Georgia Department of Transportation

Introduction to InRoads for Design

InRoads Select Series 2

Training Guide

Office of Design Policy & Support

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Revisions

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Table of Contents

Introduction to InRoads for Design Cover ..... Cover

Revisions ..... Lab Revisions-1

Introduction ..... Lab Introduction-1

Lab 1 Start InRoads and Set Project Defaults ..... Lab 1-1

Lab 2 Starting a Project ..... Lab 2-1

Lab 3 Horizontal Alignments ..... Lab 3-1

Lab 4 Vertical Alignments ..... Lab 4-1

Lab 5 Importing MicroStation Graphics and Placing Curve Tables ..... Lab 5-1

Lab 6 Profile Sheets ..... Lab 6-1

Lab 7 Component and Template Creation ..... Lab 7-1

Lab 8 Introduction to the Roadway Designer ..... Lab 8-1

Lab 9 Cross Section Sheets and Annotation ..... Lab 9-1

Lab 10 Construction Limits ..... Lab 10-1

Lab 11 Earthwork ..... Lab 11-1

Lab 12 Required R/W ..... Lab 12-1

Lab 13 Survey Enhancements ..... Lab 13-1

Lab 14 InRoads Style Sheets ..... Lab 14-1

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Introduction

Objective

Introduction to InRoads for Design consists of 14 labs with the following objectives.

Lab Objectives

- **Lab 1:** Start InRoads and Set Project Defaults
- **Lab 2:** Starting a Project
- **Lab 3:** Horizontal Alignments
- **Lab 4:** Vertical Alignments
- **Lab 5:** Importing MicroStation Graphics and Placing Curve Tables
- **Lab 6:** Profile Sheets
- **Lab 7**: Component and Template Creation
- **Lab 8:** Introduction to the Roadway Designer
- **Lab 9:** Cross Section Sheets and Annotation
- **Lab 10:** Construction Limits
- **Lab 11:** Earthwork
- **Lab 12:** Required R/W
- **Lab 13:** Survey Enhancements
- **Lab 14:** InRoads Style Sheets

Lab Format Standards

In the following labs, user input and action will be displayed in **bold** type. You will be instructed to either type-in information, click on a command or button, or press a particular key or function button. When instructed to click on something, you will need to press on the left mouse button and then release it. When instructed to double-click, you will need to quickly press the left mouse button twice in rapid succession and then release it. Additionally, the ▶ symbol is used to designate successive pull down menus. ie. **File▶Save**. If the lab asks you to press a particular key on the keyboard -- Key strokes will be displayed in < > brackets (ie. **<CTRL>** or **<F4>**).

The lab format will be as follows:

Step Number	The **top line** will display the instructions or the **user input**. The user actions will be displayed in the format described above. *The **bottom line** will be in italics and will indicate the **system response**. It will also display some additional information regarding the process you have just performed.*

Note:

Each step of the lab depends on a previous step, so please ***read everything carefully*** and ***DO NOT*** skip any steps.

InRoads and MicroStation Delineation

In the following labs, the user will be working in both the **InRoads Design Software** and the **MicroStation CADD Software**. The **InRoads Software** is the database in which the surveying data is created and processed. The **MicroStation CADD Software** is used for the viewing and manipulation of graphics derived from **InRoads**.

In order to differentiate between the two software(s) the following symbolization will be utilized:

InRoads Software	User performs steps in InRoads
MicroStation Software	User performs steps in MicroStation

Lab 1
Start InRoads and Set Project Defaults

Objective

The recommended File Structure for InRoads is a Project Folder (which is named for the PI # of the Project – *Example:* **1234567**) located as a sub-folder under **C:\InRoads Data** – *Example:* **C:\InRoads Data\1234567**). This Project Folder will contain the individual InRoads Data Files. Some Examples of InRoads Data Files are:

1. **PI#.DTM** ------ (Digital Terrain Model File) – contains Surface data
2. **PI#.FWD** ------ (Survey File) – contains Field Survey data
3. **PI#.ALG**------- (Geometry File) – contains Geometric Point, Horizontal and Vertical data
4. **PI#.IRD** ------- (Roadway Design File) – contains the Design Surface data
5. **PI#.RWK**------ (Project File) – contains project data for InRoads files in ASCII format
6. **PI#.ITL**-------- (InRoads Template File) – contains InRoads Templates for cross-sections
7. **PI#.SDB**------- (Drainage File) – contains the InRoads Storm and Sanitary data

It is highly recommended to backup the Project Folder (which contains these individual data files) after each work session to your Group Account on the GDOT Server if you are a GDOT Employee (or to an appropriate Business Server if you are a GDOT Consultant).

The objective of **Lab 1** is to:

- Create a Project Folder
- Start InRoads
- Set the InRoads Project Defaults
- Set Design Default Preferences
- Set the InRoads "Locks"
- Add the Application and Variable Manager Add-Ins

Lab1A Create a Project Folder & Copy Lab Project Files

In this section of the lab you will be creating a folder or directory. This folder is where your projects and all of your InRoads project data files will be located. The newly created InRoads project directory will be (**C:\InRoads Data\PI#)**. This is the recommended file structure for InRoads projects. (For this tutorial only -- you will also copy the "Design Lab" Files to this folder in order to access the InRoads "1234567" Lab Files.)

1.	From the desktop, double-click on the **My Computer** icon. *This will open the My Computer dialog box. This is your computer's file manager. Via this dialog box, you may view the content of your computer's various hard-drives.*
2.	Double-click on the **C:** directory (also referred to as folder or drive). *This will open the **C:** directory box, listing the contents of the **C:** drive.*
3.	If the **C:** directory does not contain a folder named **InRoads Data** -- create the folder. *Creates folder **InRoads Data** under the **C:** drive.*

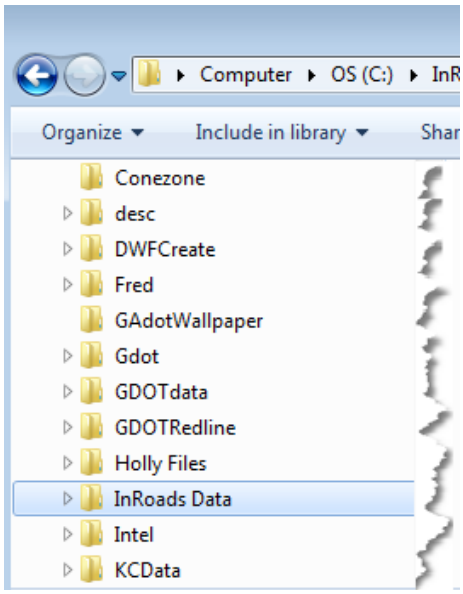


Figure L1-1 InRoads Project Folder In **C:** directory

4.	Using Windows Explorer, create a new folder under **InRoads Data** and name it **1234567**. This is the project folder you will use for the Lab Lessons (**C:\InRoads Data\1234567).** *Creates folder **1234567** under **C:\InRoads Data**.*
5.	Using Windows Explorer, copy the folder **Design Labs** from **C:** to (**C:\InRoads Data\1234567)**. *Places the **Design Labs** in **C:\InRoads Data\1234567***

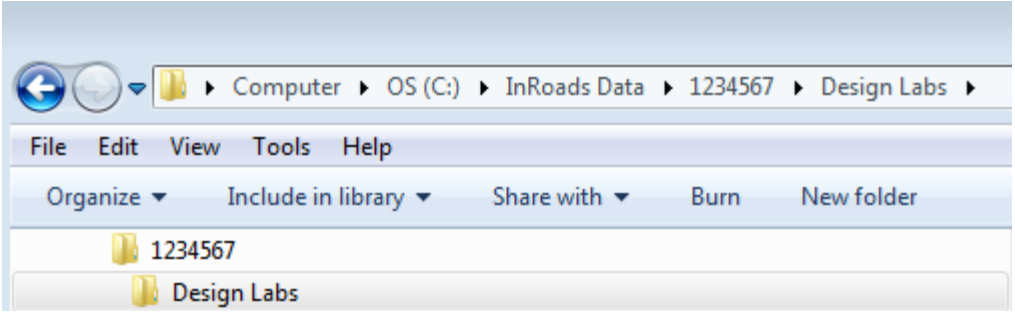


Figure L1-2 Folder **Design Labs** in the **C:\InRoads Data\1234567** folder

6.	Close the **Explorer** window by clicking on the in the upper right-hand corner of the window. *This will close the **Explorer** window.*

Lab1B Start InRoads

In this section of the lab you will be opening **MicroStation V8i Select Series 2** in the 'GDOT Corporate Workspace' and **InRoads Suite V8i Select Series 2.** You will also select a "seed" file to use for the "Working" DGN file. This "Working" DGN file is used to display the temporary and/or permanent graphics in **InRoads**. **MicroStation** is opened first and then **InRoads** is opened from the MicroStation Menu bar.

7. From the desktop, double-click on the **GDOT MicroStation V8i SS2 (x86)** icon.

Double click on the icon labeled **GDOT MicroStation V8i SS2 (x86)**

- When the **MicroStation Manager** dialog box opens – navigate to the **C:\InRoads Data\1234567\Design Labs\Standards** folder and select the "**GDOT 3D Working File.dgn**". (Creation of the 'GDOT 3D Working File.dgn' is documented in the ***Design Guidelines***). Click **Open**.

- Now open InRoads from within MicroStation by selecting: **InRoads ▶ InRoads Suite (SELECTseries 2) V8i 08.11.07.566** from the [MicroStation Menu].

*After the **MicroStation** Splash Screen appears, the **MicroStation Manager** dialog (See Figure L1-3) will open so that you can select a "**Working**" DGN file. Once **InRoads** and **MicroStation** are up and running, your desktop should look similar to that of Figure L1-4 and Figure L1-5.*

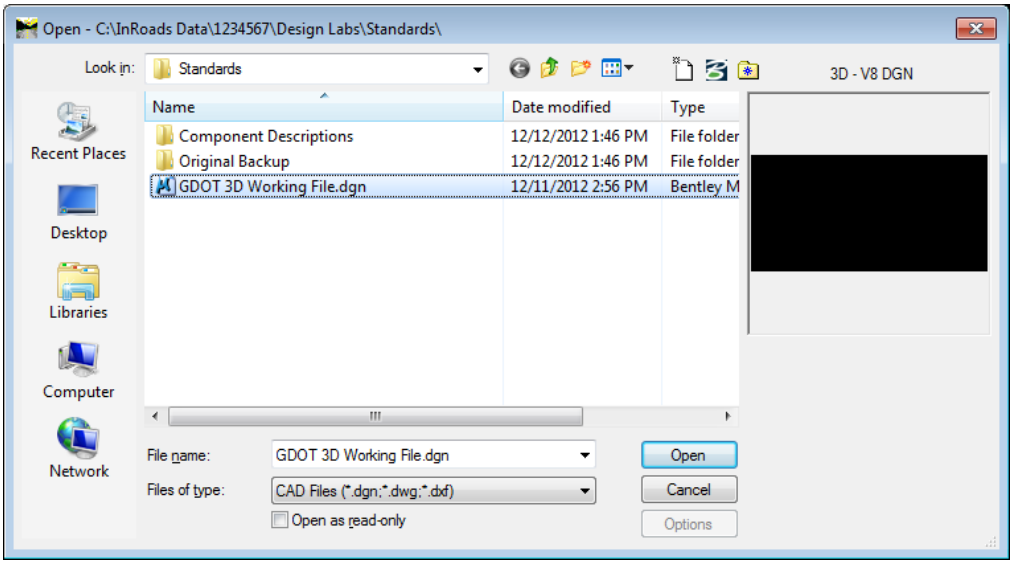


Figure L1-3 Starting **MicroStation V8i and InRoads Suite**

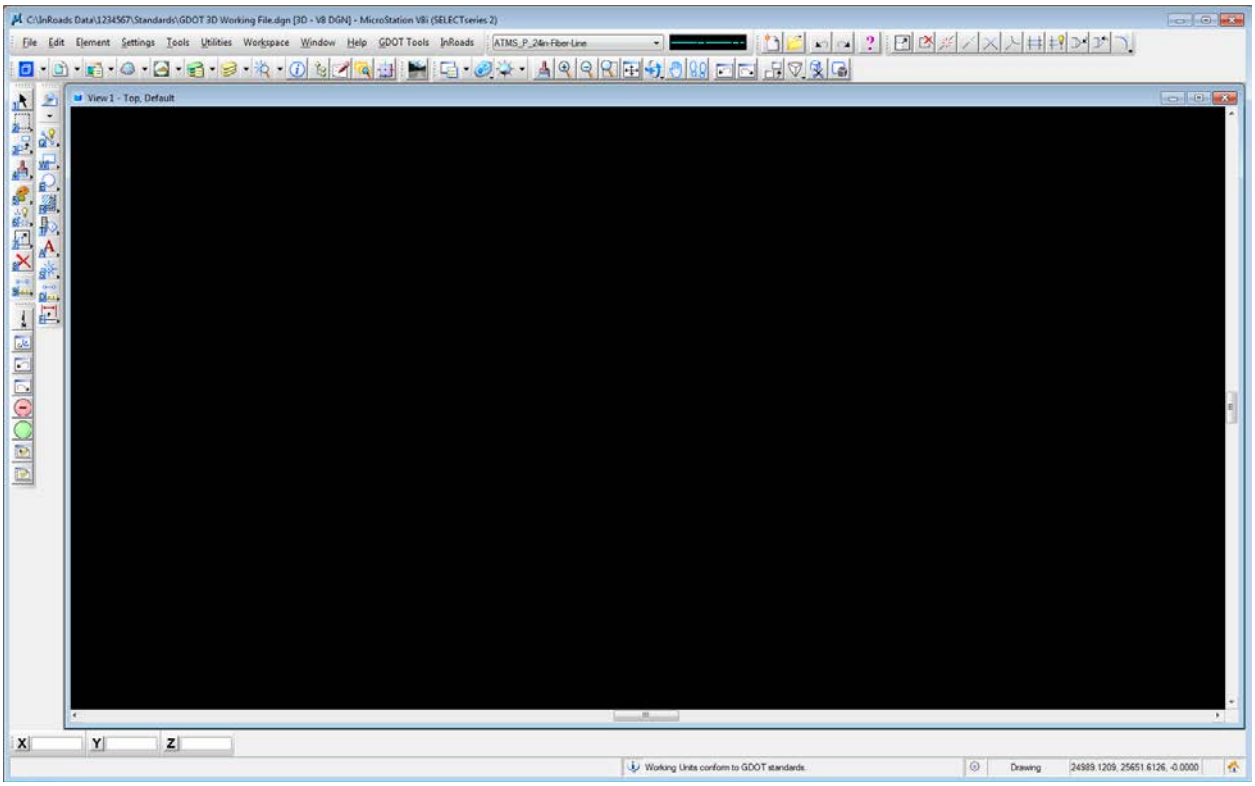


Figure L1-4 Main **MicroStation V8i** Window

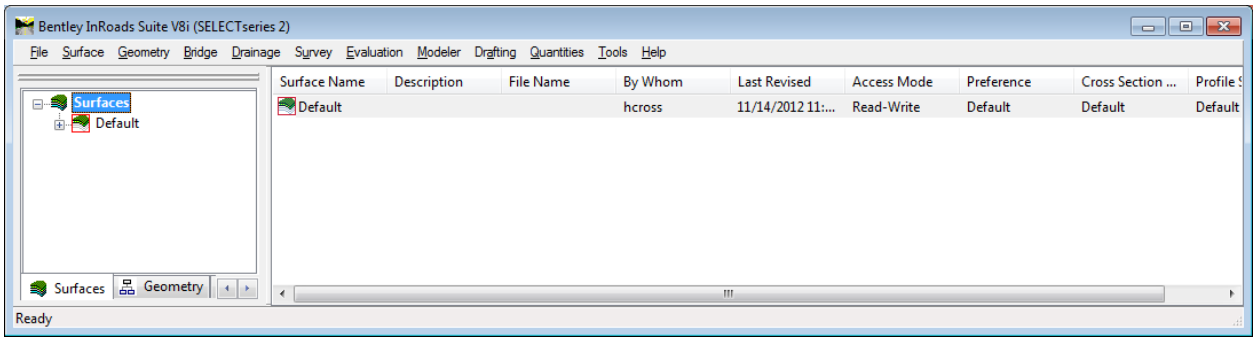
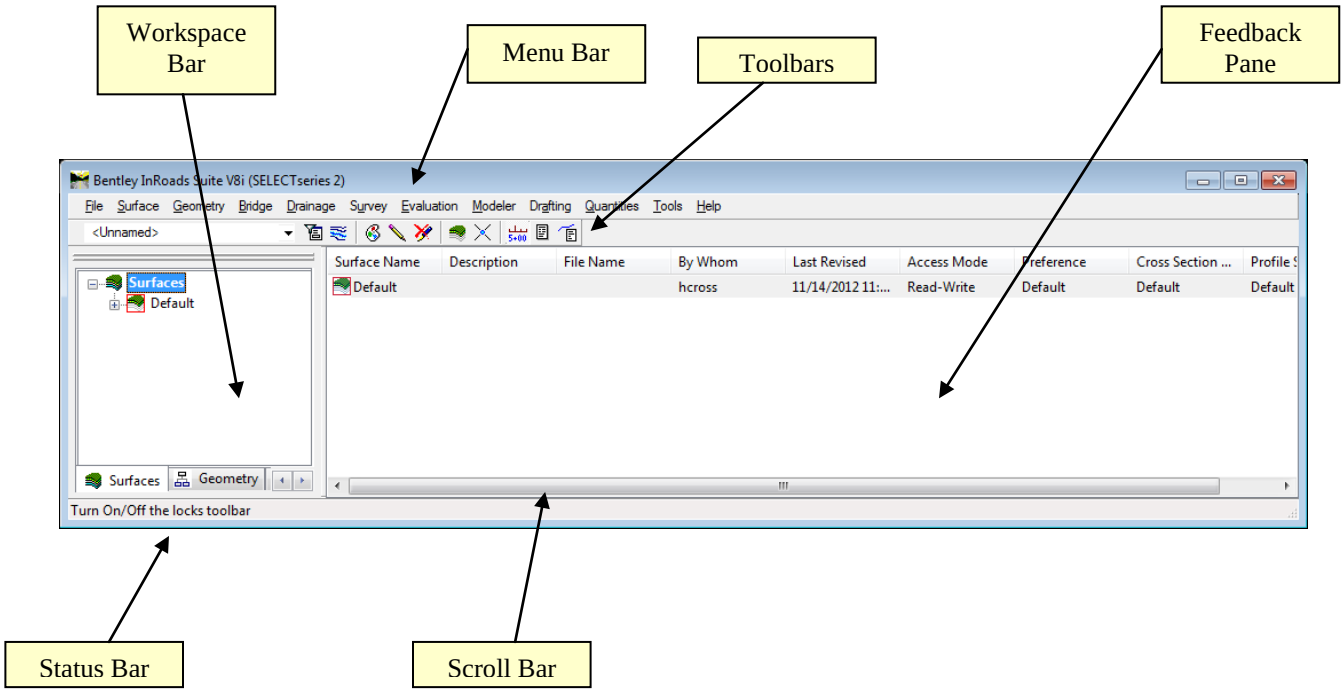


Figure L1-5 Main **InRoads V8i** Window

8.	As mentioned previously - you will be working in <u>both</u> the **InRoads Design Software** and the **MicroStation CADD Software**. The **InRoads Software** is the database in which the Design data is created and processed. The **MicroStation CADD Software** is used for the viewing and manipulation of graphics derived from **InRoads**. Please review the **diagram** depicted below for a brief overview of the InRoads Explorer Interface: *Details the components of the InRoads Explorer Interface.*



- **Workspace Bar** – Contains all of the InRoads Project Data information
- **Menu Bar** – Contains the pull-down menus to access InRoads commands
- **Toolbars** – Contains default and customized toolbars to access InRoads commands
- **Feedback Pane** – Contains details of selected Project Data from the Workspace Bar
- **Scroll Bar** – Enables the user to view more of the InRoads Explorer Interface. (The Scroll Bar may not be visible if the InRoads Interface is already viewed to extents).
- **Status Bar** – Contains InRoads messages and prompts (Please note: InRoads may direct you to locate something graphically in MicroStation -- some of these prompts may display in the MicroStation Status Bar instead). It is very important that the user review both the InRoads and the MicroStation Status Bar for prompts and information.

Lab1C Set InRoads Project Defaults

The **InRoads Project Defaults** setting allows you to define the "default folder locations" for projects. A ***Project Default*** configuration can then be saved for each project so that multiple projects can be accessed. This configuration allows you to easily navigate between projects. Once the Project Folder locations are saved in the Configuration, the projects can be accessed by selecting the appropriate Project Configuration Name. The Project Defaults also contains the location for selecting the standard GDOT InRoads Preference File (**GDOT_Standard V8i_SS2.xin**).

9.	Click **File▶Project Defaults** from the InRoads pull-down menu. *The Set Project Defaults dialog box appears. Each Project will require an individual setup as detailed in the following steps.*
10.	Click **New** and enter **1234567_Design** in the **New Configuration** dialog box. Then click **OK**. *The New Configuration dialog box will appear. After entering in the Project Name and clicking OK – a new configuration will be created that is named 1234567_Design.*
11.	Under the **Default Preferences** section - Click in the **Preferences (*.xin):** field and then click the **Browse** button to navigate to the following file: **C:\InRoads Data\1234567\Design Labs\Standards\GDOT_Standard V8i_SS2.xin**. Select the **GDOT_Standard V8i_SS2.xin** file and click **Open**. *The **GDOT_Standard V8i_SS2.xin** file is added as the Project Preference File.*
12.	Under the **Default Directory Paths** Section - Click in the **Project Default Directory:** field and then click the **Browse** button to navigate to the folder: **C:\InRoads Data\1234567\Design Labs**. Next - click **Open**. *The Current Configuration for the 1234567 project will now default to the following path: **C:\InRoads Data\1234567\Design Labs**.*

13.	Under the **Default Directory Paths** Section – copy and paste the following text into each entry field shown below: **C:\InRoads Data\1234567\Design Labs** • Report Directory: **C:\InRoads Data\1234567\ Design Labs ** • Projects (*.rwk): **C:\InRoads Data\1234567\ Design Labs ** • Surfaces(*.dtm): **C:\InRoads Data\1234567\ Design Labs ** • Geometry Projects:(*.alg): **C:\InRoads Data\1234567\ Design Labs ** • Template Libraries:(*.itl): **C:\InRoads Data\1234567\ Design Labs ** • Roadway Design: (*.ird): **C:\InRoads Data\1234567\ Design Labs ** • Survey Data: (*.fwd): **C:\InRoads Data\1234567\ Design Labs ** • Drainage: (*.sdb): **C:\InRoads Data\1234567\ Design Labs ** • Quantity Manager: (*.mdb): **C:\InRoads Data\1234567\ Design Labs ** • Site Modeler Projects: (*.gsf): **C:\InRoads Data\1234567\ Design Labs ** *The Configuration for the 1234567 project will now default to the path listed above.*
14.	Under the **Default Directory Paths** Section - Click in the **Style Sheet (*.xsl):** field and then click the **Browse** button to navigate to the folder: **C:\InRoads Data\Style Sheets\GDOT**. Next - click **Open**. *The Current Configuration for the Style Sheets will now default to the following path:* ***C:\InRoads Data\Style Sheets\GDOT***.
15.	The **Project Defaults** should now correspond to the screen capture depicted in *Figure L1-6* (as shown below). Verify to ensure that your 1234567 Project Defaults match the inputs in the screen capture. *The Project Default Fields are verified for accuracy.*

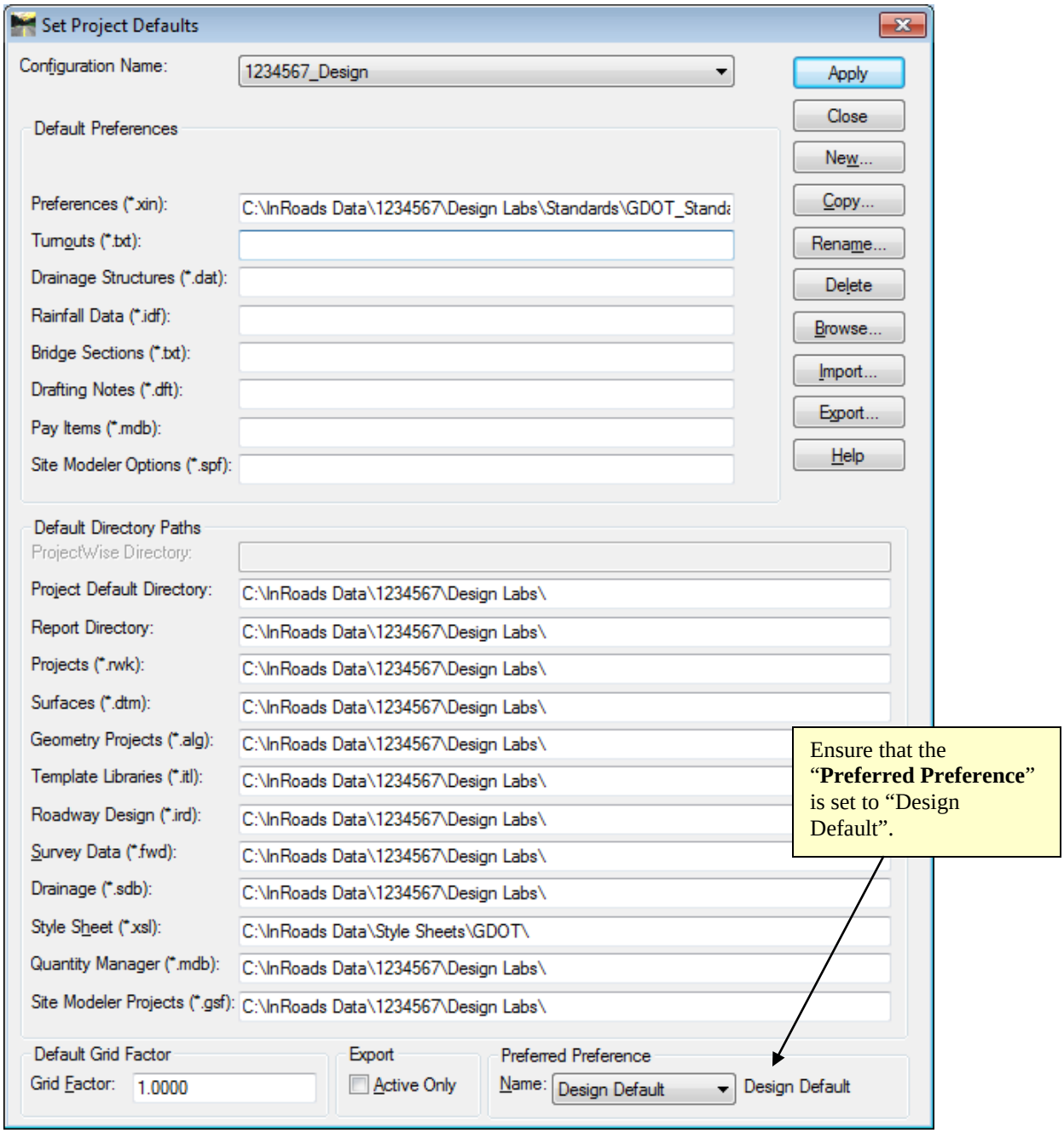
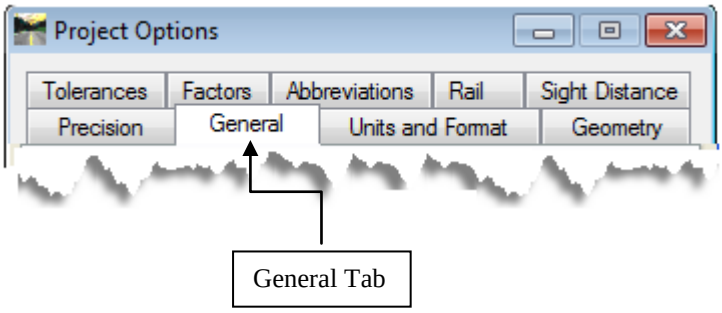
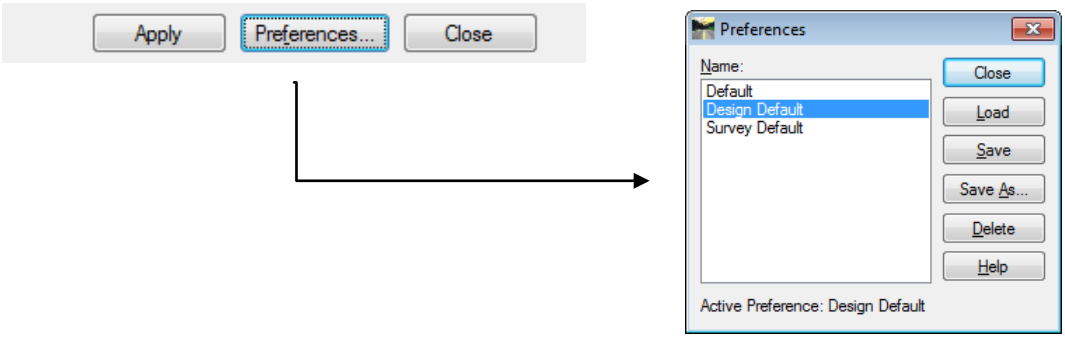


Figure L1-6 Set Project Defaults

16.	Click **Apply** and then click **Close**. The **<u>Set Project Defaults</u>** dialog box will close and the settings for this configuration of Project 1234567_Design will be the default settings until the configuration is changed to another Project. This folder location will also be the default folder when **File▶Save** and **File▶Close** are used.

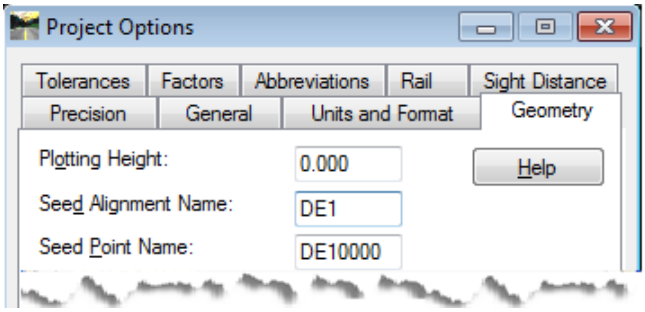
Lab1D Set Design Default Preferences

The **Design Default** Preferences must be loaded in InRoads in order to conform to standards for the processing of Design Projects. This is a very important step to ensure that standards are followed for any Design data that will be processed. The **Design Default** Preference loads the Precision Settings, Tolerances, Units and Formats, etc. Once the **Design Default** Preference is loaded – the project will retain these settings each time the project is accessed.

17.	Click **File▶ Project Options** from the InRoads pull-down menu to access the **Project Options** dialog box. *The Project Options dialog box appears.*
18.	In the **Project Options** dialog box - click on the **General** Tab.  *The General Tab dialog box appears.*
19.	In the **General Tab** dialog box click the command button named **Preferences…** (Located at the bottom of the dialog box).  *The Preferences dialog box will open.*
20.	In the **Preferences** dialog box – select **Design Default**. Then click **Load** and then click **Close**. *The **Design Default** Preference will be loaded. This will load the appropriate data for ALL of the tabs in the Options dialog box. The individual tabs (Tolerances, Geometry, Units and Format, etc.) will automatically be configured for use in Design. These individual tab options will NOT need to change. Once the **Design Default** Preference is loaded – the project will retain these settings each time the project is accessed.*

21. **Important Information:**

In the **Project Options** dialog box - click on the **Geometry** Tab.



Notice in the image at right, the **Seed Alignment Name:** and **Seed Point Name:** default settings of ***DE1*** and ***DE10000***. These values were set when the **Design Default** Preference was loaded in the preceding step.

These settings are of particular importance to the Designer. Alignments must have a **DE** prefix. Points must also have a **DE** prefix as well as numbering starting at **10000**. In order for survey enhancements to be properly added during the design phase of a project, it is essential that Designers pay particular attention to this setting. **DE** stands for design.

22. **Click** back to the **General** Tab.

The **Design Default** Preference should now correspond to the screen capture depicted in *Figure L1-7* (as shown below). Verify to ensure that the **Project Options** dialog box for Project 1234567 matches the inputs in the screen capture.

The Project Options are verified for accuracy.

Ensure that the "**Refresh Command Settings on Preference Change**" is checked:

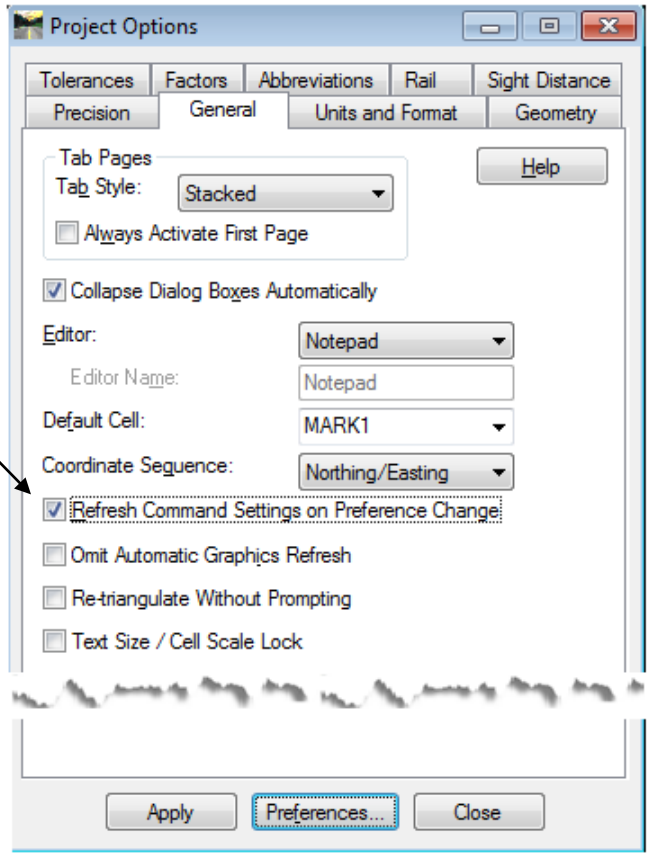


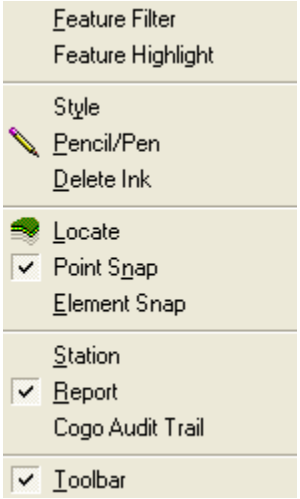
Figure L1-7 Design Default Settings

23.	Click **Apply** and then click **Close**. *The Project Options dialog box will close and the Design Default Preference for this configuration of Project 1234567 will be the default settings until the configuration is changed to another Project.*

Lab1E Set InRoads "Locks"

InRoads contains several "Locks" which are used by many InRoads commands to control different aspects of the selection and viewing of data as well as the reporting of data. There are basically two types of "Locks" – On/Off "Locks" and Switch "Locks". (Switch "Locks" contain different modes but one mode is always active and the user can switch between modes). Both types of "Locks" can be changed by the user as the situation dictates during the course of the database generation. These locks affect many commands – so it is very important that the user understand the use of these locks.

The following Lab contains a brief overview of <u>some</u> of the InRoads "Locks". These "Locks" must be set according to the following Lab --- (**Lab1E**) ---- for the use in upcoming Labs. <u>This is a very important step to ensure that the "Locks" are set accordingly.</u>

24.	Click **Tools ▶ Locks** from the InRoads pull-down menu. *This command accesses the available InRoads "Locks". Each time a "Lock" is changed – the pull-down menu will close and the user must click on **Tools ▶ Locks** again to access the Locks pull-down.*
25.	Ensure that the following locks are selected/unselected as appropriate: Feature Filter _____ Unchecked Feature Highlight __ Unchecked Style _____ Unchecked Pencil/Pen _____ Set to Pencil Delete Ink _____ Unchecked Locate _____Set to Features Point Snap _____ Checked Element Snap _____Unchecked Station _____ Unchecked Report _____ Checked Cogo Audit Trail __ Unchecked Toolbar _____ Checked  *The InRoads "Locks" are set accordingly.*

26.	Following is a brief overview of the "Locks": **Feature Filter** displays or obscures Surface Features based on a filter (also controls Survey Style Filter) **Feature Highlight** highlights the feature in plan view when selected from a list **Style** determines if a dialog box is displayed for a surface command or cross sections **Pencil/Pen** controls the redisplaying of Graphics **Delete Ink** allows redisplayed graphics to replace graphics in pen mode **Locate** controls if Locate Buttons snaps to Graphics or Features **Point Snap** controls the ability to snap to points in Geometry Project **Element Snap** controls the ability to snap to elements in Geometry Project **Station** controls the Stationing as it pertains to Cross Sections **Report** controls if Report is displayed or not displayed in a dialog box **Cogo Audit Trail** controls the reporting of coordinate geometry results to a text file **Toolbar** displays or turns off the Locks Toolbar *Describes a "brief" overview of the InRoads "Locks".*

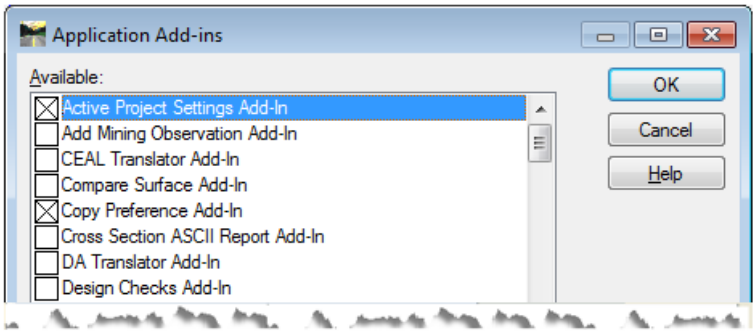
Lab1F Add Application and Variable Manager Add-Ins

InRoads contains several Application and Variable Manager "Add-Ins" which must be selected and added to the InRoads Program in order to access the standard GDOT customized menu applications/translators for Survey. Once the Application and Variable Manager Add-Ins are selected – the settings are written to registry keys in the user's profile. This ensures that each time InRoads is accessed in the user profile -- these settings will already be available. These add-ins will only need to be added once and will then be accessible in all of the InRoads Modules and InRoads Projects.

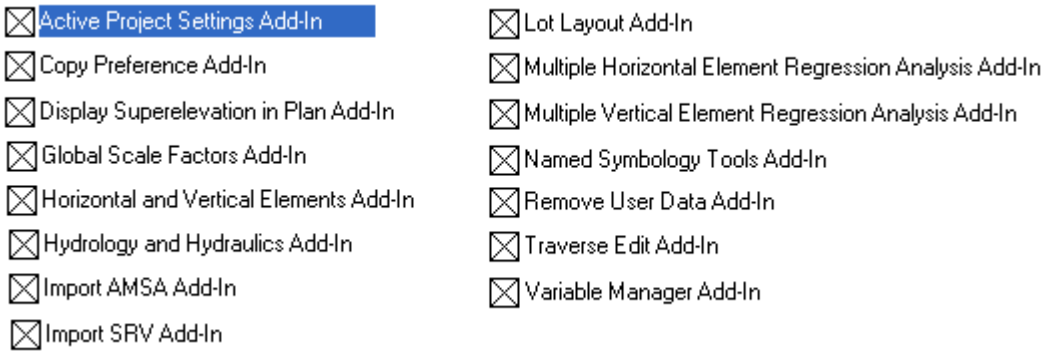
The following Lab contains a brief overview of the InRoads "Application and Variable Manager Add-Ins". These "Application and Variable Manager Add-Ins" must be set according to the following Lab --- (**Lab1F**) ---- for their use in upcoming Labs. This is a very important step to ensure that the "Add-Ins" are set accordingly.

27. The Application Add-Ins will be selected:

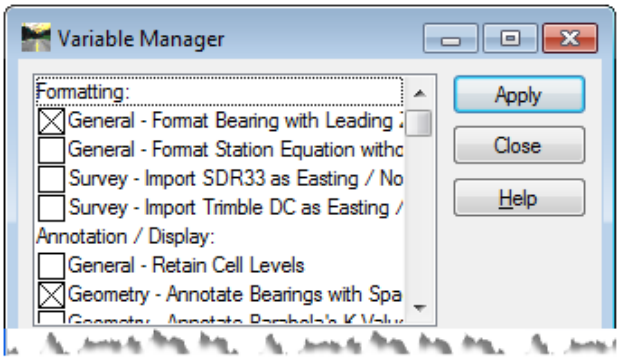
Click **Tools▶Application Add-Ins** from the InRoads pull-down menu and the following dialog box will appear:



Select the following Application Add-Ins by clicking an ☒ by the appropriate Add-In:



The InRoads "Application Add-Ins" are selected accordingly.

28.	Click **OK** to accept the settings and to close out of the dialog box. *The Application Add-Ins dialog box will close and the selected Application Add-Ins will be available for use.*
29.	Next the Variable Manager Add-Ins will be selected: Click **Tools▶Variable Manager** from the InRoads pull-down menu and the following dialog box will appear:  Select the following Variable Manager Add-Ins by clicking an ☒ by the appropriate Variable: ☒ General - Format Bearing with Leading Zero Option ☒ Geometry - Annotate Bearings with Spaces ☒ Geometry - Alphanumeric Names in Create/Edit Alignment by Cogo Points *The InRoads "Variables" are selected accordingly.*
30.	Click **Apply** to accept the settings and then click **Close** to close out of the dialog box. *The Variable Manager dialog box will close and the selected Variables will be available for use.*
31.	STOP This concludes Lab 1. Do not proceed until the Instructor directs you to do so.

Lab 2
Starting a Project

Objective

The Designer will receive from the SDE (Survey Data Engineer) some or all of the following eight electronic files. These files will be made available for copying from SDECommon.

1. PI#_SDE.alg (InRoads Geometry file)
2. PI#_SDE.dtm (InRoads Digital Terrain Model)
3. PI#_TOPO.dgn (Existing Topo features)
4. PI#_PROP.dgn (Existing Property Information)
5. PI#_UTLE.dgn (Existing Utility features)
6. PI#_PSR.xls or .psr or .mdb (Property Statistics Report)
7. PI#_Hydraulics.docx (Hydraulics report)
8. PI#_Misc.txt (Miscellaneous information SDE deems important. This file may not be included.)

The Designer will create a folder called 'SDE' under the PI# folder on the group account and copy these files to it for backup. The Designer is not to work directly from these files but from copies of them.

The objective of Lab 2 is to:

- Copy and rename the PI#_SDE.alg to PI#_Design.alg externally and internally.
- Copy and rename the PI#_SDE.dtm to PI#_Exist.dtm externally and internally.
- Copy and rename the DGN files from the SDE folder.

Lab 2A Copy the Survey Files from the SDE folder to the InRoads Data folder and rename Externally

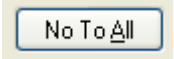
In **Lab 2A** you will copy 1234567_SDE.alg, 1234567_SDE.dtm, 1234567_TOPO.dgn, 1234567_PROP.dgn, & 1234567_UTLE from the Survey Data (SDE) folder to the proper InRoads Data folder for use in this Lab.

1.	From the desktop, double-click on the **My Computer** icon. *This will open the My Computer dialog box. This is your computer's file manager. Via this dialog box, you may view the content of your computer's various hard-drives.*
2.	Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 2\SDE**. The 1234567_SDE.alg and 1234567_SDE.dtm files (as well as the associated DGN Files) which are provided by survey will be in this folder for use in this Lab. *The 1234567_SDE.alg and 1234567_SDE .dtm files as well as the associated DGN files will normally be copied from SDECommon by the Designer to the group account SDE folder first for backup. The SDE folder in this step is to mimic the SDE folder on the designers' group account.*
3.	Copy **1234567_SDE.alg** & **1234567_SDE.dtm** (and) Copy the DGN files -- **1234567_TOPO.dgn**, **1234567_PROP.dgn**, & **1234567_UTLE.dgn** From: **C:\InRoads Data\1234567\Design Labs\Lab 2\SDE** To: **C:\InRoads Data\1234567\Design Labs\Lab 2** After Copying the DGN files– Rename the DGN Files in Windows Explorer: • Rename **1234567_TOPO.dgn** to **1234567TOPO.dgn** • Rename **1234567_PROP.dgn** to **1234567PROP.dgn** • Rename **1234567_UTLE.dgn** to **1234567UTLE.dgn** **For Information Only:** The DGN Files received from the SDE contain an underbar (_) in the file name. The reason for this is to assist in differentiating DGN data received from the SDE from the Design DGN files. This will assist in organization of data during the enhancement processes. The Designer must rename the DGN files from the SDE naming convention to the Design naming convention in order for the MicroStation customized Macros to function correctly and to conform to the current EDG (Electronic Data Guidelines). If the Designer does not rename the DGN files (and remove the underbars) as depicted above – the GDOT MicroStation Macros may not function. *The recommended folder path for the Designer to follow when working in InRoads is C:\InRoads Data\PI#. This is documented in the InRoads Design Guidelines.*

4.	In Windows Explorer -- Rename the file called 1234567_SDE.alg which is located in ***C:\InRoads Data\1234567\Design Labs\Lab 2\1234567_SDE.alg*** to the following: **1234567_Design.alg** In Windows Explorer -- Rename the file called 1234567_SDE.dtm which is located in ***C:\InRoads Data\1234567\Design Labs\Lab 2\1234567_SDE.dtm*** to the following: **1234567_Exist.dtm**. This may be accomplished by right mouse clicking over the file(s) and selecting Rename. ***NOTE**: Although you have now renamed the file it is only renamed Externally. It must still be renamed internally to InRoads as will be demonstrated later. *The file naming convention for the InRoads Geometry Project and the InRoads Surface when in the design phase of a project is 1234567_Design.alg and 1234567_Exist.dtm. This is documented in the InRoads Design Guidelines.*

Lab 2B Open the 1234567_Design.alg and rename Internally

In **Lab 2B** you will open InRoads, open 1234567_Design.alg and rename the internal 1234567_SDE project name to 1234567_Design.

5.	**Starting Clean** In order to ensure that you are working with a "clean" database – you will close MicroStation and InRoads if they are still running from a previous Lab: To CLOSE MicroStation and InRoads - Select **File ▶ Exit** from the [MicroStation Menu]. If any messages appear regarding the saving of projects – Select  *This closes BOTH the MicroStation and InRoads Software(s).*
6.	**Starting MicroStation and InRoads in the GDOT Workspace.** From the desktop, double-click on the **MicroStation** icon labeled **GDOT MicroStation V8i SS2 (x86)**. Double click on the icon labeled **GDOT MicroStation V8i SS2 (x86)**. • When the **MicroStation Manager** dialog box appears – navigate to the **C:\InRoads Data\1234567\Design Labs\Standards** folder and select the "**GDOT 3D Working File.dgn**". (Creation of the 'GDOT 3D Working File.dgn' is documented in the Design Guidelines). Click **Open**. • Now open InRoads from within MicroStation by selecting: **InRoads ▶ InRoads Suite (SELECTseries 2) V8i 08.11.07.566** from the [MicroStation Menu]. *The MicroStation and InRoads Software(s) will open.*
7.	**Clear the MicroStation Window (***This step may be ignored if your MicroStation Window is already clear of graphics***)** • Click **Edit ▶ Select All** from the [MicroStation Menu]. • Then select the **<DELETE>** key on the computer keyboard *The MicroStation Window is now clear of all graphics from the previous lab and ready for this lab.*

8.	**Verify Project Defaults** • In InRoads, select **File ►Project Defaults** • Use the pull down next to *Configuration Name:* to select **1234567_Design** which you created in Lab 1. • Verify Settings match those shown in *Figure L2-1*. • Click **Apply** & **Close.** *Sets Project Defaults.*

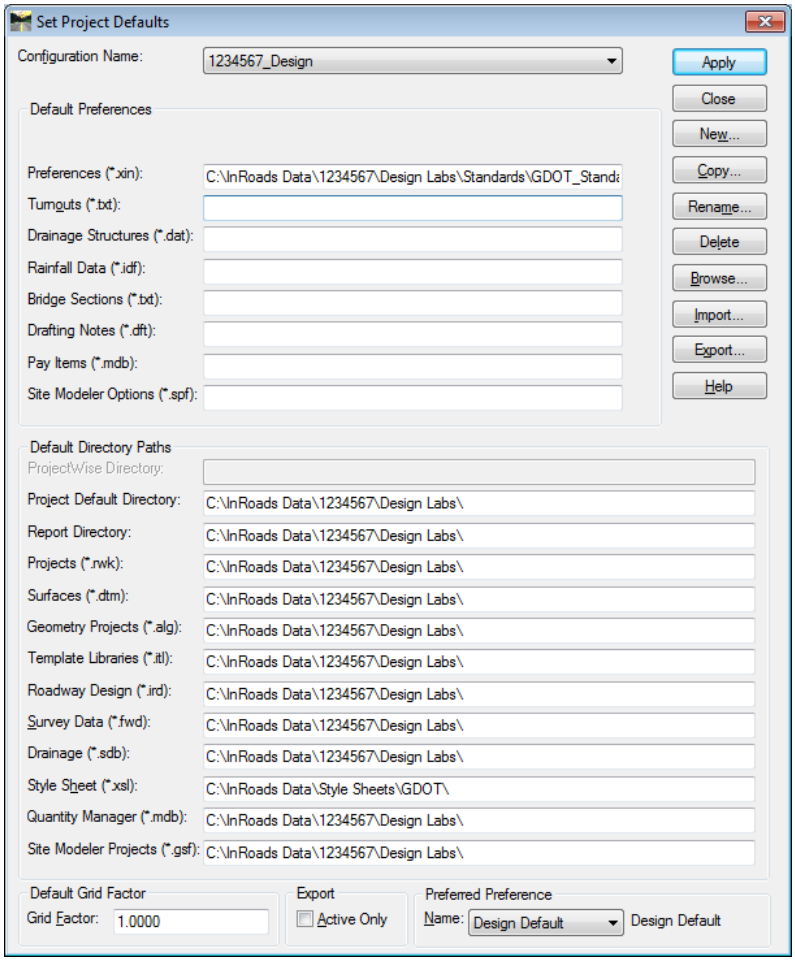
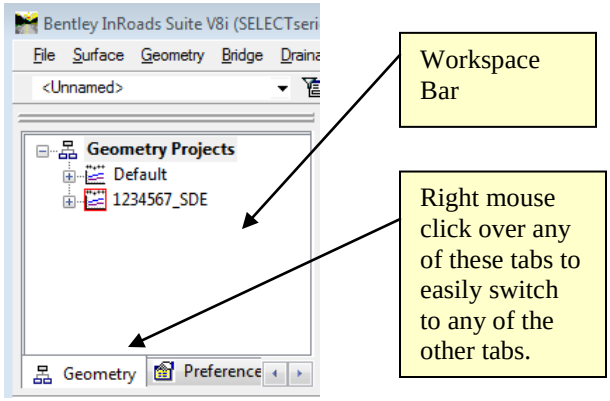


Figure L2-1 Project Defaults

9.	**Open the 1234567_Design.alg Geometry file.** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 2** • Highlight **1234567_Design.alg** • Click **Open** and then click **Cancel**. *The 1234567_Design.alg file is opened.*

10. **Make the InRoads Geometry tab the active tab**

- In InRoads, Right mouse click over any of the tabs in the Workspace Bar and select **Geometry**.
- Verify your view matches that shown in *Figure L2-2* and that the **Geometry** tab is the active tab showing the Geometry Projects.



** **NOTE**: Even though you opened **1234567_Design.alg**, 1234567_SDE is showing as the active geometry project. Even though we changed the Name of the file externally, InRoads retains the project name internally and must also be changed internally to match.

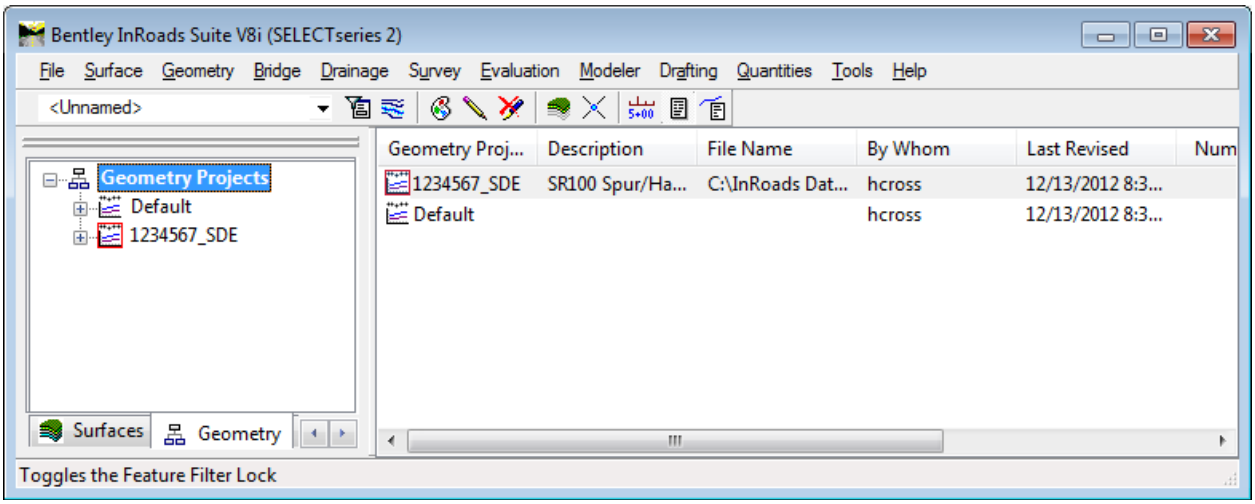


Figure L2-2 Main InRoads Window

11. **Change the Internal Project Name from 1234567_SDE to 1234567_Design.**

- Select **Geometry ► Rename Geometry.** The **Rename Geometry** dialog opens. The **Rename Geometry** command may be used to rename a Geometry Project, Horizontal Alignment or Vertical Alignment.
- In the **Rename Geometry** dialog make the entries as shown in *Figure L2-3*.
- Click **Apply** and answer **Yes** to rename the Geometry Project.
- Click **Close** to exit the **Rename Geometry** dialog.
- In the InRoads workspace bar **verify** that the Geometry Project is now renamed **1234567_Design** as shown in *Figure L2-4*.

The internal file is renamed to 1234567_Design.alg.

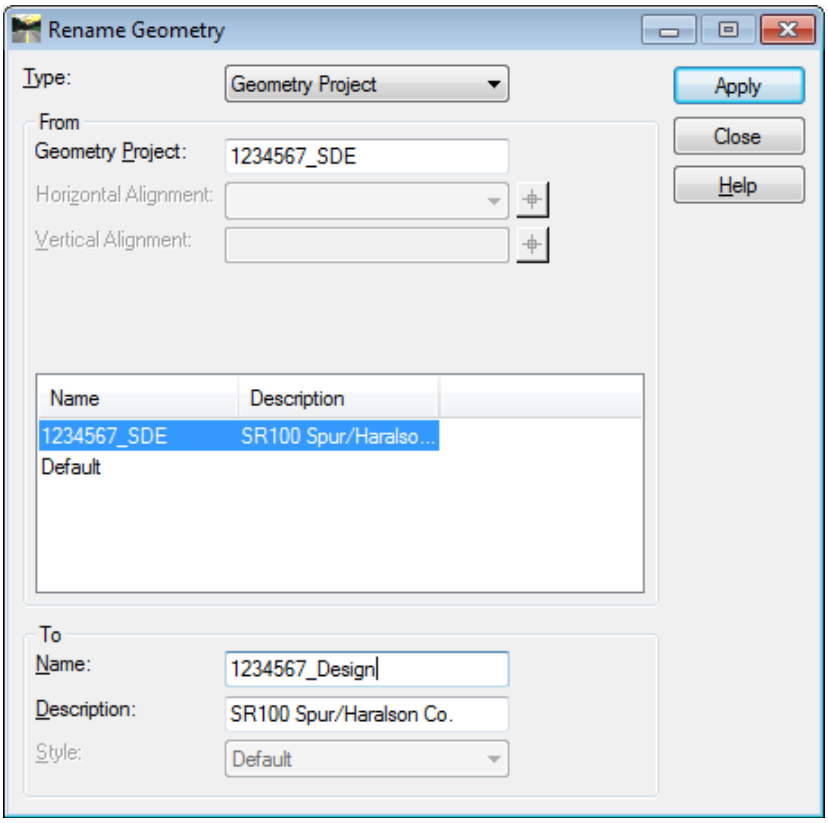


Figure L2-3 Rename Geometry

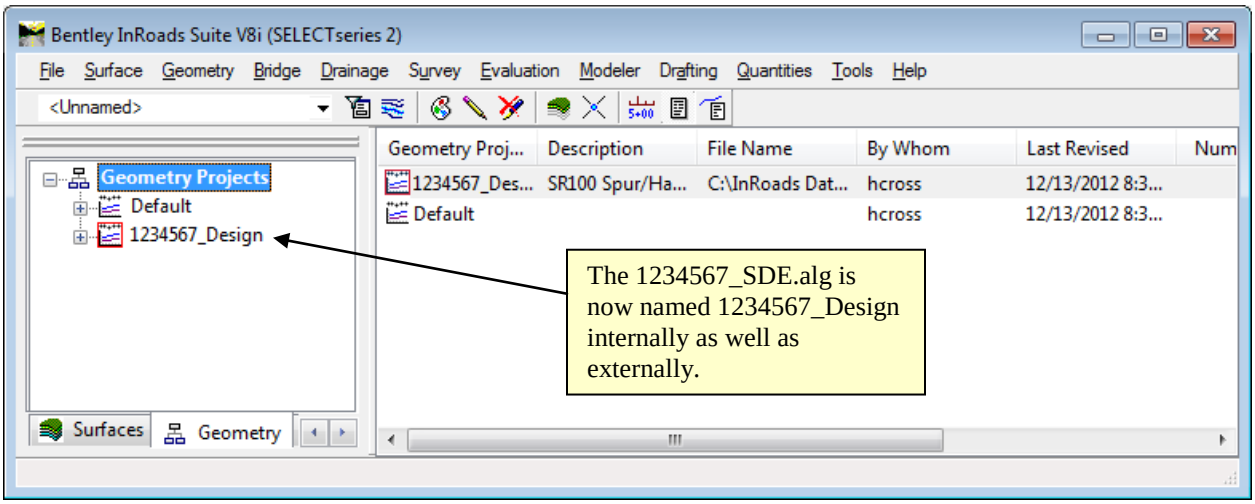
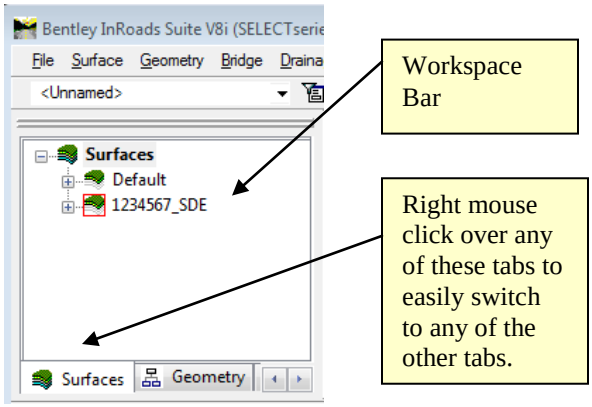


Figure L2-4 Main InRoads Window

12.	**Save the InRoads Geometry File** Even though the project has been renamed – the data has not yet been saved. InRoads retains the data in temporary memory but does not save the data on the fly. Whenever a change has been made to an InRoads Geometry Project – Save the project and its associated modifications or changes. • Select **File ▶ Save ▶ Geometry Project** from the **InRoads Menu**. The Geometry Project (***1234567_Design.alg***) will be saved to **Lab 2** in the following path: **C:\InRoads Data\1234567\Design Labs\Lab 2** Note that the **InRoads** and **MicroStation Status Bar** (Located at the bottom of both the InRoads and MicroStation Interface) will depict a message when the Geometry Project has been saved. *The **1234567_Design** Geometry Project has now been saved to the following path: C:\InRoads Data\1234567\Design Labs\Lab 2*

Lab 2C Open the 1234567_Exist.dtm and rename internally

In **Lab 2C** you will open 1234567_Exist.dtm and rename the internal 1234567_SDE project name to 1234567_Exist.

13.	**Open the 1234567_Exist.dtm Surface.** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 2** • Highlight **1234567_Exist.dtm** • Click **Open** and **Cancel**.
14.	**Make the InRoads Surface tab the active tab** • In InRoads, Right mouse click over any of the tabs in the Workspace Bar and select **Surfaces**. • Verify your view matches that shown in *Figure L2-5* and that the **Surfaces** tab is the active tab showing the **Surface(s)** listed.  ** **NOTE**: Even though you opened **1234567_Exist.dtm**, **1234567_SDE** is showing as the active Surface. Even though we changed the Name of the file externally, InRoads retains the project name internally and must also be changed internally to match.

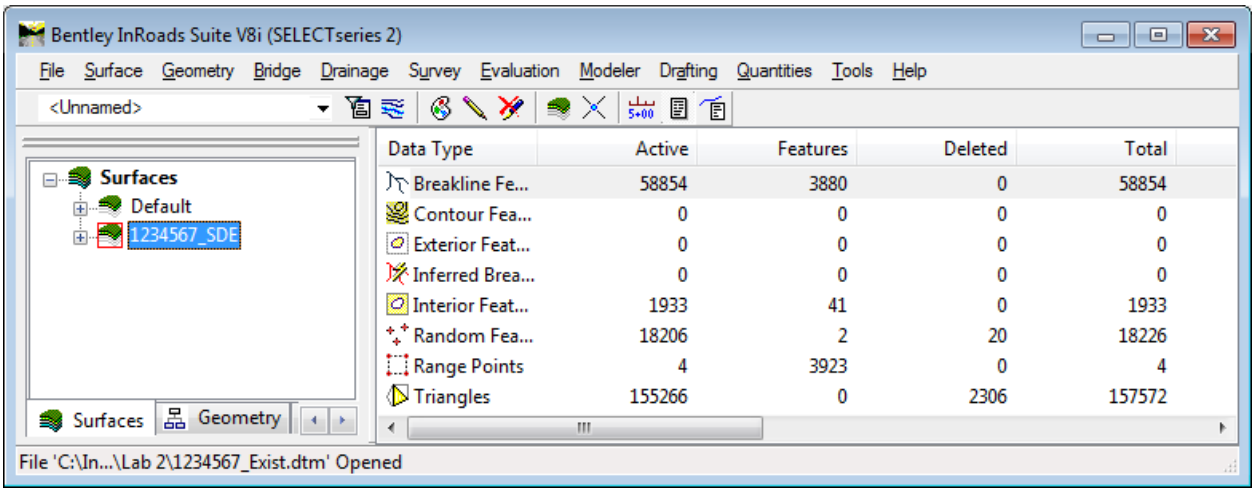


Figure L2-5 Main InRoads Window

15.	**Change the Internal Project Name from 1234567_SDE to 1234567_Exist.** • Select **Surface ► Rename Surface.** The **Rename Surface** dialog opens. • In the **Rename Surface** dialog make the entries shown in *Figure L2-6*. • Click **Apply**. • Click **Close** to exit the **Rename Surface** dialog. • In the InRoads workspace bar **verify** that the Surface is now renamed **1234567_Exist** as shown in *Figure L2-7*. *The internal file is renamed to 1234567_Exist.dtm.*

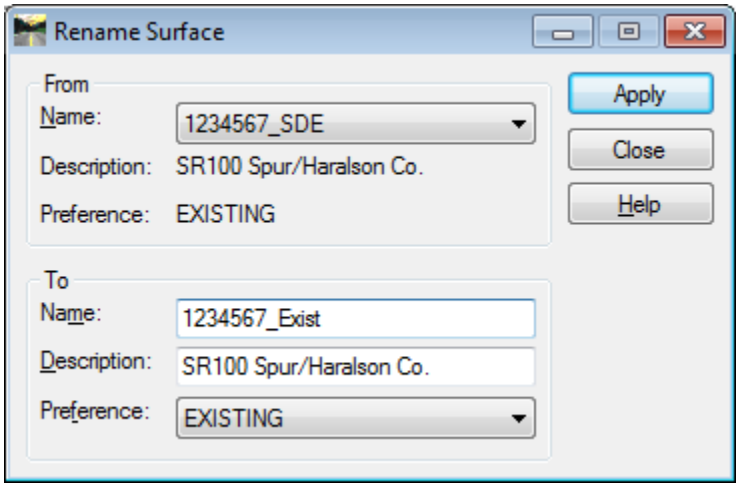


Figure L2-6 Rename Surface

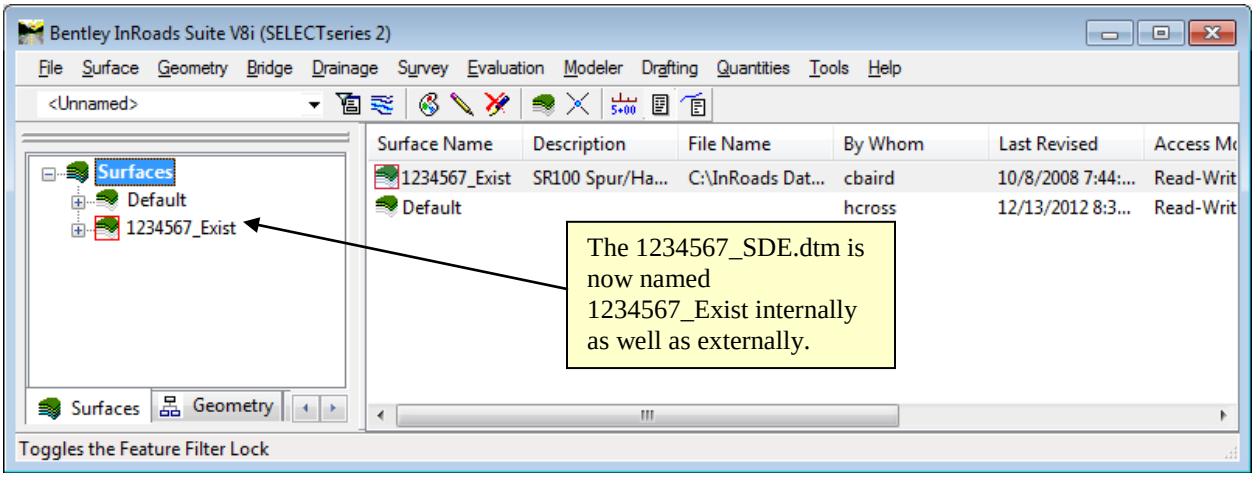
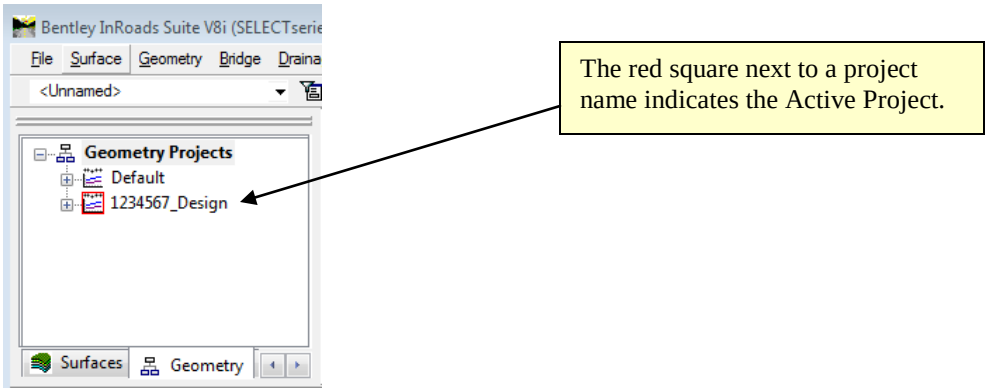


Figure L2-7 Main InRoads Window

16.	**Save the InRoads Surface File** Even though the Surface has been renamed – the data has not yet been saved. InRoads retains the data in temporary memory but does not save the data on the fly. Whenever a change has been made to an InRoads Surface – Save the project and its associated modifications or changes. • Select **File ▶ Save ▶ Surface** from the **InRoads Menu**. The Surface Project (***1234567_Exist.dtm***) will be saved to **Lab 2** in the following path: **C:\InRoads Data\1234567\Design Labs\Lab 2** Note that the **InRoads** and **MicroStation Status Bar** (Located at the bottom of both the InRoads and MicroStation Interface) will depict a message when the Surface Project has been saved. *The **1234567_Exist.dtm** Surface has now been saved to the following path: C:\InRoads Data\1234567\Design Labs\Lab 2*

Lab 2D Setting the Active Project

When working with more than one project it is important that the Designer keep in mind which project is the Active Project. This Lab will discuss setting the Active Project and how to determine which project is the Active Project.

17.	In the InRoads Workspace Bar the Active Project has a red square next to it as shown here. 
18.	**Make the Default Project the Active Project** • In InRoads, Select **Geometry ► Active Geometry**. The **<u>Active Geometry</u>** dialog opens. • Highlight **Default** in the **<u>Active Geometry</u>** dialog as shown in *Figure L2-8*. • Click **Apply** & **Close**. *A Default Project will always exist in the InRoads Workspace Bar. This is internal to InRoads and is required. The Designer should <u>NEVER</u> use the Default project to design a project.*

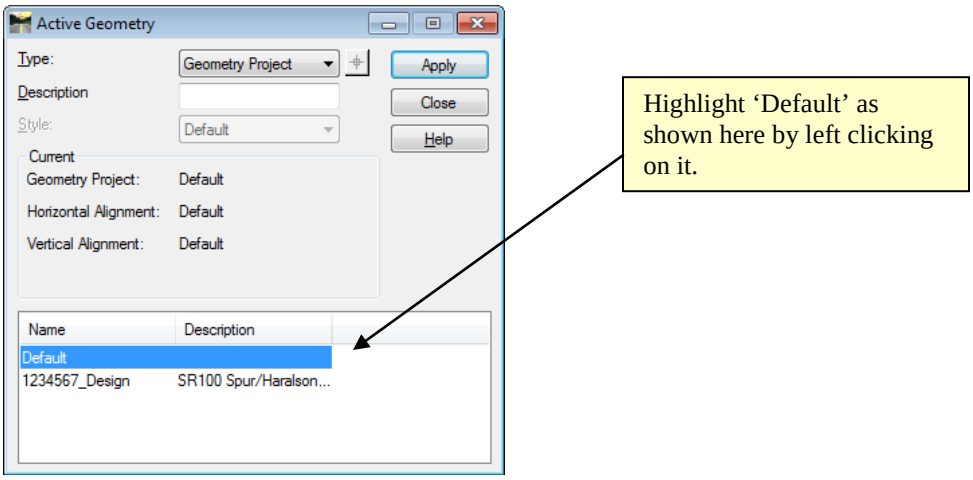
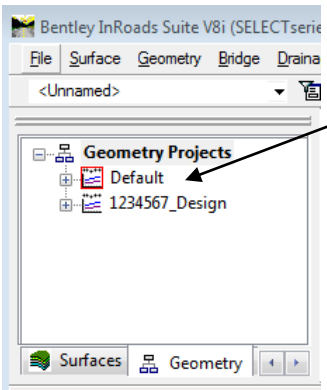


Figure L2-8 Active Geometry

19. Look in the InRoads Workspace Bar. The **Default Project** should now be the Active Project as demonstrated by the red square as shown here.



The red square next to a project name indicates the Active Project.

**** HINT**: You may right mouse click over the project name and click '**Set Active**' to set the Active Project also.

Either the Active Geometry command or right mouse clicking may be used to set the active Horizontal and Vertical Alignments as well.

20. STOP This concludes Lab 2. Do not proceed until the Instructor directs you to do so.

Lab 3
Horizontal Alignments

Objective

In InRoads the term Horizontal Alignment refers to all linear elements, open or closed, such as centerlines, right of way parcels, edge of pavements, etc. This lab will focus on several common methods typically used by GDOT for storing and editing centerline alignments.

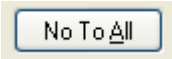
1. Copying an existing survey alignment for use as proposed alignment.
2. Creating a new location alignment.

Lab 3A Open 1234567_Design.ALG

1. Starting Clean

In order to ensure that you are working with a "clean" database – you will close MicroStation and InRoads if they are still running from a previous Lab:

To CLOSE MicroStation and InRoads -

Select **File►Exit** from the [MicroStation Menu].
If any messages appear regarding the saving of projects – Select 

This closes BOTH the MicroStation and InRoads Software(s).

2. Starting MicroStation and InRoads in the GDOT Workspace.

From the desktop, double-click on the **MicroStation** icon labeled **GDOT MicroStation V8i SS2 (x86)**.

Double click on the icon labeled **GDOT MicroStation V8i SS2 (x86)**.

- When the **MicroStation Manager** dialog box appears – navigate to the **C:\InRoads Data\1234567\Design Labs\Standards** folder and select the "**GDOT 3D Working File.dgn**". (Creation of the 'GDOT 3D Working File.dgn' is documented in the Design Guidelines). Click **Open**.

- Now open InRoads from within MicroStation by selecting:
  InRoads ► InRoads Suite (SELECTseries 2) V8i 08.11.07.566 from the [MicroStation Menu].

The MicroStation and InRoads Software(s) will open.

3. Clear the MicroStation Window (*This step may be ignored if your MicroStation Window is already clear of graphics***)**

- Select **Edit ►Select All** from the [MicroStation Menu].
- Then select the **<DELETE>** key on the computer keyboard.

The MicroStation Window is now clear of all graphics from the previous lab and ready for this lab.

4.	**Verify Project Defaults** • In InRoads, select **File ►Project Defaults** • Use the pull down next to **Configuration Name:** to select ***1234567_Design*** which you created in **Lab 1**. • Click **Apply** & **Close.** *Sets Project Defaults.*
5.	**Set the Design Default Preferences** • Select **File ► Project Options** and the **<u>Project Options</u>** dialog box appears. • Select the **Factors** tab. • This will be a 50 Scale Project. Enter ***50*** in each line for the **Text**, **Cell** & **Line Style Scale Factor(s)**. • Then in the same **<u>Project Options</u>** dialog box select the **Geometry** tab. • Click the **Preferences** button at the bottom of the dialog box. • Choose ***Design Default***. Click **Load** and **Close**. This will set the remainder of the Design Defaults. ****IMPORTANT**: As stated previously, the ***Design Default*** Preference loads the appropriate settings for use during Design. These settings include the Alignment and Point name settings. These settings are of particular importance to the Designer. Alignments must have a **DE** prefix. Points must also have a **DE** prefix as well as beginning the point numbering scheme at Number 10000. In order for survey enhancements to be properly added during the design phase of a project, it is essential that Designers pay particular attention to this setting. • In the **<u>Project Options</u>** dialog box click **Apply** and **Close**. *Sets the Design Default Preference.*
6.	**Open 1234567_Design.alg** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 3** • Highlight **1234567_Design.alg** • Click **Open** & **Cancel**. *The Geometry Project 1234567_Design is opened.*

Lab 3B Viewing Alignments and Points

7.	**Open the View Horizontal Annotation Command** • In InRoads, select **Geometry ►View Geometry ► Horizontal Annotation**. The **<u>View Horizontal Annotation</u>** dialog opens as shown in *Figure L3-1*.

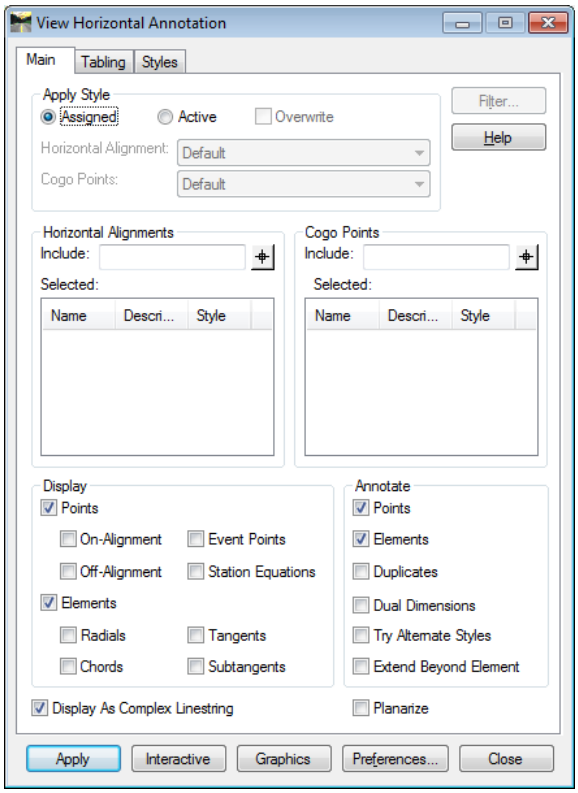


Figure L3-1 View Horizontal Annotation

8.	**Set the Viewing Preferences for Design Information.** • In the **<u>View Horizontal Annotation</u>** dialog click the **Preferences** button. • In the **<u>Preferences</u>** dialog that opens, select ***BEARING & DISTANCE***. This Preference loads the settings for the typical viewing of Existing Centerlines. • Click **Load** & **Close**. • Verify the **<u>View Horizontal Annotation</u>** dialog settings match those shown in *Figure L3-2*. *'Preferences' are used throughout InRoads for storing data for later retrieval related to viewing settings, dialog box settings, options and standards settings. 'Preferences' are stored in a Preference file. The name of the Preference file GDOT uses is GDOT_StandardV8i_SS2.xin and is available for download from the ROADS Webpage.*

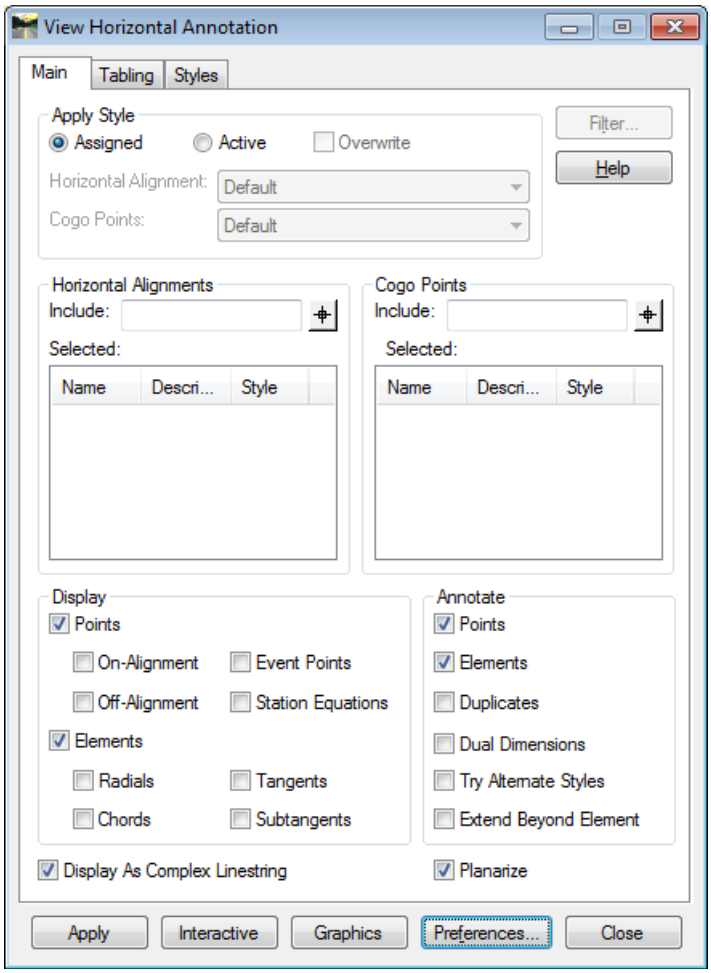


Figure L3-2 View Horizontal Annotation

9.	In *Figure L3-2* above, under the **Annotate** frame, uncheck the **Elements** check box. *The Annotate Elements check box annotates the bearing and distance on Alignments. This information is not needed for this Lab.*
10.	In *Figure L3-2*, notice the **Filter** button is Grayed out. • Click in the **Horizontal Alignments** '**Include:**' key-in field. • Notice the **Filter** button is now active. • Click the **Filter** button. The **Geometry Selection Filter** dialog opens as shown in *Figure L3-3*. • Click the **All** button to move all the Horizontal Alignments to the '**Selected**' field. • Click **OK** to return to the **View Horizontal Annotation** dialog. • Notice the Alignments are now populated in the **View Horizontal Annotation** frame's **Horizontal Alignments** '**Selected**' field as shown in *Figure L3-4*. *The Geometry Selection Filter lists all the Horizontal Alignments in the Available field and allows the user to Filter data for viewing by several methods.*

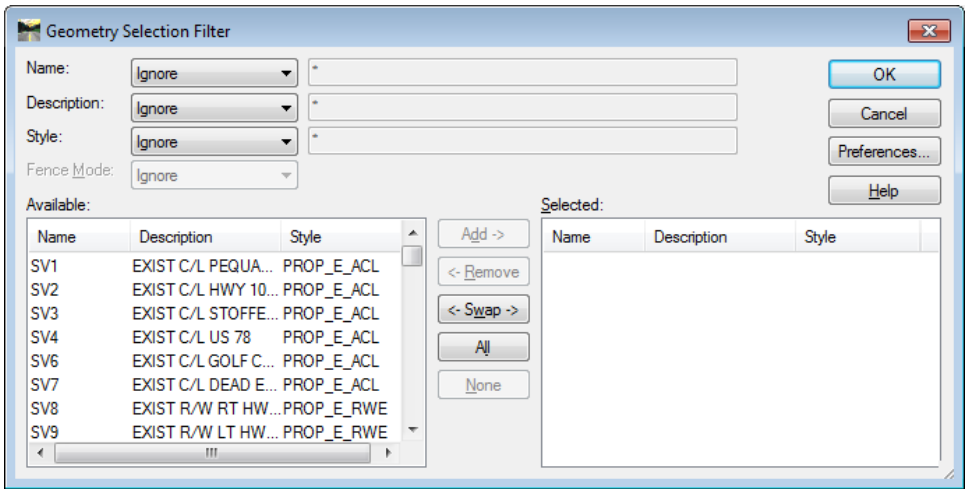


Figure L3-3 Geometry Selection Filter

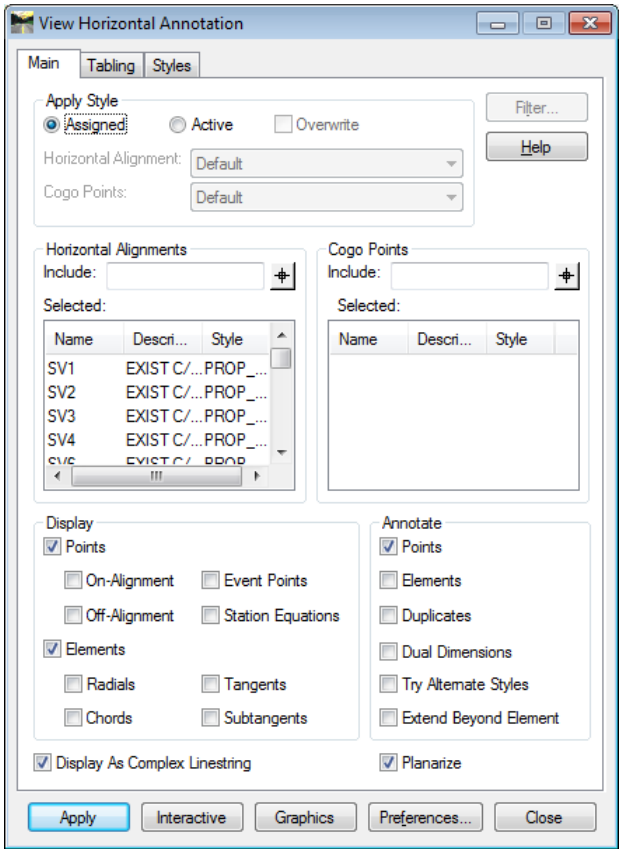


Figure L3-4 View Horizontal Annotation

11.	• Click in the **Cogo Points** '**Include**' field to activate the **Filter** button for the Cogo Points. • Click the **Filter** button to open the **Geometry Selection Filter** for the Cogo Points. • Click the **All** button to move all the points in the **'Available'** field to the **'Selected'** field. • Click **OK** to close the **Geometry Selection Filter** dialog and populate the **View Horizontal Annotation** frame's **Cogo Points** **'Selected'** field. • Verify your view matches that shown in *Figure L3-5*. *The Geometry Selection Filter lists all the Cogo Points in the Available field and allows the user to Filter data for viewing by several methods.*

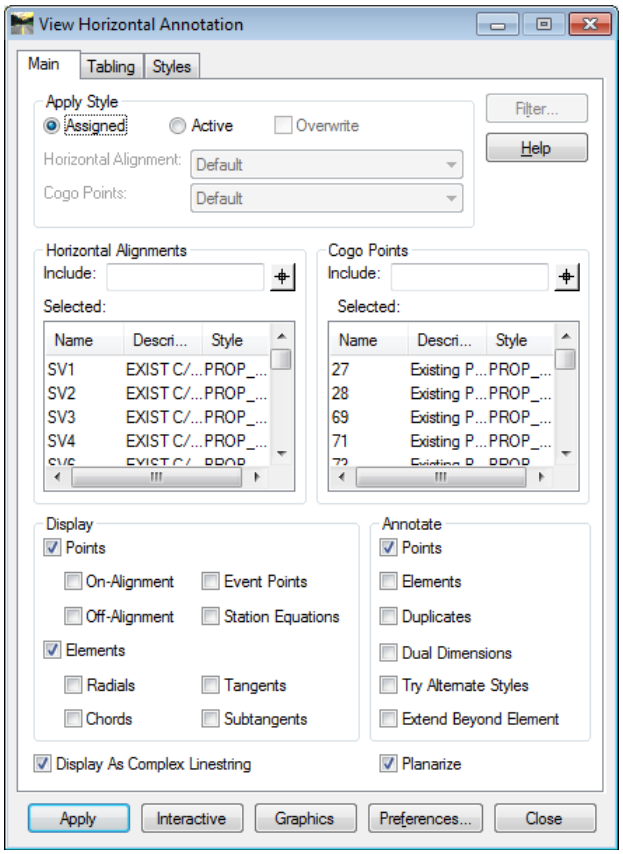


Figure L3-5 View Horizontal Annotation

12.	• In the **View Horizontal Annotation** dialog click **Apply** and then click **Close**. (Please be patient -- viewing may take time.) • In MicroStation, Click the **Fit View** button. **Fit View** • Verify your MicroStation view resembles that shown in *Figure L3-6*.

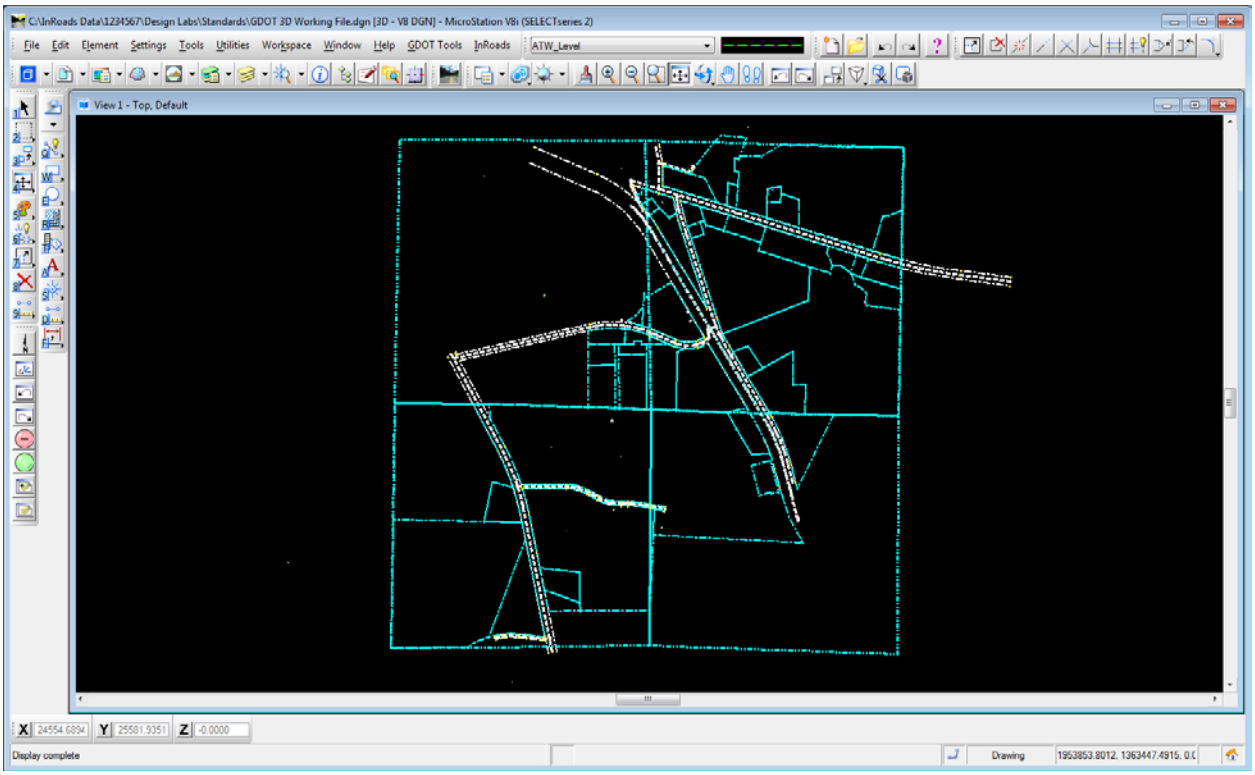
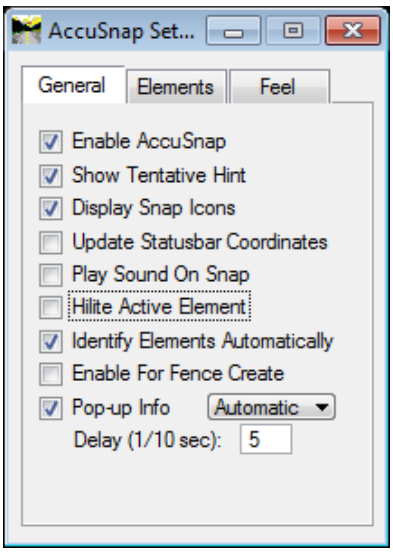


Figure L3-6 MicroStation Window

13.	**<u>***IMPORTANT DISCUSSION***</u>** *It is <u>very important</u> at this time to discuss some differences between InRoads and what you are familiar with in CAiCE. InRoads has different kinds of points. <u>Alignment points</u> and <u>COGO points</u> are two types of points to be aware of. <u>Alignment points</u> are nothing more than names assigned to coordinates in an alignment and do not exist in the COGO points buffer. In order to satisfy GDOT plan presentation requirements, prepare R/W tables and properly add enhanced survey data to your project. -- Surveyors and Designers alike must ensure that all alignments have a corresponding COGO point stored. At some point this may cause you problems as you branch out and experiment with other InRoads commands because not all InRoads commands store COGO points. Some only assign Alignment Point names and must be converted to COGO points. Some don't assign Alignment Point names or store COGO points and must be assigned Alignment Point names and then be converted to COGO points. As such we recommend that you adhere closely to the methods presented in the tutorials concerning centerlines, R/W and property. We bring this up at this point because it is possible to view points at the same time as viewing Alignments without having to populate the Cogo Points in the <u>View Horizontal Annotation</u> command. Viewing points in this manner would not apply the correct attributes to the points -- therefore you must view the Cogo points separately.*

14. **InRoads contains a function called Pop-up that is similar to 'Data Tips' in CAiCE**

- In the [MicroStation Menu] -- Select **Settings ▶ Snaps ▶ AccuSnap**
- The **AccuSnap Settings** dialog box will appear. Ensure that your settings contain the same check marks to correspond to the screen capture depicted below:



- Close the **AccuSnap Settings** dialog box by clicking the ☒ in the upper right-hand corner of the window.
- In MicroStation, Left Click on the **Element Selection** tool ( ).
- Move your mouse over any object in the MicroStation Window and the Pop-up will provide information concerning the element as shown in *Figure L3-7*.

Pop-up provides useful information such as element Name, Level and Style.

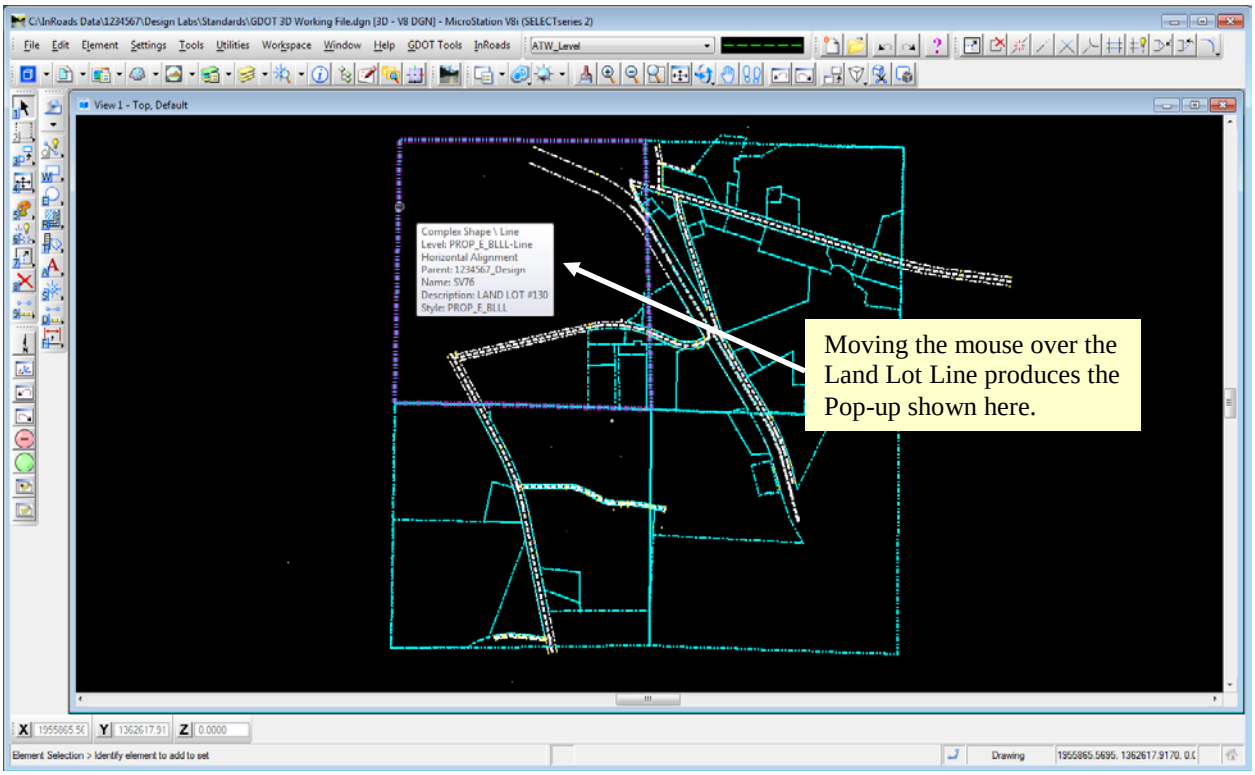


Figure L3-7 MicroStation Window

Lab 3C Create a Design Alignment from an Existing Centerline Alignment

Designers should not use the Existing Centerline Alignment provided by Survey as their Design Alignment but should instead work from a copy of the Existing Centerline. The copy may then be assigned the correct Feature Style and Description as well as any other modifications seen fit. This Lab will show you how to copy an Alignment, apply the correct DE prefix, assign the correct Feature Style and enter the correct Description.

15.	In MicroStation, use the **Window Area** tool to zoom into **US78 (Alignment SV4)** as shown in *Figure L3-8*. Window Area Tool After windowing in - your view should be similar to that shown in *Figure L3-9*.

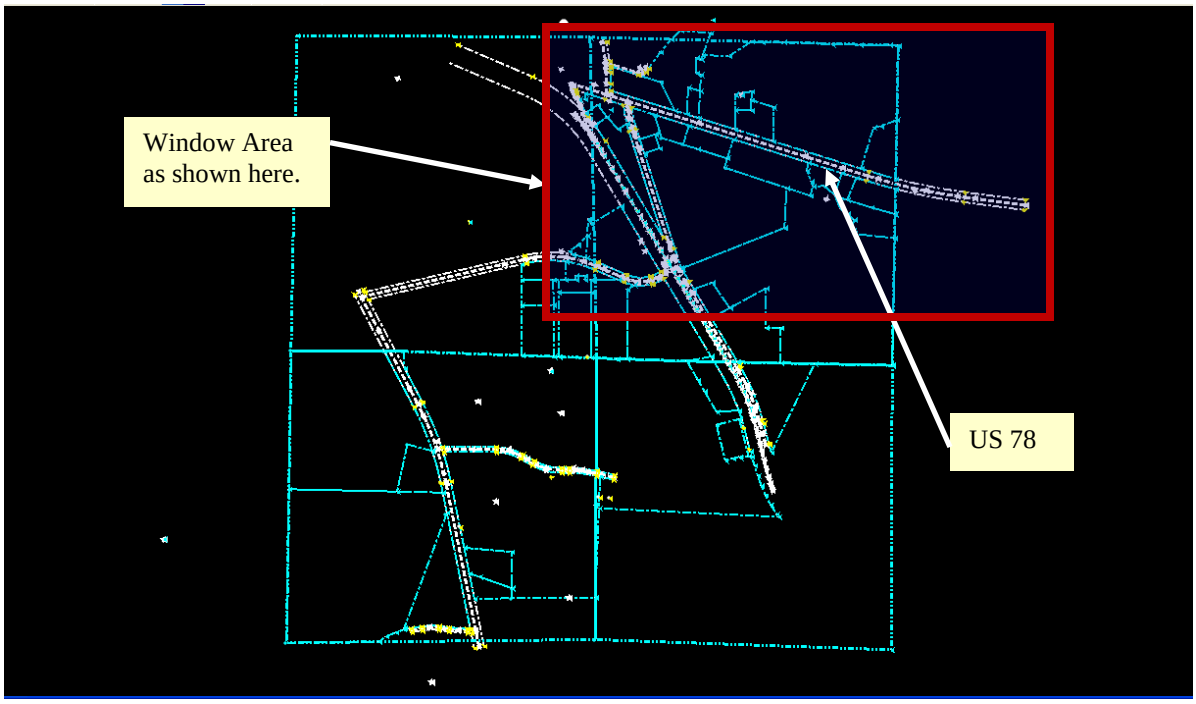


Figure L3-8 MicroStation Window

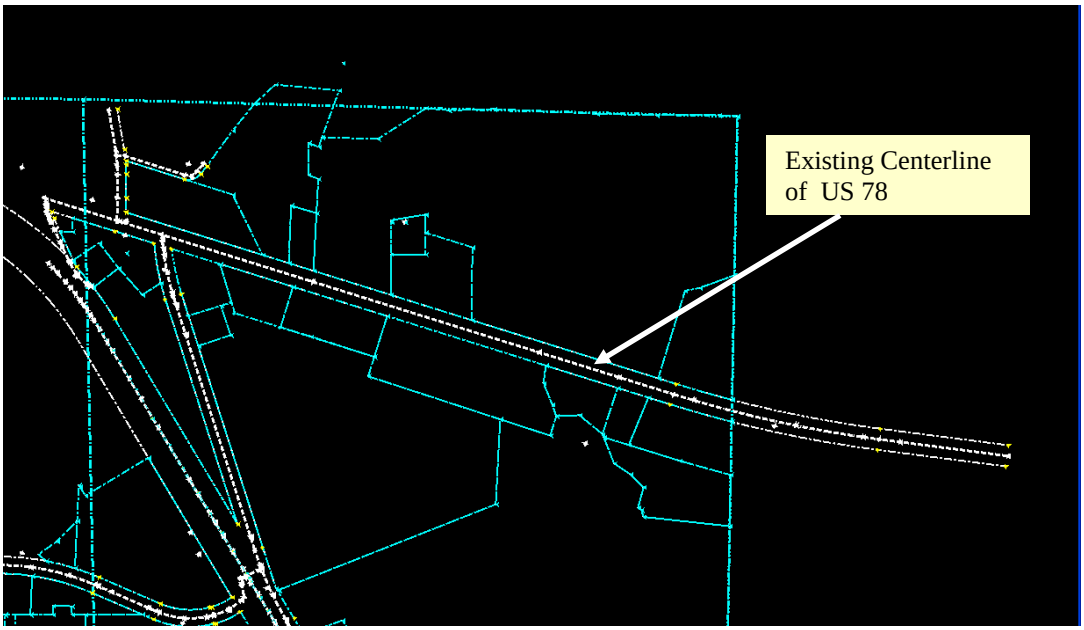


Figure L3-9 MicroStation Window

16.	In InRoads, Select **Geometry ► Utilities ► Parallel Horizontal Alignment.** The **Parallel Horizontal Alignment** dialog opens as shown in *Figure L3-10*. *The Parallel Horizontal Alignment dialog is opened.*

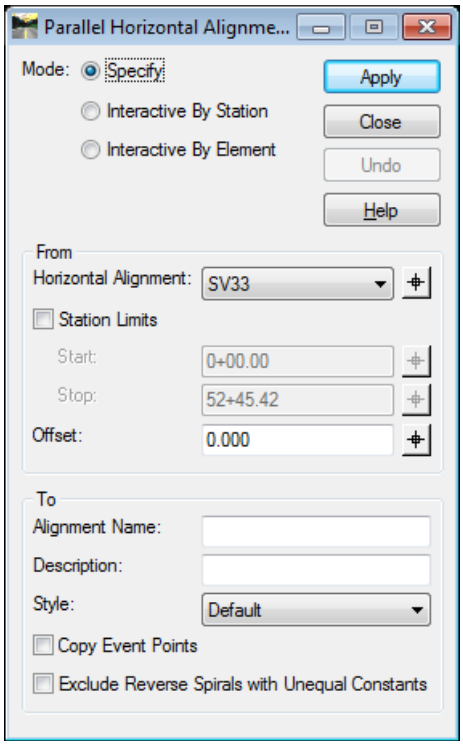
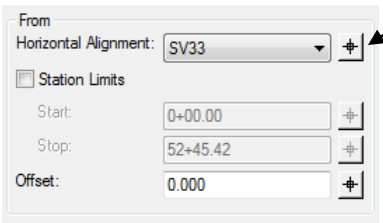


Figure L3-10 Parallel Horizontal Alignment

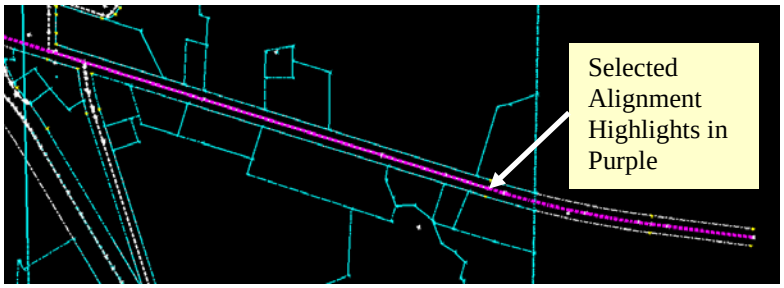
17. **The Parallel Horizontal Alignment tool will be used to copy Existing US78 (SV4), name it DE7 and give it the Feature Style of MAIN_P_SIDECL and Description of 'C/L US 78'.**

-
- In the **From** frame of the dialog box - click the **Locate** button next to **Horizontal Alignment:**. The **Locate** button allows you to graphically select information.

LOCATE BUTTON



- After clicking the locate button the **Parallel Horizontal Alignment** command disappears and you are prompted in the lower left corner of the MicroStation Window to > **Identify alignment**. Look for the prompt > Identify alignment
- **Left click** on **US78 (SV4). SV4** will highlight in Purple as shown here.



- Notice the prompts in the bottom of the MicroStation window. In the bottom middle of the MicroStation Window you are prompted which Alignment was selected with the message '**Selected alignment 'SV4''**. In the bottom left of the MicroStation window you are prompted to **'>Accept/Reject'** the alignment as shown here.

> Accept/Reject | Selected alignment 'SV4'

- **Left Click** on a blank part of the MicroStation window to **Accept** the selection or Right mouse click to Reject the selection and try again.
- The **Parallel Horizontal Alignment** dialog returns and the **Horizontal Alignment:** entry field is populated with **SV4**. Enter the following information in the **To** frame.

  Alignment Name: ***DE7***
  Description: ***C/L US 78***
  Style: ***MAIN_P_SIDECL***
- Verify your entries match those shown in *Figure L3-11*. Click **Apply** & **Close**.
- Verify Alignment **DE7** was drawn in MicroStation as shown in *Figure L3-12*.

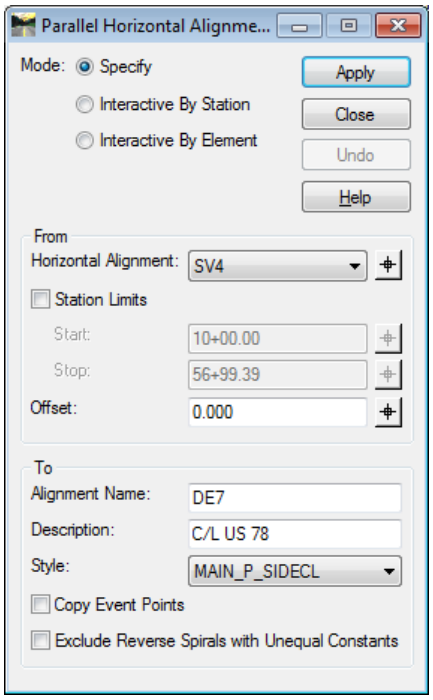


Figure L3-11 Parallel Horizontal Alignment

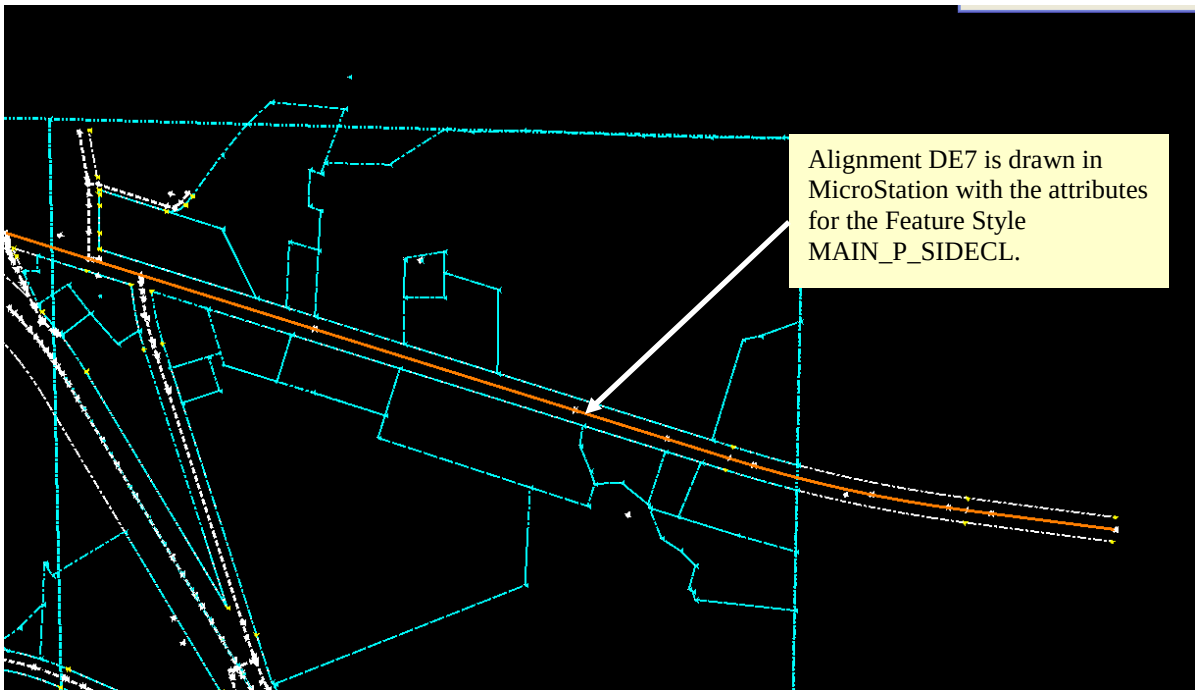


Figure L3-12 MicroStation Window

18.	**Review Alignment DE7.** • In InRoads, Select **Geometry ► Review Horizontal**. The **<u>Review Horizontal Alignment</u>** Report window opens as shown in *Figure L3-13*. • Notice that there are no Point Names or Numbers associated with the Alignment. • Click **Close** to close the Report window. *From this window a text file may be saved by clicking the Save As.. button.*

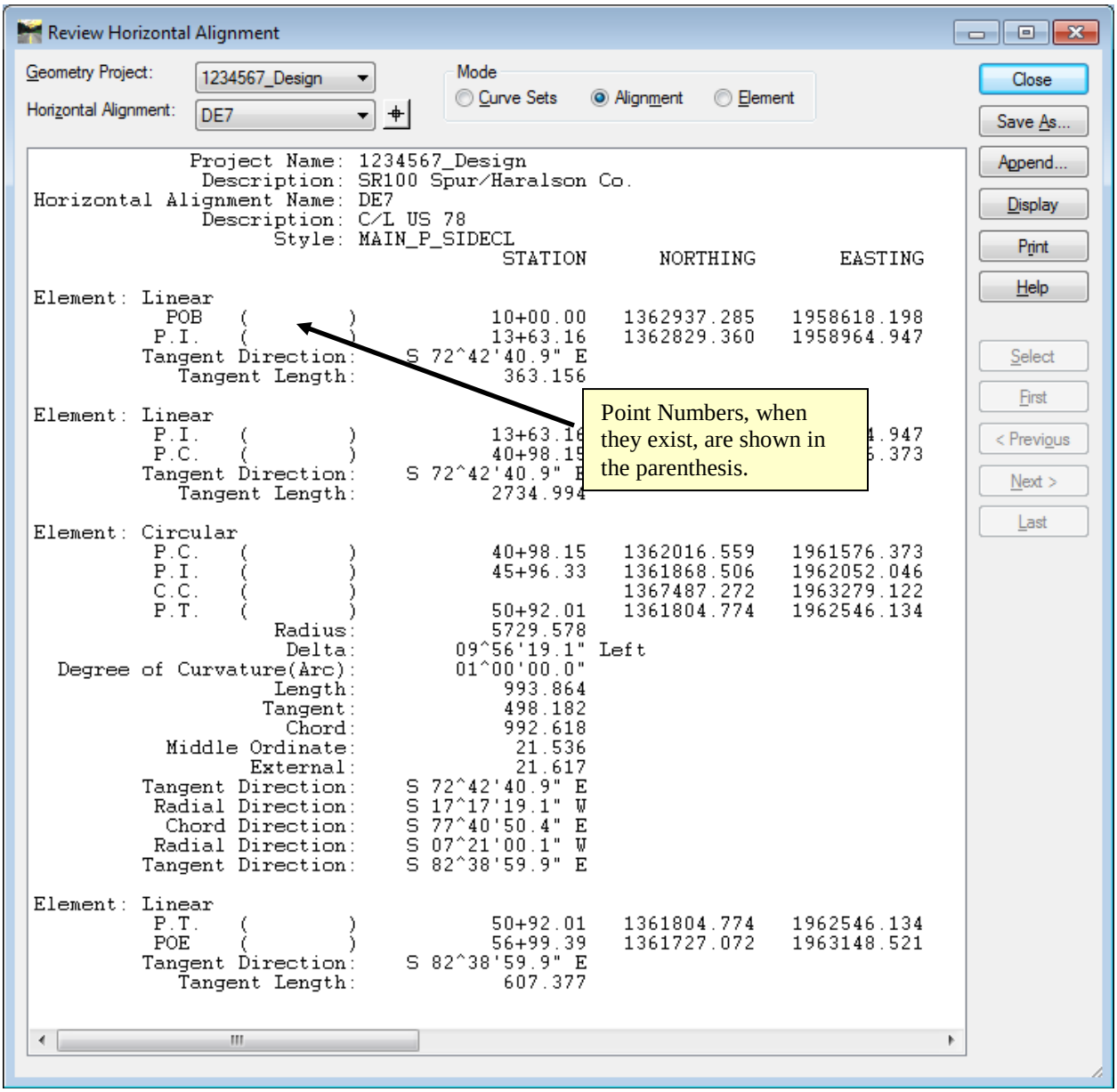


Figure L3-13 Review Horizontal Alignment

19.	**Assign Point Names to Alignment DE7.** • In InRoads, Select **Geometry ► Utilities ► Assign Names**. The **Assign Names** dialog opens. • Check the **Alignments** radio button. • Use the **Locate** button to select Alignment **DE7**. ***Hint:*** During this process – watch/follow the prompts at the bottom of the MicroStation Window to identify the element, accept/reject, etc. (Left click to accept Alignment **DE7** and the dialog box will return.) • Uncheck '**Check for Coincident Points**'. **Please Note"** In this case, a new Proposed Alignment is created from an Existing Survey Alignment, therefore, new points need to be created instead of using Coincident Points. • Verify your entries match those shown in *Figure L3-14*. • Click **Apply** & **Close**. *Point Names are assigned to Alignment DE7.*

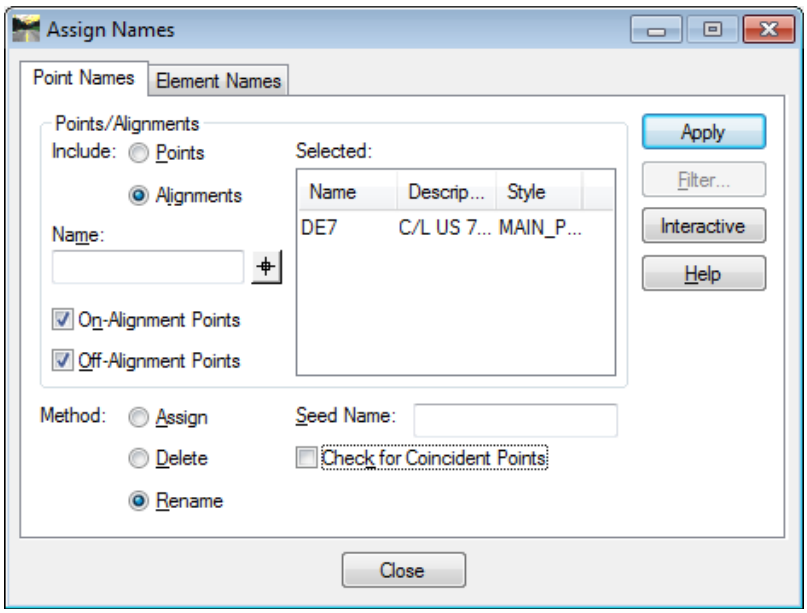


Figure L3-14 Assign Names

20.	**Review Alignment DE7.** • In InRoads, Select **Geometry ► Review Horizontal**. The **Review Horizontal Alignment** Report window opens as shown in *Figure L3-15*. • Notice that Point Names now exist and that they have a **DE** prefix. • Click **Close** to exit the **Review Horizontal Alignment** Report. *Alignment DE7 is reviewed and depicts the Point Names and the DE prefixes of the points.*

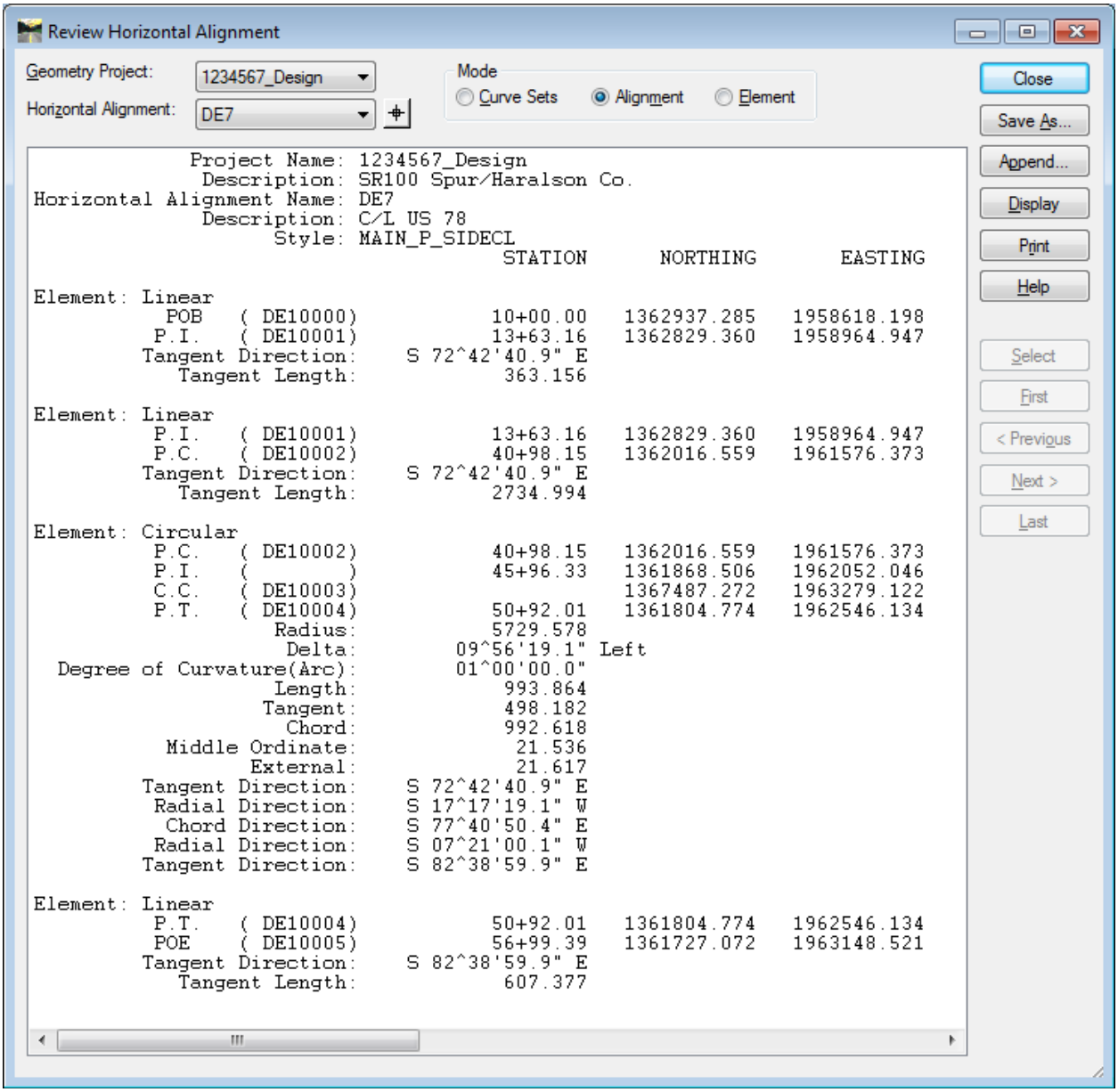


Figure L3-15 Review Horizontal Alignment

21.	**Create COGO Points of all Alignment Points.**
	
	* **IMPORTANT**: Although Point Names (Alignment Points) now exist in Alignment **DE7** for the PI's, PC's and PT's -- the Alignment Points don't actually exist as COGO Points in the COGO Buffer. In order to properly display the points in MicroStation and for the proper delivery of Enhancements during the life of the project, the Alignment Points must be converted to COGO Points and assigned the proper Feature Style.
	
	• Select **Geometry ► Horizontal Curve Set ► Events**…
	• In the **Horizontal Events** dialog:
	  o Check the '**Alignment Point to Cogo'** radio button.
	  o Set the **Style**: to ***MAIN_P_SIDECL***
	  o Accept all other defaults.
	• Click **Apply.** A **Results** Report opens showing all points that are now COGO Points.
	• Click **Close** to close the **Results** box.
	• Click **Close** to close the **Horizontal Events Dialog.**
	
	*** Note:** Cogo Points are only assigned to Alignment Points for the active Alignment. The process must be repeated for each Alignment.
	
	Cogo Points are created from the Alignment Points and are stored in the Cogo Buffer.

