LAB 3 - Geometry Annotation

This lab demonstrates how annotate horizontal geometry, set and display alignment stationing, and use horizontal alignment tracking tools.

Chapter Objectives:

- Display horizontal alignments.
- Annotate horizontal alignments and cogo points.
- Reset stationing on an alignment.
- Display stationing.
- Add a station equation.
- Use Tracking and Horizontal Alignments Tracking.

The following files are used in this lab:

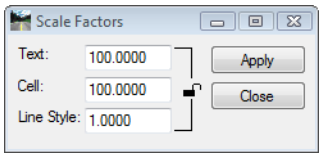
- C:\Projects\12345\Design\Drawings\Reference_Files\12345DES_Geometry-Annotation.dgn
- C:\Projects\12345\Design\InRoads\12345DES_Design.alg
- C:\Projects\12345\Design\InRoads\12345 existing ground.dtm

Lab 3.1 - Geometry Display

Section Objectives:

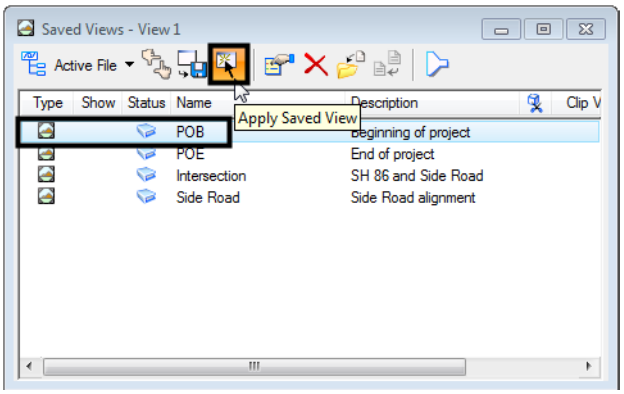
- Set the proper scale factors.
- Open a saved view in MicroStation.
- Display alignments using the View and Annotation commands.

1. Select **Tools > Global Scale Factors** and set the scales to ***100*** for ***Text*** and ***Cell*** and ***1*** for ***Line Style***.



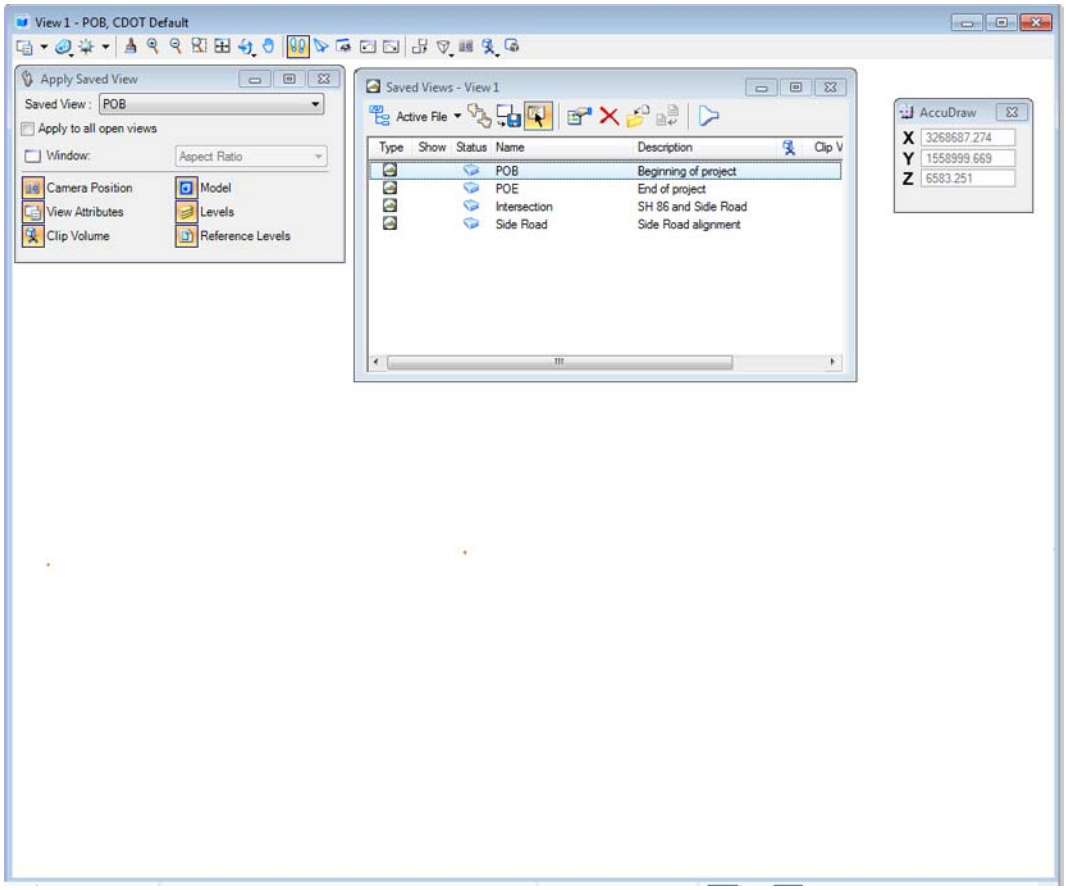
2. **<D> Apply** then **Close** to accept the changes and dismiss the dialog box.
3. Using the ***MicroStation*** menus, select **Utilities > Saved Views** to open the saved views dialog box.

4. **<D>** on the name **POB**, **<D>** the **Apply Saved View** button, then **<D>** in **View 1**.

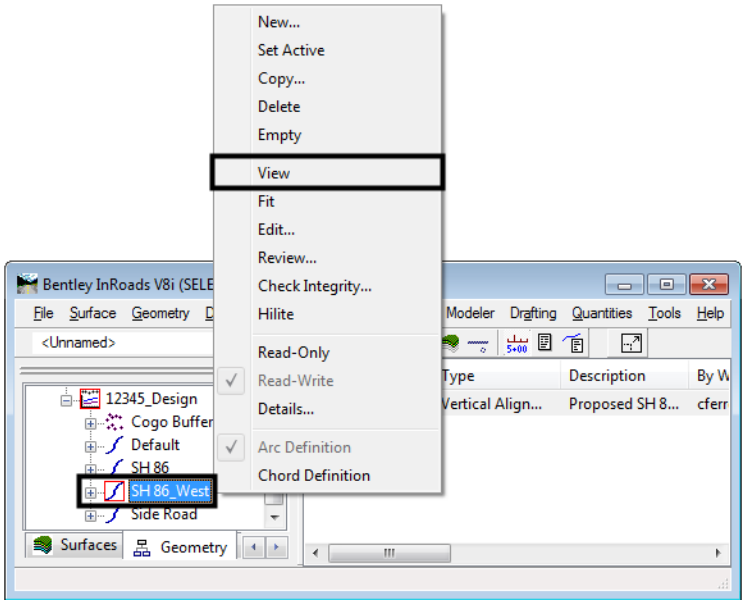


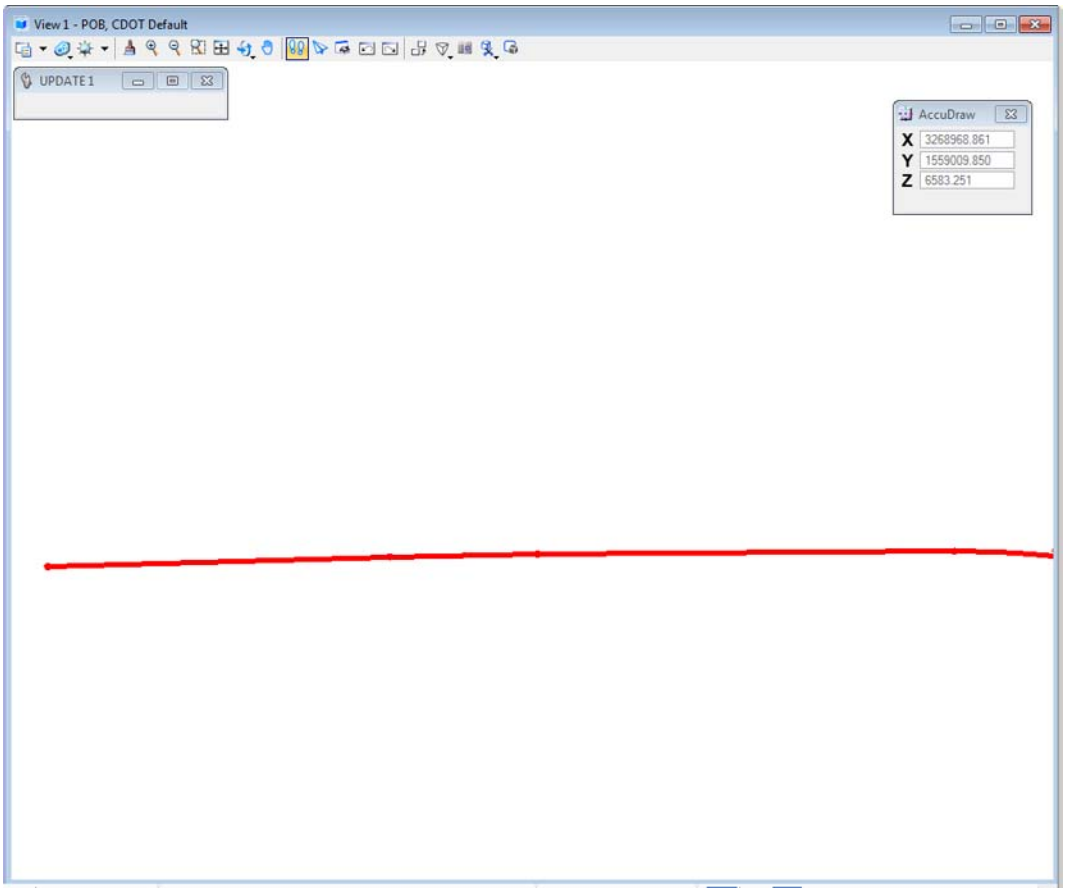
5. Close the ***Saved Views*** dialog box.

