# FDOTConnect for OpenRoads Designer

# Civil Geometry COURSE GUIDE

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State of Florida

Department of Transportation

# FDOTConnect

## for

# OpenRoads Designer Civil Geometry

**Course Guide** 

2024

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

### **FDOTConnect**

for

### **OpenRoads Designer**

### **Civil Geometry**

#### **Description**

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

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

#### **Objectives**

- Use Civil Geometry Elements in the design file to calculate and define a proposed centerline of construction.
- Use Civil Geometry Elements in the design file to define the roadway features of the proposed design.
- Apply Civil Cells delivered within the FDOTConnect Civil Cell *Dgn* library.
- Use Civil Geometry Elements in the design file to define the vertical profiles of a proposed centerline.

#### <u>Audience</u>

• FDOT Roadway Designers and Engineers

#### Prerequisites

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

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#### **INTRODUCTION**

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

#### **EXPECTATIONS – WHAT THIS COURSE PROVIDES**

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





#### DOCUMENT STYLE

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

Item	Convention	Example
Menu names and com- mands	Bold (Names separated with > symbol)	<ul> <li>General form is Workflow (when applicable) &gt; Tab &gt; Group &gt; Tool</li> <li>File &gt; Open</li> <li>File &gt; Settings &gt; User &gt; Preferences</li> <li>OpenBridge Modeler (Workflow) &gt; FDOT &gt; Actions &gt; Create File</li> </ul>
Window actions	Bold	<ul> <li>Click the Apply button.</li> <li>Click the Graphic Select button to the right of the <i>Horizontal Alignment Include</i> box.</li> <li>In the Segment Type list, click Lines.</li> </ul>
Window field names	Italic	<ul> <li>Key in Hemfield Road in the Alignment Name field.</li> <li>Click the Graphic Select button to the right of the Horizontal Alignment Include field.</li> <li>In the Segment Type list, click Lines.</li> </ul>
Key-ins	Bold	• Key in <b>Hemfield Road</b> in the <i>Alignment Name</i> field.
File names	Italic	Open the file <i>Working Graphics.dgn</i> in the C:\Bent- ley Training\GEOPAK 101\Project Setup\Practice\ folder.
File paths	Underline	Open the file <i>Working Graphics.dgn</i> in the C:\Bent- ley Training\GEOPAK 101\Project Setup\Practice\ folder.
New terms or emphasis	Italic or Bold	<ul> <li>The Template Library contains <i>templates</i>, which represent typical sections of the proposed roadway.</li> <li>The user is not to utilize this tool.</li> </ul>

#### 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:

- <u>Surface.tin (i/o)</u> 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.
- <u>**Template Library.itl (i)**</u> 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/openr oads-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: <u>https://learn.bentley.com</u>

#### Bentley Product OpenRoads:

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

#### YouTube:

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

#### Production Support Office | CADD (CADD) Website:

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

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

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

https://www.youtube.com/channel/UCqbY8kqZuXp1pyYV6lIQwA

CIVIL GEOMETRY 11

#### **COURSE SUPPORTING FILES**

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

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

#### FDOTConnect PREDEFINED SETTINGS



#### **DESIGN FILE SETTINGS:**

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Active Angle	Station Settings		•	
Active Scale	Format	\$\$\$+\$\$.\$\$		
Angle Readout	Format Delimiter	+		
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	Focus Item Description			
	Select category to view.			
	Slope Format Slope Precision Focus Item Description Select category to view.	0.123 Percentage 0.123		

#### FDOTConnect WORKSPACE PREFERENCES:

Preferences (FDOT)			×
Category	Name for Disferences, Data ut Disferences		
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Language	Manipulator Settings	*	
Look and Feel Mouse Wheel Operation Position Mapping Rester Manager Reference Render Ribbon Spelling	Manipulator Size     25.0000       Normal Color     [0,0,255]       Piece Cnity Color     [128,255,255]       Selected in Property Pane Color     [128,255,255]       Selected Color     [0,192,0]       Manipulator Fort     Anial       Manipulator Fort     Anial       Manipulator Transparency     30.0000       Use Staded Manipulator     True		
Tegs	Survey Decorators	~	
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	Survey Locator	·	3
	For more options, click on the category list at left.		Ĩ
	Defaults <u>QK</u>	Cance	4

#### **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

Online Help	×
One Panda Device and all new divelop and the bala Mala survey have	internet.
connectivity.	internet
To view offline help, uncheck the "Use Online Help" option in the Prefe dialog (File > User > Preferences) from the Help Settings category.	rences
🗌 Do not display again	
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**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.

References (0 of 0 unique, 0 displayed)	- 🗆 🗙
Tools Properties	
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Function Key F10 – Toggles Level Display Dialog Open\Close.

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Function Key F11 - Toggles Explorer Dialog Open/Close.



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



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#### **FDOTConnect USER CONFIGURATION VARIABLES**

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#### FDOTConnect DESIGN AND 3D MODELING OVERVIEW



#### **GENERAL WORKFLOW AND CHAPTER OUTLINE**

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

#### **RECOMMENDED MICROSTATION SETTINGS**

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

#### LAUNCHING FDOTConnect FOR OPENROADS DESIGNER

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

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



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



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



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

Configuration	OpenRoads Designer CE
Examples Configuration	WorkSpace WorkSet FDOT * 0_WORKSET_TEMPLATE *
:: 🍃 Custom Configuration	Recent Fi Search
Manage Configuration	0_WORKSET_TEMPLATE You haven't start by clicking on Browse.
Recent WorkSets	
You haven't opened any files from a WorkSet recently.	Brows
Browse for files, create a new file, or select another WorkSpace or WorkSet from the drop- down menus.	
No WorkSpace	+ Create WorkSet

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

Name:	NEW_TEST_WORKSET		
Description:	New Test WorkSet for Training Example		
Template:	0_WORKSET_TEMPLATE	ers Only	
🛨 Add a Custom Property 🔻			
Folder locations			
Root Folder:			
Design Files:			
Standard Files:			
Standards Subfolders:			
ProjectWise Projects			
(click Browse to attach a Projec		Browse	
	ОК	Cancel	
	80.03		

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

#### **OpenRoads Designer CE**

WorkSpace	WorkSet
FDOT -	NEW_TEST_WORKSET *

Recent Files

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



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



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



#### **MENU DOCKING**

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



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



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



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



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

# 2D DESIGN GEOMETRICS ALIGNMENTS

#### **INTRODUCTION**

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

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

We would like to introduce the user to a new workflow terminology using the Ribbon if you see a direction like this **OpenRoads Modeling > Geometry > Horizontal > Lines > Line From Element > Simple Line From Element** 

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

#### FEATURE DEFINITIONS

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

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

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

#### **CIVIL GEOMETRY - DESIGN INTENT**

As defined in the Bentley Civil Tools help file:

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

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

#### CIVIL GEOMETRY DESIGN STANDARDS

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

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

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

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

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

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

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

#### **OBJECTIVES**

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

Design Geometrics and Criteria	FDOT Design Manual (FDM), Part 2 Chapter 210
Design Speed	45 MPH
Facility	Low Speed Desired Length
Maximum Tangent Deflection w/out curve	1 Degree Section 210.8.1
Minimum Horizontal Radius	694 feet Table 210.9.2
Minimum Length of Curve	675 feet Table 210.8.1
Context Class	C3 Max Grade Table 210.12.1

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

#### NOTE Refer to the FDM for Tables

#### EXERCISE OVERVIEW

Exercise 1.1	Import Baseline	30
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Import Baseline In this exercise, the user will create a new design file and import chains from the LandXML file provided from the survey.

