Working with Corridors

TRIMBLE BUSINESS CENTER TUTORIAL

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About this tutorial

A "corridor" is a 3D model of a linear structure, such as a road or waterway. The corridor is based on a horizontal and (optionally) vertical alignment and includes templates that define cross-sections throughout the length of the corridor.

In this tutorial, you will create a road corridor based on an existing surface and alignment.

Notes:

- To create a corridor with material layers as described in this tutorial, you must be running **Trimble Business Center** software with the ***Survey Advanced*** product license. The ***Survey Standard*** product license allows you only to create a corridor without material layers. To verify the product license for your installation, select **Help > About Trimble Business Center** and click the **License** button. Licensed features are displayed in the **Features** list.
- If you need additional help at any time you are using the software, press **F1** to display the online help.

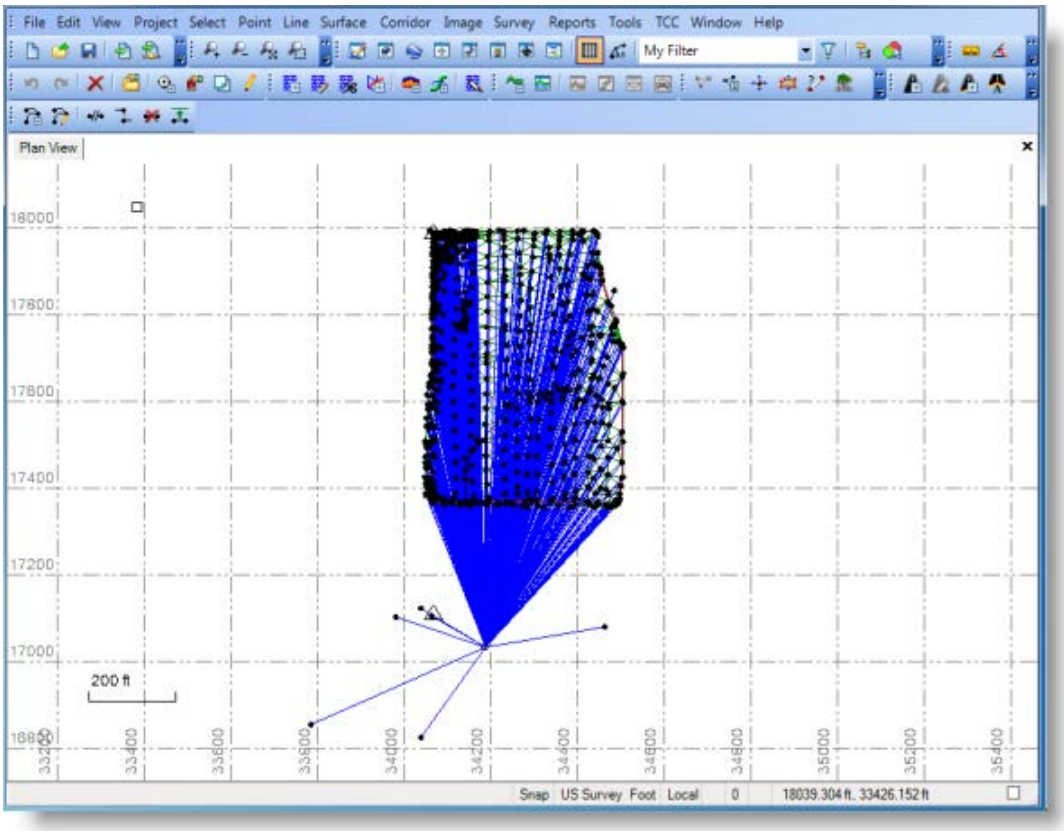
Step 1. Open the project

For this tutorial, you will use the project file *Working with Corridors.vce*. This project contains a surface and alignment to be used to create a new road corridor.

1. On the **Trimble Business Center** menu bar, select **File > Open Project**. Or, click the **Open Project** icon on the toolbar.
2. In the **Open File** dialog, browse to ***C:\Trimble Tutorials\TBC\Projects\Working with Corridors.vce*** and click **Open**.

   If you installed the tutorial to a location other than the default location shown here, browse to that location.

The project opens in the **Trimble Business Center** window.



Note: This figure shows the **Plan View** with a white background. Your background may be black. If you want to change it to white, select **Tools > Options** and select **Background color: White** in the **Options** dialog.

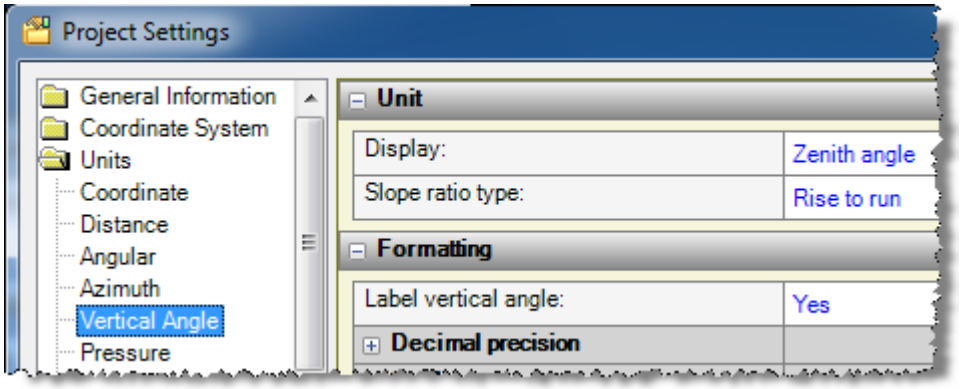
The project file is read-only. You can perform the tutorial steps without saving the project file. However, if you are interrupted while performing the tutorial, you can save it by selecting **File > Save Project As** and saving it to ***..\My Documents\Trimble Business Center***, which is the typical location for storing project files on your computer. Then, you can re-open the project to continue the tutorial at a later time.

Step 2. Select the slope ratio type for the project

Because corridors include slopes, you should verify that the slope ratio type for your project is correct. The type can be either rise-to-run or run-to-rise.

1. Select **Project > Project Settings**.

2. In the **Project Settings** dialog, select **Units > Vertical Angle** in the left navigation pane.



Note that the **Slope ratio type** is set to **Rise to run**. This is the setting you want to use for this tutorial, so you do not need to make any changes.

3. Click the **Cancel** button.

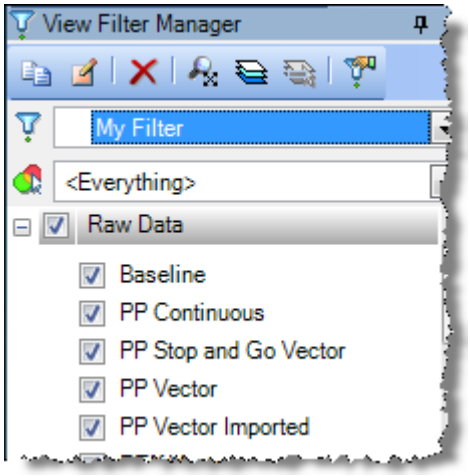
Step 3. Filter the view

To better view the alignment and surface included in the project, you can filter the view to hide RTK vectors and points.

1. Select **View > View Filter Manager.**

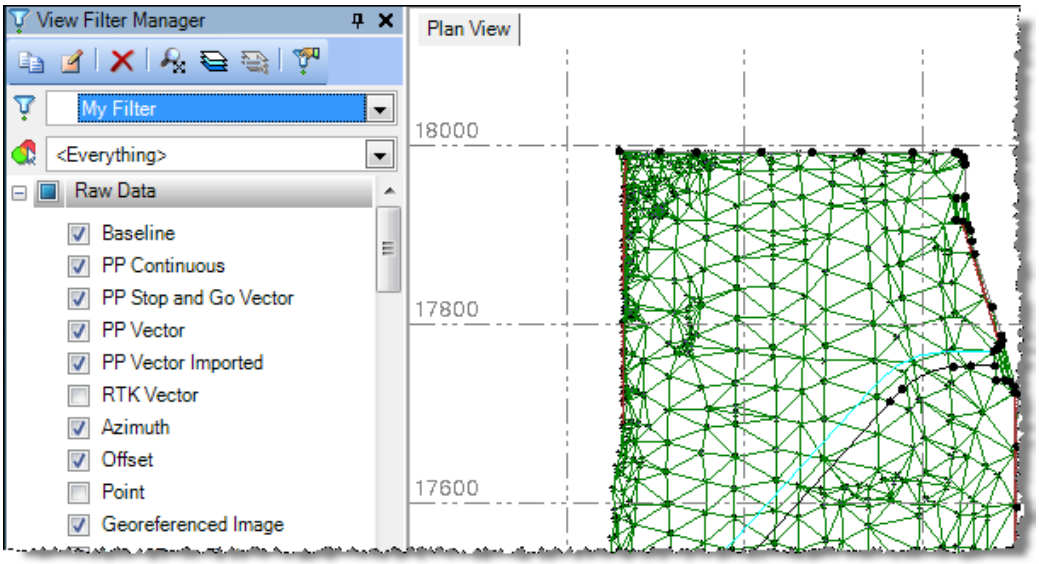
> **Note:** To see the **Raw Data** section, you may have to click the icon at the top of the pane to access the **Advanced View Filter Settings**. Then right-click on the **Raw Data** section and select **Show category**.

