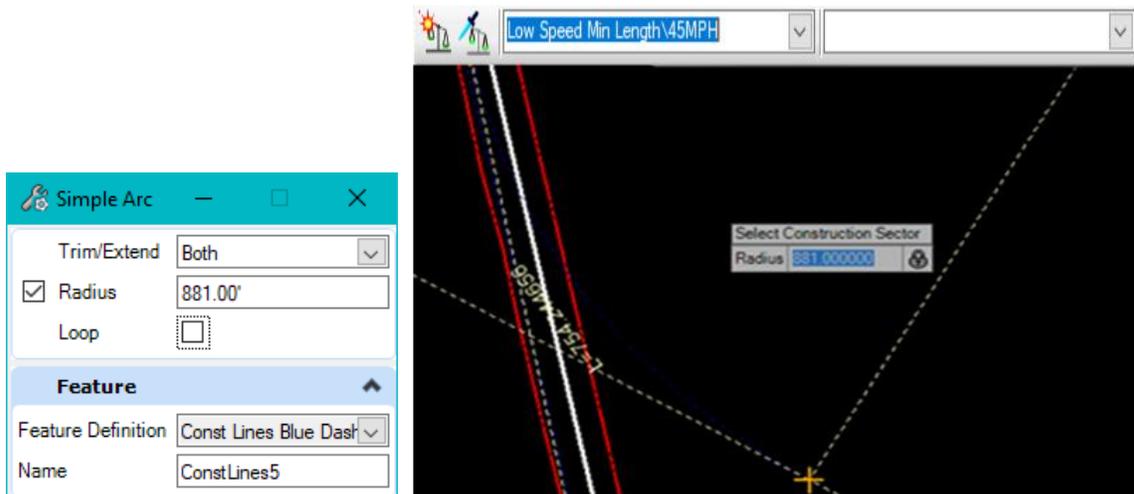
3. Activate the **Toggle Active Design Standard** icon.



- 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*

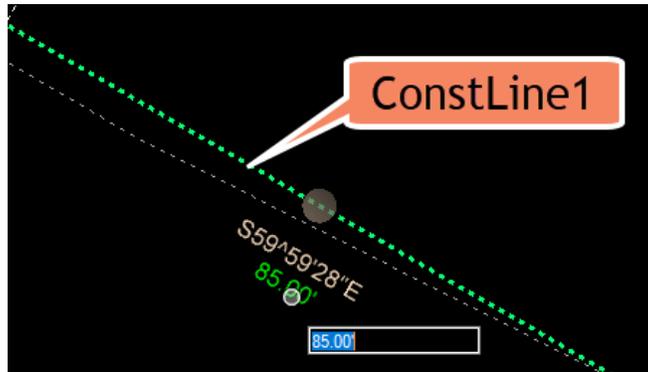


- Use *Feature Definition Const Lines Blue Dash* and *Name ConstLines6*.
- Create a *Radius* between **ConstLine2** and **ConstLine5** you will notice that setting the Design Standard has set a default value of 2083.00' for the Radius, be sure to change this to 881.00. Set *Trim/Extend* to **Both**.

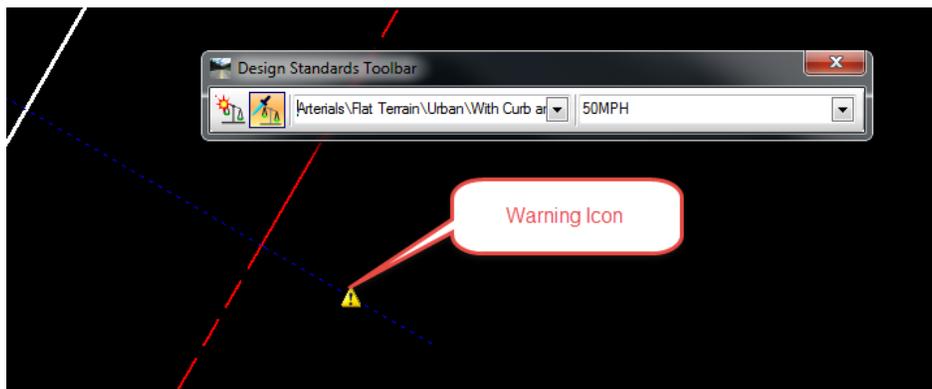


➤ **Make a Longer Driveway into the School.**

1. Select ConstLine1 using the element selection tool.
2. Select the manipulator for length, click it and change the length from 85 to 105



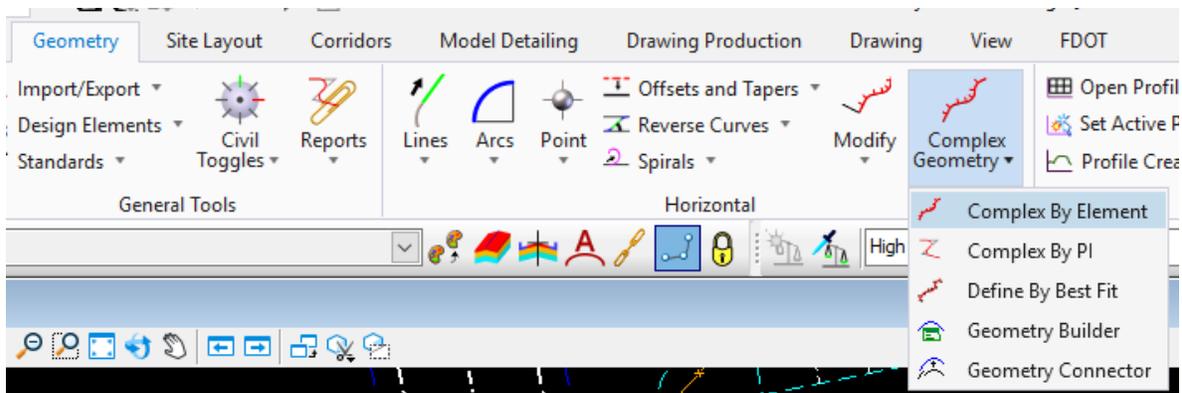
Note After the line is constructed a *Warning* icon may appear on the line because the *Active Design Standard* icon is being toggled **ON** and the *tangent length* may be less than the *minimum 100 feet*.



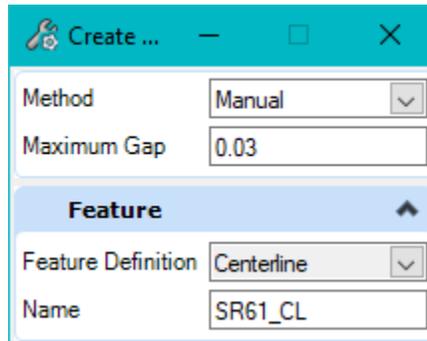
➤ **Create a Centerline of All the ConstrLines.**

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

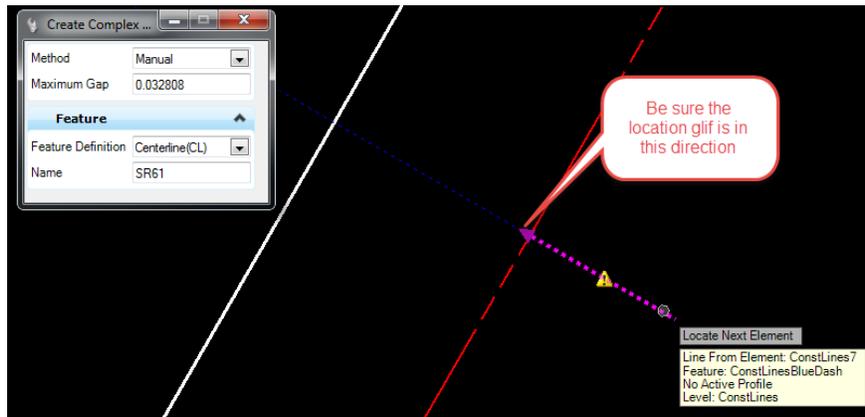
OPENROADS MODELING>GEOMETRY>HORIZONTAL>Complex Geometry>Complex By Element



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



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

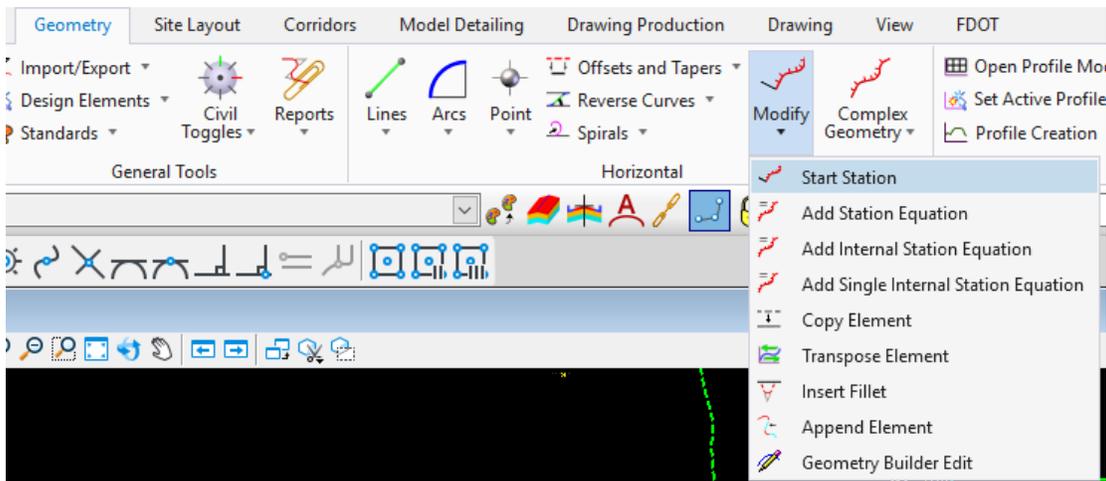


4. Continue until New Centerline is constructed as shown below.

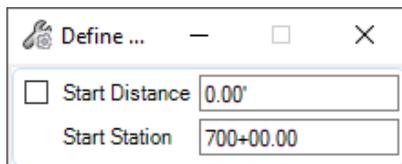


➤ **Set a Begin Station Value at the Intersection of BL98**

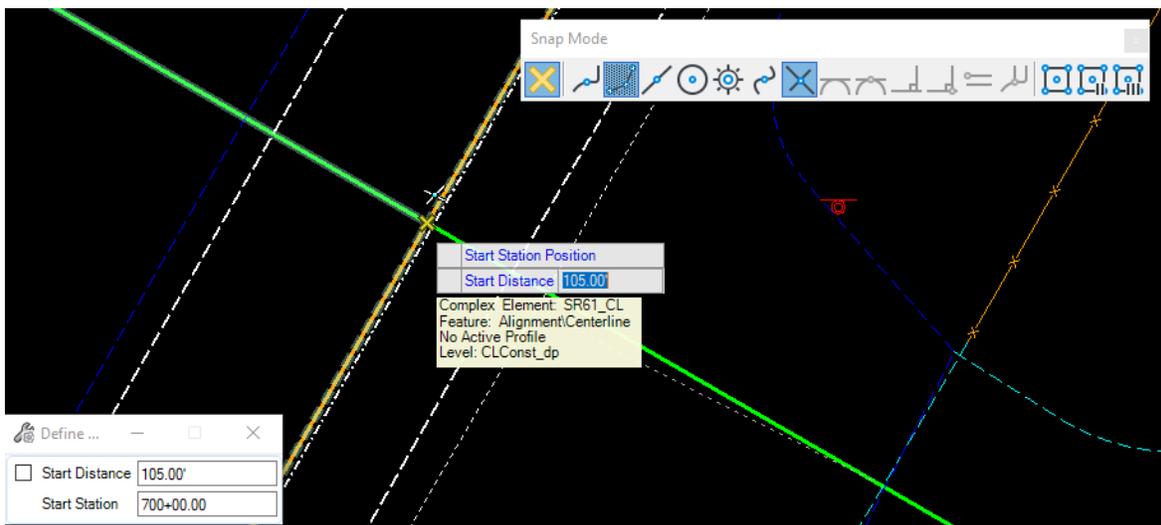
1. Use the Geometry Tab and Horizontal Group, Start Station tool under the Modify icon. *OPENROADS MODELING>GEOMETRY>HORIZONTAL>Modify>Start Station*



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

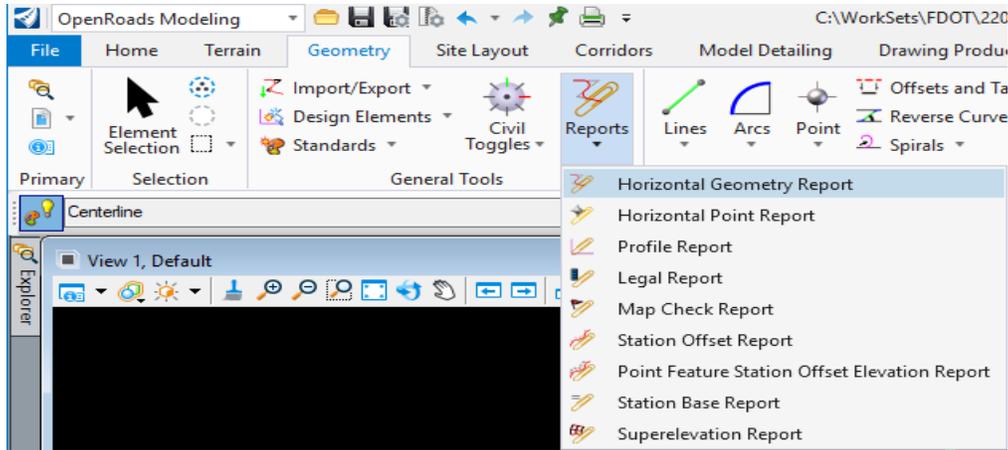


3. Select the new **SR61 Centerline(CL)**.
4. Use **AccuSnap** to locate the *Intersection* with **BL98** and **data point** to accept.
5. Enter **70000** and select **Enter <OR> data point** to accept.

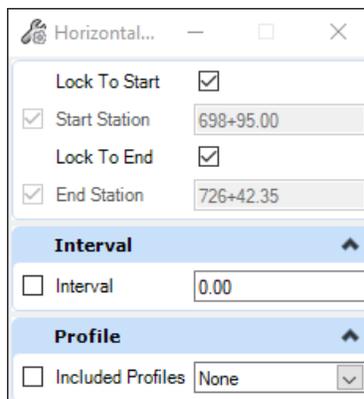


➤ **Describe the New Centerline Geometry**

1. Use the *Geometry Tab and General Tools Group*, **Horizontal Geometry Report** tool under the Reports icon.
OPENROADS MODELING>GEOMETRY>HORIZONTAL>Reports>Horizontal Geometry Report



2. Select the **SR61_CL 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

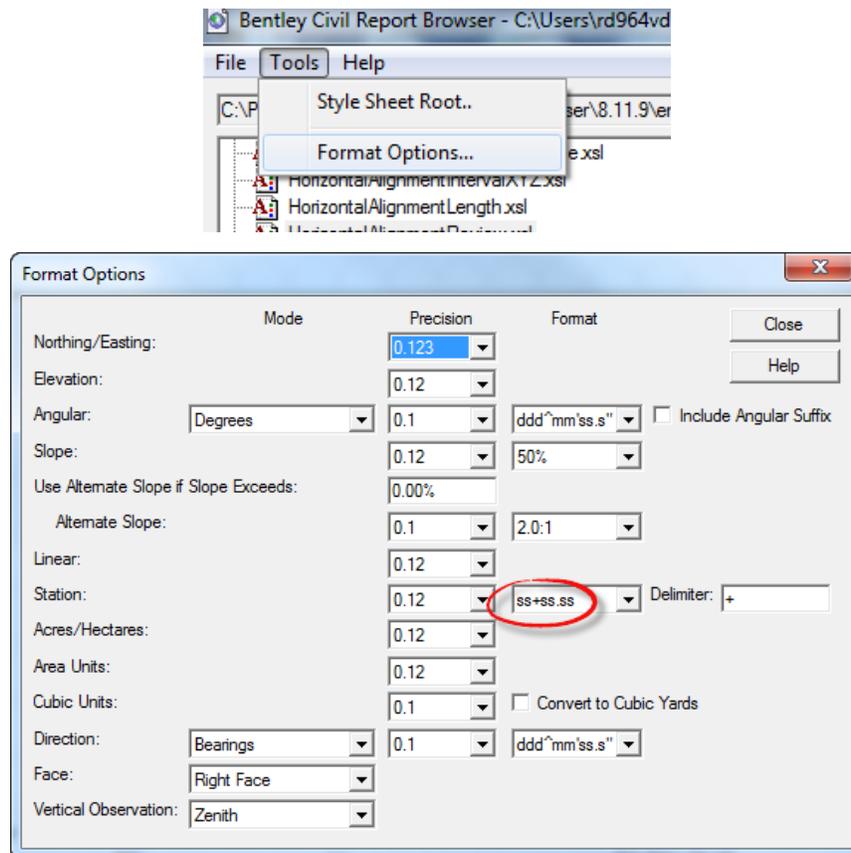
Project: Default
 Description:
 File Name: C:\WorkSets\FDOT\22049555201\roadway\ALGNRD08.dgn
 Last Revised: 8/13/2019 15:13:46

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

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

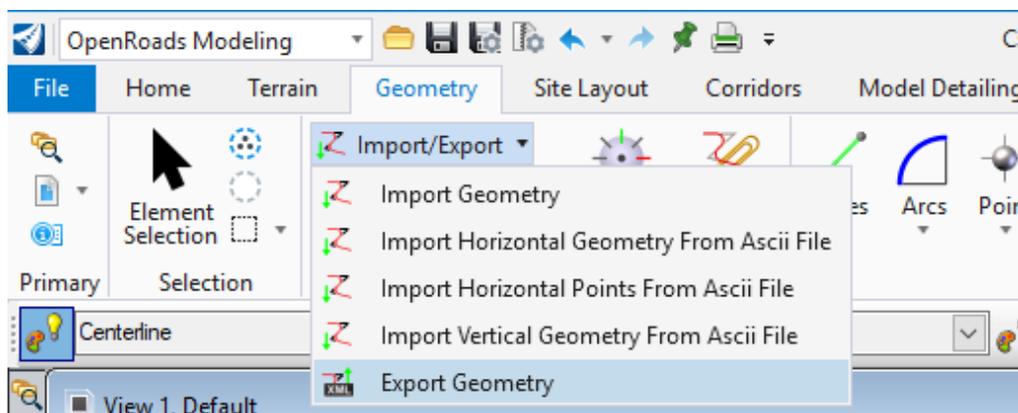


➤ **Save the SR61 Centerline to a Landxml for a Back up.**

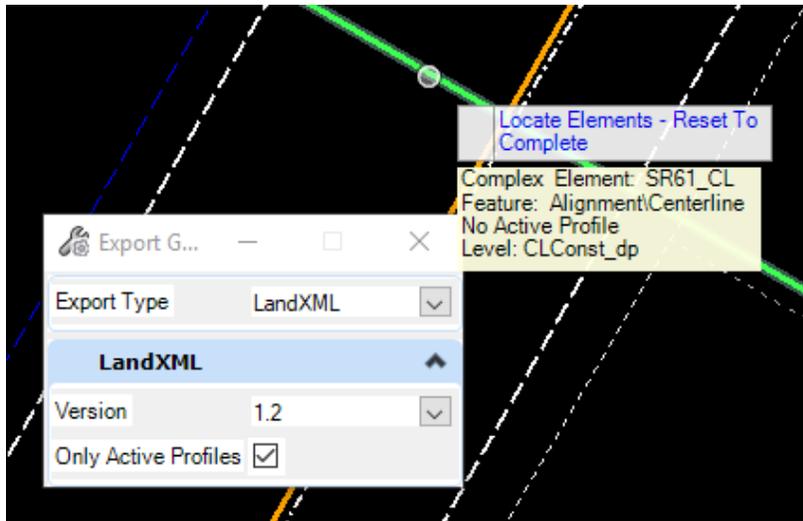
1. Use the *Geometry Tab and the General Tools Group*, to select the **Export to Native** tool and save the **SR61_CL Centerline** to a *Landxml* file.

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

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

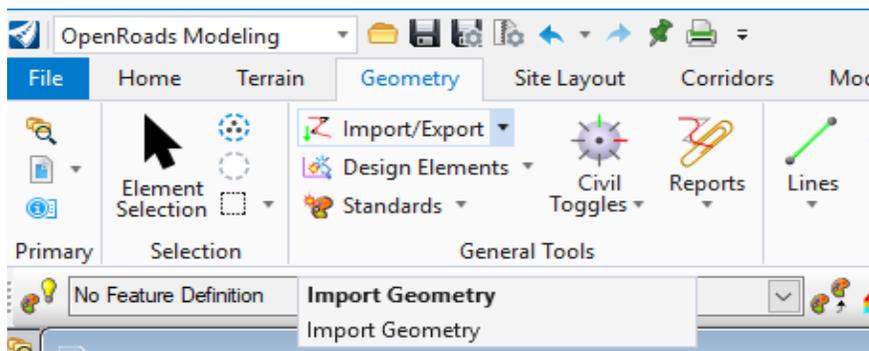


3. Select the Alignment you wish to export, select Version 1.2 for export, when prompted save as SR61_CL.xml

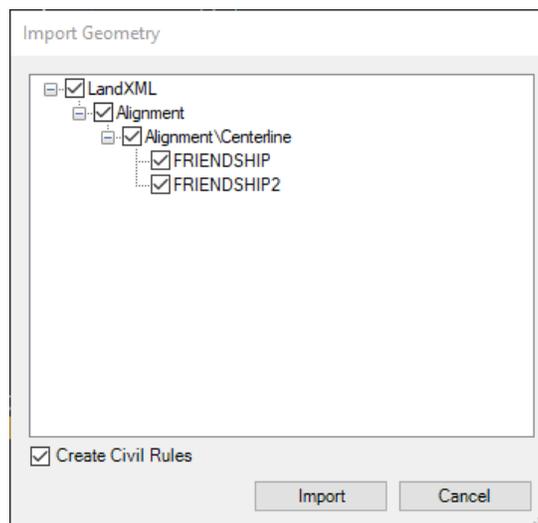


Exercise 2.4 Import Side Roads

1. From the Home tab, set Active Level to CLConst_dp before you import.
2. 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*



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

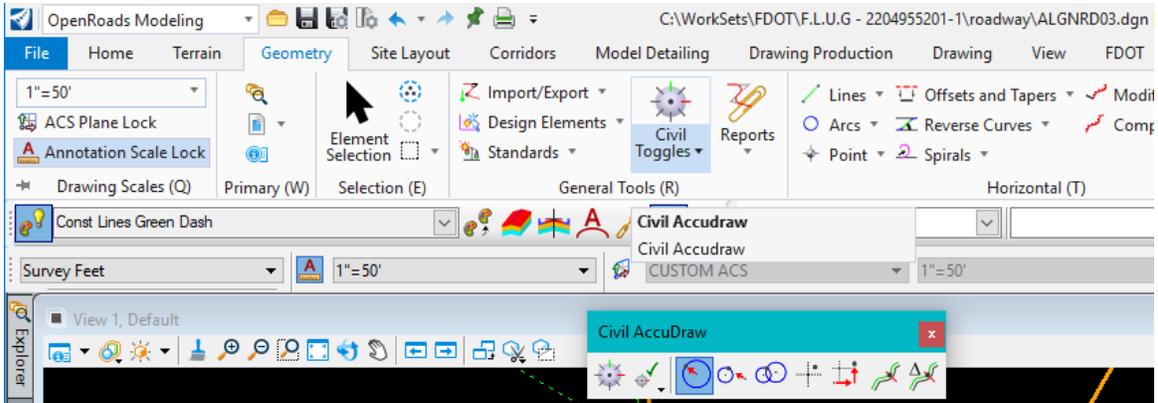


4. Notice from the LandXML a Feature Definition for CenterLine is defined for each alignment.

Exercise 2.5 Baseline Side Road Design from US98

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

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

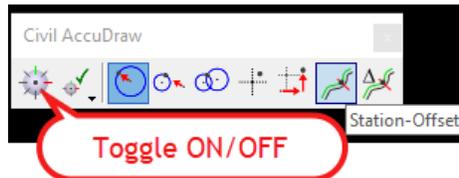


2. Use *Geometry Tab and the General Tools Group*, to select the **Civil Toggles icon** to call Civil AccuDraw tool to activate the Civil AccuDraw toolbar.

OPENROADS MODELING>GEOMETRY>GENERAL TOOLS>Civil Toggles>Civil AccuDraw

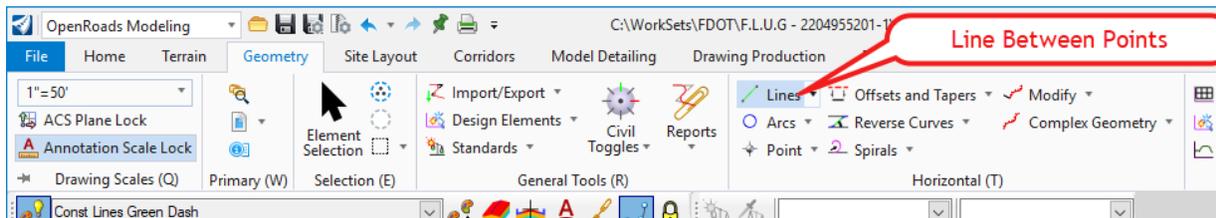


3. Click on the *Mode Station-Offset* to toggle **ON**.

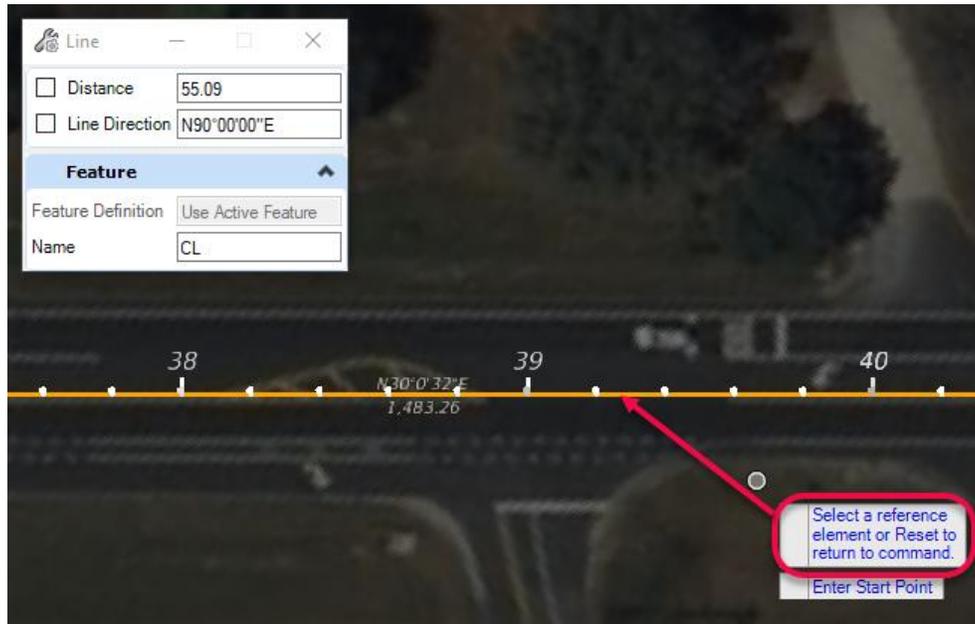
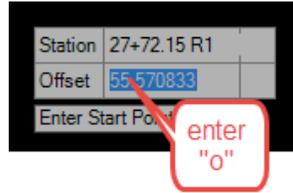


4. Use the *Geometry Tab and Horizontal Group*, to select the **Line Between Points** tool to create a **Centerline** perpendicular to the *BL98* at *Station 39+00* for a *Length of 80 feet* used as a side road centerline. Here are the steps to use Civil AccuDraw with the *Station Offset* option:

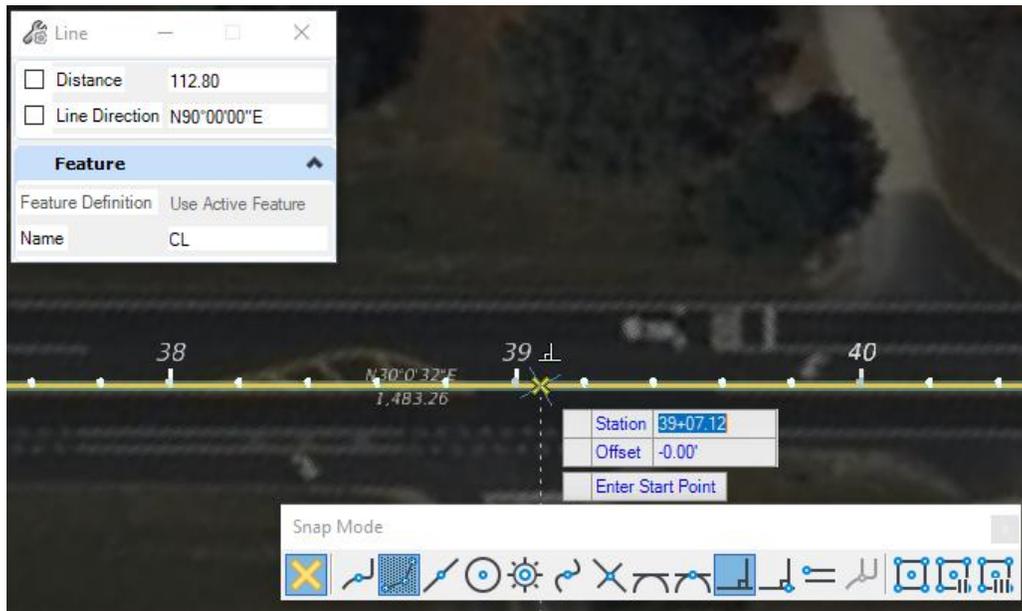
OPENROADS MODELING>GEOMETRY>HORIZONTAL>Lines>Line Between Points



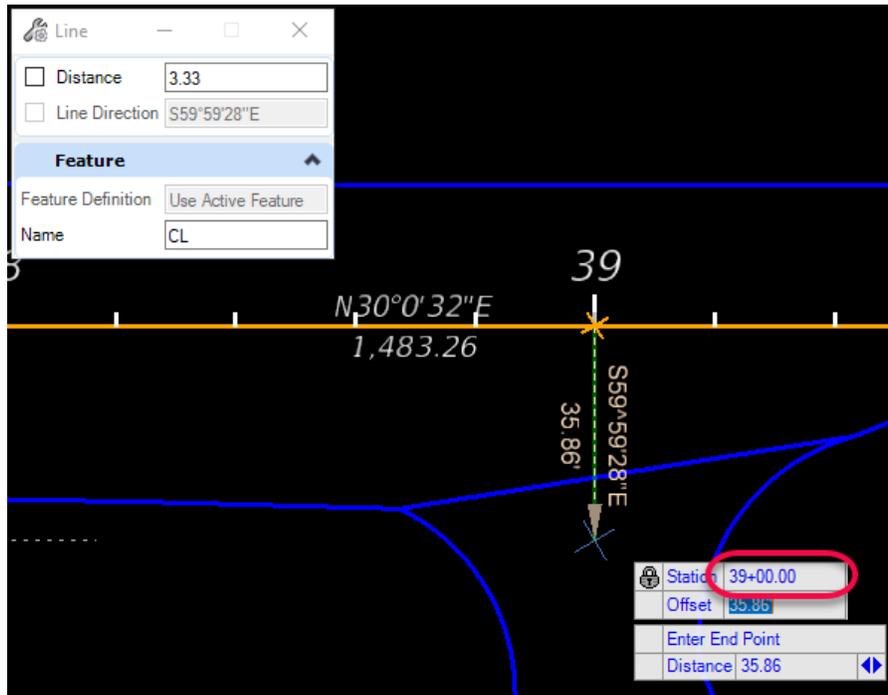
Important! On the cursor prompt, tab to the offset field and use the Shortcut Key-in **o** and select the reference line **BL98**. The cursor will now track the station and offset.



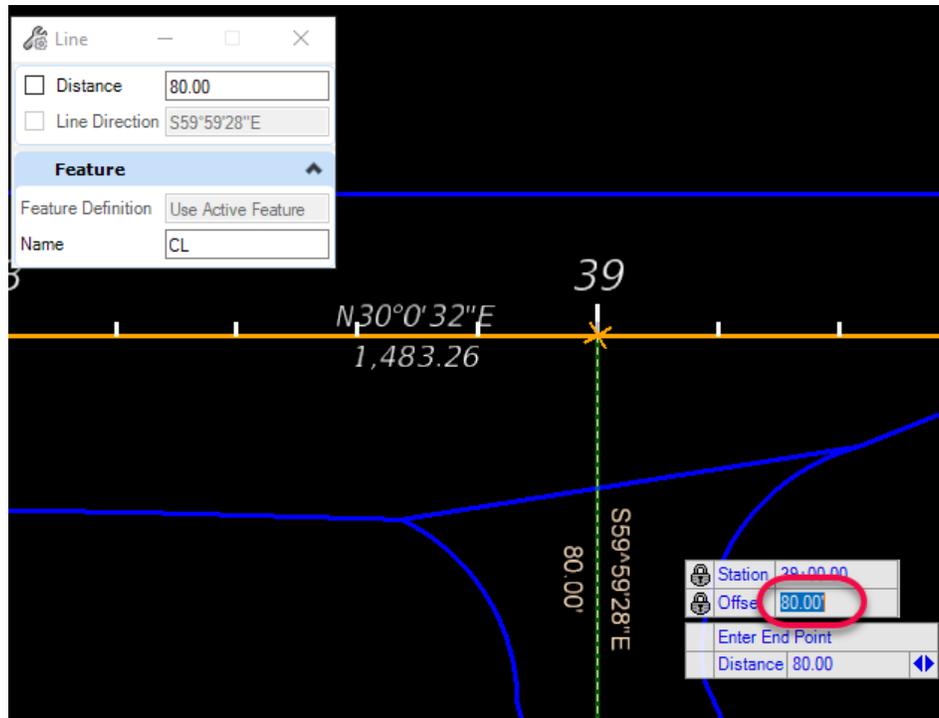
a. For the first data point, set the *Snap Locator* button to **Perpendicular**, and select on the **BL98**.



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



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

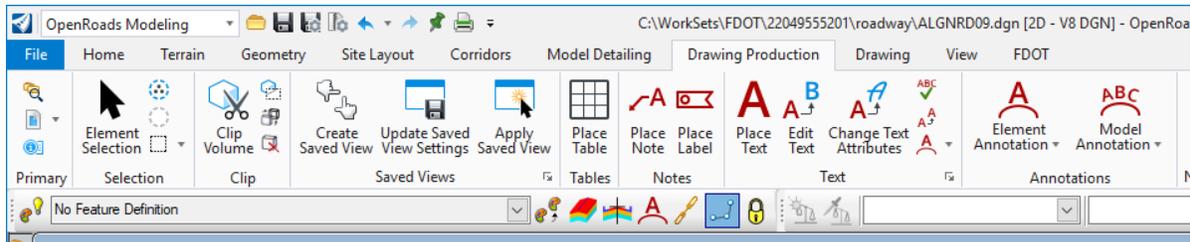


- d. **Data point in View** to place the point. Repeat these steps for the Centerline at Station 36+40.0

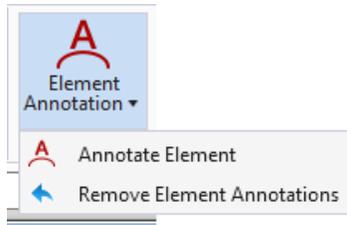
Exercise 2.6 *Using Annotation Groups to Label Your Alignment Features*

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

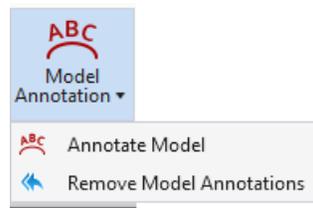
OPENROADS MODELING>DRAWING PRODUCTION>ANNOTATIONS



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

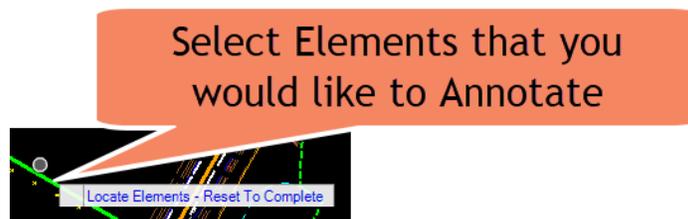


- b. Model Annotation – This will annotate all the elements in the model and remove the element Annotation Group.

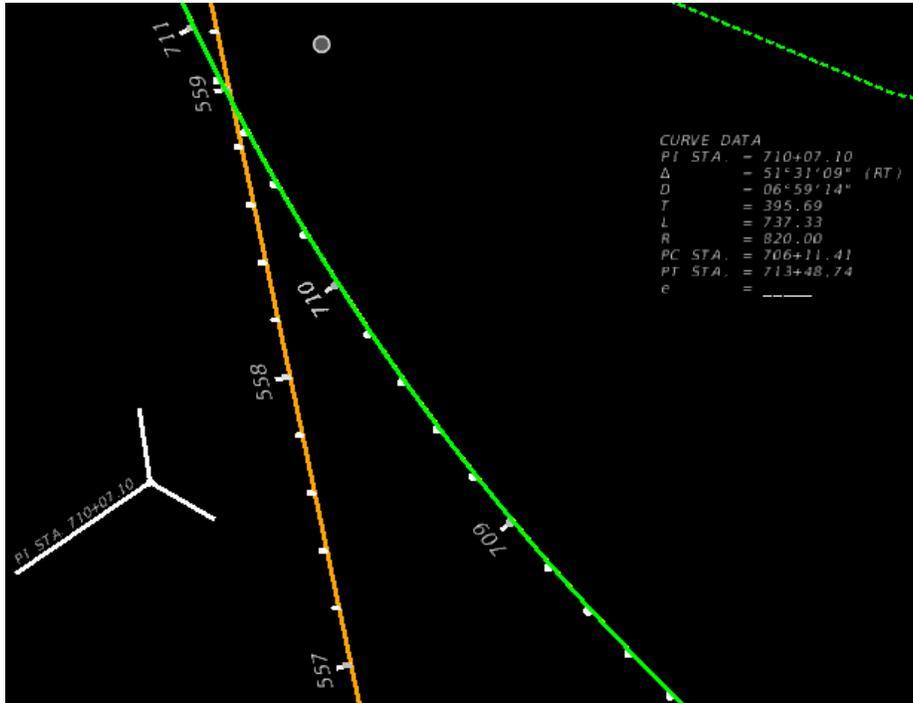


2. From the Drawing Production Tab and the Annotations Group, Select the Annotate Element button then following the prompts by the cursor. Select SR61 Centerline (optional you may select multiple alignments if you like) The n reset the tool by right click.

OPENROADS MODELING>DRAWING PRODUCTION>ANNOTATIONS>Annotate Element

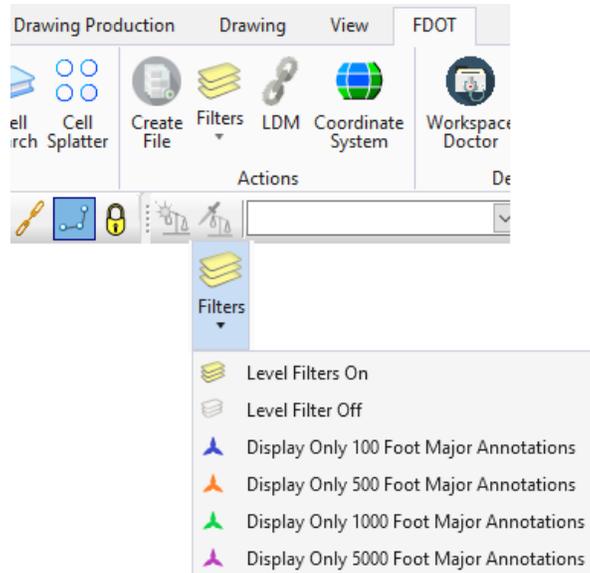


3. You have now just Annotated your Alignments.



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

OPENROADS MODELING>FDOT>ACTIONS>Filters



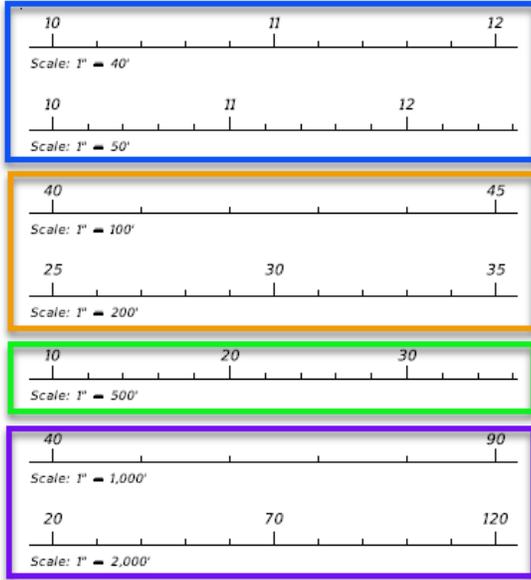
b. From this list you will now be able to control what levels will be displayed for the Annotation Group.

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

Topic #625-000-002
 FDOT Design Manual

January 1, 2019

Figure 312.2.1 Centerline Station Numbering and Tick Marks

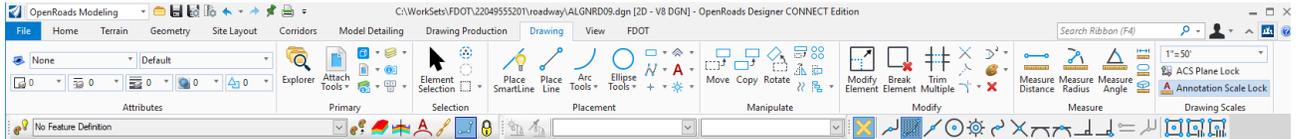


Display Only 100 Foot Majors Annotations

Display Only 500 Foot Majors Annotations

Display Only 1000 Foot Majors Annotations

Display Only 5000 Foot Majors Annotations



- 4. Example: For drawing scales from 1"=10' to 1"=60' use the Level Filter for Display Only 100 Foot Major Annotations

Exercise 2.7 Geometry Builder

This exercise will introduce a new tool that will replace the old COGO tools. Geometry Builder is the new tool to quickly layout an alignment. It is found in the OpenRoads Modeling workflow within the Geometry Tab and the Horizontal Group. Pick on the split button of Complex By Element to view this tool.

OPENROADS MODELING>GEOMETRY>HORIZONTAL>Geometry Builder

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



2. Navigate to FDOT Ribbon Tab of the OpenRoads Modeling WorkFlow looking for the Actions Group click on the create file. Create a **ALGNRD01.dgn** file with the dialog as shown below

OPENROADS MODELING>FDOT>ACTIONS>Create File

Workset: C:\WorkSets\FDOT\22049555201

Discipline: ROADWAY

File Group: Roadway Files

File Type:

| Base Filename | Description |
|---------------|--|
| ALGNRD | Alignment Layout |
| DSGNRD | Proposed 2D Planimetrics Design |
| MODLRD | 3D Modeling File (Existing/Proposed) |
| KEYSRD | Key Sheet |
| TMSSRD | Traffic Monitoring Site Plan Sheet |
| SIGNCB | Signature Sheet - Core Borings |
| SIGNPC | Signature Sheet - Project Control |
| SIGNRD | Signature Sheet |
| SIGNVU | Signature Sheet - Verified Utilities |
| SPDTRD | Special Details Sheet |
| TCTYRD | Traffic Control Typical Section Sheets |

Output File:

Base Filename: ALGNRD Modifier (Optional): File Sequence #: 07 Extension: .dgn

C:\WorkSets\FDOT\22049555201\roadway\ALGNRD07.dgn

Output Folder: roadway Browse

Seed File: C:\WorkSets\FDOT\22049555201\seed\FDOT-ORD-Seed2D Browse

County: Wakulla Coordinate System: FL83-NF

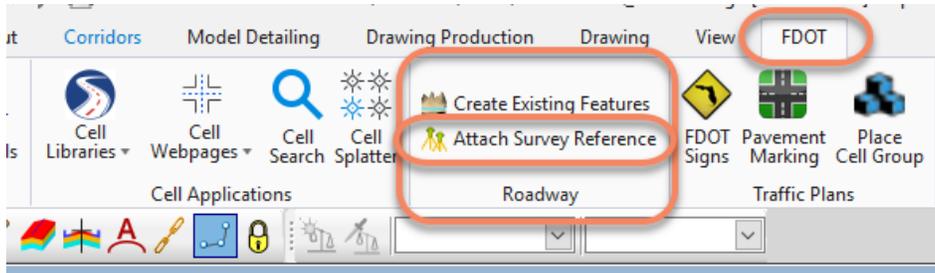
Action: model create design SUPERELEVATION,model active Default.fil

Create - Open File Close

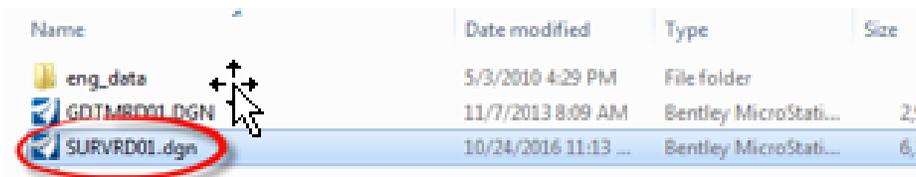
- a. From the Create File Dialog box pick the Base Filename of **ALGNRD**
- b. Select your County, by selecting this the correct coordinate system will be selected.
- c. Click **Create - Open File** to create the file, **ALGNRD01.dgn**.
- d. You are now in the **ALGNRD01.dgn** Click **Close**.
- e. Navigate to the models Dialog, you will notice that during the creation of the ALGNRD a new model of SUPERELEVATION was created.

3. 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 OpenRoads Modeling WorkFlow. Otherwise, skip to step 7.

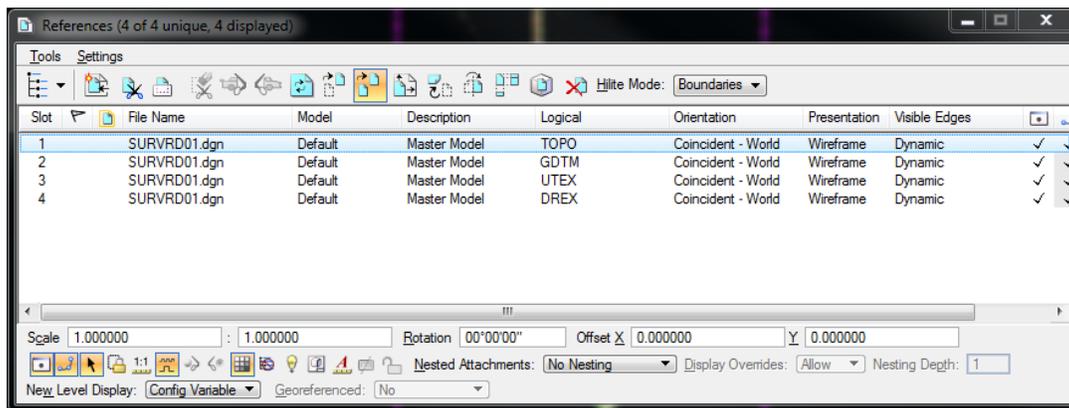
OPENROADS MODELING>FDOT>ROADWAY



4. Select the *SURVRD01.dgn* file.



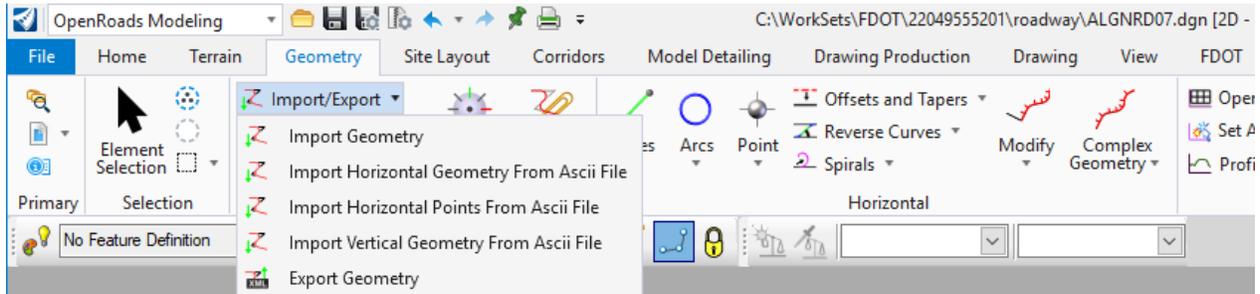
5. From the Function key F9 (toggles on the Reference Dialog) to view the attached files:



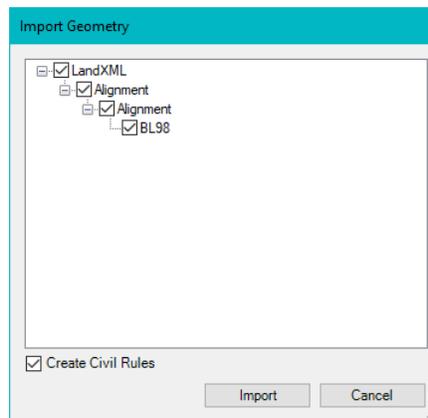
6. From the Function key F9 (toggles on the Reference Dialog) and attach the following files:
 - ALGNRD01_GeometryBuilder_01.dgn that is located in the Roadway Folder
7. Fit View and Save Settings, select Ctrl F.
8. From the Home tab, set Active Level to BaselineSurvey before you import.

9. Use the *OpenRoads Modeling* workflow to locate the *Geometry Tab*, then in the *General Tools Group* is where you will find *import tools*, **Import/Export** tool – import Geometry and select the Landxml file in the *Roadway* folder to import alignments. We are looking for the file name **BL98.xml**. (Note: The level needs to be set to either *Baseline Survey* or *CLConst_dp* before the import from a landxml file)

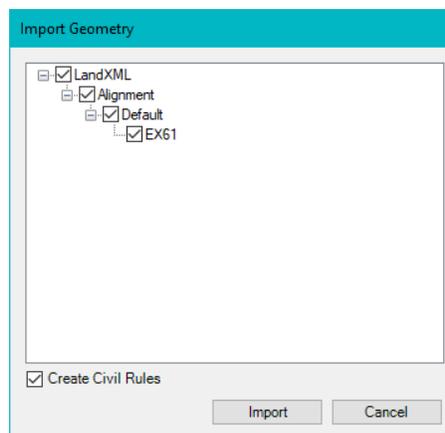
OPENROADS MODELING>GEOMETRY>GENERAL TOOLS>Import/Export>Import Geometry



- a. Navigate to the **Alignment > Alignment>BL98** folder.
- b. Click in the box to select **BL98**.



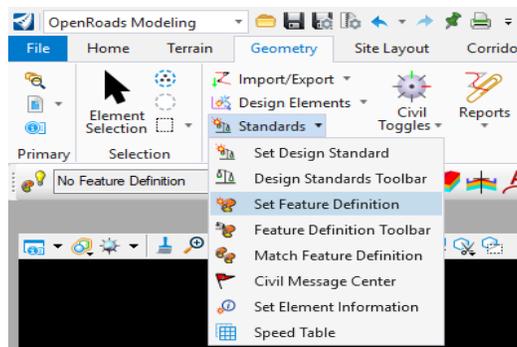
- c. Click **Import**.
- d. Repeat this process to import the existing baseline for **SR61**. The file name of this LandXML is **EX61.xml**.



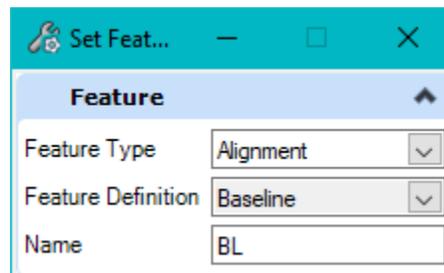
10. Zoom to the intersection of EX-SR61 and US98, hover over the baseline to verify the alignment imported in the previous step. You will notice that the Baseline for US98 already has a Feature Definition assigned to it.



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

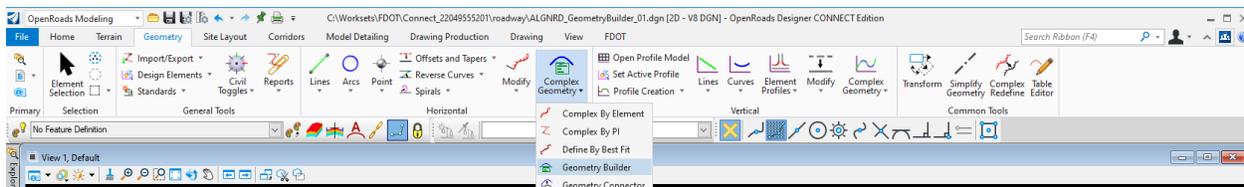


- a. Set the Feature Type to Alignments.
- b. Set the Feature Definition to **Baseline**.

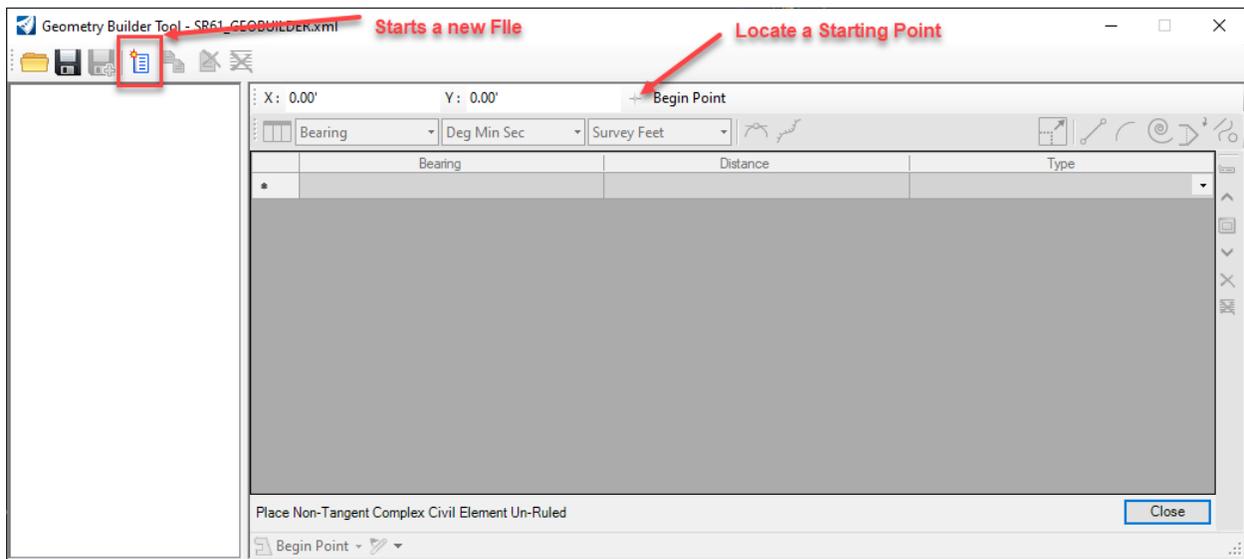


- c. Select the **EX-SR61**, then click **Reset** to set the **Baseline** feature on the line.

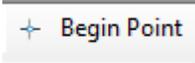
12. Select the **Element Selection** to exit the command, you can also do this by the function Key F6.

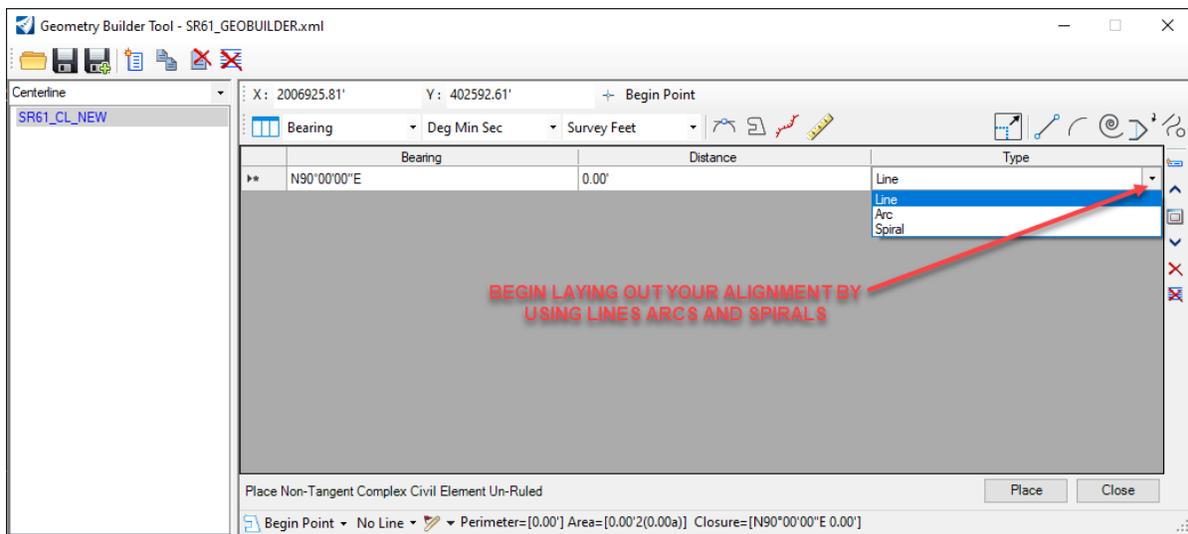


13. Click on the Geometry Builder button will bring the dialog up.



14. From here click on the add new geometry icon  to start the tool. From here rename to the current project centerline name.

15. The first step is to locate a begin point, click on begin point  to select a point from the screen



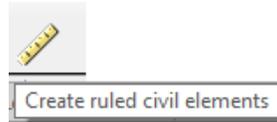
16. Once the begin point is set. Select the drop down from the Type Column to pick Line. Then start filling out the Bearing and Distance columns with the information from the Table provided. (Bearing N59° 59' 28" W Distance 105.00')

17. Select Line from the Type column fill out the Bearing and Distance from the Table. (Bearing N59° 59' 28" W, Distance 611.90')

18. Next Select Arc from the TYPE column fill out Radius, Length, and check the box for Clock, bearing from the Table. (Radius 819.00, Length 756.43' Bearing N34° 13' 53" W)

19. Select Line from the Type column fill out the Bearing and Distance from the Table. (Bearing N08° 28' 19" W, Distance 265.02')

20. Next Select Arc from the TYPE column fill out Radius, Length, and check the box for Clock, bearing from the Table. (Radius 7639.00, Length 462.23' Bearing N10° 12' 19" W)
21. Select Line from the Type column fill out the Bearing and Distance from the Table. (Bearing N11° 56' 20" W, Distance 524.42')
22. Now that the New Alignment is designed click on the Create civil ruled elements icon



23. Next select the place icon to place the new alignment.

| Element: Linear | | Station | Northing | Easting |
|-------------------|------------------------------|--------------------|------------|-------------|
| START | () | 698+95.000 | 402592.610 | 2006925.814 |
| | Tangential Direction: | N59°59'28"W | | |
| | Tangential Length: | 105.00 | | |
| Element: Linear | | | | |
| | Tangential Direction: | N59°59'28"W | | |
| | Tangential Length: | 611.90 | | |
| Element: Circular | | | | |
| | Radius: | 819.00 | | |
| | Length: | 736.43 | | |
| | Chord Direction: | N34°13'53"W | | |
| Element: Linear | | | | |
| | Tangential Direction: | N08°28'19"W | | |
| | Tangential Length: | 265.02 | | |
| Element: Circular | | | | |
| | Radius: | 7639.00 | | |
| | Delta: | 3.467° | Right | |
| | Degree of Curvature (Arc): | 0.75° | | |
| | Length: | 462.23 | | |
| | Chord Direction: | N10°12'19"W | | |
| Element: Linear | | | | |
| | Tangential Direction: | N11°56'20"W | | |
| | Tangential Length: | 524.42 | | |

2D PLANIMETRICS: CIVIL GEOMETRY, CIVIL CELLS

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.

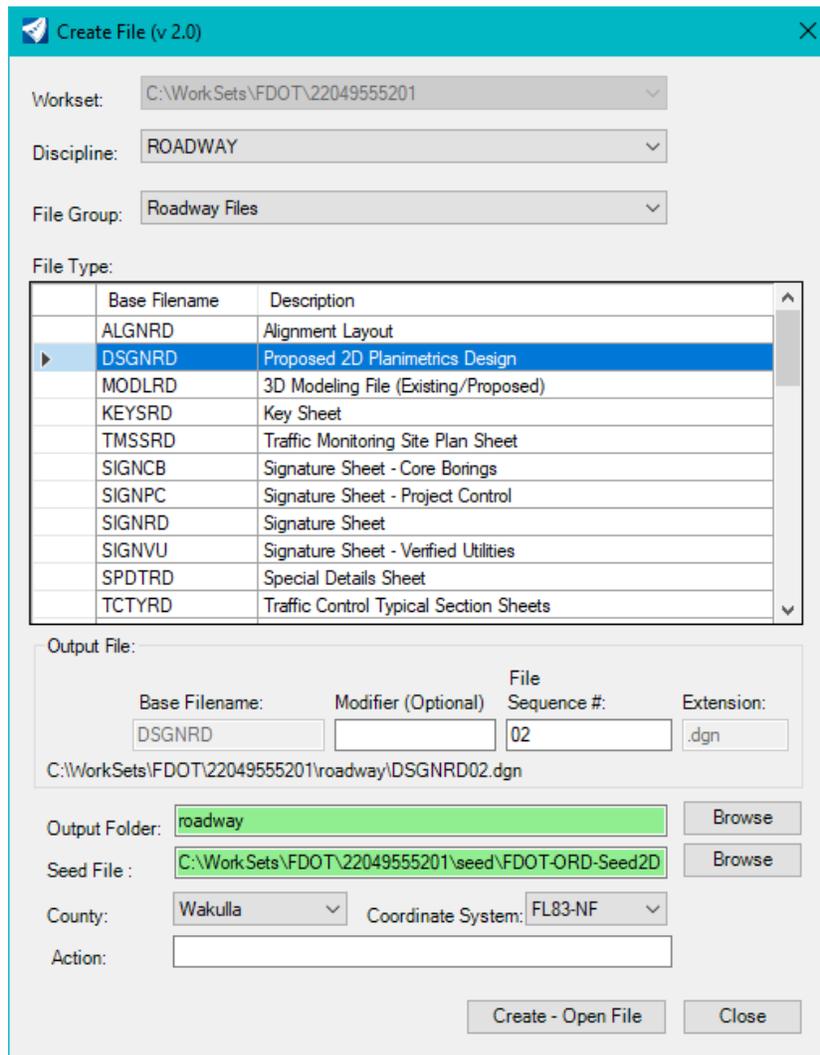
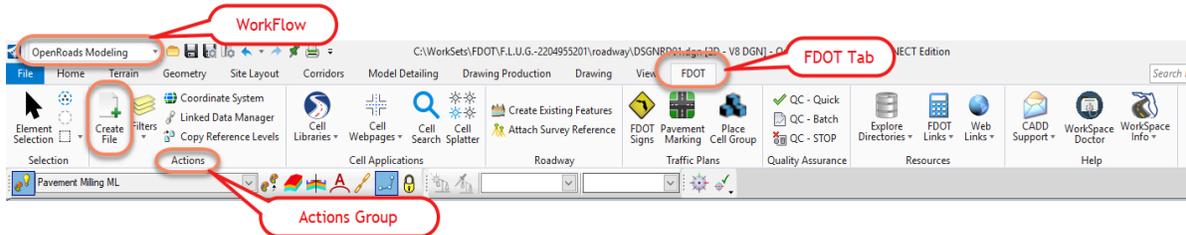
EXERCISE OVERVIEW – 2D PLANIMETRICS

- 2.8 Preparation for 2D Plans
- 2.9 BL98 Milling Limits
- 2.10 BL98 Widening
- 2.11 BL98 Widening Taper Line
- 2.12 For SR61 New Construction Template Lines
- 2.13 Add Right Turn lane on BL98
- 2.14 Add the School Entrance Right Turn Lane off BL98 Intersection
- 2.15 Create/Edit the Intersection Curve Radii
- 2.16 Trim Back Sidewalk and Curb Lines to the Curve Radii
- 2.17 Use Civil Cell Technology to Place Curb and Sidewalk Around the Radii
- 2.18 Create a Custom Civil Cell for Other Radii
- 2.19 Place Left Turn with Traffic Separator
- 2.20 Place Right Turn Island
- 2.21 For BL98 Intersection Crosswalks Lines
- 2.22 Create BL98 Turnouts
- 2.23 For BL98 Intersection Shoulders
- 2.24 For Friendship Intersection

Exercise 2.8 Preparation for 2D Plans

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

OPENROADS MODELING > FDOT > ACTIONS > Create File

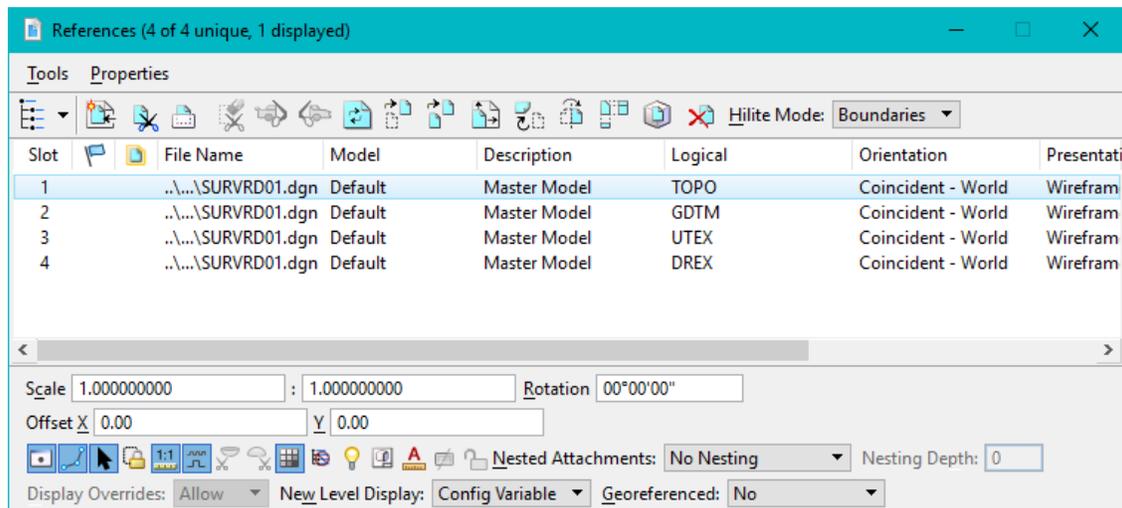


Exercise 2.9 *BL98 Milling Limits*

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

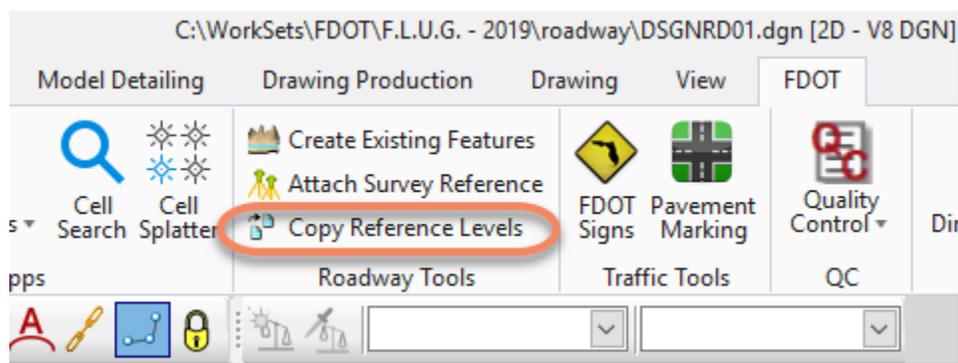
1. Use the **Attach Survey Reference** from the FDOT Tab within the Roadway Tools Group. (This tool will attach a SURVRD file 4 times with different Logical names of **TOPO**, **GDTM**, **UTEX**, **DREX** which apply to different level filters.)

OPENROADS MODELING>FDOT>ROADWAY>Attach Survey Reference

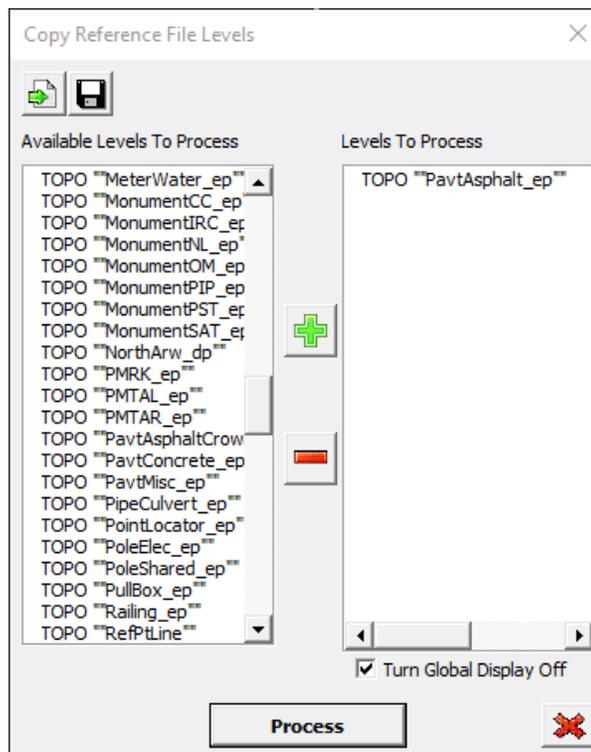


2. Once the SURVRD is attached, open your Reference Dialog (Function Key F9) and Detach the reference files with logical names of GDTM, UTEX, DREX. This will only leave the TOPO.
3. Now we need to copy or merge the elements that are on the PavtAsphalt_ep level. This can be done by using the **Copy Reference Levels** tool from the FDOT Tab with in the Roadway Tools Group

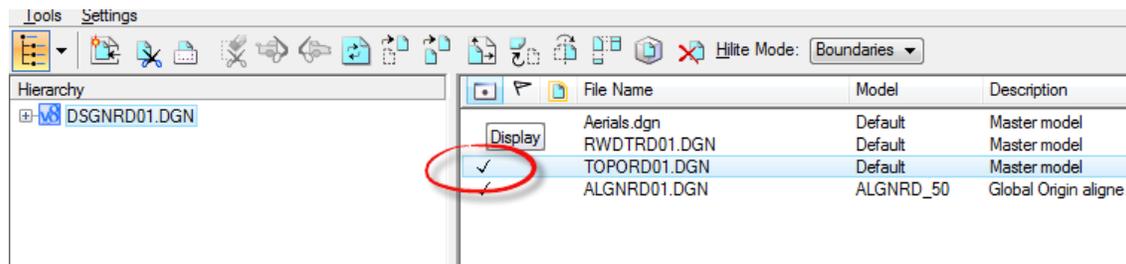
OPENROADS MODELING>FDOT>ACTIONS>Copy Reference Levels



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

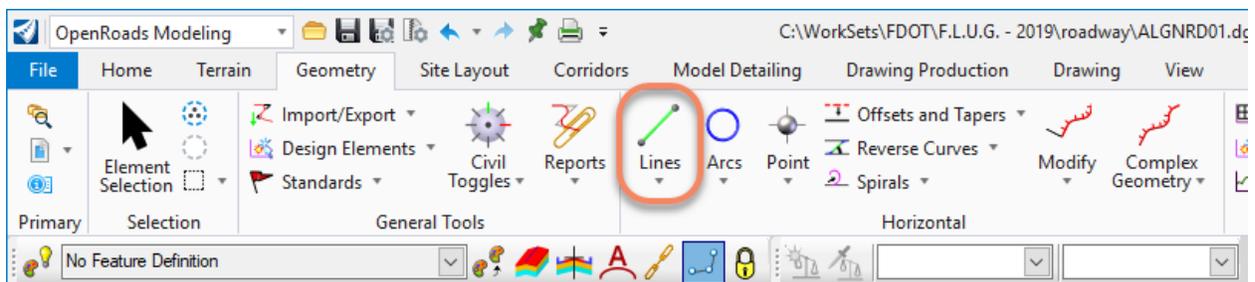


- This step if no SURVD Exists Use OpenRoads **References (Function Key F9)** to attach and display the *TOPORD01* and *RWDTRD01* Reference files.

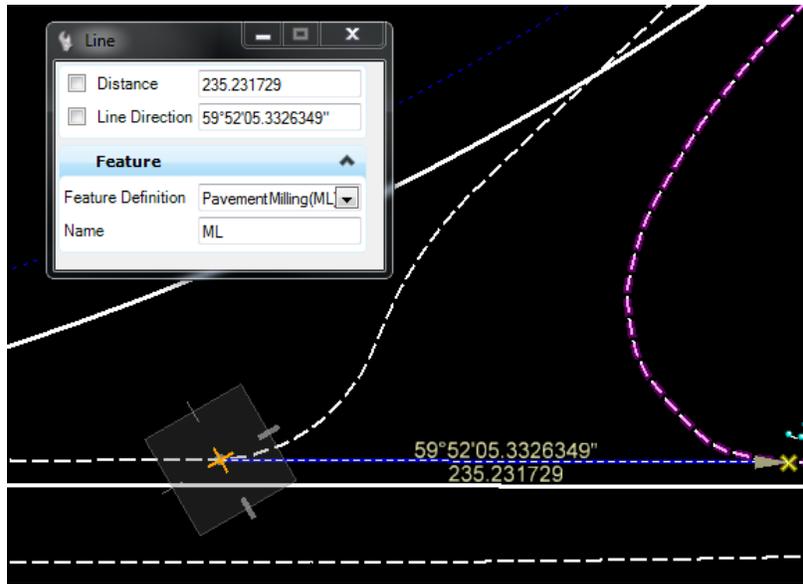


- Use OpenRoads **Level Display** to turn **OFF** all the *TOPORD01* Levels except the **PavAsphalt_ep**.
- Use the *Geometry Tab* and the *Horizontal Group, Line Between Points* tool.

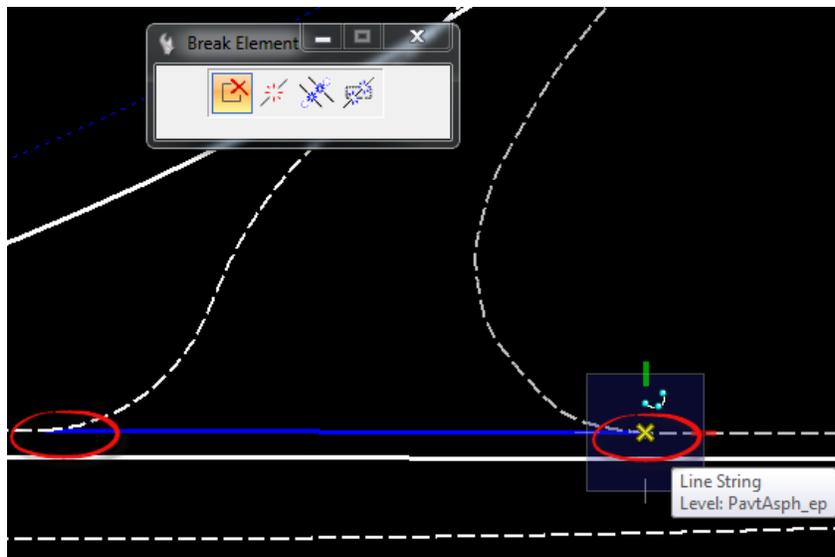
OPENROADS MODELING>GEOMETRY>HORIZONTAL>Lines>Line Between Points



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

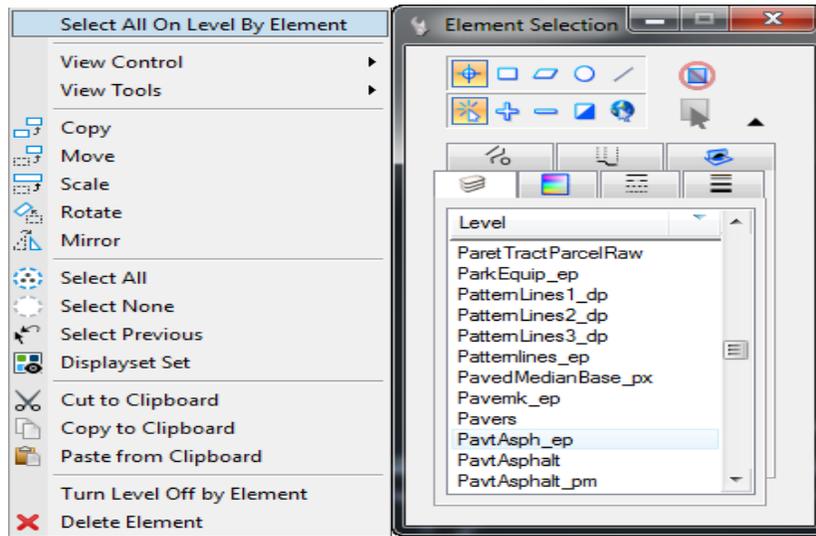


9. Use OpenRoads **Break Element** on the **PavtAsphalt_ep** line string elements where the new *PavementMilling(ML)* line intersects.

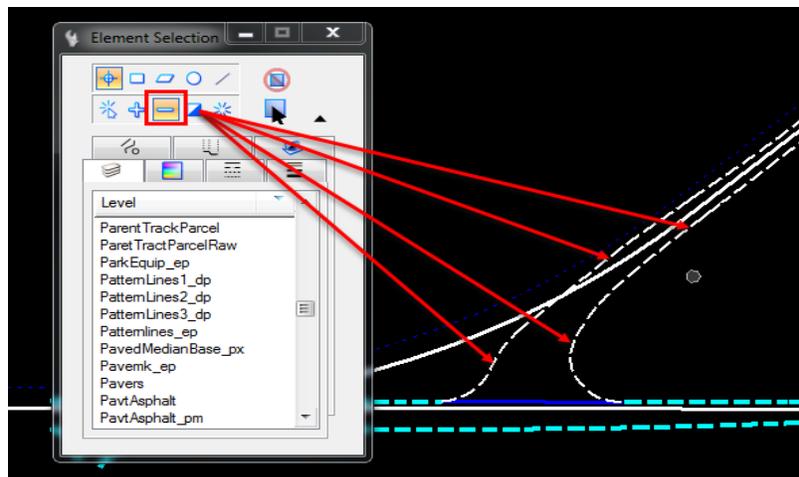


10. Repeat these steps for the other **side roads** along *BL98*.

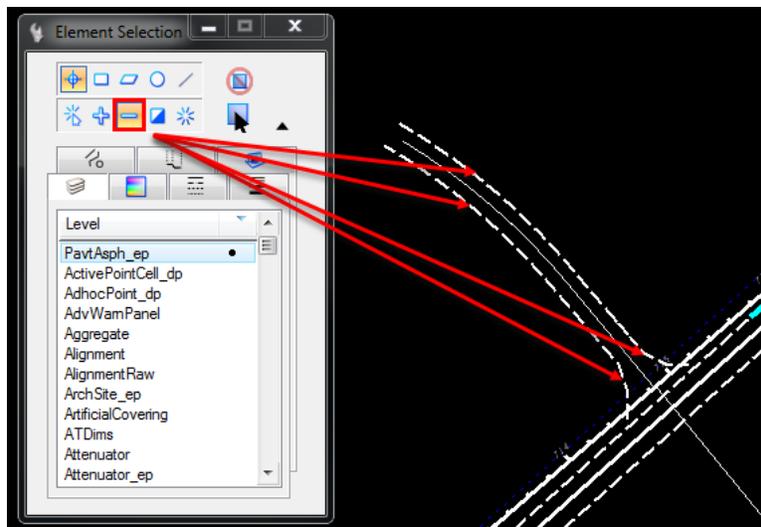
11. Create a *Selection Set* of the **PavtAsphalt_ep** by level. This can be done with the right click function of the mouse, by holding down and Selecting All On Level By Element. Then selecting an element.



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

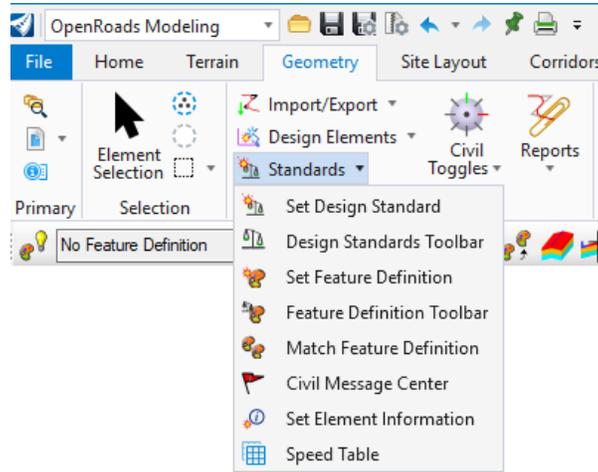


- b. Also subtract out of the *Selection Set* the **Intersection lines at Friendship Road**.

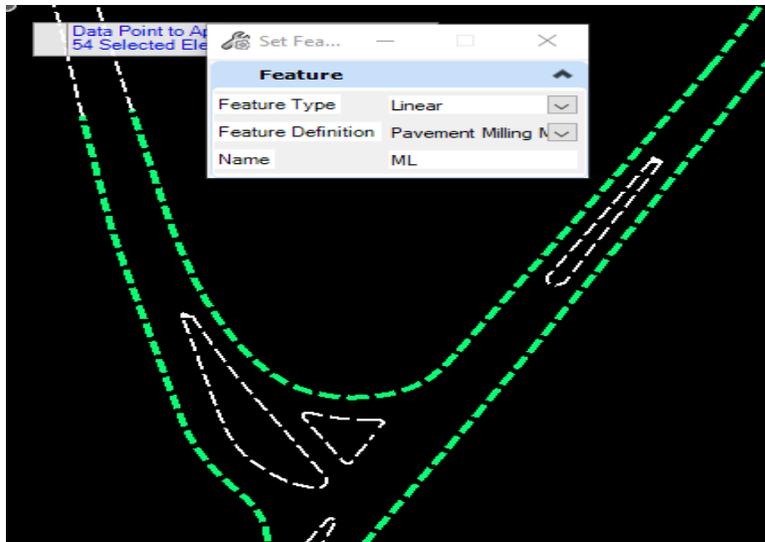


- Use the Geometry Tab and the General Tools Group, Click on the Standards button to bring up a drop down that has the Set Feature Definition tool.

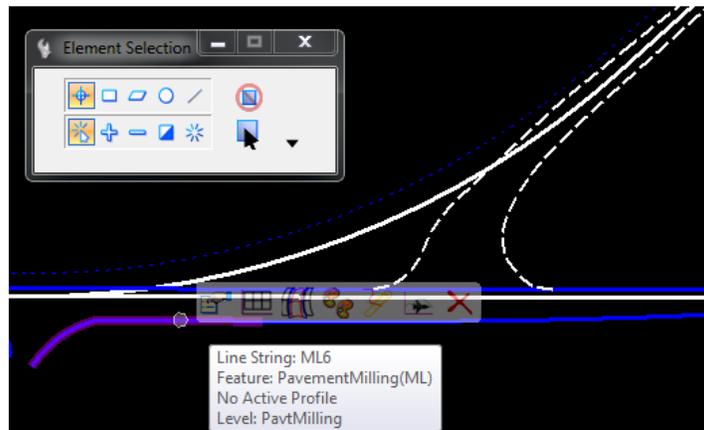
OPENROADS MODELING>GEOMETRY>GENERAL TOOLS>Standards>Set Feature Definition



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



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

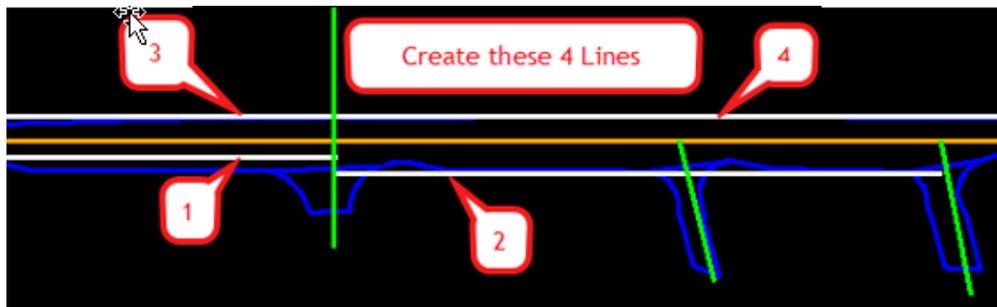


Exercise 2.10 *BL98 Widening*

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

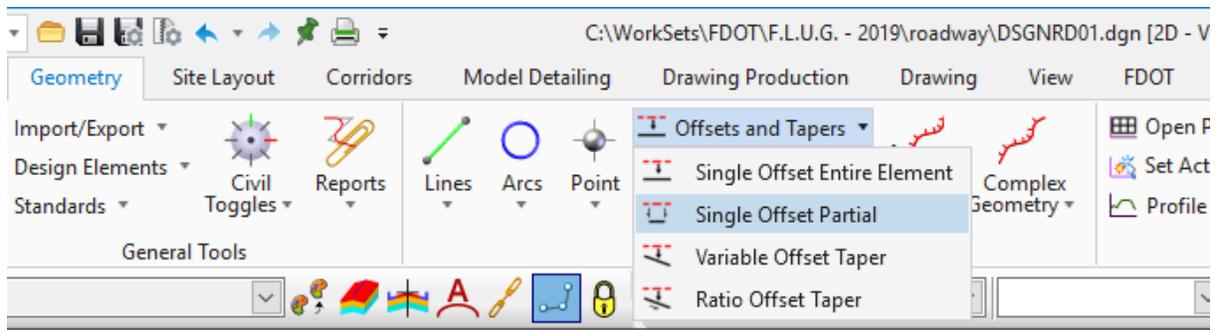
In this exercise, the proposed Pavement Lines used for widening on BL98 are created at the following locations:

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



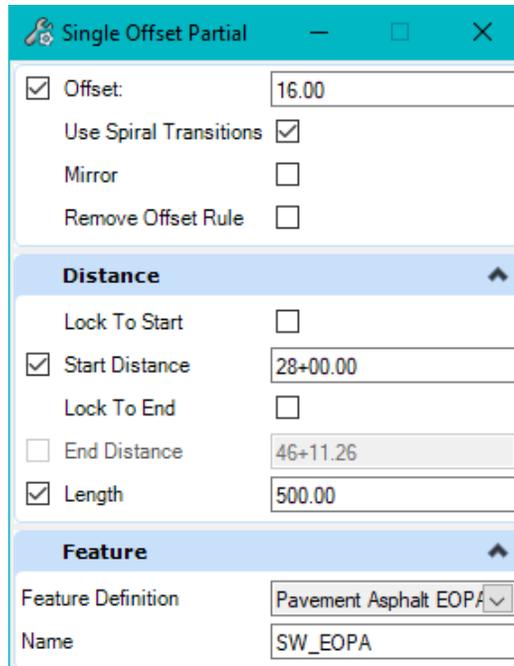
1. Use the *Geometry Tab and the Horizontal Group*, to select **Single Offset Partial** tool located in the Offsets and Tapers button.

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

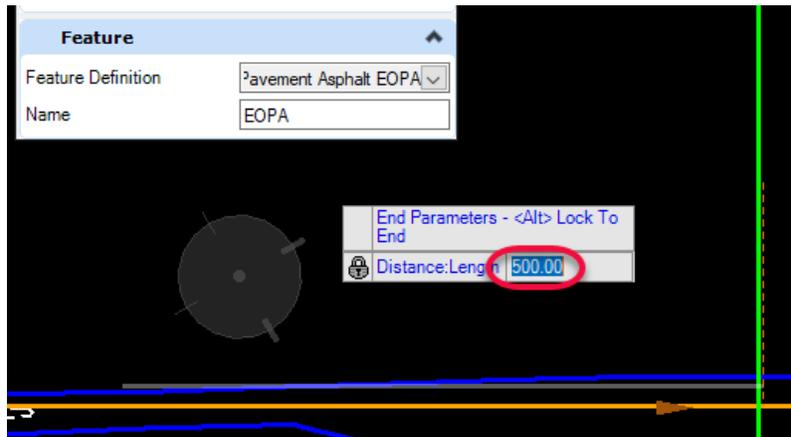


- a. Select the **BL98** line at the prompt to **Locate Element**.

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



- c. **Data point** in the **View** to accept the *Offset*.
 d. **Data point** in the **View** to accept *Length*.



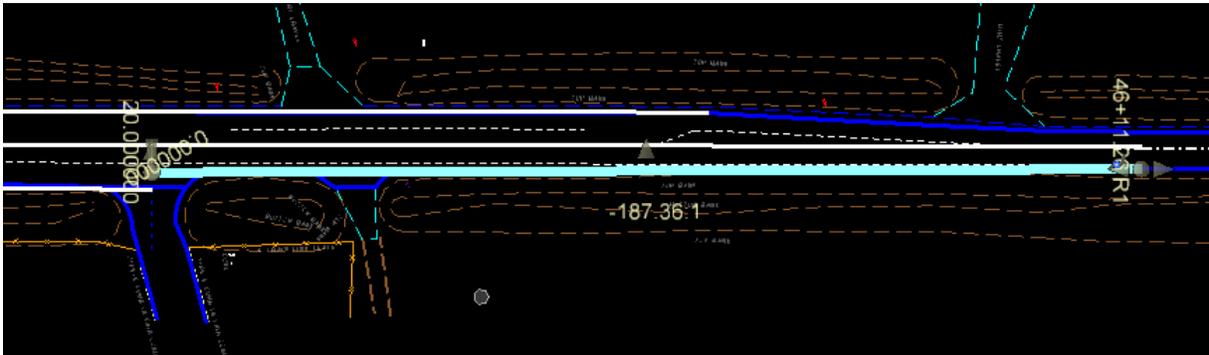
- e. **Data Point** in the **View** to accept **No** at the *Mirror* option prompt.
 2. Repeat this procedure for each of the **Pavement Asphalt EOPA** widening lines diagram and table above.

