

# Chapter 9

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## Cross Sections

### Learning Objectives

**After completing this chapter, you will be able to:**

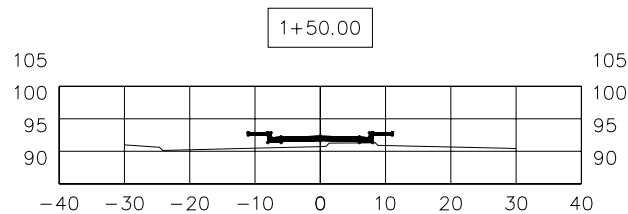
- *Understand sections.*
- *Know about sample lines.*
- *Create sample lines using different methods.*
- *Edit sample lines.*
- *Create section views.*
- *Understand section view data bands.*
- *Add section labels.*
- *Understand quantity takeoffs.*
- *Compute materials.*
- *Generate takeoff reports.*

## OVERVIEW

In AutoCAD Civil 3D, a cross section provides a graphical view of the terrain or surface elevations along a linear feature cut at a certain angle across a horizontal alignment. To create a cross section, you need at least two Civil 3D objects such as an alignment and a surface. Thus, a cross section consists of elevation data along any linear feature. The major components of a section are vertices or points at which one grade line ends and another grade line starts. The other component of the section is the line segment that represents the surface grade between two vertices or grade break points.

Civil 3D allows you to create sections from surfaces, corridors, corridor surfaces, and pipe networks along a linear object.

The section created at a particular station or a range of stations can be viewed using a section view. These section views are the graphical representation of the elevation data or an assembly (in case of corridor sections) placed at a particular station. Figure 9-1 shows a typical corridor section view of a section at a station.



*Figure 9-1 A typical cross section view created in civil 3D*

## SAMPLE LINES

To create cross sections in Civil 3D, you need to create sample lines. Sample lines are the linear objects that are used to cut sections across an alignment or a corridor. These lines represent the direction along which sections are cut. A sample line consists of two components, sample line style and sample line label style. A group of sample lines is called Sample Line Group. You can create multiple groups of sample lines for a single alignment. The sample line group controls the display of sample lines, sections, and section views. The sample line group is available in the parent alignment collection in the **Prospector** tab of the **Toolspace** palette.

Sample lines are created using the **Sample Lines Tools** toolbar. Before you start creating sample lines, you need to have an alignment. It is better to create a corridor and corridor surfaces before creating sample lines because corridor can provide you more information such as materials used and surfaces with cut and fill areas.

# Creating Sample Lines

**Menu:** Sections > Create Sample Lines  
**Shortcut Keys:** ALT+O+C

To create sample lines, choose **Sections > Create Sample Lines** from the menu bar; the *Select an alignment <or press enter key to select from list>*: prompt will be displayed at the command line. Select an alignment; the **Sample Lines Tools** toolbar will be displayed. Next, choose the button next to the **Current sample line group** drop-down list in the toolbar; the **Create Sample Line Group** dialog box will be displayed, as shown in Figure 9-2. This dialog box is used to create a group of sample lines.

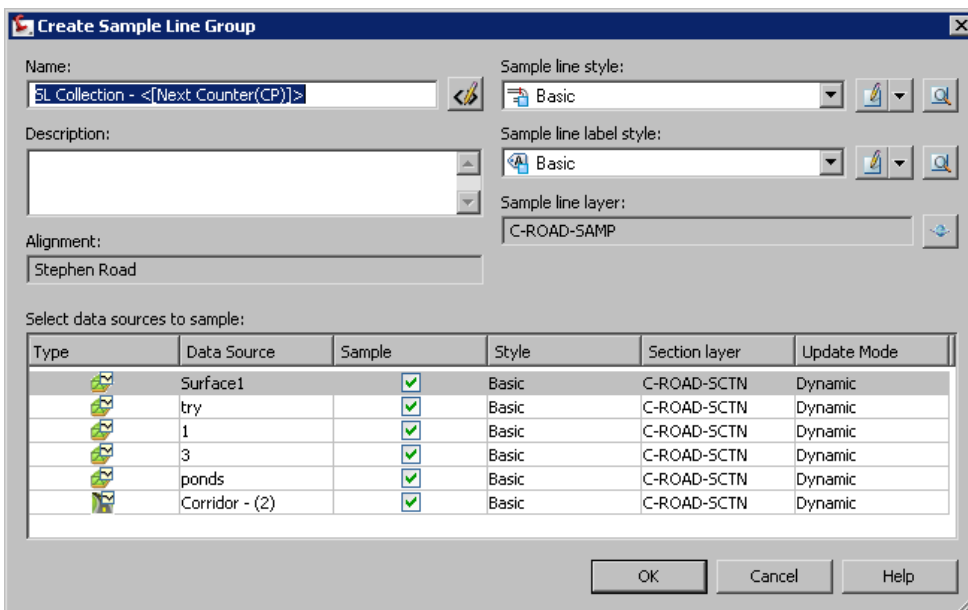


Figure 9-2 The Create Sample Line Group dialog box

In the dialog box, enter the name of the sample line group in the **Name** edit box. Optionally, enter description of the sample line in the **Description** text box. Now, select a line style and label style from the **Sample line style** and **Sample line label style** drop-down lists, respectively. The **Sample line layer** option in this dialog box is used to specify the layer on which sample line is created. To create a new layer for the sample line, choose the button on the right of the **Sample line layer** option; the **Object Layer** dialog box will be displayed. In this dialog box, you can use the required tools to create a new layer and then assign it to the sample line. The **Alignment** text box in the **Create Sample Line Group** dialog box is used to display the name of the parent alignment under which the sample line group belongs.

In the **Create Sample Line Group** dialog box, the **Select data sources to sample** area displays the type of existing data source and the section style. In this area, the **Type** column displays the symbol for data sources, whereas the **Data Source** column displays the name of the data source from where elevations will be sampled. Clear the check boxes in the **Sample** column, if you do not want to sample any data source. The **Style** column displays the default style of

the section. To change the style, click in the cell of this column; the **Pick Section Style** dialog box will be displayed. Select the required style from this dialog box and then choose the **OK** button. The **Section layer** column in this area displays the default layer on which the section will be created. To modify the layer, click in this column cell; the **Object Layer** dialog box will be displayed. Select the required layer from the dialog box and choose the **OK** button. The **Update Mode** column displays the status of the update mode of the section. To specify the status of the update mode, click in the cell of the **Update Mode** column; a drop-down list will be displayed. Select the **Dynamic** option from the drop-down list to enable the sections to update dynamically to the changes made in the sample lines. If you select the **Static** option from the drop-down list, it will not affect the sections even if you modify the sample lines geometry or position.

Once you have specified the information in the **Create Sample Line Group** dialog box, choose the **OK** button; the **Create Sample Line Group** dialog box will be closed and you will be prompted to specify a station. You can specify stations by using different options available in the **Sample Lines Tools** toolbar, as shown in Figure 9-3. The tools in the **Sample Lines Tools** toolbar are used to create and edit sample lines along the alignment. The tools in the toolbar are discussed next.

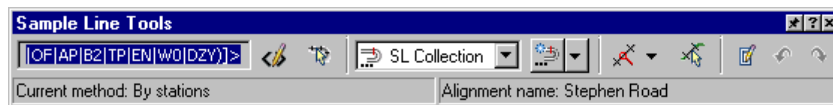


Figure 9-3 The Sample Line Tools toolbar

### Click to edit name template



This tool is used to edit the default name of the sample line. Choose the **Click to edit name template** button; the **Name Template** dialog box will be displayed. In this dialog box, specify the name of the sample line to be created in the **Name** edit box and then choose the **OK** button; the dialog box will be closed and the name of the sample line group that you have specified will be displayed in the text box next to it.

### Alignment picker



This tool is used to select the required alignment to create sample line. Invoke this tool from the **Sample Lines Tools** toolbar. Next, select the alignment from the drawing or press ENTER to display the **Select Alignment** dialog box to select the required alignment from the list of alignment(s) displayed in it.

### Current sample line group

The **Current sample line group** drop-down in the **Sample Lines Tools** toolbar displays the list of all sample line groups. You can select the required sample line group from this drop-down list and edit it.

### Sample line group actions



Choose the down-arrow on the right of the button next to the **Current sample line group** drop-down list; a flyout will be displayed, as shown in Figure 9-4. The options in the flyout are discussed next.

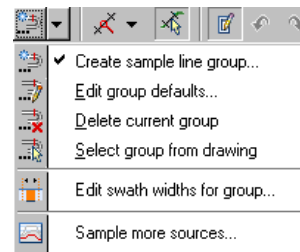


Figure 9-4 Flyout showing different options

**Create Sample Line group**

On choosing this default button, the **Create Sample Line Group** dialog box will be displayed again. Use this dialog box to create a new sample line group and choose the **OK** button; the name of the sample line group will be added in the **Sample line group** drop-down list.

**Edit group defaults**

If you choose this button, the **Edit Sample Line Group** dialog box will be displayed, as shown in Figure 9-5. Specify the options in this dialog box to edit details of the selected sample line group and then choose the **OK** button; the selected sample line group will be modified. Now, you can select this group from the **Sample line group** drop-down list in the **Sample Line Tools** toolbar .

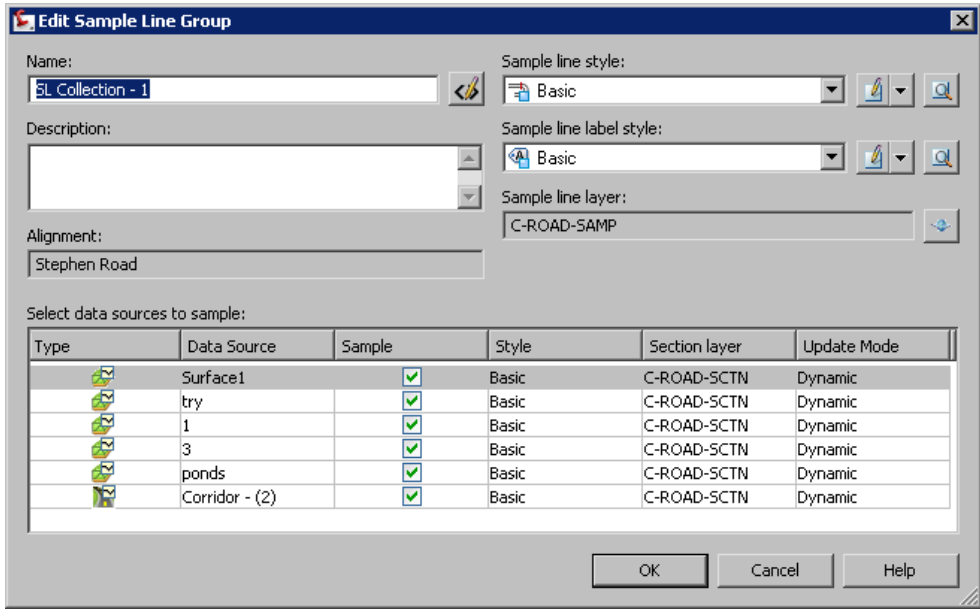


Figure 9-5 The *Edit Sample Line Group* dialog box

**Delete current group**

Choose the **Delete current group** option to delete the current sample line group from the **Sample line group** drop-down list. Ensure that the required group from the **Sample line group** drop-down list is selected.

**Select group from drawing**

Choose this option to select a sample line group from the drawing. On choosing this option, you will be prompted to select the alignment sample line. Select the sample line of the required group; the selected sample line group will become the current group.

**Edit swath widths for group**

On choosing this option, the **Edit Sample Line Widths** dialog box will be displayed. Specify the left and right swath width values in the **Left swath width** and **Right swath width** edit boxes, respectively, and then choose the **OK** button. The swath width value represents the left and right offset distances from the centerline.

### Sample more sources

On choosing the **Sample more sources** option from the flyout; the **Section Sources** dialog box will be displayed, as shown in Figure 9-6.

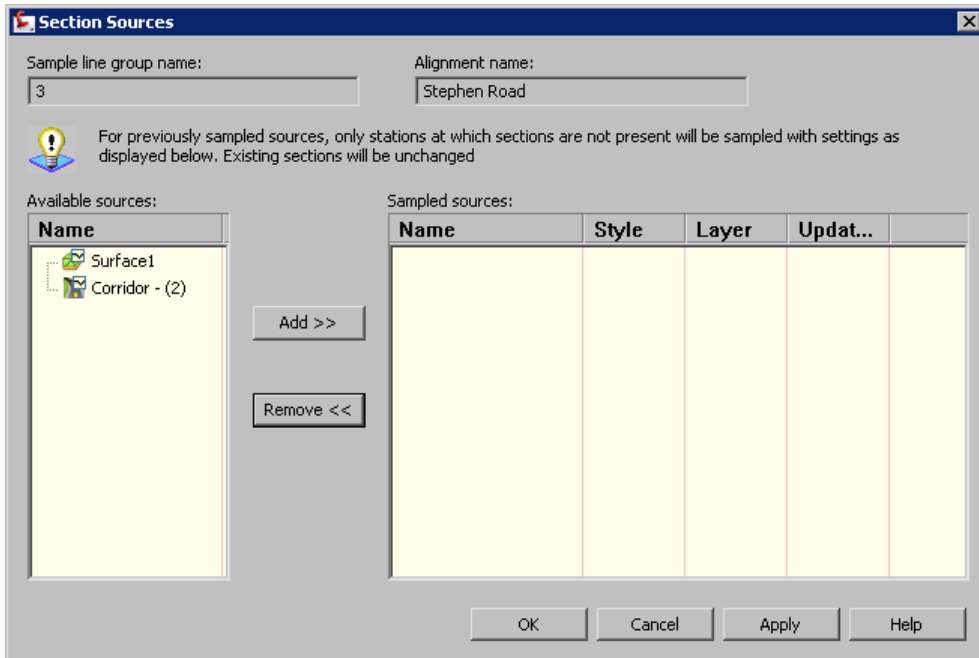


Figure 9-6 The Section Sources dialog box

In this dialog box, select the sources to be sampled from the **Available sources** area and then choose the **Add** button to add the selected source to the **Sampled sources** table of it. Choose the **OK** button; the dialog box will be closed and the selected sample sources will be added to the current sample line group.

### Sample line creation methods

This is the second button on the right of the **Current sample line group** drop-down list. Choose the down-arrow on the right of this button; a flyout showing different methods of creating sample lines will be displayed, as shown in Figure 9-7. The methods displayed in the flyout are discussed next.

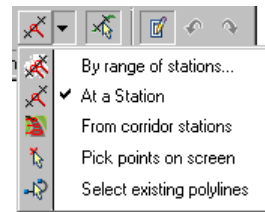
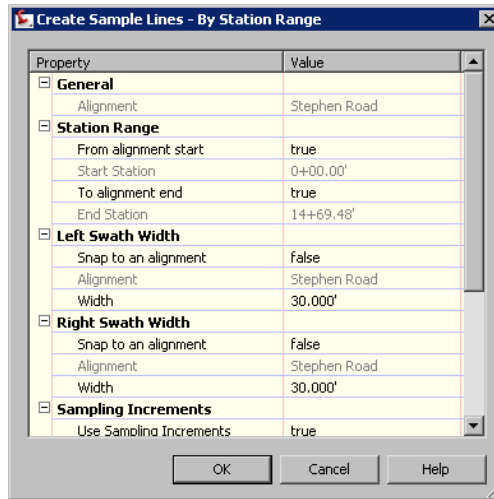


Figure 9-7 Flyout displaying the sample lines creation methods

#### By range of stations

This method is used to create sample lines by specifying the station range. On choosing this option, the **Create Sample Lines - By Station Range** dialog box will be displayed, as shown in Figure 9-8. This dialog box is used to specify different settings before creating sample lines.

In the **Station Range** collection, set the values of the **From alignment start** property to **false**. On doing so, the value of the **Start Station** property will be highlighted. Click in the **Value** field of the **Start Station** property and enter the required station value in the **Value** column. Alternatively, choose the button displayed on the right of the value in the



**Figure 9-8** The *Create Sample Lines - By Station Range* dialog box

**Value** field of the **Alignment** property to select the station from the drawing. Similarly, specify the **End Station** of the station range in the **Value** column.



**Note**

*If you set the values of the **Start station** and **End station** properties to **true**, the sample line will be created from the complete station range of the alignment.*

In the **Left Swath Width** collection, you can set the value of the **Snap to an alignment** property to **true**. This will enable the sample lines to snap the swath widths to the alignment offsets. On doing so, the **Alignment** property value will be highlighted. Click in the **Value** field of the **Alignment** property; a button will be displayed on the right in the **Value** column. Choose the button; the **Sample line left swath offset alignment** dialog box will be displayed. Select the offset alignment from the drop-down list in the dialog box and choose the **OK** button; the dialog box will be closed and the sample line will snap the swath width to the selected offset on the left of the alignment.

By default, the value of the **Snap to an alignment** property is set to **false** to enable the sample line to snap the swath width to the specified swath distance. The **Width** property of the **Left Swath Width** collection specifies the width of the left swath. You can specify the swath width in the **Value** field of the **Width** property. Similarly, you can specify the value of the right swath for the sample line in the **Right Swath Width** collection. You can also set the values of sampling increments and specify to add additional sample controls in this dialog box. Once you have specified the settings, choose the **OK** button; the dialog box will be closed.



