

LAB 6 - Working with Surfaces

This lab covers how to use additional cross section and profile tools to review surface data.

Chapter Objectives:

- Learn how to use cross section tools to cut sections on a skew to the alignment.
- Learn how to cut sections at specific locations based on graphic elements.
- Learn how to use level filters to find specific levels or groups of levels to turn on or off.
- Learn how to update components, features or surfaces on cross sections.
- Learn how to annotate points or features on cross sections.
- Learn how to use feature filters to find specific features for displaying or annotating.
- Learn how to cut profiles along graphic elements.

The following files are used in this lab:

- C:\Projects\12345\Bridge\Working \CU12345BRDG_Model.dgn
- C:\Workspace\Workspace-CDOT_XM\Standards-Global\InRoads\Preferences\CDOT_Civil.xin
- C:\Projects\12345\ROW_Survey\InRoads\DTM\12345 existing ground for interchange
- C:\Projects\12345\Design\InRoads\12345 SH52
- C:\Projects\12345\Design\InRoads\12345 SH119 SH52 Interchange.alg
- C:\Projects\12345\Bridge\Drawings\Reference_Files\12345BRDG_Model_D-16-DU.dgn
- C:\Workspace\Workspace-CDOT_XM\Standards-Global\InRoads\Templates\CDOT_Template-Library.itl

Lab 6.1 - Open Project Data

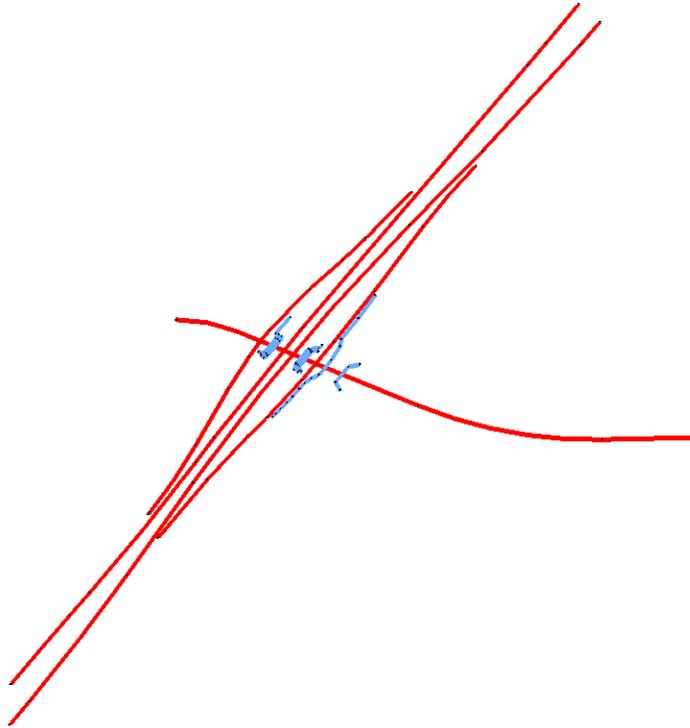
1. Open MicroStation and InRoads using the *C:\Projects\12345\Bridge\Working\CU12345BRDG_Model.dgn* file.
2. Verify the correct *XIN* file is loaded.
3. Select **File > Open** from the InRoads menu.
4. Open *C:\Projects\12345\Design\InRoads\12345 SH52* and *12345 SH119 SH52 interchange.alg*.
5. Open *C:\Projects\12345\ROW_Survey\InRoads\DTM\12345 existing ground for interchange*.

Lab 6.2 - Create Skewed Cross Sections from Graphics

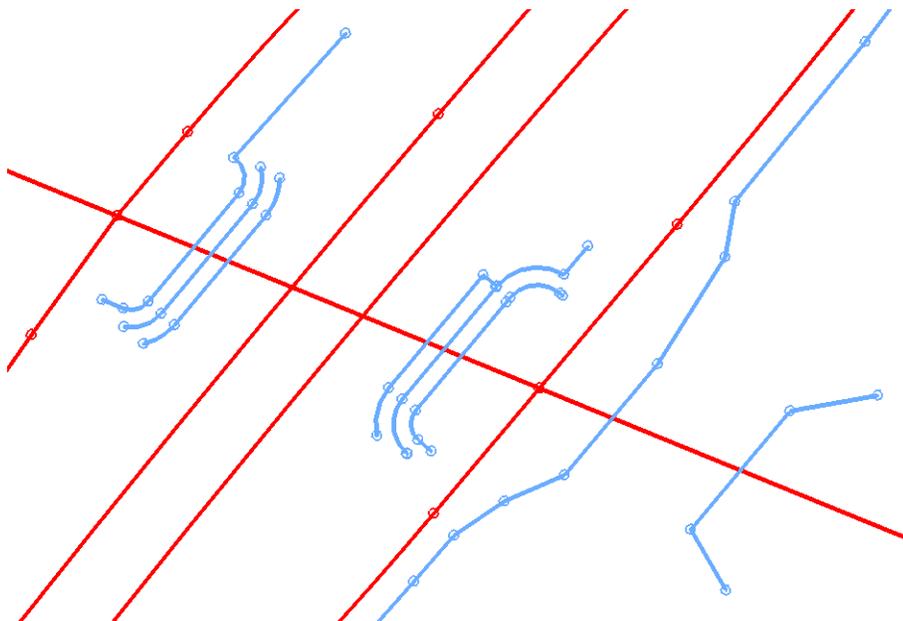
In the previous lab, a cross section set was created based on SH52 at an even interval along the alignment and all sections were perpendicular. In this section, cross sections are created on a skew to the alignment for review purposes.

1. **Delete** any MicroStation graphics currently in the design file.

2. Select **Geometry > View Geometry > All Horizontals**.
3. **Fit** the MicroStation view.



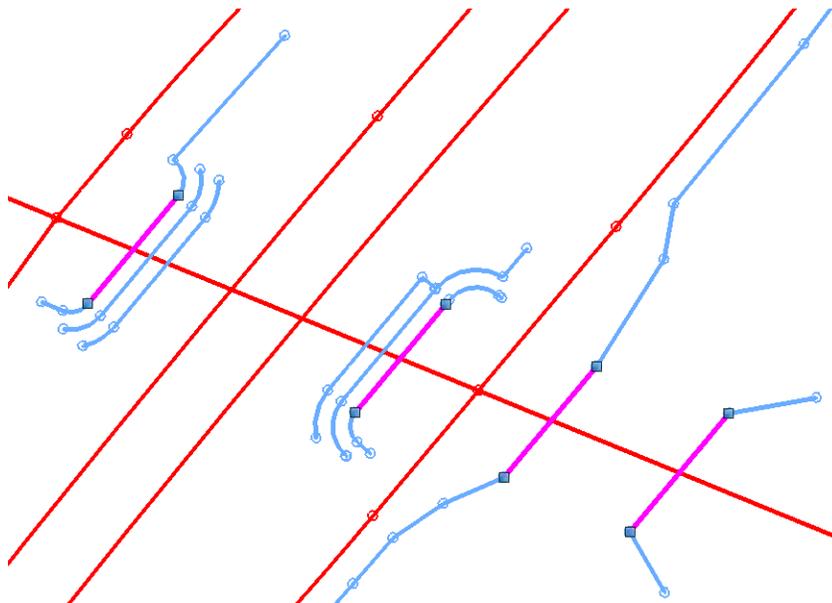
4. **Zoom in** to the approximate area shown.



- In MicroStation, select the **Element Selection** tool.



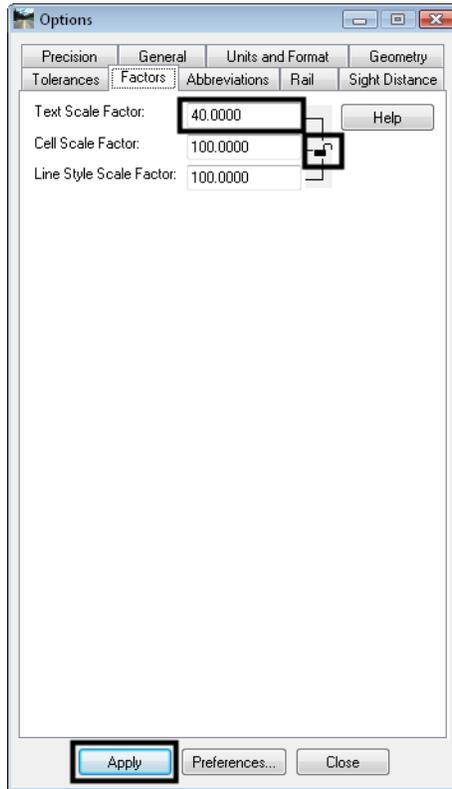
- While holding down the **<Ctrl>** key on your keyboard, **<D>** on the four elements shown here.