   Below is an example of the saved view. Only two small symbols are visible.



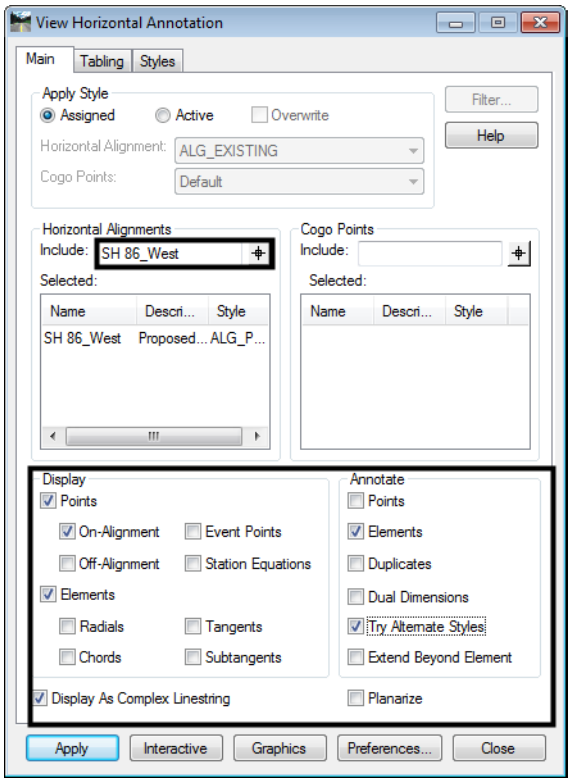
6. Display alignment **SH 86_West** from the Geometry Project ***12345_Design*** by right-clicking **<R>** on the alignment name and selecting **View** from the right click menu.





The alignment display is based on the geometry style assigned to the alignment. This display method does not allow the user to annotate of the geometry. The next steps illustrate how to display various types of horizontal alignment data.

7. Select **Geometry > View Geometry > Horizontal Annotation**.

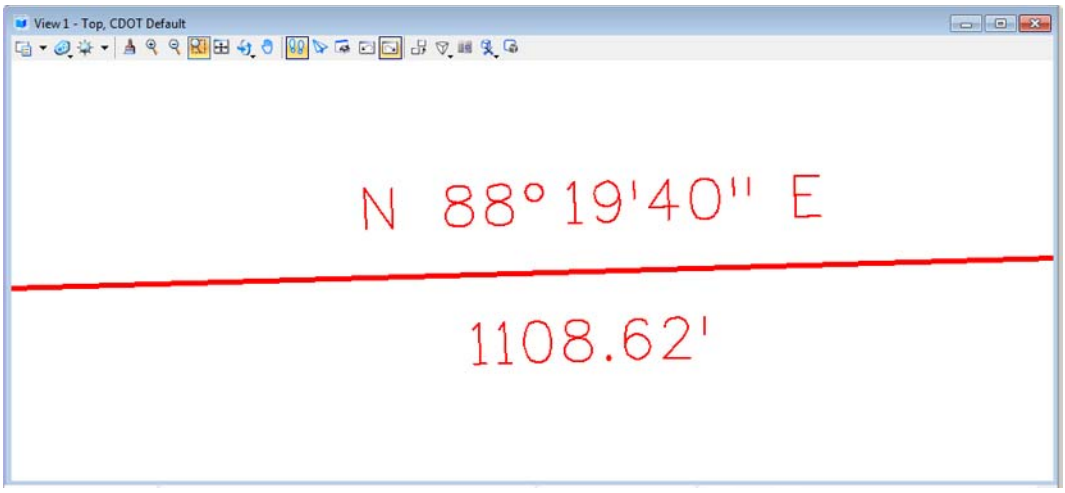


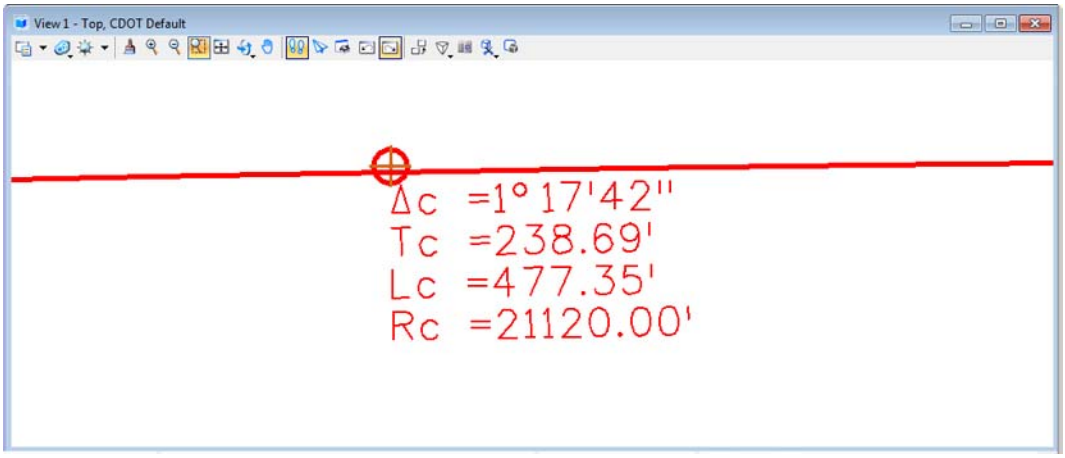
8. Key in ***SH 86_West*** in the ***Annotate*** field and ***Tab*** from the field.

9. Set options for the ***Display*** and ***Annotate*** sections of the dialog box as shown in the above illustration.

10. **<D>** the **Apply** button. The ***SH86_West*** alignment and its annotation are displayed.

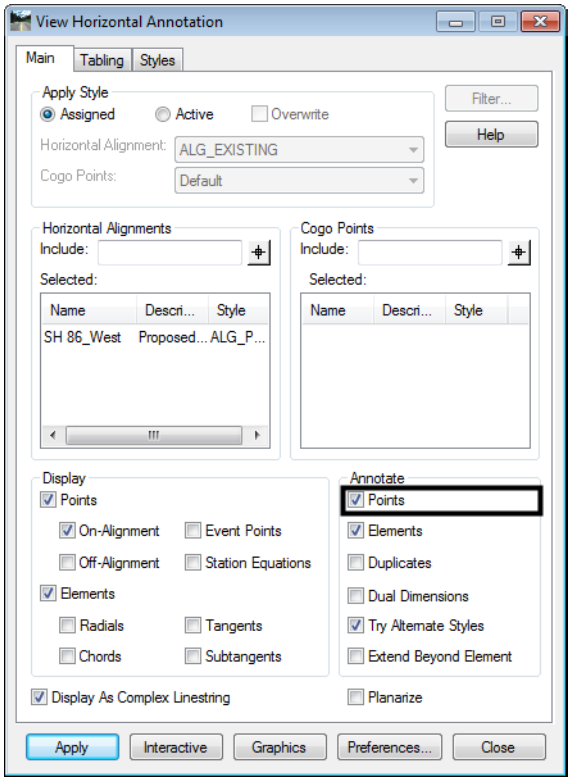
11. Note how ***Bearing*** and ***Distance*** annotation is displayed along the tangents. If the alignment contains horizontal curves, curve data will be displayed.



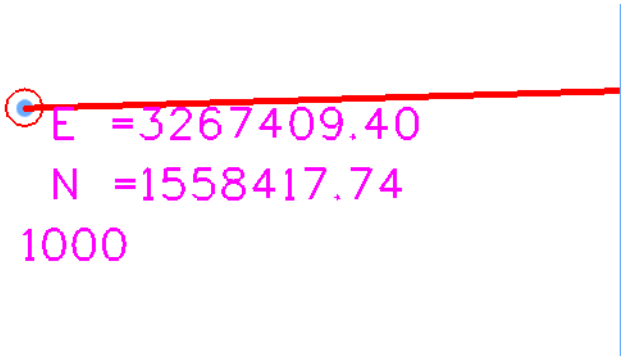


12. Return to the **View Horizontal Annotation** dialog box.

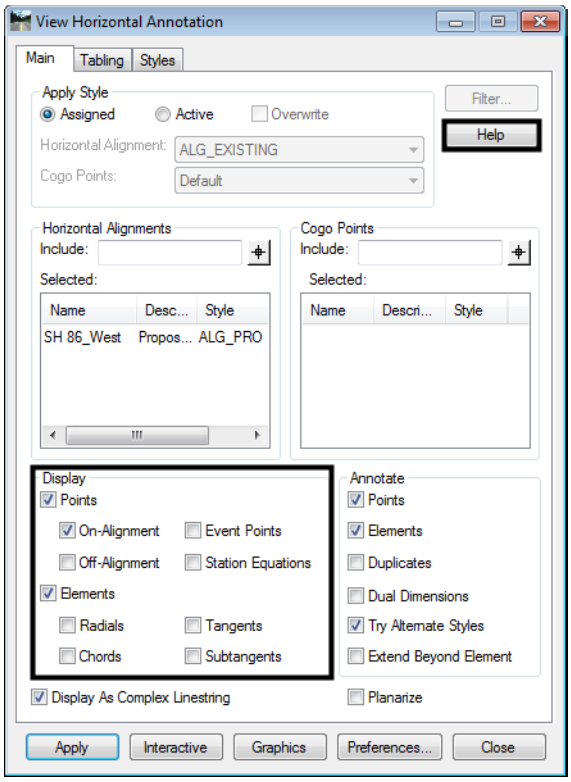
13. In the ***Annotate*** area of the ***Main*** tab, Toggle on ***Points*** and **<D> Apply**



In addition to annotation for tangents and curves, notice that alignment vertices are also annotated.



