LAB 5 - Horizontal Alignments

Although there are multiple methods for creating horizontal geometry in InRoads, this lab will concentrate on the using the horizontal curve set commands and importing geometry from graphics. Additional methods covered in the Geometry for ROW course include cogo and traverse commands.

This lab also demonstrates how to modify an existing alignment and create a parallel alignment to an existing alignment. An example of this would be to create parallel/offset alignment from a road centerline to represent the edge of road or other feature that parallels the centerline.

Chapter Objectives:

- Create a new geometry
- Create alignment tangents
- Understand the difference between Named and Unnamed cogo points and how to apply cogo point names
- Define alignment curves
- Define and modify alignment stationing
- Annotate an alignment
- Create a horizontal alignment from graphics
- Modify an existing alignment
- Create parallel horizontal alignments

The following files are used in this lab:

- C:\Projects\12345\Design\Drawings\Reference_Files\12345_Horizontal Alignments.dgn
- C:\Projects\12345\ROW_Survey\InRoads\Geometry\12345SURV_Fieldbook.alg
- C:\Projects\12345\Design\InRoads\12345DES_Design.alg

A typical workflow is:

1. Create or open a geometry project
2. Create horizontal alignments
3. Assign stationing for alignments
4. Define station equations, if any
5. Define alignment key-points (unique points of interest)
6. Review alignments
7. View created alignments
8. Display stationing for alignments
9. Annotate created alignments

Note: The screened topography and the training guides are either locked graphics or in an attached reference file, you will not be able to delete these graphics and will use them for orientation.

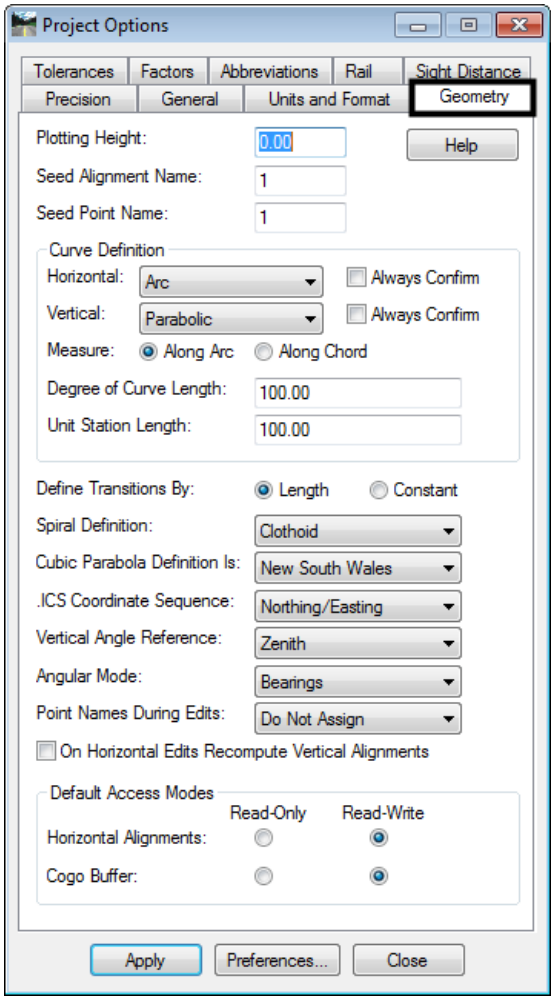
Lab 5.1 - Name Alignment Points

Section Objectives:

- Add names to unnamed points on an alignment

1. Start InRoads opening the file **12345DES_Horizontal Alignments.dgn** from the **C:\Projects\12345\Design\Drawings\Reference_Files** directory.

2. Select **File > Project Options** from the InRoads main menu and review the settings in the **Geometry** tab.



Note: If ***Point Name During Edits*** is set to **Assign** on the ***Geometry*** tab of the ***Options*** dialog box, alignment key-points are generated with a name based on the next available ID as specified in the ***Seed Point Name*** field. The specified seed point name can be alpha, numeric, or alphanumeric characters. The assigned name is also reserved in the Cogo buffer. However the point is not written to the Cogo Buffer automatically.

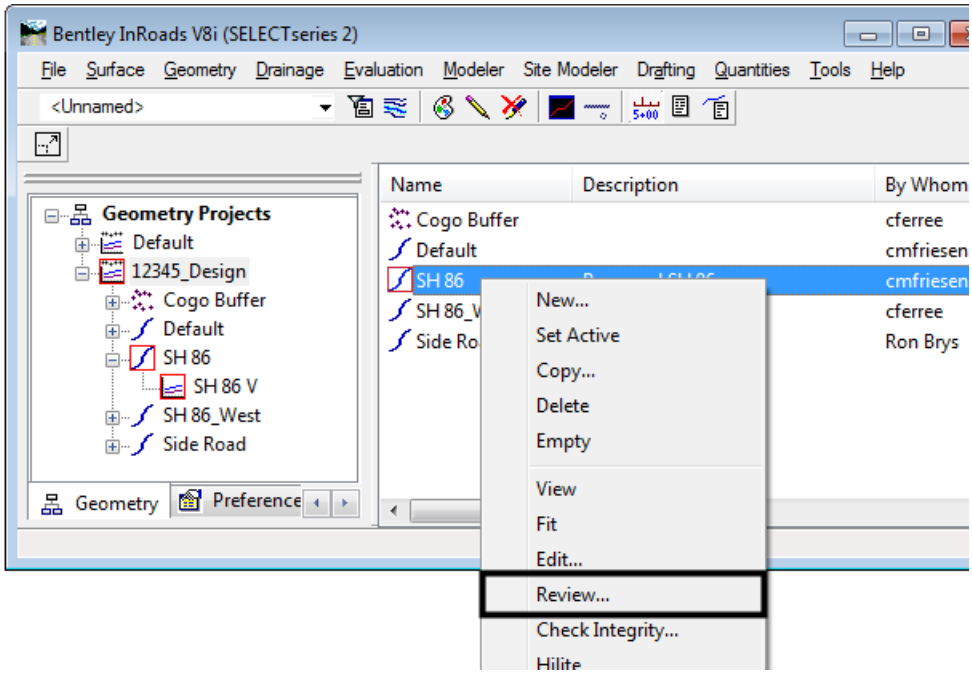
For descriptions of each of the items in the **Geometry** tab, refer to the ***Practical Guide for Using InRoads***.

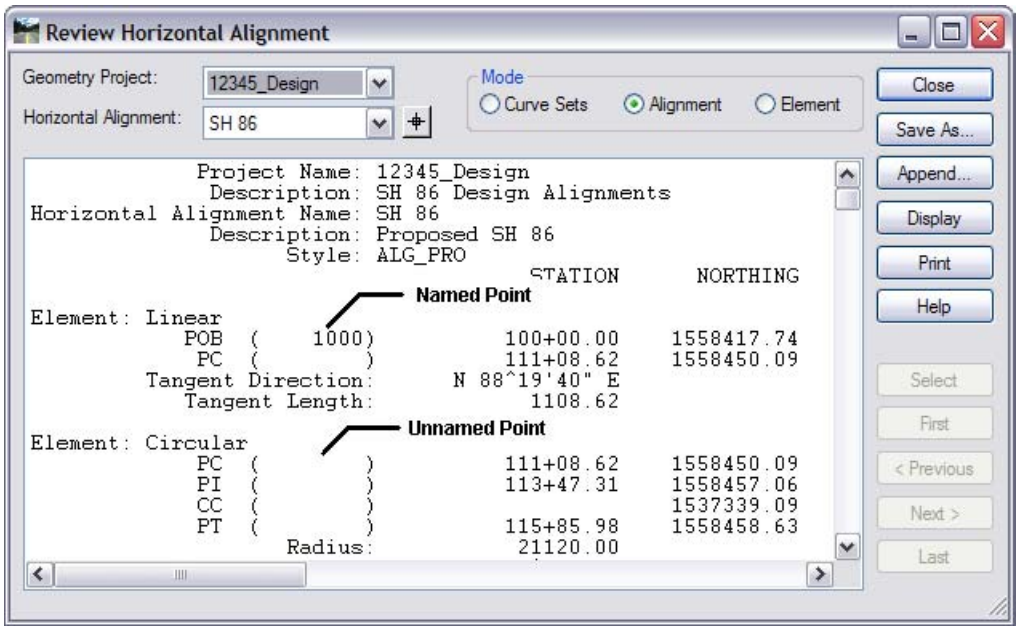
3. Load the geometry project **12345DES_Design.alg** from the folder **C:\Projects\12345\Design\InRoads**.

Alignment key-points (PC, PI, PT, CC, etc) exist in one of three states:

- Unnamed
- Named
- Cogo Points

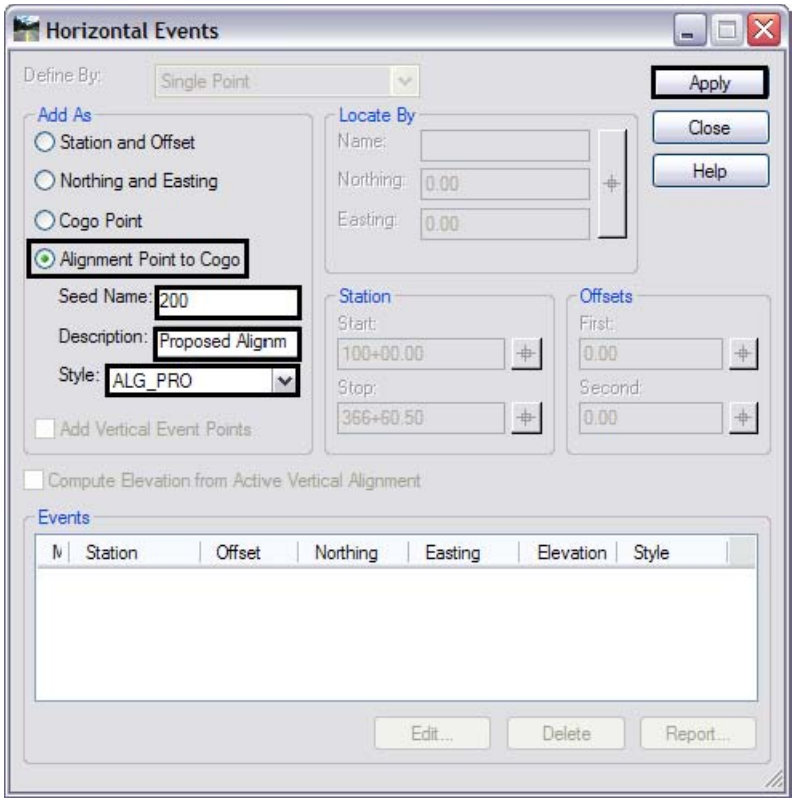
4. Review the horizontal alignment and notice that many points on the alignment are not named.



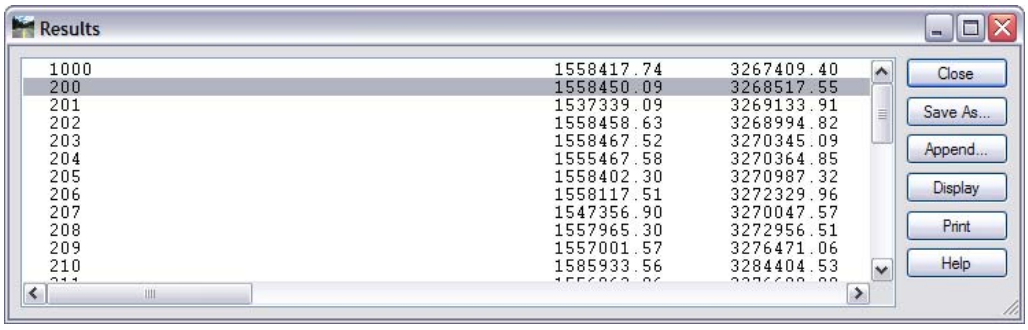


In the next series of steps, the alignment points are named and added to the Cogo buffer.

5. Select **Geometry > Horizontal Curve Set > Events**.
6. In the ***Horizontal Events*** dialog box, toggle on **Alignment Point to Cogo** in the ***Add As*** section.
7. Key in ***200*** for the ***Seed Name:***.
8. ***Proposed Alignment*** for ***Description:***.
9. Select **ALG_PRO** for the ***Style:***.
10. Click **Apply**.



A ***Results*** dialog box appears with the new point name and the associated coordinates of the point. All alignment key points that were not previously assigned a name are written to the Cogo buffer beginning with the ID number of 200.



Note: The command **Geometry > Utilities > Assign Names** can also be used to add, delete, or rename geometry points. However, names added using this command are not added to the Cogo Buffer.

11. **Close** the **Results** and **Horizontal Events** dialog boxes.

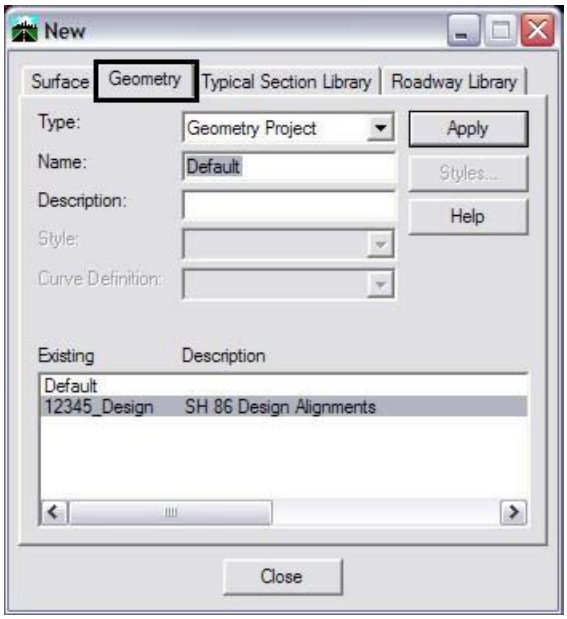
Lab 5.2 - Create New Geometry

Next we will create a new geometry project and a placeholder for horizontal alignment data.

