FDOTConnectXX.XX

State of Florida Department of Transportation

FDOTConnect for OpenRoads Designer

Comprehensive Template Design

Course Guide

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

FDOTConnectXX.XX OpenRoads Designer Comprehensive Template Design

Description

This is a 1-day training course to learn the fundamentals of Template Design. Participants will learn basic and advanced knowledge of the Create Template dialog within Bentley OpenRoads Designer Connect Edition environment for design and modeling within the FDOTConnectXX.XX workspace. Most all of the Create Template dialog capabilities are included as follows:

- Template Library Basics
- Creating New Libraries, Folders and Templates
- Current Template Window
- Template Preview Window
- Current/Active Template Tab
- Dynamic Settings
- Create / Modify / Delete Components, Points, etc.

- Point and Component Properties
- Constraint Types/ Labels
- Horizontal Feature Constraints
- End Conditions/ Targets/ Priorities
- Display Rules
- Testing Window
- Point Name and Component Name Overrides

Objectives

- Create a New Project Template Library and Project Folders.
- Use Template Library Organizer to build Project Templates.
- Build a Resurfacing Template from Basic Components.
- Learn to Use the Variable Median FDM Templates.
- Configure Templates for Superelevation.
- Add and Test End Conditions.
- Build a Special Condition Component Sets for Displaying Walls, Guard Rails, Sidewalks, etc.
- Build a Special Condition Component Sets for Displaying Special Ditches with Variable Width and Constant Slopes.
- Adding Special Condition Component Sets to a Template.
- Practice Building Project Templates from Sample Project Typical Sections

Audience

• FDOT Roadway Designers and Engineers

Prerequisites

Participants have a basic understanding of Computer Aided Drafting and Design (CADD) using MicroStation, a basic understanding of OpenRoads Technoloyconcepts and a solid understanding of the engineering necessary to design a Roadway. In OpenRoads Designer there is no longer any GEOPAK Functionality.

Duration: 8 Hours

Professional Credit Hours: 8 PDHs

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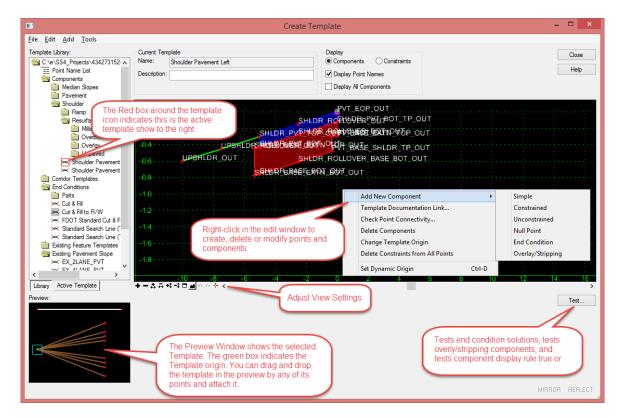
1 GETTING STARTED

INTRODUCTION

Best Practices

- 1. Using the already created itl add any folders that are missing
- 2. Use TLO to copy FDOT Templates.
- 3. Organized Templates by corridor.
- 4. Version the Templates or organize by Template Drop Stations.
- 5. Use Apply Affixes when building new Templates (tools options).
- 6. One green point per Template (as a rule).
- 7. Remove Point Name Overrides, except on common tie down points (All white text).
- 8. Remove Component Name Overrides, except on common tie down components.
- 9. Use the same label on common Constraints.

CREATE TEMPLATE DIALOG



- User Definable Folders
- 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

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 hotkey 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

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

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.

SETTING PREFERENCES

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🛅 End Condi	Options			4		
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FDOT provides a collection of preferences definitions that should be applied before creating templates.

- 1. From the Create Template dialog select Tools > Options.
- 2. On the Template Options dialog click the Preferences button.
- 3. On the Preferences dialog select FDOT and click Load (or double-click FDOT).

Template Options

Specifies naming and step options for the current template.

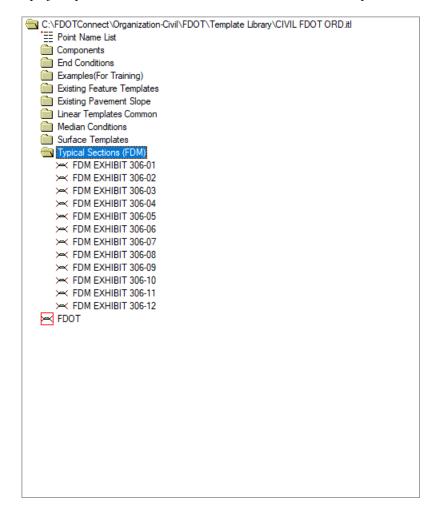
Template Options	×
Naming Options Component Seed Name:	OK Cancel
O Specify:	Preferences
Point Seed Name:	
Apply Affixes Prefix Suffix	
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Step Options	
X: 0.10 Y: 0.10 Slope	e: 0.000%

• Naming Options

- *Component Seed Name From Feature Definition -* indicates, when selected, the component name is derived from the style specified when the component is created.
- *Component Seed Name Specify* indicates, when selected, the component name is specified in the field.
- *Points Seed Name* allows you to specify the seed name for point in the current template. Since point names must be unique, the seed name is appended with a different number each time a point is created.
- \circ Apply Affixes Left Prefix/Suffix specifies which prefix/suffix should be added to a point or component when the value is on the left of 0.0 (absolute).
- *Apply Affixes Right Prefix/Suffix* specifies which prefix/suffix should be added to a point or component when the value is on the right of 0.0 (absolute).
- Step Options specifies precision step input for components and points. These values can also be accessed from the <u>Dynamic Settings</u> dialog.
 - Step Options X Step specifies the step increment for the X distance from the dynamic origin. If this value is non-zero, then the cursor moves to the horizontal increments of the specified value as measured from the dynamic origin.
 - *Step Options Y Step -* specifies the step increment for the Y distance from the dynamic origin. If this value is non-zero, then the cursor moves to the vertical increments of the specified value as measured from the dynamic origin.
 - *Step Options Slope* specifies the step increment for slope from the dynamic origin. If this value is not 0, then the cursor moves to the slope increments of the dynamic origin. Slope is applicable only when the dynamic settings are in horizontal/slope mode.
- **Preferences** opens the Preferences dialog.

TEMPLATE LIBRARY

FDOT provides a customized Template Library named: CIVIL FDOT ORD.ITL, located in the \FDOTConnectXX.XX\Organization-Civil\FDOT\Template Library directory. It contains a collection of Components and Templates that were developed from the FDOT Design Standards and FDM. These templates can be copied into a project specific ITL and customized to meet the needs and unique conditions of each project.



The FDOTCONNECTXX.XX workspace includes configuration variables that will make a project specific .itl file when a file is created in the Roadway folder of the project. The .itl that is created will have only some of the componets that you will need make CIVIL FDOT ORD.ITL the default template library unless a project specific ITL is found. If an ITL file name matches the project name then it will be defined as the default ITL.

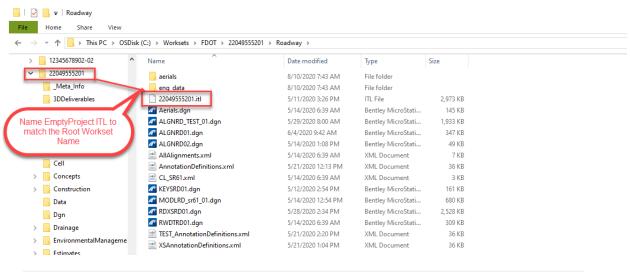
The Components contained in the FDOT template library were developed using the criteria defined in the FDOT Design Standards.

The Templates delivered in the "Typical Sections (FDM)" folder of the ITL are static templates matching each Typical Sections defined in the Florida Design Manual (FDM).

Workset ITL

The CIVIL FDOT ORD.ITL file is normally located on the server where users have limited access. To customize the template library for a specific project it will be important to create a project ITL file and import the needed components and templates from the CIVIL FDOT ORD.ITL file. The project ITL file can then be selected in the Corridor Modeler preferences to associate it with a specific project.

A Workset specific ITL will be created once a design file is created using the Create File tool. This ITL file will have folder structure and some common templates that can be used to design a project.



Note A ITL file will be created automatically in the Roadway Folder when you first create a file. The user then will use the Template Library Organizer to build the itl..

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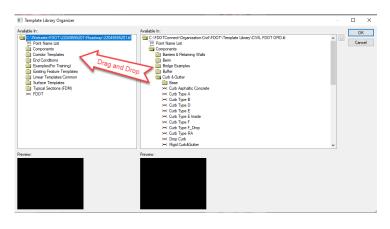
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Template Library Organizer

After creating and opening the project specific template library you can import Templates and Components using the Template Library Organizer. On the Create Template dialog select Tools > Template Library Organizer.

The Template Library Organizer moves (drag and drop) templates from one template library to another. To copy or move a template or an entire folder, press and hold the left mouse button down over a template or folder, then drag the selected item to its new location either in the other library or the same library.

The default process is to copy the item. To move the item, hold down the shift key while releasing the left mouse button. The selected folder or template can also be deleted by pressing the delete key.



EXERCISES OVERVIEW

To prepare your computer for the next set of exercises:

a) Delete the following file 22049555201_CE.itl from the location

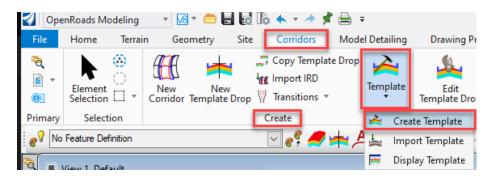
C:\WorkSets\FDOT\22049555201_CE\Roadway Folder.

- b) Open the ComprehensiveTemplateDesign folder on the desktop and expand the DataSets folder.
- c) Extract the CT22049555201_Chapter1.zip file in the C:\WorkSets\FDOT\ folder.

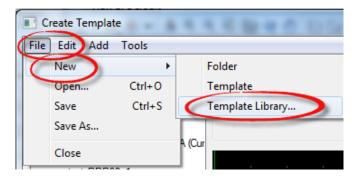
Exercise 1.1 Creating a New Project Template Library

In this exercise students will create a project specific template library. This new project Template Library is the container for all the components and templates used to develop the model for the project.

- 1. Open the *MODLRD_TemplateDesign01.dgn* file from the current workset that was delivered. C:\WorkSets\FDOT\22049555201_CE\Roadway\
- 2. On the OpenRoads Modeling workflow select the Corridor Tab on the Ribbon, Create Template tool.



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



4. Navigate to the Workset **rRoadway** folder, C:\WorkSets\FDOT\22049555201_CE\Roadway\ and enter the new *Template Library Name*, Training. Press **Save**.

Save As X					
$\leftrightarrow \rightarrow \cdot \uparrow$	> This PC > OSDisk (C:) > Worksets	> FDOT > 22049555201_CE > Roadwa	y >	・ C Search Roadway	
Organize 👻 Ne	w fold r				
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5. Select **File > Save** again to verify, then close the **Create Template** dialog. Press **Close**.

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Library	Active Templa	ate	+-;	\$ # + + - +	- 1
Preview:					
C:\e\proje	ects\22049555	201\roadway	/\220495552	01.itl Saved	

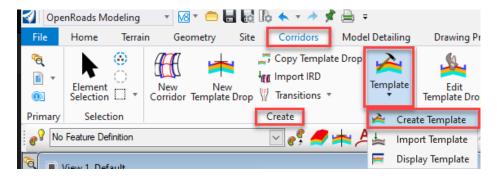
Exercise 1.2 Create Template Library Folders

- 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 FDOTCONNECTXX.XX 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. This can be found on the Corridors Tab



2. Create new folders in the Project Template Library by selection **File > New > Folder** from the menu or by right clicking on the root folder in the Create Template dialog and selecting New > Folder from the context menu.

Create Template					- 0 X	
File	Edit Add	Tools				
	New	•	Folder		Display	Close
	Open	Ctrl+O	Template		Components Constraints	
	Save	Ctrl+S	Template Library		Display Point Names	Help
	Save As	L L		,	Display All Components	
	Close					_

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

o urface Templates

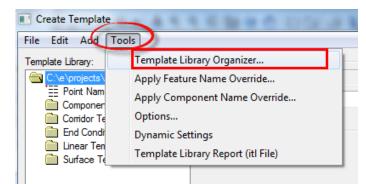
Create Template File Edit Add Tools	4. Select File > Save to save the project <i>Template Library .itl</i> file.
Template Library: C:\Worksets\FDOT\22049555201_CE\Roadway\TrainingExample.itl TEMP Point Name List Components Comidor Templates End Conditions Linear Templates	Tile.
C Surface Templates	

Exercise 1.3 Using the Template Library Organizer

Typically the components and templates needed for your project can be copied from other Template Libraries and design files using the Template Library Organizer. This exercise uses the Template Library Organizer to copy the components need for this workshop into your project ITL file.

Note If a new template is created as in this exercise a new setting preferences needs to be defined.

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



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

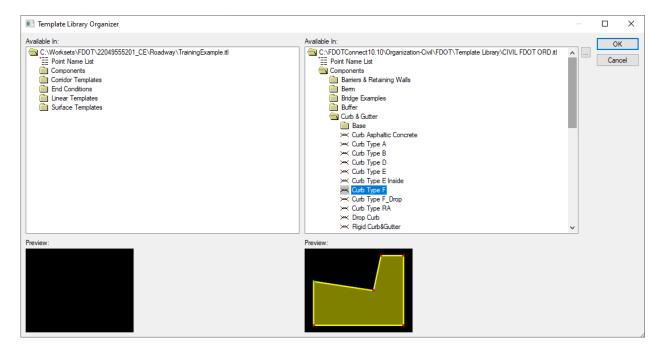
Template Library Organizer		— 🗆 X
Available In: C:\Worksets\FDOT\22049555201_CE\Roadway\TrainingExample.ttl	Available In:	OK Cancel

3. From Open Template Library, navigate to the Template Library folder within the FDOTConnectXX.xx workspace

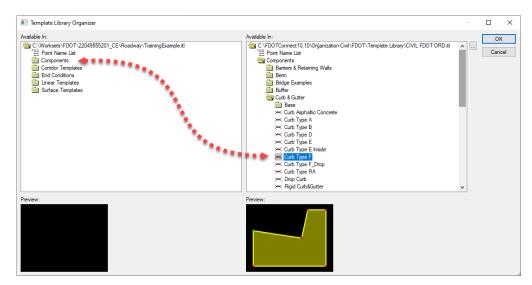
C:\FDOTConnect10.10\Organization-Civil\FDOT\Template Library folder and select the **CIVIL FDOT ORD.itl** *Template Library* file. Press **Open**.

🜍 Open				×
← → ▾ 📙 « Orga	nization-Civil > FDOT > Template Library	ٽ ~ ٧	🔎 Search Te	emplate Library
Organize 👻 New folder				:==
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🟥 Documents 🖈	🛃 help	9/15/2021 1:43 PM	File folder	
📰 Pictures 🛛 🖈	CIVIL FDOT ORD.itl	9/15/2021 1:43 PM	ITL File	6,401 KB
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	File 🔻	Directory 🔹		
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File nan	ne: CIVIL FDOT ORD.itl	``````````````````````````````````````	 *.itl 	~
			Open	Cancel

- 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 Components\Curb & Gutter folder shown below.
- 6. Select **Curb Type F** to preview the template in the *Preview* window below the directory view.



7. Drag the **Curb Type F** component from the *right side* to the *left side* and drop it onto the *Components* folder for the project.



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

CIVIL FDOT ORD Template Location	Project Folder Location
Components/Curb & Gutter	Curb Type F to Components
Components/Ditches	Common Ditch Left to Components
Components	Entire Null folder to Components
Components	Entire Pavement folder to Components
Components/Shoulder	Shoulder Pavement Left to Components
Components/Shoulder	Shoulder Pavement Right to Components
Components/Utility Strip	Utility Strip Left to Components
End Conditions	Entire Parts folder to End Conditions

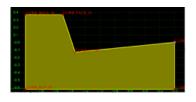
End Conditions	Cut & Fill to End Conditions
End Conditions	Standard Search Line (Trigger) to End Conditions

- 9. Press **OK** to return to the **Create Template** dialog and press **Yes** to the "Save data to file... The FDOT Standard Items are now saved in the Project Template Library.
- 10. Close MicroStation so the FDOT workspace will recognize the new Project ITL file.

2 BUILD A STATIC TEMPLATE

TERMS

Component - a set of points that define an open or closed shape.



Template - a collection of points and components.



Template Library - Templates are stored in a Template Library (*.itl).

TEMPLATE COMPONENTS

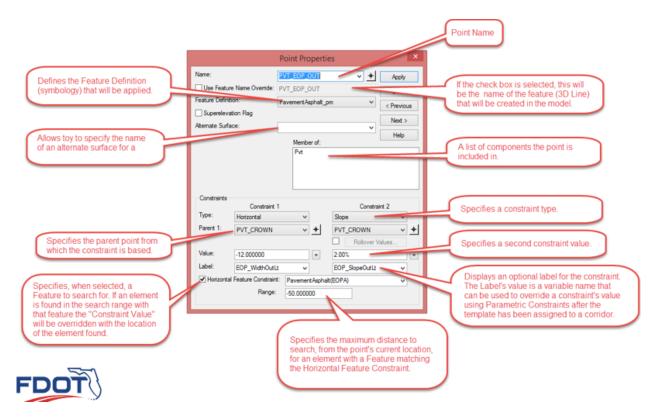
A component is a set of points that define an open or closed shape. Each component, whether open or closed, can represent a different material or area of interest. Components are named and have an assigned feature style.

Components can be modified as desired. There is no limit to the number of points or components in a Template. When Templates are paired with horizontal and vertical alignments and superelevation, they define the surface of a corridor. Templates are flexible design components that allow you to model simple constructs, such as ditches and sidewalks, to the more complex multi-lane highways with superelevated curves and variable side slopes.

There are 5 types of components created in Corridor Modeling: Simple, Constrained, Unconstrained, Null Point, End Condition, and Overlay/Stripping.

- **Simple Component** typically represents a section of pavement. It's a closed parallelogram (4 constrained points) that is defined by the slope and thickness.
- **Constrained Component** consists of points that are all restricted to the movement of the first point. A constrained point is typically used to manage the behavior of other points in the template. When a point (parent) is moved, any constrained point (child) also moves. This restriction only affects the offset and elevation (x,y) of the restrained point and, the relationship is unidirectional (movement of child point does *not* move the parent point).
- **Unconstrained Component** an open or closed-shaped with no movement restrictions.
- Null Point Component a template point that is purposely not related to any particular component. It's most often used as a reference for controlling other points.
- End Condition Component a special open-shaped component that targets a surface, a feature of a surface, an elevation, or an alignment (it replaces the former Cut/Fill, Material, and Decision tables). The integrity of end conditions can now be routinely tested while the roadway template is being created.
- **Overlay/Stripping Component** used to handle all milling/stripping operations and can be used to handle leveling (overlay) operations.

POINT PROPERTIES



Point Properties specifies properties associated with roadway template points:

- Name displays the point name. The drop down list includes items from the Point Name List.
- Use Feature Name Override displays the name of the feature that will be created in the surface to correspond to the point. This field is optional. If it is blank, then the point name will be used as the feature name.
 - **Note** While the Point name must be unique to the template, the Feature Name does not have to be. However, if the same feature name exists on more than one point for the solution at a given station, undesirable results will occur.

The option is intended, primarily, for end condition components, to create connectivity from one station to the next when the template end conditions change. For example, if you want all surface tie-in points to belong to one feature, then set the feature name of all the ending end condition points on each side of the template to the same name (i.e. all Cut and Fill end points on the right would be given the feature name Tie_R and all the ones on the left would be given the feature name Tie_L).

- **Feature Definition** displays the feature style of the point. If no style is specified, then it comes from the first component of which the point is a member.
- Alternate Surface allows you to specify the name of an alternate surface for a point. You may choose multiple alternate surface names. Select from the list of available surfaces in the active template.
 - End Condition Properties allows you to specify additional properties when a point is part of an end condition.
 - **Check for Interception** specifies the preceding segment will be checked for interception of the target when the end-conditions are solved. If it is turned off, then the segment will be ignored when checking for interceptions.
 - **Place Point at Interception** specifies that when an interception is found along the preceding line segment, the line segment will be drawn to the interception. Otherwise, if the interception is found, the line segment will be drawn to its maximum width.

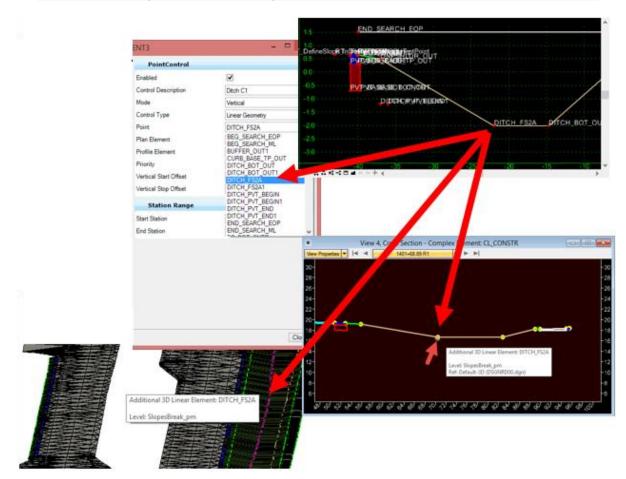
- End Condition is Infinite specifies the last segment will be considered to be of infinite length when attempting to intercept the target. This option is applicable only to the last point on the end condition.
- **Do Not Construct** specifies the point will be solved like all other points in the end-condition, but the point will be skipped when drawing the component segments.
- **Member Of** indicates in which components the point is included.
- **Constraints** allows you to review/edit the constraints on a point.
 - **Type** specifies the constraint type: None, Horizontal, Vertical, Slope, Vector-Offset, Project to Surface, Project to Design, Horizontal Maximum, Horizontal Minimum, Vertical Maximum, Vertical Minimum, Angle Distance.
 - **Parent 1** specifies the constraint parent point.
 - **Parent 2** displays the second parent point, only when applicable. Applicable to Horizontal and Vertical Maximum and Minimum constraints and Vector Offset Constraints.
 - **Rollover Values (check box and button)** displays only for a slope constraint. These values are displayed in the Parent 2 field since the rollover reference point is the second parent point for the slope constraint. Selecting the checkbox activates the Rollover Values button. Selecting the button displays the <u>Rollover Point Properties</u> dialog.
 - **Value** specifies the horizontal offset for horizontal type constraints. Negative values are to the left; positive values are to the right.
 - ✓ For Vertical type constraints, this is the vertical offset. Negative values are down; positive values are up.
 - ✓ For the Slope constraint, the value is the slope. Negative Values indicate a slope that goes from upper left to lower right; positive values indicate a slope from the lower right to upper left.
 - ✓ For the Vector Offset constraint, a negative value is an offset to the left of the vector going from the first parent to the second parent; positive values are to the right of the vector.
 - ✓ For the Project to Surface constraint, the value is the name of the surface (Note that a blank name will translate to the active surface).
 - ✓ For the Project to Design constraint, the value is the maximum distance to attempt to project to. Negative values imply the projection is to the left; positive values project to the right.
 - \checkmark For variable constraints, the value is the difference between two points.
 - **Label** displays the optional label for the constraint. Constraints that are labeled can have their value changed during design processing. The same label name can be assigned to more than one constraint and more than one point.
 - **Project to Surface** allows you to limit the projection of a point to the surface: Any Direction (no restrictions), Down (point projects down from its original location only), Left (point projects to the left from its original location only), Right (point project to the right from it original location only), and Up (point projects up from its original location only). The Up and Down options are ignored when the other Constraint is Vertical. Similarly, the Left and Right options are ignored when the other Contraint is Horizontal.
 - **Style Constraint** specifies, when selected, that the style contraint on a point overrides the point contraints if a feature or alignment with a matching style is found within a specified horizontal range. Activates the Style field which allows you to identify the style.
 - **Style Constraint (Type)** allows you to select the constraint type: Horizontal, Vertical, or Both.
 - **Range** specifies the maximum horizontal distance to search from the point's current location to any feature or alignment with the specified style. Only the active surface and active geometry project is searched. Negative values cause the search to be to the left; positive values to the right. A value of zero causes the search to find the closest instance of the style.
- Apply saves changes to the current point.

