# OpenRoads Designer:
# Widening and Resurfacing

Introduction

Widening and resurfacing projects can be accommodated using the OpenRoads Designer tools. Template components can be added to define pavement planning and wedge course components. This section will introduce users to the tools available for widening and resurfacing projects.

Template Components for Overlay and Stripping

From the **OpenRoads Modeling** WorkFlow, select the **Create Template** icon from the **Corridors** tab to open the *Create Template* dialog. To add an Overlay/Stripping component to the template, right-click in the current template window and choose **Add New Component > Overlay/Stripping** as shown below.
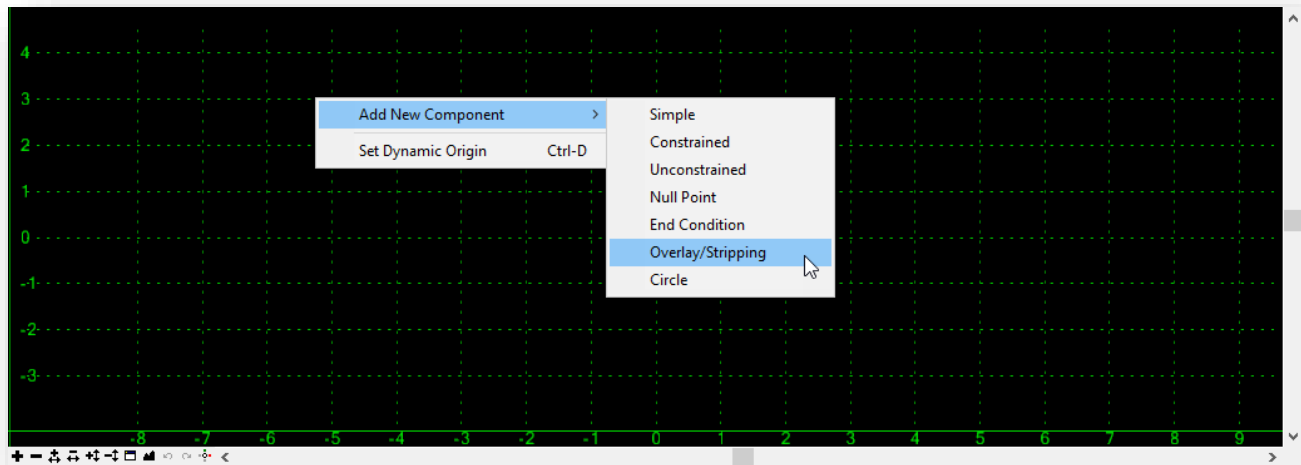
Several parameters are available to define the overlay/stripping component.
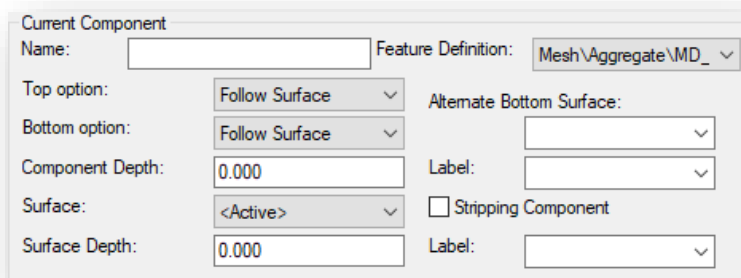
Name
Specifies the name of the new component.

Feature Definition
Specifies the feature style of the new component. This option is used for display and to define the component's material. The OHDOT standards contains two features for an overlay/stripping component:

>Mesh\Resurfacing\MD_P_Pavement_Planing
>Mesh\Resurfacing\MD_P_Wedge Course

Top Option
Specifies how the top of the component is defined. The following options are available:

>**Follow Surface**
>Specifies the top of the component will follow the surface.

>**Follow Component**
>Specifies the top of the component will follow the defined top of the component.

>**Follow Highest**
>Specifies the top of the component will follow the higher of the defined segments or surface.

Bottom Option
Specifies how the bottom of the component is defined. The behavior of these options can be different, depending on the selected Top Option.

>**Follow Surface**
>Specifies the bottom of the component will follow the surface at the defined depth, but will not cross over the top of the component. The following options are available:

>**Follow Component**
>Specifies the bottom of the component will follow the defined top of the component at the defined depth but will not go above the top of the component.

>**Follow Lowest**
>Specifies the bottom of the component will follow the lower of the component/surface at the defined depths.

>**Follow Highest**
>Specifies the bottom of the component will follow the higher of the component/surface at the defined depths.

Component Depth
Sets the depth of the bottom below to the defined component line. This value cannot be negative.

Surface
Defines the surface to follow along. Does not support aliasing.

Surface Depth
Sets the depth of the bottom below the surface. This value cannot be negative.

Alternate Bottom Surface

If this field is populated, when alternate surfaces are created from the Roadway Designer Create Surface command, the bottom of this component will generate an alternate surface of the specified name.

Label (Component Depth/Surface Depth)