Section Objectives:

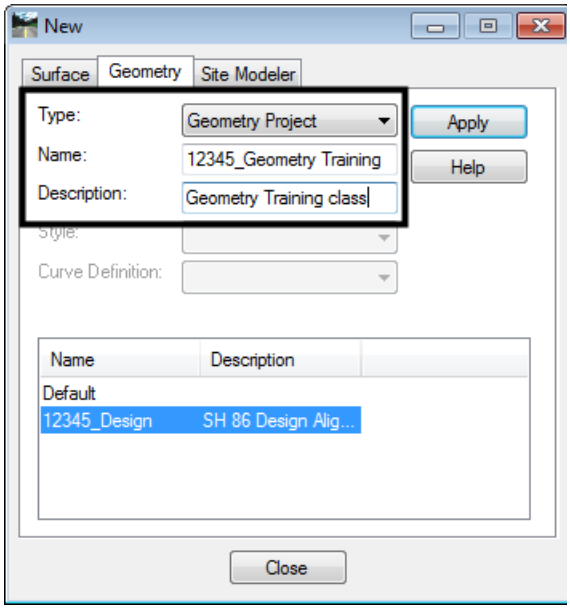
- Create a geometry project and place holders for horizontal geometry data.

1. From the InRoads main menu **File > New**.



2. **<D>** the **Geometry** tab.
3. For the ***Type***, select **Geometry Project**.
4. In the ***Name*** field, key in ***12345_Geometry Training***.

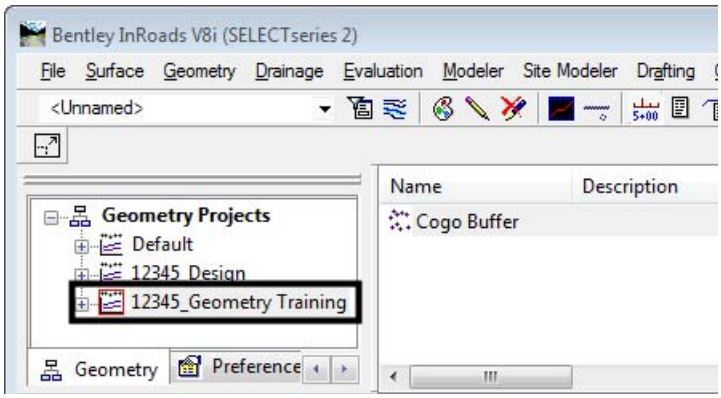
5. In the ***Description*** field, key in ***Geometry Training class***.



Note: The lower portion of the ***New*** dialog displays geometry projects that are currently loaded.

6. **<D> Apply** (Do not Close the New dialog box yet). This creates the geometry project where all new alignment data for this class will be stored. At this point, it is held in RAM (Random Access Memory).

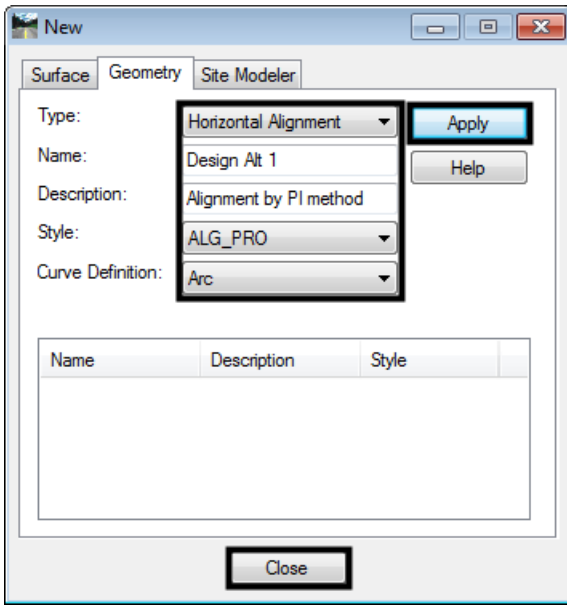
7. **Verify** that the new geometry project was created.



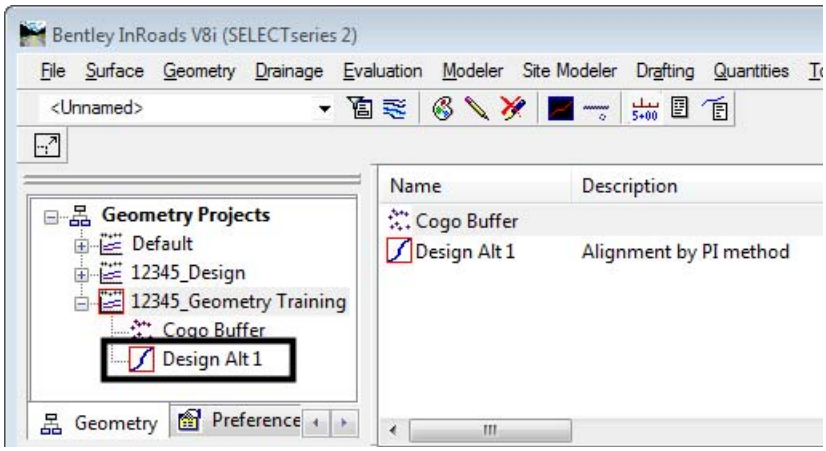
8. Use the following data to create a place holder for horizontal geometry data.

- ***Type:*** **Horizontal Alignment**
- ***Name:*** ***Design Alt 1***
- ***Description:*** ***Alignment by PI method***
- ***Style:*** **ALG_PRO**

- ***Curve Definition:*** **ARC**



9. **<D>** the **Apply** then the **Close** buttons.



10. Verify the horizontal alignment is created in the active geometry project.
11. **<R>** on the **12345_Geometry Training** geometry project in the InRoads Explorer pane and **<D> Save** from the right click menu.
12. Verify that the directory path is set to **C:\Projects\12345\Design\InRoads**.
13. Key in ***12345_Geometry Training*** for the ***File name***.
14. **<D> Save** then **Cancel** to save the file and dismiss the Save As dialog box.

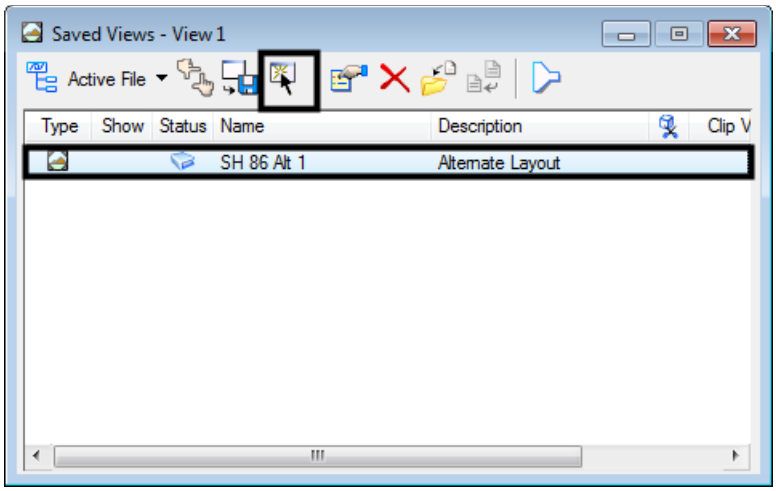
The following exercises will step you through creating an alignment using the Horizontal Curve Set, or PI method. While these exercises are based on a roadway alignment, the tools and logic apply to any new alignment whether it is for drainage, utilities, pavement marking, bridge geometry, parcels, or any other purpose.

Lab 5.3 - Create Alignment Tangents

Section Objectives:

- Create horizontal alignments from PI to PI.

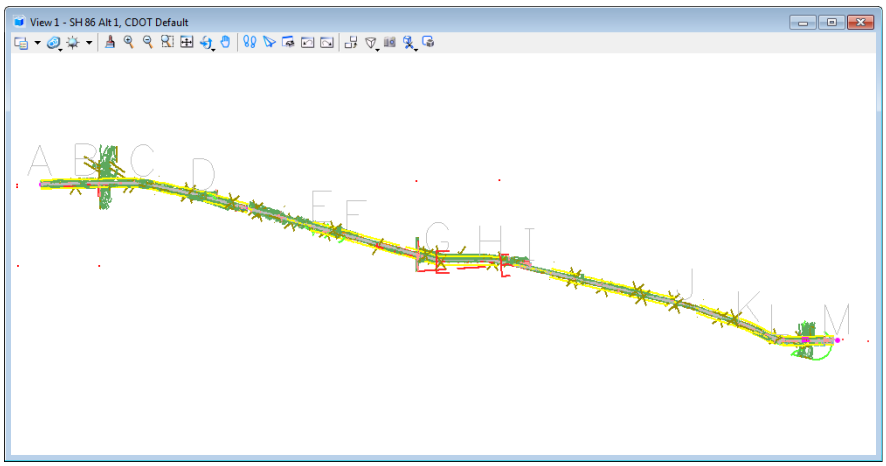
1. From the MicroStation pull-down menu select **Utilities > Saved Views**.
2. From the ***Saved Views*** dialog box **<D>** saved view name **SH 86 ALT 1**.



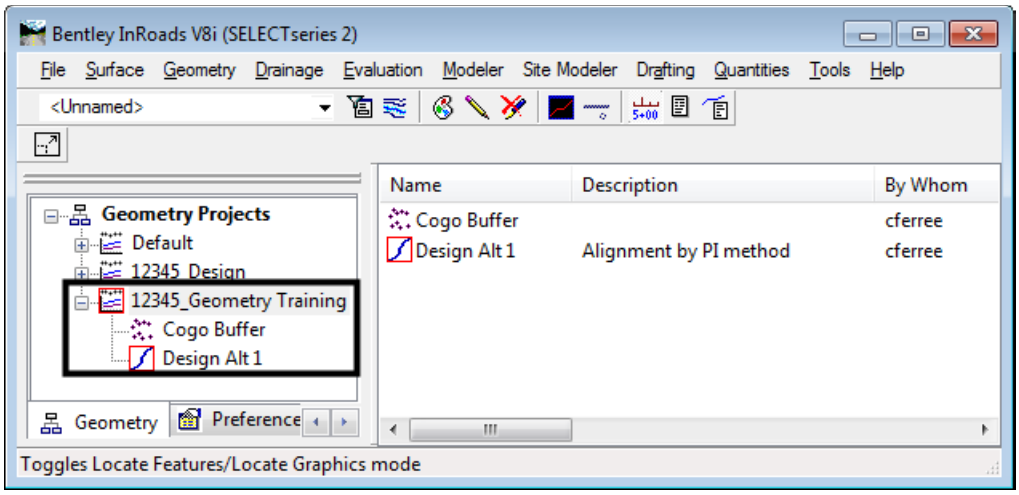
3. **<D>** the **Apply** button.

Points A-M represent the required location of alignment PI's.

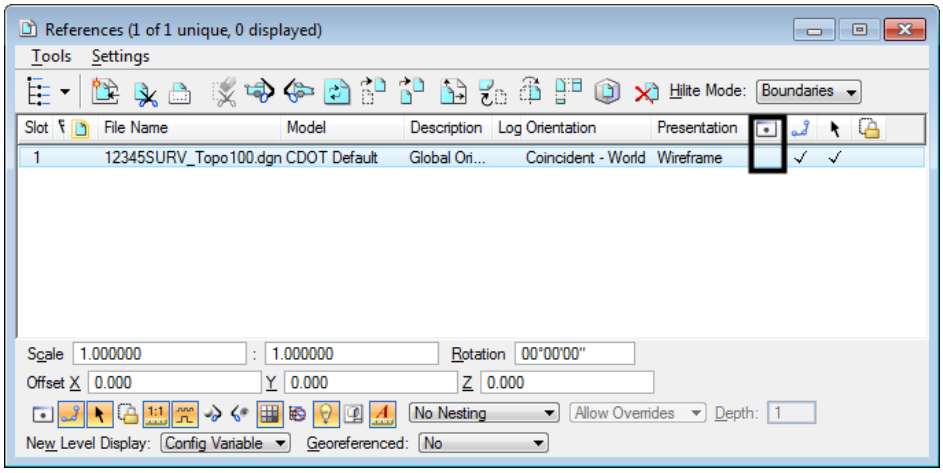
Horizontal curve set commands will be used to create the horizontal alignment. The next series of steps are used to construct the tangents.



4. Before beginning, verify that the **Design Alt 1** alignment is ***Active***. Any geometry data entered will be added to this alignment.



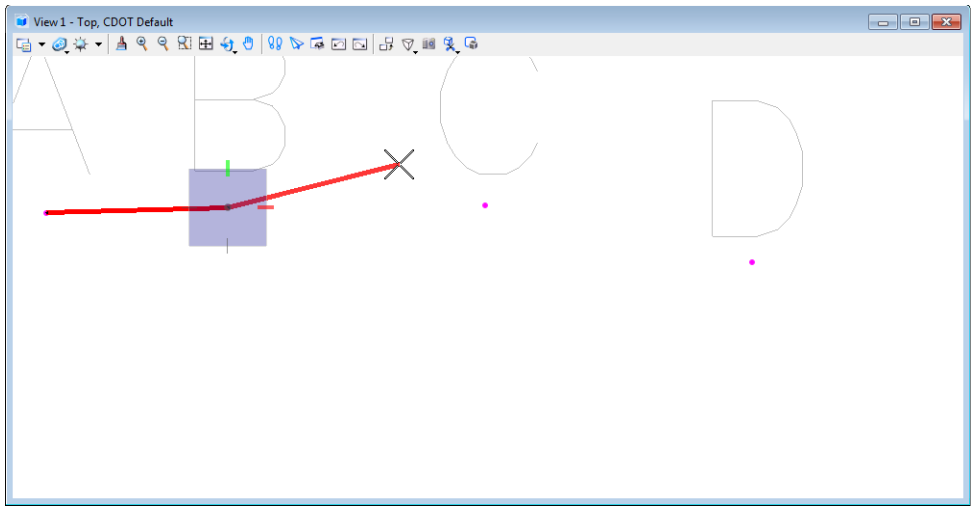
5. To clear the MicroStation view, toggle **Off** the Reference Display for the **12345SURV_Topo100Scale01.dgn** in the ***References*** dialog box.