Point Naming is Important

The Point Name is very important. There's no standard naming convention for the points but they should be named so that each point in a template has a unique name and is easily identifiable by it's name alone. Consistency in point naming is important too. If multiple templates will be applied to a corridor the names of common points in the templates should match.

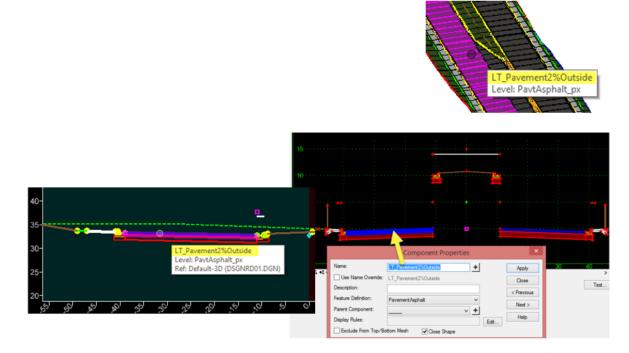
For example: If you have two templates for a given corridor and on the first template you name the point representing the outside edge of pavement on the left roadway LT_PVT_EOP_OUT then you will need to name the point the same thing on the second template as well. The will allow the corridor to transition smoothly from one template to the next.

Note Point Name overrides are sometimes necessary when using trigger sets or for template transitions but should only be used when necessary.



Component Naming

Individual Component Names also appear in the ensuing model. These components are used for volume calculations, so standard naming conventions should be applied to ensure consistent results. When transitioning between two templates (going from a two-lane to a four-lane roadway, for example), the corridor attempts to connect component points of the same name to model the transition.

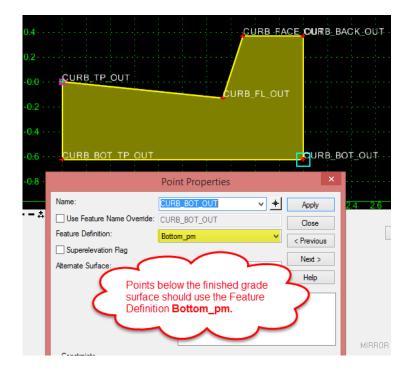


- Consistency is important
- Component naming is recommended to be consistent with the material type.
 - o Used for identifying components
 - Template Transition

Point Feature Definitions

Feature Definitions define the symbology of the point and how it should be displayed in the various views.

- Points in a template should always have a _pm Feature Definition.
- _pm indicates that the element is shown in a Proposed Model view.
- Bottom_pm should be used for points below the finished grade so they can be easily turned off when producing 3D Deliverables or creating a finished grade surface.

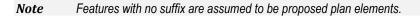


FDOT's Feature naming convention mirrors its level naming convention where the name is followed by an underscore and then two characters which represent the state .of the element and the view it is displayed in. Since the elements in the template will be drawn into the 3D model and then cut into cross sections the features used will have a _pm (pointsl) or _px (components) suffix.

The format of the Feature Name is: feature_sv (max. 18

Where: $(object = element type)_(s = state)(v = view)$

(S)tate Designations	(V)iew Designations		
p (proposed)	p (plan)		
d (drafting element)	r (profile)		
e (existing	x (cross section)		
m (model)			



CONSTRAINTS ON POINTS

Point constraints are used to manage the behavior of points in a template. If a point is moved in a template, either by the user editing the template or by the application of a horizontal or vertical control during design processing, all the points related to the point being moved behave in a rational and predictable manner.

- A point can have, at most, 2 constraints on it. It is then "fully constrained".
- A point with only one constraint is "partially constrained"
- A point with no constraints is "unconstrained" and the point is shown as a green plus sign

Note A rule of thumb is to have only one green point per template and all other points are red.

Point constraints are two-dimensional and one-way. Two-dimensional means that the constraints can only affect the points offset and elevation (x and y coordinates in the cross section view). One-way means there is a child-parent relationship between points. In other words, if point B is constrained by point A, point A is said to be the parent of point B and moving point A will affect point B, but you cannot move point B to affect point A. The example below shows a sample of this where the light blue arrow indicates a parent/child relationship from point A to point B.

	Point Properti	es	×	
Name:	RT_PVT_OLAY_O	UT v 🕈	Apply	
Use Feature Name Override	RT_PVT_OLAY_O	JT	Close	
Feature Definition:	Pavement Milling_pr	n v	< Previous	
Superelevation Flag			Next >	
Alternate Surface:		~		
	Member of:		Help	
RT_PvtOverlay_02 RT_PvtOverlay_03				
Constrain Type: Horizontal	t 1	Constrai	int 2	
Parent 1: RT_PVT_OLA		None Horizontal Vertical Slope	+	
Value: -12.0000	=	Vector-Offset	=	
Label:	~	Project To Surface Project To Design		
Horizontal Feature Constra		Horizontal Maximu Horizontal Minimur Vertical Maximum Vertical Minimum		

- Point Constraints provide structure to the points making up each component.
- A Constraints basically defines where a point is located, relative to another "Parent" point.
- Constraints can have different parents.

Point Constraints Example

		Create Template		- 🗆 🗙
File Edit Add Tools Template Libray: CravSS4_Projects \220495552011\ Components Components Components SR61 SR61 SR61 Libray SR61 Libray Templates Suface Templates Suface Templates	Current Template Name: SR61 Description:		Display Components Constraints Display Point Names Display All Components	Close Help
	Name: Use Feature Name Ovenide: Feature Definition: Superelevation Rag Alternate Surface:	Point Properties	Apply Close < Previous Help	
C Sector Sect	Constraints Type: Horizontal Parent 1: RT_SW_FRON Value: 5.000000 Label: BSW_WidthRt ✔ Horizontal Feature Constrain Range	Slope IT_TOP_(v + RT_SW_FRON' Rollover 2.00% SW_CrossSlop SW_CrossSlop rt: SidewalkBack(BSW)	▼ T_TOP_(▼ ↓ Values	45 50 Y Test

Constraint Types

There are a variety of constraint types that can be applied to a point's properties. By applying two of these constraints to a point structure defining the points relationship to others is established.

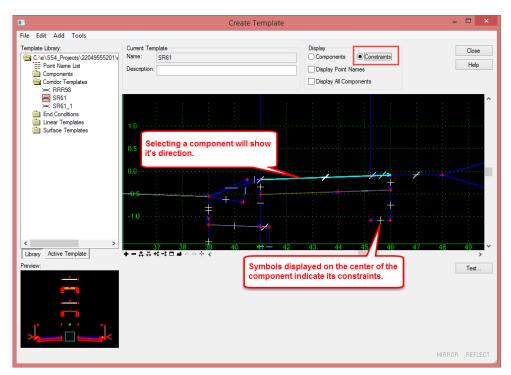
Corridor Modeling provides a variety of constraint types for roadway template design (*Horizontal, Horizontal Maximum, Horizontal Minimum, Vertical, Vertical Maximum, Vertical Minimum, Slope, Vector Offset, Project to Surface, Project to Design, Angle Distance*) as described as defined below:

- Horizontal The child point remains at the given horizontal distance from the parent point.
- **Horizontal Maximum** The child point has two parent points and remains at the given horizontal distance from the parent point that is farthest to the right (has the maximum horizontal or X value).
- **Horizontal Minimum** The child point has two parent points and remains at the given horizontal distance from the parent point that is farthest to the left (has the minimum horizontal or X value).
- Vertical The child point remains at the given vertical distance from the parent point.
- Vertical Maximum The child point has two parent points remains at the given vertical distance from the parent point that is highest (has the maximum vertical or Y value).
- Vertical Minimum The child point has two parent points and remains at the given vertical distance from the parent point that is lowest (has the minimum vertical or Y value).
- Slope The child point will maintain the given slope from the parent point. Slope constraints can, additionally, have rollover values assigned to them. Rollover values are used to set the slope constraint based on a high side slope difference and a low side slope difference, and a reference point which defines the controlling slope to the parent point. Slope constraints are absolute. Slopes going from lower-left to upper-right are positive regardless of whether the child point is to the left or right of the parent.
- Vector Offset The child point has two parent points and will be projected onto the vector defined by the two parents. If the offset is not zero, then the child point will maintain a perpendicular offset from the parent vector at the specified offset value. Negative values indicate an offset to the left of the vector defined by the parent points. Positive values indicate an offset to the right.
- **Project to Surface** This constraint must be used in conjunction with one of the previously define constraints. The other constraint will define the projection direction. The child point will then be projected to the surface with the name or parametric label given when the design is processed. If the surface does not exist, or no solution is found, then the point will remain where it is placed in the template.

- **Project to Design** This constraint is similar to the Project to Surface, except that the point is projected to the design surface of the template. A projection value is given to indicate whether the projection is to be to the left or to the right. The point must also be constrained by one of the previous constraints, excluding the Project to Surface, so that a direction for the projection may be determined. A negative value limits the projection to the left of 0; a positive value limits the projection to the right of 0 to project the point. If no solution is found, then the point will remain where it is placed in the template.
- Angle Distance This constraint takes two parent points, a distance, and an angle. The selected point is then fully constrained to the location defined by the first parent, and the angle from the first parent relative to the vector defined by the two parent points. This constraint creates a rigid-body rotation. When selected, no other constraints types are available.

Display Constraints

Switching the Display mode from Components to Constraints will provide a graphical representation of the relationships of the points making up the template.



- **Components/Constraints** Determines the display mode of the template. If the display components field is set, then the components is displayed. If the display constraints field is set, then the point constraints is displayed. Points are always displayed.
- **Display Point Names** Specifies point names are displayed (in white), when this option is checked. If the point has a Feature Name Override (applied on the Point Properties dialog), it is displayed in red.
- **Display All Components** Specifies all components that are hidden because of their display rules are displayed with dashed lines, when this option is checked. For more specific details on defining display rules, see the <u>Display Rule</u> help topic.

TEMPLATE OPTIONS

There are some options you will find helpful when working in the Create Template dialog.

- > To select the FDOT defined Preferences:
 - 1. Select **Tools > Options** from the menu in the **Create** Templates dialog.
 - 2. Click the **Preferences** button.
 - 3. On the Preferences dialog select **FDOT** then click **Load** and **OK**.
 - 4. Click **OK** to accept the options and **Close** the dialog.

Template Options	×
Naming Options Component Seed Name:	OK Cancel
Specify:	Preferences
Point Seed Name:	Help
Apply Affixes Prefix Suffix	
Left: LT_	
Right: RT_	
Step Options	
X: 0.1000 Y: 0.1000 Slop	e: 0.00%

DYNAMIC SETTINGS

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

Dynamic Settings 🛛 🗴			
X: -37.6408	16 Step: 0.100000		
Y: 14.67957	2 Step: 0.100000		
Point Name:	~		
Point Style:	Curb_pm 🗸		
Apply Affixes			
hs= ∨			
Set Dynamic Origin			

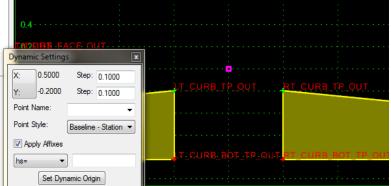
The Dynamic Settings dialog is accessed by selecting the menu option Tools > Dynamic Settings or using the *View Control* icons located below the Current Template window.

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

CONSTRUCTION OF TEMPLATES

	Template Opti	ons	×
Naming Options		ОК	
Component Seed N		Cance	el
O Specify:		Preference	es
Point Seed Name:		✓ Help	
 Apply Affixes 	Prefix Suffix		
Left:	Prefix Suffix LT_		
Right:	RT_		
Step Options			
X: 0.100000	Y: 0.100000	Slope: 0.00%	
		:	



- Components Building Blocks of Templates
 - o Pavement
 - o Curbs & Sidewalks
 - Tie Down & End Conditions
- Allows Drag & Drop
- Mirror/Reflect and Affixes
 - o Components
 - Points (Including Overides)
 - o CDR's
- Allows for One Component

The Apply Affixes option can automatically insert a prefix or suffix to point names and components indicating the side of the road they were applied to. This is powerful because it allows a single component to be used on both sides of the road when used with the Mirror and Reflect placement options. More commonly, you can also select the Apply Affixes option on the dynamic settings dialog.

Note Thought needs to be given as to when this option should be selected. If you select it when creating a template and then also have it selected when applying the template you will have nested Affixes.

Building a Template from Components

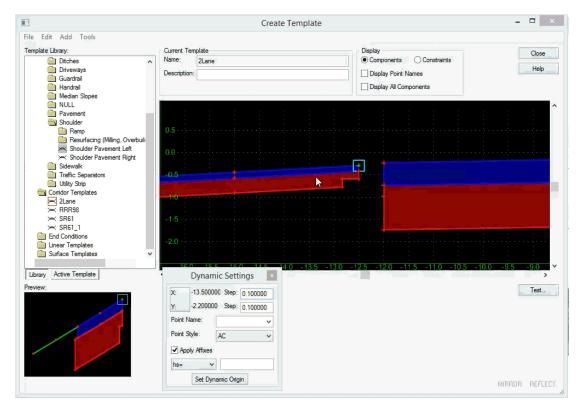
Drag components from Template Library folders or the Preview Window into the editing window.

•	Create Template -	×
File Edit Add Tools		
Template Library: Driveways Guardrail Handrail Median Slopes	Current Template Display Name: 2Lane Description: Image: Constraints Display Point Names Display Point Names	Close Help
 NULL Base Extension Miscellaneous Pavement Ramp Pavement Resurfacing (Miling, Overbuik Shared Use Path Tardic Separators Utity Strip Conidor Templates Zlane × SR61 SR61 SR61 Inear Templates Vibrary Active Template 	4 3 2 1 0 LT_PVT_EOP_OUT -1 LT_PVT_BASE_BOT_OUT -2 -3 4 -5 Dynamic Settings ■ 0 2 0 2 4 -5 Dynamic Settings ■ 0 2 0 2 4 Apply Affixes should be selected if component points do not have side prefixes applied yet. N= 0 x y x x x x x x x x x x x x x x x x x	Test
	Set Dynamic Origin	REFLECT

Merging Points

Merges overlapping points into a single point. This command is available only if there is more than one point under the cursor. You are prompted to select the point to be deleted. Reset to exit the command.

Points will be merged automatically if a new component is attached directly to an existing component.

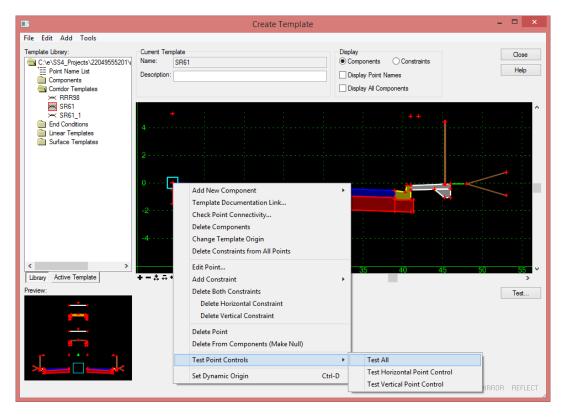


Note If the point remains green, you deleted the wrong one.

Testing Components

To test simple components, right-click on the points and select "Move Point" to see how the point constraints will react when points start dynamically moving.

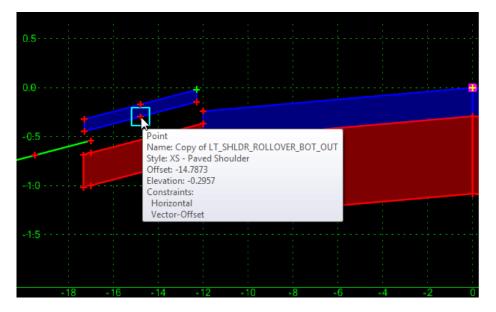
You can test constraints in components by moving points to see results.



Inserting Components

To insert a component between other components in a template you will need to Unmerge the components.

- Right-click on the component and select Unmerge Component points.
- Points in the component will be renamed, inserting "Copy of" before the name. This breaks other components constraints to the points allowing you to move the component.
- You can then insert the new component and rename the points of the unmerged components before attaching it to the inserted component(s).
- Previous constraints and attachments will have to be recreated and points should be merged after moving components into place.



EXERCISES

OPTIONAL: To prepare your computer for the next set of exercises:

- *a)* Delete the C:\WorkSets\FDOT\22049555201_CE\ folder.
- b) Open the ComprehensiveTemplateDesign folder on the desktop and expand the DataSets folder.
- *c)* Extract the *CT22049555201_CE_Chapter2.zip* file in the C:\WorkSets\FDOT\ folder.

Exercise 2.1 Creating a Static Template

In this exercise students will create the backbone of a resurfacing template with widening and new shoulders.

- **Note** Steps 1-7 (loading Create Template preferences) are only needed if MicroStation was closed and restarted.
- 1. Open the MODLRD01.dgn*MODLRD_TemplateDesign01.dgn* file from the current worksetC:\WorkSets\FDOT\22049555201_CE\Roadway\
- 2. Use the **F12** key to launch the Create Template dialog.

If the ITL is named properly the Project ITL file should already be loaded.

📧 Create Template		
File Edit Add Tools		
Template Library: C:\Worksets\FDOT\22049555201_CE\Roadway\22049555201_CE.itl	Current Templat Name:	e SR61 R1
	Description:	Is Tunnel Temple

Note The FDOTConnectXX.XX workspace provides some predefined preferences that are useful when working with templates. These preferences should be loaded for each new MicroStation session.

- 3. Select **Tools > Options** from the menu.
- 4. On the Template Options dialog press the **Preferences** button.

Template Options				X
Naming Options Component Seed				OK Cancel
Specify:				Preferences
Point Seed Name:			•	Help
Apply Affixes	Prefix	Suffix		
Left:				
Right:				
Step Options				
X: 0.100000	Y: 0.10	00000	Slope	e: 0.00%

5. On the Preferences dialog, select **FDOT** from the list and press **Load**.

Note You can also double-click FDOT to load the preferences.

Preferences							
Name:	Close						
Default FDOT	Load						
	Save						
	Save As						
	Delete						
	Rename						
	Help						
Preference 'FDOT' loaded							

6. Press the **Close** button to return to the Template Options dialog.

Notice that Left and Right Prefixes have been defined and the Step Options have been set to a tenth. The step options allow the components being dragged into the active template to snap onto the grid at one tenth of a foot intervals.

Template Options		×
Naming Options Component Seed N		OK Cancel
Specify:		Preferences
Point Seed Name:		Help
Apply Affixes	D-0-000	
Left:	Prefix Suffix LT_	
Right:	RT_	
Step Options		
X: 0.100000	Y: 0.100000 Slop	e: 0.00%

- 7. Press **OK** to close the **Template Options** dialog.
- 8. Back on the Create Template dialog, double-click on the root folder to expand it and view the contents.

9. Right-click on the Corridor Templates folder and select New > Template from the context menu.

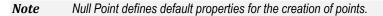
Cre	eate Template	2			
File E	dit Add 1	Tools			
C:	_		_CE\Roadway	\22049555201_CE.itl	Current Terr Name:
	Point Name Components Comidor Tem	i			Description [;]
	📄 Example	New	>	Folder	
	≻ DropCu ≻ RRR98	Cut	Ctrl-X	Template	
	🖂 SR61 ir	Сору	Ctrl-C		
	ir → SR61 ir → SR61 ir	Paste	Ctrl-V		- T.
	→ SR61 L → SR61 L	Delete	Del		<u> </u>
	C SHOTL	and the second	Pl	and the second second	- and

10. When prompted, enter the new template *name*: US98.

M Create Template	*
File Edit Add Tools	
Template Library:	Current Template
C:\Worksets\FDOT\22049555201_CE\Roadway\22049555201_CE.itl	Name: US98
E Point Name List	Description:
Components	
Corridor Templates	ls
Examples not in training guide	
→ DropCurb_Driveway	
📉 US98	
RR98 cross slope correction L control	

- 11. Select **Tools > Dynamic Settings** from the menu.
- 12. On the Dynamic Settings dialog, key-in CL in the *Point Name* field and select **TemplateMisc_pm** from the *Point Style* drop down.

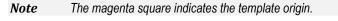
Dynamic Settings							
X:	-1.200000	Step:	0.100000				
Y:	-0.800000	Step:	0.100000				
Point N	ame: (CL	-				
Point S	Point Style: TemplateMisc_pr 🔻						
📝 Арр	Apply Affixes						
hs=							
Set Dynamic Origin							

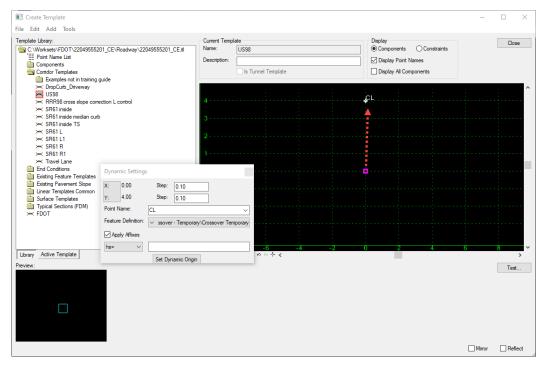


13. Right-click in the working area and select **Add New Component > Null Point** from the *context* menu.

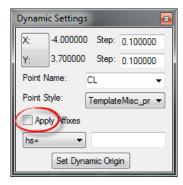
Create Template					-	
File Edit Add Tools						
Template Library:	Current Temp	plate	Displa	y		Close
Image: State of the	E.itl Name: Description:	US98	Dis	mponents O Constraints splay Point Names splay All Components		0030
DropCutb_Driveway Single Trade Single S	4 3 2	+ mpony → C + <	Add New Compo Set Dynamic Orig -2 0		Simple Constrained Unconstrained Null Point End Condition Overlay/Stripping Circle G	8 Test
					Mirror	Reflect

14. Place the point above the magenta square at approximately 0' horizontal and 4' vertically.





15. On the Dynamic Settings dialog, Uncheck the *Apply Affixes* check box so the prefixes will not be applied to point names and components when the next component is placed.