**Note**

*The method of creating sample lines as well as the alignment with which sample lines are associated are displayed at the bottom of the **Sample Line Tools** toolbar.*

**At a station**

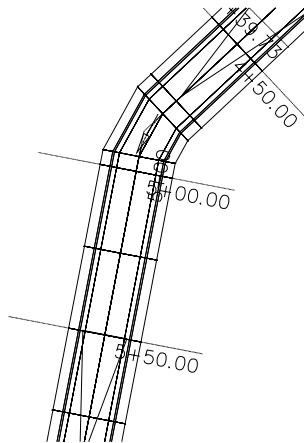
This method is used to create a sample line by specifying an individual station. On choosing this option; you will be prompted to specify the station. Select the required station from the drawing; you will be prompted to specify the left swath width. Enter the width at the command line or specify it by picking points from the drawing. Similarly, specify the right swath width when prompted to do so.

**From corridor stations**

This method is used to create sample lines by specifying corridor stations. On choosing this option, the **Create Sample Lines - From Corridor Station** dialog box will be displayed. In this dialog box, specify the settings for sample lines, as explained in the **By range of stations** method. Note that the corridor name will be displayed in the **General** collection of the dialog box.

**Pick points on screen**

This method is used to create a sample line by picking points from the screen. On choosing this option, you will be prompted to specify the start point. Select the start point from the drawing and then the end point when prompted to do so. Finally, press ENTER after picking the start and end points; a sample line will be created between the two points, as shown in Figure 9-9. Press ENTER again to end the command.



*Figure 9-9 Sample lines added by using the **Pick points on screen** method*

**Select existing polylines**

This method is used to create a sample line by using the existing polylines. You can use this method, if there are polylines in the drawing. On choosing this option, you will be prompted to select polylines. Select the required polylines and press ENTER; the polylines will be converted into sample lines. Press ENTER again to end the command.

**Select/Edit SampleLine**

This tool is used to select and then edit the sample line parameters. Choose the **Select/Edit SampleLine** button from the **Sample Line Tools** toolbar; the **Edit Sample**



**Line** dialog box will be displayed. Note that this dialog box is empty. Now, select the required sample line from the drawing; the dialog box will be populated with the parameters and values of the selected sample line, as shown in Figure 9-10.

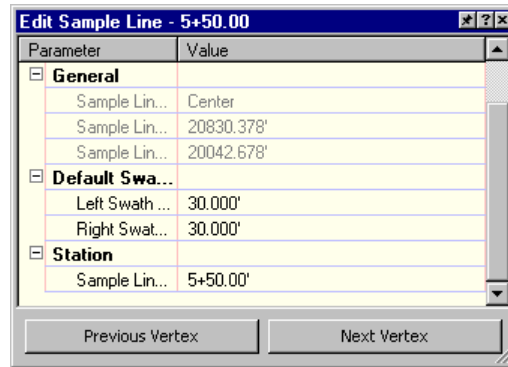


Figure 9-10 The *Edit Sample Line* dialog box

### SampleLine Entity View



This tool is used to toggle the display of the **Edit Sample Line** dialog box between two selections of different sample lines. To use this tool, choose the **SampleLine Entity View** button from the **Sample Line Tools** toolbar; the **Edit Sample Line** dialog box will disappear. Next, choose the **Select/Edit SampleLine** button, the **Edit Sample Line** dialog box will appear again, but with empty fields. Next, select the required sample line from the drawing; the dialog box will be populated with sample line parameters. Now, choose the **SampleLine Entity View** button again; the dialog box will disappear. Thus, you can toggle the display of the **SampleLine Entity View** dialog box.

Once you have specified the sample line parameters and selected the methods of creating sample lines by using the **Sample Line Tools** toolbar, you can create the required sample lines group. Press ENTER after creating sample lines; the toolbar will be closed and the section will be cut using the sample lines cutting across the alignment. After the section is created using sample lines, the next step is to create section views to display the section of the surface.



#### Note

*Sample lines are added in the **Sample Line Groups** node under the parent alignment head in the **alignments** collection of the **Prospector** tab. Sections are added in the **Sections** node of the collection of the parent sample line. Also, note that the section and section views have their own properties and styles.*

## CREATING SECTION VIEWS

As mentioned above, the next step after creating the sample line group is to create section views to view sections. In AutoCAD Civil 3D, you can create two types of section views, single section view and multiple section view. Section views are added in the collection of parent sample line in the **Prospector** tab. The process to create both types of section views is discussed next.

## Creating a Single Section View

**Menu:** Sections > Create Section View  
**Shortcut Keys:** ALT+O+V

To create a single section view at a particular station, choose **Sections > Create Section View** from the menu bar; the **Create Section View - General** wizard will be displayed, as shown in Figure 9-11.

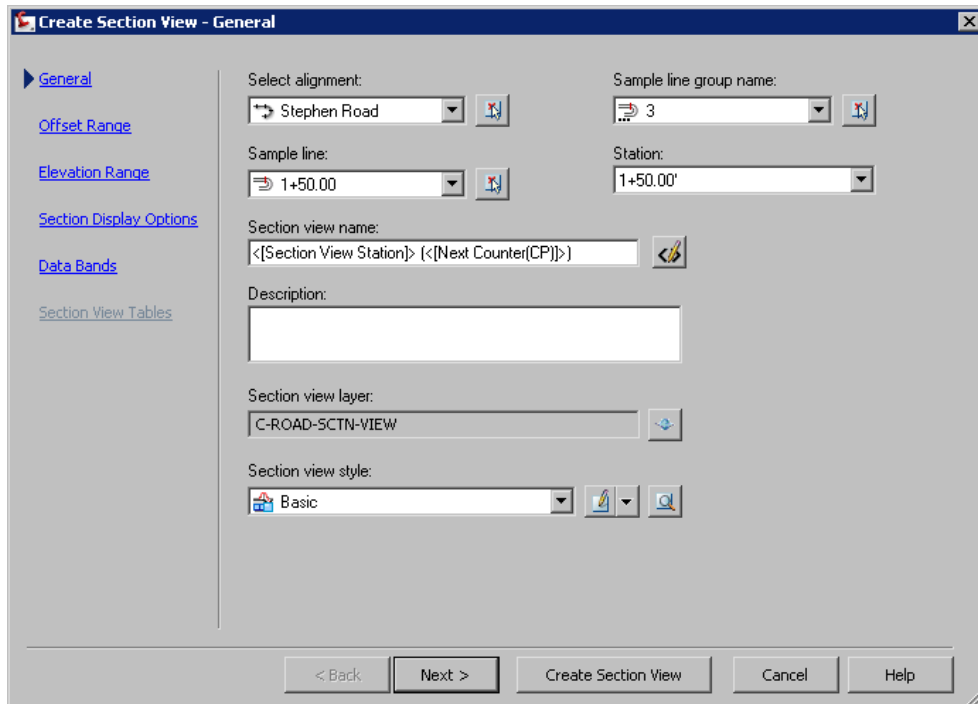


Figure 9-11 The **Create Section View - General** wizard

There are six options (pages) available in this wizard namely, **General**, **Offset Range**, **Elevation Range**, **Section Display Options**, **Data Bands**, and **Section View Tables**. The options in this wizard are discussed in detail next.

### The General Page

The **General** page in the **Create Section View** wizard displays the general parameters to be set for the section view. This page is displayed by default when you invoke the wizard. This page is used to specify the basic information about the section view to be generated. The basic information that can be specified on this page are parent alignment, sample line group name, sample line, station, style, and layer. Various options in this page are discussed next.

#### Select alignment Area

The **Select alignment** area in the **General** page of the wizard is used to specify the name of the parent horizontal alignment for which the section view is to be created. Select the

name of the parent alignment from the drop-down list in this area. Alternatively, you can also choose the **Select from the drawing** button available next to the drop-down list.

#### **The Sample line group name Area**

This area is used to specify the name of the sample line group of the sample line from which the section view will be created. Select the name of the sample line group from the drop-down list available in this area. Alternatively, choose the alignment sample line from the drawing by choosing the **Select from the drawing** button available next to this drop-down list.

#### **The Sample line Area**

This area is used to specify the sample line from which the section view will be created. To specify the sample line, select the name of the sample line group from the drop-down list available in this area. Alternatively, choose the sample line from the drawing by choosing the **Select from the drawing** button available next to this drop-down list.

#### **The Station Area**

This area is used to specify the station value of the sample line from which the section view will be created. You can view the list of available stations from the drop-down list in this area. Note that as you change the station value, there will be corresponding change in the sample line value in the **Sample line** area and vice-versa.

#### **The Section view name Area**

The **Section view name** edit box is used to specify the default name of the section view. Choose the **Click to edit name template** button on the right of this edit box; the **Name Template** dialog box will be displayed. Enter a name for the section view in the **Name** edit box of this dialog box and then choose the **OK** button. Optionally, enter a description of the section view in the **Description** text box.

#### **The Section view layer Area**

The options in this area displays the default layer on which the section view will be created. To edit this layer, choose the button on the right of this area; the **Object Layer** dialog box will be displayed. You can specify various settings in this dialog box to edit the default layer.

#### **The Section view style Area**

The options in this area displays the default section view styles. To specify a style of the section view, select a style from the **Section view style** drop-down list. Choose the down-arrow on the right of this area; a flyout will be displayed. You can edit the default style or create a new style for the section view by choosing the respective options from the flyout.

### **The Offset Range Page**

Choose the **Offset Range** option from the **Create Section View** wizard to display various options in the **Offset Range** page. This page enables you to set the offset range such as the left and right swath of the section view. The options of this page are discussed next.

### The Elevation Range area

The **Elevation Range** area of the **Offset Range** page is used to specify the range of offset by using two radio buttons, **Automatic** and **User specified**. The **Automatic** radio button is selected by default. As a result, the offset range is set automatically. The minimum and maximum length of swaths are displayed in the **Left** and **Right** fields next to the radio button selected. You can also specify the offset range manually. To do so, select the **User specified** radio button and enter the length of the left and right ranges in the respective edit boxes available next to the radio button selected.

### The Section Display Options Page

In this page, you can set the section display option. To do so, choose the **Section Display Options** option in the **Create Section View** wizard to display the **Section Display Options** page in the **Create Section View** wizard.

The **Name** column in this area displays the name of the current sections. Clear the check box available in the **Draw** column if you do not want to draw a section view of a particular section listed in the **Name** column. Select the required radio button available in the **Clip Grid** column to specify the extents of the section view grid. The extents of the section view grid will be adjusted according to the section for which you have selected the radio button in the **Clip Grid** column. The **Change Labels** column displays the label style set for the section view. To change the existing label style or to hide labels, click in the column cell of the required section; the **Select Style Set** dialog box will be displayed. Select the label style set from the drop-down list in the dialog box or select the **\_No Labels** option to hide labels, and then choose the **OK** button. The **Style** column displays the default section style. Click on the default style in the column; the **Pick Section style** dialog box will be displayed. Select the required section style from the drop-down list in the dialog box and then choose the **OK** button; the dialog box will be closed.

### The Data Bands Page

This page is used to specify the properties of data bands associated with the section view. You can display this page by choosing the **Data Bands** button in the **Create Section View** wizard. Various options in this wizard are discussed next.

#### The Select Band Set Area

This area is used to specify the set of band styles used in the section view. You can select a specific band style from the drop-down list in this area. You can also use this area to create a new band style, edit the existing band style, or copy the existing band style. To perform any of these operations, choose the down-arrow next to the drop-down list and then choose the required option from the flyout.

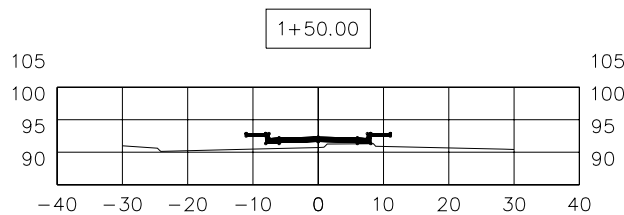
#### The List of Bands Area

This area is used to specify the location and band properties of the section view. The **Location** drop-down list in this area is used to specify the position of band with respect to the section view. Select the required option from the drop-down list to set the position of the band. Next, use the **Set band properties** area to specify the band type, style, and surfaces sampled by the sample line that supplies data for the band, including any corridor surface.

### The Section View Tables Page

This page is used to set the volume table properties of the section view. This page will not be available in the **Create Section View** wizard if the material list is not available for the drawing. Choose the **Section View Tables** option from the wizard to display various options in this page.

Once you have specified the settings for the section view, choose the **Create Section View** button from the **Create Section View** wizard; the wizard will be closed and you will be prompted to specify the origin of the section view. Click at the required location on the screen; the section view will be created and added in the drawing, as shown in Figure 9-12.



*Figure 9-12 A section view created at station 1 + 50.00*

The section view displays the title of the section view at top, section line, and elevations along the Y-axis on the left and right sides of the section view respectively, and the station values along the X-axis. The section view also displays swath widths and offsets labeled in the section view, depending upon the settings of the selected section label style.

### Creating Multiple Section Views

**Menu:** Sections > Create Multiple Section Views  
**Shortcut Keys:** ALT+O+M

To create multiple section views, choose **Sections > Create Multiple Section Views** from the menu bar; the **Create Multiple Section Views** wizard will be displayed, as shown in Figure 9-13. This wizard is used to create multiple section views from the existing sections. The options in this wizard are the same as discussed in the **Create Section View** wizard. A station range to generate multiple section views can be specified in the **Station range** area of the **General** page of the wizard. In this area, you can specify the station range automatically or manually. The **Automatic** radio button is selected by default and as a result, the station range is selected automatically. The start and end stations of the specified sample line group for multiple section views are displayed in the fields next to the selection.

Similarly, you can assign a station range manually as per your requirement. To assign the station range, select the **User specified** radio button in this area; the **Start** and **End** edit boxes on the right of the radio button will be activated. Enter the start and end station values in the respective edit boxes. Alternatively, choose the button on the right of these edit boxes and select the station from the drawing.

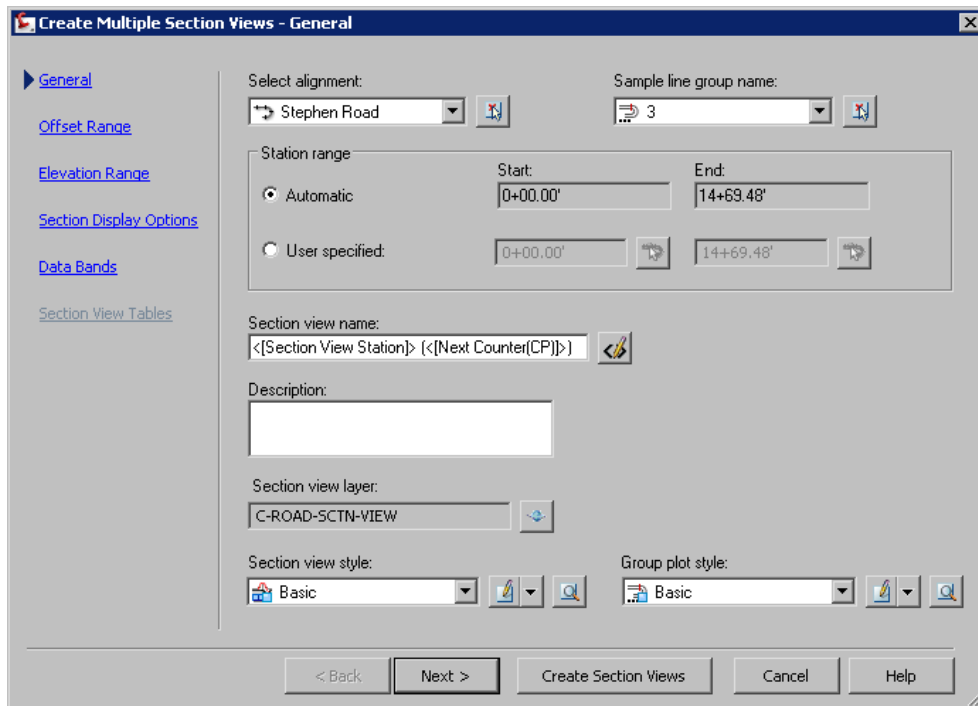


Figure 9-13 The Create Multiple Section Views wizard

Multiple section views can be plotted on a sheet. You can arrange multiple section views in rows and columns, and plot them on a sheet. The **Group plot style** area is used to specify the settings for the arrangement of multiple section views. To specify a group plot style to multiple section views, you can select the required option from the drop-down list in this area.

### Creating a Group Plot Style

You can create a new group plot style for section views. To do so, choose the down-arrow on the right of the drop-down list in the **Group plot style** area of the **Create Multiple Section Views** wizard; a flyout will be displayed. Choose the **Create New** option from the flyout, as shown in Figure 9-14.

On doing so, the **Group Plot Style - New Group Plot Style** dialog box will be displayed, as shown in Figure 9-15. In the **Information** tab of this dialog box, enter a style name in the **Name** edit box. Next, choose the **Array** tab. The options in this tab are used to specify the settings for the layout of section views on a sheet, refer to Figure 9-15.

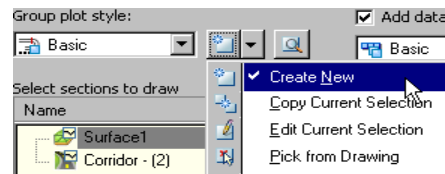


Figure 9-14 Choosing the Create New option from the flyout



**Tip.** Alternatively, to display the **Group Plot Style - New Group Plot Style** dialog box, expand the **Section View** collection, in the **Settings** tab of the **Toolspace** palette, right-click on the **Group Plot Style** option; a shortcut menu will be displayed. Choose the **New** option from the shortcut menu to display the dialog box.

