State of Florida Department of Transportation



FDOT Roadway Design & 3D Modeling

Basic 2D Rule Based Design (Introduction & Chapters 2, 3, & 4)

Advanced 3D Modeling (Introduction & Chapters 1, 5, 6, 7, 8, 9 & 10)

Course Guide

October 31, 2018

PRODUCTION SUPPORT CADD OFFICE TALLAHASSEE, FLORIDA

http://www.fdot.gov/cadd/

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FDOT Roadway Design and 3D Modeling

Basic 2D Rule Based Design Training

Description

This is a 2-day training course to include the Introduction and Chapters 2, 3, and 4 of the course guide. Participants will be introduced to Bentley GEOPAK V8i SELECT Series4 (SS4) OpenRoads Technology tools for design and modeling; specifically for Florida Department of Transportation (FDOT) projects using the FDOTSS4 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
- Task Menus 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 FDOTSS4 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 GEOPAK concepts and a solid understanding of the engineering necessary to design a Roadway.

Duration: 16 Hours

Professional Credit Hours: 16 PDHs

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FDOT Roadway Design and 3D Modeling

Advanced 3D Modeling Training

Description

This is a 2-day training course to include the Introduction and Chapters 1, 5, 6, 7, 8, 9, and 10 of the course guide. Participants will continue to learn the Bentley GEOPAK V8i SELECT Series4 (SS4) OpenRoads Technology tools for design and modeling within the FDOTSS4 workspace. Several advanced concepts and technologies will be introduced including:

- Rule Based Superelevation Design Parameters
- Associating Template Points to Superelevation Lanes
- Constructing 3D Elements
- Building Intersection Terrains from 3D Elements
- Appling a Surface Depth to Terrain Elements
- Placing 3D Civil Cells
- Configuring Advanced 2D and 3D Civil Cells
- Corridor and Terrain Model Clipping
- Applying Linear Templates to 3D Elements
- Building DTM, XML Files for Construction Deliverables

Objectives

- Create a Superelevation Shape Model.
- Create Superelevation Sections and Lanes.
- Calculate and Assign Superelevation to a Corridor.
- Create an Intersection Terrain Model from 3D Elements.
- Create a Traffic Separator Nose Model on the Corridor Model.
- Create an Island Model on an Intersection.
- Apply Linear Corridors along 3D Elements.
- Create 3D Driveway on a Corridor Model.
- Create 3D Sidewalk Ramps on Intersection Model.
- Prepare the Files Necessary for Construction Deliverables.

<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 GEOPAK concepts and a solid understanding of the engineering necessary to design a Roadway.

In addition to the above, the participant is required to complete:

FDOT Roadway Design and 3D Modeling - Basic Training.

Duration: 16 Hours

Professional Credit Hours: 16 PDHs

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INTRODUCTION

This course was developed to introduce Roadway Designers to the V8i SELECTSeries4 (SS4) OpenRoads Technology tools for design and modeling on Florida Department of Transportation (FDOT) projects. The curriculum was developed within the FDOTSS4 Workspace to provide sample exercises for most of the new Civil Tools on a sample project data set.

COURSE OBJECTIVES

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

- Create a Terrain Element from the existing surface to be used as a reference for the project.
- Develop Existing Feature Terrain Surfaces to be shown on cross sections and used in earthwork calculations.
- Use Civil Geometry Elements in the design file to calculate and define a proposed centerline of construction and while using the built in Design Standards Criteria checking.
- Use Civil Geometry Elements in the design file to define the roadway features of the proposed design.
- Apply Civil Cells delivered within the FDOTSS4 Civil Cell DGN library.
- Use Civil Geometry Elements in the design file to define the vertical profiles of a proposed centerline.
- Use the Standard Components and Templates within the FDOTSS4 Template library.
- Create a 3D Model of the existing and proposed Roadways.
- Reference 2D Civil Geometry Elements to a Corridor Model by adding the elements for use as design model control lines.
- Apply varying Typical Section conditions along the project, including: variable medians, special ditches, handrail checks, gravity wall placement, slope conditions, left and right turns, etc.
- Define the Superelevation Standards along a corridor.
- View Dynamic Cross Sections for review, updates, and design checks along the project before cross sections are created for printing.
- Create and display 3D Models for better designing and visualization.
- Use the Milling Overbuild and Overlay Components on a project corridor.
- Apply Corridor Modeling Techniques used for developing driveways and intersection, etc.

EXPECTATIONS – WHAT THIS COURSE PROVIDES

This course provides a standard workflow for designing a project with Bentley Systems GEOPAK OpenRoads Technology within the FDOTSS4 Workspace. Although the majority of tools are used throughout, this course does not provide a description of every Bentley Systems GEOPAK OpenRoads Technology Civil Tool. Integrated help for each of the tools can be found by selecting from the Main Menu in MicroStation: GEOPAK > ROAD > Help.

<u>G</u> EOPAK	<u>Wi</u> ndow	Sub	surface Utility Engineering <u>H</u> elp	1
<u>R</u> OAD		•	ROAD Tools	
SURVE)	r GF	+	Project Manager	
LANDSC	CAPE	•	Active Chain Control	
WATER	SEWER	►	Element Attributes	
Training			3PC AdHoc Attribute Manager	
Activate Map			<u>U</u> ser Preferences Geometry	,
			Design & Computation Manager	
			Plans Preparation	•
			DTM <u>T</u> ools	
			<u>3</u> D Tools	•
			Cross Sections	•
			<u>U</u> tilities	۲
			Help	



DOCUMENT STYLE

	Item	Convention	Example
	Menu names and commands	Bold N (Names separated with > symbol)	 File > Open File > ComSelect > Design
	Dialog box Actions	Bold	 Click the Apply button. Click the Graphic Select button to the right of the <i>Horizontal Alignment Include</i> box. In the <i>Segment Type</i> list, click Lines.
	Dialog box Field Names	Italic	 Key in Hemfield Road in the Alignment Name field. Click the Graphic Select button to the right of the Horizontal Alignment Include field. In the Segment Type list, click Lines.
-	Key-ins	Bold	• Key in Hemfield Road in the <i>Alignment Name</i> field.
	File Names	Italic	 Open the file Working Graphics.dgn in the C:\Bentley Training\GEOPAK 101\Project Setup\Practice\ folder.
	File Paths	Non italic	 Open the file Working Graphics.dgn in the C:\Bentley Training\GEOPAK 101\Project Setup\Practice\ folder.
	New Terms or Emphasis	Italic	• The Template Library contains <i>templates</i> , which represent typical sections of the proposed roadway.

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

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.
- <u>Surface.dat (i)</u> A binary (or ASCII) file containing string and point information that is used for digital terrain model construction.
- <u>Surface.dtm (i/o)</u> 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>Geometry Project.gpk (i/o)</u> A binary file (*job###.gpk*) created when starting a coordinate geometry (COGO) session for the first time or created through Project Manager, that stores geometric data including points, lines, curves, spirals, parcels, chains, and profiles. The file may be appended to during the design process. Multiple users can access this file at the same time. Only one file should be created for each project. The "###" is the only variable in this filename. It represents a job number (1 to 3 alphanumeric characters) unique to a project and is user defined upon creation.
- <u>*CMJobxx.alg* (*i*)</u> A binary file containing the imported Chain, Profiles, and MicroStation Plan Elements necessary on a project in the Select Series 2 Version of GEOPAK Corridor Modeling.
- <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.
- <u>*Project.rdp*</u> Stores the corridor modeling preferences imported geometry, DTM, and plan graphics in the Select Series 2 Version of GEOPAK Corridor Modeling. This file is not used or imported in the Select Series 3 release.
- <u>Project.ird (i)</u> Stores Corridor Definitions including; Limits, Template Drops, Parametric Constraints, Superelevation, Point Controls, Key Stations, Etc. in the Select Series 2 Version of GEOPAK Corridor Modeling. This file can be imported in the Select Series 3 release.

LEARNING RESOURCES

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

• Bentley Communities:

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

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: <u>https://www.Bentley.com</u>

• YouTube:

Bentley OpenRoads Videos are available on a variety of topics:

http://www.youtube.com/user/BentleyCivil

• YouTube Search - Google:

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

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

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

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

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

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

COURSE SUPPORTING FILES

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

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

INTRODUCING A NEW WORKSPACE

FDOTSS4 PREDEFINED SETTINGS



DESIGN FILE SETTINGS:

egory	Export Setting	js		•
ve Angle	Export To Native	Use Feature S	etting	
le Readout	Coordinate Se	ttings	^	
Formatting	Format	XY		-
	Precision	0.1234		
ce	Ratio Settings	(Distance:Off	set) 🔺	
netric	Format	1:D		
ks	Precision	0.1234		
ps am	Station Settin	gs	*	
vs	Format	\$\$+\$\$		
king Units	Format Delimiter	+		
	Precision	0.1234		
	Equation	By Name		
	Radius Settin	gs	^	
	Degree Of Curve Degree Of Curve Radius Topole Ch	Method Arc Length 100.00	0000	
	Profile Setting	gs	~	
	Elevation Precisio	0.1234		
	Slope Format	Percent	age	
	Slope Precision	0.1234		
	Ratio Format	Run:Ris	e	
	Ratio Precision	0.1234	1.10	
	Vertical Curve Pa	rameter Kvalue		÷
	Focus Item Description			

FDOTSS4 WORKSPACE PREFERENCES:

Preferences [FDOTSS4]			
Category	Name for preferences Default Preferences		
Database			
Input	Subsurface Utilities	*	ОК
Look and Feel	Manipulator Settings	~	
Mouse Wheel	Manipulator Sizo 10		Cancel
Operation	Normal Color 1255 255 1281		
Raster Manager	Read-Only Color [211,211,211]		Defaulte
Reference	Selected In Property Pi [255.255.255]		Deradits
Spelling	Selected Color [255, 165, 0]		
Tags	Manipulator Font Arial		
Task Navigation	Manipulator Font Scale 1		
View Ontions - Civil	Manipulator Transpare 30		
View Options	Use Shaded Manipulat True		
	Superelevation Settings	*	
	Fill Color Shaded Fill		
	Survey Locator	*	
	Maximum Error Ellipse	*	
	Medium Error Ellipse	*	
	Minimum Error Ellipse	*	
	Focus Item Description		

FDOTSS4 Keyboard Shortcuts

These will open the Civil Tasks on your cursor as shown below.

ß	Analysis & Reporting	Ctrl+Shift+A
ß	General Geometry	Ctrl+Shift+G
ß	Horizontal Geoometry	Ctrl+Shift+J
ß	Vertical Geometry	Ctrl+Shift+V
ß	Terrain Model	Ctrl+Shift+T
ß	Corridor Modeling	Ctrl+Shift+M
ß	Civil Cells	Ctrl+Shift+C

FDOTSS4 FUNCTION KEYS

F	FDOTSS4 Function Key Assignments				
F1	Opens the Civil 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 off and on.				
F8	Toggles between MicroStation AccuDraw and Civil AccuDraw.				
F9	With 3D Model view active, Toggles Off 3D proposed model shapes and bottom lines.				
F10	With 3D Model view active, Toggles On 3D proposed model shapes.				
F11	Toggles (opens or closes) the Project Explorer dialog.				
F12	Opens the Create Template dialog.				

Function Keys:\Interfaces\Fkeys\FDOTSS4_FKEY.mnu						
<u>F</u> ile						
- Function Ke	Function Keys					
⊡ <u>C</u> trl	At Shift F1					
Key:	F1					
Action:	expand keyin %% "\$(MS_HELPLOAD_SERVER)Civil_Tools_SS4.chm"					
Kev	Action:					
F1	expand kevin %% "\$(MS_HELPLOAD_SERVER)Civil_Tools_SS4.chm"	m)				
F2	vba run [ViewSet] Module 1. Two View 3D	-				
F3	view on 3; view off 4; window arrange	-				
F4	vba run [ViewSet] Module1.FourView					
F5	vba run [ViewSet] Module 1. SetActive Model To DrawLast					
F6	choose none					
F7	vba run [ViewSet] Module1.ToggleViewConstructions;					
F8	vba run [AccuDraw] Toggle.ToggleOnOff					
F9	level set display off "* px";level set display off "bottom pm";level set display off "					
F10	level set display on "*_px"					
F11	dialog project toggle					
F12	corridor templatelibrary open					
Alt+F3	vba run [ViewSet] Module 1. Exaggerate ZFor Attachment	Ŧ				
	<u>O</u> K Cancel					

• Function Key F1 – Civil Help



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





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

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



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



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



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



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



• Function Key F9 – With 3D Model View Active, Toggles Off 3D Shapes and Bottom Lines



• Function Key F10 – With 3D Model View Active, Toggles On 3D Shapes.



• Function Key F11 Toggles Project Explorer Dialog Open/Close.

R Project Explorer	
🖺 Links 🔀 File 🏮 Survey 📿 Civil Model 😵 Civil Standa	ards
E…Z Civil Data mathing C GDTMBD02 DGN, Default	

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



FDOTSS4 USER CONFIGURATION VARIABLES

Configuration : User [FDOTSS	53]	
<u>F</u> ile		
Category All (Alphabetical) All (By Level) Cells Clash Detection Colors	•	View/modify all configuration variables.
Data Files Database Design Applications Design History Distributed DGN DWG/DXF Engineering Links Extensions File Saving Levels Markup	III	CIVIL_DEFAULT_STATION_LOCK User Edit Select Delete New Expansion C:\FDOTSS3\RESOURCES\Dgnlibs\Civil_Cells*.dgnlib
MDL Development OLE Operation Primary Search Paths Printing Protection Raster Reference Reference Rendering/Images Security		Description
Seed Files	*	For more options, click on the category list at left.

FDOT SS4 DESIGN AND 3D MODELING OVERVIEW



GENERAL WORKFLOW AND CHAPTER OUTLINE

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

RECOMMENDED MICROSTATION SETTINGS

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

GETTING STARTED

- 1. (Optional) Extract the 22049555201(1).zip file in the Data Set folder to the c:\e\projects folder. If this is a class environment, then this step has already been completed.
- 2. (Optional) Copy the 22049555201.pcf file in the Data Set folder to the c:\e\projects folder. If this is a class environment, then this step has already been completed.



- 3. Click on the **FDOTSS4** icon so the windows task bar <OR> double click on the FDOTSS4 icon in the FDOTSS4 folder on the desktop to open the Workspace.
- 4. In the lower right corner of the File Open dialog, set the User to FDOTSS4, Project to 224049555201, and Interface to FDOTSS4.

	.,	1.000			
	7/15/2014 3:09 PM	File fol			
	7/15/2014 3:09 PM	File fol			
	7/16/2014 3:42 PM	File fol			
	7/15/2014 3:09 PM	File fol	Ŧ		
		+			
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(*.dgn)	•	Cancel		Project:	22049555201 💌
		Options		Interface:	fdotSS3 🔹
					d

5. Navigate to the *Roadway* folder, select *TYPSRD01.dgn* and click **Open**.

MENU DOCKING



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



Verify that the *Project Explorer* is docked on the left side; if not, from the main menu bar, select File > Project Explorer, dock and unpin...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 main menu bar, select **Settings > Levels > Display**, dock and unpin.



4. Verify that the *Task Bar* is docked on the left side; if not, from the main menu bar, select **Tools** > **Tasks**, dock and unpin.



5. Verify that the *Element Information* is docked on the right side; if not, from the main menu bar, select **Settings > Element Information**, dock and unpin.



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

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1 EXISTING TERRAIN AND FEATURES

INTRODUCTION

This chapter will introduce the OpenRoads Technology tools to use for viewing the existing terrain and creating 3D existing features in design models in FDOTSS4.

CIVIL TERRAIN MODELING

As defined in the Bentley Civil Tools help files:

"A terrain model is a set of three-dimensional triangles mathematically computed from point data collected on the surface being modeled. Models are used to define highly irregular surfaces, particularly the surface of the earth, but can be generated for proposed surfaces, subsurface geotechnical layers, and etcetera. Terrain models are also referred to as digital terrain models (DTMs), triangulated irregular networks (TINs), or triangulated surfaces.

The MicroStation Terrain Model tools support importing and labeling terrain contours and spots on terrain models. You can import a terrain model into a DGN to use its data. Terrain models imported from the LandXML file format are supported within MicroStation. However, any manipulation or importing from Civil products must be done within Bentley Civil.

Bentley Civil provides a robust set of tools to create, edit, analyze, and work with terrain models.

A terrain model is recognized as a MicroStation element type as of MicroStation V8i (SELECTseries 4). When you select a terrain model, the Element Selection tool Element Type tab indicates that it is a Terrain element type."

Several terrain model civil features have been developed for the FDOTSS4 Workspace to be used on FDOT projects. Terrain elements created in the design file can be selected from these features in the various Terrain Model Tasks.

WORKFLOW INFORMATION

The workflow process for getting existing features to appear on cross sections has changed significantly in FDOTSS4. No longer will the legacy existing features criteria be used. Instead the existing features will be created in a 3D model following the steps outlined in the exercises to follow.

- Levels containing the existing features will be identified from the SURVRD01 OR TOPORD01 file and copied into a GKLNRD file.
- Closed shapes will be created to contain areas representing the existing features. These are the features which are typically required to be the on cross sections.

Level	Existing Feature				
CGBack_ep	Curb Back Line				
CGep_ep	Curb Edge of Pavement				
ConcSlabs_ep	Concrete Slabs				
Driveway_ep	Driveway Pavement				
PavtAsphalt_ep	Pavement (Roadway)				
PavtMisc_ep	Pavement (Miscellaneous)				
ShldrPaved_ep	Shoulder Pavement				
SidewalkFront_ep	Sidewalk Front Line *				
SidewalkBack_ep	Sidewalk Back Line				
TrafSeparator_ep Traffic Separator					
* A sidewalk front line	may not be present when				
the sidewalk is adjacent to curb.					

The table below is a list of the Levels that contain these features.

- The existing Terrain will then be clipped by each shape individually to create separate existing feature Terrains
- A surface template is then applied to the terrain features to define the sub-surface depth to the terrain.
- For the non-uniform depth curb and gutter a linear template is applied.
- A profile is added to the R/W Existing lines in order to display the R/W line symbol in a cross section view

When finished, the file will contain 3D existing features developed from the original existing DTM terrain and TOPORD01 files. As a result of creating this file, any cross section created while the terrain elements are displayed in the 3D model will show existing features below the surface.

EXERCISE OVERVIEW

- 1.1 Create and Set Up the GKLNRD file
- 1.2 Create Shapes Using FDOT Create Existing Features
- 1.3 Create Existing Feature Terrains (External)
- 1.4 Clip Terrains within Terrain, i.e. Medians/Traffic Separators
- 1.5 Create Existing Traffic Separator Terrains
- 1.6 Apply Surface Templates
- 1.7 Edit Existing Feature Depth
- 1.8 Add Curbs to the Existing Features
- 1.9 View Existing Cross Sections
- 1.10 Add Existing R/W Lines for Cross Section Viewing
- 1.11 Add Existing Utility Lines for Cross Section Viewing

Exercise 1.1 Create and Set Up the GKLNRD file

In this exercise, the GKLNRD01.dgn file will be created and the FDOT Create Existing Features tool will be used to reference the SURVRD01 file which contains the existing survey. The RWDTRD01 file will also be referenced.

1. From the main Tasks bars, select the FDOT Plans Development task.



2. From the *FDOT Plans Development, Roadway Plans* Task, select the **Create New File** icon. The **Create File** dialog displays.

Roadway Plans	
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W Create New File	
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3. Create a *GKLNRD01.dgn* file with the Create File/Project dialog as shown below.

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Actio	on:	mdi I plot	scale;plot	scale	set				

- 4. Click **Create Open File** to create the file, *GKLNRD01.dgn*. Click **Open File**, *GKLNRD01.dgn* displays. **Set/Update Plot Scale** displays. Use the default settings and click **OK**.
- 5. Click **Close** to close the **Create File** dialog.
- 6. From the *FDOT Plans Development, Existing Features* Task, select the **Create Existing Features** icon.

Tasks FDOT Plans Development	•
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Key Sheets	~
Roadway Plans	*
Existing Features	
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7. At the Open dialog, navigate to the project **survey** directory and select the *SURVRD01.dgn* file.

Men Open							×
← → ~ ↑ <mark>.</mark> « 2204955	5201 > s	urvey	~	Ō	Search survey	8	Q
Organize 🔻 New folder						•	?
 ✓ Quick access ✓ This PC ✓ Desktop ✓ Documents ✓ Downloads ✓ Music ✓ Pictures 	^	Name eng_data Ø GDTMRD Ø SURVRDC Ø TOPORD	01.DGN 11.dgn 01.DGN	^		Date modified 5/3/2010 4:29 / 11/7/2013 8:09 11/2/2016 5:41 10/24/2016 1:3	PM AM PM 6 PM
— File name:		<		~	Drawing Files (.d	an) (*.dan)	~
					Open	Cancel	

8. Click **Open**. *FDOT Features 1.00.00* opens. (The tool has attached the reference file, copied in the elements, and then turn off the display to the reference file.)

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9. Select MicroStation Fit View to see the elements copied into the file.



- 10. Delete the DTM element from the file.
- 11. Turn on the display for the referenced SURVRD01 file.
- 12. Turn off all the levels in the reference SURVRD01 file except the DTM_ep and DTM_ex.

> To Add Lines from R/W

- 1. From the MicroStation menu select File > References and attach the following files: C:/e/projects/rwmap/RWDTRD01.dgn
- 2. From the FDOT Plans Development, Existing Features Tasks, select the Copy Reference File Levels icon.

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Roadway Plans	*
Existing Features	
	File Levels
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	RevisionsText		Attach External Reference Files Batch Attach Reference Files Reference-Raster Cleanup Utility Reference File Tools
			Display All Reference Files Display No Reference Files

<OR> From the FDOTSS4 Menu select Design Apps > Reference File > Copy Reference **File** Levels.

- 3. Select the level **RWLine_ep** and click the **Add** button. When finished select **Process**.
 - Copy Reference File Levels × 🔊 🖬 🖏 Available Levels To Process Levels To Process EXFEAT_SURVRD01.dgn "RWLine_ep" RWDTRD01.DGN Default\ "Default" Default "LeaderLine_dp" "RWLine" "TextCurveData" "TextLabel" "TextMinor" "TextMisc" -1 . Turn Global Display Off Process *
- 4. Click the **X** button to close the application.
- 5. From the *Reference* file manager, turn the display off for the *RWDTRD01.dgn* file.

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Exercise 1.2 Create Shapes Using FDOT Create Existing Features



The FDOT Features tool will be used to assist in closing areas and creating the necessary shapes for the existing features to be modeled. The tool contains a drop-down menu and 3 tool icons. The drop-down menu allows for the selection of the active existing feature. Levels are turned on/off to help isolate the areas where shapes are needed. In order to create a continuous shape around the existing features, miscellaneous lines are drawn in the file at various locations. The first icon, Place Feature Line, activates the Place Feature Line tool. The second and third icons are used to create the shapes either by the flood method or by selecting the elements to trace.

1. On the FDOT Features dialog, select Pavement from the dropdown list.



2. Select Place Feature Line and place lines to separate the 2 existing roadways and close off the pavement areas as shown.







- Note The lines drawn to close the turnouts (purple) beyond the RW line can be used to create shapes for either Turn Out or Pavement depending on preference
 - 3. Select the icon Create Feature Shape by Flood.

FDOT Features 1.00.00	
Pavement	- / @ /

- 4. Data point inside each area defined with step 2 to create the required shapes. The tool will highlight and zoom the area to fit the view before accepting each shape. Click again in the screen to accept. Zooming out to see the entire shape before selecting inside an area is not necessary.
- 5. Repeat the steps to create closed shapes for each of the following types of features.
- Note Place lines to close line work differentiating existing features. It may be necessary to modify the Tolerance value when creating the shapes. The Flood Feature Tolerance dialog box will pop up when the Create Feature Shape by Flood tool is activated.

	Existing Features Types:
	Shoulders
	Driveways,
	Existing Traffic Separator
	Turnouts
	Side Streets
	Medians
	(CGFace_ep and CGBack_ep elements will be used in later exercises.)
Note	This exercise is meant to demonstrate the procedures for adding existing features into a 3D model. There may be more features on a typical project and the steps outlined here can be used to achieve the desired

6. Close the FDOT Features tool and then close MicroStation.

results.
Exercise 1.3 Create Existing Feature Terrains (External)

Once the shapes are created, those shapes can be used to create individual terrains from the existing DTM. This is referred to as External Clipping. In this exercise, the Open Roads Civil tool, Clip Terrains will be used to create the terrains for the pavement, shoulders, driveways, and turnouts.

- 1. Open up the MicroStation file C:\e\projects\22049555201\Roadway\GKLNRD01.dgn.
 - a. Set the Active Level to PavtAsphalt_ep and turn Off all the other Used Levels.
 - b. Make sure the Reference file display for the *Terrain* is turned **On**.
- 2. Use the *Existing Features*, Clip Terrain tool to create a *Terrain for Existing Features*.

Existing Features	
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E Clip Terrain	

- *Note* If you did not close the file when completing Exercise 1.2 and the file crashes when activating this tool, use Clear Crash to close the MicroStation session. Reopen the file and start this exercise from step 1.
 - 3. On the Create Clipped Terrain Models dialog, under the *Feature* section set the *Feature Definition* to **DtmExistingFeature** and enter **ExFeature_SR61_Pavement** for the *Name*.
- *Note* DtmExistingFeature is a terrain feature used for Surface Templates. It is a construction class terrain element and can be turned OFF with the F7 function key.

Reference Terrain Model	Existing_Ground	~
Clipping Method	External	~
Horizontal Offset	0.000000	
Vertical Offset	0.000000	
Feature		^
Feature Definition	DtmExistingFeature	~
Name	ExFeature_SR61_Pavement	

- a. Following the prompts on the end of the cursor, locate the *Reference Terrain Model* element. This will be the terrain you are clipping from; which in most cases will be the *Existing Terrain Model*. Select the **GDTMRD boundary** as the *Reference Terrain*.
- b. Locate the *Clipping Element*; the shape for which you want to create a terrain. Select the **shape** created for the *left existing pavement* for *SR 61* and data point to accept it as the *Clipping Element*.
- *HINT* Some of the shapes may overlap each other. **Right-click** or **Tab** through the shapes and select the correct one. Select **F6** to exit the command and then restart the command if needed.

- c. Right click to **Reset** when finished to stop selecting *Clipping Elements*.
- d. Set the *Horizontal Offset* to **0.0** and **left-click** to accept.
- e. Set the *Vertical Offset* to **0.0** and **left-click** to accept.
- f. Set the *Clipping Method* to **External** and **data point** to accept.
- *Note* When selecting multiple shapes, the dialog will flip and lock to the internal method. External boundaries can only be selected one boundary at a time.

Internal clipping elements will be added in another exercise.

4. Repeat step 3 to create the terrain for the right side of SR61. The tool will automatically rename the terrain by adding a 1 to the end. (Notice that the triangle for the right side of SR61 are triangulating outside of the boundary.)



- 5. A *clipped terrain* is created and placed in the 3D Model of the *GKLNRD01*. The 3D Model is then referenced to the 2D Model. To Edit a terrain, it must be done in the 3D model. Select the *Function Key* **F2** to open both the 2D and the 3D Model.
- 6. Change the *View Rotation* to **Top** and zoom in to the area of triangles that are incorrect.
- 7. Select the Function Key F11 to open Project Explorer.
- 8. Under the Civil Model tab, go to GKLNRD01.dgn, **Default > Terrain Models > Terrain Model: ExFeature_SR61_Pavement1** (the right side existing terrain for SR 61).
- 9. Right Click on the Terrain Model and select Rules > Remove Rules.

- 10. With the 3D view active, go to **Tasks > Civil Tools > Terrain Model > Edit Terrain Model**.
 - Tasks 🧭 Civil Tools of . X Analysis & Reporting M General Geometry Korizontal Geometry * 🖽 Vertical Geometry ۷ A Terrain Model 🗛 🕾 👯 📾 🚇 周周 A 14 2 社風風 1 \$ Edit Terrain Model 123 A
- 11. The Edit Terrain toolbox opens. Select the option to Delete Triangle By Line.



12. In the 3D view, select the terrain boundary and then draw a line across the unwanted triangles.



- 13. Continue deleting triangles until removed from all 3 areas. When done, close the 3D view.
- 14. Repeat the Step 3 **Clip Terrain** command for each of the following existing shapes. Use the table below to record the *Status*.

Status
completed

Exercise 1.4 Clip Terrains within Terrain, i.e. Medians/Traffic Separators

In some cases, the terrain created may include areas that they should not. Examples include Traffic Separator, Medians, or Curbed Islands within a terrain created for a pavement area. These smaller sections need to be clipped out of the larger terrain. This is referred to as Internal Clipping. The tool creates a new terrain with the area(s) clipped out. It does not modify the existing terrain.

In this exercise, a terrain will be created using the internal method for the pavement terrain created in the previous exercise on the right side of SR 61.

1. Select the **Terrain** and hover over the boundary to display the **Context Menu**. Select the **Properties** dialog.



2. From the Properties dialog, set the *Triangles* option to Off.

Edge Method	Max Triangle Length
Congar	
Contours	Off
Triangles	Off
Triangle Vertices	Off
Flow Arrows	Off
Low Points	Off
High Points	Off
Breakline	Off
Boundary	On
Spot	Off
Override Symbology	No
Feature Name	ExFeature_SR61_Pavem
Feature Definition	DtmExistingFeature

3. Use the *Existing Features*, **Clip Terrain** tool to create a clip boundary within a *terrain for Existing Features*.



- a. On the Create Clipped Terrain Models dialog, select the *Reference Terrain Model* **ExFeature_SR61_Pavement1.**
- b. Enter the *Name* ExFeature_SR61_Pavment2.
- c. Then locate the **shape** inside the *ExFeature_SR61_Pavement1 boundary*.
- d. **Reset** when finished.



- *HINT* Multiple internal clipping elements can be added one time.
 - e. Change the *Clipping Method* to **Internal**.
 - f. **Data point** to create the clipped Terrain.

4. To delete the first ExFeature_SR61_Pavement1 Terrain.

- a. Select F11 to launch Project Explorer.
- b. Select the **Civil Model** tab.
- c. Navigate to the *Civil Data > GKLNRD01.DGN*, *Default > Terrain Models* folder.
- d. Right-click on the Terrain Model: ExFeature_SR61_Pavement1 and select Delete.

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Civil Data Civil Data Civil Data Civil Data Civil Constraints Civil Constraints	aver	nent			^
⊞		Override S	ymbology		
		Select All (On Level B	y Elemen	t
		Export Ter	rain Model	I	•
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Exercise 1.5 Create Existing Traffic Separator Terrains

So far the Existing Pavement Terrain area has been created for ExFeature_US98_Pavement, now the Existing Traffic Separator Terrain can be created.