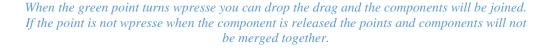
16. Navigate to the Components\Pavement\Resurfacing\Overlay folder and select the Pvt Overlay Left *component*.

Create Template	01.4	0.04(0.0.0)	
File Edit Add Tools			
Template Library:	Current Template	Display	Close
Point Name List	Name: US98	Components Constraints	Help
NULL	Description:	Display Point Names	Theip
Pavement		Display All Components	
Base Extension			
Friction Course Layer			· ·
Miscellaneous Pavement			
Resurfacing (Milling, Overbuild a	4.0	jol i i i i i i i i i i i i i i i i i i i	
Milling	4.0		
Overbuild			
Cverlay	3.5		
Ref Pvt Overlay Left			
Pvt Overlay Right	3.0		
Widening	Dynamic Settings		
Contract → Contrac	2.5 X: -4.000000 Step: 0.100000		
→ Travel Lane Left → Common Ditch Left	0.100000		
Curb Type F	2.0··· Y: 3.700000 Step: 0.100000		
Shoulder Pavement Left	Point Name: CL -		
→ Shoulder Pavement Right	1.5.		
🖂 Utility Strip Left	Point Style: Template Misc_pr		
Corridor Templates	1.0 Apply Affixes		
US98	Apply Antxes		
End Conditions	0.5 · · hs= •		
Linear Templates	Set Dynamic Origin		1.
	Set Dynamic Origin		
	-40 -30 -20 -10	0 10 20 30 40	50 (🔻
Library Active Template	╪╼╬╬╬╗╗╔╬╡		+
Preview:			Test
-			
			MIRROR REFLECT
			A

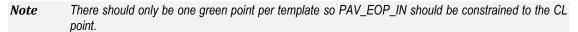
17. Drag the Pvt Overlay Left component into the working area and place it just below the CL point.



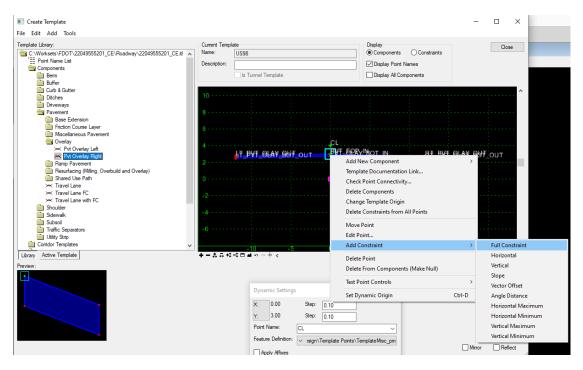
18. Next select the **Pvt Overlay Right** *component* and snap it onto the green point of the component placed in the previous step.







19. Right-click on the **PVT_EOP_IN** *point* and select **Add Constraint** > **Full** from the *context* menu and then select on the **CL** *point* to define the point to constrain it to.



20. When prompted enter a Horizontal Offset of zero and a Vertical Offset of -1 then press OK.

Add Full Constraint	×
Horizontal Offset: 0.000000	ОК
Vertical Offset: -1.000000	Cancel
-1.00000	Пер

- 21. Navigate to the Components\Pavement\Resurfacing (Milling, Overbuild and Overlay) Milling folder and select the **Pvt Milling Left** component.
- 22. Drag and drop the **Pvt Milling Left** *component* onto the bottom of the *left overlay component*.

				сL					
					OP_IN				
 LT_PV				PVT_0	DLAY_B	OT_IN		RT_PV	
 LT PV	<u>BOT</u>	001		\				RT_PV	I_O
				.					
				a <mark>.</mark>					

23. Drag and drop the **Pvt Milling Right** component onto the bottom of the right overlay component.

Exercise 2.2 Configure Template to Match Existing Pavement Slopes

To configure this template match the existing pavement slopes the points on the top of the overlay components will need to be modified to target the surface.

1. Double-click on the point named PVT_EOP_IN to open its properties dialog.

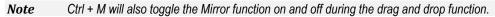
Point Properties	;				×
Name:	[PVT_EOP_IN V + Apply			
Use Feature N	PVT_EOP_IN			Close	
Feature Definition:	: [✓ plate Poin	ts\Pave	mentAsphalt_pm	< Previous
Superelevation	n Flag				
Alternate Surface:	: [~	Next >
	Constrain Horizontal	RT_Pvi	of: PvtOve Overlay		nt 2
	-	~	#	Horizontal Vertical Slope	<u>*</u>
	0.00		=	Vector-Offset Project To Surface	
Label:		~		Project To Desig	
Horizontal Fe	ature Constraint	Crossov	ver - Tei	Honzontar Minimu Vertical Maximum	
	Range:	0.00		Vertical Minimum	

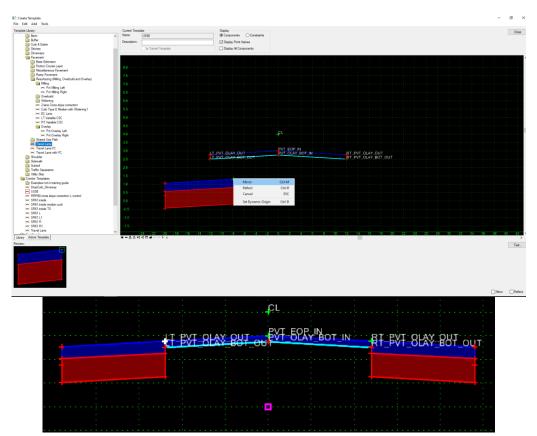
- 2. Change *Constraint 2 Type* to **Project to Surface**
- 3. Press Apply and then Close to return to the Create Template dialog.

Dynami	c Settings	-		x			
X:	-3.800000	Step:	0.100000]			
Y:	0.800000	Step:	0.100000]			
Point N	Point Name: CL 🗸						
Point S	ityle:	[emplate	eMisc_pr 🔻				
App	Apply offixes						
hs= 🔻							
Set Dynamic Origin							

- 4. Repeat *steps 1-3* for LT_PVT_OLAY_OUT and RT_PVT_OLAY_OUT.
- 5. On the Dynamic Settings dialog, Check the *Apply Affixes* box again to turn the point name prefixes back on.
- 6. Navigate to the Components\Pavement\Milling folder and select the Travel Lane Left component.

7. Drag and drop the **Travel Lane Left** *component* onto the top left point of the overlay. Right-click while dragging and select **Mirror** to attach the component to both sides at the same time.





Exercise 2.3 Configure Widening to Match Existing Pavement Slopes

To make the widening follow the same slope as the existing pavement a Vector-Offset constraint must be applied.

- 1. Double-click on the LT_PVT_EOP_OUT *point* to edit its properties.
- 2. Change the *Constraint 2 Type* to a Vector-Offset

Parent 1 : PVT_EOP_IN

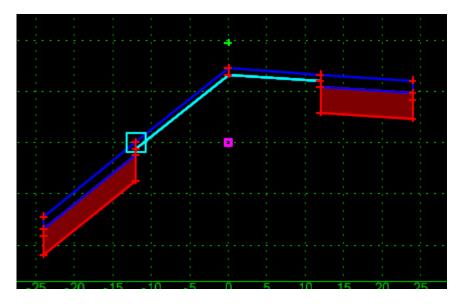
Parent 2 : LT_PVT_OLAY_OUT

💽 Create Template						- a ×
File Edit Add Tools Terestels Libory: C. Winkowsky VDOT 22049555201_CE /Readway 32049555201_CE // File Twen Tome Ear Date:	Current Template Name: US98 Description: the Tunnel Template	Daplay Components Constraints Display Point Names Display Al Components				Close
Chries Verwenge Verwenge Solvador Solvador Solvador Utily Spa	80 75 70 65					
Example not in training guide Conjuct_Dreverse US38 WRRIB coss size correction L control www.SR81 marke Paint Properties Name: LT_PVT_EOP_OUT +	60 55 50 ×					
Hamilton Control Cont	Any Cree < Pressa Net 2 PVT, EOP, GUF V PVT, EOP, GUF V PVT, BOT, OUT U, PVT, BASE, BOT, OUT U, PVT, BASE, BOT, OUT	LT ENT QUAY OUT T ENT DUAY BOT OUT T ENT BOT CNTR LT ENT BASE BOT CNTR		AT PAY GLADION OUT AT PAY OLAY BOT OUT AT PAY BOT CATR AT PAY BASE BOT CATR	RT_PVT_ECP_OUT TT_PVT_BCD_OUT RT_CURB_BASE_TP_OUT RT_PVT_BASE_BOT_OUT	
Contraints Contraint 1 Contraint 1 Type: Hexenal ✓ Veloci Other Peret 1: T_PVT_DUAr OUT ~ ± PVT_DOU'N Value: 12.00 = 0.00 Used: TOP VMPOULI ✓ ■	2 2 2 4 4 4 4 - -					
Hotorta Falak Contact V Jones Parenet Age	set COA	4 - 12 - 10 of -4 -4 -2	02468	10 12 14 16 18 20 27	<u>34 26 28 30 32 34</u>	36 38 40 42 ~
						Manar Reflect

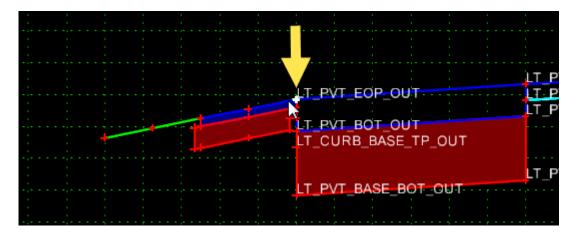
- 3. Press **Apply** and **Close** to return to the **Create Template** dialog.
- 4. Repeat **steps 1-3** for the widening on the right side of the template.
- 5. To test the new constraints right-click on the top inside *widening point* and select **Test Point Controls** > **Test Vertical Point Control** from the *context* menu.

plate Library	Ourrent Terring	state	Declay				0
C.\Worksets\FDOT\22049555201 CE\Roadway\22049555201 CE.tl	Name:	US10	Components Constraints				G
22 Point Name List	Description:		Display Point Names				
Components	100000000						
Bern		is Turnel Template	Display All Components				
Carb & Gutter							
Diches							
Drugoster							
(iii) Payment	6.5						
Shoulder							
G Sdewak	6.0						
Subsol							
Traffic Separators	5.5						
Condor Templates							
Examples not in training guide	5.0						
DrocCub Driveway							
US98	4.5						
RRR98 cross slope correction L control							
🖂 SR61 inside	40			CL			
🖂 SR61 inside median curb							
> SR61 inside TS	35						
🖂 SR61L	3.5						
🖂 SR61 L1	30			Pu	T_EOP_IN		
🖂 SR61 R	3.0		LT PUT OLAY OUT		T OLAY BOT IN	RT PVT OLAY OUT	
🖂 \$R61 R1		AT PVT EOP OUT	Add New Component	2		RT PVT OLAY BOT OUT	BT PVT EOP OUT
Travel Lane	25		Template Documentation Link			RT PVT BOT CNTR	
End Conditions Existing Feature Templates		T PVT BOT OUT					BT PVT BOT OUT
Existing Pearure Templates	20	LT CURB BASE TP OUT	Check Point Connectivity				RT_CURB_BASE_TP_OUT
Linear Templates Common		Contraction of the	Delete Components				11_CON0_0000_00_00
Surface Templates	1.5		Change Template Origin			RT PVT BASE BOT CNTR	
Typical Sections (FDM)		LT PVT BASE BOT OUT	Delete Constraints from All Points			RT_PVT_BASE_BOT_CNTR	RT_PVT_BASE_BOT_OUT
- FOOT	1.0	LI PVI BASE BOT COT					HT PVT BASE BOT OUT
			Edit Point				
	0.5		Add Constraint				
			Delete Both Constraints				
	0.0						
			Delete Project To Surface Constraint				
	0.5		Defete Point				
	-10		Delete From Components (Make Null)				
	10		Test Point Controls	1	Test All		
	1.5				Test Horizontal Point Control		
	1.0		Set Dynamic Origin	Ctri-D		10 10 10 10 10	
ay Active Template					Test Vertical Point Control	12 14 10 18 20	11 14 25 25 30

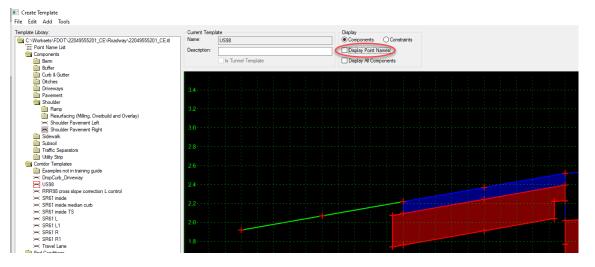
6. Move the inside point up and down. This should cause the outside point to move as well to maintain the same slope as the resurfacing.



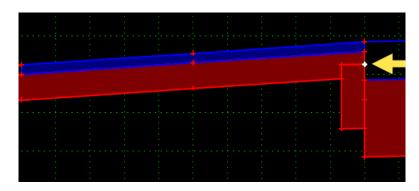
- 7. Right-click to get out of the testing mode.
- 8. From the Components\Shoulder folder drag and drop the Shoulder Pavement Left *component* attaching it to the top left point on the widening component. Toggle Off the *Mirror* option using Ctrl + **F** while dragging.

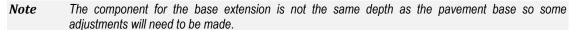


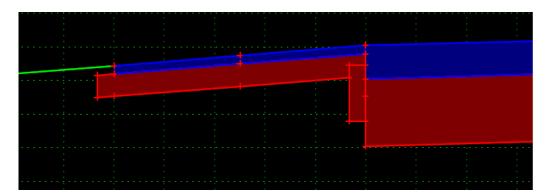
- 9. From the Components\Shoulder folder drag and drop the Shoulder Pavement Right component attaching it to the top right point on the widening component.
- 10. Uncheck **Display Point Names** to make the template more visible.



11. Navigate to the Components\Pavement\Base Extension folder and select the Pavement Base Extension Inside Right



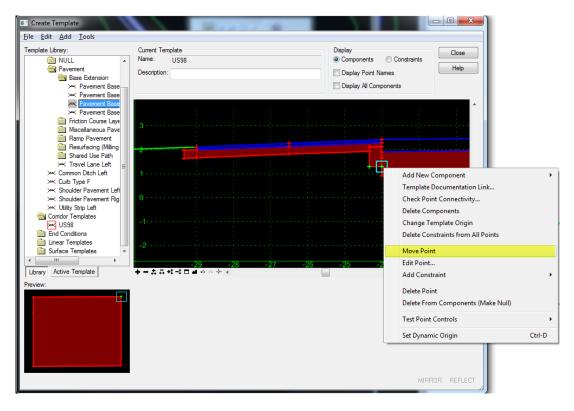




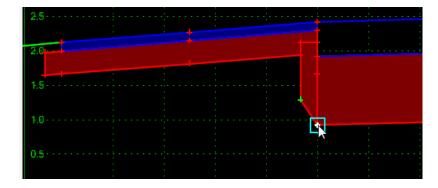
12. Right-click on the bottom inside point of the **base extension** *component* and select **Delete Both Constraints** from the *context* menu.

Create Template		100					
<u>File Edit Add T</u> ools							
Template Library:	Current Ten	plate			Display	Close	
NULL 🔺	Name:	US98			Components O Constraints		
Pavement	Description				Display Point Names	Help	
Base Extension							
→ Pavement Base → Pavement Base					Display All Components		
Revement Base							
Pavement Base						<u> </u>	
Friction Course Lave							
Miscellaneous Pave							
Ramp Pavement	4 · · · ·						
Resurfacing (Milling)							
🚞 Shared Use Path							
→ Travel Lane Left → Common Ditch Left	2						
Curb Type F						Add New Component	•
Shoulder Pavement Left	0					Template Documentation Link	
🖂 Shoulder Pavement Rig	0				1		
🛏 Utility Strip Left					1	Check Point Connectivity	
Corridor Templates	. <u>.</u>					Delete Components	
US98						Change Template Origin	
End Conditions						Delete Constraints from All Points	
Surface Templates	-4					belete constraints normality office	
						Edit Point	
Library Active Template	+ - +	- <u>30</u> ≹-‡⊟≰⊌∽⇔∲-	29 -2 8	-27	-26 -25 -2	Add Constraint	
Preview:	T = ↔ ↔	••••				Delete Both Constraints	
						Delete Horizontal Constraint	
						Delete Vertical Constraint	
						Delete Point	
						Delete From Components (Make Nul	I)
						Test Point Controls	+
						Set Dynamic Origin	Ctrl-D
					MI	RROR REFLECT	

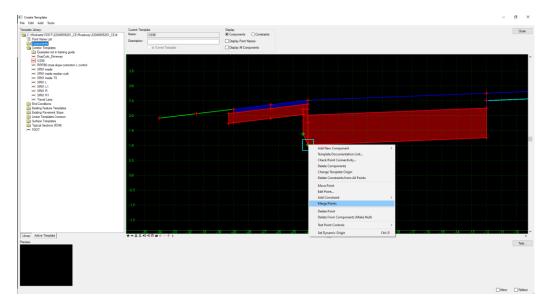
- 13. Right-click on the bottom outside point side point of the **base extension** *component* and select **Delete Both Constraints** from the *context* menu.
- 14. Right-click on the bottom inside point of the **base extension** *component* and select **Move Points** from the *context* menu.



15. Snap the **point** onto the bottom.

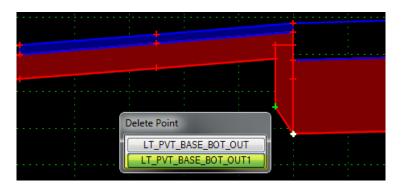


16. Right click on the **point** that was just moved and select **Merge Points** from the *context* menu.



17. When prompted, select LT_PVT_BASE_BOT_OUT1. This will delete one of the points sharing the same location combining that part of the components.

Note If the remaining point is green then you deleted the wrong one.



18. Double-click on the bottom outside point of the base extension component to edit its properties.

19. Edit the *points properties* as shown below:

	Constraint 1	Constraint 2		
Туре	Horizontal	Туре	Vector-Offset	
Parent 1	LT_PVT_BASE_EXTN_TOP_OUT	Parent 1	LT PVT BASE BOT CNTR	
Value	0.0		LT PVT BASE BOT OUT	
		Value	0.0	

Point Properties				 X
Name:	LT_PVT_BA	N_BOT_ ▼ _ +	Apply	
Use Feature Name Ov	veride: LT_PVT_BA	SE_EXT	N_BOT_OUT	Close
Feature Definition:	Bottom_pm		•	< Previous
Superelevation Flag				
Alternate Surface:	STABILIZA	TION	•	Next >
	Memb	er of:		Help
	LT_P	vtBaseEx	tOut	
Constraints	nstraint 1		Constra	int 2
Type: Horizont	al 🔻		Vector-Offset	•
Parent 1: LT_PVT	_BASE_EXTN_1 -	- + -	LT_PVT_BASE_E	30T_CN ▼ +
Parent 2:			LT_PVT_BASE_E	30T_0I ▼ +
Value: 0.00000	0	=	0.000000	=
Label: EOP_Ba	seExtWidthOutLt 👻			-
Horizontal Feature C	ionstraint: Range: 0.000000)		

- **Note** The Vector-Offset constraint will force the bottom of the base extension to maintain the same slope as the base even if the slope changes for superelevation.
- 20. Repeate steps 11-19 on the right side of the template to apply a base extension.
- 21. Once both sides are complete **Save** the template by selecting **File > Save** from the menu on the **Create** Template dialog and then **Close** the **Create** Template dialog.

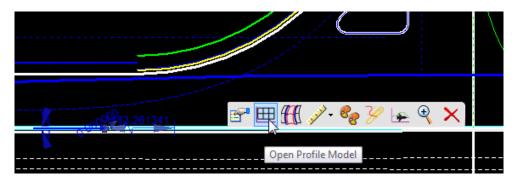
Exercise 2.4 Creating a Corridor

In this exercise students will create a corridor using the newly constructed template. To create a corridor you will need an alignment, a profile, and a surface. MODLRD01.dgnMODLRD_TEMPLATEDESIGN01.DGN contains the elements necessary but the active surface and profile must be defined.

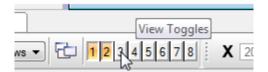
1. Begin by selecting the **green terrain boundary** *element* and then placing the cursor over the boundary to get the *context* menu. Select the second icon, **Set as Active Terrain Model**.



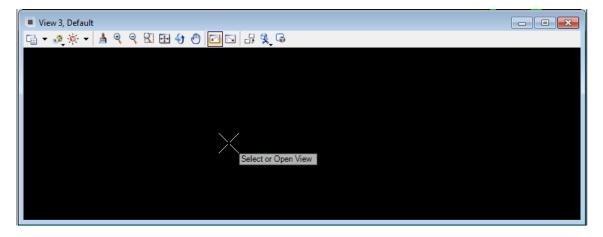
2. Open a *profile view* for the baseline of US 98 by selecting the **baseline** and then placing the cursor over the baseline to get the *context* menu. Select the second icon, **Open Profile Model**.



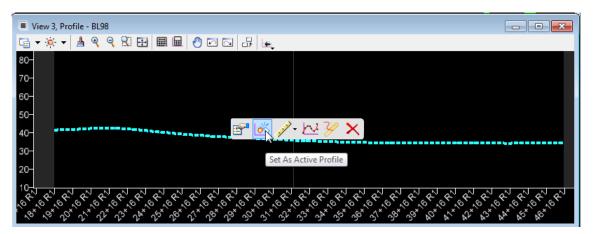
3. When prompted on the cursor to *select* or *open* a view, select **View 3** from the *View Toggles* toolbar.



4. Then select **View 3** to display the existing profile.



5. Select the **existing profile** and then hover the cursor over the profile to get the *context* menu. Select the second icon, **Set as Active Profile**.



Note With the active profile and active terrain model defined a corridor can be easily created.

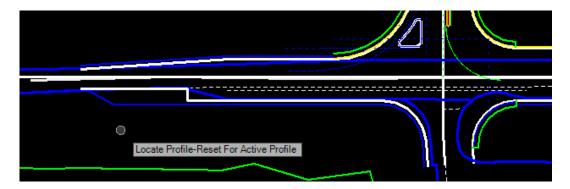
6. From the Ribbon and the Create Group select the New Corridor tool **OPENROADS MODELING>CORRIDORS>CREATE>New Corridor > Create Corridor**.

💋 Ор	enRoads Modeling	- 🛛 - 🖻 🛃	là 🛧 = 🔶 📌	- 🗎 =		C:\Work	sets\FDOT\2204	9555201_CE\roadv	vay\MODLRD_TemplateDesign01.dgn	[2D - V8 DGN] -
File	Home Terrain	Geometry Site	Corridors	Model Detailing	Drawing Production	Drawing Utilities	Collaborate	View Help	FDOT	
°€ ∎ • 0:	Element		Copy Templat (Import IRD	e Drop 🙀 Template	Edit Template Drop	Define Target Aliasing Me Corridor References Mg Corridor Clipping *		Calculate	Dynamic Sections * 3D Drive Corridor Through Reports *	
Primary	Selection		Create		Edit	Miscellaneous	Su	uperelevation	Review	
@ ⁹ N	o Feature Definition		v 🥰	• 🛧 🖊 🗸	J # 1 1 1	~	~			

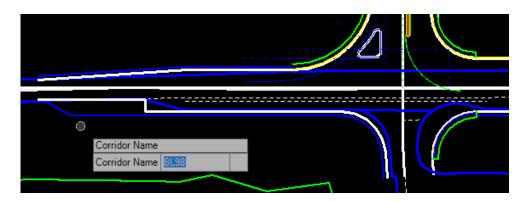
7. When prompted, select the **base line** of US 98.