22.	**Save the InRoads Geometry File** Even though the Alignment has been stored – the data has not yet been saved. InRoads retains the data in temporary memory but does not save the data on the fly. Whenever a change has been made to an InRoads Geometry Project – Save the Project and its associated modifications or changes. • Select **File►Save► Geometry Project** from the **InRoads Menu**. The Geometry Project (***1234567_Design.alg***) will be saved to **Lab 3** in the following path: **C:\InRoads Data\1234567\Design Labs\Lab 3** Note that the **InRoads** and **MicroStation Status Bar** (Located at the bottom of both the InRoads and MicroStation Interface) will depict a message when the Geometry Project has been saved. *The Geometry File is saved to the following path:* *C:\InRoads Data\1234567\Design Labs\Lab 3*

23.	**Station Alignment DE7 to Begin at Station 1+00.00** • Select **Geometry ► Horizontal Curve Set ► Stationing**. The **Stationing** dialog opens as shown in *Figure L3-16*. *Opens the Stationing dialog box.*

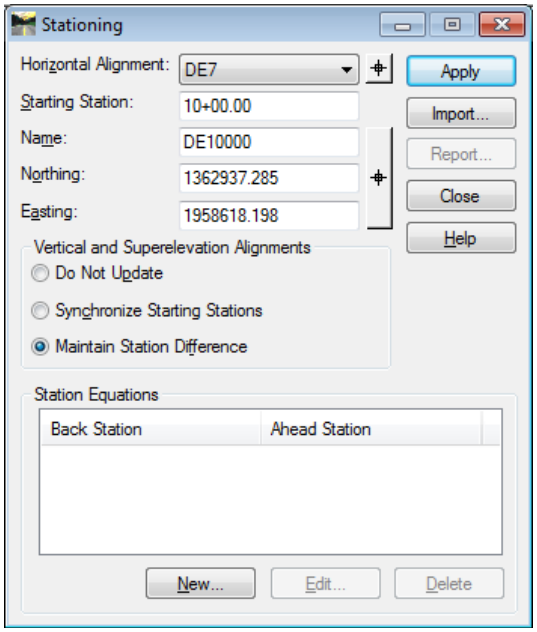


Figure L3-16 Stationing

24.	• In the **Stationing** dialog, enter ***1+00.00*** in the '**Starting Station:**' entry field. • Verify your entries match those shown in *Figure L3-17*. • Click **Apply** & **Close**. *The beginning Alignment Stationing is entered as 1+00.00.*

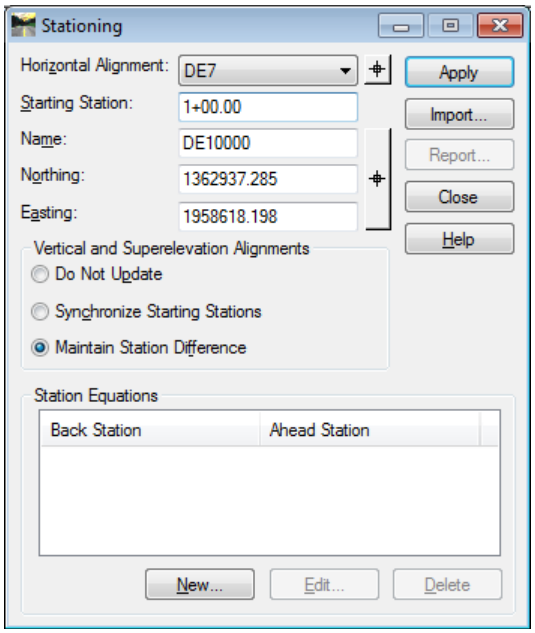


Figure L3-17 Stationing

25.	**Review Alignment DE7.** • In InRoads, Select **Geometry ► Review Horizontal**. The **<u>Review Horizontal Alignment</u>** Report window opens as shown in *Figure L3-18*. • Notice that the Alignment now begins at **Sta.1+00.00** • Click **Close** to exit the **<u>Review Horizontal Alignment</u>** Report. *The Alignment now depicts a starting Station of 1+00.00.*

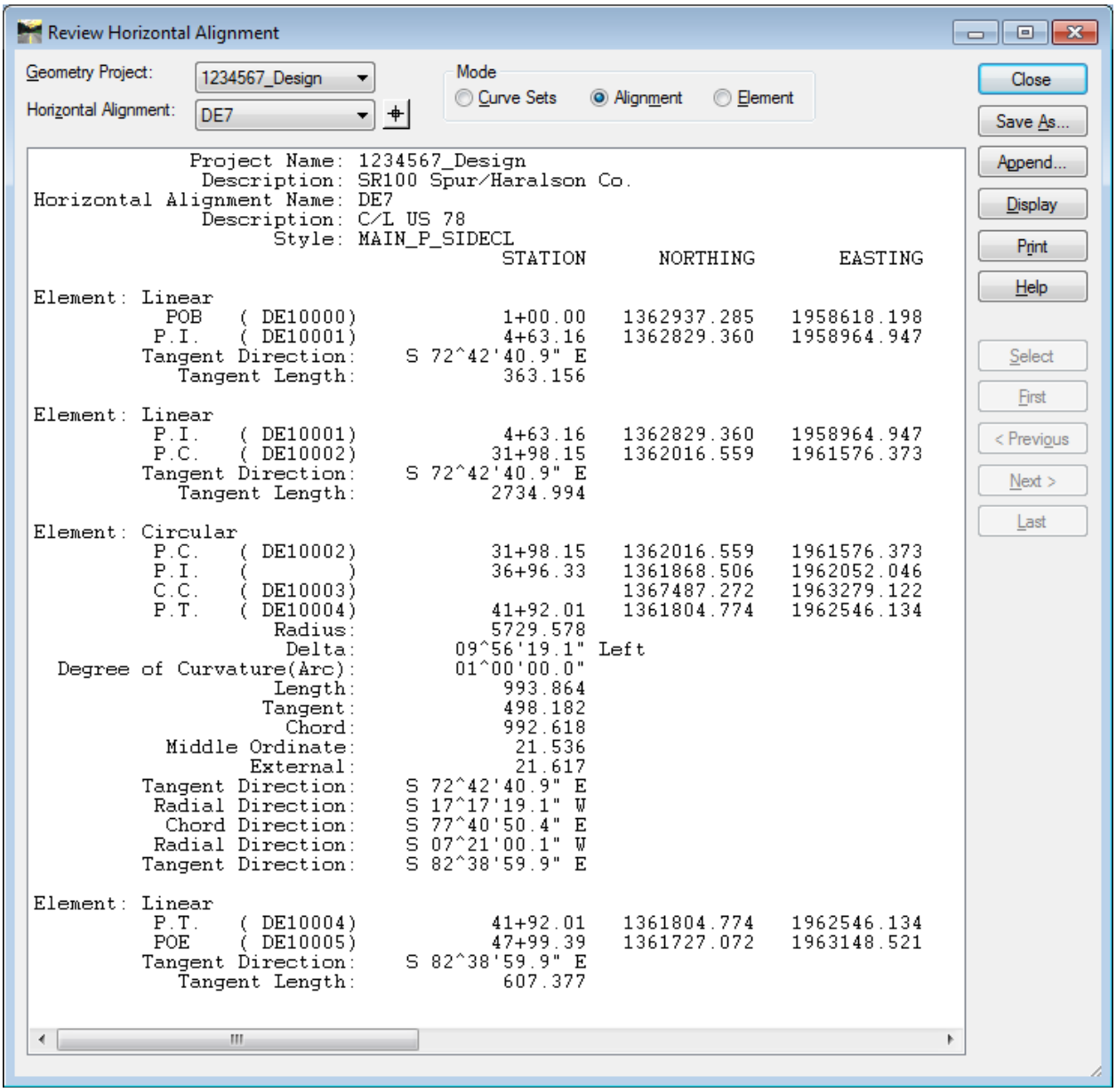


Figure L3-18 Review Horizontal Alignment

26.	**View the Stationing for Alignment DE7** • In InRoads, Select **Geometry ► View Geometry ► Stationing**. The **<u>View Stationing</u>** dialog opens. • Click the **Preferences** button. • In the **<u>Preferences</u>** dialog Highlight ***SIDECL***. • Click **Load** and **Close**. • In the **<u>View Stationing</u>** dialog Click **Apply** & **Close.** • Zoom into Alignment **DE7** and verify it matches that shown in *Figure L3-19*. *The Stationing for Alignment DE7 is depicted.*

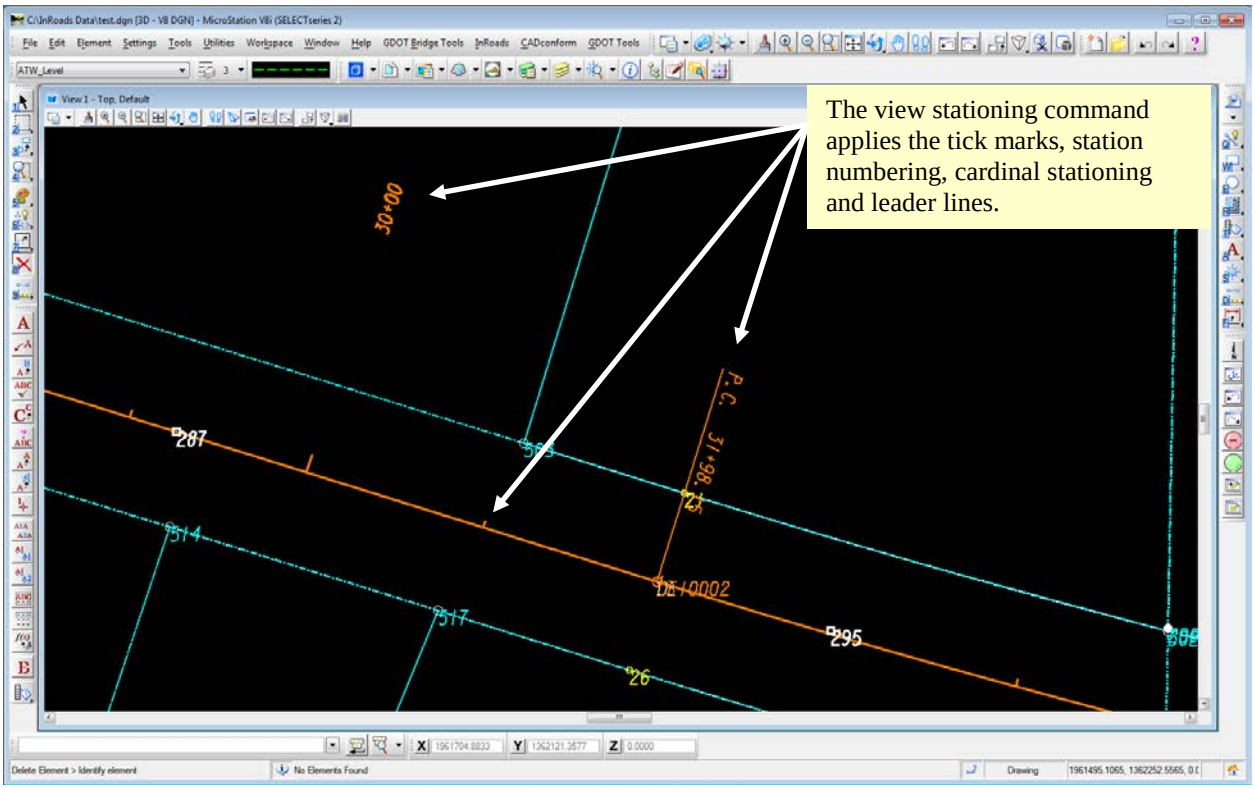


Figure L3-19 MicroStation Window

	In MicroStation, Click the **Fit View** button. **Fit View** *The MicroStation View of the Geometry Project is fit to the screen.*

Lab 3D Create a New Location Alignment

This Lab will depict how to create a New Location Alignment.

27.	• In InRoads, Select **File ► New**. The **New** dialog opens. • Select the **Geometry** tab. • Make the following entries: o **Type:** ***Horizontal Alignment*** o **Name:** ***DE31*** o **Description:** ***C/L SR100 SPUR*** o **Style:** ***MAIN_P_CONSTCL*** • Verify your entries match those shown in *Figure L3-20*. • Click **Apply** & **Close**. *Creates a new empty alignment named DE31.*

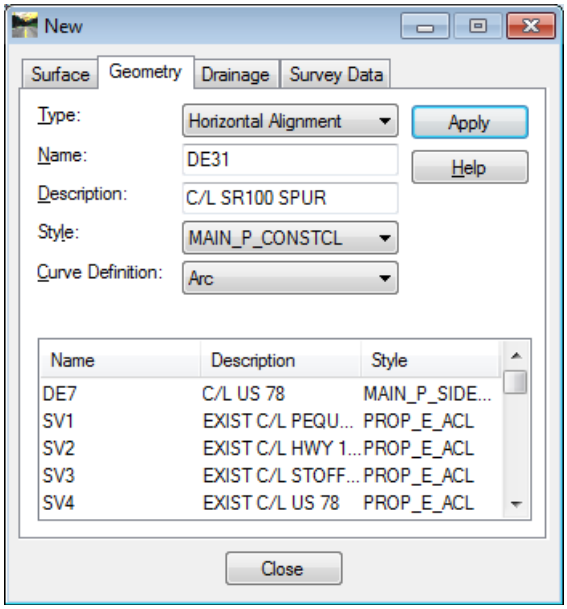


Figure L3-20 New Dialog

28.	**DE31 will begin at the Intersection of Alignments SV2 (EXIST C/L HWY 100) and SV1 (EXIST C/L PEQUANOC DR as shown in *Figure L3-21*.** • In MicroStation, Use the **Window Area** command to zoom into the Intersection of **SV2** and **SV1** as shown in *Figure L3-21* and *Figure L3-22*. Window Area *Zooms to the intersection of SV2 and SV1.*

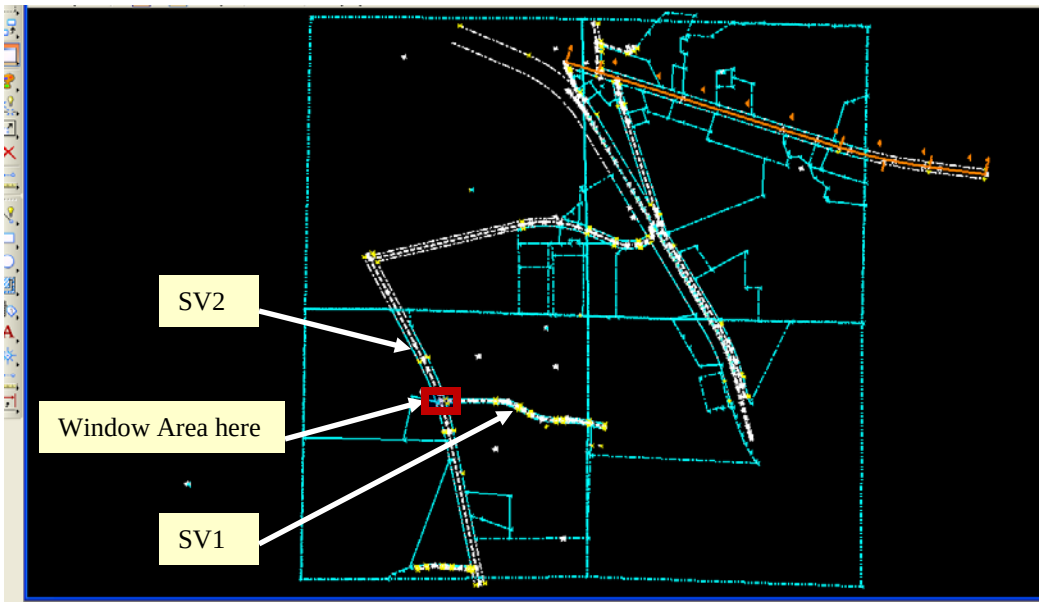


Figure L3-21 MicroStation Window

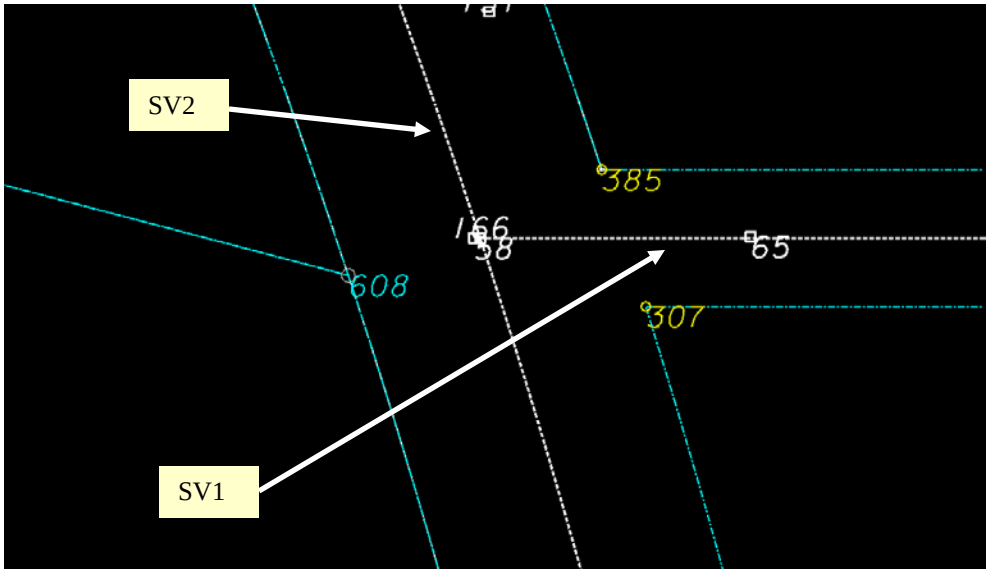


Figure L3-22 MicroStation Window

29.	**Store a Point at the Intersection of SV1 and SV2.** • In InRoads, Select **Geometry ► Locate ► Intersection.** The **Intersection** dialog opens. • Change the **Type:** to ***Alignment/Alignment***. • Use the **Locate** button to select **SV1** for **Alignment 1**. Notice the prompts in the lower left corner of the MicroStation Window as you do this. • Use the **Locate** button to select **SV2** for **Alignment 2**. Notice the prompts in the lower left corner of the MicroStation Window as you do this. • Verify your entries match those shown in *Figure L3-23*. *The Locate Button is used to select SV1 and SV2.*

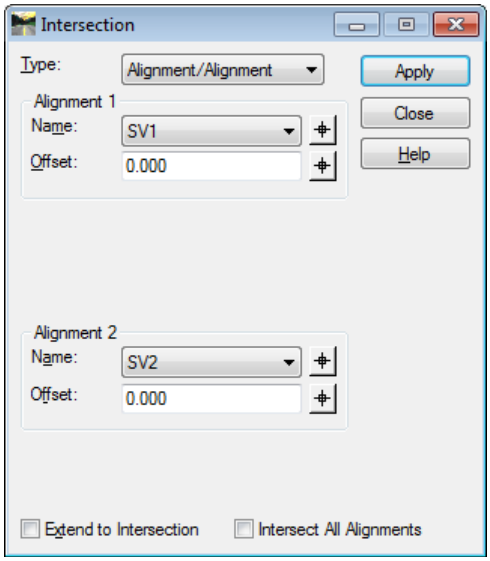


Figure L3-23 Intersection

30.	• In the **Intersection** dialog, click **Apply**. The **Locate Results** dialog opens and the Point is highlighted in MicroStation in purple. • In the **Locate Results** dialog, change the **Style:** to ***MAIN_P_CONSTCL***. • Verify your entries match those shown in *Figure L3-24*.

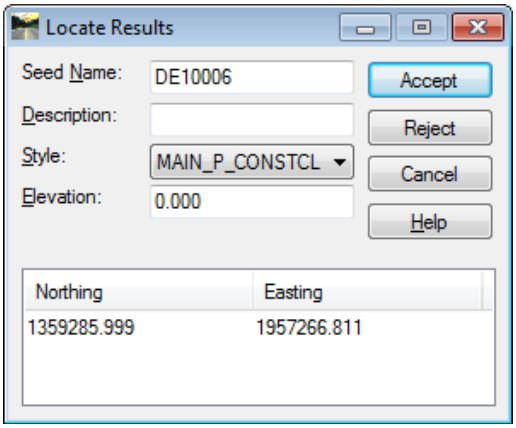


Figure L3-24 Locate Results

31.	• Click **Accept**. The **Results** dialog opens as shown in *Figure L3-25*. • Review the **Results** dialog and then click **Close**. • Click **Close** to close the **Intersection** dialog. *Cogo Point DE10006 is stored.*

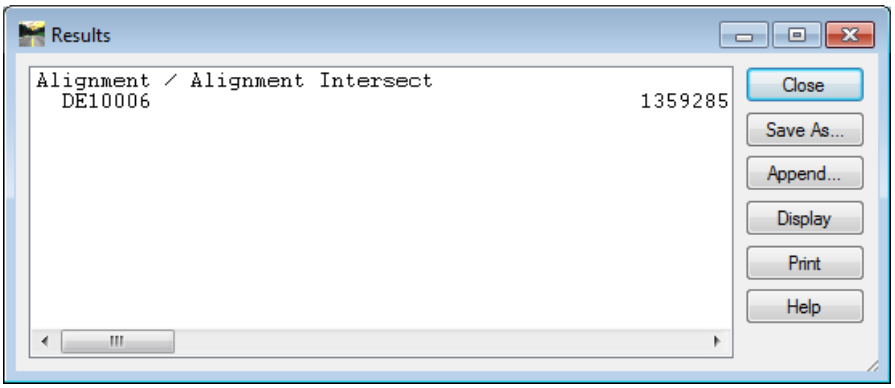
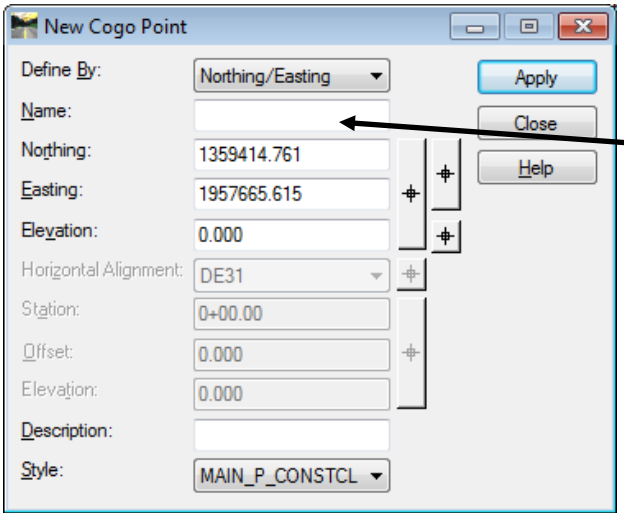


Figure L3-25 Results

32.	**The next two PI's for Alignment DE31 will be stored by entering Northing and Easting Coordinates.** • In InRoads, Select **Geometry ► Cogo Points ► New.** The **New Cogo Point** dialog opens. • Enter the following information: o **Define By:** ***Northing/Easting*** o **Northing:** ***1359414.761*** o **Easting:** ***1957665.615*** o **Style:** ***MAIN_P_CONSTCL*** • Verify your entries match those shown in *Figure L3-26*. • Click **Apply**. The **Results** dialog opens and Cogo Point **DE10007** is stored and viewed in MicroStation as shown in *Figure L3-27*. • Close the **Results** dialog but do not close the **New Cogo Point** dialog. *Cogo Point DE10007 is stored.*



When a name is not entered in the Name: Field the next available seed point is chosen as set up in the FILE – PROJECT OPTIONS – GEOMETRY tab. In this case DE10007 was the next available name.

Figure L3-26 New Cogo Point

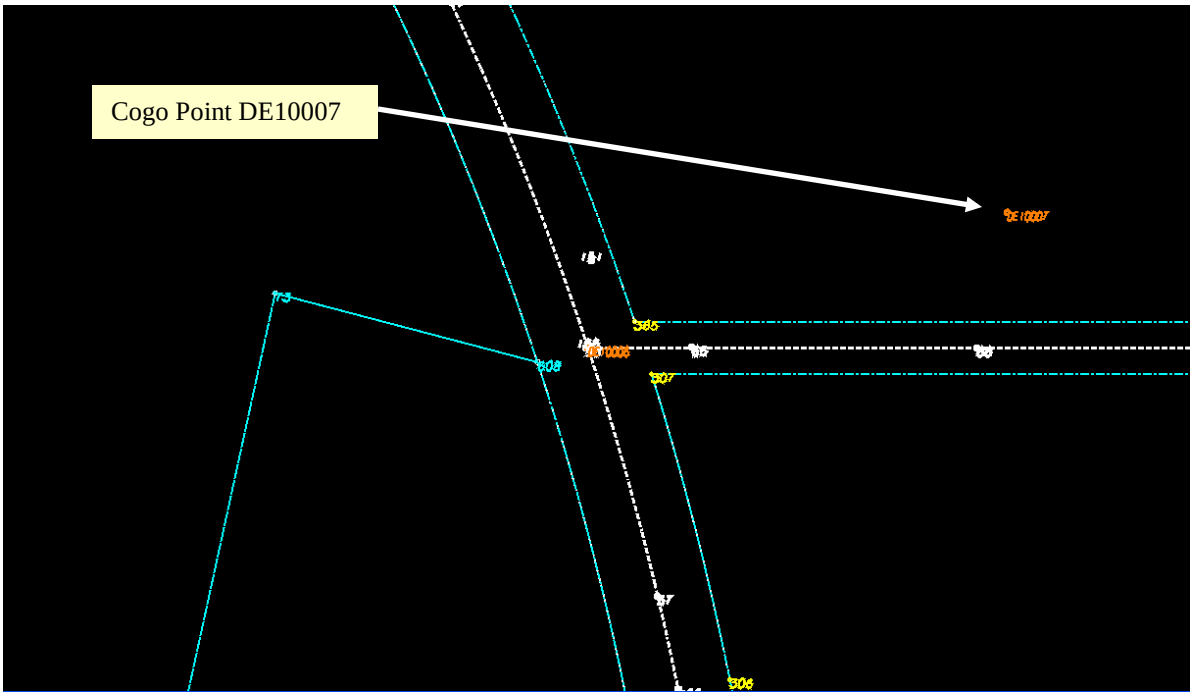
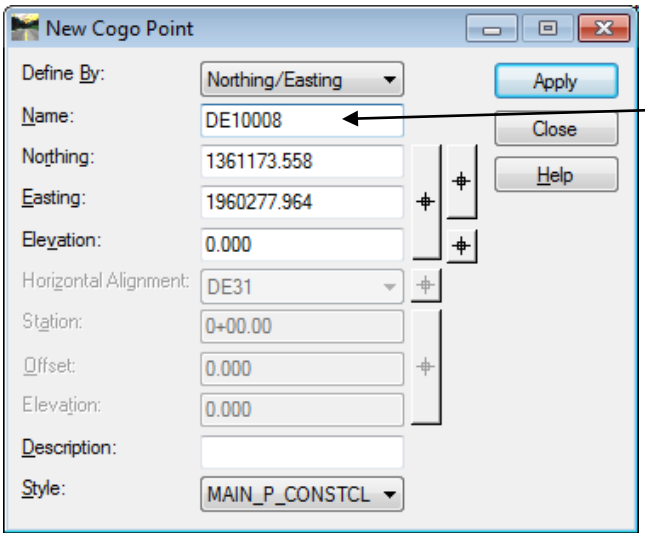


Figure L3-27 MicroStation Window.

33.	• Continuing with the **New Cogo Point** dialog, enter the following information: o **Define By**: ***Northing/Easting*** o **Northing:** ***1361173.558*** o **Easting:** ***1960277.964*** o **Style:** ***MAIN_P_CONSTCL*** • Verify your entries match those shown in *Figure L3-28.* • Click **Apply.** The **Results** dialog opens showing that Cogo Point **DE10008** was stored and **DE10008** is drawn in MicroStation as shown in *Figure L3-29.* You may have to zoom out in MicroStation to see the point. • **Close** the **Results** dialog and **Close** the **New Cogo Point** dialog. • In MicroStation, click the **Fit View** button to see the entire project. *Cogo Point DE10008 is stored.*



DE10008 is the next available point name and was automatically entered when we clicked Apply in Step 33.

Figure L3-28 New Cogo Point

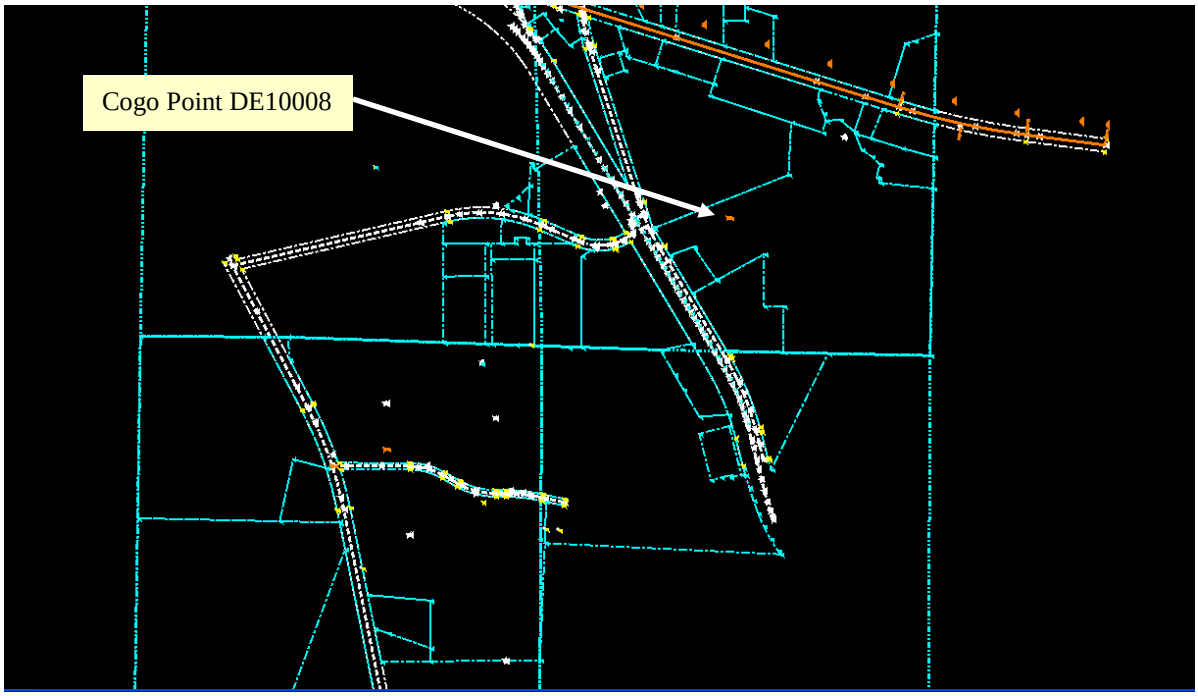


Figure L3-29 MicroStation Window

34.	**The Final PI of Alignment DE31 will be Stored at STA.20+60.00 on Alignment DE7.**
	
	• In InRoads, Select **Geometry ► Cogo Points ► New**
	• In the **New Cogo Point** dialog, change the **Define By:** entry to **Station/Offset**.
	• Make the following entries:
	  o **Horizontal Alignment:** ***DE7***
	  o **Station:** ***20+60.00***
	  o **Style:** ***MAIN_P_CONSTCL***
	• Verify your entries match those shown in *Figure L3-30*.
	• Click **Apply**. The **Results** dialog opens showing Cogo Point **DE10009** was stored and drawn in MicroStation.
	• In MicroStation, **Window Area** as shown in *Figure L3-31*
	• Verify Cogo Point **DE10009** was drawn as shown in *Figure L3-32*.
	• **Close** the **Results** Dialog and the **New Cogo Point** dialog.
	• In MicroStation, click the **Fit View** button.
	
	Cogo Point DE10009 is stored.

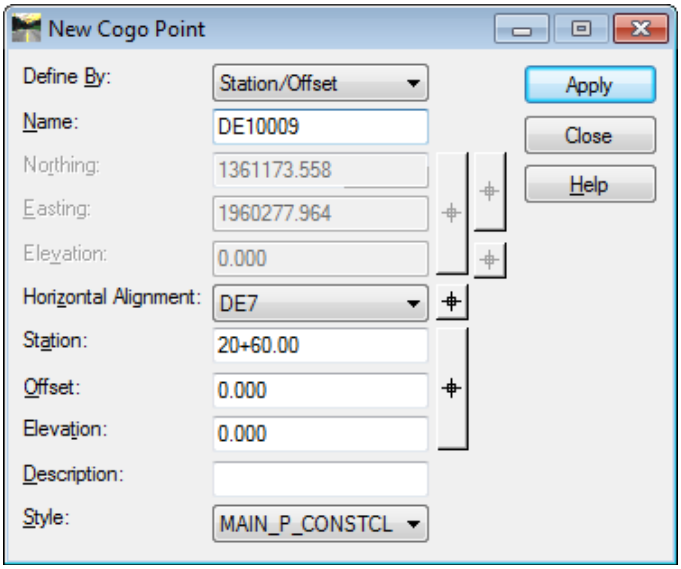


Figure L3-30 New Cogo Point

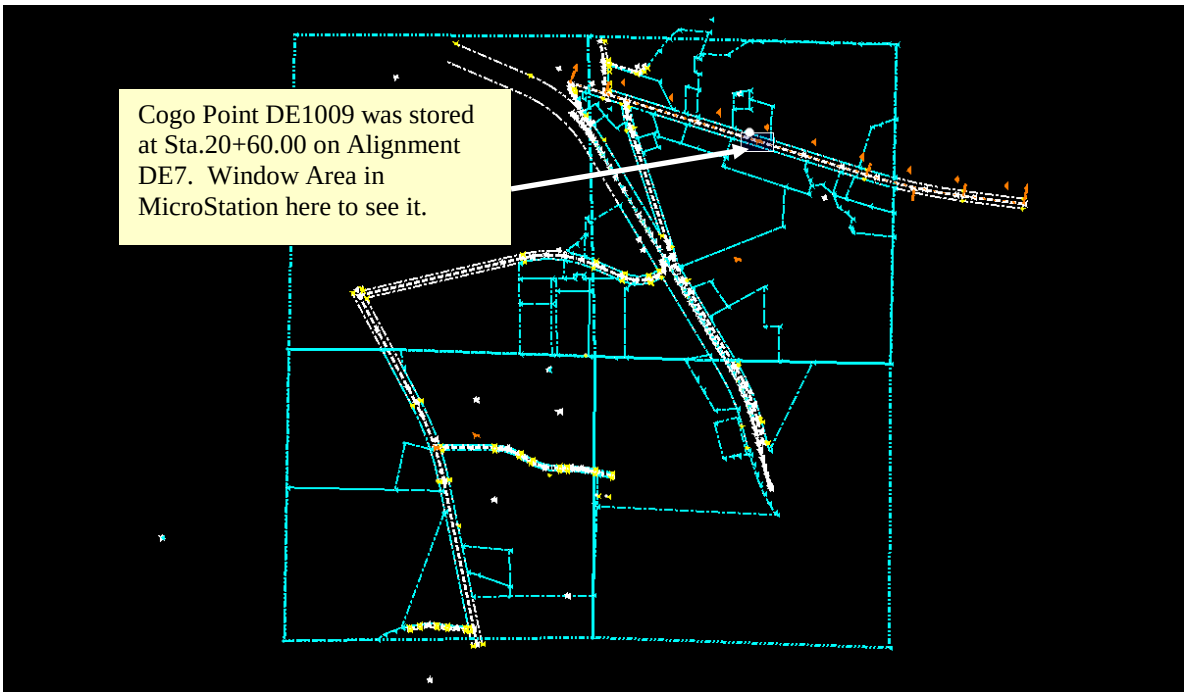


Figure L3-31 MicroStation Window

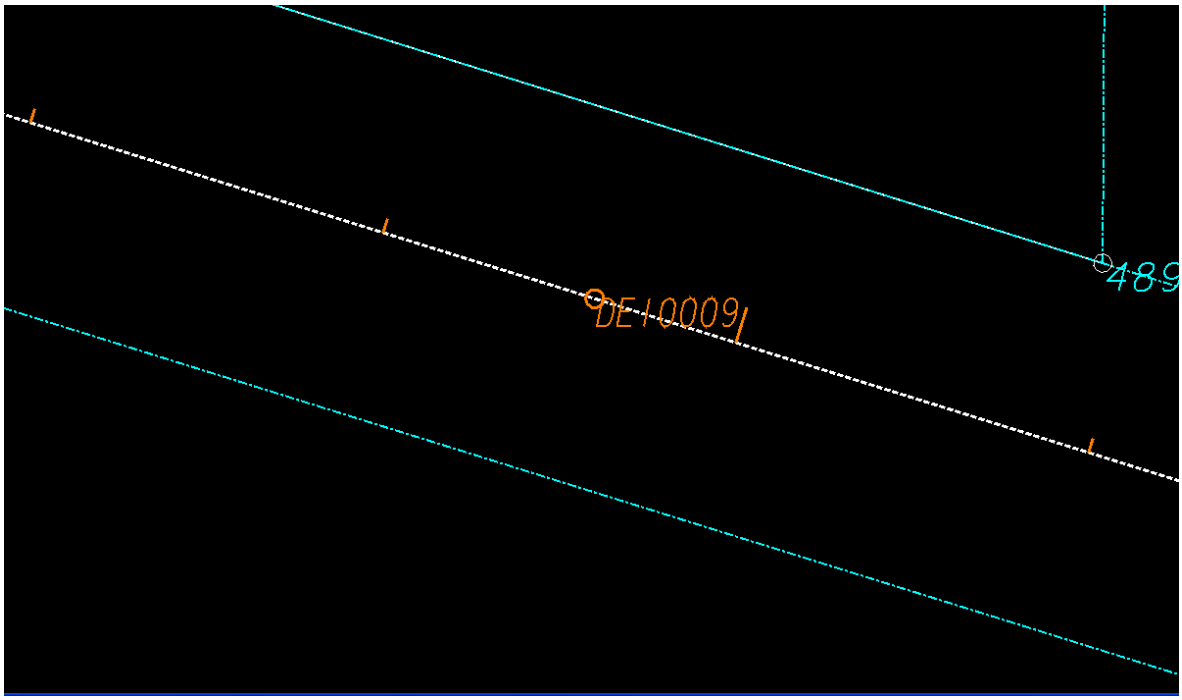


Figure L3-32 MicroStation Window

35. **Save the InRoads Geometry File**

Even though the Cogo Points have been stored – the data has not yet been saved. InRoads retains the data in temporary memory but does not save the data on the fly. Whenever a change has been made to an InRoads Geometry Project – Save the project and its associated modifications or changes.

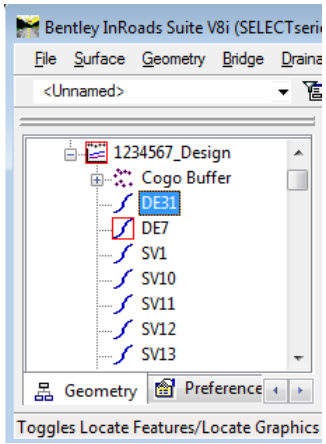
- Select **File ▶ Save ▶ Geometry Project** from the **InRoads Menu**.

The Geometry Project (***1234567_Design.alg***) will be saved to **Lab 3** in the following path:
C:\InRoads Data\1234567\Design Labs\Lab 3

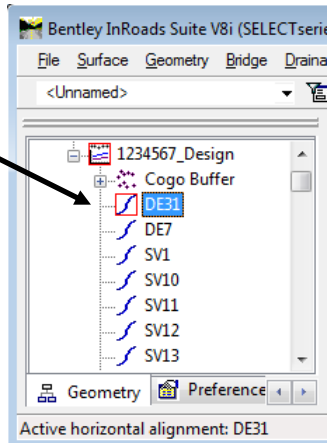
The Geometry File is saved to the following path:
C:\InRoads Data\1234567\Design Labs\Lab 3

36. **Set DE31 to be the Active Alignment**

- In the InRoads workspace bar, left click on Alignment **DE31** to highlight it as shown at right. ***HINT: You may have to scroll to the bottom of the workspace bar to find DE31.**
- Now, Right mouse click over **DE31** and select '**Set Active**'.
- **DE31** should now have a red box around it indicating that it is the Active Alignment.
- Verify that **DE31** has a red box around it as shown below right.



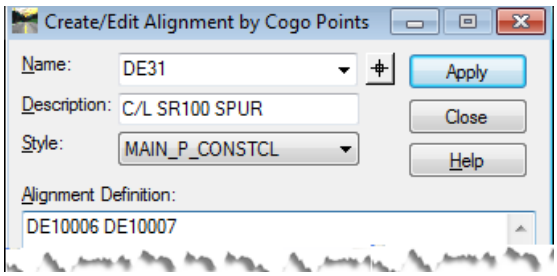
Red Box indicates the active alignment.



The Active Alignment is set to DE31.

37. **Use the '<u>Create/Edit Alignment by Cogo Points</u>' Command to Add Points to an Alignment.**

- In InRoads, Select **Geometry ► Utilities ► Create/Edit Alignment by Cogo Points**. The **<u>Create/Edit Alignment by Cogo Points</u>** dialog opens.
- In the '**Alignment Definition:**' field, Key-in **DE10006 DE10007**.
- Verify your entries match those shown here:



Click **Apply** and **Close** to close out of the **<u>Create/Edit Alignment…</u>** dialog.

- In Microstation, notice that a line was drawn from point DE10006 to DE10007 as shown in *Figure L3-33*.

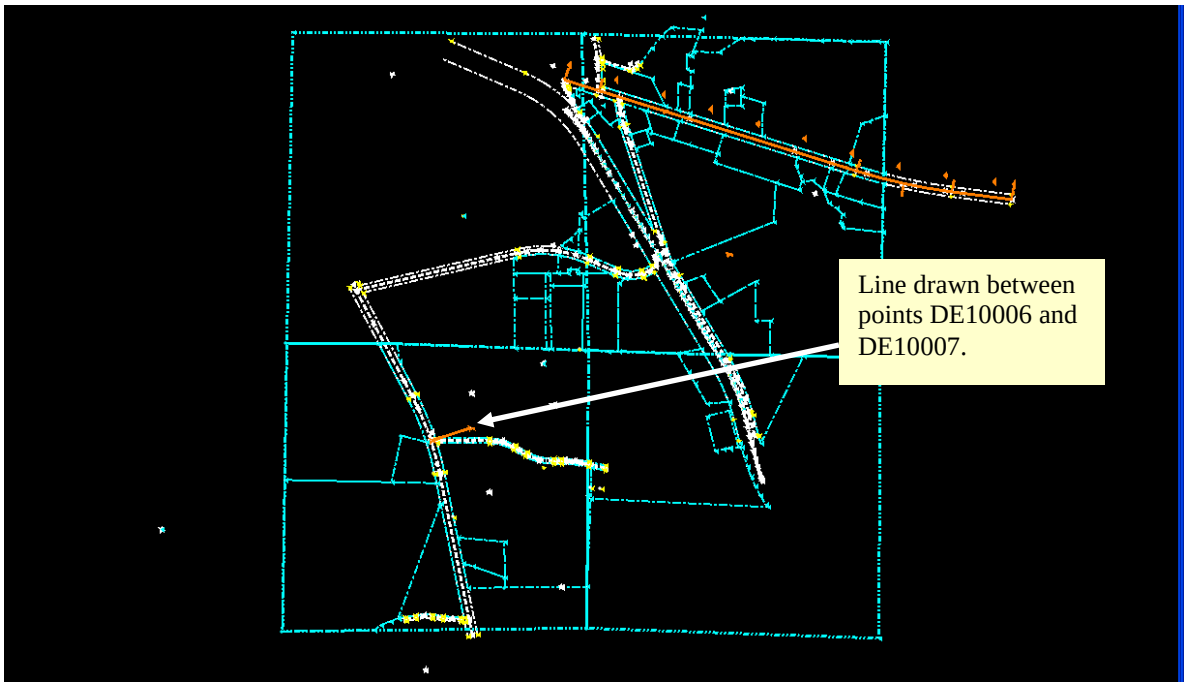
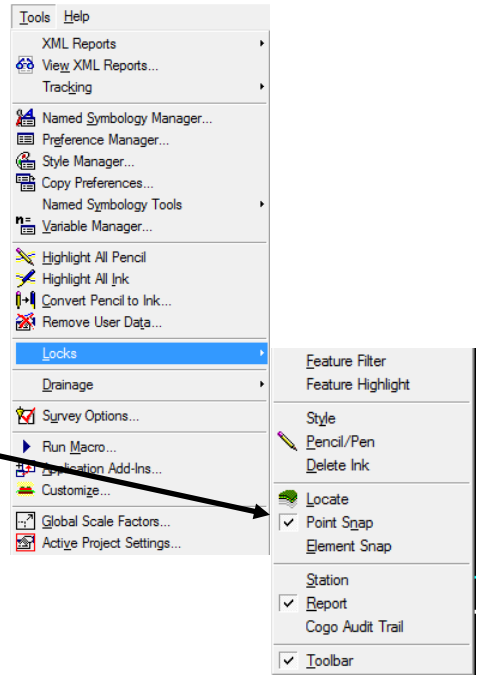


Figure L3-33 MicroStation Window

38. **INFORMATION:** InRoads snaps are separate than snaps in MicroStation. InRoads uses locks to determine what snap mode is utilized. '**Point Snap'** is used to snap to InRoads Points, '**Element Snap**' is used to snap to InRoads elements such as Alignments and '**No Snap**' allows graphic elements in MicroStation to be snapped using the common MicroStation snap options.

- In InRoads, Select **Tools ► Locks** and verify that a Check Mark is next to **Point Snap** as shown here.
- **Point Snap** is now the active snap mode in InRoads.



A check mark next to 'Point Snap' indicates that it is the active snap lock.

The Active InRoads Snap is set to Point Snap.

39. **Use the Create/Edit Alignment by Cogo Points to continue adding the rest of the PI's to Alignment DE31.**

- Select **Geometry ► Utilities ► Create/Edit Alignment by Cogo Points**. The **Create/Edit Alignment…** dialog opens as shown in *Figure L3-34*.

The Create/Edit Alignment by Cogo Points dialog opens.

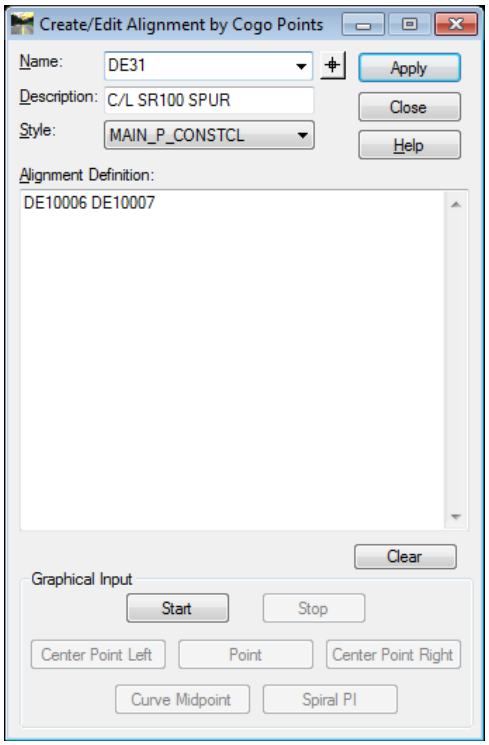


Figure L3-34 Create/Edit Alignment by Cogo Points

40.	**In Addition to Manually Keying in Point Names into the 'Alignment Definition' Field, Points may be Graphically Selected by using the Buttons at the Bottom of the Command.** • Click the **Start** button. • Look in the bottom left corner of the MicroStation Window. You are prompted to **'> Identify Point'**. > Identify Point . • In MicroStation, left click on point **DE10008** as shown in *Figure L3-35*. (You may have to zoom in close to select it.) • Look in the bottom middle of the MicroStation Window. You are prompted with the message. '**Point DE10008 selected'**. Point DE10008 selected . • Look in the bottom left corner of the MicroStation Window. You are prompted to '> **Identify Point'**. > Identify Point . • At this point you can identify another point or you can right mouse click to return to the **<u>Create/Edit Alignment…</u>** command. **Right Mouse** click somewhere over the MicroStation Window to return to the **<u>Create/Edit Alignment…</u>** command. The **<u>Create/Edit Alignment…</u>** command returns as shown in *Figure L3-36*.

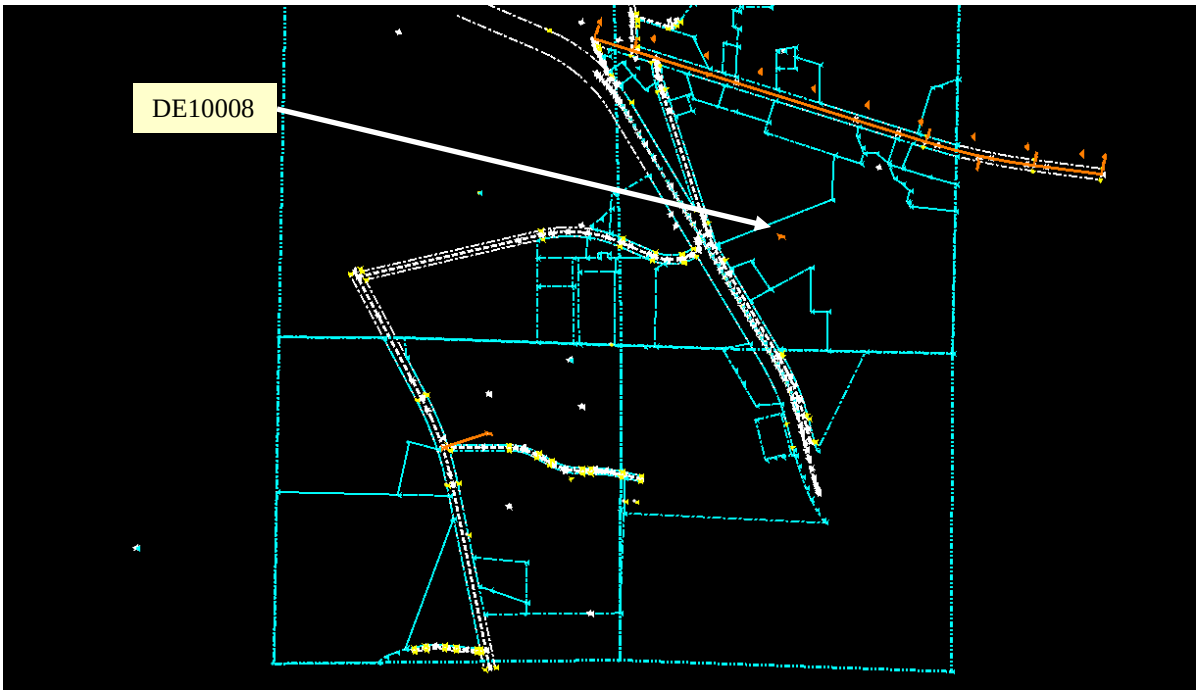


Figure L3-35 MicroStation Window

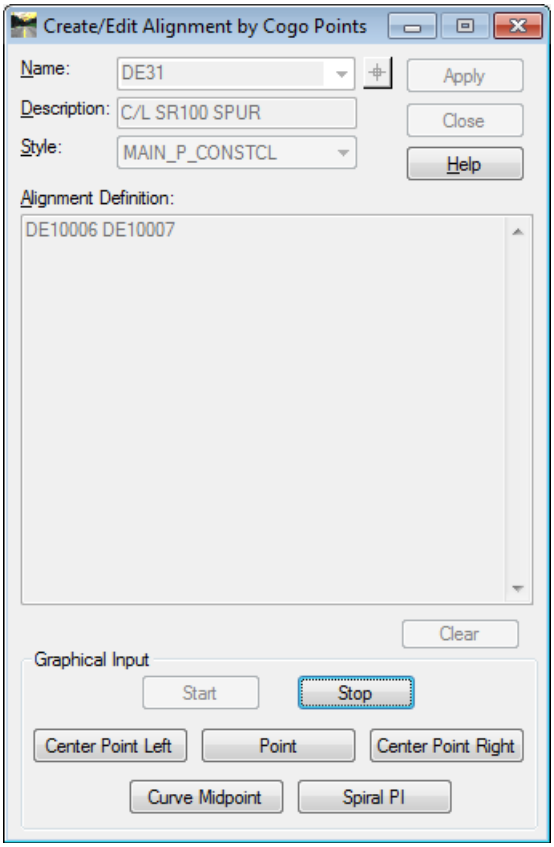


Figure L3-36 Create/Edit Alignment by Cogo Points

41.	Notice that the **Create/Edit Alignment…** Dialog is Grayed out Except for the buttons. At this point you are at an Intermediary Step in the command. Clicking **Stop** will return the selected data to the '**Alignment Definition'** Field. Clicking any other Button will allow you to Continue Selecting Data for inclusion into the '**Alignment Definition'** Field. • Click the **Stop** button. • Verify your entries match those shown in *Figure L3-37*. • Click **Apply**. A line from **DE10007** to **DE10008** was drawn in MicroStation as shown in *Figure L3-38*. • **Do not close** the **Create/Edit Alignment…** dialog. *Adds Point DE10008 to Alignment DE31.*

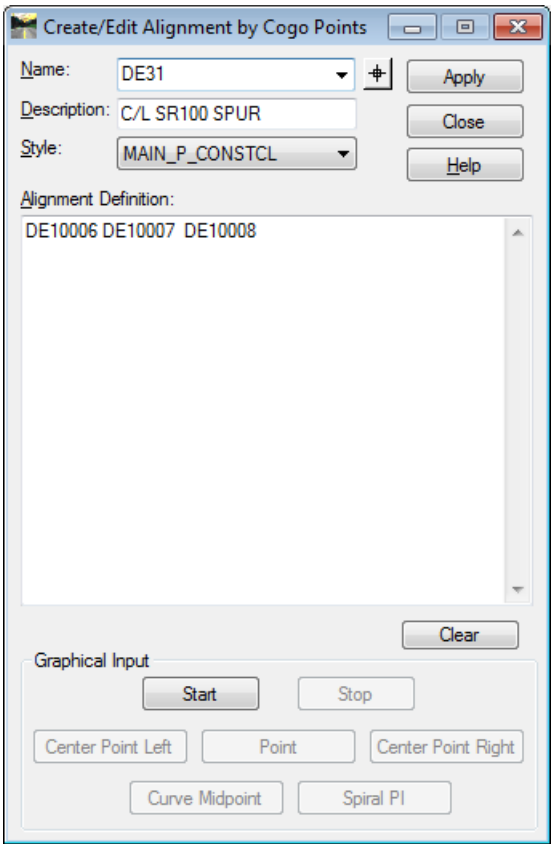


Figure L3-37 Create/Edit Alignment by Cogo Points

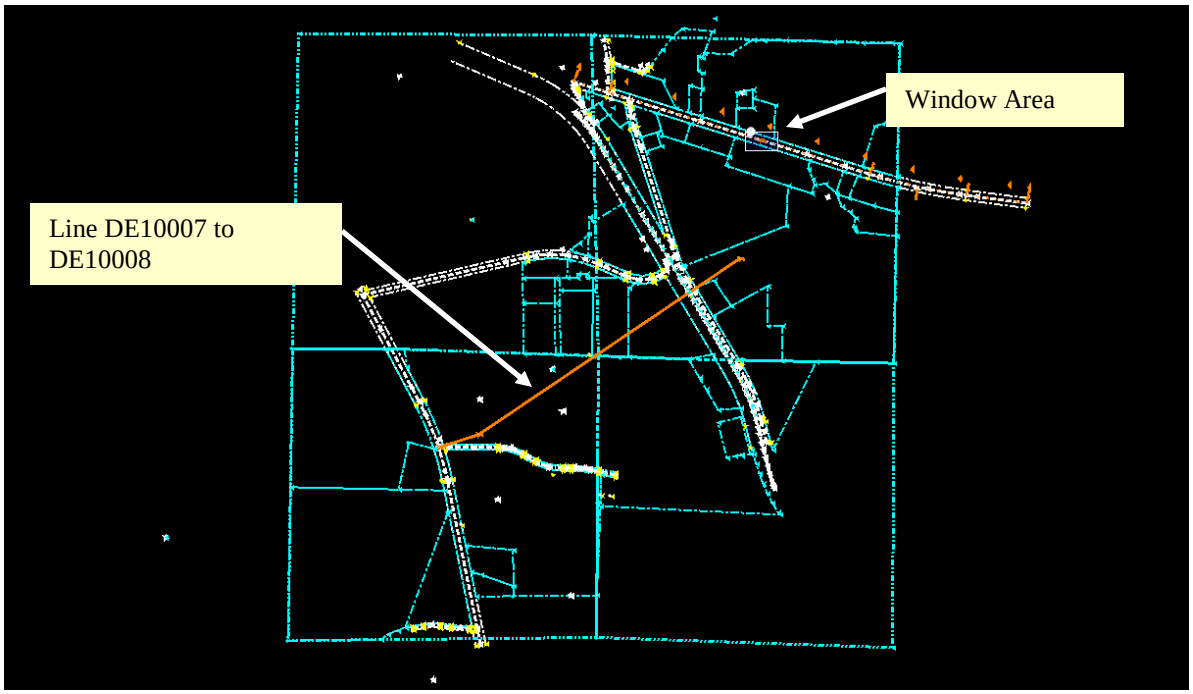


Figure L3-38 MicroStation Window

42.	• In MicroStation, **Window Area** as shown above in *Figure L3-38* to zoom into Point **DE10009** stored earlier. • Verify your MicroStation View matches that shown in *Figure L3-39*. *Zooms to Point DE10009.*

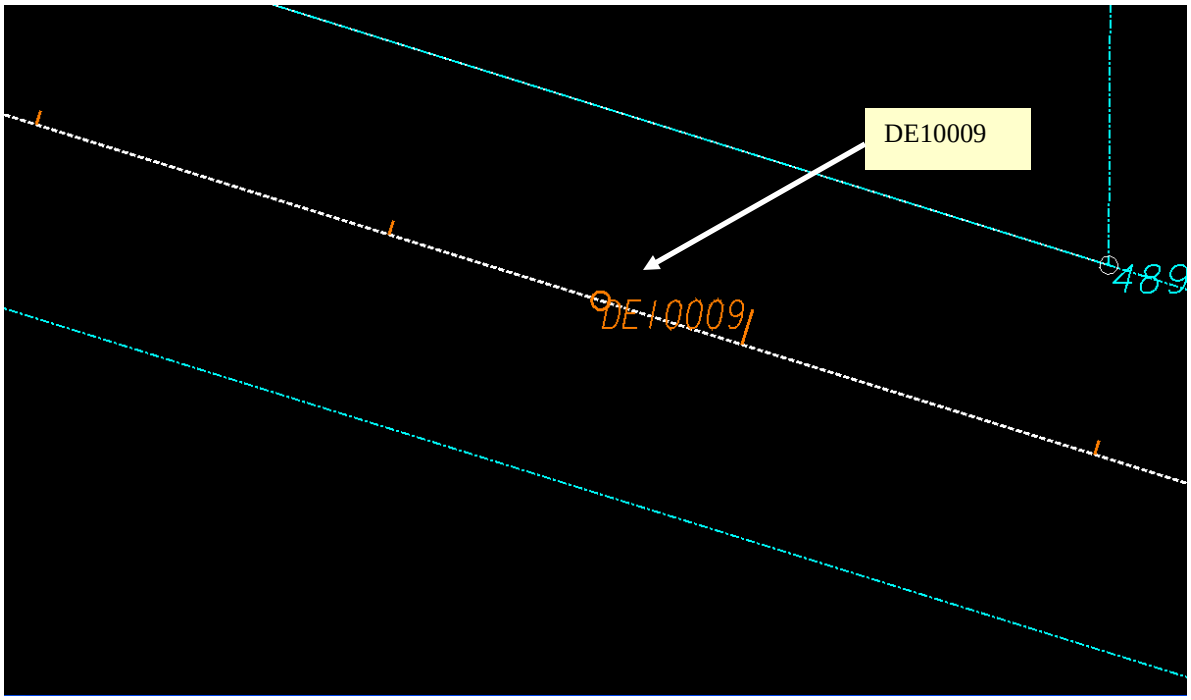


Figure L3-39 MicroStation Window

43.	**The <u>Create/Edit Alignment by Cogo Points</u> Dialog should still be Open**. • In the **<u>Create/Edit Alignment by Cogo Points</u>** dialog, click **Start**. • Notice the Prompt in the lower left corner of the MicroStation Window. > Identify Point . • Left click on Point **DE10009** as shown in *Figure L3-39*. • Notice the Prompt in the lower middle of the MicroStation Window. Point DE10009 selected . • **Right mouse** click to return the **<u>Create/Edit Alignment…</u>** dialog. • Click **Stop** to populate the '**Alignment Definition'** field with **DE10009**. • Verify your view matches that shown in *Figure L3-40*. • Click **Apply** and **Close**. A line was drawn from **DE10008** to **DE10009**. • In MicroStation, Click **Fit View**. Verify a line was drawn from **DE10008** to **DE10009** as shown in *Figure L3-41*. *Adds Point DE10009 to Alignment DE31.*

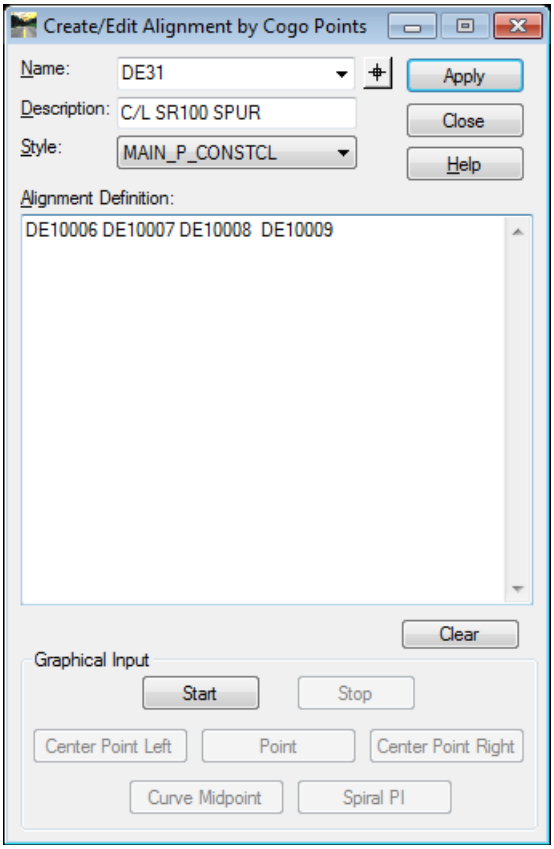


Figure L3-40 Create/Edit Alignment by Cogo Points

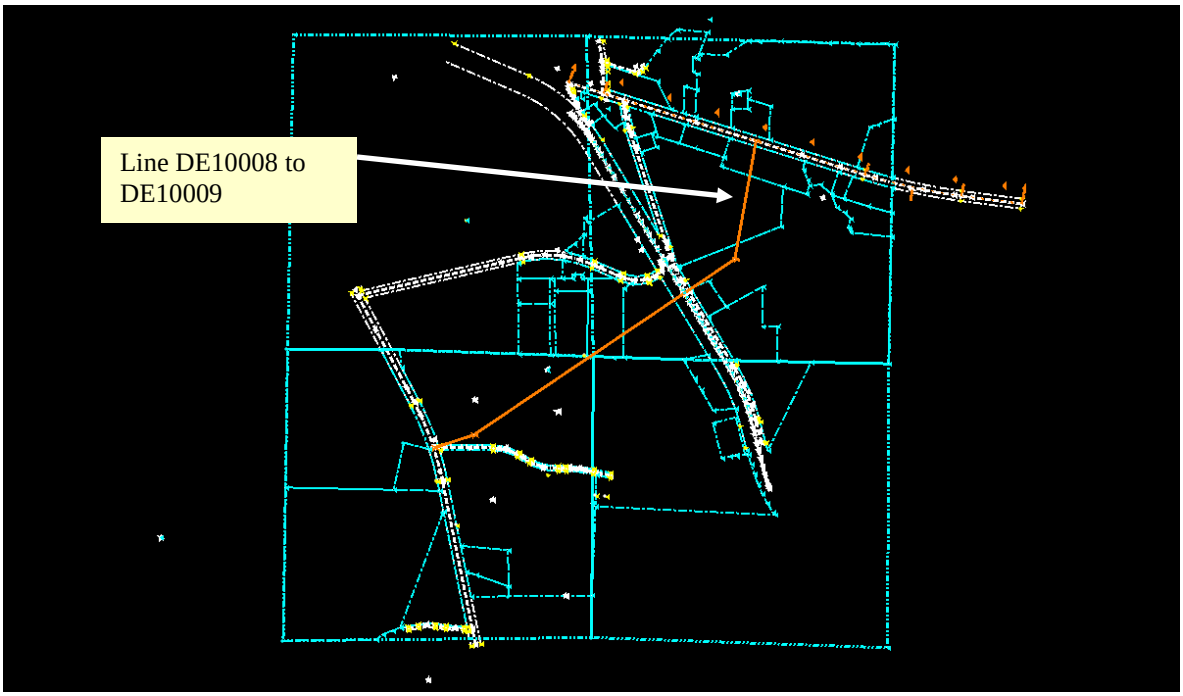


Figure L3-41 MicroStation Window

44.	**Save the InRoads Geometry File** Even though the Cogo Points have been stored – the data has not yet been saved. InRoads retains the data in <u>temporary</u> memory but does not <u>save</u> the data on the fly. Whenever a change has been made to an InRoads Geometry Project – <u>Save</u> the project and its associated modifications or changes. • Select **File ▶ Save ▶ Geometry Project** from the **InRoads Menu**. The Geometry Project (***1234567_Design.alg***) will be saved to **Lab 3** in the following path: **C:\InRoads Data\1234567\Design Labs\Lab 3** *The Geometry File is saved to the following path:* *C:\InRoads Data\1234567\Design Labs\Lab 3*

Lab 3E Add Curves to Alignment DE31

45.	• Verify **DE31** is the Active Alignment. In the InRoads Workspace Bar it should have a red box next to it as shown here. *Verifies that DE31 is the Active Alignment.*
46.	• In InRoads, Select **Geometry ► Horizontal Curve Set ► Define Curve**. The **<u>Define Horizontal Curve Set</u>** dialog opens. • In the MicroStation screen, notice the Back Tangent and Ahead Tangent for the first PI in Alignment **DE31** are highlighted in Purple. • In the **<u>Define Horizontal Curve Set</u>** dialog click the '**Curve Calc…**' button. The **<u>Curve Calculator</u>** dialog opens. • Place a Check Mark in the **Angle:** check box and the **DOC:** (Degree of Curve) check box. • In the **DOC:** entry field, enter a Degree of Curve **of 6°00'00"**. ***NOTE**: InRoads angle entries take the form of degrees, space, minutes, space, seconds (i.e. **6 00 00**) • Click **Compute**. • Verify your entries match those shown in *Figure L3-42*. • Click **OK**. You are returned to the **<u>Define Horizontal Curve Set</u>** dialog. • Click **Apply** in the **<u>Define Horizontal Curve Set</u>** dialog. • <u>Do not close</u> the **<u>Define Horizontal Curve Set</u>** dialog box yet. • In MicroStation, notice that the Curve was applied to **DE31**. *Defines the First Curve in Alignment DE31.*

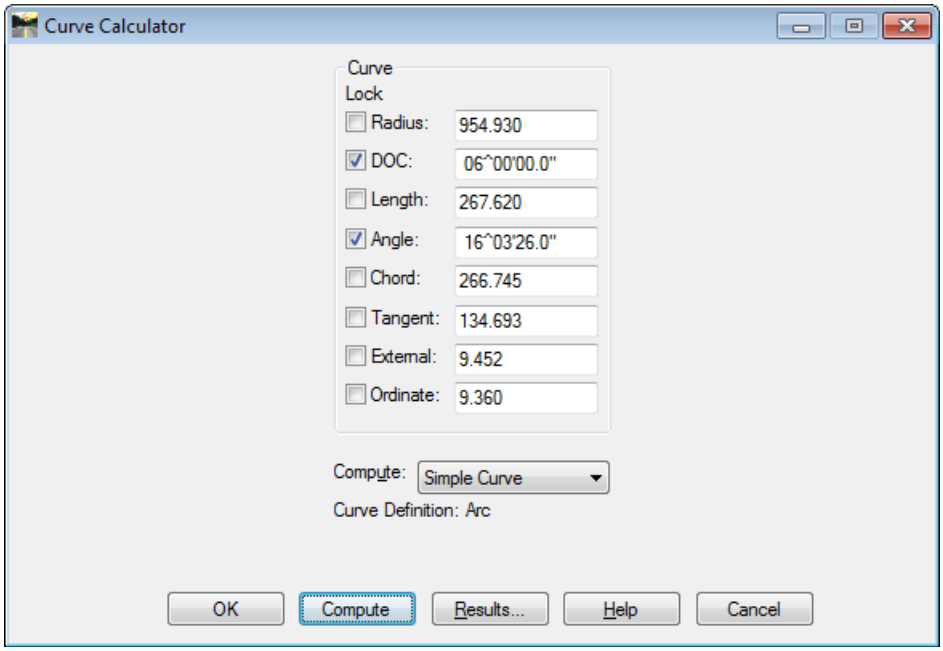


Figure L3-42 Curve Calculator

47.	**The Next PI will be assigned a 5°45'00" Curve.** • In the **Define Horizontal Curve Set** dialog, click **Next >**. • In the MicroStation screen, notice the Back Tangent and Ahead Tangent for the next PI in Alignment **DE31** are highlighted in Purple. • In the **Define Horizontal Curve Set** dialog click the '**Curve Calc…**' button. The **Curve Calculator** dialog opens. • Place a Check Mark in the **Angle:** check box and the **DOC:** (Degree of Curve) check box. • In the **DOC:** entry field, enter a Degree of Curve of **5°45'00"**. ***NOTE**: InRoads angle entries take the form of degrees, space, minutes, space, seconds (i.e. **5 45 00**) • Click **Compute**. • Verify your entries match those shown in *Figure L3-43*. • Click **OK**. You are returned to the **Define Horizontal Curve Set** dialog. • Click **Apply** in the **Define Horizontal Curve Set** dialog. • In MicroStation, notice that the Curve was applied to **DE31**. • Click **Close** to close the **Define Horizontal Curve Set** dialog. • Verify that your view in MicroStation matches that shown in *Figure L3-44*. *Defines the Second Curve in Alignment DE31.*

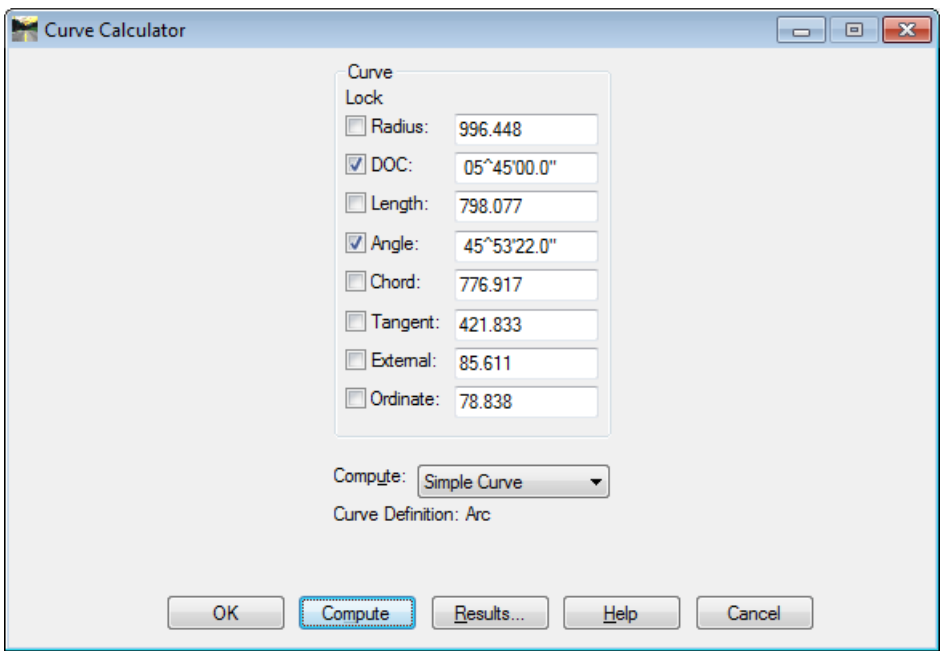


Figure L3-43 Curve Calculator

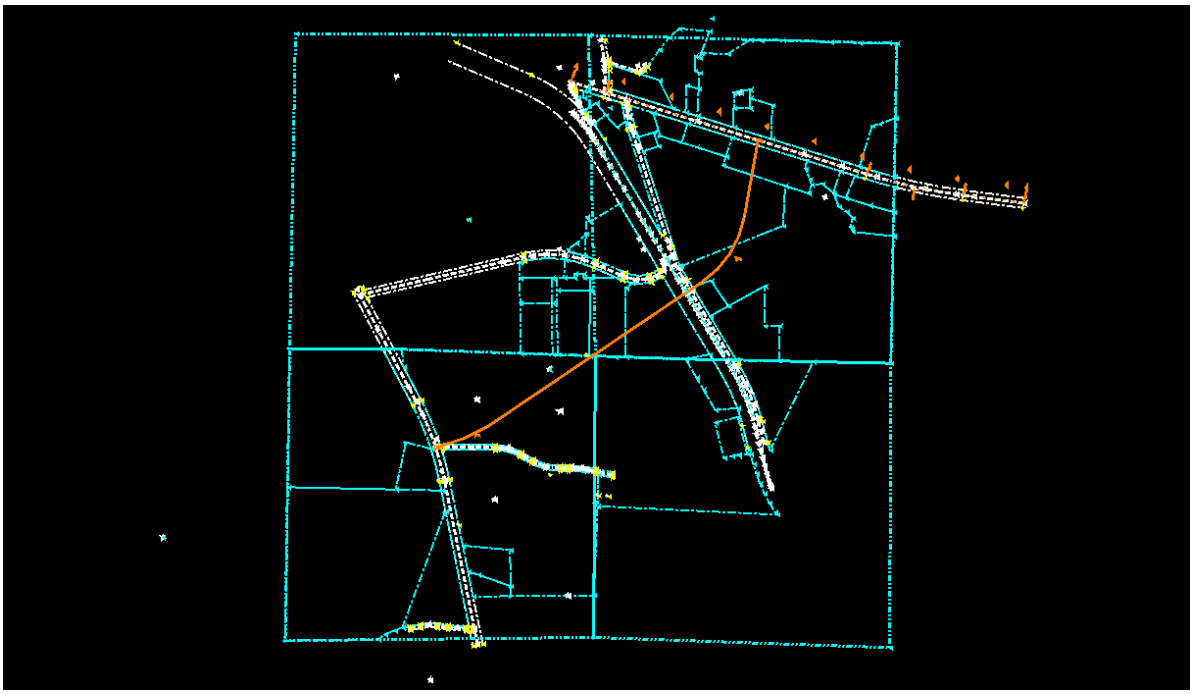


Figure L3-44 MicroStation Window

48.	**Station the Alignment to Begin at Sta.10+00.** • In InRoads, select **Geometry ► Horizontal Curve Set ► Stationing**. The **Stationing** dialog opens. • Change the starting Station to **10+00.00.** • Verify your entries match those shown in *Figure L3-45*. • Click **Apply** and **Close**. *Begins Alignment Stationing for DE31 at 10+00.00.*

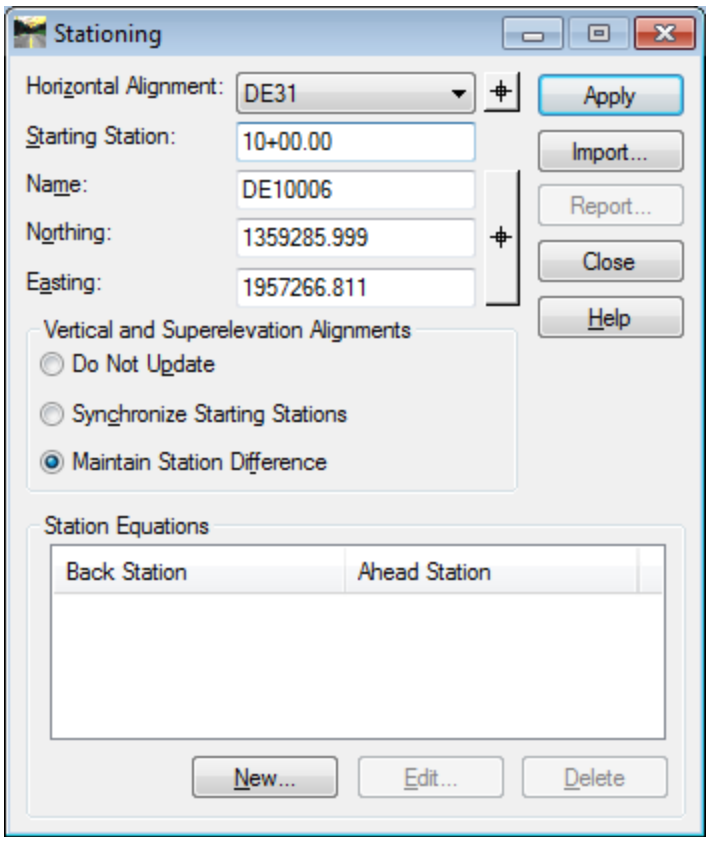


Figure L3-45 Stationing

49.	**Review Alignment DE31** • In InRoads, Select **Geometry ► Review Horizontal**… • Take a moment to review *Figure L3-46*. Notice that the PC's and PT's do not have Names assigned to them. • **Close** the **<u>Review Horizontal Alignment</u>** dialog. *Reviews Alignment DE31*.

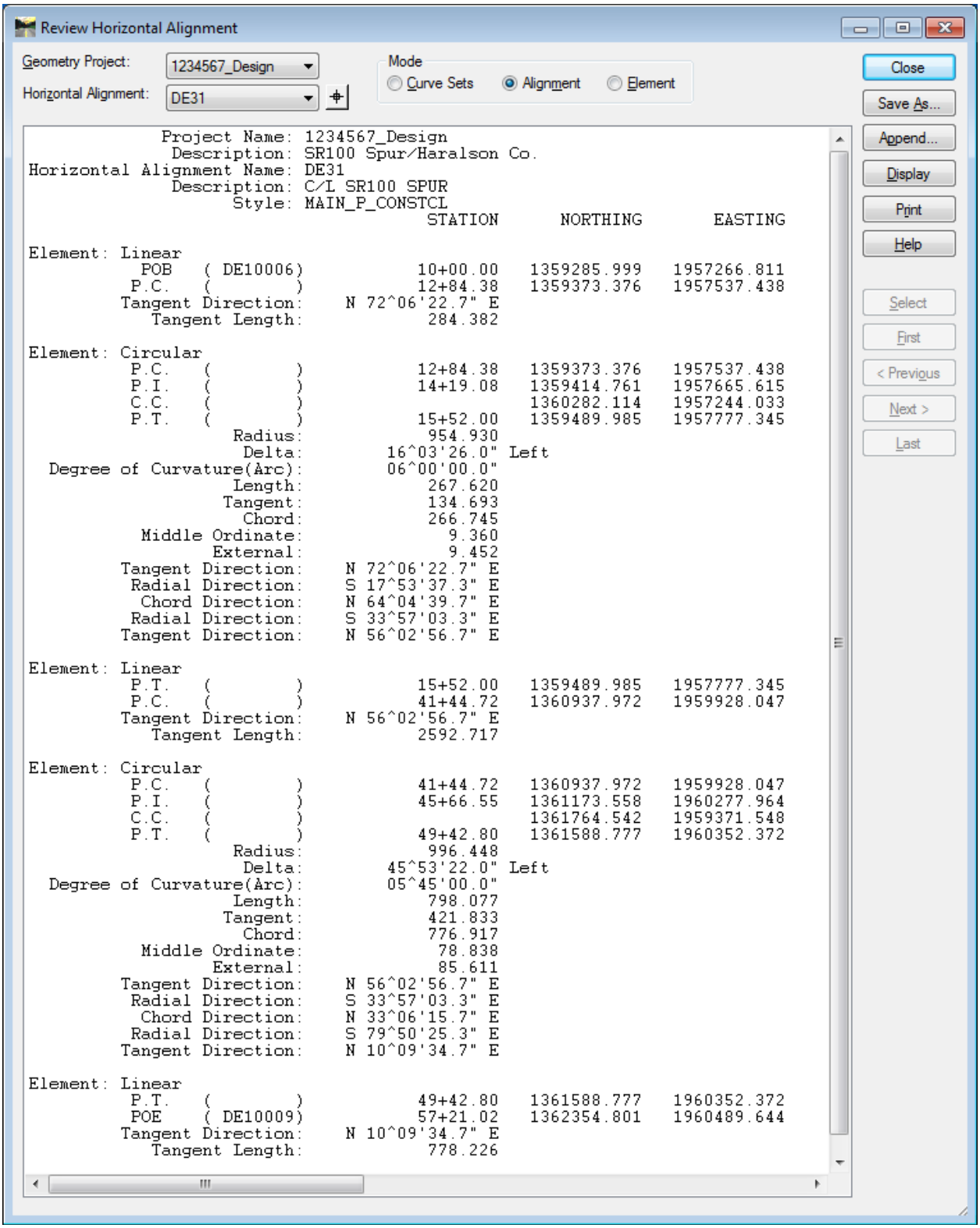


Figure L3-46 Review Horizontal Alignment

50.	**Assign Names to the Points in Alignment DE31.** • In InRoads, Select **Geometry ► Utilities ► Assign Names**. The **Assign Names** dialog opens. • Check the **Alignments** radio button. • Use the **Locate** button to select Alignment **DE31**. During this process watch the prompts at the bottom of the MicroStation Window. ***Hint:*** During this process – watch/follow the prompts at the bottom of the MicroStation Window to identify the element, accept/reject, etc. (Left click to accept Alignment **DE31** and the dialog box will return.) • This time place a check in the Checkbox for '**Check for Coincident Points**'. We did not enter a check previously because we were working with an existing Alignment and did not want to use existing survey points. • Verify your entries match those shown in *Figure L3-47*. • Click **Apply** & **Close**. *Point Names are assigned to Alignment DE31.*

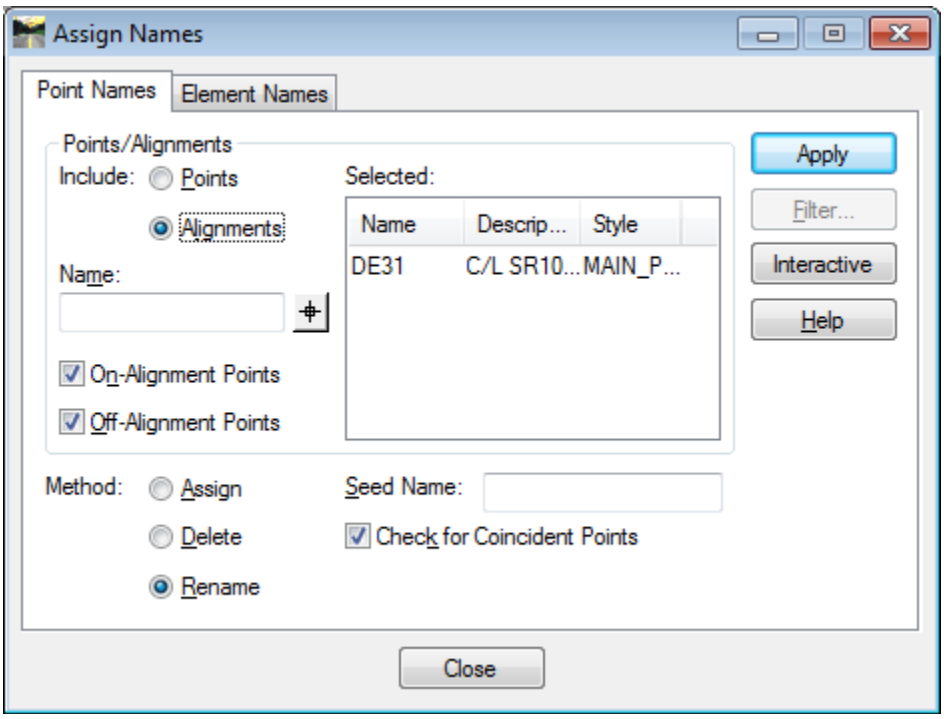


Figure L3-47 Assign Names

51.	**Review Alignment DE31.** • In InRoads, Select **Geometry ► Review Horizontal**. The **Review Horizontal Alignment** Report window opens as shown in *Figure L3-48*. • Notice that **Point Names** now exist and that they have a **DE** prefix. • Click **Close** to exit the **Review Horizontal Alignment** report. *Reviews Alignment DE31.*

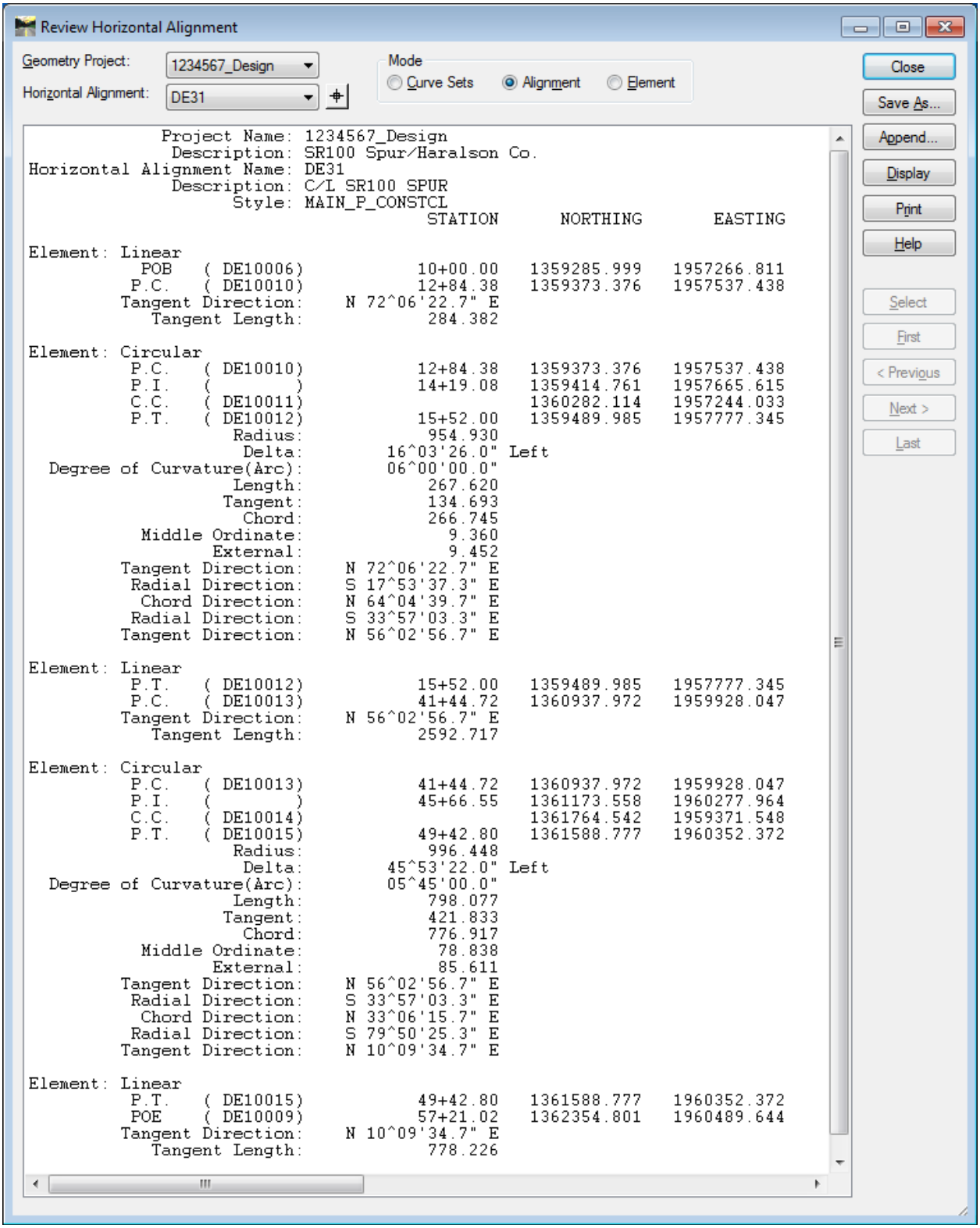


Figure L3-48 Review Horizontal Alignment

52.	**Create COGO Points of all Alignment Points.**
	
	* **IMPORTANT**: As stated earlier, although Point Names (Alignment Points) now exist in Alignment **DE31** for the PI's, PC's and PT's -- the Alignment Points don't actually exist as COGO Points in the COGO Buffer. In order to properly display the points in MicroStation and for the proper delivery of Enhancements during the life of the project -- the Alignment Points must be converted to COGO Points and assigned the proper Feature Style.
	
	• Select **Geometry ► Horizontal Curve Set ► Events**…
	• In the **<u>Horizontal Events</u>** dialog:
	  o Check the '**Alignment Point to Cogo'** radio button.
	  o Set the **Style:** to ***MAIN_P_CONSTCL***
	  o Accept all other defaults.
	• Click **Apply.** A **<u>Results</u>** Report opens showing all points that are now COGO Points.
	• Click **Close** to close the **<u>Results</u>** box.
	• Click **Close** to close the **<u>Horizontal Events</u>** Dialog**.**
	
	Cogo Points are created from Alignment Points.

53.	**View the Stationing for Alignment DE31** • In InRoads, Select **File ► Project Options**. • Select the **Factors** tab and verify the **Text**, **Cell** and **Line Style Scale Factor(s)** are all set to **50** and click **Apply** and **Close**. • In InRoads, Select **Geometry ► View Geometry ► Stationing**. The **<u>View Stationing</u>** dialog opens. • Click the **Preferences** button. • In the **<u>Preferences</u>** dialog Highlight ***CONSTCL***. • Click **Load** and **Close**. • In the **<u>View Stationing</u>** dialog click **Apply** & **Close.** • In MicroStation, zoom into Alignment **DE31** and verify that Stationing is viewed. *The Stationing for Alignment DE31 is viewed.*
54.	**View the Curve Set Annotation for Alignment DE31.** • In InRoads, Select **Geometry ► View Geometry ► Curve Set Annotation**. The **<u>Curve Set Annotation</u>** dialog opens. • Click the **Preferences** button. • In the **<u>Preferences</u>** dialog, highlight ***CONSTCL*** and Click **Load** & **Close**. • In the **<u>Curve Set Annotation</u>** dialog click **Apply** & **Close**. ***Note**: Curve Set Annotation is viewed in MicroStation as Graphic Groups and can be rotated and moved as a single element. • In MicroStation, Take a moment to zoom into one of the Curve Set Annotations and review it.

55.	**Save the InRoads Geometry File** Even though the Alignment has been stored – the data has not yet been saved. InRoads retains the data in temporary memory but does not save the data on the fly. Whenever a change has been made to an InRoads Geometry Project – Save the project and its associated modifications or changes. • Select **File ▶ Save ▶ Geometry Project** from the **InRoads Menu**. The Geometry Project (***1234567_Design.alg***) will be saved to **Lab 3** in the following path: **C:\InRoads Data\1234567\Design Labs\Lab 3** Note that the **InRoads** and **MicroStation Status Bar** (Located at the bottom of both the InRoads and MicroStation Interface) will depict a message when the Geometry Project has been saved. *The Geometry File is saved to the following path:* *C:\InRoads Data\1234567\Design Labs\Lab 3*
56.	This concludes Lab 3. Do not proceed until the Instructor directs you to do so.

Lab 4
Vertical Alignments

Objective

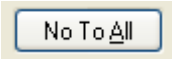
The objective of this Lab is to learn how to create, edit and annotate Existing Ground Profiles (Terrain Profiles) and Design Vertical Alignments.

Lab 4A Open 1234567_Design.ALG and 1234567_Exist.DTM

1. Starting Clean

In order to ensure that you are working with a "clean" database – you will close MicroStation and InRoads if they are still running from a previous Lab:

To CLOSE MicroStation and InRoads -

Select **File►Exit** from the [MicroStation Menu].
If any messages appear regarding the saving of projects – Select 

This closes BOTH the MicroStation and InRoads Software(s).

2. Starting MicroStation and InRoads in the GDOT Workspace.

From the desktop, double-click on the **MicroStation** icon labeled **GDOT MicroStation V8i SS2 (x86)**.

Double click on the icon labeled **GDOT MicroStation V8i SS2 (x86)**.

- When the **MicroStation Manager** dialog box appears – navigate to the **C:\InRoads Data\1234567\Design Labs\Standards** folder and select the "**GDOT 3D Working File.dgn**". (Creation of the 'GDOT 3D Working File.dgn' is documented in the Design Guidelines). Click **Open**.

- Now open InRoads from within MicroStation by selecting:
  InRoads ► InRoads Suite (SELECTseries 2) V8i 08.11.07.566 from the [MicroStation Menu].

The MicroStation and InRoads Software(s) will open.

3. Clear the MicroStation Window (*This step may be ignored if your MicroStation Window is already clear of graphics***)**

- Select **Edit ►Select All** from the [MicroStation Menu].
- Then select the **<DELETE>** key on the computer keyboard.

The MicroStation Window is now clear of all graphics from the previous lab and ready for this lab.

4.	**Verify Project Defaults** • In InRoads, select **File ►Project Defaults** • Use the pull down next to **Configuration Name:** to select ***1234567_Design*** which you created in Lab 1. • Click **Apply** & **Close.** *Sets Project Defaults.*
5.	**Set the Design Default Preferences** • Select **File ► Project Options** and the **<u>Project Options</u>** dialog box appears. • Select the **Factors** tab. • This will be a 50 Scale Project. Enter ***50*** in each line for the **Text**, **Cell** & **Line Style Scale Factor(s)**. • Then in the same **<u>Project Options</u>** dialog box select the **Geometry** tab. • Click the **Preferences** button at the bottom of the dialog box. • Choose ***Design Default***. Click **Load** and **Close**. This will set the remainder of the Design Defaults. ****IMPORTANT**: As stated previously the ***Design Default*** Preference loads the appropriate settings for use during Design. These settings include the Alignment and Point name settings. These settings are of particular importance to the Designer. Alignments must have a **DE** prefix. Points must also have a **DE** prefix as well as beginning the point numbering scheme at Number 10000. In order for survey enhancements to be properly added during the design phase of a project, it is essential that Designers pay particular attention to this setting. • In the **<u>Project Options</u>** dialog box click **Apply** and **Close**. *Sets the Design Default Preference.*
6.	**Open 1234567_Design.alg** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 4** • Highlight **1234567_Design.alg** • Click **Open** & **Cancel**. *The Geometry Project 1234567_Design is opened.*

7.	**Open 1234567_Exist.dtm** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 4** • Highlight **1234567_Exist.dtm** • Click **Open** & **Cancel**. *The Surface Project 1234567_Exist is opened.*

Lab 4B Create a New Vertical Alignment

In **Lab4B** a Vertical Alignment named **DE7** will be created for the Horizontal Alignment **DE7** (US 78). A parent/child relationship exists in InRoads between the Horizontal and Vertical Alignments. A Vertical Alignment is a child of the Horizontal Alignment. Multiple Vertical Alignments may exist for a single Horizontal Alignment -- therefore it is important to have the correct Vertical Alignment active along with the active Horizontal Alignment before doing any work.

8.	**Ensure Alignment DE7 is the Active Alignment** • Click the **Geometry** Tab at the bottom of the InRoads Workspace Bar. • Click the **+** sign next to the **1234567_Design** project to expand the project. • Scroll to **DE7** and left click on Alignment **DE7** to highlight it. • Now, Right mouse click over it and select **'Set Active'**. • **DE7** should now have a red box around it indicating that it is the Active Alignment. *The Active Alignment is set to DE7.*

9.	• In InRoads, Select **File ► New**. The **New** dialog opens.
	• Select the **Geometry** Tab.
	• Enter the following information:
	  o **Type:** ***Vertical Alignment***
	  o **Name:** ***DE7***
	  o **Description:** ***US 78***
	  o **Style:** ***MAIN_P_SIDECL***
	  o **Curve Definition:** ***Parabolic***
	• Verify your entries match those shown in *Figure L4-1*.
	• Click **Apply** & **Close**.
	
	Creates a new empty vertical alignment named DE7.

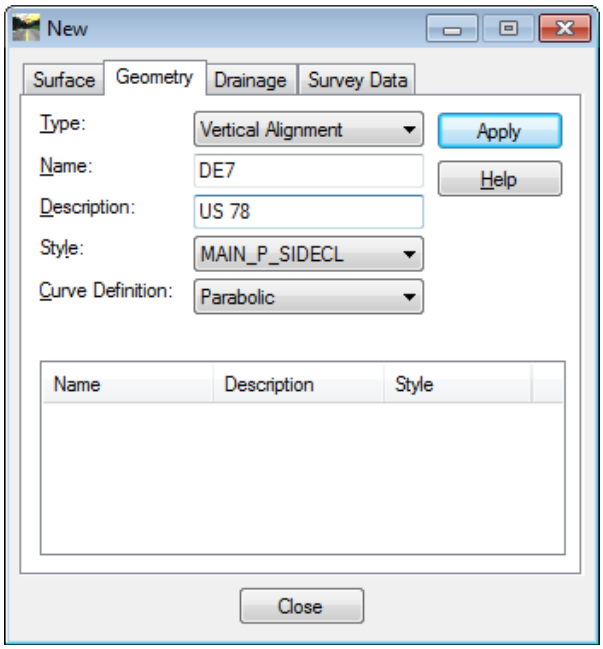
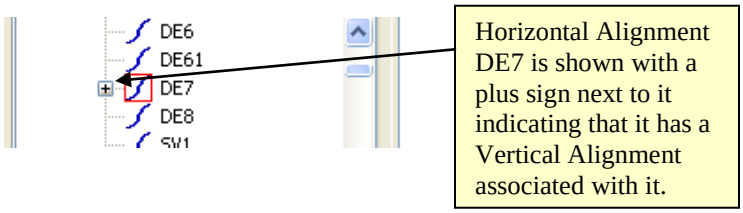


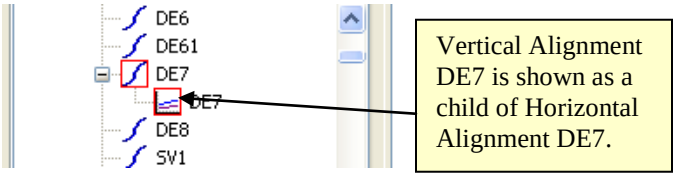
Figure L4-1 New

10.

- In the InRoads Workspace Bar, Notice there is a plus (+) sign next to the Horizontal Alignment **DE7** as shown here. This indicates a Vertical Alignment is associated with it.



- Left Click on the plus (+) sign next to **DE7**. The Vertical Alignment **DE7** is shown as a child of the Horizontal Alignment as shown here. Horizontal Alignments can have more than one Vertical Alignment associated with it but must have different names. We named our Vertical Alignment **DE7** just so it would match the Horizontal Alignment.



Lists the Vertical Alignment DE7.

Lab 4C Create an Existing Ground Profile (aka Terrain Profile) and a Profile Window

Before PVI's can be added to the Vertical Alignment, a Profile Window must be created. This is also how the Terrain Profile is created. In InRoads, the Terrain Profile is not stored as a permanent object as in CAiCE. The Terrain Profile is created 'on the fly' from the DTM and must be recreated each time you want to view it.

11.	**Ensure Alignment DE7 is the Active Alignment** • Click the **Geometry** Tab at the bottom of the InRoads Workspace Bar. • Click the + sign next to the **1234567_Design** project to expand the project. • Scroll to **DE7** and make sure it is the Active Alignment by Right mouse clicking over it and selecting **'Set Active'**. *Ensures the Active Alignment is set to DE7.*
12.	• In InRoads, Select **Evaluation ► Profile ► Create Profile**. The **<u>Create Profile</u>** dialog opens as shown in *Figure L4-2*.

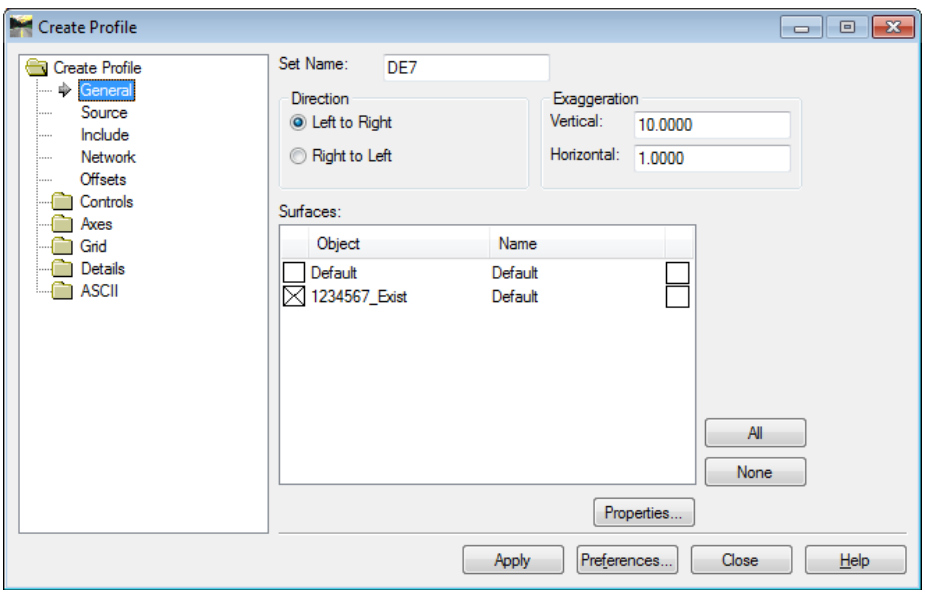


Figure L4-2 Create Profile

13.	• In the **<u>Create Profile</u>** dialog click the **Preferences** button. The **<u>Preferences</u>** dialog opens as shown in *Figure L4-3*. • Under the **Name:** field -- Select the Preference **50h_10v_SHEETS**. The **50h_10v_SHEETS** Preference sets up the **<u>Create Profile</u>** dialog for temporary viewing of the Profile. ***NOTE:** *The _SHEETS preferences differ from the _WORKING preferences only in that the grid is also viewed in the _WORKING preferences.* • Click **Load** & **Close.**

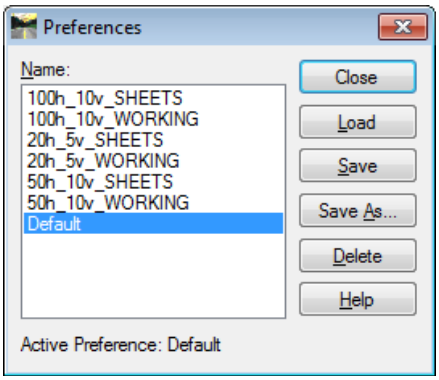


Figure L4-3 Preferences

14.	• In the **Create Profile** dialog ensure the Check Box next to ***1234567_Exist*** is checked as shown in *Figure L4-4*. • Click **Apply** • Notice in the bottom left corner of the MicroStation window the prompt **>Identify Location**. > Identify Location . • Left Click anywhere in the MicroStation View Window. The **Create Profile** dialog is returned and the existing ground profile is drawn for the Horizontal Alignment **DE7**. • In the **Create Profile** dialog, click **Close**. • In MicroStation, Click the **Fit View** button. **Fit View** • In MicroStation, verify that your view matches that shown in *Figure L4-5*. *The Terrain Profile is created and viewed.*

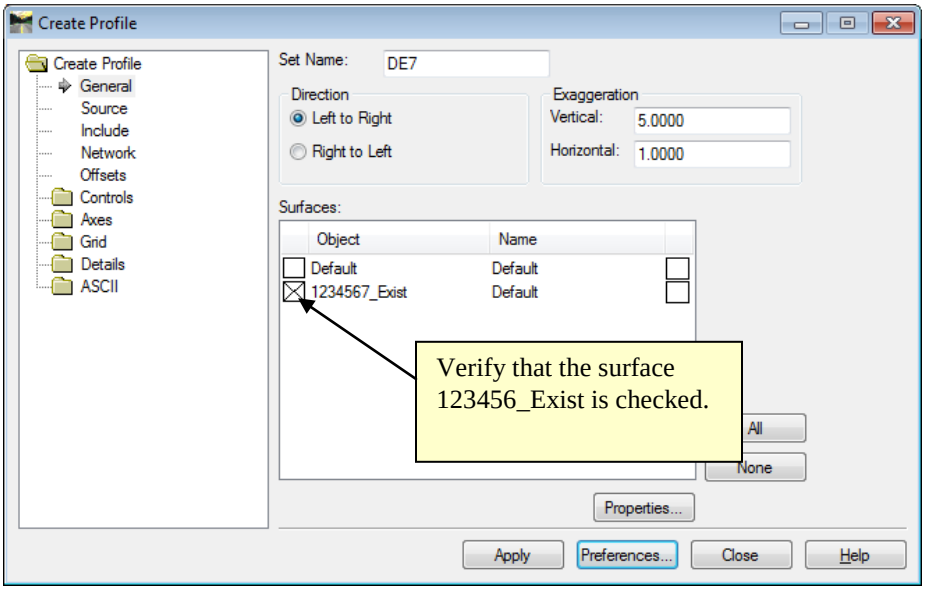


Figure L4-4 Create Profile

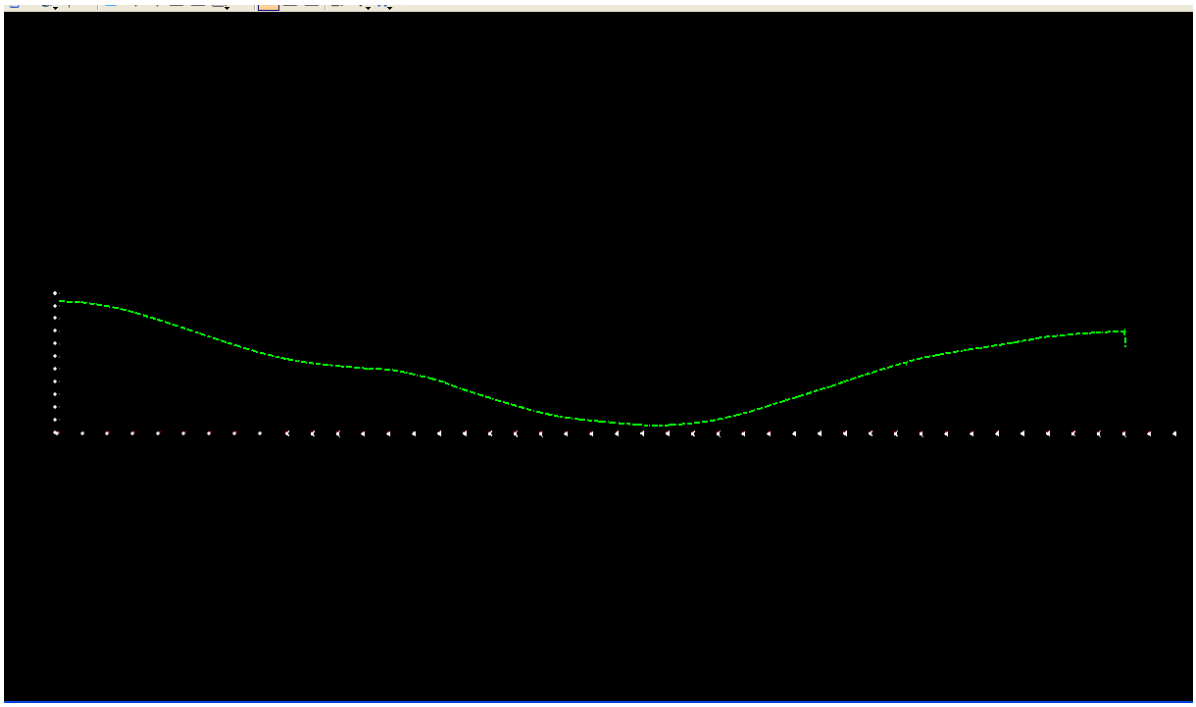


Figure L4-5 MicroStation Window

15.	**For Information Only:** The Screen Capture in *Figure L4-6* shows the results of selecting the Preference **50h_10v_WORKING**. The **50h_10v_WORKING** Preference views all the same information as the **50h_10v_SHEETS** Preference -- yet adds a grid. This is for the temporary viewing of the profile during the design of the project. Permanent viewing of the Profile and Vertical Alignment for plan generation and plotting will be covered in **Lab 6** which depicts the use of the **Plan and Profile Generator** in InRoads. *Information regarding the viewing of selected Profile Preferences.*

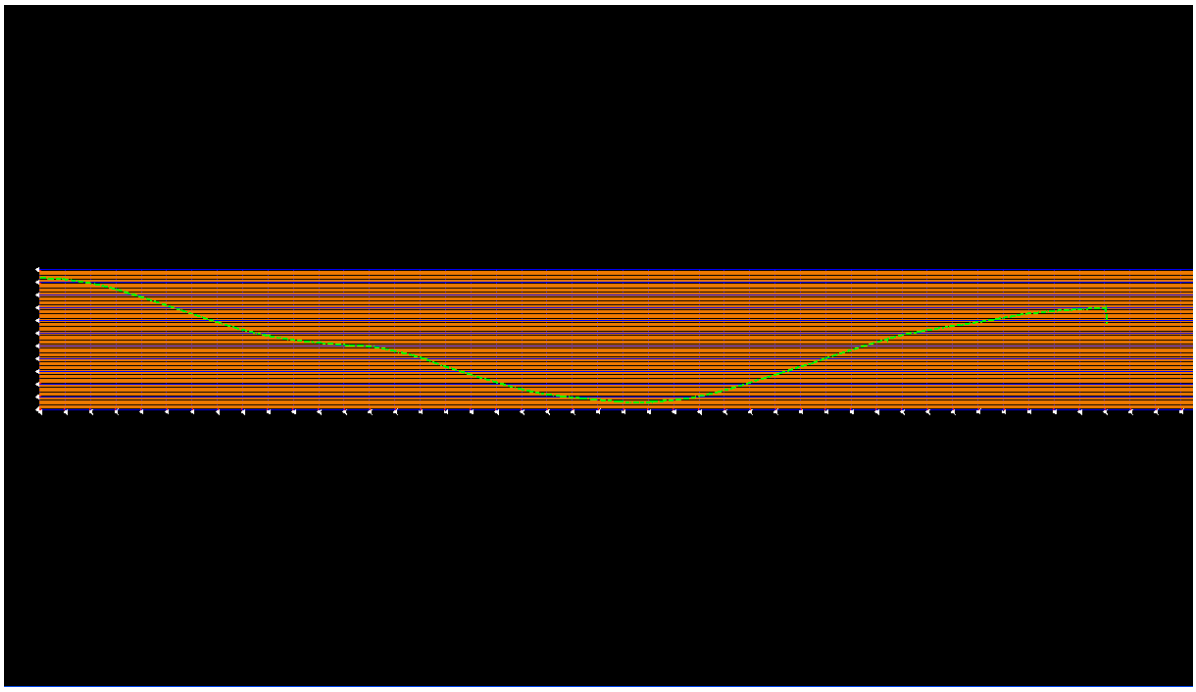


Figure L4-6 MicroStation Window

Lab 4D Add PVI's to the Vertical Alignment DE7

Adding PVI's to a Vertical Alignment requires that you have an active Horizontal Alignment, Vertical Alignment and a Profile window in the MicroStation drawing file.

16.	**In MicroStation – Ensure that the Key-in Window is open and available in the MicroStation Interface:** **MicroStation Key-in Window** The **Key-in Window** must be available in order to input in the Vertical Alignment data in InRoads. If the **Key-in Window** is <u>not</u> open – perform the following steps: • In MicroStation, select **Utilities ► Key-in** • The **Key-in Window** will open. You can then "dock" the **Key-in Window** at the top of the MicroStation Interface tool bars (See screen capture above). *Ensures that the MicroStation Key-in Window is available.*
17.	**Dynamics Settings Dialog Box** • In InRoads, Select **Geometry ► Vertical Curve Set ► Dynamics Settings**. The **<u>Dynamics Settings</u>** dialog box appears as shown in *Figure L4-7*. This dialog box will be utilized in the following steps for the **Add PI**, **Insert PI** and **Move PI** commands and inputs. *The <u>Dynamics Settings</u> dialog is opened.*

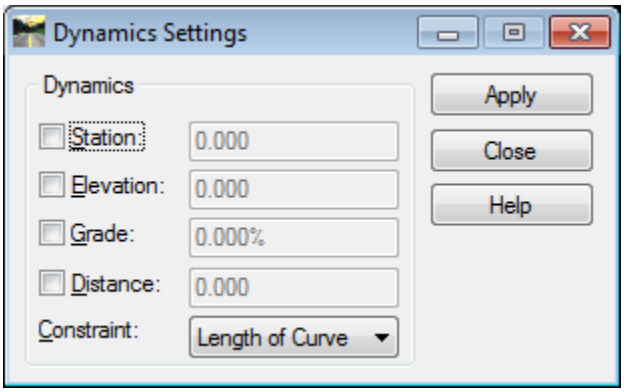


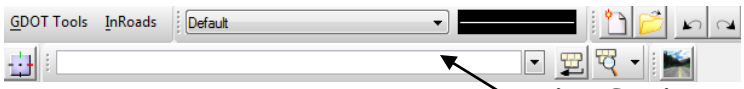
Figure L4-7 Add Vertical PI

18.

Add Vertical PI

If None of the Dynamics options in the Dynamics Settings dialog are checked -- their values are determined by the position of the cursor or by key-ins in the MicroStation Key-in Window.

- In InRoads, Select **Geometry ► Vertical Curve Set ► Add PI**. Notice the prompt in the MicroStation Status bar (bottom left corner of the MicroStation window) prompting you to **>Identify first point**. > Identify first point
- Left click in the MicroStation **Key-in** Window to activate the cursor.



MicroStation Key-in Window

- Key-in **se=1050.00, 1106.60** (for Station **10+50.00** and Elevation **1106.60**).
- If you have not already done so, press the **Enter** button on your key board.
- Move your cursor around the MicroStation window. The first **PVI** was placed and a dynamic line follows your cursor.
- As you move the cursor, look at the InRoads Status bar and the MicroStation Status bar. The **Station**, **Elevation**, **Grade Back** and **Grade Ahead** are displayed.
- Also, notice in the MicroStation Status bar the prompt **>Identify Point/Reject**.
- At this point you may enter another key-in, graphically select another **PVI** or right mouse click to end the **Add Vertical PI** command.
- In the MicroStation Key-in field, enter **dg=350,-.0315** (for distance of **350 ft** and downward grade of **3.15%)** and press **Enter**.
- Next, Right mouse click to end the **Add Vertical PI** command.

Adds Vertical PVI (Point of Vertical Intersection).

19.

- In the **Dynamics Settings** dialog, check the **Station:** and **Elevation:** check boxes.
- In the **Station:** entry field key-in **3000.00** (for Station 30+00.00).
- In the **Elevation:** entry field key-in **1077.67** (for Elevation 1077.67 ft).
- Click **Apply**.
- In the MicroStation Status bar you are prompted to >**Identify alignment end**. Left click on the end of the orange vertical alignment as shown in *Figure L4-8*.

***NOTE:** *You may use the MicroStation view manipulation tools in the middle of an InRoads command. Right mouse click to return to the last step you were on in InRoads prior to using the view manipulation tool.*

- In the MicroStation Status bar you are prompted to **>Identify Point/Reject**. Left Click on the end of the orange line that is drawn for you as shown in *Figure L4-9*.
- Next, Right mouse click to end the **Add Vertical PI** command.
- Click **Close** to close out of the **Dynamics Settings** dialog box.

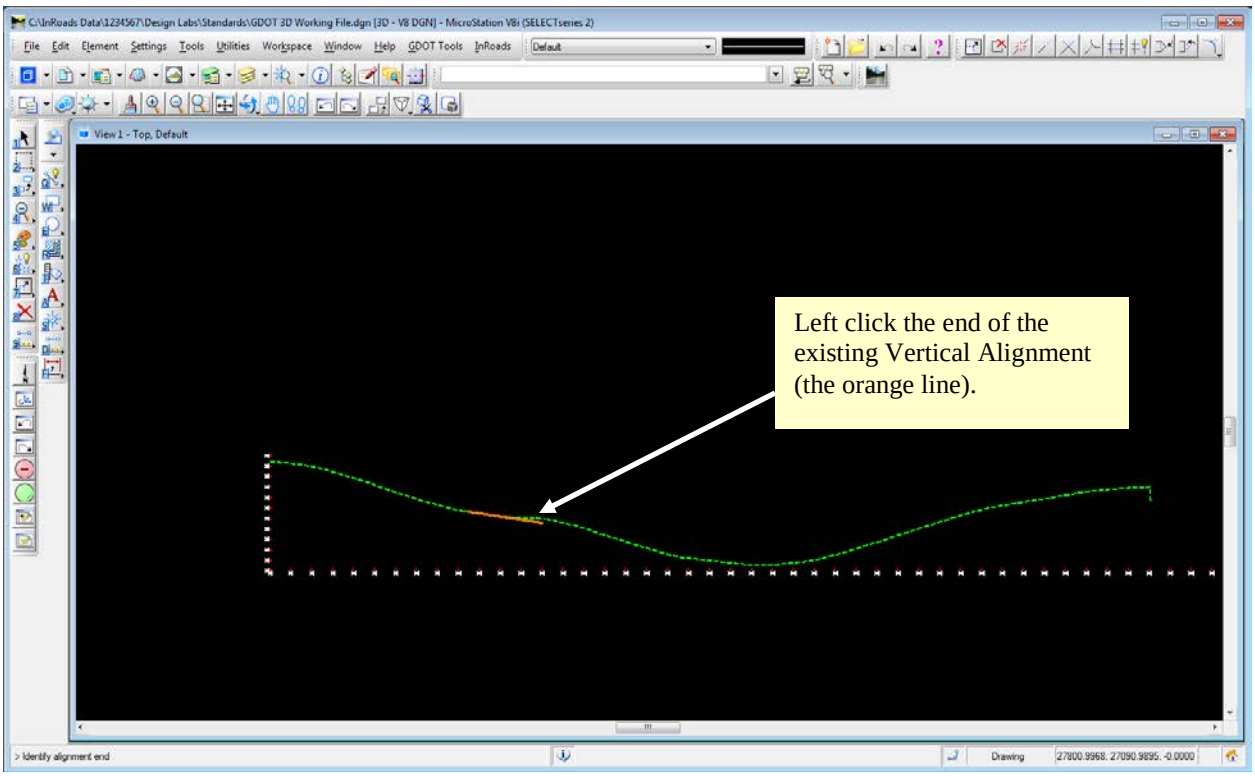


Figure L4-8 MicroStation Window

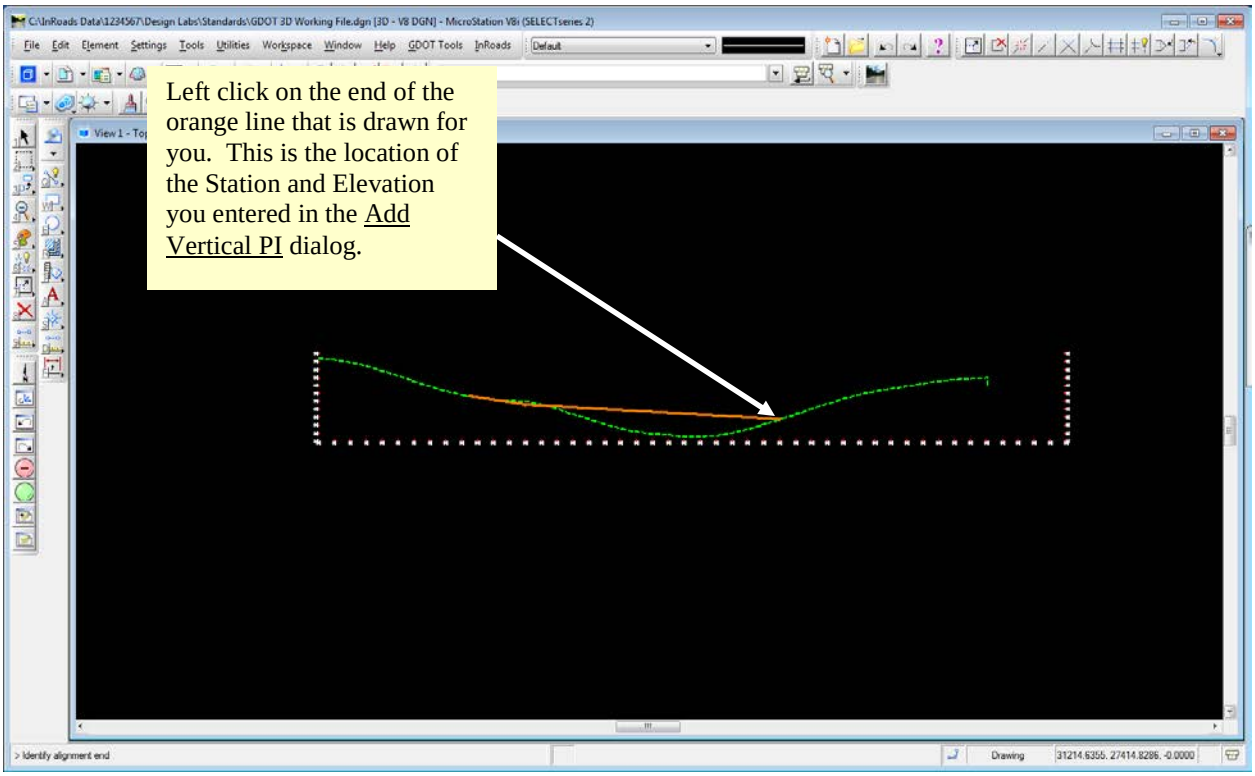


Figure L4-9 MicroStation Window

20.	**The <u>Add Vertical PI</u> command is used to begin a Vertical Alignment and to add PVI's to the end of a Vertical Alignment. Use the <u>Insert Vertical PI</u> command to add PVI's between two existing PVI's.** • In InRoads, Select **Geometry ► Vertical Curve Set ► Dynamics Settings**. The **<u>Dynamics Settings</u>** dialog opens as shown in *Figure L4-10*. • In InRoads, Select **Geometry ► Vertical Curve Set ► Insert PI**.

