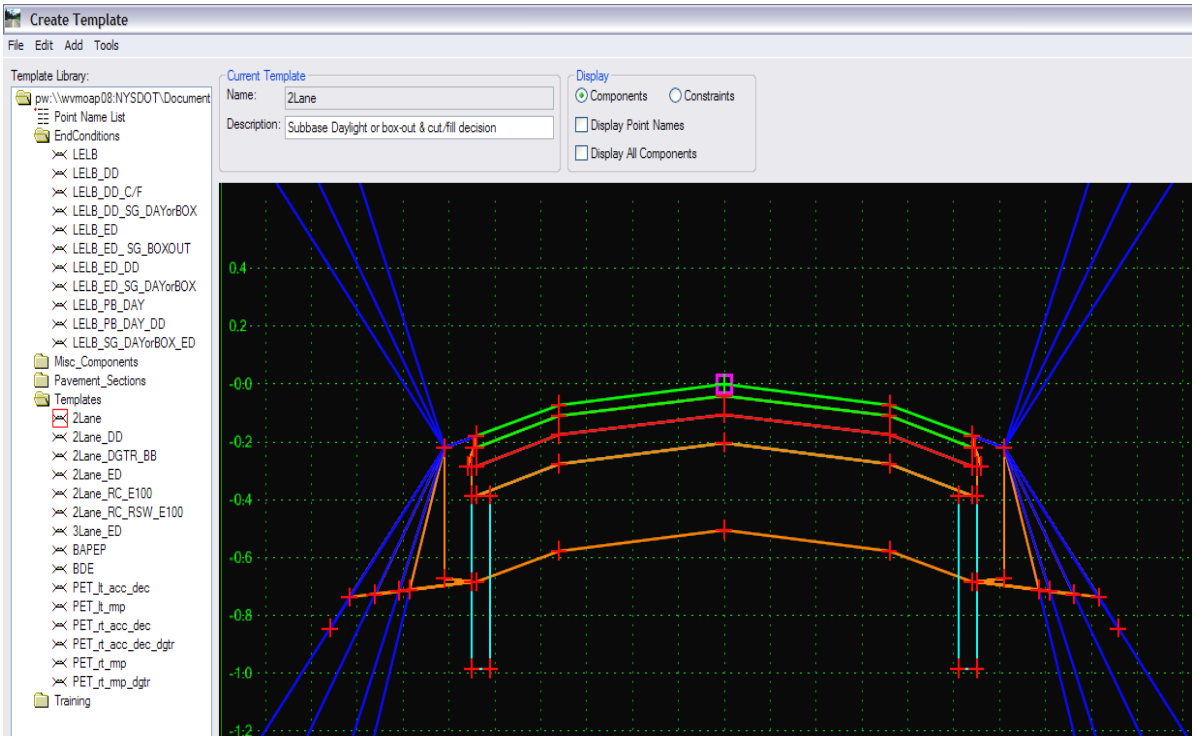
COURSE 330

INROADS XM–TEMPLATE LIBRARY



July 2010

NEW YORK STATE DEPARTMENT OF TRANSPORTATION

Course Prerequisites

The following is a list of requirements that must be met by a student before entering class:

- √ Should have MicroStation experience
- √ Introduction to InRoads XM—Version 8.09; or InRoads XM Data and Environment
- √ Horizontal Alignments and Cross Sections Course
- √ Vertical Alignments and Profiles Course
- √ Should have experience with InRoads Alignments

Disclaimer: *The Material within this book is for the purpose of teaching the use of InRoads XM as a Design Tool.*

Please refer to Design Procedural and Standards Manuals, such as the "Highway Design Manual" and others, for Specific Guidance on your Project's Design.

Any representation of Design Documents contained within are subject to change. Please, consult latest version of Design Documents.

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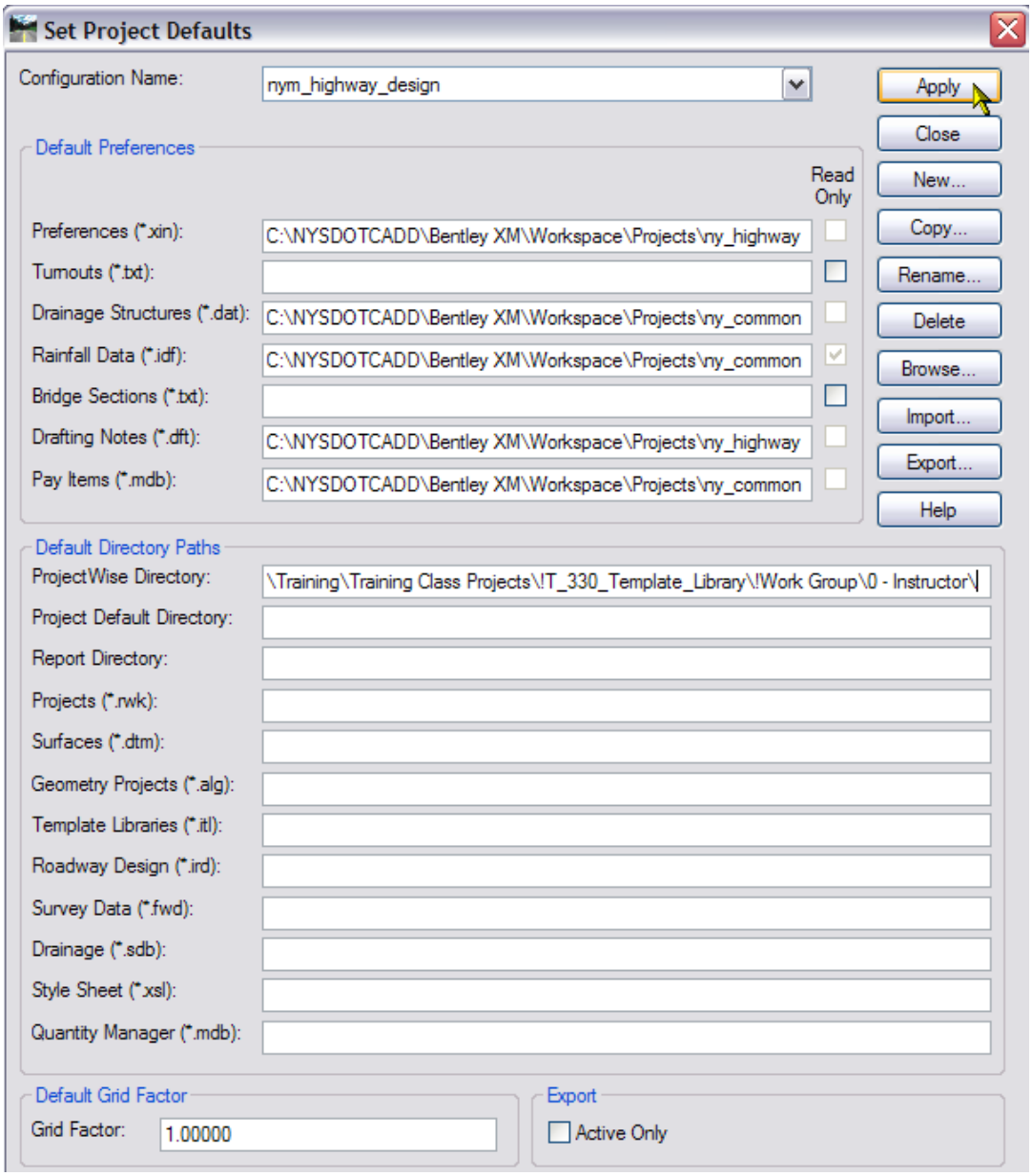
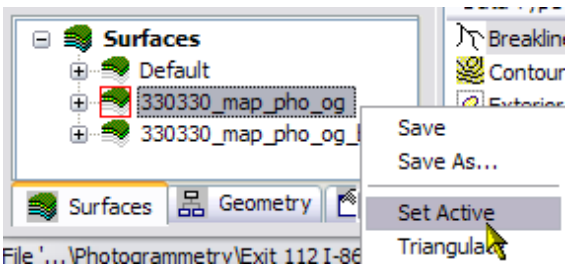
Chapter 1

Getting Started

In this chapter you will create a Template Library File from a Seed Document. You will open a MicroStation Design File, open InRoads, Create Project Defaults, and Open InRoads Files.


Set Project Defaults
Configuration Name:
nym_highway_design
Apply
Close
New...
Copy...
Rename...
Delete
Browse...
Import...
Export...
Help
Default Preferences
Read Only
Preferences (*.xin):
C:\NYSDOTCADD\Bentley XM\Workspace\Projects\ny_highway
Turnouts (*.txt):
Drainage Structures (*.dat):
C:\NYSDOTCADD\Bentley XM\Workspace\Projects\ny_common
Rainfall Data (*.idf):
C:\NYSDOTCADD\Bentley XM\Workspace\Projects\ny_common
Bridge Sections (*.txt):
Drafting Notes (*.dft):
C:\NYSDOTCADD\Bentley XM\Workspace\Projects\ny_highway
Pay Items (*.mdb):
C:\NYSDOTCADD\Bentley XM\Workspace\Projects\ny_common
Default Directory Paths
ProjectWise Directory:
\Training\Training Class Projects\!T_330_Template_Library\!Work Group\0 - Instructor\
Project Default Directory:
Report Directory:
Projects (*.rwk):
Surfaces (*.dtm):
Geometry Projects (*.alg):
Template Libraries (*.itl):
Roadway Design (*.ird):
Survey Data (*.fwd):
Drainage (*.sdb):
Style Sheet (*.xsl):
Quantity Manager (*.mdb):
Default Grid Factor
Grid Factor:
1.00000
Export
Active Only


Surfaces
Default
330330_map_pho_og
330330_map_pho_og_
Save
Save As...
Set Active
Triangulate
Surfaces
Geometry

1) **Open the MicroStation Design File.**

The instructor will give directions on what log-in to use and where the lab files are located in ProjectWise

Open the MicroStation design file **330330_fea_rwy_tmp.dgn**

2) **Create Project Template Library File from Seed Folder**

Copy nym_standard.itl from **Seed Folder to Student Folder.**

Rename the Template Library file, **330330_fea_rwy.itl**

3) **Open InRoads, Create the Project Default and Open InRoads Files**

Create the Project Defaults by setting the **Default Directory Path, ProjectWise Directory**, to the class **Student Folder**.

Open the InRoads files from your **Student Folder**.

330330_fea_rwy.alg
330330_fea_rwy.itl (Copy of Standard .itl)

Open the Original Ground DTM's as **"Read Only"** from the Photogrammetry Folder.

330330_map_pho_og.dtm
330330_map_pho_og_b.dtm

4) **Set the Active Surface**

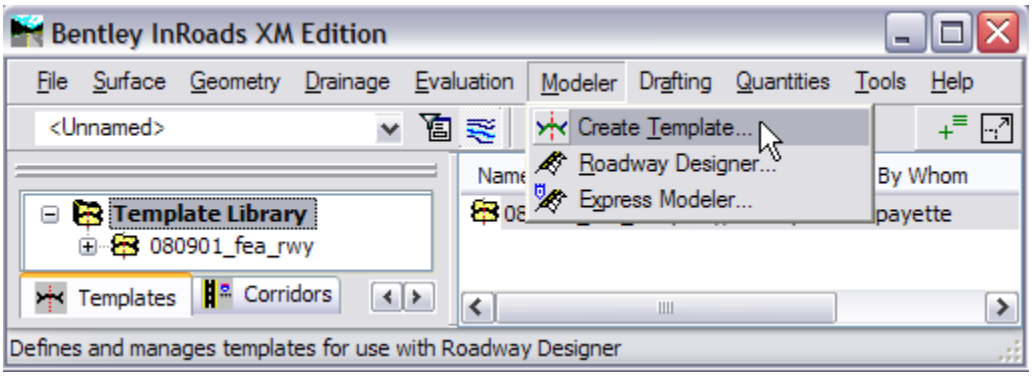
Set Active Surface to **330330_map_pho_og.dtm.**

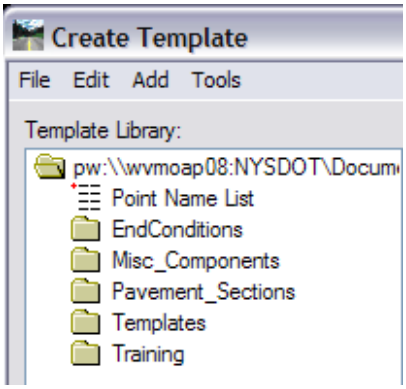
Chapter 2

Create Template Dialog Box

This chapter will introduce you to the Create Template Dialog Box. Create Template remains under InRoads “Modeler” tools. However, the Create Template command has been rewritten. The file extension for Template Libraries is *.itl. Only one Template Library can be open at a time.

The Create Template dialog box is the primary place for creating and editing templates. In this chapter, the various parts of the Create Template Dialog Box will be explored. Later chapters will explain in detail how templates are created.


Bentley InRoads XM Edition
File Surface Geometry Drainage Evaluation Modeler Drafting Quantities Tools Help
<Unnamed>
Create Template...
Roadway Designer...
Express Modeler...
Name
By Whom
payette
Template Library
080901_fea_rwy
Templates
Corridors
Defines and manages templates for use with Roadway Designer


Create Template
File Edit Add Tools
Template Library:
pw:\\wvmoap08:NYSDOT\Docum
Point Name List
EndConditions
Misc_Components
Pavement_Sections
Templates
Training

1) **Template Library Area**

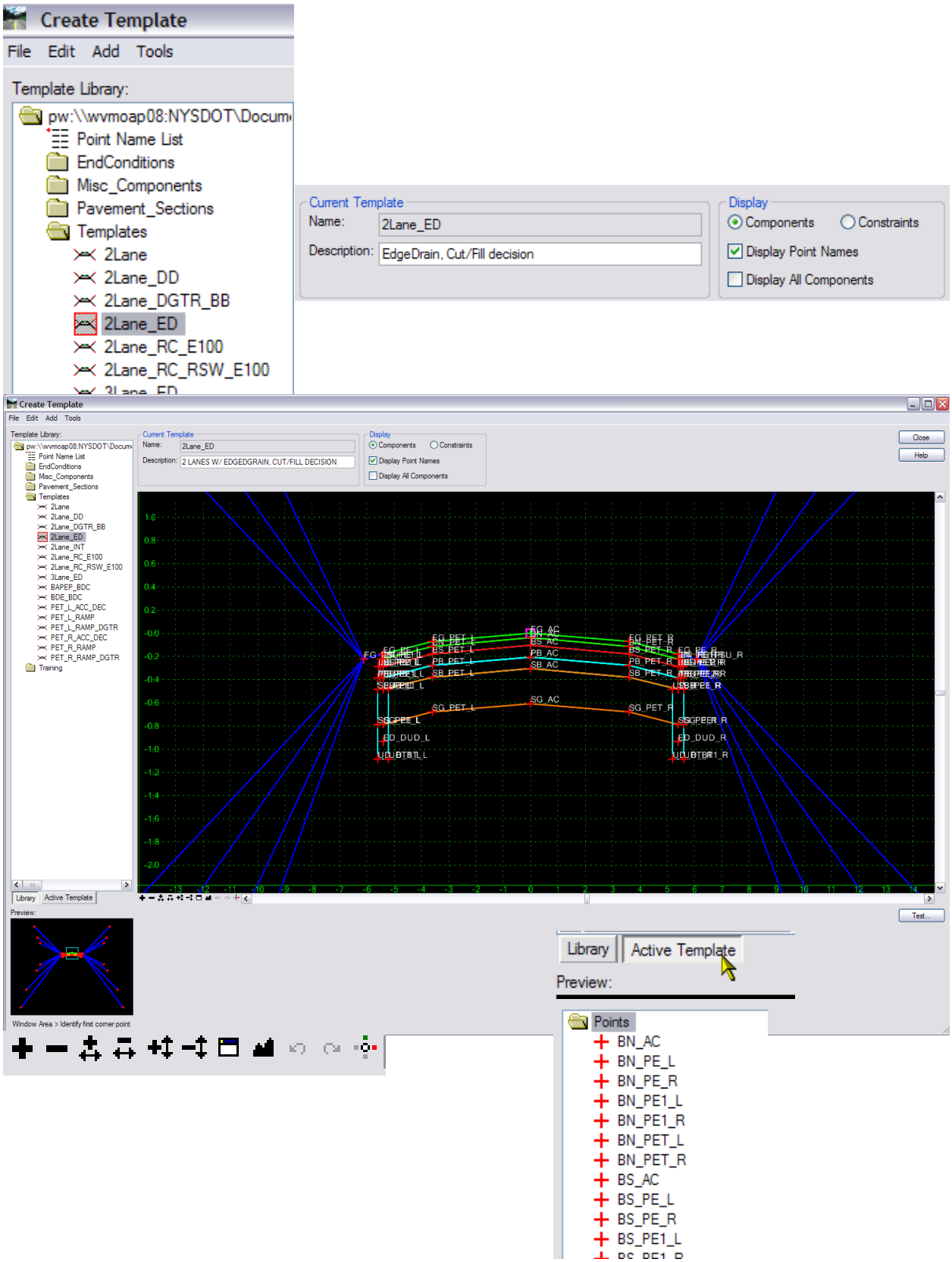
Open the Create Template dialog box, on the left side of the dialog box is the Template Library area. The Template Library area contains a "Windows like" folder structure. The root folder is the name and location of the InRoads Template Library that is currently open.

Double click on the Root Folder, which is the name and location of the InRoads Template Library which is currently open.

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 Window functions, such as drag and drop, cut and paste, etc.

The following categories are provided in the standard Template Library:

- EndConditions—Cut and Fill Slope Decisions; Subbase Daylighting for fills and ditches; box-out for cut slopes; box-out for non-daylighting subbase requirements, and other typical end conditions
- Miscellaneous_Components—Shapes, such as Gutter and Curb Details, and other detailed portions of a Template.
- Pavement_Sections—Pavement Layer Courses; Pavement Sections of Templates
- Templates—Complete templates for modeling
- Training—Templates for Training


Create Template
File Edit Add Tools
Template Library:
pw:\\wvmoap08:NYSDOT\Docum
Point Name List
EndConditions
Misc_Components
Pavement_Sections
Templates
2Lane
2Lane_DD
2Lane_DGTR_BB
2Lane_ED
2Lane_RC_E100
2Lane_RC_RSW_E100
Current Template
Name:
2Lane_ED
Description:
EdgeDrain, Cut/Fill decision
Display
Components
Constraints
Display Point Names
Display All Components
Close
Help
Test...
Library
Active Template
Preview:
Points
BN_AC
BN_PE_L
BN_PE_R
BN_PE1_L
BN_PE1_R
BN_PET_L
BN_PET_R
BS_AC
BS_PE_L
BS_PE_R
BS_PE1_L

2) **Current Template Window**

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 templates is also identified in the Current Template area next to the Template Library area. To assemble or edit a template, it must be the current template.

The Current Template window is the main graph for creating templates. This is where templates are assembled and edited. 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.

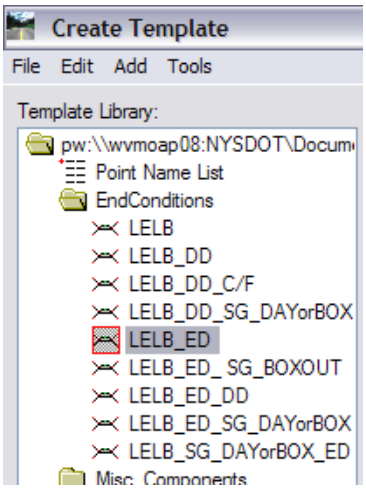
Below the graph, there are numerous view commands, similar to the MicroStation View commands. There are two buttons that look like the MicroStation “View Previous” and “View Next” command; however, they are used to undo and redo template creation operations.

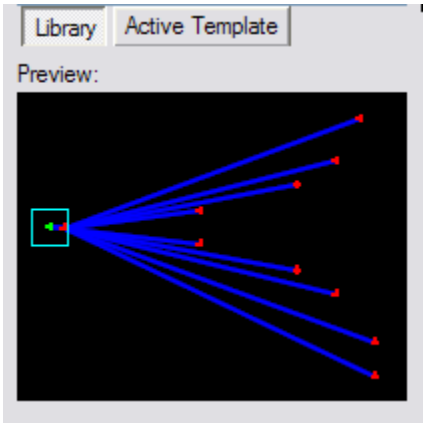
In the graph area, you can right-click to access commands and you can double-click elements in the graph for editing purposes.

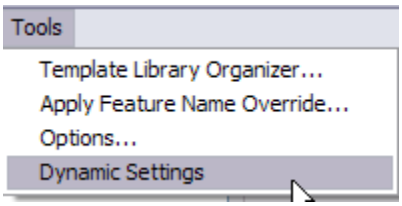
As you add template components, the area under the graph changes to allow for different types of component input. This is called the Current Component area.

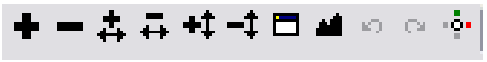
The display commands to the right of the Current Template, above the Current Template window, allow the user to turn off/on portions of the Template for viewing.

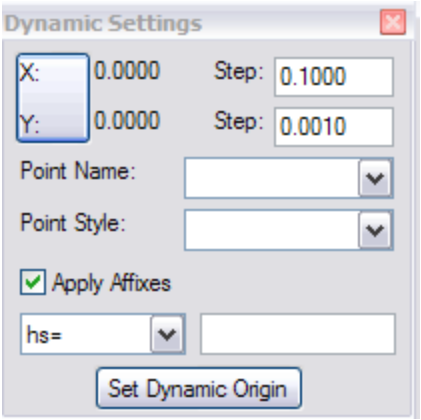
While viewing the current template, the Template Library can be switched to the Active Template mode. The Active Template properties will appear in the Template Library area.

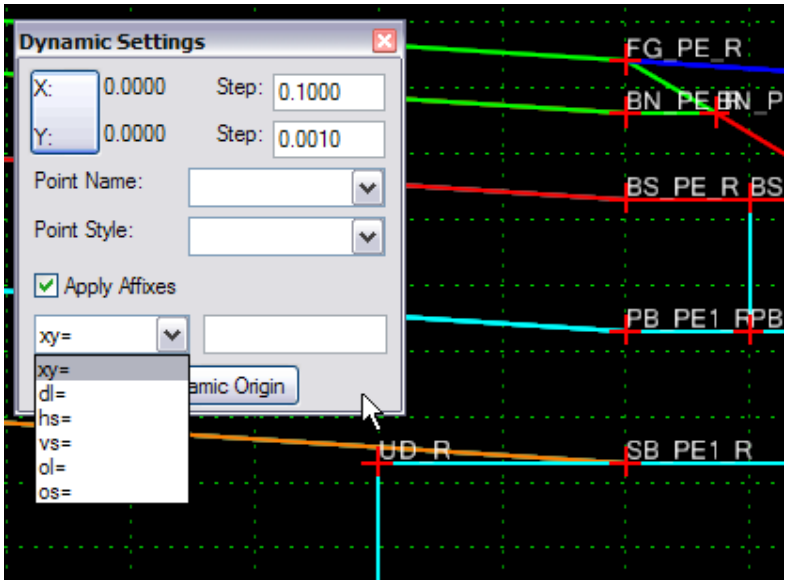

Create Template
File Edit Add Tools
Template Library:
pw:\\wvmoap08:NYSDOT\Docum
Point Name List
EndConditions
LELB
LELB_DD
LELB_DD_C/F
LELB_DD_SG_DAYorBOX
LELB_ED
LELB_ED_ SG_BOXOUT
LELB_ED_DD
LELB_ED_SG_DAYorBOX
LELB_SG_DAYorBOX_ED
Misc. Components


Library
Active Template
Preview:


Tools
Template Library Organizer...
Apply Feature Name Override...
Options...
Dynamic Settings




Dynamic Settings
X:
Y:
0.0000
0.0000
Step:
0.1000
Step:
0.0010
Point Name:
Point Style:
Apply Affixes
hs=
Set Dynamic Origin


Dynamic Settings
X:
Y:
0.0000
0.0000
Step:
0.1000
Step:
0.0010
Point Name:
Point Style:
Apply Affixes
xy=
xy=
dl=
hs=
vs=
ol=
os=
FG_PE_R
BN_PE_R
BN_P
BS_PE_R
BS
PB_PE1_R
PB
UD_R
SB_PE1_R

3) **Template Preview Window**

When you highlight a non-current template, the template is displayed in the Preview area, located under the Template Library area. The Preview area is used to assemble templates from their parts or components using drag and drop to the Current Template window graph.

The cyan-colored box in the preview represents the insertion point for any drag and drop operation. You can change the point of insertion location by clicking on the preview.

4) **Dynamic Settings**

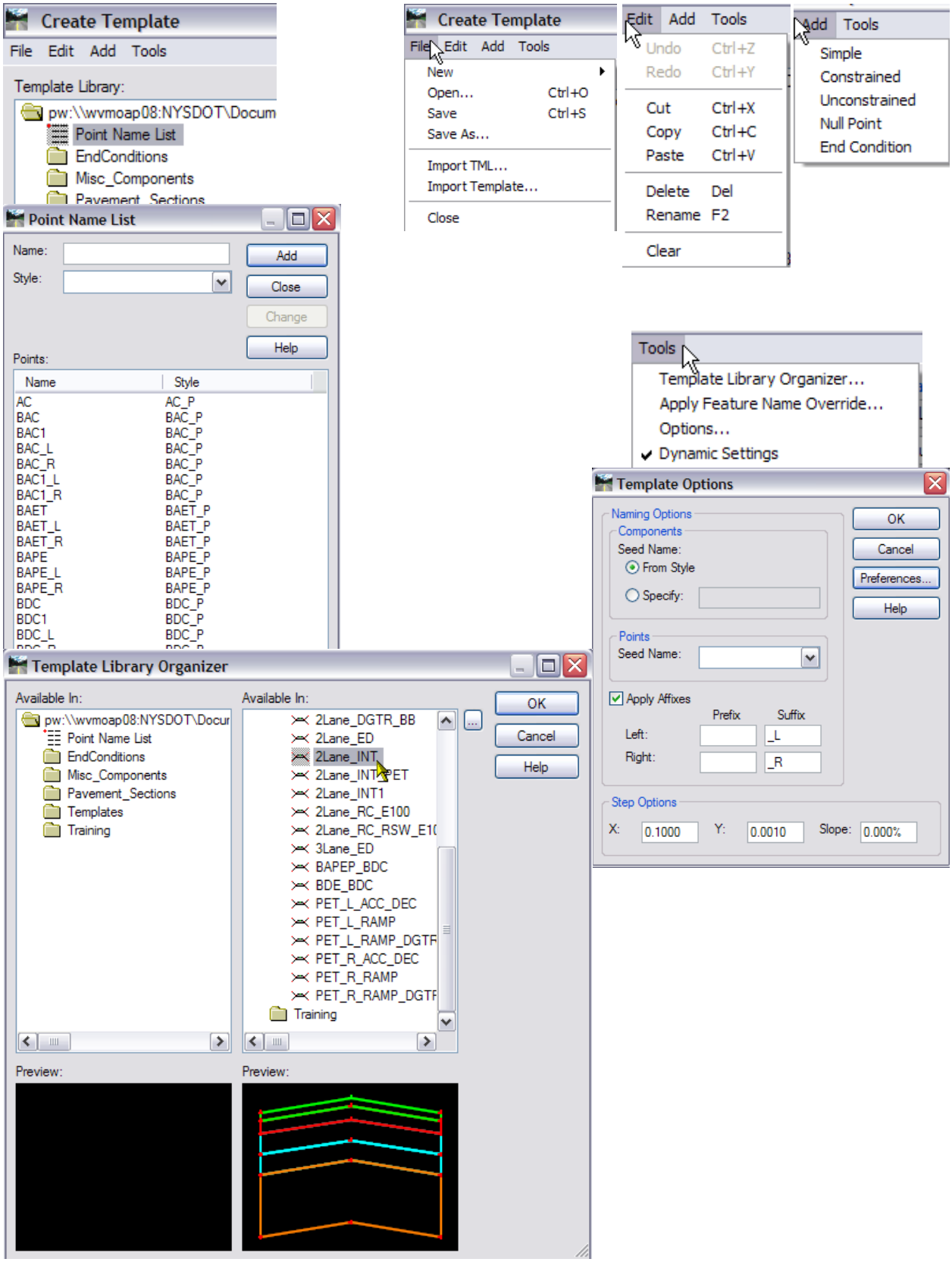
The Dynamic Settings dialog box is used for precision input of the template components, and to dynamically assign point names and style when creating components.

It is also a compass and can be used 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 box.

Below the graph, with the view control icons, is the icon for Dynamic Settings.

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
- 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


Create Template
File Edit Add Tools
Template Library:
pw:\\wvmoap08:NYSDOT\Docum
Point Name List
EndConditions
Misc_Components
Pavement_Sections
Create Template
File Edit Add Tools
New
Open... Ctrl+O
Save Ctrl+S
Save As...
Import TML...
Import Template...
Close
Edit Add Tools
Undo Ctrl+Z
Redo Ctrl+Y
Cut Ctrl+X
Copy Ctrl+C
Paste Ctrl+V
Delete Del
Rename F2
Clear
Add Tools
Simple
Constrained
Unconstrained
Null Point
End Condition
Point Name List
Name:
Style:
Add
Close
Change
Help
Points:
Name Style
AC AC_P
BAC BAC_P
BAC1 BAC_P
BAC_L BAC_P
BAC_R BAC_P
BAC1_L BAC_P
BAC1_R BAC_P
BAET BAET_P
BAET_L BAET_P
BAET_R BAET_P
BAPE BAPE_P
BAPE_L BAPE_P
BAPE_R BAPE_P
BDC BDC_P
BDC1 BDC_P
BDC_L BDC_P
Tools
Template Library Organizer...
Apply Feature Name Override...
Options...
Dynamic Settings
Template Options
Naming Options
Components
Seed Name:
From Style
Specify:
Points
Seed Name:
Apply Affixes
Prefix Suffix
Left: _L
Right: _R
Step Options
X: 0.1000 Y: 0.0010 Slope: 0.000%
OK
Cancel
Preferences...
Help
Template Library Organizer
Available In:
pw:\\wvmoap08:NYSDOT\Docur
Point Name List
EndConditions
Misc_Components
Pavement_Sections
Templates
Training
Available In:
2Lane_DGTR_BB
2Lane_ED
2Lane_INT
2Lane_INT_PET
2Lane_INT1
2Lane_RC_E100
2Lane_RC_RSW_E1(
3Lane_ED
BAPEP_BDC
BDE_BDC
PET_L_ACC_DEC
PET_L_RAMP
PET_L_RAMP_DGTF
PET_R_ACC_DEC
PET_R_RAMP
PET_R_RAMP_DGTF
Training
OK
Cancel
Help
Preview:
Preview:

5) **Point Name List—Template Points**

The template point names represent the names of Digital Terrain Model (DTM) features that are generated when the template is used to create a model of the roadway. Template Point Names will be discussed in Chapter 3 of this manual.

