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Nordic Civil 2012

Bentley Civil Workshop

Introduction to Roadway Designer for Road and Rail

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LESSON NAME: OPENING A PROJECT

LESSON OBJECTIVE:

In this lesson the student will learn to access an InRoads project in preparation for designing a model in Roadway Designer.

EXERCISE: GETTING STARTED

This exercise will guide you through the steps to get started

1. Go to **Start > Programs > Bentley > InRoads Group V8i (SELECTseries 2) > InRoads Suite**.
2. The instructor will provide the appropriate path location for this project. When the MicroStation Manager appears select the file:
Plan.dgn and click **OK**.
3. When the InRoads Explorer appears, go to **File > Open** from the InRoads menu.
4. When the Open dialog appears select the InRoads project file:
My_Project.rwk and click **OK**.

Opening the *RWK* project file opens the following files:

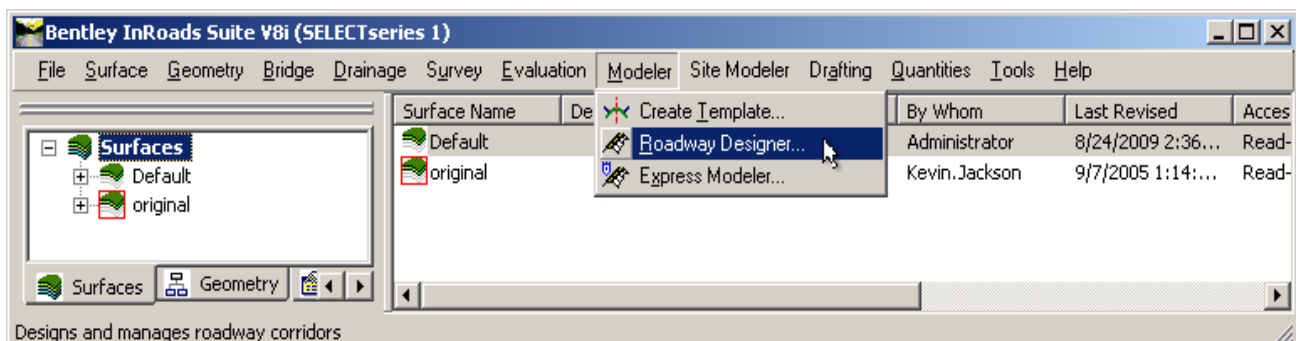
CMJOB001.alg

Templates.itl

Original.dtm

Default_Styles.xin

5. Select **Modeler > Roadway Designer** from the InRoads Explorer menu to access Roadway Designer.



LESSON NAME: BUILDING A CORRIDOR

LESSON OBJECTIVE:

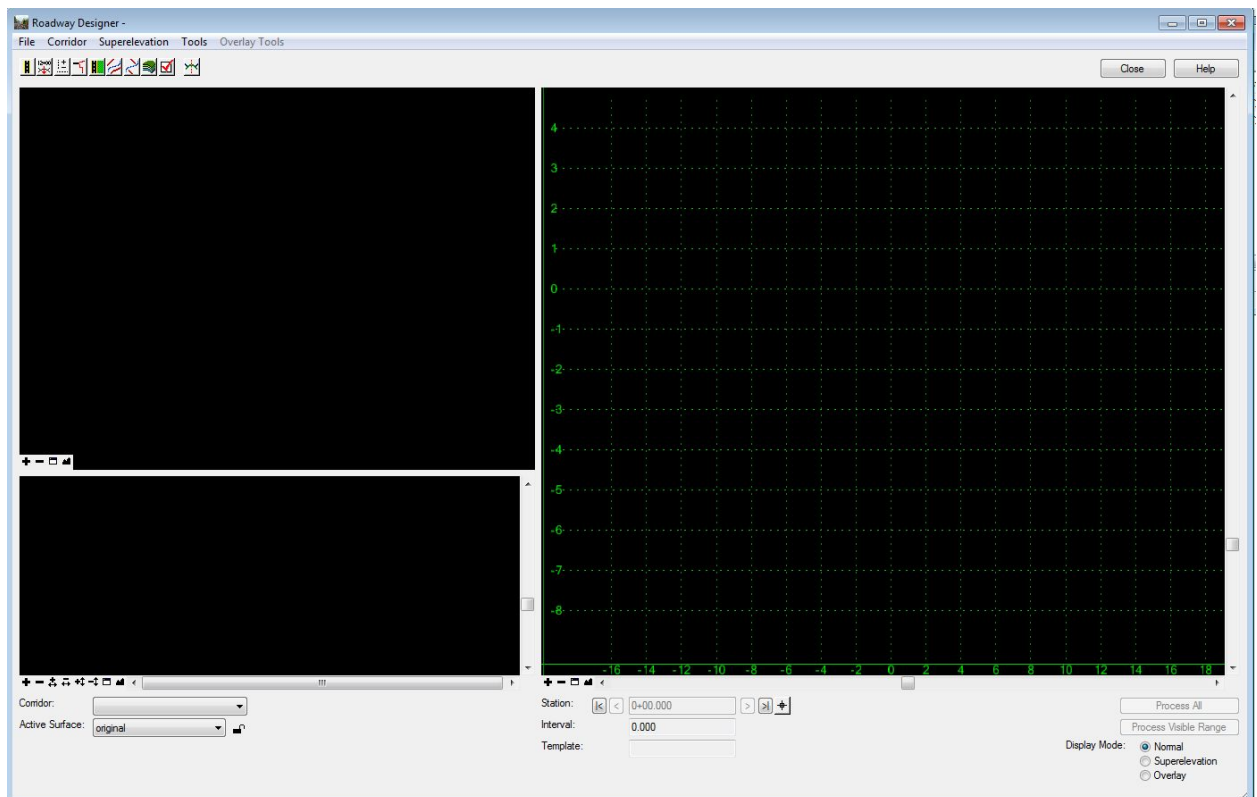
This lesson will take you through how to setup and apply templates to a corridor.