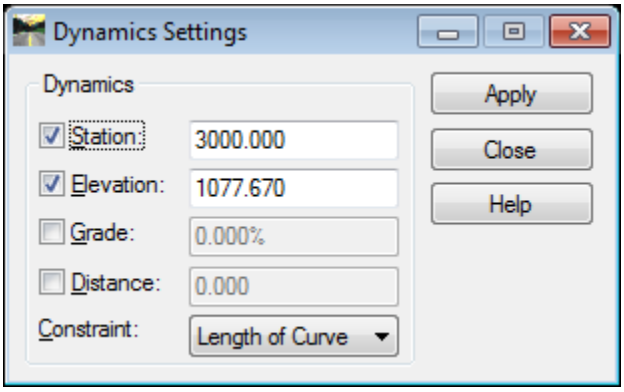


Figure L4-10 Dynamics Settings

21.	• In the **<u>Dynamics Settings</u>** dialog, check the **Station:** and **Elevation:** check boxes. • Enter **2069.11** (for Station **20+69.11**) and **1062.54** (for elevation **1062.54 ft**) • Click **Apply**. • In the MicroStation Status bar you are prompted to **>Identify Element**. Left Click on the Vertical Alignment (orange line). • In the MicroStation Status bar you are prompted to **>Identify Point/Reject**. Left Click on the new point. • In the MicroStation Status bar you are prompted to **>Accept overall solution/Reject**. Left mouse click in MicroStation to accept. • Right mouse click twice to end the **Insert PI** command. • <u>Do not close</u> the **<u>Dynamics Settings</u>** dialog.
22.	• In InRoads, Select **Geometry ► Vertical Curve Set ► Insert PI**. • In the **<u>Dynamics Settings</u>** dialog, enter **2500.00** (for Station **25+00.00**) and **1051.45** (for elevation **1051.45 ft**) • Click **Apply**. • In the MicroStation Status bar you are prompted to **>Identify Element**. Left Click on the Vertical Alignment (orange line). • In the MicroStation Status bar you are prompted to **>Identify Point/Reject**. Left Click on the new point. • In the MicroStation Status bar you are prompted to **>Accept overall solution/Reject**. Left mouse click in MicroStation to accept. • Right mouse click twice to end the **Insert PI** command. • <u>Do not close</u> the **<u>Dynamics Settings</u>** dialog.

23.	• In InRoads, Select **Geometry ► Vertical Curve Set ► Insert PI**. • In the **Dynamics Settings** dialog, enter **2941.77** (for Station **29+41.77**) and **1074.45** (for elevation **1074.45 ft**) • Click **Apply**. • In the MicroStation Status bar you are prompted to **>Identify Element**. Left Click on the Vertical Alignment (orange line). • In the MicroStation Status bar you are prompted to **>Identify Point/Reject**. Left Click on the new point. • In the MicroStation Status bar you are prompted to **>Accept overall solution/Reject**. Left mouse click in MicroStation to accept. • Right mouse click twice to end the **Insert PI** command. • Click **Close** to close the **Dynamics Settings** dialog. *You have now added 6 PVI's to the Vertical Alignment DE7.*
24.	**Using the Move PI command we will move the PVI at Station 25+00 to Station 25+96.77 and leave the Elevation unchanged.** • In InRoads, Select **Geometry ► Vertical Curve Set ► Dynamics Settings**. The **Dynamics Settings** dialog opens as shown in *Figure L4-11*. • In InRoads, Select **Geometry ► Vertical Curve Set ►Move PI**.

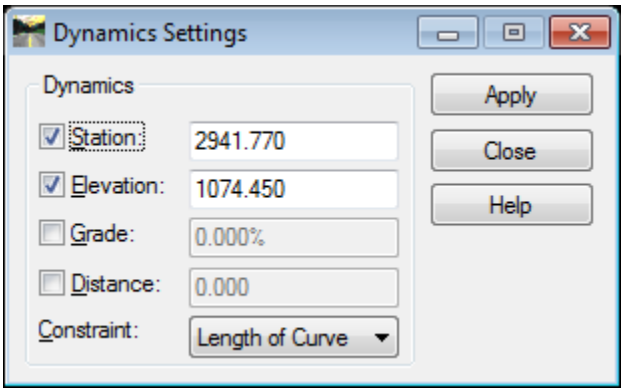


Figure L4-11 Dynamics Settings

25.	• In the **Dynamics Settings** dialog, place a Check in the **Station** check box and uncheck the **Elevation** check box. • In the **Station:** entry field key-in **2596.77** (for Station **25+96.77**). • Click **Apply**. • In the MicroStation Status bar you are prompted to **>Identify Element**. Left click on the PVI at Station **25+00.00**. In MicroStation, the PVI at Station **25+00.00** is moved to Station **25+96.77**. At this point it is not a permanent move. • In the MicroStation Status bar you are prompted to **>Identify Point/Reject**. Left click on the new point. • Left mouse click to **<Accept overall solution**. • Right mouse click twice to return to the **Dynamics Settings** dialog. • Click **Close** to close the **Dynamics Settings** dialog. *The PVI at Station 25+00.00 and Elevation 1051.45 has been moved to Station 25+96.77 and Elevation 1051.45.*
26.	**Save the InRoads Geometry File** Even though the Vertical Alignment has been stored – the data has not yet been saved. InRoads retains the data in temporary memory but does not save the data on the fly. Whenever a change has been made to an InRoads Geometry Project – Save the project and its associated modifications or changes. • Select **File ▶ Save ▶ Geometry Project** from the **InRoads Menu**. The Geometry Project (***1234567_Design.alg***) will be saved to **Lab 4** in the following path: **C:\InRoads Data\1234567\Design Labs\Lab 4** *The Geometry File is saved to the following path:* *C:\InRoads Data\1234567\Design Labs\Lab 4*

Lab 4E Define Vertical Curves for the Vertical Alignment DE7

Defining Vertical Curves requires that you have an active Horizontal Alignment, Vertical Alignment and a Profile window in the MicroStation drawing file.

27.	• In InRoads, Select **Geometry ► Vertical Curve Set ► Define Curve**. The **Define Vertical Curve Set** dialog opens as shown in *Figure L4-12* (with the first **PVI** active).

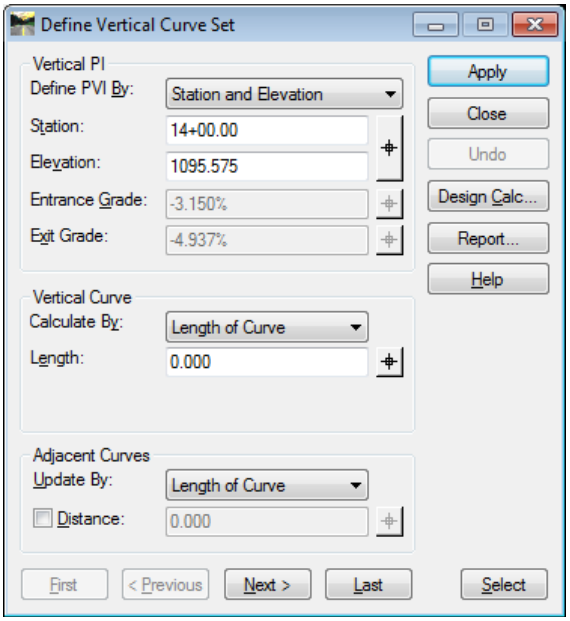


Figure L4-12 Define Vertical Curve Set

28.	**The Define Vertical Curve Set may also be used to Move a PVI.** • In the **Define PVI By:** entry field select **Station and Elevation**. • In the **Station:** entry field key-in **15+00.00**. • In the **Elevation:** entry field key-in **1092.41**. • Click **Apply** but do not close the **Define Vertical Curve Set** dialog. The **PVI** that was at Station **14+00.00** and Elevation **1095.575** was moved to Station **15+00.00** and Elevation **1092.41**. *The PVI is moved to Station 15+00.00 and Elevation 1092.41.*
29.	• In the **Vertical Curve** frame - click the pull down arrow next to **Calculate By:** as shown in *Figure L4-13*. Take a moment to review the options that are available -- then select **Length of Curve**. • Enter a length of **500** in the **Vertical Curve – Length:** entry field as shown in *Figure L4-13*. • Click **Apply** but do not close the **Define Vertical Curve Set** dialog. *The Length of Curve of 500 is entered.*

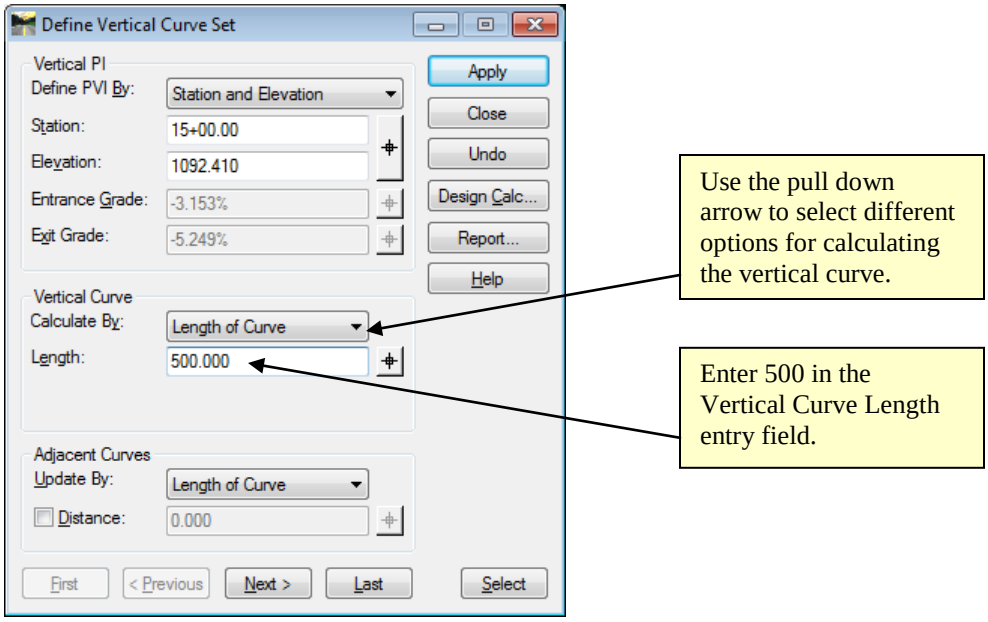


Figure L4-13 Define Vertical Curve Set

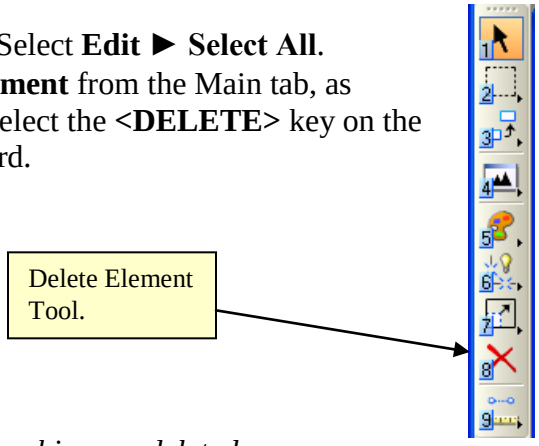
30.	• Click **Next** in the **Define Vertical Curve Set** to advance to the next **PVI** at Station **20+69.11**. • Enter a length of **360** in the **Vertical Curve** – **Length:** entry field. • Click **Apply** but do not close the **Define Vertical Curve Set** dialog. *The Length of Curve of 360 is entered.*
31.	• Click **Next** in the **Define Vertical Curve Set** to advance to the next **PVI** at Station **25+96.77**. • Enter a length of **690** in the **Vertical Curve** – **Length:** entry field. • Click **Apply** & **Close** to exit the **Define Vertical Curve Set** dialog. *The curves for Vertical Alignment DE7 have been defined.*
32.	**Save the InRoads Geometry File** Even though the Vertical Alignment has been stored – the data has not yet been saved. InRoads retains the data in temporary memory but does not save the data on the fly. Whenever a change has been made to an InRoads Geometry Project – Save the project and its associated modifications or changes. • Select **File ▶ Save ▶ Geometry Project** from the **InRoads Menu**. The Geometry Project (***1234567_Design.alg***) will be saved to **Lab 4** in the following path: **C:\InRoads Data\1234567\Design Labs\Lab 4** *The Geometry File is saved to the following path:* *C:\InRoads Data\1234567\Design Labs\Lab 4*

Lab 4F Annotate Vertical Alignment , Terrain Profile & Elevations for DE7

InRoads requires three steps to view the Annotation for the Terrain Profile, the annotation for the Vertical Alignment and the Elevations of Terrain Profile and Vertical Alignment.

33. **Clear the MicroStation Working Drawing.**

- In MicroStation, Select **Edit ► Select All**.
- Select **Delete Element** from the Main tab, as shown here **OR** select the **<DELETE>** key on the computer keyboard.



The Working Drawing graphics are deleted.

34. **Create Profile Window and Terrain Profile.**

- In InRoads, Select **Evaluation ► Profile ► Create Profile**.
- In the **Create Profile** dialog -- click the **Preferences** button.
- Under the **Name:** field -- Select the Preference **50h_10v_SHEETS**. The **50h_10v_SHEETS** Preference sets up the **Create Profile** dialog for viewing of the Profile.
- Click **Load** & **Close**.

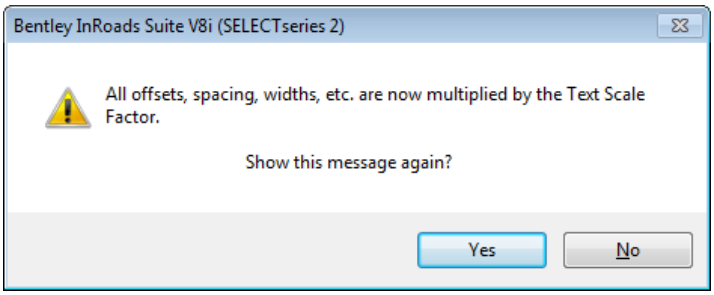
The 50h_10v_SHEETS Preference is selected.

35.

- In the **Create Profile** dialog ensure the Check Box next to ***1234567_Exist*** is checked.
- Click **Apply**
- Notice in the bottom left corner of the MicroStation window the prompt **>Identify Location**. > Identify Location .
- Left Click anywhere in the MicroStation View Window. The **Create Profile** dialog is returned and the existing ground profile is drawn for the Horizontal Alignment **DE7**.
- In the **Create Profile** dialog, click **Close**.
- In MicroStation, Click the **Fit View** button.

Fit View

The Terrain Profile is created and viewed.

36.	**Verify Scale Factor** • In InRoads, Select **File ► Project Options**. • Select the **Factors** tab and verify that ***50*** is entered for the **Text, Cell and Line Style Scale Factor(s)**. • Click **Apply** and **Close**. *The Scale Factor is verified.*
37.	**Annotate Profile Window and Terrain Profile** • Select **Evaluation ► Profile ► Annotate Profile**. <u>If</u> the following message pops up:  • Click **No**. The **<u>Annotate Profile</u>** dialog opens as shown in *Figure L4-14*. *The <u>Annotate Profile</u> dialog opens.*

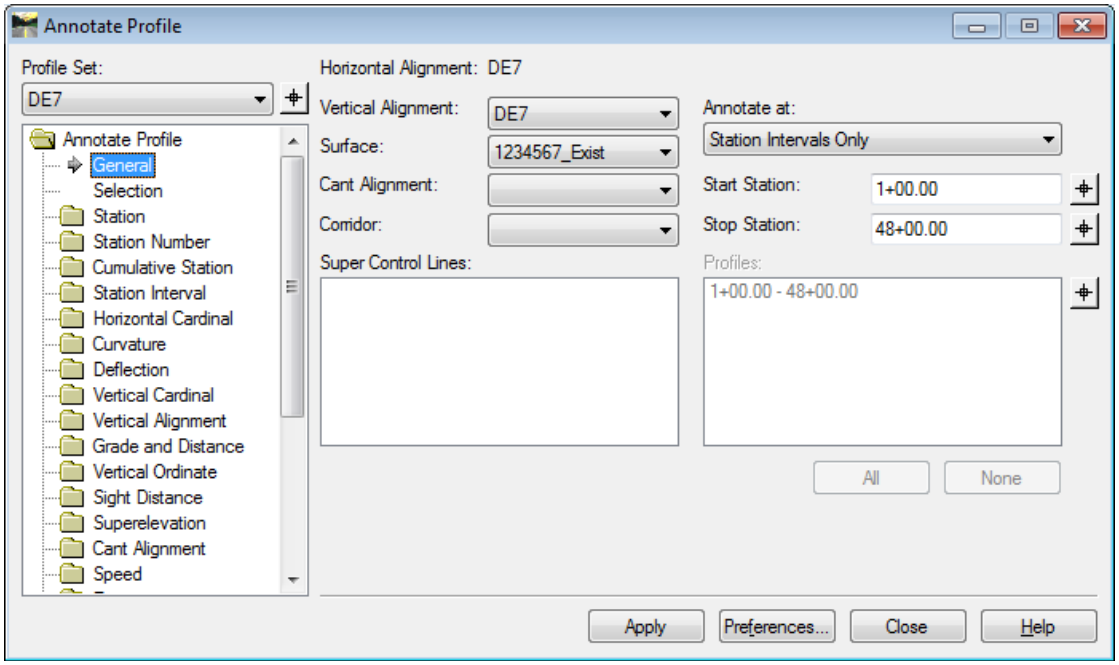


Figure L4-14 Annotate Profile

38.	**View Terrain Profile and Vertical Alignment Elevations** A Profile Preference will be selected – once the Preference is selected the settings for Alignment **DE7** will be entered into the dialog box. • Click the **Preferences** button. • Under the **Name:** field -- Select the Preference **50h_10v_Profile**. The **50h_10v_Profile** Preference sets up the **Annotate Profile** dialog for viewing of the Terrain Profile and Vertical Alignment Elevations. • Click **Load** and **Close**. • Click **Apply** & click **Close** in the **Annotate Profile** dialog. • The Elevations for the Terrain (Green) and Vertical Alignment (Red) are now viewed in the MicroStation Window as shown in *Figure L4-15*. *The Elevations are viewed.*

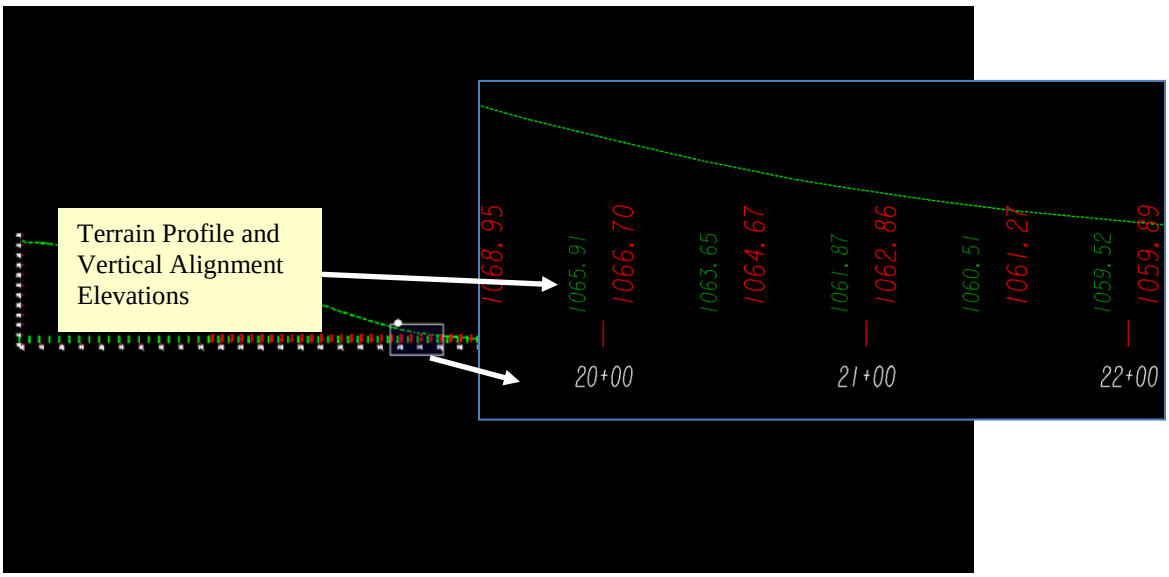


Figure L4-15 MicroStation Window

39.	**Annotate Vertical Alignment** • In InRoads, Select **Geometry ► View Geometry ► Vertical Annotation**. The **View Vertical Annotation** dialog opens as shown in *Figure L4-16*. *The View Vertical Annotation dialog opens.*

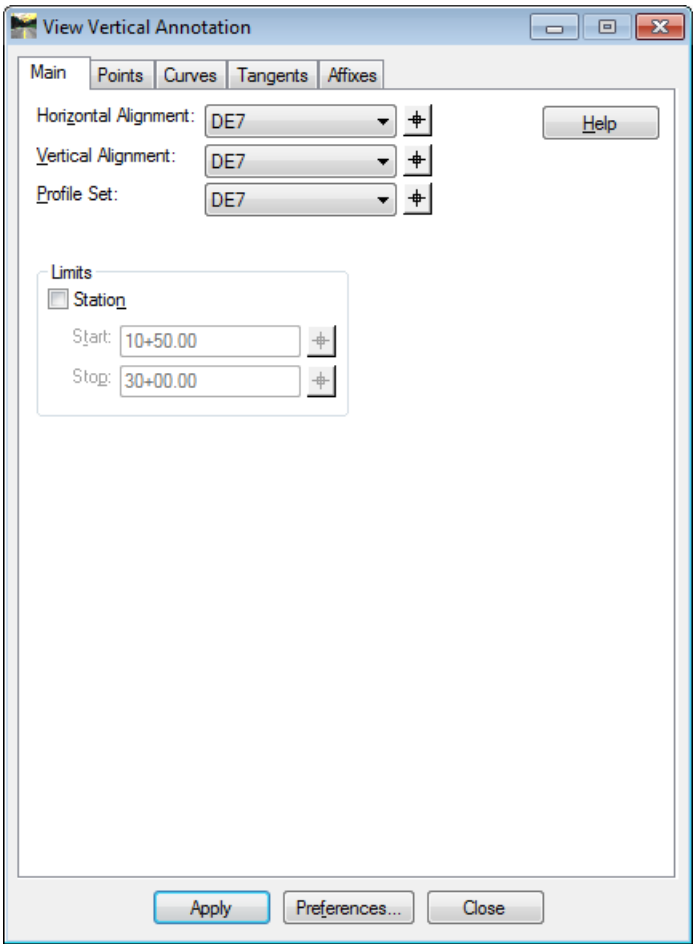


Figure L4-16 View Vertical Annotation

40.	**Annotate Vertical Alignment** • Click the **Preferences** button. • Under the **Name:** field -- Select the Preference **GDOT Profiles**. The **GDOT Profiles** Preference sets up the **<u>View Vertical Annotation</u>** dialog for viewing of the Vertical Alignment Annotation. • Click **Load** and **Close**. • Click **Apply** & **Close** in the **<u>View Vertical Annotation</u>** dialog. • Verify your view in MicroStation matches that shown in *Figure L4-17*. *The Vertical Alignment and associated Vertical Annotation is viewed.*

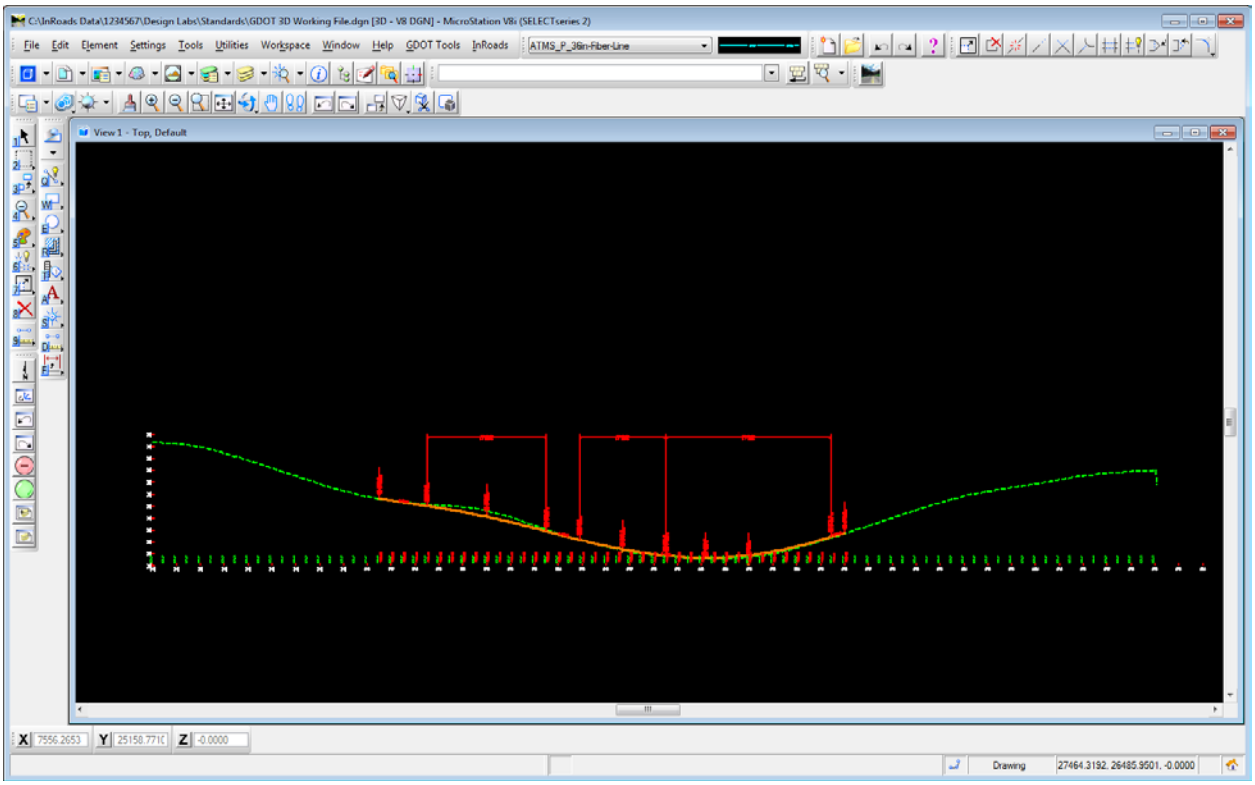


Figure L4-17 MicroStation Window

41.	**For Information Only.** The Screen Capture in *Figure L4-17* shows the results of selecting the various commands and preferences for the temporary viewing of the profile during the design of the project. Permanent viewing of the Profile and Vertical Alignment for plan generation and plotting will be covered in **Lab 6** which covers the use of the **Plan and Profile Generator** in InRoads. *Information regarding the generation of the Profile Sheets.*
42.	**Review Vertical Alignment DE7.** • In InRoads, Select **Geometry ► Review Vertical**. The **<u>Review Vertical Alignment</u>** Report window opens as shown in *Figure L4-18*. • Review the Vertical Alignment and ensure that your Report corresponds to the <u>partial</u> Report as depicted in *Figure L4-18* • Click **Close** to exit the **<u>Review Vertical Alignment</u>** Report. *Vertical Alignment DE7 is reviewed.*

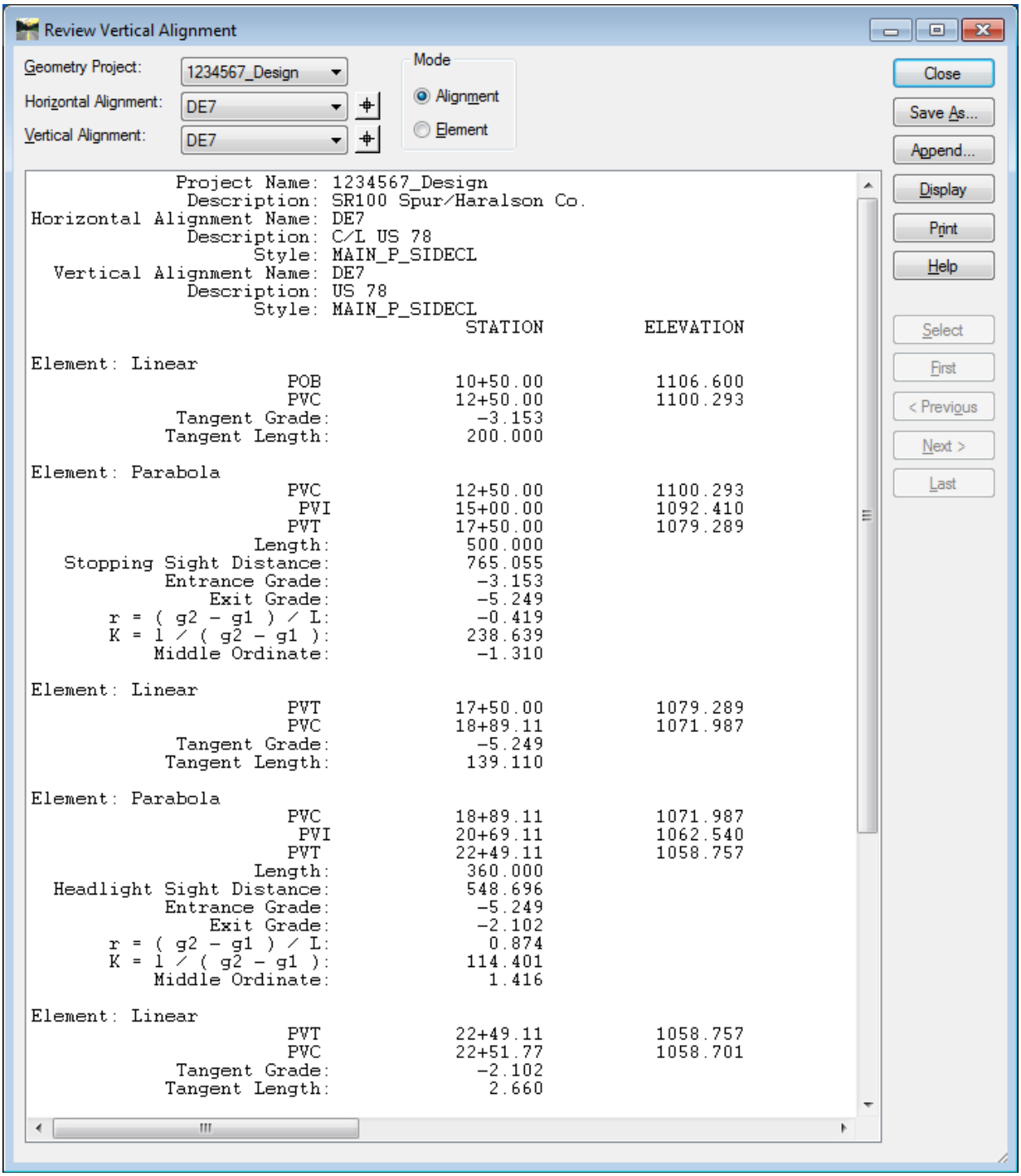


Figure L4-18 Review Vertical Alignment

43.	**Save the InRoads Geometry File** Whenever a change has been made to an InRoads Geometry Project – Save the project and its associated modifications or changes. • Select **File ▶ Save ▶ Geometry Project** from the **InRoads Menu**. The Geometry Project (***1234567_Design.alg***) will be saved to **Lab 4** in the following path: **C:\InRoads Data\1234567\Design Labs\Lab 4** *The Geometry File is saved to the following path:* *C:\InRoads Data\1234567\Design Labs\Lab 4*
44.	This concludes Lab 4. Do not proceed until the Instructor directs you to do so.

Lab 5
Importing MicroStation Graphics and Placing Curve Tables

Objective

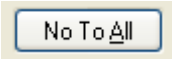
Objects drawn in MicroStation can be imported into the InRoads ALG file. In this lab you will learn how to import MicroStation elements into Inroads by importing the alignment 'Golf Course Rd Tie-in' as DE60. Golf Course Rd Tie-in is identified below by the white alignment.

Lab 5A Open 1234567_Design.ALG

1. Starting Clean

In order to ensure that you are working with a "clean" database – you will close MicroStation and InRoads if they are still running from a previous Lab:

To CLOSE MicroStation and InRoads -

Select **File►Exit** from the [MicroStation Menu].
If any messages appear regarding the saving of projects – Select 

This closes BOTH the MicroStation and InRoads Software(s).

2. Starting MicroStation and InRoads in the GDOT Workspace.

From the desktop, double-click on the **MicroStation** icon labeled **GDOT MicroStation V8i SS2 (x86)**.

Double click on the icon labeled **GDOT MicroStation V8i SS2 (x86)**.

- When the **MicroStation Manager** dialog box appears – navigate to the **C:\InRoads Data\1234567\Design Labs\Standards** folder and select the "**GDOT 3D Working File.dgn**". (Creation of the 'GDOT 3D Working File.dgn' is documented in the Design Guidelines). Click **Open**.

- Now open InRoads from within MicroStation by selecting:
  InRoads ► InRoads Suite (SELECTseries 2) V8i 08.11.07.566 from the [MicroStation Menu].

The MicroStation and InRoads Software(s) will open.

3. Clear the MicroStation Window (*This step may be ignored if your MicroStation Window is already clear of graphics***)**

- Select **Edit ►Select All** from the [MicroStation Menu].
- Then select the **<DELETE>** key on the computer keyboard.

The MicroStation Window is now clear of all graphics from the previous lab and ready for this lab.

4.	**Verify Project Defaults** • In InRoads, select **File ►Project Defaults** • Use the pull down next to **Configuration Name:** to select ***1234567_Design*** which you created in Lab 1. • Click **Apply** & **Close.** *Sets Project Defaults.*
5.	**Set the Design Default Preferences** • Select **File ► Project Options** and the **<u>Project Options</u>** dialog box appears. • Select the **Factors** tab. • This will be a 50 Scale Project. Enter ***50*** in each line for the **Text**, **Cell** & **Line Style Scale Factor(s)**. • Then in the same **<u>Project Options</u>** dialog box select the **Geometry** tab. • Click the **Preferences** button at the bottom of the dialog box. • Choose ***Design Default***. Click **Load** and **Close**. This will set the remainder of the Design Defaults. ****IMPORTANT**: As stated previously the ***Design Default*** Preference loads the appropriate settings for use during Design. These settings include the Alignment and Point name settings. These settings are of particular importance to the Designer. Alignments must have a **DE** prefix. Points must also have a **DE** prefix as well as beginning the point numbering scheme at Number 10000. In order for survey enhancements to be properly added during the design phase of a project, it is essential that Designers pay particular attention to this setting. • In the **<u>Project Options</u>** dialog box click **Apply** and **Close**. *Sets the Design Default Preference.*
6.	**Open 1234567_Design.alg** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 5** • Highlight **1234567_Design.alg** • Click **Open** & **Cancel**. *The Geometry Project 1234567_Design is opened.*

Lab 5B Open Lab5_Import Graphics.dgn and Import Golf Course Rd Tie-in into InRoads

In **Lab5B** you will open the MicroStation File ***Lab5_Import Graphics.dgn*** and import into InRoads, as **DE60** (**Golf Course Rd Tie-in**), the MicroStation elements that have been provided.

7.	**Open Lab5_Import Graphics.dgn** • In MicroStation, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 5** • Highlight **Lab5_Import Graphics.dgn** • Click **Open**. • Verify your view in MicroStation matches that shown in *Figure L5-1*. The elements showing represent alignment **DE60** and will be imported into InRoads. *The MicroStation File Lab5_Import Graphics.dgn is opened.*

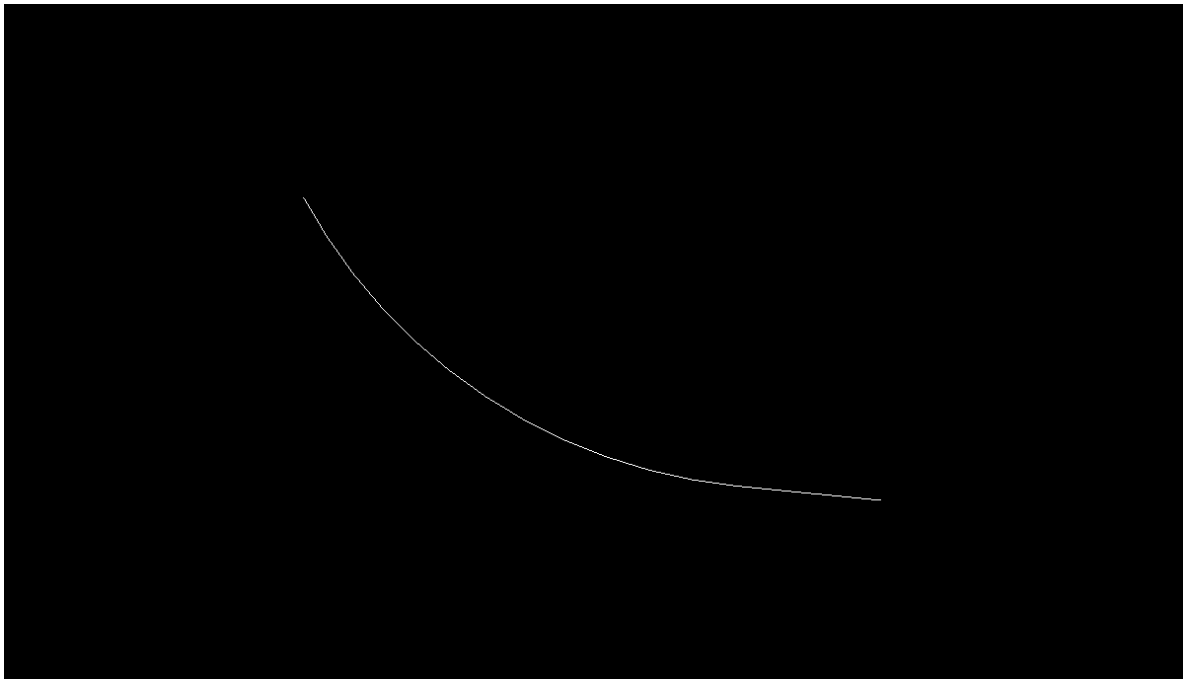


Figure L5-1 MicroStation View

8.	**Open the <u>Import Geometry</u> dialog.** • In InRoads, select **File ► Import ► Geometry**. The **<u>Import Geometry</u>** dialog opens as shown in *Figure L5-2*.

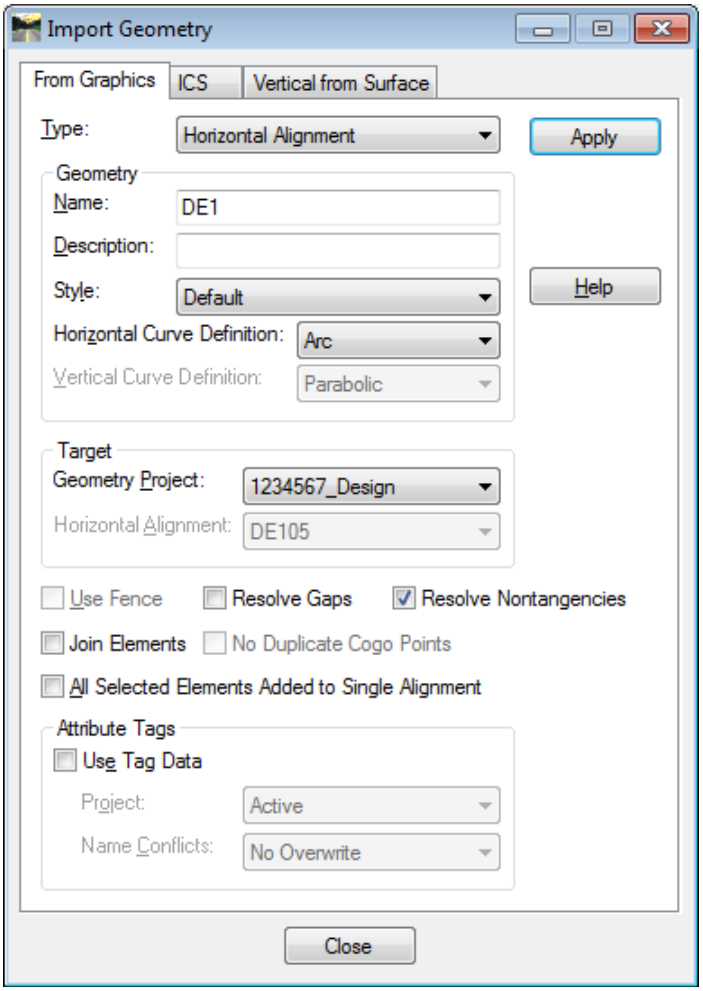


Figure L5-2 Import Graphics

9.	**Enter the <u>Import Geometry</u> dialog settings to import Golf Course Rd Tie-in**
	
	• Select the **From Graphics** tab if it is not already the active tab.
	• Set the Type: to **Horizontal Alignment**.
	• In the **Geometry** Frame: enter the following:
	  o **Name:** ***DE60***
	  o **Description:** ***C/L Golf Course Rd Tie-in***
	  o **Style:** ***MAIN_P_SIDECL***
	  o **Curve Definition:** ***Arc***
	• In the **Target** field set the **Geometry Project:** to **1234567_Design** from the pull down menu.
	• Make sure only the following check boxes contain a check mark:
	  o ☑ Join Elements
	  o ☑ All Selected Elements Added to Single Alignment
	• Verify your entries match those shown in *Figure L5-3*.

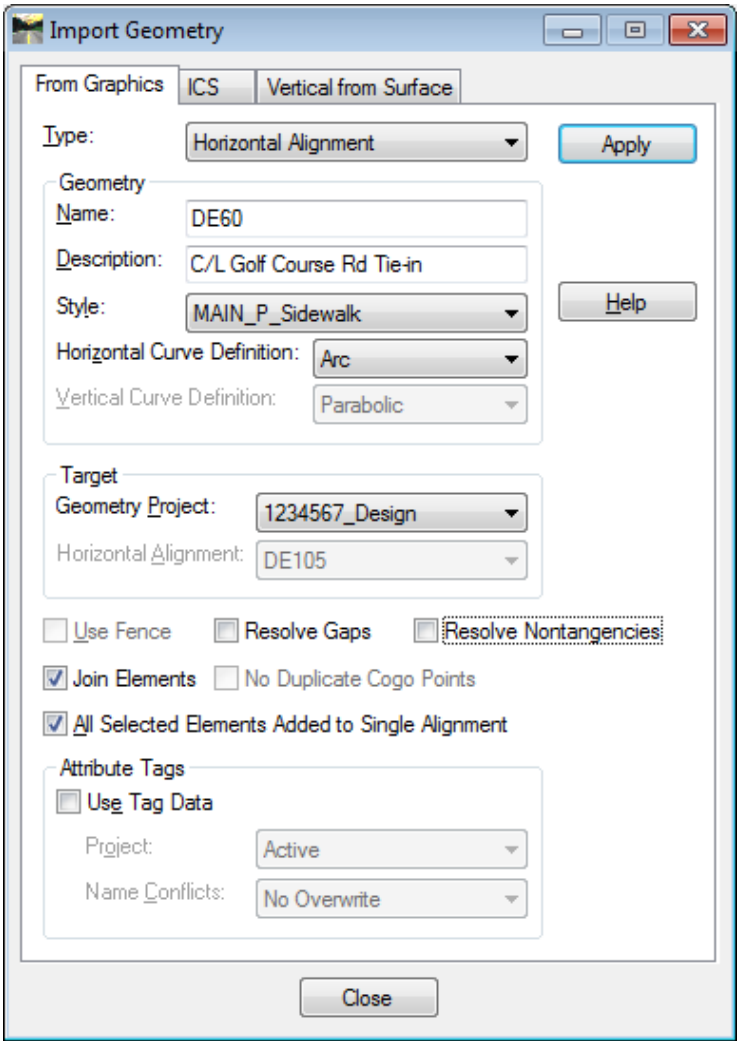
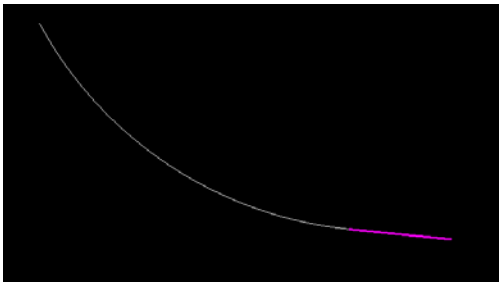


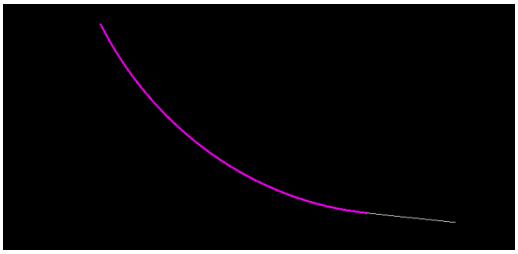
Figure L5-3 Import Geometry

10. **Import the MicroStation Graphics into the InRoads ALG file.**

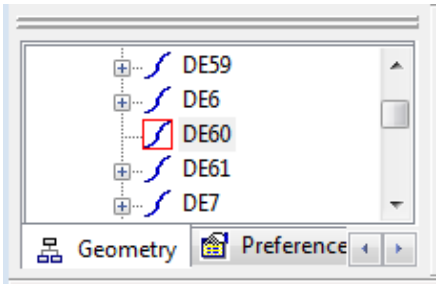
- In the **Import Geometry** dialog, click **Apply.**
- Notice in the bottom right left corner of the MicroStation window you are prompted to > **Identify element**.
- Left click on the tangent section of the alignment. It will turn purple (as shown below) and you will be prompted to left click in the bottom left of the MicroStation window to > **Accept/Reject**.



- Left click anywhere in the MicroStation window to **Accept**.
- Notice in the bottom left corner of the MicroStation window you are now prompted again to > **Identify element**.
- Left click on the curve. The curve will turn purple (as shown below) and you are prompted in the bottom left corner of the MicroStation window to > **Accept/Reject**.



- Left click anywhere in the MicroStation window to **Accept**.
- Notice in the bottom left corner of the MicroStation window you are now prompted again to > **Identify element**.
- Right mouse click to end importing graphics and return to the **Import Graphics** dialog.
- Click **Close** to exit the **Import Geometry** dialog.
- The MicroStation Graphics have now been imported into the InRoads ALG file as a horizontal alignment.

11.	**Verify Alignment DE60 has been imported into the InRoads ALG.** • In the InRoads workspace bar, click the **Geometry** tab to make it the active tab. • Verify alignment **DE60** is present and also that it is the active alignment. It should have a red square around it as shown here. 
12.	**Review Alignment DE60.** • In InRoads, select **Geometry ► Review Horizontal**. The **Review Horizontal Alignment** window opens as shown in *Figure L5-4*. • Notice in the **Review Horizontal Alignment** window none of the coordinates have names assigned to them. • Close the **Review Horizontal Alignments** window.

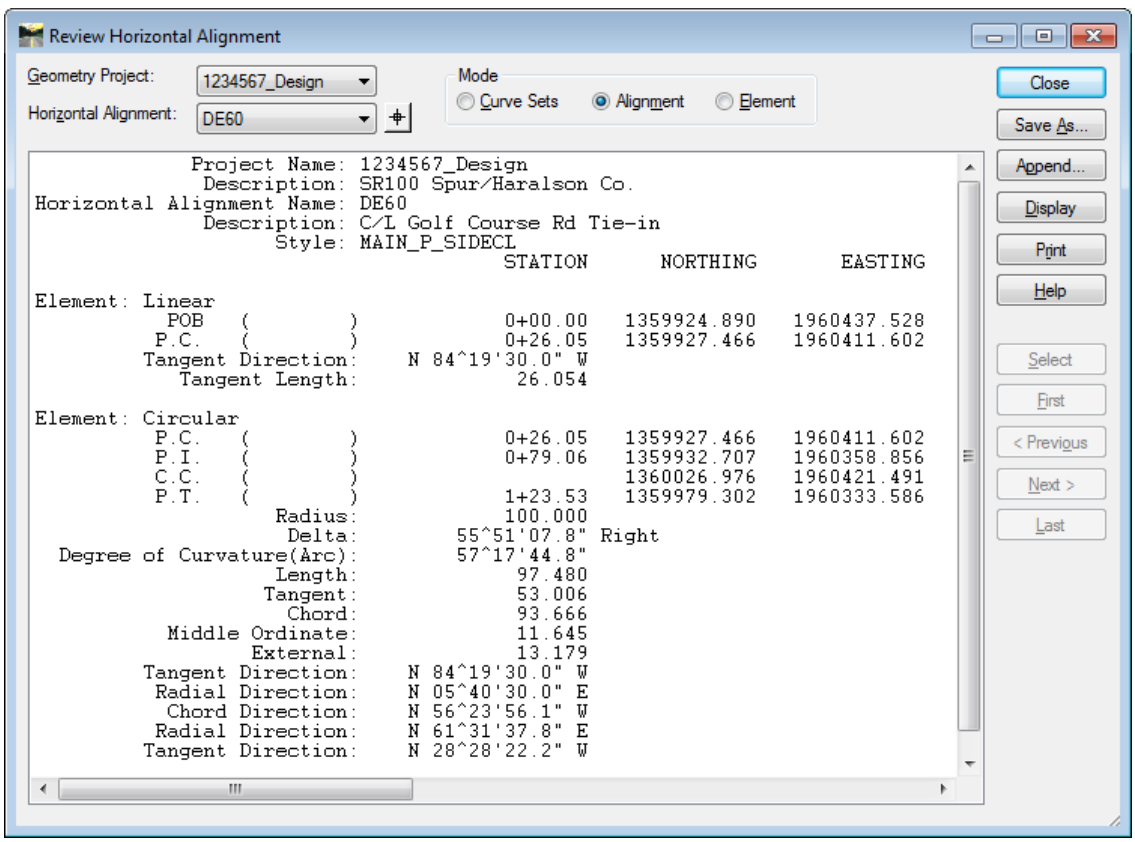


Figure L5-4 Review Horizontal Alignment

13.	**Assign Names to the Coordinates in Alignment DE60.** • In InRoads, select **Geometry ► Utilities ► Assign Names**. The **Assign Names** dialog opens. • **Match** the settings in the **Assign Names** dialog to those shown in *Figure L5-5*. • Click **Apply** and **Close**.

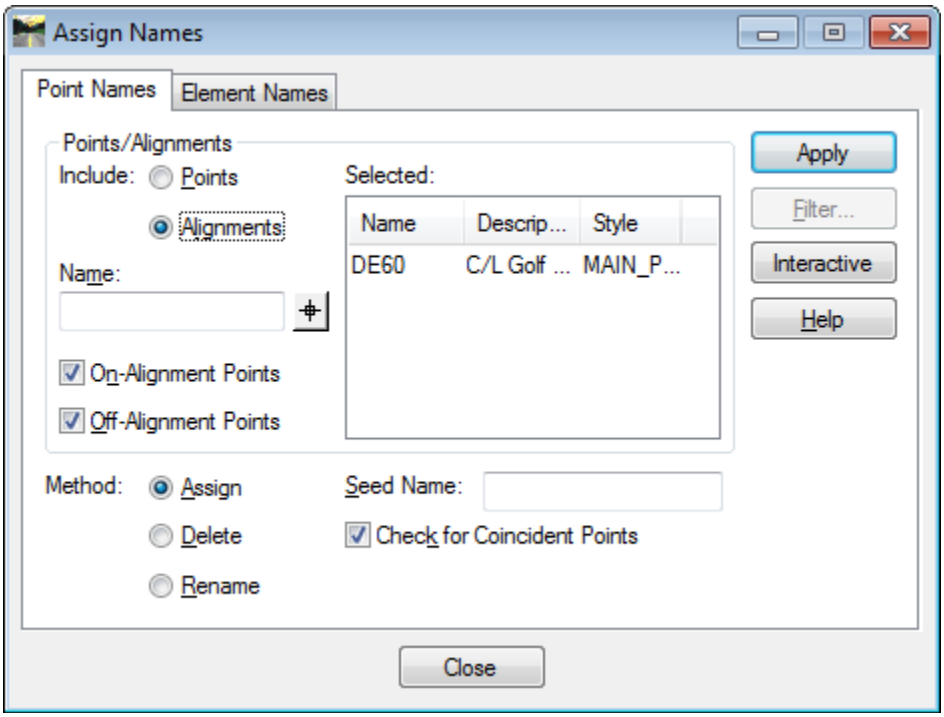


Figure L5-5 Assign Names

14.	**Review Alignment DE60.** • In InRoads, select **Geometry ► Review Horizontal**. The **Review Horizontal Alignment** window opens as shown in *Figure L5-6*. • Notice in the **Review Horizontal Alignment** window the coordinates now have names assigned to them. • Close the **Review Horizontal Alignments** window.

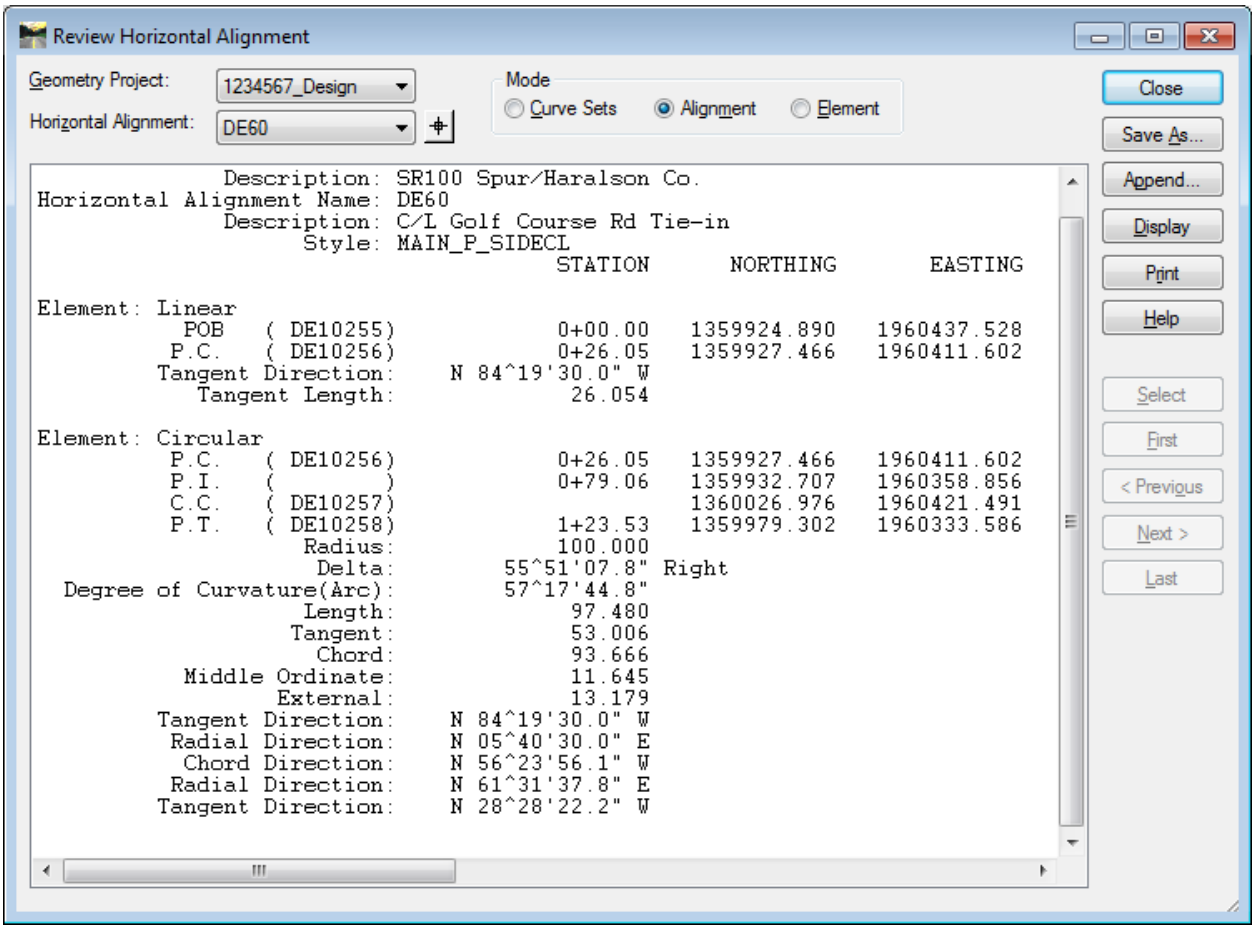


Figure L5-6 Review Horizontal Alignment

15.	**Create COGO Points of all Alignment Points.** * **IMPORTANT**: Although Point Names (Alignment Points) now exist in Alignment **DE60** for the PI's, PC's and PT's -- the Alignment Points don't actually exist as COGO Points in the COGO Buffer. In order to properly display the points in MicroStation with the proper symbology and for the proper delivery of Enhancements during the life of the project, the Alignment Points must be converted to COGO Points and assigned the proper Feature Style. • In InRoads, select **Geometry ► Horizontal Curve Set ► Events**. The **<u>Horizontal Events</u>** dialog opens. • **Match** the settings in the **<u>Horizontal Events</u>** dialog to those shown in *Figure L5-7*. • Click **Apply** and **Close**. • **Close** the **<u>Results</u>** window. *** NOTE:** Cogo Points are only assigned to Alignment Points for the active Alignment. The process must be repeated for each Alignment.

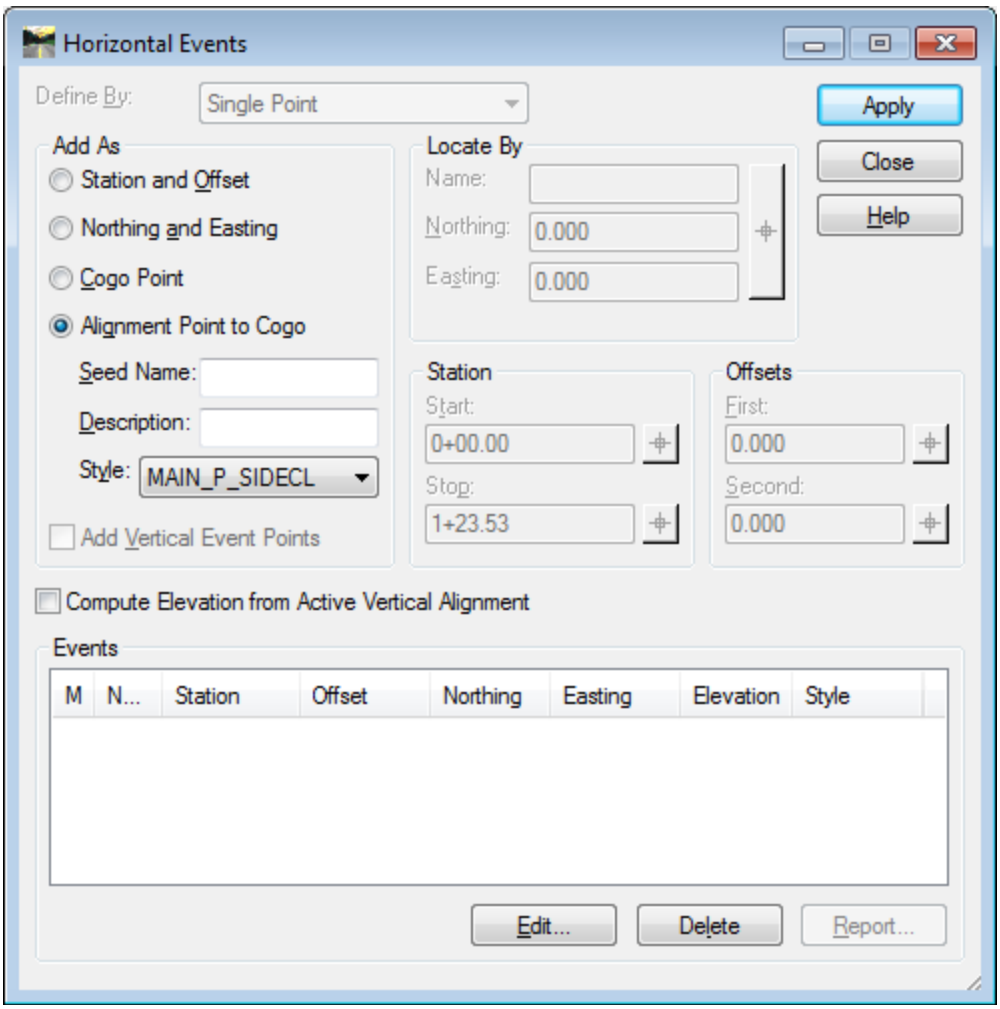


Figure L5-7 Horizontal Event Points

16.	**Save the InRoads Geometry File** Even though the Alignment has been stored – the data has not yet been saved. InRoads retains the data in <u>temporary</u> memory but does not <u>save</u> the data on the fly. Whenever a change has been made to an InRoads Geometry Project – <u>Save</u> the Project and its associated modifications or changes. • Select **File ▶ Save ▶ Geometry Project** from the **InRoads Menu**.
17.	**Station Alignment DE60 to Begin at Station 15+55.76** • Select **Geometry ▶ Horizontal Curve Set ▶ Stationing**. The **<u>Stationing</u>** dialog opens. • **Match** the settings shown in *Figure L5-8*. • Click **Apply** & **Close**.

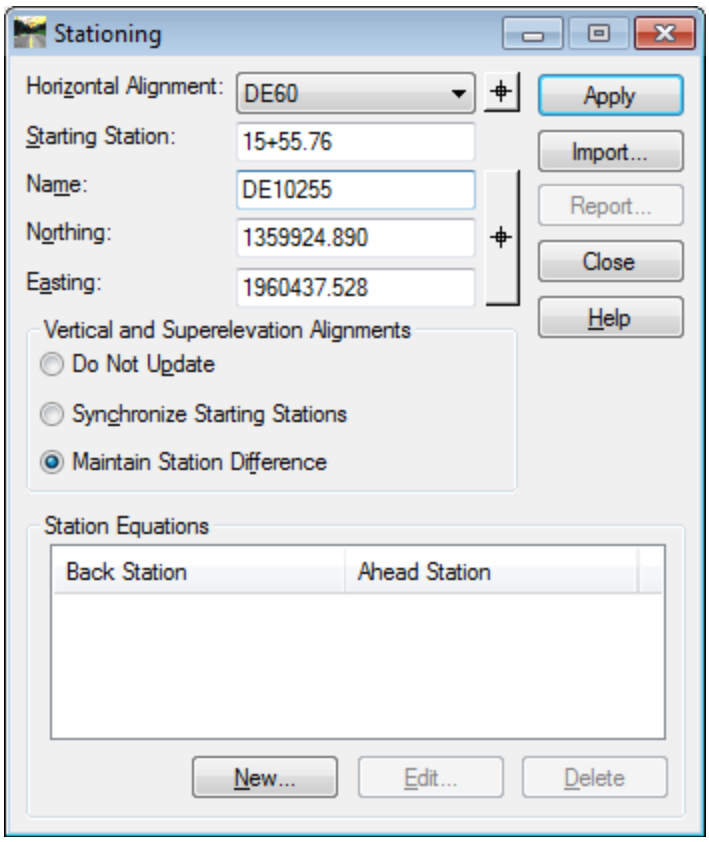


Figure L5-8 Stationing

18.	**Review Alignment DE60.** • In InRoads, select **Geometry ► Review Horizontal**. The **<u>Review Horizontal Alignment</u>** window opens as shown in *Figure L5-9*. • Notice in the **<u>Review Horizontal Alignment</u>** the Stationing now begins at Station **15+55.76**. • Close the **<u>Review Horizontal Alignments</u>** window.

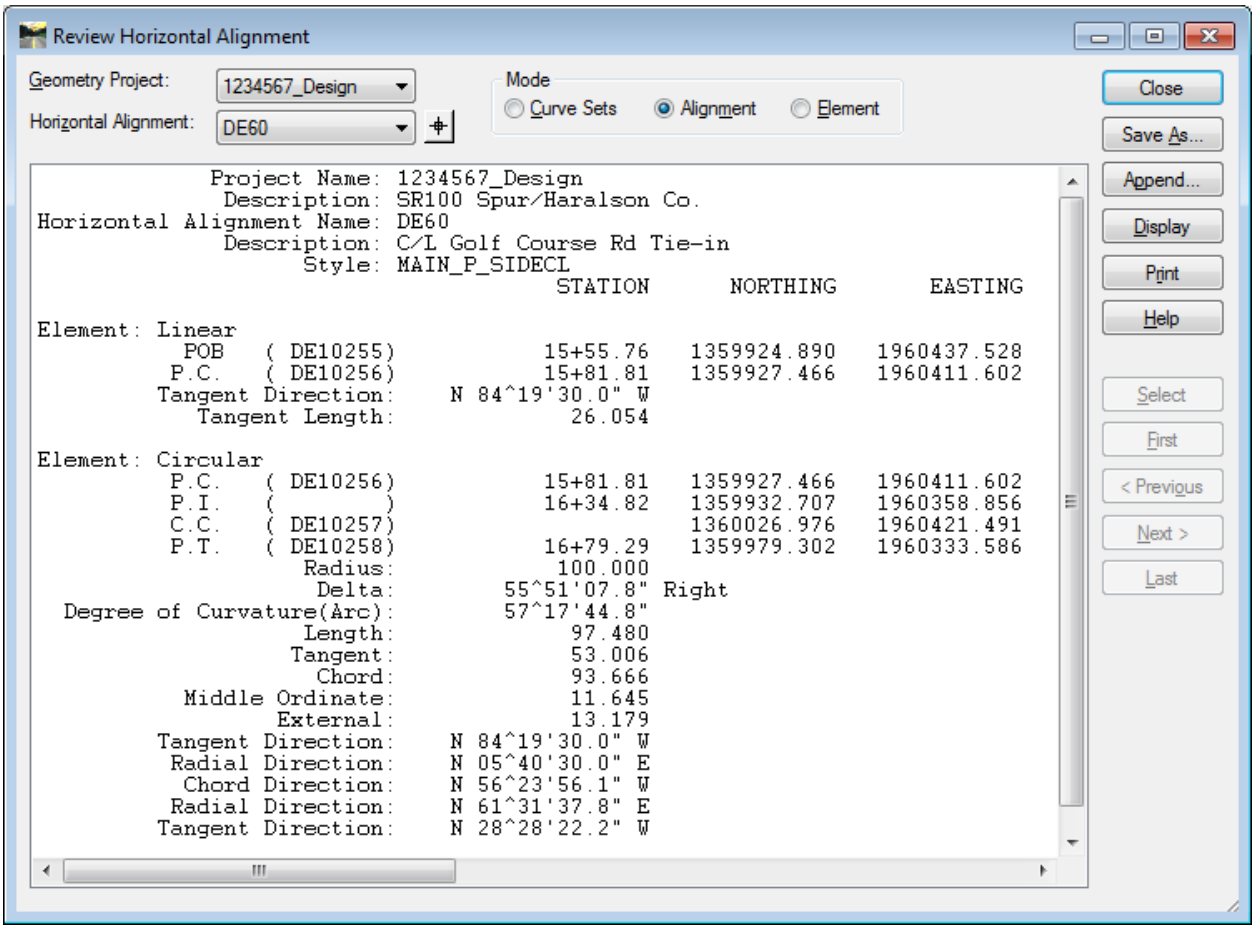


Figure L5-9 Review Horizontal Alignment

19.	**Save the InRoads Geometry File** • Select **File ▶ Save ▶ Geometry Project** from the **InRoads Menu**.
20.	**Open the GDOT 3D Working File.dgn** • In MicroStation, select **File ▶ Open**. The **Open** dialog opens. • Navigate to **c:\InRoads Data\1234567\Design Labs\Standards** • Highlight the File **GDOT 3d Working File.dgn**. • Click **Open**.

21.	**View Alignment DE60 in MicroStation.** • In InRoads, select **Geometry ► View Geometry ► Horizontal Annotation**. The **View Horizontal Annotation** dialog opens. • Load the Preference **'NO BEARING & DISTANCE'.** This may be accomplished by clicking the **Preferences** button, highlighting the preference **'NO BEARING & DISTANCE'** and clicking **Load** and **Close** in the **Preferences** dialog. • In the **Horizontal Alignments** – **Include:** field, key-in **DE60** and hit the **Tab** key on your keyboard. • Verify your entries match those shown in *Figure L5-10*. • Click **Apply** & **Close**. • Verify alignment **DE60** was drawn in MicroStation with the correct attributes as shown in *Figure L5-11*.

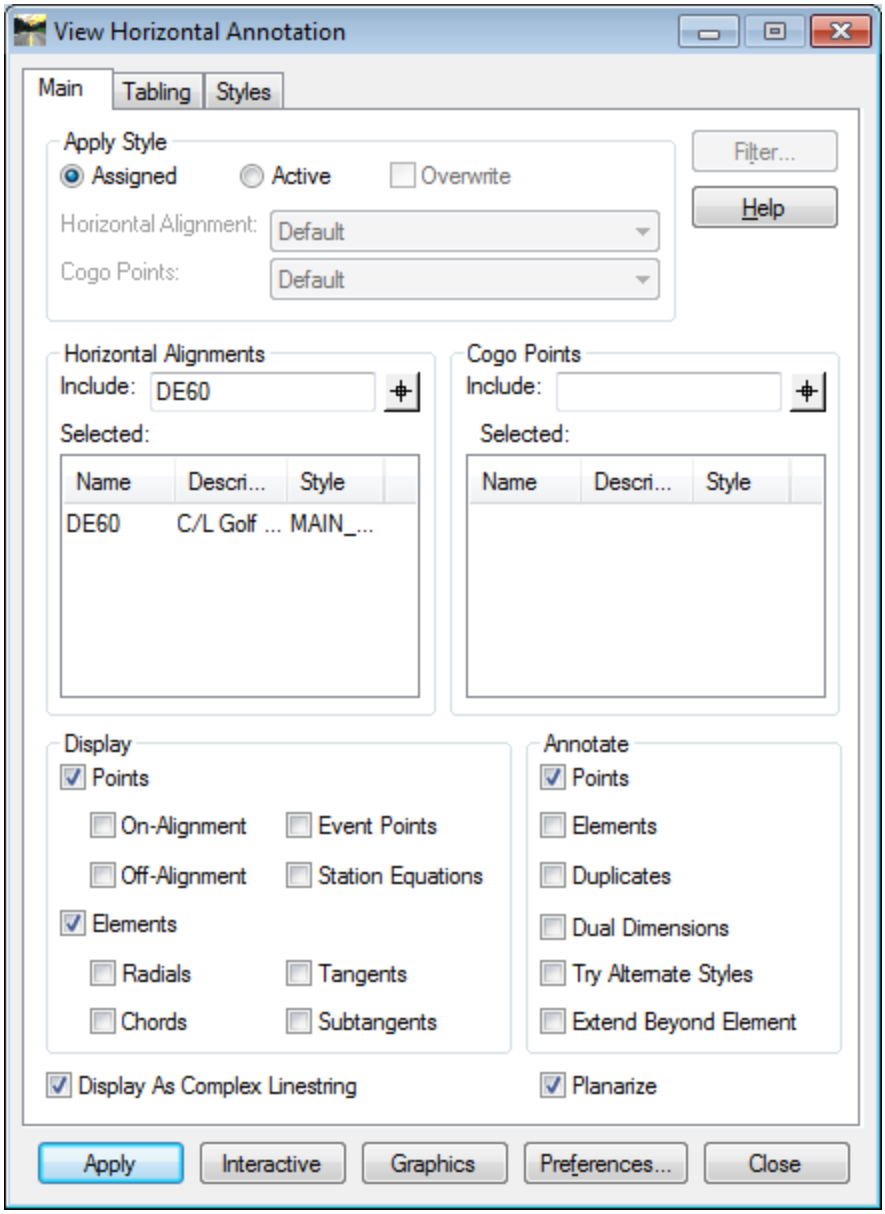


Figure L5-10 View Horizontal Annotation

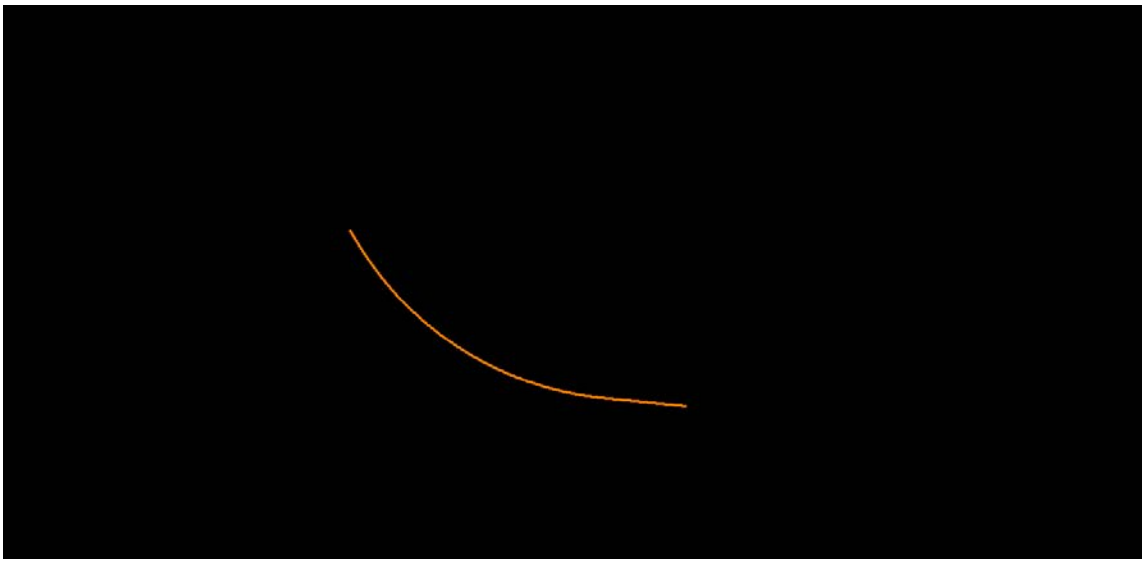


Figure L5-11 MicroStation View

22.	**Station the Alignment.** • In InRoads, select **Geometry ► View Geometry ► Stationing**. The **View Stationing** dialog opens. • Load the **SIDECL** preference. This may be accomplished by clicking the **Preferences** button, highlighting the preference **SIDECL** and clicking **Load** and **Close** in the **Preferences** window. • In the **View Stationing** dialog, ensure **DE60** is shown in the **Horizontal Alignment:** entry field as shown in *Figure L5-12*. • Click **Apply** and **Close**. • Verify your view in MicroStation matches that shown in *Figure L5-13*. ***NOTE**: At this point MicroStation is used to clean up overlapping text.

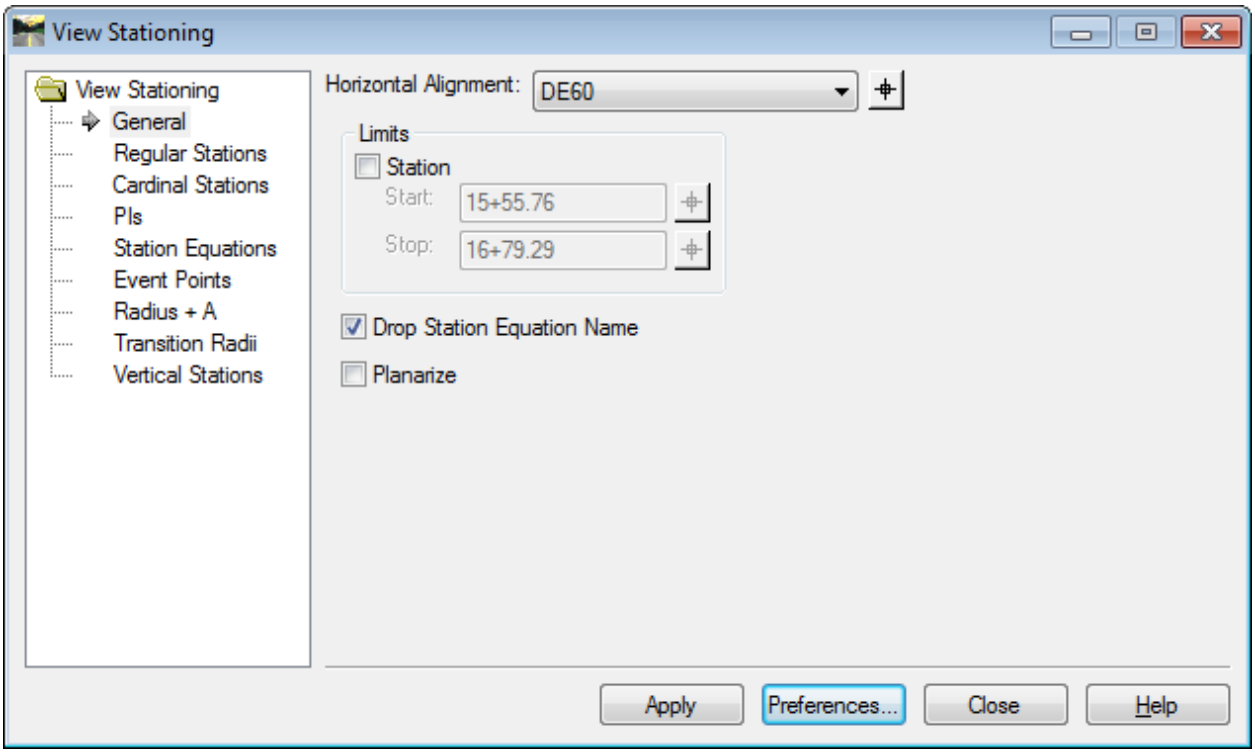


Figure L5-12 View Stationing

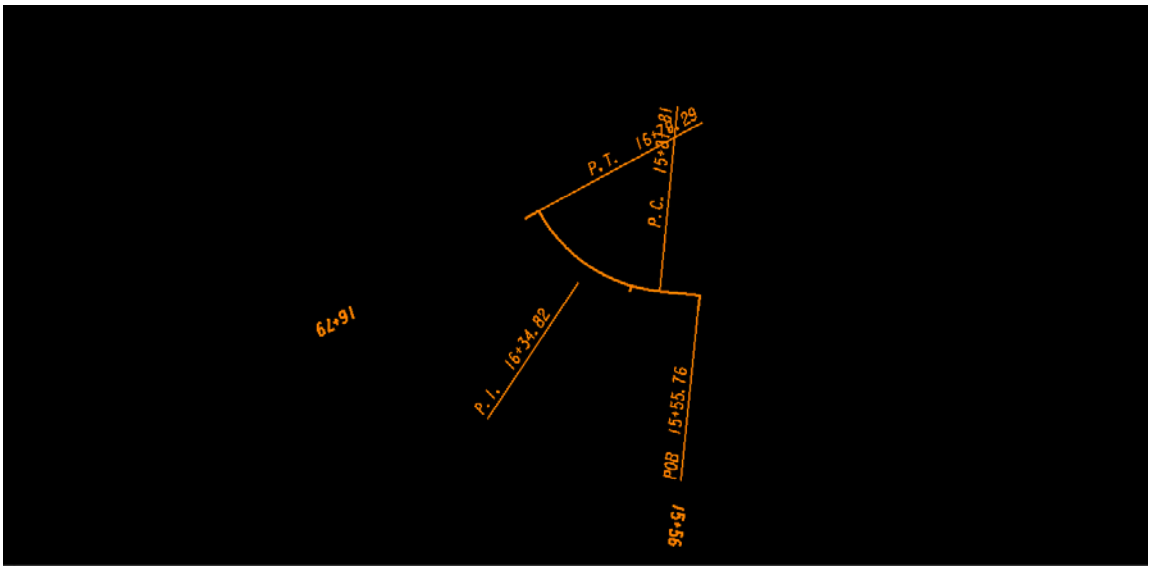


Figure L5-13 MicroStation View

Lab 5C Placing Curve Data Tables

In **Lab5C** you will place Curve tables in MicroStation for Alignment DE60. The following information is required per the GDOT Plan Presentation Guide.

Curve Data Table Required Information

- **CURVE Number**
- **P.I. Station**
- **P.I. Coordinates**
- **△ or "DELTA"** **(Deflection angle)**
- **D** **(Degree of Curve)**
- **T** **(Tangent Length)**
- **L** **(Length of Curve)**
- **R** **(Radius)**
- **E** **(External distance)**
- **e** **(Superelevation in percent)**

23.	**Open the <u>Curve Set Annotation</u> dialog.** • In InRoads, select **Geometry ► View Geometry ► Curve Set Annotation**. The **<u>Curve Set Annotation</u>** dialog opens as shown in *Figure L5-14*. • Click the **Annotation** folder. The Annotation folder is where settings are entered to control what and how Curve data is annotated as shown in *Figure L5-15*.

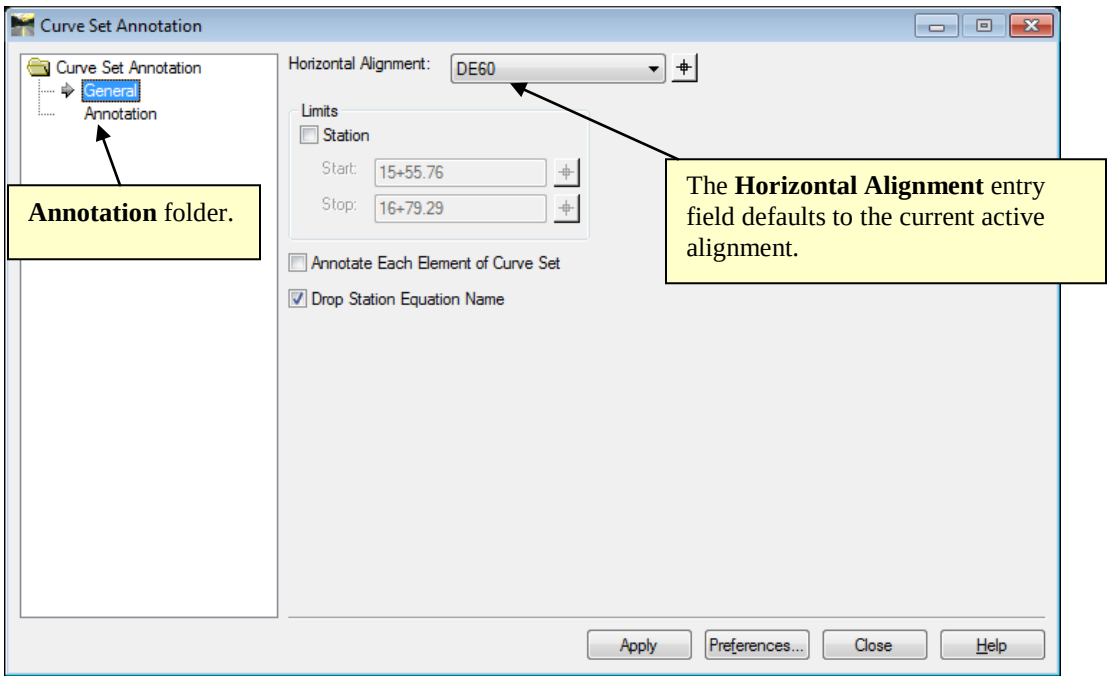
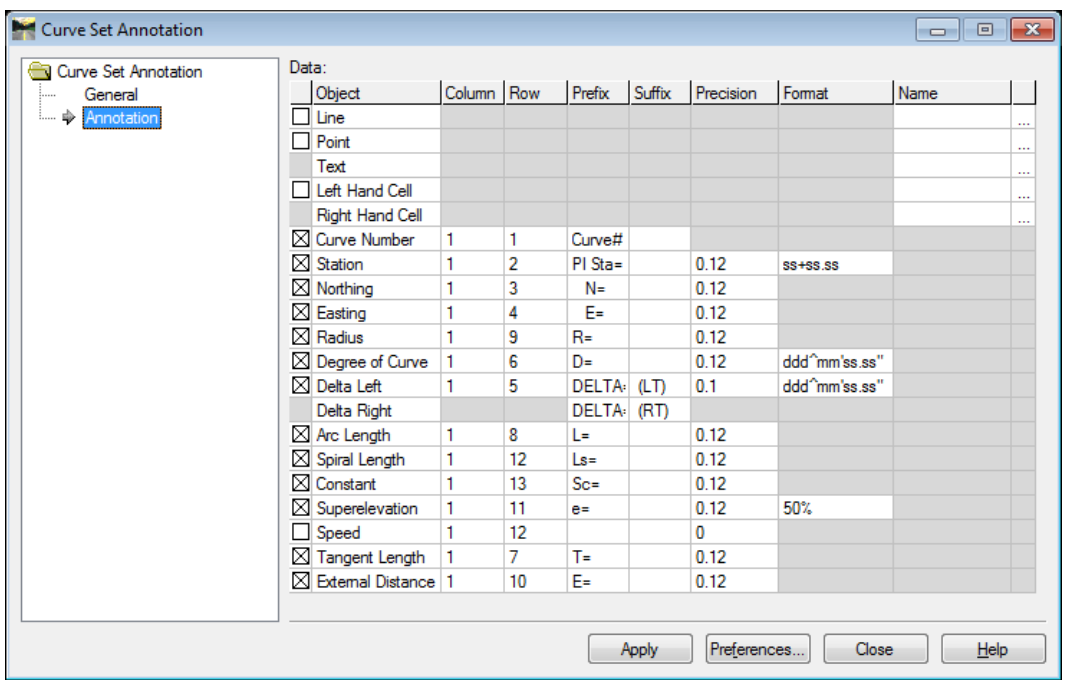


Figure L5-14 Curve Set Annotation



Object	Column	Row	Prefix	Suffix	Precision	Format	Name
Line							
Point							
Text							
Left Hand Cell							
Right Hand Cell							
Curve Number	1	1	Curve#				
Station	1	2	PI Sta=		0.12	ss+ss.ss	
Northing	1	3	N=		0.12		
Easting	1	4	E=		0.12		
Radius	1	9	R=		0.12		
Degree of Curve	1	6	D=		0.12	ddd^mm'ss.ss"	
Delta Left	1	5	DELTA:	(LT)	0.1	ddd^mm'ss.ss"	
Delta Right			DELTA:	(RT)			
Arc Length	1	8	L=		0.12		
Spiral Length	1	12	Ls=		0.12		
Constant	1	13	Sc=		0.12		
Superelevation	1	11	e=		0.12	50%	
Speed	1	12			0		
Tangent Length	1	7	T=		0.12		
External Distance	1	10	E=		0.12		

Figure L5-15 Curve Set Annotation

24.	**Load the SIDECL Preference.** • In the **Curve Set Annotation** dialog, click the **Preferences** button. The **Preferences** selection window opens. • In the Preferences selection window, highlight **SIDECL** as shown in *Figure L5-16*. • Click **Load** & **Close**. This loads the settings into the **Curve Set Annotation** dialog for viewing Curve Data Tables in MicroStation.

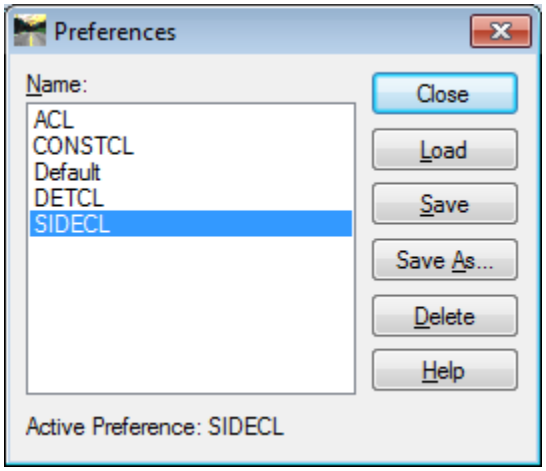


Figure L5-16 Preferences

25.	**View the Curve Data Table for Alignment DE60 in MicroStation.** • In the **Curve Set Annotation** dialog, click **Apply** and **Close**. • In MicroStation, click the **Fit View** button ( ). • Verify your view in MicroStation matches that shown in *Figure L5-17*. ***NOTE**: At this point MicroStation may be used to Move or Rotate the Curve Table as necessary for plan presentation.

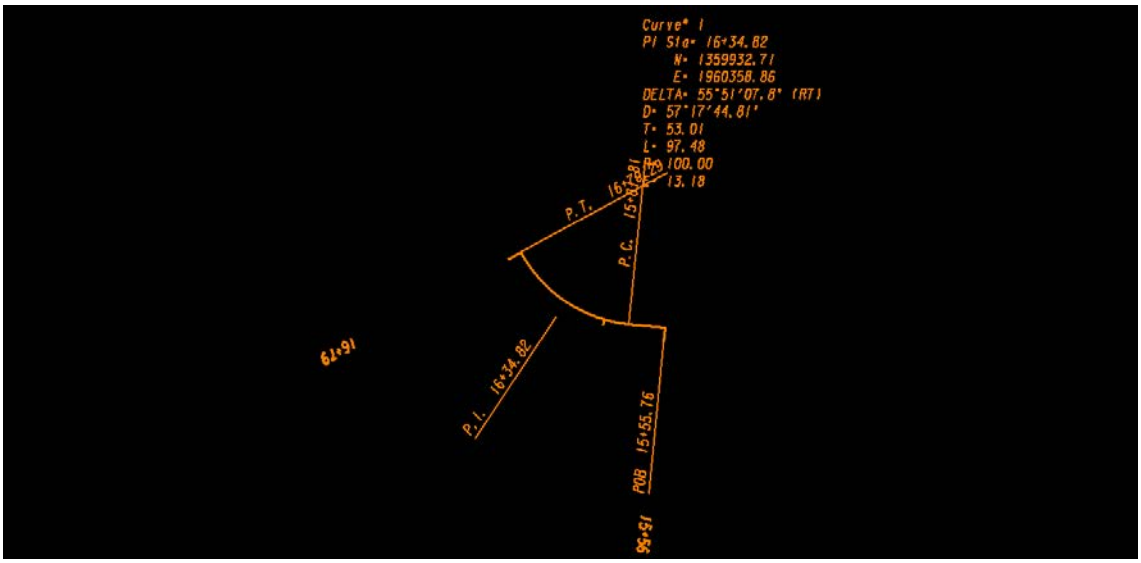


Figure L5-17 MicroStation View

26.	STOP This concludes Lab 5. Do not proceed until the Instructor directs you to do so.

Lab 6
Profile Sheets

Objective

The objective of this Lab is to learn the procedures for creating Profile Sheets by using the Plan and Profile Generator command.

Important Discussion:
The generation of Profile Sheets is accomplished by using the **Plan and Profile Generator** command in InRoads. This command uses DGN and Host files to generate the Profile Sheets. In order to understand the process -- the following information regarding the creation of Profile Sheets will be discussed in **Lab 6**.

- **"Master" DGN File -** a new MicroStation DGN file that is created which will contain the actual Terrain Profile, Vertical Alignment and Annotation.
    - The recommended File Naming Structure is ***PI#PR##.dgn***.
    - (***PI#*** = the *Project Number*, ***PR##*** = the *Profile Alignment Name*).
- **"Host File"** – a MicroStation DGN file which is used to create the Profile Sheet. This file contains the grid cell and the clipping elements. It is the actual Profile Sheet which uses the "Master" DGN file as a Reference File.
    - The recommended File Naming Structure is ***PI#_Section Number.dgn***. The Section Number is depicted in the Electronic Data Guidelines (EDG). The Section for Mainline Roadway Profile is 15. The Section for Crossroad Profile is 16.
    - (***PI#*** = the *Project Number*, ***Separator*** = *_*, ***Section Name*** = *15* or *16*).
- **"Seed Host File"** – a MicroStation DGN file which is used as the seed file to create the "**Host File**". This is the **GDOT_V8_3D.dgn** file which contains the standard GDOT DGN Library, cell libraries, etc.
    - (Note: In this Lab the "**Seed Host File**" is named ***GDOT 3D Working File.dgn***).

RECAP:

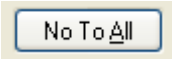
- ***PI#PR##.dgn*** = DGN File which contains the Terrain Profile, Vertical Alignment and Annotation
- ***PI#_Section Number.dgn*** = DGN File which contains the Profile Sheets.
- ***GDOT 3D Working File.dgn*** = DGN File which is the standard GDOT Seed File.

Lab 6A Open 1234567_Design.ALG and 1234567_Exist.DTM

1. Starting Clean

In order to ensure that you are working with a "clean" database – you will close MicroStation and InRoads if they are still running from a previous Lab:

To CLOSE MicroStation and InRoads -

Select **File►Exit** from the [MicroStation Menu].
If any messages appear regarding the saving of projects – Select 

This closes BOTH the MicroStation and InRoads Software(s).

2. Starting MicroStation and InRoads in the GDOT Workspace.

From the desktop, double-click on the **MicroStation** icon labeled **GDOT MicroStation V8i SS2 (x86)**.

Double click on the icon labeled **GDOT MicroStation V8i SS2 (x86)**.

- When the **MicroStation Manager** dialog box appears – navigate to the **C:\InRoads Data\1234567\Design Labs\Standards** folder and select the "**GDOT 3D Working File.dgn**". (Creation of the 'GDOT 3D Working File.dgn' is documented in the Design Guidelines). Click **Open**.

- Now open InRoads from within MicroStation by selecting:
  InRoads ► InRoads Suite (SELECTseries 2) V8i 08.11.07.566 from the [MicroStation Menu].

The MicroStation and InRoads Software(s) will open.

3. Clear the MicroStation Window (*This step may be ignored if your MicroStation Window is already clear of graphics***)**

- Select **Edit ►Select All** from the [MicroStation Menu].
- Then select the **<DELETE>** key on the computer keyboard.

The MicroStation Window is now clear of all graphics from the previous lab and ready for this lab.

4.	**Verify Project Defaults** • In InRoads, select **File ►Project Defaults** • Use the pull down next to **Configuration Name:** to select ***1234567_Design*** which you created in **Lab 1**. • Click **Apply** & **Close.** *Sets Project Defaults.*
5.	**Set the Design Default Preferences** • Select **File ► Project Options** and the **<u>Project Options</u>** dialog box appears. • Select the **Factors** tab. • This will be a 50 Scale Project. Enter ***50*** in each line for the **Text**, **Cell** & **Line Style Scale Factor(s)**. • Then in the same **<u>Project Options</u>** dialog box select the **Geometry** tab. • Click the **Preferences** button at the bottom of the dialog box. • Choose ***Design Default***. Click **Load** and **Close**. This will set the remainder of the Design Defaults. ****IMPORTANT**: As stated previously the ***Design Default*** Preference loads the appropriate settings for use during Design. These settings include the Alignment and Point name settings. These settings are of particular importance to the Designer. Alignments must have a **DE** prefix. Points must also have a **DE** prefix as well as beginning the point numbering scheme at Number 10000. In order for survey enhancements to be properly added during the design phase of a project, it is essential that Designers pay particular attention to this setting. • In the **<u>Project Options</u>** dialog box click **Apply** and **Close**. *Sets the Design Default Preference.*
6.	**Open 1234567_Design.alg** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 6** • Highlight **1234567_Design.alg** • Click **Open** & **Cancel**. *The Geometry Project 1234567_Design is opened.*
7.	**Open 1234567_Exist.dtm** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 6** • Highlight **1234567_Exist.dtm** • Click **Open** & **Cancel**. *The Surface Project 1234567_Exist is opened.*

Lab 6B Create Profile Sheets

In Lab 6B, Profile Sheets will be created which depict the Terrain Profile, Vertical Alignment, Annotation and Profile Grid.

8.	**Set DE7 to be the Active Alignment** • Click the **Geometry** Tab at the bottom of the InRoads Workspace Bar. • Click the **+** sign next to the **1234567_Design** Project to expand the project. • Scroll to **DE7** and left click on Alignment **DE7** to highlight it. • Now, Right mouse click over it and select **'Set Active'**. • **DE7** should now have a red box around it indicating that it is the Active Alignment. *The Active Alignment is set to DE7.*
9.	Create a new MicroStation DGN file named ***1234567PR07.dgn***. (This is the File that will contain the Terrain Profile, Vertical Alignment and Annotation). The recommended MicroStation File Naming Convention is **PI#PR##.dgn**. (**PI#** = the *Project Number*, **PR##** = the *Profile Name*). • In MicroStation, Select **File ► Save As**. • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 6** • In the **File name:** field -- Enter the File name ***1234567PR07.dgn*** • Click **Save**. *The MicroStation DGN File named 1234567PR07.dgn is created and is made the current active DGN File.*
10.	In InRoads, Select **Drafting ► Plan and Profile Generator**. The **Plan and Profile Generator** dialog opens. *The Plan and Profile Generator dialog is opened.*
11.	**In the Plan and Profile Generator:** • Click the **Main** tab to be the active tab. • Click the **Preferences** button. • In the **Preferences** dialog select ***50 Scale Double Profile***. • Click **Load** and **Close**. • Verify your entries match those shown in *Figure L6-1*. **Please Note:** In a "real world" project the user may select the type of Profile Sheet that is applicable (**EX: *50 Scale Single Profile***) and the correct settings will be selected/loaded. *The Standard GDOT Settings for a 50 Scale Double Profile is selected and loaded.*

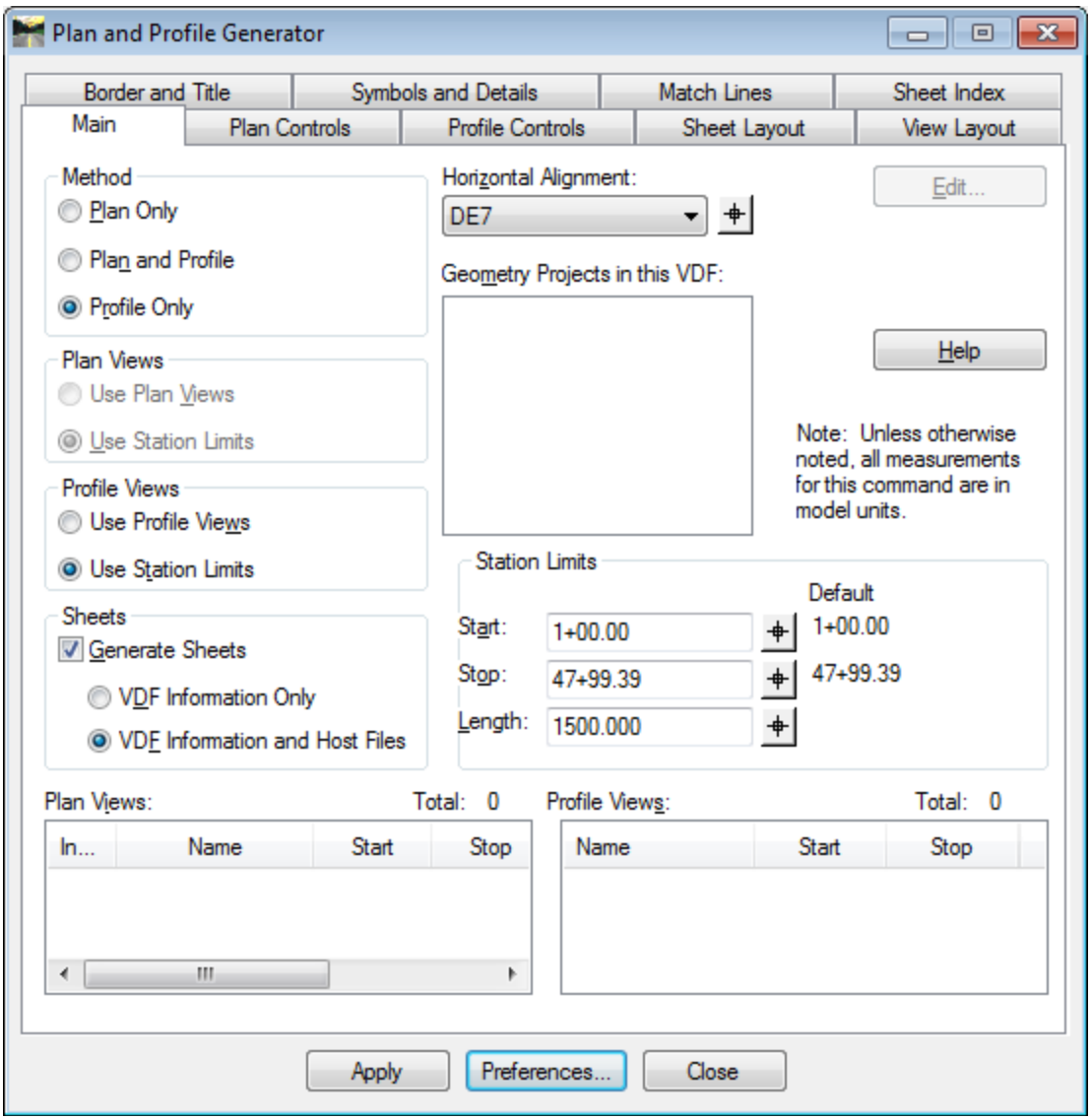


Figure L6-1 Plan and Profile Generator

12.	**In the <u>Plan and Profile Generator</u>:** • Click the **Profile Controls** tab to be the active tab. • Use the pull down arrow next to **Vertical Alignment:** to select ***DE7***. • Leave all other Entries as the default. • Verify your entries match those shown in *Figure L6-2*. *The Vertical Alignment of DE7 is selected.*

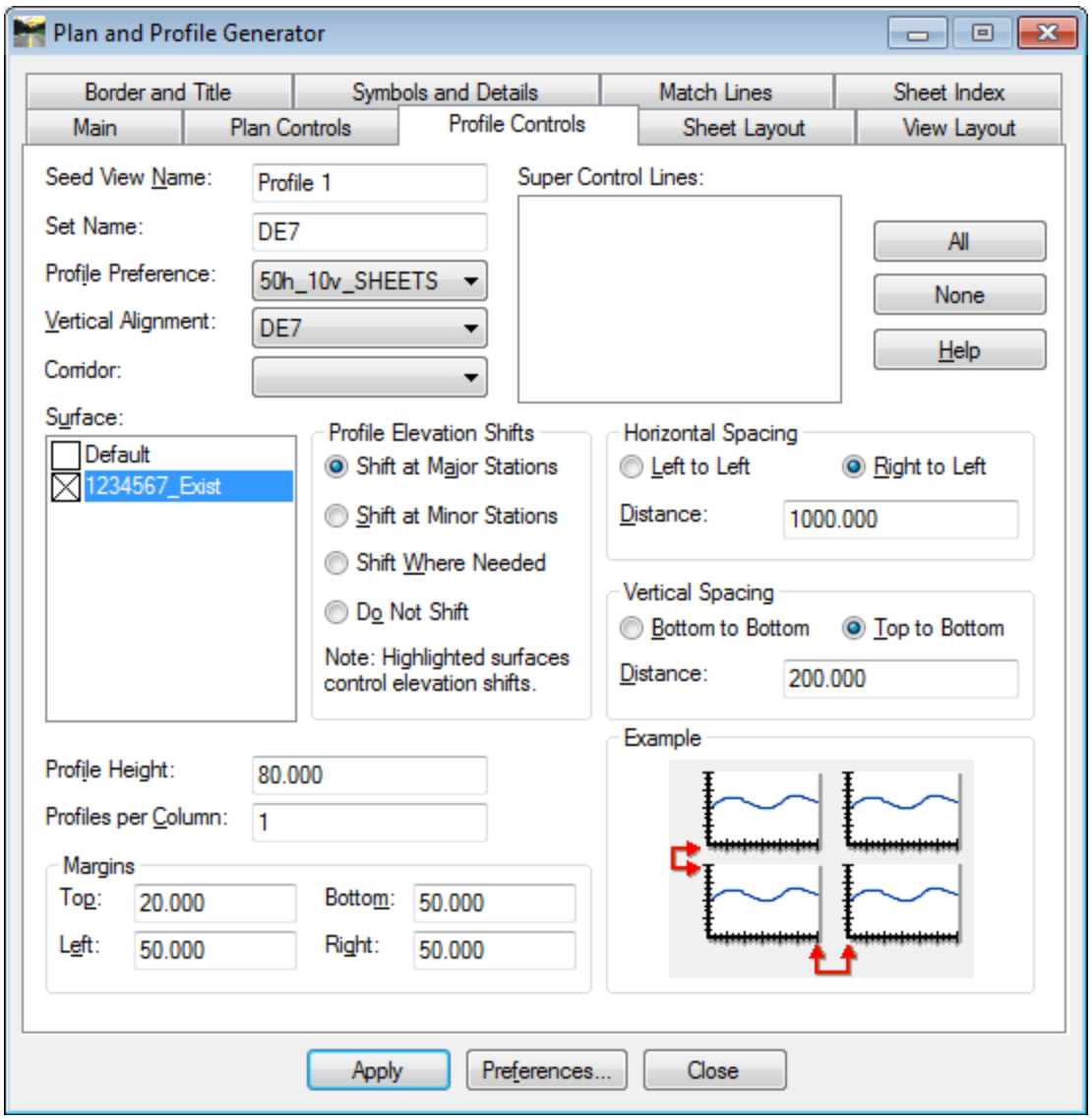


Figure L6-2 Plan and Profile Generator

13.	• Click the **Sheet Layout** tab to be the active tab.
	• Click the **Locate** button ( ) next to the **Host File:** entry field.
	  o Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 6**
	  o In the **File name:** field -- Enter the File name ***1234567_16.dgn***
	  o Click **Save**.
	• Click the **Locate** button ( ) next to the **Seed Host File:** entry field.
	  o Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 6**
	  o Select the **GDOT 3D Working File.dgn.** (This is the Seed File used to create the Host DGN File.)
	  o Click **Open.**
	• Verify your entries match those shown in *Figure L6-3*.

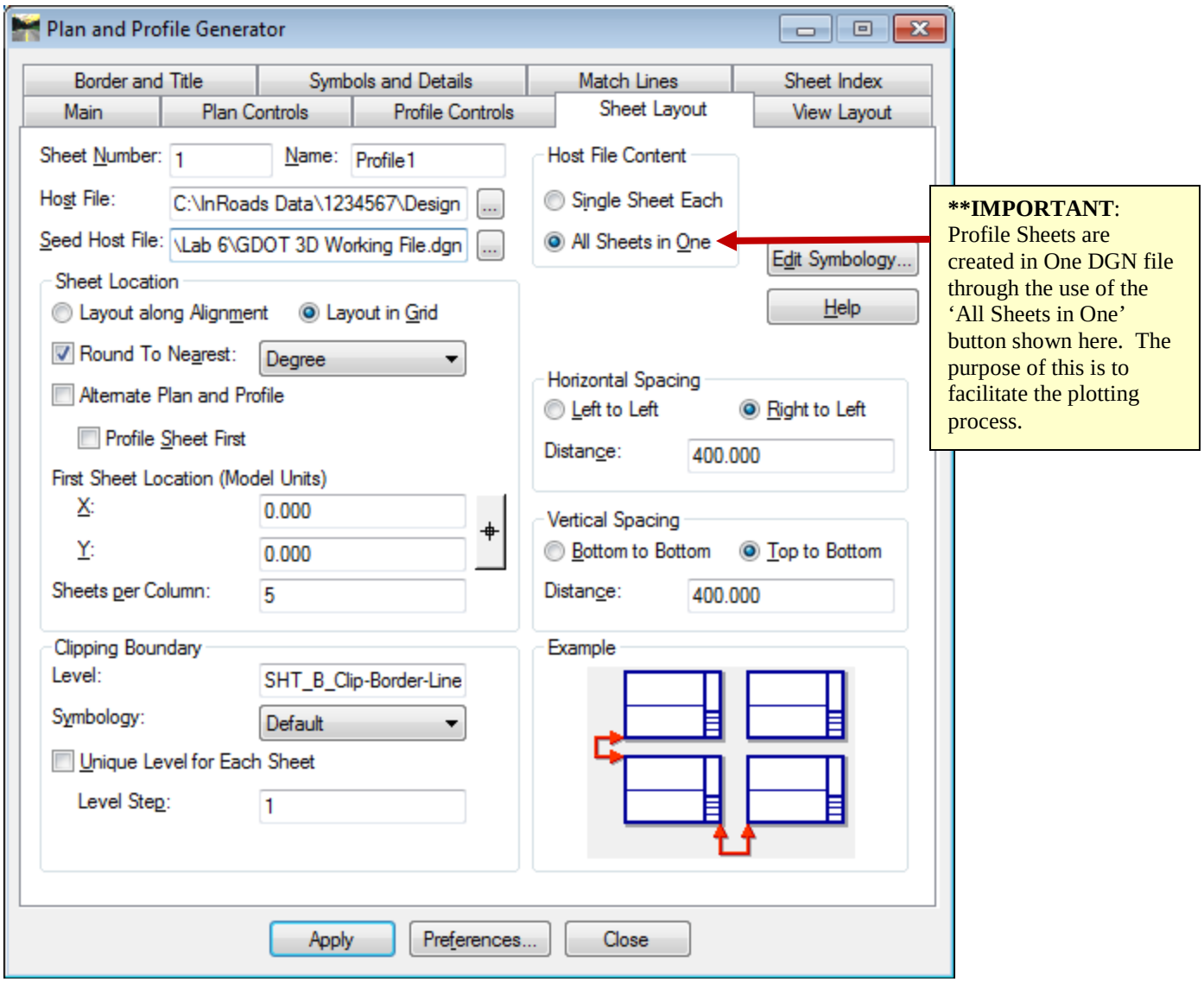


Figure L6-3 Plan and Profile Generator

14.	**In the <u>Plan and Profile Generator</u>:** • Click **Apply**. • You are prompted in the lower left corner of the MicroStation Window to **>Identify Location.** > Identify Location • Left Click anywhere in the MicroStation View window. Your Profile Sheets will be built and you will be left in the last MicroStation file created (in this case the DGN File named ***1234567_16.dgn***). • The **<u>Plan and Profile Generator</u>** dialog is returned and the Profile Sheets are built. • Click **Close** to exit the **<u>Plan and Profile Generator</u>** dialog. You will be prompted to '**Save Current VDF File?**' • Click **No**. *The individual Profile DGN is generated.*
15.	• In MicroStation -- Verify you are currently in the DGN File named ***1234567_16.dgn***. • Ensure that your view in MicroStation matches that shown in *Figure L6-4*. *Views the Profile in MicroStation.*

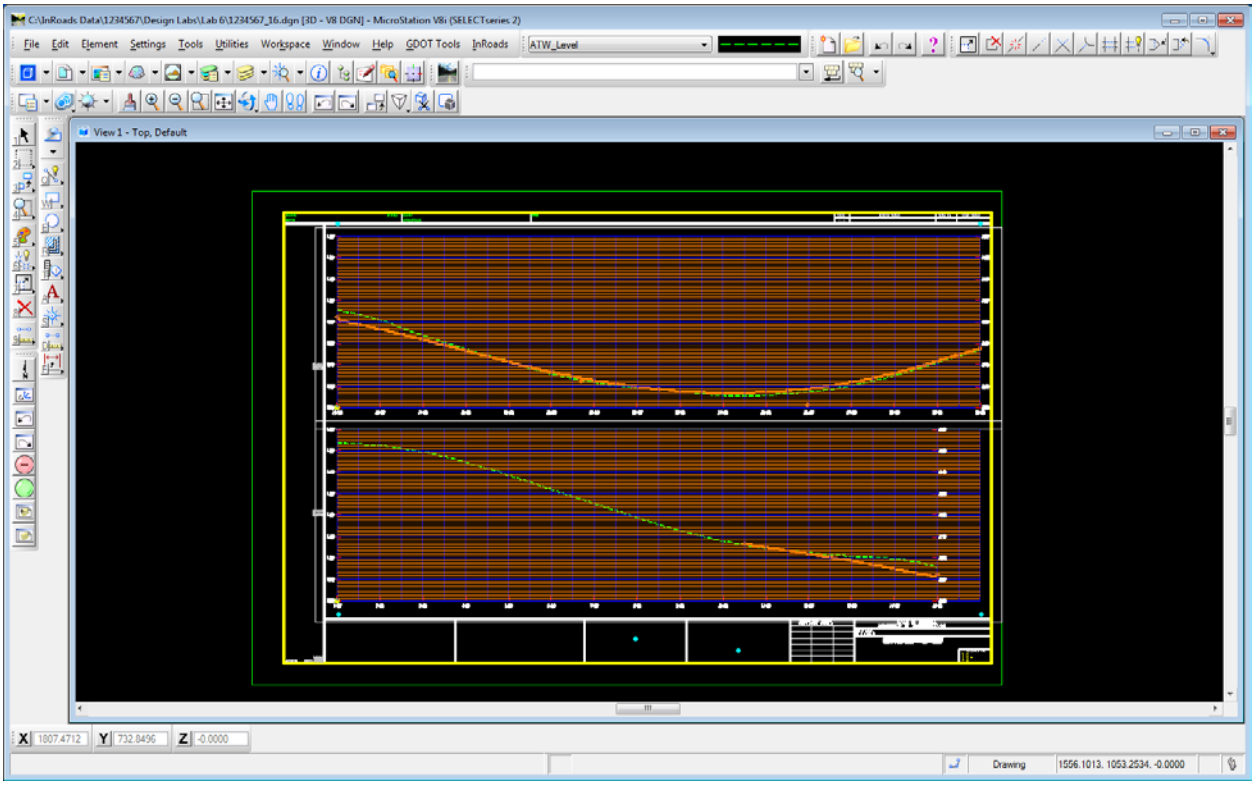


Figure L6-4 MicroStation Window

16.	**For Information Only**: At this point the Profile Sheets have been created and the Existing and Proposed Profiles have been plotted. The Vertical Alignment curve data still needs to be viewed and the Annotation applied. The remaining steps will instruct you on viewing the Vertical Alignment curve data and Annotating the Elevations. *Information regarding the viewing of Profile Sheets.*
17.	All viewing of Vertical Alignments and Annotation must be performed in the ***1234567PR07.dgn*** file and ***<u>not the individual</u>*** Sheet File. • In MicroStation, Select **File ► Open**. • Navigate to **Lab 6** – then **Select** and **Open** --- ***1234567PR07.dgn***. • In MicroStation, Click the **Fit View** button. Fit View *The 1234567PR07 DGN file is opened.*
18.	**Open the <u>View Vertical Annotation</u> Dialog.** • In InRoads, Select **Geometry ► View Geometry ► Vertical Annotation**. The **<u>View Vertical Annotation</u>** dialog opens as shown in *Figure L6-5*. *The <u>View Vertical Annotation</u> dialog opens.*

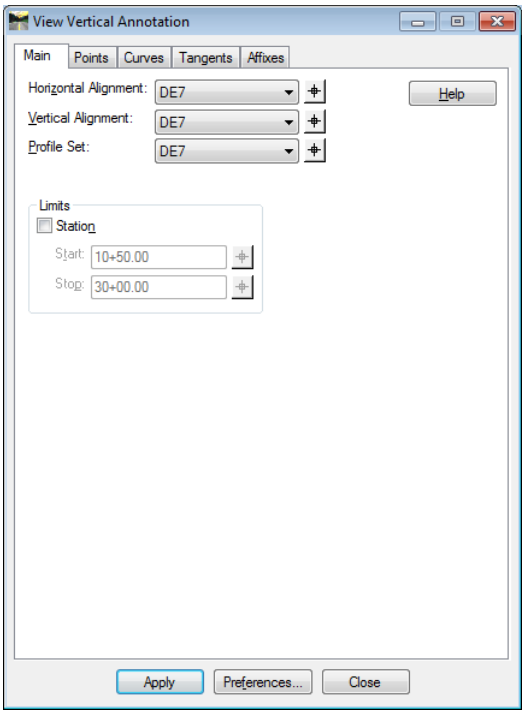


Figure L6-5 MicroStation Window

19.	**View and Annotate Vertical Alignment** • Click the **Preferences** button. • Under the **Name:** field -- Select the Preference **GDOT Profiles**. The **GDOT Profiles** Preference sets up the **<u>View Vertical Annotation</u>** dialog for viewing of the Vertical Alignment Annotation. • Click **Load** and **Close**. • Click **Apply** & **Close** in the **<u>View Vertical Annotation</u>** dialog. • Verify your view in MicroStation matches that shown in *Figure L6-6*. *The Vertical Annotation is viewed.*

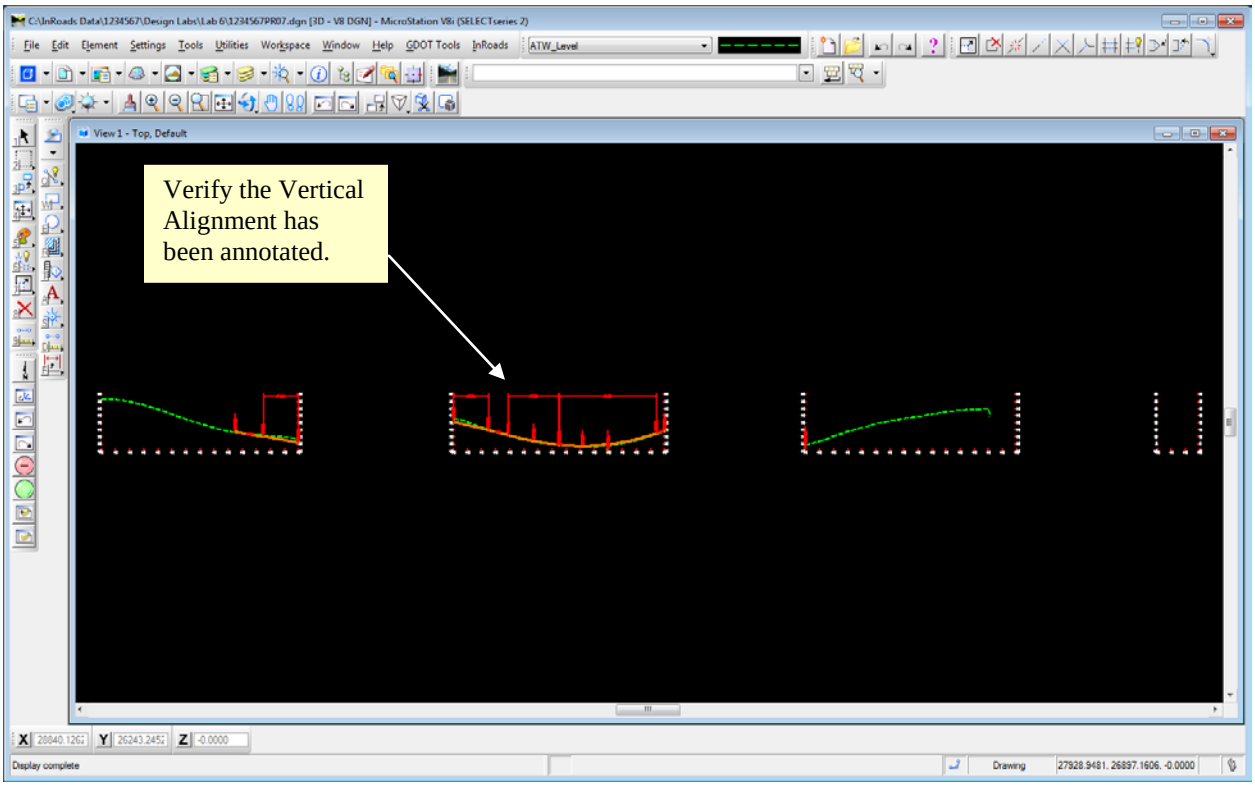


Figure L6-6 MicroStation Window

20.	**View the Profile and Vertical Alignment Elevations** In InRoads, Select **Evaluation ► Profile ► Annotate Profile**. The **<u>Annotate Profile</u>** dialog opens. *The <u>Annotate Profile</u> dialog opens.*

21.	**View the Profile and Vertical Alignment Elevations** A Profile Preference will be selected – once the Preference is selected the settings for Alignment **DE7** will be entered into the dialog box. • Click the **Preferences** button. • Under the **Name:** field -- Select the Preference **50h_10v_Profile**. The **50h_10v_Profile** Preference sets up the **<u>Annotate Profile</u>** dialog for viewing of the Terrain Profile and Vertical Alignment Elevations. • Click **Load** and **Close**. • In the **<u>Annotate Profile</u>** dialog select the Profiles as shown in *Figure L6-7*. *The 50h_10v_Profile Preference is selected.*

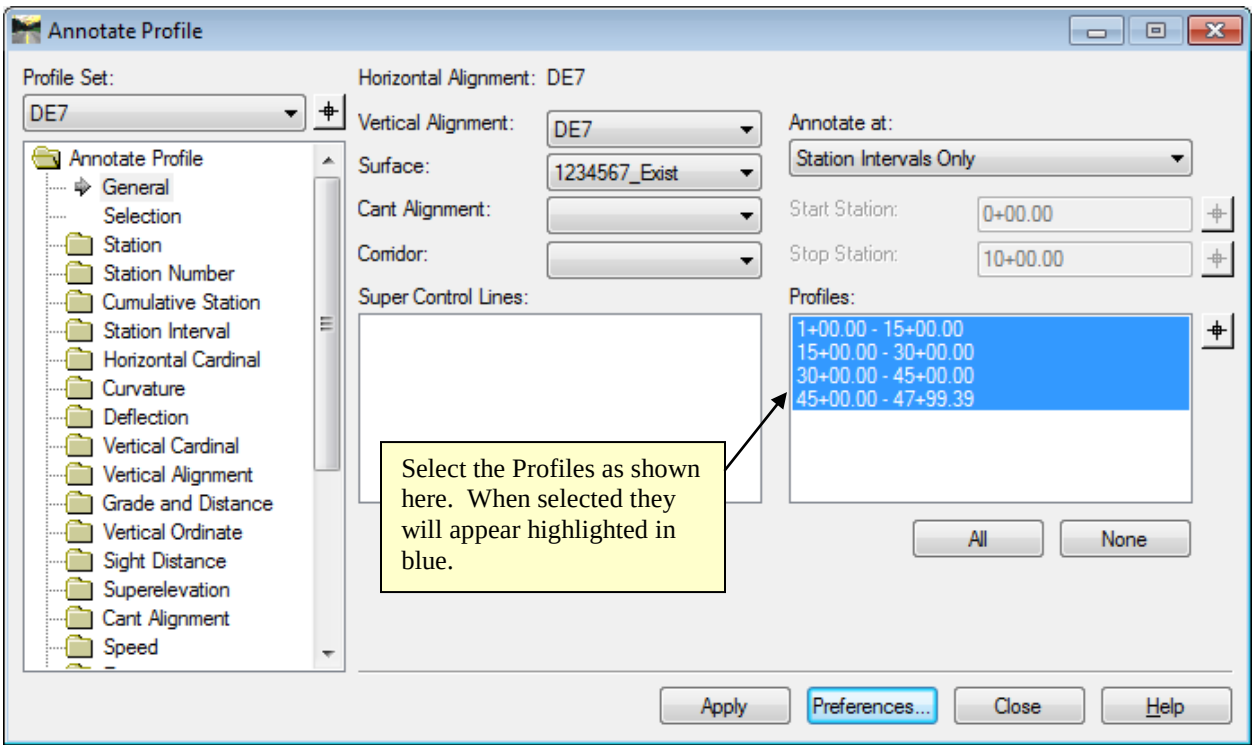


Figure L6-7 Annotate Profile

22.	• Click **Apply** & click **Close** in the **<u>Annotate Profile</u>** dialog. • The Elevations for the Terrain (Green) and Vertical Alignment (Orange) are now viewed in the MicroStation Window. • Verify your view matches that shown in *Figure L6-8* and that the Elevations have been annotated. *The Elevations are viewed.*

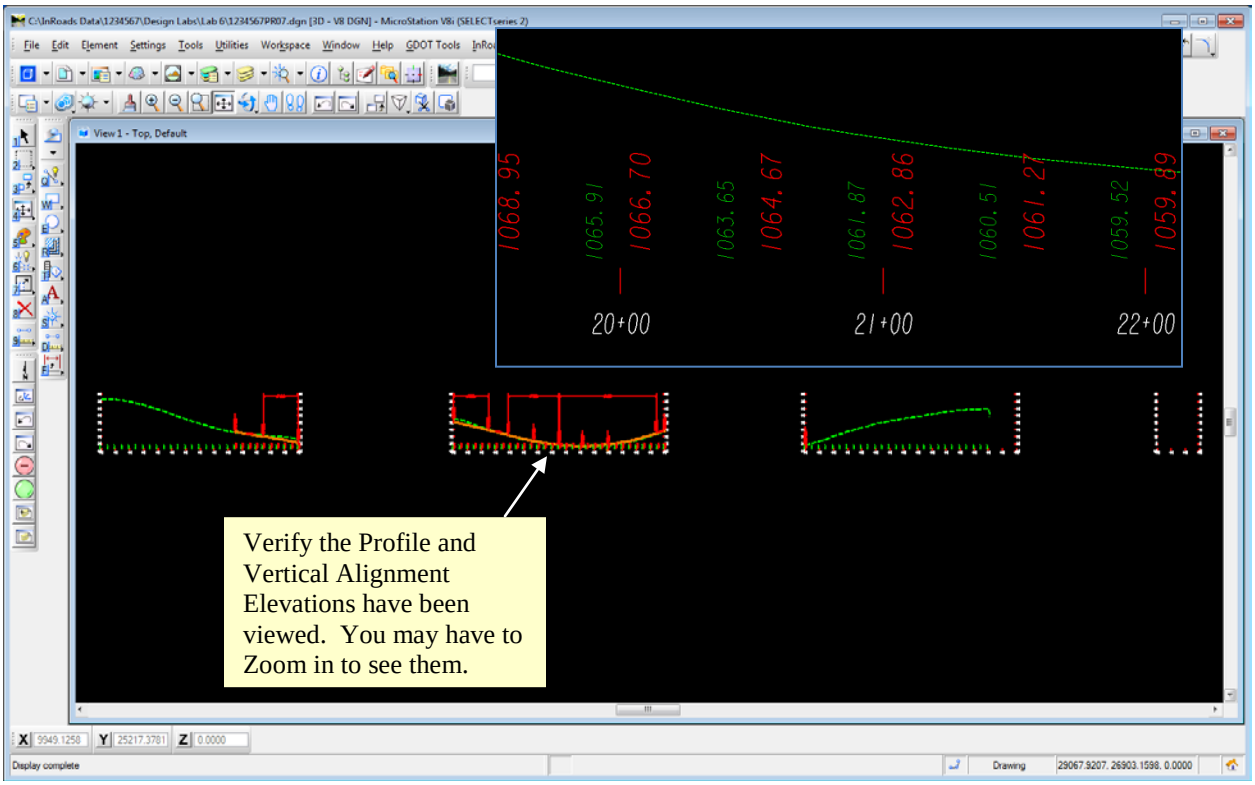


Figure L6-8 MicroStation Window

23.	**Open the Individual Profile Sheet DGN** • In MicroStation, Select **File ► Open**. • Navigate to **Lab 6** - then **Select** and **Open** --- ***1234567_16.dgn*** ****Remember**: ***1234567_16.dgn*** refers to the following: **PI# = *1234567*** **Section# = *16*** **<u>Please Note:</u>** You may need to manually renumber the DGN files as needed if there are multiple Side Road or Cross Road Profiles. • Verify your view matches that shown in *Figure L6-9*. *The Profile Sheet File 1234567_16.dgn is opened.*
24.	**For Information Only**: At this point the Profile Sheets have been created and all the Profile and Vertical Alignment information has been viewed. From here the Designer should refer to the EDG and GDOT MicroStation Documentation to properly set the Level(s) and for additional documentation pertaining to Plotting Automation.

