

Chapter 2 - Intersection Project

This intersection lab is based on the Federal Blvd. and 6th Ave. interchange reconstruction project. The lab focuses on the reconstruction of the intersection at Federal Blvd. and 5th Avenue. It describes the tools and techniques for modeling an intersection.

Chapter Objectives:

- Describe the procedures and techniques used to create an at-grade intersection
- Improve proficiency in creating corridors
- Practice creating design surfaces
- Introduce the student to the multi-centered curve tool used to develop geometry for curb returns
- Learn how to use point controls in typical sections to model curb returns
- Reinforce techniques for combining surfaces to create a final surface

Project Overview

The scope of work for the Federal Blvd. and 5th Ave. intersection project is a complete reconstruction. Key features of the reconstruction are:

- Federal Blvd. (the mainline) is being widened from 4 to 6 lanes
- 5th Ave. (the crossing street) is being realigned to accommodate the on ramp to 6th Ave.
- Federal Blvd. uses a concrete pavement design
- 5th Ave. uses an asphalt pavement design
- 5th Ave. switches to a concrete pavement prior to the intersection.
- 5th Ave has a taper on the south side to facilitate right turns.

Project Data

The following data is provided for this project:

- **Federal @ 5thAve.alg** - This file contains predefined horizontal and vertical alignments for Federal Blvd. and the horizontal alignment 5th Ave. The student will create a vertical alignment for 5th Ave. in addition to geometry for each of the curb returns.
- **16628_Existing.dtm** – This file represents the surveyed surface data of the existing intersection.
- **Federal_and_5th.itl** – This file contains predefined templates for Federal Blvd. and 5th Ave.

InRoads Design Process

Below is an outline of the InRoads procedures used to create the intersection design model:

1. Create the initial mainline design surface
2. Create the vertical alignment for crossing street and match the mainline design surface through the intersection
3. Create the initial crossing street design surface
4. Add geometry for each curb return
5. Update the crossing street corridor to include curb returns
6. Update mainline corridor to include curb returns and features from the crossing street.
7. Create the final intersection Surface

Initial Modeling

Section Objectives:

Federal Blvd. is considered the mainline and should be modeled first. Use this initial Federal Blvd. design surface to assist in defining the vertical alignment for 5th Ave., the intersecting street. Using the new vertical alignment and the predefined template for 5th Ave., create the initial design surface for the crossing street. At this point there will be two separate design surfaces, one for the mainline and one for the crossing street.

Create the Initial Federal Blvd. Design Surface

Use the following procedure to create the initial design surface for Federal Blvd.:

- ◆ Load project data
- ◆ Create the Federal Blvd. corridor
- ◆ Add template drops
- ◆ Generate the initial mainline design surface

Load Project Data

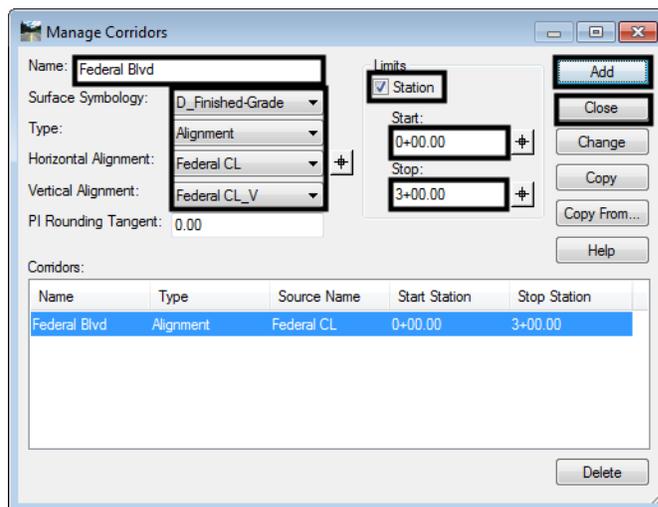
1. Open the **Federal @ 5thAve.alg** geometry file.
2. Open the **Federal_and_5th.itl** template library.
3. Open the **16628_Existing.dtm** surface.

Create the Federal Blvd. Corridor

The Federal Blvd. alignment runs from south of 5th Ave to north of the ramps for eastbound 6th Ave. Because this lab is concerned with the intersection at 5th Ave., the first 300 feet of the Federal Blvd. alignment is used.

1. Select **Modeler > Roadway Designer** from the InRoads menu bar. This displays the **Roadway Designer** dialog box.
2. In the **Roadway Designer** dialog box, select **Corridor > Corridor Management** or <D> the  button. This displays the **Manage Corridors** dialog box.

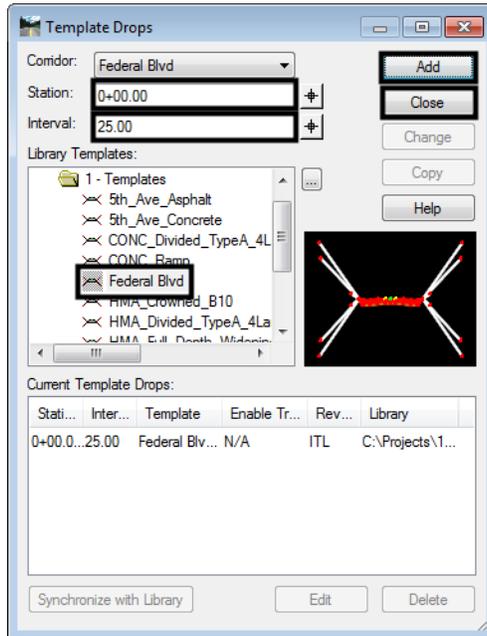
3. In the **Manage Corridors** dialog box, key in **Federal Blvd** for the **Name**.
4. Set the **Surface Symbology** to **D_Finished-Grade**.
5. Set the **Type** to **Alignment**.
6. Select **Federal CL** as the **Horizontal Alignment**.
7. Select **Federal CL_V** as the **Vertical Alignment**.
8. Toggle on **Station** in the **Limits** area.
9. Key in **0+00.00** for the **Start** station.
10. Key in **3+00.00** for the **Stop** station.
11. <D> **Add** to complete the corridor.
12. <D> **Close** to dismiss the **Manage Corridors** dialog box.



Add Federal Blvd. Template Drops

1. In the **Roadway Designer** dialog box, select **Corridor > Template Drops** or <D> the  button. This displays the **Template Drops** dialog box.
2. In the **Template Drops** dialog box, Key in **0+00.00** for the **Station**.
3. Key in **25** for the **Interval**.
4. In the **Library Templates** area, expand the **1 – Templates** folder.

- Highlight the **Federal Blvd** template.



- <D> Add and <D> Close.

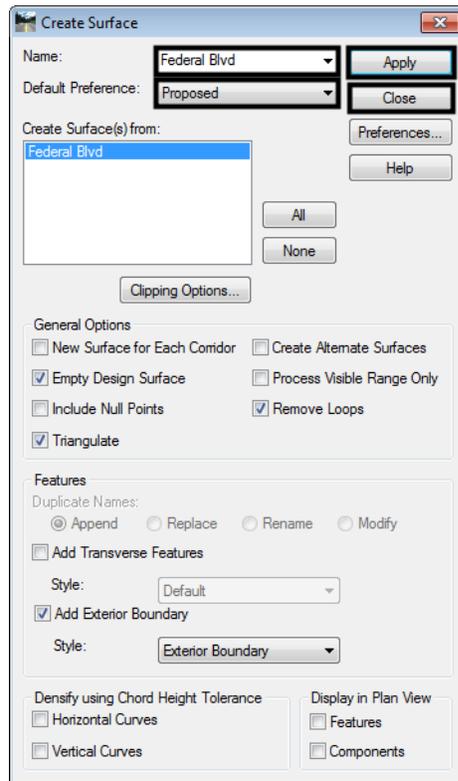
Create the Initial Federal Blvd. Design Surface

The surface created here will be used in conjunction with the existing ground to lay out the vertical alignment for 5th Ave. Having the Federal Blvd. surface makes it easier to match it's cross slope with the 5th Ave vertical alignment.

- In the **Roadway Designer** dialog box, select **Corridor > Create Surface** or <D> the  button. This displays the **Create Surface** dialog box.
- Key in **Federal Blvd** for the **Name**.
- Select **Proposed** for the **Default Preference**.

Note: If Proposed is not found in the list, make sure the standard CDOT_Civil.xin file is loaded.

- Verify the remaining settings match the illustration below.



- <D> **Apply** and <D> **Close**.

Note: If the **Report Lock** is **On**, the **Results** dialog box will appear with information about the creation of the surface. This can be dismissed.

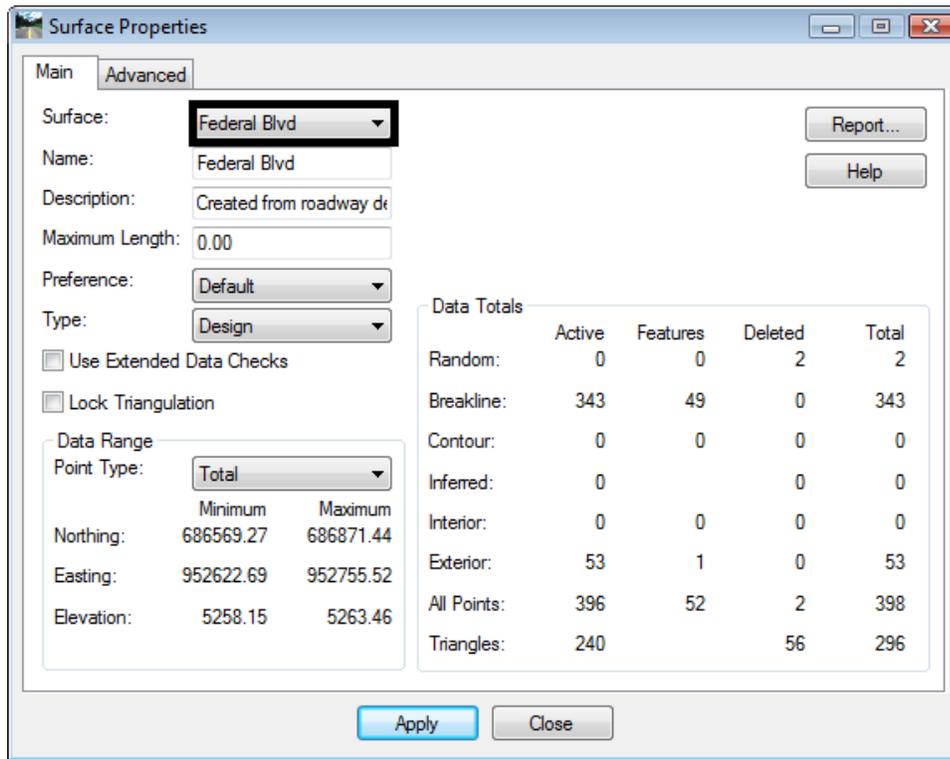
Roadway Designer is exited at this point. Save the ird file so that it can be used in later steps.

- Select **File > Save** from the **Roadway Designer** menu bar.
- Key in **Federal_and_5th.ird** for the **file name**.
- <D> **Save** then <D> **Cancel** in the **Save As** dialog box.
- Close** the **Roadway Designer** dialog box.

Changing the symbology for the cross sections and profiles makes it easier to differentiate between surfaces. To change the symbology:

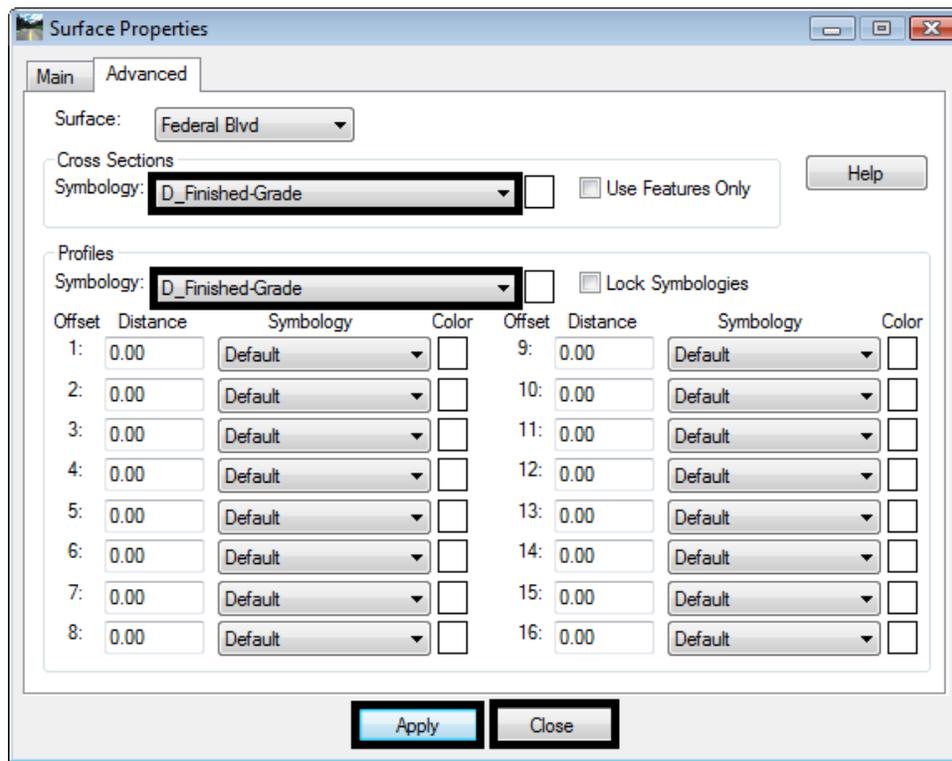
- From the InRoads menu bar, select **Surface > Surface Properties**. This displays the **Surface Properties** dialog box.