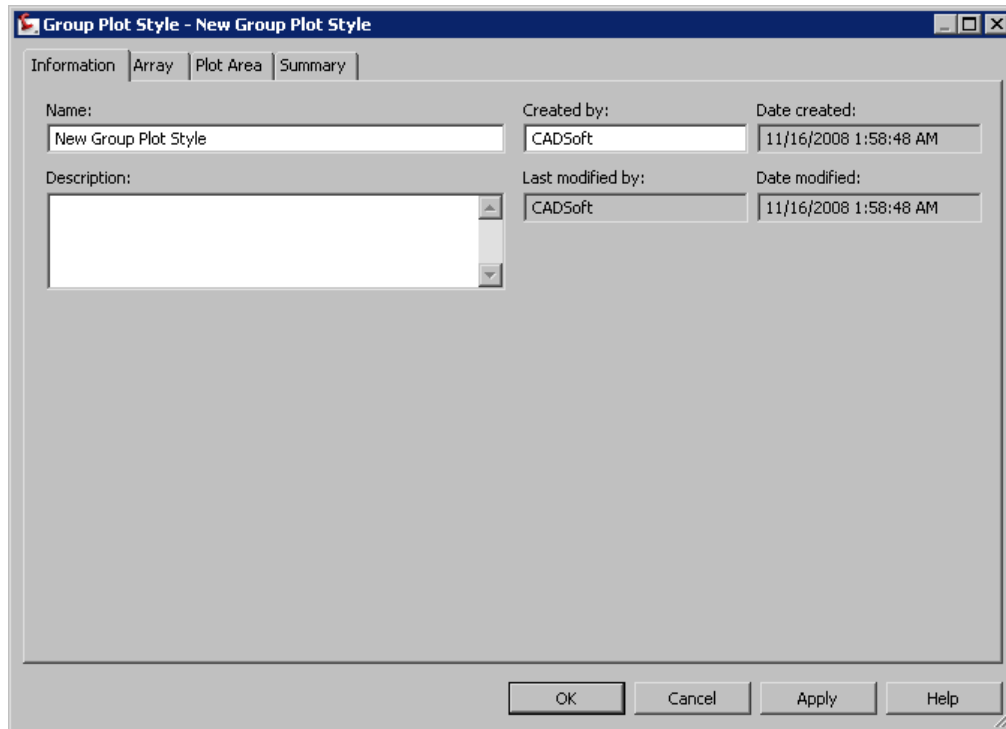


Figure 9-15 The Group Plot Style - New Group Plot Style dialog box

In the **Plot rules** area of the **Array** tab, the **By rows** radio button is selected by default. As a result, section views are plotted in rows. You can select the **By columns** radio button to plot views in columns. You can use the spinner in the **Maximum in a row** or **Maximum in a column** option to specify maximum section views in a row or in a column. Select the start corner from the **Start corner** drop-down list to plot section views.

From the **Align section views about** drop-down list, select the axis along which you want to align the section view. The options in the **Cell Sizes** drop-down list are used to determine the size or area of section views. In the **Space between the adjacent section views** area, specify the spacing between two adjacent section views in a column and a row in the respective edit boxes.

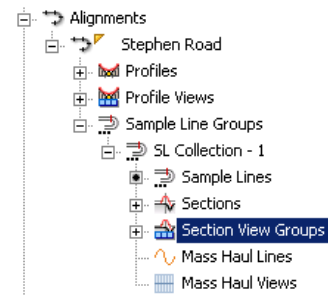
Next, choose the **Plot Area** tab from the dialog box. This tab is used to select the method of plotting section views. Selecting the **Plot all** radio button in this tab helps you plot all section views on a single sheet. Selecting the **Plot by page** radio button allows you to plot views according to the sheet style and the specified gap. Select the required sheet style from the **Sheet style** drop-down list and then specify the gap between successive pages in the **Gap between the successive pages** edit box. After specifying the required plot style, choose the **OK** button to return to the **Create Multiple Section Views** dialog box.

Multiple section view objects are added under their parent section view group in the **Section View Groups** collection of the **Prospector** tab of the **Toolspace** palette.



To view the section view name, choose the **Prospector** tab and expand **Alignments > Sample Line Groups** to display the existing sample line groups. Now, expand the required sample line group to view the sample lines of that group. Next, expand the required sample line node. Each sample line node consists of a **Sections** and **Section View Groups** collections, as shown in Figure 9-16.

The sections sampled from the parent sample line are listed in the **Sections** collection and the section views created are added and displayed under their parent section view group in the **Section Views Groups** collection.



**Figure 9-16** The expanded *Sample Line Groups* collection

## Section View Band Set

A section view band set is a set of data bands that displays annotation of the section view and other related objects such as station offset, elevations, and so on. You can place the section view band set above or below the section view. The band set consists of two types of bands, **Section Data** and **Section Segment**. The **Section Data** band is used to annotate major offsets from the centerline, section 1 and section 2 elevations, distance from centerline, and section segment grade points. The **Section Segment** data is used to annotate the length of section segments.

### Creating a Band Style - Section Data

Band types have their own band styles created and managed in the respective **Section data** and **Section Segment** nodes in the **Settings** tab. You can create your own styles and use them in section views. To do so, expand **Section View > Band Style > Section Data** in the **Settings** tab. Right-click on the **Section Data** node and choose **New** from the shortcut menu; the **Section Data Band Style - New SectionData Band Style** dialog box will be displayed. In this dialog box, enter a style name in the **Name** edit box of the **Information** tab.

Next, choose the **Band Details** tab. The options in this tab are used to specify the settings for band layout, title text, style, composing label, and so on, as shown in Figure 9-17. Choose the **Compose Label** button from the **Title text** area; the **Label Style Composer - Band Title** dialog box will be displayed. Use this dialog box to specify the title text name, content, text height, color, and so on.

In the **Layout** area of the **Band Details** tab, specify the band height, the text box width where the title text will be displayed, and the distance of the text box from the band in the **Band height**, **Text box width**, and **Offset from band** edit boxes, respectively. Select the location of the text box from the **Text box position** drop-down list to add the text box to the left or right of the section band.

In the **Labels and Ticks** area, select the points where you want to add labels. For example, selecting the **Major Increment** option will enable you to add labels only at major intervals along the band. Also, the ticks will be placed at major intervals only. Similarly, you can add labels and ticks at minor increments, centerline, sample line vertices, grade breaks, incremental distance by selecting the required option from the **Labels and Ticks** area. On the right side of this area, select the **Full band height ticks** radio button to specify the ticks to be drawn at full band height.



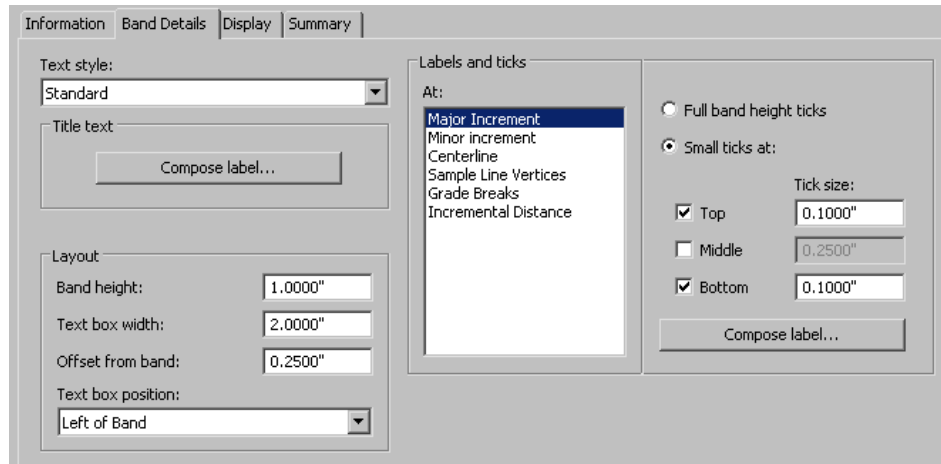


Figure 9-17 Partial view of the **Band Details** tab

This radio button will be selected by default when you select the **Centerline** option from **Labels and Ticks** area. By default, the **Small Ticks At** radio button as well as the **Top** and **Bottom** check boxes will be selected, except in the case of centerline option. The **Tick size** edit box is used to display the default tick size at top, middle, and bottom of the band. To do so, specify the required tick size value in this edit box. You can also place small ticks at top, bottom, or middle of the band by selecting the respective check boxes.

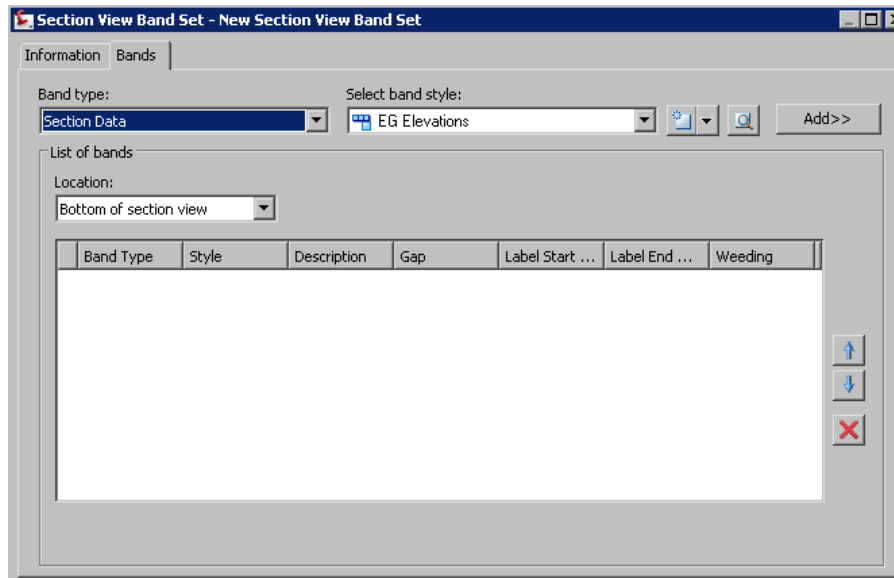
Choose the **Compose label** button from the **Title text** area; the **Label Style Composer** dialog box will be displayed, based on the option selected from the **Labels and Ticks At** area. You can use this dialog box to compose the labels to be added at the selected point such as Major Increment, Centerline, and so on. Now, choose the **OK** button to close the **Label Style Composer** dialog box. Again, choose **OK** from the **Section Data Band Style - New Band Style** dialog box; the dialog box will be closed and the new band style will be added to the **Section Data** node in the **Settings** tab.

Similarly, you can create a new band style for the **Section Segment** band type. After you have created band styles for both the **Section Data** and **Section Segment** band types, you can add them to a band set and create a new band set style to add to section views.

### Creating a Band Set Style

To create a band set style, expand **Section View > Band Styles > Band Sets** in the **Settings** tab. Right-click on the **Band Sets** node and choose **New** from the shortcut menu; the **Section View Band Set - New Section View Band Set** dialog box will be displayed. In this dialog box, specify the name of the style in the **Name** edit box of the **Information** tab.

Now, choose the **Bands** tab, as shown in Figure 9-18. This tab is used to specify the data bands to be added to the set along with band styles and positions. Select the band to be added from the **Band type** drop-down list. Next, select the corresponding band style from the **Select band style** drop-down list. In the **Location** drop-down list, select the band to add it at top or bottom of the section view. Next, choose the **Add** button; the band will be added in the **List of bands** area.



*Figure 9-18 Partial view of the **Bands** tab of the **Section View Band Set - New Section View Band Set** dialog box*

Similarly, add another data band and choose the **OK** button; the dialog box will be closed and the data band set style will be added to the **Band Sets** node in the **Settings** tab.

### Applying the Band Set

You can apply a band set before or after creating section views. To add a data band after the section views are created or to edit a data band set style, select the section view in the drawing and right-click; a shortcut menu will be displayed. Choose **Section View Properties** from the shortcut menu; the **Section View Properties- <section view name>** dialog box will be displayed. Choose the **Bands** tab from the dialog box. Next, select the band type, band type style, and location and then choose the **Add** button to add them in the **List of bands** area. You can also choose the **Import band set** button from the **Section View Properties- <section view name>** dialog box to import an existing band set to be added into the current section view. On doing so, the **Band Set** dialog box will be displayed. Select the required band set from the drop-down list in the dialog box and choose the **OK** button; the bands in the band set will be added in the **List of bands** area. Next, choose the **OK** button from the **Section View Properties - <section view name>** dialog box; the dialog box will be closed and the band set will be added to the section view at the specified location.

To apply band set to multiple section views, select any of the section views from the drawing and right-click; a shortcut menu will be displayed. Choose **Section View Group Properties** from the shortcut menu; the **Section View Group Properties - <section view group name>** dialog box will be displayed. Choose the **Section Views** tab from this dialog box and then choose the button in the **Change Band Set** column; the **Select a section view band set** dialog box will be displayed, as shown in figure 9-19. Select the required band set style from the drop-down list in the dialog box and choose the **OK** button; the **Section View Bands - <section view group name> - Set Properties** dialog box will be displayed. This dialog box is used to select source surface for data band annotation.



**Figure 9-19** The *Select a section view band set* dialog box in the *Sections* tab

The **Location** drop-down list in the **List of bands** area in this dialog box specifies the location of the data band annotation in the section view. Select the required option from the drop-down list to specify the location. The **Band Type** column in the **List of bands** area displays the type of data band specified in the band set property. The **Style** column in this area specifies the style specified in the band set properties.

Now, click in the cell of the **Surface 1** column for the required band type and select the required surface from the drop-down list. **Surface 1** is the surface sampled by sample lines to provide data for data bands. This surface can also include any type of corridor surface. Similarly, click in the cell of the **Surface 2** column and select the required surface from the drop-down list for the required band type. **Surface 2** is the additional surface sampled by sample lines to provide data for the **Section Data** band only. This surface can also include any type of corridor surface. After specifying source surfaces and location for data bands, choose the **OK** button from the **Section View Bands - <section view group name> - Set Properties** dialog box will be closed. Also, the **Section View Group Properties- <section view group name>** dialog box will be displayed. Choose the **OK** button from the dialog box; the dialog box will be closed and the data bands will be added to multiple section views.

## Adding Section View Labels

**Menu:** Sections > Add Section View labels > Add Section View Labels

To add grade or offset labels to a section view, choose **Sections > Add Section View Labels > Add Section View Labels** from the cascading menu, as shown in Figure 9-20.

On doing so, the **Add Labels** dialog box will be displayed. Make sure the **Section View** option is selected from the **Feature** drop-down list. Next, select the type of label that you want to add from the **Label type** drop-down list. There are two options in this drop-down list, **Grade** or **Label**. Select the label style from the **Grade label style** or **Offset elevation label style** drop-down list available according to the label type selected. Note that options in the **Label type** drop-down list will vary depending upon the type of option you select from the **Feature** drop-down list. Next, choose the **Add** button; you will be prompted to select the section view. Select the required

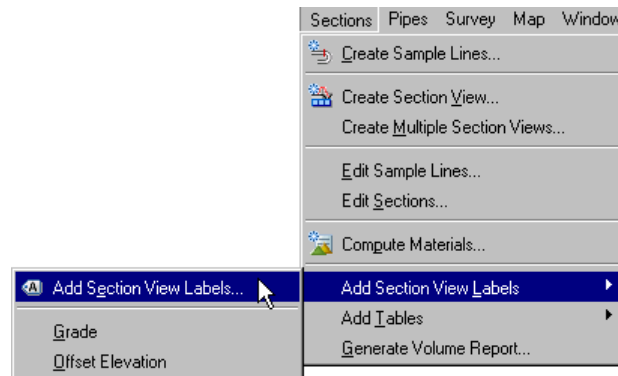


Figure 9-20 Adding Section View labels

section view and follow prompts to add the labels. Next, press ESC to end the command. Now, choose the **Close** button from the **Add Labels** dialog box to close it.

Note that if you want to add the **Grade** labels or the **Offset Elevation** labels using default label styles, choose **Sections > Add Section View labels > Grade/Offset Elevation** from the menu bar.

The **Grade** labels styles and **Offset Elevation** label styles are listed in the **Label Styles** node of the **Section View** collection in the **Settings** tab. To create a new label style, choose the **Settings** tab and expand **Section View > Label Styles**. Next, select the required **Offset Elevation** or **Grade** sub-node and right-click on it; a shortcut menu will be displayed. Choose **New** from the shortcut menu; the **Label Style Composer** dialog box will be displayed. You can use this dialog box to create a new label style.

## Sample Line Properties

To view and edit the properties of a sample line, select the required sample line from the drawing and right-click; a shortcut menu will be displayed. Choose **Sample Line Properties** from the shortcut menu; the **Sample Line Properties - 6+50.00** dialog box will be displayed, as shown in Figure 9-21. The tabs in this dialog box are discussed next.



**Tip.** Alternatively, expand the sample line group node with which the required sample line is associated. Right-click on the required sample line and choose **Properties** from the shortcut menu.

### The Information Tab

The **Information** tab is used to edit the name of a sample line in the **Name** edit box and select a sample line style from the **Object style** drop-down list.

### The Sample Line Data Tab

The **Sample Line Data** tab is used to view the sample line properties. In this tab, the **Lock to the Station** check box is selected by default. As a result, the position of the sample line is modified if its station value is changed. Clear the check box to enable the sample line to remain in its original position even if the parent alignment is modified.