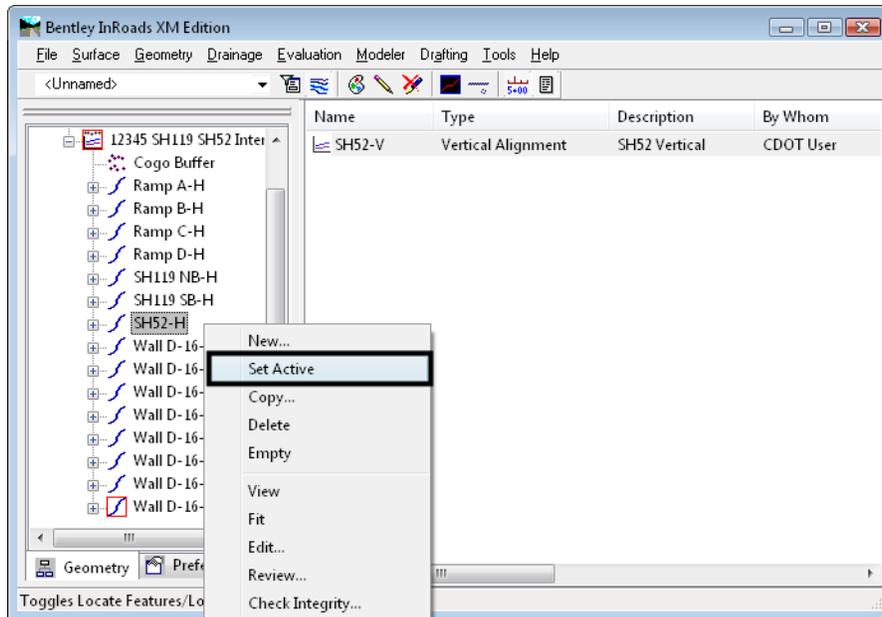
Note: This makes a MicroStation selection set from the wall alignment graphics.

- Select **Tools > Options > Factors**.
- <D>** the lock icon.

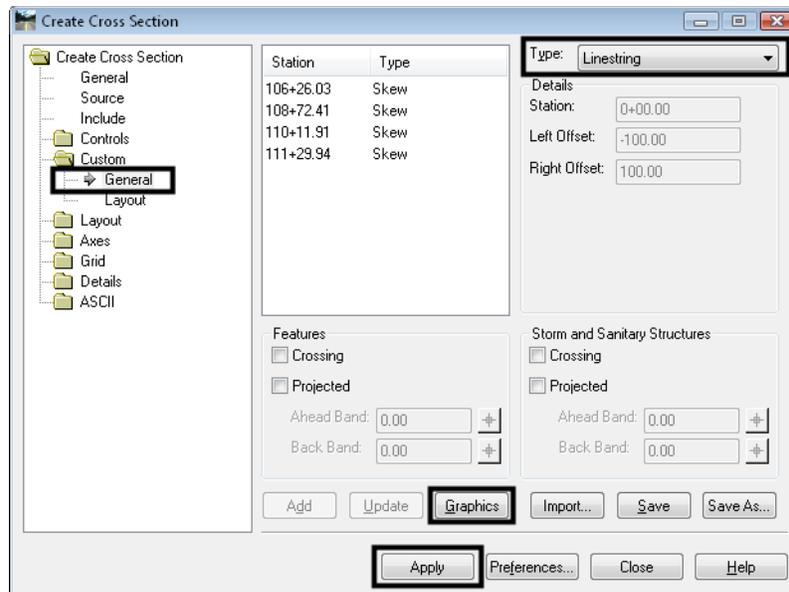
- Set the *Text Scale Factor* to **40**.



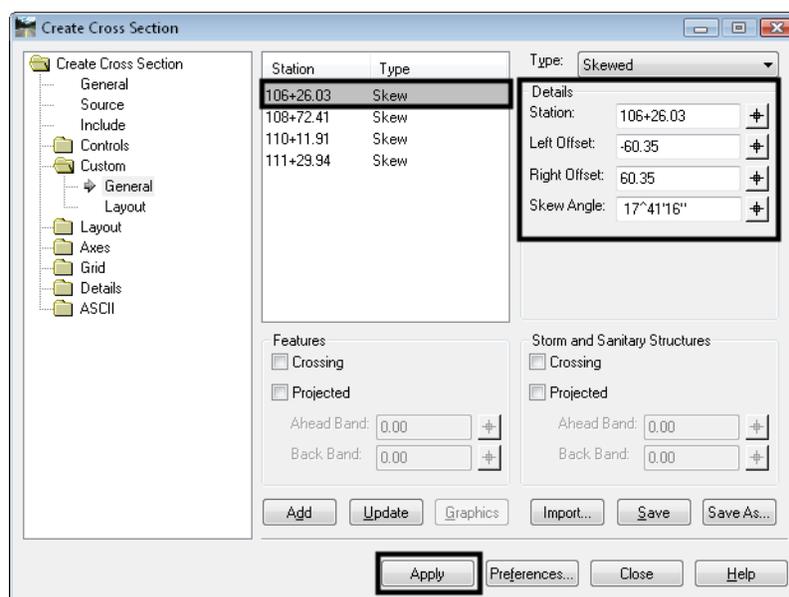
- <D> **Apply**, then **Close**.
- Make **SH52-H** the active alignment.



12. Select **Evaluation > Cross Sections > Create Cross Sections**.
13. Toggle on the two surfaces.
14. Select the **Custom > General** branch.
15. Set the *Type* to **Linestring**.
16. <D> **Graphics**.

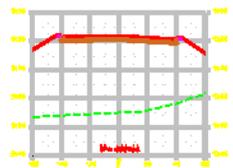
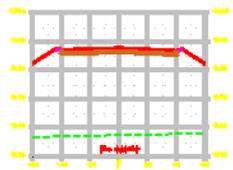
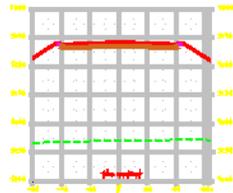
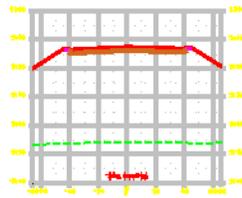


Note: The list of stations where the graphics cross the alignment is shown in the dialog. If an entry is highlighted, the information on the right shows the offsets and the skew angle also.



17. <D> **Apply**.

18. <D> a clear area in the design file for the bottom left corner of the cross section set.



19. Review sections by zooming in or by using the **Cross Section Viewer**.

Note: The cross sections are created based on the graphic elements. In this case, they are graphical displays of alignments, but they can be graphics drawn in MicroStation as well. Next, elements representing bearing lines and the pier centerline are used to create sections.

20. Back in the **Cross Section** dialog, highlight the list of custom stations and choose **Delete** on the keyboard.

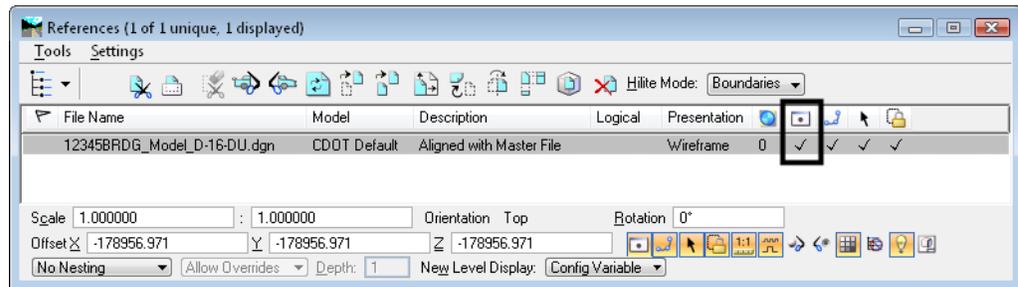
21. <D> **Close**.