14. On the **Main** tab, click the **Help** button and review the descriptions for the various components that can be displayed.



15. Experiment displaying an alignment with ***Points*** and ***Elements*** turned on or off in both the ***Display*** area and the ***Annotate*** area.

16. Close the ***View Horizontal Annotation*** dialog box.

Section Summary:

- InRoads displayed graphics are governed by the Global Scale Factor in InRoads. The MicroStation Annotation Scale has no affect on these elements.
- The view alignment commands (from the right click menu or from Geometry > View Geometry > Active Horizontal) only display the lines and arcs that make of the alignments path.
- Horizontal Annotation also displays the alignment's path and it can display other geometry data as well.

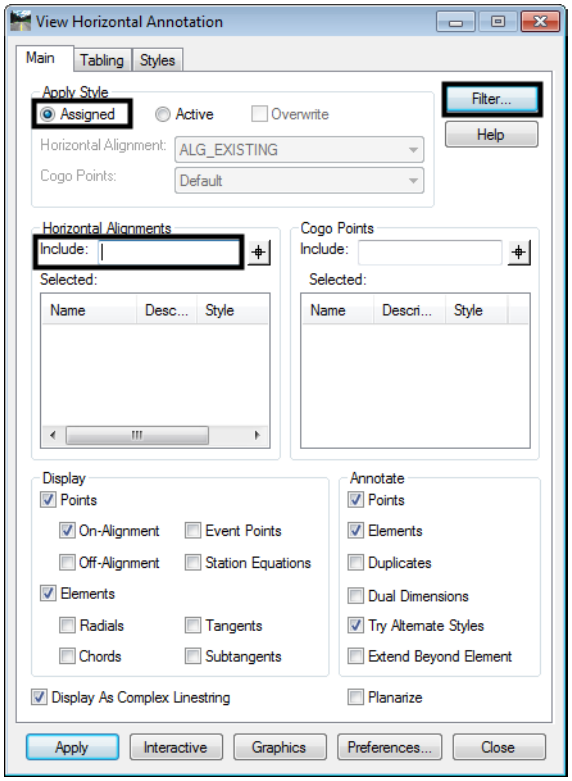
Lab 3.2 - Selecting Multiple Alignments for display and/or Annotation

Section Objectives:

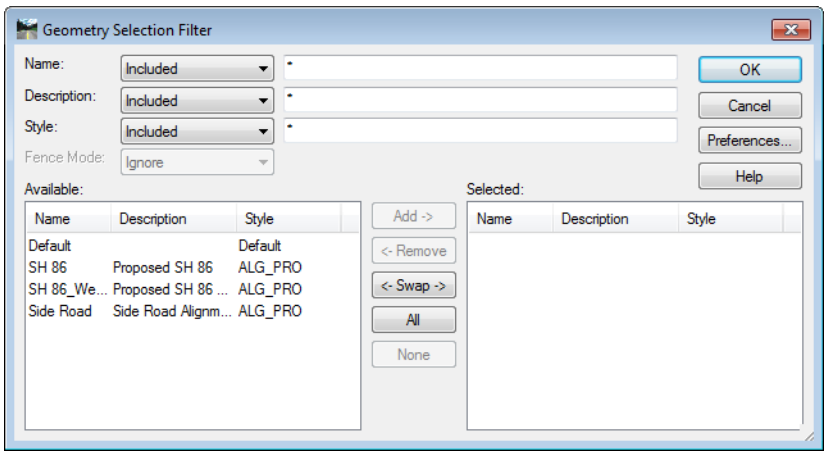
- Illustrate how to display and annotate multiple horizontal alignments at one time.

1. Select **Geometry > View Geometry > Horizontal Annotation**.

2. **<D>** the ***Main*** tab.
3. Set the ***Apply Style*** to **Assigned**.
4. **<D>** in the ***Include*** field in the ***Horizontal Alignments*** area. The ***Filter*** button becomes active.



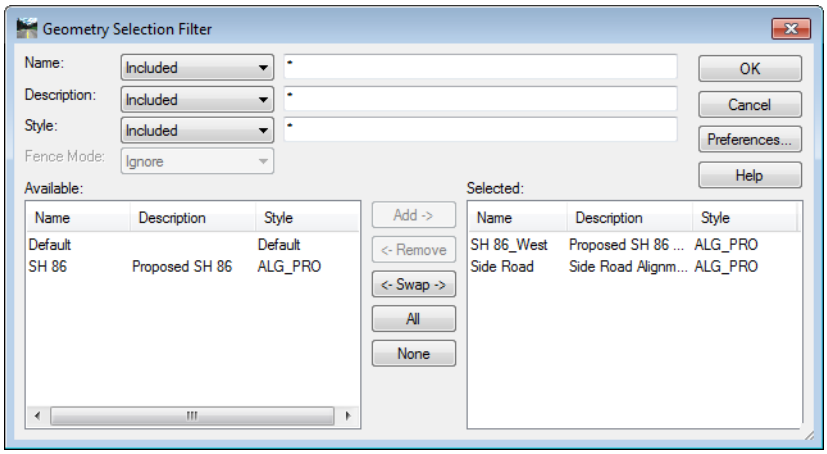
5. **<D>** the **Filter** button to display the ***Geometry Selection Filter*** dialog box.



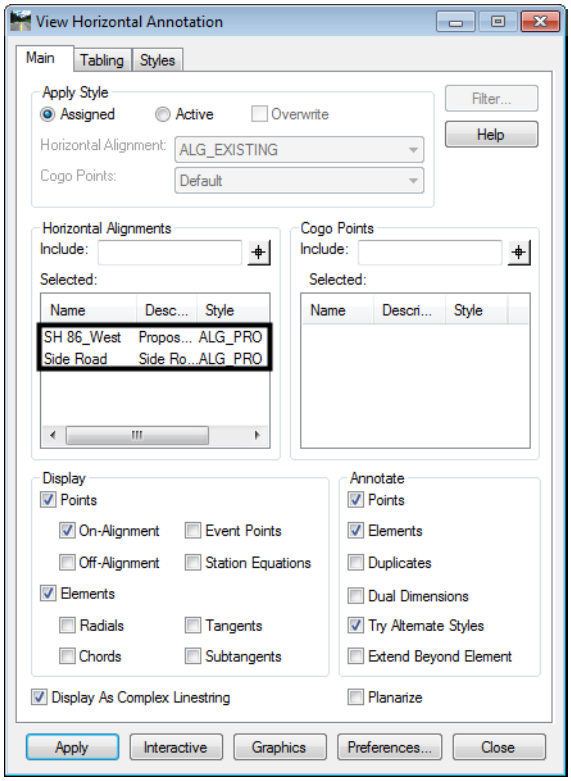
Note: ***Available*** alignments are shown on the left, ***Selected*** (for display or annotation) alignments are shown on the right. This makes it possible to select multiple alignments for display or annotation.

6. Move the alignments **SH 86_West** and **Side Road** from the ***Available*** list to the ***Selected*** list by highlighting their names in the ***Available*** list and then **<D>** the **ADD** button (or **<D><D>** on the names).

   Note: To sort the data in this dialog box, **<D>** on the column headers. To select multiple alignments use of the ***<CTRL>*** or ***<Shift>*** keys.