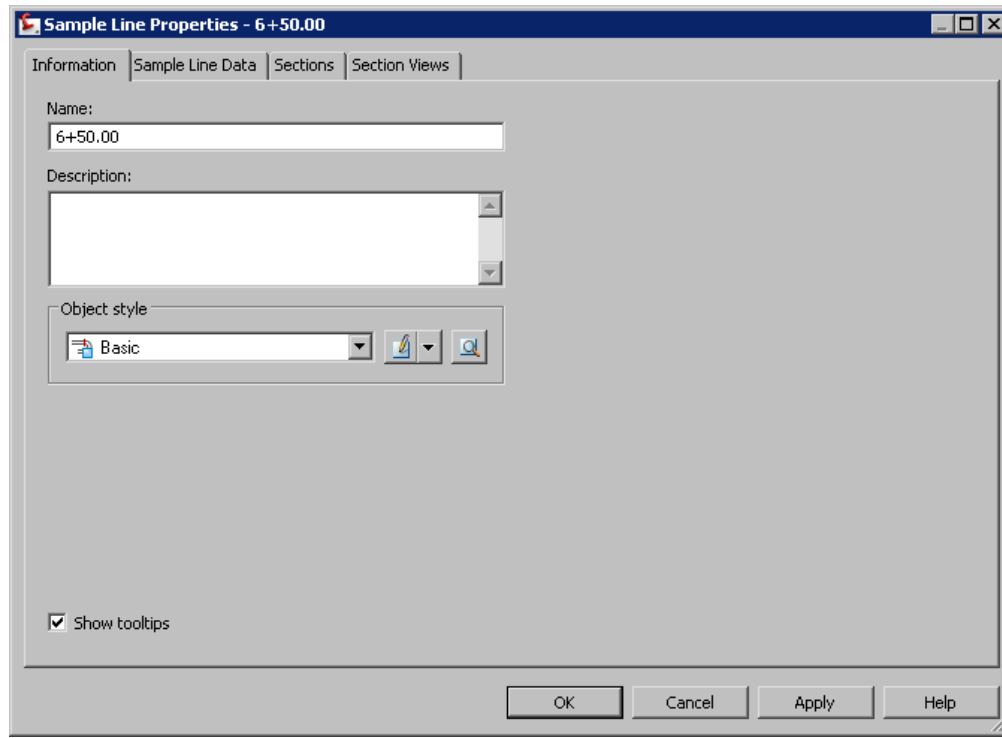


Figure 9-21 The *Sample Line Properties - 6+50.00* dialog box

### The Sections Tab

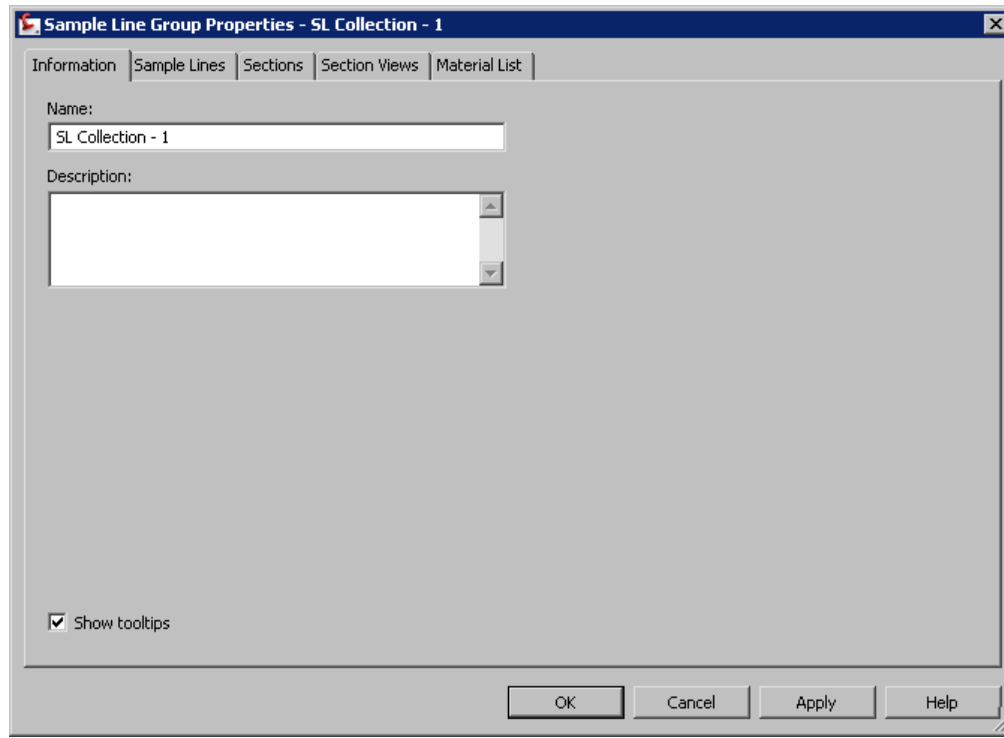
The **Sections** tab is used to display the properties of sample lines that are used to create section views. You can modify the update mode, layer, and style of sample line in this tab. The **Offsets** columns in this tab specifies the left and right offset values of the section view that is created along the sample line. The **Elevations** column specifies the minimum and maximum elevations of the sections created using the sample line.

### The Section Views Tab

The **Section Views** tab is used to view and edit the properties of the section views associated with sample line. Using this tab, you can modify the layer and style of the section view created from sample line.

## Sample Line Group Properties

To view the sample line group properties, expand the **Alignments** collection from the **Prospector** tab of the **Toolspace** palette; the existing alignments will be displayed. Now, expand the required alignment node with which the sample line group is associated. Next, expand the **Sample Line Groups** node under the required alignment node; the existing sample line groups will be listed in this node. Right-click on the required sample line group; a shortcut menu will be displayed. Choose **Properties** from the shortcut menu; the **Sample Line Group Properties - SL Collection - 1** dialog box will be displayed, as shown in Figure 9-22. The tabs in this dialog box are discussed next.



*Figure 9-22 The Sample Line Group Properties - SL Collection - 1 dialog box*

### The Information Tab

This tab is used to view the name of the sample line group. You can modify the name of the sample line group by entering a new name in the **Name** edit box. Optionally, enter a description for the sample line group in the **Description** text box.

### The Sample Lines Tab

This tab is used to view and edit the properties of sample lines included in the sample line group. You can modify the values for the layer, style, left offset and right offset of the sample line by double-clicking in the respective columns of the tab. Choose the **Edit Sample Group labels** button; the **Sample Line Labels <sample line group name>** dialog box will be displayed. You can use this dialog box to modify the sample line labels style for the group.

### The Sections Tab

This tab is used to view and edit the properties of the section included in the sample line group. In this tab, the **Name** column of the **Sections list** area displays the name of the sections associated with the selected sample line group. In this area you can also use various options to modify the style of the section, update mode, and layer of sections from respective columns displayed in it. Next, choose the **Sample more sources** button; the **Section Sources** dialog box will be displayed. You can use this dialog box to sample the sections of the selected sample line group again.

### The Section Views Tab

This tab is used to view and edit the properties of section views associated with the selected sample line group. The **Section View** column in the **Section views list** area displays the name of section views. In this tab, you can modify the group label style, section view style, band set style, and section display settings. The **Section Display** column displays the section display settings. To modify these settings, choose the button in the **Section Display** column; the **Section Display Controls - Section View Group - <group name>** dialog box will be displayed. You can use this dialog box to modify the display options of the section views of the sample line group.

To display the profile grade point in the section view, choose the button in the **Profile Grade** column; the **Profile Grade Points - Section View Group - <group name>** dialog box will be displayed. You can use this dialog box to select the required alignment whose profile grade is to be displayed in the section view.

### The Material List Tab

This tab is used to view and edit the material list of the sample line group. You can also add and delete materials using this tab. To add a new material to the list, choose the button on the right of the **Add new material** button; the **Name Template** dialog box will be displayed. Specify the name of the material in this dialog box and choose the **OK** button. Next, choose the **Add new material** button; the material will be added in the **Material Name** column.

In the **Define material** area of the **Material List** tab, ensure that the **Surface** option is selected from the **Data type** drop-down list so that the type of data that will be compared and processed is a surface when you define a material. You can also select the type of data as a corridor shape. To do so, select the **Corridor shape** option from the **Data type** drop-down list when the material quantity type in the **Quantity Type** column of the **Material List** tab is set to **Structures**. Next, select the corridor shape from the **Select corridor shape** drop-down list.

Now, choose the button on the right of the **Select surface** or **Select corridor shape** drop-down list; the selected surface or the corridor shape will be added in the **Material Name** column under the added material.

The **Condition** column in the **Material List** tab specifies the criteria for material calculation. There are five different types of conditions, **Above**, **Below**, **Base**, **Compare**, and **Include**. The **Above** condition specifies that the material above the selected surface will be included in the material definition. The **Below** condition specifies that the area below the selected surface will be included in the material definition. The **Base** condition specifies that the selected surface is the surface to be compared against the **Compare** surface. This condition is used when the quantity type in the **Quantity** column is set to **Earthworks**. The **Include** condition specifies that the corridor shape is included in the structure type definition.

The **Quantity Type** column specifies the type of quantity to be calculated. To specify the quantity type, click in the cell of the **Quantity Type** column and select the required quantity type from the drop-down list. There are five options in the list, **Cut**, **Fill**, **Cut and Refill**, **Earthworks**, and **Structures**. The **Cut** option is used to calculate the quantity of material to



be removed. The **Fill** option is used to calculate the quantity of the material to be added. The **Cut** and **Refill** option is used to specify the area cut and refilled with the fill material. The **Earthworks** option is used to calculate the total cut and fill area by comparing two surfaces (EG and FG surfaces). The **Structures** option is used to calculate the volume of the corridor shapes such as volume of the sidewalk in a corridor.

The **Cut Factor** and **Fill Factor** columns display the total expansion and contraction factors of the cut and fill materials (soil). Generally, the volume of the material expands after its removal and gets compacted while filling. The expansion and contraction of the material depends upon the soil types and soil conditions. The cut and fill factors indicate the requirements of additional material volume. The **Refill Factor** column specifies the factor to determine the quantity of the cut material that can be reused as fill material.

The **Shape Style** column in the **Material List** tab, displays the default style to display the material in a section view. To modify the style, click in the **Shape Style** column of the corresponding material in the material list; the **Pick Material Section Style** dialog box will be displayed. Select the required style from the dialog box and choose the **OK** button. The **Curve Tolerance** column in the **Material List** tab specifies the value of the curve correction tolerance of curves. To edit this value, select the check box in this column and enter the value in the column.

## Section View Properties

To view and edit the section view properties, choose the **Prospector** tab and expand the parent sample line collection. Next, expand the **Section Views** node to display section views in the node. Select the required section view and right-click; a shortcut menu will be displayed. Choose **Properties** from the shortcut menu; the **Section View Properties - <section view name>** dialog box will be displayed.

You can use this dialog box to view and edit the properties of the section view, section view style, bands, and profile grade lines associated with the selected section view.

## Editing Sample Lines

**Menu:** Sections > Edit Sample Lines  
**Shortcut Keys:** ALT+O+E

To edit sample lines parameters, choose **Sections > Edit Sample Lines** from the menu bar; the **Edit Sample Line** dialog box along with the **Sample Line Tools** toolbar will be displayed. Also, you will be prompted at the command line to select a sample line. Select the required sample line; the **Edit Sample Line** dialog box will be populated with the selected sample line parameters. You can edit the required parameters either by using this dialog box or by using the **Sample Line Tools** toolbar, as explained earlier in this chapter.



**Tip.** Alternatively, select the required sample line from the drawing and right-click; a shortcut menu will be displayed. Choose **Edit Sample Line Style** from the shortcut menu.



To edit the sample line style, choose the **Settings** tab of the **Toolspace** palette and expand **Sample Line > Sample > Line Style** collection. Next, select the required sample line and right-click on it; a shortcut menu will be displayed. Choose **Edit** from the shortcut menu, as shown in Figure 9-23. On doing so, the **Sample Line Style <style name>** dialog box will be displayed. You can use this dialog box to edit the style name and to display sample lines.



Figure 9-23 Choosing the *Edit* option from the shortcut menu

Editing Sections

Menu: Sections > Edit Sections

Shortcut Keys: ALT+O+S

To edit section from a section view, choose **Sections > Edit Sections** from the menu; you will be prompted to select a section. Select the section line (black color) from the section view; the **Section Editor** dialog box will be displayed, as shown in Figure 9-24. You can edit values of the section parameters in this dialog box.

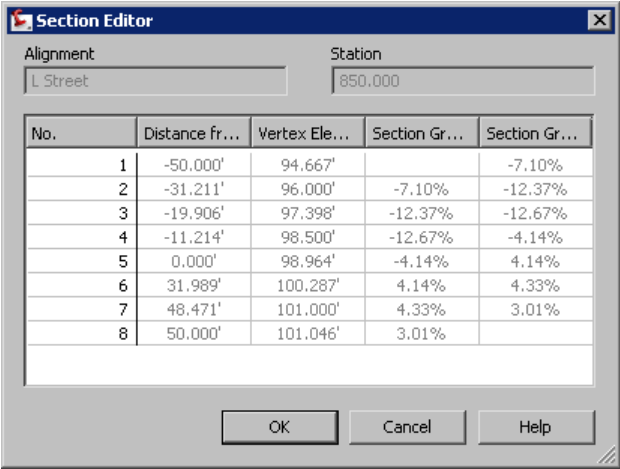


Figure 9-24 The *Section Editor* dialog box



**Note** The **Edit Sections** option is used to edit the static sections whose update mode is set to **Static**. If you edit dynamic sections using this option, the **Section Editor** dialog box will not allow you to modify the values in the columns.



**Tip.** Alternatively, select the required section view from the drawing and right-click to display a shortcut menu. Choose **Section View Properties** from the shortcut menu.

QUANTITY TAKEOFFS

Civil 3D provides with two types of quantity takeoffs, earthworks, and material volumes. You can generate the formatted reports of earthwork and material volumes. The Earthwork takeoff represents the amount of total material to be added or removed from the existing site. This

is done by comparing the existing surface with the Datum of the assembly. The datum of the subassembly is the bed over which different layers of materials (rubble, concrete, etc) to build the road are laid. The main purpose of the earthwork calculation is to modify the design such that a balance is maintained between the total cut and fill material.

The material volume takeoffs represent the material needed on the site. The subassembly of the corridor subassembly provides the information about the materials used. The quantity of the material takeoff is determined by the subassembly shapes (Structures) such as **Pave1**, **Curb**, **Sidewalk**, and so on.

To compute the quantity takeoffs for earthworks, you need to create a material list and define the conditions for quantity takeoffs, as mentioned earlier in this chapter. To define the criteria or conditions for quantity takeoffs, choose the **Settings** tab in the **Toolspace** palette and expand the **Quantity Take Off** collection. Select **Quantity Takeoff Criteria** from the expanded collection and right-click on it; a shortcut menu will be displayed. Choose **New** from the shortcut menu; the **Quantity Takeoffs criteria - New Quantity Takeoff Criteria** dialog box will be displayed. This dialog box is used to create material list and set the criteria for quantity takeoffs. Creating the material list and defining the criteria for quantity takeoffs are explained next.

## Defining the Quantity Takeoff Criteria

Choose the **Information** tab from the **Quantity Takeoff criteria - New Quantity Takeoff Criteria** dialog box and then enter the name for quantity takeoff criteria in the **Name** edit box. Now, choose the **Material List** tab. The options in this tab are used to create the material list and set the criteria for quantity takeoffs.

To create the material list, choose the **Material Name Template** button; the **Name Template** dialog box will be displayed. Enter the required material name in the **Name** edit box and choose the **OK** button; the dialog box will be closed. Now, choose the **Add new material** button; the material will be added in the **Material Name** column. Note the default values in the **Quantity Type**, **Cut Factor**, and **Refill factor** columns. Next, click in the **Quantity Type** column and select **Earthworks** from the drop-down list. Now, you need to add data to the material list. To do so, set the data type to **Surface** and select the required surface from the **Select surface** drop-down list in the **Define material** area. Now, choose the **Add Data to Material Item** button; the data will be added to the material list of the **Material Name** column. Similarly, select another surface from the **Select surface** drop-down list and add it to the list. In the **Condition** column, set the value of one of the surfaces to **Base** and another to **Compare**, as shown in Figure 9-25.