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



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

	computation	Select Workset here
	Examples Configuration	WorkSpice WorkSpice - 22049555201.2D -
Select Custom	Custom Configuration	Recent Files Select Workset here
configuration	Manage Configuration Recent WorkSets	ALGNRD01.dgn C:\Worksets/FD07b2049555201_2D:Roadway/ Modified 08:/2020 405020 AM Star-C40 KB
Select Browse	FDOT +	

- 3. Once the file opens navigate to FDOT Ribbon Tab of the OpenRoads Modeling WorkFlow looking for the Actions Group click on the **Create File**. **OpenRoads Modeling > FDOT > Actions**
- 4. Create a ALGNRD01.dgn file with the dialog as shown below.

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



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



Attach Surve	ey Reference (v.2022.1.4	1.1)	×
Survey Referen	ce File		
:\Worksets\FD	OT\22049555201_CE\S	urvey\SURVRD01.d	gn
Logical Referen	nce Attachments		Browse
	TOPO		2
GDTM	UTEX		
		Attach	Cancel

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

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lat 🖓 🖪	File Name	Hedel	Description	Lopcel	Otentation	Presentation	Vable Edges	
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			,					

- 8. From the Function key F9 (toggles on the Reference Dialog) and attach the following files:
  - C:/Workset/FDOT/22049555201/Survey/TOPORD01.dgn (disregard if SURVRD exists)
  - C:/Workset/FDOT/22049555201/ROWMap/RWDTRD01.dgn Set the Logical Name to RWDTRD
  - C:/Workset/FDOT/22049555201/Roadway/AERIALS.dgn
     Set the Logical Name to AERIALS
- 9. Fit View and the select Save Settings.



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



a. Navigate to the Roadway > US98.xml.

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

ClandXML CAgment CAgment US9	t'Easeine 8		
Assign Feature Def	initions from Table		
Feature Definitions Tab	le.		
Assign Feature Def	inition		
Linear Features	No Feature Definition		
Point Features	No Feature Definition	12	
Create Civil Rules			
		Import	Cancel

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

E CandXML E Alignment E Obelauit E EX61	i	
Assign Feature Defi	nitions from Table	
eature Definitions Tab	le:	
Assign Feature Defi	inition	
Park A de la Colorada	No Feature Definition	
Linear Features:		
Linear Features: Point Features:	No Feature Definition	
Linear Features: Point Features:	No Feature Definition	

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



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



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



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



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



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



#### ConstrLines1

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



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


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



- a. Use Feature Definition Const Lines Blue Dash and a Name of ConstLines1. You will have to add the 1 to the name.
- b. Start a line perpendicular to US98 and ending at the middle of the Gate line near the middle of the Driveway.



## ConstrLines2

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

OpenRoads Modeling > Geometry > Horizontal > Lines > Line From Element > Simple Line From Element



- 2. Use Feature Definition Const Lines Blue Dash and Name ConstLines2
- 3. First select **ConstLines1**, then use the AccuSnap to locate the beginning of the line at US98.



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



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## 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

Geometry	Site Layout	Corridors	М	odel De	tailing	D	rawing Production	Drawin	g View
Import/Export		70	1	0	-	10	Offsets and Tapers 🔹	لمسلو	J.S.
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Gen	eral Tools					T	Variable Offset Taper		
	~ e <sup>e</sup> ,	an.	A /	al	8	T	Ratio Offset Taper		

- 2. Use Feature Definition Const Lines Blue Dash and Name ConstLines3.
- 3. Data point in the View to create a line -30 feet Offset to EX-61.
- 4. Uncheck the *mirror option* to **No** and click in the **View**.



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



## ConstrLines4

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

 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** 

in	Geometry	Site Layout	Corridors	M	odel De	tailing	Drawing Production	Drawin	ig View	r.ag
Z. 1000	Import/Export Design Elemen Standards *	ts + Civil Toggles +	Reports	Lines	O Arcs		<ul> <li>✓ Offsets and Tapers</li> <li>✓ Reverse Curves *</li> <li>✓ Spirals *</li> </ul>	تستور Modify	Complex Geometry *	
	Ger	neral Tools					Horizontal			
		⊻ ¢ <sup>¢</sup> , 4	• <b>A</b>	Lines Line Be	tween	Points		~		~

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



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



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



## ► Verify the Construction Lines Maintain Design Intent

1. Change the Active Level to **Scratch1\_dp**. Use MicroStation Drawing to Place Circle with MicroStation with a center at the end of **ConstrLines5** 



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



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



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

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



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

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

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

File Home	Terrain Geometry	Site Corridors	s Model Detailing I	Drawing Production	Drawing Utilitie	s Collaborate View Help	FDOT	
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2. Set Active the Design Facility Standard to: Low Speed Desired Length, 45 MPH.



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3. Activate the Toggle Active Design Standard icon.

8 x	Low Speed Desired Length \45MPH	~
	· · · · · · · · · · · · · · · · · · ·	
T	oggle Active Design Standard	

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

Import/Export	TOC
Primary Selection   @ No Feature Definition     Image: View 1, Default   Image: View 1, Default <t< td=""><td>Open Profile Model Set Active Profile Profile Creation *</td></t<>	Open Profile Model Set Active Profile Profile Creation *
• View 1, Default       Arc Between Points         • View 1, Default       Arc To Element         • Q 👾 • 1 9 9 9 9 9 10 1 40 10 10 10 10 10 10 10 10 10 10 10 10 10	
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<u>&gt;</u> Complex Transition between Any element and Arc 편 Sp Ta 편 30	mple Arc
<sup>2</sup> 空 Ta デ 30 年 32	piral Arc Spiral
F5 3 年 3	aper Arc Taper
	Center Arc
	Center Arc

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



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## ► Make a Longer Driveway into the School.

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



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



- ► Next, Create a Centerline of All the ConstrLines.
- 1. Use the Geometry Tab and Horizontal Group, Complex by Element tool. OpenRoads Modeling > Geometry > Horizontal > Complex Geometry > Complex By Element

Geometry	Site Layout	Corridors	Model De	tailing	Drawing Production	Drawin	g	View	FDOT
Import/Export Design Elemen Standards *	ts * Civil Toggles *	Reports	Lines Arcs		<ul> <li>✓ Offsets and Tapers</li> <li>✓ Reverse Curves *</li> <li>② Spirals *</li> </ul>	Modify	Com Geom	J iplex etry •	Open Profil     Set Active F     Profile Creat
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2. Create the new *Alignment* by connecting the elements. Use *Feature Definition* **Centerline** and *Name* **CL\_SR61**, with no spaces. Use the **Manual** *Method*.

Create C	- 0	×
Method	Manual	~
Maximum Gap	0.03	
Feature		^
Feature Definition	Centerline	~
Name	CL_SR61	

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



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



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

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



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

Define	- 🗆 X
Start Distance	0.00'
Start Station	700+00.00

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



## ► Describe the New Centerline Geometry

 Use the Geometry Tab and General Tools Group, Horizontal Geometry Report tool under the Reports icon. OpenRoads Modeling > Geometry > Horizontal > Reports > Horizontal Geometry Report



2. Select the CL\_SR61 Centerline. Use the settings below at the prompt to generate the report shown.

S	Horizontal	[]	$\times$
	Lock To Start	$\checkmark$	
$\sim$	Start Station	698+95.00	
	Lock To End		
$\checkmark$	End Station	726+42.35	
	Interval		^
	Interval	0.00	
	Profile		*
	Included Profiles	None	~

	Horiz	ontal Alignment Review	м кероп	
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Project:	Default			
Description:				
File Name:	C:\WorkSets\FDOT\22049	555201/roadway/ALGNRD08.dgn		
Last Revised:	8/13/2019 15:13:46			
			ote: All units in this report are in feet	unless specified otherwise.
Aller	mant Names SDE1 CI			
Align	ment name: Skol_CL			
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## NOTE If the Stationing format is not displayed correctly, In the Bentley Civil Report Browser, select Tools Format Options.