The **View Filter Manger** pane shows that all **Raw Data** objects are selected for display.



2. In the **Raw Data** list, deselect **RTK Vector** and **Point**.

You can see the change in the **Plan View**.



3. Close the **View Filter Manager** pane.

Step 4. Create template node names

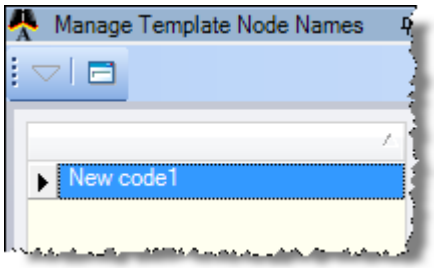
Before creating a new corridor, you can create names that will be used to identify nodes in corridor cross-section templates.

You can also create template node names when you are creating corridor templates, but creating them in advance can help speed up the template creation process. It also allows you to create a library of node names that can be used repeatedly in each of your projects. Simply create the names you might need, then save your project as a template. The names will be available for any project created using the template. For instructions on creating project templates, see the tutorial ***Setting Up a New Project***.

In this procedure, you will create two new template node names.

1. Select **Corridor > Manage Template Node Names**. Or, click the **Manage Template Node Names** icon on the toolbar.
2. In the **Manage Template Node Names** pane, click the **New** button located at the bottom of the pane. (You might need to scroll down to see it.)

   A new row displays in the list.



3. Enter *Travel Lane*.
4. Repeat steps 2 and 3 to create the name *Catch Point*.
5. Click the **Close** button.

Next, you will create a new material layer for the corridor.

Step 5. Create material layers

You can specify the available material layers in your project, each representing a different surface within the corridor. For example, in addition to the default "Finish" layer, you might specify layers for "Base course," "Stabilized subgrade," and "Subgrade."

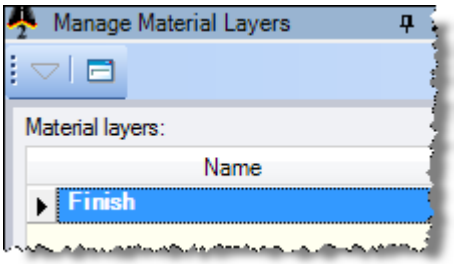
Each time you create an instruction for a corridor template (as described later in this tutorial), you can select one or more material layers on which the line segment created by that instruction appears.

When creating or editing a corridor, you can specify its "current material layer" by selecting it from the **Layers** list. This is the layer that will display in the **Plan View** and **3D View**. If you export the corridor, this is the layer used to create the exported corridor surface. The line segments appearing on the current material layer are used to build the corridor surface.

In this procedure, you will create a new material layer to use in the corridor.

1. Select **Corridor > Manage Material Layers**. Or, click the **Manage Material Layers** icon on the toolbar.

   The **Manage Material Layers** pane displays. The default *Finish* layer displays in the **Material layers** list.

2. Click the **New** button.

   A new row displays in the **Material layers** list.
3. In the **Name** field, enter *Subgrade.*
4. Click the **Close** button.

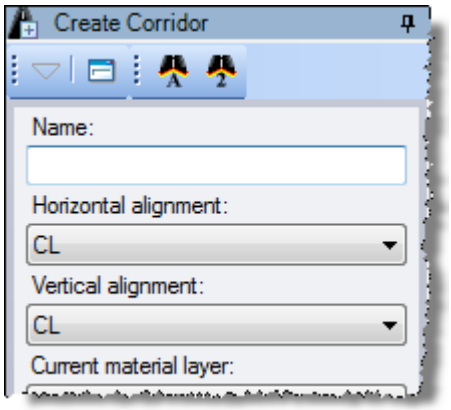
You are now ready to create a new corridor.

Step 6. Create a corridor

In this procedure, you will create a corridor for a road that is to be constructed based on the surface and alignment contained in the project.

1. Select **Corridor > Create Corridor**. Or, click the **Create Corridor** icon on the toolbar.

   The **Create Corridor** pane displays.



2. In the **Name** field, enter *Road01*.

   CL is the only alignment in the project, so it is selected by default in the **Horizontal alignment** and **Vertical alignment** drop-down lists.

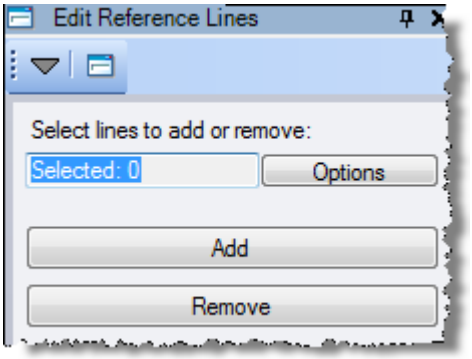
3. In the **Current material** layer list, select *Finish*.

   This is the layer that will display in the **Plan View** and **3D View**.

   You will now select a CAD polyline included in the project to be used as a reference line in the new corridor. You will be able to create offsets in the corridor based on this line.

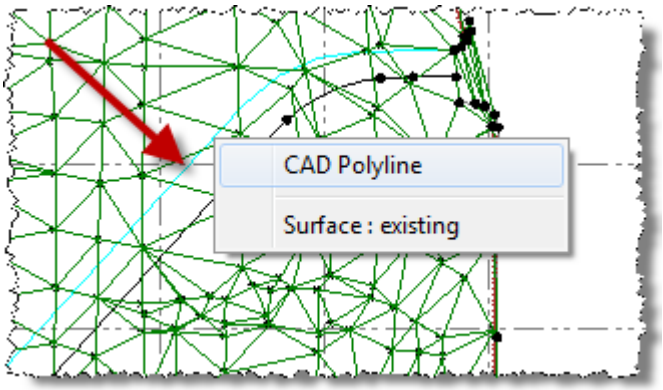
4. Click the ***+/-*** button.

   The **Edit Reference Lines** pane displays.

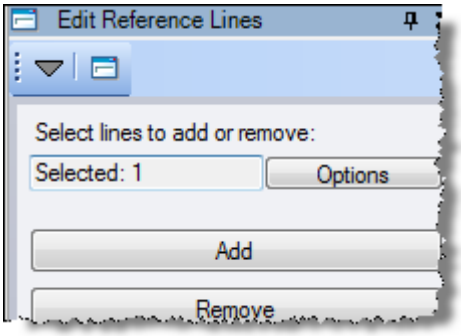


5. Click in the **Select lines to add or remove** field. Then, click the aqua CAD polyline in the **Plan View**. In the context menu, select **CAD Polyline**.

If necessary, use the mouse wheel to zoom in to better see the line.



The field shows that one item is selected.

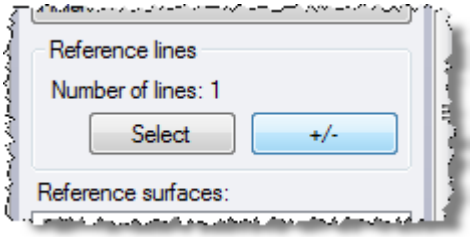


6. Click the **Add** button.

   A message displays saying that the selected item was added as a reference line to the new corridor.