### Note

*Civil 3D calculates quantity takeoffs by comparing two surfaces. You must specify and add two surfaces to the material list to calculate quantity takeoffs. Similarly, select and add two corridor shapes from the **select corridor shape** drop-down list when the **Corridor Shape** is selected from the **Data type** drop-down list.*

Optionally, modify the cut, fill, and refill factors in their respective columns. Next, modify the material section style in the **Shape Style** column, if required. Similarly, you can add more

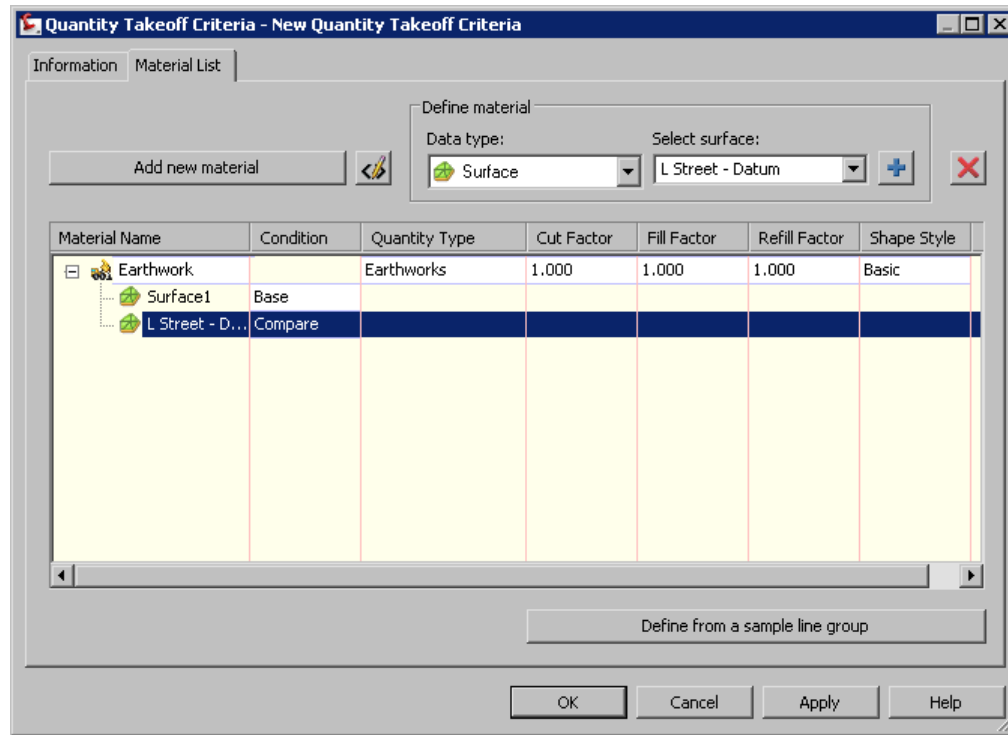


Figure 9-25 The **Material List** tab of the **Quantity Takeoff Criteria - New Quantity Takeoff Criteria** dialog box

material lists with different criteria and add data to them. Thus, you have created the material list and set the criteria to calculate the quantity of earthworks.

You can also create the material list using the **Sample Line Group Properties** dialog box and then use the created list to define the criteria of quantity takeoff. To do so, choose the **Define from a sample line group** button from the **Quantity Takeoff Criteria** dialog box; the **Define Material Criteria** dialog box will be displayed. Select the required sample line group from the **Select sample line group** drop-down list in the dialog box and choose the **OK** button.

After you have created the material list and the criteria of the quantity takeoff in the **Quantity Takeoff Criteria - New Quantity Takeoff Criteria** dialog box, choose the **OK** button; the dialog box will be closed and the new quantity takeoff criteria will be added in the **Quantity TakeOff Criteria** node in the **Settings** tab.

## Computing Materials

**Menu:** Sections > Compute Materials  
**Shortcut Keys:** ALT+O+P

To compute materials, choose **Sections > Compute Materials** from the menu bar; the **Select a Sample Line Group** dialog box will be displayed. Select the required alignment and the sample line group from the respective **Select alignment** and **Select sample line group**

drop-down lists, respectively. Choose the **OK** button; the **Compute Materials - <sample line group name>** dialog box will be displayed, as shown in Figure 9-26.

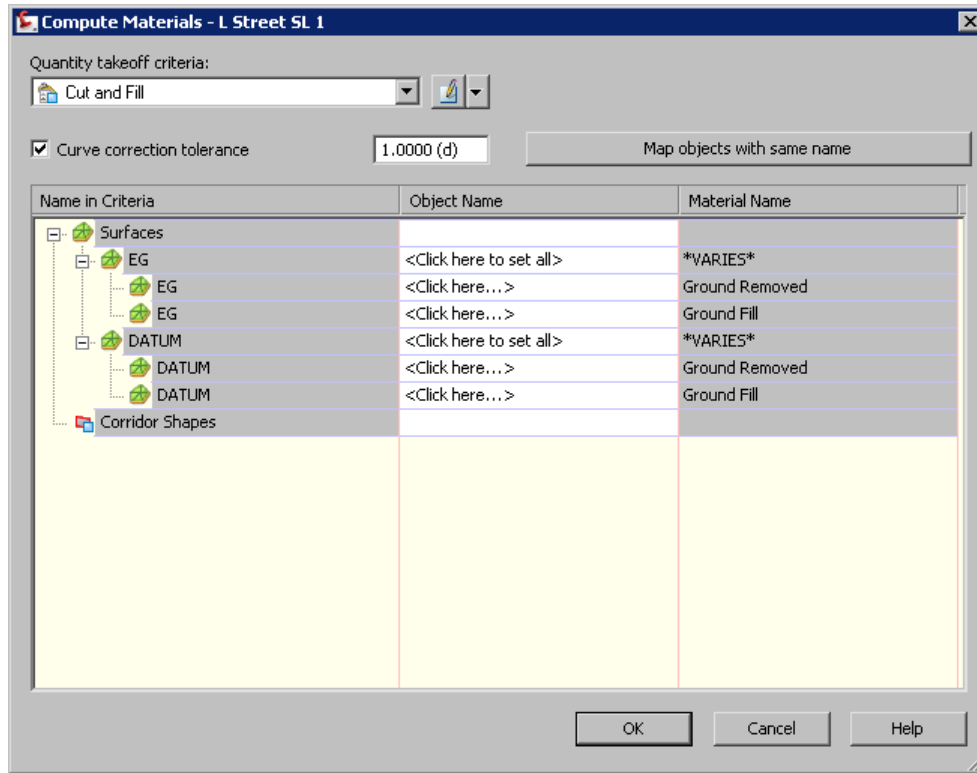


Figure 9-26 The Compute Materials - <sample line group name> dialog box

Select the required quantity takeoff criteria from the **Quantity takeoff criteria** drop-down list. Enter the curve correction tolerance value in the edit box on the right of the **Curve correction tolerance** check box. Choose the **Map objects with same name** button to map surfaces and corridor shapes with the same name as they are in the drawing. Next, choose the **OK** button; the dialog box will be closed and the materials and quantities will be computed. To view the quantities of cut and fill volumes, you need to generate volume reports. Civil 3D creates volume reports in the printable format or in the form of tables that can be added in the drawing. The method of generating the reports is discussed next.

## Generating Volume Reports

**Menu:** Sections > Generate Volume Reports  
**Shortcut Keys:** ALT+O+G

To view the total volume of cut and fill quantity reports, choose **Sections > Generate Volume Reports** from the menu bar; the **Report Quantities** dialog box will be displayed, as shown in Figure 9-27.

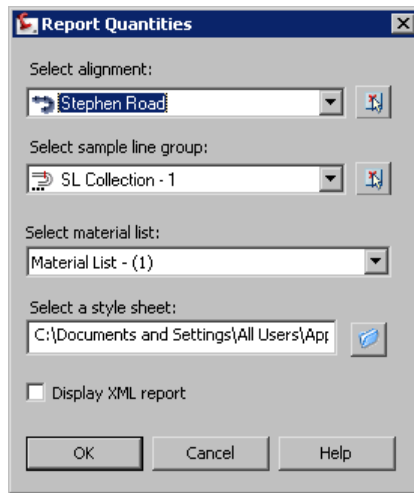


Figure 9-27 The **Report Quantities** dialog box

In the **Report Quantities** dialog box, the **Select alignment** area displays the existing alignment. Select the required alignment from the drop-down list in this area. Similarly, select the required sample line group from the drop-down list in the **Select sample line group** area. Next, select the material list for which you want to compute materials from the **Select material list** drop-down list. The **Select a style sheet** area is used to display the path and name of the style to be used to generate volume report. To select the style sheet, choose the button on the right of the **Select a style sheet** area; the **Select Style Sheet** dialog box will be displayed. In this dialog box, there are three types of style sheets that are discussed next.

#### **earthworks.xml**

This style sheet generates the reports of station-by-station values in a tabular format for cut and fill volumes, incremental volumes, and cumulative net volume.

#### **Mass Haul - Multiple Materials.xml**

This type of style sheet is used if you have defined multiple material types to be removed. You can generate material-by-material reports at each station as well as aggregate volume reports for mass-hauls and then create mass-hauls curves.

#### **Select Material.xml**

This style sheet is used to generate station-by-station value reports for the selected materials. You can use this sheet to generate reports of all the selected materials defined in the criteria and cumulative volumes that are reported at each station.

You can select any of these style sheets according to your requirement. Next, choose the **Open** button to return to the **Report Quantities** dialog box. In this dialog box, select the **Display XML report** check box to generate the XML report of the computed volumes or materials. Now, choose the **OK** button; the **Report Quantities** dialog box will be closed and the **Internet Explorer** message box will be displayed. Choose **Yes** from the message box; the Volume Report will be generated, as shown in Figure 9-28. Figure 9-29 shows the Material Report generated after selecting the required **earthworks.xml** and **Select Material.xml** style sheets.

## Volume Report

Project: C:\DOCUME~1\Cadsoft\LOCALS~1\Temp\Figure 9-12\_1\_1\_0169.svs

Alignment: Stephen Road  
 Sample Line Group: SL Collection - 1  
 Start Sta: 0+50.000  
 End Sta: 14+00.000

Station	Cut Area (Sq.ft.)	Cut Volume (Cu.yd.)	Reusable Volume (Cu.yd.)	Fill Area (Sq.ft.)	Fill Volume (Cu.yd.)	Cum. Cut Vol. (Cu.yd.)	Cum. Reusable Vol. (Cu.yd.)	Cum. Fill Vol. (Cu.yd.)	Cum. Net Vol. (Cu.yd.)
0+50.000	0.00	0.00	0.00	19.06	0.00	0.00	0.00	0.00	0.00
1+00.000	0.00	0.00	0.00	9.68	26.59	0.00	0.00	26.59	-26.58
1+50.000	0.00	0.00	0.00	19.84	27.12	0.02	0.02	53.71	-53.69
2+00.000	0.00	0.00	0.00	11.72	29.35	0.02	0.02	83.06	-83.04
2+50.000	0.31	0.33	0.33	11.14	20.75	0.34	0.34	103.81	-103.47
3+00.000	0.04	0.33	0.33	15.02	23.99	0.68	0.68	127.80	-127.12
3+50.000	0.00	0.04	0.04	13.49	26.39	0.71	0.71	154.20	-153.48
4+00.000	1464.14	1355.62	1355.62	0.00	12.55	1356.33	1356.33	166.74	1189.59
4+50.000	1465.86	2712.96	2712.96	0.00	0.00	4069.30	4069.30	166.74	3902.56
5+00.000	1471.25	2719.62	2719.62	0.00	0.00	6788.91	6788.91	166.74	6622.17
5+50.000	1470.61	2723.95	2723.95	0.00	0.00	9512.86	9512.86	166.74	9346.12

Figure 9-28 Volume Report showing the total cut and fill volumes

## Material Report

Project: C:\DOCUME~1\Cadsoft\LOCALS~1\Temp\Figure 9-12\_1\_1\_0169.svs

Alignment: Stephen Road  
 Sample Line Group: SL Collection - 1  
 Start Sta: 0+50.000  
 End Sta: 14+00.000

	Area Type	Area	Inc. Vol.	Cum. Vol.
		Sq.ft.	Cu.yd.	Cu.yd.
Station: 0+50.000				
	Ground Removed	0.00	0.00	0.00
	Ground Fill	19.06	0.00	0.00
	Pavement Structure	8.04	0.00	0.00
Station: 1+00.000				
	Ground Removed	0.00	0.00	0.00
	Ground Fill	9.68	26.59	26.59
	Pavement Structure	8.04	14.89	14.89
Station: 1+50.000				
	Ground Removed	0.00	0.00	0.02
	Ground Fill	19.84	27.12	53.71
	Pavement Structure	8.04	14.89	29.78

Figure 9-29 Material Report

## Adding Tables

**Menu:** Sections > Add Tables > Total Volume / Material Volume  
**Shortcut Keys:** ALT+O+T+T/M

You can also view the cut and fill volumes in tabular form by adding the volume table or the material volume in the drawing. To do so, choose **Sections > Add Tables > Total Volume**; the **Create Total Volume Table** dialog box will be displayed, as shown in Figure 9-30.

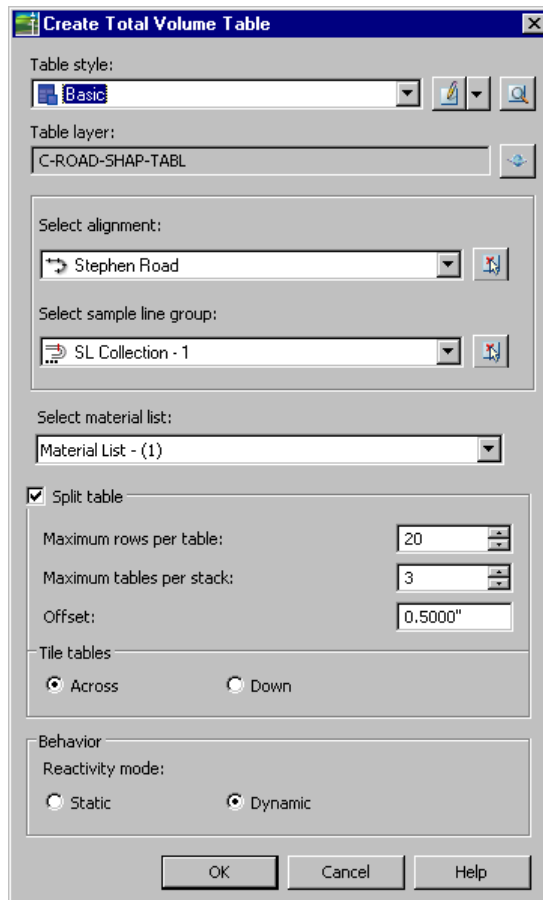


Figure 9-30 The Create Total Volume Table dialog box

This dialog box is used to create table using the volume data from the material list. To do so, select the required table style from the **Table style** drop-down list. The **Table layer** option is used to display the default layer on which the table will be created. Select the required alignment from the **Select alignment** drop-down list. Next, select the required sample line group from the **Select sample line group** drop-down list. In the **Split table** area, ensure that the **Split table** check box is selected so that the table is split to adjust with the screen. You can specify the maximum number of rows in a table using the spinner in the **Split table** area. Specify the behavior of the table by selecting the **Static** or **Dynamic** radio button. Once you have specified the settings for the volume table, choose the **OK** button; the dialog box will be closed and you will be prompted to specify the upper left corner of the table. Click at the required location in the screen; the Total Volume Table will be created, as shown in Figure 9-31.

You can also create the **Material Volume** table. To do so, choose **Sections > Add Tables > Total Material** from the shortcut menu; the **Create Material Volume Table** dialog box will be displayed. Use this dialog box to create the material volume table.

Total Volume Table						
Station	Fill Area	Cut Area	Fill Volume	Cut Volume	Cumulative Fill Vol	Cumulative Cut Vol
0+50.00	19.06	0.00	0.00	0.00	0.00	0.00
1+00.00	9.68	0.01	26.59	0.01	26.59	0.01
1+50.00	19.84	0.00	27.12	0.01	53.71	0.02
2+00.00	11.72	0.00	29.35	0.00	83.06	0.02
2+50.00	11.14	0.31	20.75	0.33	103.81	0.34
3+00.00	15.02	0.04	23.99	0.33	127.80	0.68
3+50.00	13.49	0.00	26.39	0.04	154.20	0.71
4+00.00	0.00	1464.14	12.55	1355.62	166.74	1356.33
4+50.00	0.00	1465.86	0.00	2712.96	166.74	4069.30
5+00.00	0.00	1471.25	0.00	2719.62	166.74	6788.91
5+50.00	0.00	1470.61	0.00	2723.95	166.74	9512.86
6+00.00	0.00	1468.27	0.00	2721.21	166.74	12234.07
6+50.00	0.00	1464.86	0.00	2715.86	166.74	14949.93
7+00.00	0.00	1460.76	0.00	2708.90	166.74	17658.83
7+50.00	0.00	1458.05	0.00	2702.59	166.74	20361.42
8+00.00	0.00	1482.82	0.00	2722.99	166.74	23084.41
8+50.00	0.00	1487.21	0.00	2750.23	166.74	25834.63
9+00.00	0.00	1490.15	0.00	2756.82	166.74	28591.46
9+50.00	0.00	1487.62	0.00	2757.20	166.74	31348.66
10+00.00	0.00	1494.37	0.00	2761.10	166.74	34109.76

Figure 9-31 The Total Volume Table displaying the cut and fill volumes

Table styles are created and managed in the **Table Styles** node of the **Section View** collection of the **Settings** tab.

## TUTORIALS

### Tutorial 1

### Section View

In this tutorial, you will learn to create a sample line group by using the **From Corridor Stations** method and then create a section view at the selected station, as shown in Figure 9-32.  
(Expected time: 30 min)

The following steps are required to complete this tutorial:

- Download and open *civil-3d-2009-c09-tut-1.dwg* file from [http://www.cadcam.com/civil\\_3d\\_2009/civil\\_3d\\_2009.htm](http://www.cadcam.com/civil_3d_2009/civil_3d_2009.htm) link.
- Create the sample line group
- Create the cross section at a selected station.
- Edit the section label style

### Opening the File

- Download the *civil-3d-2009-c09-tut-1.dwg* file from the [http://www.cadcam.com/civil\\_3d\\_2009/civil\\_3d\\_2009.htm](http://www.cadcam.com/civil_3d_2009/civil_3d_2009.htm) link and save it.
- Choose **File > Open** from the menu bar; the **Select a File** dialog box is displayed.
- Browse to the required location to select the *crosssection.dwg* file.
- Choose the **Open** button to open the file that consists of a corridor, a profile view, and an assembly.