	Jo	
Locate Corridor Baseline		
Complex Element: BL98 Feature: Baseline(BL) Active Profile Exists Level: BaselineSurvey		

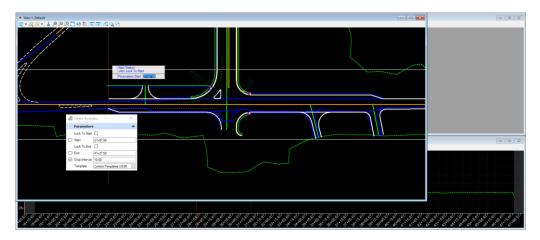
8. Next you will be prompted for a *profile*. Reset (right-click) to use the active profile for the baseline.



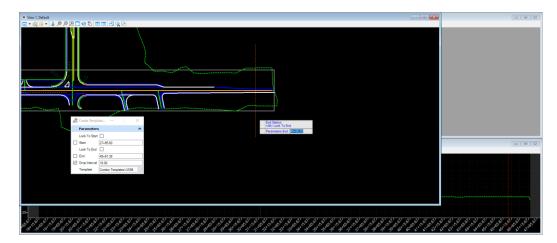
9. Next you will be prompted to *name* the corridor. Just Data Point (left-click) to accept the *default name* which matches the alignment name.



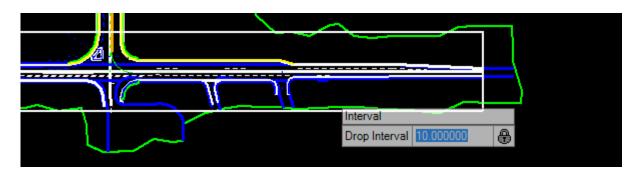
10. Next you will be prompted for the *Start Station* for the corridor. Make sure "Lock to Start" is NOT selected on the Create Template Drop dialog and then snap to the beginning of one of the *proposed edge of pavement* lines and Data Point.



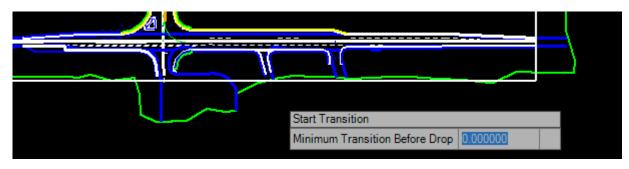
11. Next you will be prompted for the *End Station*. Make sure **Lock to End** is **NOT** selected on the **Create Template Drop** dialog and then snap to the end of one of the *proposed edge of pavement* lines and **Data Point**.



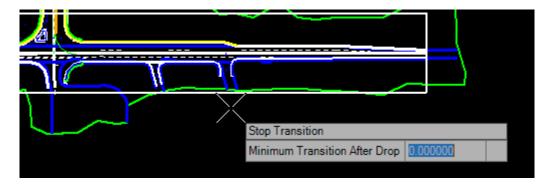
12. When prompted for the *drop interval* key-in **10**, press **Enter** to lock the value, and then **Data Point** to accept.



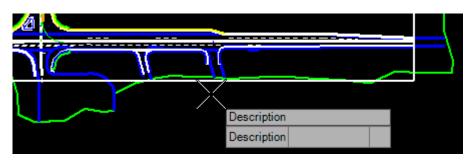
13. Accept the default value of **Zero** for *Minimum Transition Before Drop* by using the **Data Point** to accept.



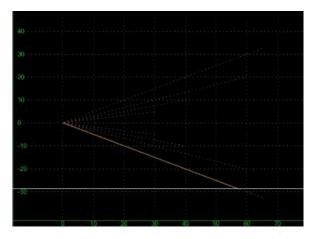
14. Accept the default value of Zero for Minimum Transition After Drop by using the Data Point to accept.



15. Enter an optional *description* or leave it blank and **Data Point** to accept completing the corridor creation process.



3 ADDING END CONDITIONS



END CONDITION PROPERTIES

End Conditions are different than simple, constrained, unconstrained, null point, and overlay/stripping components because they have the ability to target a surface or element with specific Features. End Condition Properties specify properties only visible for End Condition components.

		Compone	nt Properties	
	Name:	RWP_2:1Cut	+	Apply
	Use Name Override:	CUT		Close
	Description:			< Previous
	Feature Definition:	Slopes	~	Next >
	Parent Component:		v +	
	Display Rules:			Edit Help
	Exclude From Top/Bo	ottom Mesh		
	End Condition Propertie			-
	Target Type: Terrain M	lodel N	Priority:	35
	Terrain Model:	✓ <active></active>	Benching Count:	0
rain Model	1		No Datum	
vation ear Horizontal	Horizonta	al Vertical		
ear Vertical ear Both	Offsets: 0.000000	0.000000	Rounding Length	0.000000
ture Definition Horizontal ture Definition Vertical ture Definition Both				

- Target Type specifies the type of target the End Condition is seeking. Targets include:
 - *Surface* Seeks a surface
 - o *Elevation* Seeks a particular elevation
 - Feature XY Seeks the horizontal location of a feature of a particular surface.
 - Feature Elevation Seeks the vertical location of a feature of a particular surface.
 - *Feature XYZ* Seeks the location of a feature of a particular surface. Overrides the slope constraint of the End Condition segment to seek the feature.
 - *Alignment XY* Seeks the horizontal location of a particular alignment.
 - *Alignment Elevation* Seeks the vertical location of a particular vertical alignment or, in the absence of a vertical alignment, uses horizontal geometry elevation.
 - *Alignment XYZ* Seeks the location of a particular alignment. Overrides the slope constraint of the End Condition segment to seek the feature.

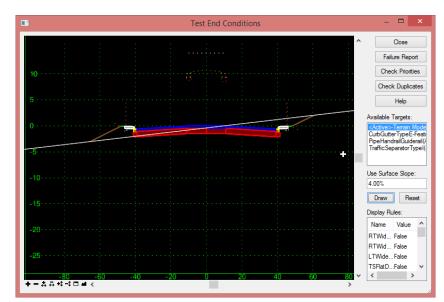
• **Surface/Feature/Alignment** - specifies the surface associated with the target type. Depending on the target type, Surface, Alignment, or Surface and Feature options are available that allow you to set the target information. If the target type is Elevation, then no field is displayed here.

Note If the target type is Surface or one of the Feature target types, and you do not specify a surface name; then, the surface during the Roadway Designer session will be the active surface. See the Roadway Designer command for more information on Target Aliases.

- **Priority** specifies the order in which End Conditions are attempted in seeking a solution. Where more than one End Condition starts at the same point, this value determines the order in which End Conditions are attempted to find a solution. Lower numbers are attempted first.
- **Benching Checkbox** indicates, when On, the set of segments of the End Condition are repeated until a solution is found.
- **Benching Count** indicates the maximum number of times that benching should occur. If this value is 0, then the repeat count is unlimited, and the benching End Condition must find its target for it to be valid. If any other number is entered, then if the benching is repeated for the specified count and if the target is not reached, the benching End Condition will still be considered successful if an End Condition attached to the end of the benching End Condition is successful.
- **From Datum** indicates, when On, the benching will use a Datum Elevation and Step Elevation to set the benching rather than using the End Condition segments as they are defined.
- **Datum Elevation** specifies the elevation that represents the basis for the Step Elevation. Datum + Current Bench Elevation = n * Step Elevation.
- **Step Elevation** specifies the increment for benching when a datum is being used. Each bench elevation is always located at the end of the first segment (or the second point) of the benching End Condition.
- **Horizontal Offset** specifies a horizontal offset from the target. This option only applies if the target is a horizontal target or has a horizontal aspect.
- Vertical Offset specifies a vertical offset from the target. Applies only if the target is a vertical target or has a vertical aspect. For an elevation target, specify the elevation here.
- **Rounding Length** specifies the length used to round the End Condition. When this value is something other than 0.0, 4 additional points are added to the end of the End Condition using a parabolic formula to smooth out the transition of the intersection of the End Condition with the surface. This rounding effect is only applied when the target is a surface or an elevation. Any other End Conditions attached to the end of this one is attached to the end of the rounded section.

TESTING END CONDITIONS

End Conditions solutions and overly/stripping components can be tested to see how they react to the surface or other features and tests component display rule true or false flags from the **Test End Conditions** dialog.



- <View Window> displays the current template. Non-solved end conditions, and their child components, are displayed in dashed lines. Normal components and solved end conditions are displayed as solid lines. The display has all the standard windowing commands and scrollbars.
- **Close** dismisses the dialog.
- **Failure Report** activates the Results dialog. When you fail to get a solution on one or both sides, the results show which components failed and which end condition start points were not solved.
- **Check Priorities** tests the template for priority conflicts. When conflicts exist, a message is displayed indicating there are end conditions that start from the same points and have the same priorities. The <u>End</u> <u>Condition Priority Conflicts</u> dialog is displayed. If no conflicts exist, a message box indicating no conflicts is displayed.
- **Check Duplicates** checks for duplicate feature and component names for the given solution. If duplicate feature or component names are found, the Duplicate Feature Name List dialog is displayed. If no duplicates are found, a message to this effect is displayed.
- Help displays help.
- Available Targets lists all of the targets applicable to the current template. You can select the desired target and draw it in the display.
- Use Surface Slope specifies the slope of the surface that is being placed. This is useful in certain instances where an end condition intersects a surface more than once, such as a ditch profile.
- **Draw** draws the selected target. Surfaces and elevations are drawn as horizontal lines. Features and alignments are drawn as + marks. As you draw a target, the display dynamically updates to show the solution(s).
- **Reset** clears all the drawn targets.
- **Display Rules** list the display rules for the current template. Left-click over a value to toggle between True and False. Press the Reset button to restore the original Display Rules values.

EXERCISES

OPTIONAL: To prepare your computer for the next set of exercises:

- *a)* Delete the C:\WorkSets\FDOT\22049555201_CE\ folder.
- b) Open the ComprehensiveTemplateDesign folder on the desktop and expand the DataSets folder.
- c) Extract the CT22049555201_CE_Chapter3.zip file in the C:\WorkSets\FDOT\ folder.

Exercise 3.1 Add End Conditions

In this exercise End Condition components will be added to the template so cut and fill lines will tie the proposed template to the existing ground.

- *Note* Steps 1-7 (loading Create Template preferences) are only needed if MicroStation was closed and restarted.
- 1. Open the MODLRD_TemplateDesign01.dgn*MODLRD_TemplateDesign01.dgn* file from the current workset.
- 2. Use the **F12** key to launch the **Create Template** dialog. If the ITL is named properly the Project ITL file should already be loaded.

📧 Create Template		<u> </u>
File Edit Add Tools		
Template Library: C:\Worksets\FDOT\22049555201_CE\Roadway\22049555201_CE.itl	Current Temp Name: Description:	sR61 R1
hand and a second and and		Is Tunnel Temple

Note The FDOT workspace provides some predefined preferences that are useful when working with templates. These preferences should be loaded for each new MicroStation session.

- 3. Select **Tools > Options** from the menu.
- 4. On the Template Options dialog press the Preferences button.

Template Options			X
Naming Options Component Seed			ОК
From Feature	e Definition		Cancel
Specify:			Preferences
Point Seed Name:		•	Help
Apply Affixes	Prefix \$	Suffix	
Left:			
Right:			
Step Options			
X: 0.100000	Y: 0.10000)) Slope	e: 0.00%

5. On the Preferences dialog, select FDOT from the list and press Load.

Note You can also double-click FDOT to load the preferences.

Preferences	×
Name:	Close
Default FDOT	Load
	Save
	Save As
	Delete
	Rename
	Help
Preference 'FDOT' loaded	

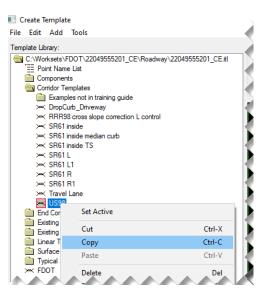
- 6. Press the **Close** button to return to the **Template Options** dialog.
- **Note** Notice that Left and Right Prefixes have been defined and the Step Options have been set to a tenth. The step options allow the components being dragged into the active template to snap onto the grid at one tenth of a foot intervals.

Template Options		×
Naming Options Component Seed N		OK Cancel
Specify:		Preferences
Point Seed Name:		Help
Apply Affixes	Prefix Suffix	
Left:	LT_	
Right:	RT_	
Step Options		
X: 0.100000	Y: 0.100000 Slope	0.00%

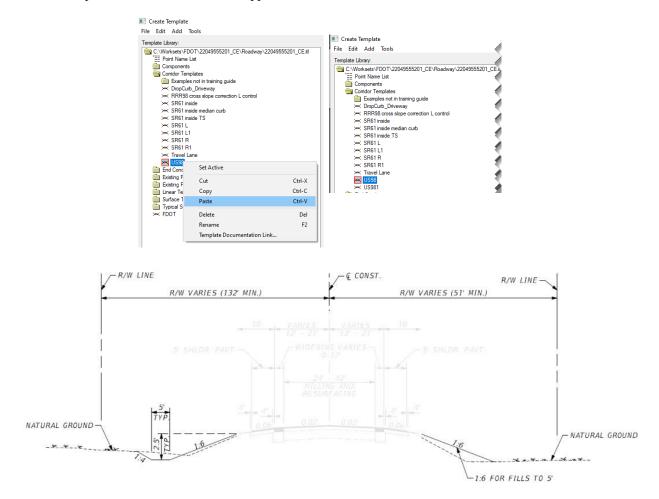
7. Press **OK** to close the **Template Options** dialog.

Note Before making major edits, it is recommended to make a copy in case you want to go back to a previous state.

- 8. From the Create Template dialog, navigate to the Corridor Templates folder and double-click on the US98 *template* to make it active.
- 9. Right-click on the **US98** *template* and select **Copy** from the *context* menu.



10. Right-click on the Corridor Templates folder and select **Paste** from the *context* menu. A copy of the template will be made with a "1" appended to the name.



- Image: Section Components
 Image: Section Components

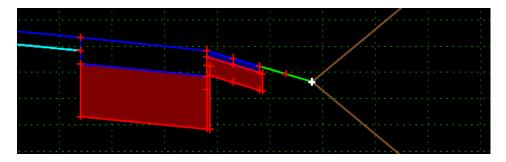
 Image: Constructions
 Image: Constructions

 Ima
- 11. Toggle **On** the Dynamic Settings dialog box using the icon in the *view controls*.

- 12. Uncheck the **Display Point Names** box.
- 13. Navigate to the **End Conditions** > **Parts** folder, then drag and drop the **6:1 FILL TO 5**' *component* on the unpaved shoulder on the right side of the template.

				1	
				;	·····
Componen	t Properties				×
Name:	P	T_1:6 FILL	+		Apply
🗹 Use Nam	e Override: 🖪	T_FILL			Close
Description:					< Previous
Feature Defir	nition:	+	Mesh\XS\Slopes		
Display Rule	s:			Edit	Next >
	onent:		~	+	
Parent Comp	From Top /Botto	om Mesh			
Exclude F	Tom Top/ Bollo				
Exclude F	ion Properties				
Exclude f End Condit Target Type	ion Properties ^{e:} Terrain Mod	el 🔹	Priority:	1	
End Condit Target Type Terrain Mod	ion Properties ^{e:} Terrain Mod del:	<active></active>	Priority:		
End Condit Target Type Terrain Mod	ion Properties ^{e:} Terrain Mod	<active></active>	-		
End Condit Target Type Terrain Mod	ion Properties ^{e:} Terrain Mod del:	<active></active>	Benching Count		

14. Drag and drop the **6:1CUT** component on the same unpaved shoulder on the right side of the template.



15. Double-click on the **right fill line** just placed to review the *Component Properties*.

Name:	Begins with RT_
Name Override:	Begins with RT_
Target Type:	Terrain Model
Terrain Model:	<active></active>
Priority:	1

- 16. Press **Clos**e to return to the **Create Template** dialog.
- 17. Double-click on the **right cut line** to review the *Component Properties*. Change the *Priority* to **2** and press **Apply**.

Component Properties				×
Name:	RT_1:6 CUT	+		Apply
Use Name Override:	RT_CUT			Close
Description:				< Previous
Feature Definition:	~	Mesh\XS\Slopes		Next >
Display Rules:			Edit	INEXT >
Parent Component:		~	¢ -	
Exclude From Top/Bot	tom Mesh		_	
End Condition Properties				
Target Type: Terrain Mo	odel 🗸 🗸	Priority:	2	
Terrain Model:	<active></active>	Benching Count:	0	
Fillet Tangent Length: 0.	.00	No Datum		
Offsets: 0.00	ntal Vertical	Rounding Length	0.00	

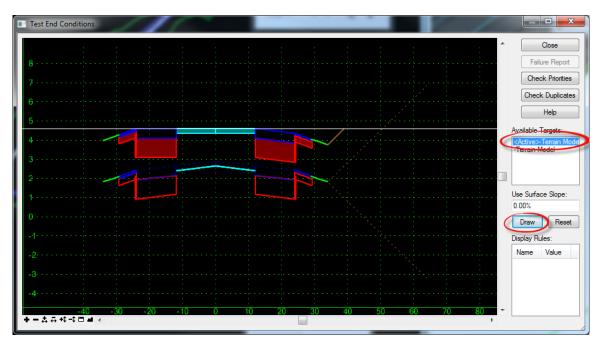
Name:	Begins with RT_
Name Override:	Begins with RT_
Target Type:	Terrain Model
Terrain Model:	<active></active>
Priority:	2

18. Press **Close** to return to the **Create Template** dialog.

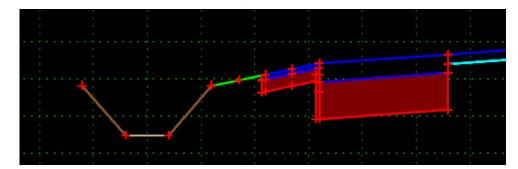
Exercise 3.2 Test End Conditions

The **Create Template** dialog provides a tool to test End Conditions before applying them to a corridor to make sure you get the expected results.

- 1. From the Create Template dialog click the Test button.
- 2. On the **Test End Conditions** dialog, select **<Active>-Terrain Model** from the *Available Targets* list and move the cursor above and below the template to see how the End Conditions react.



- 3. Press Close to return to the Create Template dialog.
- 4. Navigate to the **Components**\Ditches folder, then drag and drop the **Common Ditch Left** *component* on the left shoulder component.



- 5. Select **File > Save** from the **Create Template** dialog.
- 6. Press the Close button to return to MicroStation.

Exercise 3.3 Synchronized Template Changes in the Corridor

To see the changes in the model the changes to the template will need to be synchronized in the corridor.

1. From the Corridors Tab then the Miscellaneous Group select the Synchronize Template Tool. OPENROADS MODELING>CORRIDORS>MISCELLANEOUS>Synchronize Template

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© ∎ ▼ ® Primary	Element Selection	New Corridor Template Dro	Copy Template	2	🎽 🗅	₹ dits *	O Define	Target Aliasing or References or Clipping iscellaneous		ate Calculat	`ख ▪ ₂ ♥⁄ ₽	Dyna Sectic
	Feature Definition		✓ e ^g	• * A 8	· 🗾 🗤 🖄	5				ize Templat ize Template		

2. When prompted on the cursor to *Locate Template Drop*, select the **corridor boundary**.



3. The corridor will process and you can evaluate the changes to the model.

4 HORIZONTAL FEATURE CONSTRAINTS

HIERARCHY OF CONSTRAINTS

A points location can be overridden in various ways to produce variable results from a single template. From lowest priority to highest:

- **Point Constraints** Each point can have up to two constraints that define its location in relation to other points.
- **Horizontal Feature Constraint** Each point can have a single Horizontal Feature Constraint that will allow a point to override the location defined by the Point Constraints.
- **Parametric Constraints** Can be created to override Point Constraints within a defined station range. This will override Point Constraints and Horizontal Feature Constraints.
- **Point Controls** A point control can be applied to any point on a template and forces the point to follow a particular geometric element in the file. This will override Parametric Constraints, Point Constraints and Horizontal Feature Constraints.
- **Superelevation** A specialized point control that is created and applied using the superelevation tools. This will override all other constraints and controls.

HORIZONTAL FEATURE CONSTRAINT

Horizontal Feature Constraints provide the ability to override a points location when an element with the assigned Feature is found within the search Range, the maximum horizontal distance to search from the point's current location. The search distances in the Range field are based on the offset defined in the template, not where the parent point may be when applied to a corridor. Only elements that have been added to the corridor as "External References" are searched.

Note	Regarding search range, negative values will search left.	Positive values to the right.	A value of zero
	causes the search to find the closest instance of the Feat	ure.	

Point Proper	ties				×
Name:	[LT_PVT_OL	AY_OU	• •	Apply
Use Featur	e Name Override:			T avement Milling pm	Close
Supereleva	tion Flag			wementmining_pm	< Previous
Alternate Surfa	ice:			~	INEXI >
Constraints		Membe LT_LT LT_Pv	_PvtOv	erlay	
	Constrain	t 1		Constraint	2
Туре:	Horizontal	~		Project To Surface	• ~
Parent 1:	PVT_EOP_IN	~	+	Any Direction	~
Value:	-12.00		=		~
Label:	OLAY_PvtWidthL	t ~			~
Horizonta	Feature Constraint Range:	✓ le 2D -50.00	Lines\P	avement\Pavement	: Milling ML

> How to make a milling component follow a milling limits line is:

- 1. Draw the milling limit lines in the plan view using the Feature "Pavement Milling ML".
- 2. Create a template assigning the Feature "Pavement Milling ML" as a Horizontal Feature Constraint on the outside points of the overlay component.
- 3. Create a corridor using template
- 4. Add milling limit lines in the plan view as Corridor References using the "Add Corridor Reference" from the Corridors Tab from the Miscellaneous Group the Corridor References Tool selection.OPENROADS MODELING>CORRIDORS>MISCELLANEOUS>Corridor Reference>Add Corridor Reference

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	File	Home Terrai	in Geometry Site Corridors	Model Detailing	Drawing Production	Drawing Utilities Coll	laborate	
	~ € ∎ ▼ ®:	Element Selection	New New Corridor Template Drop $\sqrt{2}$ Transitions	Template	Edit Template Drop	, conner enpping	£6+	Add Corridor Reference Remove Corridor Reference
	Primary	Selection	Create		Edit	Miscellaneous		

Horizontal Feature Constraints are the most common way to make a point follow a plan element like an edge of pavement as its horizontal location from the centerline varies.

