

# LAB 27 - Create Raised Median

This lab demonstrates a procedure for modeling a roadway which includes a raised median and a median opening. The exercise below uses a single template which utilizes point controls and display rules to achieve the two different roadway sections. Additionally a second template is used to model the median openings.

## Chapter Objectives:

- Use a single template to model the mainline with and without a median
- Create display rules which determine when the raised median excluded
- Use point controls to define the location of the median nose
- Model multiple corridors
- Combine corridors in a single final surface

## Lab 27.1 - Open Lab Files

An initial model of the roadway is crated using the roadway typical section without the median. This is done for the purposed of extracting the profile gradeline for the median noses.

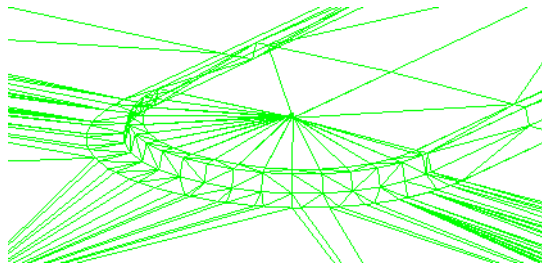
1. Open MicroStation and InRoads using the *12345DES\_Model-Create Raised Median.dgn* file.
2. Select **File> Open** from the InRoads menu bar.
3. Select the file *C:\Workspace\Workspace-CDOT\_XM\Standards-Global\InRoads\Preferences\CDOT\_Civil.xin*
4. Continue to select the following files from *C:\Projects\12345\Design\InRoads\* and the <D> **Open** button.
  - ◆ 12345DES\_Existing-Create Raised Median.dtm
  - ◆ 12345DES\_Geometry-Create Raised Median.alg
  - ◆ 12345DES\_Templates-Create Raised Median.itl
  - ◆ 12345DES\_Roadweay-Create Raised Median.ird
5. <D> **Cancel** the *Open* dialog box to close.

## Lab 27.2 - Workflow

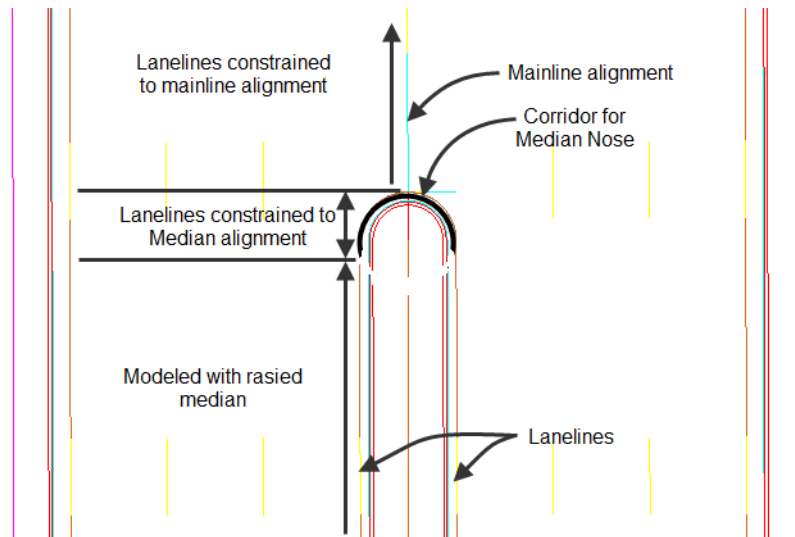
A summary of the overall process

1. In addition to the mainline horizontal and vertical alignments, create horizontal alignment(s) for the median nose.
2. Create a template for the crowned roadway - without the raised median.
3. Model the mainline using the crowned template.
4. Create the vertical alignments for the median noses by extracting their elevations from the surface created in the previous step.
5. Create a template for the median noses

6. Model the median noses
7. Create a template for the raised median
8. Add Display Rules to the components of the raised median.
9. Create a corridor definition for the raised median
10. Add point controls to constrain the raised median template to run as defined, constrained to the medians or to the mainline alignment.
11. Define key stations for template drops.
12. Create the final design surface by modeling the mainline and median openings simultaneously.



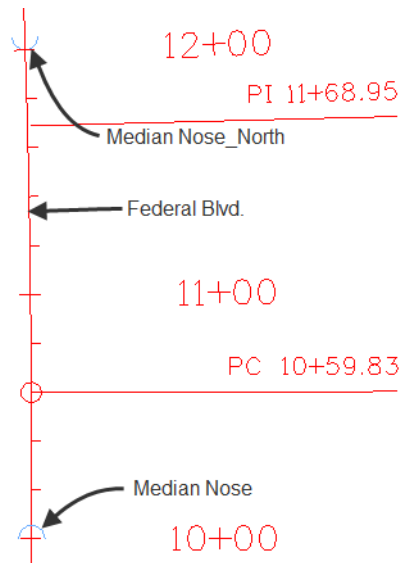
### **Modeling Schematic**



## Lab 27.3 - Review The Alignments

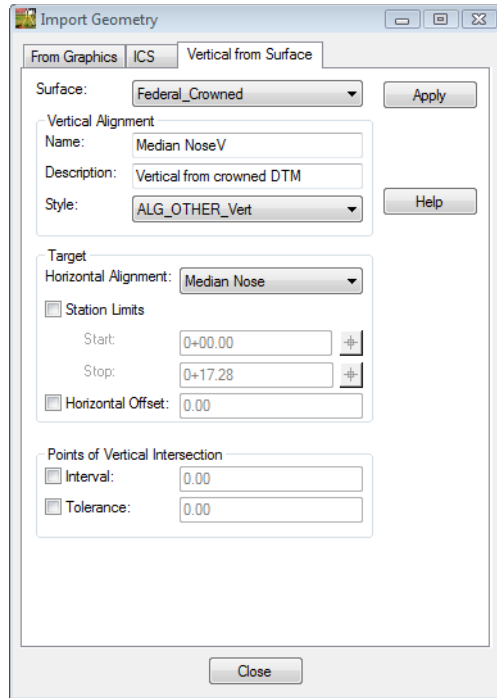
In this exercise three alignments are used. **Federal CL** for the main corridor and **Median Nose** & **Median Nose\_North** which define the median opening and termination.