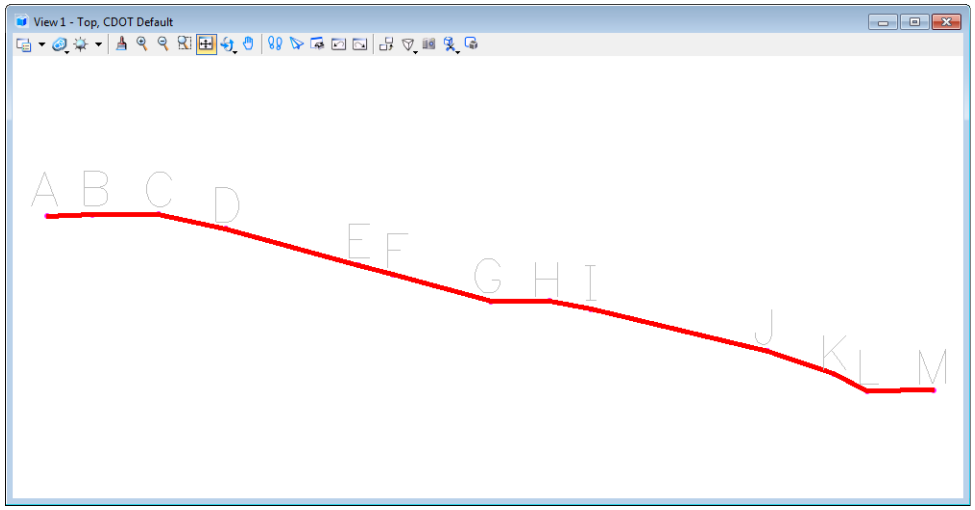
6. Select **Geometry > Horizontal Curve Set > Add PI** from the Inroads main menu. You are prompted in the MicroStation status bar to ***Identify Alignment End***.

   Note: There is not a dialog box for this command.

7. **<T>** then **<D>** at point **A** (tentative or snap, and Data point). The alignment interactively displays as you move the cursor.



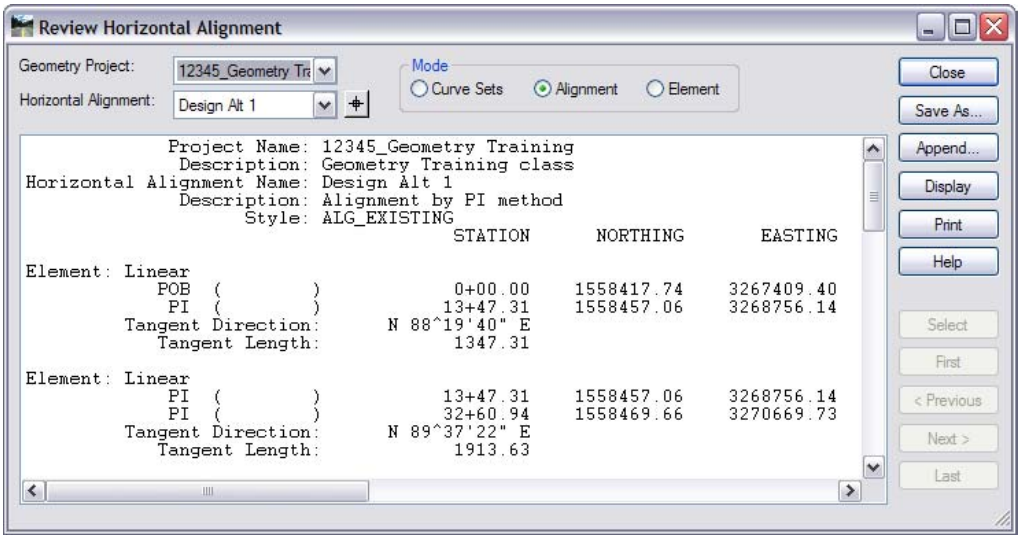
8. Repeat step 7 for points **B** through **M**.



9. **<R>** (reset) when complete.

10. If the alignment created does not pass through points A-M, use the ***Insert***, ***Move***, or ***Delete*** PI commands from the Horizontal Curve Set tools to correct the locations.

11. Review the new alignment using **Geometry > Review Horizontal**



Following is a summary of the PI locations

PI	NORTHING	EASTING	BEARING	DISTANCE	STA.
A	1,558,417.74	3,267,409.40			0+00.00
B	1,558,457.06	3,268,756.14	N 88°19'39.62" E	1,347.31'	13+47.30
C	1,558,469.66	3,270,669.73	N 89°37'21.60" E	1,913.63'	32+60.94
D	1,558,050.59	3,272,645.47	S 78°01'28.88" E	2,019.69'	52+80.63
E	1,556,982.55	3,276,540.43	S 74°39'56.80" E	4,038.75'	93+19.38
F	1,556,716.98	3,277,527.47	S 74°56'25.98" E	1,022.14'	103+41.51
G	1,555,931.76	3,280,408.64	S 74°45'18.96" E	2,986.25'	133+27.77
H	1,555,939.60	3,282,135.29	N 89°44'23.81" E	1,726.67'	150+54.44
I	1,555,699.32	3,283,343.64	S 78°45'12.06" E	1,232.01'	162+86.44
J	1,554,474.27	3,288,508.48	S 76°39'23.63" E	5,308.14'	215+94.58
K	1,553,821.34	3,290,431.45	S 71°14'44.01" E	2,030.79'	236+25.37
L	1,553,315.19	3,291,416.57	S 62°48'22.55" E	1,107.55'	247+32.92
M	1,553,346.54	3,293,367.43	N 89°04'46.05" E	1,951.11'	266+84.03

Note: Results may vary based on the specific PI locations defined by the user.

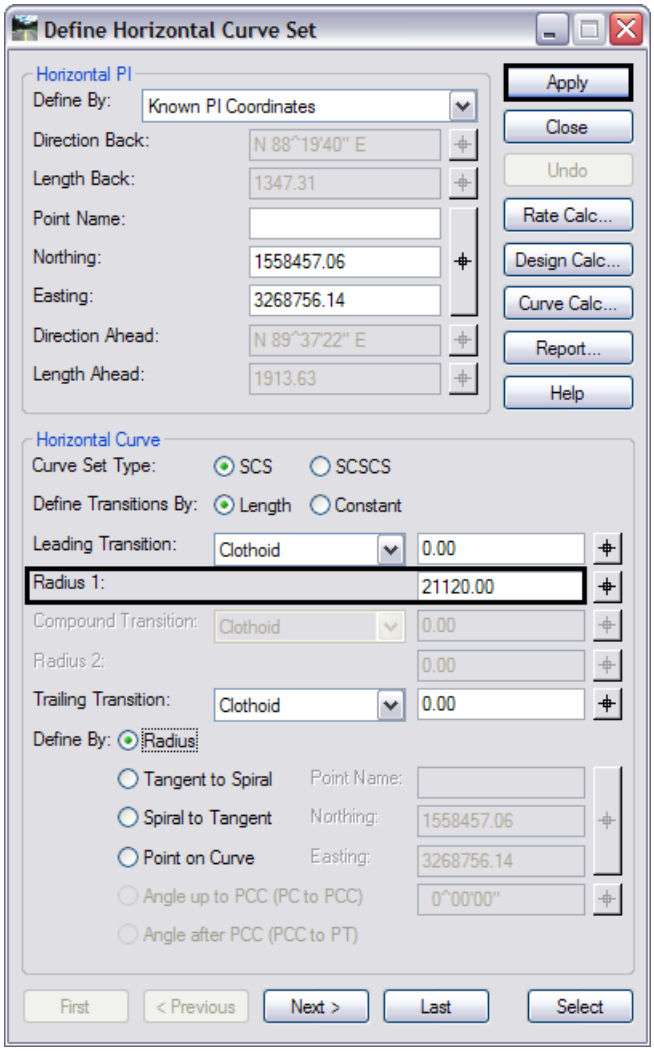
Lab 5.4 - Define Alignment Curves

The ***Define Horizontal Curve Set*** command is used to create curves between alignment tangents or to revise existing curve definition. The ***Previous*** and ***Next*** buttons are used to step sequentially through the alignment. The Select button can be used to graphically identify an alignment location for editing. As alignment components are selected, they highlight in the MicroStation view.

Section Objectives:

- Add curves to horizontal alignments using various methods
- Use the Curve Calculator to determine the radius of a curve

1. Select **Geometry > Horizontal Curve Set > Define Curve.** The first two tangents A-B and B-C highlight.
2. Key in ***Radius 1: 21120***.



3. **<D>** the **Apply** button. The curve is created and displays.
4. **<D>** the **Next** button. Tangents B-C and C-D highlight.
5. Key in **Radius 1: *3000***.
6. **<D>** the **Apply** button.
7. Repeat steps 4-6 for the curves at locations:

   D Radius = 11,000.00
   E Radius = 3,000.00
   F Radius = 3,000.00

For the first 5 curves, radii were input to define the curves. For the curve located at point G, the degree of curve is the known component (along with the external deflection angle). The Curve Calc… button is used to solve the curve data.

8. **<D>** the **Next** button to define the curve at point G.

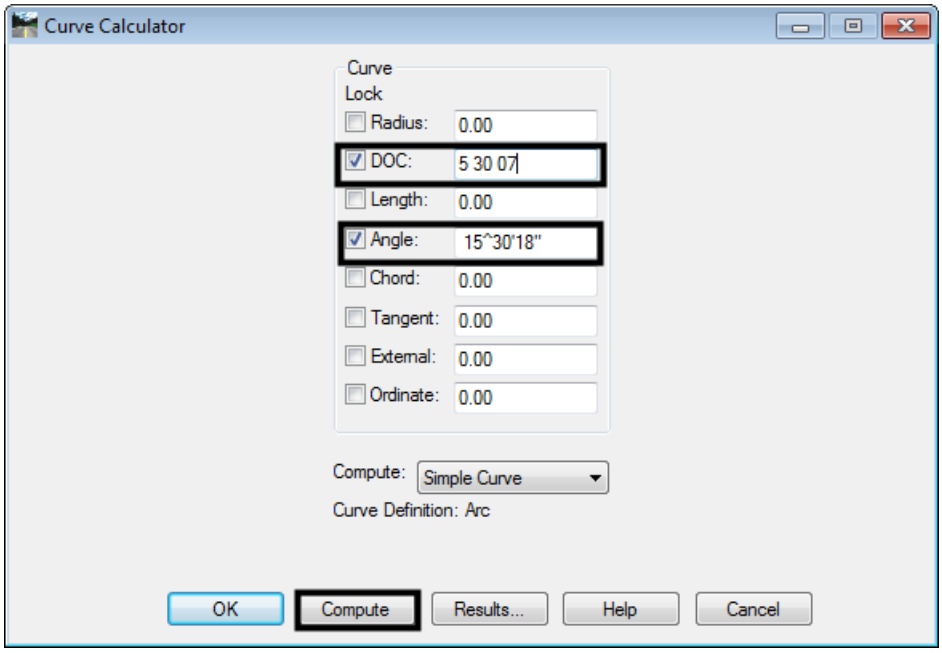
9. **<D>** the **Curve Calc…** button.

10. **Set** Compute: to **Simple Curve**.

The calculation is based on a 5 degree 30 minute 17 second curve.

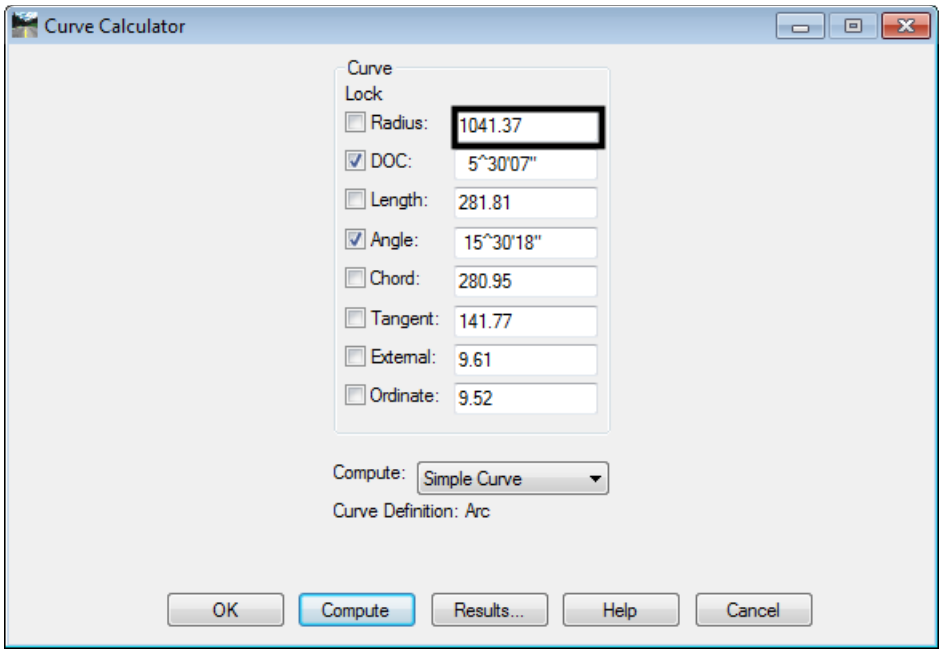
11. Toggle on ***DOC:*** and key in ***5 30 07***.