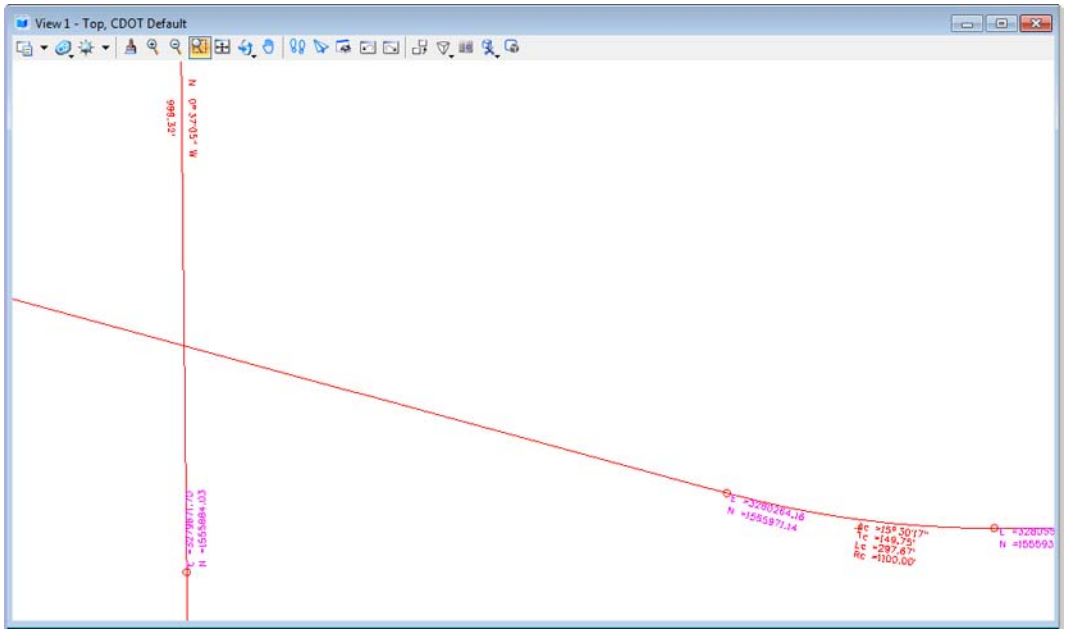


7. **<D> OK** to dismiss the ***Geometry Selection Filter*** dialog box and populate the ***Horizontal Alignments Selected*** field of the ***View Horizontal Annotation*** dialog box.



8. **<D> Apply** and the selected alignments are displayed in MicroStation.

9. Review the results in MicroStation.



Section Summary:

- Alignments can be selected for annotation by key in, graphic selection using the button, or by using the Filter options.
- The Display area is used to turn on or off the display of the geometry elements.
- The Annotate area is used to turn on and off the text data associated with the geometry elements.

Lab 3.3 - Display or Annotation of Cogo Points

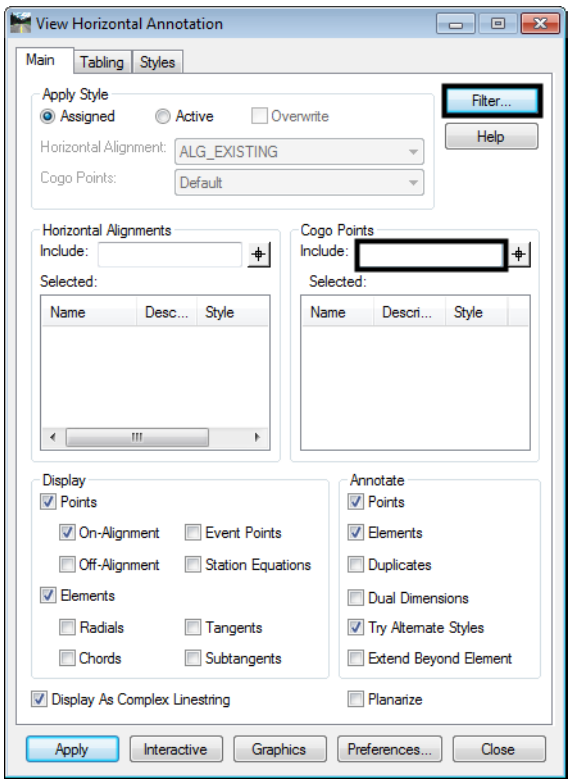
Section Objectives:

- Illustrate a method for defining cogo points for display and/or annotation.

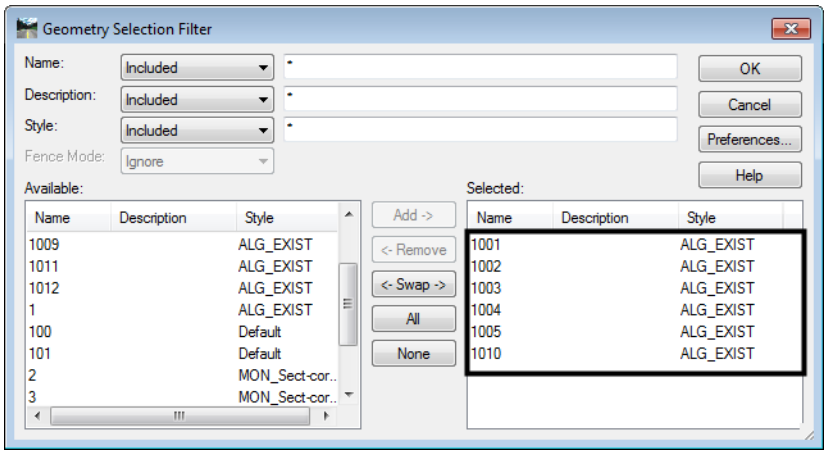
Note: Whether you are annotating Points or Alignments, keep in mind that the element selection button can be used to graphically identify the geometry of interest. This is universally true in InRoads whenever the selection button is displayed.

10. **<D>** the ***Include*** field in the ***Cogo Points*** area to activate the ***Filter*** button

11. **<D>** the **Filter** button. The ***Geometry Selection Filter*** dialog box is displayed.



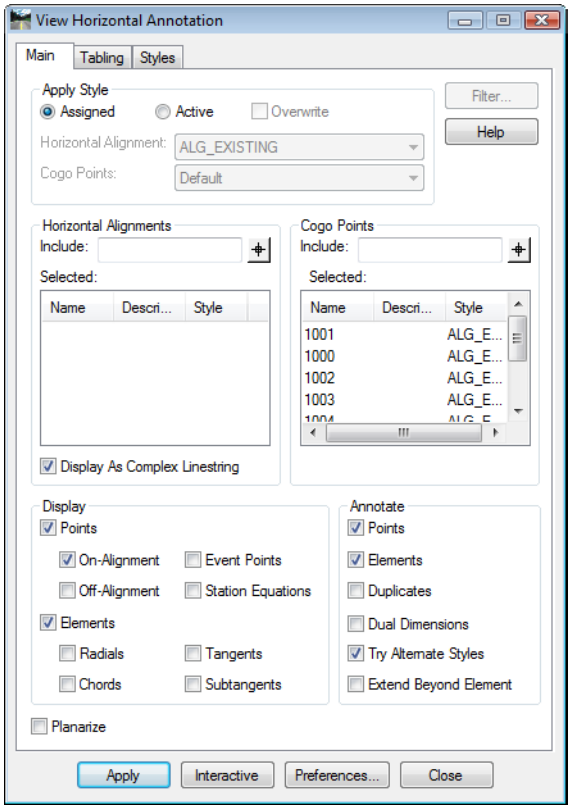
12. Select points **1001-1005 & 1010** from the ***Available*** field and add them to the ***Selected*** field.

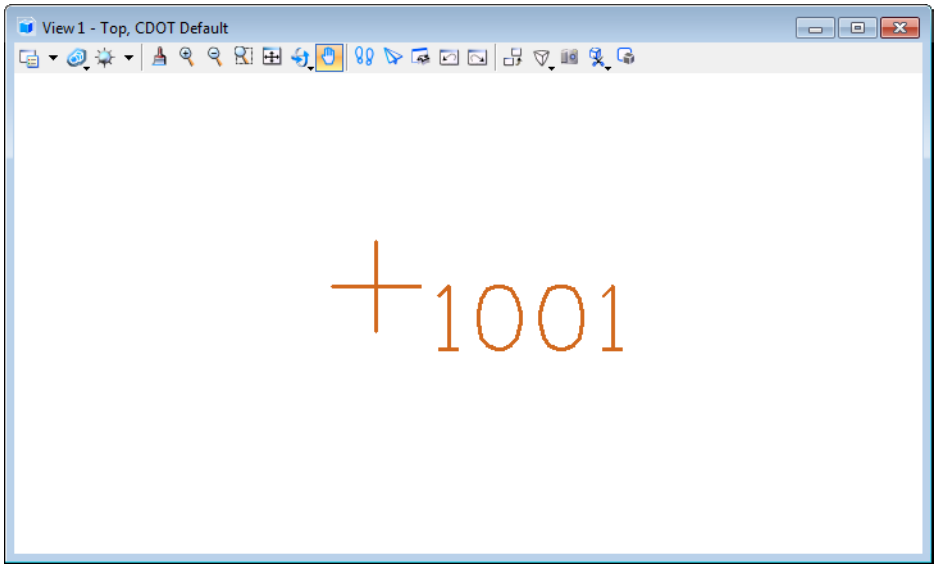


13. **<D>** the **OK** button. The points populate the ***Selected*** field.

14. **<D> OK** to dismiss the ***Geometry Selection Filter*** dialog box and populate the ***Cogo Points Selected*** field of the ***View Horizontal Annotation*** dialog box.

15. **<D>** the **Apply** button in the ***View Horizontal Annotation*** dialog box.





16. Experiment displaying various ***Alignments*** and ***Points*** with the assorted settings.

17. Close the ***View Horizontal Annotation*** dialog box.

Section Summary:

- Cogo Points can be selected for annotation by key in, graphic selection using the button, or by using the Filter options.
- In the Display area, the Points toggle is used to turn on or off the display of the geometry points.
- The Annotate area is used to turn on and off the text data associated with the geometry elements.