11. In the **Surface Properties** dialog box on the **Main** tab, select the **Federal Blvd** surface.



12. Select the **Advanced** tab.
13. Select **D_Finished-Grade** for **Cross Sections Symbology**.

14. Select **D_Finished-Grade** for **Profile Symbology**.



15. <D> **Apply**.

16. <D> **Close**.

This completes the initial design of Federal Blvd.

Create the 5th Ave Vertical Alignment

The vertical alignment for 5th Ave. is created at this point. Using the initial Federal Blvd surface and the existing ground surface, the vertical alignment for 5th Ave. can be tied into Federal Blvd. properly.

- ◆ Create the crossing street profile
- ◆ Define the crossing street vertical alignment

Create a Profile for 5th Ave.

In order to define a vertical alignment, a profile window is required. The existing surface along with the initial Federal Blvd. surface is displayed in this profile.

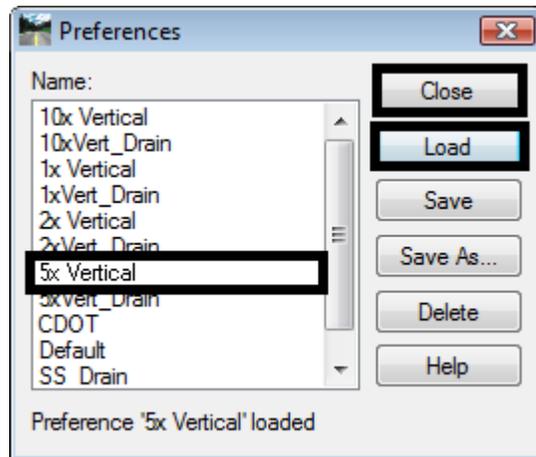
1. In MicroStation, move to an area to the right of the alignments.
2. Verify the **5th_Ave** horizontal alignment is active.
3. On the InRoads main menu, select **Evaluation > Profile > Create Profile**. This displays the **Create Profile** dialog box.

The 5x Vertical preference is used here so that the slopes are easier to see.

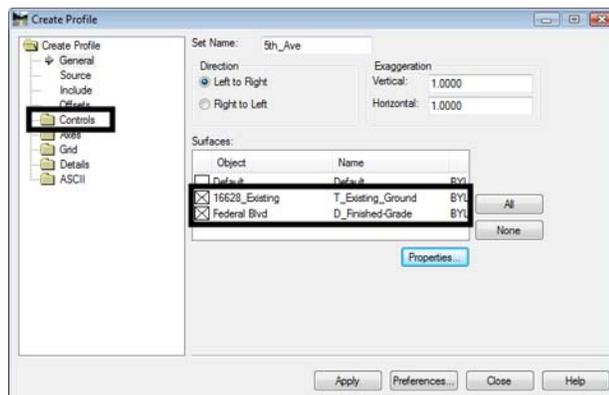
4. <D> **P**references and highlight the preference **5x Vertical** from the list.

Note: Because there are so many settings that control the look and feel of a profile, several CDOT preferences have been created that can save the end user a significant amount of time setting up and creating a profile. Be sure to use a standard preference as much as possible.

5. <D> **L**oad to load the preference and then <D> **C**lose.



6. On the **General** leaf, enter **5th_Ave** for the **Set Name**.
7. Toggle on **Right to Left** in the **Direction** area.
8. Toggle on the **16628_Existing** and **Federal Blvd** surfaces.
9. <D> on the **Controls** leaf.

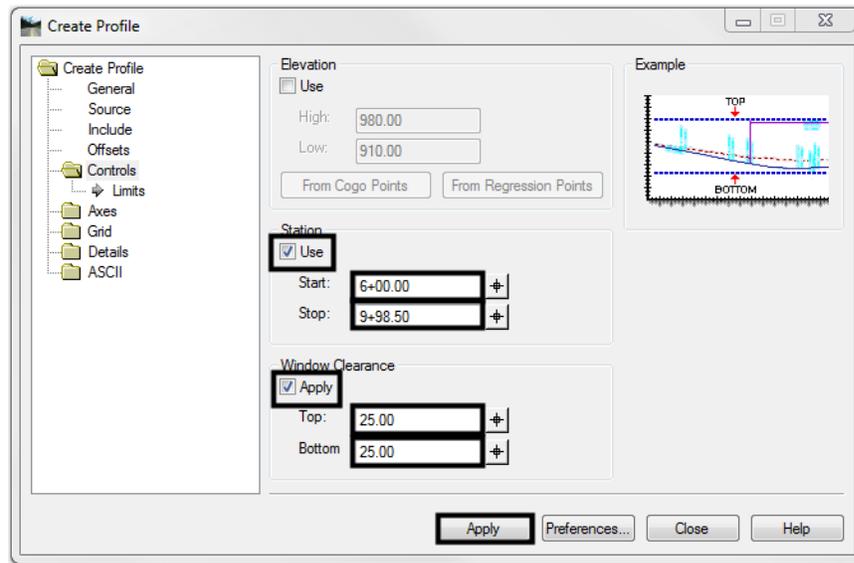


10. Toggle on **Use** in the **Station** area.

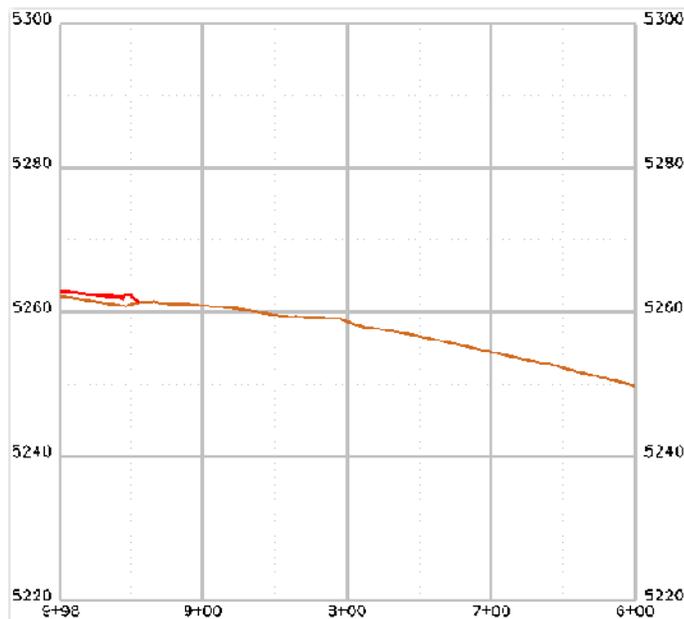
Because this lab is concerned with just the intersection, the vertical alignment (and the profile) is constructed to cover just the area of the intersection.

11. Key in **6+00.00** for the **Start** station.

12. Key in **9+98.50** for the **Stop** station.
13. Toggle on **Apply** in the **Window Clearance** area.
14. Key in **25** for both the **Top:** and **Bottom.**



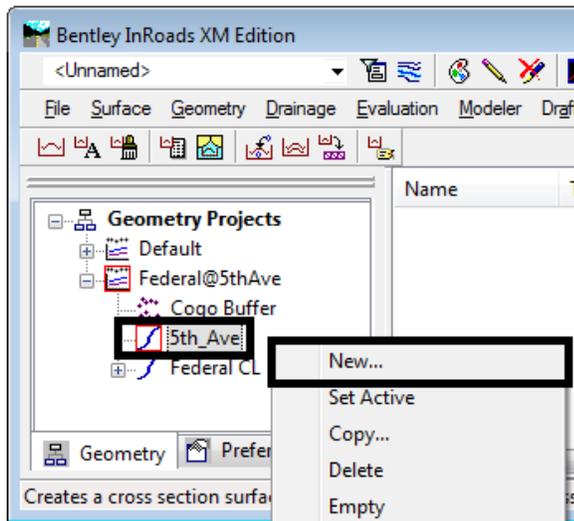
15. <D> **Apply**.
16. <D> in the MicroStation view window to identify the profile's location. Because the **Direction** was set to **Right to Left**, the profile will be placed to the right of the data point.
17. The profile should look similar to the following:



18. <D> **Close** on the **Create Profile** dialog box to dismiss it.

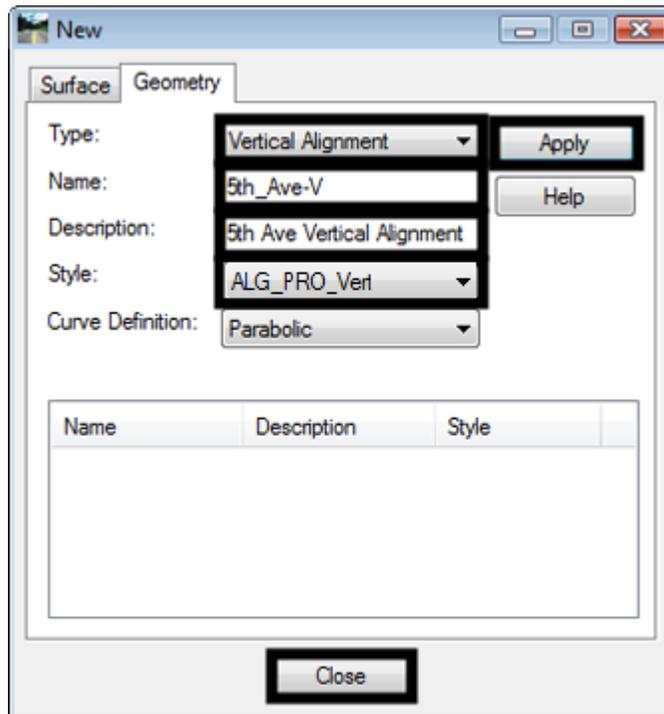
Define the 5th Ave Vertical Alignment

1. Select the **Geometry** bottom tab from the InRoads Explorer.
2. Expand the **Federal@5thAve** geometry project to show the **5th_Ave** horizontal alignment.
3. <R> on the **5th_Ave** horizontal alignment and select **New** from the menu.

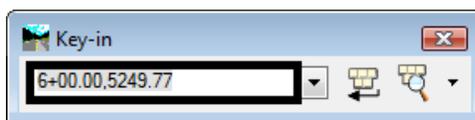


4. In the **New** dialog Box, set the **Type** to **Vertical Alignment**.
5. In the **Name** field, key in **5th_Ave-V**
6. In the **Description** field, key in **5th Ave Vertical Alignment**.
7. Set the **Style** to **ALG_PRO_Vert**. (This stands for Alignment Proposed Vertical)

8. The dialog box should look like the following:



9. <D> **Apply** and <D> **Close**.
10. Select **Geometry > Vertical Curve Set > Add PI** from the InRoads main menu. There is no dialog box with this command.
11. In the MicroStation **Key in** window, key in *se=6+00.00, 5249.77* and press **Enter**.

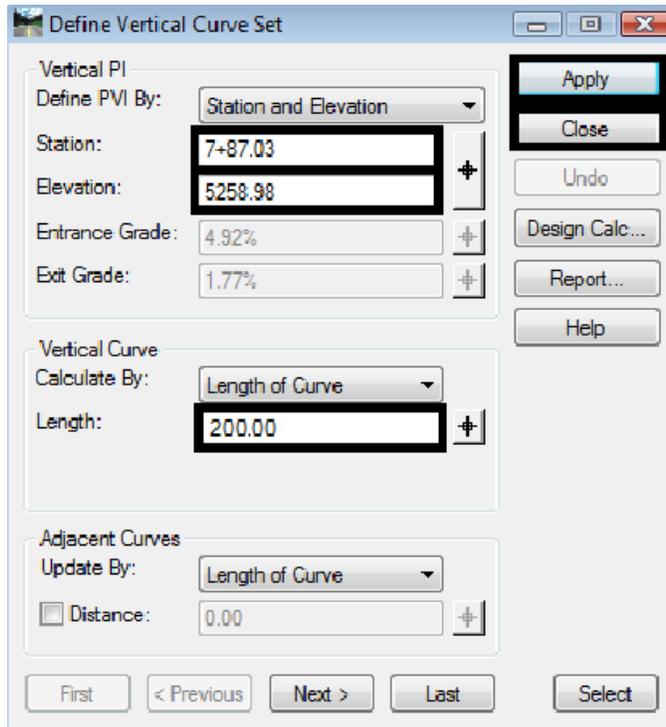


12. Key in *se=7+87.03, 5258.98* and press **Enter**.
13. Key in *se=9+57.46, 5261.99* and press **Enter**.

Note: This is the station where the alignment of 5th Ave. ties into the cross slope of Federal Blvd. Make sure that this is a smooth transition by comparing the cross slope of Federal Blvd. to the slope of this tangent.