Point Name List—Use this dialog box to manage entries in the default point name list. Existing Point Names can be modified, predefined styles can be assigned to points, or you can add new Point Names as needed. The Point Name List has been populated with the list of standard point names for templates in the InRoads XM Version. Right Click to Edit, or Double Click, on the Point Name List.

6) **Template Library Menu Bar**

In the Create Template Dialog box, menu commands include: File, Edit, Add, Tools. Many of these commands will be covered in this manual. There are other means of accessing most of these commands, mainly with right-click menus.

The Default standard for Affixes is set in the Template “Options” Dialog Box. The standard Suffix for side of roadway is _L and _R. Standard Step Options are also available in this dialog box.

Affixes will be automatically added during component placement when components are being used to create templates. To disable Apply Affixes on the fly, use the Dynamic Settings Dialog Box and manually toggle off “Apply Affixes” during placement of a component.

The use of Affixes and Steps will be further explained during this course.

7) **Template Library Organizer**

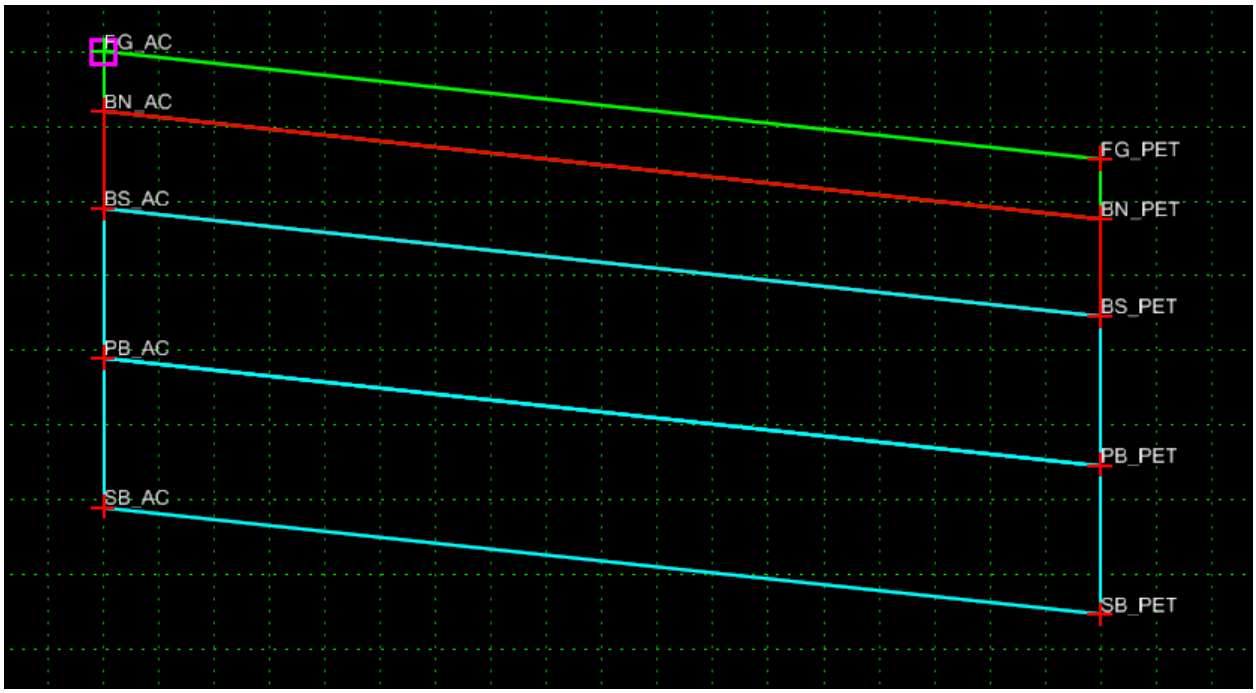
Templates can be copied from one Template Library to another with the Tools> Template Library Organizer.

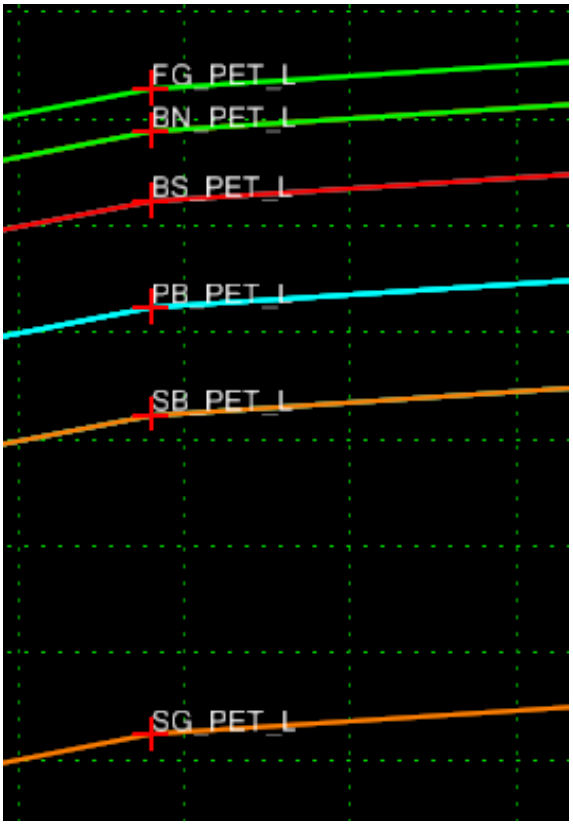
Chapter 3

Point Constraints and Components

This chapter will introduce you to Template Point Controls and Components. Point Constraints are used for control of Template Points. Components are closed or open shapes, and are parts of a template.

This chapter will introduce you to components, and show you how to use and manipulate Point Constraints on components. You will learn about the Point naming convention.


FG_AC
BN_AC
BS_AC
PB_AC
SB_AC
FG_PET
BN_PET
BS_PET
PB_PET
SB_PET


FG_PET_L
BN_PET_L
BS_PET_L
PB_PET_L
SB_PET_L
SG_PET_L

1) **Template Points—Point Names**

As in past versions of InRoads, template point names represent the names of Digital Terrain Model (DTM) features that are generated when the template is used to create a model of the roadway. This modeling process is now accomplished using the Roadway Designer command (previously called the Roadway Modeler). Templates are created and controlled by Points.

Template point names are assigned during the template creation process from the list of standard template point names predefined within the Point Name List. The standard list of points is based on the naming convention for InRoads XM, using the same feature styles from MicroStation levels. Point names replace the transition control name from Template segments. Names of features will be the name of the template points. Point names must be unique within a template.

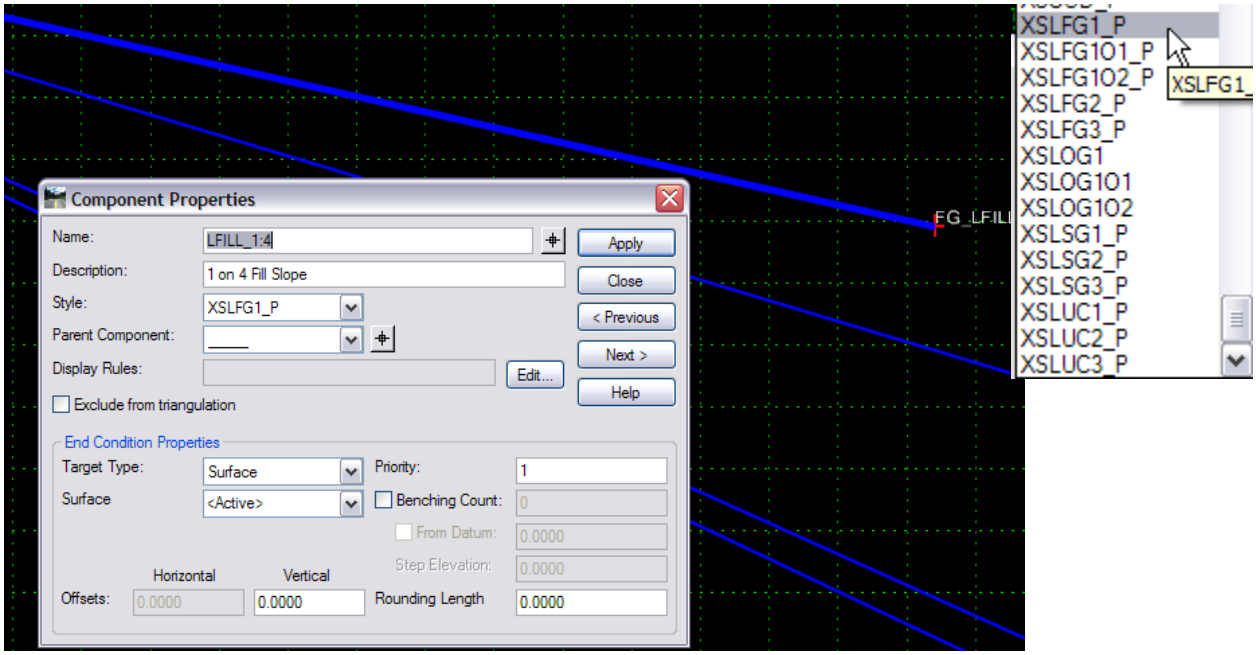
Top points of components create the Finished Grade and are assigned the FG_ prefix designation. Pavement Layers are designated with prefix letters representing pavement courses. Top points within Subbase components are designated with the prefix SB_; bottom points within Subbase components are designated with the prefix SG_.

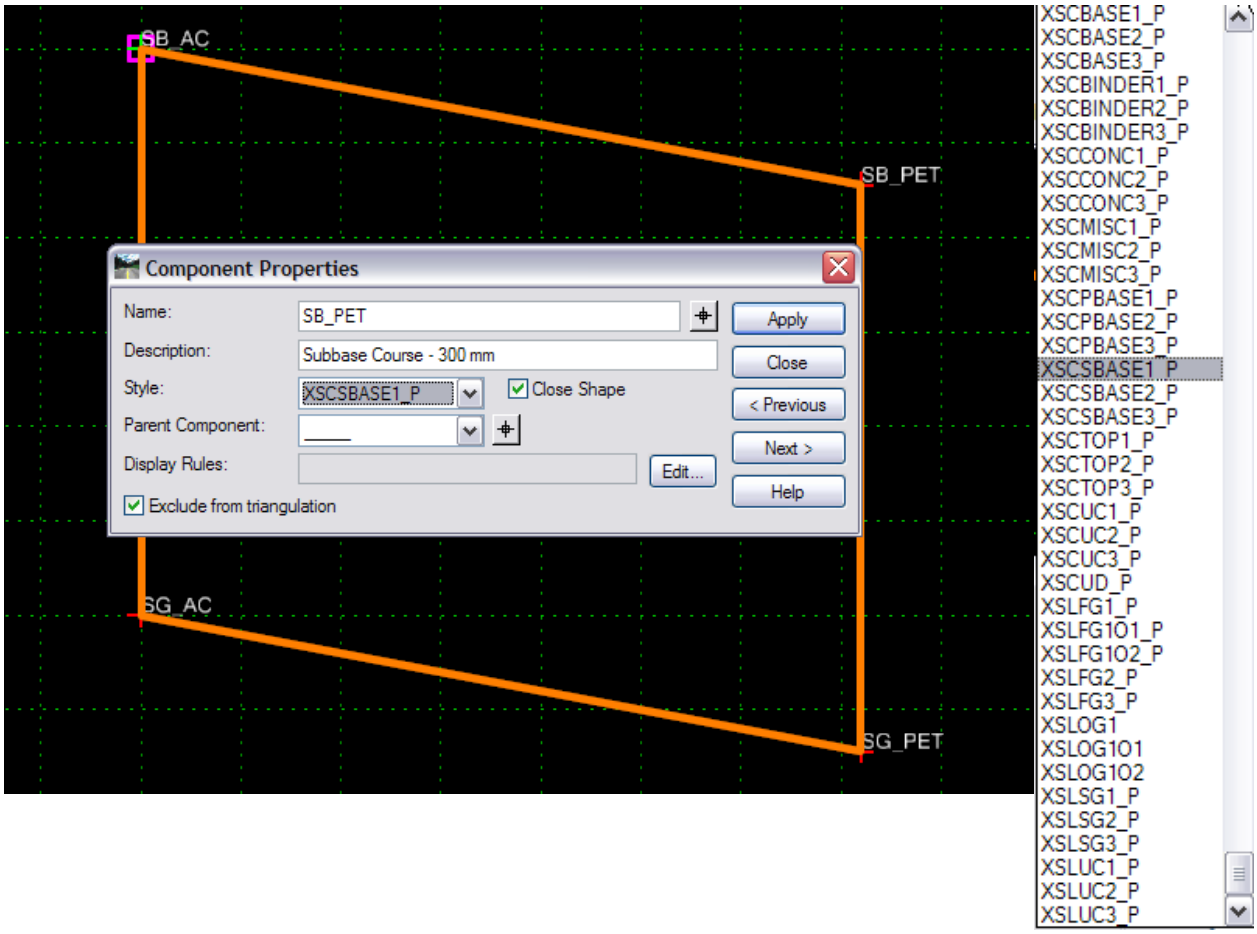
The following list is for clarification:

Finished Grade/Top of Top course:
FG_FEATURE_SIDE (FG_LFILL_L; FG_PET_L)
Top of Binder Course: BN_FEATURE_SIDE (BN_PET_L)
Top of Base Course: BS_FEATURE_SIDE (BS_PET_L)
Top of Permeable Course: PB_FEATURE_SIDE (PB_PET_L)
Top of Subbase Course: SB_FEATURE_SIDE (SB_PET_L)
Bottom of Subgrade: SG_FEATURE_SIDE (SG_PET_L, SG_RELB_R)

The standard Suffix for side of roadway is _L and _R. These suffixes are added to the Template Points during the template building process and are discussed in Chapter 4.

Building templates and roadway corridors uses a process of controlling points, similar to InRoads V8.05 and older used template segments. In InRoads XM, road models are built from points controlled by constraints. Each template is connected longitudinally to the next template drop to form longitudinal breakline features.


Component Properties
Name:
LFILL_1:4
Description:
1 on 4 Fill Slope
Style:
XSLFG1_P
Parent Component:
Display Rules:
Edit...
Exclude from triangulation
Apply
Close
< Previous
Next >
Help
End Condition Properties
Target Type:
Surface
Priority:
1
Surface
<Active>
Benching Count:
From Datum:
Step Elevation:
Horizontal
Vertical
Offsets:
0.0000
Rounding Length
0.0000
XSLFG1_P
XSLFG101_P
XSLFG102_P
XSLFG2_P
XSLFG3_P
XSLOG1
XSLOG101
XSLOG102
XSLSG1_P
XSLSG2_P
XSLSG3_P
XSLUC1_P
XSLUC2_P
XSLUC3_P


SB_AC
SB_PET
SG_AC
SG_PET
Component Properties
Name:
SB_PET
Description:
Subbase Course - 300 mm
Style:
XSCSBASE1_P
Close Shape
Parent Component:
Display Rules:
Edit...
Exclude from triangulation
Apply
Close
< Previous
Next >
Help
XSCBASE1_P
XSCBASE2_P
XSCBASE3_P
XSCBINDER1_P
XSCBINDER2_P
XSCBINDER3_P
XSCCONC1_P
XSCCONC2_P
XSCCONC3_P
XSCMISC1_P
XSCMISC2_P
XSCMISC3_P
XSCPBASE1_P
XSCPBASE2_P
XSCPBASE3_P
XSCSBASE1_P
XSCSBASE2_P
XSCSBASE3_P
XSCTOP1_P
XSCTOP2_P
XSCTOP3_P
XSCUC1_P
XSCUC2_P
XSCUC3_P
XSCUD_P
XSLFG1_P
XSLFG101_P
XSLFG102_P
XSLFG2_P
XSLFG3_P
XSLOG1
XSLOG101
XSLOG102
XSLSG1_P
XSLSG2_P
XSLSG3_P
XSLUC1_P
XSLUC2_P
XSLUC3_P

2) **Template Components**

A Component is a group of template points that make up an open or closed shape. Components are logical parts of a template; therefore, Components are used as “parts” to assemble complete templates.

Portions of the template that are separated into components are normally based on tabulation considerations. Components can represent any roadway feature, such as curb, gutter, sidewalk or other miscellaneous detailed portion of a template. Components can also represent pavement and subbase layers, bridge decks, cut and fill conditions, and other logical parts of a template.

During the roadway design process, template components will be used to generate a DTM of the top layer of the design. Components that have subgrade points will be added to the DTM as non-triangulated points. Previous DTM challenges, such as designing vertical slopes and undercuts, are simplified using components. This results in only having one DTM that contains all modeled layers of the design. Components are a child of the DTM.

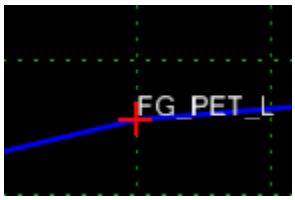
Each Component in the Standard Template Library has a logical name, description, and style. Individual component names are used in the creation of pavement layers and sub-surfaces; therefore logical names and styles for the components are required. This practice will help to produce consistent results when these components are used for volume calculations.

Components which will be viewed as MicroStation line elements, are assigned Cross Section Line styles (XSL). These include open Finished Grade components such as Cut and Fill Slopes, Pavement Landscape Elevation Breaks and Shoulder Backup components.

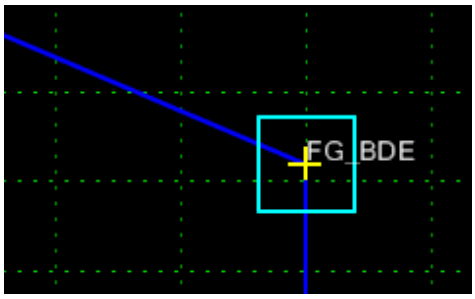
The most common use of viewing all other components is in cross sections for volumes; therefore, the style of the remainder of template components are cross section component styles (XSC). There are multiple styles for each type of component, this is a list of style types:

> XSCBASE, Base Pavement Course; XSCBINDER, Binder Pavement Course; XSCCONC, Concrete Courses (Bridge Deck, etc.); XSCMISC, for miscellaneous components (Curb, Sidewalk, etc.); XSCPBASE, Permeable Base Course; XSCSBASE, Subbase Course; XSCTOP, Top Pavement Course; XSCCUC, Subgrade Under-Cut; XSCCUD, for Underdrain/Edgedrain.

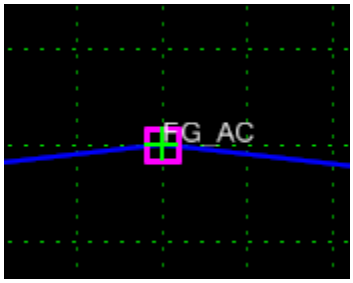
"Fully Constrained—with 2 constraints



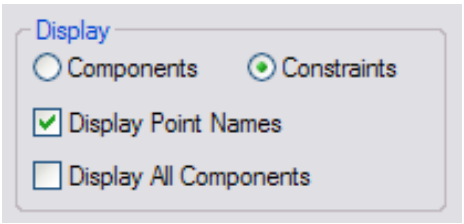
"Partially Constrained—with 1 constraint

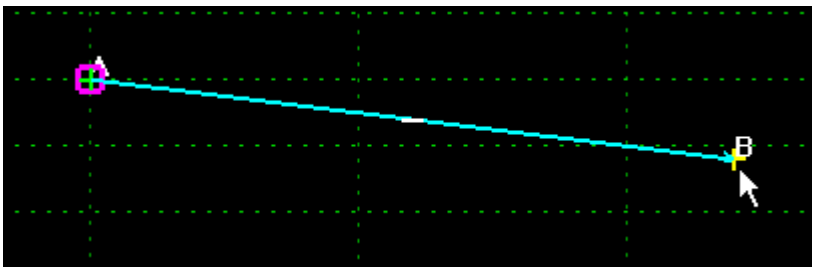


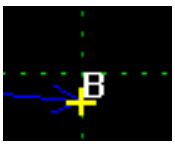
"Unconstrained"



COLOR	NUMBER OF CONSTRAINTS
RED	2
YELLOW	1
GREEN	0







3) Point Constraints

Constraints on points manage the behavior of template points. Using point constraints controls the movement of a point in a template. If a point is moved in a template, either by the user when editing a template or by the application of point controls during design processing, all points related to the point being moved will behave in a manner that is predictable.

These are basic Point Constraint rules:

- A template can only have a maximum of 2 constraints on it. When a point has 2 constraints it is considered "fully constrained." A point that is fully constrained is represented by a red plus sign.

- A point that has only 1 constraint on it is considered "partially constrained." This point is shown as a yellow plus sign

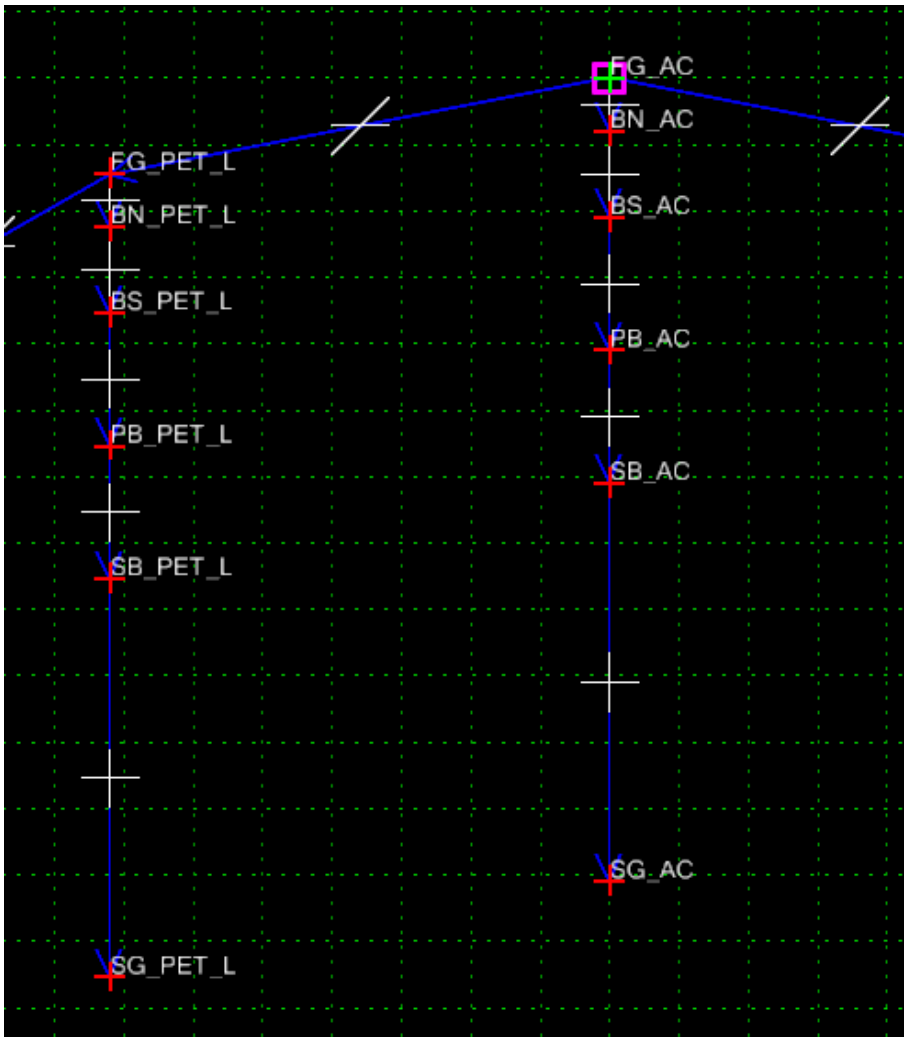
- A point with no constraints, "unconstrained," is shown as a green plus sign.

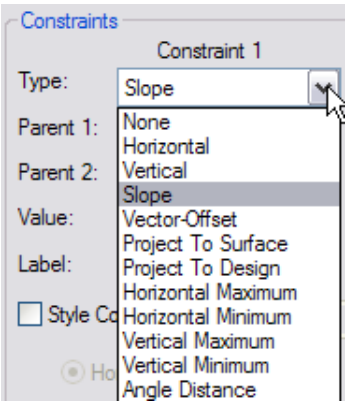
Point constraints are determined by a Parent-Child point relationship. When a point is constrained, they are constrained in a two dimensional plane. Constraints can affect only the point's offset and elevation, the X and Y coordinates in a cross section view.

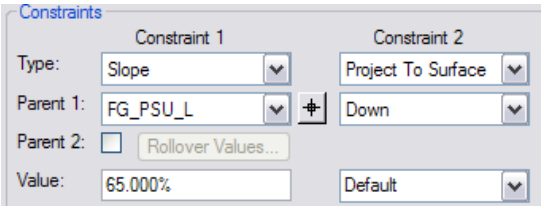
Point constraints are directional. The direction forms the parent-child relation ship between points. If point B is constrained by point A, point A is said to be the parent of point B. When viewing the constraints, the parent point has a blue arrow pointing to the child point. To see constraints in a template, enable the Constraints toggle located in the Display portion of the Create Template dialog box.

Types of Constraints include:

- Horizontal
  The child point remains at the given horizontal distance from the parent point.
- Vertical
  The child point remains at the given vertical distance from the parent point
- Slope
  The child point maintains the given slope from the parent point. Slope constraints can, additionally, have rollover values assigned to them.

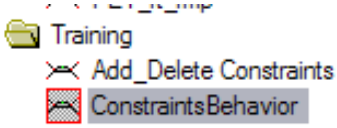

FG_AC
BN_AC
FG_PET_L
BN_PET_L
BS_AC
BS_PET_L
PB_AC
PB_PET_L
SB_AC
SB_PET_L
SG_AC
SG_PET_L

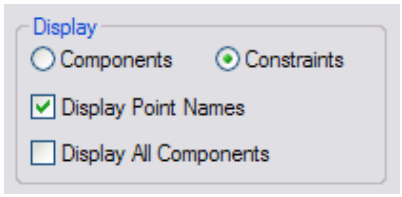

Constraints
Constraint 1
Type:
Slope
Parent 1:
Parent 2:
Value:
Label:
None
Horizontal
Vertical
Slope
Vector-Offset
Project To Surface
Project To Design
Horizontal Maximum
Horizontal Minimum
Vertical Maximum
Vertical Minimum
Angle Distance

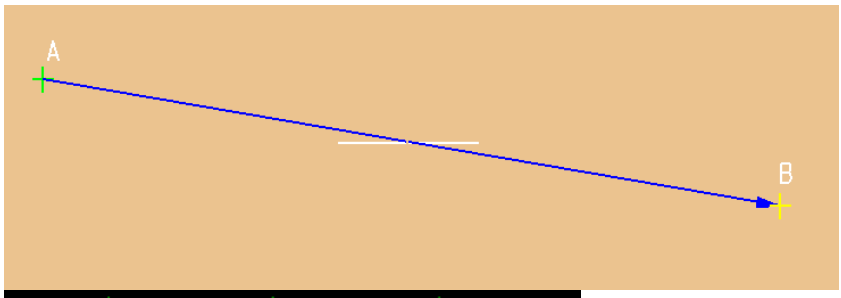

Constraints
Constraint 1
Constraint 2
Type:
Slope
Project To Surface
Parent 1:
FG_PSU_L
Down
Parent 2:
Rollover Values...
Value:
65.000%
Default

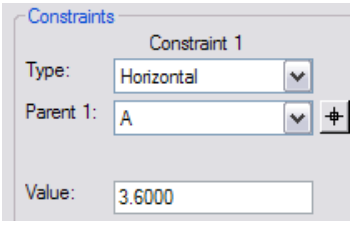
- Horizontal Maximum
  The child point has 2 parent points and remains at the given horizontal distance from the parent point that is farthest to the right (the point with the maximum horizontal or X value).
- Horizontal Minimum
  The child point has 2 parent points and remains at the given horizontal distance from the parent point that is farthest to the left (the point with the minimum horizontal or X value).
- Vertical Maximum
  The child point has 2 parent points and remains at the given vertical distance from the parent point that is highest (the point with the maximum vertical or Y value).
- Vertical Minimum
  The child point has 2 parent points and remains at the given vertical distance from the parent point that is lowest (the point with the minimum vertical or Y value).
- Vector Offset
  The child point has 2 parent points and will be projected onto the vector defined by the 2 parents. If the offset is not 0, then the child point maintains 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 defined constraints. The other constraint will define the projection direction. The child point will then be projected to the surface with the name given when the design is processed. If the surface does not exist, or no solution is found, the point will remain where it is placed in the template.
- Project to Design
  This constraint is similar to 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. Again, 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. Again, if no solution is found, the point will remain where it is placed in the template.
- Angle Distance
  This is one constraint with two parents.

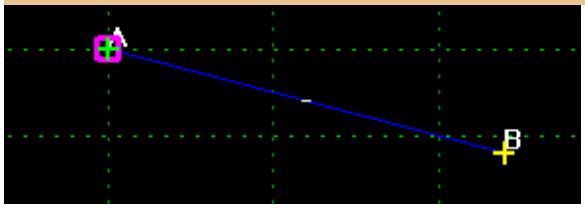
Combinations of constraints can be used, and a child may have 2 parents.