Parametric label, used to change the default depth(s) from within Roadway Designer > Tools > Parametric Constraints.
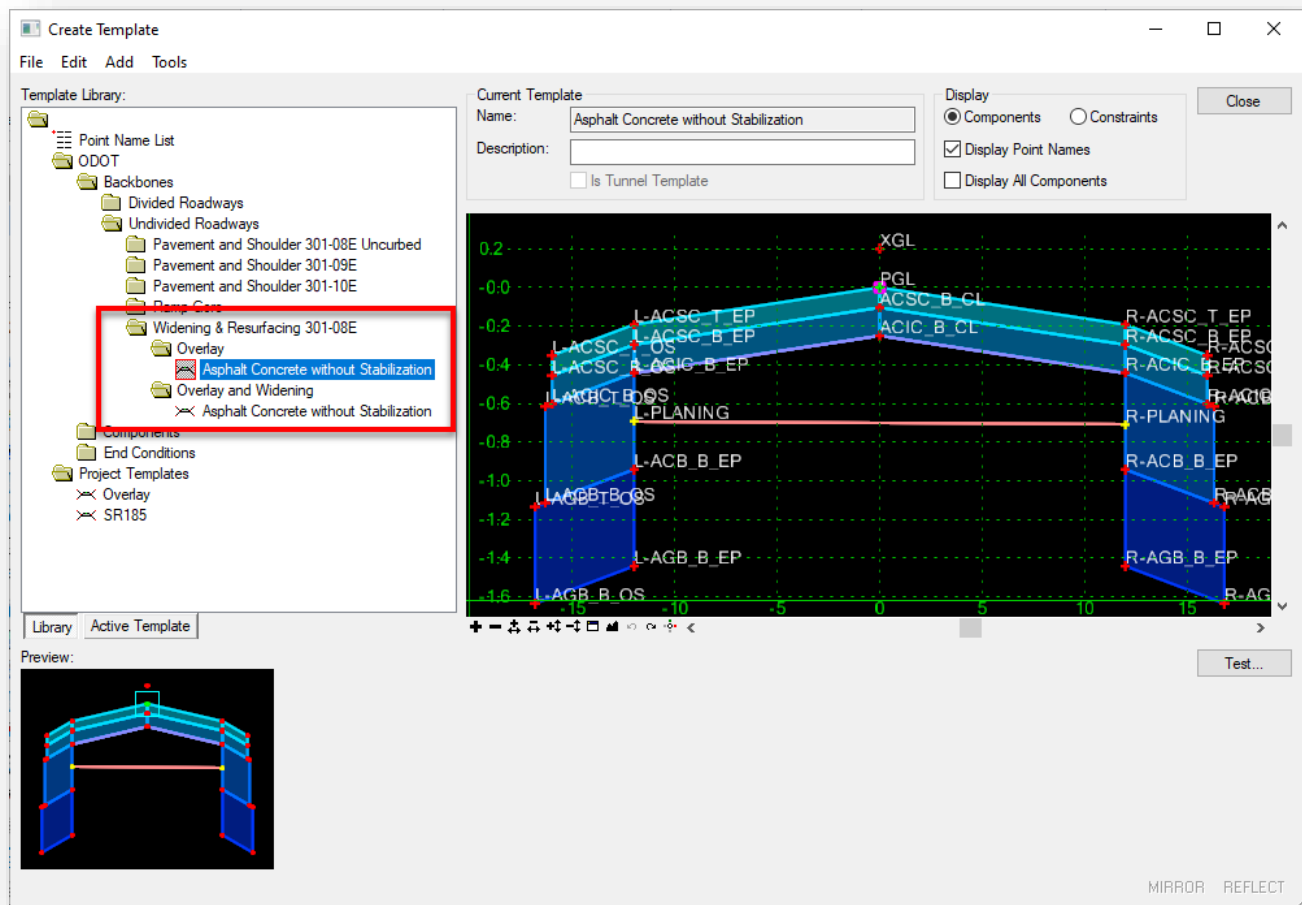
Stripping Component

Defines whether this component is designed to remove material or add material. Used in end-area volumes.

ODOT Example Templates for Overlay and Widening

The **OHDOT_Templates.itl** library contains two sample templates for widening and resurfacing as shown below. These templates can be used as the starting point for customization to meet a variety widening and resurfacing project needs.