22. Clear the selection set of graphics by selecting the **Element Select** tool and <D> in a clear area of your file.

Note: The graphics representing the centerline and bearing lines are currently in a reference file and on a level that is turned off.

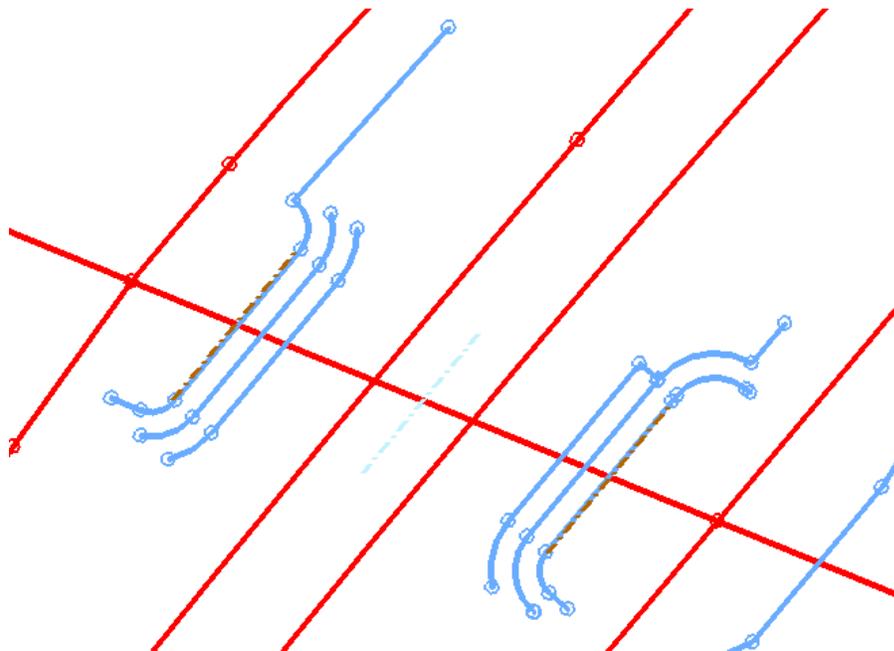
23. Select **File > Reference** from the MicroStation menu.

24. Turn on the display of the **BRDG_Model_D_16-DU.dgn** reference.



25. Close the **Reference** dialog box.

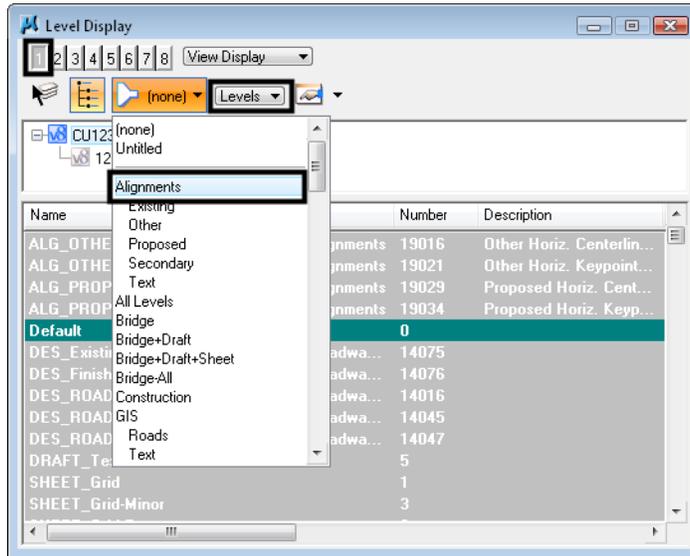
Note: Bearing and Pier centerlines are shown in the file. This reference was attached in the previous lab.



Note: It will be easier to see the new elements if the alignment levels are turned off. To facilitate finding the appropriate levels, level filters are used. Level filters allow the segregation of levels based on predefined criteria, such as all alignment levels, all bridge levels, etc. When a level filter is active, the dialogs listing levels only show those that pass the filter, making it easier to find specific ones.

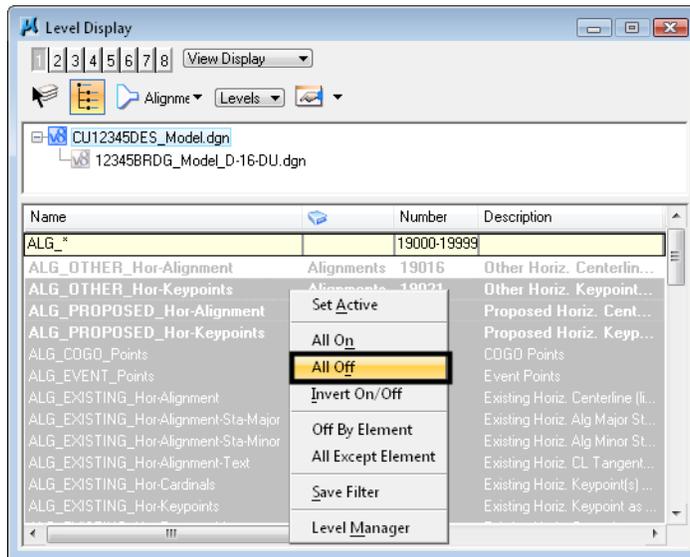
26. In MicroStation, select **Settings > Level > Display**.
27. Toggle **View Index 1** on and all others off.
28. Set the **Active Level** to **Default**.
29. Toggle **Show Level Name or Filters** to **Levels**.

30. Set the *List Filter* to *Alignment*



31. Scroll through the list and notice only alignment levels are displayed.

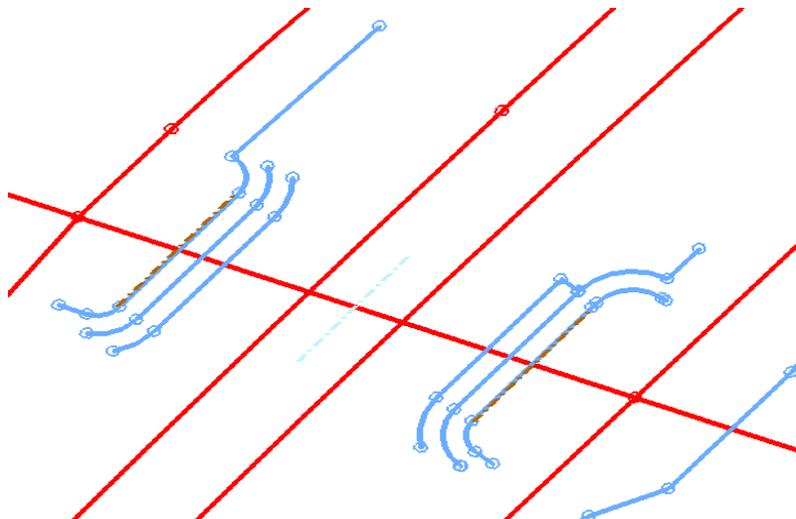
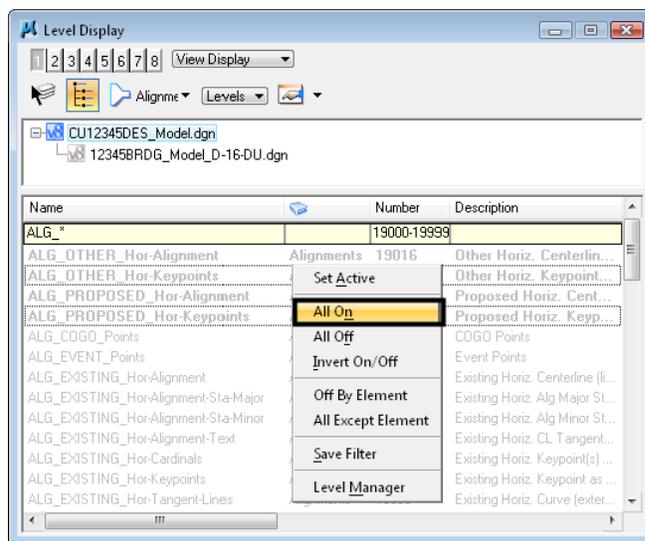
32. Right-click in the level list and choose *All Off*.



Note: In the MicroStation view, notice the alignments levels are now off and the bridge levels are still on.

