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 joining cogo points together and the traversing commands.

Another aspect of this lab is to learn how to modify or create new geometry from geometry features that exist in a geometry project. An example of this would be to create parallel/offset alignment such as a centerline to represent the edge of road or other feature that parallels the centerline.

Chapter Objectives:

- Create a new geometry.
- Create alignment tangents.
- Define alignment curves.
- Learn how to define and modify alignment stationing.
- Annotate an alignment.
- Create a horizontal alignment form graphics.
- Modify an existing alignment.
- Create parallel horizontal alignments.

The following files are used in this lab:

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

A predefined workflow for creating geometry is not dictated by InRoads. However, a typical workflow might be:

1. Create or open an existing geometry project
2. Create horizontal alignments (or Cogo points)
3. Assign stationing for alignments
4. Define alignment 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

Before continuing with this lab, delete all visible graphics in your MicroStation file using the element selection tool or a fence. Note that you are deleting the graphical display of data, not the data itself. The graphics could be redisplayed using the InRoads display commands shown in previous sections.

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 - Review Geometry from Survey

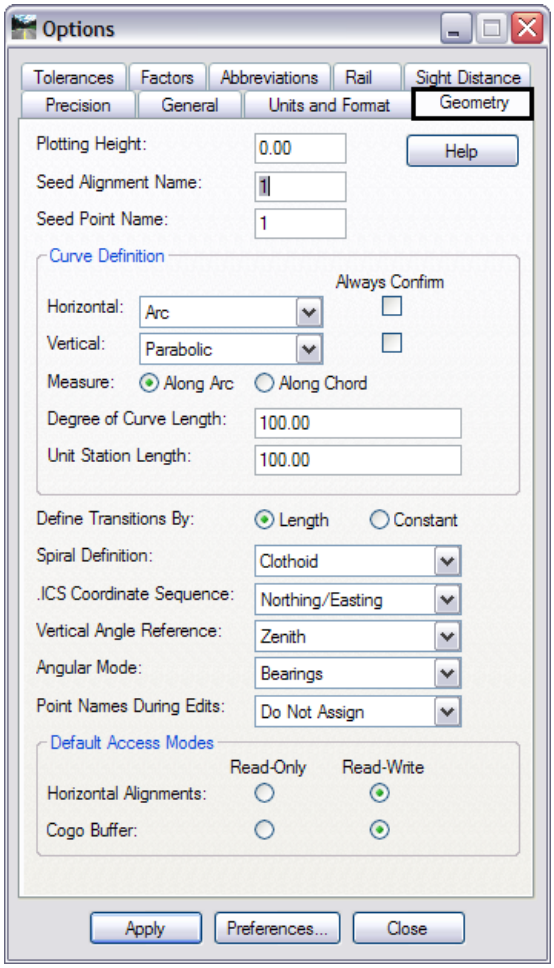
Section Objectives:

- Understand the difference between Named and Unnamed cogo points and how to apply cogo point names

1. Start InRoads using your desktop icon and opening the file **12345DES_Model.dgn** from the **C:\Projects\12345\Design\Drawings\Reference_Files** directory.

2. Open up the InRoads ***Options*** dialog box from the menu bar under **Tools > Options** and review the settings in the **Geometry** tab.

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

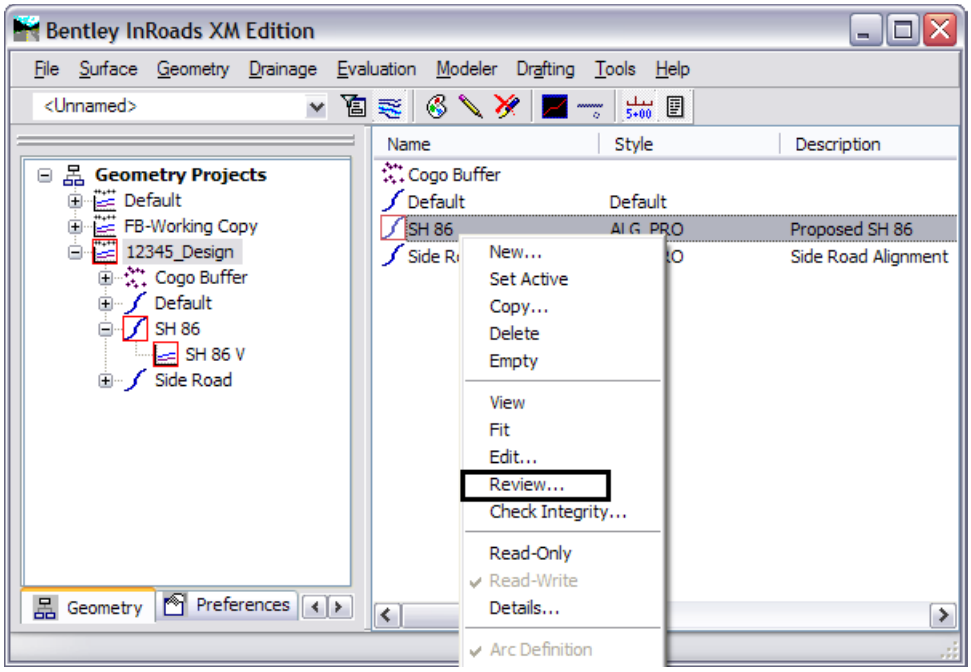


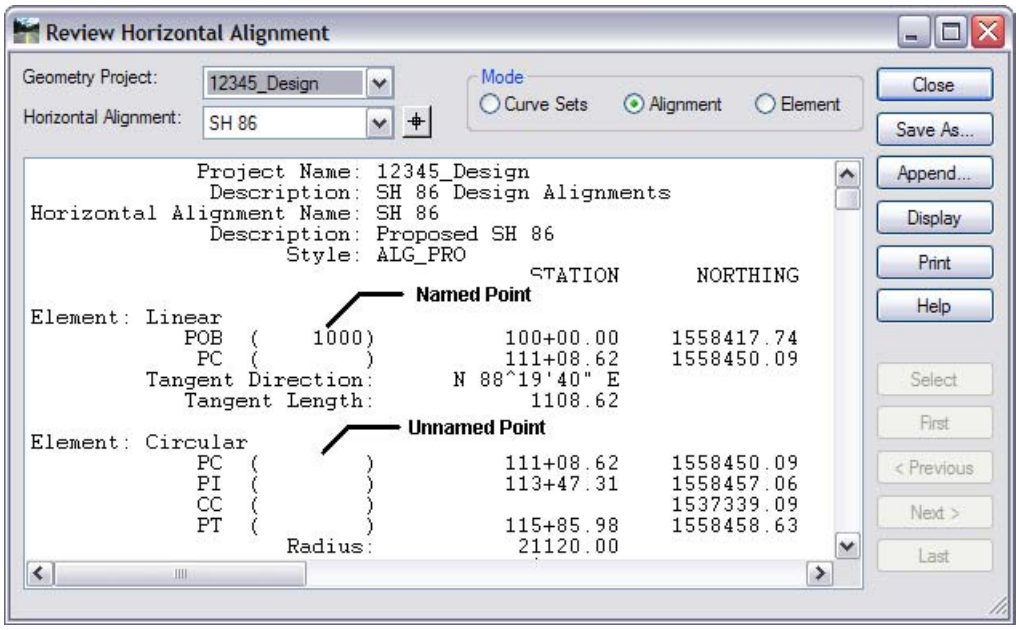
3. Load the geometry project **12345DES_Design.alg** from the folder **C:\Projects\12345\Design\InRoads**.

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.





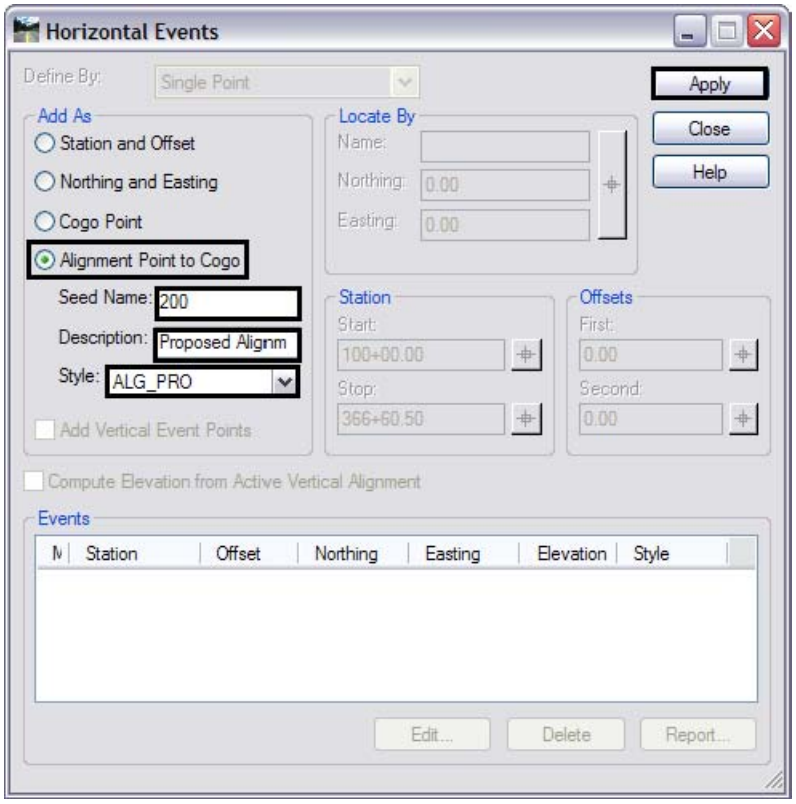
Note: If ***Point Name During Edits*** is set to **Named** on the ***Geometry*** tab of the ***Options*** dialog box, alignment key-points are generated with a name based on the next available ID as specified in the ***Seed Point Name*** field. The specified seed point name can be alpha, numeric, or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

5. To create point names for all alignment key points and add them to the Cogo Buffer, select **Geometry > Horizontal Curve Set > Events**.

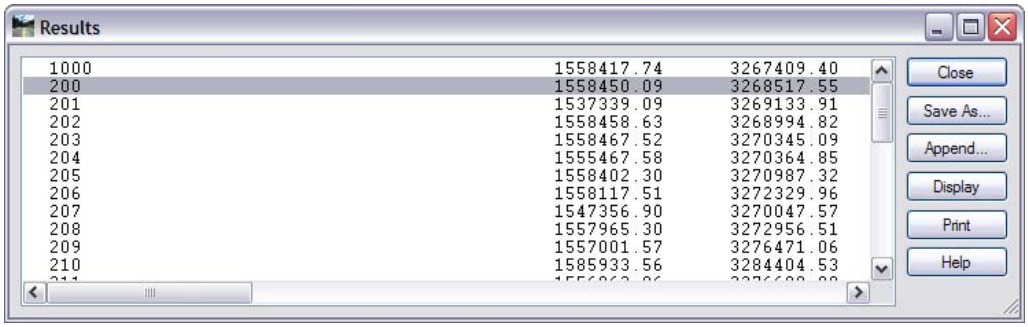
6. In the Horizontal Events dialog box, toggle on Alignment Point to Cogo in the Add As section.

7. Key in ***200*** for the ***Seed Name:***, ***Proposed Alignment*** for ***Description:***, and select **ALG_PRO** for the ***Style:***.

8. Click **Apply**.



A Results dialog box will appear 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.

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

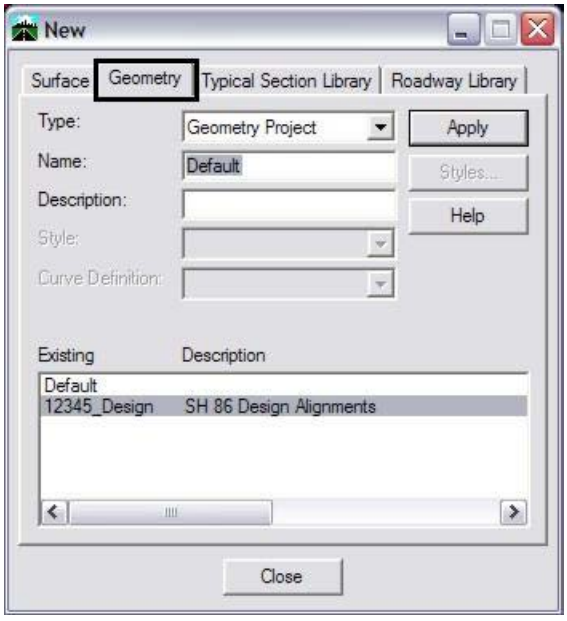
Lab 5.2 - Create New Geometry

Section Objectives:

- Learn how to create a geometry project and place holders for horizontal geometry data.

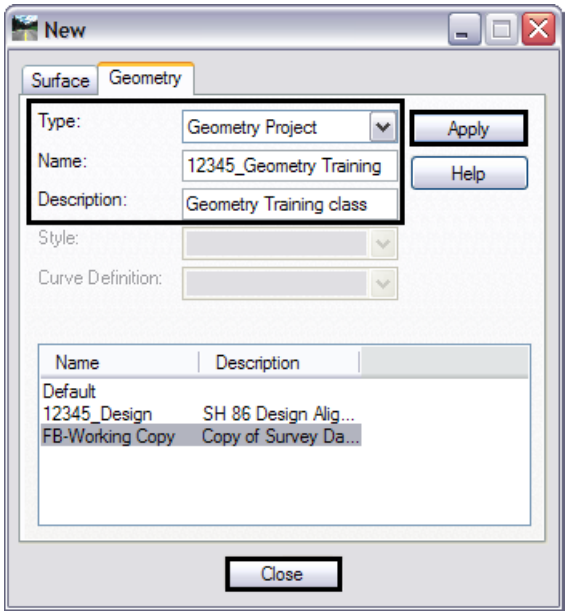
Next we will create a new geometry project and a placeholder for horizontal alignment data.