These templates have pavement planning and wedge course components defined. The pavement planning component is defined as shown below:
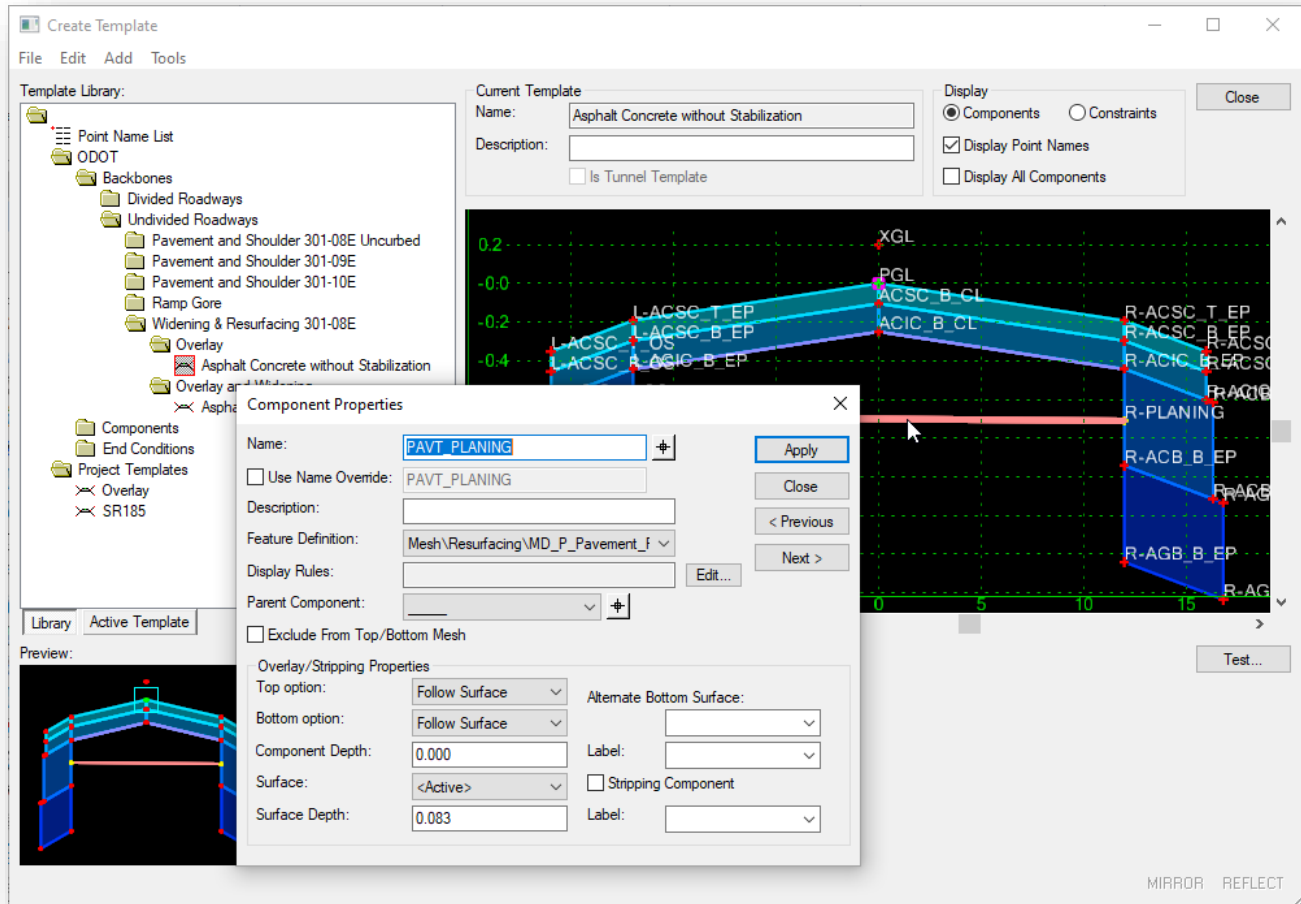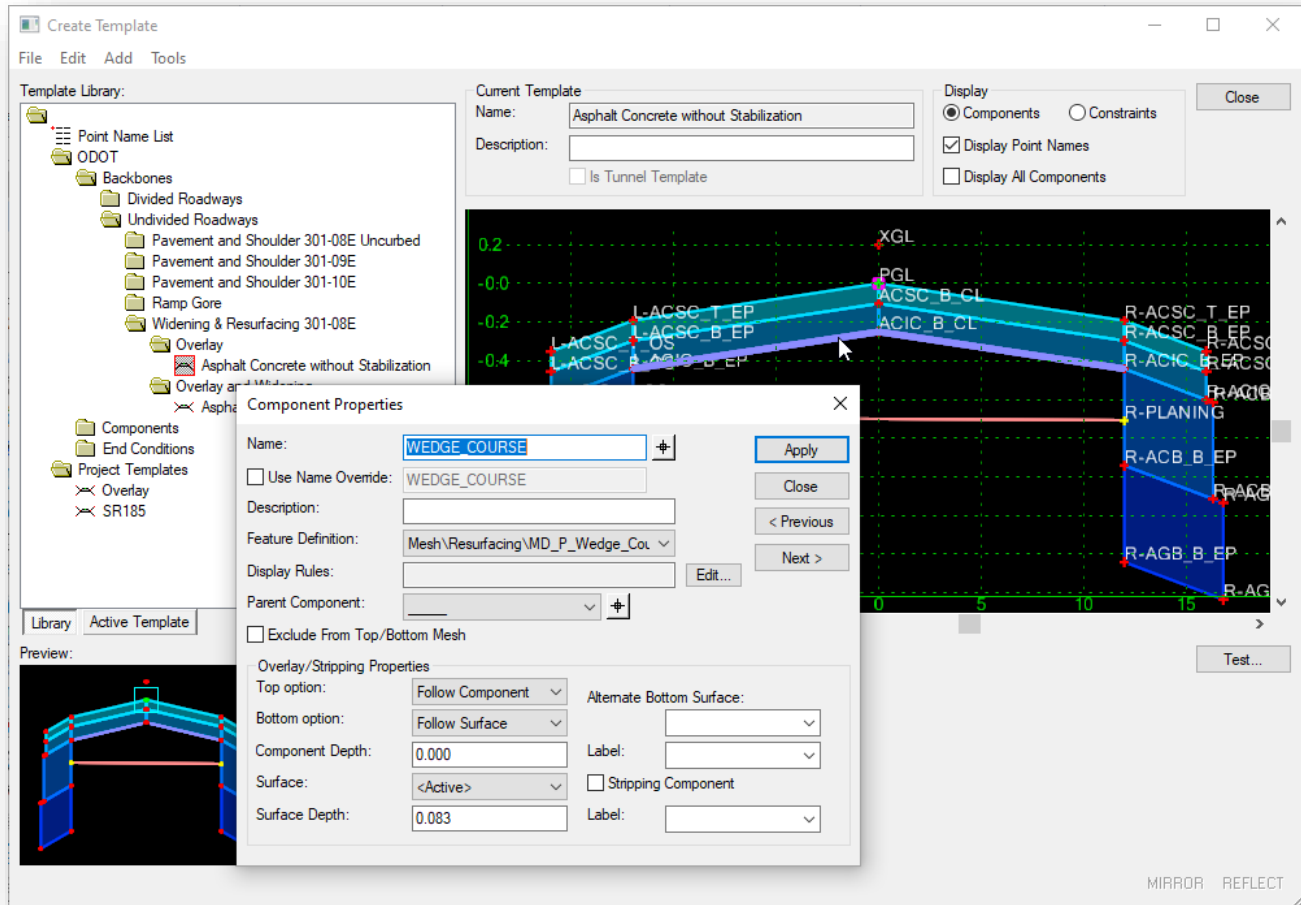
The pavement planing component is defined as a straight line across the template. The component is defined in the template below the pavement, but the actual location of the component within the template is not important. When the template is processed, the top of the pavement planing component will follow the existing terrain surface. The bottom is defined to follow the terrain surface with a depth of 1". An example is shown below.
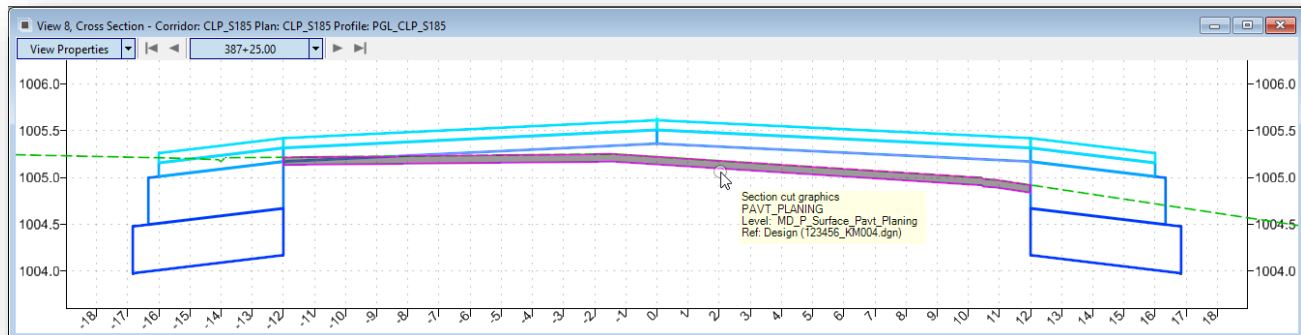
The wedge course component is defined to overlap the bottom of the Asphalt Concrete Intermediate Course layer as shown below.