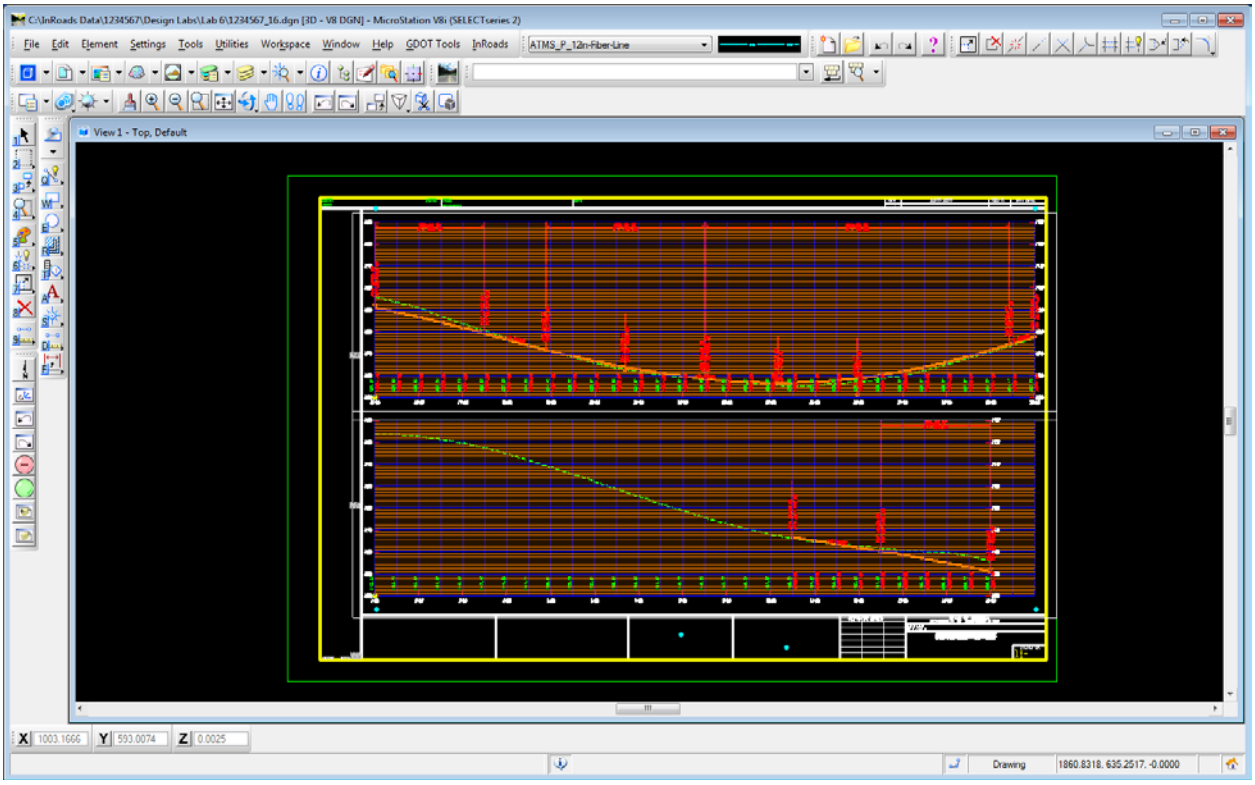


Figure L6-9 MicroStation Window

25.	**Save the InRoads Geometry File** Whenever a change has been made to an InRoads Geometry Project – <u>Save</u> the project and its associated modifications or changes. • Select **File ▶ Save ▶ Geometry Project** from the **InRoads Menu**. The Geometry Project (***1234567_Design.alg***) will be saved to **Lab 6** in the following path: **C:\InRoads Data\1234567\Design Labs\Lab 6** *The Geometry File is saved to the following path:* *C:\InRoads Data\1234567\Design Labs\Lab 6*
26.	STOP This concludes Lab 6. Do not proceed until the Instructor directs you to do so.

Lab 7
Component and Template Creation

Objective

The objective of Lab 7 is to provide an overview of the InRoads Template Library and familiarize the Designer with the following:

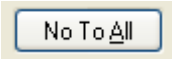
- Components
- Constraints
- Dynamic Settings
- Display Rules
- Preview Window
- End Conditions
- Template Library Organizer
- Parametric Constraints

Lab 7A Set Project Defaults and Open Files

1. Starting Clean

In order to ensure that you are working with a "clean" database – you will close MicroStation and InRoads if they are still running from a previous Lab:

To CLOSE MicroStation and InRoads -

Select **File►Exit** from the [MicroStation Menu].
If any messages appear regarding the saving of projects – Select 

This closes BOTH the MicroStation and InRoads Software(s).

2. Starting MicroStation and InRoads in the GDOT Workspace.

From the desktop, double-click on the **MicroStation** icon labeled **GDOT MicroStation V8i SS2 (x86)**.

Double click on the icon labeled **GDOT MicroStation V8i SS2 (x86)**.

- When the **MicroStation Manager** dialog box appears – navigate to the **C:\InRoads Data\1234567\Design Labs\Standards** folder and select the "**GDOT 3D Working File.dgn**". (Creation of the 'GDOT 3D Working File.dgn' is documented in the Design Guidelines). Click **Open**.

- Now open InRoads from within MicroStation by selecting:
  InRoads ► InRoads Suite (SELECTseries 2) V8i 08.11.07.566 from the [MicroStation Menu].

The MicroStation and InRoads Software(s) will open.

3. Clear the MicroStation Window (*This step may be ignored if your MicroStation Window is already clear of graphics***)**

- Select **Edit ►Select All** from the [MicroStation Menu].
- Then select the **<DELETE>** key on the computer keyboard.

The MicroStation Window is now clear of all graphics from the previous lab and ready for this lab.

4.	**Verify Project Defaults** • In InRoads, select **File ►Project Defaults** • Use the pull down next to **Configuration Name:** to select ***1234567_Design*** which you created in **Lab 1**. • Click **Apply** & **Close.** *Sets Project Defaults.*
5.	**Set the Design Default Preferences** • Select **File ► Project Options** and the **<u>Project Options</u>** dialog box appears. • Select the **Factors** tab. • This will be a 50 scale project. Enter ***50*** for the **Text**, **Cell** & **Line Style Scale Factor(s)**. • Then in the same **<u>Project Options</u>** dialog box select the **Geometry** tab. • Click the **Preferences** button at the bottom of the dialog box. • Choose ***Design Default***. Click **Load** and **Close**. This will set the remainder of the Design Defaults. ****IMPORTANT**: As stated previously the ***Design Default*** Preference loads the appropriate settings for use during Design. These settings include the Alignment and Point name settings. These settings are of particular importance to the Designer. Alignments must have a **DE** prefix. Points must also have a **DE** prefix as well as beginning the point numbering scheme at Number 10000. In order for survey enhancements to be properly added during the design phase of a project, it is essential that Designers pay particular attention to this setting. • In the **<u>Project Options</u>** dialog box click **Apply** and **Close**. *Sets the Design Default Preference.*
6.	**Open 1234567_Design.alg** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 7** • Highlight **1234567_Design.alg** • Click **Open** & **Cancel**. *The Geometry Project 1234567_Design is opened.*
7.	**Open 1234567_Exist.dtm** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 7** • Highlight **1234567_Exist.dtm** • Click **Open** & **Cancel**. *The Surface Project 1234567_Exist is opened.*

Lab 7B Create an InRoads Template Library (.ITL)

In Lab7B, an InRoads Template Library will be created. The InRoads Template Library is where the Designer will create all the Components necessary to generate a complete Template such as shoulders, travel lanes, barriers, medians and end conditions. Component is the term InRoads uses to describe such pieces. A completed Template is technically referred to as a Component also but for the sake of clarity the term Template will be used to describe a completed Template and Component will be used only to describe pieces of a Template. A Component may be thought of as a CAiCE Fragment with some very important distinctions. CAiCE Fragments are created by Programmers using either GML (Geometric Modeling Language – a variation of C++) or VBA (Visual Basic for Applications) and the Designers are limited to the Fragments provided and the functionality they provide. In InRoads, no programming is used in the creation of components and it becomes the responsibility of the Designer to learn the idea of Constraints and create the Component and the functionality required through the use of the **Create Template** window. Constraints and Component creation will be covered in further detail in Labs 7C through 7H.

8.	**Open the Create Template Window** • In InRoads, select **Modeler ► Create Template.** The **Create Template** Window opens as shown in *Figure L7-1*. *The Create Template Window opens.*

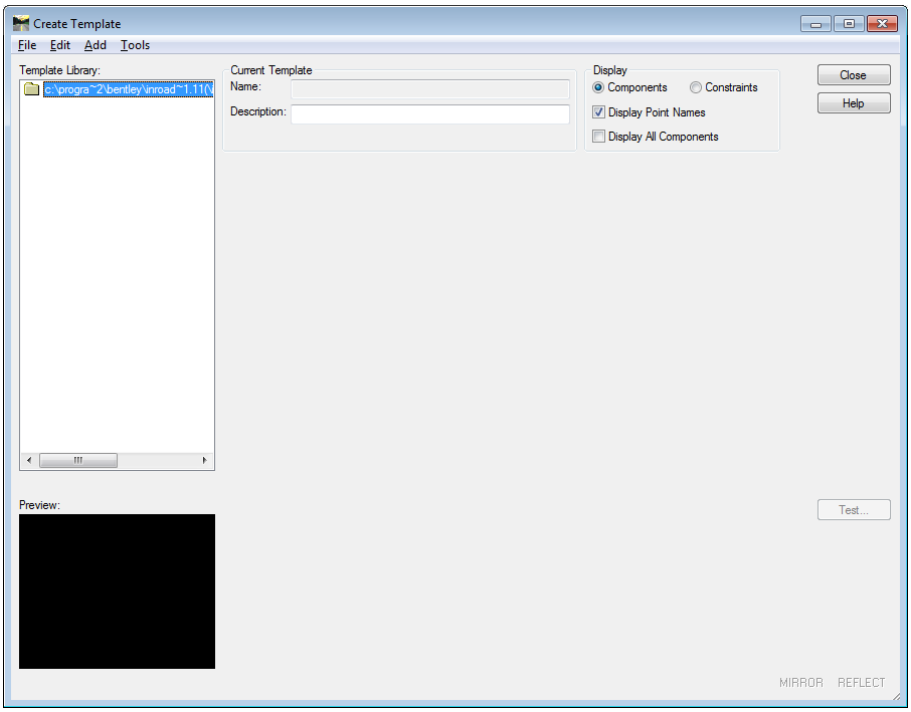


Figure L7-1 Create Template Window

9.	**Create an InRoads Template Library (.ITL) and name it GDOT_Lab7.itl** • In the **<u>Create Template</u>** window, select **File ► New ► Template Library…** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab7** • Enter a **File name:** of ***GDOT_Lab7.itl***. • Click **Save**. • Verify that the Template Library was created and that **C:\InRoads Data\1234567\Design Labs\GDOT_Lab7.itl** appears in the **<u>Create Template</u>** Window as shown in *Figure L7-2*. *A new Template Library called GDOT_Lab7.itl has been created.*

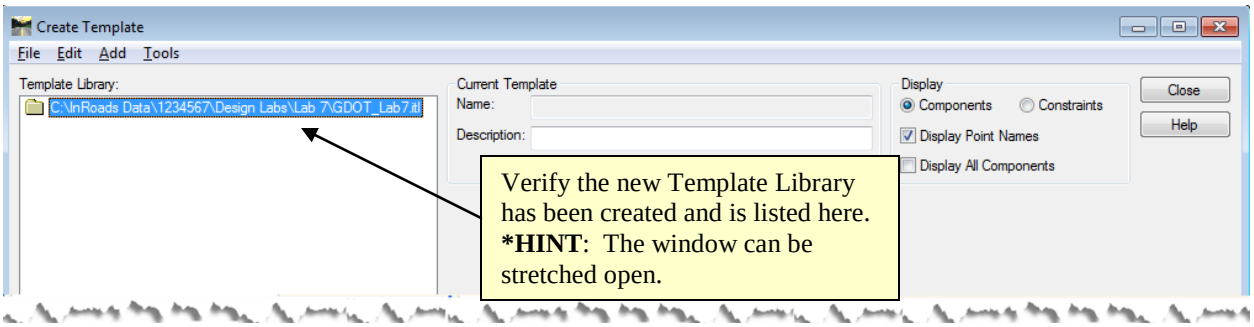


Figure L7-2 Create Template Window

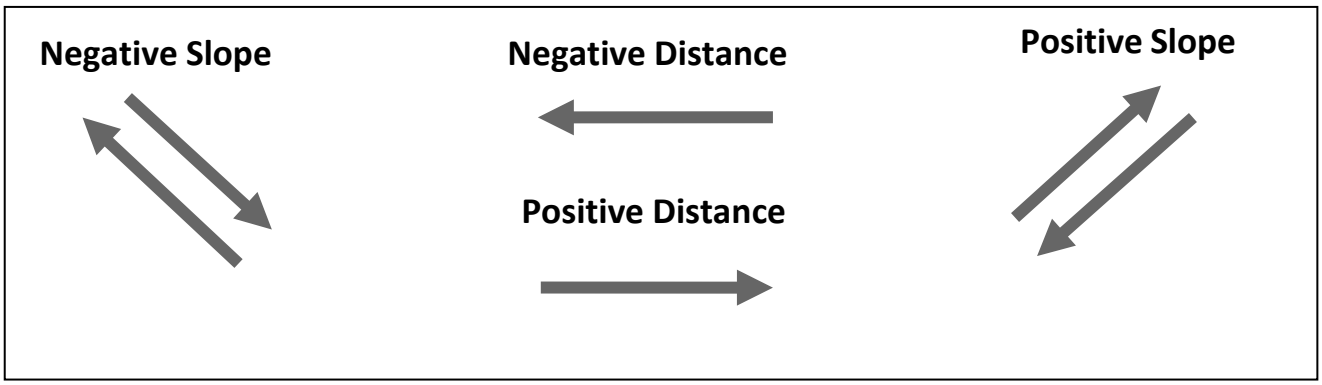
10.	**Save the Template Library** • In the **<u>Create Template</u>** window, select **File ► Save**. *The GDOT_Lab7.itl has been created and saved.*

Lab 7C Components and Constraints

Lab 7C will introduce you to Components and Constraints. In this Lab a simple Travel Lane component will be created with 4 pavement layers, a Surface Layer (1.5” thick), an Intermediate Layer (2” thick), a Base Layer (3” thick) and a Graded Aggregate Base Layer (8” thick).

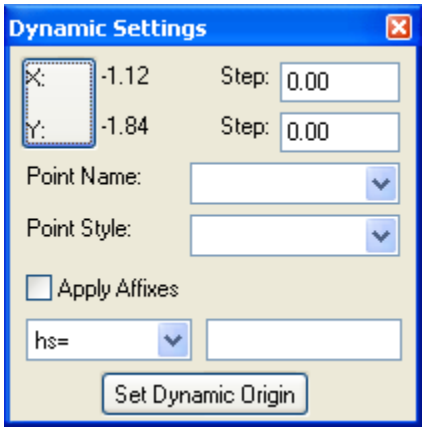
For Information Only:

The Diagram depicted below is a Guide for Designers to utilize in storing Components based on Slope and Distance. The Slope (Positive or Negative) is dependent on the direction the Point is located from the Parent Point.



The Designer may use the **<u>Dynamic Settings</u>** dialog (see below) to assist in the creation of components/templates. The following is a brief overview of the available Precision Input Key-In’s which may be used:

- **XY** = “Absolute coordinates”
- **DL** = “Delta coordinates from the last point placed”
- **HS** = “Horizontal delta distance and slope from last point placed”
- **VS** = “Vertical delta distance and slope from last point placed”
- **OL** = “Delta coordinates from the dynamic origin”
- **OS** = “Horizontal delta distance and slope from the dynamic origin”



11.	**If not open from Lab 7B, Open the <u>Create Template</u> Window and the GDOT_Lab7.itl Template Library. (***This step may be ignored if the Template Library is already open***).** • In InRoads, select **Modeler ► Create Template**. The **<u>Create Template</u>** Window opens. • In the **<u>Create Template</u>** Window, select **File ► Open**. • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 7** • Highlight ***GDOT_Lab7.itl*** and click **Open**. *Opens the GDOT_Lab7.itl Template Library.*
12.	**Create a New Template** • In the **<u>Create Template</u>** Window, select **File ► New ► Template.** The new Template (Component) is created with the Dynamic Origin (purple box) of the component defaulted to **0,0** as shown in *Figure L7-3.* The Dynamic Origin of a component is the reference location of the component. *A new Template (Component) is created.*
13.	**Rename the New Template to '*Asphalt Lane*'** • Right mouse click over ***New Template*** in the **Template Library:** Window and select **Rename**. • Key-in ***Asphalt Lane***. *Renames the Template to 'Asphalt Lane'.*

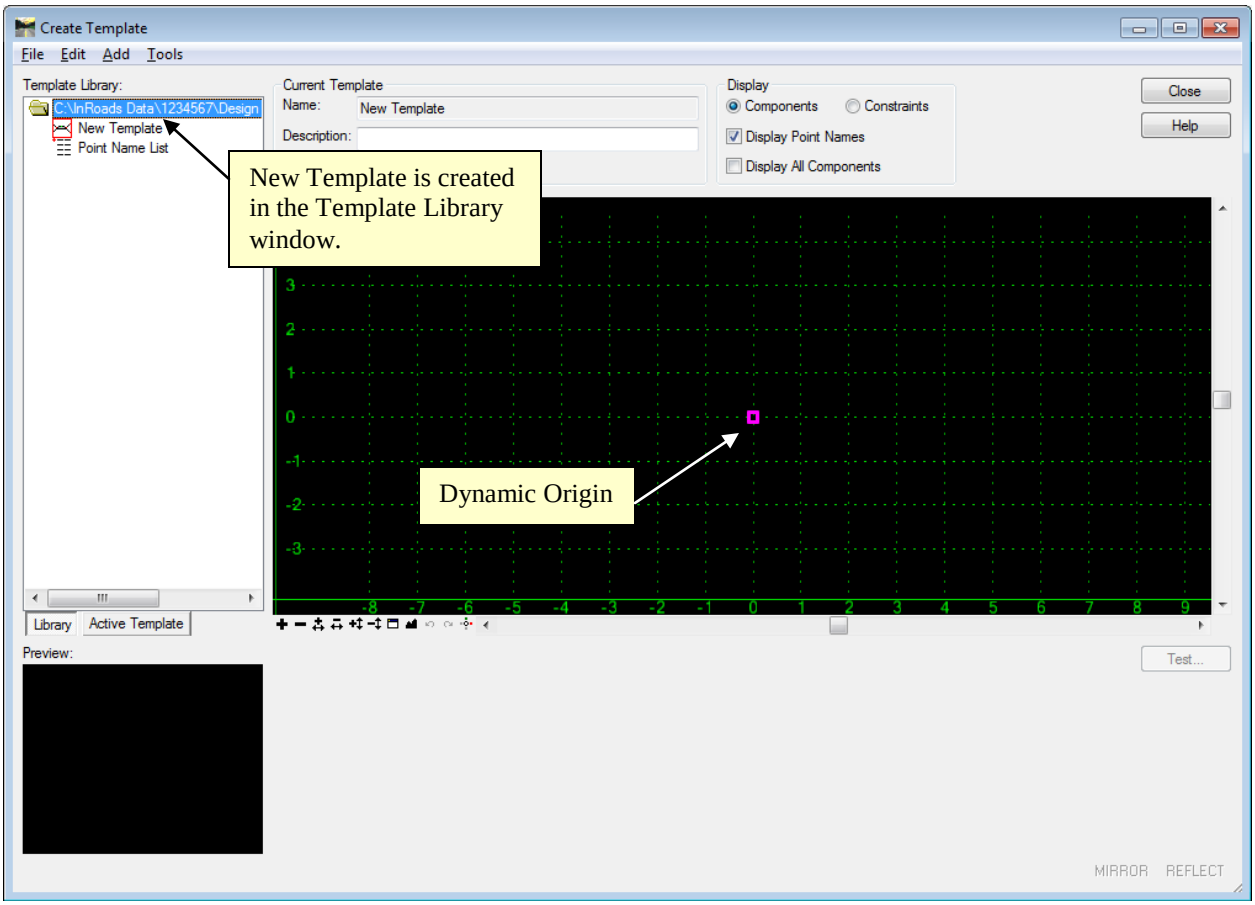
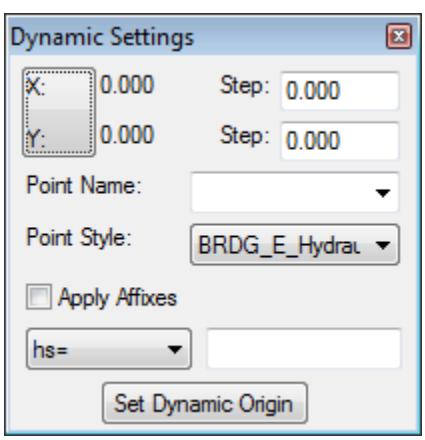


Figure L7-3 Create Template Window

14.	**Open the <u>Dynamic Settings</u> dialog.** • In the **<u>Create Template</u>** Window, select **Tools ► Dynamic Settings**. The **<u>Dynamic Settings</u>** dialog opens as shown here.  *The <u>Dynamic Settings</u> dialog is where Point Names and Point Styles can be applied to components during their construction. The <u>Dynamic Settings</u> dialog can also be used to create components of varying shapes such as curb & gutter by utilization of key-ins or selections from the pull down menu. It is also used to set the Dynamic Origin which is the reference point for the step values and the OL= and OS= key-ins.* *(**<u>NOTE:</u>** Make sure that the **Apply Affixes** check box is <u>Unchecked</u>).*

15.	**Set the <u>Dynamic Settings</u> X: and Y: Step Values** • In the **<u>Dynamic Settings</u>** dialog, set the **X:** and **Y:** Step values to ***1.0*** as shown here. Step: 1.000 Step: 1.000 *The Step values effect how the <u>Create Template</u> grid responds when placing a component. This will be demonstrated in the next step.*
16.	**Add a Simple Component to represent the Surface Layer of the Pavement Structure** • In the **<u>Create Template</u>** Window, select **Add ►Simple**. A **Simple Component** is selected and ready to be placed in the **Create Template** grid. • Move your cursor slowly around the grid and notice how your cursor locks on the grid points divisible by **1, 1**. This is the effect of setting the **Step:** values in the previous step. • Find the location **X: = -1, Y: = -2** and place the component at this location. • Use the View Buttons (located at the bottom left of the **Create Template** grid) and experiment with viewing using these buttons and the wheel on your mouse until the view is similar to that shown in *Figure L7-4*. (**<u>Hint:</u>** You can also use a combination of the mouse wheel and Control or Shift keys to stretch/zoom).

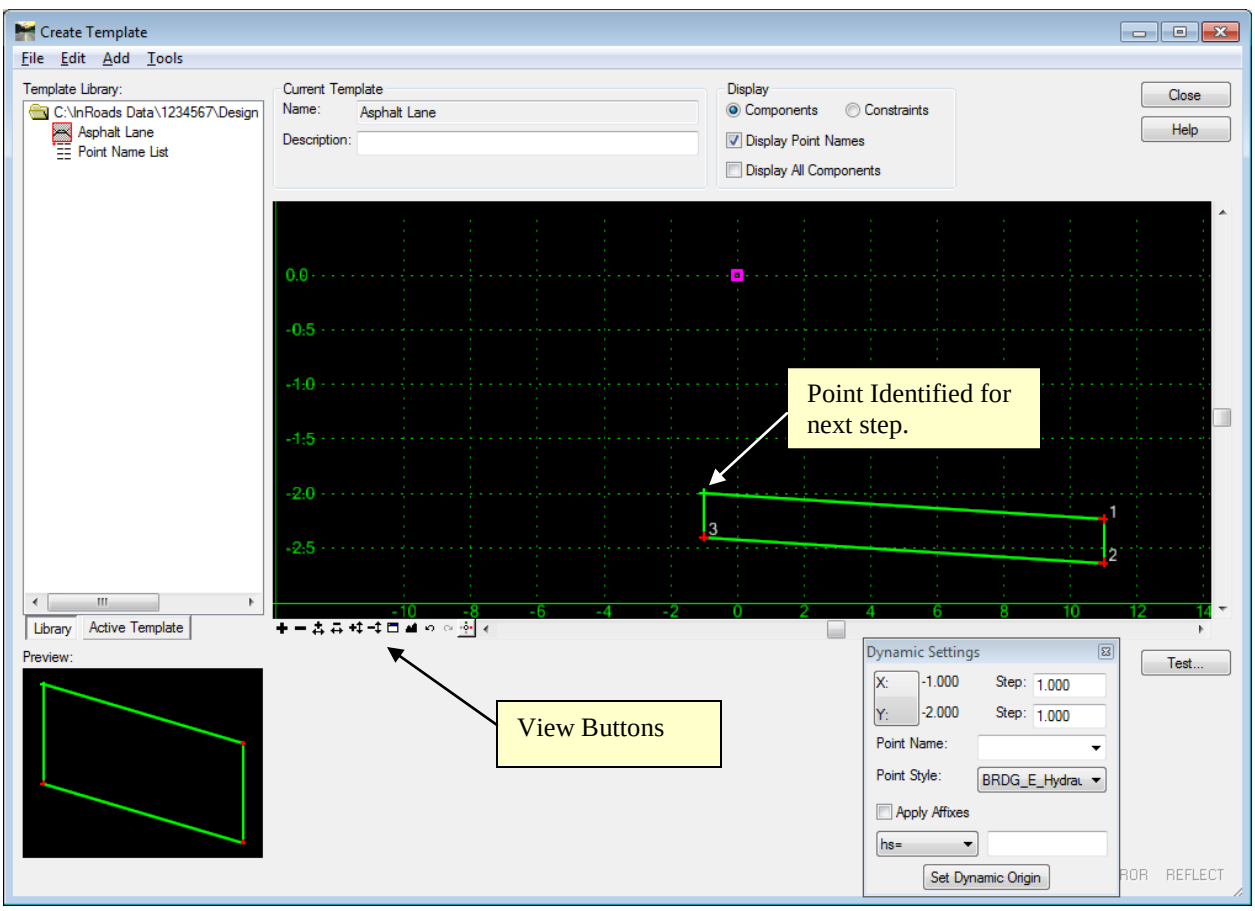
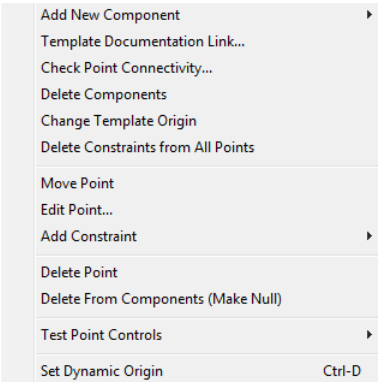


Figure L7-4 Create Template Window

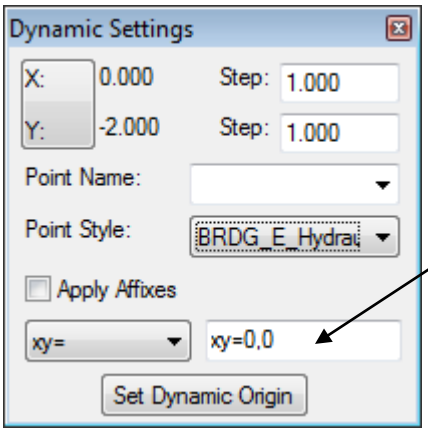
17. Move the Component to X =0, Y =0

- Place your cursor over the Point identified in *Figure L7-4*.
- Right mouse click and select ***Move Point***.



****HINT**: Many commands can be accessed by Right mouse clicking over the points or components or the grid itself.

- With the **Simple Component** still dynamically attached to the cursor, place the cursor in the **<u>Dynamic Settings</u>** Precision Input Field and key-in ***xy=0,0*** as shown here and press the **Enter** key on your keyboard.



<u>Dynamic Settings</u> Precision Input Field. Key-in xy=0,0 and press the Enter key on your keyboard or use the pulldown and select xy= then key-in 0,0 in the key-in field.

- Click the **Fit** button, (located at the bottom left of the **Create Template** grid).

Fit button

- Ensure the component has moved as shown in *Figure L7-5*.

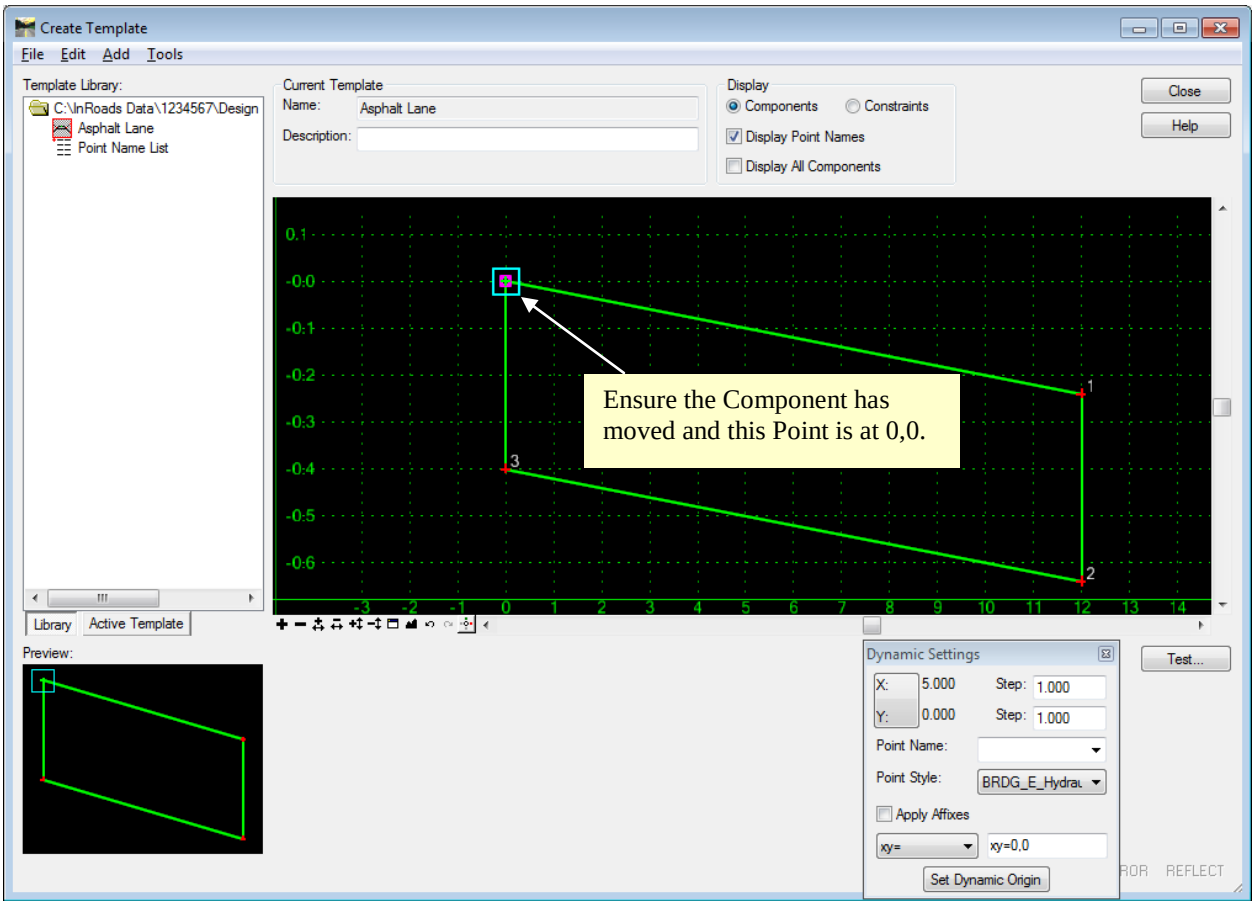


Figure L7-5 Create Template Window

18.	**Open the <u>Component Properties</u> Dialog** • Double click on the Component (not the points). • The **<u>Component Properties</u>** dialog opens as shown in *Figure L7-6*.

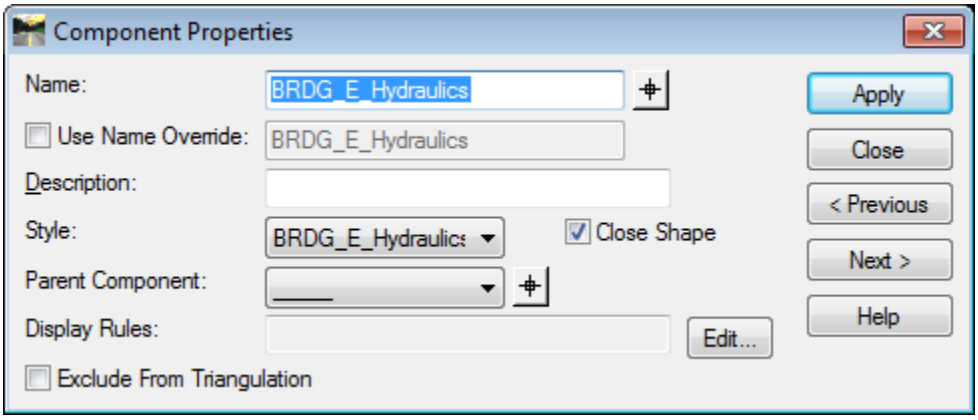


Figure L7-6 Component Properties Dialog

19.	**Rename the Component from 'BRDG_E_Hydraulics' to 'Surface' and Apply the Style MAIN_P_EOP.**
	
	• In the **<u>Component Properties</u>** dialog enter the following information:
	  o **Name:** ***Surface***
	  o **Style:** ***MAIN_P_EOP***
	• Verify your entries match those shown in *Figure L7-7*.
	• Click **Apply** & **Close**.
	• **<u>Note:</u>** When creating a component, the Name and Style default to the first alphabetical name in the Feature Style list. In this case, BRDG_E_Hydraulics happens to be the first alphabetical Feature Style and is changed to MAIN_E_EOP as shown below.
	• Make sure your view matches that shown in *Figure L7-8*.

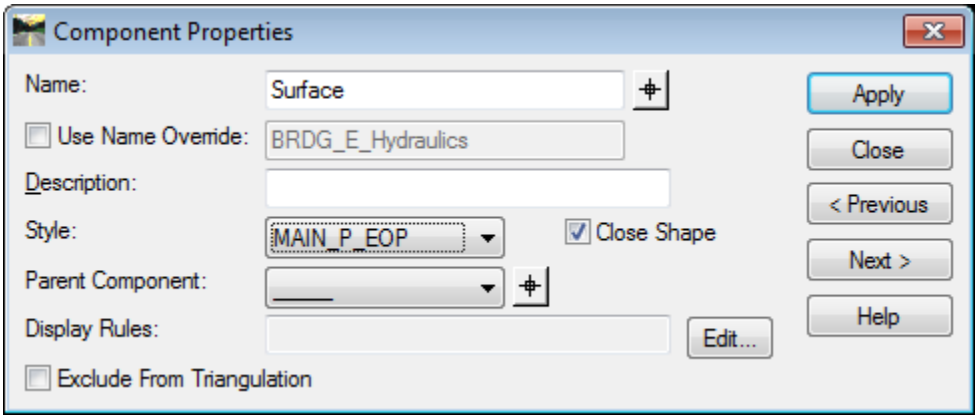


Figure L7-7 Component Properties Dialog

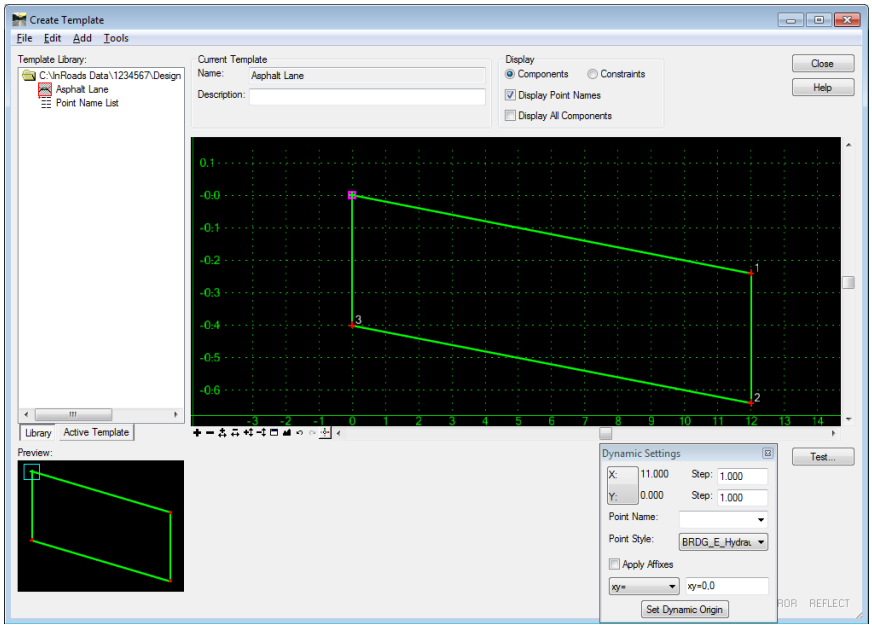


Figure L7-8 Create Template Window

20.	**Open the Point Properties Dialog** • Double click on the upper leftmost Point shown with a purple square around it in *Figure L7-8*. • The **Point Properties** dialog opens as shown in *Figure L7-9*. *The Point Properties dialog appears. (Note: your Screen Capture may have a different Feature Style listed instead of Default).*

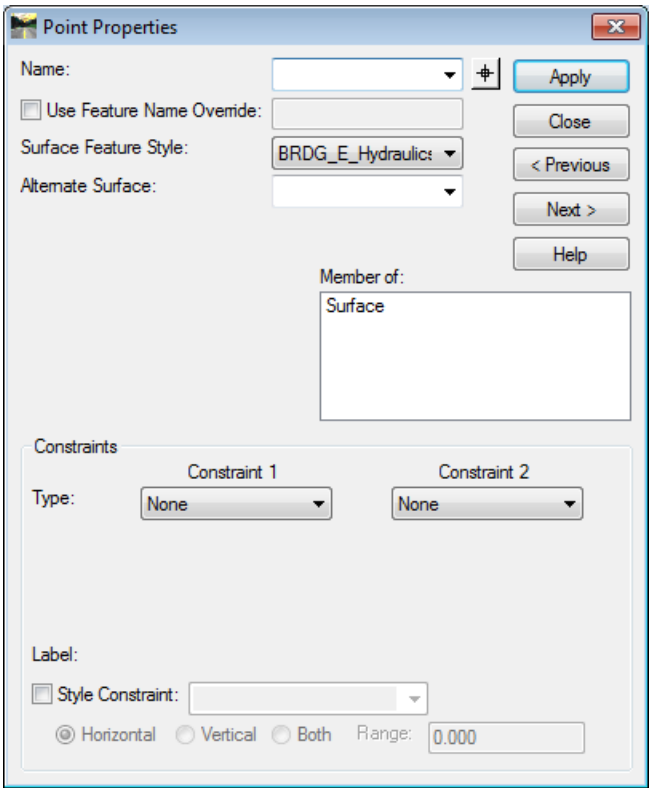


Figure L7-9 Point Properties

21.	**Assign the Point the Name PGL and the Feature Style MAIN_P_EOP**
	
	• In the **Point Properties** dialog enter the following information.
	  o **Name:** ***PGL*** (Point names are used in annotating the cross sections so it is important to keep up with the Point names you assign and choose a logical naming scheme.)
	  o **Surface Feature Style:** ***MAIN_P_EOP*** (The Feature Styles of Points control attributes of the point and can also be used to annotate cross sections so it is important to keep up with and select logical Feature Styles.)
	  o Verify your entries match those shown in *Figure L7-10*.
	  o Click **Apply** but do not close the **Point Properties** dialog.
	  o Verify the Point has been named ***PGL*** as shown in *Figure L7-11*.

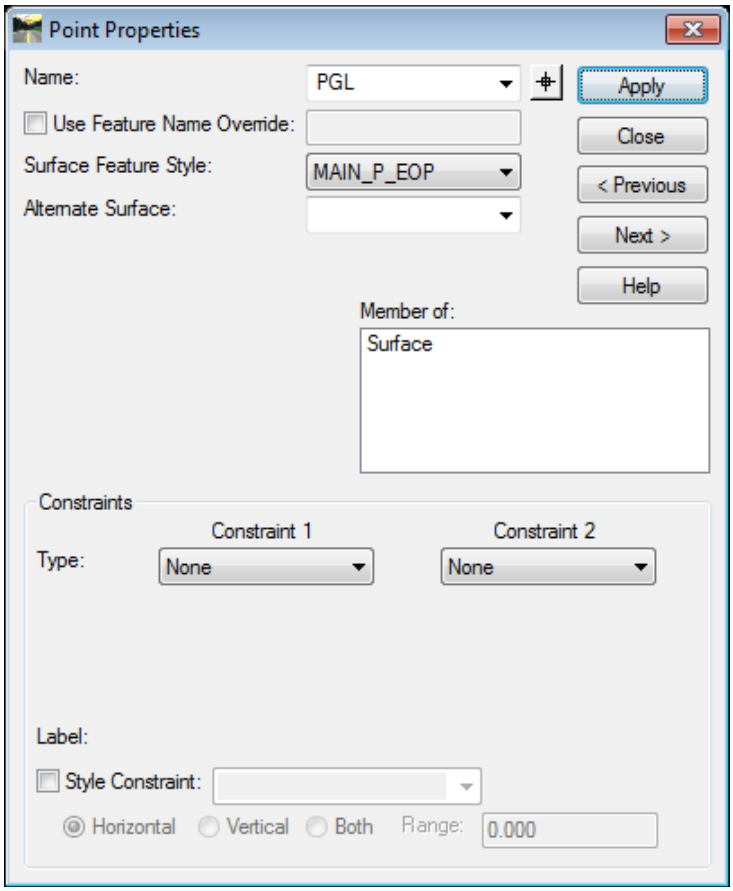


Figure L7-10 Point Properties

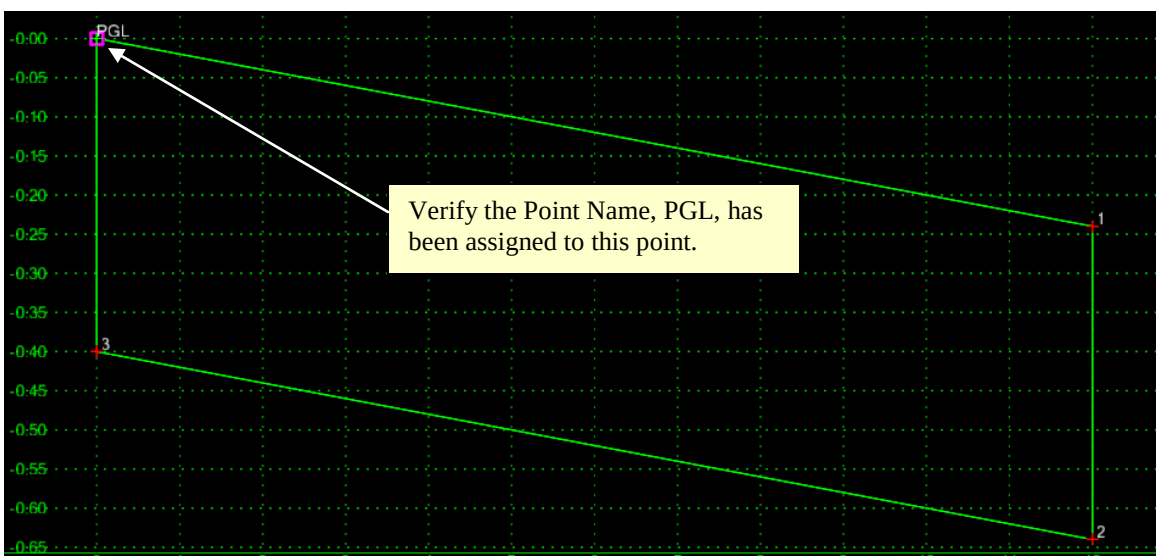


Figure L7-11 Create Template Grid

22.	**Assign Point 3 the Name PGLB and the Feature Style MAIN_P_EOP.** • In the **Point Properties** dialog click the **Next >** button. • Verify Point ***3*** appears in the **Name:** field. • Change Point ***3*** to ***PGLB*** (Profile Grade Line Bottom). • Change the **Surface Feature Style:** to ***MAIN_P_EOP*** • Notice the **Constraints** entries. **Constraint 1** is ***Horizontal 0.000*** feet from ***PGL***. **Constraint 2** is ***Vertical*** and ***-0.400*** feet from ***PGL***. • Change the **Vertical Constraint** from ***-0.400*** to ***-0.125*** and press the **Tab** key. This value represents 1.5" of pavement depth and is a common depth for the surface. ***NOTE:** InRoads rounds to three decimal places in the **Constraints** field but keeps the entire amount in memory. In addition to keying in ***-0.125*** InRoads also accepts mathematical operations. You could have keyed in ***-1.5/12*** to represent 1.5 inches of depth divided by 12 to convert to feet. • Verify your entries match those shown in *Figure L7-12*. • Click **Apply** but do not close the **Point Properties** dialog.

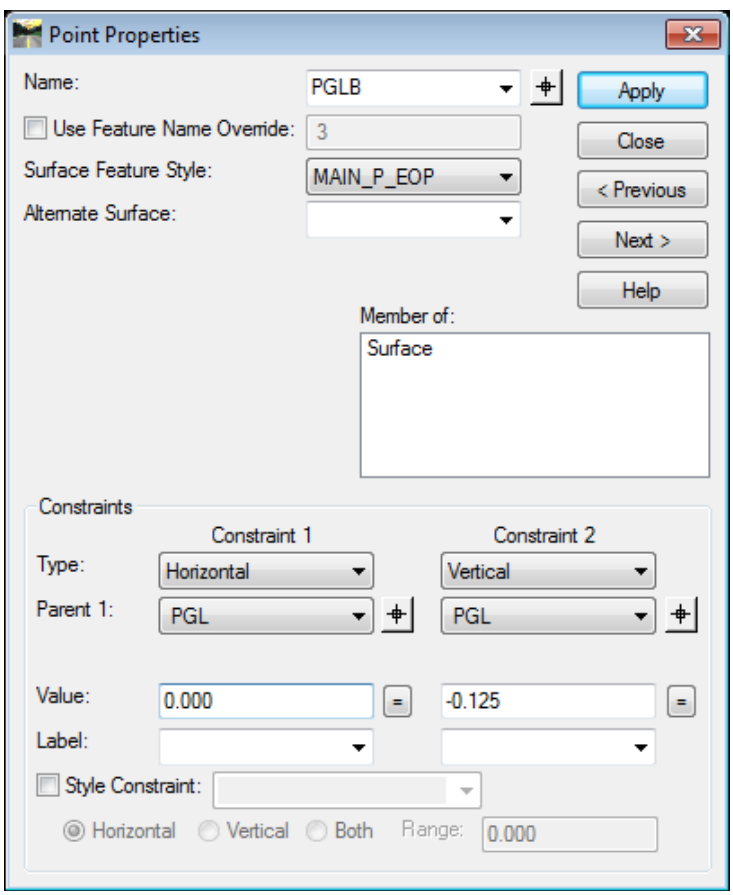


Figure L7-12 Point Properties

23.	**Assign Point 1 the Name LANE and the Feature Style MAIN_P_EOP.** • In the **Point Properties** dialog click the **Next >**button. • Verify Point ***1*** appears in the **Name*:*** field. • Change Point ***1*** to ***LANE***. • Change the **Surface Feature Style:** to ***MAIN_P_EOP*** • Notice the **Constraints** entries. **Constraint 1** is ***Slope -2.000%*** feet from ***PGL***. **Constraint 2** is ***Horizontal*** and ***12.000*** feet from **PGL**. Accept these **Constraints**. • Verify your entries match those shown in *Figure L7-13*. • Click **Apply** but do not close the **Point Properties** dialog.

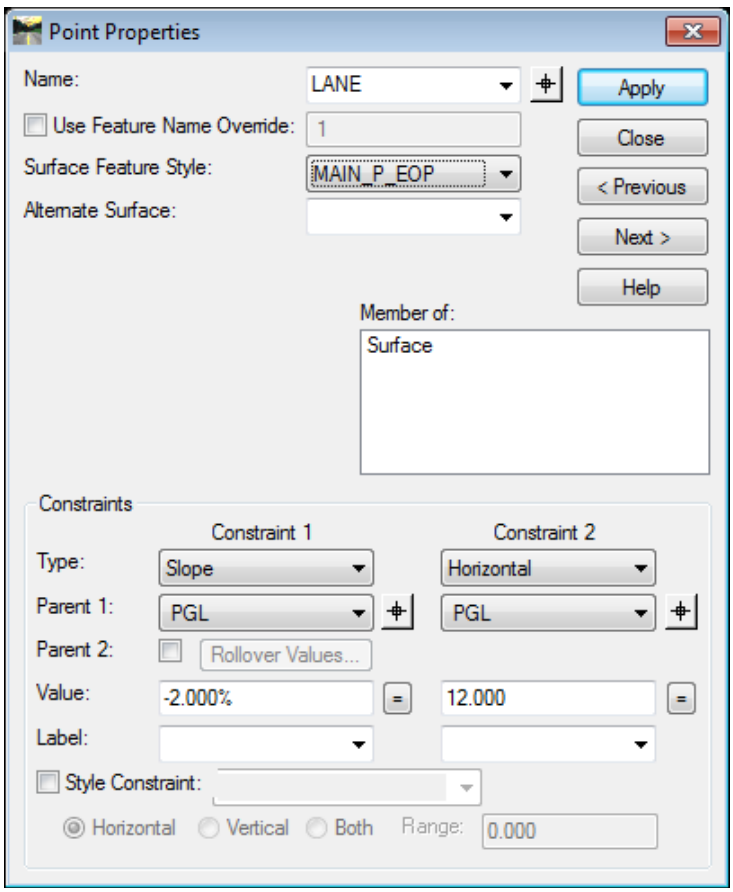
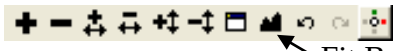


Figure L7-13 Point Properties

24. **Assign Point 2 the Name LANEB and the Feature Style MAIN_P_EOP.**

- In the **Point Properties** dialog click the **Next** > button.
- Verify Point ***2*** appears in the **Name:** field.
- Change Point ***2*** to ***LANEB*** (LANE Bottom).
- Change the **Surface Feature Style:** to ***MAIN_P_EOP***
- Notice the **Constraints** entries. **Constraint 1** is ***Horizontal*** and ***0.000*** feet from ***LANE***. **Constraint 2** is ***Vertical*** and ***-0.400*** feet from ***LANE***.
- Change the **Vertical Constraint** by keying in ***-1.5/12*** and pressing the **Tab** key to accept the entry. This value represents 1.5" of pavement depth and is a common depth for the surface.
- Verify your entries match those shown in *Figure L7-14*.
- Click **Apply** and **Close** to exit the **Point Properties** dialog.
- Click the **Fit** button in the **Create Template** Window and verify your Surface Component matches that shown in *Figure L7-15*.



This completes the creation of the Surface Component of the Travel Lane.

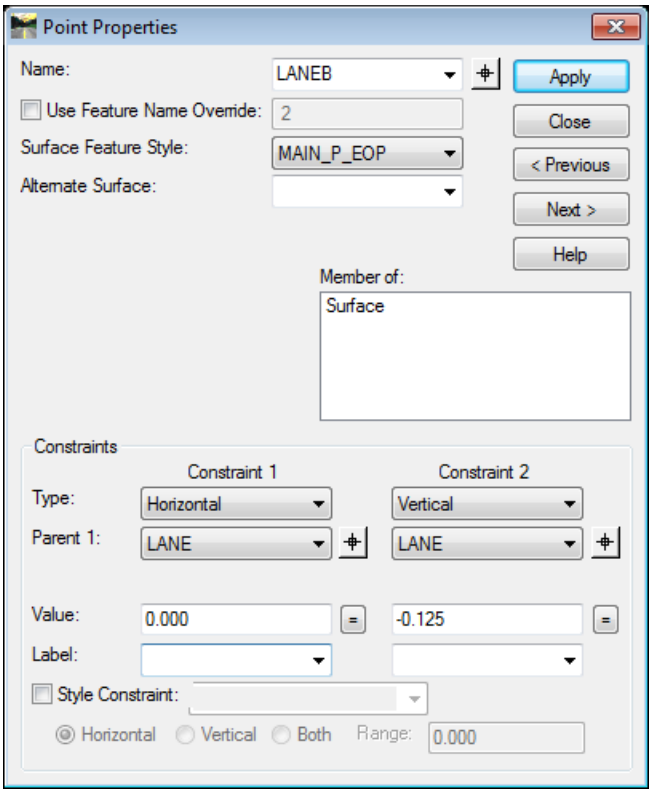


Figure L7-14 Point Properties

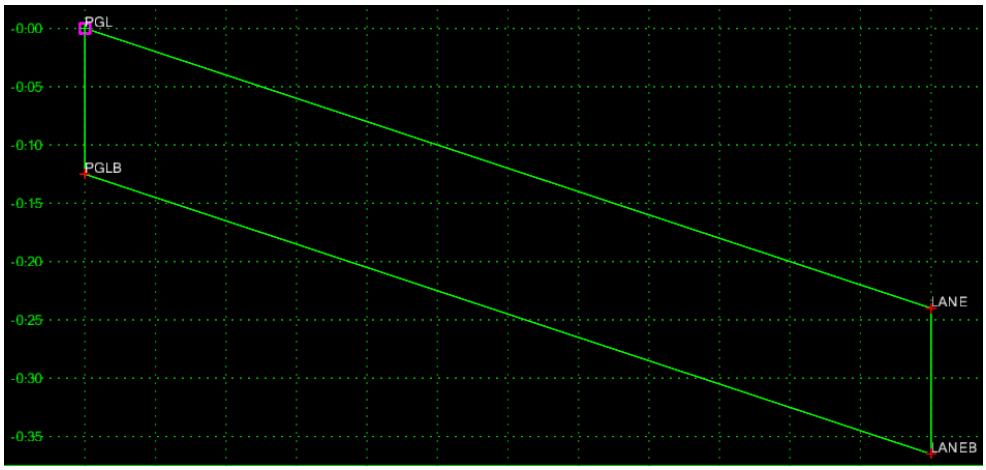


Figure L7-15 Create Template Grid

25.	**For Information Only:** In the previous Steps, we created a 1.5" Surface Pavement layer by adding a Simple Component and making the appropriate edits. InRoads has 6 types of Components that can be placed as described here: 1. **Simple**: A Simple Component is a simple prefabricated closed rectangular shape. This is useful for the quick setup of rectangular shapes like a travel lane as was demonstrated in the previous steps. 2. **Constrained**: A Constrained Component is placed one point at a time and can be either a closed or open shape. It is useful for making objects of differing shapes such as curb and gutter. The points in Constrained Components can be set to behave in a particular manner by the selection of the differing constraint options. The default constraint is set to be Horizontal and Vertical to the previous point placed. 3. **Unconstrained**: An Unconstrained Component is placed one point at a time, the same as a Constrained Component, but is placed with no constraint defaults applied. The constraints of points composing both Constrained and Unconstrained Components can be edited after placement to apply whatever constraints the user desires. 4. **Null Point**: Null Point Components are placed unconstrained to other components and are typically edited to control the behavior of other points. Null Points can be edited to behave as **'Display Switches'** in order to display different components under differing conditions such as Type S Barrier switching between the S1, S2 or S3 variations. 5. **End Condition**: End Condition Components are used to tie to a surface - typically the existing surface. Cut/Fill slopes are the typical type components created with End Condition Components. End Condition Components can be designed with ditches incorporated and that widen for guardrail when certain conditions are met. 6. **Overlay/Stripping:** Components used for milling/stripping and overlay operations.

26.	**The next Pavement layer, a 2" Intermediate Pavement Layer, will be constructed by placing a Constrained Component. Begin by opening the <u>Dynamic Settings</u> dialog.** • The **<u>Dynamic Settings</u>** dialog should still be open from the previous Lab. If it is not still open from the previous Lab, then select it in the **<u>Create Template</u>** Window, by selecting **Tools ► Dynamic Settings**. • Set the **Step:** Values to ***0.000*** as shown in *Figure L7-16*.

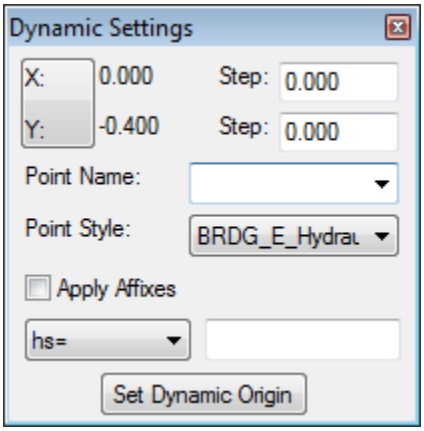


Figure L7-16 Dynamic Settings

The <u>Dynamic Settings</u> dialog is useful when adding Constrained Components. The Point Name, Point Style, and location can all be performed in one step minimizing the number of steps in creating a component.

27.	**The Step: Values Control the X and Y Cursor Movement Increments on the Grid. A Value of 1, 1 Moves the Cursor in Increments of 1' Horizontally and 1' Vertically.** • In the **<u>Create Template</u>** Window, select **Add ►Simple**. • Move your cursor and the Simple Component around the grid. Notice how it moves smoothly and doesn't 'snap' to any location on the grid. • Right mouse click and select **Cancel**. • Enter **X** and **Y Step:** values of ***1.000*** and ***1.000***. • In the **<u>Create Template</u>** Window, select **Add ► Simple**. • Move your cursor and the Simple Component around the grid. Notice how the cursor locks onto grid points located in increments of **1'** Horizontally and **1'** Vertically as measured from the **Dynamic Origin**. • Right mouse click and select **Cancel**. • Return the **X** and **Y Step:** values to ***0.000*** and ***0.000*** as shown in *Figure L7-17*. **Step:** values will not be required for this exercise. This has simply been a further demonstration of the **Step:** functionality. • Left click on the **X: Y:** button, . Notice this toggles to **X: Slope:**, . The grid can be incremented using either method. • Left click on the **X: Slope:** button to toggle back to an **X: Y:** entry.

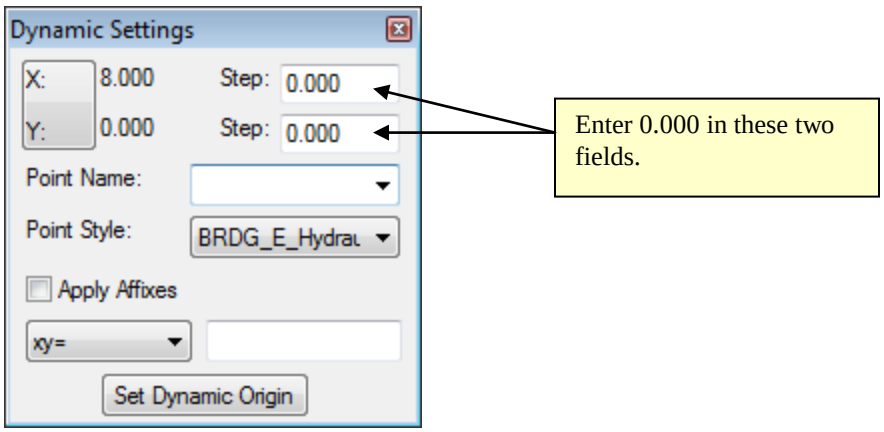


Figure L7-17 Dynamic Settings

28.	**Begin Constructing the 2" Intermediate Pavement Layer.** • In the **<u>Create Template</u>** Window, select **Add ► Constrained**. • Hover your cursor over the Point ***PGLB***. Notice the Red Point changes to White. This indicates this Point and its exact location will be selected if you were to Left click. • Left click on the Point ***PGLB***. Notice when you move your cursor a line is dynamically moved with the cursor as shown in *Figure L7-18*.

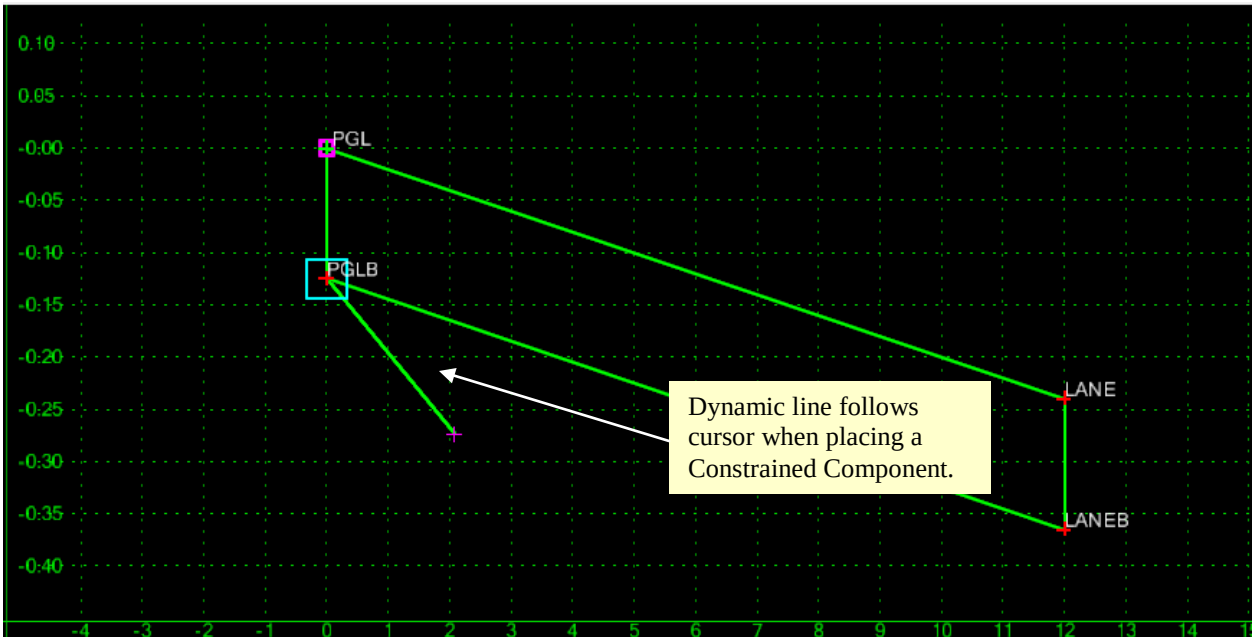


Figure L7-18 Create Template

29.	**Label the Component 'Intermediate' and Give the Component a Feature Style of 'MAIN_P_EOP'.** • With the Dynamic line still attached, move the cursor to the **Current Component** entry field and Left click in the field as shown in *Figure L7-19*. • In the **Name:** field key-in ***Intermediate*** as shown in *Figure L7-19*. • In the **Style:** field use the pull down arrow to select ***MAIN_P_EOP*** as shown in *Figure L7-19*.

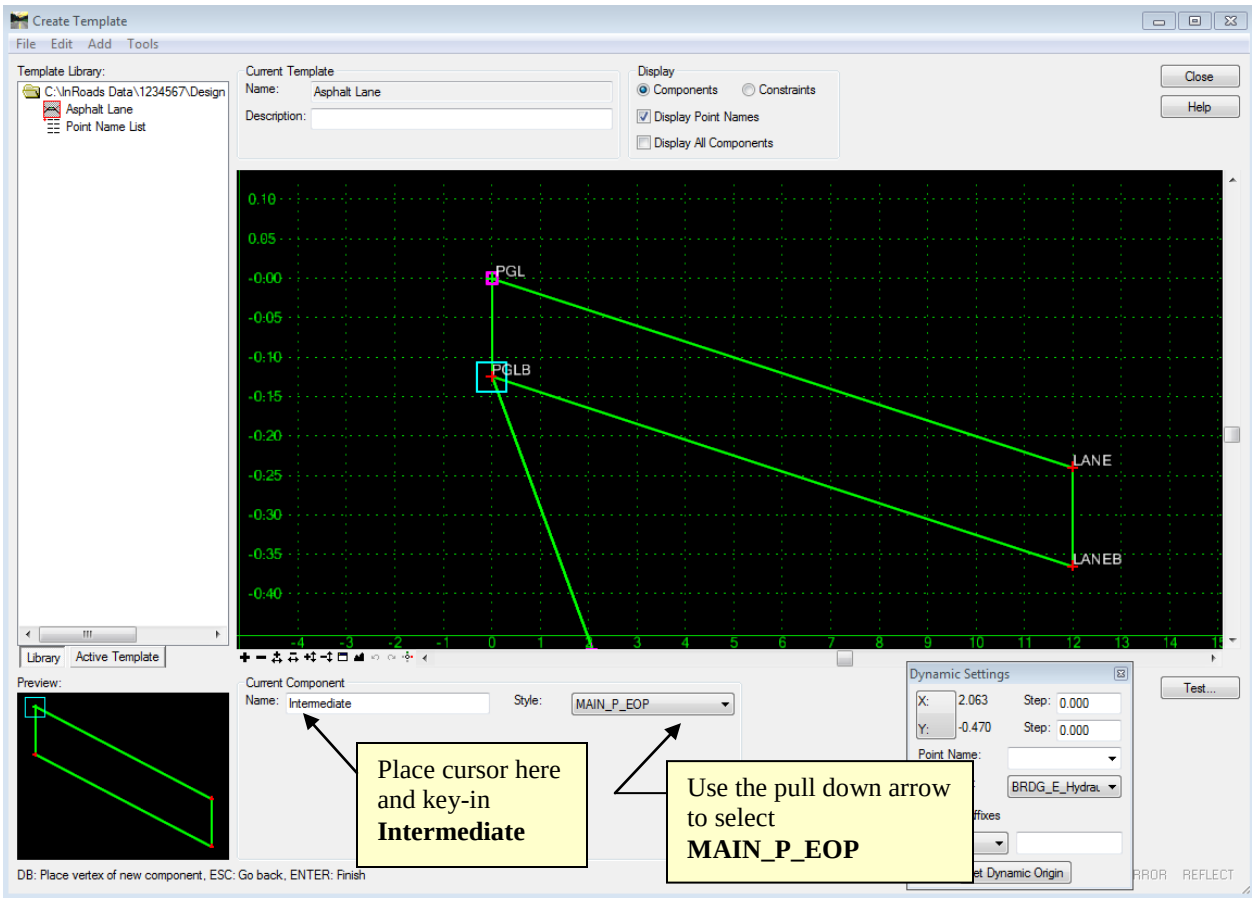


Figure L7-19 Create Template

30.	**Continue Constructing the 2" Intermediate Pavement Layer.** • Move your cursor into the **Dynamic Settings** dialog and click in the **Point Name:** field. • Key-in ***PGLIB*** (Profile Grade Line Intermediate Base). • In the **Point Style:** field use the pull down arrow to select ***MAIN_P_EOP***. • Under the **Apply Affixes** check button use the pull down arrow to select **dl =** • Key-in ***0,-2/12*** in the Precision Input Field. • Verify your entries match those shown in *Figure L7-20*. • With your cursor in the Precision Input Field, press the **Enter** key on your keyboard. • Verify a **.166'** vertical link and Point ***PGLIB*** were drawn as shown in *Figure L7-21*. **Note:** If your Dynamic Line appears different than the screen capture depicted below in *Figure L7-21* – the **Closed Shape Setting** may be turned on. This may be determined by right mouse clicking over the component. If this is the case – leave the **Closed Shape** turned on. This setting is required to be on in the following Steps.

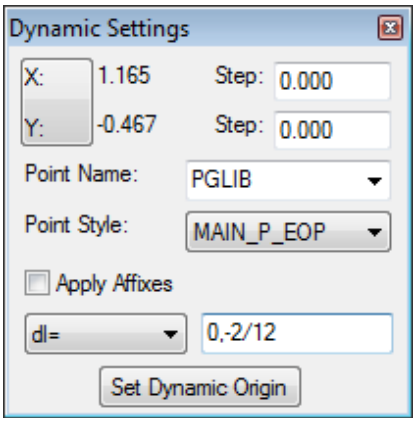


Figure L7-20 Dynamic Settings

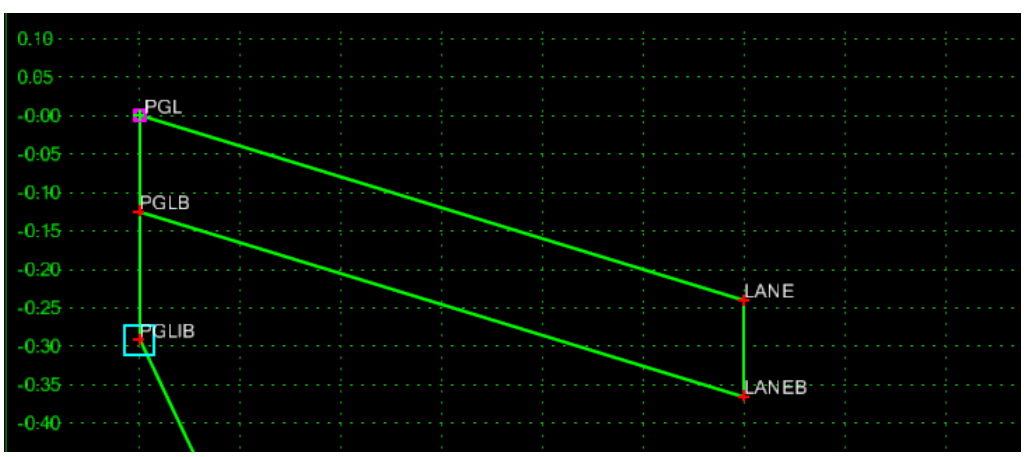
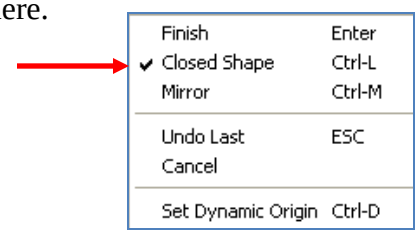


Figure L7-21 Create Template

31. **If not on - Turn <u>on</u> the Closed Shape Setting.**

- Right mouse click in the **Create Template** Grid. Ensure a check mark exists next to **Closed Shape** as shown here.



- Move your cursor around the **Create Template** Grid. Notice the Component is now a Closed Shape rather than a line as shown in *Figure L7-22*.

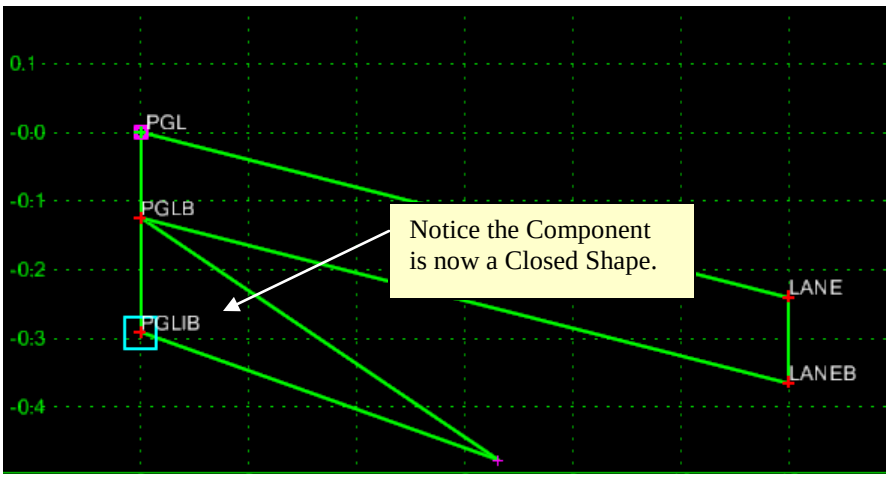
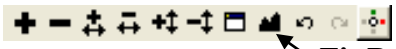


Figure L7-22 Create Template Grid

32. **Continue Constructing the 2" Intermediate Pavement Layer.**

- In the **<u>Dynamic Settings</u>** dialog enter the following information:
  - **Point Name:** ***LANEIB***
  - **Point Style:** ***MAIN_P_EOP***
  - **hs =** ***12, -.02*** (hs= horizontal distance, slope)
- Verify your entries match those shown in *Figure L7-23*.
- With your cursor in the Precision Input Field, press the **Enter** key on your keyboard.
- Click the **Fit** button.



Fit Button

- Verify your view is similar to that shown in *Figure L7-24* and that Point **LANEIB** has been created 12' from **PGLIB** at a Slope of - 2.00%. Notice the shape is still dynamically attached to your cursor.

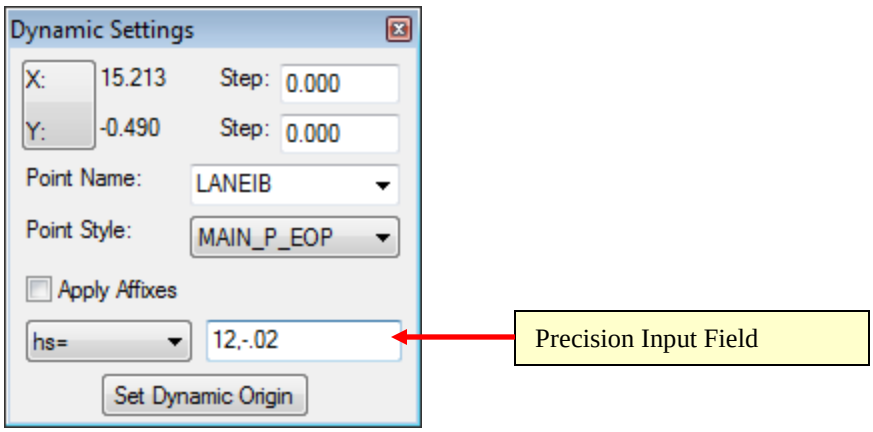


Figure L7-23 Dynamic Settings

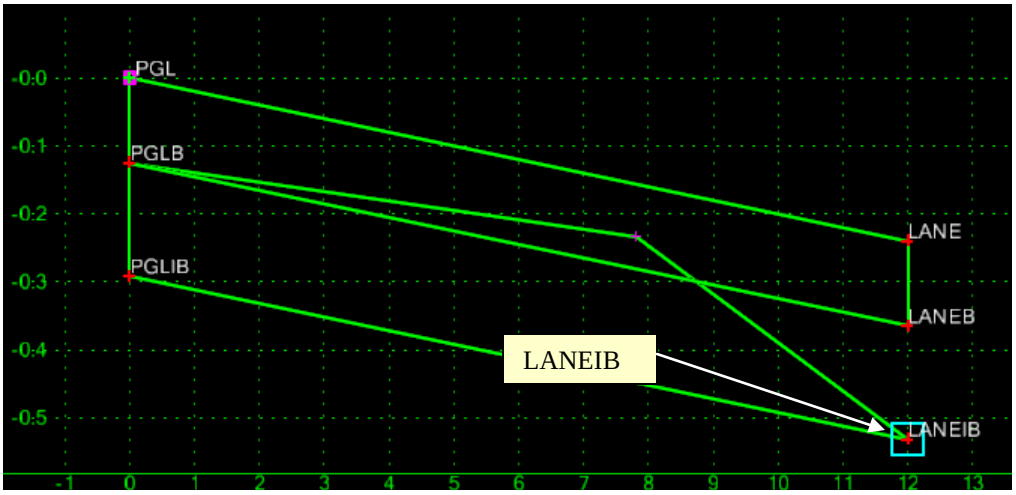


Figure L7-24 Create Template Grid

33.	**Complete the 2" Intermediate Pavement Layer shape.** • Left click on Point **LANEB**. • Right mouse click and select ***Finish***. • Verify your Component matches that shown in *Figure L7-25*. *This completes the addition of the 2" Intermediate Pavement Layer.*

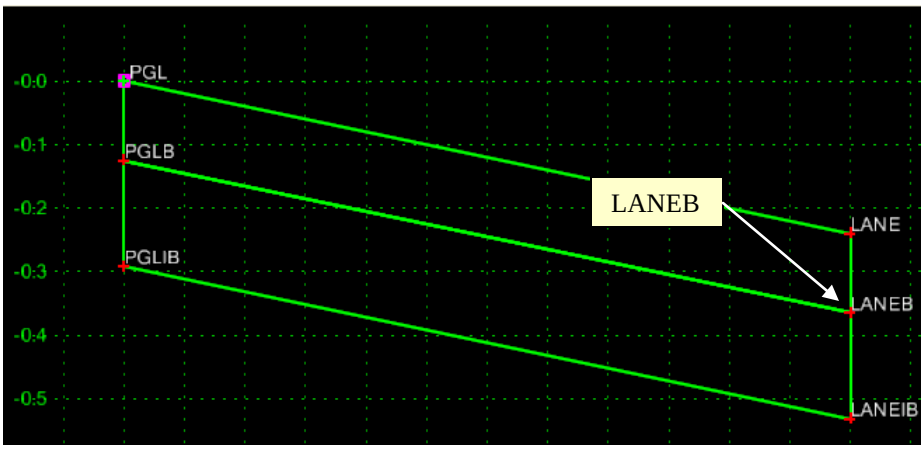


Figure L7-25 Create Template Grid

34.	**Even though the Intermediate Pavement Layer appears complete, the constraints are such that it will not superelevate correctly when Superelevation is applied. Superelevation is most easily applied to the Points across the Pavement Surface. All Points below the Surface must be constrained so they will adjust accordingly. This should become clearer as we make the constraint changes.** • Double click on Point **LANEIB**. The **<u>Point Properties</u>** dialog opens as shown in *Figure L7-26*. Notice the two constraints are **Slope** and **Horizontal**. This follows the input we used in the **<u>Dynamic Settings</u>** dialog in **Step 32** (**hs=12,-.02**). With **LANEIB** constrained as a slope to **PGLIB** it will not superelevate when the Surface superelevates but will remain constrained at a **2.00%** slope to **PGLIB**. • Change the **Slope** constraint to ***Vertical*** by using the pull down arrow. • Change the **Parent 1:** for the ***Vertical*** constraint to **LANEB**, either by key-in or using the **Locate** button. • Change the **Parent 1:** for the ***Horizontal*** constraint to **LANEB**, either by key-in or using the **Locate** button. ****NOTE - Parent/Child Relationships:** Parent/Child is the terminology InRoads uses to describe the constraint relationship between two points. In *Figure L7-26* **LANEIB** is the Child and **PGLIB** is the Parent. This means **LANEIB** will behave in response to the movements of **PGLIB** according to the constraints applied to it. • Verify your entries match those shown in *Figure L7-27*. • Click **Apply** & **Close**. **LANEIB** is now constrained Vertically and Horizontally to **LANEB** and will move in response to **LANEB**. Since **LANEB** is constrained vertically/horizontally to **LANE** the Superelevation of all pavement layers superelevate appropriately. *This completes the construction of the 2" Intermediate Pavement Layer.*

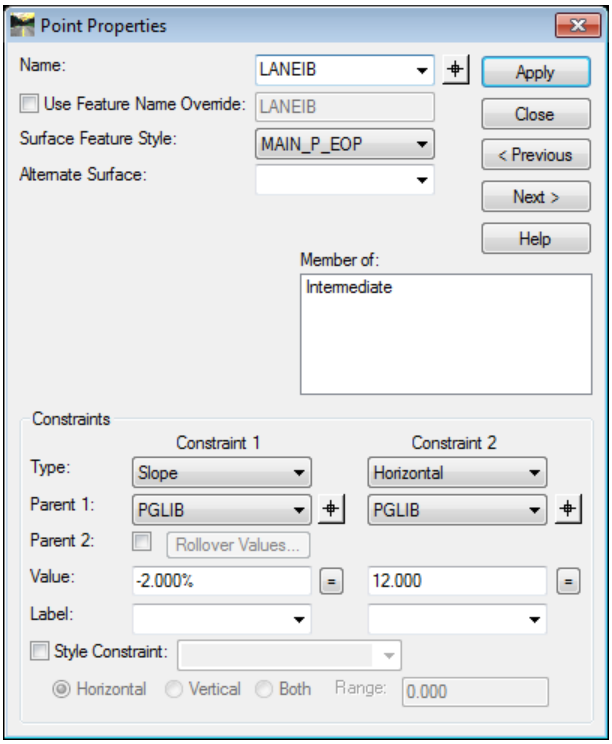


Figure L7-26 Point Properties

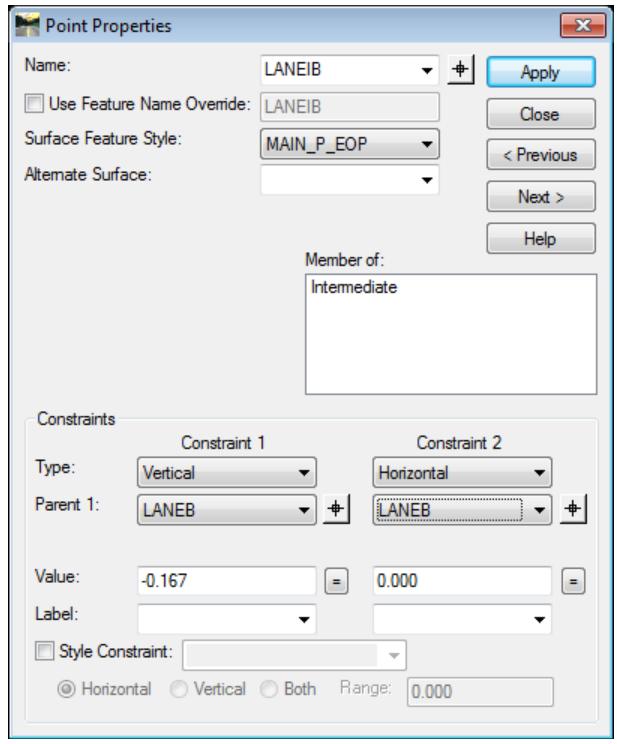
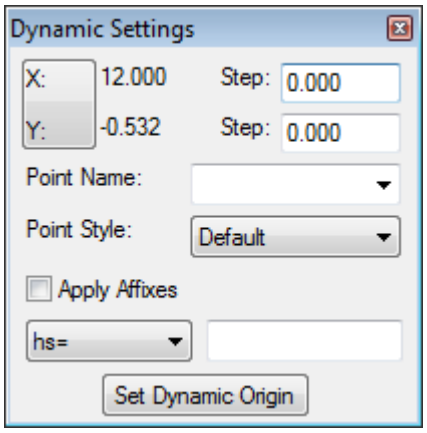
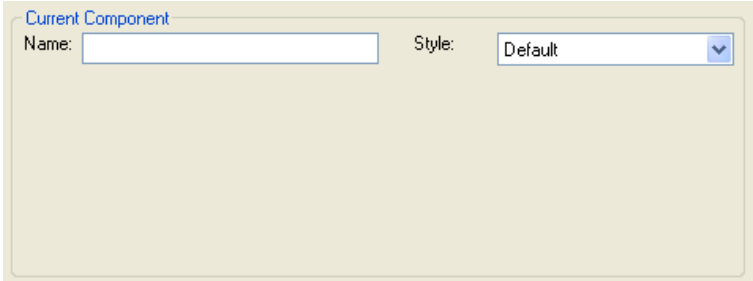


Figure L7-27 Point Properties

35.	**At this point you have created a 1.5" Surface Pavement Layer by placing a Simple Component and a 2" Intermediate Pavement Layer by placing a Constrained Component. Now let's create the 3" Base Layer by placing an Unconstrained Component and editing the Points to assign the proper constraints.** • Clear the **Point Name:** field in the **<u>Dynamic Settings</u>** dialog and set the **Point Style:** to ***Default***. It should look like this: 

36.

- In the **Create Template** Window, select **Add ► Unconstrained**.
- Change the **Current Component Style:** to ***Default*** as shown here:



- Left click on Point **PGLIB**.
- Continue placing Points counter-clockwise as shown in *Figure L7-28* to create a 'rough' Pavement Layer shape. Remember to Right mouse click and select '***Finish***' to finish creating the shape.

***HINT**: Ensure a check mark exists next to '**Closed Shape'** during construction. This may be accomplished by right mouse clicking in the grid during placement of the component.

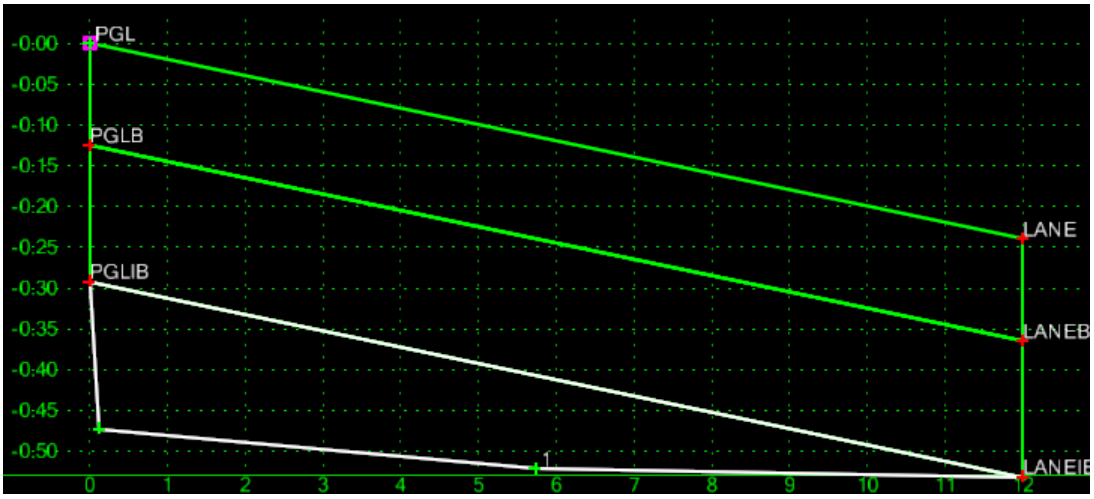


Figure L7-28 Create Template Grid

37.	**Name the Component 'Base' and Apply a Feature Style of 'MAIN_P_EOP'.**
	
	• Double click on the newly created Component. The **Component Properties** dialog will open.
	• Enter the following information:
	  o **Name:** ***Base***
	  o **Style:** ***MAIN_P_EOP***
	• Verify your entries match those shown in *Figure L7-29*.
	• Click **Apply** and **Close**. Notice the '**Base**' Component turns Green.

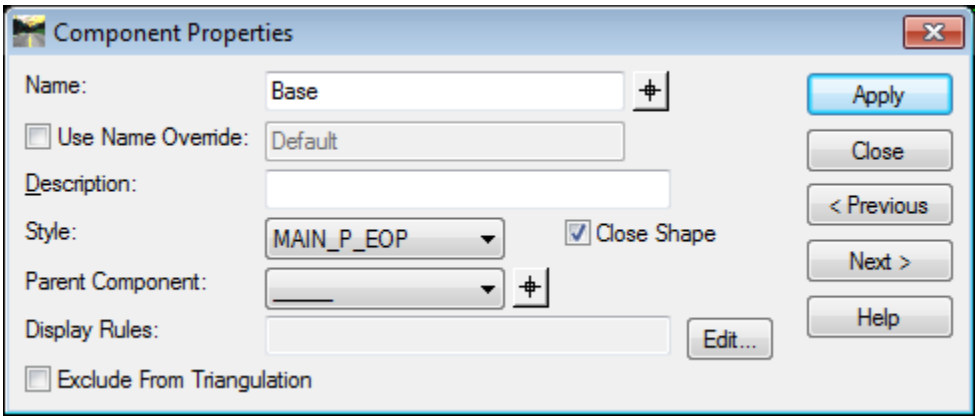


Figure L7-29 Component Properties

38.	**Begin Editing the Points to Complete the 'Base' Pavement Layer.**
	
	• Double click on the **Unlabeled Point** identified in *Figure L7-30*. The **Point Properties** dialog will open. Notice in the **Point Properties** dialog, the **Constraints** section contains no constraints. This is the result of placing the Component as an **Unconstrained Component**. Constraints can still be added to make the Component look or behave as you need.
	• Key-in a **Name:** of ***PGLBB*** (Profile Grade Line Base Bottom).
	• Select a **Surface Feature Style:** of ***MAIN_P_EOP***.
	• Define **Constraint 1**
	  o **Type:** ***Horizontal***
	  o **Parent 1:** ***PGLIB***
	  o **Value:** ***0.00***
	• Define **Constraint 2**
	  o **Type:** ***Vertical***
	  o **Parent 1:** ***PGLIB***
	  o **Value:** ***-0.25*** (3" Pavement Depth)
	• Verify your entries match those shown in *Figure L7-31*.
	• Click **Apply** and **Close**.
	• Verify point **PGLBB** and the Constraints were applied. The View will have also automatically adjusted to fit the Grid as shown in *Figure L7-32*. If not click the **Fit** button. The Base Pavement Layer looks strange at this point but will take shape once all the Constraints are defined and applied.

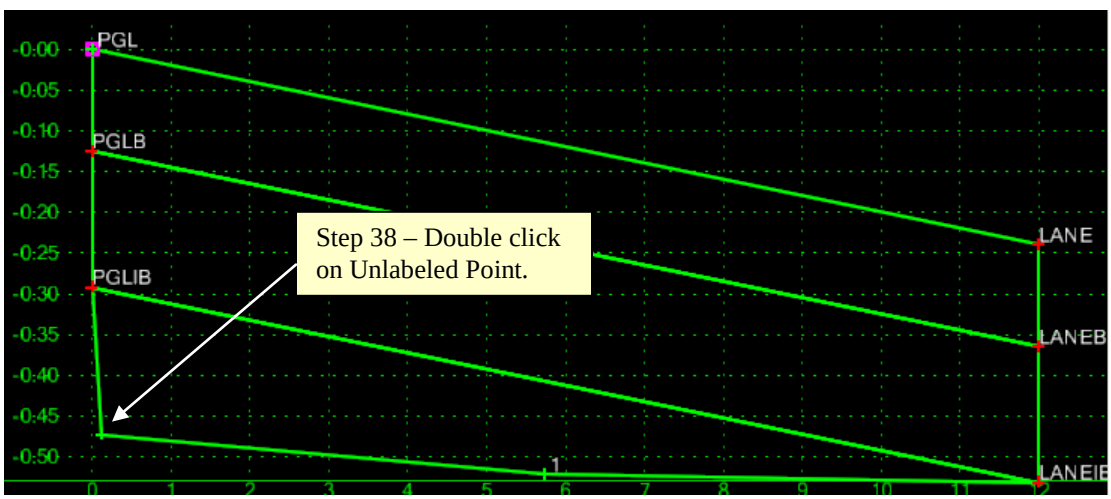


Figure L7-30 Create Template Grid

Important:
A common occurrence in InRoads when entering Values for **Constraint 2** is for the **Constraint 1** value to change in response. **ALWAYS** double check your entries to ensure they are correct prior to accepting the entry.

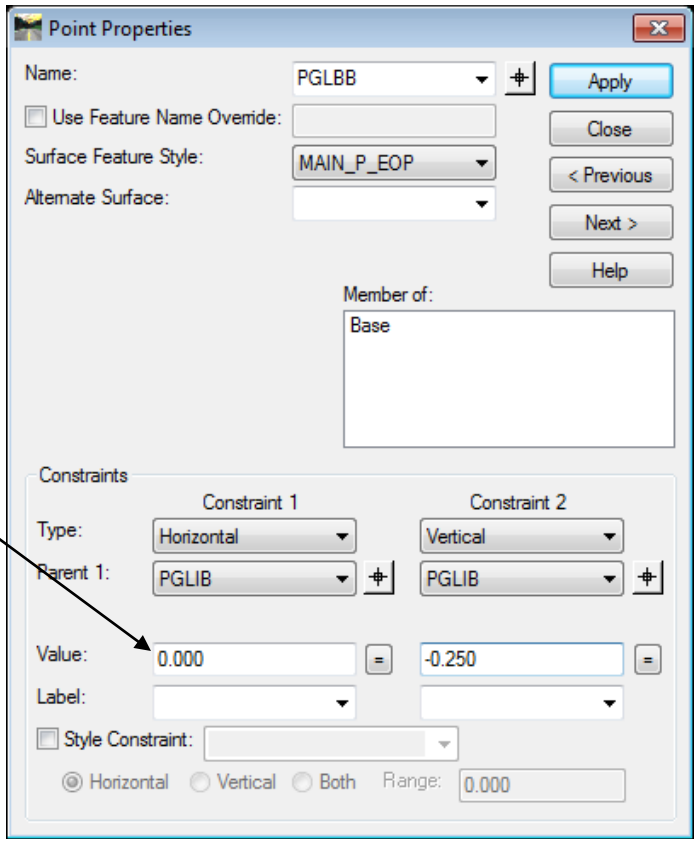


Figure L7-31 Point Properties Dialog

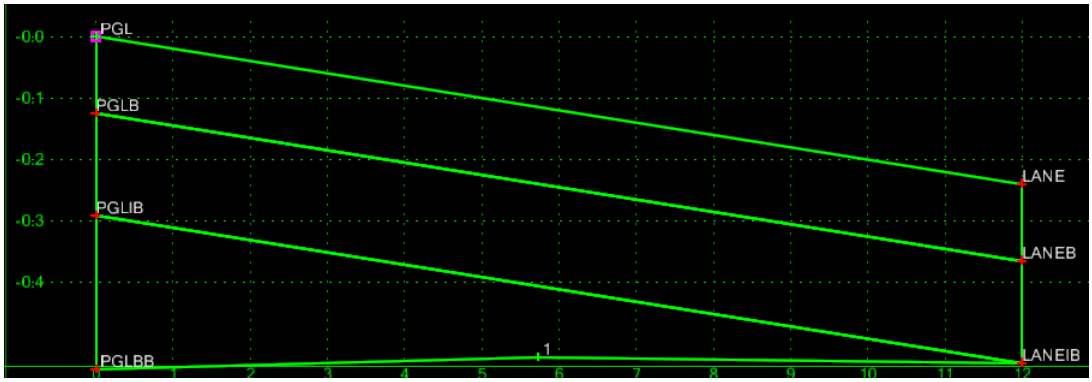


Figure L7-32 Create Template Grid

39.	**Edit the Unconstrained Point 1.**
	
	• Double click on the Point labeled **1**.
	• Key-in a **Name:** of ***LANEBB*** (LANE Base Bottom).
	• Select a **Surface Feature Style:** of ***MAIN_P_EOP***.
	• Define **Constraint 1**
	  o **Type:** ***Horizontal***
	  o **Parent 1:** ***LANEIB***
	  o **Value:** ***0.00***
	• Define **Constraint 2**
	  o **Type:** ***Vertical***
	  o **Parent 1:** ***LANEIB***
	  o **Value:** ***-0.25*** (3" Pavement Depth)
	• Verify your entries match those shown in *Figure L7-33*.
	• Click **Apply** and **Close**.
	• Verify point **LANEBB** and the constraints were applied as shown in *Figure L7-34*.
	
	This completes the addition of the Base Pavement Layer Component.

Important:
A common occurrence in InRoads when entering Values for **Constraint 2** is for the **Constraint 1** value to change in response. **ALWAYS** double check your entries to ensure they are correct prior to accepting the entry.

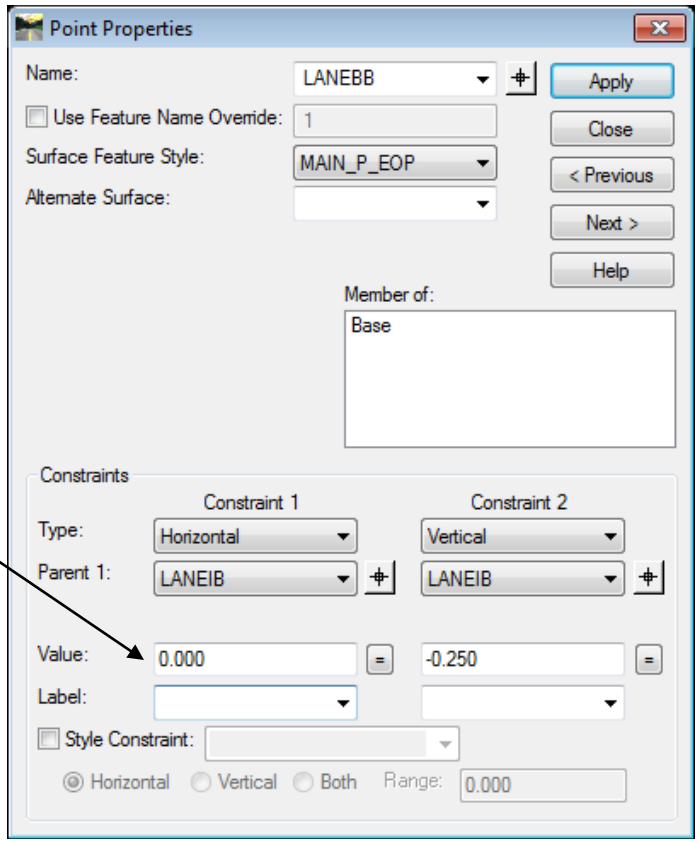


Figure L7-33 Point Properties Dialog

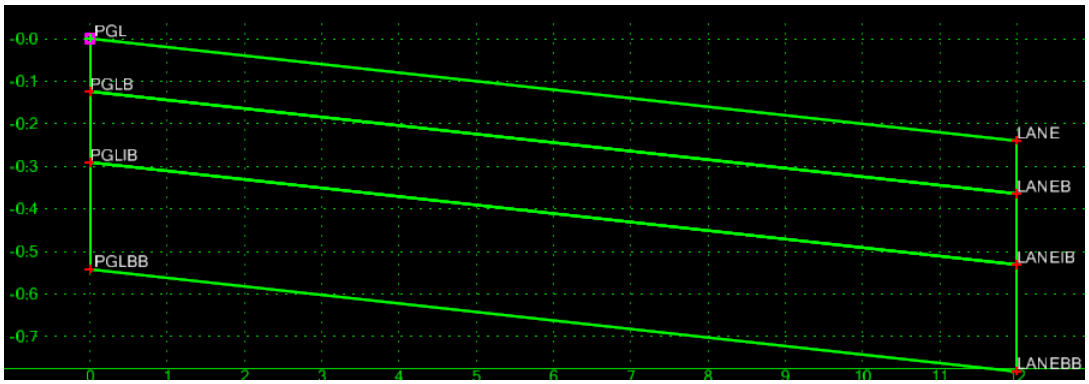


Figure L7-34 Create Template Grid

40.	**At this point you have completed the 1.5" Surface Layer utilizing a *Simple* component, the 2" Intermediate Layer utilizing a *Constrained* component and the 3" Base Layer utilizing an *Unconstrained* component. Let's complete the 4th and Final Pavement layer utilizing a *Simple* component again. This Layer will be called GAB and be 8" thick.** • In the **Create Template** Window, select **Add ► Simple**. 'Drop' the **Simple** component on the **Base** Layer by Left clicking on the Point **PGLBB**. • Click **Fit** to fit the view.

41.	**Name the Component GAB and give it a Feature Style of MAIN_P_EOP.**
	
	• Double click on the Component. The **Component Properties** dialog will open.
	• Enter the following information:
	  o **Name:** ***GAB***
	  o **Style:** ***MAIN_P_EOP***
	• Verify your entries match that shown in *Figure L7-35*.
	• Click **Apply** and **Close**.

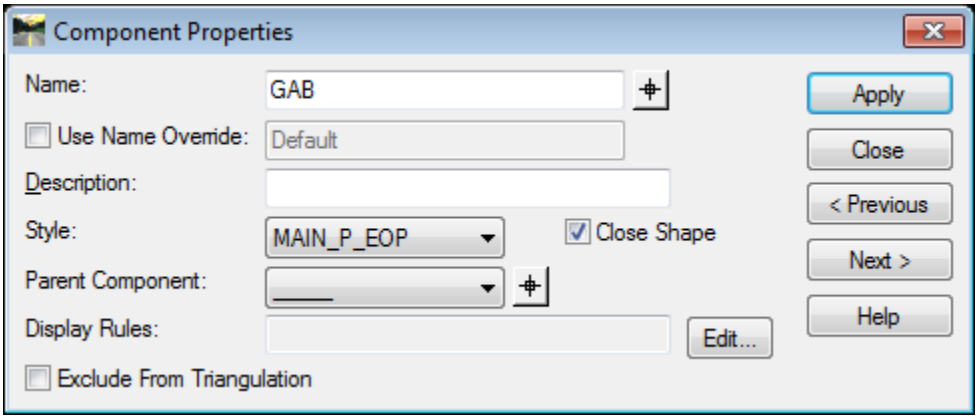


Figure L7-35 Component Properties

42.	**Rename Point 3 to PGLGAB, Apply the Surface Feature Style: MAIN_P_EOP and edit Constraints to create an 8" pavement.** • Double click Point ***3***. • Match the entries shown in *Figure L7-36*. • Click **Apply** & **Close**.

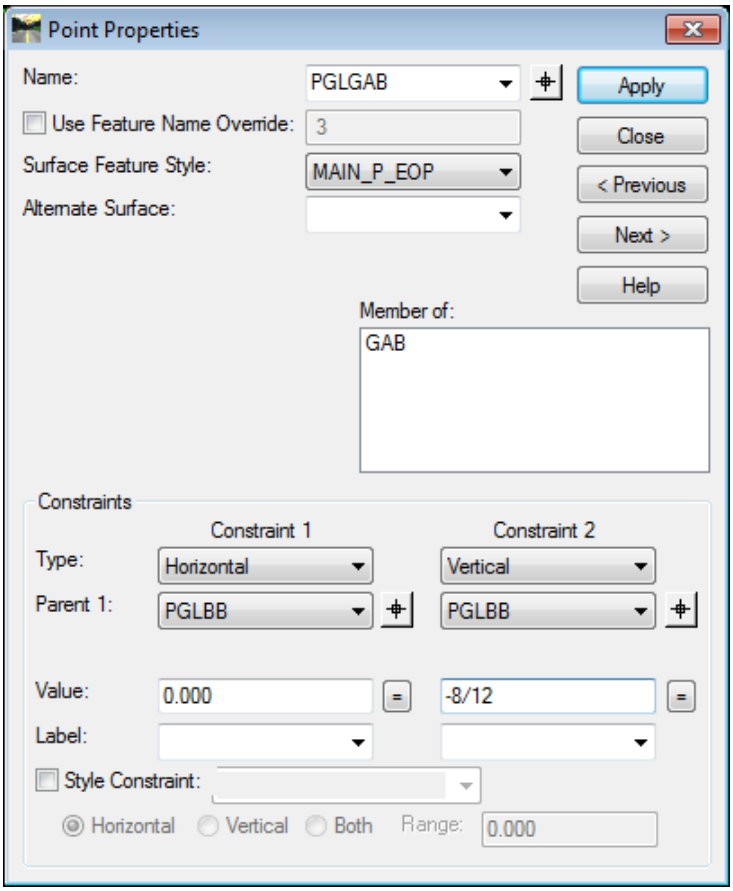
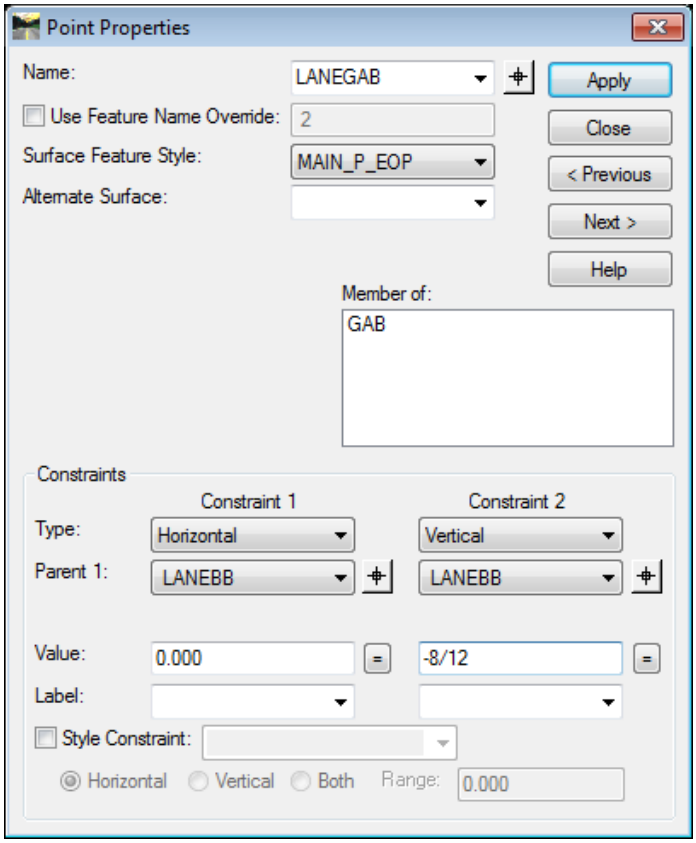


Figure L7-36 Point Properties Dialog

43. **Rename Point 2 to LANEGAB, Apply the Surface Feature Style: MAIN_P_EOP and edit Constraints to create an 8" pavement.**

- Double click Point ***2***.
- Match the entries shown below in the **<u>Point Properties</u>** dialog.
- Click **Apply** & **Close**.
- Click **Fit** to fit the view.
- Verify your View matches that shown in *Figure L7-37*.



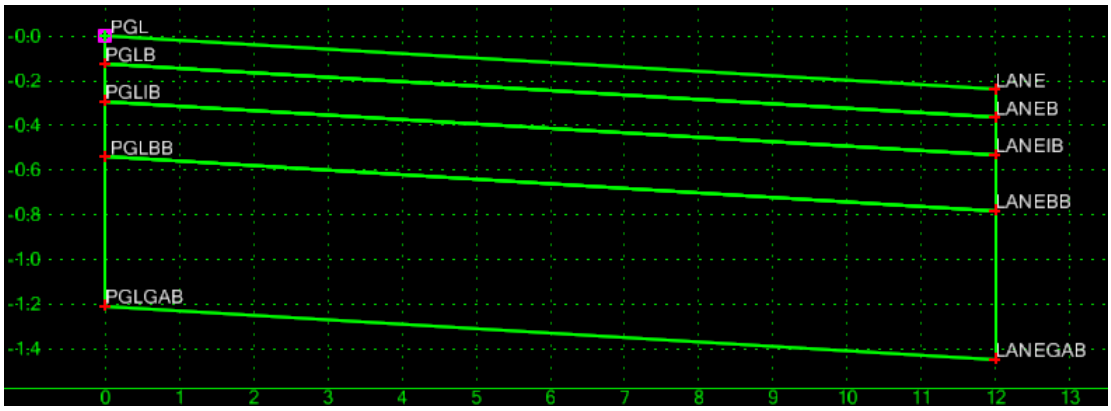


Figure L7-37 Create Template Grid

44.	**Save the Component.** • In the **<u>Create Template</u>** Window, click **File ► Save**. This completes the construction of a 12' Travel Lane with 4 Pavement Layers. *This construction of the 12' Travel Lane with 4 Pavement Layers is now complete.*
45.	**For Information Only:** For the Travel Lane we just created in **Lab 7C**, we used several different types of components. This was used in order to demonstrate the various ones available. We could easily have created the Travel Lane using only one type of component. There are many ways to create any desired component and the way a component is created will vary from Designer to Designer. The same holds true for constraints. Several different combinations of constraints can result in components with the same behavior. The constraints used to define the behavior of a component will vary from Designer to Designer. Thus it is very important that all InRoads users become very familiar with the different types of components and constraints.

Lab 7D Display Rules

In addition to constraints to control the behavior of components - the user may also employ **Display Rules** to further the capability of a component. **Display Rules** are used to turn on and off different parts of the same component. To demonstrate the use of **Display Rules**, in this Lab we will create a simple 3.5' by 2' wide wall (Wall Type 1) that will switch to a 6' tall by 4' wide wall (Wall Type 2) when the vertical distance from the existing ground to a certain point exceeds 3.5'. The walls and the Point names we will employ are shown in *Figure L7-38*. One workflow that works well for constructing this component is to build two separate components first and then drop one component on top of the other component and then define the **Display Rules**. This is how we will approach building this component.

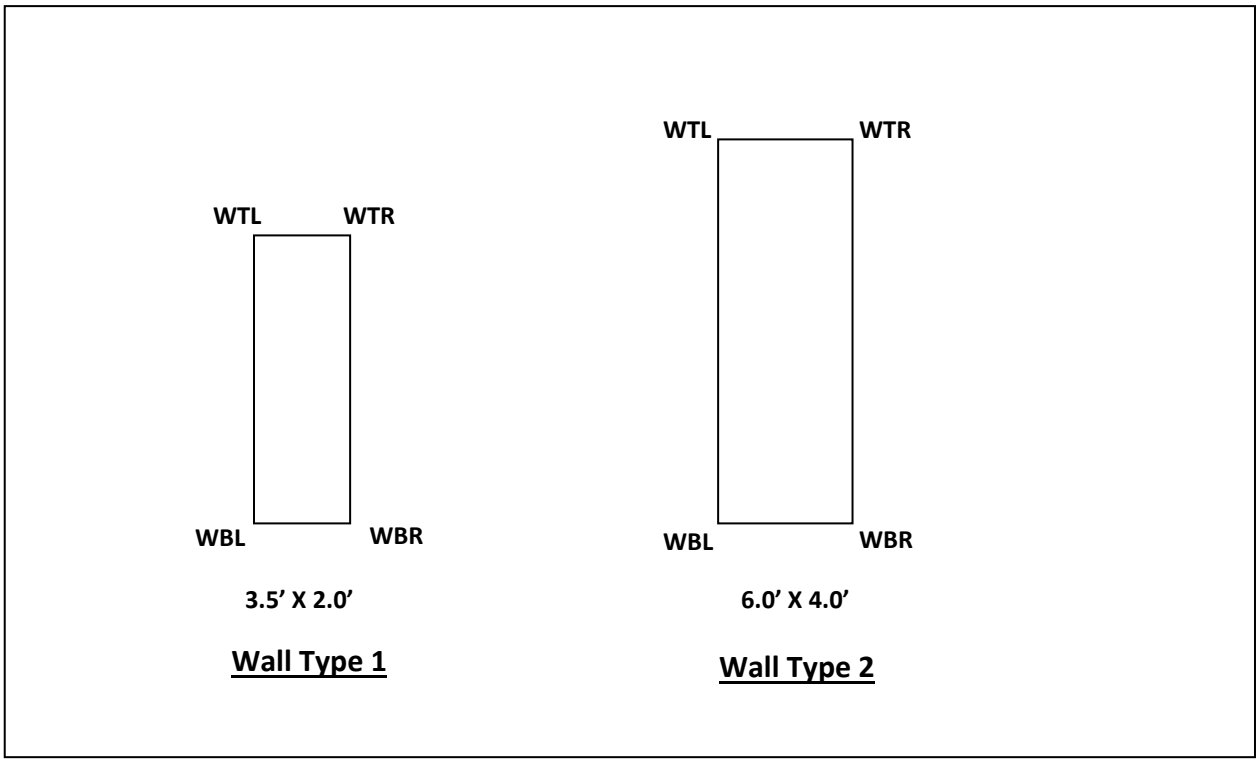
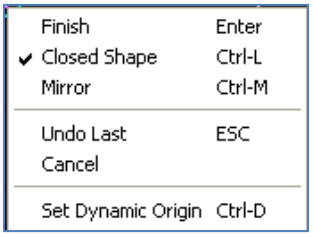


Figure L7-38 Wall Shapes

46.	**If not open from Lab 7C, Open the <u>Create Template</u> Window and the GDOT_Lab7.itl Template Library. (***This step may be ignored if the Template Library is already open***).** • In InRoads, select **Modeler ► Create Template**. The **<u>Create Template</u>** Window opens. • In the **<u>Create Template</u>** window, select **File ► Open**. • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 7** • Highlight ***GDOT_Lab7.itl*** and click **Open**.
47.	**Create a new Template and call it *Wall 1*.** • In the **<u>Create Template</u>** window, select **File ► New ► Template**. • Right mouse click over ***New Template*** in the **Template Library:** Window and select **Rename**. • Key-in ***Wall 1***.
48.	**Draw an Unconstrained 'Rough' Wall shape approximately 3.5' high by 2.0' wide.** • In the **<u>Create Template</u>** window, select **Add ► Unconstrained.** • Draw the shape <u>Clockwise</u> beginning at the bottom Left Point as shown in *Figure L7-39*. ***HINT**: Right click to ensure '***Closed Shape'*** is checked. • Right click to check '***Finish***' when Shape is completed. ***NOTE:** The Color/Smbology of the wall you draw may vary from the color depicted in the screen captures shown below. 

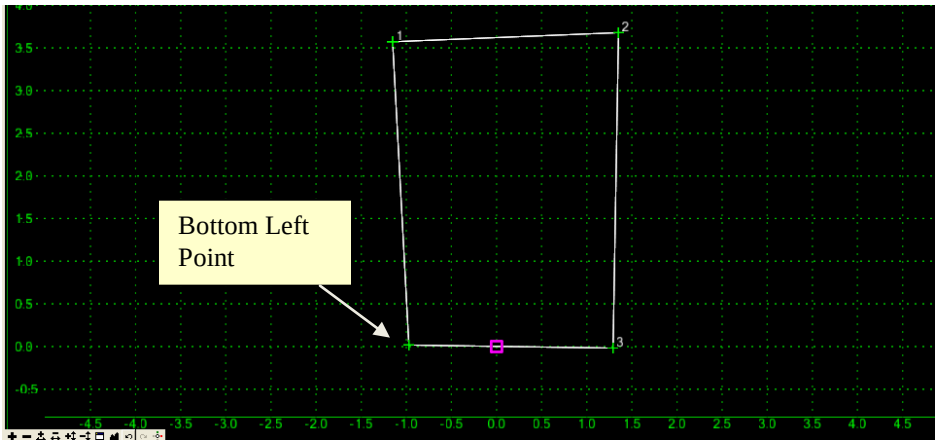
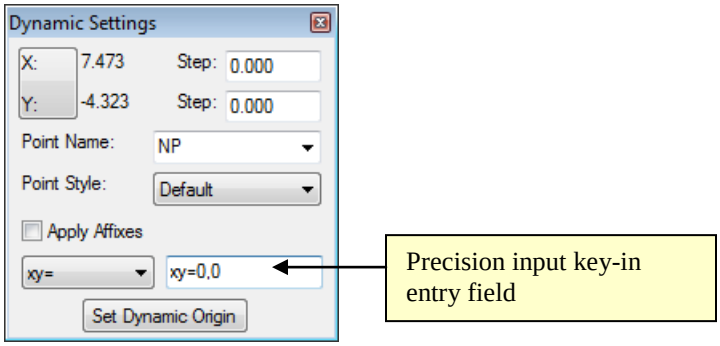


Figure L7-39 Create Template Dialog Grid

49.	**Open the Dynamic Settings Dialog** • Open the **Dynamic Settings** dialog box. Select **Tools ► Dynamic Settings**.
50.	**Add a Null Point at X,Y = 0,0.** • In the **Create Template** window, select **Add ► Null Point**. • In the **Dynamic Settings** dialog enter the following information: o **Point Name:** ***NP*** o **Point Style:** ***Default*** o **Key-in: xy=*0,0*** • Verify your entries match those shown here.  • With the Cursor in the Precision Input Field – press the **Enter** button on your keyboard. ***NOTE**: *Null Points are generally used as reference points for defining constraints in other components. In this case the wall will be constrained horizontally to the Null Point. When this wall is used in a cross section design the Null Point would be inserted so as to follow a horizontal alignment or another component as will be discussed in more detail in the lab on the Roadway Designer. This will allow us to constrain the wall to move vertically to the ground yet also constrained horizontally to an alignment or another component.* • Verify a **Null Point** labeled ***NP*** was placed at ***0,0*** as shown in *Figure L7-40*.