14. Key in *se=9+98.49, 5262.82* and press **Enter**.
15. <R> to stop placing PI's.
16. In the **Add Vertical PI** dialog box, <D> **Close** to dismiss the dialog box.
17. Select **Geometry > Vertical Curve Set > Define Curve** from the InRoads main menu.

18. In the **Define Vertical Curve Set** dialog box, verify that the **Station** is **7+87.03**.
19. Verify that the **Elevation** is **5258.98**.
20. In the **Vertical Curve** area, key in **200.00** in the **Length** field.



21. <D> **Apply** and <D> **Close**.

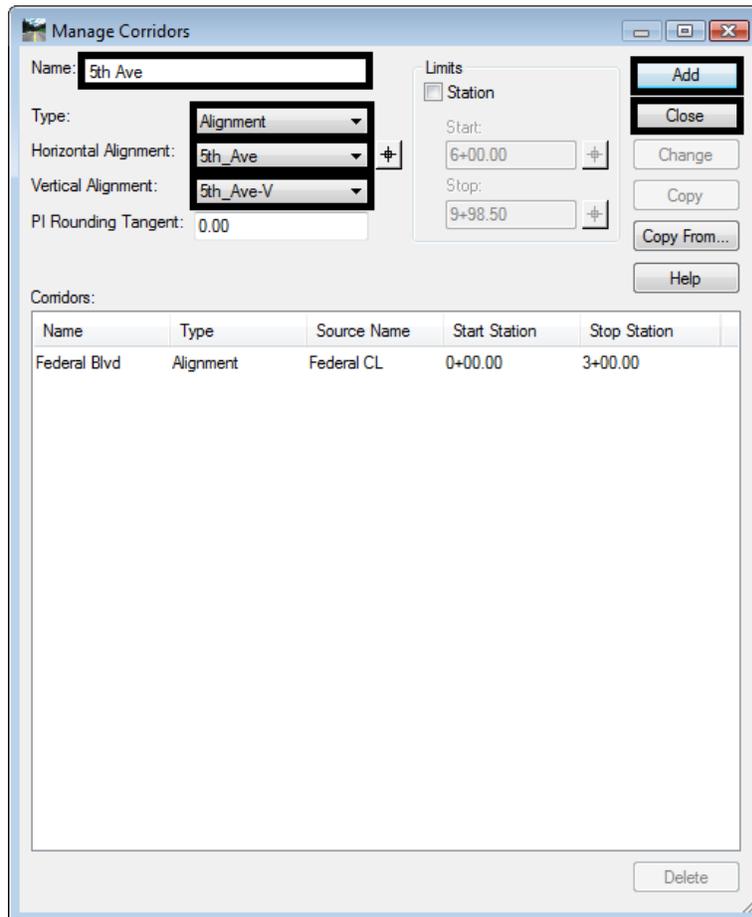
Create the Initial 5th Ave. Design Surface

- ◆ Define the corridor for the crossing street
- ◆ Add template drops
- ◆ Add point controls
- ◆ Create the initial crossing street design surface

Build the 5th Ave. Corridor

1. Select **Modeler > Roadway Designer** from the InRoads menu bar. This displays the **Roadway Designer** dialog box.
2. In the **Roadway Designer** dialog box, select **Corridor > Corridor Management** or <D> the  button. This displays the **Manage Corridors** dialog box.
3. In the **Manage Corridors** dialog box, key in **5th Ave** for the **Name**.
4. Set the **Type** to **Alignment**.

5. Select **5th_Ave** as the **Horizontal Alignment**.
6. Select **5th_Ave -V** as the **Vertical Alignment**.
7. Toggle off **Station** in the **Limits** area.
8. <D> **Add** to complete the corridor.



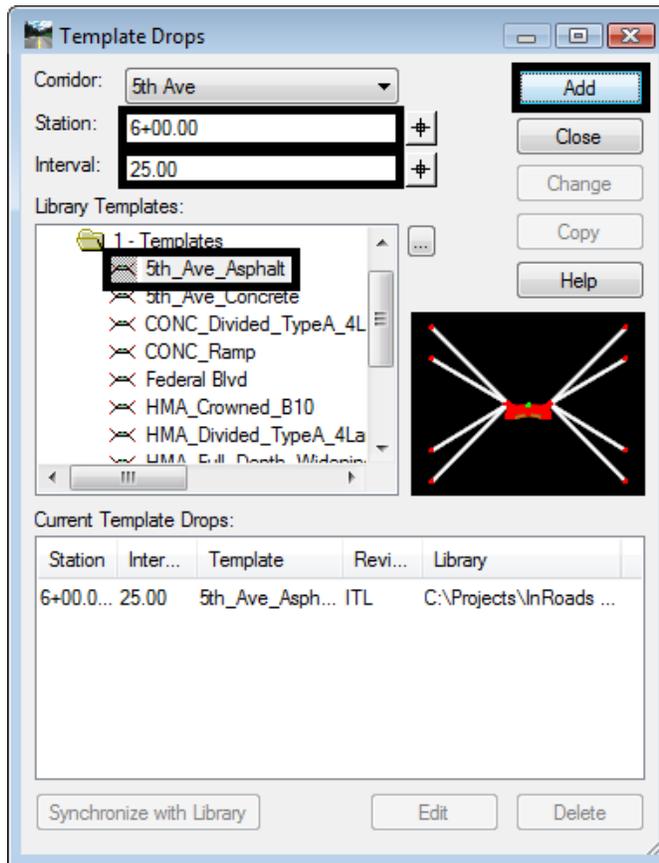
9. <D> **Close** to dismiss the **Manage Corridors** dialog box.

Add 5th Ave. Template Drops

The pavement for 5th Ave. needs to change from an asphalt pavement to a concrete pavement as it approaches Federal Blvd. This takes place at Sta. 8+30.00. Therefore, the asphalt template is used from the beginning of the 5th Ave. corridor to station 8+29.99. The concrete template is used from station 8+30.00 to the end of the project. Switching templates in 1/100 of a foot gives a clean change between templates.

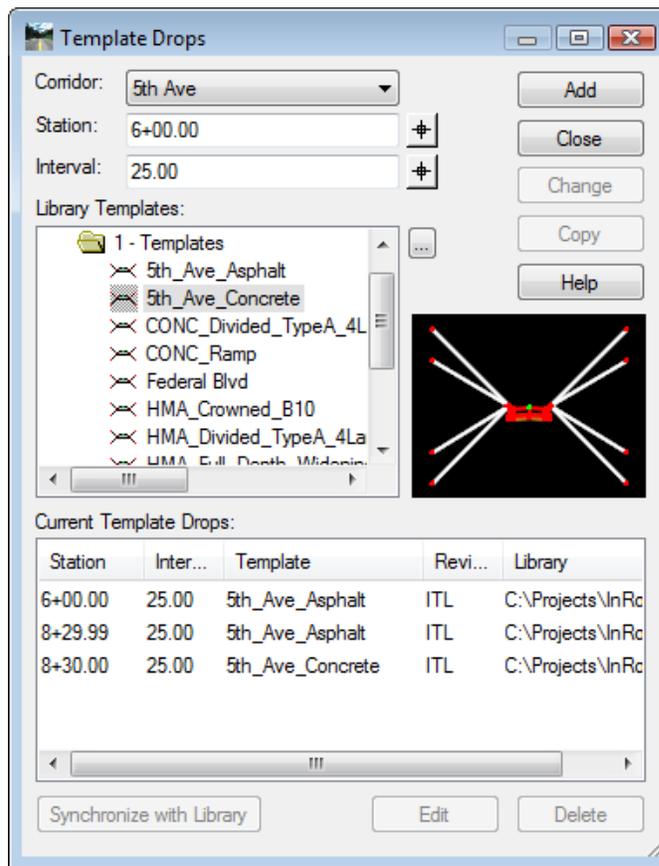
1. In the **Roadway Designer** dialog box, select **Corridor > Template Drops** or <D> the  button. This displays the **Template Drops** dialog box.
2. Verify the **Corridor** is set to **5th Ave**.
3. In the **Template Drops** dialog box, Key in **6+00.00** for the **Station**.

4. Key in **25** for the **Interval**.
5. In the **Library Templates** area, expand the **1 – Templates** folder.
6. Highlight the **5th_Ave_Asphalt** template.
7. <D> **Add**.



8. Key in **8+29.99** for the **Station**.
9. Highlight the **5th_Ave_Asphalt** template.
10. <D> **Add**.
11. Key in **8+30.00** for the **Station**.
12. Highlight the **5th_Ave_Concrete** template.
13. <D> **Add**.

14. The template drops appear in the dialog box as shown below:



15. <D> Close.

Add 5th Ave. Point Controls

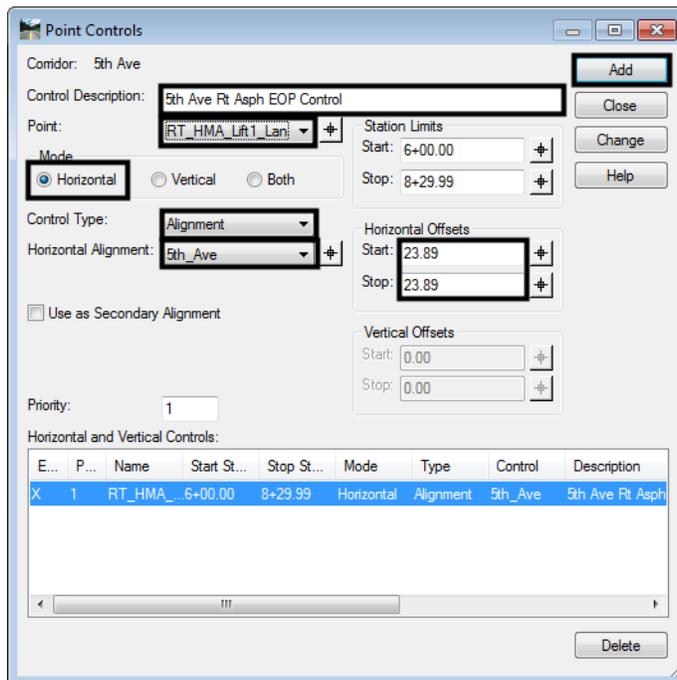
The templates are defined to be used “as is” at the beginning of the alignment and are to widen out as Federal Blvd. is approached. The point controls used here reflect the area of widening where 5th Ave. approaches Federal Blvd.

Because the asphalt template and the concrete template use different point names, point controls have to be defined for each template. This first set of point controls define the widening on the right side of 5th Ave. This widening is constant through the corridor.

1. In the **Roadway Designer** dialog box, select **Corridor > Point Controls** or <D> the  button. This displays the **Point Controls** dialog box.
2. In the **Control Description** field, key in **5th Ave Rt Asph EOP Control**.
3. In the **Point Controls** dialog box, set the **Point** to **RT_HMA_Lift1_Laneline-Top** using the drop down menu or the  Button.
4. Toggle on **Horizontal** in the **Mode** area.
5. Set the **Control Type** to **Alignment**.

6. Set the **Horizontal Alignment** to **5th_Ave**.

Note: The settings made in steps 3 through 5 are used for setting up all of the point controls that follow.
7. In the **Station Limits** area, key in **6+00.00** for the **Start** station.
8. Key in **8+29.99** for the **Stop** station.
9. In the **Horizontal Offsets** area, key in **23.89** for the **Start** and **Stop** offsets.
10. <D> Add.



11. Advance the **Station** to **8+30.00** in the Roadway Designer plan view window.
12. In the **Control Description** field, key in **5th Ave Rt Conc EOP Control**.
13. In the **Point Controls** dialog box, set the **Point** to **RT_Conc_Laneline-Top** using the drop down menu or the  button.
14. In the **Station Limits** area, key in **8+30.00** for the **Start** station.
15. Key in **9+98.50** for the **Stop** station.
16. In the **Horizontal Offsets** area, key in **23.89** for the **Start** and **Stop** offsets.
17. <D> Add.