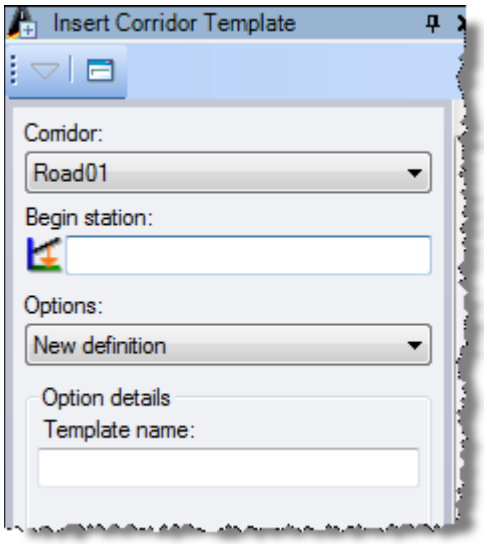
7. Click the **Close** button.

   The quantity of reference lines to be included in the corridor is displayed in the **Create Corridor** pane.



8. In the **Reference surfaces** list, select the *existing* checkbox.
9. Click **OK**.

The **Insert Corridor Template** pane displays.



Next, you will insert a cross-section template into the new corridor.

Step 7. Insert a corridor template

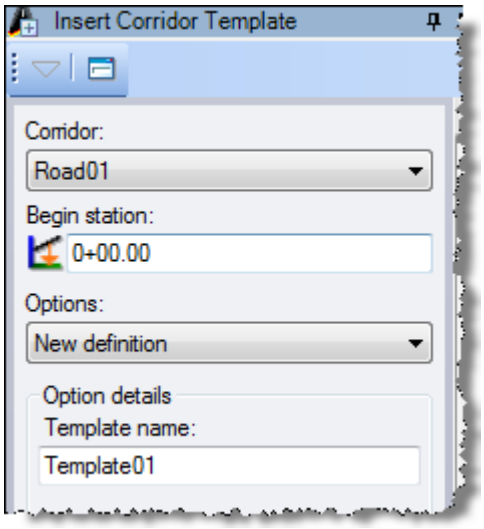
You can create and insert one or more cross-section templates into a corridor. (However, you cannot insert more than one template at the same station.) Each template includes instructions that define cross-sections for a specified length of the corridor (for example, the various offsets and slopes for a road).

In this procedure, you will create a single template that defines the corridor from station 0+00 forward.

1. In the **Insert Corridor Template** pane, ensure *Road01* is selected in the **Corridor** drop-down list.
2. In the **Begin station** field, enter *0.*

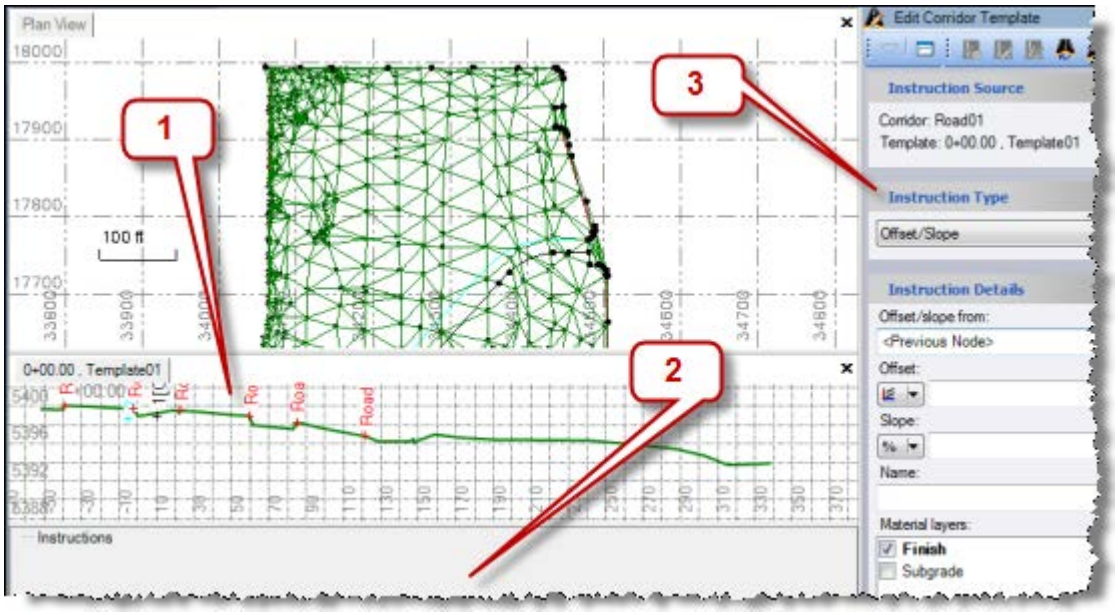
   Note that when you move the cursor from the field, the *0* changes to the standard stationing format: *0+00.00.* This indicates that the new template will be inserted at station 0+00.00 in the corridor and will be used to define the corridor from this station to the next template or, if there are none, to the end of the corridor.
3. In the **Options** drop-down list, ensure **New definition** is selected.

4. In the **Template name** field, enter *Template01*.

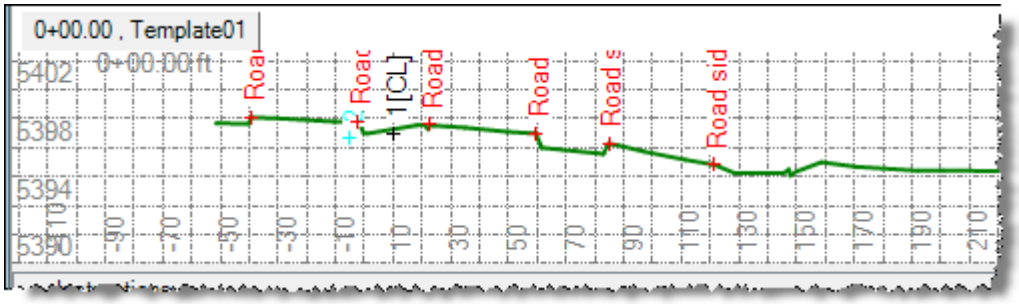


5. Click the **Insert** button.

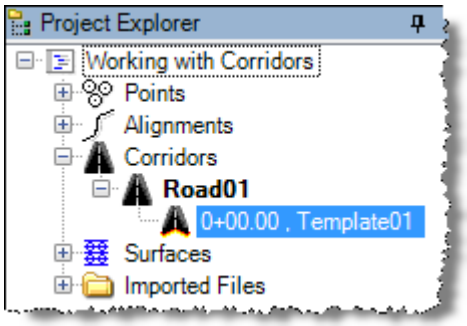
   The **Edit Corridor Template** pane displays. The pane includes three sections: (1) a template graphic view tab, (2) an **Instructions** list, and (3) an instruction properties section.



On the graphic view tab, the green line represents the surface in the project. The centerline node *1[CL],* which is based on the horizontal alignment, was automatically created and added to the template. You can also see that a node *2* was added (approximately 15 ft to the left of *1[CL]*) based on the single CAD polyline you added to the corridor earlier.



6. Select **View > Project Explorer**. Then, in the **Project Explorer** pane, click the plus sign preceding the *Corridors* node and the *Road01* node to see the new template node.



7. Close the **Project Explorer** pane.

Step 8. Create instructions for the corridor template

Now that you have created and inserted a cross-section template into the new corridor, you can define instructions that specify what that the cross-section looks like along the length of the corridor for which the template is defined: the various offsets and slopes for the road.

Corridor templates are made up of nodes and instructions. Nodes are used to define the various offsets and slopes in the templates. For example, a simple road corridor might contain three nodes: a centerline based on the alignment (1), a right edge of pavement (2), and a left edge of pavement (3).

The software automatically creates some nodes based on the alignment and reference lines in your corridor. For example, node 1 in the figure above was automatically created as the centerline for the corridor based on the corridor's alignment.

You can create additional nodes as necessary to define offsets and slopes for other corridor features. For example, node 2 in the figure above was manually created to represent the right edge of the pavement with an offset of 10 ft and a slope of -2% relative to the centerline. To create a node manually, you define the instructions that specify the node's offset and slope relative to other nodes in the template.

In this procedure, you will define a corridor template by first defining nodes and lines for the right side of the corridor for both the Finish and Subgrade material layers. Then you will use the Mirror Instructions command to copy the same node and line layout to the left side of the centerline.