1. From the pull-down menu **File > New**.



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

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

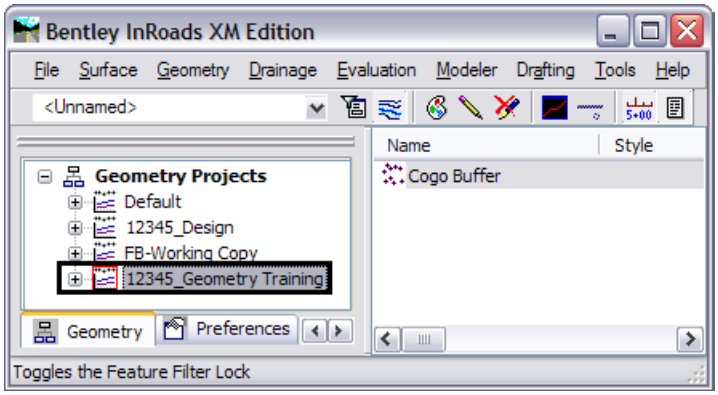


Note: The lower portion of the ***New*** dialog displays geometry projects that are currently loaded into memory.

6. **<D> Apply** (Do not Close the New dialog box yet).

Note: InRoads created the geometry project and made it the active geometry project. Any horizontal alignments created will be placed in the active geometry project.

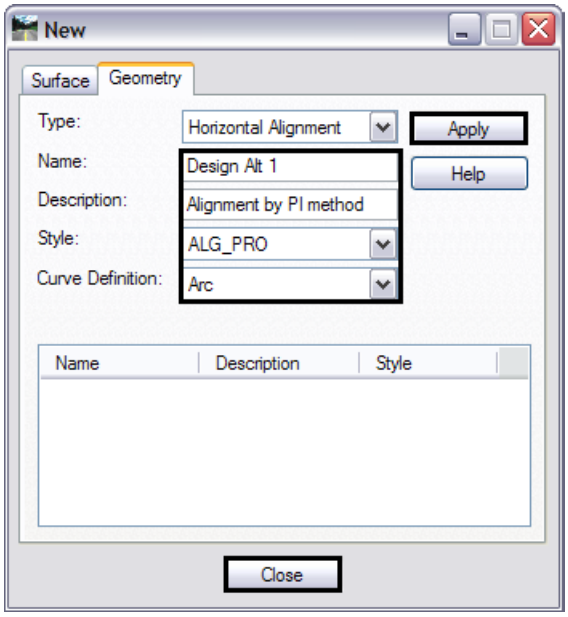
7. **Verify** that the new geometry project was created.



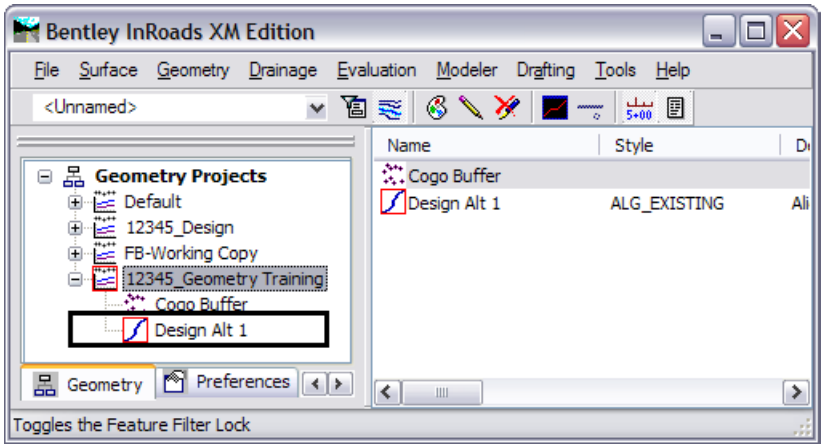
Note: This creates the geometry project where all new alignment data will be stored. At this point, it is held in RAM (Random Access Memory). When saved to the hard drive, the default extension will be *.alg, as was assigned to previous geometry projects.

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**



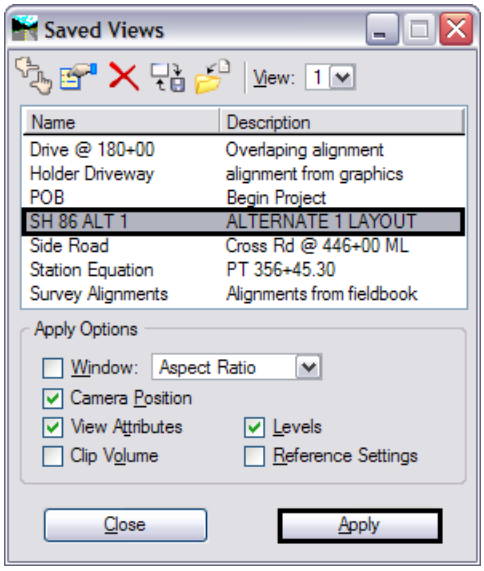
9. **<D>** the **Apply** then **Close** buttons.



10. **Verify** the horizontal alignment is created in the active geometry project.

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

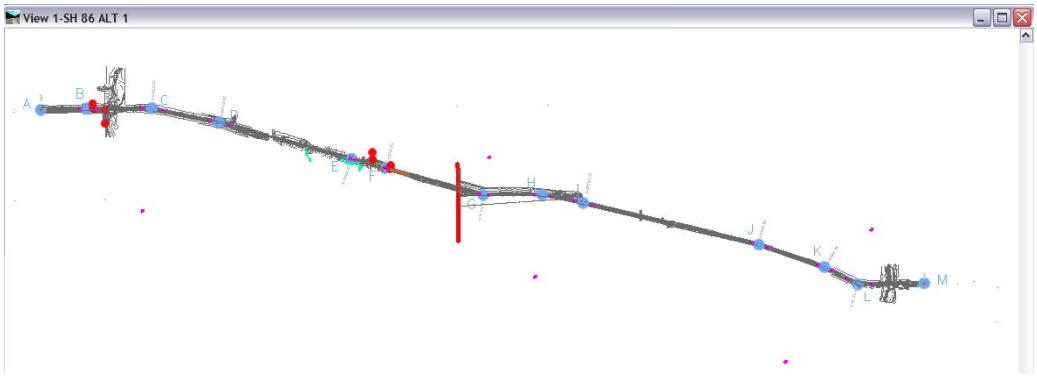
12. From the ***Saved Views*** dialog **<D>** saved view name **SH 86 ALT 1**.



13. **<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 steps will be used to construct the tangents, then insert curves between the tangents once constructed.



Note: The following labs 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.

Note: For orientation screened graphics and curve radius values are shown for the alignment that will be created.

Lab 5.3 - Create Alignment Tangents

Section Objectives:

- Learn how to create horizontal alignments from PI to PI.

The first toolbox that we will use is the ***Horizontal Curve Set*** commands. These commands present an easy way to create alignments. They consist of five primary commands described below and may be accessed from a toolbar (shown) or from the pull-down menu under ***Geometry > Horizontal Curve Set***.

Add PI is used to create a PI that begins a new alignment, or to add a PI onto either end of an existing alignment thereby extending it.

Insert PI is used to add a PI to an existing alignment between two existing PIs.

Move PI is used to change the location of a PI previously established.

Delete PI is used to remove a PI from an existing alignment. For removing more than one PI, you must choose and ***Accept*** each one individually. To remove all PIs associated with an alignment, but leave the alignment name, right-click on the alignment name in the Explorer menu and choose ***Empty***.

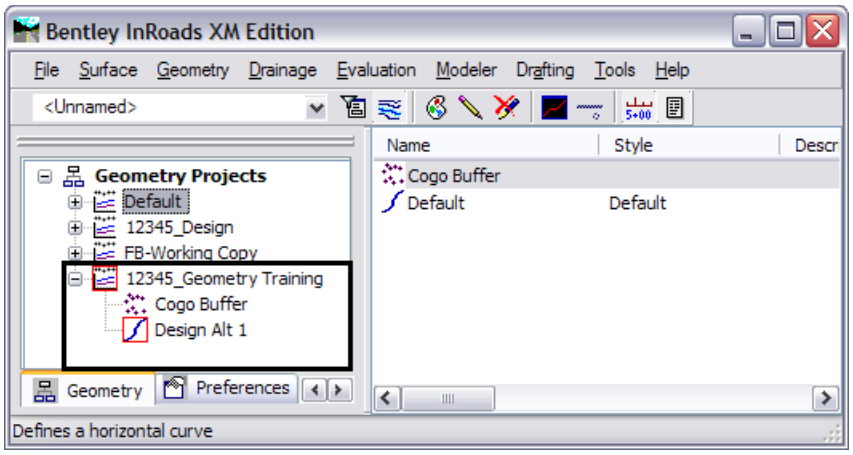
Define Curve is used to either establish curves or to edit curves previously defined.

Stationing for establishing stationing or station equations along an alignment

Events are used to establish unique locations relative to an alignment, Cogo points, or the assignment of Cogo points along an alignments keypoints.

In this lab you will create an alignment using the Horizontal Curve Set, or PI method. First input the tangent sections of the alignment by selecting locations graphically. This is accomplished by **<D>** at the desired location. Once the tangents are in place, curves between these tangents will be defined.

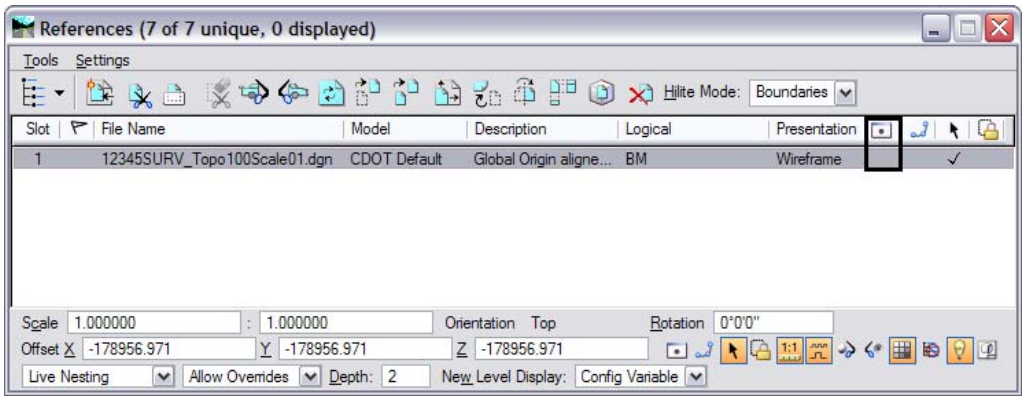
1. Before beginning, verify the proper alignment is ***Active***. This is necessary as any geometry entered will be populated in the active alignment.



Design Alt 1 should be the active alignment. If not, several options exist to define it as the active alignment.

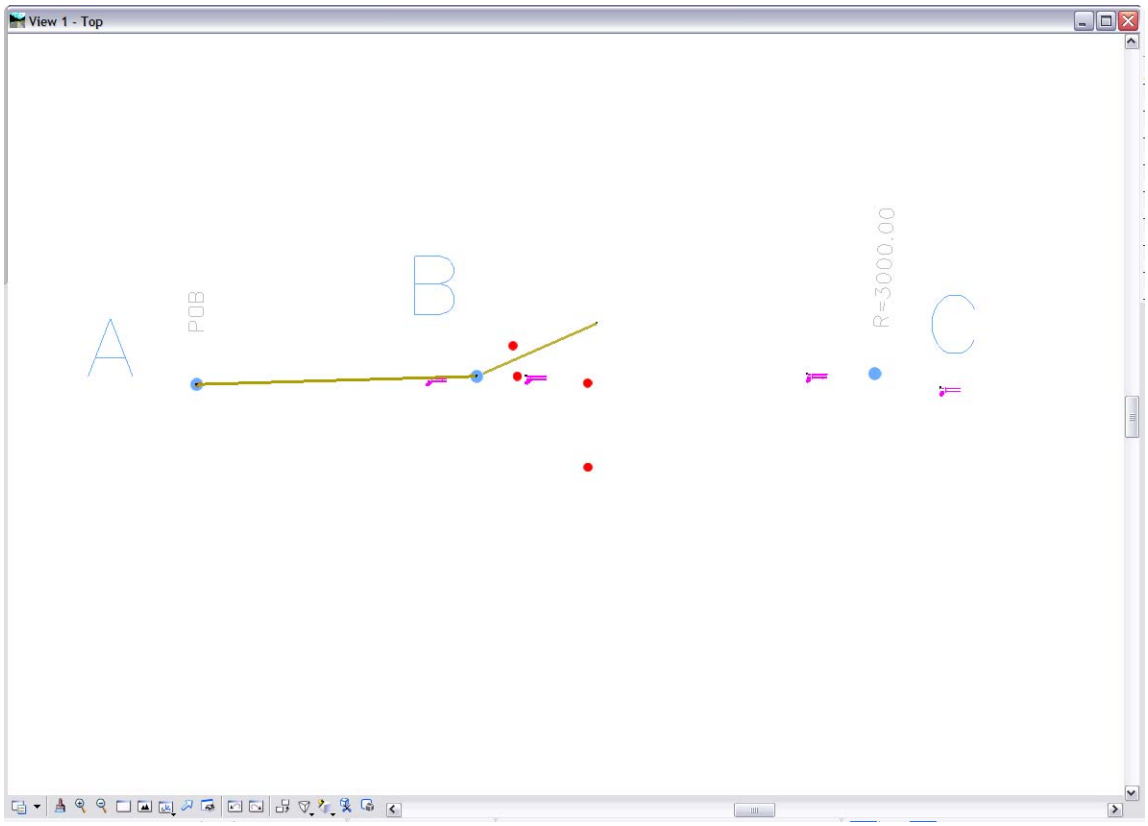
- Right-click **<R>** on the horizontal alignment name and select ***Set Active*** from the fly-out menu.
- From the pull-down menu, select **Geometry > Active Geometry** and use the resulting dialog to set the active alignment.