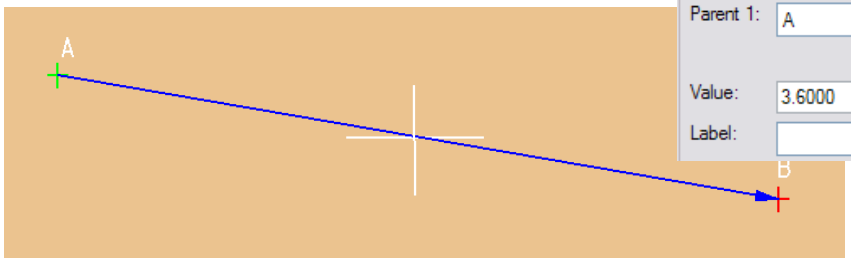

Training
Add_Delete Constraints
ConstraintsBehavior

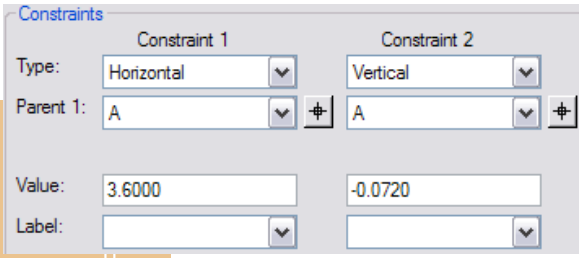

Display
Components
Constraints
Display Point Names
Display All Components

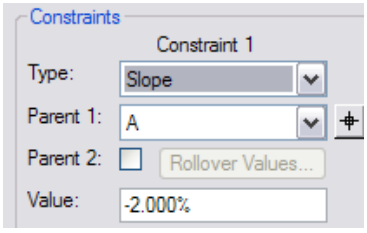

A
B

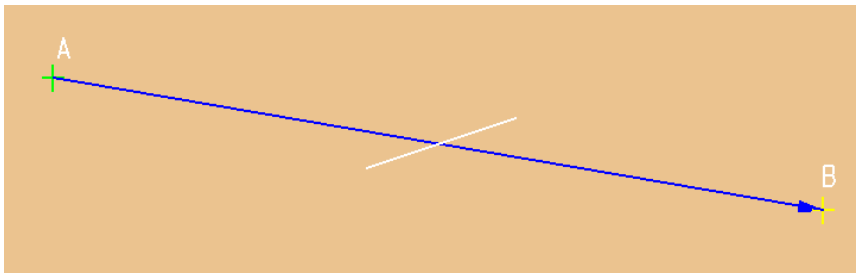

Constraints
Constraint 1
Type:
Horizontal
Parent 1:
A
Value:
3.6000

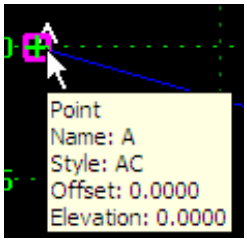

A
B

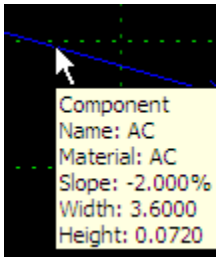

A
B


Constraints
Constraint 1
Constraint 2
Type:
Horizontal
Vertical
Parent 1:
A
A
Value:
3.6000
-0.0720
Label:


Constraints
Constraint 1
Type:
Slope
Parent 1:
A
Parent 2:
Rollover Values...
Value:
-2.000%


A
B


Point
Name: A
Style: AC
Offset: 0.0000
Elevation: 0.0000


Component
Name: AC
Material: AC
Slope: -2.000%
Width: 3.6000
Height: 0.0720

When using a horizontal constraint, a white horizontal line crossing over the blue arrow indicates a horizontal constraint. In this example, Point B has 1 constraint, horizontal to point A.

When using a horizontal and vertical constraint, both a white horizontal and a white vertical line cross over the blue arrow. In this scenario, Point B is constrained horizontal and vertically to point A. When the point is fully constrained, the point is shown in red.

When using a slope constraint, a white diagonal line appears across the blue arrow. When the point is partially constrained, the point is shown in yellow.

Open the template component “Constraints Behavior” in the training folder.

Modeler> Create Template

Create Template Dialog Box

Training Templates Folder> Open> Constraints Behavior
Double Click> Constraints Behavior (Will appear in Current Template window)

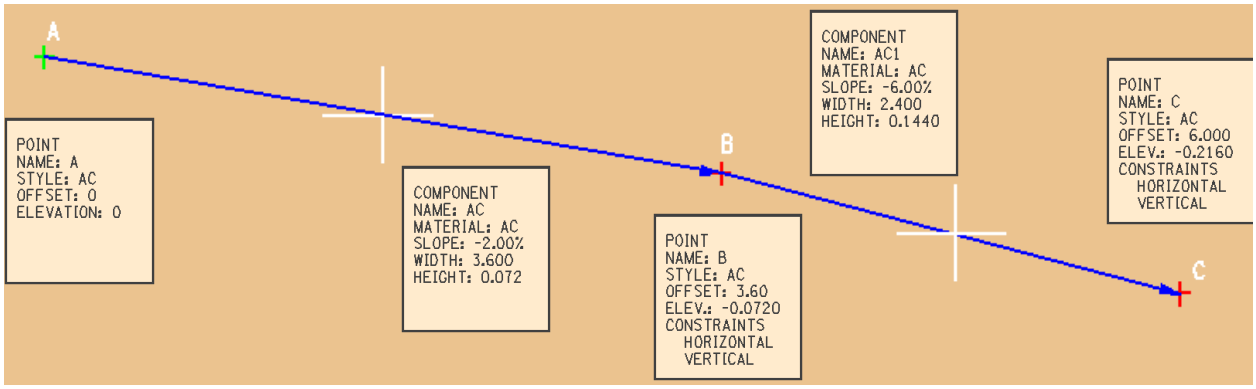
Display
Enable> Constraints
Toggle On> Point Names

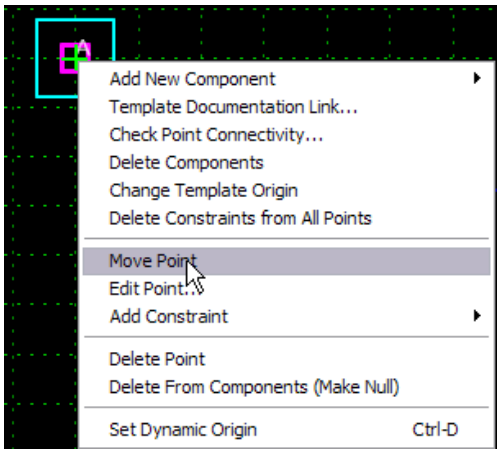
Hover-Over> Points A, B and C

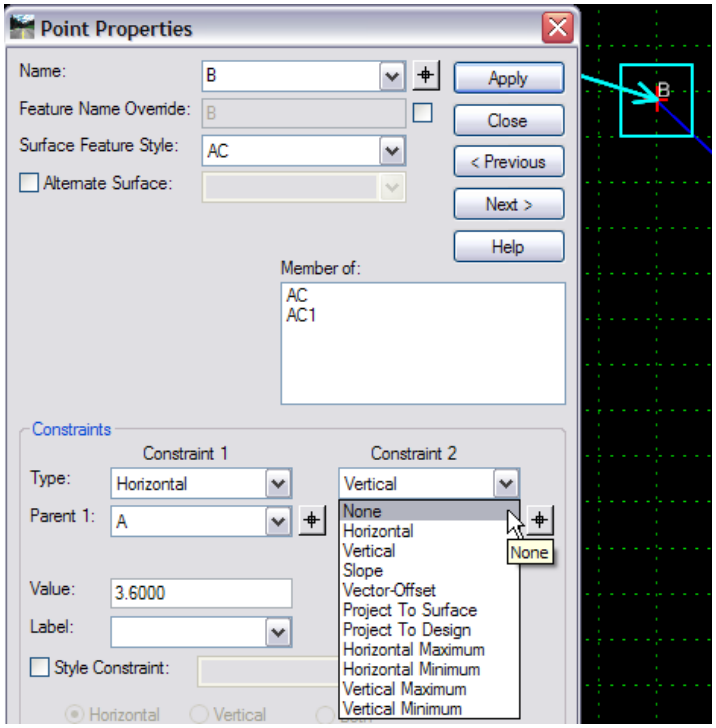
Hover-Over> Components AC and AC1

Hover-over Points A, B and C, a Point information box will appear describing the point name and style, type of constraint applied, and the offset and/or elevation difference from the parent.

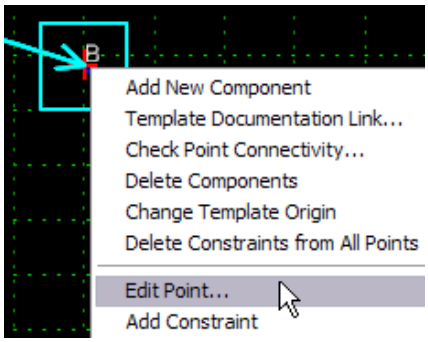
Hover over the line between Points A and B, a Component information box will appear describing the component name and material, as well as the slope, width and height differential along the component.

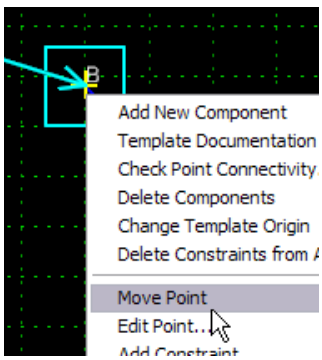






Point Property Dialog Box: Double Click on Point—Or Right Click> Edit Point





4) **Manipulating Points and Point Constraints**

Point A is the parent of Point B—Point B is the child of Point A
Point B is horizontally and vertically constrained to Point A
Point B is the parent of Point C—Point C is the child of Point B
Point C is horizontally and vertically constrained to Point B

Create Template Dialog Box

Constraints Behavior Template
Right Click> **Point A**
Select> Move Point

Observe> Behavior of Points

Right Click> **Point B**
Select> Move Point is Unavailable

Double Click> **Point B**

Point Properties Dialog Box
Constraint 2
Select Vertical> Change To> **None**

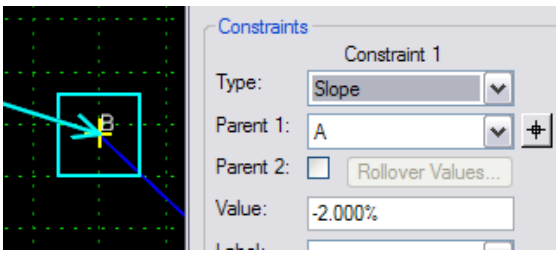
Apply

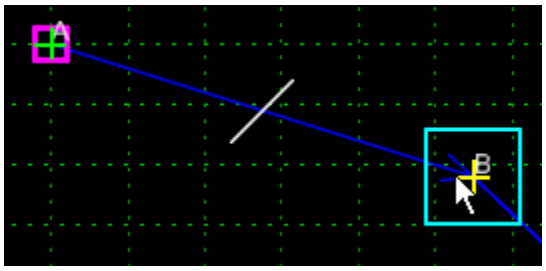
Close

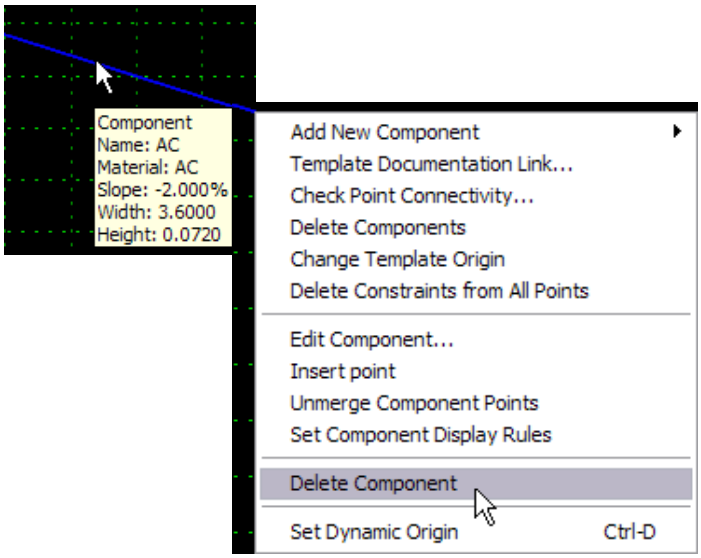
With the vertical constraint removed from Point B, the color of the Point changed from red to yellow. The point is now able to be moved. With the horizontal constraint remaining, the distance between Point A and Point B constantly remains the same.

Create Template Dialog Box

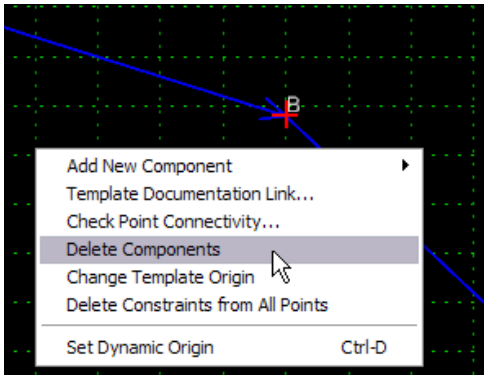
Constraints Behavior Template
Right Click> **Point B**
Select> Move Point

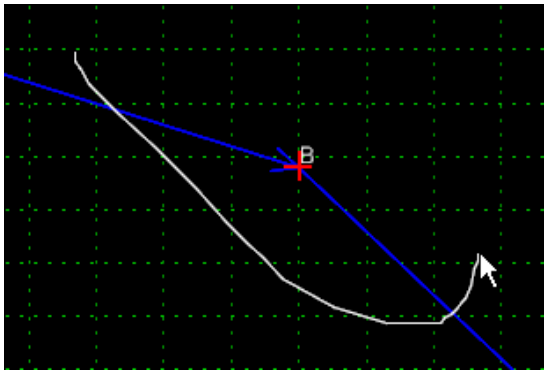

Constraints
Constraint 1
Type:
Slope
Parent 1:
A
Parent 2:
Rollover Values...
Value:
-2.000%
B


B


Component
Name: AC
Material: AC
Slope: -2.000%
Width: 3.6000
Height: 0.0720
Add New Component
Template Documentation Link...
Check Point Connectivity...
Delete Components
Change Template Origin
Delete Constraints from All Points
Edit Component...
Insert point
Unmerge Component Points
Set Component Display Rules
Delete Component
Set Dynamic Origin
Ctrl-D


0.0
0.2


B
Add New Component
Template Documentation Link...
Check Point Connectivity...
Delete Components
Change Template Origin
Delete Constraints from All Points
Set Dynamic Origin
Ctrl-D


B

Change the constraint on Point B from Horizontal to Slope. Move Points A and B.

Create Template Dialog Box

Constraints Behavior Template
Double Click> **Point B**

Point Properties Dialog Box
Constraint 1
Select Horizontal> Change To> **Slope**

Apply

Close

Right Click> **Point B**
Select> Move Point

Right Click> Cancel

Right Click> **Point A**
Select> Move Point

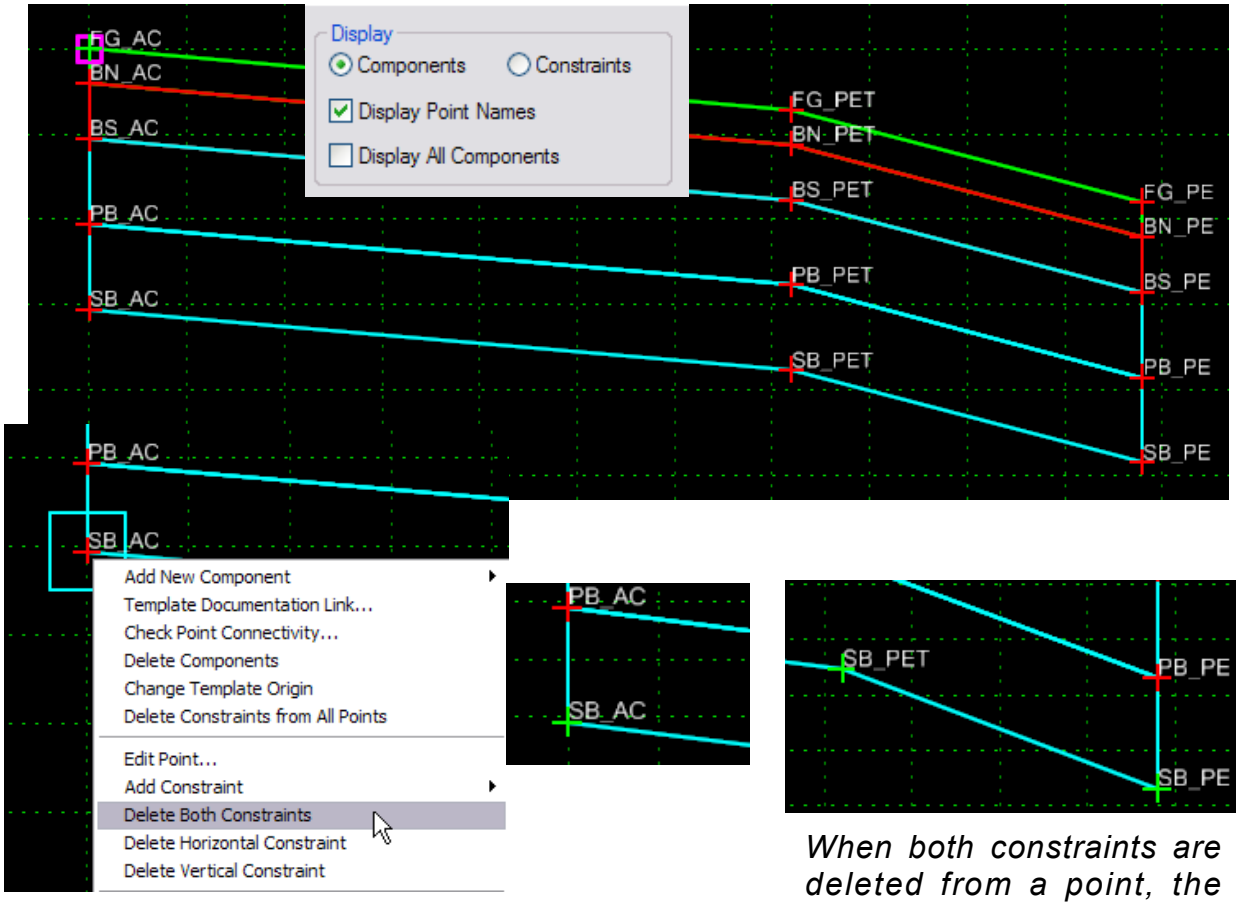
Right Click> Cancel

Right Click> **Component**
Select> Delete Component

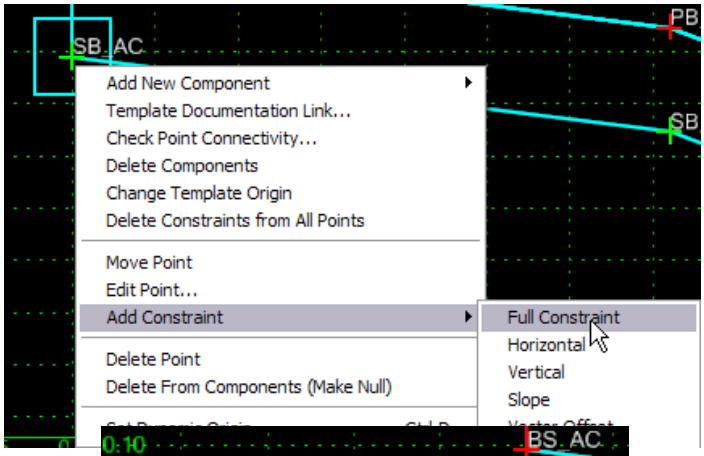
Undo

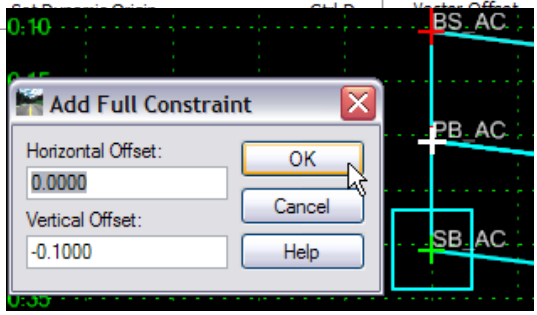
Right Click> Component
Select> Delete Components> **Draw Line** through
Components> Left Click (Data)

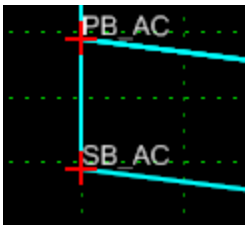
A single component can be deleted from a template using Delete Component command; or, multiple components can be deleted at one time using Delete Components.



When both constraints are deleted from a point, the color of the point changes from red to green.







When full constraints are added to an unconstrained point, the color of the point changes from green to red (2 constraints)

5) **Deleting and Adding Point Constraints**

In addition to editing the template point constraints using the Point Properties Dialog box, a right-click on any point can access **Add Constraint** or **Delete Constraints**.

Delete Constraints removes all constraints from a point. Add Constraint allows you to pick the type of constraint you want to add to the point. Full Constraints adds both horizontal and vertical constraints to a point.

Setting the appropriate constraints on points is important to achieve the desired results when pavement layers, superelevation and point transitions are introduced to the design process. Use the Point Properties to adjust point constraints after initial point placement, if necessary.

Create Template Dialog Box

Add_Delete Constraints Template

Right Click> Point **SB_AC** (Component PB)
Select> Delete Both Constraints

Right Click> Point **SB_PET**
Select> Delete Both Constraints

Right Click> Point **SB_PE**
Select> Delete Both Constraints

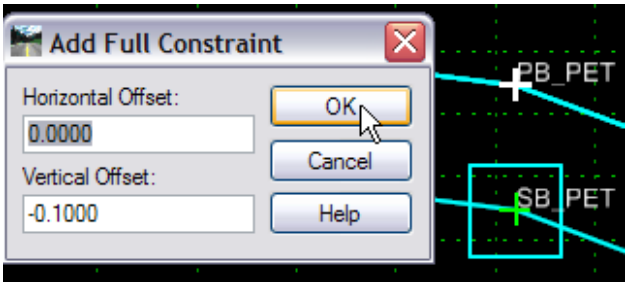
Right Click> Point **SB_AC**
Select> Add Constraint> **Full Constraint**

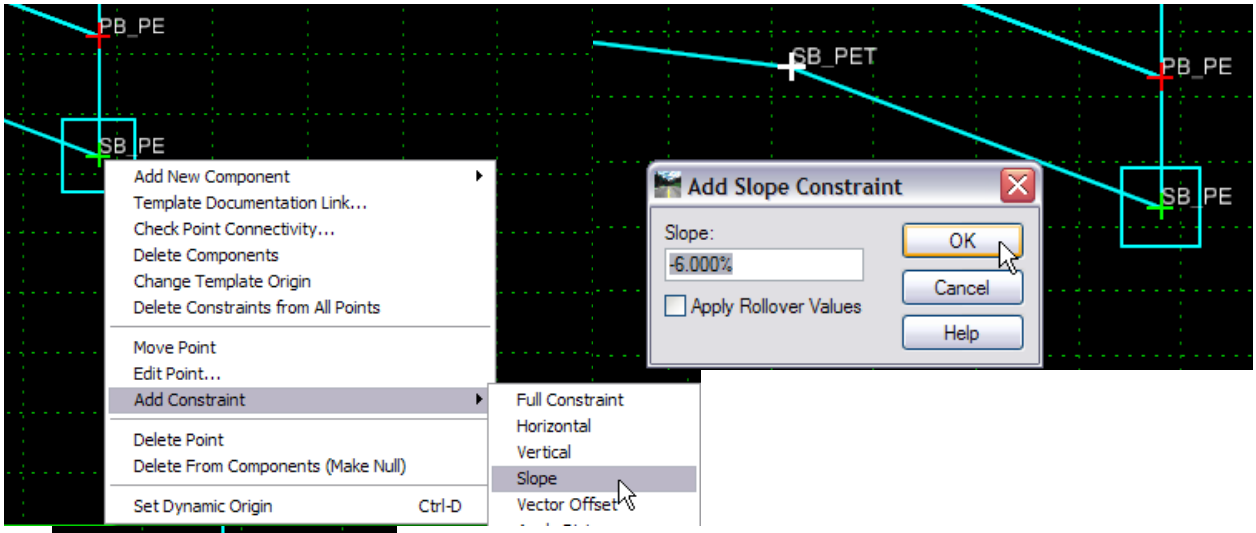
Data Select> Point **PB_AC** (Component BS)

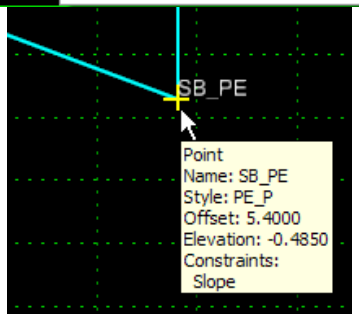
Add Full Constraint Dialog Box
Horizontal Offset> 0.0000

Vertical Offset> -0.1000

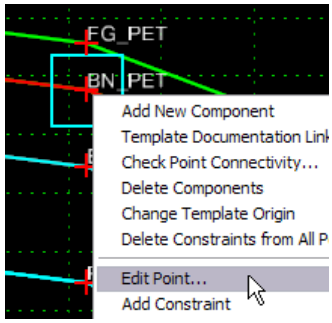
OK

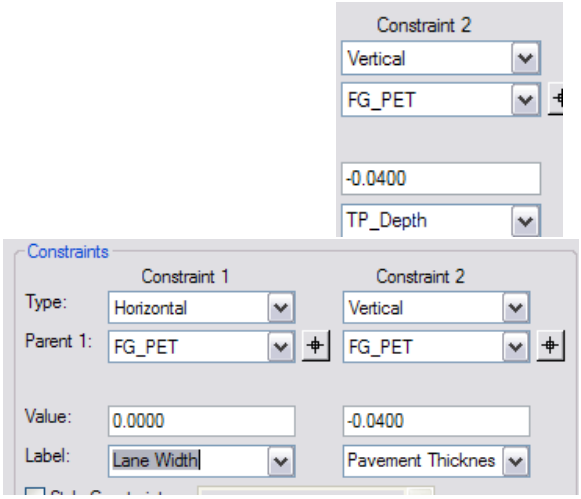






When 1 constraint is added to an unconstrained point, the color of the point changes from green to yellow





Add_Delete Constraints Template
Right Click> Point **SB_PET**
Select> Add Constraint> **Full Constraint**

Data Select> Point **PB_PET** (Component BS)

Add Full Constraint Dialog Box
Horizontal Offset> 0.0000

Vertical Offset> -0.1000

OK

Add_Delete Constraints Template
Right Click> Point **SB_PE** (Component PB)
Select> Add Constraint> Constraint> **Slope**

Data Select> Point SB_PET (Component PB)

Add Slope Constraint Dialog Box
Slope> -6.00%

OK

6) **Point Labels**

Constraints can be labeled so that during the design process the value of labeled constraints may be changed. For example, the template may have a constraint label called “Pavement Thickness” that controls the depth of the pavement layer. The pavement thickness can be changed in the Roadway Designer so that one template can be used for different pavement layer depths, without having to edit the template.

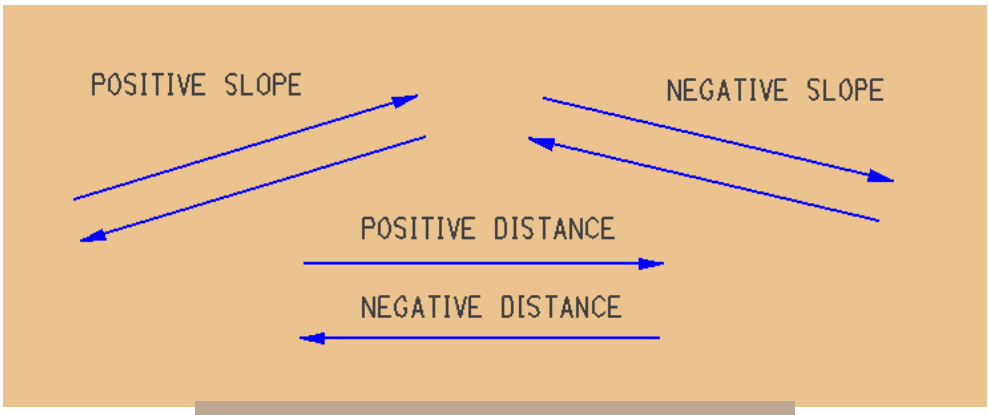
Once a Point Label is created in the Template Library, this label is available for use with other points as a pull-down choice. To create a new Label, type in the desired name.

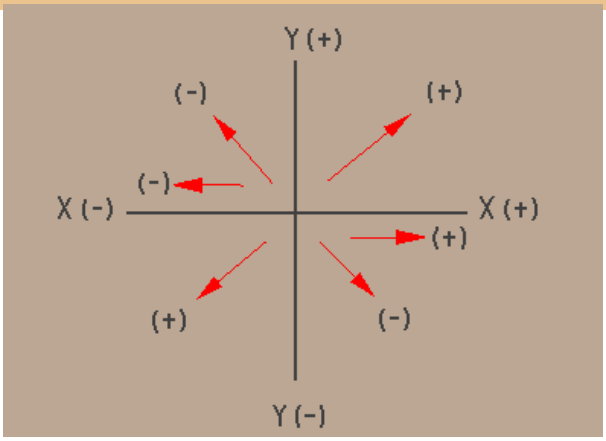
More will be discussed on this topic using Parametric Constraints in the InRoads XM Roadway Designer course.