- 1. On the reference dialog, turn off the Display for the Default 3D model. (This will make it easier to select the traffic separator shape.)
- 2. Use the *Existing Features*, **Clip Terrain** tool to create a terrain for Existing Traffic Separator island shape.

Existing Features	
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E Clip Terrain	

- 3. On the Create Clipped Terrain Models dialog, select the *Reference Terrain Model* **GDTMRD01.**
- 4. Set the *Clipping Method* to **External.**
- 5. Set the *Feature Definition* to **DtmExistingFeature**.
- 6. Enter **ExFeature_US98_TrafficSeparator** for the *Name*.



7. Select the Traffic Separator Island Shape.

Figure 4 inotios Proventa	
Complex Shape \ Line Level: TrafSeparator_ep	

Note The curb islands will be created in exercises to follow using linear templates.

8. Turn back on the display for the Default 3D model to see the terrain triangles.

Exercise 1.6 Apply Surface Templates

In this exercise the Surface Template will be applied to each of the existing terrains created from the previous exercises.

1. Use the *Existing Features*, **Open Existing Features Template** to view Surface Templates to apply to each Clipped Terrain.



- a. The Create Template dialog displays the *FDOTSS4.itl* file.
- b. Navigate the left folders to the **Existing Feature Templates** *folder*.

C:\FDOTSS4_server\GEOPAK\comidor\FDOTSS4.itl
Point Name List
Components
End Conditions
Examples(For Training)
🖮 Existing Feature Templates
🖂 Curb Existing
🛏 DrivewayExisting
🖂 GuardrailExisting
→ PavedShldrExisting
Pavement Asphalt Existing
🖂 SidewalkExisting
HTrafficSepExisting
🛏 WallBarrierExisting
Existing Pavement Slope
🚞 Linear Templates Common
Median Conditions
Surface Templates
Typical Sections (PPM)

c. Double click on **PavementAsphaltExisting**. (This is an example of the template to be used for the existing pavement.)

Create Template File Edit Add Tools		– 🗆 X
Template Library: C:\FDOTSS4\GEOPAK\comdor\F[`\E Point Name List Components Component	Current Template Name: PavementAsphaltExisting Description:	Display Close Close Display Point Names Display All Components
Examples (For Training) Existing Feature Templates Curb Existing Driveway Existing Guardrall Existing Pavement Asphall Existing Traffic Sep Existing Stidewalk Existing Existing Pavement Slope Linear Templates Common Median Conditions Surface Templates Typical Sections (PPM) FDOT New Template1 Pavement Supplate1	0.1 -0:0 PVT_IN -0:1 -0:2 -0:3 -0:4 -0:5 -0:6 PVT_BOT_IN -0.7 0.0 0.1 0.2 0.3 0.4 0.5 0.6 + - ☆ ↔ + + + = □ ■ < ↔	PVT_OUT PVT_BOT_OUT 0.7 0.8 0.9 1.0 1.1 1.2 × Test
		MIRROR REFLECT

- d. Click **Close** to exit the dialog.
- 2. Use the *Existing Features*, **Apply Surface Template** to apply Surface Templates to each Clipped Terrain.



a. Following the prompts on the end of the cursor, locate the *Terrain Model* and select the **ExFeature_SR61_Pavement** *Terrain*.



b. Set the *Apply External Clip Boundary* to **No**. (The arrow keys on the keyboard can be used to toggle through the options.)



- c. Data point to accept.
- d. Set the General *Template* to **PavementAsphaltExisting**.



HINT The Template library can be opened by Selecting **Alt+** on the keyboard.

- e. Data point to accept that template. A surface will be applied to that terrain with the correct feature.
- 3. Repeat this procedure for each of the *Existing Feature Terrains* shown in the table below.

Existing Feature Terrain Name	Existing Feature Template
ExFeature_SR61_Pavement2	PavementAsphaltExisting
ExFeature_SR61_Shoulder(s)	PavedShldrExisting
ExFeature_US98_Pavement(s)	PavementAsphaltExisting
ExFeature_US98_Driveway(s)	DrivewayExisting
ExFeature_US98_Shoulder(s)	PavedShldrExisting
ExFeature_US98_TrafficSeparator	TrafficSepExisting
ExFeature_US98_Turnout(s)	PavedAsphaltExisting

4. To view those *Existing Features* created in the 3D Model without the *Existing Feature Terrain* triangles, click **F11** to open *Project Explorer*, then navigate to **Civil Standards** > **GKLNRD01.dgn**, **Default** > **Feature Definitions** > **Terrain Display** and toggle **OFF** either the **Terrain Display** or **DtmExistingFeature** option.





Exercise 1.7 Edit Existing Feature Depth

The surface templates that have been applied are set with a default depth. In many cases, these depths may be acceptable. If not, they will need to be edited.

- 1. Click F2 to open the views showing both the 2D and 3D models.
- 2. Select the 3D view to make it active. (A dialog will pop up asking to accept settings. This is due to the Survey attached to the file. Click on the X to close the dialog.)
- 3. Click on the **Existing Features > Edit An Applied Surface Template** icon.



4. In the 3D view, select one of the surface templates. The Editing Roadway Design Template Drop dialog (the interface is identical to the Template Library dialog) opens with the current template shown with the Library tab active.

Editing Roadway Designer Templat	Drop				1 <u>955</u> 3	
Template Library: C:\FDOTSS4\GEOPAK\comidor\FDC Till Point Name List Components End Conditions Faxemples(for Training)	Current Template Name: PavementAsphaltExist Description:	ng		isplay) Components] Display Point N] Display All Com	Constraints lames iponents	OK Cancel Help
Examples(For Training) Existing Feature Templates CurbExisting GuardrailExisting FavedShidrExisting FavementAsphaltExisting Kidewalk	-0:0 - PVT_IN :	0,3 0.4	0.5 0.6	\$ 0.7	0.8 0.9	PVT PVT PVT PVT > Test
					MIRF	IOR REFLECT

5. Click on the Active Template tab.



6. On the left hand menu, navigate to the *Parametric Constraints* folder and double click on the **EOP_PvtThick** item.

⊕ ints	
🗄 🚞 Components	
End Condition Branches	
Display Rules	
🚊 📇 Parametric Constraints	
EOP_Pvt hick	
Alternate Surfaces	
Point Feature Definitions	
Component Feature Definitions	

7. Set the *Default Value* to **-.5** and click **OK**.

Edit Default Pa	rametric Value	×
Label:	EOP_PvtThick	ОК
Default Value:	-0.500000	Cancel
		Help

- 8. Click **OK** to close the Editing Roadway Designer Template Drop dialog. You do not have to select **File > Save** to save your edits.
- *Note* Another Option is to open Project Explorer and navigate to the Terrain's surface template and right click to choose Edit and Applied Surface Template.

						5.5
🐮 Links 🔣 File Utility M	odel 📋 🤅	Survey 📿 (Civil Model)	Civil St	andards	
⊡…Z Civil Data				· .		~
GKLNRD01.DGN, Def	ault					
Linear Elements						
···· Point Elements						
	S					
🖻 🦣 Terrain Models						
Date: Terrain Model:	EvFeature	CDC1 D				
Tenain Model.	Exi catalo_	SR61_Paveme	ent			
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Exercise 1.8 Add Curbs to the Existing Features

In this exercise a model of the existing curbs will be developed. In order to use the Civil Tools to create the Existing Curb Model, MicroStation elements will need to be changed to Civil Features. Linear templates will then be applied to the feature elements to generate the depth needed for curbs.

- 1. Select Ctrl + F1 to return to a *One View* only of the project.
- 2. Select the *Existing Terrain Boundary*, and when the Context Menu displays, click on the Set As Active Terrain Model. (This will allow for profiles to be displayed on elements.)



- 3. In the Level Display dialog, right click on the *Ref*, *GKLNRD01.DGN*, *default-3D* file and **Uncheck** the display.
- 4. In the Level Display dialog, click on *GKLNRD01.DGN*, *default* file, set the *Active Level* to CG_ep, and turn OFF all other *Levels* except for CGBack_ep and PavtAsphalt_ep.
- 5. Create a *Selection* of the median shapes made from the *Back of Curb* (level CGBack_ep) elements.



a. Use the *Existing Features*, **Set Feature Definition** to set the *Back of Curb* shapes to the *Civil Roadway Feature*, **CurbExisting**.



b. On the Set Feature Definition dialog, set the *Feature Type* to **Linear** and navigate the *Feature Definition* to **Plans** (**2D**) > **CurbGutter** > **CurbExisting**. The *Name* will automatically populate.

🚯 Set Feature			X
Feature			*
Feature Type	Linear		~
Feature Definition	CurbExis	ting	~
Name	CurbExis	ting	

- c. Data Point to apply *Feature* to the selected elements.
- 6. Right click and hold to access the context menu and select **Select All On Level By Element**. Click on one of the edge of pavement shapes to create a *Selection* of the median shapes made from the *Existing Pavement (PavtAsphalt_ep)* elements.
 - a. Use the *Existing Features*, **Set Feature Definition** to set the *Existing Pavement* (*PavtAsphalt_ep*) shapes to the *Civil Roadway Feature*, **PavementExisting**.



b. On the Set Feature Definition dialog, navigate to the *Feature Definition* to Plans (2D) > PavementExisting. The *Name* will automatically populate.

🚯 Set Featur	-		×
Feature			*
Feature Type	Linear		~
Feature Definition	Pavem	ent Existin	ng 🗸
Name	Pavem	entExistin	g

c. Data point to apply *Feature* to the selected elements. ≻ Open Profile Model for Back of Curb.

- 7. Turn **ON** the *CGFace_ep* level.
- 8. Select the **Back of Curb** shape and hover over the highlighted line until the Popup Menu displays.



9. Select the **Open Profile Model** icon and select **View 3** at the bottom of the **MicroStation** window to open the *Profile* view, then data poin inside **View 3**.



10. In the *Profile* view, select the **Existing Ground Profile** to display the **Popup Menu** and then select the **Set Active Profile** icon. Close the *Profile* view window.



> Appling an Existing Curb Template

1. Use the *Existing Features*, Apply Linear Templates to create a 3D Existing Curb Feature.



- a. At the prompt locate element and select the **CurbExisting** *Feature* (i.e. back of curb line).
- b. Hold Alt down arrow key to pick the CurbExisting Template.

Pick Template		×
□- C:\FDOTSS4\GEOPAK\comidor\FDOTSS4.itl		
- Components		
End Conditions		
Examples(For Training)		
Existing Feature Templates		
Curb Existing		1
DrivewayExisting		
Guardrail Existing		
Paved ShldrExisting		
PavementAsphaltExisting		
SidewalkExisting		
Traffic Sep Existing		
WallBarrierExisting		
+ Existing Pavement Slope		
Linear Templates Common		
Median Conditions		
- Surface Templates		
Typical Sections (PPM)		
FDOT		
New Template 1		*
1016494010-190398-19208-19208		
	ок	Cancel

- c. Click Ok and then data point to accept.
- d. Press the **Alt** key to lock the *Start* and then **data point**. Press the **Alt** key to lock the *End*, and then **data point** again.
- e. Select the side to place the curb and data point outward from the *back of curb*.
- f. Enter (<OR> accept) **1 degree** for the *Exterior Corner Sweep Angle*.
- g. Enter **Existing Curb** for the *Description*. Data point to accept.

2. Select the **F2** *Function Key* to open the *3D model View*. The *3D Curb* bottom shape will appear in the model.



3. Use *Existing Feature*, **Add Corridor Reference** tool to add the *Template Target Feature*, **PavementExisting**, to the *CurbExisting Template*.



- a. At the prompt, select the **CurbExisting** *corridor boundary element handle* on level *CorrHndlStg3_dp*.
- b. Select the **PavementExisting** line in front of the *CurbExisting Feature*.
- c. Click **F6** to end the command.
- *Note* The Existing curb in the 3D model should stretch from the back to the edge of pavement as shown in the image below.



Exercise 1.9 View Existing Cross Sections

Once the Existing Feature Terrains have been created a cross section view can be created to verify the model data. In this exercise a base line in the TOPO reference file will be used to create a cross section view.

- 1. Use **Reference Display** to display the attached *SURVRD01.DGN* file. This file has the *Survey Baseline* elements displayed to use for cross sections.
- 2. Use *Existing Features*, **Open Cross Sections in a View** tool.



3. At the prompt, select the *Alignment* shown below.



4. Enter information in the dialog as shown:

Note

Be sure to **check** the Station box or the Program may crash!



- 5. **Data point** in the view to accept EACH of the settings from above.
- 6. Open **View 4** and **data point** in the view to display the **Cross Section**.



- 7. For the Cross Section View 4:
 - a. Notice many of the MicroStation Zoom, Pan, etc. commands will operate as normal.
 - b. Use the *Cross Section* View Navigation tools to examine the Existing Features.



c. Select **View Properties** and set the *Vertical Exaggeration* to **10** and then select the **View** to see the changes.

View 4, Cross Section	- Line
View Properties 🔻 🖂	•
Fit Section	
Center Backbone	
Center on Current Offse	ets
Backbone Screen Width:	0.80
Vertical Exaggeration:	10
Display Null Points	
Display Cut and Fill Gra	phics
Display Cut and Fill Val	ues

d. Select the **Station** pull down menu and change to *Station* **2+20**, (i.e. key in 220 and Enter).



8. Navigate the cross section stations and notice the blue line in the plan view designating the current cross section view station.

Note This line will also appear in the Profile Model if open.



Exercise 1.10 Add Existing R/W Lines for Cross Section Viewing

- 1. Select **CTRL** + **F1** to return to a single plan view of the *GKLNRD01.DGN* file.
- 2. From MicroStation, select the menu Tools > Groups Menu > Create Complex Chain.



3. Set the *Active Level* to **RWLine_ep.**

HINT Optional: Turn off all other levels.

4. Set the Create Complex Chain *Method* to Automatic and chain together the **RWLines** in the active file within the project Existing Terrain Limits.



- > Create a Selection Set of RWLine_ep.
- 1. Use *Existing Feature* > **Set Feature** tool to create *Civil Features* of the **RW lines** in the selection set.

Existing Features	
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E 😽 🔨 ([[]+ 😪	
Crd Set Feature Definition	*

a. In the *Feature Definition*, navigate and select the **RightofWayItems** > **RightofWayLine(Existing)** *Feature*.

Feature		~
Feature Type	Linear	
Feature Definition	PavementCrown	
Name	PipeHa □ □ □ □ PipeHa □ □ □ □ Rightof □ □ @ Eas □ @ Eas □ @ Lim □ @ Lim □ @ Lim □ @ Lim □ @ Lim	IndrailGuiderail Wayitems sementPerpetual(P sementPerpetual(P itedAccessRightof itedAccessRightof itsofConstruction ipsertvLine
	Rig	htofWayLine(Exist) htofWayLine(Prop

- b. The *Name* will be set to **Exist. R/W**.
- c. Data point in the view to Apply Feature Definitions to elements.
- d. Hover over an element to verify the new Feature Definition.



2. Select the line to display the Context Menu and select Open Profile Model.



3. At the cursor prompt, select **View 3** to open and draw the profile.



4. Select the line and select **Set as Active Profile**.

HINT To create an offset profile line, 2 feet below the surface, use the Vertical Geometry, Profile Offset Transition Command in the Civil Tools Task Menu.



- 5. Repeat these steps for each of the **R/W lines** in the file.
 - a. Use *Existing Features*, **Open Cross Sections in a View** tool.



b. Select the **Baseline Survey** line in the SURVRD file as the *Alignment*.



- c. Enter -100 feet for the Left Offset, data point in the view
- d. Enter **100** feet for the *Right Offset*, data point in the view
- e. Enter the Start Station value 0+00, data point in the view
- f. Enter or lock the *interval* to **50** feet, data point in the view
- g. Open **View 4** and data point to display the *Cross Section*.
- 6. The existing *R/W lines* appear on the cross sections.



Exercise 1.11 Add Existing Utility Lines for Cross Section Viewing

- 1. Select **Ctrl** + **F1** to return to a single plan view of the *GKLNRD01.DGN* file.
- 2. Turn On the EXFEAT_SURVRD01.dgn, SURVRD01.dgn reference attachment.
- 3. On the FDOTSS4 Menu, select the Design Apps > Reference Files> Copy Reference File Levels.



- a. On the Copy Reference File Levels dialog, from the *Available Levels To Process* column, select the **WaterB_ep** item.
- b. Click the "**plus**" sign to add it to the levels to process.
- c. Click the **Process** button, close the dialog.



4. Turn **OFF** the *Reference file* display for the utilities.

- 5. Delete any **WaterB_ep** elements in the active file outside of the *terrain boundary limits*. They are not necessary for the project limits.
- 6. Set the *Active Level* to **WaterB_ep.**
- 7. Use **Create Complex Chain**, set *Method* to **Manual** and chain together the **WaterB_ep** lines in the active file within the project Existing Terrain Limits.
- 8. Create a *Selection Set* of **Water_ep**.

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WallTempBarrier WallTempBarrier_px	

- 9. Use Existing Feature, Set Feature tool to create *Civil Features* of the Water Lines in the *Selection Set*.
- *Note* Existing and Proposed Utility features are located the Utilities folder in the Feature List.



Note This folder will be shown when the Include Utilities Features box is checked on the FDOT Menu Configuration dialog.

	FDOT Menu Configuration	
ſ	• Standard Menu	
	Options Available with Standard Menu	1
	□ Construction □ Drainage □ Include	
	☐ Geotechnical	
	Traffic Plans Traffic Control Select All	
	C Standard Plus Structures Menu	
	C Right-of-Way Menu	
	C Photogrammetry Menu 🔦 🥝	
Į		Ľ
	Existing Features	
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	w 👧 差 🖉 🕍	
	E 😽 🔨 🖽 😒	
r	Set Feature Definition	5
1		
Main	n, 10" Pipe (Quality Level B), Existing	
÷	🖗 Reclaimed Water	
+	Sanitary Sewer	
÷	👘 Telephone (Aboveground)	
Đ	Telephone (Underground)	
÷	- 🗊 Unknown	
ė	🐌 Water	
	Steam Pipes (Quality Level B), Existing	
	Steam Pipes (Quality Level C), Existing	
	Steam Pipes (Quality Level D), Existing	
	Water Main, 10" Pipe (Quality Level B), Existing	
	Water Main, 10" Pipe (Quality Level C), Existing	
	Water Main 10" Pipe (Quality Level D) Existing	

10. Data point in the view to Apply Feature Definitions to elements.

11. Use the **Selector** tool to identify the new *Feature* and hover over an element to verify the new *Feature Definition*.



12. Select the line to display the Context Menu and select Open Profile Model.





13. At the cursor prompt, select **View 3** to open and draw the profile.

14. Set the sidebar tasks to Civil Tools.

File Edit Element Settings Tools Utilities Workspace GEOP	<u>File E</u> dit Element <u>S</u> ettings <u>T</u> ools <u>U</u> tilities Workspace	<u>G</u> EOPAK <u>Window</u> Subsurface Utility
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	Tasks 💌	7 🗙 😈 View 1 - Top, Default
	🦻 Civil Tools	- G - 3 & - A 9 9
1 2-3 3-4 5 click here	1 2 3 <td>Tasks Civil Tools Switcher Start Classic Subscription Subscription</td>	Tasks Civil Tools Switcher Start Classic Subscription Subscription
	1 General Geometry	Drawing

15. To *offset* the Utility Profile line **3 feet below** the existing Terrain surface, on the Civil Tools Task Menu, select the Vertical Geometry > Profile Offset Transition tool.

🖽 Vertical Geometry	
	21-2
REWENE	~ 🛄
⊤ 止 ⊑ 🖾 💌 🗟	🔫 🖌 Profile Offset Transition

a. Set the *Placement Method* to **Single Offset**.

8	Profile Offset	
	Placement Method	Single Offset
	Offset:	-3.000000
	Mirror	
	Distance	*
	Lock To Start	
\checkmark	Start Distance	0.000000
	Lock To End	
\checkmark	End Distance	1412.065176
	Length	1323.780377
Feature 🔺		
Name		
Elei	ment Template	None 💌

- b. Following the prompt on the cursor select the water profile line in **View 3**.
- c. Enter **-3.0** for the *Offset* value.
- d. Press the \Box key and press **Alt** to lock the profile to the start point. Data point to accept the offset and start point.
- e. Press Alt to lock the profile to the end point and data point to accept the end point. f. Set *Mirror* to No.
- g. Data point to place the profile line the view.
- 16. Select the water profile line in **View 3** and hover over it to display the **Context Menu**. Select **Set As Active Profile**.



17. Press the F2 key to open the 3D view and view the 3D water line.



- 18. Repeat these steps for each of the *Utility Lines* in the file.
- 19. Use Existing Features, Open Cross Sections in a View tool.



- ASPH ASPH
- a. Select the **Baseline Survey** line in the TOPO reference file as the *Alignment*.

- b. Enter -100 feet for the *Left Offset*, then data point in the view.
- c. Enter **100** feet for the *Right Offset*, then data point in the view.
- d. Enter the *Start Station* value **0+00**, then data point in the view.
- e. Enter or lock the *Interval* to **50** feet, then data point in the view.
- f. Open View 4 and data point to display the *Cross Section*.
- 20. The existing Water Utility displays on the cross section.



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2 CENTERLINE ALIGNMENTS

INTRODUCTION

This chapter will introduce three (3) important OpenRoads Technologies for creating geometry/line work while designing in FDOTSS4. They are:

- Feature Definitions
- Civil Geometry Design Intent
- Design Standards

FEATURE DEFINITIONS

As defined in the Bentley Civil Tools help files:

"Feature Definitions are used to control symbology, annotation, and various other properties that are applied to the geometric elements. The feature definitions are built by using your existing feature table from GEOPAK (DDB), InRoads (XIN), or MX (PSS). These existing feature tables are utilized by way of a link to the file, plus the addition of more settings to enhance capabilities. 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 *FDOTCivilFeatures.dgnlib* has been developed for the FDOTSS4 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 and 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 FDOTSS4 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 FDOTDesignGeometricsCriteria.dgnlib has been developed for the FDOTSS4 Workspace to be used for all FDOT projects. Alignments created in the design file either with Civil Geometry Tools or Imported should have a set Design Geometrics Criteria. FDOT Design Geometrics Criteria can be viewed in the Project Explorer and in the Design Standard Toggle Bar.
EXERCISE OVERVIEW

In this chapter exercise, the existing roadway Baselines for SR61 and US98 will be imported from a provided (*.gpk*) 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 PPM 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	Plans Preparation Manual, Volume 1
Design Speed	50 MPH
Facility	Urban Arterial with Curb
Maximum Tangent Deflection w/out curve	1 degree Table 2.8.1a
Minimum Horizontal Radius	881 feet Table 2.83
Minimum Length of Curve	750 feet Table 2.8.2a

- 2.1 Design New SR61 Centerline
- 2.2 Import Side Roads
- 2.3 Import Baseline
- 2.4 Create ALGNRD01 Stationing Annotation Models

Exercise 2.1 Import Baseline

Import Baseline In this exercise, the user will create a new design file and import chains from the *job00.gpk* file provided from the survey.

- 1. (Optional) Extract the 22049555201(2).zip file in the Data Set folder to the c:\e\projects folder.
- 2. From the desktop FDOTSS4 folder, double-click on the Create Files icon.



3. Create a DSGNRD01.dgn file with the dialog as shown below.

🎢 Create File/I	Project		_ _ X
Project:	C:\e\projects\22049555201	-	Project Settings
Workspace:	FDOTSS4	•	
Control File: ROADWAY.CTL		11	
File Group:	File Group: Roadway Design Files (DGN)		
File Type:			
INTERSECTIC INTERSECTIC KEY SHEET LATERAL DIT LATERAL DIT LATERAL DIT MITIGATION / MOTIF FILE FI PLAN SHEET POND DESIG POND X5ECT PROFILE SHE PROJECT NO PROJECT NO PROJECT NO PROJECT NO PROJECT NO PROJECT NO PROJECT NO PROJECT NO	INVINTERCHANGE PROFILES CH CROSS SECTIONS CH PLAN / PROFILE SHEET AREAS OR PLAN SHEETS OR PROFILE SHEETS OR PROFILE SHEETS SOFILE SHEETS N IONS.PATTERN LINES & SHAPES IETS YOUT SHEETS TES OFTILE LAYOUT IESIGN DIGITAL TERRAIN SURFACE MODELS 20001 5 20001 5		E
			÷
Output File:	JDSGNRD01	_	
Output Folder:	Roadway\	_	Browse
Seed File:	fdotseed2d.dgn	_	Browse
Seed Path:	resources/seed/	_	
Action: Create Active File for C	mun prosocie/piotscale set Open File Open/Edit: DSGNRD01.DGN		Apply Action
	OK		

- a. Click Create to create the file, DSGNRD01.dgn.
- b. Click **Open File**, *DSGNRD01.dgn* displays.
- c. Set/Update Plot Scale displays. Use the default settings and click OK.
- d. Click OK to close the Create File/Project dialog.

4. If the SURVRD file exists, Use the **Attach Survey Reference Files** tool from the FDOT Menu. Otherwise skip to step 7.



5. Select the *SURVRD01.dgn* file.

Name	Date modified	Туре	Size
🎉 eng_data 🕂 🕂	5/3/2010 4:29 PM	File folder	
GDTMRD01 DGN	11/7/2013 8:09 AM	Bentley MicroStati	2,9
SURVRD01.dgn	10/24/2016 11:13	Bentley MicroStati	6,3

6. From the MicroStation menu select File > References to view the attached files:

🗈 Re	ferences (4 of 4 unique, 4 displa	ayed)						×
Tools	s <u>S</u> ettings							
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Slot	🏱 🛅 File Name	Model	Description	Logical	Orientation	Presentation	Visible Edges	•
1	SURVRD01.dgn	Default	Master Model	TOPO	Coincident - World	Wireframe	Dynamic	V .
2	SURVRD01.dgn	Default	Master Model	GDTM	Coincident - World	Wireframe	Dynamic	× .
3	SURVRD01.dgn	Default	Master Model	UTEX	Coincident - World	Wireframe	Dynamic	- V -
4	SURVRD01.dgn	Default	Master Model	DREX	Coincident - World	Wireframe	Dynamic	- V -
•			m					*
Scale	1.000000 : 1.0	00000	Rotation 00°00'00	Offset X 0.00	0000 Y	0.000000		
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- 7. From the MicroStation menu select File > References and attach the following files:
 - C://e/projects/survey/TOPORD01.dgn (disregard if SURVRD exists)
 - C://e/projects/rwmap/RWDTRD01.dgn
 - C://e/projects/roadway/AERIALS.dgn
- 8. Fit View and Save Settings, select Ctrl F.

9. Change the *Task Menu* to **Civil Tools.**

Tasks	Image: Second
Key Sheets	
Roadway Plans	
Existing Features	

10. Use *General Geometry*, **Import Geometry** tool and select the **job00.gpk** file in the *Roadway* folder.

612 General Geometry	#≡≡∧
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w 🔀 Zt 🎾	
E Import Geometry	
R 🕺 🦓 💐	

- a. Navigate to the **Alignment > No Features** folder.
- b. Click in each box to select **BL98** and **EX-61**.



c. Click Import.

11. Zoom to the intersection of **EX-SR61** and **US98**, hover over the *baseline* to verify the *alignment* imported in the previous step.



12. Use *Horizontal Geometry*, Set Feature Definition tool.



a. Set the *Feature Definition* to **Baseline(BL).**



- b. Select both **EX-SR61** and **US98** line, then click **Reset** to set the **Baseline**(**BL**) *feature* on the lines.
- 13. Select the **Element Selection** to exit the command.



Exercise 2.2 Design New SR61 Centerline

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



ConstLines1

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



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

3. Use the *Horizontal Geometry*, Line Between Points tool.

Z	Horizontal Geometry	^
Q	<u>An 🍓 🟀 🏀 X</u>	
W	-\$\$\$	
Е		
R	Line Between Points	
т	2)	

- a. Use *Feature Definition* ConstLinesBlueDash and *Name* ConstLines1.
- b. Start a line perpendicular to *BL98* and ending at in the middle of the *Driveway*. Be careful not to snap to anything on the second point.



ConstrLines2

1. Use *Horizontal Geometry*, **Simple Line From Element** tool.



- 2. Use *Feature Definition* ConstLinesBlueDash and *Name* ConstLines2
- 3. First select **ConstLines1**, then use the AccuSnap to locate the beginning of the line at *BL*98.



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



1. Use the *Horizontal Geometry*, **Single Offset Entire Element** tool.

Z	Horizontal Geometry			^	
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R	$\bigcirc \bigcirc $				
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c		1	Single	Offse	et Entire Element
5		<u>2</u>	Single	Offse	et Partial

- 2. Use Feature Definition ConstLinesBlueDash 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 TOPORD Reference file.



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ConstrLines4

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

1. Find the *Azimuth 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**.



2. Use the *Horizontal Geometry*, Line Between Points tool.



- 3. Use *Feature Definition* ConstLinesBlueDash and *Name* ConstLines4.
- 4. Start a line at the *intersection* of **ConstLine2** and **ConstLine3** 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 extend the ConstLines4 line to intersect EX-61. This step will create an interval element ConstLines5.



- > Verify the Construction Lines Maintain Design Intent
- 1. Change the Active Level to Scratch1_dp. Use MicrosStion Drawing to Place Circlee with MicroStation with a center at the end of **ConstrLines5**



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



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



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

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



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

- Construct a Horizontal Curve between ConstLines2 and ConstLines5 to Meet Geometric Standards.
- 1. Use the *General Geometry*, **Design Standards Toolbar**.



2. Set Active the Design Facility Standard to: Arterial, Flat, Urban, with Curbs, 50 MPH.



3. Activate the Toggle Active Design Standard icon.

🐂 Design Standards Toolbar	×
Krterials∖Flat Terrain∖Urban∖With Curb ar 50MPH	•
Toggle Active Design Standard	

4. Use the *Horizontal Geometry*, **Simple Arc** tool.

Z Horizontal Geometry	∷ ≡ ≡ ∧
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$\mathbb{R} \bigcirc \bigcirc$	
T 2 Simple Arc	

- 5. Use Feature Definition ConstLinesBlueDash and Name ConstLines6.
- 6. Create a *Radius* between **ConstLine2** and **ConstLine5** using the *default value* 881.4738, Set *Trim/Extend* to **Both**.