12. Verify that the ***Angle*** field is toggled on.

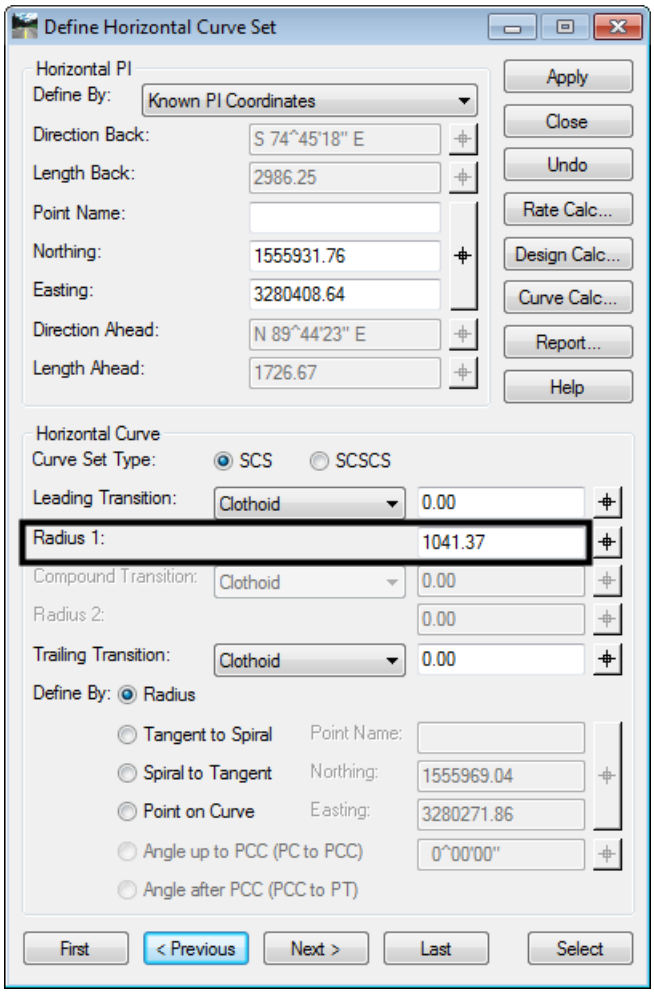


13. **<D> Compute**.

Notice the changes that occur in the dialog box. The values in the unlocked fields are modified based on the locked fields.



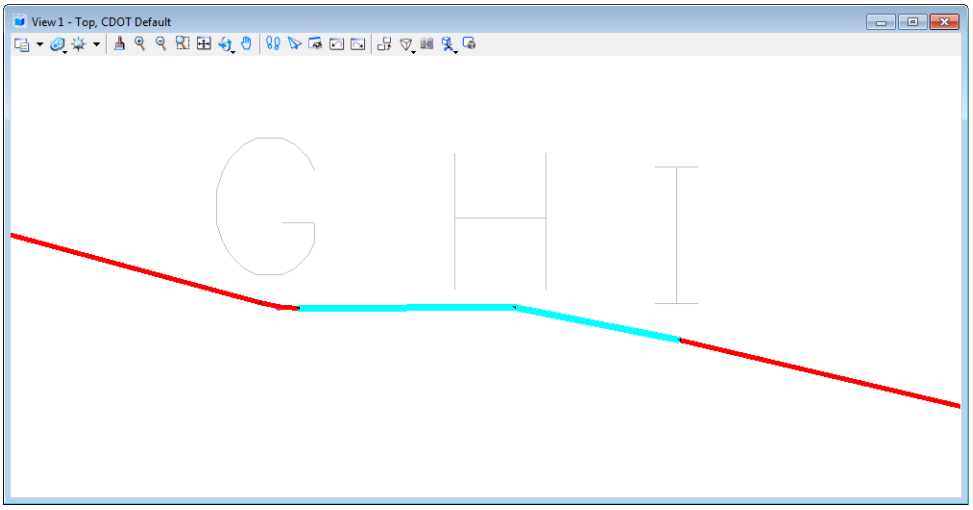
14. **<D> OK**. The ***Curve Calculator*** dialog box is dismissed and the calculated radius is added to the ***Radius 1*** field in the parent dialog box.



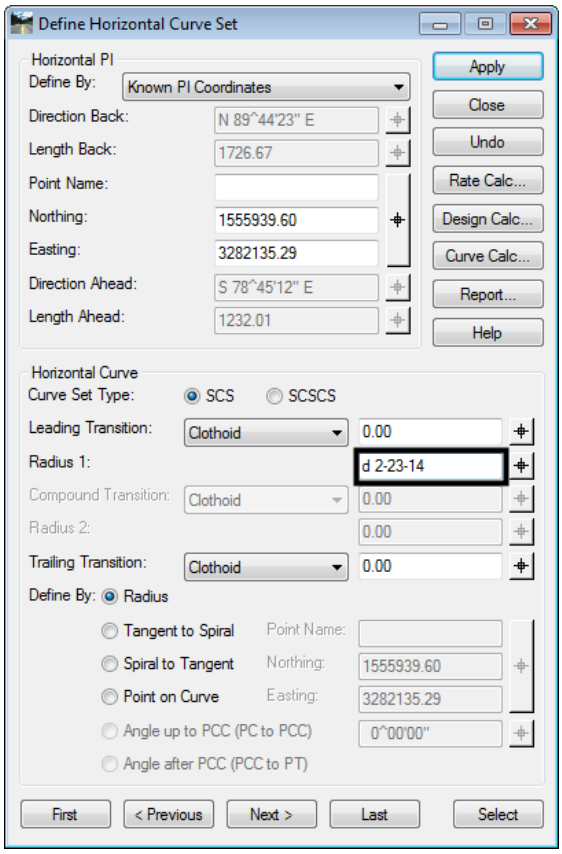
15. **<D> Apply** and the curve will be created.

The next curve (location H) will also be calculated using the degree-of-curve. However a short-cut will be used to generate the input for the Radius 1 field.

16. **<D> Next** to select the tangents on either side of point H.



17. In the ***Radius 1:*** Field Key in ***D 2-23-14***. The key in stands for D.O.C. 2^ 23' 14".



18. Press the keyboard **<TAB>** key to leave the field. The radius (2400.10) will compute for the selected location.

19. **<D> Apply** to form the curve.

20. If time permits, complete the remainder of the curves using the data listed below:

I Radius = 15,000.00
J Radius = 5,000.00
K Radius = 3,000.00
L DOC = 3-34-52

21. Review the alignment data select **Geometry > Review Horizontal**.

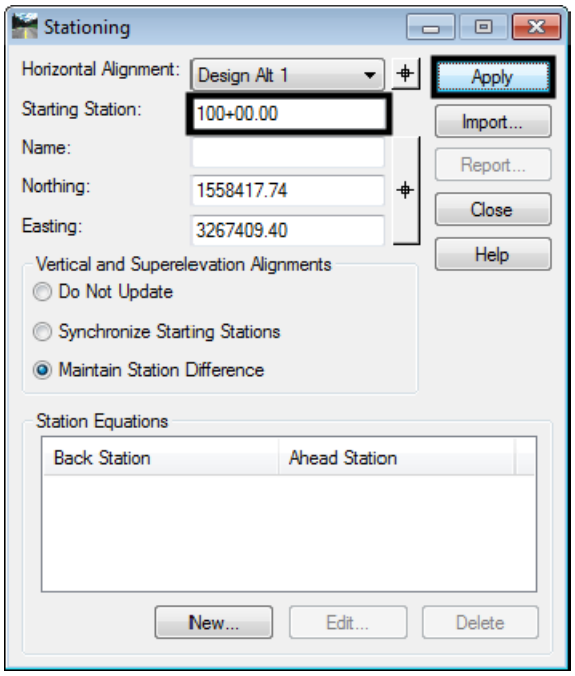
Lab 5.5 - Alignment Stationing

Section Objectives:

- Change the assigned stationing of an alignment.

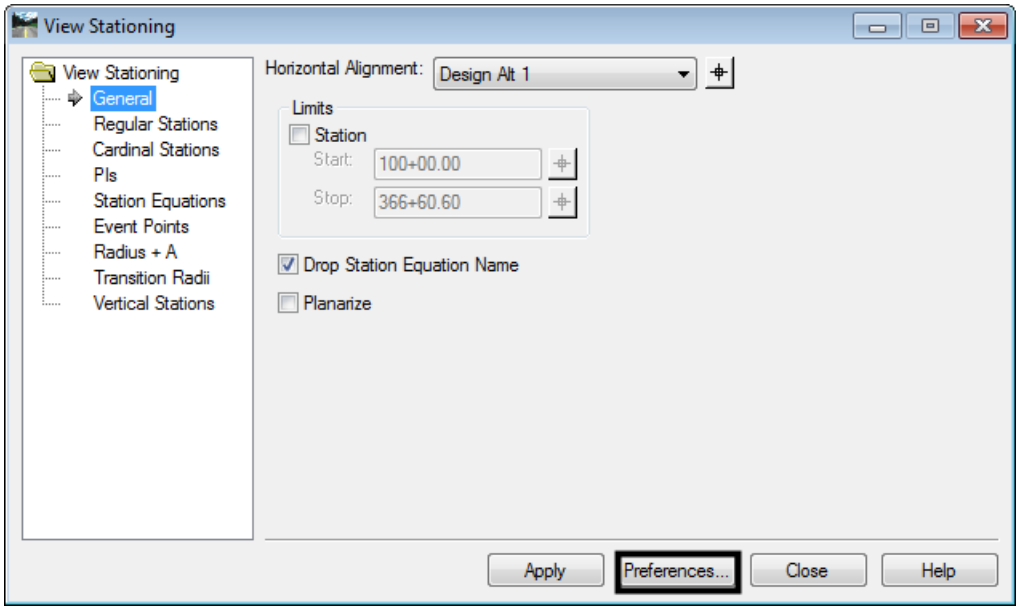
The default station value assigned to the start of a new alignment is 0+00. Redefine the beginning station to 100+00.00

1. Select **Geometry > Horizontal Curve Set > Stationing**.
2. In the ***Stationing*** dialog box, key in ***100+00***. (Can be entered as 10000 and then tab out of the field) in the ***Starting Station*** field.
3. **<D>** the **Apply** button.



4. Verify your results using both of these methods:
   - **Geometry > Review Horizontal**
   - **Tools > Tracking > Horizontal Alignments**

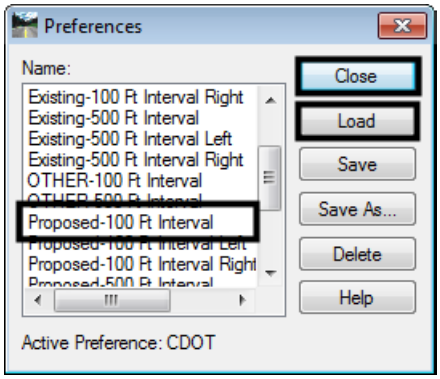
5. Select **Geometry > View Geometry > Stationing** from the InRoads main menu.



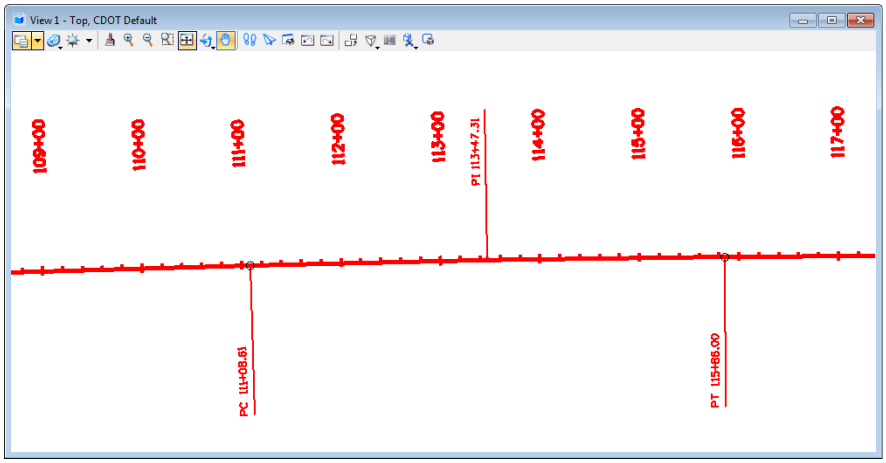
6. **<D>** the **Preferences** button.

7. Highlight the **Proposed-100 Ft Interval** preference.

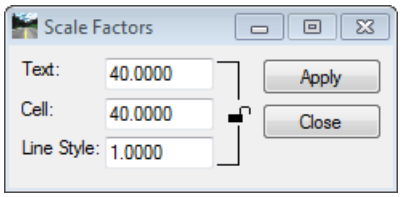
8. **<D> Load** and **Close**.



9. **<D>** the **Apply** button from the ***View Stationing*** dialog box. Stationing is displayed.



10. Experiment with changing the global scale factor value for text and redisplaying the stationing.

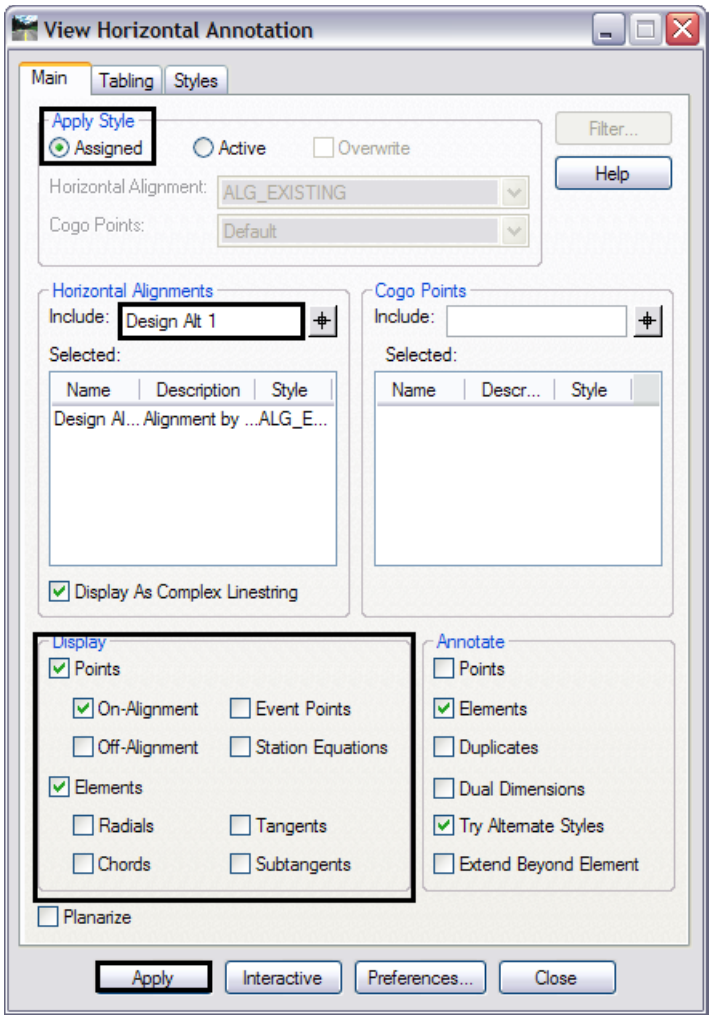


Lab 5.6 - Annotating an Alignment

Section Objectives:

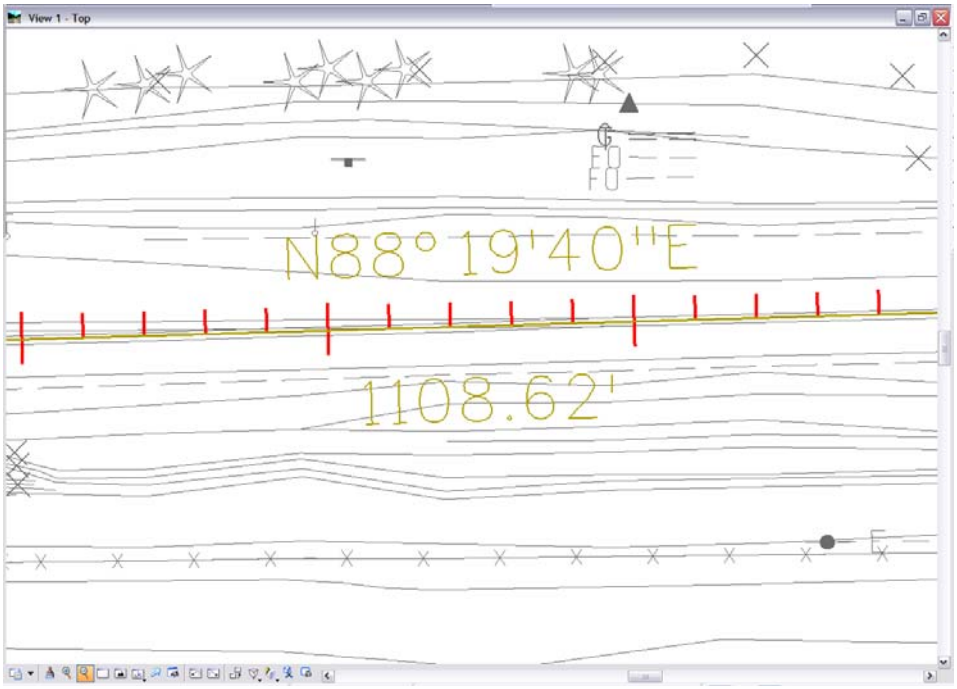
- Annotate an alignment.

1. Select **Geometry > View Geometry > Horizontal Annotation** from the InRoads main menu.



2. Verify the settings as shown above and click **Apply** to display the alignment annotation.

3. **Review** the results in MicroStation.



Challenge Exercise:

1. Use **Geometry>Copy Geometry** to copy alignment **Design ALT 1** to a new horizontal alignment named **Design ALT 1 Modified.**

2. Perform the following actions to the copied alignment:

   - Move a PI
   - Redefine one or more horizontal curves
   - Define alignment stationing to end at station 382+00
   - Redisplay stationing at a 500 foot interval
   - Introduce 2 station equations; one overlap and one gap.
   - Revert the alignment to a simple PI at point B (remove the curve definition)
   - Transpose the direction of the alignment

Lab 5.7 - Horizontal Alignment from Graphics

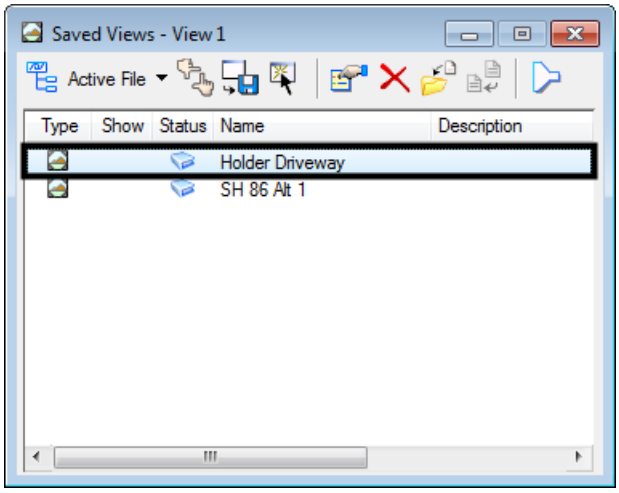
Alignments can be created from existing MicroStation graphics. In this exercise a chained MicroStation element will be used to create an alignment.

Section Objectives:

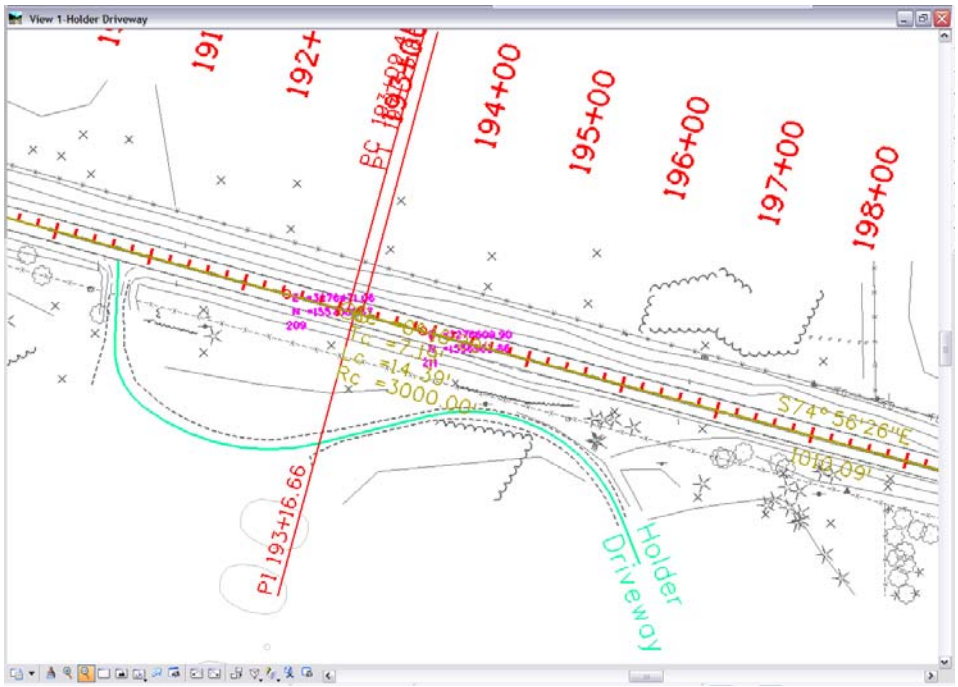
- Create a new horizontal alignment from MicroStation graphics.

1. From the MicroStation pull-down menu select **Utilities > Saved Views**.

2. From the ***Saved Views*** dialog box, highlight **Holder Driveway**.

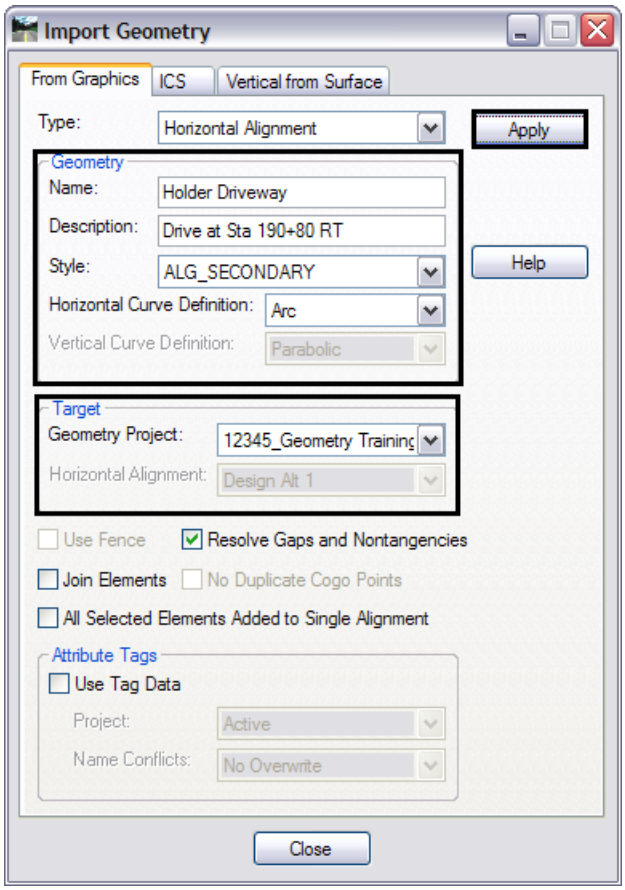


3. **<D>** the **Apply** button then **Close**.



4. Select **File > Import > Geometry.** The ***Import Geometry*** dialog box will open.
5. Fill in the following information on the **From Graphics** tab:
6. Set the Type: to **Horizontal Alignment**
7. Key in ***Holder Driveway*** for the ***Name:***.
8. Key in ***Driveway at Sta 190+80 RT*** for the ***Description:***.

9. Set the Style: to ***ALG_SECONDARY***.
10. Verify the ***Geometry Project:*** is set to **1234_Geometry Training.**
11. **<D>** the **Apply** button. The ***Import Geometry*** dialog box is minimized.

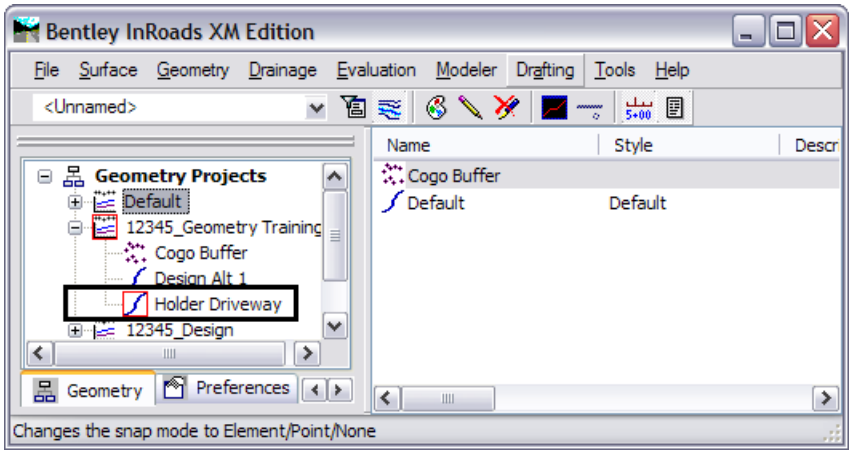


12. You are prompted to ***Identify Element***. **<D>** on the MicroStation graphic drawn in the center of the driveway.
13. **<D>** again to accept the highlighted graphics in the MicroStation view.
14. **<R>** in the MicroStation view to terminate the command. The ***Import Geometry*** dialog box is redisplayed. The MicroStation graphics have been imported as an alignment.

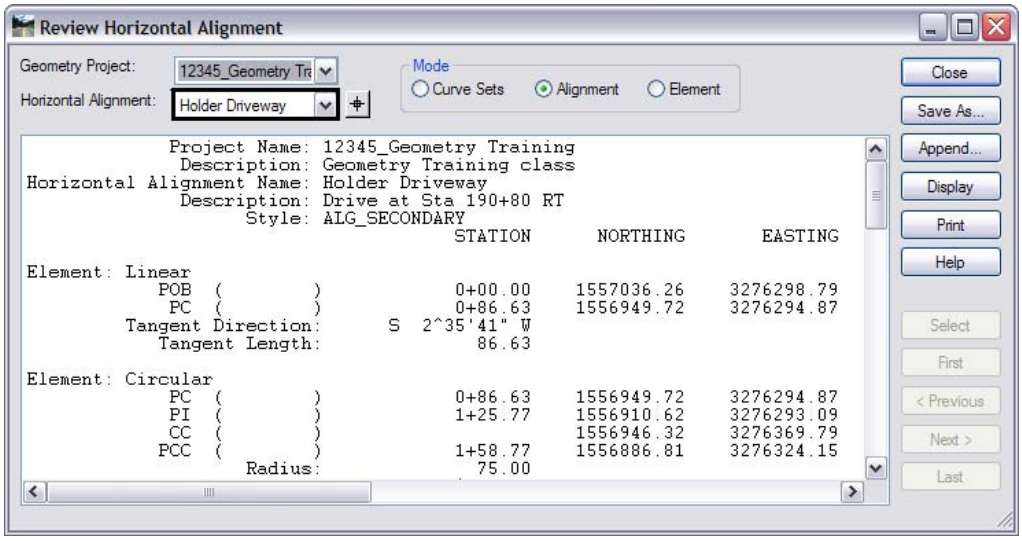
    Note: The geometry name field increments for additional selection(s).

15. **<D>** the **Close** button to dismiss the ***Import Geometry*** dialog box.

16. **Verify** the alignment was created.



17. Review the alignment using **Geometry > Review Horizontal**.



18. When finished **Close** the ***Review Horizontal Alignment*** dialog box.

19. Time permitting, display the alignment graphics, stationing, and curve information.

Lab 5.8 - Extend Alignment

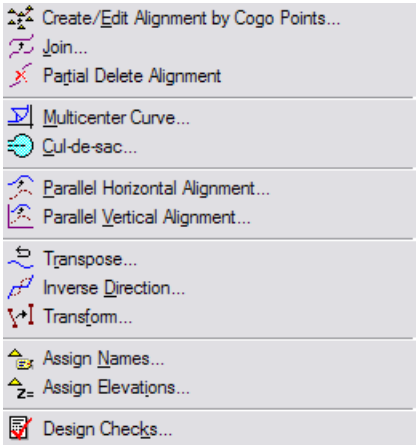
The alignment ***Holder Driveway*** does not intersect the reference line alignment ***Design Alt 1***. Standard practice necessitates the driveway alignment to commence at the main-line reference line.

Section Objectives:

- Learn one of the tools used to modify existing alignments.