[On-Line Help Topic](#): Search on “Roadway Designer”

EXERCISE: BUILDING CORRIDORS

This exercise will take you through setting up a corridor in Roadway Designer.

1. When the Roadway Designer opens you will see three panes in the window. The top left pane is the plan view. The bottom left is the profile view. The right pane is the cross section view.



2. To create a corridor, select **Corridor > Corridor Management** from the menu on the **Roadway Designer**.
3. Select *Proposed Roadway* for the Surface Symbology. Key-in **Route1** in the **Name** field and click **Add**.

Manage Corridors

Name: Route1

Surface Symbology: Proposed Roadway

Type: Alignment

Horizontal Alignment: highway

Vertical Alignment: highway

PI Rounding Tangent: 0.000

Limits

☒ Station

Start: 12+34.000

Stop: 31+47.783

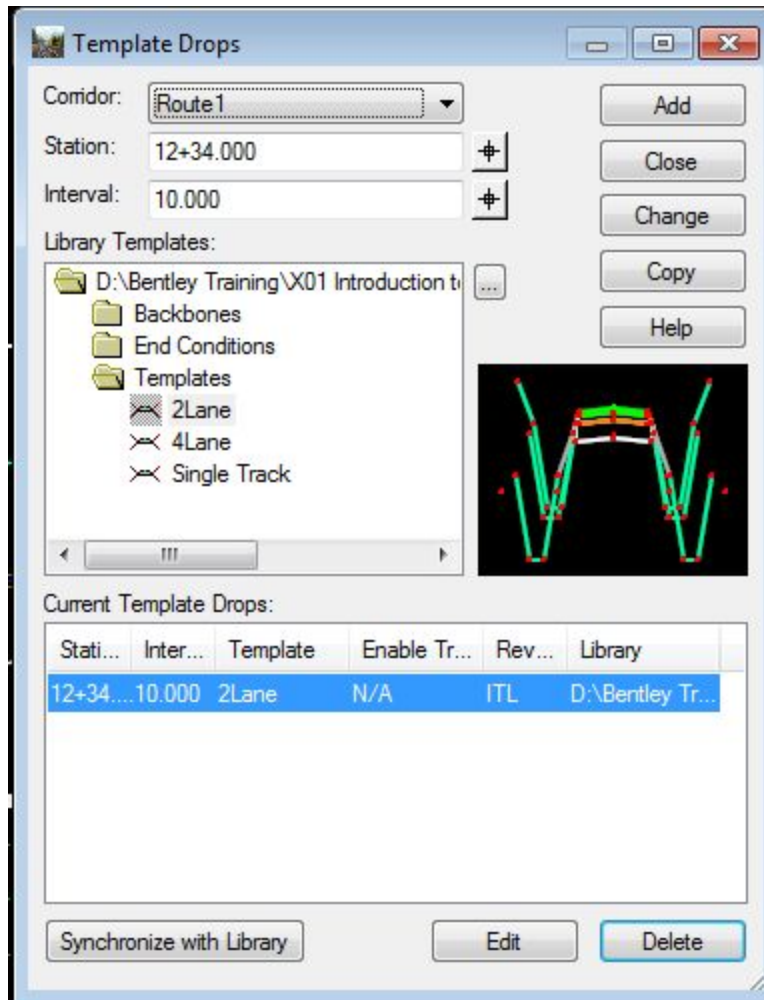
Buttons: Add, Close, Change, Copy, Copy From..., Help

Comidors:

Name	Type	Source Name

Buttons: Delete

5. Close the Corridor Management dialog.
6. On the Roadway Designer dialog click the Fit on the profile pane. You should now see the plan view of the alignment and the profile view of it.
7. To apply templates to the corridor go to **Corridor > Template Drops**.
8. Ensure that **12+34** is set for the **Station**.
9. Set the **Interval** to **10.00**.
10. Expand the **Library Templates** tree and highlight the **2Lane** template.
11. Click **Add**.