2. To clear the MicroStation view turn **Off** the Reference Display for the **12345SURV_Topo100Scale01.dgn** in the ***References*** dialog box.

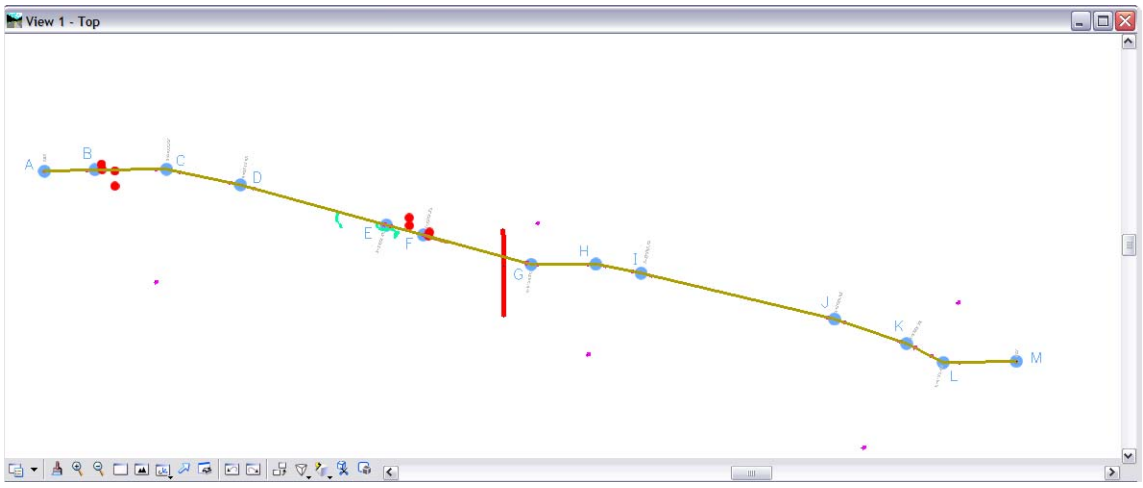


3. Select **Geometry > Horizontal Curve Set > Add PI.** You are prompted in the MicroStation status bar to ***Identify Alignment End***.

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



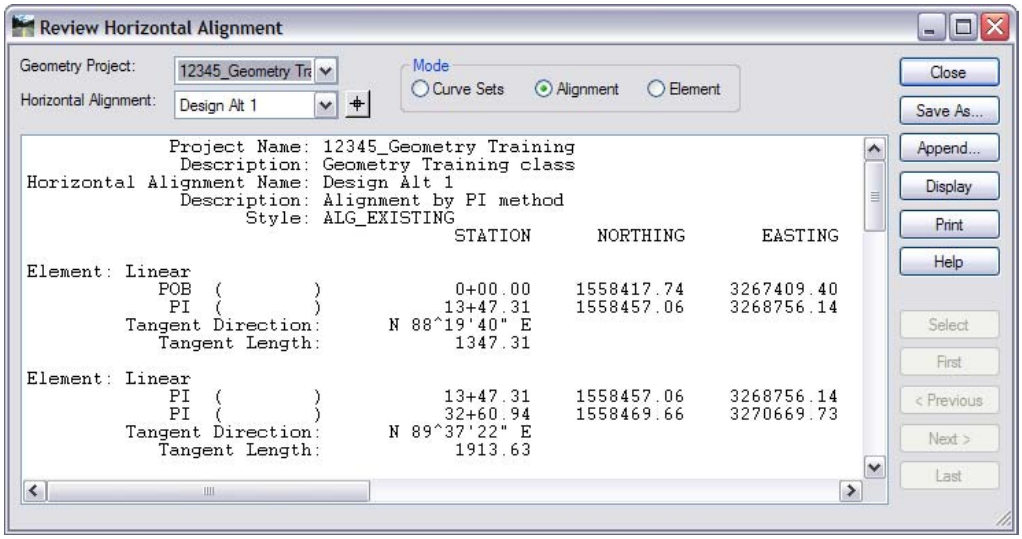
5. Continue to issue a series of points **<T>** and **<D>** through points **B**-**M**.



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

7. 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.

8. 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.

The next lab teaches how to define the horizontal curves.

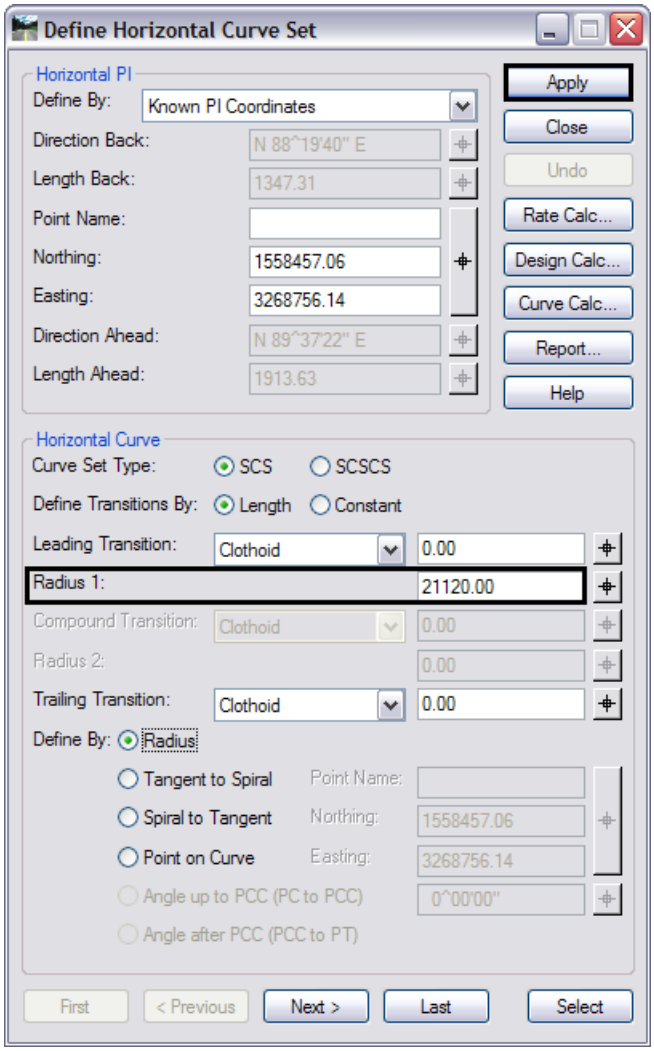
Lab 5.4 - Define Alignment Curves

Section Objectives:

- Learn how to add curves to horizontal alignments using various methods
- Learn how the Curve Calculator is useful in calculating an unknown curve radius

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 can 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.

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). Use the Curve Calc…. button to solve the curve data.

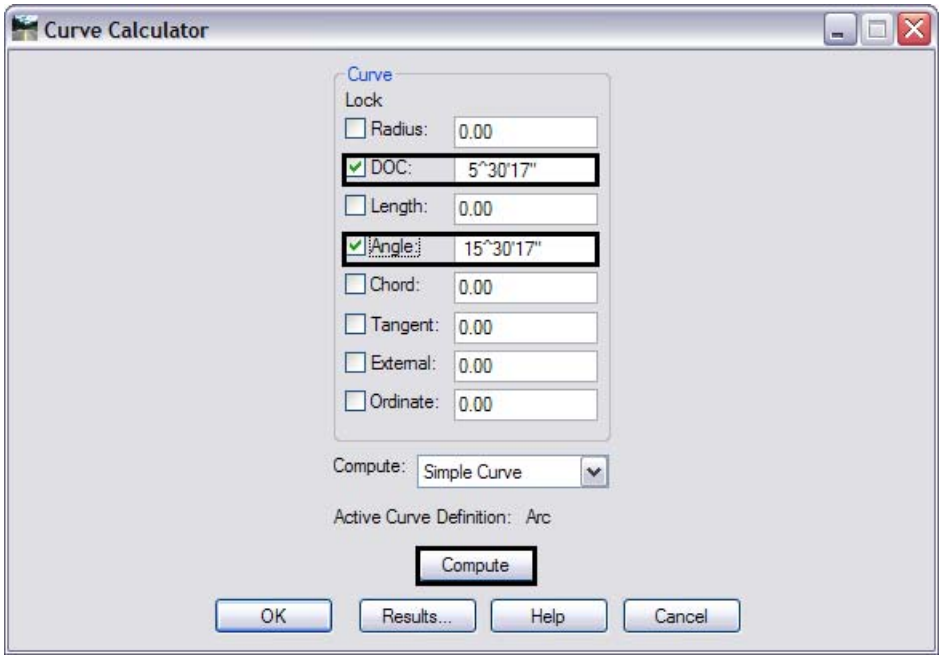
8. **<D>** the **Next** button to define the curve at point G.

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

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

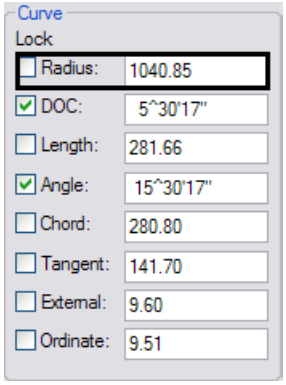
11. Calculate based on a **5 degree 30 minute 17 second** curve.

12. Key in ***5 30 07*** for the ***DOC:*** the field and verify that the ***Lock*** field is **Checked On**. (Verify the Radius option is unlocked and that only 2 fields shown below are locked).

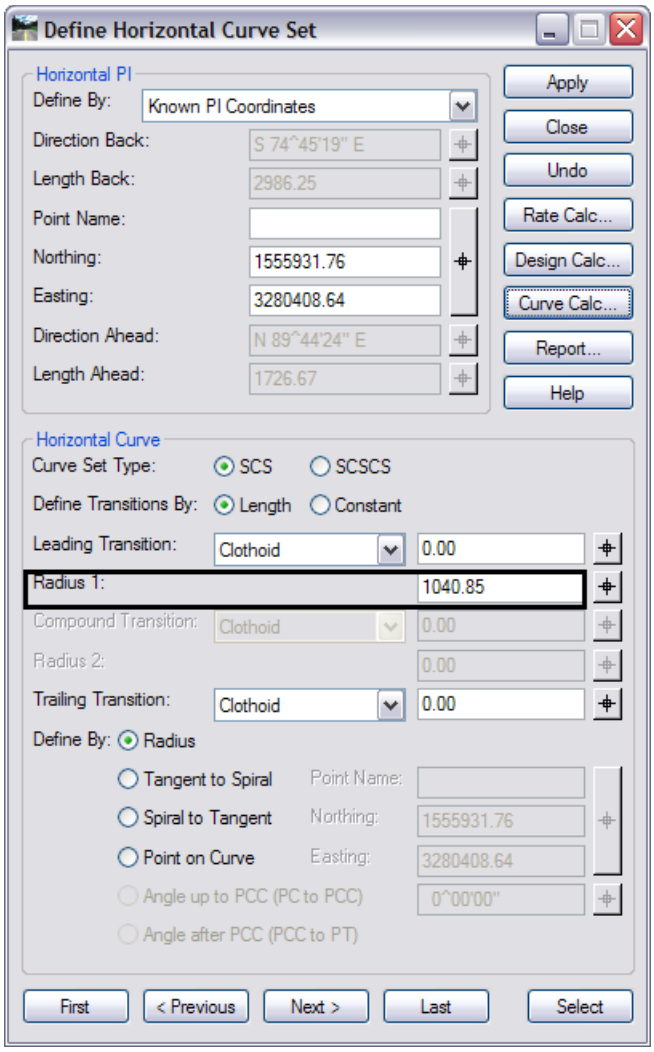


13. **<D> Compute**.

Notice the changes that occur in the dialog.



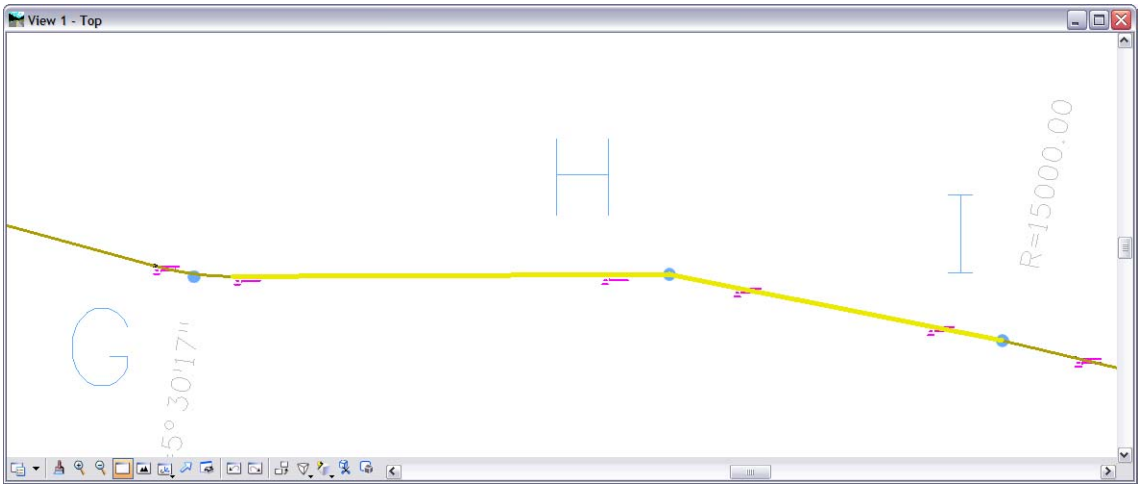
14. **<D> OK**. The ***Curve Calculator*** dialog will close and the calculated radius will be populated in the ***Radius 1*** field in the parent dialog.