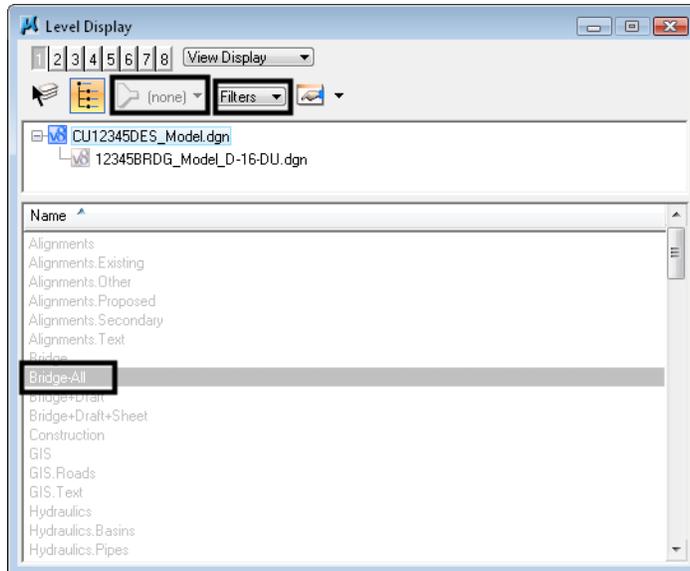


33. Right-click in the level list and choose *All On*.

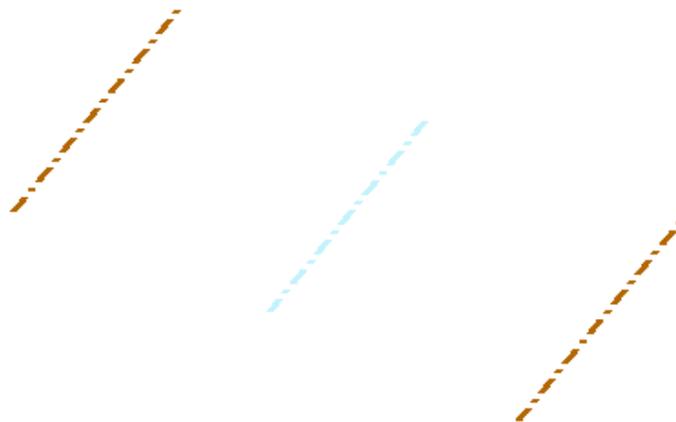


Note: Level filter are used in two ways. One, as described above, they are used to segregate the level lists to make it easier to find the necessary levels. They can also be used to turn on or off all associated levels.

34. Toggle the **Filter** to **(none)**.
35. Toggle **Show Level Name or Filters** to **Filters**
36. Highlight **Bridge-All**.



37. Fit the MicroStation view and notice that the alignment levels are now off and only bridge levels are on.



38. Clear any previous selection set.

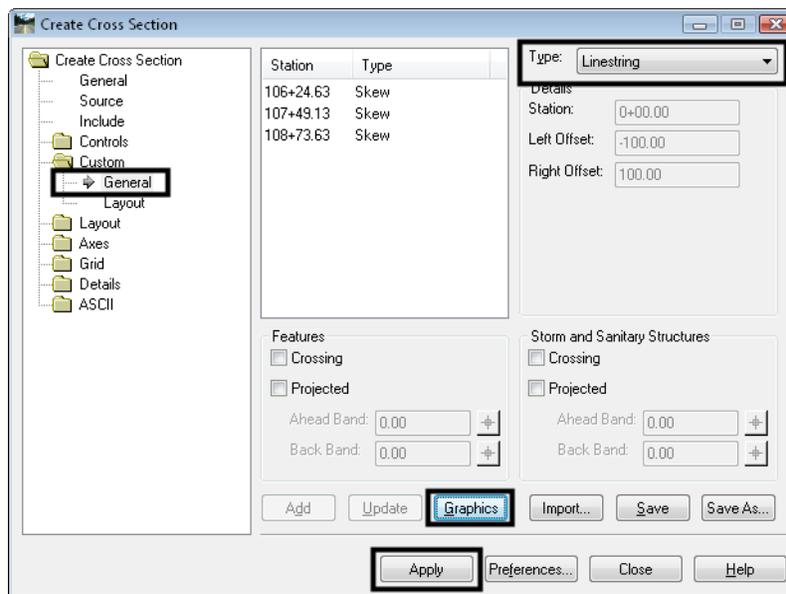
39. Make a selection set from the Pier and Bearing MicroStation graphics.



40. Select **Evaluation > Cross Section > Create Cross Section**.

41. In the *Cross Section* dialog on the *Custom > General* branch, set the *Type* to *Linestring*.

42. <D> **Graphics**.



43. In the *Level Display* box, toggle off the *Bridge-All* filter to turn all levels back on.

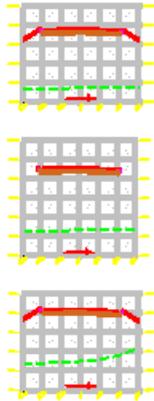
44. In the *Create Cross Section* command, <D> **Apply** and then <D> in a clear area of the file.

45. <D> **Close**.

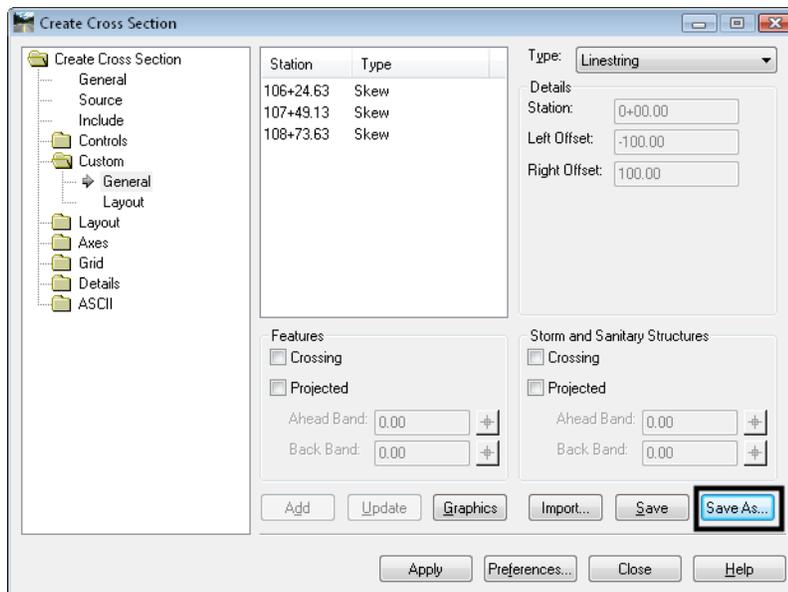
Note: Three cross sections are created for the three lines in the selection set.

46. **Do not** close out of the *Create Cross Section* command.

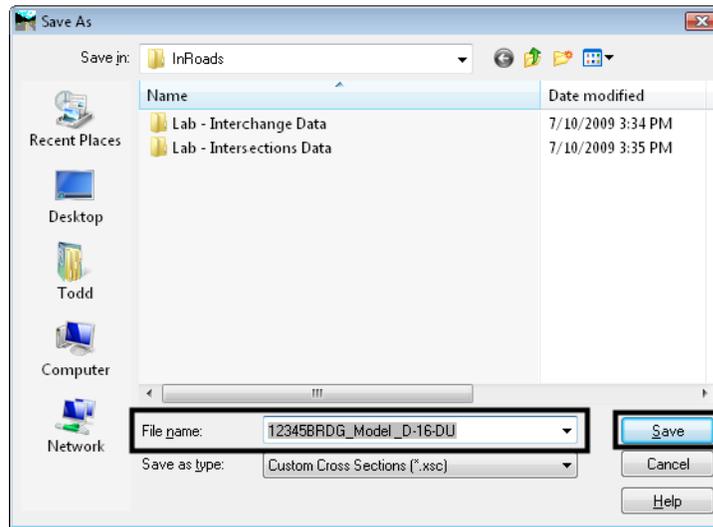
- 47. Close the *Level Display* box.
- 48. Review your new custom cross section set.



- 49. In the *Create Cross Section* dialog box, select **Save As**.