12. Key in station **15+90** and select the **2Lane** template again and select **Add**.
13. Add the following template drops:
 - Station 16+40 Template: 4Lane**
 - Station 23+70 Template: 4Lane**
 - Station 24+20 Template: 2Lane**
14. **Close** the **Template Drops** dialog.
15. Select the **Process All** button.
16. In the Roadway Designer dialog select **File > Save** to save the Roadway Designer project file. Name the file **My_Project.ird**.

LESSON NAME: TEMPLATE TRANSITIONS

LESSON OBJECTIVE:

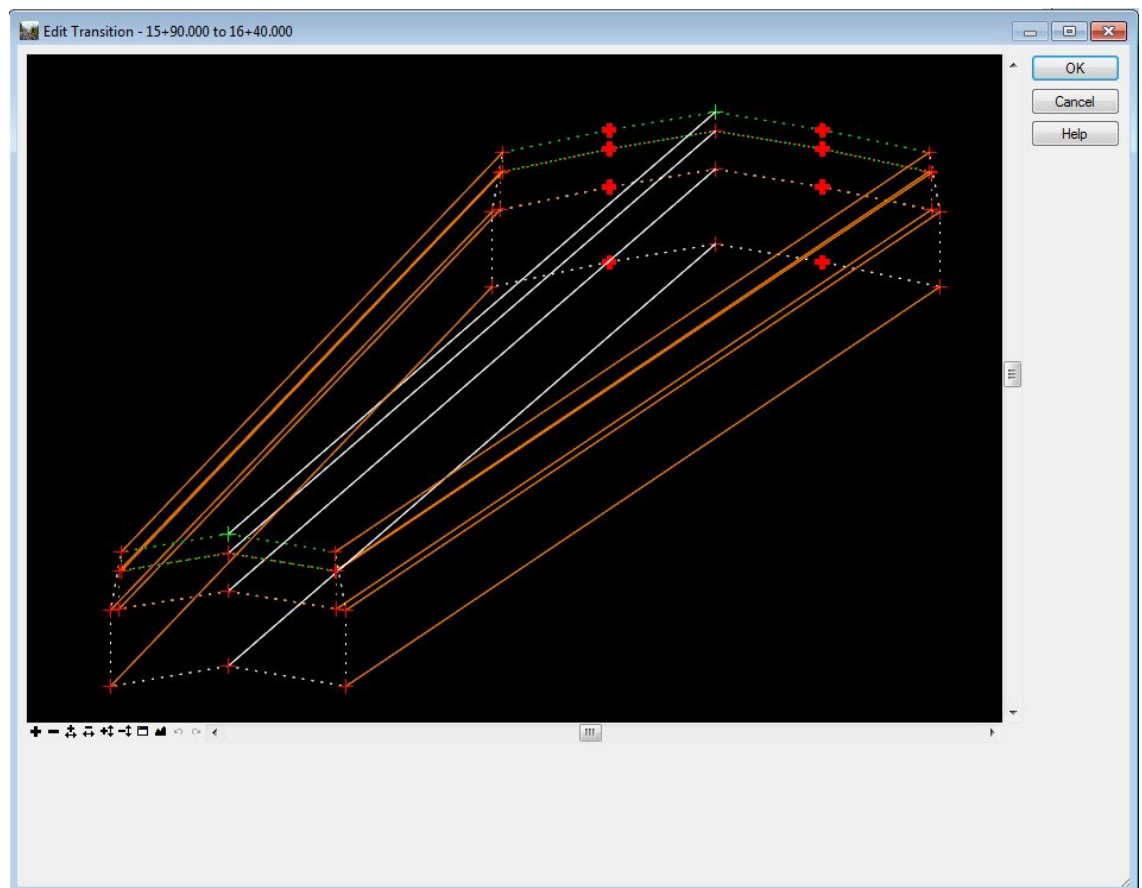
This lesson will take you through how to handle template transitions that you defined in the corridor.