This set of point controls define the widening on the left side of 5th Ave. It is constant from the beginning of the corridor to station 8+30.00 (where the templates change). From here it transitions out to provide the additional width for right turns. The additional width is maintained to the end of the corridor.

18. In the *Control Description* field, key in ***5th Ave Lt Asph EOP Control***.
19. Set the Point to **LT_HMA_Lift1_Laneline-Top**.
20. In the **Station Limits** area, key in **6+00.00** for the **Start** station.
21. Key in **8+29.99** for the **Stop** station.
22. In the **Horizontal Offsets** area, key in **-12.45** for the **Start** and **Stop** offsets.
23. <D> **Add**.

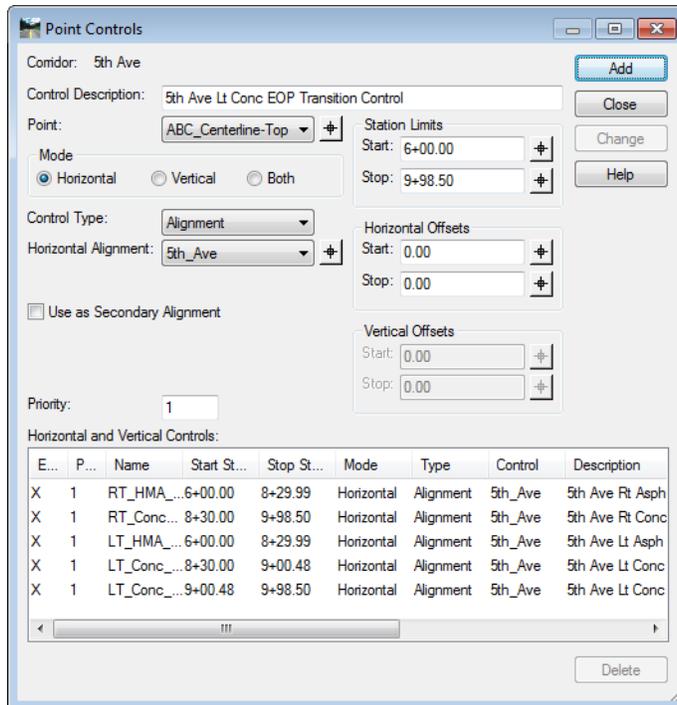
The next series of steps define the tapered area of the widening.

24. In the *Control Description* field, key in ***5th Ave Lt Conc EOP Transition Control***.
25. Set the Point to **LT_Conc_Laneline-Top**.
26. In the **Station Limits** area, key in **8+30.00** for the **Start** station.
27. Key in **9+00.48** for the **Stop** station.
28. In the **Horizontal Offsets** area, key in **-12.45** for the **Start** offset.
29. Key in **-15.87** for the **Stop** offset.
30. <D> **Add**.

For the final point control use the following steps:

31. In the *Control Description* field, key in ***5th Ave Lt Conc EOP Full Width Control***.
32. In the **Station Limits** area, key in **9+00.48** for the **Start** station.
33. Key in **9+98.50** for the **Stop** station.
34. In the **Horizontal Offsets** area, key in **-15.87** for the **Start** and **Stop** offsets.
35. <D> **Add**.

36. At this point there should be 5 point controls setup, 3 for the left side of 5th Ave. and 2 for the right side, as shown in the following image.



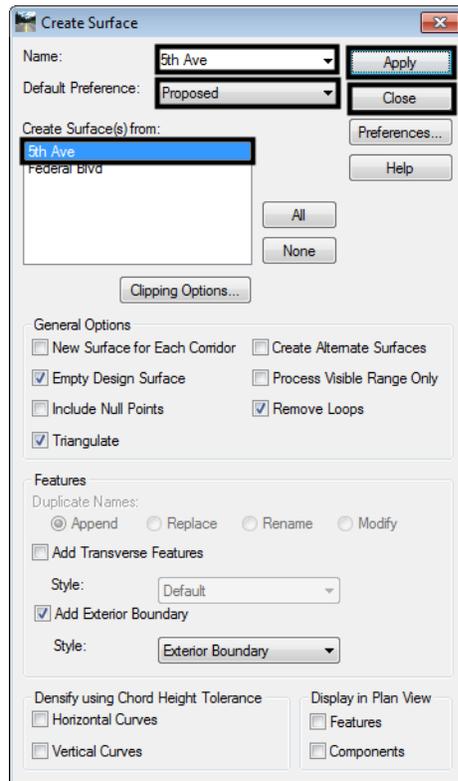
37. <D> Close.

Create the Initial 5th Ave. Design Surface

This surface, along with the initial Federal Blvd. surface, will be used to determine the vertical alignments for the curb returns.

1. In the **Roadway Designer** dialog box, on the InRoads **Surfaces** tab, verify that **16628_Existing** is the active surface.
2. Select **Corridor > Create Surface** or <D> the  button. This displays the **Create Surface** dialog box.
3. Key in **5th Ave** for the **Name**.
4. Select **Proposed** for the **Default Preference**.
5. Highlight only **5th Ave** in the **Create Surface(s) From** list.

6. The remaining settings should be correct. If not, set them to match the illustration below.



7. <D> **Apply**.
8. <D> **Close**.
9. Select **File > Save** from the **Roadway Designer** menu bar.
10. **Close** the **Roadway Designer** dialog box.
11. From the InRoads menu bar, select **Surface > Surface Properties**. This displays the **Surface Properties** dialog box.
12. In the **Surface Properties** dialog box on the **Main** tab, select the **5th Ave** surface.
13. Select the **Advanced** tab.
14. Select **D_Finished-Grade** for **Cross Sections Symbology**.
15. Select **D_Finished-Grade** for **Profile Symbology**.
16. <D> **Apply** and <D> **Close**.

Section Summary:

At this point there are two initial design surfaces created; a mainline and the crossing street. In order for these surfaces to match up through the intersection additional, geometry will need to be created.

Additional Geometry

Section Objectives:

- Create horizontal and vertical geometry for curb returns

In this section the two initial design surfaces are used to create smooth vertical alignment transitions around the corners of the intersection. Horizontal and vertical geometry for each curb return is defined with the InRoads **Create Multicenter Curves** tool. The new geometry will be used to create the final design surface.

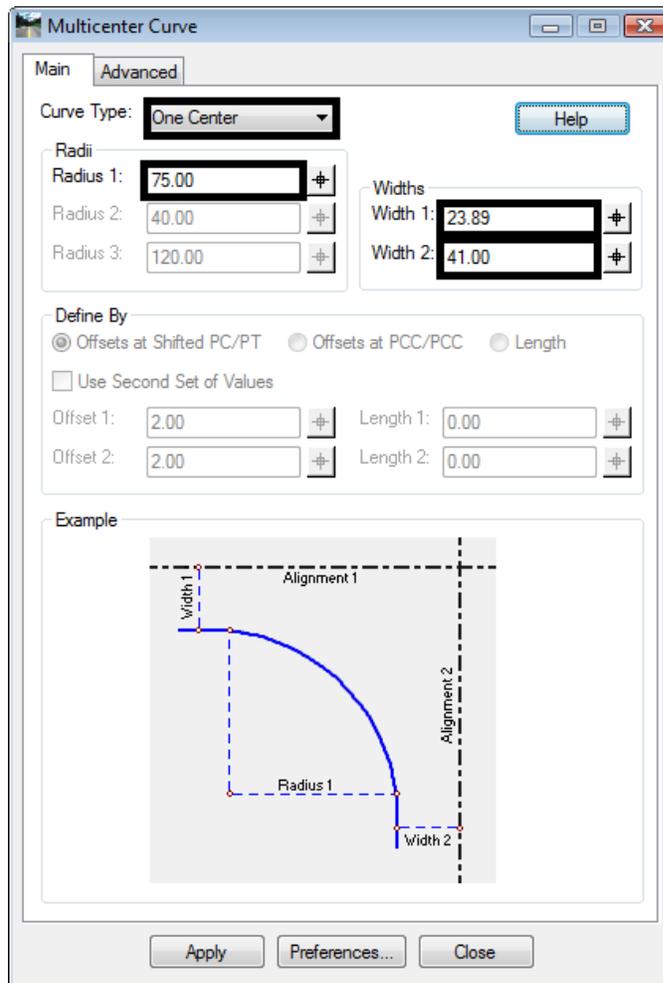
Curb Returns

Because this example is a T-intersection there are only two curb returns to model. In a typical intersection there are four returns to model. The steps shown below can also be used to develop curb returns for an intersection with more than one crossing street.

Create Northeast Curb Return

1. From the InRoads menu bar, select **Geometry > Utilities > Multicenter Curve...** This displays the **Multicenter Curve** dialog box.
2. On the **Main** tab of the **Multicenter Curve** dialog box, set the **Curve Type** to **One Center**.
3. In the **Radii** area, key in **75** for **Radius 1**.
4. In the **Widths** area, key in **23.89** for **Width 1**. This is the width of 5th Ave. from its centerline to the right edge of pavement.

- Key in **41** for **Width 2**. This is the width of Federal Blvd. from its centerline to the right edge of pavement.



Important! Use the graphic in the Example area to determine how to enter your curb data. This graphic changes according to the Curve Type:. As an example, when prompted by the software to choose the first alignment, choose the alignment that is associated with Width 1.

- <D> the **Advanced** tab.

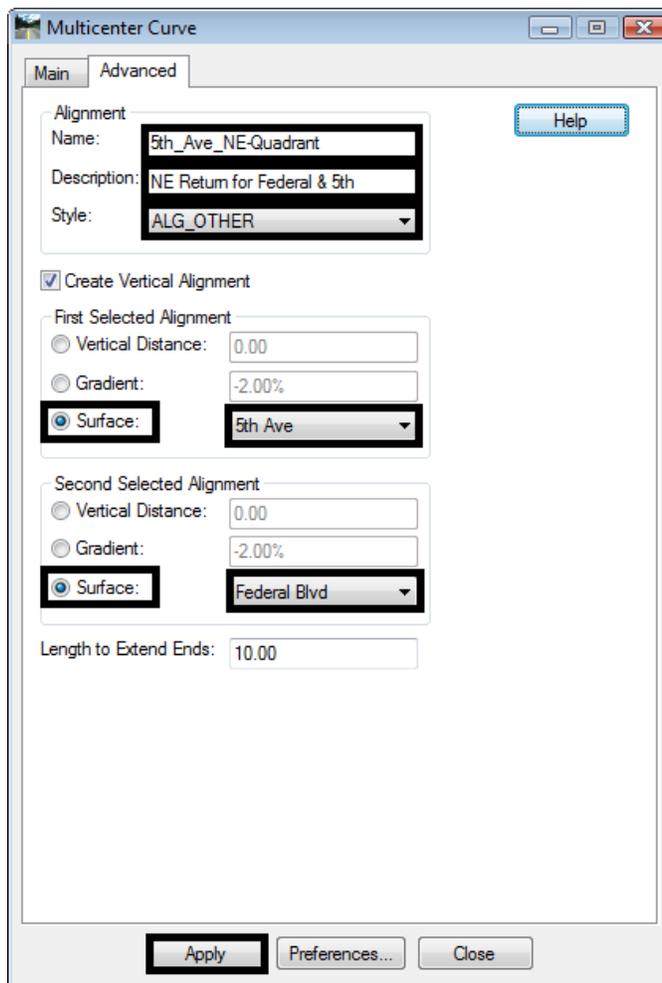
The steps below define the properties of the horizontal alignment representing the northeast curb return.

- In the **Name** field of the **Alignment** area, key in **5th_Ave_NE-Quadrant**.
- In the **Description** field, key in **NE Return for Federal & 5th**.
- Set the **Style** to **ALG_OTHER**.

The following steps define the vertical alignment for the curb return. Because the 5th Ave. width was entered in Width 1 previously, 5th Ave. data must be used in the First Selected Alignment fields here. The Federal Blvd. data is used in the Second Selected Alignment fields.

10. Toggle on **Create Vertical Alignment**.
11. In the **First Selected Alignment** area, toggle on **Surface**.
12. Select **5th Ave** for the surface.
13. In the **Second Selected Alignment** area, toggle on **Surface**.
14. Select **Federal Blvd** for the surface.

The dialog box should now look like the image below.



15. <D> **Apply**.

Important! Now you must select the alignments in the same order that they were defined in the dialog box.