😵 Si	imple Arc		x
-	Trim/Extend	Both	•
v	Radius	881.0000	
	Loop		
	Feature		^
Feat	ure Definition	ConstLinesBlueDash	-
Nam	e	ConstLines5	



- > Make a Longer Driveway into the School.
- 1. Use *Horizontal Geometry*, Line Between Elements tool;



- 2. Turn **ON** the *TOPORD* file.
- 3. Use *Feature Definition* ConstLinesBlueDash and *Name* ConstLines6.
- 4. First, snap to the end of the first *Construction line* placed, **ConstLines1**.
- 5. Then snap to the end of the *Existing Centerline* in the **TOPORD** file.



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 *Horizontal Geometry*, **Complex by Element** tool.

∠ Horizontal Geometry
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T <u>2</u>)
$\mathbb{A} \xrightarrow{M} \mathbb{Z} \xrightarrow{M} \overline{\mathbb{Y}} \xrightarrow{V} \mathbb{Y} \xrightarrow{V} \xrightarrow{M} \underbrace{\mathbb{Z}} \mathsf{M$
S Complex By Elements

2. Create the new Alignment by connecting the elements. Use Feature Definition Centerline(CL) and Name SR61, with no spaces. Use the Manual Method.

😗 Create Comple	ex 💶 🗖 🗙
Method	Manual 💌
Maximum Gap	0.032808
Feature	*
Feature Definition	Centerline(CL)
Name	SR61

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

	💱 Create Comple	•x 🗖 🗖	×			/		
	Method	Manual	•					
i.	Maximum Gap	0.032808		. /	(
	Feature		^			Be : locatio	sure the on alif is in	
	Feature Definition	Centerline(CL)				this	direction	
	Name	SR61						
l								
					/ *	<u>ه</u>		
		/				No.	Locate Next Elen	nent
							Line From Eleme	nt: ConstLines7
							No Active Profile Level: ConstLine	s

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



- > Set a Begin Station Value at the Intersection of BL98
- 1. Use the Horizontal Geometry, Start Station tool.
- 2. Set a *Begin Station* value of **700+00** at the intersection of **SR61** and **BL98**.
- 3. Select the new SR61 Centerline(CL).
- 4. Use AccuSnap to locate the *Intersection* with **BL98** and **data point** to accept.



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



> Describe the New Centerline Geometry

1. Use Horizontal Geometry, Horizontal Geometry Report tool.



2. Select the SR61 Centerline (CL). Use the settings below at the prompt to generate the report shown.

🚯 Horizontal Geome	etry 💻 🗖 🗙
Lock To Start	
Start Station	698+53.79 R1
Lock To End	
End Station	726+41.07 R1
Interval	^
Interval	0.000000
Profile	^
Included Profiles	None

			Report Created: 7/29/2014 Time: 10:32am		
	Project:	Default			
	Description:				
	File Name:	C:\e\projects\2	049555201\roadway\DSGNRD01.DGN		
	Last Revised:	7/29/2014 10:3):42		
$\Delta \Delta \lambda$	$\Delta \Delta \Delta$			ote: All units in this report are in feet	unless specified otherwise
	Align	ment Name: S	261		
	Alignment	Description:			
	Aligr	nment Style: C	enterline(CL)		
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ment: Linea	XXX				
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	PI	$\sim \sim 0$	R1 699+55.72	402619.953	2006871.488
	Tanger	tial Direction:	N 63°11'58.7" W		
	Tang	ential Length:	101,93		
ment: Linea	X,X				
	PI	~ 0	R1 699+55.72	402619.953	2006871.488
	PI	~ 0	R1 700+00.00	402642.100	2006833.142
	Tanger	ntial Direction:	N 59°59'28.0" W		
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ment: Linea					
	PI 🔨	$\times \times 0 \times$	R1 700+00.00	402642.100	2006833.142
	PC	$< \times \infty$	R1 705+69.84	402927.098	2006339.688
	Tanger	tial Direction:	N 59°59'28.0" W		
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ormat Options				
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Elevation:			0.12 -	Help
Angular:	Degrees	-	0.1 💌	ddd^mm'ss.s" 🗨 🔲 Include Angular
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Use Alternate Slope if	Slope Exceeds:		0.00%	,
Alternate Slope:			0.1 💌	2.0:1
Linear:			0.12 💌	
Station:			0.12	ss+ss.ss 🗸 Delimiter: +
Acres/Hectares:			0.12 -	
Area Units:			0.12 💌	
Cubic Units:			0.1 💌	Convert to Cubic Yards
Direction:	Bearings	•	0.1 💌	ddd^mm'ss.s'' 💌
Face:	Right Face	•		

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

- > Save the SR61 Centerline to the job00.gpk
- 1. Use the *General Geometry*, **Export to Native** tool and save the **SR61** Centerline to the *job00.gpk* file.



Exercise 2.3 Import Side Roads

- 1. Use General Geometry, Import Geometry tool.
- 2. Navigate to the **Alignment > NoFeature** folder.



3. Select the following *GEOPAK chains* from the *job61.gpk* file: **Friendship, Friendship2.** Be certain to **Uncheck** the *Profile* before clicking the **Import** button..

Note This file may be named *job61.org* in the dataset, copy and rename it *job61.gpk*

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	DLD SR61		Ŧ
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4. Use *Horizontal Geometry*, Set Feature Definition tool.

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	NO X TO MO TO		Feature		^
Q	TT IF - 8 8 8		Feature Type	Linear	•
w	-d- o ⁺ Set Feature Definition		Feature Definition	Centerline(CL)	•
	T +		Name	FREINDSHIP	
Е		Į			

- a. Set the *Feature Definition* to **Centerline**(**CL**).
- b. Select both **FREINDSHIP** and **FREINDSHIP2** line, then click **Reset** to set the **CenterLine**(**CL** *feature* on the lines.
- c. Select the Element Selection to exit the command.



Exercise 2.4 Create ALGNRD01 Stationing Annotation Models

1. From the FDOTSS4 menu, select **Actions > Create/Edit File**.

Standard CellApps	Actions	Design Apps Drainage	Roadwa	ay 🔗 🖿 🚺 😫
	🕜 Cre	ate/Edit File		
	Set	Geographic Coordinate System	m	
	📀 Set	Plot Scale of File		
	She	eet Navigator		
	She	ets.	•	

2. Create an *ALGNRD01.dgn* file with the dialog as shown below.

M Create File/F	Project							
Project:	Project: C:\e\projects\22049555201 -							
Workspace:	orkspace: FD0TSS4							
Control File:	Control File: ROADWAY.CTL							
File Group:	Roadway Design Files (DGN)							
File Type:	ΑΥΟΠΤ							
AUTOMATED BACK OF SIDE BORDER SHE BORDER SHE BORDER SHE BORDER SHE BORDER SHE BORDER SHE BOX CULVER BRIDGE HYDF CLIP BORDER CONCRETE SI CURVE OR CC DIGITAL SIGN DIGITAL TERF DRAINAGE DE DRAINAGE FL DRAINAGE OF	ALIGNMENT LAYOUT AUTOMATED MACHINE GUIDANCE MODEL (3D) BACK OF SIDEWALK PROFILES BORDER SHEET REFERENCE FILE FOR BRIDGE HYDRAULIC SHEET BORDER SHEET REFERENCE FILE FOR DRAINAGE MAP SHEET BORDER SHEET REFERENCE FILE FOR PLAN SHEET BORDER SHEET REFERENCE FILE FOR PLAN/PROFILE SHEET BORDER SHEET REFERENCE FILE FOR PROFILE SHEET BORDER SHEET REFERENCE FILE FOR PROFILE SHEET BORDER SHEET REFERENCE FILE FOR SHEET BOX CULVERT WINGWALL DESIGN AND SPECIAL DETAILS BRIDGE HYDRAULICS RECOMMENDATION SHEET CUP BORDERS CONCRETE SLAB INVENTORY CURVE OR COORDINATE DATA SHEET DIGITAL SIGNATURE (MULTI) DIGITAL TERRAIN MODEL / TIN MODEL - 3D DRAINAGE ETAIL SHEET DRAINAGE FLOOD DATA FORM DRAINAGE FLOOD DATA FORM							
Output File:	ALGNRD01							
Output Folder:	Roadway\	Browse						
Seed File:	fdotseed2d.dgn	Browse						
Seed Path: resources/seed/								
Action: mdl I plotscale;plotscale set;model create design ALGNI Apply Action								
Create	Create Open File							
Active File for O	pen/Edit: ALGNRD01.DGN							
	ОК							

- 3. Click **Create** to create the file, *ALGNRD01.dgn*. Click **Open File**, *ALGNRD01.dgn* displays. Click **OK**.
- *Note* This tool now creates multiple models to display Stationing at different scale once the Open File button is clicked.

4. Verify the *Active Model* in the design file is **ALGNRD_50**.



5. In MicroStation, select GEOPAK > ROAD > Design & Computation Manager.

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	<u>R</u> OAD		- +	ROAD Tools
	<u>S</u> URVE) DRAINA	r GE	+	Project Manager
	LANDSC	APE	•	Active Chain Control
1	<u>W</u> ATER	WATER SEWER	→	Element Attributes
1	Training			3PC AdHoc Attribute Manager
	Activate	Man		<u>U</u> ser Preferences
1	Activate	мар		Geometry
J				Design & Computation Manager
1				Quantity Manager

a. Navigate to the *Roadway Design > Plan Features* folder and select **CL Centerline of Construction (with stationing)**.

🖌 Design and Computation Manager 🛛 🗆	23
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C:\FDOTSS3\geopak\databases\FDOTSS3.ddb	
🛅 Topography	
🛑 Structures	=
RW Items for Roadway Plans	
📄 🗁 Roadway Design	
Plan Features	
AS Archeological Sites	
BLDGP Buildings (Proposed)	
BSW Back of Sidewalk	
CI COGO Information	
CL Centerline of Construction (with stationing)	
C&CD Curve & Coordinate Data	
CZ Clear Zone	
DITCH Ditch Line	
DWY Driveway, Lane, Turnout	Ŧ

b. On the CL Centerline of Construction dialog, check the **Place Influence** box and click the **Draw Plan & Profile** button.

uction (💻 🗖 🗶
Match Point Text
Draw Plan & Profile

c. On the Open Job dialog, browse to the *job00.gpk Job* file and click OK.

Open Job	
Job: 🕕	۹
<u>O</u> K	Cancel

- 6. On the Draw Plan & Profile dialog,
 - a. Change the *Element Type* to **Stationing**.
 - b. Enter **50** for the *Label Scale*.

Item: CL Centerline of Construction (with stationing) Element Type Stationing Label Scale: 50 Key-in Points:	
Select Chain to Draw BL98 EX-61 FRIENDSHIP SR61 Image: Provide the state of t]

c. In the Select Chain to Draw List box, select on SR61.



7. Close each of the Design & Computation Manager dialogs (3) and click **Fit View** to see the results.



- 8. In MicroStation, select File > Save Settings <OR> select Ctrl F.
- 9. (Optional) Continue to add the *Stationing Annotations* by repeating these steps for the different scale models.
- 10. **Return / Open** to the *DSGNRD01* file and attach the *Reference* in the **ALGNRD01_50** *Model* file.

3 2D PLANS

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 FDOTSS4. They are:

- Civil AccuDraw
- Civil Cells

CIVIL ACCUDRAW

As defined in the Bentley Civil Tools help files:

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

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

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

CIVIL CELLS

As defined in the Bentley Civil Tools help files:

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

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

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

EXERCISE OVERVIEW

- 3.1 Preparation for 2D Plans
- 3.2 BL98 Milling Limits
- 3.3 BL98 Side Street
- 3.4 BL98 Widening
- 3.5 BL98 Widening Taper Line
- 3.6 For SR61 New Construction Template Lines
- 3.7 Add Right Turn lane on BL98
- 3.8 Add the School Entrance right Turn Lane off BL98 Intersection
- 3.9 Create/Edit the Intersection Curve Radii
- 3.10 Trim Back Sidewalk and Curb Lines to the Curve Radii
- 3.11 Use Civil Cell Technology to Place Curb and Sidewalk Around the Radii
- 3.12 Create a Custom Civil Cell for Other Radii
- 3.13 Place Left Turn with Traffic Separator
- 3.14 Place Right Turn Island
- 3.15 For BL98 Intersection Crosswalks Lines
- 3.16 Create BL98 Turnouts
- 3.17 For BL98 Intersection Shoulders
- 3.18 For Friendship Intersection

Exercise 3.1 Preparation for 2D Plans

- 1. (Optional) Extract the 22049555201(3).zip file in the c:\e\projects folder.
- 2. Open the *DSGNRD01.dgn* file of the c:\e\projects\22049555201\roadway\ folder in the FDOTSS4 Workspace in MicroStation.

Exercise 3.2 BL98 Milling Limits

In this exercise the exiting pavement edge lines from the TOPORD file are copied to be used as the Milling Lines for the proposed improvements.

1. Use MicroStation References to attach and display the *TOPORD01* and RWDTRD01 *Reference* files.

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Hierarchy		🗆 P 🗋	File Name	Model	Description
		Display	Aerials.dgn RWDTRD01.DGN	Default Default	Master model Master model
			TOPORD01.DGN	Default	Master model
			ALGNRD01.DGN	ALGNRD_50	Global Origin aligne.

2. Use MicroStation Level Display to turn OFF all the *TOPORD01 Levels* except the PavtAsphalt_ep.



3. Use MicroStation *References*, Merge into Master tool to copy existing edge PavtAsphalt_ep lines into the active *DSGNRD01* file.



4. Use the *Horizontal Geometry*, Line Between Points tool.



5. Create a PavementMilling(ML) line across the existing intersection of SR61 and BL98.



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



- 7. Repeat these steps for the other **side roads** along *BL98*.
- 8. Create a *Selection Set* of the **PavtAsphalt_ep** by level.

Image: Constraint of the second s	💡 Element Selection 💶 💷 💌	
Image: Constraint of the second state of the second sta		
Level		
Paret Tract Parcel Raw Park Equip_ep Pattem Lines 1_dp Pattem Lines 2_dp Pattem Lines 3_dp Pattem lines_ep Paved Median Base_px Pavemk_ep Pavers Pavt Asph_ep Pavt Asphalt Pavt Asphalt_pm	Level	
	Paret Tract Parcel Raw Park Equip_ep Pattem Lines 1_dp Pattem Lines 2_dp Pattem Lines 3_dp Pattem lines_ep Paved Median Base_px Pavemk_ep Pavers Pavt Asph_ep Pavt Asphalt Pavt Asphalt_pm	



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

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



9. Use the *Horizontal Geometry*, **Set Feature Definition** tool.

💙 Horizontal Geo	ometry	# ≡	= ^
a 🐴 🐐 🏀	8		
₩-¢- ₊ ° ⁺	Set Feature Definition]	
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ROCO	$\neg \square \bigcirc \square$		

10. Data point to change the elements to the Feature Definition, PavementMilling(ML).

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Feature	*		
Feature Type	Linear 💌		
Feature Definition	Pavement Milling (M 💌		
Name	ML		م مربر
0			
Data Po Selecter	int to Apply Feature De d Elements.	finition to 57	
15			

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

🙀 Element Selection 💻 🗖 🗙	
Image: Control of the control of	
Line String: ML6 Feature: Pavemen No Active Profile Level: PavtMilling	g ⅔ ⊭ 🗙

Exercise 3.3 BL98 Side Street

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

1. MicroStation 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 MicroStation AccuDraw.



2. Use General Geometry, Civil AccuDraw tool to activate the Civil AccuDraw toolbar.

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w Z Zt 💙	
e 🔆 🔆 🗗	
R Activate Civil Accudraw Toolbar	

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



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

Z	Horizontal Geometry
Q	<u>An 🗞 😵 🥙 📎</u>
W	-\$+° ⁺
Е	\mathbb{Z} \mathbb{Z}
R	Line Between Points





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



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



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



d. Data point in View to place the point.



Exercise 3.4 BL98 Widening

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

	START STATION	OFFSET	LENGTH
1	28+00	16 feet	500 feet
2	33+00	32 feet	600 feet
3	30+00	-24 feet	300 feet
4	33+00	-24 feet	1000 feet



1. Toggle **OFF** *Civil AccuDraw* tool.

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	Civil AccuDraw	3	
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11	Toggle Off		

2. Use the *Horizontal Geometry*, **Single Offset Partial** tool.

∠ Horizontal Geometry			•
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	<u> <u> </u></u>	e Offset Entire Elen	nent
	L 2 Sing	e Offset Partial	
Uertical Geometry	😳 <u>3</u> Varia	ble Offset Taper	
Terrain Model	<u>4</u> Ratio	Defined Taper	

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

1	Offset:	16.000000
	Distance	·
	Lock To Start	
1	Start Distance	28+00.00
	Lock To End	
	End Distance	27+95.59
1	Length	500.000000
	Feature	^
Feature Definition		PavementAsphalt(EOPA)
Name		EOPA

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

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

Feature	^		
Feature Definition	PavementAsphalt(EOPA)		
Name	EOPA		
		2 6	4
	Ead B	competence (Althe Look To End	İ
	Distar	ince:Length 500.0000	
		ŝ.	1
		28,7864997,162	

- e. Data Point in the View to accept No at the *Mirror* option prompt.
- 3. Repeat this procedure for each of the **PavementAsphalt**(**EOPA**) widening lines diagram and table above.
Exercise 3.5 BL98 Widening Taper Line

In This exercise a tapered Pavement Asphalt (EOPA) line off BL98 is created at the following location. Select **Alt** to enter the *End Station*.

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



HINT Toggle On the Civil AccuDraw.

1. Use the *Horizontal Geometry*, Variable Offset Taper tool.

ζ	Horizontal Geometry				
Q	1 🐴 😵 🥙 🏏				
W	-\$\$				
Е	/ $/$ $/$ $/$				
R	0/6-2032	2			
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	3D Geometry			Open 'Offsets and	Tapers' as Toolbox

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

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



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

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

Exercise 3.6 For SR61 New Construction Template Lines

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

1. Use the *Horizontal Geometry*, **Single Offset Partial** tool.

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	1 Single Offset Entire Element
	2 Single Offset Partial
🖽 Vertical Geometry	3 Variable Offset Taper
Terrain Model	4 Ratio Defined Taper

- 2. Create a *Feature line*, ConstLinesGreen.
 - a. Select the SR61 Centerline(CL).
 - b. Set the Offset to 0.00.
 - c. For the first point, set AccuSnap to Intersection and select the intersection of SR61 and BL98.



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



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

3. Use *Civil Cells* task, **Place Civil Cell** tool.



a. Navigate to the FDOT_Templates.dgnlib, 4 Lane Divided Arterial(45 MPH or Less) and select **PPMEXHIBIT TYP5.**



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

c. Locate *Reference Element*, select the **GreenConstLine**.

HINT Use the tab key to after clicking on an element to get to the last place GreenConstLine.

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



- 4. Change the Front Sidewalk Utility Strip Width to **0ft** and the Sidewalk Width to **6ft**,
 - a. Select the **SidewalkFront** *Feature* and zoom to find the **Context** Menu near the middle of the element.



- b. Change the *SidewalkFront Dimension* from **3** to **0**.
- c. Change the *SidewalkBack* from **5** to **6**.
- d. Repeat this for *both sides* of the roadway.



Exercise 3.7 Add Right Turn Lane on BL98

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

1. Use *Civil Cells*, **Place Civil Cell** tool.

🏪 Civil Cells	#==
Q	
Place Civil Cell	

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



- 3. At the prompt, for the first *Reference*, select the widening PavementAshaplt(EOP) line.
- 4. For the second Reference, select the SR61 Right EOP Out PavementAshaplt(EOP).
- 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 **135** to **500 feet**.



8. Use MicroStation *Trim to Intersection* to correct the PavementAsphalt(EOPA) lines.

Exercise 3.8 Add the School Entrance Right Turn Lane off BL98 Intersection

1. Use the Horizontal Geometry, Single Offset Partial tool.

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



3. For the opposite side, use the *Horizontal Geometry*, Single Offset Partial tool.

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S	Single Offset Partial

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





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



a. At the prompt, for the first *Reference*, select the **widening PavementAshaplt(EOPA)** line.



b. For the second *Reference*, select the intersection PavementAshaplt(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.

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7. Edit the storage length for the second Right Turn Lane placed, select the tangent line and change the Length from 135 to 365 feet. Change the lane width to -16 feet.



Exercise 3.9 Create/Edit the Intersection Curve Radii

1. Use the *Horizontal Geometry*, Simple Arc tool.

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- 2. Create/Edit the **Curve** returns.
- 3. Select Feature Definition, PavementAsphalt(EOPA) to place remaining curve radii.
- 4. Follow the cursor prompt to select the two Roadway **PavementAsphalt(EOPA)** *reference lines*.
- *HINT* Select the two PavementAsphalt(EOPA) in each quadrant. Use the value shown and trim both for each of the following quadrants: Southwest 110 feet,
 - Southeast 60 feet, Northeast 60 feet, Northwest 60 feet

Simple Arc	Select Construction Sector Radius 110.000000 @	X		
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5. Select F11 to open the *Project Explorer* menu options; change the tab to Civil Model.



6. Navigate to the *Civil Cells* listed in the active design file, right click on *each* and select **Drop Civil Cell**. This allows for editing the Civil Geometry elements individually in future exercises.

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Exercise 3.10 Trim Back Sidewalk and Curb Lines to the Curve Radii

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



1. Select the LT_CURB_FACE_OUT line.

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



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



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



5. Repeat these steps to move the **RT_CURB_FACE_OUT** line back to the *curve radius* on the right Roadway.



Exercise 3.11 Use Civil Cell Technology to Place Curb and Sidewalk Around the Radii

1. Select *Civil Cells*, **Place Civil Cell** tool.



2. Navigate to the FDOT_Intersections.dgnlib and select the CurbSidewalkLines civil cell.

Place Civil Cell Civil Cell Curb SidewalkLines		-	
Pick Civil Cell			
	[ОК	Cancel

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



4. Edit the *SidewalkFront* to be **0 feet** from the **CurbBack** line at the middle of the element.



5. Edit the *SidewalkBack* line to be **6 feet** from the **SidewalkFront** line of the element.



Exercise 3.12 Create a Custom Civil Cell for Other Radii

1. Select *Civil Cells*, **Drop Civil Cell** tool.

🏥 Civil Cells	
Drop Civil Cell	**

2. Select the CurbSidewalkLines Civil Cell in the View and data point to drop the Civil Cell.

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



3. Use *Civil Cells*, Create Civil Cell tool.



a. Enter the Civil Cell Name: Custom CurbandSidewalkLines.



b. Data point to accept the new Name.

- Locate Reference Element
- c. At the prompt, locate *Reference Element* and select the SW 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 Civil Cell, Place Civil Cell tool.



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 NW EOPA Radius line.



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



d. Reset to View alternates.



e. Data Point to accept the Civil Cell Placement.

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



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

Exercise 3.13 *Place Left Turn with Traffic Separator*

1. Use Civil Cells, Place Civil Cell tool.



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



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



c. At the *Locate Reference Element PavementAsphalt(EOPA)*, select the **RT_PVT_EOP_IN** line in the View.



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

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





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

2. Use MicroStation **Trim to Intersection** tool.



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



4. Use MicroStation **Trim to Element** tool.

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i Terrain Model	++	<u>6</u> Trim Multiple

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





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

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





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

Exercise 3.14 Place Right Turn Island

1. Use *Civil Cells* task, **Place Civil Cell** tool.

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Place Civil Cell	•

2. Navigate to the FDOT Intersections.dgnlib, select Right Turn Island. Click OK.

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3. Select the first **PavementAsphalt(EOPA)** lines.



4. Select the second **PavementAsphalt(EOPA)** line.



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



۶ Change the Right Turn Island Parameters

1. Change *ConstLinesBlueDashed Arc Radius* from **110 feet** to **126 feet**.



2. Check ConstLinesBlueDashed Begin Arc Offset is -18 feet.





3. Check ConstLinesBlueDashed End Arc Offset is -16 feet.

4. Change the straight *ConstLinesBlueDashed SR61 EOP Offset* from **1 foot** to -**16 feet.**



5. Check ConstLinesBlueDashed BL98 EOP Offset is -16 feet.



6. Change *Island EOP Offset* from the ConstLinesBlueDashed BL98 from -5 feet to -2 feet.





7. Change *Island EOP Offset* from the ConstLinesBlueDashed SR61 from **1 foot** to **6 feet**.

8. Change Island Radii to 4 feet.





9. Change the Island ingress Offset -6 feet and Island Egress Offset -3 feet.

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



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

12. Use the MicroStation Crate Region Flood tool, select the center of the island, and then data point to accept the *closed element*.

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Fill Type: None	
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13. Use the MicroStation Select tool to view the properties of the new island. Record the Area

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



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Exercise 3.15 For BL98 Intersection Crosswalks Lines

H Corridor Modeling

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- 1. Use the *Horizontal Geometry*, **Single Offset Partial** tool.

2. Create a Partial Offset line from BL98 -52 feet across the intersection. Use Feature Definition ConstLinesBlueDash and Name ConstLineA.

4

Ratio Defined Taper

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	Offset: Mirror	-52.000000	
	Distance	*	
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	End Distance	33+91.64 R1	
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Featu	ure Definition	ConstLinesBlueDa 💌	create this line -52 feet from
Name	e	ConstLinesA	
	begin		end snap
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			Distance:End Distance 3245165/R1 Complex Element: EOPA7 Interval

3. Use *Horizontal Geometry*, Line Between Points tool.

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



5. Use the Horizontal Geometry, Single Offset Partial tool.



6. Create a **Partial Offset** line from *SR61* across the intersection. Use *Feature Definition* **ConstLinesBlueDash** and *Name* **ConstLineC**.



HINT Snap to the mid-point of the radii.

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

Exercise 3.16 Create BL98 Turnouts

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

1. Use *Horizontal Geometry*, Single Offset Entire Element tool.

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a. Select the ContLineBlueDash Turnout line.

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	Offset:	20.000000	
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	Feature Definition	PavementAsphalt(EOPA)	
	Name	EOPA	
ļ			Locate Element <alt> to Pick element in</alt>
			Line: ConstLines Feature: ConstLinesBlueDash No Active Profile Level: ConstLines

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

Single Offset E	intire Ele – – × 20.000000		
Feature Feature Definition Name	PavementAsphalt(EOPA)		
			Locate Element <alt> to Pick element</alt>

2. Use Horizontal Geometry, Simple Arc tool.

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a. Place the *Radius* on both side and set *Trim/Extend* to **Both**.

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	Feature	^		
	Feature Definition	PavementAsphalt(EOPA)		
	Name	EOPA		
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b. Change the *Geometry* to fit the existing driveway.

HINT Use the centerline snap and dimensions to modify the location, length and angle. Use the Offset PavementAsphalt(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 Intersection.dgnlib, and Side Road Turnout.

However, first place the Side Road Centerline.



HINT When using the Side Road Turnout Civil Cell; there was an issue delivered. Drop the placed civil cell, fit the view and delete the extraneous element placed.

Exercise 3.17 For BL98 Intersection Shoulders

This exercise uses the PavementAsphalt(EOPA) to create the 5 feet ShoulderPaved(PSHLD) Offset lines.

- 1. Turn **ON** the *ShldrPaved* level.
- 2. Use *Horizontal Geometry*, Single Offset Entire Element tool.

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3. Set the *Offset* to **5 feet** and the *Feature Definition* to **ShoulderPaved(PSHLD)**.

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Mirror									
Feature	*								
Feature Definition	ShoulderPaved(PSHLDR -								
Name	PSHLDR								

- 4. Select the **PavementAsphalt(EOPA)** lines from the previous steps.
- 5. Repeat these steps to add the remaining *Shoulder lines* for the widening along BL98.
- 6. View the intersection below for complete details.



Exercise 3.18 For Friendship Intersection

1. Use Civil Cells, select Place Civil Cell tool.

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a. From the Place Civil Cell dialog, navigate to the *FDOT _Intersections.dgnlib* and select **Side Road Turnout**.

Place Civil Cell	1 ¹¹
Active DGN A	
	OK Cancel

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

HINT When using the Side Road Turnout Civil Cell; there was an issue delivered. Drop the placed civil cell, fit the view and delete the extraneous element placed.

- c. Use **Modify Element** to clean the extra curb line and sidewalk lines across the intersection.
- d. Change all Radii to 35 feet.
- e. Change Friendship2 Side Road Offsets to 20 feet.
- f. Change *Centerline Length* to **100 feet**.



2. Use Civil Cells, Place Civil Cell tool.



a. From the Place Civil Cell dialog, navigate to the *FDOT _Intersections.dgnlib* and select Left Turn with TS.

Place Civil Cell								
Pick Civil Cell	•	9	<u>ه</u>					-
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b. Use *FDOT_Intersections.dgnlib*, **Left Turn with TS** *Civil Cell* to a place left turn lane on SR61 at *Friendship Intersection*.



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

d. For the second *Reference* element, select the *left median* **PavementAsphalt(EOPA)** line.



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



3. Use MicroStation Trim to Element tool.



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

HINT Use the ConstLinesGreen as the cut element



5. Use MicroStation Trim to Intersection tool.

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

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



4 PROFILES

INTRODUCTION

This chapter will continue to use the OpenRoads Technology Civil Tools, Vertical Geometry. Rather than use traditional GEOPAK Profile 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 vertical geometry layout. This will be beneficial for design when changes need to be reflected and considered through-out the development process.

This chapter introduces important new OpenRoads Technologies for creating vertical geometry line work while designing in FDOTSS4.

OPEN PROFILE MODEL

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

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

EXERCISE OVERVIEW

- 4.1 Preparation for SR61 Profile
- 4.2 Create SR61 Profile
- 4.3 Edit SR61 Profile
- 4.4 BL98 Profile
- 4.5 Friendship Profile

Exercise 4.1 Preparation for SR61 Profile

- 1. (Optional) Extract the 22049555201(4).zip file in the c:\e\projects folder.
- 2. Open the *DSGNRD01.dgn* file of the c:\e\projects\22049555201\roadway\ folder in the *FDOTSS4* Workspace in MicroStation.
- 3. Use MicroStation, References tool to attach the Existing Terrain file,

c:\e\projects\22049555201\survey\ GDTMRD02

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



4. Select the Tasks list and set the Menu Tasks to Civil Tools.

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ス Horizontal Geometry	

5. Use the *Terrain Model*, Set Active Terrain Model tool.



6. At the cursor prompt, select the **Terrain Boundary** green line from the attached *GDTMRD02 Reference* file <OR> pick it from the list on the dialog.



Exercise 4.2 Create SR61 Profile

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

1. Use the *Vertical Geometry*, **Open Profile Model** tool.

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W Open Profile Model	
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a. At the cursor prompt, select on the mainline SR61 Centerline.