1. Select the **Geometry** tab in the **InRoads Explorer**
2. View the horizontal alignments **Federal CL**, **Median Nose** & **Median Nose\_North**
3. View stationing for horizontal alignment **Federal CL**

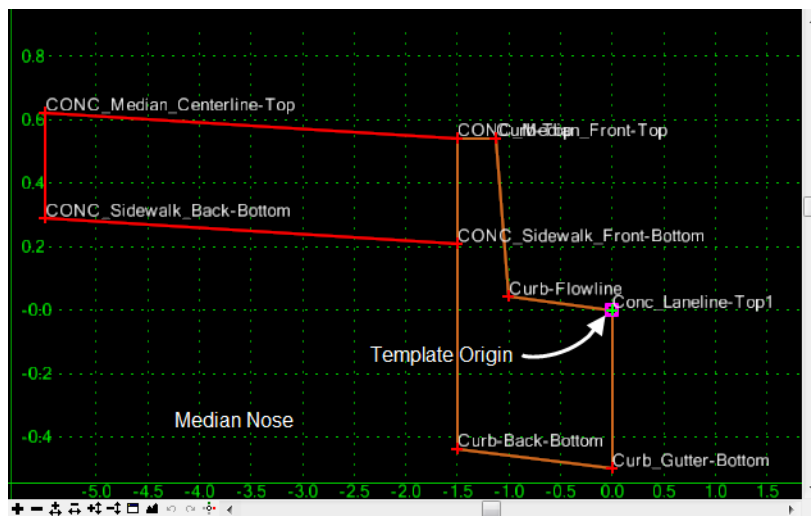


## Lab 27.4 - Review Data

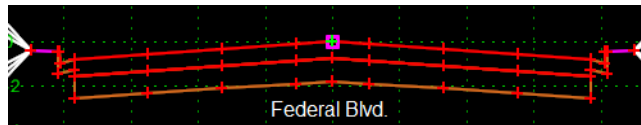
An initial model of the roadway was created using a crowned roadway section (without the raised median). This is done for the purpose of extracting the vertical profile of the median noses which is accomplished by using the command **File > Import > Geometry [Vertical From Surface]**. This step has already been completed.



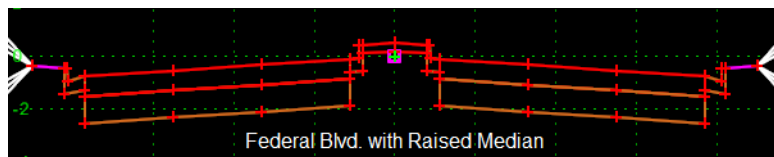
1. Select **Modeler > Create Template** from the InRoads menu bar.
2. In the *Create Template* dialog review the template for *Median Nose* in the *1-Templates* folder.



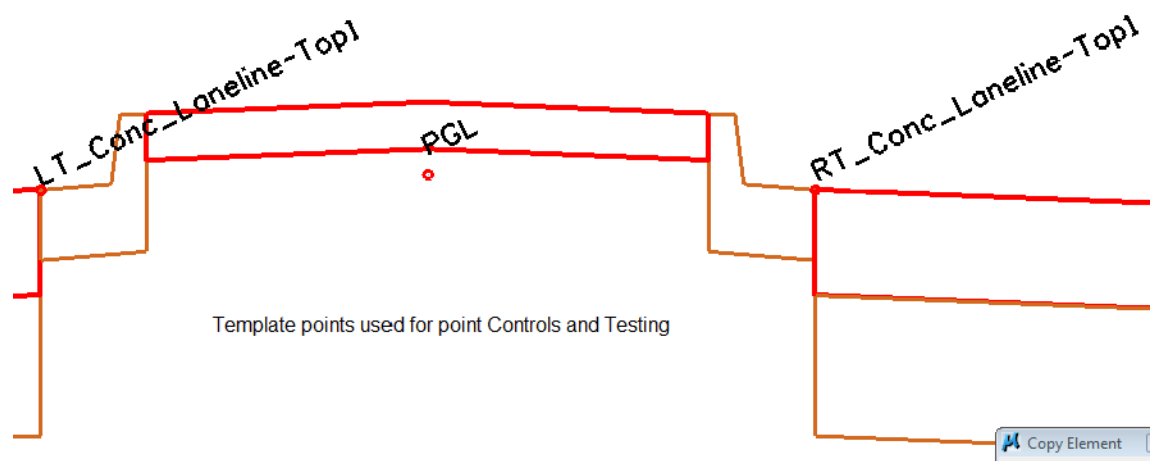
- Also in the *Create Template* dialog review the template for *Federal Blvd* in the *1-Templates* folder. This template was used to create a preliminary model. This model was used to extract vertical alignments for the median alignments.



- The template *Federal Blvd with Raised Median*. Display rules control if the median is modeled.



- An expanded view of the median. The 'Laneline' points will be controlled by both the Federal Blvd. and median alignments. Additionally the median components will be assigned display rules which will test the distance between the lanelines and the PGL.



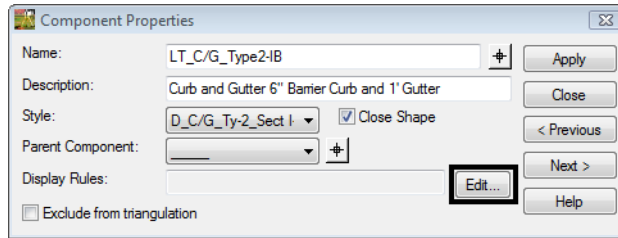
## Lab 27.5 - Add Display Rules

Display rules can be associated with components to test if the component should be displayed or not.