Exercise 2.11 *BL98 Widening Taper Line*

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

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

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



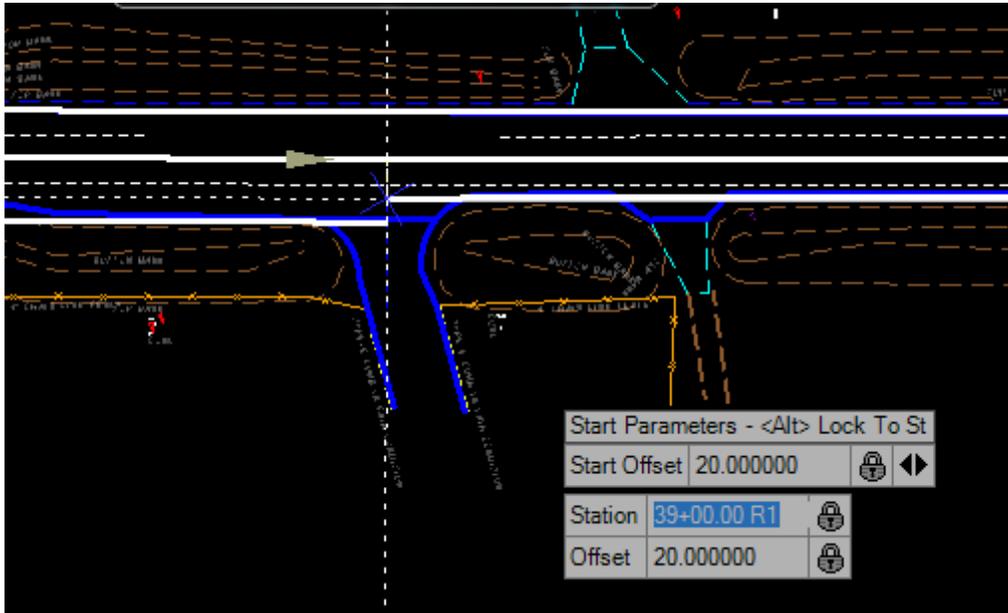
HINT Toggle On the Civil AccuDraw.

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

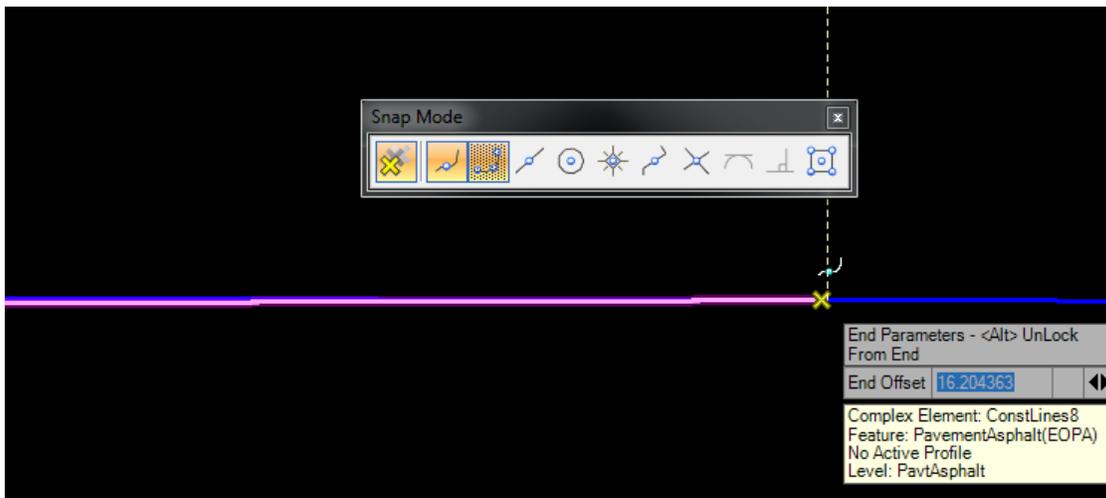
OPENROADS MODELING > GENERAL > HORIZONTAL > Offsets and Tapers > Variable Offset Taper

2. Select the **BL98** element to *offset* from.
3. Enter the *Station* at **39+00** and select **Enter** to lock the value.
4. Tab to the *Offset*, enter **20** and select **Enter** to lock the value.

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



6. Select **Alt** key to lock the *End Station* value.
7. Set the *AccuSnap* tool to **Nearest**, hover over the right **Pavement Milling ML** until the *Snap Mode* displays.

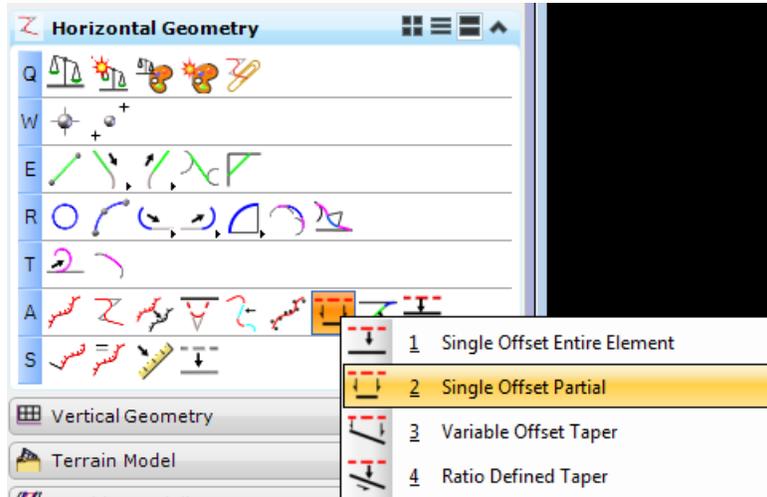


8. **Data Point** to place the second point and complete the command.

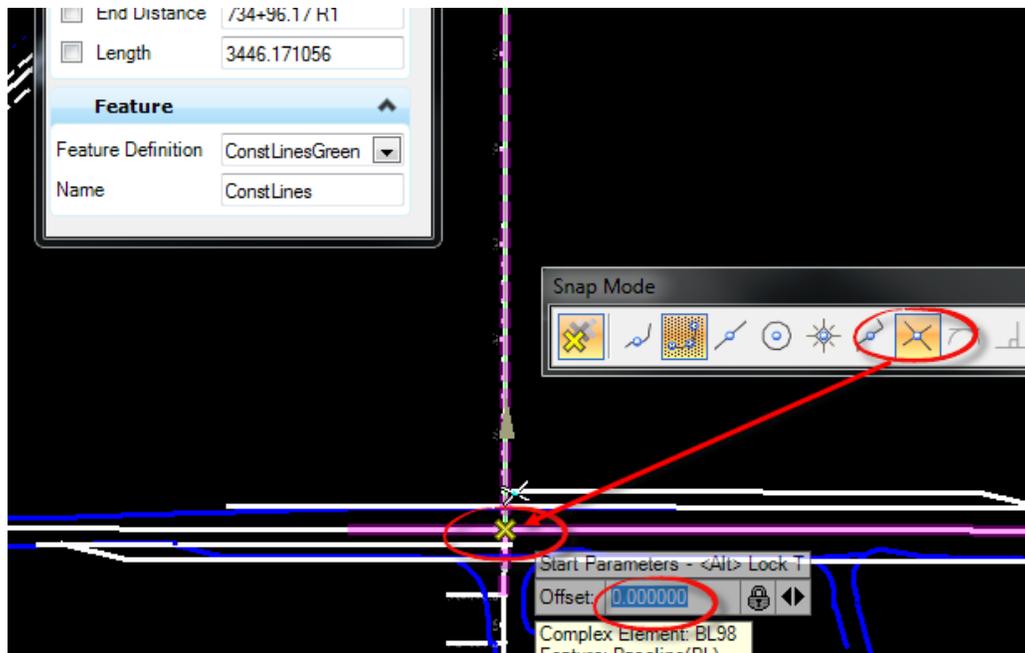
Exercise 2.12 For SR61 New Construction Template Lines

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

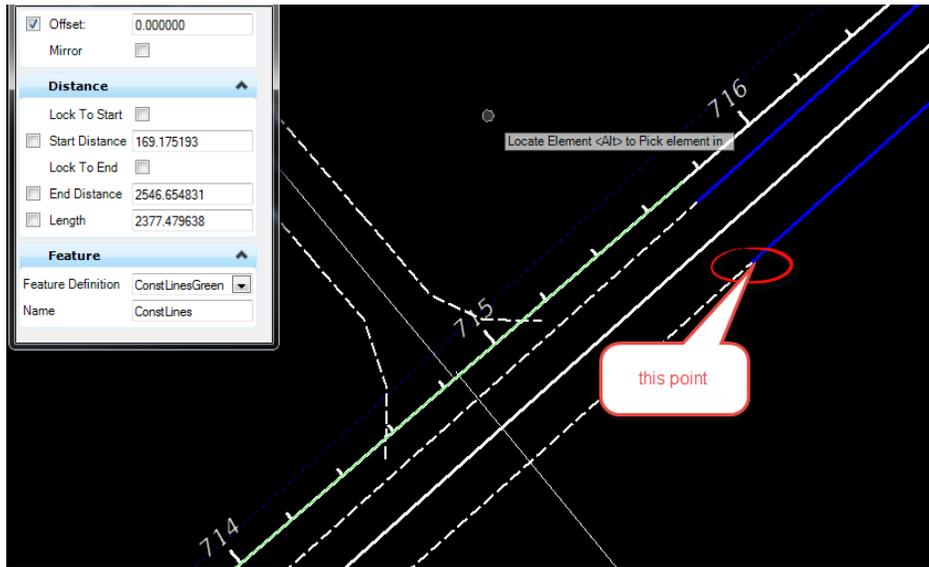
1. Use the Geometry Tab and the Horizontal Group, to select the **Single Offset Partial** tool. OPENROADS MODELING>GEOMETRY>HORIZONTAL>Offsets and Tapers>**Single Offset Partial**



2. Create a *Feature line*, **Const Lines Green**.
 - a. Select the SR61 Centerline CL.
 - b. Set the Offset to 10.00.
 - c. For the first point, set AccuSnap to Intersection and select the intersection of SR61 and BL98.

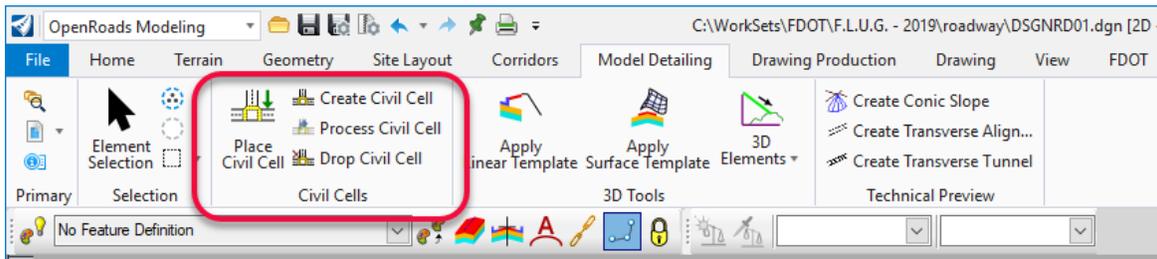


- d. For the second point, zoom out to the first *intersection* after the end of the SR61 curve and snap to the right **Pavement Milling ML** of existing SR61 <OR> Key in **Station 716+50**.

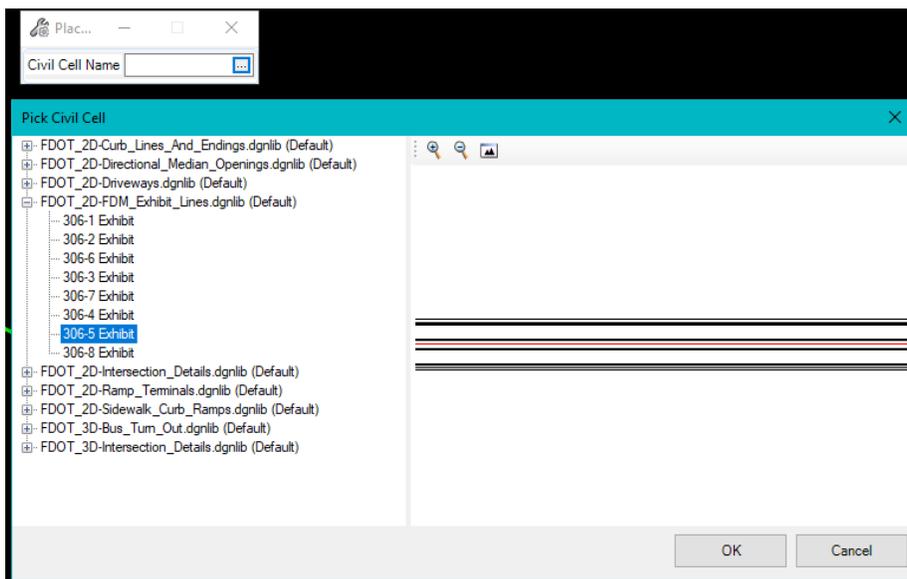


HINT Use Intersect Snap and to place first point and Key Point snap for the second point.

- 3. Use the Model Detailing Tab and the *Civil Cells Group*, to find the **Place Civil Cell** tool.
OPENROADS MODELING>MODEL DETAILING>CIVIL CELLS>Place Civil Cell



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

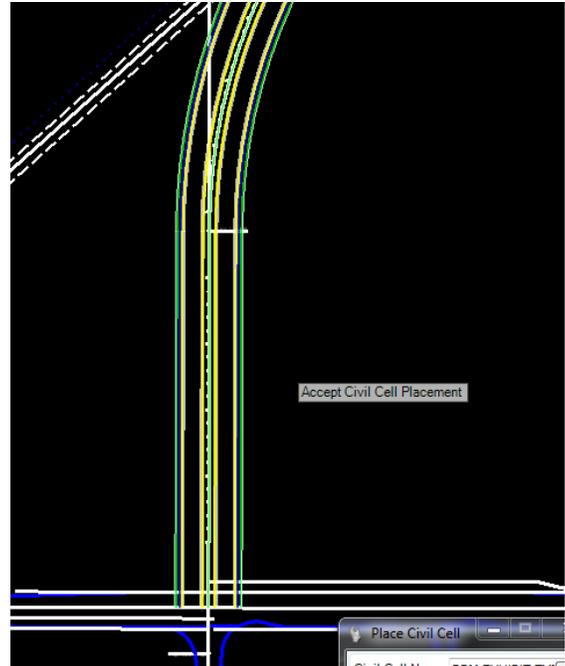


- a. Click **OK** and follow the prompts to complete the *Place Civil Cell* command.

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

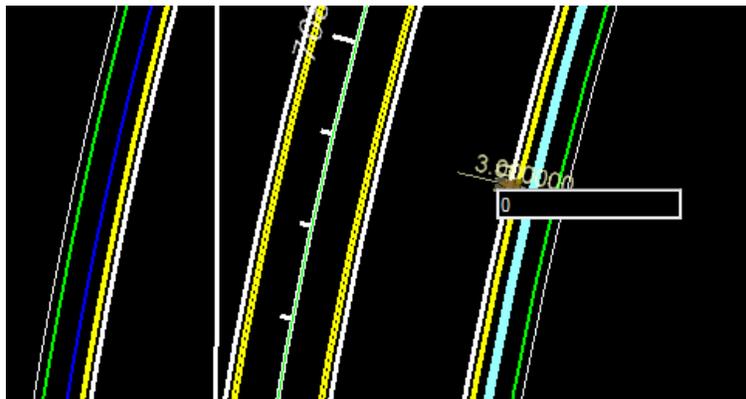
HINT Use the tab key to after clicking on an element to get to the last place Green Const Line.

- c. **Reset** to Skip View Alternates.
- d. Data point to accept **Civil Cell Placement**



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

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



- b. Change the *SidewalkFront Dimension* from **4** to **0**.
- c. Verify that the *SidewalkBack* is set to **6**.
- d. Repeat this for *both sides* of the roadway.

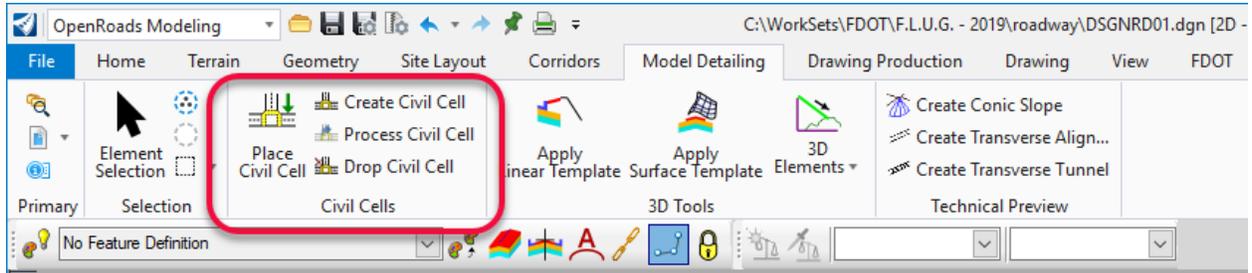


Exercise 2.13 Add Right Turn Lane on BL98

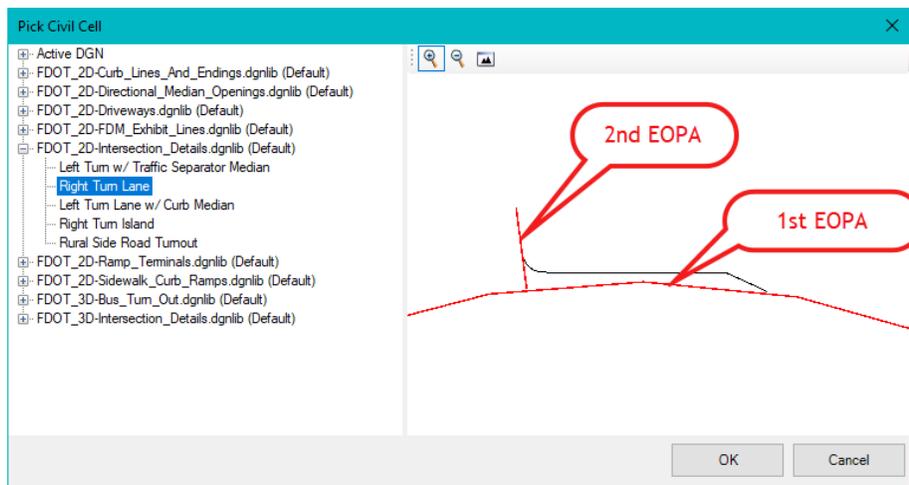
This exercise uses Civil Cells to add a right turn lane to the BL98.

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

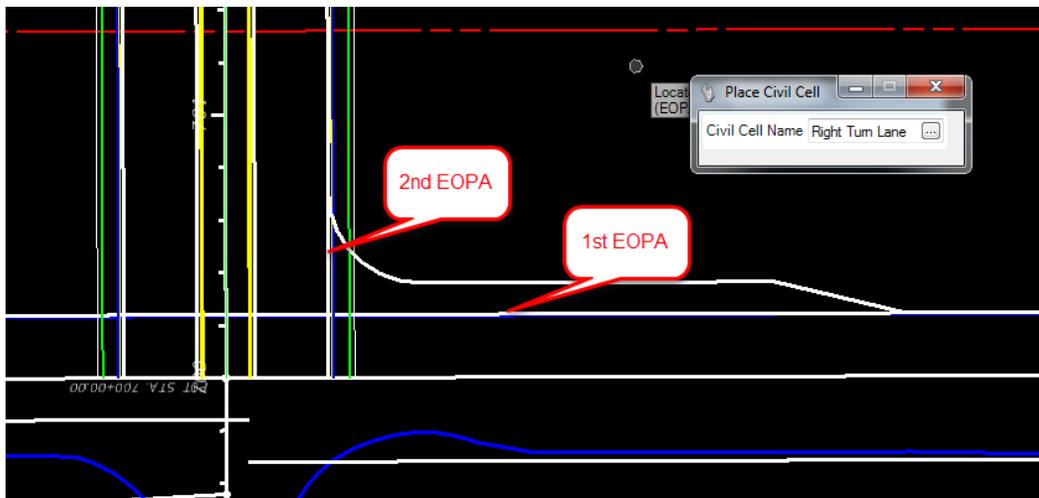
OPENROADS MODELING>MODEL DETAILING>CIVIL CELLS>Place Civil Cell



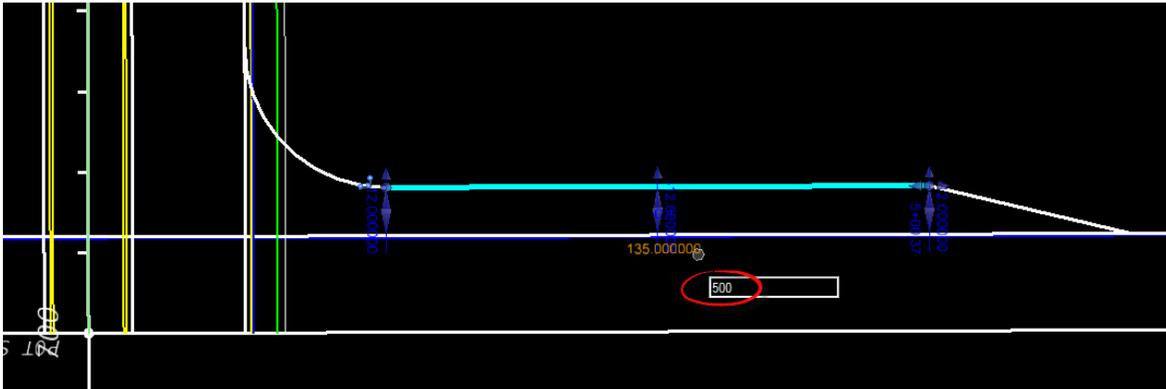
2. From the Place Civil Cell dialog, navigate to the *FDOT_2D-Intersection_Details.dgnlib* and select **Right Turn Lane**.



3. At the prompt, for the first *Reference*, select the **widening Pavement Asphalt EOPA** line.
4. For the second *Reference*, select the **SR61 Right EOP Out Pavement Asphalt EOPA**.
5. Reset to Skip Elements to View Alternatives.
6. **Data point** to accept *Civil Cell Placement*. The right turn lane is added.



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

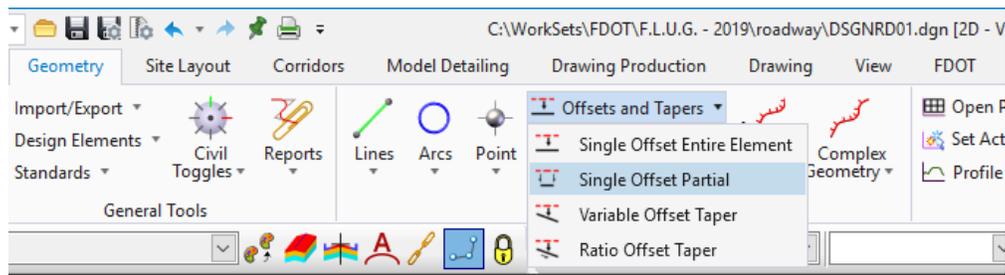


8. Use OpenRoads *Trim to Intersection* to correct the Pavement Asphalt EOPA lines.

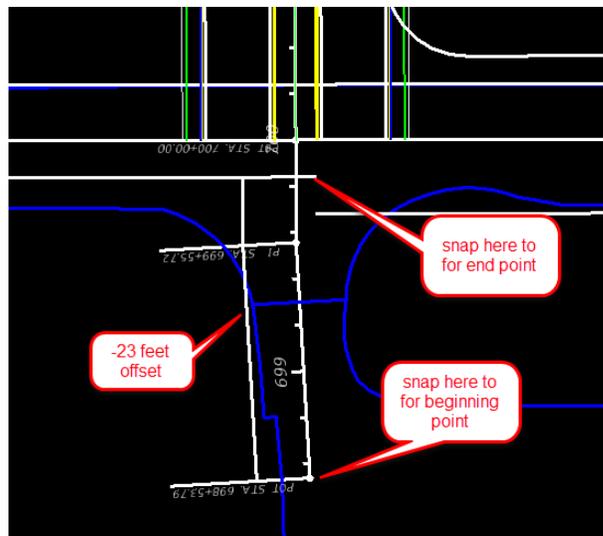
Exercise 2.14 Add the School Entrance Right Turn Lane off BL98 Intersection

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

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

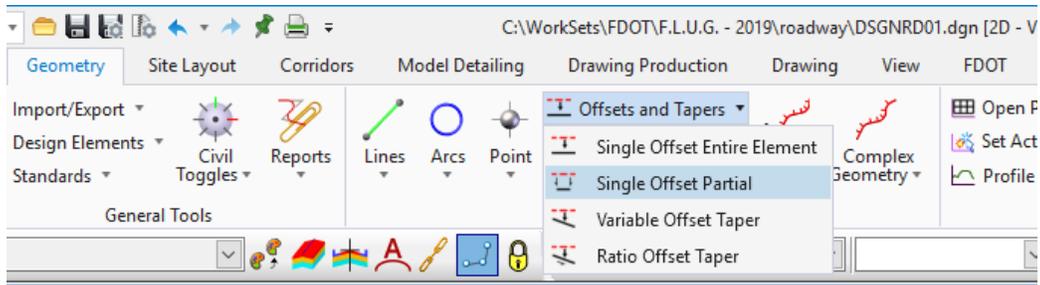


2. Create the side road **Pavement Asphalt EOPA** opposite *SR61* left *offset -23 feet*.
 - a. For the *beginning*, snap to beginning of **SR61**.
 - b. For the *end*, snap to the BL98 widening line end point at **SR61**.
 - c. Uncheck *Mirror* to set to **No**.



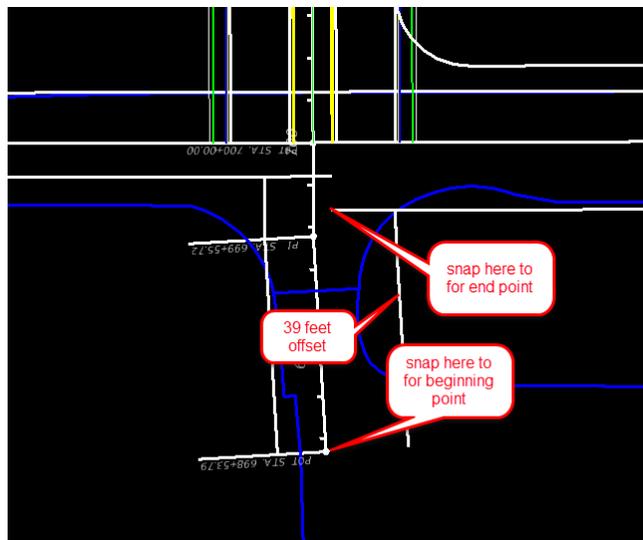
3. For the opposite side, use the *Geometry Tab and the Horizontal Group*, to select **Single Offset Partial** tool located in the Offsets and Tapers button.

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

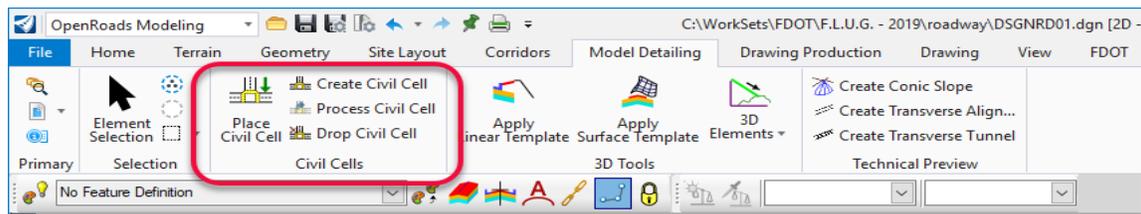


4. Create the side road **Pavement Asphalt EOPA** opposite *SR61 Left Offset 39 feet*.
 - a. For the *beginning*, snap to beginning of **SR61**.
 - b. For the *end*, snap to the **BL98** widening line end point at **SR61**.
 - c. Uncheck *Mirror* to set to **No**.

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



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



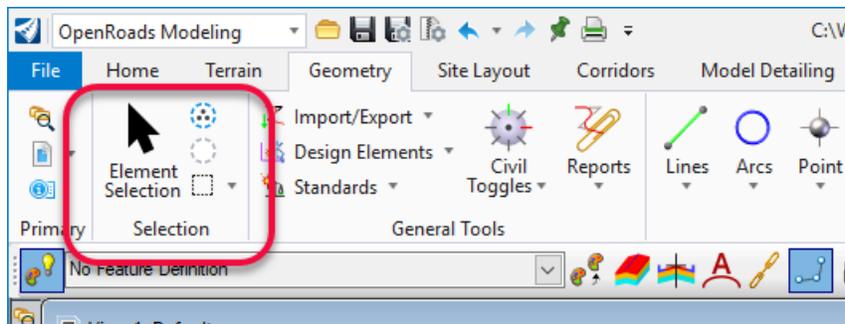
- a. At the prompt, for the first *Reference*, select the **widening Pavement Asphalt EOPA** line.

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

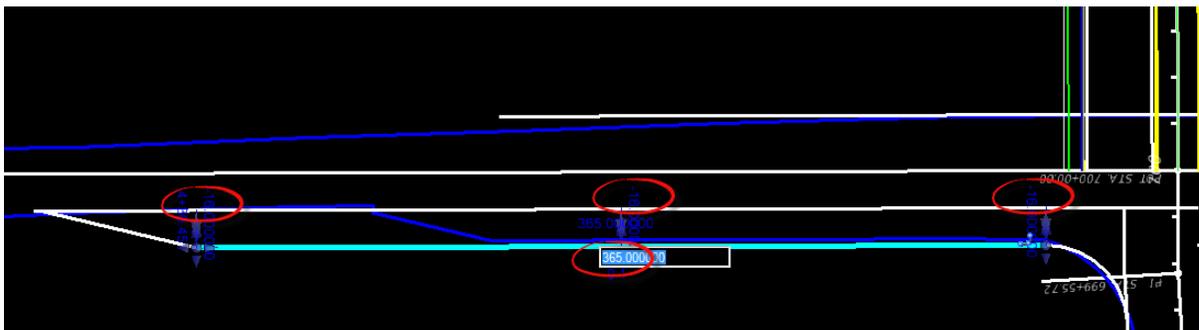


c. **Data point** to accept **Civil Cell Placement**. The Right Turn Lane is added.

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

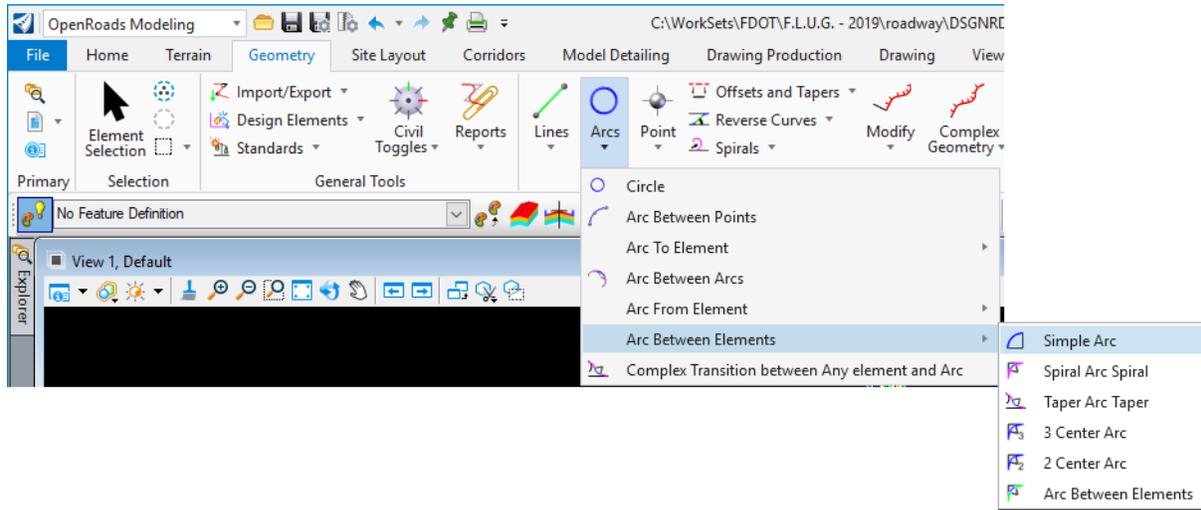


7. Edit the storage length for the second Right Turn Lane placed, select the tangent line and change the Length from 200 to 365 feet. Verify the Change the lane width is -16 feet.



Exercise 2.15 Create/Edit the Intersection Curve Radii

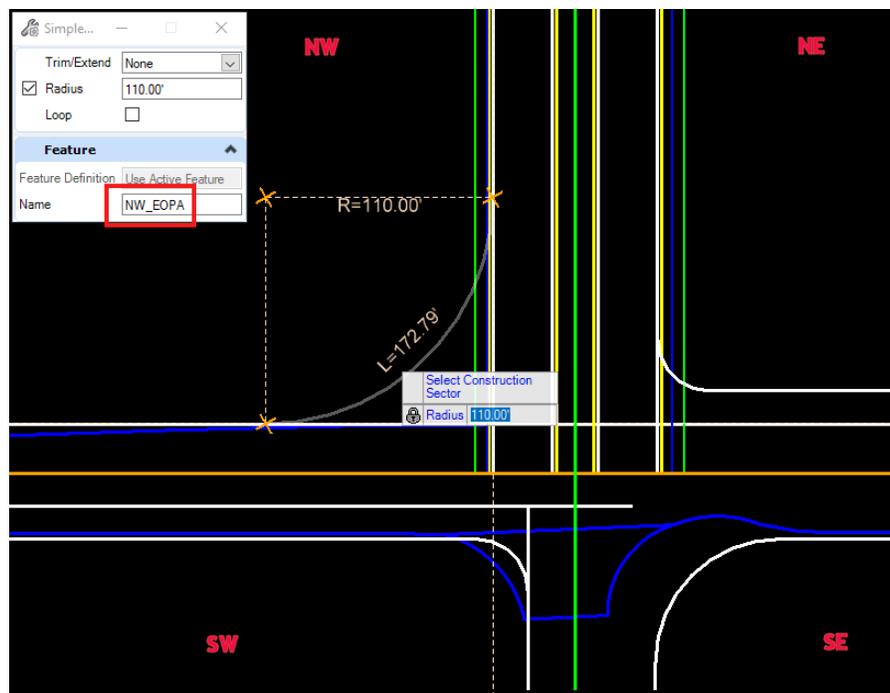
1. Use the *Geometry Tab and the Horizontal Group*, to select the **Simple Arc** tool located in the ARCS button then the drop down of Arc Between Elements.

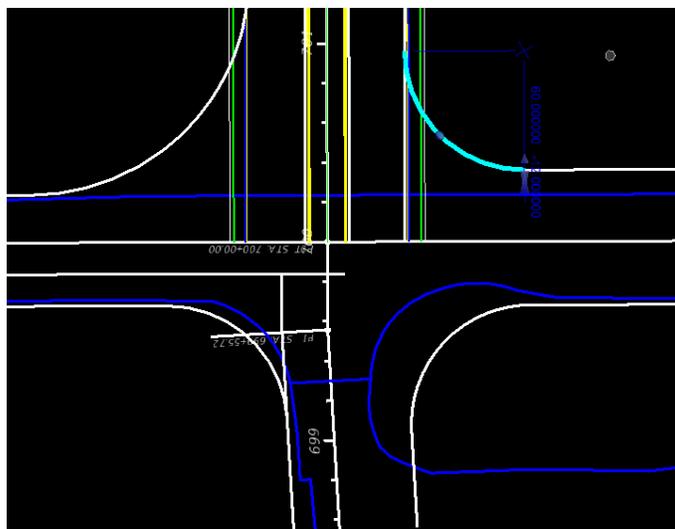
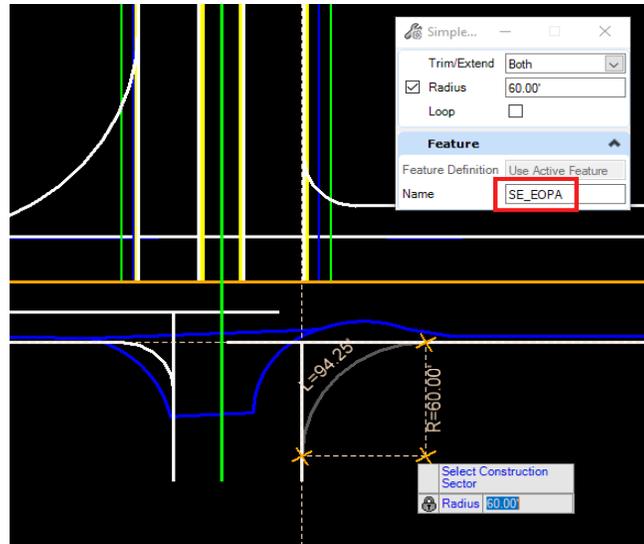


2. Create/Edit the **Curve** returns.
3. Select *Feature Definition, Pavement Asphalt EOPA* to place remaining curve radii.
4. Follow the cursor prompt to select the two Roadway **Pavement Asphalt EOPA reference lines**.

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

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

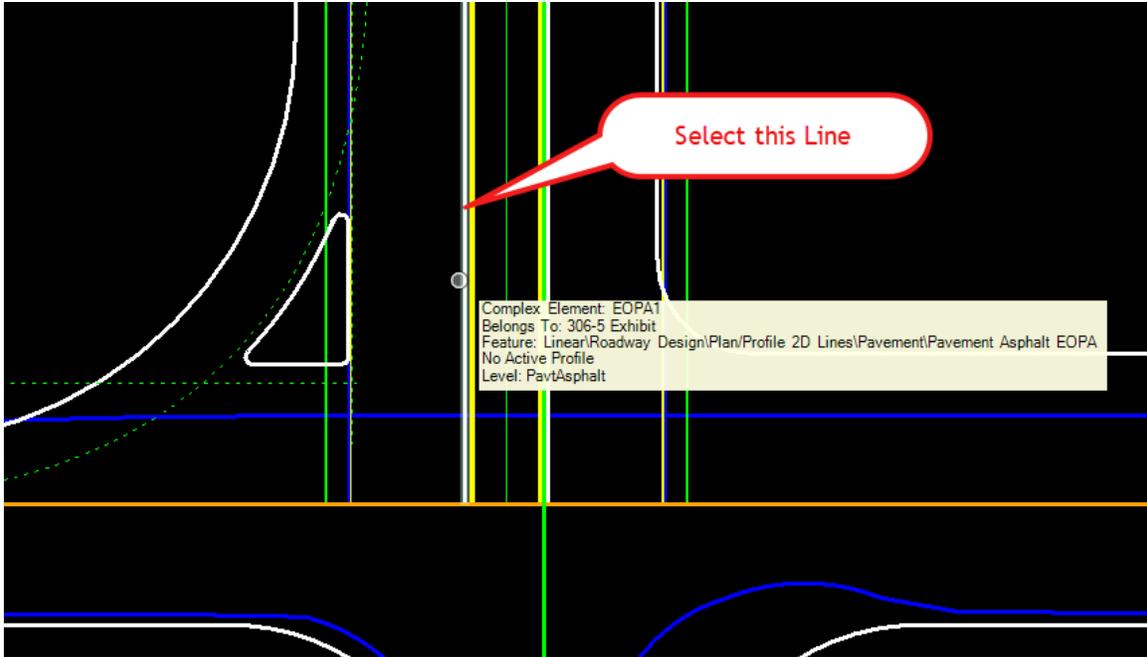




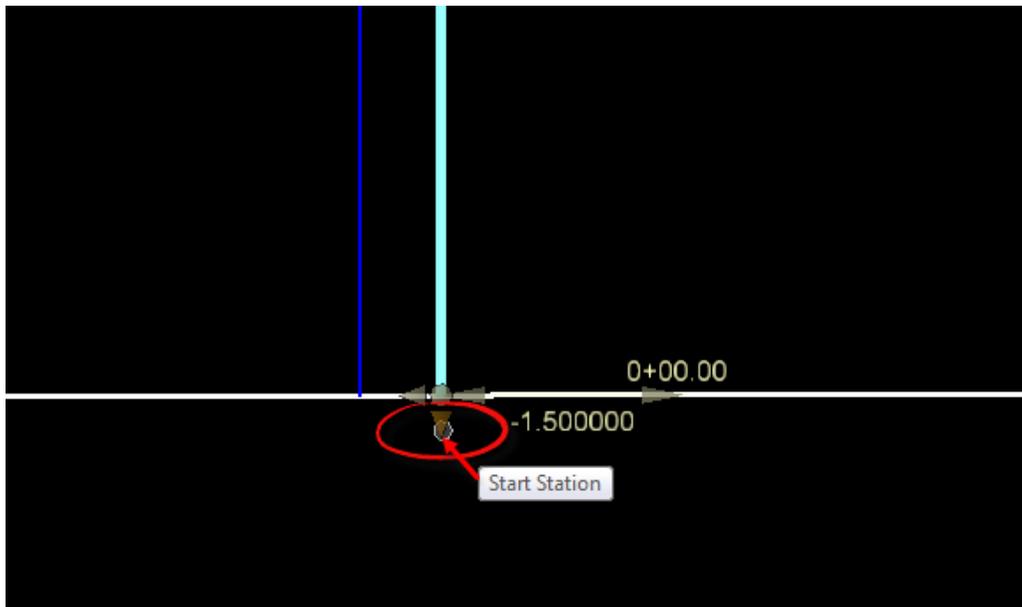
Exercise 2.16 *Trim Back Sidewalk and Curb Lines to the Curve Radii*

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

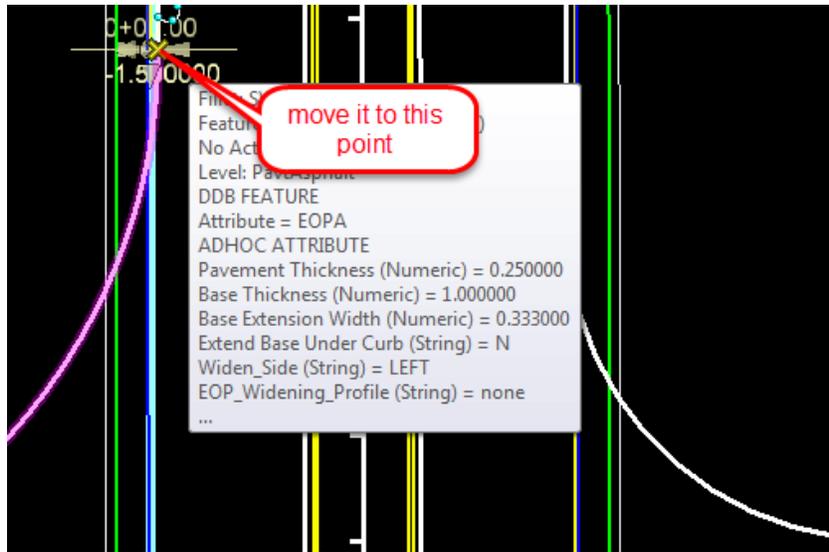
1. Select the **LT_PVT_EOP_IN** line (Pavement Asphalt EOPA Feature).



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



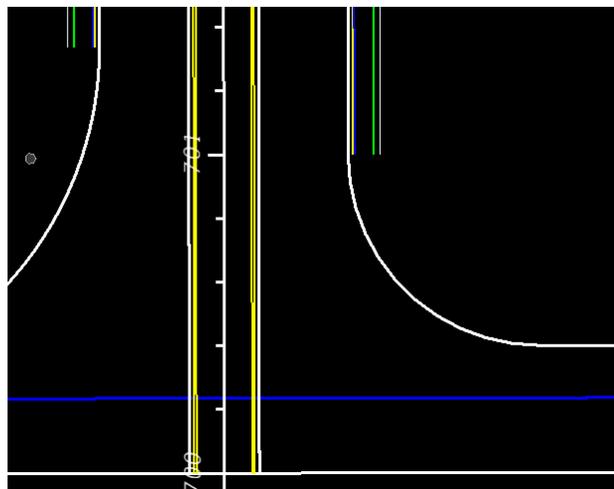
3. Drag the handle while zooming out and select the **End Radius** point to move the point.



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



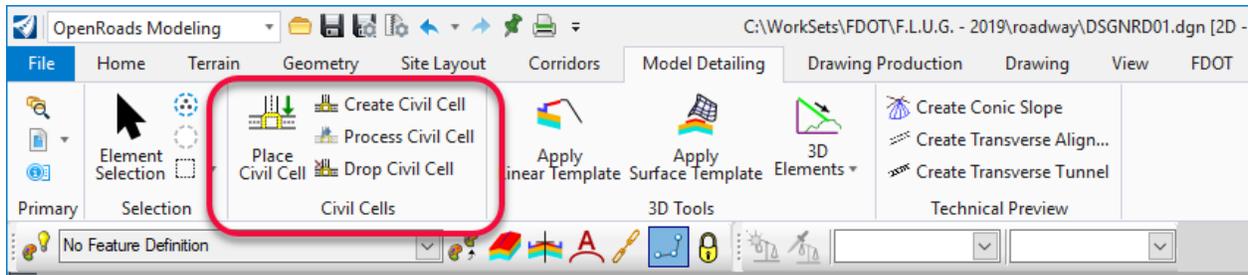
5. Repeat these steps to move the **RT_PVT_EOP_IN** line (Pavement Asphalt EOPA Feature) back to the *curve radius* on the right Roadway.



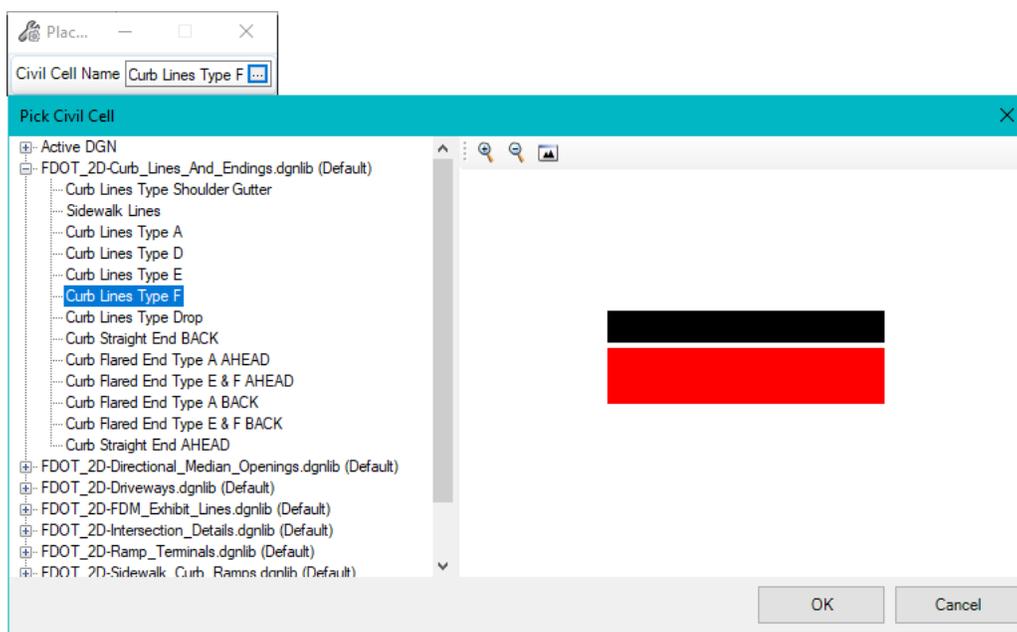
Exercise 2.17 Use Civil Cell Technology to Place Curb and Sidewalk Around the Radii

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

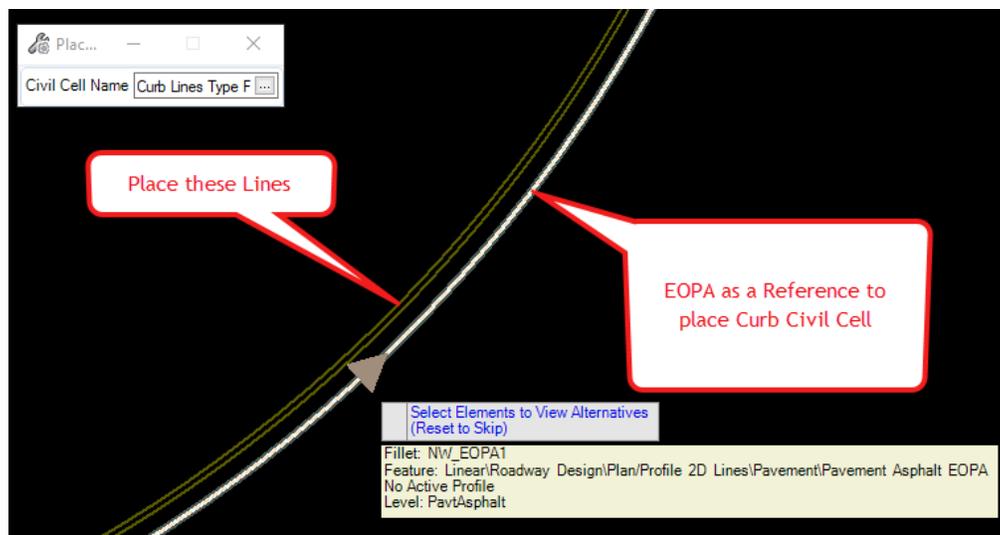
OPENROADS MODELING>MODELING DETAILING>Place Civil Cell



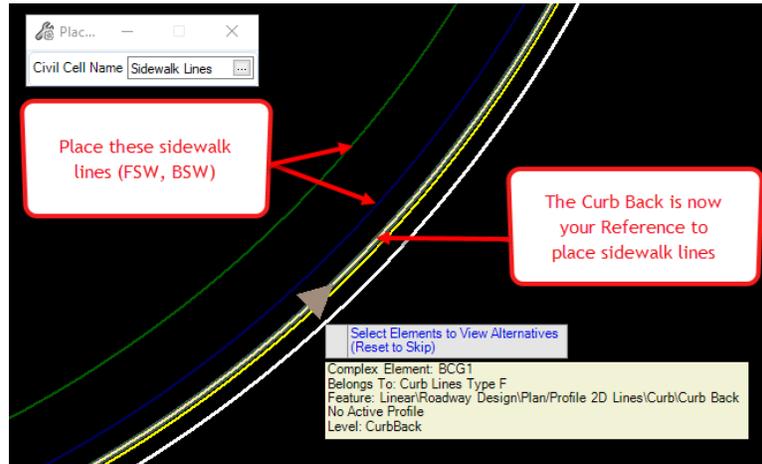
2. Navigate to the *FDOT_2D-Curb_Lines_And_Endings.dgnlib* and select the **Curb Lines Type F civil cell**.



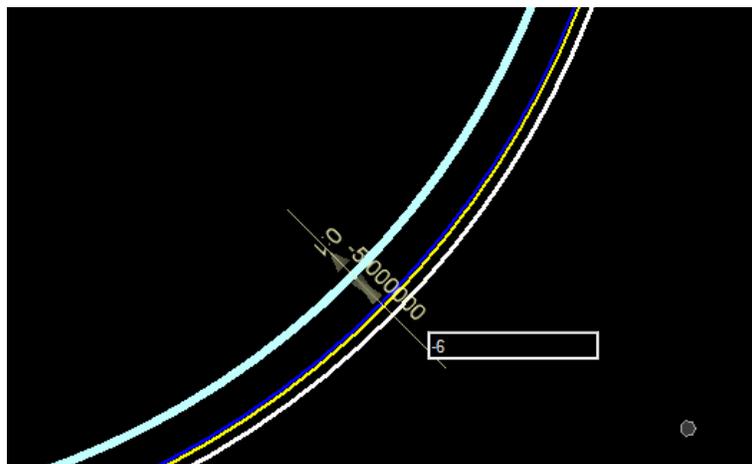
3. At the prompt, select the *NW_EOPA radius line*, reset to **View Alternates** and then data point to accept the **Civil Cell Placement**.



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



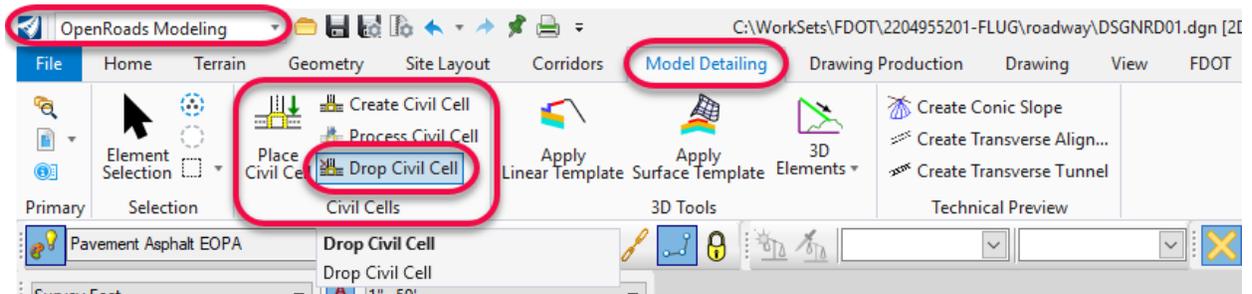
5. Edit the *SidewalkBack* line from -5 to -6 feet from the *SidewalkFront* line of the element. Also the *SidewalkFront* needs to be set from -4 to 0 feet.



Exercise 2.18 Create a Custom Civil Cell for Other Radii

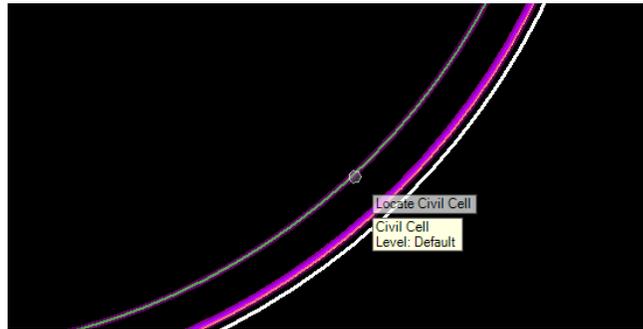
1. From the Model Detailing Tab and the Civil Cells Group, select the **Drop Civil Cell** tool.

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



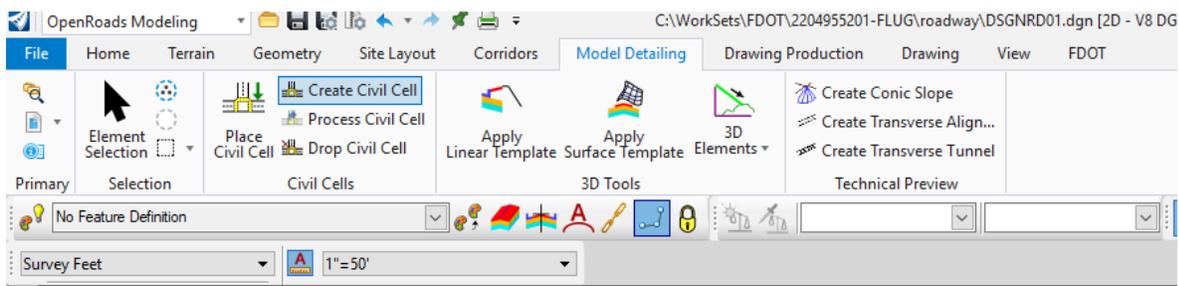
2. Select the SidewalkLines *Civil Cell* in the *View* and data point to drop the Civil Cell. Repeat this for the Curb Civil Cell.

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

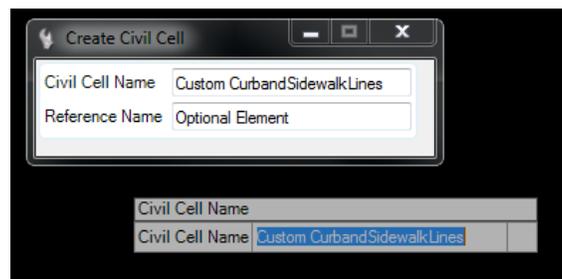


3. Use *Civil Cells*, **Create Civil Cell** tool. This can be found in the Model Detailing Tab and the Civil Cells Group of the Ribbon.

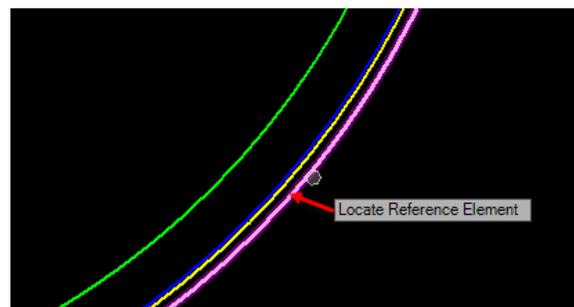
OPENROADS MODELING>MODEL DETAILING>CIVIL CELLS>Create Civil Cell



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



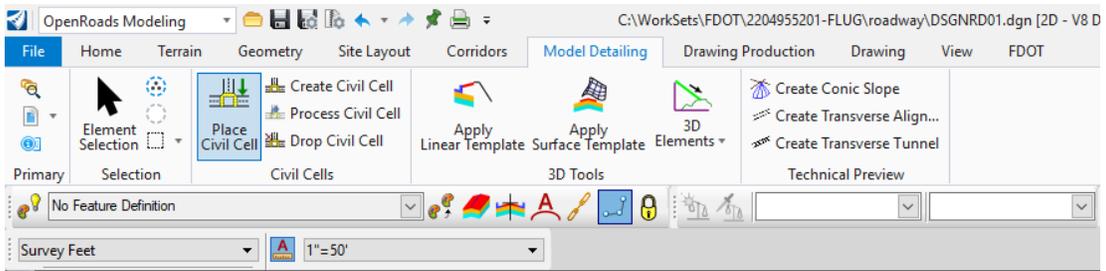
- b. Data point to accept the new *Name*.
- c. At the prompt, locate *Reference Element* and select the **NW_EOPA** line.



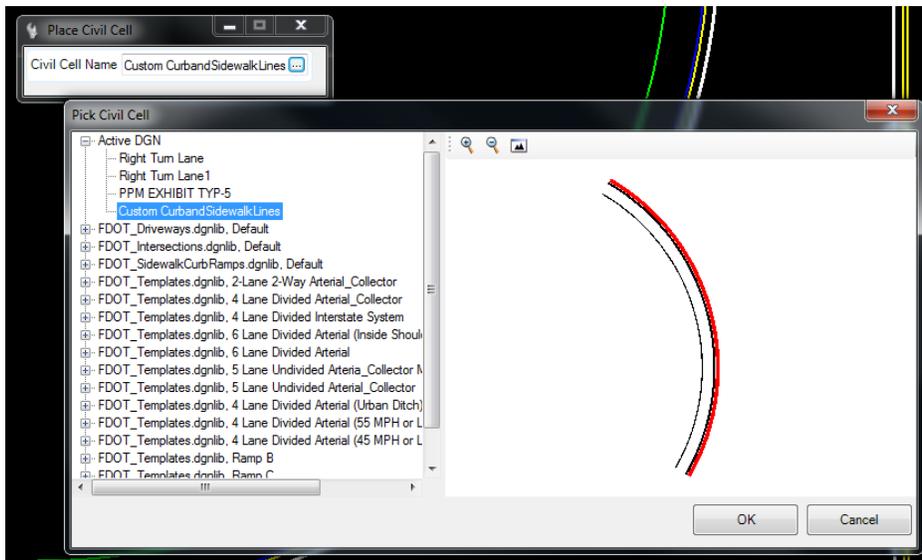
- d. Reset to Locate Reference Element.
- e. Reset to Optional Reference.
- f. Data Point to accept **Civil Cell**.

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

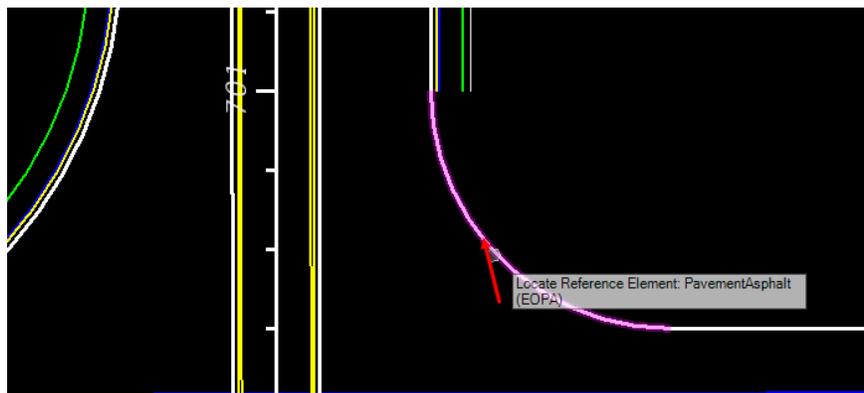
OPENROADS MODELING>MODEL DETAILING>CIVIL CELLS>Place Civil Cell.



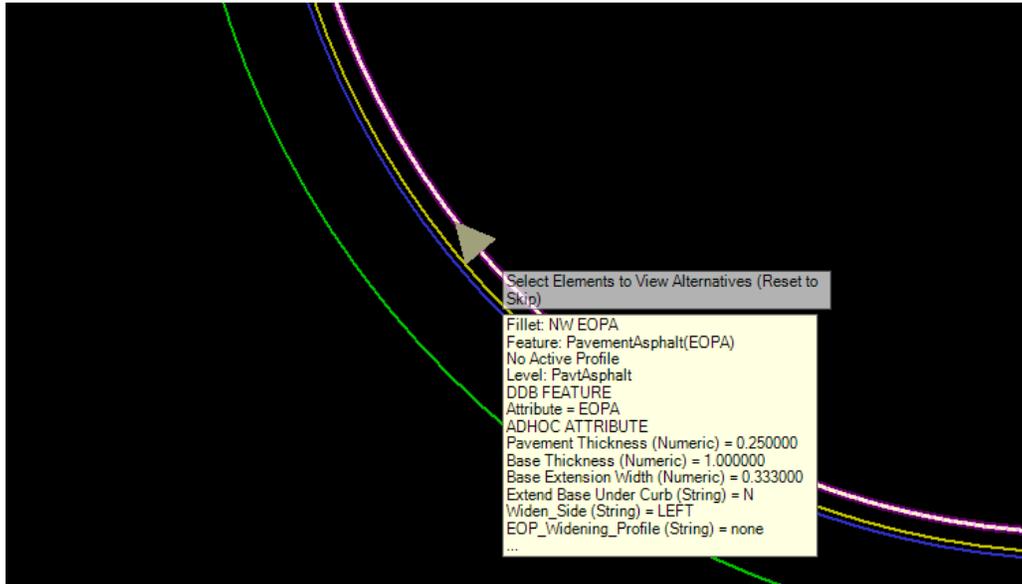
- a. If the **Custom CurbandSidewalkLines** is not active, navigate to the *Active DGN* and select it from the list. Click **OK**.



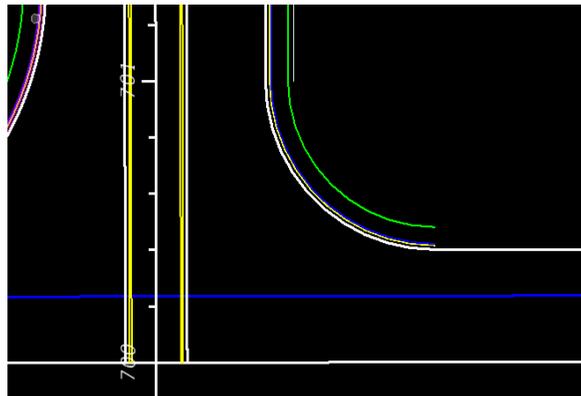
- b. At the prompt, select the *NE_EOPA Radius line*.



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



- d. Reset to View alternates.
- e. Data Point to accept the **Civil Cell Placement**.



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

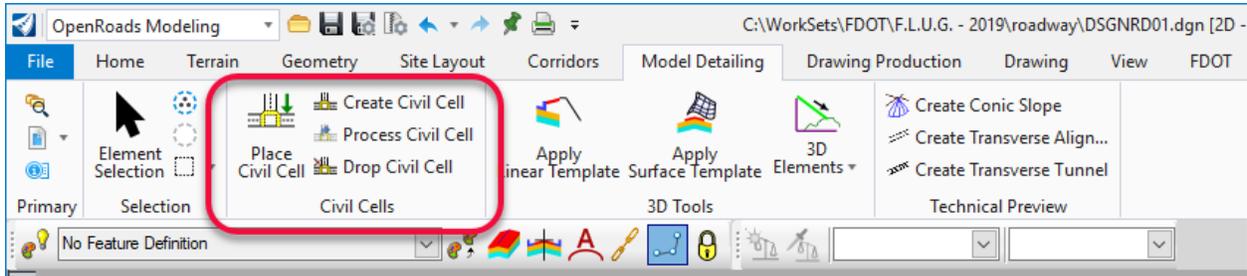


- 6. Leave the **SE Radius** without curb and sidewalk.

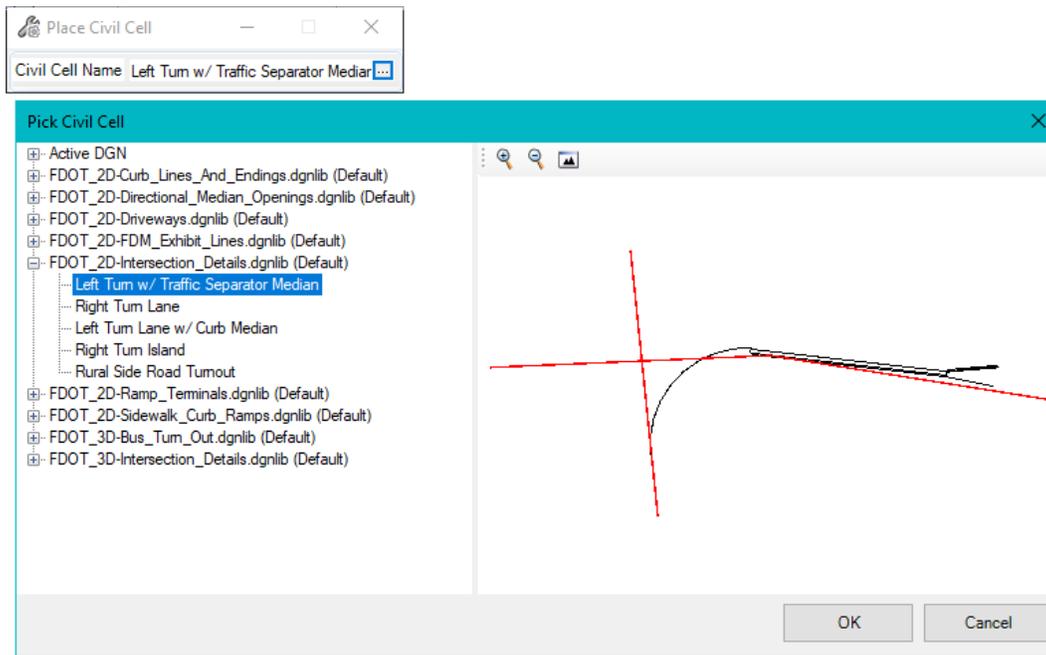
Exercise 2.19 Place Left Turn with Traffic Separator

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

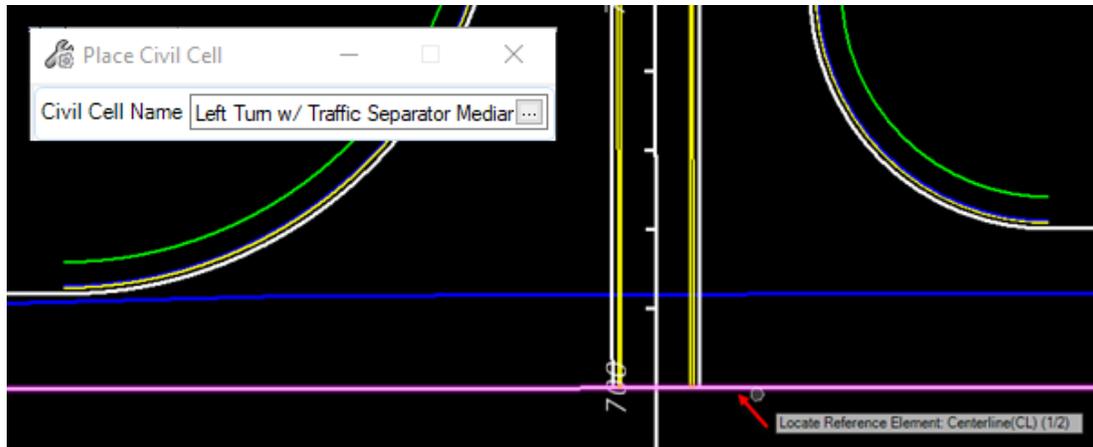
OPENROADS MODELING>MODEL DETAILING>CIVIL CELLS>Place Civil Cell



- a. Navigate to the *FDOT_Intersections.dgnlib* and select **Left Turn with TS civil cell**.

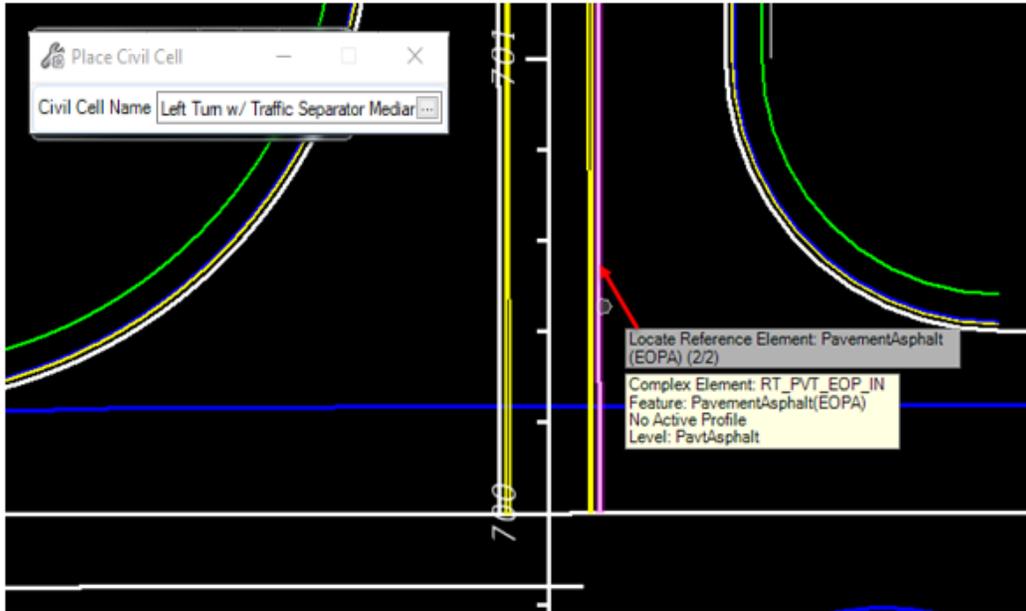


- b. At the *Locate Reference Element Centerline*, select the **BL98** line in the View.

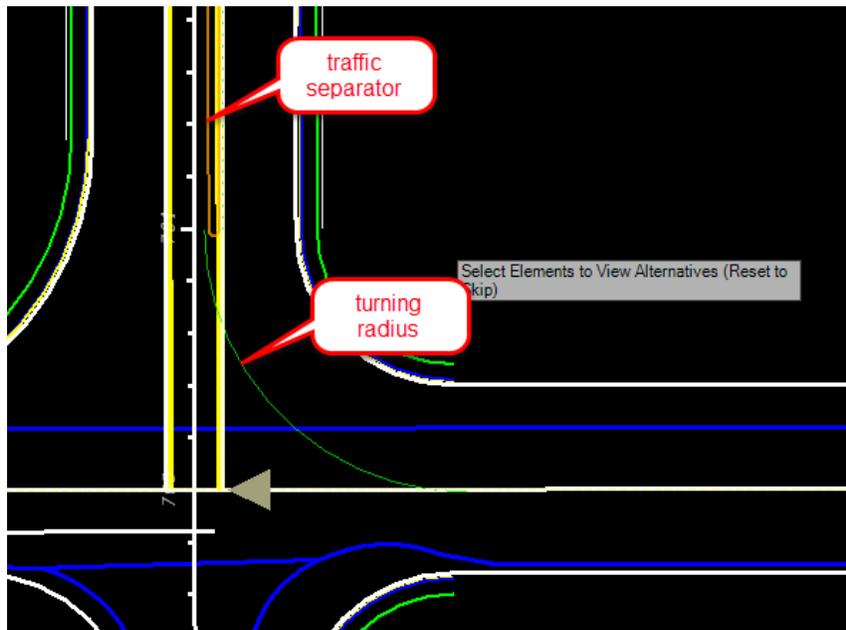


- c. At the *Locate Reference Element Pavement Asphalt EOPA*, select the **RT_PVT_EOP_IN** line in the View.

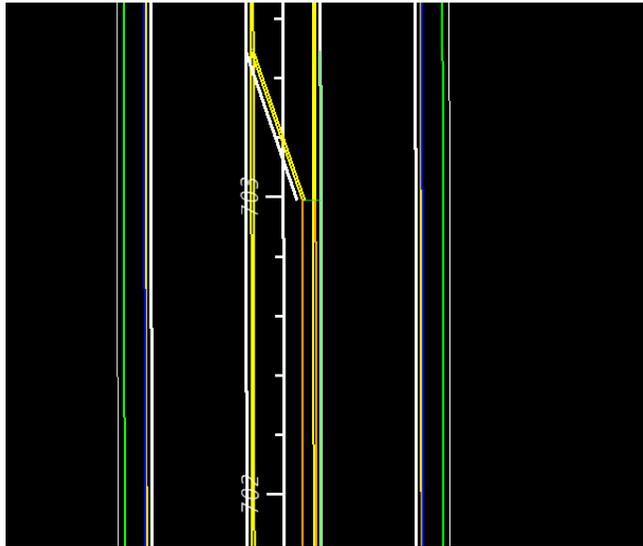
HINT For the direction of travel I, this is always the left median EOP line



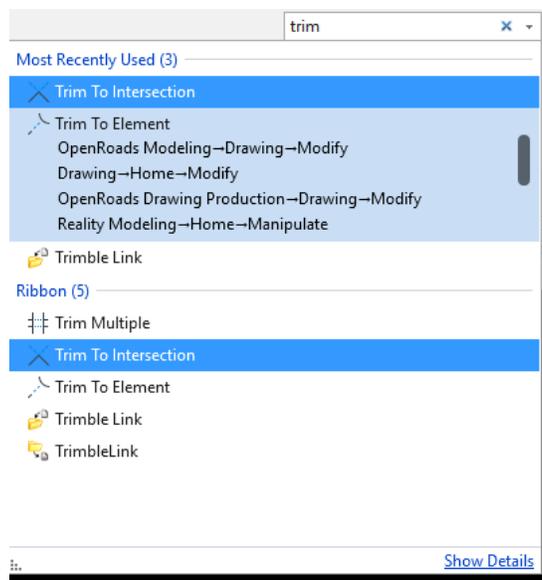
- d. Click on the **Arrow** of both *Reference Elements* to **View Alternates**, when the *Green Turning Radius* and *Traffic Separator* are both in the correct place, **Reset** to skip.



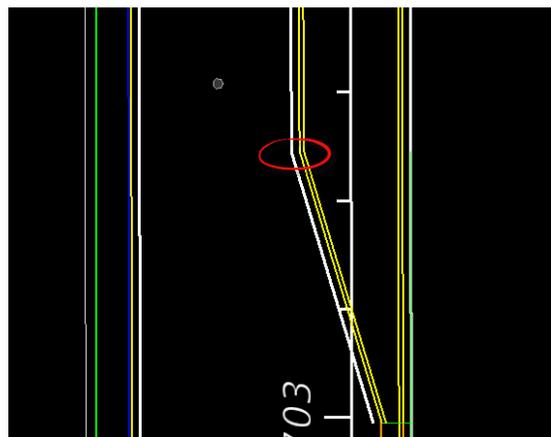
- e. Data point to accept the **Civil Cell Placement** and view the left turn lane on **SR61** at *BL98 Intersection*.



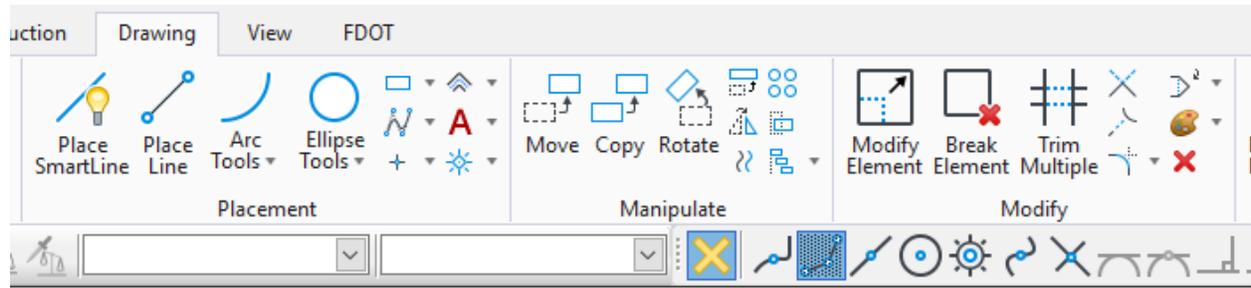
- 2. Use OpenRoads **Trim to Intersection** tool. A quick way to find a tool is to use the search ribbon.



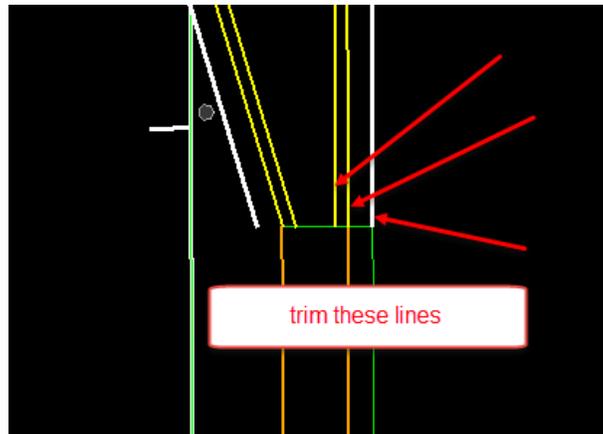
- 3. Trim the *curb median elements* at the **begin taper** as shown.



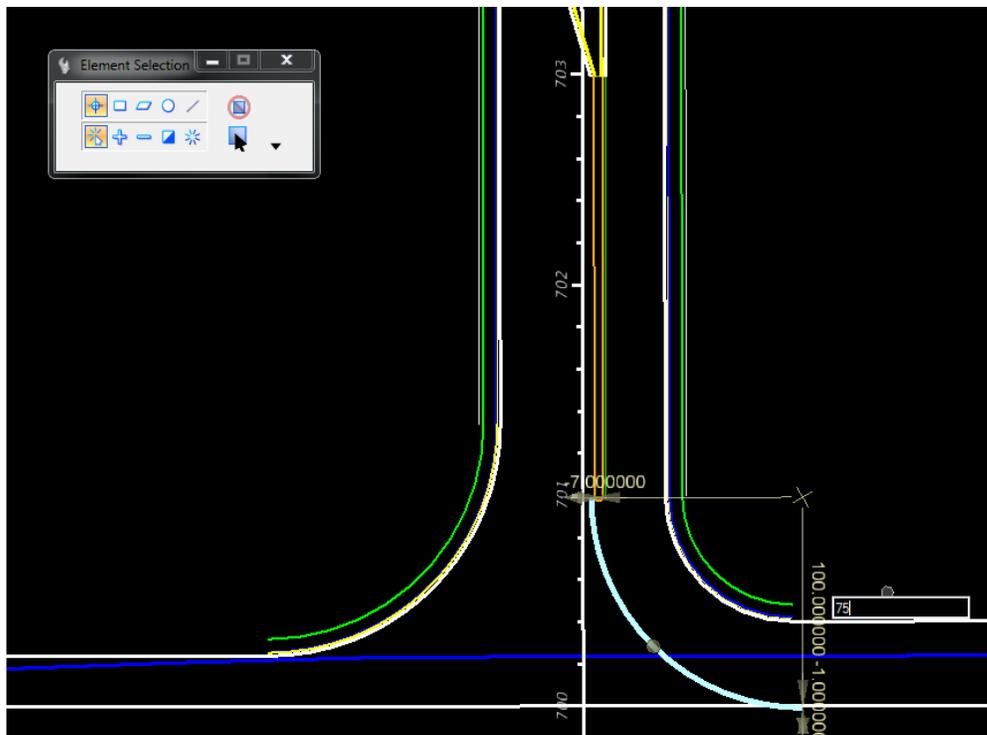
- Use OpenRoads **Trim to Element** tool. Which can found in the Drawing Tab, and the Modify Group



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

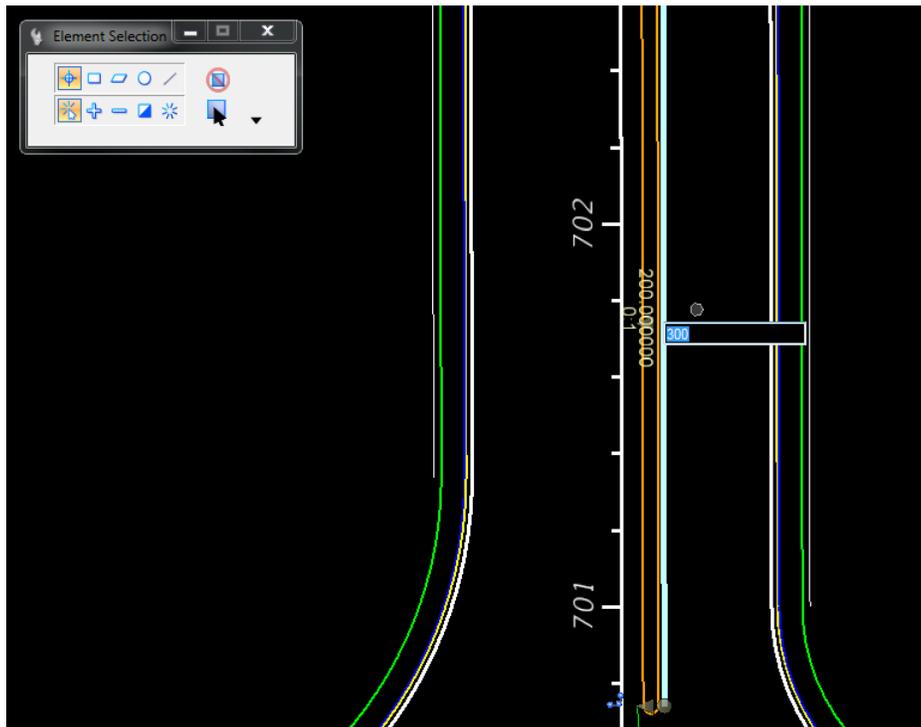


- View the placed left turn, change the *Turning Radius* from **100 feet** to **75 feet**.

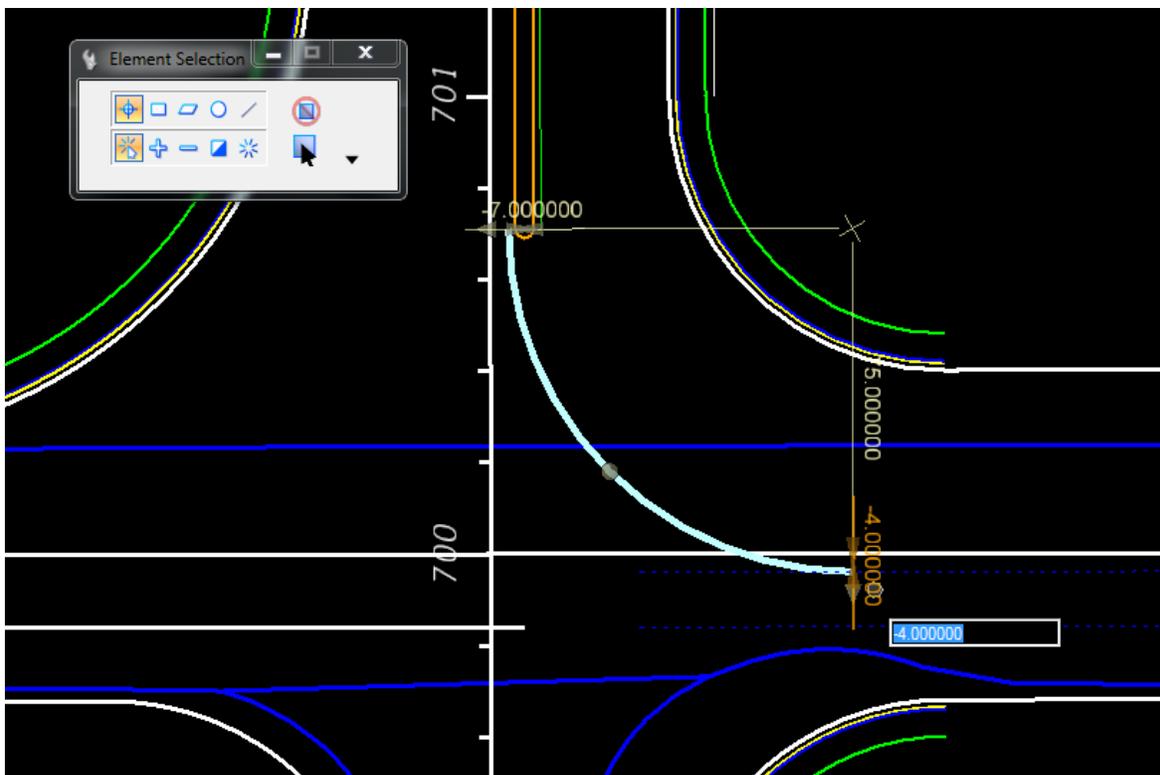


- View the placed left turn, change the *Storage Length* from **200 feet** to **300 feet**.

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



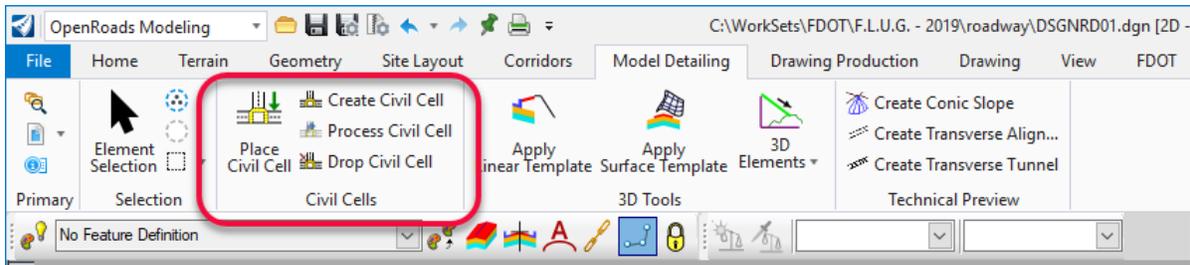
- Zoom to the *Turning Radius Offset Dimension*, change the value from -1 feet to -4 feet.