8a. Define the right travel lane – Finish layer

1. In the **Edit Corridor Template** pane, select **Offset/Slope** in the **Instruction Type** drop-down list.

   This instruction type allows you to create a node in the template for which you specify the offset and slope in relation to another node. In this case, you will base the new node on the CL node that was automatically created for the selected alignment.

2. In the **Offset/slope from** field, select *<Previous Node>*.

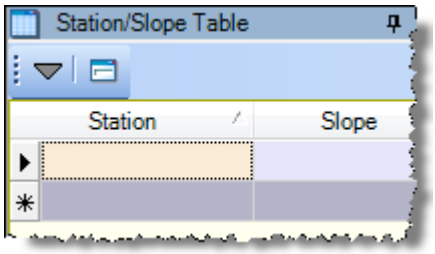
   When you select *<Previous Node>*, the node created by the preceding instruction in the **Instructions** list is referenced. If there are no preceding instructions in the list, as in this case, the *1[CL]* node automatically created for the horizontal alignment is referenced.

3. On the **Offset** button, ensure that the **Offset** icon is displayed. Then, enter *12* in the field.

   This specifies that the new node will be created 12 ft to the right of the *1[CL]* node (centerline). If you were to enter -12, the new node would be created 12 ft to the left of the *1[CL]* node.

4. On the **Slope** button, click the drop-down icon and select the **Table** option . Then click the **Table** button .

   The **Station/Slope Table** pane displays. This pane allows you to specify the slope between the *1[CL]* node and the new node at specified locations along the corridor, from the current template to the next template (or the end of the corridor).

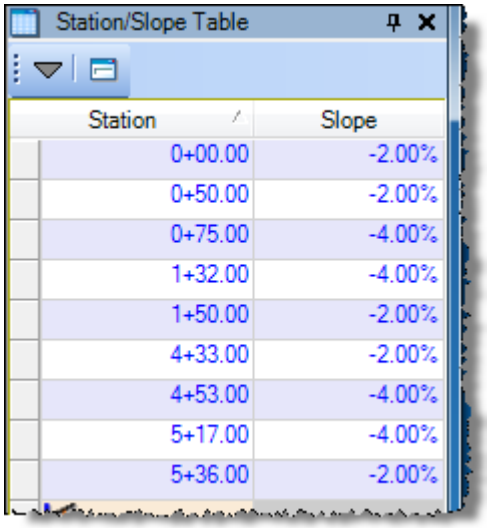


5. In the **Station/Slope Table** pane, enter the following values.

Note: You do not have to enter values in the format shown here. For *0+00.00*, you can simply enter *0*. For *4+33.00*, you can enter *433*. For a *-2.00%* slope, you can enter *-2*. The correct format will be applied when your cursor leaves the table cell.

Station	Slope
0+00.00	*-2.00%*
0+50.00	*-2.00%*
0+75.00	*-4.00%*
1+32.00	*-4.00%*
1+50.00	*-2.00%*
4+33.00	*-2.00%*
4+53.00	*-4.00%*
5+17.00	*-4.00%*
5+36.00	*-2.00%*

A negative slope percentage indicates to create the node beneath the centerline.



When you are done, click **OK.**

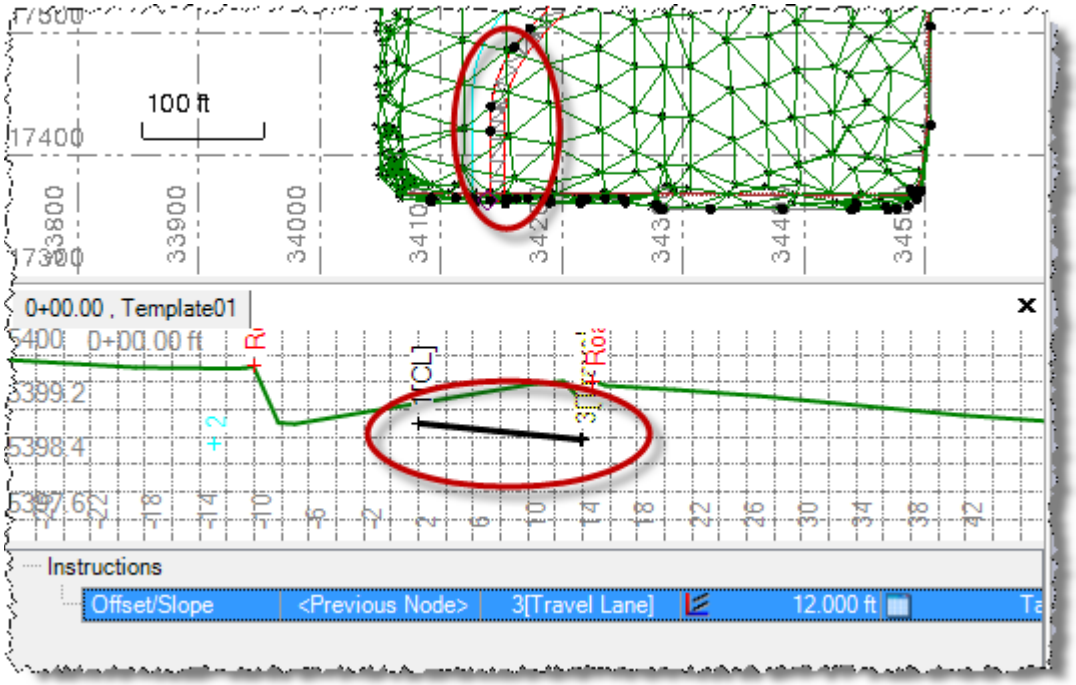
6. In the **Name** drop-down list, select *Travel Lane.*

   This node represents the right edge of the right travel lane.

7. In the **Material layers** list, select *Finish*.

8. Click the **Add** button.

The newly created *3[Travel Lane]* node is displayed in the template graphic view. The instruction used to create the node is displayed in the **Instructions** list. Click in the graphic area and use your mouse wheel to zoom in on the new node. Note also that the corridor is now displayed in the **Plan View.**

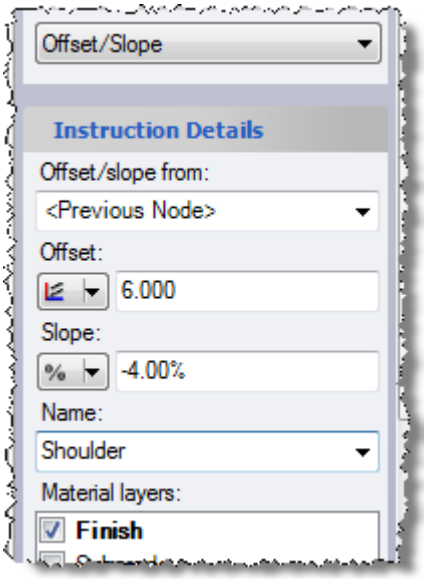


The fields in properties section of the **Edit Corridor Template** pane have been cleared to allow you to create another instruction.

8b. Define the right shoulder – Finish layer

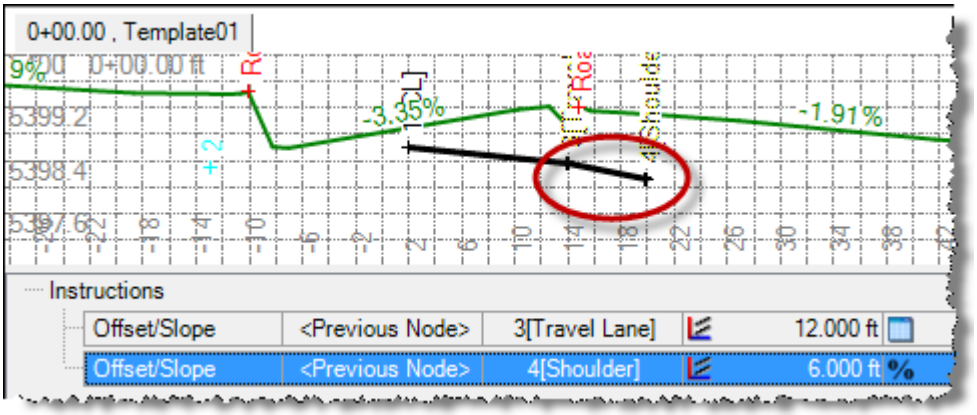
1. In the **Instruction Type** drop-down list, select **Offset/Slope**.
2. Complete the **Instruction Details** fields as follows:
   - **Offset/slope from:** *<Previous Node>*
     In this case, the *<Previous Node>* is the newly created *3[Travel Lane]* node.
   - **Offset > Offset** : *6*
   - **Slope > Slope percent** : *-4*
     On the **Slope** button drop-down select the **Slope percent** option. The minus sign preceding the number indicates the slope is in a downward direction from the *3[TL]* node.
   - **Name**: *Shoulder*
     Since you did not enter *Shoulder* as a corridor code using the **Corridor Code Manager**, you can type it into the **Code** field now.