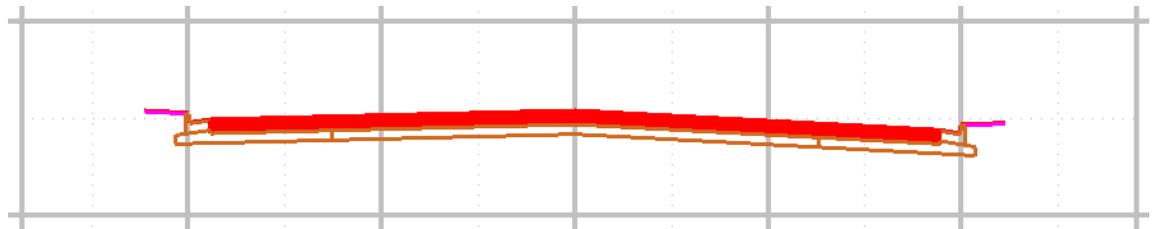
50. Key in **12345BRDG_Model_D-16-DU** for the file name.



51. Select **Save**.

Note: In the future, these sections can be re-created by loading this text (*.xsc) file rather than selecting the graphic elements.

52. **Zoom in** to the second cross section.



Lab 6.3 - Update and Annotate Cross Sections

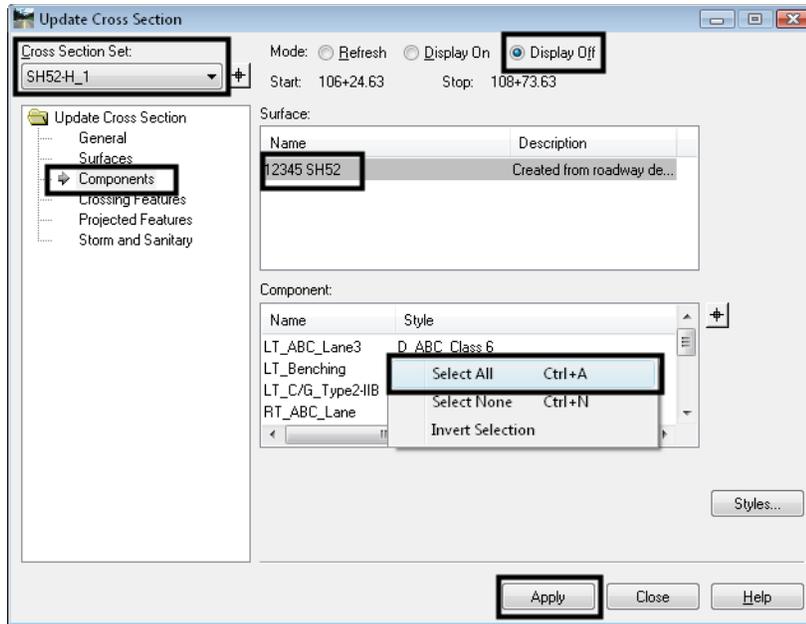
You can update a cross section set to turn on or off the display of components, crossing features, projected features or surfaces. You can also refresh the display of these items if changes have been after creating the cross sections.

Cross section points and segments can be annotated as well. If you want to annotate specific points, you can choose the corresponding features for annotation. However, the features must first be displayed on the cross section before they can be annotated.

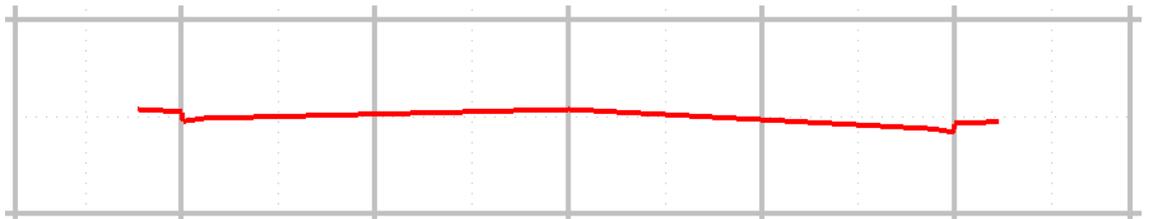
In this section, you will use both the **Update Cross Section** and **Annotate Cross Section** commands. First, to more easily see the design surface, you will toggle off the components.

1. Select **Evaluation > Cross Section > Update Cross Section**.
2. Verify the **Section Set** is the current one.
3. Set the **Mode** to **Display Off**.
4. Highlight **Components** at left.

5. Highlight the *SH52* Surface.
6. Right-click in the component list and <D> *Select All*.

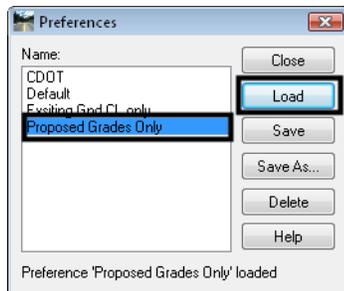


7. <D> *Apply*, then *Close*.
8. Review the cross section to see that components have been turned off.

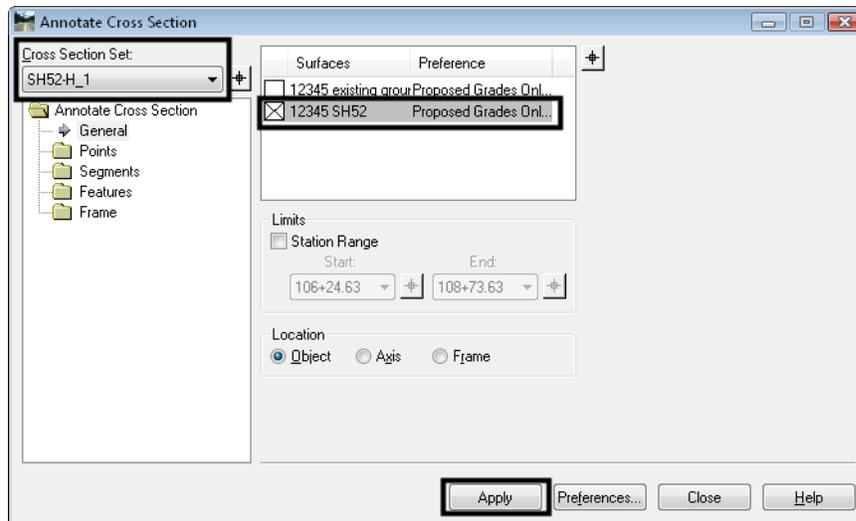


Note: To assist in evaluating the cross sections, it is often helpful to see the elevations, which can be annotated using *Annotate Cross Sections*.