The following message is displayed in the lower left corner of the MicroStation window:

```
> Identify first alignment/Reset
```

16. <D> on the **5th_Ave** alignment in the MicroStation view window. The following message is displayed:

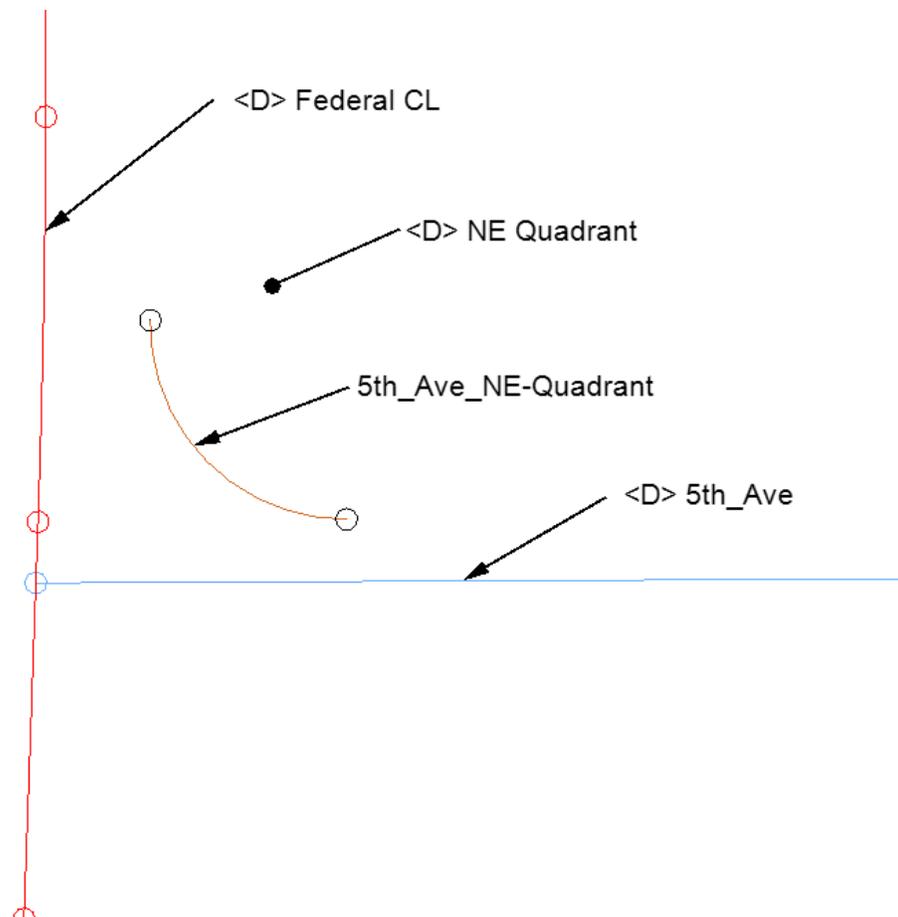
> Identify second alignment/Reset for new first alignment

17. <D> on the **Federal CL** alignment. The following message is displayed:

> Identify quadrant for return/Reset for new second alignment

18. <D> above the **5th_Ave** alignment and to the right of the **Federal CL** alignment. The curb return alignment is displayed.

19. <D> one more time to **Accept** the creation of the new alignment.

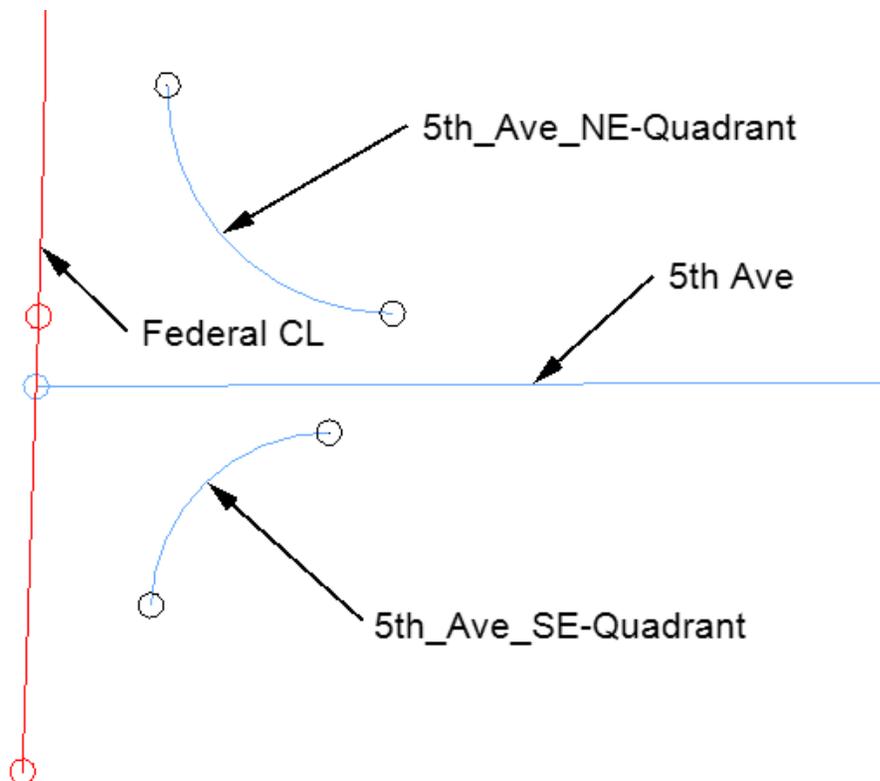


Create Southeast Curb Return

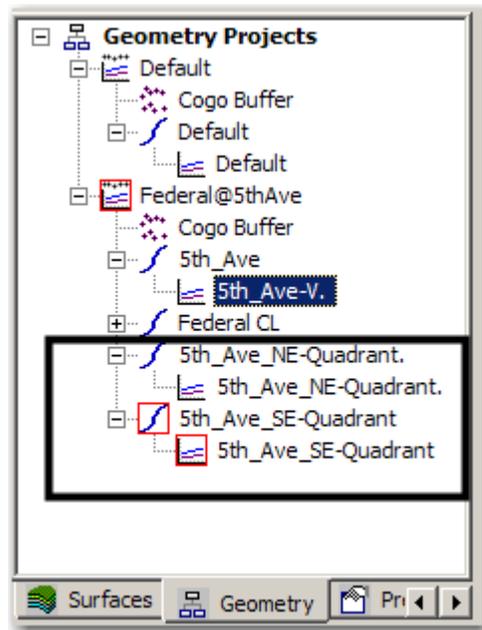
Again, the 5th Ave. data is used first to create the southeast curb return.

1. From the InRoads menu bar, select **Geometry > Utilities > Multicenter Curve...**
2. On the **Main** tab, in the **Radii** area, key in **60** for **Radius 1**.
3. In the **Widths** area, key in **15.87** for **Width 1**.

4. Key in **41** for **Width 2**.
5. <D> the **Advanced** tab.
6. In the **Name** field of the **Alignment** area, key in **5th_Ave_SE-Quadrant**.
7. In the **Description** field, key in **SE Return for Federal & 5th**. The remaining data is the same as used on the northeast quadrant.
8. <D> **Apply**.
9. Follow the prompts, identifying **5th_Ave** first then **Federal CL**. Identify the quadrant below the **5th_Ave** alignment and to the right of the **Federal CL** alignment. The curb return alignment is displayed.



10. Verify that the new alignments show up in the **Geometry** tab of InRoads Explorer as shown below.



Section Summary:

The **Multicenter Curve** tool created smooth horizontal and vertical alignments from the surface of the cross street to the surface of the mainline. You may need to modify these alignments depending on the actual design needs for the flowline.

Final Design Modeling

Section Objectives:

- Revise the point controls and template drops for 5th Ave using new curb return alignments.
- Use Target Aliasing to match the surface of Federal Blvd to the surface of 5th Ave.
- Update the 5th Ave surface
- Update Federal Blvd. template drops and add point controls
- Create a complete final combined surface

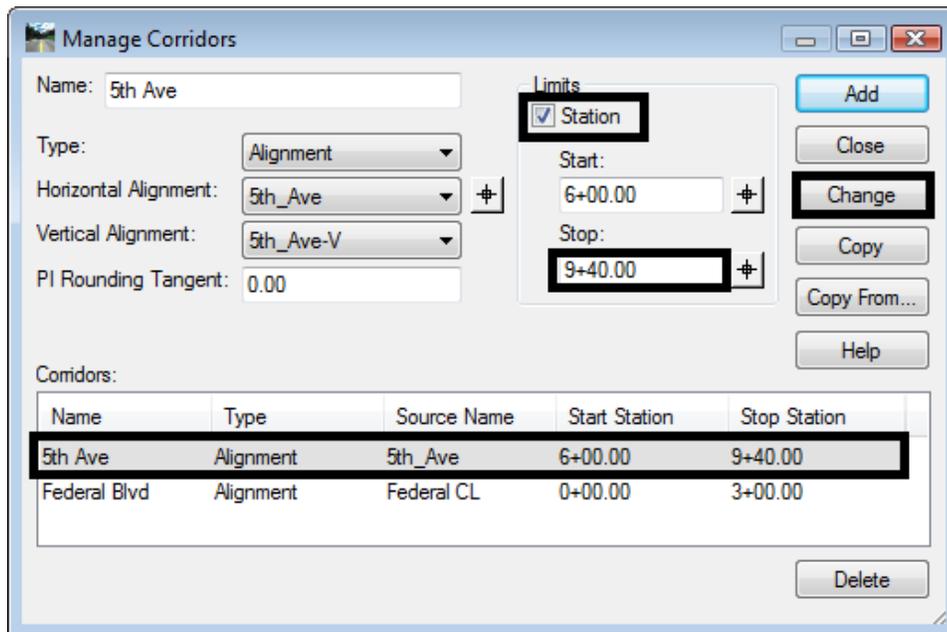
Create the Final 5th Ave. Corridor Surface

The 5th Ave. design surface is created first so that a feature in that surface can be used to control the edge of Federal Blvd. through the intersection. The 5th Ave. corridor is used to clip the Federal Blvd. corridor, removing the curb and gutter through the intersection that would normally be placed by the Federal Blvd. template.

Edit 5th Ave. Corridor Definition

The 5th Ave corridor is going to clip out portions of the Federal Blvd. corridor when the final surface is created. If the 5th Ave. corridor clips any of the driving lane components in the Federal Blvd. template, those components will be lost for calculating volumes. In order to prevent this from occurring, The corridor for 5th Ave. is stopped before it reaches the edge of the Federal Blvd. template.

1. Select **Modeler > Roadway Designer** from the InRoads main menu.
2. In the **Roadway Designer** dialog box, select **Corridor > Corridor Management** or <D> the  button. This displays the **Manage Corridors** dialog box.
3. Highlight **5th Ave** in the **Corridors** list.
4. Toggle on **Station** in the **Limits** area.
5. Key in **9+40.00** for the **Stop** station. This station was selected because it is about halfway through the curb returns and before the edge of Federal Blvd.
6. <D> **Change**.
7. <D> **Close**.



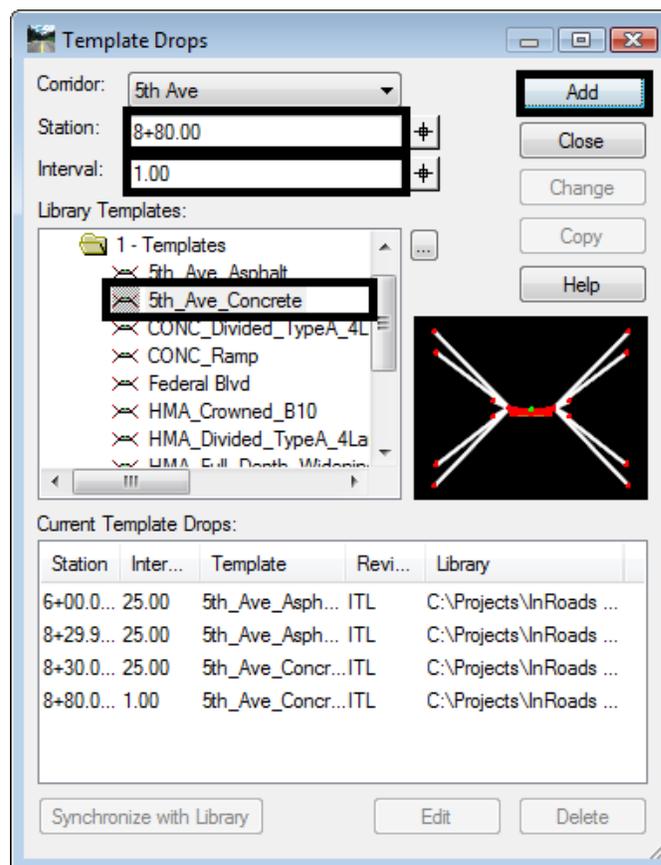
Edit 5th Ave. Template Drops

1. In the **Roadway Designer** dialog box, select **Corridor > Template Drops** or <D> the  button. This displays the **Template Drops** dialog box.
2. Verify that the **Corridor** is set to **5th Ave**.
3. In the **Template Drops** dialog box, Key in **8+80.00** for the **Station**.