When the template is processed, the top of the wedge course component will follow the component definition. The bottom is defined to follow the terrain surface with a depth of 1" which is the depth of the pavement planing. An example is shown below.
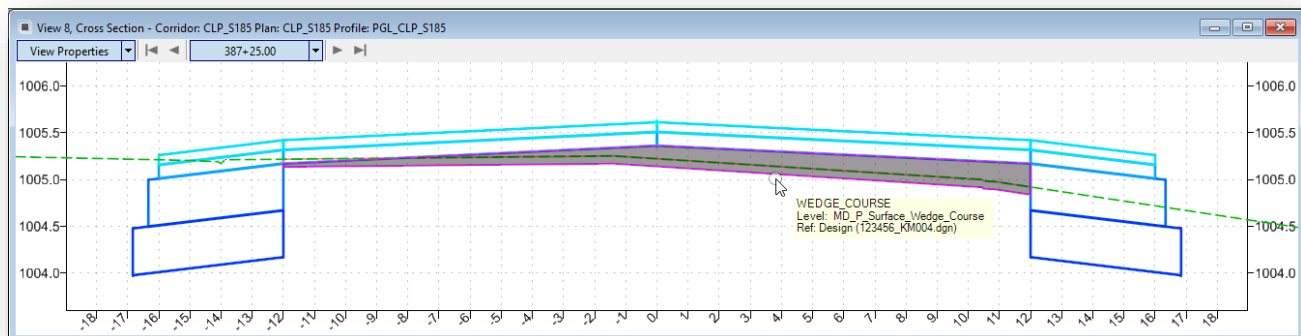
The Overlay and Widening template is configured with the same settings for the overlay/stripping components as the example shown above. The difference is that this template is configured to search for a saw cut line on the left and right sides of the centerline to define the limits of pavement widening.

The right side of the template, showing the R-SAWCUT point is shown below.
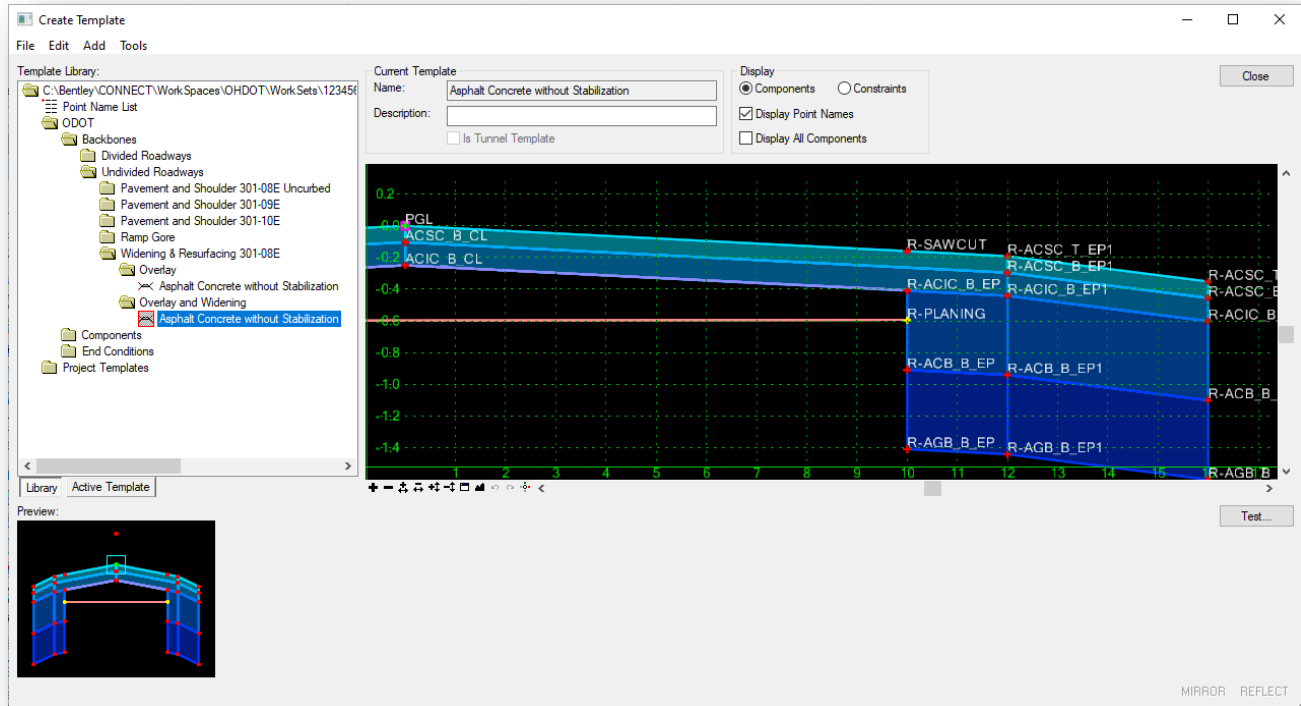

The L-SAWCUT and R-SAWCUT points are defined at a 10' offset from the center of the template. These points are configured with a **Horizontal Feature Constraint** to search for a graphic defining the saw cut line location in the case that the sawcut is not at a constant offset from the centerline of the alignment. The point properties are shown below.
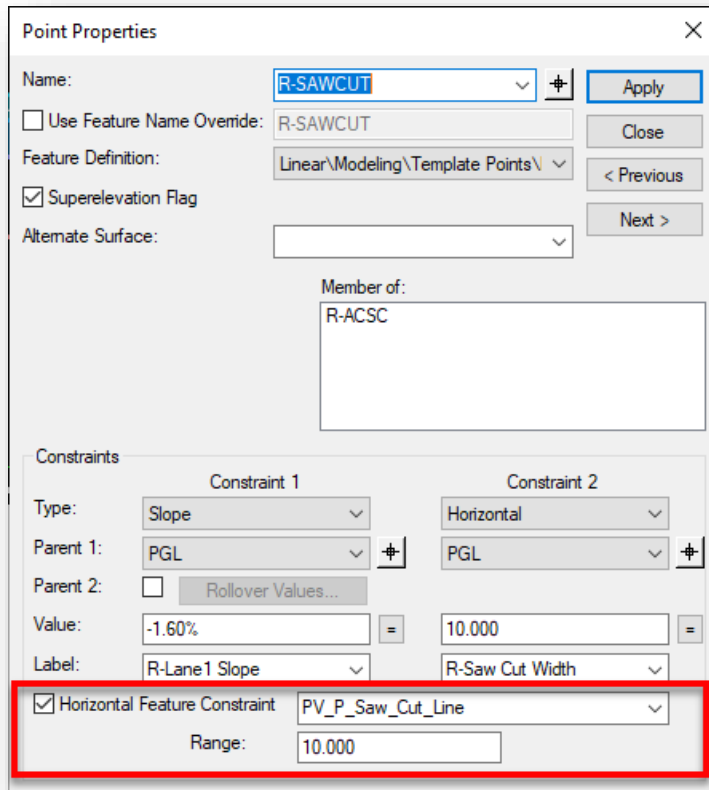
The elements representing the saw cut must be added as corridor references using the **OpenRoads Modeling > Corridors > Corridor References > Add Corridor References** command.