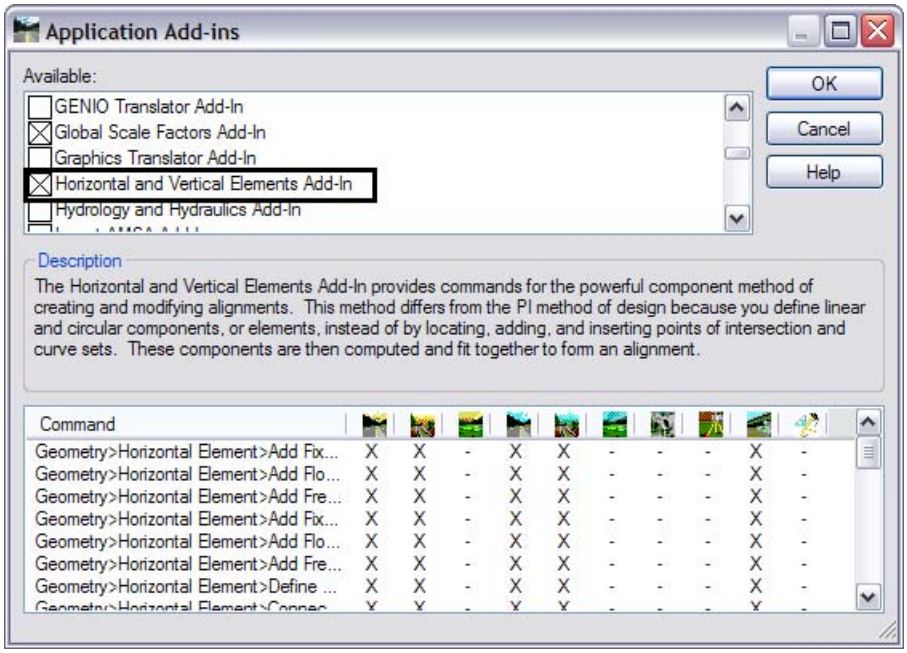
1. **Select Geometry > Utilities >** and hold.

Note: If the commands for Trim and Extend Alignment are not listed in the menu, this means that they are not enabled. These 2 commands are an extension of the Horizontal & Vertical Elements command set which must be enabled.

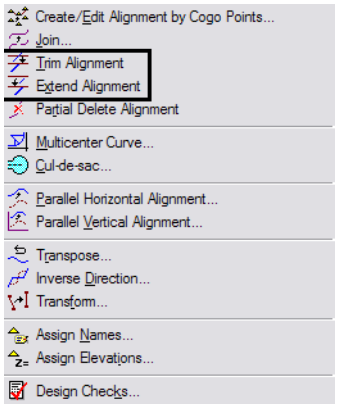


2. Select **Tools > Application ADD-Ins**.

3. Enable **Horizontal and Vertical Elements Add-In**.



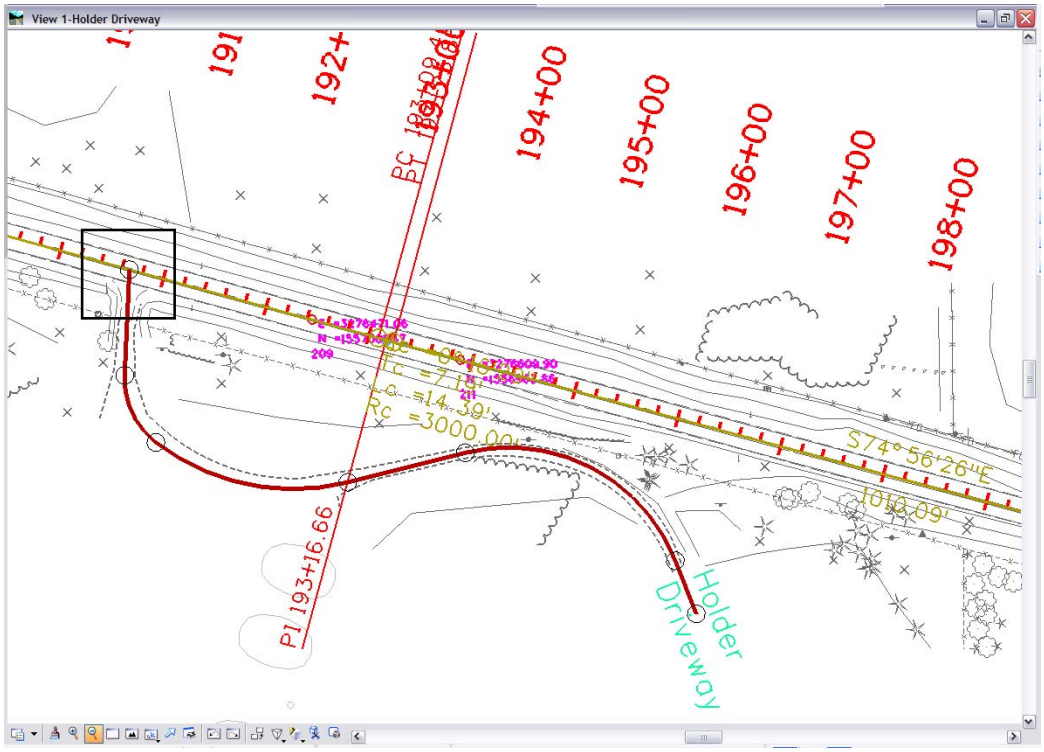
4. Once enabled, **Select Geometry > Utilities > Extend Alignment**.



5. At the prompt: ***Identify Alignment to extend to***, **<D>** on the alignment **Design Alt 1**.

6. At the prompt: ***Identify Alignment to extend***, **<D>** on the alignment **Holder Driveway**.

7. **<D>** to ***accept*** the presented solution.



Note: The alignment-alignment intersection is now the initial point of the driveway alignment. Because the alignment was edited (extended) from its beginning, the initial station value was recalculated to -0+12.41. Because the original beginning point retains its station value (0+00), the new beginning point is given a negative station value.

8. From the InRoads main menu, select **Geometry > Horizontal Curve Set > Stationing** define the driveway beginning station as **3+25**.

Challenge Exercises:

- Display stationing at a 100 foot interval for Holder Drive.
- Display alignment annotation for Holder Drive.
- Recall saved view Drive @ 180+00.
- Import the graphics representing the driveway centerline into an alignment named Drive 180+00**.**
- Use the command **Geometry > Utilities > Trim Alignment** to remove the portion of the driveway alignment that lies north of the main-line reference line.

Note: The order selecting alignments is not important when using the trim alignment command. The location of the data point in response to ***Identify portion to clip*** determines both the alignment and the portion of that alignment that is eliminated.

Lab 5.9 - Saving Geometry

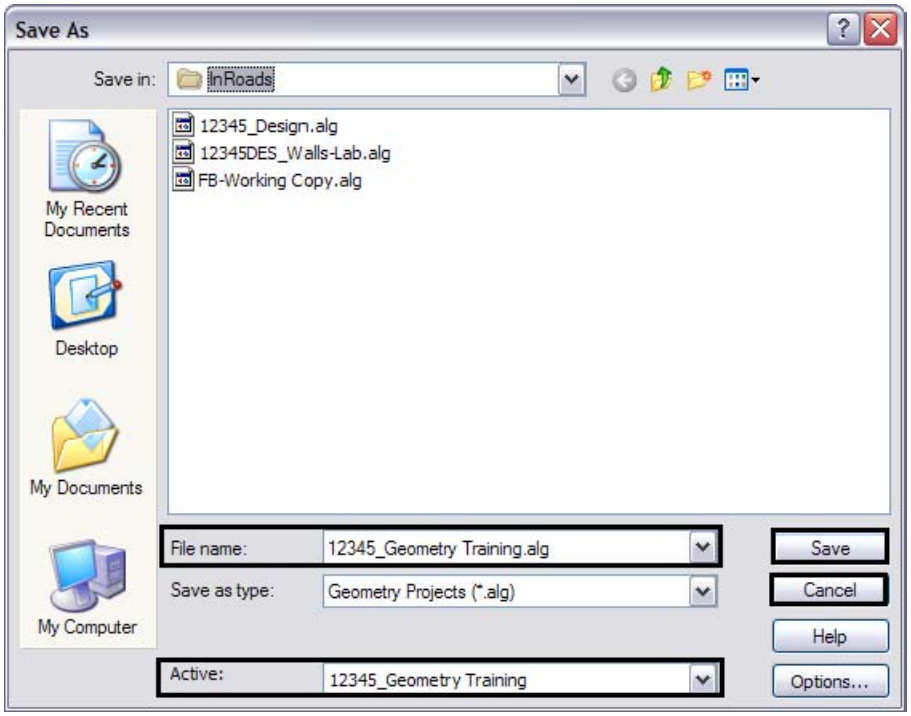
Alignments cannot be saved individually. They are saved when the geometry project is saved. Due to the fact InRoads works on geometry that is loaded in memory, the geometry project must be saved at appropriate times.

Section Objectives:

- Save InRoads design data.

1. From the InRoads main menu, select **File > Save > Geometry Project**. The ***Save As*** dialog box is displayed with the ***Save as type:*** set to **Geometry (*.alg)**.

2. Verify you are in the correct project directory; **C:\Projects\12345\Design\InRoads**.



3. The file name should match the ***Active:*** name at the bottom of the ***Save As*** dialog box. If necessary, use ***Active*** drop-down menu and reselect the desired name to ensure the saved file name will match the geometry project name.

   Note: Geometry projects have both an internal name that appears in the dialog boxes in InRoads and a name on the hard drive that has an.ALG extension. To minimize any confusion between these two names, ensure that the saved Geometry name in the project folder matches the Geometry name displayed in InRoads explorer.

4. **<D>** the **Save** button and then the **Cancel** button. The file will be saved to disk and the ***Save As*** dialog is dismissed.

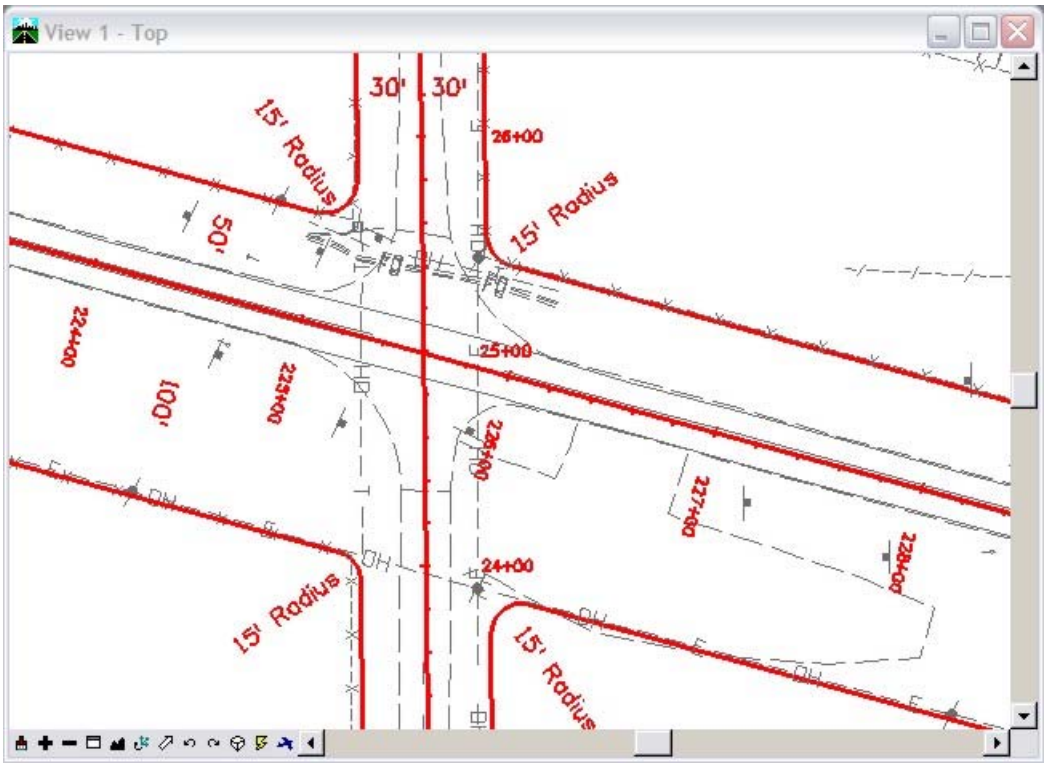
Lab 5.10 - Creating Parallel Horizontal Alignments

Offset alignments can be created to generate geometry for elements such as right-of-way limits, easement limits, under-drains, retaining walls, bridge decks, etc.

Section Objectives:

- Learn additional tools for creating alignments.

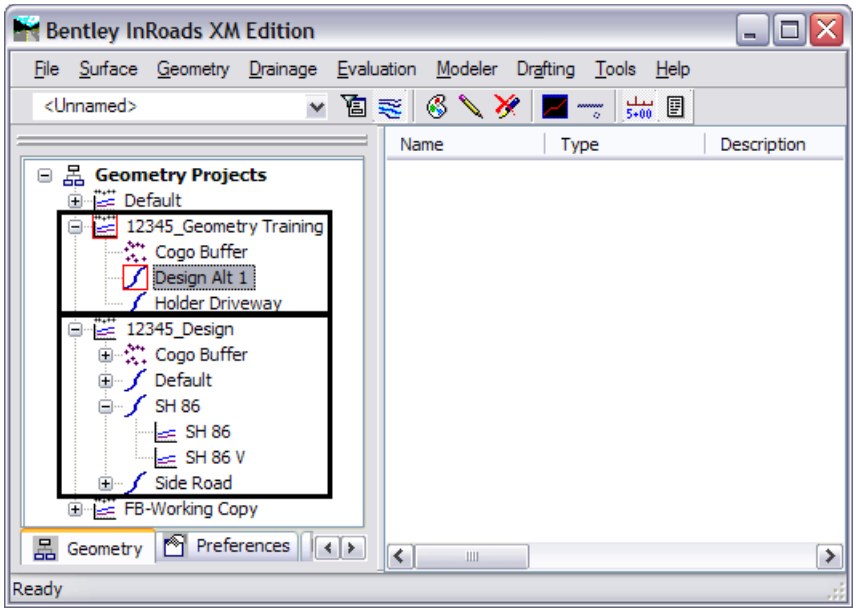
In this lab horizontal alignments are created to define the right-of-way limits for the mainline road and the side road. The Side Road has a right-of-way width of 60’ (30’ on each side of centerline). The mainline alignment has a total right-of-way width of 150’; 50’ feet north of the reference line and 100’ south. At the intersection of the right-of-way lines a radius of 15’ is required.