	Mode		Precis	ion	Format	Close
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Use Alternate Slope if	Slope Exceeds:		0.00%	_		
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Vertical Observation:	Zenth	*				

## Save the SR61 Centerline to a Landxml for a back up.

- 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*.





1. Use the Geometry Tab under the General Tools Group, to select the Import Geometry tool. OpenRoads Modeling > Geometry > Horizontal > General Tools > Import/Export > Import Geometry



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

Import Geometry		
⊡-Mignment ⊡-Mignmen	t\Centerline	
	NDSHIP NDSHIP2	
Assign Feature Defi	nitions from Table	
Feature Definitions Tab	le:	
Assign Feature Def	inition	
Linear Features:	No Feature Definition	
Point Features:	No Feature Definition	~
Create Civil Rules		
	Import	Cancel

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





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

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

OpenRoads Modeling File Home Terrai	n Geometry	ite Layout	Corridors	C:\Wor Model Detailing	kSets\FDOT Drawi	T\F.L.U.G - 22049 ing Production	55201-1\roadw Drawing	ay\ALGNRD View	03.dgn FDOT
1"=50"  Constant Series Constant Consta	Image: Select       Image: Select		Z Import/Expor Z Design Eleme	t * ents * Civil Toggles *	Reports	<ul> <li>✓ Lines * 1</li> <li>○ Arcs * 3</li> <li>◆ Point * 2</li> </ul>	Offsets and T Reverse Curv - Spirals *	Tapers * 🗸	Mod Com
Drawing Scales (Q)	Primary (W) Sel	ection (E)	Ger	neral Tools (R)	-		Hor	izontal (T)	
Const Lines Green Dash		~	e", 🏉 📩 ,	A Civil Accu	draw		~		
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 Use Geometry Tab and the General Tools Group, to select the Civil Toggles icon to call Civil AccuDraw tool to activate the Civil AccuDraw toolbar. Openroads Modeling > Geometry > General Tools > Civil Toggles > Civil Accudraw



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



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



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#### **Openroads Modeling > Geometry > Horizontal > Lines > Line Between Points**



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

File Home Terrain	Geometry	Site Layout	Corridors Model Detailing Draw	Line Between Points	
1°=50° * 20 ACS Plane Lock ▲ Annotation Scale Lock ★ Drawing Scales (0)	Eler Eler Sele	ment -	Civil Standards * Toggles *	Lines     Lines	15 👼 🖩

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





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



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



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



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

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

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

File	Home Terra	in Geomet	ry Site Layout Corridors	Model Deta	ailing Draw	ing Production	Drawing Vi	ew FDOT	
€ 4 •	Element Selection	Clip Volume	Create Update Saved Apply Saved View View Settings Saved View	Place Table	Place Place Note Label	A A B Place Edit Text Text	A J AS AS AS A A A A A A A A A A A A A A	Element Annotation + Model Annotation +	
Primary	Selection	Clip	Saved Views	Tables	Notes	Т	ext G	Annotations	1

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.



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



3. You have now just Annotated your Alignments.



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



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

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

10 11 12 	Display Only 100 Foot Major Annotations
10 11 12 1	
40 45 1 5 cale: P = 100 <sup>o</sup>	Display Only 500 Foot Majors
25 30 35 1	Annotations
10 20 30 1	Display Only 1000 Foot Majors Annotations
40 90 	Display Only 5000 Foot Majors
20 70 120 1 1 1 1 1 Scale: T = 2,000	Annotations

NOTE For drawing scales from 1"=10' to 1"=60' use the Level Filter for Display Only 100 Foot

ES#+A/EBASE

21 4

5

Major Annotations

# 2 2D PLANIMETRICS

## **INTRODUCTION**

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

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

- Civil AccuDraw
- Civil Cells

## CIVIL ACCUDRAW

As defined in the Bentley Civil Tools help files:

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

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

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

## **CIVIL CELLS**

As defined in the Bentley Civil Tools help files:

A civil cell is a collection of civil elements - geometry, templates, and terrain models - which can be placed repeatedly in a design. The collection of civil elements will have been created relative to one or more reference elements. When you place the civil cell, you choose the new reference elements, and a new collection of civil elements is then created relative to them. A civil cell can therefore be thought of as a copy of the original collection of civil elements, relative to the geometry of the new reference elements. Civil cells can be 2D or 3D. They can consist of 2D (plan) elements only, or 3D elements (2D elements with profiles), and can include terrains, linear templates, area templates, and simple corridors.

When the new civil elements are created, all of the rules associated to them are also created. This means that the new civil elements retain their relationships, both with each other and with the reference elements, and therefore know how to react when these relationships change. In addition, the Civil and MicroStation toolsets can still be used on the new civil elements, to adjust and further refine the design as required, because there is no difference between a civil element created by a civil tool, and one created by placing a civil cell.

Civil cells can save a lot of time and effort, because they replicate the complete series of steps needed to create the civil elements. They also help to ensure compliance with design standards, by making a civil cell available to the design team.

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## Exercise 2.1 Preparation for 2D Plans

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



Discipline: ROADWAY File Group: Roadway Files 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 - Core Borings SIGNPC Signature Sheet - Project Control SIGNRD Signature Sheet SIGNVU Signature Sheet SIGNVU Signature Sheet SIGNVU Signature Sheet TCTYRD Traffic Control Typical Section Sheets Output File: Base Filename: Modifier (Optional) File Sequence #: E DSGNRD Ot unter State		· · ·	2049555201	Sets\FDOT\2	C:\\	cset:	Nork
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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.

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

OpenRoads I File Home	Modeling Terrai	n Geome Create Filter	s Linked Data Manage	Corridor Misc. Tools *	s Model Plan Set Manager *	Detailing Cell Libraries +	Drawing Prod	EDOT Cells	Drawing	FDOT T/ xisting Features	AB FDOT Signs	Pavement Marking	19555201	CE - DSG	NRD.dgn DOT Lig Pole M
Selection	Primary		Action	15		Ce	I Applications	8	Re	adway			Traffic	c Plans	
No Feature D	efinition		~ *	<b>#</b>	Al	3 1	on the		~	~					
				Attach Survey Re	Survey Refr eference File ets\FDOT\22	rrence (v.20 v. 1049555201_	22.1.4.1) CE\Survey\S	URVRDO	1.dgn	×					
				Logical F	Neference Att	achments TOPO UTEX		Attach	Brow	cel					

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**.

References (1 of 1 unique, 1 displayed)	- 🗆 X
Tools Properties	
臣•险及西受沙沙西部部的东市即	Hilite Mode: Boundaries *
Slot ا 🔯 File Name ^	Model Description Logical
3 C:\Worksets\FDOT\22049555201_CE\Survey\SURVRD01.dgn	Default TOPO TOPO
¢	3
Scale 1.000000000 ± 1.000000000 Rotation 00*/	00'00"
Offset X 0.0000 Y 0.0000	
🖸 💽 🖌 🖓 🐨 🕼 🖓 🐨 🛆 🟥 🗠 Nested Attachmer	nts: • Nesting Depth: 0
Display Overrides:   New Level Display:   Geo	oreferenced:

 Now we need to copy or merge the elements that are on the PavtAsphalt\_ep level. This can be done by using the Copy Reference Levels tool from the FDOT Tab within the Roadway Tools Group Openroads Modeling > FDOT > Actions > Misc. Tools > Copy Reference Levels



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

Abo
n(s)

- 5. This step only. If no **SURVD** Exists. Use OpenRoads References (Function Key F9) to attach and display the *TOPORD01* and *RWDTRD01* Reference files.
- 6. Use OpenRoads Level Display to turn OFF all the TOPORD01 Levels except the PavtAsphalt\_ep.