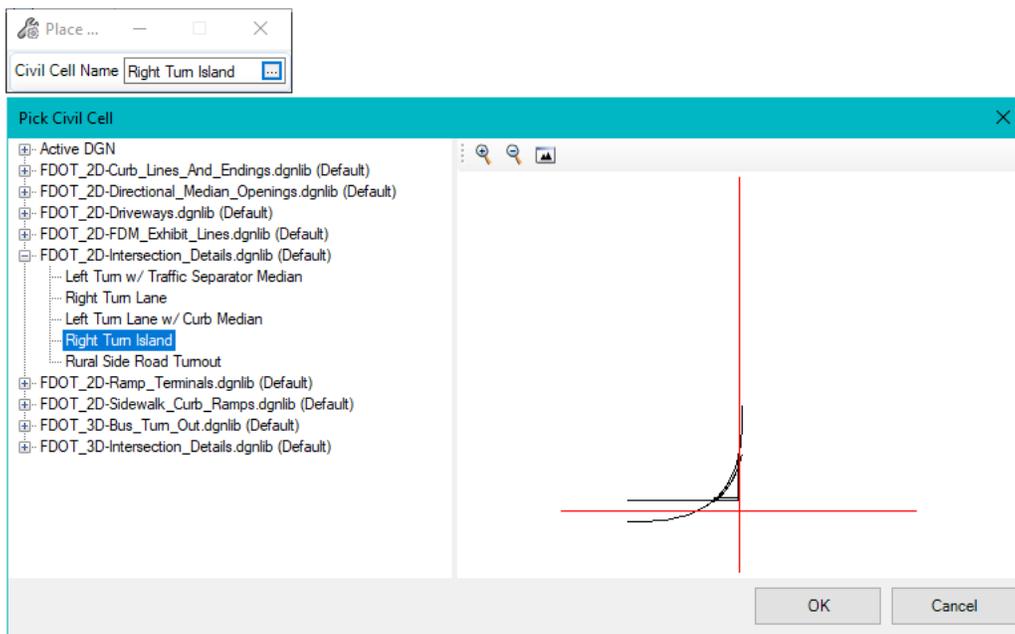
Exercise 2.20 Place Right Turn Island

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

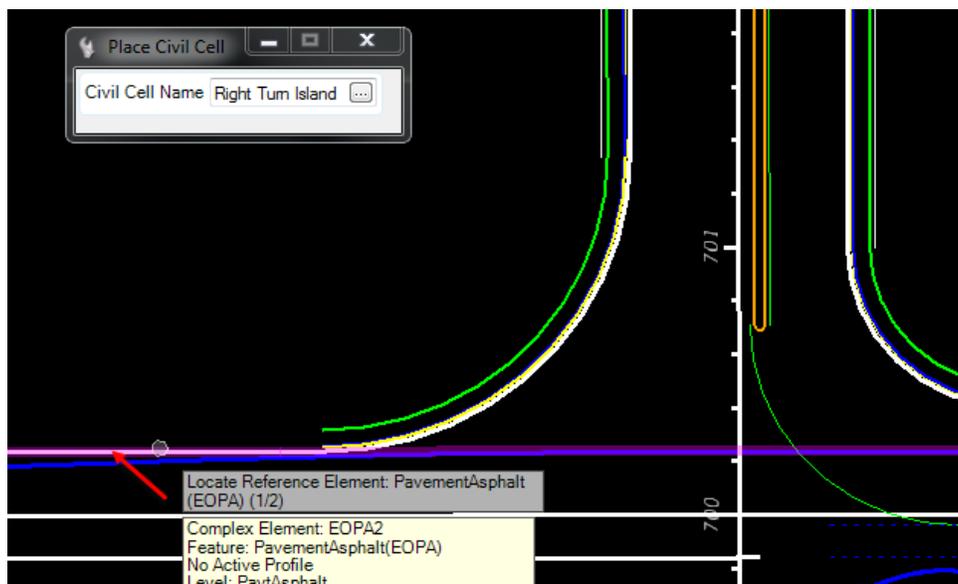
OPENROADS MODELING>MODEL DETAILING>CIVIL CELLS>Place Civil Cell



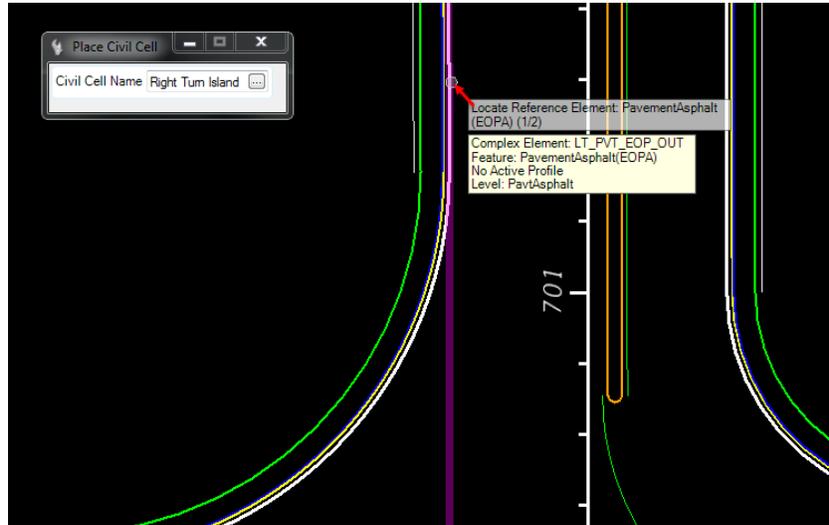
2. Navigate to the *FDOT_2D-Intersection_Details.dgnlib*, select **Right Turn Island**. Click **OK**.



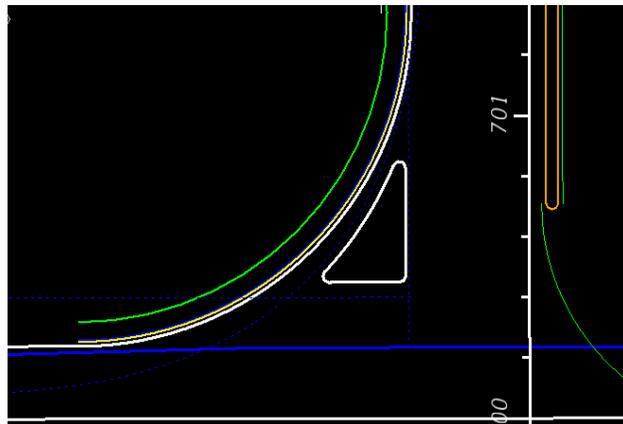
3. Select the first **Pavement Asphalt EOPA** lines.



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

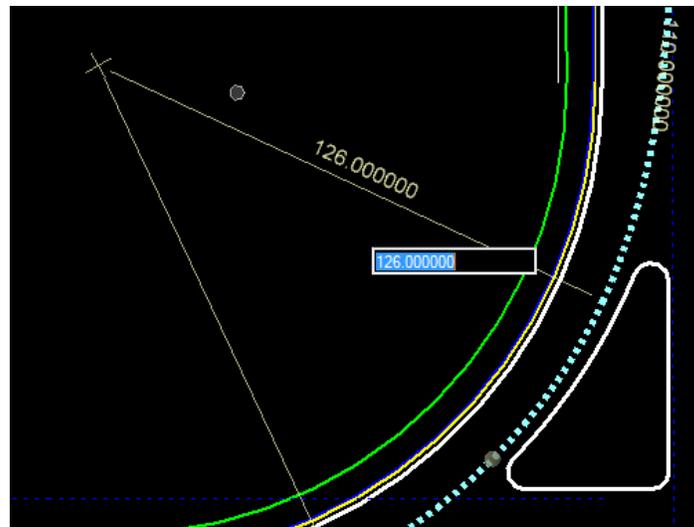


5. Reset to Skip Alternates.
6. Data Point to accept the **Civil Cell**.

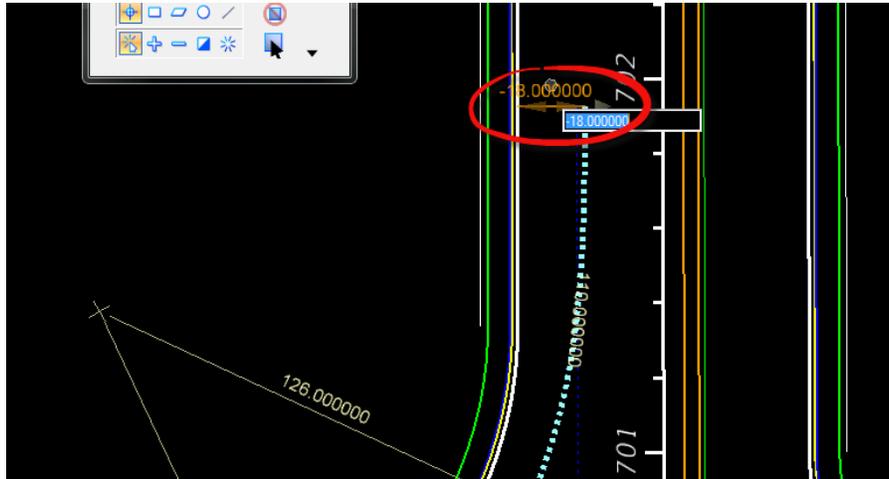


➤ **Change the Right Turn Island Parameters**

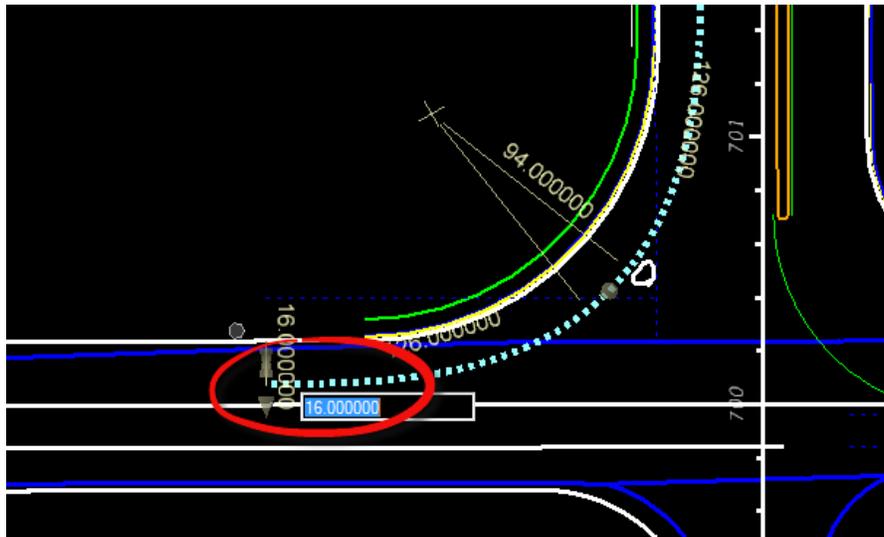
1. Change *Const Lines Blue Dashed Arc Radius* from **110 feet** to **126 feet**.



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



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



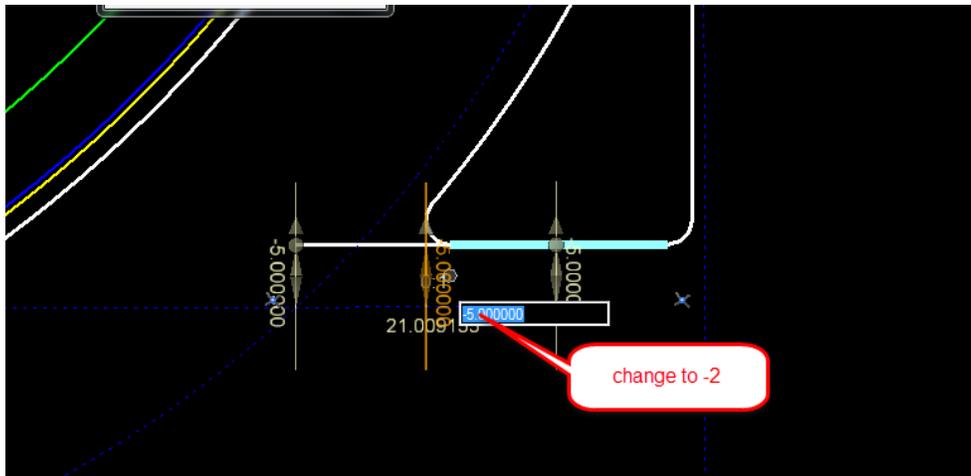
- 4. Change the straight Const Lines Blue Dashed SR61 EOP Offset from **1 foot** to **-16 feet**.



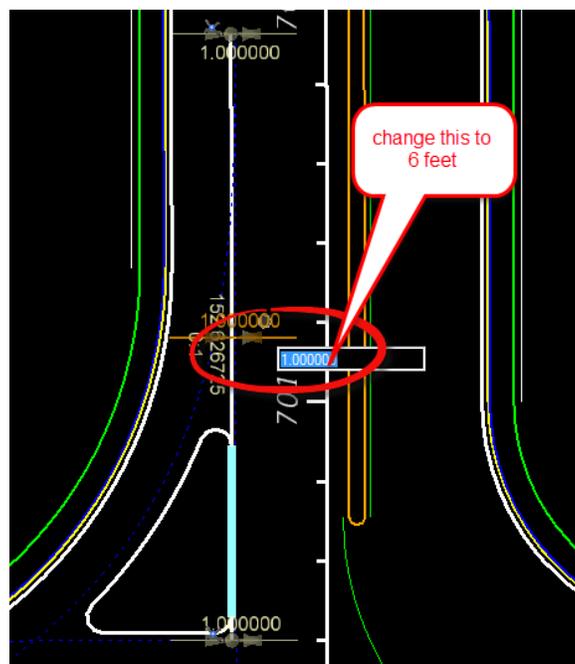
- 5. Check Const Lines Blue Dashed BL98 EOP Offset is **-16 feet**.



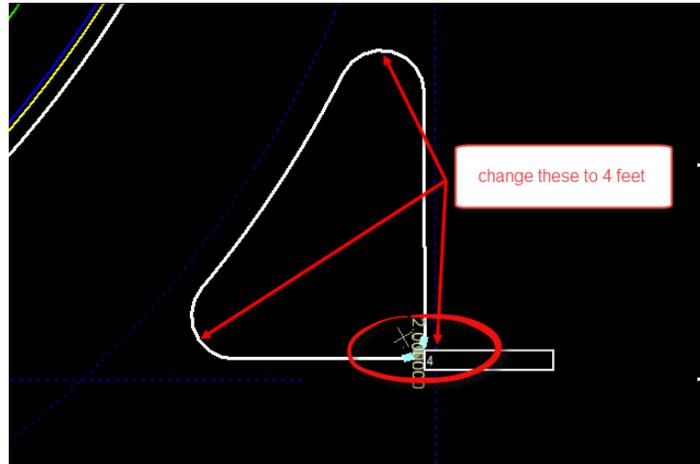
- 6. Change *Island EOPA Offset* from the Const Lines Blue Dashed BL98 from **-5 feet** to **-2 feet**.



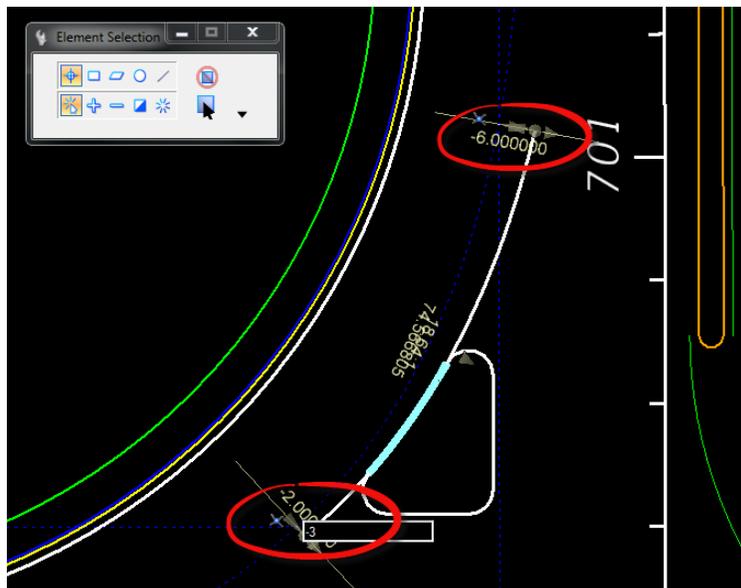
- 7. Change *Island EOPA Offset* from the Const Lines Blue Dashed SR61 from **1 foot** to **6 feet**.



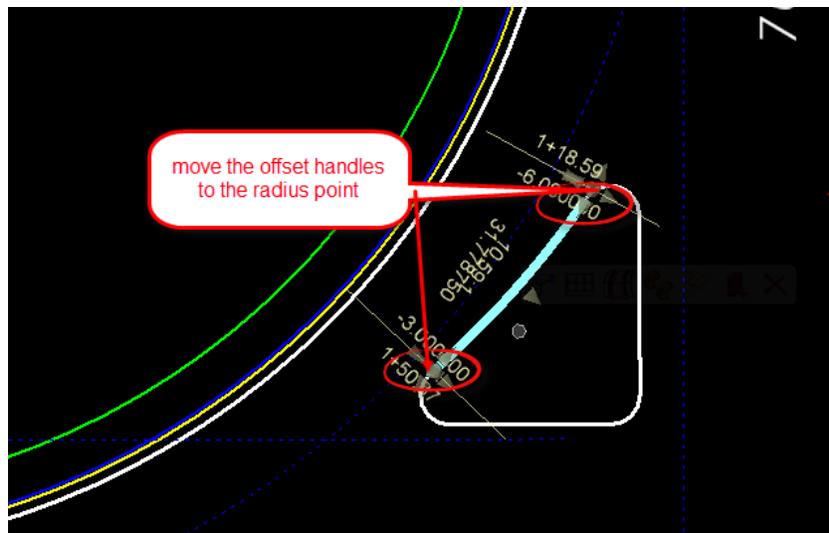
8. Change *Island Radii* to **4 feet**.



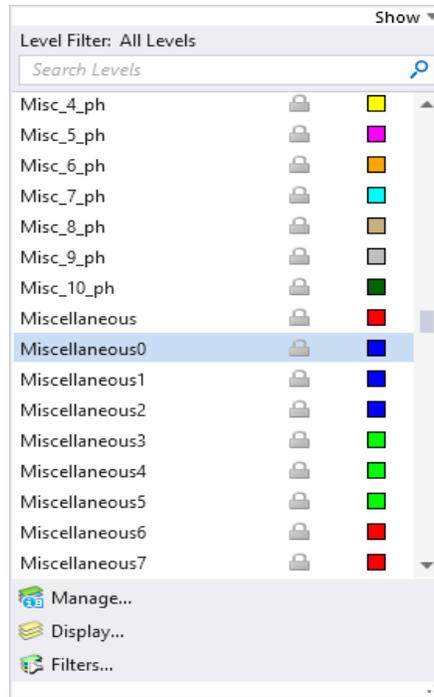
9. Change the Island ingress Offset **-4 feet** and Island Egress Offset **-3 feet**.



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



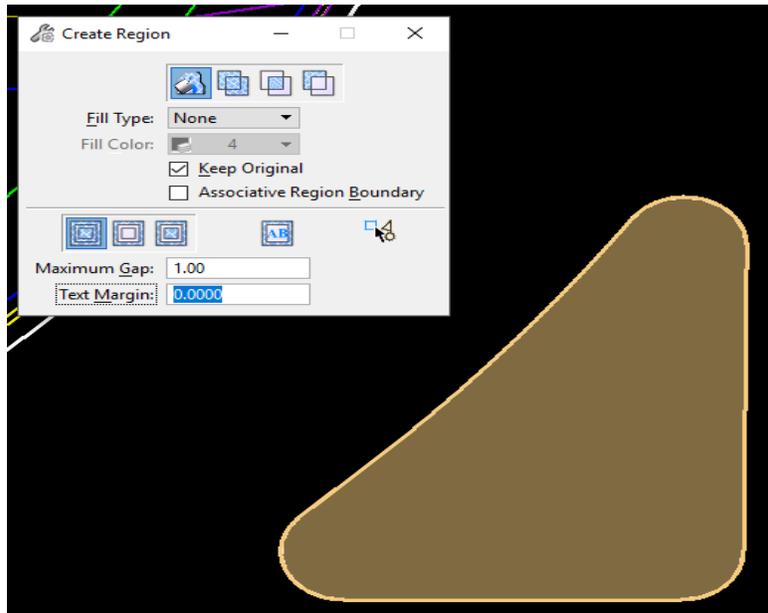
11. Change the *Active Level* to **Miscellaneous0**.



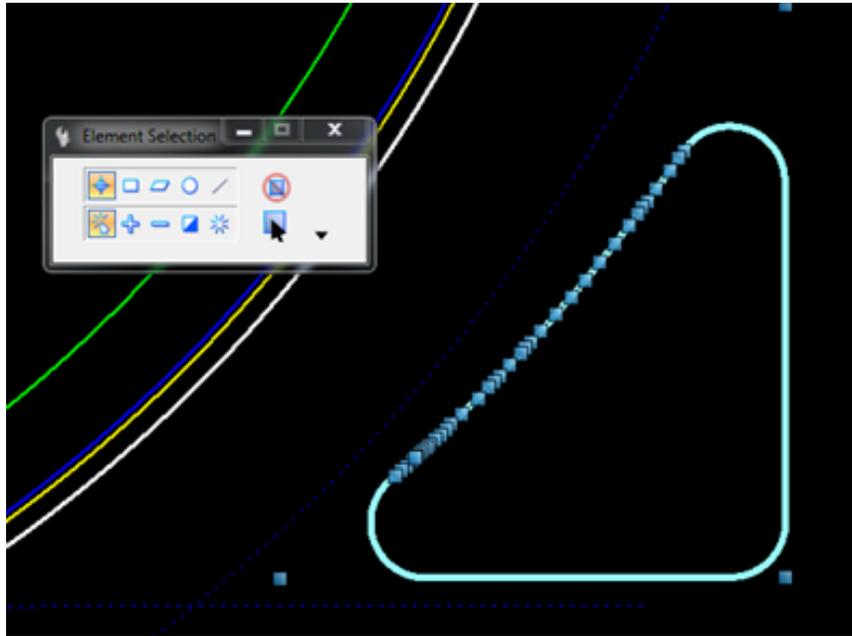
12. Use the OpenRoads **Crate Region Flood** tool, this tool can be found by switching to the Drawing Workflow and then the Home Tab and with in the Groups Group will be the Create Region

DRAWING>HOME>GROUP>Create Region

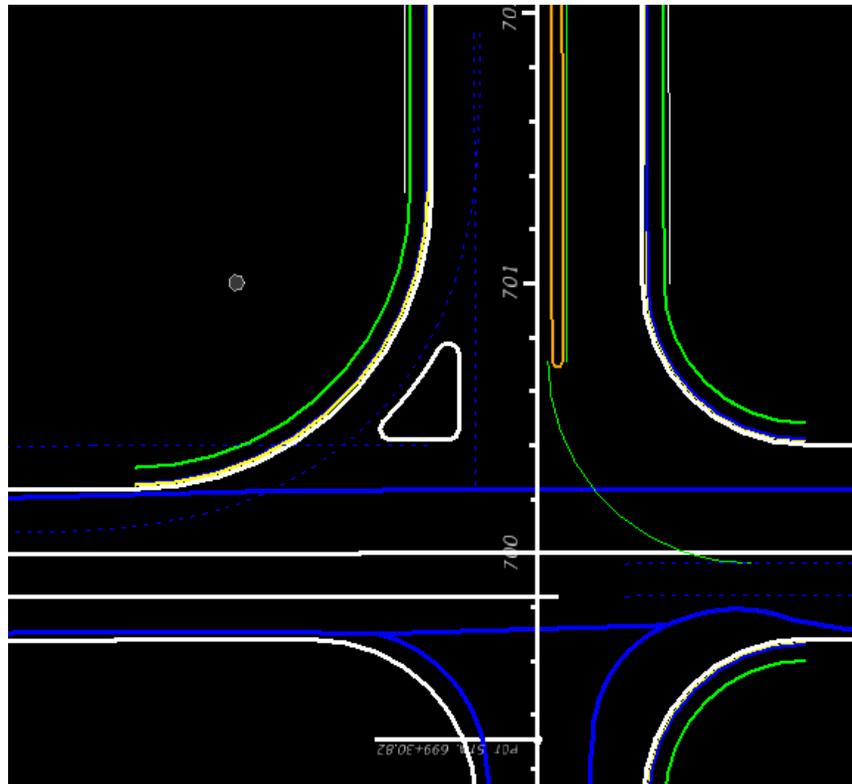
13. Select the Center of the Island, and then data point to accept the closed element.



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



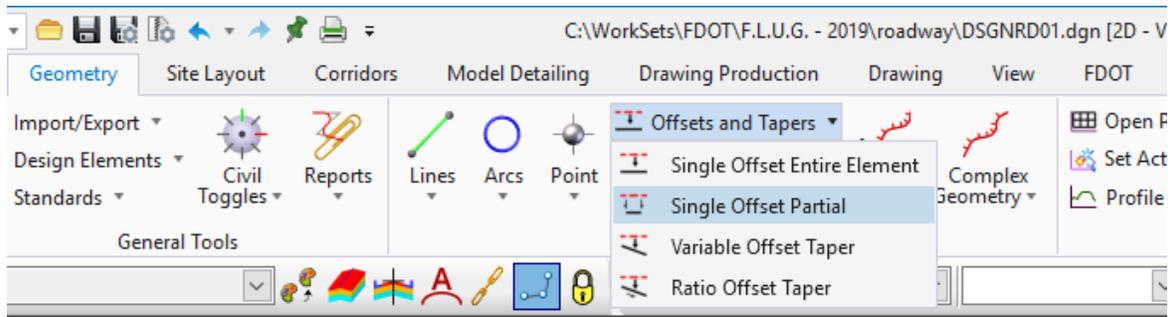
15. View the modified **Right Turn Island**.



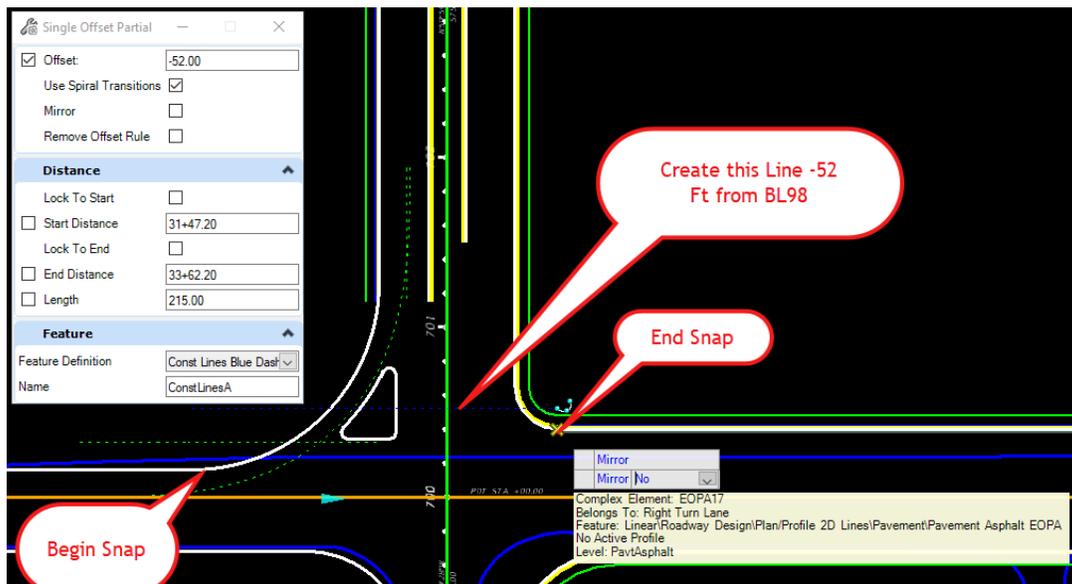
Exercise 2.21 For BL98 Intersection Crosswalks Lines

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

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

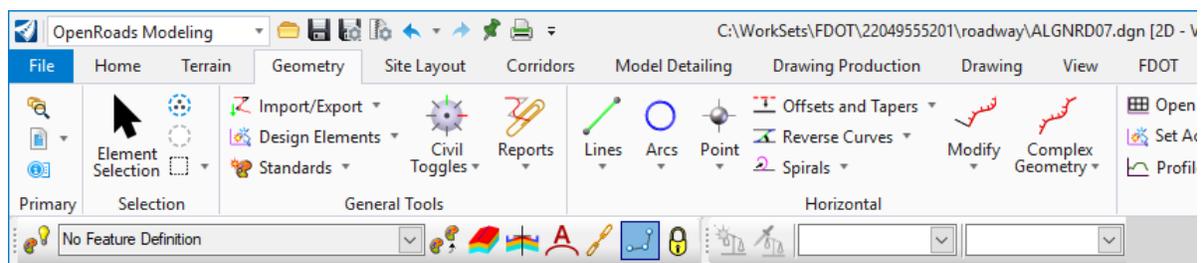


2. Create a **Partial Offset** line from BL98 -52 feet across the intersection. Use *Feature Definition Const Lines Blue Dash* and *Name ConstLineA*.

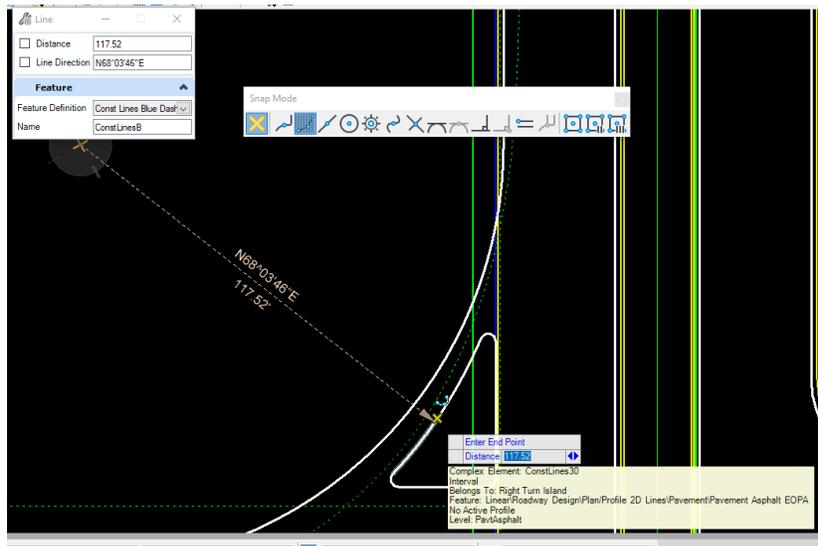


3. Use *Geometry Tab and the Horizontal Group*, to select the **Line Between Points** tool.

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

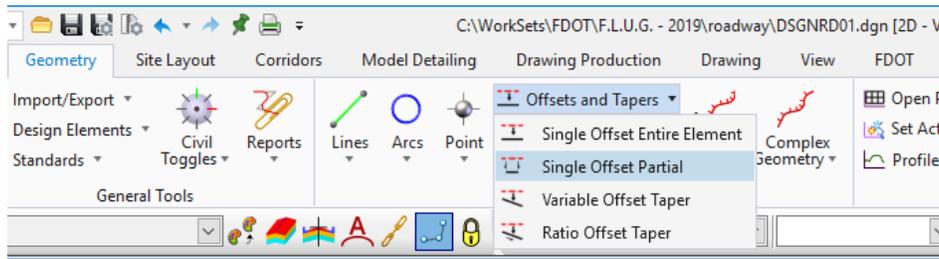


4. Create a line from the curve center to the midpoint of the *Island Radius EOP*. Use *Feature Definition Const Lines Blue Dash* and *Name Line B*.



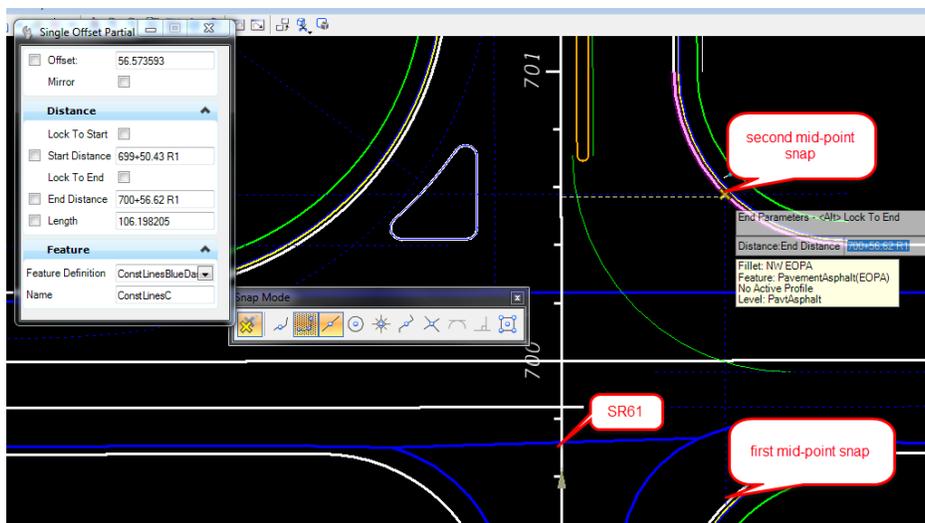
5. Use the *Geometry Tab and the Horizontal Group*, to select **Single Offset Partial** tool located in the Offsets and Tapers button.

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



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

HINT Snap to the mid-point of the radii.



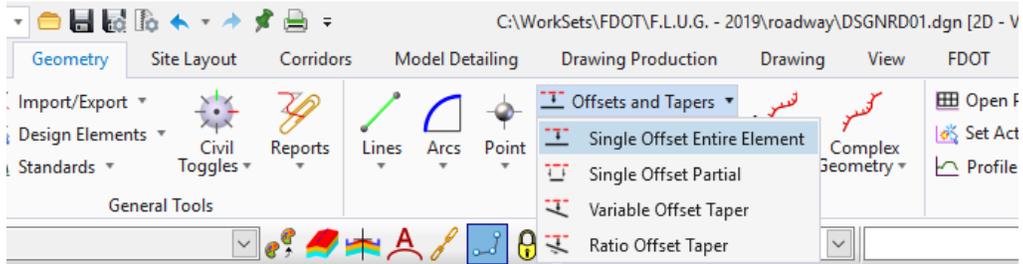
Note Use these lines in later exercises to place *3D Sidewalk Ramp Civil Cells*.

Exercise 2.22 Create BL98 Turnouts

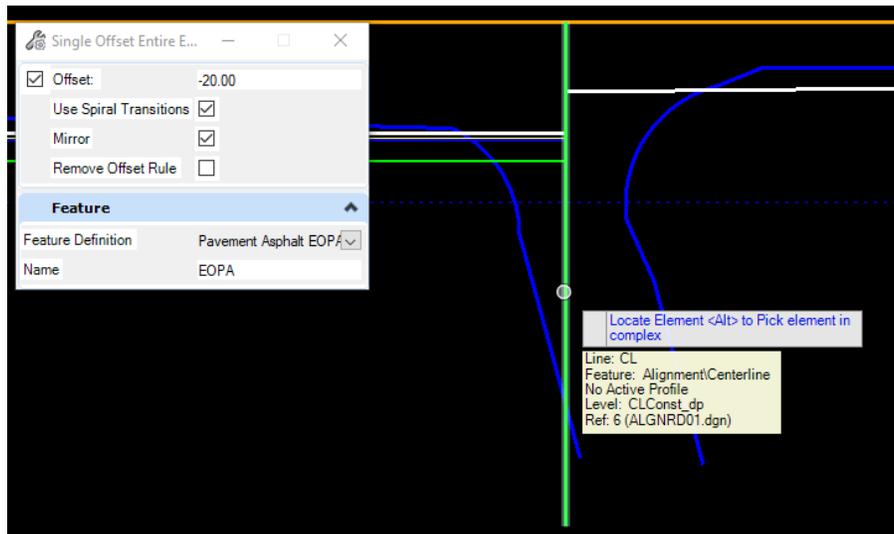
In this exercise the additional rural turnouts can be added to BL98.

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

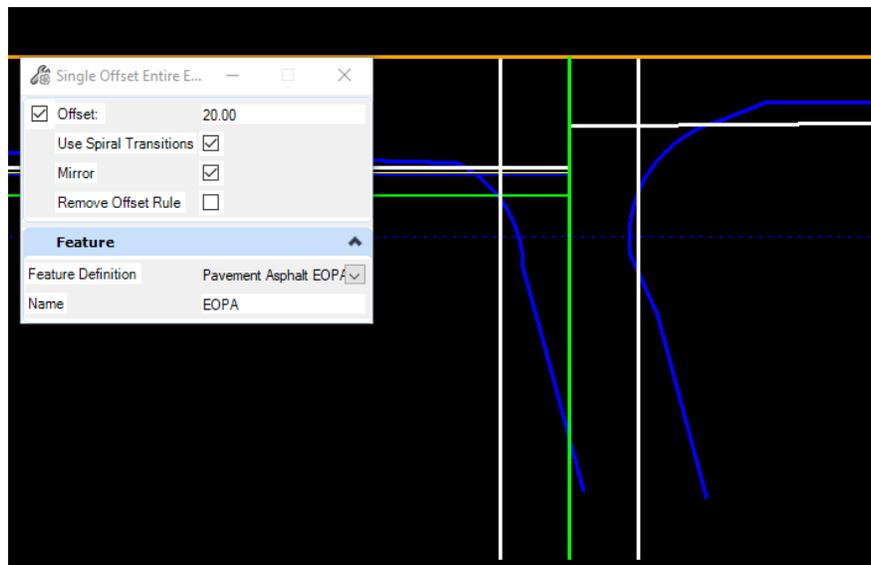
OPENROADS MODELING>GEOMETRY>HORIZONTAL>Offsets and Tapers>Single Offset Entire Element



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

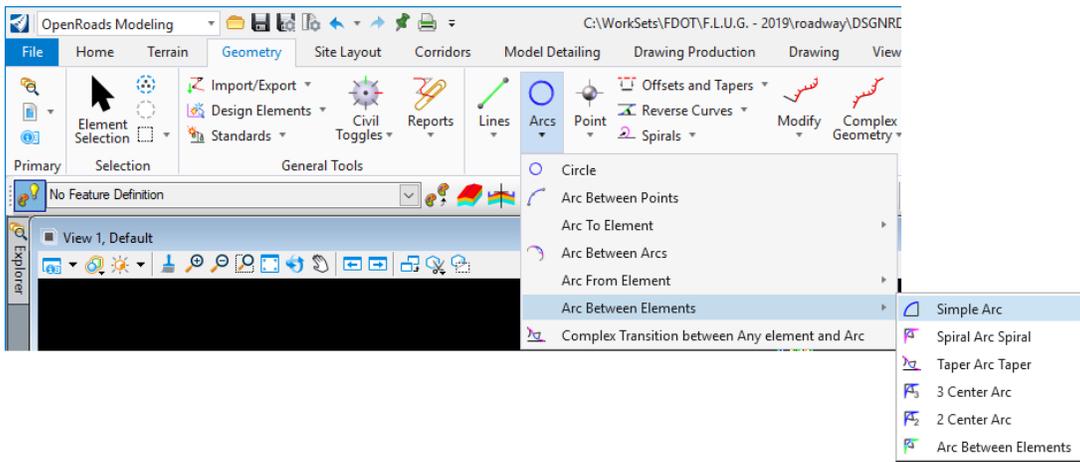


- b. Accept the **-20 feet Offset** and *Mirror*.

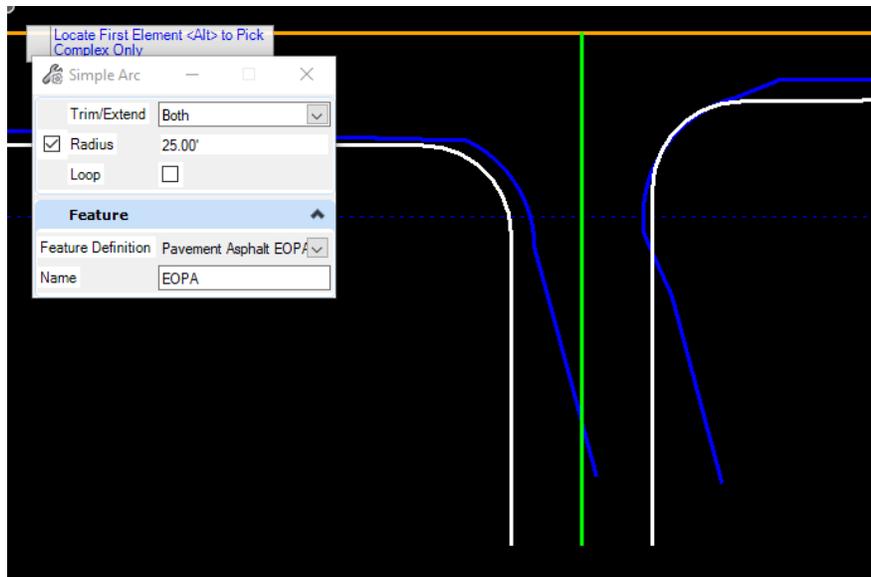


2. Use the *Geometry Tab and the Horizontal Group*, to select the **Simple Arc** tool located in the ARCS button then the drop down of Arc Between Elements.

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

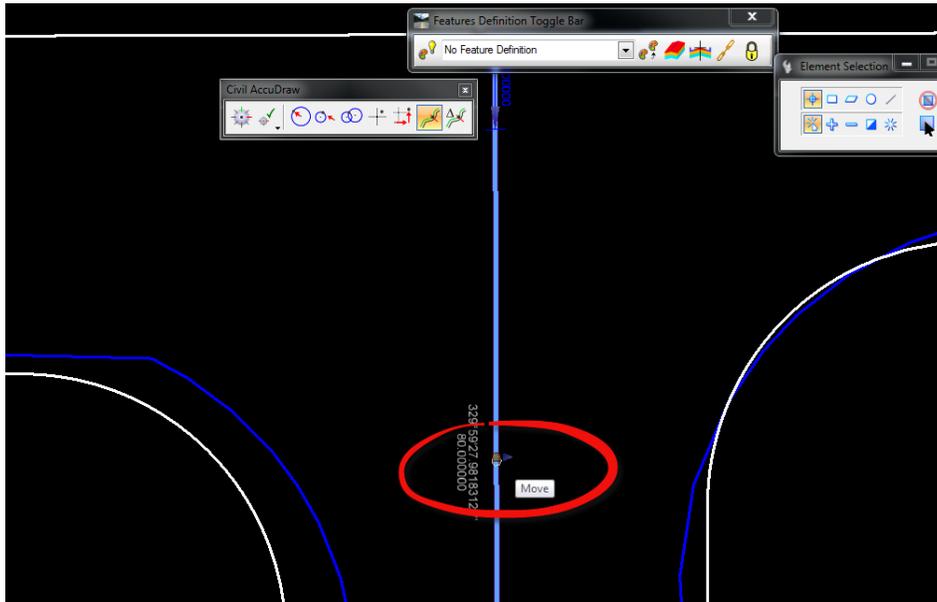


- c. In the Simple Arc tool set *Trim/Extend* to **Both**, then set the Radius to **25.0'**. Be sure to set a Feature Definition of Pavement Asphalt EOPA. Then place the *Radius* on both sides.

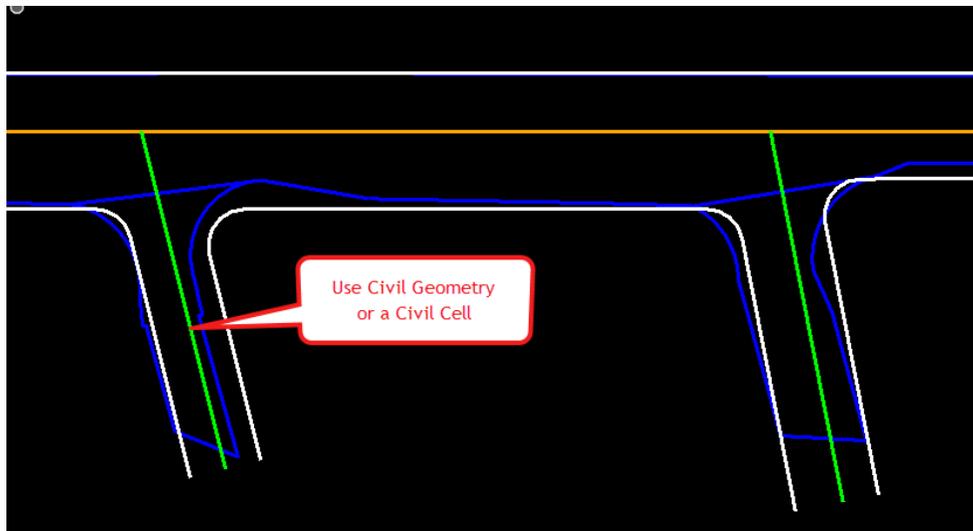


d. Change the *Geometry* to fit the existing driveway.

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



3. (EXTRA Exercise) Repeat the steps above to create an addition Turnout as shown below <OR> use the Civil Cell, FDOT_2D-Intersection_Details.dgnlib, and Side Road Turnout.
4. First place the Side Road Centerline make sure to go back into the ALGNRD file to adjust the centerline feature.

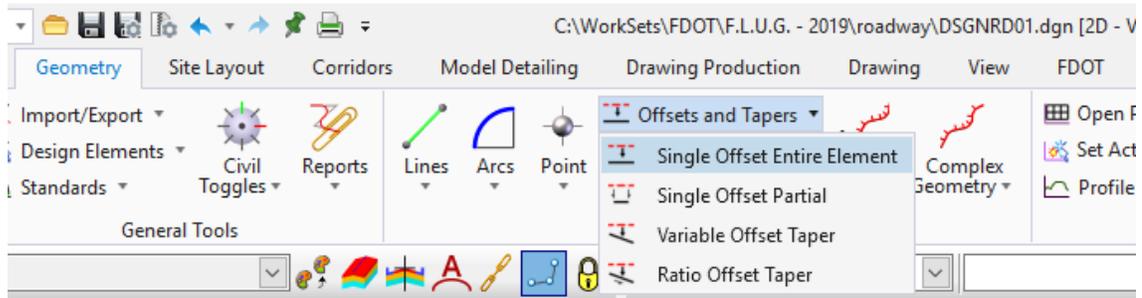


Exercise 2.23 For BL98 Intersection Shoulders

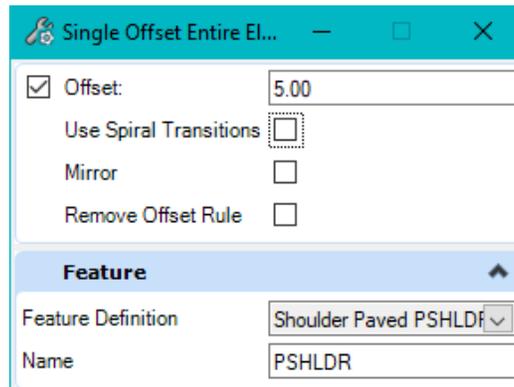
This exercise uses the Pavement Asphalt EOPA to create the **5 feet Shoulder Paved PSHLDR** Offset lines.

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

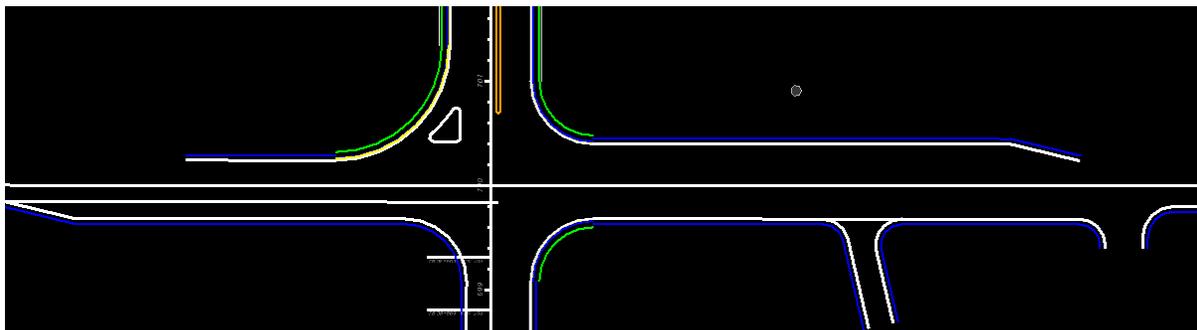
OPENROADS MODELING>GEOMETRY>HORIZONTAL>Offsets and Tapers>Single Offset Entire Element



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



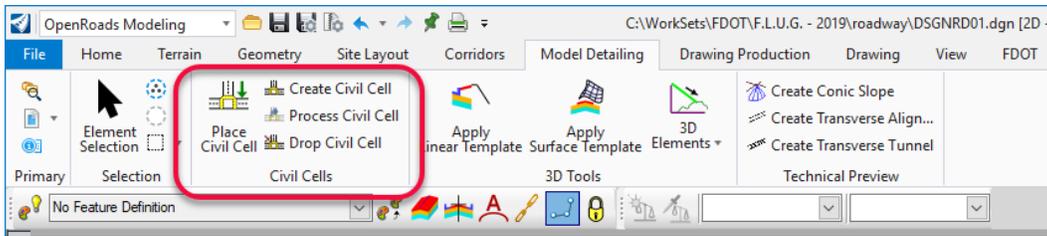
3. Select the **Pavement Asphalt EOPA** lines from the previous steps.
4. Repeat these steps to add the remaining *Shoulder lines* for the widening along BL98.
5. View the intersection below for complete details.



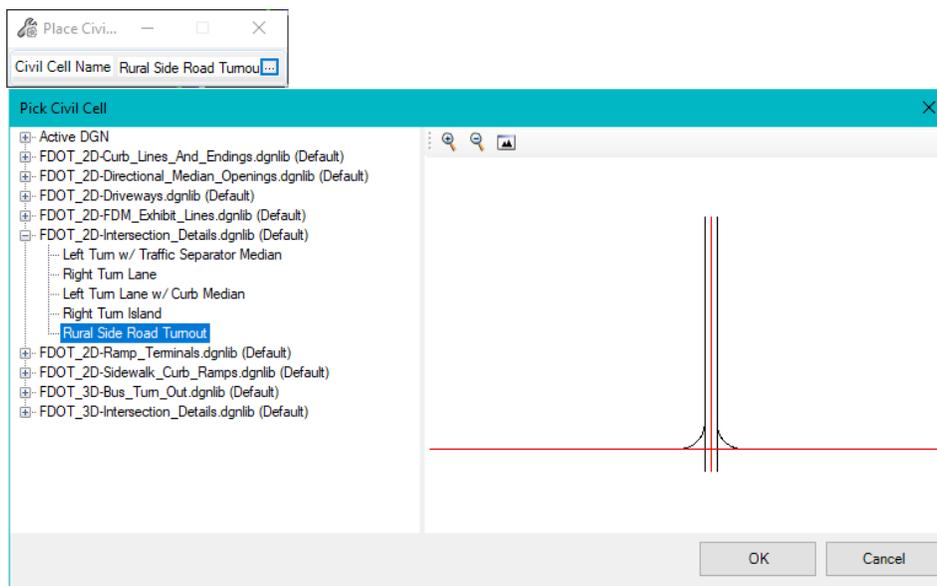
Exercise 2.24 For Friendship Intersection

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.

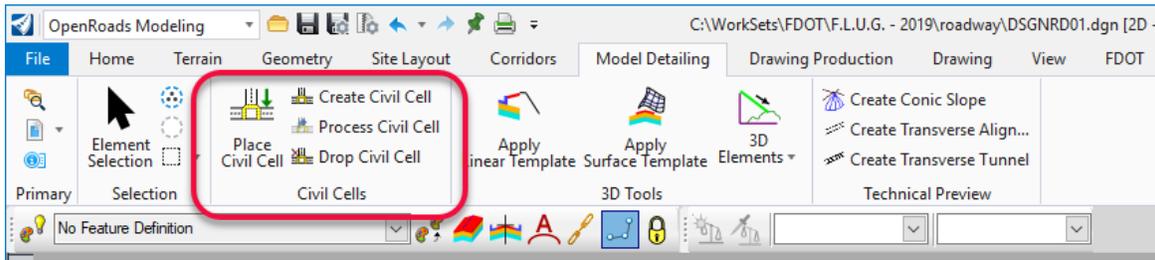
OPENROADS MODELING>DRAWING>MODIFY>Trim to Element

- 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.

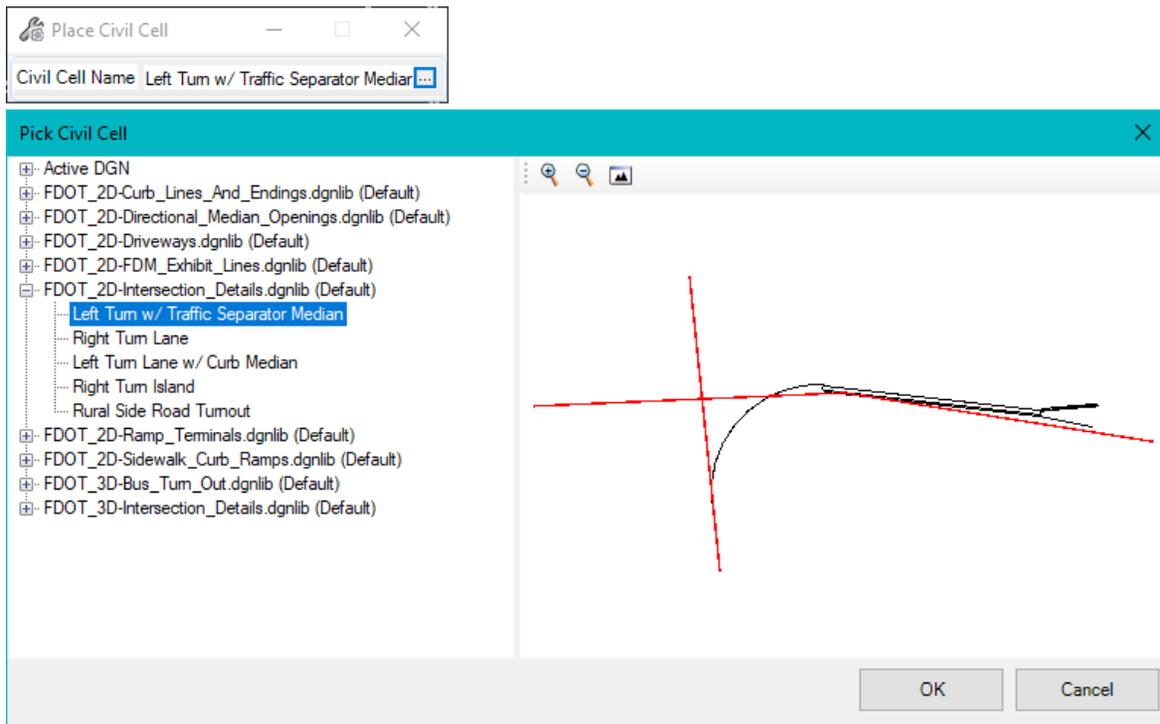


2. Use Model Detailing Tab and the Civil Cells Group, to select the **Place Civil Cell** tool.

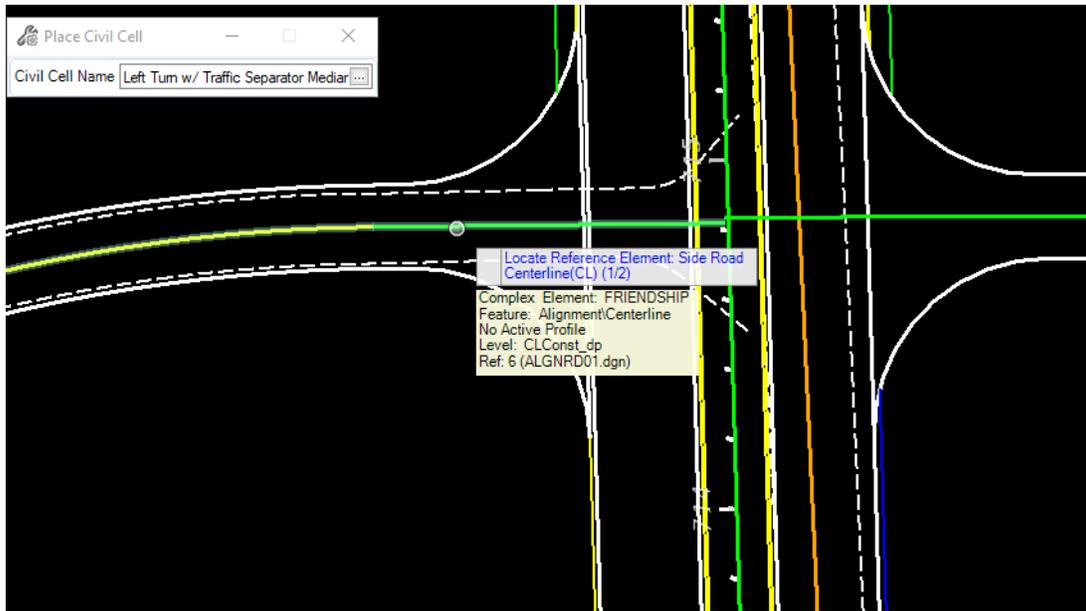
OPENROADS MODELING>MODEL DETAILING>CIVIL CELLS>Place Civil Cell



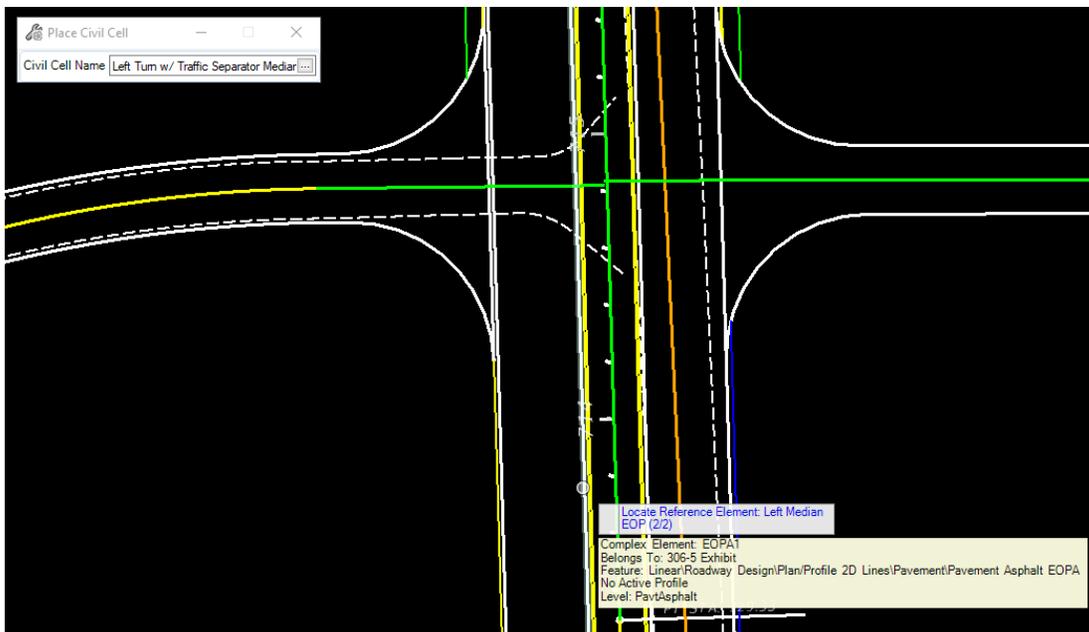
- g. From the Place Civil Cell dialog, navigate to the *FDOT_2D-Intersection_Details.dgnlib* and select **Left Turn w/ Traffic Separator Median**.



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



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



- j. Reset to Skip Alternates and data point to accept Civil Cell Placement.
- k. Change the turning *Radius* to **50 feet**.
- l. Change the turning lane storage length to 300 feet.



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

OPENROADS MODELING>DRAWING>MODIFY>Trim to Element



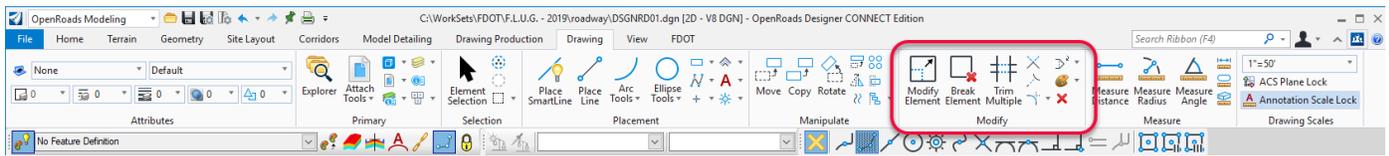
- 4. Move the **LT_PVT_EOP_IN** to the beginning of the *Traffic Separator*.

HINT Use the Const Lines Green as the cut element

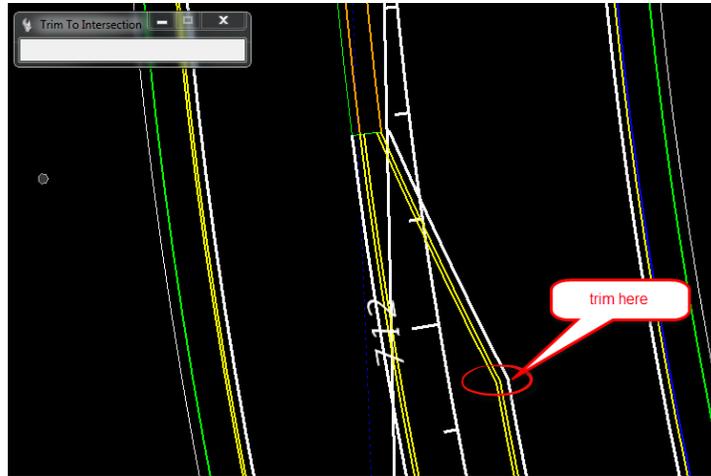


5. Use OpenRoads **Trim to Element** tool. This can be found using the **Drawing Tab** and the **Modify Group**. You can also use the **Search on the Ribbon**.

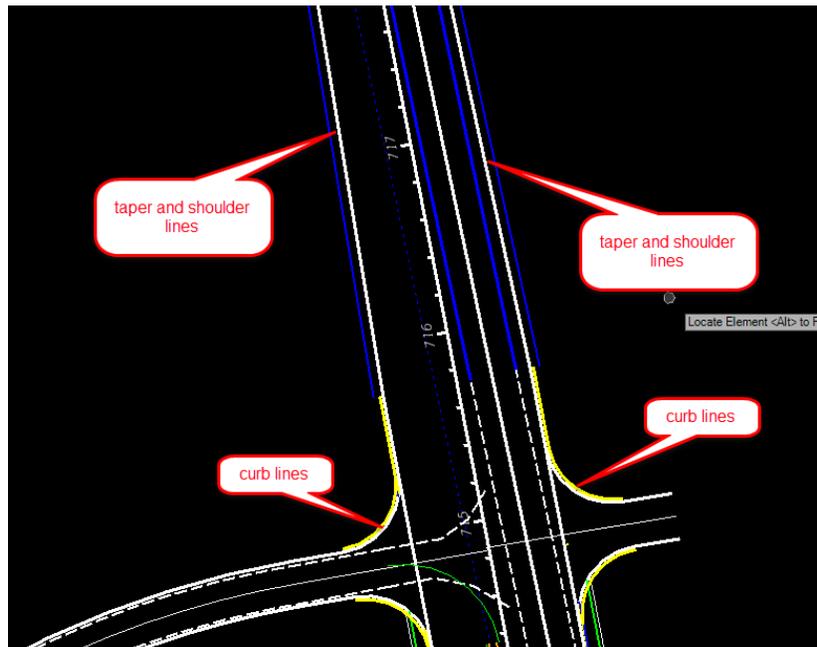
OPENROADS MODELING>DRAWING>MODIFY>Trim to Element



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



7. (EXTRA Exercises) Complete the *Intersection with Civil Geometry* tools as follows below:
 - m. Add **Curb** lines for each of the *Radius*.
 - n. Trim **Sidewalk** lines into the *Radius Curb* lines. There is no sidewalk along SR61 north of Friendship Road.
 - o. Add **Pavement Asphalt EOPA Taper** lines from the Intersection Radii at Friendship to the End Station of SR61 11 left.
 - p. Add **Shoulder Paved PSHLDR** lines to both sides along the *Taper*.



DESIGN PROFILES

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

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

OPEN PROFILE MODEL

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

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

CIVIL GEOMETRY - DESIGN INTENT

As defined in the Bentley Civil Tools help file:

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

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

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

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

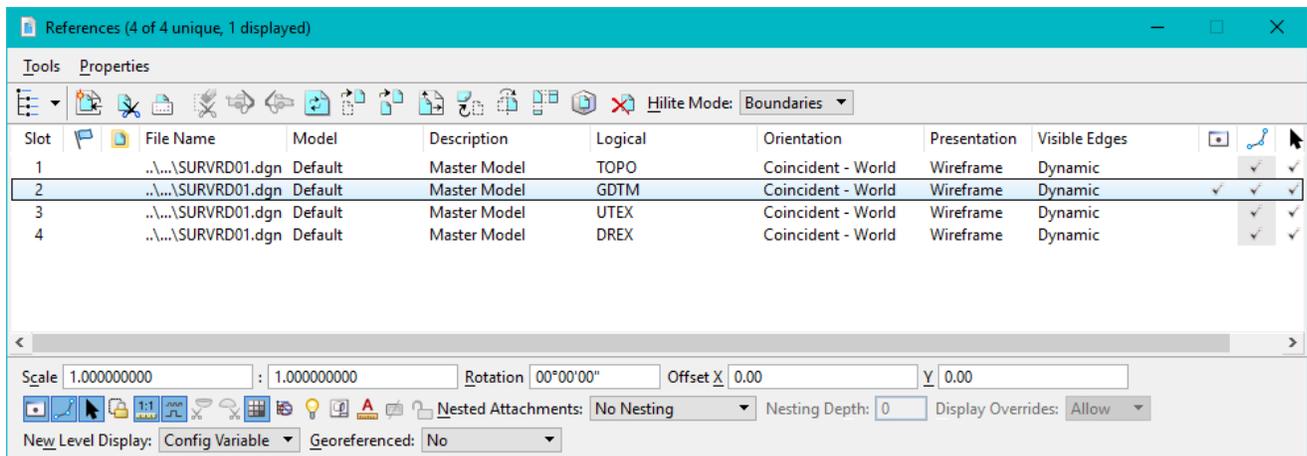
Note Refer to the FDM for Tables

EXERCISE OVERVIEW - PROFILES

- 2.25 Preparation for SR61 Profile
- 2.26 Create SR61 Profile
- 2.27 Edit SR61 Profile
- 2.28 BL98 Profile
- 2.29 Friendship Profile

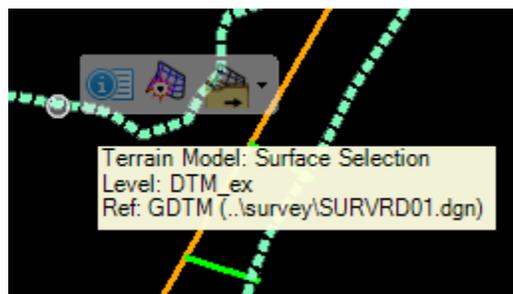
Exercise 2.25 Preparation for SR61 Profile

1. Open the ALGNRD01.dgn that was created in Exercise 2.1. C:\WorkSets\FDOT\22049555201\roadway.
2. From the Function key F9 (toggles on the Reference Dialog) to view the attached files: Turn the display off on all the reference files except the SURVRD file with a logical name of GD TM. This file will be used to create Profiles of the Existing Ground.



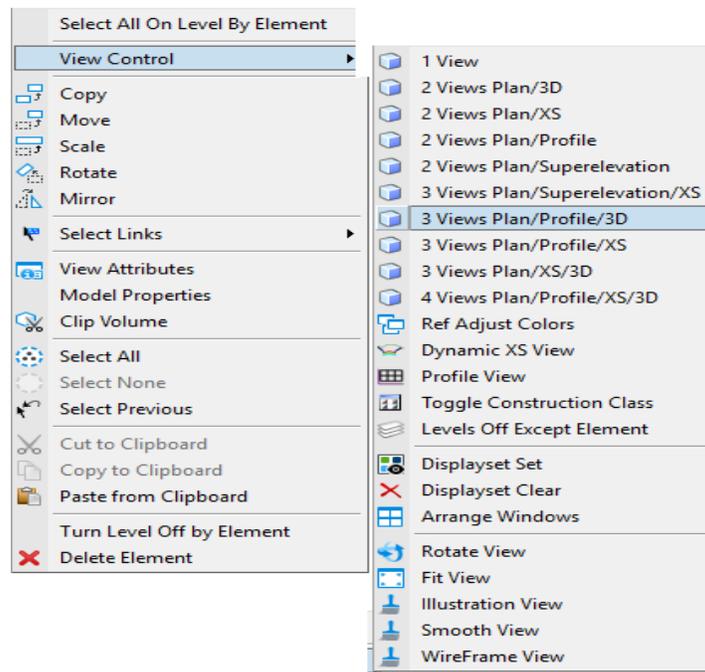
Note If the SURVRD file exists, the SURVRD01 -GTMRD logical can be used

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

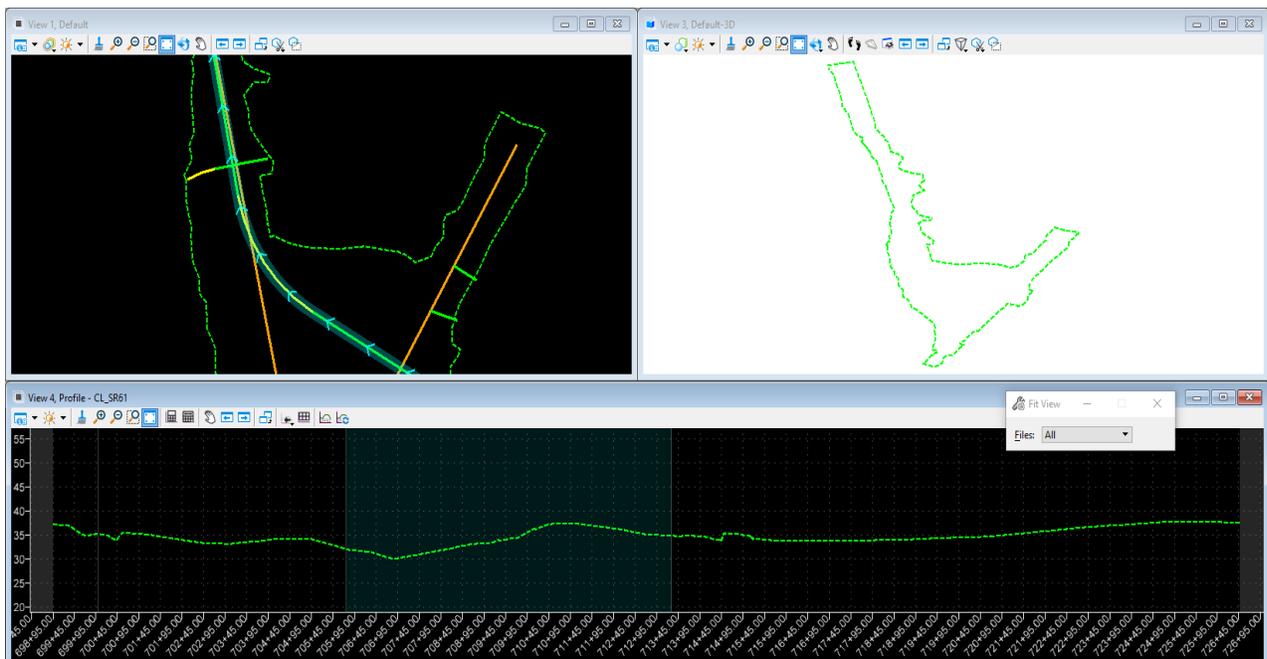


Note Setting the terrain to Active will create a new Model that is 3D we will use this Model to view our Profiles

- 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.



- 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.

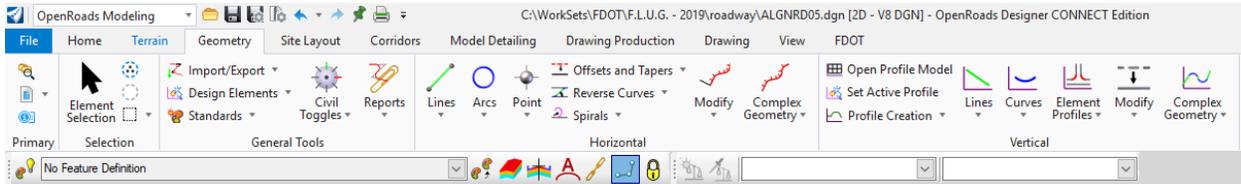


Exercise 2.26 Create SR61 Profile

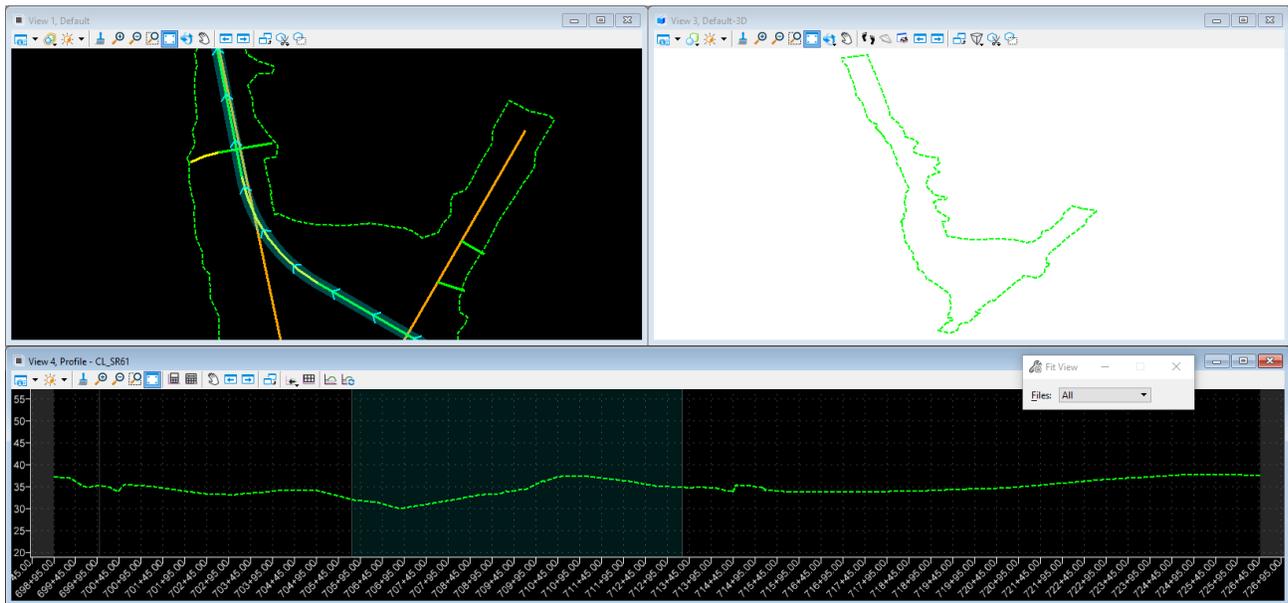
In this exercise, several Vertical Geometry tools are used to create a proposed profile for SR61.

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

OPENROADS MODELING>GEOMETRY>VERTICAL

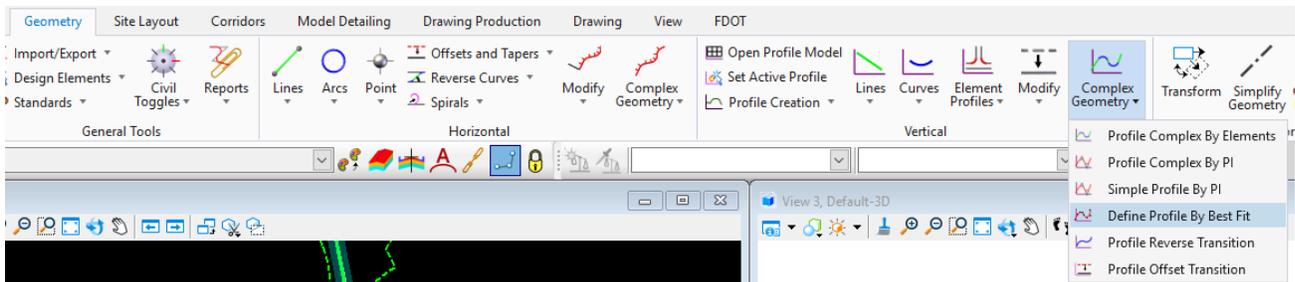


2. From the previous exercise select View 4 to make the Profile window active.

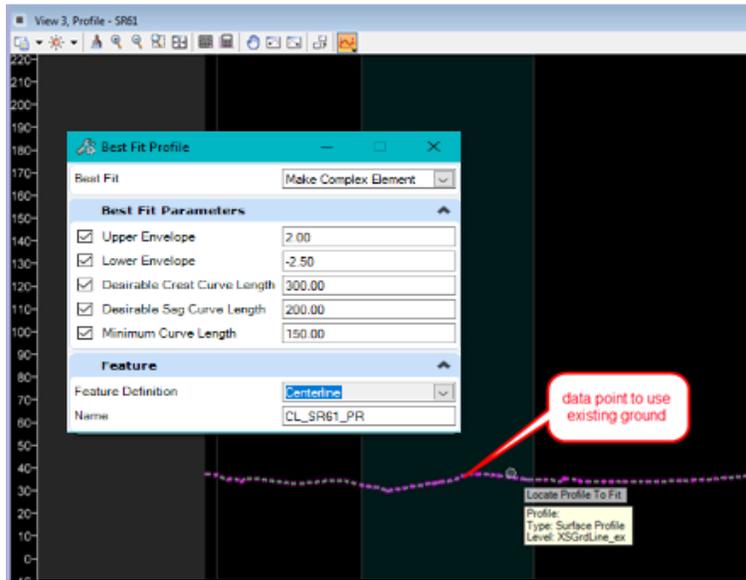


3. Use the *Geometry Tab and the Vertical Group*, to select the **Define Profiles by Best Fit** tool that is located within the Complex Geometry pull down.

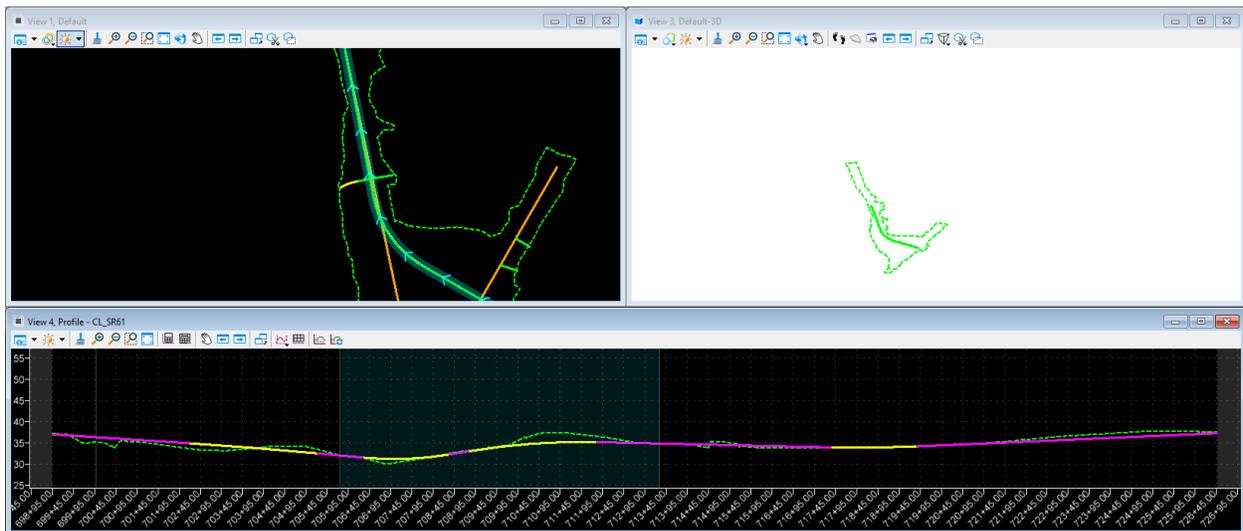
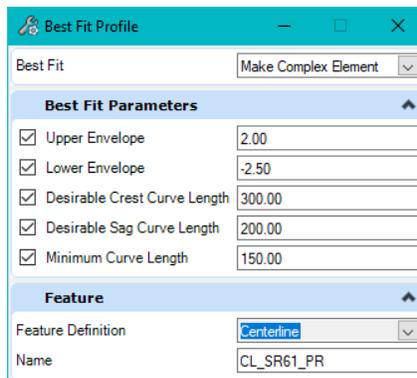
OPENROADS MODELING>GEOMETRY>VERTICAL>Complex Geometry>Define Profile By Best Fit



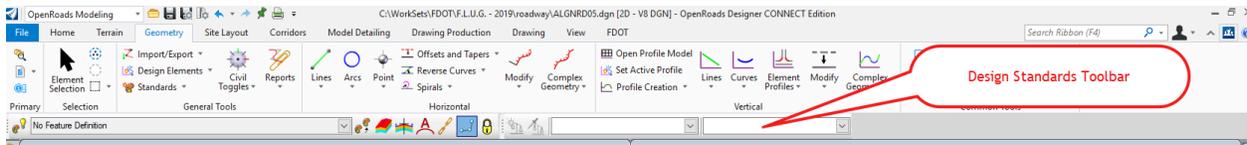
- a. At the cursor prompt, data point to **Make Complex Element** option. Enter the *Profile Name* , SR61-PR, and then data point on the green line in the profile.



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

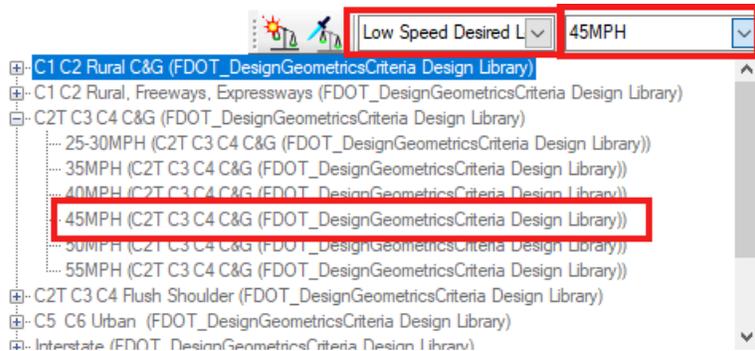


4. Using the **Design Standards Toolbar** that is already docked at the top of the screen.

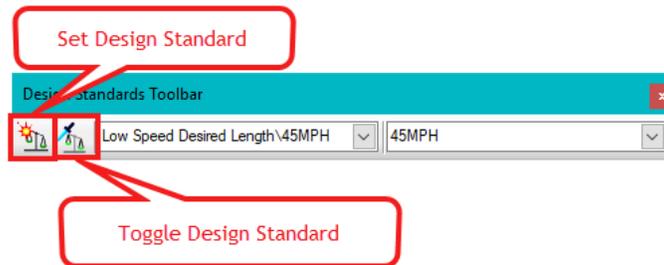


5. On the Design Standards Toolbar, using the second drop down list navigate to the C2T C3 C4 C&G (FDOT_DesignGeometrics Criteria Design Library and select **45 MPH**. Toggle **On** the Active Design Standard.

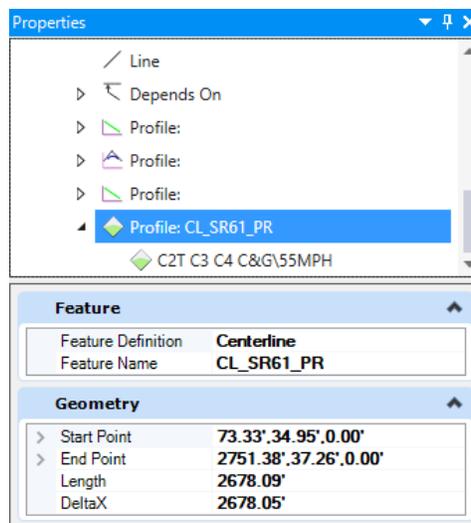
HINT Be sure to set the left field (Horizontal Design Standard) in order to set the right field (Vertical Design Standard) to 45 MPH



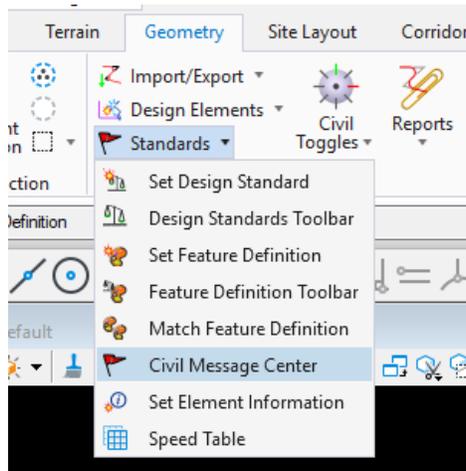
6. Use the Design Standards Toolbar, to select the **Set Design Standard** tool.



- a. At the prompt, select the **Best Fit Profile** created in the previous steps. The profile now has a *Vertical Design Standard* rule placed on it.
- b. Using the Element Select Tool, select the profile element and view its properties in the **Element Information** dialog.

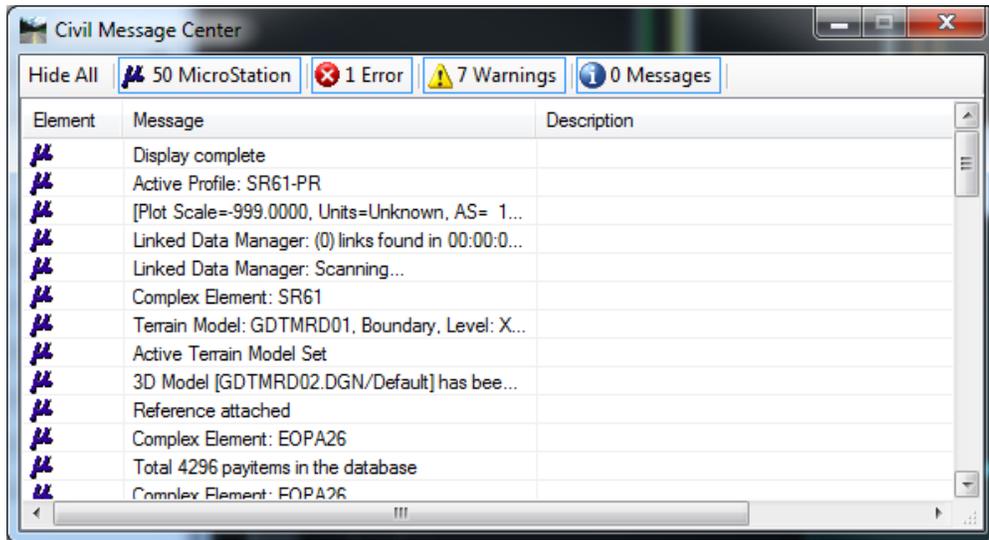


7. Use the **Civil Message Center** tool that is located on the Geometry Tab and General Tools Group in the Standards drop down menu.



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

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

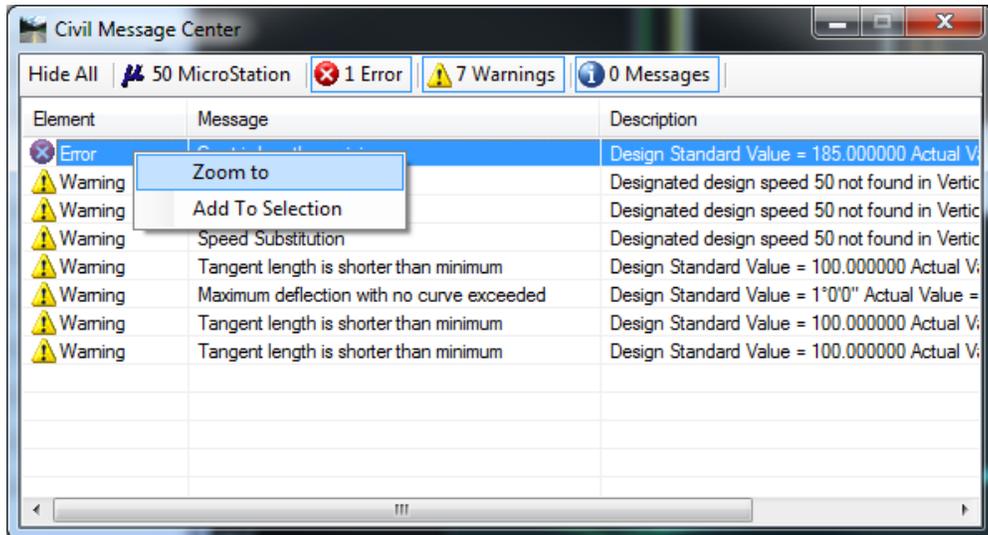


- b. In the Civil Message Center dialog, select on the **MicroStation** tab. This will toggle **Off** all the general messages for MicroStation and leave only *Error messages* and *Warnings* in the list.

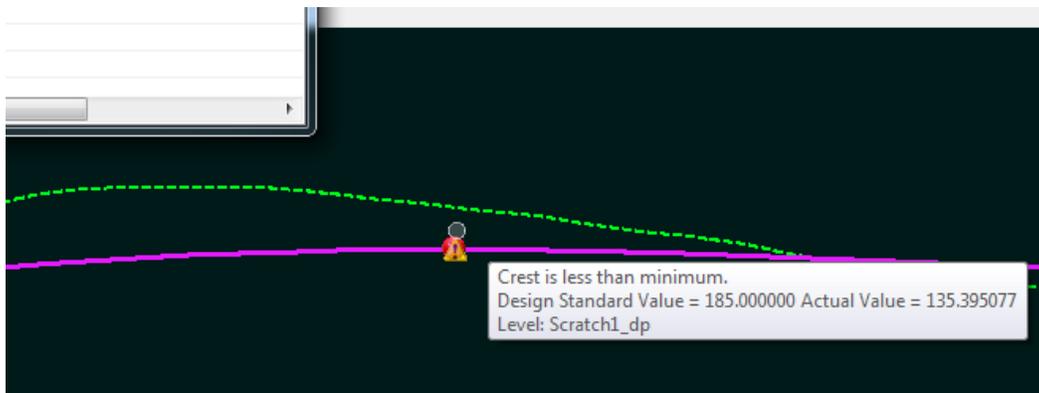
| Element | Message | Description |
|-----------|---|--|
| ✖ Error | Crest is less than minimum | Design Standard Value = 185.000000 Actual V... |
| ⚠ Warning | Speed Substitution | Designated design speed 50 not found in Vertic |
| ⚠ Warning | Speed Substitution | Designated design speed 50 not found in Vertic |
| ⚠ Warning | Speed Substitution | Designated design speed 50 not found in Vertic |
| ⚠ Warning | Tangent length is shorter than minimum | Design Standard Value = 100.000000 Actual V... |
| ⚠ Warning | Maximum deflection with no curve exceeded | Design Standard Value = 1'0'0" Actual Value = |
| ⚠ Warning | Tangent length is shorter than minimum | Design Standard Value = 100.000000 Actual V... |
| ⚠ Warning | Tangent length is shorter than minimum | Design Standard Value = 100.000000 Actual V... |

- 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.