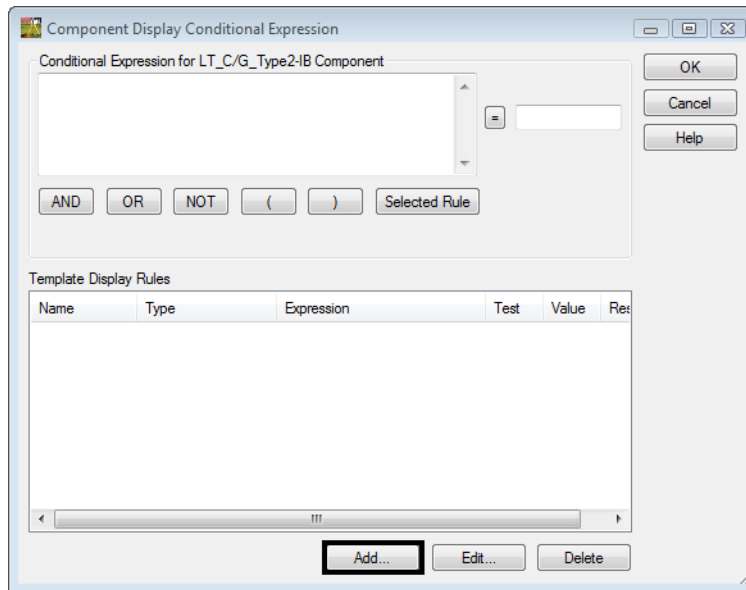
- Copy the template *Federal Blvd with Raised Median* to *Federal Blvd with Raised Median\_DR*
- Open *Federal Blvd with Raised Median\_DR* for editing
- The goal is to eliminate the construction of the median components if the distance between either lanelines and the PGL is less than 5.50'.

**Note:** 5.50 feet represents the distance from the mainline alignment to the PC or PT of the alignments for the median noses.

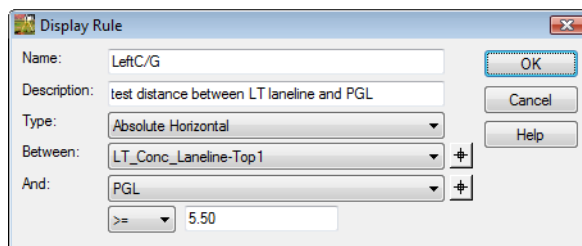
- Select the median curb and gutter component named **LT\_C/G\_Type2-1B** for editing.



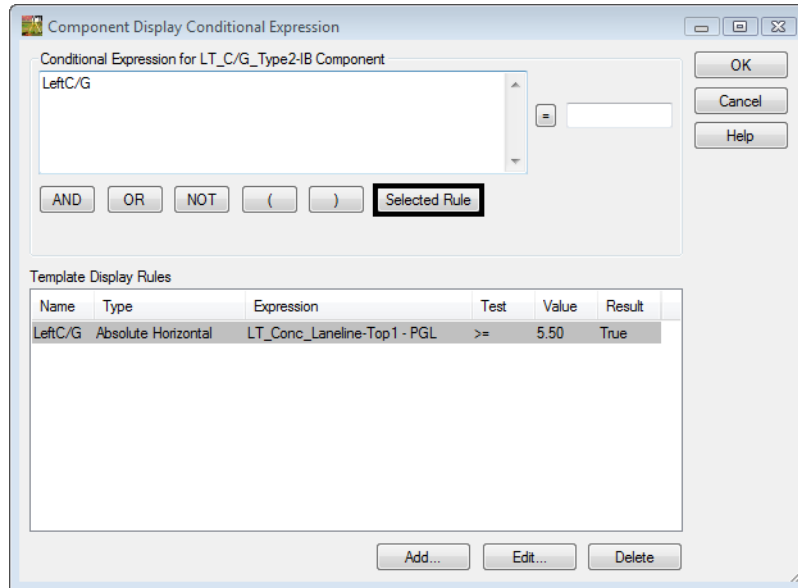
- Select **Edit**



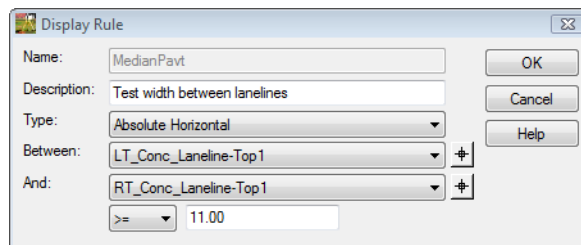
- Select **Add**
- Create** a Display Rule that tests the distance between the Left Laneline and the PGL.
  - ◆ Name: LeftC/G
  - ◆ Description: test distance between LT laneline and PGL
  - ◆ Type: Absolute Horizontal
  - ◆ Between: LT\_Conc\_Laneline-Top1 and PGL
  - ◆ Test: >=
  - ◆ Value: 5.50



8. Select **Rule** for the LT Laneline, **OK & Apply**




9. Select the component **RT\_C/G\_Type2-1B** for editing.
10. **Build** and **apply** a similar rule for the RT Laneline.
- ◆ Name: RightC/G
  - ◆ Test between RT\_Conc\_Laneline-Top1 and PGL
  - ◆ All other fields are the same
11. **Edit** the component **CONC\_Sidewalk-4**
12. **Build** and **Apply** a Display Rule to test for a minimum distance of 11.00 feet between the RT and LT Lanelines for the Median Cover (Conc\_Sidewalk-4)
- ◆ Name: MedianPavt
  - ◆ Description: Test width between lanelines
  - ◆ Type: Absolute Horizontal
  - ◆ Between: LT\_Conc\_Laneline-Top1 and RT\_Conc\_Laneline-Top1
  - ◆ Test: >=
  - ◆ Value: 11.00