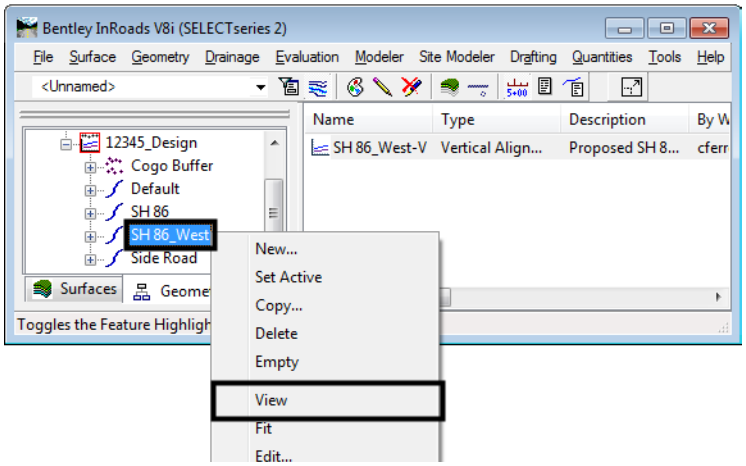
Lab 3.4 - Displaying Stationing

Section Objectives:

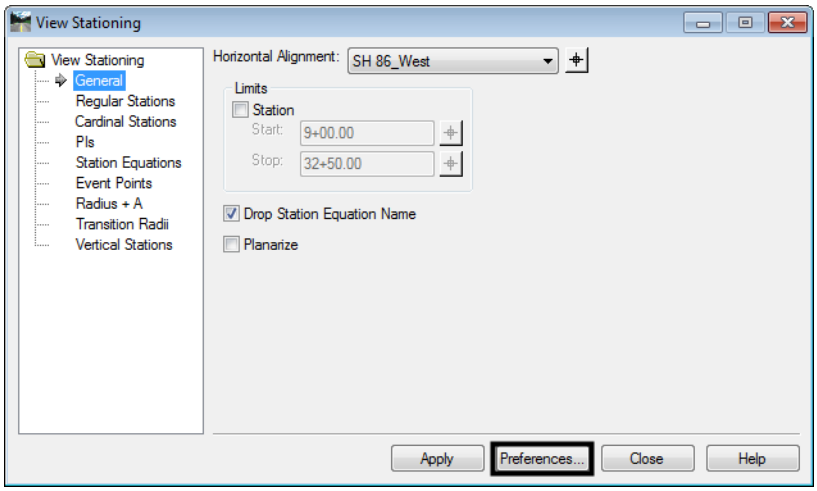
- Display stationing and alignment keypoints.
- Use the Symbology toggles to turn on and off various items.

1. Prior to displaying the stationing, display the linework for the horizontal alignment **SH 86_West.**

   Right-click on the alignment name in the InRoads explorer pane and select ***View*** from the right click menu.



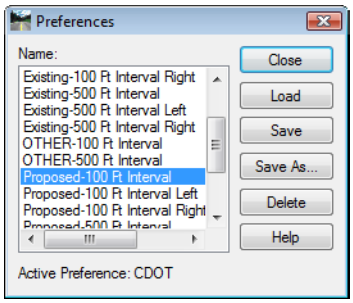
2. Select **Geometry > View Geometry > Stationing.** The ***View Stationing*** dialog box is displayed.



3. **<D>** the ***Preferences*** button.

   Note: The Preferences dialog box is used to load predefined settings for a particular tool. In the View Stationing dialog box the preference sets the interval and symbology of the display graphics.

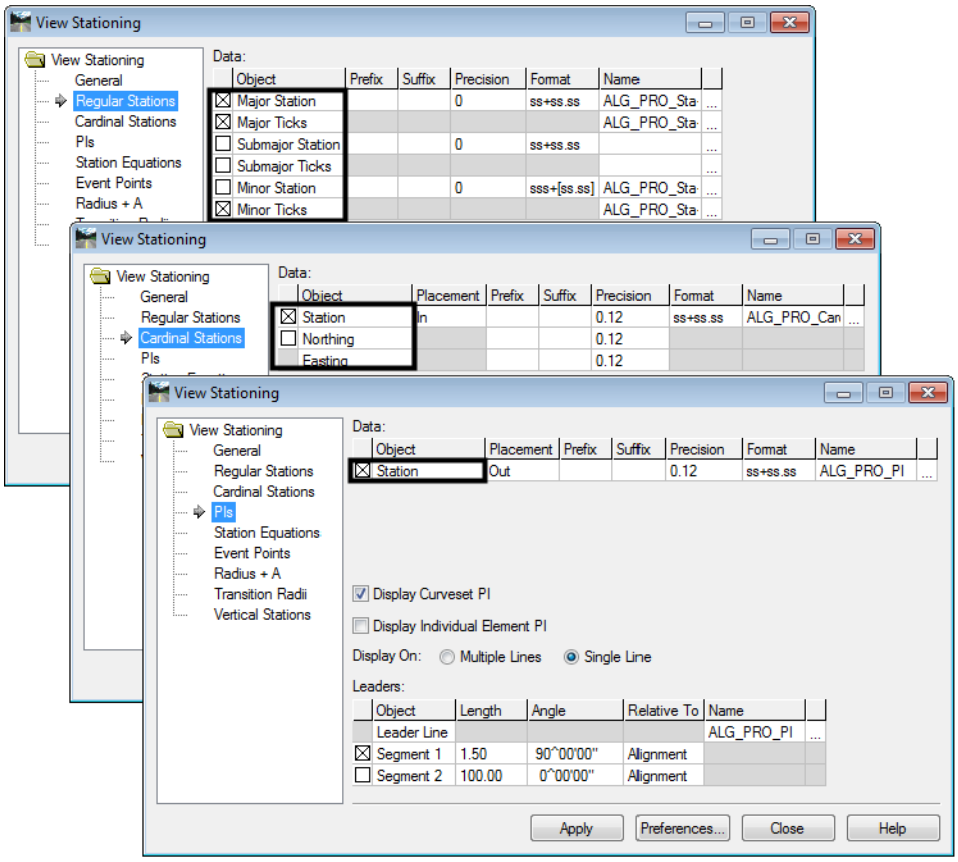
The following steps load the Preference Proposed–100 Ft Interval as the active symbology.



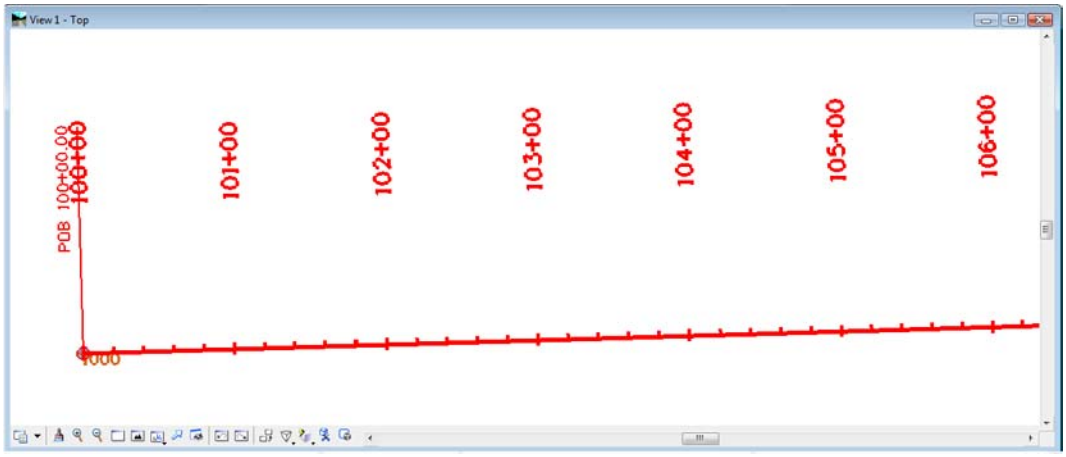
4. **<D> Proposed-100 Ft Interval**.

5. **<D> Load** then **Close** button.

6. Using the dialog box explorer, select or de-select alignment stationing components for display.



7. **<D> Apply** to display the stationing.



The ***View Stationing*** dialog box is populated with the predefined settings from the preference. The display toggles define what will display; the name column identifies the named symbology used for that station type.

There are several standard CDOT preferences to choose from. These are based on the type of alignment and station interval. Choose the appropriate **Preference** and **<D> Apply** to see the stationing.

Keep in mind that text size is dependent on the active ***Global Scale Factor*** at time of display. If necessary, select **File > Project Options [Factors]** to change the value of the Global Scale factors.

8. **Change** the ***Global Scale Factor*** and redisplay stationing.
9. **Experiment** displaying stationing using various CDOT preferences.
10. **Experiment** with the various settings in the ***View Stationing*** dialog box and investigate what changes are made when stationing is redisplayed.

Section Summary:

- The stationing Preferences are set to CDOT standards and should be used in most cases.
- Using the Pencil mode automatically deletes old stationing when new stationing is displayed.

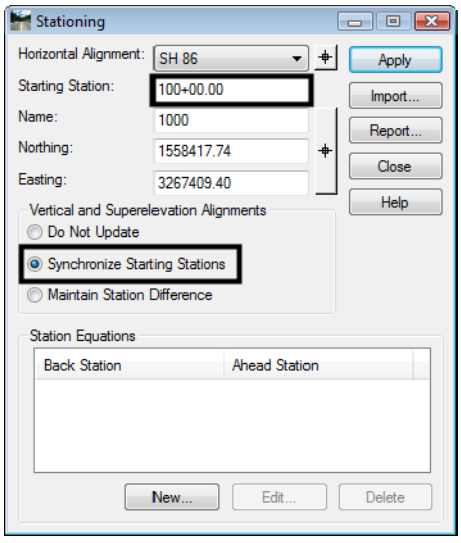
Lab 3.5 - Defining Stationing

Section Objectives:

- Change the beginning station of an alignment.