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



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



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

Drawing	Workset: 22049555201_CE - D Utilities Collaborate View Help	GNRD01.dgn (Default) - OpenRoads FD0T	Designer CE - 2022 Release 3 Update 1	b	esk
Fence Tools •	Place Place Arc Arc A · Placement	Move Copy Rotate 2 1 1 2 .	Hodfy Break Element Element Multiple + ×	Measure Measure Angle Measure	Create © 10
[v]	v		Break Element Break a linear element		



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



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

Select All On Level By Element	Element Selection
View Control View Tools	
Copy Move Scale	
Mirror	Level
Select All Select None Select Previous Displayset Set	Paret TractParcelRaw ParkEquip_ep PattemLines1_dp PattemLines2_dp PattemLines3_dp PattemLines_ep
Cut to Clipboard Copy to Clipboard Paste from Clipboard	Pavemk_ep Pavers PavtAsph_ep PavtAsphalt
Turn Level Off by Element Delete Element	PavtAsphalt_pm

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.



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

54 Selected El	Set Fea	- 23	×	/
1	Feature Type	Linear	101	11
	Feature Definition	Pavement Milling	NV	11
			11	1
			111	
	•			
1	1	1	1	
		1		
		1		
		1	/	

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





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

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

the second se	Construction of the local	\22049555201_CE\roadway\ALGNRD01.dgn
Model: Defa	ult	•
gical Name:		
Description: Mas	ter Model	
rientation:		
hew		Description
Coincident		Aligned with Master File
Coincident - Wor	ſd	Global Origin aligned with Master File
Geographic - AEC Transform		Calculated Transform, max error 0.01071
Geographic - Rep	rojected	Reproject reference data to Master GCS
Saved Views (non	(m)	
Named Boundari	es (none)	

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

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



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



Select the US98 line at the prompt to Locate Element.

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

🔏 Single Offset Partial	– 🗆 🗙
Offset:	16.00
Use Spiral Transitions	s 🗹
Mirror	
Remove Offset Rule	
Distance	*
Lock To Start	
Start Distance	28+00.00
Lock To End	
End Distance	46+11.26
Length	500.00
Feature	*
Feature Definition	Pavement Asphalt EOPA
Name	SW_EOPA

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



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



## Exercise 2.4 US98 Widening Taper Line

In This exercise a tapered Pavement Asphalt EOPA line off US98 is created at the following location. Select **Alt** to enter the *End Station*.

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



 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

$\square$	Start Offset	20.00	
	End Offset	145.04	
	Mirror		
	Distance	^	
	Lock To Start		
$\square$	Start Distance	39+00.00	
	Lock To End		
	End Distance	46+11.26	
	Length	711.26	
	Feature	^	
Feature Definition		Pavement Asphalt EOPA	
Name		EOPA_TAPER	

- 2. Select the **US98** element to *offset* from.
- 3. Enter the Station at **39+00** and select **Enter** to lock the value.
- 4. Tab to the *Offset*, enter **20** and select **Enter** to lock the value.

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



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

Snap Mode	X	
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	~	
	×	
	End Parameters - <alt> UnLock From End</alt>	
	End Offset 16:204363	•
	Complex Element: ConstLines8 Feature: PavementAsphalt(EOP No Active Profile Level: PavtAsphalt	PA)

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

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

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



- 2. Create a Feature line, Const Lines Green.
  - a. Select the SR61 Centerline CL.
  - b. Set the Feature Definition to Const Lines Green Dashed
  - c. Set the Name to ConstLines\_CL
  - d. Set the Offset to 10.00.
  - e. For the first point, set AccuSnap to Intersection and select the intersection of SR61 and US98.


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



- g. Use Intersect Snap and to place first point and Key Point snap for the second point.
- Use the Model Detailing Tab and the Civil Cells Group, to find the Place Civil Cell tool Openroads Modeling > Model Detailing > Civil Cells > Place Civil Cell



4. Navigate to the FDOT\_2D-FDM\_Exhibit\_Lines.*dgn*lib and select **306-5** Exhibit civil cell to place.

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

- Notes		
Pick Civil Cell		
FDDT_2D-Curb_Lines_Are_Endops dytis (Default)     FDDT_2D-Curb_Lines_Are_Endops dytis (Default)     FDDT_2D-Chrestond, Methad_Operating adviss (Default)     S06-1 Exhibit     S06-1 Exhibit     S06-5 Exhibit     S06-7 2D-Stressection_Default dytis (Default)     FDDT_2D-Stressection_Default dytis (Default)     FDDT_3D-Intersection_Default dytis (Default)     FDDT_3D-Intersection_Default dytis (Default)	 	
	OF	Course

CIVIL GEOMETRY 73

- a. Click **OK** and follow the prompts to complete the *Place Civil Cell* command.
- b. Locate *Reference Element*, select the **Green Const Line (ConstLines\_CL)**.

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

c. Reset to Skip View Alternates.

Data point to accept Civil Cell Placement.



d. Select the Constlines element near station 708 and change offset from **10**' to **0**'. This will align the Construction line and Civil Cell up with CL\_SR61 roadway alignment.



BEFORE





- e. Change the Front Sidewalk Utility Strip Width to 2 ft and set the Sidewalk Width to 5 ft.
- f. Select the **Sidewalk Front FSW** *Feature* and zoom to find the Context Menu near the middle of the element.



- b. Change the SidewalkFront offset Dimension from 6 to 5.
- c. Verify that the *SidewalkBack* is set to **5**.



d. Repeat this for both sides of the roadway



## **Exercise 2.6** Add Right Turn Lane on US98

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

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



2. From the Place Civil Cell dialog, navigate to the FDOT\_2D-Intersection\_Details.dgn lib and select **Right Turn Lane.** 



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

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



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



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

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

 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

File	Home Terrai	n Geometry	Site Corr	idors	Model De	tailing	Dra	wing P	roduction	Drawing	9	Utilities
a	8	Z Import/Export	· 214	70	1	0	à	Ψo	offsets and Ta	pers •	Jul.	
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00	Selection 🖂 *	Standards *	Toggles *	*	*	*		Ũ	Single Offse	t Partial		ieome
Primary	Selection	Ger	neral Tools					F	Variable Offs	set Taper	T	ī
Par	vement Asphalt EOP/	<b>v</b>	V	A	1	1	1.85	T	Ratio Offset	Taper		i E

- 2. Create the side road EOPA\_SCH\_ENT opposite SR61 left and right offsets at -23 feet.
  - a. For the *beginning*, snap to beginning of **SR61**.
  - b. For the *end*, snap to the US98 widening line end point at **SR61**.
  - c. Uncheck *Mirror* to set to **No**.



 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

🛃 Ope	nRoads Modeling	• 🖬 • 👄 🖬 🕼 🕻	ロケーチョ	🚔 =				
File	Home Terrai	n Geometry Site	Corridors	Model Detailing	Drav	wing Production	Drawing	Utilities
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	Flament	🛃 Design Elements *	Civil Reports	Lines Arcs	Point	T Single Offse	et Entire Elemen	Comp
00	Selection [] *	💁 Standards * To	iggles * *	* *	*	😳 Single Offse	et Partial	eomet
Primary	Selection	General Too	ols		_	T Variable Off	set Taper 🔨	
Pav	vement Asphalt EOP/	۸ 🗸 🖉	📥 📥 🦄	1 3 1	1873	T Ratio Offset	Taper	8

- 4. Create the side road Pavement Asphalt EOPA opposite SR61 Left Offset 39 feet.
  - a. For the *beginning*, snap to beginning of **SR61**.
  - b. For the end, snap to the US98 widening line end point at SR61.
  - c. Uncheck *Mirror* to set to No.

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



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

File	Home Terra	in Geometry	Site	Corridors	Model Detailing	Drawing Pr	oduction	Drawing	Utilities	
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Primary	Selection	Civil	Cells			3D Too	ls .			