- **Material layers**: *Finish*



3. Click the **Add** button.

   The newly created *4[Shoulder]* node represents the right edge of the shoulder based on the right edge of the travel lane.



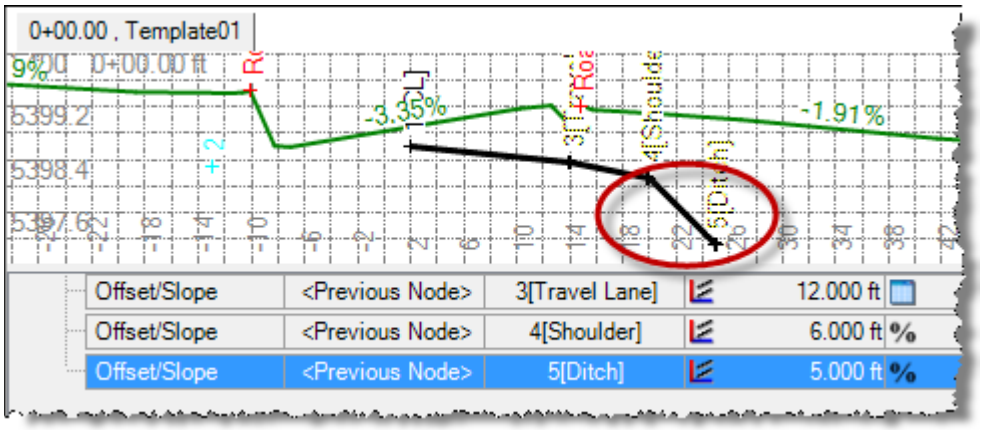
8c. Define the right drainage slope – Finish layer

1. In the **Instruction Type** drop-down list, select **Offset/Slope**.
2. Complete the **Instruction Details** fields as follows:
   - **Offset/slope from:** *<Previous Node>*
     In this case, the *<Previous Node>* is the newly created *4[Shoulder]* node.
   - **Offset > Offset** : *5*
   - **Slope > Slope percent** : *-20*
     On the **Slope** button drop-down select the **Slope percent** option. The minus sign preceding the number indicates the slope is in a downward direction from the *4[Shoulder]* node.

- **Name**: *Ditch*
  You'll need to type this new code in the field.
- **Material layers**: *Finish*

3. Click the **Add** button.

   The newly created *5[Ditch]* node represents the right edge of the drainage slope based on the right edge of the shoulder.



You are now ready to define a side slope for the right side of the corridor template. The Side Slope instruction type defines a side slope node based on either or both of the following:

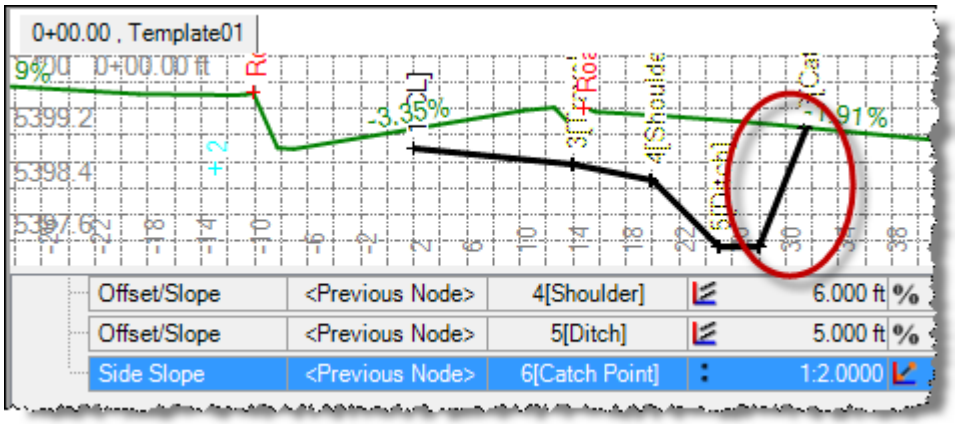
- Cut slope and, optionally, a ditch width
- Fill slope

The side slope node specifies the cut or fill slope intercept with the target surface.

8d. Define the right side slope – Finish layer

1. In the **Instruction Type** drop-down list, select **Side Slope**.
2. Complete the **Instruction Details** fields as follows:
   - **Side slope from**: *<Previous Node>*
     In this case, the *<Previous Node>* is the newly created 5*[Ditch]* node.
   - **Target surface:** *existing*
     This allows the side slope to connect to the existing surface.
   - **Cut slope > Slope ratio** : *1:2*
     Based on the project settings, this represents a slope type of rise-to-run.
   - **Cut ditch width:** *3*
     This indicates that if a fill is required, a 3 foot-wide ditch is included.
   - **Fill slope > Slope ratio** : *1:5*
   - **Name**: *Catch Point*
   - **Material layers:** *Finish*

3. Click the **Add** button.



As you can see, the side slope extends until it intercepts the surface, which changes along the length of the corridor. Depending on the surface at each location along the corridor, a cut or fill might be required. If a fill is required, a 3 ft-wide ditch is included, per the instruction.

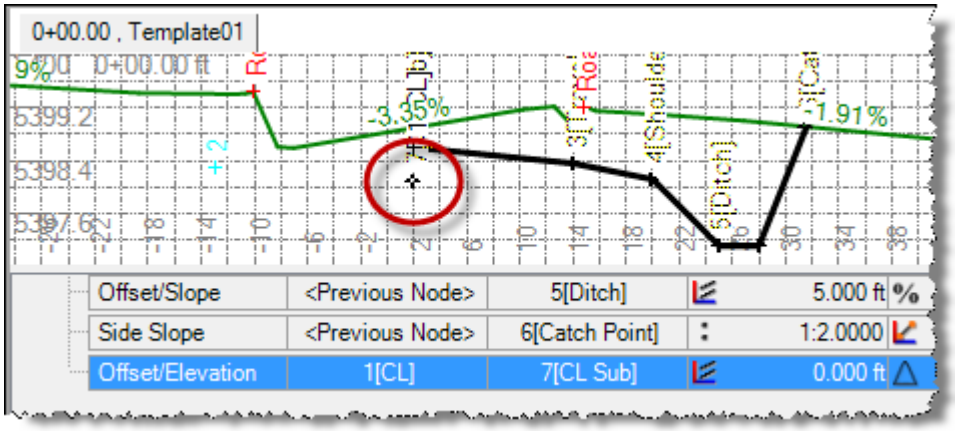
You are done defining the Finished material layer for the right side of the template. Next, you will define the Subgrade material layer for the right side.

8e. Define the centerline – Subgrade layer

In the **Edit Corridor Template** pane, do the following:

1. In the **Instruction Type** drop-down list, select **Offset/Elevation**.
2. Complete the **Instruction Details** fields as follows:
   - **Offset/elevation from:** *1[CL]*
   - **Offset > Offset** : *0*
     The *0* offset ensures the new Subgrade node is located directly above or beneath the *1[CL]* node , depending on the **Elevation** value.
   - **Elevation > Delta elevation** : *-0.5*
     On the **Elevation** button drop-down, select the **Delta elevation** option. The minus sign preceding the number indicates the new node will be .5 feet beneath the *1[CL]* node.
   - **Name**: *CL Sub*
     Type this new code in the field.
   - **Material layers**: nothing selected
     By not selecting a material layer, you can ensure that a line is not automatically created connecting the *1[CL]* node to the new node.
3. Click the **Add** button.