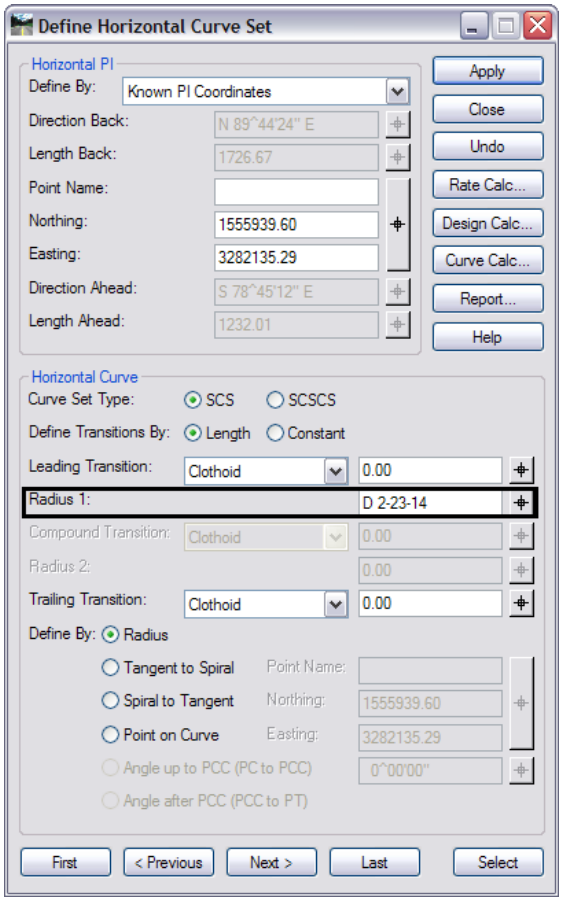
15. **<D> Apply** and the curve will be created.

The next curve (location H) will also be developed 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***.



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 as noted in the drawing and 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**.

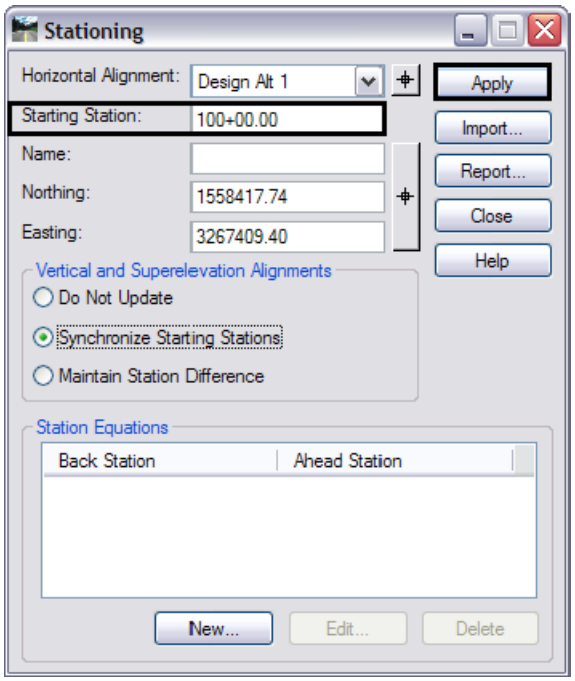
Lab 5.5 - Alignment Stationing

Section Objectives:

- Understand how to change the assigned stationing of an alignment.

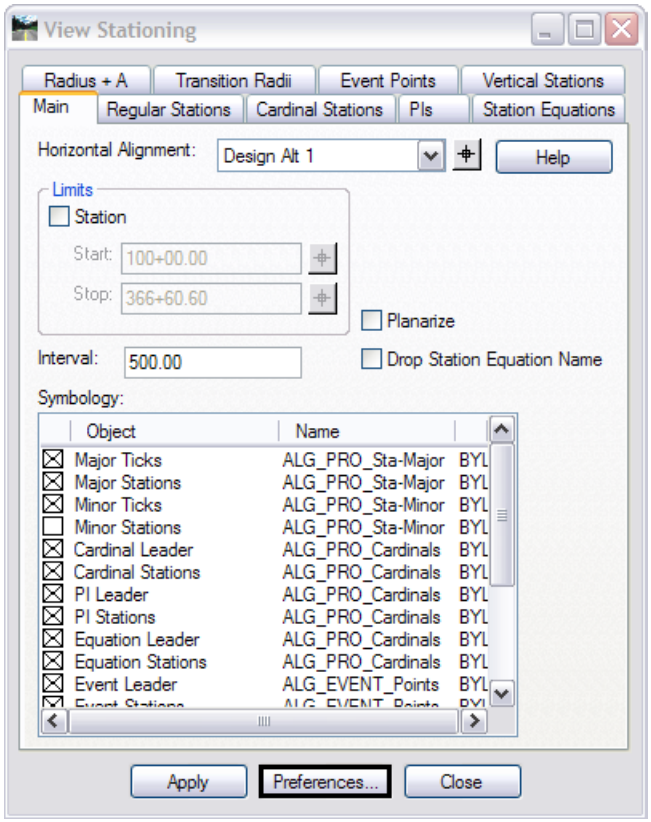
The default station value assigned to the start of a new alignment is 0+00. Redefine the beginning station to 100+00.00

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



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

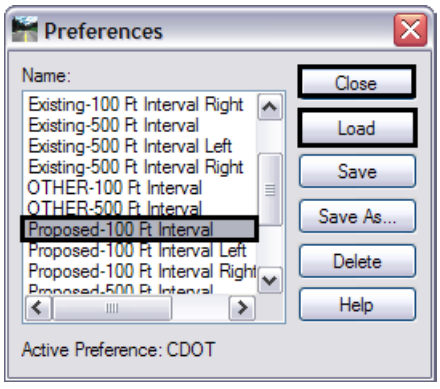
5. Select **Geometry > View Geometry > Stationing**.



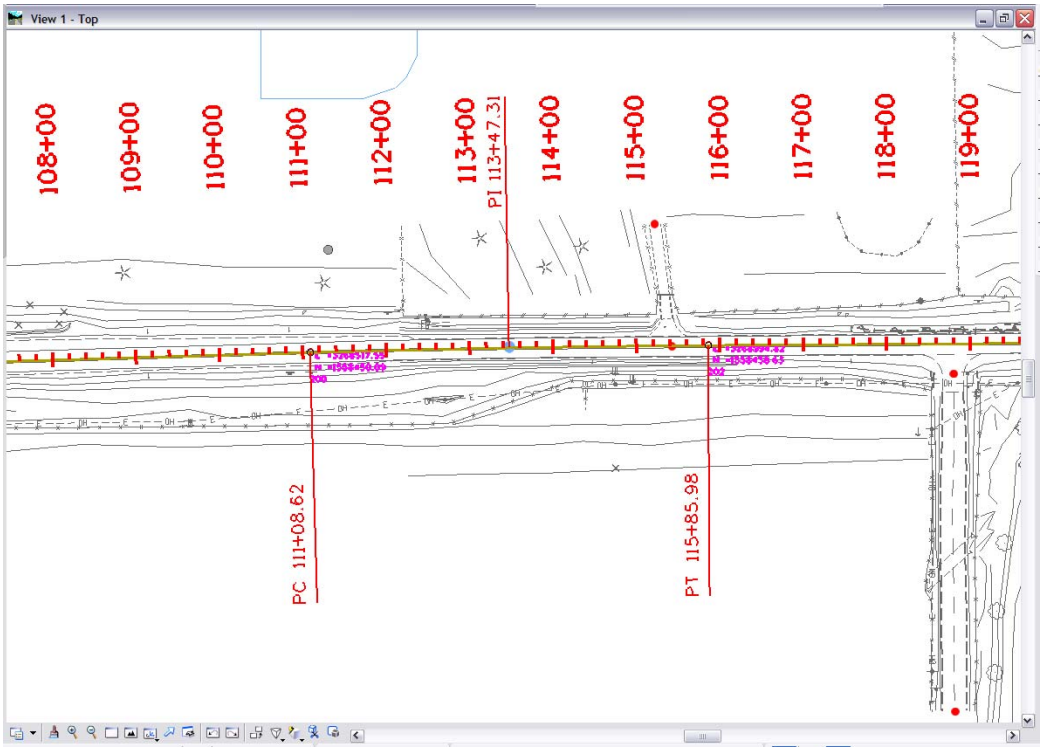
6. **<D>** the **Preferences** button.

7. **<D>** the saved preference name **Proposed-100 Ft Interval**.

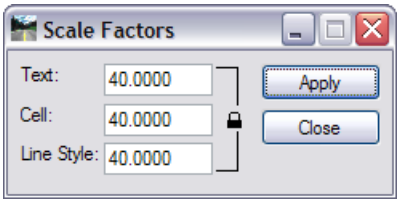
8. **<D> Load** and **Close**.



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



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



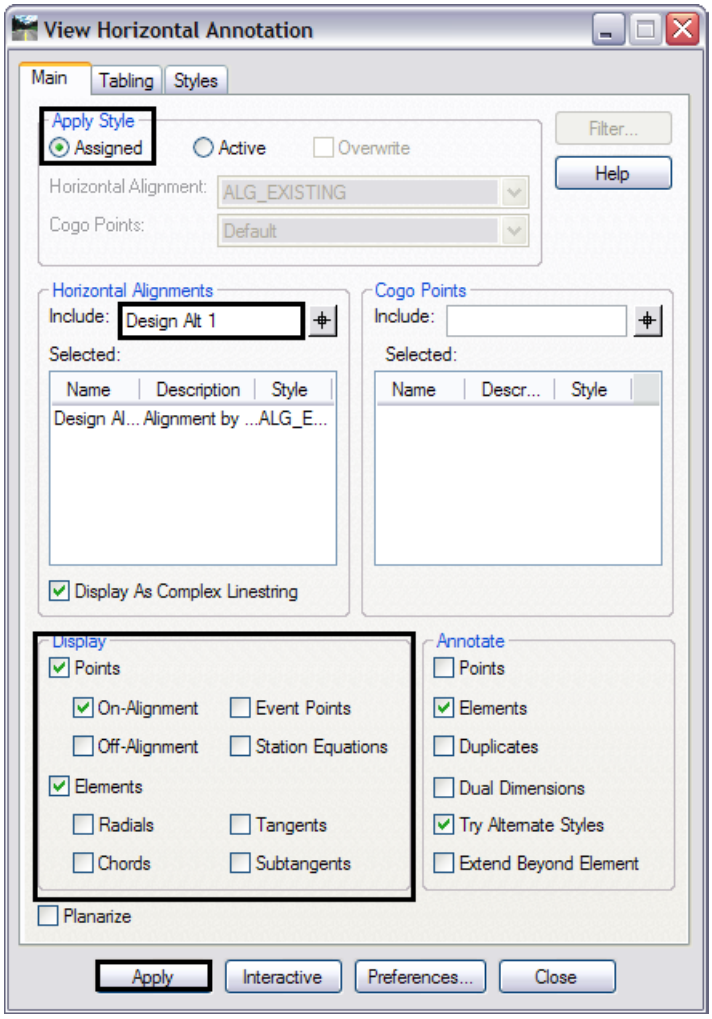
Lab 5.6 - Annotating an Alignment

Section Objectives:

Understand the difference between Named and Unnamed cogo points and how to apply cogo point names.

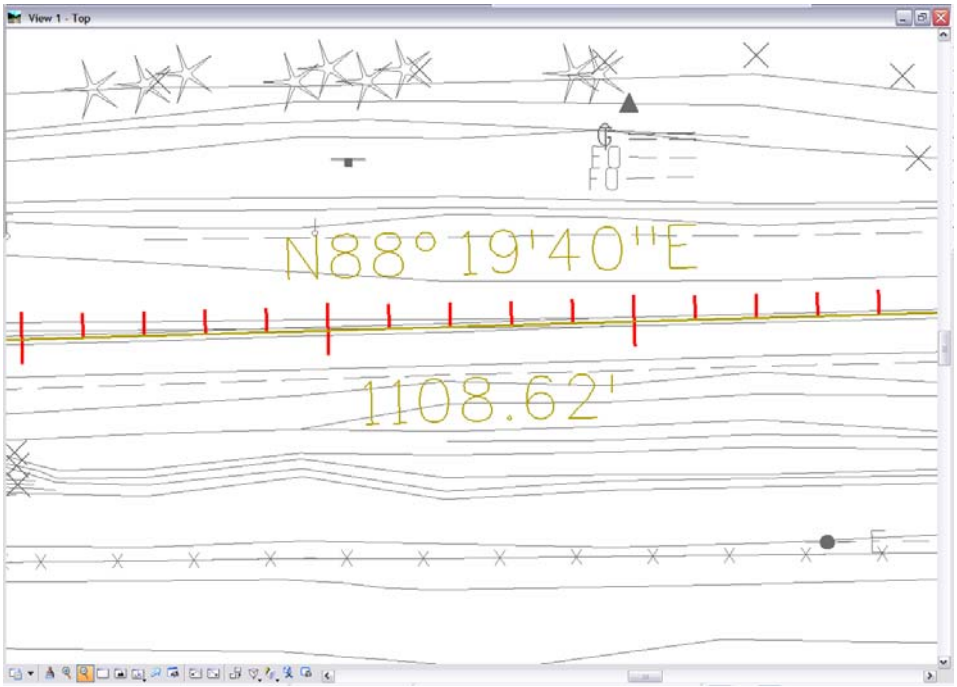
- Learn how to annotate an alignment.