Upon creation, alignments are defined with a beginning stationing of 0+00. Stationing can be redefined from any location along the alignment.

1. Select **Geometry > Horizontal Curve Set > Stationing**. By default, this dialog box displays the beginning station value of the active alignment.

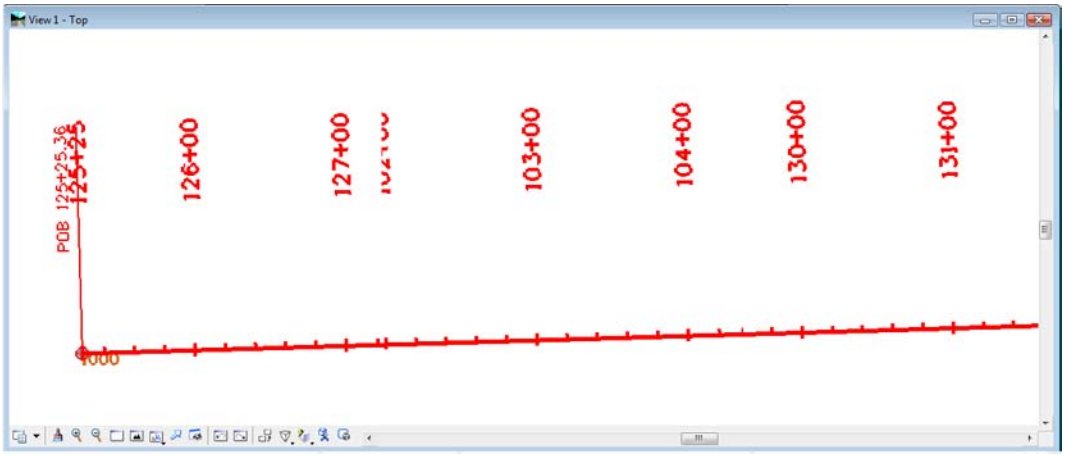


2. Verify that **SH86_West** is set as the ***Horizontal Alignment***.
3. Select **Synchronize Starting Stations** in the ***Vertical and Superelevation Alignments*** section.

Important! Do not use this option if any of the vertical alignments associated with the horizontal do not start at the beginning of the horizontal alignment. Using this option will move those vertical alignments that start after the beginning of the horizontal alignment to the beginning station of the horizontal alignment.

4. In the ***Starting Station*** field, key in ***125+25.36*** then **<D>** the **Apply** button.

5. **Verify** the change has been applied by redisplaying the stationing. Also, check the beginning station value of the associated vertical alignments by using the review command.



Note: The options for ***Vertical Alignments*** should be considered carefully. **Do Not Update** will leave the stationing of vertical application stations as is, **Synchronize Starting Stations** will update their stationing to match that of the horizontal and **Maintain Station Difference** will keep any difference (delta) in the current starting stations.

- InRoads does not require a '+' when keying in a station. The plus sign will be added automatically.
- Stationing can be set from any alignment point. If the point selected is not the POB, the stationing is computed for the POB from the selected point.

Section Summary:

- When stationing is set for a particular point, the stationing for the remainder of the alignment (forwards and backwards).
- The reference to Superelevation in the Vertical and Superelevation Alignments area refers to geometry created in the 2004 edition of InRoads. It does not affect the superelevation contained in the Roadway Designer.

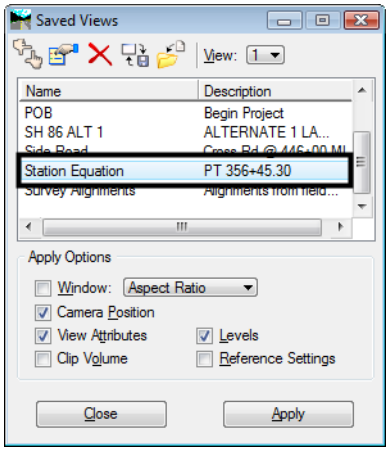
Lab 3.6 - Station Equations

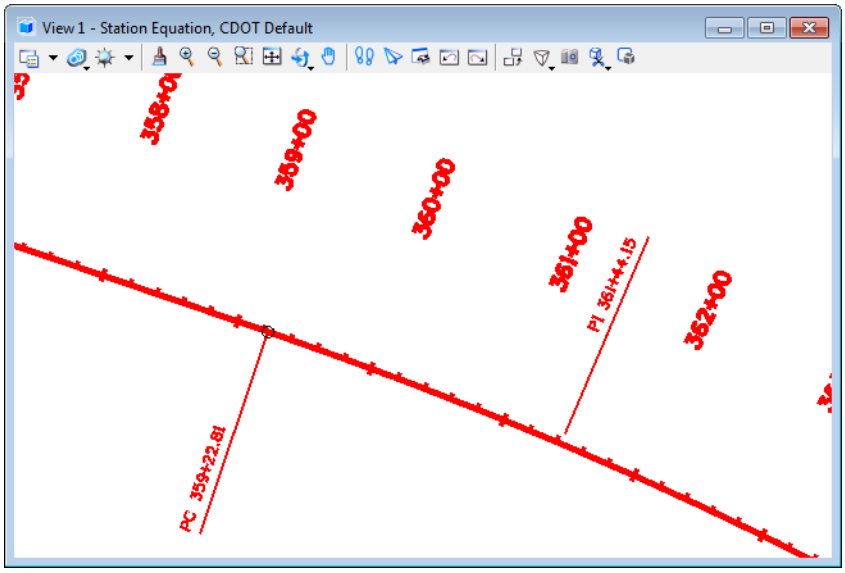
If there are inequalities in the alignment, station equations may be required. These equations can be either gap or overlap equations.

Section Objectives:

- Add a station equation to an existing alignment.
- Redisplay stationing to show the station equation.

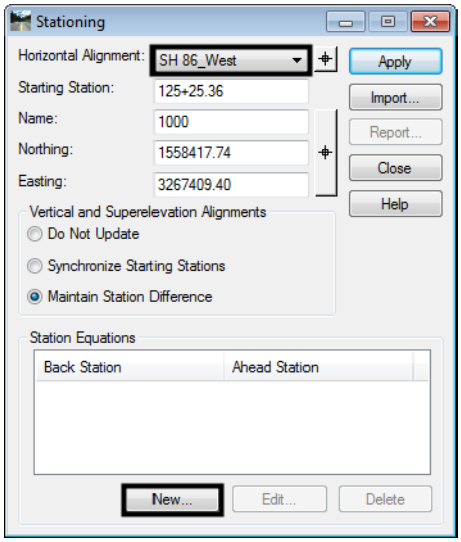
1. From MicroStation, select **Utilities > Saved Views.**
2. Highlight the **Station Equation** saved view and **<D> Apply** then **Close** the ***Saved View*** dialog box.



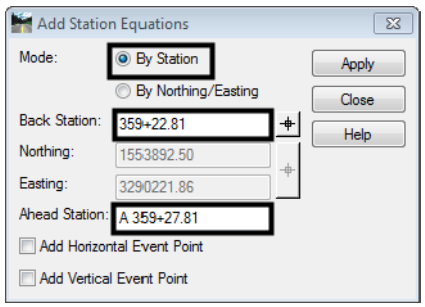


At the PT of the curve a station equation is necessary to tie to previous work. The values are:
Back = 359+22.81
Ahead = 359+27.81

3. Select **Geometry > Horizontal Curve Sets > Stationing** to display the ***Stationing*** dialog box.
4. Verify **SH 86_West** is the horizontal alignment.
5. At the bottom of the dialog box, choose **New**. The ***Add Station Equation*** dialog box is displayed.



6. In the ***Add Station Equation*** dialog box, set the ***Mode*** to **By Station**.
7. Enter the ***Back Station*** and the ***Ahead Station*** as shown below.



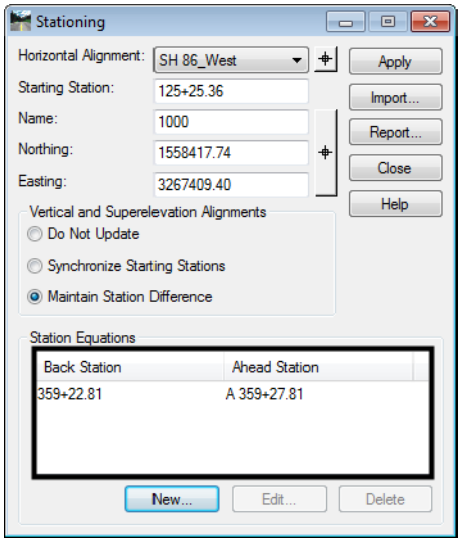
8. **<D> Apply**.

Note: The ahead station must be prefixed with an equation name. The name must consist of at least one alpha character.

- An alignment can contain multiple station equations.