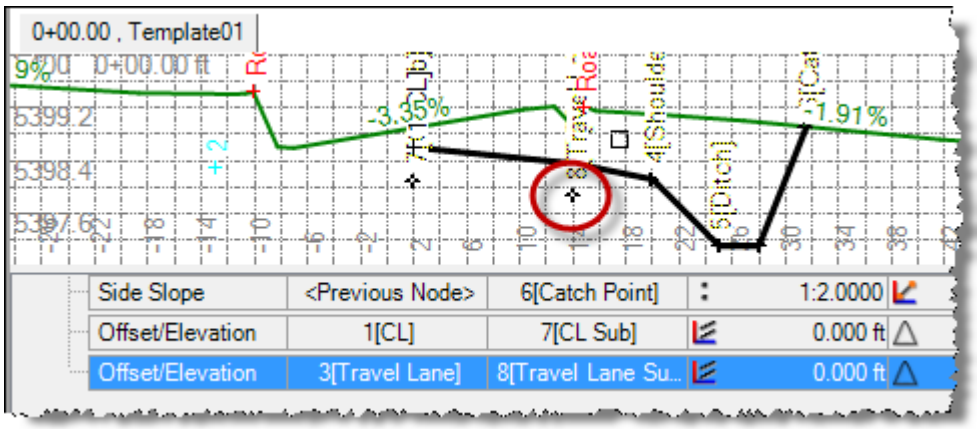
The newly created *7[CL Sub]* node represents the centerline for the Subgrade material layer.



8f. Define the right travel lane – Subgrade layer

1. In the **Instruction Type** drop-down list, select **Offset/Elevation**.
2. Complete the **Instruction Details** fields as follows:
   - **Offset/elevation from:** *3[Travel Lane]*
   - **Offset > Offset** : *0*
   - **Elevation > Delta elevation** : *-0.5*
   - **Name**: *Travel Lane Sub*
   - **Material layers**: nothing selected
3. Click the **Add** button.

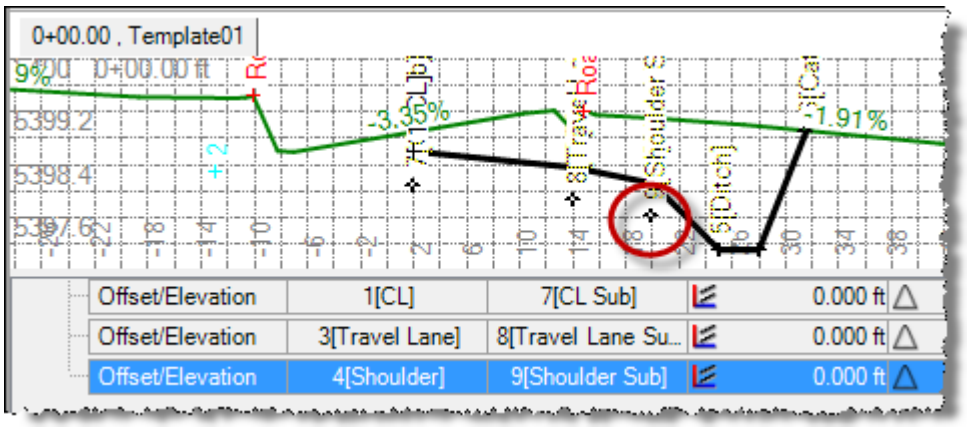
   The newly created *8[Travel Lane Sub]* node represents the right edge of the right travel lane for the Subgrade material layer.



8g. Define the right shoulder – Subgrade layer

1. In the **Instruction Type** drop-down list, select **Offset/Elevation**.
2. Complete the **Instruction Details** fields as follows:
   - **Offset/elevation from:** *4[Shoulder]*
   - **Offset > Offset** : *0*
   - **Elevation > Delta elevation** : *-0.5*
   - **Name**: *Shoulder Sub*
   - **Material layers**: nothing selected
3. Click the **Add** button.

   The newly created *9[Shoulder Sub]* node represents the right edge of the right shoulder for the Subgrade material layer.



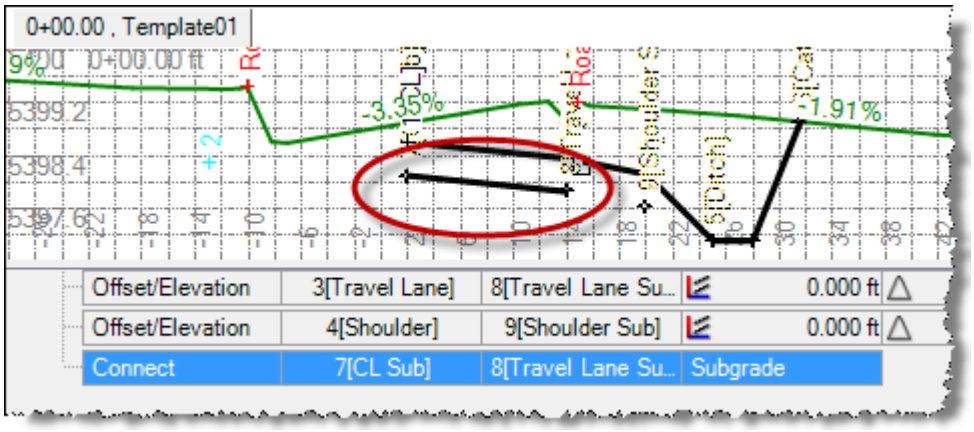
Next, you will connect the newly created Subgrade nodes with line segments.

8h. Connect the nodes – Subgrade layer

In this procedure you will define a line segment to connect the *7[CL Sub]* and *8[TL Sub] nodes.*

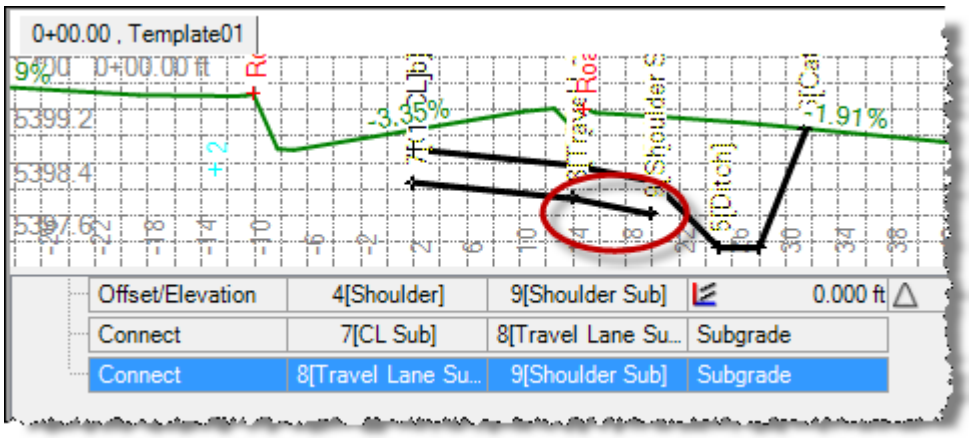
1. In the **Instruction Type** drop-down list, select **Connect**.
2. Complete the **Instruction Details** fields as follows:
   - **From node:** *7[CL Sub]*
     You can select the node name in the drop-down list, or you can select it in the template graphic view.
   - **To node:** *8[Travel Lane Sub]*
   - **Material layers**: *Subgrade*

3. Click the **Add** button.



Next, you will define a line segment to connect *8[TL Sub]* and *9[Shoulder Sub].*

4. In the **Instruction Type** drop-down list, select **Connect**.
5. Complete the **Instruction Details** fields as follows:
   - **From node:** *8[Travel Lane Sub]*
   - **To node:** *9[Shoulder Sub]*
   - **Material layers**: *Subgrade*
6. Click the **Add** button.

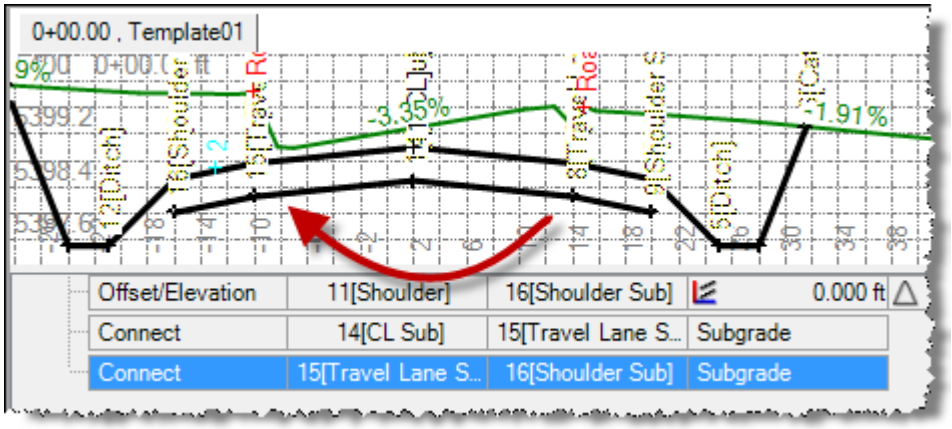


You are now ready to create instructions to define nodes and lines on the left side of the centerline *1[CL]* node. For this tutorial, the left side will be defined exactly the same as the right side, so you can use the **Mirror instructions** command.