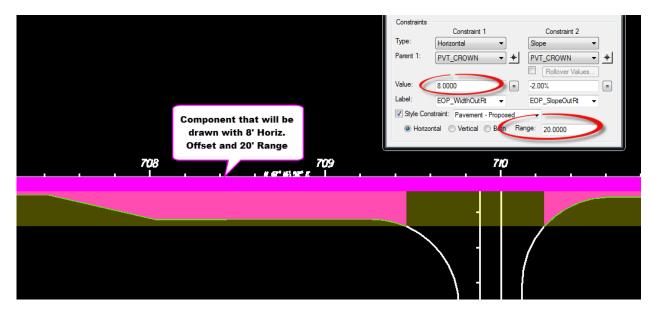
Point Proper	ties				×	
Name:		RT_PVT_EOP_	OUT	✓		
Use Featur	e Name Override:	RT_PVT_EOP_	OUT	Close	-	
Feature Definit	tion:	 plate Points 	PavementAspl			
Supereleva	ation Flag					
Alternate Surfa	ace:			Next >		
		Member o RT_PvtO RT_Shldr			The search for an element with Feature starts at the	
Constraints	Constra	int 1	C	Constraint 2		
Type:	Horizontal	\sim	Slope	\sim		
Parent 1:	RT_PVT_OLAY	_OUT ~ +	RT_PVT	_OLAY_OUT ~	+	
			F	Rollover Values		
Value:	0.10	=	-2.000%		= 111 11 11 11 11 11 11 11 11 11 11 11 1	
Label:	EOP_WidthOut	~	EOP_Slo	peOut ~		
Horizonta	l Feature Constrair	nt 🗸 🤉 Lines 🛛	Pavement\Pave	ment Asphalt EOPA		
	Range:	20.0				

In the example above the horizontal constraint (Constraint 1) defines the width of the pavement but with the Horizontal Feature Constraint defined it will follow the EOP line as it transitions.

- 1. Apply "Feature" to the plan element defining its symbology.
 - 2. Edit the template point you want to follow the plan element and select the Horizontal Feature Constraint to match the Feature applied to the plan element.
 - 3. In the point properties define the Range or distance you expect the template to encounter the plan element.
 - 4. When the corridor is created the plan element will need to be added as a Corridor Reference in order for the template to see it.

The Range defines the distance from the points location it will search for a line with the Feature "Pavement Asphalt EOPA". If found the constraints will be overridden to that elements horizontal offset.

The Range or search distance begins from the points horizontal location in the template. The template will search from that location the distance defined in the Range property. Positive distances to the right and negative distances are to the left. This creates an envelope in which an element with the defined feature can be found. This keeps the system from finding like elements on the other side of the road.



The animation in this slide shows what happens to the edge of pavement when it is located within the search Range and how it defaults back to the defined point constraints when the edge of pavement falls outside the search Range.

EXERCISES

OPTIONAL: To prepare your computer for the next set of exercises:

- *a)* Delete the C:\WorkSets\FDOT\22049555201_CE\ folder.
- *b)* Open the ComprehensiveTemplateDesign folder on the desktop and expand the DataSets folder.
- c) Extract the CT22049555201_CE_Chapter4.zip file in the C:\WorkSets\FDOT\ folder.

Exercise 4.1 Horizontal Feature Constraints

In this exercise Horizontal Feature Constraints will be applied to the corridor making it more flexible. Horizontal Feature Constraints are the first level of point overrides and provides the template with the flexibility to follow an edge of pavement of milling limits line.

- **Note** Steps 1-7 (loading Create Template preferences) are only needed if MicroStation was closed and restarted.
- 1. Open the MODLRD_TemplateDesign01.dgn*MODLRD_TemplateDesign01.dgn* file from the current workset of 22049555201_CE.
- 2. Use the **F12** key to launch the **Create Template** dialog. If the ITL is named properly the Project ITL file should already be loaded.



- **Note** The FDOTConnectXX.XX workspace provides some predefined preferences that are useful when working with templates. These preferences should be loaded for each new MicroStation session.
- 3. Select **Tools > Options** from the menu.
- 4. On the Template Options dialog press the Preferences button.

Template Options	_	X
Naming Options Component Seed N		OK Cancel
Specify:		Preferences
Point Seed Name:	•	Help
Apply Affixes	Prefix Suffix	
Left:		
Right:		
Step Options		
X: 0.100000	Y: 0.100000 Slop	e: 0.00%

5. On the Preferences dialog, select **FDOT** from the list and press **Load**.

Note You can also double-click FDOT to load the preferences.

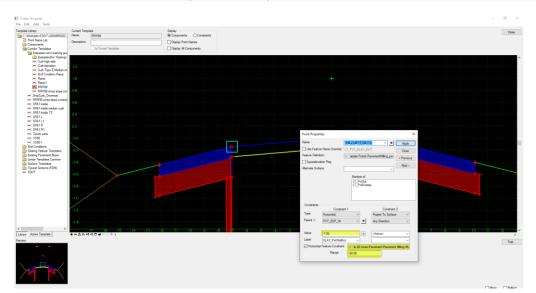
Preferences	×
Name:	Close
Default FDOT	Load
	Save
	Save As
	Delete
	Rename
	Help
Preference 'FDOT' loaded	

- 6. Press the **Close** button to return to the **Template Options** dialog.
- **Note** Notice that Left and Right Prefixes have been defined and the Step Options have been set to a tenth. The step options allow the components being dragged into the active template to snap onto the grid at one tenth of a foot intervals.

Template Options	_	x
Naming Options Component Seed N From Feature		OK Cancel
Specify:		Preferences
Point Seed Name:	•	Help
Apply Affixes	Prefix Suffix	
Diabat	-'- RT_	
Step Options X: 0.100000 Y: 0.100000 Slope: 0.00%		

7. Press **OK** to close the **Template Options** dialog.

- 8. Navigate to the Corridor Templates folder and double-click on the US98 *template* to make it active.
- 9. Double-click on the LT_PVT_OLAY_OUT *point* to review its properties.
- **Note** Notice the default Horizontal value for this point is -12 but a Horizontal Feature Constraint is applied with the Feature Pavement Milling ML and a Range of -50'



10. Close the Point Properties and Create Template dialogs.

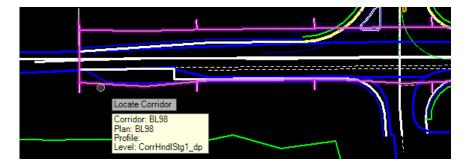
Exercise 4.2 Adding Corridor References

In order for a corridor to apply Horizontal Feature Constraints the horizontal geometry must be added to the corridor as external references. Without this the Horizontal Feature Constraints are ignored and the components are drawn at the horizontal Value.

1. From the Ribbon selectAdd Corridor Reference OPENROADS MODELING>CORRIDORS>MISCELLANEOUS>CORRIDOR REFERENCES>Add Corridor Reference

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File	Home Terrai	n Geometry Site	Corridors	Model Detailing	Drawing Pro	duction	Drawing	Utilities	Collaborat	5
°€ ∎ ▼ ®:	Element Selection		Copy Template Import IRD	e Drop 🙀 Template	Edit Template Drop	Edits	Corri	e Target Aliasi dor Reference dor Clipping	5 - I m	Corridor References Image: Corridor Reference Cre Cre Cre Cre Cre Cre Cre Cre Cre Cr
Primary	Selection		Create		Edit	:	ľ	liscellaneous		

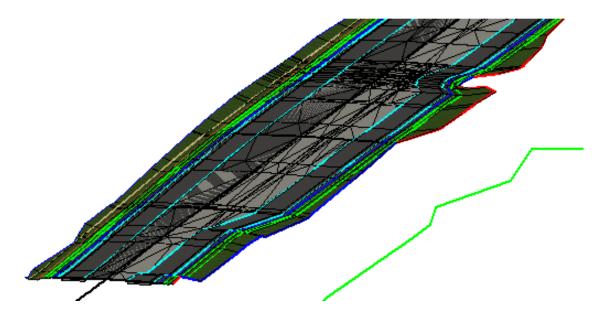
2. When prompted, left click on the corridor boundary to locate it.



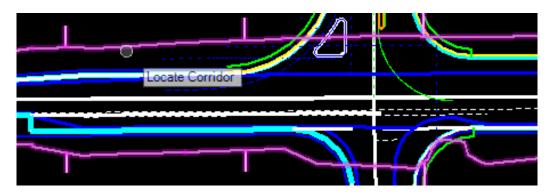
- 3. Next you will be prompted to "Locate First Reference". Begin left-clicking all of the Milling Limits *lines* within the range of the corridor.
- 4. When all of the Milling Limits lines are selected right-click (*Reset*) to complete the process.



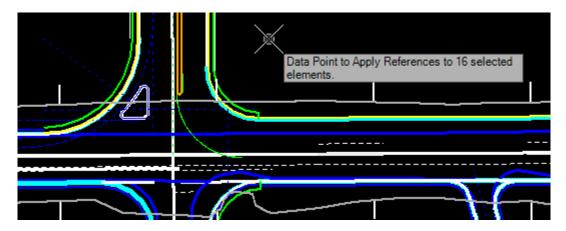
Note The corridor will reprocess and the shape of the model will begin to change.



- 5. Select **F6** to get out of the command and start the element selection tool.
- 6. Make a MicroStation *selection set* of all the **edge of pavement** lines within the range of the corridor.
- From the Ribbon select Add Corridor Reference OPENROADS MODELING>CORRIDORS>MISCELLANEOUS>CORRIDOR REFERENCES>Add Corridor Reference
- 8.
- 9. When prompted, left-click on the corridor boundary to locate it.



10. When prompted Data Point (left-click) to apply selected elements as corridor references.



Note The corridor will process and the model will further change shapes.

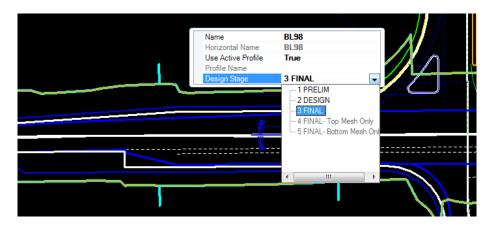
Exercise 4.3 Set Corridor Design Stage

This is a small corridor and changes in the horizontal geometry are occurring over short distances. To better see how the Feature Constraints are being applied the corridor Design Stage can be modified.

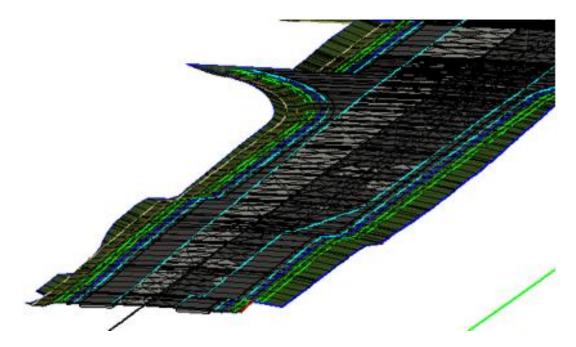
1. Select one of the **corridor handles** sticking out from the boundary and then hover over it to get the *context* menu. Select the first icon on the menu, **Properties**.



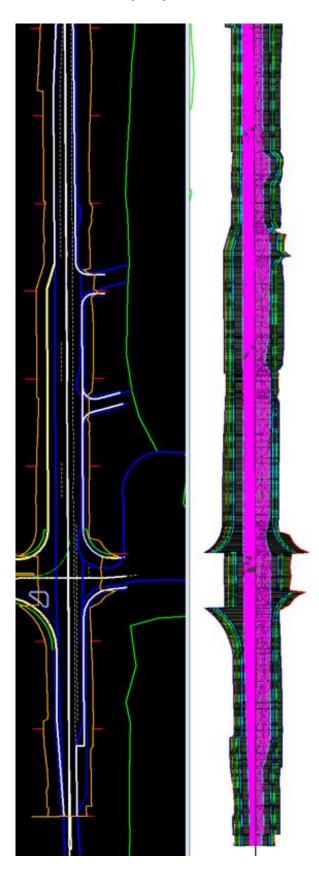
2. Using the drop-down arrow, change the Design Stage to "3 FINAL".



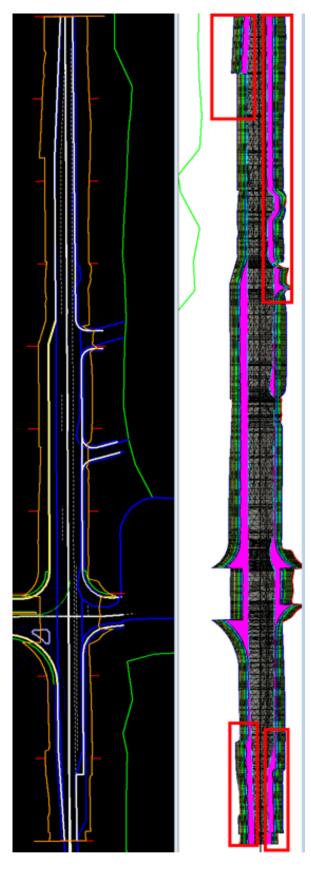
Note The corridor will reprocess again, providing further detail.



3. With the overlay *component* selected in the model you can see where the milling lines are now being located by the template in most locations.

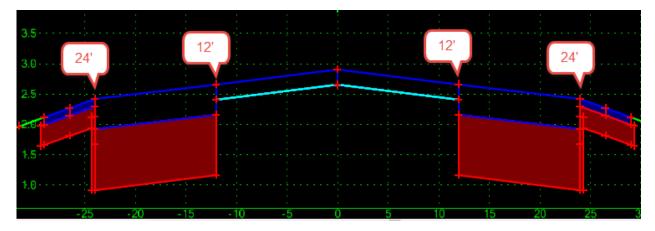


4. With the **widening** *components* selected you can identify locations at the beginning and ending of the corridor where the edges of pavement are not being located correctly.



Exercise 4.4 Search Range

Ranges are a common issue when using Horizontal Feature Constraints. Since the beginning the search range is based on the points location in the template instead of the its relative position to other points when applied to the corridor.



1. Start the **Measure Distance** command from the Ribbon The measure Distacne Tool can be found on the Drawing Tab and measure Group OPENROADS MODELING>DRAWING>MEASURE>Measure Distance

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2. On the Measure Distance dialog select the Perpendicular Method.

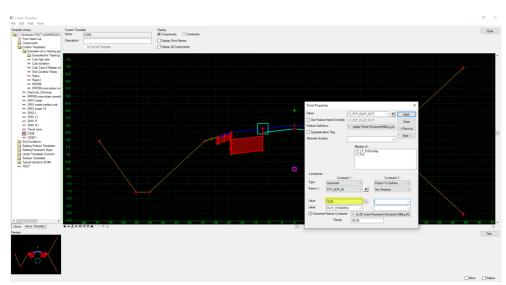
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Method: About:	 <u>B</u>etween Points <u>Al</u>ong Element <u>P</u>erpendicular 	
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Exercise 4.5 Troubleshooting Ranges

Use the Measure Distance tool to identify the narrowest distance from the baseline to the milling limits and from the baseline to the proposed edge of pavement for the widening.

	Complex Element: EOPA33 Feature: PavementAsphalt(EOPA) No Active Profile Referenced By Corridor: BL98 Level: PavtAsphalt	Measure Distance Method: Perpendicular About: Global Z True Distance: 11.053731' Segment Only	_ _ ×	
5 7 8 · X Z	3351857/			

- **Note** When working with multilane facilities, divide highways, interchanges, or the likes you will also want to identify the widest point for each search so you can limit the search range and not accidently locate a matching feature from another lane.
- 1. Select **F12** to open the Create Template dialog.
- 2. Double-click on the *left milling limits point* (LT_PVT_OLAY_OUT) to edit its properties.



3. Change the value for the *Horizontal constraint* to be -6, then press Apply and Close.

- 4. Double-click on the *left outside widening point* (LT_PVT_EOP_OUT) to edit its properties.
- 5. Change the value for the *Horizontal constraint* to be -.1, then press Apply and Close.

C:\Worksets\FDOT\22049555201 Foint Name List Components	Description:	Dapley Components Constraints Dapley Point Names	
Context Treatment Context Context	75 70 65 60 55		Point Proportion X Name: I_V/Y_SDP_0UT Charles Theme Controls: I_V/Y_SDP_0UT Call and bottom: I_V/Y_SDP_0UT Call and bottom: I_V/Y_SDP_0UT Decembranding: Intervent Decembranding: Intervent Decembranding: Intervent Theme: Intervent Decembranding: Intervent Decembrandi

- 6. Repeat **Steps 2-5** for the right side of the template.
- 7. Select **File > Save** from the **Create Template** dialog.
- 8. Press the Close button to return to MicroStation.

Exercise 4.6 Synchronize Template Changes with the Corridor

To see the changes in the model the changes to the template will need to be synchronized in the corridor.

 1. From the Ribbon select the Synchronize Template Tool. This can be found on the Corridors Tab then the Miscellaneous Group. OPENROADS MODELING>CORRIDORS>MISCELLANEOUS>Synchronize Template

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°∂ ∎ ▼ ®: Primary	Element Selection	New New Corridor Template D	Create	Drop Karlen Template	Edit Template Drop Edit	Corric	e Target Aliasin dor References dor Clipping <i>*</i> ⁄liscellaneous	Crea	te Calculate Superelevatio	÷	Dyna Sectic
	Feature Definition		✓ e ² / ₂	• 📥 Å 🖋	° 🔜 🖋 🖄 🐁 [_			ze Template :e Template		

2. When prompted on the cursor to *Locate Template Drop*, select the **corridor boundary**.



Note The corridor will process and you can evaluate the changes to the model.

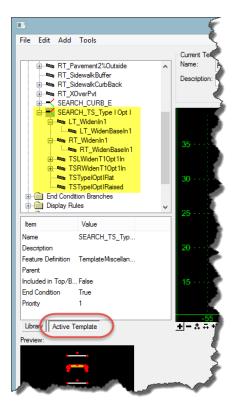
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5 SWITCHES

INTRODUCTION

In this exercise Switches will be used to turn off the display of components through areas like intersections or drives where detail modeling techniques will be used. Turning of the display of components in these areas is far more efficient when processing a corridor than clipping references.

PARENT \ CHILD RELATIONSHIPS

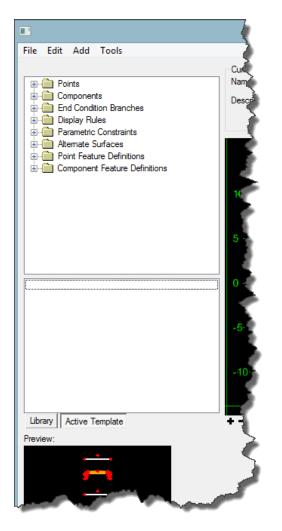


Defining a Parent\Child relationship between related components makes it much easier to manage their display in variable conditions.

- End Conditions, Switches, and Display Rules effect the parent effect children.
- Deleting a parent component deletes all children.
- Component Relationships can be viewed as a hierarchical tree using the Active Template tab on the Create Template dialog.
- Relationships can be created by dragging and dropping on the Active Template tab.

A well structured template will have parent\child relationships defined between components that go together. For example: the base component is a child of the pavement component. This becomes more important as variable conditions and display rules are added to the template. When properly structured you can apply the display rule to the parent component only instead of modifying each subcomponent individually.

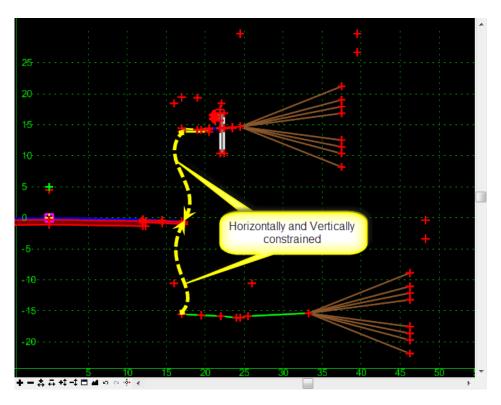
ACTIVE TEMPLATE VIEW



The Active Template view allows you to see and modify properties for all parts of the active template.

- **Points** List of all points. Highlights the selected point in the template.
- **Components** List of Components in hierarchical tree.
- End Condition Branches List of end conditions in hierarchical tree.
- **Display Rules** List of all Display Rules . Highlights the selected Display Rules in the template.
- Parametric Constraints List of all Labels defined in the active template.
- Alternate Surfaces List of all Alternate Surfaces and their components.
- **Point Feature Definitions** List of Points categorized by Feature.
- Component Feature Definitions List of Components categorized by Feature.

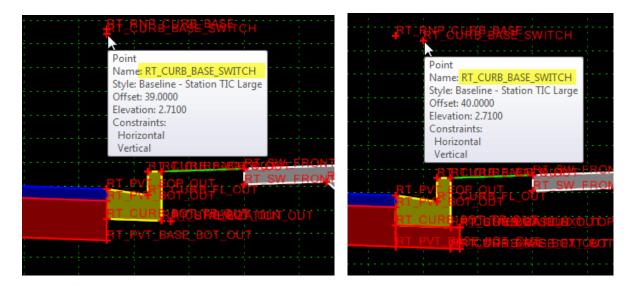
ORGANIZING \ STACKING CONDITIONS



- Instead of stacking the End Conditions on top of each other, they can be offset.
- All End Conditions can be attached using Horizontal and Vertical Constraints
- Parametric Constraints can be used to override the Horizontal and Vertical Constraints to zero values when applied to the corridor.

As more conditional components are added to make the template more dynamic, it gets very busy and hard to manage if all the components are on top of each other. We recommend placing the conditional trigger set above or below the connection point and then use parametric constraints to move the trigger sets into place when applied to a corridor.

SWITCHES



Switches are often used to switch the display of components On or Off. If a component or template has a point with the word 'SWITCH' in the point name, then the 'SWITCH' Points Horizontal value can be modified to change the components that are displayed.

Switches are basically a series of if statements with a display rule added to each. Typically the 'if statement' measures the distance between two points and assigns a display rule to activate when the distance equals a specific number. This way each possibility can only occur in one condition.

- ✓ If the distance between LT_Switch and LT_Switch1 is 1' display a Type F Curb and Gutter
- ✓ If the distance between LT_Switch and LT_Switch1 is 2' display a Type E Curb and Gutter
- ✓ If the distance between LT_Switch and LT_Switch1 is 3' display a Drop Curb

Display Rules are applied to each of the possible conditions so as the distance changes one condition is turned Off and another is turned On.