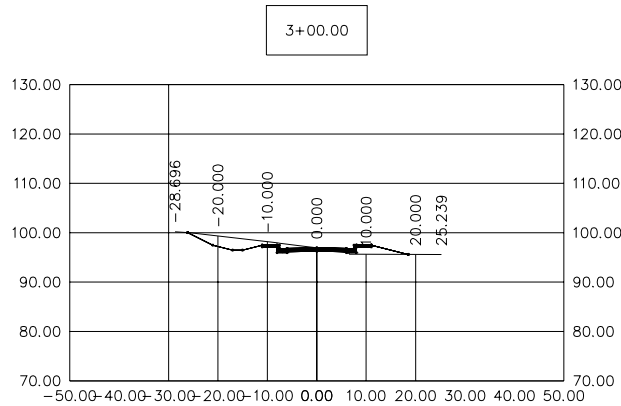

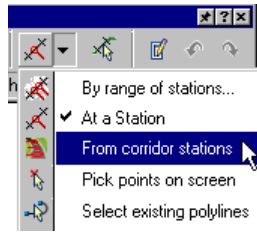


Figure 9-32 The created section view at a selected station

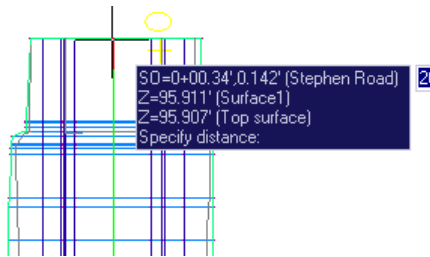
### Creating a Sample Line Group

1. Choose **Sections > Create Sample Lines** from the menu bar; you are prompted to select an alignment.
2. Press ENTER; the **Select Alignment** dialog box is displayed.
3. Select **Stephen Road** from the **Select Alignment** dialog box and choose the **OK** button in the dialog box; the **Sample Line Tools** toolbar is displayed.
4. Choose the button next to the **Current sample line group** drop-down list from the toolbar; the **Create Sample Line Group** dialog box is displayed.
5. Next, choose the **Click to edit name template** button on the right of the **Name** edit box; the **Name Template** dialog box is displayed. 
6. In the **Name Template** dialog box, enter **Stephen Collection** in the **Name** edit box and choose the **OK** button.
7. Select **Stephen Style** from the **Sample line style** drop-down list in the **Create Sample Line Group** dialog box .
8. Next, select **SR Label Style** from the **Sample line label style** drop-down list and choose the **OK** button; the **Sample Line Tools** toolbar is displayed.
9. Choose the down-arrow next to the **Sample line creation methods** button in the **Sample Line Tools** toolbar and then choose the **From corridor stations** option from the flyout, as shown in Figure 9-33. On doing so, the **Create Sample Line - From Corridor Stations** dialog box is displayed.
10. In the **Station Range** category, set the value of the **To alignment end** property to **false**.

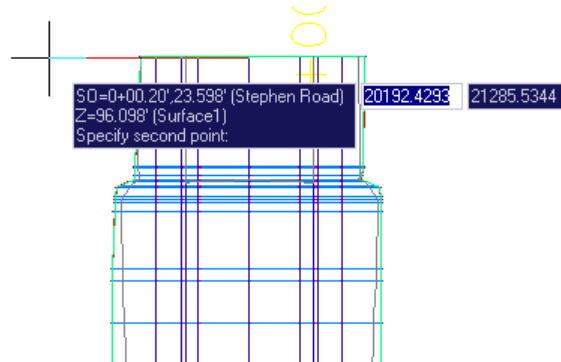


**Figure 9-33** Selecting *From corridor stations* from the *Sample line creation* flyout

11. For the **End Station** property, enter **5+19.91'** in the **Value** column or choose the button displayed on the right to pick the station from the drawing.
12. In the **Left Swath Width** category, click in the **Value** field of the **Width** property; a button is displayed on the right in the **Value** column.
13. Choose the button; the **Create Sample Line - From Corridor Stations** dialog box is closed and you are prompted to specify the distance at the command line.
14. Zoom into the first station at the start of the corridor and click at the top center of the alignment as shown in Figure 9-34.
15. Click at the top center of the **Stephen Road** alignment; you are prompted to specify the second point.
16. Drag the cursor to the left, as shown in Figure 9-35, and then click on the screen to specify the left swath width. On doing so, the **Create Sample Line - From Corridor Stations** dialog box is displayed again and the swath width is displayed in the **Value** column. The swath width is 28.696'.



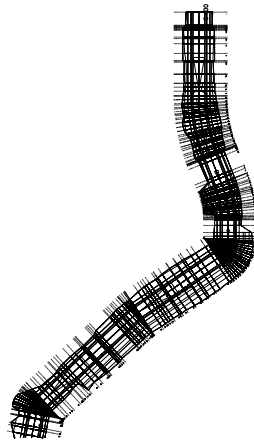
**Figure 9-34** Selecting the top center of the alignment



**Figure 9-35** Dragging the cursor on the left to specify the swath width

17. Ensure that the value of the left swath width is approximately equal to the value displayed in the dialog box. If it is not so, specify the left swath width value in the **Value** column of the **Width** property.

18. Similarly, in the **Right Swath Width** category, set the value of the **Width** property to **25.239'**.
19. Choose the **OK** button; the **Create Sample Line - From Corridor Stations** dialog box is closed.
20. Next, press ENTER to exit the command and close the **Sample Line Tools** toolbar.
21. Close the **Panorama** window if it is displayed; sample lines are created from corridor stations, as shown in Figure 9-36.



*Figure 9-36 Sample lines created from corridor stations*

22. Zoom in to check sample line numbers. Each sample line is named by its number.

Now, you have finished the creation of sample line using the **From corridor stations** methods and specifying the left and right swath widths. The sample line group is added in the **Sample Line Group** node of the parent alignment in the **Alignments** collection.

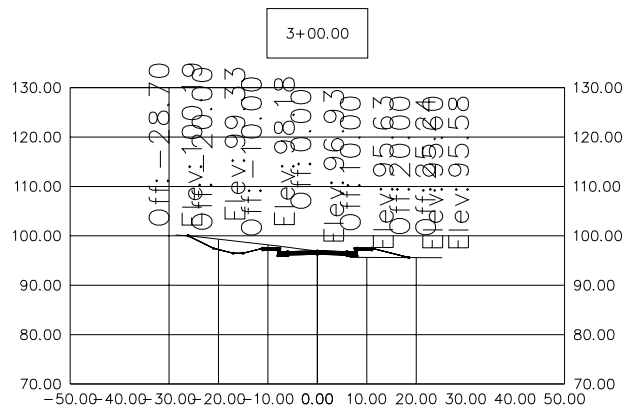
Sections are created by sampling the Surface 1 (EG) and Top Surface (corridor surface).

### Creating the Section View

Once the sections are created along the sample lines, you need to create a section view at a specified station.

1. Choose **Sections > Create Section View** from the menu bar; the **Create Section View-General** wizard is displayed.
2. Choose the **Click to edit name template** button in the **Section view name** area of the **Create Section View - General** wizard; the **Name Template** dialog box is displayed.
3. In the **Name Template** dialog box, enter **Stephen Section** in the **Name** edit box and then choose the **OK** button; the dialog box is closed.

4. Next, in the **Section view style** area choose the down-arrow next to the drop-down; a flyout is displayed.
5. Choose the **Create New** option from the flyout; the **Section View Style - New Section View Style** dialog box is displayed.
6. Now, retain all default settings in this dialog box and choose the **OK** button.
7. From the drop-down list in the **Section view style** area of the **Create Section View - General** wizard, select **New Section View Style**.
8. Select the sample line **3+00.0** from the **Sample line** drop-down list.
9. Next, choose the **Section Display Options** button from the **Create Section View - General** wizard; the **Section Display Options** page is displayed.
10. In the **Select sections to draw** area of the **Section Display Options** page, clear the check box in the **Draw** column in the **Corridor 1 Top surface** row to exclude the top surface section to be drawn in the section view.
11. Now, choose the **Create Section View** button; the wizard is closed and you are prompted to specify the origin of the section view.
12. Click at the required location in the drawing; the section view is created, as shown in Figure 9-37. The view is added in the **3+00.00** sub node sample line in the **Prospector** tab.



**Figure 9-37** Section view created at station 3+00.00

13. Press ESC to exit the command.

### Editing the Section Label Style

1. Now, select the section view from the drawing and right-click; a shortcut menu is displayed.
2. Choose **Section View Properties** from the shortcut menu; the **Section View Properties - 3+00.00** dialog box is displayed.

- 3. Choose the **Sections** tab from this dialog box.
- 4. In the first row of **Stephen Collection - 3+00.00 - Surface 1**, click on **<Edit>** in the **Labels** column, as shown in Figure 9-38.

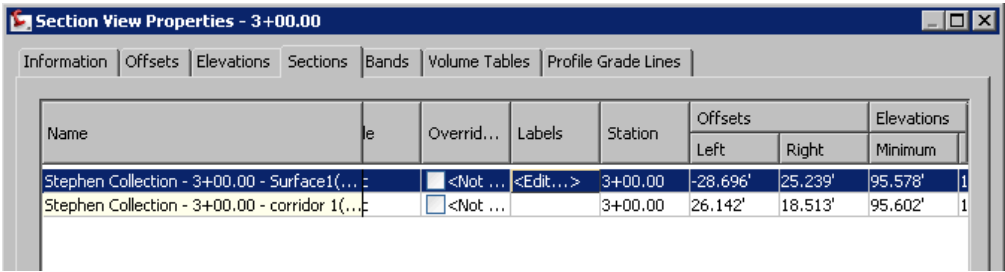


Figure 9-38 Partial view of the **Sections** tab of the **Section View Properties - 3+00.00** dialog box

On doing so, the **Section Labels - Stephen Collection - 3+00.00 - Surface 1** dialog box is displayed. Make sure that **Major Offset** and **Basic** are added in the **Type** and **Style** columns of the dialog box.

- 5. Click on the symbol in the **Style** column; the **Pick Label Style** dialog box is displayed.
- 6. Select **Stephen Major** from the drop-down list in the dialog box, as shown in Figure 9-39.

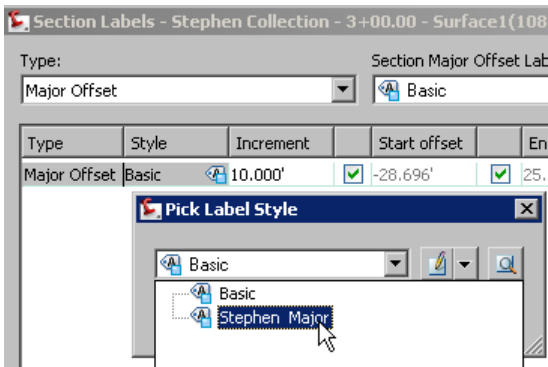


Figure 9-39 Selecting the **Stephen Major** section label style

- 7. Choose the **OK** button; the dialog box is closed.
- 8. Again, choose **OK** to close the **Section Labels - Stephen Collection - 3+00.00 - Surface 1** dialog box and return to the **Section View Properties - 3+00.00** dialog box.
- 9. Now, choose the **OK** button from the **Section View Properties - 3+00.00** dialog box; the dialog box is closed and the section view is displayed, as shown in Figure 9-40. Similarly, you can create a section view at any station by selecting the required sample line.

This completes the tutorial of creating a section view.

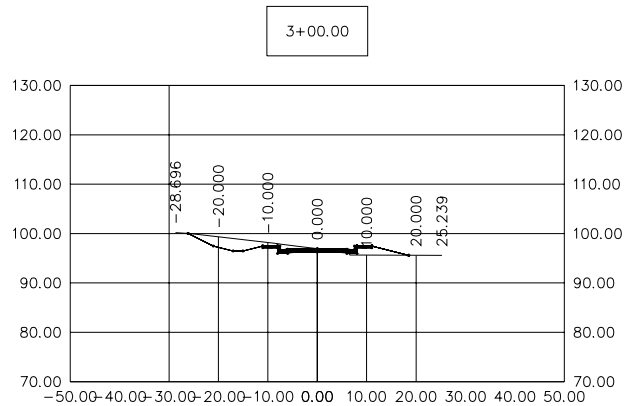


Figure 9-40 The Stephen Section view created at station 3+00.00

### Saving the File

1. Choose **File > Save As** from the menu bar; the **Save Drawing As** dialog box is displayed.
2. Browse to the *My Documents\civil\_3d* folder.
3. Save the file with the name *c09-tut-1* in this folder.

## Tutorial 2

## Multiple Section View

In this tutorial, you will create a band style and multiple section views, as shown in Figure 9-41. Also, you will create a plot style to plot views on the sheet. **(Expected time: 30 min)**

The following steps are required to complete this tutorial:

- a. Download the *civil-3d-2009-c09-tut-2.dwg* file from [http://www.cadcim.com/civil\\_3d\\_2009/civil\\_3d\\_2009.htm](http://www.cadcim.com/civil_3d_2009/civil_3d_2009.htm) link and then open it.
- b. Create the band set style.
- c. Create the multiple section views.
- d. Create the plot style.
- e. Assign the plot style.

### Opening the File

1. Download the *civil-3d-2009-c09-tut-2.dwg* file from [http://www.cadcim.com/civil\\_3d\\_2009/civil\\_3d\\_2009.htm](http://www.cadcim.com/civil_3d_2009/civil_3d_2009.htm) link and save it to the required location.
2. Choose **File > Open** from the menu bar; the **Select File** dialog box is displayed.
3. Browse to the required location where the file is saved.

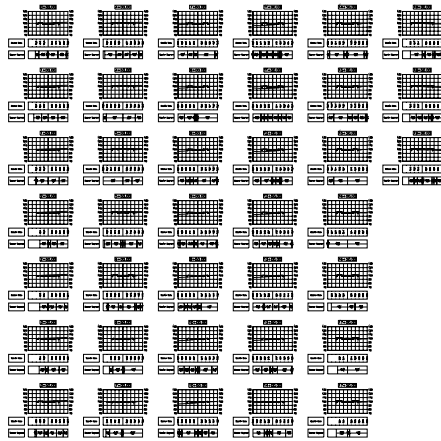


Figure 9-41 Multiple Section Views

4. Select the file and choose the **Open** button to open the *civil\_3d\_2009\_c03\_tut\_2.dwg* file. This file consists of two alignments, a corridor, two sample line groups, and profile views. sections To begin with, you will create a band set style, create multiple section views and then create a plot style for multiple section views.

### Creating the Section Data Band Style

1. Choose the **Settings** tab and then expand **Section View > Band Styles > Section Data** in this tab.
2. Right-click on the **Section Data** node; a shortcut menu is displayed.
3. Choose the **New** option from the shortcut menu; the **Section Data Band Style - New Section Data Band Style** dialog box is displayed.
4. Enter **L Street Data Band** in the **Name** edit box of the **Information** tab of the **Section Data Band Style - New Section Data Band Style** dialog box.
5. Next, choose the **Band Details** tab of this dialog box.
6. Choose the **Compose label** button from the **Title text** area of the **Band Details** tab; the **Label Style Composer - Band Title** dialog box is displayed.
7. Set the following values for the properties in the **Label Style Composer - Band Title** dialog box and then choose the **OK** button; the dialog box is closed. .

Name: **Surface1 Elevation**

Text Height: **0.0700"**

Color: **red**

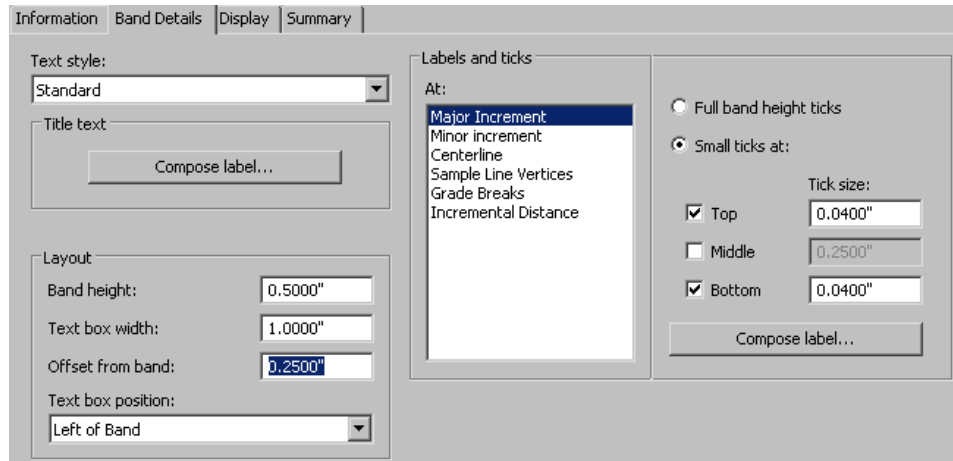
8. In the **Layout** area of the **Band Details** tab, set the following values.