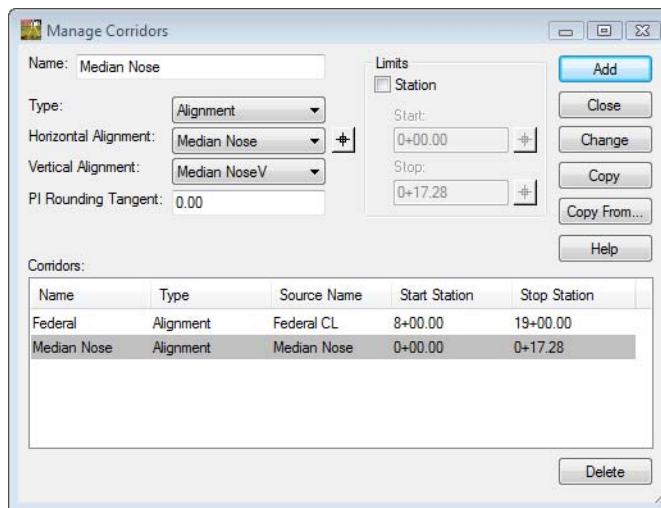


13. **Save** and **Close** the Create Template dialog.

## Lab 27.6 - Create Corridors

Corridors contain definitions for which alignments, templates, point controls, etc. to incorporate when modeling the roadway. In this exercise, three corridors are defined, one for each median nose and one for the mainline.

1. Select **Modeler > Roadway Designer**
2. Select **Corridor > Corridor Management** from the Roadway Designer menu bar or <D> the Manage Corridors button .
3. **Add** corridors for both median openings.
  - ◆ Name: Median Nose
  - ◆ Type: Alignment
  - ◆ Horizontal Alignment: Median Nose
  - ◆ Vertical Alignment: Median NoseV




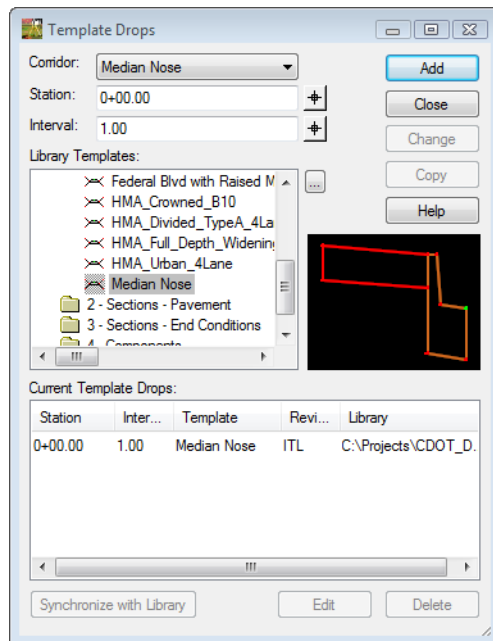
4. **Add** corridor definition for corridor Median Nose\_North
  - ◆ Name: Median Nose\_North
  - ◆ Type: Alignment
  - ◆ Horizontal Alignment: Median Nose\_North
  - ◆ Vertical Alignment: Median Nose\_NorthV
5. **Add and Close**



## Lab 27.7 - Add Template Assignments

Templates define the cross section of the design model. They are assigned to the corridor through the Template Drops dialog box. The starting station defaults to the beginning of the alignment so setting the interval and selecting the desired template is all of the input that is required.

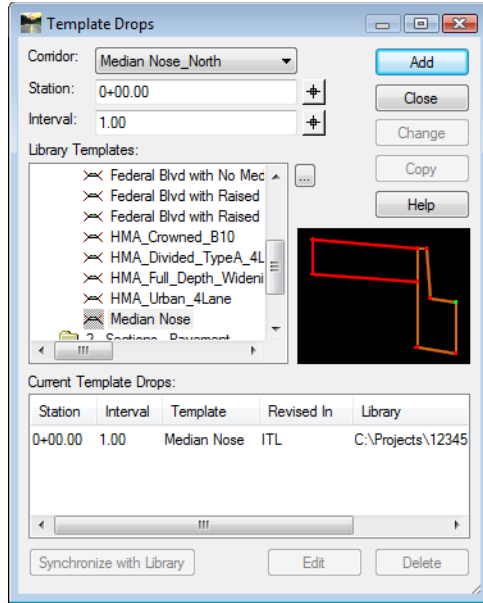
1. Select **Corridor > Template Drops** from the Roadway Designer menu bar or <D> the template drops button .
2. **Add** template assignment to *Median Nose*
  - ◆ Template: Median Nose
  - ◆ Interval of 1'



3. <D> **Add** then **Close**.