- View 3, Profile SR61 ¥ 9 21 🕀 🖩 🖻 🕐 🖂 🖧 🦗 - <u>0</u> - <u>A</u> V 넙 ۷ 100 ¥ 80-۷ se? 60-۷ 40-20--0-2×81 RV 14:81 81 10r81RV 26+81 R1 16+81 RV 18+81 81 0+81 RV N RN RN click on view 3 2 3 4 5 6 7 8 (1 X 41.500934 Y -16.867954
- b. At the prompt select to open View 3, then data point in the View.

2. Use the *Vertical Geometry*, **Define Profiles by Best Fit** tool.



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.

	View 3,	Profile - SR61				
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220 [.]						
210 [.]	1					
200 [.]	1					
190 [.]	1					
180-	1	Best Fit Profile				
170-		Best Fit	Make Complex Element			
160		Best Fit Parameters	*			
140		Upper Envelope	2.000000			
130		Lower Envelope	-2.500000			
120		Desirable Crest Curve Length	300.000000			
110		Desirable Sag Curve Length	200.000000			
100-		Minimum Curve Length	150.000000			
90-		Feature	*			
80		Name	SR61-Pr			
70		Element Template	Profiles(2D)\Proposed_pr\GradeLine		data point to use	
60					existing ground	
50						
40				and the same of the same		
30			Constant of the second se	L	ocate Profile To Fit	
20				F	rofile: ype: Surface Profile	
10				L	evel: XSGrdLine_ex	
0.						

b. Follow the prompts to enter the **Best Fit Parameters** as shown.

🚯 Best Fit Profile	
Best Fit	Make Complex Element
Best Fit Parameters	*
Upper Envelope	2.000000
Lower Envelope	-2.500000
Desirable Crest Curve Length	300.000000
Desirable Sag Curve Length	200.000000
Minimum Curve Length	150.000000
Feature	*
Name	SR61-Pr
Element Template	Profiles(2D)\Proposed_pr\GradeLine

3. Use the *General Geometry*, **Design Standards Toolbar** tool.



4. On the Design Standards Toolbar, navigate to *Arterials, Flat Terrain, Urban, With Curb and Gutter* and select **55MPH**. Toggle **On** the Active Design Standard.





5. Use the *General Geometry*, **Set Design Standard** tool.

💁 General Geometry	∷ ≡∎∧
a <u>n</u> 🧤 😵 😵 🚩 🕡	
W Z Set Design Standard	
E 🖶 ờ 💕	
R 🔣 🦓 💐	

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.



 Element Information 	
È… E Active Profile: È… T Depends Artenals\F Line N B-spline C Line	SR61-PRType: Fit Profile On Hat Terrain\Urban\55MPH
General	^
Description	Application Data
Extended	*
Vertical Design S	Standard 🔺
Vertical Design Stand	55MPH
Minimum Slope	0.300%
Maximum Slope	5.000%
Require Curves to be	False
Allow Overlaps	False
Allow Gaps	False
Maximum Difference	0.400%
Vertical Table Type	K Table
lable	

6. Use the *General Geometry*, Civil Message Center tool.



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

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

Hide All	📕 50 MicroStation 🛛 🐼 1 Error 🛛 🔔 7 Warnir	ngs 🚺 0 Messages
Element	Message	Description
μ	Display complete	
μ	Active Profile: SR61-PR	
μ	[Plot Scale=-999.0000, Units=Unknown, AS= 1	
μ	Linked Data Manager: (0) links found in 00:00:0	
μ	Linked Data Manager: Scanning	
μ	Complex Element: SR61	
μ	Terrain Model: GDTMRD01, Boundary, Level: X	
μ	Active Terrain Model Set	
μ	3D Model [GDTMRD02.DGN/Default] has bee	
μ	Reference attached	
μ	Complex Element: EOPA26	
μ	Total 4296 payitems in the database	
<u>u</u>	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 *Errors* and *Warnings* in the list.

Element	Message	Description
😣 Error	Crest is less than minimum	Design Standard Value = 185.000000 Actual V
🔔 Waming	Speed Substitution	Designated design speed 50 not found in Vertic
🔔 Waming	Speed Substitution	Designated design speed 50 not found in Vertic
🔔 Waming	Speed Substitution	Designated design speed 50 not found in Vertic
🔔 Waming	Tangent length is shorter than minimum	Design Standard Value = 100.000000 Actual V
🔔 Waming	Maximum deflection with no curve exceeded	Design Standard Value = 1°0'0" Actual Value =
🔔 Waming	Tangent length is shorter than minimum	Design Standard Value = 100.000000 Actual V
🔔 Waming	Tangent length is shorter than minimum	Design Standard Value = 100.000000 Actual V
4		

- 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.

🖌 Civil Message	Center	
Hide All 🛛 🖊 50 I	MicroStation 🛛 😵 1 Error 🕅 🚹 7 Warnings 🕅	0 Messages
Element	Message	Description
Warning	Zoom to	Design Standard Value = 185.000000 Actual V Designated design speed 50 not found in Vertic
Warning	Add To Selection	Designated design speed 50 not found in Vertic
Warning	Tangent length is shorter than minimum	Designated design speed 50 not round in Vertic Design Standard Value = 100.000000 Actual V:
Warning	Maximum deflection with no curve exceeded Tangent length is shorter than minimum	Design Standard Value = 1°0'0" Actual Value = Design Standard Value = 100.000000 Actual V:
Warning	Tangent length is shorter than minimum	Design Standard Value = 100.000000 Actual Vi
•	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.





7. On the Design Standards Toolbar, navigate to *Arterials, Flat Terrain, Urban, With Curb and Gutter* and select **50MPH.**



8. Use the General Geometry, Set Design Standard tool.



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



Exercise 4.3 Edit SR61 Profile

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

> Edit the Best Fit Profile

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

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



2. Select the Convert to Profile Rule tool.

> Delete Pls

1. Use MicroStation Modify, Delete Vertex tool.





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

> Create Profile with Place Vertical Line

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

1. Use Vertical Geometry, Profile Line Between Points tool.



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



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

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



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

💡 Profile Line Bet	ween Points
Length	16.000000
V Slope	2.00%
Feature	^
Name	
Element Template	Profiles(2D)\Proposed_pr\GradeLineCtr



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

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> Profile by VPI's

1. Zoom to the Beginning of the profile, Use Vertical Geometry, Profile Complex By VPI tool.

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т	📙 🛛 Profile Complex By VPI Ҟ 🏏	

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

HINT Check that the Vertical Curve Type is set to Parabola

🚯 Complex Element By VPI	- • ×
Vertical Curve Parameter	0.000000
Curve ength	50.00000
Slope	0.000%
Vertical Curve Type	Parabola 🗨
Feature	*
Name	
Element Template	None

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



HINT This is not exact, snap to 3 points

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







> Complex Profile Elements

1. Use Vertical Geometry, Profile Complex by Elements tool.

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R 🔽 🏹 🗠 🖉 🛄	
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2. Keyin the name SR61_PR on the dialog and Start at the Beginning Profile line and create a new **Connected Profile**.

Complex Element

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

x

Feature Name SR61_PR Element Template None * ** - A R R R BB C C R R R R R R R R R R R R R R R R R R		Method Maximum Gap	Automatic		
View 3 Profile - 551 • • • • • • • • • • • • •		Feature Name Element Template	SR61_PR None		
478.710788 200.00000 570.053353 179.820324 701.017809. -0.40% -0.40% -0.48\% -0.48\% -0	View 3, Profile - SR61 → ※ ● ▲ ● ● ● E E □ □ □ □ □ □ □ □ □ □ □ □ □ □ □	Element Selection			
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> Profile Report

1. Use Vertical Geometry, Profile Report tool.



<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.

	Vertic	al Alignment Review F	Report	
		Report Created: 9/9/2015		
		Lime: 1:37pm		
Project:	Default			
Description:				
File Name:	C:\e\SS4projects\22049555201\roadv	vay\DSGNRD01.DGN		
Last Revised:	9/9/2015 13:33:59			
			Note: All units in this report are in feet unless specified otherwise.	
				\sim
	lorizontal Alignment: SR61			
H H	orizontal Description:			
	Horizontal Style: Centerline(CL)			
	Vertical Alignment: SR61_Pr			
	Vertical Style: Cantadina(CL)			
	Vertical Style. Centenine(CL)	Station	Flevation	
Element: Linear				
	РОВ	698+53.79 R1	37,36	
	PVC	698+78.91 R1	37.23	
	Tangent Grade:	-0.53%		
	Tangent Length:	25.12		
Element: Symmetrical Parabola				
	PVC	698+78.91 R1	Element Selection	
	PVI	698+95.02 R1		
	PVRC	699+11.12 R1		
	Length:	32.20	()	
	Entrance Grade:	-0.53%		
	Exit Grade:	-6 43%		

3. Use Vertical Geometry, Set Active Profile tool.

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W Set Active Profile	

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

> Export Profile

1. Use the *General Geometry*, **Export to Native** tool.



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

2. Select the **SR61** *Profile* and save it to the *job00.gpk* file.

Exercise 4.4 BL98 Profile

- 1. With the **BL98** selected in the *Plan View*, hover over the element to display the **Context Menu** and select the **Open Profile Model**.
- 2. Select **View 3** to view the *Existing Ground Profile* for the mainline **BL98** *Centerline*.

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Open Profile Model	

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

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**.

View 3, Profile - BL98	
90-	
80-	
70-	
60-	
50-	
30- Set As Active Profile	
20-	
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6. Use the *General Geometry*, **Export to Native** tool, select the **BL98_EX** *Profile* and save it to the *job00.gpk* file.

Exercise 4.5 Friendship Profile

1. With the **Friendship** selected in the *Plan View*, hover over the element to display the **Context** Menu and select the **Open Profile Model**.



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



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



- 4. Repeat the steps for Friendship2 Rd.
- 5. Open View 2 using the F2 Function Key to see the 3D alignment cernterlines for the project
- 6. Notice the **3D lines** displays in *View 2*.


5 TEMPLATE DESIGN

OVERVIEW

The Create Template command generates the transverse geometry that is central to roadway design. A template comprises a series of points and components that represent break line features that are processed using Corridor Modeling commands. Roadway features that have been processed are saved to the design surface. Templates are stored in a template library (*.*itl*).

TEMPLATE BASICS

- The FDOTSS4 Workspace provides an extensive Template Library.
- FDOTSS4 Templates closely follow CADD Manual, PPM and FDOT Design Standards and should be used to start a project.
- FDOTSS4 Templates are designed from the PPM typical sections of the proposed roadway.
- FDOTSS4 Templates are stored in the FDOTSS4.itl.
- The *FDOTSS4.itl* Templates have Features, Point Names, Component Names, Parametric Constraints and Display Rules which follow a standard naming convention.
- A project specific Template Library is created and FDOTSS4.itl file templates are copied to that library and are modified to meet the specific needs of the project.
- New and modified templates should adhere to the template standards of the *FDOTSS4.itl* file.
- When applied to a Corridor, templates are written to the design file and can be edited within the file.
- Once templates are in a design file, they can be copied to another Project Template Library or design file.

APPLYING TEMPLATES

- Templates create a model of the proposed roadway.
- Template points generate longitudinal break line features in the model.
- Templates are used to create a proposed model of the roadway.
- Templates are assigned to specific stations along an alignment at a specific interval, which are called template drops.
- When a corridor is processed, the points of the template drops are connected to form a model of the roadway.
- The connected template points also form longitudinal break line of the surface model.
- The model can be exported into a traditional surface Terrain model.

CREATE TEMPLATE DIALOG

The Create Template dialog is accessed from the Corridor Modeling, Create Template tool. To create or edit a Template Library, click the Open Create Template icon on the Corridor Modeling dialog. This displays the Create Template dialog.

The **Create Template** dialog is the primary place where templates are created and edited. This is also where templates are copied from a standard Template Library to a project Template Library using Tools > Template Library Organizer.

- User Definable Folder Structure
- Create Templates, Components and End Conditions
- Right-click Functions
- Copy and Paste, and Drag and Drop
- Red-colored Box Indicates Current Template
- Drag and Drop Components to Current Template Window

On the left side of the dialog, you will find the Template Library area, which contains a Windows-like folder structure. The root folder is the name and location of the Template Library that is currently open. Only one Template Library may be open at a time.

To navigate the folder structure, double-click the folders you want to open or close. Inside any folder you can create and organize your templates and subfolders. The organization of the folder structure is user definable. The folder structure also supports common Windows functions, such as drag and drop, cut and paste, etc.

Most commonly used commands can be accessed by right clicking on the folders and templates. If you double click a template, it becomes the Current Template and is signified by a red box around the Template icon. The Current Template is also identified in the Current Template area next to the Template Library area. To assemble or edit a template, it must be the Current Template.

CURRENT TEMPLATE WINDOW

- Templates Assembled and Edited
- Right-click To Create Components
- Double-click To Edit Points and Components
- View Commands Bottom of Window

In the center of the **Create Template** dialog is the main graph for creating templates. The graph is called the Current Template window. The Current Template window uses its own graphics engine and is not a **MicroStation** View. The scale of the graph is dynamic and changes as you zoom in and out.

The center point of the Current Template window is marked by the dynamic origin, which is a magenta-colored box. The dynamic origin is used as a reference point and can be moved to any location in the graph.

At the bottom of the graph there are numerous view commands, which are similar to MicroStation View commands. There are two buttons that look like the MicroStation View Previous and View Next commands, however, they are used to undo and redo template creation operations.

If your mouse has a scroll wheel, it can be used to pan and zoom. The CTRL-Z keyboard hot key will undo your last edit or creation. In the graph area you can right-click to access commands and you can double-click elements in the graph for editing purposes.

TEMPLATE PREVIEW WINDOW

- Previews Templates and Components
- Works on Non-current Templates
- Placement Point Location Denoted by a Cyan-colored Box
- Click Point to Move Placement Point Location
- Drag and Drop from Preview Area to Current Template Window

Under the Template Library area is the Preview area. When you highlight (single click) a template, the template is displayed in the Preview area.

You can use the Preview to assemble templates from their parts or components. This is accomplished using drag and drop functions. The cyan-colored box in the Preview represents the insertion point for any drag and drop operation. You can change the insertion point location by clicking the desired insertion point on the preview.

DYNAMIC SETTINGS

- Tools > Dynamic Settings Command
- Precision Input Template Points
- XY = Absolute Coordinates
- HS = Horizontal Delta Distance and Slope from Last Point Placed
- DL = Enter Delta Coordinates from Last Point Placed

The Dynamic Settings dialog is used for precision input of the template components and to assign point names and styles when creating components. It also serves as a compass for the location of your cursor with respect to the dynamic origin. The dynamic origin can be moved using Set Dynamic Origin, located at the bottom of the Dynamic Settings dialog.

The Dynamic Settings dialog is accessed by selecting the menu option **Tools > Dynamic Settings** or using the View Control icons located below the Current Template window.

The Key-in pull-down specifies the type of key-in to be performed:

XY = key-in absolute coordinates

- DL = key-in delta coordinates from last point placed (defaults to the dynamic origin if it is the first point of a component)
- HS = key-in horizontal delta distance and slope from last point placed
- VS = key-in vertical delta distance and slope from last point placed
- OL = key-in delta coordinates from dynamic origin
- OS = key-in horizontal delta distance and slope from dynamic origin

COMPONENTS

- Components are Parts of the Template
- Curb and Gutter, Median Barrier, Pavement Layers, Cut and Fill, etc.
- Simply Drag and Drop Components Together to Create a Complete Template
- When Two Points Coincide, Heavy White Plus Sign Appears
- Existing Connection Point Name Override Dropped Point Name

Components are logical parts of a template. Portions of the template that are separated into components are normally based on tabulation considerations. Examples of components include curb and gutter, median barrier, pavement layers, cut and fill slopes, and ditches.

Components are normally kept in a separate folder in the Template Library and are used to assemble complete templates. Drag and drop the components to the Current Template window to create a complete template. When connecting two components, the connecting point will change to a white colored plus sign prior to placing the component. This is the indication that the points coincide. When the components are connected together, using drag and drop from the Template Library folders, any coincident component points will use the point names of the previously placed component. Template point names can be edited anytime during the creation process.

Components are normally created with point names that are not specific to being on the left or right side of the roadway. When they are used to create completed templates, prefixes and suffixes to the template points can be automatically added during component placement. Prefixes and suffixes are controlled using **Tools > Options** in the **Create Template** dialog and can be set and cleared in the **Dynamic Settings** dialog during placement using the Apply Affixes check box.

MERGING COMPONENTS

- Right-click Between the Components to Merge
- Select the Merge Components Command

When combining two components of a pavement section together, two separate components are produced with a vertical segment dividing them. To remove the vertical segment, position the cursor over the vertical segment and right-click. Then select Merge Components.

EXERCISE OVERVIEW

- 5.1 Creating a New Project Template Library
- 5.2 Create Template Library Folders
- 5.3 Using the Template Library Organizer
- 5.4 Naming Project Templates
- 5.5 Creating A Resurfacing Template
- 5.6 Editing Templates

Exercise 5.1 Creating a New Project Template Library

This exercise opens the proposed roadway design file, *DSGNRD01.dgn*, with GEOPAK using the FDOT Workspace and Project configuration. The **Create Template** dialog displays and a new Template Library file created for the project in the project *symb* folder. This new project Template Library is the container for all the components and templates used to develop the design model for the project design.

- 1. (Optional) Extract the 22049555201(5).zip file in the c:\e\projects folder.
- 2. Open the *DSGNRD01.dgn* file of the c:\e\projects22049555201roadway folder in the FDOTSS4 Workspace in MicroStation.
- 3. Use *Corridor Modeling*, Create Template tool.

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4. Open the Create Template dialog and select File > New > Template Library.

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	C C	reate Templa	te		
(File	Edit Add	Tools		
	\mathcal{C}	New	•		Folder
1		Open	Ctrl+O		Template
		Save	Ctrl+S	0	Template Library
		Save As	,		
		Close		(00	
			10 d		

5. Navigate to the Project roadway folder, C:\e\projects\22049555201\roadway\.



Save Template Lib	rary As	All CONTRACTOR OF	x
Save in:	🜗 roadway 👻	G 🤌 📂 🛄 🗸	
æ	Name	Date modified	Туре
Recent Places	\mu aerials 🌗 eng_data	11/6/2014 6:01 AM 5/12/2014 4:43 PM	File folder File folder
	퉬 projdbs	11/6/2014 6:01 AM	File folder
	22049555201.itl	11/7/2014 1:17 PM	ITL File
Desktop Libraries Computer			
	•		4
	File name: 22049555201.itl		Save
Network	Save as type: Template Libraries (*.itl)	•	Cancel
			Help

6. Enter the new *Template Library Name*, **22049555201**. Click **Save**.

7. Select **File > Save** again to verify, then close the **Create Template** dialog. Click **Close**.



Exercise 5.2 Create Template Library Folders

- Components
- Corridor Templates
- End Conditions
- Linear Templates
- Surface Templates

The Components, End Condition, Linear Templates, Surface Templates folders contain parts of the full Templates and is obtained from the FDOTSS4 Template Library.

The Corridor Templates folder contains the constructed templates for the corridor. The Project Templates in the exercises to follow are named and saved in stages or phases in order to track the progress of the design. This method is also recommended to provide a backup and/or history for potential trouble shooting along the way.

1. Use Corridor Modeling, Create Template tool.

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- 2. From the Create Template dialog, select File > Open and navigate to the FDOTSS4/GEOPAK/corridor directory and choose the EmptyProject.itl *Template Library*.
- From the Create Template dialog, select File > Save As to copy the blank Project Template Library over the 22049555201 .itl Template Library created earlier. This will save the next few steps.

> Optional Steps

1. Create new folders in the *Project Template Library*.

	Create Templat	te 💼 👘	1110000000	(J.L.)	
File	Edit Add	Tools			
	New	•	Folder	Display	Close
	Open	Ctrl+O	Template	Components O Constraint	s
	Save	Ctrl+S	Template Library	Display Point Names	Help
	Save As	L		Display All Components	
	Close				

- 2. Create and re-name five folders. Select the **Root** folder and repeat steps to include all the following folders:
 - Components
 - o Corridor Templates
 - $\circ \quad \text{End Conditions} \\$
 - Linear Templates
 - o Surface Templates



3. Select **File > Save** to save the project *Template Library .itl* file.

Exercise 5.3 Using the Template Library Organizer

This exercise uses the Create Template dialog to open the Template Library Organizer from the *Tools* menu option. Various components and templates from other Template Libraries and Roadway Designer files are obtained from using the Template Library Organizer. For the Chapter exercises to follow, the FDOTSS4 Template Library contains a basic Typical Section and all of the components used for the project design.

1. Use *Create Template* and select Tools > Template Library Organizer.



2. From the Template Library Organizer dialog, click the Ellipses icon next to the OK button. The Open Template Library window displays.

Template Library Organizer	These backson	
Available In:	Available In:	OK Cancel Help

3. From Open Template Library, navigate to the c:\FDOTSS4\GEOPAK\corridor folder and select the **FDOTSS4.itl** *Template Library* file. Click **Open**.

Open Template Li	ibrary			×
Look in:	\mu corridor	•	G 🌶 📂 🛄 -	
Recent Places	Name help tables FDOTSS4.itl Type: 1 Date n	rt.itl TTL File 81 MB nodified: 9/2/2015 11:16 AM	Date modified 3/3/2015 1:31 PM 3/3/2015 1:31 PM 2/19/2015 9:26 AM 9/2/2015 11:16 AM	Type File folder File folder ITL File ITL File
Libraries Computer Network	File name: Files of type:	III FDOTSS4.itl Template Libraries (*.itl)	•	Open Cancel Help

4. The Template Library Organizer dialog displays with the *.itl* file listed in the right *Available In:* window pane.



5. From the Template Library Organizer, navigate to the FDOT folder shown below.



6. Select the **PPM EXHIBIT TYP-5** to preview the template in the *Preview* window below the directory view.

	- • •
T -	· · · · · · · · · · · · · · · · · · ·

7. Drag the **Template** from the *right side* to the *left side* onto the *Components* folder for the project.



8. Collect the following items from the *FDOTSS4 Template Library* and drag them to the *Project Folders Locations* as shown below

FDOTSS4 Template Location	Project Folder Location
Examples/Typical Sections(Variable) /4 Lane Divided Arterial (45 MPH or Less)	PPM EXHIBIT TYP-5 to Components
End Conditions/Parts	Entire Parts folder to End Conditions
Component/Pavement/Resurfacing	Entire Resurfacing folder to Components
Component/Curb & Gutter	Curb Type E Inside to Linear Templates
Linear Templates Common	Outside Lane w/ Paved Shoulder to Linear Templates
Linear Templates Common	Outside Lane w/ Type F Curb to Linear Templates
Surface Templates	Pavement Asphalt to Surface Templates

9. Click **OK** to return to the **Create Template** dialog and click **Yes** to the *"Save data to file...* The FDOT Standard Items are now saved in the **Project Template** Library.

Exercise 5.4 Naming Project Templates

This exercise copies and renames the Typical Section obtained from the FDOTSS4 Template Library in the project Template Library template folder using the Create Template dialog. The Create Template dialog has functionality similar to Window Explorer to help manage templates for each project.

- *Note* A consistent project template naming convention is valuable as the design progresses. As more are added to the template design, create a backup copy and add a suffix to the name "_1, _2, _3, etc.
 - 1. In the *Components* folder, right click on the *PPM* EXHIBIT TYP 5 *Template*, and select Copy.

C:\e\project III Point N Compo Re	cts\2/ Name Inents	2049555201\symb\SR61.itl List cing	Name: Description:
PI Corride		Set Active	
End C		Cut	Ctrl-X
🔄 Linear	(Сору	Ctrl-C
× a × a		Paste	Ctrl-V
× 0		Delete	Del
Surfac		Rename	F2
		Template Documentation Link	

Right click on the *Corridor Templates* folder and select **Paste**. Right click on the copied **EXHIBIT TYP – 5** Template and select **Rename**.

C:\e\projec	Name:	
* Point N	Description	
Compoi	nents	
🚞 Re	surfacing	
	M EXHIBIT TYP-5	
Corrido	r Templates	
🔁 <u>E</u>	Set Active	
	Cut	Ctrl V
🔁 Lj	cui	CUI-A
7	Сору	Ctrl-C
7	Paste	Ctrl-V
_ >		
s 🔁	Delete	Del
	Rename	F2
	Template Documentation Link	

3. Change the *Name* of the Template to **SR61**. Right click on the **SR61** *Template* and select **Set Active**. A small red box will indicate the *Active Template*.



4. Select **File > Save** to save the *Project Template Library*.

Exercise 5.5 Creating a Resurfacing Template

This exercise creates a Resurfacing Template within the project Template Library. This exercise helps provide a basic understanding of the basic template creation methods from the FDOTSS4 Template library components types, connection points, constraints, targets, etc.

1. Right click on the *Corridor Templates* folder and select New > Template.



- 2. Right click on the *New Template1* and select **Rename**. Change the *Name* to **RRR98** and Select **Enter** to store the name.
- 3. Right click again on the RRR98 and select Set Active.



- > Before Adding Components, Open Preference File to Add a Prefix to the Point Names.
- 1. Select the **Tools** > **Options** from the **Create Template** dialog to launch the **Template** Options dialog.

Create Template	e	-
File Edit Add	Tools	
Template Library: C:\e\projects\ III Point Nam Componer Componer Resuf × PPM E Comdor Te RERES	Template Library Organizer Apply Feature Name Override Apply Component Name Override Options Dynamic Settings Template Library Report (itl File)	R
🖂 SR61		

2. Click the **Preferences** button and then select the **FDOT** list item. Click **Load** and then **Close** the **Preferences** dialog. Click **OK** to close the **Template Options** dialog.

Template Options			×	
Naming Options Component Seed N From Feature Specify:	lame: Definition		OK Cancel Preferences	
Point Seed Name:		•	Help	
Left:	Prefix Pr	references		
Right:		Name: Default		Close
Step Options	4	FDOT		Load
X: 0.100000	Y: 0.1			Save As
				Delete
				Help
	4	Active Prefer	ence: Default	

3. Select the **Tools > Dynamic Settings** from the **Create Template** dialog. This provides a toolbox like dialog for placing components.

Note	The X and	Y Step	value	0.1000	functions	similar	to a	grid	lock in	MicroStation	when	placing	the
	components												

Dynamic Settings]
X: 0.000000 Step: 0.10000	
Y: 0.000000 Step: 0.100000	
Point Name:	
Point Style: Archeological Site 💌	
Apply Affixes	
hs= 🔻	ľ
Set Dynamic Origin	

- a. Change the *Point Style* to **Template Miscellaneous.**
- b. Uncheck Apply Affixes.

Dynamic Settings 🛛 🔊	Dynamic Settings					
X: 0.000000 Step: 0.100000	X: -1.737602 Step: 0.100000					
Y: 0.000000 Step: 0.100000	Y: -0.284752 Step: 0.100000					
Point Name:	Point Name:					
Point Style: TemplateMisc_pr	Point Style: TemplateMisc_pr					
Apply Affixes	Apply Affikes					
hs= 🔻	hs= 🔻					
Set Dynamic Origin	Set Dynamic Origin					

> Add Components

1. Navigate to Components/Resurfacing/Overlay and select the Pvt Overlay Right Component.



2. Drag the **Component** to the small magenta square in large *View*.

C\e\projects\22049555201\symb\SR61.tl Components Resulfacing Million	Name: Description:	5: RRR98 xription:						Components Constraints Display Point Names Display All Components				Help
Overbuild Vertay Keft - 2" Depth ME												
	³ drag	the te	empla	te								
SR61	2											
☐ Parts ☐ Linear Templates ➤ Curb Type E ➤ Outbild Round Shoulder	-0											
→ Outside Faved shoulder → Outside Type F Curb 2% w/Sidewalk Surface Templates → Rinht Pavement/Travel Lanes 2%	-3											
		-8	-6	-5	-3	-2	-0	2	3	5	6	8 9

3. Repeat this step to place the **Pvt Overlay Left** *Component* on the small magenta square.

Template Library: Che'projects\22049555201\symb\ E Point Name List Components Resurfacing (Miling, Overbu Miling	Current Tem Name: Description:	plate RRR98			Display Comp Display Display Display	oonents ay Point N ay All Com	Const ames ponents	raints					
Overlay Verlay													
RRR98 SR61 End Conditions Linear Templates Surface Templates			<u>LT_PVT</u>	OUT OT_OUT					IP IN AY_BOT	IN			OUT SOT_OUT

4. Fit View by selecting the **Fit** icon below the *Active Template* window.



5. Drag and drop the **Resurfacing/Milling/ Pvt Milling Right** *Component* and connect it to the bottom side of the **Overlay** *Component* in the Template. The cursor will turn white when it is lock on the location.





6. Repeat this step for the Left Milling Component.

7. Drag and drop the **Resurfacing/Overbuild/ Pvt Overbuild Right** *Component* and connect it to the bottom side of the **Overlay** *Component* in the template. The cursor will turn white when it is lock on the location.



8. Repeat this step for the Left Overbuild Component.



9. Check Apply Affixes on the Dynamic Settings dialog.

Dynami	c Settings		×						
X:	-1.737602	Step:	0.100000						
Y:	-0.284752	Step:	0.100000						
Point N	ame:		-						
Point Style: TemplateMisc_pr -									
🔽 Арр	ly Affixes								
hs= 🔹									
	Set Dynar	nic Orig	in						

10. Drag and drop the Linear Templates/Outside Lane w/ Paved Shoulder *Component* and connect it to the top side of the widening template. While dragging Right click and turn On *Mirror*.

1			1
C	Mirror	Ctrl-M	
	Reflect	Ctrl-R	
	Cancel	ESC	
	Set Dynamic Origin	Ctrl-D	

-0.0				
	LI_PVT_OLAY_OUT	PVT_OLAY_BOT_IN	RT_PVT_OLAY_OUT	
-0:4	LT_PVT_OLAY_BOT_OUT		RT_PVT_OLAY_BOT_OUT	
	TRT_PVT_ADJ1_BOT_O	UT	RT_RT_PVT_ADJ1_BOT_OUT	ĸŢĸĸ₽ĬĸŔĹġŔŸĬŀŴĿġŎ₽IJ₽ŸĔŨŧ
-1-2	E_BOT_OUT			RT_RT_PVT_2ASE_SHEDR_TP_00
-1:4				<mark>₽₽₽</mark> ±ד ₽ ±₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽
1:8	LT_RT_PVT_ADJ1_BASE_I	BOT_OUT	RT_RT_PVT_ADJ1_BASE_BOT_	DUT
-2.0	ĴŤ_OUT			HIT HIT HAT BRASE BEAT OUS
	-10 -5	0 5	Uynamic Settings	30 35

- 11. Modify the **Widening** lane Width and Slope,
 - a. Edit the *Point* **RT_PVT_EOP_OUT**, double click on the *Point* to open the Point **Properties** dialog.
 - b. Change the Horizontal Constraint Value to 1 and Slope Constraint Value to -2%.