[On-Line Help Topic](#): Search on “template transitions”

EXERCISE: TEMPLATE TRANSITIONS

This exercise will take you through defining template transitions. The reason you will need to define transitions is because when transitioning between one template and a template that has more segments in it, the Roadway Designer does not know how to connect the segments. This is because there may be more than one way to connect them.

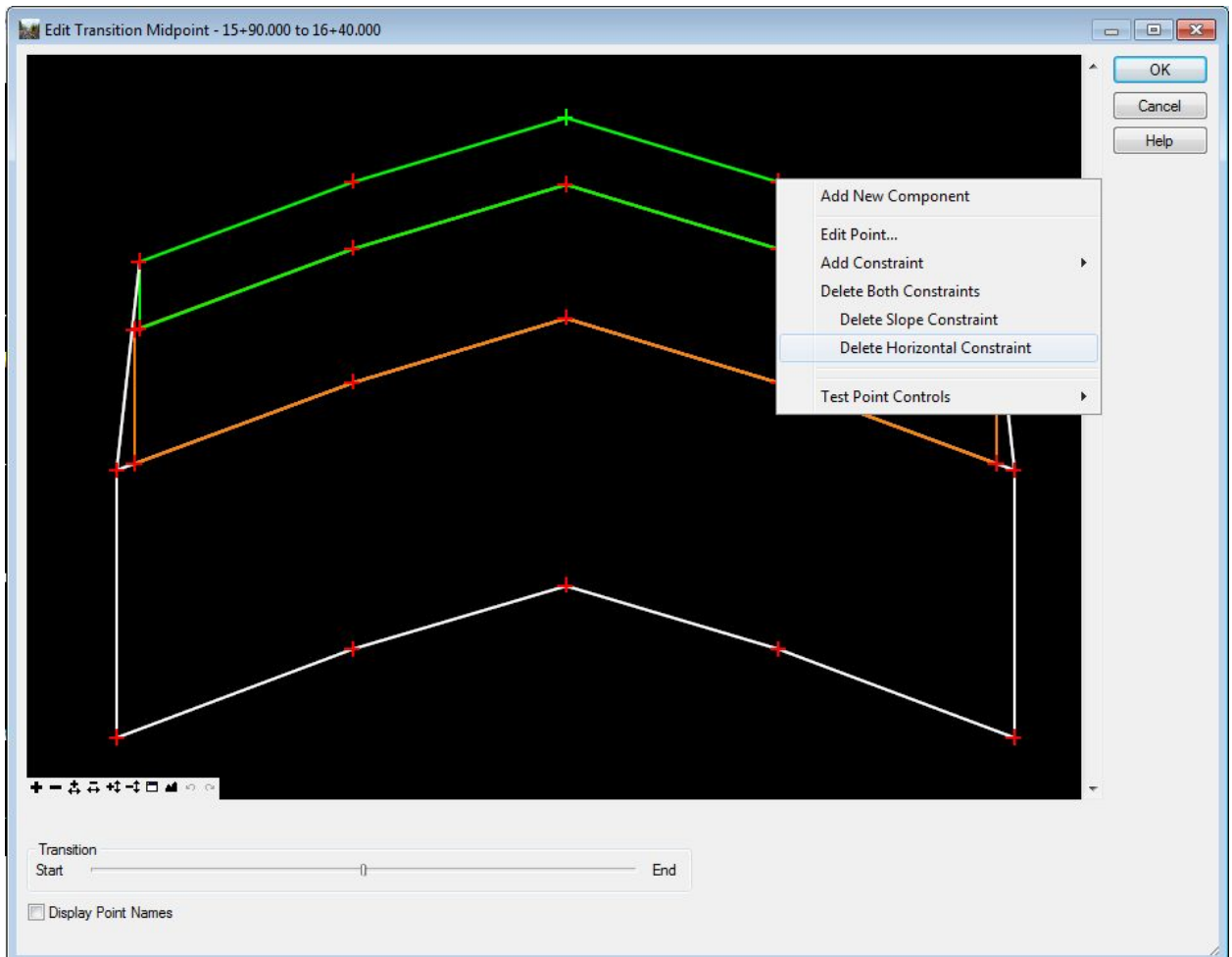
1. From the **Roadway Designer** double click on the west yellow shape in the plan view. This will bring up the **Edit Transition** dialog.



2. To edit the transitions **click** on the bolded tic mark and then connect it to the desired transition location by clicking on it (the center points of the first template).

3. Finish defining the transitions.
4. Select **OK**.
5. Now you see the cross section view that is half way through the transition.
6. At the bottom of the **Edit Transition Midpoint** dialog you will see a slider bar. Try moving the bar to the left and right. Is anything happening?