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



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

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 an alignment PI
   - Redefine one or more horizontal curves
   - Define alignment stationing as ending 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
   - Create a profile showing the existing ground profile along the copied alignment with a 2x vertical exaggeration

Lab 5.7 - Horizontal Alignment from Graphics

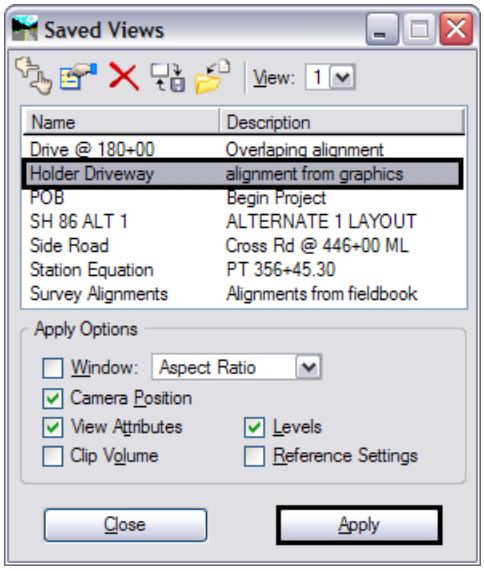
Section Objectives:

- Learn how to create a new horizontal alignment from MicroStation graphics.

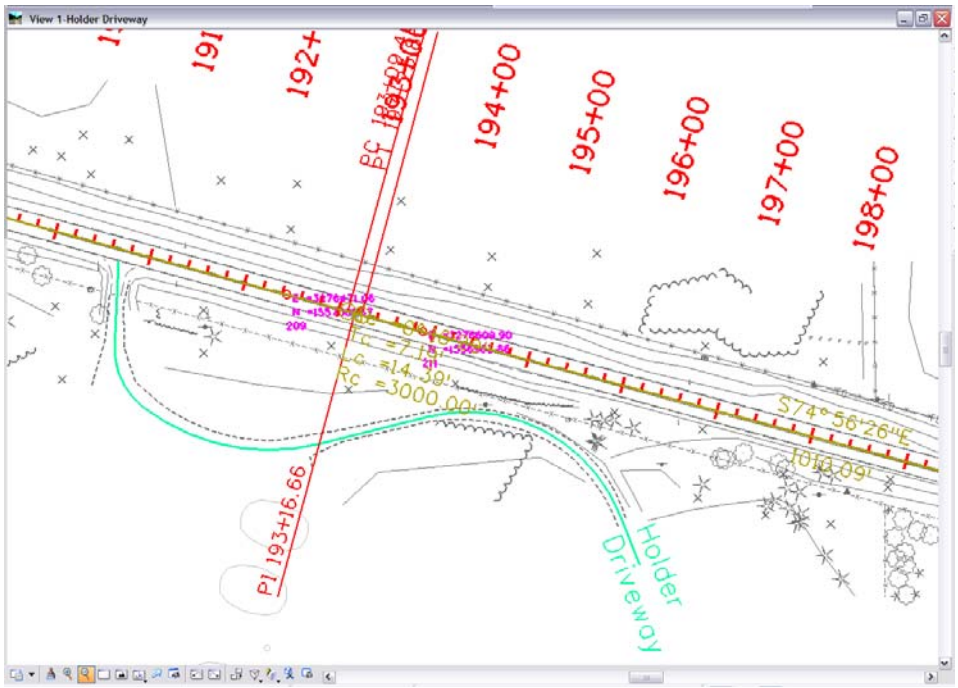
Alignments can be created from existing MicroStation graphics. In this exercise a chained MicroStation element will be used to create an alignment.

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

2. From the ***Saved Views*** dialog **<D>** saved view name **Holder Driveway**.



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



4. Select **File > Import > Geometry.** The ***Import Geometry*** dialog will open.

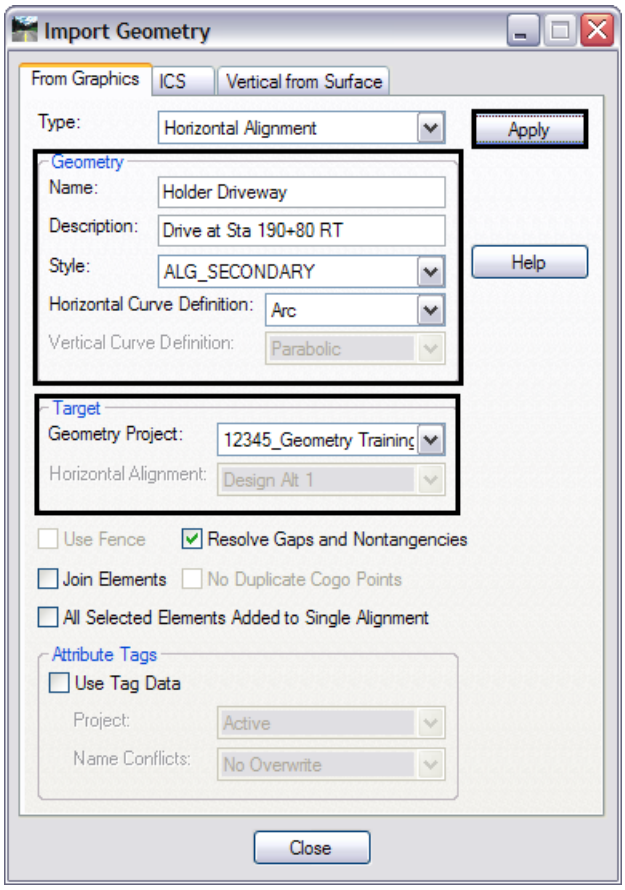
Horizontal Alignments, Horizontal and Vertical Alignments, Cogo Points or Event Points can be imported from MicroStation graphics. If the alignment has curves, it is recommended to toggle on **Resolve Gaps and Nontangencies**. If the alignment was drawn as a series of lines and/or arcs that have not been chained together as complex elements toggle on **All Selected Elements Added to Single Alignment** (you must define a Fence or Selection Set of the elements).

After specifying the ***Name***, the ***Description*** and the ***Style***, choose **Apply**. If you created a Selection Set or defined a fence prior to initializing the command, you will be asked to Accept the contents. If this was not done, you'll be asked to identify the element. In either case, after accepting, an alignment or alignments will be added to the geometry project specified in the ***Target*** section.

5. Fill in the following information on the **From Graphics** tab:

   - Type: **Horizontal Alignment**
   - Name: ***Holder Driveway***
   - Description: ***Driveway at Sta 190+80 RT***
   - Style: ***ALG_SECONDARY***
   - Geometry Project: **1234_Geometry Training**

6. **<D>** the **Apply** button. The ***Import Geometry*** dialog will minimize allowing you to see more of your MicroStation view.



7. When prompted to Identify Element **<D>** on the MicroStation graphic drawn in the center of the driveway.

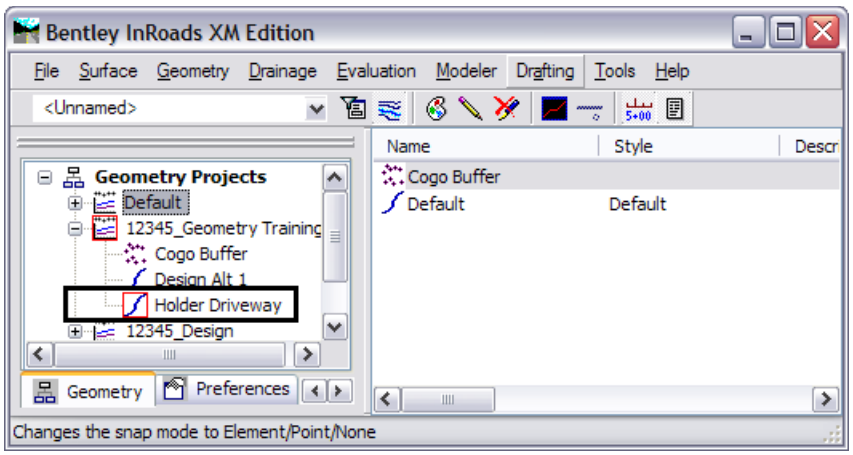
8. **<D>** again to accept the highlighted graphics in the MicroStation view.

9. **<R>** in the MicroStation view to terminate the command. The ***Import Geometry*** dialog will restore. The MicroStation graphics have been imported as an alignment.

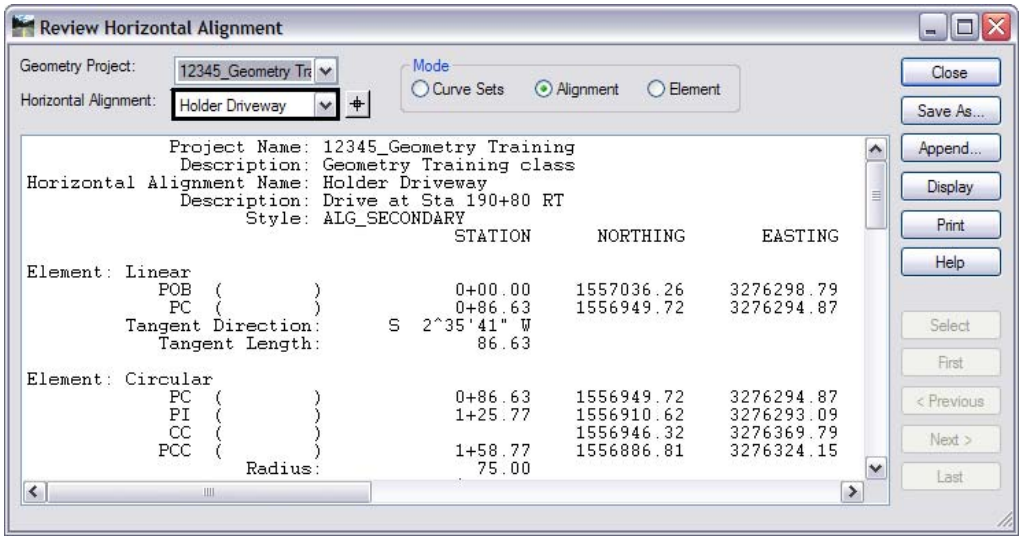
   Note: The geometry name field increments for additional selection(s).

10. **<D>** the **Close** button to close the ***Import Geometry*** dialog.

11. **Verify** the alignment was created.



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



13. When finished Close the dialog box.

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

Lab 5.8 - Extend Alignment

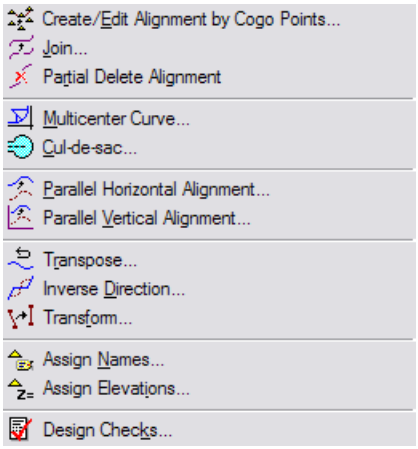
Section Objectives:

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

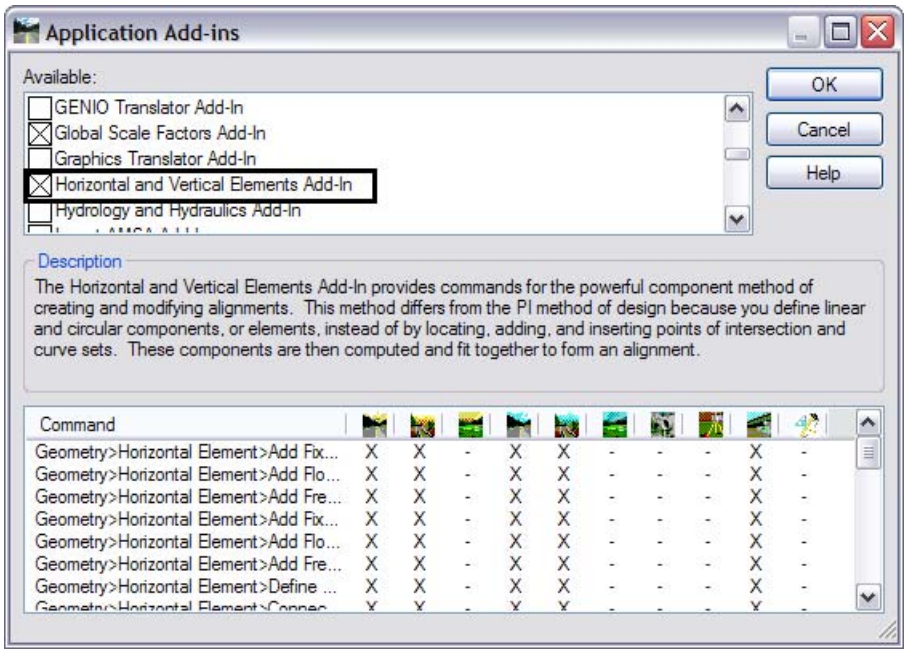
The alignment ***Holder Driveway*** does not intersect the reference line alignment ***Design Alt 1***. Standard practice necessitates the driveway alignment to commence at the main-line reference line.