Point Properties	X
Name:	RT_PVT_EOP_OUT - Apply
Use Feature Name Override:	RT_PVT_EOP_OUT Close
Feature Definition:	PavementAsphalt_pm
Superelevation Flag	
Alternate Surface:	▼ Next >
	Member of:
	RT_ShidrPvtOut RT_ShidrPvtOut
Constraints Constraint	1 Constraint 2
Type: Horizontal	▼ Slope ▼
Parent 1: RT_VT_OLAY	OUT
Value: 1.000000	= -2.00% =
Label: EOP_WidthOut	✓ EOP_SlopeOut
V Horizontal Feature Constrain	t: PavementAsphalt(EOPA) -
Range:	50.000000

12. Repeat for the *Left Side Widening Pavement*, **LT_PVT_EOP_OUT**, use *Horizontal* value **-1**, and *Slope* value **2.0%**.

> Add End Conditions to the SR61 and RRR98 templates

- 1. Drag and drop the End Conditions/Parts 6:1 Cut and 6:1 FILL TO 5' *Components* to both sides.
- 2. Select **File > Save** to save the Template changes.





Exercise 5.6 Editing Templates

1. On the Create Template dialog, check On the Display Point Names option.

File Edit Add Tools			
Template Library: C:\e\projects\22049555201\symb\ TEE Point Name List Components Components Components	Current Temp Name: Description:	late RRR98	Display Components Constraints Display Point Names Display All Components

- > Change End Condition Point Properties
- 1. Double click on the **RT 6:1** Cut Point to launch the Point Properties dialog.

_											^
5		Point Properties			x						
4 · · · · ·		Name:	RT_6:1Cut	+ +	Apply	(.	RT_6;1Cut				
		Use Feature Name Override:	RT_CUT		Close						
4 · · · · ·		Feature Definition:	Cut_pm	•	< Previous						
2		Superelevation Flag			Next >						
3		End Condition Properties	Marsharafi	•	Help						
2 · · · · ·		Check for Interception	RT_1:6 CUT								
		End Condition is Infinite									
2		Do Not Construct									
1		Constraints		Constant							
		Type: Slope	•	Horizontal	TT 2						
1		Parent 1: RT_LT_UPSHLD	R_OUT - +	RT_LT_UPSHLD							
N n		Parent 2: Rollover V	alues								
BOT_IN	RT_MARE GAVAY_EEDTOUT	Value: 16.67%		30.00000							
-1		Horizontal Feature Constraint	•		-						
	RT PYHERE BASE IN A DO	Range:	0.000000								
+-**	9 12 15 18 -1∎4000€4					46	49 52	55 58	61 6	4 67	70 -

2. Check the End Condition is Infinite box and change *Constraint 2, Horizontal Value*, from 30 to 5 feet. Click Apply and then Close.

		-
5		
	Point Properties	
4	Name. RI_5:1Cut • + Apply	
	V Use Feature Name Override: RT_CUT Close	
4	Feature Definition: Cut_pm	
	Superelevation Rag	
3	Atemate Surface:	
	End Condition Properties Help	
	Check for Interception Member of:	
2 1 1 1 1	V Place Point at Interception	
	V Engloandtion is Infinite	
2	Do Not Construct	
4	Constraints	
	Constraint i Constraint 2	
· · · · · · · · · · · · · · · · · · ·		
N	Parent 2: Pollover Values	
BOT IN BIT_DIVER_DEWAYLEDED OUT	Value: 16.67%, e 5.00000 e	
BT_BYGT Qby Back Batt Page	Label:	
	Horizontal Feature Constraint:	
RT_PYH BART BART HEXTRIN	Barone	
		١.
····································		

- 3. Repeat these changes for the remaining *End Conditions*; **RT 6:1Fill, LT 6:1Cut, RT 6:1Fill.**
- *HINT* Use -5 for left side points. To edit consecutive points, click the pick icon next to the point name and select the next point.

Point Properties			×
Name:	RT_6:1Cut		ily
Use Feature Name Override:	RT_CUT	Clos	se
Fasting Definition	r		

4. Select **Fit View** the *Active Template* and changes.

0.2 · · · · · · · ·	T_6:1Cul							PT_6	5:1Cut
-0.0	λ				PVT_EOP_IN				
			LT RUTL	HUAAAL_OOLPT		RT PUL O	AL OBT		
				UT	PVT_OLAY_BOT_IN	RT_	PVT_EOP_OUT		
-0.3			SHLDR_ROLLOV	ER_OUT			RT_LT_PSHLD	R_ROLLOVER_OUT	
			LT_LT_PSHLDR	DLAY BOT OUT PVT_BOT_TP_OUT		RT_PVT_OI	AY BOT OUT		
		LT_LT_PSHLDR	PVT_TOP_OUT					_PSHLDR_PVT_TOP_OUT	
-0:6	Υ.		T_SHLDR_PVT_	BASE_TP_IN		RT	SHLOR_PVT_BASI		ER_001
	···· /		KE BOTVOAU	NTOP_OUT		. म्रिय	LITENVIBOUSOUEX		
			T_T_PVT_BASE	SHLDR_TP_OUT		RT	LT_PVT_BASE	LDR_TP_OUT	
-0:9		LT LT L				RT_PVT_BA	SE BOTLTNPSHLD	R_ROLLOVER_BASE_BOT	OUT
		LT LT RSHLDR	BASE BOT OUT				RJ-LJ	-PSHLDR-BASE-BOJ-OU	
12			ASE_EXTN_BOT	_001			1 1 1	+_PSHLUR_DASE_EAHV_D	
-1:2									
-1:4 • • • • • • • •									
-1:5	¥T_6:1Fili							¥st_e	5:1Fill
+-4440	-24 -21 ∎ • ○ • • •	-18 -15 -	-9	-6 -3	-0 3 6	6 9 12	15 18	21 24	27

5. Rich click on the each Fill components and choose edit properties. Change the Priority Value to 2

Component Properties	
Name:	+ Apply
Use Name Override: LT_FILL	Close
Description:	
Feature Definition: Slopes	
Parent Component:	• • •
Display Rules:	Edit
Exclude From Top/Bottom Mesh	
End Condition Properties	Priority:
Terrain Model	
■ Contrain Model.	
	No Datum
Horizontal Vertical Offsets: -0.000000 0.000000	Rounding Length 0.000000

6. Turn **OFF** the *Horizontal Feature Constraint* on the middle point, **PVT_EOP_IN Point.**

		Point Properties			×
		Name:	PVT_EOP_IN	• +	Apply
	FRT_	Use Feature Name Override:	PVT_EOP_IN		Close
			PavementAsphalt_p	m 🔻	< Previous
	₽₽ ντ_	Alternate Surface:		•	Next >
₽UT SHEDR_PVT_BOT_OUT BOT_OUT VEABPJERHATIOPTOUT BASE_SHLDR_TP_OUT _BASE_BOT_OUT		Constraints Constraint Type: None	Member of: LT_PvtOverla RT_PvtOverla	y y Constra None	int 2
		Horizonal Feature Constrain Range:	t: 0.000000		-

7. Select **File > Save** to save the Template changes.

> Change the Overlay Depth Properties

1. Change the bottom tab on the left side of the Create Template dialog to Active Template.

Cre	eate T	emplat	e
File	Edit	Add	Tools
	Poi Con Dis Par Alte Con	nts mponen d Condit play Ru rametric ernate S nt Featu mponen	its tion Branches les Constraints Surfaces ure Definitions It Feature Definitions
Item			Value
 ↓ /ul>	ary 🚺	Active T	II. I I I I I I I I I I I I I I I I I I

2. Open the **Parametric Constraints** folder, double click on the **OLAY_PvtThick** *Label* and change the *Default Value* from **-.25** to **-2/12**. Click **OK**.

Create Template	
File Edit Add Tools	
Parametric Constraints Parametric Constraints P-P- EOP_Base ThickLt P-P- EOP_Base ThickRt P-P- EOP_ExtBaseLt P-P- EOP_PvtThickLt P-P- EOP_PvtThickLt P-P- EOP_PvtThickRt P-P- EOLAY_PvtThickRt P-P- OLAY_PvtThickRt P-P- OLAY_PvtThickRt P-P- OLAY_PvtThickRt P-P- OLAY_PvtWidthLt P-P- OLAY_PvtWidthLt P-P- OLAY_PvtWidthRt P-P- OLAY_PvtWidthRt P-P- SHLDR_BaseFvtWidth	Current Template Name: RRR98 Description: Edit Default Parametric Value Label: OLAY_PvtThick OK Default Value: 0,166667 Cancel Help

3. Repeat these steps for the OLAY_PvtThickLt and OLAY_PvtThickRt Labels.

> Change the Milling Point Properties

1. Zoom in the Active Template View to the Right Widening side.



2. Right click on the **RT_PVT_OLAY_OUT** and select **Edit Point**.



- a. Change the Constraint 1, Horizontal Value from 12 to **5 feet**.
- b. Change *Constraint 2*, from **Slope** to **Project to Surface.**
- c. Set the *Constraint 2* Value to Active.
- d. Click **Apply** and then **Close**.

Point Properties	
Name:	RT_PVT_OLAY_OUT - Apply
Use Feature Name Override:	RT_PVT_OLAY_OUT Close
Feature Definition:	Pavement Milling_pm
Superelevation Flag	
Alternate Surface:	▼ Next >
	Member of:
Constraints Type: Horizontal Parent 1: PVT_EOP_IN Value: 5.00000 Label: OLAY_PvtWidthl	RT_PvtOut RT_PvtOverlay 1 Image: Constraint 2 Image: Project To Surface Image: Constraint 2 Image: Project To Surface Image: Pvtoper Project To Surface Image: Pvtoper Pv
Horizontal Feature Constraint	Pavement Milling (ML)
Range:	50.000000

e. Repeat these steps for the LT_PVT_OLAY_OUT, change the *Horizontal Value* from -12 to -7 and *Slope* to **Project to Surface**.

Point Properties	
Name:	LT_PVT_OLAY_OUT - Apply
Use Feature Name Override:	LT_PVT_OLAY_OUT Close
Feature Definition:	Pavement Milling_pm
Superelevation Flag	
Alternate Surface:	▼ Next >
	Member of:
Constraints Type: Horizontal Parent 1: PVT_EOP_IN Value: -7.00000 Label: OLAY_PvtWidth	LT_PvtOut LT_PvtOverlay
Horizontal Feature Constraint	:: Pavement Milling (ML)
Range:	-50.000000

3. Zoom out of the *Active Template* to view the results.

	4T_01Cu	₽T_61CM
		indinational de la declarada de la Anglanda de la declarada de la declarada de la declarada de la declarada de
-0:2	LT_PVT_OLAY_OUT PVT_EOP_OUT PVT_OLAY_BC	RT PVT OLAY OUT
	LT_LT_PSHLDR_ROLLOVER_OUT	RT_LT_PSHLDR_ROLLOVER_OUT
		RTPPVTBASEUDSM DONTOURDERLEDR BOLLOVER OUT
	LTLTPOYTERSE SKIN TOP OUT	RATLITPYTBRASEVENTN TOP SULT UPSHLDR_OUT
	CT_LT_PVT_BASE_SHLDR_TP_OUT	RT_LT_PVT_BASE_SHLDR_TP_OUT
	LT_LT_PSHLDR_ROLLOVEBLEEDED	RT_PVT BASE BCRTNLT_PSHLDR_ROLLOVER_BASE_BOT_OUT
	LETET_PSRUBRBBRSEFERRN_BUT_OUT	<mark>₽</mark> ₽₽ <u>₽</u> ₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽
-1:4		λ
-1:5	¥ ^r ,c.1F#	₩T_6.1Fill
+-44	4 -23 -21 -20 -18 -17 -15 -14 -12 -11 -9 -8 -6 -5 -3 -2 0 2 3 ⊑41=1⊐∎o⊙∲∢	5 6 8 9 11 12 14 15 17 18 20 21 23

4. Select **File > Save** to save the Template changes.

> Change the Widening Point Properties

					^ ^ ^
0.0	PVT_EOP_IN		Point Properties	— ×	
-0:0			Name:	RT_PVT_EOP_OUT + Apply	
-0.1			Use Feature Name Override:	RT_PVT_EOP_OUT Close	
-0:1 · · · · · · · · · · · ·			Feature Definition:	PavementAsphalt_pm	j
-0.2			Superelevation Flag	Next >	
		B PVT EOP OI	Alternate Surface:	▼ Help	
-0:2	PV1_OLAY_BO1_IN			Member of:	
-0:3	\sim			RT_PvtWiden	/
-0:4 · · · · · · · · · ·					/
0.4					
-0.4		RT_PVT_OLAY_BOT_OUT	Constraints	1 Constraint 2	
-0:5		RT_LT_PSHLDR	Type: Slope	Horizontal	
-0:5 · · · · · · · · · ·		BT PVT BOT IN	Parent 1: RT_PVT_OLAY	_OUT + + RT_PVT_OLAY_OUT + +	
-0:6		RTERVELEOFASI	Parent 2: Rollover	Values	
			Value: -2.00%	2.000000	
-0:7			Label:	WideningWidthRt	OUT
-0:7		₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽	Horizontal Feature Constraint	t: PavementAsphalt(EOPA)	
-0:8 · · · · · · · · · · · ·			Range:	50.000000	
	0 2 3 5	6 RT_LT_PVT_B	BeTourout It Tool	12 14 15	
+	0.00				F

1. Double click on the **RT_PVT_EOP_OUT** to edit the *Point Properties*.

2. Change the *Constraint 1, Horizontal Value* from 1 to.01 feet and *Horizontal Feature Constraint Range* from 50 to 100 feet. Click Apply and then Close.

Point Properties		x
Name:	RT_PVT_EOP_C	OUT 🔻 🕈 🖌 Apply
Use Feature Name Override:	RT_PVT_EOP_C	OUT Close
Feature Definition:	PavementAspha	alt_pm
Superelevation Flag		
Alternate Surface:		▼ Next >
	Member of:	f:
	RT_PvtOu	ut
	RT_ShldrF	PvtOut
Constraints		Constants 2
Type: Horizontal		Slope
Parent 1: PT PVT OLAN		
Value: 0.010000		
		500.0
EOP_WidthOut	▼	EOP_slopeOut
Monzontal Feature Constrain	nt: PavementAsp	phalt(EOPA)
Range	100.00000	

3. Repeat these steps for the LT_PVT_EOP_OUT, change the *Horizontal Value* from -1 to -.01 and *Horizontal Feature Constraint Range* from -50 to -100 feet. Click Apply and then Close.

Point Properties		
Name:	LT_PVT_EOP_OUT	T 🔻 🕂 Apply
Use Feature Name Override:	LT_PVT_EOP_OUT	T Close
Feature Definition:	PavementAsphalt_p	om
Superelevation Flag		
Alternate Surface:		▼
	Member of:	Help
	LT_PvtOut LT_ShldrPvtO	Dut
Constraints Constraint	1	Constraint 2
Type: Horizontal	•	Slope 💌
Parent 1: LT_PVT_OLAY	′_OUT ▼ +	LT_PVT_OLAY_OUT - +
		Rollover Values
Value: _0.010000	=	2.00%
Label: -EOP_WidthOut	t 🔻	-EOP_SlopeOut
V Horizontal Feature Constrain	nt: PavementAspha	lt(EOPA) 👻
Range	-100.0000	

4. Fit View the Active Template to view the results.



5. Select **File > Save** to save the Template changes.

> Check the Milling Component Properties

1. Double click on the bottom line of the **RT_PvtOverlay** to open the **Component Selection** dialog and select the **RT_PvtMilling** option to edit the **Component Properties**.



- 2. Change the *Overlay/Stripping Properties / Bottom* option from Follow Surface to Follow Component. Click Apply and then Close.
- *Note* This is the appropriate setting for constant depth milling to match existing pavement slope between two points.

Component Properties					×
Name:	RT_P	∕t Milling	-	+	Apply
Use Name Override:	RT_P	vt Milling		_	Close
Description:					
Feature Definition:	Paver	nentMilling		•	
Parent Component:			•	+	Next >
Display Rules:				Edit	Help
Exclude From Top/Bo	ttom Me	esh			
Overlay/Stripping Prope	erties		_		
Top option:		Follow Surface 🔹	Altema	te Bottom Surfa	ace:
Bottom option:		Follow Component 👻]		•
Component Depth:		0.000000	Label:		•
Surface:		<active> •</active>	🛛 🔽 Strip	oping Compone	ent
Surface Depth:		0.000000	Label:	PvtMillingDep	oth 👻

3. Repeat these steps for the LT_PvtMilling Component, change the Overlay/Stripping Properties / Bottom option from Follow Surface to Follow Component. Click Apply and then Close.

Component Properties					x
Name:	LT_Pv	tMilling	+		Apply
Use Name Override:	LT_Pv	tMilling			Close
Description:					Previoue
Feature Definition:	Paver	nentMilling	•	ĵ	
Parent Component:			+	Í	Next >
Display Rules:				Edit	Help
Exclude From Top/Bo	ttom Me	esh			
Overlay/Stripping Prope	erties		_		
Top option:		Follow Surface 🔹	Altemate	Bottom Surfa	ace:
Bottom option:		Follow Component 🔹			•
Component Depth:		0.000000	Label:		-
Surface:		<active> -</active>	Stripp	ing Compone	ent
Surface Depth:		0.000000	Label: p	PvtMillingDep	oth 👻

4. Select File Save to save the Template changes.

> Insert a Milling Slope Break Template Point

1. Right click on the **RT_PvtOverlay** *Component* and select **Insert Point**.



2. Data point in the Active Template View to store a point. Right click and select Finish.



3. Double click on the new *Point* to edit the **Point Properties**. Change the **Point Constraints** as shown.

Point Properties	
Name:	T_ML_BREAK
🔲 Use Feature Name Override: 🛛 🛛	T_ML_BREAK Close
Feature Definition:	avementCrown_pm
Superelevation Flag	
Alternate Surface:	Next >
	Member of:
Contervints	RT_PvtOverlay
Constraint 1	Constraint 2
Type: Horizontal	✓ Project To Surface
Parent 1: PVT_EOP_IN	
Value: 0.100000	= <active> -</active>
Label:	•
Horizontal Feature Constraint: Range:	0.000000

4. Click **Apply** and then **Close**.



5. Repeat the steps above to insert *Points* on the bottom of the **PvtOverlay**, **PvtMilling**, and **PvtOverbuild** *Components*.



HINT If insert point option is not available for the last component, use add point

6. Set the **Point Properties** as shown.

Point Properties			×
Name:	T_ML_BREAK_BO	•	Apply
Use Feature Name Override: R	T_ML_BREAK_BOT	Г	Close
Feature Definition:	lottom_pm	•	< Previous
Superelevation Flag			Next >
Alternate Surface:		•	
	Member of:		Help
	RT_PvtMilling RT_PvtOverbu RT_PvtOverlay	ild ,	
Constraints Constraint 1		Constrai	nt 2
Type: Horizontal		Vertical	•
Parent 1: RT_ML_BREAK	•	RT_ML_BREAK	+
Value: 0.000000		-0.166667	=
Label:	-	OLAY_PvtThickRt	-
Horizontal Feature Constraint:			
Range:	0.000000		



7. Merge the three points into one final point.

0.1			:							;	:				^
0.0					VT EOP IN	BT	ML_BREAK								
-0:1															
-0:1															
-0.2															
-0:2					PVT OLAY BOT IN	RT_	ML BREAK BO	<u>T</u>							
-0:3					one final point on										
-0:4					all three components										
-0;4															
-0.5															
-0.6															
-02 +-☆☆☆☆□≝०००∲	-0.2 -0.2	-0.1	-0.1 -0.1	-0.0	0.0 0.0 0.	1 0.1	0.1 0.2	0.2	0.2	0.2	0.3 (3 0	.3 0.4	4 0.4	÷

8. Select **File > Save** to save the Template changes and then close the **Create Template** dialog.

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6 BASIC CORRIDORS MODELS

CORRIDOR MODELING OVERVIEW

As defined in the Bentley Civil Help:

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

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

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

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

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

The following are minimum requirements to use Corridor Modeling.

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

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

CORRIDOR MODELING PLANNING

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

- Determine how to break up the project into logical independent corridors
- Determine which sections of the project are needed for detail modeling and surface modeling
- Determine the files and filenames to be used for corridors and details.
- *Note* The project 3D Model may be in separate files or all combined into one file.: The FDOT file defined to be used for Corridor and Detail Models is MODLRDxx.

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



EXERCISE OVERVIEW

- 6.1 Prepare to Create Corridor Model for SR61
- 6.2 Create Corridor, SR61
- 6.3 Variable Medians, SR61 Templates
- 6.4 Add Corridor References, SR61
- 6.5 Add Corridor Point Controls, SR61
- 6.6 Add Corridor Key Stations, SR61
- 6.7 Change Corridor Design Stage, SR61
- 6.8 Review Corridor Objects, SR61
- 6.9 Create RRR Corridor Model, BL98
- 6.10 Create Template Drop, RRR98
- 6.11 Add Corridor References, RRR98
- 6.12 Template Point Control, RRR98

Exercise 6.1 Prepare to Create Corridor Model for SR61

- 1. (Optional) Extract the 22049555201(6).zip file in the c:\e\projects folder.
- 2. Use the create file tool to create the *MODLRD01.dgn* file to be used for corridor models.
- 3. Open the *MODLRD01.dgn* or *DSGNRD01.dgn* file of the c:\e\projects\22049555201\roadway\ folder in the *FDOTSS4* Workspace in MicroStation.
- 4. If using the MODLRDO1 file, attach the terrain, 2D plan and survey files as references.
- 5. Use the *Terrain Model*, Set Active Terrain Model tool.



- 6. At the cursor prompt, select the **Terrain Boundary** green dashed line from the attached *GDTMRD01 reference* file. This will set the *terrain model* as **Active**.
- 7. Move the cursor over the **SR61** *Centerline Feature* and verify an **Active Profile**.



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

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W	<u>\$</u>	ł	1	⊹	2		Create	Template
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т	0	5	(∰+	€€	∰	∰	I	↓ ¶¶¶
		1.0	രം	\sim				

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

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



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



Exercise 6.2 Create Corridor, SR61

1. Use the *Corridor Modeling*, **Create Corridor** tool.



2. Enter the *Corridor Name*, SR61, in the Create Corridor dialog and then select the SR61 Centerline in the Plan View.

Create Corridor	X
Locate Profile Element Corridor Name SR61 Design Stage 1 PRELIN	
Λ	
	Locate Corridor Baseline
	Active Profile: SR61-1 R1 Level: GradeLine profile: SR61-1 R1 DBC FEATURE Attribute = CLC
0	

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

- 4. Data point to accept the *Name of the Corridor*, **SR61**. The corridor is created AND the integrated Create Template Drop dialog launches.
- *Note* Once a Corridor is created, a shape boundary is placed in the Plan View representing its outline. This shape is initially placed on the CorrHndlStg1_dp level. It has several properties which can be seen by clicking on the shape and choosing first icon. One of the properties is the Design Stage.

😵 Create Template Drop	
Lock To Start	
Start	0.000000
Lock To End	
End	0.000000
Drop Interval	10.000000
Minimum Transition Before Drop	0.000000
Minimum Transition After Drop	0.000000
Template	Corridor Templates\SR61
	Locate Corridor Corridor: SR61 Plan: SR61 Profile: SR61-PR1 Level: CorrHndlStg1_dp
~	

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

🚯 Create Template Drop	X
Lock To Start	
Start	698+80.82 R1
Lock To End	
End End	726+42.21 R1
Drop Interval	10.000000
Minimum Transition Before Drop	0.000000
Minimum Transition After Drop	0.000000
Template	Corridor Templates\SR61
0	
Select Template <alt> Dov Templates</alt>	vn o Browse
Template Comidor Template	SNSR61 🖂

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



- 7. Data point to accept the **Template** and move to the next setting.
- 8. Continue to define the Create Template Drop dialog information entering and accepting the following for the SR61 *Corridor*:
 - a. *Start* Use keypoint or intersect snap click to the *ML line* on 98, *Station* **700+23.62**.

ſ	😵 Create Template Drop		
	Lock To Start		
	Start	700+23.62 R1	
	Lock To End		
	End	726+42.21 R1	
	Drop Interval	10.000000	\mathbf{N}
	Minimum Transition Before Dro	op 0.000000	\backslash
	Minimum Transition After Drop	0.000000	
	Template	Corridor Templates\SR61	
-			
		OOC Katt Statton CALt> Lock To Start Start 700+23.62 R1 Line String: ML4 Feature: PavementMilling(ML) No Active Profile Level: PavtMilling	



b. *End* - snap to the beginning of the *milling*, *Station* **715+73.20.** Complete dialog as shown below.

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



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



> Turn 3D Reference File Display Off in the Plan View

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

- 1. Data Point somewhere in **View 1** to make it active.
- 2. On the MicroStation Level Display dialog, navigate to the **Ref. DSGNRD01 Default-3D** file or **Ref. MODLRD01.DGN Default-3D** file.



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



Exercise 6.3 Variable Medians, SR61 Templates

The *FDOTSS4.itl* file contains some PPM Exhibit Templates which are delivered with variable medians included. The median can vary with the following conditions or component sets:

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

To properly operate the median condition templates consider the following:

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

> Add Parametric Constraint for Variable Median, SR61 Template

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

1. Use the *Corridor Modeling*, **Create Parametric Constraint** tool.



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



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

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

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

Exercise 6.4 Add Corridor References, SR61

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

1. The SR61 template is designed to target CurbGutterTypeE lines in the median. Use the Set Feature Definition tool to change the two median CurbFace feature lines to CurbGutterTypeE features.

∠ Horizontal Geometry		
a <u>AD</u> 💁 😵 😿 🏏		
W Set Feature De	finition Set Featur	– 🗆 X
\mathbb{E} γ γ γ γ	Feature	*
$\mathbb{R} \cup \mathbb{C} \subseteq \mathbb{Z} \subseteq \mathbb{C} \subseteq \mathbb{C}$	Feature Type	Linear 🗸
т 🧟 🔿	Feature Definition	CurbGutterTypeE 🗸
The Start Start Start	Name	CurbE
s مَسْرَدُ مُسْرَدُ مُسْرَدُ اللَّهُ عَلَيْهُ مُسْرَدُ عَلَيْهُ مُسْرَدُ عَلَيْهُ مُسْرَدُ عَلَيْهُ مُسْرَد		

- 2. Create a selection set of the following 12 features in the plan view:
 - 2 PavementAsphalt(EOP) lines in the median
 - 4 PavementAsphalt(EOP) taper lines in the median
 - 2 CurbGutterTypeE lines in the median (step 1 above)
 - 2 CurbGutterTypeE taper lines in the median
 - 4 TrafficSeparatorTypeI(4 feet) lines in the median
- 3. Use the Corridor Modeling, Add Corridor References tool.

Ħ	Corridor Modeling 🔢 🗮 🗮 🔺
Q	∰ ┿ 🖞 👭 🎜 🏊 📼
W	🏝 🖌 🧹 🖾 🚫 🔀 🥌
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A	🚅 🐓 🏹 Add Corridor Reference

- 4. Identify the **Corridor** *handle* and then data point to add the selected lines as listed above to the corridor.
- 5. Once the **Reference Lines** have been added, the Corridor will automatically process to include the new **Horizontal Feature Constraints**.

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



Exercise 6.5 Add Corridor Point Controls, SR61

This exercise defines the LT and RT PGL to be a fixed distance from the centerline, 11 feet.

- *HINT* On projects where the PGL lines vary from parallel to the centerline, use the linear option and select the feature lines that represent the varying PGL's.
- 1. Use the *Corridor Modeling*, Create Point Control tool.



2. Identify the **Corridor Boundary** *handle*. Continue to define the **Create Point Control** dialog information.

💱 Create Point Control	_ 🗆 🗙
Lock To Start	
✓ Start	698+53.79 R1
Lock To End	
✓ Stop	726+41.07 R1
Control Description	RT_PGL
Point	RT_PGL_HANDLE
Mode	Horizontal 💌
Control Type	Linear Geometry 💌
Plan Element	
Use as Secondary Alignment	
Priority	1
Horizontal Offsets	^
Start	11.000000
Stop	11.000000

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

0	Start Station	Alt for Begin
0	End Station	Alt for End
0	Control Description	RT_PGL
0	Point	RT_PGL_HANDLE
0	Mode	Horizontal
0	Control Type	Linear Geometry
0	Start Value	11.00
0	End Value	11.00

Note At the prompt to select an element, choose the SR61 centerline

4. Repeat the previous steps to add the *Point Control* for the LT_PGL.

🖇 Create Point Control	
Lock To Start	
✓ Start	698+53.79 R1
Lock To End	
✓ Stop	726+41.07 R1
Control Description	LT_PGL
Point	LT_PGL_HANDLE
Mode	Horizontal
Control Type	Linear Geometry 💌
Plan Element	
Use as Secondary Alignment	
Priority	1
Horizontal Offsets	*
Start	-11.000000
Stop	-11.000000

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

0	Start Station	Alt for Begin
0	End Station	Alt for End
0	Control Description	LT_PGL
0	Point	LT_PGL_HANDLE
0	Mode	Horizontal
0	Control Type	Linear Geometry
0	Start Value	-11.00
0	End Value	-11.00

At the prompt to select an element, choose the SR61 centerline Note

Exercise 6.6 Add Corridor Key Stations, SR61

Create Key Station tool is useful to add stations that are not coincident with the template interval. When the median conditions change abruptly, it is desirable to include the station for processing.

1. Use the Corridor Modeling, Create Key Station tool.



- 2. Identify the Corridor Boundary handle.
- 3. Use AccuSnap to locate the Plan View CurbMedian / Traffic Separator division line.





- Station Station 703+73.87 R1
- 4. Repeat these steps for both **Traffic Separator** locations in the *Plan View*.

Exercise 6.7 Change Corridor Design Stage, SR61

The FDOTSS4 Workspace defines Corridor Stages to help with various tasks for Design and 3D Modeling. Depending on the Active Stage, processing the Corridor will take longer.

- 1. Open the Project Explorer dialog, select the F11 Function Key.
- 2. Select the Civil Standards tab and expand the Libraries option list.
- 3. Locate the **Corridor Design Stages** under *Project Settings* > *FDOT_CivilFeatures_RD*.