The workflow will consist of using an assortment of geometry commands:

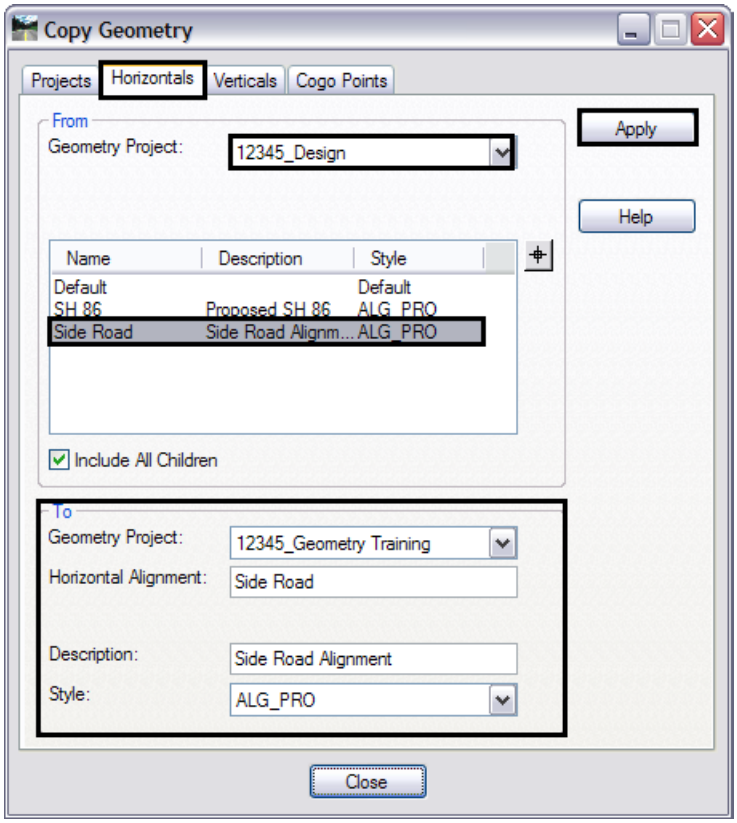
- **Copying Geometry** - used to combine geometry residing in two different geometry projects into one project
- **Multi-Center Curve** – to create radius returns
- **Parallel Horizontal Alignment** - to offset alignments
- **Join Alignments** – to connect separate alignments
- **Join Elements** – to simplify geometry

The first step is to create alignments relative to both the mainline alignment (SH 86) and the side road alignment (Side Road). These two horizontal alignments reside in two different geometry projects. To work efficiently, they should reside in a single geometry project. The ***Copy Geometry*** command is used to achieve this result.



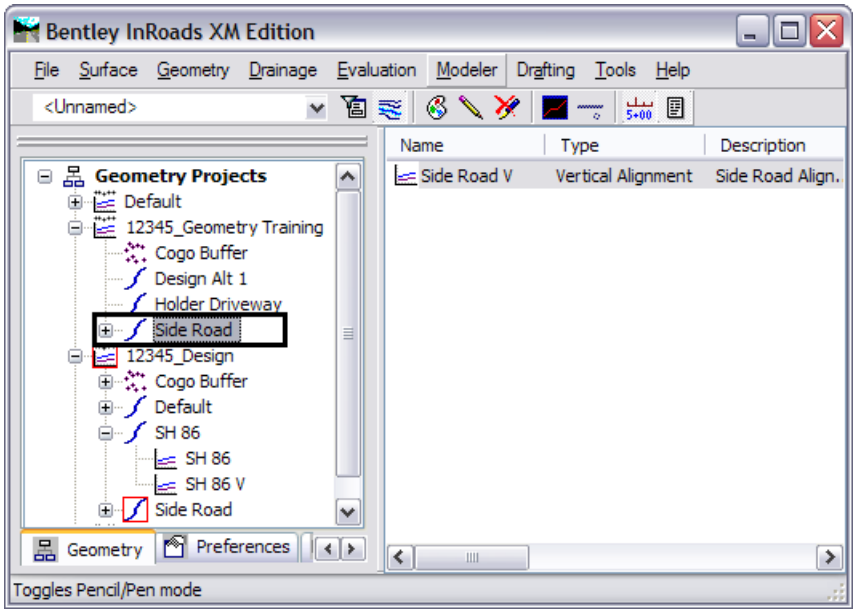
1. Select **Geometry>Copy Geometry** from the Inroads main menu.
2. In the From area, select **12345_Design** for the geometry project.
3. Highlight the alignment **Side Road** from list.
4. Verify that **Include All Children** is toggled on.
5. In the ***To*** area, Select **12345_Geometry Training** for the ***Geometry Project***.
6. Key in ***Side Road*** for the ***Horizontal Alignment*** name.
7. Key in ***Side Road Alignment*** for the ***Description***.
8. Select **ALG_PRO** for the ***Style***.

9. **<D> Apply** then **Close** to copy the alignment and dismiss the dialog box.



10. Verify the alignment was copied.

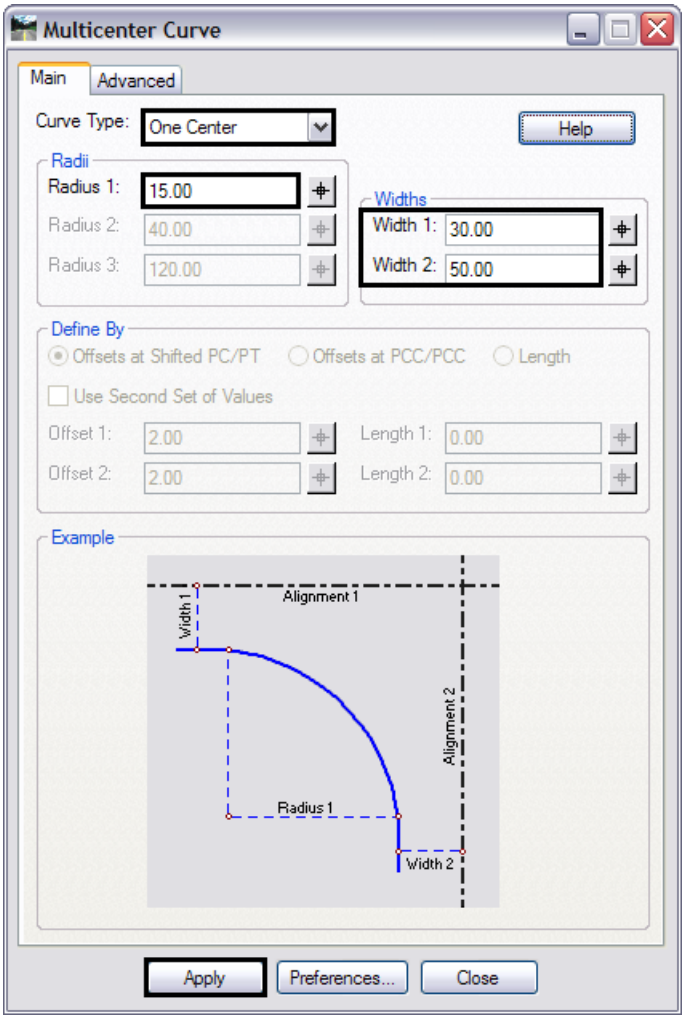
11. Copy alignment **SH 86** as **SH 86 ALT 1** if you feel the mainline alignment created in an earlier lab exercise may contain errors



12. Set the geometry project **12345_Geometry Training** as ***Active***.

The next step is to generate the radius returns. This is done by using the Multicenter Curve command. Begin by creating the radius returns north of the mainline alignment.

13. From the ***Saved Views*** dialog box, **<D>** saved view name **Side Road**.
14. Click **Apply**.
15. Select **Geometry > Utilities > MultiCenter Curve** from the InRoads main menu.

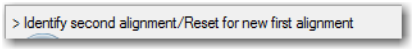


16. Select **One Center**.
17. Input the following values:

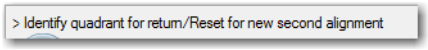
- ***Radius: 15***
- ***Width 1: 30***
- ***Width 2: 50***

18. **<D>** the **Apply** button. The following prompts are displayed.

19. In the MicroStation view **<D>** on the **Side Road** alignment.



20. **<D>** on the **Design ALT 1** alignment.



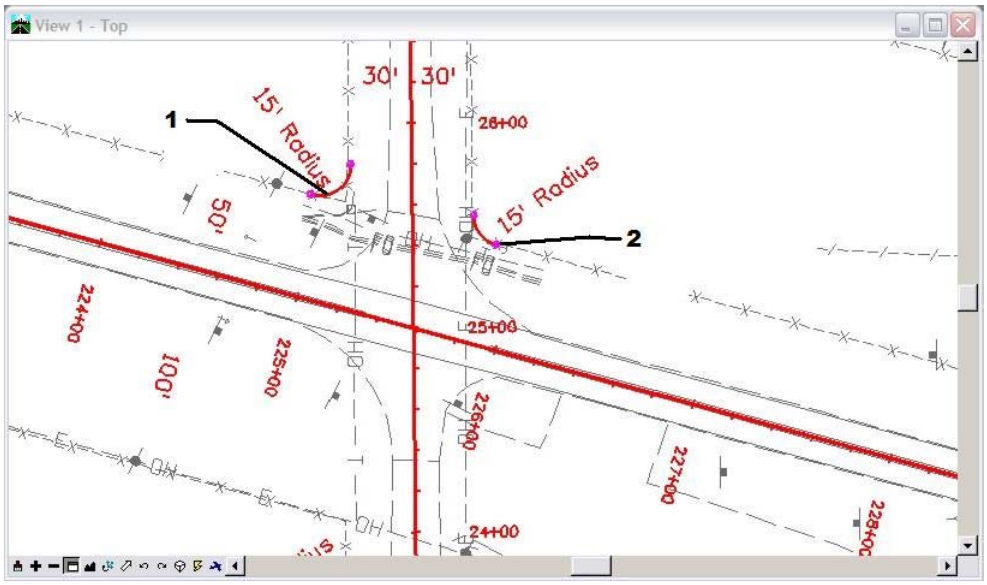
21. **<D>** in the ***Northwest*** quadrant

22. **<D>** to accept and create an alignment representing the radius return.

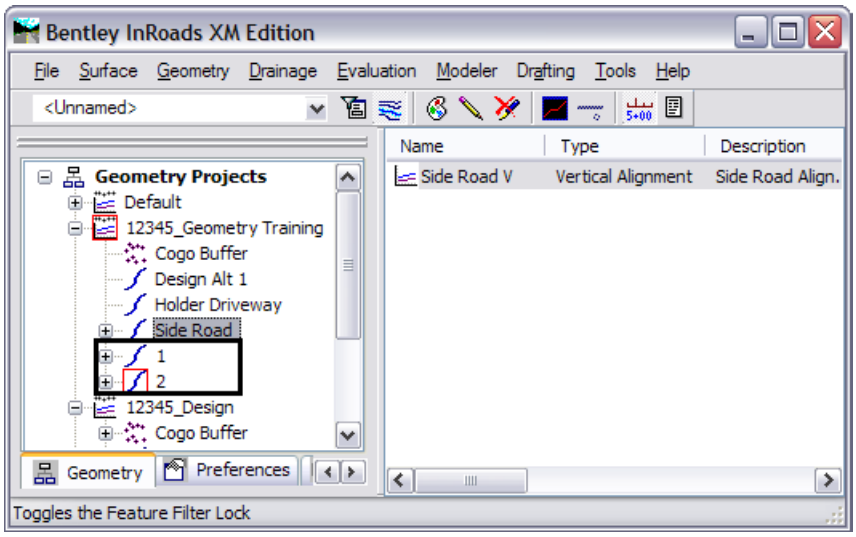
23. To add the radius returns to the remaining quadrants, **<D>** in the quadrant then **<D>** again to **Accept**.

    New alignments will be assigned names based on the seed alignment name specified in **Tools > Options [Geometry]**.

    Two new alignments are created, ***1***and ***2***.



Note: Your stationing graphics may appear at a different location than shown above.

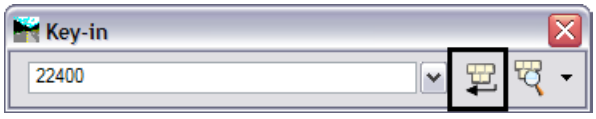


The next steps will be to offset the mainline and side road alignments so they match up with the returns that were just created. This is done using the ***Parallel Horizontal Alignment*** command.

24. From the MicroStation drop-down menu, select **Utilities > Keyin**. The key in window is needed to input the desired station limits and offset distances.

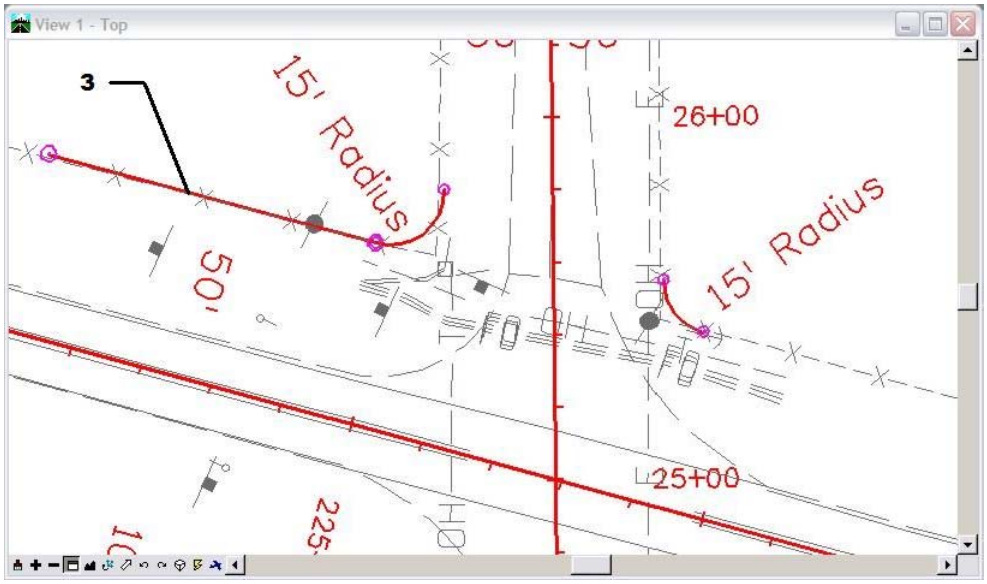
    Note: Stations and offsets can be identified graphically. However, using key-in's provides greater accuracy.