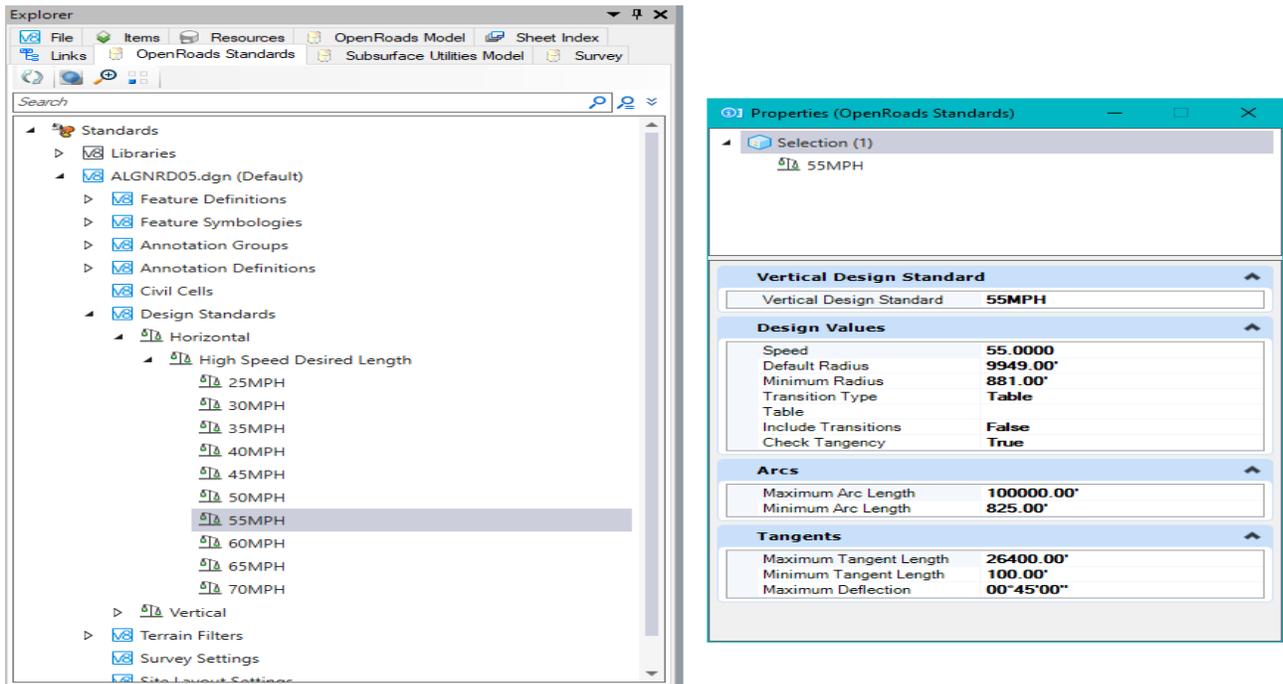
- e. Notice the *Error* is now centered in the profile view. Hover the cursor over the *Error* icon to display the *Error Message* description.



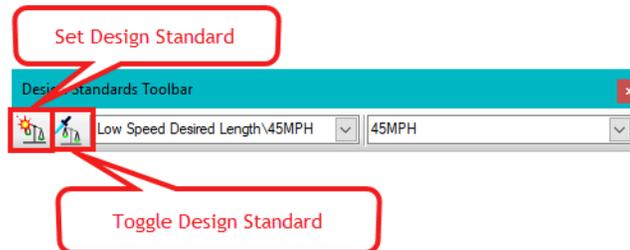
Note The values are given in whole stations, i.e. 3.5 station equals 350 feet.

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.

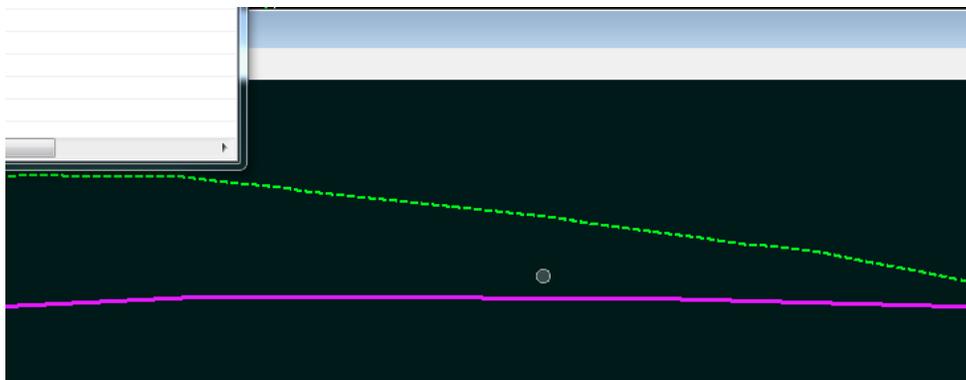
- b. Select the Horizontal Design Section to see which design standard is applied to the Alignment, next select the desired speed. Now using the Ctrl+I keys to bring up the properties dialog lets link a vertical design speed to the horizontal.



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

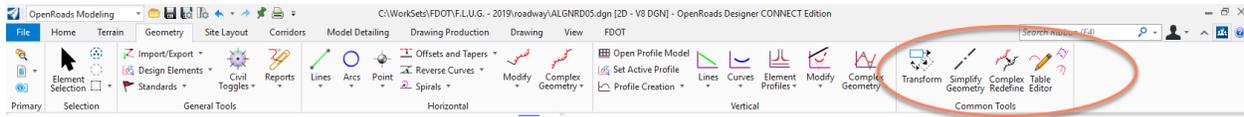


- 10. At the prompt, select the **Best Fit Profile** created in the previous steps. Notice the *Error* icons are no longer displayed.



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

OPENROADS MODELING>GEOMETRY>COMMON TOOLS>Table Editor



Profile Table Editor: CL_sr61_pr1

| | Back Tangent Length | Back Slope | Station | Elevation | Curve Length | K Value | Ahead Slope | Ahead Tangent Length |
|--|---------------------|----------------------------------|-----------|-----------|--------------|---------|----------------------------------|----------------------|
| | | <input type="checkbox"/> | 698+95.00 | 37.25 | | | <input type="checkbox"/> 1.000% | 16.12 |
| | 16.12 | <input type="checkbox"/> 1.000% | 699+36.12 | 37.66 | 50.00 | 5.31 | <input type="checkbox"/> -8.413% | 7.21 |
| | 7.21 | <input type="checkbox"/> -8.413% | 699+68.33 | 34.95 | 0.00 | 0.00 | <input type="checkbox"/> -0.300% | 12.98 |
| | 12.98 | <input type="checkbox"/> -0.300% | 699+81.31 | 34.91 | 0.00 | 0.00 | <input type="checkbox"/> 1.872% | 17.89 |
| | 17.89 | <input type="checkbox"/> 1.872% | 699+99.19 | 35.24 | 0.00 | 0.00 | <input type="checkbox"/> -1.723% | 24.42 |
| | 24.42 | <input type="checkbox"/> -1.723% | 700+23.62 | 34.82 | 0.00 | 0.00 | <input type="checkbox"/> 1.974% | 31.33 |
| | 31.33 | <input type="checkbox"/> 1.974% | 700+54.95 | 35.44 | 0.00 | 0.00 | <input type="checkbox"/> -0.487% | 316.00 |
| | 316.00 | <input type="checkbox"/> -0.487% | 703+70.95 | 33.90 | 0.00 | 0.00 | <input type="checkbox"/> -0.925% | 212.38 |
| | 212.38 | <input type="checkbox"/> -0.925% | 705+83.32 | 31.94 | 0.00 | 0.00 | <input type="checkbox"/> 0.482% | 627.65 |
| | 627.65 | <input type="checkbox"/> 0.482% | 712+10.97 | 34.96 | 0.00 | 0.00 | <input type="checkbox"/> -0.300% | 525.43 |
| | 525.43 | <input type="checkbox"/> -0.300% | 717+36.40 | 33.39 | 0.00 | 0.00 | <input type="checkbox"/> 0.300% | 200.00 |
| | 200.00 | <input type="checkbox"/> 0.300% | 719+36.40 | 33.99 | 0.00 | 0.00 | <input type="checkbox"/> 0.461% | 709.97 |
| | 709.97 | <input type="checkbox"/> 0.461% | 726+46.28 | 37.26 | | | <input type="checkbox"/> | |

Buttons: Report, Apply

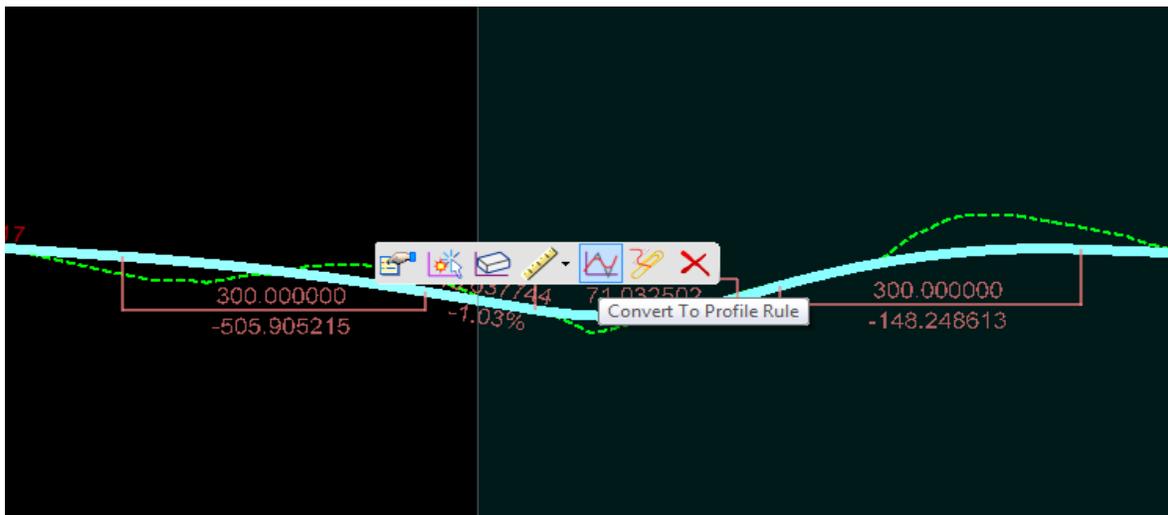
Exercise 2.27 Edit SR61 Profile

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

➤ **Edit the Best Fit Profile**

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

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

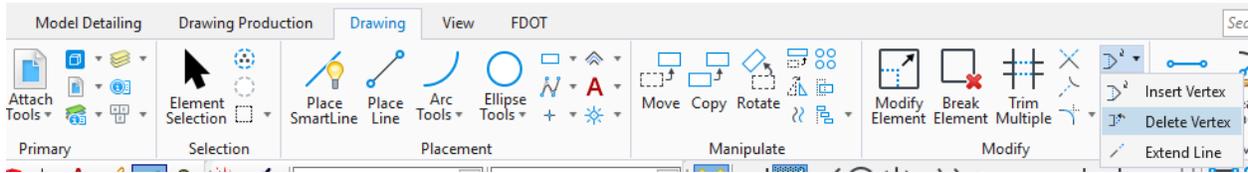


2. Select the Convert to Profile Rule tool.

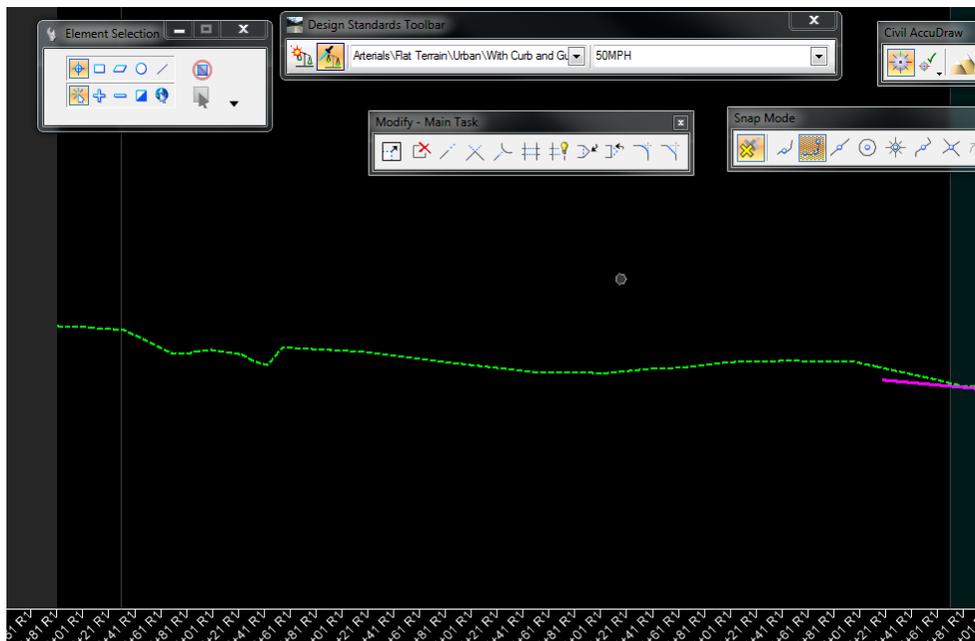
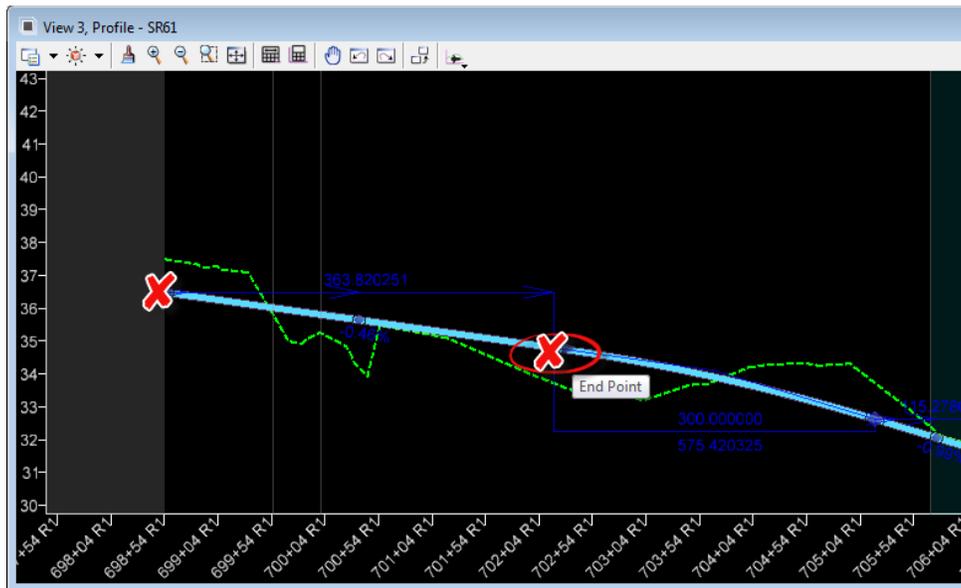
➤ **Delete PIs**

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

OPENROADS MODELING>DRAWING>MODIFY>Delete Vertex



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

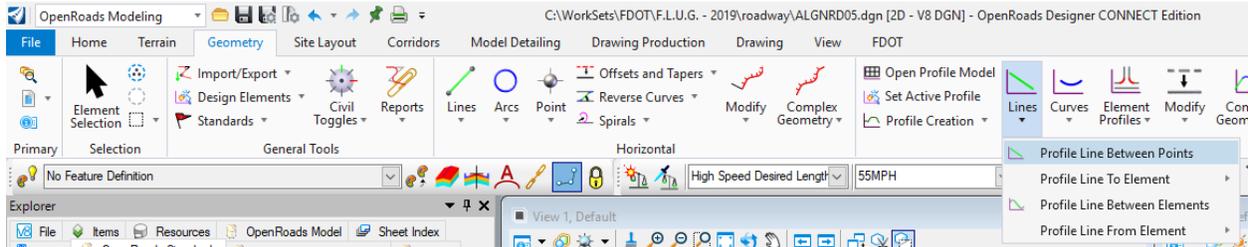


➤ **Create Profile with Place Vertical Line**

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

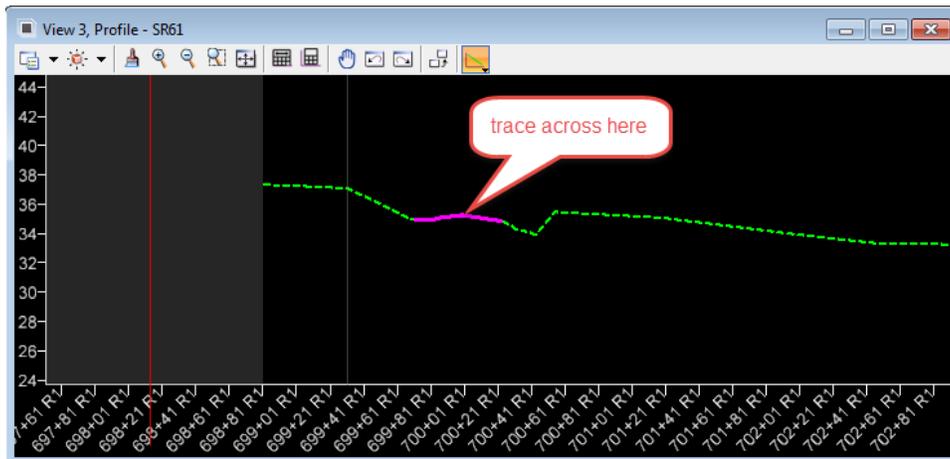
1. Use *Geometry Tab and the Vertical Group*, to select the **Profile Line Between Points** tool located in the Lines Tools.

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



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

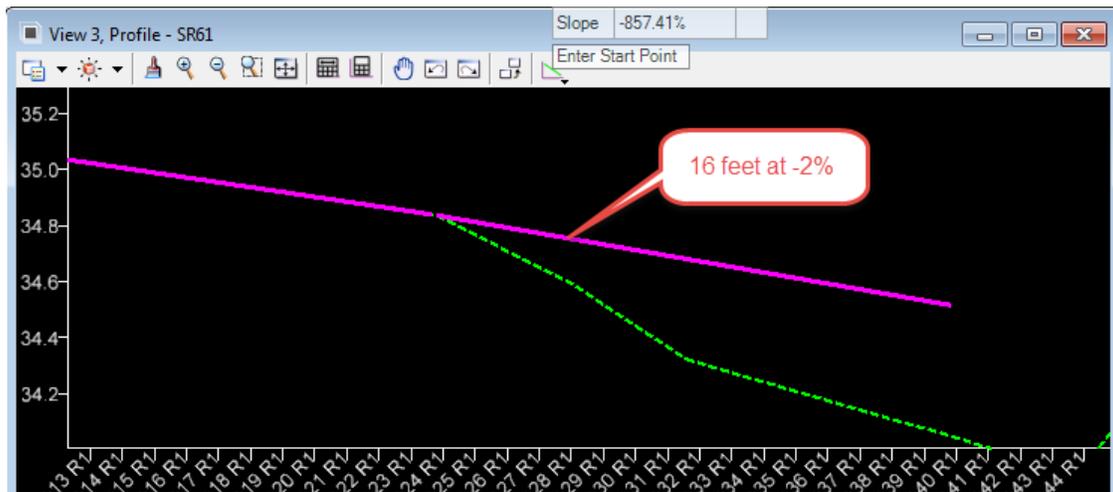
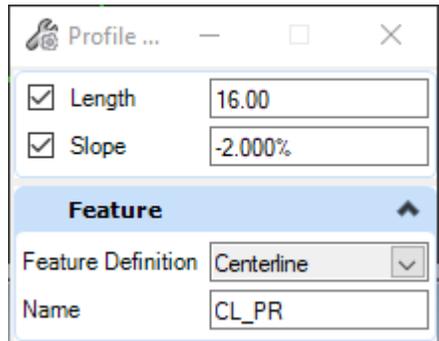
Note This is not exact, simply trace a few lines.



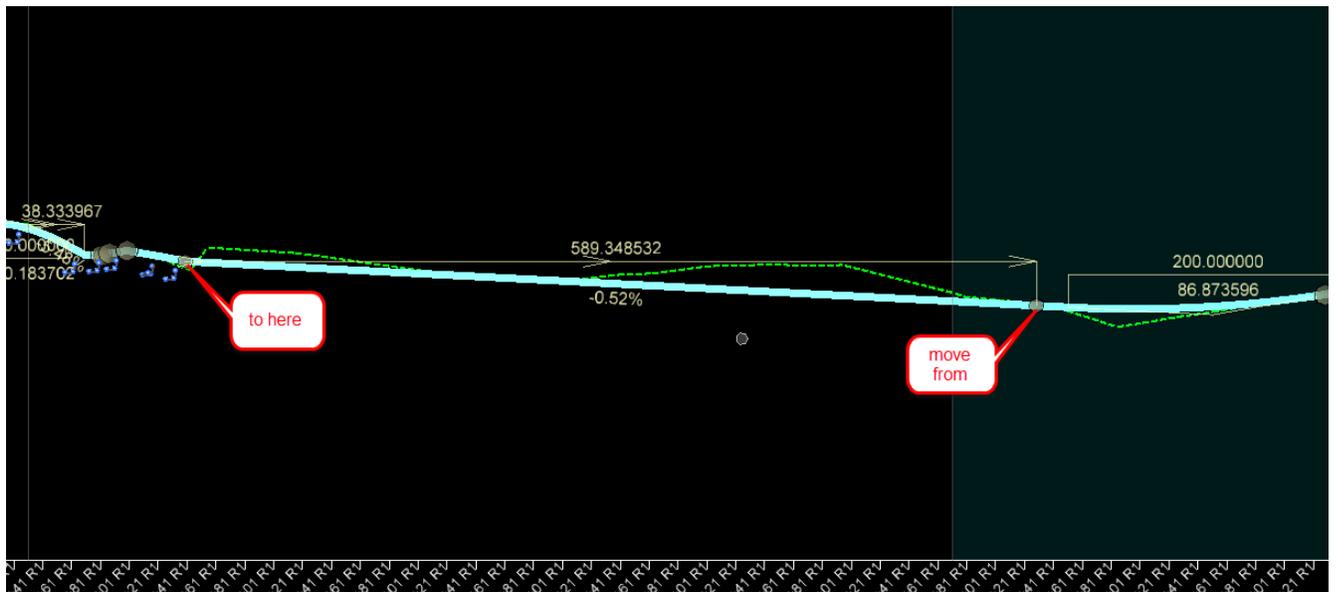
3. Continue using the Profile Line Between Points tool
 - a. Begin at the edge of the existing pavement or connect to the proposed profile line from the step above.



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



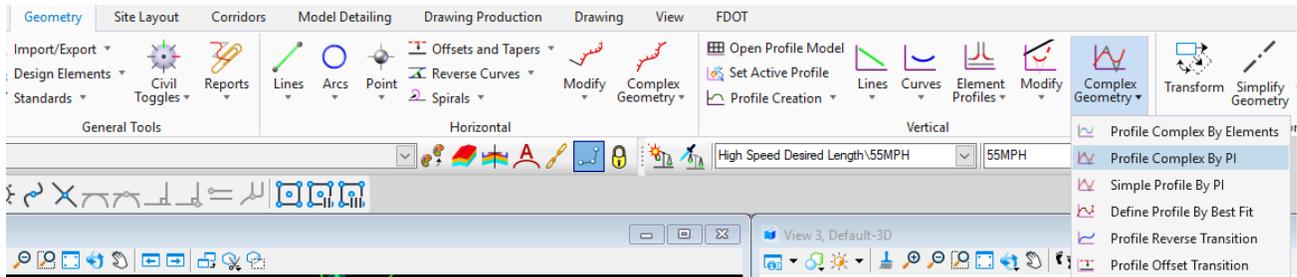
- c. Using *Line Between Points* to join the two profiles, place another **Profile line** between the “16’ at 2%” line and the *Best Fit Profile*.



➤ **Profile by VPI's**

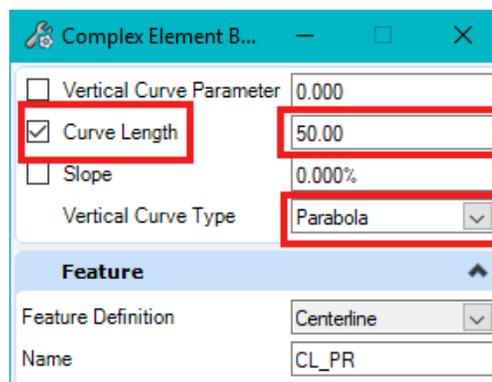
1. Zoom to the Beginning of the profile, Use *the Geometry Tab and the Vertical Group*, to select the **Profile Complex By VPI or PI** tool located in the Complex Geometry tool Group.

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



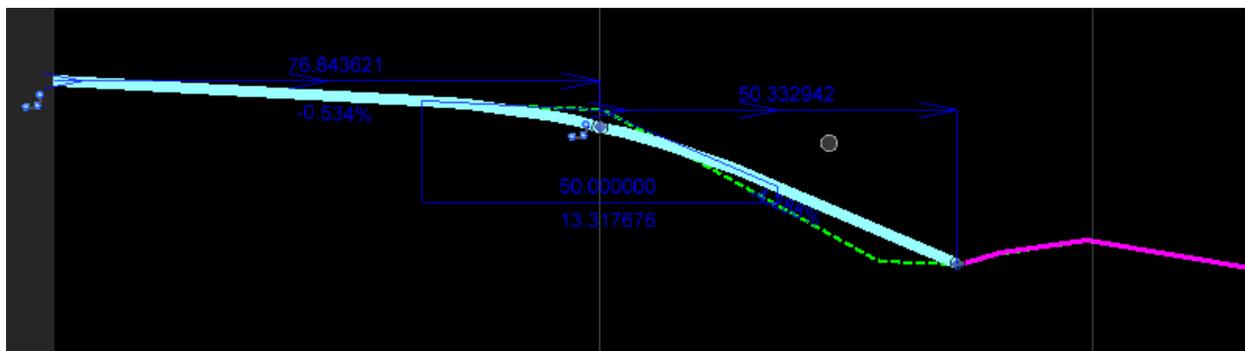
2. Toggle **OFF** the *Active Design Standard*, set the *Curve length* to **50 feet**.

HINT Check that the Vertical Curve Type is set to Parabola

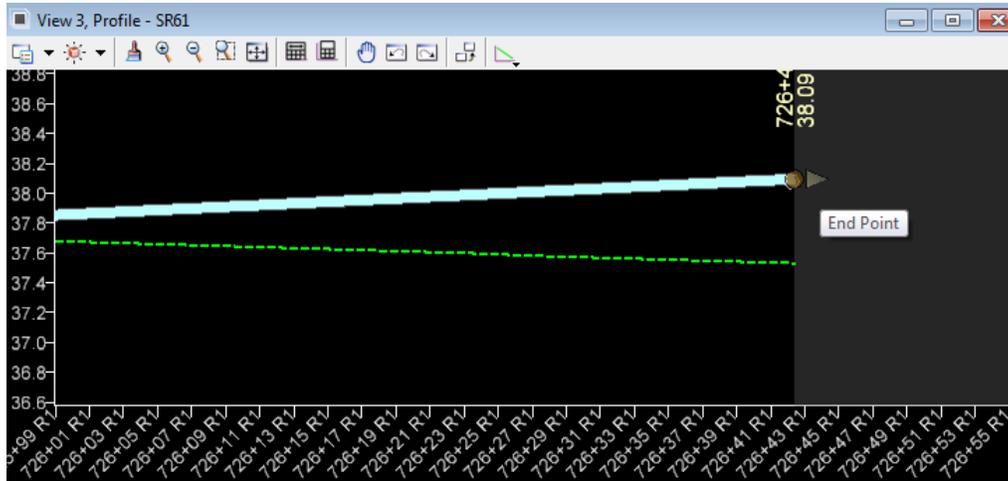


3. Start by snapping to the **Beginning Point** on the ground and complete the *Profile Segment* as shown below.

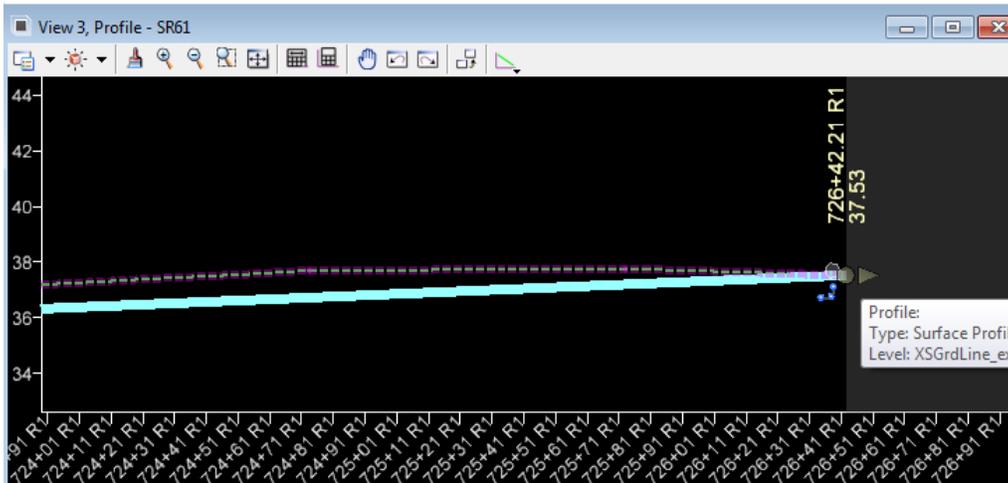
HINT This is not exact, snap to 3 points



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



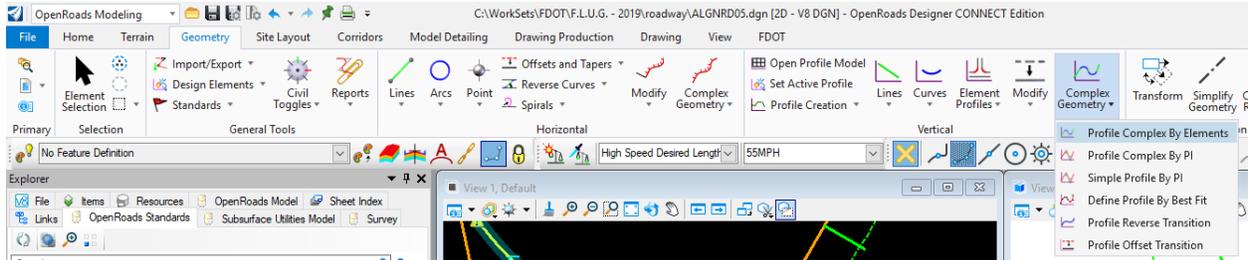
HINT Click on the solid ball manipulator at the end of the line to move it in both directions



➤ **Complex Profile Elements**

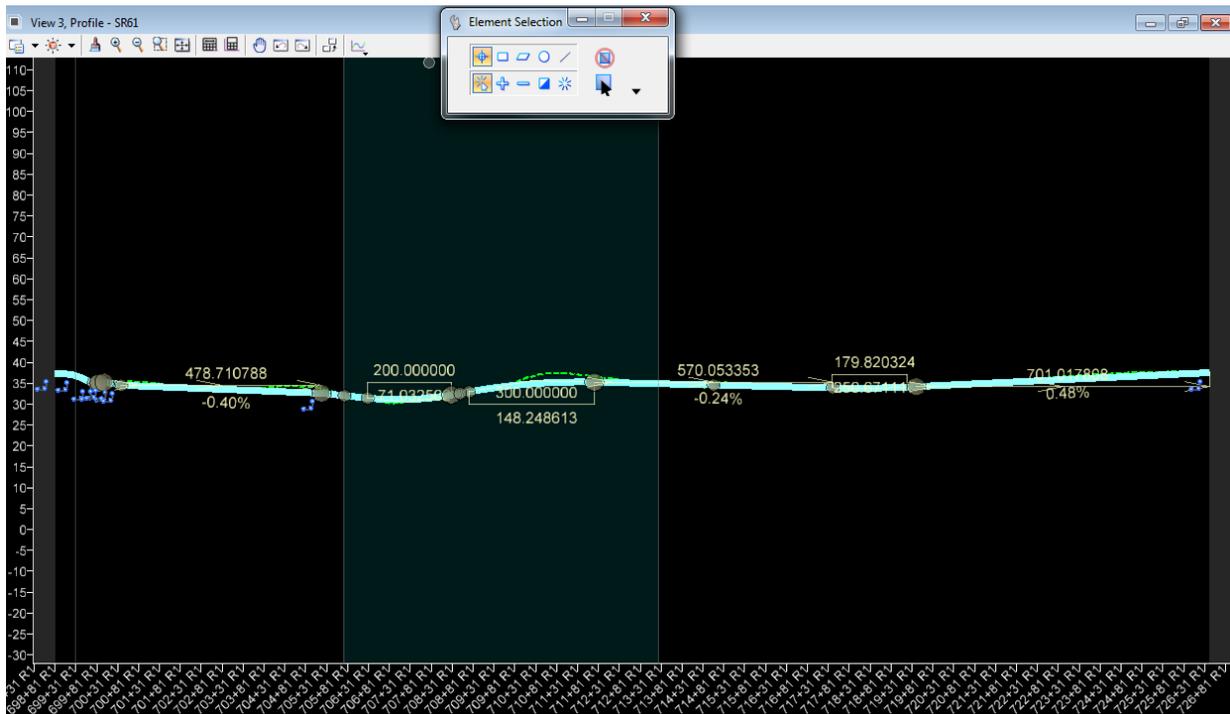
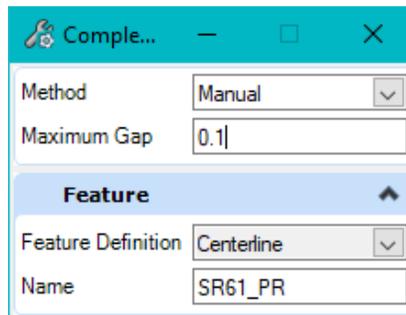
1. Use *Geometry Tab and the Vertical Group*, to select the **Profile Complex by Elements** tool located within the Complex Geometry tool Group.

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



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

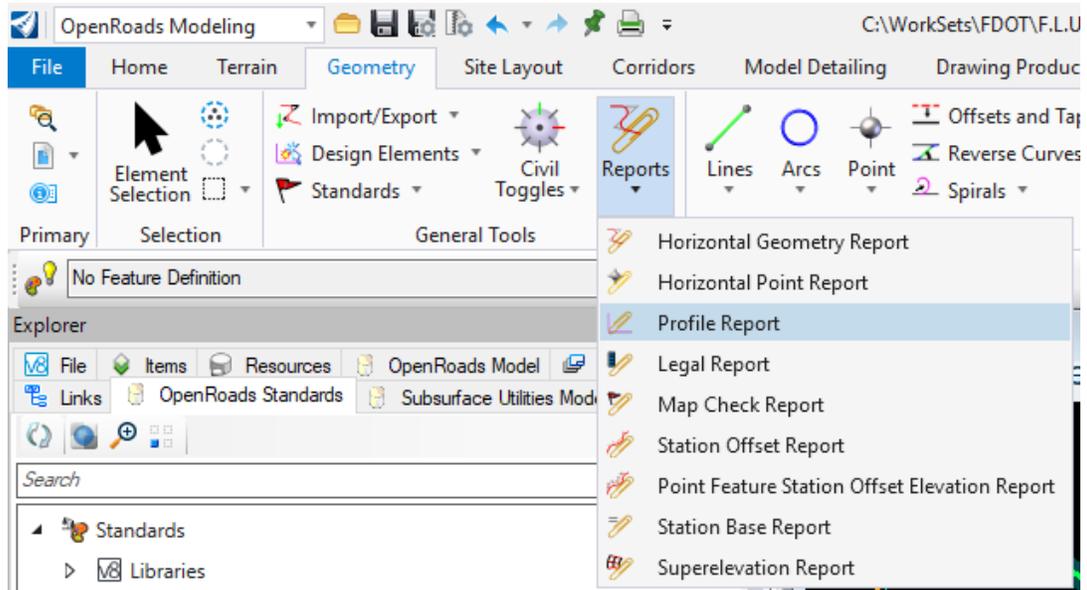
HINT On the Profile Complex by Element tool setting, enter the **Feature Name**. This is the *Profile Name* assigned to the Profile.



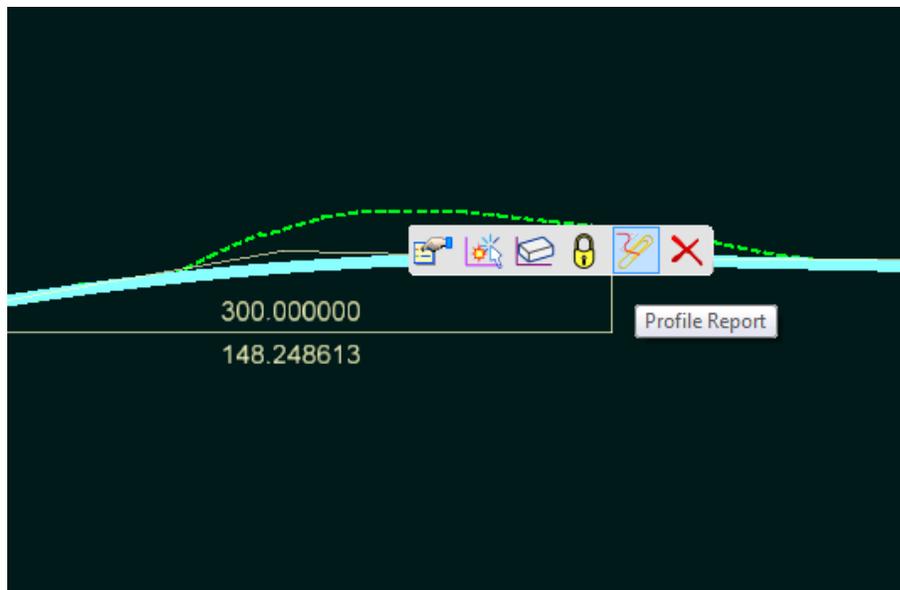
➤ **Profile Report**

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

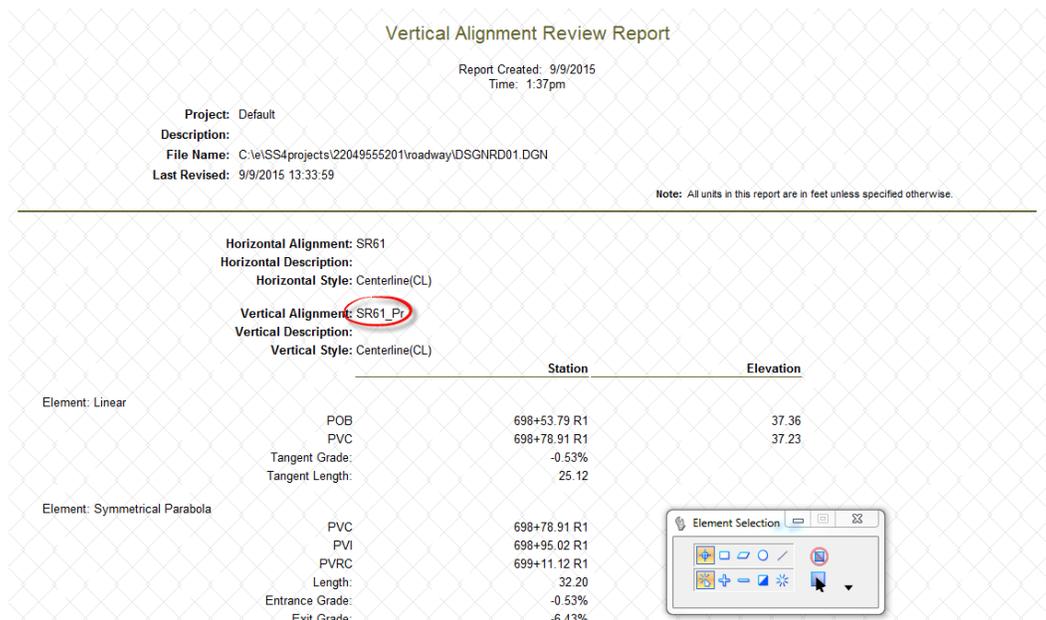
OPENROADS MODELING>GEOMETRY>GENERAL TOOLS>Reports>Profile Report



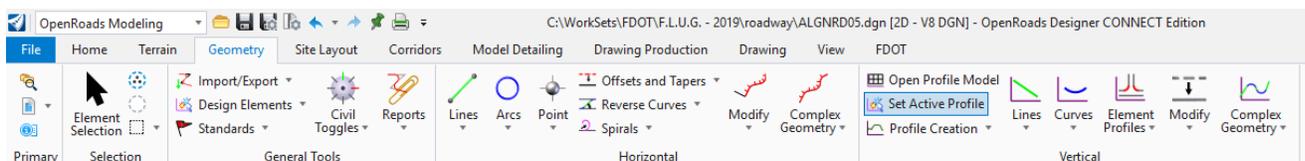
<OR> With the *Profile* selected, hover over the element to display the Context Menu and select the **Profile Report**.



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



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



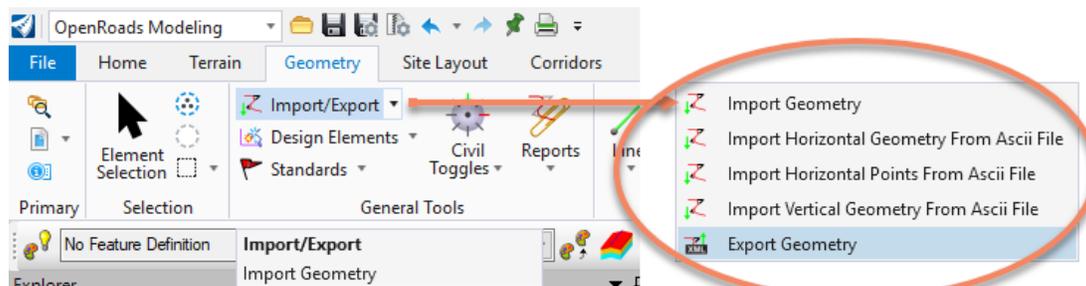
<OR> With the **Profile** selected, hover over the element to display the Context Menu and select **Set Active Profile**.

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**

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

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



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

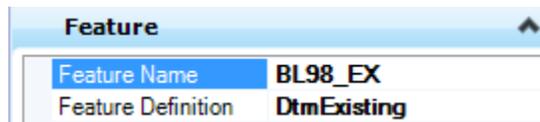
- Select the **SR61 Horizontal Alignment** and save as SR61_Alignment.xml for a backup.

Exercise 2.28 BL98 Profile

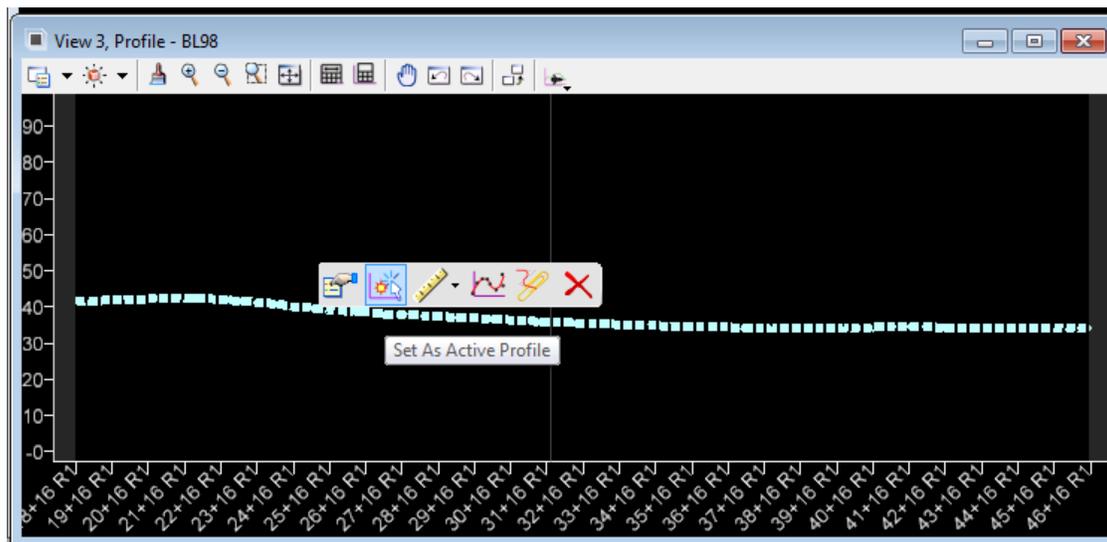
1. With the **BL98** alignment selected in the *Plan View*, hover over the element to display the Context Menu and select the **Open Profile Model**. (Optional Method - Using the Right Click Menu under View Control navigate and pick **2 Views Plan\Profile** then follow the prompts to setup a Plan and Profile views.)
2. Select **View 3** to view the *Existing Ground Profile* for the mainline **BL98 Centerline**.



3. With the **Profile** selected, hover over the element to display the Context Menu and select the first icon **Properties**
4. In the name field enter **BL98_EX**

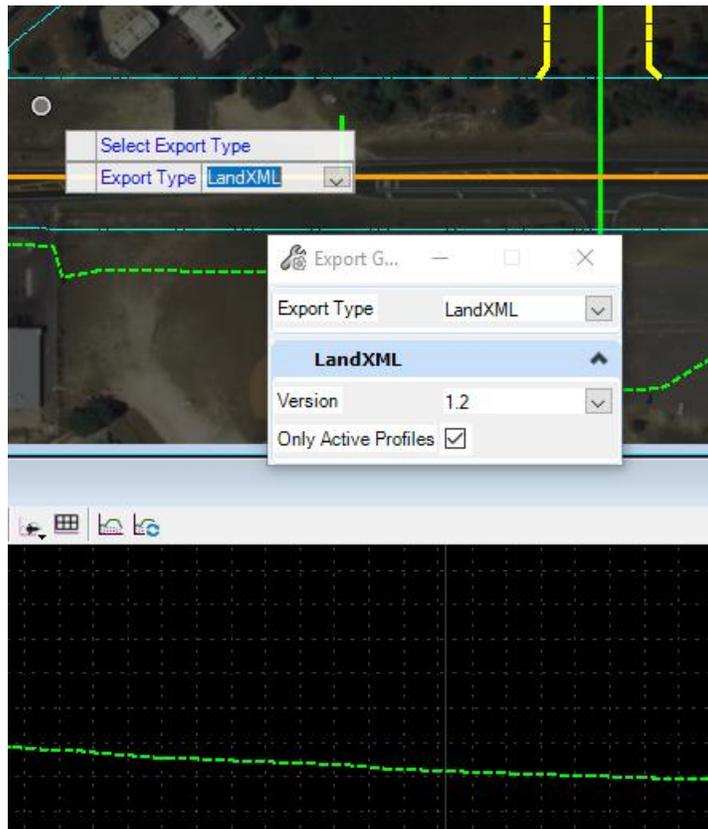
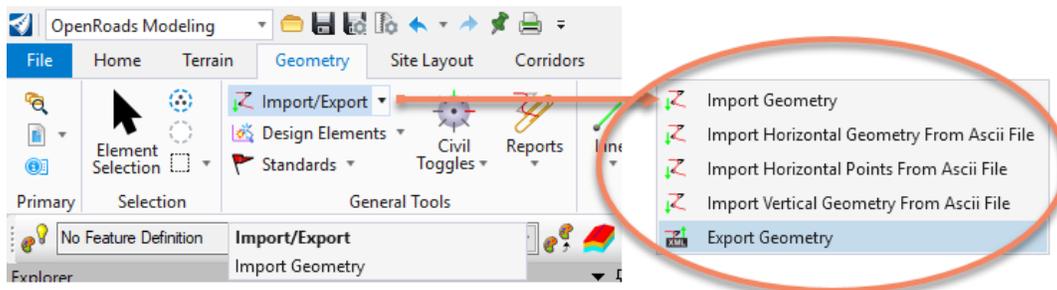


5. With the **Profile** selected, hover over the element to display the Context Menu and select **Set As Active Profile**.



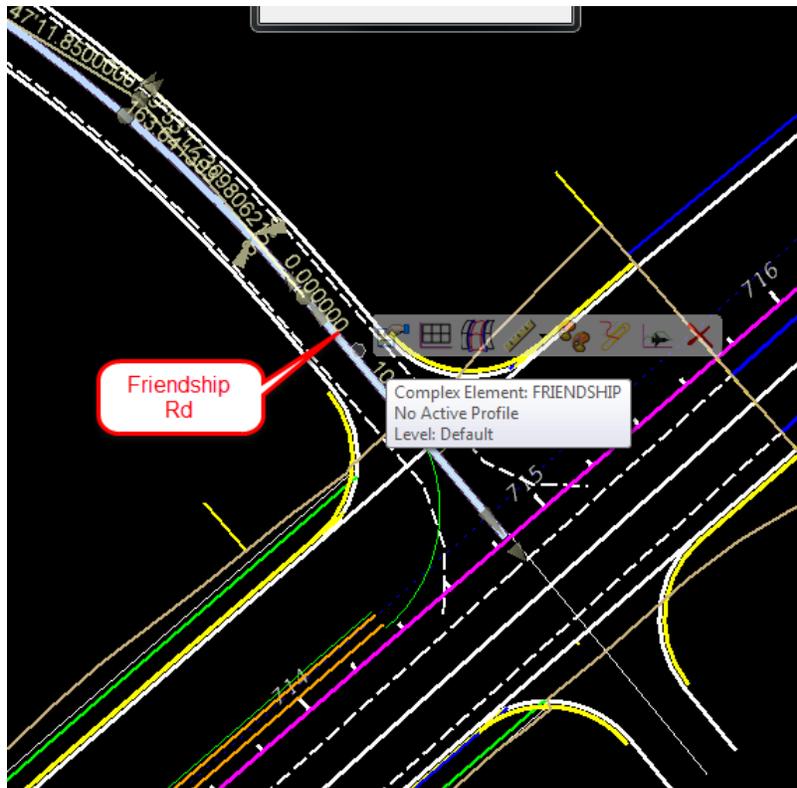
- Use the *Geometry Tab and the General Tools Group*, to select the **Export Geometry** tool, select the **BL98_EX** plan element and save as a LandXML file. (Ex. BL98_EX.xml).

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

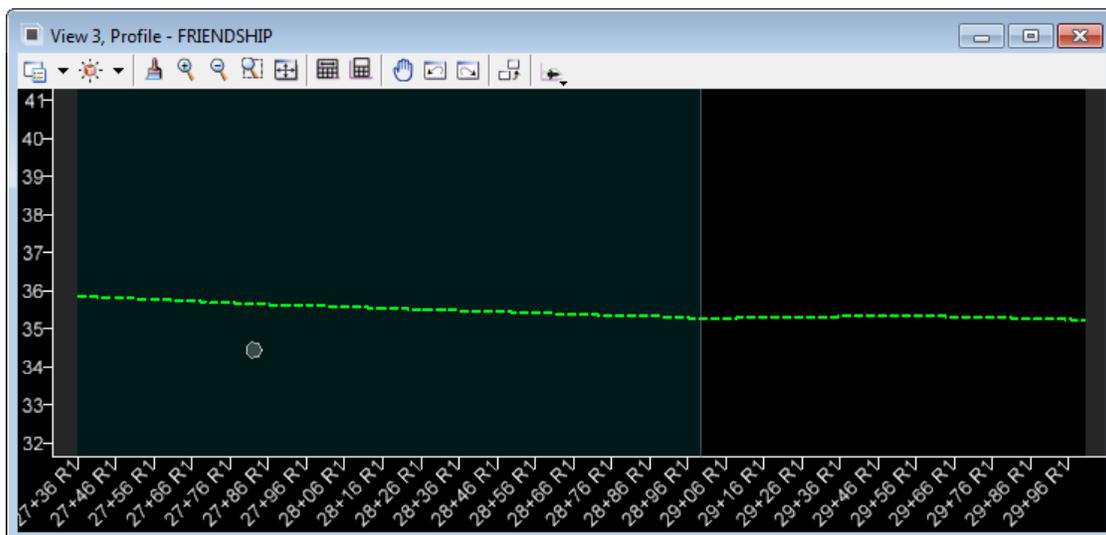


Exercise 2.29 Friendship Profile

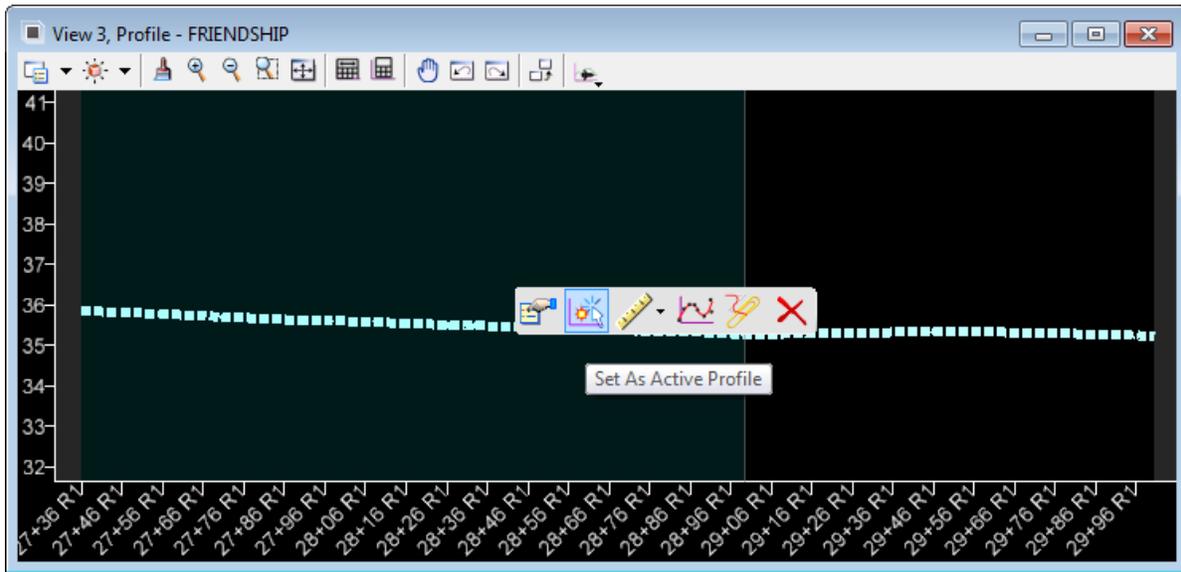
1. With the **Friendship alignment** selected in the *Plan View*, hover over the element to display the Context Menu and select the **Open Profile Model**. (Optional Method - Using the Right Click Menu under View Control navigate and pick **2 Views Plan\Profile** then follow the prompts to setup a Plan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



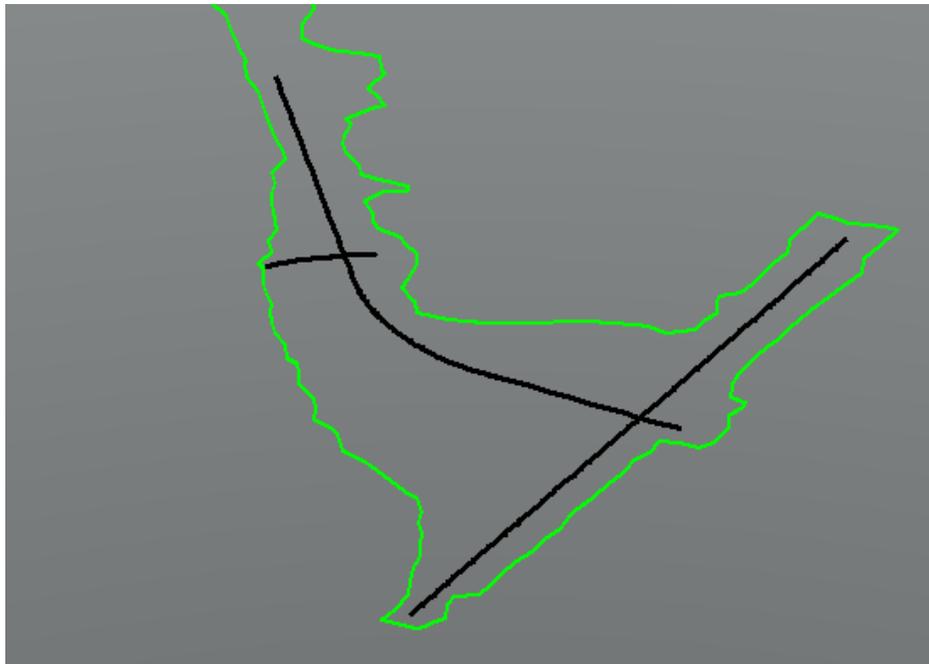
2. Select **View 3** to view the *Existing Ground Profile* for the mainline *Friendship Centerline*.



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 centerlines 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*.



3 3D ROADWAY MODELING WORKFLOW

BASIC CORRIDOR MODELING OVERVIEW

As defined in the Bentley Civil Help:

“The Corridor Modeling toolset is a group of highly interactive commands to create new design surfaces that represent a new roadway or other type of surface. Tools for creation, modification, management, and report functions are supported.

Corridor Modeling tools aggregates a variety of civil data. The geometry is created with the Horizontal and Vertical Geometry tools, while the existing ground is defined by a MicroStation mesh or Civil Terrain Model. Plan view elements, such as edges of pavement, shoulders, curbs, etc. can be 2D or 3D. Superelevation information is defined within a design file using standards or imported data. Templates are utilized from one or more template libraries.

Reference files can be used extensively with Corridor Modeling. On a simple project, the data may be all in one file; larger projects may have geometry in one file, plan view graphics in a second, terrain in another, superelevation in a fourth and the actual model in a fifth. All files can reference the others, to present a complete picture of the project.

When working with Corridor Modeling, you can draw in 2D or 3D. When using 2D (such as for plan-view graphics), a 3D view is automatically created and maintained. For example, when a vertical geometry element is initially defined for a horizontal geometry element, the Default-3D model is created, if there isn't one already. The 3D baseline (combination of horizontal and vertical element) is drawn into the 3D model. As template drops are added, and progressed, they are added to the 3D model automatically.

When starting to create a corridor, basic information can be used. A single template can be used, along with preliminary geometry and a high level terrain model. As the design progresses, more detail can be added. Instead of a single template drop, perhaps more templates better define the roadway. Transitions can be added to smoothly move from one template to another. There may be multiple roadways all interconnected using the target aliasing tools. All the while, as changes are made, the corridor model is updating, so you see up-to-the minute results. Simple projects may not require all the tools, and a basic corridor model may be sufficient. But all the tools are available to handle basic to complex, small-scale to large-scale projects.

The following are minimum requirements to use Corridor Modeling.

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

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

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

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

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

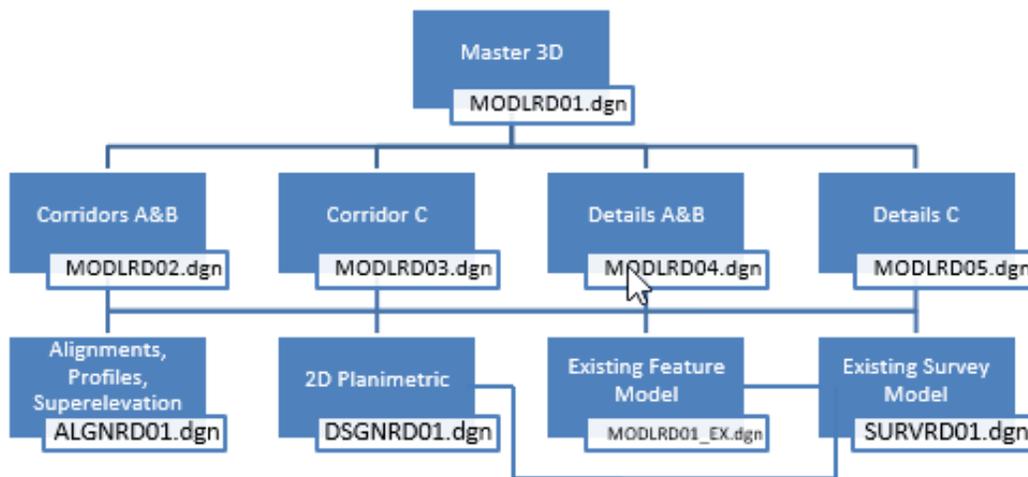
CORRIDOR MODELING PLANNING

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

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

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

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

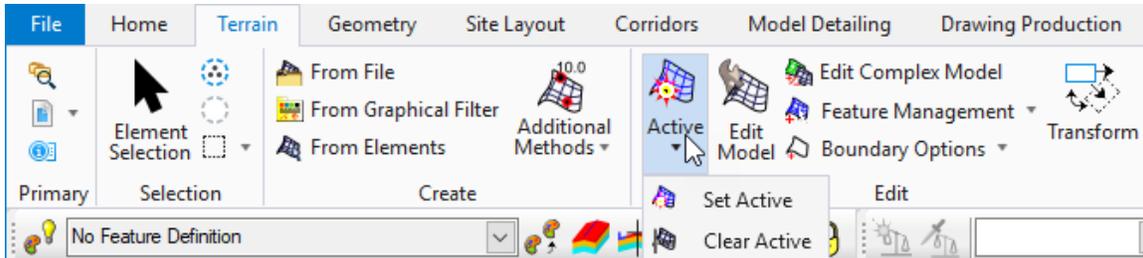


EXERCISE OVERVIEW – BASIC CORRIDOR MODELING

- 3.1 Prepare to Create Corridor Model for SR61
- 3.2 Create Corridor, SR61
- 3.3 Create Template, SR61 End Conditions
- 3.4 Add Corridor Point Controls, SR61 L and R
- 3.5 Add Corridor References, SR61
- 3.6 Variable Medians, SR61 Templates
- 3.7 Change Corridor Feature Definition, SR61
- 3.8 Add Corridor Key Stations, SR61
- 3.9 Review Corridor Objects, SR61

Exercise 3.1 Prepare to Create Corridor Model for SR61

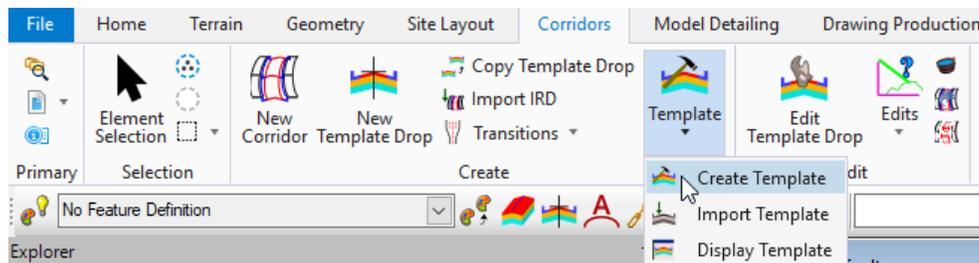
1. Open the `_BlankFile.dgn` file of the `c:\<Workset Folder>\FDOT\22049555201_CE\` folder in the *FDOTConnect - Roadway* Workspace in OpenRoads Designer.
2. Go to the FDOT ribbon and Choose “Create File.”
3. Create a new `MODLRD01.dgn` file. Select Wakulla County. Choose Create/Open File.
4. Open the `MODLRD01.dgn` file.
5. Reference the `SURVRD01`, `ALGNRD01` and `DSGNRD01` files.
6. Use the *Terrain* tab, **Set Active** tool.



7. At the cursor prompt, select the **Terrain Boundary** green dashed line from the attached `SURVRD01` reference file. This will set the *terrain model* as **Active**.
8. Move the cursor over the **SR61 Centerline Feature** and verify an **Active Profile**.

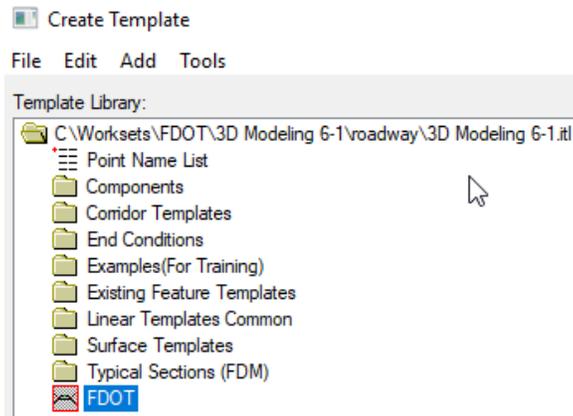


9. Use the *Corridor Modeling*, **Create Template** tool.

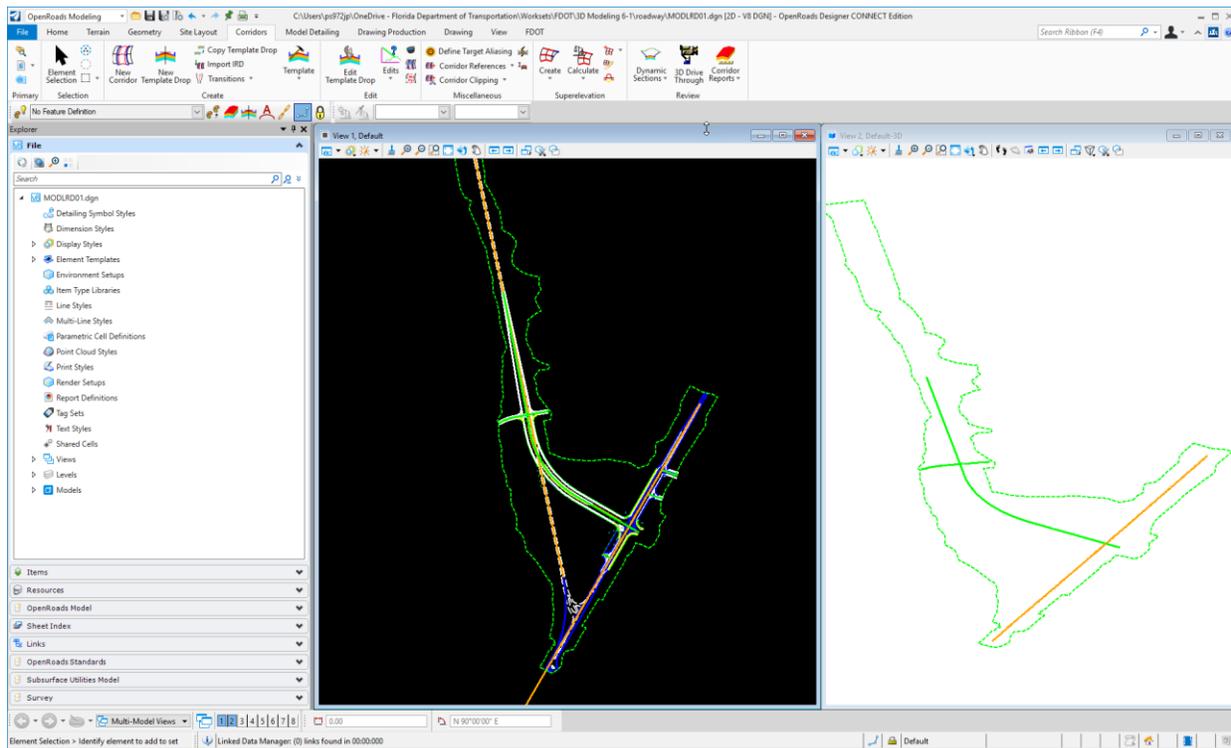


HINT Use the F12 function key to access the Create Template Dialog.

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

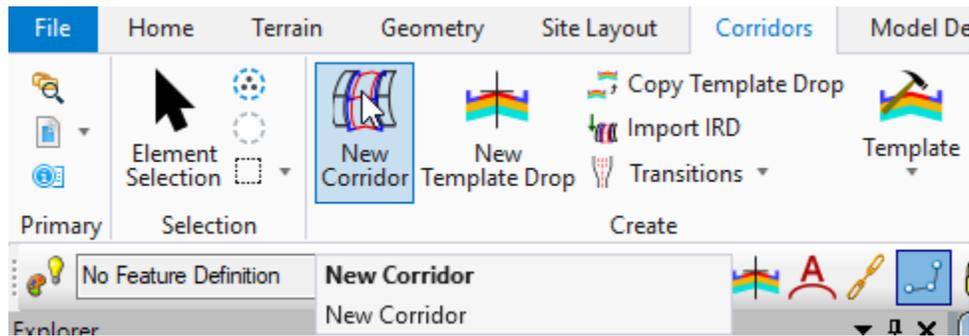


11. To set up the *Views* for viewing the **2D Plan** and **3D Model** simultaneously in the FDOTSS4 Workspace, Select the **F2 Function Key** on the keyboard. This will open an *Isometric View* of the project.

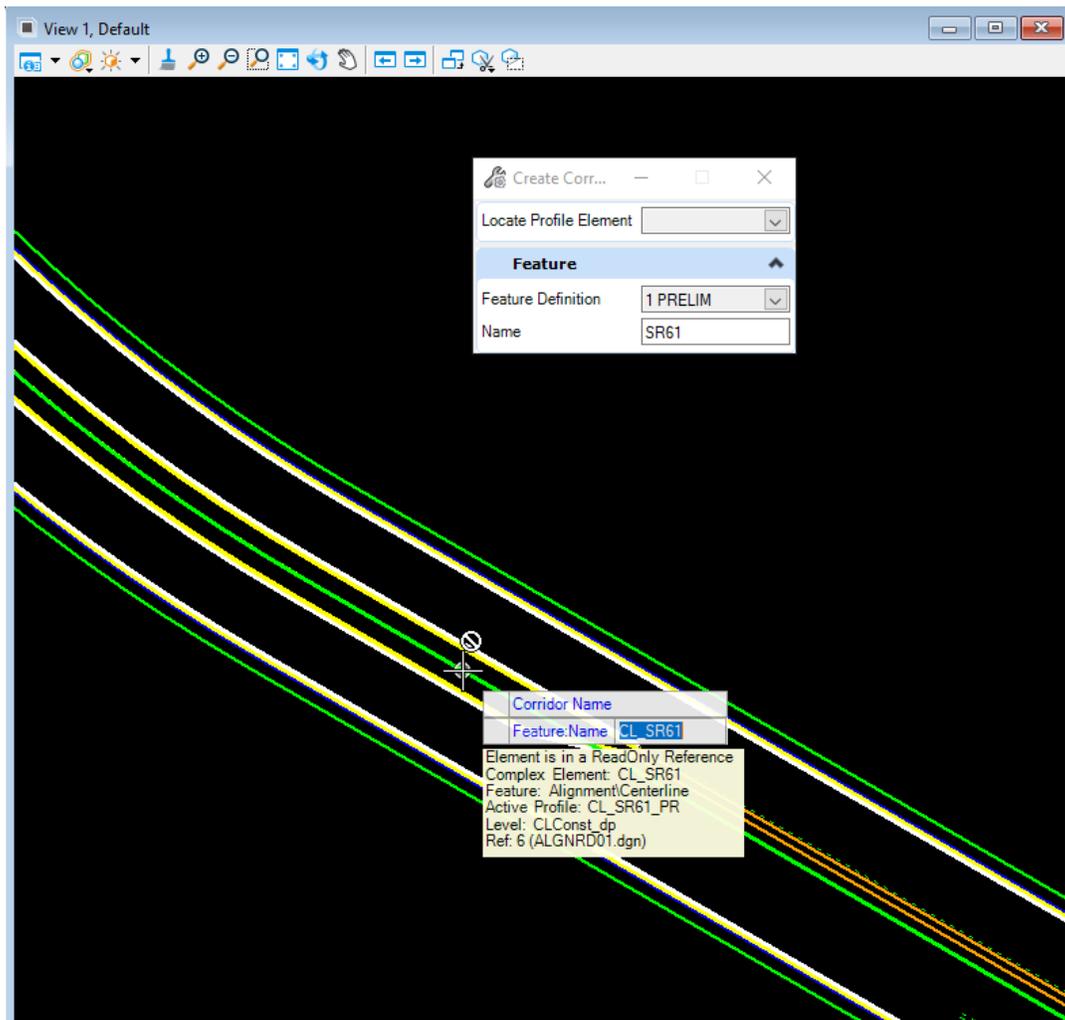


Exercise 3.2 Create Corridor, SR61

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



2. Select the **SR61 Centerline** in the Plan View when the “Locate Corridor Baseline” prompt comes up.
3. Reset to accept the **Active Profile**. This profile resides with the *SR61 Civil Feature Centerline*.
4. Enter the *Corridor Name*, **SR61**, in the Create Corridor dialog.

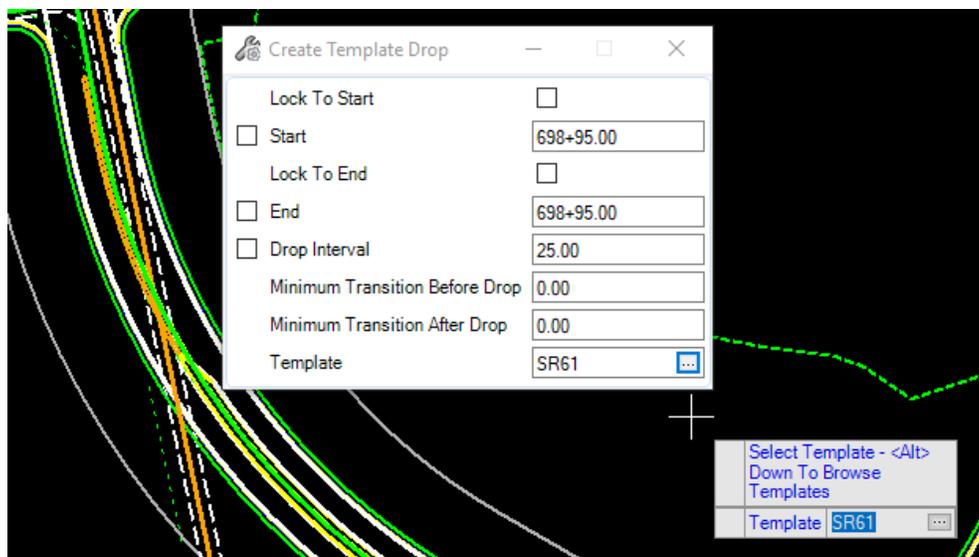


5. Data point to accept the *Name of the Corridor*, **SR61**. The corridor is created AND the integrated Create Template Drop dialog launches.

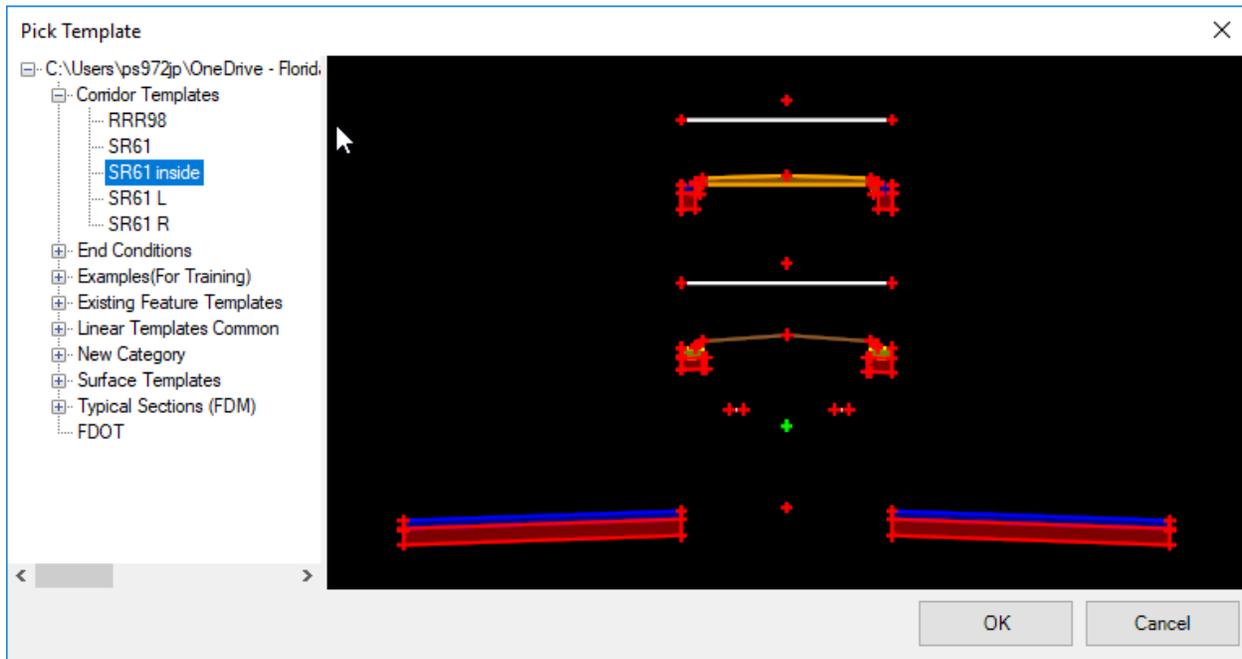
Note Once a Corridor is created, a shape boundary is placed in the Plan View representing its outline. This shape is initially placed on the CorrHndlStg1_dp level. It has several properties which can be seen by clicking on the shape and choosing first icon. One of the properties is the Feature Definition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



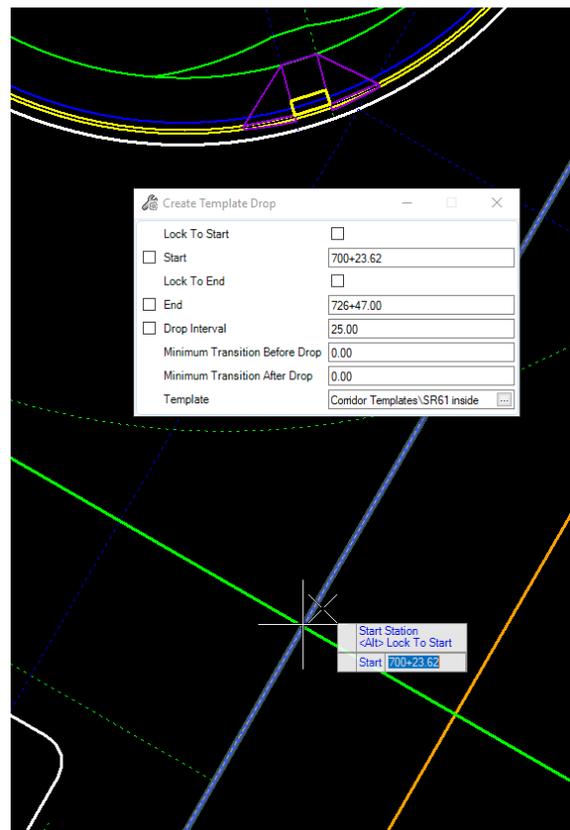
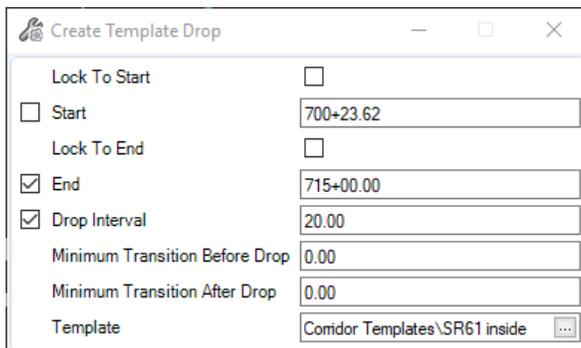
6. Once the Create Template Drop dialog is opened, first select the **corridor template** to be placed on the corridor. Either use the **icon** on the dialog <OR> select **ALT down arrow** to pick a template.



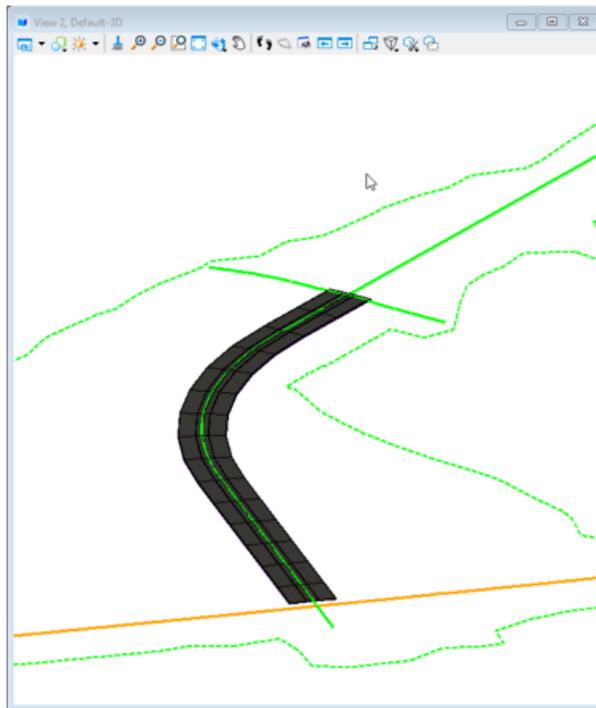
7. Find the **SR61 Inside** template in the *Corridor Templates* folder of the active Project Template Library. Select it and click “OK.”



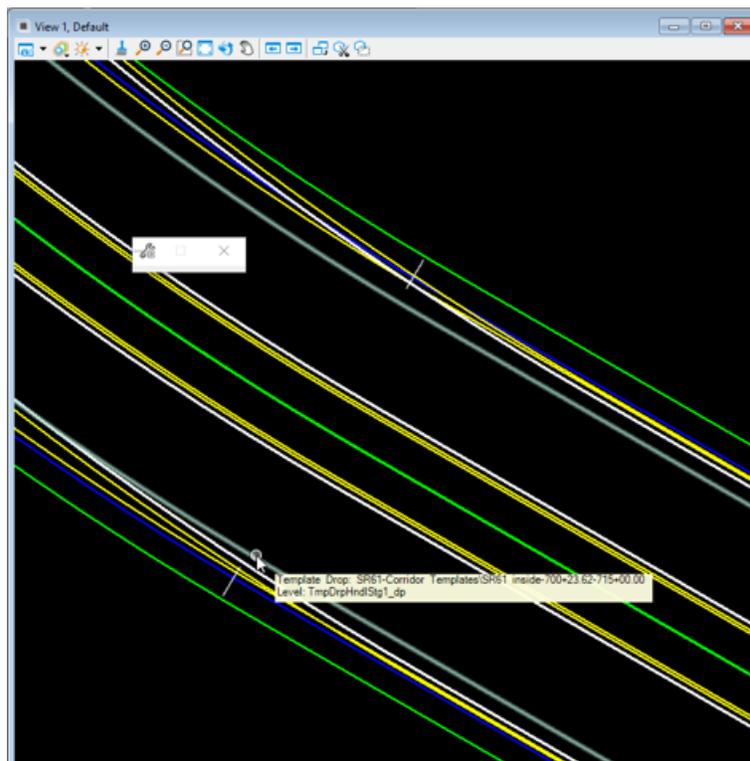
8. Data point to accept the **Template** and move to the next setting.
9. Continue to define the Create Template Drop dialog information entering and accepting the following for the **SR61 Corridor**:
 - a. *Start* – Use keypoint or intersect snap click to the *ML line* on 98, *Station 700+23.62* as shown on the right.
 - b. *End* – type in *Station 715+00* as shown below.
 - c. Set the Drop Interval to 20 as shown below.



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



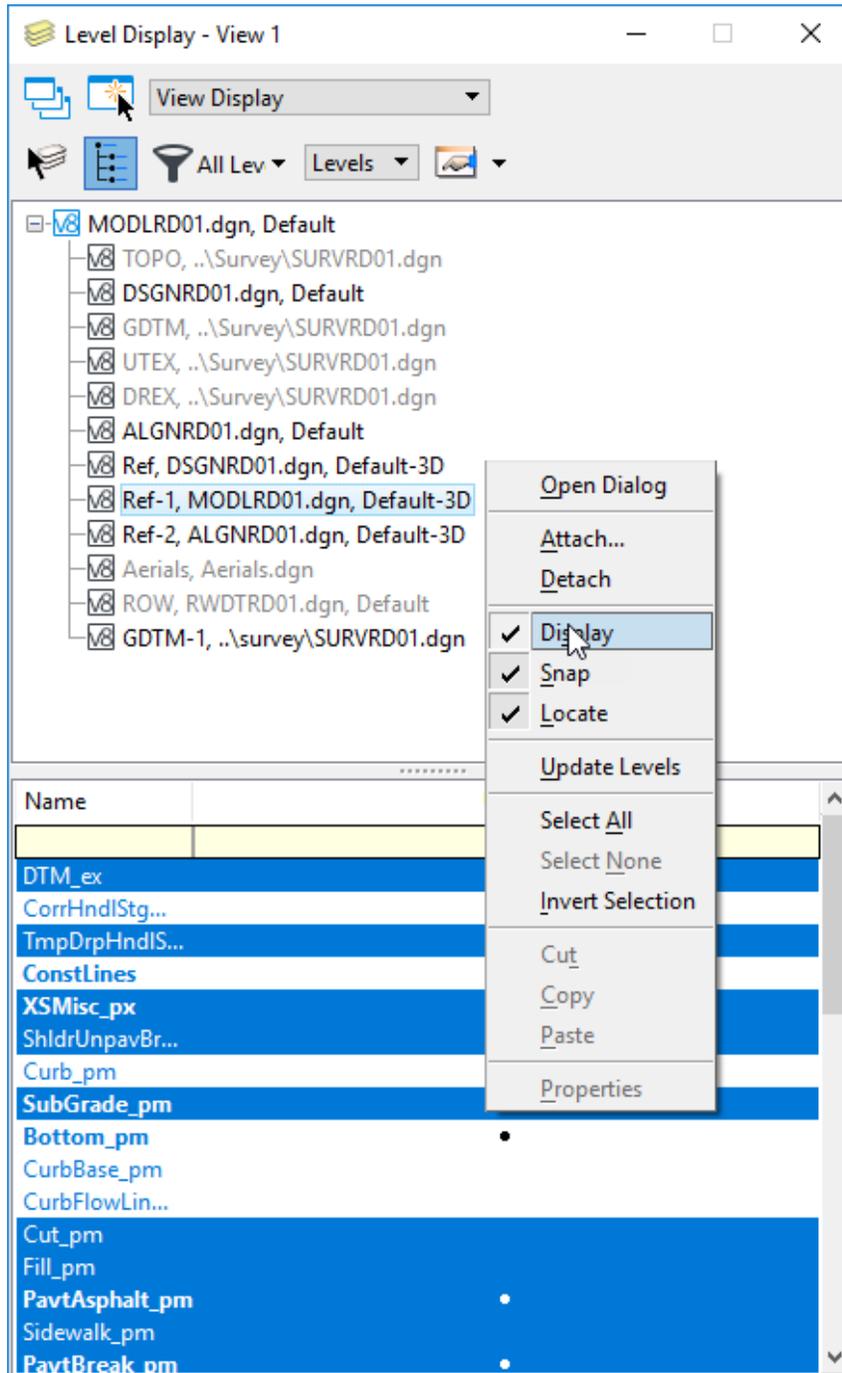
Note Once a Template Drop is created, a shape boundary is placed in the Plan View represent its outline. This shape is initially placed on the TmpDrpHndlStg1_dp level. It has several properties which can be seen by clicking on the shape and choosing first icon. Properties include the Template Drop Interval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



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

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

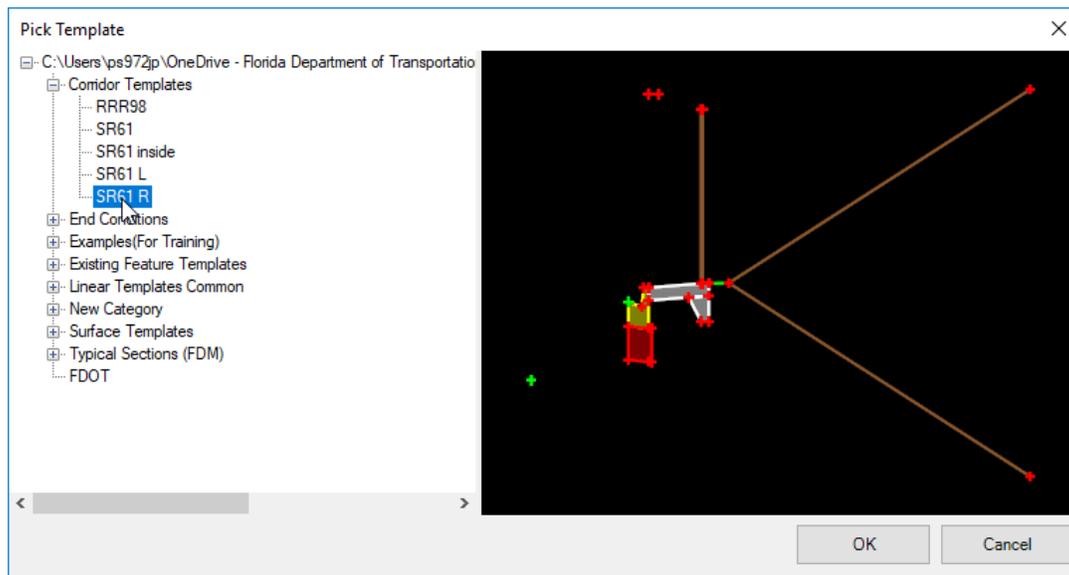
1. Data Point somewhere in **View 1** to make it active.
2. On the OpenRoads Level Display dialog, navigate to the **Ref. MODLRD01.DGN Default-3D** file.
3. Right click on the file and un-check the **Display** option.