Name	Туре	Expression	Test	Value	Result
LT_SWITCH1	Horizontal	LT_SWITCH1 - LT_SWITCH	=	1.000000	False
LT_SWITCH2	Horizontal	LT_SWITCH1 - LT_SWITCH		2.000000	True
LT_SWITCH3	Horizontal	LT_SWITCH1 - LT_SWITCH	=	3.000000	False
LT_SWITCH4	Horizontal	LT_SWITCH1 - LT_SWITCH	=	4.000000	False
LT_SWITCH5	Horizontal	LT_SWITCH1 - LT_SWITCH	=	5.000000	False
RT_SWITCH	Horizontal	RT_SWITCH1 - RT_SWITCH	=	1.000000	False
RT_SWITCH	Horizontal	RT_SWITCH1 - RT_SWITCH	=	2.000000	False
RT_SWITCH	Horizontal	RT_SWITCH1 - RT_SWITCH	=	3.000000	False
RT_SWITCH	Horizontal	RT_SWITCH1 - RT_SWITCH	=	4.000000	False
RT_SWITCH	Horizontal	RT_SWITCH1 - RT_SWITCH	=	5.000000	False
<					2

DISPLAY RULES

		Component Properties	s	×	
	Name:	SEARCH_ML	+	Apply	
	Use Name Override:	SEARCH_ML		Close	
	Description:	+++ 			
	Feature Definition:	TemplateMiscellaneous	~	< Previous	
	Parent Component:		+	Next >	
	Display Rules:	NOT SEARCH_EOP	Edit	Help	
I I					1
Component	t Properties	×			
Name: LT_SWITCH	-+ Apply				
Use Name Override: LT_SWITCH	Close				
Description:	< Previo				
Feature Definition: TemplateMiscellaneous		1. Click Edit to odd o			
Parent Component:	v +	Display Rule			
Display Rules:	Edit Help				
Exclude From Top/Bottom Mesh					
		-			
Con	mponent Display Conditional Ex	pression – 🗆 🗙			or the Display Rule and choose the type pe" drop-down. Each type will require
Conditional Expression for LT_SWITCH Compo	nent	ок		additional propertie	es be defined once selected.
		A			
Build Conditiona	Expression Here	= Cancel		Die	play Rule ×
		Help		Dis	
		· ·	Name:	Rule1	OK
AND OR NOT () Selected Rule		Description	1:	Cancel
		on using Template Display Rules	Type:	Component is Displayed	✓ Help
Template Display Rules	rom below or click add to crea	te a new Template Display Rule.	Componen	t: LT_SWITCH	v 🛃
	ression To	est Value Result			
	WITCH1 - LT_SWITCH =	1.000000 False			
	SWITCH1 - LT_SWITCH =	2.000000 False 3.000000 False			
	SWITCH1 · LT_SWITCH = SWITCH1 · LT_SWITCH =	3.000000 False 4.000000 False			
LT_SWIT Horizontal LT_S	SWITCH1 · LT_SWITCH =	5.000000 False		Hori	izontal solute Horizontal
	SWITCH1 - RT_SWITCH =	1.000000 False		Vert	
	CIMITCUS DT CIMITCU	2,000000			-has Mosteral
	SWITCH1 - RT_SWITCH = SWITCH1 - RT_SWITCH =	2.000000 File		Slop	
				Slop	

A Display Rule is a condition statement that can be assigned to a component. Once assigned, the component can only be displayed when the conditional statement is true. Each interval is evaluated by the Display Rule and the components and all the children are affected.

Note Display rules are not applied in transitions. Transitions see only what is displayed at the beginning and end of the transition at the time the transition is created, and use that information to create the transition. Only components that are displayed are included in the transition.

Creating Display Rules

To create a *Display Rule* click the **Edit** button on the parent Component Properties dialog. This opens the Component Display Conditional Expressions dialog that allows you to build a Conditional Expression by evaluating and selecting from a list of previously created Display Rules.

If there are no Display Rules listed yet, <OR> if the Display Rule needed does not appear in the list, click the Add button on the bottom of the dialog. This opens the Display Rule dialog that allows you to enter a name and a description to create a new Display Rule.

• **Name** - displays the rule name. In edit mode, this field is read only. However, you can rename the rule from the Create Template > Active Template tab.

Note Display Rules can not contain a left or right parenthesis, "(" or ")", or any of the following phrases in the rule name: AND, OR, NOT.

- **Description** specifies a description for the display rule.
- **Type** displays the rule type.

Then you can choose from a list of Display Rule Types and define the properties associated with the Type.

- **Horizontal** -specifies the difference between the x values of the point (pt1.x pt2.x).
- Absolute Horizontal specifies ABS (pt1.x pt2.x).
- **Vertical** specifies pt1.y pt2.y.
- Absolute Vertical specifies ABS (pt1.y pt2.y).
- **Slope** specifies the slope from pt1 to pt2.
- Absolute Slope specifies the absolute value of the slope from pt1 to pt2.
- **Component is Displayed** list existing components. The rule is evaluated to True if the indicated component is displayed.
- **Between (1st point)** specifies the first point for the conditional test. Does not apply for type Component is Displayed type.
- And (2nd point) specifies the second point for the conditional test. Does not apply for type Component is Displayed.
- (Expression) specifies the conditional expression (<, <=, =, >=, >).
- (Value field) specifies the value that the expression is evaluated against.

DEFINING PARAMETRIC CONSTRAINTS (LABELS)

Display All Components							_
	Point Properties					×	
*	Name:		PVT_OLAY_	BOT_IN	I v +	Apply	
	Use Feature	Name Override:	PVT_OLAY_	BOT_IN	1 PVT_	OLAY_BOT	r_IN1
	Feature Definition	on:	Bottom_pm		~	< Previou	
	Superelevati	ion Flag					
	Alternate Surfac	e:			v .	Next >	
			Membe	er of:		Help	
				rt Or. /t Milling	02		
				/tOverbu /tOverlay	ild_02 / 02		
					_02		
	Constraints					-	
	Tumo:	Constraint			Constrai		
	Туре:	Horizontal	~		Vertical	~	
	Parent 1:	LT_PVT_EOP_I	N Y	+	LT_PVT_EOP_IN	~	<u>+</u>
							- 1
-25 -20	Value:	0.000000		=	-0.250000		= 5
	Label:		~		OLAY_PvtThickLt	¥	
	Horizontal	Feature Constrain	t:			~	÷
		Range:	0.000000)			

Parametric Constraints use the Label property defined on a points constraints to override the defined value over a specified station range. Labels for common constraints should be the same.

- ✓ Pavement Depth
- ✓ Lane Width
- ✓ Switches

Parametric Constraints

Parametric Constraints allows you to reset the values for all points using the selected label at once.

For example, Pavement Thickness could be defined on the inside and outside of every pavement component ion the template. For a six lane section with cross overs Pavement Thickness could be defined 14 times or more in a single template. If the pavement design changes you can quickly reset all of those values at once without having to edit each point's properties to redefine the vertical constraint.

> To edit Parametric Constraints on the Create Template dialog:

- 1. Select the "Active Template" tab.
 - 2. Expand the Parametric Constraints folder
 - 3. Double-click the Label name
 - 4. Enter a value in the "Edit Default Parametric Value" dialog
 - 5. Click OK.

Applying Parametric Constraints

Parametric constraints can also be used to change one or more labeled constraint values of a template while the template is being processed through the corridor.. Click Tools > Parametric Constraints. This allows you to use only one template to handle a number of different conditions. The process involves two steps.

- 1. Add labels to the constraints that are to be controlled. This is done in the Create Template command.
 - 2. Specify the new constraint value(s) and the station range over which they will be applied on the corridor. This is most commonly used to change pavement thickness over a specified range.

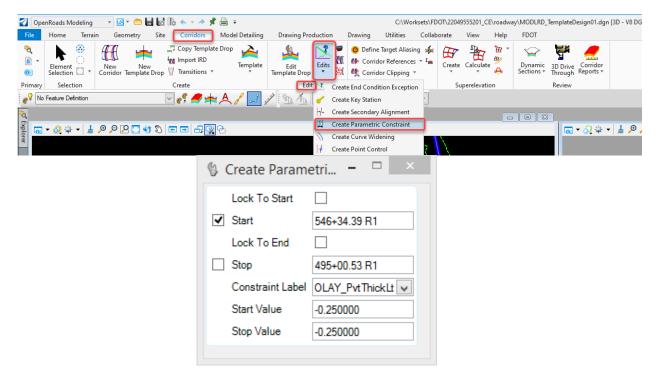
All constraints can contain parametric labels.

For example, if the milling depth changes in the middle of the project you don't need to do multiple template drops. You can do a single template drop and add a Parametric Constraint each time the milling thickness changes.

> To apply a parametric Constraint to a corridor

1. Select Create Parametric Constraint, this tool can be found on the Corridor Tab, Edits Group the Edits Drop down

OPENROADS MODELING>CORRIDORS>EDITS>EDITS>Create Parametric Constraint



- 2. After selecting the corridor you will be prompted for:
 - Start station
 - Stop station
 - Constraint Label
 - o Start Value
 - \circ End Value

EXERCISES

OPTIONAL: To prepare your computer for the next set of exercises:

- *a)* Delete the C:\WorkSets\FDOT\22049555201_CE\ folder.
- b) Open the ComprehensiveTemplateDesign folder on the desktop and expand the DataSets folder.

c) Extract the CT22049555201_CE_Chapter5.zip file in the C:\WorkSets\FDOT\ folder.

Exercise 5.1 Setting Preferences (Optional)

- **Note** Steps 1-7 (loading Create Template preferences) are only needed if MicroStation was closed and restarted.
- 1. Open the MODLRD_TemplateDesign01.dgn*MODLRD_TemplateDesign01.dgn* file of the current workset C:\WorkSets\FDOT\22049555201_CE\Roadway folder
- 2. Use the **F12** key to launch the **Create Template** dialog. If the ITL is named properly the Project ITL file should already be loaded.



- **Note** The FDOTConnectXX.XX workspace provides some predefined preferences that are useful when working with templates. These preferences should be loaded for each new MicroStation session.
- 3. Select **Tools > Options** from the menu.
- 4. On the Template Options dialog press the Preferences button.

Template Options		— X
Naming Options Component Seed N	ОК	
From Feature	e Definition	Cancel
Specify:		Preferences
Point Seed Name:	•	Help
Apply Affixes		
Left:	Prefix Suffix	
Right:		
Step Options X: 0.100000	Y: 0.100000 Sid	ope: 0.00%

5. On the Preferences dialog, select FDOT from the list and press Load.

Note	You can also double-click FDOT to load the preferences.
------	---

Preferences	— X
Name:	Close
Default FDOT	Load
	Save
	Save As
	Delete
	Rename
	Help
Preference 'FDOT' loaded	

- 6. Press the **Close** button to return to the **Template Options** dialog.
- **Note** Notice that Left and Right Prefixes have been defined and the Step Options have been set to a tenth. The step options allow the components being dragged into the active template to snap onto the grid at one tenth of a foot intervals.

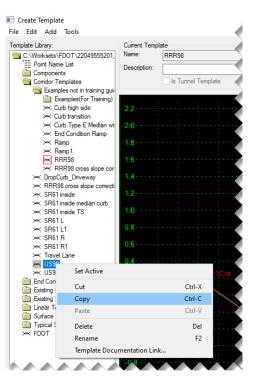
Template Options		×
Naming Options Component Seed From Feature		OK Cancel
Specify: Point Seed Name:		Preferences
Apply Affixes	Prefix Suffix	пер
Left: Right:	LT_	
Step Options X: 0.100000	Y: 0.100000 Slop	e: 0.00%

7. Press OK to close the Template Options dialog

Exercise 5.2 Parent \ Child Relationships

It is best to create parent $\$ child relationships between components so Display Rules can be applied to a single component instead of all components outside that location.

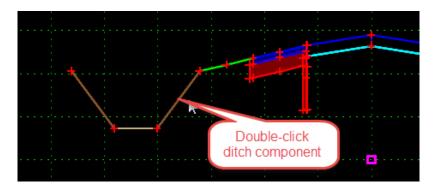
- *Note* Before making major edits, it is recommended to make a copy in case you want to go back to a previous state.
- 1. Navigate to the Corridor Templates folder and double-click on the US98 template to active.
- 2. Right-click on the US98 template and select Copy from the Context menu.



3. Right-click on the Corridor Templates folder and select **Paste** from the *Context* menu. A copy of the template will be made with a '1' appended to the name.

💽 Create Templa	ate		
File Edit Add	Tools		
Template Library:		Template RR ion:	
Conidor		>	
→ Drop → RRF → SR6	Cut	Ctrl-X	
	Daste	Ctrl-C Ctrl-V	
≍ SR6 ≍ SR6	Delete	Del	
i → SR6 → SR6		F2	
	8	1.2	

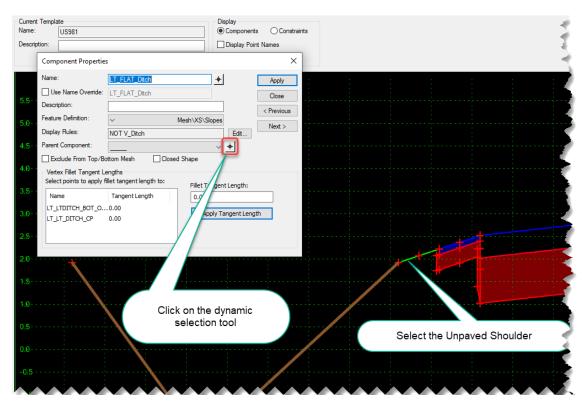
4. Double-click on the **ditch** *component*.



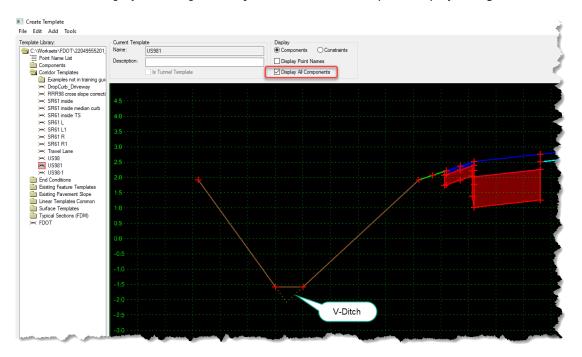
5. The Component Selection dialog opens indicating there are multiple components at that location. Select the **top component**.



6. To assign a *Parent Component* select a component name from the *drop-down list* or select the parent *dynamically*. Select the **dynamic selection** tool and then select the **unpaved shoulder** *component*.



- 7. After selecting the unpaved shoulder press Apply and Close to return to the Create Template dialog.
- 8. Double-click on the **ditch** component again; this time selecting the bottom component when prompted.
- 9. Make the **unpaved shoulder** the *parent component* of the **second ditch** *component* by repeating steps 3 and 4.
- 10. Check the **Display All Components** option in the Create Template Display settings.



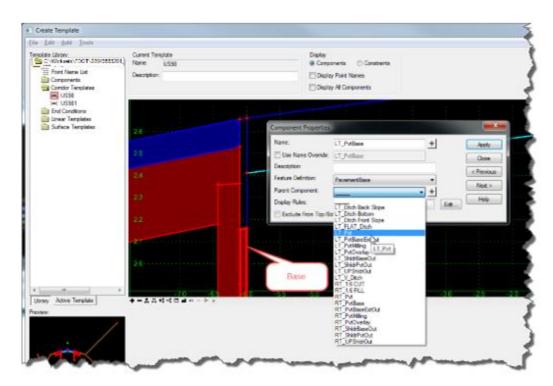
- 11. Double-click on the V ditch component.
- 12. Make the **unpaved shoulder** the *parent component* of the **V ditch** *component* by repeating steps 3 and 4.
- 13. Uncheck the **Display All Components** option in the **Create Template Display** settings.
- 14. Zoom in to the area where **paved shoulder** component attaches to the **widening** component.
- 15. Double-click on the **paved shoulder** *component* and use the **dynamic selection** tool to select the *widening component* (**LT_Pvt**) as the *Parent Component*.

Create Template File Edit Add Tools	
Template Library: C·Worksets\FDOT\22049555201. ∷ Point Name List Components Condor Templates ∑xamples not in training guli Examples(For Training)	Apply Apply
✓ Curb high side ✓ Curb transition ✓ Curb Type E Median wir ✓ End Condition Ramp ✓ Ramp ✓ Ramp1 ✓ RRR98 cross slope cor	Use Name Override: LT_Shidr PvtOut Description: Feature Definition: ✓ Mesh XS/ShoulderPaved Net > Display Rules: Edit Parent Component: ✓ Exclude from Top/Bottom Mesh ✓ Closed Selection tool
	Vertex File Tangent Length Select points to apply filet tangent length to: ILT_SHLDR_POLT_TOP0.00 ILT_SHLDR_POLT_TOP0.00 C
	24 22 20 18

- 16. Press Apply and Close to return to the Create Template dialog.
- 17. Double-click on the **base extension** for the left side and use the *Parent Component* drop-down list to select LT_Pvt.

nplate Library: CNWorksete/FDOT/220/	Current Tr 19555201 Name	englate USSB			Daplay Campor
Component Properties	(Second			-	Deplay
Nane	LT_PutBaseExtOut	+	1 6	Acoly	Depley
Use Name Override:	LT_FvBmeExtOut			Oce	
Description:				Previous	
Feature Definition:	PavamentBase			Ned >	
Parent Component: Deplay Rules		• •	Ē	Help	
	LT_Ditch Back Sope		Ea		
Exclude From Top/Bo	LT_Dath Front Stope LT_FLAT_Dath				
	LT PytEase	B			. Janin
	LT_PvtMing LT_PvtOverlay	LT_PA			
	LT_ShitRaseOut LT_ShitPMOut LT_UPShitOut				
	LT_V_Dich RT_16CUT			/	
	RT_16FEL RT_PM				
	RT_PytBase RT_PytBaseEdOut				
	RT_PvtMiling RT_PvtOvefay		Base Extensi		
	RT StiddateOut				

- 18. Press Apply and Close to return to the Create Template dialog.
- 19. Double-click on the **left pavement base** *component* and use the *Parent Component* drop-down list to select LT_Pvt.



20. Press Apply and Close to return to the Create Template dialog.

Exercise 5.3 Add Switches and Display Rules

The CIVIL FDOT ORD.ITL provides a prebuilt "Switches" component that contains the controlling points and related display rules for 5 conditions on each side of the template.

Note When making major edits it is recommended to make a copy in case you want to go back.

- 1. Navigate to the Corridor Templates folder and double-click on the US98 template to active.
- 2. Right-click on the US98 *template* and select Copy from the *context* menu.

Create Template							
File Edit Add To	ols						
Template Library:		Current Templa	ate				
C:\Worksets\FDO	T\22049555201	Name:	RRR98				
Point Name Lis	st	Description:					
Components							
Corridor Temple	ates not in training gui		Is Tunnel Templ	ate			
	les(For Training)						
Curb h		2.2					
Curb tr							
	ype E Median wi	2.0					
× End Co	ondition Ramp	1.8					
Ramp	1	1.0					
RRR9		1.6					
	8 cross slope cor						
>=< DropCurb_		1.4					
SB61 insid	oss slope correcti	1.2					
SR61 insid	-						
SR61 insid	le TS	1.0					
🖂 🖂 🖂 🖂		0.8					
SR61 L1		0.8					
SB61 B1		0.6					
I Travel Lan	e						
Contraction Contra		0.4					
	Set Active			:1Cut			
End Con	Cut		Ctrl-X				
Existing	Сору		Ctrl-C				
Linear To	Paste		Ctrl-V				
Typical 5	Delete		Del				
FDOT	Rename		F2				
	Template Docu	mentation Link					
		-0-8					

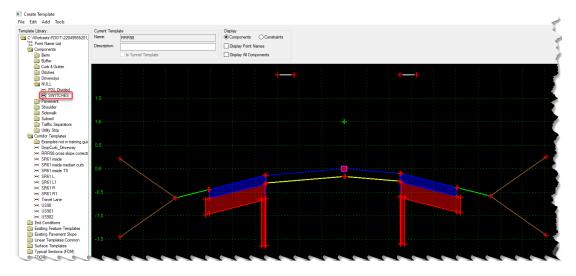
3. Right-click on the Corridor Templates folder and select **Paste** from the *context* menu. A copy of the template will be made with a '2' appended to the name.

Create Template				
File Edit Add To	ols			
Template Library:		Current Temp	late	
C:\Worksets\FDC	T\22049555201	- · · ·	US98	
== Point Name Li		-		-
Components		Description:		
Corridor Temp	lates		Is Tunnel	Template
🚞 Exa	New	>		
🖂 Drop				
H RRF	Cut	Ctrl-X		
≻≺ SR€	Сору	Ctrl-C		2
× SR€	Paste	Ctrl-V		2
× SR€				
× SRE	Delete	Del		
× SRE	Rename	F2		
SR61 R1		5.5		
→ Travel Lar	he	0.0		
US98	-	5.0		
📈 US981				
🛏 US982		4.5		
End Condition	s	40		
📄 Existing 🦳 tu	re Templates		and the second second	

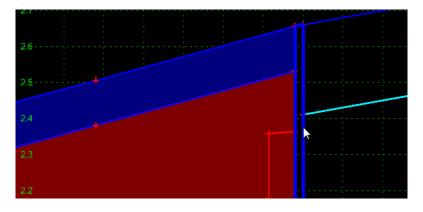
4. Open the Dynamic Settings dialog if necessary (Tools > Dynamic Settings) and ensure the Apply Affixes box is unchecked.

Dynami	c Settings	5		×			
X:	-15.60000	00 Step:	0.100000				
Y:	5.600000	Step:	0.100000				
Point N	ame:		•	-			
Point S	tyle:	Archaeo	logical Si 🔹	•			
Арр	ly Affixes						
hs=	•						
Set Dynamic Origin							

- 5. Navigate to the Components\Null folder and select the SWITCHES component.
- 6. Drag it onto the active template and drop it onto the green CL point.



7. Double-click on the **widening** *component* to edit its properties.



8. On the Component Properties dialog, press the *Display Rules* Edit button.

Name:	LT_Pvt				
Use Name Override:				+	Apply
	LT_Pvt				Close
Description:					< Previous
Feature Definition:	∼ Me	esh∖∖	XS\	PavementAsphalt	
Display Rules:		_	_	Edit	Next >
Parent Component:	LT SWITCH			+	
Exclude From Top/Bo	-	Zα	osed	d Shape	
Vertex Fillet Tangent L Select points to apply f	-	to:		Fillet Tangent Length:	
Name	Tangent Length		^	0.00	
LT_PVT_OLAY_OUT	0.00			Apply Tapgopt Long	4h
LT_PVT_EOP_OUT	0.00			Apply Tangent Lengt	ui
LT_PVT_BOT_OUT	0.00		۷		
<		>			

9. On the Component Display Conditional Expression dialog select the *rule in the list* then press the **NOT** button and the **Selected Rule** button.