The reason nothing is happening is because of the constraints on the template points. To modify the constraints **right click** on the right lane line point and select **Edit point** and **DELETE** the Horizontal Constraint.



7. Try sliding the **Transition** bar again. What is happening?
8. Correct the constraint on the left lane line point.
9. When completed click **OK** on the **Edit Transition Midpoint** dialog.
10. Correct the west transition with the same steps as above.
11. In the Roadway Designer dialog select **File > Save** to save the Roadway Designer project file updating from the previous save.

LESSON NAME: EXAMINING THE CORRIDOR

LESSON OBJECTIVE:

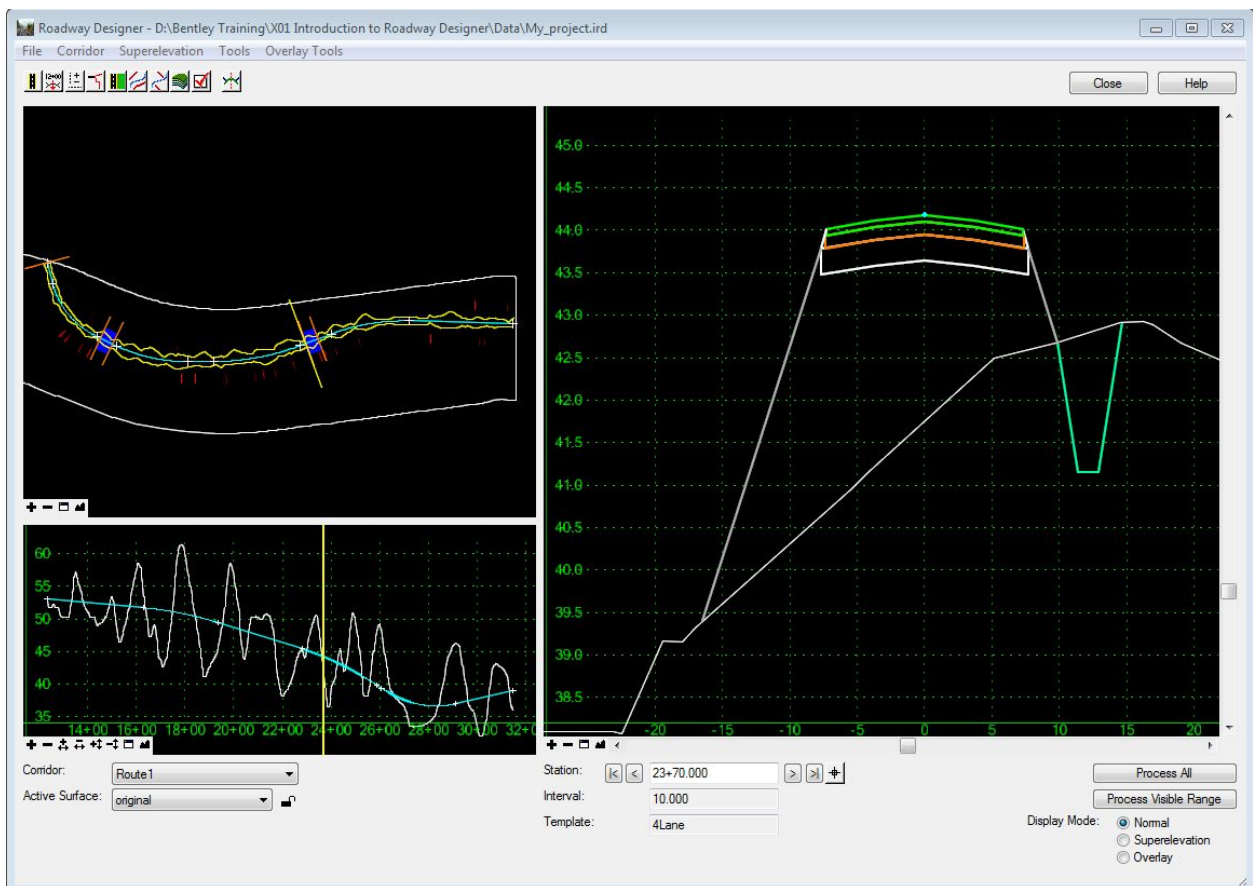
This lesson will take you through how to navigate through the corridor.

[On-Line Help Topic](#): Search on “Roadway Designer”

EXERCISE: CORRIDOR NAVIGATION

This exercise will take you through the navigation tools in the Roadway Designer.

1. From the **Roadway Designer** click on the **Process All** button.
2. At the bottom of the Roadway Designer dialog there is a station value with advancing arrows on either side of it.