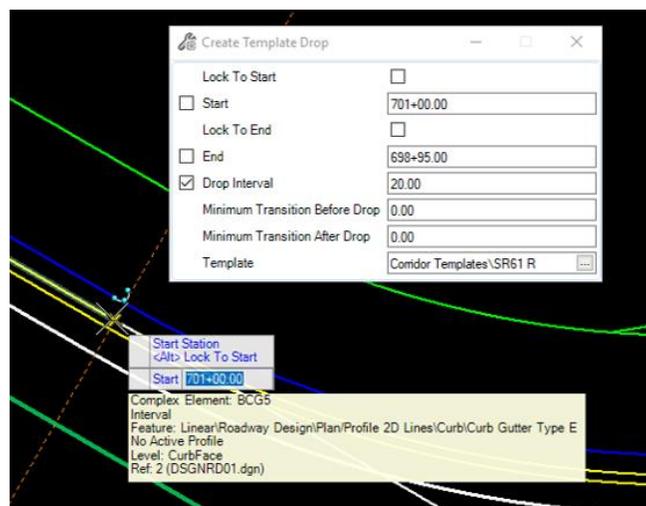
Exercise 3.3 Create Template, SR 61 End Conditions

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

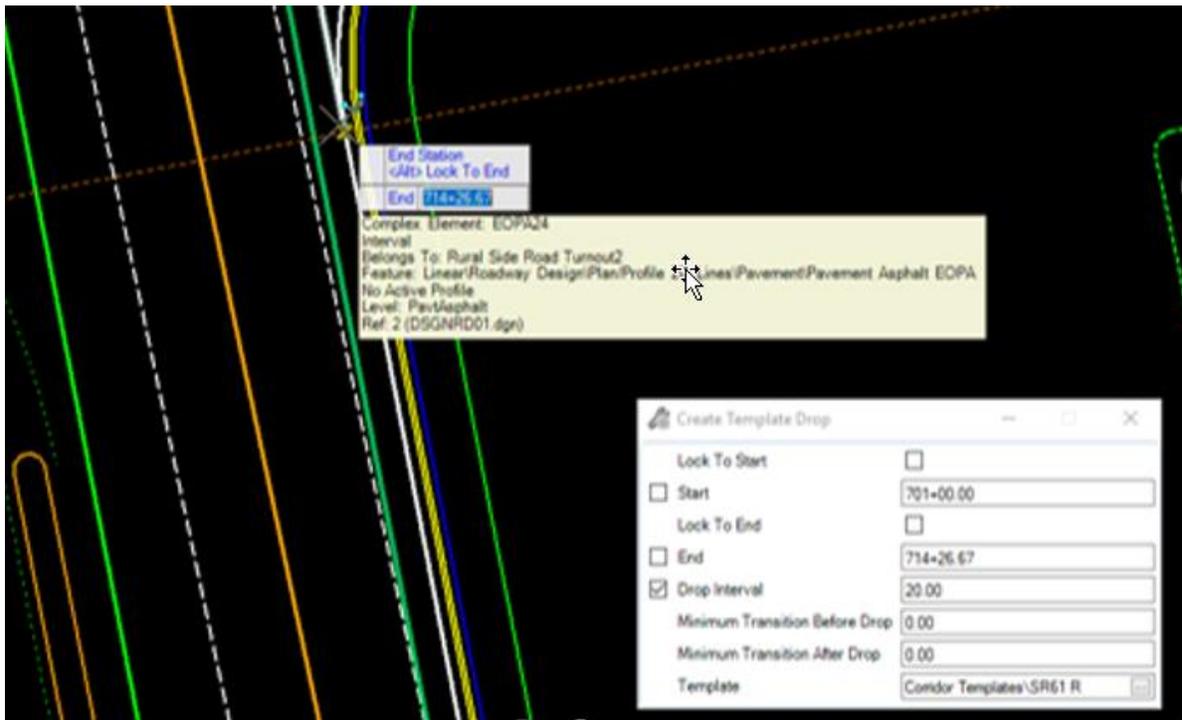
1. Use the *Corridors*, **New Corridor** tool.
2. Select the **SR61 Centerline** in the Plan View when the “Locate Corridor Baseline” prompt comes up.
3. Reset to accept the **Active Profile**. This profile resides with the *SR61 Civil Feature Centerline*.
4. Enter the *Corridor Name*, **SR61 R**, in the Create Corridor dialog.
5. OpenRoads will continue on to the **Create Template Drop** command. Either use the **icon** on the dialog <OR> select **ALT down arrow** to pick a template.



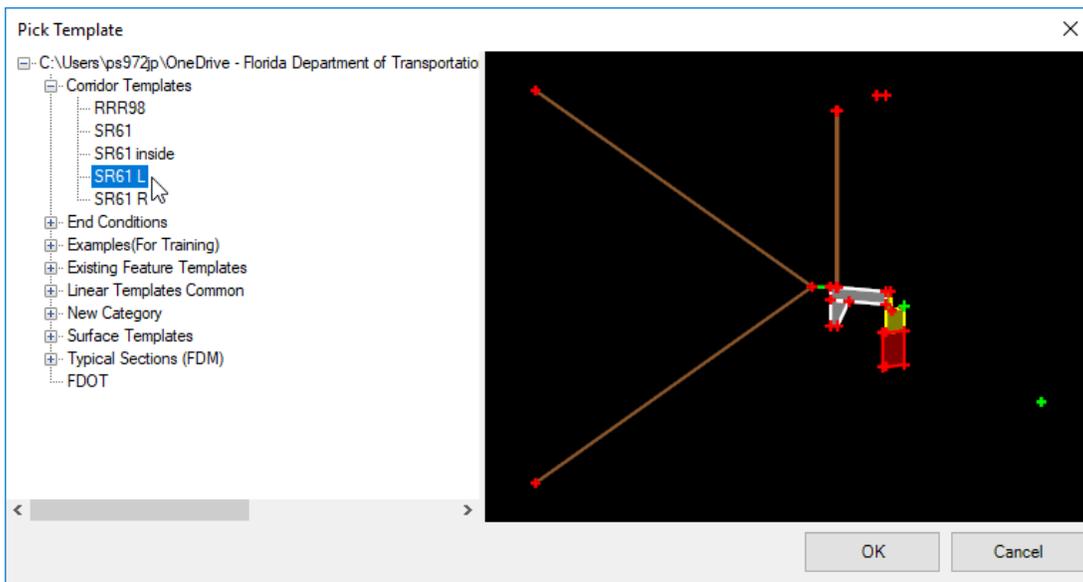
6. Pick the **SR61 R** template in the *Corridor Templates* folder of the active Project Template Library.
7. Continue to define the Create Template Drop dialog information entering and accepting the following for the **SR61** Corridor:
 - a. *Start* – Snap to the end of the curb radius return on the right side of SR 61 at the T intersection, *Station 701+00*, as shown below.



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

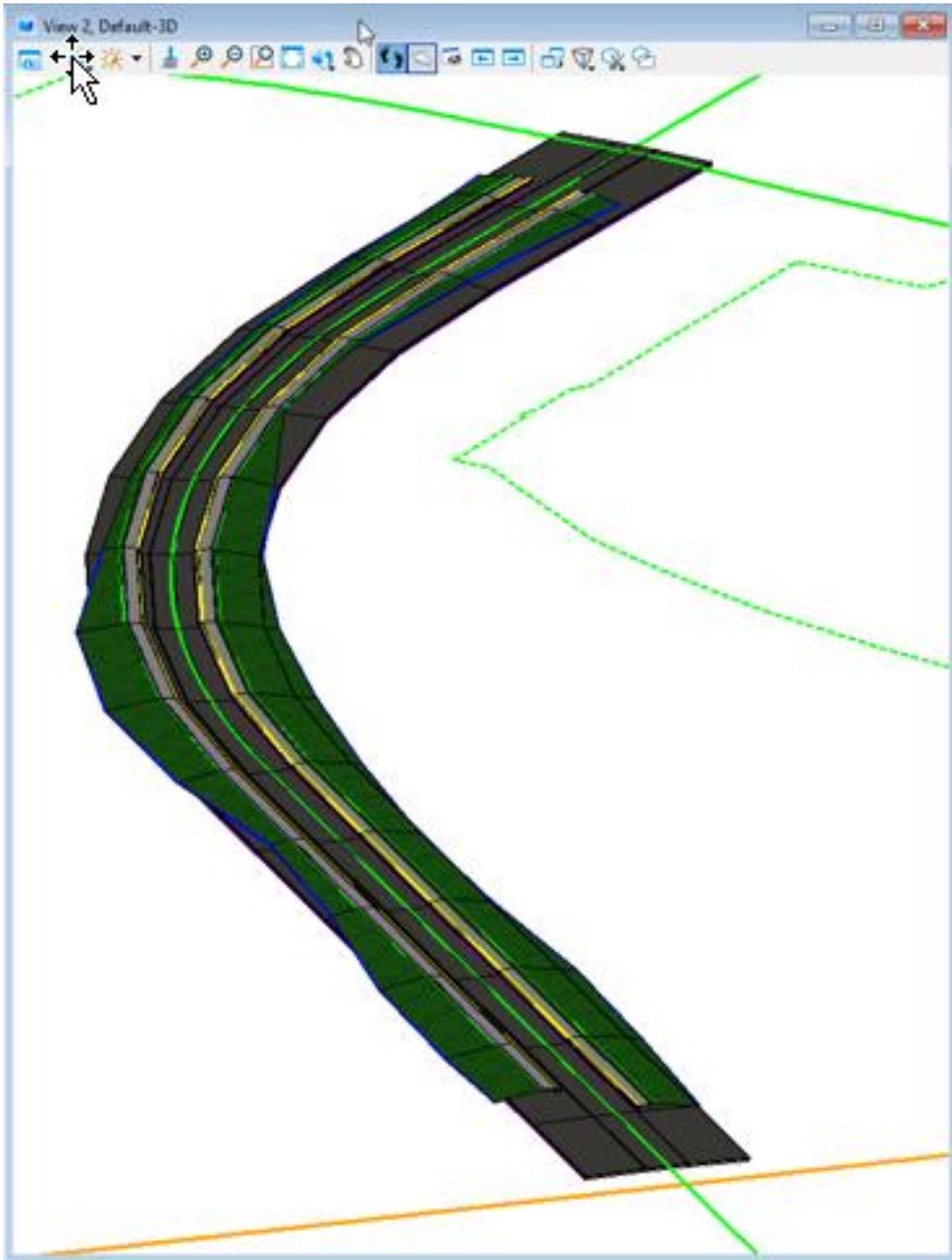


- c. Set the Drop Interval to 20 and accept the remaining prompts.
8. Repeat Steps 1-7 for the left side.
- a. Name the Corridor SR 61 L and pick the SR 61 L Template



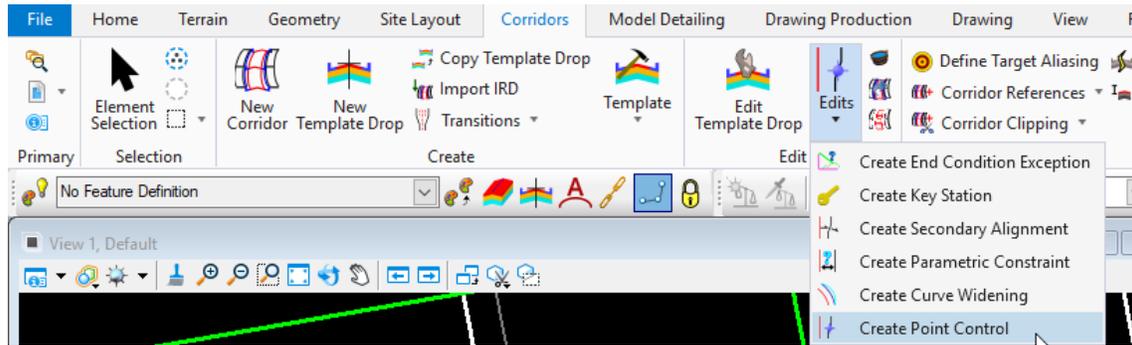
- b. Select the start and end points of the template drop based on the curb radius return points on the left side of the roadway. The stationing is listed below:
 - o *Start* – Station **701+34.00**
 - o *End* – Station **714+29.06**

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

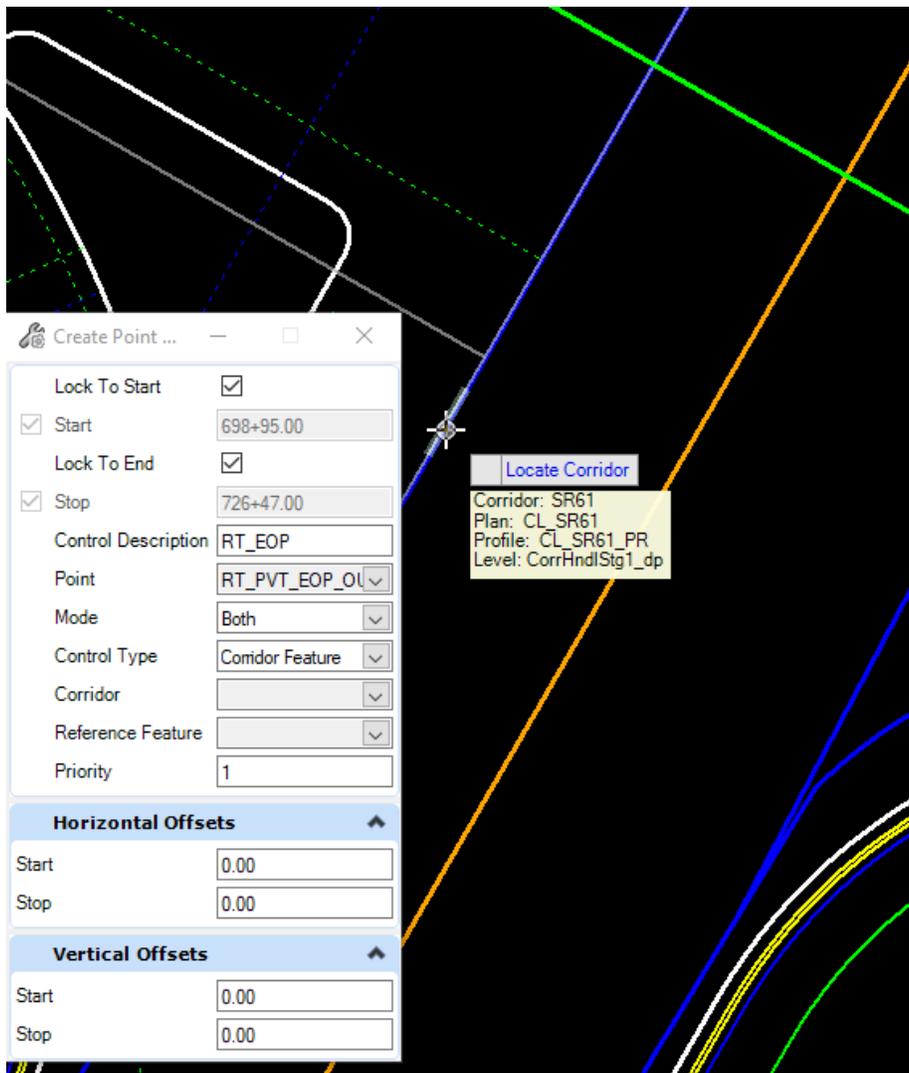


Exercise 3.4 Add Corridor Point Control, SR 61 L and R

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



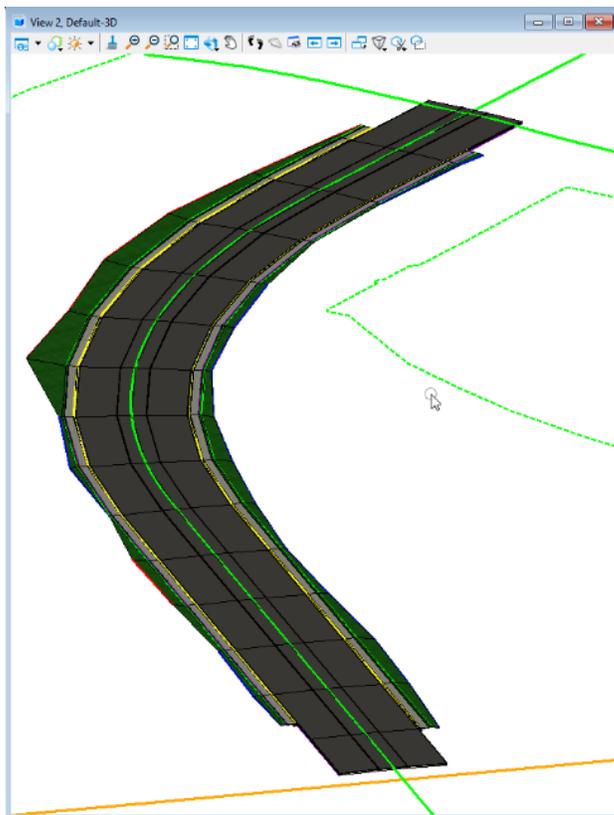
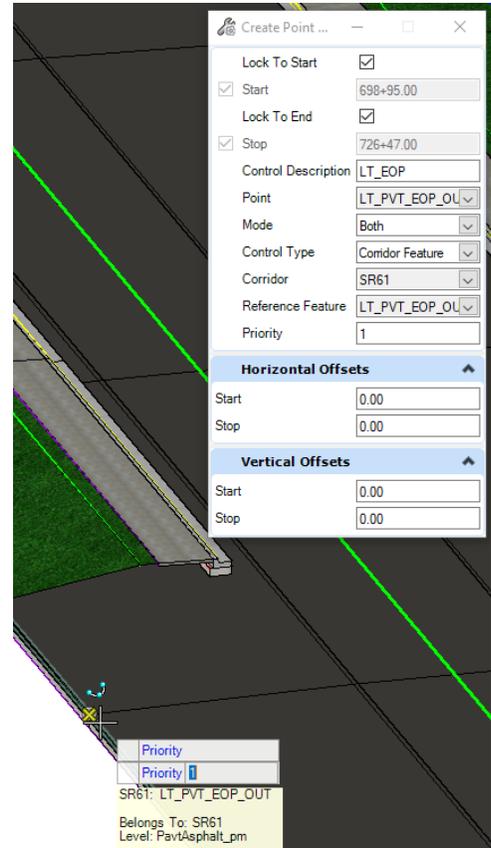
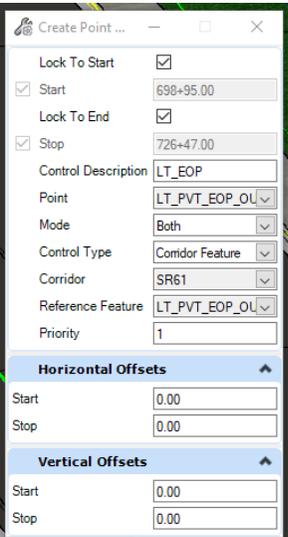
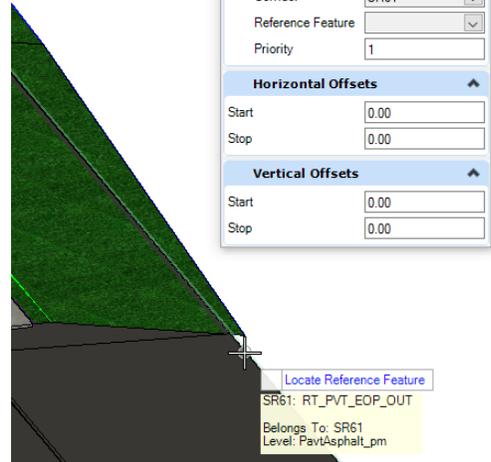
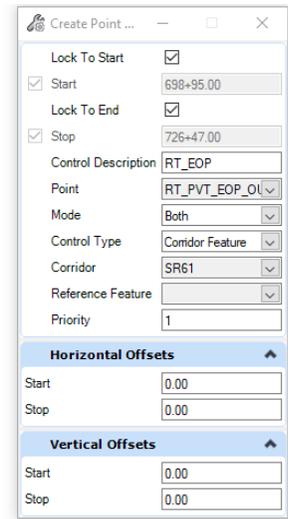
2. Identify the **Corridor Boundary handle** for the **SR 61 R** corridor. Continue to define the Create Point Control dialog information.



3. Enter and accept the following for the **SR61 R** Corridor:
 - *Start Station* **Lock to Start**
 - *End Station* **Lock to End**
 - *Control Description* **RT_EOP**
 - *Point* **RT_PVT_EOP_OUT**
 - *Mode* **Both**
 - *Control Type* **Corridor Feature**

4. For the Corridor, select a handle on SR 61 corridor developed for the inside.
5. For the Reference Feature, select the **RT_PVT_EOP_OUT** line on the **SR 61** corridor (inside) in the 3D view, as shown on the right. Note: DO NOT use select this with the drop-down as ORD currently has a bug where that will cause it to not display correctly.
6. Accept the defaults for the remaining items. The 3D view will update to move the curb and sidewalk to match the edge of pavement of the **SR 61** corridor model.
7. Repeat Steps 1 through 4 to set a point control for the **SR 61 L** corridor, with the following differences in the dialog:
 - *Control Description:* **LT_EOP**
 - *Point:* **LT_PVT_EOP_OUT**

8. *For the Reference Feature:* select from the dropdown list or select the **LT_PVT_EOP_OUT** line on the **SR 61** corridor (inside) in the 3D view, as shown on the right.
9. Repeat Step 6 to complete the point control. The model should look like below in the 3D view.



Exercise 3.5 Add Corridor References, SR61

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

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

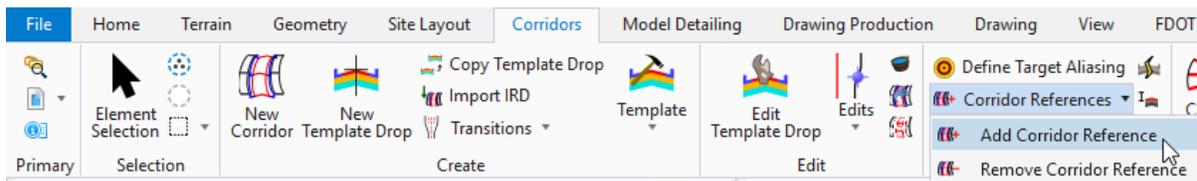


2. Create a selection set of the following 12 features in the plan view:

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

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

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



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

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



Exercise 3.6 *Variable Medians, SR61 Templates*

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

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

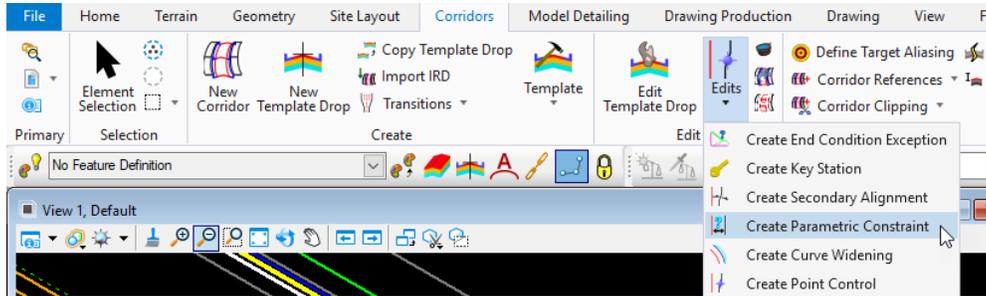
To properly operate the median condition templates, consider the following:

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

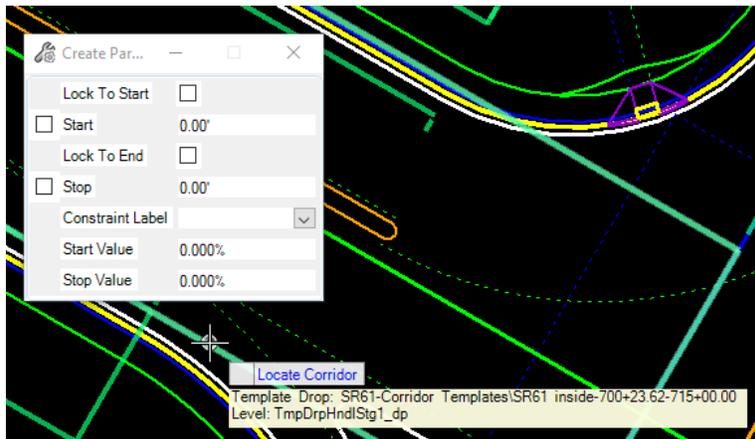
➤ **Add Parametric Constraint for Variable Median, SR61 Template**

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

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

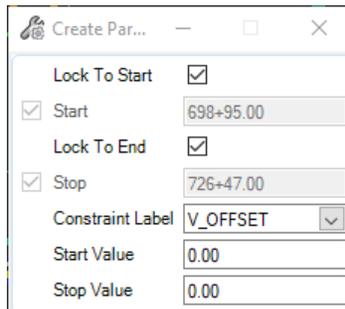


2. Identify the **Corridor Boundary handle**. Continue to define the Create Parametric Constraint dialog information.



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

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



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

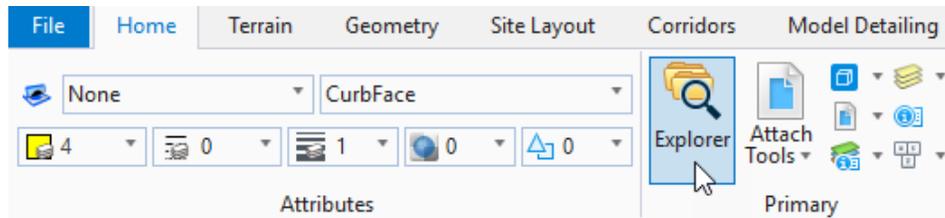
Exercise 3.7 *Change Corridor Feature Definition, SR61*

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

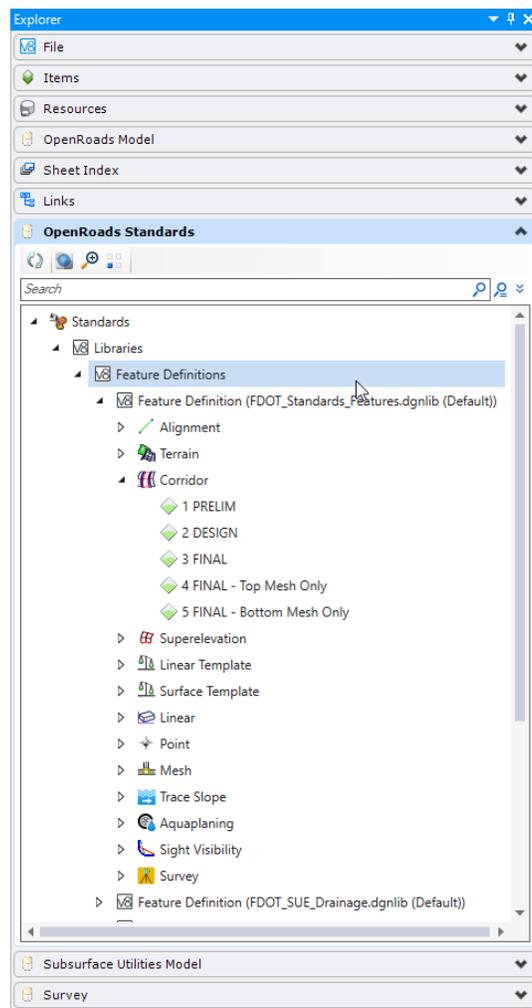
To optimize model performance, it is recommended that designers wait to change the Feature Definition until later in the design process, as each definition is set up with multipliers that decrease the corridor interval spacing.

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

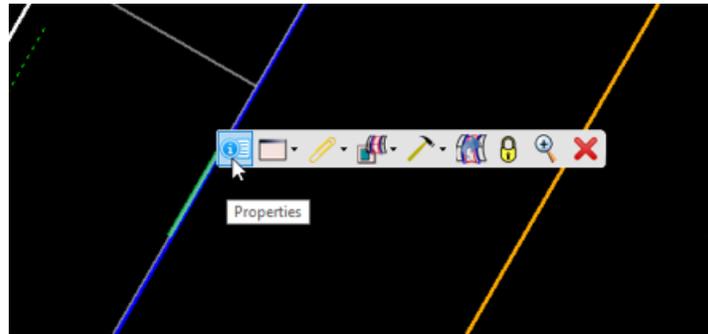
1. Open the Explorer pane from the Home tab or with the **F11** Function Key.



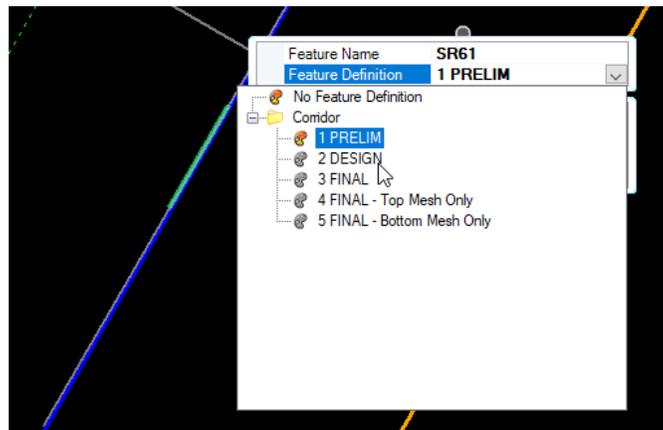
2. Select to expand the **OpenRoads Standards** section and expand the **Standards** option list.
3. Expand **Corridor** under *Libraries > Feature Definitions > Feature Definition (FDOT_Standards_Features.dgnlib (Default))*. These Feature Definitions are set up for various Design Stages.



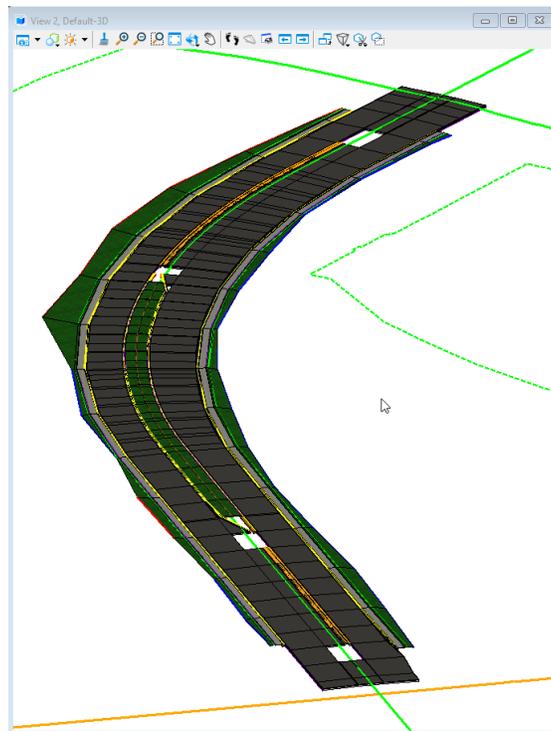
4. Select the **Handle** of the **SR 61** Corridor and locate the **Properties** icon when the menu displays.



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

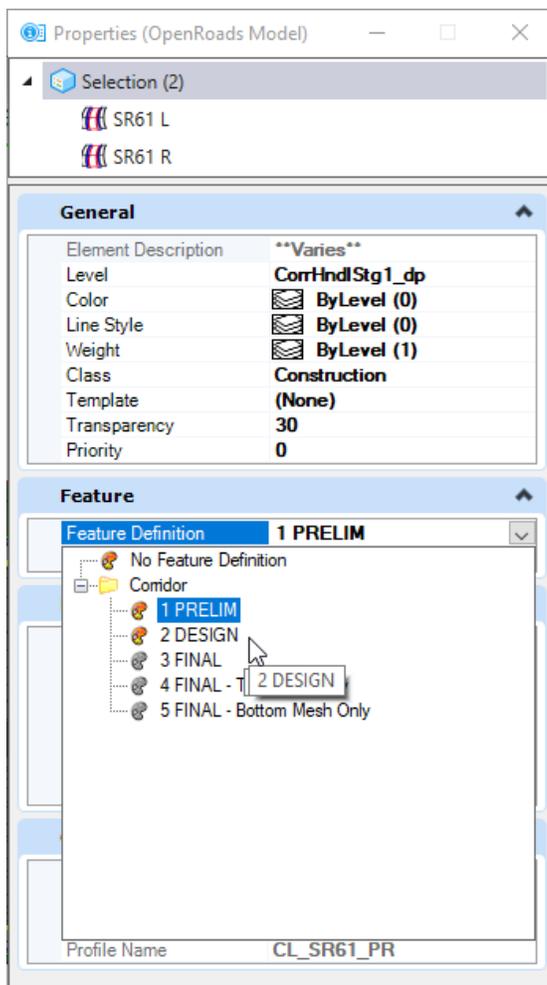
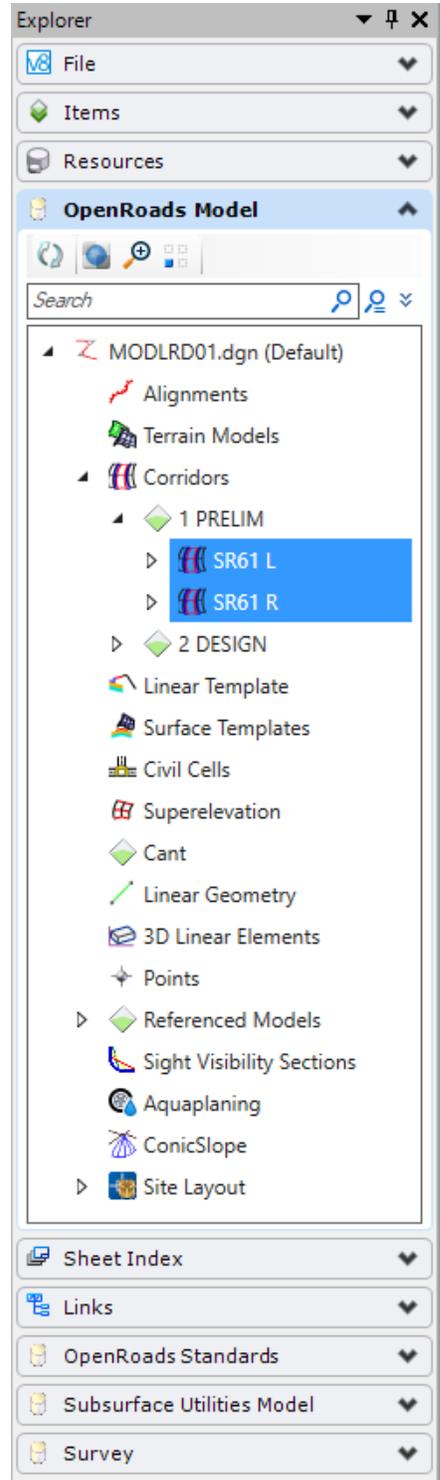


6. The Corridor will re-process and the 3D Model will re-draw with a tighter interval. Notice that the outside corridors remain unchanged.



7. Expand the **OpenRoads Model** section of the **Explorer** window.
8. Expand **MODLRD01.dgn (Default)**.
9. Expand **1 PRELIM** under *Corridors*.
10. Right click on SR61 L and select “Properties.”
11. Hold down **Shift** or **Ctrl** and select SR61 R. The Properties window changes to show both Corridors selected.

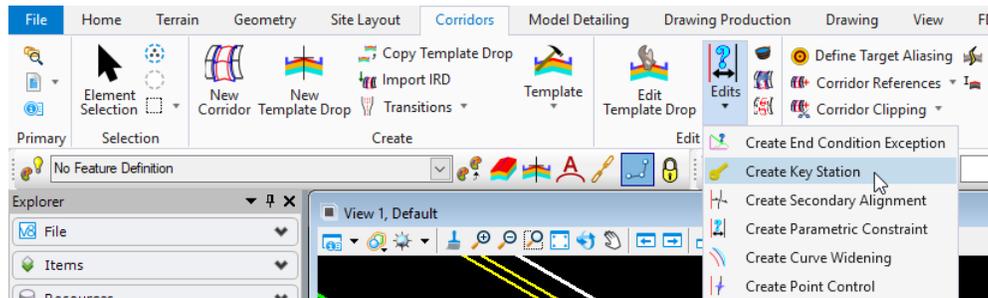
12. Change the *Feature Definition* from **1 PRELIM** to **2 DESIGN** as shown below. The 3D models for the outside corridors should redraw with a tighter interval.



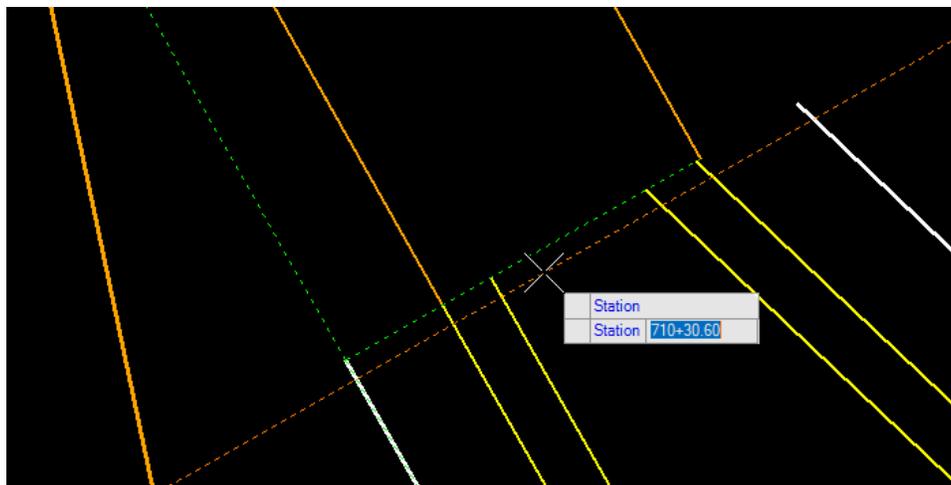
Exercise 3.8 Add Corridor Key Stations, SR61

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

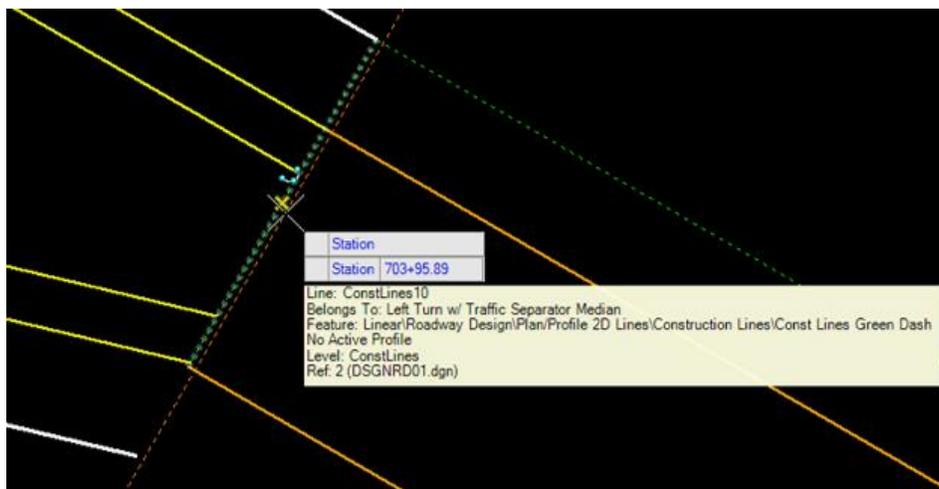
1. Use the *Corridors, Edits>Create Key Station* tool.



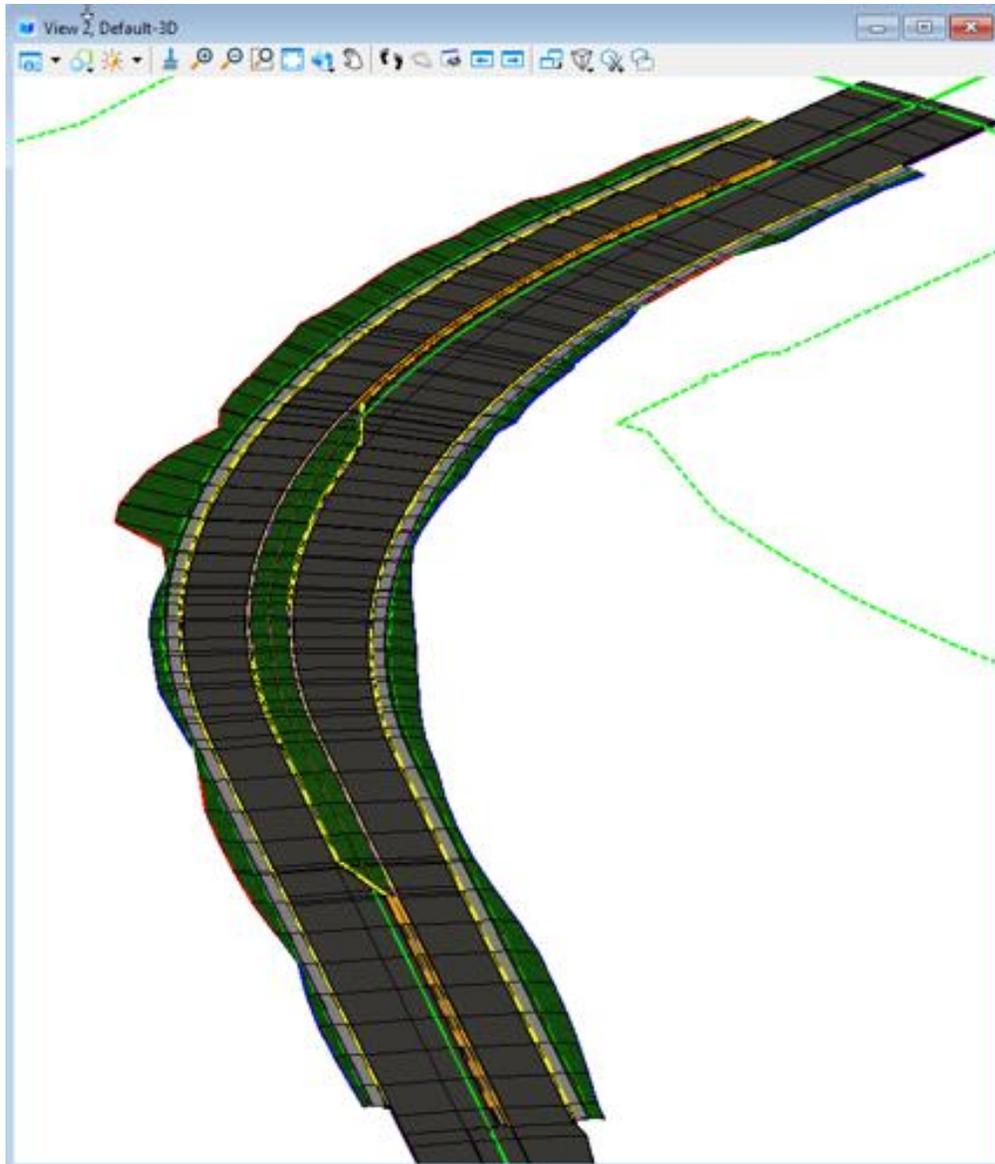
2. Identify the **Corridor Boundary** handle of the **SR61** Corridor.
3. Use AccuSnap to locate the Plan View **CurbMedian / Traffic Separator** division line. Snap to a point on this line.



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



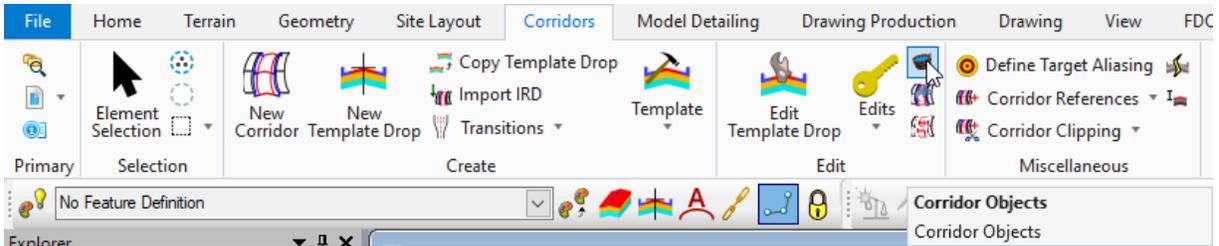
5. Add Key Stations at other transition areas, including where the left turn lane transition begins. If snapping directly on the transition point does not work, sometimes a key station is needed immediately before and/or after the transition point in order to minimize the size of the hole.
6. (Optional) Rotate the 3D View to a Top-down orientation, as it is sometimes easier to see where to snap to in the 3D view.



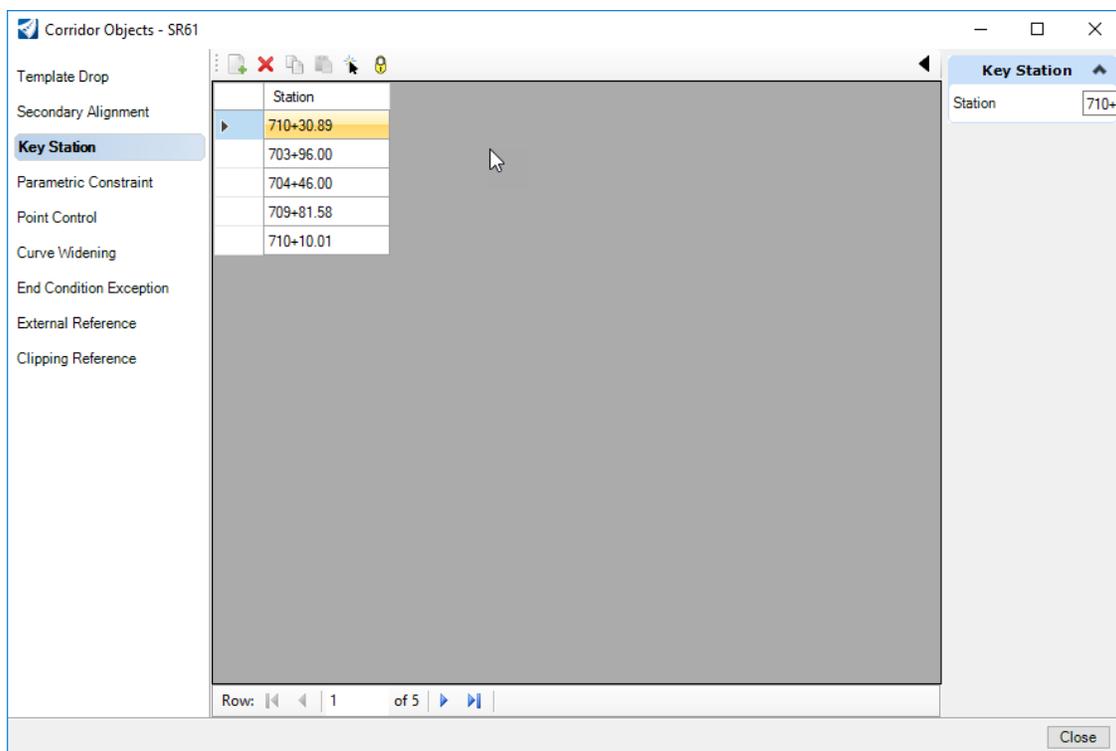
Exercise 3.9 Review Corridor Objects, SR61

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

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



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



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

➤ Additional Template Edits, SR61

1. Add the sidewalk front and back lines as corridor references to the respective outside corridors.
2. Change the sidewalk buffer from *3 feet* to **0 feet** on both roadways.

SUPERELEVATION

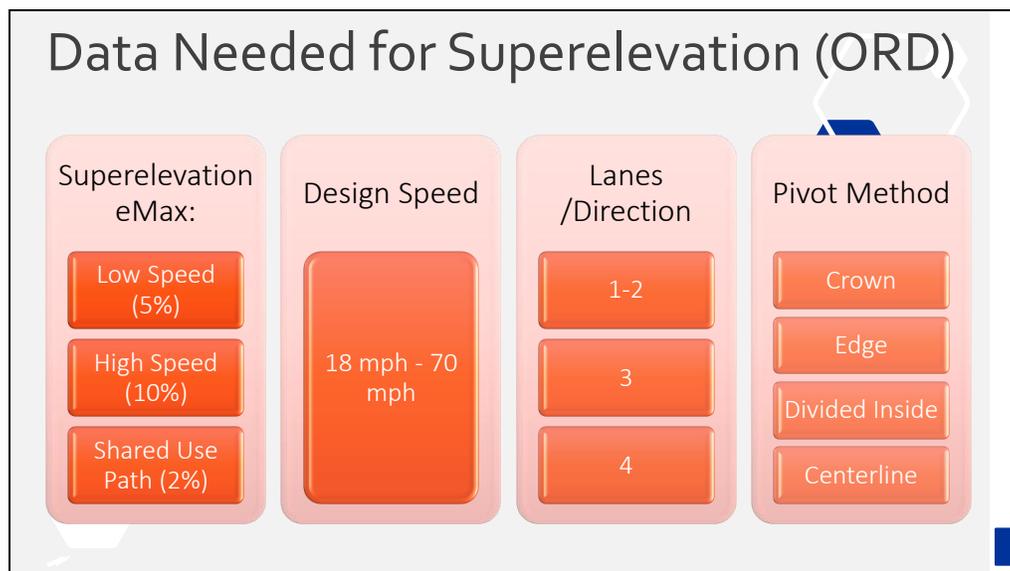
Superelevation rotates the pavement cross slopes through a curve so that vehicles can maintain stability and speed while on a turning roadway. Elevation banking is applied to help offset centrifugal force. Superelevation standards also define the transition length required to rotate from a normal crown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

Superelevation can be calculated in two ways:

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

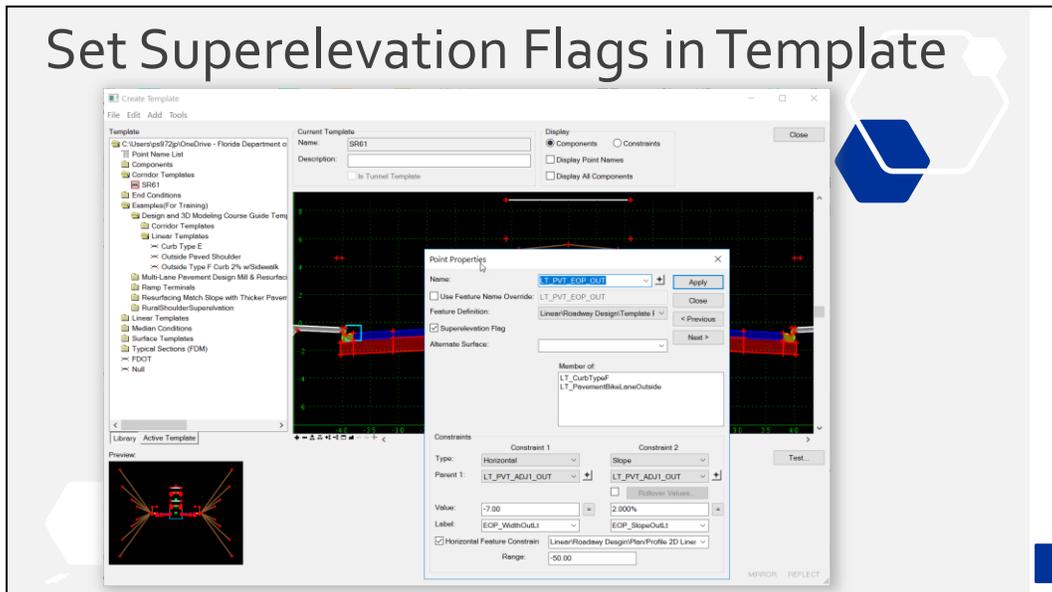
The result of superelevation is a DGN file of graphic superelevation lanes with cross slope attributes. This file can be referenced to a corridor model and associated, so the superelevation transitions are incorporated into the corridor model. The superelevation data should be stored in the ALGNRD DGN file, in the Superelevation model.

DATA NEEDED FOR SUPERELEVATION



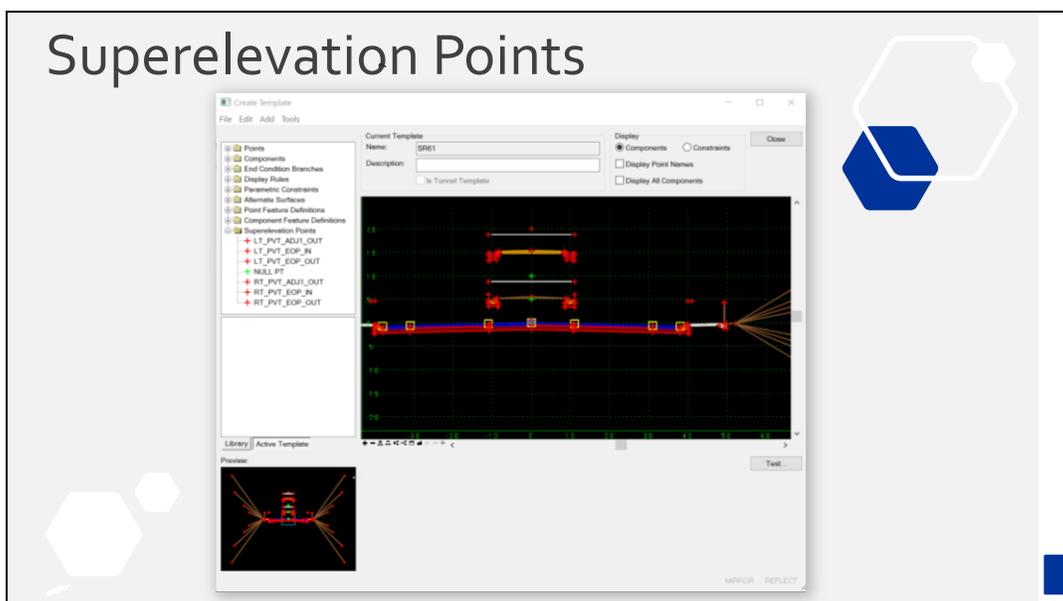
- Shared Use Path would typically be one of the “Edge” methods (inside, outside, left, right).
- Undivided roadway would typically be Crown or Centerline.
- Divided roadway might be “Divided Inside”.

SET SUPERELEVATION FLAGS IN TEMPLATE



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

SUPERELEVATION POINTS



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

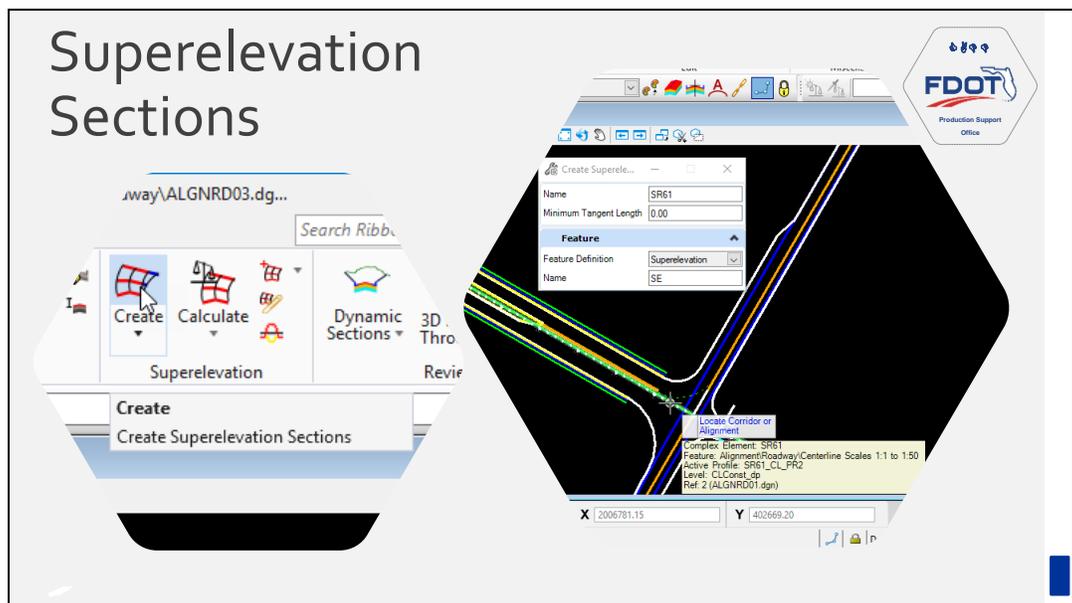
EXERCISE OVERVIEW – SUPERELEVATION

- 3.10 Prepare Alignment File for Superelevation
- 3.11 Create Superelevation Sections
- 3.12 Create Superelevation Lanes
- 3.13 Calculate Superelevation
- 3.14 Assign Superelevation to Corridor

Exercise 3.10 Prepare Alignment File for Superelevation

1. Open ALGNRD01.dgn and switch to the Superelevation model.
2. Reference *DSGNRD01_Complete.dgn*, *MODLRD_Mainline_01.dgn* and *ALGNRD01.dgn* (Default model) files.

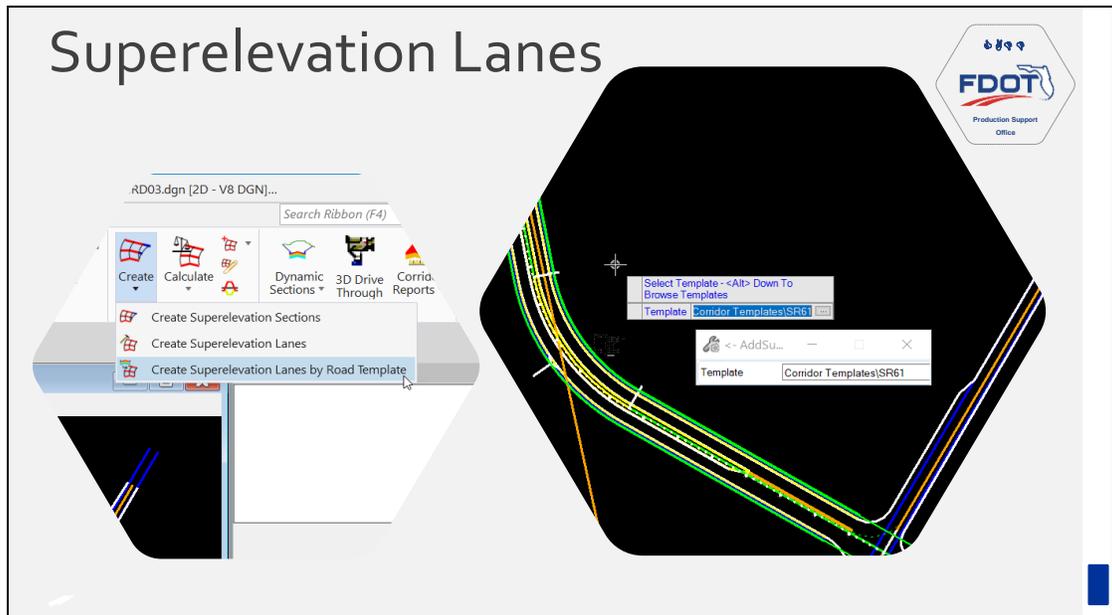
Exercise 3.11 Create Superelevation Sections



1. Select **Create** in the Superelevation section in the *Corridors* tab.
2. Select the corridor.
3. Name and give the Superelevation feature definition.

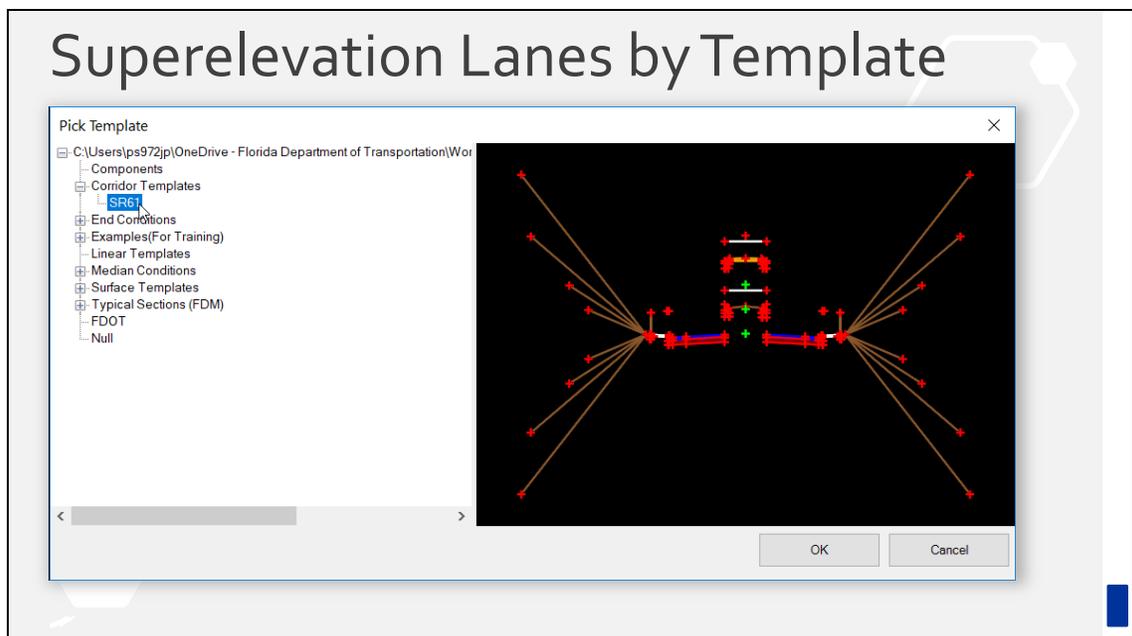
HINT Minimum tangent length can split it into multiple sections (ie if you have multiple design speeds) based on the distance between curves.

Note Just like in SS4 it goes straight into the create superelevation lanes tool.

Exercise 3.12 Create Superelevation Lanes

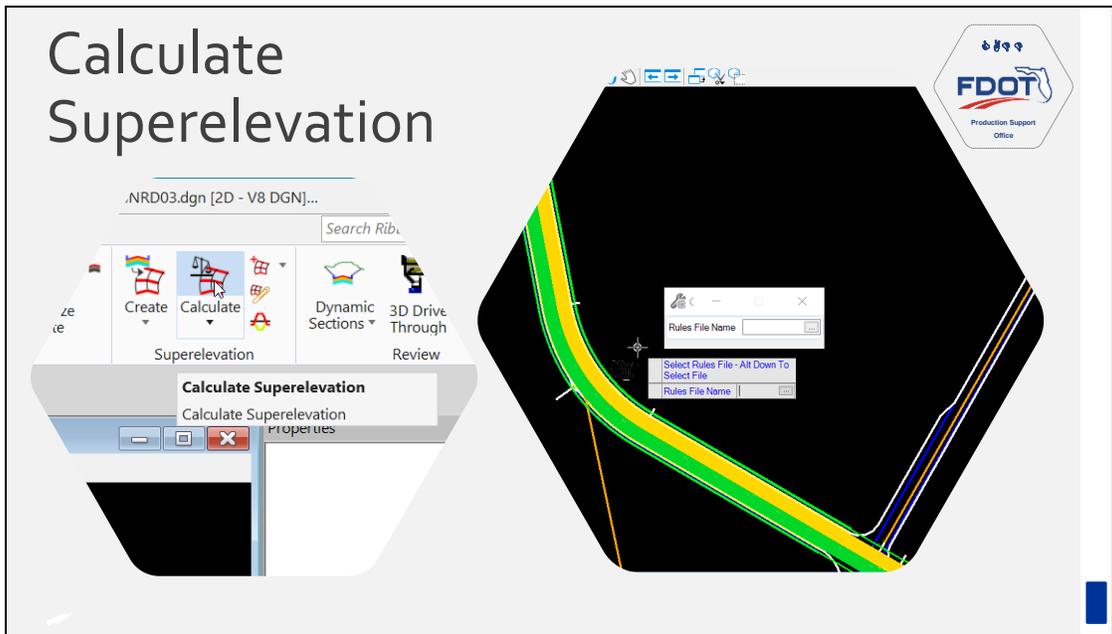
Note New feature lets you select your template in order to create super-elevation lanes in accordance with the lanes in the template.

4. From the super-elevation section context menu or in the *Corridors* tab of the ribbon, choose Create by Template. The points will automatically be picked up based on how your template is set up.

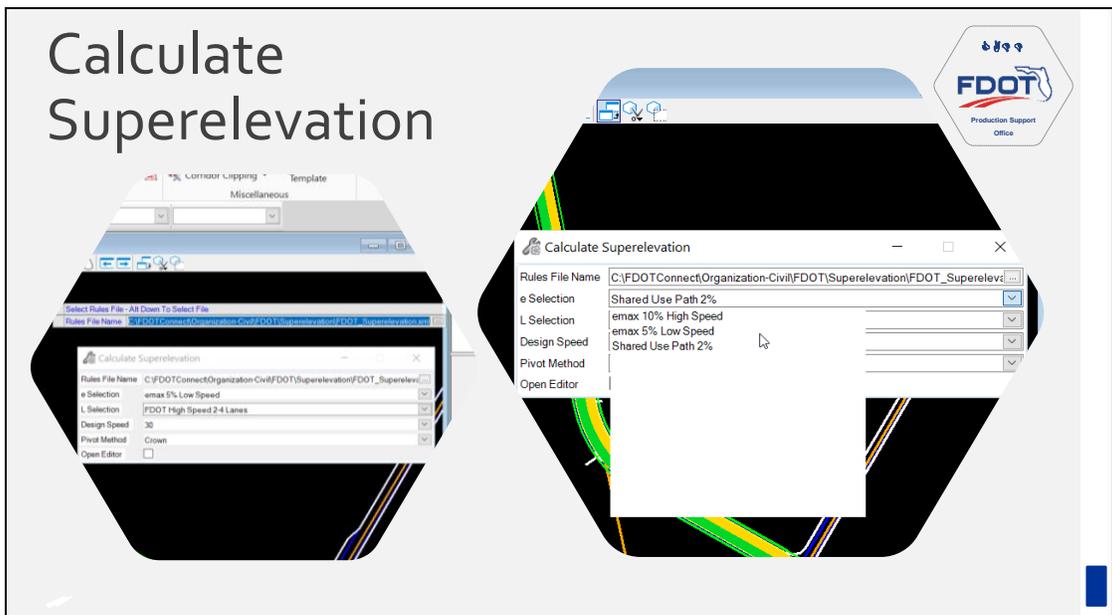


5. Pick template.

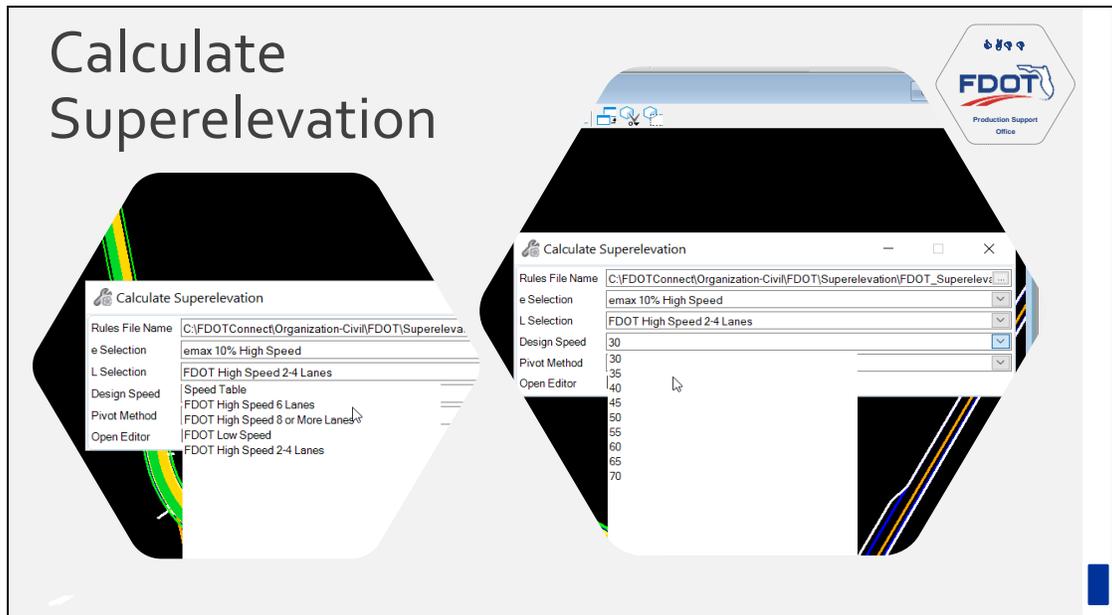
Exercise 3.13 Calculate Superelevation



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



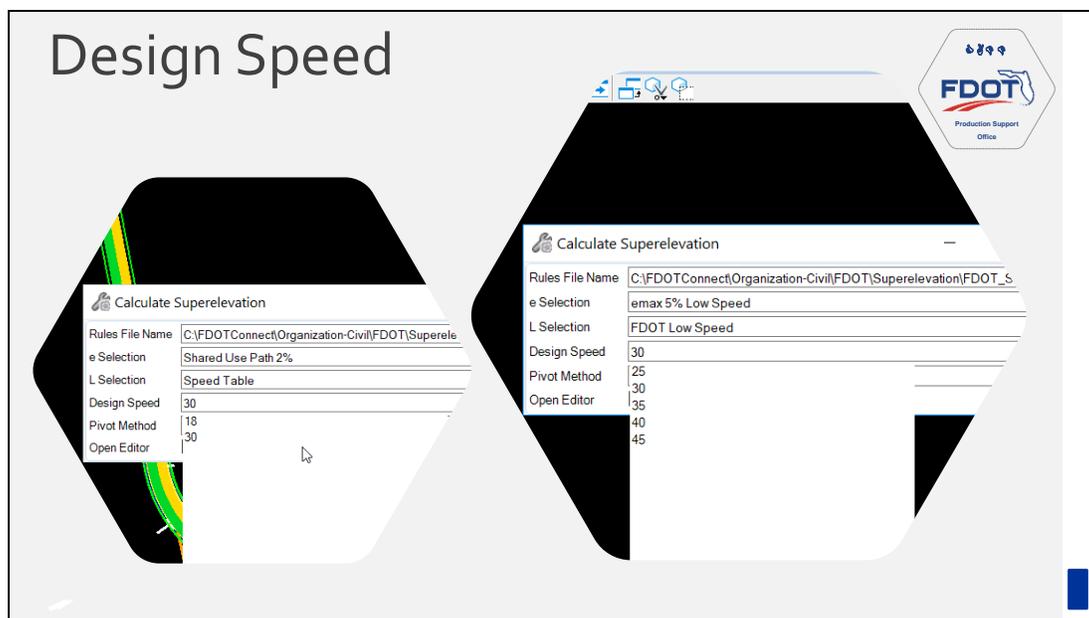
3. Select appropriate settings, e selection is “Low Speed,” “High Speed,” or “Shared Use Path”

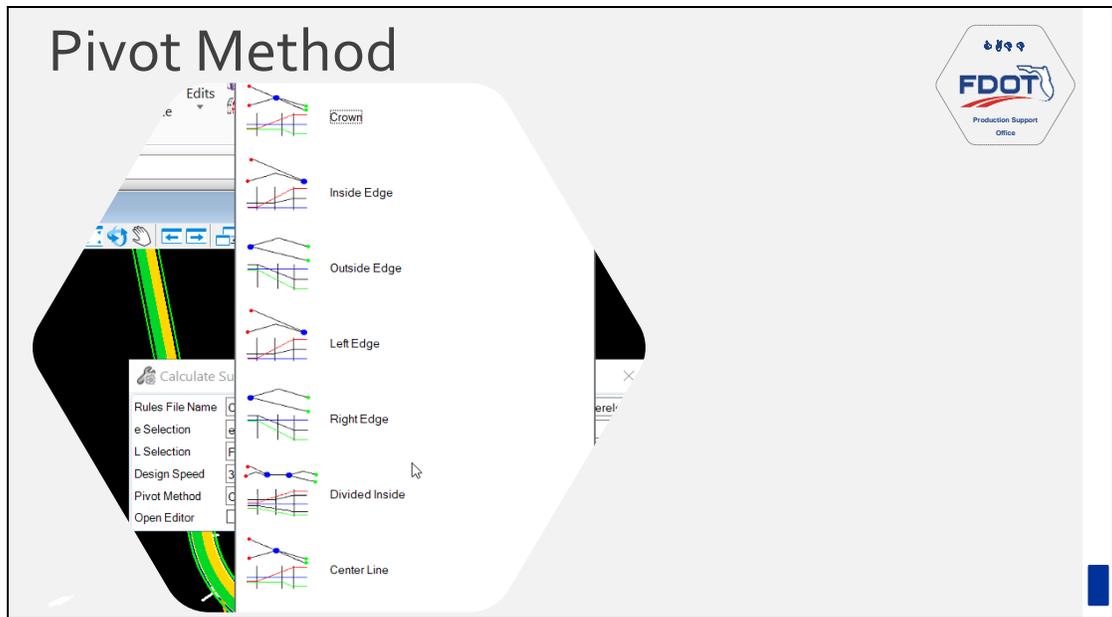


4. For Shared Use Path, select “Speed Table” under “L.”

HINT For High Speed you need to know the lanes

Note Design speed varies based on e selection. For high speed we have 30-70. For Shared Use Paths we have 18 and 30, and for Low Speed we have 25-45.





5. Select the “Center Line” pivot method.

Important! Template needs to be set up in a way that allows for the pivot method (i.e. with a null point at the centerline.)

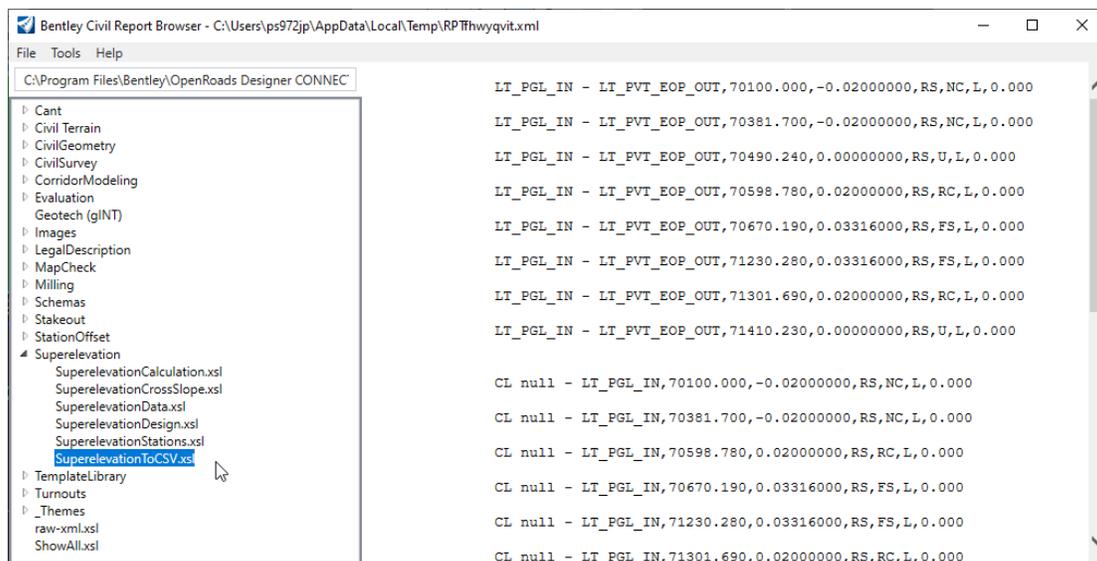
6. (Optional) Open the Superelevation Editor. Close when complete.

➤ **Export and Import Superelevation**

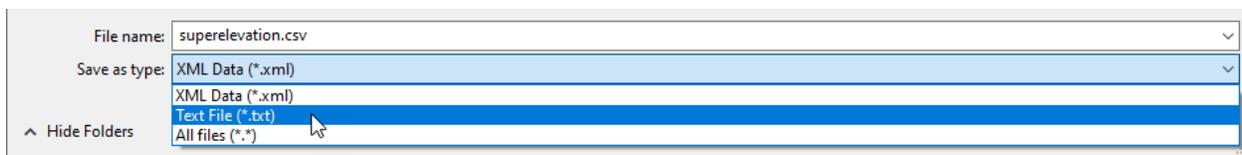
1. From the superelevation section context menu, open the Superelevation Report.



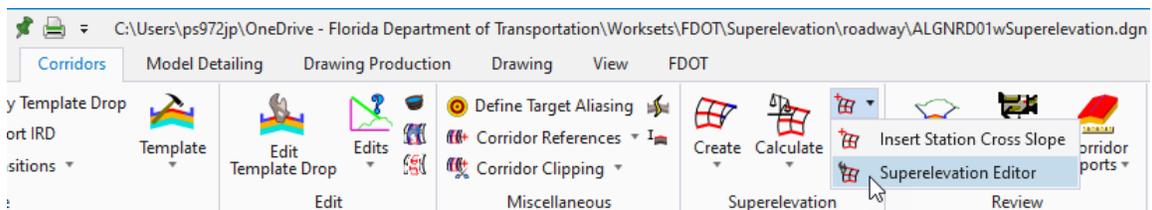
2. Select “SuperelevationToCSV.xml” Change Format Options to show stationing correctly if desired.



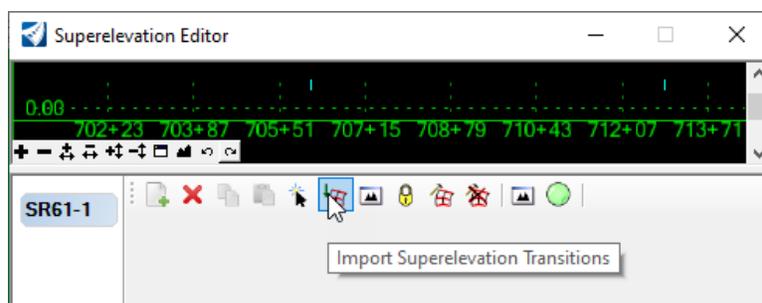
3. Select *File > Save As...* and save the file as “Superelevation.csv.” Change the “Save as type:” to “Text File (*.txt)”, then click **Save**.



4. Open the file in Excel, edit some values, and save the file.
5. Open the Superelevation Editor from the *Corridors* tab. Select the superelevation section at the prompt



6. Select all rows and delete.
7. Select “Import Superelevation transitions” as shown on the right, and import the “Superelevation.csv” file.

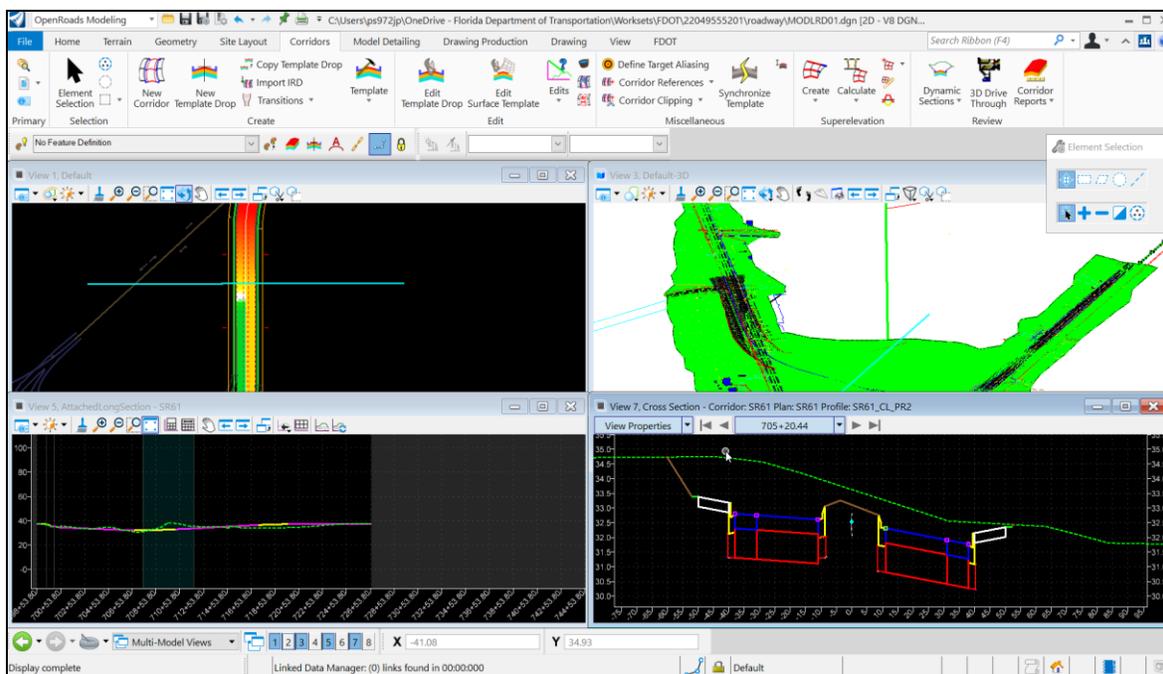


HINT This is a good way to make corrections or calculations in Excel if you want to double check that the numbers meet the standards.

Exercise 3.14 Assign Superelevation to Corridor



1. Open the *MODLRD01.dgn* file of the <Workset Folder>\FDOT\22049555201_CE\ folder in the *FDOTConnect - Roadway Workspace* in *OpenRoads Designer*.
2. Reference in the *ALGNRD01.dgn* file, **Superelevation** model, into the 2D model.
3. From the *Corridors* tab, select “Assign to Corridor.”
4. Select the Superelevation section and then the corridor, Verify the points in the dialog, and it should process when you click OK.



5. Open a cross section view and verify that the superelevation has been applied.
6. (Optional) If corrections are needed, use the *Corridors, Corridor Objects* tool and select “Point Controls”. Each superelevation lane has been added as a separate point control.

4 PLAN DEVELOPMENT WORKFLOW FOR CUTTING SHEETS

KEY SHEET

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

OBJECTIVES

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

EXERCISE OVERVIEW – KEY SHEET

- | | |
|-----|---|
| 4.1 | Create the Key Sheet |
| 4.2 | Place and Edit the Components of Contract Plan Set List |
| 4.3 | Create and Place the Key Sheet Index |
| 4.4 | Place the Range and Township Map Label |
| 4.5 | Place the Project Location Labels |
| 4.6 | Place the Contract Revision Note (Optional) |
| 4.7 | Index the Key Sheet |
| 4.8 | Create the Plan Sheets |

Exercise 4.1 *Create the Key Sheet*

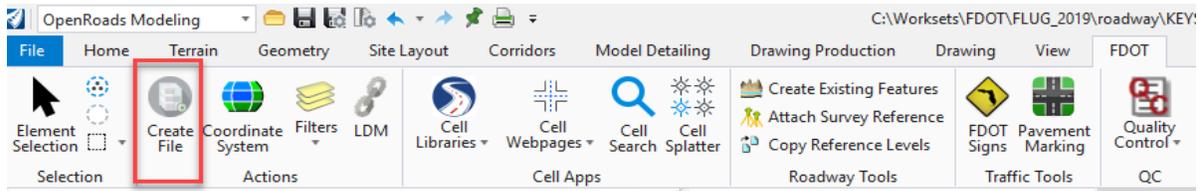
In this exercise, the Key Sheet DGN file will be created, the sheet will be placed with a map, and all of the necessary information will be added to the sheet.

1. Using the FDOTConnect icon on your desktop, open the MicroStation design file:

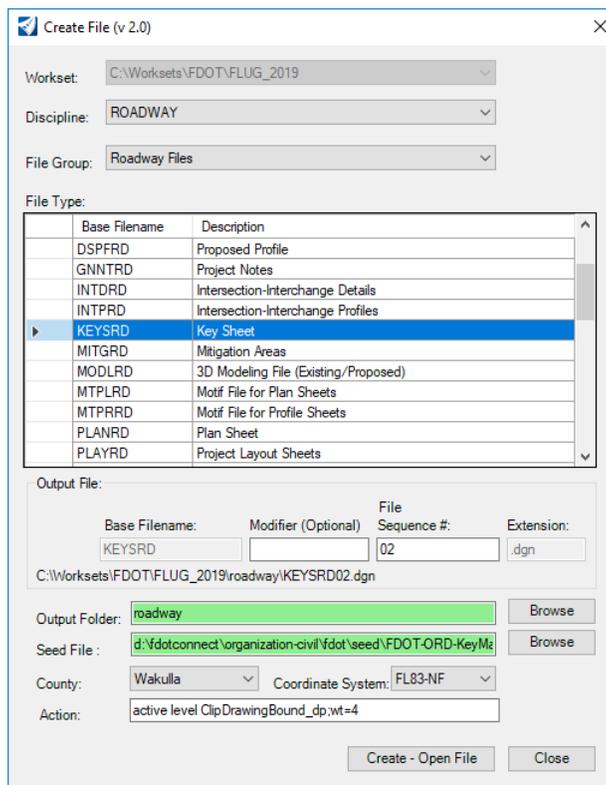
C:\Worksets\FDOT\FLUG_2019\BlankFile.dgn



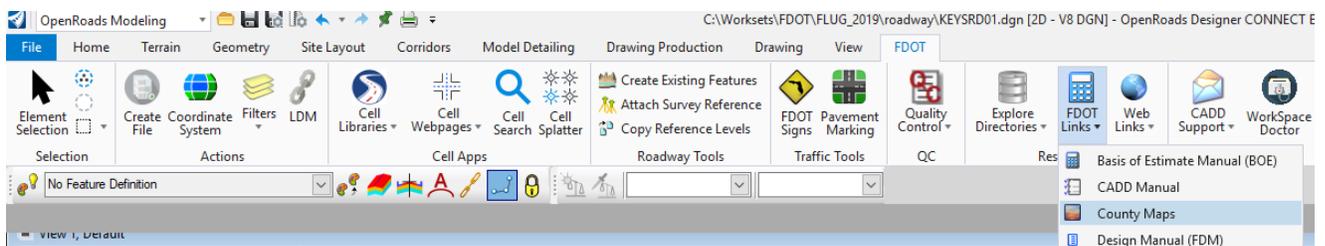
- On the OpenRoads Modeling Workflow, select **Create File**, from the **FDOT** Tab



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

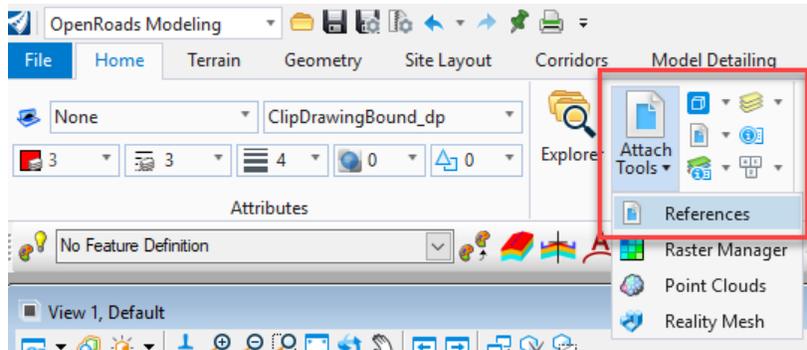


- Once in the file, download the PDF county map using the County Maps link on the FDOT Tab. **FDOT Links>County Maps**. Scroll to Wakulla and download the Waku-c.pdf to the rmap folder within your workset.

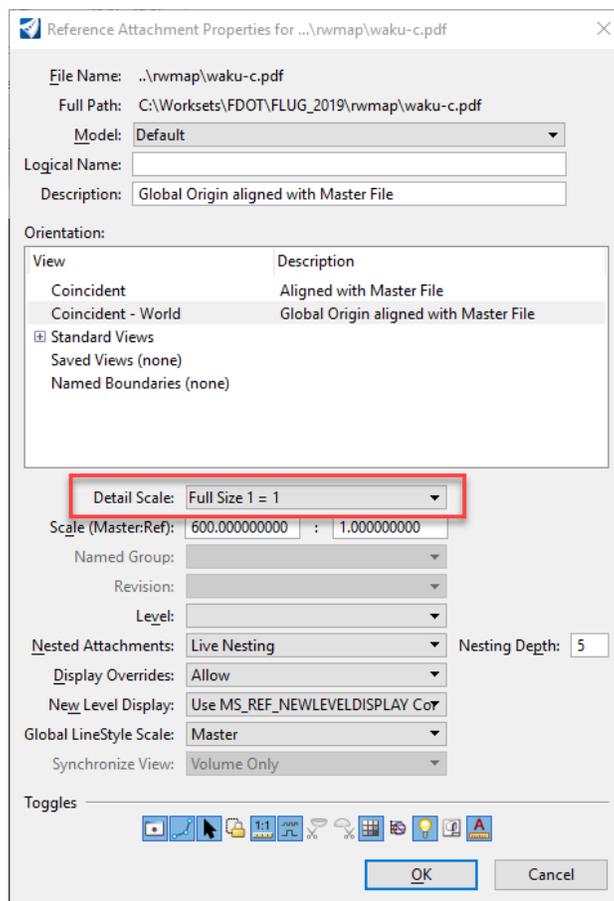


Note All Florida County Maps can be found in MicroStation DGN format and PDF format at: <http://www.fdot.gov/geospatial/countymap.shtm>

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

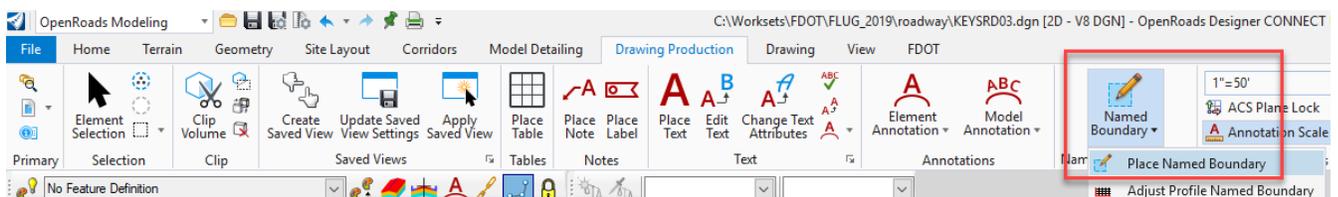


- Attach the waku-c.pdf as a reference, setting the Detail Scale: Full Size 1 = 1

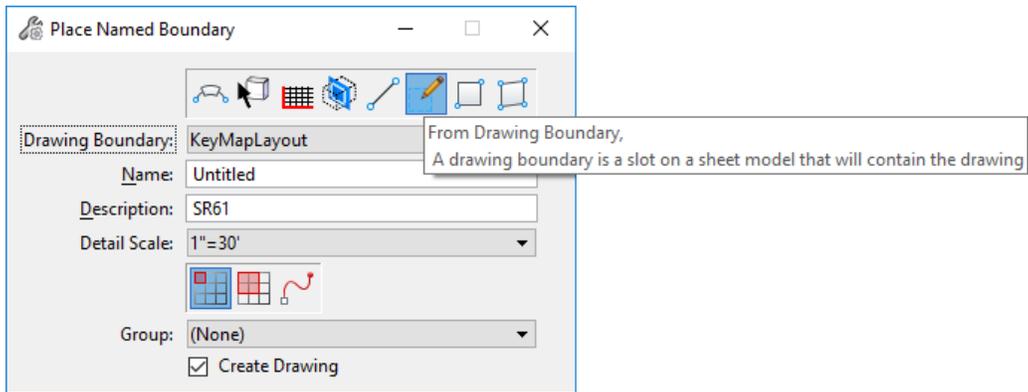


- Fit view and the zoom into the project location, which is the intersection of SR 61 and US 98.