An example of this template, with an additional lane added to the right side, is shown below. The Sawcut and wedge course components are defined like the Overlay template example.
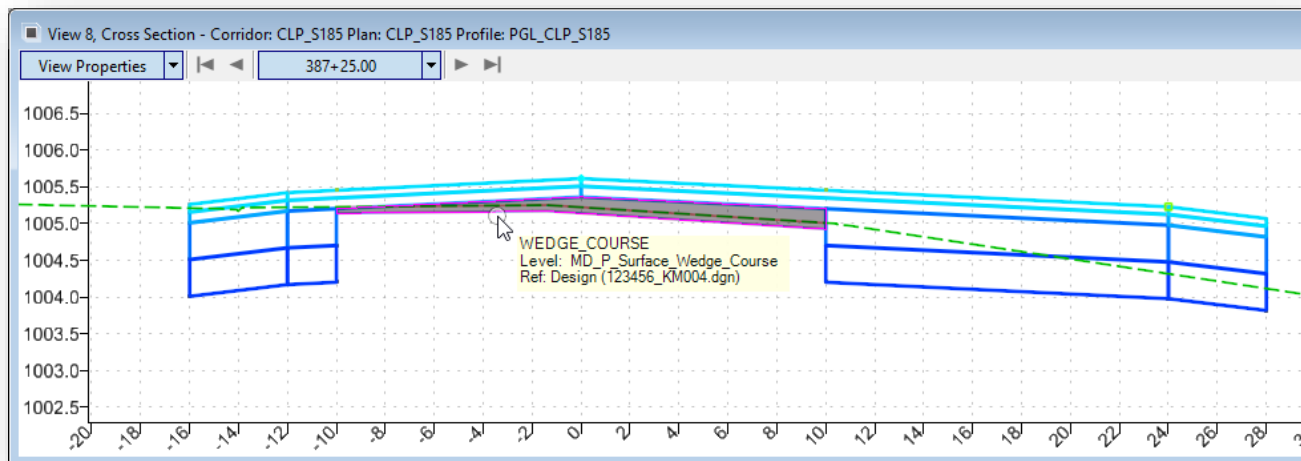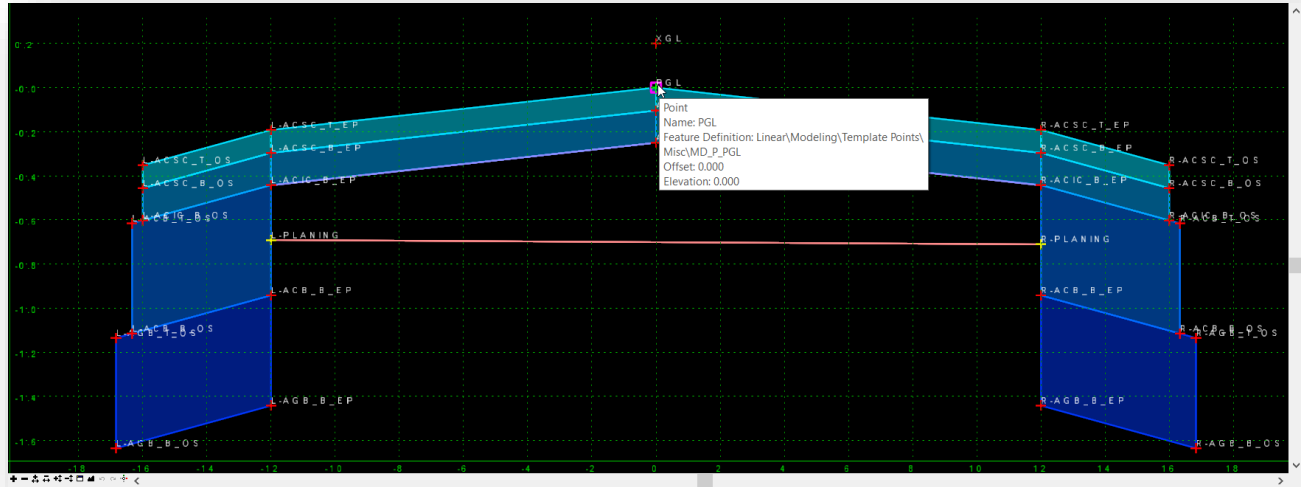
Processing Overlay Templates using the Existing Profile

The examples above were generated using a proposed profile to process the overlay template. The point named "PGL" is at the origin of the template as shown below, and is applied to the alignment and profile.

For many projects, the user will want to process a template that overlays the existing pavement using the existing profile rather than a proposed profile. For example, the project may require planing off a portion of the pavement and replacing that with new asphalt pavement layers.

There are many variations for overlay project requirements. Two examples are illustrated below.

Example 1

For this scenario, we will overlay the existing pavement with 3" of new pavement using the 1.6% cross slope for the new pavement, as defined in the template. The following template is used for this example:

> **ODOT > Backbones > Undivided Roadways > Widening & Resurfacing 301-8E > Overlay > Asphalt Concrete without Stabilization**

The template can be processed as defined using the existing profile to place 3" of new pavement by planing the existing pavement as necessary.

Defining the Existing Ground Profile

The existing ground profile displayed in the profile view is read from the active terrain model. This profile is not a "named" profile that can be used for corridor modeling. It is necessary to generate a profile from the alignment and terrain model that can be used for corridor modeling.

The **Profile From Surface**, or **Quick Profile From Surface** command, located in the **OpenRoads Modeling** workflow, **Geometry** tab, can be used to generate the existing profile.
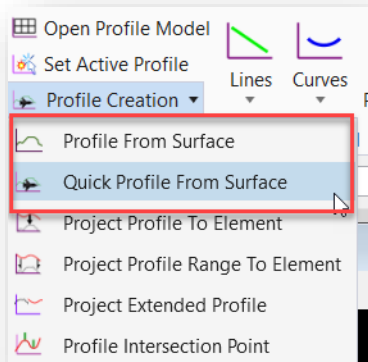
The **Quick Profile From Surface** command extracts a profile from the selected alignment, using the selected terrain model, for the entire length of the alignment. No additional parameters are available.

The **Profile From Surface** command allows additional parameters to define starting and ending stations, horizontal and vertical offsets, etc.