Component	Display Condit	ional Expression			
Conditional Exp	ression for LT_P	vt Component			
AND	RNOT	() Selected Rule			
Template Display	Rules				
Name	Туре	Expression	Test	Value	Result
LT_SWITCH1	Horizontal	LT_SWITCH1 - LT_SWITCH	=	1.000000	False
LT_SWITCH2	Horizontal	LT_SWITCH1 - LT_SWITCH	=	2.000000	False
T_SWITCH3	Horizontal	LT_SWITCH1 - LT_SWITCH	=	3.000000	False
T_SWITCH4	Horizontal	LT_SWITCH1 - LT_SWITCH	=	4.000000	False
T_SWITCH5	Horizontal	LT_SWITCH1 - LT_SWITCH	=	5.000000	False
RT_SWITCH1	Horizontal	RT_SWITCH1 - RT_SWITCH	=	1.000000	False
RT_SWITCH2	Horizontal	RT_SWITCH1 - RT_SWITCH	=	2.000000	False
RT_SWITCH3	Horizontal	RT_SWITCH1 - RT_SWITCH	=	3.000000	False
RT_SWITCH4	Horizontal	RT_SWITCH1 - RT_SWITCH	=	4.000000	False
RT_SWITCH5	Horizontal	RT_SWITCH1 - RT_SWITCH	=	5.000000	False
V_Ditch	Horizontal	LT_DITCH_CP - LT_DITCH_BOT_OUT	<	0.000000	False
•		III			+
		Add.		Edit	Delete

10. This builds the statement "NOT LT_SWITCH1". Press OK to apply this Display Rule.

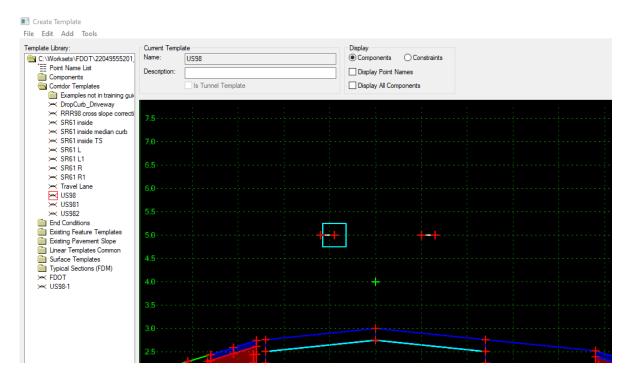
Component Display Conditional Expression		
Conditional Expression for LT_Pvt Component NOT LT_SWITCH1 AND OR NOT () Selected Rule		OK Cancel Help
Jo biste holonomia	and the second	

Note Back on the Component Properties dialog you will see that the Display Rules field has been populated.

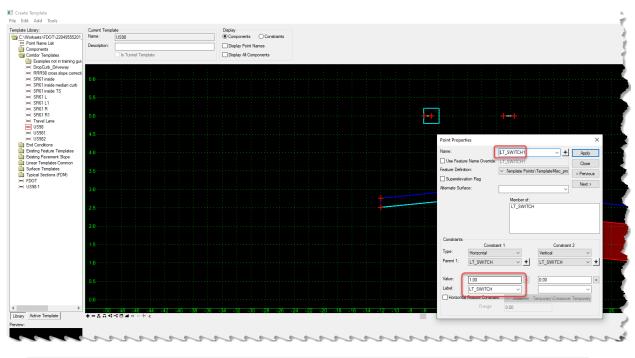
11. Press Apply and then Close to return to the Create Template dialog.

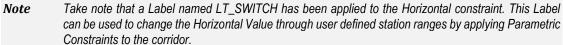
Component Propertie	s			×
Name:	LT_Pvt		+	Apply
Use Name Override:	LT_Pvt			Close
Description:				< Previous
Feature Definition:	∽ Mesh	NXS\Pa	vementAsphalt	
Display Rules:	NOT LT_SWITCH1		Edit	Next >
Parent Component:	LT_SWITCH		~ +	
Exclude From Top/B	ottom Mesh 🔽	Closed S	hape	
Vertex Fillet Tangent L Select points to apply f	-	:	Fillet Tangent Length:	
Name	Tangent Length	^	0.00	
LT_PVT_OLAY_OUT	0.00		Apply Tapaget Land	44
LT_PVT_EOP_OUT	0.00		Apply Tangent Leng	Jui
LT_PVT_BOT_OUT	0.00	~		
<	1	>		

12. Double-click on the inside point of the *left switch component* (LT_SWITCH1).



13. Set the *Horizontal Value* to **1** and press **Apply**. Notice how everything to the left of the resurfacing is turned Off.





- 14. Set the *Horizontal Value* back to **1.5** then press **Apply** and **Close**.
- 15. On the Create Template dialog select File > Save from the menu and then Close to return to MicroStation.

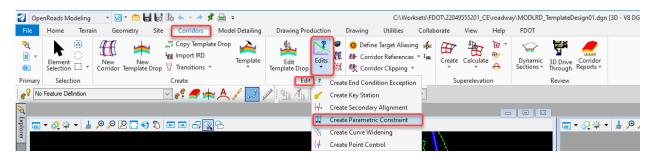
Exercise 5.4 Apply Parametric Constraints

Parametric Constraints can be applied to a corridor to override the value of point constraints if a label has been defined in the point properties. This exercise will use this functionality to turn off the display of components through the intersection.

1. To Sychronize Template use the tool that can be found on Corridors Tab of r\the Ribbon on the Miscellaneous Group then Synchronize Template OPENROADS MODELING>CORRIDORS>MISCELLANEOUS>Synchronize Template

🛃 Оре	nRoads Modeling	- M- 🖨 🖥	16 🔶 - 🔶 📌 🕯	🚔 =				C:\Works	sets\FD	OT\22049	555201_CE	:\roadwa	y\MODLRD_	TemplateD	esign01.dgn
File	Home Terrai	n Geometry Site	e Corridors I	Model Detailing	Drawing Prod	uction	Drawing	Utilities	Collab	orate	View	Help	FDOT		
°₹ ■ ▼ 0.	Element Selection	New New Corridor Template Drop	Copy Template I for Import IRD	Drop Template	Template Drop	Edits	Corrid	: Target Aliasing lor References lor Clipping 💌	\sim			™ ₩ ₽	Dynamic Sections *	-	Corridor Reports *
Primary	Selection		Create		Edit		M	liscellaneous		Su	perelevatio	on		Review	
e 😵 No	💦 No Feature Definition 🛛 💽 🧬 📥 🙏 🦯 🔜 🖋 🌆 📶 🔽 🔽 🔽 Synchronize Template														
Q	/iew 1, Default								- Syno	hronize 1	[emplate				'iew 2, Defaul

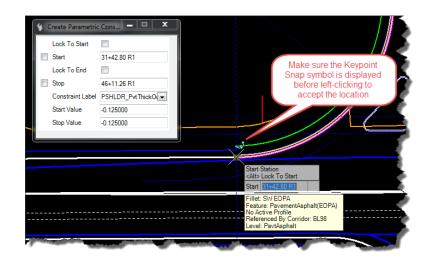
 From the Ribbon on the Corridor Tab then the Edit Group, select the Edits Drop down to select the Create Parametric Constraint tool OPENROADS MODELING>EDIT>EDIT>Create Parametric Constraint



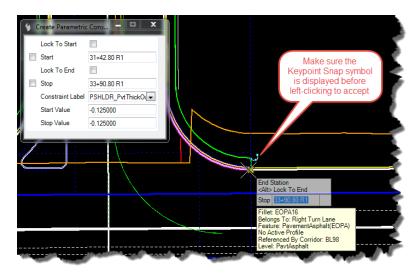
3. Ensure that the *start and end values* are **not locked** in on the **Create Parametric Constraint** dialog and select the *corridor boundary* **to Locate Corridor** as prompted on cursor.

4	Create Parametric	C	Ŋ		
	Lock To Start				
	Start	0.000000			r
	Lock To End				Ľ.
	Stop	0.000000			b
	Constraint Label	•		'	١.
	Start Value	-60.96%		and the second	
	Stop Value	-60.96%		in the second	F
			J.	· //	
			╧		
				Locate Corridor	2
				Corridor: BL98	2
				Profile: Level: CorrHndlStg3_dp	
	10. A				r

4. When prompted for the *Start Station* use AccuSnap to snap to the first return of the **SR 61** *intersection* and then **Data Point** (left-click) to Accept.



5. When prompted for the *End Station* use AccuSnap to snap to the opposite return of the SR 61 *intersection* and then Data Point (left-click) to Accept.

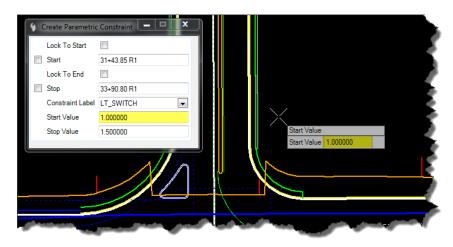


6. When prompted for the *Constraint Label* choose LT_SWITCH from the drop-down on the Create Parametric Constraint dialog

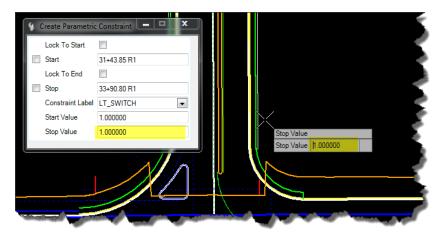
<OR> use the up and down arrows on the key board to select LT_SWITCH from the cursor and then Data Point (left-click) to Accept.

Lock To Start 31+ Start 31+ Lock To End 53- Stop 33- Constraint Label LT Start Value 1.5	A3.85 R1 43.85 R1 90.80 R1 SWITCH	Constraint Label Constraint Label

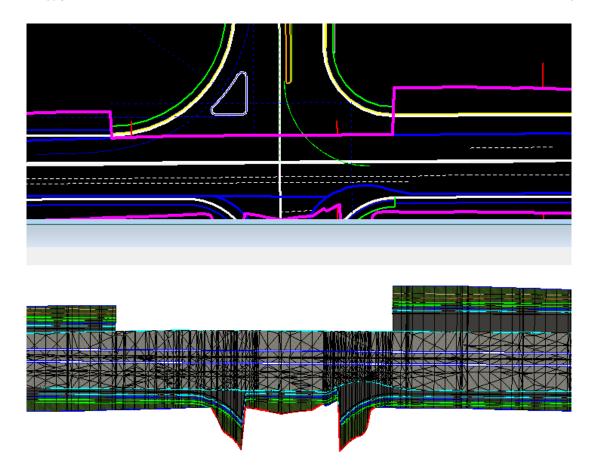
7. When prompted for the *Start Value* key in 1 and press Enter then Data Point (left-click) to Accept.



8. When prompted for the *Stop Value* key in 1 and press Enter then Data Point (left-click) to Accept.



Note Notice how, using the Parametric Constraint to make the statement in display rule true, turns off the components through the station range defined.

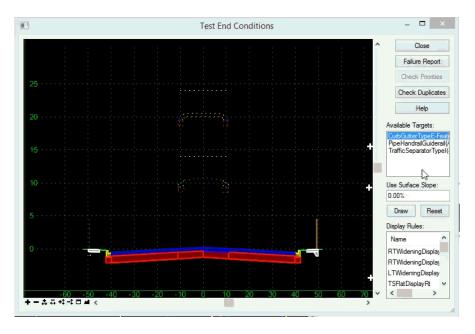


- 9. Press F6 on the key board to get out of the current command and return to *Element Selection*.
- 10. Select one of the **returns** and change the *radius* to see how that effects the model. By snapping to the returns for start and stop locations the model will automatically heal itself if changes to geometry are made.
- 11. Use **Ctrl+Z** to *Undo* the change to the return.

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6 TRIGGER LINES

INTRODUCTION



- Make Trigger Line the Parent of related components.
- An End Condition (Trigger Line) is configured to search for a specific Target.
- When Target is located, all related components of a Trigger Line will display, but not displayed if Target is not found.
- Exclude Trigger Lines from triangulation.

"Trigger Line" is a term for the use of End Conditions as display controls. Trigger Lines are used to make a template dynamic by including multiple possibilities in a single template. This reduces the number of template drops required along a corridor and is especially useful in urban areas where conditions change frequently.

Trigger Lines are End Condition components used to search for "Corridor References" with a specific Feature. End Conditions are only displayed when the defined condition is true. All child components of an End Condition are displayed when the End Condition is True.

Creating Trigger Lines

, , ,	Material: Te Feature Defi Horizontal (Vertical Offs Priority: 1	RCH_TS_Type I Opt emplateMiscellaneo inition: TrafficSepar Offset: 0.000000 set: 0.000000	us
#	Slope: 0.009 Width: 22.00 Height: 0.00	00000	
	Component	Properties	×
Name:	SEARCH_TS_Type I Op	tl 🕂	Apply
Use Name Override:	SEARCH_TS_Type I Op	ot I	Close
Description:			< Previous
Feature Definition:	TemplateMiscellaneous	~	Next >
Parent Component:		~ +	
Display Rules:			Edit
Exclude From Top/B	ottom Mesh		
End Condition Propertie Target Type: Feature [^p riority:	1
Feature Definition:	✓ TrafficSeparatorType	Benching Count:	0
		No Datum	
Horizonta Offsets: 0.000000	al Vertical	Rounding Length	0.000000

To create a Trigger Line you can right-click in the editor and select "Add New Component > End Condition" and draw a line horizontally from where you want to begin the search to a point in the direction of the search. You could then set the Target Type to "Feature Definition Horizontal" and the choose the desired target Feature Definition.

> To Use the Predefined Standard Search Line (Trigger)

A default Trigger Line is provided in the CIVIL FDOT ORD.ITL file. It is named "Standard Search Line (Trigger)" and can be found in the End Conditions folder.:

- 1. Drag the Standard Search Line (Trigger) component into your template.
- 2. Set the *Target Feature* in the trigger line properties.
- 3. Edit the component to be controlled by the trigger line and make the trigger line the *parent component*.

EXERCISES

In this exercise Trigger Lines are used to change from a paved shoulder to a curbed section through the turn lane.

OPTIONAL: To prepare your computer for the next set of exercises:

- *a)* Delete the C:\WorkSets\FDOT\22049555201_CE\ folder.
- b) Open the ComprehensiveTemplateDesign folder on the desktop and expand the DataSets folder.
- c) Extract the CT22049555201_CE_Chapter6.zip file in the C:\WorkSets\FDOT\ folder.
- d) Note the paved shoulder on US 98 has been changed to Type F Curb and Gutter along the right turn lane.

- **Note** Steps 1-7 (loading Create Template preferences) are only needed if MicroStation was closed and restarted.
- 1. Open the MODLRD_TemplateDesign01.dgn*MODLRD_TemplateDesign01.dgn* file of the current workset. C:\WorkSets\FDOT\22049555201\Roadway\ folder
- 2. Use the **F12** key to launch the **Create Template** dialog. If the ITL is named properly the Project ITL file should already be loaded.



- **Note** The FDOTConnectXX.XX workspace provides some predefined preferences that are useful when working with templates. These preferences should be loaded for each new MicroStation session.
- 3. Select **Tools > Options** from the menu.
- 4. On the **Template Options** dialog press the **Preferences** button.
- 5. On the Preferences dialog, select **FDOT** from the list and press **Load**.
- *Note* You can also double-click FDOT to load the preferences.

Preferences	X
Name: Default	Close
FDOT	Load
	Save
	Save As
	Delete
	Rename
	Help
Preference 'FDOT' loaded	

Template Options				 X
Naming Options Component Seed N				OK Cancel
Specify:			- [Preferences
Point Seed Name:		•		Help
Apply Affixes	Prefix	Suffix		
Left:				
Right:				
Step Options				
X: 0.100000	Y: 0.10	0000 SI	ope:	0.00%

- 6. Press the **Close** button to return to the **Template** Options dialog.
- **Note** Notice that Left and Right Prefixes have been defined and the Step Options have been set to a tenth. The step options allow the components being dragged into the active template to snap onto the grid at one tenth of a foot intervals.
- 7. Press OK to close the Template Options dialog

Template Options	
Naming Options Component Seed Name:	OK Cancel
Specify:	Preferences
Point Seed Name:	▼ Help
Apply Affixes Prefix	Suffix
Left: LT_	
Right: RT_	
Step Options	
X: 0.100000 Y: 0.1	100000 Slope: 0.00%

Exercise 6.2 Stacking Conditions

To make for easy maintenance of the template it is a best practice to stack variable conditions above or below the connection point instead of putting multiple components on top of each other. This exercise will be adding a second condition that can be triggered on as needed.

- 1. Use F12 to open the Create Template dialog.
- 2. Navigate to the Corridor Templates folder and double-click on the US98 template to make it active.
- 3. Right-click on the US98 *template* and select Copy from the *context* menu.

Create Template				
File Edit Add	Tools			
Template Library:	DOT\22049555201 List s pplates se not in training guit b_Driveway cross slope correcti	Current Templa Name: Description: 7.5	ste US98 Is Tunnel Temp	late
→ SR61 in → SR61 in → SR61 L → SR61 R → SR61 R → SR61 R → Travel L ↓ SP40	side TS 1 1	6.5····· 6.0····· 5.5·····		
🖂 US	Set Active			
VIS 🚞 End Co	Cut		Ctrl-X	
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Surface	Delete		Del	· · · · ·
FDOT	Rename		F2	÷
🛏 US98-1	Template Docum	nentation Link		T_DI

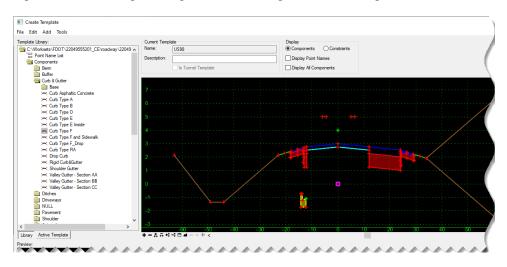
4. Right-click on the **Corridor Templates** folder and select **Paste** from the *context* menu. A copy of the template will be made with a **3** appended to the *name*.

Create Template File Edit Add Tools			
Template Library: C:\Worksets\FDOT\2 [™] Point Name List Components	22049555201 <u></u>	Current Templ Name: Description:	ate US
Comidor Tempini Examples	New	>	
→ DropCurb → BBB98 c	Cut	Ctrl-X	
SR61 ins	Сору	Ctrl-C	
→ SR61 ins	Paste	Ctrl-V	
SR61 Ins SR61 L SR61 L1 SR61 R	Delete Rename	Del F2	
 ✓ SR61 R1 ✓ Travel Lane ✓ US98 ✓ US981 ✓ US982 ✓ US983 ✓ End Conditions ✓ Existing Feature T ✓ Fxisting Pavement 		5.5 · · · · · · · · · · · · · · · · · ·	· · · ·

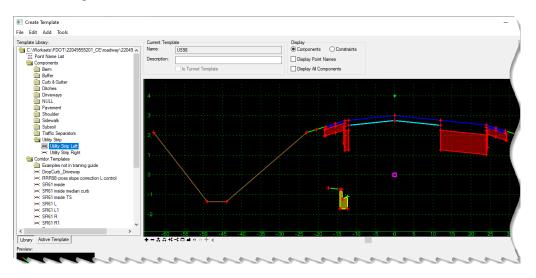
Exercise 6.3 Type F Curb & Gutter Condition

The right turn lane has Type F Curb and Gutter instead of paved shoulders so another condition needs to be accounted for in the template.

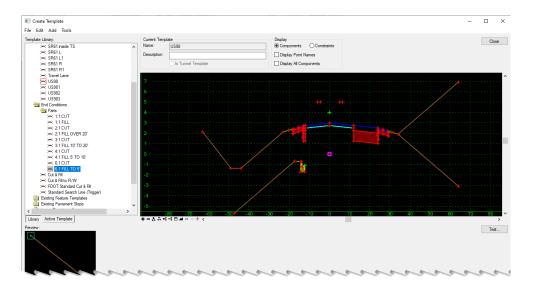
- 1. Navigate to the Components\Curb & Gutter folder and select the Curb Type F component.
- 2. While dragging the **Curb Type F** into the template press **Ctrl+R** on the keyboard to *Reflect* the component and then drop it a couple feet below the paved should component.



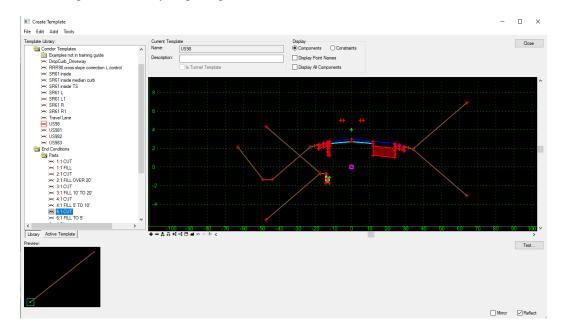
- 3. Navigate to the Components\Utility Stripe folder and select the Utility Strip Left component.
- 4. While dragging the **Utility Strip** into the template press **Ctrl+R** on the keyboard to toggle **Off** *Reflect* and then drop it on the back of curb.



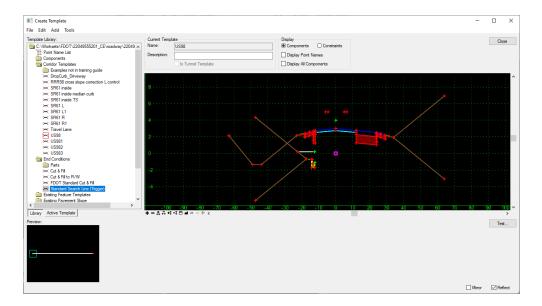
- 5. Navigate to the End Conditions\Parts folder and select the 6:1 Fill TO 5' component.
- 6. While dragging the 6:1 Fill TO 5' into the template press Ctrl+R on the keyboard to toggle On *Reflect* and then drop it on the utility strip component.



- 7. Navigate to the End Conditions\Parts folder and select the 6:1 CUT component.
- 8. While dragging the **6:1 CUT** into the template press **Ctrl+R** on the keyboard to toggle **On** *Reflect* and then drop it on the utility strip component.



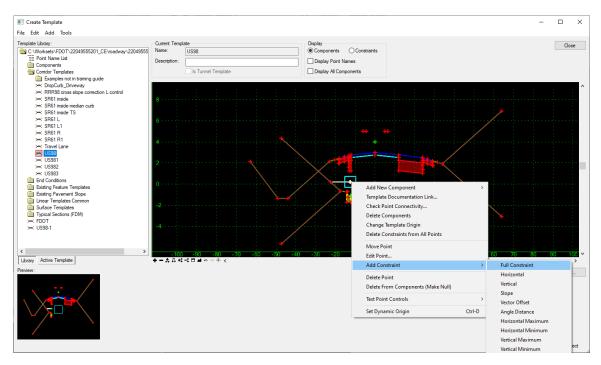
- 9. Navigate to the End Conditions folder and select the Standard Search Line (Trigger) component.
- 10. Drag the Standard Search Line (Trigger) and drop it just above the Type F Curb component.



Exercise 6.4 Constraining Conditions Together

Now that the additional components have be placed, point constraints must be defined tying the new components to the original template. This way each of the conditions will be constrained to the proper location.

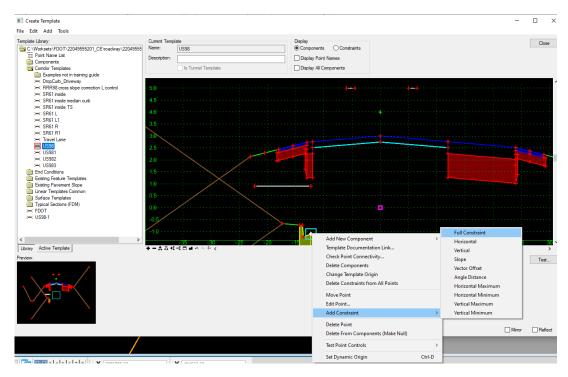
1. Right-click on the **green point** on the *trigger line* and select **Add Constraint > Full Constraint** from the *context* menu then select the **green point** on the *Curb Type F component*.