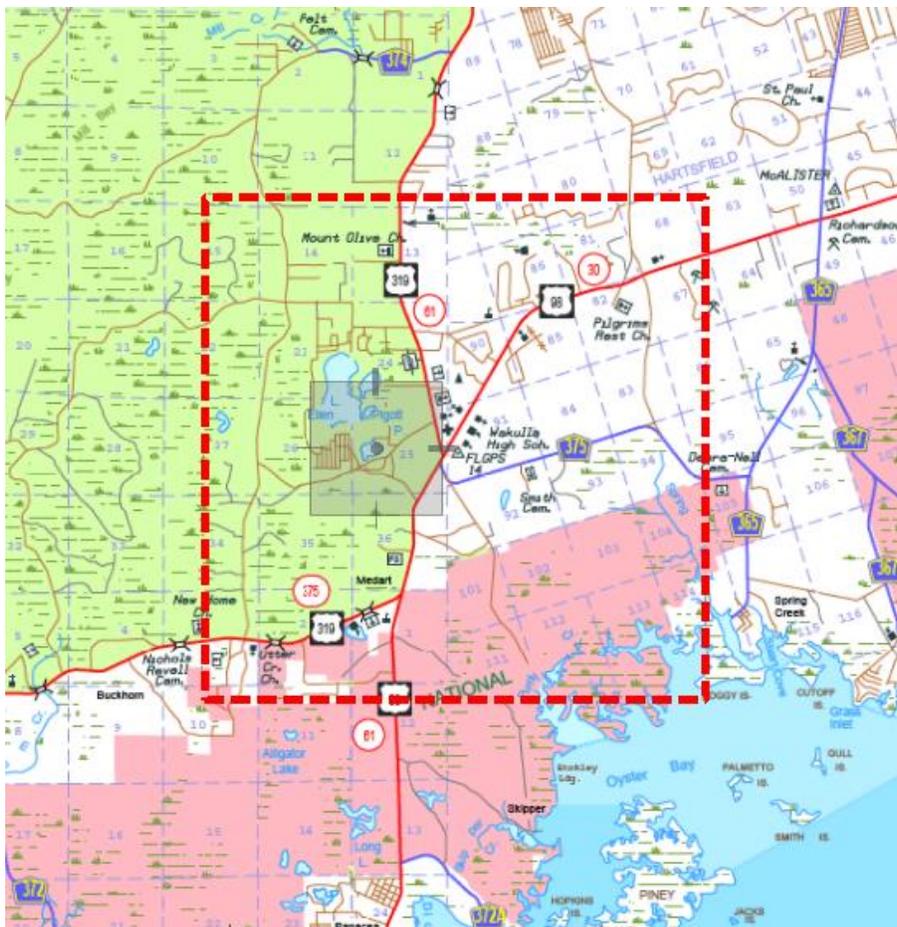
- Navigate to the Drawing Production tab and select the Place Named Boundary tool.



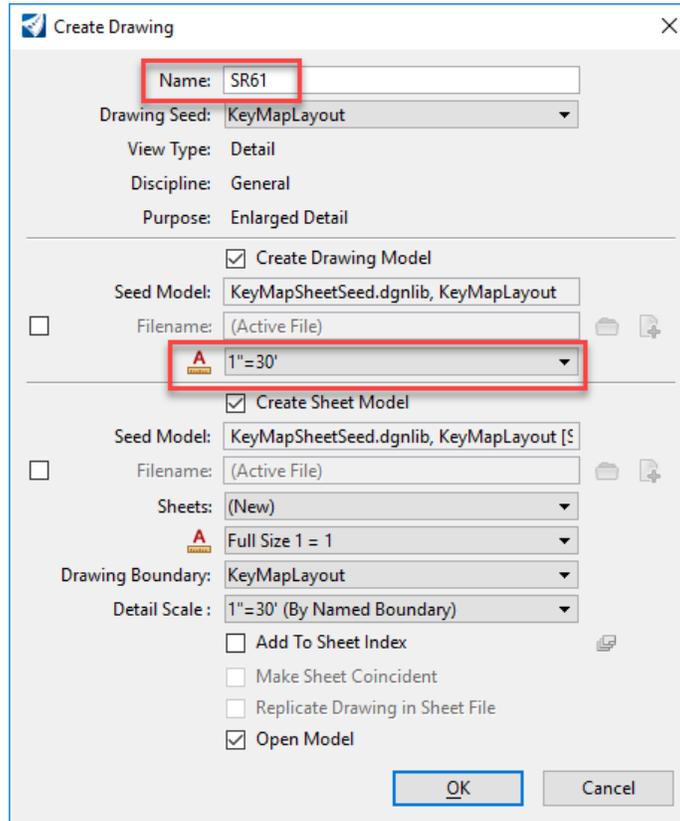
c. Fill out the Place Named Boundary dialog as shown below



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

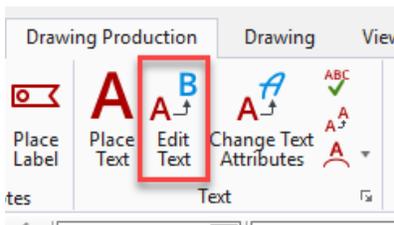


- e. Once the named boundary is placed, the Create Drawing dialog will display. Fill this out as shown below, making sure the Drawing Model annotation scale matches the Detail Scale set on the Place Named Boundary dialog. Once filled out, click OK to create the Key Sheet.



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

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



GOVERNING STANDARD PLANS:
 Florida Department of Transportation, **FY2019-20** Standard Plans for Road and Bridge Construction and applicable Interim Revisions (IRs).
 Standard Plans for Road Construction and associated IRs are available at the following website: <http://www.fdot.gov/design/standardplans>

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

GOVERNING STANDARD SPECIFICATIONS:
Florida Department of Transportation, July 2019 Standard Specifications for Road and Bridge Construction at the following website: <http://www.fdot.gov/programmanagement/Implemented/SpecBooks>

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

CONSTRUCTION CONTRACT NO.
T-8888

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

FISCAL YEAR
19

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

FDOT PROJECT MANAGER:
CHRISTOPHER THORP

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

ROADWAY PLANS ENGINEER OF RECORD:
CHRISTOPHER THORP, P.E.
P.E. LICENSE NUMBER 12345
PSO | CADD OFFICE
605 SUWANNEE ST
TALLHASSEE, FL 32399
CONTRACT NO.: C1111
VENDOR NO.: 12-345678

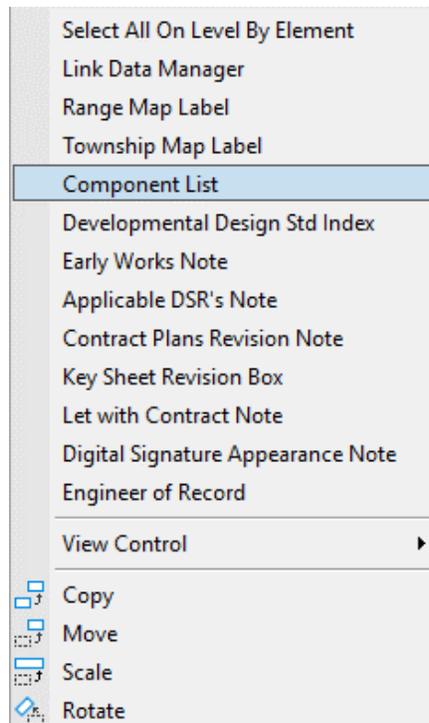
- k. Finally, use the Edit Text tool to enter the *Section Number* and *STATE ROAD NO.*, as shown below.

CONTRACT PLANS
FINANCIAL PROJECT ID 220495-5-52-01
WAKULLA COUNTY (59010)
STATE ROAD NO. SR 61

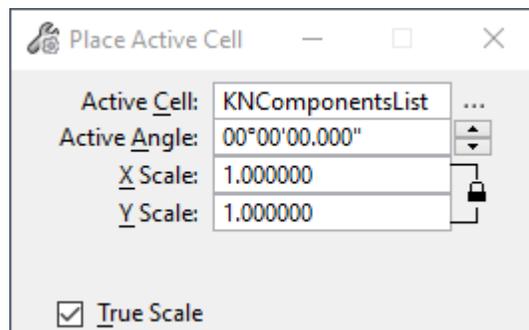
Exercise 4.2 *Place and Edit the Components of Contract Plans Set List*

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

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



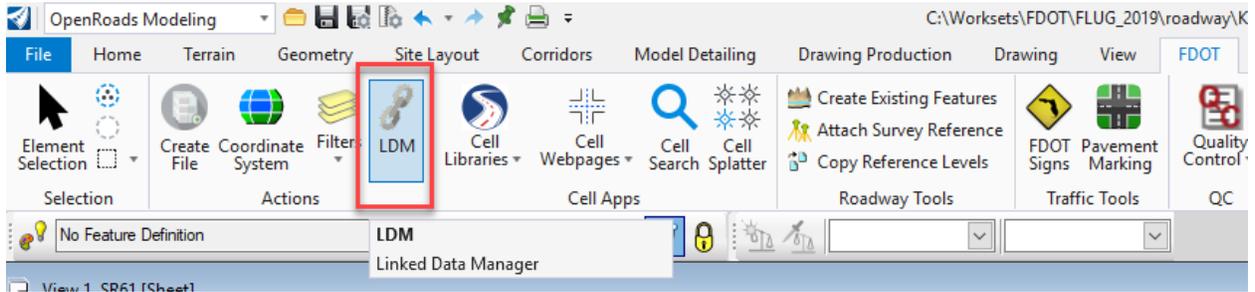
2. The MicroStation Place Active Cell command launches with **KNComponentsList** set as the *Active Cell*.



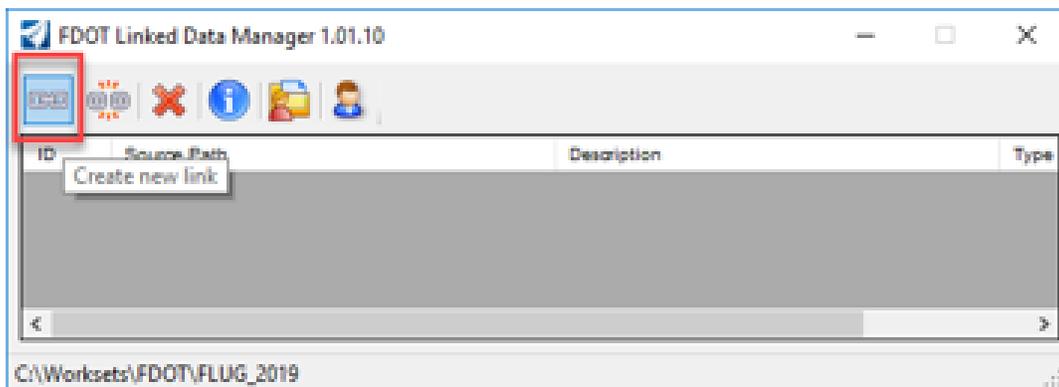
3. **Data Point** at the upper left corner of the *Key Sheet border* to place the cell.
4. The text appears under the *COMPONENTS OF CONTRACT PLANS SET* on the *Key Sheet*.
5. To edit the list of components, double-click on the text.
6. Edit the list in the Text Editor dialog. This project should include plans for the following components:
 - ROADWAY PLANS
 - SIGNING AND PAVEMENT MARKING PLANS
 - SIGNALIZATION PLANS
7. Data point in MicroStation when finished editing the text.

Exercise 4.3 Create and Place the Key Sheet Index

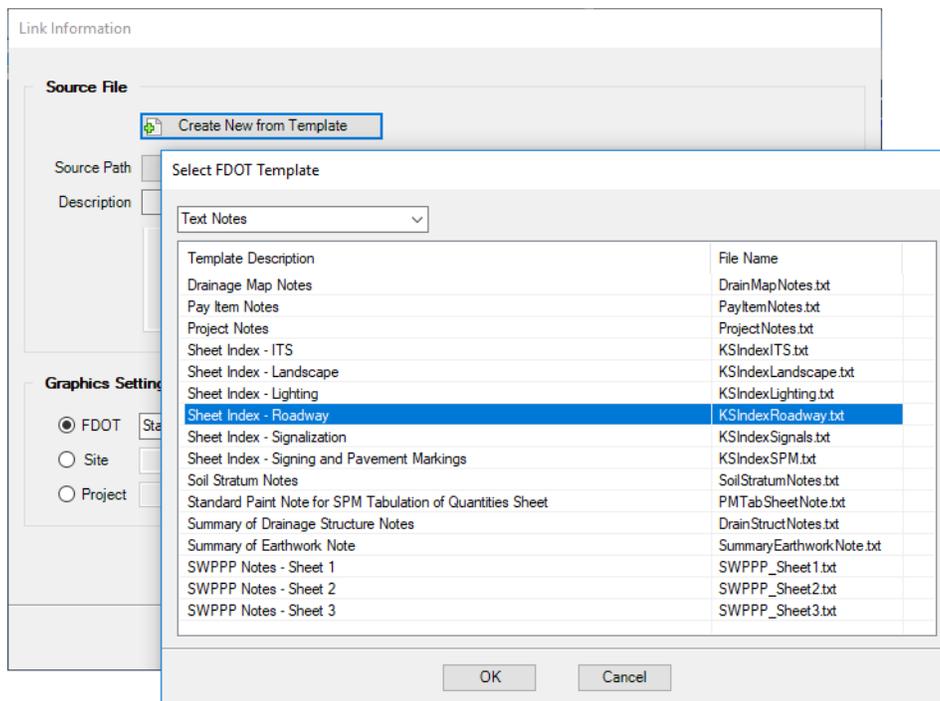
1. On the FDOT Tab, select **LDM** from the Actions group.



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



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

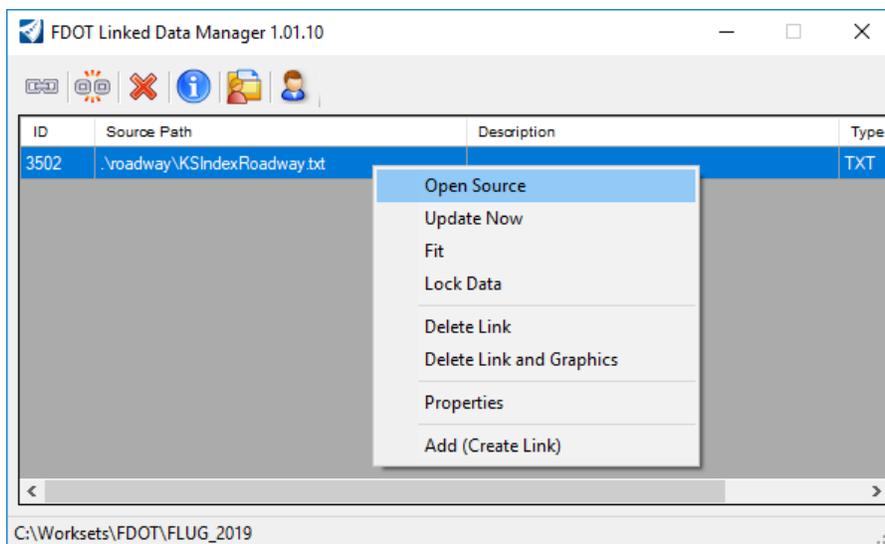


- a. Once saved and back on the Link Information dialog, click OK to place the Index.
- b. Place the Index so that it lines up with the SHEET NO. and SHEET DESCRIPTION headers.

INDEX OF ROADWAY PLANS

| SHEET NO. | SHEET DESCRIPTION |
|--------------|---------------------------------------|
| 1 | KEY SHEET |
| 2 | SIGNATURE SHEET |
| 3 | SUMMARY OF PAY ITEMS |
| 4 | DRAINAGE MAP |
| 5 | INTERCHANGE DRAINAGE MAP |
| 5 - 8 | TYPICAL SECTIONS |
| 9 - 10 | SUMMARY OF DRAINAGE STRUCTURES |
| 11 | OPTIONAL MATERIALS TABULATION |
| 12 | PROJECT LAYOUT |
| 13 | PROJECT CONTROL |
| 14 | GENERAL NOTES |
| 15 - 22 | ROADWAY PLAN-PROFILES |
| 23 | TRAFFIC MONITORING SITE |
| 24 | SPECIAL PROFILES |
| 25 | BACK OF SIDEWALK PROFILES |
| 26 | INTERSECTION LAYOUT |
| 27 | RAMP TERMINAL DETAILS |
| 28 | INTERSECTION LAYOUT DETAILS |
| 29 - 32 | DRAINAGE STRUCTURES |
| 33 | OUTFALL/LATERAL DITCH PLAN-PROFILES |
| 34 | OUTFALL/LATERAL DITCH CROSS SECTIONS |
| 35 | SPECIAL DETAILS |
| 36 | CROSS SECTION PATTERN |
| 37 | ROADWAY SOIL SURVEY |
| 38 - 49 | CROSS SECTIONS |
| 50 - 52 | STORM WATER POLLUTION PREVENTION PLAN |
| 53 - 57 | TEMPORARY TRAFFIC CONTROL PLANS |
| 58 - 62 | UTILITY ADJUSTMENTS |
| 64 - 67 | SELECTIVE CLEARING AND GRUBBING |
| 68 | TREE DISPOSITION PLAN |
| 50-1 - 50-99 | SUMMARY OF QUANTITIES |

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

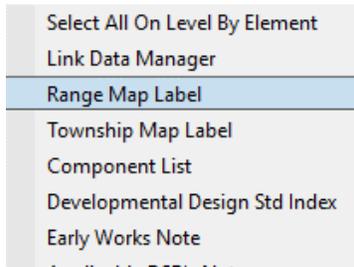


Exercise 4.4 Place the Range and Township Map Label

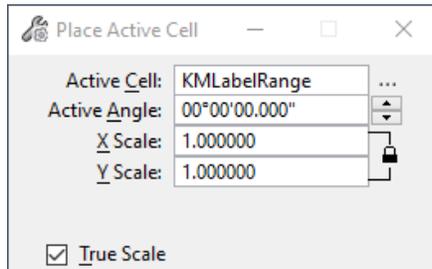
This exercise describes how to place township and range labels on a key sheet. This is a requirement for the Key Sheet.

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

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



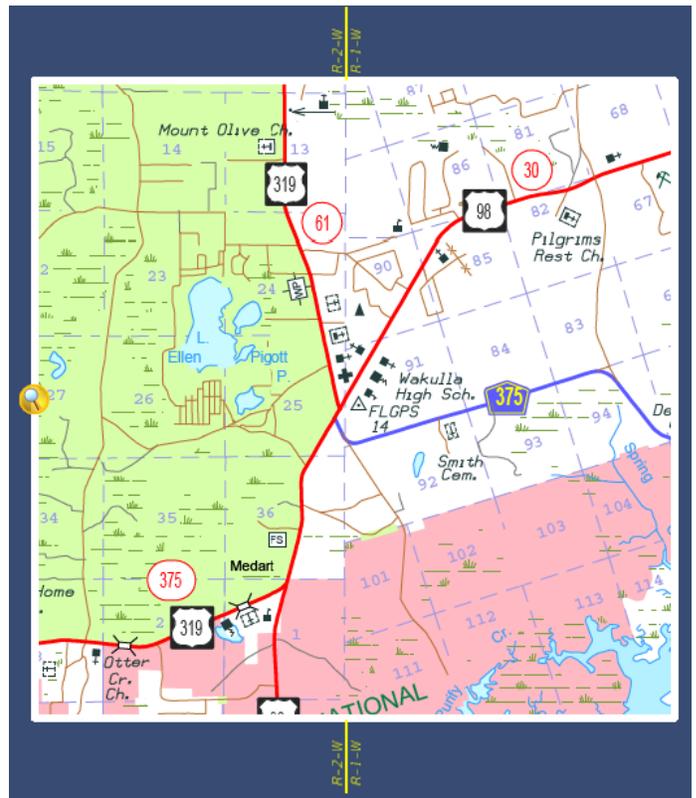
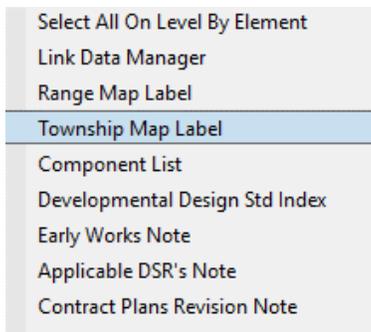
2. The MicroStation Place Active Cell command launches with **KMLLabelRange** set as the *Active Cell*.



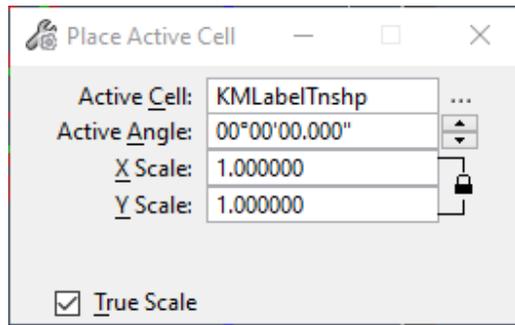
3. **Data point** to place the *Range Map Label* at the correct locations around the map. Place as many labels as needed. **Reset** when finished placing labels.

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

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

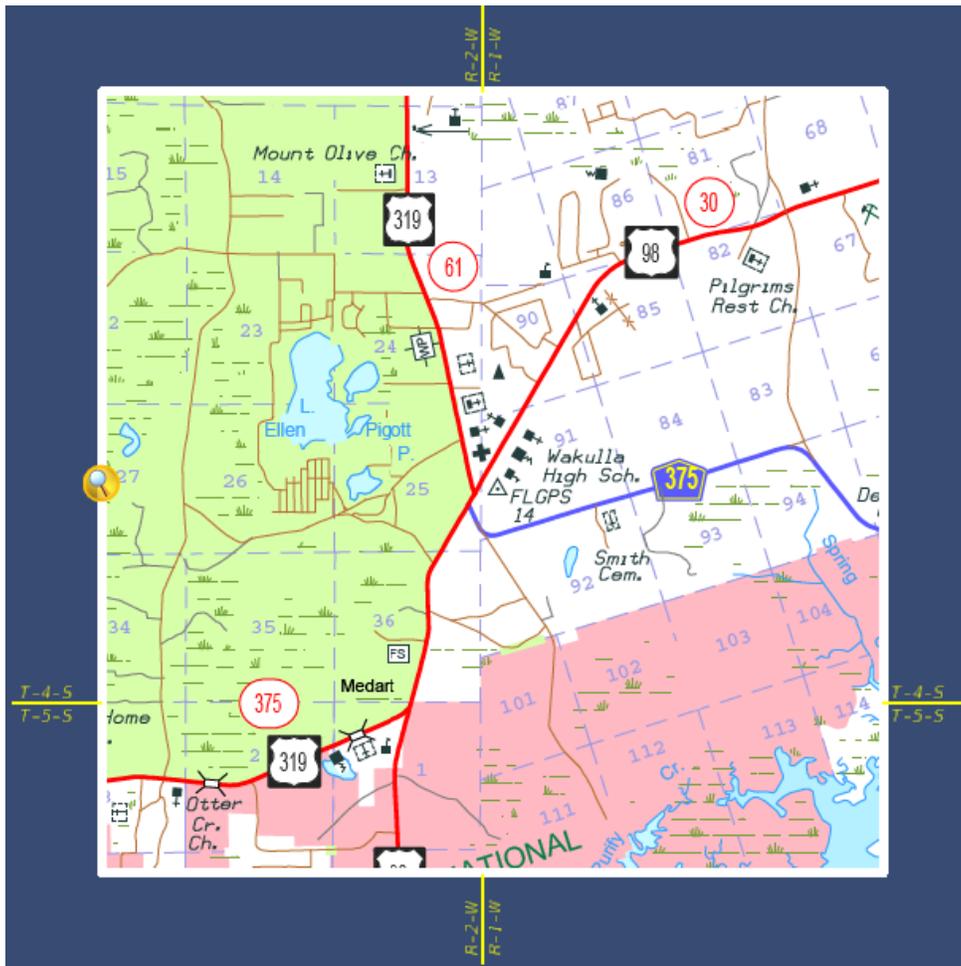


- The MicroStation Place Active Cell command launches with **KMLabelTnshp** set as the *Active Cell*.



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

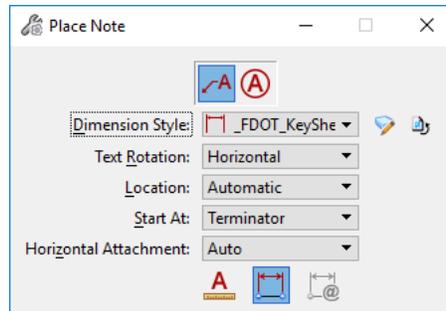
- Select the Edit Text tool  to edit the labels. See the image below for the correct *Township Values* and *Locations*.



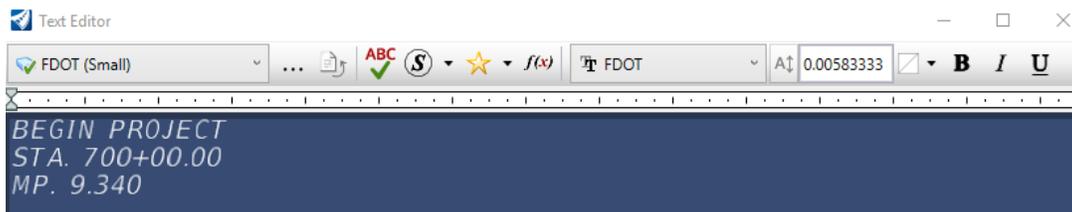
Exercise 4.5 Place the Project Location Labels

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

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



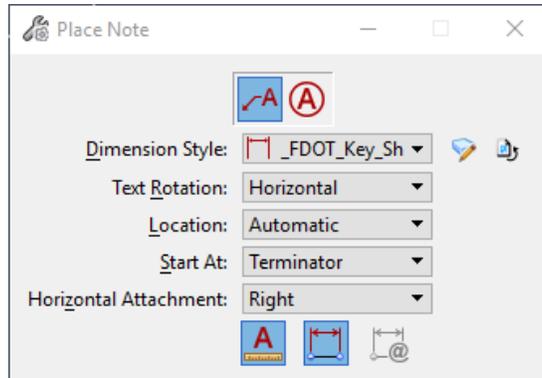
- a. Fill out the Text Editor dialog as shown below.



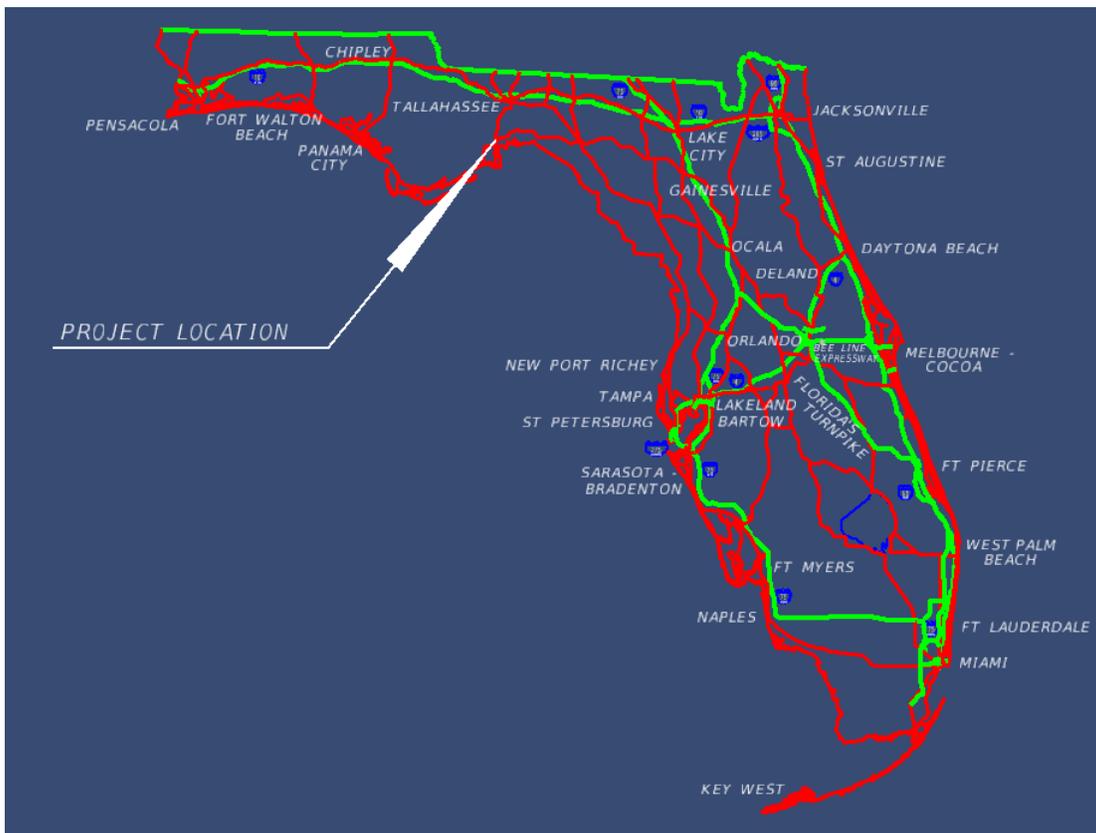
- b. Position the terminator in the desired location
 - c. Data point to place the terminator
 - d. Position the note in the desired location
 - e. Data point to place the note
2. Repeat the same process, using the `_FDOT_KeySheet_EndProject` Dimension Style, to place the End Project Note.
 - o END PROJECT
 - o STA. 726+45.00
 - o MP 9.824



3. There is another *Project Location* label that is required for the Key Sheet that points to the Florida map. From the Drawing Production Tab, select **Place Note**.
4. Set the Place Note Parameters as shown below, with the Dimension Style set to `_FDOT_Key_Sheet_Locate`:



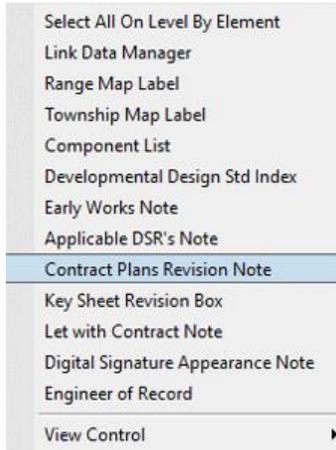
5. Type *PROJECT LOCATION* into the Text Editor, select the general *project location* on the Florida map, position the *label*, and **data point** again to place it. The *label* should display as shown below.



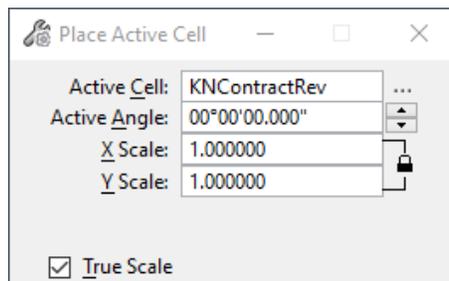
Exercise 4.6 *Place the Contract Revision Note (Optional)*

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

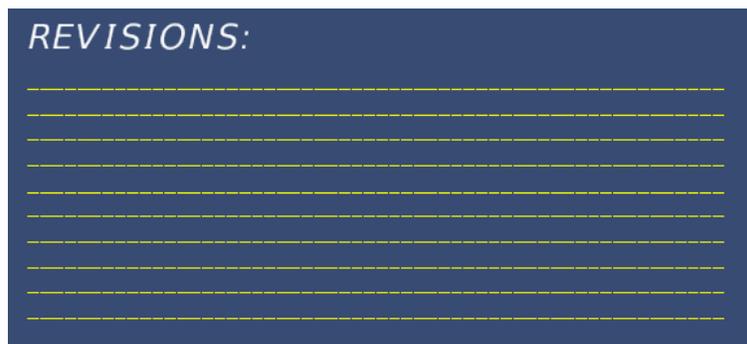
1. With the Element Selection tool active, right-click and hold to bring up the Context Menu. On the Context Menu, select Contract Plans Revision Note. The MicroStation



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

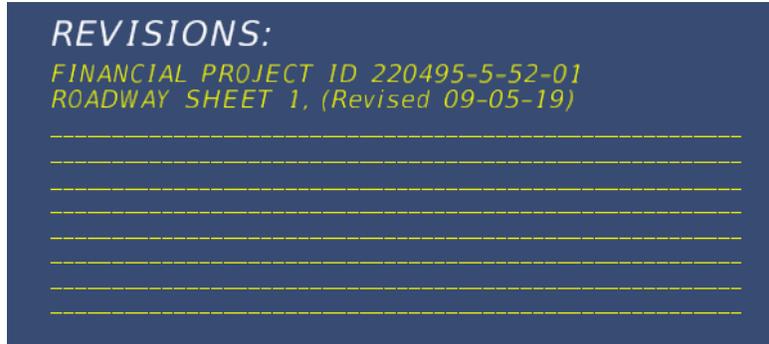


3. **Data point** to the lower left corner of the *Key Sheet border*. The *Note* should display as shown.

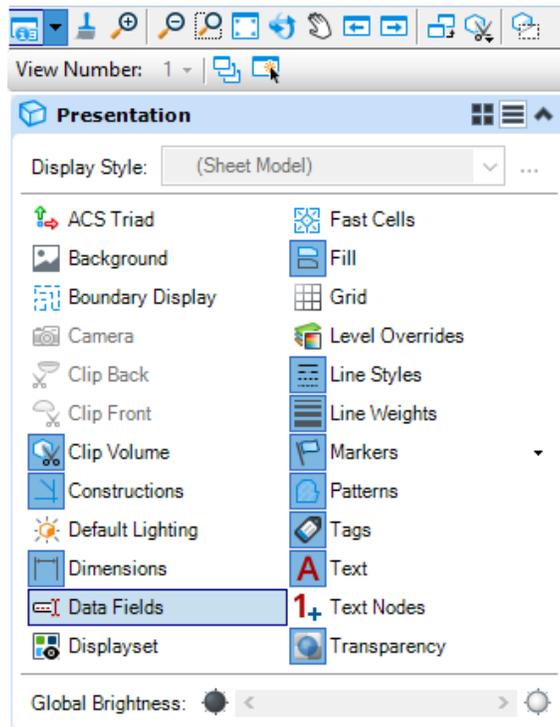




4. Select the **Edit Text** tool to enter the *Financial Project ID*, **220495-5-52-01** as well as the *Revision Number*, the *Component Set*, the *Revised Page Numbers*, and *Date of Revision*. See below.



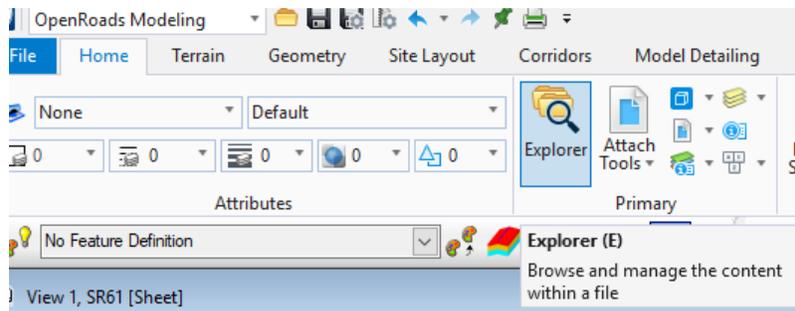
5. Go to the MicroStation *View* options and turn **Off** *Data Fields*.



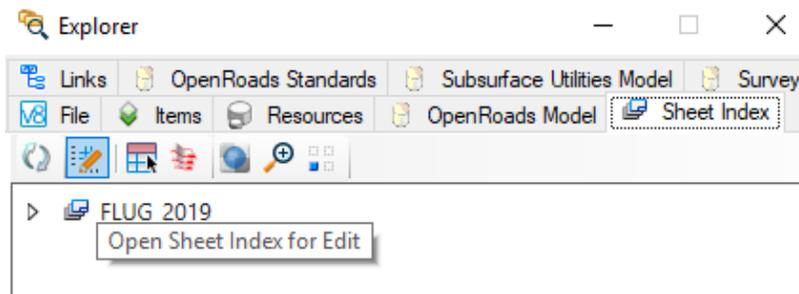
6. **Fit View** in MicroStation.
7. Select **File > Save Setting**.

Exercise 4.7 Index the Key Sheet

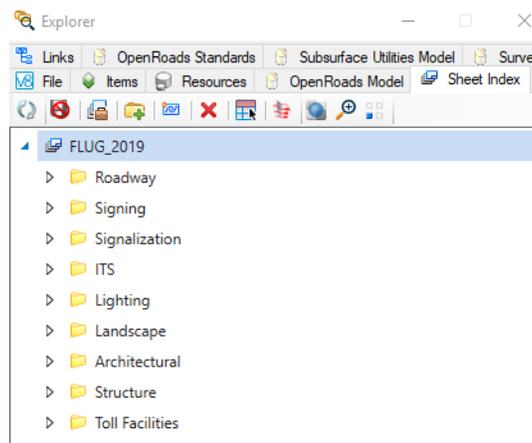
- Continuing in the *KEYSRD01.dgn* file, go to the Home Tab, select the **Explorer** tool from the Primary Group



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



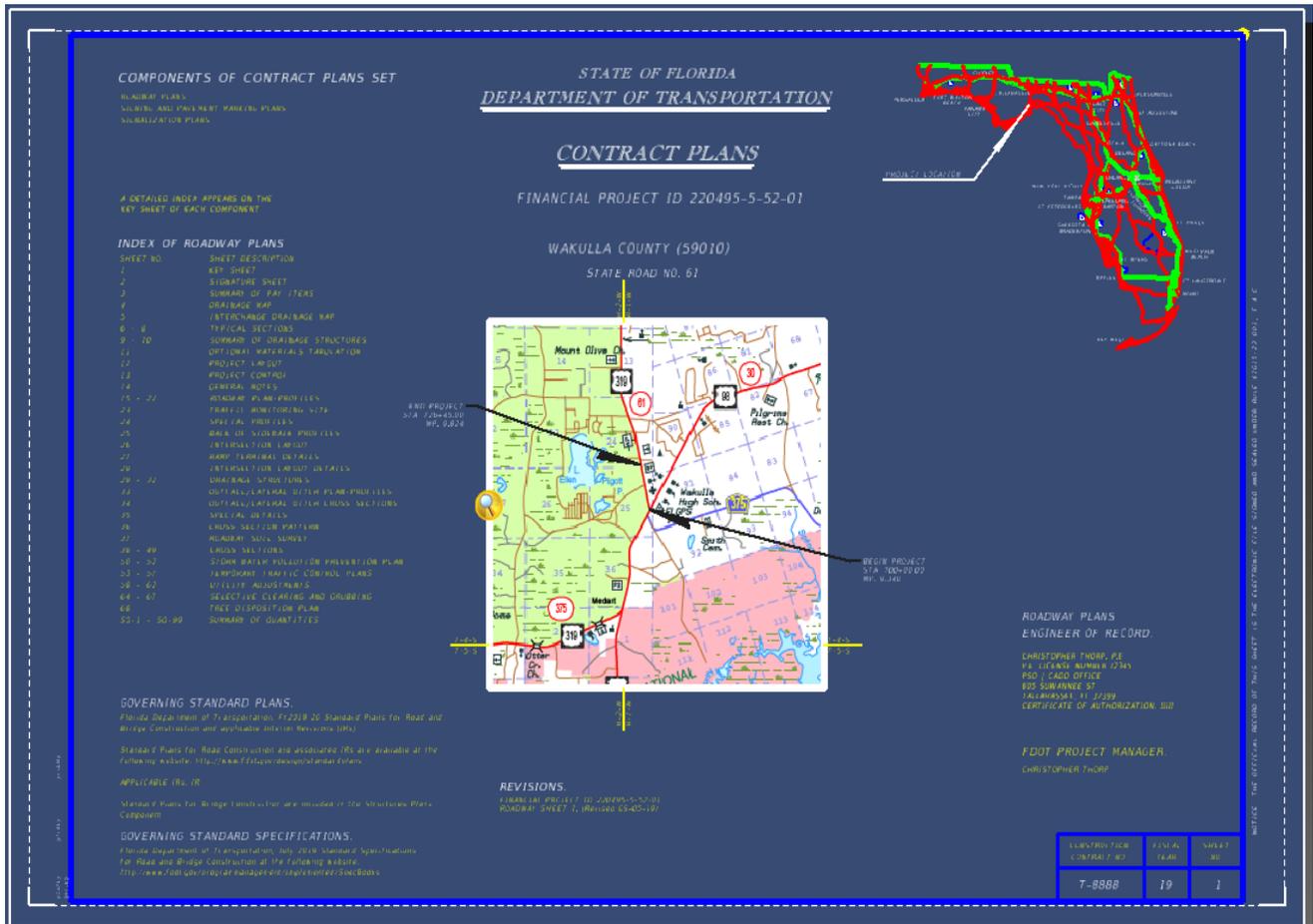
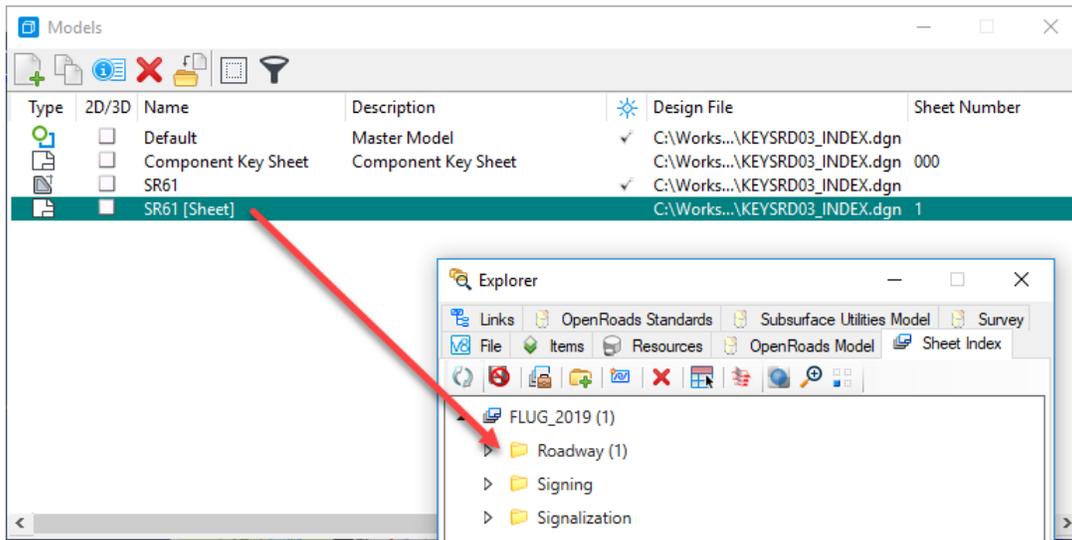
- With the Sheet Index open for editing, expand out the Index to view the folders for each discipline.



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



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



PLAN ONLY SHEETS

Exercise 4.8 Create the Plan Sheets

1. Use the **FDOTConnect for OpenRoads Designer** icon to open:
C:\Worksets\FDOT\FLUG_2019\PLANRD01.dgn file
2. Select *Drawing Production > Annotations > Element Annotation > Annotate Element*. Left click on the CL_SR61 alignment to select it and then right click to accept and annotate the alignment.
3. From the *Drawing Production* tab, select the **Place Named Boundary** tool.
4. Drawing Production > Named Boundaries > Named Boundary > Place Named Boundary

- a. Select the **Civil Plan** mode.
- b. Set *Drawing Seed* to **Plan Only**
- c. In the 2D view, select the CL_SR61 alignment along which the plan named boundaries will be created.
- d. Fill out the dialog, as shown
- e. *Follow the prompts* in the lower left corner **left click** to define the named boundaries. *Multiple left clicks may be required.*
- f. Two or three clicks are required to (1) accept the Start Location, (2) accept the Stop Location, and (3) create the Named Boundaries. However, if the Start or Stop Location are selected graphically one or more of these clicks has already been completed.
- g. On the *Create Drawing* dialog, click OK to create the sheets.

PLAN AND PROFILE SHEETS

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

Exercise 4.9 Creating Plan and Profile Sheets

1. Use the **FDOTConnect for OpenRoads Designer** icon to open:
C:\Worksets\FDOT\FLUG_2019\PLPRRD01.dgn file
2. Select *Drawing Production > Annotations > Element Annotation > Annotate Element*. Left click on the CL_SR61 alignment to select it and then right click to accept and annotate the alignment.
3. Create Named Boundaries for the **plan** portion of the sheets.

- a. Select Drawing Production > Named Boundaries > Named Boundary > Place Named **Boundary**.
- b. Select the **Civil Plan** mode.
- c. Set *Drawing Seed* to **Plan over Profile - Top**
- d. In the 2D view, select the CL_SR61 alignment along which the plan named boundaries will be created.
- e. Fill out the dialog, as shown, making sure that *Create Drawing* is unchecked.
- f. *Follow the prompts* in the lower left corner **left click** to define the named boundaries. Multiple left clicks may be required. A total of two clicks are required to (1) accept the Start Location, (2) accept the Stop Location, and (3) create the Named Boundaries. However, if the Start or Stop Location are selected graphically one or more of these clicks has already been completed.

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

Place Named Boundary Civil Profile

Drawing Seed: Plan over Profile - Bottom

Detail Scale: 1"=50'

Name: Profile 1

Description:

Method: From Plan Group

Plan Group: CL_SR61

Group: (New)

Name: CL_SR61_PR

Description: From Plan Group: CL_SR61

Vertical Exaggeration: 10.000000

Available Profile Height: 19.800000

Top Clearance: 0.500000

Bottom Clearance: 0.500000

Elevation Datum Spacing: 2.000000

Station Datum Spacing: 1.000000

Profile Shifts: Datum Stations

Use Terrains

Use Active Vertical

Create Drawing

Show Dialog

- Open a profile view for the CL_SR61 alignment. This can be done using the right click View Control context menus.
- Select *Drawing Production* > *Named Boundaries* > *Named Boundary* > **Place Named Boundary**
- Select the **Civil Profile** mode.
- Set *Drawing Seed* to **Plan over Profile - Bottom**
- In the *profile* view, select the profile along which the named boundaries will be created.
- Fill out the dialog, as shown below, this time making sure that *Create Drawing* is enabled.
- Follow the prompts* in the lower left corner **left click** to define the named boundaries. *Multiple left clicks may be required*
- On the *Create Drawing* dialog, click OK to create the sheets.

CROSS SECTION SHEETS

Exercise 4.10 Creating Cross Section Sheets

1. Use the **FDOTConnect for OpenRoads Designer** icon to open:
C:\Worksets\FDOT\FLUG_2019\RDXS RD01.dgn file
2. Create Named Boundaries which define the location and extent of each cross section.

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

- a. Select Drawing Production > Named Boundaries > Named Boundary > **Place Named Boundary**.
- b. Select the **Civil Cross Section** mode.
- c. Set *Drawing Seed* to **CrossSection20Scale**
- d. In the 2D view, select the CL_SR61 alignment along which the cross section named boundaries will be created.
- e. Set the *Start Location* to **700+00** and the *Stop Location* to **715+00**. the dialog should be filled out as shown below. The settings from the *Left Offset* down are set based on the applied *Drawing Seed*.

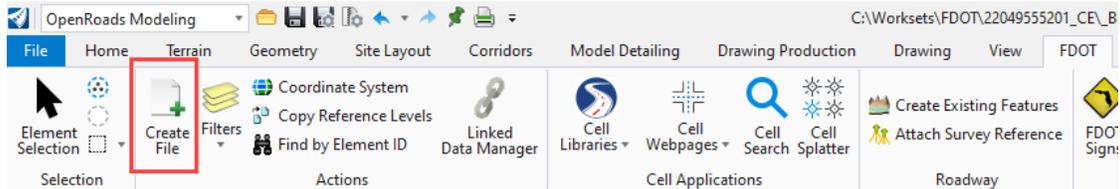
- f. Follow the prompts in the lower left corner **left click** to define the named
- g. boundaries. *Multiple left clicks are probably required*. Once the named boundaries are created they appear in the 3D view.
- h. Click **OK** on the *Create Drawing* dialog to create the sheets.

PROJECT NOTES SHEET

The General Notes sheet is required for each project. See *Exhibit 311-1* in *Part 3* of the *FDOT Design Manual (FDM)* for a list of General Notes that are required.

Exercise 4.11 Creating the Project Notes Sheet

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



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

Create File (v 2.0)

Workset: C:\Worksets\FDOT\22049555201_CE

Discipline: ROADWAY

File Group: Roadway Files

File Type:

| | Base Filename | Description |
|---|---------------|--------------------------------------|
| | CSINRD | Concrete Slab Inventory |
| | CURCRD | Curve or Coordinate Data Sheet |
| | DSGNRD | Proposed 2D Planimetrics Design |
| | DSPFRD | Proposed Profile |
| ▶ | GNNTRD | Project Notes |
| | INTDRD | Intersection-Interchange Details |
| | INTPRD | Intersection-Interchange Profiles |
| | KEYSRD | Key Sheet |
| | MITGRD | Mitigation Areas |
| | MODLRD | 3D Modeling File (Existing/Proposed) |
| | PLANRD | Roadway Plan Sheet |

Output File:

Base Filename: GNNTRD Modifier (Optional): File Sequence #: 01 Extension: .dgn

C:\Worksets\FDOT\22049555201_CE\roadway\GNNTRD01.dgn

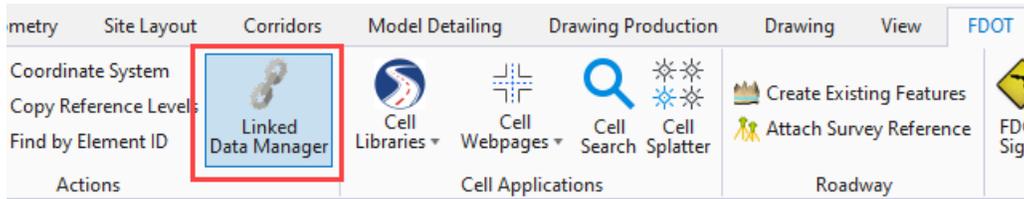
Output Folder: roadway

Seed File: d:\fdotconnect\organization-civil\fdot\seed\FDOT-ORD-Seed2

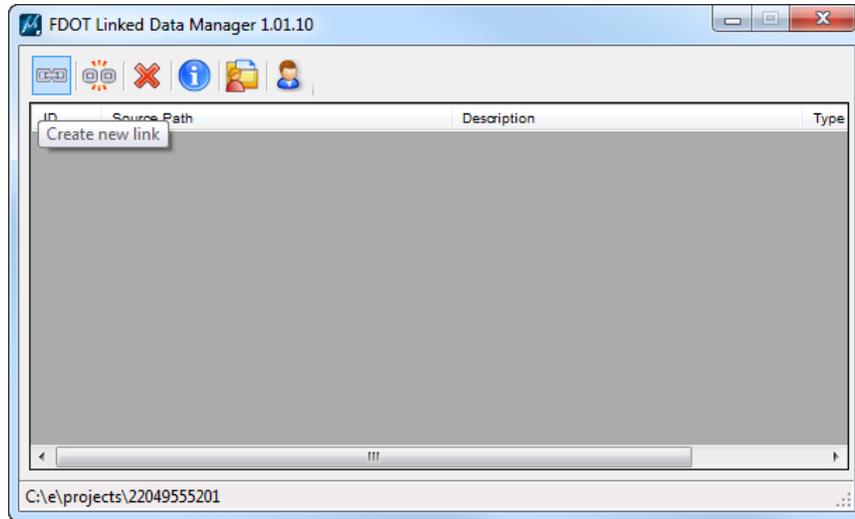
County: Wakulla Coordinate System: FL83-NF

Action: model create sheet GENERALNOTES

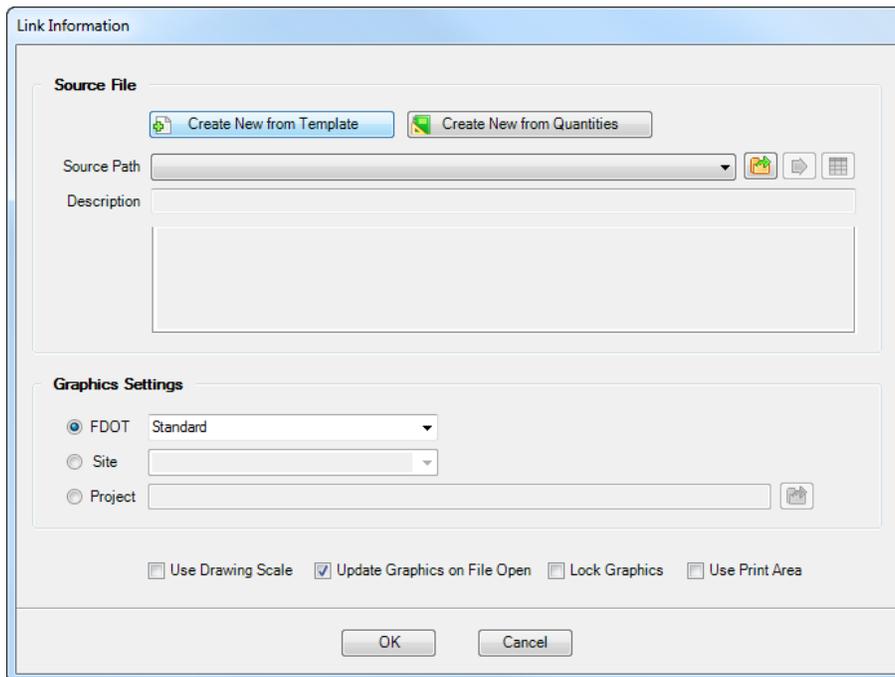
3. From the FDOT Tab, select **Linked Data Manager** from the Actions group.



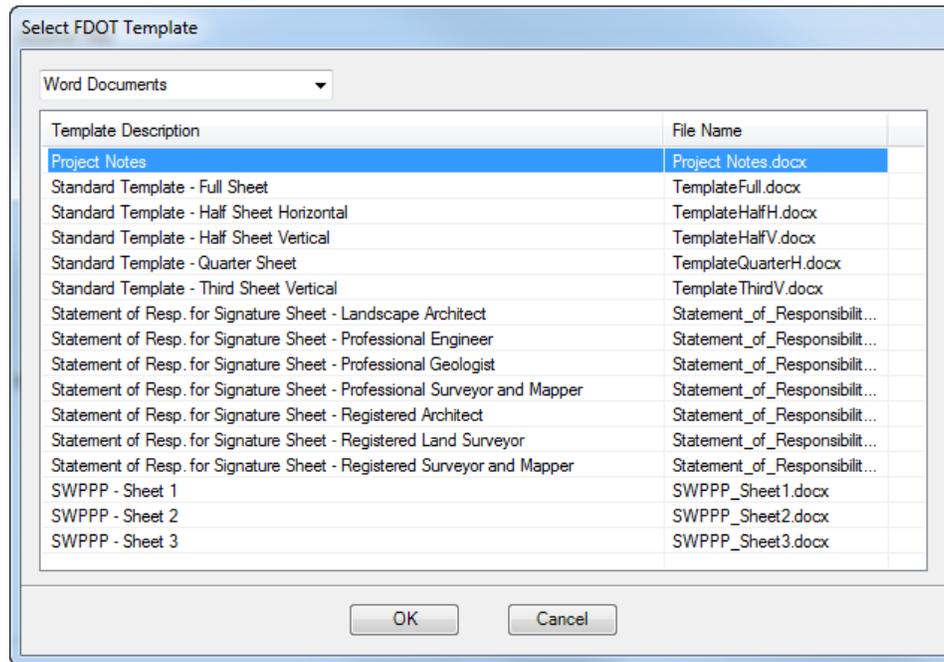
4. The FDOT Linked Data Manager dialog displays. Select the **Create New Link** icon.



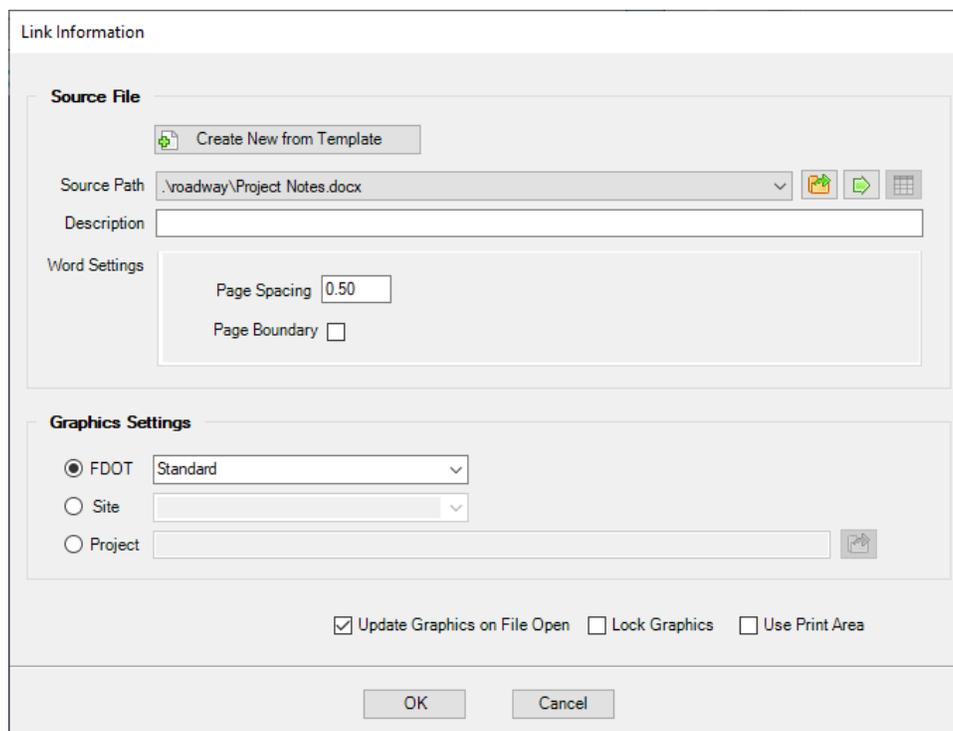
- a. The Link Information dialog displays. Click on the **Create New from Template** button.



- b. The Select FDOT Template dialog displays. Set the drop down to **Word Documents** and select the **Project Notes Template**. Click **OK**.



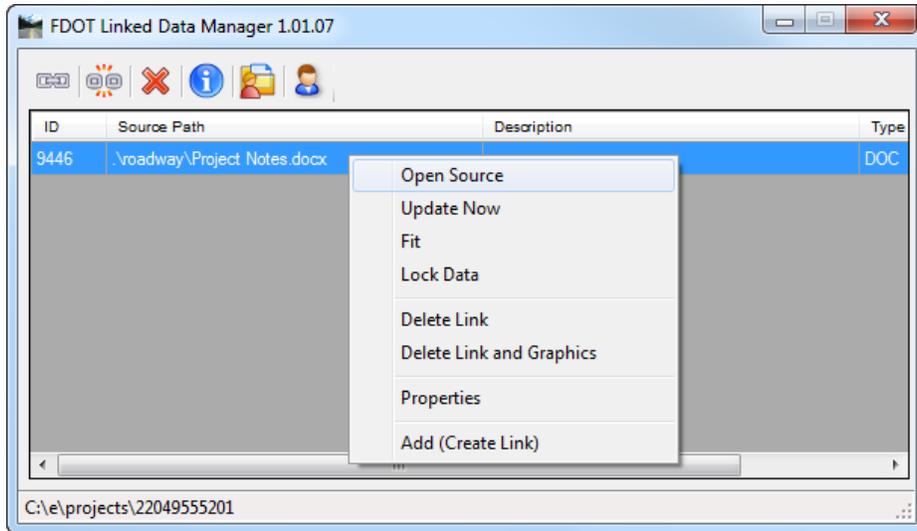
- c. From the *Save File* dialog browse to the C:\Worksets\FDOT\22049555201_CE\roadway folder, accept the default filename and **Save** the file.
- d. From the Link Information dialog, toggle **Off** the *Page Boundary* check box and click **OK**.



- e. With the *Project Notes* attached to cursor snap to the top, left corner of the *Plan Sheet* and data point to place the link. The Link is created and listed in the Linked Data Manager dialog.

2. To edit the *Project Notes*: Go to the Linked Data Manager dialog, right-click on the link and select **Open Source**.

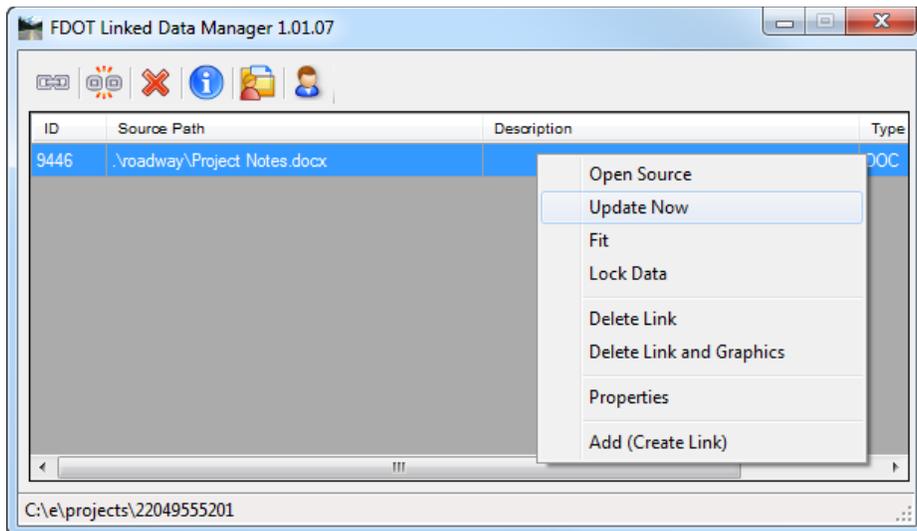
Note DO NOT edit the text for the Project Notes in the MicroStation file. Always edit the word document or the link will be broken.



- a. The Word Document opens the .docx file. **Add** the utility owners below, **Save** the file and **close** it.

| | | |
|-------------------------------|----------------|--------------------------|
| <i>UTILITY AGENCY/OWNERS:</i> | <i>CONTACT</i> | <i>TELEPHONE NUMBERS</i> |
| <i>TELEPHONE COMPANY A</i> | <i>OWNER A</i> | <i>(850) 222-2222</i> |
| <i>GAS COMPANY B</i> | <i>OWNER B</i> | <i>(850) 333-3333</i> |

- b. From the Linked Data Manager dialog, select the link again, right-click and select **Update Now**. The *Project Notes* will be updated in the MicroStation file to reflect the changes made.



3. From MicroStation turn **Off Data Fields**, **Fit View** and then select **File > Save Settings**.

Note The project notes are also available through Linked Data Manager as a Text Document Template. Follow the same steps as shown above, except use the template under the Text Notes option.

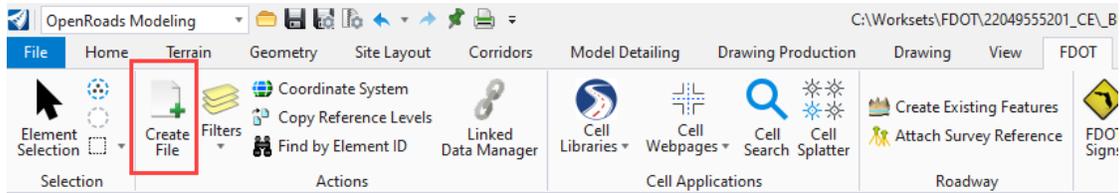
TYPICAL SECTION SHEETS

Exercise 4.12 Create the Roadway Typical Section Sheet

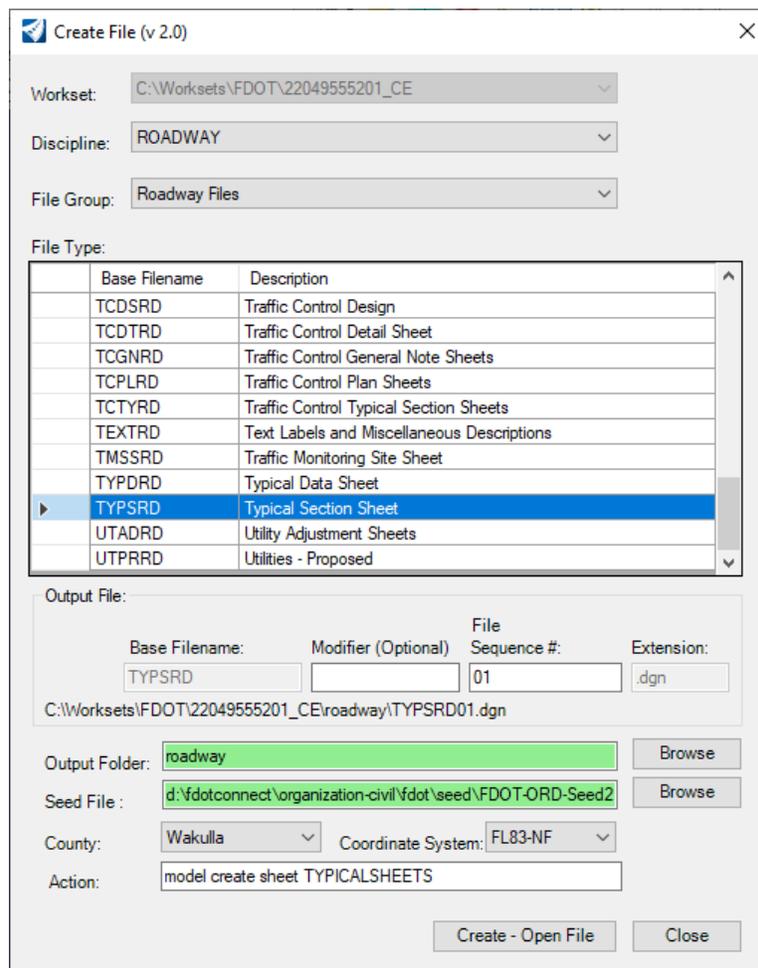
The FDOT Workspace contains a number of Typical Sections that can be used and adjusted to suit the conditions of a particular project. For the purposes of this project and class, the New 4 Lane, Divided Urban Typical will be used. This Typical Section should be modified based on project specific requirements.

Note Due to time constraints of this course, the design modification of the Typical Section is assumed.

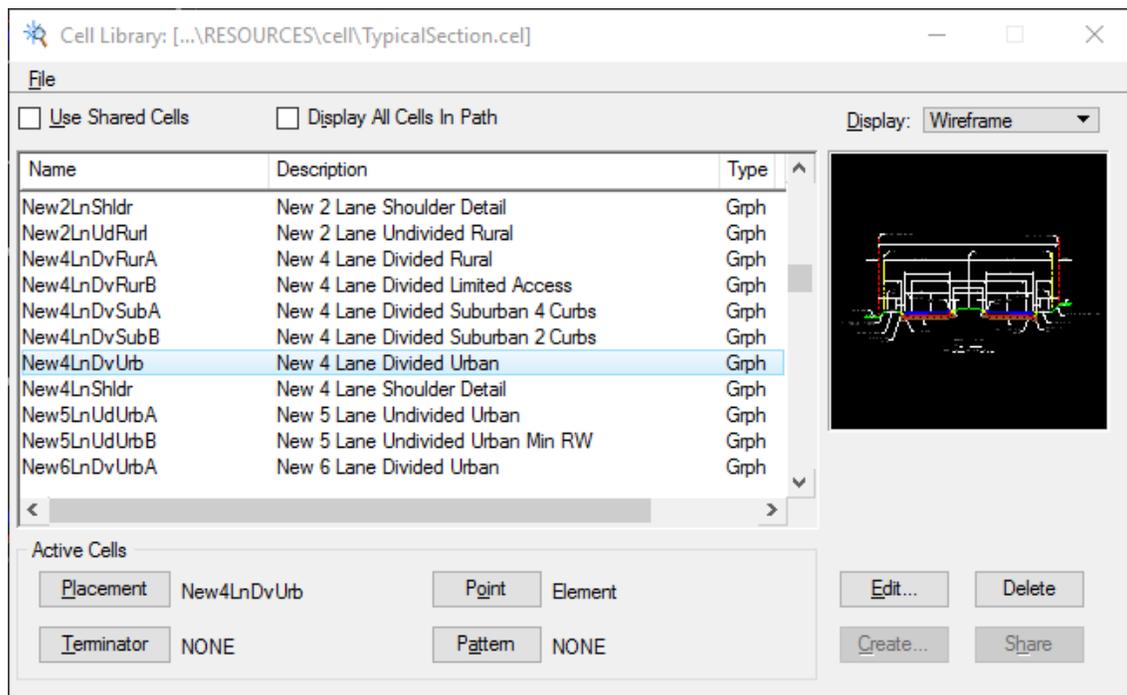
1. On the OpenRoads Modeling Workflow, select **Create File**, from the **FDOT** Tab



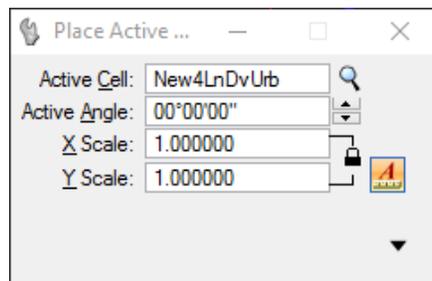
2. The Create File (v 2.0) dialog displays. On the Create File dialog set the *Discipline* to **Roadway** and *File Group* to **Roadway Files**. From the File Type list, select TYP SRD. On the Output File section of the dialog, be sure to set the County to Wakulla. Once everything is set up to match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



3. From the Drawing Tab, select the Place Active Cell tool and the browse to the TypicalSection.cel library.
4. Find the **New4LnDvUrb** cell and double click. The MicroStation *Place Active Cell* command displays with **New4LnDvUrb** set as the *Active Cell*.

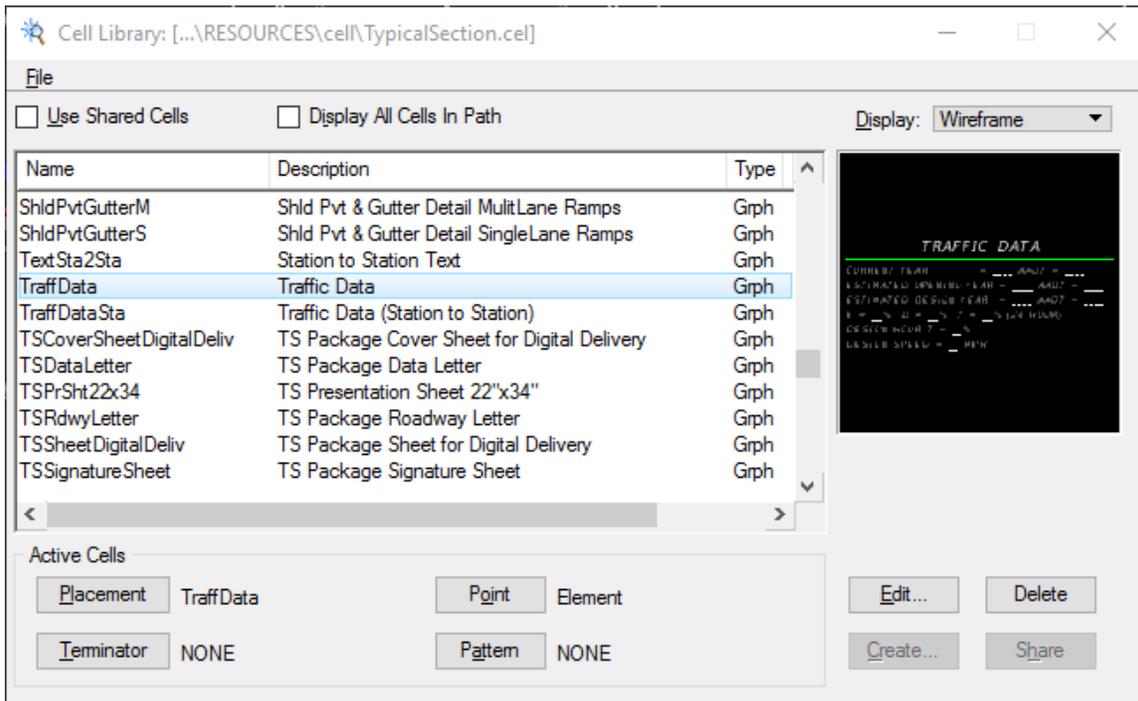


5. Set *scale* of the cell to **1.0**.

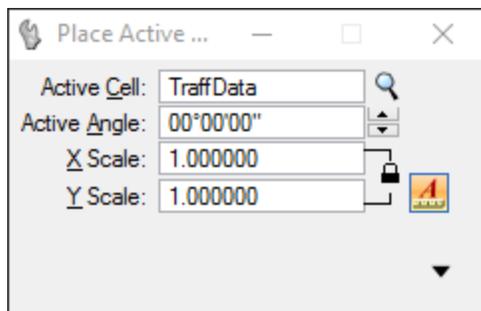


6. **Data point** to place the *cell* in the sheet. **Reset** when finished to exit the *Place Cell* command.

- On the Cell Library dialog, double click on the cell **TraffData**. The MicroStation Place Active Cell command displays with **TraffData** set as the *Active Cell*.



- Set *scale* of the cell to **1.0**



- Data point** to place the *cell* in the left bottom corner of the sheet. **Reset** when finished to get out of the *Place Cell* command.

- Use the Edit Text tool  to enter the correct *Traffic Data* information as shown below.

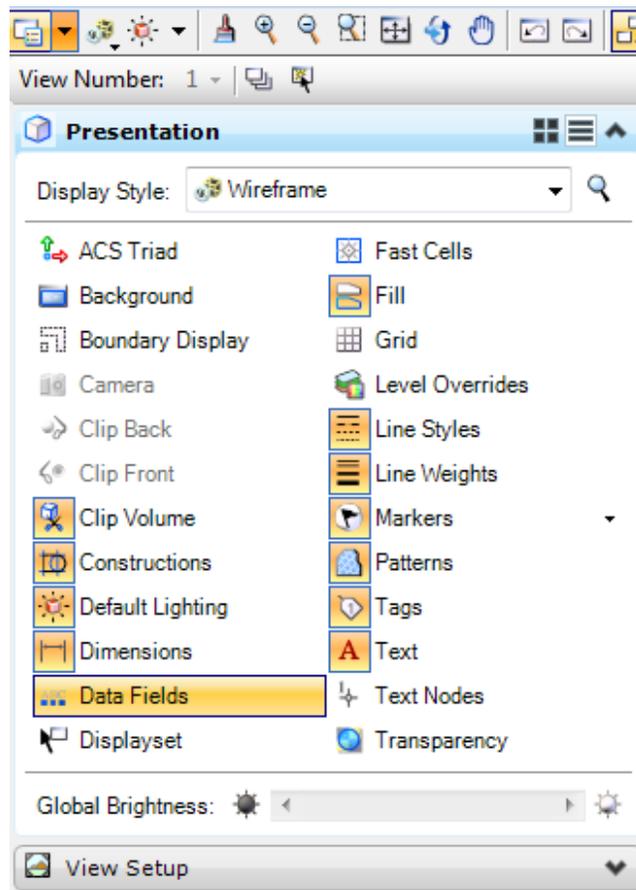
TRAFFIC DATA

CURRENT YEAR = 2015 AADT = 8,400
ESTIMATED OPENING YEAR = 2020 AADT = 9,900
ESTIMATED DESIGN YEAR = 2040 AADT = 14,100
K = 9.5% D = 56.5% T = 2.74% (24 HOUR)
DESIGN HOUR T = 3.5%
DESIGN SPEED = 45 MPH

11. Repeat steps 7 through 10 to place and edit the following cells with the information shown below. Place these cells in the middle of the sheet, under the *typical section*.

- Cell Name: **NewOBGSPFC125**
 OPTIONAL BASE GROUP 6 WITH
 TYPE SP STRUCTURAL COURSE (TRAFFIC B) (2 1/2")
 AND FRICTION COURSE FC-9.5 (TRAFFIC B) (1") (PG 76-22)
- Cell Name: **MillPvt**
 MILL EXISTING ASPHALT
 PAVEMENT FOR DEPTH (1")
- Cell Name: **ResrPvtFC95**
 FRICTION COURSE FC-9.5 (TRAFFIC B) (1") (PG 76-22)

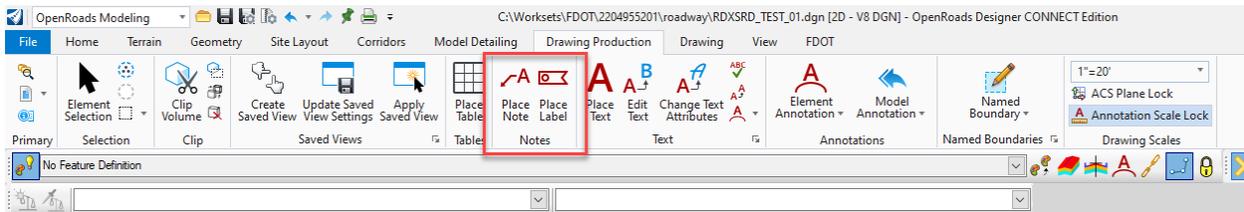
12. Go to the MicroStation *View* options and turn **Off** the *Data Fields* option. Select **File > Save Setting**.



13. **Close** MicroStation.

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5 PLAN LABELING DEVELOPMENT WORKFLOW



This chapter will introduce the new way of placing notes using the PLACE NOTE or PLACE LABEL tool. This tool can be found in the Drawing Production Tab, and the Notes Group of the OpenRoads Modeling Workflow.

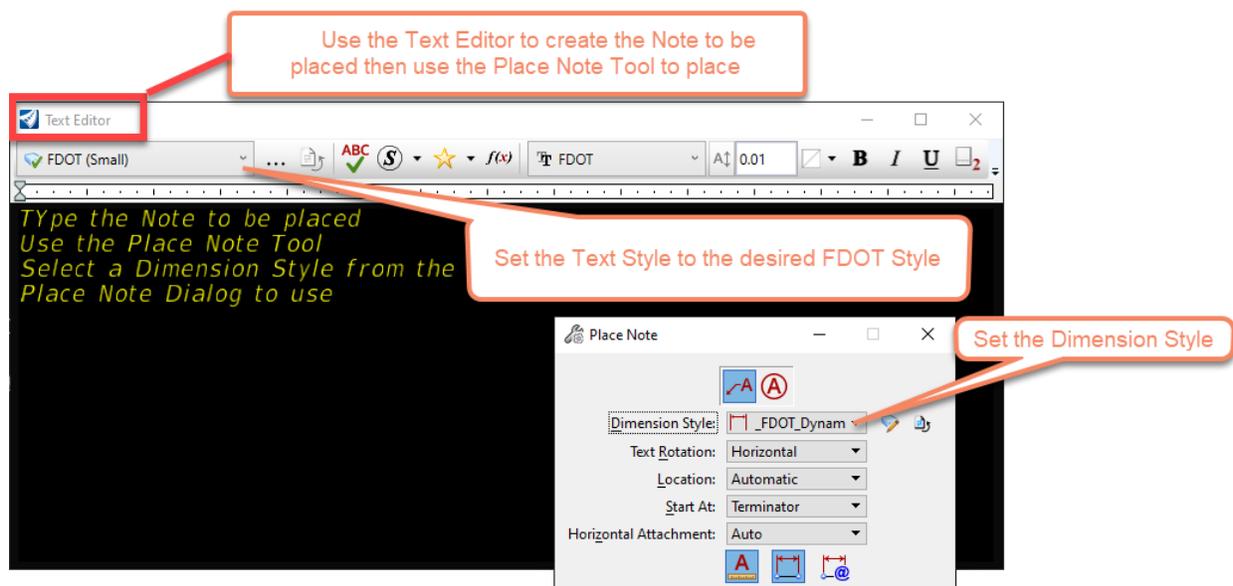
OPENROADS MODELING>DRAWING PRODUCTION>NOTES>Place Note or Place Label.

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**, it 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.

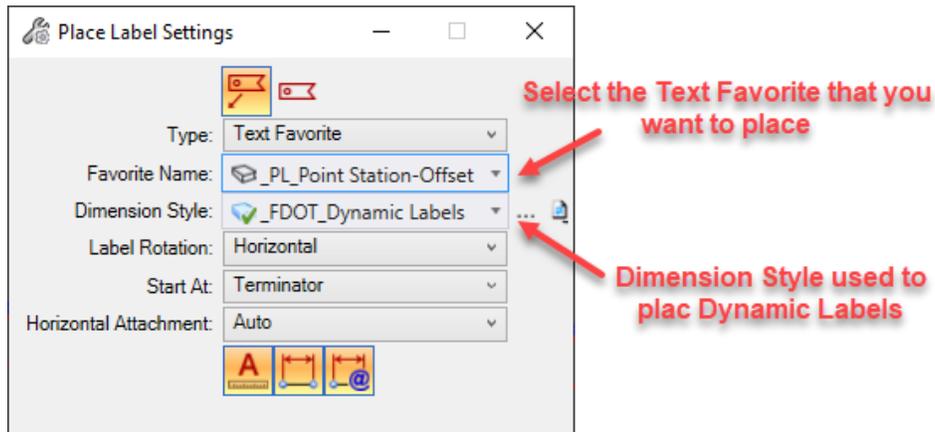
The two new ways of labeling your plan sheets are using the Place Note or Place label. First the Place Note is just a simple way of placing information

The Place Label tool will be replacing the Plan View Labeler Tool that was found in Geopak. We want to introduce the two different ways of placing notes or labels. The first way is by the Place Note. With this method the user would type the note using the text editor dialog and would select a dimension style before placing the note.

PLACE NOTES

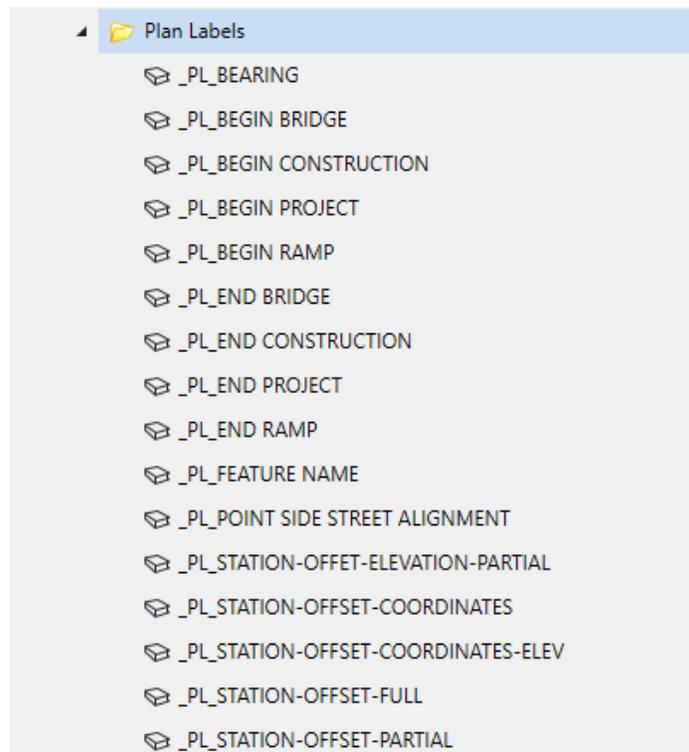


PLACE LABEL

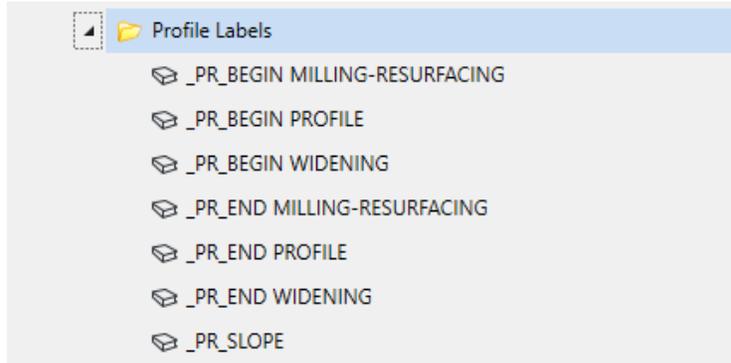


We have created some Text Favorites to label in the plan, profile and cross sections.

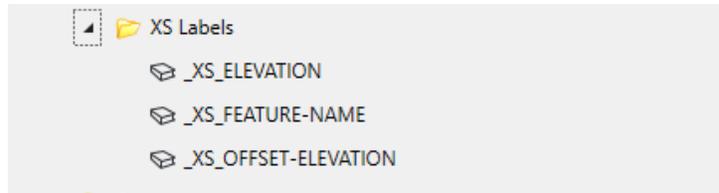
- The Plan Text Favorites have the prefix of `_PL_`



- The Profile Text Favorite have the prefix `_PR_`



- The Cross Section Text Favorites have a prefix `_XS_`



EXERCISE OVERVIEW – PLACE LABELS

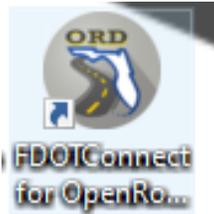
- 5.1 Place Dynamic Labels
- 5.2 Place Labels on the Plan
- 5.3 Place Labels on the Profile
- 5.4 Place Labels on the Cross Section

Exercise 5.1 *Place Labels on the Plan*

In this exercise, we are going to open the PLANRD_PLAN_LABELING_01.dgn to place dynamic labels.

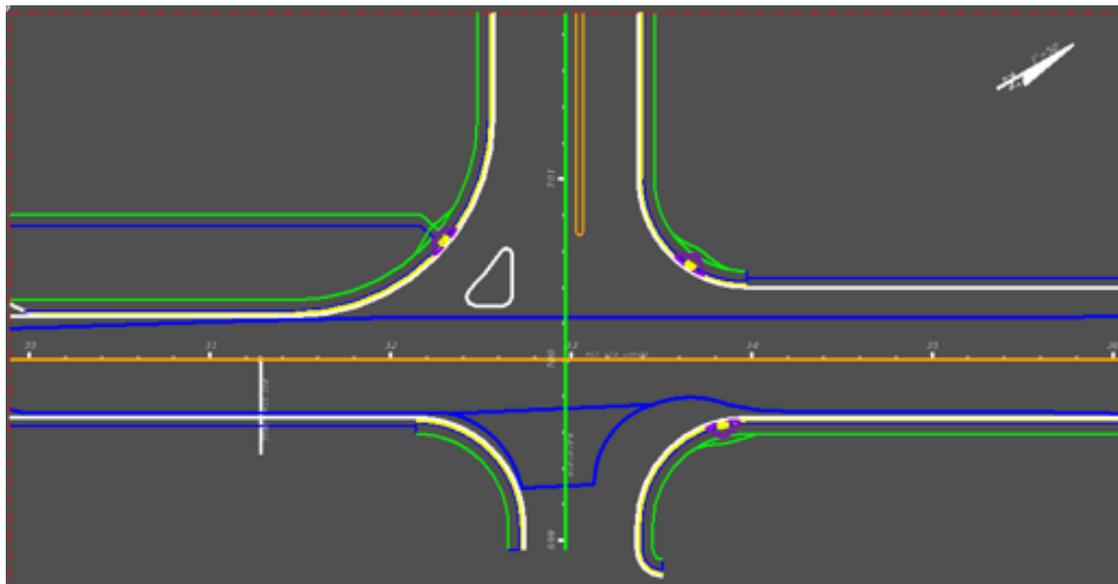
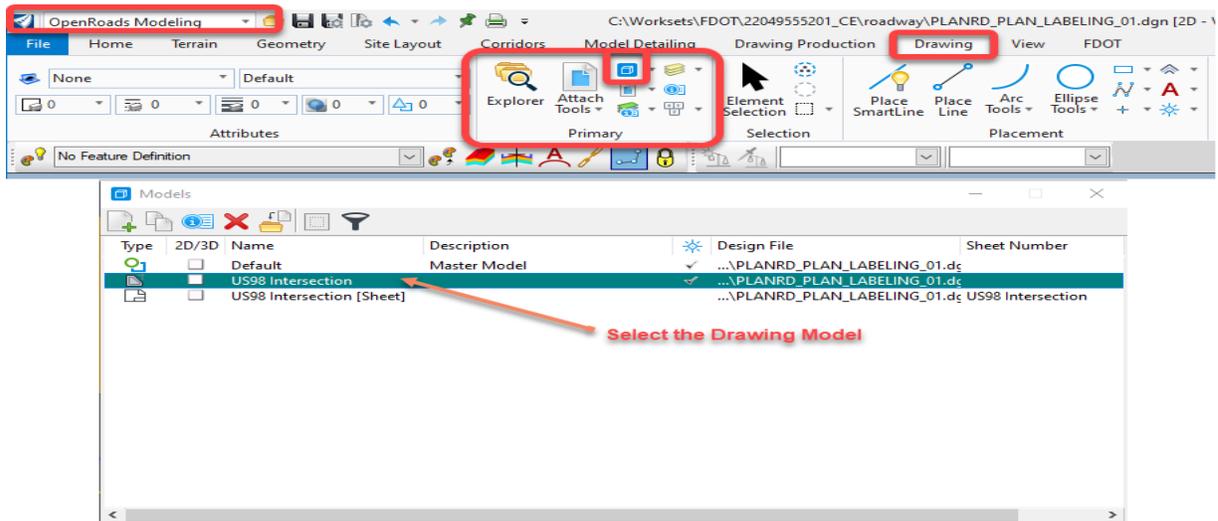
We will place a Begin Project, Begin Construction, Station Offset Labels.