3. Clicking on the arrows move along the stations.

4. Notice in the plan view and the profile view there is a yellow line across the alignment and the profile. This line represents where the cross section view is.
5. Double click in the plan view. Notice that the line moved to the place on the alignment that was orthogonal to your double click.
6. Try the same in the profile view.
7. Now using your left mouse button click and hold on the yellow line in the plan view and drag it along the alignment.
8. Try the same in the profile view.

LESSON NAME: SUPERELEVATION

LESSON OBJECTIVE:

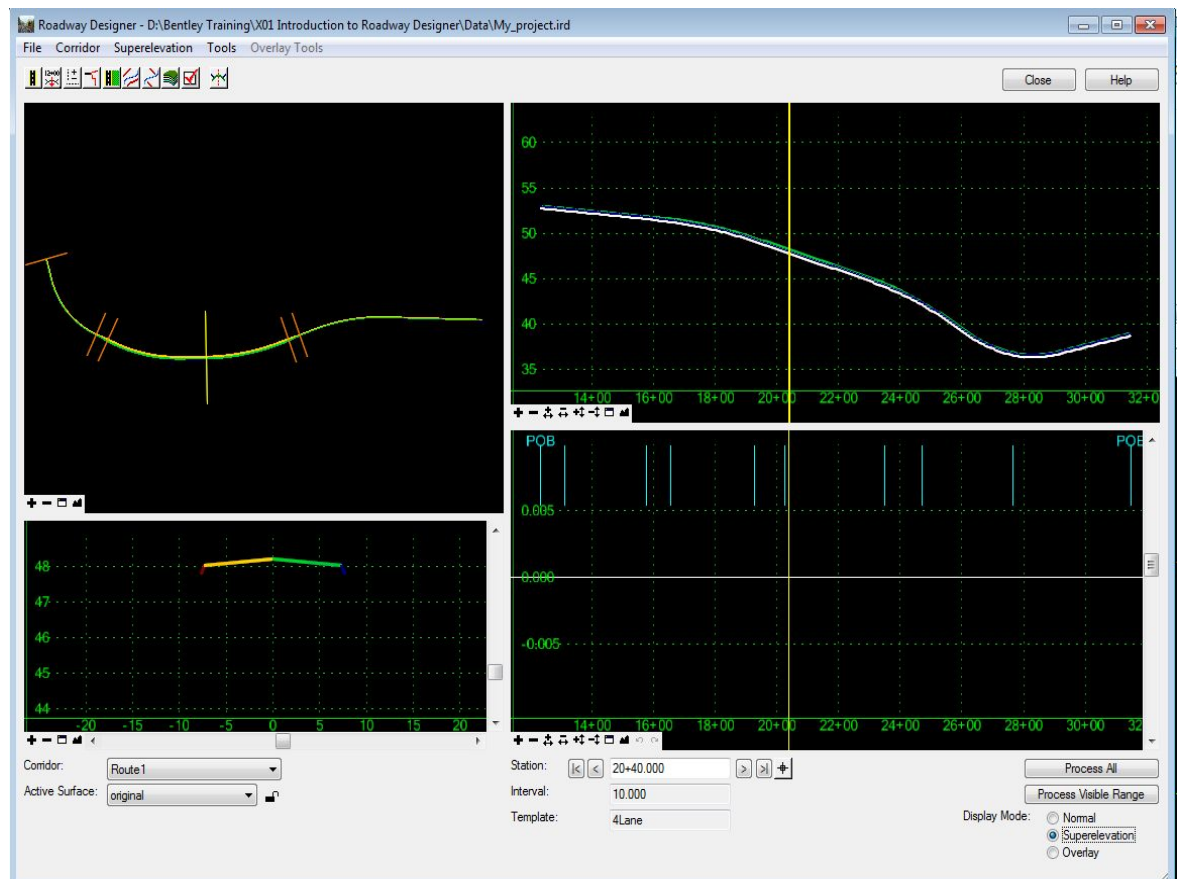
This lesson will take you through how to setup superelevation.

[On-Line Help Topic](#): Search on “Superelevation”

EXERCISE: SUPERELEVATION

This exercise will take you through defining and setting up superelevation.

1. On the **Roadway Designer** click the Display Mode: **Superelevation** option in the on the bottom right of the dialog.
2. The top left pane is the plan view. The bottom left pane is the cross section view. The top right pane is the profile view and the bottom right pane is the superelevation diagram.



3. To set up super elevation we must first calculate the superelevation rates. **Right click** on the superelevation diagram pane and select **Create Superelevation Wizard > AASHTO**. This will bring up the **AASHTO Wizard**.