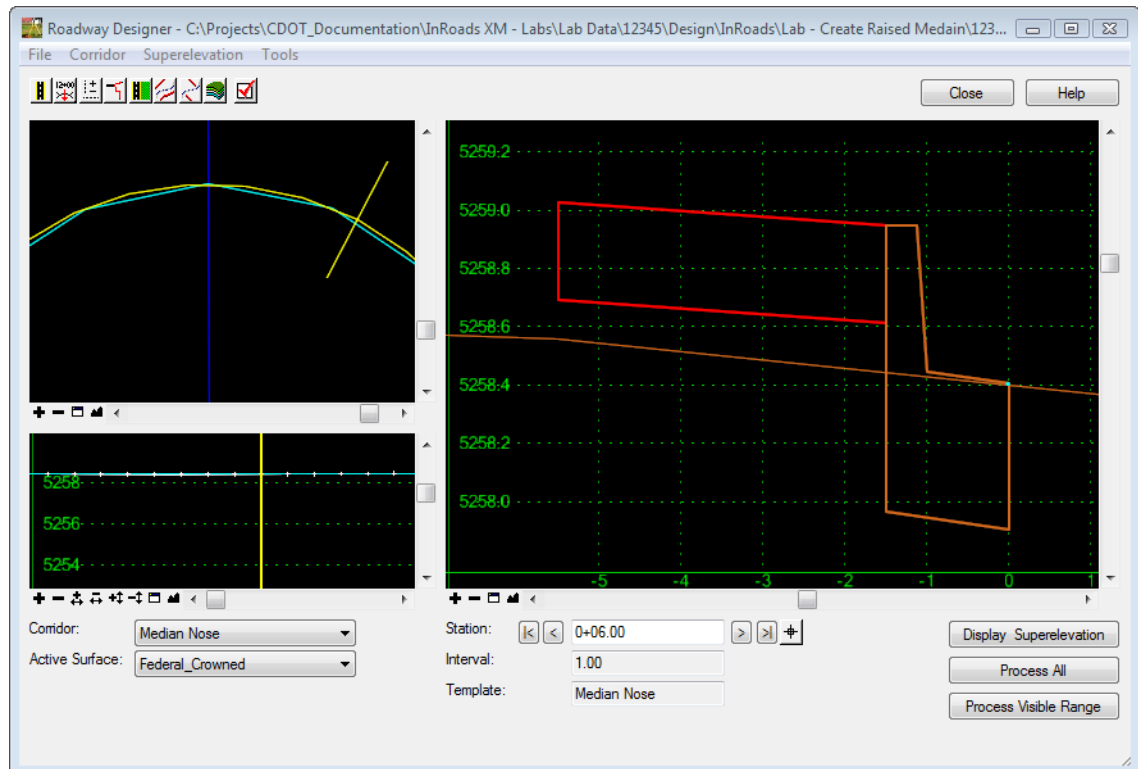
4. Add template assignment to *Median Nose\_North*

- ◆ Template: Median Nose\_North
- ◆ Interval of 1'



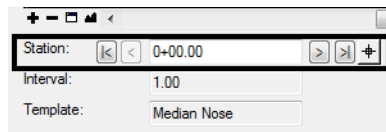
5. <D> Add then Close.

6. Roadway Designer can be used to evaluate the two median corridors.

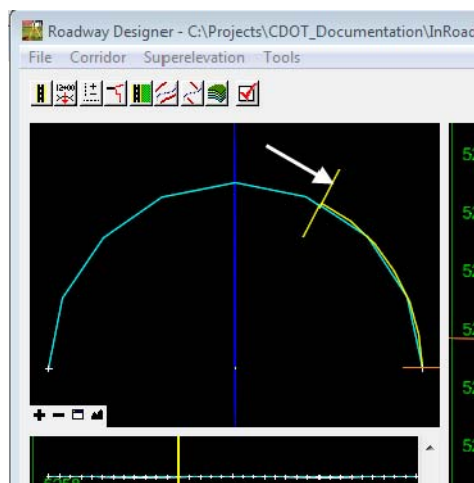


**Note:** The template data is displayed in the template view. There are two options for scrolling through the design, using the station arrows below the template view and using the station line in the plan view.

7. <D> on the station arrows to scroll through the design.



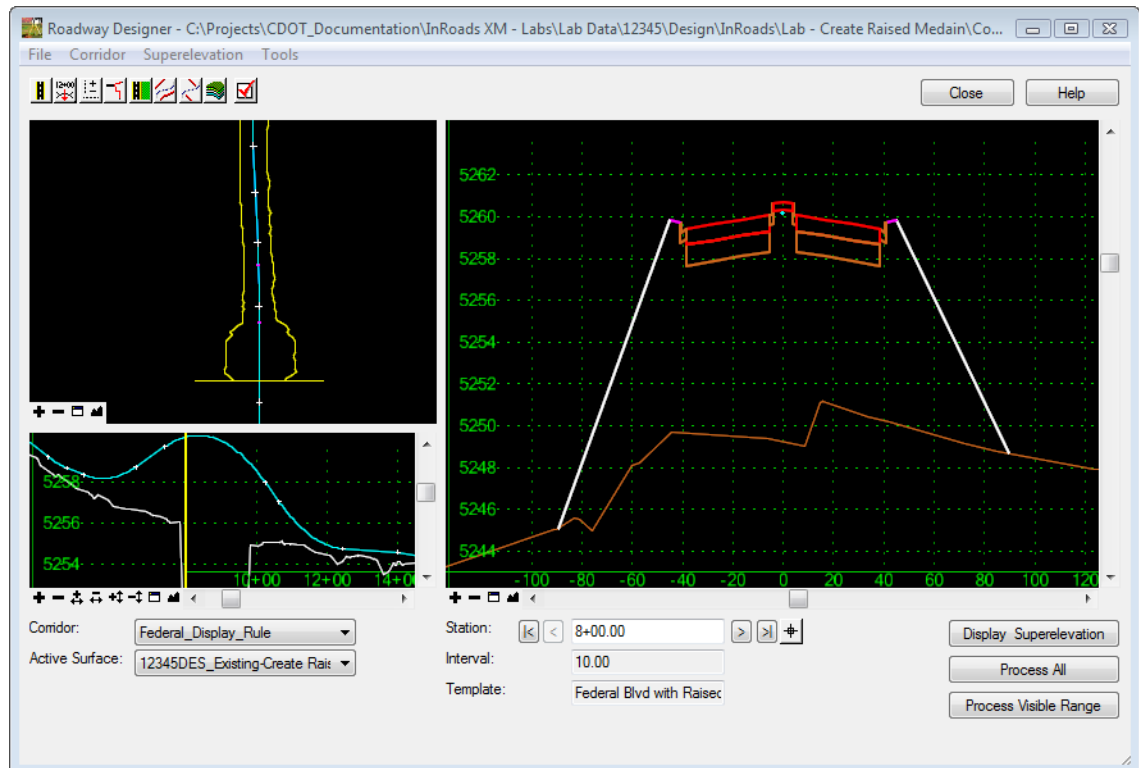
8. <D> **and Hold** on the yellow station line. Move the pointer back and forth to scroll through the design.