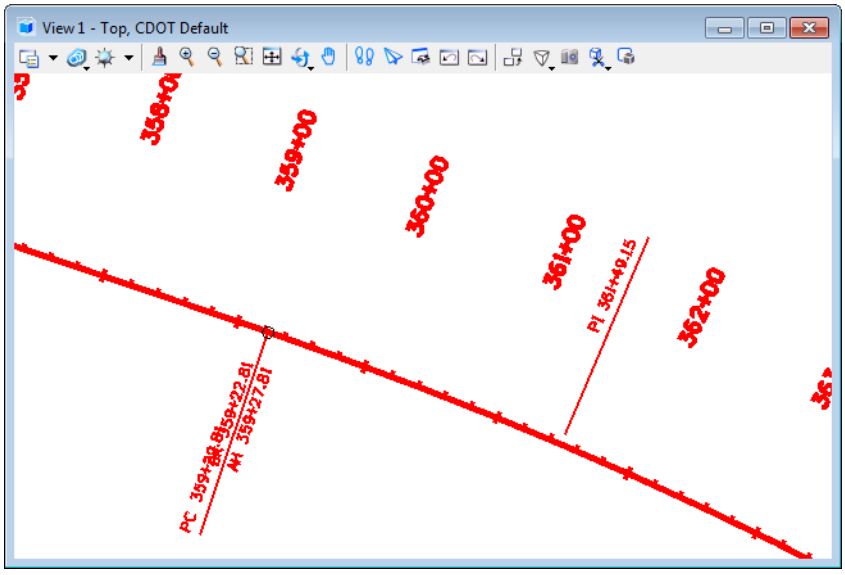
- Annotation of stationing lying within the range of a station equation will be prefixed with the equation name. The toggle ***Drop Station Equation Name*** in the ***General*** leaf of the ***View Stationing*** dialog box is on so that the equation name is not displayed.

9. **<D> Close** to dismiss the ***Add Station Equation*** dialog box. The station equation is shown in the parent dialog box.



10. **<D> Close** in the ***Stationing*** dialog box.

11. Redisplay the stationing for alignment **SH 86_West**.

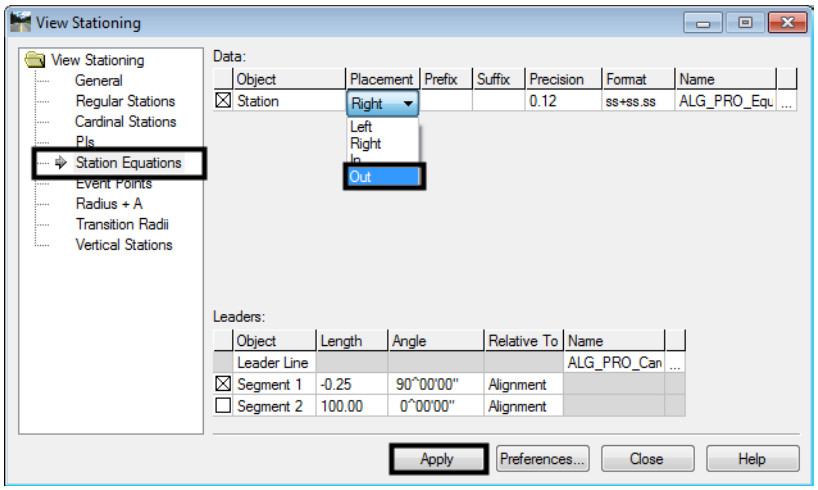


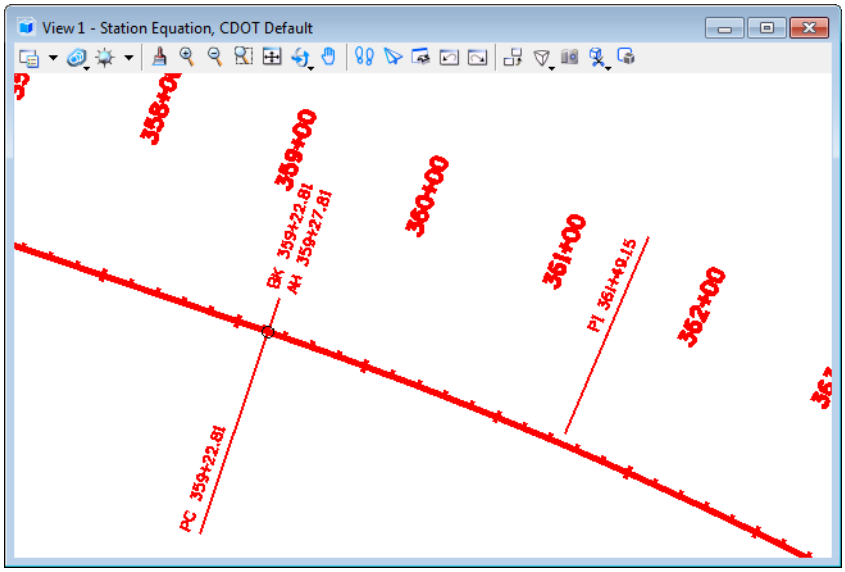
Notice that the station equation text is on top of the PC station text. To fix this problem:

12. Select **Geometry > View Geometry > Stationing**.

13. Select the **Station Equation** leaf.

14. Toggle the ***Placement*** to **Out**.
15. **<D> Apply** to redisplay the stationing.





The equation is now displayed on the opposite side of the alignment from the PC stationing text.

Section Summary:

- Station equations are used to change the stationing from a given spot forward, along the alignment. Stationing prior to the equation retains its original stationing.
- The ahead station must have a prefix, containing at least 1 letter, followed by the new station number.

Lab 3.7 - Horizontal Alignment Tracking

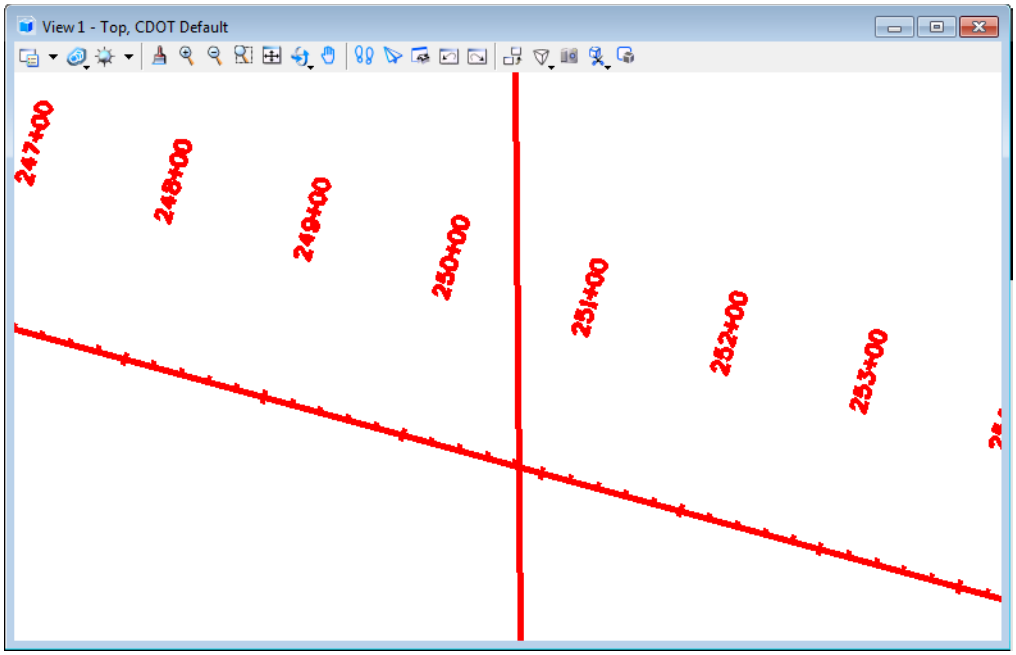
Two methods exist for receiving interactive information relative to a horizontal alignment. These are Tracking and Horizontal Alignment Tracking. Both methods report on stationing, offset, elevation, etc. Tracking reports the elevation of the active surface, Horizontal Alignment Tracking reports the elevation of the active vertical alignment.

Section Objectives:

- Demonstrate the Tracking command.
- Demonstrate the Tracking Horizontal Alignments command

Tracking (horizontal alignment and surface data)

1. **Recall** Saved View **Side Road**.
2. If the ***Side Road*** alignment is not visible, display it.



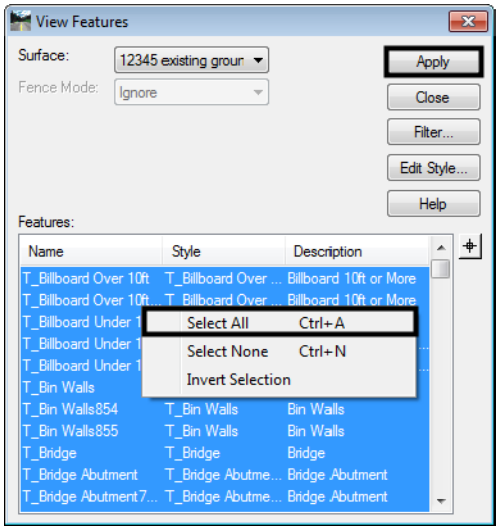
Tracking reports on station and offset information relative to the active alignment along with information relative to the active surface.

3. Select **File > Open** and load the surface **12345SURV_Existing_Ground.dtm** from the **C:\Projects\12345\ROW_Survey\InRoads\DTM** folder.