AASHTO Wizard

Corridor: Route1 Help

General Superelevation Data

Maximum Delta G: Spiral Tangent Point at:

☐ Zero Cross Slope

☐ Non-Linear Curve Length: ☒ Normal Crown

Horizontal Curve Sets:

ID	Start Station	Stop Station	Superelevation Rate
1	13+12.034	15+76.197	7.70%
2	16+54.809	19+26.614	3.85%
3	20+24.449	23+48.883	2.57%
4	24+70.864	27+64.995	3.08%

4. First we need to compute the rates. **Click** the **Rate Calculator** button.
5. When the **Rate Calculator** appears **Edit** each record and set the design speed to **55**.

Superelevation Rate Calculator Editor

Method: **AASHTO Method 1**

Design Speed: **55.000**

Friction Factor: **19.000%**

Running Speed: **48.000**

Absolute Maximum Rate: **6.000%**

Preferred Maximum Rate: **5.000%**


Computed Rate: **1.874%**

☐ Round Rates To: **0.1**

Curve Limits

☐ Use Curve Limits

	Radius	%f Used	f Demand	e Value
NC to RC:	0.000	0.000	0.000	0.000%
RC to Superelevation:	0.000	0.000	0.000	0.000%
Start Maximum Rate:	0.000	0.000	0.000	0.000%

6. When editing is complete select **Apply** and then **Close**. You will be returned to the **AASHTO Wizard**.
7. **Move the yellow navigation line** to somewhere where the **2Lane** template exists.
8. Select **Next**.
9. Select **Add**.
10. When the **Add SuperElevation Section** dialog appears select the  button beside the **Crown Point** field and select the crown point in the cross section view.
11. Do the same for the **Left Range Point** and **Right Range Point** by selecting the edges of pavement.
12. Turn on the **Station** toggle and key in the **12+34** for the **Start** and **15+90** for the **Stop**.

Add Superelevation Section

Name:

☐ List all backbone points

Crown Point:

Left Range Point:

Right Range Point:

Pivot Direction:

Limits

☒ Station

Start:

Stop:

13. Click **OK** to add the first super elevation section.
14. **Move the yellow navigation line** somewhere where the **4Lane** template exists.
15. Repeat the process for identifying the points and set the station range to **15+90** through **24+20**.
16. **Move the yellow navigation line** somewhere where the **2Lane** template exists.
17. Repeat the process for identifying the points and set the station range to **24+20** to **31+47.783**. Don't forget to move the yellow navigation line to the 2Lane section.

Superelevation Section Definitions

Help

Sections:

Name	Start Station	Stop Station	Crown Point	Left Range ...	Right Rang...	Pivot Direction
Section1	12+34.000	15+90.000	CLRD_WC_...	L_EP_WC_...	R_EP_WC_...	From Crown P...
Section2	15+90.000	24+20.000	CLRD_WC_...	L_EP_WC_...	R_EP_WC_...	From Crown P...
Section3	24+20.000	31+47.783	CLRD_WC_...	L_EP_WC_...	R_EP_WC_...	From Crown P...

Add... Edit... Delete

Superelevation for Selected Section:

Start Station	Stop Station	Entering Tra...	Exiting Tran...	Width from ...	Superelevation Rate
24+69.219	27+66.640	2.74	2.74	3.66	0.75%

Edit...

< Back Next > Preferences... Close

18. Select **Next**.
19. Select **Finish**.
20. Select **Process All**.
21. In the Roadway Designer dialog select **File > Save** to save the Roadway Designer project file updating from the previous save.
22. Spend some time navigating through the panes and looking at the model. Notice in the plan view that the cross slope is denoted by colors.
23. Toggle the Roadway Designer display mode to Normal.

EXERCISE: CREATE RAILWAY CORRIDOR

LESSON OBJECTIVE:

This lesson will take you through how to setup and apply templates to a corridor.

[On-Line Help Topic](#): Search on “Roadway Designer”

1. Select Corridor > Corridor Management from the menu on the Roadway Designer.
2. Select Proposed Railway for the Surface Symbology. Key-in Railway1 in the Name field, select the horizontal alignment railway and click Add.
3. Close the Corridor
4. Close the Corridor Management dialog.
5. On the Roadway Designer dialog click the Fit on the profile pane. You should now see the plan view of the alignment and the profile view of it.
6. To apply templates to the corridor go to Corridor > Template Drops.
7. Ensure that 10+00 is set for the Station.
8. Set the Interval to 10.00.
9. Expand the Library Templates tree and highlight the Single Track template.
10. Click Add.
11. Close the Template Drops dialog.
12. Select the Process All button.
13. In the Roadway Designer dialog select File > Save to save

EXERCISE: ROTATE TEMPLATE TO DESIGN CANT

LESSON OBJECTIVE:

This lesson will take you through how to setup point controls to your template.