9. Select **Evaluation > Cross Section > Annotate Cross Section**.
10. Load the preference *Proposed Grades Only*.

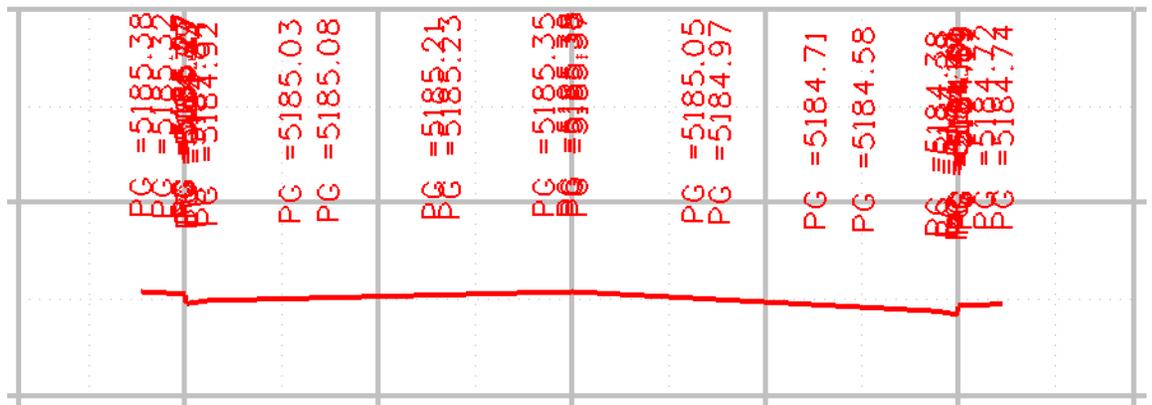


11. Select the Set of skewed sections.
12. Toggle on the *SH52* surface.



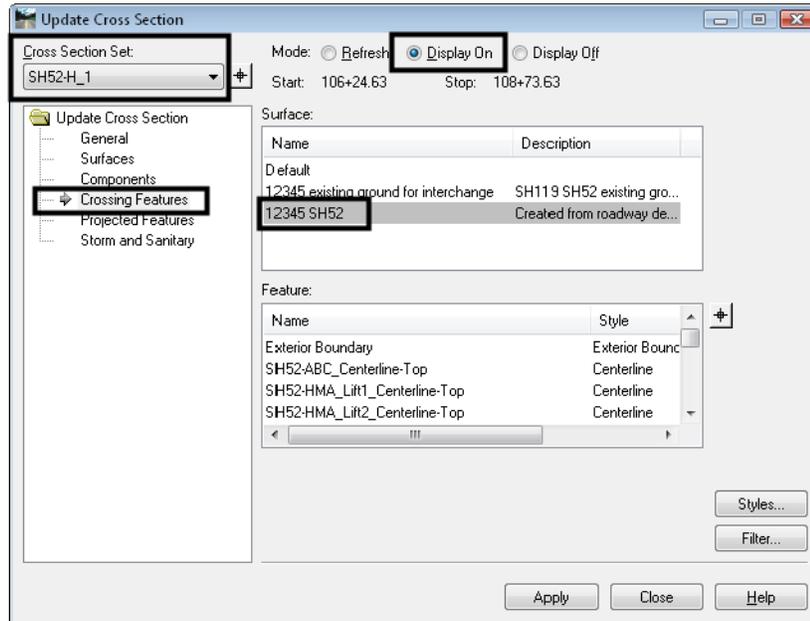
13. <D> **Apply**, then **Close**.

Note: The elevations are annotated for every point on the proposed grade.



Note: Often, a more useful option is to annotate the elevations of only certain points. This is accomplished by first displaying the features in the proposed model on the cross sections.

14. Select **Evaluation > Cross Sections > Update Cross Sections**.
15. Select the set of skewed sections.
16. Set the *Mode* to **Display On**.
17. Select **Crossing Features**.

18. Highlight the *SH52* Surface.

Note: Look in the feature list and notice that there are several features. The surface contains features for each of the lifts seen on the cross sections earlier. The features on the finished grade, which are triangulated, are the ones typically annotated in this case. Rather than scrolling through this list and highlighting just those, a feature filter is used.

19. Select **Tools > Locks > Toolbar** to toggle on the locks toolbar if it is not on already.
20. On the *Update Cross Section* box, select **Filter...**
21. In the feature filter list, select *XS_Excluded from Triangulation* and select **OK**.

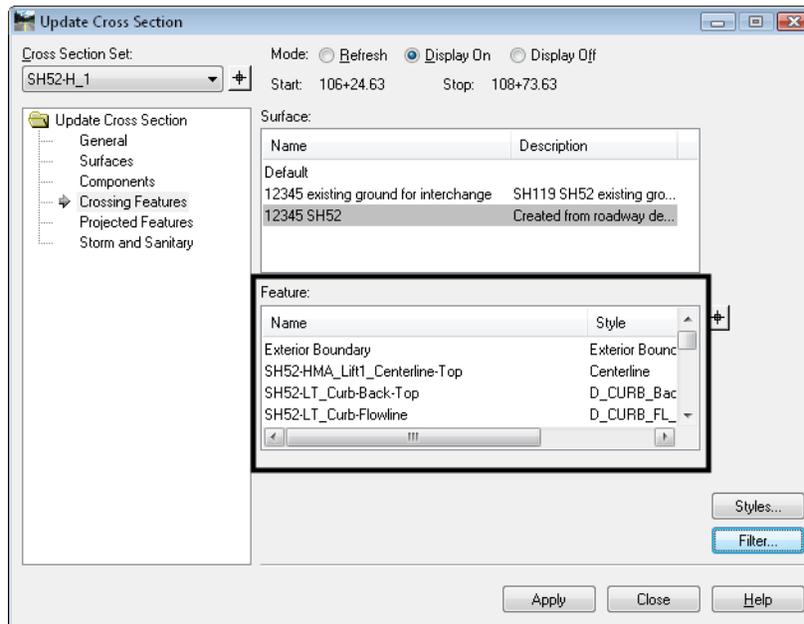


- Toggle on the *Feature Filter* lock.



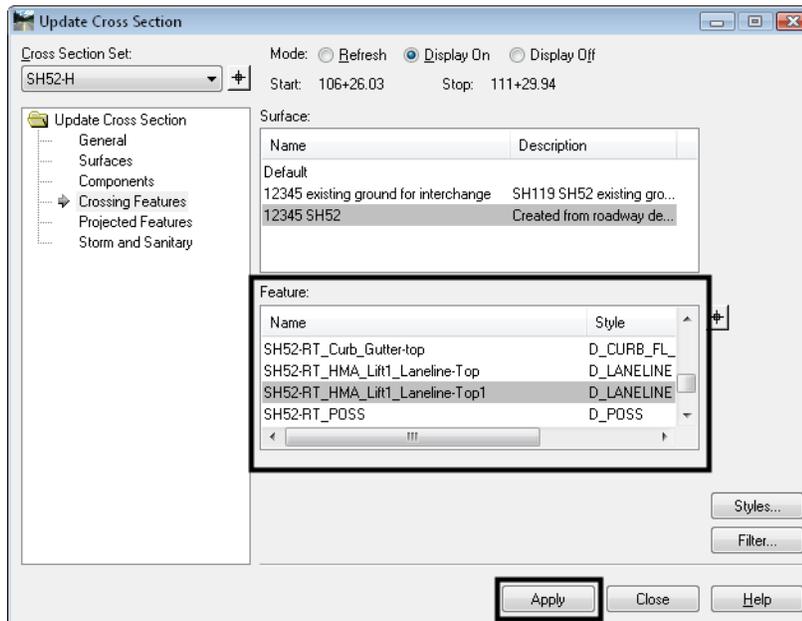
Note: The feature filter has no effect unless the lock is on.

- In the *Update Cross Section* box, scroll through the list of features and note the number is greatly reduced.

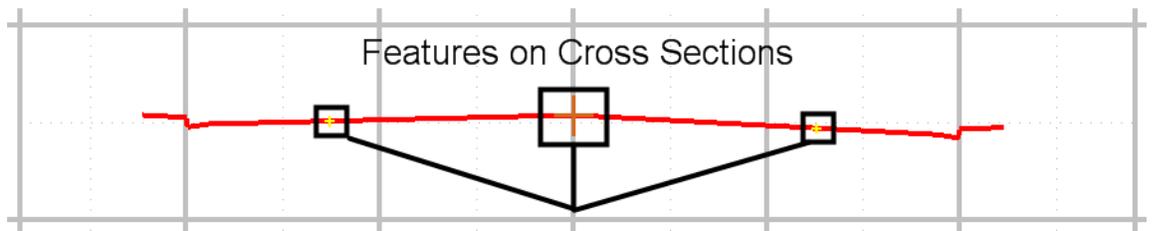


Note: The filter chosen, *XS_Excluded from Triangulation* eliminates non-triangulating features from any dialog box that lists features. While it is very handy, it can also be confusing when features that exist do not show up in the list. For that reason, the lock is toggled off after use. There are several pre-defined filters that can be used to segregate features. These filters are stored in the *XIN* file.

24. Highlight the *Centerline Top* and the *left* and *right Laneline-Top1* features.



25. <D> Apply.



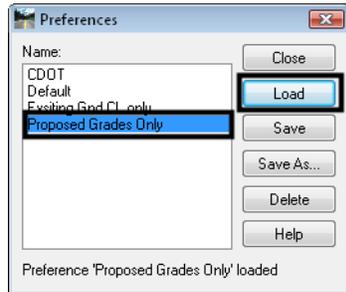
Note: Small '+' signs are shown on the cross sections. These mark the location of the features and can now be annotated.

26. <D> Close.
27. Toggle off *Feature Filter* lock.

Note: It is best to leave this lock off unless you need it.