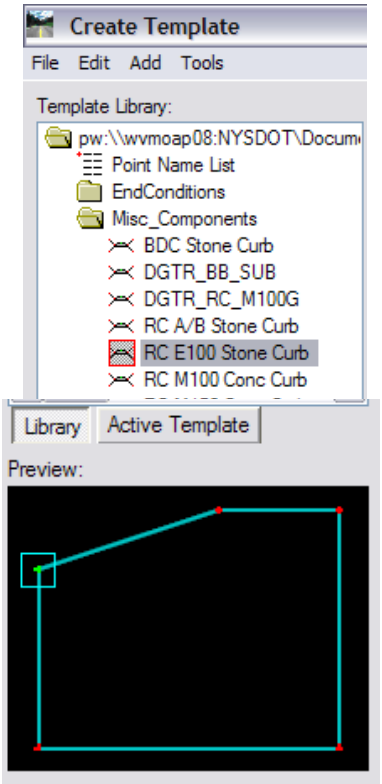
Chapter 4

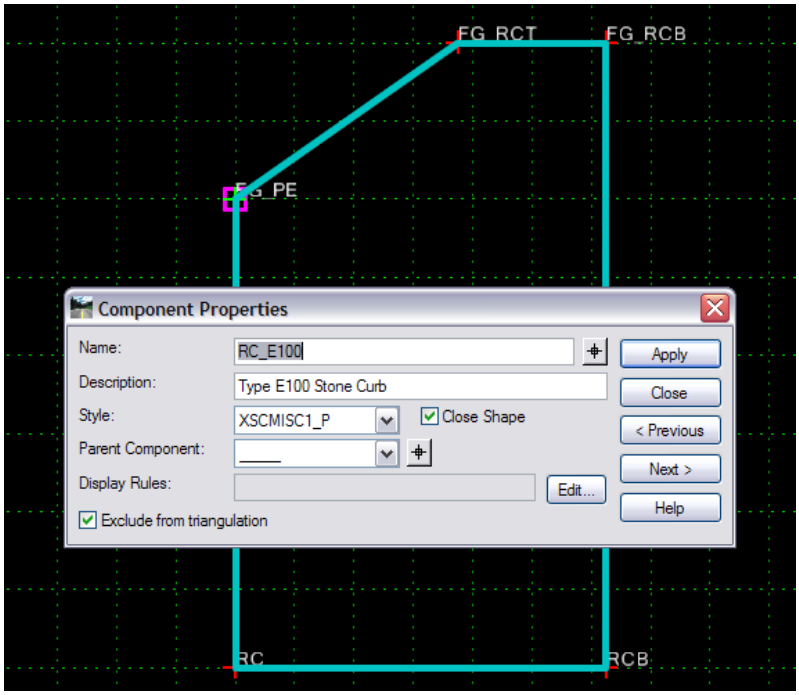
Creating Components

This chapter will introduce you to component creation and editing. Shapes, called components, can be created in the template library and used to build templates. This chapter will teach you how to create Templates from Components, and how to edit a template by Editing Template Point Controls.


POSITIVE SLOPE
NEGATIVE SLOPE
POSITIVE DISTANCE
NEGATIVE DISTANCE


Y (+)
(-)
(+)
(-)
X (-)
X (+)
(+)
(+)
(-)
Y (-)


Create Template
File Edit Add Tools
Template Library:
pw:\\wvmoap08:NYSDOT\Docum
Point Name List
EndConditions
Misc_Components
BDC Stone Curb
DGTR_BB_SUB
DGTR_RC_M100G
RC A/B Stone Curb
RC E100 Stone Curb
RC M100 Conc Curb
Library
Active Template
Preview:


EG_RCT
EG_RCB
EG_PE
Component Properties
Name:
RC_E100
Description:
Type E100 Stone Curb
Style:
XSCMISC1_P
Close Shape
Parent Component:
Display Rules:
Edit...
Exclude from triangulation
Apply
Close
< Previous
Next >
Help
RC
RCB

1) **Component Slopes and Distances**

When components are created with precision input, the parent-child relationship determines the sign of the distance. The parent is always the first point placed.

The child placed to the right (X) of the parent is positive distance; the parent has a lower X value than the child. The child placed to the left (X) of the parent is negative distance; parent has a higher X value than the child.

The sign of the component slope is based on the mathematical/algebraic slope.

2) **Component Names**

The components are named for the point and layer they represent. Components are designated with the same prefix as the points on the component, followed by the segment name if applicable. The pavement layers are designated with the prefix, followed by the feature (if applicable). Subbase components are designated with the prefix SB, for Top of Subbase, or SG, for Bottom of Subbase/Subgrade.

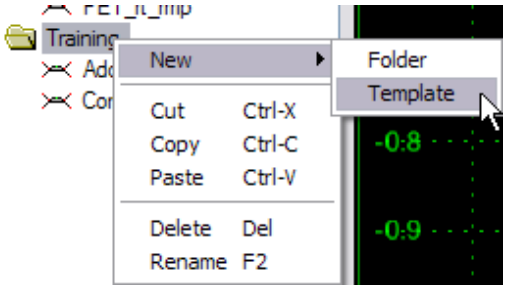
The following list is for pavement components:

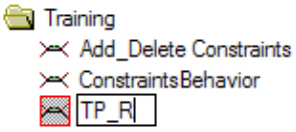
Top Course: TP_FEATURE (TP_PET)
Binder Course: BN_FEATURE (BN_PET)
Base Course: BS_FEATURE (BS_PET)
Permeable Course: PB_FEATURE (PB_PET)
Subbase/Subgrade Course: SB (Top)/SG(Bottom)_FEATURE (SB_PET)

When Pavement components are merged together, the name should be changed as appropriate for the entire component. If the top course is merged and represented by one component, the component would be named “TP.”

Miscellaneous Components, such as Curb Details, are named by the Feature Style, followed by the Type. For example, a Type M150 Concrete Curb Component will be named RC_M150.

Component Styles are discussed on page 3-6 of this manual.


Training
New
Folder
Template
Cut Ctrl-X
Copy Ctrl-C
Paste Ctrl-V
Delete Del
Rename F2
-0:8
-0:9


Training
Add_Delete Constraints
ConstraintsBehavior
TP_R

3) **Create Simple Component**

A Component is an ***open or closed*** shape defined by a set of points. Each component, open or closed, can represent a different material or area.

Components can be children or parents of other components, also. Examples include Daylight Subbase and Subbase Box Out Components; they are children of Cut and Fill Slopes in End Conditions.

Five types of components can be created in InRoads:

- Simple
- Constrained
- Unconstrained
- Null Point
- End Condition

A simple component typically represents a section of pavement or sidewalk. It is a closed parallelogram that is defined by slope, thickness and width. The top points are constrained by horizontal and slope constraints. The lower points are constrained to the points directly above them with horizontal and vertical constraints.

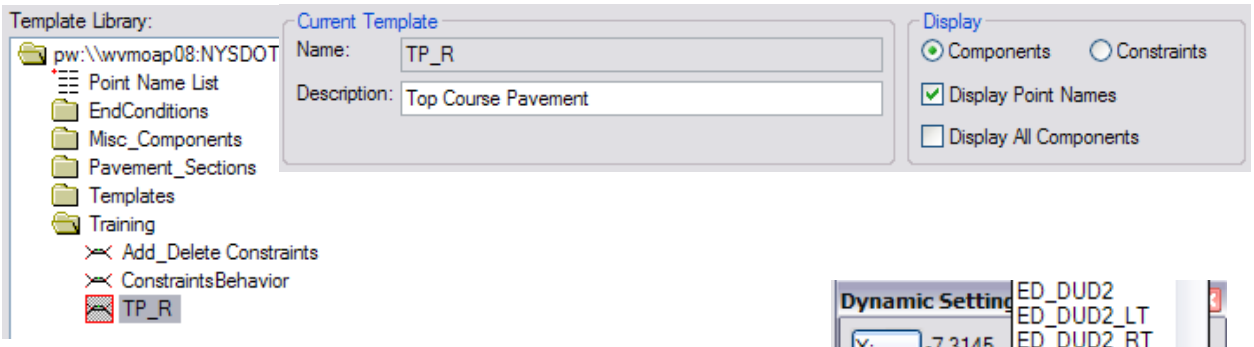
Create a New Template, **TP_R**, which will be Top Course Pavement on the Right Side of Roadway. **Add** a good Description.

Create Template Dialog Box
Training Folder> Right Click> New> Template
Name> **TP_R**

Double Click> **TP_R** (Appears in Current Template window)

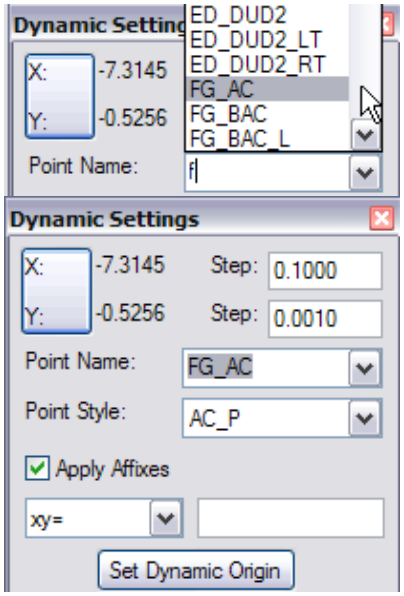
Description> **TOP COURSE PAVEMENT**

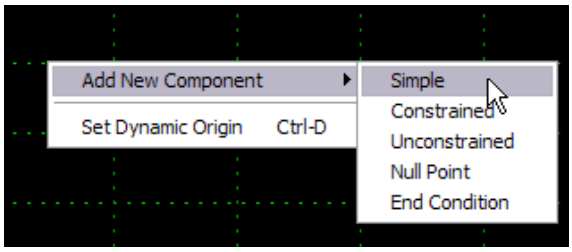
Create a simple component called **TP_PET_R**. Begin with the Point Name **FG_AC**. As Template Components are added, the Current Component area (the area under the graph) changes to allow for different types of component input.

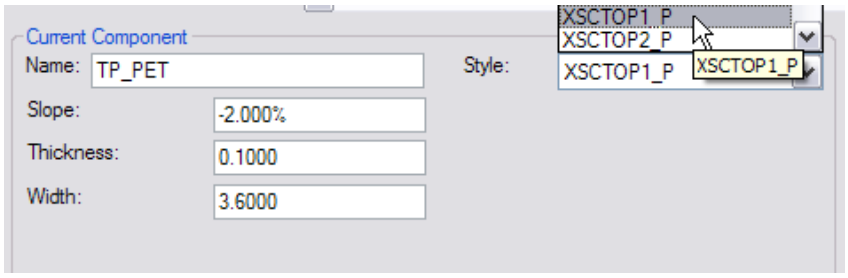


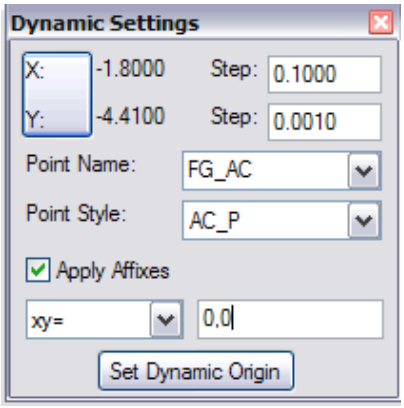
When selecting Point Name: Choose Name from Pull-Down, Style is Automatically Set correctly.

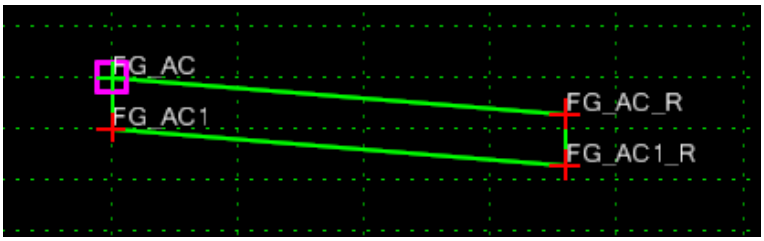
If a Point Name that is not on the Point Name list is necessary, the Point Name can be entered in the blank space. Using this method, the style will need to be set, also.











Display
Toggle **On**> Components

Toggle **On**> Display Point Names

Dynamic Settings Dialog
Step Options
X> 0.1000

Y> 0.0010

Toggle **On**> **Apply Affixes**

Point Name> **FG_AC** (Pull Down)

Point Style> **AC_P** (Automatic—Name pull down)

Toggle **On**> Apply Affixes

Right Click> Add New Component> **Simple**

Current Component Area *(Tab between data entries)
Name> **TP_PET**

Style> **XSCTOP1_P**

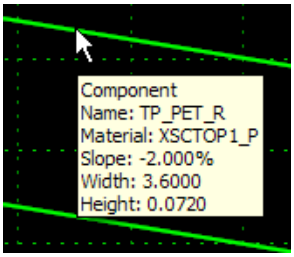
Slope> **-2.000%**

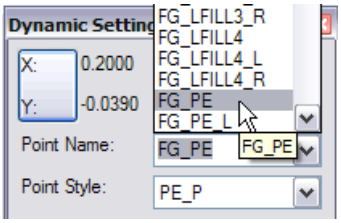
Thickness> **0.1000**

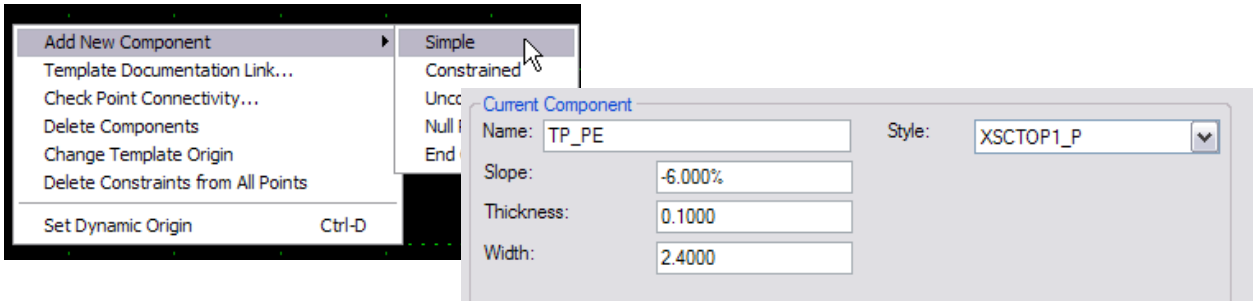
Width> **3.600**

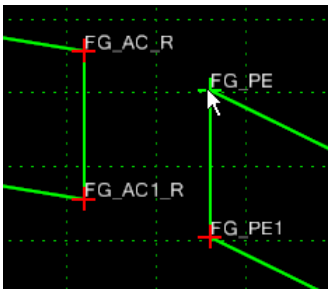
Dynamic Settings Dialog
Select xy (Pull Down)> Key In 0,0> Enter
(Places the component at the Origin of the Current Template Window, X=0;Y=0)

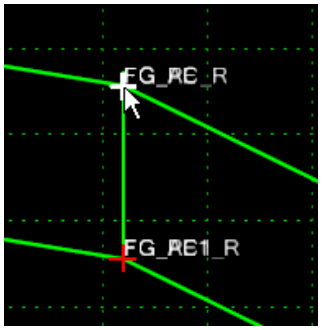
**Tab between data entries in all InRoads commands. See Page 2-8 for list of Key-In Options in Dynamic Settings.*

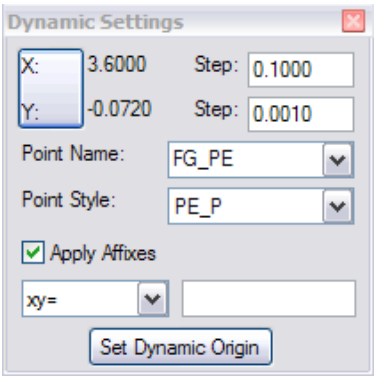

Component
Name: TP_PET_R
Material: XSCTOP1_P
Slope: -2.000%
Width: 3.6000
Height: 0.0720

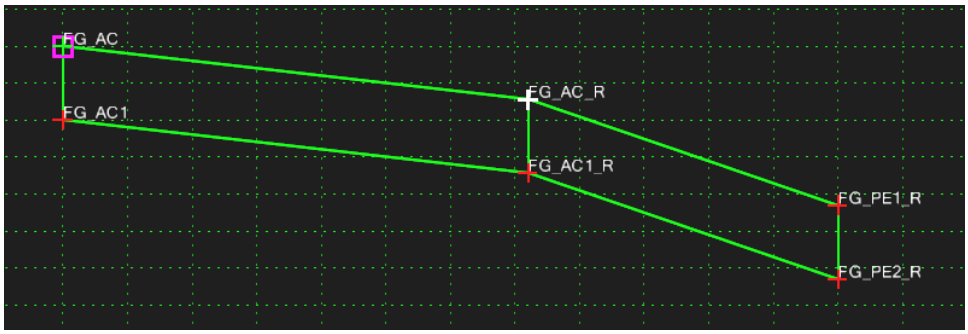

Dynamic Setting
X:
0.2000
Y:
-0.0390
Point Name:
FG_PE
Point Style:
PE_P
FG_LFILL3_R
FG_LFILL4
FG_LFILL4_L
FG_LFILL4_R
FG_PE
FG_PE_L
FG_PE

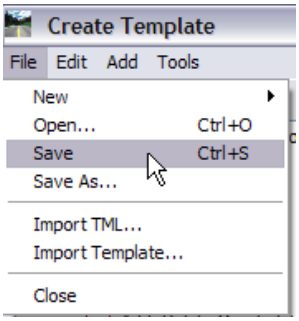

Add New Component
Template Documentation Link...
Check Point Connectivity...
Delete Components
Change Template Origin
Delete Constraints from All Points
Set Dynamic Origin
Ctrl-D
Simple
Constrained
Current Component
Name:
TP_PE
Style:
XSCTOP1_P
Slope:
-6.000%
Thickness:
0.1000
Width:
2.4000


FG_AC_R
FG_PE
FG_AC1_R
FG_PE1


FG_PE_R
FG_PE1_R


Dynamic Settings
X:
3.6000
Step:
0.1000
Y:
-0.0720
Step:
0.0010
Point Name:
FG_PE
Point Style:
PE_P
Apply Affixes
xy=
Set Dynamic Origin


FG_AC
FG_AC1
FG_AC_R
FG_AC1_R
FG_PE1_R
FG_PE2_R


Create Template
File
Edit
Add
Tools
New
Open...
Ctrl+O
Save
Ctrl+S
Save As...
Import TML...
Import Template...
Close

The component's name is TP_PET_R; because "Apply Affixes" was toggled on, the prefix _R was added to the component.

Change the **Point Name** for the second simple component to **FG_PE**. **Set up** the Current Component area as you proceed through component creation.

Training Folder> TP_R

Dynamic Settings Dialog
Point Name> **FG_PE** (Pull Down)

Point Style> PE_P

Right Click> Add New Component> **Simple**

Current Component Area
Name> **TP_PE**

Style> **XSCTOP1_P**

Slope> **-6.00%**

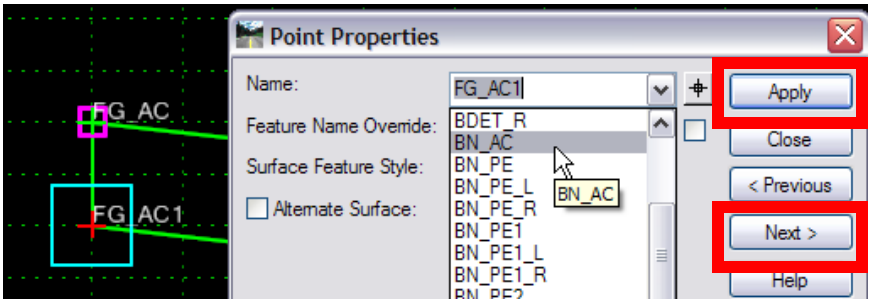
Thickness> **0.100**

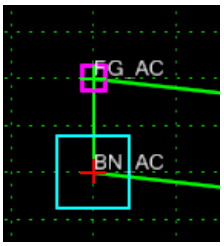
Width> **2.4**

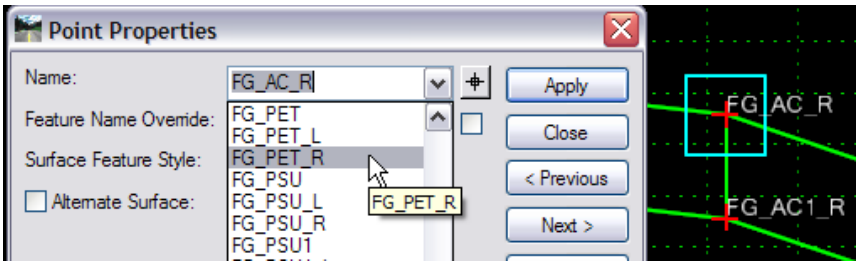
Place Point FG_PE on Point **FG_AC_R** (Point will turn white for exact placement on point**> Data**

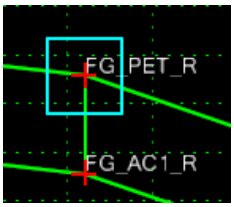
Dynamic Settings Dialog
When Placing the component at the FG_AC_R Point, X:/Y: watch readout X = 3.6; Y = -0.072 *(Point could be placed with Key In)*

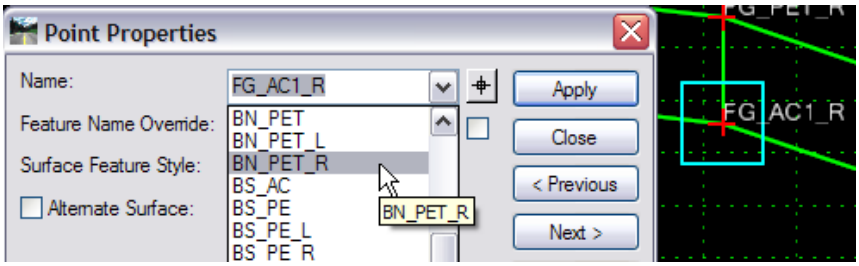
Save the Template Library; the Template Library can be saved in the Create Template dialog box.

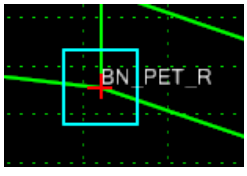

Point Properties
Name:
FG_AC1
Feature Name Override:
Surface Feature Style:
Alternate Surface:
BDET_R
BN_AC
BN_PE
BN_PE_L
BN_PE_R
BN_PE1
BN_PE1_L
BN_PE1_R
BN_AC
Apply
Close
< Previous
Next >
Help
FG_AC
FG_AC1


FG_AC
BN_AC


Point Properties
Name:
FG_AC_R
Feature Name Override:
Surface Feature Style:
Alternate Surface:
FG_PET
FG_PET_L
FG_PET_R
FG_PSU
FG_PSU_L
FG_PSU_R
FG_PSU1
FG_PET_R
Apply
Close
< Previous
Next >
FG_AC_R
FG_AC1_R


FG_PET_R
FG_AC1_R


Point Properties
Name:
FG_AC1_R
Feature Name Override:
Surface Feature Style:
Alternate Surface:
BN_PET
BN_PET_L
BN_PET_R
BS_AC
BS_PE
BS_PE_L
BS_PE_R
BN_PET_R
Apply
Close
< Previous
Next >
FG_AC1_R


BN_PET_R

4) **Edit Template Point Names**

Templates are used by the Roadway Designer to create surfaces of the proposed roadway. Component points, which will create Surface Features, will need to follow the correct naming convention. Detailed information on the naming convention for template points is in Chapter 3 of this manual, in the section entitled **Template Points—Point Names.**

The surface created by the top points will not have a layer prefix designation. The point of origin is the centerline of the roadway from the horizontal and vertical alignments and is called "FG_AC." The point below the FG_AC will be on the bottom of the Top Course, or the top of the Binder Course; therefore the name of the point will be BN_AC.

Edit all the Template Points, selecting the correct names from the Point Name List.

Create Template Dialog Box> Training Folder> TP_R
Right Click Point **FG_AC1**> Edit Point (**Or** Double Click)

Point Properties Dialog Box
Name> FG_AC1> **BN_AC**

Surface Feature Style> AC_P

Apply

Next

Name> FG_AC_R> **FG_PET_R** (Pull-Down)

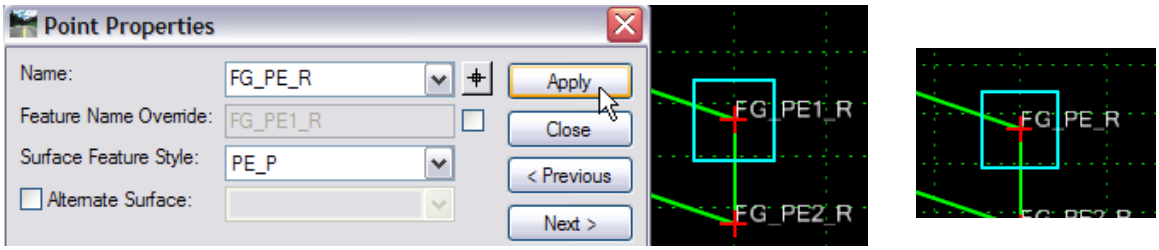
Surface Feature Style> PET_P (Automatic using Pull-Down Point Name)

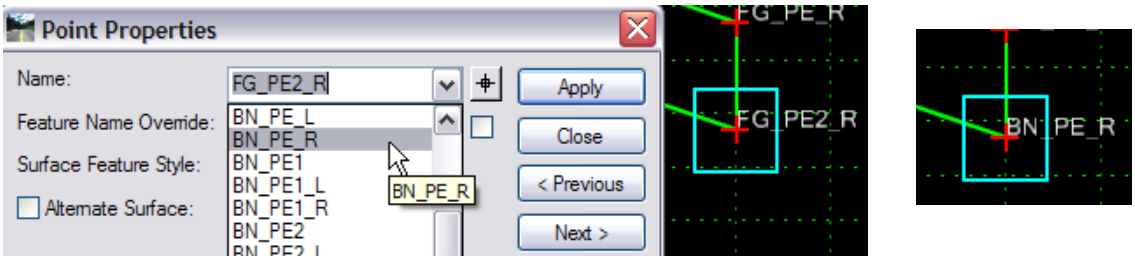
Apply

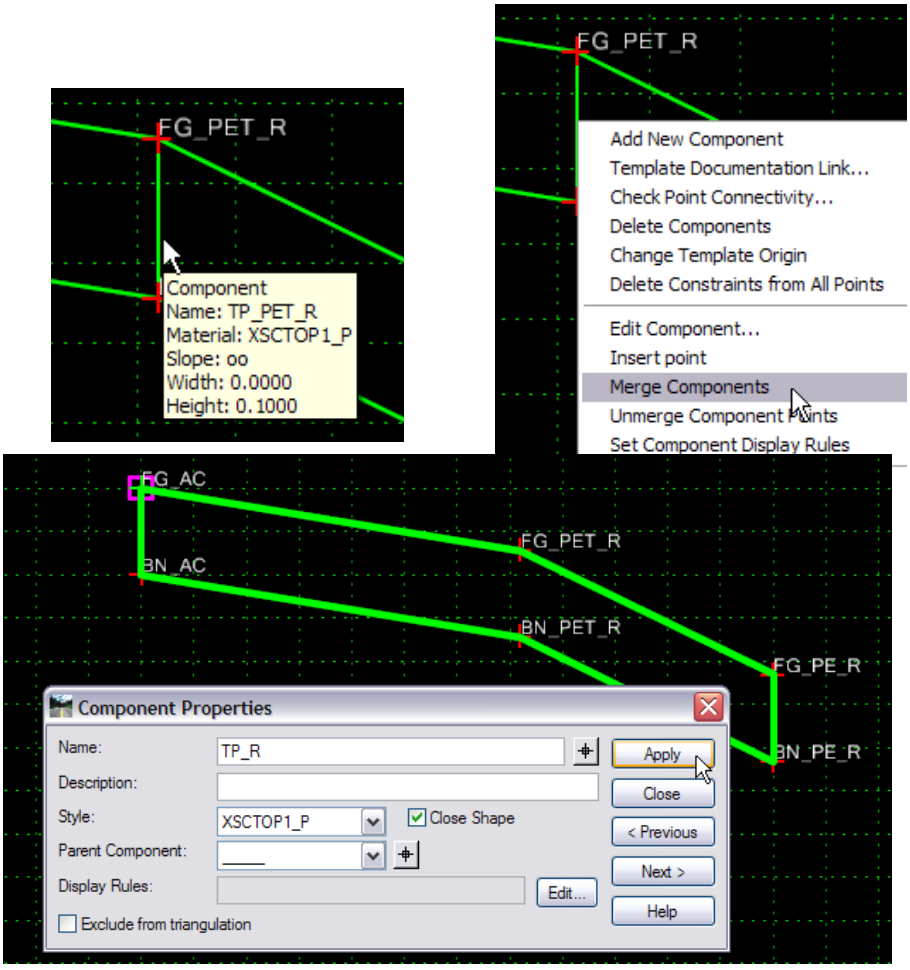
Next

Name> FG_AC1_R> **BN_PET_R**

Apply


Point Properties
Name:
FG_PE_R
Feature Name Override:
FG_PE1_R
Surface Feature Style:
PE_P
Alternate Surface:
Apply
Close
< Previous
Next >
FG_PE1_R
FG_PE2_R
FG_PE_R


Point Properties
Name:
FG_PE2_R
Feature Name Override:
Surface Feature Style:
Alternate Surface:
BN_PE_L
BN_PE_R
BN_PE1
BN_PE1_L
BN_PE1_R
BN_PE2
BN_PE_R
Apply
Close
< Previous
Next >
FG_PE2_R
BN_PE_R


FG_PET_R
Component
Name: TP_PET_R
Material: XSCTOP1_P
Slope: oo
Width: 0.0000
Height: 0.1000
Add New Component
Template Documentation Link...
Check Point Connectivity...
Delete Components
Change Template Origin
Delete Constraints from All Points
Edit Component...
Insert point
Merge Components
Unmerge Component Points
Set Component Display Rules
FG_AC
BN_AC
FG_PET_R
BN_PET_R
FG_PE_R
BN_PE_R
Component Properties
Name:
TP_R
Description:
Style:
XSCTOP1_P
Close Shape
Parent Component:
Display Rules:
Edit...
Exclude from triangulation
Apply
Close
< Previous
Next >
Help

Next

Name> FG_PE1_R> **FG_PE_R**

Surface Feature Style> PE_P

Apply

Next

Name> FG_PE2_R> **BN_PE_R**

Apply

Close

Save the Template Library.