CIVIL GEOMETRY

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- 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.





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



- 2. Create/Edit the Curve returns.
- 3. Select Feature Definition, Pavement Asphalt EOPA to place remaining curve radii.
- 4. Follow the cursor prompt to select the two Roadway Pavement Asphalt EOPA reference lines.
- 5. Rotating the view along the US98 BaseLine will set the Top of the screen as North giving a quandrant as shown below.
- 6. Select the two Pavement Asphalt EOPA in each quadrant. Use the value shown and trim both for each of the following quadrants: NorthWest 110 feet,

NorthEast 60 feet, SouthWest 60 feet, SouthEast 60 feet



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## 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

File	Home Terrai	n Geometry Si	te Corridors	Model Detailing	Drawing Pro	duction	Drawing	Utilities
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e? Par	vement Aaphait EOP/	A Place Gvil Cell	A	121	勤查		v	

2. Navigate to the *FDOT\_2D-Curb\_Lines\_And\_Endings.dgn* lib and select the Curb Lines Type F civil cell.

🏀 Plac — 🖂 🗙									
Civil Cell Name Curb Lines Type F									
Pick Civil Cell									>
P-Active DGN     POT_2D Curb_Lines_And_Endings.dgnlib (Default)     Curb Lines Type Shoulder Gutter     Sidewalk Lines     -Curb Lines Type D     Curb Lines Type D     Curb Lines Type E     Curb Rared End Type A AHEAD     Curb Rared End Type A AHEAD     Curb Rared End Type A ABACK     Curb Rared End Type A BACK     Curb Rared End Type A BACK     Curb Straight End AHEAD     Curb Straight End AHEAD     Curb Straight End AHEAD     Curb Rared End Type A BACK     Curb Straight End AHEAD     Curb Straight End AHEAD     Curb Straight End AHEAD     Curb Straight End AHEAD     FDOT_2D-Directional_Median_Openings.dgnlib (Default)     FDOT_2D-Intersection_Details dgnlib (Default)     FDOT_2D-Intersection_Details dgnlib (Default)     FDOT_2D-Intersection_Details dgnlib (Default)     FDOT_2D-Ramp_Terminals dgnlib (Default)     FDOT_2D-Ramp_Terminals dgnlib (Default)     FDOT_2D-Stewark Curb Rams deniin (Default)	~	Q	Q						
							ОК	Can	cel

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





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



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



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

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Trim To Element		
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		Show Details

Exercise 210 Create a Custom Civil Cell for Other Radii

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



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

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



 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

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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**.



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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.



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



a. Navigate to the FDOT\_Intersections.dgn lib and select Left Turn with TS civil cell.



b. At the *Locate Reference Element Pavement Asphalt EOPA*, select the **RT\_PVT\_EOP\_IN** line in the View.

🕼 Place Civil Cell — 🗆 🗙	
Civil Cell Name Left Tum w/ Traffic Separator Mediar	
	Locate Reference Element: Centerline(CL) (1/2)

CIVIL GEOMETRY 91

c. At the Locate Reference Element Pavement Asphalt EOPA, select the RT\_PVT\_EOP\_IN line in the View.





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.



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



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



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



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

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¥	>					Trim To Inte Lengthen or intersection	rsection Shorten element to

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



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



- 7. View the placed left turn, change the *Storage Length* from **200 feet** to **300 feet**.
- **NOTE** Select the green line, then select the length text.



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





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

File	Home Terrai	n Geom	etry Site	Corridors	Model Detailing	Drawing Pro	duction	Drawing	Utilities
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Primary	Selection	<b>T</b> (	ivil Cells			3D Tool	ls		
e Pav	ement Asphalt EOP	Place Civil (	Cell	A	121	Sn the		~	Ŷ

2. Navigate to the FDOT\_2D-Intersection\_Details.dgnlib, select Right Turn Island. Click OK.



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



4. Select the second Pavement Asphalt EOPA line.



5. Reset to Skip Alternates.



6. Data Point to accept the Civil Cell.



## ► CHANGE THE RIGHT TURN ISLAND PARAMETERS

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



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



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



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



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



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



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



8. Change Island Radii to 4 feet.



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



10. Move the Offset handles to the Radius Point.





11. Change the Active Level to Miscellaneous0.

Level Filter: All Levels		She	ow *
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Miscellaneous			1
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12. Use the OpenRoads Create Region Flood tool, this tool can be found by switching to the Drawing Workflow and then the Home Tab and with in the Groups Group will be the Create Region. Drawing > Home > Group > Create Region

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×	v					Create Region Create a complex shape using a region

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

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



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



 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

File	Home Terra	in Geometry Site	Corridors	Model Detailing	Drawin	g Production Drawing Utilit
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2. Create a **Partial Offset** line from *US98* **-52 feet** across the intersection. Use *Feature Definition* **Const Lines Blue Dash** and *Name* **ConstLineA**.



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

File Home Terrain		in Geometry	Site Cor	ridors	Model De	tailing	Drav	ving Producti	
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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**.



 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

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- 6. Create a **Partial Offset** line from *SR61* across the intersection. Use *Feature Definition* **Const Lines Blue Dash** and *Name* **ConstLineC**.
- NOTE Snap to the mid-point of the radii.





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



### Exercise 2.14 Create US98 Turnouts

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

 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

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03	Element Selection -	Standards * Toggles	Reports	Lines Arcs	Point	U Single Offset Partial
Primary	Selection	General Tools				✓ Variable Offset Taper 🔨
e No	Feature Definition	🖂 e <sup>ç</sup> 🤞		8 🔜 🧨	1912	🕄 Ratio Offset Taper

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



b. Accept the -20 feet Offset and Mirror.

Parameters	^		1	
Offset	-20.0000			1
Use Spiral Transitions	2	<u> </u>		
Mirror				A A
Remove Offset Rule		1		
Feature	^			
Feature Definition	Use Active Feature		1	
Name	EOPA		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. OpenRoads Modeling > Geometry > Horizontal > Arcs > Arc Between Elements>Simple Arc



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



- b. Change the Geometry to fit the existing driveway.
- NOTE Use the centerline snap and dimensions to modify the location, length and angle. Use the Offset Pavement Asphalt EOPA Dimensions to change the width.



3. (EXTRA Exercise) Repeat the steps above to create an addition Turnout as shown below <OR> use the Civil Cell, FDOT\_2D-Intersection\_Details.*dgn*lib, and Side Road Turnout.

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

·





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

 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

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Geometry	Site Layout	Corridors	M	odel De	tailing	Dr	rawing Production	Drawin	g View	FDOT
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2. Set the Offset to 5 feet and the Feature Definition to Shoulder Paved PSHLDR.

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<ul> <li>Offset:</li> <li>Use Spiral Transition</li> <li>Mirror</li> <li>Remove Offset Rule</li> </ul>	5.00
Feature	^
Feature Definition	Shoulder Paved PSHLDF
Name	PSHLDR

- 3. Select the **Pavement Asphalt EOPA** lines from the previous steps.
- 4. Repeat these steps to add the remaining *Shoulder lines* for the widening along US98.
- 5. View the intersection below for complete details.





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** 

File	Home Terra	in Geor	netry Site	Corridors Mo	del Detailing	Drawing Pro	oduction	Drawing	Utilities
°⊄ ■ •	Element C	Place Civil Cell	Create Civil Cell	Apply Linear lemplat	Surface Templates *	Create Closed Mesh	3D Elements •	Create Conic Slope	Transverse Tools *
Primary	Selection	7	Civil Cells			3D Tool	s		

a. From the Place Civil Cell dialog, navigate to the *FDOT\_2D-Intersection\_Details.dgnlib* and select **Rural Side Road Turnout**.