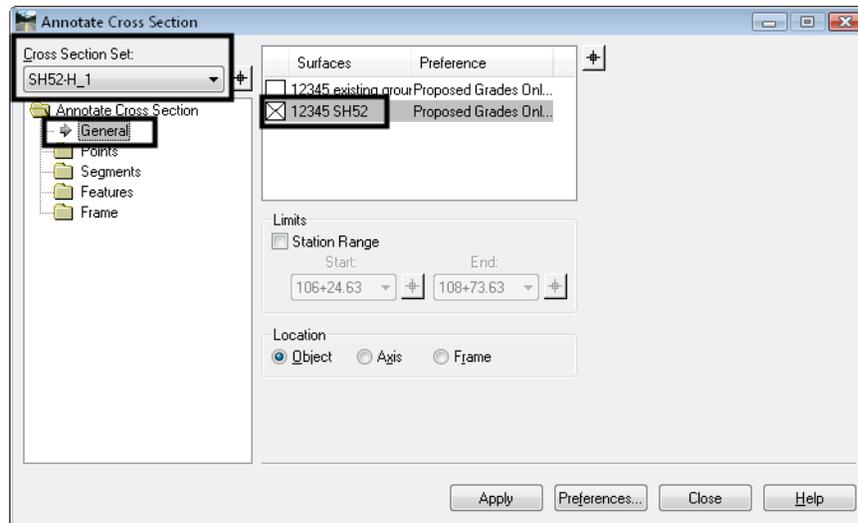
28. Select **Evaluation > Cross Section > Annotate Cross Section**.

29. Load the preference *Proposed Grades Only*.

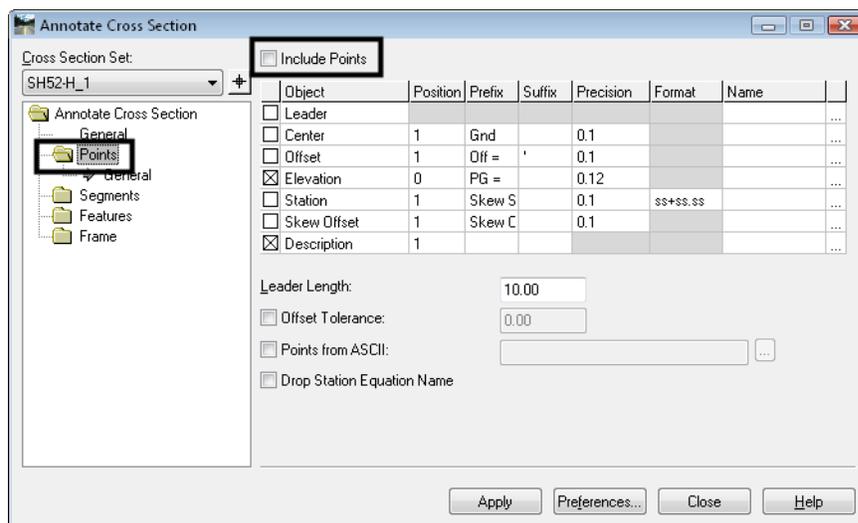


30. Select the set of skewed sections.

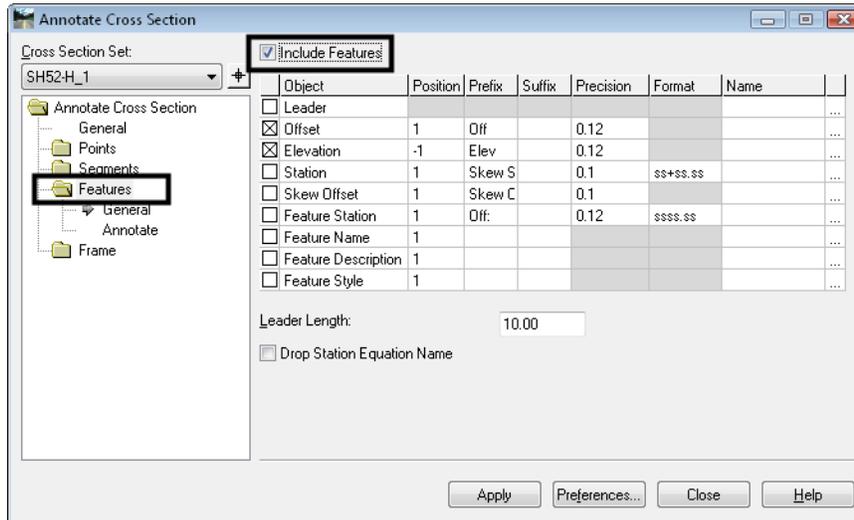
31. Toggle on the *SH52* surface.



32. Select *Points* and toggle off *Include Points*.

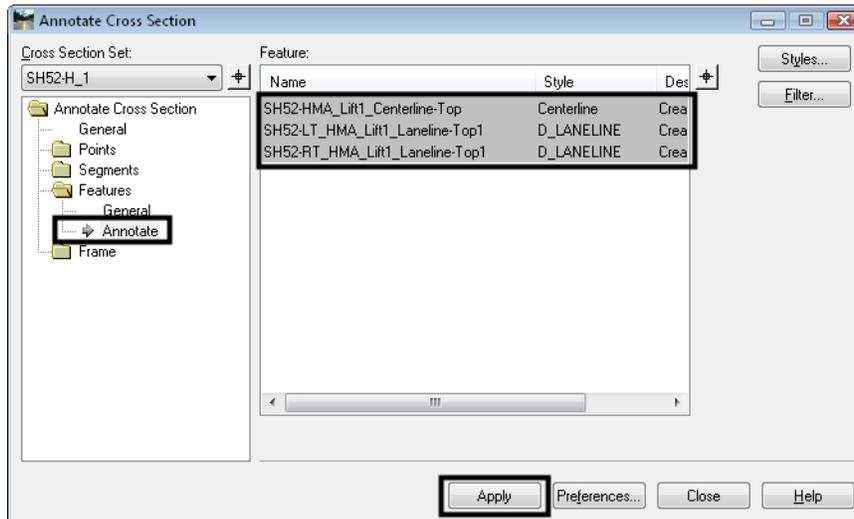


33. Select **Features** and toggle on **Include Features**.

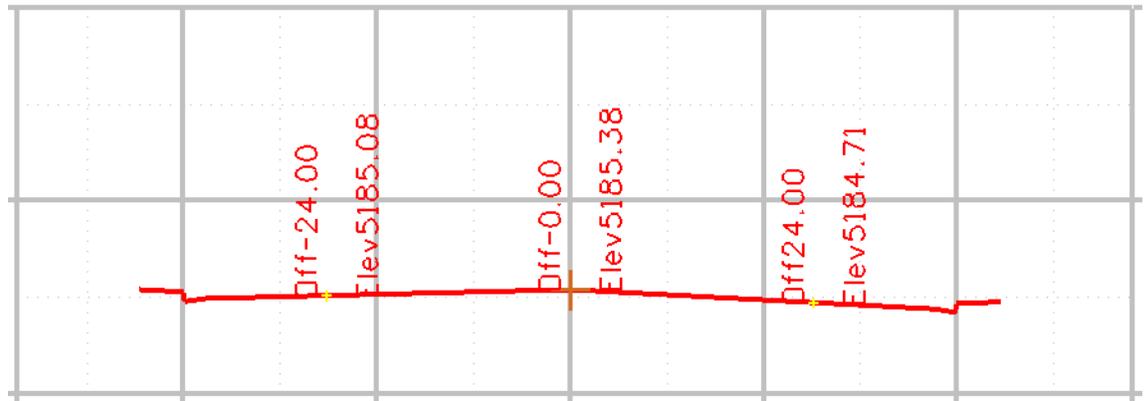


34. Select **Annotate** under **Features**.

35. Highlight the three features listed.



36. <D> **Apply**, then **Close**.



Note: Offsets and elevations are annotated for only the three features on the proposed grade. The previous annotation was deleted since you displayed these graphics in *Pencil* mode.