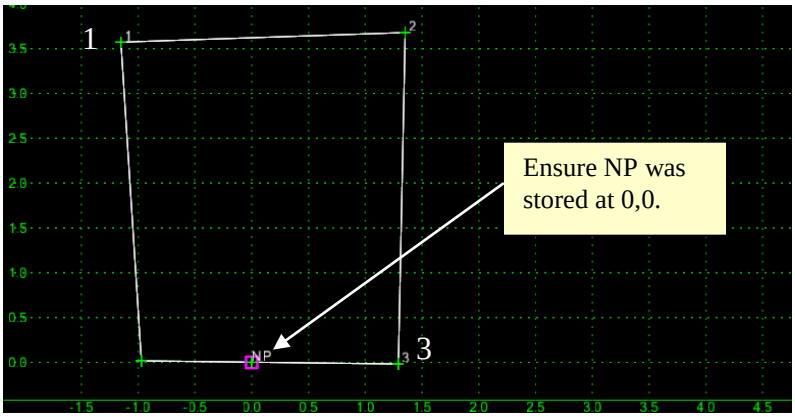


Figure L7-40 Create Template Dialog Grid

51.	**Edit Point 3.** • Double click on Point **3** as shown in *Figure L7-40* above. • In the **<u>Point Properties</u>** dialog that opens, match the entries shown in *Figure L7-41*. • Click **Apply** & **Close**. • Ensure Point **3** was renamed **WBR** (Wall Bottom Right). ***<u>NOTE</u>**: *The 'Project To Surface' constraint used in this step behaves as its name implies and projects the point to a defined surface in the direction assigned. The effects of this constraint are not immediately realized but can be seen by clicking the Test button just below the bottom right hand side of the Create Template Grid. A Surface must be open and active for testing to work.*

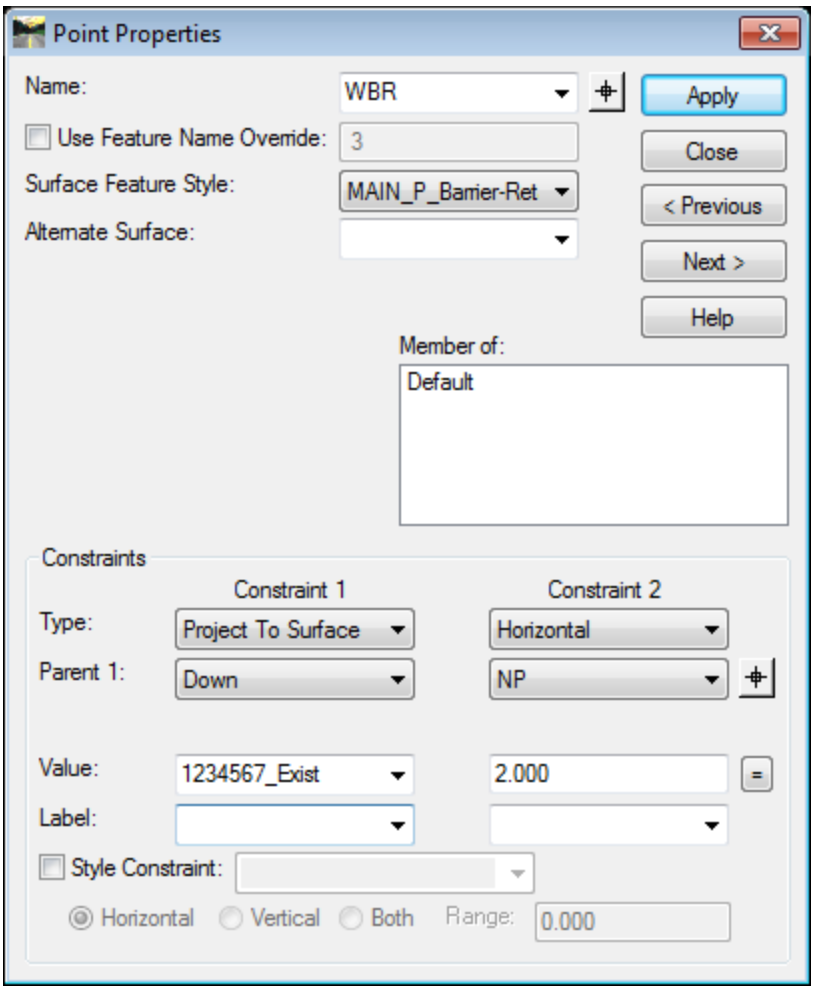


Figure L7-41 Point Properties

52.	**Edit Point 2.** • Double click on Point **2**. • In the **<u>Point Properties</u>** dialog that opens, match the entries shown in *Figure L7-42*. • Click **Apply** & **Close**. • Ensure Point **2** was renamed **WTR** (Wall Top Right).

Important:
A common occurrence in InRoads when entering Values for **Constraint 2** is for the **Constraint 1** value to change in response. **ALWAYS** double check your entries to ensure they are correct prior to accepting the entry.

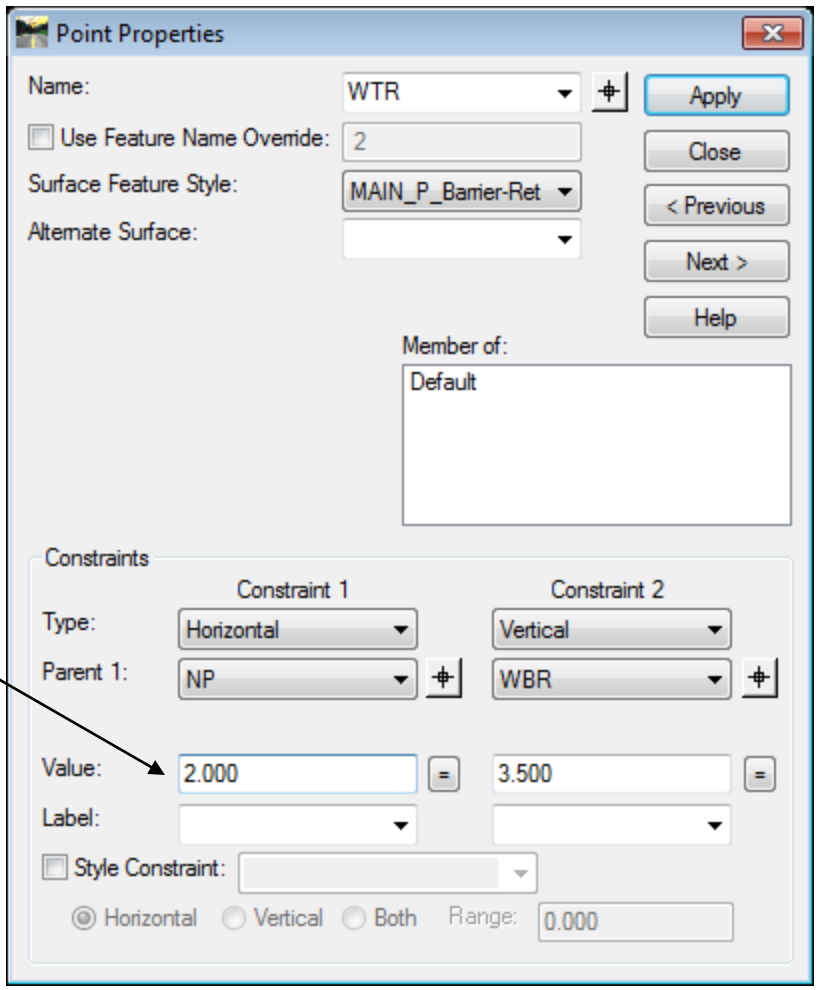


Figure L7-42 Point Properties

53.	**Edit Point 1.** • Double click on Point **1**. • In the **Point Properties** dialog that opens, match the entries shown in *Figure L7-43*. • Click **Apply** & **Close**. • Ensure Point **1** was renamed **WTL** (Wall Top Left).

Important:
A common occurrence in InRoads when entering Values for **Constraint 2** is for the **Constraint 1** value to change in response. **ALWAYS** double check your entries to ensure they are correct prior to accepting the entry.

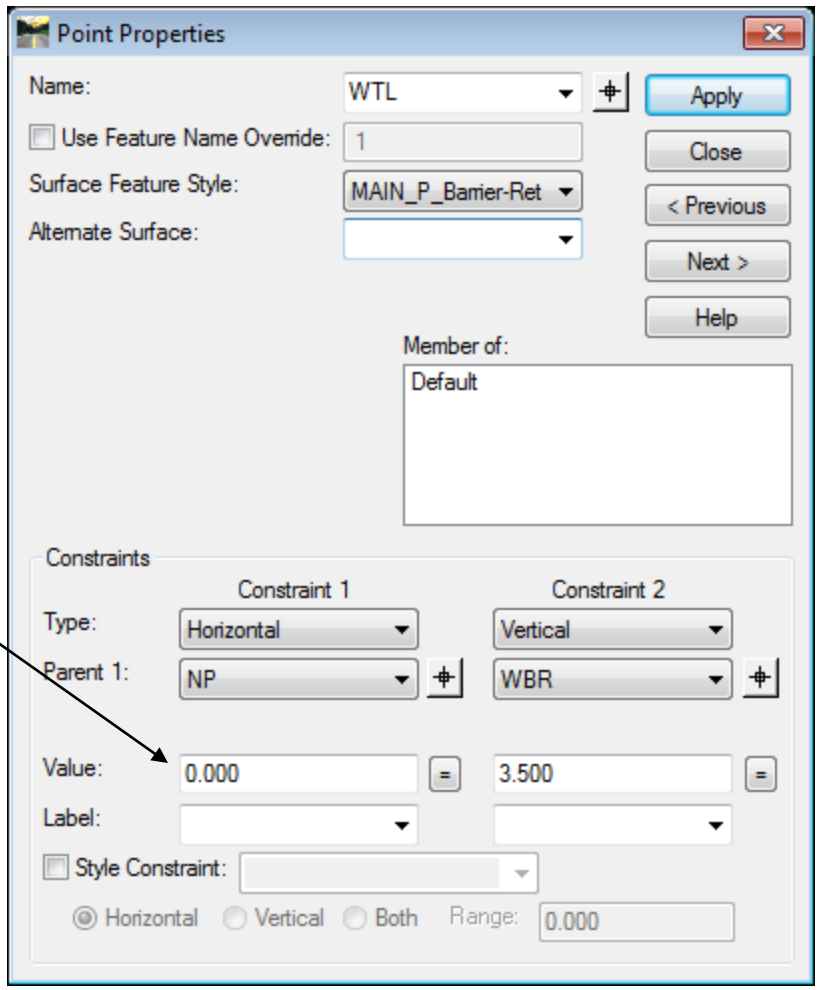


Figure L7-43 Point Properties

54.	**Edit the Remaining Unnamed Point.** • Double click on the **Unnamed** Point. • In the **Point Properties** dialog that opens, match the entries shown in *Figure L7-44*. • Click **Apply** & **Close**. • Ensure the Point was renamed **WBL** (Wall Bottom Left).

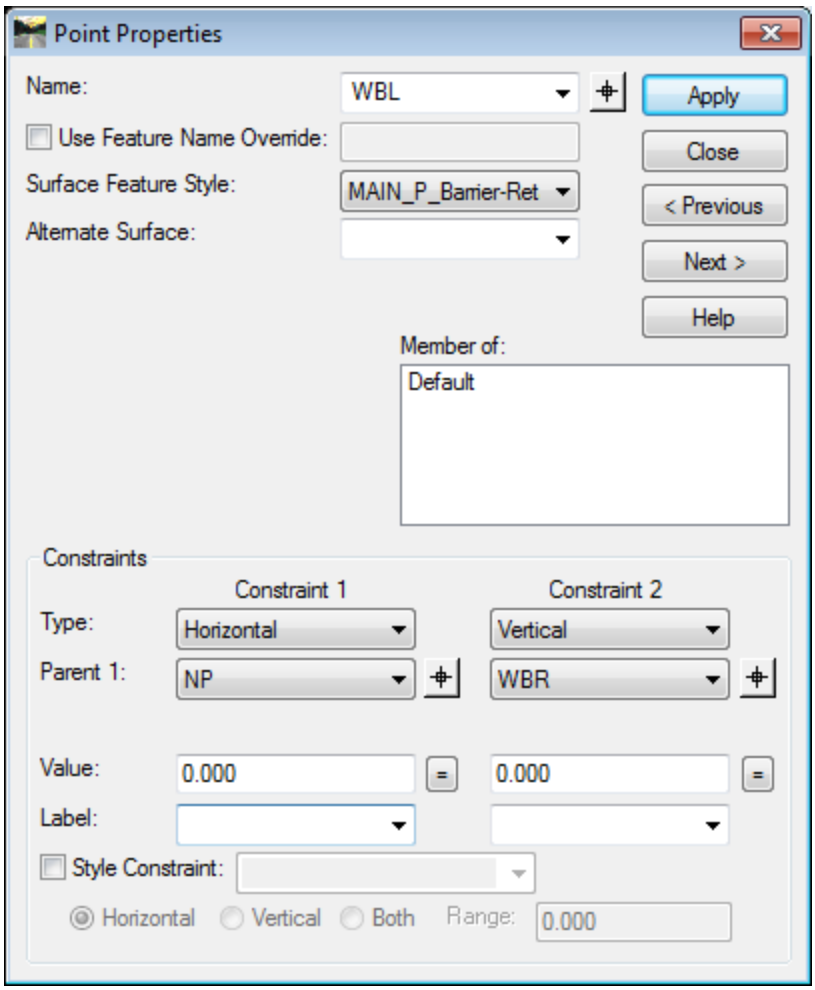


Figure L7-44 Point Properties

55.	**Rename the Component to Wall 1.** • Double click on the Component (not the Points). • Match the entries shown in *Figure L7-45*. • Click **Apply** & **Close**. • Verify your **Wall 1** matches that shown in *Figure L7-46*. ((**Note:** the screen capture is zoomed in– so your view may be slightly different).).

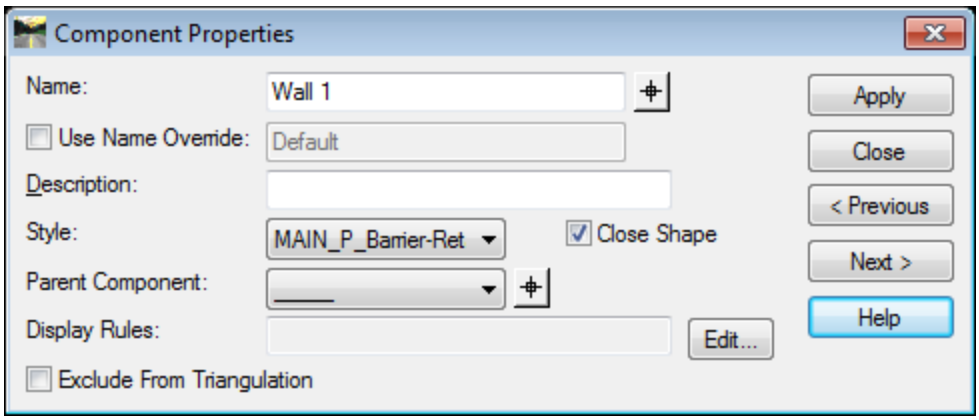


Figure L7-45 Component Properties

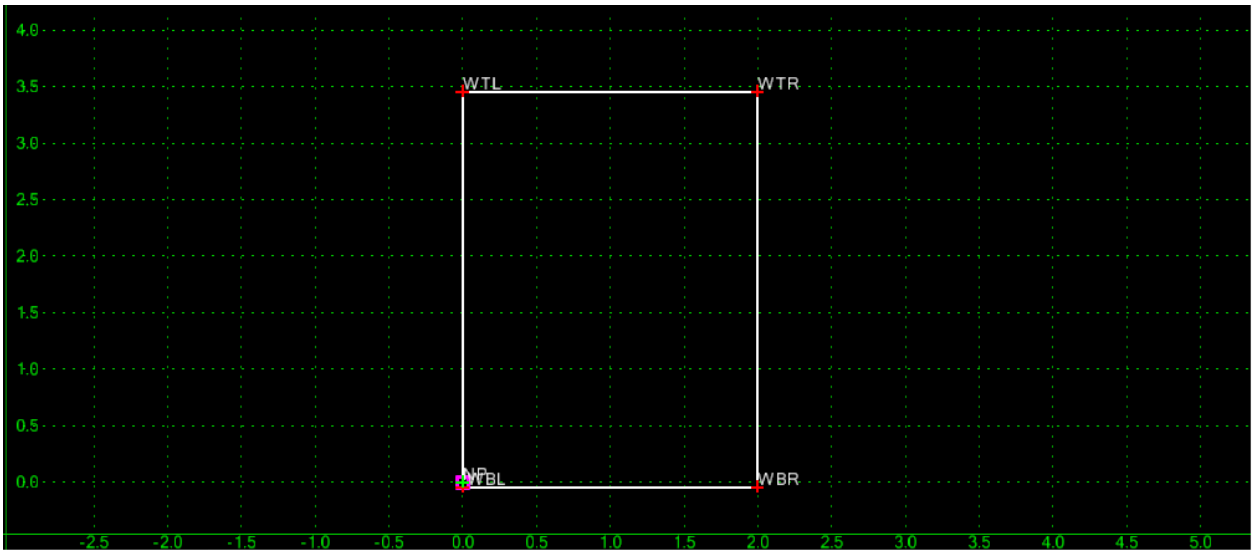


Figure L7-46 Create Template Dialog Grid

56.	**Open the Test End Conditions Window** • Click the **Test** button in the lower right corner of the **<u>Create Template</u>** window. The **<u>Test End Conditions</u>** window opens as shown in *Figure L7-47*. • **Zoom Out** by using the wheel on your mouse. If your mouse does not have a wheel - click the Zoom Out button until your screen is similar to that shown in *Figure L7-48*.

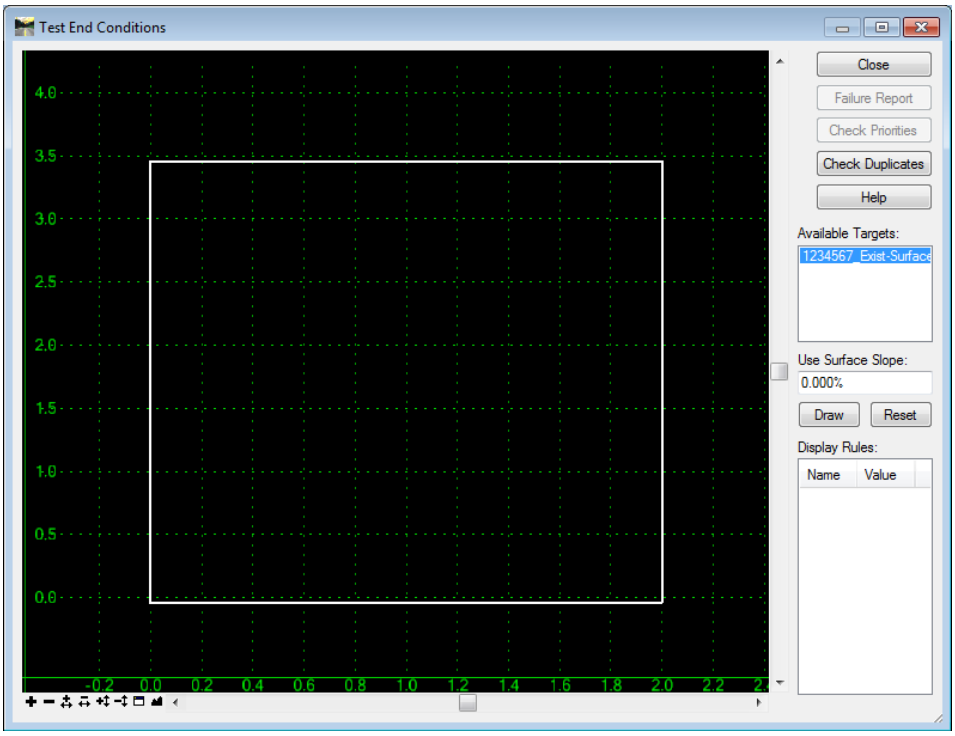


Figure L7-47 Test End Conditions

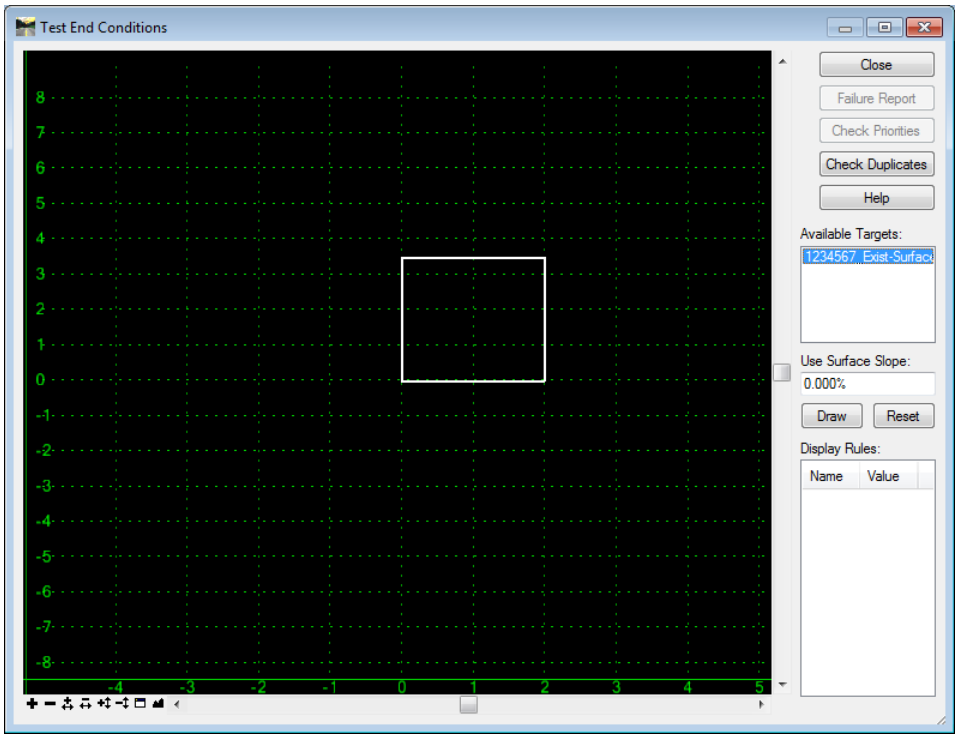


Figure L7-48 Test End Conditions

57.	**Test the Wall.** • In the **<u>Test End Conditions</u>** window, click the **Draw** button. The **Draw** button draws a line representative of the Active Surface at the Slope defined in the **Use Surface Slope:** entry field. • **Move** your cursor up and down in the **<u>Test End Condition</u>** window. Notice the **Wall** moves up and down staying on the existing ground. This is in response to the ***Project To Surface*** constraint we placed on Point **WBR**. A view of the Wall in its original location remains in the grid as shown in *Figure L7-49*. This is normal. • Click **Close** to close the **<u>Test End Conditions</u>** window. Testing will be covered in more detail in the section on End Conditions.

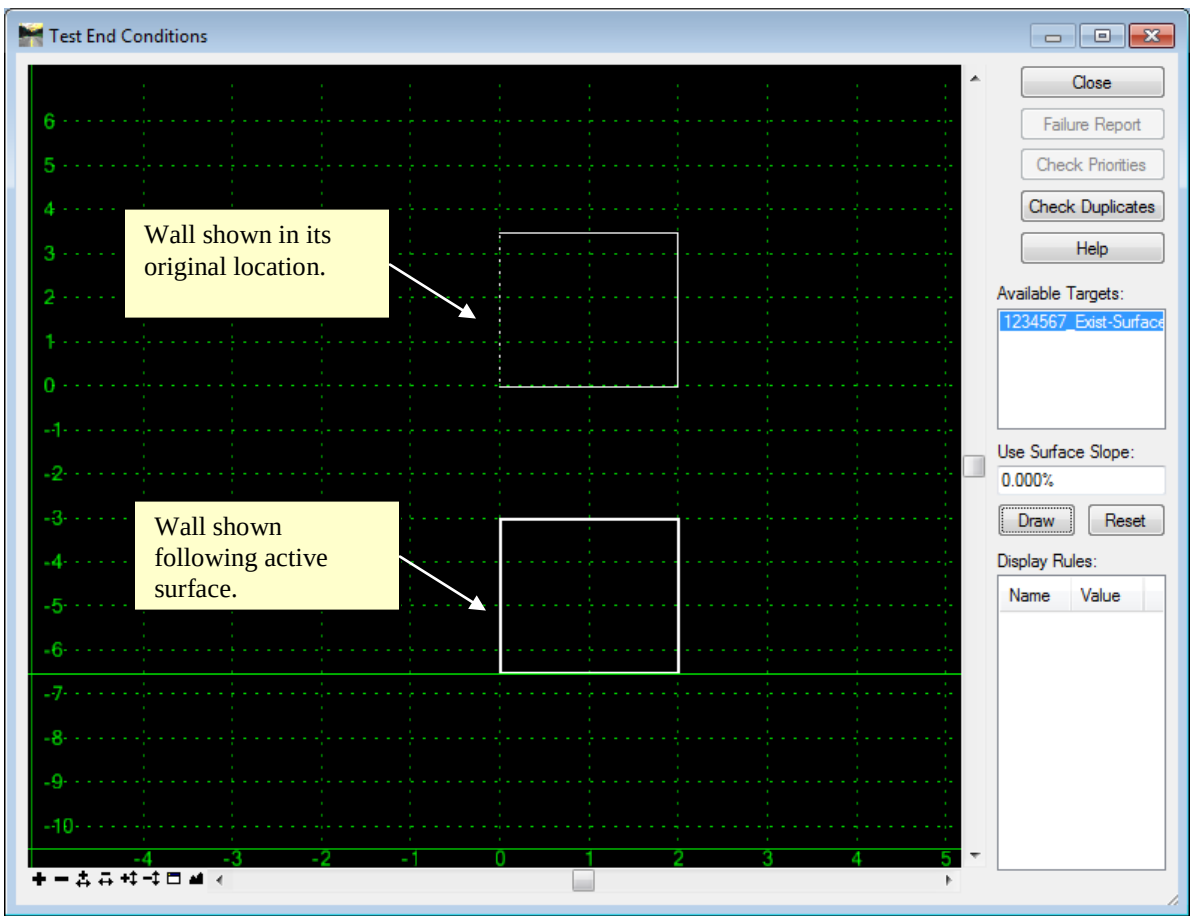


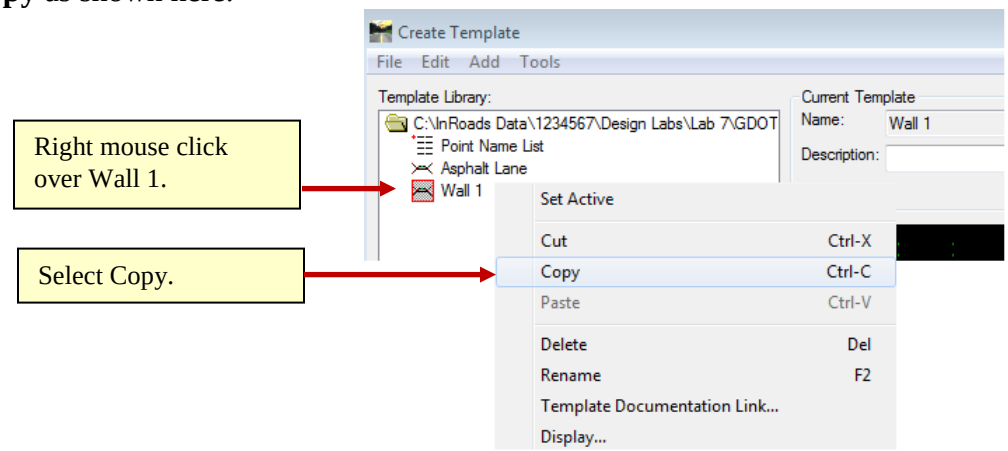
Figure L7-49 Test End Conditions

58. **Save Your Work**

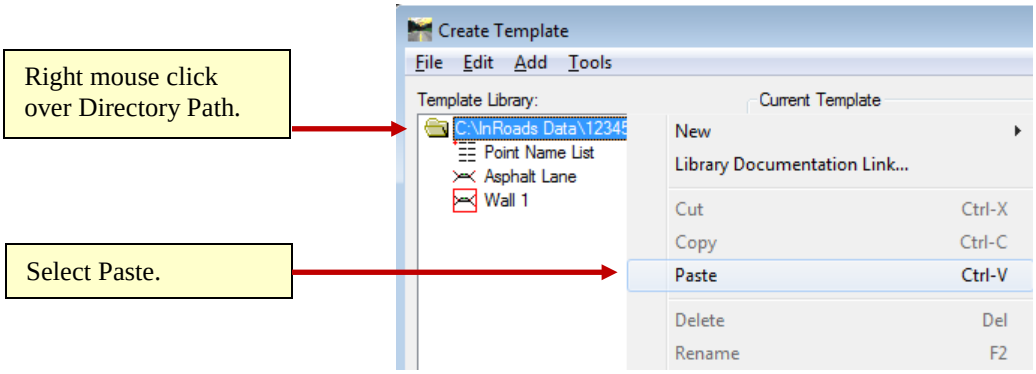
- In the **Create Template** Window, click **File ► Save**.

59. **Copy Wall 1 to Wall 2**

- In the **Create Template** window - Right mouse click over **Wall 1** and select **Copy** as shown here.

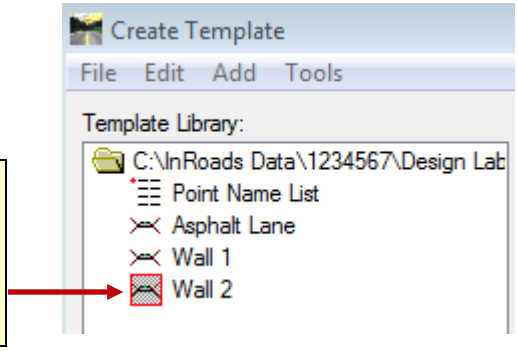


- In the **Create Template** Window - Right mouse click over the **Directory Path** and select **Paste** as shown here.



60. **Rename Wall11 to Wall 2.**

- You should now have a component called **Wall11**.
- Right mouse click over **Wall11** in the **Template Library:** Window and select ***Rename***.
- **Rename** it to ***Wall 2*** and make it the Active Component (by double clicking it) ensuring a Red Square is around it as shown here.



Ensure Wall 2 is the Active Component by double clicking it. A Red Square indicates it is the active component.

61. **Edit Point WTL in Wall 2 to make it 6' High.**

- With **Wall 2** active, double click Point **WTL**.
- In the **Point Properties** dialog - change the **Vertical** constraint from **3.50** to ***6.00***.
- Click **Apply** & **Close**.
- **Fit** the view.
- Ensure your Component corresponds to that shown in *Figure L7-50*. (**Note:** the screen capture below is zoomed out – so your view may be slightly different).

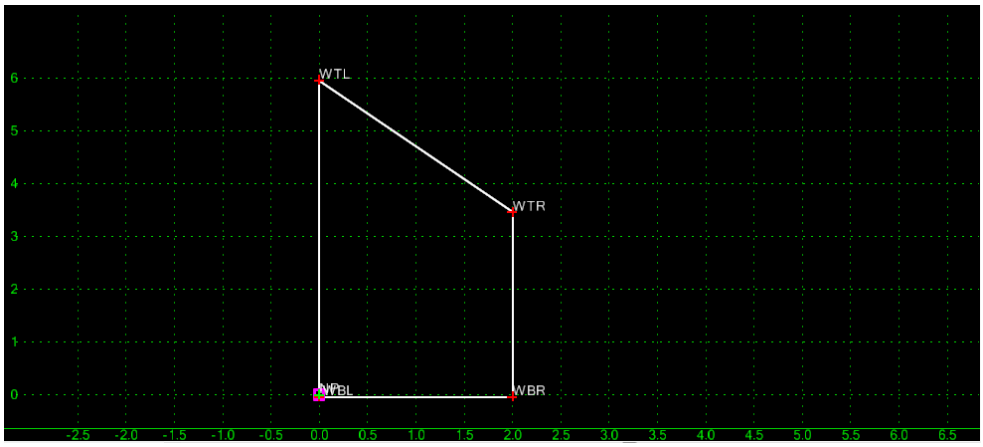


Figure L7-50 Create Template Grid

62.	**Edit Point WTR in Wall 2 to make it 4' Wide and 6' High.** • With **Wall 2** active, double click Point **WTR**. • Change the **Horizontal** constraint from **2.00** to ***4.00***. • Change the **Vertical** constraint from **3.50** to ***6.00***. • Click **Apply** & **Close**. • **Fit** the view. • Ensure your Component matches that shown in *Figure L7-51*.

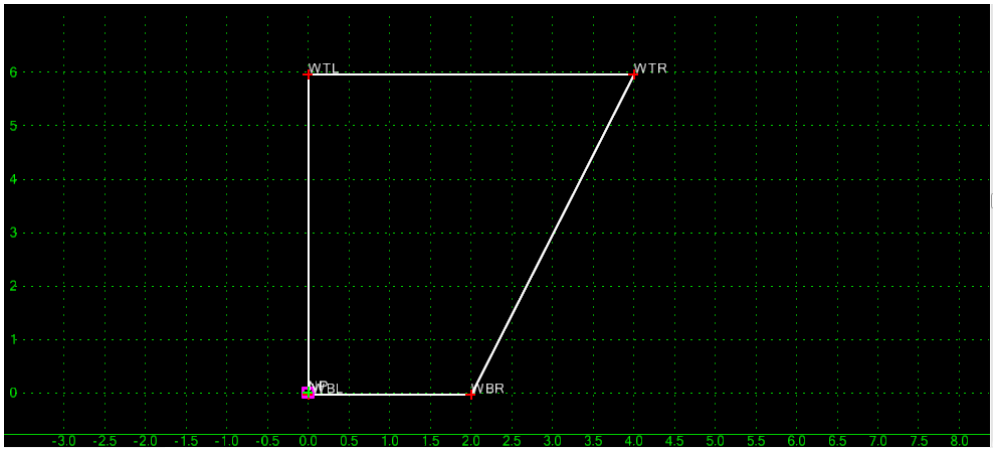


Figure L7-51 Create Template Grid

63.	**Edit Point WBR in Wall 2 to make it 4' Wide.** • With **Wall 2** active, double click Point **WBR**. • Change the **Horizontal** constraint from **2.00** to ***4.00***. • Click **Apply** & **Close**. • **Fit** the view. • Ensure your Component matches that shown in *Figure L7-52*.

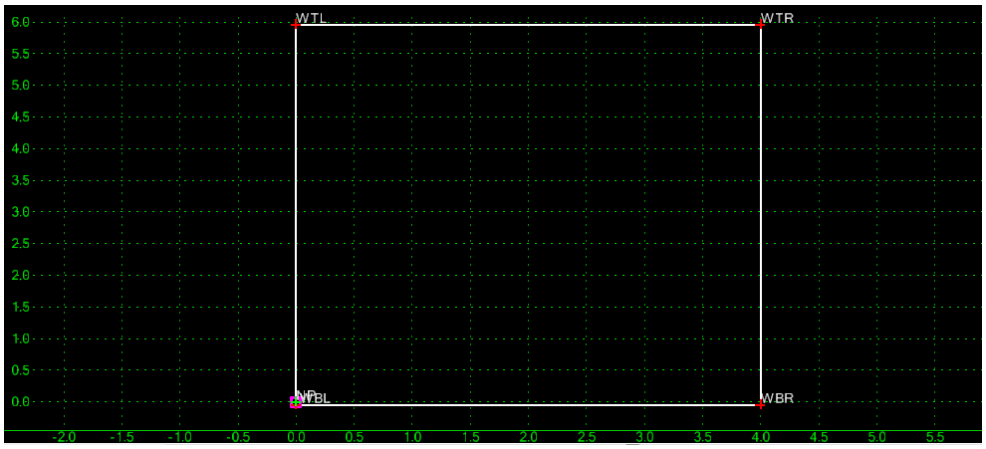
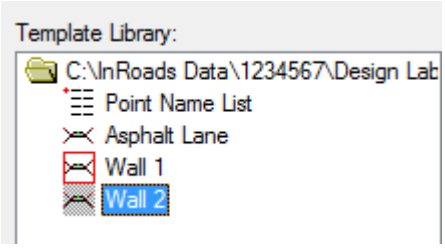


Figure L7-52 Create Template Grid

64.	**Rename Component** • Double click on **Wall 2** (Double Click the Component – not the Points). • Notice in the **<u>Component Properties</u>** dialog which opens that the Component name is still **Wall 1**. • Rename the Component to ***Wall 2***. • Click **Apply** & **Close**.
65.	**Save Your Work** • In the **<u>Create Template</u>** Window, click **File ► Save**.
66.	**For Information Only:** At this point we have created two separate components. One component representing **Wall 1** and one component representing **Wall 2**. Now it is time to drag and drop **Wall 2** on top of **Wall 1** creating a single Component with both walls.
67.	**Make Wall 1 the Active Component.** • Double click on **Wall 1** (in the **Template Library:** list) and ensure a Red Square exists next to it indicating it is the Active Component.
68.	**Highlight Wall 2** • Left Click once on **Wall 2** so that it is highlighted in blue but not the Active Component as shown here. 

69.	**Ensure the Insertion Point for Wall 2 is at point WBL.** • When **Wall 2** was highlighted in blue, it became visible in the **Preview:** window. See *Figure L7-53*. ***NOTE**: *The Preview window is where the Insertion Point of a component can be changed and is identified by the light blue square shown in Figure L7-53. The Insertion Point can be changed to any Point in the component and is selected by left clicking on any Point in the Preview window.* • In the **Preview:** window, Left click on the lower left Point (**WBL**) to ensure it is the Insertion Point.

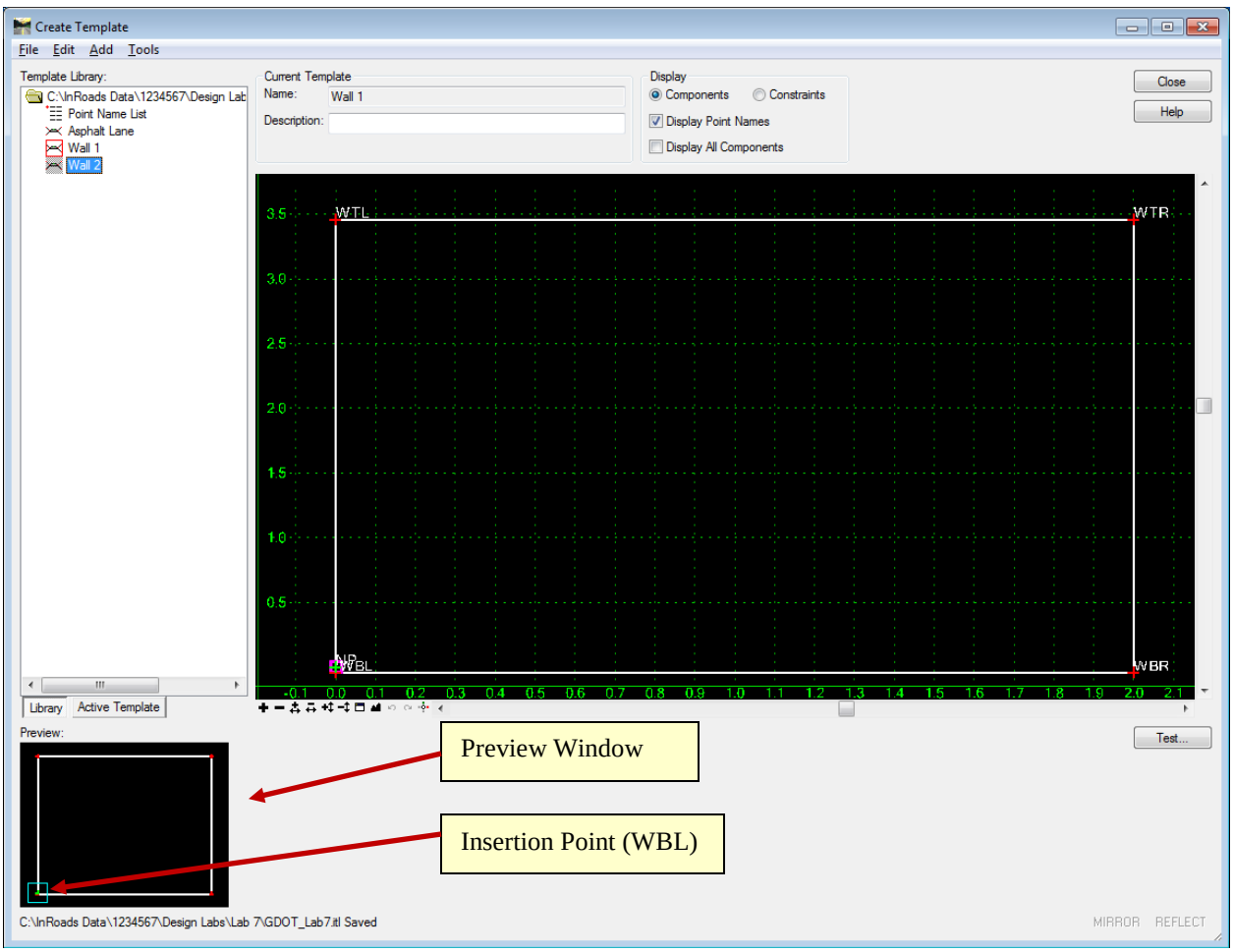


Figure L7-53 Create Template Window

70.	**Place Wall 2 on Wall 1** • Left click and hold **Wall 2** and drag to **WBL** in the Grid and place on **WBL**. ***HINT:** *Use the wheel on your mouse to zoom in and out as necessary.* • **Fit** the view and ensure your view matches that shown in *Figure L7-54*. • When one Component is placed on another, matching Point Names are appended numerically beginning with **1**. Notice there are now Points named **WTL** & **WTL1**, **WTR** & **WTR1** and **WBR** & **WBR1** in *Figure L7-54*. • When Points are dropped directly onto one another the default behavior is to merge the two Points together. Zoom into point **WBL** in the lower left corner and you will see there is not a **WBL** and a **WBL1**. Only a **WBL**. The two Points were merged into one Point.

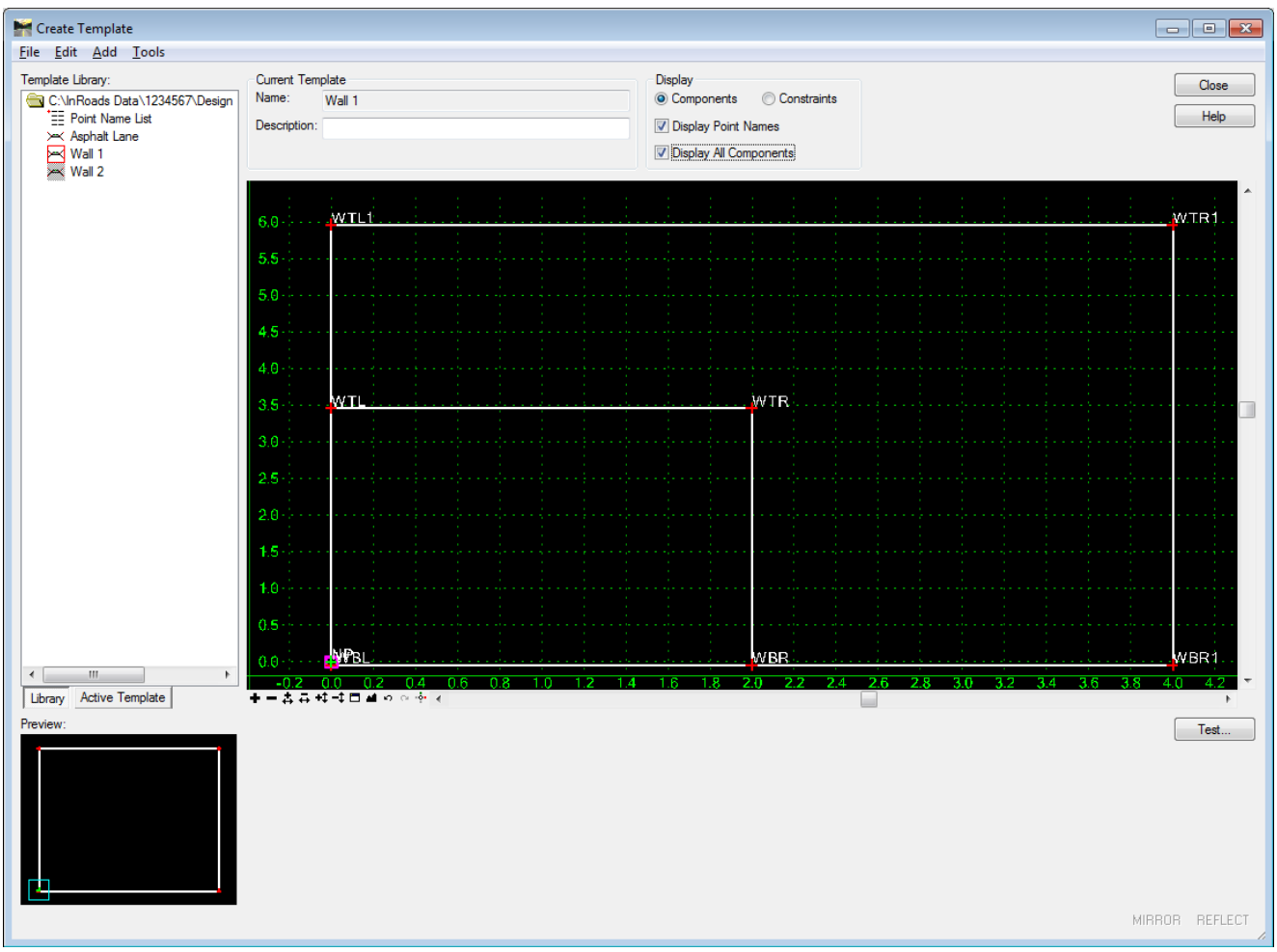


Figure L7-54 Create Template Window

71.	**For Information Only:** At this point we have created **Wall 1** and **Wall 2** and placed them together in **Wall 1**. Currently they are both displaying all the time. Now it is time to add **Display Rules** to each Component that will limit them to viewing only under certain conditions. **Wall 1** is intended to be viewed when the Vertical distance between **NP** and **WBR** is less than **3.5'** and **Wall 2** is intended to be viewed when the Vertical distance between **NP** and **WBR** is greater than or equal to **3.5'**. Remember **WBR** is constrained to move to the existing surface.
72.	**Ensure Wall 1 is the Active Component.** • Ensure **Wall 1** is still the Active Component by double clicking on it and ensuring a Red Square exists next to it.
73.	**Open the <u>Component Properties</u> dialog.** • Double click on the Component **Wall 1** (The Smaller Wall). The **<u>Component Properties</u>** dialog opens.
74.	**Open the <u>Component Display Conditional Expression</u> Dialog.** • Click the **Edit…** button in the **<u>Component Properties</u>** dialog. The **<u>Component Display Conditional Expression</u>** dialog then opens as shown in *Figure L7-55*.

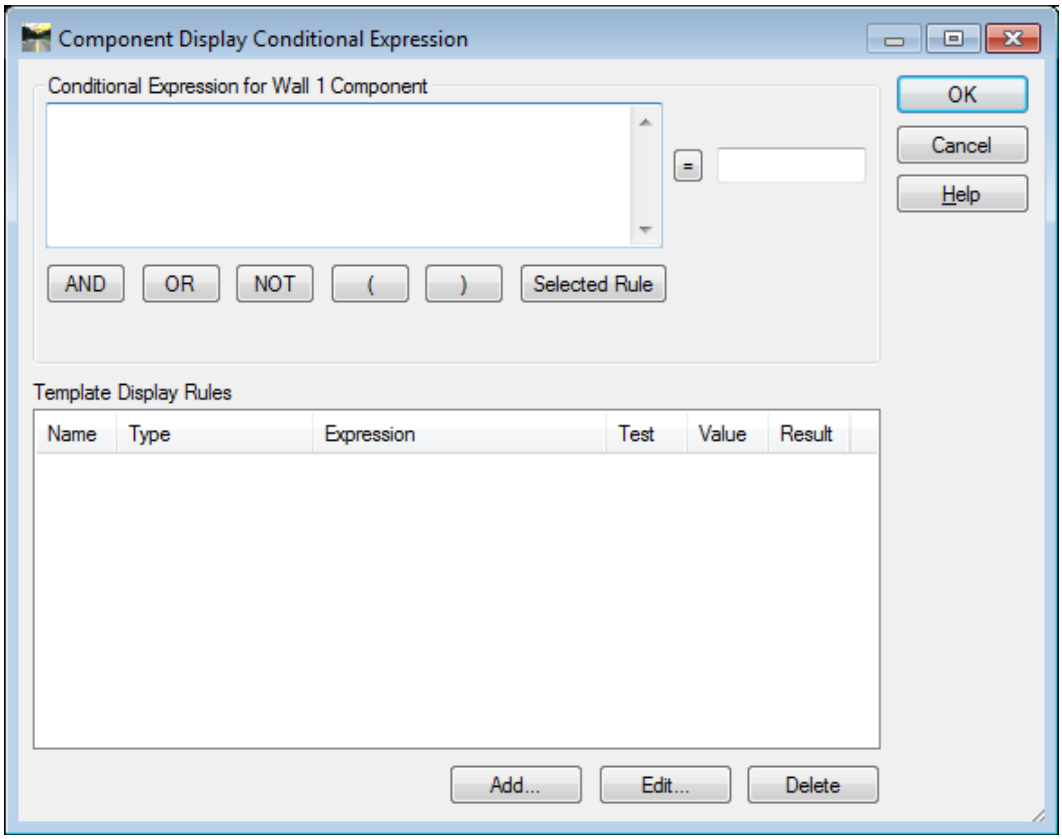


Figure L7-55 Component Display Conditional Expression Dialog

75.	**Open the <u>Display Rule</u> Dialog.** • Click on the **Add…** button. The **<u>Display Rule</u>** dialog opens as shown in *Figure L7-56*.

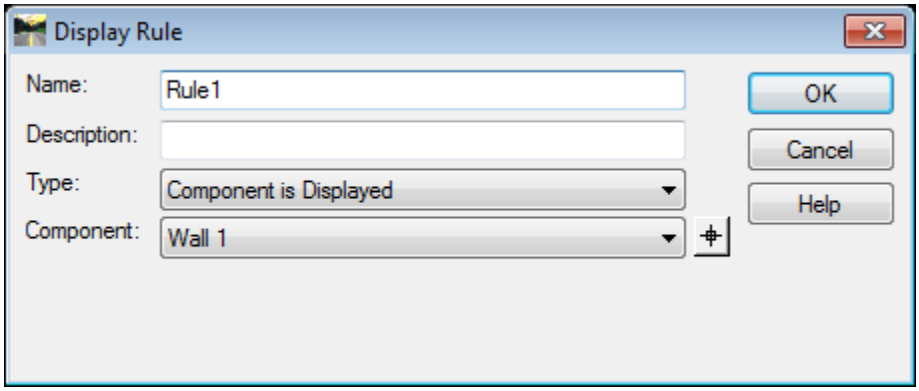


Figure L7-56 Display Rule Dialog

76.	**Create a New Rule called Wall1. This Rule, when applied, will tell the Component Wall 1 to turn off when the Vertical distance between points NP and WBR reach or exceed 3.5'** • Enter the following information: o **Name:** ***Wall1*** o **Description:** ***NP < 3.5'*** o **Type:** ***Absolute Vertical*** o **Between:** ***NP*** o **And:** ***WBR*** o < **3.500** • Verify your entries match those shown in *Figure L7-57*. • Click **OK**. You are returned to the **<u>Component Display Conditional Expression</u>** dialog as shown in *Figure L7-58* with the new Display Rule **Wall1** showing in the **Template Display Rules** field which makes it available to select as a rule to apply to a Component.

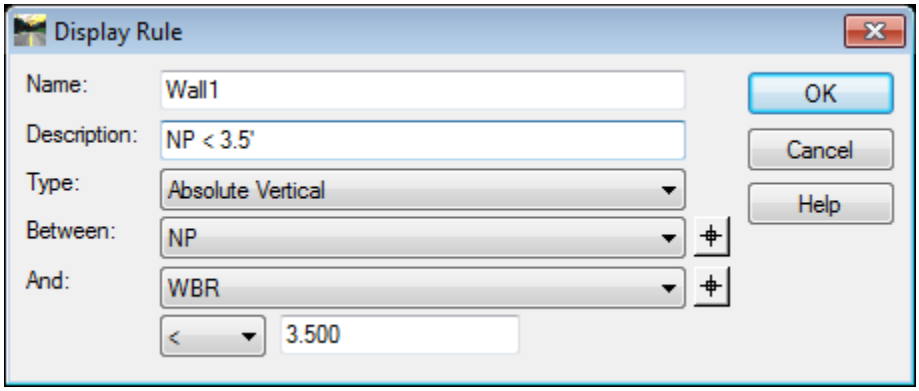


Figure L7-57 Display Rule Dialog

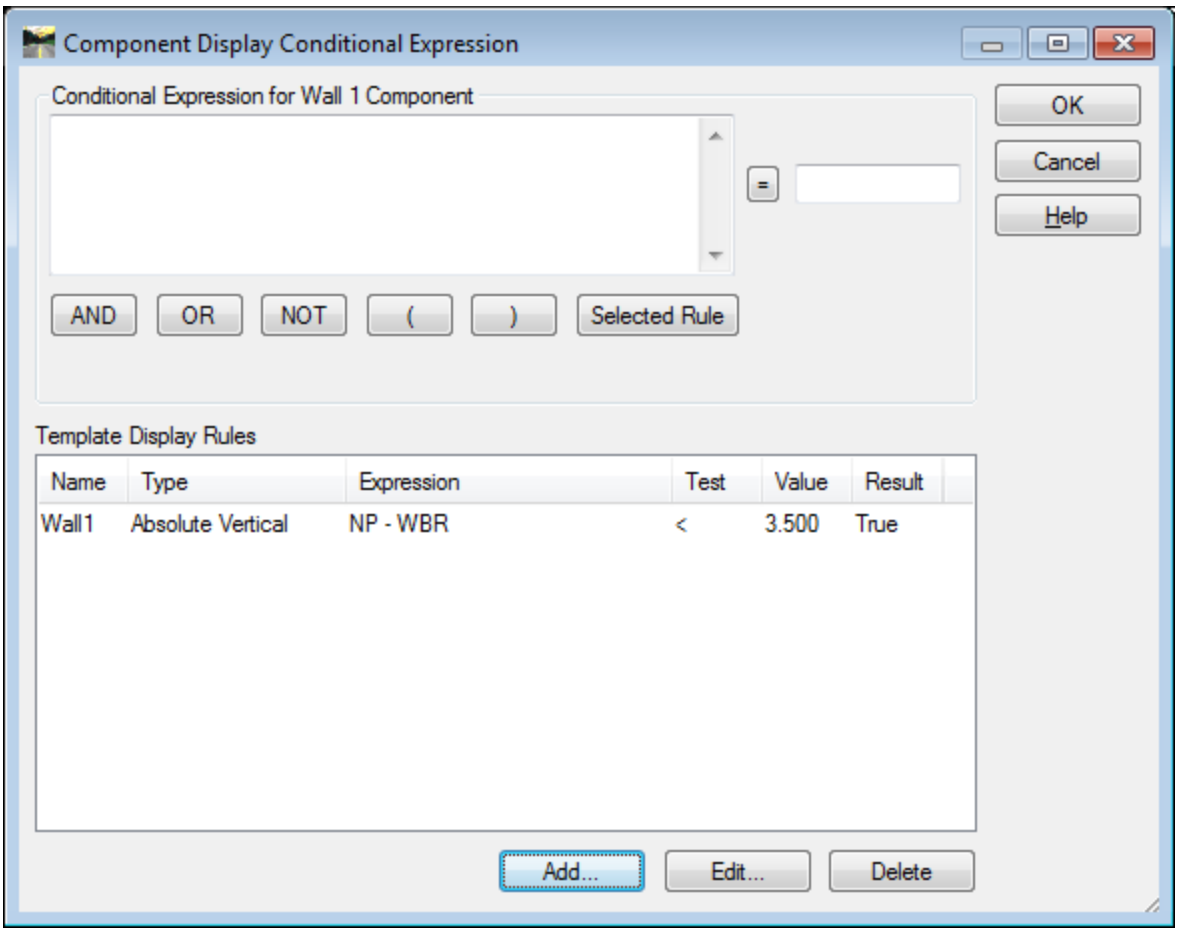


Figure L7-58 Component Display Conditional Expression Dialog

77.	**Apply the New Rule** • Left click on rule **Wall1** (in the **Template Display Rules** field) to highlight it in **Blue**. • Click the **Selected Rule** button. This places rule **Wall1** in the **Conditional Expression...** field which allows the rule to be applied to the Component. **<u>*NOTE</u>**: *The 'AND', 'OR', and 'NOT' buttons allow you to apply multiple Display Rules to a single component allowing the user to apply much more detailed display control to a component.* • Click the = button. The result of **True** tells you the current condition of the rule as it is displayed on the **<u>Create Template</u>** window. • Click **OK**. • Click **Apply** and **Close**.

78.	**Test the Component** • Click the **Test** button. ***NOTE:** *The Test button is for the sole purpose of testing 'End Condition' components which we have not covered yet. Since we have a 'Project to Surface' constraint defined in this component we can get an idea of how the component will behave by using the Test button even though it is not intended to be used for this purpose.* • Click the **Draw** button and move the cursor up and down to see how the component behaves. The smaller component should appear and disappear when the distance between **NP** and **WBR** is greater than or equal to **3.5'** as we told it to do in the Display Rule. ***HINT**: Use the mouse wheel to zoom in and out further if necessary. • **Close** the **Test End Conditions** window.
79.	**Open the 'Component Properties' Dialog.** • Double click on the Component **Wall 2** (The Larger Wall). The **Component Properties** dialog opens.
80.	**Open the 'Component Display Conditional Expression' Dialog.** • Click the **Edit** button in the **Component Properties** dialog. The **Component Display Conditional Expression** dialog opens. • Notice the Display Rule '**Wall1',** created earlier, is available for use.
81.	**Rather than create a new Display Rule to control the display of Wall 2 we can use the Display Rule, Wall1, to control the display of Wall 2.** • Click the **NOT** button. This places the expression ***NOT*** in the **Conditional Expression…** for **Wall 2** Component field. • Highlight the Display Rule **Wall1**. • Click the **Selected Rule** button. This places the rule **Wall1** in the **Conditional Expression…** for **Wall 2** Component field behind the expression **NOT**. • Verify your dialog matches that shown in *Figure L7-59*. • Click **OK**. • In the **Component Properties** dialog click **Apply** & **Close**. • Notice the Component **Wall 2** disappeared from View. This is because in its current location the **Display Rule** turns its display off.

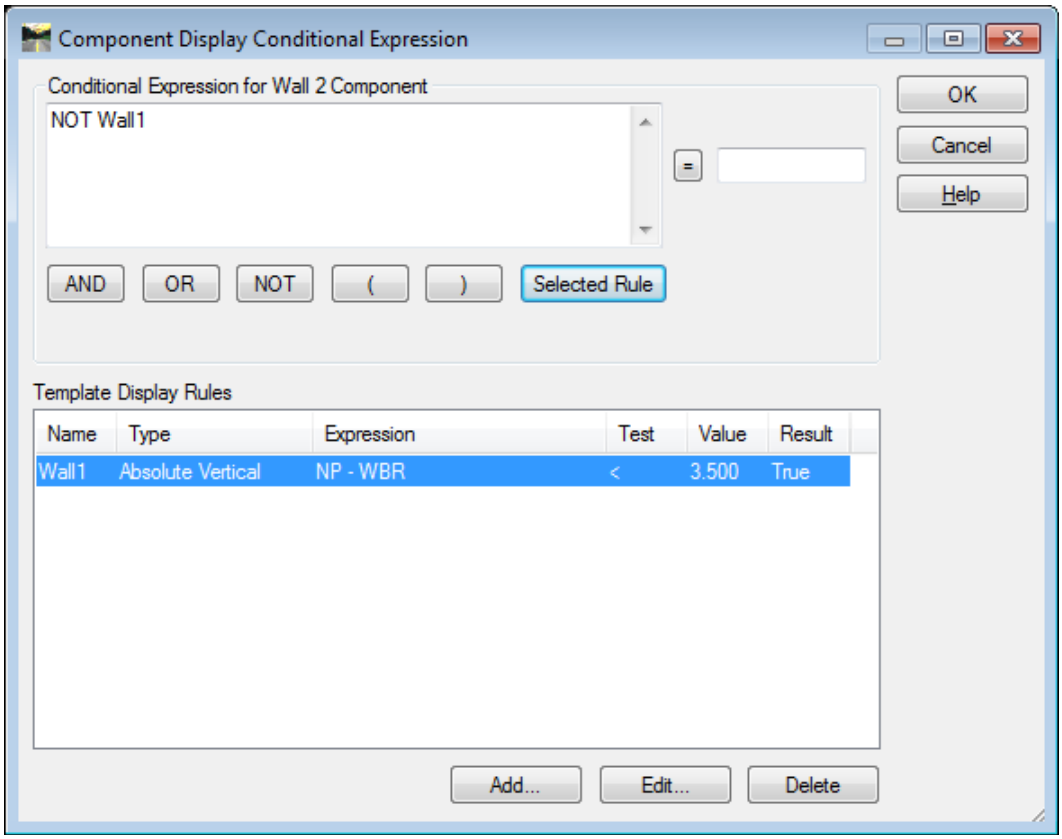


Figure L7-59 Component Display Conditional Expression

82.	**Test the Component** • Click the **Test** button. • Click the **Draw** button and move the cursor up and down to see how the component behaves. The smaller component should appear and disappear when the distance between **NP** and **WBR** is greater than or equal to **3.5'** as we told it to do in the Display Rule. The larger component should also appear and disappear except only when the distance between **NP** and **WBR** is not less **3.5'**. ***<u>HINT</u>**: Use the mouse wheel to zoom in and out further if necessary. • **Close** the **<u>Test End Conditions</u>** window.
83.	**Save Your Work.** • In the **<u>Create Template</u>** Window, click **File ► Save.**
84.	**Close the Create Template Window.** • In the **<u>Create Template</u>** Window, select **File ► Close**.

Lab 7E End Conditions

In Lab 7C you learned about components and constraints. One Component that was not discussed was the End Condition. End Conditions are special components that target a surface and are typically used to create Cut/Fill slopes.

In Lab 7E we will build an End Condition component that places a 4:1 Fill slope for 10' vertical, a 2:1 Fill slope over 10' vertical that widens 5.5' for guardrail and a cut slope with a 4' Flat bottom ditch with a 12'- 4:1 front slope and a 2:1 back slope as shown in *Figure L7-60*.

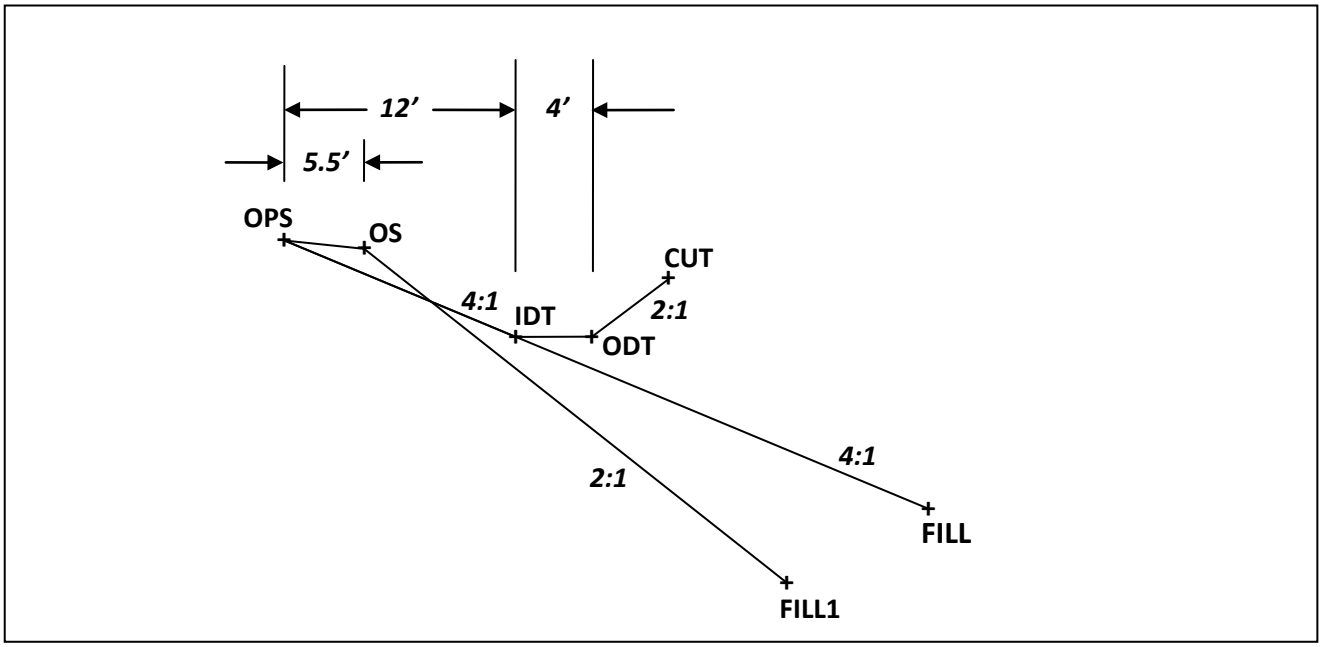


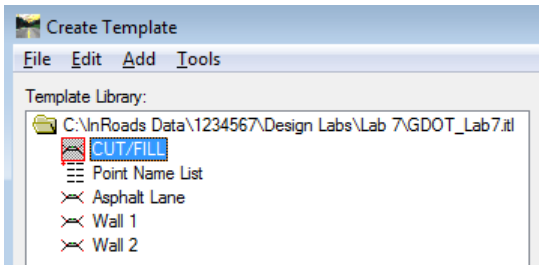
Figure L7-60 End Condition

85. **If not open from Lab 7D, Open the <u>Create Template</u> Window and the GDOT_Lab7.itl Template Library. (***This step may be ignored if the Template Library is already open***).**

- In InRoads, select **Modeler ► Create Template**. The **<u>Create Template</u>** Window opens.
- In the **<u>Create Template</u>** Window, select **File ► Open**.
- Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 7**
- Highlight ***GDOT_Lab7.itl*** and click **Open**.

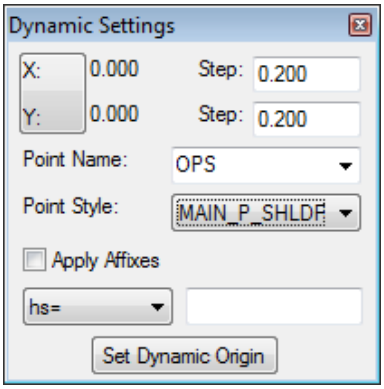
86. **Create a New Template and call it CUT/FILL**

- In the **<u>Create Template</u>** Window, select **File ► New ► Template**.
- Right click and rename the Template **CUT/FILL** as shown here.



87. **Open the <u>Dynamic Settings</u> dialog and set the X and Y Step: Values to .200 and .200, the Point Name to OPS, and the Point Style to MAIN_P_SHLDR.**

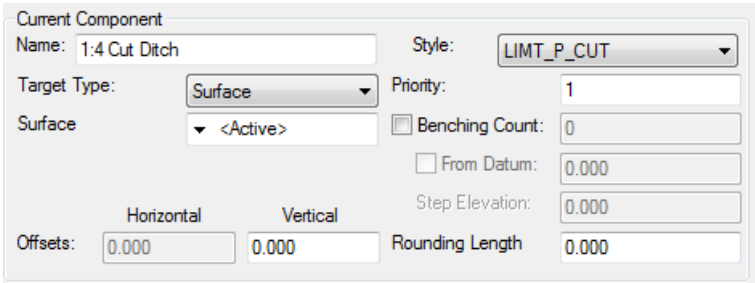
- In the **<u>Create Template</u>** Window, select **Tools ► Dynamic Settings**.
- Enter the following information:
  - **X Step:** ***0.200***
  - **Y Step:** ***0.200***
  - **Point Name:** ***OPS*** (Outside Paved Shoulder)
  - **Point Style:** ***MAIN_P_SHLDR***
- Verify your entries match those shown here.



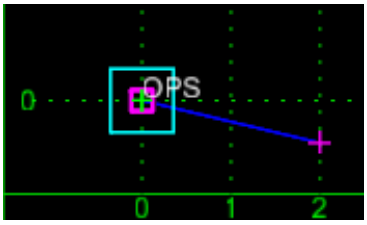
- Continue to the next Step.

88. **Add the 1:4 Cut Ditch End Condition Component to CUT/FILL.**

- In the **Create Template** Window, select **Add ► End Condition**.
- In the **Current Component** field enter the following information:
  - **Name:** ***1:4 Cut Ditch***
  - **Style:** ***LIMT_P_CUT***
- Verify your entries match those shown here:



- Left Click once on the coordinates **0,0** in the **Create Template** grid.
- Notice point **OPS** was placed at **0,0** and a blue dynamic line extends from it as shown here.



- Notice the **Dynamic Settings** dialog changes to that shown in *Figure L7-61*.

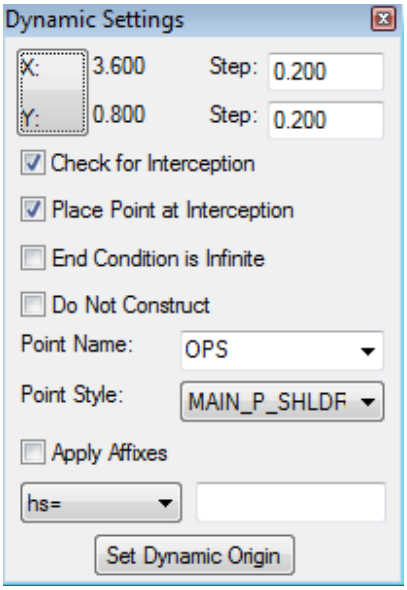


Figure L7-61 Dynamic Settings Dialog

89.	**Create the Front Slope Point of the 1:4 Cut Ditch Component.** • In the **<u>Dynamic Settings</u>** dialog, uncheck the **Check for Interception** box. • Enter a **Point Name:** of ***IDT*** (Inside Ditch Bottom). • Enter a **Point Style:** of ***DRNG_P_Ditch***. • In the Precision Input Field key-in ***hs=12,-1:4***. • Ensure your entries match those shown in *Figure L7-62*. • With the cursor still in the Precision Input Field, press the **Enter** key on your keyboard. • **Fit** the view. • Ensure the front slope and the point **IDT** were drawn as shown in *Figure L7-63.* A dynamic line should be extending from **IDT**.

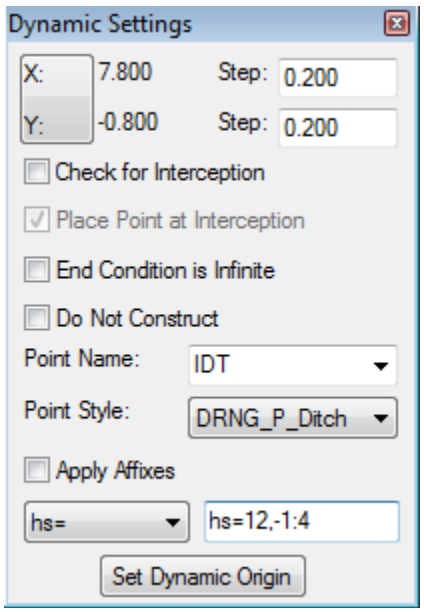


Figure L7-62 Dynamic Settings

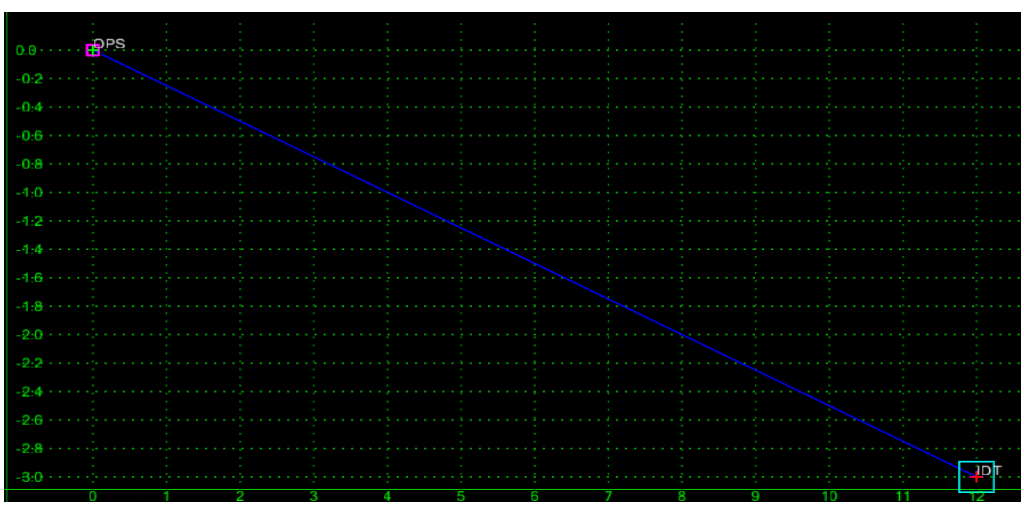


Figure L7-63 Create Template Grid

90.	**Create the Ditch Bottom for the 1:4 Cut Ditch Component.** • Match the entries shown in *Figure L7-64*. • With the cursor still in the Precision Input Field, press the **Enter** key on your keyboard. • **Fit** the view. • Ensure the ditch bottom and the Point **ODT** (Outside Ditch Bottom) was drawn as shown in *Figure L7-65*. A dynamic line should be extending from **ODT**.

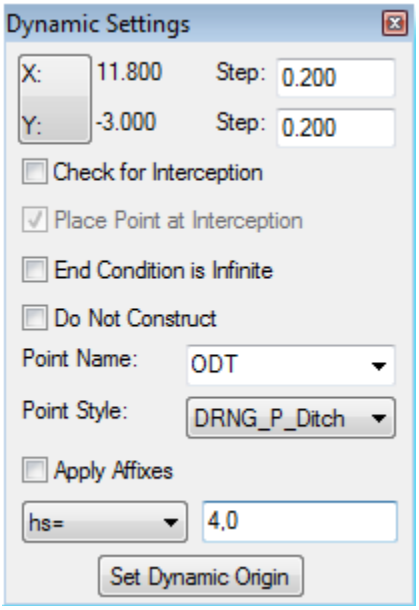


Figure L7-64 Dynamic Settings

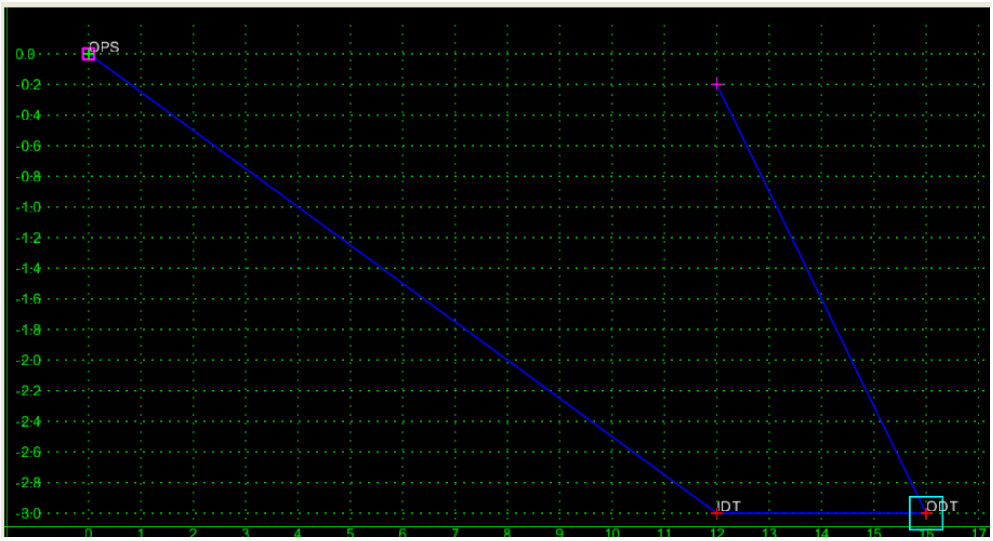


Figure L7-65 Create Template Grid

91.	**Create the Back Slope for the 1:4 Cut Ditch Component.** • Match the entries shown in *Figure L7-66*. • With the cursor still in the Precision Input Field, press the **Enter** key on your keyboard. • **Fit** the view. • Ensure the ditch bottom and the Point **CUT** were drawn as shown in *Figure L7-65*. A dynamic line should be extending from **CUT**. • In the **Create Template** grid, Right mouse click and select ***Finish***. The dynamic line should have disappeared completing the component.

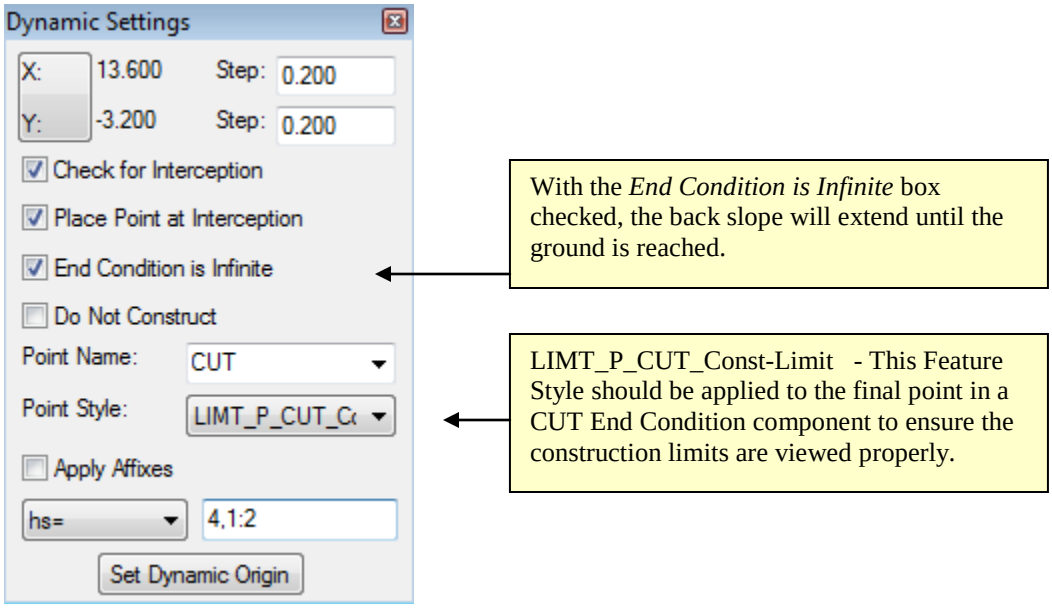


Figure L7-66 Dynamic Settings

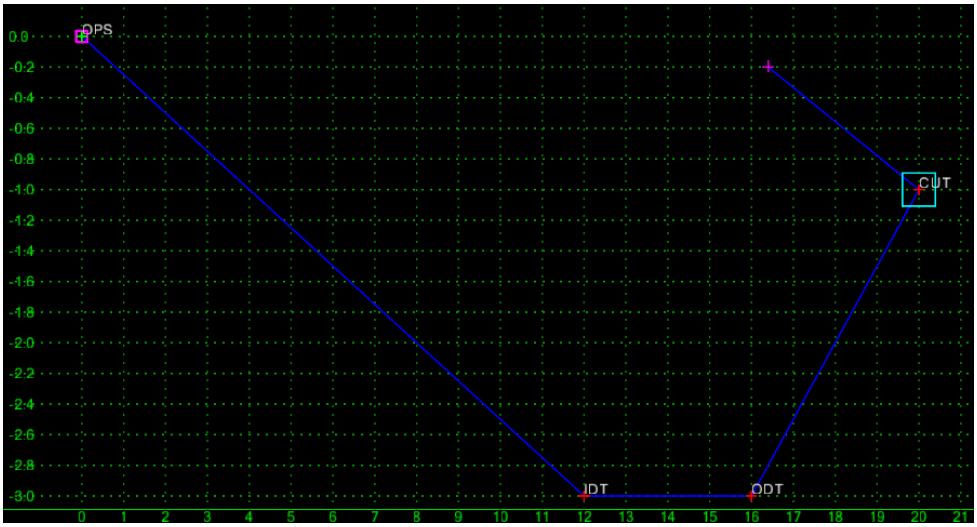
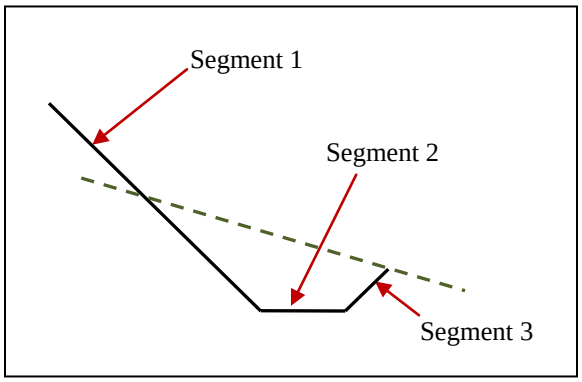


Figure L7-67 Create Template Grid

92. **For Information Only: Dynamic Settings Information**

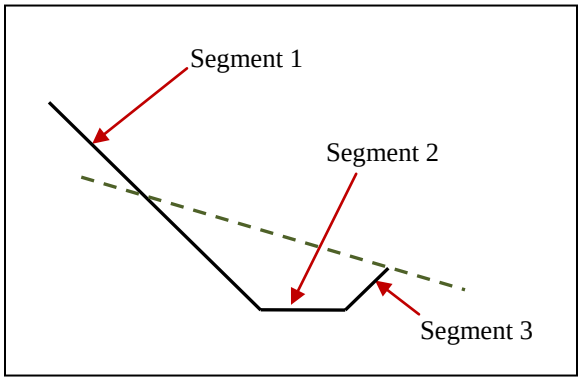
When placing End Condition components, four new check boxes appear in the **Dynamic Settings** dialog as shown in *Figure L7-66* above. Their function is described here:

- **Check for Interception**: To intercept a target such as a surface, the Point's **Check for Interception** property must be set. Sometimes segments such as Ditch Foreslopes are not meant to intercept a target. They are meant to be placed only if a later segment finds the target. These segments **Check for Interception** property should be unchecked.



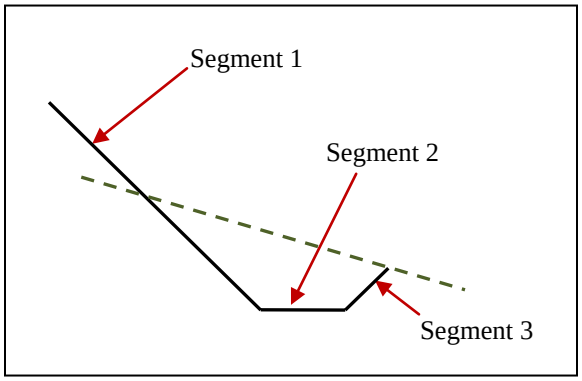
In this example, *Check for Interception* for Segment 1 and Segment 2 should be unchecked and Segment 3 should be checked. This will result in Segment 3 searching for the ground. If Segment 3 does not find the ground the solution fails and the whole end condition will not be drawn.

- **Place Point at Interception:** In order to place a point at the target, the **Place Point at Intersection** property must be set. Sometimes a point needs to be placed at the end of a segment even if the target is intercepted prior to the end of the segment. An example is a minimum depth ditch foreslope 5' deep. In this case, clearing the **Place Point at Interception** property will place the 5 foot ditch foreslope even if the surface is found at three feet.



In this example, *Place Point at Interception* for Segment 1 and Segment 2 should be unchecked. This will result in the full length of the segments being drawn and not being intercepted at the ground. Segment 3 should be checked. This will result in Segment 3 stopping at the ground.

- **End Condition is Infinite:** Very often the constraints of an End Condition Point are defined as Slope and Horizontal. The Horizontal Constraint value represents the maximum width within which to check for the target. For example a 1:6 slope may be appropriate for a maximum width of 18 feet. This would be represented in InRoads as a segment with a 1:6 slope constraint and Horizontal Constraint of 18 feet when the **End Condition is Infinite** check box is unchecked. If the **End Condition is Infinite** check box is checked the segment seeks the surface without limit. This check box is generally checked on the final cut or fill alternative.

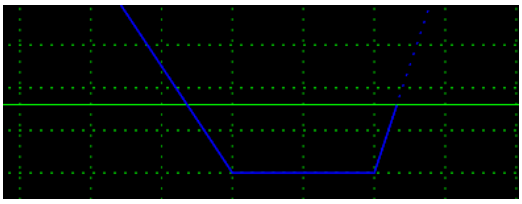


In this example, *End Condition is Infinite* for Segment 1 and Segment 2 should be unchecked. This will result in the constrained length of the segments being drawn and not being extended to intercept the ground. Segment 3 should be checked. This will result in Segment 3 being extended or trimmed at the ground regardless of the length defined in the segment.

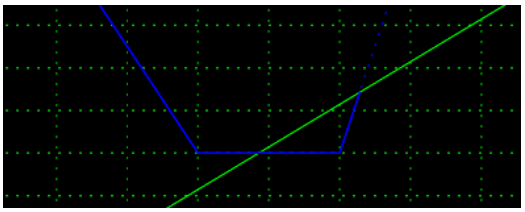
- **Do Not Construct:** The **Do Not Construct** check box specifies the point will be solved like all other points in the End Condition, but the point will be skipped when drawing the component segments. This is useful in many situations, including variable slope solutions. A point with this property checked is like any other point in the template but the surface segments are not drawn to it and no surface feature is created for that point. This allows the ability to provide Variable Slope solutions, such as Clear Zone and Right of Way tie-ins.

93. **Test the Component.**

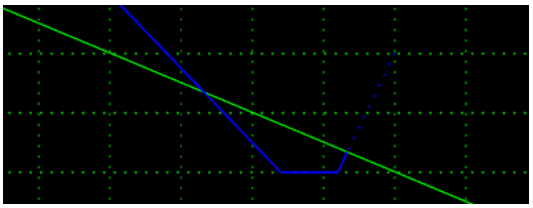
- Click the **Test** button.
- Test the End Condition with a **0%** slope.
- Notice the whole ditch draws and the back slope terminates at the existing ground, as shown below, which is what we want. This is a result of the combination of **Dynamic Settings** (**Check for Interception, Place Point at Interception and End Condition is Infinite**) boxes we checked.

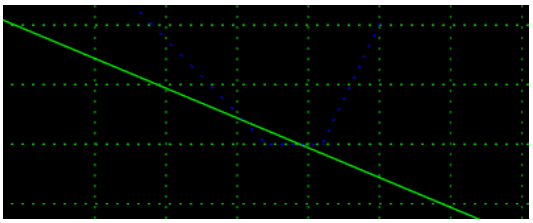


- Test the End Condition with a **10%** slope.
- Notice the whole ditch again draws and the back slope terminates at the existing ground as shown below.

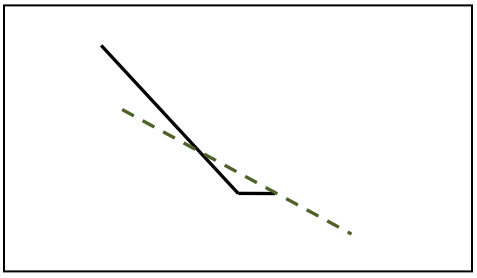


- Test the End Condition with a **-10%** slope.
- Notice the two conditions shown here: The top condition provides a solution and the bottom condition fails to find a solution.





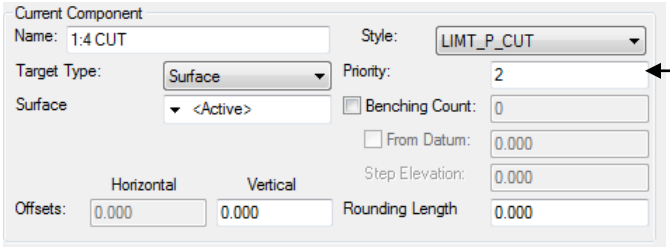
- The desired solution to the failed condition is shown here.



- **Close** the **<u>Test End Conditions</u>** window.
- As demonstrated during testing– No combination of End Condition **Dynamic Settings** can provide a solution for all possible combinations of existing ground situations. The solution is to build additional End Condition components into the first placed end condition component. Priorities are then set that provide appropriate solutions as will be shown in the next steps.

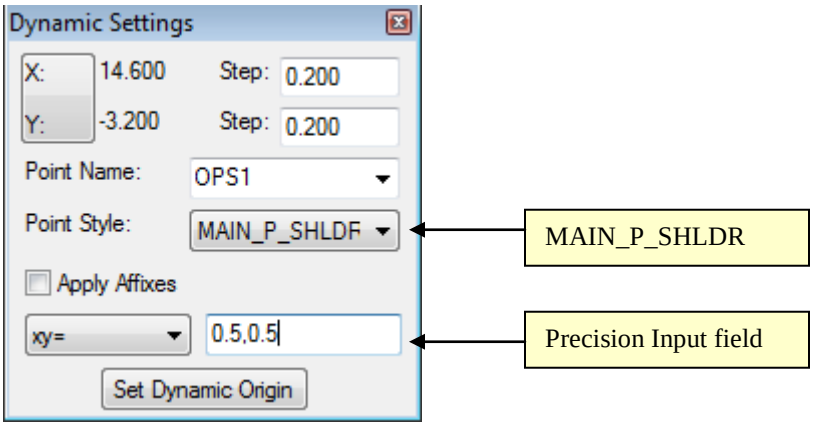
94. **Add a 1:4 Cut End Condition Component to CUT/FILL that will solve when the 1:4 Cut Ditch Component Does not.**

- In the **Create Template** Window, select **Add ► End Condition**.
- Enter the following information in the **Current Component** field.



***NOTE**: Priorities define the order in which the End Condition components are tested. If the component defined as Priority 1 finds a solution, all other priorities are ignored. So it is important to consider the Priority you assign to ensure the proper solution is used.

- Enter the following information in the **Dynamic Settings** dialog.



- With the cursor in the Precision Input Field, press the **Enter** key on your keyboard.
- **Fit** the view.
- Verify Point **OPS1** was placed at the coordinate **0.5,0.5** and that a blue line extends dynamically from it as shown in *Figure L7-68*.

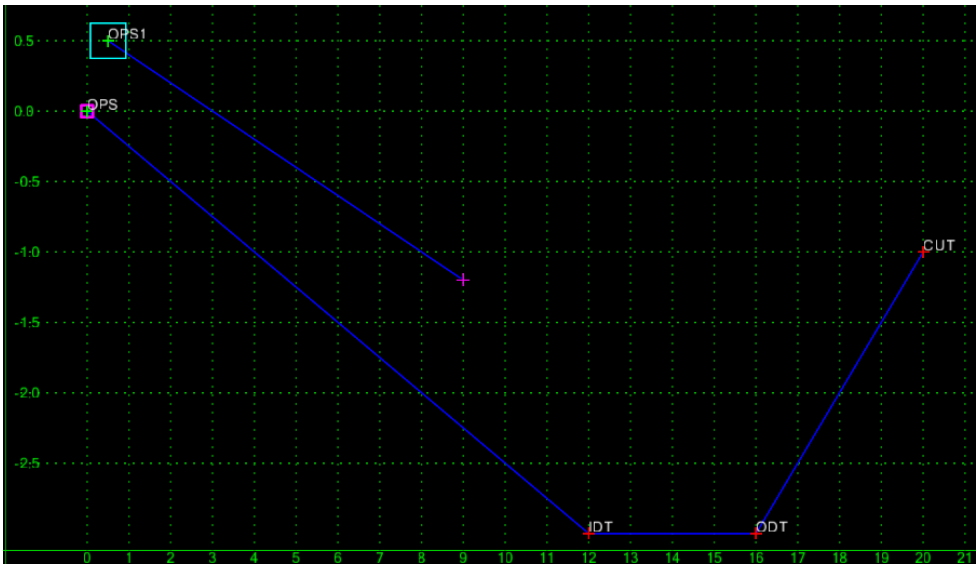
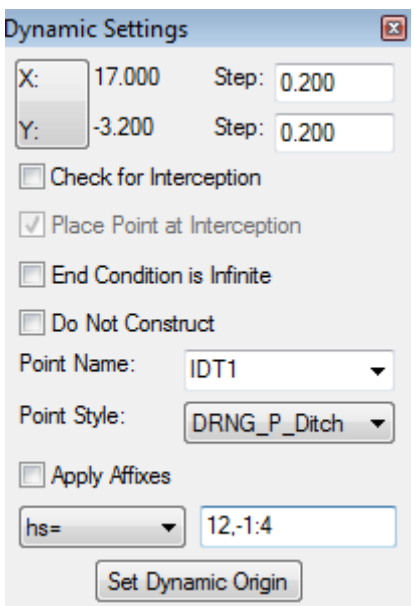


Figure L7-68 Create Template Grid

95.	**Create the Front Slope of the 1:4 CUT Section.** • Match the entries shown in the **<u>Dynamic Settings</u>** dialog.  • With your cursor in the Precision Input Field, press the **Enter** key on your keyboard. • Verify Point **IDT1** was drawn and your view matches that shown in *Figure L7-69* with a blue line extending dynamically from it.

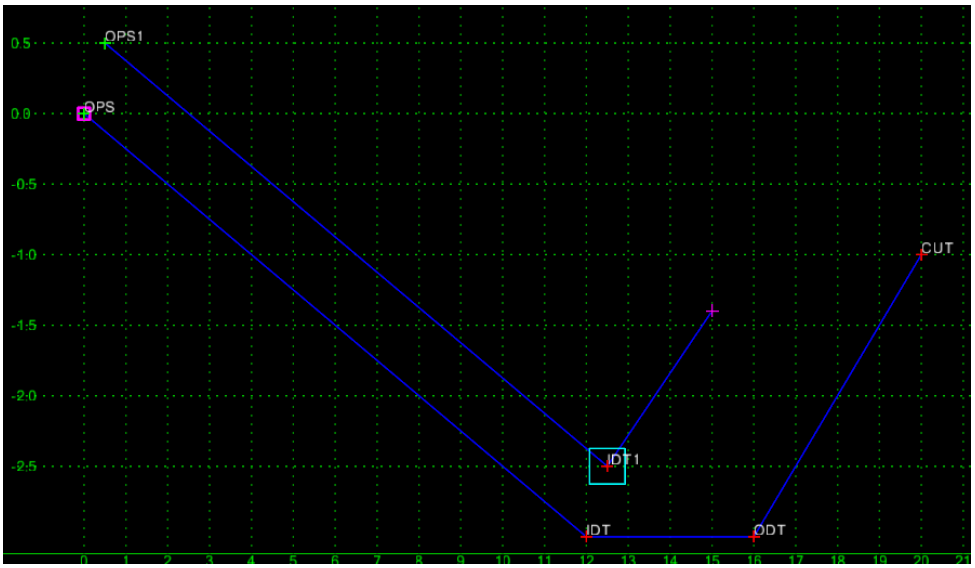
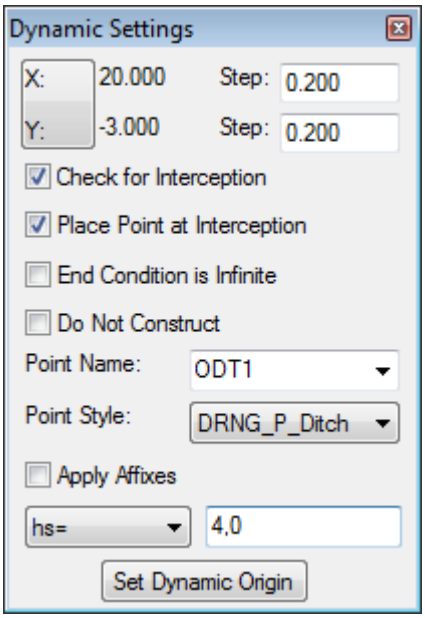


Figure L7-69 Create Template Grid

96.	**Create the Ditch Bottom of the 1:4 CUT Section.** • Match the entries shown in the **<u>Dynamic Settings</u>** dialog.  • With your cursor in the Precision Input Field, press the **Enter** key on your keyboard. • Right mouse click over the grid and select ***Finish***. • Verify Point **ODT1** was drawn and your view matches that shown in *Figure L7-70*.

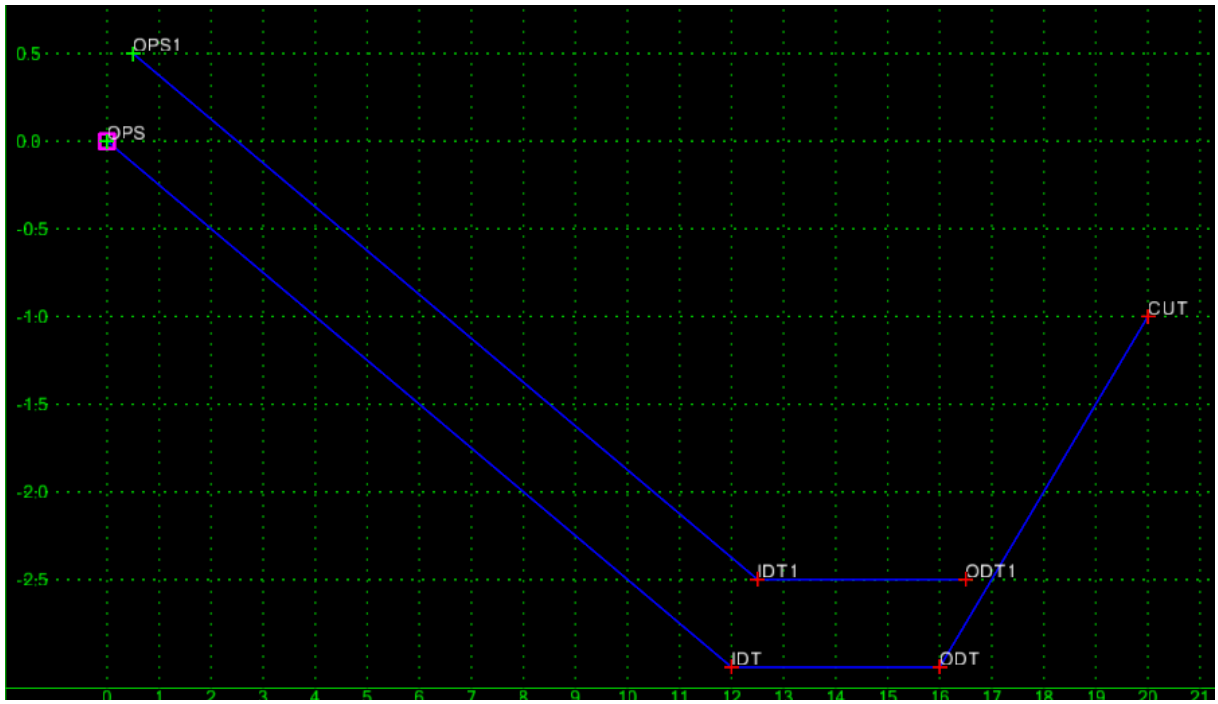


Figure L7-70 Create Template Grid

97.	**For Information Only.** Notice in *Figure L7-70* that we created the **1:4 CUT** component slightly offset from the **1:4 Cut Ditch** component. The reason for this is because if we had created it directly on top of the **1:4 Cut Ditch** component the points would have merged with the already existing points and not behaved as an independent component as we want. Now we can move the **1:4 CUT** component directly onto the **1:4 Cut Ditch** component and the points will not automatically merge.
98.	**Move the 1:4 CUT component on top of the 1:4 Cut Ditch component.** • Right mouse click over Point **OPS1** and select ***Move Point***. ***NOTE**: You may have noticed during the process of creating points that points are identified with Green, Yellow or Red plus signs. A green plus sign (+) means the point is unconstrained. A yellow plus sign (+) means the point has one constraint and the red plus sign (+) means that a point has two constraints. • Place **OPS1** directly on top of **OPS**.

99. **Merge Points OPS1 and OPS.**

- Right mouse click over **OPS1** and **OPS** and select ***Merge Points***.
- In the **Delete Point** selection box, select **OPS1**. This deletes Point **OPS1** and merges it with **OPS**.

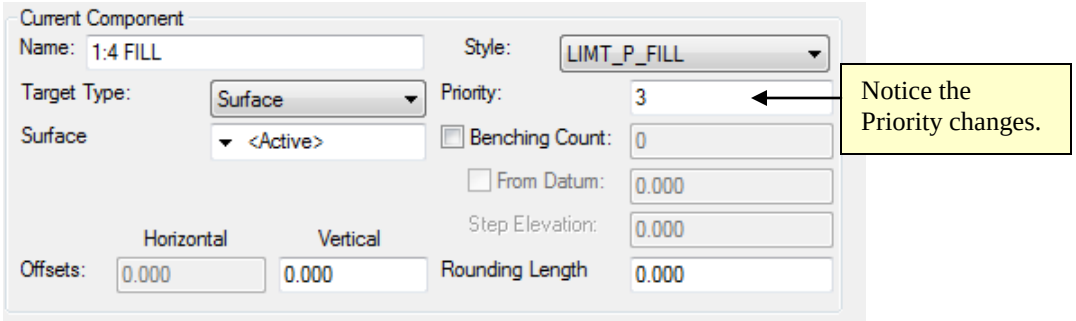
***NOTE:** Earlier we stated we did not want to merge the points. We didn't want to merge **IDT1** with **IDT** nor **ODT1** with **ODT** but we do want to merge **OPS1** with **OPS**. The reason for this is End Conditions must have a common starting point to work properly.

100. **Test the End Condition.**

- Click the **Test** button.
- Test the component with **0%**, **10%** and **-10%** slopes. The cut section should now solve correctly for all cut situations described in **Step 93**.
- **Close** the **Test End Conditions** dialog.
- In the **Create Template** Window, select **File ► Save** to save your work.

101. **Add a 1:4 Fill End Condition Component to CUT/FILL.**

- In the **Create Template** Window, select **Add ► End Condition**.
- Match the entries shown here in the **Current Component** field.



- Left click on **OPS**.
- Ensure the component begins at **OPS** and that a yellow dynamic line extends from **OPS** as shown in *Figure L7-71*.

NOTE**: *The color of the line and the line style is determined by the Style. In this case LIMT_P_FILL. The style also determines what level the information will be placed on when it is viewed in MicroStation so it is important to properly assign styles to all of your components and points. A list of available styles is available in the* ***Design Guidelines*.*

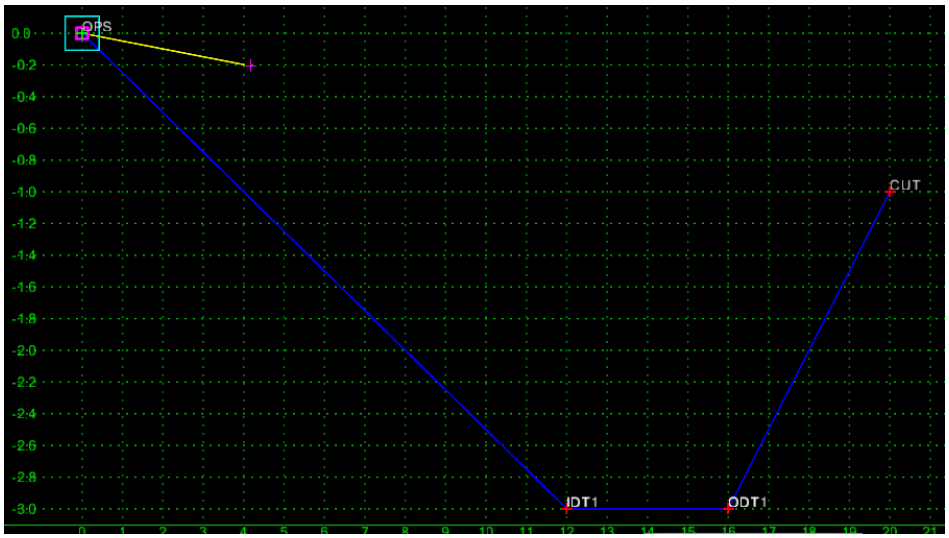
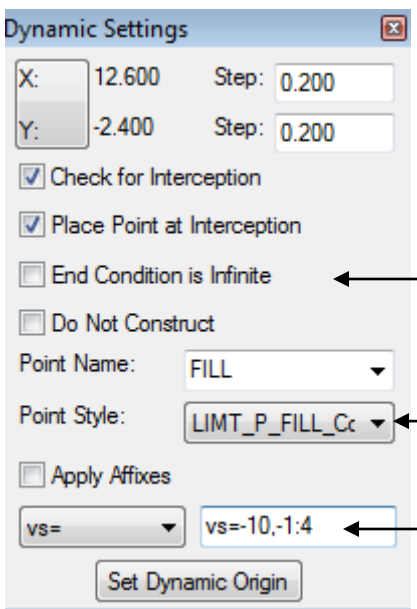


Figure L7-71 Create Template Grid

102. **Create a 10' High Fill Slope for the 1:4 Fill Component.**

- **Match** the entries shown here in the **Dynamic Settings** dialog.



Unchecking *End Condition is Infinite* defines the slope to build only to the constraints we define. In this case, -10 feet vertically and at a -1:4 slope. Beyond that the component does not find a solution and the next priority is tested.

LIMT_P_FILL_Const-Limit - This Feature Style should be applied to the final point in a FILL End Condition component to ensure the construction limits are viewed properly.

vs= -10,-1:4. This constrains the slope vertically -10ft. and at a -1:4 slope.

- With the cursor in the Precision Input Field, press the **Enter** key on the keyboard.
- Right mouse click and select ***Finish***.
- **Fit** the view.
- Ensure the fill slope and the **FILL** point were drawn as shown in *Figure L7-72*.
- Double click on the **FILL** point.
- Notice it is constrained vertically **-10 ft** and at a **-1:4 (-25%)** slope from **OPS**.
- Close the **Point Properties** dialog.

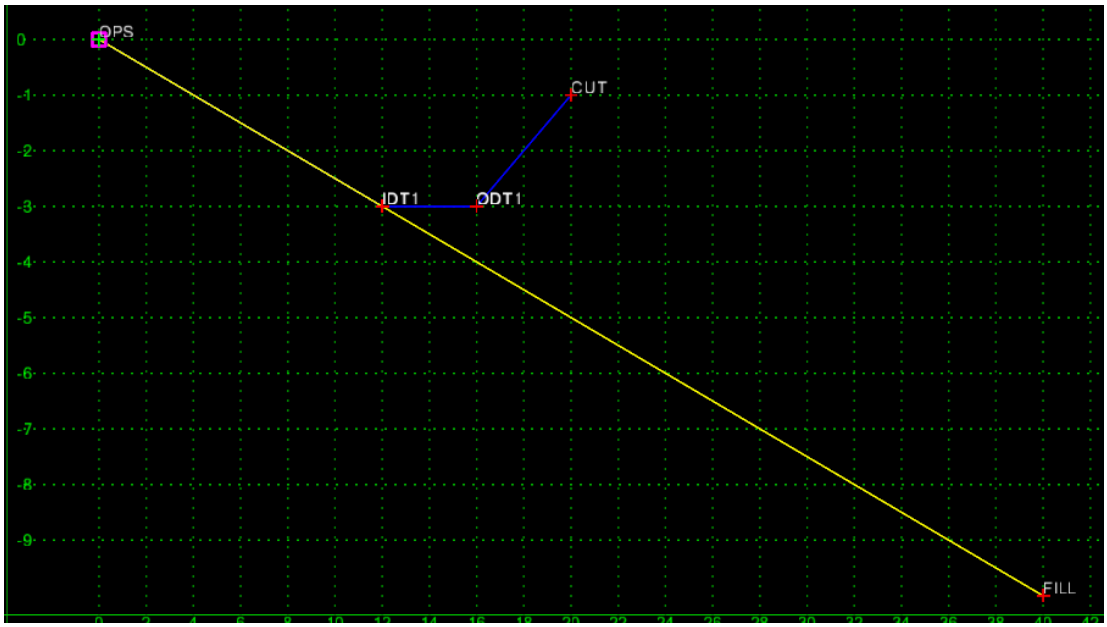
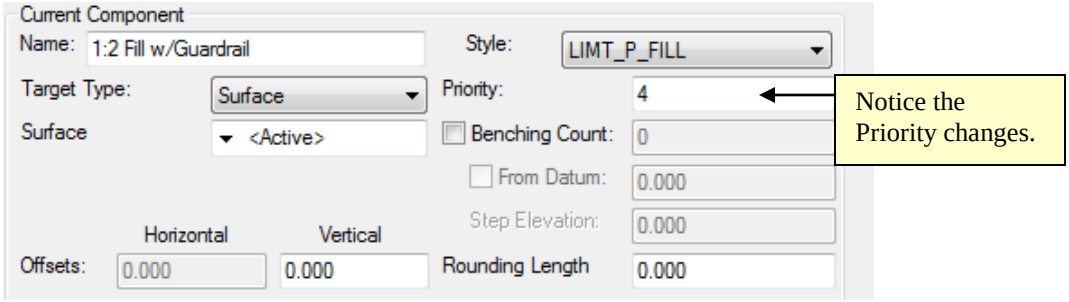
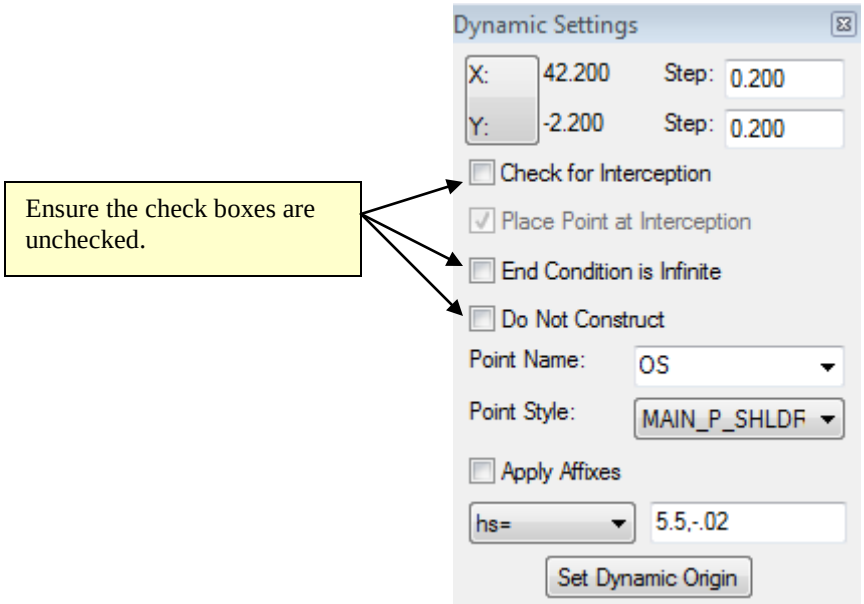


Figure L7-72 Create Template Grid

103.	**Test the End Condition.** • Click the **Test** button. • Test the component with **0%**, **10%** and **-10%** slopes. • Verify the Fill slope displays when the Cut sections fail to find a solution. • **Close** the **<u>Test End Conditions</u>** dialog.
104.	**Add a 1:2 Fill End Condition Component to CUT/FILL.** • In the **<u>Create Template</u>** Window, select **Add ► End Condition**. • Match the entries shown here in the **Current Component** field.  • Left click on **OPS**. • Ensure the component begins at **OPS** and that a yellow dynamic line extends from it.

105. **Add the Guardrail widening portion.**

- Match the entries shown here in the **Dynamic Settings** dialog.



- With the cursor in the Precision Input Field, press the **Enter** key on your keyboard.
- Verify that a **5.5'** shoulder was drawn at **2.0%** from **OPS** as shown in *Figure L7-73*.

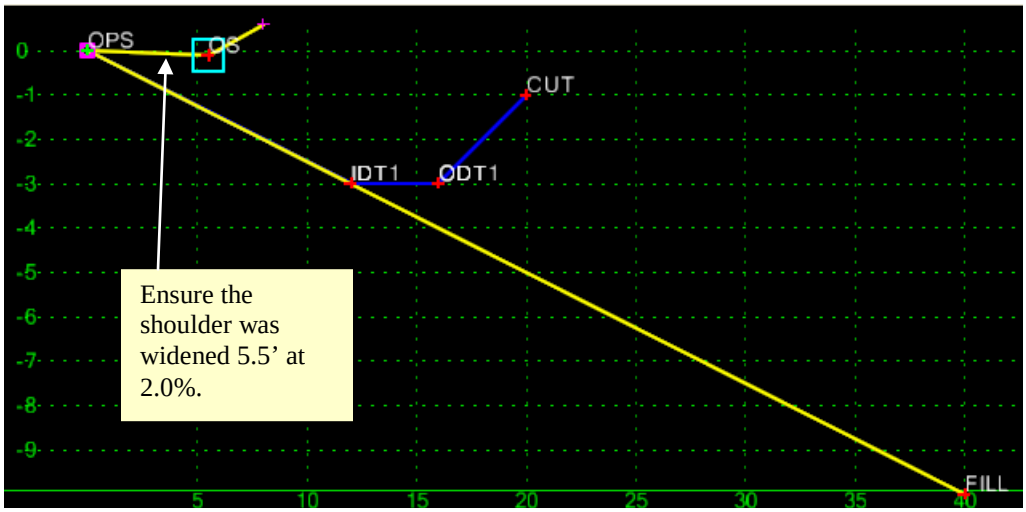
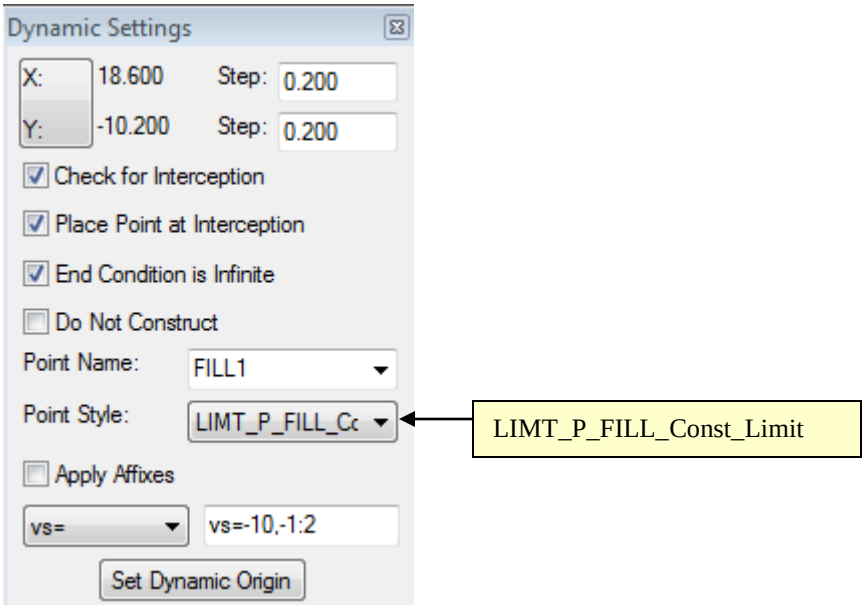


Figure L7-73 Create Template Grid

106. **Add a 1:2 Fill Slope on the back of the Guardrail Widening Portion.**

- Match the entries shown here in the **Dynamic Settings** dialog.



- With your cursor in the Precision Input Field, press the **Enter** key on your keyboard.
- Right mouse click in the grid area and select ***Finish***.
- Verify your Component matches that shown in *Figure L7-74*.

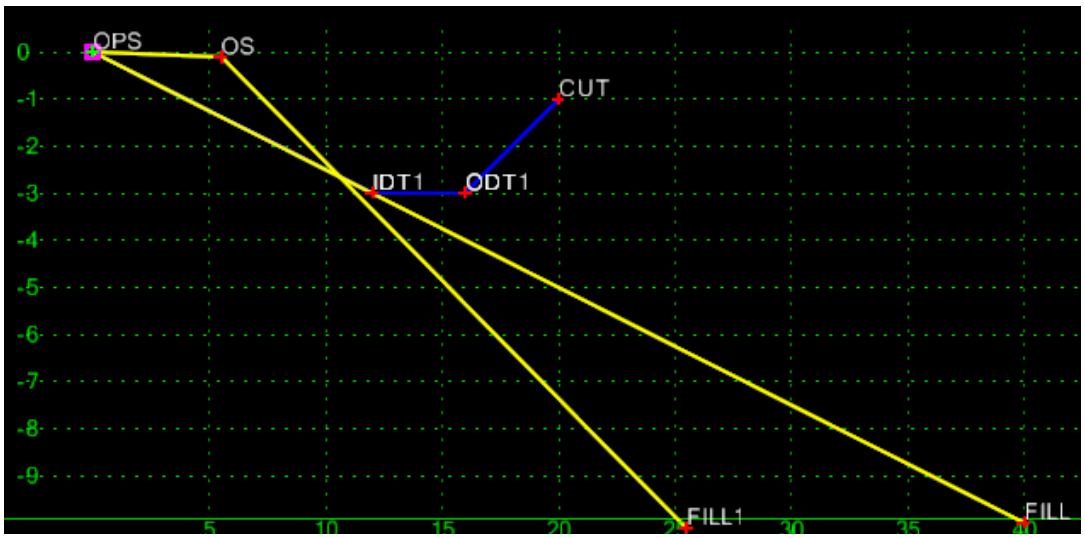


Figure L7-74 Create Template Grid

107.	**Test the End Condition.** • Click the **Test** button. • Test the component with **0%**, **10%** and **-10%** slopes. • **Close** the **<u>Test End Conditions</u>** dialog.
108.	**For Information Only:** • As mentioned previously – the Designer may use the **<u>Dynamic Settings</u>** dialog to assist in the creation of components/templates. The following is a brief overview of the available Precision Input Key-Ins which may be used: o **XY** = "absolute coordinates" o **DL** = "delta coordinates from the last point placed" o **HS** = "horizontal delta distance and slope from last point placed" o **VS** = "vertical delta distance and slope from last point placed" o **OL** = "delta coordinates from the dynamic origin" o **OS** = "horizontal delta distance and slope from the dynamic origin"
109.	**This completes Lab 7 Section E. Save your work and Close the <u>Create Template</u> Window.** • In the **<u>Create Template</u>** Window, select **File ► Save**. • In the **<u>Create Template</u>** Window, select **File ► Close**.

Lab 7F The Template Library Organizer

In Lab 7F you will learn about the Template Library Organizer. The Template Library Organizer is a tool in InRoads to share components and templates between different InRoads Template Library's (.ITL's). This tool is useful when working on multiple projects that use an identical template. Rather than recreate the template, the Template Library Organizer can be used to copy the template or templates from one project's template library to another.

110.	**If not open from Lab 7E, Open the <u>Create Template</u> Window and the GDOT_Lab7.itl Template Library. (***This step may be ignored if the Template Library is already open***).** • In InRoads, select **Modeler ► Create Template**. The **<u>Create Template</u>** Window opens. • In the **<u>Create Template</u>** window, select **File ► Open**. • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 7** • Highlight ***GDOT_Lab7.itl*** and click **Open**.
111.	**Open the Template Library Organizer** • Select **Tools ► Template Library Organizer**… The **<u>Template Library Organizer</u>** opens as shown in *Figure L7-75*.

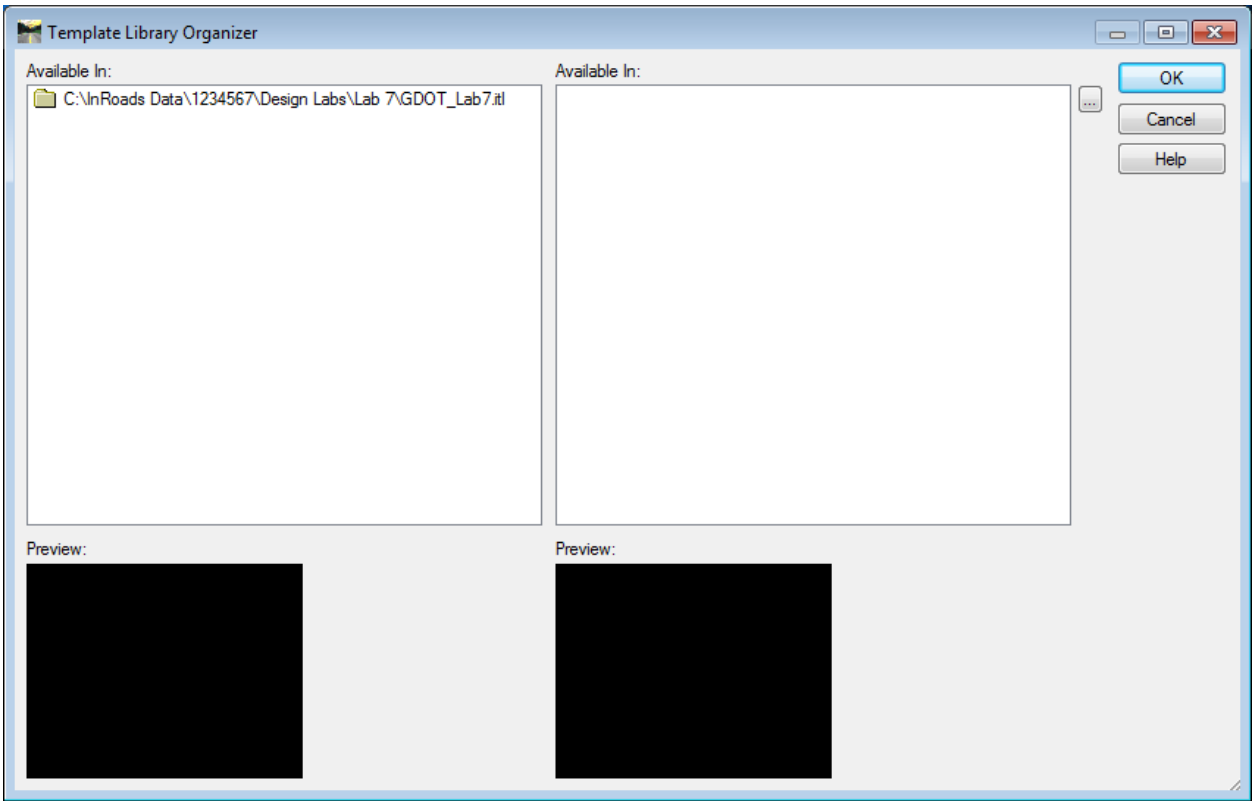


Figure L7-75 Template Library Organizer

112.	**Open the Template Library 'GDOT_StandardV8i.itl' in the Template Library Organizer.** • Left click on the **Locate** button ( ). • Navigate to **C:\InRoads Data\1234567\Design Labs\Standards** • Select ***GDOT_Standard V8i_SS2.itl*** and Click **Open**.
113.	**For Information Only:** The **GDOT_Standard V8i_SS2.itl** is a GDOT provided Template Library available on the ROADS webpage. It is obtained by downloading the **InRoadsALL.exe** and extracting the files to the default location. More information about the **InRoadsALL.exe** is available in the GDOT Design Guidelines. The **GDOT_Standard V8i_SS2.itl** Template Library is provided as a starting point for template creation and is in no way intended to supply the Designer with all the components necessary to design project cross sections. Many users may be accustomed to the GDOT supplied CAiCE Fragment library which contains all of the fragments necessary to build a project's template(s). In InRoads, no such library can be created. All components provided in the **GDOT_Standard V8i_SS2.itl**, when put together to create a template, must be edited to provide the behavior desired by the Designer depending on how they are placed. This will become clearer once the user becomes familiar with InRoads template creation and the Roadway Designer.