Place Civi X		
Pick Civil Cell		×
Active DGN     Active DGN     FDOT_2D-Curb_Lines_And_Endings.dgnlb (Default)     FDOT_2D-Directional_Median_Openings.dgnlb (Default)     FDOT_2D-Directional_Median_Openings.dgnlb (Default)     FDOT_2D-FDM_Exhibit_Lines.dgnlb (Default)     FDOT_2D-Intersection_Details.dgnlb (Default)     - FDOT_2D-Intersection_Details.dgnlb (Default)     - Right Turn Lane     - Left Turn w/ Traffic Separator Median     - Right Turn Island     - Right Turn Island     - Right Turn Island     - FDOT_2D-Ramp_Terminals.dgnlib (Default)     FDOT_2D-Bidewalk_Curb_Ramps.dgnlib (Default)     FDOT_3D-Bus_Turn_Out dgnlib (Default)     FDOT_3D-Intersection_Details.dgnlib (Default)		
	ОК	Cancel

- 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

OpenRoads Modeling	Geometry Site Ci	* 📌 📾 =	Drawing Production	Drawing	Utilities
Note         Note <t< th=""><th>Place Civil Cell</th><th>Apply Linear Templates</th><th>Create 30 Closed Mesh Elements</th><th>Create Conic Slope</th><th>Transverse Tools *</th></t<>	Place Civil Cell	Apply Linear Templates	Create 30 Closed Mesh Elements	Create Conic Slope	Transverse Tools *
Primary Selection Pavement Aphat EOPA	Place Gvil Cells	AINI	10 Tools	v	Ŷ



- a. From the Place Civil Cell dialog, navigate to the *FDOT\_2D-Intersection\_Details.dgnlib* and select **Left Turn w/ Traffic Separator Median**.
- b. For the first *Reference* element, select the **Friendship Rd Centerline**.



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





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



 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

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4. Move the LT\_PVT\_EOP\_IN to the beginning of the *Traffic Separator*. Use the Const Lines Green as the cut element.



 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

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



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

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



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# **INTRODUCTION**

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

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

# **OPEN PROFILE MODEL**

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

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

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US98 Profile	141
Friendship Profile	143
	Preparation for SR61 Profile Create SR61 Profile Edit SR61 Profile US98 Profile Friendship Profile.

# **CIVIL GEOMETRY - DESIGN INTENT**

As defined in the Bentley Civil Tools help file:

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

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

Design Geometrics and Criteria	FDOT Design Manual (FDM), Part 2 Chapter 210
Design Speed	45 MPH
Facility	Low Speed Desired Length
Maximum Tangent Deflection w/out curve	1 Degree Section 210.8.1
Minimum Horizontal Radius	694 feet Table 210.9.2
Minimum Length of Curve	675 feet Table 210.8.1
Context Class	C3 Max Grade Table 210.12.1

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

NOTE Refer to the FDM for Tables.

### **Exercise** 3.1 Preparation for SR61 Profile

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

Ref	erences (4 of 4 unique, 1 display	red)									×
Tools	Properties										
<b>.</b> •	12 😣 🗅 🕺 🏟 🦃	· 🖻 🔁 🔂	d 🕫 🛱 ᢪ	🔘 🗙 н	ilite Mode: Boundaries 🔻	•					
Slot	🏴 🧕 File Name	Model	Description	Logical	Orientation		Presentation	Visible Edges		1	8
1	\\SURVRD01.dgn	Default	Master Model	TOPO	Coincident	- World	Wireframe	Dynamic		4	- V
2	\\SURVRD01.dgn	Default	Master Model	GDTM	Coincident	- World	Wireframe	Dynamic	4	*	4
3	\\SURVRD01.dgn	Default	Master Model	UTEX	Coincident	- World	Wireframe	Dynamic		×	*
4	\\SURVRD01.dgn	Default	Master Model	DREX	Coincident	- World	Wireframe	Dynamic		¥	
<											>
Scale	1.000000000 : 1.	00000000	Rotation 00°	00'00"	Offset X 0.00		<u>Y</u> 0.00				
	/ <b>N</b> 🕒 🛄 🎞 🖉 🔍 💷 🕷	9 🖸 📥 🐽 🦒	Nested Attachme	nts: No Nestin	ng 🔹 Nesting De	pth: 0	Display Over	ides: Allow	• :		
100				1							

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

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



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

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

	View Control		1 View
-	Copy		2 Views Plan/3D
	Maye		2 Views Plan/XS
	Scale		2 Views Plan/Profile
2	Rotate		2 Views Plan/Superelevation
K	Mirror		3 Views Plan/Superelevation/XS
	Calant Links	- 0	3 Views Plan/Profile/3D
-	Select Links	-	3 Views Plan/Profile/XS
	View Attributes		3 Views Plan/XS/3D
	Model Properties		4 Views Plan/Profile/XS/3D
×	Clip Volume	6	Ref Adjust Colors
~	Select All	~	Dynamic XS View
	Select None	EEE	Profile View
0	Select Previous	11	Toggle Construction Class
1		- 0	Levels Off Except Element
10	Cut to Clipboard		Displayset Set
	Desta from Clinhoard	×	Displayset Clear
2	Paste nom cipboard	-	Arrange Windows
	Turn Level Off by Element		
ĸ	Delete Element	2	Rotate view
			FIT VIEW
		-	Illustration View
		-	Smooth View
			WireFrame View

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



### Exercise 3.2 Create SR61 Profile

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

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

File	Home Terra	in Geometry Site	e Corridors	Model Detailing	Drawing Production Drawing	Utilities	Collaborate View He	lelp FDOT		
₩ •	Bement O Selection O +	ズ Import/Export * ☆ Design Elements * Standards *	Civil Reports	Lines Arcs	Point 2 Spirals * Modify	Complex Geometry +	Open Profile Model	Liņes Curves	Bernent Modify Complex Profiles *	Ransform
Primary	Selection	General	Tools		Horizontal			Vertical		

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



 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

Geometry	Site Layout	Corrido	rs M	odel De	tailing	Drawing Production	Drawi	ng View	FDOT									
Import/Export * Design Elements Standards *	Civil Toggles •	Reports	Lines	O Arcs	-¢- Point	T Offsets and Tapers * Reverse Curves * Spirals *	هسري Modify	کسبو Complex Geometry *	田 Op M Set	en Profile Mode Active Profile ofile Creation *		Curves	Element Profiles *	Modify ▼	Co Geor		Transform	, Simplify Geometry
Gene	eral Tools					Horizontal						Vertica	d		b	Profile	Complex By	Elements
				~ .		A/ 30	873 1	TA .			-			1	W	Profile	Complex By	PI
							-			VERN 2 P	Stocker 20				EV.	Simple	Profile By Pl	
0.00		-								views, D	eraun-su	0	0		N	Define	Profile By Be	st Fit
	JEE	03 % 1			e e					100 02 3	1997	100	المتا تتك	10.	"2	Profile	Reverse Tran	sition
					1										<u>er</u>	Profile	Offset Trans	ition

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.