The median models are now ready to be evaluated.

9. From the pull down menu in the Roadway Designer dialog **Corridor > Corridor Management**.
10. **Create** a corridor for the Mainline.
- ◆ Name: Federal\_Display\_Rule
  - ◆ Type: Alignment
  - ◆ Horizontal Alignment: Federal CL
  - ◆ Vertical Alignment: Federal CL\_V
  - ◆ Start Station: 8+00
  - ◆ Stop Station: 19+00
11. <D> **Add**
12. <D> **Close**
13. From the Roadway Designer dialog **Corridor > Template Drops**
14. **Add** template assignments to the corridor Federal\_Display\_Rule.
- ◆ Station: 8+00

- ◆ Interval of 10'
  - ◆ Template:Federal Blvd with Raised Median\_DR
15. <D> Add
  16. <D> Close
  17. Evaluate the *Federal\_Display\_Rule* corridor.



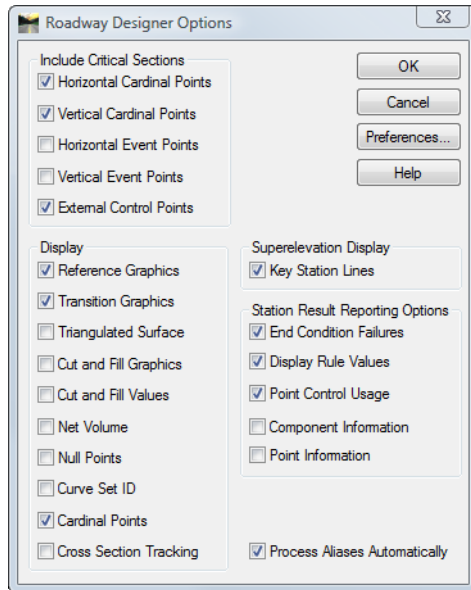
## Lab 27.8 - Change Roadway Designer Settings

The Roadway Designer settings determine if additional stations are processed, what information is displayed in the views, and what information is included in the processing report. In this exercise, horizontal cardinal and event points are processed, cut and fill information is added to the template view, and component and point information is added to the processing report.

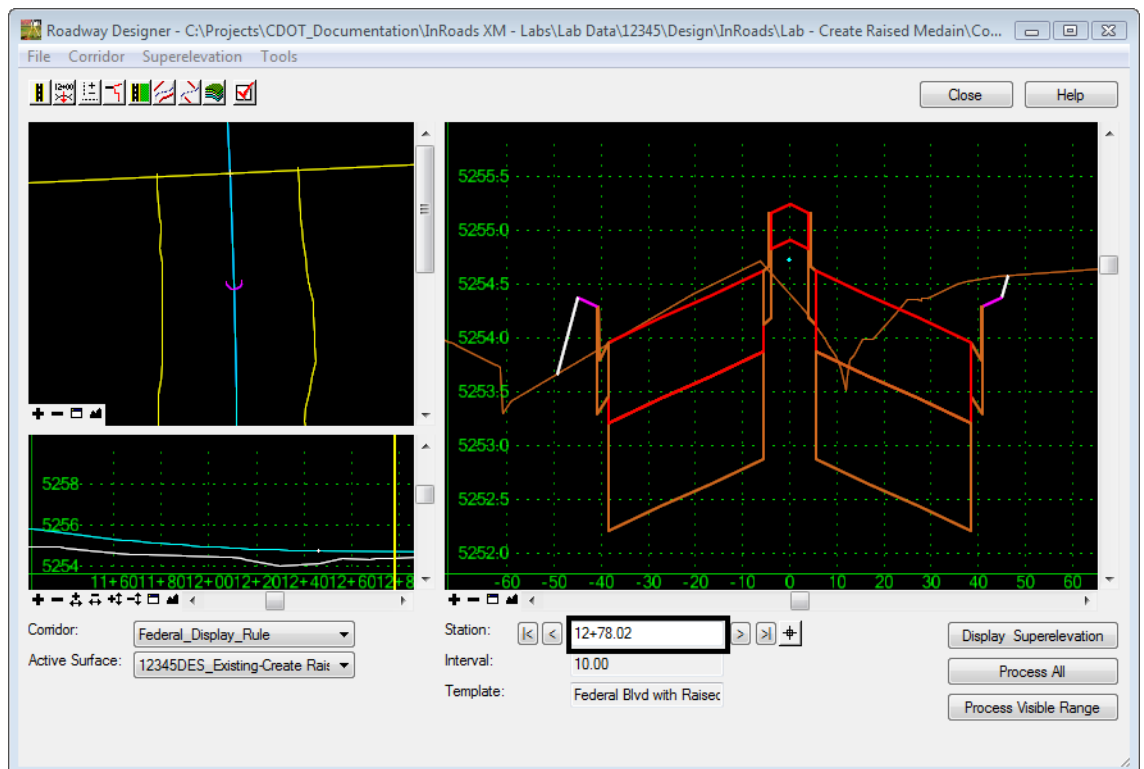
The first series of steps tell the Roadway Designer to process the horizontal cardinal and event points.

1. From the Roadway Designer menu bar, select **Tools > Options**.

- In the **Roadway Designer Options** dialog box, toggle on **Horizontal Cardinal Points**, **Vertical Cardinal Points**, **External Control Points**, **Reference Graphics**, and **Transition Graphics**.