114.	**Open each of the Folders in the <u>Template Library Organizer</u>.** • Double click on each of the folders in the **<u>Template Library Organizer</u>** to open them. • Drag the **Medians**, **Shoulders**, **Travel Lanes** and **End Conditions** folders from the Right side to the Left side. ***HINT**: Each of the folders must be dropped onto the **Path** (highlighted in blue) as shown in *Figure L7-76*. • Click **OK** and Select **Yes** to save the data to the ***GDOT_Lab7.itl*** Template Library and return to the **<u>Create Template</u>** Window. • Ensure the **<u>Create Template</u>** Window contains the new folders as shown in *Figure L7-77*.

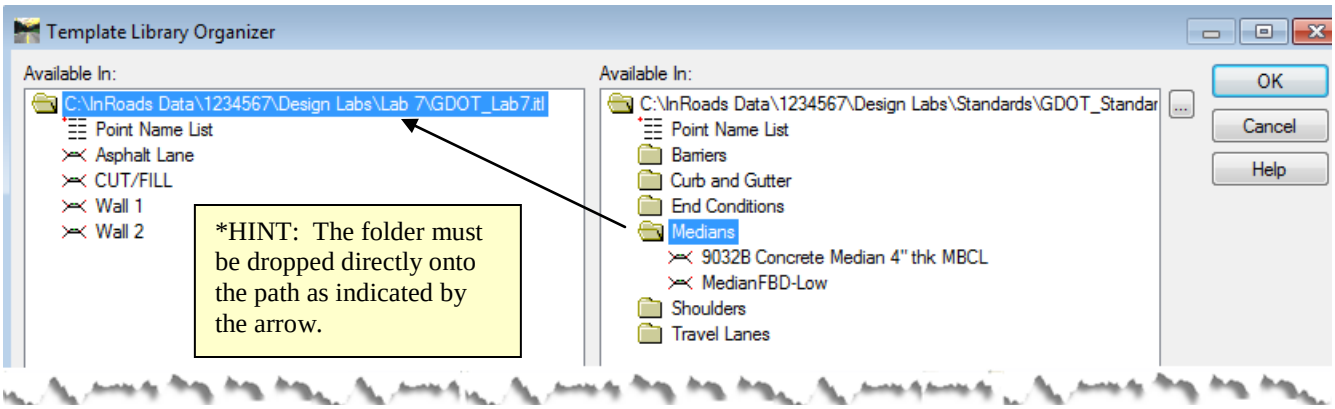


Figure L7-76 Template Library Organizer

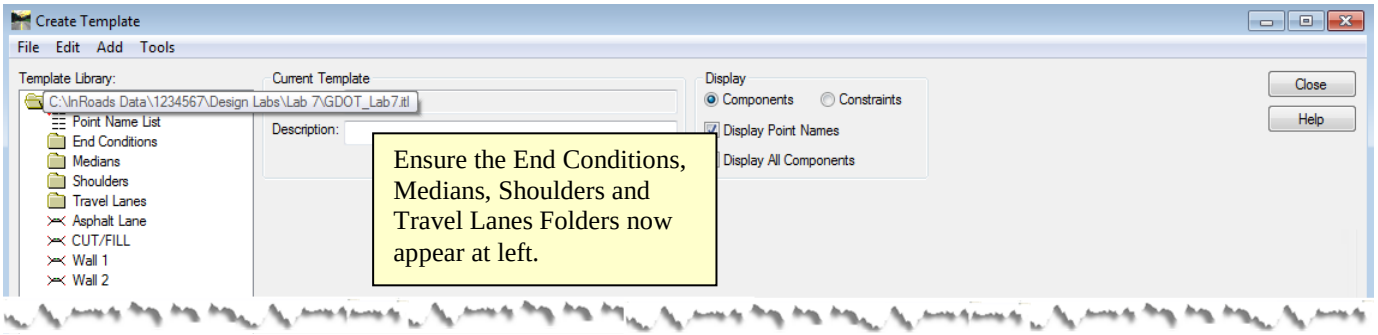
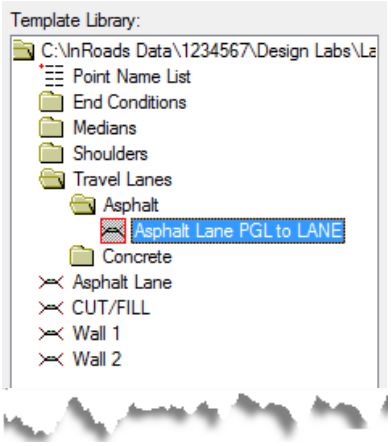


Figure L7-77 Create Template Window

115.	**The <u>Template Library Organizer</u> has now been used to copy four folders and the Templates contained within them from the GDOT_Standard V8i.itl to the GDOT_Lab7.itl. Save Changes.** • In the **<u>Create Template</u>** window, select **File ► Save**.

Lab 7G Parametric Constraints

Parametric Constraints are labels applied to values that are changeable. Parametric Constraints allow dimensional changes without having to edit the template. An example use of a Parametric Constraint would be for pavement depths. By labeling the pavement depth, the depth can be changed at anytime by modifying the value assigned to the label without having to edit the template. They are set up during the Create Template phase of cross section design and applied or changed during the Roadway Designer phase of cross section design. In this Lab you will learn how to add Parametric Constraints to a component.

116.	**If not open from Lab 7F, Open the <u>Create Template</u> Window and the GDOT_Lab7.itl Template Library. (***This step may be ignored if the Template Library is already open***).** • In InRoads, select **Modeler ► Create Template**. The **<u>Create Template</u>** Window opens. • In the **<u>Create Template</u>** window, select **File ► Open**. • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 7** • Highlight ***GDOT_Lab7.itl*** and click **Open**.
117.	**Make the Component 'Asphalt Lane PGL to Lane' the Active Component.** • In the **<u>Create Template</u>** Window, open the '**Travel Lanes'** folder and the '**Asphalt**' sub-folder as shown here.  • Double click on the component '**Asphalt Lane PGL to Lane'** to make it the active component. • Ensure the component is displayed in the **Create Template** grid as shown in *Figure L7-78*.

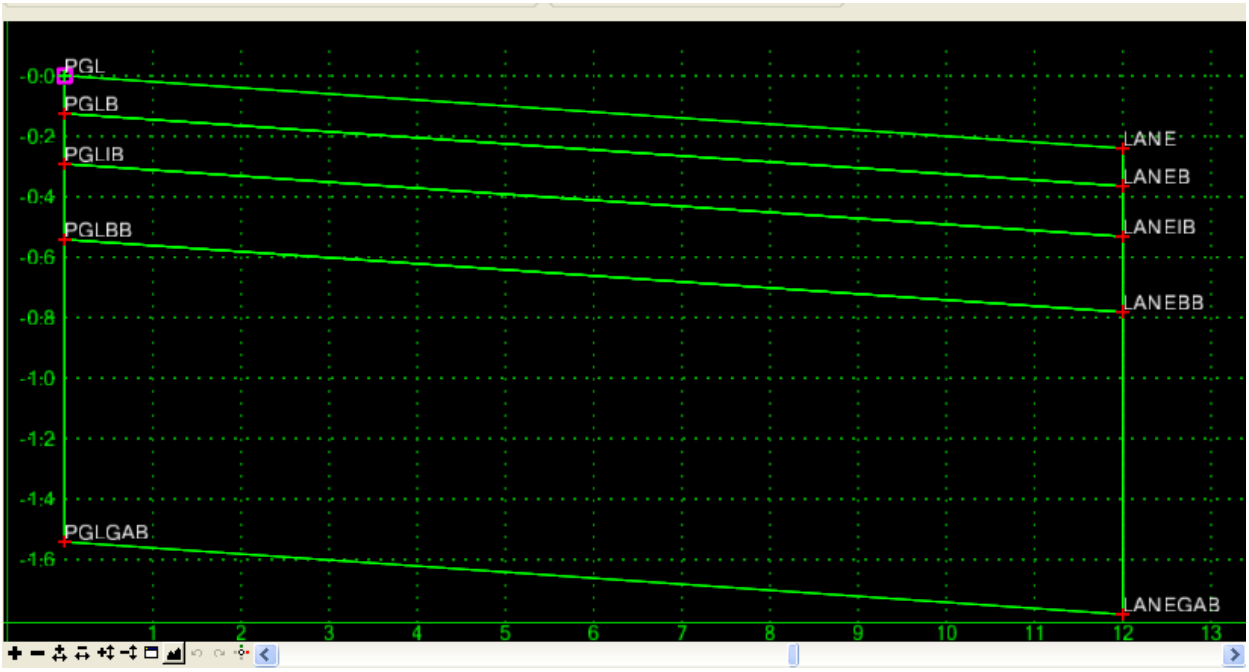
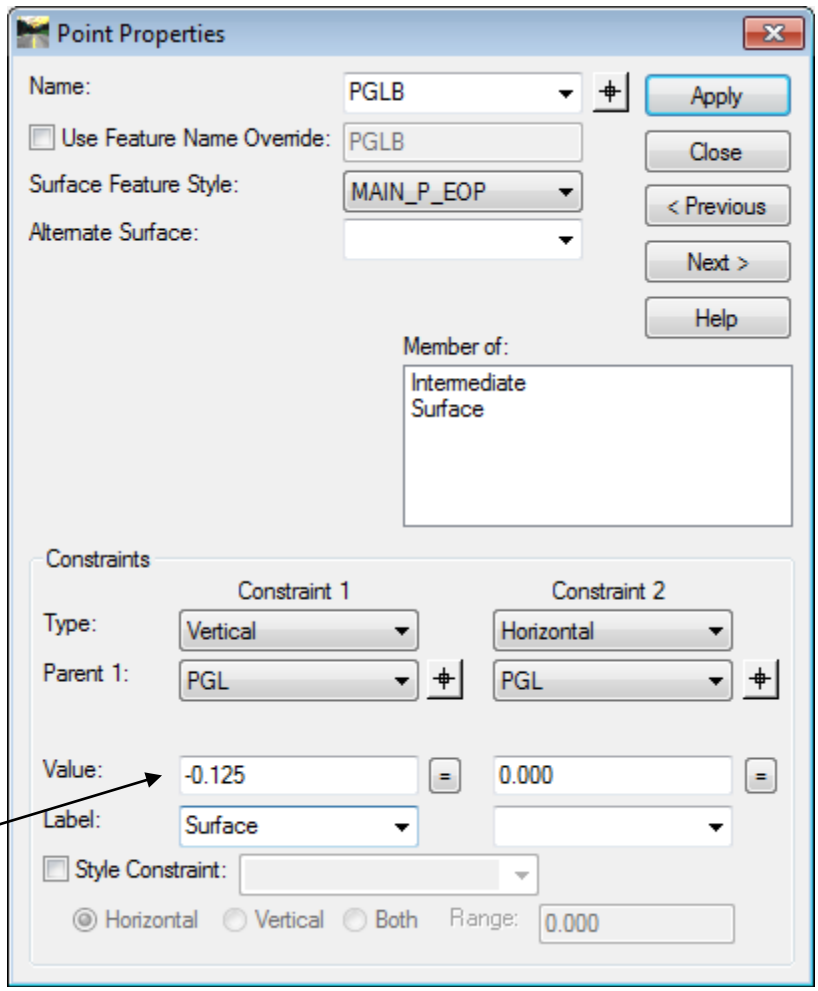


Figure L7-78 Create Template Grid

118.	**Open the Point Properties Dialog for the Point PGLB.** • Double click on the Point **PGLB** (Profile Grade Line Bottom). The **<u>Point Properties</u>** dialog opens.
119.	**Labels for Parametric Constraints are added in the Label Field. For the Vertical Constraint add a Label Named 'Surface'.** • In the **<u>Point Properties</u>** dialog, key-in ***Surface*** in the **Label:** field under **Constraint 1** as shown in *Figure L7-79*. If your Vertical Constraint has been built under **Constraint 2** instead that is Ok. Make the change to **Constraint 2** if that is the case. • Click **Apply** & **Close**. • A Parametric Constraint named **Surface** has been created for the Point **PGLB**. The default value for the Vertical Constraint for **PGLB** will remain **-0.125** until a value for **Surface** is defined. Values for Parametric Constraints are added during the Roadway Designer phase of cross section design and will be covered in **Lab 8**.



To create a Parametric Constraint label, key-in the label name in the Label: field. Key-in **Surface** here.

Figure L7-79 Point Properties

120.	**Open the <u>Point Properties</u> Dialog for Point LANEB.** • Double click on the Point **LANEB** (Lane Bottom). The **<u>Point Properties</u>** dialog opens.
121.	**Add a Parametric Constraint label named 'Surface' to the Vertical Constraint for the Point LANEB.** • In the **<u>Point Properties</u>** dialog for **LANEB** use the pull down arrow to select the Label: ***Surface*** for the Vertical Constraint as shown in *Figure L7-80*. ***NOTE**: Once a Parametric Constraint label has been created in a component the label becomes available in the pull down menu for all points in the component. • Click **Apply** & **Close**.

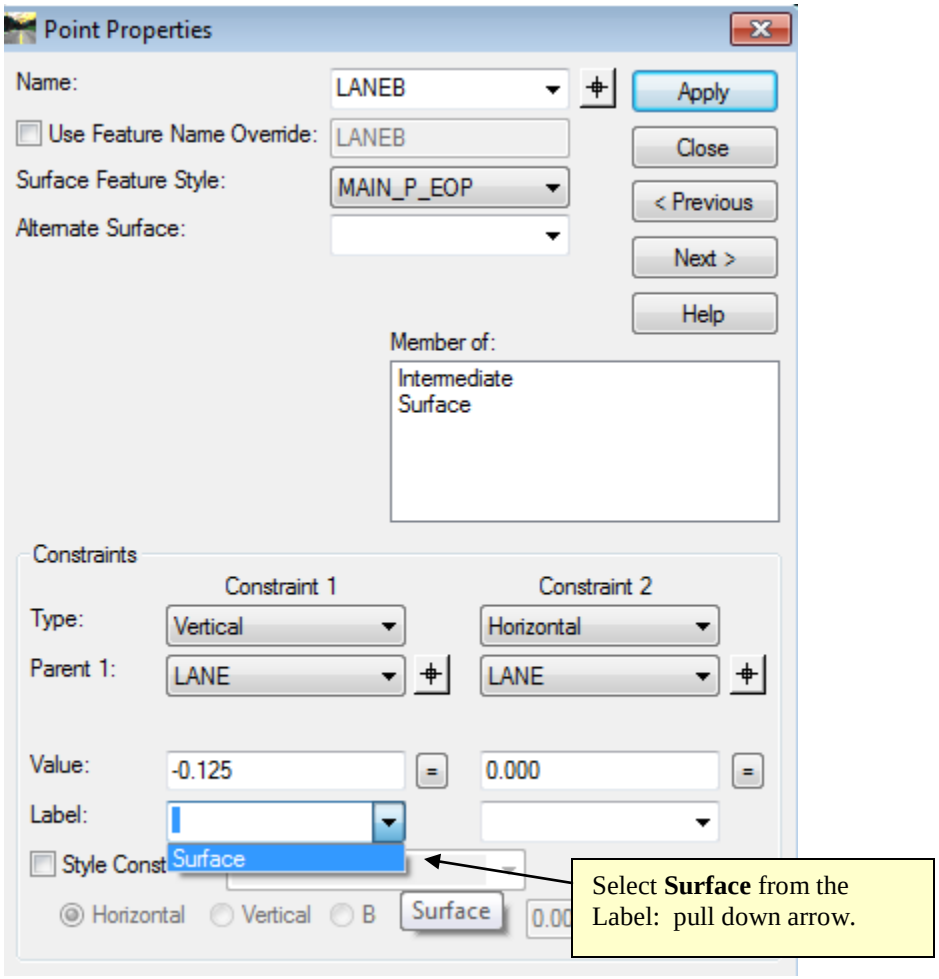


Figure L7-80 Point Properties

122.	**For Information Only.** The Parametric Constraint **Surface** has now been created and applied to both Points **PGLB** and **LANEB**. Now when a value is defined for the Parametric Constraint **Surface** during the Roadway Designer phase -- the thickness for the surface layer will be reflected at both ends of the component.
123.	**Save Changes.** • In the **<u>Create Template</u>** Window, select **File ► Save**.

Lab 7H Create a Rural Roadway Template

In the preceding sections of Lab 7 you were introduced to Components, Constraints, the Dynamic Settings window, Display Rules, the Preview Window, End Conditions, the Template Library Organizer and Parametric Constraints. Now it is time to put all the pieces together and create a complete template. In this section you will create a Rural Roadway Template with a depressed grassed median as shown in *Figure L7-81*.

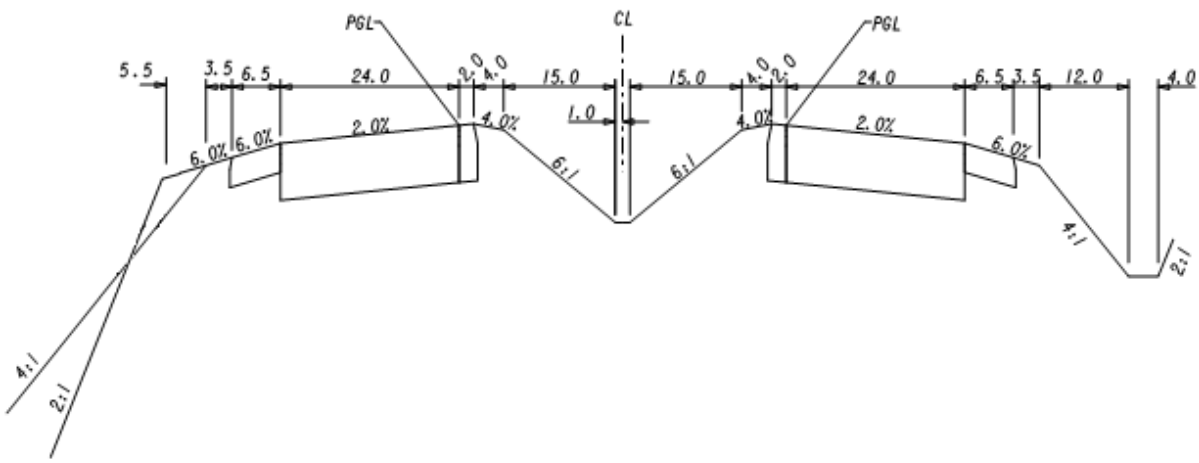
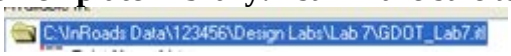
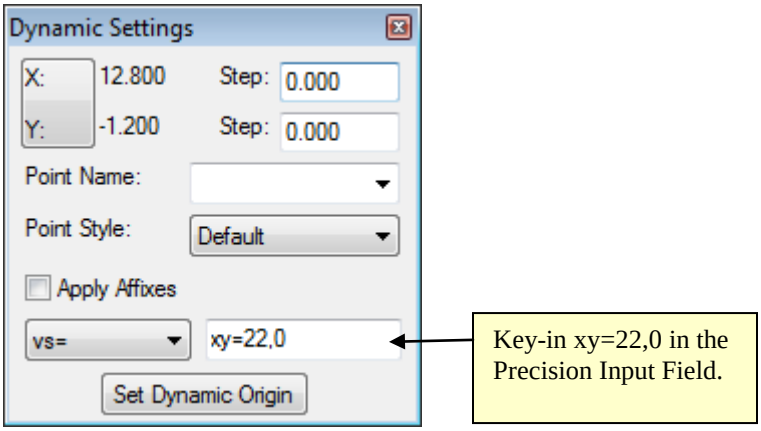


Figure L7-81 Rural Typical Section

124.	**If not open from Lab 7G, Open the <u>Create Template</u> Window and the GDOT_Lab7.itl Template Library. (***This step may be ignored if the Template Library is already open***).** • In InRoads, Select **Modeler ► Create Template**. The **<u>Create Template</u>** Window opens. • In the **<u>Create Template</u>** window select **File ► Open**. • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 7** • Highlight ***GDOT_Lab7.itl*** and click **Open**.
125.	**Create a New Template and Name it 'Rural Typical'.** • In the **Template Library:** list -- make sure to <u>click</u> on the Path to highlight it in blue.  (This is to ensure that the new ***Rural Typical*** template is created directly under this folder path). • In the **<u>Create Template</u>** Window, select **File ► New ► Template**. • Rename the new template ***Rural Typical***.
126.	**Open the <u>Dynamic Settings</u> dialog.** • Select **Tools ► Dynamic Settings**.

127. **Place the 'Travel Lane' Component First with the Inside Edge of the 'Travel Lane' at the PGL. The PGL is located 22' Horizontally from the Centerline and 0' Vertically.**

- In the **Create Template** Window, open the **Travel Lanes** folder.
- Under the **Travel Lanes** folder open the **Asphalt** subfolder.
- With **Rural Typical** the active template, left click once on the component **Asphalt Lane PGL to LANE** (Located under the folder ***\Travel Lanes \Asphalt***) and drag into the grid area but do not drop in the grid.
- With the Left mouse button still depressed, right mouse click and then lift up on the left mouse button and select ***Mirror***. The **Mirror** option prepares the component to be placed in both orientations at the same time (Left orientation and right orientation).
- (DO NOT place the components on the **Create Template** grid yet)!
- In the **Dynamic Settings** dialog, match the entries shown below:



- Place your cursor in the Precision Input Field of the **Dynamic Settings** dialog and press the **Enter** key on your keyboard.
- **Fit** the view and ensure your view matches that shown in *Figure L7-82*.
- Notice each Point placed on the Left Travel Lane is a duplicate of the Point placed on the Right Travel Lane but is appended with a **1.** As stated earlier in **Lab 7** -- duplicate point names cannot exist in the same component/template. InRoads default behavior is to numerically append to a point each time the point is placed.

***NOTE:** Under **Tools ► Options,** in the **Create Template** Window, additional options are available for applying affixes to duplicate point names.

***NOTE:** In the **Dynamic Settings** dialog, please note the **Point Style:** pull down has no effect on the Style of the Point(s) which have already been established in previously completed components. **Point Names** and **Point Styles** are only applied during component construction.

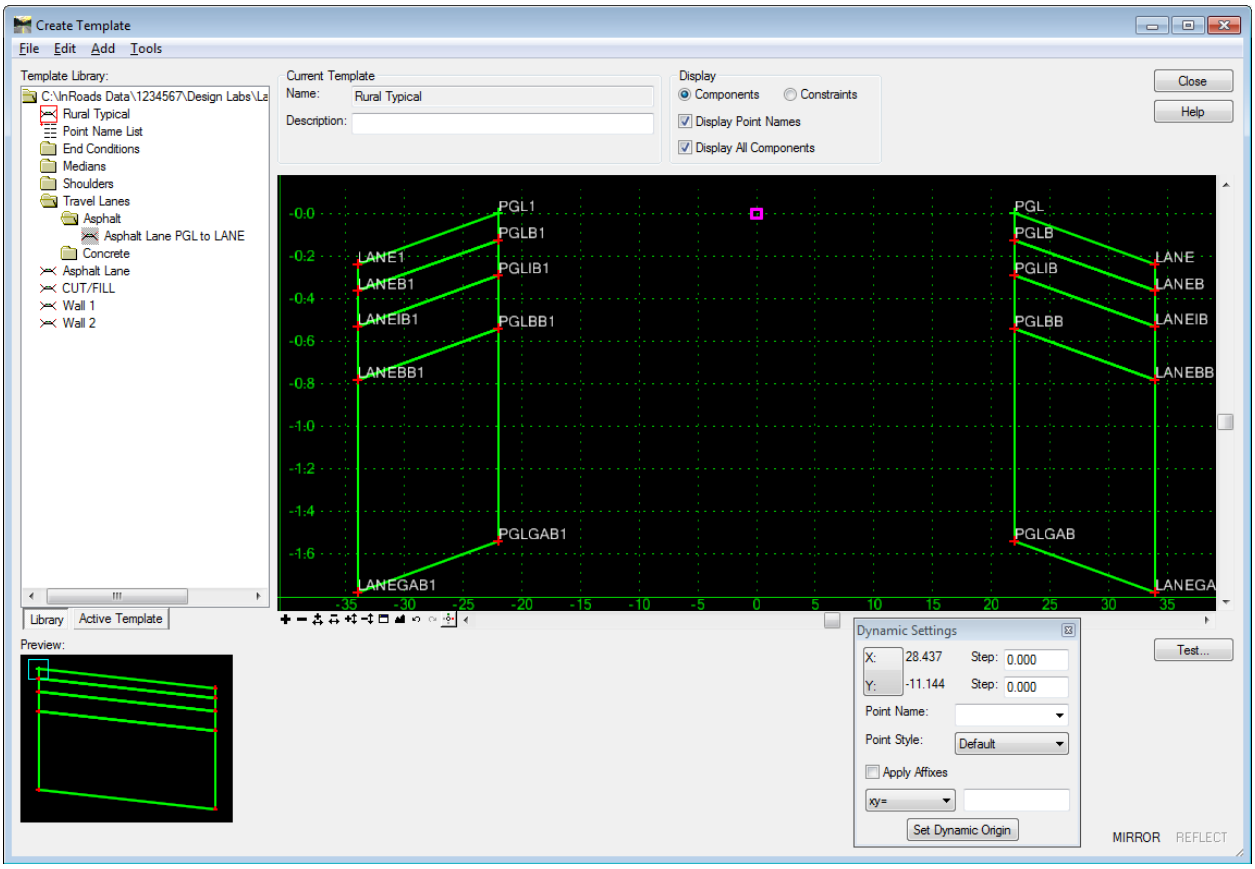


Figure L7-82 Create Template

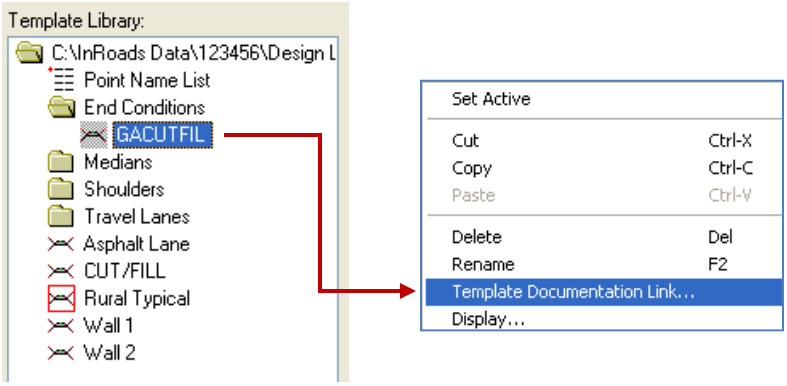
128.	**Change the Right Lane Width from 12' to 24'.** • Double click on the Point named **LANE** to open the **<u>Point Properties</u>** dialog. • Edit the Horizontal Constraint from **12.00** to ***24.00***. • Click **Apply** and **Close**. • **Fit** the view.
129.	**Change the Left Lane Width from 12' to 24'.** • Double click on the Point named **LANE1** to open the **<u>Point Properties</u>** dialog. • Edit the Horizontal Constraint from **-12.00** to ***-24.00***. • Click **Apply** and **Close**. • **Fit** the view.

130. **For Information Only:**

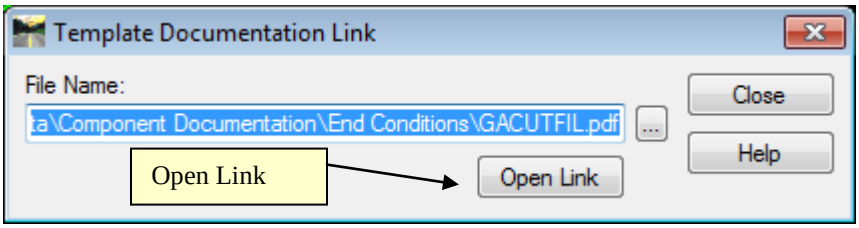
The **InRoadsALL.exe** mentioned earlier - which is available for download from the GDOT ROADS web page - contains a Component Description Library written for the components provided in the **GDOT_Standard V8i_SS2.itl**. When **InRoadsALL.exe** is executed, the Component Description Library is placed on the user's computer in the following location: **C:\InRoads Data\Component Descriptions\.**

131. The Component Description Files are included in the Path discussed in **Step 130**.

- Right mouse click over the component **'GACUTFIL'** and select **Template Documentation Link**… as shown here.

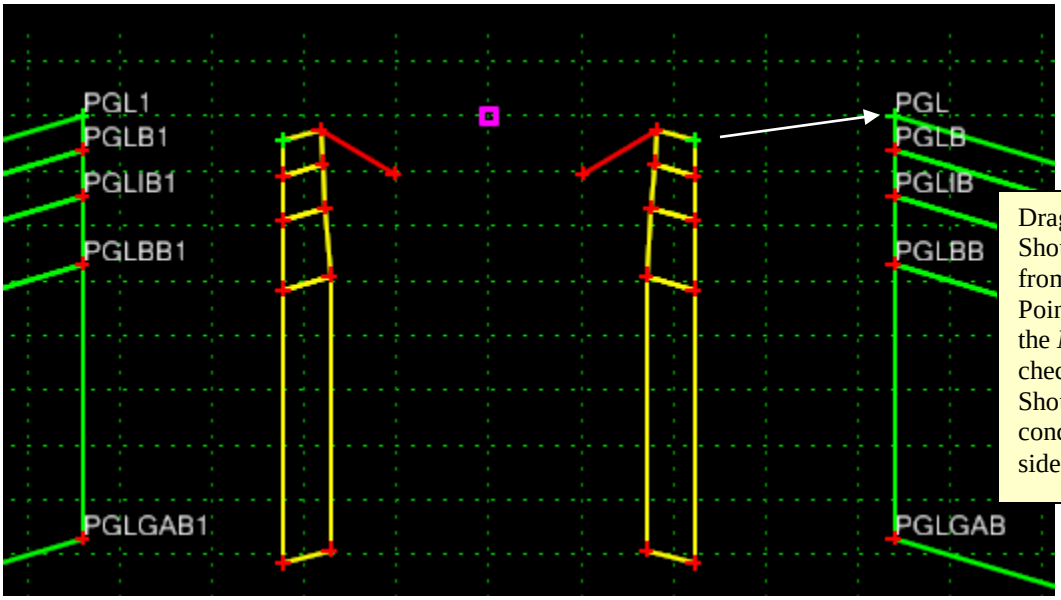


- In the **Template Documentation Link** dialog - click **Open Link**.



- Take a moment to review the Component Description.
- **Close** the Component Description PDF File.
- Click **Close** to close the **Template Documentation Link** dialog.

132.	**Continue creating the 'Rural Typical'. Place the Inside Shoulders.** • In the **<u>Create Template</u>** Window, open the **Shoulders** folder. • With **'Rural Typical'** still the active template/component; drag the **Inside Shoulder** component (located in the **Shoulders** folder) onto the **PGL** point as shown in *Figure L7-83*. Notice the ***Mirror*** option is still active from the previous step. Leave it active. • Notice the Point names for the '**Inside Shoulder'** component appear when the component is placed. ***NOTE**: The upper right point, when dropped directly onto **PGL**, assumes the point name **PGL** and the point's constraints even though it was created initially with the point name **IEP** (Inside Edge of Pavement). If you desire to keep the point name, **IEP**, then do not place the component directly on **PGL**. Place it elsewhere on the grid, than Right mouse click over **IEP** and select ***Move Point***, then drop it onto **PGL**. This will result in **IEP** and **PGL** occupying the same coordinates yet retaining their individual Point names and constraints. This is useful when you do not want the constraints for the component to change. Many InRoads users prefer to always drop components away from one another then move them together so the point names and constraints do not change. If they determine they do want the points and constraints to be the same, they then Right mouse click over the points and select ***Merge Points***.

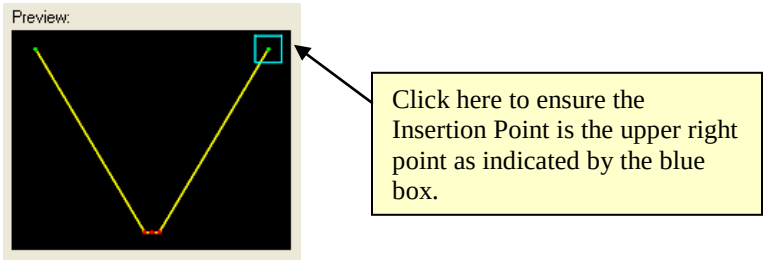


Drag the Inside Shoulder component from the upper right Point onto PGL. With the *Mirror* option checked, the Inside Shoulder will be placed concurrently on the left side.

Figure L7-83 Create Template Grid

133. **Place the Median.**

- In the **<u>Create Template</u>** Window, open the **Medians** folder.
- Highlight the **MedianFBD-Low** component so it becomes visible in the **Preview:** window as shown in *Figure L7-84*.
- Change the **Insertion Point** from the middle to the right side by Left clicking on the top right point and ensure a blue box is depicted around the Point as shown here.



- With '**Rural Typical**' the active template/component, drag the **MedianFBD-Low**' component into the grid area and Right click to bring up the option menu.
- Click on ***Mirror*** to uncheck it.
- Drop the median component directly onto point **IS** (Inside Shoulder).
- **Fit** the view.

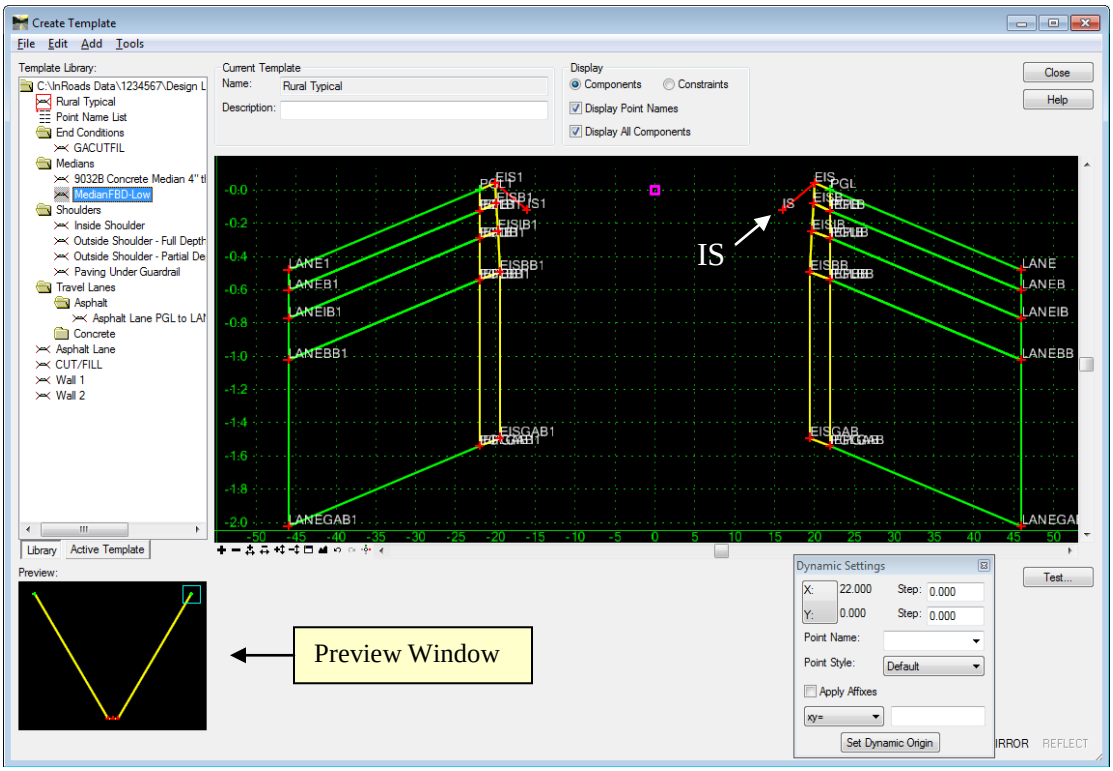
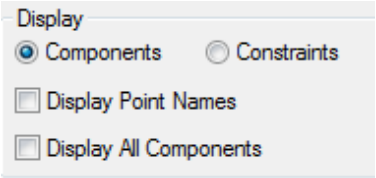


Figure L7-84 Create Template

134. **Place the Outside Shoulder.**

- In the **Create Template** Window, open the **Shoulders** folder.
- With '**Rural Typical**' the active component, drag the **Outside Shoulder – Partial Depth** component into the grid area.
- Right mouse click and select the ***Mirror*** option.
- Drop the shoulder onto Point **LANE** as shown in *Figure L7-85*.

***HINT:** If the Point Names begin to clutter your view, turn them off by un-checking '**Display Point Names**' in the **Display** field of the **Create Template** Window.



- **Fit** the view.

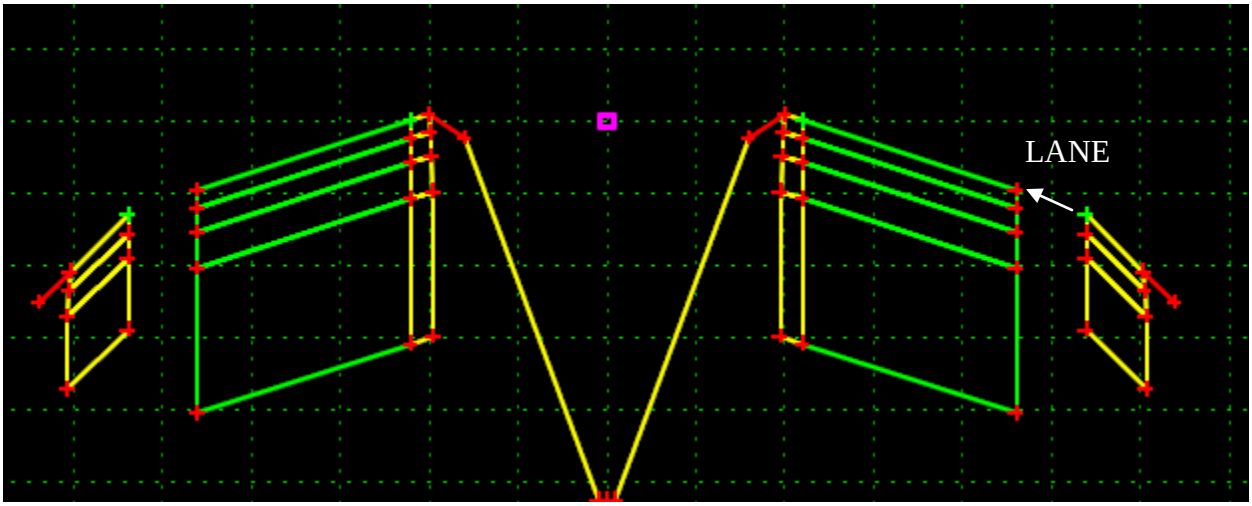


Figure L7-85 Create Template Grid

135. **Place the End Condition 'GACUTFIL'.**

- In the **Create Template** Window, open the **End Conditions** folder.
- With '**Rural Typical**' the active component, drag the **GACUTFIL** component into the grid area.
- Ensure the ***Mirror*** option is selected.
- Drop the **GACUTFIL** component directly onto the Point **EOS** (Edge of Outside Shoulder) as shown in *Figure L7-86*.
- **Fit** the view.
- Ensure your view matches that shown in *Figure L7-86*.

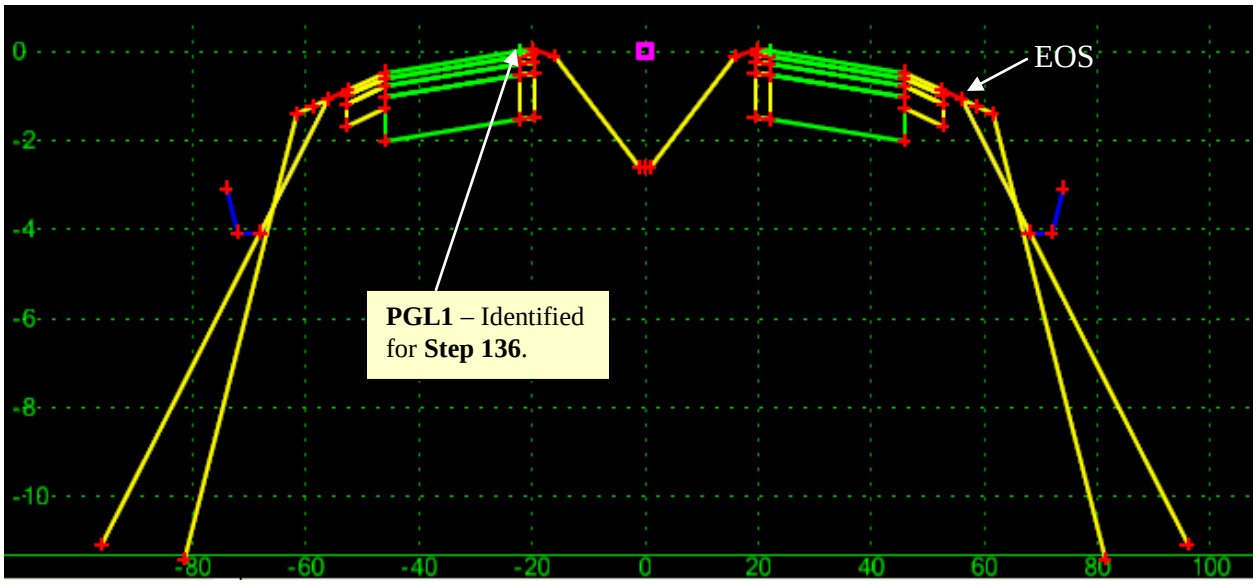


Figure L7-86 Create Template Grid.

136.	**Currently there are two Green Points (PGL and PGL1) which are unconstrained and movable. In InRoads, it is good practice to have only one Green point that is unconstrained and allowed to move freely. The simple reason for this is 'so you can be certain of what InRoads will do'. When you place a template on an Alignment in the Roadway Designer (which you will do in Lab 8), the template is 'run' along the Green point (unconstrained point). If you have more than one Green point (unconstrained point), InRoads will either not perform or try and assume something. There is no way of knowing what InRoads assumed without investigating the cross sections to see what was done. Constrain PGL1 vertically to PGL.** • If Point Names are turned off, check the '**Display Point Names**' in the **Display** field of the **Create Template** Window. • **Window Area** or **Zoom** into the area where the Point **PGL1** is located. **PGL1** is located on inside edge of the Travel Lanes on the left side of the template as shown in *Figure L7-86*. • Double click on the Point **PGL1** to open the **Point Properties** dialog. • Change **Constraint 1** to ***Vertical***. • Use the pull down menu next to **Parent 1** to select ***PGL***. • Leave the value as **0.000**. This will ensure that the elevation of **PGL1** is the same as **PGL**. • Ensure your entries match those shown in *Figure L7-87*. • Click **Apply** & **Close**. • Notice **PGL1** changes from a Green plus sign to a Yellow plus sign indicating it is singly constrained. • **Fit** the view.

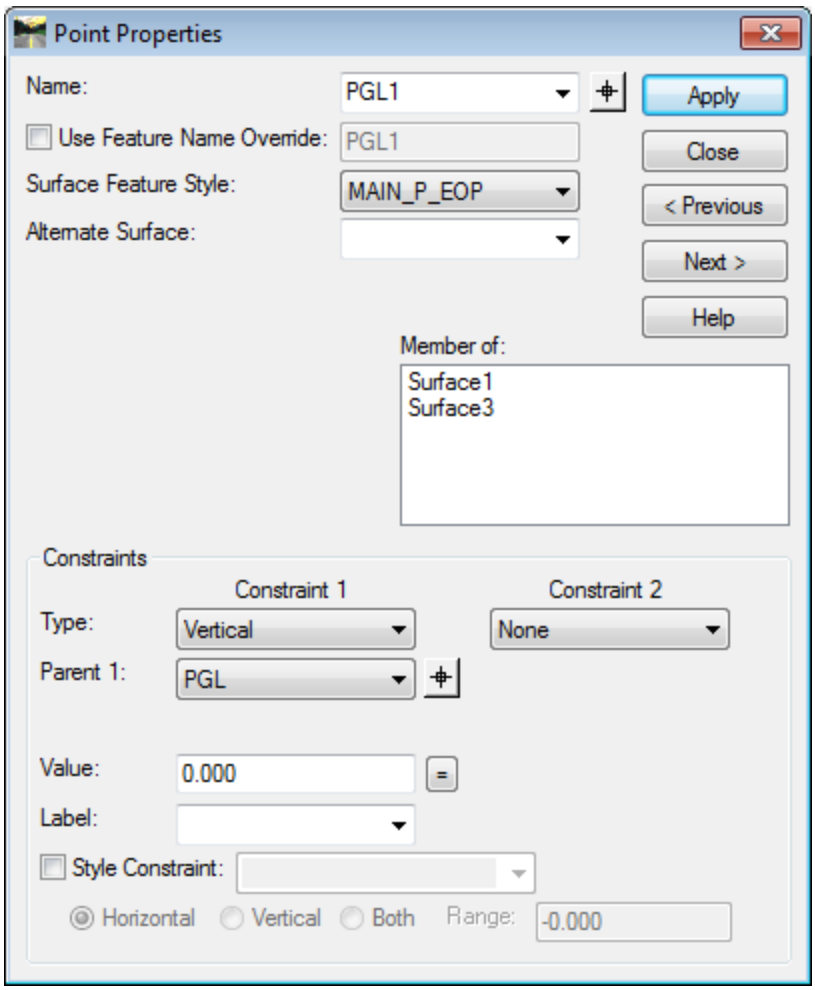
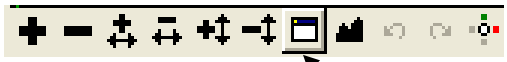


Figure L7-87 Point Properties dialog

137.	**Save your Template.** • In the **<u>Create Template</u>** Window, select **File ► Save**.
138.	**Zoom in the Left Shoulder.** • Select the **Window Area** button and window as shown in *Figure L7-88*.  **Window Area Button** • Ensure your view matches that shown in *Figure L7-89*.

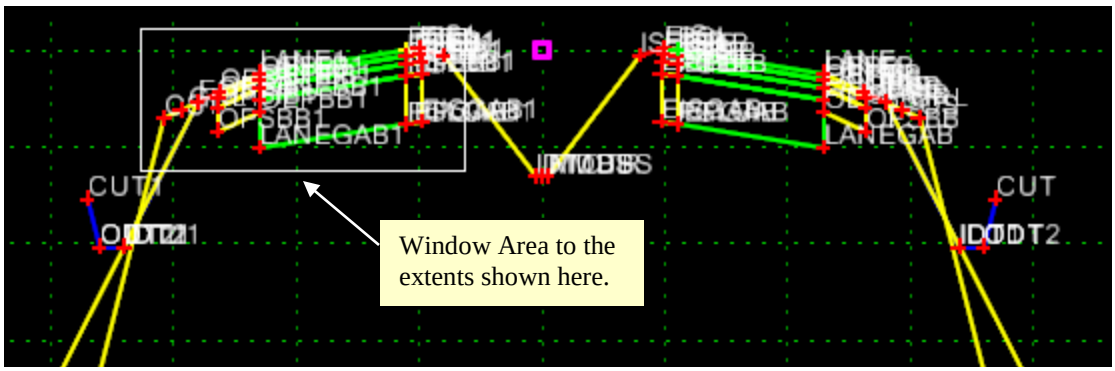


Figure L7-88 Create Template Grid

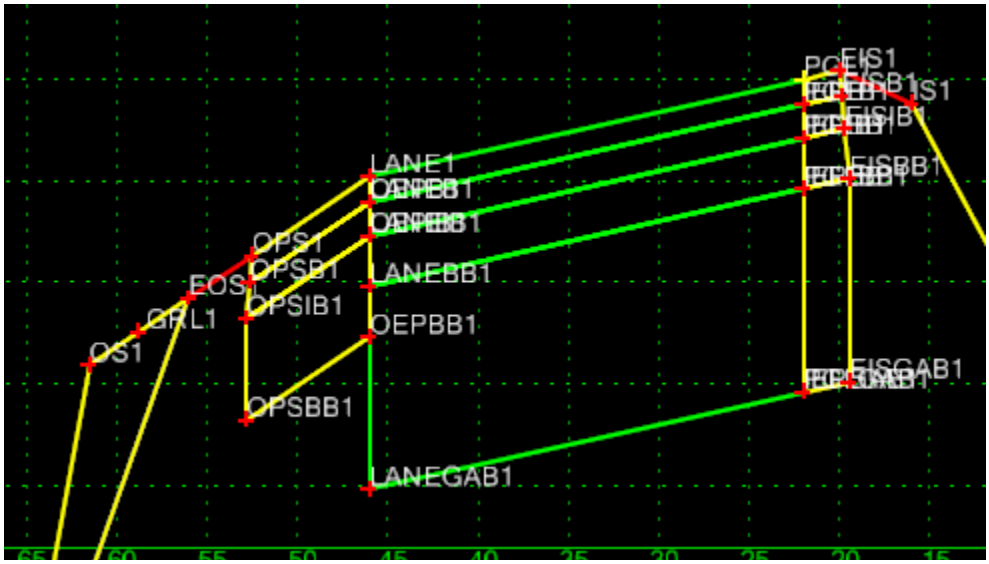


Figure L7-89 Create Template Grid

139.	**In InRoads Template design, Rollover Locks determine how components will superelevate in relation to one another. For instance, a common rotational behavior for a GDOT outside paved shoulder is to maintain a 6.0% slope until an algebraic difference of 8.0% is reached and then rotate the shoulder so as not to exceed an algebraic difference of 8.0%. The Rollover Locks for the shoulders must be set up by the user by editing points. Set the Rollover Locks for OPS1.** • Double click on Point **OPS1** or Right mouse click over the Point and select **Edit Point** to open the **<u>Point Properties</u>** dialog as shown in *Figure L7-90*. • Place a check mark in the box next to **Parent 2** to activate the **Rollover Values**… button. • Click the **Rollover Values**… button. The **<u>Rollover Point Properties</u>** dialog opens as shown in *Figure L7-91*.

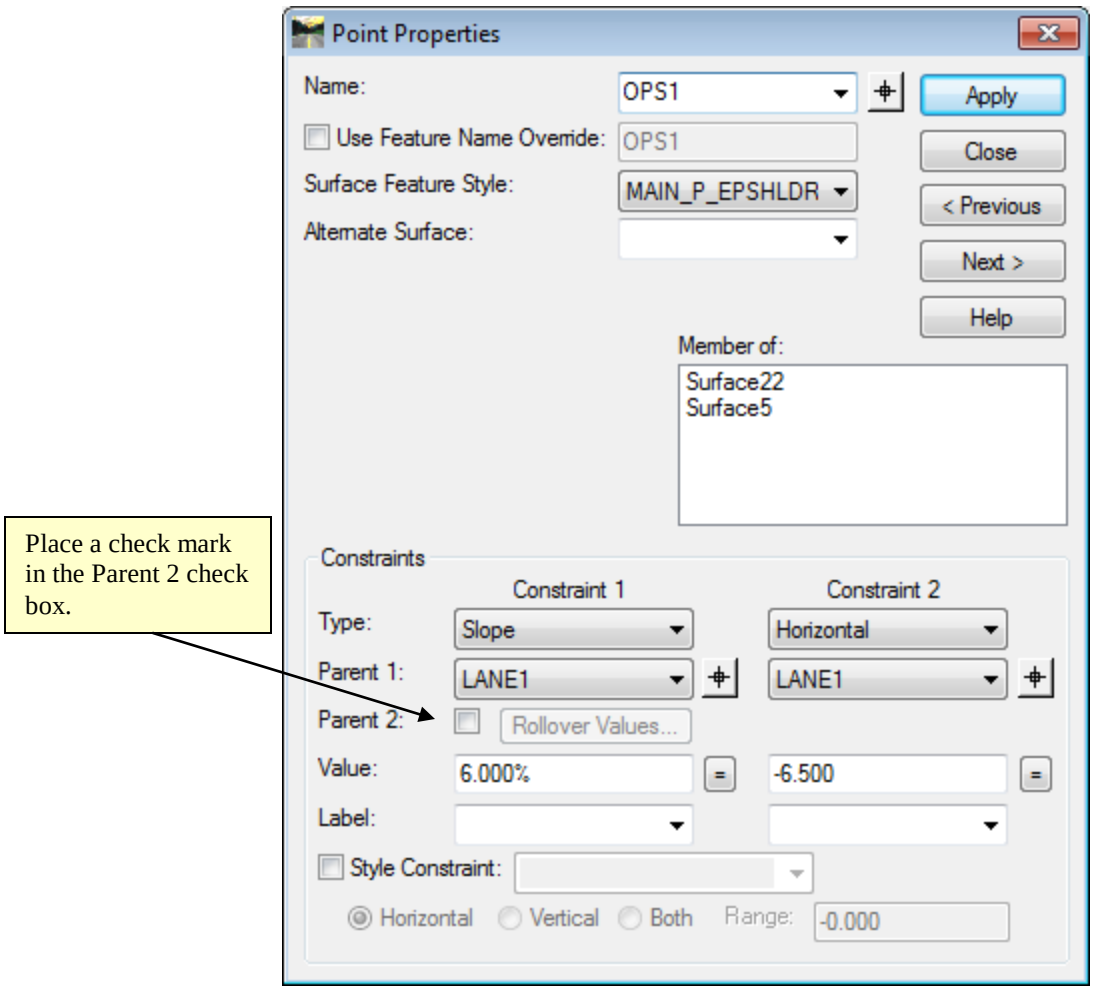


Figure L7-90 Point Properties

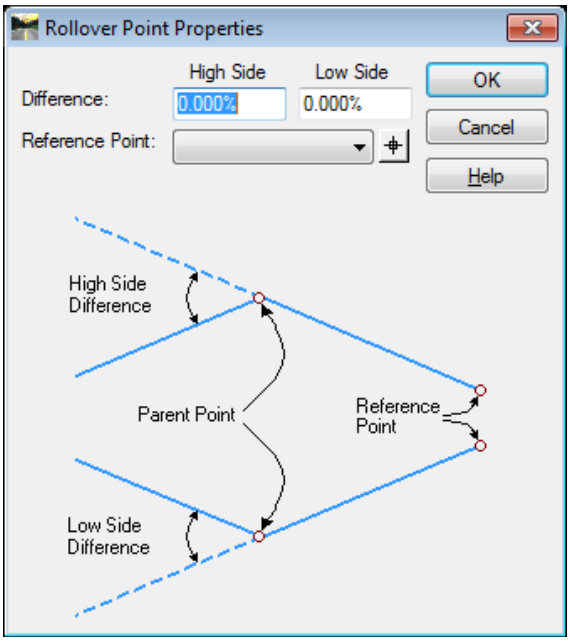


Figure L7-91 Rollover Point Properties

140.	**As stated previously, the normal rotational behavior for a GDOT outside paved shoulder is to maintain a 6.0% slope until an algebraic difference of 8.0% is reached and then rotate the shoulder so as not to exceed an algebraic difference of 8.0%. Fill in the <u>Rollover Point Properties</u> dialog to achieve this behavior.** • Define the **Reference Point** to be ***PGL1*** by use of either the **Locate** button or the **Pull Down** Menu. • Enter **8.00%** in the Entry field for **High Side**. • Enter **0.00%** in the Entry field for the **Low Side**. • Ensure your entries match those shown in *Figure L7-92*. • Click **OK** in the **<u>Rollover Point Properties</u>** dialog. • Click **Apply** & **Close** in the **<u>Point Properties</u>** dialog. • This completes the setup of the **Shoulder Rollover Locks** for the Left side outside paved shoulder. We are not going to do the remaining shoulders but on an actual project the inside and outside paved and grass shoulders must also have the Rollover Locks set to complete the template.

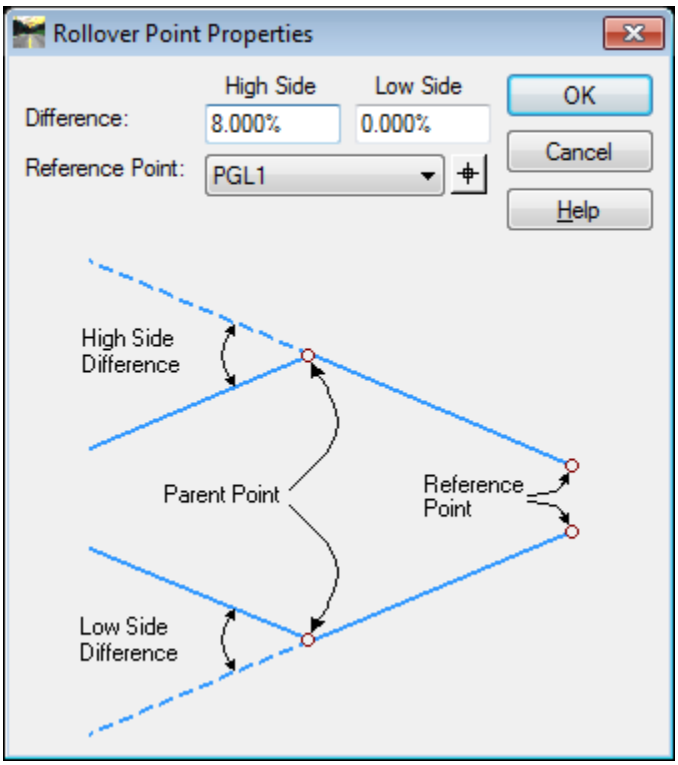


Figure L7-92 Rollover Point Properties

141.	**Save your Template.** • In the **<u>Create Template</u>** Window, click **File ► Save**. This completes the construction of the Rural Roadway Template. *The GDOT_Lab7.itl is saved to the following path:* *C:\InRoads Data\1234567\Design Labs\Lab 7*
142.	This concludes Lab 7. Do not proceed until the Instructor directs you to do so.

Lab 8
Introduction to the Roadway Designer

Objective

The objective of this Lab is to provide a brief workflow overview of the Roadway Designer. The Roadway Designer is located under the InRoads Modeler menu and is where Roadway Design Files (.IRD's), Corridors, Template Drops, Point Controls, End Condition Exceptions, Superelevation and Final Surfaces are performed, assigned, created, etc.

Following is the workflow and terminology of the Roadway Designer:

Step 1. Create a Roadway Design File – The Roadway Design File (.IRD) is where Corridors are created, Templates are added to Corridors, Point Controls and End Condition Exceptions are added and Design Surfaces are created.

Step 2. Create a Corridor – A Corridor is a strip of land defined by a horizontal and vertical alignment or alignments. It can be considered the project's footprint. Cross section design is performed in the Corridor and the Final Surface is created from the corridor.

Step 3. Add Template Drops – Template Drops are used to add Templates from the .ITL (InRoads Template Library) to specified station ranges in the Corridor.

Step 4. Add Point Controls – Point Controls are used in cross section design to override a point's normal constraint. Example uses of Point Controls in a cross section design would be to have the point representing the outside edge of a travel lane, follow a horizontal alignment to widen for an auxiliary lane (such as a turn lane) or having a point follow a different vertical alignment for split grades.

Step 5. Add End Condition Exceptions – End Condition Exceptions are applied to End Conditions during cross section design when the normal behavior of an End Condition is not sufficient for actual conditions and it is not desirable to create and place new templates. Examples include steepening slopes to stay inside Right-of-Way and additional shoulder widening for guardrail anchorage.

Step 6. Add Superelevation – Superelevation Control Lines are added to control the Roadway cross slope in horizontal curve areas. InRoads utilizes Superelevation Tables based on the current edition of the AASHTO Green Book.

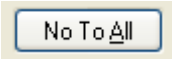
Step 7. Create Final Surface – The creation of a Final Surface DTM is necessary in InRoads. The cross sections shown on the cross section sheets are generated from the Final Surface. The Construction Limits and the Roadway Ditches are also generated from the Final Surface.

Lab 8A Set Project Defaults and Open Files

1. Starting Clean

In order to ensure that you are working with a "clean" database – you will close MicroStation and InRoads if they are still running from a previous Lab:

To CLOSE MicroStation and InRoads -

Select **File►Exit** from the [MicroStation Menu].
If any messages appear regarding the saving of projects – Select 

This closes BOTH the MicroStation and InRoads Software(s).

2. Starting MicroStation and InRoads in the GDOT Workspace.

From the desktop, double-click on the **MicroStation** icon labeled **GDOT MicroStation V8i SS2 (x86)**.

Double click on the icon labeled **GDOT MicroStation V8i SS2 (x86)**.

- When the **MicroStation Manager** dialog box appears – navigate to the **C:\InRoads Data\1234567\Design Labs\Standards** folder and select the "**GDOT 3D Working File.dgn**". (Creation of the 'GDOT 3D Working File.dgn' is documented in the Design Guidelines). Click **Open**.

- Now open InRoads from within MicroStation by selecting:
  InRoads ► InRoads Suite (SELECTseries 2) V8i 08.11.07.566 from the [MicroStation Menu].

The MicroStation and InRoads Software(s) will open.

3. Clear the MicroStation Window (*This step may be ignored if your MicroStation Window is already clear of graphics***)**

- Select **Edit ►Select All** from the [MicroStation Menu].
- Then select the **<DELETE>** key on the computer keyboard.

The MicroStation Window is now clear of all graphics from the previous lab and ready for this lab.

4.	**Verify Project Defaults** • In InRoads, select **File ►Project Defaults** • Use the pull down next to **Configuration Name:** to select ***1234567_Design*** which you created in **Lab 1**. • Click **Apply** & **Close.** *Sets Project Defaults.*
5.	**Set the Design Default Preferences** • Select **File ► Project Options** and the **<u>Project Options</u>** dialog box appears. • Select the **Factors** tab. • This will be a 50 scale project. Enter ***50*** for the **Text**, **Cell** & **Line Style Scale Factor(s)**. • Then in the same **<u>Project Options</u>** dialog box select the **Geometry** tab. • Click the **Preferences** button at the bottom of the dialog box. • Choose ***Design Default***. Click **Load** and **Close**. This will set the remainder of the Design Defaults. ****IMPORTANT**: As stated previously the ***Design Default*** Preference loads the appropriate settings for use during Design. These settings include the Alignment and Point name settings. These settings are of particular importance to the Designer. Alignments must have a **DE** prefix. Points must also have a **DE** prefix as well as beginning the point numbering scheme at Number 10000. In order for survey enhancements to be properly added during the design phase of a project, it is essential that Designers pay particular attention to this setting. • In the **<u>Project Options</u>** dialog box click **Apply** and **Close**. *Sets the Design Default Preference.*
6.	**Open 1234567_Design.alg** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 8** • Highlight **1234567_Design.alg** • Click **Open** & **Cancel**. *The Geometry Project 1234567_Design is opened.*
7.	**Open 1234567_Exist.dtm** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 8** • Highlight **1234567_Exist.dtm** • Click **Open** & **Cancel**. *The Surface Project 1234567_Exist is opened.*

8.	**Open GDOT_Lab8.itl** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 8** • Highlight **GDOT_Lab8.itl** • Click **Open** & **Cancel**. *The Template Library GDOT_Lab8 is opened.*

Lab 8B Create a Roadway Design and Corridor

In Lab8B, the Roadway Designer will be opened and a Roadway Design file (.IRD) will be created called 1234567.ird. The Roadway Designer will then be used to create a new Corridor called SR100 SPUR utilizing the Horizontal Alignment DE31, shown in *Figure L8-1* below, and the Vertical Alignment DE31.

Figure L8-1 MicroStation V8i Window

9.	**Open the Roadway Designer.** • Select **Modeler ► Roadway Designer**. The **<u>Roadway Designer</u>** Window opens as shown in *Figure L8-2*.

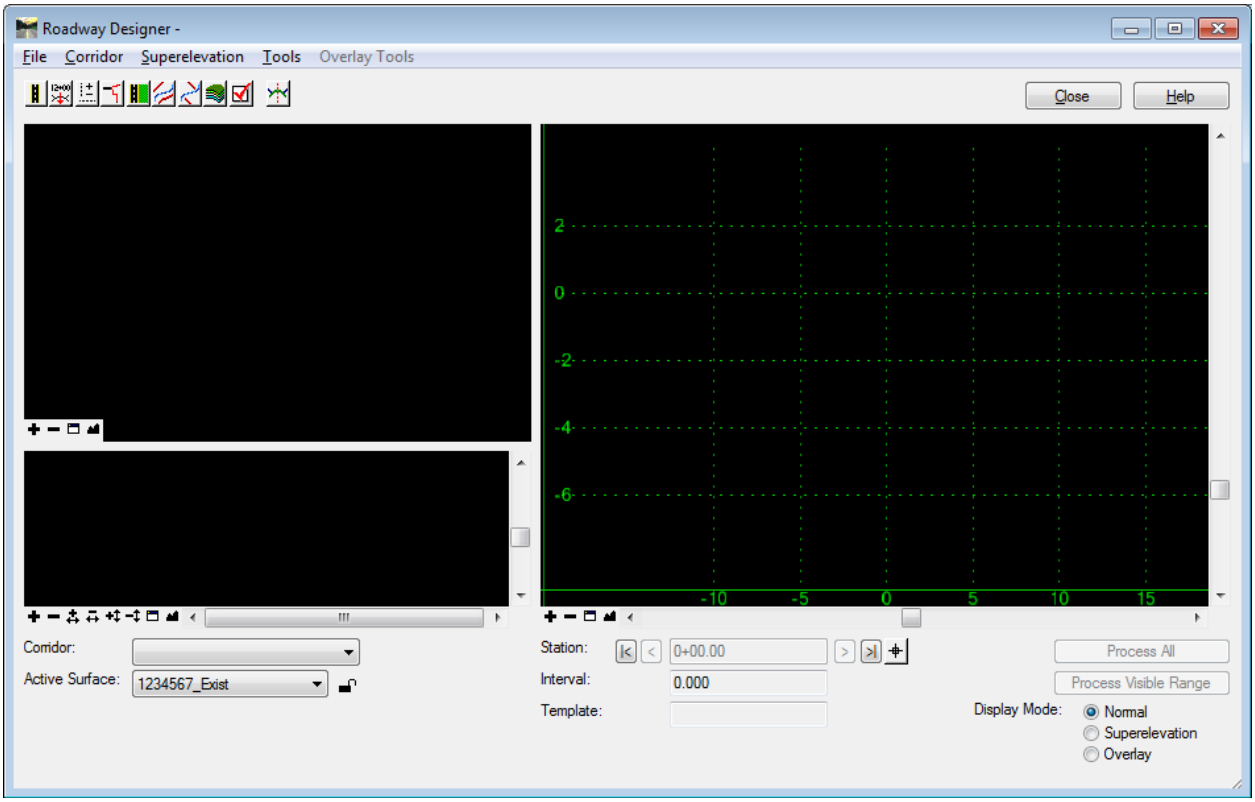


Figure L8-2 Roadway Designer

10.	**Create an InRoads Roadway Design (.IRD) and name it 1234567.ird** • In the **<u>Roadway Designer</u>** Window, select **File ► Save As**. • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 8**. • Enter a **File name:** of ***1234567.ird***. • Ensure your entries match those shown in *Figure L8-3*. • Click **Save.** *A new Roadway Design called 1234567.ird has been created.*

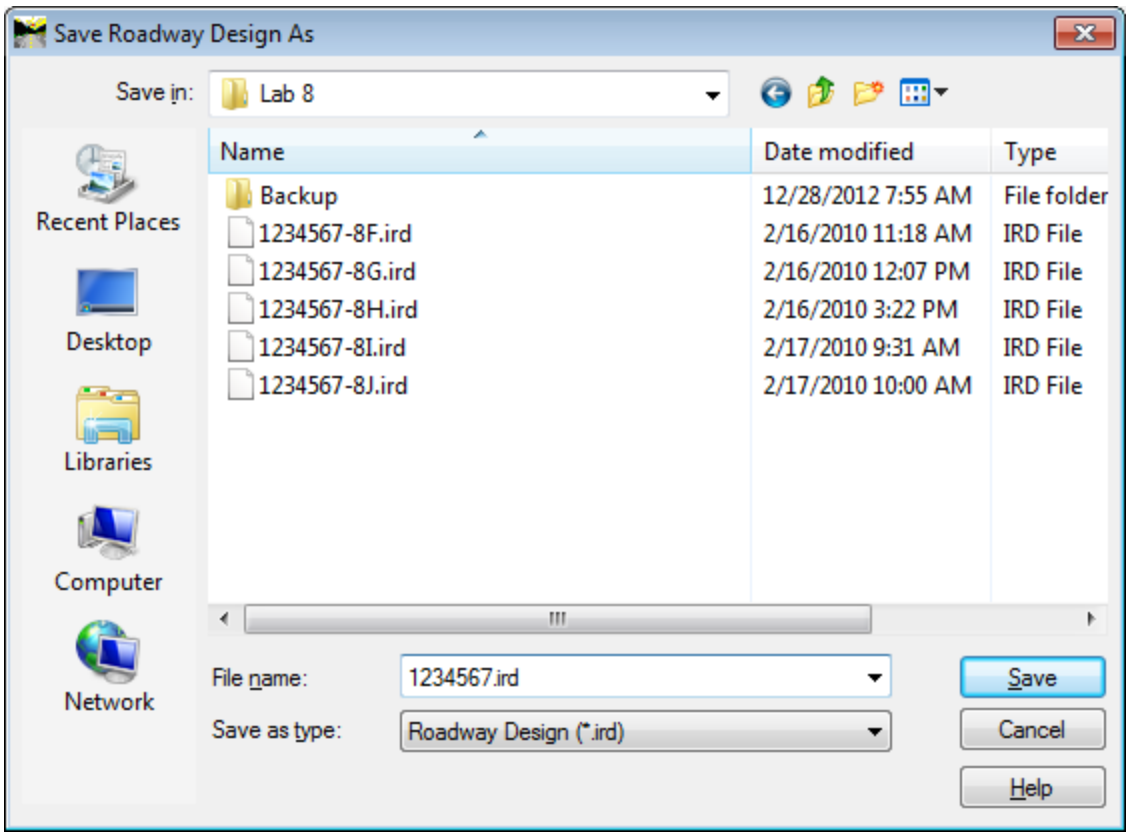


Figure L8-3 Save Roadway Design As Dialog

11.	**Open the Roadway Design file** Even though **1234567.ird** was saved in the previous step - it must still be opened. Open the Roadway Design File **1234567.ird** saved in the previous step. • In the **Roadway Designer**, select **File ► Open**. • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 8** • Highlight **1234567.ird**, created in the previous step. • Click **Open**. • Verify the **Roadway Designer** menu bar reads **C:\InRoads Data\1234567\Design Labs\Lab 8\1234567.ird** as shown in *Figure L8-4*.

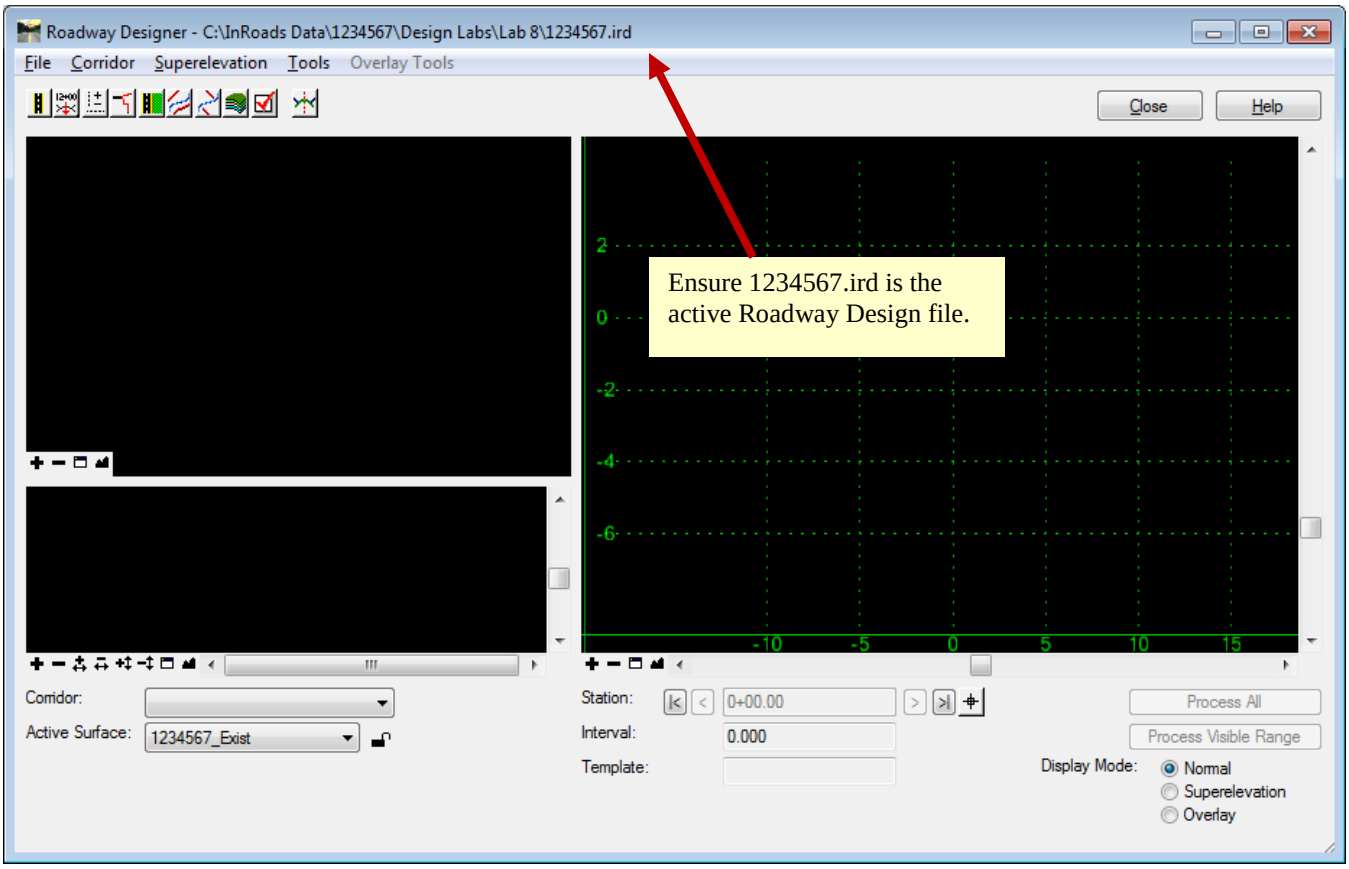
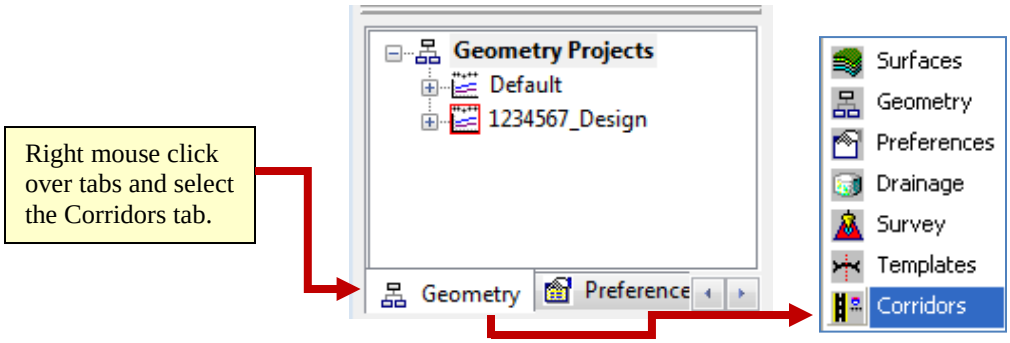


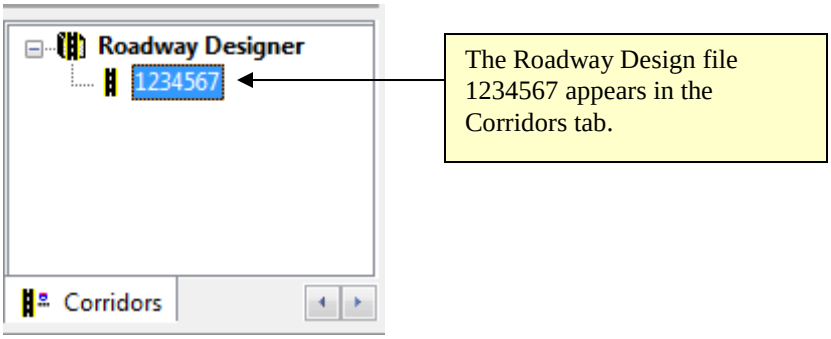
Figure L8-4 Roadway Designer

12. **Open the Corridor Tab in the InRoads Workspace Bar.**

- In the **InRoads Workspace Bar**, right mouse click over any of the tabs and select **Corridors** as shown here.



- Click on the **Plus Sign** next to **Roadway Designer** to expand the list. The Roadway Design **1234567** should now be shown in the Workspace bar as depicted here.



13. **Create a New Corridor called 'SR100 SPUR'**

- In the **<u>Roadway Designer</u>** Window, select **Corridor ► Corridor Management**. The **<u>Manage Corridors</u>** dialog opens similar to that shown in *Figure L8-5*.
- Key-in **SR100 SPUR** in the **Name:** field.
- Ensure the **Surface Symbology:** is set to ***FINISH***
- Ensure the **Type:** is set to ***Alignment*** and the Horizontal Alignment and Vertical Alignments match what is shown in *Figure L8-5*.
- Click **Add** & **Close**.

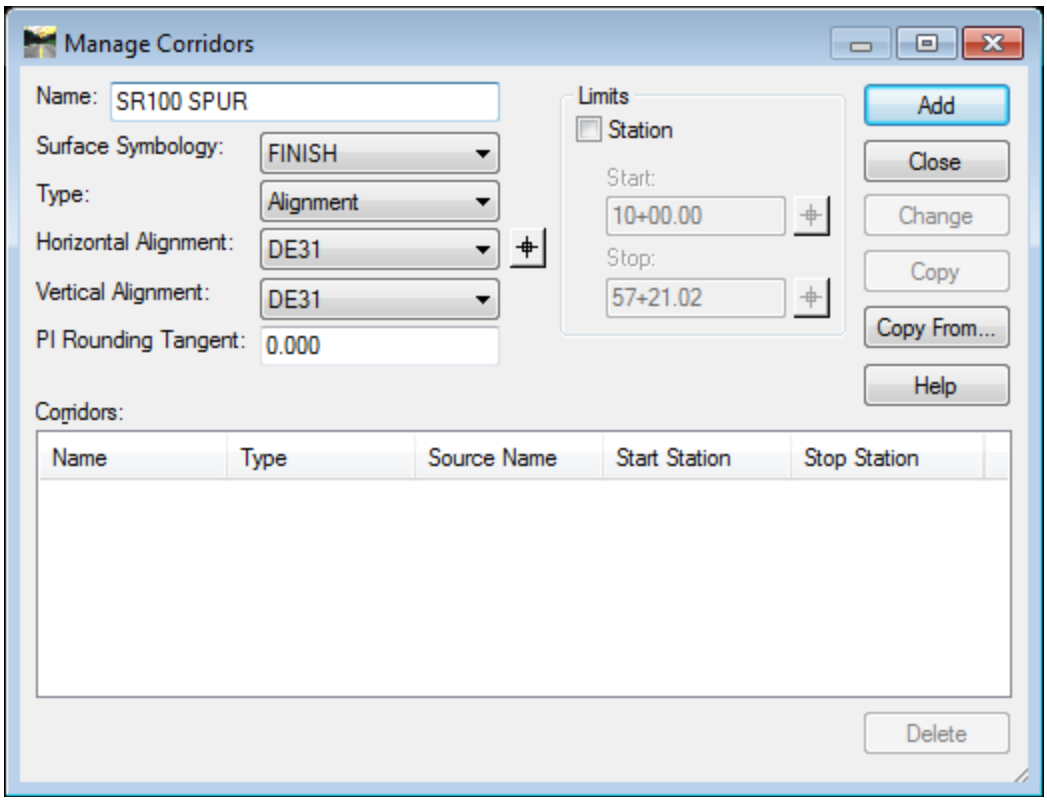
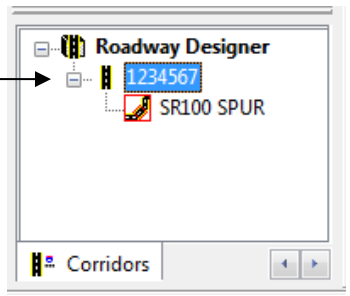


Figure L8-5 Manage Corridors

14.	**Ensure 'SR100 SPUR' is The Active Corridor.** • In the InRoads Workspace bar, expand the Roadway Design file **1234567** and ensure the Corridor **SR100 SPUR** is listed and has a Red square around it as shown here indicating it is the Active Corridor. The Corridor *SR100 SPUR* should now be listed under the Roadway Design *1234567* and have a Red square around it indicating it is the Active Corridor.  • In the **<u>Roadway Designer</u>** Window, use the pull down arrow next to the **Corridor:** field to ensure ***SR100 SPUR*** is listed as shown in *Figure L8-6*. • In the **<u>Roadway Designer</u>** Window, select **File ► Save**. *'SR100 SPUR' has been created and is now the Active Corridor.*

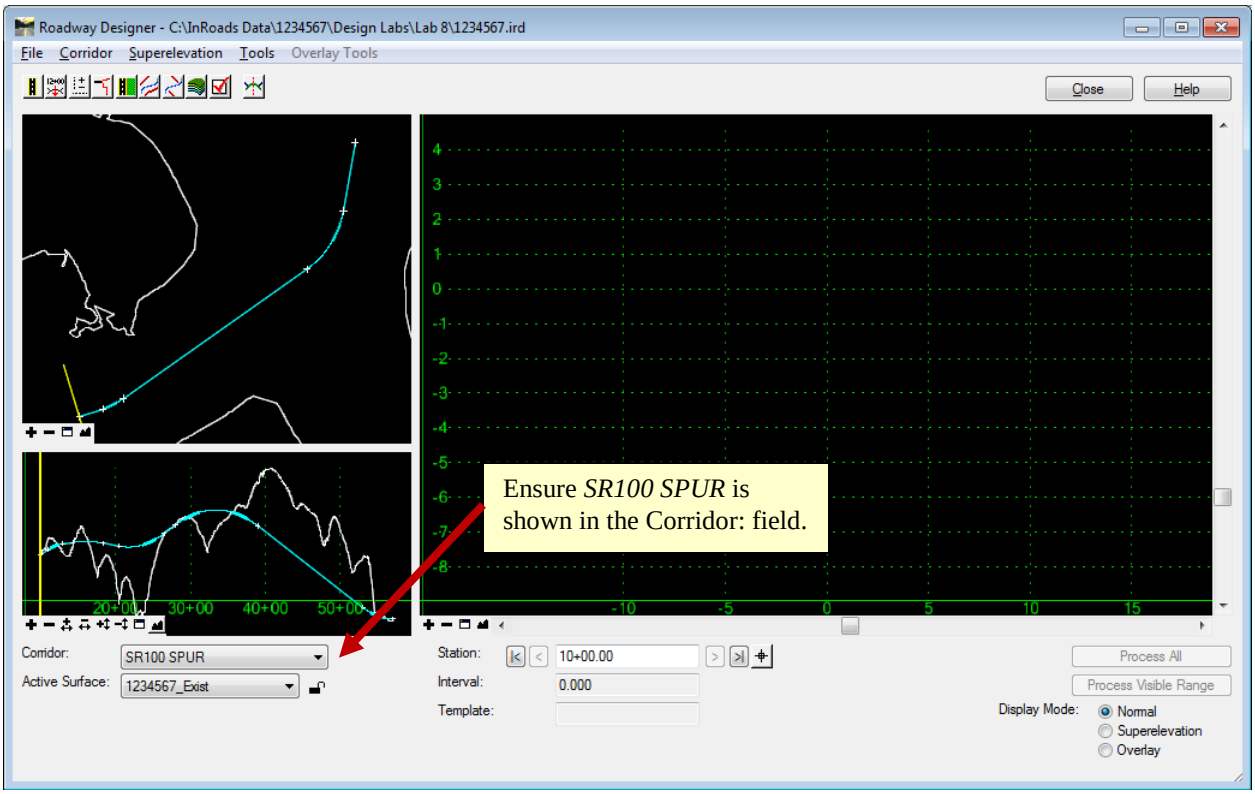


Figure L8-6 Roadway Designer

Lab 8C Add the Templates 'Two-Lane' and 'Two-Lane w/ Right Turn Lane' To The Corridor and Transition between the Two Templates

Once a template has been created with the Create Template tool as was shown in Lab 7, it is then placed or 'dropped' into a corridor at the desired Stations. In Lab 8C, you will place a Typical Section named **'Two_Lane'** as shown in *Figure L8-7* and a Typical Section named **'Two-Lane w/ Right Turn Lane'** as shown in *Figure L8-8* onto the corridor ***SR100 SPUR.*** You will also transition between the two templates so that a gradual taper occurs rather than a sudden change.

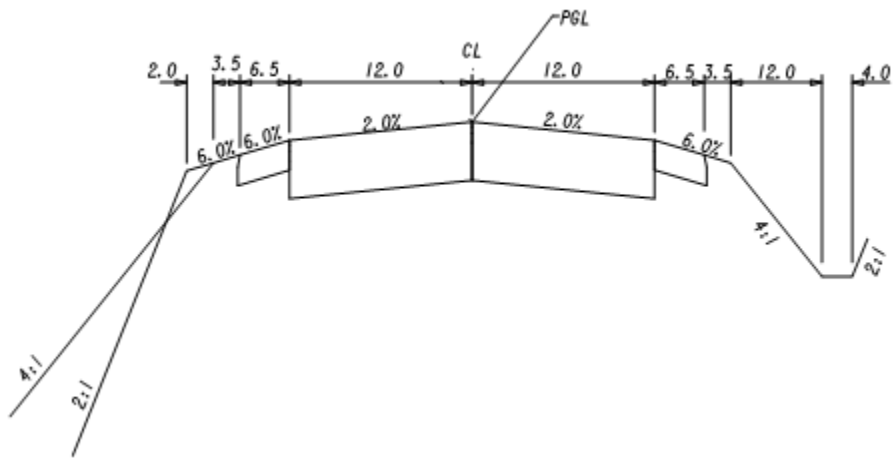


Figure L8-7 Two-Lane Typical

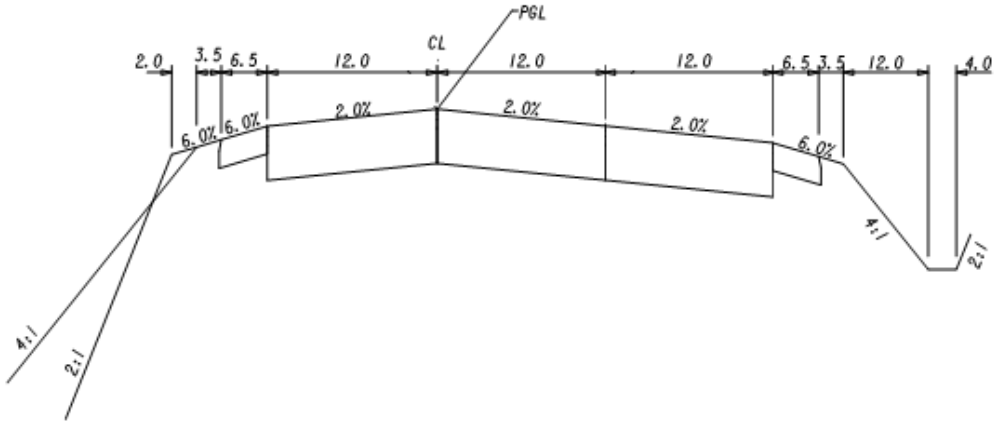


Figure L8-8 Two-Lane w/ Right Turn Lane Typical

15.	**Open the <u>Template Drops</u> Window.** • In the **<u>Roadway Designer</u>** Window, select **Corridor ► Template Drops**. The **<u>Template Drops</u>** dialog opens as shown in *Figure L8-9*.

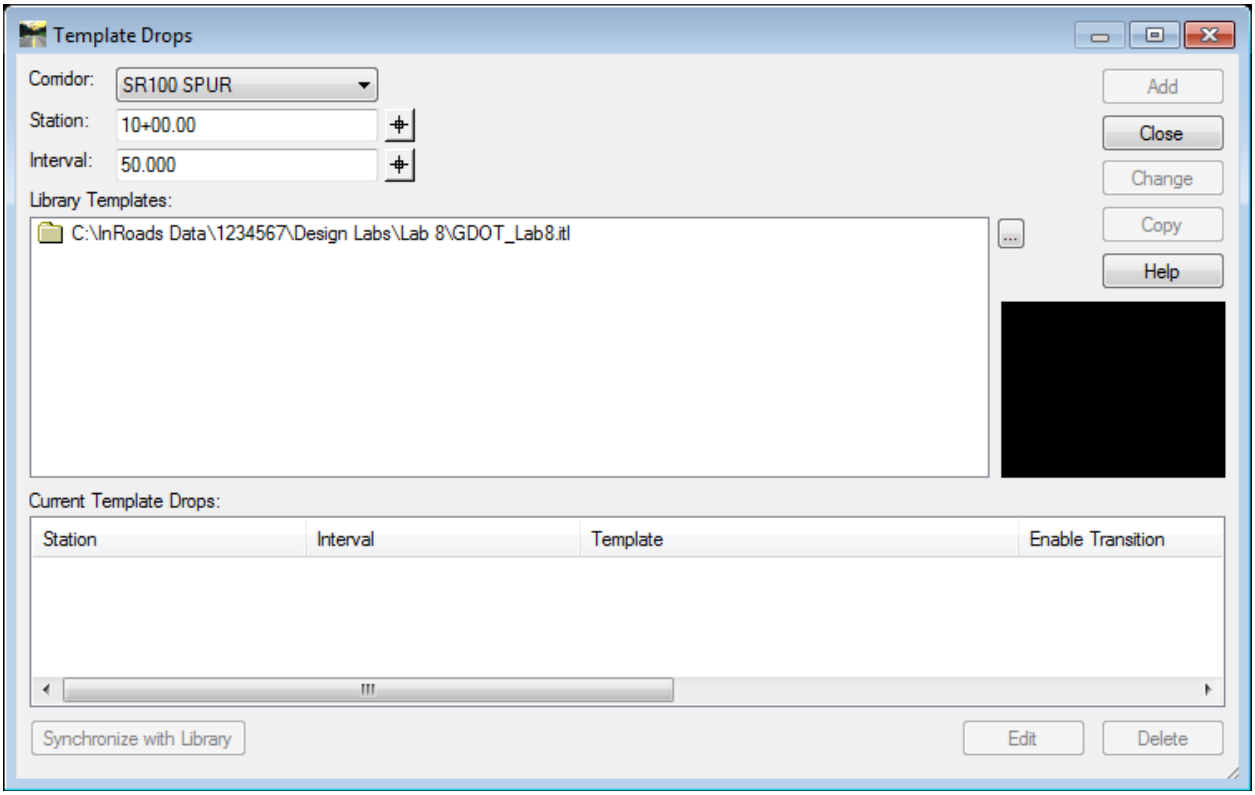
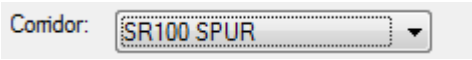


Figure L8-9 Template Drops

16.	**Set the Corridor:** • In the **<u>Template Drops</u>** dialog, use the pull down arrow and ensure the **Corridor:** is set to ***SR100 SPUR*** as shown here. 
17.	**Set the Station:** • In the **<u>Template Drops</u>** dialog, enter the **Station:** ***10+00.00*** as shown below. This Station is where the template will begin and will be placed at every station from there forward until the project ends or another template is dropped.

18.	**Set the Interval:** • In the **<u>Template Drops</u>** dialog, enter an **Interval:** value of ***25*** as shown here. The **Interval:** specifies how often to place the template in feet. A value of ***25*** will drop the template every 25 feet. Interval: 25.000 ***IMPORTANT:** *When choosing an Interval it is recommended to select a value based on how often you intend to show cross sections on the cross section sheets. It is recommended that if 100 foot stationing is desired then a 50' interval be entered, if 50 foot stationing is desired then a 25' interval be entered and if 40 foot stationing is desired then a 20' interval be entered, etc.*
19.	**Add the 'Two Lane' Typical at Station 10+00.00** • In the **<u>Template Drops</u>** dialog, open the ***1234567*** folder and highlight the **Two Lane** Template as shown here. C:\InRoads Data\1234567\Design Labs\Lab 8\GDOT_Lab8.itl 1234567 Two Lane Two Lane w/ Right Turn Lane • Click the **Add** button but **<u>do not</u>** close the **<u>Template Drops</u>** dialog. The ***Two Lane*** Template is added to the **Current Template Drops:** field as shown in *Figure L8-10*.

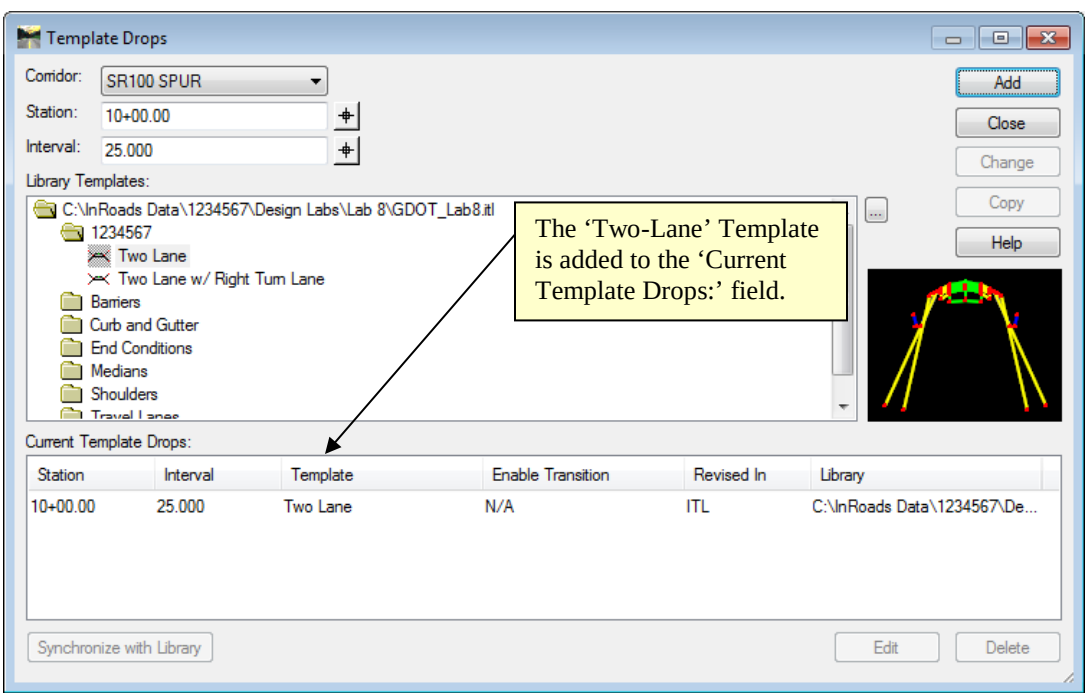


Figure L8-10 Template Drops

20.	**Add the 'Two Lane' Template at Station 51+72.00. This is the Station where the 'Two Lane' Template will end and begin transitioning to the 'Two Lane w/ Right Turn Lane' Template which we will add in the next step.** • In the **<u>Template Drops</u>** dialog, key-in a **Station:** of ***51+72.00*** • Highlight the ***Two Lane*** Template. • Ensure your entries match those shown in *Figure L8-11*. • Click **Add** but **<u>do not</u>** close the **<u>Template Drops</u>** dialog. • The ***Two Lane*** Template is added to the **Current Template Drops:** field as shown in *Figure L8-12*.

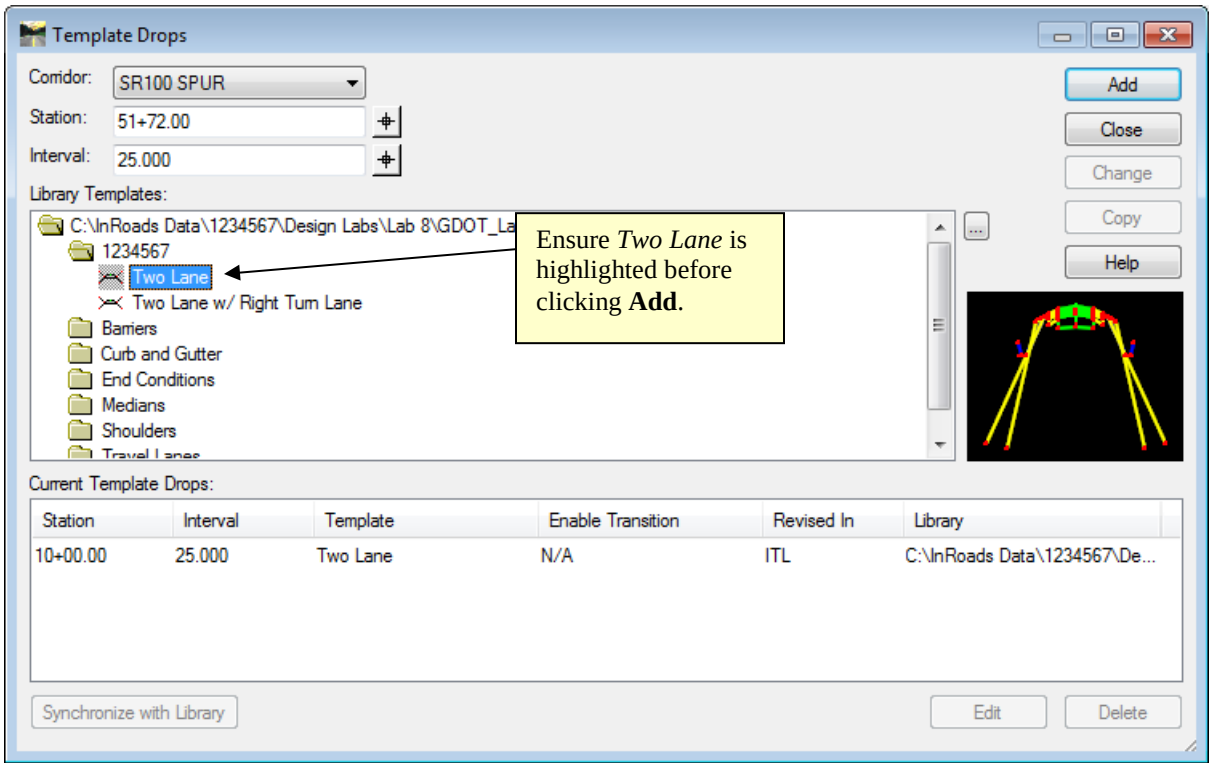


Figure L8-11 Template Drops

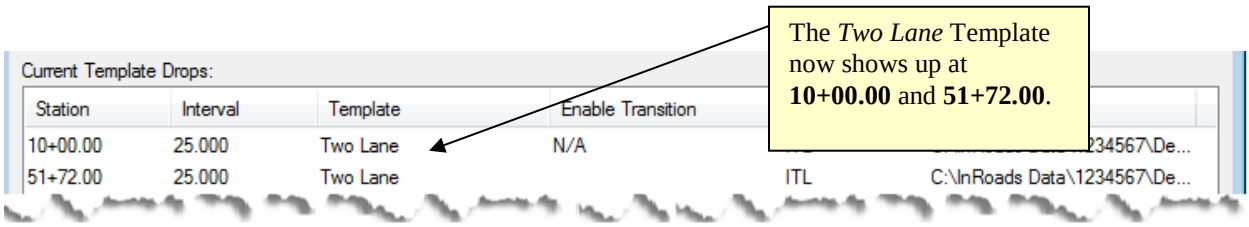


Figure L8-12 Template Drops

21.	**Add the 'Two Lane w/ Right Turn Lane' Template at Station 53+22.00.** • In the **Template Drops** dialog, key-in a **Station:** of ***53+22.00***. • Highlight the ***Two Lane w/ Right Turn Lane*** Template. • Ensure your entries match those shown in *Figure L8-13*. • Click **Add** but **do not** close the **Template Drops** dialog. • The ***Two Lane w/ Right Turn Lane*** Template is added to the **Current Template Drops**: field as shown in *Figure L8-14*. • Notice, in *Figure L8-14*, an '**X**' is shown in the **Enable Transition** column next to the ***Two Lane w/ Right Turn Lane*** Template. An '**X**' in the field indicates a transition between the two differing templates exists and must be resolved.

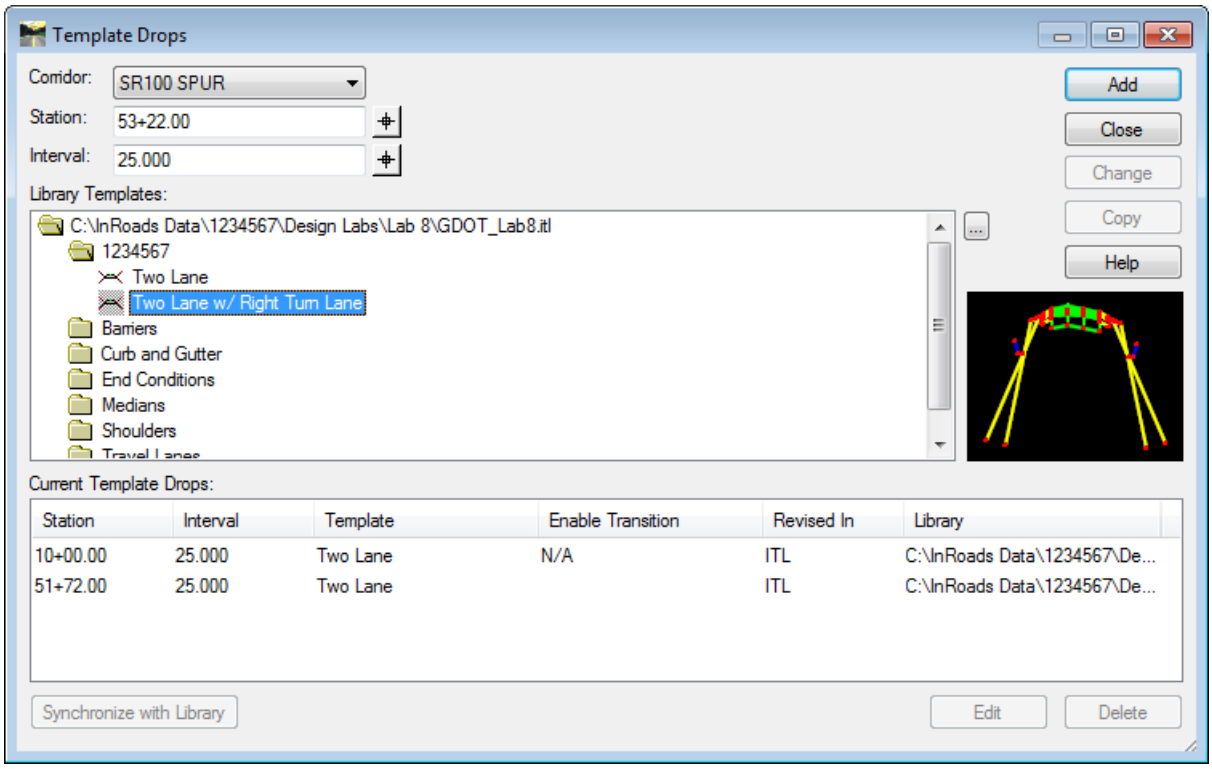


Figure L8-13 Template Drops

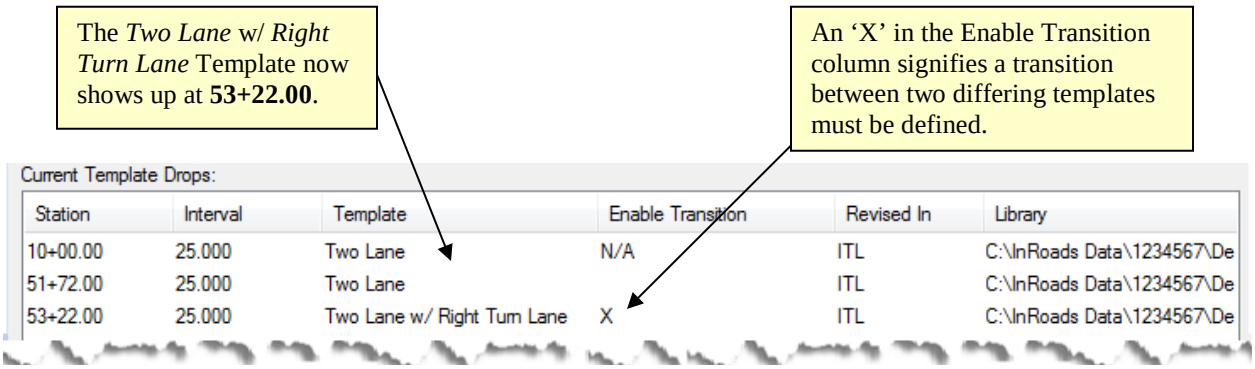


Figure L8-14 Template Drops

22.	**Before closing the <u>Template Drops</u> dialog to resolve the transitions, let's look at the Template Drops dialog a little further.** • Highlight Station **53+22.00** in the **Current Template Drops:** field. • Notice the **Edit** button becomes active as shown in *Figure L8-15*. • Click the **Edit** button. The **<u>Editing Roadway Designer Template Drop</u>** Window opens as shown in *Figure L8-16*. • Continue to **Step 23**.

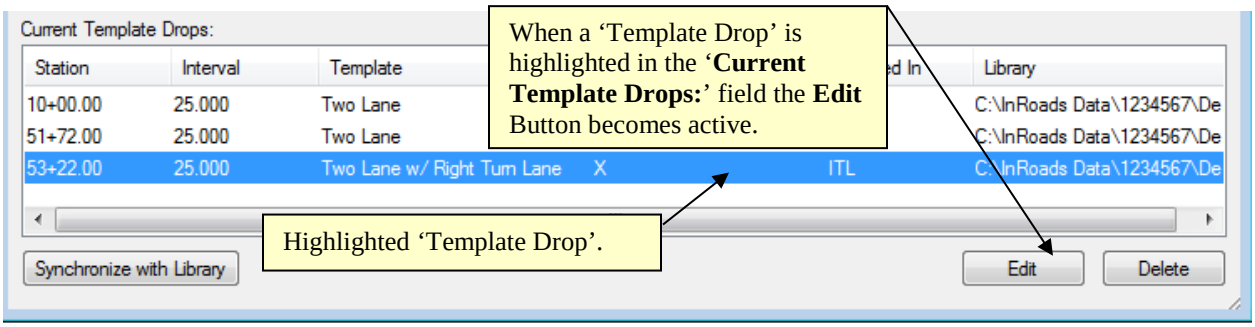


Figure L8-15 Template Drops

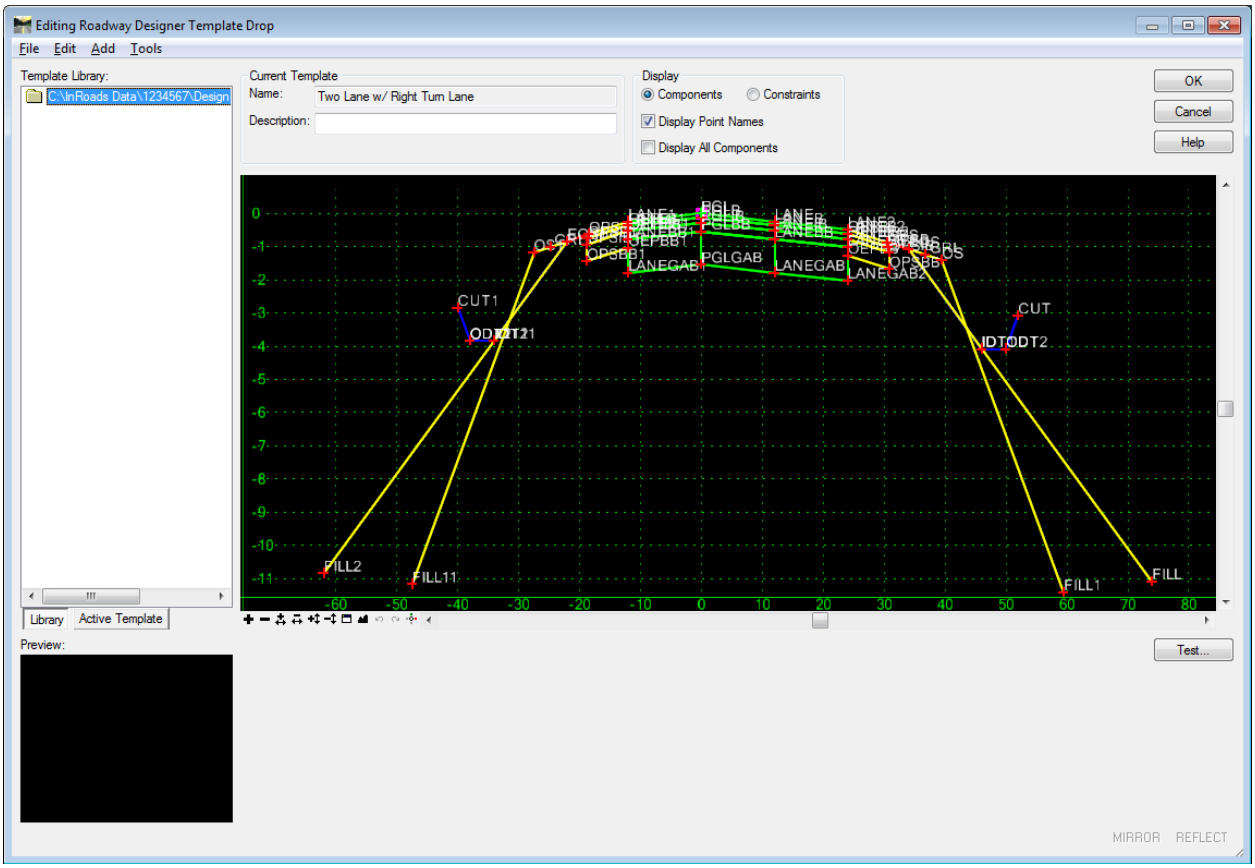


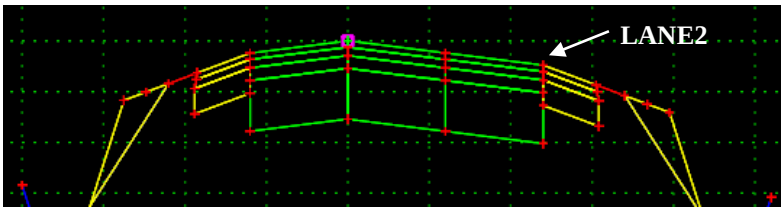
Figure L8-16 Editing Roadway Designer Template Drop

23. **IMPORTANT:**

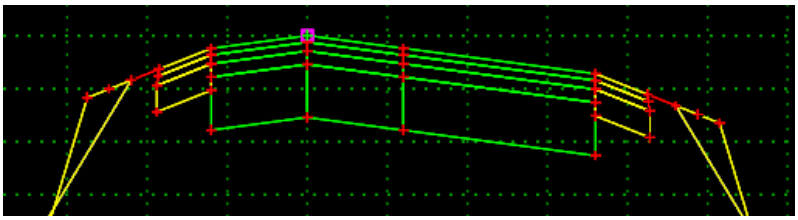
*The Editing Roadway Designer Template Drops Window looks and functions the same as the Create Template Window. Editing a Template in the Roadway Designer does **NOT**, however, save Template changes to the Template Library (.ITL). The change is only saved in the Roadway Design file (.IRD).*

24. **While still in the Editing Roadway Designer Template Drop Window, edit the Right Turn Lane to be 24' Wide.**

- Double click Point **LANE2** as shown here to open the **Point Properties** dialog. Zoom in and out as necessary to assist in locating the Point and remember… Point names may be turned on and off by checking and un-checking the **Display Point Names** check box as desired.



- Change the **Horizontal Constraint** value from 12.000 to ***24.000***.
- Ensure your entries match those shown in *Figure L8-17*.
- Click **Apply** and **Close**.
- Click the **Fit** button, (located at the bottom left of the **Editing Roadway Designer Template Drop** grid) to fit the view.
- The Right Turn Lane is now 24' wide as shown here.



- Click **OK** to close the **Editing Roadway Designer Template Drop** Window and return to the **Template Drops** dialog.
- **DO NOT** close the **Template Drops** dialog.

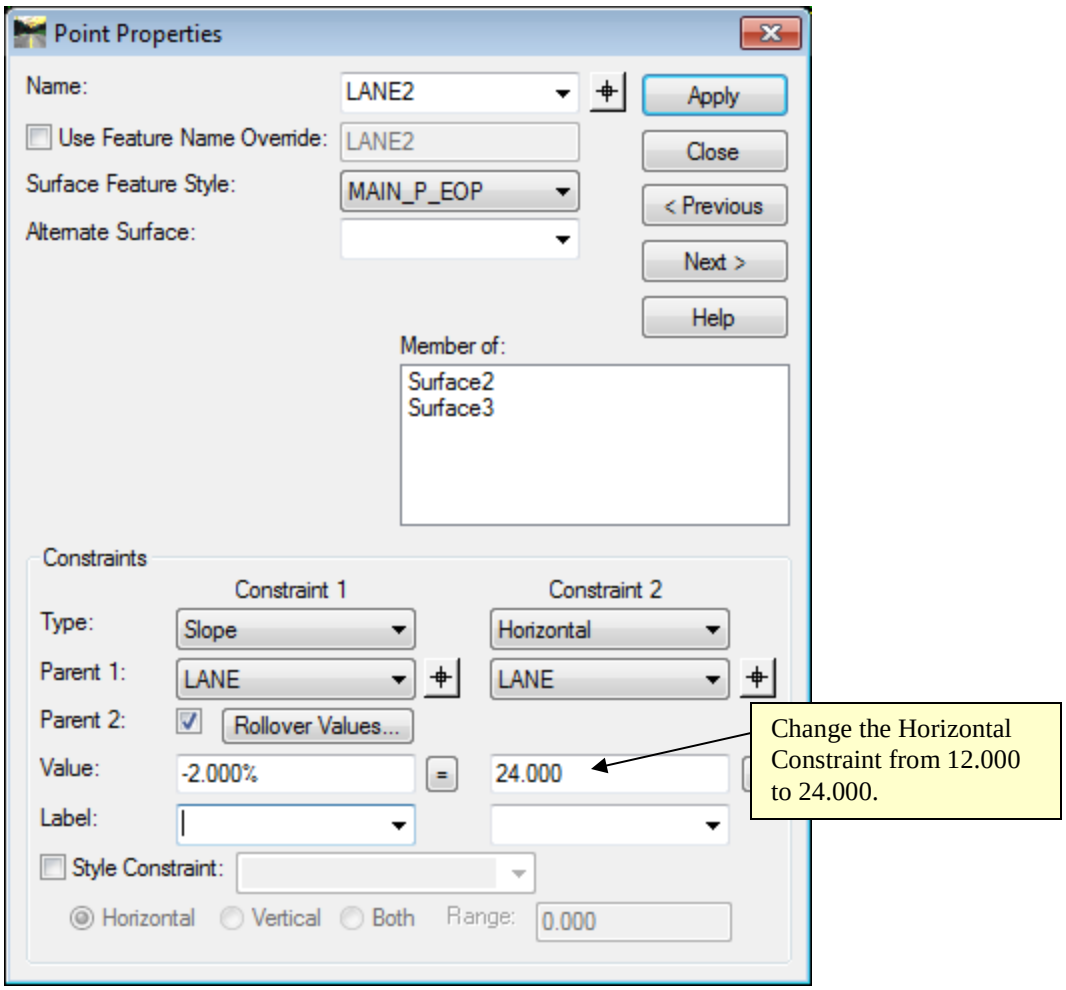


Figure L8-17 Point Properties

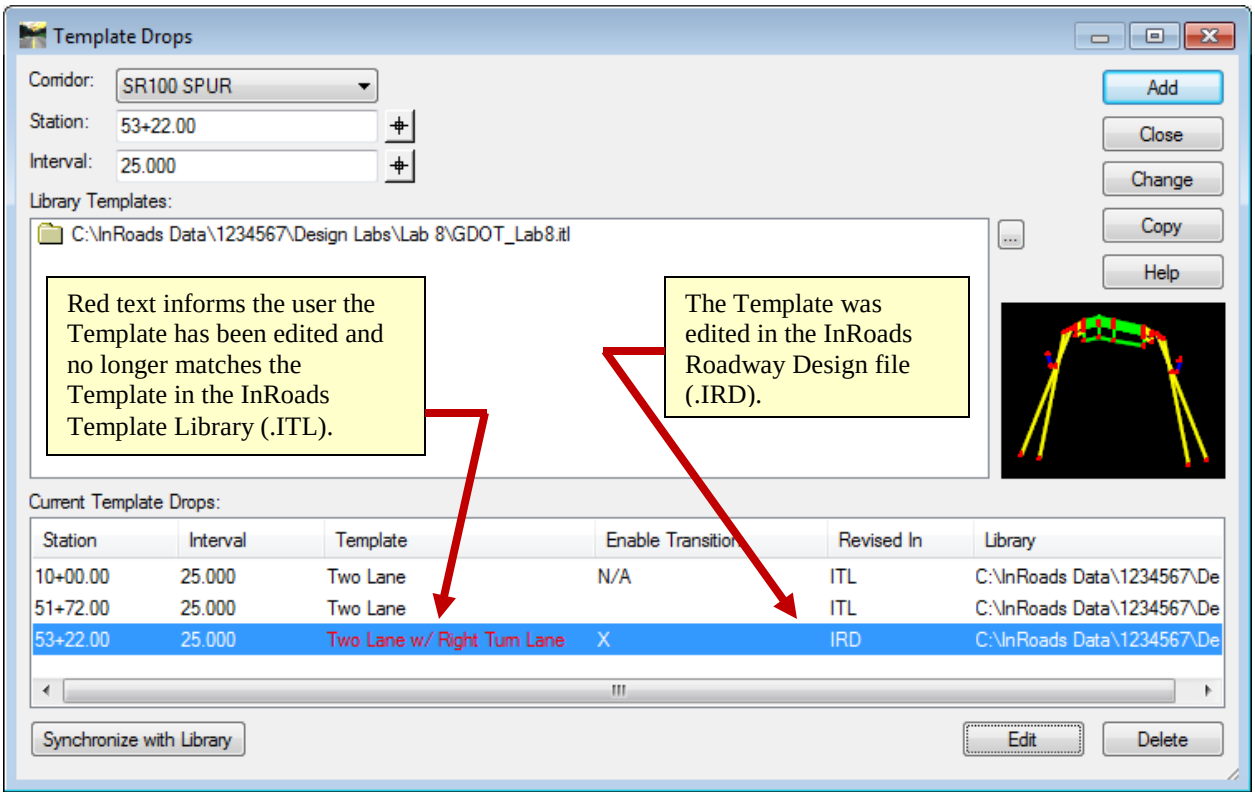
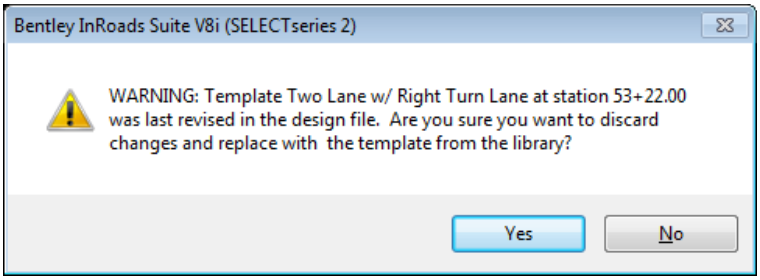


Figure L8-18 Template Drops

25.	**For Information Only:** Notice, in *Figure L8-18* above, that the Template ***Two Lane w/Right Turn Lane*** has turned from black to **red**. This indicates the Template has been edited and no longer matches the Template in the InRoads Template Library (.ITL). The **'Revised In'** column tells where the edit was made. In this case the change was made in the InRoads Roadway Design file (.IRD). Template changes made in the Roadway Design file (.IRD) cannot be saved back to the Template Library (.ITL) as a new Template. It is **highly recommended** that all necessary Template changes be made in the InRoads Template Library (.ITL) and that new Templates be created rather than editing the Roadway Design file (.IRD). The **Synchronize with Library** button is often utilized during cross section development to return edited Templates to the unedited state in the InRoads Template Library (.ITL) which in turn causes all edits made in the Roadway Design file (.IRD) to be lost. ***Additionally*:** **Red** Station text – Geometry has changed and stationing is invalid. **Red** template library (.ITL) – Template did not come from the active template library. **Red** template text – Template has been modified from that stored in the ITL. **Blue** template text – Template does not exist in the active template library. • This information and more is also available via the **Help** button. Click the **Help** button and take a moment to review the information available.