To display the surface features from the existing ground dtm:

4. Select **Surface > View Surface > Features**.

5. **<R>** in the ***Features*** list and **<D> Select All**.



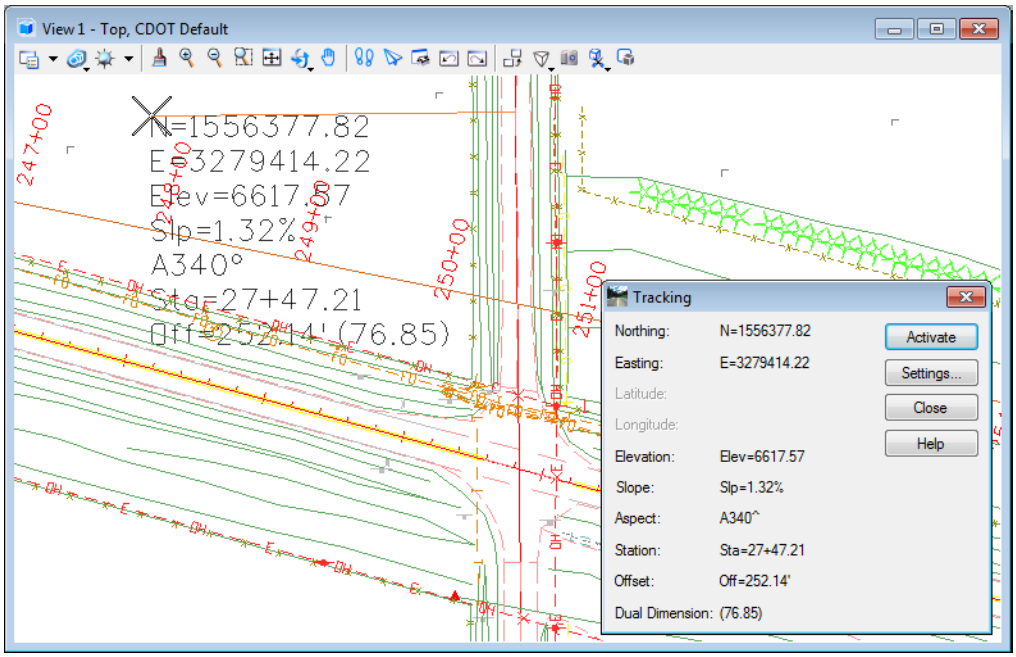
6. **<D> Apply** then **Close**.

Displaying surface features is a good way to orient yourself to the location you are at in the model.

7. Select **Tools > Tracking > Tracking** to track both the active horizontal alignment and information relative to the active surface.

   Note: This command will display information about any data that is present. Neither geometry or a dtm are required to get some feedback from this command.

8. Select **Activate** to initialize the command. Slide the cursor along the alignment to interactively update the display in the ***Tracking*** dialog box. If a **<D>** (data point) is entered in the design file the information toggled on is displayed graphically.

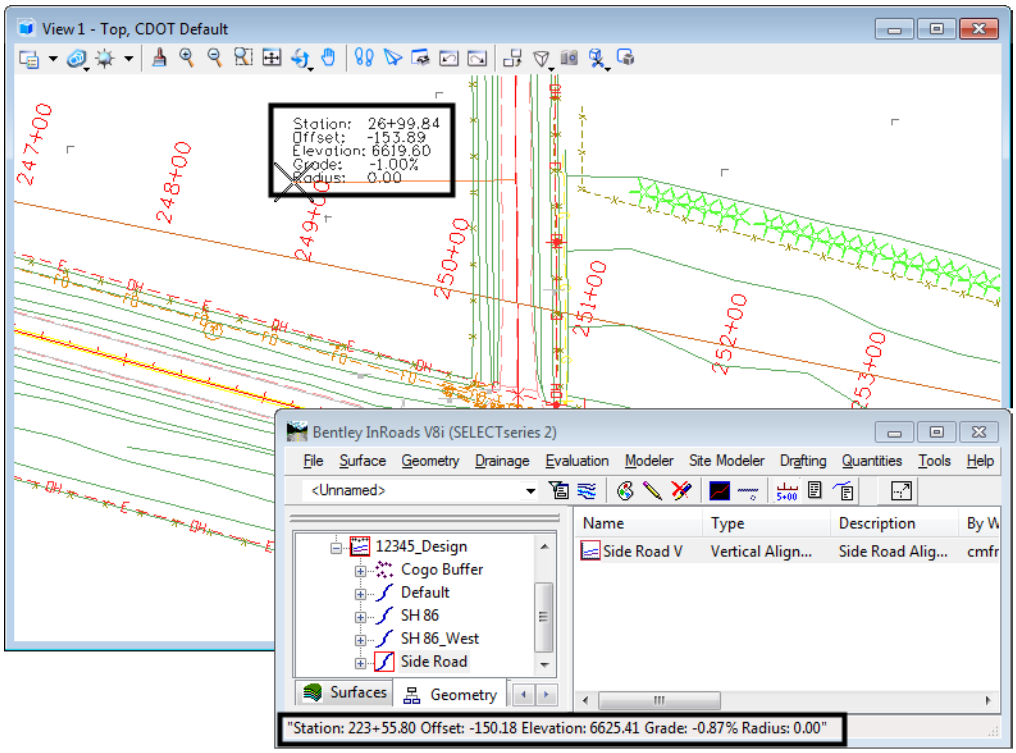


Note: Select the **Settings** button in the ***Tracking*** dialog box to examine the attributes assigned to annotation placed in the MicroStation design file.

Horizontal Alignment Tracking (with vertical alignment data)

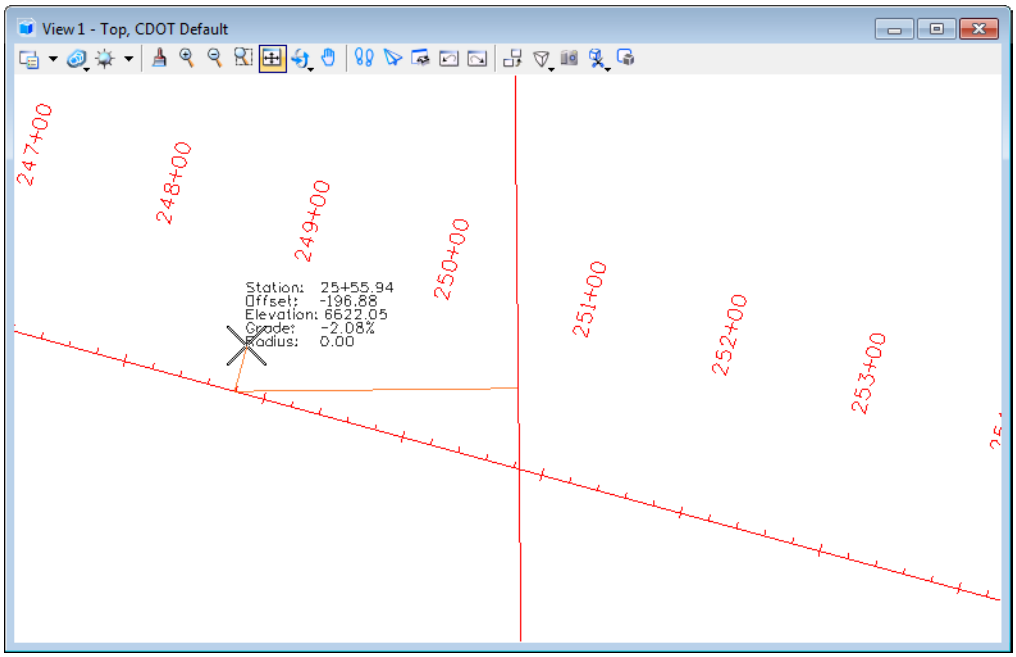
This tracks the station and offset relative to the active horizontal alignment along with the elevation of the active vertical alignment. Station, Offset, and Elevation information is displayed in the message field of the InRoads interface. Note: A horizontal alignment must be present for this command to work.

1. Select **Tools > Tracking > Horizontal Alignment** to track the active horizontal alignment.



The results display at the cursor and in the status bar of the InRoads interface.

Note: The readout interactively reflects the location of the cursor relative to the active alignment. If a second horizontal alignment is selected with a data point, the offset displayed will be the distance to intersect the selected alignment from the active alignment, perpendicular to the active alignment.



Section Summary:

- Use the Tracking command to get surface information in relation the horizontal alignment.
- The Tracking command can be used to display the information in its dialog box as MicroStation graphics.
- The tracking Settings options are used to enable and disable the graphic display of items in the Tracking dialog box.
- Use the Horizontal Alignments tracking to get vertical alignment information in relation the horizontal alignment.
- Horizontal Alignments tracking can not be displayed graphically.

Chapter Summary:

- Horizontal alignments can be displayed using the View and View All Horizontals from the right click menu or from the main tool bar, or by using the horizontal alignment annotation command.
- Use the preferences to set up the Stationing dialog box. Items in the Stationing dialog box should only be changed for special circumstances.
- Use the Stationing options under the Horizontal Curve Set commands to change the stationing for the entire alignment.
- Use station Equations to change the stationing from a point on the alignment to the end.
- Tracking is used to gain station and offset information at the cursors location.

- Tracking also collects surface data, while Horizontal Alignment tracking gets vertical alignment data.