4. Select the **Boundary** of the Corridor and locate the **Properties** icon when the menu displays.



5. Select the **Properties** icon and change the *Design Stage* from **1 PRELIM** to **2 DESIGN**.

Name	SR61
Horizontal Name	SR61
Use Active Profile	True
Profile Name	SR61-PR1
Design Stage	2 DESIGN
	···· 1 PRELIM
	- 2 DESIGN
	O FINIAL

6. The Corridor will re-process and the 3D Model will re-draw with a tighter interval.



Exercise 6.8 Review Corridor Objects, SR61

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

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

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Е	田宙智笛田田罗(Corridor Objects
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2. Identify the Corridor Boundary *handle* to open the Corridor Objects dialog.



- > Additional Template Edits, SR61
- 1. Change the *sidewalk buffer* from **3 feet** to **0 feet** on both roadways.
- 2. Either change the *sidewalk width* to **6 feet** or add the *sidewalk back lines* to the Corridor as **References** for the *template* **HFC**.
- 3. Add End Conditions 2:1 Cut & Fill *components* to each side with *Mirror* and *Affixes* checked ON.

Exercise 6.9 Create RRR Corridor Model, BL98

- 1. Continue in the DSGNRD01.dgn or MODLRD01.dgn file.
- 2. *Optional*: Use the *General Geometry*, **Set Active Terrain Model** tool.

🖺 General Geometry	
a 🐴 🦖 😽 🍫 🗸 🕡	
v 🛴 Zt 🏏	
E 🔆 🏏 🔐	
R 😹 🖓 💐	
Z Horizontar Geometry	*

Note This tool can also be found on the Terrain Model Workflow Task.

3. At the cursor prompt, click on the **Terrain boundary line** from the attached *GDTMRD02* Reference file. If the Terrain Model is *Active*, a message will display, **Terrain Model Already Active**.



4. Move the cursor over the **BL98 centerline** *Feature* and verify an **Active Profile**.



- 5. To set up the *Views* for viewing the **2D Plan** and **3D Model** simultaneously in the FDOTSS4 Workspace, select the **F2** *Function Key* on the keyboard. This will open an **Isometric View** of the project.
- *HINT* Use the Shift Key and Middle Button to rotate the 3D view.



6. Use the Corridor Modeling, **Create Corridor** tool.



- 7. Enter the *Corridor Name*, **RRR98**, in the Create Corridor dialog and then select the **BL98** centerline in the *Plan View*.
- 8. Reset to accept the Active Profile. This profile resides with the *BL98 Civil Feature Centerline*.
- 9. Data point to accept the *Name of the Corridor*, **BL98**. The corridor is created AND the integrated Create Template Drop dialog launches.



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

Exercise 6.10 Create Template Drop, RRR98

1. Once the Create Template Drop dialog displays, first select the corridor template to be placed on the corridor. Either use the icon on the dialog <OR> Select ALT down arrow to pick a template.

🚯 Create Template Drop	– – X	Ŋ
Lock To Start		
Start	18+15.67 R1	
Lock To End		
End End	46+11.26 R1	
Drop Interval	10.000000	
Minimum Transition Before Drop	0.000000	
Minimum Transition After Drop	0.000000	
Template	Comidor Templates\SR61	þ
		J
0	- Al	
Select Template - <alt> Templates</alt>	Down To Browse	/

2. Select the **RRR98** template in the *Corridor Templates* folder. Click **OK**.



3. Data point to accept the **Template** and move to the next setting. Continue to define the **Create Template Drop** dialog information entering and accepting the following for the **SR61** *Corridor*:

 Start Station End Station Drop Interval Min. Tran. Before Min. Tran. After 	28+00 Alt for the end station 10.0 0.0 0.0	
🚯 Create Template Drop		/
Lock To Start		
Start	28+00.00 R1	
Lock To End		
✓ End	46+11.26 R1	
Drop Interval	10.000000	
Minimum Transition Before Drop	0.000000	
Minimum Transition After Drop	0.000000	
Template	Corridor Templates\RRR98	
Interval Drop Interval		

4. Upon completion of the Corridor processing bar in the lower right hand side of the MicroStation status bar, the *3D Model* will be displayed in **View 2**.



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



Exercise 6.11 Add Corridor References, RRR98

Corridor References are related to the template points having a Horizontal Feature Constraint to control the location of the point on the corridor. They are 2D graphical Civil Features that need to be added to a Corridor. For the RRR98 Corridor add the following Civil Feature References:

- PavementMilling(ML)
- Widening PavementAsphalt(EOPA)
- 1. Select the lines as listed above to add to the Corridor.

HINT Use the Selector Tools with in MicroStation to assist.



2. Use the *Corridor Modeling*, Add Corridor Reference tool.

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⊤ 🧿 🍂 🗰 🖽 👯 Щ, I _≈ ↓	Ħ
A 🛃 炉 🤤 Add Corridor Reference	l

3. At the prompt, select the **corridor handle** or **boundary**, data point to accept the selected elements as *corridor references*.



4. Once the *Reference lines* have been added, the Corridor will automatically process to include the new *Horizontal Feature Constraints*.



Exercise 6.12 Template Point Control, RRR98

The template used has milling slope break points built within meant to follow normal slope breaks in the existing pavement. These lines add Point Controls for the Corridor.

1. With **View 1** active, turn **Off** all *Levels* in the *TOPORD* file and turn **On** the **Pavemk_ep** *Level*.

Level Display - View 1		
U View Display		
N II Le	eve 🕶 Levels 💌 🐱 🕶	
E-M DSGNRD01.DGN	N, Default	
-we Aerials.dgn		
-V8 RWDTRD01	DGN	
TOPORD01.	DGN NONED FR	
-VO ALGINHUUT.L	DGN, ALGNRD_50	
	DUT.DGN, Default-3D	
BUTMRDUZ.	Dan	
Name		Used 🍸
Name		Used T
Name DummyChains_ep Fence_en		Used T
Name DummyChains_ep Fence_ep FoodLight_ep		Used T
Name DummyChains_ep Fence_ep RoodLight_ep Gates_ep		Used *
Name DummyChains_ep Fence_ep FoodLight_ep Gates_ep GroundShot_ep		Used *
Name DummyChains_ep Fence_ep FoodLight_ep Gates_ep GroundShot_ep Handrail_ep		Used *
Name DummyChains_ep Fence_ep FloodLight_ep Gates_ep GroundShot_ep Handrail_ep Hole_ep		Used *
Name DummyChains_ep Fence_ep FoodLight_ep Gates_ep GroundShot_ep Handrail_ep Hole_ep Mailbox_ep		Used *
Name DummyChains_ep Fence_ep FoodLight_ep Gates_ep GroundShot_ep Handrail_ep Hole_ep Mailbox_ep MiscEquip_ep		Used *
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Name DummyChains_ep Fence_ep FoodLight_ep Gates_ep GroundShot_ep Handrail_ep Hole_ep Mailbox_ep MiscEquip_ep Pavemk_ep PavtConc_ep PavtConc_ep PavtCrown_ep		Used •
Name DummyChains_ep Fence_ep FoodLight_ep Gates_ep GroundShot_ep Handrail_ep Hole_ep Mailbox_ep MiscEquip_op PavtConc_ep PavtConc_ep PavtCrown_ep PavtCrown_ep PavtCrown_ep PavtMisc_ep		Used
Name DummyChains_ep Fence_ep FoodLight_ep Gates_ep GroundShot_ep Handrail_ep Hole_ep Mailbox_ep MiscEquip_ep PavtConc_ep PavtConc_ep PavtCrown_ep PavtCrown_ep PavtMisc_ep RipRap_ep		Used *

2. Use *References*, **Merge Into Master** tool to copy the **Pavemk_ep** lines into the *DSGNRD or MODLRD* file.



- 3. Create a *Selection Set* of the middle **Pavemk_ep** lines.
- 4. Use *Horizontal Geometry*, Set Feature Definition tool.

Z	Horizontal Geometry
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т	2

- 5. Select the **PavementCrown** Feature Definition and **pvtcrown** Name.
- 6. Data point to accept the Feature Definition to selected elements.

Í	💡 Set Feature De	fin 💻 🗖	x		
	Feature		^		
	Feature Type	Linear	-		
	Feature Definition	PavementCrown	-		
	Name	pvtcrown			
	٢				/ /
		Data Point to Apply Selected Elements	y Feature	e Definition to 5	
		Sciected Elementa			
~					Ρ
					$\overline{\Lambda}$

7. Use the *Corridor Modeling*, **Create Point Control** tool.



8. Identify the **Corridor Boundary** handle. Continue to define the **Create** Point Control dialog information entering and accepting the following for the **RRR98** *Corridor*:

0	Start Station	28+00
0	End Station	Alt for End
0	Control Description	GradeBreak
0	Point	RT_ML_Break
0	Mode	Horizontal
0	Control Type	Feature Definition
0	Feature Definition	Pavement Crown
0	Range	10
0	Priority	1
0	Horizontal Offset Start	0.0
0	Horizontal Offset Stop	0.0

S Create Point Control	
Lock To Start	
🔽 Start	28+00.00 R1
Lock To End	
Stop	46+11.26 R1
Control Description	GradeBreak
Point	RT_ML_BREAK
Mode	Horizontal
Control Type	Feature Definition
Feature Definition	PavementCrown
Range	10.000000
Use as Secondary Alignment	
Priority	1
Horizontal Offsets	*
Start	0.000000
Stop	0.000000

> To validate the model verses the plan, Complete the Following

- 1. Open Project Explorer, Civil Standards, DSGNRD01.DGN or MODLRD01.DGN, Feature Definitions, Corridor Lines(3D)
- 2. Select the PavementAsphalt_pm and then right click to select the properties
- 3. In the Properties dialog, change the Linear Default Setting, Create Template Geometry setting to True

Linear Default Settings	^
Automatically Create 3D Elements	True
Corridor Template	
Terrain Model Feature Type	Break Line
Create Template Geometry	True 💌
	True
Plan	False

4. Re-process the Corridors



- 5. Verify that the construction lines in magenta, line up with the plan lines.
- 6. Repeat the steps for the Milling_pm lines



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7 OPEN CROSS SECTION VIEW

INTRODUCTION

This section will cover the Cross Section View tool. This is a single Cross Section View tool and is not for producing final plan cross sections to print or other production needs. Refer to the *FDOT Plan Development Workflows* training manual.

The Cross Section View tool creates a single section plane through any displayed elements in the "default- 3D model" of the DGN file, thus having the ability to see a true slice or cross section through the model. The graphics can be created from a Roadway Corridor, Drainage Network, Bridge Structure, or any other 3D solid element in the design file or reference file.

The cross section view created is dynamic and will change as the model elements in the design file or reference file changes.

This Cross Section View tool will also display a location line in the plan view, profile view and 3D model view. This line is also tied to an element or alignment for specific location identification and navigation. The Cross Section View tool is essential to evaluate the design and to make design decisions.

EXERCISE OVERVIEW

- 7.1 Opening a Cross Section View
- 7.2 SR61 Corridor Cross Section View
- 7.3 BL98 Alignment Cross Section View
- 7.4 SR61/BL98 Turn Lane Cross Section View
- 7.5 Create a 3D Drive-Through Animation

Exercise 7.1 Opening a Cross Section View

This exercise teaches the user to open a View and set it to a Cross Section Model View.

> Corridor Modeling Tool Used

- 1. (Optional) Extract the 22049555201(7).zip file in the c:\e\projects folder.
- 2. Open the *DSGNRD01.dgn OR MODLRD01.dgn* file of the c:\e\projects\22049555201\roadway\ folder in the FDOTSS4 Workspace in MicroStation.

HINT Check on the Reference file display for the TOPORD, and GDTMRD files

- 3. Select the *Function Key* **F2** to open **View 2** the 3D Model. Click on the **View 2** window to make it active.
- 4. Use **Reference Display** to attach the *GKLNRD Default-3D* file. This is the file with the *Existing Feature model* elements.


5. Click in **View 2** to make it *Active*. Use *Level Display* to toggle **Off** the **DTM** *Level* in the *GKLNRD Reference* file.



- 6. Select the *Function Key* F4 to open Views 1-4.
- 7. Use the MicroStation Select tool to select the SR61 centerline. Click the Open Profile Model icon on the Context Menu and select View 3 to place the Profile View of *SR61*.

Exercise 7.2 SR61 Corridor Cross Section View

1. Use *Corridor Modeling*, **Open CrossSection View** tool.

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R	≤≈≈≈√⊠⊠≈<
т	Open CrossSection View I 🕿 🕼
А	<u>_</u> 1/ % 7

2. Select the *Corridor*: **SR61** by the handle or near the boundary and click in **View 4** to display the *Corridor Cross Section*.



- *Note* When used on a Corridor, the Cross Section View tool will determine the following from the corridor properties:
 - Left Offset
 - Right Offset
 - o Interval
 - o Start Station

- 3. For the **SR61** Cross Section View 4:
- *Note* There is a known issue with SS4 Dynamic Cross Sections; the program will crash if you zoom and scroll at the same time when the cursor is over a yellow point. To turn off the yellow points, go to the Project Explorer Civil Standard Tab and turn off the 3D Lines features.



- a. Notice many of the MicroStation Zoom, Pan, etc. commands will operate as normal.
- b. Use the Cross Section View Navigation tools to examine the Corridor Model.



c. Select **View Properties** and change the *Vertical Exaggeration* to **10** and then click the **View** to see the changes.

View 4, Cross Section - Corridor: SR6
View Properties 🔫 🖂 🚽
Fit Section
Center Backbone
Center on Current Offsets
Backbone Screen Width: 0.80
Vertical Exaggeration:
Display Null Points
Display Cut and Fill Graphics
Display Cut and Fill Values



d. Select the Station pull down menu and change to Station 715+00.

4. Use Corridor Modeling, Locate Station Via Datapoint tool;



5. Select the **Corridor boundary** to see a dynamic locater line perpendicular to the Centerline. Data point at any station along the alignment and click in **View 4** to see its *Cross Section*.



HINT Another way to access the tool is to hold down a Right Click in the Cross View to select the Locate Station via Data Point

Exercise 7.3 BL98 Alignment Cross Section View

1. Use Corridor Modeling, Open Cross Section View tool.

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T Open CrossSection View 🙀 I🕿 🕌	ß
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2. Select the *Alignment* **BL98** and enter the following:

Left Offset	-75
Right Offset	75
Start Station	28+00
Interval	20





3. Left click in View 4 to display the Corridor Cross Section.

HINT Hold down a right click to Turn Off the Baseline cell level.

- 4. Evaluate the *RRR98 Model* using the **Cross Section** tool.
- *Note* The Cross Section View tool works with Corridors, Civil Geometry, MicroStation Line or Line String Elements.

Vie

Exercise 7.4 SR61/BL98 Turn Lane Cross Section View

1. Use *Corridor Modeling*, **Open CrossSection View** tool.

👭 Corridor Modeling 📰 🗮 📥 🔺
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2. Select the **PavementAsphalt(EOPA)** line on the *SW turning lane* at the SR61 Intersection with BL98 and enter the following:

0	Left Offset	20
0	Right Offset	20
0	Start Station	0+00
	x , x	10

	0	In	ter	val			10					
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			لر محر ب									





3. Left click in **View 4** to display the *Corridor Cross Section*.

- 4. Evaluate the Model along the *Curve Radii* using the Cross Section tool.
- *Note* Since the intersection model is not yet built, there is no widening or shoulder drawing in the cross section around the radius.

Exercise 7.5 Create a 3D Drive-Through Animation

Creating a drive through along the project requires a 3D view and a 3D path to follow. This exercise explains how to use the new Drive Through tool in SS4 along the proposed SR61 3D Model.



- > To Setup the Animation Drive Through
- 1. Maximize View 2 Default-3D model to set it as the Active View.
- 2. Turn **OFF** the **ConstLines** and **XSMisc_px** *levels*.
- 3. Use Analysis & Reporting, **3D Drive Through** tool.

Tasks Vivil Tools	•
🧭 Analysis & Reporting	= ^
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General Geometry 3D Drive Through	ugh

- 4. At the prompt, *Select a 3D view*, left click inside View 2.
 - a. At the prompt, *Select the center line of the road*, pick the 3D line in the view shown below.



b. On the 3D Drive Through dialog, change to the tab **Camera/Target Controls** and enter the values as shown below.

🖌 3D Drive Through - SR6	1.SR61
General Controls Advanced	Controls Camera/Target Controls
Camera Control	Target Control
Vertical Offset	Height
12.00 🌲 feet	2.50 🔶 feet
Horizontal Offset	Distance
0.00 🌩 feet	100.00 🌩 feet
	.::

c. Change the tab back to the General Controls and Select the play button.



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8 SUPERELEVATION

OVERVIEW

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

Superelevation can be calculated in two ways:

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

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

EXERCISE DESCRIPTION

In this workshop, the SR61 Centerline has a single curve to define superelevation. Once the required superelevation is determined from a predefined FDOT rule file, it will be assign to the SR61 corridor the results will be reviewed in the Cross Section View. Also, the results will be reviewed in the table editor and generate reports will be generated as other methods to review data.

As an alternative to calculating supers with rules, we'll also import a dataset from a FDOT Curve Table (csv file generated from Excel).

The general workflow for superelevation is listed below.

- Create RDXSRD File to draw superelevation lane shapes
- Reference the ALGNRD File
- Create Superelevation Sections
- Create Superelevation Lanes
- Calculate Superelevation Based on FDOT Tables
- Project Explorer Edits, Graphical Edits
- Assign Superelevation to Corridor, Associate Points
- Special Template Point, Superelevation Flag Box
- Template Inside Lane Vector Offset Constraint
- Superelevation Diagram and Reports

EXERCISE OVERVIEW

- 8.1 Create Superelevation Model
- 8.2 Create Superelevation Sections
- 8.3 Create Superelevation Lanes
- 8.4 Calculate Superelevation
- 8.5 Graphical Edits
- 8.6 Project Explorer Edits
- 8.7 Superelevation Reports and Diagram Editing
- 8.8 Assign Superelevation to Corridor

Exercise 8.1 Create Superelevation Model

- 1. (Optional) Extract the 22049555201(8).zip file in the c:\e\projects folder.
- 2. Open the *DSGNRD01.dgn* file of the c:\e\projects\22049555201\roadway\ folder in the FDOTSS4 Workspace in MicroStation.
- 3. From the FDOTSS4 Menu, select Actions > Create/Edit File.

Standard CellApps	Actions	Design Apps Drainage	Roadway	/ 🏈 🖿 🚺 🚱 😫
	📀 Cre	ate/Edit File		
	Set	Geographic Coordinate Syste	m	
	📀 Set	Plot Scale of File		
	🕜 She	et Navigator	/	A C
	📀 She	ets	•	
	📀 Lab	el Shapes with ID		
	2 Lin	ed Data Manager		
	🕜 Trn	sport	•	1

a. From the Create File/Project dialog, locate the **ROADWAY CROSS SECTIONS** from the **Roadway Design Files** *File Group* and click **Create**.

PCreate File/	Project						
Project:	C:\e\projects\22049555201	Project Settings					
Workspace:	FDOTSS4						
Control File:	ROADWAY.CTL -						
File Group:	Group: Roadway Design Files (DGN)						
File Type:							
PROFILE SHE PROJECT LAY PROJECT NO PROJECT PRO PROPOSED D PROPOSED D QUANTITY CC QUANTITY CC QUANTITY CC RIGHT OF WA RDADWAY CF SELECTIVE CI SPECIAL DET. STORM WATT SUMMARY OF SUMMARY OF SUMMARY OF SUMMARY OF SUMVEY OF W	ETS 'OUT SHEETS TES DFILE LAYOUT IESIGN IGITAL TERBAIN SURFACE MODELS ROFILE DMPUTATION DETAILS DMPUTATION SHAPES/CALCULATIONS MY DETAILS FOR ROADWAY TOSS SECTIONS LEARING AND GRUBBING SHEET AILS SHEET ER POLLUTION PREVENTION PLAN TORAINAGE STRUCTURES PAY ITEM SHEETS TORAINAGE STRUCTURES PAY ITEM SHEETS TVERIFIED UTILITIES (2D) (FRIFIED UTILITIES (2D) (FRIFIED UTILITIES (2D)						
Output File:	RDXSRD01						
Output Folder:	Roadway\	Browse					
Seed File:	fdotseedxs.dgn	Browse					
Seed Path: resources/seed/							
Action:	mdl I plotscale;plotscale set	Apply Action					
Create	Open File						
Active File for O	Ipen/Edit: RDXSRD01.DGN						
	OK						

b. Click **Open File**, and set the **Set/Update Plot Scale** dialog displays.

🐂 Set/Update Plot Sc 💻
Scale: 1.0000
Units: English 🔻
Process File List
File List:
OK Cancel

c. Click **OK** on the **Set/Update Plot Scale** dialog. Click **OK** on the **CreateFile/Project** dialog.

4. Locate the *View Group* toggle on the bottom left of the MicroStation window and change the *View Group/Model* to **Xsshrd Views.**

	Name	Model
	Dettrd Views	Pattrd
	E Rdxsrd Views	Rdxsrd
	Rdxsrd_shq_Views	Rdxsrd_shg
Civil Message Center	🗘 Xsshrd Views	Xsshrd
🕒 - 🕗 - 🌭 -	🖆 Xsshrd Views 🔻	12345678

5. On the MicroStation References tool, attach the *DSGNRD01* file.

References (1 of 1 unique, 1 displayed)							
<u>T</u> ools <u>S</u> ettings							
🗄 - 🖄 🔍 🖻 🕺 🗢 🖪	1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2						
Hierarchy	💿 🏱 🛅 File Name						
H-100 DSGNRD01.DGN, Superelevation	✓ ✓ DSGNRD01.DGN						

- *Note* The Superelevation tools utilize the active MicroStation symbology.
 - 6. Window into the **Proposed Roadway** in the DSGNRD01 Reference file.
 - 7. Set the MicroStation active *Level* to ConstLines and select File > Save Settings (Ctrl +F).



Exercise 8.2 Create Superelevation Sections

1. Use Corridor Modeling, Create Superelevation Sections tool.



2. On the Create Superelevation Sections dialog, enter as shown below:

Name Start Statio End Statio Minimum	S on A n A Tangent 0	R61 .lt to loo .lt to loo	ck to Begin ck to End
\$ (Create Superelevat	tion Sec	tio 💻 🗖 🗙
	Name		SR61
	Lock To Start		
1	Start Station		698+80.82 R1
	Lock To End		V
1	End Station		726+42.21 R1
	Minimum Tangent	Length	0.000000
Enter	the minimum tange s	nt length	between
Minin	num Tangent Length	0.000	



3. The *Superelevation Sections* are drawn and the Create Superelevation Lanes dialog is launched.

Note Use the Function Key F5 to dim the references

Exercise 8.3 Create Superelevation Lanes

1. Use the *Corridor Modeling*, Create Superelevation Lanes tool.



2. Define each of the **Super Elevation Lanes** as shown below, following the prompt to enter and data point to accept data:

🖇 Create Superelev	rati 🗖 🗖 🗙
Name	Left1
Туре	Primary 💌
Side Of Centerline	Left 🗨
Inside Edge Offset	11.000000
Width	24.000000
Normal Cross Slope	-2.00%

Name	Left1	Left2	Right1	Right2
Туре	Primary	Primary	Primary	Primary
Side	Left	Left	Right	Right
Inside Edge Offset	11	35	11	35
Width	24	16	24	16
Normal Cross Slope	-2.00%	-3.00%	-2.00%	-3.00%



3. The *Superelevation Lanes* are drawn and the Calculate Superelevation Lanes dialog is launched.

Exercise 8.4 Calculate Superelevation

1. Use the *Corridor Modeling*, Calculate Superelevation tool.



2. On the Calculate Superelevation dialog:

🖇 Calculate Superel	evation
Standards File Name	C:\FDOTSS4_server\GEOPAK\e_tables\FDOT_Urban_e.sep
e Selection	5% e max 💌
L Selection	2 & 4 Lane 💌
Design Speed	30 💌
Transition ID	Linear 💌
Number Of Lanes	1
Facility	Divided
Open Editor	

3. Select the **Browse** button and navigate to select the **FDOT_Urban_e.sep** *file* from the \FDOTSS4\GEOPAK\e_tables\ directory.



4. Enter the necessary dialog information as shown at the prompt and data point to accept data:

5
2
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&4lane	
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Divided	
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💱 Calculate Superel	evation
Standards File Name	C:\FDOTSS4_server\GEOPAK\e_tables\FDOT_Urban_e.sep
e Selection	5% e max 💌
L Selection	2 & 4 Lane 💌
Design Speed	50 💌
Transition ID	Linear 💌
Number Of Lanes	4
Facility	Divided 💌
Open Editor	

5. The *Superelevation Lanes* are now applied with **Superelevation** and the **Superelevation** Editor dialog is launched.

ation Editor - SR6	51									
					1					
	1701+82	R1705+10	<u> </u>			R1714+94	R 1718+2	22 R1	721+50	R1724+78
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1 🗅 🗙 🖌 🖻) 🐐 🖯 😾 🖽	窗 🗞 🗄 🔘								
Superelevation	Name	Station	Curve Set	Cross Slope	Transition Type	Pivot Edge	Non Linear Curv	Point Type	Ignore	Distance Cons
	D: 111 000 F0	000 50 7015 51				1.0.51				
Right1	Right I - 698+53	698+53.7915 RT			Linear	Lett Edge		Normal Crown	raise	Ivone
Right1 Right1	Right 1 - 698+53 Right 1 - 704+96	704+96.6927 R1	1	-2.0000%	Linear	Left Edge		Normal Crown	False	None
Right1 Right1 Right1	Right 1 - 698+53 Right 1 - 704+96 Right 1 - 706+54	704+96.6927 R1 706+53.4427 R1	1	-2.0000% -2.0000%	Linear Linear Linear	Left Edge		Normal Crown In Full Super In	False False False	None None None
Right1 Right1 Right1 Right1	Right 1 - 698+53 Right 1 - 704+96 Right 1 - 706+54 Right 1 - 712+41	698+53.7915 R1 704+96.6927 R1 706+53.4427 R1 712+40.4873 R1	1 1 1	-2.0000% -2.0000% -5.0000% -5.0000%	Linear Linear Linear Linear	Left Edge Left Edge Left Edge		Normal Crown In Full Super In Full Super Out	False False False False	None None None None
Right 1 Right 1 Right 1 Right 1 Right 1	Right 1 - 698+53 Right 1 - 704+96 Right 1 - 706+54 Right 1 - 712+41 Right 1 - 713+95	598+53,7915 R1 704+96.6927 R1 706+53.4427 R1 712+40.4873 R1 713+97.2373 R1	1 1 1 1 1	-2.0000% -2.0000% -5.0000% -5.0000% -2.0000%	Linear Linear Linear Linear Linear	Left Edge Left Edge Left Edge Left Edge Left Edge		Normal Crown Normal Crown In Full Super In Full Super Out Normal Crown Out	False False False False False	None None None None None
Right1 Right1 Right1 Right1 Right1 Right1	Right 1 - 693+53 Right 1 - 704+96 Right 1 - 706+54 Right 1 - 712+41 Right 1 - 713+95 Right 1 - 726+42	704+96.6927 R1 706+53.4427 R1 712+40.4873 R1 713+97.2373 R1 726+41.0679 R1	1 1 1 1 1	-2.0000% -2.0000% -5.0000% -5.0000% -2.0000%	Linear Linear Linear Linear Linear Linear	Left Edge Left Edge Left Edge Left Edge Left Edge Left Edge		Normal Crown Normal Crown In Full Super In Full Super Out Normal Crown Out Normal Crown	False False False False False False	None None None None None None None None
Right1 Right1 Right1 Right1 Right1 Right1 Right2	Right 1 - 693+53 Right 1 - 704+96 Right 1 - 706+54 Right 1 - 712+41 Right 1 - 713+95 Right 1 - 726+42 Right 2 - 698+53	704+96.6927 R1 706+53.4427 R1 712+40.4873 R1 713+97.2373 R1 726+41.0679 R1 698+53.7915 R1	1 1 1 1 1	-2.0000% -2.0000% -5.0000% -5.0000% -2.0000% -3.0000%	Linear Linear Linear Linear Linear Linear Linear	Left Edge Left Edge Left Edge Left Edge Left Edge Left Edge Left Edge		Normal Crown Normal Crown In Full Super In Full Super Out Normal Crown Out Normal Crown Normal Crown	False False False False False False False	None None None None None None None None
Right1 Right1 Right1 Right1 Right1 Right1 Right2 Right2	Right1 - 596+33 Right1 - 704+96 Right1 - 706+54 Right1 - 712+41 Right1 - 712+41 Right1 - 713+95 Right1 - 726+42 Right2 - 698+53 Right2 - 705+49	704+96.6927 R1 706+53.4427 R1 706+53.4427 R1 712+40.4873 R1 713+97.2373 R1 726+41.0679 R1 698+53.7915 R1 705+48.9427 R1	1 1 1 1 1 1 1 1	-2.000% -2.000% -5.000% -5.000% -2.000% -2.000% -3.000% -3.000%	Unear Linear Linear Linear Linear Linear Linear	Left Edge Left Edge Left Edge Left Edge Left Edge Left Edge Left Edge Left Edge Left Edge		Normal Crown In Full Super In Full Super Out Normal Crown Out Normal Crown Normal Crown Normal Crown In	False False False False False False False False	None None None None None None None None
Right1 Right1 Right1 Right1 Right1 Right1 Right2 Right2 Right2	Right1 - 596+33 Right1 - 704+96 Right1 - 706+54 Right1 - 712+41 Right1 - 712+41 Right1 - 712+42 Right1 - 726+42 Right2 - 698+53 Right2 - 705+49 Right2 - 706+54	704+96.6927 R1 706+53.4427 R1 706+53.4427 R1 712+40.4873 R1 713+97.2373 R1 726+41.0679 R1 698+53.7915 R1 705+48.9427 R1	1 1 1 1 1 1 1 1 1	-2.000% -2.000% -5.000% -2.000% -2.000% -3.000% -3.000% -5.000%	Unear Linear Linear Linear Linear Linear Linear Linear Linear	Left Edge Left Edge Left Edge Left Edge Left Edge Left Edge Left Edge Left Edge Left Edge Left Edge		Normal Crown In Full Super In Full Super Out Normal Crown Out Normal Crown Normal Crown Normal Crown In Full Super In	False False False False False False False False False	None None None None None None None None
Right1 Right1 Right1 Right1 Right1 Right1 Right1 Right2 Right2 Right2 Right2	Right1 - 59(±+3) Right1 - 704+96 Right1 - 704+96 Right1 - 704+96 Right1 - 712+41 Right1 - 713+95 Right2 - 698+53 Right2 - 705+54 Right2 - 705+54 Right2 - 712+41	595493 /916 H1 706+53.4427 R1 712+40.4873 R1 712+40.4873 R1 726+41.0679 R1 698+53.7915 R1 705+48.9427 R1 706+53.4427 R1 712+40.4873 R1	1 1 1 1 1 1 1 1 1 1	-2.000% -2.000% -5.000% -2.000% -2.000% -3.000% -3.000% -5.000% -5.000%	Unear Linear Linear Linear Linear Linear Linear Linear Linear Linear	Left Edge Left Edge		Normal Crown Normal Crown In Full Super In Full Super Out Normal Crown Normal Crown Normal Crown In Full Super In Full Super Out	False False False False False False False False False False	None None None None None None None None
Right1 Right1 Right1 Right1 Right1 Right1 Right1 Right1 Right2 Right2 Right2 Right2 Right2 Right2 Right2 Right2	Right1 - 504:53 Right1 - 704:96 Right1 - 704:96 Right1 - 704:96 Right1 - 712:41 Right1 - 712:41 Right1 - 712:41 Right2 - 706:42 Right2 - 706:454 Right2 - 706:454 Right2 - 712:41 Right2 - 713:46	505443.7916 H1 7064596.6927 R1 706453.4427 R1 712440.4873 R1 713+97.2373 R1 726441.0679 R1 698453.7915 R1 706453.4427 R1 706453.4427 R1 712440.4873 R1	1 1 1 1 1 1 1 1 1 1 1 1	-2.0000% -2.0000% -5.0000% -2.0000% -2.0000% -3.0000% -5.0000% -5.0000%	Linear Linear Linear Linear Linear Linear Linear Linear Linear Linear	Left Edge Left Edge		Nomal Crown In Full Super In Full Super Out Nomal Crown Out Nomal Crown Nomal Crown Nomal Crown In Full Super In Full Super Out Nomal Crown Out	False False False False False False False False False False False	None None None None None None None None
Right1 Right1 Right1 Right1 Right1 Right2 Right2 Right2 Right2 Right2 Right2 Right2 Right2 Right2	Pight 1 530433 Pight 1 704-96 Right 1 704-96 Right 1 702-41 Right 1 713-95 Right 2 705-42 Right 2 705-43 Right 2 705-43 Right 2 705-44 Right 2 712-41 Right 2 712-41 Right 2 712-41	534253.7915 RT 704+96.6927 RT 706+53.4427 RT 712+40.4873 RT 712+40.4873 RT 712+41.0679 RT 698+53.7915 RT 706+53.4427 RT 712+40.4873 RT 713+44.9873 RT 713+44.9873 RT	1 1 1 1 1 1 1 1 1 1 1 1	2.0000% 2.0000% 5.0000% 5.0000% 2.0000% 3.0000% 3.0000% 5.0000% 3.0000% 3.0000%	Linear Linear Linear Linear Linear Linear Linear Linear Linear Linear Linear	Left Edge Left Edge		Normal Crown N Full Super In Full Super In Full Super Out Normal Crown Out Normal Crown In Full Super In Full Super Out Normal Crown Out Normal Crown Out Normal Crown Out	False False False False False False False False False False False False	None None None None None None None None
Right1 Right1 Right1 Right1 Right1 Right1 Right2 Right2 Right2 Right2	Right 1 530783 Right 1 704-96 Right 1 706-954 Right 1 713-95 Right 1 713-95 Right 2 705-42 Right 2 705-43 Right 2 705-44 Right 2 712-441 Right 2 712-441 Right 2 713-46 Right 2 726+42	534-35, 7915 RT 704-96, 6327 RT 706-53, 4427 RT 712-40, 4873 RT 713-97, 2373 RT 726+41, 0679 RT 698-53, 7915 RT 706+53, 4427 RT 712+40, 4873 RT 713+44, 9873 RT 713+44, 9873 RT	1 1 1 1 1 1 1 1 1 1 1 1 1 1	20000% -2.0000% -5.0000% -5.0000% -2.0000% -3.0000% -3.0000% -5.0000% -3.0000% -3.0000% -3.0000%	Linear Linear Linear Linear Linear Linear Linear Linear Linear Linear Linear	Left Edge Left Edge		Nomal Crown Nomal Crown In Full Super In Full Super Out Nomal Crown Out Nomal Crown Nomal Crown In Full Super In Full Super Out Nomal Crown Out Nomal Crown Out	False False False False False False False False False False False	None None None None None None None None

6. **Review** the data and **Close** the **Superelevation Editor** dialog.