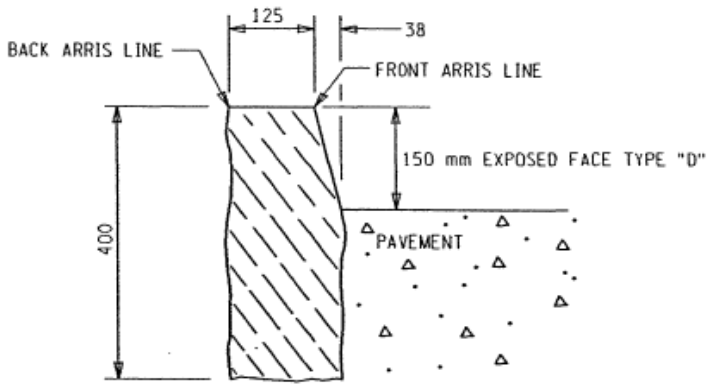
5) **Merge Components**

Two or more separate components of like materials, such as the same course of pavement, can be merged together to create a single component. When components are merged together, the vertical line which divides them is removed. To merge components together, point to the dividing line and **right-click** to **Merge Components** command.

Training Folder> TP_R
TP_R (Appears in Current Template window)

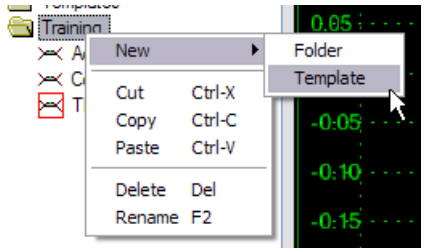
Right Click> Where Pavement Edge of Travelway meets Pavement Edge Component> **Merge Components**

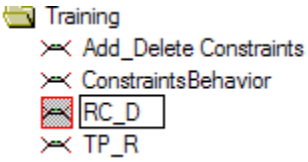
Once components are merged together, they then need to be renamed. The component no longer represents just the right pavement edge of travelway or right pavement edge, but a combination of both. **Double Click** on the component and **change** the name to **TP_R**.

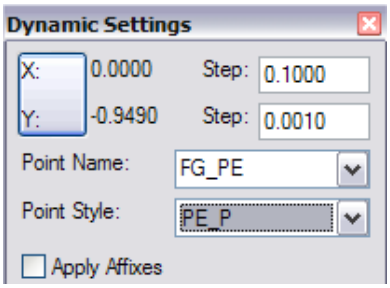


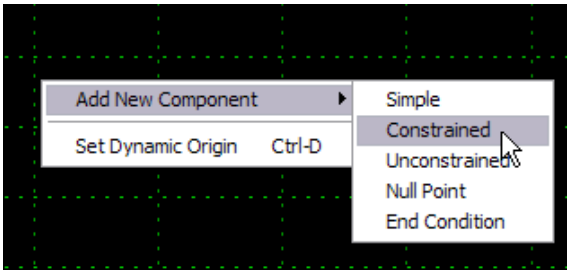
TYPE "D" CURB

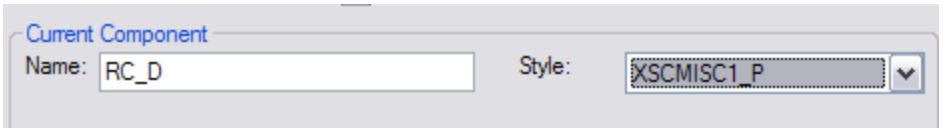
SAWED, HAMMERED OR THERMAL FINISH
TOP AND FACE











6) **Create Constrained and Unconstrained Components**

Constrained components are created with horizontal and vertical constraints automatically applied. Examples of constrained Components include median barrier, curb and gutter sections, retaining walls and complex pavement sections.

Unconstrained components are created with no constraints; then, manually, constraints can be added after the component is created.

Both open and closed shapes can be created; this option is available by right-clicking on the Current Template Window while components are being created.

During component creation, the Dynamic Settings dialog is used to define point names and styles. The Dynamic Settings dialog can be used to enter the precise location for the points. Create a constrained template using the Dynamic Settings Dialog precision input.

Create a Type D Stone and Granite Curb as per Detail on page 4-15. Toggle **Off** "Apply Affixes."

Create Template Dialog Box>

Training Folder> Right Click> New> Template
Name> **RC_D**

Double Click> **RC_D** (Appears in Current Template window)

Display
Toggle On> Components

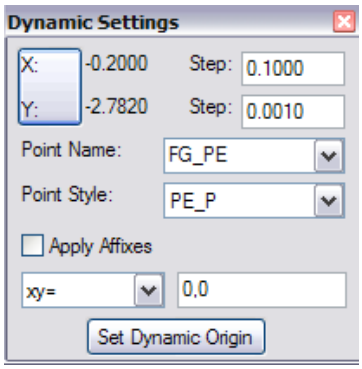
Toggle On> Display Point Names

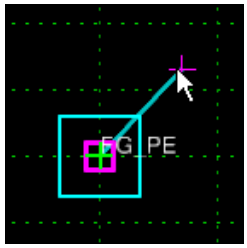
Dynamic Settings Dialog box
Point Name> **FG_PE** (Pull Down)

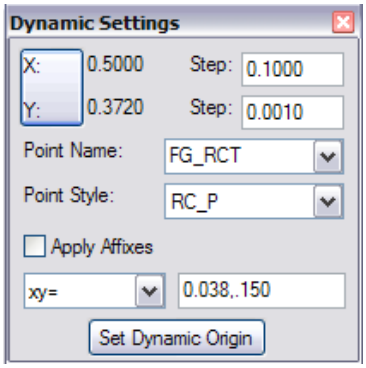
Point Style> **PE_P** (Automatic—Name pull down)

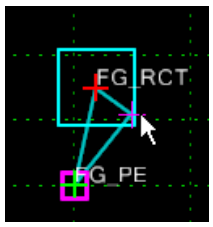
Toggle **Off**> **Apply Affixes**

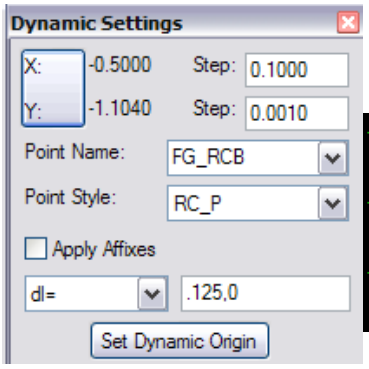
Right Click> Add New Component> **Constrained**

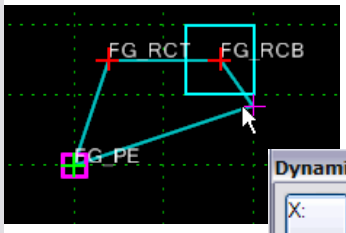


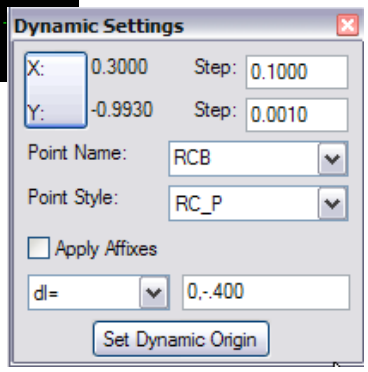


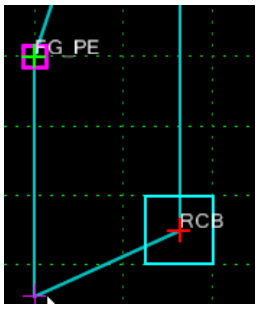


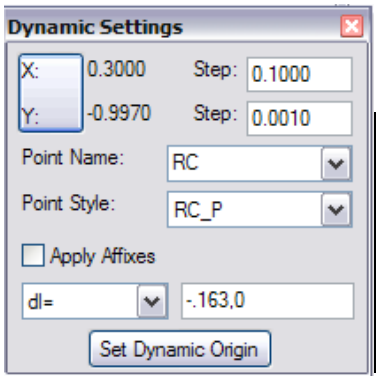


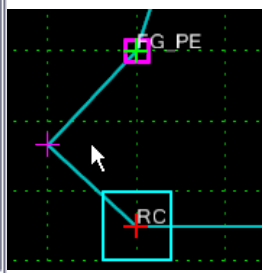


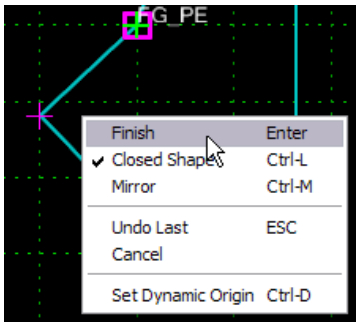


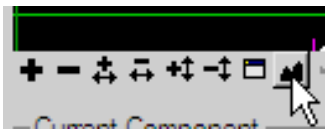












DB: Place vertex of new component, ESC: Go back, ENTER: Finish

Use View Command as necessary/Use Mouse Wheel to change view

Current Component Area
Name> **RC_D**

Style> **XSCMISC1_P**

Dynamic Settings Dialog box
Name> **FG_PE**
Select **xy** (Pull Down)> Key In **0,0> Enter**

Name> **FG_RCT**
Select **xy**> Key In **0.038,0.150> Enter**

Name> **FG_RCB**
Select **dl** (Pull Down)> Key In **0.125,0> Enter**

Name> **RCB**
Select **dl**> Key In **0,-0.400> Enter**

Name> **RC**
Select **dl**> Key In **–.163 ,0**> Enter (.125 + .038=.163)

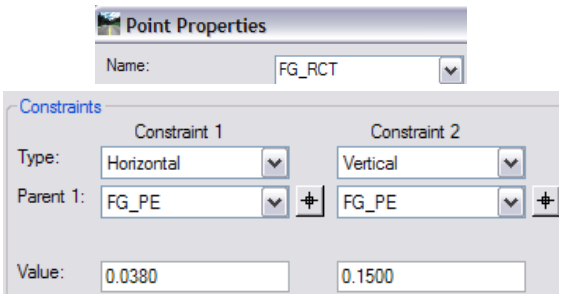
Right Click or "Enter"> **Finish**

At any time during the process of creating a component, the command "**Undo Last**" is available by right-clicking in the Current Template Window.

Also, the escape key, "**ESC**," allows you to go back during the precision input process.

Save the Template Library.

A Review of the Point Properties shows that the points were created with horizontal and vertical constraints, by using constrained component.

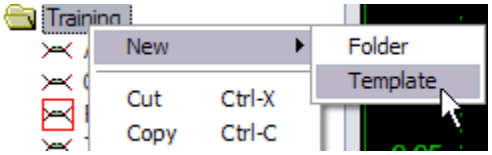


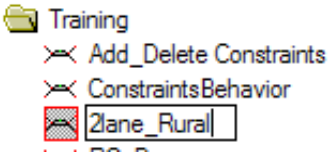
Chapter 5

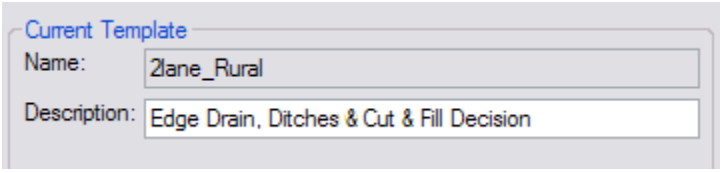
Creating Templates

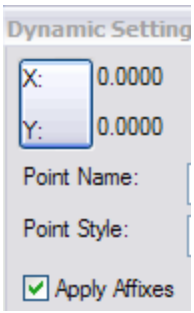
This chapter will introduce you to creating and editing templates. This chapter will teach you how to build complete Templates from Components, and how to edit a template by Editing Template Point Controls.

In this chapter, you will learn how to place and use End Conditions with templates.


Training
New
Cut Ctrl-X
Copy Ctrl-C
Folder
Template


Training
Add_Delete Constraints
ConstraintsBehavior
2lane_Rural


Current Template
Name:
2lane_Rural
Description:
Edge Drain, Ditches & Cut & Fill Decision


Dynamic Setting
X:
0.0000
Y:
0.0000
Point Name:
Point Style:
Apply Affixes

1) **Create New Template**

Although there are already several standard templates provided in the Template Library which can be edited, there may be a need to create a template with a different combination of components.

Create a new template in the Training Folder called 2lane_Rural.

Modeler> Create Template

Create Template Dialog Box

Training Folder> Right Click> **New> Template**
Name> **2lane_Rural**

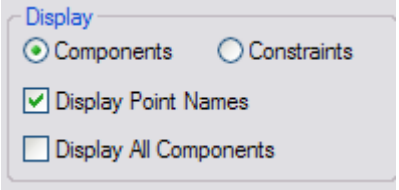
Double Click> **2lane_Rural> Add Description** (Appears in Current Template window)
Description> Edge Drain, Ditches & Cut & Fill Decision

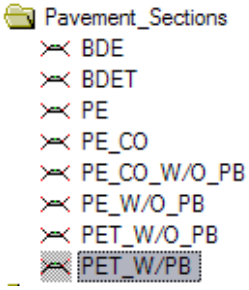
Build the new template using pavement, miscellaneous and end condition components. To assemble a Template, simply drag and drop the components to the Current Template window. A single-click on a component will display the component in the Preview Window. A Right-Click in the Current Window while dragging a component for placement will allow you to return to the Dynamic Settings Dialog Box.

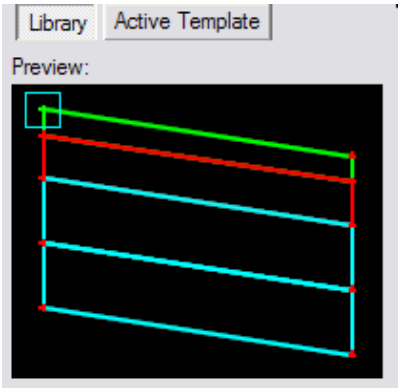
When connecting two components, the connecting point will change to a white colored plus sign prior to placing the component. This indicates that the points coincide. Any coincident component points will use the point names of the previously placed component. Template point names can be edited anytime during the creation process.

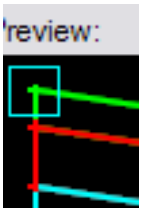
Affixes can be automatically added during component placement when components are being used to create templates; they can be changed on the fly in the Dynamic Settings Dialog. Toggle **On** "Apply Affixes." The standard Suffix for side of roadway is _L and _R.

Steps options are set up in "Template Options" to assist with the Dynamic Settings, locating the point of origin, etc.

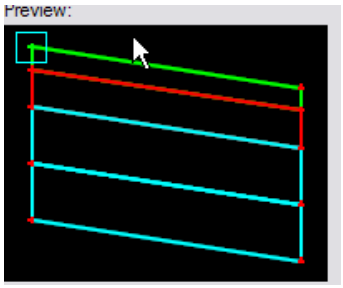


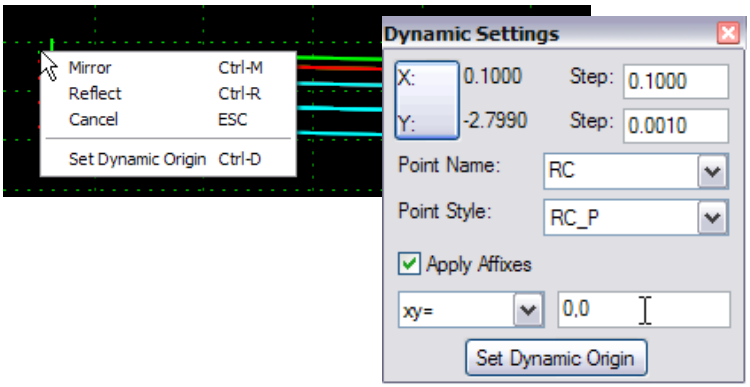


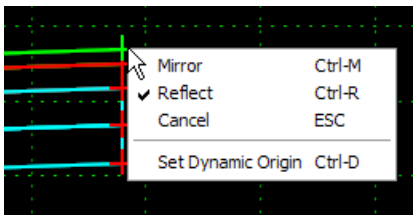


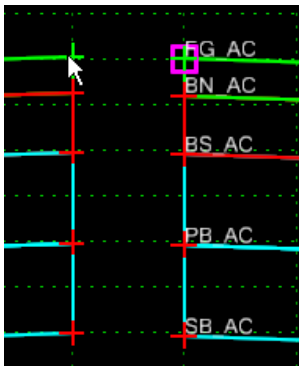


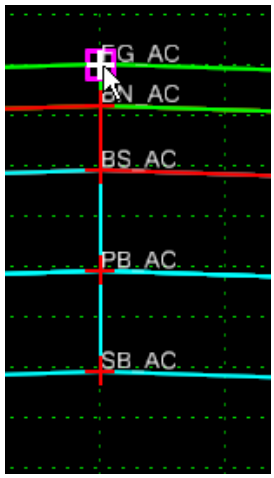
Insertion point is automatically at component origin. To change place of insertion, click on a different point on component.

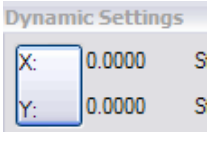












Create Template Dialog Box> Training Folder> 2lane_Rural

Display

Enable> **Components**

Toggle **On**> Display Point Names

Open> Dynamic Settings Dialog

Toggle **On**> **Apply Affixes**

Pavement_Sections Folder

Highlight> **PET_W/PB** Appears in Preview window)

Drag and Drop Component

Drag> PET_W/PB, From Black Area of Preview window> **Right Click** While Dragging to Origin X=0; Y=0 (Leave "Data" Button Depressed)> **Go to Dynamic Settings Dialog Box**

Dynamic Settings

Select **xy** (Pull Down)> Key In **0,0> Enter> Drop**

2lane_Rural as Current Template

Pavement_Sections Folder

Highlight> **PET_W/PB**

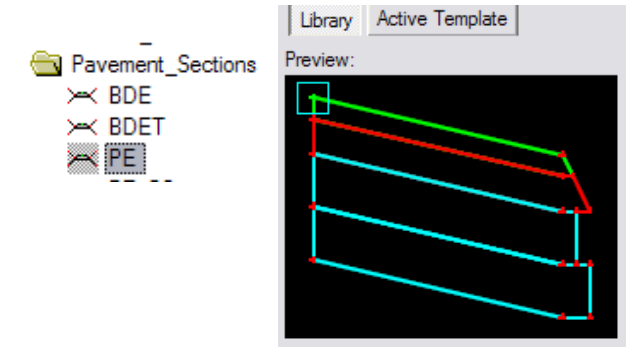
Drag and Drop Component

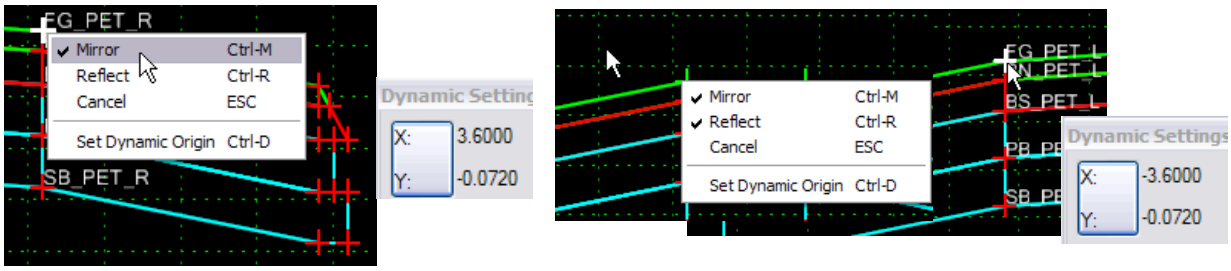
Drag> PET_W/PB

Right Click> Reflect to place Left Side

Drop> PET_W/PB> **at FG_AC;** ***Point will Highlight in White***; (Dynamic Settings Dialog Box Readout at Origin: X=0; Y=0)

Watch the Dynamic Settings for correct readouts as you place points. Adjust Step Options as necessary.

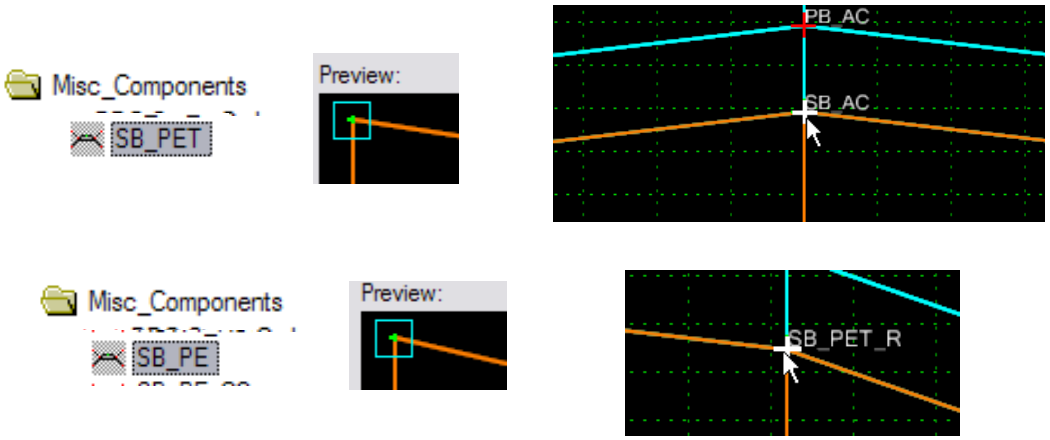


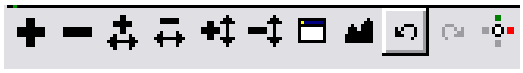


Mirror—Mirrors the component and adds on both sides of the template; the insertion point is in the direction component is created.

Reflect—Adds a mirror image component on the opposite side, only

Mirror and Reflect—Same as mirror, but insertion point is on opposite side.





Use window view commands to change views within the Current Template window. Use Mouse Wheel to change views; Mouse Wheel + Ctrl & Mouse Wheel + Shift. Use "UNDO" in the window view commands area to undo last command.

Pavement_Sections Folder

Highlight > **PE**

Drag and Drop Component
Drag> PE

Right Click> Reflect and Mirror> **Drop at FG_PET_L**

(OR)

Right Click> Mirror ONLY> **Drop at FG_PET_R**

Misc_Components Folder

Highlight> **SB_PET**

Drag and Drop Component
Drag> SB_PET

Right Click> Mirror> **Drop at SB_AC**

Misc_Components Folder

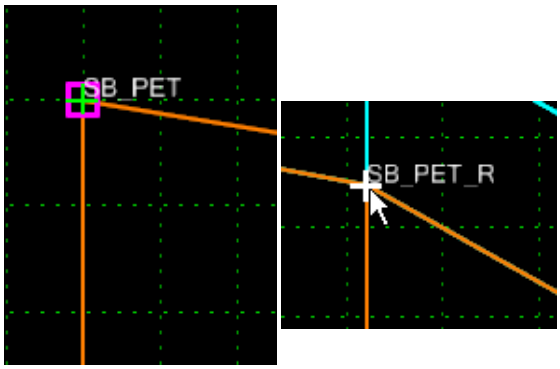
Highlight > **SB_PE**

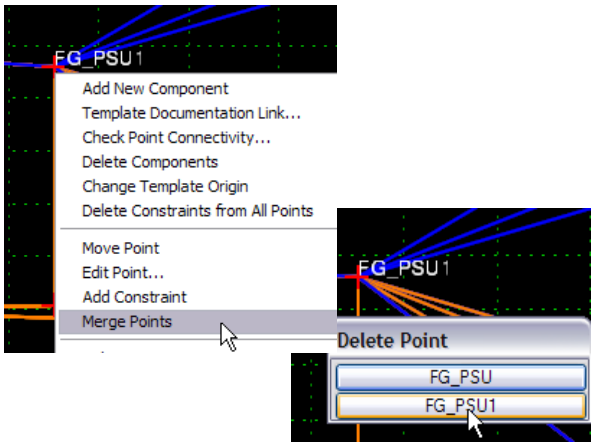
Drag and Drop Component
Drag> SB_PE

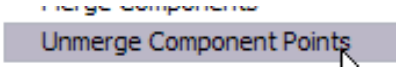
Right Click> Mirror> **Drop at SB_PET_R**

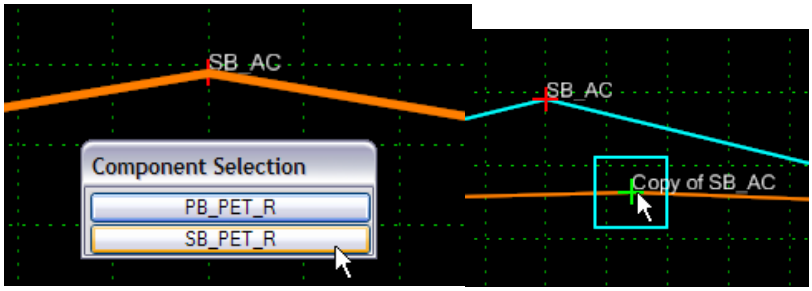
When dragging Components from the Preview Window, using the black area in the Window leaves the insertion point at the default location.

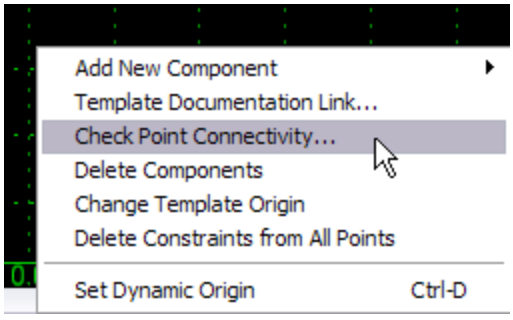
Save the Template Library.

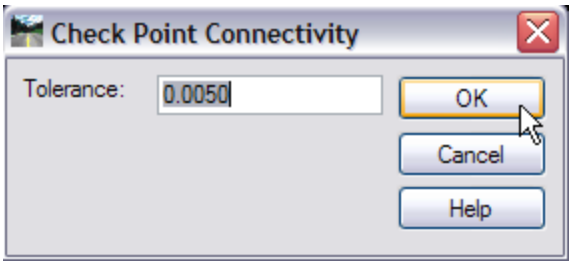

SB_PET
SB_PET_R


FG_PSU1
Add New Component
Template Documentation Link...
Check Point Connectivity...
Delete Components
Change Template Origin
Delete Constraints from All Points
Move Point
Edit Point...
Add Constraint
Merge Points
FG_PSU1
Delete Point
FG_PSU
FG_PSU1


Unmerge Component Points


SB_AC
SB_AC
Component Selection
PB_PET_R
SB_PET_R
Copy of SB_AC


Add New Component
Template Documentation Link...
Check Point Connectivity...
Delete Components
Change Template Origin
Delete Constraints from All Points
Set Dynamic Origin
Ctrl-D


Check Point Connectivity
Tolerance:
0.0050
OK
Cancel
Help


Bentley InRoads XM Edition
No two points found honoring tolerance
OK

When the components came together at the same point, those points automatically merge together and the first point that was created in the template remains. The point is now shared by both components.

For instance, the Subbase layer merged to the bottom of the Permeable Base layer and the Points at the pavement edge of travelway, SB_PET, automatically merged together. If points do not merge automatically, right-click and use the merge points command. The user must choose which point should be deleted.

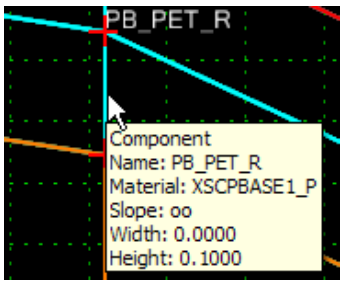
"Unmerge Component Points nullifies the automatic merge of component points merged together during creation of the template. The component that was sharing its points with another component, gets a copy of that point. All constraints between these shared points (and other points in the template) are removed.

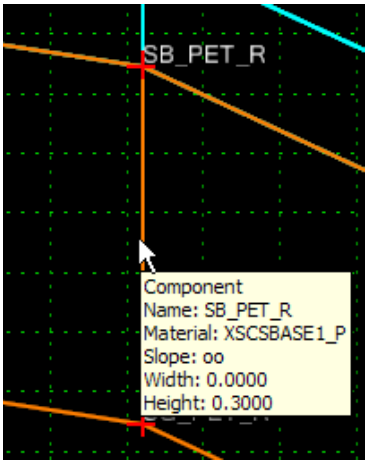
2) **Check Point Connectivity**

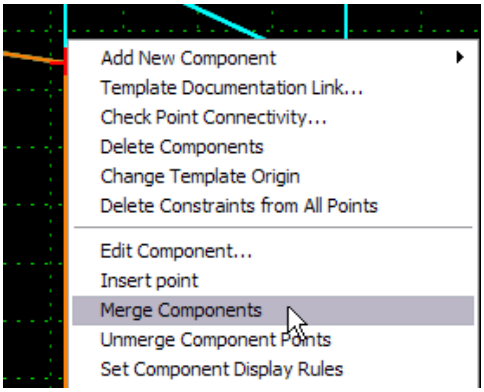
Exact placement of components to the origin and to each other are required to eliminate extra points; misplaced points that go un-noticed can cause problems in the way the surface is created from the template.

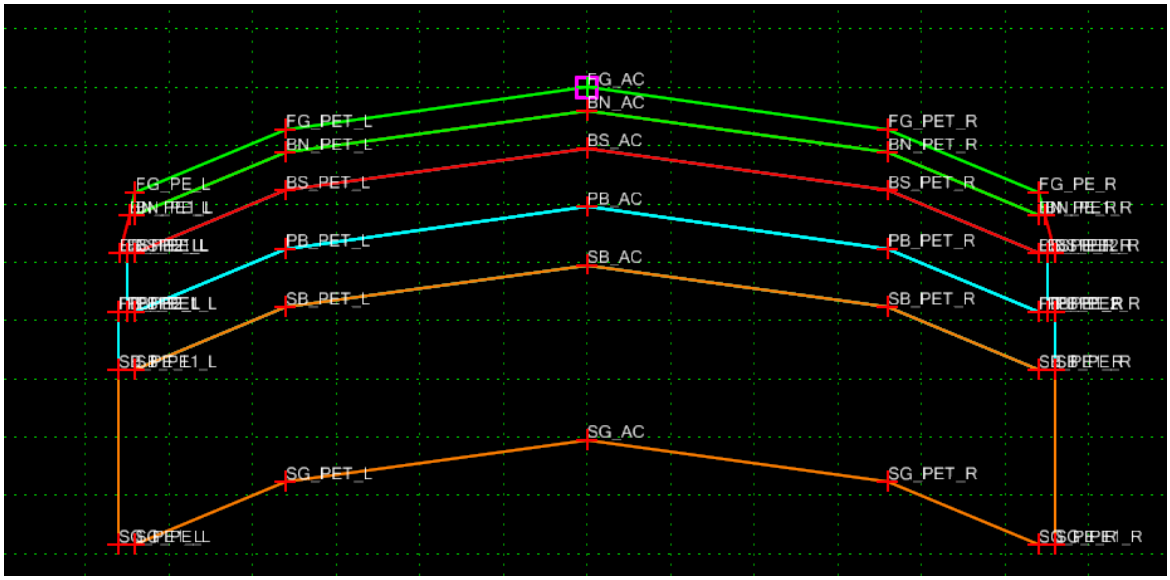
Use the Check Point Connectivity command to check points on components. Use the default tolerance of 0.005.