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

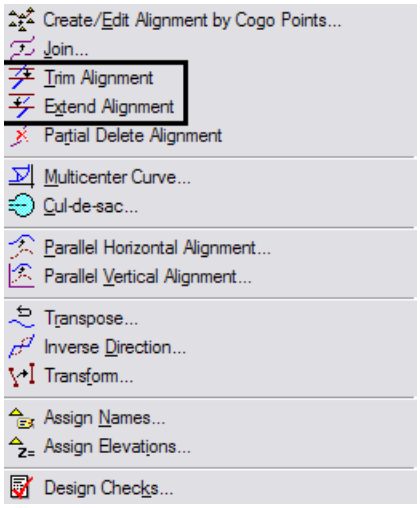
   Note: If the commands for Trim and Extend Alignment are not listed in the menu, this means that they are not enabled. These 2 commands are an extension of the Horizontal & Vertical Elements command set which must be enabled.



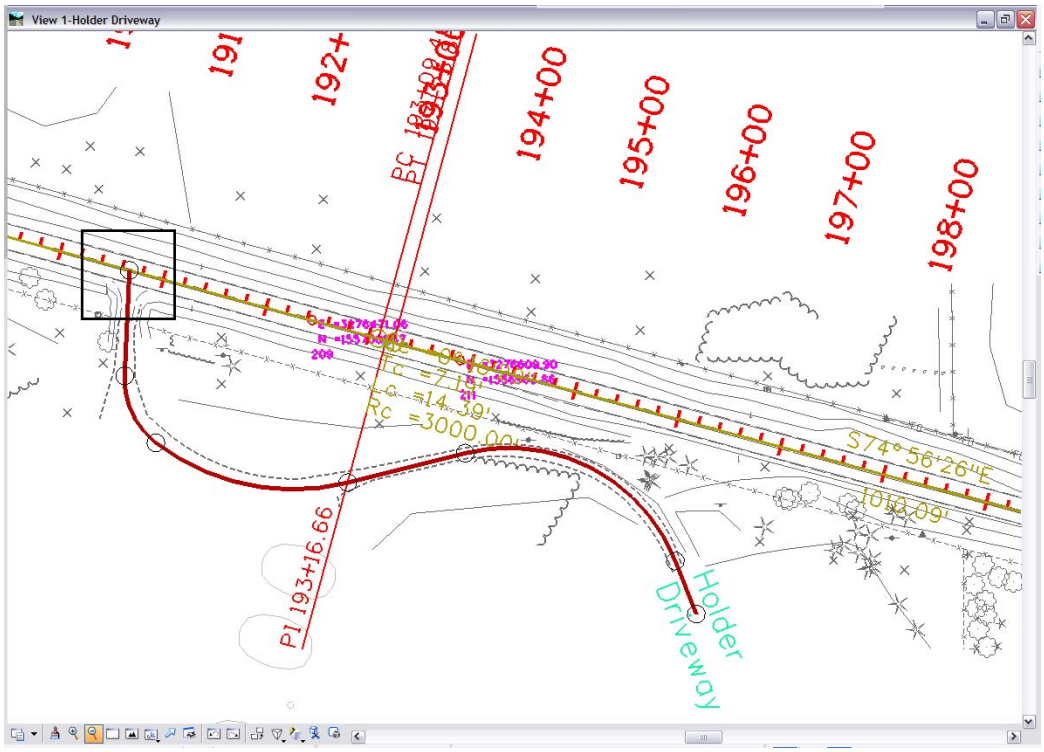
2. Select **Tools > Application ADD-Ins**.



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 and is assigned a station value of -0+12.41. The negative value is due to the original points in the alignment retaining their assigned station locations.

8. From the pull-down menu **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 and are prompted to select alignments. However, the location of the data point in response to ***Identify portion to clip*** will determine both the alignment and the portion that will be eliminated.

Lab 5.9 - Saving Geometry

Section Objectives:

- Understand the importance of frequently saving InRoads design data.

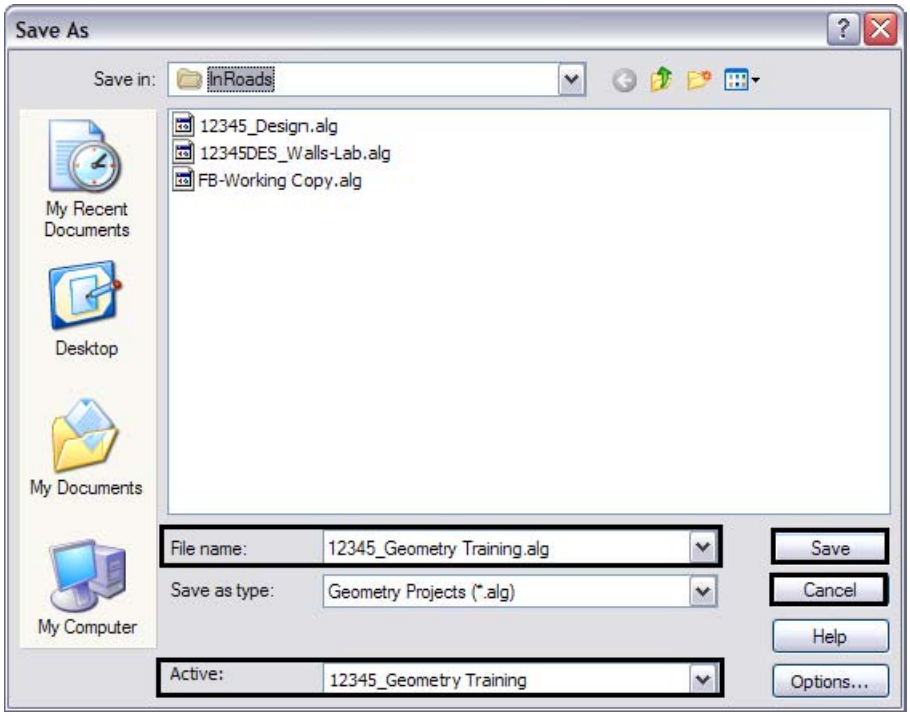
Alignments cannot be saved individually. They are saved when the geometry project is saved. Due to the fact InRoads works on geometry that is loaded in memory, the geometry project must be saved at appropriate times.

Geometry projects can be saved using several methods including:

1. From the pull-down **File > Save > Geometry Project**. The ***Save As*** dialog will appear with the ***Save as type:*** set to **Geometry (*.alg)**.

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

Note: If the geometry project is already saved, then perform a **Save** operation instead of a **Save As** (see below).



3. The file name should match the ***Active:*** name at the bottom of the ***Save As*** dialog. If necessary, use the drop-down arrow in the ***Active:*** field and reselect the desired name to ensure the saved file name will match the surface 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 will close.

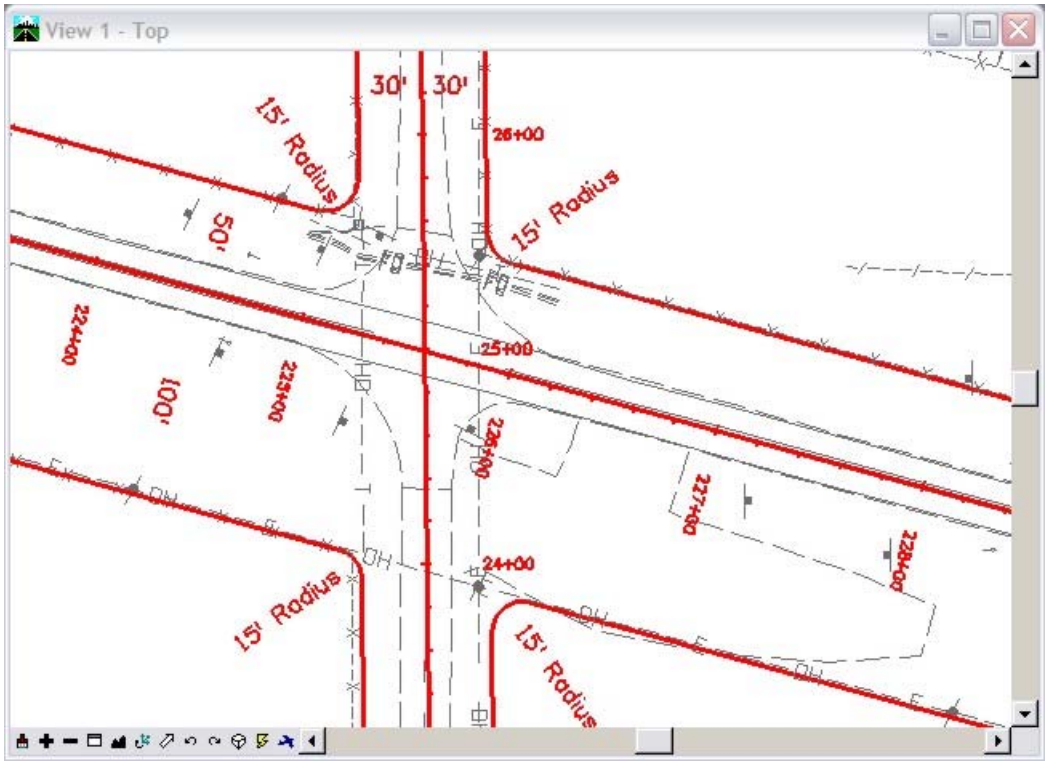
Lab 5.10 - Creating Parallel Horizontal Alignments

Section Objectives:

- Learn additional tools for creating 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.

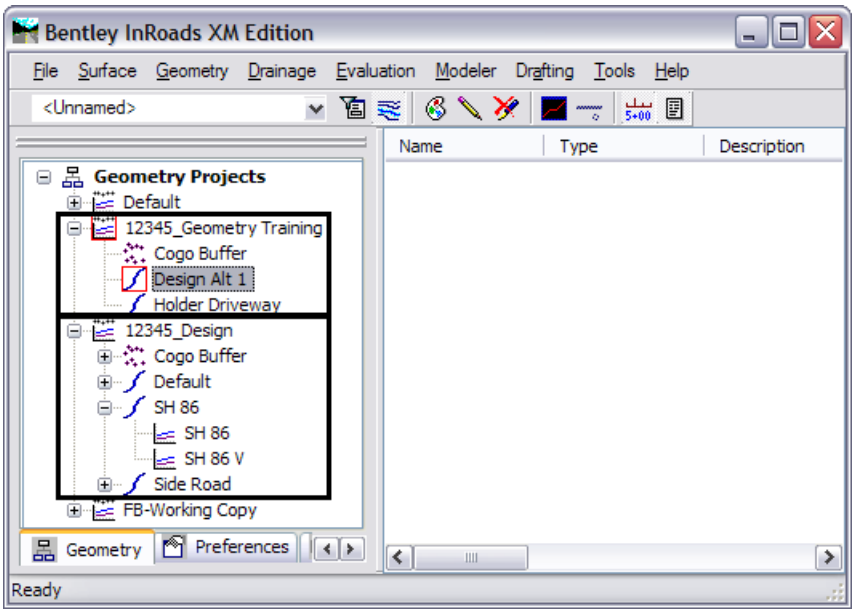
In this lab we will generate right-of-way limits for the mainline road and the side road. The Side Road has a right-of-way width of 60' (30' on each side of centerline). The mainline alignment has a total right-of-way width of 150' being 50' feet north of the reference line and 100' south. At the intersection of the right-of-way lines a radius of 15' is required.



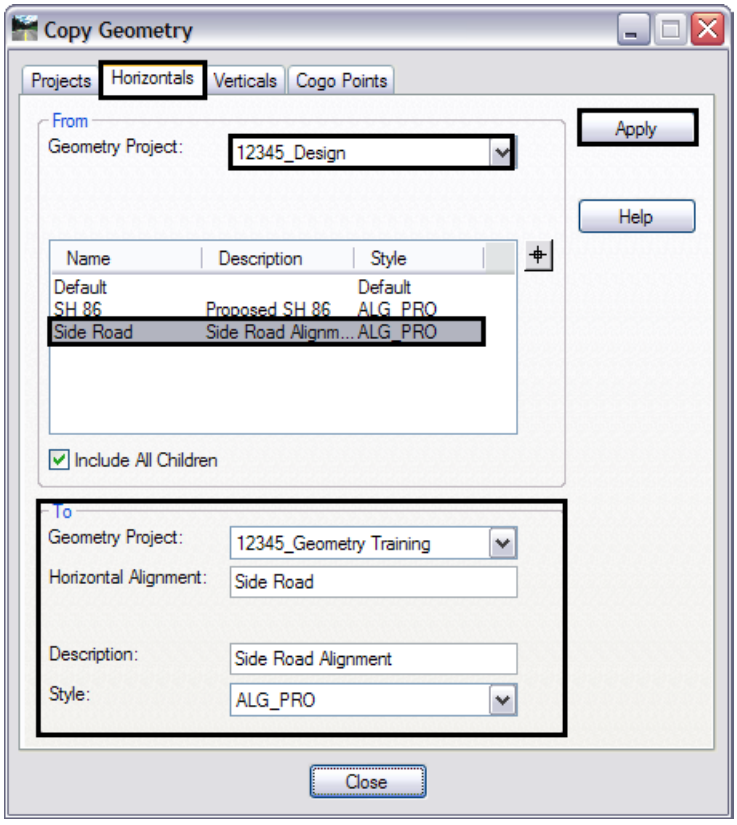
The workflow will consist of using an assortment of geometry commands:

- **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.