- Key in **1** for the **Interval**

Note: An interval of 1 is used here in order to sufficiently model the surface around the curb returns.

- In the **Library Templates** area, expand the **1 – Templates** folder.
- Highlight the **5th_Ave_Concrete** template.
- <D> **Add**.
- <D> **Close**.



5th Ave. Point Controls for Curb Returns

Additional point controls are added to the 5th Ave. corridor to use the curb return alignments. The existing point controls for the concrete pavement must also be modified so that they do not overlap the curb returns.

- In the **Roadway Designer** dialog box, select **Corridor > Point Controls** or <D> the  button.
- In the **Control Description** field, key in **5th Ave Rt Conc EOP Return Control**.
- Set the **Point** to **RT_Conc_Laneline-Top** using the drop down menu or the  button.

4. Toggle on **Both** in the **Mode** area.
5. Set the **Control Type** to **Alignment**.
6. Set the **Horizontal Alignment** to **5th_Ave_NE-Quadrant**.

Note: Selecting the 5th_Ave_NE-Quadrant alignment automatically sets the **Station Limits** to cover that alignment.

7. Toggle on **Use as Secondary Alignment**.
8. <D> **Add**.

Point Controls

Corridor: 5th Ave

Control Description: 5th Ave Rt Conc EOP Return Control

Point: RT_Conc_Laneline- [Add]

Mode: Horizontal Vertical Both

Control Type: Alignment

Horizontal Alignment: 5th_Ave_NE-Quadrant [Add]

Vertical Alignment: 5th_Ave_NE-Quadrant

Use as Secondary Alignment

Station Limits: Start: 8+79.07 [Add] Stop: 9+40.00 [Add]

Horizontal Offsets: Start: 0.00 [Add] Stop: 0.00 [Add]

Vertical Offsets: Start: 0.00 [Add] Stop: 0.00 [Add]

Priority: 1

Horizontal and Vertical Controls:

E...	P...	Name	Start St...	Stop St...	Mode	Type	Control	Description
X	1	RT_HMA_...6+00.00	8+29.99	8+29.99	Horizontal	Alignment	5th_Ave	5th Ave Rt Asph EOP Control
X	1	RT_Conc... 8+30.00	9+98.50	9+98.50	Horizontal	Alignment	5th_Ave	5th Ave Rt Conc EOP Control
X	1	RT_Conc... 8+79.07	9+40.00	9+40.00	Both	Alignment	5th_Ave_...	5th Ave Rt Conc EOP Return Control
X	1	LT_HMA_...6+00.00	8+29.99	8+29.99	Horizontal	Alignment	5th_Ave	5th Ave Lt Asph EOP Control
X	1	LT_Conc_...8+30.00	9+00.48	9+00.48	Horizontal	Alignment	5th_Ave	5th Ave Lt Conc EOP Transition Control
X	1	LT_Conc_...9+00.48	9+98.50	9+98.50	Horizontal	Alignment	5th_Ave	5th Ave Lt Conc EOP Transition Control

Delete

Important! The entry is displayed in orange, indicating that there is a conflict with another point control. The point control entered during the initial modeling is now too long, so its end station must be adjusted.

9. Highlight the **RT_Conc_Laneline-Top** control that runs from **8+30.00** to **9+98.50**.
10. In the **Station Limits** area, key in **8+79.06** for the **Stop** station. This stops the point control where the curb return control starts.

11. <D> Change.

Corridor: 5th Ave

Control Description: 5th Ave Rt Conc EOP Control

Point: RT_Conc_Laneline- +

Mode: Horizontal Vertical Both

Control Type: Alignment

Horizontal Alignment: 5th_Ave +

Use as Secondary Alignment

Priority: 1

Station Limits: Start: 8+30.00 Stop: 8+79.06

Horizontal Offsets: Start: 23.89 Stop: 23.89

Vertical Offsets: Start: 0.00 Stop: 0.00

Horizontal and Vertical Controls:

E...	P...	Name	Start St...	Stop St...	Mode	Type	Control	Description
X	1	RT_HMA_...6+00.00	8+29.99	9+98.50	Horizontal	Alignment	5th_Ave	5th Ave Rt Asph EOP Control
X	1	RT_Conc_... 8+30.00	9+98.50	9+98.50	Horizontal	Alignment	5th_Ave	5th Ave Rt Conc EOP Control
X	1	RT_Conc_... 8+79.07	9+40.00	9+40.00	Both	Alignment	5th_Ave_...	5th Ave Rt Conc EOP Return Control
X	1	LT_HMA_...6+00.00	8+29.99	9+98.50	Horizontal	Alignment	5th_Ave	5th Ave Lt Asph EOP Control
X	1	LT_Conc_...8+30.00	9+00.48	9+00.48	Horizontal	Alignment	5th_Ave	5th Ave Lt Conc EOP Transition Control
X	1	LT_Conc_...9+00.48	9+98.50	9+98.50	Horizontal	Alignment	5th_Ave	5th Ave Lt Conc EOP Transition Control

12. In the *Control Description* field, key in **5th Ave Rt Conc EOP Return Control**.

13. Set the *Point* to **LT_Conc_Laneline-Top** using the drop down menu or the button.

14. Toggle on **Both** in the *Mode* area.

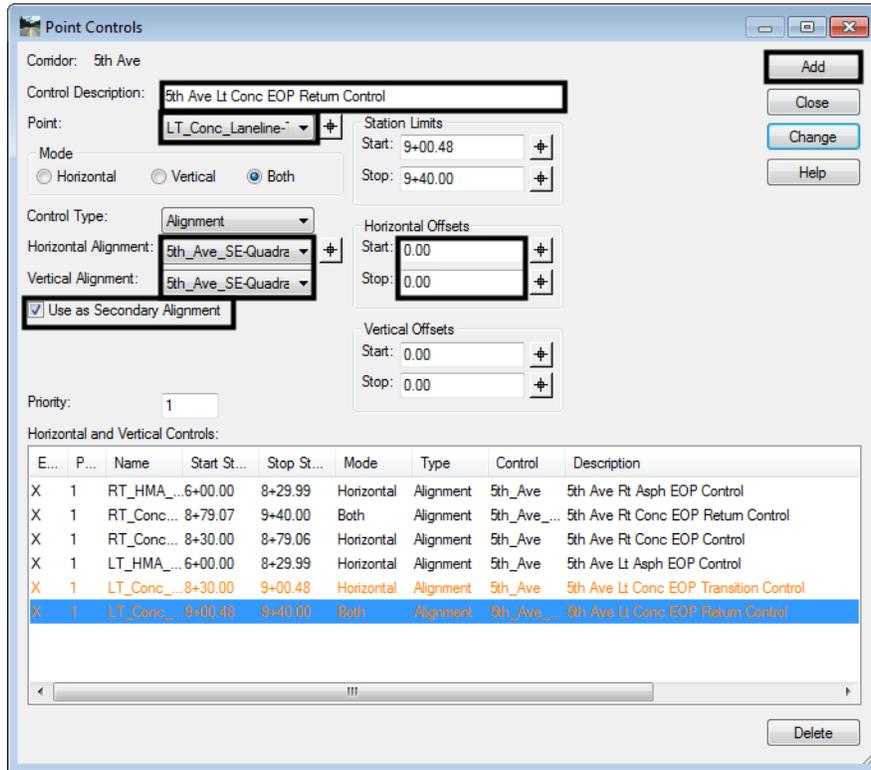
15. Set the *Control Type* to **Alignment**.

16. Set the *Horizontal Alignment* to **5th_Ave_SE-Quadrant**.

17. Toggle on **Use as Secondary Alignment**. This is so that the curb component is placed perpendicular to the curb return alignment.

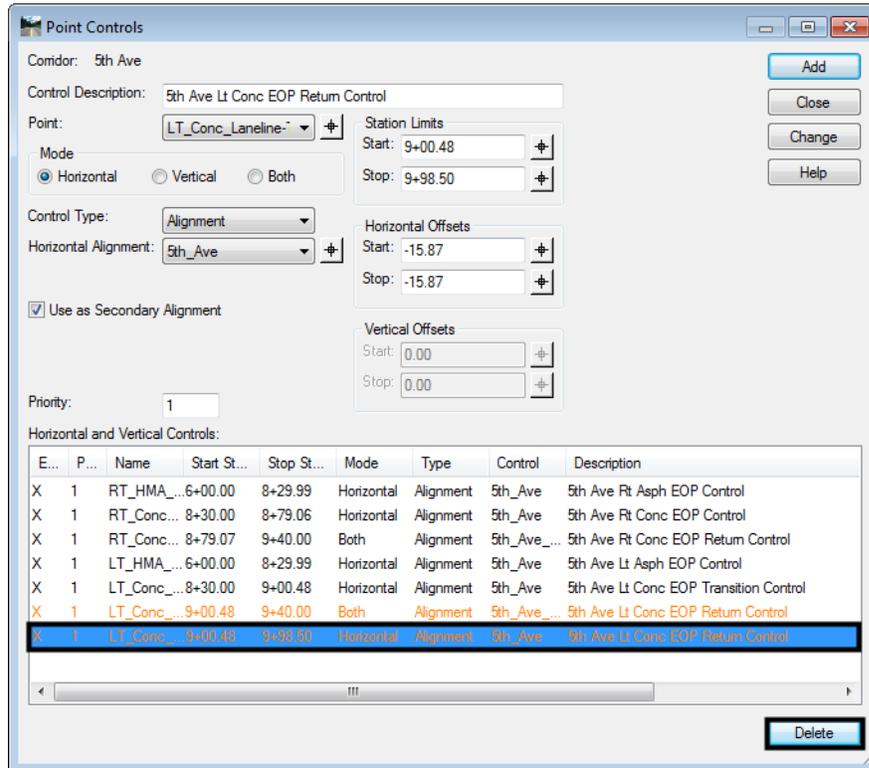
18. In the *Horizontal Offsets* area, key in **0** for the *Start* and *Stop* offsets.

19. <D> Add.

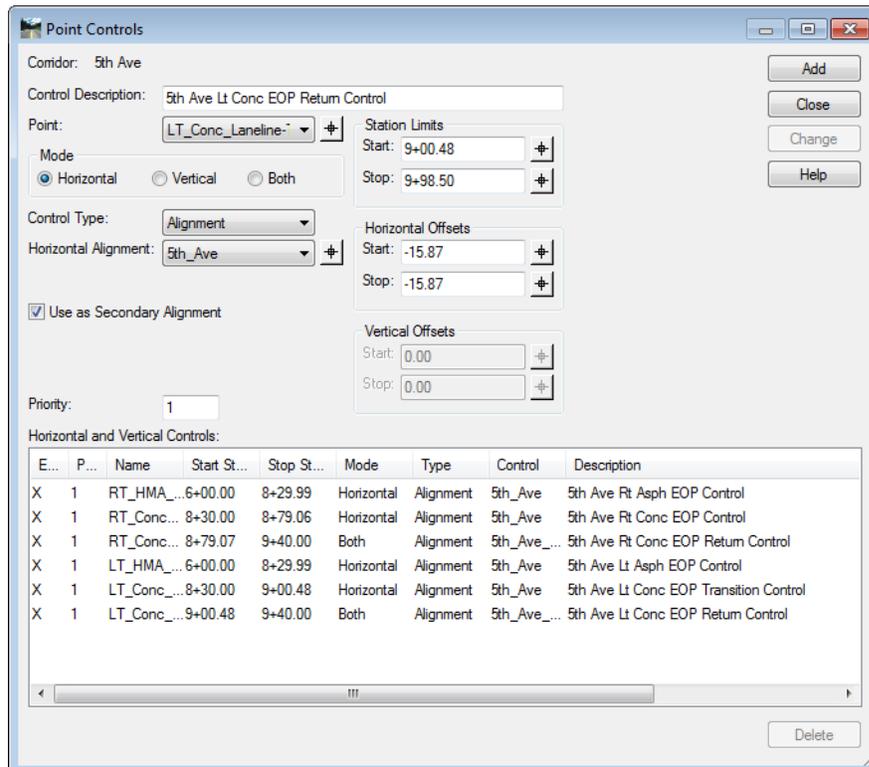


20. Highlight the **LT_Conc_Laneline-Top** control that runs from **9+00.48** to **9+98.50**. This entry is completely covered by the curb return, so it is deleted.

21. <D> Delete.



The illustration below shows the list of point controls used on the Final 5th Ave. corridor.