In the example below, the **Quick Profile From Surface** command was used to generate an existing profile. The existing profile lies on top of the profile that is displayed from the terrain model.
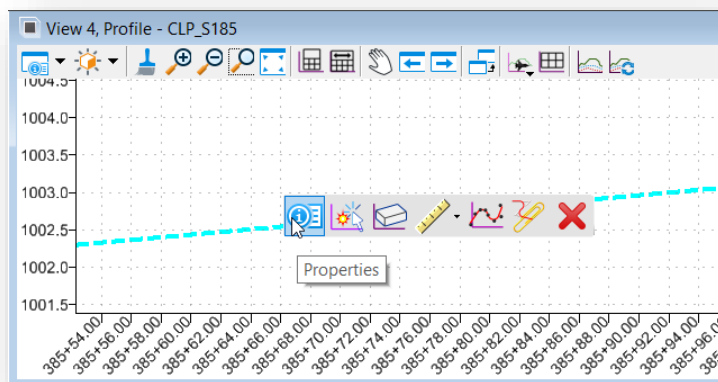
The newly created profile can be named using the **Properties** dialog from the pop-up menu when the profile is selected, as shown at left.
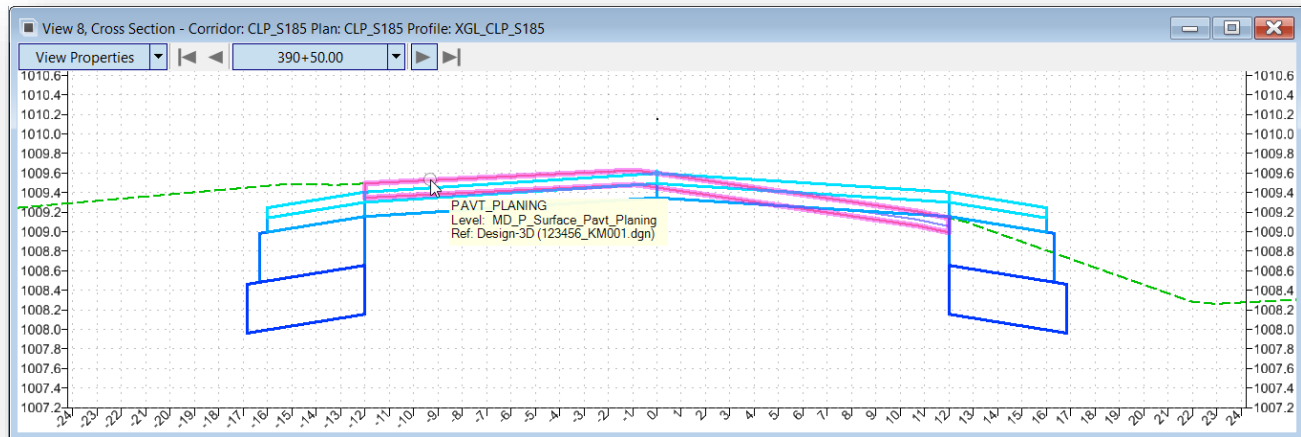
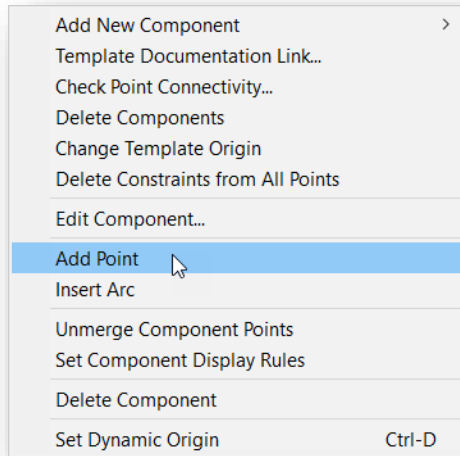The profile is given a name according to the OHDOT CADD Standards as shown below.
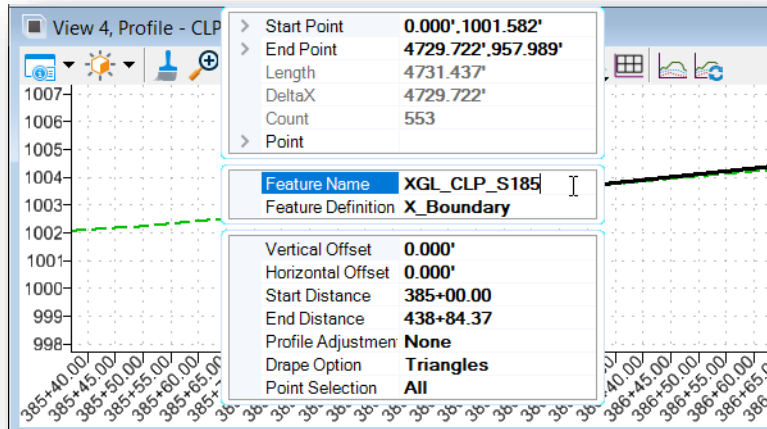
Defining the Pavement Planing Parameters

The template is applied like the example below. Note that the proposed 1.6% pavement slope does not match the existing pavement slope.

The pavement planing follows the existing pavement slope for both the top and bottom depths. This can be adjusted to follow the bottom the proposed pavement by editing the template as follows:

Add New Component >	
Template Documentation Link...	
Check Point Connectivity...	
Delete Components	
Change Template Origin	
Delete Constraints from All Points	
Edit Component...	
Add Point	
Insert Arc	
Unmerge Component Points	
Set Component Display Rules	
Delete Component	
Set Dynamic Origin	Ctrl-D

Add a point to the pavement planing component by right-clicking on the component and choosing the **Add Point** command.

Add a point to the component by clicking on top of the point **ACIC_B_CL** point.

Next, move point **L-Planing** on top of point **L-ACIC_B_EP** by right-clicking on point **L-Planing** and choosing the **Move Point** command.

Move point **R-Planing** on top of point **R-ACIC_B_EP** by right-clicking on point **R-Planing** and choosing the **Move Point** command.