A Best F	it Profile	÷ 4	×	
Seat Fit		Make Complex Berrent	2	
Best	Fit Parameters		^	
2 Upper	Envelope	2.00		
Z Lower	Envelope	-2.50		
Deairs	able Creat Curve Length	300.00		
Z Desin	able Seg Curve Length	200:00		
Minim	um Curve Length	150:00		
Featu	ire		^	
eature De	tinition	Centerline		data point to use
		president and the second se		dana point to do

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

Best Fit	Make Complex Element	V				
Best Fit Parameters		~				
Upper Envelope	2.00					
Lower Envelope	-2.50					
Desirable Crest Curve Length	300.00 200.00					
Desirable Sag Curve Length						
Minimum Curve Length	150.00					
Feature		•				
Feature Definition	Centerline	~				
Name	CL_SR61_PR					



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

File Home Terr	in Geometry Site Layout Corridor	s Model Detailing Drawing Production Drawing View	FDOT	Search Ribbon (F4) 🖉 - 💄 • 🔺 🔟 (
R → Bement ⊖ ·	Z Import/Export * Design Elements * Standards * Toggles *	Unes Arcs Point & Reverse Curves * Modify Complex & Spirals * Modify Complex Spirals *	Gene Profile Model     Gene Active Profile     Lines Curves Element Modely     Complex     Profile Creation *	Design Standards Toolbar
timery Selection	General Tools	Horizontal	Vertical	

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

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



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



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

ope	rties		• 4	×
	/ Line			
	▷ <a> </a> Depends	On		
	Profile:			
	Profile:			
	Profile:			
	🔺 🧇 Profile: C	L_SR61_PR		
		3 C4 C&G\55MPH		Ļ
	Feature			
	Fasture Defeities	Castadian		
	Feature Name	CL_SR61_PR		
	Geometry			•
>	Start Point	73.33',34.95',0.00'		
> >	Start Point End Point	73.33',34.95',0.00' 2751.38',37.26',0.00'		
>	Start Point End Point Length	73.33',34.95',0.00' 2751.38',37.26',0.00' 2678.09'		

**CIVIL GEOMETRY** 

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



a. The Civil Message Center dialog displays the results.

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

Hide All	K 50 MicroStation 😧 1 Error 🥂 7 Warr	iings 🚺 0 Messages	
Element	Message	Description	ĺ,
μ.	Display complete		
K.	Active Profile: SR61-PR		
ML.	[Plot Scale=-999.0000, Units=Unknown, AS= 1.		
JL.	Linked Data Manager: (0) links found in 00:00:0.		
AL.	Linked Data Manager: Scanning		
HL.	Complex Element: SR61		
LL.	Terrain Model: GDTMRD01, Boundary, Level: X.	•	
11	Active Terrain Model Set		
LL.	3D Model [GDTMRD02.DGN/Default] has bee		
11	Reference attached		
µ.	Complex Element: EOPA26		
μ	Total 4296 payitems in the database		
11	Complex Element: EOPA26		

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
8 Error	Crest is less than minimum	Design Standard Value = 185.000000 Actual V
Warning	Speed Substitution	Designated design speed 50 not found in Vertic
A 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 =
1 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
< [	m	•

- 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.

Hide All 🕌 5	0 MicroStation 😵 1 Error 🥂 7 Warnings	0 Messages				
Element	Message	Description				
Error 👘		Design Standard Value = 185.000000 Actual				
Naming	Zoom to	Designated design speed 50 not found in Ver				
Naming	Add To Selection	Designated design speed 50 not found in Vert				
Naming -	Speed Substitution	Designated design speed 50 not found in Verti Design Standard Value = 100.000000 Actual				
1 Warning	Tangent length is shorter than minimum					
Naming	Maximum deflection with no curve exceeded	Design Standard Value = 1°0'0" Actual Value Design Standard Value = 100.000000 Actual				
Naming	Tangent length is shorter than minimum					
Naming	Tangent length is shorter than minimum	Design Standard Value = 100.000000 Actual				
12						
•	III					

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



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

- 8. Since there can be a number of different situations for both the horizontal and vertical curve depending on Context classification and Design Speed we will now set the vertical in the *Explorer* Dialog.
  - a. Using the *Explorer* Dialog (Function Key F11) if you do not have it docked. Navigate to the **OpenRoads Standards Tab** then click on Standards to open the current file you are in to see the Design Standards Category to view the Design Standard applied the Alignments in the file.
  - b. Select the Horizontal Design Section to see which design standard is applied to the Alignment, next select the desired speed. Now using the Ctrl+I key to bring up the properties dialog lets link a vertical design speed to the horizontal.



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



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



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

#### **OpenRoads Modeling > Geometry > Common Tools > Table Editor**

	Back Tangent Length	Back Slope	Station	Elevation	Curve Length	K Value	Ahead Slope	Ahead Tangent Length	
			698+95.00	37.25			1.000%	16.12	
	16.12	1.000%	699+36.12	37.66	50.00	5.31	-8.413%	7.21	
	7.21	-8.413%	699+68.33	34.95	0.00	0.00	-0.300%	12.98	
	12.98	-0.300%	699+81.31	34.91	0.00	0.00	1.872%	17.89	
	17.89	1.872%	699+99.19	35.24	0.00	0.00	-1.723%	24.42	
	24.42	-1.723%	700+23.62	34.82	0.00	0.00	1.974%	31.33	
	31.33	1.974%	700+54.95	35.44	0.00	0.00	-0.487%	316.00	
	316.00	-0.487%	703+70.95	33.90	0.00	0.00	-0.925%	212.38	
	212.38	-0.925%	705+83.32	31.94	0.00	0.00	0.482%	627.65	
	627.65	0.482%	712+10.97	34.96	0.00	0.00	-0.300%	525.43	
	525.43	-0.300%	717+36.40	33.39	0.00	0.00	0.300%	200.00	
	200.00	0.300%	719+36.40	33.99	0.00	0.00	0.461%	709.97	
_	706.97	0.461%	726.46.20	27.26		N I	1		



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.

# ► <u>DELETE PIS</u>

 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

Model Detailing	Drawing Produ	ction Drawing	View FDOT					Sec
Attach Tools *	Element Selection	Place Place SmartLine	Arc Ellipse H	/ • A • □ □ <sup>4</sup> Move Copy R	otate 2 № % - Modify	Break Trim	, ], ⊃, ⊃, .	Insert Vertex Delete Vertex
Primary	Selection		Placement	Manip	pulate	Modify	1	Extend Line
		11		and a second				1110-00

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





# ► <u>CREATE PROFILE WITH PLACE VERTICAL LINE</u>

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

 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

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File	Home Terra	in Geometry	Site Layout	Corridor	s Mod	el Detailing	Drawing Production	Drawing V	/iew FDOT				
<b>®</b> •	Element Selection	Z Import/Export	s - Civil Toggles -	Reports	Lines A	Arcs Poin	T Offsets and Tapers T Reverse Curves * Spirals *	* کسی کسی Modify Comp & Geomet	Dev Try * Open Profile Model	Lines	s Curves Ele	timent Modify	y Con Georr
Primary	Selection	Gen	eral Tools				Horizontal			N	Profile Line B	etween Points	
el No	Feature Definition			~ .,	a ==,	A	📓 🚷 🦄 👫 Hat	n Speed Desired Leng	t v 55MPH	1	Profile Line To	o Element	* 1
Explorer					• 4 ×	-	1. Defects			5	Profile Line Be	etween Elemenf	ts
File	😝 Items 🔒 Re	esources 📋 OpenRo	ads Model 🥔	Sheet Inde	x		0 0 0 <b>1</b> - 4		∃ <b>.</b>		Profile Line Fr	om Element	1 de

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

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



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



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

Length	250.00
Slope	-0.300%
Feature	
Feature Feature Definition	Centerline



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



### PROFILE BY VPI'S

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

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

Geometry Site Layout Corridor Import/Export * State Layout Corridor Design Elements * Civil Reports Standards * Toggles *	Model Detailing	Drawing Production Dra T Offsets and Tapers * Reverse Curves * & Spirals * Mod	swing View def Complex Geometry *	FDOT Copen Profile Model Set Active Profile Profile Creation *	Liņes Curves	Bernent Profiles *	Modify		Transform Simplify Geometry
General Tools		Horizontal	A & 1	High Speed Desred Lengt	Vertica h\SSMPH	554	PH	Pro	file Complex By Elements file Complex By Pl
K=LLMX53						Jard Loo		EV Sim	iple Profile By Pl
₽ <b>₽₽₽₽₽₽₽₽₽₽₽₽₽</b>			00	View 1. Defa		20	101	Pro	file Reverse Transition file Offset Transition