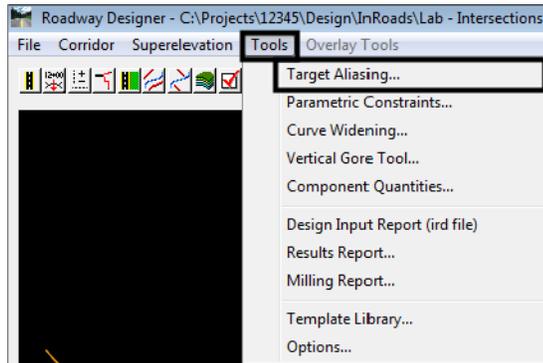
22. Close the *Point Control* dialog box.
23. Select **File > Save** from the *Roadway Designer* menu bar.998

Create the Final 5th Ave. Design Surface

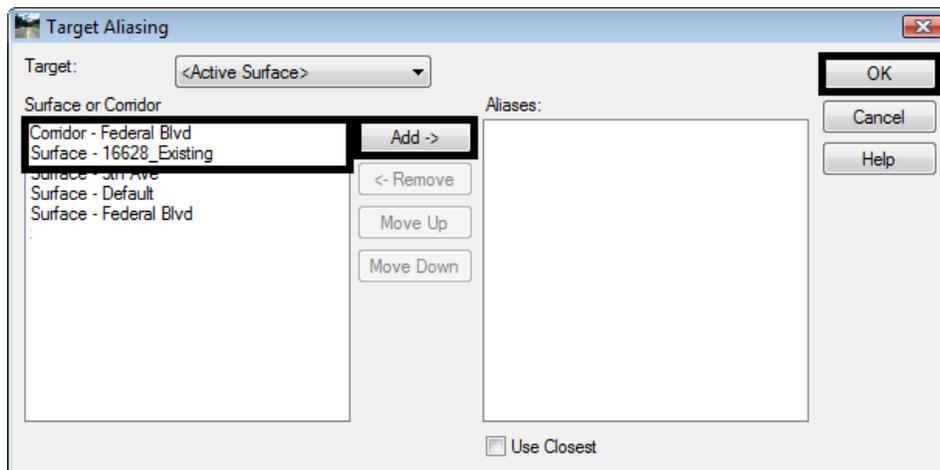
The 5th Ave. surface is remodeled to incorporate the corridor changes made above and to generate the feature that will control the edge of pavement for Federal Blvd.

The target aliasing is set up so that the 5th Ave corridor will clip the Federal Blvd. corridor when the final surface is created.

1. In the *Roadway Designer* dialog box, select **Tools > Target Aliasing**.



2. In the *Target Aliasing* dialog box, highlight both the **Corridor – Federal Blvd** and **Surface – 16628_Existing** from the *Surface or Corridor* list.
3. <D> Add.

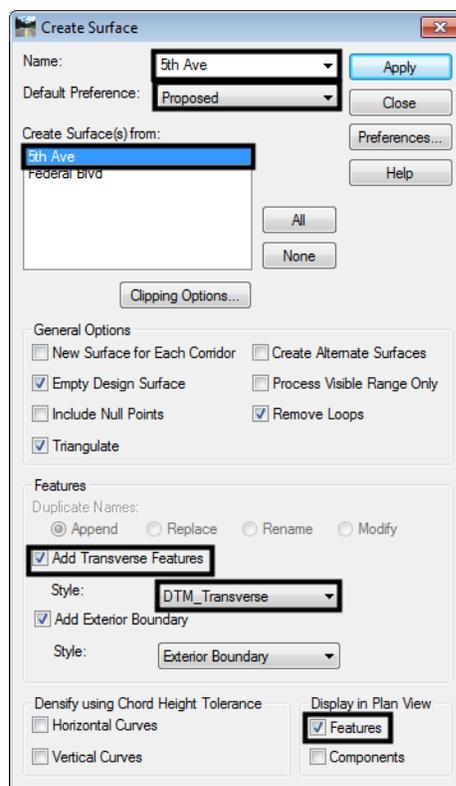


4. <D> OK to dismiss the *Target Aliasing* dialog box.
5. In the *Roadway Designer* dialog box, select **Corridor > Create Surface** or <D> the  button. This displays the **Create Surface** dialog box.
6. Key in **5th Ave** for the *Name*.

7. Select **Proposed** for the **Default Preference**.
8. Highlight only **5th Ave** in the **Create Surface(s) From** list.

Transverse features run perpendicular to the corridor alignment and are placed at each template drop. The last transverse feature created on the 5th Ave. corridor will be used to control the edge of Federal Blvd. through the intersection.

9. Toggle on **Add Transverse Features**.
10. Set the transverse feature **Style** to **DTM_Transverse**.
11. Toggle on **Display Features in Plan View**. (These features will be used to identify important stationing for Federal Blvd. template drops.



12. <D> **Apply** and <D> **Close**.
13. If necessary, click **Fit View** to see the new graphics.

Final Federal Blvd. Corridor Surface

Additional template drops and point controls are required on Federal Blvd. as well. The template drops change the interval to model smoothly around the curb returns. The point controls are used to model the remaining parts of the curb returns and the intersection driving surface.

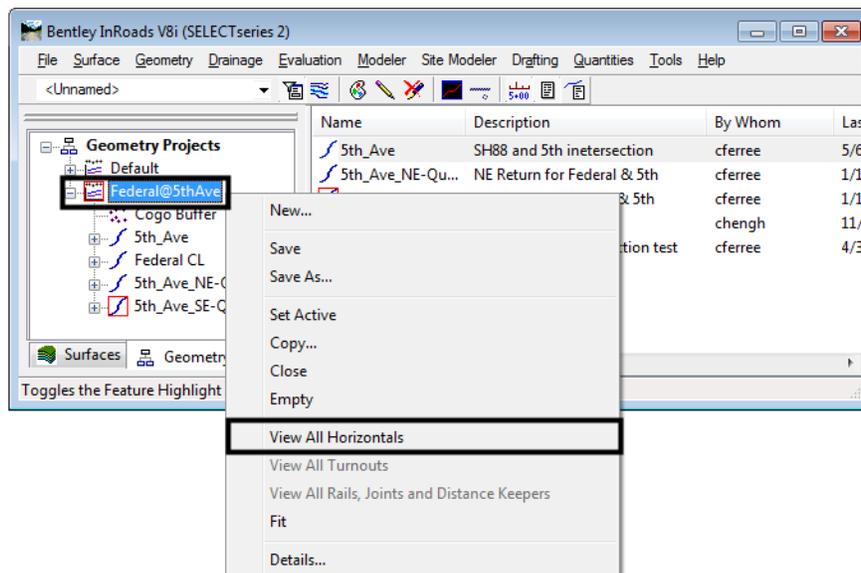
Section Objectives:

- ◆ Add template drops to tie into 5th Ave corridor
- ◆ Add point controls

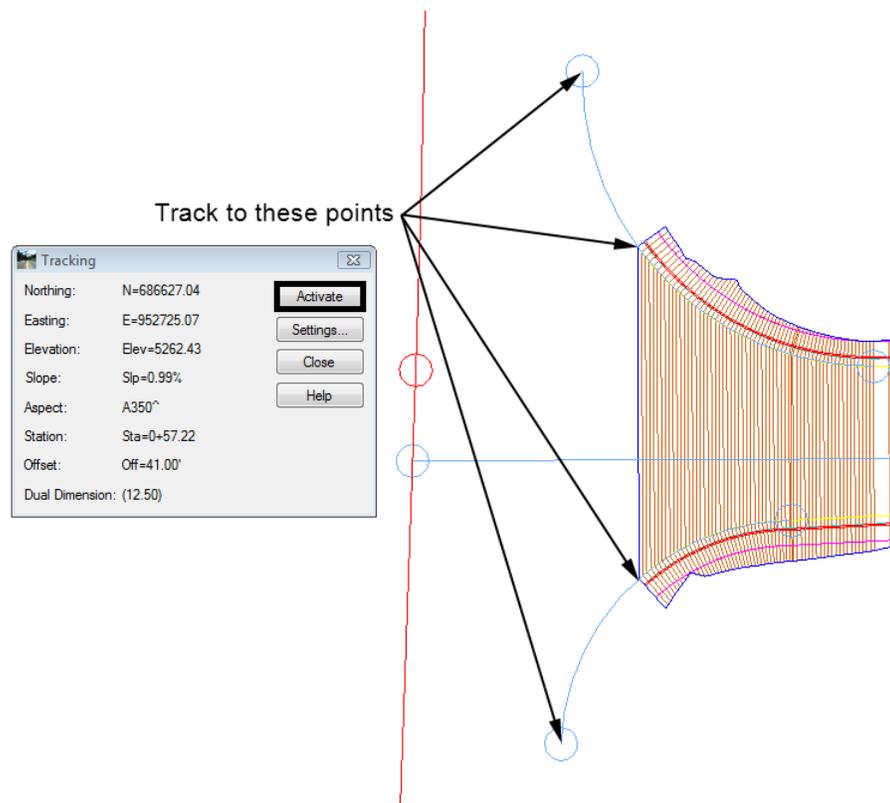
Collect Station Information for Template Drops

The locations for the template drops and point controls are determined using tracking.

1. In the InRoads main dialog box, set the InRoads Explorer to the **Geometry** tab.
2. Set the **Federal CL** as the active alignment.
3. <R> on the **Federal@5thAve** geometry project and select **View All Horizontals** from the menu.



4. In the MicroStation view window, zoom in around the intersection.
5. Select **Tools > Tracking > Tracking** from the InRoads menu bar.
6. In the **Tracking** dialog box, <D> the **Activate** button.
7. <T> to each of the points indicated in the illustration below and write down the Station for each.



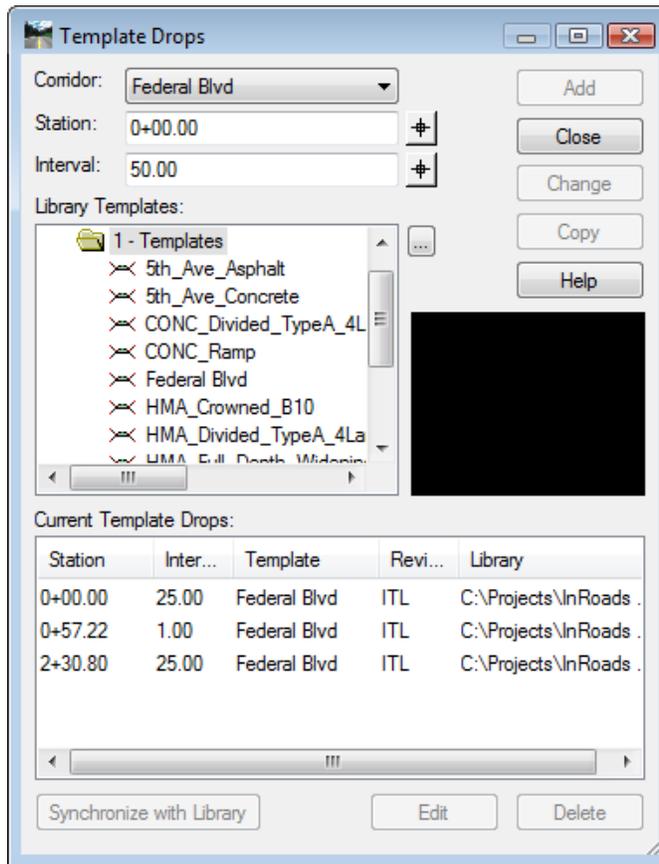
These stations are (from bottom to top):

- ◆ 0+57.22
- ◆ 1+00.73
- ◆ 1+86.15
- ◆ 2+30.80

Template drops are required at the first and last stations. The first station starts the one foot intervals around the SE curb return. The last station is at the end of the intersection and goes back to a 25 foot interval.

8. In the **Roadway Designer** dialog box, select **Corridor > Template Drops** or <D> the  button. This displays the **Template Drops** dialog box.
9. Verify the **Corridor** is set to **Federal Blvd**.
10. In the **Template Drops** dialog box, key in **0+57.22** for the **Station**.
11. Key in **1** for the **Interval**.
12. Highlight **Federal Blvd** in the **Library Templates** list.
13. <D> **Add**.
14. Key in **2+30.80** for the **Station**.
15. Key in **25** for the **Interval**.

16. <D> Add. The list of template drops is illustrated below.



17. <D> Close.

Federal Blvd. Point Controls for Curb Returns

All four of the stations located above are used for point controls. The first and second stations create a control for the SE curb return. The second and third stations create a point control that follows the last transverse feature in the 5th Ave. surface. The third and fourth stations create a control for the NE curb return.

1. In the **Roadway Designer** dialog box, select **Corridor > Point Controls** or <D> the  button.
2. In the **Control Description** field, key in **Federal EOP SE Quad Return Control**.
3. Set the **Point** to **RT_Conc_Laneline-Top6** using the drop down menu or the  button.
4. Toggle on **Both** in the **Mode** area.
5. Set the **Control Type** to **Alignment**.
6. Set the **Horizontal Alignment** to **5th_Ave_SE-Quadrant**.
7. Toggle on **Use as Secondary Alignment**.