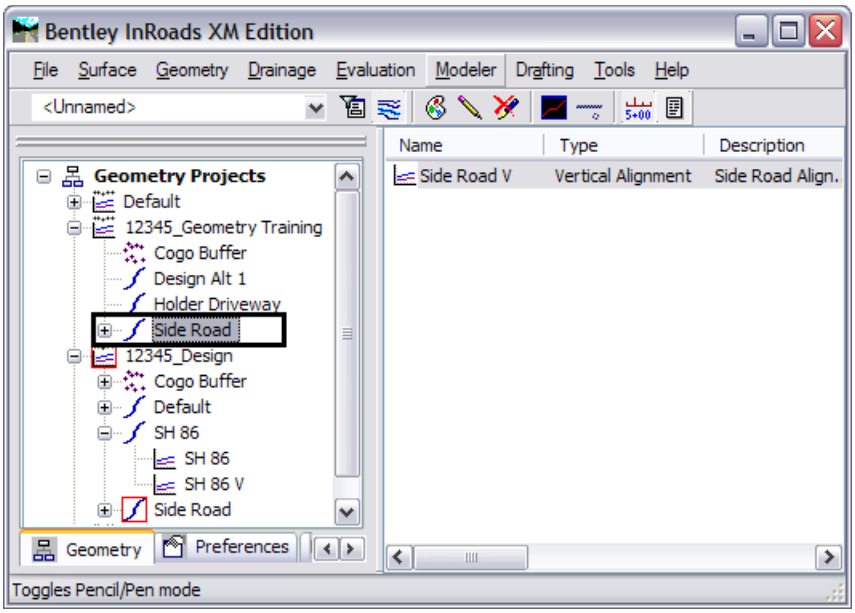
1. Select **Geometry>Copy Geometry**.



2. **Copy** the alignment **Side Road** from geometry project **12345_Design** to the geometry project **12345_Geometry Training**.

   Note: Also copy alignment **SH 86** as **SH 86 ALT 1** if you feel the mainline alignment created by an earlier lab exercise may be problematic.

3. Verify the alignment was copied.



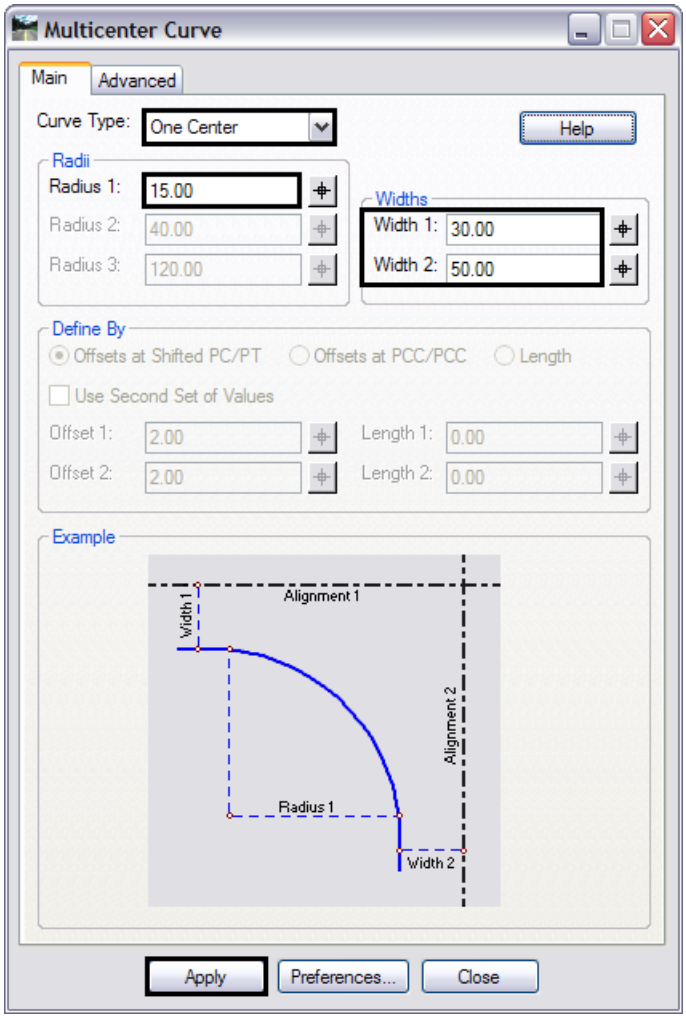
4. Set the geometry project **12345_Geometry Training** as ***Active*** causing newly created geometry to populate this project.

The next step is to generate the radius returns. This is done by using the ***Multi-Center Curves*** command. Begin by creating the radius returns north of the mainline alignment.

5. From the ***Saved Views*** dialog **<D>** saved view name **Side Road**.

6. Click **Apply**.

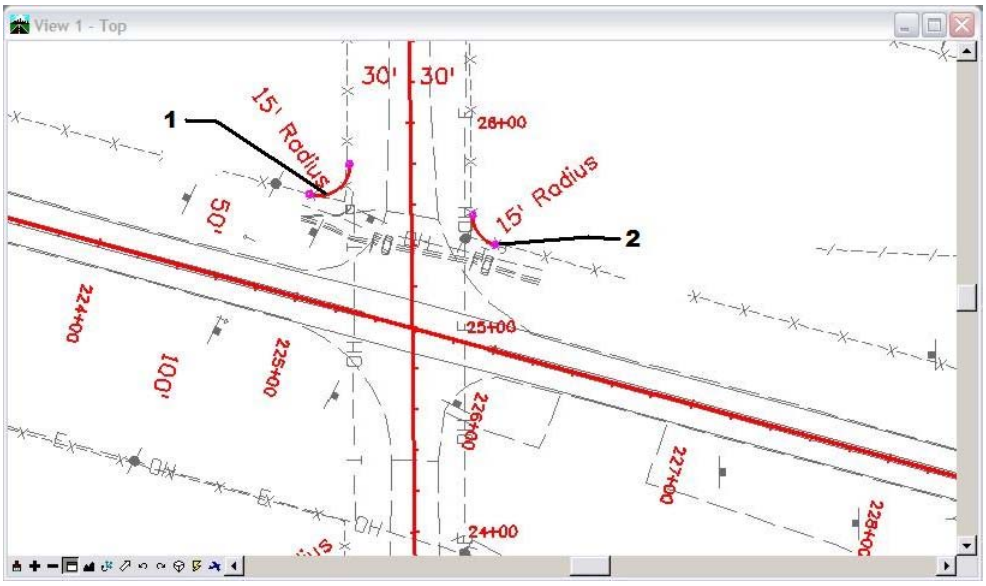
7. Select **Geometry > Utilities > MultiCenter Curve**.



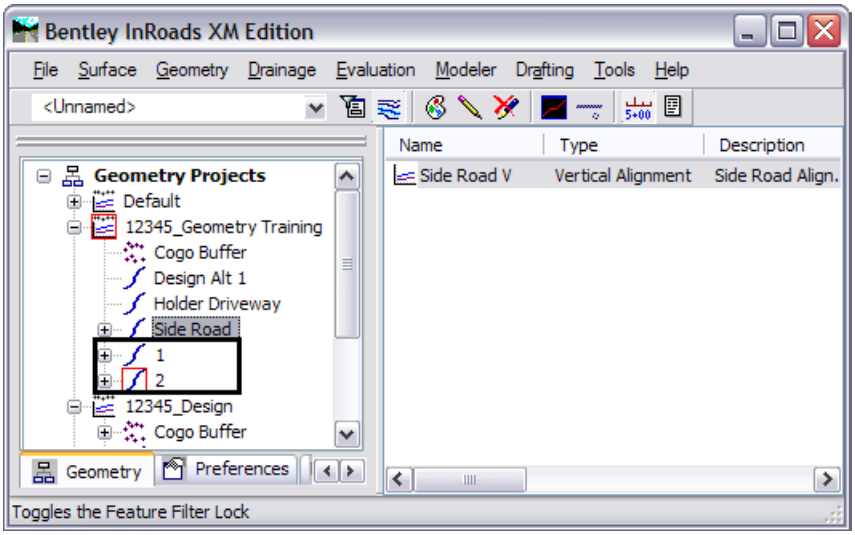
8. Choose **One Center**.
9. Input the following values:
   - Width 1: ***30***
   - Width 2: ***50***
   - Radius: ***15***
10. **<D>** the Apply button. Follow the prompts.
11. In the MicroStation view **<D>** on the **Side Road** alignment.
12. **<D>** on the **SH 86** alignment.
13. **<D>** in the ***Northwest*** quadrant
14. **<D>** to accept and create an alignment representing the radius return.
15. **Repeat** steps 7-12 and **<D>** in the ***Northeast*** quadrant.

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

Two new alignments are created, 1and 2.



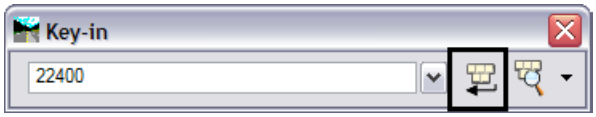
Note: Your stationing graphics may appear at a different location than shown above.



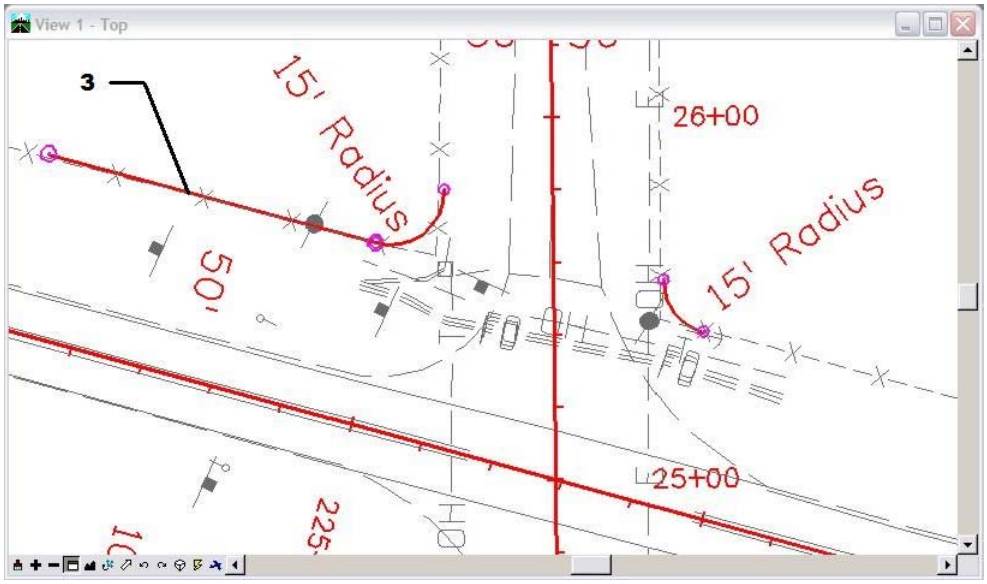
The next steps will be to offset the mainline and side road alignments so they match up with the returns that were just created. This is done using the ***Offset Alignments by Station*** command.

16. From the MicroStation pull-down menu, select **Utilities > Keyin**. The key in browser is needed to input the desired station limits and offset distances. Without this, they could be defined graphically.

17. From the InRoads pull-down menu **Geometry > Utilities > Parallel Horizontal Alignment...**.
18. In the ***Parallel Horizontal Alignment*** dialog box toggle on **Interactive By Station** and then click **Apply**.
19. In the MicroStation view **<D>** on the mainline alignment.
20. At the prompt ***Identify First Station/Key in Station***, key in ***224+00***.
21. **<D>** the **Run** button or press the Enter key.



22. At the prompt ***Identify Second Station/Key in Station***, key in ***224+93.20***.
23. **<D>** the **Run** button.
24. For ***Identify Location:*** key in ***-50*** (50' to the left).
25. **<D>** the in the view window to accept the solution and alignment 3 is created and displayed.