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

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



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





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



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



# COMPLEX PROFILE ELEMENTS

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

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

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File	Home Terra	in Geometry	Site Layout	Corridor	rs M	odel Deta	ailing	Drawing Production	Draw	ing View	FDOT								
(d .	Element Selection	Import/Export * Import/Export * Import/Export * Import/Export * Standards *	• Orivil Toggles •	7 Reports	Lines	O Arcs	-¢- Point	Offsets and Tapers Reverse Curves * Spirals *	Modify	Complex Geometry *	Open Profile Mode Set Active Profile Profile Creation *	Lines	Curves	Element Profiles *	 Modify	Com	<u>∨</u> nplex etry •	Transform	Simplify Geometry
Primary	Selection	Gene	ral Tools					Horizontal					Vertica	al		1×	Profile Co	omplex By B	lements
No No	Feature Definition			~ e?		A	P. J	8 Sta An High	Speed De	sired Lengtr ~	55MPH	~	لمر 🔰	11	00	12	Profile Co	omplex By P	PI
Explorer					- 4 >	(	View I	Default				1	- 6	E 23	Vin Vin	EV.	Simple Pr	rofile By Pl	
File Unic	🗣 items 🕞 Re s 🖯 OpenRoads	esources 🚺 OpenRoi Standards 🥑 Subaut	ads Model 🛛 🥔 face Utilities Mo	Sheet Inde	ix Jirvey	66	• 0.	<b>↓ ↓ 0 0 0</b>	•		8.2				105 ·	BRE	Define Pr Profile Re Profile Of	ofile By Bes everse Trans ffset Transit	it Fit iition

- 2. Key-in the name **CL\_SR61\_PR** on the dialog and Start at the Beginning Profile line and create a new **Connected Profile** of Maximum Gap.
- NOTE On the Profile Complex by Element tool setting, enter the Feature Name. This is the Profile Name assigned to the Profile. Switching the method should run the entire element if all elements are within the tolerance of Maximum Gap.

Comple	- 0	$\times$
Method	Automatic	~
Maximum Gap	0.03	
Feature		*
Feature Feature Definition	Centerline	*



# PROFILE REPORT

 Use the Geometry Tab and the General Tolls Group, to select the Profile Report tool located within the Reports tool Group. OpenRoads Modeling > Geometry > General Tools > Reports > Profile Report



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



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

	Report Created: 9/9/2015 Time: 1:37pm	
Project: Default		
Description:		
File Name: C:\e\SS4projects\22049555201\roadway	DSGNRD01.DGN	
Last Revised: 9/9/2015 13:33:59		
<u></u>	00000	Note: All units in this report are in feet unless specified otherwis
Horizontal Alignment: SR61		
Horizontal Description:		
Horizontal Style: Centerline(CL)		
Vertical Alignment: SR61_P		
Vertical Description:		
wardcar beschpuon:		
Vertical Style: Centerline(CL)	200000	000000000000
Vertical Style: Centerline(CL)	Station	Elevation
Vertical Style: Centerline(CL)	Station	Elevation
Element: Linear POB	Station 698+53.79 R1	Elevation 37.36
Element Linear POB PVC	Station 598+53 79 R1 598+78.91 R1	Elevation 37.36 37.23
Element Linear POB PVC Tangent Grade.	Station 698+53 79 R1 698+78 91 R1 -0 53%	Elevation 37.36 37.23
Element Linear POB PVC . Tangent Grade : Tangent Lineght :	Station 698+53.79 R1 698-78.91 R1 0.53% 25.12	Elevation 37.36 37.23
Element: Linear POB PVC Tangent Crade : Tangent Crade : Element: Symmetrical Parabola	Station 598+51.79 R1 699+78.91 R1 -0.53% 25.12	Elevation 37.36 37.23
Element: Linear POB PVC Tangent Grade Tangent Length: Element: Symmetrical Parabola PVC	Station 699+53.79 R1 698+78.91 R1 -0.53% 25.12 699+78.91 R1	27.36 37.23
Element: Symmetrical Parabola PVC Element: Symmetrical Parabola PVC Tangent Gode: Tangent Length:	Station 698+53.79 R1 698+78.91 R1 -0.53% 25.12 698+78.91 R1 698+95.02 R1	Elevation 37.36 37.23
Element: Linear POB PVC Tangent Eright: Element: Symmetrical Parabola PVC PVC PVN PVRC	Station 699+53 79 R1 699-76 91 R1 -0.53% -25 12 699+76 91 R1 699+56 22 R1 699+11 12 R1	27.36 37.23
Element: Linear POB PVC PVI Element: Symmetrical Parabola PVC PVI PVI	51ation 698+53 79 R1 698+76 91 R1 0 53% 25 12 698+78 91 R1 698+75 02 R1 699+11 12 R1 699+11 12 R1	Elevation 37.36 37.23
Element: Linear POB PVC Tangent Easternet: Symmetrical Parabola PVC Element: Symmetrical Parabola PVC EVC Length: Element: Symmetrical Parabola PVC Engle Length: Entrance Grade: Entrance Grade: Element: E	54adion 698-43 79 R1 699-78 91 R1 699-78 91 R1 6594-76 91 R1 609-95 62 R1 609-56 52 R1 609-11 2 R1 619-11 2 R1 52 20 0.53%	Elevation 37.36 37.23

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

20	penRoads Mo	deling		0 H H I	6	h + + 1	1 🗎 +			C:\//	VorkSets\/FDOT\/F.L.U.G 2	019.roadv	wy/ALGNRD0	5.dgn [2D - V8 DGN] - Ope	mReads	Designe	CONNECT	Edition	
File	Home	Terrain		Geometry	Site	Layout	Corridor	i M	odel De	tailing	Drawing Production	Drawin	ng View	FDOT					
	Bement	80.	N M	import/Export * Design Elements Standards *		Civil Toggles -	Reports	Lines	O Aecs	-¢- Point	또 Offsets and Tapers * 교 Reverse Curves * 윤 Spirals *	Modify	Complex Geometry -	Open Profile Model Set Active Profile Profile Creation *	Lines	Curves	Element Profiles *	Medify	Complex Geometry *
Prima	y Select	on		Gene	eral T	Tools					Horizontal					Vertica	1		

<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



NOTE Always check that the profile has a Feature Name before saving to the LandXML file.

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





- With the US98 alignment selected in the *Plan View*, hover over the element to display the Context Menu and select the Open Profile Model. (Optional Method - Using the Right Click Menu under View Control navigate and pick 2 Views Plan\Profile then follow the prompts to setup a Plan and Profile views.)
- 2. Select View 3 to view the Existing Ground Profile for the mainline US98 Centerline.



- 3. With the **Profile** selected, hover over the element to display the Context Menu and select the first icon **Properties.**
- 4. In the name field enter **US98\_EX.**

Feature	^
Feature Name	BL98_EX
Feature Definition	DtmExisting

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



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Use the Geometry Tab and the General Tools Group, to select the Export Geometry tool, select the US98\_EX plan element and save as a LandXML file. (Ex. US98\_EX.xml). Openroads Modeling > Geometry > General Tools > Import/Export > Export Geometry



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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**.

View 3, Profile - FRIENDSHIP	
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- 4. Repeat the steps for Friendship2 Rd.
- Open View 2 using the F2 Function Key to see the 3D alignment cernterlines for the project (Optional Method - Using the Right Click Menu under View Control navigate and pick 2 Views Plan\Profile then follow the prompts to setup a Plan and Profile views.).
- 6. Notice the 3D lines displays in *View 2*.


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## **Civil Geometry**