2. Set the *Horizontal Offset* value to Zero and the *Vertical Offset* Value to 2.0 and press OK.

Add Full Constraint	X
Horizontal Offset:	ОК
Vertical Offset:	Cancel
2.000000	Help

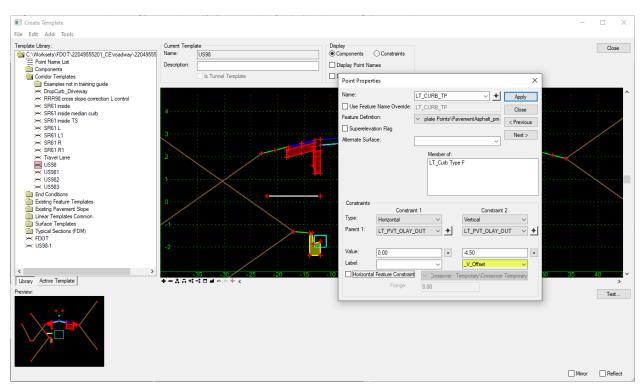
3. Right-click on the **green point** on the *curb* and select **Add Constraint > Full Constraint** from the *context* menu then select the top outside point of the **widening** *component* where the curb should be placed when displayed.



4. Set the *Horizontal Offset* value to **Zero** and the *Vertical Offset* value to **-4.5** and press **OK**.

Add Full Constraint	x
Horizontal Offset:	ОК
0.000000	Cancel
Vertical Offset: -4.500000	Help
-4.500000	Help

5. Double-click on the LT_CURB_TP and add the Label _V_Offset to the *Vertical constraint*. This will allow you to override the Vertical Value with a Parametric Constraint Value of zero in the corridor making all of the components move to their correct location.

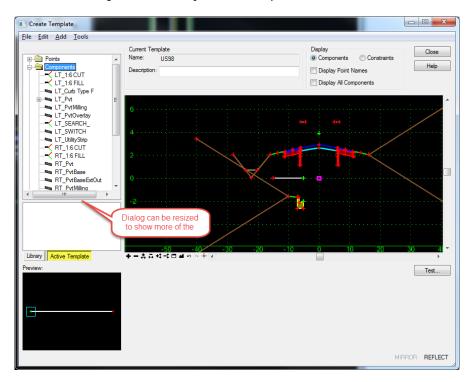


6. Press Apply and then Close to return to the Create Template dialog.

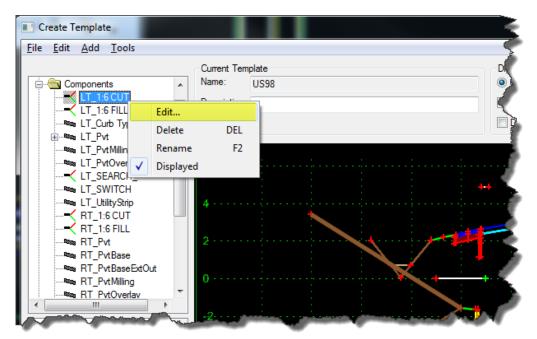
Exercise 6.5 Defining Parent \ Child Relationships

Now that the points are properly constrained, parent\child relationships must be defined. This will make for easier management of the template because display rules only need to be applied to the upper most relationship in the hierarchy.

1. Select the Active Template tab and expand the Components folder.



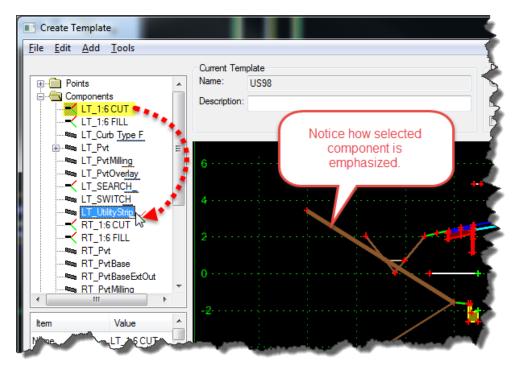
2. Left-click on the LT_1:6 CUT *component* and select Edit from the *context* menu.



3. On the Component Properties dialog, notice that *Parent Component* is undefined. Press **Close** to return to the **Create Template** dialog.

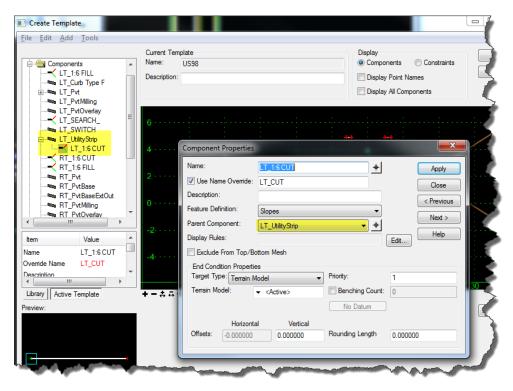
Component Properties			— X —
Name:	LT_1:6 CUT	+	Apply
Use Name Override:	LT_CUT		Close
Description:			< Previous
Feature Definition:	Slopes	▼	
Parent Component:		+	Next >
Display Rules:			Edit
Exclude From Top/Bo	ottom Mesh		
End Condition Propertie Target Type: Terrain M		Priority:	1
	✓ <active></active>	Benching Count:	0
		No Datum	
Horizonta Offsets: -0.000000	al Vertical 0.000000	Rounding Length	0.000000

- 4. Select the *LT_1:6 CUT component*.
- 5. Drag and drop LT_1:6 CUT on the *LT_UtilityStrip component*.

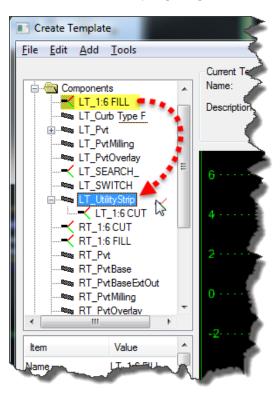


6. Left-click on the LT_1:6 CUT *component* and select Edit from the *context* menu.

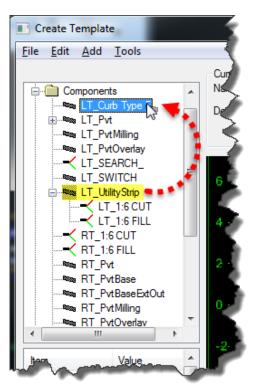
7. On the Component Properties dialog, notice that *Parent Component* is now *LT_UtilityStrip*. Press Close to return to the Create Template dialog.



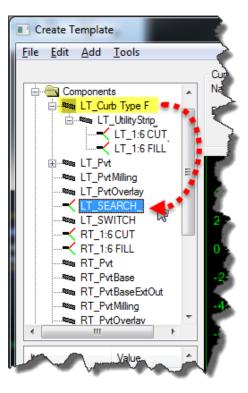
8. Drag and drop LT_1:6 FILL on the *LT_UtilityStrip component*.



9. Drag and drop LT_UtilityStrip on the *LT_Curb Type F component*.



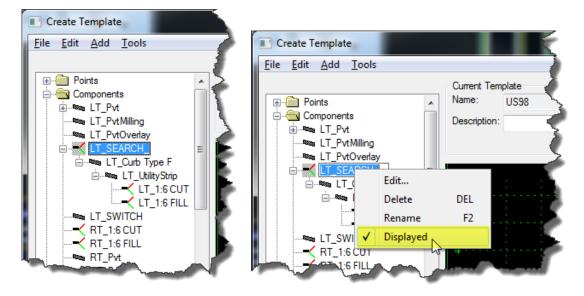
10. Drag and drop **LT_Curb Type F** on the *LT_SEARCH_ component*.



Exercise 6.6 Testing Relationships

Now everything should be constrained as shown below. To test the relationships the display of the LT_SEARCH_ component can be toggled Off. If properly configured, the new curb and everything connected to it will disappear.

1. Right-click on LT_SEARCH_ and toggle Off Displayed to see what all turns off.



Note You can see how turning off the "Trigger Line" (LT_SEARCH_) turns off all related components.

2. Right-click on LT_SEARCH_ and toggle On Displayed.

Exercise 6.7 Configuring Trigger Line Component

Now that the relationships are defined, the trigger line needs to be configured to search for a specific Feature or Element.

- 1. Double-click on the *trigger line* (LT_SEARCH_)
- 2. Ensure **Target Type** is *Feature Definition Horizontal* and select **CurbGutterTypeF** from the *Feature Definition* drop-down list.

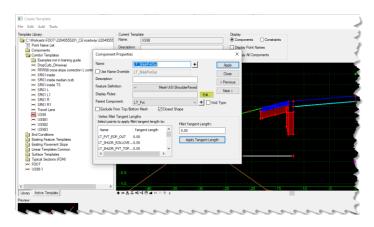
Create Template			- 🗆 ×
File Edit Add Tools			
Hie Eatt Add Tools Ternalde Libray: C:Worksets/FDOT 22049555201_CEvoadway/22049555 E Point Name Lat Components Condor Templates Condor Templates Con	Current Template Name: US36 Description: Is Turnel Template 5 Double Click trigger line to	Deplay Occupations Constraints Deplay Point Names Deplay Al Components	Cose
Sriel L S		Component Properties X Name: SEARCH Vee Name Overide: UT_SEARCH Descripton: Feature Definition: Daplay Rules:	
Contraction of the second seco	.45 -347 -345 -30 -25 -30 -15 -3 +-4,न.4-1 ⊟ # ० ः 4 र	Parert Component: Parent Component: Esclude From Top/Bottom Meth For Condon Propetes Target Type: Feature Definition Hotzontal Feature Definition: Voto Gutter Type F Feature Definition: No Datum Hotzontal Offsets: Offsets: Offsets: Offsets: Offsets: Definition: Definition: Definition: Definition: Definition: Parent Length: Definition: Definition: Definition: Definition: Definition: Definition: Parent Length: Definition: Definition:	60 65 70 Test

3. Press **Apply** and **Close** on the **Component Properties** dialog to return to the **Create Template** dialog.

Exercise 6.8 Display Rule

With the trigger line configured to turn on when a line with the Feature CurbGutterTypeF is found, the paved shoulder needs to be updated to turn off when the curb turns on. This will be handled by creating a Display Rule on the paved shoulder that checks for the trigger line.

- 1. Double-click on the shoulder pavement component.
- 2. On the Component Properties dialog press the Edit button.



- 3. Select the SEARCH_ Display Rule, press NOT and then press Selected Rule.
- 4. When the *Conditional Expression* reads **NOT SEARCH_** press **OK** to return to the **Component Properties** dialog.

	isplay Conditional Expression					
AND OF		Selected Rule		A v		OK Cancel Help
Femplate Display F Name	Rules Type	Expression	Test	Value	Result	
LT SWITCH1	Horizontal	LT SWITCH1.LT SWITCH		1.000000	False	
LT_SWITCH1	Horizontal Horizontal	LT_SWITCH1 - LT_SWITCH LT_SWITCH1 - LT_SWITCH	1	1.000000	False False	
LT_SWITCH1 LT_SWITCH2 LT_SWITCH3		LT_SWITCH1 - LT_SWITCH	-			
LT_SWITCH2	Horizontal			2.000000	False	
LT_SWITCH2 LT_SWITCH3	Horizontal Horizontal	LT_SWITCH1 · LT_SWITCH LT_SWITCH1 · LT_SWITCH		2.000000 3.000000	False False False	
LT_SWITCH2 LT_SWITCH3 LT_SWITCH4	Horizontal Horizontal Horizontal	LT_SWITCH1 - LT_SWITCH LT_SWITCH1 - LT_SWITCH LT_SWITCH1 - LT_SWITCH	1	2.000000 3.000000 4.000000	False False False False	
LT_SWITCH2 LT_SWITCH3 LT_SWITCH4 LT_SWITCH5	Horizontal Horizontal Horizontal Horizontal	LT_SWITCH1 - LT_SWITCH LT_SWITCH1 - LT_SWITCH LT_SWITCH1 - LT_SWITCH LT_SWITCH1 - LT_SWITCH	:	2.000000 3.000000 4.000000 5.000000	False False False False	
LT_SWITCH2 LT_SWITCH3 LT_SWITCH4 LT_SWITCH5 RT_SWITCH1	Horizontal Horizontal Horizontal Horizontal Horizontal	LT_SWITCH1 - LT_SWITCH LT_SWITCH1 - LT_SWITCH LT_SWITCH1 - LT_SWITCH LT_SWITCH1 - LT_SWITCH RT_SWITCH1 - RT_SWITCH	:	2.000000 3.000000 4.000000 5.000000 1.000000	False False False False False	
LT_SWITCH2 LT_SWITCH3 LT_SWITCH4 LT_SWITCH5 RT_SWITCH1 RT_SWITCH2 RT_SWITCH3 RT_SWITCH4	Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal	LT_SWITCH1 - LT_SWITCH LT_SWITCH1 - LT_SWITCH LT_SWITCH1 - LT_SWITCH LT_SWITCH1 - LT_SWITCH RT_SWITCH1 - RT_SWITCH RT_SWITCH1 - RT_SWITCH	:	2.000000 3.000000 4.000000 5.000000 1.000000 2.000000	False False False False False False	
LT_SWITCH2 LT_SWITCH3 LT_SWITCH4 LT_SWITCH5 RT_SWITCH1 RT_SWITCH2 RT_SWITCH3 RT_SWITCH4 RT_SWITCH5	Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal	LT_SWITCH1 - LT_SWITCH LT_SWITCH1 - LT_SWITCH LT_SWITCH1 - LT_SWITCH RT_SWITCH1 - RT_SWITCH RT_SWITCH1 - RT_SWITCH RT_SWITCH1 - RT_SWITCH RT_SWITCH1 - RT_SWITCH RT_SWITCH1 - RT_SWITCH	-	2.000000 3.000000 4.000000 5.000000 1.000000 2.000000 3.000000	False False False False False False False	
LT_SWITCH2 LT_SWITCH3 LT_SWITCH4 LT_SWITCH4 LT_SWITCH1 RT_SWITCH2 RT_SWITCH3 RT_SWITCH4 RT_SWITCH5 SEARCH_	Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal Component is Displayed	LT_SWITCH-LT_SWITCH LT_SWITCH-LT_SWITCH LT_SWITCH-LT_SWITCH LT_SWITCH-LT_SWITCH T_SWITCH-LT_SWITCH RT_SWITCH-RT_SWITCH RT_SWITCH-RT_SWITCH RT_SWITCH-RT_SWITCH RT_SWITCH-RT_SWITCH RT_SWITCH-RT_SWITCH	-	2.00000 3.00000 4.00000 5.00000 1.00000 2.00000 3.00000 4.00000 5.00000	False False False False False False False False False False True	
LT_SWITCH2 LT_SWITCH3 LT_SWITCH4 LT_SWITCH5 RT_SWITCH1 RT_SWITCH2 RT_SWITCH3 RT_SWITCH4 RT_SWITCH5	Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal	LT_SWITCH1 - LT_SWITCH LT_SWITCH1 - LT_SWITCH LT_SWITCH1 - LT_SWITCH RT_SWITCH1 - RT_SWITCH RT_SWITCH1 - RT_SWITCH RT_SWITCH1 - RT_SWITCH RT_SWITCH1 - RT_SWITCH RT_SWITCH1 - RT_SWITCH	-	2.000000 3.000000 4.000000 5.000000 1.000000 2.000000 3.000000 4.000000	False False False False False False False False False	

5. Back on the Component Properties dialog, you will see that the *Display Rules* field has been populated. Press **Apply** and then **Close** to return to the **Create Template** dialog.

Name:	LT_ShldrPvtOut +	Apply
Use Name Override:	LT_ShldrPvtOut	Close
Description:		< Previous
Feature Definition:	ShoulderPaved 👻	
Parent Component:	LT_Pvt +	Next >
Display Rules:	NOT SEARCHEdit	Help

6. Select File > Save from the menu and Close the Create Template dialog.

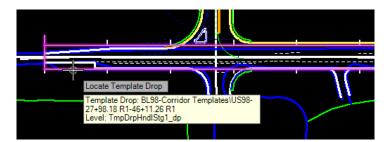
Exercise 6.9 Adding Corridor References

To see the changes the template must be synchronized and a corridor reference must be added so the trigger line can see the curb and gutter.

 From the Ribbon select the Synchronize Template Tool from the Corridor Tab Miscellaneous Group select the Synchronize Template. OPENROADS MODELING>MISCELLANEOUS>Synchronize Template

👔 OpenRoads Modeling 💿 💀 😑 🖶 🎼 🎼 🦘 🔹 🗧 🗧 C:\Worksets\FDOT\22049555201_CE\roadway\MODLRD_TemplateDesign01.dgn																
File	Home Terra	in Geomet	try Site	Corridors	Model Detailing	Drawing Pro	duction	Drawing	Utilities	Collab	orate	View	Help	FDOT		
°€ ∎ • ©: Primary	Element Selection	New Corridor Tem	New 4	Copy Templat Import IRD Transitions	e Drop 💦 Template	Edit Template Drop Edit	Edits	Corri Corri	e Target Aliasing dor References dor Clipping * Miscellaneous	-	Create	Calculate	÷	Dynamic Sections *	3D Drive Through Review	Corridor Reports *
					•			L L	viiscellaneous		30	perelevati	on		Review	
💕 No Feature Definition 🛛 💽 🚅 🚔 📥 🔶 🎢 🖾 🚱																
Synchronize Template																

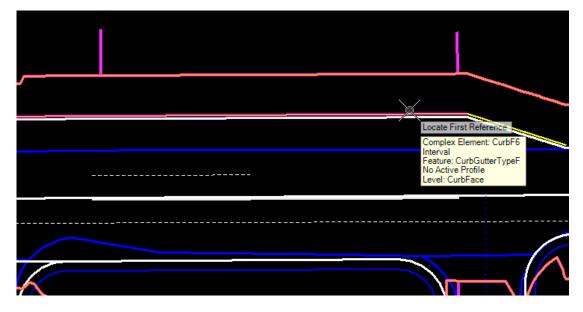
2. When prompted on the cursor to *Locate Template Drop*, select the **corridor boundary**.



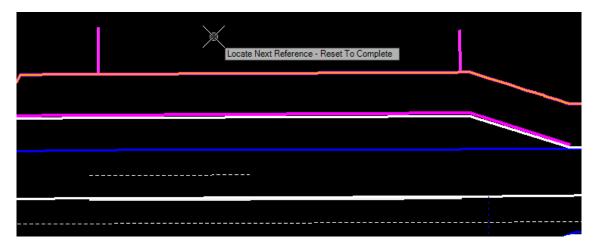
- 3. Press **F6** on the keyboard to get out of the current command and start the **Element Selection** tool.
- 4. Select a **corridor handle** sticking out from the boundary and then hover the mouse over it to get the *context* menu.
- 5. Select the 5th icon on the *context* menu to open the dropdown and select Add Corridor Reference.



6. When prompted, select both of the **curb lines** on the *right turn lane*.



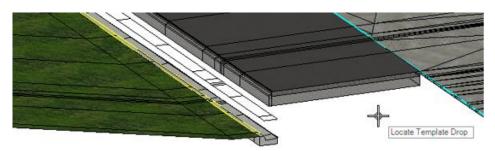
7. When both are selected, **Reset** (right-click) to complete the process.



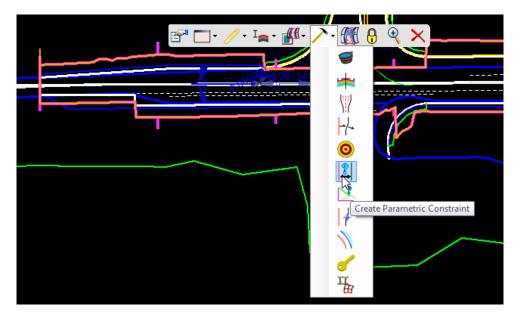
Exercise 6.10 Fixing Vertical Offset with Parametric Constraints

The corridor will reprocess showing the Curb section. The Vertical Offset from the template will remain until a Parametric Constraint is applied.

1. Select a **corridor handle** sticking out from the boundary and then hover the mouse over it to get the *context* menu.



2. Select the 6th icon on the *context* menu to open the dropdown and select Create Parametric Constraint.



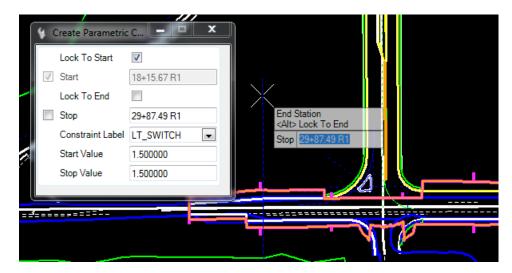
3. When prompted for the *Start Station*, press the **Alt** key on the keyboard to lock the station to the beginning of the corridor.

	% (Create Parametric	: C 🗖 🗖	x			
		Lock To Start					
		Start	30+01.26 R1				
-		Lock To End					
		Stop	18+15.67 R1				
2		Constraint Label	LT_SWITCH	•			
1		Start Value	1.500000		Start Station <alt> Lock To Start</alt>		
1		Stop Value	1.500000		Start 30+01.26 R1		
						17.1	
Ŧ	4						
						ÌΪ.	

4. **Data Point** (left-click) to accept the *Start Station*.



5. When prompted for the End Station, press the Alt key on the keyboard to lock the station to the end of the corridor.



6. Data Point (left-click) to accept the End Station.

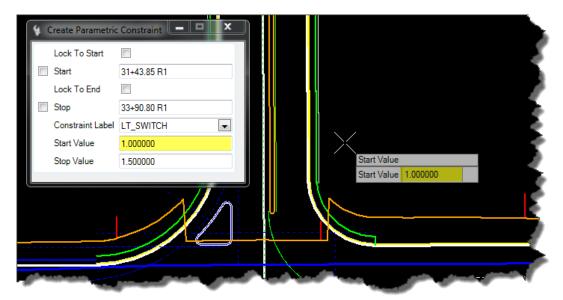
Lock To Start Start Lock To End Stop Constraint Label Start Value Stop Value	 ✓ 18+15.67 R1 ✓ 46+11.26 R1 LT_SWITCH ▼ 1.500000 1.500000 	End Station <alt> UnLock From End Stop 46+11.26 R1</alt>	

7. When prompted for the *Constraint Label* choose _V_Offset from the drop-down on the Create Parametric Constraint dialog

<OR> use the up and down arrows on the key board to select V_Offset from the cursor and then **Data Point** (left-click) to Accept.

🚯 Create Parametric	: C 💻 💷 🗙		
Lock To Start			
✓ Start	18+15.67 R1		
Lock To End	\checkmark		
Stop	46+11.26 R1		
Constraint Label	_V_Offset		
Start Value	-4.500000		
Stop Value	-4.500000	Constraint Label	
		Constraint Label	
1			

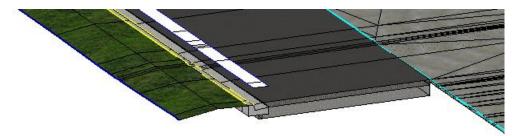
8. When prompted for the *Start Value* key in **Zero** and press **Enter** then **Data Point** (left-click) to Accept.



- х Create Parametric C... u Lock To Start 1 18+15.67 R1 ✓ Start 1 Lock To End ✓ Stop 46+11.26 R1 Constraint Label _V_Offset • Start Value 0.000000 Stop Value 0.000000 Stop Value Stop Value 0.000000
- 9. When prompted for the *Stop Value* key in **Zero** and press **Enter** then **Data Point** (left-click) to Accept.

Note

The corridor will reprocess attaching the curb to the pavement.



10. Click on the title bar of *View 2* to give it focus and then press F7 to turn Off construction elements.