Band height: **0.5000"**

Text box width: **1.0000"**

Offset from band: **0.2500"**

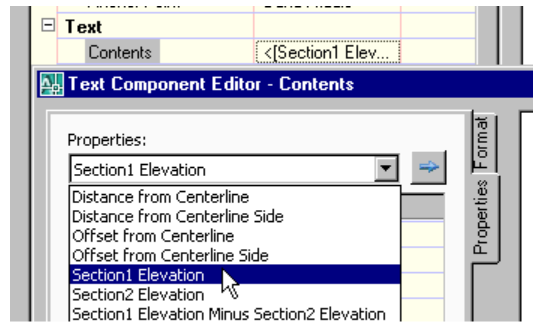
9. Ensure that in the **Layout** area the **Text box position** drop-down list is set to **Left of Band**.
10. Ensure that **Major Increments** is chosen from the **Labels and ticks At** area.
11. On the right panel of this area, select the **Top** and **Bottom** check boxes, if they are not selected. Also, set the tick sizes for both the Top and Bottom ticks to **0.0400"** as shown in Figure 9-42.



*Figure 9-42 Settings for the **Band Details** tab of the **L Street Data Band** style*

12. Now, choose the **Compose label** button from the **Label and ticks At** area; the **Label Style Composer - Major Increment** dialog box is displayed.
13. Click in the **Value** field of the **Contents** property; a button is displayed on the right of it.
14. Choose this button; the **Text Component Editor - Contents** dialog box is displayed.
15. Select the text from the **Editor** window on the right of the dialog box and delete the text.
16. Next, select **Section1 Elevation** from the **Properties** drop-down list, as shown in Figure 9-43.
17. Choose the arrow button adjacent to the **Properties** drop-down list, and then choose the **OK** button to close the **Text Component Editor - Contents** dialog box and return to the **Label Style Composer - Major Increment** dialog box.
18. In the property table of this dialog box, set **Text height** to **0.0500"** and **Color** to **red**.
19. Next, choose the **OK** button from the **Label Style Composer - Major Increment** dialog box to close it.
20. Choose the **OK** button from the **Section Data Band Style - L Street Data** dialog box; the dialog box is closed and the **L Street Data band** style is added to the **Section Data** node in the **Settings** tab.





**Figure 9-43** Selecting the **Section1 Elevation** option from the **Properties** drop-down list in the **Text Component Editor-Content** dialog box

After you have created the **Section data band** style, you will add data bands and their styles to a data band set so that data bands can be applied to multiple section views easily. To do so, you need to create a data band set style.

### Creating a Band Set Style

1. Expand **Section View > Band Styles > Band Set** in the **Settings** tab.
2. Right-click on the **Band Set** node and then choose **New** from the shortcut menu; the **Band Set Style - New Band Set Style** dialog box is displayed.
3. Enter **L Street Band Set** in the **Name** edit box of the **Information** tab.
4. Choose the **Bands** tab and select **Section Data** from the **Band type** drop-down list in this dialog box.
5. Next, select **L Street Data** from the **Select band style** drop-down list.
6. Ensure that **Bottom of section view** option is selected from **Location** drop-down list.
7. Choose the **Add** button; the **Section Data** band is added in the **List of Bands** area.
8. Similarly, select **Section Segment** and **Segment Length** from the corresponding **Band type** and **Select band style** drop-down lists and then add them to the **List of bands** area, as shown in Figure 9-44.
9. Choose the **OK** button; the **Data Band Set Style - New Band Set Style** dialog box is closed and the **L Street Band Set** style is added to the **Band Set** node in the **Settings** tab. So, you have finished the creation of the band set style. Now, you will create multiple section views and assign the band set style created in the drawing.

### Creating Multiple Section Views

1. Choose **Sections > Create Multiple Section Views** from the menu bar; the **Create Multiple Section Views - General** wizard is displayed.

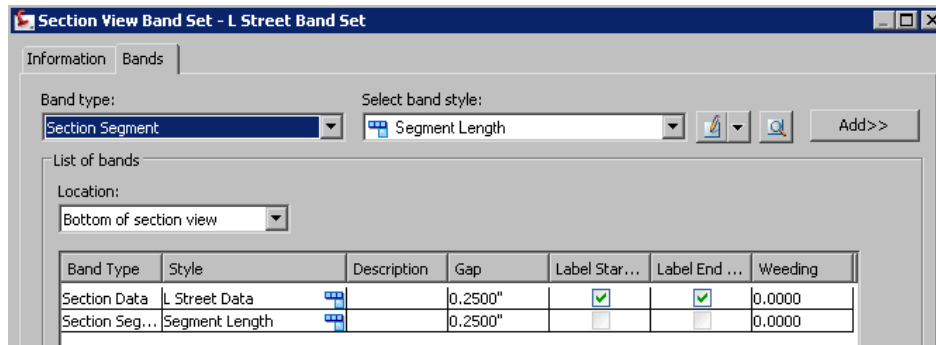


Figure 9-44 Partial view of the **Bands** tab

2. Choose the **Click to edit name template** button from the **Section view name** area; the **Name Template** dialog box is displayed.
3. Enter **L Street Views** in the **Name** edit box of the dialog box and choose the **OK** button; the **Name Template** dialog box is closed.
4. Now, ensure that the **L Street** alignment and the **L Street SL 1** sample line group are selected from the **Select alignment** and **Sample line group name** drop-down lists, respectively.
5. Accept the default section view and group plot styles and choose the **Data Bands** option from the **Create Multiple Section Views - General** wizard.
6. In the **Data Bands** page of the **Create Multiple Section Views** wizard, select **L Street Band Set** style from the **Select band set** drop-down list, as shown in Figure 9-45.
7. Now, choose the **Create Section Views** button; the **Create Multiple Section Views-Data Bands** wizard is closed and you are prompted to identify the origin of the section view.
8. Click in the drawing at the required location; multiple section views are created.
9. Zoom in to view the section view and the data bands added below each section view, as shown in Figure 9-46.

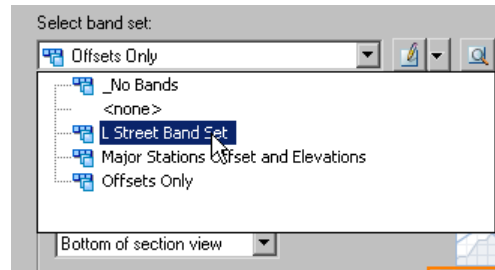
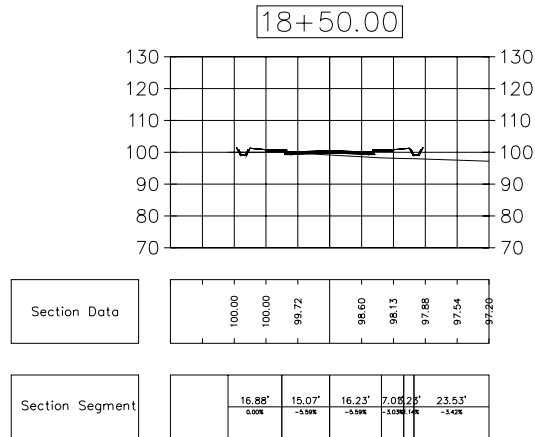


Figure 9-45 Selecting the **L Street Band Set** style

After creating multiple section views, you need to create a plot style.

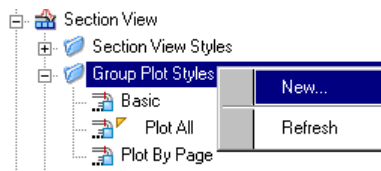
### Creating the Plot Style

1. Choose the **Settings** tab from the **Toolspace** palette and expand **Section Views > Group Plot Style** in the **Settings** tab; the existing plot style (**Plot All**) is displayed in the **Group Plot Style** node.



**Figure 9-46** Section view and data bands created at station 18+50.00

2. Select the **Group Plot Style** node and right-click on it; a shortcut menu is displayed.
3. Choose **New** from the shortcut menu, as shown in Figure 9-47; the **Group Plot Style - New Group Plot Style** dialog box is displayed.



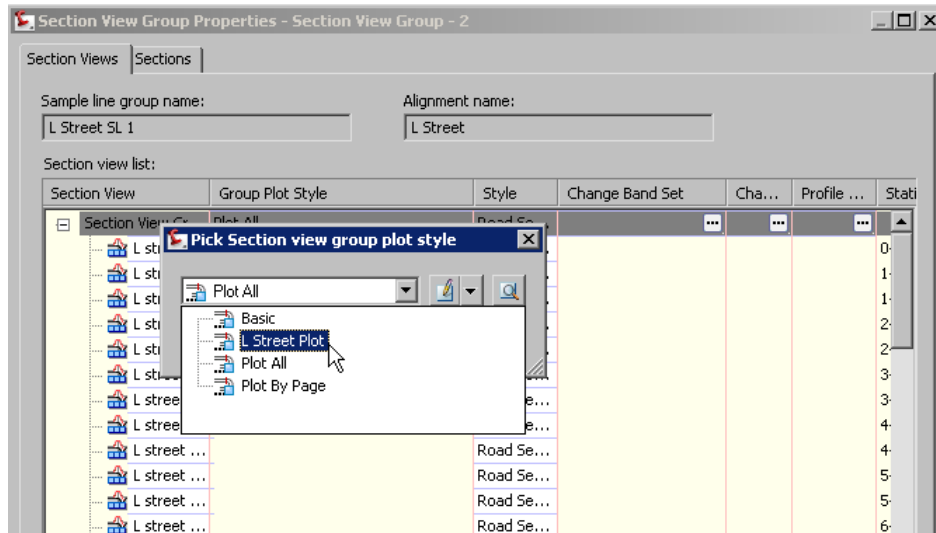
**Figure 9-47** Choosing the **New** option from the shortcut menu

4. Enter **L Street Plot** in the **Name** edit box of the **Information** tab.
5. Now, choose the **Array** tab and select the **By column** radio button from the **Plot rules** area.
6. Set the value in the **Maximum in a column** spinner to **7**.
7. Select **Upper Left** from the **Start corner** drop-down list and select **Left** from the **Align section views about** drop-down list.
8. In the **Space between adjacent section views** area, enter **0.5000"** in the **Column** and **Row** edit boxes.
9. Now, choose the **OK** button; the **Group Plot Style - New Group Plot Style** dialog box is closed and the **L Street Plot** style is added to the **Group Plot Styles** node in the **Settings** tab.

After you have created the plot style, you need to assign the plot style to the properties of multiple section views.

### Assigning the Plot Style

1. Select any of the multiple section views from the drawing and right-click; a shortcut menu is displayed.
2. Choose **Section View Group Properties** from the shortcut menu; the **Section View Group Properties - Section View Group - 1** dialog box is displayed.
3. Choose the **Section Views** tab and click on the default value **Plot All** in the **Group Plot Style** column; the **Pick Section view group plot style** dialog box is displayed.
4. Select the **L Street Plot** style from the drop-down list in this dialog box, as shown in Figure 9-48.

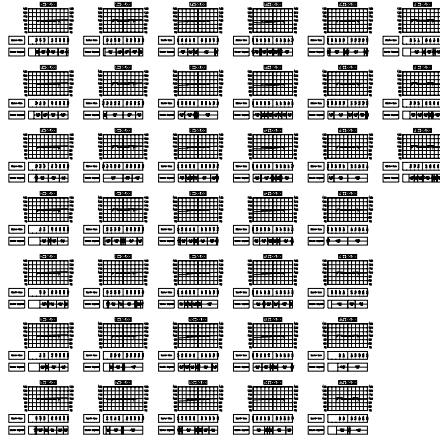


**Figure 9-48** Selecting the **L Street Plot** style from the **Pick Section view group plot style** dialog box

5. Choose the **OK** button; the **Pick Section view group plot style** dialog box is closed.
6. Again, choose the **OK** button from the **Section Views** tab; the **Section View Group Properties - Section View Group 1** dialog box is closed and multiple section views are displayed, as shown in Figure 9-49.

Note that section views are arranged according to the settings of the plot style. The number of views in each column is 7.

This completes the Tutorial 2.



*Figure 9-49 Multiple section views displayed after applying the **L Street Plot** style*

### Saving the File

1. Choose **File > Save As** from the menu bar; the **Save Drawing As** dialog box is displayed.
2. Browse to the *My Documents\civil\_3d* folder.
3. Save the file with name *c09-tut\_2*.

### Tutorial 3

### Quantity Takeoffs

In this tutorial, you will create a material list and then set the criteria for the Cut and fill volumes, and material takeoffs. Also, you will generate a volume and material report and add the volume table in the drawing, as shown in Figure 9-50. **(Expected time: 30 min)**

The following steps are required to complete this tutorial:

- a. Download the *civil-3d-2009-c09-tut-3.dwg* file from the [http://www.cadcam.com/civil\\_3d\\_2009/civil\\_3d\\_2009.htm](http://www.cadcam.com/civil_3d_2009/civil_3d_2009.htm) link.
- b. Create a material list for the calculation of materials.
- c. Compute the materials.
- d. Generate a volume report.
- e. Add the material table in the drawing.

### Opening the File

1. Download the *civil-3d-2009-c09-tut-3.dwg* file from [http://www.cadcam.com/civil\\_3d\\_2009/civil\\_3d\\_2009.htm](http://www.cadcam.com/civil_3d_2009/civil_3d_2009.htm) link and save it.
2. Choose **File > Open** from the menu bar; the **Select a File** dialog box is displayed.

Total Volume Table						
Station	Fill Area	Cut Area	Fill Volume	Cut Volume	Cumulative Fill Vol	Cumulative Cut Vol
0+50.00	0.00	8.54	0.00	0.00	0.00	0.00
1+00.00	0.00	7.32	0.00	14.69	0.00	14.69
1+50.00	0.00	8.86	0.00	14.98	0.00	29.67
2+00.00	0.00	8.91	0.00	16.46	0.00	46.13
2+50.00	0.00	10.28	0.00	17.77	0.00	63.90
3+00.00	0.00	12.06	0.00	20.69	0.00	84.59
3+50.00	0.00	11.75	0.00	22.04	0.00	106.63
4+00.00	0.00	12.27	0.00	22.24	0.00	128.87
4+50.00	0.00	10.89	0.00	21.44	0.00	150.31
5+00.00	0.00	13.21	0.00	22.31	0.00	172.62
5+50.00	0.00	10.91	0.00	22.33	0.00	194.95
6+00.00	0.00	10.44	0.00	19.77	0.00	214.72
6+50.00	0.00	9.47	0.00	18.44	0.00	233.16
7+00.00	0.00	8.94	0.00	17.05	0.00	250.21
7+50.00	0.00	10.44	0.00	17.95	0.00	268.16
8+00.00	0.00	8.49	0.00	17.53	0.00	285.69
8+50.00	0.00	9.71	0.00	16.85	0.00	302.54
9+00.00	0.00	10.99	0.00	19.16	0.00	321.70
9+50.00	0.00	11.56	0.00	20.88	0.00	342.58
10+00.00	0.00	12.86	0.00	22.61	0.00	365.19

*Figure 9-50 Total Volume Report*

- Browse to the required location in the dialog box to select the *civil-3d-2009-c03-tut-2.dwg* file.
- Next, choose the **Open** button from the **Select a File** dialog box to open the file. The drawing file consists of a corridor, a profile view, and an assembly. The file consists of an existing surface, corridor, corridor surfaces, profile view, multiple section views, and a pipetrench assembly.

The opened drawing consists of two corridor surfaces, **Pipetrench-Datum** and **Pipetrench-Bedding**. You need to calculate the total volume of the cut and fill volumes between the **SurfaceEG** and **Pipetrench-Datum** corridor surfaces. Note that the red colored line segments in the section views are the sections of the Surface EG, Trench, and Datum surface.




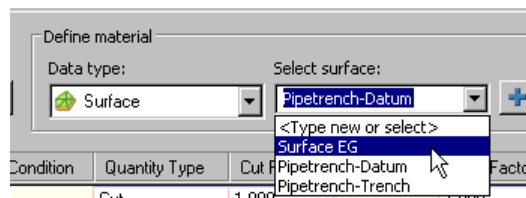
#### Note

*The section created at the Datum is not visible in section views as it coincides with the Trench section.*

### Setting the Criteria for the Quantity Takeoff

- Choose the **Settings** tab in the **Toolspace** palette and then expand **Quantity Takeoff** > **Quantity Takeoff Criteria** in this tab.
- Right-click on the **Quantity Takeoff Criteria** node; a shortcut menu is displayed.
- Choose **New** from the shortcut menu; the **Quantity TakeOff Criteria - New Quantity Takeoff Criteria** dialog box is displayed.
- Enter **Cut and Fill Criteria** in the **Name** edit box of the **Information** tab.
- Now, choose the **Material List** tab.

6. In the **Material List** tab, choose the **Material Name Template** button next to the **Add new material** button; the **Name Template** dialog box is displayed. 
7. Enter **Surface Cut** in the **Name** edit box of the **Name Template** dialog box and choose the **OK** button; the **Name Template** dialog box is closed.
8. Now, choose the **Add new material** button in the **Material List** tab; **Surface Cut** is added in the **Material Name** column. Make sure the quantity type is set to **Cut** in the **Quantity Type** column. Thus, you have created a material and now you will add data to this material.
9. In **Define material** area in the **Material List** tab, ensure that the **Surface** option is selected as data type. Also, select **Surface EG** from the **Select surface** drop-down list, as shown in Figure 9-51.