8. In the **Station Limits** area, the **Start** station is set by the specified alignment. Key in **1+00.73** for the **Stop** station.
9. <D> **Add**.

Corridor: Federal Blvd

Control Description: Federal EOP SE Quad Return Control

Point: RT_Conc_Laneline:

Mode: Horizontal Vertical Both

Control Type: Alignment

Horizontal Alignment: 5th_Ave_SE-Quadra

Vertical Alignment: 5th_Ave_SE-Quadra

Use as Secondary Alignment

Priority: 1

Station Limits: Start: 0+57.22 Stop: 1+00.73

Horizontal Offsets: Start: 0.00 Stop: 0.00

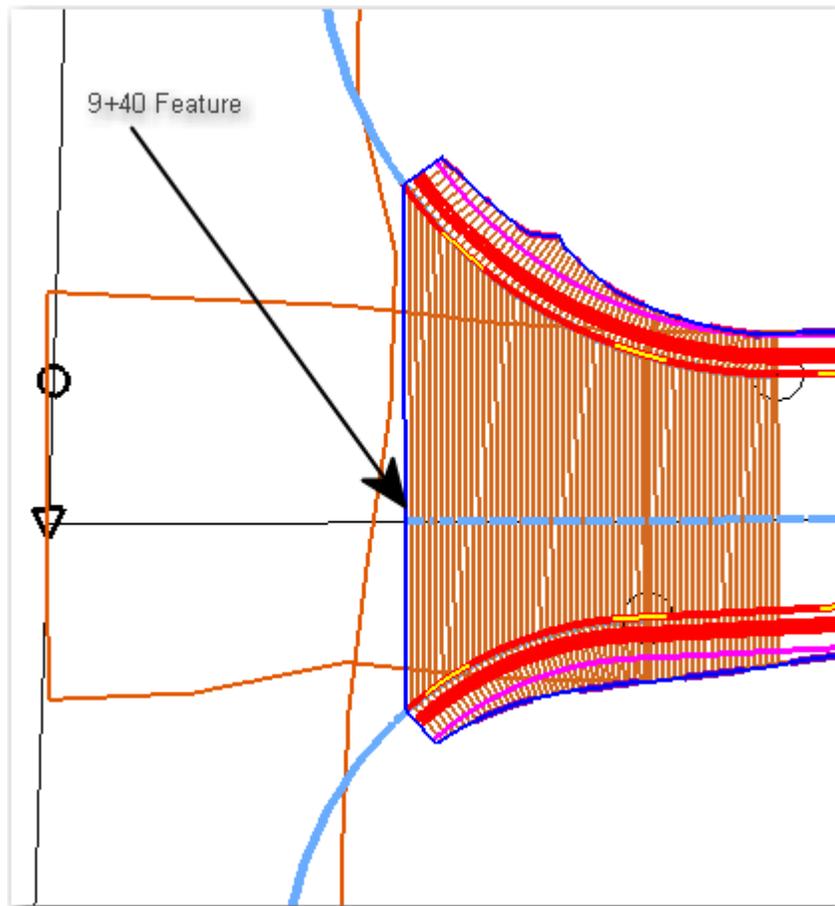
Vertical Offsets: Start: 0.00 Stop: 0.00

Horizontal and Vertical Controls:

E...	P...	Name	Start St...	Stop St...	Mode	Type	Control	Description
X	1	RT_Conc...	0+57.22	1+00.73	Both	Alignment	5th_Ave_...	Federal EOP SE

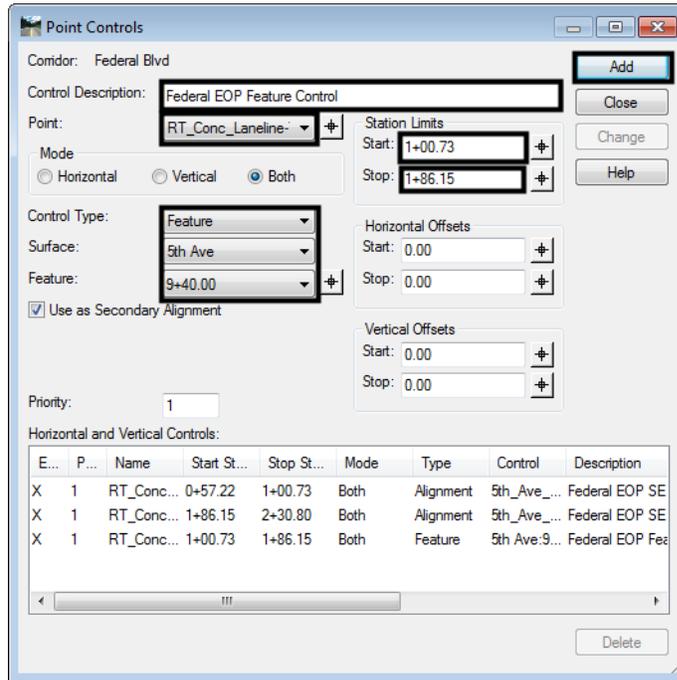
10. In the **Control Description** field, key in **Federal EOP Feature Control**.
11. Set the **Control Type** to **Feature**.
12. Select **5th Ave** for the **Surface**.

13. Select **9+40.00** for the **Feature**.



14. In the **Station Limits** area, key in **1+00.73** for the **Start** station.
15. Key in **1+86.15** for the **Stop** station.

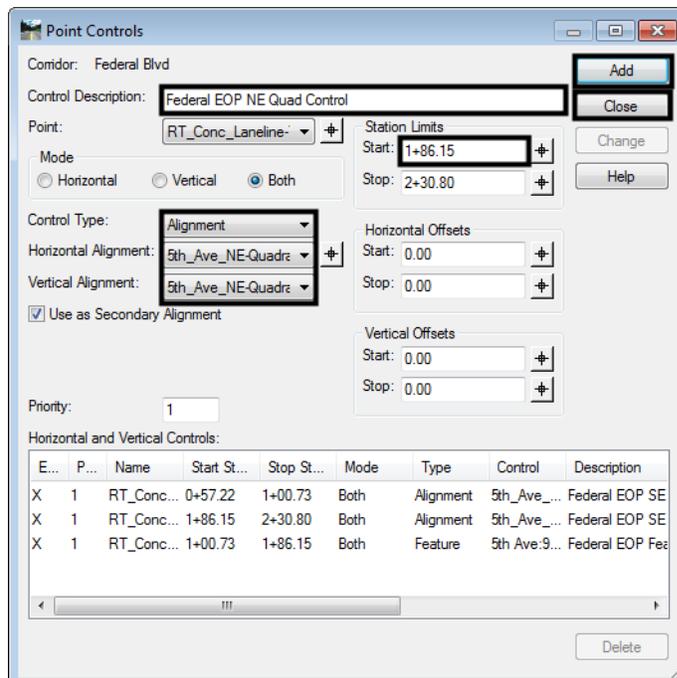
16. <D> Add.



17. In the **Control Description** field, key in **Federal EOP NE Quad Control**.

18. Set the **Control Type** to **Alignment**.

19. Set the **Horizontal Alignment** to **5th_Ave_NE-Quadrant**. In the **Station Limits** area, key in **1+86.15** for the **Start** station. The **Stop** station is set by the selected alignment.



20. <D> **Add.** and <D> **Close.**

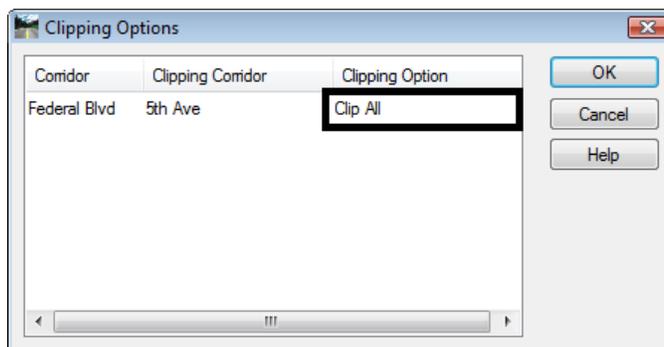
Create the Final Intersection Design Surface

After creating the point controls for Federal Blvd. (using features from the 5th Ave. design surface), both corridors are used to create the design surface of the entire intersection.

1. Verify that **16628_Existing** is the active surface.

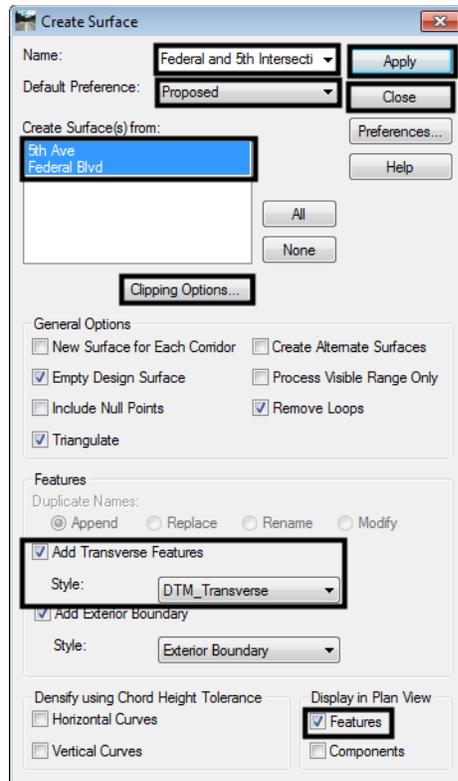
Note: If the Existing surface is not the active surface several template drop errors will be listed in the Results dialog box indicating problems with the final surface.

2. In the **Roadway Designer** dialog box, select **Corridor > Create Surface** or <D> the  button. This displays the **Create Surface** dialog box.
3. Key in **Federal and 5th Intersection** for the **Name**.
4. Select **Proposed** for the **Default Preference**.
5. Highlight both **5th Ave** and **Federal Blvd** in the **Create Surface(s) From:** list.
6. <D> the **Clipping Options** button.
7. Verify that the **Clipping Option** is set to **Clip All**.
8. <D> **OK** on the **Clipping Options** dialog box.



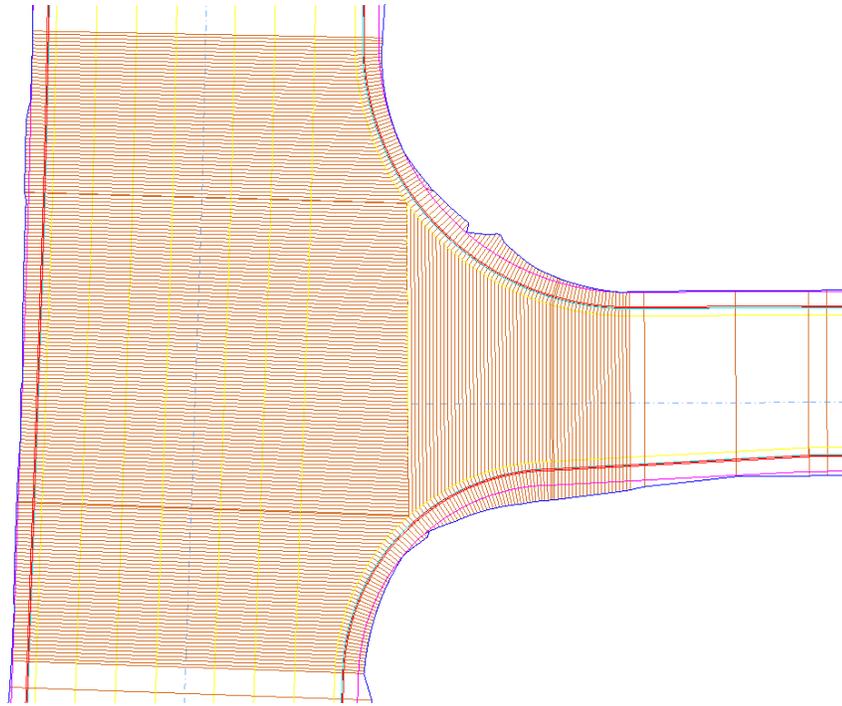
9. Toggle on **Add Transverse Features**.
10. Set the transverse feature **Style** to **DTM_Transverse**.

11. Toggle on **Display Features in Plan View**. This displays the surface features in the dgn file for review.



12. <D> **Apply** and <D> **Close**.
13. Select **File > Save** from the *Roadway Designer* menu bar.
14. <D> **Close** to dismiss the *Roadway Designer* dialog box.

15. Examine the features displayed in the MicroStation view window. The illustrations below show the finished intersection.



16. Use the rotate view command to see the features in 3D