8i. Mirror instructions on the right side of the template to the left side

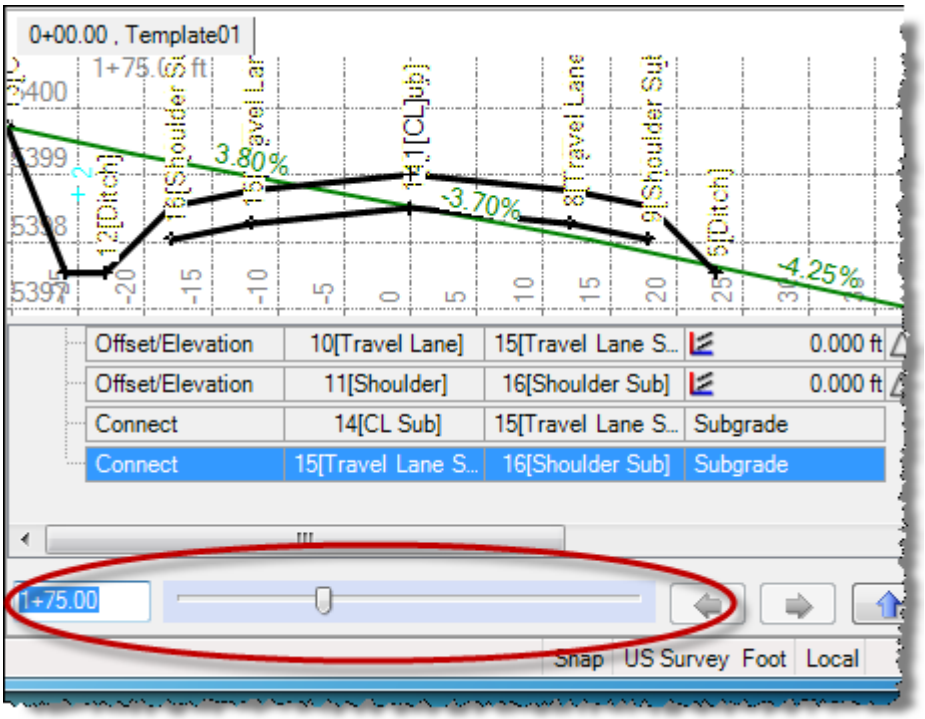
1. Click the **Mirror Instructions** icon located at the top of the **Edit Corridor Template** pane.

Instructions are copied to the left side of the template in a mirror-like fashion as shown here.



2. To see how the template changes in relation to the existing surface along the length of the corridor, use the slide control located beneath the **Instructions** list.

   The station is displayed in the field to the left.



   This template is complete, and you can now insert additional templates into the corridor if necessary. However, you will not add any more templates for this tutorial. Instead, the next procedure will explain how you can edit an existing template by changing an instruction.

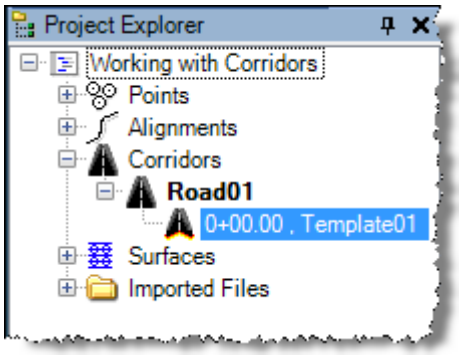
3. In the **Edit Corridor Template** pane, click, the **Close** button.

Step 9. Edit an instruction

In this step, you will edit an instruction in the newly created corridor template by redefining the left edge of the left travel lane to be based on a CAD polyline you added to the project as a reference line earlier in tutorial. As the CAD polyline moves in relation to its offset to the centerline, so too does the offset for the left edge of the left travel lane.

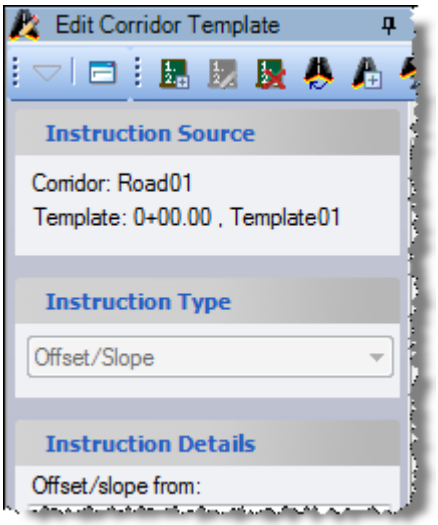
1. In the **Trimble Business Center** window, select **View > Project Explorer,** or click the **Project Explorer** icon in the toolbar.

   The **Project Explorer** pane displays.



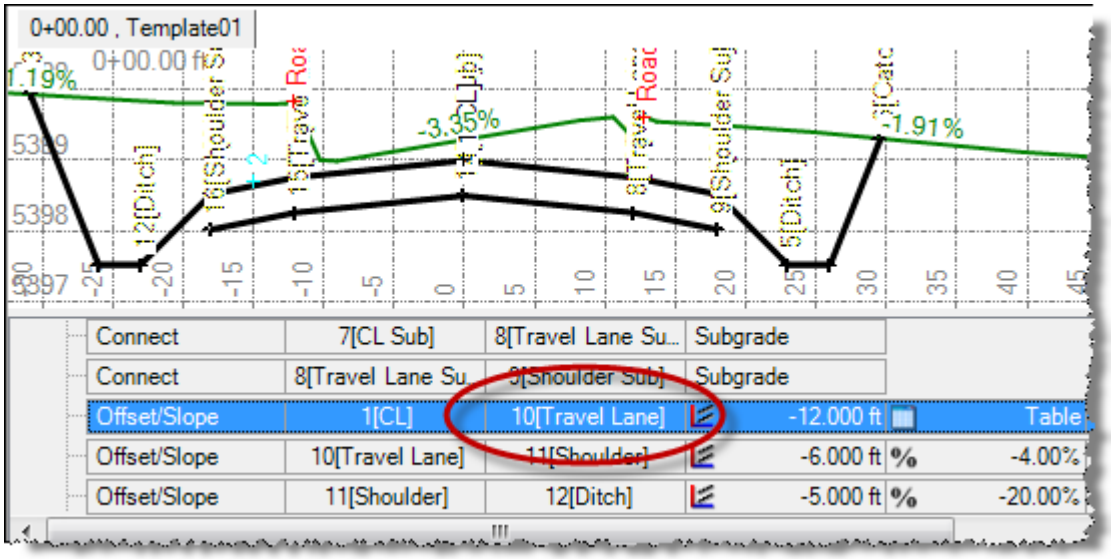
2. In the **Project Explorer** pane, expand **Corridor**, right-click the corridor template node *0+00.00, Template 01,* and select **Edit**.

   The **Edit Corridor Template** pane displays.