*Figure 9-51 Selecting Surface EG from the Select surface drop-down list*

10. Now, choose the **Add Data to Material Item** button; the selected surface is added in the **Material Name** column.
11. Similarly, select the **Pipetrench-Datum** surface from the **Select surface** drop-down and add the surface to the **Material** column.
12. For **Surface EG**, ensure that the condition is set to **Above** in the **Condition** column to calculate the volume of the surface to be removed above the existing surface.
13. For the **Pipetrench-Datum** surface, click on the default value in the **Condition** column and select **Below** from the drop-down list displayed.
14. Now, repeat steps 1-10 and add a new material, named **Surface Fill**, in the **Material Name** column.
15. Set the condition for the surfaces in the **Quantity Takeoff Criteria - Cut and Fill Criteria** dialog box, as shown in Figure 9-52.

You have set the criteria for volume takeoffs. Now, you will set the criteria for material takeoffs, which is discussed next.

### Creating Material Quantity Take Off Criteria

1. Choose the **Material Name Template** button ; the **Name Template** dialog box is displayed.

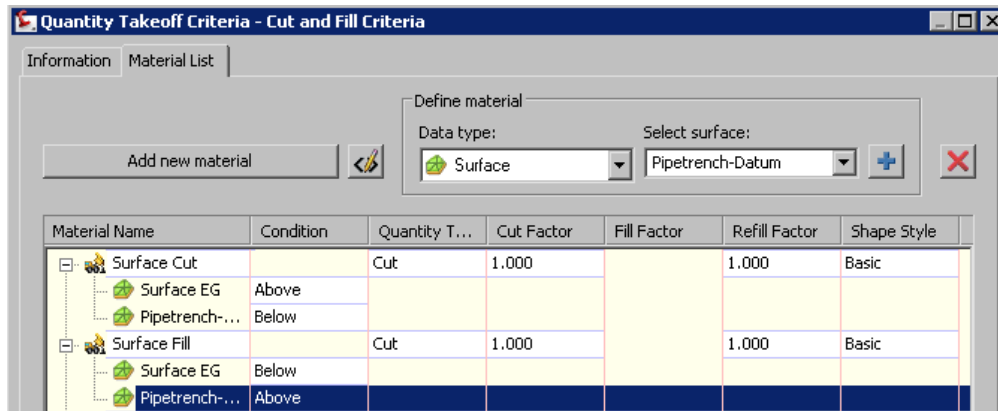


Figure 9-52 Partial view of the *Quantity Takeoff Criteria - Cut and Fill Criteria* dialog box

2. Enter **Coarse Aggregate** in the **Name** edit box and choose the **OK** button; the **Name Template** dialog box is closed.
3. In the **Quantity Takeoff Criteria - Cut and Fill Criteria** dialog box, choose the **Add new material** button; the material name is added to the list.
4. Now, set the quantity type of the created material to **Structures** in the **Quantity Type** column.
5. Select **Corridor Shape** from the **Data type** drop-down list.
6. Next, select **Trench\_Bedding** from the **Select corridor shape** drop-down list.
7. Choose the **Add Data to Material Item** button from the **Define material** area in the **Material List** tab; the selected data type and the corridor shape are added under the **Coarse Aggregate** material in the list.
8. Similarly, add another item to the material list and name it **Concrete**.
9. Select **Trench\_Backfill** from the **Select corridor shape** drop-down list, as shown in Figure 9-53, and add it to the **Concrete** material, as explained earlier.
10. Now, choose the **OK** button; the **Quantity Takeoff Criteria - Cut and Fill Criteria** dialog box is closed and the takeoff criteria is added in the **Quantity TakeOff Criteria** node. After creating the material lists and setting the takeoff criteria, now you will compute the materials.

### Computing Materials

1. Choose **Sections > Compute Materials** from the menu bar; the **Select a Sample Line Group** dialog box is displayed.
2. Make sure the **Centerline** alignment and **SL Collection-1** are selected from the **Select alignment** and **Select sample line group** drop-down lists of the dialog box, respectively.



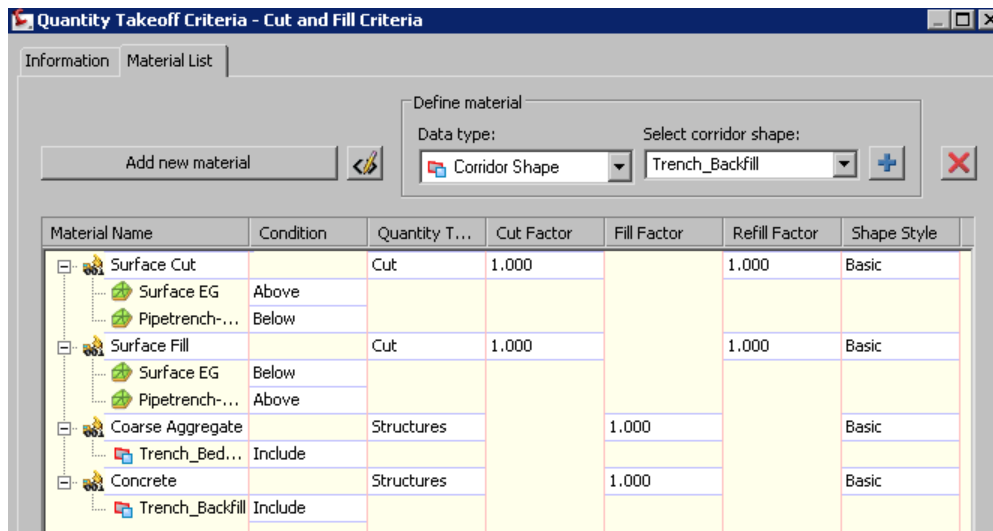


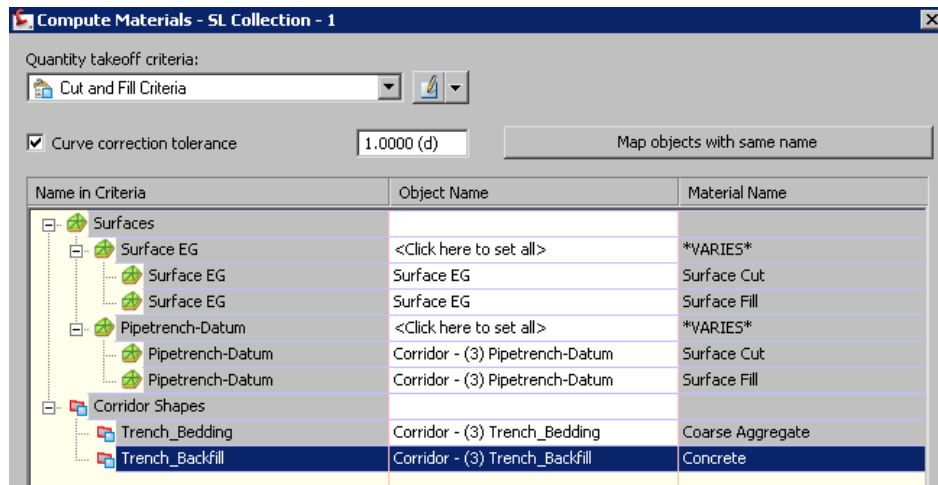
Figure 9-53 The Material List tab of the *Quantity Takeoff Criteria - Cut and Fill Criteria* dialog box

3. Choose the **OK** button; the **Compute Materials- SL Collection-1** dialog box is displayed.
4. Select the **Cut and Fill Criteria** option from the **Quantity takeoff criteria** drop-down list.
5. Now, choose the **Map objects with same name** button in the **Compute Materials- SL Collection-1** dialog box; the surface and corridor shapes are mapped automatically with the same name, as shown in Figure 9-54.
6. Choose the **OK** button; Civil 3D starts computing materials. Wait till the dialog box is closed and materials are computed to 100% shown by the progress bar.

Now, you need to generate a volume report to see the total cut and fill volumes of the material required.

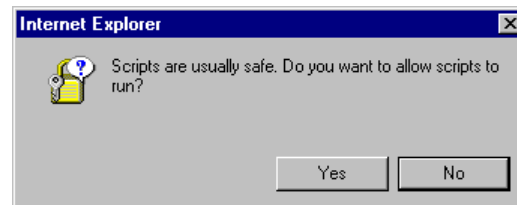
### Generating the Volume Report

1. Choose **Sections> Generate Volume Report** from the menu bar; the **Report Quantities** dialog box is displayed.
2. Ensure that **Centreline**, **SL Collection-1**, and **Material List (1)** are selected from their respective drop-down lists in the dialog box.
3. Choose the button adjacent to the **Select a style sheet** edit box; the **Select Style Sheet** dialog box is displayed.
4. Select the *earthwork.xml* sheet style from this dialog box and choose the **Open** button.



**Figure 9-54** Partial view of the *Compute Materials - SL Collection-1* dialog box displaying takeoff criteria

- Now, choose the **OK** button from the **Report Quantities** dialog box to close the dialog box; the **Internet Explorer** message box is displayed box, as shown in Figure 9-55.



**Figure 9-55** The *Internet Explorer* message box

- Choose the **Yes** button; the message box is closed and the volume report is generated, as shown in Figure 9-56.

### Generating the Material Report

- Repeat steps 1-3 as performed in generating volume report.
- Select the *Select Material.xml* sheet style from **Select Style Sheet** dialog box and choose the **Open** button.
- Now, choose the **OK** button from the **Report Quantities** dialog box; the dialog box is closed and the **Internet Explorer** message box is displayed.
- Choose the **Yes** button from the message box; the message box is closed and the Material Report is generated, as shown in Figure 9-57.

## Volume Report

Project: C:\DOCUME~1\Cadsoft\LOCALS~1\Temp\Pipe  
trench\_recover\_1\_1\_3381.sv\$

Alignment: Centreline  
Sample Line Group: SL Collection - 1  
Start Sta: 0+50.000  
End Sta: 10+00.000

Station	Cut Area (Sq.ft.)	Cut Volume (Cu.yd.)	Reusable Volume (Cu.yd.)	Fill Area (Sq.ft.)	Fill Volume (Cu.yd.)	Cum. Cut Vol. (Cu.yd.)	Cum. Reusable Vol. (Cu.yd.)	Cum. Fill Vol. (Cu.yd.)	Cum. Net Vol. (Cu.yd.)
0+50.000	8.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1+00.000	7.32	14.69	14.69	0.00	0.00	14.69	14.69	0.00	14.69
1+50.000	8.86	14.98	14.98	0.00	0.00	29.67	29.67	0.00	29.67
2+00.000	8.91	16.46	16.46	0.00	0.00	46.13	46.13	0.00	46.13
2+50.000	10.28	17.77	17.77	0.00	0.00	63.90	63.90	0.00	63.90
3+00.000	12.06	20.69	20.69	0.00	0.00	84.59	84.59	0.00	84.59
3+50.000	11.75	22.04	22.04	0.00	0.00	106.63	106.63	0.00	106.63
4+00.000	12.27	22.24	22.24	0.00	0.00	128.87	128.87	0.00	128.87
4+50.000	10.89	21.44	21.44	0.00	0.00	150.31	150.31	0.00	150.31
5+00.000	13.21	22.31	22.31	0.00	0.00	172.62	172.62	0.00	172.62

Figure 9-56 The generated Volume Report

## Material Report

Project: C:\DOCUME~1\Cadsoft\LOCALS~1\Temp\Pipe  
trench\_recover\_1\_1\_2895.sv\$

Alignment: Centreline  
Sample Line Group: SL Collection - 1  
Start Sta: 0+50.000  
End Sta: 10+00.000

	Area Type	Area	Inc.Vol.	Cum.Vol.
		Sq.ft.	Cu.yd.	Cu.yd.
Station: 0+50.000				
	Surface Cut	0.00	0.00	0.00
	Surface Fill	8.54	0.00	0.00
	Coarse Aggregate	15.75	0.00	0.00
	Concrete	0.00	0.00	0.00
Station: 1+00.000				
	Surface Cut	0.00	0.00	0.00
	Surface Fill	7.32	14.69	14.69
	Coarse Aggregate	15.75	29.17	29.17
	Concrete	0.00	0.00	0.00
Station: 1+50.000				

Figure 9-57 The generated Material Report

## Adding Tables

You can also view the quantity takeoffs in a tabular form by adding the Volume or Material table in the drawing.

1. Choose **Sections > Add Tables > Volume Table** from the cascading menu; the **Create Total Volume Table** dialog box is displayed.
2. Choose the **OK** button; you are prompted to specify the upper left corner.
3. Click at the required location in the drawing; the Total Volume Table is created, as shown in Figure 9-58.

Total Volume Table						
Station	Fill Area	Cut Area	Fill Volume	Cut Volume	Cumulative Fill Vol	Cumulative Cut Vol
0+50.00	0.00	8.54	0.00	0.00	0.00	0.00
1+00.00	0.00	7.32	0.00	14.69	0.00	14.69
1+50.00	0.00	8.86	0.00	14.98	0.00	29.67
2+00.00	0.00	8.91	0.00	16.46	0.00	46.13
2+50.00	0.00	10.28	0.00	17.77	0.00	63.90
3+00.00	0.00	12.06	0.00	20.69	0.00	84.59
3+50.00	0.00	11.75	0.00	22.04	0.00	106.63
4+00.00	0.00	12.27	0.00	22.24	0.00	128.87
4+50.00	0.00	10.89	0.00	21.44	0.00	150.31
5+00.00	0.00	13.21	0.00	22.31	0.00	172.62
5+50.00	0.00	10.91	0.00	22.33	0.00	194.95
6+00.00	0.00	10.44	0.00	19.77	0.00	214.72
6+50.00	0.00	9.47	0.00	18.44	0.00	233.16
7+00.00	0.00	8.94	0.00	17.05	0.00	250.21
7+50.00	0.00	10.44	0.00	17.95	0.00	268.16
8+00.00	0.00	8.49	0.00	17.53	0.00	285.69
8+50.00	0.00	9.71	0.00	16.85	0.00	302.54
9+00.00	0.00	10.99	0.00	19.16	0.00	321.70
9+50.00	0.00	11.56	0.00	20.88	0.00	342.58
10+00.00	0.00	12.86	0.00	22.61	0.00	365.19

Figure 9-58 The Total Volume Table created

4. Similarly, create the Material Table.

This completes the tutorial

## Saving the File

1. Choose **File > Save As** from the menu bar; the **Save Drawing As** dialog box is displayed.
2. Browse to the *My Documents\civil\_3d* folder.
3. Save the file with name *c09-tut-3*.

## Self-Evaluation Test

Answer the following questions and then compare them to those given at the end of this chapter:

1. To create a cross section, you need at least \_\_\_\_\_ Civil 3D objects such as an alignment and a surface.

2. The cross section in Civil 3D has generally two components, alignment and section view. (T/F)
3. The \_\_\_\_\_ is a Civil 3D object used to cut sections across an alignment or any linear feature.
4. To create sample lines, choose **Corridors > Create Sample Lines** from the menu bar. (T/F)
5. Sample lines are created using the **Sample Layout Tools** toolbar. (T/F)
6. The \_\_\_\_\_ method is used to create sample lines by specifying the station range.
7. The **Create Section Views** dialog box is used to create multiple section views. (T/F)
8. The \_\_\_\_\_ dialog box is used to add labels to section views.
9. The \_\_\_\_\_ dialog box is used to create a new group plot style.
10. The **Edit Sections** option is used to edit the sections whose update mode is set to \_\_\_\_\_.

### Review Questions

Answer the following questions:

1. Section views are the graphical representation of elevation data or an assembly (in case of corridor sections) placed at a particular station. (T/F)
2. You can create multiple groups of sample lines for single alignment. (T/F)
3. The \_\_\_\_\_ dialog box is used to select sources or elements to be sampled by sample lines.
4. The \_\_\_\_\_ tab is used to view and edit material list of the sample line group.
5. The \_\_\_\_\_ tool is used to select and then edit the sample line parameters.
6. The Earthwork takeoff represents the amount of total material to be added or removed from the existing site. (T/F)
7. Civil 3D allows you to calculate only Earthwork takeoffs. (T/F)
8. To compute quantity takeoffs for earthworks and material volumes, you need to define the quantity takeoffs criteria. (T/F)
9. Volume Report displays material volumes. (T/F)
10. The \_\_\_\_\_ is a set of data bands that display the annotation of the section view.

## Exercise

### Exercise 1

Download the *c09-exercise 1a.dwg* file from [http://www.cadcim.com/civil\\_3d\\_2009/civil\\_3d\\_2009.htm](http://www.cadcim.com/civil_3d_2009/civil_3d_2009.htm) link and create a group plot style and multiple section views, as shown in Figure 9-59.

(Expected time: 30 min)

Use the following settings for the group plot style.

Maximum in a row: **7**

Space between adjacent sections in a row: **2.0000"**

Save the drawing as *c09-exercise-1b.dwg*

Accept the default values for all other options

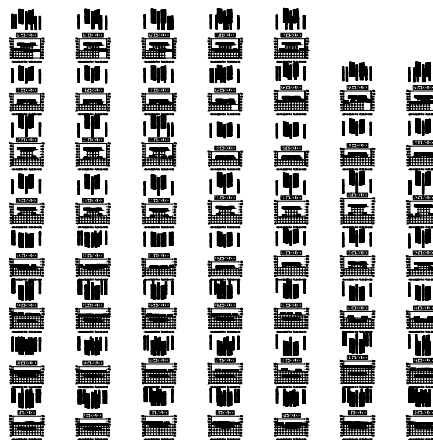


Figure 9-59 Multiple Section Views

### Answers to Self-Evaluation Test

1. two, 2. F, 3. Sample line, 4. T, 5. T, 6. By range of stations, 7. F, 8. Add Labels, 9. Group Plot Style - New Group Plot Style, 10. Static