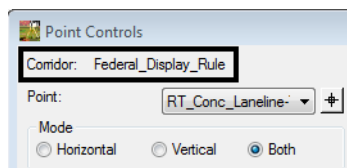
- <D> OK.
- Scroll through the stations and notice that some stations do not fall on even intervals. These are the cardinal and event points.



## Lab 27.9 - Point Controls

This series of steps adds Point Controls (overrides) to the corridor definition previously defined in Roadway Designer.

1. Select **Corridor > Point Controls** from the Roadway Designer menu bar or <D> the Point Control button  .
2. The roadway will model as defined until it encounters a point control. For this design, three point controls are required for each side of the roadway (Left laneline and Right laneline). The first control instructs the laneline to follow a feature created by the **Median Nose** corridor. The second control instructs the laneline to follow the **mainline alignment**. The third control instructs the laneline to follow a feature created by the **Median Nose\_North** corridor.
3. Verify the corridor **Federal\_Display\_Rule** is the active corridor.



4. Create the following Point Control entries to instruct the template point RT\_Conc\_Laneline-Top1 to follow a feature (by the same name) created by the Median Nose corridor.
5. **First** Point Control
  - ◆ Point: RT\_Conc\_Laneline-Top1
  - ◆ Mode: Both
  - ◆ Control Type: Corridor Point
  - ◆ Corridor: Median Nose
  - ◆ Reference Point: Conc\_Laneline-Top 1
  - ◆ Station Start: 10+00.00 (begin of median radius)
  - ◆ Station Stop: 10+05.50 (end of median radius/nose)
6. <D> **ADD**

Horizontal and Vertical Controls:							
Enab...	Priority	Name	Start Station	Stop Station	Mode	Type	Control
X	1	RT_Conc_Laneline-Top1	10+00.00	10+05.50	Both	Corridor Point	Median Nose:Conc_Laneline-Top1

7. **Second** Point Control
  - ◆ Point: RT\_Conc\_Laneline-Top1
  - ◆ Mode: Both
  - ◆ Control Type: Alignment

- ◆ Horizontal Alignment: Federal CL
- ◆ Vertical Alignment: Federal CL\_V
- ◆ Station Start: 10+05.51 (end of median radius/nose - beginning of median opening)
- ◆ Station Stop: 12+00.00 (beginning of north median/radius nose)

8. <D> ADD

Horizontal and Vertical Controls:							
Enab...	Priority	Name	Start Station	Stop Station	Mode	Type	Control
X	1	RT_Conc_Laneline-Top1	10+00.00	10+05.50	Both	Corridor Point	Median Nose:Conc_Laneline-Top1
X	1	RT_Conc_Laneline-Top1	10+05.51	12+00.00	Both	Alignment	Federal CL:Federal CL_V

9. *Third* Point Control

- ◆ Point: RT\_Conc\_Laneline-Top1
- ◆ Mode: Both
- ◆ Control Type: Corridor Point
- ◆ Corridor: Median Nose\_North
- ◆ Reference Point: Conc\_Laneline-Top 1
- ◆ Station Start: 12+00.00 (begin of median radius/nose)
- ◆ Station Stop: 12+05.00 (end of median radius)

10. <D> ADD

Horizontal and Vertical Controls:							
Enab...	Priority	Name	Start Station	Stop Station	Mode	Type	Control
X	1	RT_Conc_Laneline-Top1	10+00.00	10+05.50	Both	Corridor Point	Median Nose:Conc_Laneline-Top1
X	1	RT_Conc_Laneline-Top1	10+05.51	12+00.00	Both	Alignment	Federal CL:Federal CL_V
X	1	RT_Conc_Laneline-Top1	12+00.00	12+05.00	Both	Corridor Point	Median Nose_North:Conc_Laneline-Top1

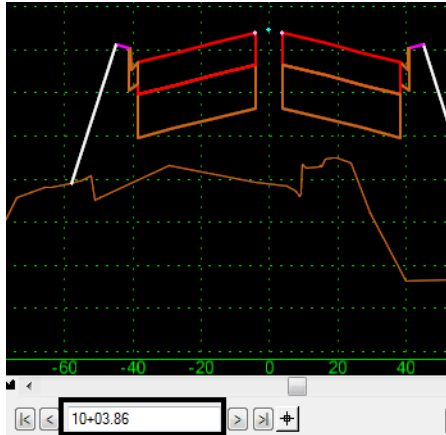
11. Add the fourth, fifth, and sixth entry for the *LT\_Conc\_Laneline-Top1* point. The definitions mimic the definitions use for the RT\_Conc\_Laneline-Top1 point.

Horizontal and Vertical Controls:							
Enabled	Priority	Name	Start Sta...	Stop Station	Mode	Type	Control
X	1	RT_Conc_Laneline-Top1	10+00.00	10+05.50	Both	Comdor Point	Median Nose:Conc_Laneline-Top1
X	1	RT_Conc_Laneline-Top1	10+05.51	12+00.00	Both	Alignment	Federal CL:Federal CL_V
X	1	RT_Conc_Laneline-Top1	12+00.00	12+05.00	Both	Comdor Point	Median Nose_North:Conc_Laneline-Top1
X	1	LT_Conc_Laneline-Top1	10+00.00	10+05.50	Both	Comdor Point	Median Nose:Conc_Laneline-Top1
X	1	LT_Conc_Laneline-Top1	10+05.51	12+00.00	Both	Alignment	Federal CL:Federal CL_V
X	1	LT_Conc_Laneline-Top1	12+00.00	12+05.00	Both	Comdor Point	Median Nose_North:Conc_Laneline-Top1

12. <D> ADD

13. <D> Close


- Review the results graphically in Roadway Designer. You should see the raised median disappear between stations 10+00.00 and 10+05.00 and again between 12+00.00 and 12+05.00. Between these station limits, the corridors for the medians will complete the model.