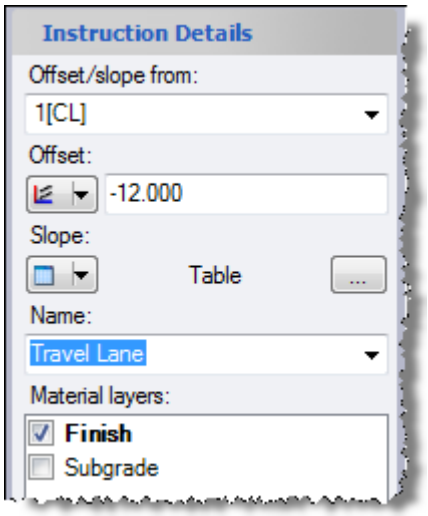


3. Close the **Project Explorer** pane.

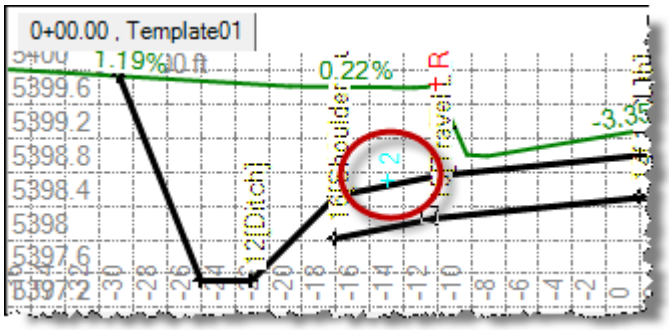
4. In the **Instructions** list in the **Edit Corridor Template** pane, double-click the instruction *10[Travel Lane],* or right-click it and select **Edit**.



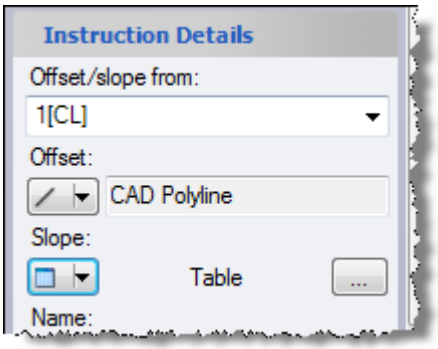
Properties for the *10[TL]* node display in the **Instruction Details** section.



5. Click the **Offset** button drop-down and select **2D line** . Then select node *2* in the graphic view. (Use your mouse wheel to zoom in if necessary).



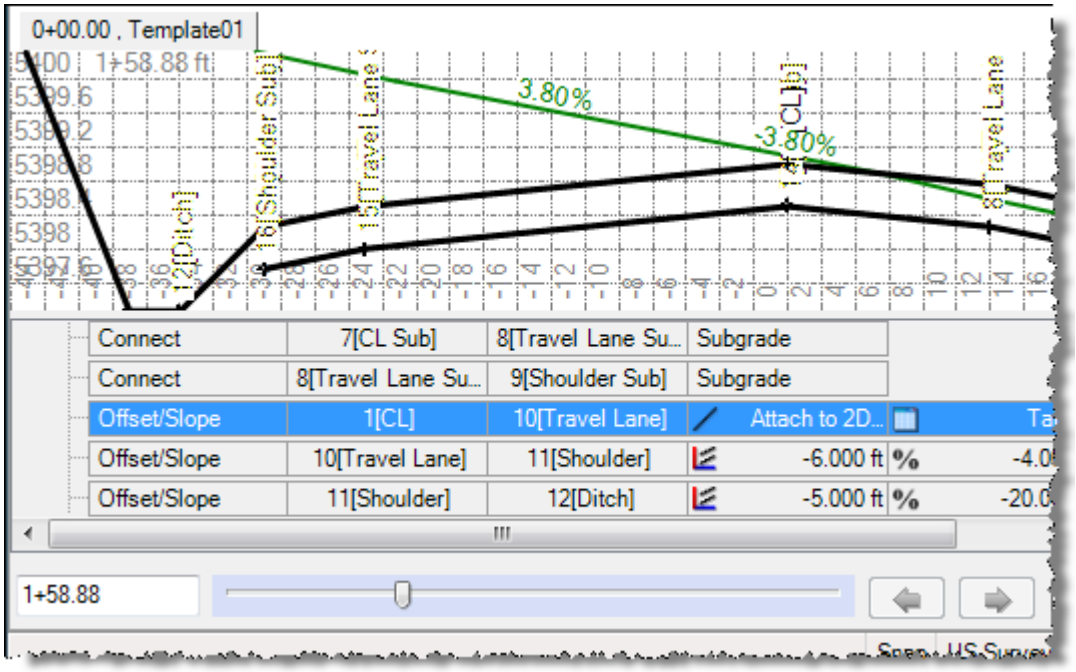
CAD Polyline displays in the **Offset** field.



6. Click the **Save** button.

   The left edge of the left travel lane is now dependent on the location of the CAD polyline.

7. To see how the template changes in relation to the existing surface and the CAD polyline along the length of the corridor, use the slide control located beneath the **Instructions** list.

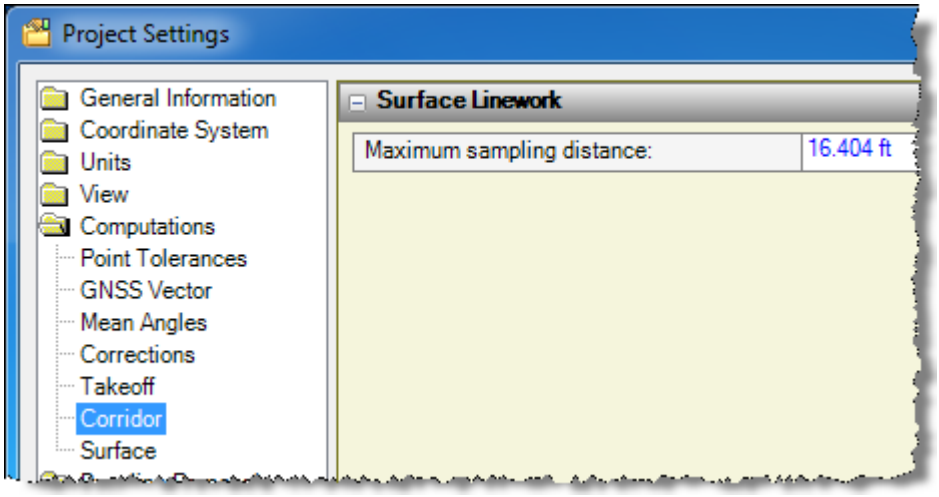


Step 10. Verify the maximum sampling distance

Corridor templates create a surface that is "sliced" at the major horizontal and vertical components of the alignment. Additional slices are created at intervals (sampling distances) defined in the project settings. In this step, you will verify the sampling distance setting is correct.

1. Select **Project > Project Settings**.

2. In the **Project Settings** dialog, select **Computations > Corridor** in the navigation pane.



You could decrease the **Maximum sampling distance** to cause more slices to be created, which would result in a smoother surface in horizontal and vertical curves. However, for this tutorial you will not change the default value.

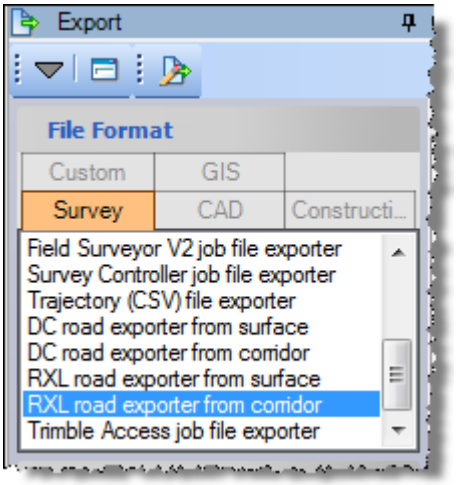
3. Click the **Cancel** button.

You are now ready to export the corridor.

Step 11. Export the corridor

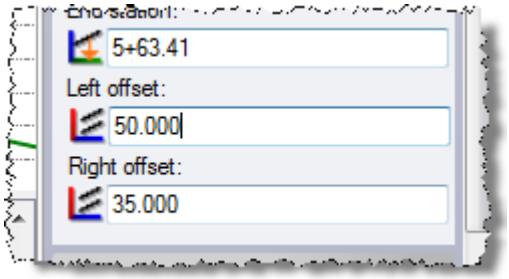
In this step, you will export the newly create corridor as an RXL file.

1. Select **File > Export.** Or, click the **Export** icon on the toolbar.
2. In the **Export** pane, select the **Survey** tab. Then select **RXL road exporter from corridor** in the list.



3. In the **Left offset** field enter *50.* In the **Right offset** field enter *35.*

These distances ensure the width of the entire corridor is included in the exported surface.



4. In the **File Name** section, select the **More** button and select the location to which you want to export the file.
5. Click the **Export** button.

   You are done working with the corridor, so you can now close the project.
6. Select **File > Close Project**.

   The **Save Changes** dialog displays. If you saved the project to a new location or with a new name, you can click **Yes**. Otherwise, click **No**.