Lab 6.4 - Creating Profiles from Graphics

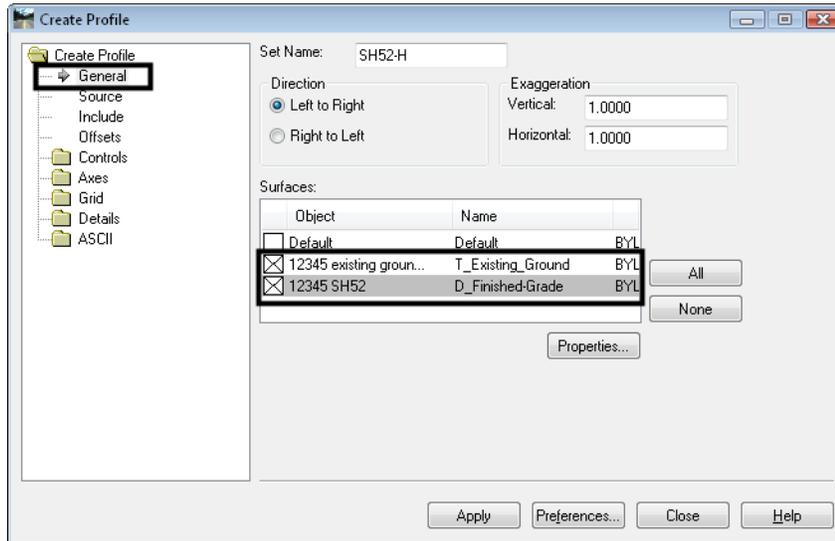
In addition to cutting skewed sections based on graphic elements, profiles can also be generated from graphics. The main differences between the two options include:

- The bottom axis of Cross Sections list offsets from the reference line along which they are created (alignment, graphic, or multi-point).
- The bottom axis of a Profile lists stationing, even if the profile is cut from a graphic. For profiles cut from graphics or multi-points, the stationing begins at 0+00.

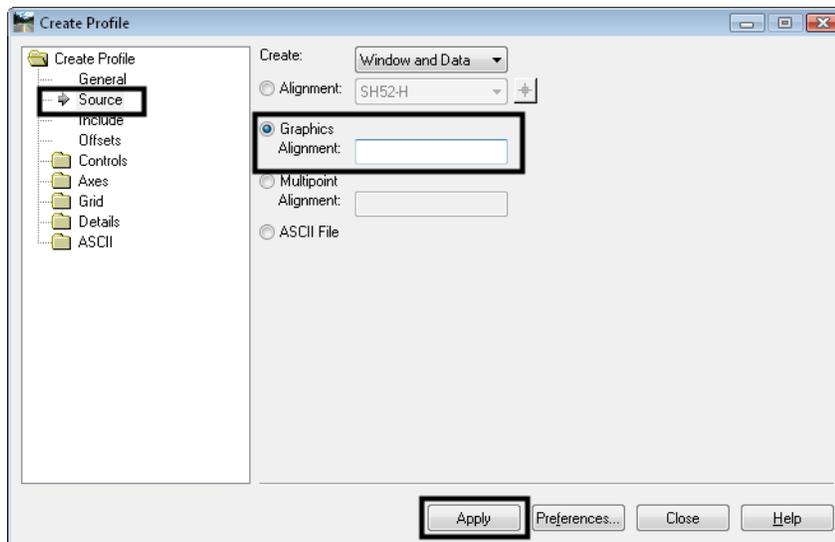
In this section, you will generate a profile showing existing and proposed surfaces along a the pier centerline graphic. Since the graphic is in a reference, you will first draw a new line the active file to use for profiling.

1. In MicroStation select the **Place Line** command.
2. Place a new line by snapping to the two end points of the pier centerline.
3. Select **Evaluation > Profile > Create Profile**.
4. Select *General*.

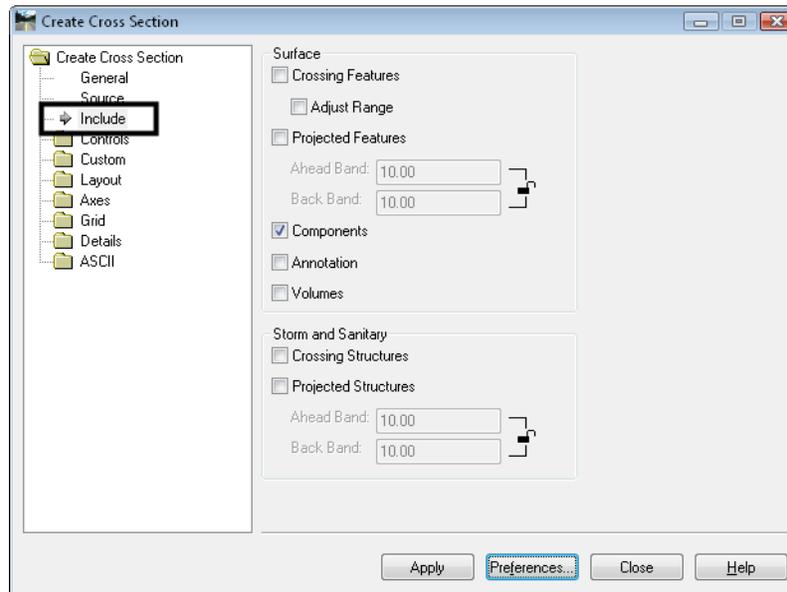
5. Toggle on both surfaces.



6. Select *Source*.
7. Toggle on *Graphics Alignment*.
8. If you key in a name in the *Graphics Alignment* field, an alignment is created for the graphic element selected after choosing Apply.



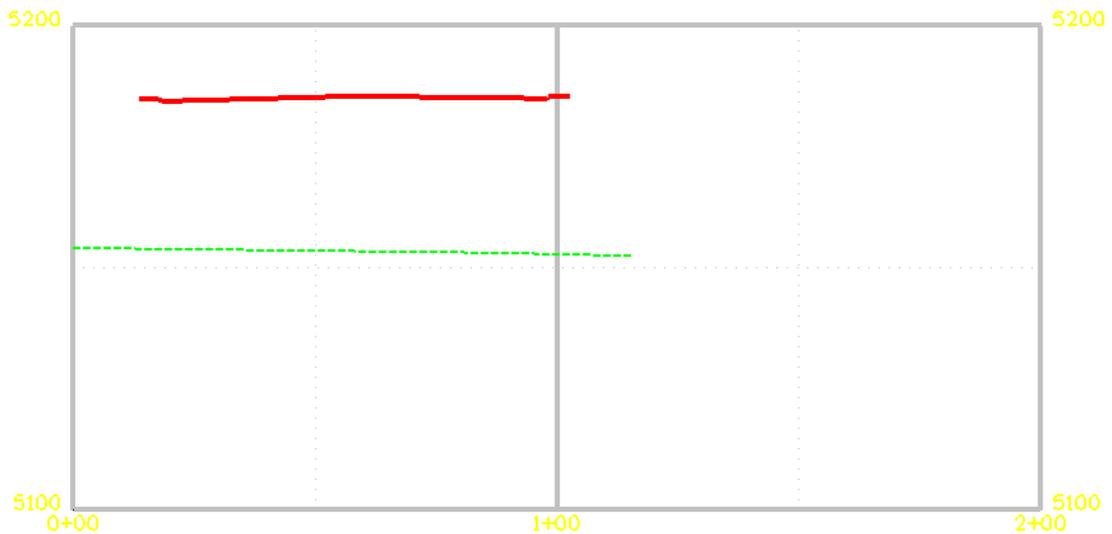
9. <D> on the Include Branch.



Note: If you want to display crossing features on your cross section like pipes or utilities, toggle on **Crossing Features**. These features must first exist in the surface(s) you're showing on the sections. The feature's style controls if the feature can be shown on the cross section.

Note: If you want to show features that fall outside the cross section, toggle on **Projected Features**. This will show the orthogonal projection of the features onto the cross section. You also have the option of specifying a **Bandwidth** to either side of the section to project the features.

10. For this exercise, leave **Crossing Features** and **Projected Features** turned off.
11. <D> **Apply**.
12. <D> on the line you drew over the pier centerline element.
13. <D> to accept the element.
14. <D> a clear area in the file.



Note: The profile is created showing both surfaces. Since there is not an alignment associated with this review profile, some of the post-processing commands for profiles, such as annotating and updating are not available. Profiles that need to be annotated and/or updates should be cut using an alignment, or an alignment should be created when the profile is cut by specifying an alignment name as noted above.

Chapter Summary:

- Custom cross sections are used to create sections that are not based on an interval or perpendicular to an alignment.
- The setup for custom cross section sets may be saved to a text file and loaded later to cut sections at the same location.
- Level filters can create a subset or group of levels to easily turn an entire group of levels on or off. They can also help you find individual levels more easily.
- Feature filters create a subset or group of surface features for displaying in plan, profile or cross section. They can also help you find individual features more easily.
- Profiles can be cut based on alignments or graphics.