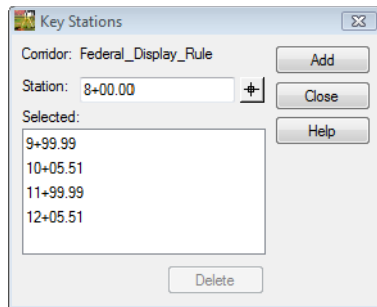
- You should also see the left and right pavement edges running together between stations 10+05.51 and 12+00.00. This represents the median opening.

## Lab 27.10 - Adding Key Stations

Key Stations are specific locations you define relative to your design. At these locations an additional template is processed. You can also elect to create a cross section at locations defined by key stations. Examples of Key Stations may be at driveways, side roads, drainage or in the case of this exercise, just prior to and after the application of point controls. This ensures the roadway models as designed and eliminates transitions between point controls and the next corridor defined interval.

- Select **Corridor > Key Stations** from the Roadway Designer menu bar or <D> the Point Control button  .
- Key-in** the station values immediately before and after the point controls. Select **Add** after each entry.
  - ◆ **9+99.99**
  - ◆ **10+05.51**
  - ◆ **11+99.99**




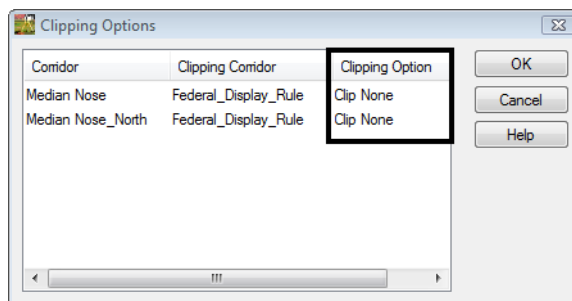
◆ **12+05.51**

3. D > Close
4. Select File > Save from the Roadway Designer menu.

## Lab 27.11 - Creating the Model

With all the corridors, template applications, point controls and key stations defined, the model is ready to be created.

1. Select Corridor > Create Surface from the Roadway Designer menu bar or <D> the Point Control button 
2. Select the following corridors for modeling:
  - ◆ *Federal\_Display\_Rule*
  - ◆ *Median Nose*
  - ◆ *Median Nose\_North*
3. <D> on *Clipping Options*



4. Under the Clipping Option column, <D> to cycle through the options and set both the *Median Nose* and *Median Nose\_North* corridors to *Clip None*.

Also set:

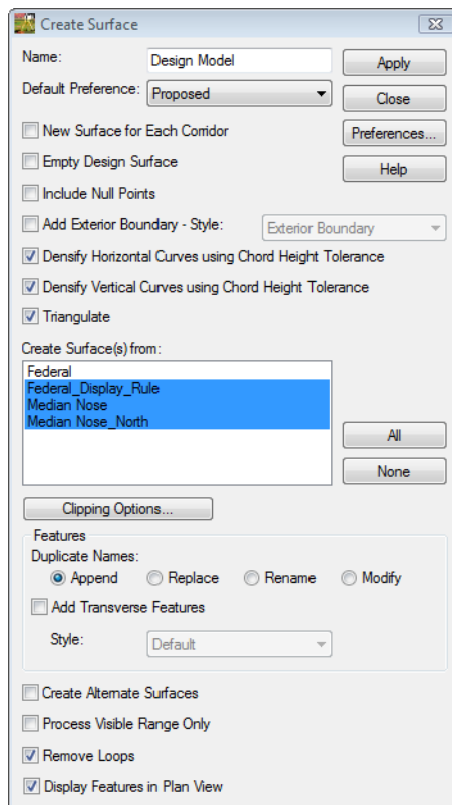
- ◆ Name: ***Design Model***
- ◆ Default Preference: ***Proposed***

And toggle on:

- ◆ ***Densify Horizontal Curves using Chord Height Tolerance***
- ◆ ***Densify Vertical Curves using Chord Height Tolerance***
- ◆ ***Triangulate***
- ◆ ***Remove Loops***
- ◆ ***Display Features in Plan View***

And toggle off:

- ◆ ***Add Exterior Boundary - Style:***

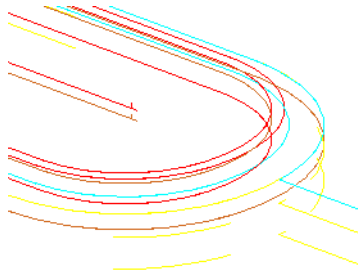


## Lab 27.12 - Review the Design

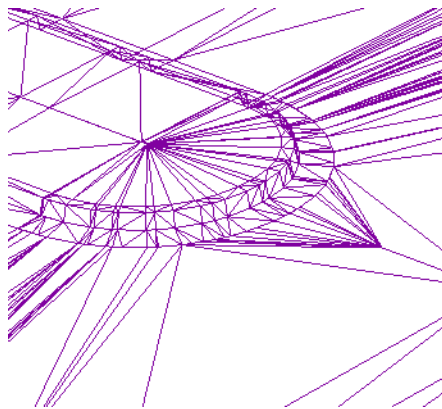
Use your knowledge of InRoads to review your model.

Some methods may include:

- A 3D isometric view of DTM features



- DTM triangles



Contours, profiles and cross sections are additional options.

### **Chapter Summary:**

- In [Lab 27.5 -Add Display Rules](#) were created and associated with template components.
- In [Lab 27.9 -Point Controls](#) were defined to modify the application of the defined template
- In [Lab 27.10 -Adding Key Stations](#) are used to define supplemental template application stations.
- In [Lab 27.11 -Creating the Model](#) multiple corridors are modeled simultaneously and corridor clipping option are defined.