Points not within that tolerance, will display with a "Delete Point" Dialog box on the screen, giving the user the option to delete the extra point. Do not delete the necessary points. Use the "Escape" key to move to the next conflict, and finally to close the command.


PB_PET_R
Component
Name: PB_PET_R
Material: XSCPBASE1_P
Slope: oo
Width: 0.0000
Height: 0.1000


SB_PET_R
Component
Name: SB_PET_R
Material: XSCSBASE1_P
Slope: oo
Width: 0.0000
Height: 0.3000


Add New Component
Template Documentation Link...
Check Point Connectivity...
Delete Components
Change Template Origin
Delete Constraints from All Points
Edit Component...
Insert point
Merge Components
Unmerge Component Points
Set Component Display Rules


SG_AC
BN_AC
FG_PET_L
BN_PET_L
BS_AC
FG_PET_R
BN_PET_R
FG_PE_L
BS_PET_L
BS_PET_R
FG_PE_R
PB_AC
PB_PET_L
PB_PET_R
SB_AC
SB_PET_L
SB_PET_R
SG_AC
SG_PET_L
SG_PET_R

3) **Merge Components**

Merge all the component pavement layers of the same composition. When this step is complete, there will be only one component for each pavement and subbase layer

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

Create Template Dialog Box

Training Folder> 2lane_Rural
2lane_Rural (Appears in Current Template window)

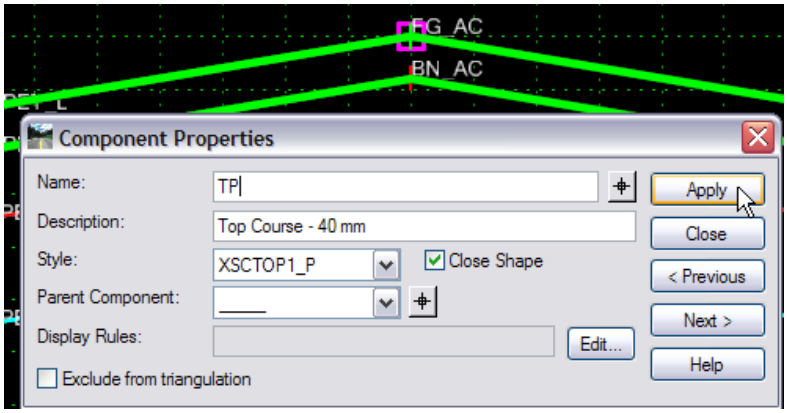
Right Click> Vertical Line where (Pavement Travelway) **PET** component meet (Pavement Edge) **PE** Components> **Merge Components**

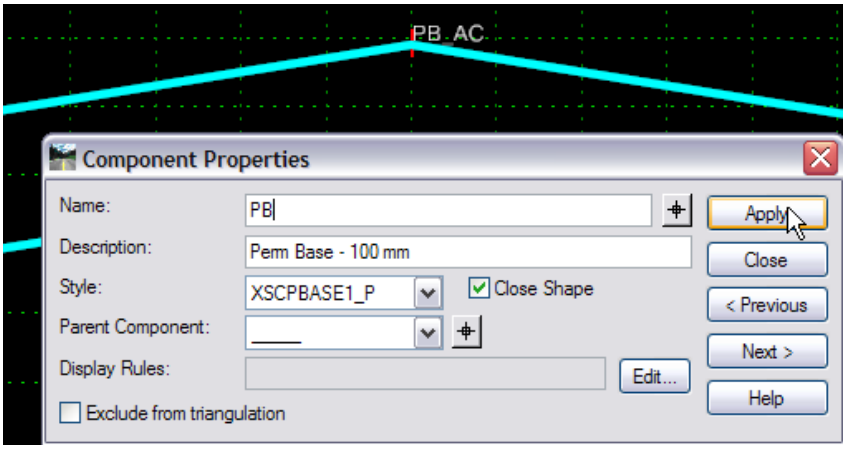
Do this for all courses; Top Course, Binder Course, Base Course, Permeable Base Course and Subbase Course

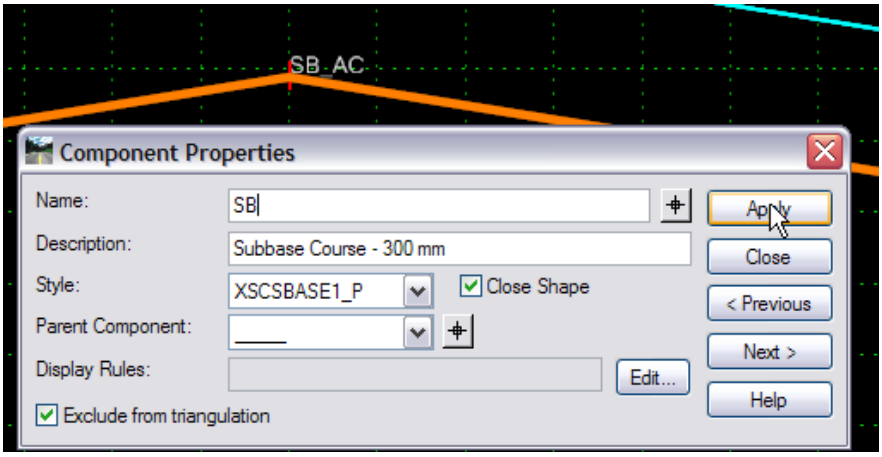
Right Click> Vertical Line where (Pavement Travelway) **PET** components meet> **Merge Components**

Do this for all courses; Top Course, Binder Course, Base Course, Permeable Base Course and Subbase Course

If you receive an error message concerning shared points when using the “Merge Component” command, un-merged points exist between the components.


FG_AC
BN_AC
Component Properties
Name:
TP
Description:
Top Course - 40 mm
Style:
XSCTOP1_P
Close Shape
Parent Component:
Display Rules:
Edit...
Exclude from triangulation
Apply
Close
< Previous
Next >
Help


PB_AC
Component Properties
Name:
PB
Description:
Perm Base - 100 mm
Style:
XSCPBASE1_P
Close Shape
Parent Component:
Display Rules:
Edit...
Exclude from triangulation
Apply
Close
< Previous
Next >
Help


SB_AC
Component Properties
Name:
SB
Description:
Subbase Course - 300 mm
Style:
XSCSBASE1_P
Close Shape
Parent Component:
Display Rules:
Edit...
Exclude from triangulation
Apply
Close
< Previous
Next >
Help

4) **Rename Components**

Once all the components are merged, the component names have been compromised and should be changed.

Each pavement sub-layer course is now one component across the roadway; therefore, they should no longer designate the side of the roadway or the template point control for one segment.

Instead, each component will be named the letter prefix of the layer, and the name of the layer. **Rename** the Components.

Training Folder> 2lane_Rural
Right Click> **Top Course Component**

Component Properties Dialog Box
Name> TP_PET_R> **TP**

Apply, Next

Name> PB_PET_R> **PB**

Apply, Next

Name> SB_PET_R> **SB**

Apply, Next

Name> BN_PET_R> **BN**

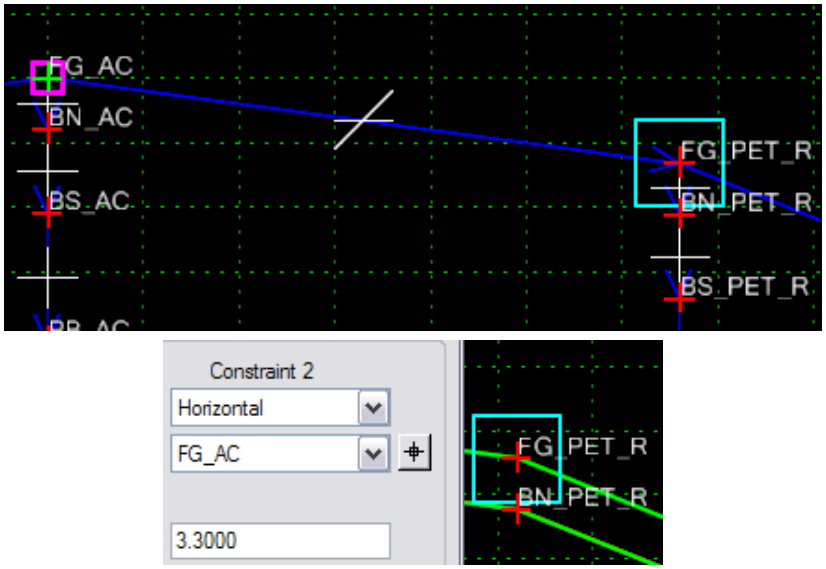
Apply, Next

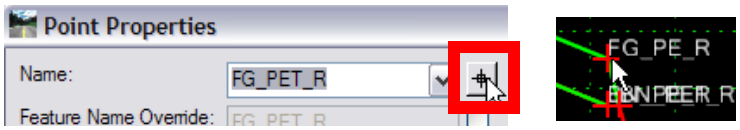
Name> BS_PET_R> **BS**

Apply

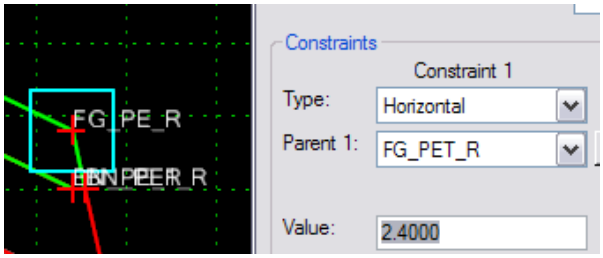
Close

This is a template that can be used for “Backbone only” roadway corridor modeling.


FG_AC
BN_AC
BS_AC
FG_PET_R
BN_PET_R
BS_PET_R
Constraint 2
Horizontal
FG_AC
3.3000
FG_PET_R
BN_PET_R


Point Properties
Name:
FG_PET_R
Feature Name Override:
FG_PE_R


Point Properties
Name:
FG_PE_R
Feature Name Override:
FG_PE_R
Apply
Close
FG_PE_R


FG_PE_R
Constraints
Constraint 1
Type:
Horizontal
Parent 1:
FG_PET_R
Value:
2.4000

5) **Edit Components**

Any changes necessary to a template can be made through Point Properties. Access the Point Properties dialog box by right-click to Edit Point, or by double-clicking any point.

Change the width of the roadway from 3.6 m to 3.3 m, and the width of the shoulders from 1.8 m to 2.4 m. **Change** the ***Horizontal Constraints Value*** on the FG_PET_R, FG_PET_L, FG_PE_R and FG_PE_L points on the template surface.

Training Folder> 2lane_Rural
2lane_Rural (Appears in Current Template window)

Right Click> **FG_PET_R> Edit Point**

Point Properties Dialog Box
Constraints
Constraint 2 **(Whichever constraint is horizontal)**
Type> Horizontal Constraint

Parent> FG_AC

Value> 3.6000> **3.3000**

Apply

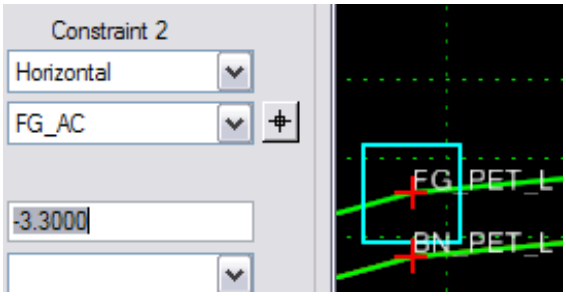
Locate> FG_PE_R
Constraints
Constraint 1 **(Whichever constraint is horizontal)**
Type> Horizontal Constraint

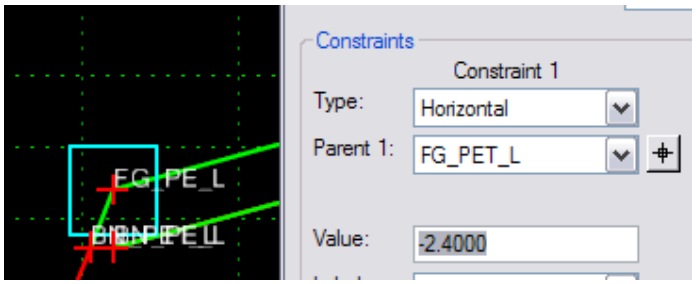
Parent> FG_PET_R

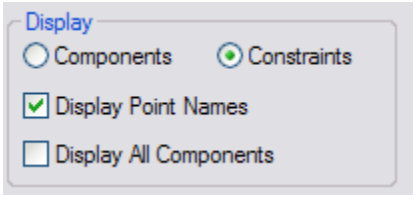
Value> 1.8> **2.4**

Apply

Locate> FG_PET_L
Constraints


Constraint 2
Horizontal
FG_AC
-3.3000
FG_PET_L
BN_PET_L


FG_PE_L
Constraints
Constraint 1
Type:
Horizontal
Parent 1:
FG_PET_L
Value:
-2.4000


Display
Components
Constraints
Display Point Names
Display All Components

Constraint 1 **(Whichever constraint is horizontal)**
Type> Horizontal Constraint

Parent> FG_AC

Value> -3.6> **-3.3**
Apply

Locate> FG_PE_L
Constraints
Constraint 1 **(Whichever constraint is horizontal)**
Type> Horizontal Constraint

Parent> FG_PET_L

Value> -1.8> **-2.4**
Apply

Close

The Edge of Travelway points on sub-layers are constrained horizontally and vertically to the top surface Edge of Travelway points. The same is true of the left and right Edge of Pavement points.

When the top surface points are changed, the width of all the sub-layers automatically changes to the new width of the point to which they are constrained.

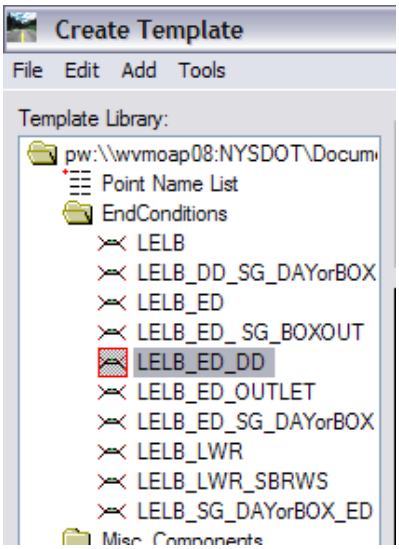
To view the template points constraints, change the **Display View to Constraints.**

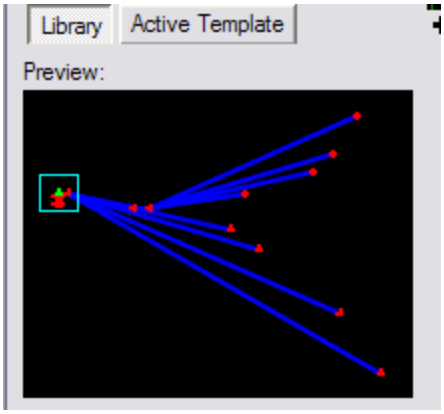
Chapter 6

End Conditions

This chapter will teach you how End Conditions work, how to test them, and how to check their operation in a template.

In this chapter, you will learn how to place and use End Conditions with templates.


Create Template
File Edit Add Tools
Template Library:
pw:\\wvmoap08:NYSDOT\Docum
Point Name List
EndConditions
LELB
LELB_DD_SG_DAYorBOX
LELB_ED
LELB_ED_ SG_BOXOUT
LELB_ED_DD
LELB_ED_OUTLET
LELB_ED_SG_DAYorBOX
LELB_LWR
LELB_LWR_SBRWS
LELB_SG_DAYorBOX_ED
Misc Components


Library
Active Template
Preview:

1) **End Conditions Provided in Standard Template Library**

End Conditions—Cut and Fill slopes which combine and replace the template cuts and fills and decision tables, the "Catch Point" choices of Roadway Library.

The End Conditions components that are supplied in the Standard Template Library include the following:

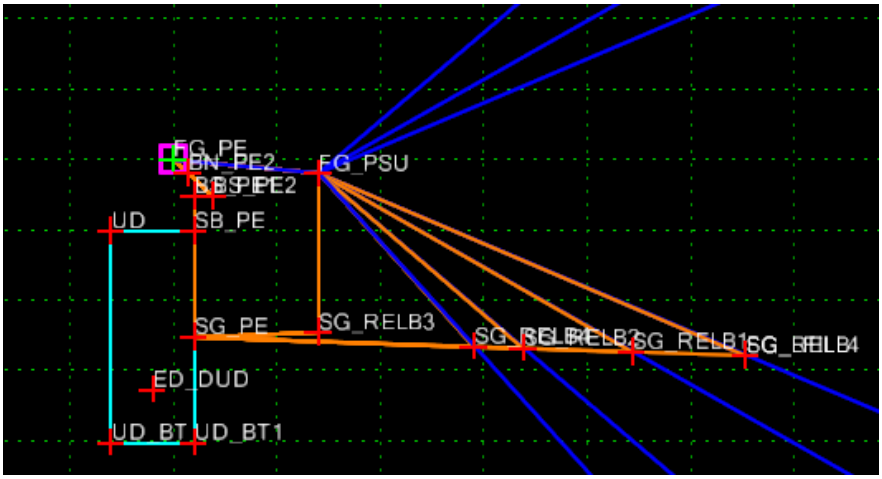
- **LELB**—Variable Cut and Fill Slopes; *No subgrade or edgedrain attached* (In Fill Area—Decision on which fill slope will be applied; In Cut Area—Decision on which cut slope will be applied)

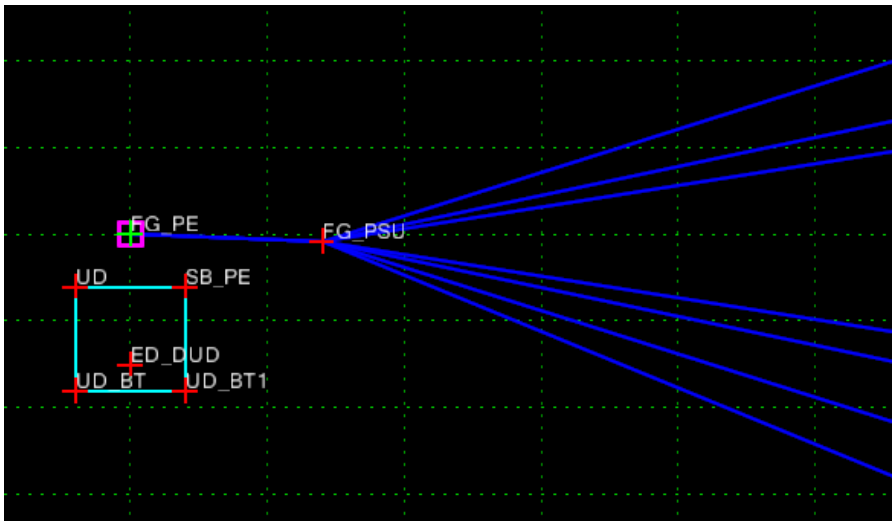
- **LELB_DD_SG_DAYorBOX**—Variable Fill Slopes, Ditch with Variable Cut Slopes. Use without Permeable Base Course.
  - Fill Area—Decision on which fill slope will be applied. Subgrade Daylight attached to whichever slope is decided upon in Fill Area, once the depth allows for Daylighting condition. Box-Out Subgrade and Edge Drain attached to fill slope to minimal to allow for Daylighting.
  - Cut Area—Create ditch and decide which cut slope will be applied.

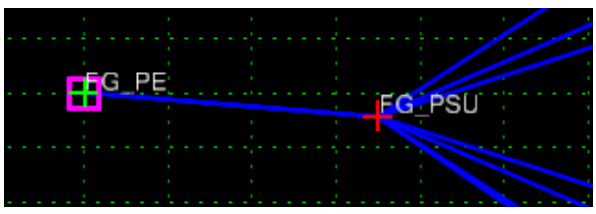
- **LELB_ED**—Variable Cut and Fill Slopes; Use with Permeable Base Course.
  - Fill Area—Decision on which fill slope will be applied. Edgedrain is used for all fill conditions.
  - Cut Area—Decide which cut slope will be applied. Edgedrain is used for all cut conditions

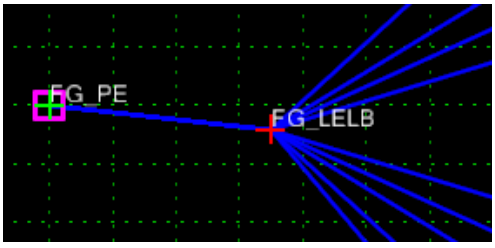
- **LELB_ED_SG_BOXOUT**—Variable Cut and Fill Slopes; Edgedrain & Subgrade Box-Out attached to all cut and fill slopes (In Fill Area—Decision on which fill slope will be applied; In Cut Area—Decide which cut slope will be applied). Use without Permeable Base Course.

- **LELB_ED_DD**—Variable Fill Slopes, Ditch with Variable Cut Slopes; Use with Permeable Base Course.
  - Fill Area—Decision on which fill slope will be applied. Edgedrain is used for all fill conditions.
  - Cut Area—Create ditch and decide which cut slope will be applied. Edgedrain is used for all cut conditions.


FG_PE
FG_PSU
UD
SB_PE
SG_PE
SG_RELB3
ED_DUD
UD_BT
UD_BT1


FG_PE
FG_PSU
UD
SB_PE
ED_DUD
UD_BT
UD_BT1


FG_PE
FG_PSU


FG_PE
FG_LELB

- **LELB_ED_OUTLET**—Variable Cut and Fill Slopes; Use with Perm Base Course at Single Station to Outlet Edge Drain.
  - Fill Area—Decision on which fill slope will be applied. Edgedrain outlet to slope is applied.
  - Cut Area—Same as LELB_ED

- **LELB_ED_SG_DAYorBOX**—Variable Cut and Fill Slopes; Subgrade Daylight attached to fill slope in fill areas; Subgrade Box-Out attached to cut slope in cut area (In Fill Area—Decision on which fill slope will be applied; In Cut Area—Decide which cut slope will be applied). Use without Permeable Base Course.
  - Fill Area—Decision on which fill slope will be applied. Subgrade Daylight attached to whichever slope is decided upon in Fill Area, once the depth allows for Daylighting condition. Box-Out Subgrade attached to fill slope too minimal to allow for Daylight.
  - Cut Area—Decide which cut slope will be applied; Box-Out Subgrade attached to all cut slopes.
  - Edgedrain is used for both Box-Out and Daylight Conditions

- **LELB_LWR**—Retaining Wall End condition
  - Slope—Cut and Fill Slope set at Eight Degree Batter

- **LELB_LWR_SBRWS**—Segmental Block Retaining Wall System
  - Slope—Cut and Fill Slope set at Eight Degree Batter; Blocks are attached to Cut and Fill Slope to create Block Rows. Display Rules define creation of block rows.

- **LELB_SG_DAYorBOX_ED**—Variable Cut and Fill Slopes; Subgrade Daylight attached to fill slope in fill areas; Subgrade Box-Out attached to cut slope in cut area (In Fill Area—Decision on which fill slope will be applied; In Cut Area—Decide which cut slope will be applied). Use without Permeable Base Course.
  - Fill Area—Decision on which fill slope will be applied. Subgrade Daylight attached to whichever slope is decided upon in Fill Area, once the depth allows for Daylighting condition. Edgedrain and Box-Out SG only attached to fill slope which does not Daylight.
  - Cut Area—Decide which cut slope will be applied. Edgedrain and Box-Out Subgrade attached to all cut slopes.

2) End Conditions' Settings and Properties

End Conditions components make decisions on cut and fill slopes, and can be added to and used with templates.

In each End Condition, individual Cut and Fill Slopes were created as individual components. The Cut/Fill Points use slope and horizontal constraints to the FG_PSU, the Finished Grade pavement shoulder unpaved (shoulder backup) point; or the FG_LELB, landscape elevation break point. The Finished Grade Pavement Edge, FG_PE, is the component's point of origin. The name of each component begins with the style (level) and a logical description was given to each component.

The components, in Component Properties, are set up to find the Active Surface as the target. They are "prioritized" in the order in which they will make a "decision."

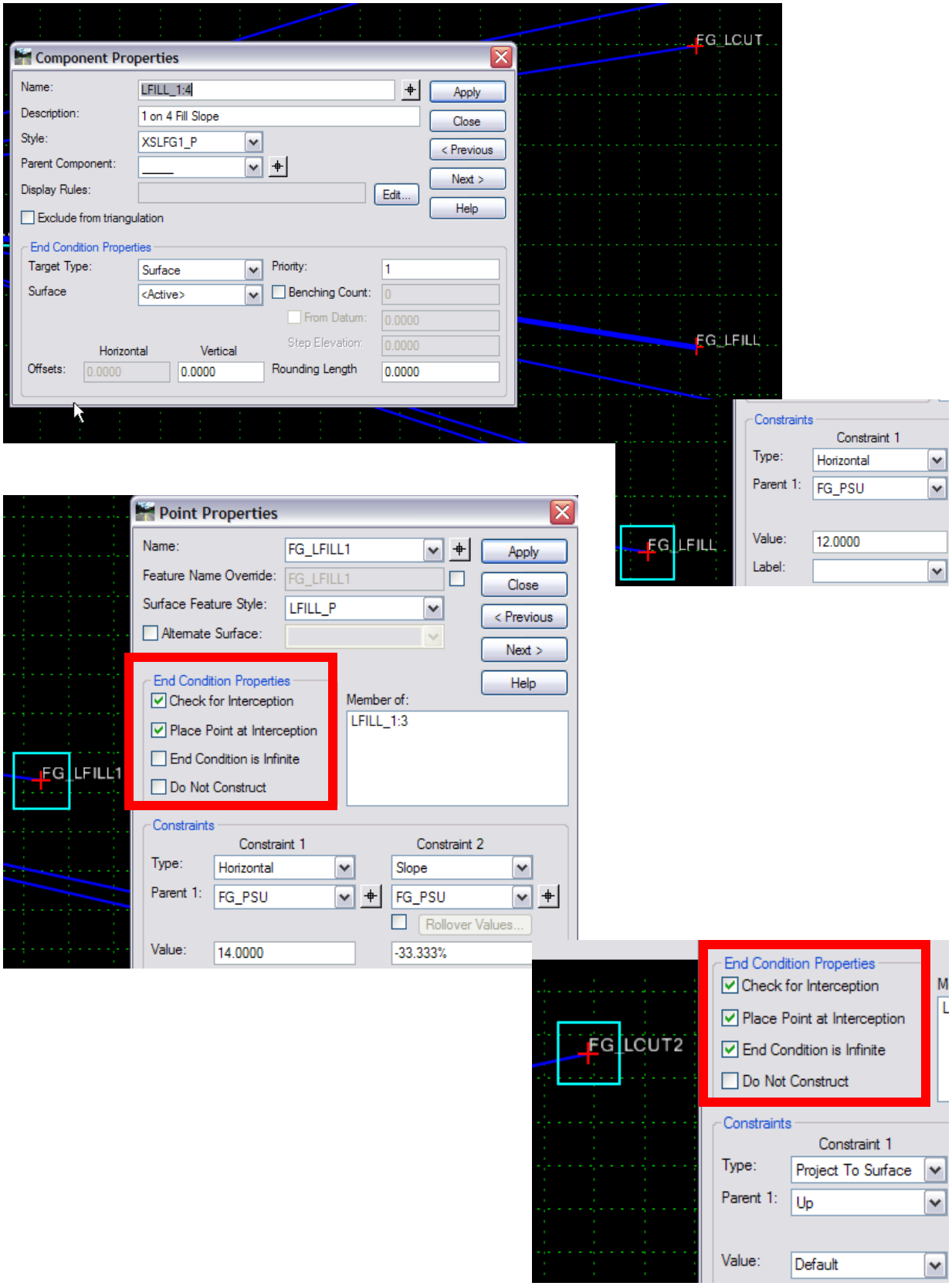
The priority sequence that is set up in the standard end conditions at each component that begins at the same point. Decide which end condition component is most desirable for the project. This component, the most desirable end condition component, would be assigned the lowest priority number, in this case a priority of 1. The last condition to be tested, when other tests have failed, is given the highest priority number.

Priorities can be re-sequenced, depending on ROW limitations and other design requirements of the project. The horizontal distance can be changed in each of the cut and fill slopes, as necessary, to change the distance in which a particular slope travels to attempt to find the target.

Each Cut and Fill slope percentage is determined by the value of the Slope Constraint. The Horizontal Constraint value determines the distance a particular slope will travel to arrive at the target (active surface). If the first slope cannot meet the target within that distance, an attempt is made at placing the next slope in order of priority.

The final, infinite, Cut and Fill Slopes are created with Project to Surface Constraints along with the Slope Constraints. If previous slopes failed to find a target, this final cut/fill slope will be "infinite" and will project to the surface that is applied in the "Value" of the Project to Surface constraint.

Changes can be performed in either the Component Properties or Point Properties Dialog Boxes.