When complete, the **PAVT_PLANING** component now follows the bottom of the proposed pavement as shown below.
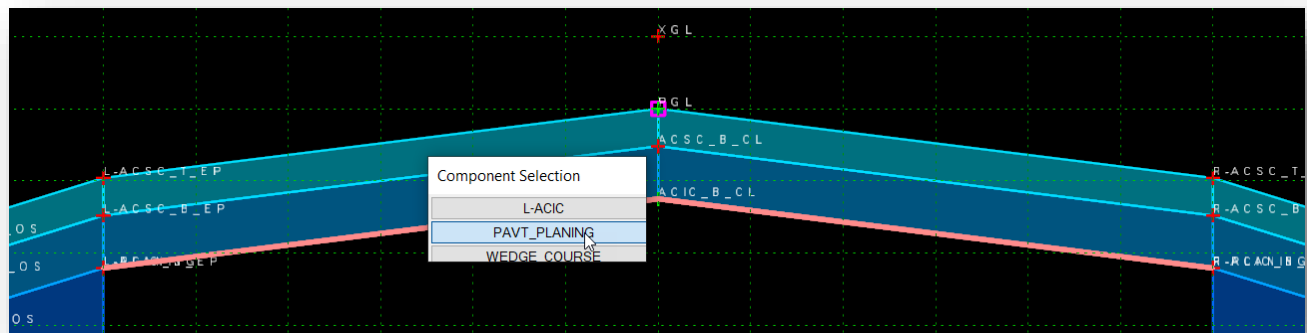
Note: There are now two points on top of each other at the left and right point locations. These points can be merged by right-clicking on the points and choosing the **Merge Point** command to remove the **L-PLANING** and **R-PLANING** points

Double-click the bottom of the pavement layers to edit the **PAVT_PLANING** component properties. Three components are defined at this location. Select the **PAVT_PLANING** component from the list to edit the properties.

Note: The **WEDGE_COURSE** component is not needed for this example and can be deleted.

Change the **Bottom Option** to **Follow Component**.

Set the **Component Depth** to a value of **0**.

When the template is processed, the pavement planing now follows the top of the existing pavement and the bottom of the proposed pavement like the example below.
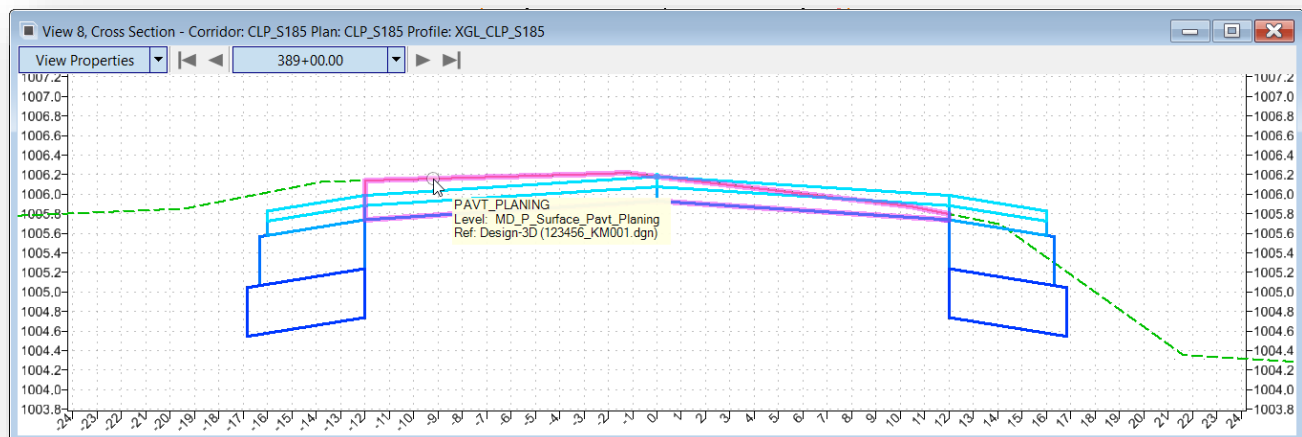
Example 2

For this scenario, we will overlay the existing pavement with 3" of new pavement by matching the existing pavement width and cross-slope. The following template is used as the basis for this example:

> **ODOT > Backbones > Undivided Roadways > Widening & Resurfacing 301-8E > Overlay > Asphalt Concrete without Stabilization**

A few changes need to be made to the template for this example:

1. Edit the constraints for points **L-ACIC_B_EP** and **R-ACIC_B_EP** to define these points so that they will find the existing edge of pavement lines and meet the pavement surface. The properties for the point **L-ACIC_B_EP** are shown below. Point **R-ACIC_B_EP** will be defined similarly, with at an offset of 8' to the right of point **ACIC_B_CL**.

2. Edit the remaining EP points so that the pavement buildup is defined from the bottom-up instead of the top-down.

3. Delete the **WEDGE_COURSE** component. It is not needed for this example.

4. Modify the **PAVEMENT_PLANING** component to follow the bottom of the proposed pavement with a **Component Depth** value of **0**.

When the edited template is processed, the pavement slopes meet the existing terrain like the example below.
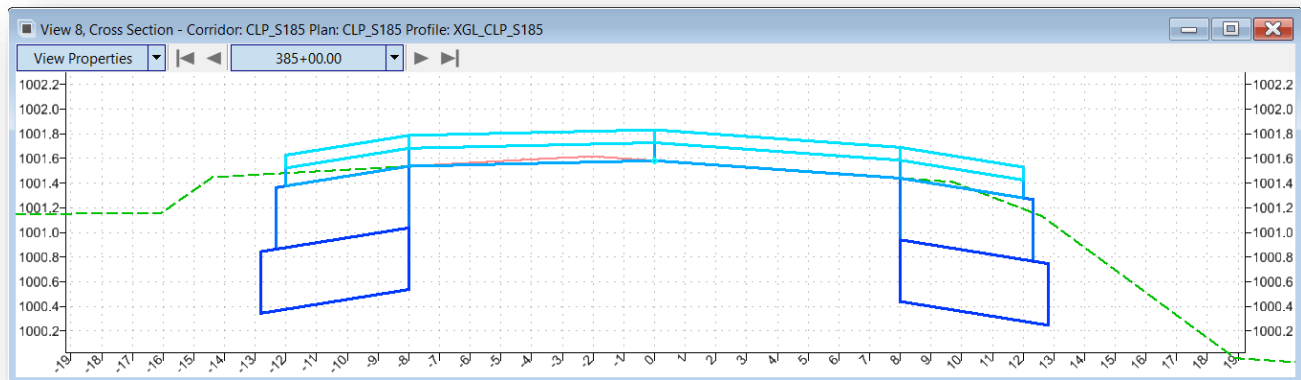
The left and right edge of pavement lines are defined with an offset of 12' and do not meet the existing edge of pavement lines from the survey data. The **Horizontal Feature Constraint** parameter, which is defined in the template *Point Properties* dialog, can be used to set points **L-ACIC_B_EP** and **R-ACIC_B_EP** to meet the existing edge of pavement lines be defining the **Feature Definition** of the edge of pavement element.