26. **As stated previously, the 'Synchronize with Library' button removes all Template edits and restores the Template to its original condition found in the Template Library (.ITL). The widening of the turn lane to 24' in Step 24 will be undone by using the 'Synchronize with Library' button.**

- In the **Template Drops** dialog, ensure the Template Drop at Station **53+22.00** is highlighted as shown in *Figure L8-19*.
- Click the **Synchronize with Library** button. The following warning message appears.



- Click **Yes**.
- Notice the Template is no longer **Red** and the '**Revised In'** column returns to **ITL**.
- Click **Close** to exit the **Template Drops** dialog.

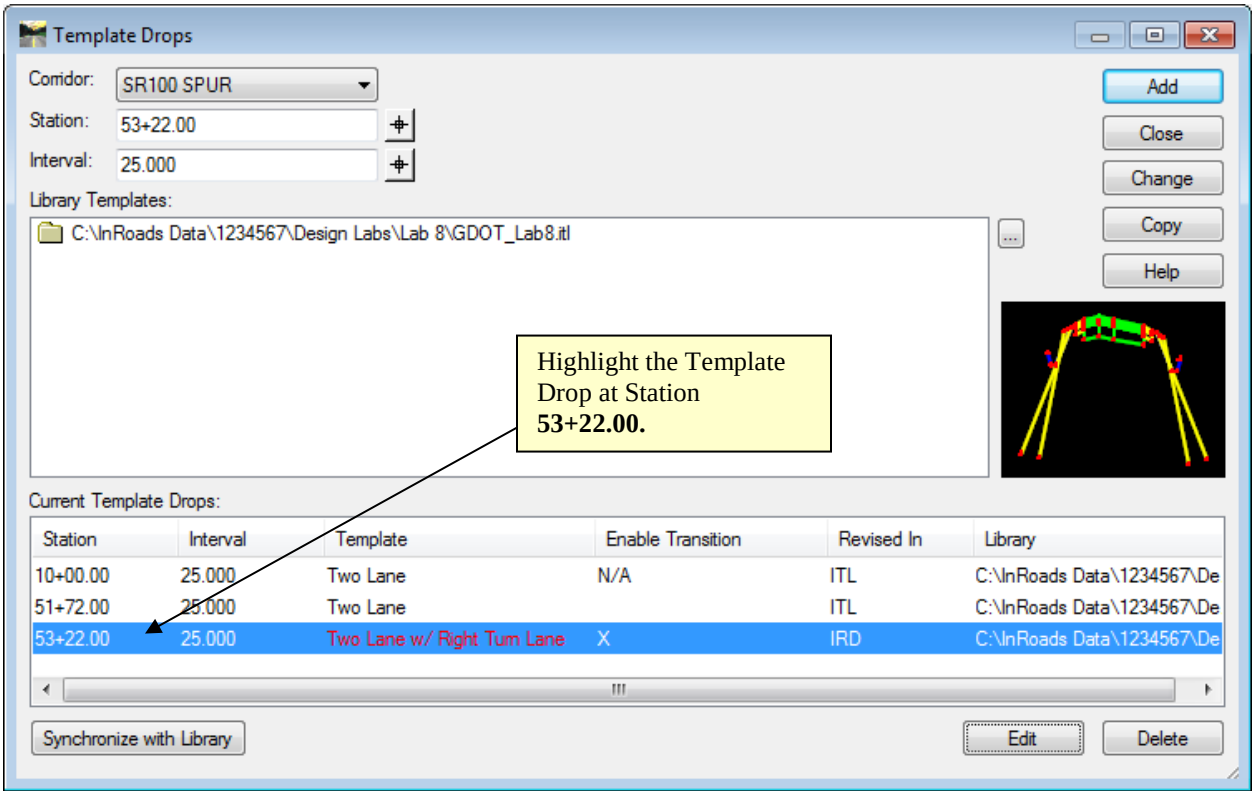


Figure L8-19 Template Drops

27.	**Process the Template Drops.** • In the **Roadway Designer** Plan View, click the **Fit** button ( ) as shown in *Figure L8-20* to fit the view. ***NOTE:** *The Plan, Profile and Cross Section Windows of the Roadway Designer can all be resized to your preference by holding your cursor over the edges of the windows and dragging. Try it.* • In the **Roadway Designer** Cross Section View, click the **Fit** button ( ) or zoom in so that your view appears similar to *Figure L8-20*. • Click the **Process All** button. • If a **Results** window opens, click **Close** to close the **Results** window.

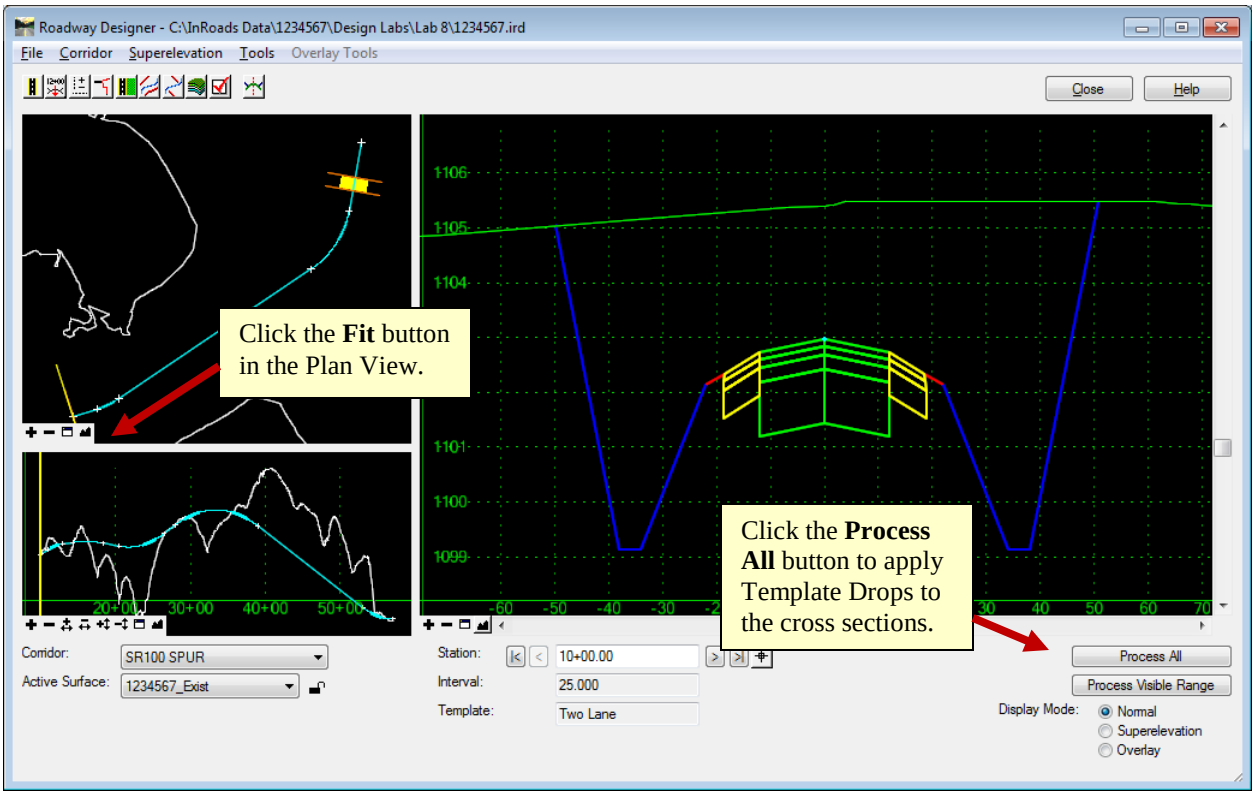
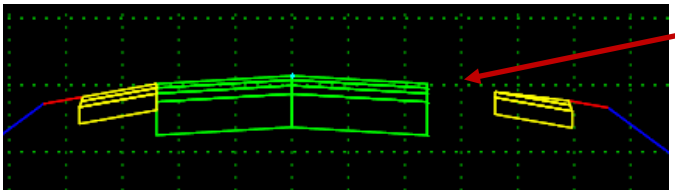


Figure L8-20 Roadway Designer

28. **Review Stations 51+72.00 to 53+22.00.**

- In the **Roadway Designer**, key-in ***51+72.00*** in the **Station:** field as shown in *Figure L8-21*.
- Click the Right Arrow button ( ) to review stations **51+72.00** to **53+22.00**.
- Notice the gap that develops as you get closer to station **53+22.00** as shown here. The gap is the result of two different Templates not having the transition between the two resolved.



Notice the gap that develops as you review stations **51+72.00** to **53+22.00**.

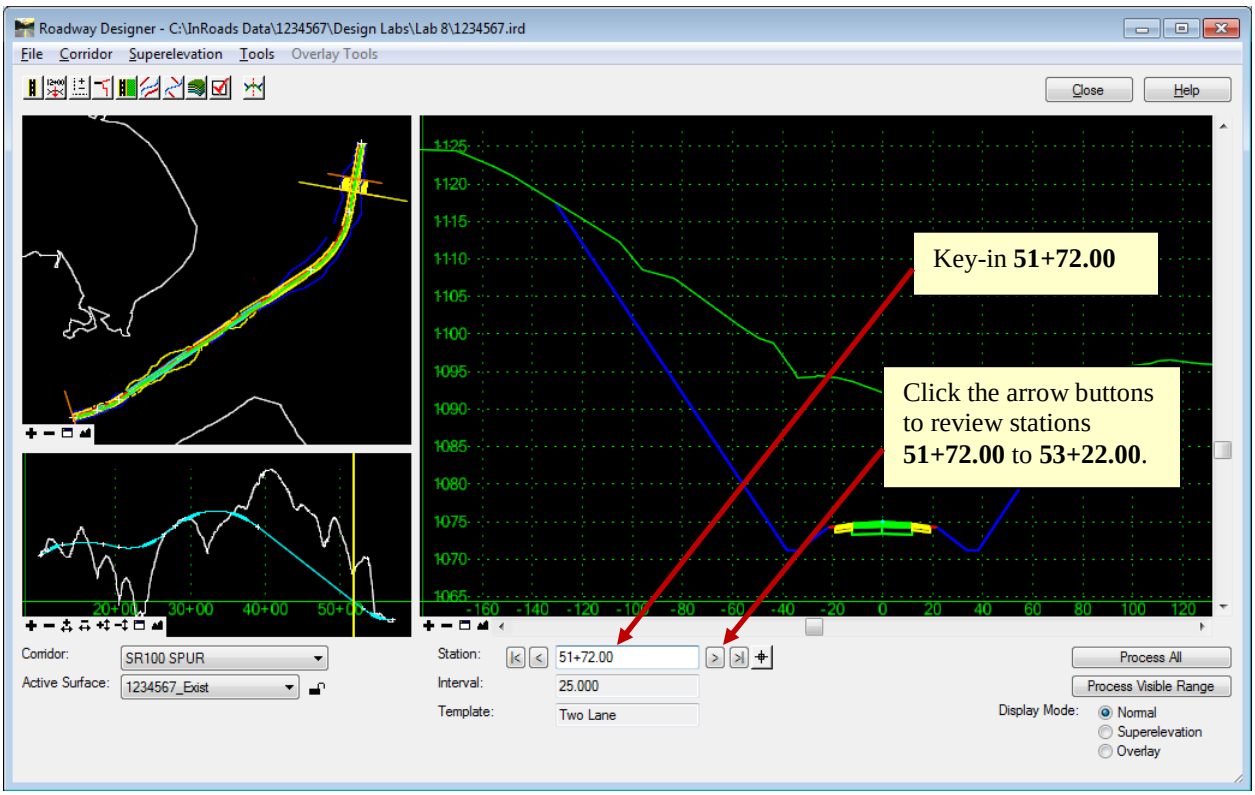
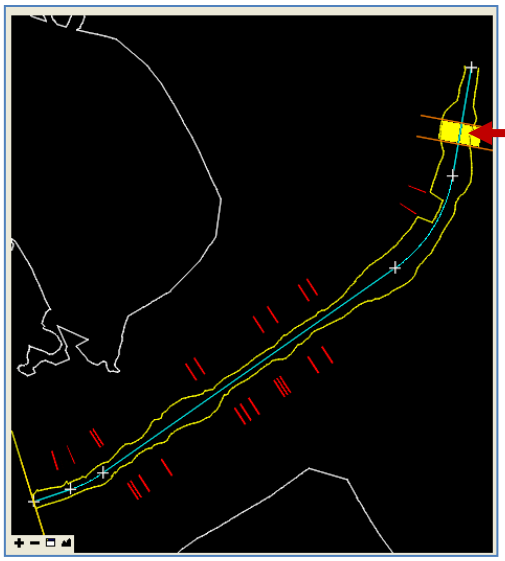


Figure L8-21 Roadway Designer

29. **As stated earlier, when two differing Templates are placed, the transition between the two must be defined. In this case the transition between the 'Two Lane' Template and the 'Two Lane w/ Right Turn Lane' Template must be resolved. Open the Edit Transition window.**

- Double click the Yellow transition zone in the Plan View as shown here. The **Edit Transition** window opens as shown in *Figure L8-22*.



***NOTE on Graphics in Plan View**: A Yellow transition zone indicates no editing to the transition has occurred. A Light Blue transition zone indicates some editing has occurred. A Dark Blue transition zone indicates all transitioning has been accounted for. The Orange lines on either side of the transition zone indicate Template Drop locations.

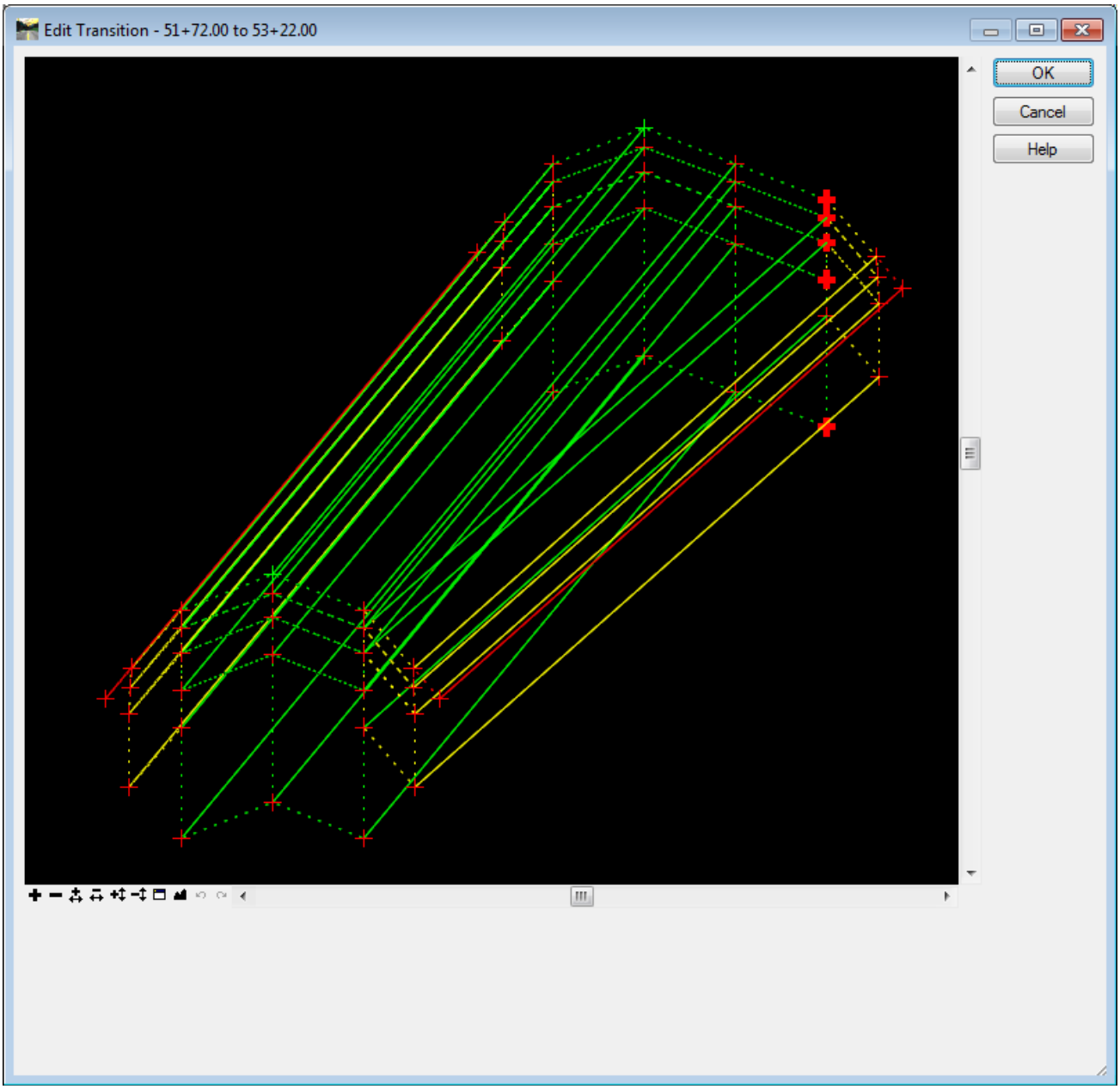


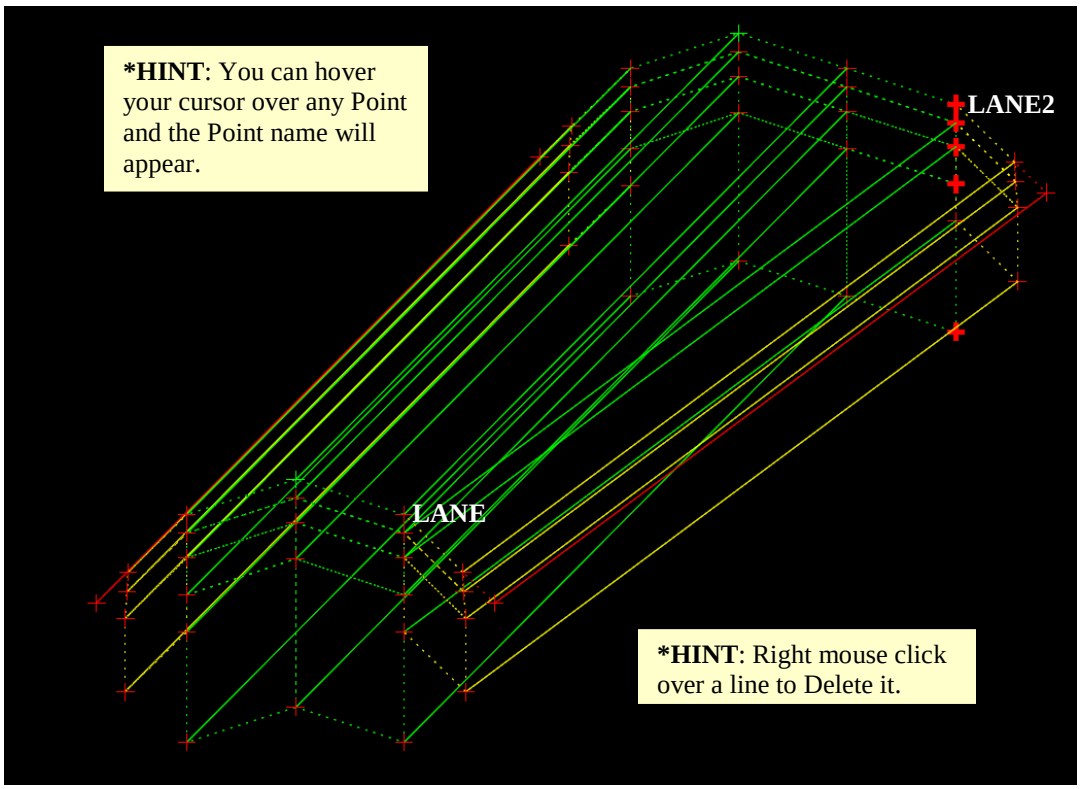
Figure L8-22 Edit Transitions

30. **Move the Template to get a better view.**

- Right mouse click over any Red, Green or Yellow plus symbol in the **Edit Transition** window and select **Move Template**.
- Move your cursor around the Window to see how the Template can be moved.
- Left click anywhere in the view to stop moving the Template.

31. **Bold Colored Plus Symbols indicate Connectivity is Undefined. Connectivity is made by Left clicking on a Bold Point and dragging a line to the Point it should transition from. Define Connectivity for the Point LANE2 to the Point LANE.**

- Left click on the Bold Point, **LANE2**, identified here. A dynamic transition line now follows your cursor.



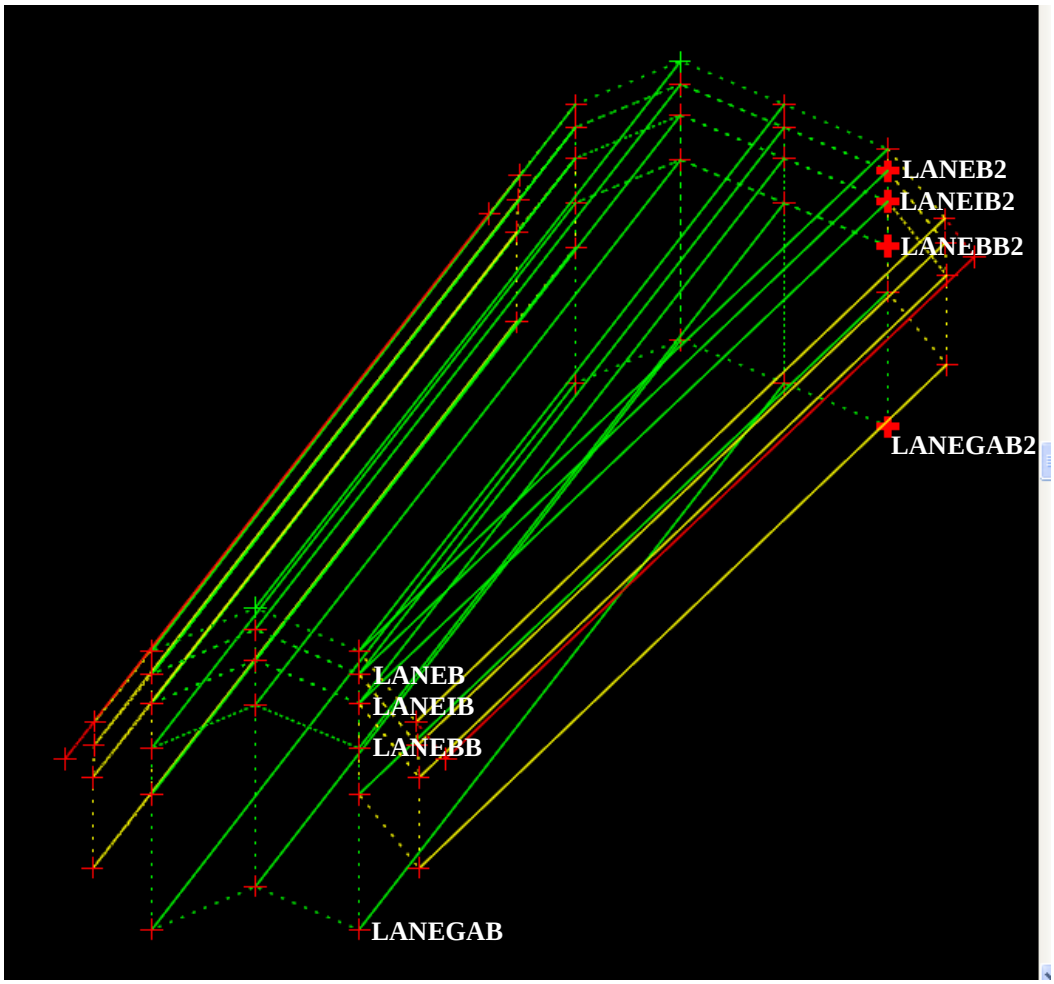
- **LANE2** is the Outside Surface Point of the Right Turn Lane and will be connected to the Point **LANE**, located on the Outside Surface Point of the right side travel lane identified above. Left click on the Point **LANE**.

***HINT:** If you make a mistake, Right mouse click over the incorrect placement and select **Delete** then try again.

- Notice the Bold Plus associated with the Point **LANE2** is no longer bold indicating it now has connectivity.

32. **Define the Connectivity for the remaining unconnected Points.**

- Left click on Point **LANEB2** to engage the transition line.



- Left click on Point **LANEB** to define the transition.
- Left click on Point **LANEIB2** and connect to **LANEIB**.
- Left click on Point **LANEBB2** and connect to **LANEBB**.
- Left click on Point **LANEGAB2** and connect to **LANEGAB**.
- Click **OK**. A **Reminder** dialog opens. Read the **Reminder**.
- Click **OK** to close the **Reminder**. The **<u>Edit Transition Midpoint</u>** Window opens as shown in *Figure L8-23*.

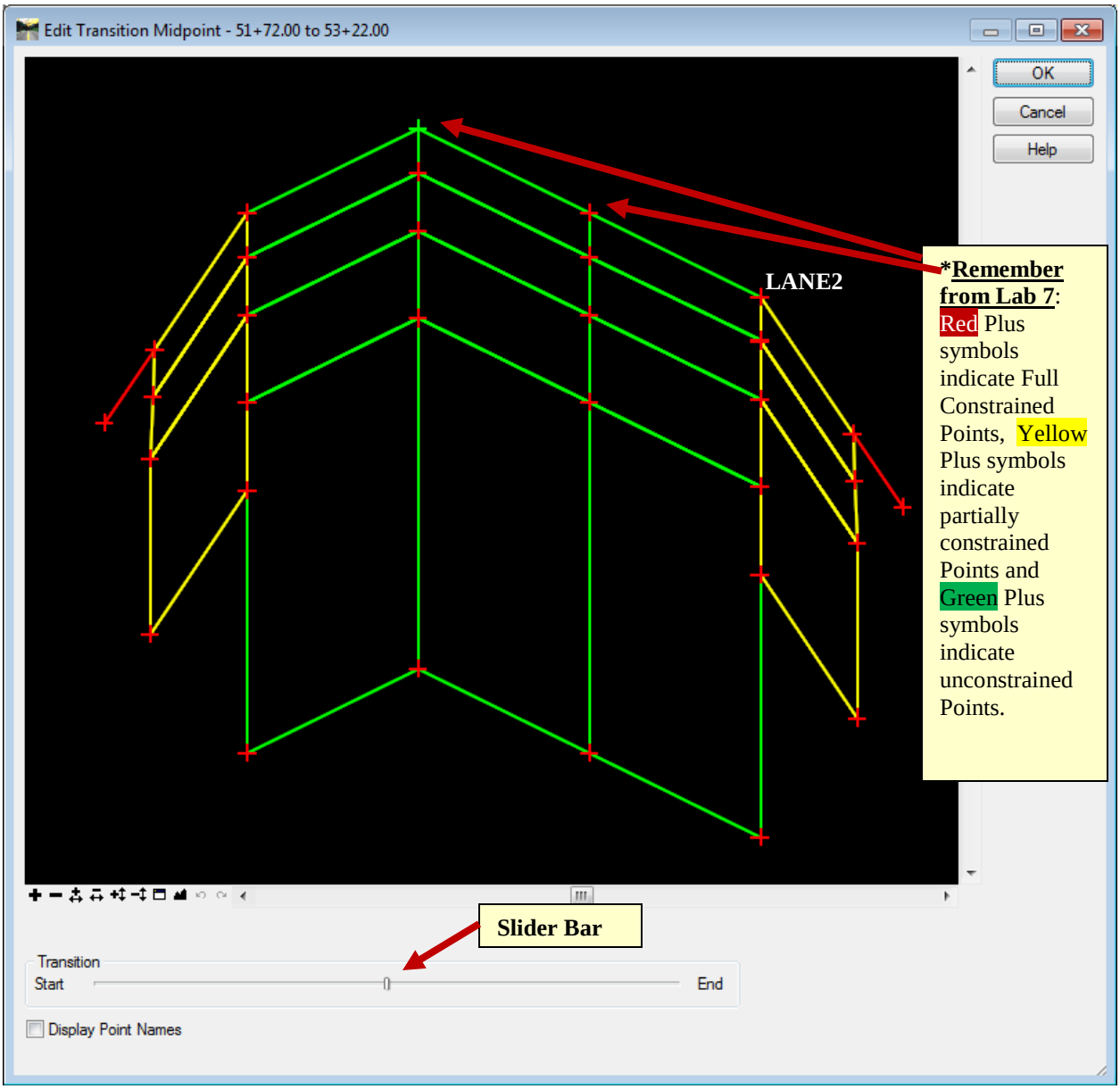
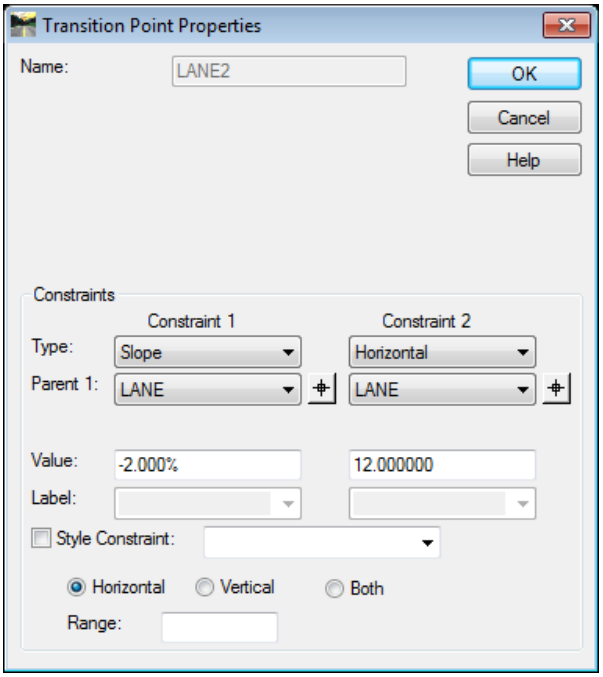


Figure L8-23 Edit Transition Midpoint

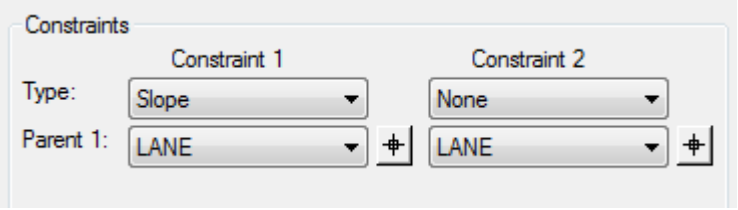
33.	**The <u>Edit Transition Midpoint</u> dialog allows you to interactively test the transition and to make edits to the Point Constraints as necessary in order for the transition to behave properly. Test the Transition.** • In the **<u>Edit Transition Midpoint</u>** Window, drag the **Slider Bar** to view how the transition widens and narrows the turn lane from beginning to end. • Notice <u>no transition</u> occurred. This informs you that the transition requires additional edits to function properly.

34. **The Reason the Transition did not occur properly is because the Turn Lane is Fully constrained, as can be seen by the Red Plus on the Point LANE2 identified in *Figure L8-23*. Edit the Point Constraints to allow the Transition to occur.**

- In the **Edit Transition Midpoint** Window, double click the point **LANE2** identified in *Figure L8-23*.
- The **Transition Point Properties** dialog opens as shown here.



- Remove the **Horizontal** constraint from **Constraint 2** by using the pull down arrow to select ***None*** as shown here.



- Click **OK**. The **Transition Point Properties** dialog closes and you are returned to the **Edit Transition Midpoint** Window.
- Notice Point **LANE2** is now shown with a Yellow Plus Symbol meaning it is partially constrained. By removing the **Horizontal** constraint the component is free to transition properly.
- In the **Edit Transition Midpoint** Window, drag the **Slider Bar** to view how the transition widens and narrows the turn lane from beginning to end.
- Click **OK** to close the **Edit Transition Midpoint** Window.

35.	**Even though the transition was defined in the <u>Edit Transition</u> Window it must still be processed in the Roadway Designer.** • In the **<u>Roadway Designer</u>**, click the **Process All** button. • **Close** the **<u>Results</u>** Report if it opens.
36.	**The Plan View shown in *Figure L8-24* now shows a Dark Blue transition zone. As stated earlier a Dark Blue transition zone indicates the transition between the two templates has been accounted for. The long Yellow line in the transition zone indicates the current station in the cross section window and can be dragged to any station.** • Left click on the Yellow line (in the Plan Window) and drag it to another station. Notice the Cross Section Window goes to the Station where the yellow line is. • The same function is available with the long Yellow line in the Profile Window. Drag the Yellow line in the Profile Window to see how it changes the Station in the Cross Section Window. • Take a moment to look at Stations **51+72.00** to **53+22.00** and review the transition we just defined.

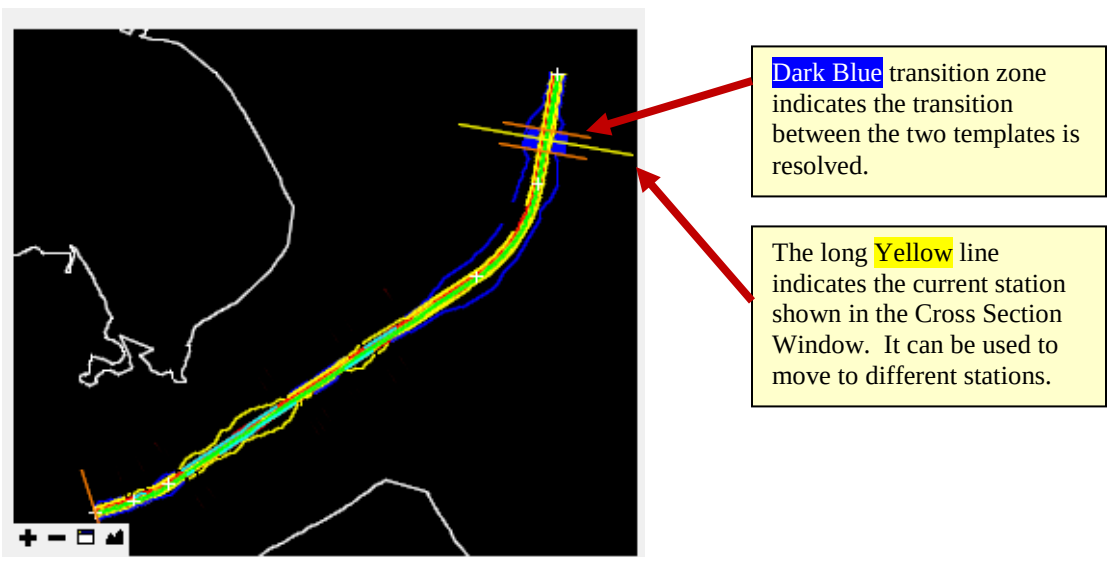


Figure L8-24 Roadway Designer – Plan View

37.	**Save your work.** • In the InRoads **<u>Roadway Designer,</u>** select **File ► Save**.
38.	**Exit the Roadway Designer** • In the InRoads **<u>Roadway Designer</u>**, select **File ► Close**.

Lab 8D Point Controls

Point Controls are used to override the horizontal and vertical control of a Point's normal constraints in a component. They are most often used to make a Point follow a horizontal or vertical alignment or both. In Lab 8D we will use Point Controls to control the Point **LANE1**, identified in *Figure L8-25*, with a horizontal alignment to follow the edge of travel lane Alignment **DE32**, identified in *Figure L8-26*, between stations **27+87.00** and **37+43.00**.

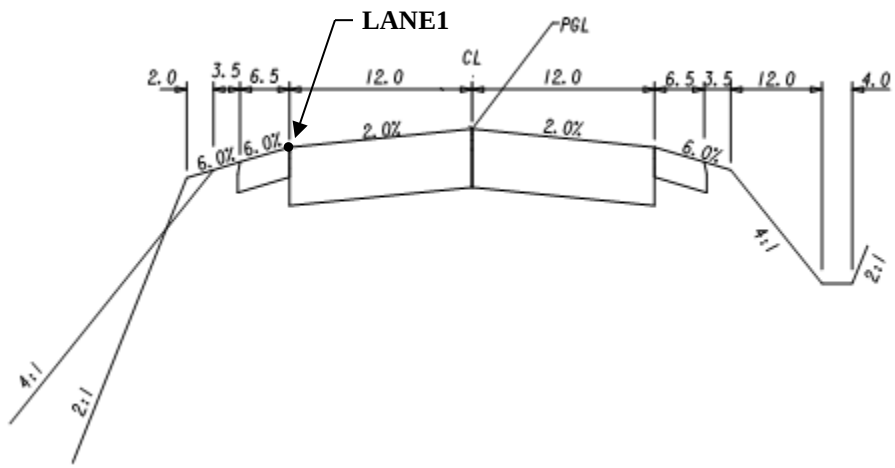


Figure L8-25 Two-Lane Template

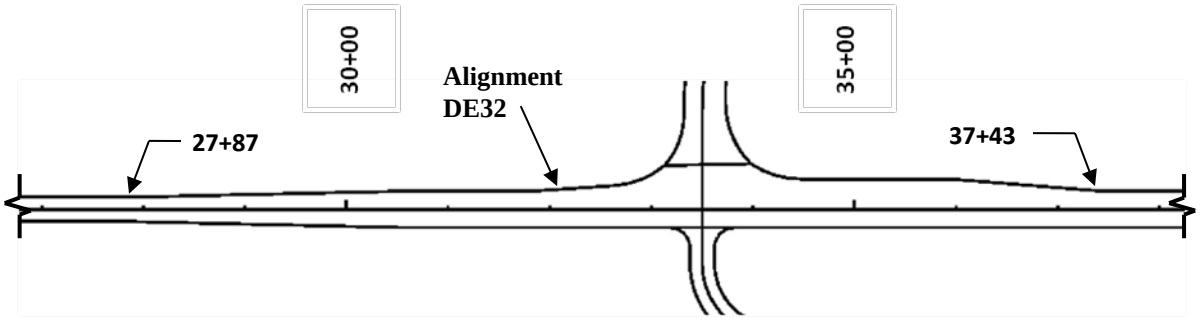


Figure L8-26 Plan View

39.	**If <u>not</u> still open from the Previous Section, open MicroStation and InRoads and the following files. Refer to Lab Section 8A for Help. (Omit this step if files are open).** ➢ GDOT 3D Working File.dgn ➢ 1234567_Exist.dtm ➢ GDOT_Lab8.itl ➢ 1234567_Design.alg ➢ 1234567.ird (Created in Lab 8C).
40.	**If Not Already Clear, clear the MicroStation Window.** • In MicroStation, select **Edit ►Select All**. • Click the Delete Icon (✕).
41.	**Open the <u>View Horizontal Annotation</u> Dialog.** • In InRoads, select **Geometry ► View Geometry ► Horizontal Annotation**.
42.	**Load the 'NO BEARING & DISTANCE' Preference.** • In the **<u>View Horizontal Annotation</u>** dialog, click the **Preferences** button. The **<u>Preferences</u>** dialog opens. • Highlight the **NO BEARING & DISTANCE** Preference. This Preference loads the settings to view the alignments without annotating the bearing and distance. • Click **Load** and **Close**.
43.	**Open the Geometry Selection Filter for Horizontal Alignments to Select All Alignments for Viewing.** • In the **<u>View Horizontal Annotation</u>** dialog, place your cursor in the **Horizontal Alignments Include:** field to activate the **Filter** button. • Click the **Filter** button. The **<u>Geometry Selection Filter</u>** dialog opens. • Click the **All** button. All of the Horizontal Alignments move from the **Available:** field to the **Selected:** field. • Click **OK**. You are returned to the **<u>View Horizontal Annotation</u>** dialog with the Horizontal Alignments loaded in the **Horizontal Alignments Selected:** field. • In the **<u>View Horizontal Annotation</u>** dialog, click **Apply** and **Close**. • In MicroStation, click the **Fit View** button ( ). • Your view in MicroStation should look like that in *Figure L8-27*.
44.	**Zoom into the Intersection of SR100 SPUR and Stoffel Rd.** • In MicroStation, click the **Window Area** button. • Window the area outlined in Red as shown in *Figure L8-27*. • Ensure your view matches that shown in *Figure L8-28*. Road names have been added for clarity and will not be present in your view.

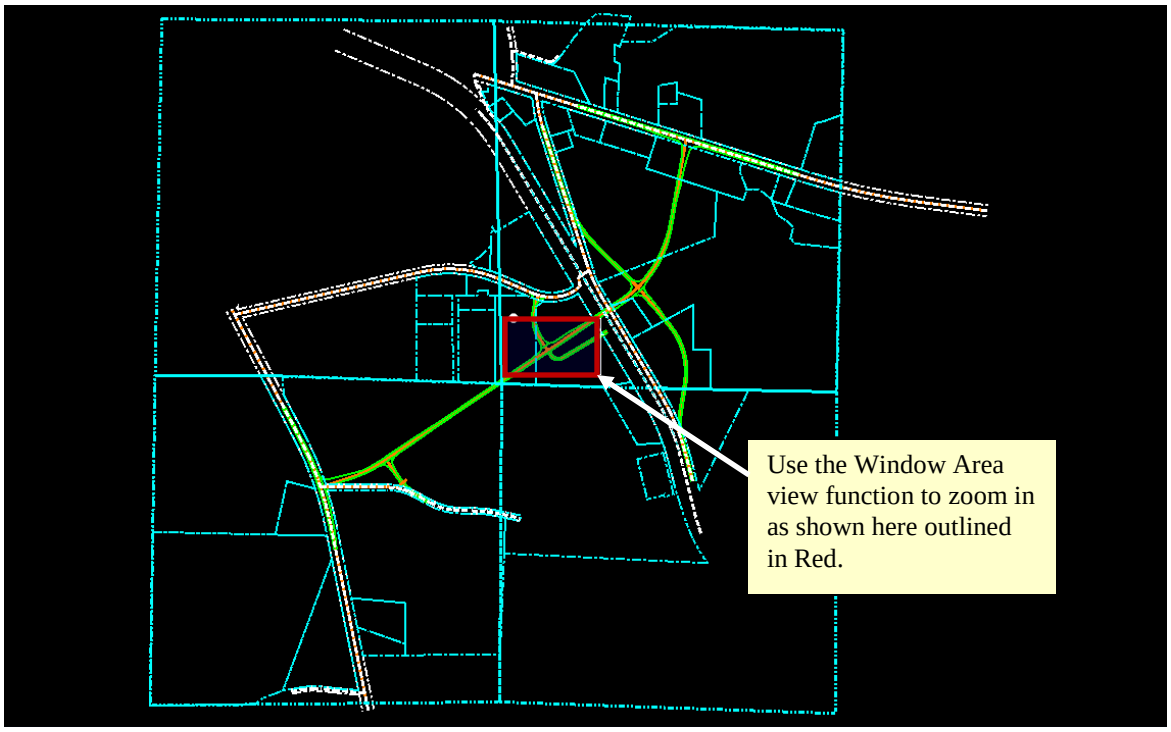


Figure L8-27 MicroStation View

Figure L8-28 MicroStation View

45.	**Rotate the MicroStation View Window so that the Alignment SR100 SPUR will be horizontal.** • In the MicroStation key-in field, key-in **rotate view element** as shown here and press **Enter** on your keyboard. rotate view element • Notice in the bottom left corner of the MicroStation window you are told to **>Identify element**, as shown here. Rotate View (Aligned with Element) > Identify element • Left click on the Orange Alignment representing **SR100 SPUR** identified in *Figure L8-28* above. It will turn purple in color to signify it has been selected. • Left click again to confirm the selection. • Right mouse click to unselect item. • Ensure your MicroStation View is similar to that shown in Figure *L8-29*.

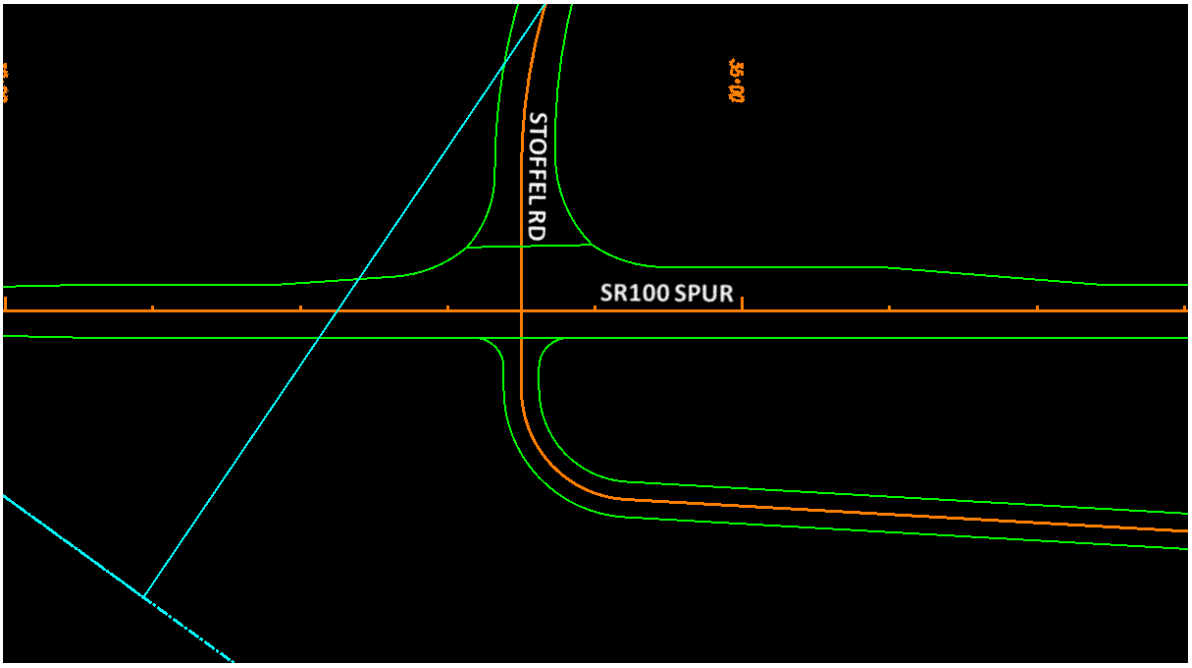


Figure L8-29 MicroStation View

46.	**Open the Roadway Designer.** • In InRoads, select **Modeler ► Roadway Designer**.
47.	**Ensure the Corridor is set to 'SR100 SPUR' and the Active Surface is 1234567_Exist.** • In the InRoads **Roadway Designer** Window, use the pull down arrow next to **Corridor:** and select ***SR100 SPUR*** as shown in *Figure L8-30*. • In the InRoads **Roadway Designer** Window, use the pull down arrow next to **Active Surface:** and select ***1234567_Exist*** as shown in *Figure L8-30*. • In the **Roadway Designer**, click the **Process All** button. • **Close** the **Results** Report if it opens.

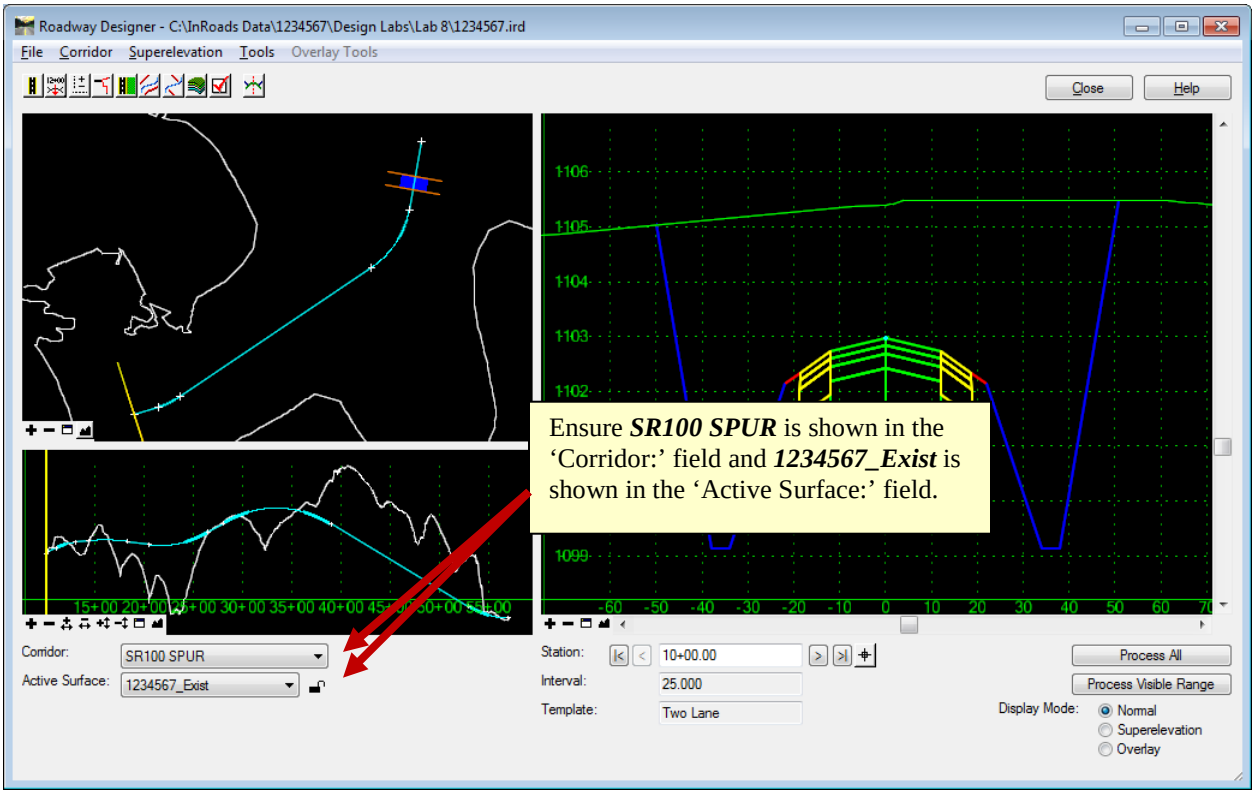


Figure L8-30 Roadway Designer

48.	**Open the Point Controls Dialog.** • Select **Corridor ► Point Controls**. The **Point Controls** dialog opens as shown in *Figure L8-31*.

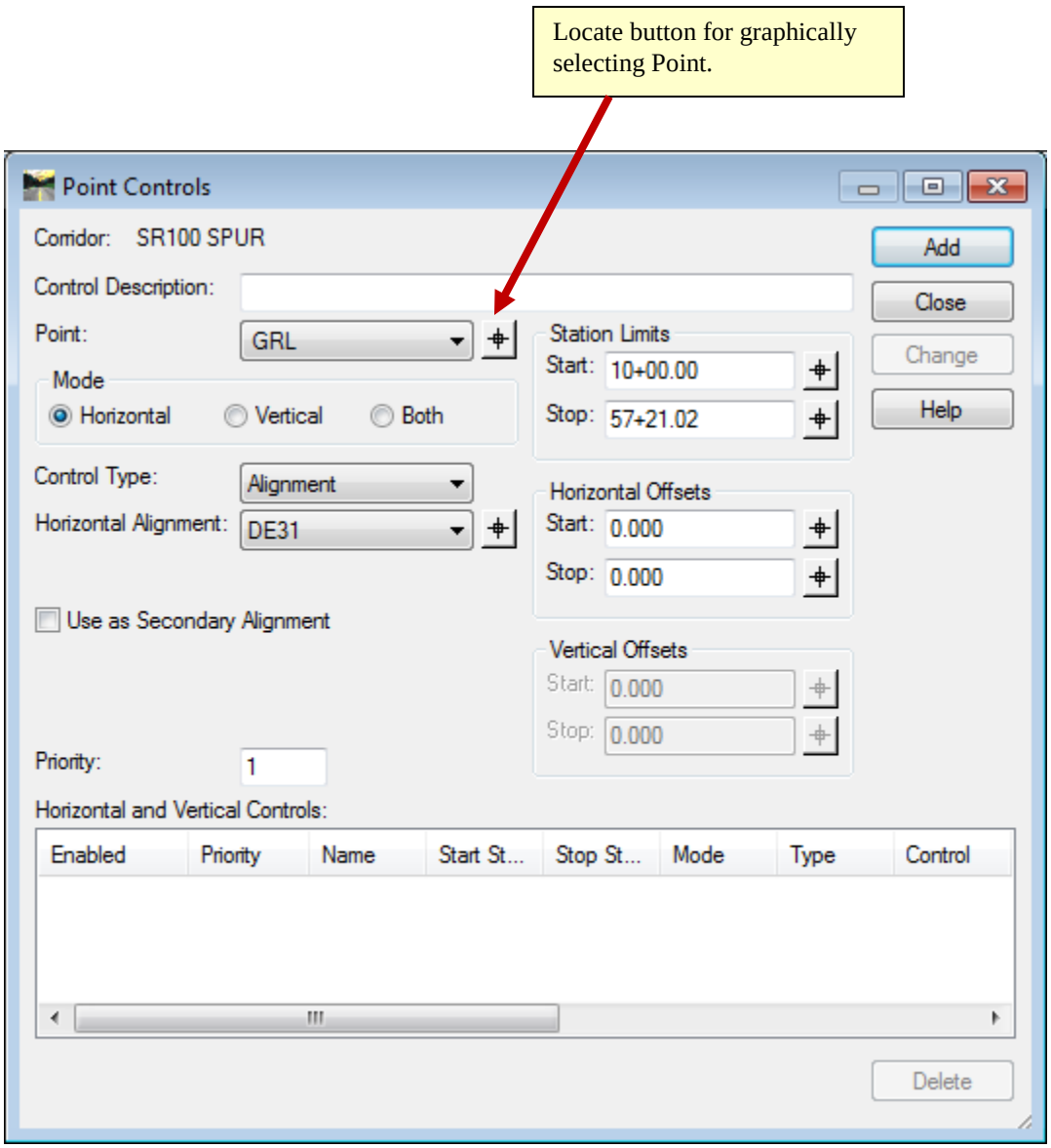


Figure L8-31 Point Controls

49.	**Select the Point 'LANE1' as the Point to apply a control to.** • Click the **Locate** button ( ) next to the **Point:** field as shown in *Figure L8-31* above. The **<u>Point Controls</u>** dialog disappears and makes the **<u>Roadway Designer</u>** Window available to graphically select a Point in the Cross Section Window. • Left Click on the Point **LANE1** identified in *Figure L8-32*. You are returned to the **<u>Point Controls</u>** dialog and the Point **LANE1** is entered into the **Point:** field as shown here. ***HINT:** You may also select the Point from the **Point:** pull down arrow.

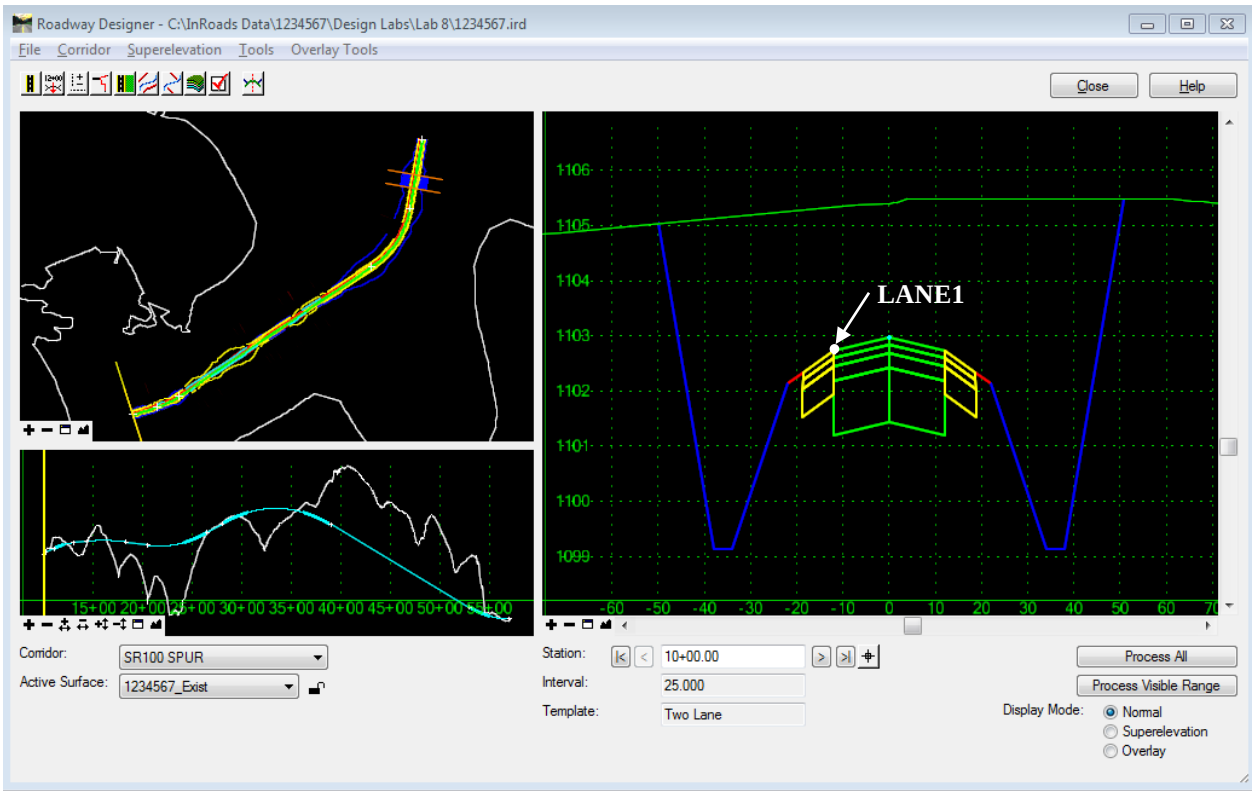
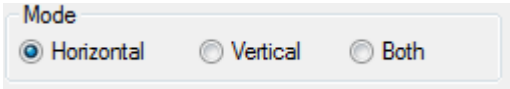


Figure L8-32 Roadway Designer

50.	**Point Controls can be used to control a Point's Horizontal or Vertical Alignments or Both. In this example a Control will be applied Horizontally. Set the Mode to Horizontal.** • In the **<u>Point Controls</u>** dialog, check the **Horizontal** radio button as shown here. 
51.	**In addition to Horizontal and Vertical modes of Point Controls there are also several other types of Point Controls. A control by an Alignment is the most common but other types include control by Feature, Style and Corridor Point. Refer to the InRoads Help for more information about controlling Points by Feature, Style or Corridor Point. For this example, ensure the Control Type: is set to Alignment.** • In the **<u>Point Controls</u>** dialog, select **Alignment** from the pull down menu as shown here.

52.	**Select Horizontal Alignment DE32 which represents the Edge of Travel Lane as the Horizontal Alignment for Point LANE1 to follow.** • In the **Point Controls** dialog, click the **Locate** button ( ) next to the **Horizontal Alignment:** field. Both the **Point Controls** dialog and the **Roadway Designer** Window disappear making the MicroStation Window active for selecting an Alignment. • In MicroStation, Left click on the Horizontal Alignment, **DE32**, identified in *Figure L8-33*. It will turn Purple as shown in *Figure L8-34*. • In the lower left corner of MicroStation you are prompted to > Accept/Reject. Left click on a blank part of the MicroStation Window to accept. The **Point Controls** dialog re-opens with **DE32** listed in the **Horizontal Alignment:** field.

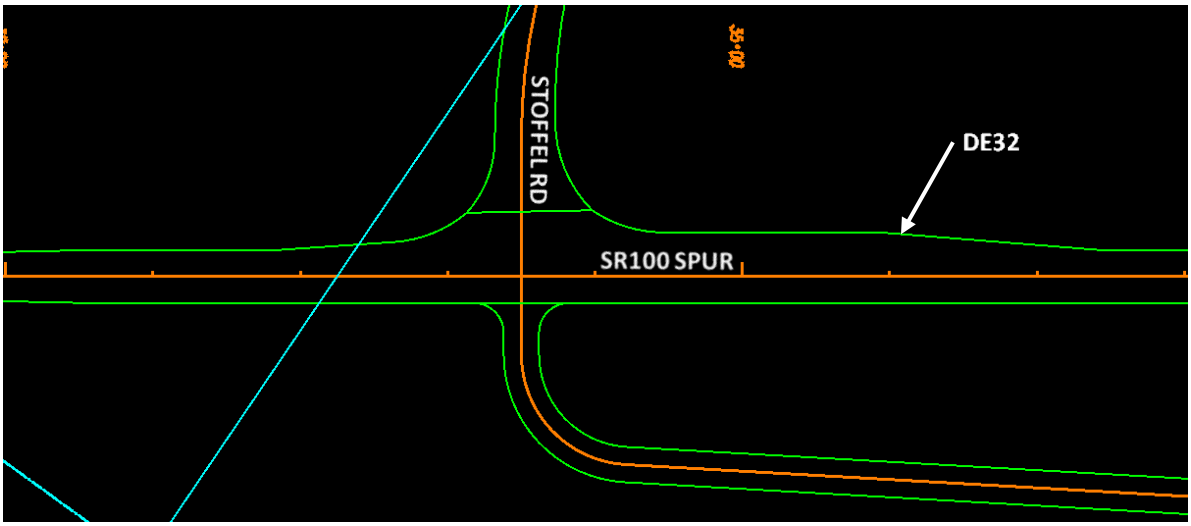


Figure L8-33 MicroStation View

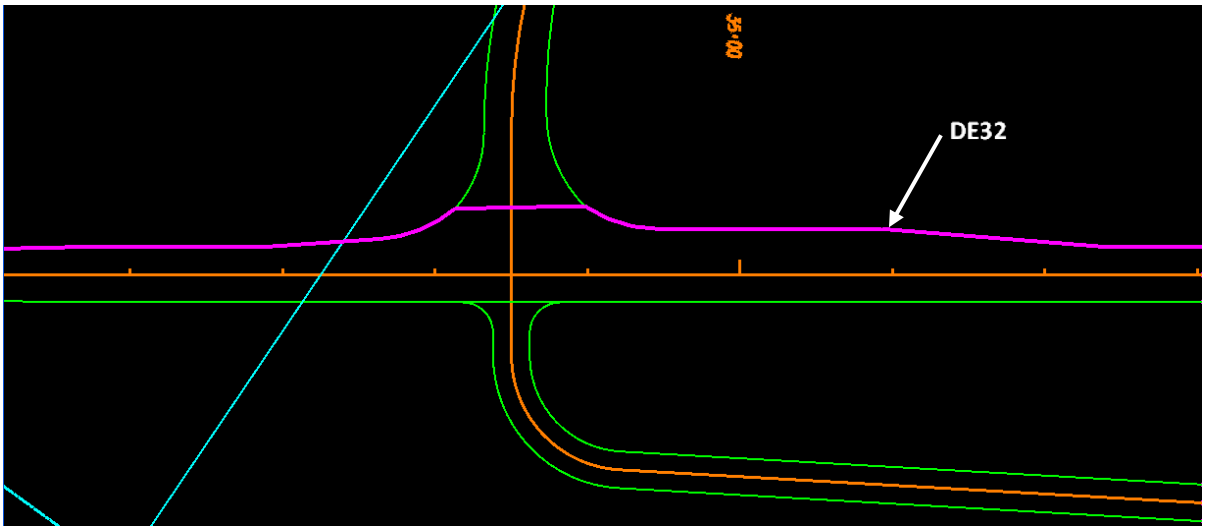
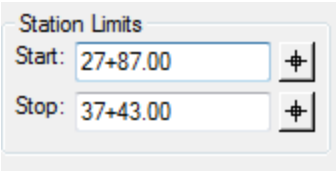
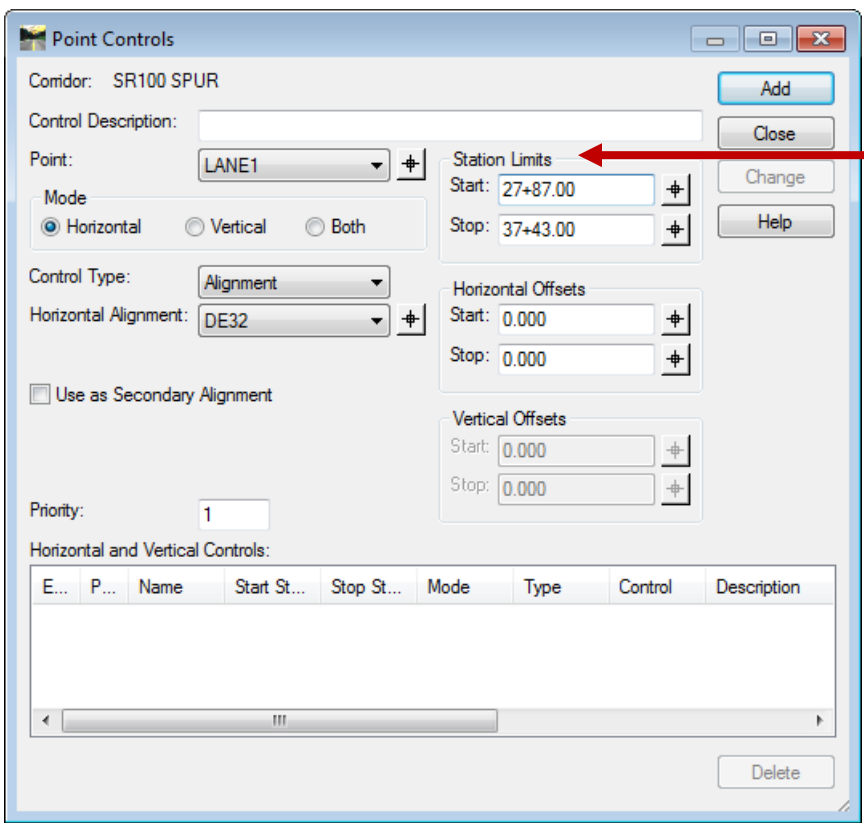


Figure L8-34 MicroStation View

53.	**The Point Control for LANE1 will be applied from Station 27+87 to Station 37+43.** • In the **Point Controls** dialog, key-in the Station values in the **Station Limits:** field as shown here.  ***IMPORTANT:** The **Station Limits:** field refers to the ***SR100 SPUR*** centerline alignment **DE31** that was used to create the ***SR100 SPUR*** corridor and not the Edge of Pavement alignment **DE32** entered in the **Horizontal Alignment:** field.
54.	**Add the Point Control for LANE1 to the Horizontal and Vertical Controls Field.** • Ensure your entries match those in the **Point Controls** dialog shown in *Figure L8-35*. • Click **Add**. The Point Control is added to the **Horizontal and Vertical Controls**: field as shown in *Figure L8-36*. • Click **Close**. The **Point Controls** dialog closes and you are returned to the **Roadway Designer** Window. The Point Control has now been applied to the **SR100 SPUR** Corridor.



REMINDER**: The Station Limits field refers to the ***SR100 SPUR centerline alignment **DE31** that was used to create the ***SR100 SPUR*** corridor and not the Edge of Pavement alignment **DE32** entered in the Horizontal Alignment field.

Figure L8-35 Point Controls

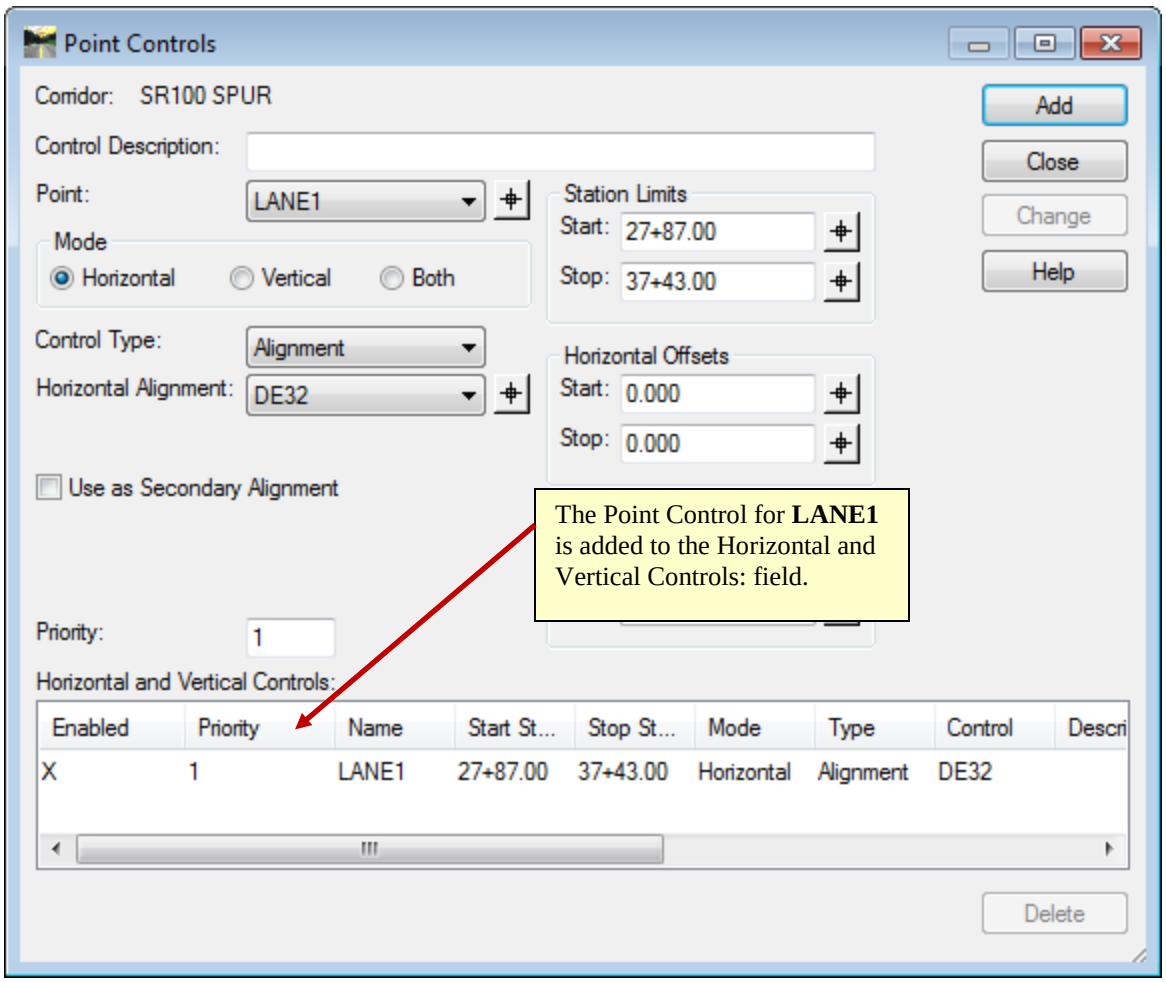
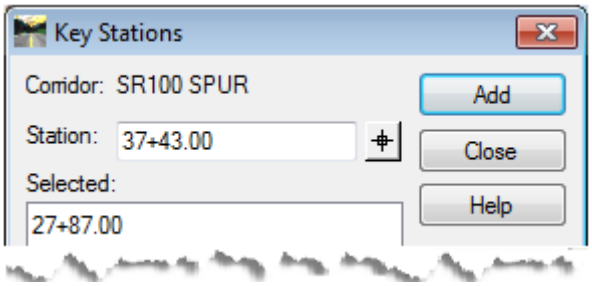


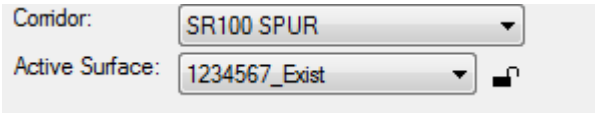
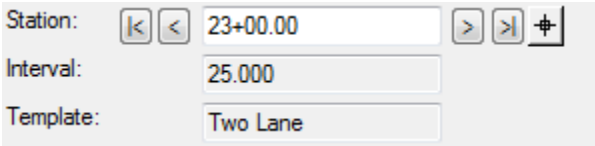
Figure L8-36 Point Controls

55.	**Process the Changes in the Roadway Designer.** • In the **Roadway Designer**, click the **Process All** button. • **Close** the **Results** Report if one opens.
56.	**Inspect the Changes.** • In the **Roadway Designer**, key-in ***27+87*** in the **Station:** key-in field and press the **Tab** key on your keyboard. The Cross Section at Station **27+87** appears in the Cross Section Window. • Click the Right arrow button ( ) to cycle through the stations from Station **27+87** to Station **37+50**. Notice as you do this - the travel lane on the left side of the Template widens and narrows. This is a result of the Point Control for **LANE1** following the Alignment **DE32**.

57.	**As you cycled through the Stations using the Arrow keys - you may have noticed Station 37+43 was not available in the Corridor. Add Station 37+43 to the Corridor.** • In the **Roadway Designer**, select **Corridor ► Key Stations**. The **Key Stations** dialog opens. • In the **Key Stations** dialog, enter ***37+43.00*** as shown here.  • Click **Add** but **do not** close out of the **Key Stations** dialog. Notice the Station **37+43.00** is also added to the **Selected:** field. • Click **Close** to exit the **Key Stations** dialog. • In the **Roadway Designer**, click the **Process All** button to apply the changes. • **Close** the **Results** Report if one opens. • In the **Roadway Designer**, cycle through the Stations using the arrow keys to ensure that Station **37+43.00** was added to the Corridor**.**
58.	**Save Your Work.** • In the InRoads **Roadway Designer**, select **File ► Save**.
59.	**Exit the Roadway Designer.** • In the InRoads **Roadway Designer**, select **File ► Close**.

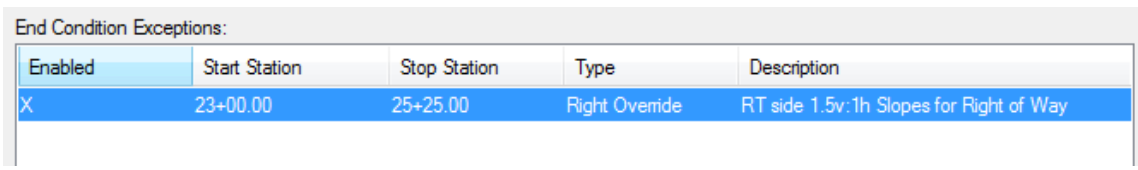
Lab 8E End Condition Exceptions

End Condition Exceptions provide a means by which a Template's End Condition cut or fill interception with the ground may be controlled for a specified range of stations. End Condition Exceptions can be used to satisfy design needs encountered under actual conditions without the need to create a new Template. At times, with the approval of the Office of Materials & Research, it is acceptable to steepen the fill slopes to 1.5v:1h to stay inside the available Right of Way or to avoid some warranted condition. In Lab 8E you will add an End Condition Exception to the right side of Stations 23+00 to 25+25 to steepen the slopes from 2v:1h to 1.5v:1h.

60.	**If <u>not</u> still open from the Previous Section, open MicroStation and InRoads and the following files. Refer to Lab Section 8A for Help. (Omit this step if files are open).** ➢ GDOT 3D Working File.dgn ➢ 1234567_Design.alg ➢ 1234567_Exist.dtm ➢ 1234567.ird (Created in Lab8C and appended to in Lab8D) ➢ GDOT_Lab8.itl
61.	**Open the Roadway Designer.** • In InRoads, select **Modeler ► Roadway Designer**.
62.	**Ensure the Corridor is 'SR100 SPUR' and the Active Surface is '1234567_Exist'.** • In the **<u>Roadway Designer</u>** Window, verify the **Corridor:** and **Active Surface:** fields match those shown here.  • In the **<u>Roadway Designer</u>**, click the **Process All** button. • **Close** the **<u>Results</u>** Report if one opens.
63.	**Navigate the Cross Section Window to Station 23+00.** • In the **<u>Roadway Designer</u> Station:** key-in field enter **23+00** as shown here, and then press the **Tab** key on your keyboard to accept the entry. 
64.	**Open the <u>End Condition Exceptions</u> dialog.** • Select **Corridor ► End Condition Exceptions**. The **<u>End Condition Exceptions</u>** dialog opens similar to that shown in *Figure L8-37*.

65. **The <u>End Condition Exceptions</u> dialog is where the Station Range and the Exception Side to be Applied To is Entered. Add an End Condition Exception to the Right Side from Stations 23+00.00 to 25+25.00**

- In the **Station Range:** fields key-in the following:
  - **Start**: ***23+00.00***
  - **Stop**: ***25+25.00***
- In the '**Apply To'** field, check the **Right Override** radio button.
- In the **Description:** field enter the following:
  - **Description**: ***RT side 1.5v:1h Slopes for Right of Way***
- Ensure your entries match those shown in *Figure L8-37*.
- Click **Add**. The '**End Condition Exceptions:**' field is populated with a new End Condition Exception as shown here:



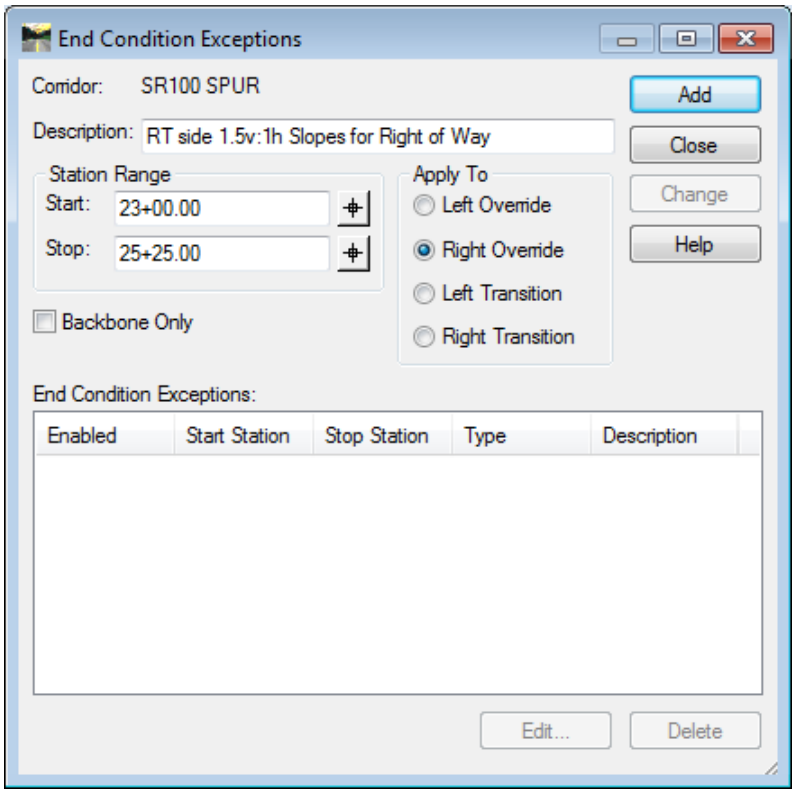
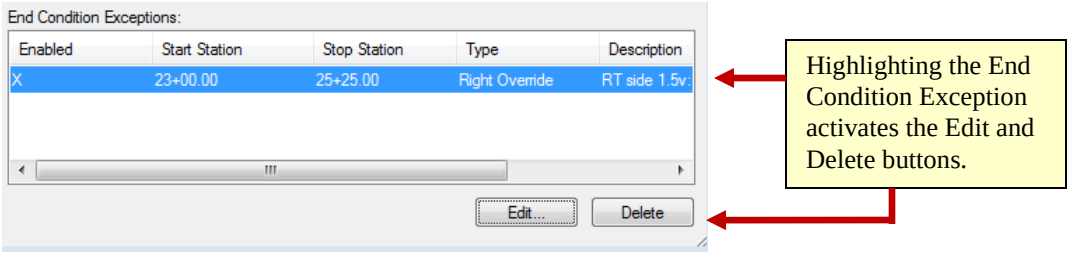


Figure L8-37 End Condition Exceptions

66. **Open the Override Window so the End Condition can be Edited.**

- In the **End Condition Exceptions** dialog, **Left click** on the new End Condition to activate the **Edit**… button as shown here.



- Click the **Edit**… button. The **Right Override** Window opens as shown in *Figure L8-38.*

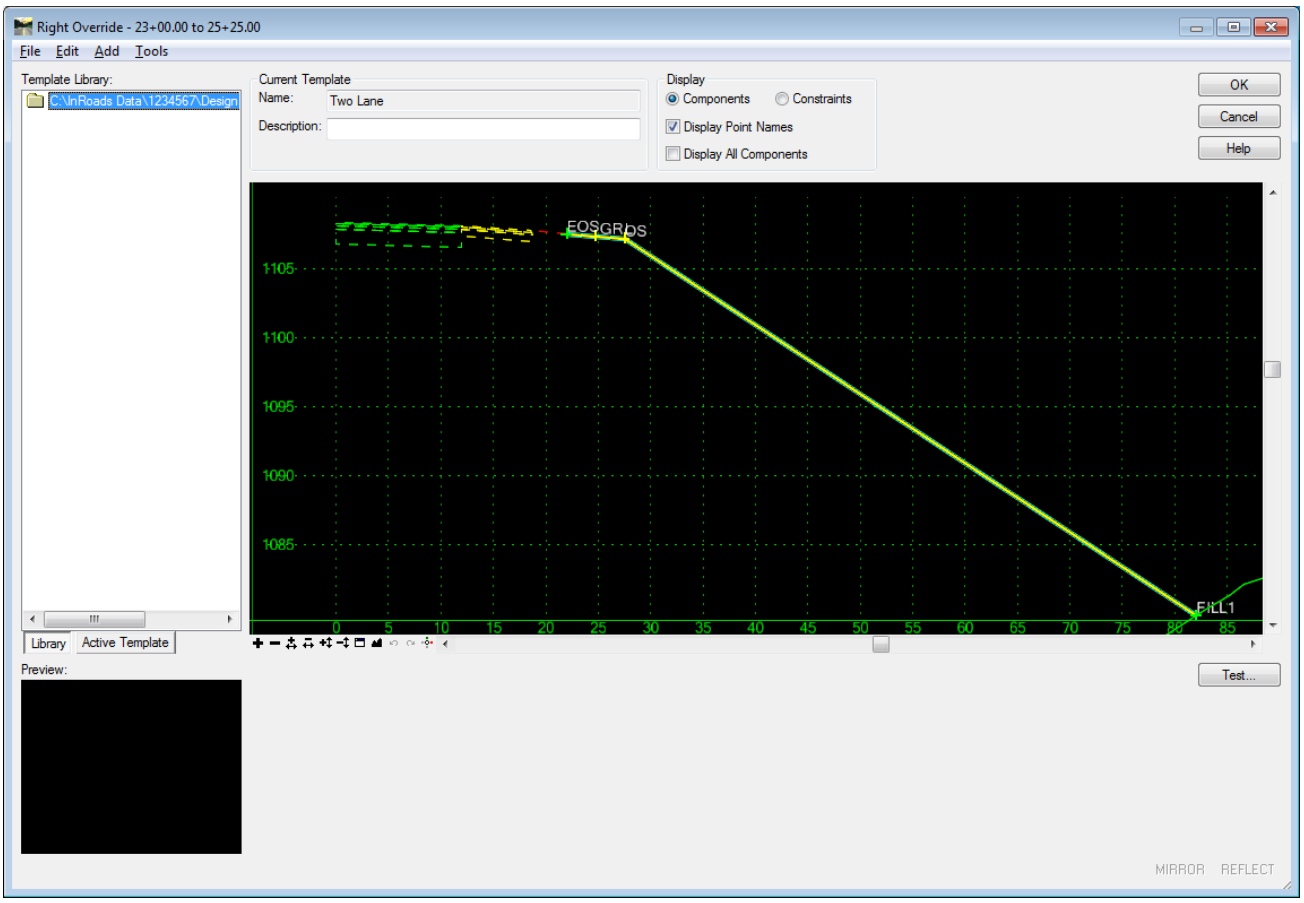


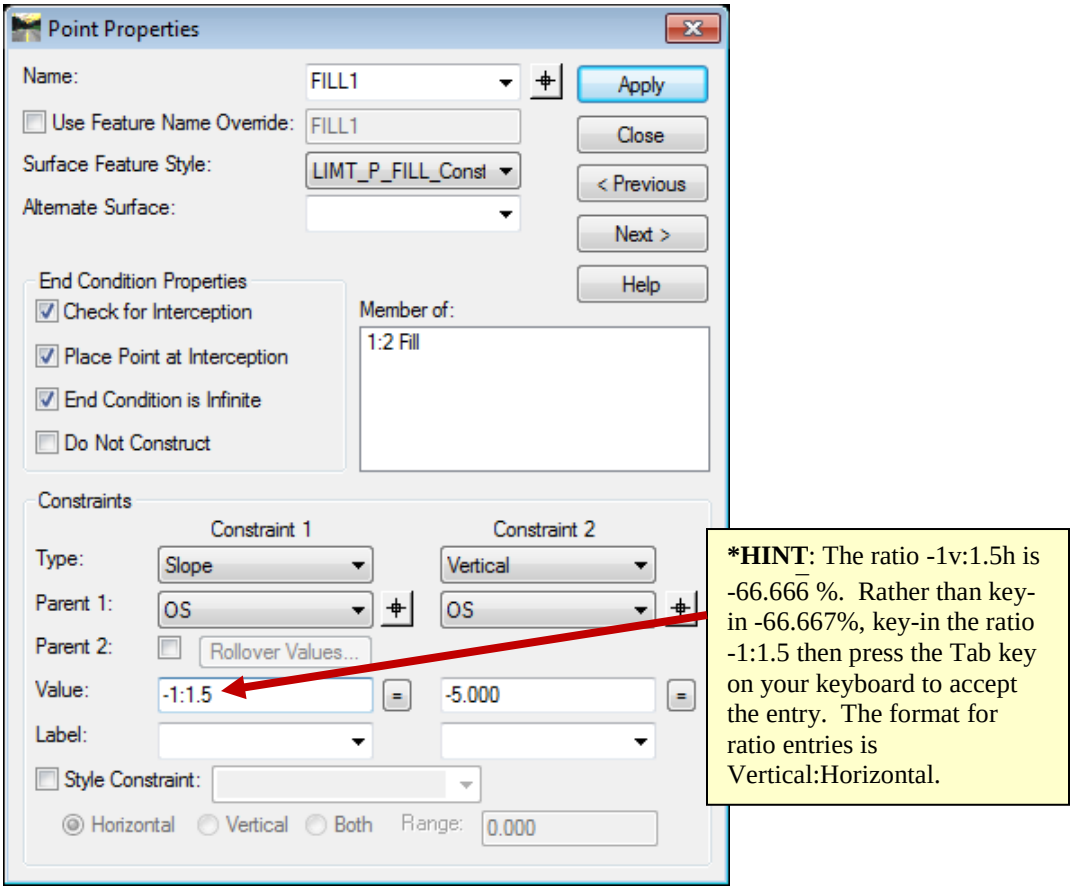
Figure L8-38 Right Override Window

67. **Open the Point Properties dialog for the Point 'FILL1'.**

- In the **Right Override** Window, Right mouse click over the Point **FILL1** and select **Edit Point**. The **Point Properties** dialog opens.

68. **Change the Constraints for 'FILL1' to build a 1h:1.5v slope.**

- Match the entries for **FILL1** to those shown here:



- Click **Apply** & **Close**.
- The **Right Override** Window should match that shown in *Figure L8-39*.

***NOTE**: The light blue fill slope represents the end condition as it was prior to the change. The yellow fill slope represents the current constraints settings. Although the yellow fill slope is not depicted as intersecting the ground, the settings of the End Condition Properties in the **Point Properties** dialog above will ensure the Fill Slope is extended properly in the Roadway Designer.

- Click **OK** to exit the **Right Override** Window.
- Click **Close** to exit the **End Condition Exceptions** dialog.

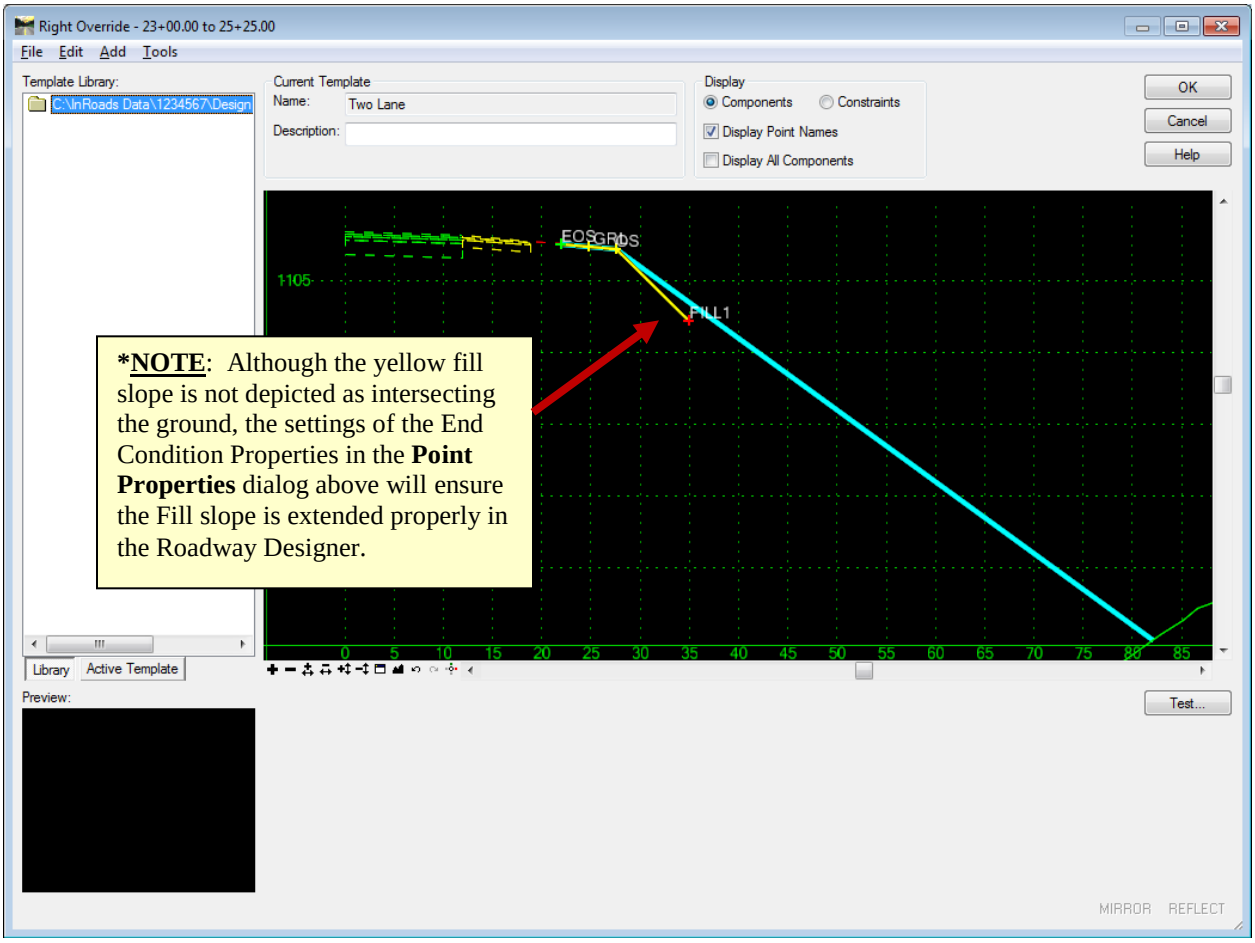
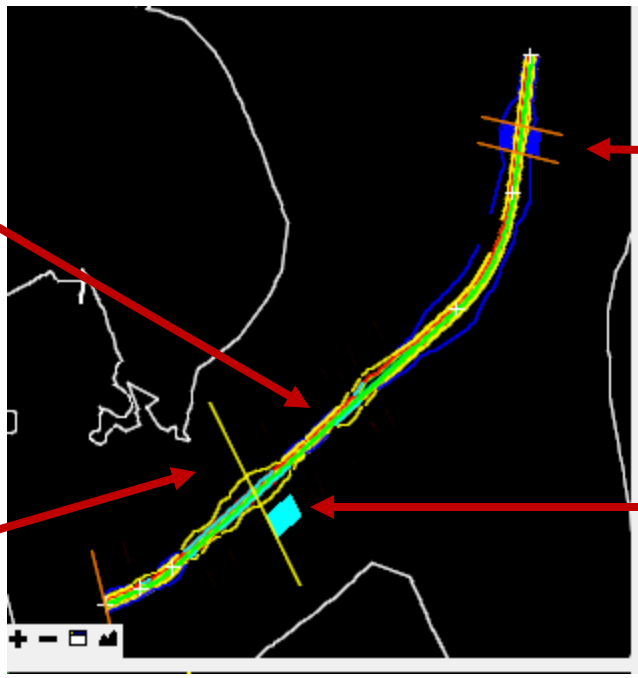


Figure L8-39 Right Override Window

69.	**Apply the Change to the Roadway Designer.** • In the **Roadway Designer**, click the **Process All** button. This ensures the End Condition Exception is applied to all the Stations affected and the Plan View Window is updated appropriately to affect the change as shown in *Figure L8-40*. • **Close** the **Results** Report if one opens. ***NOTE**: The light blue area in *Figure L8-40* identifies the location of the End Condition Exception. The **End Condition Exceptions** dialog may be opened by double clicking in the light blue area.



*NOTE: The Red lines identify locations where end conditions switch between cut and fill sections.

*REMEMBER: The dark blue area identifies template transition areas.

*REMEMBER: The yellow line identifies the current location shown in the Cross Section View and can be dragged with the mouse to any location along the Alignment.

*NOTE: The light blue area identifies the location of an End Condition Exception. Double clicking in the area will open the End Condition Exceptions dialog.

Figure L8-40 Roadway Designer – Plan View

70.	**Verify the Slope Change from 1v:2h to 1v:1.5h.** • In the Cross Section View of the **Roadway Designer**, hold your mouse cursor over the Right side fill slope. An information pop-up appears as shown here. Component Name: 1:2 Fill Material: LIMT_P_FILL Surface: <Active Surface> Horizontal Offset: 0.000 Vertical Offset: 0.000 Priority: 4 Slope: -66.667% Width: 46.842 Height: 31.228 The -66.667% slope shown here in the information pop-up verifies the fill slope was changed from 1v:2h to 1v:1.5h.
71.	**Save Your Work and Exit the Roadway Designer.** • In the **Roadway Designer**, select **File ► Save**. • Click **File ► Close** to exit the **Roadway Designer**.

Lab 8F Superelevation

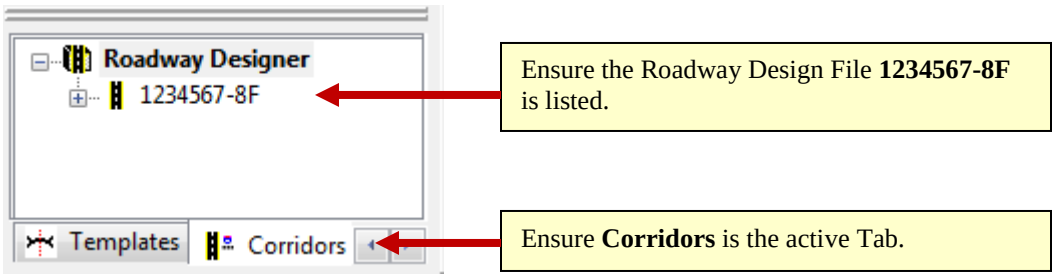
Superelevation in InRoads is created by the addition of Vertical **Point Controls**, the same as you were shown in Lab 8D titled: **Point Controls**, yet with a Superelevation control type. The addition of Superelevation Point Controls is facilitated by the use of the Superelevation Wizard and is performed after a corridor is created and templates are dropped. Once Superelevation has been added to the corridor by the Superelevation Wizard, the Superelevation Display is used to resolve Superelevation overlaps and to make any necessary edits to the Superelevation. In Lab 8F you will use the Superelevation Wizard to add Superelevation to the SR100 SPUR Corridor. After the Superelevation Wizard is used to add Superelevation to the Corridor, the Superelevation Display will be used to resolve Superelevation overlaps and to edit the Superelevation through an intersection.

72. **If <u>not</u> still open from the Previous Section, open MicroStation and InRoads and the following files. Refer to Lab Section 8A for Help. (Omit this step if files are open).**

- GDOT 3D Working File.dgn
- 1234567_Exist.dtm
- 1234567_Design.alg
- GDOT_Lab8.itl

73. **To Ensure your Data Matches during this Section of Lab 8, a Roadway Design File (.IRD) has been prepared for you. Open the Roadway Design File 1234567-8F.ird**

- In InRoads, select **File ► Open**. The **<u>Open</u>** dialog appears.
- **Browse** to the folder **C:\InRoads Data\1234567\Design Labs\Lab 8**
- **Highlight** the file **1234567-8F.ird**.
- Click **Open** and **Cancel**.
- In the InRoads Workspace Bar, ensure the **Corridors** tab is the active tab as shown here and that the file **1234567-8F** is listed. (You may need to click the Plus Symbol to expand the **Roadway Designer** to see the listed **1234567-8F** file.)

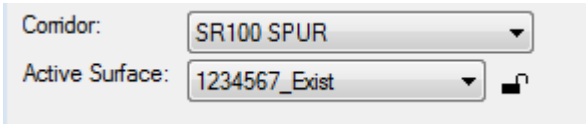


74. **Open the Roadway Designer.**

- In InRoads, select **Modeler ► Roadway Designer**.

75. **Ensure the Corridor: is 'SR100 SPUR' and the Active Surface: is '1234567_Exist'.**

- In the **<u>Roadway Designer</u>** Window, verify the **Corridor:** and **Active Surface:** fields match those shown here.



- In the **<u>Roadway Designer</u>**, click the **Process All** button.
- **Close** the **<u>Results</u>** Report if one opens.

76. **Open the Superelevation 'Table Wizard'.**

- In the **<u>Roadway Designer</u>**, select **Superelevation ► Create Superelevation Wizard ► Table**. The Superelevation **<u>Table Wizard</u>** opens as shown in *Figure L8-41*.

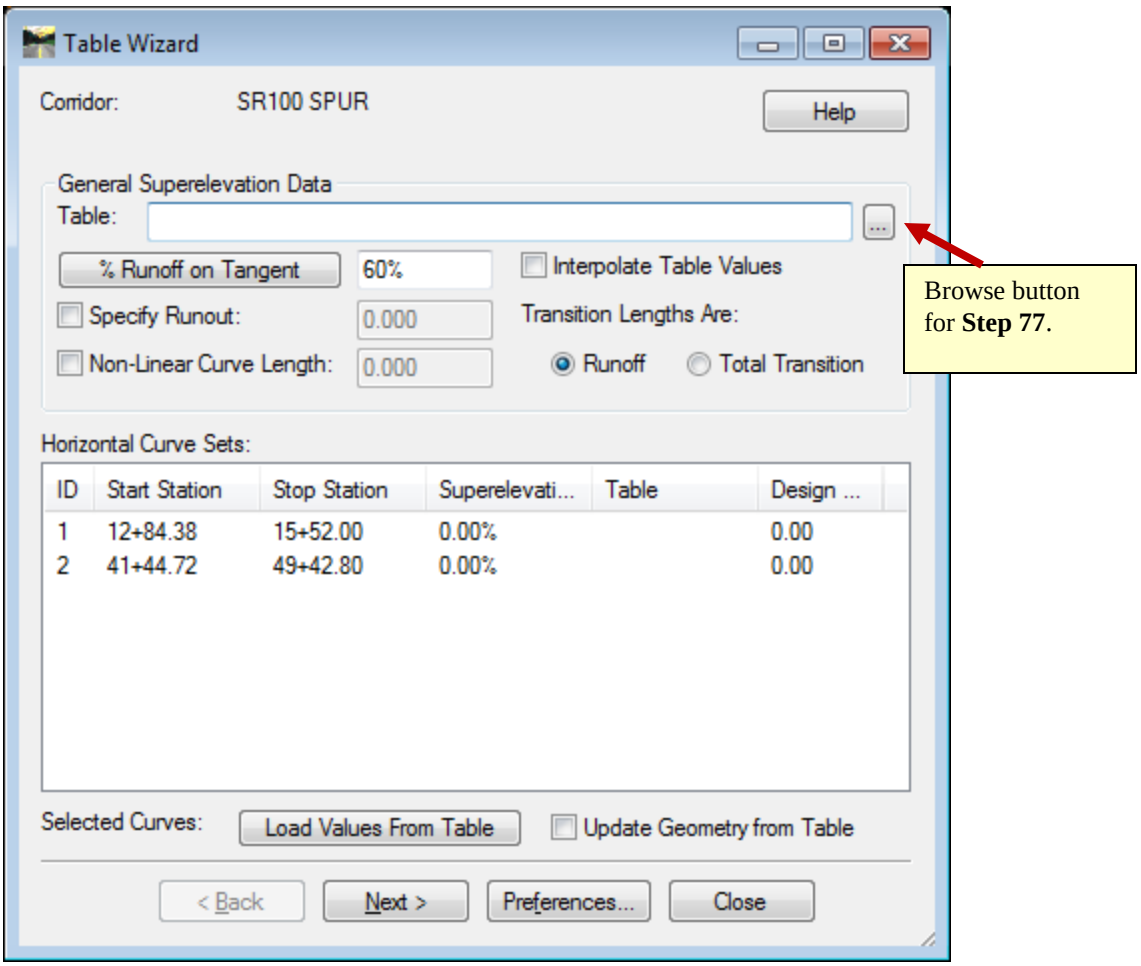
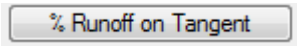
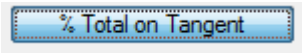
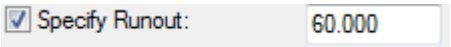
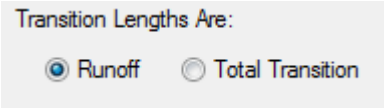


Figure L8-41 Table Wizard

77.	**Select the Superelevation Table for a 65mph design speed and a maximum Superelevation rate of 8.0%.** • Click the Browse button ( ) next to the **Table:** field. The **<u>Open Superelevation Table</u>** Window opens. ***NOTE**: *InRoads provides Superelevation Tables based on the 2004 AASHTO 'Green Book' pages 167 to 181. These tables are located in the folder **C:\Program Files (x86)\Bentley\InRoads Group V8.11 (SELECTseries) \InRoads Group V8.11\Data\AASHTO 2004\imperial**. The Tables are text files that can be easily edited to a Designer's criteria in a text editor such as Microsoft Notepad.* • Navigate to the folder: **C:\Program Files (x86)\Bentley\InRoads Group V8.11 (SELECTseries)\InRoads Group V8.11\Data\AASHTO 2004\imperial** • Select the **08_65.sup** file and click **Open**. You are returned to the **<u>Table Wizard</u>** and the file **08_65.sup** is entered into the **Table:** entry field.

78.	**Define the Percent Runoff to be on the Tangent.** • In the **<u>Table Wizard</u>**, click the **%Runoff on Tangent** button shown here.  • Notice the button changes to **% Total on Tangent** as shown here.  • InRoads allows the Designer to specify whether the transition on the tangent before and after each curve is a percentage of the Runoff on the tangent or a percentage of the total transition on the tangent. For this example we will use the **% Runoff on Tangent** method. • Click the **% Total on Tangent** button again to return to the **% Runoff on Tangent**. • In the **% Runoff on Tangent** entry field, key-in ***2/3*** and press the **Tab** key on your keyboard to accept the entry. The entry field changes to **67%** but retains **66.6$\overline{6}$ %** in memory.
79.	**Set the Runout Length.** • Place a check mark in the **Specify Runout:** check box as shown below. ***NOTE**: *Runout, also known as crown removal, is the distance from normal crown to zero percent super. When checked, the Specify Runout entry field activates and allows the user to manually define the length of the Runout. When uchecked the runout is extended at the same rate of transition as the runoff.* • In the **Specify Runout:** entry field, key-in ***60.000*** as shown here: 
80.	**The Transition Lengths provided in the table are to be considered Runoff Lengths and not Total Transition Lengths. Ensure the Transition Lengths are defined as Runoff Lengths.** • Check the radio button for the **Runoff** Transition Length as shown here: 

81.	**Load the Superelevation Values from the 08_65.sup table.** • In the **Table Wizard**, ensure a check mark **does not** exist next to the **Update Geometry from Table** check box as shown here. ☐ Update Geometry from Table • Click the **Load Values From Table** button. The Superelevation Values are entered from the **08_65.sup** table as shown in *Figure L8-42*.

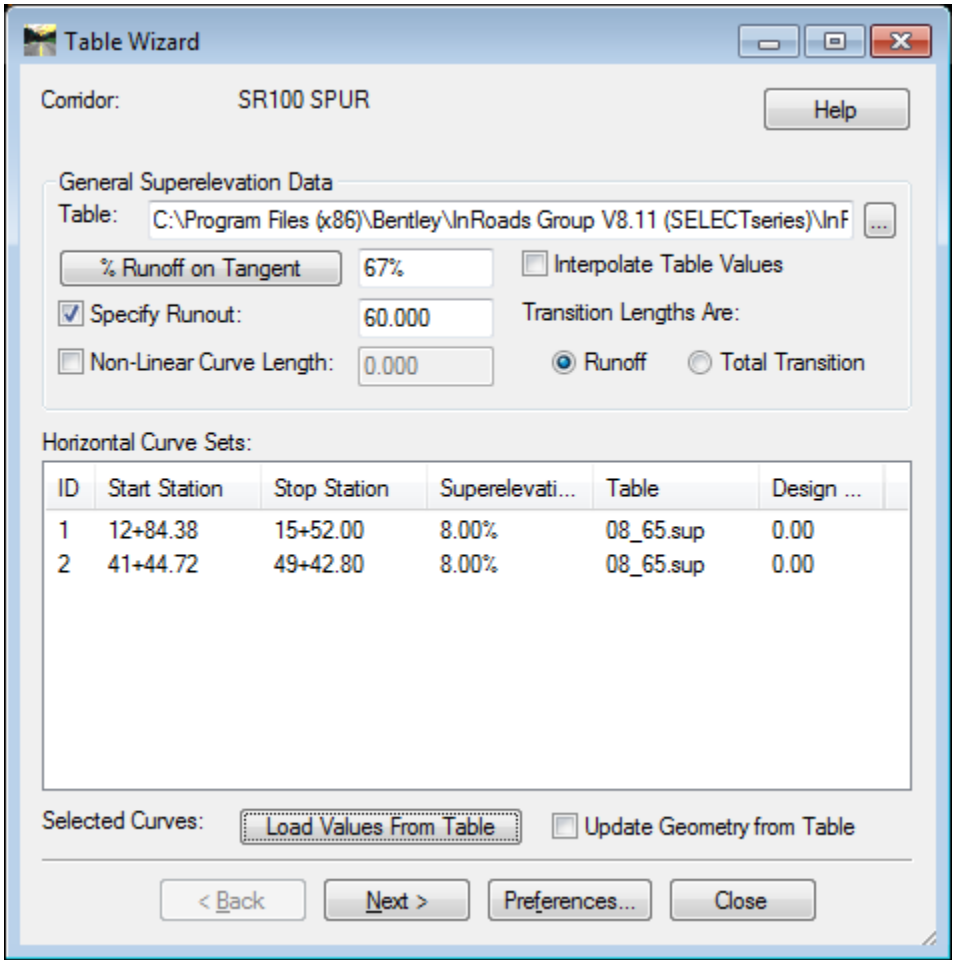


Figure L8-42 Table Wizard

82.	**Open the Superelevation Sections Definition Window.** • Ensure your values match those shown in *Figure L8-42*. • Click **Next >**. The **Superelevation Section Definitions** Window opens as shown in *Figure L8-43*.

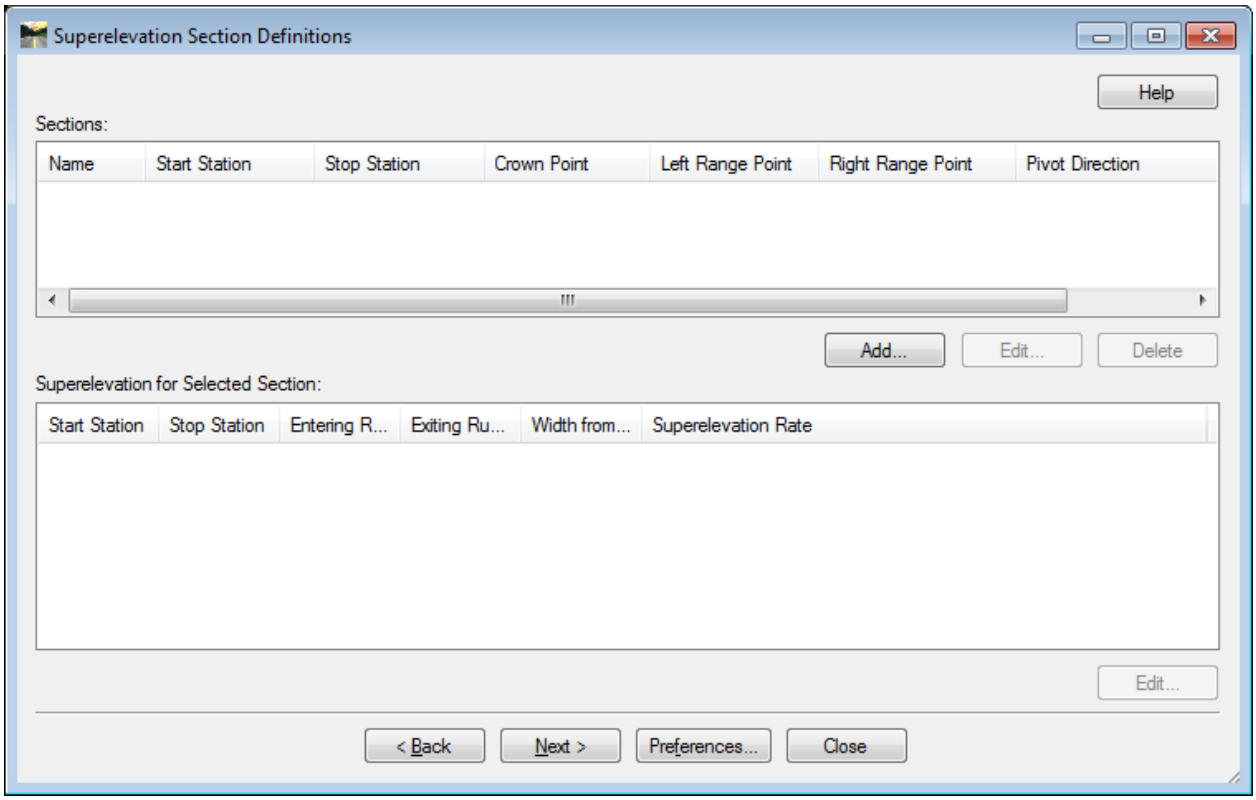
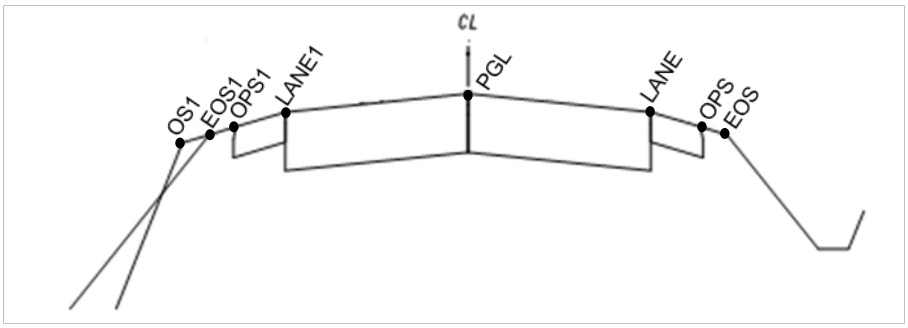


Figure L8-43 Superelevation Section Definitions

83. **Discussion:**

The **<u>Superelevation Section Definitions</u>** Window is where the Crown Point or rotational point of the Template and the Left and Right Range Points are added. The Profile Grade Point (PGL) is commonly chosen as the crown point of the Template but does not have to be. Range Points are points on the Template chosen to identify the extents to which the Superelevation is to be applied along the Template. Range Points are almost always picked at the outside edge of the travel lanes whereas the shoulder points are controlled by Shoulder Rollover Locks. In the image below, the Points **LANE** and **LANE1** would be identified as the Right and Left Range Points while the remaining points would be set up with rollover locks defined in either the Template as shown in Lab 7 or in the Roadway Designer as will be demonstrated later in Lab 8.



84.	**Open the <u>Add Superelevation Section</u> Dialog box.** • Click the **Add** button. The **<u>Add Superelevation Section</u>** dialog opens as shown in *Figure L8-44*.

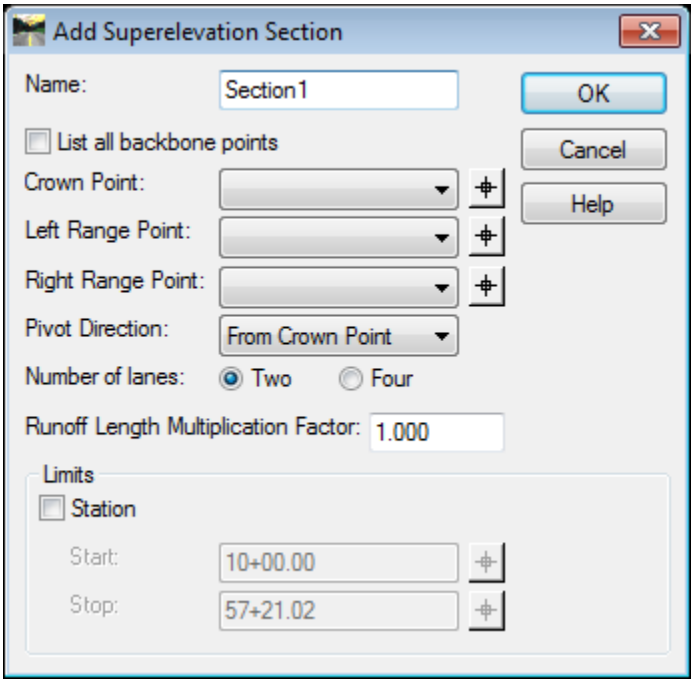
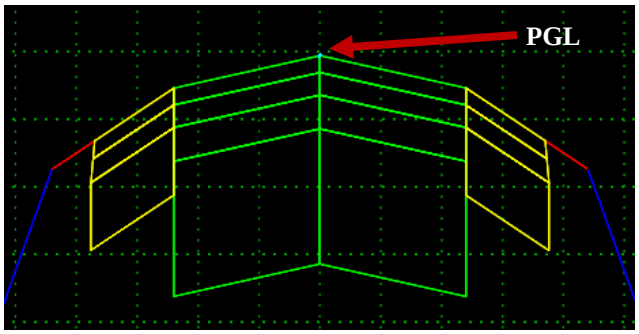
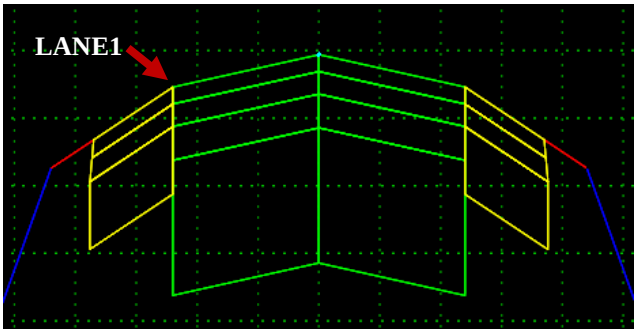


Figure L8-44 Add Superelevation Section

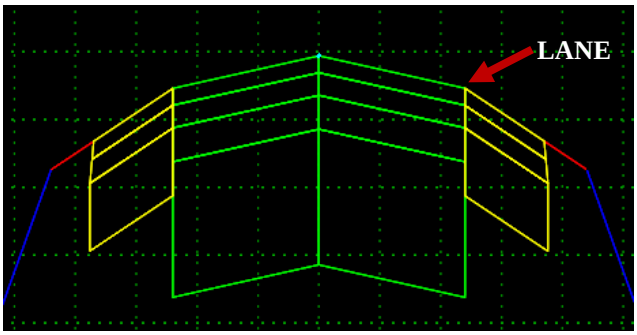
85.	**Identify the Crown Point** • Click the **Locate** button (⌖) next to the **Crown Point:** field. The **<u>Add Superelevation Section</u>** dialog disappears and the **<u>Roadway Designer</u>** Window becomes the active window. • Left click on the **PGL** Point identified here. You are returned to the **<u>Add Superelevation Section</u>** dialog and **PGL** is entered in the **<u>Crown Point:</u>** field.  ***<u>HINT</u>**: Use the mouse wheel to zoom in and out as necessary in order to select the correct Point. Try the mouse wheel in combination with the **CTRL** and **Shift** keys and see what happens.

86. **Identify the Left and Right Range Points and Add the Section to the <u>Superelevation Sections Definitions</u> Window.**

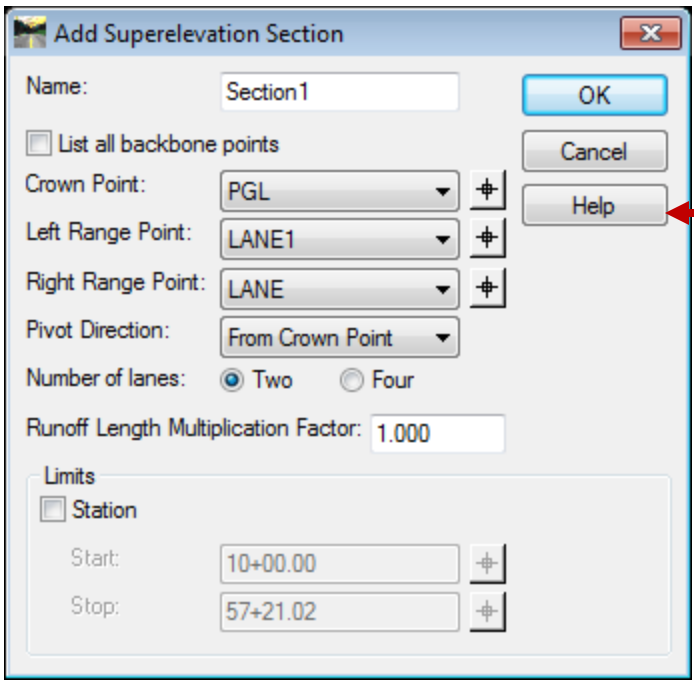
- Click the **Locate** button ( ) next to the **Left Range Point:** field. The **<u>Add Superelevation Section</u>** dialog disappears and the **<u>Roadway Designer</u>** Window becomes the active window.
- Left click on the Point **LANE1** identified here. You are returned to the **<u>Add Superelevation Section</u>** dialog and **LANE1** is entered in the **Left Range Point:** field.



- Click the **Locate** button ( ) next to the **Right Range Point:** field. The **<u>Add Superelevation Section</u>** dialog disappears and the **<u>Roadway Designer</u>** Window becomes the active window.
- Left click on the Point **LANE** identified here. You are returned to the **<u>Add Superelevation Section</u>** dialog and **LANE** is entered in the **Right Range Point:** field.

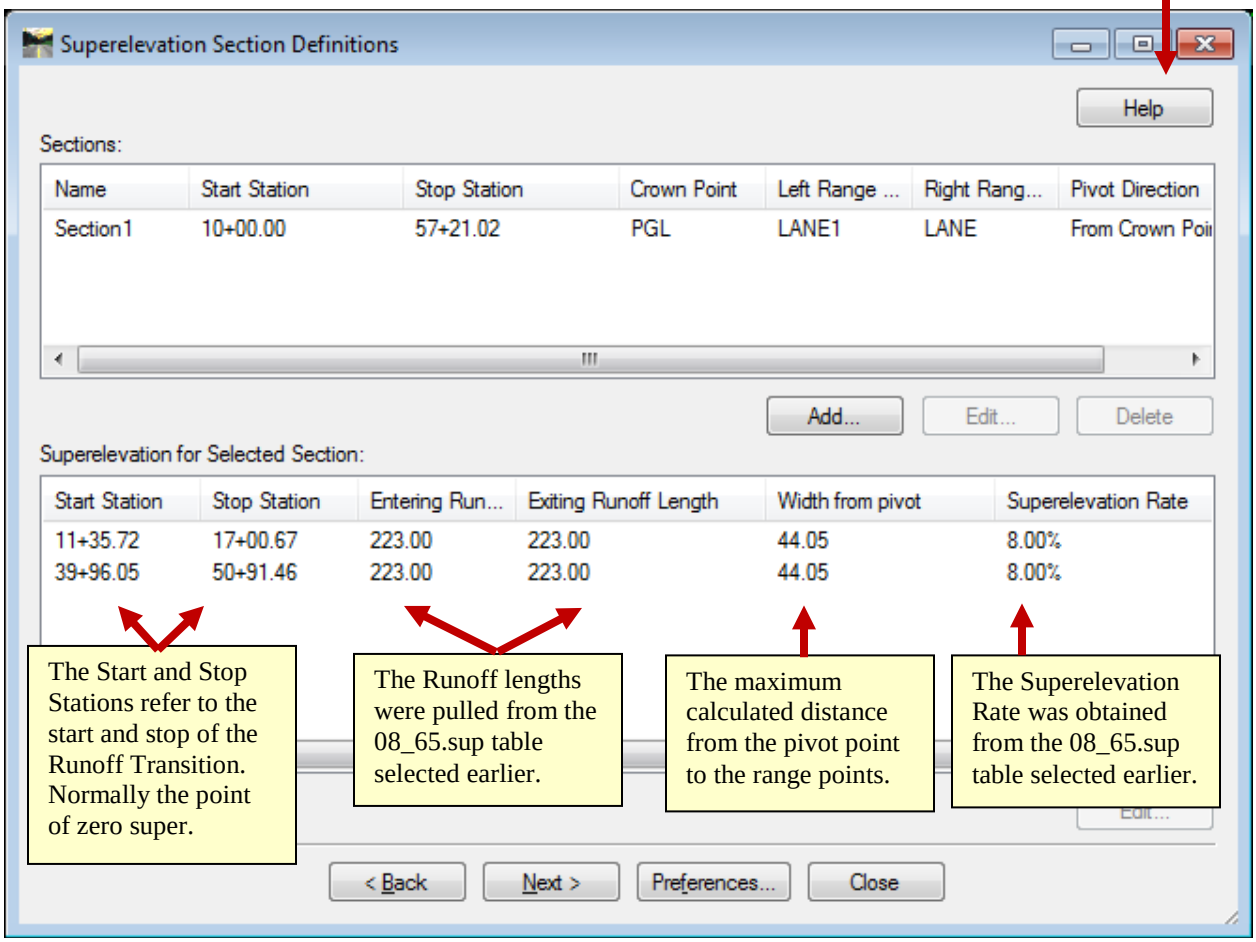


- **Match** the remaining entries shown in *Figure L8-45*.
- Click **OK**. You are returned to the **<u>Superelevation Section Definitions</u>** Window and **Section1** is populated in the **Sections:** area as shown in *Figure L8-46*.