Component Properties
Name: LFILL_1:4
Description: 1 on 4 Fill Slope
Style: XSLFG1_P
Parent Component:
Display Rules:
Exclude from triangulation
Apply
Close
< Previous
Next >
Help
Edit...
End Condition Properties
Target Type: Surface
Surface: <Active>
Priority: 1
Benching Count: 0
From Datum: 0.0000
Step Elevation: 0.0000
Horizontal
Vertical
Offsets: 0.0000 0.0000
Rounding Length: 0.0000
FG_LCUT
FG_LFILL
Constraints
Constraint 1
Type: Horizontal
Parent 1: FG_PSU
Value: 12.0000
Label:
Point Properties
Name: FG_LFILL1
Feature Name Override: FG_LFILL1
Surface Feature Style: LFILL_P
Alternate Surface:
End Condition Properties
Check for Interception
Place Point at Interception
End Condition is Infinite
Do Not Construct
Member of:
LFILL_1:3
Constraints
Constraint 1
Constraint 2
Type: Horizontal
Slope
Parent 1: FG_PSU
FG_PSU
Rollover Values...
Value: 14.0000
-33.333%
FG_LFILL1
FG_LCUT2
End Condition Properties
Check for Interception
Place Point at Interception
End Condition is Infinite
Do Not Construct
Constraints
Constraint 1
Type: Project To Surface
Parent 1: Up
Value: Default

Other End Condition Component settings that have to be considered in order to obtain the desired results are the following:

- Check for Interception—when this toggle is checked on, the line segment will search for the specified target. When this toggle is checked off, the line segment will be created at its full width regardless of whether it intersects the target, provided one of the segments connected to this segment successfully intersects the target.

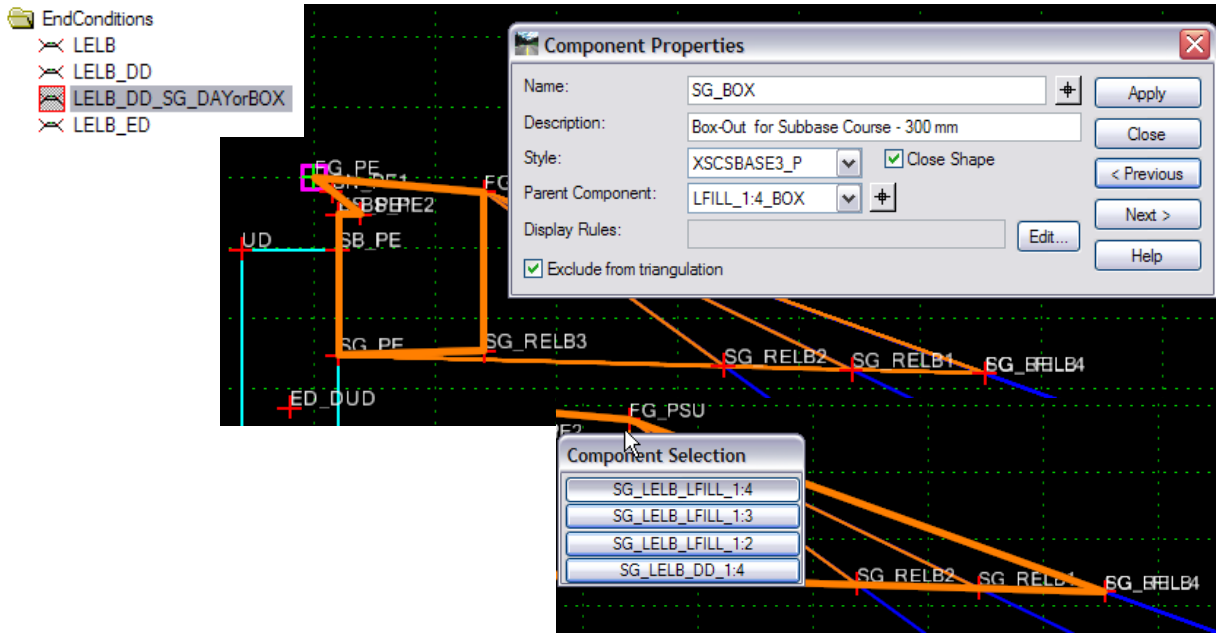
- Place Point at Intersection—when this toggle is checked on, a point will be placed at the location of the interception.

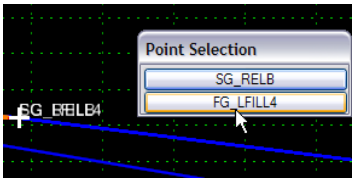
- End Condition is Infinite—when this toggle is checked on, the line segment will automatically be extended to intercept the target. When the toggle is checked off, the line segment will only extend to its maximum constraint to meet its target. This setting applies only to the last line segment in an end condition.

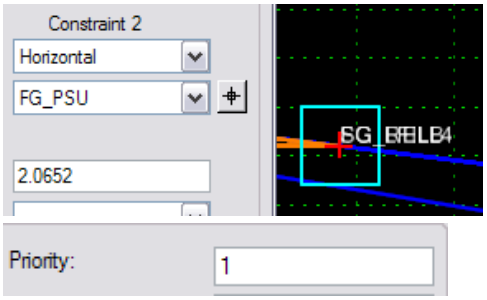
- Do Not Construct—when this toggle is checked on, the end point of the line segment will be used as a reference point to find a subsequent point. The point will be solved for, like any other end condition point, but that point will be skipped when drawing the final component segments. This is normally checked off, and is used only for more complex conditions decisions.

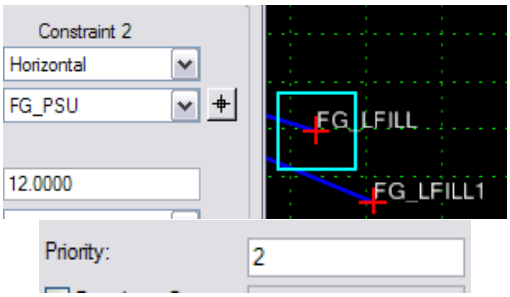
In the End Conditions which feature Subbase Daylighting/Box-Out conditions, Subbase Components and Subgrade Conditions are children of Cut and Fill Slope Components. For Instance, the Subgrade Box-Out component, SG_BOX is a child of LFILL_1:4_BOX component in the LELB_DD_SG_DAYorBOX End Condition. Each Subgrade Daylight Component is a child of a different fill slope, or ditch section.

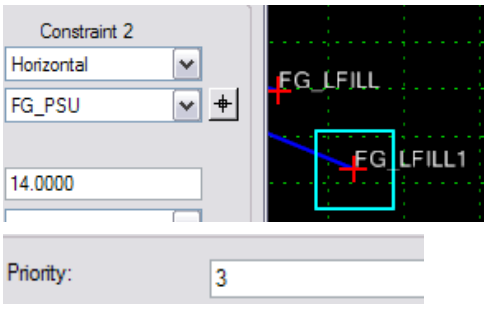
In areas where multiple components are in the same location, Right-Click on component which will bring up the Component Selection Dialog Box. Select component; or, for more components not shown in Component Selection Dialog Box, hit the “ESC” key on the keyboard and a second Component Selection Dialog Box will appear.

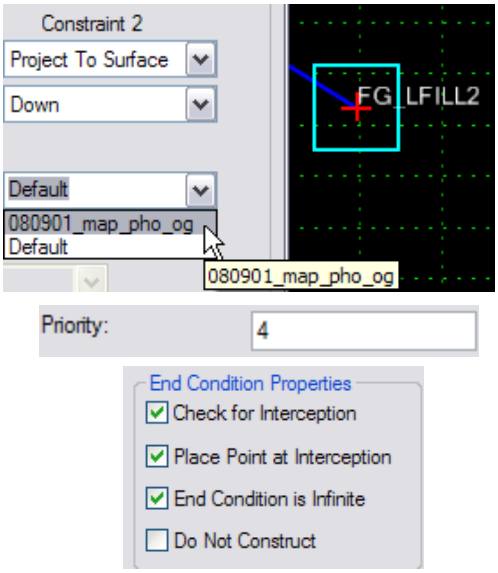

EndConditions
LELB
LELB_DD
LELB_DD_SG_DAYorBOX
LELB_ED
Component Properties
Name:
SG_BOX
Description:
Box-Out for Subbase Course - 300 mm
Style:
XSCSBASE3_P
Close Shape
Parent Component:
LFILL_1:4_BOX
Display Rules:
Edit...
Exclude from triangulation
Apply
Close
< Previous
Next >
Help
SG_RELB3
SG_RELB2
SG_RELB1
FG_PSU
Component Selection
SG_LELB_LFILL_1:4
SG_LELB_LFILL_1:3
SG_LELB_LFILL_1:2
SG_LELB_DD_1:4


Point Selection
SG_RELB
FG_LFILL4


Constraint 2
Horizontal
FG_PSU
2.0652
Priority:
1


Constraint 2
Horizontal
FG_PSU
12.0000
FG_LFILL
FG_LFILL1
Priority:
2

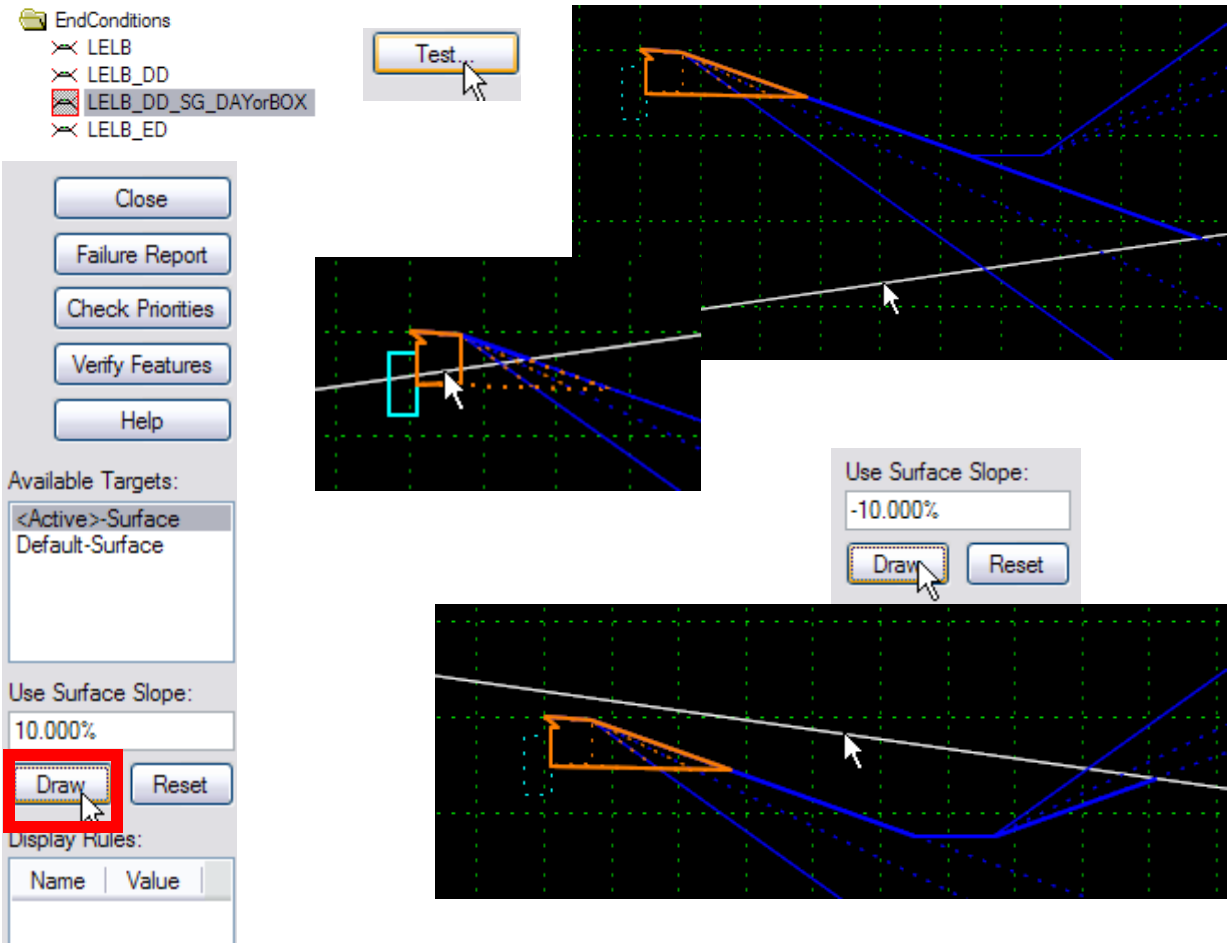

Constraint 2
Horizontal
FG_PSU
14.0000
FG_LFILL
FG_LFILL1
Priority:
3

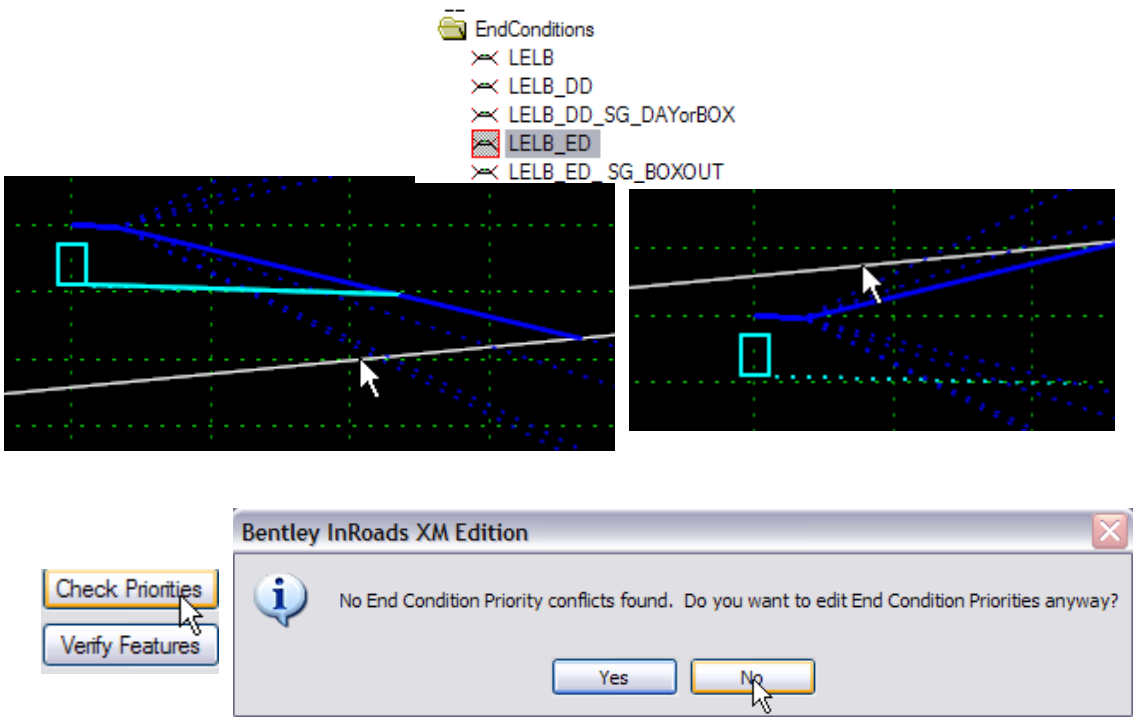

Constraint 2
Project To Surface
Down
Default
080901_map_pho_og
Default
FG_LFILL2
Priority:
4
End Condition Properties
Check for Interception
Place Point at Interception
End Condition is Infinite
Do Not Construct

In the EndConditions Folder, make the LELB_DD_SG_DAYorBOX the current template. **Check** the End Condition, looking at all the fill slope components; notice the priorities that are set on the components. Then, check the Constraints set on the Template Points.

Right-click> Edit on the fill slopes components. Check the priority sequence of the components. **Right-Click>** Edit on the fill slope points to open the Point Properties Dialog box. For each slope, in order of priority, the Horizontal Constraint Value increases. This value represents the distance the slope will travel to intercept the target. The final, infinite, slope will project to the target surface and intercept the target with no restriction of distance travelled.

Once a Template Library has been copied to the project from the NYS Standard Template Library, **set the Original Ground Surface in End Condition Template Points which "Project to Surface."** These points should be set in any End Conditions Template, in the EndConditions Folder, and on all Templates in other folders that are to be used on the project.


EndConditions
LELB
LELB_DD
LELB_DD_SG_DAYorBOX
LELB_ED
Test...
Close
Failure Report
Check Priorities
Verify Features
Help
Available Targets:
<Active>-Surface
Default-Surface
Use Surface Slope:
10.000%
Draw
Reset
Display Rules:
Name
Value
Use Surface Slope:
-10.000%
Draw
Reset


EndConditions
LELB
LELB_DD
LELB_DD_SG_DAYorBOX
LELB_ED
LELB_ED_SG_BOXOUT

Check Priorities
Verify Features
Bentley InRoads XM Edition
No End Condition Priority conflicts found. Do you want to edit End Condition Priorities anyway?
Yes
No

3) **Test End Conditions**

End Conditions can be tested during end condition creation. They can also be tested once attached to other templates. Testing simulates the behavior of the end conditions behavior during modeling, without having to use the Roadway Designer.

Test the various End Condition components. Set the active surface as the Available Target.

Create Template Dialog Box

End Conditions Folder> LELB_DD_SG_DAYorBOX

LELB_DD_SG_DAYorBOX(Appears in Current Template window)

Test> Test End Conditions Dialog Box
Available Targets> <Active> Surface

Use Surface Slope> 10%

Draw

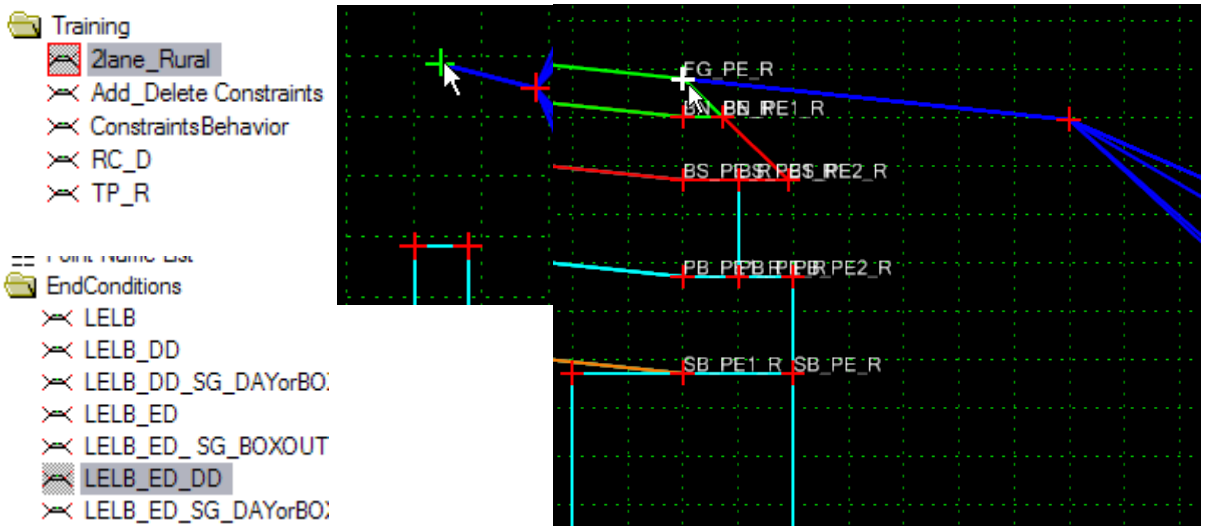
Use Surface Slope> -10%

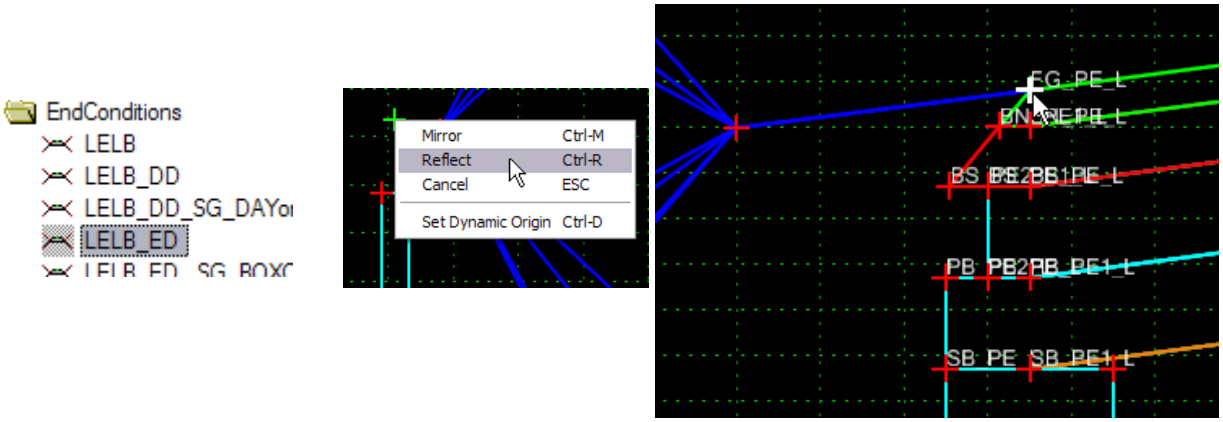
Test other End Conditions Components

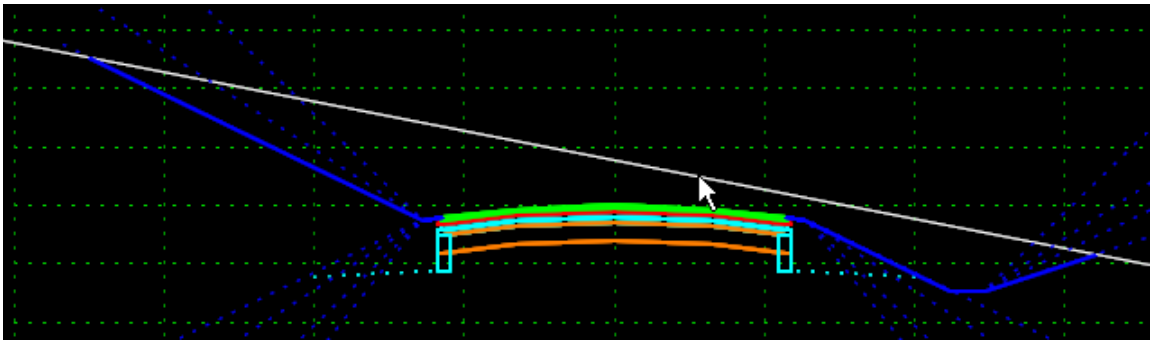
Within the Test End Conditions dialog box, priorities can be checked for conflicts, or edited to change the priority sequencing.

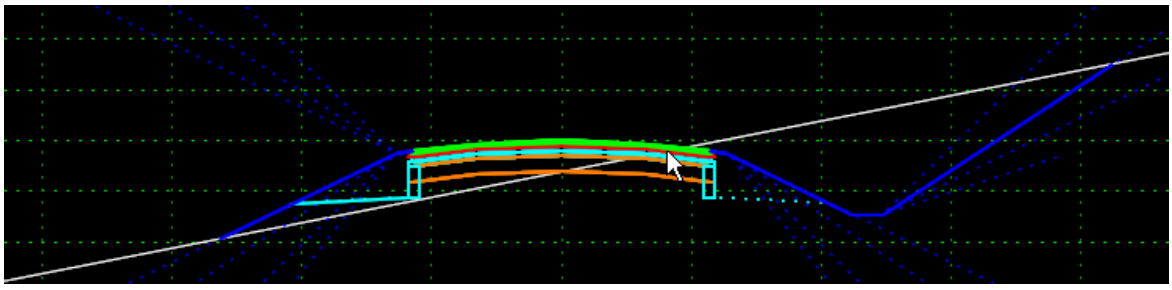
It is important that End Conditions have at least one solution that will not fail to intercept it's target.

In some of the End Conditions components, Subgrade Daylight and Subgrade Box-Out components are attached to the cut and fill slopes. With these End Conditions, decisions will be made as to which cut/fill slope is used. Because the subgrade is a child of the slope which is applied, the subgrade will automatically be created.


Training
2lane_Rural
Add_Delete Constraints
ConstraintsBehavior
RC_D
TP_R
EndConditions
LELB
LELB_DD
LELB_DD_SG_DAYorBO
LELB_ED
LELB_ED_ SG_BOXOUT
LELB_ED_DD
LELB_ED_SG_DAYorBO
EG_PE_R
BS_PE1_R
BS_PE2_R
PB_PE2_R
SB_PE1_R
SB_PE_R


EndConditions
LELB
LELB_DD
LELB_DD_SG_DAYo
LELB_ED
Mirror Ctrl-M
Reflect Ctrl-R
Cancel ESC
Set Dynamic Origin Ctrl-D
EG_PE_L
PB_PE2_PB_PE1_L
SB_PE_SB_PE1_L





4) **Add End Condition Components to Template**

Add End Conditions components to 2lane_Rural template in the Training Folder. Add Cut and Fills with Ditches and Edgedrain (LELB_ED_DD) to the 2lane_rural template on the right side. Add the Cut and Fills with Edgedrain (LELB_ED) on the left side.

Create Template Dialog Box

Training Folder> 2lane_Rural
Double Click> 2lane_Rural (Appears in Current Template window)

EndConditions Folder
Highlight EndConditions> **LELB_ED_DD**

Drag and Drop Component
Drag and Drop Component
Drag> LELB_ED_DD (From Preview window)

Drop (No Reflect or Mirror)> at point **FG_PE_R**

Highlight EndConditions> **LELB_ED**

Drag and Drop Component
Drag and Drop Component
Drag> LELB_ED (From Preview window)

Right-Click> **Reflect**

Drop> at point **FG_PE_L**

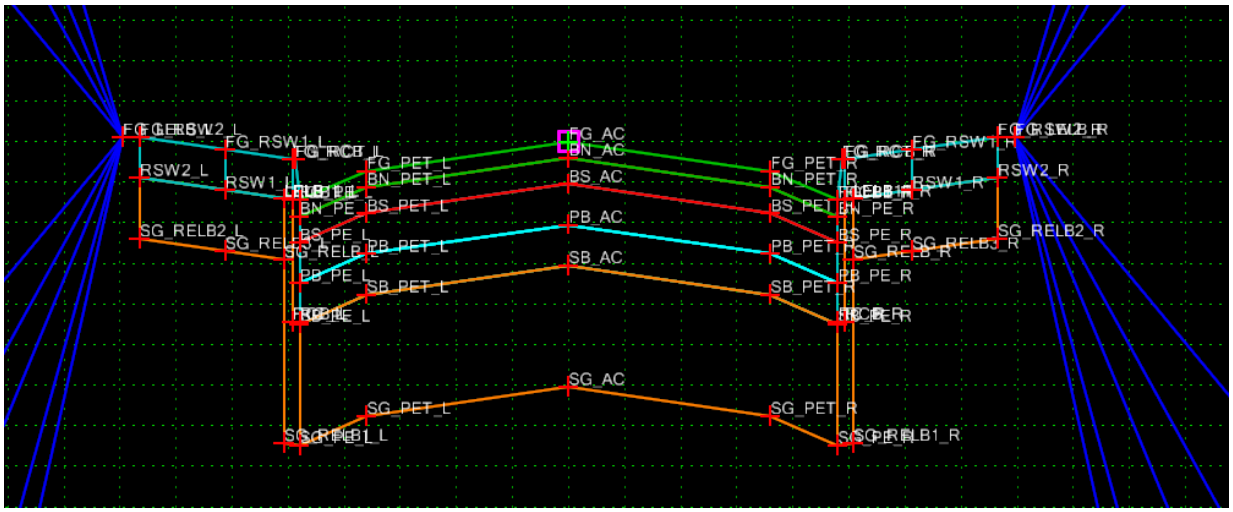
Test> Test End Conditions Dialog Box
Available Targets> <Active> Surface

Use Surface Slope> -10%
Draw

Use Surface Slope> 10%
Draw

Close

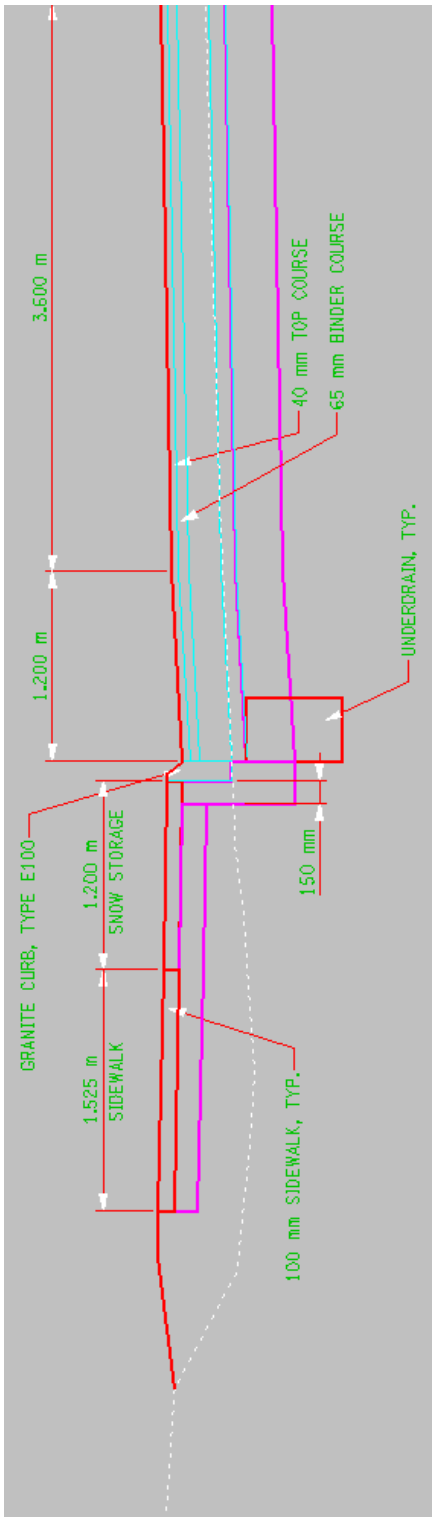
Save the Template Library.