7. Open the *Civil Message Center* to review the **Superelevation Notes**.

	/ 10 M/ / M - 14 M	
Civil Message Center		
Hide All 🛛 🖊 50 MicroStatio	n 🛛 😵 0 Errors 🖾 0 Warnings 🖉	0 Messages
Element	Message	Description
μ	Superelevation Calculation Complete.	
μ	No transition conflicts were found.	
μ	Checking for transition conflicts	
μ	Length of 417.9104 has been round	
μ	Transition Length adjusted to 417.9	
μ	Curve SR61-1: Super rate of 5.000	

Exercise 8.5 Graphical Edits

> Superelevation Sections

- 1. Use the MicroStation Element Selection tool and select the Superelevation Section. The *graphic handlers* now display.
- 2. Change the *Begin Station* to **70000.**



> Superelevation Lanes

- 1. Using the MicroStation Element Selection tool, select the Left2 lane of the *Superelevation Lanes*. The *graphic handlers* now display.
- 2. Change the *Left2 Lane width* to **4 feet**, repeat for the *Right2 Lane*.



Exercise 8.6 Project Explorer Edits

1. Open the Project Explorer, Select **F11** and select the **Civil Model** tab. If this tab is not shown click on the small arrow in the top right corner of the dialog.



2. Expand the *RDXSRD01.dgn* data tree and navigate to **Superelevation** > **SR61-1** > **Superelevation Objects** > **Left 1**. Right click and select **Properties**.

Reproject Explorer	
😤 Links 🚾 File 💄 Survey 🏹 Civil Model 🛛 🏀 Civil Standards	
EZ Civil Data	
iaZ RDXSRD01.DGN, Rdxsrd_shg	
/ Linear Elements	
Terrain Models	
"fft Conidors	
Enter Skol-1	
Insert Superelevation Station/Cross-slope	
💾 Civil Cells 🗙 Delete	
🚽 💕 Civil Objects 📝 Properties	

- 3. In the Element Information dialog, review the Superelevation Lane Properties.
- 4. Change the *Left1 Lane width* to 29 feet, repeat this for the *Right1 Lane Width*.

(i) Element Information		Element Information	
E Clection		Selection	
General	^	General	^
Description	Superelevation: Left1	Description	Superelevation: Right 1
Level	ConstLines	Level	ConstLines
Color	ByLevel (1)	Color	ByLevel (1)
Line Style	ByLevel (0)	Line Style	ByLevel (0)
Weight	ByLevel (0)	Weight	ByLevel (0)
Class	Primary	Class	Primary
Template	None	Template	None
Transparency	0	Transparency	0
Priority	0	Priority	0
Extended	*	Extended	^
Model	Xsshrd	Model	Xsshrd
Last Modified	8/27/2014 7:32 AM	Last Modified	8/27/2014 7:33 AM
Snappable	Snappable	Snappable	Snappable
Modified	Modified	Modified	Modified
New	New	New	New
Locked	Unlocked	Locked	Unlocked
Display Style	From View	Display Style	From View
Superelevation	^	Superelevation	^
Name	Left 1	Name	Right 1
Side Of Centerline	Left	Side Of Centerline	Right
Inside Edge Offset	11 000000 ²	Inside Edge Offset	11.000000 ²
Width	28.000,00 9	Width (28.00000 ⁹
Start Station	700-60.0000 R1	Start Station	700-00.0000 R1
End Station	726+41.0679 R1	End Station	726+41.0679 R1
Normal Cross Slope	-2.0000%	Normal Cross Slope	-2.0000%
		-	

Note For this project template, there is no slope break or outside lane so Left2 and Right2 will be remove from the Superelevation design.



> Delete Lane Shapes for this project template

1. In the Project Explorer dialog, right click on the *Left2 Lane* and select **Delete**. Repeat for *Right2 Lane*.



2. Close the Project Explorer dialog.

Exercise 8.7 Superelevation Reports and Diagram Editing

> Create a Superelevation Report

1. Use the *Corridor Modeling*, **Superelevation Report** tool.

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W	<u>\$</u>	ł	1	4	2	\mathcal{N}	1	9			
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R	$\mathbf{\mathbf{v}}$	$\overset{\circ}{\diamond}$	X	⇔	y wit	$\left \frac{1}{2} \right $	X	Super	elevat	tion Re	port
т	0	\$	(∰+	€€-	₩ţ	₩	I	ł			
А	4	V	%	7							

2. Select the SR61 Superelevation Section and right click to accept.

Superelevation Data Report

Report Created: 9/28/2015 Time: 8:11am

			Time: 6:11am	
	File Name: Input Grid Factor:		Note: All units in th	his report are in feet unless specified otherwise.
Section Name:	SR61-1	$\dot{\mathbf{x}}$	XXXXXXXXX	
Base Horizontal Name:	SR61			
Standards Filenam	e: C:\FDOTSS4_ser	ver\GEOPAK\e_tables\FDOT_Urban_	_e.sep	
Design Speed:	50			
Pivot Method:				
Transition Type:	Linear			
Number Of Lanes:	4			
Facility:	Divided			
E Selection:	5% e max			
L Selection:	2 & 4 Lane			
		Superelevation: L	eft1	
Stat	ion	Cross Slope	Point Type	Transition Type
700+00	.00 R1	-2.00%	Normal Crown	
703+09	.13 R1	-2.00%	Normal Crown In	Linear
703+93	.13 R1	0.00%	Level Crown In	Linear
704+77	.13 R1	2.00%	Reverse Crown In	Linear
706+03	.13 R1	5.00%	Full Super In	Linear
712+39	.77 R1	5,00%	Full Super Out	Linear
713+65	.77 R1	2.00%	Reverse Crown Out	Linear
714+49	.77 R1	0.00%	Level Crown Out	Linear
X X <u>X. X</u>	<u></u> X X X	- X XX X X X	- X X X. X. X X X X X	E X X X X X X X X X

3. In the Civil Report Browser, Change the report format stylesheet to SuperelevationToCSV.xsl

Bentley Civil Report Browser - C:\Users\ps972vd\AppData\Local\Temp\RPTpvt4msrw.xml	-	×
File Tools Help		
File Tools Help C:ProgramData\Bentley\Civil\ReportBrowser\8.11.9\en\ Evaluation Geometry ICS InfraresctingAlignmentStations LegaCy-RoadwayDesign LegaCy-RoadwayDesign LegaCy-RoadwayDesign LegaCy-RoadwayDesign LegaCy-RoadwayDesign Superelevation SightVisibility SightVisibility Superelevation Superelevation		

- 4. In the Civil Report Browser, select File > Save As.
- 5. Change the *path folder* to C:\e\projects\22049555201**Roadway** and the *File Name* to **SR61_SE** use the *Save as type* **Text File** (*.txt).



6. Choose Save and Exit the Civil Report browser.

7. This file can be used to edit and re-import superelevation values for the corridor.

Ħ	Corridor Modeli	ng 🔢 🗮 🛋 🔺			
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_	\$\$ \$ \$	<u>1</u> Calculate Superelevation			
к	٠	2 Impart Superelevation			
т	<mark>o</mark> 🖕 🐠 💳	Open 'Calculate Superelevation' as Toolbox			
А	21997	•			
	Model Interoperal	Import Superelevation	—		\times
	Civil Cells	Import File Name D:\e\Support projects files\220495552	01\roadway\S	R61_SE.tx	

- 8. To use the modified CSV values, first delete all the entries in the Superelevation Editor diagram then using this tool,
- 9. Locate the csv file in the Roadway directory and import the Superelevation.

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0.02			/ 1	
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-0:04 · · ·				. 🔪
	R1700+18	R1701+82 R17	03+46 R1705+	10 R1706+74 F
+-44*	‡—‡⊟ ⊉ юα			
SR61-1	1 🗅 🗙 🖌 🖻	🏌 🔒 🐙 🖽	宙 窗 🗞 🖽	\bigcirc
	Superelevation	Name	Station	Curve Set
	Right1	Right1 - 65 Import	Superelevation Tran	nsitions
	Right1	Right1 - 705+03	705+03.3360 R1	
	Right1	Right1 - 706+28	706+29.1780 R1	
	B. 1.4	D. 1.4 D40.00	740 00 0000 04	

Exercise 8.8 Assign Superelevation to Corridor

1. Return to the **Default** Model of the DSGNRD01 or MODLRD01 file.



2. Attach the **Superelevation Design** from the *RDXSRD01-Xsshrd Model* as a *Reference* file.



- > Check the Active Template for Superelevation Flags
- 1. Use *Corridor Modeling*, **Create Template** tool.
 - a. Set active the SR61 Template.
 - b. Open each of the **4 Pavement Edge** *Points Properties*, and check **ON** the *Superelevation Flag* option.



- 2. Use Corridor Modeling, Synchronize Template tool.

3. Select the SR61 Template Drop Handle, the Corridor will begin to Re-Process.



4. Use Corridor Modeling, Assign Superelevation to Corridor tool.



- a. Select the *Reference* Superelevation Section boundary.
- b. Select the **Corridor Boundary** for *SR61*.
- c. The Associate Superelevation dialog displays. Review the **Pivot Point** and **Superelevation Point** *assignment* and then click **OK**.

As	ssociat	e Superelevation					
۱ſ		Superelevation Object	Superelevation Point	Pivot Point	Start Station	Stop Station	Priority
	•	Left1 -	LT_PVT_EOP_OUT	LT_PGL_IN	698+53.79 R1	726+41.07 R1	1
		Right1	RT_PVT_EOP_OUT	RT_PGL_IN	698+53.79 R1	726+41.07 R1	1
	*						
						OK Ca	ancel

5. The *Corridor* will begin to process and display the new model.

13% 👝		

6. Select the *Function Key* **F4** to open 4 *Views*. Use the **Open CrossSection** tool to display and review the *Superelevation* on the Corridor.





7. Follow the cursor prompts to display the **cross section** in *View 4*.

HINT Use the Locate Station via Data point tool to navigate to the curve area of the alignment with superelevation.







SR61 CORRIDOR DESIGN DETAILS EXERCISES

- Intersection Design
 - Build Intersection Terrain at BL98
 - Including TS Nose and Turn Island

OTHER DESIGN DETAILS

- Build Intersection Terrain at School Entrance
- Transition Template for the End of the Project
- Build Intersections for Friendship Road
- Add 3D Urban Driveway
- Add 3D Sidewalk Ramps
- Add 3D Rural Turn Out
- Superelevation Vector Offsets for the Median Widening and Curb Gutter Points
- Superelevation Vector Offsets for the Traffic Separator Widening

INTERSECTION DESIGN

The intersection can be built in parts as shown in the diagram:



The following exercises provide instructions on how to model these with Civil Tools other than the Normal Corridor Templates. The steps to design the SR61 intersection have been detailed in the Chapter, Exercises 9.1 through 9.12. Once completed follow the same methodology to add further design details 9.13 and 9.14.

EXERCISE OVERVIEW

- 9.1 Plan to Build Intersection Terrain at BL98
- 9.2 Add a Component Switch to the RRR98 Template
- 9.3 Constructing Vertical Profiles from 3D Model Elements
- 9.4 Construct 3D Radius Lines
- 9.5 Construct 3D Intersection Limit Lines
- 9.6 Build the Intersection Terrain from 3D Elements
- 9.7 Create an Intersection Pavement Surface
- 9.8 Traffic Separator Nose
- 9.9 SR61 Corridor Clipping References
- 9.10 Model Curb and Sidewalk around Radii
- 9.11 Right Turn Island
- 9.12 RRR98 Corridor-Build Intersection Terrain at School Entrance (On Your Own)
- 9.13 SR61 Corridor-Build Intersection Terrain at Friendly Road (On Your Own)


Exercise 9.1 *Plan to Build Intersection Terrain at BL98*

The general methodology for building intersection design come from the concept of creating new 3D model boundary lines from profiles on the corridor surfaces and 3D lines. Transition profiles are easily produced with the civil tools for the radii.

These are the general steps to follow:

- 1. Develop a seam line between corridors through the intersection,
- 2. Create a switch or trigger line on the crossing corridor templates,
- 3. Remove outside corridor component elements through the limits of the intersection,
- 4. Construct 2D elements around the perimeter of the intersection,
- 5. Develop/design the profiles for each of the perimeter line,
- 6. Build an intersection terrain boundary using the 3D perimeter elements,
- 7. Add break lines if necessary to the intersection terrain,
- 8. Add surface templates to the intersection terrain,
- 9. Use linear templates along the perimeter edge lines to help transition corridors,
- 10. Use corridor clipping tool to clean overlaps between corridor and linear templates.

(Optional) Extract the 22049555201(9).zip file in the c:\e\projects folder.

Open the *DSGNRD01* file and zoom into the *Intersection* of **SR61** and **BL98**.

<OR> Create a MODLRD02.dgn file and create the intersection details in this file. Refer to Chapter 6 Corridor Modeling Planning.

- > Turn OFF the Automatic Corridor processing of SR61.
- 1. Select the SR61 Corridor *handle* to display the Context Menu and select Lock Deactivate Rule.



2. Select the *Function Key* **F2** to open the *Plan* and *Model Views* together. Zoom into the Intersection in both **Views 1** and **2**.



Exercise 9.2 Add a Component Switch to the RRR98 Template

This exercise adds a Component Switch to the RRR98 template to be used across the limits of the intersection. This switch is implemented using a Parametric Constraint on the BL98 corridor to turn off all the outside components for the corridor through the intersection.

1. Use *Corridor Modeling*, **Create Template** tool.



2. Set Active the *RRR98* template.



3. Using the Template Library Organizer, locate the SWITCHES template in the *FDOTSS4.itl* file



- Template Library Organizer Available In: Available In: OK C:\e\projects\22049555201\roadway\22049555201.itl C:\FDOTSS4_server\GEOPAK\corridor\FDOTSS4.i Cancel == Point Name List == Point Name List Components Components Help Resurfacing (Milling, Overbuild and Overlay) Barriers & Retaining Walls 💼 Milling 📄 Berm Overbuild Bridge Examples Buffer Widening Curb & Gutte PPM EXHIBIT TYP-5 Ditches SWI Driveways 📄 Guardrai 💼 Corridor Template × RRR98 💼 Handrail 🛩 SR61 ≻ Handrail Median Slopes End Conditions Median Depressed & Flat Combination 📄 Parts Linear Templates 🛏 Median Raised & Flat Combination > Outside Lane w/ Paved Shoulder 🔁 NULL → Outside Lane w/ Type F Curb Surface Templates → PGL Divided → SWITCHES > Pavement Asphalt Pavement
- 4. Drag the SWITCHES template to the project Components folder

5. Choose OK and choose Yes to Save the data to the project template library, 22049555201.itl.



6. With the *RRR98* template active, drag the **SWITCHES** template onto the center of the *RRR98* template



Note The switch template consists of two simple components left and right of the centerline. A label has been assign to the horizontal constraint value. Also, display rules have been created for when the value is 1,2,3,4, or 5. By assigning one of the rules to a component, the display of that component and all related components can be controlled based on the value of the switch.

- > Create a Parent /Child relationship of all the Left side components.
- 1. Open the Component Properties dialog for the Left Cut Component.
 - a. Set the *Parent Component* by using the "pick icon" $\stackrel{\bullet}{\clubsuit}$, select the LT_PvtOut.
- *Note* Use the wheel to zoom into the Left Widening LT_PvtOut component or select it from the list

Component Properties		— ×	
Name: LT_1:6 CUT	+	Apply	٦
✓ Use Name Override: LT_CUT		Close	5
Description:			ī
Feature Definition: Slopes	-	CTIEVIOUS	
Parent Component:	+	Next >	_
Display Rules:		Edit	
Exclude From Top/Bottom Mesh			
End Condition Properties			
Target Type: Terrain Model 🔹	Priority:	1	
Terrain Model: <active></active> 	Benching Count:	0]
	No Datum		
Horizontal Vertical Offsets: -0.000000 0.000000	Rounding Length	0.000000]

- b. Choose Apply and Close the Component Properties dialog.
- c. Repeat this procedure for the Left Fill, and Left Shoulder components. The Unpaved Shoulder and Base components should already have a parent relationship which can be used.
- 2. Use the Active Template Tab to view the Component Relationships to the LT_PvtOut.



- 3. In the *Active Template* Component List, Right click on the **LT_PvtOut** Component and uncheck the **Display** option,
- 4. All of the left side components should turn off, Right click on the LT_PvtOut Component and toggle the **Display** back on.
- 5. In the Active Template Component List, Right click on the LT_PvtOut Component and choose Edit.
- 6. From the Component Properties dialog, Select Edit on the Display Rules: field

Component Properties		×
Name:	LT_PvtOut +	Apply
Use Name Override:	LT_PvtOut	Close
Description:		Previous
Feature Definition:	PavementAsphalt 🗸	CTIEVIOUS
Parent Component:	+	Next >
Display Rules:	Edit	Help
Exclude From Top/Bo	ttom Mesh 🛛 🔽 Close Shape	

- a. Select the Template Display Rule LT_SWITCH1 rule from the list
- b. Build the *Conditional Expression* **NOT LT_SWITCH1** by clicking the **NOT** button and then **Selected Rule** button

Component Display (Conditional Expression	
Conditional Expression fo	r LT_PvtOut Component	
NOT LT_SWITCH1		
	NOT	Selected Rule
Template Display Rules		
Name	Туре	Expression
LT_SWITCH1	Horizontal	LT SWITCH1-LT SWITCH
	Hadaaatal	

c. Choose OK, then Apply, then Close to save the display rule to the component.

Note Adding the rule NOT SWITCH1 is telling the template left side "Not To Display If The Horizontal Distance Of The Switch Is The Value 1"

7. Choose Close and Yes to save change to exit the Create Template dialog.

- > To update the Corridor with the Template changes.
- 1. Use Corridor Modeling: Synchronize Template tool;



- 2. At the prompt, select the **BL98** *Template boundary*. The corridor will re-process with the updated RRR98 template.
- > To implement the Switch, Add the Parametric Constraint
- 1. Use Corridor Modeling, Create Parametric Constraint;



- a. At the prompt, select the **BL98** Corridor boundary.
- b. Snap to the SW Radius for the *Start Station*.
- c. Snap to the **NW Radius** for the *End Station*.
- d. Pick the LT_SWITCH Constraint Label from the list.
- e. Enter 1 for the *Start Value*.
- f. Enter **1** for the *Stop Value*.



- g. The corridor will re-process with the updated RRR98 Template.
- 2. The left outside components of the *BL98* corridor are now turned off though the limits of the intersection.



Exercise 9.3 Constructing Vertical Profiles from 3D Model Elements

This exercise calculates a Curb Profile between the two EOP Lines, from which it is constructed, in order to construct the Intersections Corners. However, first it's necessary to add the Model Line Profiles back onto the 2D elements.

Important! FDOTSS4 – with the MR2 release, we have implement 2D Lines from the 3D model. In Project Explorer change the PavmentAsphalt_pm feature property to True as shown below. Then re-process each corridor to see the resulting construction lines. These lines have profiles and can be used in lieu of the steps outlined in the exercise.



1. Use the Vertical Geometry, Project Profile by 3D Element tool.

🖽 Vertical Geometry	
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${}^{\mathbb{R}} \trianglerighteq \swarrow \swarrow \swarrow \swarrow \swarrow \swarrow \swarrow \swarrow \Join \swarrow \Join \swarrow \Join \Join$	
╹╙╚╚╲	
Pr Pr	ofile By 3d Element

2. At the prompt select *plan Line* **PavementAsphalt(EOPA)**.

3. From the *Model*, select the **PavtAsphalt_pm** *Line* representing the outside *RRR98 EOP* in the Model.



4. Repeat for all 4 lines shown below.



Exercise 9.4 Construct 3D Radius Lines

 First: Use the Horizontal Geometry Simple Arc tool to create new Construction Line Blue Dash features between the two *PavementAsphalt EOP* edges on both corners. Use 110' and 60.





2. Use Vertical Geometry, Quick Profile Transition tool.

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Quick Profile Trans Quick Transition Metho Feature Name Element Template	ition Parabolic NWEOP None		
Quick Profile Trans Quick Transition Metho Feature Name Element Template	ition Parabolic MWEOP None		

3. Accept the **Parabolic Quick Transition** *Method*, enter **SW_EOP-Pr** and select the *construction line* **Radius Line** create from above. A 3D element should display.



4. Open the *Profile View* for the **SW EOP Curve Radius**.



5. Repeat the same steps above to create a *Profile* for the **NW_EOP-Pr** *Line*.



- 6. (Alternative to using the Parabolic Option) Follow the next steps.
 - a. Open the Profile Model of the **Radius Element.**
 - b. Use *Vertical Geometry*, **Profile Intersection Point** tool.



c. Select the **NW PavementAsphalt(EOPA)** *Radius Line* as the *Element to Show Intersections.*



d. Select the *Right SR61* EOP and *Right Turn Lane* PavementAsphalt(EOPA) *Lines* respectfully.



e. Two white location points will display on the Profile View.



- f. Use *Vertical Geometry*, **Profile Line between Points** tool and snap to the two **Intersection Points** on the *NW Profile View*.
- g. Select the new **Profile Line.** Select the **Set Active Profile** from the **Context Menu** and the *3D Line* will display.



Exercise 9.5 Construct 3D Intersection Limit Lines

- 1. Use *Horizontal Geometry*, Line between Points tool.
 - a. Use the Feature Definition ConstLinesGreenDash.
 - b. Construct a line perpendicular to the *Traffic Separator lines* and ends at the *Radius EOP* across both Roadways *left* and *right*.



2. Use the Vertical Geometry, Open Profile Model and select the newly constructed line.



- 3. On the Profile window, hold down the last icon until a drop down menu displays.
 - a. Select the Quick Profile from Surface command.



b. At the prompt, first select the LT_PvtOut Surface in the 3D Model.



c. Then select the LT_PvtWideneIn Surface.



d. Continue to add the TSWidenIn Surface.



e. Data point to accept.



4. On the Profile window, hold down the last icon until a drop down menu displays.

View 3, Profile - ConstLines20		
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35.4	🗭 <u>1</u>	Quick Profile From Surface
35.2-	<u>2</u>	Profile Line Between Points
35.0-	<u>* 3</u>	Profile Line To Element
34.8	🚰 <u>4</u>	Profile Line From Element
34 6-	<u>\</u>	Profile Line Between Elements
	<u> </u>	Profile Curve Between Points
34.4	숙 Z	Profile Curve To Element
34.2	<u>/</u> 2 <u>8</u>	Profile Curve From Element
34.0	<u>^ 9</u>	Profile Curve Between Elements
33 8-	<u>∼ 0</u>	Profile Complex By Elements
00.0	🗠 Q	Profile Complex By VPI
33.0	<u>₩</u> <u>₩</u>	Define Profiles By BestFit
33.4-	🗹 E	Profile Insert Curve
33.2-	<u>⊢ R</u>	Profile Reverse Transition
	🔟 Op	en as ToolBox

a. Select the Profile Complex By Elements command.

b. At the prompt, select the **first segment** and data point to accept Profile.



5. Use Vertical Geometry, Set Active Profile.



6. Repeat these steps for the other Intersection Limit line.



- 7. Construct an element across the *Right Turn Lane* from the **EOP** to the **ML** line at the *Radius Point* on the NW corner of the Intersection.
 - a. Use *Vertical Geometry*, Profile from Surface tool and select the Right Turn Pavement Component.



b. Use Vertical Geometry, Set Active Profile.

8. Repeat these steps to create the **3D line** on the opposite side.



> Add Profile to Traffic Separator Lines in Plan

- 1. Open the *profile view* for the **Traffic Separator** line
- 2. From the *profile view*, select the *Vertical Geometry*, **Quick Profile from Surface** tool.



3. At the cursor prompt, select the *pavement surface*, **TSWidenT1Opt1In**, in the 3D model, *view* 2.



- 4. Repeat this for the opposite **Traffic Separator** *element*.
- 5. Construct lines using *Horizontal Geometry*, **Single Offset Partial** on either side of the *Traffic Separator*. Use **.08 feet** *Offset*, **1 inch**.
 - a. *Start* the line at the end of the **Traffic Separator** and *Stop* at the **Intersection Limit Construction** line.

b. Repeat this for both sides.



6. Use *Vertical Geometry*, **Project Slope from Element** tool.

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i Terrain Model	Profile By Slope Fre	om Element 🖌 🗸

- a. Project a Profile on the lines from the **Traffic Separator Profile**. Use **0%** *Slope*.
- b. Select the *line* and select Set Active Profile from the Context Menu.



7. Delete the Traffic Separator Nose Radius Line. It will be created later with a Civil Cell.

Note It may need to be dropped from the Left Turn with TS Civil Cell.

- 8. Construct a Line across the *Traffic Separator Offset Ends*.
- 9. Create a **Profile** from the elements that intersect. Set the **Profile** as *active*.



- 10. Create a **3D Line** across the *Intersection from Radius to Radius*. This will close the Intersection boundary.
- 11. Construct the Line across the Intersection.
- HINT Use Single Offset Partial for the Horizontal, and Profile from Element for the Vertical.



Exercise 9.6 Build the Intersection Terrain from 3D Elements

1. Use Terrain Model, Create from Elements tool.



2. Select the **3D Model View** to set active and using the **Project Explorer**, **Civil Standards**: Turn **OFF** the **Corridor Components** and **Corridor Lines(3D)**



3. Select the boundary elements for the intersection.



4. Data point to accept.



Exercise 9.7 Create an Intersection Pavement Surface

- 1. Use *3D Geometry*, Apply Surface Template.
- 2. Select a **Pavement Surface** *Template* from the *Template Library* and select the **Intersection Terrain** to create pavement.



Exercise 9.8 Traffic Separator Nose

- 1. In Project Explorer change the Traffic Separator_pm feature property Linear Feature Properties to *True* as shown in Exercise 9.3. Then re-process each corridor to see the resulting construction lines. These lines have profiles and can be used for the steps outlined in this exercise.
- 2. To add the *Traffic Separator Nose* use the Civil Cell Place Civil Cell Tool.



3. Select the **TSNose** *Civil Cell*.



- 4. Select the **Right Side** of the *Traffic Separator_pm* in the Plan View, then select the **Left Side** of the *Traffic Separato_pm*. These magenta line have profiles attached either from the model.
- 5. While hovering over each of the Reference lines, change the *Reference Line* direction **arrow**(triangle) on both elements until it fits on the lines.
- 6. Data point to accept.