With this release of the software, the **Horizontal Feature Constraint** parameter does not allow selecting Survey features. The surveyed edge of pavement lines must be copied from the survey design file to the modeling design file and then assigned a new feature definition that can be used for the modeling process.

After copying the existing edge of pavement lines from the survey design file to the modeling design file, set the feature definition for the newly copied elements by using the **OpenRoads Modeling > Set Feature Definition** command as shown below.
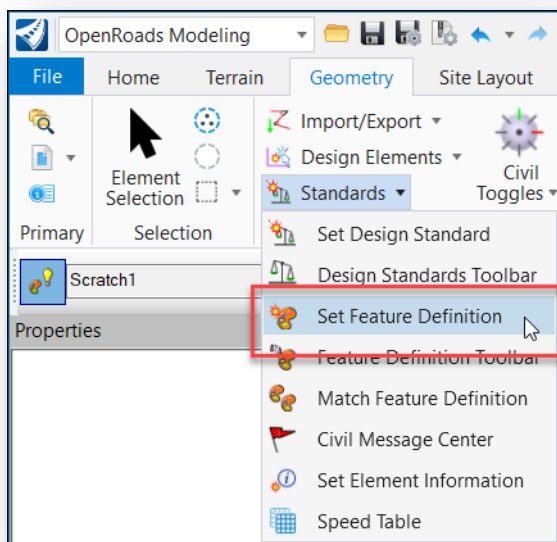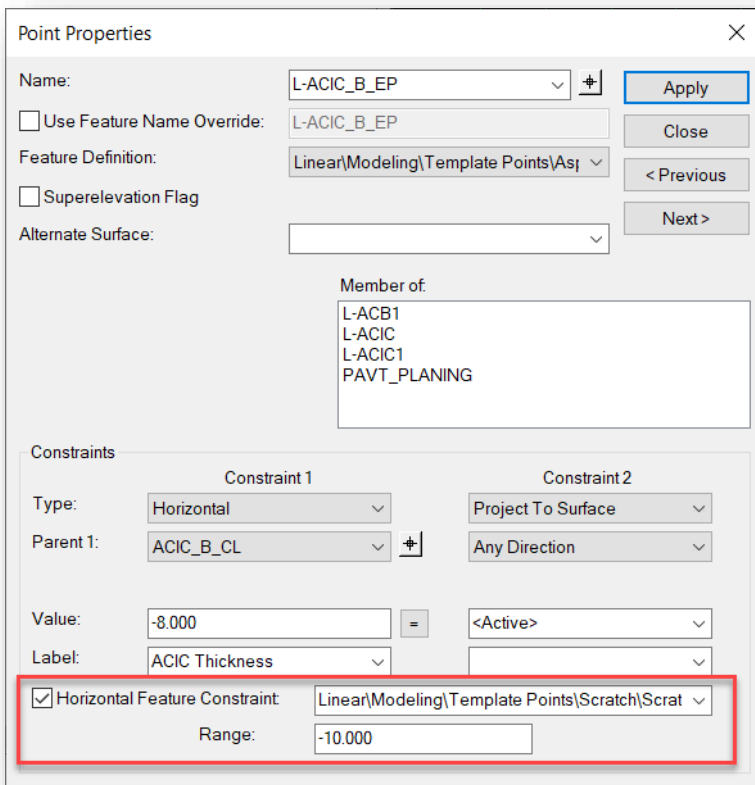

The feature **Linear > Modeling > Template Points > Scratch > Scratch1** is used in this example.

Select each copied edge of pavement element to assign the new feature definition.

The feature definition is assigned like the example below.
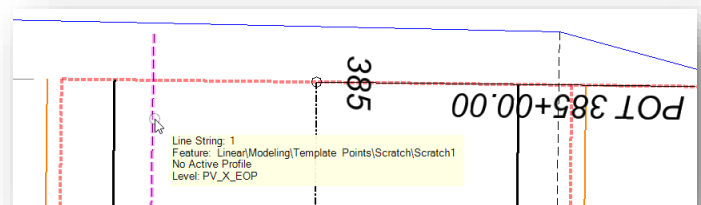
In the *Create Template* dialog, edit the point properties for points **L-ACIC_B_EP** and **R-ACIC_B_EP** to assign the **Horizontal Feature Constraint** parameter using the **Scratch1** feature like the example at left.

Note: The **Horizontal** offset value of **8'** is used to position the pavement points inside the limits of the existing pavement. The software will search from the location of the points, outward, for the intersecting elements. If the template points are already wider than the existing pavement the process will not find the existing pavement lines.

The edge of pavement elements must be added as a corridor reference for the modeling process to recognize the lines. Choose the **OpenRoads Modeling > Corridors > Add Corridor Reference** command.
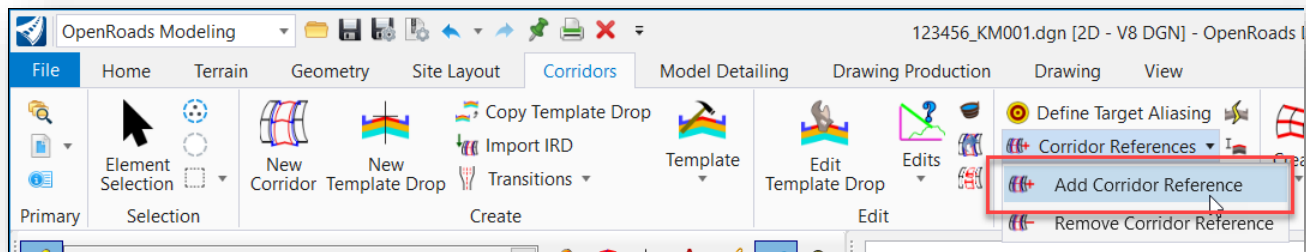
- When prompted to locate the corridor, choose one of the corridor handle graphics to identify the corridor.
- Next choose the edge of pavement elements to add them as corridor references

OpenRoads Software Version

This document was prepared using the following software version:

OpenRoads Designer CONNECT Edition – 2019 Release 1 Update 7 – Version 10.07.03.18

Contacts

For any questions, suggestions, or problems with this document please contact the ODOT Office of CADD and Mapping Services by use of the following form on the ODOT website:

https://odot.formstack.com/forms/cadd_servicerequest