25. From the InRoads main menu select **Geometry > Utilities > Parallel Horizontal Alignment...**.
26. In the ***Parallel Horizontal Alignment*** dialog box, toggle on **Interactive By Station**
27. **<D>** the **Apply** button.
28. In the MicroStation view **<D>** on the mainline alignment.
29. At the prompt ***Identify First Station/Key in Station***, key in ***224+00*** in the MicroStation Key-in window.
30. Press the ***Enter*** key.



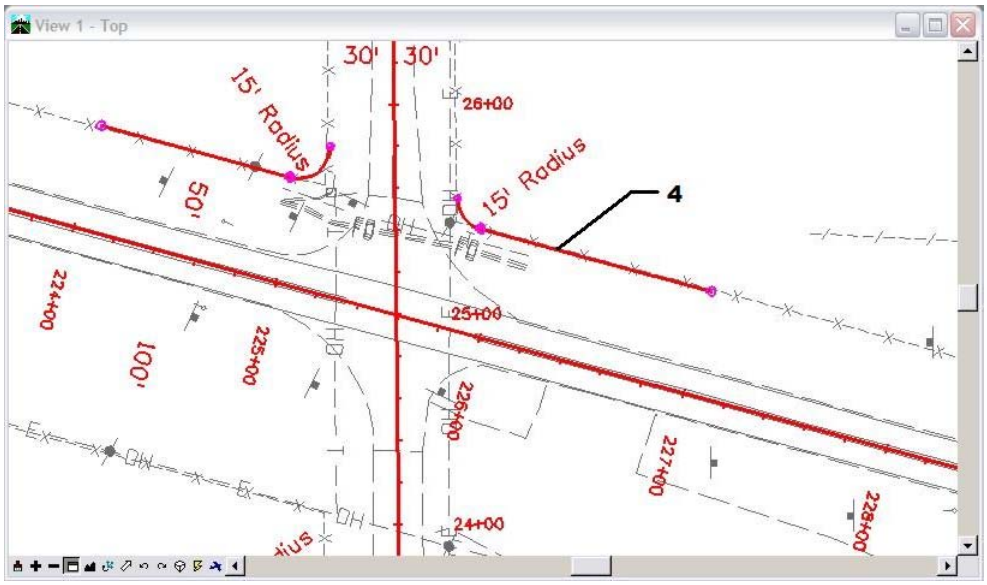
31. At the prompt ***Identify Second Station/Key in Station***, key in ***224+93.20*** in the MicroStation Key-in window.

32. Press the ***Enter*** key.
33. For ***Identify Location:*** key in ***-50*** (50' to the left) in the MicroStation Key-in window.
34. Press the ***Enter*** key.
35. **<D>** the in the view window to accept the solution. Alignment 3 is created and displayed.

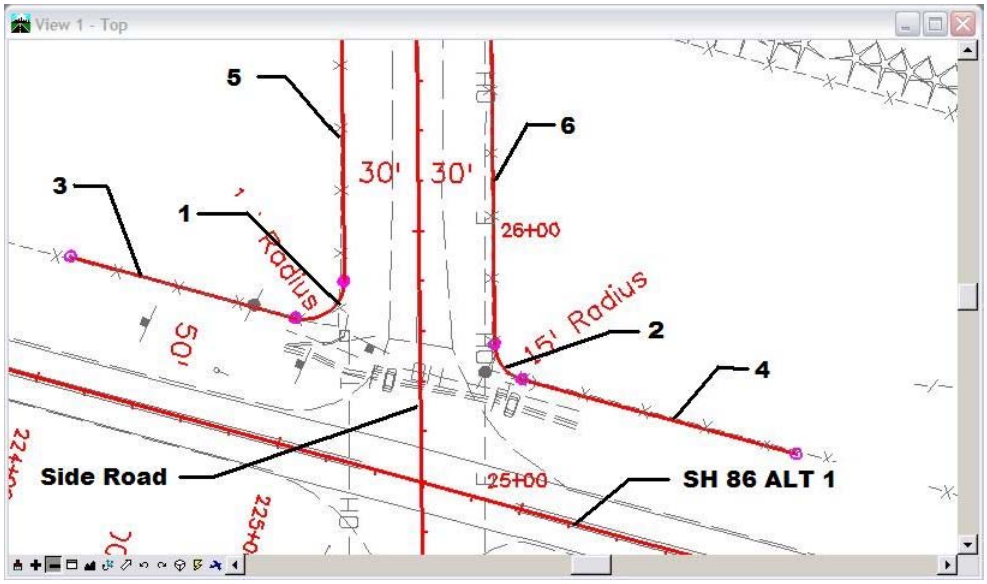


36. Repeat the **Geometry > Utilities > Parallel Horizontal by Station** command to the east of the side road using the following data:
    - Station limits of: **225+86.76** to **227+00, 50'** left of Design Alt 1

    Alignment 4 is created and displayed.



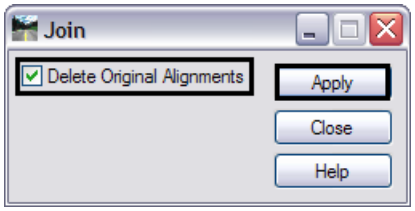
37. Repeat the process to create the alignments along the Side Road north of the radius returns.



Next use the Join Alignment command to connect the alignments created in the previous steps single alignments for each quadrant.

Join alignments 3, 1, & 5 to create the Northwest quadrant's right-of-way limits.

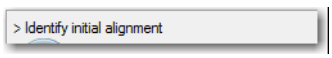
38. Select **Geometry > Utilities > Join**.



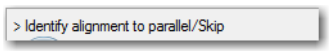
39. toggle on ***Delete Original Alignments***.

Note: The first alignment identified (3) will become the final alignment name and alignments (1) and (5) will be deleted upon completion of the command.

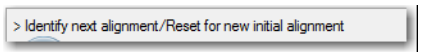
40. **<D>** the **Apply** button and follow the prompts.



41. **<D>** on alignment **3**.



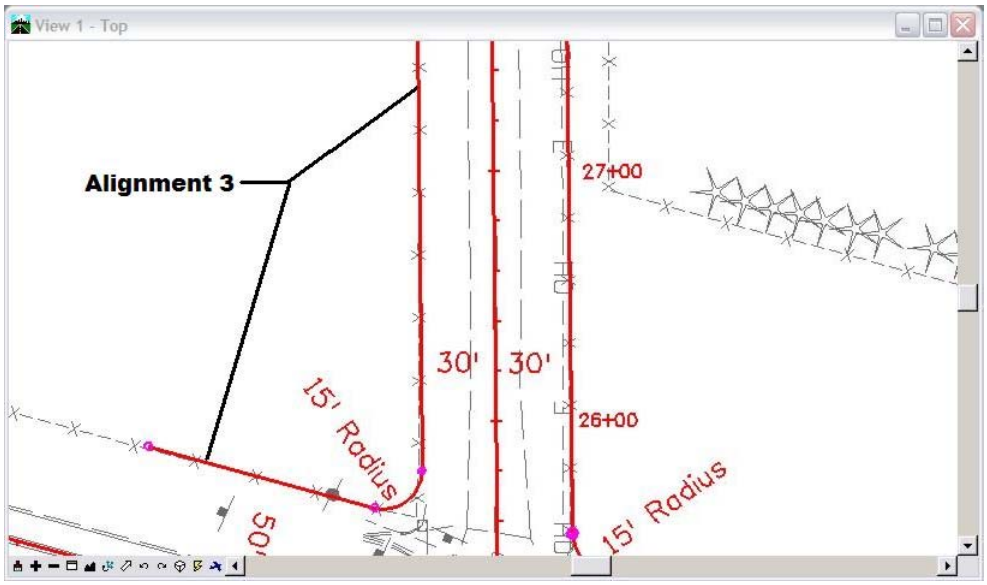
42. **<D>** alignment **1**.



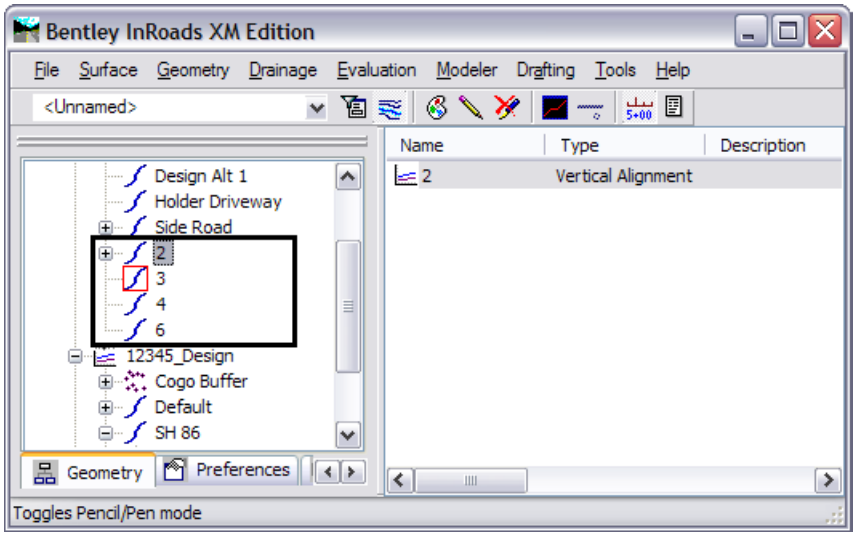
43. **<D>** on alignment **5**.

44. **<D>** to accept the results.

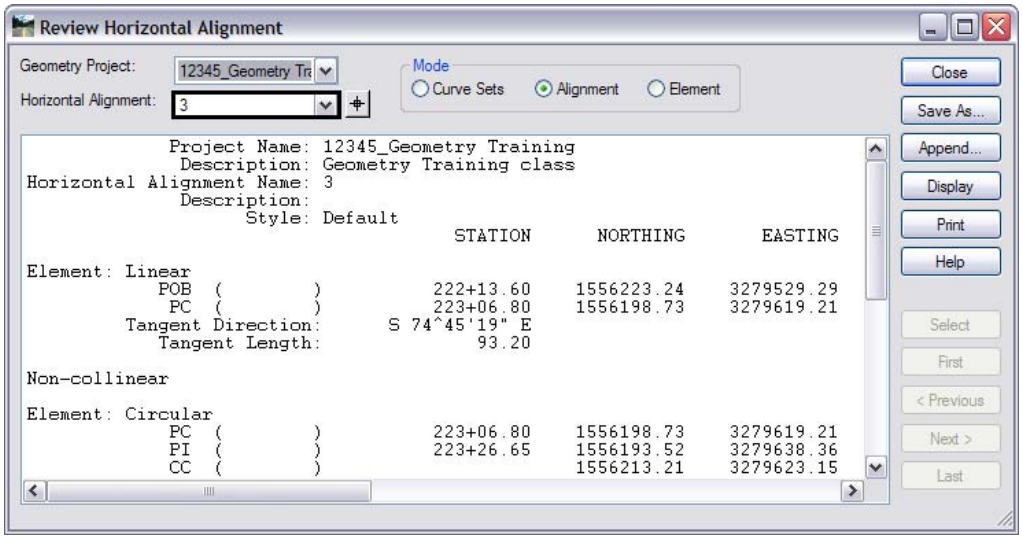
45. Reset **<R> <R>** to exit the command.



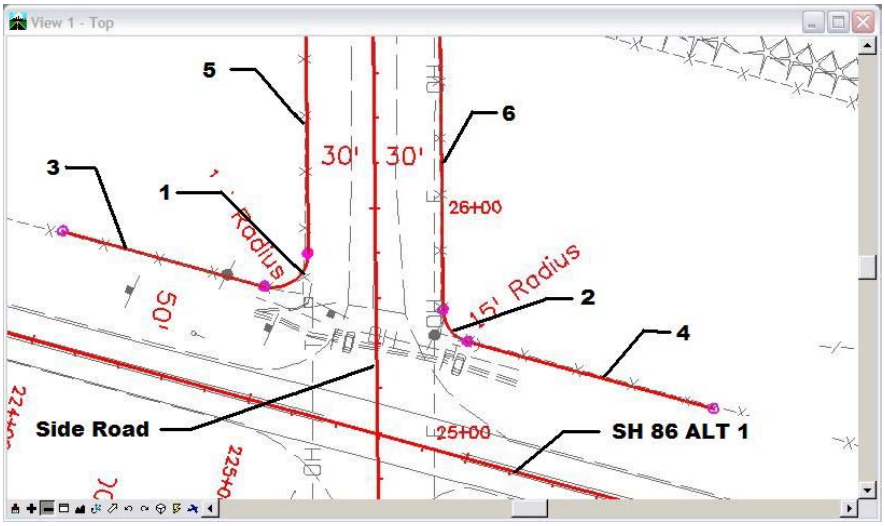
Alignment 3 is now the combination of the alignments 3, 1, and 5. Alignments 1 and 5 have been removed from the geometry project.



46. **Review** alignment **3**.



47. Using the same steps above, join alignments 6, 2, and 4 (in that order) to create the northeast quadrant's right-of-way limits; begin with alignment **6**.



Once the above step is completed, alignments 3 and 6 define the right-of-way limits on the north side of the intersection.

Another method of creating parallel alignments is by element instead of by station.

48. Select **Geometry > Utilities > Parallel Horizontal Alignment**.

Parallel Horizontal Alignment ***by Element*** differs from ***by Station*** in that you can select the limits of the alignment to offset by selecting alignment components (tangents or curves) to define the desired limits.