Exercise 9.9 SR61 Corridor Clipping References

1. Use *Corridor Modeling*, Add Clipping Reference tool.



2. At the prompt, select the **SR61** Corridor *handle*.



3. Select the Intersection Terrain Boundary.



4. Reset and the SR61 Corridor begins re-processing.



5. Repeat to add the Intersection as a *clipping reference* for <u>RRR98 Corridor</u>.

Note Later the shoulders and sidewalks will be clipped with the Linear Templates added around the radii.

Exercise 9.10 Model Curb and Sidewalk Around Radii

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



2. Open the **SR61** Template Library.

💽 Create Template	
File Edit Add Tools	
Template Library:	Current Template ay\SR61.it] SR61
Point Name List Components Corridor Templates End Conditions	Description:
Linear Templates	30 24
	18 T_3:1CN

3. Navigate to the Linear Templates folder.



4. Double click on the **Outside Lane w/ Type F Cub** *Template* to make active.

- 5. Make the following edits:
 - a. Delete the **Pavement** and **Base**.
 - b. Change the *Template Origin* to the **Curb PVT_EOP_OUT Point**.
 - c. Change the Utility Strip Horizontal Value to Zero.
 - d. Change the *Back of Sidewalk* to **6 feet**.
 - e. Add the 6:1 *Fill* and *Cut End Conditions*, set the *End Points* to **Infinite**.

Create Template			
File Edit Add Tools			
Template Library: C:\e\projects\22049555201\roadway\2204955 Template List Components Components Comdor Templates End Conditions	Current Template Name: Outside Lane w/ Type F Curb Description:	Display Components Constraints Display Point Names Display All Components	Close Help
Eurear Templates	5		
	4 3 2 1 0		
 III → Library Active Template Preview: 	° <u>₂°</u> 3456 +-≴∺‡⊐¤∞∞∲∢		2 13 14 15 18▼ ▼ Test
			MIRROR REFLECT

- 6. Close the Create Template dialog and click Yes to Save Changes.
- 7. Use *3D Geometry*, **Apply Linear Template** tool.



\$	Apply Linear Template	_ _ X	
	Lock To Start		
	Start Station	0.000000	
	Lock To End		
	End Station	0.000000	
	Exterior Corner Sweep Angle	1°0′0″	
	Mirror		
	Reflect		
	Template	Outside Type F Curb	
	Design Stage	1 Lines and Components	
		Locate Element To Apply Template Fillet: SWEOPA41 Feature: PavementAsphalt(EOPA) Active Profile: SW SR61_US98Pr Level: PavtAsphalt DDB FEATURE Attribute = EOPA ADHOC ATTRIBUTE	
		Pavement 1 inckness (Numeric) = 0.250000 Base Thickness (Numeric) = 1.000000 Base Extension Width (Numeric) = 0.333000 Extend Base Under Curb (String) = N Widen_Side (String) = LEFT EOP_Widening_Profile (String) = none	

a. At the prompt select the SW_EOP Construction Radius Line in the Plan View.

b. Select **Alt** *down arrow* to select the *Template*, **Outside Type F Curb**. Data Point to accept the Template.



- c. Select Alt to lock the Start Station and data point to accept.
- d. Select **Alt** to lock the *End Station* and data point to accept.

- e. Data point to accept the **Reflect Orientation**.
 - •
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- f. Data point to accept the Exterior Corner Sweep Angle.

8. Repeat the steps above for the **NW EOP** *Construction Radius Plan Element*.



HINT To turn off the Blue triangles, toggle off the DTM and DTM Triangles.

9. Use *Corridor Modeling*, Add Clipping Reference tool.

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A	Add Clipping Reference

a. At the prompt, select the **SR61** *Corridor handle*.



- b. Select the **2 Linear Template Boundaries** as *Clipping References*.
- c. Data point to accept the **Corridor clipping**.


Exercise 9.11 Right Turn Island

- 1. For this exercise, an Island Curb will need to be retrieved from the FDOTSS4.itl file.
 - a. Use the *Create Template*, **Template Library Organizer** to add the **Curb Type E Inside** to the project .itl file.



2. Use *Vertical Geometry*, **Open Profile Model** tool.

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W Open Profile Model	
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a. Select the **Turn Island** *shape* and select **View 3**.

HINT First toggle off the PavtAsphalt(EOP) level

b. In the *Profile Model View 3*, select the **Quick Profile from Surface** command.

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										E	1	Quick Profile From Surface	
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36.0-									t	<u>\</u>	<u>5</u>	Profile Line Between Elements	
35 5									1		c	Profile Cursus Potusoon Points	

c. At the prompt, select the *Intersection Terrain Surface* **DTMPrInt** in the *3D Model View 2*.

Note It may be necessary to tab over the surface features in intersection in order to select the terrain element.





d. Data point to accept. A new *Profile* will display.

e. Select the Profile and select Create Best Fit Profile.



f. Enter the Best fit Parameters as shown.

🖇 Best Fit Profile					
Best Fit	Make Complex Element				
Best Fit Parameters	^				
Upper Envelope	0.020800				
Lower Envelope	-0.020800				
Desirable Crest Curve Length	5.000000				
Desirable Sag Curve Length	5.000000				
Minimum Curve Length	5.000000				
Feature	*				
Name	Island				
Element Template	Profiles(2D)\Proposed_pr\GradeLine				

- g. Create the Best Fit Profile, select the new Profile and select Set As Active.
- h. The Island Boundary is created in the 3D Model.



3. Use 3D Geometry, Apply Linear Template tool.



a. At the prompt select the Island Line in the *Plan View*.

Locate Element To Apply Template Complex Element: MedianLine Active Profile: Island Level: Miscellaneous0	

b. Select **Alt** *down arrow* to select the *Template*, **Curb Type E**. Data point to accept the Template.



- c. Select **Alt** to lock the *Start Station* and data point to accept.
- d. Select **Alt** to lock the *End Station* and data point to accept.
- e. Data point to accept the Reflect Orientation.
- f. Data point to accept the Exterior Corner Sweep Angle.



g. To create the sod within the Traffic Island, Use Terrain Model, Create from Elements tool.



- • 👿 View 2, Default-3D х Create Terrain Model... Feature Type Boundary T Edge Method • None Feature * Feature Definition DtmProposed • DTMPr_Island Nam
- h. Create a **Terrain** from the *3D Top Back Curb* line.

- 4. To change the *Terrain Triangles* display,
 - a. Select the new Terrain **DTMPr_Island** and open the properties, **Element Information** dialog.
 - b. Change the *level* for the *Calculated Features Display Triangles* to **ShldUnpaved_px** and change the *class* from **construction** to **primary.**

Element Information	
Selection Terrain Model DTM Calculated Feature Contours Triangles Triangles	Pr_Island Ires Display
General	~
Display	On
Level	ShidrUnpaved_px
Color	ByLevel (2)
Line Style	ByLevel (0)
Weight	ByLevel (2)
Transparency	0
Thematic Display Style	
Material	¥
D 14	
Description	Terrain Model: DTMPr_Island
lovel	
Color	Bylevel (1)
Line Style	ByLevel (0)
Weight	Bylevel (0)
Class	Primary
Template	None
Transparency	0

5. Use the *Terrain Model*, Create Clipped Terrain Model tool



a. Select the Intersection terrain and then select the island boundary and choose Internal



Exercise 9.12 RRR98 Corridor-Build Intersection Terrain at School Entrance (On Your Own)

- 1. Create a shape boundary of the perimeter of the School Driveway pavement to be resurfaced.
- 2. Use the Create Clipped Terrain Model tool to model the existing pavement.
- 3. Add a surface template to the Terrain in step 2.
- 4. Use the RT_Switch parametric constraint along the RRR98 corridor to remove the overlap components between radius points.
- 5. Add Key Station to near the radius points to create complete components
- 6. Use Linear *Template* around the *Radii* to construct the curb, sidewalk, shoulder, etc.

 - a. Set the Template Origin and Pavement Point as shown

b. Add the PavementMilling(ML) lines a reference to the linear templates to complete the widening.



Exercise 9.13 SR61 Corridor-Build Intersection Terrain at Friendship Road (On Your Own)

- 1. Drop the **Complex Chain** that makes up the *EOP Lines* and *Radius*.
- 2. Create a **Corridor Model** of the *Friendship Road*.
- 3. Edit the *Template Drop* and delete all **Components** outside of widening.
- 4. Project Profile to Element on the *Curve EOP lines* <OR> Quick Profile from Surface.
- 5. Construct a **Profile** from the *Projected Surface Lines* for the Curve Radii.
- 6. Use Linear *Template* around the *Radii*.
- 7. Create a **Terrain** from the *3D elements*.

HINT For the Traffic Separator to Pavement Crown Cross over median, set the LT_XOVER_CTL, RT_XOVER_CTL, and PVT_CROWN Properties as shown:

Name: IT_XOVER_CTL Isoperature Name Override: LT_XOVER_CTL Isoperature Definition: Isoperature Close Superelevation Flag Next > Alternate Surface: Image: Telepoint Close Member of: Image: Telepoint Close LT_XOverPvt Image: Telepoint Close Constraints Constraint 1 Type: Horizontal
Use Feature Name Override: LT_XOVER_CTL Close Feature Definition: Previous Superelevation Flag Next > Attemate Surface: Help Member of: LT_XOverPvt Constraints Constraint 1 Constraint 2 Slope Slope Slope Slope Slope Constraint 2 Slope Slop Slope Slope <
Feature Definition: Superelevation Flag Next > Altemate Surface: Member of: Help LT_XOverPvt
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Member of: LT_XOverPvt Constraints Constraint 1 Type: Horizontal
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Type: Horizontal Slope
Parent 1: LT PGL IN 👻 🕂 LT PGL IN 👻 🕂
Rollover Values
Value: 0.100000 = 2.00% =
V Horizontal Feature Constraint: Pavement Slope Break
Range: 19.00000
10.00000

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Feature Definition:		
Superelevation Flag		
Alternate Surface:		▼ Next >
	Member of:	Help
	RT_XOverPvt	t
Constraints	+ 1	Constraint 2
Type: Horizontal	▼	Slope -
Parent 1: RT_PGL_IN	• +	RT_PGL_IN - +
		Rollover Values
Value: -0.100000	=	-2.00%
Label:	•	_
V Horizontal Feature Constra	int: PavementSlopeE	Break 👻
Rang	e: -18.000000	

Point Properties					×
Name:	F	VT_CROW	/N	•	+ Apply
Use Feature Name	e Override:	VT_CROW	/N		Close
Feature Definition:	ſ	PavementBr	eak_pm		
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		LT_X RT_X	DverPvt OverPvt		
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10 CREATING 3D DELIVERABLE FILES

INTRODUCTION

This chapter will provide detailed instructions for producing the specific output files used by contractors for Automated Machine Guidance (AMG). Specifically:

- Controlling Geometry Files
- 2D CADD files
- Proposed 3D Breakline CADD files
- Existing, Proposed and Subgrade/Earthwork surface XML files

3D DELIVERABLES SUPPORTING AMG for 3D PROJECTS (Store in project folder: 3DDeliverables)				
File Name	Description			
Design Alignments and Profiles	1			
AMG-ALGN##.xml	All Alignments and Profiles exported from the \Roadway\ALGNRD, PROF or model files and \Roadway\DSGNRD or CORRRD files in LandXML format.			
2D Proposed Planimetrics Design				
AMG-2DSGN##.dwg/dgn	2D proposed Roadway design exported from the \Roadway\DSGNRD file. (Production of this file for construction is at the designer's discretion.)			
AMG-2DRPR##.dwg/dgn	2D proposed Drainage design exported from the \Roadway\DRPRRD file. (Production of this file for construction is at the designer's discretion.)			
AMG-2PDPL##.dwg/dgn	2D proposed Pond design exported from the \Roadway\PDPLRD file. (Production of this file for construction is at the designer's discretion.)			
2D Existing Survey (Note: These a	re being considered to merge into a single survey Planimetrics file)			
AMG-2TOPO##.dwg/dgn	2D proposed existing Topography exported from the \Survey\TOPORD file. (Production of this file for construction is at the designer's discretion.)			
AMG-2DREX##.dwg/dgn	2D proposed existing Drainage exported from the \Survey\DREXRD file. (Production of this file for construction is at the designer's discretion.)			
AMG-2UTEX##.dwg/dgn	2D proposed existing Utilities exported from the \Survey\UTEXRD file. (Production of this file for construction is at the designer's discretion.)			
3D Existing Survey Surfaces				
AMG-3SURFACEEX##.xml	3D existing terrain surface to be exported from the \Survey\GDTMRD file as LandXML format. (Production of this file for construction is at the designer's discretion. This file will be produced if the 3D Existing Surface dwg/dgn file(s) are not produced.)			
3D Proposed Surfaces	1			
AMG-3SURFACEPR##.xml	3D proposed finished (top) surface to be exported as LandXML format from the \Roadway\MODLRD file.			
AMG-3SURFACEEW##.xml	3D proposed finished (bottom) surface to be exported as LandXML format from the \Roadway\MODLRD file. This file will be used to generate surface to surface earthwork volumes.			
3D Proposed Break Lines				
AMG-3DSGN##.dwg/dgn	3D proposed Roadway design exported from the \Roadway\DSGNRD file. (Production of this file for construction is at the designer's discretion. This file will be produced if the 3D Proposed Surface(s) LandXML file(s) is not produced. Geometric elements should be in vector.)			

EXERCISE OVERVIEW

- 10.1 Creating Alignment XML File for AMG
- 10.2 Creating 2D Proposed Lines File for AMG
- 10.3 Creating Existing Surface File for AMG
- 10.4 Creating 3D Breaklines and Proposed Surface Files for AMG
- 10.5 Creating 3D Breaklines and Proposed Subgrade/Earthwork Files for AMG
- 10.6 Use LandXML Visualizer to Validate Land XML File

Exercise 10.1 Creating Alignment XML File for AMG

You can export Alignments and Profiles directly from the elements in the DGN file.

- 1. Open the DSGNRDxx.dgn.
- 2. Select and hover over an Alignment. Select Horizontal Geometry Report from the Context Menu.



3. In the Bentley *Civil Report Browser* select the **Civil Geometry** > **AlignmentsToLandXML.xsl** report.



- 4. Select File > Save As
 - a. Navigate to the **3DDeliverables** directory. If it doesn't exist, use create new folder.

Save As			X
Save in:	22049555201	30000	
æ	Name	Date mod Create New	Folder
	Janeta info	10/18/2016 6:49 AM	File fol
Recent Places	3DDeliverables	10/24/2016 8:30 AM	File fol ≡
	admin admin	10/18/2016 6:49 AM	File fol
	퉬 arch	10/18/2016 6:49 AM	File fol
Desktop	퉬 brinspect	10/18/2016 6:49 AM	File fol
F	鷆 cell	10/28/2009 11:16	File fol

- b. Enter the *File name:* AMG-ALGNSR61.xml
- c. Select **Text File** (.txt) as the *Save as type*.
- d. Click Save.
- 5. Repeat for the AMG-ALGNBL98.xml

Save As		-		×
Save in	3DDeliverables	•	G 🤌 📂 🛄 🗸	
C	Name	*	Date modified	Туре
Recent Places		No items match your s	earch.	
Desktop				
Libraries				
Note: U	se	m		4
forma	t as type: Tex	G-ALIGNSR61.xml		Save Cancel
				Help



This will save both the Horizontal and Vertical (Profile) Geometry.

Exercise 10.2 Creating 2D Proposed Lines File for AMG

Use the MicroStation Save As command to save copies of the Proposed Design files into the *3DDeliverables* directory with AMG-2 names in *DGN* and *DWG* formats.

For example: AMG-2DSGNRDxx.DGN, AMG-2DSGNRDxx.DWG.

Simplify MicroStation Elements

- 1. Open the DSGNRDxx.dgn.
- 2. Select the Plan View to make active. Select Function Key CTRL F1 to open a Plan View.
- 3. In the View Attributes, turn Off Construction elements<OR> Select Function Key F7.
- 4. Turn Off reference file display
- 5. Turn Off levels for Baseline, CLConstr., and Scratch
- 6. Place a **Fence** around all **Elements** in the design file.
- 7. Enter ff= ..\3DDeliverables\AMG-2DSGNRD01.

<Or> use the Copy Fence Contents dialog.



- 8. Data point to accept.
- 9. Verify the file is in the **3DDeliverables** directory.

Save as DWG(Optional)

- 1. Open the .\3DDeliverables\AMG-2DSGNRD01 design file.
- 2. Select **File > Save As** from the MicroStation menu.
- 3. Select **Autodesk(R) DWG** as the *Save as type*.

Note There is no need to set **Options** on the **Save As** dialog

- 4. Verify or Enter the *File Name*, AMG-2DSGNRDxx and click Save.
- 5. Select the *Units* **Survey Feet** and click **OK**.

DWG/DXF Units						
Power GEOPAK requires that the file units be accurately specified in order for "True" scaling to be calculated correctly when working with cells and reference files.It is not possible to infer the units for the DWG or DXF file: "C:\e\projects\22049555201\roadway\TEST.dwg" for the following reason:						
The "Design Center Units" option has been selected, but Design Center units are not specified in this file.						
Units: Survey Feet						
Do not display again (Use this setting for all DWG/DXF files of this type)						
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Note The file will open in DWG Work Mode, see the blue cross hairs icon in the bottom right of the MicroStation window



Chapter 10_____

Exercise 10.3 Creating Existing Surface File for AMG

- 1. Open the DSGNRD01.dgn file. Display 2D and 3D Views and Select Function Key F2.
- 2. Turn **ON** the **Reference file** display for *GDTMRD02 or SURVRD01*.
- 3. Select and hover over the *Existing Surface* and then select **Export Terrain Model** > **LandXML**.



- 4. Select the Terrain.
- 5. Select the *Export Format:* LandXML
- 6. Enter the *Project Name:* AMG-3SURFACEEX01
- 7. Enter the Project Description: Existing Surface
- 8. Select the Export Options: Export Both



9. Save the AMG-3SURFACEEX01.xml file to the 3DDeleverables directory.

Exercise 10.4 Creating 3D Breaklines and Proposed Surface Files for AMG

This exercise outlines the steps to create the proposed surface of the project for use by contractors for automated machine guidance as follows:

Prepare the View for Exporting Exporting 3D Break Lines Creating Proposed Surface Files for AMG Delete extraneous triangles

- Prepare View for Exporting
- 1. Open the *DSGNRDxx.dgn or MODLRDxx* file. To Display **2D** and **3D Views**, select *Function Key* **F2**.
- 2. Turn **OFF** the **Reference File** display for:
 - o GKLNRD01.DGN
 - o GDTMRD02.DGN or SURVRD01.DGN

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3. Set the Corridor Design Stage to Final.



- 4. Maximize the View 2 Default-3D.
- 5. Change the *View Rotation* to a **Top view**



- 6. Open Project Explorer Use the *Function Key* F11 . Navigate to Civil Standards > *Active file* > Feature Definitions. Uncheck Corridor Components *folder* to turn OFF Mesh Solid elements.
- Use Project Explorer Civil Standards > Active file >Feature Definitions. Uncheck Plan(2D) folder to turn OFF Lines created from Active Profiles



8. Use the *Function Key* F7 to turn OFF all *Construction* elements in the 3D View.

- In Project Explorer Civil Standards > Active file > Feature Definitions. Open the Corridor Lines(3D) folder to uncheck any proposed sub-surface features and other non-proposed surface features.
 - i.e. Bottom_pm, Subgrade_pm CurbBase_pm, PavementBase_pm, ShoulderBase, TemplateMisc_pm, TemplateNullPoint_pm.



- 10. Use Level Display dialog to turn off the default level in the Default 3D view
- *Note* Use Level Display dialog to *turn off* remaining levels to use for the 3D Proposed breakline surface. i.e. Default level, Scratch dp, Miscellaneous, ConstLines, etc

> Exporting 3D Break Lines.

1. Place a Fence around all the **Elements** in the default-3D View.



2. Enter ff= ..\3DDeliverables\AMG-3DSGNRD01. Or use the copy fence contents dialog.



3. Data point to accept and verify the file is in the **3DDeliverables** directory.

Save as DWG(Optional)

- 1. Open the 3DDeliverables\AMG-3DSGNRD01 design file.
- 2. Select **File > Save As** from the MicroStation Menu.
- 3. Select Autodesk(R) DWG as the *Save as type*.

Note There is no need to set **Options** on the **Save As** dialog

- 4. Verify or Enter the File Name, AMG-3DSGNRD01 and click Save.
- 5. Select the Units Survey Feet and click OK.

DWG/DXF Units
Power GEOPAK requires that the file units be accurately specified in order for "True" scaling to be calculated correctly when working with cells and reference files.It is not possible to infer the units for the DWG or DXF file: "C:\e\projects\22049555201\roadway\TEST.dwg" for the following reason:
The "Design Center Units" option has been selected, but Design Center units are not specified in this file.
Units: Survey Feet
Do not display again (Use this setting for all DWG/DXF files of this type)
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Note The file will open in DWG Work Mode, see the blue cross hairs icon in the bottom right of the MicroStation window. Open the dwg file and trim extraneous elements as necessary



Creating Proposed Surface Files for AMG \triangleright

- 1. In FDOTSS4, Select File > Open to the AMG-3DSGN01.DGN file. Click Open File and click OK.
- 2. Create a Selection Set of all Elements.
- 3. Use Civil Tools, Terrain Model, Create From Elements tool.



- 4. Define the following in the Create Terrain Model dialog:
 - *Feature Type:* **Break Line** 0 0 Edge Method: None Feature Definition: DTMProposed 0 AMG-3SURFACEPR01 Name: 0

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Feature Type	Break Line 🗸	
Edge Method	None	
Feature	~	
Feature Definition	DtmProposed 🗸	
Name	Errain Display	^
	DtmDerivedExtended	
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5. Data point through prompts to accept settings. A Surface is created. Use Function Key F2 to turn ON/OFF the construction elements

6. Notice the External Triangles must be trimmed.



- 7. Turn **Off** the Level **DTM_px**.
- 8. Create a Selection Set of all the **Cut_pm** and **Fill_pm** Lines defining the *slope construction limits*.
- 9. Use Civil Tools, Terrain Model, Change Feature Type tool.



- 10. Set the *Feature Type* to **Boundary**.
- 11. When prompted **left click twice** to change all the selected lines to *boundary elements for the External Limits of the Surface*.
- 12. Turn **ON** the **DTM_px** level to see the results.

To delete extraneous triangles ۶

1. Select and hover over the Surface Terrain edge and then select Rules>Remove Rule.

This will break the relationship to the 3D elements! Note



2. Use Civil Tools, Terrain Model, Edit Terrain Model tool



3. From the tool settings menu, select Delete Triangle By Line



4. Draw a line (two left clicks) from outside the terrain across the erroneous triangle, then repeat as necessary.



Save Terrain to Land XML file \triangleright

1. Select and hover over the *Surface* and then select **Export Terrain Model > LandXML**.



- 2. Select the Terrain.
- 3. Select the Export Format: LandXML
- Enter the Project Name: AMG-3SURFACEPR01.xml 4.
- Enter the Project Description: Proposed Surface 5.
- Select the Export Options: Export Both 6.



7. Save the file to the *3DDeleverables* directory.

Exercise 10.5 Creating 3D Breaklines and Proposed Subgrade/Earthwork Files for AMG

This exercise outlines the steps to create the proposed surface of the project for use by contractors for automated machine guidance as follows:

Prepare the Templates for Subgrade Point definitions and Alternate Surfaces

Prepare the View for Exporting

Exporting 3D Break Lines

Creating Proposed Surface Files for AMG

Delete extraneous triangles

The 3D proposed finished subgrade surface to be exported as LandXML format from the \Roadway\MODLRD file. This file can be used to generate surface to surface **earthwork** volumes

The subgrade surface can be created from the 3D feature lines provided that they have been defined properly in the point definitions on all project corridor, linear and surface templates.

> Prepare the Templates for Subgrade Point definitions and Alternate Surfaces

In the Create Template dialog, edit each of the points defining the finished subgrade. Set the **Feature Definition** and **Alternate Surface** fields to *SubGrade_pm* and *SUBGRADE*, respectfully.

When creating surface terrains from 3D lines, there are two important TIN principles for consideration:

- a. Vertical Faces all lines must have different xy values. They cannot be stacked in the z plane. Therefore, set the horizontal offset value no less than .01 feet on vertical component points in the project templates
- b. Caves/Cliffs all lines must continue in the same direction. The TIN triangles will not reverse direction across a surface. Therefore, consider which points to use for the subgrade surface. I.E. base, base extensions, wall footers, etc. Additional template points may be needed to intercept the top surface in these areas. As a rule, it is better to include the base, base extensions, wall footers, etc for excavation and not to include base, base extensions, wall footers, etc for embankment.
- *Note* These template accommodations are necessary to consider for ALL Corridor, Linear and Surface Templates used on the project.

The following images are examples of the point properties dialog, highlighted **Subgrade_pm** Point Feature Definition, and the highlighted **SUBGRADE** Alternate surface. In this example the base extension is not included in the subgrade surface definition.

Point Propertie	s						×
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> Prepare the View for Exporting

- 1. Open the *DSGNRDxx.dgn or MODLRDxx* file. To Display **2D** and **3D Views**, select *Function Key* **F2**.
- 2. Turn **OFF** the **Reference File** display for:

GKLNRD01.DGN GDTMRD02.DGN or SURVRD01.DGN

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3. Set the *Corridor Design Stage* to **Final** for all the corridors and linear templates.



- 4. Open both the Project Explorer and Element Properties Dialogs, Navigate to the Civil Model>Active Design file > Terrain Models.
- 5. For EACH Terrain Model Surface Templates, Set the Create Linear Features option to *True*.

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Terrain Models DTMPr DTMPr Surface Template1 DTMPr Surface Template1 DTMP Surface T		Mesh Template Template Name Create Linear Features True

- 6. Maximize the View 2 Default-3D.
- 7. Change the *View Rotation* to a **Top view**



- 8. In Project Explorer > Civil Standards > *Active file* >Feature Definitions. Uncheck Corridor Components *folder* to turn OFF Mesh Solid elements.
- 9. Use Project Explorer Civil Standards > *Active file* >Feature Definitions. Uncheck Plan(2D) *folder* to turn OFF Lines created from Active Profiles



10. Use the Function Key F7 to turn OFF all Construction elements in the 3D model view.

11. In Project Explorer Civil Standards > *Active file* >Feature Definitions. Open the *Corridor Lines*(*3D*) folder to check only-proposed subgrade surface features.

i.e. Cut_pm, Fill_pm, MedianCrown_pm, ShoulderUnpavBreak_pm, Subgrade_pm,



- 12. Use Level Display dialog to turn off the *default* level in the Default 3D view
- *Note* Use Level Display dialog to *turn off* remaining levels to use for the 3D Proposed Subgrade breakline surface. i.e. Default level, Scratch_dp, Miscellaneous, ConstLines, etc.

> Exporting 3D Break Lines.

1. Place a Fence around all the **Elements** in the default-3D View.



- 2. Enter ff=..\3DDeliverables\ AMG-3DSGNRDEW01.dgn.
- 3. Or use the copy fence contents dialog.



- 4. Data point to accept.
- 5. Verify the file is in the **3DDeliverables** directory.

Save as DWG(Optional)

- 1. Open the 3DDeliverables*AMG-3DSGNRDEW01.dgn* design file.
- 2. Select **File > Save As** from the MicroStation Menu.
- 3. Select **Autodesk(R) DWG** as the *Save as type*.

Note There is no need to set **Options** on the **Save As** dialog

- 4. Verify or Enter the *File Name*, AMG-3DSGNRDEW01 and click Save.
- 5. Select the Units Survey Feet and click OK.

DWG/DXF Units
Power GEOPAK requires that the file units be accurately specified in order for "True" scaling to be calculated correctly when working with cells and reference files. It is not possible to infer the units for the DWG or DXF file: "C:\e\projects\22049555201\roadway\TEST.dwg" for the following reason:
The "Design Center Units" option has been selected, but Design Center units are not specified in this file.
Units: Survey Feet Do not display again (Use this setting for all DWG/DXF files of this type)
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Note The file will open in DWG Work Mode, see the blue cross hairs icon in the bottom right of the MicroStation window. Open the dwg file and trim extraneous elements as necessary



> Creating Proposed Subgrade Surface Files for AMG

- 1. In FDOTSS4, Select File >**Open** to the *AMG-3DSGNEW01.DGN* file. Click **Open File** and click **OK**.
- 2. Create a Selection Set of all Elements.
- 3. Use *Civil Tools, Terrain Model*, **Create From Elements** tool.



- 4. Define the following in the Create Terrain Model dialog:
 - Feature Type: Break Line
 Edge Method: None
 Feature Definition: DTMProposed
 Name: AMG-3SURFACEEW01

🚯 Create Terrain	– 🗆 🗙	
Feature Type Edge Method	Break Line	
Feature	•	
Feature Definition	DtmProposed 🗸	
Name	⊟ Terrain Display 	^
	Image: Structure Image: Structure	~
	< >	
- 5. Data point through prompts to accept settings. A *Surface* is created. Use Function Key **F2** to turn ON/OFF the construction elements
- 6. Notice the External Triangles must be trimmed.



7. Turn **Off** the Level **DTM_px**.

8. Use Civil Tools, Terrain Model, Change Feature Type tool.



- 9. Set the *Feature Type* to **Boundary**.
- 10. Select each of all the **Cut_pm** and **Fill_pm** Lines individually defining the *slope construction limits*. Right click to finish when all the selected lines to *boundary elements for the External Limits of the Surface*.
- *Note* A Selection Set for Cut/Fill Lines does not produce the desired results for the creation of the Subgrade surface Terrain
 - 11. Turn **ON** the **DTM_px** level to see the results.



> Save Terrain to Land XML file

1. Select and hover over the *Surface* and then select **Export Terrain Model > LandXML**.



- 2. Select the **Terrain**.
- 3. Select the *Export Format:* LandXML
- 4. Enter the Project Name: AMG-3SURFACEEW01.xml
- 5. Enter the Project Description: Proposed Surface
- 6. Select the Export Options: Export Both



7. Save the file to the 3DDeleverables directory.

Exercise 10.6 Use Land XML Visualizer to Validate Land XML File

1. From the desktop locate and open the FDOTSS4 Product Folder



- 2. Open the Land XML Visualizer tool
- 3. On the Land XML Visualizer tool, select File Open. Choose the AMG-3SURFACEPR01.xml file



4. Change the **Plan View** Setting to **Default**, **No Fill**, **No Vectors** and **No shading** as shown below. Also, right click on the **Pnts** definition and choose **Hide**

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