1. Click on the FDOTConnect for OpenRoads Designer icon to launch the file, PLANRD_PLAN_LABELING_01.dgn.



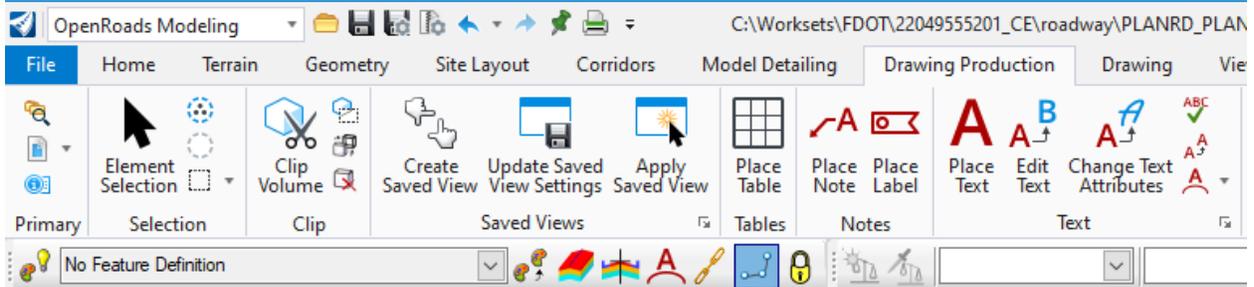
2. Once the file is open make sure you are in the OpenRoads Modeling workflow, then selecting the Drawing Tab look for the Primary Group select the Models dialog to switch to the Drawing Model. This is where we will start placing our labels.

OPENROADS MODELING>DRAWING>PRIMARY> Models

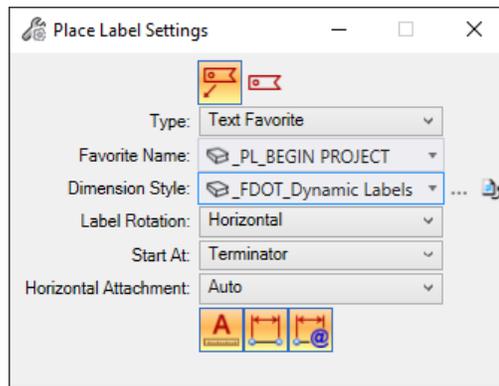


- Switching to the Drawing Production Tab of the OpenRoads Modeling Workflow we need to find the Notes Group then the Place Label button.

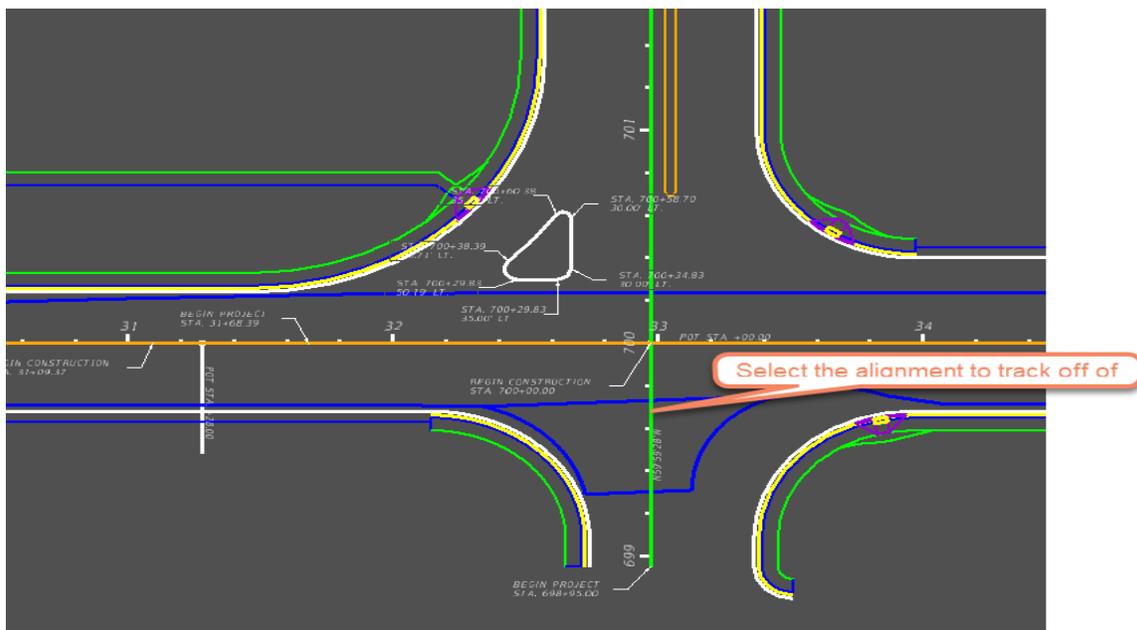
OPENROADS MODELING>DRAWING PRODUCTION>NOTES>Place Label



- Set the Level to a TextLabel before placing any notes or Labels.
- This will bring the Place Label Dialog, set the Type to Text Favorite, Select Text Favorite from list. Set your Dimension Style from list (Set the Dialog as the picture below.)



- Once the dialog is set, select the Alignment from which you would like to track to place the label, then select where you want the label to be placed.
- Use the same process to place the Begin Construction, Station Offset



Exercise 5.2 Place Labels on the Profile

In this exercise, we are going to open the PLPRRD_LABELING_01.dgn to place dynamic labels.

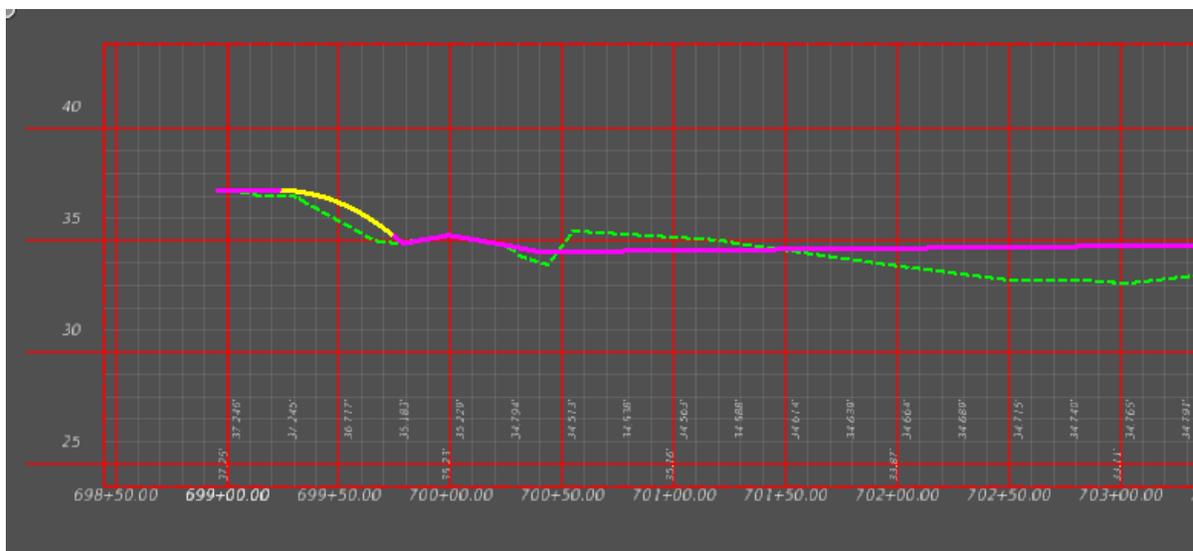
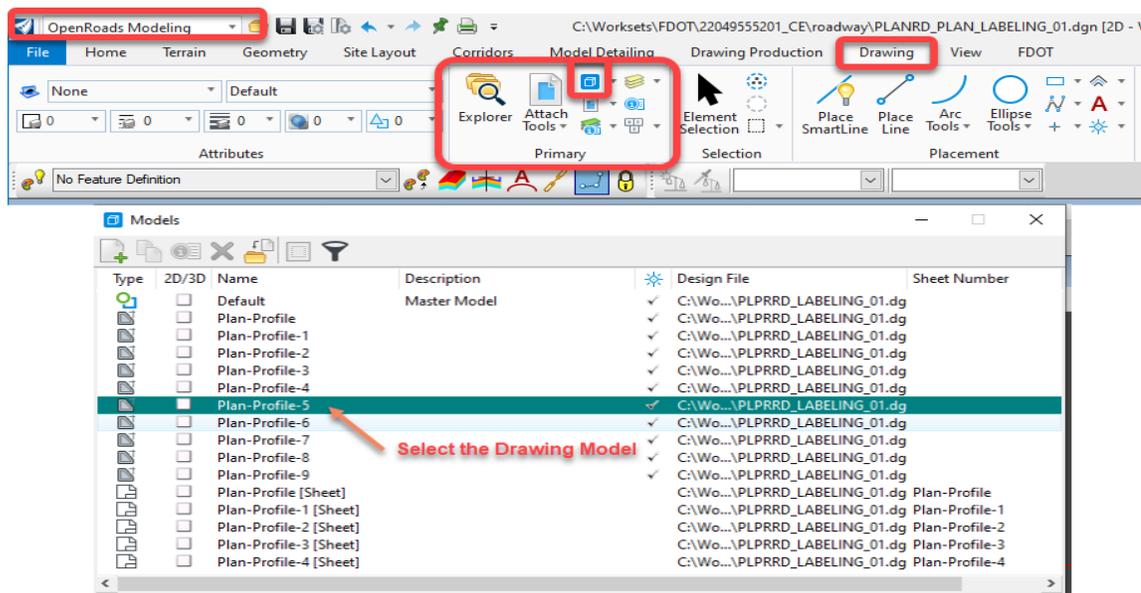
We will place a **Begin Profile, Begin Widening, Begin Milling-Resurfacing, End Profile, End Widening, End Milling-Resurfacing**.

1. Click on the FDOTConnect for OpenRoads Designer icon to launch the file PLANRD_LABELING_01.dgn



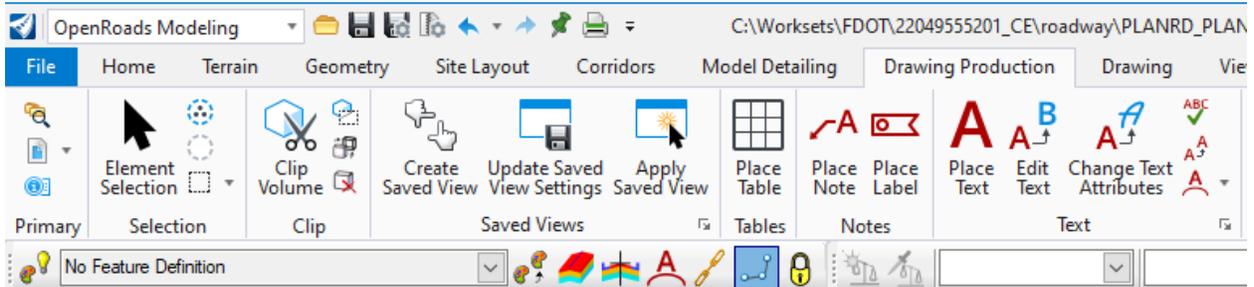
2. Once the file is open make sure you are in the OpenRoads Modeling workflow, then selecting the Drawing Tab look for the Primary Group select the Models dialog to switch to the Drawing Model. This is where we will start placing our labels.

OPENROADS MODELING>DRAWING>PRIMARY> Models

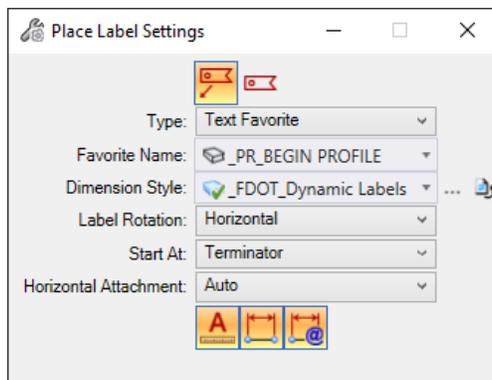


- Switching to the Drawing Production Tab of the OpenRoads Modeling Workflow we need to find the Notes Group then the Place Label button.

OPENROADS MODELING>DRAWING PRODUCTION>NOTES>Place Label



- Set the Level to a TextLabel before placing any notes or Labels.
- This will bring the Place Label Dialog, set the Type to Text Favorite, Select Text Favorite from list. Set your Dimension Style from list (Set the Dialog as the picture below.)



- Once the dialog is set, select the Profile that you would like to track off of to place the label, then select where you want the label to be placed.
- Use the same process to place the Begin Milling and Resurfacing, Begin Widening.



Exercise 5.3 Place Labels on a Cross Section

In this exercise, we are going to open the RDXSRD_LABELING_01.dgn to place dynamic labels.

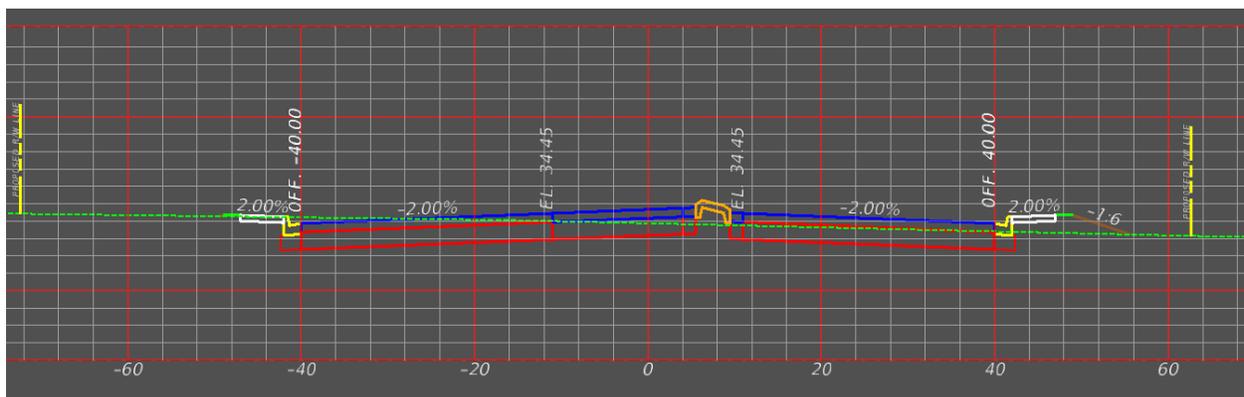
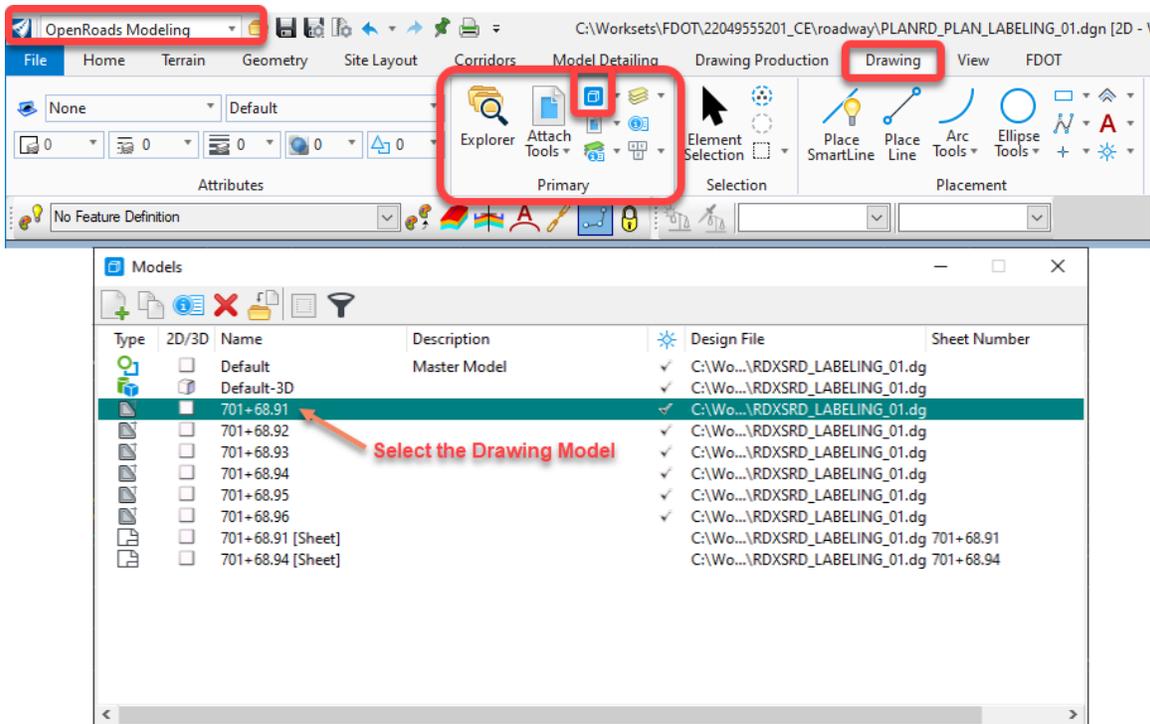
We will place a **Elevation, Offset-Elevation**.

1. Click on the FDOTConnect for OpenRoads Designer icon to launch the file PLANRD_LABELING_01.dgn



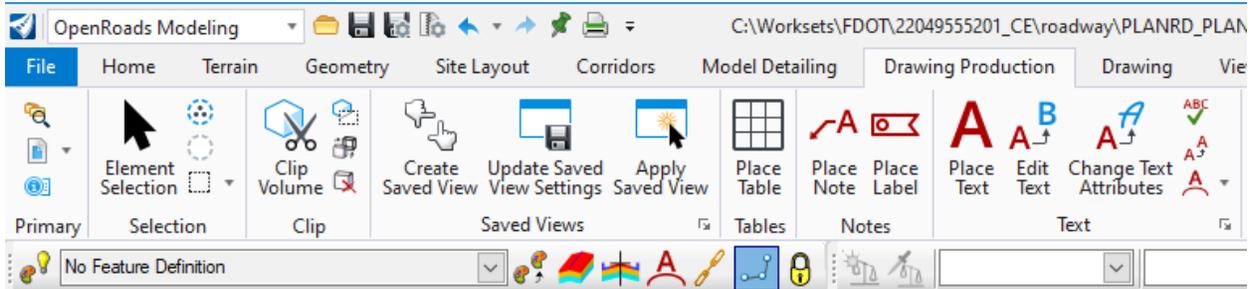
2. Once the file is open make sure you are in the OpenRoads Modeling workflow, then selecting the Drawing Tab look for the Primary Group select the Models dialog to switch to the Drawing Model. This is where we will start placing our labels.

OPENROADS MODELING>DRAWING>PRIMARY> Models

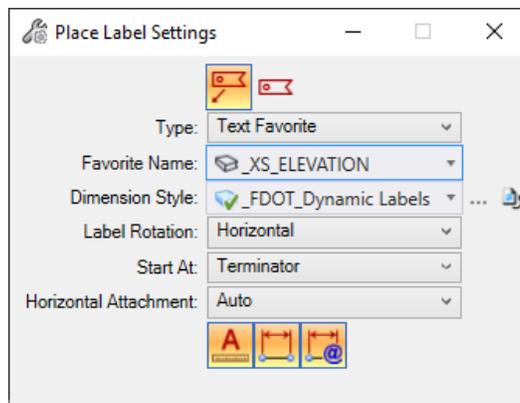


- Switching to the Drawing Production Tab of the OpenRoads Modeling Workflow we need to find the Notes Group then the Place Label button.

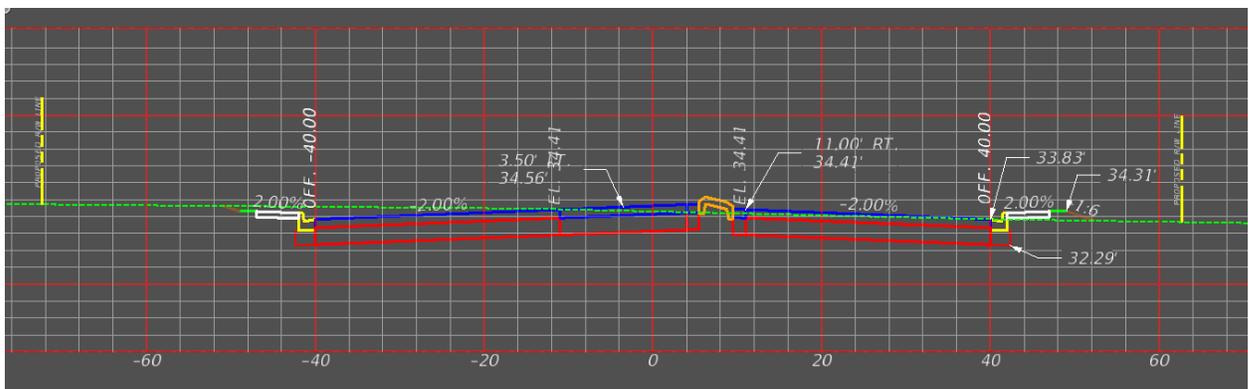
OPENROADS MODELING>DRAWING PRODUCTION>NOTES>Place Label



- Set the Level to a TextLabel before placing any notes or Labels.
- This will bring the Place Label Dialog, set the Type to Text Favorite, Select Text Favorite from list. Set your Dimension Style from list (Set the Dialog as the picture below.)



- Once the dialog is set, select the Point that you would like to label.
- Use the same process to place the Offset-Elevation.



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6 TRAFFIC PLANS WORKFLOW

ORD SETUP

OBJECTIVES

This chapter covers the initial setup required to start using this tutorial.

In this chapter, the following topics will be covered:

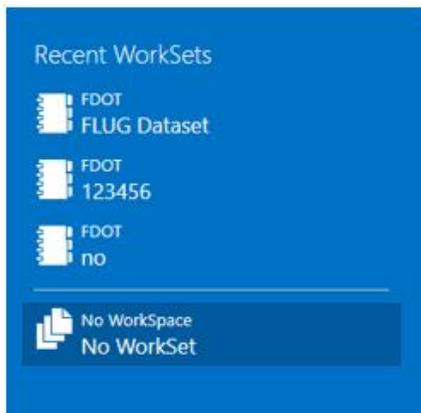
- FDOT Workspace
- FDOT Worksets
- Creating a New Project
- Create File Process

OVERVIEW

If this is your first-time opening FDOT ORD you will need to do some basic setup before you can begin your project design, this chapter will cover the basics.

FDOT WORKSPACE

When you launch FDOT ORD you are greeted with the following screen. ORD needs a starting point to begin, so you will need to point to a WorkSpace and WorkSet. The image below tells you that neither have been selected.



OpenRoads Designer CONNECT Edition

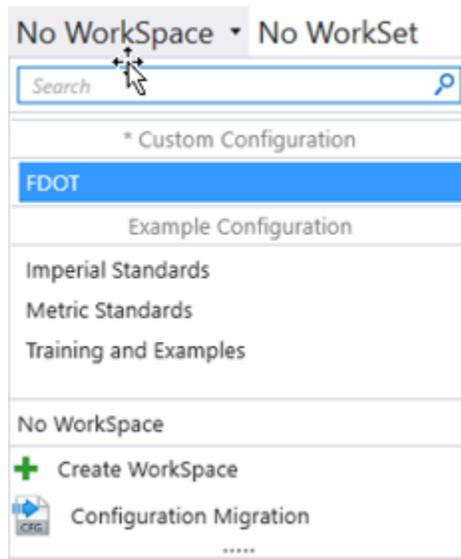
No Workspace • No WorkSet

Recent Files

You haven't opened any files recently. To browse for a file, start by clicking on Browse.



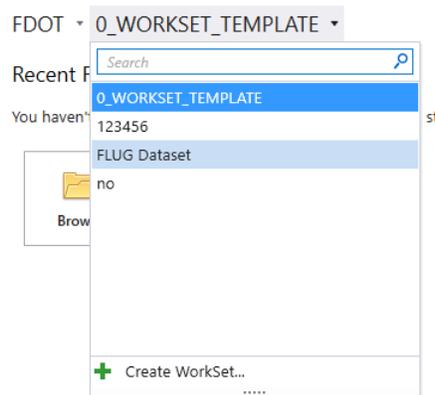
To set a Workspace select the pulldown to see the list of available workspaces and select FDOT as shown below.



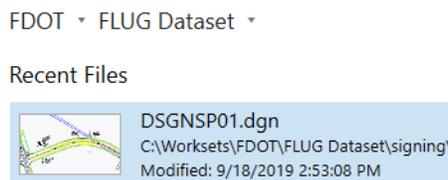
Not only can you select a workspace from this dialog, but you can create different WorkSpaces in case you are working for multiple DOT's

SETTING WORKSET LOCATION

Now that you have the WorkSpace and all the settings that are inclusive to that particular work space, you need to set the WorkSet, which represents your active project folder and drawings. Using the pull down to display the list select the FLUG Dataset workset, which is used for this workbook.

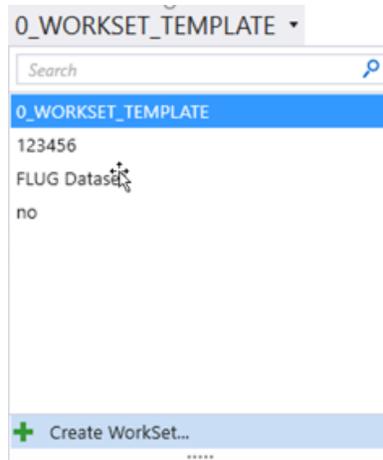


If you have worked in this workset before a list of recently opened files are visible and are ready to be opened. The Recent files list only applies for the current workset.



PROJECT SETUP

You do not need to do this for this workbook, but this topic is for future reference on starting a new project from scratch using the FDOT WorkSpace, with the work space set to FDOT pull down the Work Set List and select **Create WorkSet**.



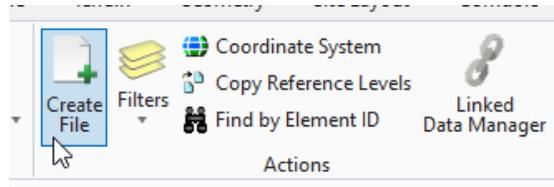
The Create WorkSet dialog box opens, which you will fill in the Name, Description, Template, Location, and other data. Make sure for template you select 0_WORKSET_TEMPLATE. Select OK when finished.

It's important to note that the first file you must open is the _BlankFile.dgn, this will allow you to start the design file creation process using the Create File application located on the FDOT Ribbon in ORD. The BlankFile has a notification letting you know to not start any design file usage from this file. Using the Create File app applies proper symbology to the new design files.



CREATE FILE

This process has already been completed for this manual, but for reference the process to create project design files is covered in this section. Located on the FDOT Ribbon on the Actions panel is the Create File application



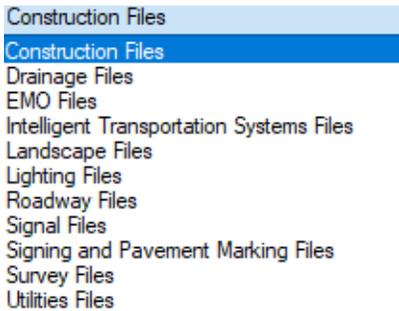
Once selected the Create File dialog opens as shown. A description of each option is listed below

 A screenshot of the 'Create File (v 2.0)' dialog box. The dialog contains several sections:

- Workset:** C:\Worksets\FDOT\FLUG Dataset
- Discipline:** ROADWAY
- File Group:** Signing and Pavement Marking Files
- File Type:** A table with columns 'Base Filename' and 'Description'. The 'DSGNP' row is selected.
- Output File:** Fields for Base Filename (DSGNP), Modifier (Optional), File Sequence # (02), and Extension (.dgn). The full path is shown as C:\Worksets\FDOT\FLUG Dataset\signing\DSGNP02.dgn.
- Output Folder:** signing (with a Browse button).
- Seed File:** c:\fdotconnect\organization-civil\fdot\seed\FDOT-ORD-Seed2 (with a Browse button).
- County:** Leon
- Coordinate System:** FL83-NF
- Action:** An empty text field.
- Buttons:** 'Create - Open File' and 'Close'.

- **Workset** - The workset by default should be the current workset where your project is located, this will allow the create file to create and place new files in the proper project folder.
- **Discipline** - The discipline options are Architectural, Geotech, MechElec, Right of Way, Roadway, & Structures. The signing and Pavement marking design files will be in the Roadway Discipline. The discipline choice controls what filenames are used.

- **File Group** - The File Group controls what component discipline is displayed upon selection. The S&PM plans will use the Signing and Pavement Marking Files File Group. The options are shown below.



Construction Files
Construction Files
Drainage Files
EMO Files
Intelligent Transportation Systems Files
Landscape Files
Lighting Files
Roadway Files
Signal Files
Signing and Pavement Marking Files
Survey Files
Utilities Files

- **File Type** - The File Type displays the Base Filename along with a Description of what the Filename contains.
- **Output File** - The output file section displays the actual name of the file including the File sequence number and Extension. A modifier entry box is also available as an optional entry. A path is displayed showing the name and the location of where the app will put the design file.
- **Output Folder** - The Output Folder is automatically selected as the location of the file based on FDOT Standards. If the box is green that means it has found the project folder structure and the target folder exists. If the box is red that means the target folder does not exist within the project folder. There is a Browse button available which will allow you to search for the folder
- **Seed File** - The seed file is automatically selected based on standards, however the user can browse to a different one if required.
- **County & Coordinate System** - The County and Coordinate System are linked, if the user changes the County the coordinate System will change if the new county is in a different Coordinate System.
- **Create -Open File** - The Create – Open File when selected will create and open the file in the background. The user can create as many files at once as needed. When desired files are created select close to exit the dialog.

SIGNING TOOLS

OBJECTIVE

This chapter covers the sign applications available in the FDOT ORD Work Space. There are Cell drawing files included, containing all sign cells from the *M.U.T.C.D.* and *Standard Highway Sign* book. These cells can be placed anywhere within the design file.

In this chapter, the following topics will be covered:

- FDOT Signs application
- Guide SIGN 7.0

OVERVIEW

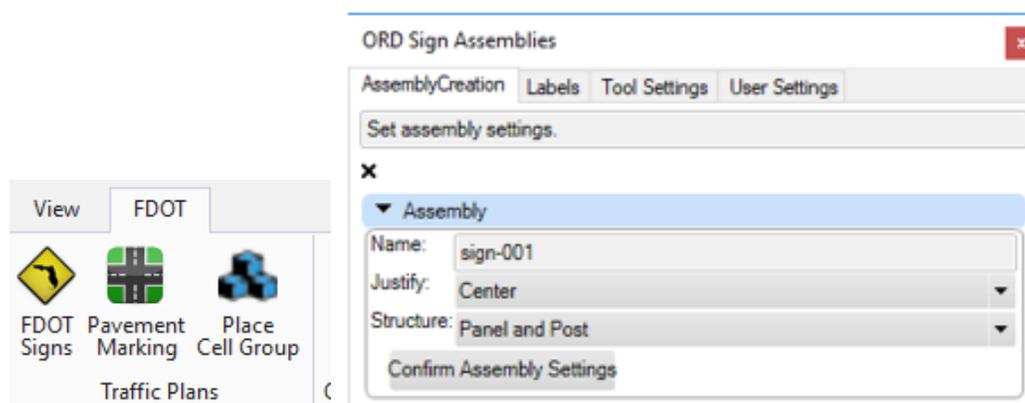
At this point, the designer may have an inventory of existing signs for their project. The designer must decide which signs need to be removed, relocated, or replaced. This work should be done in the proposed design file, *DSGNSP01.dgn*.

The FDOT Signs program is another source for placing proposed and existing sign cells. It allows the designer to build sign assemblies and place them in the design file. The sign post contains the pay item data required to be quantified., the panel contains no pay item data. The ORD version of the FDOT Signs application is very similar to the Civil 3D version.

GuidSIGN, is a sign design program available from Transoft Solutions, and is included in this section and briefly explained.

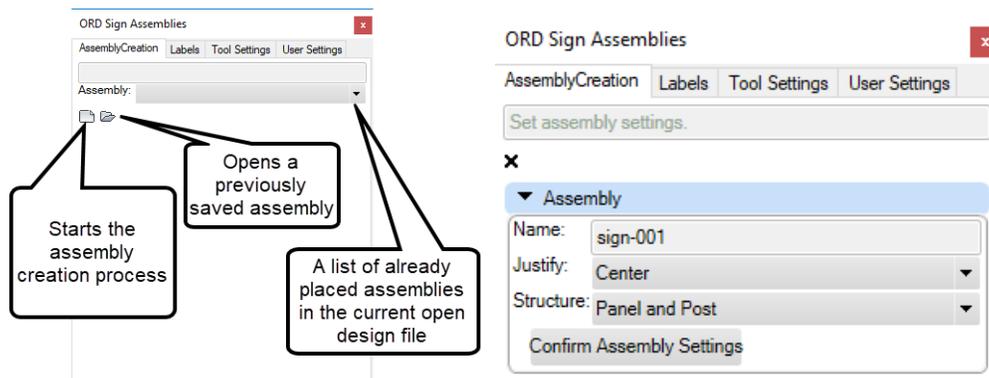
FDOT SIGNS APPLICATION

Accessible from the FDOT Ribbon on the Traffic Plans panel, the FDOT Signs Application is designed to assist in the placement of standard sign panels and posts in the signing and marking plans. This tool uses a separate xml file that contains all pay item data required to quantify correctly. All the signs that are in the *Standard Highway Sign Book* and the *Florida Roadway and Traffic Design Standards* have been included. The application is a palette-based program.



The FDOT Signs App has four tabs: **Assembly Creation, Labels, Tools Settings, & User Settings**

ASSEMBLY CREATION



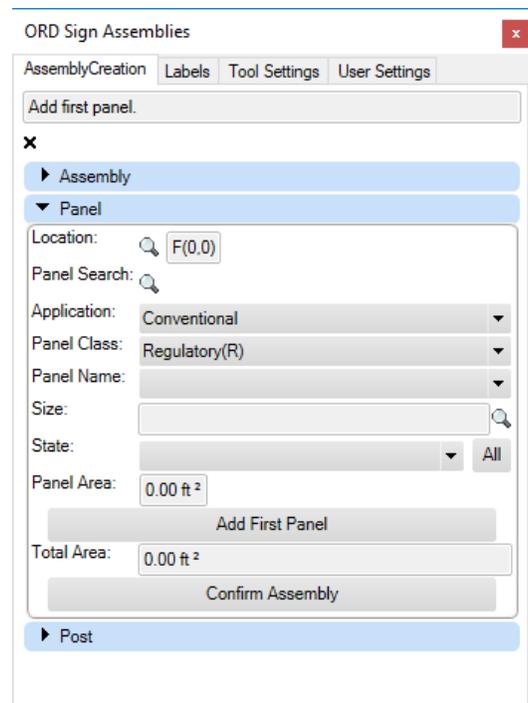
We will start when the start assembly button is selected. The dialog box shown above right opens.

- **✕ Cancels Assembly Creation:** When selected it cancels the assembly creation process and returns to the default dialog as shown above left.
- **Name:** User can assign a name or an automatic default name will be used. A 3-digit counter is added at the end, this allows same named assemblies to exist in the design file without being over written.
- **Justify:** Allows the panel(s) to be set either Left, Center, or Right in the assembly.
- **Structure:** The user can designate the assembly structure as Panel and Post, Post Only, or Panel Only.
- **Confirm Assembly Settings:** This is selected when the assembly parameters are set and the designer is ready to move on to the next step.

ASSEMBLY CREATION - PANEL

The panel assembly portion of the process is where you pick the panel(s) to add to the assembly and preview your work before moving on to the next step.

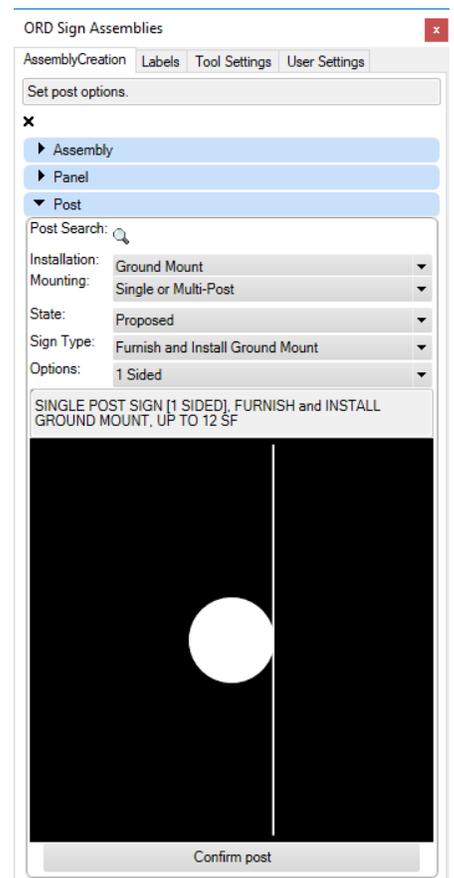
- **🔍 Location** – When selected a grid box opens showing where the panels are in relation to each other in the assembly. The user can also change locations from here by right clicking on the populated grid box for options. The grid box also contains the back side of the assembly if it is a double-sided assembly.
- **🔍 Panel Search** – Allows the user to search for a panel by name and bypasses the navigation to the desired panel.
- **Application** - This gives the designer the ability to select from the list of options including Conventional, Expressway, Freeway, Minimum, or Oversized. The selections made upstream effect what's available downstream in the selection process of other options.
- **Panel Class** – Panel Class is another way to shrink down the panels to choose from, it contains a big list of classes; Regulatory (R), Route Markers (M) and more, the letters in parenthesis designate the panel name. Example being Route Markers (M) = M1-7 panel name.



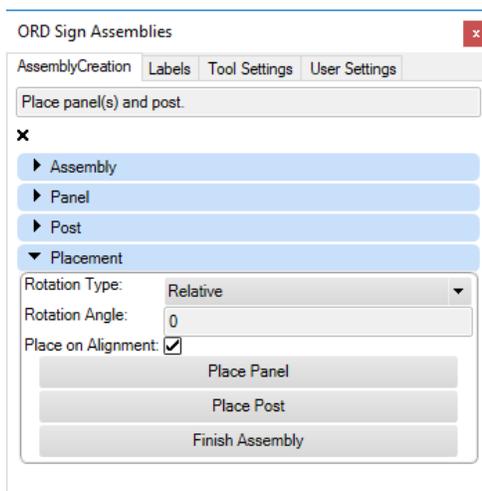
- **Panel Name** – With the previous selections made the list is culled down to the available panels and will populate with the panel name.
- **Size** – The user can select the Search icon to select the available sizes that go with the panel selected, if a size is not preset you can enter in a custom size. An example entry being 24x36 which will equal 6 S.F. It is the designer's responsibility to know what size sign to use, do not assume this tool has the intelligence built in to determine the correct size to set for the sign panels of the project.
- **State** – The user has 4 states to choose from; Proposed, Existing to Remain, Remove, and Relocate. The All button will force the state chosen to all panels in the assembly.
- **Panel Area** – This displays the Square Footage of the current panel that is being added to the assembly.
- **Panel Preview** – When a panel is selected it displays a preview of how the panel(s) will look before placement.
- **Add First Panel** – The user must select this button to add it to the assembly, if another panel needs to be added the user will repeat the previous steps to add it.
- **Total Area** – This displays the total Square Footage of all panels that are part of an assembly.
- **Confirm Assembly** – When all panels have been added to the assembly and the user is ready to move on to the post options click on Confirm Assembly.

ASSEMBLY CREATION - POST

- **Post Search** – Allows user to search for a specific post which will avoid the pulldown navigation to choose the post.
- **Installation** – The user selects which installation method to use. The following are available, Ground Mount, Panel Only, and Overhead.
- **Mounting** – This allows the user to select the type of sign mounting, options being Single or Multi-Post, Sign Beacon, Delineator, Highlighted Sign, Object Marker, Internally Illuminated Sign, Dynamic Message Sign Support Structure, or Electronic Display Sign.
- **State** – There are several states available; Proposed, Existing to Remain, Relocate, Remove, and Proposed/Remove.
- **Sign Type** – The options displayed to choose from is dependent on the type of State selected.
- **Options** – This pull down gives the user ability to pick whether the sign is one sided, two sided, or single post or multiple posts. The options available are based on the previous selections made.
- **Panel Custom Label Fields** – This is where to fill in any open fields on a sign panel. Example, the Speed Limit sign has one field that needs to be filled in. When the Speed Limit sign is selected Field 1 becomes active to enter the speed. This will change the preview display to show the new speed. If a sign is selected with more than one field in it the FDOT Signs tool will recognize this and the appropriate number of fields will become active.
- **Pay Item** – This will show a preview of the post cell used and the Pay Item information assigned.
- **Confirm Post** – When selected the assembly is ready for placement and the tool moves to the placement process.

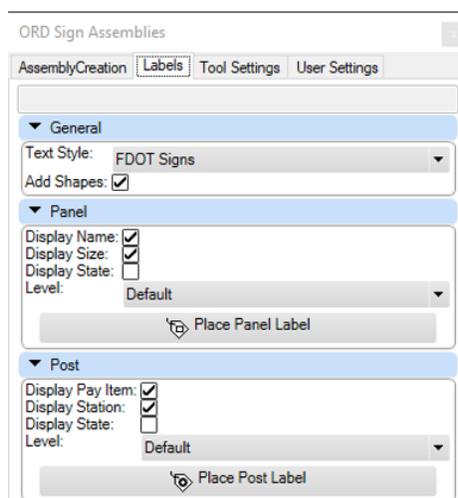


ASSEMBLY CREATION – PLACEMENT



- **Rotation Type and Angle** – There are two options for Rotation, Relative and Absolute, Relative allows the assembly to be rotated parallel to the roadway alignment and the flow of traffic, for this reason it is the default. Absolute allows the user to enter in a fixed rotation angle.
- **Place on Alignment** – This toggle when on will place the assembly along an alignment with a Station, if toggled off it will be placed freely with no association to the alignment.
- **Place Panel** – Starts the process of placing the assembly starting with the panel first.
- **Place Post** – Starts the process of placing the post to go with the previously placed panel.
- **Finish Assembly** – Once the assembly is placed this should be selected before moving on to the Label options.

LABELS



LABELS – GENERAL SETTINGS

- **Text Style** – Controls which font is used for the labels, default is set to FDOT.
- **Add Shapes** – When toggled on, the Pay Item Number Label has a Rectangle shape and the Sign panel name has an Oval shape.

LABELS – PANEL

- **Display Name** – Controls if the Panel name is part of the label or not.
- **Display Size** – Controls if the Size of the panel is part of the label or not.
- **Display State** – Controls if the state is labeled, default is proposed. If toggled on the “Existing to Remain” or “To Be Relocated” state will be part of the label.
- **Level** – Provides a level override if needed, the default is TextLabel for Panel labels.
- **Place Panel Label** – Executes the place panel label command, user picks the panel to label and then the location of the label.

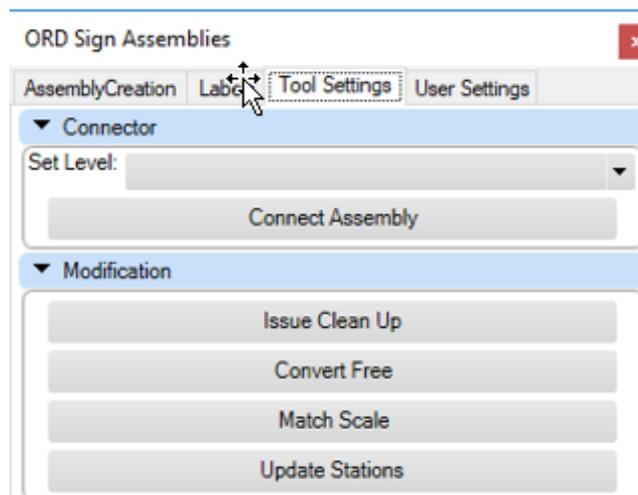
LABELS - POST

- **Display Pay Item** – Controls if the Post label contains the Pay Item Number.
- **Display Station** – Controls if the Station location is part of the label or not.
- **Display State** - Controls if the state is labeled, default is proposed. If toggled on the “Existing to Remain” or “To Be Relocated” state will be part of the label.
- **Level** - Provides a level override if needed, the default is PayItem_dp for Panel labels.
- **Place Post Label** - Executes the place post label command, user picks the post to label and then the location of the label.

LABELS – SAVE/RECALL LABEL SETTINGS

- **Recall or Save** – Allows users to save and recall their label settings for future sessions.

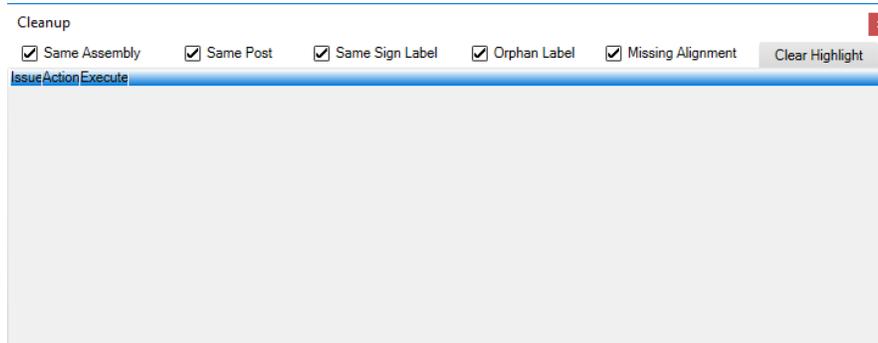
TOOLS & SETTINGS

TOOLS & SETTINGS – CONNECTOR

- **Set Level** – The default level of the connector line is TextLabel, but can be changed by use of the pull-down menu.
- **Connect Assembly** – The connector line is the leader line between the post and panel and will dynamically stay connected if panel or post is moved. If the design file has assemblies that are not connected the user can use this command to add them after they are placed.

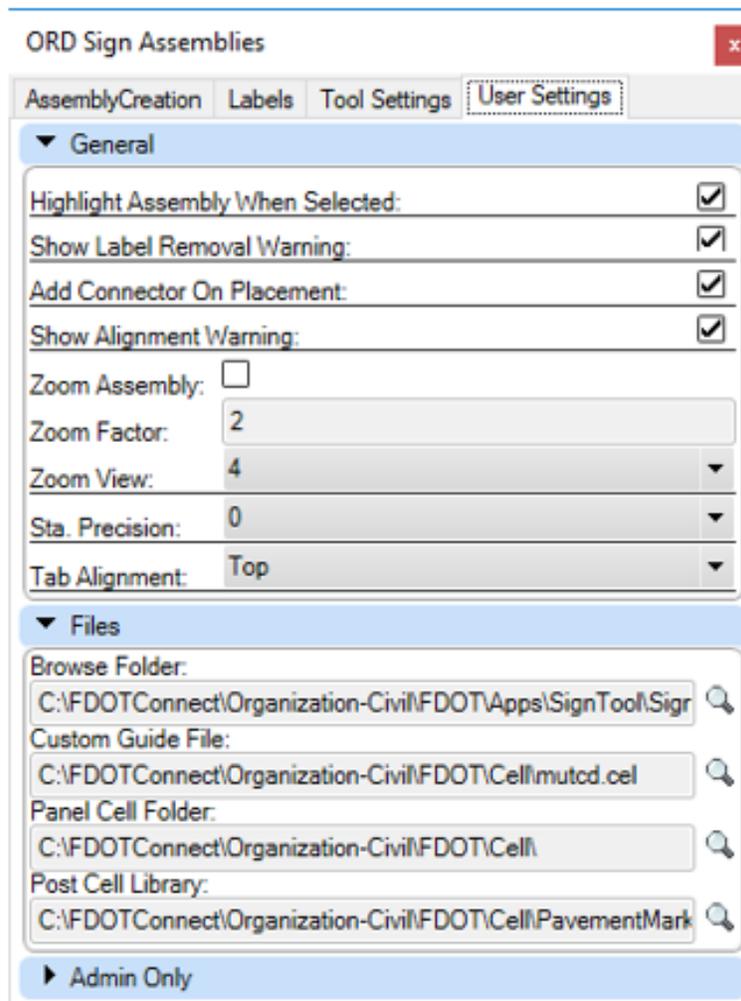
TOOLS & SETTINGS – MODIFICATION

- **Issue Cleanup** – Allows user to delete unused sign assembly data from drawing file. Each cleanup option can be controlled with a check toggle.



- **Same Assembly** – Deletes duplicate named assemblies.
- **Same Post** – This will delete duplicate sign labels that are in the file.
- **Same Sign Label** – This will delete duplicate sign labels that are in the file.
- **Orphan Label** – If an assembly has been deleted and the label somehow remains, this will delete the label that is not associated to any assembly.
- **Missing Alignment** – If an alignment that has Sign Assemblies associated to it is deleted, this will delete all signs that are still associated to the deleted alignment.
- **Clear Highlight** – When the list is populated with scan results of selected criteria, this is used to clear the list which will remove the data from the file.
- **X** – This closes the Cleanup tool.
- **Convert Free** – Converts already placed assemblies to a free state which has no association to an alignment.
- **Match Scale** – Common scale for a FDOT design file is 1" = 40', but in cases where the scale is very different Match Scale will adjust the assembly sizes in the file for better visibility.
- **Update Stations** – The user can update the station of the assembly if it has been moved or copied.

USER SETTINGS

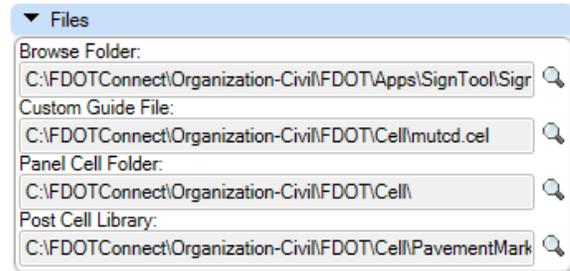


USER SETTINGS – GENERAL

- **Highlight Assembly When Selected** – Controls when an already placed assembly is selected from the assembly pull down list is highlighted or not.
- **Show Label Removal Warning** – When relabeling an already placed assembly, when toggled on a warning will display telling you that you are about to delete and relabel an assembly.
- **Add Connector on Placement** – When toggled on it will automatically place the connector line as the assemblies are placed.
- **Show Alignment Warning** – When toggled on it will warn the designer if they are about to change alignment association.
- **Zoom Assembly** – When toggled on it will zoom to the selected assembly from the list.
- **Zoom View** – Controls how far the selected assembly is zoomed in.
- **Station Precision** – Controls how many decimal places are displayed in the station label, default is set to 0 to match standards.
- **Tab Alignment** – The user can change the side of the dialog box that displays the tabs. The options are along the top or along the right side.

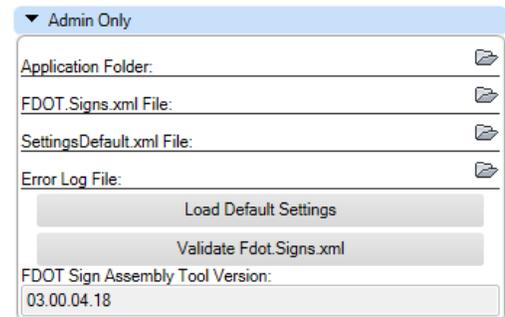
USER SETTINGS – FILES

- **Browse Folder** – The browse folder is where you save and/or recall sign assemblies. The user should change this location to point to the sign assembly folder within the ORD install which contains already created assemblies.
- **Custom Guide File** – This location is where your cells reside in the guide sign file you have created for your project, this location will constantly change as you work through a design. It is not important where the default location is pointing.
- **Panel Cell Folder** – This points to the root folder cell library location that contains all the required sign panels that you will use in your project design.
- **Post Cell Library** – This points to the cell library location that contains all the required post cells you will use in the design.

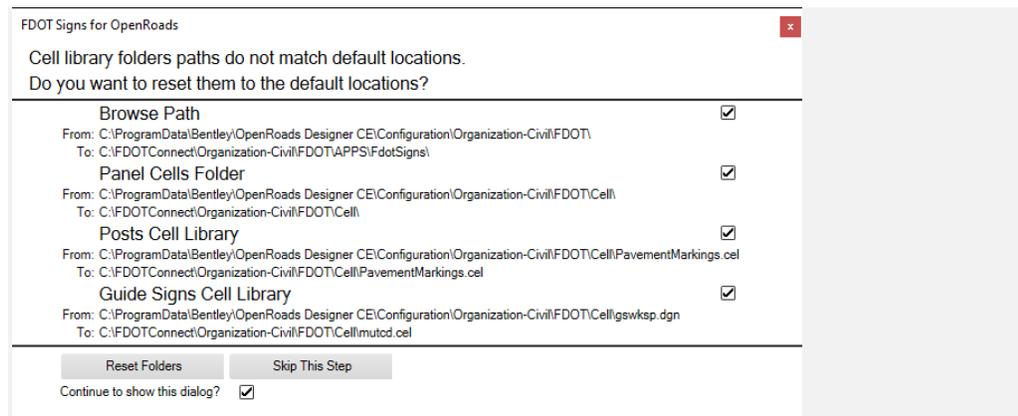


USER SETTINGS – ADMIN ONLY

- **Application Folder** - Opens the location of the FDOT Signs folder within the ORD Installation location
- **FDOT.Signs.xml File** – Opens the FDOT.Signs.xml file for editing. It is recommended that the user not edit this file, however if it is necessary use this command to access it.
- **Settings Default.xml File** – This file should already be set; however, the user can change this file and then Select the Load Default Settings to load settings into the application.
- **Error Log File** – When selected this will open the Error Log File to determine what error has occurred that can then be passed to the CADD office for the developer to evaluate.
- **Load Default Settings** – This loads the Settings.Default.xml File discussed above.
- **Validate FDOT.Signs.xml** – This will validate the cells and cell files that are necessary for the Sign Tool to function correctly. It will report what is missing.
- **FDOT Sign Assembly Tool Version** – Identifies the version of the sign application, this is useful when reporting bugs or issues with the program.



Note When the Sign tool is launched for its initial use a dialog displaying pathing that will need to be changed so the sign tool will work properly, Expand the dialog so you can see all options. Select **Reset Folders** to change the pathing that is shown below. This dialog will only display upon first time use.



EXERCISE OVERVIEW – SIGNING TOOLS

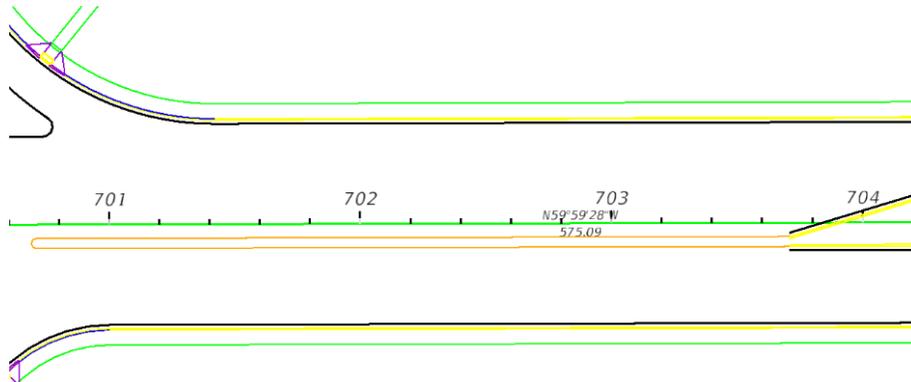
- 6.1 Place Single Post Sign Assembly
- 6.2 Save the Sign Assembly
- 6.3 Update Sign Post Location
- 6.4 Place Multi-Panel Sign Assembly
- 6.5 Create and Place a Sign Assembly Using 2 Methods (Part 1)
- 6.6 Placing Same Sign Assembly Using a Saved XML File (Part 2)
- 6.7 Review the Sign Assembly Inventory in a File

Exercise 6.1 Place Single Post Sign Assembly

In this exercise, the designer will build, place, and label a simple sign assembly. The Sign tool is designed so the user works top to bottom making selections.

1. Open the *Dsgnsp01.dgn* file and zoom in near *Station 702+20*.
2. Select the Rotate View  button select the **2 Points** command and using the SR61Alignment as the object select anywhere near station 701+00 for the first point and anywhere neat station 702+00 for the second

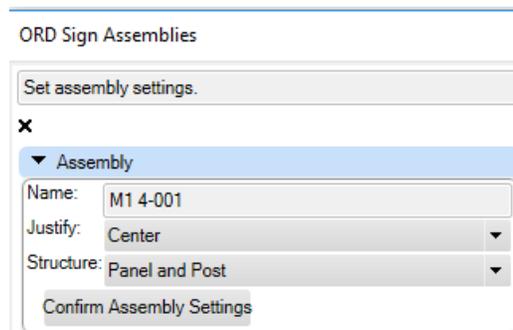
point.  The drawing should look like below.



3. From the FDOT Ribbon, select the **FDOT Signs** icon to open the application.



4. From FDOT Signs, select the **Create New Assembly**  icon.



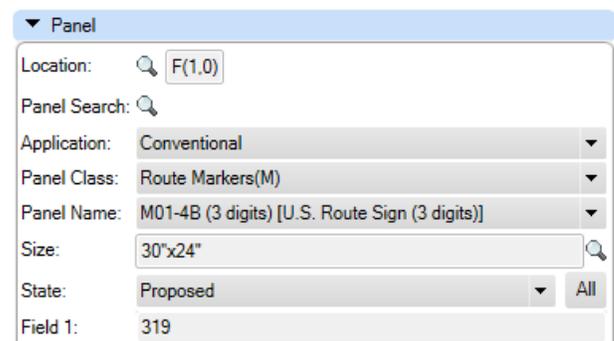
- Name* enter **M1 4**, notice the name has added -001 to the end.
 - Justify* to **Center**.
 - Structure* set **Panel** and **Post**
 - Select **Confirm Assembly Settings**.
5. Click on the *Location* icon to change the location of the panel on the grid.
6. Click on **Cell F(1,0)**. This will be the *Route Marker Panel* location.

| | | | |
|--------|--------|--------|--------|
| F(0,0) | F(0,1) | F(0,2) | F(0,3) |
| F(1,0) | F(1,1) | F(1,2) | F(1,3) |
| F(2,0) | F(2,1) | F(2,2) | F(2,3) |
| F(3,0) | F(3,1) | F(3,2) | F(3,3) |
| F(4,0) | F(4,1) | F(4,2) | F(4,3) |

↑Front ↓Back

7. In the *Panel Section*:

- Set the *Application* to **Conventional**.
- Set *Panel Class* to **Route Markers(M)**
- For *Panel Name* Select the **M1-4 (3 Digits)**.
- Size* is preset with one option, select **30"x24"**.
- Set *State* to **Proposed**.
- For *Field 1* type in **319** the panel preview shows the text.
- Click **Add First Panel**,



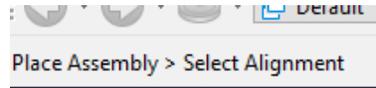
8. On the *Location Grid* select the one above the panel already created, **F(0,0)**.

9. Select another *Route Marker*, **M3-1** which is the *NORTH* panel.
10. For size select **24”x12”** from the available options.
11. Set State to **Proposed**.
12. Select **Add Next Panel**, then **Confirm Assembly**. You should see a preview of the 2-panel assembly.

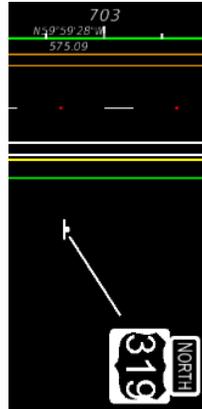


13. Select **Confirm Assembly**.
14. For the *Post Parameters* enter the following.
- Set the *Installation* to **Ground Mount**.
 - Set *Mounting* to **Single** or **Multi-Post**.
 - Set *State* to **Proposed**.
 - Set *Sign Type* to **Furnish and Install Ground Mount**.
 - Set *Options* to **1 Sided**.
 - Click on **Confirm Post** to continue to the *Placement* section.

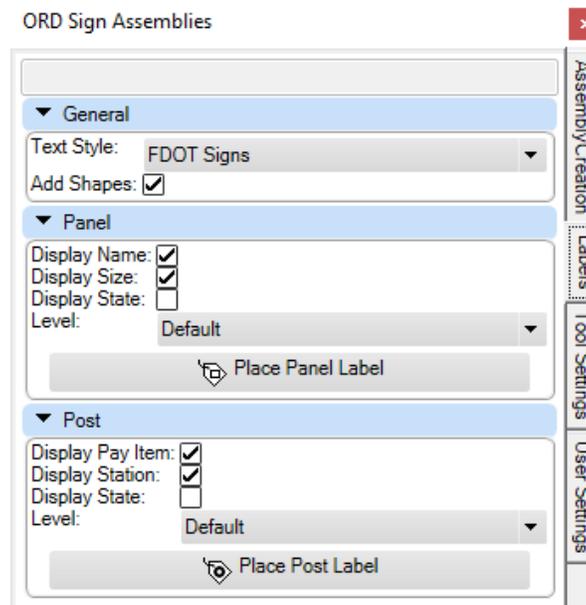
15. Select **Place Panel** to start the *panel placement command*.
16. The command line asks to select the *Alignment*, select the **SR61 Alignment** and select an area in the drawing on the south side of the alignment away from the sidewalk to allow room for labels and connector line. Left click to place panel.



17. Select **Place Post**, notice how the app remembers the Alignment and is ready to place the post, left click to place the Post near Station 702+20.
18. Select **Finish Assembly** to proceed to placing Labels. The drawing should look like below.



19. Select the **Labels** tab and make sure to match the following settings as shown below.



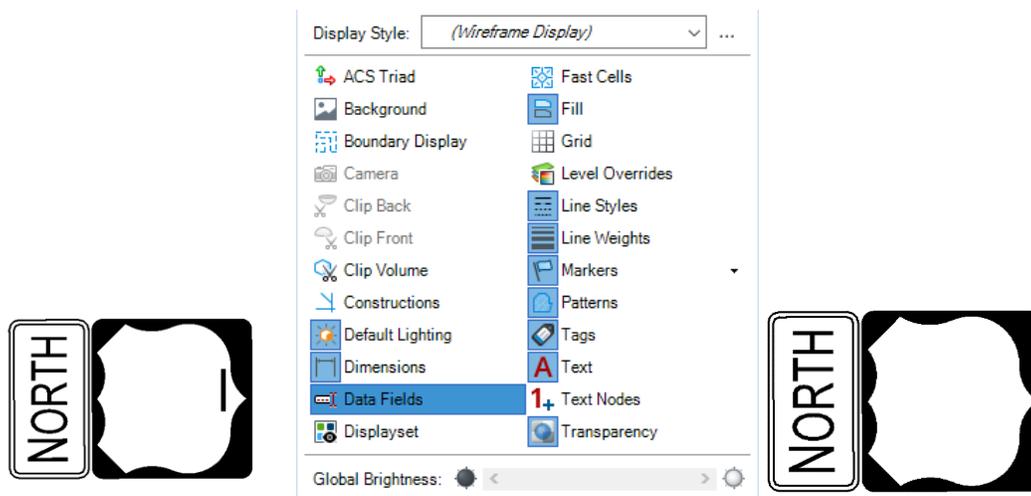
20. Click **Place Panel Label**, click the **NORTH** panel, select the *label location* to the right of the assembly, click on the **Route Marker** panel and place the label below the previous label.

21. Click **Place Post Label**, click the *post*, for *label location* pick below the previous labels. Your drawing should look like below.



Note Label placement is a personal preference. Be consistent with how you place sign labels so the plans look professional. Use MicroStation commands to move the **Sign Names** and **Sizes** so they are centered under the sign panels and are stacked from top to bottom.

22. When the panels are placed you may see the data fields still be visible along with the desired text, to cut off the data fields use the view attribute pulldown and toggle off Data Fields 



Exercise 6.2 Save the Sign Assembly

In this exercise, the designer will save the previously placed sign assembly as an xml file, so that it can be recalled, placed, and labeled in a future instance.

1. Switch to the User Settings tab on the Sign tool and change the folder used for saving and recalling assemblies

as shown. 

2. Switch back to the Assembly Creation tab and select the Save Icon   
3. The save as dialog box opens already in the folder you just set, Name the assembly M1-4_M3-1.xml.
4. Press Ok to save and close the dialog.
5. Save your file before continuing.

Exercise 6.3 Update Sign Post Location

In this exercise, the student will move the post location of an already placed assembly.

1. Continuing in the *DSGNP01.dgn*.
2. Zoom to the location of the previously placed assembly.
3. Move the post a few feet in either direction.
4. Notice that when you click to place the post the station value automatically updates along with the connector that keeps the attachment between the post and panel.
5. Save drawing before continuing.

Exercise 6.4 Place Multi-Panel Sign Assembly

In this exercise, the student will use the same process as in the previous exercise to assemble and place a four-panel sign assembly.

1. Continuing in *Dsgnsp01.dgn*, zoom to the vicinity of **Station 703+00**. This sign will be added on the North side.
2. Open the **Sign** tool, if closed, select **Start New Assembly**.
3. **Name** the new assembly **M1-4Panel** and select **Confirm Assembly Settings**.
4. In the *Panel Section*, make selections for **Panel 1 of 4** as shown below.

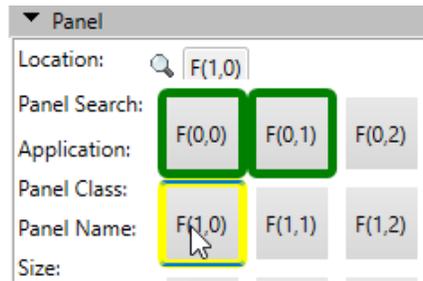
The screenshot shows the 'Panel' selection dialog box. The 'Location' field is set to 'F(0.0)'. The 'Panel Search' field is empty. The 'Application' dropdown is set to 'Conventional'. The 'Panel Class' dropdown is set to 'Route Markers(M)'. The 'Panel Name' dropdown is set to 'M01-04 (2 digits) [U.S. Route Sign (2 digits)'. The 'Size' field is set to '24"x24"'. The 'State' dropdown is set to 'Proposed'. There is an 'All' button next to the 'State' dropdown.

5. Select **Add Panel**.
6. Make the following selections for **Panel 2 of 4**.

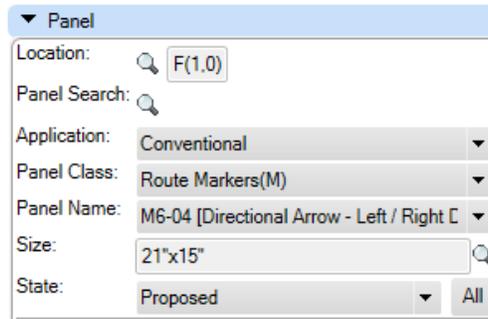
The screenshot shows the 'Panel' selection dialog box. The 'Location' field is set to 'F(0.1)'. The 'Panel Search' field is empty. The 'Application' dropdown is set to 'Conventional'. The 'Panel Class' dropdown is set to 'Route Markers(M)'. The 'Panel Name' dropdown is set to 'M01-04A (3 digits) [U.S. Route Sign (3 digits)'. The 'Size' field is set to '30"x24"'. The 'State' dropdown is set to 'Proposed'. There is an 'All' button next to the 'State' dropdown.

7. Select **Add Next Panel**.

- Click on the Location icon and select the location that is marked yellow in the diagram below, notice the used locations are green.

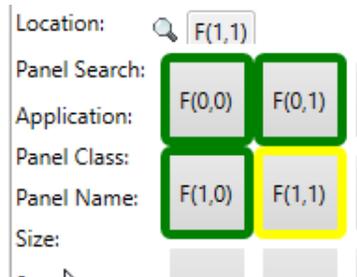


- Make the following selections for **Panel 3 of 4**.

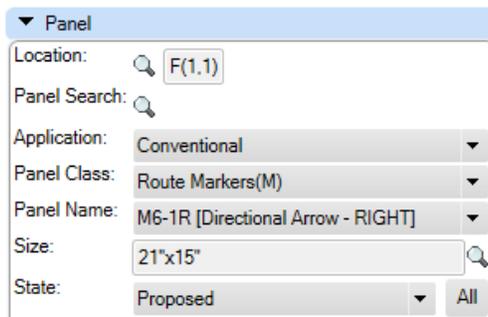


- Select **Add Next Panel**.

- Click on the Location icon and select the location that is marked yellow in the diagram below.



- Make the following selections for **Panel 4 of 4**.

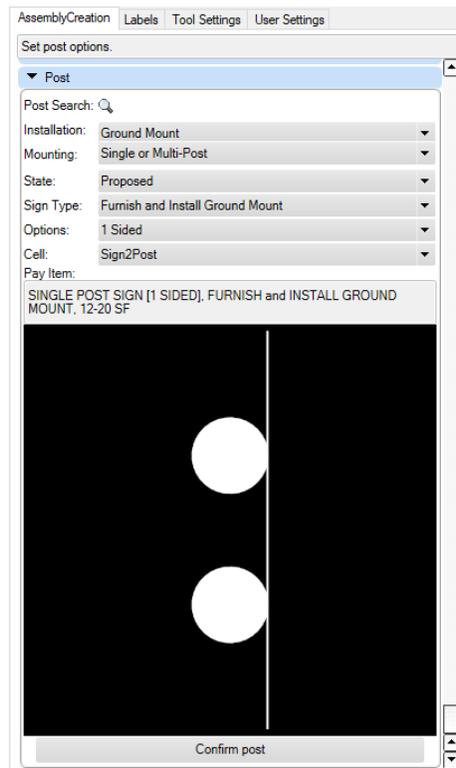


- Select **Add Next Panel**.

14. Notice the preview of the assembly and how the Panel Area is at zero, but the Total Area is 13.38sf this is the total area of all four panels.



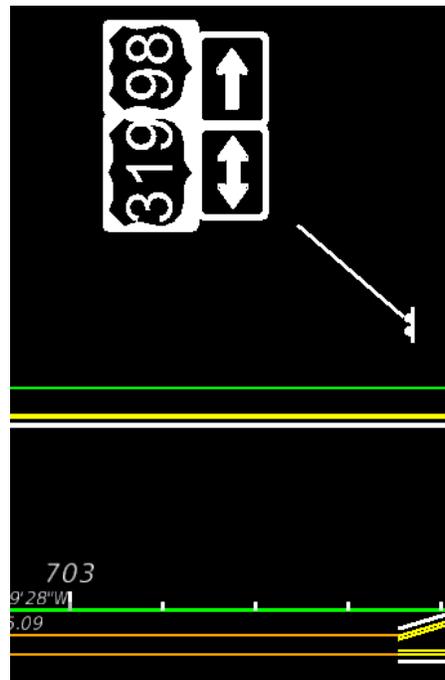
15. Select **Confirm Assembly**.
16. In the *Post* section make the following selections.



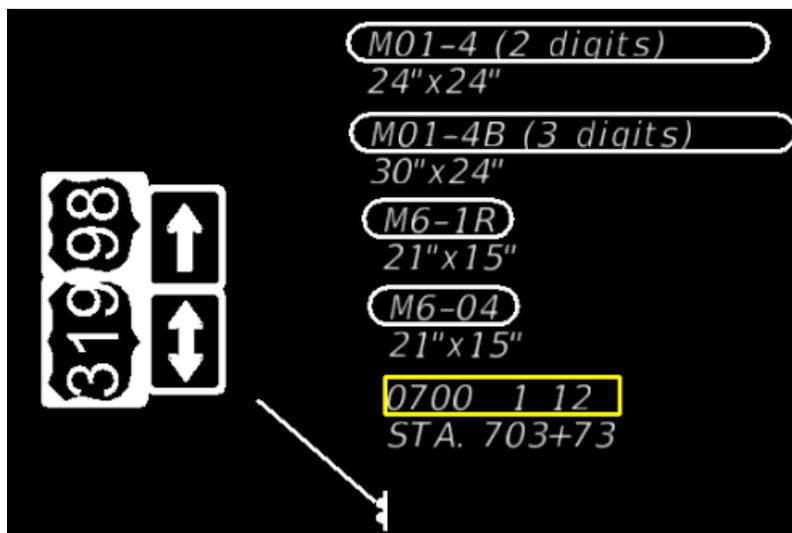
Note Notice the Pay Item information is different from the previous assembly you placed. This is because of the additional square footage of the panels. This is automatic and controlled by the signs.xml file, so the user will not have to make the selection. The data is placed on the post when placed.

17. Select **Confirm Post**.
18. Select **Place Panel**.
19. Make sure *Rotation* is set to **Relative** and *Place on Alignment* is checked.

20. Select **Place Panel** and click near the *Station 703* as shown below.



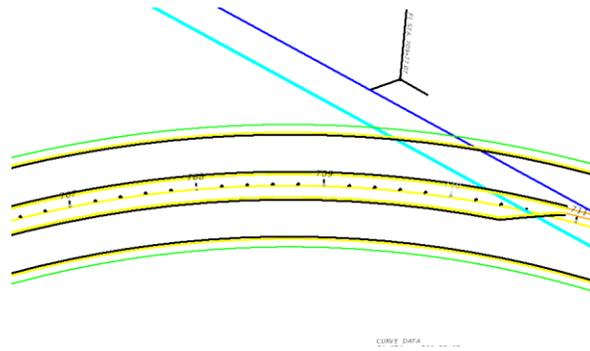
21. Select **Place Post** and Select close to Station 703+00 just outside the Sidewalk.
22. Click **Finish Assembly**, then select the **Labels** tab.
23. Select **Place Panel Label**, select one panel at a time and place the label. You don't need to select the Place Panel Label again, due to the command is always active until you change to the post.
24. Select **Place Post Label** and select below the previously placed labels. The completed assembly is shown below.
25. Save drawing before continuing.



Exercise 6.5 Create and Place a Sign Assembly Using 2 Methods (Part 1)

In this exercise, the designer will create and place a warning arrow sign assembly two times using different techniques. The designer will first place it like previous steps, then the designer will recall a previously saved version of the assembly.

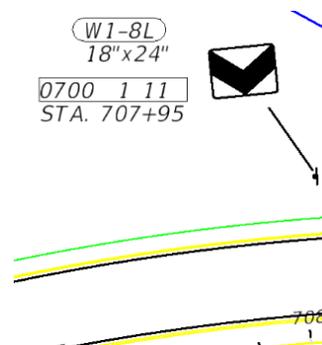
1. Continuing in the *DSGNP01.dgn* switch to the FDOT Ribbon and select the **2 Point Twist** command.
2. Rotate and zoom to the area as shown below.



3. Open **FDOT Signs** if not already open. Create the following assembly using the steps from earlier exercises.

| | |
|--|--|
| Assembly Name: W1-8L-001 Justify: Center Structure: Panel and Post Confirm Assembly Settings | |
| Panel Location: F(0,0) Panel Search: Application: Conventional Panel Class: Warning(W) Panel Name: W1-8L Size: 18"x24" State: Proposed | |
| Post Post Search: Installation: Ground Mount Mounting: Single or Multi-Post State: Proposed Sign Type: Furnish and Install Ground Mount Options: 1 Sided Pay Item: | |

4. Place the panel and post around Station 708+00 and label the panel and post as shown below.
5. Save your file before continuing.

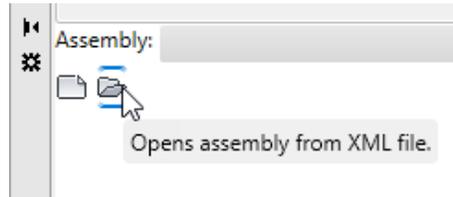


6. On the Sign Tool switch to the Assembly Creation tab.
7. Click on the save assembly button .
8. Name the assembly **W1-8L** & press OK.

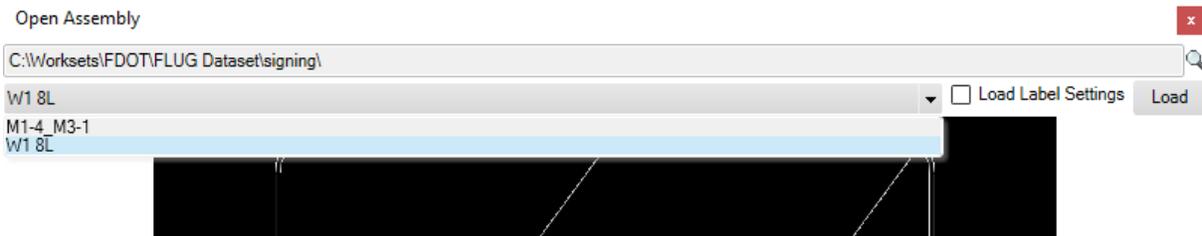
Exercise 6.6 *Place same sign assembly Using a Saved XML File (Part 2)*

In this exercise, the designer will open a saved sign assembly and place in the design file.

1. Continue working in the *DSGNP01.dgn* file.
2. Close the Sign tool if open.
3. Re open the sign tool
4. Click on **Opens assembly from XML file** button in the FDOT Signs app.



5. Using the list pulldown select the **W1 8L** assembly. A preview is shown to verify the selection.



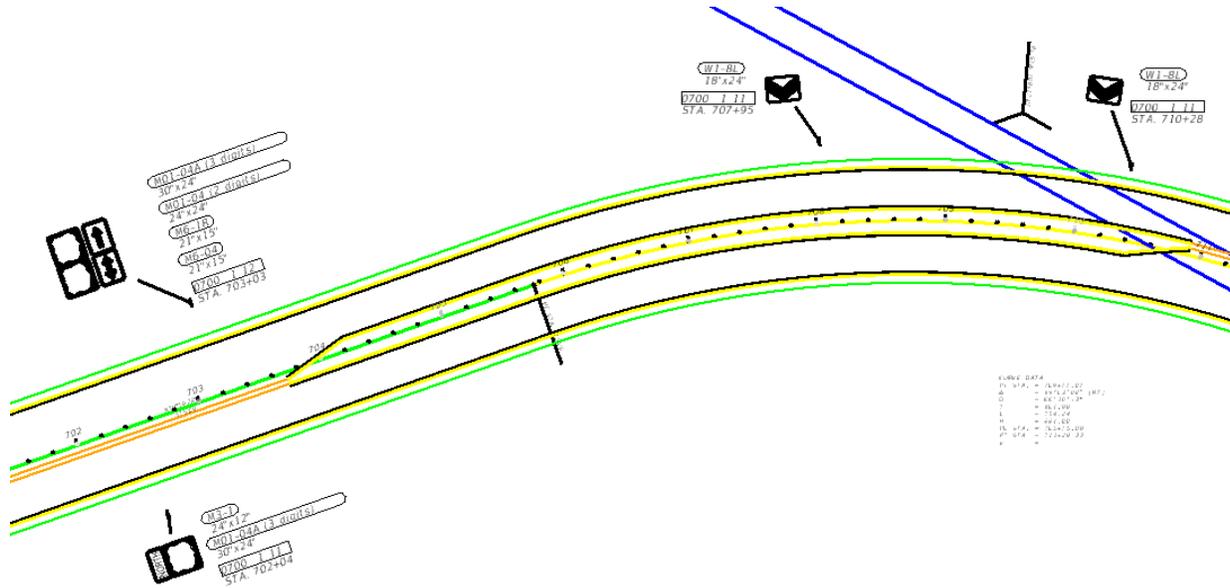
6. Select **Load**.
7. To save you time, the sign tool pre-loads all settings based on how it was saved. If no changes are needed select **Confirm Assembly** and then **Confirm Post**.
8. Place the Panel & Post.
9. Select **Finish Assembly**
10. Switch to the Labels tab on the sign tool.
11. Label Panel and Post.
12. Save drawing before continuing.

Note At the time of this manual revision the 3rd method of placing the same assembly is not completely working yet like it does in Civil 3D. The method is copying an already placed assembly and moving it along a curve and left clicking to place it, the post will rotate to maintain the relative position to the alignment. You can copy an assembly along a tangent portion of roadway and left click anywhere along the tangent to place the copy and the post station will update.

Exercise 6.7 Review the Sign Assembly Inventory in a File

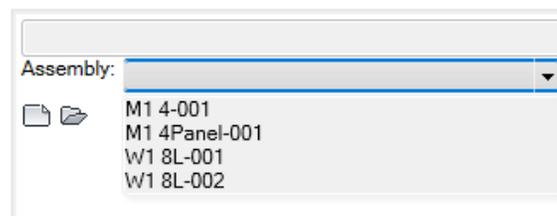
In this exercise, the designer will open the sign tool while the dsgnsp01.dgn is open to get familiar with navigating around the already placed assemblies in the file. This exercise will show the importance of proper naming conventions of assemblies.

The drawing should contain 4 Sign assemblies if you have followed the previous exercises.



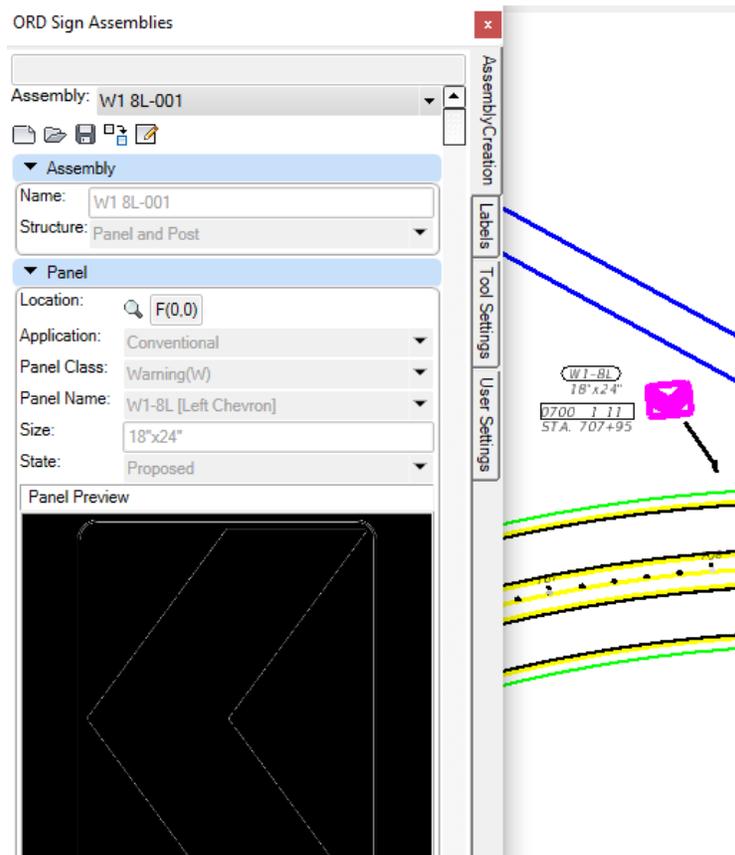
1. Continue working in the dsgnsp01.dgn file.
2. Close the Sign tool and Re-open it.
3. Click on the Assembly pulldown list.

ORD Sign Assemblies



4. The list contains the 4 placed assemblies, naming is important due to the number of assemblies a project could contain. Notice the two W1 8L assemblies in the list. The difference in the name is the 3-digit number, this will allow you to have unlimited assemblies of the same name.
5. From the assembly list select the **W1 8L-001** sign.

- Two things happened, the selected assembly is highlighted in the file and the sign tool dialog has populated with the settings of the assembly. Notice the criteria is grayed out and not editable.



- If desired, you can edit the assembly criteria by pressing the Edit Assembly button  to unlock the criteria.
- Save your drawing.

Note Editing an already placed assembly means you can change any setting in the controls or even change the panel or add additional panels. Once the changes have been made you will need to confirm the assembly and place the panel and post like you did initially along with re-labeling.

When re-labeling an assembly a warning message alerts you that you are about to delete an existing label and replace it with the new label, go ahead and select ok to replace the label.

PAVEMENT MARKING TOOLS

OBJECTIVE

The objective of this chapter is to create Proposed Pavement Marking Features using the Pavement Marking tool located on the FDOT Ribbon in ORD.

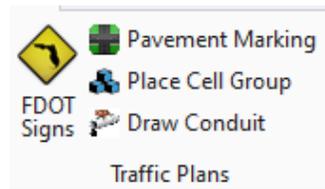
OVERVIEW

This chapter demonstrates several applications that help to create a Pavement Marking set of plans:

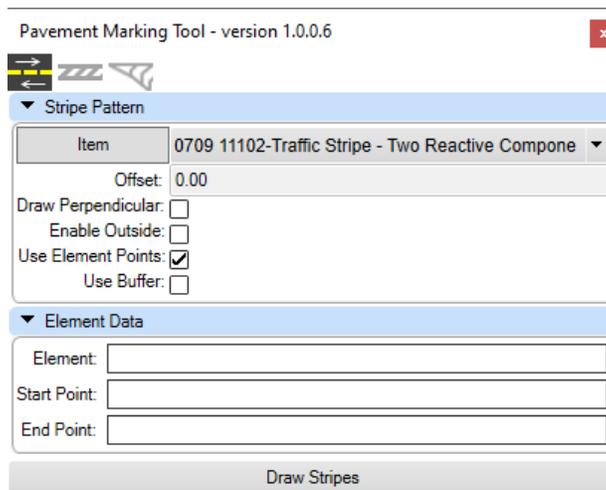
Pavement Marking tool - An application within the FDOT Workspace that is used to draw Pavement Marking in accordance with the FDOT (CADD) standards.

Refer to the Plans Preparation Manual, Volume 2, Chapter 23 for more detail on developing the Signing and Marking plans. Refer to the Design Standards indexes for details.

PAVEMENT MARKING TOOL



Many of the Traffic Plan items are simple 2d line styles drawn and have pay item information already placed for future Quantity Reports. To draw Pavement Markings with the tool, select the Pavement Marking icon on the Traffic Plans panel on the FDOT Ribbon.



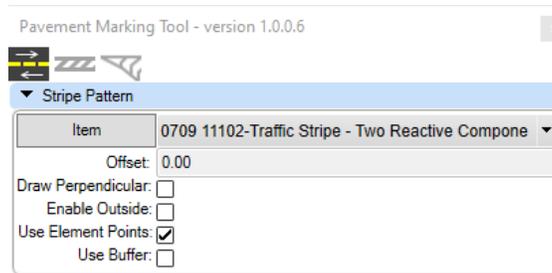
There are three modes in the Pavement Marking tool to aid in the design and layout of Patterns: *Striping*, *Separator*, & *Merge/Diverge Chevrons*.

STRIPING



The Pavement Marking tool places all solid or skip Pavement Markings. The striping tool can use an Alignment, or Line for pattern placement.

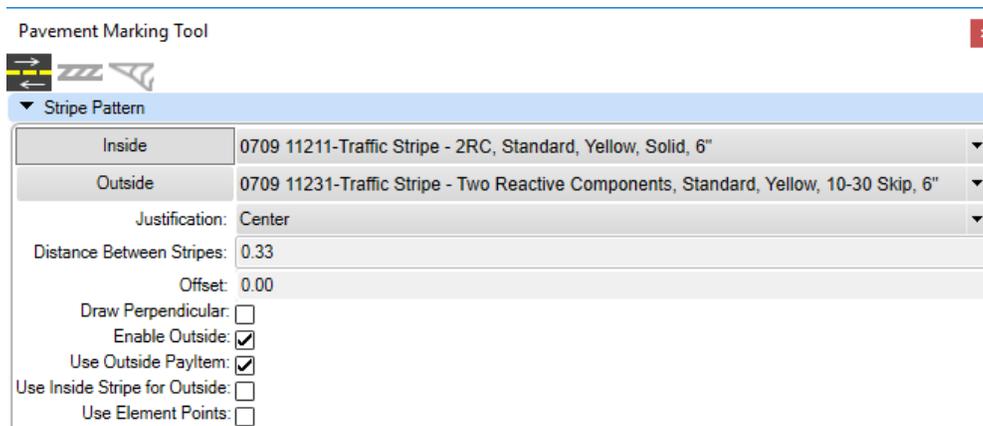
✓ *Stripe Pattern*



There is a single pattern which by default is active draws a single stripe, if you toggle on *Enable Outside* the dialog changes to display the options shown below. The verbiage changes to denote an Inside and Outside Pattern. That can be placed. The designer can enter in the distance between stripe patterns, along with the offset distance from the source element, the distance is measured from the center as a default; however, the justification can be changed.

There is a history list that the designer can quickly change patterns, the history list contains the last 10 patterns the designer has selected, to access the history list click on the pull-down button in the pattern name.

Enable Outside (Double Stripe) allows for four possible configurations set up with a combination of Solid/Solid, Skip/Skip, Solid/Skip and Skip/Solid markings. The figure shows the *Double Stripe* Pattern set up to draw a 6" solid yellow line on the Inside and a 6" 10/30 Skip line on the Outside with a 0.33' or 4" Distance Between Stripes.