FG_RSW2_L
FG_RSW1_L
RSW2_L
RSW1_L
FG_PET_L
BN_PET_L
BS_PET_L
BN_PE_L
BS_PE_L
PB_PET_L
PB_PE_L
SB_PET_L
SG_RELB2_L
SG_AC
SG_PET_L
FG_AC
BN_AC
BS_AC
PB_AC
SB_AC
FG_RSW1_R
RSW2_R
RSW1_R
FG_PET_R
BN_PET_R
BS_PET_R
BN_PE_R
BS_PE_R
PB_PET_R
PB_PE_R
SB_PET_R
SG_RELB2_R
SG_PET_R

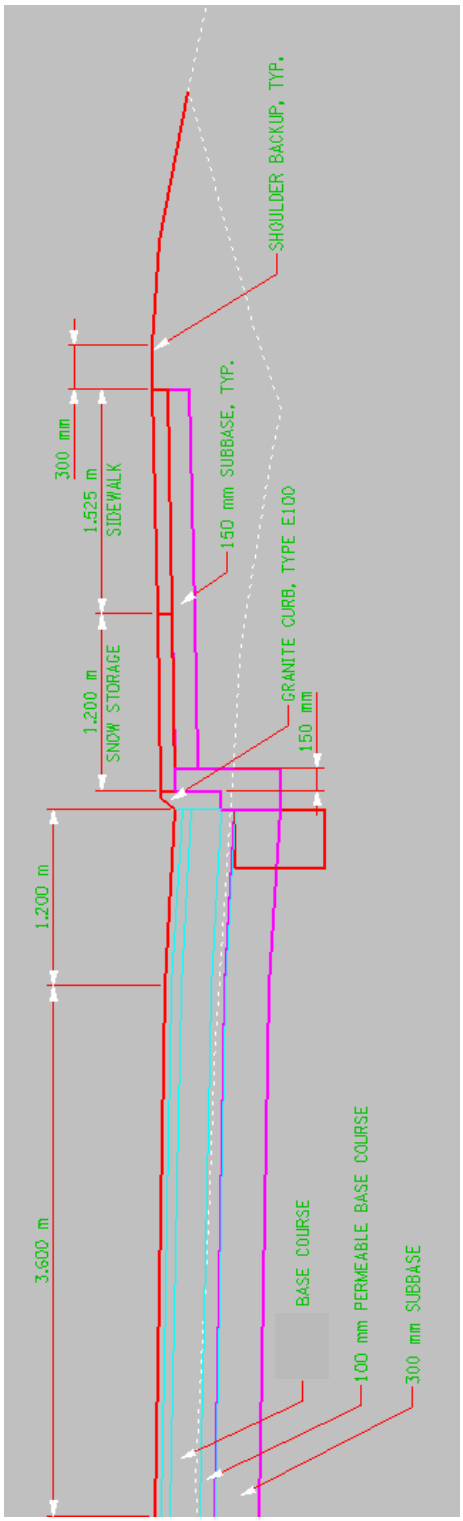
Chapter 7

LAB

This chapter you will create a new template. You will add an end condition and test it to the original ground.



LEFT side of Roadway Centerline



RIGHT side of Roadway Centerline

1) **Open New MicroStation File, Restart InRoads**

Exit from the file you are in, closing InRoads and checking in all the files. Open 330330_cph_typ_01.dgn, MicroStation file, for the LAB. In this file, is a typical section for Urban area with curbs and sidewalks.

Open InRoads, load the alignment file and the template library from your student folder.

Student Folder
330330_fea_rwy.alg
330330_fea_rwy.itl

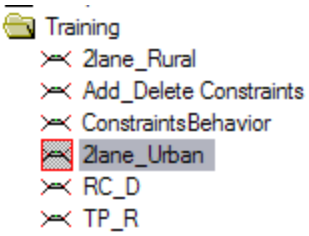
Load the original ground DTM's, read-only from the Photogrammetry folder.

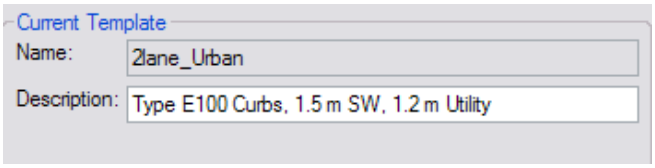
Photogrammetry Folder (Read-Only)
330330_map_pho_og.dtm
330330_map_pho_og_b.dtm

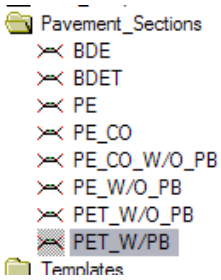
2) **Create Urban Template with Curbs, Sidewalks, and Utility Strips**

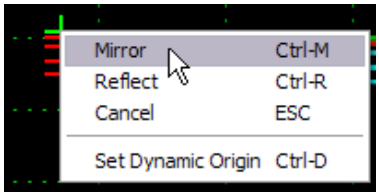
Create a new template called 2lane_Urban. Build this template with 3.6 m lanes at -2% slopes, 1.2 m curb offsets at -6% slopes, as per the typical section in the file you are working in. This typical section is also on page 7-3.

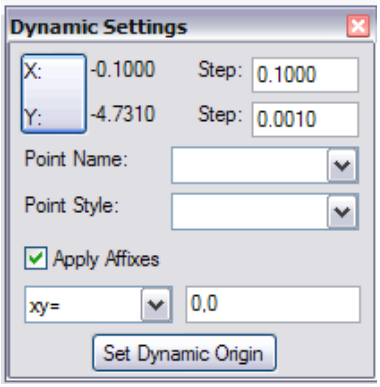

New
Folder
Template
Cut
Ctrl-X

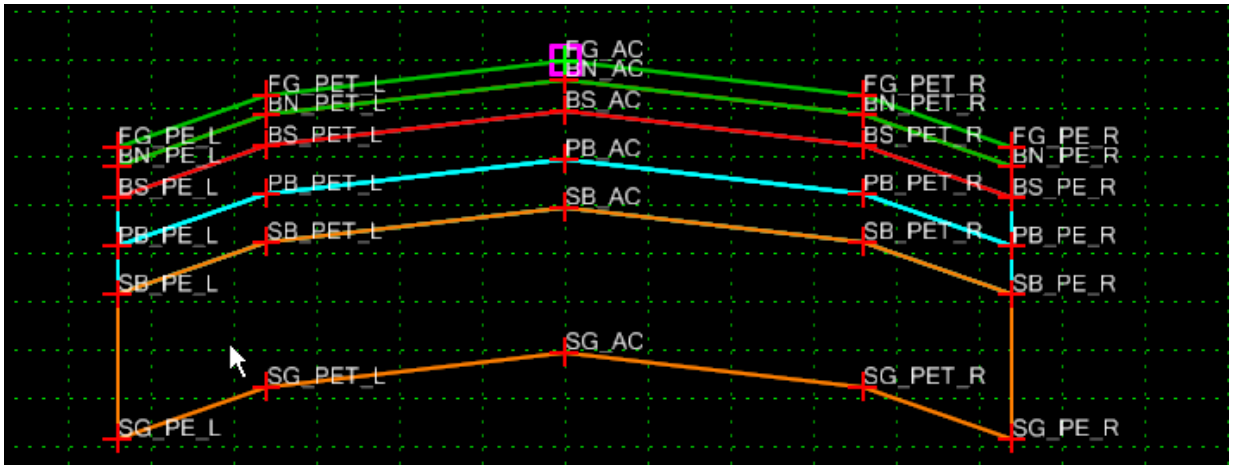

Training
2lane_Rural
Add_Delete Constraints
ConstraintsBehavior
2lane_Urban
RC_D
TP_R


Current Template
Name:
2lane_Urban
Description:
Type E100 Curbs, 1.5 m SW, 1.2 m Utility


Pavement_Sections
BDE
BDET
PE
PE_CO
PE_CO_W/O_PB
PE_W/O_PB
PET_W/O_PB
PET_W/PB
Templates


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


Dynamic Settings
X:
-0.1000
Step:
0.1000
Y:
-4.7310
Step:
0.0010
Point Name:
Point Style:
Apply Affixes
xy=
0,0
Set Dynamic Origin


FG_AC
BN_AC
BS_AC
PB_AC
SB_AC
SG_AC
FG_PET_L
BN_PET_L
BS_PET_L
PB_PET_L
SB_PET_L
SG_PET_L
FG_PE_L
BN_PE_L
BS_PE_L
PB_PE_L
SB_PE_L
SG_PE_L
FG_PET_R
BN_PET_R
BS_PET_R
PB_PET_R
SB_PET_R
SG_PET_R
FG_PE_R
BN_PE_R
BS_PE_R
PB_PE_R
SB_PE_R
SG_PE_R

Add components from Pavement_Sections folder to create pavement courses.

Add components from Miscellaneous_Components folder to create subbase course.

New Template> Training Folder
Name> **2Lane_Urban**

Description> **Type E100 Curbs, 1.5 m SW, 1.2 m Utility**

Dynamic Settings
Toggle On> Apply Affixes

Drag and Drop Components:

Drag> **PET_W/PB** From Pavement_Sections Folder
Drop> to **Origin X=0; Y=0** (2Lane_Urban—Both Sides)

Drag> **PE_CO** From Pavement_Sections Folder
Drop> to **FG_PET** (Both Sides)

Drag> **SB_PET** From Miscellaneous_Components Folder
Drop> to **SB_AC** (Both Sides)

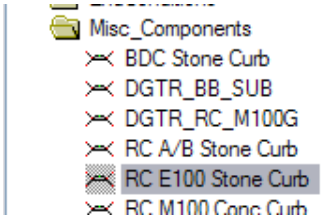
Drag> **SB_PE_CO** From Miscellaneous_Components Folder
Drop> to **SB_PET** (Both Sides)

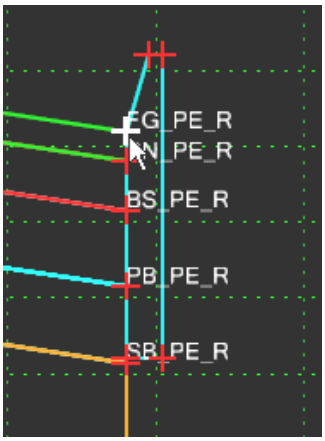
Merge Components

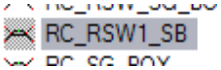
Merge> Pavement Courses
PET_L with PE_L
PET_R with PE_R
SUB_PET_L with SUB_PE_L
SUB_PET_R with SUB_PE_R

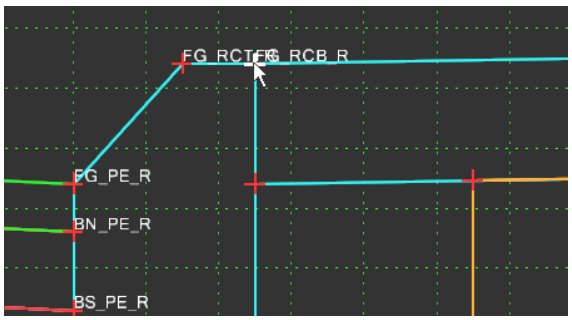
Rename Components

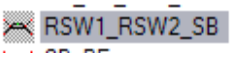
Edit> Components
Rename> **TP, BN, BS, PB, SB**

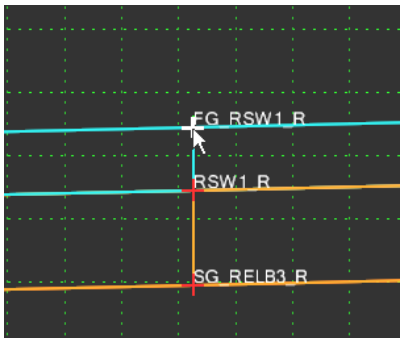

Misc_Components
BDC Stone Curb
DGTR_BB_SUB
DGTR_RC_M100G
RC A/B Stone Curb
RC E100 Stone Curb

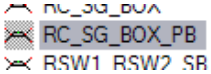

FG_PE_R
BN_PE_R
BS_PE_R
PB_PE_R
SB_PE_R

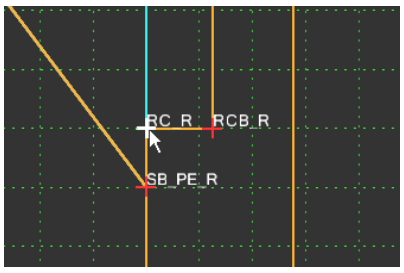

RC_RSW1_SB

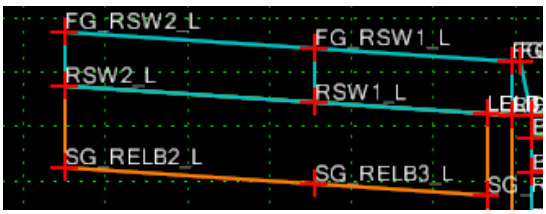

FG_RCTFG_RCB_R
FG_PE_R
BN_PE_R
BS_PE_R


RSW1_RSW2_SB


FG_RSW1_R
RSW1_R
SG_RELB3_R


RC_SG_BOX_PB


RC_R
RCB_R
SB_PE_R


FG_RSW2_L
FG_RSW1_L
RSW2_L
RSW1_L
SG_RELB2_L
SG_RELB3_L

Add the curb (RC E100 Stone Curb), utility strip (RC_RSW1_SB) and the sidewalk RSW1_RSW2_SB components from the Miscellaneous_Components folder on both sides of template. The utility strip and sidewalk components have subbase components attached.

Add curb subbase component from the Miscellaneous_Components folder on both sides at the bottom of the curb.

Training Folder> 2Lane_Urban

Drag and Drop Components:

Drag> **RC_E100 Stone Curb** From Misc_Components Folder
Drop> to **FG_PE** (Both Sides)

Drag> **RC_RSW1_SB** From Misc_Components Folder
Drop> to **FG_RCB** (Both Sides)

Drag> **RSW1_RSW2_SB** From Misc_Components Folder
Drop> to **FG_RSW1** (Both Sides)

Drag> **RC_SG_BOX_PB** From Misc_Components Folder
Drop> to **RC** (Bottom of Curbs)

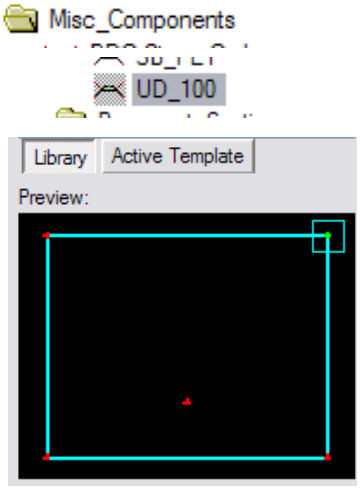
Merge Components

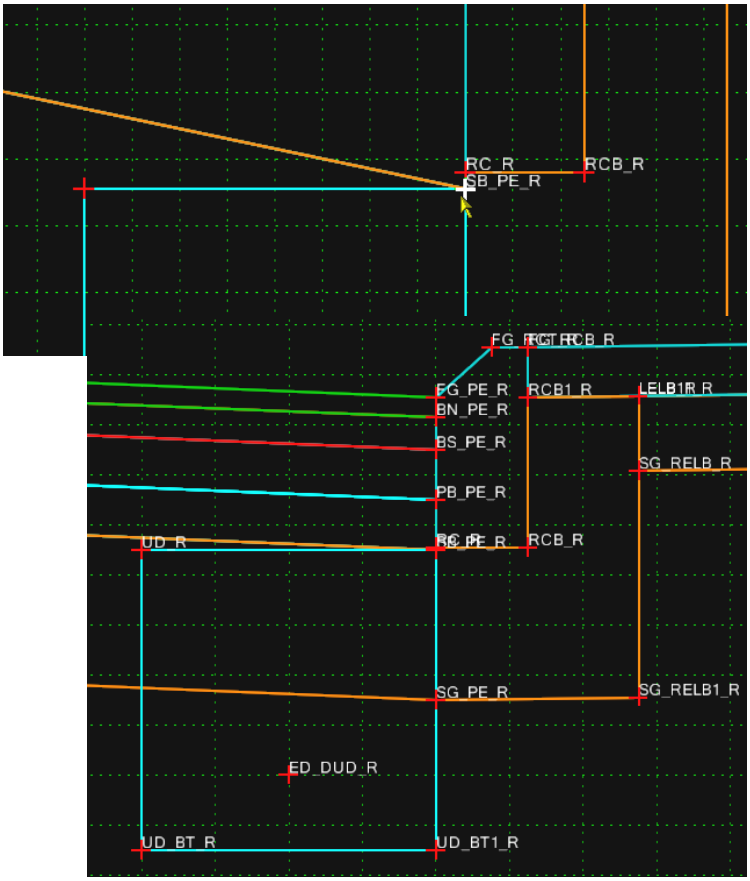
Merge> Subbase Courses
SB_RSW1_L with SB_RSW2_L
SB_RSW1_R with SB_RSW2_R

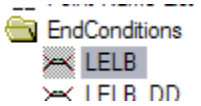
Rename Components

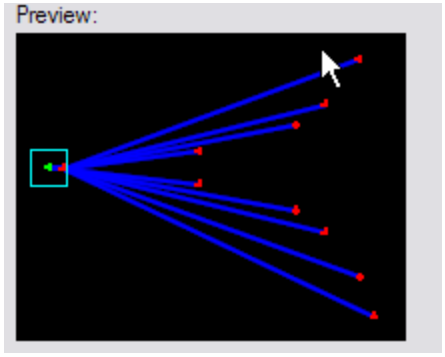
Edit> Components
Rename> **SB_RSW1_RSW2_L**

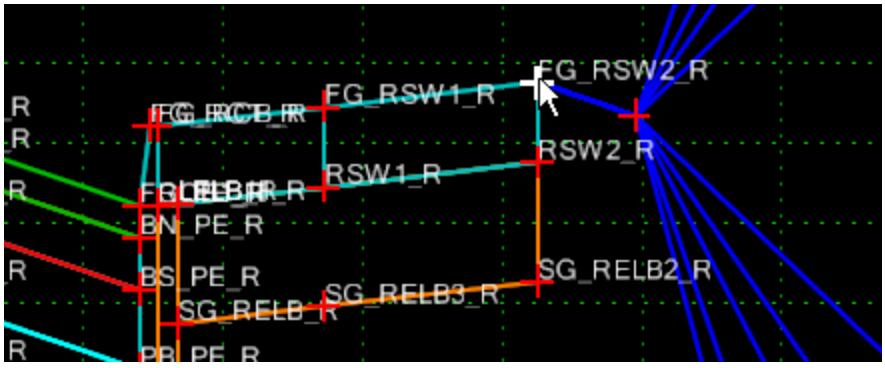
Rename> **SB_RSW1_RSW2_R**


Misc_Components
UD_100
Library
Active Template
Preview:


RC_R
RCB_R
SB_PE_R
FG_PE_R
RCB1_R
LELB1_R
BN_PE_R
BS_PE_R
SG_RELB_R
PB_PE_R
UD_R
RCB_R
SG_PE_R
SG_RELB1_R
ED_DUD_R
UD_BT_R
UD_BT1_R


EndConditions
LELB


Preview:


FG_RSW2_R
FG_RSW1_R
RSW2_R
RSW1_R
BN_PE_R
BS_PE_R
SG_RELB2_R
SG_RELB3_R
SG_RELB_R

Add the Edge Drain/Underdrain Component (UD_100), from the Miscellaneous_Components folder on both sides of template.

Miscellaneous_Components> UD_100

Drag and Drop Components:

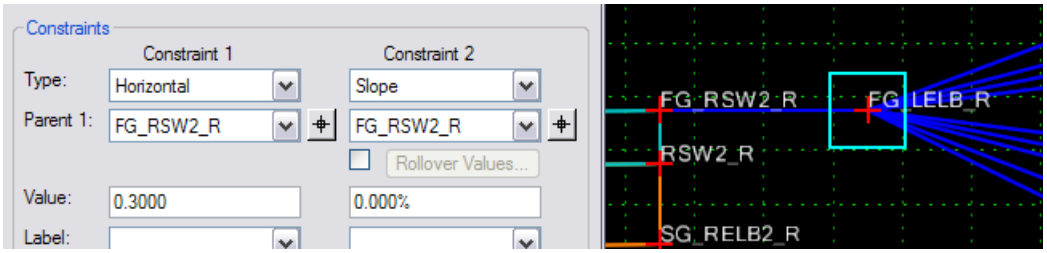
Drag> **UD_100** From Misc_Components Folder
Drop> to **SB_PE** (Both Sides)

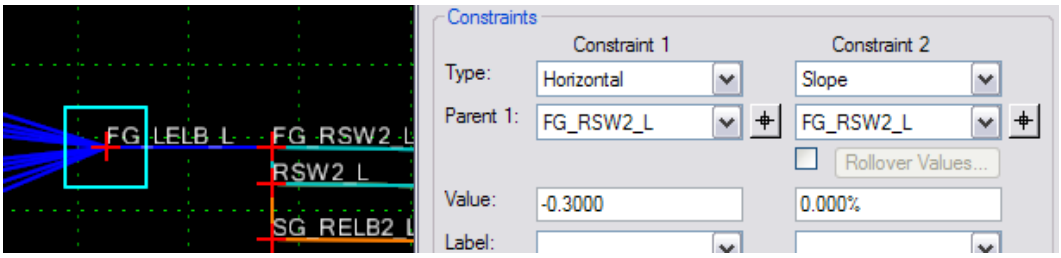
Add the cut and fill slopes' (LELB) component from the EndConditions folder on both sides of template on the back side of the Sidewalk.

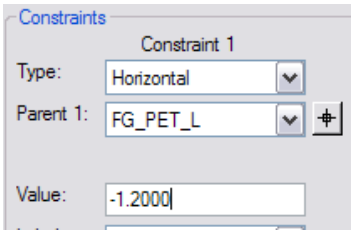
Training Folder> 2Lane_Urban

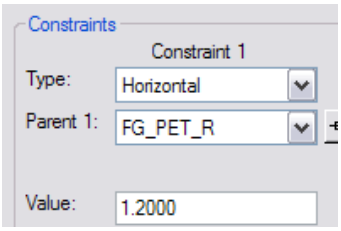
Drag and Drop Components:

Drag> **LELB** From EndConditions Folder
Drop> to **FG_RSW2** (Both Sides)


Constraints
Constraint 1
Constraint 2
Type:
Horizontal
Slope
Parent 1:
FG_RSW2_R
FG_RSW2_R
Rollover Values...
Value:
0.3000
0.000%
Label:
FG_RSW2_R
FG_LELB_R
RSW2_R
SG_RELB2_R


FG_LELB_L
FG_RSW2_L
RSW2_L
SG_RELB2_L
Constraints
Constraint 1
Constraint 2
Type:
Horizontal
Slope
Parent 1:
FG_RSW2_L
FG_RSW2_L
Rollover Values...
Value:
-0.3000
0.000%
Label:


Constraints
Constraint 1
Type:
Horizontal
Parent 1:
FG_PET_L
Value:
-1.2000


Constraints
Constraint 1
Type:
Horizontal
Parent 1:
FG_PET_R
Value:
1.2000

3) **Edit Template Points**

Change the Point Properties of Points FG_LELB_R and FG_LELB_L to a horizontal distance of 300 mm from the back of sidewalk, and the slope value to 0.000%.

Training Folder> 2Lane_Urban

Edit Points> FG_LELB:
Edit> **FG_LELB_R**
Horizontal Constraint Value> **0.300**
Slope Constraint Value> **0.00%**

Edit> **FG_LELB_L**
Horizontal Constraint Value> **-0.300**
Slope Constraint Value> **0.00%**

Save the Template Library.

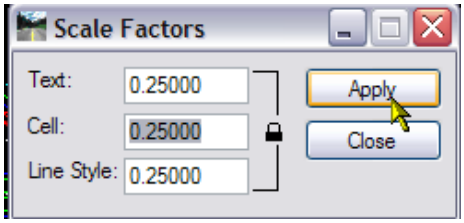
4) **End Condition Priorities**

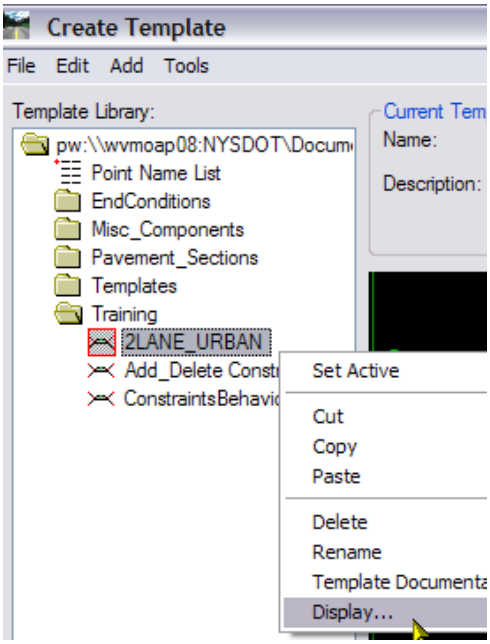
Test the End Conditions of the Template. Fix existing Priority Conflicts.

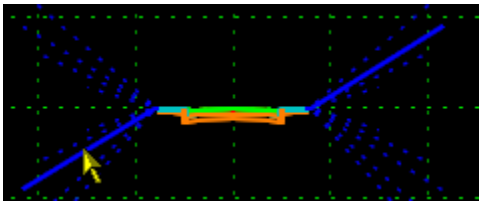
Training Folder> 2Lane_Urban

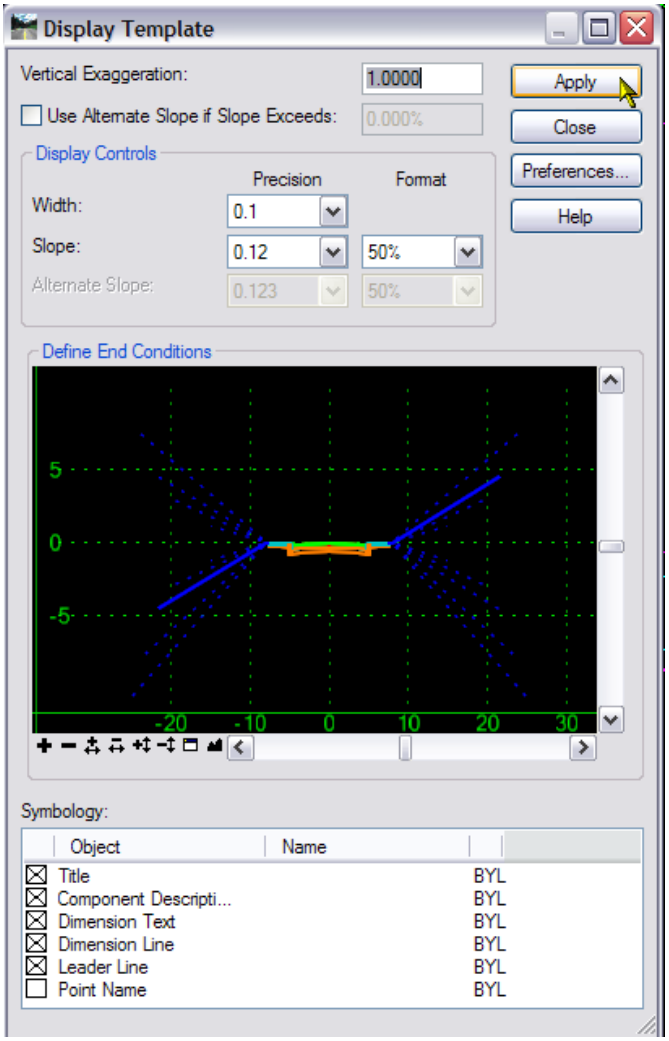
Test> End Conditions

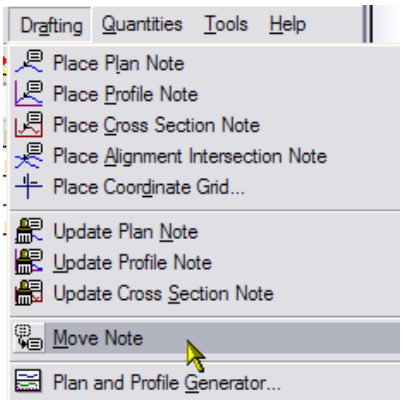
Fix Priorities> Check Priorities (renumber Priorities to Eliminate Conflicts)


Scale Factors
Text:
0.25000
Cell:
0.25000
Line Style:
0.25000
Apply
Close


Create Template
File Edit Add Tools
Template Library:
Current Tem
Name:
Description:
pw:\\wvmoap08:NYSDOT\Docum
Point Name List
EndConditions
Misc_Components
Pavement_Sections
Templates
Training
2LANE_URBAN
Add_Delete Const
ConstraintsBehavi
Set Active
Cut
Copy
Paste
Delete
Rename
Template Documenta
Display...




Display Template
Vertical Exaggeration:
1.0000
Use Alternate Slope if Slope Exceeds:
0.000%
Apply
Close
Preferences...
Help
Display Controls
Precision
Format
Width:
0.1
Slope:
0.12
50%
Alternate Slope:
0.123
50%
Define End Conditions
5
0
-5
-20
-10
0
10
20
30
Symbology:
Object
Name
Title
BYL
Component Descripti...
BYL
Dimension Text
BYL
Dimension Line
BYL
Leader Line
BYL
Point Name
BYL


Drafting
Quantities
Tools
Help
Place Plan Note
Place Profile Note
Place Cross Section Note
Place Alignment Intersection Note
Place Coordinate Grid...
Update Plan Note
Update Profile Note
Update Cross Section Note
Move Note
Plan and Profile Generator...

5) **Display Template in MicroStation DGN File**

Display the completed Template in your MIcroStation Design File. The Annotation Scale is set for the Design File Scale Model for B-Size 50 (D-Size 25).

Set Global Scale Factor for D-Size 25, which is .25 based on D-Size 1:100.

Select the Template, 2LANE_URBAN from the Training Folder, and Right Click to Display. From the Display Dialog Box, there are available options for display.

Create Template Dialog Box> Training Folder

Highlight> 2LANE_URBAN> Display

Prompts> Identity Location
Data in clear area of DGN file

Create Template Dialog Box
Close

To modify placement of the Drafting Notes, use the commands in the "Drafting Notes" section.

Or, use the Drafting Notes as a guide to recreate your dimensioning and text. In some instances, the Slope may not be what you wish to portray on the Typical Section, depending on the Constraints in the Template.