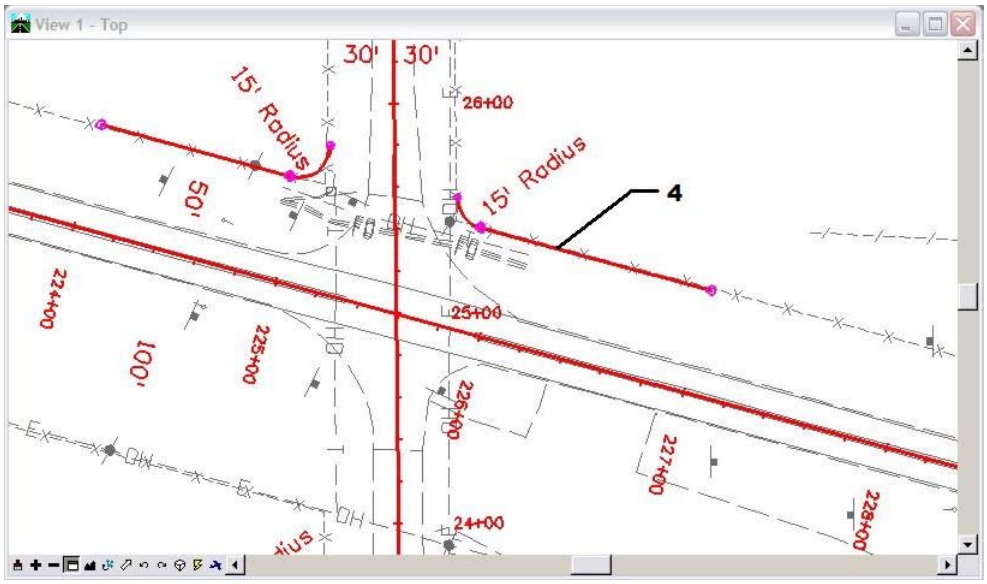


26. Repeat the **Geometry > Utilities > Parallel Horizontal by Station** command to the east of the sideroad using the following data:

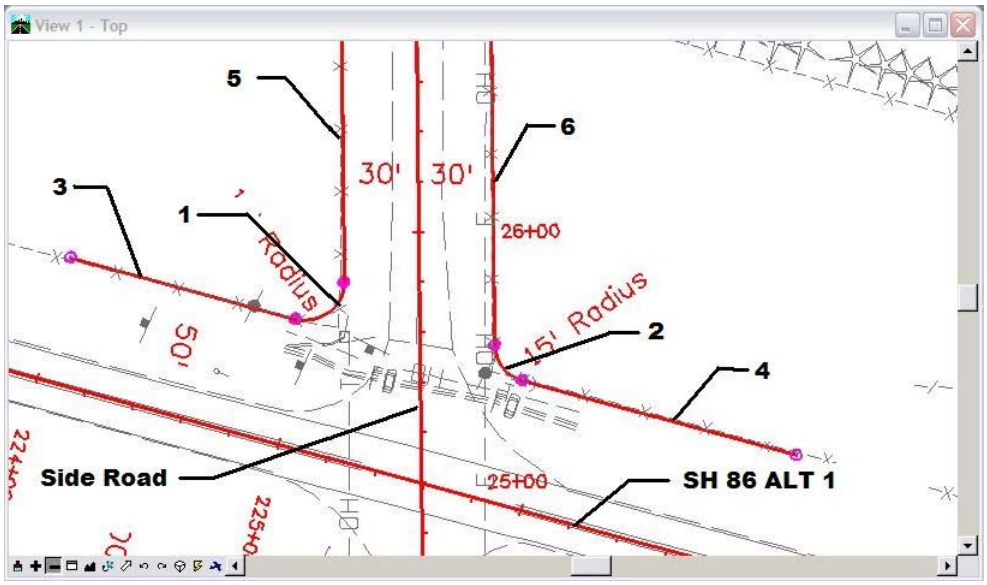
    - Station limits of: **225+86.76** to **227+00, 50'** left of US 86 Alt 1

    Note: The station limits can be graphically selected by issuing a data **<D>** point in the MicroStation view. The offset distance can also be graphically selected but using the key in field allows a specific distance to be input.

    Alignment 4 is created and displayed.



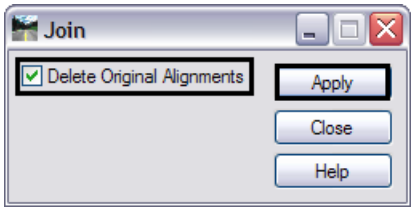
27. Re-execute the command to create the alignments along the Side Road north of the radius returns.



Next we will use the Join Alignment command to connect the alignments created in the previous steps single alignments for each quadrant. This command operates by either connecting the components with a straight line segment or by paralleling an alignment to define the configuration of the created geometry.

Join alignments 3, 1, & 5 to create the Northwesterly right-of-way limits.

28. Select **Geometry > Utilities > Join**.



29. Check **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.

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

31. ***Identify Initial Alignment:*** **<D>** on alignment **3**.

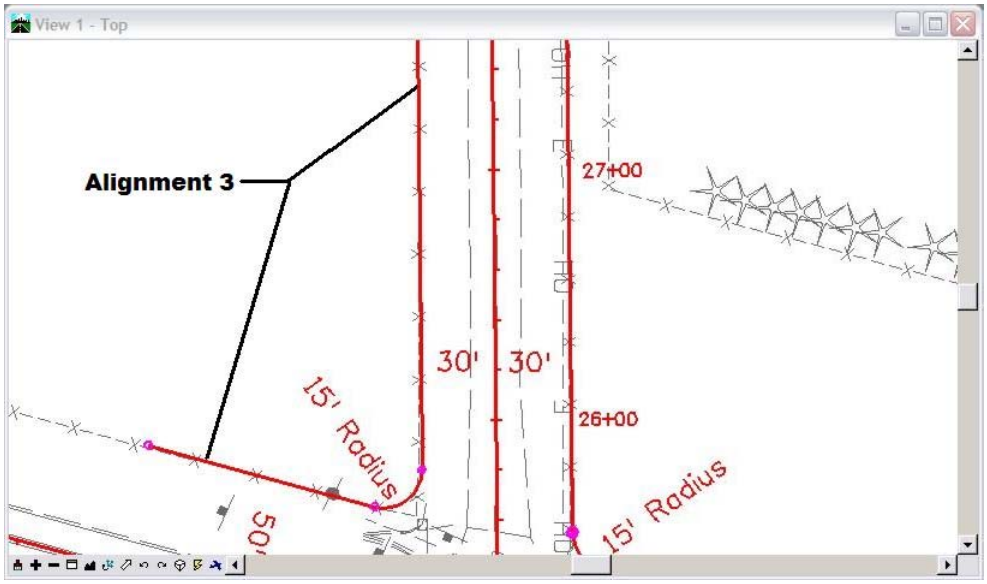
32. ***Identify Alignment to Parallel/Skip:*** **<D>** alignment **1** to parallel (overlay) this alignment.

    Note: If a reset **<R>** is issued in the above step, a tangent line would be created from the end of alignment 3 to the beginning of alignment 5. By selecting the alignment representing the radius return, a curved section is generated at a zero offset to alignment 1.

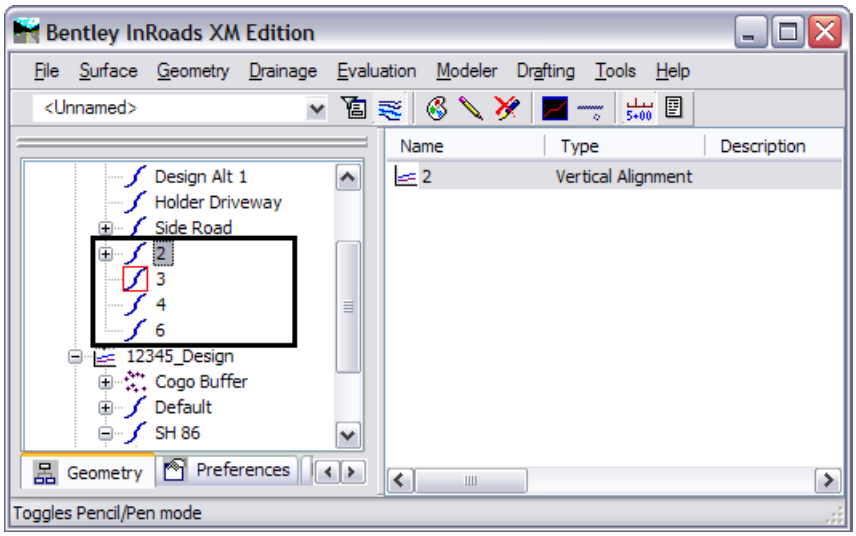
33. ***Identify Next Alignment:*** **<D>** on alignment **5**.

34. ***Accept or Reject:*** **<D>** to accept the dynamic display.

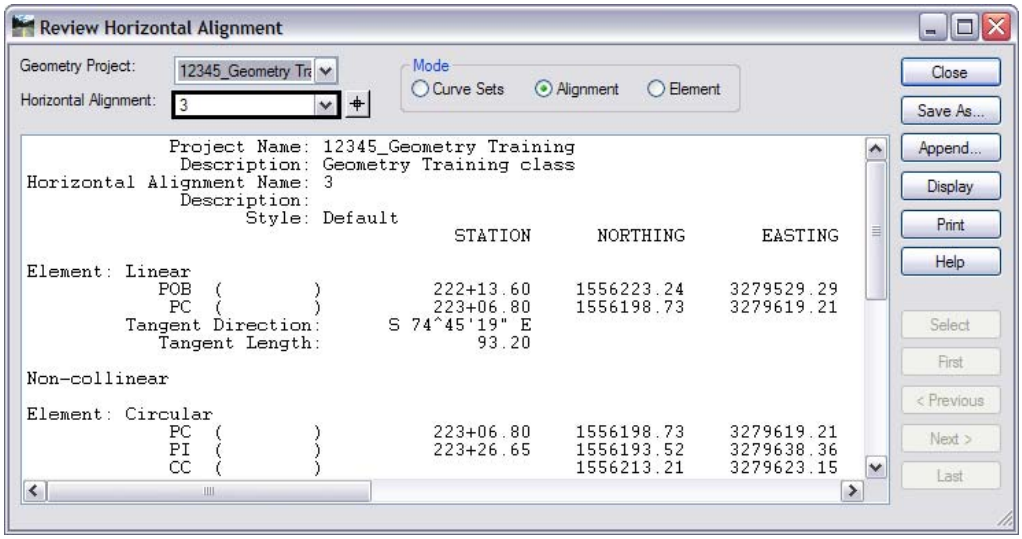
35. Reset **<R> <R>** twice to terminate the command.



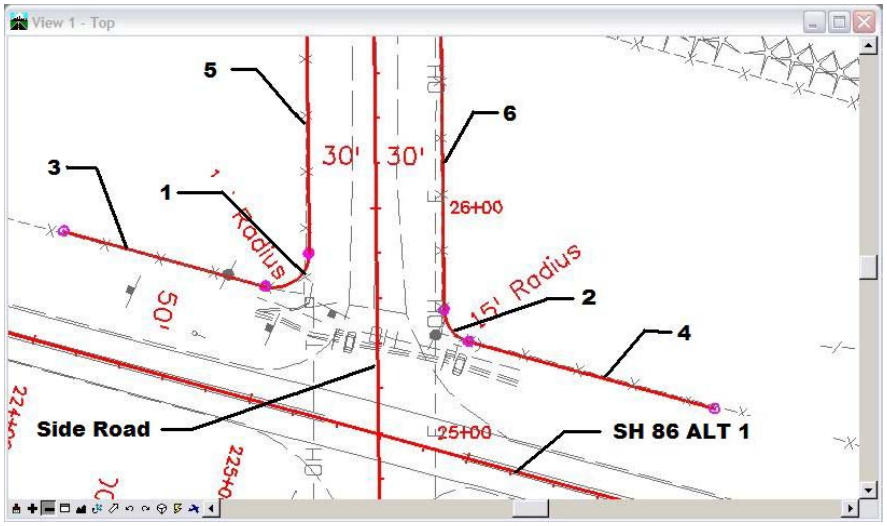
Alignment 3 is now the combination of the alignments 3, 1, and 5. Alignments 1 and 5 are removed from the geometry project.



36. **Review** alignment **3**.

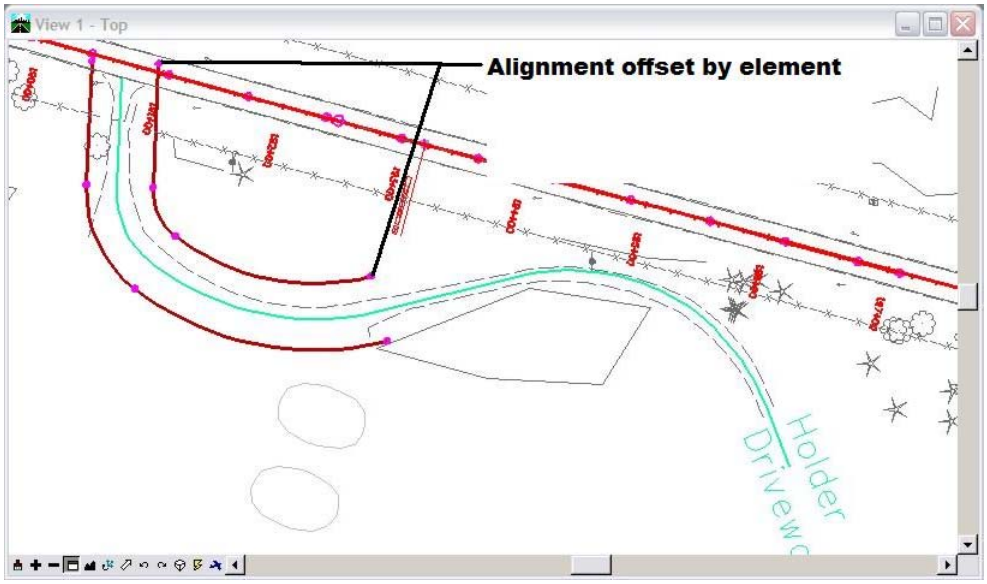


37. Using the same steps above, join alignments 6, 2, and 4 to create the northeasterly right-of-way limits; begin with alignment **6**.



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.

38. Choose **Geometry > Utilities > Parallel Horizontal by Element**.

Parallel ***by Element*** differs from by Station in that you can select the limits of the alignment to offset by selecting, **<D>**, alignment components (tangent or curve) to define the desired limits.