This is a typical set up for a two-lane roadway with a passing zone on one side, as depicted in the figure below.



- **Justification** – Justification is used to measure the distance from inside and outside patterns, Center splits the distance between patterns and adds on both sides, picking either Left or Right designates the side the pattern is placed.
- **Distance Between Stripes** – It is the space between two striping lines. This distance is expressed in terms of master units. There will be times when the designer will need to use a larger distance between lines than what the design standards call for. Example, if the signing and marking plans are at 100 scale a 4” separation between two 6” lines is not enough, the two lines appear like one thick line.
- **Offset** – The distance between the source or reference element and the beginning of the striping pattern(s).
- **Draw Perpendicular** – Allows the user to draw patterns perpendicular to a source line, an example of use is a Stop Bar or Cross Walk Striping.
- **Enable Outside** – Like discussed above, if toggled on you can add an additional pattern to place alongside the inside pattern.
- **Use Outside PayItem** – This toggle identifies if the pay item data is different between the two patterns.
- **Use Inside Stripe for Outside** – If toggled along with Enable Outside toggled it copies the inside pattern and uses the same for the outside pattern.
- **Use Element Points**- Must be toggled on to be able to select line work.
- **Use Buffer** – If toggled this allows user to select the begin and end point along the reference element selected to place patterns.

The figure below shows how the buffer function works. The reference line used which is 300’ long along with the new line created 33’ to the right of the beginning point. The reference line is, a reference, it does not have to control the length of the new striping pattern created.



✓ Element Data

| Element Data | |
|--------------|--------------------------|
| Element: | 4084 |
| Start Point: | 2006771.6, 402644.0, 0.0 |
| End Point: | 2006819.5, 402726.8, 0.0 |
| Draw Stripes | |

- **Element** – Lists the name of the reference pattern.
- **Start Point** – This lists the Coordinates or Station value of the Reference Pattern at the Starting Point.
- **End Point** – This lists the Coordinates or Station value of the Reference Pattern at the Ending Point.

SEPARATION MODE

Another Mode in the Pavement Marking tool is the Separation Mode. This mode allows you to draw stripes at an angle between elements such as a center turn lane where it approaches a left turn condition.

The screenshot shows the 'Pavement Marking Tool' window. It features a 'Separation Pattern' section with the following controls:

- Item:** A dropdown menu.
- Distance Between Stripes:** A text input field containing '20.00'.
- Angle:** A text input field containing '45.00' and a small green square icon.
- Angle Type:** A dropdown menu set to 'Fixed'.

Below this is a 'Control Points' section with two text input fields:

- Begin Striping Point:** 1453.3, 491.3, 0.0
- End Striping Point:** 1544.7, 491.3, 0.0

At the bottom of the tool is a 'Draw Stripes' button.

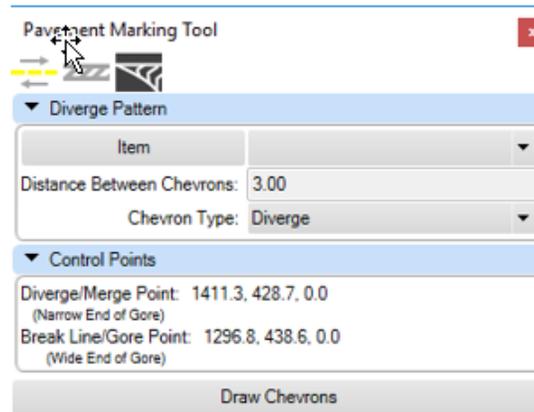
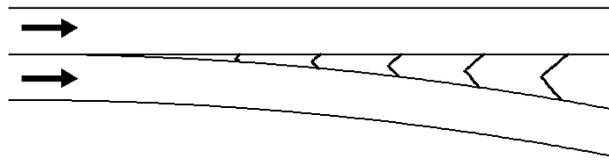


✓ *Separation Pattern*

- **Item** – Select this button to open the Pay Item Database to select a striping pattern. The list to the right contains a pulldown that lists the history of previously placed patterns.
- **Distance Between Stripes** - Allows the user to input the distance between stripes.
- **Angle** – Allows the user to enter a known angle or to select the pick box to pick two points in the drawing to designate the angle used.
- **Angle Type** – Allows the user to select either a fixed or variable angle for the stripes.

✓ *Control Points*

- **Begin Striping Point** – List the coordinates of the beginning striping point.
- **End Striping Point** – List the coordinates of the end striping point.
- **Draw Stripes** – Places the stripes based on the criteria selected.

CHEVRON DIVERGE/MERGE

The Chevron Diverge/Merge Mode is used for traffic channelization at a gore when traffic flows in the same direction as seen in the figure below. Refer to Design Standards for specific design criteria.

✓ *Diverge Pattern*

- **Item** – Select this button to open the Pay Item Database to select a striping pattern. The list to the right contains a pulldown that lists the history of previously placed patterns.
- **Distance Between Chevrons** – Allows the user to input the distance between stripes.
- **Chevron Type** – Allows the user to select the Chevron type, which determines the direction of the pattern. The choices are Diverge and Merge.

✓ *Control Points*

- **Diverge/Merge Point** – List the coordinates of the narrow end of gore.
- **Break Line/Gore Point** – List the coordinates of the wide end of gore.
- **Draw Chevrons** – Places the stripes based on the criteria selected.

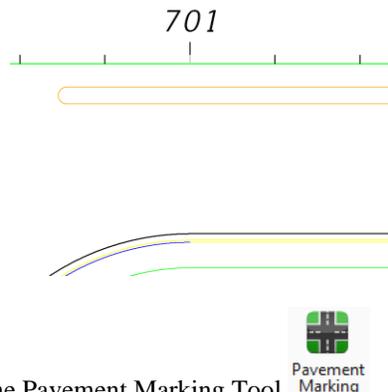
EXERCISE OVERVIEW – PAVEMENT MARKING TOOLS

- | | |
|------|------------------------------|
| 6.8 | Draw Striping Patterns |
| 6.9 | Place a 24" Stop Bar |
| 6.10 | Place Two Different Patterns |
| 6.11 | Place and Edit a Crosswalk |

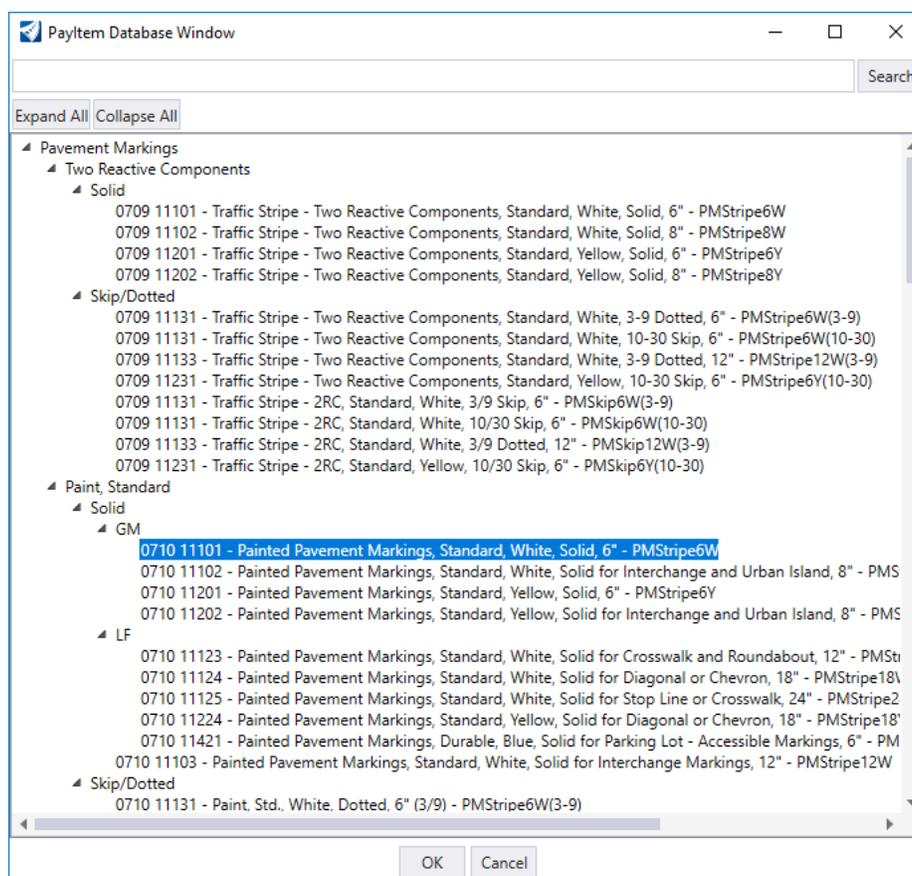
Exercise 6.8 Draw Striping Patterns

In this exercise, the user will place a 6” Solid White pattern representing the edge of pavement along the Curb & Gutter of the roadway, which is part of one side of a Bike Lane. The user will also add the other side to complete the Bike Lane designation.

1. Open or continue working in *DSGNP01.dgn*.
2. Twist view and zoom to the area shown below.

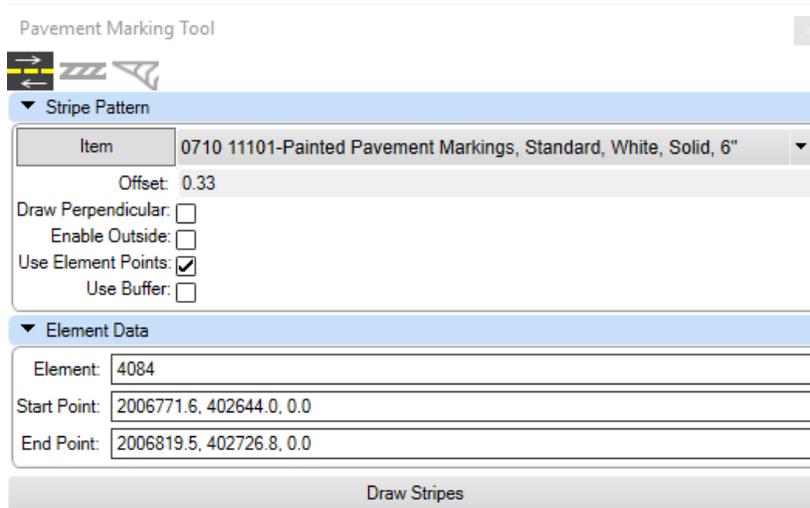


3. On the FDOT Ribbon select the Pavement Marking Tool .
4. Select the Item button to open the Pay Item Database Window.

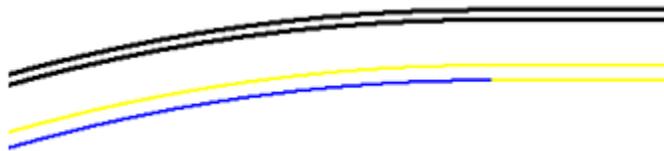


5. Select Pay Item 0710 11101 which is a 6” Solid White pattern.
6. Select **OK**.
7. For offset enter .33 which equals 4”.

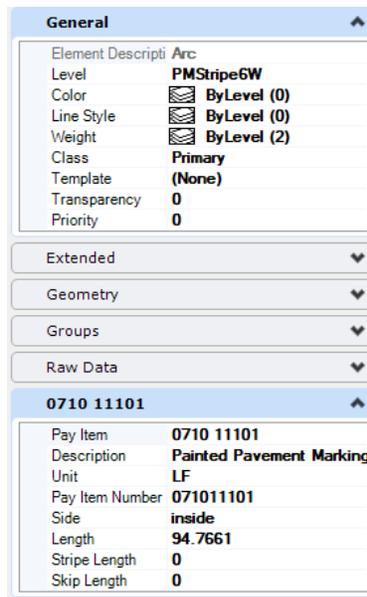
- Make sure **Use Element Points** is toggled. Make sure selections equals image below.



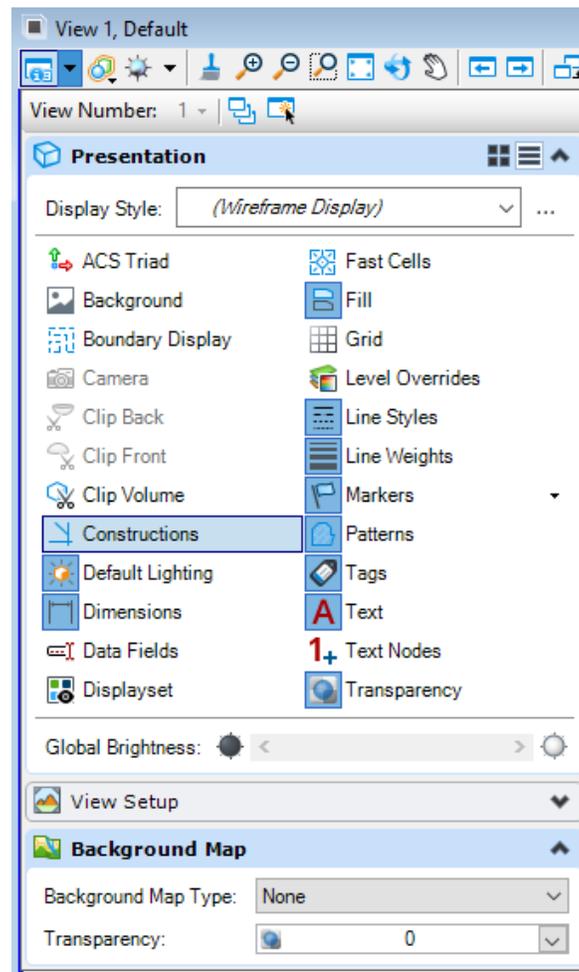
- Select **Draw Stripes** and select the Edge of Pavement and left click to the outside.
- Click **Draw Stripes** and select the EOP along the arc and left click to the outside. Your drawing should look like below.



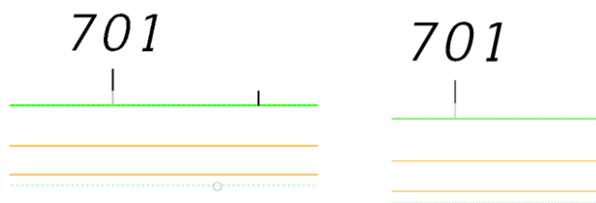
- If you select the new pattern and look at the properties, you will see the pay item information as shown in the image below.



12. Select the **View Attributes** button  and turn on constructions to see the construction linework in the drawing (or press F7).



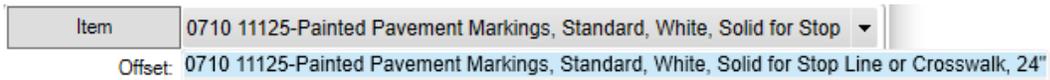
13. Using the same pattern and criteria as before select **Draw Stripes**.
14. Near the Traffic Median is a green line representing the EOP, select the line and left click below the line for placement.
15. The drawing should look like image below, save your file before continuing.



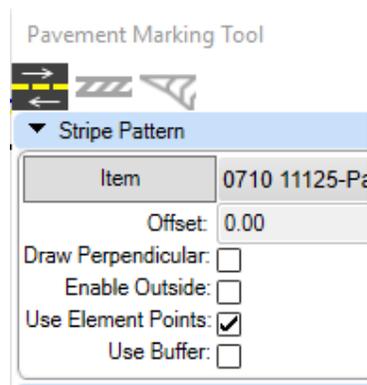
Exercise 6.9 Place a 24" Stop Bar

In this exercise, the user will place a 24" stop bar at the intersection using a construction line as a reference. Make sure Construction Lines are turned on and zoom to the intersection around Station 701+00.

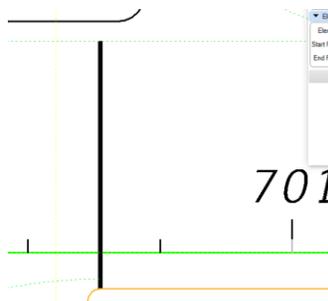
1. Continue working in the *DSGNP01.dgn* drawing.
2. Open the Pavement Marking tool.
3. Select the Item button and browse to the following and select it.



4. For Offset enter 0. Match criteria as shown below.

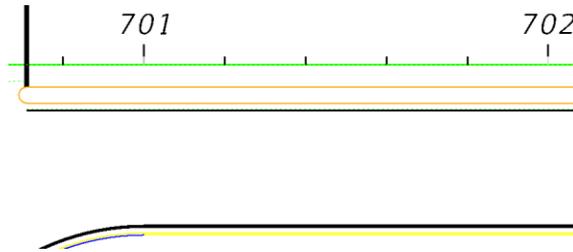


5. Select Draw Stripes and pick the Construction Line representing the Stop Bar and Left Click anywhere on the screen.
6. Drawing should look like image below.
7. Save your file before Continuing.

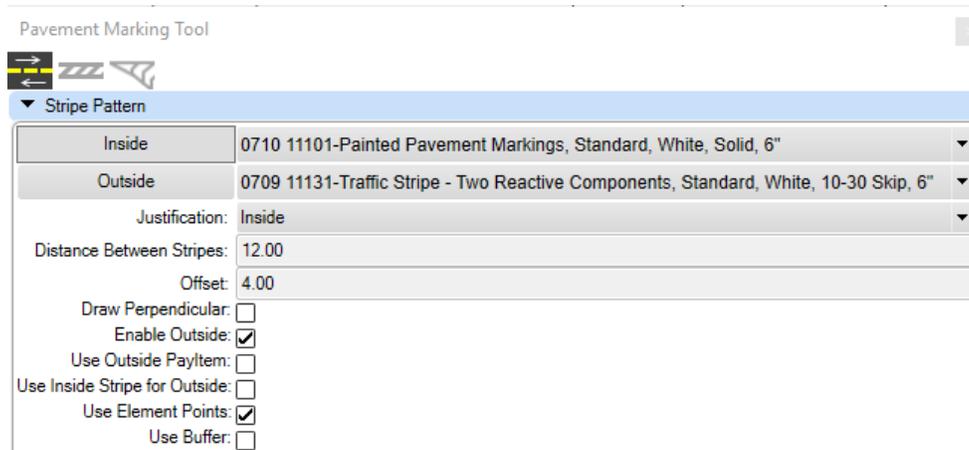


Exercise 6.10 Place Two Different Patterns

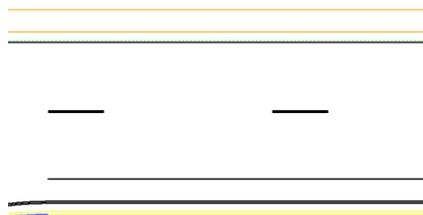
In this exercise, the user will place two patterns, one representing the Bike Lane and the other a 10/30 Skip pattern for a lane line. Zoom to the area shown below.



1. Continuing in the *DSGNP01.dgn* file.
2. Open the Pavement Marking tool if not open.
3. Browse to the patterns for inside and outside as shown below.
4. Toggle on **Enable Outside**.
5. Match all criteria as shown.



6. Select **Draw Stripes** and pick the EOP pattern that was placed in an earlier exercise.
7. Left Click in the Roadway side to place patterns.
8. Save your drawing before continuing. Your file should look like below.



Note If you are placing two of the same patterns you can toggle Use Outside Stripe for Outside to copy the pattern to the Outside List without having to browse the database.

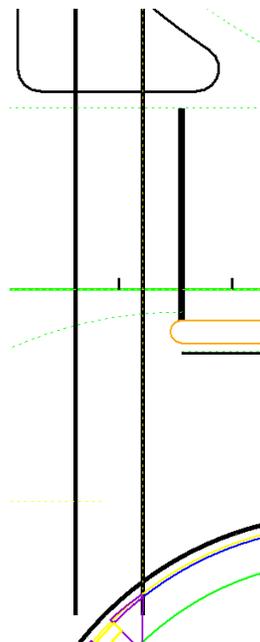
Exercise 6.11 Place and Edit a Crosswalk

In this exercise, the user will place two crosswalk patterns at the intersection using construction lines as a reference. Zoom to the area near the intersection.

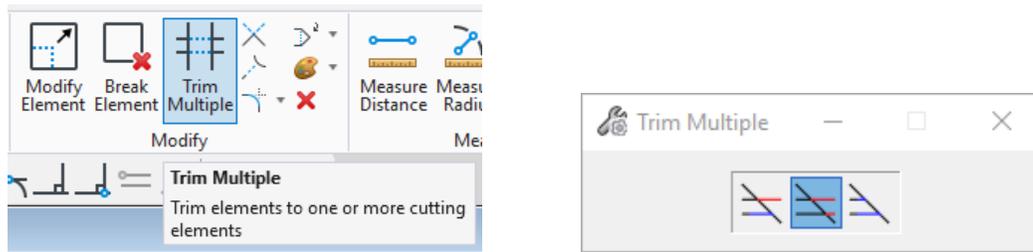
1. Continuing in the *DSGNP01.dgn* file.
2. Open Pavement Marking tool if not already open.
3. Select the inside button and browse to the **0710 11123** Pay item, which is a 12" solid white pattern.
4. For Justification select **Inside**.
5. Distance between stripes should be **12**.
6. Toggle on **Enable Outside**.
7. Toggle on **Use Inside Stripe for Outside**, this copies the inside pattern and populates the Outside pattern with same.

| Pavement Marking Tool | |
|--------------------------------|--|
| | |
| Stripe Pattern | |
| Inside | 0709 11123-Traffic Stripe - 2RC, Standard, White, Solid, 12" |
| Outside | 0709 11123-Traffic Stripe - 2RC, Standard, White, Solid, 12" |
| Justification: | Inside |
| Distance Between Stripes: | 12.00 |
| Offset: | 0.00 |
| Draw Perpendicular: | <input type="checkbox"/> |
| Enable Outside: | <input checked="" type="checkbox"/> |
| Use Outside PayItem: | <input type="checkbox"/> |
| Use Inside Stripe for Outside: | <input checked="" type="checkbox"/> |
| Use Element Points: | <input checked="" type="checkbox"/> |
| Use Buffer: | <input type="checkbox"/> |

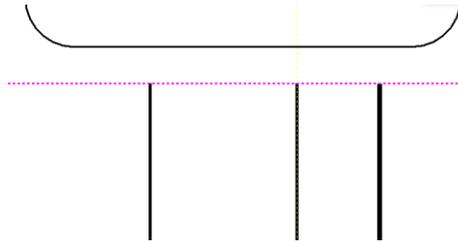
8. Select **Draw Stripes** and pick the yellow construction line representing the left side of the crosswalk.
9. Left Click anywhere on the screen. The drawing should look like below.



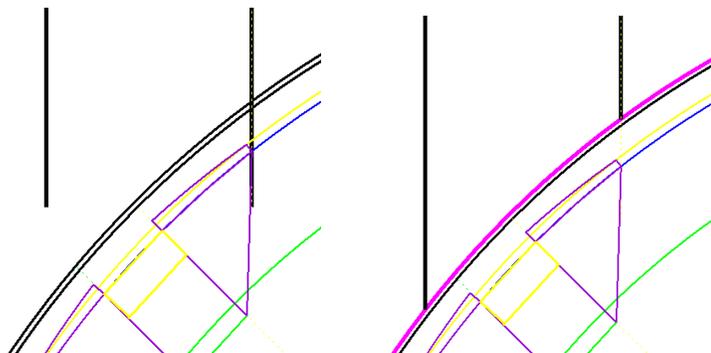
10. Now we have a little clean up to do Trimming and extending on both sides of the crosswalk pattern. First let's focus on the pedestrian median at the top of the intersection. Switch to the **Drawing Ribbon** and select **Trim Multiple**.



11. Select the construction line representing EOP and pick the two crosswalk lines.



12. Next pan to the HC Ramp on the other side. You will need to trim one side and extend the other side to the EOP that you placed earlier.



13. Using the Trim Multiple command trim one side of the crosswalk.
14. Select the Trim to Element command and extend the left side to the EOP. Drawing should look like image above .
15. Save and Exit out of ORD.

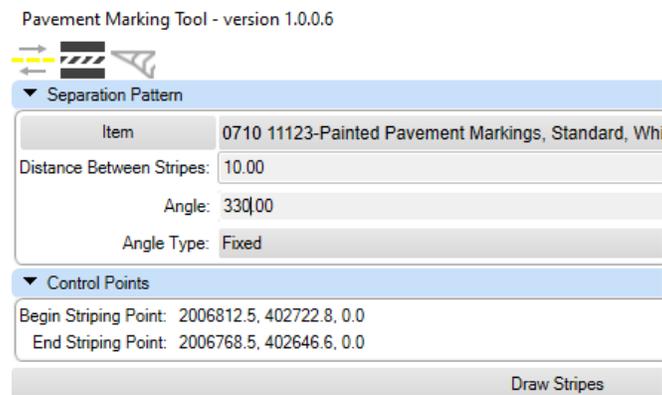
Exercise 6.12 Add Patterns Inside Cross Walk

In this exercise the user will use the Separation Mode in the Pavement Marking tool to place cross walk bars inside the previously placed cross walk.

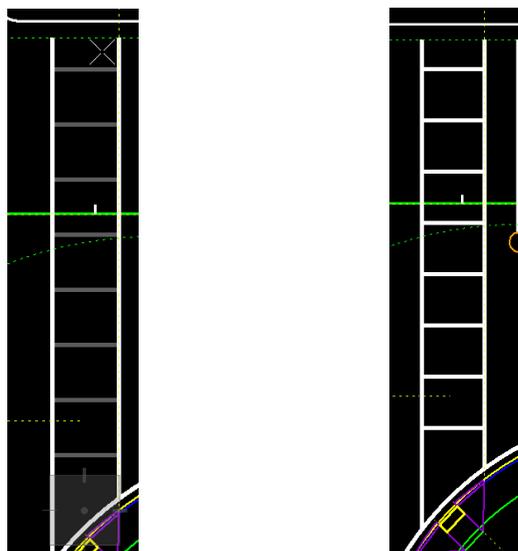
1. Continuing in the *DSGNP01.dgn* file.
2. Open Pavement Marking tool if not already open
3. Switch to the Separation Mode.



4. Select the Item button and browse to Pay Item 0710 11123 (12" Solid White for Crosswalk)
5. Make Selections as shown below.



6. Select Draw Stripes and select each side of the crosswalk, Left Click near the bottom to start the drawing process.
7. Drag your cursor along the inside from bottom to top (Notice the preview of Patterns).



8. Save the file before continuing.

PLACE CELL GROUP

OBJECTIVE

The objective of this chapter is to provide an overview of and place Cells using Place Cell Group.

OVERVIEW

This chapter demonstrates an application that helps to create a Pavement Marking set of plans. An Overview of the dialog and its behavior is below.

Place Cell Group- An application within the FDOT WorkSpace that is used to place cells along an element, such as painted messages, rpm's, Light Poles, and others. The application is located in the Traffic Plans panel on the FDOT Ribbon.



Place Cell Group - version 1.0.0.2

Cell Group

Save Pattern Load Pattern

Retro-Reflective Pz Offset: 0

Origin to Origin Upstream Spacing: 0

Thermo., Preforme Offset: 2

Origin to Origin Downstream Spacing: 0

Offset: 0

Location

Element Used for Cell Placement:
39493

Cell Placement Range:
Begin: 2006767.3, 402728.1, 0.0 Buffer: 100
End: 2006355.9, 402965.7, 0.0 Buffer: 0

Spacing and Angle:
Spacing: Once 40
Angle: Relative 0

Justification:
Cell: Center Cell

Draw Pattern

CELL GROUP

Save Pattern/Load Pattern – This function allows the user to save a one, two, or three pattern cell(s), this is mainly used for painted pavement messages. The saved pattern contains the pay item data that it was created with, when recalled the user can place the pattern without having to browse through the database.

Cell Selection with Preview – The default active cell is the center, the top and bottom contain toggle buttons to make them active also. The red button allows the user to browse the database for the desired pattern. A preview window is supplied showing the selected cell. The user must enter in an offset distance from the selected element. When the top and bottom cells are active there is an additional control that becomes active, the Upstream and Downstream spacing, which controls the distance (measured from center to center of cells) between the pavement messages.

LOCATION

Element Used for Cell Placement – This provides information on the source element used for cell placement.

Cell Placement Range – This provides information on the source element such as station values if element is an alignment. If it is not an alignment the information is the begin and end coordinates. The buffer controls allow the user to place cells at any starting or end point along the source element.

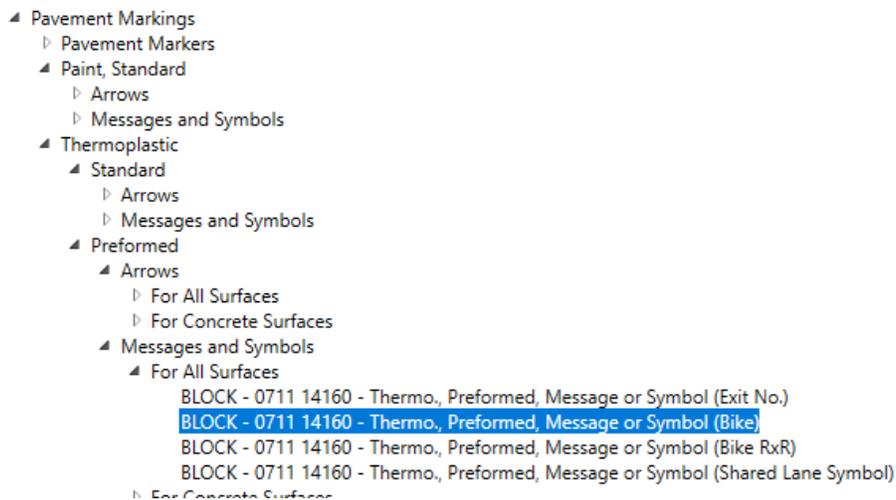
Spacing and Angle – The user can control whether the cells can be placed once or incrementally along the source element. The angle control allows options of Relative, Absolute, and Perpendicular. If you change the spacing to increment the data box becomes active allowing the user to enter a spacing distance for the cells, mostly used for RPM's.

Draw Pattern – This starts the placement process, which will ask the user for a source element to place off of. When placing there is a preview of how the placement will look, if it isn't right the user can change parameters until the preview looks correct. Left click when you are ready to actually place the cells.

Exercise 6.13 *Place Painted Pavement Message*

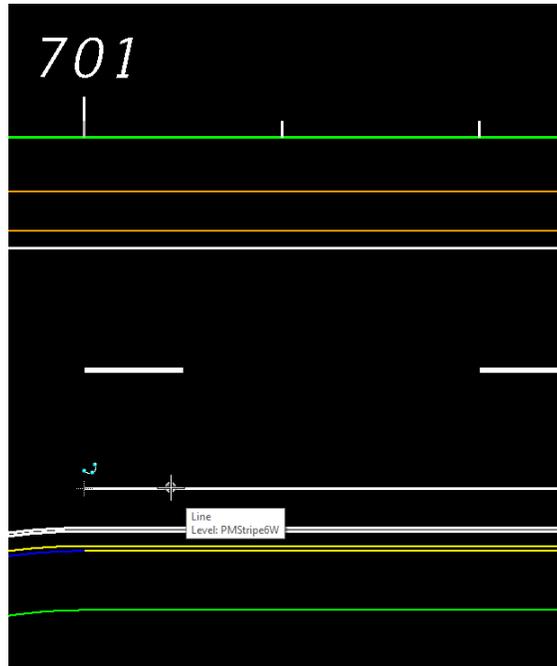
In this exercise the user will place a Bike Symbol in the Bike Lane

1. Continuing in the *DSGNP01.dgn* file.
2. Open Place Cell Group if not already open
3. Select the Red Browse button on the middle cell section.
4. Browse to Pay Item 0711 14160 (Bike Symbol) as shown below.

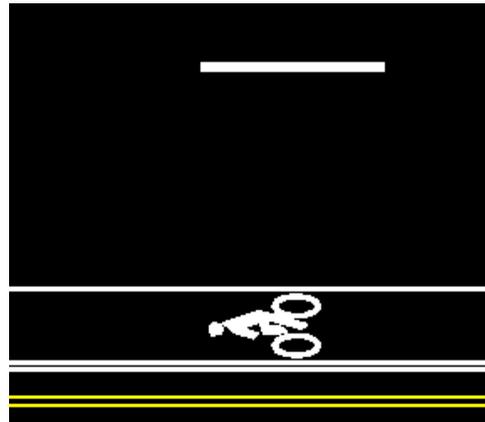
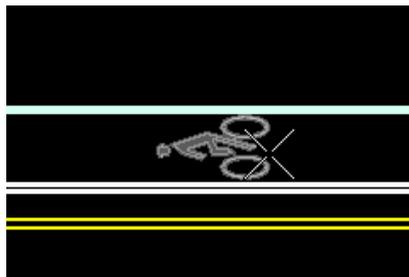


5. Change the Offset to 2.
6. For Spacing select **Once** and for Angle select **Absolute** and enter value of **180**.

7. Select **Draw Pattern** and select either pattern representing the bike lane as shown below.



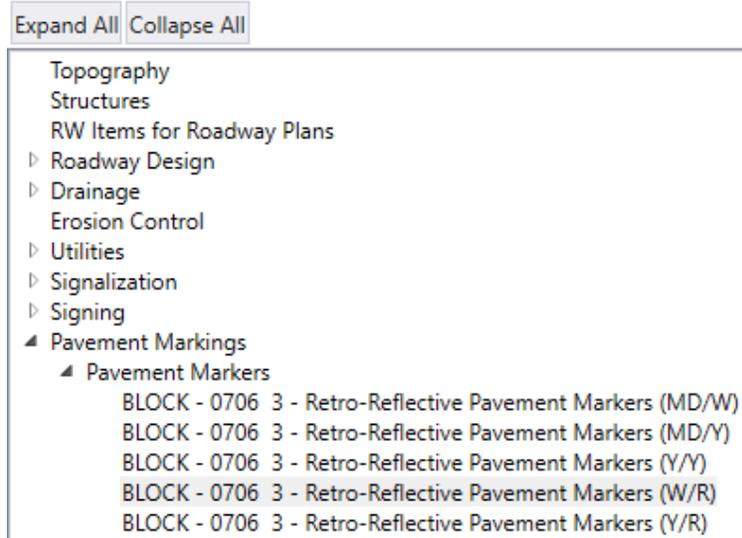
8. The symbol appears at your cursor and you can drag it along the bike lane to desired location and left click for placement.



Exercise 6.14 Place RPMs

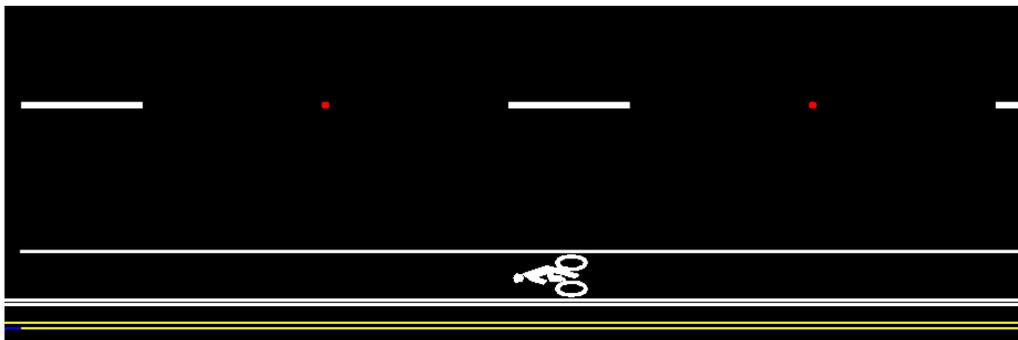
In this exercise the user will place a White/Red rpm along a 10/30 skip pattern.

1. Continuing in the *DSGNP01.dgn* file.
2. Open Place Cell Group if not already open
3. Select the Red browse button and browse to pay item 0706 3 W/R rpm. You may need to collapse all to find the rpm easier.



4. Enter 0 for the offset distance.
5. Spacing should be **Increment** and **40** for the distance between each.
6. Angle should be **Relative**.
7. For Cell Placement Range enter **25** in the Begin Buffer box, this will start the placement starting 25' from the beginning of the pattern.
8. Select **Draw Pattern** and select the 10/30 skip we placed earlier, notice the preview of the rpm's.
9. Left Click for final placement.

Drawing should look like image below.



LIGHTING PLANS

OBJECTIVE

The objective of this chapter is to provide an overview of applications that exist to aid you in creating Lighting Plans.

OVERVIEW

This chapter demonstrates several applications that help to create a Lighting Plan:

- **Place Cell Group**- An application within the FDOT WorkSpace that is used to place cells, such as light poles.
- **Draw Conduit** – an application to draw conduit for lighting and signal plans that contain the appropriate pay item data.

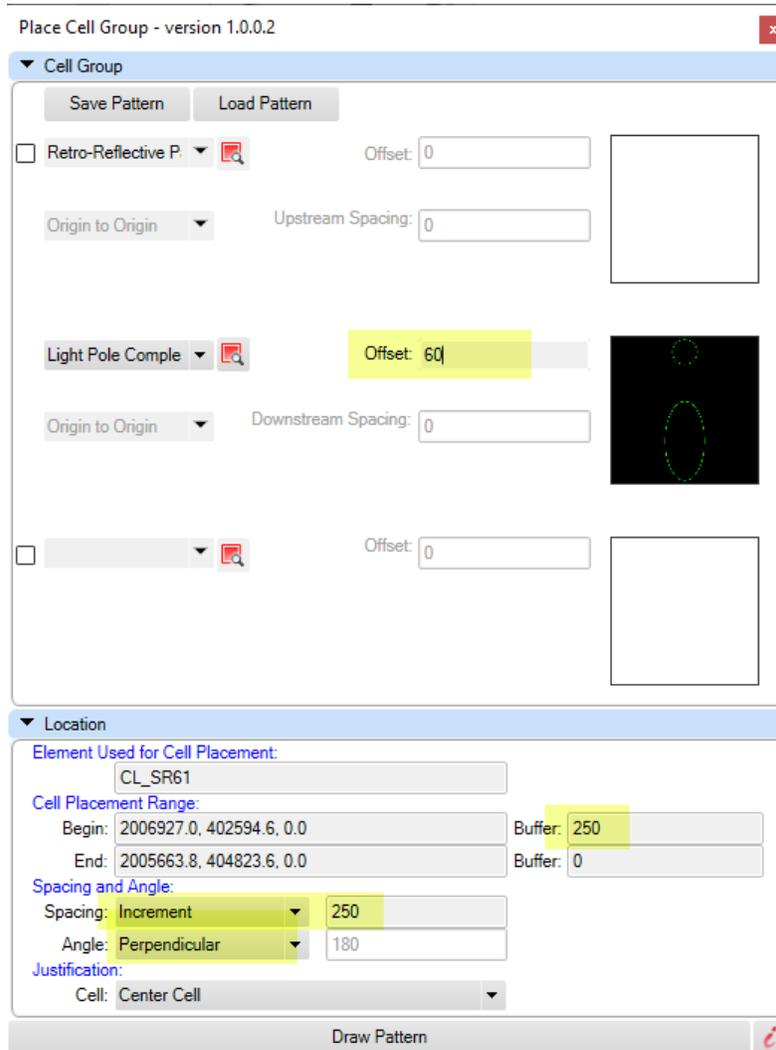
Exercise 6.15 *Placing Light Poles*

In this exercise the user will place Light Poles using the Place Cell Group application. If you need an overview of Place Cell Group refer to the previous chapter.

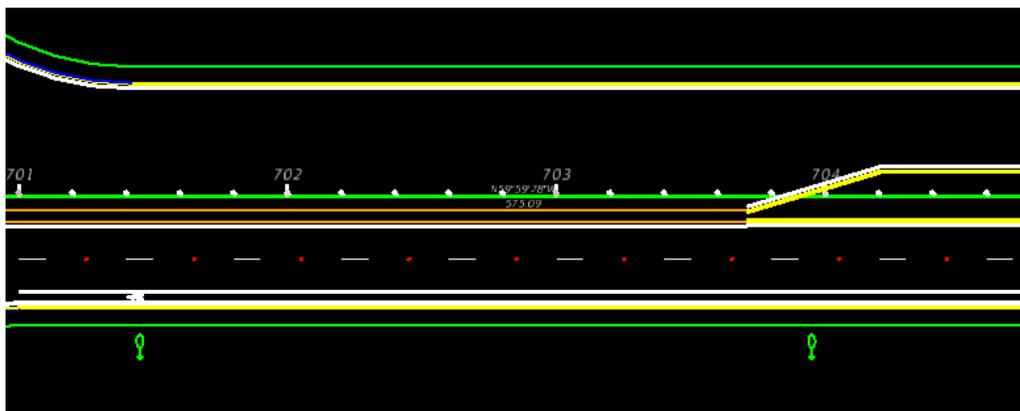
1. Continuing in the *DSGNSP01.dgn* file.
2. Open Place Cell Group if not already open
3. Select the Red Browse button and browse to pay item 0715 4 13.



4. Make the selections as shown below.



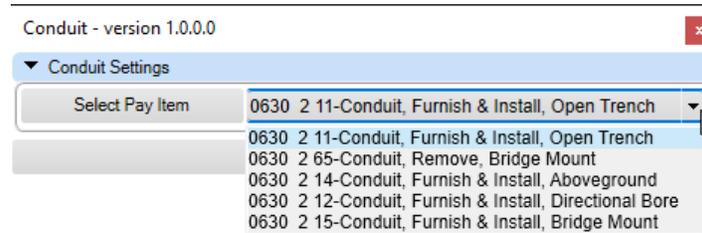
5. Select **Draw Pattern** and select the Alignment, notice the preview of the proposed placement. You can adjust the criteria and the preview will update. Left Click on the Bike Lane side of the Alignment.
6. Your drawing should look like below.



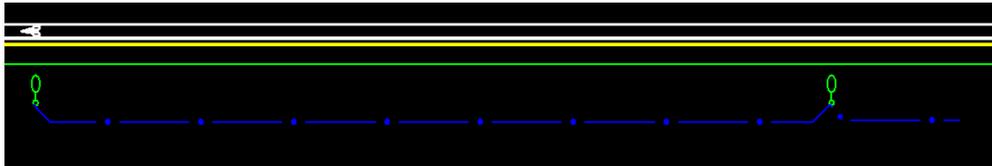
Exercise 6.16 Draw Conduit Tool

In this exercise the user will draw conduit between light poles. Located in the Traffic Plans panel is the Draw Conduit tool. The tool draws different types of conduit complete with the correct symbology including pay item numbers.

1. Continuing in the *DSGNP01.dgn* file.
2. Open **Draw Conduit**
3. The dialog box is very simple and has two functions, select conduit and draw conduit.



4. Using the pulldown, select the 0630 2 11 Conduit in the list.
5. Select **Draw Conduit**
6. Draw freehand to the points as shown below, left clicking at each point.



7. If you select the conduit and look at the properties, you will see the following pay item information



7 GEOTECH, UTILITIES AND DRAINAGE MODELING WORKFLOW

GEOTECHNICAL (GINT)

OBJECTIVES

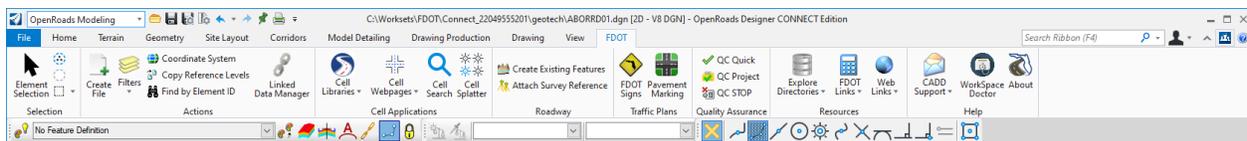
load gINT data in 2d models (mapping workflow for drilling plan creation and preliminary studies) as well as in 3d for subsurface interpretation and BIM workflows.

- Become familiar with the Geotechnical workflow
- Learn the gINT interface
- Import gINT data from a dataBase

EXERCISE OVERVIEW – GEOTECHNICAL (GINT)

- 7.1 Create and Setup the ABORRDXX.dgn for the Import of a gINT Database
- 7.2 Setup the Borehole Tab
- 7.3 Create and Setup the Lithology Tab

Exercise 7.1 *Create and Setup the ABORRDXX.dgn for the Import of a gINT Database*

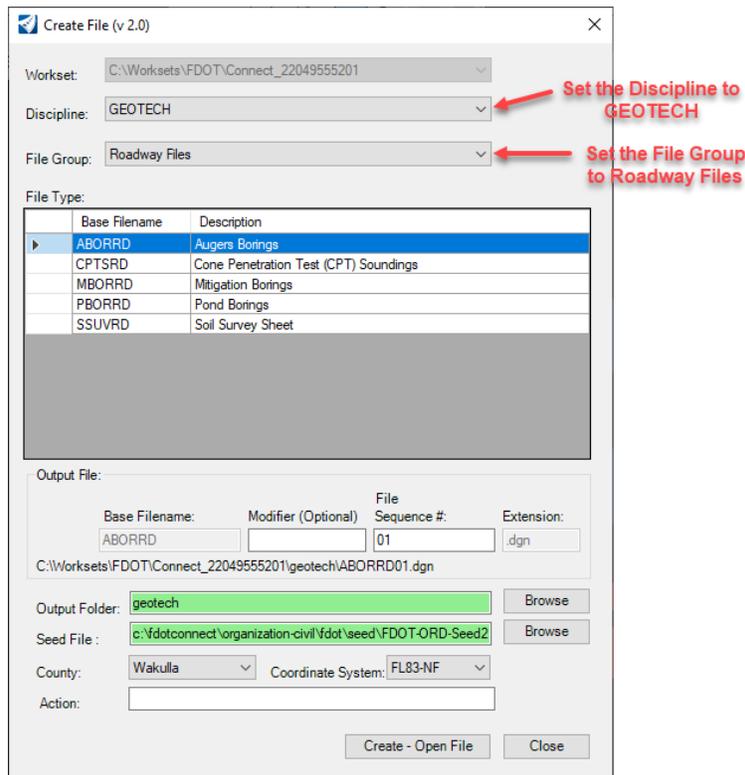


1. Navigate to FDOT Ribbon Tab of the OpenRoads Modeling WorkFlow looking for the Actions Group click on the **Create File** tool.

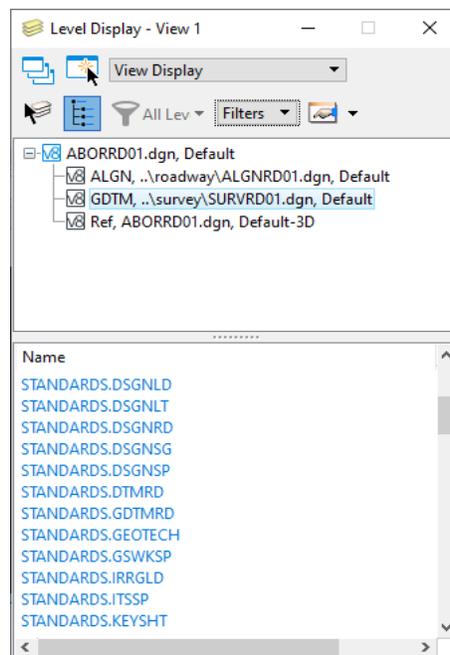
OPENROADS MODELING>FDOT>ACTIONS>Create File

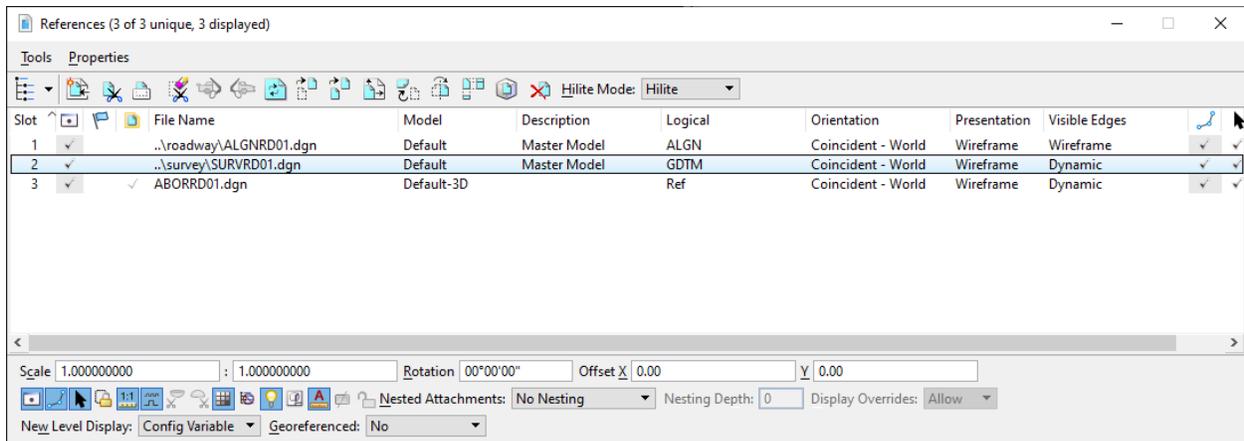
2. Create a **ABORRDXX.dgn** file with the dialog as shown below. Note your numbering may be different depending on how many files have been created.

3. Be sure you set and check the county to set the correct coordinate system. Once all settings have been verified click the **Create-Open File**.



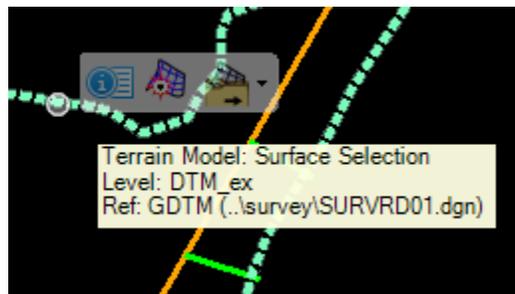
4. Once the *ABORRD01.dgn* file displays, click **Close** to close the **Create File** tool.
5. Using the function key (F9) to open your **Reference** dialog, attach the *ALGNRD01.dgn* from the WorkSet. Also attached the *SURVRD01.dgn* from the current project and give a logical name of **GDTM** to the *SURVRD01.dgn* file
6. Using **Level Filters** from the **Level Display** dialog click the filter for **GDTM**. The **Level Display** dialog may be opened using the function key (F10).





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

- Once levels are set in the SURVRD file to display the existing ground, set the **Terrain Active** by selecting the *boundary* to bring up the Context Menu, then 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.

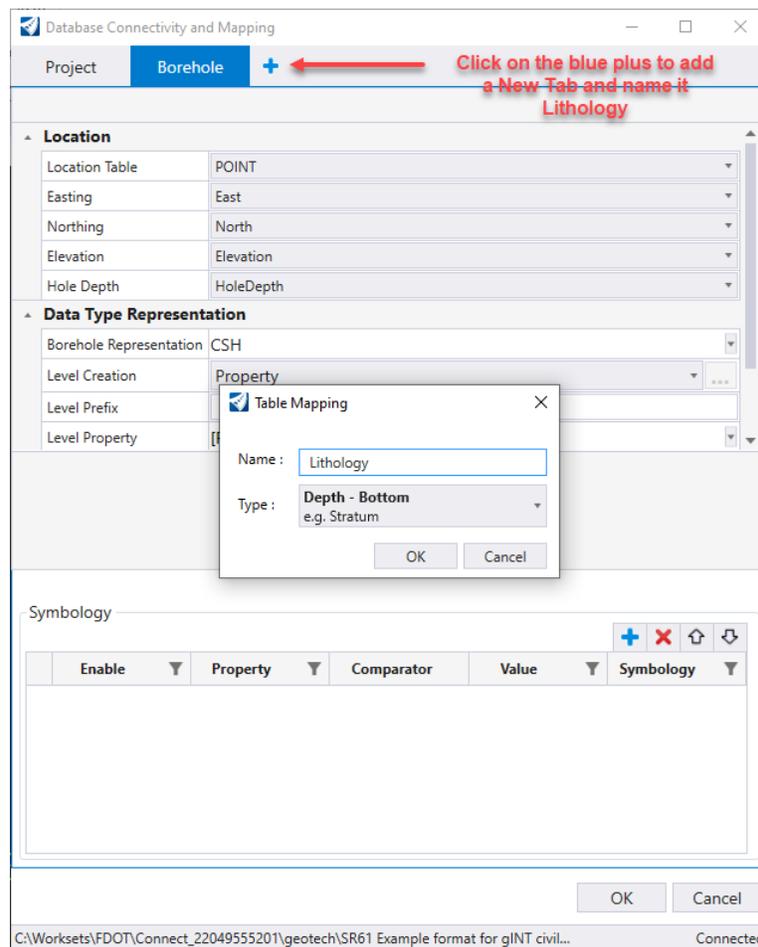
Exercise 7.2 Setup the Borehole Tab.

1. Switch the OpenRoads Modeling Workflow to the Geotechnical Workflow to make the gINT tools available.



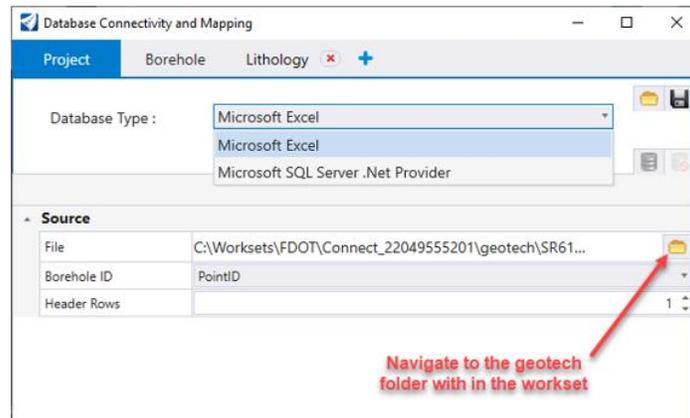
2. From the ribbon tab select the *gINT Projects* tab, then from the *Connectivity Group* select the **Database Connectivity** button.

GEOTECHNICAL>gINT PROJECTS>**CONNECTIVITY**>Database Connectivity

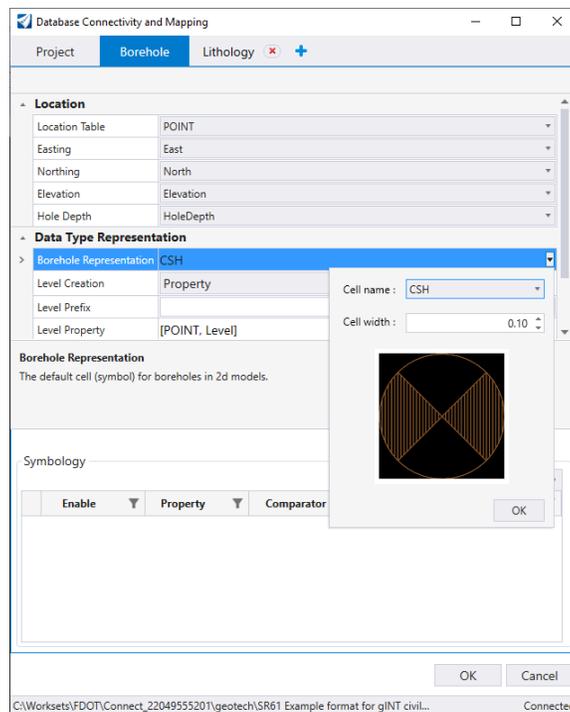


- PROJECT tab sets the type of database file to be used.
 - BOREHOLE tab defines the table name and different columns for the points.
 -  Plus icon allows the user to create a new Tab. (Used later to create a Lithology tab.)
3. Select the **Project** tab from the Database Connectivity and Mapping dialog and change *Database Type* from the default, *Microsoft SQL Server.NET Provider*, to **Microsoft Excel**.
 4. Click on the *Folder* icon under *Source* to locate the excel spreadsheet, **SR61 Example format for gINT civil tools**, located in the *Geotech* folder of the workset.

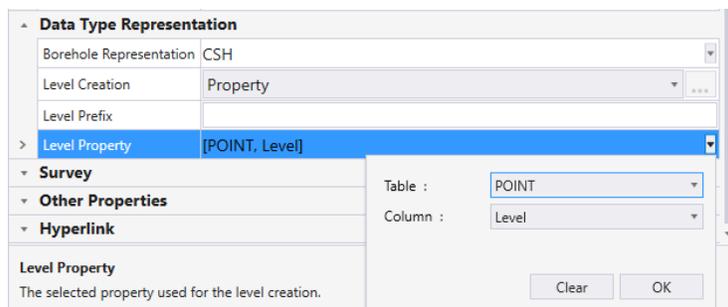
- Next select a name for the *Borehole ID*. This will be the **PointID** column from the spreadsheet.



- Navigate to the *Borehole* tab to set the properties to display boreholes in the 2D view (Default model). The *Location* drop down should fill from setting the Project tab.

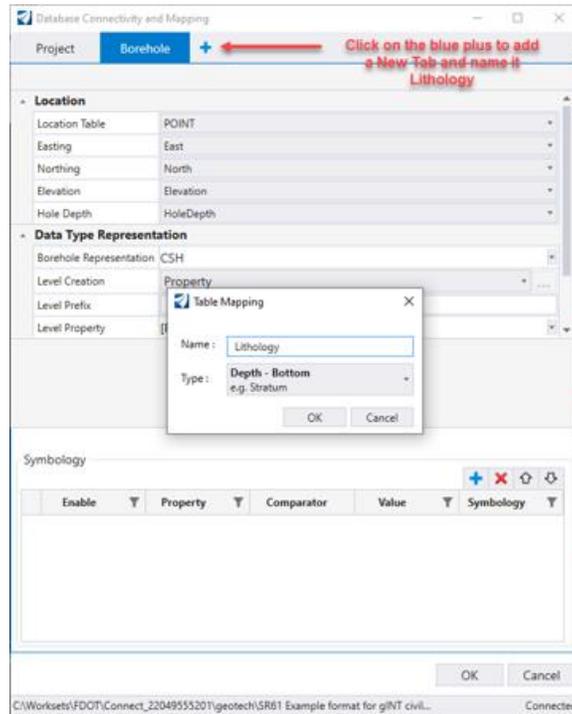


- The first step is to select a cell to represent the Borehole. From the *Geotech* cell library select the **CSH** cell and set a *Width* to **0.10**.
- Next from the *Level Creation* dropdown, set to **Property**. From the *Level Property* dropdown, set the table to **POINT** and column to **Level**.

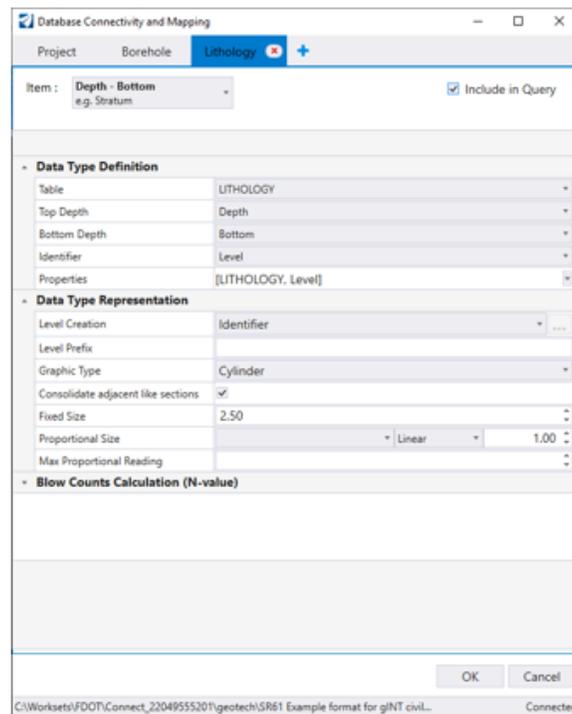


Exercise 7.3 Create and Setup the Lithology Tab

1. Click on the blue **Plus** to add a tab to the Database Connectivity and Mapping dialog and name it **Lithology**. Accept the default *Type* of **Depth- Bottom**.

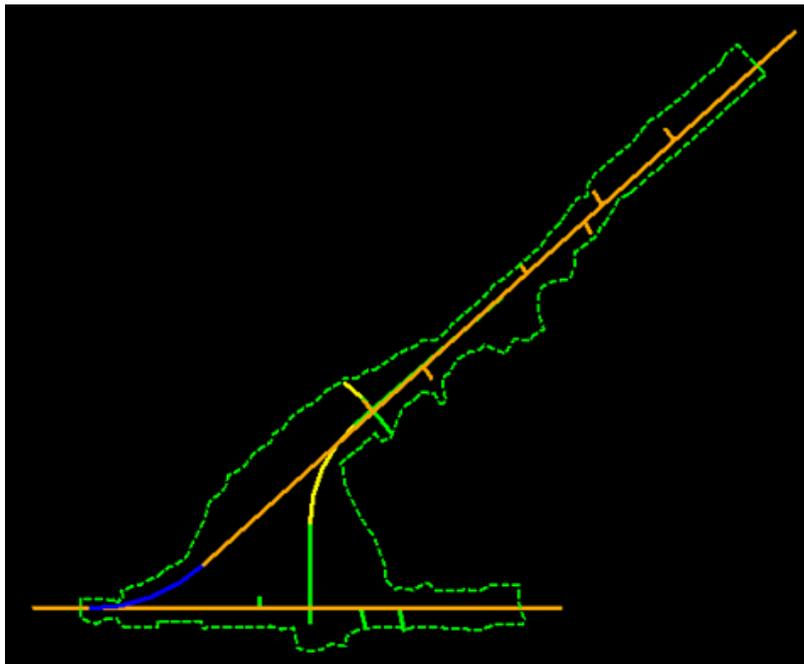
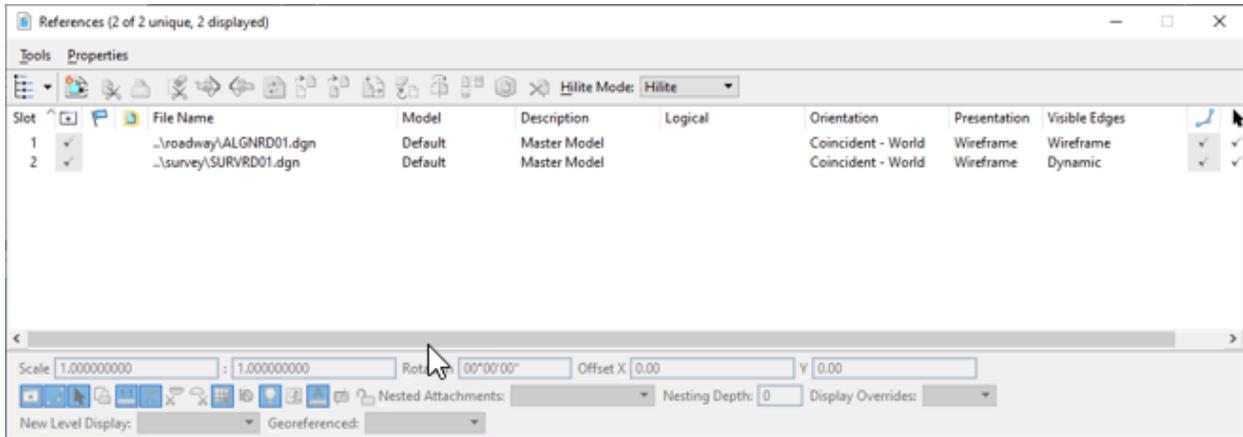


2. Set the new LITHOLOGY tab as the screen shot below.



3. Click the **OK** on the Database Connectivity and Mapping dialog.

4. To set ABORRD01.dgn up with a *Default View* and a *3D View* select the Function key (F2) <OR> use the right-click and function with the mouse.
5. Select **View** to make it your active view. Select the **Query All** button to display the information for the Boreholes. Repeat this step for the *3D View*.



UTILITIES

OBJECTIVES

Exercise 7.4 Drainage Modeling

SUBSURFACE UTILITY DESIGN & ANALYSIS (SUDA)

Exercise 7.5

8 QUANTITIES WORKFLOW

QUANTITY TOOLS FOR FDOT CONNECT

OBJECTIVES

This section will discuss the tools that are currently in development to extract quantity information from the design model in the Open Roads Designer FDOT Connect workspace.

In this chapter, the following topics will be covered:

- Item Types and Features
- Asset Manager
- Linked Data Manager
- MicroStation Reports

OVERVIEW

Quantity tools are still in development. This lesson will cover the processes that are currently expected to be part of the Quantities Workflow. All methodologies are subject to change.

ITEM TYPES

WHAT ARE ITEM TYPES?

- Much like AdHoc values in previous versions, Item Types in ORD are tags of meta information attached to a MicroStation element.
- For the Automated Quantities workflow, we will use the Item Types to apply pay item quantity information.

ARE THERE LIMITATIONS TO HOW ITEM TYPES MAY BE APPLIED?

- For now, Features will only support one Item Type per Feature.
- Item Types applied with Features do not currently read Alignment for Station and Location information.
- Asset Manager may be used to apply additional item types to a MicroStation Element and can read 2D Station and Location.

ASSET MANAGER

Asset Manager is an application being developed by Bentley that provides additional tools for organizing and applying Item Type information.

- Allows alignment values (station/offset) to be attached to item type data
- Allows multiple item types to be applied to a single MicroStation element
- Uses Excel files for database organization and management
- Provides a method for project-specific item type data to be applied and saved
- Technology preview (still in development)

REPORTS AND SUMMARY OF QUANTITIES

Traditional plan sets (11x17) will include the Summary of Quantities tables as plan sheets.

- Use Linked Data Manager to attach table
- Tables completed manually or may be semi-automated by copying data from MicroStation reports

Next-gen plans with large format sheets and reduced plan sets will provide the Summary of Quantities in a separate pdf report.

- MicroStation reports will generate raw quantity reports
- FDOT tool (in development) will combine and format raw reports into a single bookmarked pdf to be included with the project delivery

Exercise 8.1 Explore Item Types

1. From the FDOT Connect desktop folder, double-click the ORD FDOT-Roadway icon to launch Open Roads Designer with the FDOT Connect workspace.
2. Next, select the FDOT WorkSpace and the 22049555201_CE WorkSet.

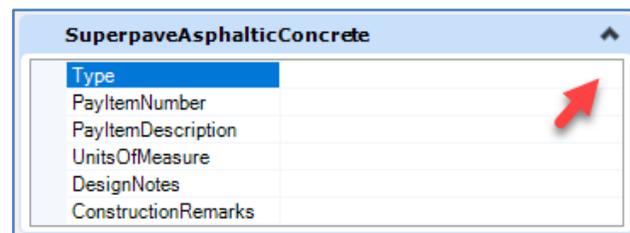
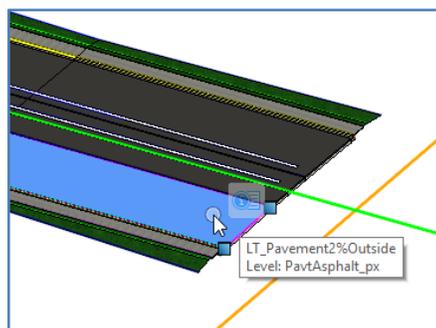


OpenRoads Designer CONNECT Edition

FDOT ▾ 22049555201_CE ▾

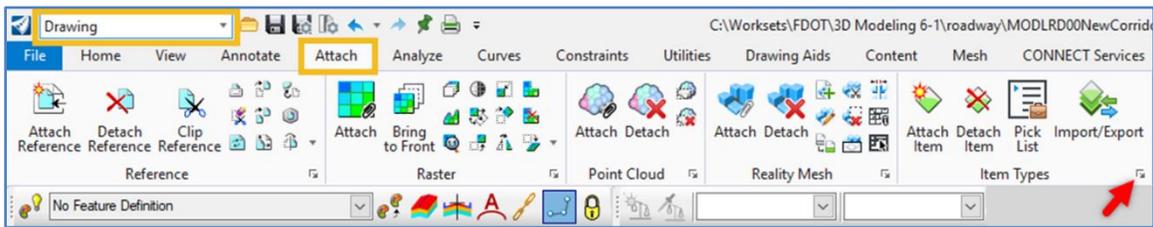


3. Choose the Browse button, navigate to the Roadway folder and choose the *MODLRD_AQT-NewCorridor.dgn*.
4. Zoom in to the end of the corridor in the 3D view, select an element of 3D mesh, and review the Item Type properties. (Note that the field for "Type" should be a pull-down option, but it is not working.)

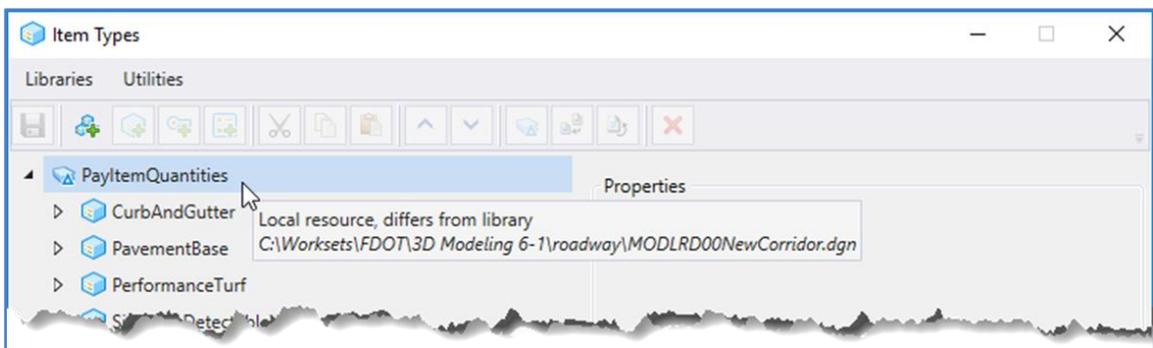


Note To correct this, we'll need to take a closer look at the Item Types library.

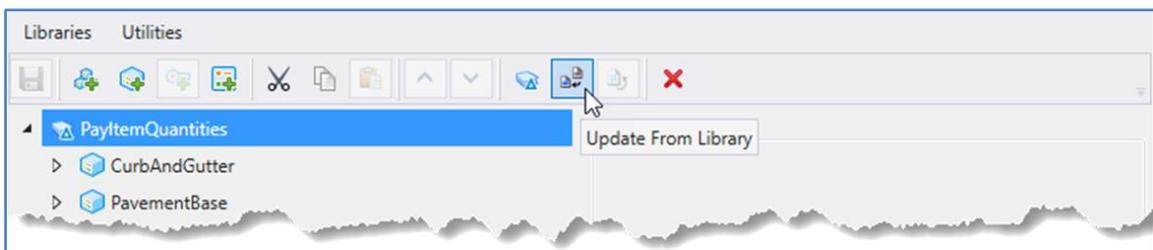
- In the top left corner select the Workflow pull-down and change it to the Drawing Workflow. Then select the Attach ribbon tab and click the flyout button in the bottom right of the Item Types tool group.



- In the Item Types dialog, hover over the PayItemQuantities category and note that the local resource does not match the dgn library.

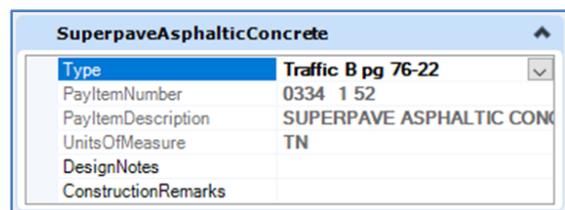
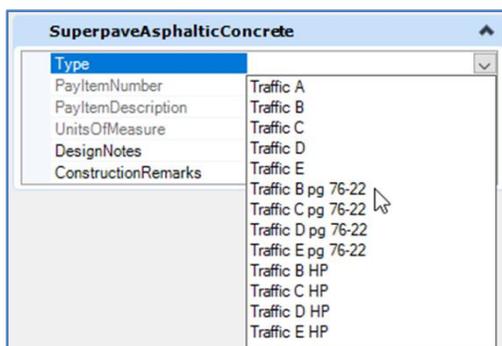


- Select the PayItemQuantities category and note the tools that activate. Choose the tool to Update From Library and click OK.



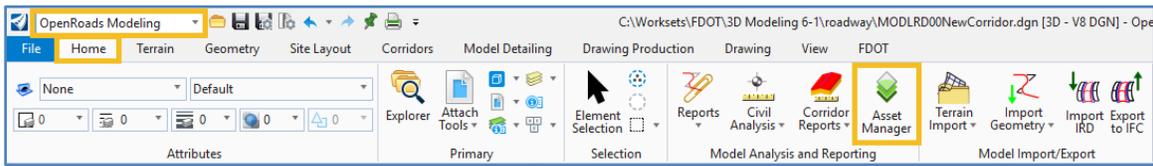
- Close the Item Types dialog and return to the 3D view. Review the Item Types properties of a 3D mesh and note that now clicking in the field by "Type" will activate a pull-down of options within the Item Type for that element.
- When an option is selected, the other data is populated with the corresponding pay item information. Design Notes may be entered in this field and will be attached to the element.

Note You can use level display and selection sets to select and set groups with the same Item Types.



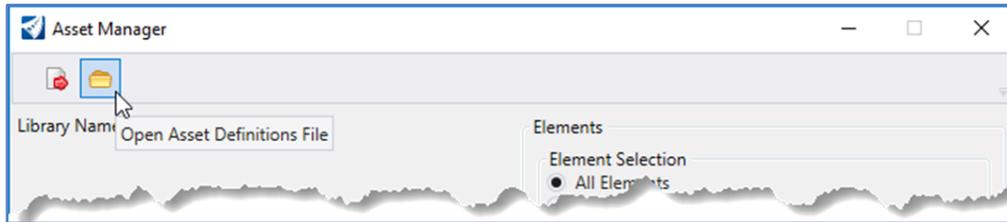
Exercise 8.2 Explore Asset Manager

1. Select the OpenRoads Modeling Workflow, and the Home ribbon tab, then find the Asset Manager tool.



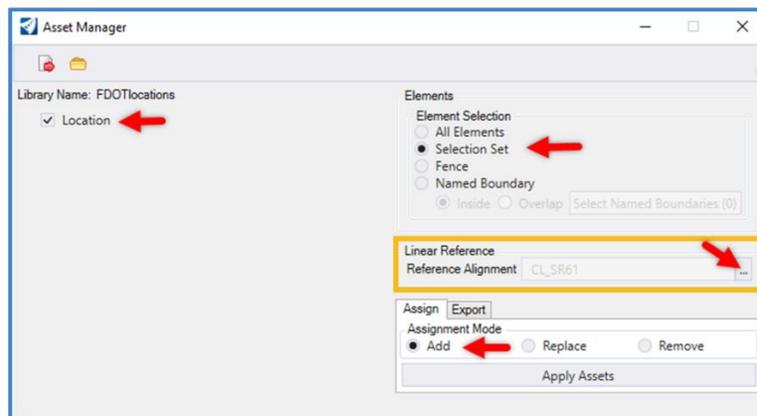
2. In the Asset Manager dialog, we'll need to attach a Definitions File.

C:\FDOTConnect\Organization-Civil\FDOT\Asset Manager\FDOTLocations.xml



3. In the dialog box, set the following information:
 - a. Check Location
 - b. Set Elements to Selection Set
 - c. Select Alignment*
 - d. Set Assignment Mode to Add
 - e. Create a selection set of elements, then click Apply Assets

* Asset Manager cannot currently locate the alignment in the 3D view. For demonstration purposes, we can attach the 2D alignment to the 3D view, then select it. For now, the location values will not show. This is expected to be corrected in future ORD releases, or an alternative method of identifying location data will be developed.



4. Note that there is now a new Item Type for Location in the properties of the elements that were in the selection set.

| SuperpaveAsphalticConcrete | |
|----------------------------|----------------------------|
| Type | Traffic B pg 76-22 |
| PayItemNumber | 0334 1 52 |
| PayItemDescription | SUPERPAVE ASPHALTIC CONCRE |
| UnitsOfMeasure | TN |
| DesignNotes | |
| ConstructionRemarks | |
| Location | |
| Start Station | |
| End Station | |
| Start Offset Side | |
| End Offset Side | |

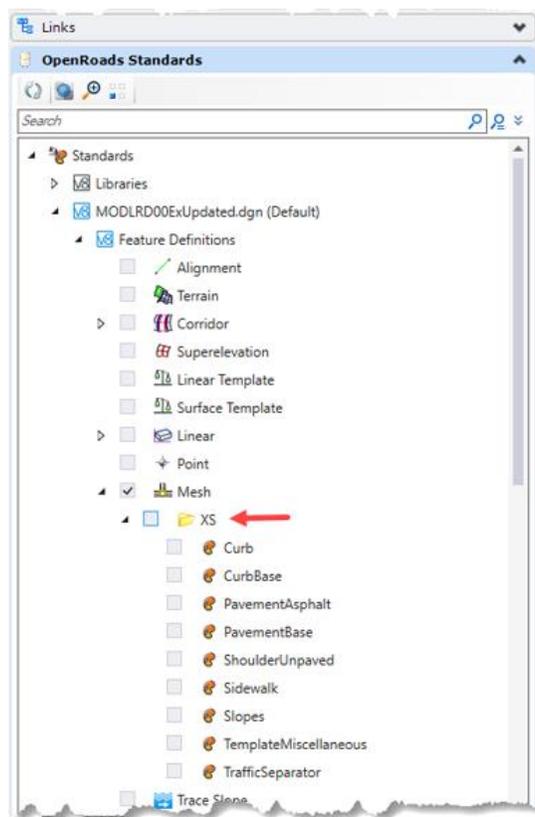
Exercise 8.3 Updating an Existing Design

Projects that already in the design phase will need to be updated to apply features with item types.

Note Bentley has indicated future provisions for an option to update Features from dgnlib that may make the update a simple process.

For this exercise, we will use a file that has already had the features updated and review the process for applying the correct quantity information.

1. Select File > Open and Browse to the Roadway folder and open the file *MODLRD_AQT-ExistingUpdated.dgn*
2. Verify that the local Item Type resource is up to date with the dgn library.
(Drawing Workflow > Attach Tab > Item Types)
3. Minimize view 1 (2D) and expand view 2 (3D)
4. Turn off all reference displays
5. In the Explorer window, expand the OpenRoads Standards group, then expand Standards > *MODLRD_AQT-ExistingUpdated.dgn* (default) > Feature Definitions > Mesh > XS.



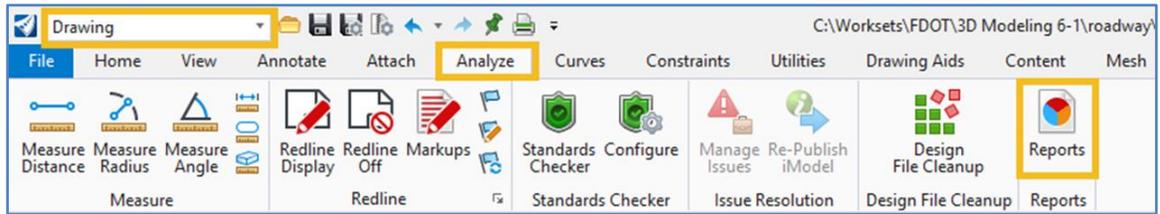
6. Uncheck the box for XS to uncheck all the mesh groups.
7. Turn on (check) each of the mesh groups, one at a time, then create a selection set of the items in that group.
8. In the properties display, the item type for each should appear.
9. In the Type field, click the pull down and select the correct type for the element selected.

Note Features have only been updated on the SR61 corridor.

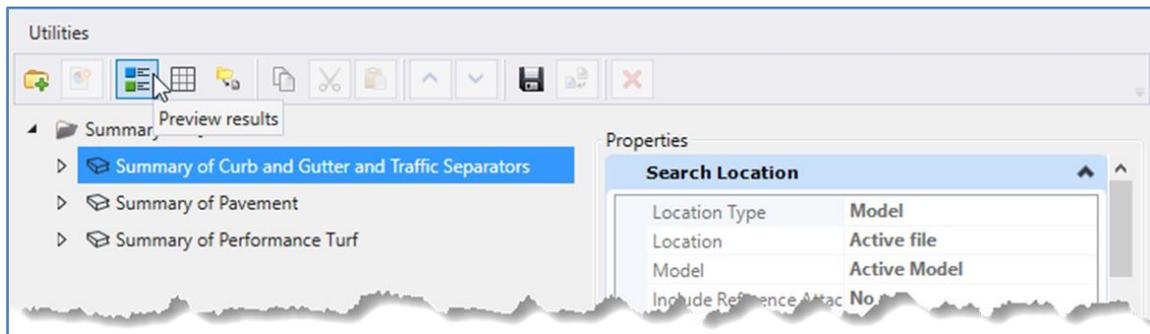
* Traffic separator in the corridor displays as one element. This will need to be addressed in the future to show appropriate start and end stations for the two separate pieces.

Exercise 8.4 Explore Reports

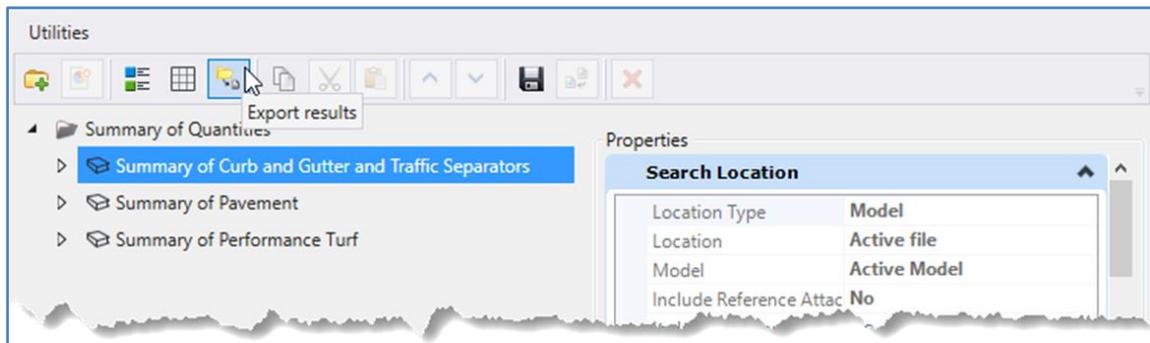
1. Continuing in the same file, in the Drawing Workflow select the Analyze ribbon tab, then select the Reports tool.



2. Select any of the formatted reports and preview the results.



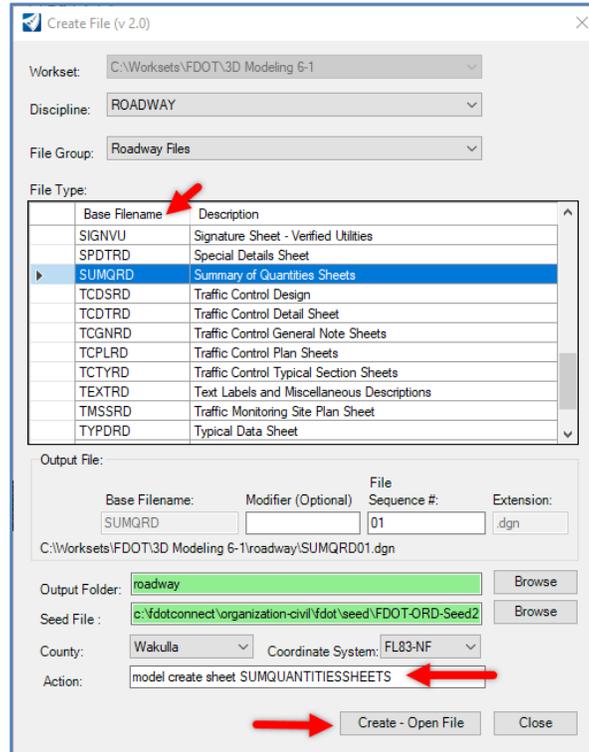
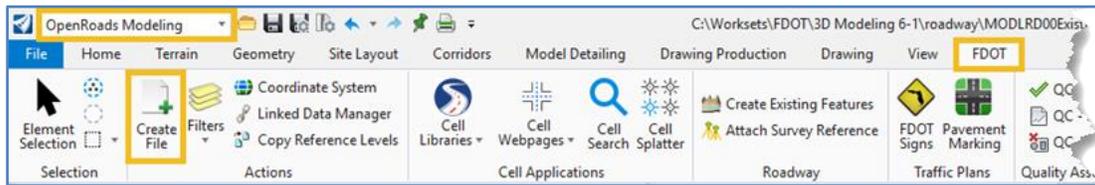
3. Results may be exported to an Excel spreadsheet and saved in the project Calculations folder.



4. Raw reports may then be used to copy data to an LDM template, or further processed into a bookmarked pdf report through a new FDOT tool (in development).

Exercise 8.5 Explore LDM in OpenRoads

1. On the OpenRoads Modeling Workflow > FDOT tab, select the Create Files tool.

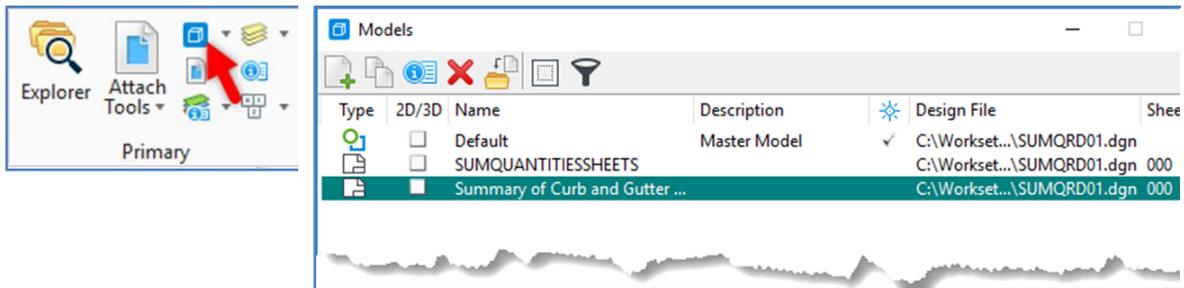


2. Sort by the Base Filename by clicking on the column header.
3. Select the SUMQGRD file.
4. Verify the output filename.
5. When the county is set, the coordinate system should update.

Note The action will create a sheet model in the new file.

6. When all settings are correct, click Create – Open File.
7. If prompted, select use active workspace.

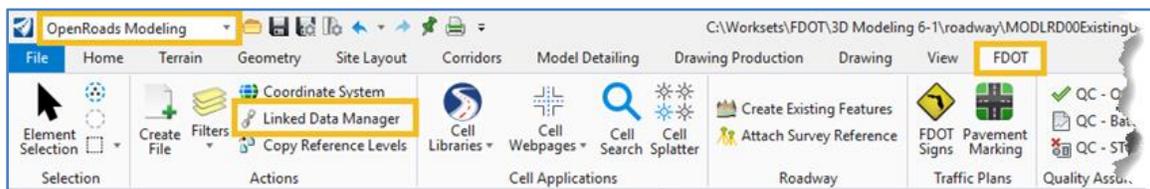
8. On the primary ribbon tab, open the Models dialog.



9. The SUMQUANTITIES SHEETS model may be copied as many times as necessary.

10. Each Summary Sheet will need its own model. Name models based on the name of the Summary table to be included on the sheet.

11. Locate and open Linked Data Manager.



12. Select Create New Link.



13. A partially filled template has been included in the dataset. Choose the Select existing file button and navigate to the project Calculations folder and attach the Summary_of_Curb_and_Traffic_Separators_Partial.xlsx

14. Set the Worksheet to Box1.

15. Check the remaining settings, click OK and place the table on the sheet border.

The image shows a 'Link Information' dialog box with the following sections and controls:

- Source File**
 - Buttons: 'Create New from Template' (with a plus icon), a file icon, a refresh icon, and a grid icon.
 - Source Path: A dropdown menu showing '.calculations\Summary_of_Curb_and_Traffic_Separators_Partial.xlsx'.
 - Description: A text input field.
- Excel Settings**
 - Worksheet: A dropdown menu showing 'Box1'.
 - Header Rows: A text input field showing '2'.
 - Width / Height: Two text input fields.
 - Offset X / Y: Two text input fields.
 - Use Title Cell: A checkbox.
- Graphics Settings**
 - Radio buttons: 'FDOT' (selected), 'Site', and 'Project'.
 - Standard: A dropdown menu showing 'Standard'.
 - Site: A dropdown menu.
 - Project: A dropdown menu with a refresh icon.
- Options**
 - Update Graphics on File Open: A checked checkbox.
 - Lock Graphics: An unchecked checkbox.
 - Use Print Area: An unchecked checkbox.
- Buttons**
 - OK
 - Cancel

Red arrows in the image point to the 'Create New from Template' button, the 'Source Path' dropdown, the 'Description' field, the 'Worksheet' dropdown, and the 'Header Rows' field.

9 OTHER ORD TOOLS

(Analyze Points, Civil AccuDraw, Aquaplaning, Sight Visibility, Reports, Labels)

ANALYZE POINTS

HEADING 3

Exercise 9.1 *Civil Accudraw*

HEADING 3

Exercise 9.2 *Aquaplaning*

HEADING 3

Exercise 9.3 *Sight Visibility*

HEADING 3

Exercise 9.4 *Reports*

HEADING 3

Exercise 9.5 *Labels*

HEADING 3

EXERCISE OVERVIEW

9.1

9.2

Exercise 9.6

1.

Exercise 9.7

10 EXPORT TO LumenRT

HEADING 2

HEADING 3

HEADING4

EXERCISE OVERVIEW

| | |
|------|------|
| 10.1 | |
| 10.2 | |

Exercise 10.1

- 1.

11 VIRTUAL REALITY DESIGN REVIEW

HEADING 2

HEADING 3

HEADING4

EXERCISE OVERVIEW

| | |
|------|------|
| 12.1 | |
| 12.2 | |
| 12.3 | |
| 12.4 | |

Exercise 11.1

- 1.