[On-Line Help Topic](#): Search on “Point Controls”

1. Select Corridor > Point Controls from the menu on the Roadway Designer.
2. Type in the point control description Design Cant.
3. Set the Mode to Vertical.
4. Set the Control Type to Cant.
5. Set the Horizontal Alignment to railway.
6. Set the Cant Centre Point to Cant.
7. Set the Cant Left Point to Left Rail.
8. Set the Cant Right Point to Right Rail.
9. Click the Add button.
10. Close the Point Control dialog box.
11. Dismiss the **Results** dialogue.
12. Select the Process All button.
13. In the Roadway Designer dialog select File > Save to save

LESSON NAME: GENERATING A SURFACE MODEL

LESSON OBJECTIVE:

This lesson will take you through how to generate a surface from your roadway design.

[On-Line Help Topic](#): Search on “Create Surface”

EXERCISE: CREATE SURFACE

This exercise will take you through defining and setting up the Create Surface command.

1. On the **Roadway Designer** select **Corridor > Create Surface**.
2. Select both the Roadway Corridors (Railway1 and Route1)
3. Set or key-in the following values

New Surface for Each Corridor: *On*

Empty Design Surface: *On*

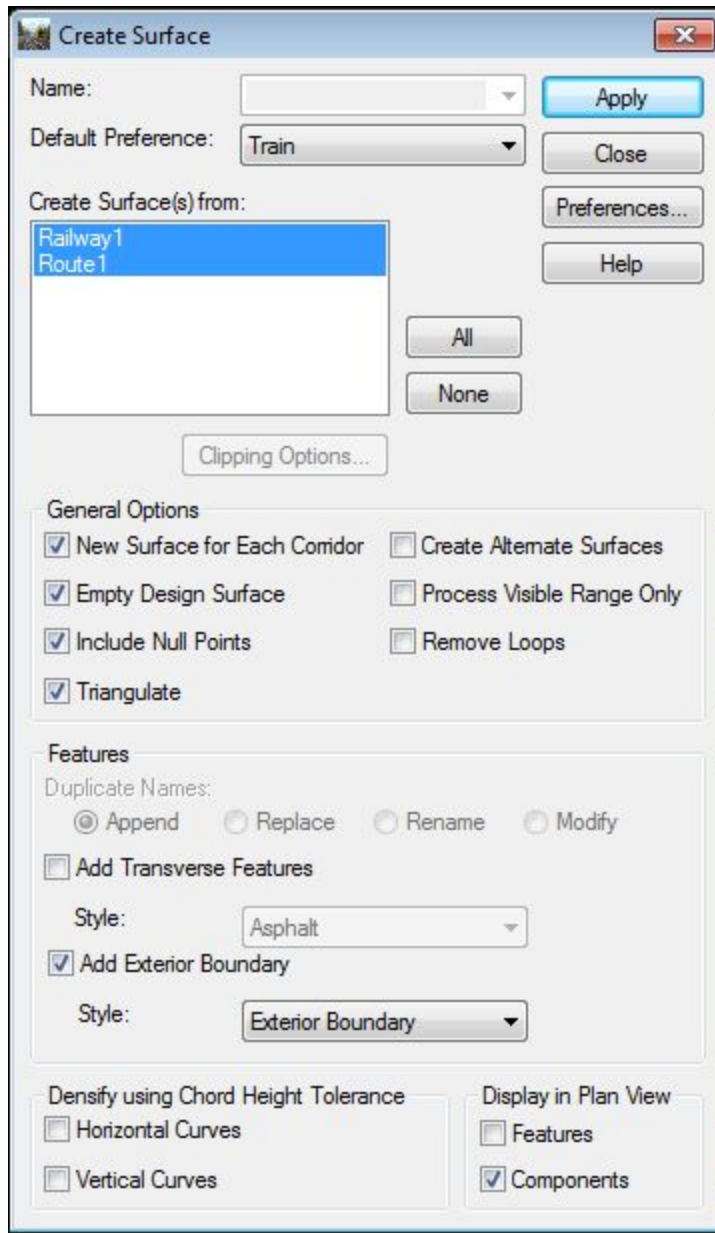
Add Exterior Boundary: *On*

Include Null Points: *On*

Triangulate: *On*

Style: *Exterior Boundary*

Display In Plan View: *Components*



4. Click **Apply**.
5. Dismiss the **Results** dialogue.
6. Click **Close** on the Create Surface dialog.
7. **Collapse** the **Roadway Designer**.
8. Using **MicroStation** examine the components displayed in the DGN file.