***HINT**: Use the InRoads Help button to get additional information about each command.

Figure L8-45 Add Superelevation Section



The Start and Stop Stations refer to the start and stop of the Runoff Transition. Normally the point of zero super.

The Runoff lengths were pulled from the 08_65.sup table selected earlier.

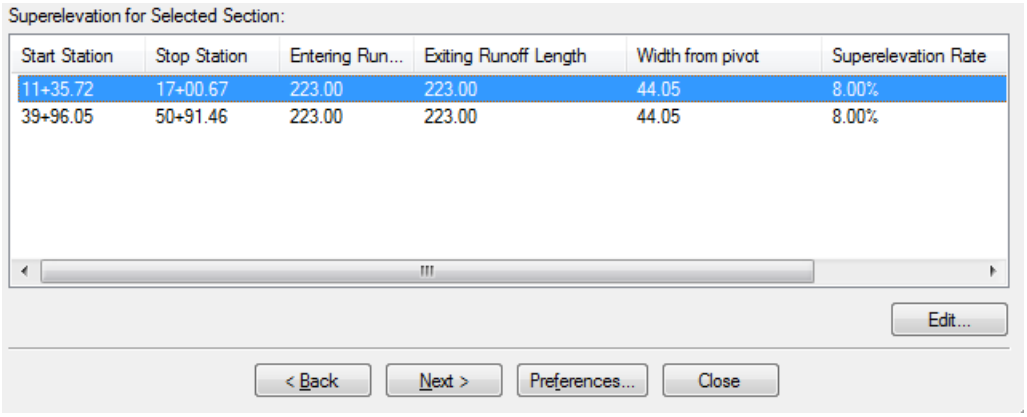
The maximum calculated distance from the pivot point to the range points.

The Superelevation Rate was obtained from the 08_65.sup table selected earlier.

Figure L8-46 Superelevation Section Definitions

87. **Once a Superelevation Section has been Added, the Superelevation Transition Data for Each Curve may be edited if desired. Change the Runoff Length for the first Curve in the list.**

- In the **Superelevation for Selected Section:** field of the **Superelevation Section Definitions** Window, highlight the **11+35.72** to **17+00.67** section as shown here. The **Edit** button becomes active.



- Click the **Edit** button. The **Superelevation Curve Information** dialog opens as shown in *Figure L8-47*.
- In the **Runoff Length:** key-in field for the **Start Curve Transition** enter ***500***.
- Ensure your entries match those shown in *Figure L8-48*.
- Click **Apply** & **Close**. You are returned to the **Superelevation Section Definitions** Window.
- Notice the Runoff value for the **Entering Runoff Length** has changed to **500.00**.

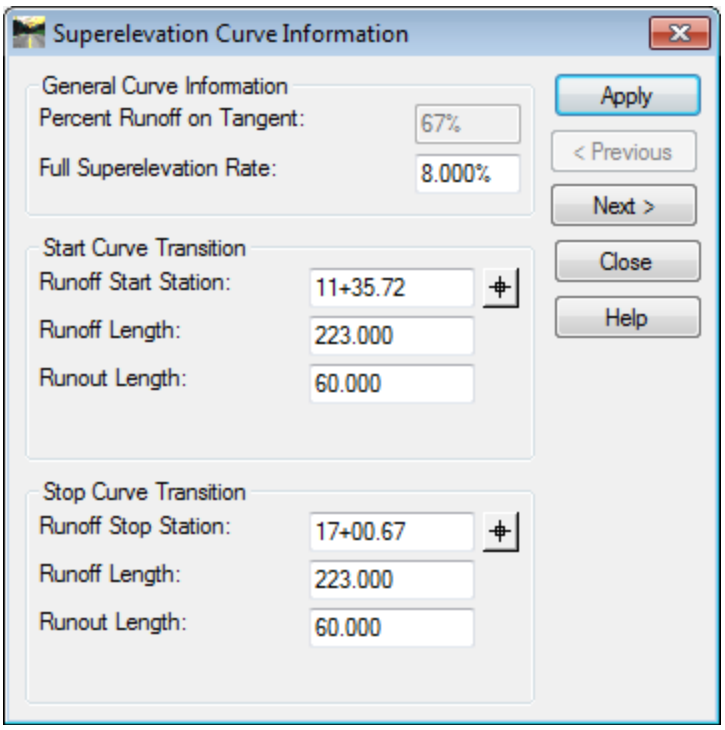


Figure L8-47 Superelevation Curve Information

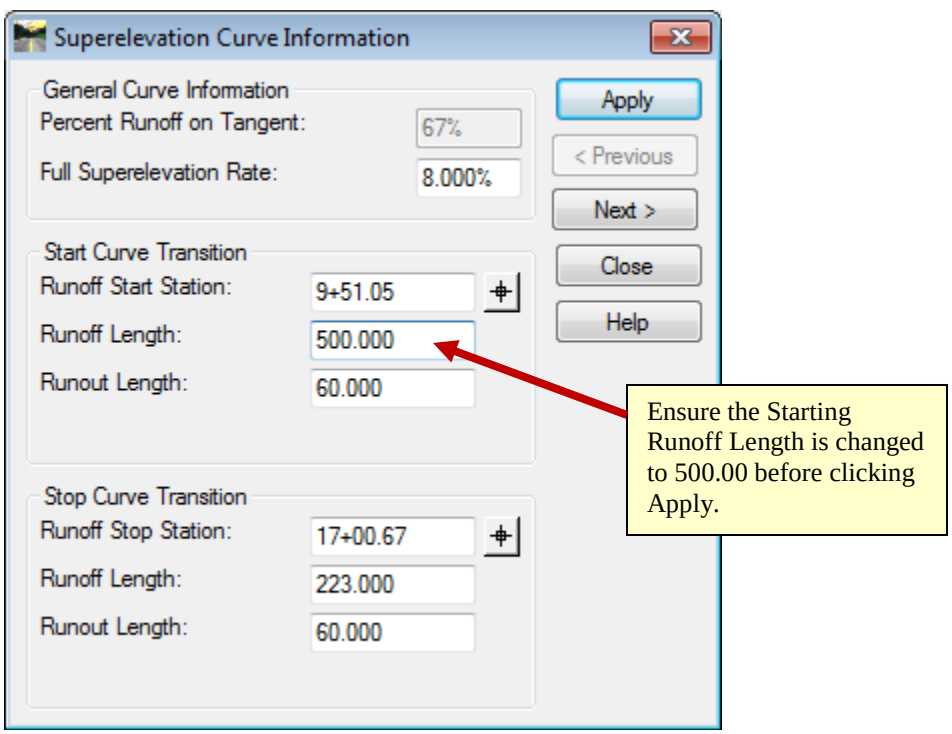


Figure L8-48 Superelevation Curve Information

88.	**Before Applying the Superelevation Control Lines that have just been created, InRoads Displays them in the Superelevation Controls Window for review. Review the Superelevation Control Lines that were created in the previous steps.** • In the **Superelevation Section Definitions** Window, click **Next >**. The **Superelevation Controls** Window opens as shown in *Figure L8-49*. ***INFORMATION:** Two Superelevation Control Lines have been created. One is from the **PGL** to the Left Range Point, **LANE1**, and the other is from the **PGL** to the Right Range Point, **LANE**. Notice in *Figure L8-49* the name of the Superelevation Control Section, **Section1**, which we assigned in **Step 84**, has been used as a prefix to name each of the Superelevation Control lines.

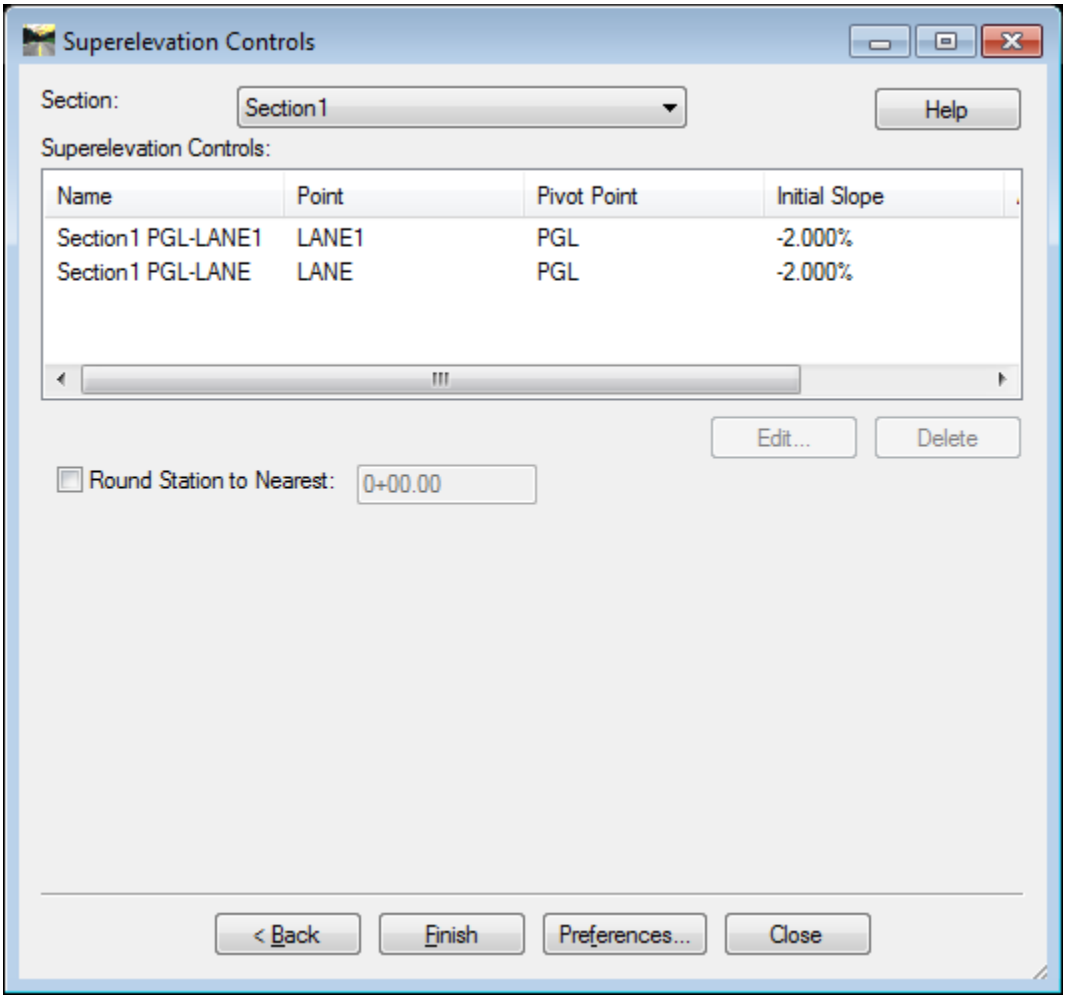
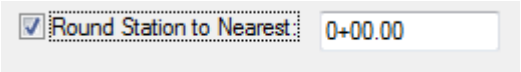
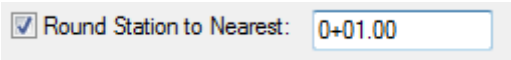


Figure L8-49 Superelevation Controls

89.	**InRoads can automatically round the Superelevation Station calculations to a user defined value. Have InRoads automatically round to the nearest 0+01.00 Station.** • In the **Superelevation Controls** Window, check the **Round Station to Nearest**: check box as shown here.  • Key-in ***0+01.00*** in the **Round Station to Nearest:** entry field as shown here.  • Click **Finish**. The **Fix Superelevation Overlap** dialog opens as shown in *Figure L8-50*. ***NOTE**: The **Fix Superelevation Overlap** dialog only displays when conflicts exist.

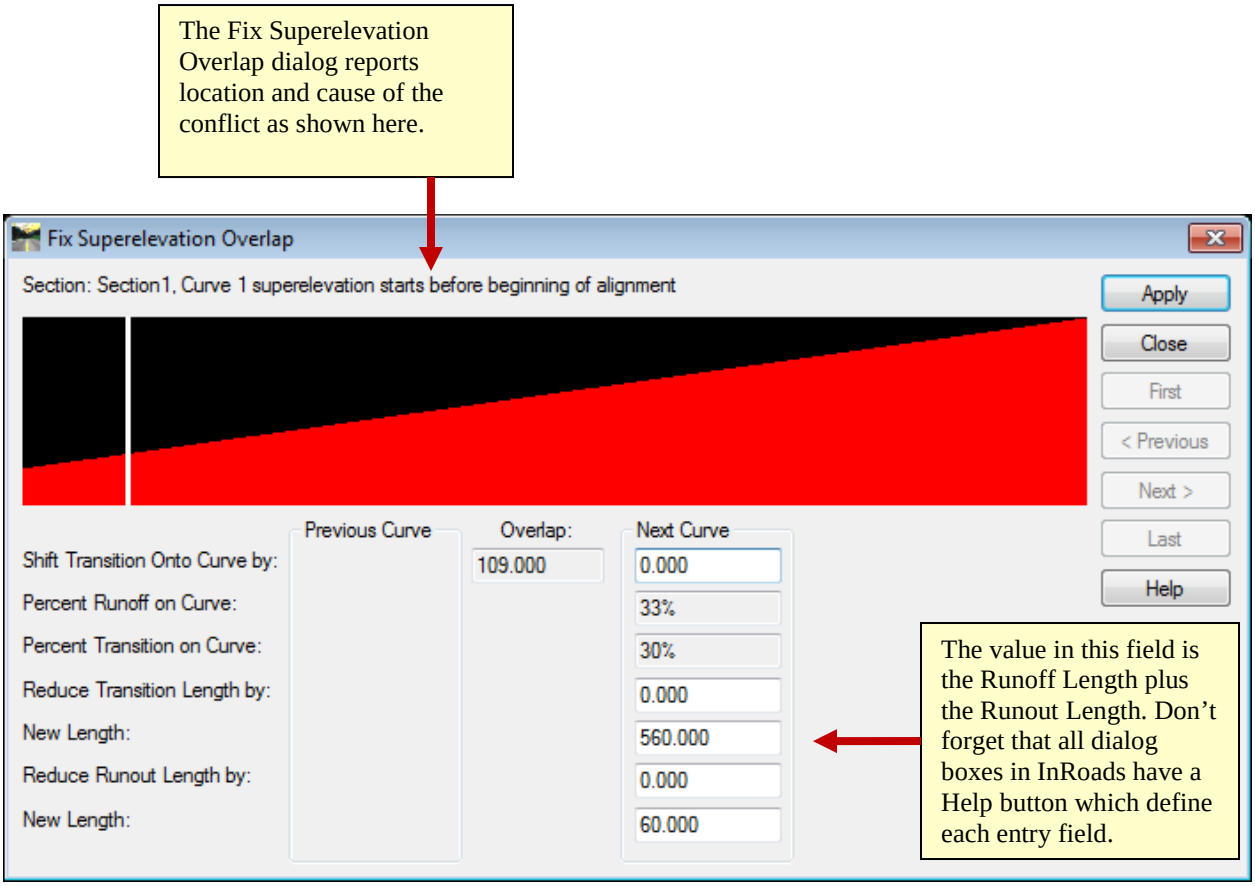


Figure L8-50 Fix Superelevation Overlap

90.	**The <u>Fix Superelevation Overlap</u> dialog appears only when Superelevation Conflicts are detected in the Superelevation Calculations. In this case the Superelevation starts before the beginning of the Alignment as stated in *Figure L8-50* above. One way to resolve this issue is to extend the Alignment but for this case we will use the <u>Fix Superelevation Overlap</u> dialog to change the Transition Runoff length from 500 to 223 (the value originally selected from the 08_65.sup table).** • In the **New Length:** field currently populated with the value **560.000**, change the value to ***283.000*** (223 + 60) and press the Tab key. • Notice the overlap value changed from **109.000** to **-168.000**. This tells us that we are now **168.00** feet from the beginning of the Alignment and that overlap is no longer a problem. The graphics also change. The White line represents the location of the conflict while the Red area illustrates the zone of conflict relative to the White line. • Ensure your entries match shown in *Figure L8-51*. • Click **Apply**. The White conflict line disappears and the Red transition area is shown without a conflict. • Notice many of the buttons are grayed out and unavailable. Had additional conflict zones existed in the Alignment - these buttons would be available to move to the next conflict so they could be resolved. • Click **Close**. You are returned to the **<u>Roadway Designer</u>**. • Click the **Process All** button to ensure the Superelevation changes are applied. • **Close** the **<u>Results</u>** Report if one opens.

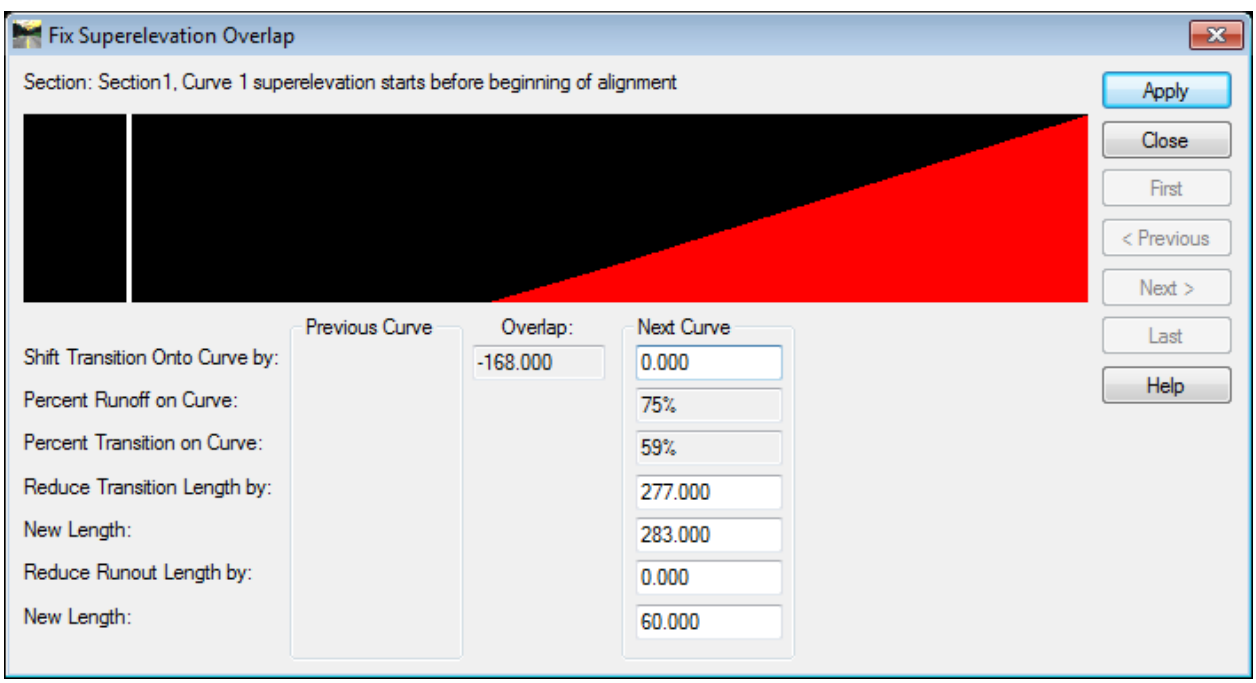


Figure L8-51 Fix Superelevation Overlap

91.	**Generate a Superelevation Report.** • In the **Roadway Designer**, select **Superelevation ► Superelevation Report**. The **Roadway Design Superelevation Report** dialog opens as shown in *Figure L8-52*. • Click the **All** button to select all the available Superelevated Points. • Click **Apply** and the **Bentley Civil Report Browser** will appear. • The Name of the Style Sheet is '**GDOT Superelevation Data Report.xsl'**. Click on this Style Sheet Name to select it. • The Superelevation Data Report opens in the **Bentley Civil Report Browser**. Take a moment to review the Report. ***NOTE**: InRoads generated the report from XML data by using a Style Sheet (XSL file). Style Sheets may be saved as HTML files or TXT files. Style Sheets will be discussed in further detail in **Lab 14**. • In the **Bentley Civil Report Browser**, select **File ► Exit**. • This completes the use of the **Superelevation Wizard**. • Click **Close** to close the **Roadway Design Superelevation Report** dialog if still open.

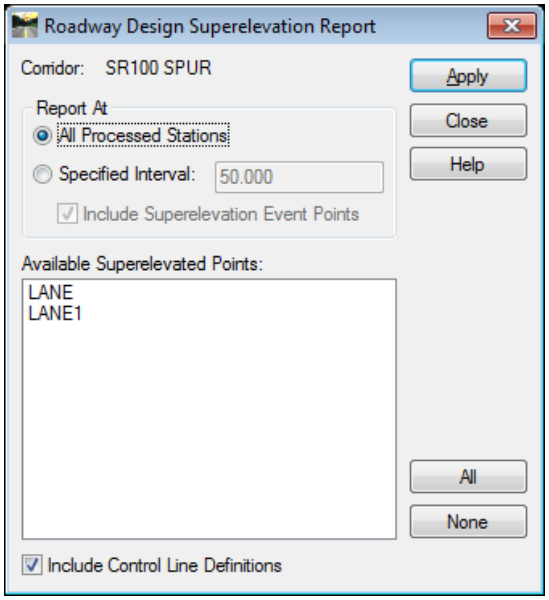


Figure L8-52 Roadway Design Superelevation Report

92.	**Save Your Work and Exit the Roadway Designer.** • In the **Roadway Designer**, select **File ► Save**. • Click **File ► Close** to exit the **Roadway Designer**.

Lab 8G Editing Superelevation

Editing or customizing Superelevation in InRoads is performed in the Roadway Designer via an interactive Superelevation Diagram similar to that shown in *Figure L8-53*. The Superelevation Diagram presents, in graphical form, the pavement edge elevations relative to the crown point. InRoads refers to these as Point Control Lines. The Superelevation Diagram also identifies Superelevation Point Stations. These Stations, labeled in *Figure L8-53* as Begin/End N.C., Adverse Crown Removed/Zero Super, Begin/End R.C., PC/PT, and Begin/End F.S. are also identified by a point on the Superelevation Diagram Point Control Lines. Editing Superelevation in InRoads is accomplished in the Superelevation Diagram by right mouse clicking over a Point Control Line and selecting from the pop up menu the desired action. Color coded displays of the Cross Section, Plan and Profile views are also provided in InRoads to assist in visually evaluating a corridor's Superelevation. In Lab 8G you will be introduced to the Superelevation Mode of the Roadway Designer, its display in the Roadway Designer and editing in the Superelevation Diagram.

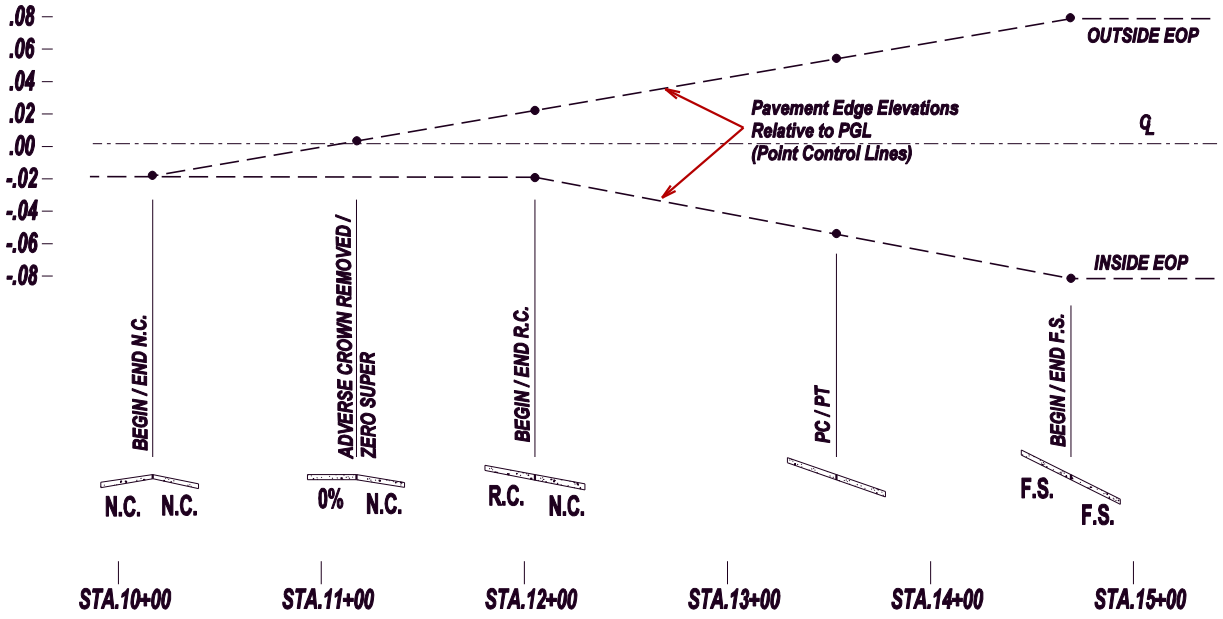


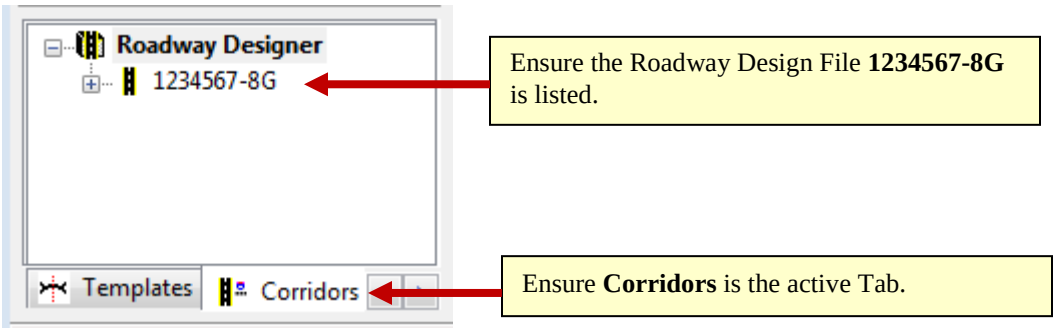
Figure L8-53 Typical Superelevation Diagram

93. **If <u>not</u> still open from the Previous Section, open MicroStation and InRoads and the following files. Refer to Lab Section 8A for Help. (Omit this step if files are open).**

- GDOT 3D Working File.dgn
- 1234567_Exist.dtm
- GDOT_Lab8.itl
- 1234567_Design.alg

94. **To Ensure your Data Matches during this Section of Lab 8, a Roadway Design File (.IRD) has been prepared for you. Open the Roadway Design File 1234567-8G.ird.**

- In InRoads, select **File ► Open**. The **<u>Open</u>** dialog appears.
- **Browse** to the folder **C:\InRoads Data\1234567\Design Labs\Lab 8**
- **Highlight** the file **1234567-8G.ird**.
- Click **Open** and **Cancel**.
- In the InRoads workspace bar, ensure the **Corridors** tab is the active tab as shown here and that the file **1234567-8G** is listed. (You may need to click the Plus Symbol to expand the **Roadway Designer** to see the listed **1234567-8G** file.)



95. **Open the Roadway Designer and Ensure the Corridor is set to 'SR100 SPUR' and the Active Surface is set to '1234567_Exist'.**

- In InRoads, select **Modeler ► Roadway Designer**.
- In the **<u>Roadway Designer</u>** Window, verify the **Corridor:** and **Active Surface:** fields are set to **SR100 SPUR** and **1234567_Exist** respectively.
- In the **<u>Roadway Designer</u>**, click the **Process All** button.
- **Close** the **<u>Results</u>** Report if one opens.
- The **<u>Roadway Designer</u>** should look similar to that shown in *Figure L8-54*.

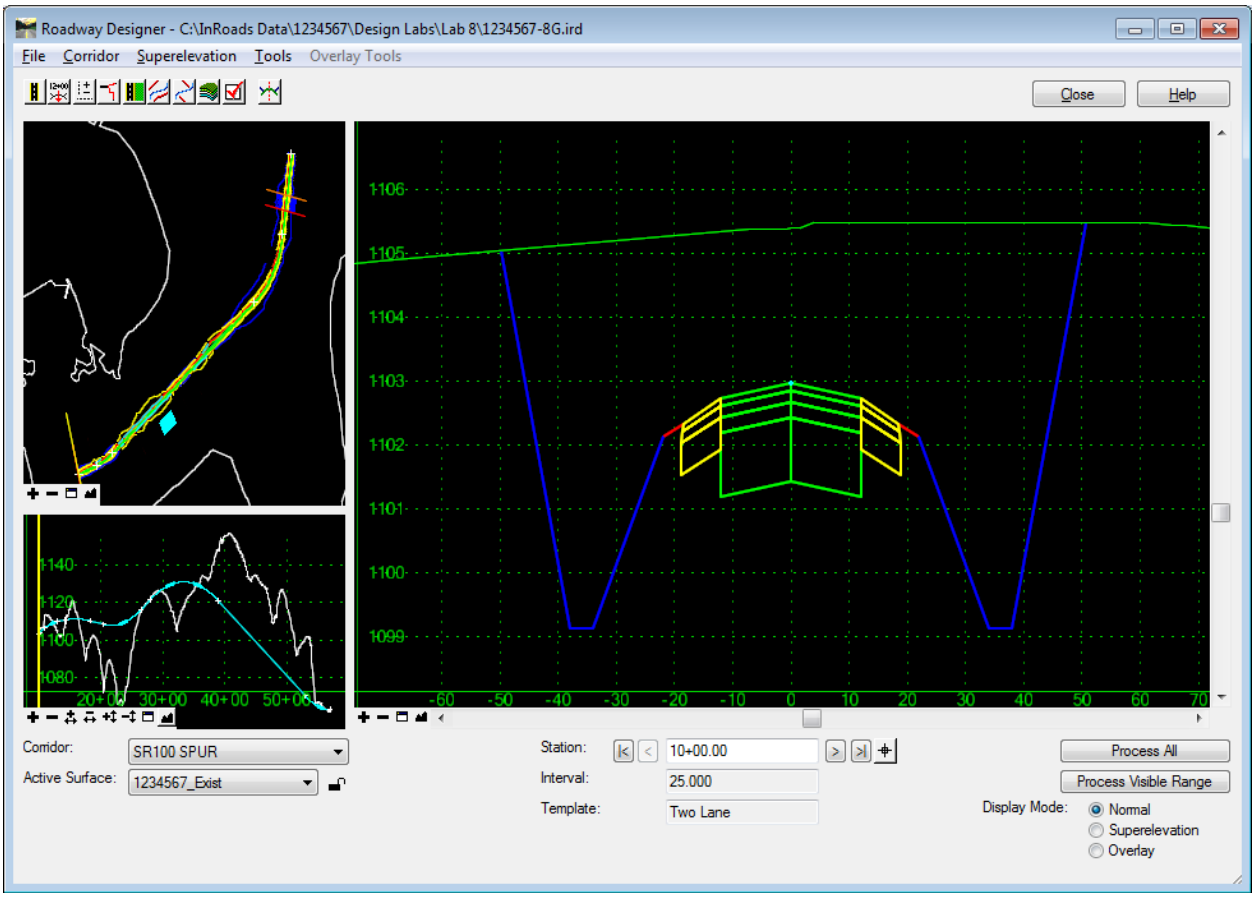


Figure L8-54 Roadway Designer

96.	**Superelevation Editing is accomplished by Switching to the Superelevation Mode in the Roadway Designer. Switch to the Superelevation Mode.** • In the **Roadway Designer**, click the **Display Mode: Superelevation** radio button. The **Roadway Designer** Window switches from the Normal Mode to the Superelevation Mode as shown in *Figure L8-55*.

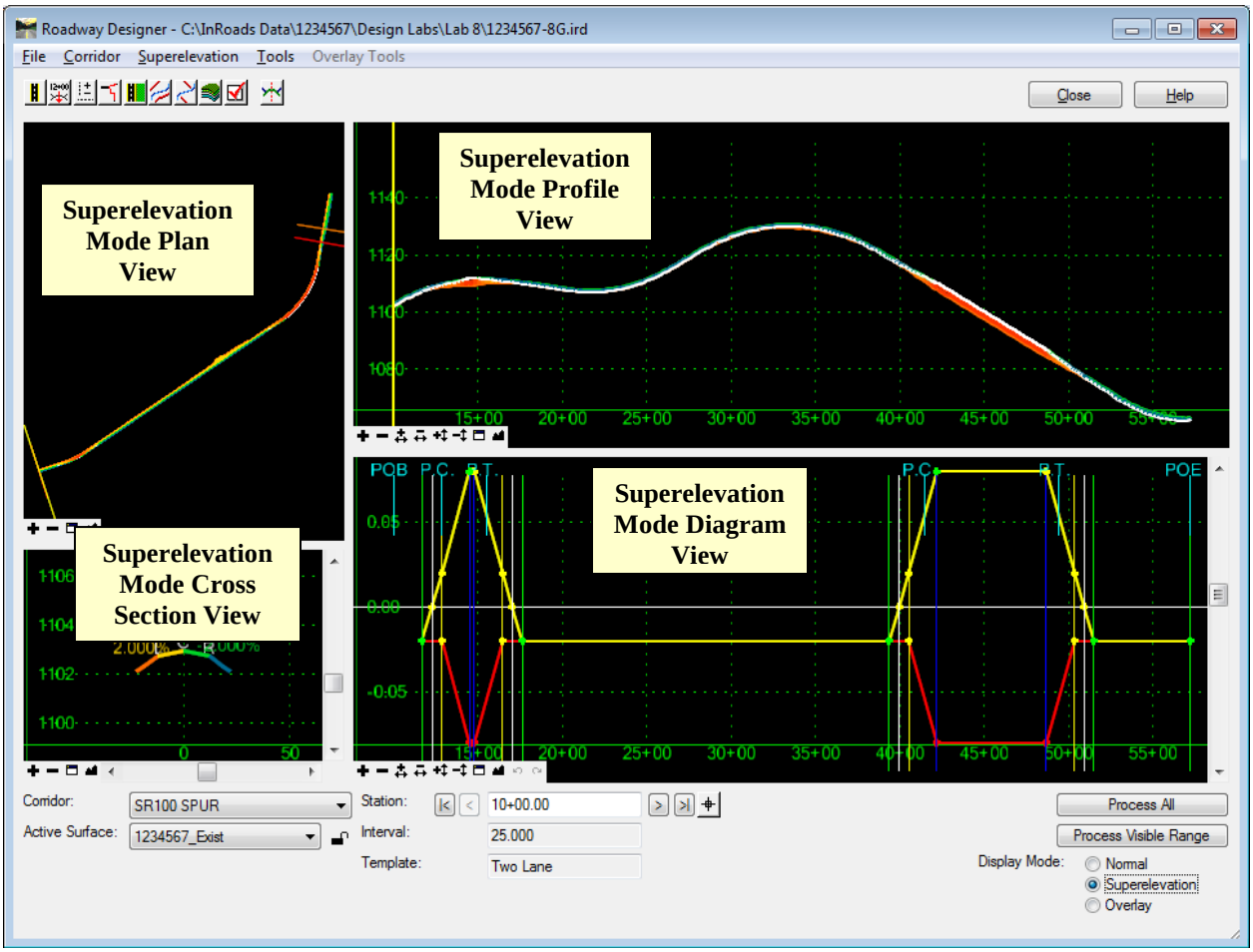


Figure L8-55 Roadway Designer – Superelevation Mode

97.	**Each of the Views In *Figure L8-55* above are Color Coded to Depict the Cross Slope Steepness. Zoom in to the Superelevation Mode Plan View to see the Color Coding.** • **Zoom** into the Superelevation Mode Plan View as shown by the white square depicted in *Figure L8-56*. • Your view should look similar to that shown in *Figure L8-57*. • Explanation of colors: **COLOR** **SLOPE** **SIDE** o Green to Blue **0.5% to 10%** Sloping to the Right o Dark Blue **> 10%** Sloping to the Right o Yellow to Red **0.5% to 10%** Sloping to the Left o Dark Red **> 10%** Sloping to the Left o White **< 0.5%** Sloping to either Left or Right

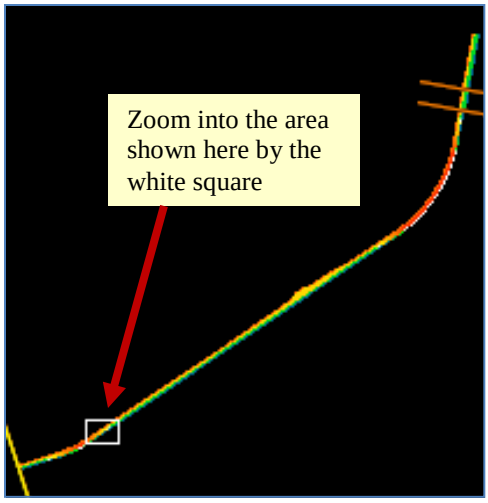


Figure L8-56 Superelevation Plan View

Figure L8-57 Superelevation Plan View

98.	**The Superelevation Mode Cross Section View is Color coded the same as the Superelevation Plan View.** • Look at the Superelevation Mode Cross Section view shown in *Figure L8-58*. The Cross Section is color coded the same as in the Superelevation Mode Plan View represented in **Step 97**. • Right mouse click in the Superelevation Mode Cross Section View. You are presented with the **Edit Station** and **Display Properties** options the same as in the Normal Mode Plan View. • Left Click in a blank part of the View to cancel making a selection.

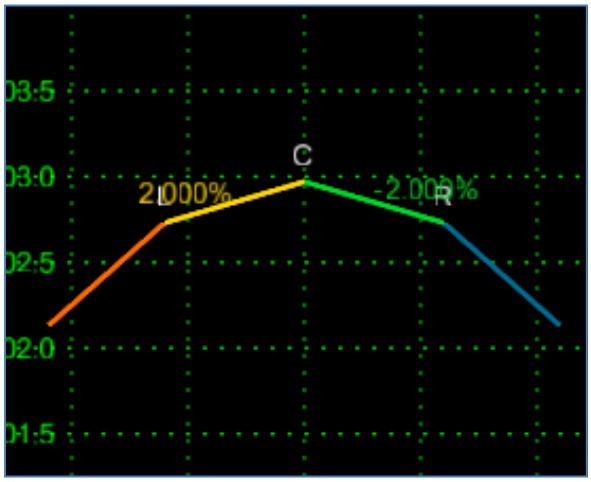
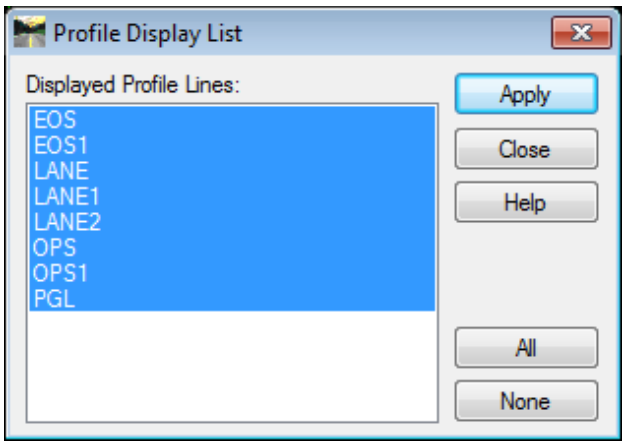


Figure L8-58 Superelevation XSEC View

99. **The Superelevation Mode Profile View shows the Profile of all the top Points in the Cross Section between the End Conditions.**

- **Zoom** in to any location in the Superelevation Mode Profile View to see the individual Profile Lines. Your view should be similar to that shown in *Figure L8-59*.
- Place your cursor over any of the lines in the Profile View. The name of the Point in the Cross Section Template is shown.
- Right mouse click in the Superelevation Mode Profile View. The **Profile Display List** dialog pops up as shown here:



- The **Profile Display List** depicts the Template Points for which Profiles are shown in the Superelevation Mode Profile View. Left click on the Point **PGL** so that only **PGL** is highlighted in the list.
- Click **Apply** and **Close**. Now only the Profile for the Point **PGL** is shown. The color of the Profile Line represents the cross section slope to the right of the point.
- Right mouse click in the Superelevation Mode Profile View again. Select **All ► Apply ► Close** to turn all the Profiles back on.
- In the **Roadway Designer** Superelevation Mode Profile View, click the **Fit** button ( ).

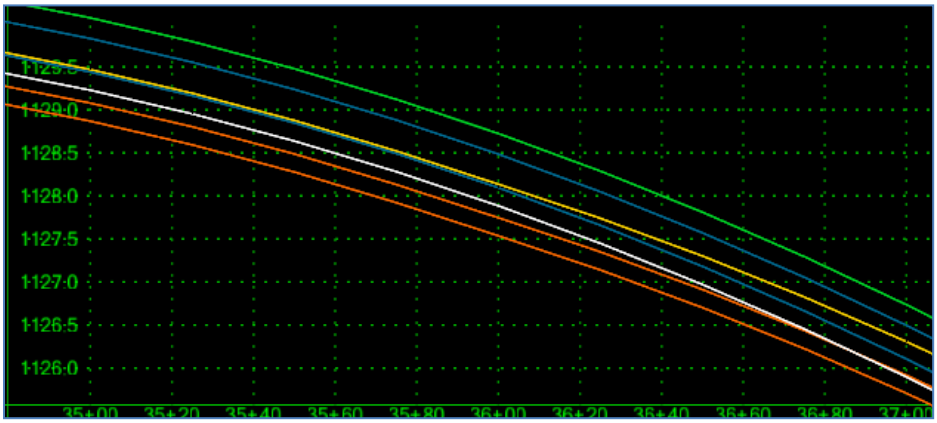
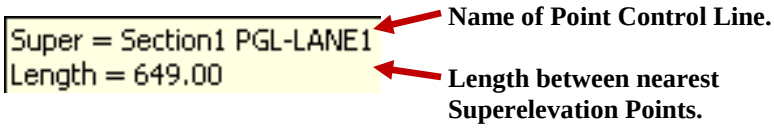


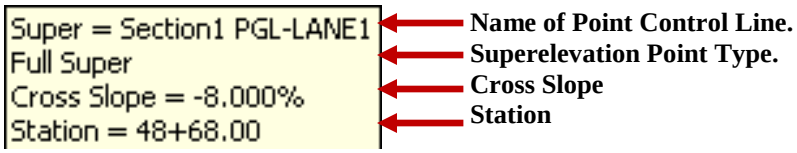
Figure L8-59 Superelevation Profile View

100. **The Superelevation Mode Diagram View, shown in *Figure L8-60*, displays the Point Control Lines and Superelevation Points created by the Superelevation Wizard. While the colors in the other Views represent the rate of super, the colors in the Diagram View only serve to differentiate one line from another. Information about each Point Control Line and Superelevation Point may also be gathered by hovering your cursor over the element.**

- Place your cursor over the Point Control Line identified in *Figure L8-60* by a white square. The information box shown here pops up.



- Place your cursor over the Superelevation Point identified in *Figure L8-60* by a white triangle. The information box shown here pops up.



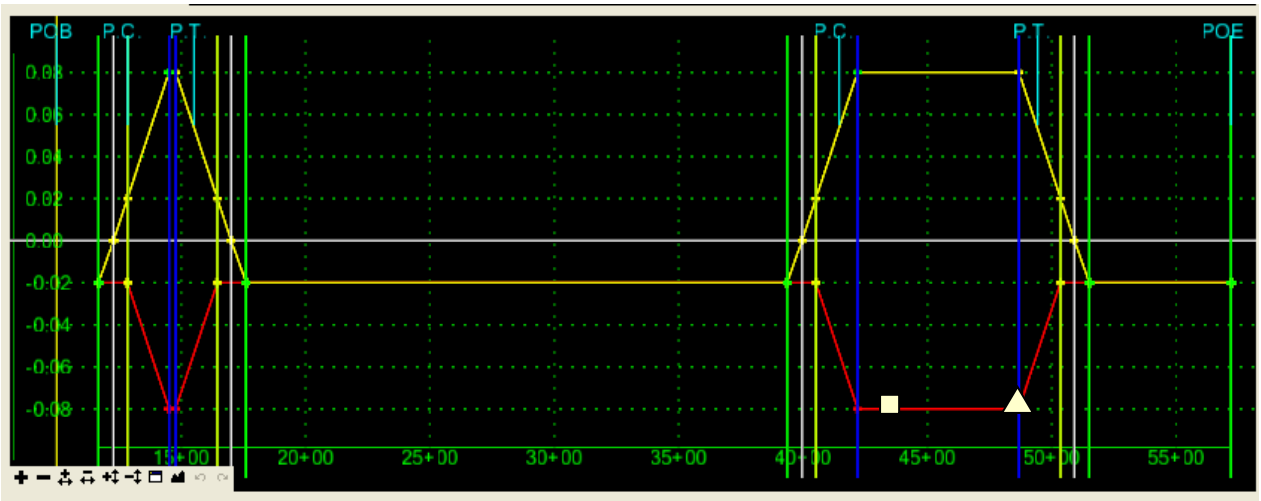


Figure L8-60 Superelevation Diagram View

101.	**Make Station 45+00 the Active Station.** • In the **Station:** key-in field enter **45+00** and press the Tab key. • Verify your view matches that shown in *Figure L8-61*. • Notice the Yellow line at Station **45+00** shown in the Plan, Profile and Diagram views. This line marks the current Station in the **Station:** key-in field and can be dragged to any Station with the mouse.

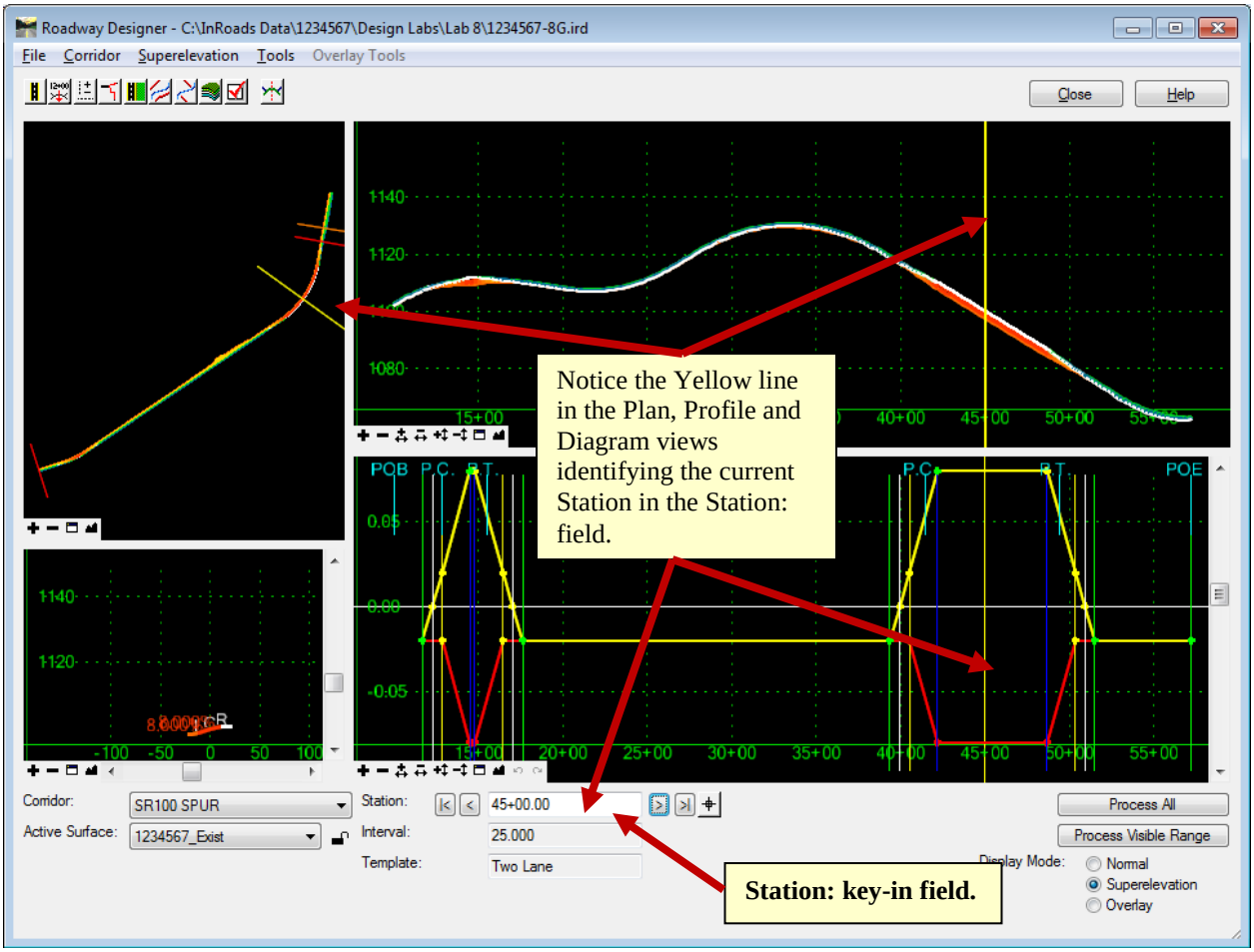
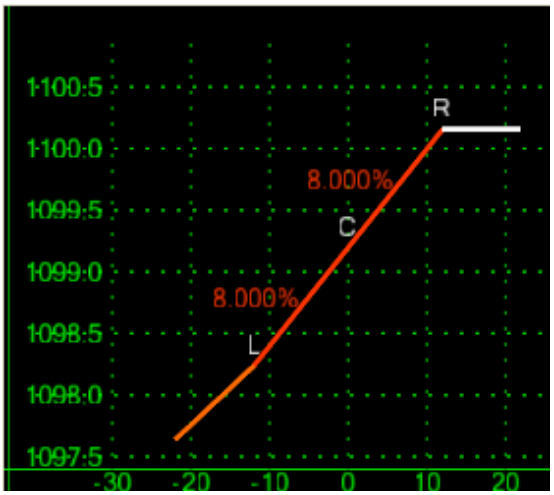


Figure L8-61 Roadway Designer – Superelevation Mode

102.	**Zoom into the Cross Section View.** • In the Cross Section View, use the **Window Area** button to match the view shown in *Figure L8-62*. ***<u>HINT</u>**: Use the mouse wheel in combination with the **Ctrl** or **Shift** key to adjust the horizontal and vertical exaggeration. • Notice the Cross Section View shows the surface at Station **45+00** and is color coded according to the information provided in **Step 97**.



***HINT**: Use the mouse wheel in combination with the **Ctrl** or **Shift** key to adjust the horizontal and vertical exaggeration display.

Figure L8-62 Superelevation XSEC View

103.	**Change the Roadway Designer from the Superelevation Mode to the Normal Mode.** • In the **<u>Roadway Designer</u>**, click the **Display Mode: Normal** radio button. • Ensure your view matches that shown in *Figure L8-63*. • Notice the Station and Zoom extents in the Cross Section Window match those that were showing when in the Superelevation Mode.
104.	**Return the Roadway Designer to the Superelevation Mode.** • Click the **Display Mode: Superelevation** radio button to return the **<u>Roadway Designer</u>** to the Superelevation Mode. • Ensure your view matches that shown in *Figure L8-64*

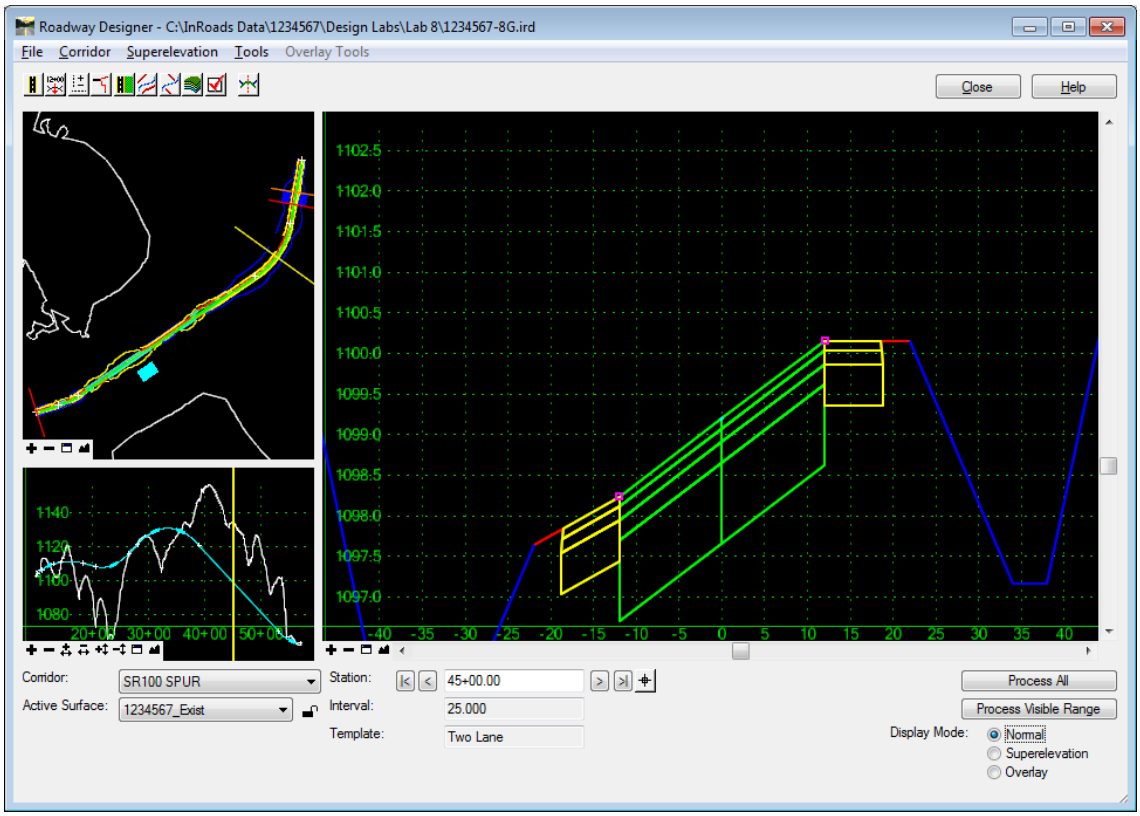


Figure L8-63 Roadway Designer – Normal Mode

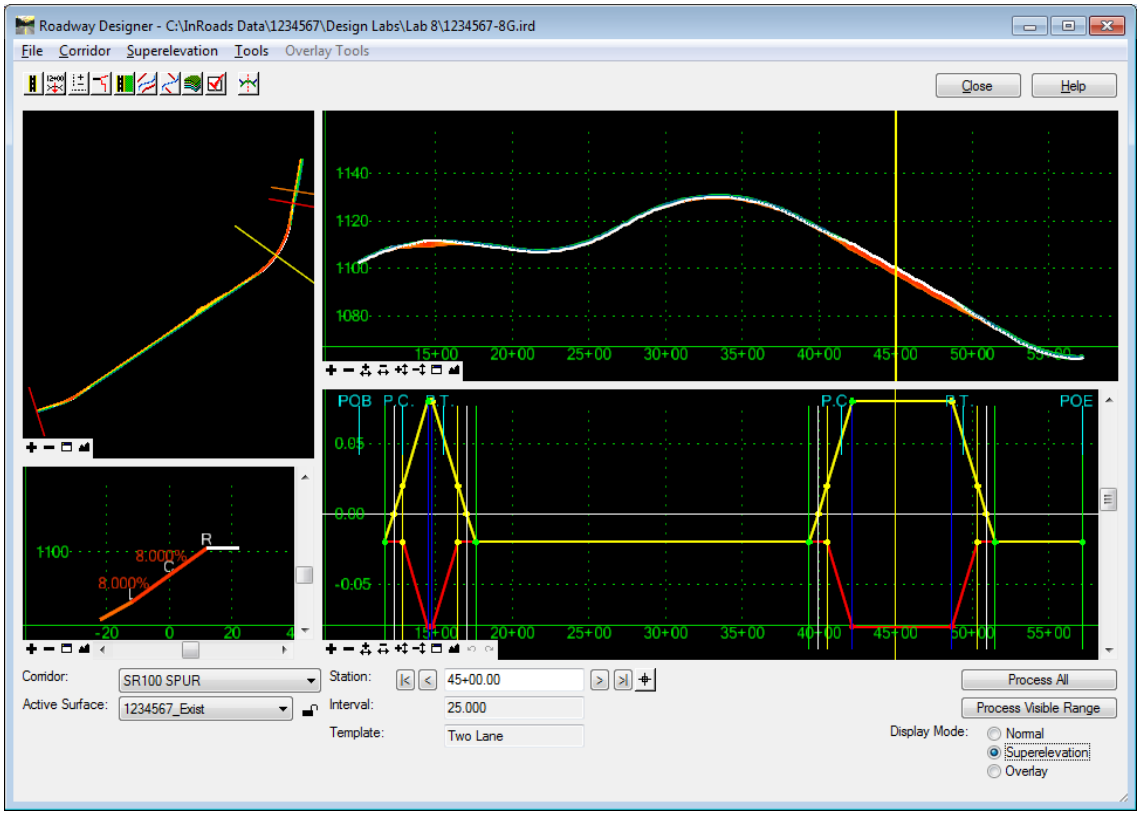
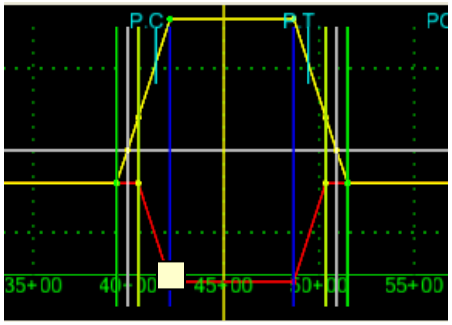


Figure L8-64 Roadway Designer – Superelevation Mode

105. **The Superelevation in both Curves in the Alignment is 8.0%. Change the Superelevation in the Second Curve from 8.0% to 5.0%**

- Double click the Superelevation Point, **Section1 PGL-LANE1**, identified by the white square shown here. The **Superelevation Point Properties** dialog opens as shown in *Figure L8-65*.



***REMEMBER**:
You can hold your mouse over any Point and a pop up will identify the Point. The white square at left is **Section1 PGL-LANE1**.

- Notice the **Cross Slope:** field is grayed out and unavailable for editing. Change **Constraint 2** from **Mirror Cross Slope** to ***None***.
- Click **Apply**. The **Cross Slope:** field becomes active for editing.
- In the **Cross Slope:** field key-in ***-5.0%*** and press the Tab key on your keyboard.
- Verify the entries in the **Superelevation Point Properties** dialog now match those shown in *Figure L8-66*.
- Click **Apply** and **Close**.
- Your Superelevation Diagram should change to that shown in *Figure L8-67*.
- At this time only one of the four Full Super Superelevation Points is changed to 5.0%. The remaining three Points may be edited using the same technique but in a later step we will edit them using a different method.

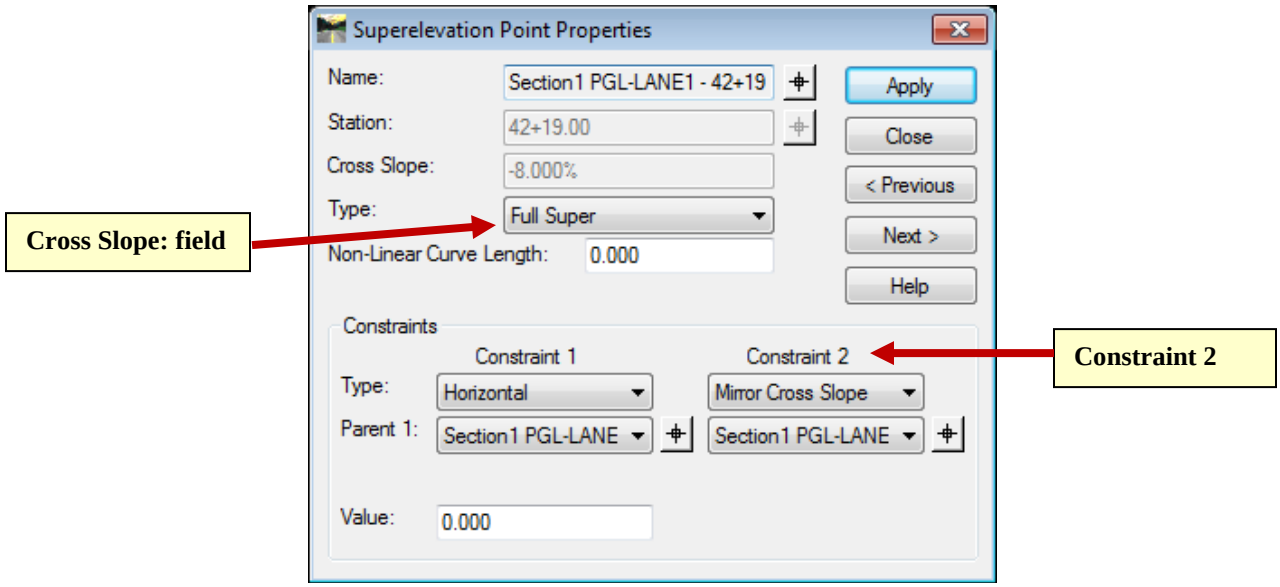


Figure L8-65 Superelevation Point Properties

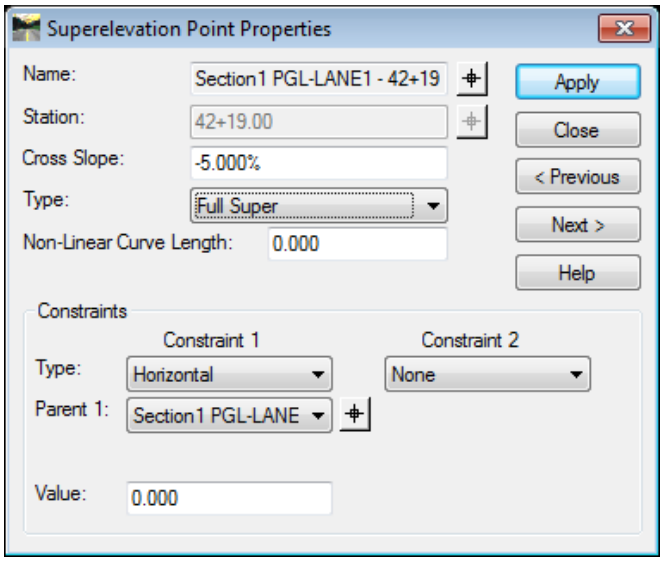


Figure L8-66 Superelevation Point Properties

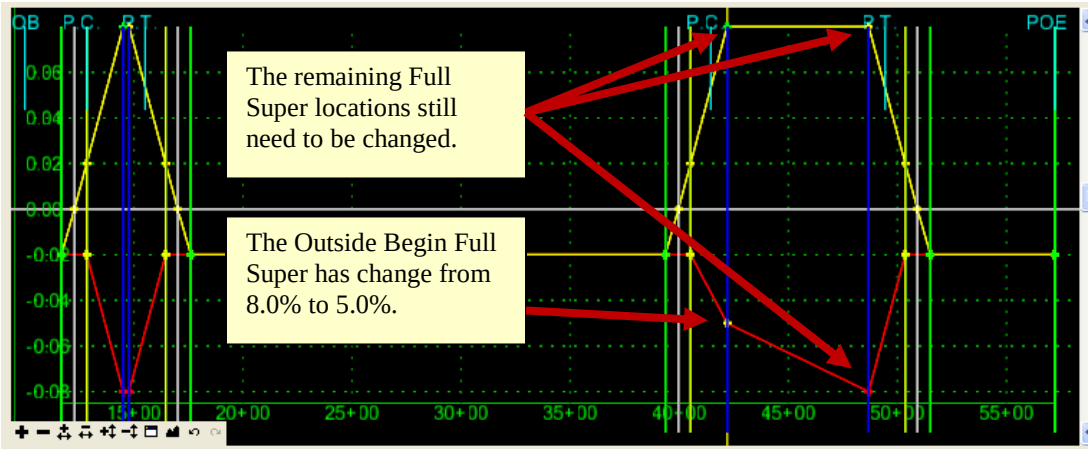


Figure L8-67 Superelevation Diagram

106.	**Generate a Superelevation Report.** • Select **Superelevation ► Superelevation Report**. The **<u>Roadway Design Superelevation Report</u>** dialog opens. • Highlight **LANE1** and click **Apply**. • The **<u>Bentley Civil Report Browser</u>** opens. The Name of the Style Sheet is **'GDOT Superelevation Data Report.xsl'**. Click on this Style Sheet Name to select it. • The GDOT Superelevation Data Report opens in the **<u>Bentley Civil Report Browser</u>** as shown in *Figure L8-68*. • Notice the Report reflects the **-5.000%** change we made. (See highlighted below in blue for clarity). • **Close** the Report by clicking the red (X) in the upper right corner of the Report Browser. • **Close** the **<u>Roadway Design Superelevation Report</u>** dialog.

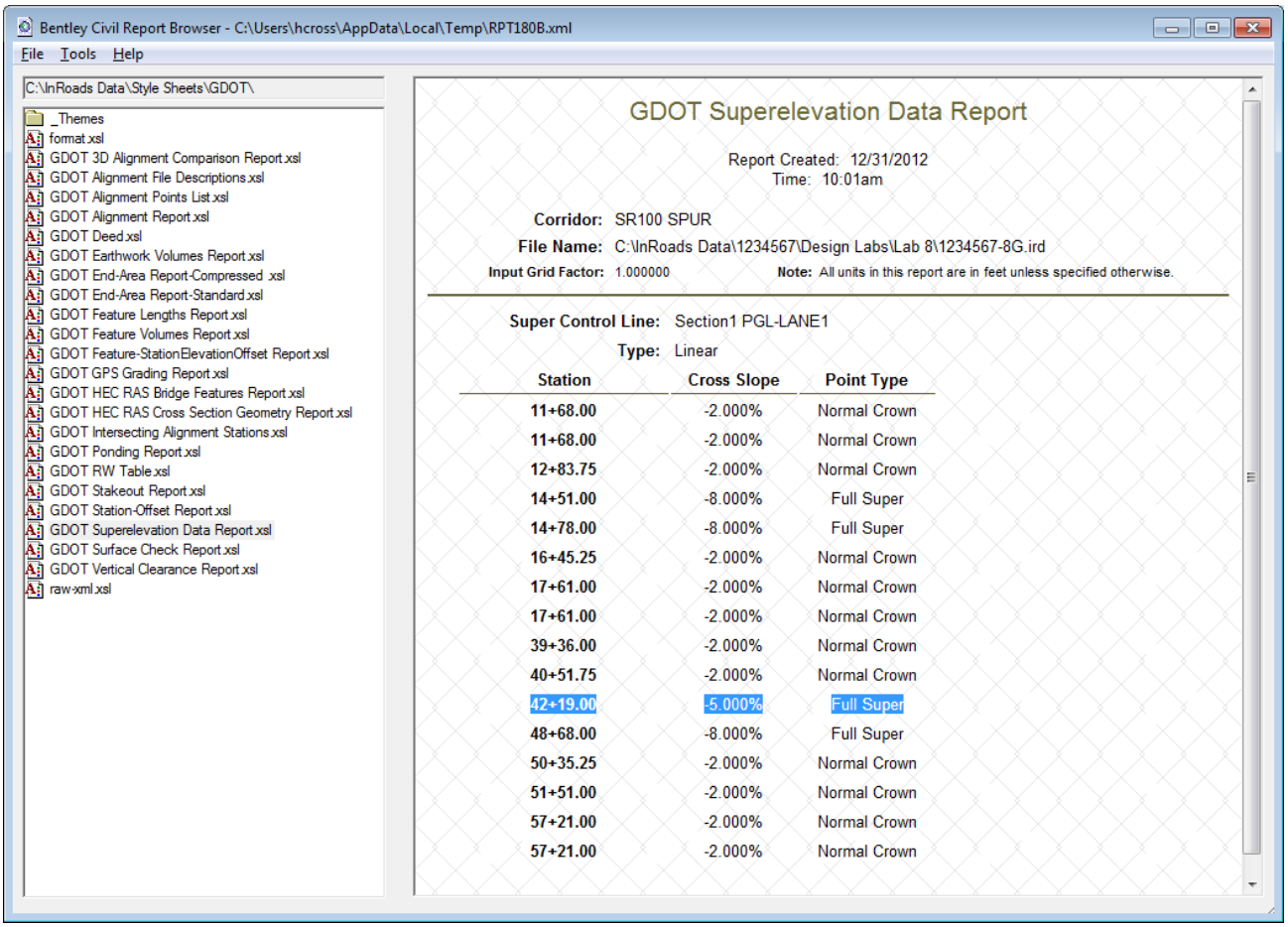
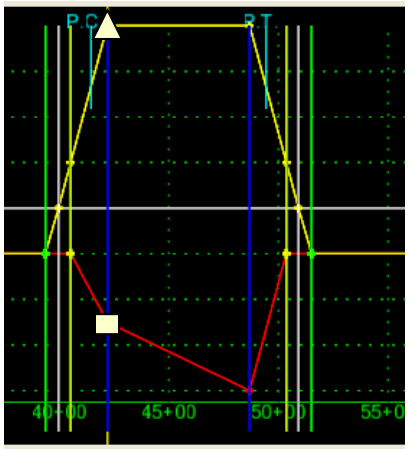


Figure L8-68 Superelevation Report

107. **Change the 5.0% slope back to 8.0%.**

- Right mouse click over the same Point edited in **Step 105** and shown below highlighted by a white square.
- Select **Edit Point**. The **Superelevation Point Properties** dialog opens.



- Change the **Cross Slope:** from -5.000% to ***-8.000%***
- Use the pull down arrow under **Constraint 2** to select ***Mirror Cross Slope***.
- Ensure **Parent 1:** is set to **Section1 PGL-LANE-42+19** by using the **Locate** button ( ) and clicking on the Point identified by a white triangle above.
- Ensure the entries in the **Superelevation Point Properties** match those shown in *Figure L8-69*.
- Click **Apply**. Notice the **Cross Slope:** field grays out. This is because of the **Mirror Cross Slope** constraint we added to **Constraint 2**.
- Click **Close** to exit the **Superelevation Point Properties** dialog.
- Verify your Superelvation Diagram matches that shown in *Figure L8-70* and that the **5.0%** Cross Slope has been returned to **8.0%.**

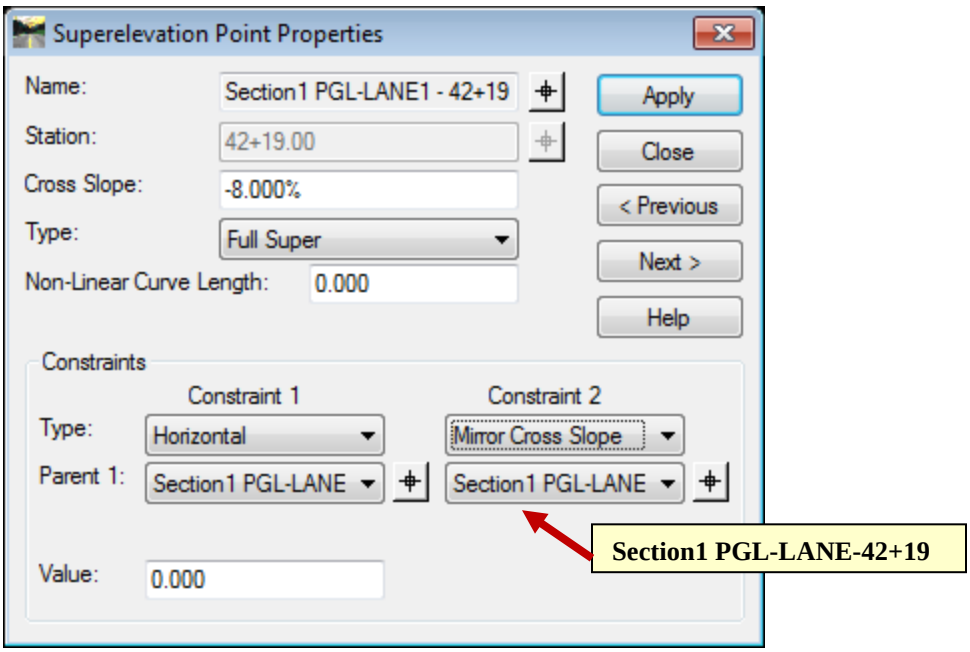
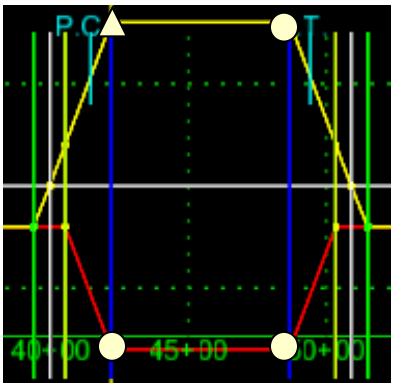


Figure L8-69 Superelevation Point Properties

Figure L8-70 Superelevation Diagram

108. **In the previous Superelevation Edit - we changed the Full Super at only one Superelevation Point (the Outside Begin Full Super Point). It is possible to change all the Full Super Points in a curve set at one time by editing the Point from which all other Points are constrained. Change the Full Super to 5.0% for all Full Superelevation Points in the second curve set.**

- Double click the Point identified with a white triangle shown here.
  The **Superelevation Point Properties** dialog opens.



- In the **Cross Slope:** field, key-in **5.000%** as shown in *Figure L8-71*.
- Click **Apply** and **Close**.
- Notice all four Full Superelevation Points were changed to **5.000%** simultaneously. This is because 3 of the Points are constrained to the Point we just edited. The cross slopes may be verified by holding your cursor over the other 3 Full Super Points (identified by white circles above) and reading the information in the pop up box. The Superelevation Wizard used earlier in Lab 8 to add Point Control Lines also adds curve sets with Superelevation Points automatically constrained. The FS Points are always constrained to the Inside Begin FS Point.

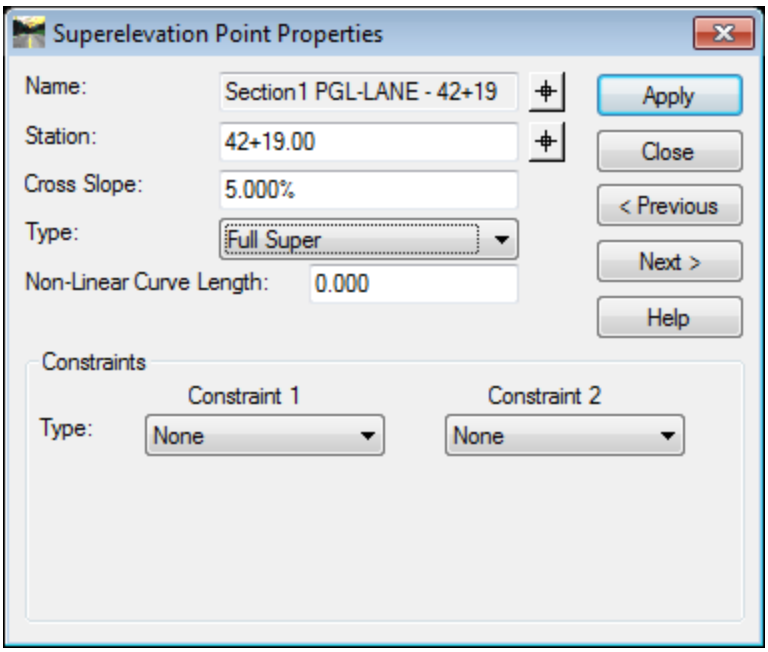
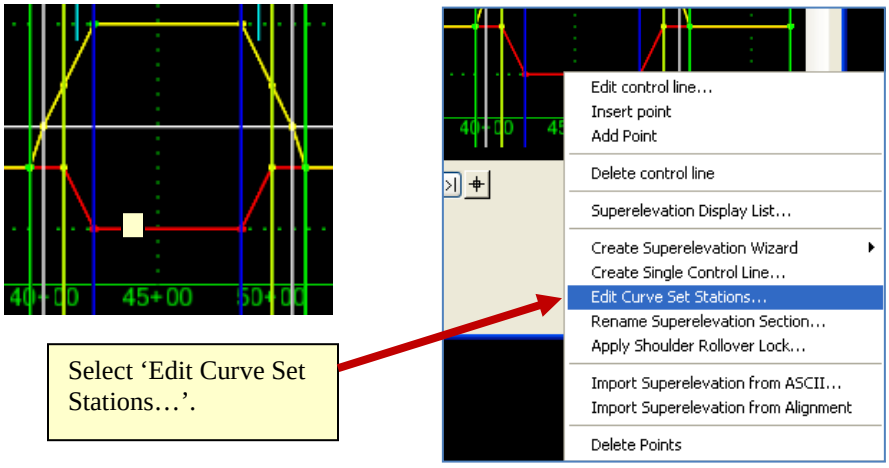


Figure L8-71 Superelevation Point Properties

109. **Another Method of making Superelevation Edits is through the use of the <u>Superelevation Control Curve Set Station Edit</u> dialog box. Open the <u>Superelevation Control Curve Set Station Edit</u> dialog box.**

- Right mouse click over the Point Control Line in the area identified by the white square as shown below left.



- From the Pop-Up menu that opens, shown above right, select **Edit Curve Set Stations…** The **<u>Superelevation Control Curve Set Station Edit</u>** dialog opens as shown in *Figure 8-72*.

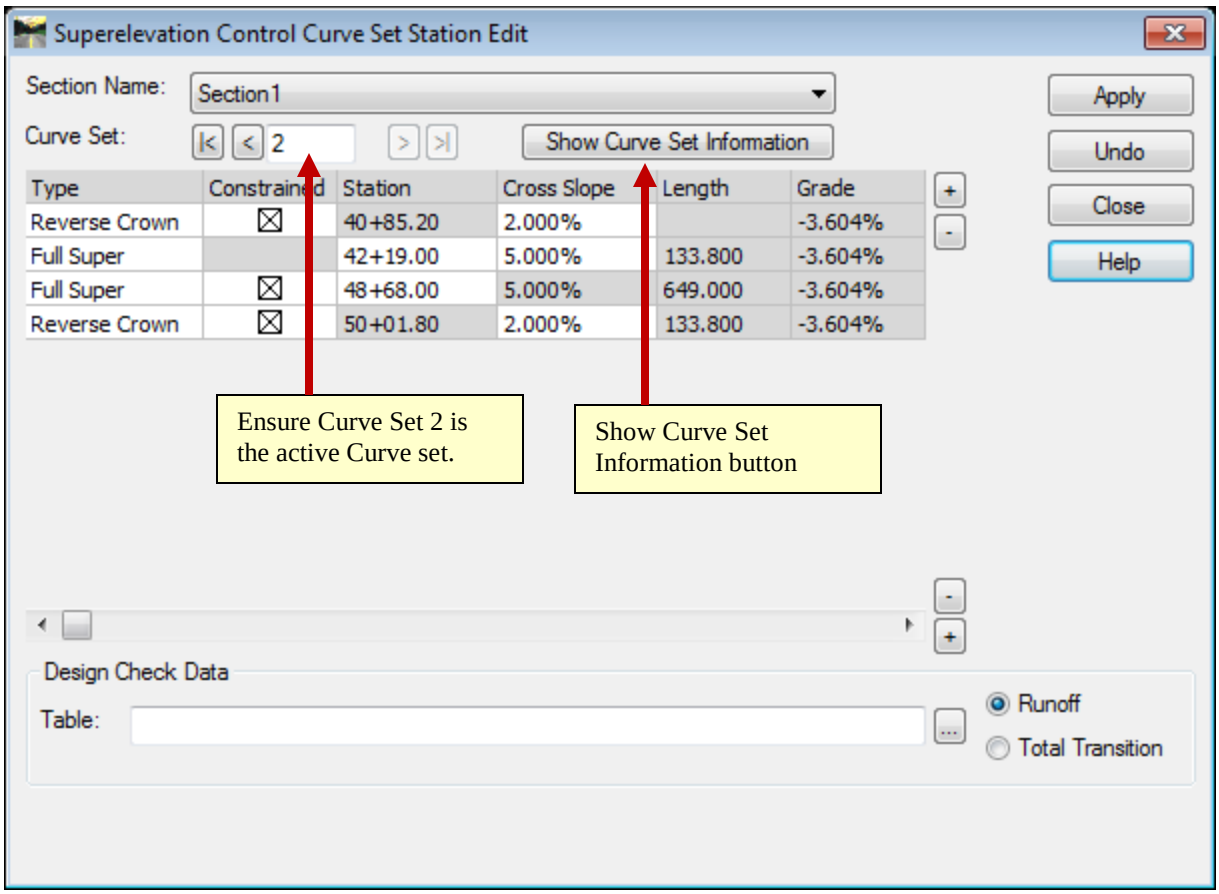


Figure L8-72 Superelevation Control Curve Set Station Edit

110.	**Use the 'Show Curve Set Information' Button to view additional information about Curve Set 2.** • Click the **Show Curve Set Information** button. Additional information about Curve Set 2 is now shown in a preview window located in the bottom right of the **<u>Superelevation Control Curve Set Station Edit</u>** dialog as seen in *Figure L8-73*.

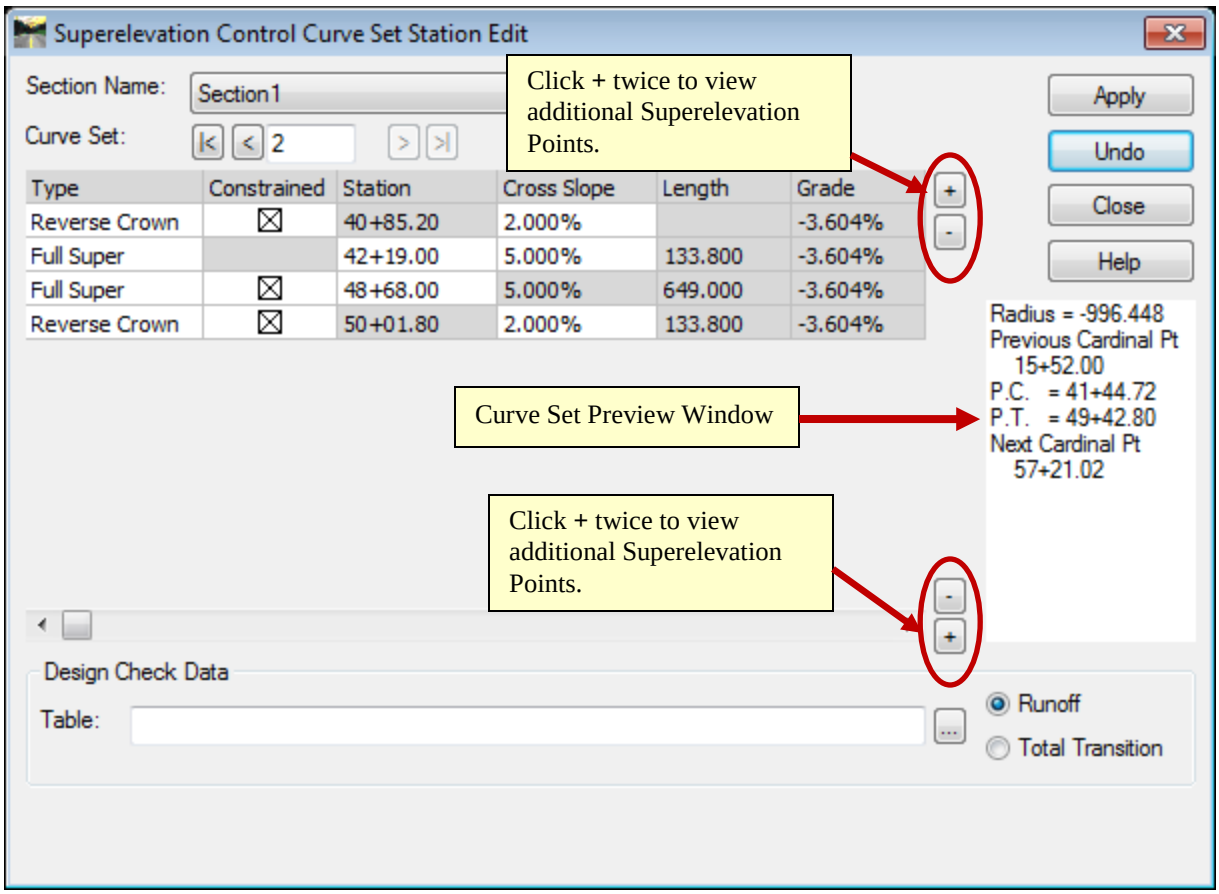


Figure L8-73 Superelevation Control Curve Set Station Edit

111.	**The <u>Superelevation Control Curve Set Station Edit</u> dialog is defaulted to open showing the Superelevation Points for only one curve set (Reverse Crown to Reverse Crown) at a time. There are two sets of + / - buttons, identified in *Figure L8-73* by Red ellipses, for adding and removing the view of Superelevation Points. Add Superelevation Points before and after the current curve set.** • **Click** the + button (+) **twice** in the top set of +/- buttons to add Superelevation Points before the currently displayed Superelevation Points. • **Click** the + button (+) **twice** in the bottom set of +/- buttons to add Superelevation Points after the currently displayed Superelevation Points. • **Ensure** your **<u>Superelevation Control Curve Set Station Edit</u>** dialog now lists the Superelevation Points from Normal Crown to Normal Crown as shown in *Figure L8-74*.

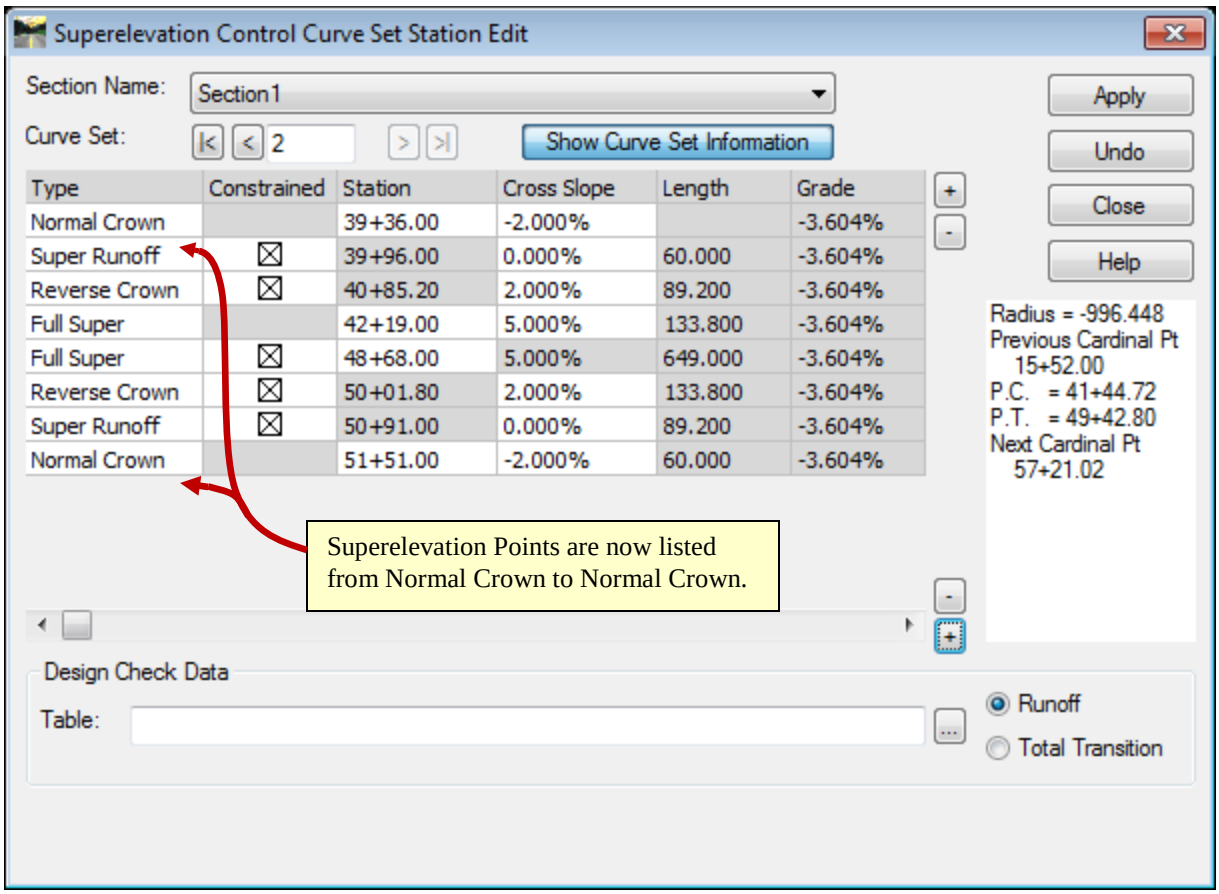
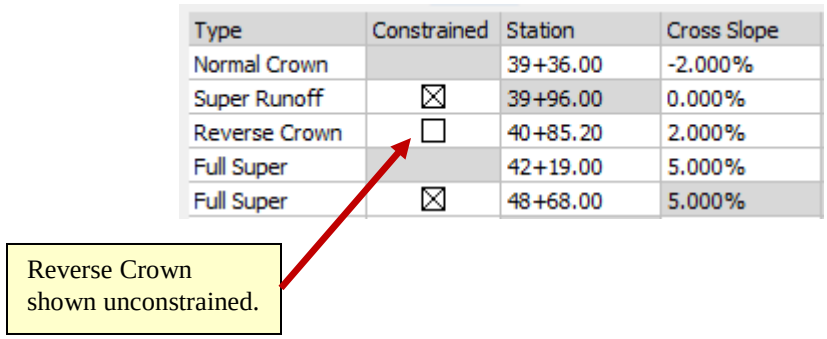


Figure L8-74 Superelevation Control Curve Set Station Edit

112. **Use the <u>Superelevation Control Curve Set Station Edit</u> dialog box to change the Station of the Reverse Crown at Station 40+85.20 to 41+00.00.**

- The Reverse Crown at Station **40+85.20** is currently constrained to the Super Runoff Point at Station **39+96.00** and the Station cannot be changed. Remove the constraint on the Reverse Crown by un-checking the **Constrained** box. This is accomplished by Left clicking in the box to remove the **X** and should appear as shown here when done.



- In the Reverse Crown **Station** entry field, change the **Station** at **40+85.20** to **41+00.00** by keying-in ***41+00.00*** and press the Tab key on your keyboard to accept the entry.
- Verify your entry matches that shown below.

Type	Constrained	Station	Cross
Normal Crown		39+36.00	-2.00
Super Runoff	☒	39+96.00	0.000
Reverse Crown	☐	41+00.00	2.000%
Full Super		42+19.00	5.000%
Full Super	☒	48+68.00	5.000%

The Reverse Crown should now begin at station 41+00.00.

- Click **Apply** to make the changes to the Corridor but do **<u>not</u>** close the dialog box.

113. **Use the <u>Superelevation Control Curve Set Station Edit</u> dialog box to change the Full Superelevation in Curve Set two from 5.000% to 8.000%.**

- In the **Cross Slope** field for the **Full Super** at Station **42+19.00** key-in ***8.000%*** and press the Tab key on your keyboard as shown here.

Reverse Crown	☐	41+00.00	2.000%
Full Super		42+19.00	8.000%
Full Super	☒	48+68.00	8.000%
Reverse Crown	☒	50+35.25	2.000%

Key-in 8.000% here.

- Notice the **Full Super** at Station **48+68.00** was automatically changed to **8.000%**. This is because it is constrained to the **Full Super** at **42+19.00** as can be seen by the **Constrained** check box.
- Click **Apply** & **Close** to make the changes to the Corridor and exit the dialog.

114. **For Information Only.**

In the **<u>Superelevation Control Curve Set Station Edit</u>** dialog shown in *Figure L8-75*, notice there is only one column for **Cross Slope**. There is no column for Left Cross Slope or Right Cross Slope. If the Left and Right Cross Slopes require different rates as may occur, the **<u>Superelevation Control Curve Set Station Edit</u>** dialog cannot be used. When different Left and Right Cross Slopes are required, the Superelevation Points must be edited as shown in **Steps 105** through **108**.

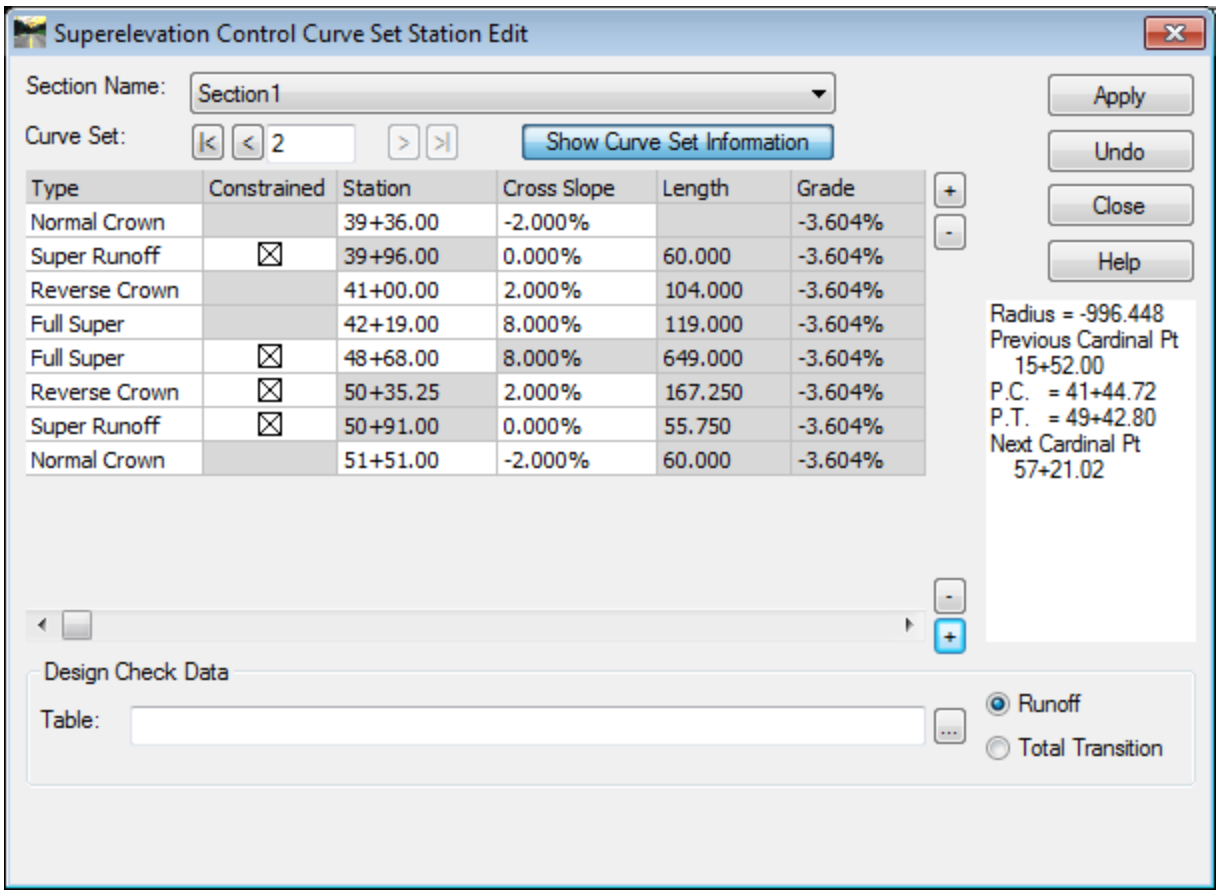


Figure L8-75 Superelevation Control Curve Set Station Edit

115.	**Create a Superelevation Report and Review your changes.** • Select **Superelevation ► Superelevation Report**. The **<u>Roadway Design Superelevation Report</u>** dialog opens. • Click the **All** button to highlight both **LANE** and **LANE1**. • Click **Apply** and the **<u>Bentley Civil Report Browser</u>** opens. The Name of the Style Sheet is **'GDOT Superelevation Data Report.xsl'**. Click on this Style Sheet Name to select it. • The **GDOT Superelevation Data Report** opens in the **<u>Bentley Civil Report Browser</u>** as shown in *Figure L8-76*. • Review the **GDOT Superelevation Data Report** as partially shown in *Figure L8-76*. • Notice the Reverse Crown at station **41+00.00**. • **Close** the Report when you are through reviewing it by clicking the red (X) in the upper right corner of the Report Browser. • **Close** the **<u>Roadway Design Superelevation Report</u>** dialog.

116.	**Save Your Work and Exit the Roadway Designer.** • In the **Roadway Designer**, select **File ► Save**. • Click **File ► Close** to exit the **Roadway Designer**.

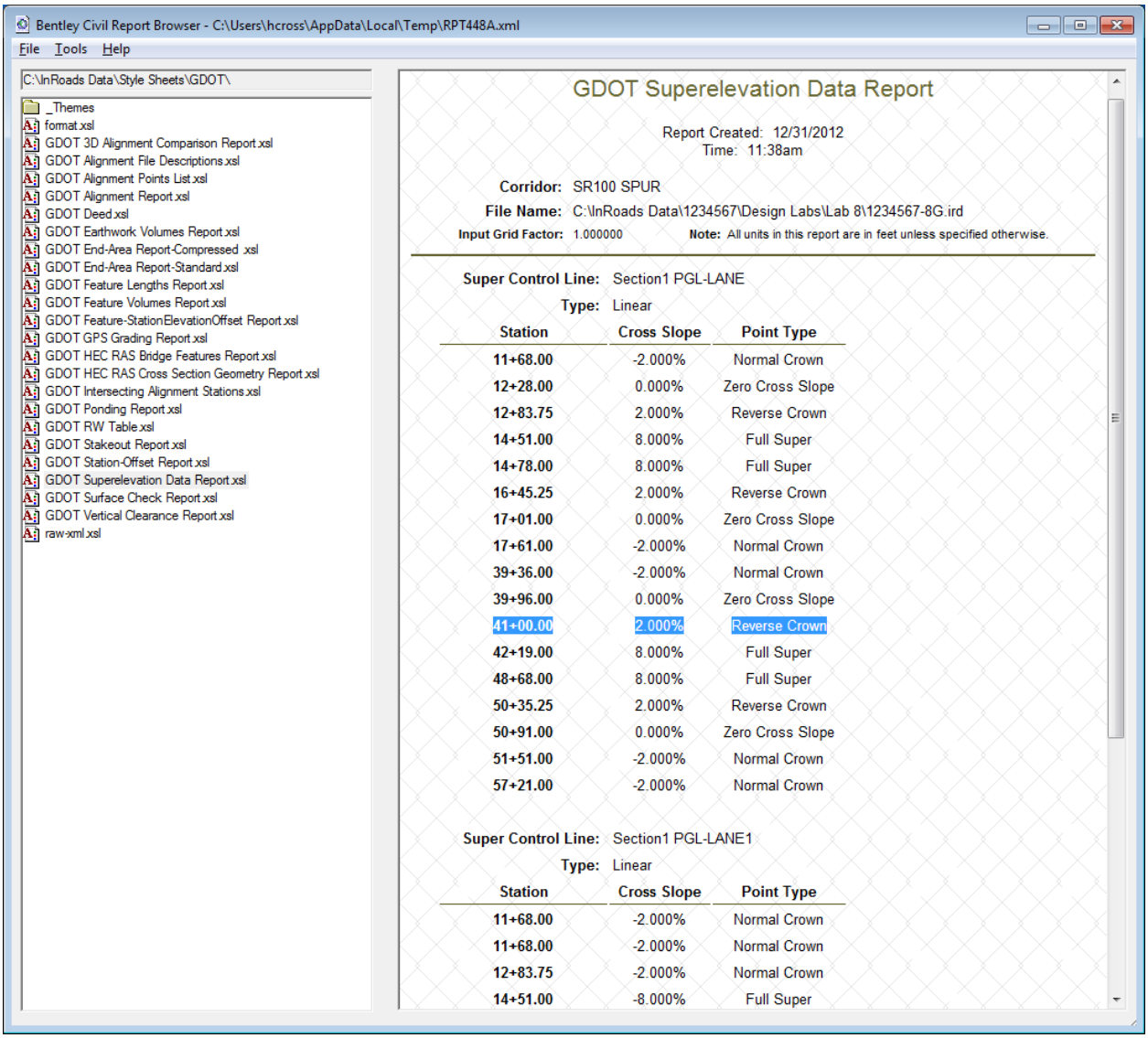


Figure L8-76 Superelevation Data Report

Lab 8H Shoulder Rollover Locks

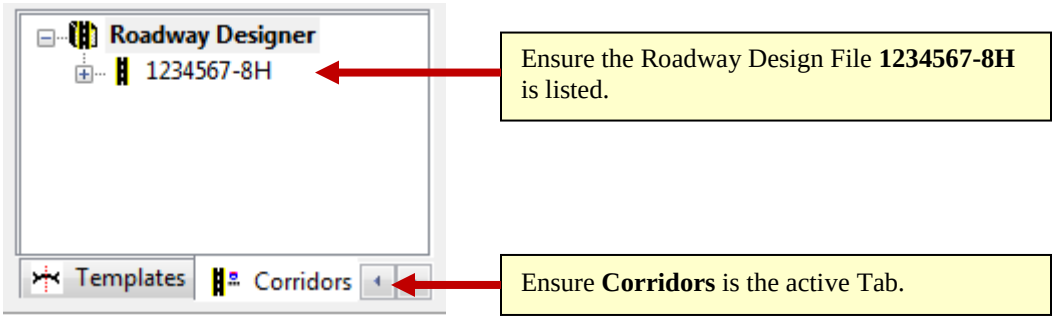
In Lab 7 you were introduced to the InRoads Template Library (.ITL) and Component and Template creation. Part of a template's function is to Superelevate or 'roll' the shoulders in response to the Superelevation of the travel lanes. The building of Shoulder Rollover Locks into templates was depicted in Lab 7H. It is preferable to define Shoulder Rollover Locks in the Components and Templates but they are not the only place Shoulder Rollover Locks can be created. InRoads provides the ability in the Roadway Designer to add or change Shoulder Rollover Lock values after a template or templates have been dropped and processed through the Corridor. In Lab 8 you will correct Shoulder Rollover Locks that were incorrectly built into a Template and do not function properly in response to a Superelevating roadway.

117. **If <u>not</u> still open from the Previous Section, open MicroStation and InRoads and the following files. Refer to Lab Section 8A for Help. (Omit this step if files are open).**

- GDOT 3D Working File.dgn
- 1234567_Exist.dtm
- GDOT_Lab8.itl
- 1234567_Design.alg

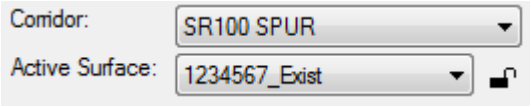
118. **To Ensure your Data Matches during this Section of Lab 8, a Roadway Design File (.IRD) has been prepared for you. Open the Roadway Design File 1234567-8H.ird.**

- In InRoads, select **File ► Open**. The **<u>Open</u>** dialog appears.
- **Browse** to the folder **C:\InRoads Data\1234567\Design Labs\Lab 8**
- **Highlight** the file **1234567-8H.ird**.
- Click **Open** and **Cancel**.
- In the InRoads workspace bar, ensure the **Corridors** tab is the active tab as shown here and that the file **1234567-8H** is listed. (You may need to click the Plus Symbol to expand the **Roadway Designer** to see the listed **1234567-8H** file.)



119. **Open the Roadway Designer and Ensure the Corridor is set to 'SR100 SPUR' and the Active Surface is set to '1234567_Exist'.**

- In InRoads, select **Modeler ► Roadway Designer**.
- In the bottom left of the **<u>Roadway Designer</u>** Window, verify the **Corridor:** and **Active Surface:** fields are set to **SR100 SPUR** and **1234567_Exist** respectively as shown here.



- In the **<u>Roadway Designer</u>**, click the **Display Mode: Normal** radio button.
- In the **<u>Roadway Designer</u>**, click the **Process All** button.
- **Close** the **<u>Results</u>** Report if one opens.

120.	**Set Station 14+50.00 as the Current Station.** • In the **<u>Roadway Designer</u> Station:** field, key-in ***14+50.00*** and press the Tab key on your keyboard. • Your view should match that shown in *Figure L8-77*.

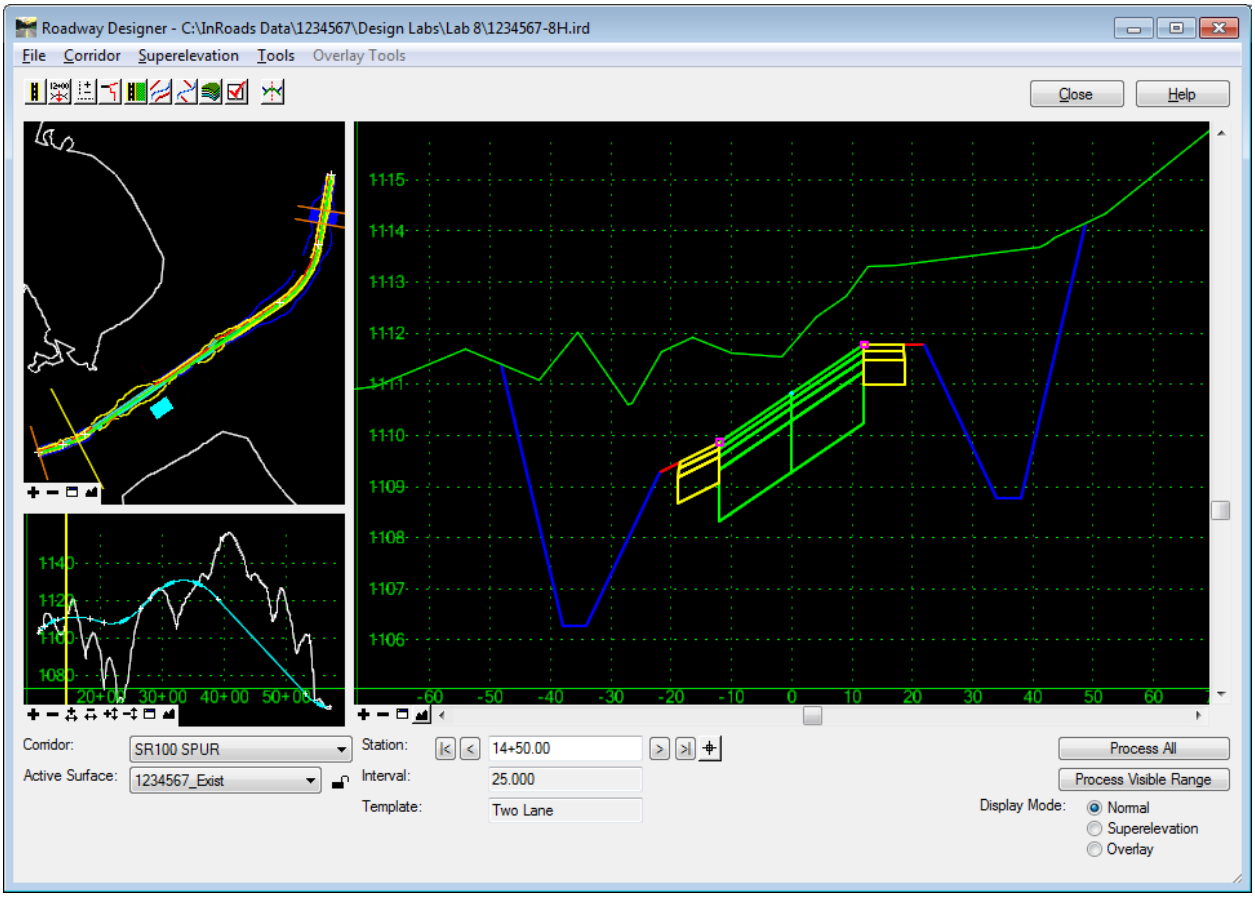
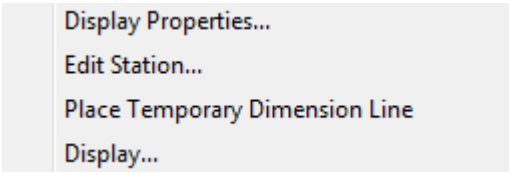
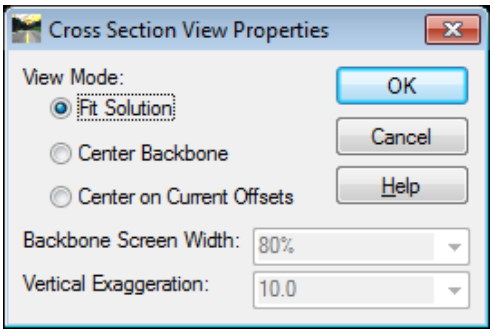


Figure L8-77 Roadway Designer

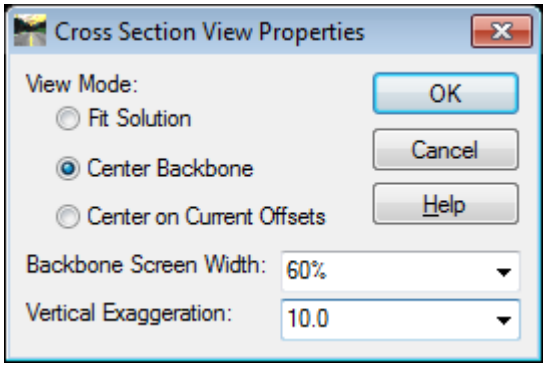
121.	**Open the <u>Cross Section View Properties</u> dialog.** • Right mouse click in the **Cross Section View** Window. In the pop-up menu that appears (shown below at left), select **Display Properties**… The **<u>Cross Section View Properties</u>** dialog opens as shown below right.  

122. **Change the <u>Cross Section View Properties</u> to Center the Backbone.**

- Click the **Center Backbone** radio button to make it the active selection.

NOTE:** ***Backbone *is an InRoads term which refers to that portion of a Template between the End Conditions.*

- Use the pull down arrow to set the **Backbone Screen Width:** to ***60%***.
- Use the pull down arrow to set the **Vertical Exaggeration:** at ***10.0***.
- Verify your entries match those shown here.



- Click **OK**. The **Cross Section View** in the **<u>Roadway Designer</u>** centers the backbone with the backbone occupying **60%** of the screen width.
- Verify your **Cross Section View** is similar to that shown in *Figure L8-78*. (Variations are possible from computer to computer depending on how closely the **Cross Section View** Window is zoomed in or out).
- The Superelevation at this Station is at 8.00%. Notice the left shoulder breaks from the travel lane and does not extend at the same cross slope as the travel lane. This is a sign the Shoulder Rollover Locks are not set correctly in the Template.
- The Shoulder Rollover Locks can be corrected by editing the Template in the Template Library (.ITL) or they can be edited from within the **<u>Roadway Designer</u>** as will be shown in the following steps.

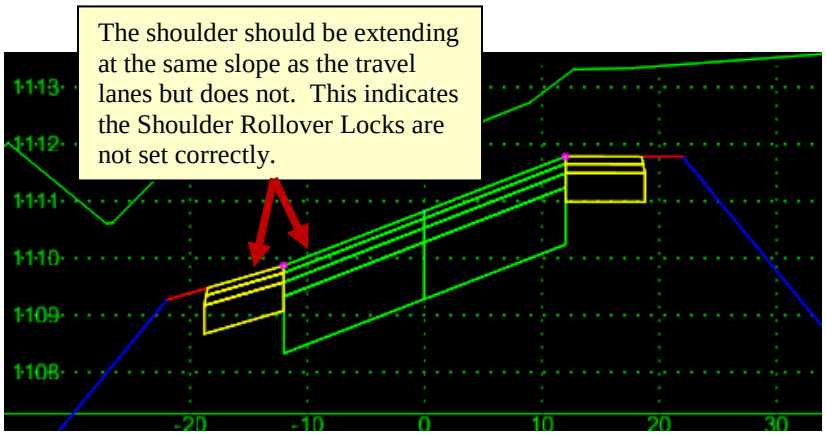


Figure L8-78 Roadway Designer

123.	**Open the <u>Apply Shoulder Rollover Lock</u> dialog.** • In the **<u>Roadway Designer</u>**, select **Superelevation ► Apply Shoulder Rollover Lock**… The **<u>Apply Shoulder Rollover Lock</u>** dialog opens as shown in *Figure L8-79*.

<u>*NOTE</u>: The ***<u>Apply Shoulder Rollover Lock</u>*** dialog controls the shoulder Superelevation by creating Point Controls the same as those discussed in Lab 8D. The Control Line Name: field at right refers to the name of the Point Control that will be created and is always defaulted to match the name of the Shoulder Point.

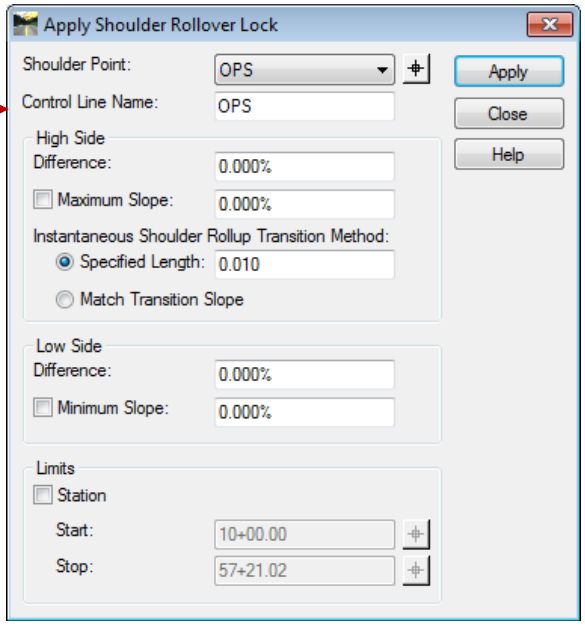
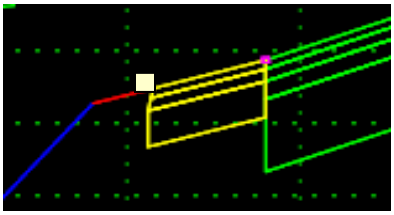
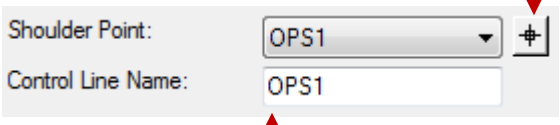


Figure L8-79 Apply Shoulder Rollover Lock

124.	**Select the Left Side Paved Shoulder Point.** • In the **<u>Apply Shoulder Rollover Lock</u>** dialog, click the **Locate** button next to the **Shoulder Point:** field and Left click on the Left Paved Shoulder Point identified below left with a white square. The **<u>Apply Shoulder Rollover Lock</u>** dialog reopens with **OPS1** selected as shown below right.



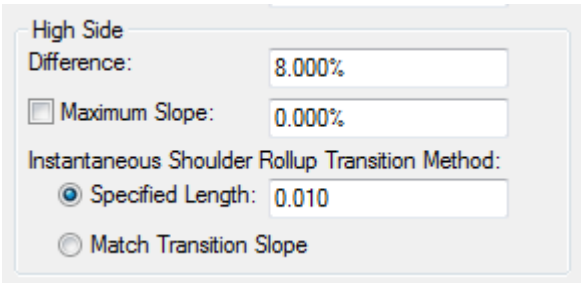
Locate Button to select Shoulder Point.



Note the Control Line Name automatically took the name of the Shoulder Point. In this case **OPS1**.

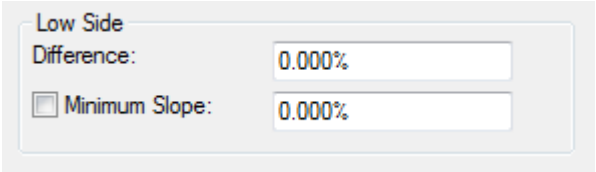
125. **Define the Shoulder so as to maintain an 8.0% Algebraic Difference between the Shoulder and Travel Lanes when the Shoulder is on the High Side of the Travel Lanes through a Curve.**

- In the **High Side** section of the **Apply Shoulder Rollover Lock** dialog ensure the **Difference:** is set to ***8.000%*** and the remainder of the entries match those shown here.



126. **Define the Shoulder so as to Match the Cross Slope of the Travel Lanes when the Shoulder is on the Low Side of the Travel Lanes through a Curve.**

- In the **Low Side** section of the **Apply Shoulder Rollover Lock** dialog ensure the **Difference:** is set to ***0.000%*** and the remainder of the entries match those shown here.



127. **Apply the Shoulder Rollover Lock and Process the Corridor.**

- Ensure the entries in the **Apply Shoulder Rollover Lock** dialog match those shown in *Figure L8-80*.
- Click **Apply** & **Close**. The **Apply Shoulder Rollover Lock** dialog closes and you are returned to the **Roadway Designer** Window.
- In the **Roadway Designer** Window, click the **Process All** button.
- **Close** the **Results** Report if one opens.
- Ensure in the **Roadway Designer** that the **Cross Section View** at Station **14+50.00** matches that shown in *Figure L8-81* and that the Left Side Shoulder now matches the Cross Slope of the travel lanes.

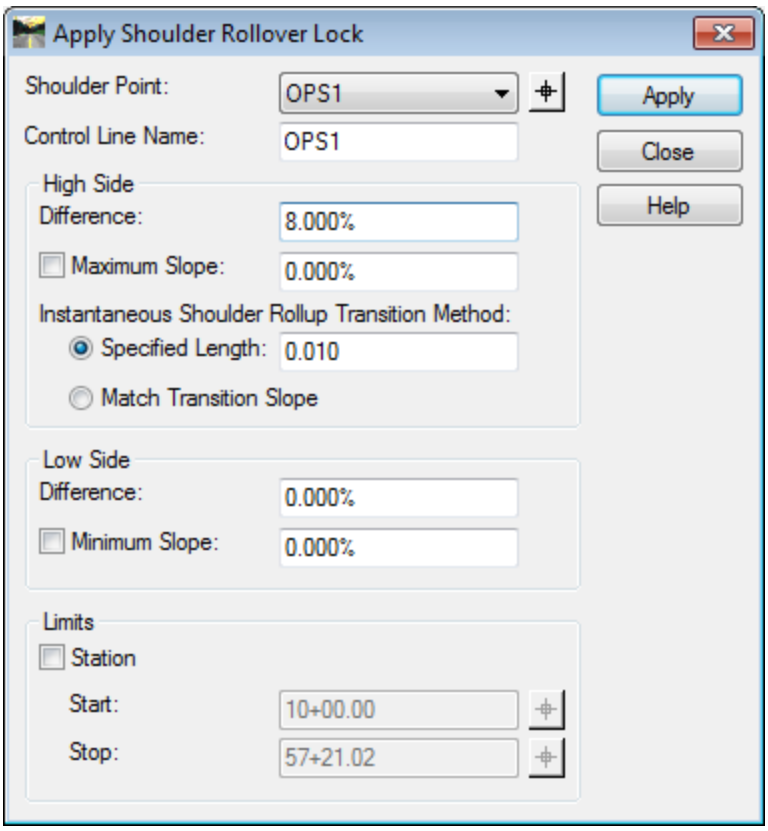


Figure L8-80 Apply Shoulder Rollover Lock

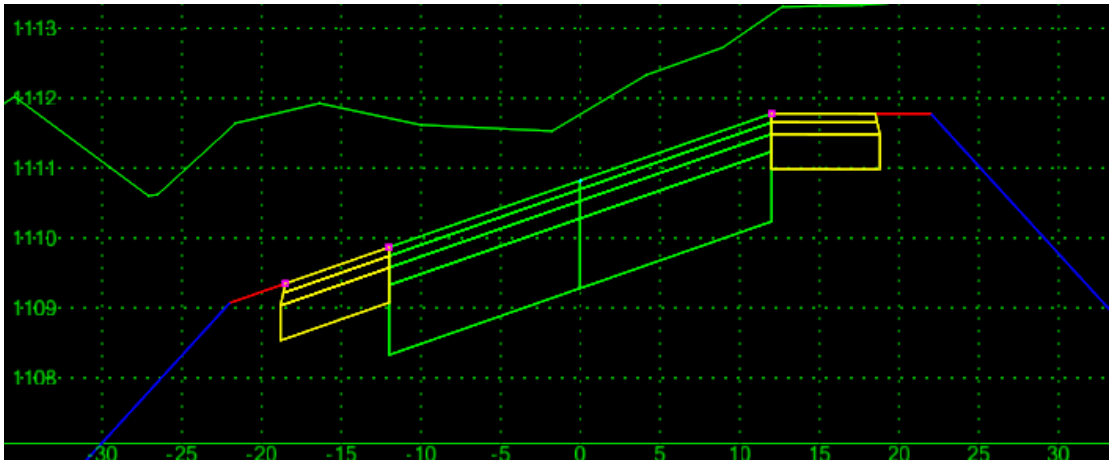


Figure L8-81 Roadway Designer Cross Section View

128.	**Open the <u>Point Controls</u> dialog and Review the Point Control that was created.** • In the **<u>Roadway Designer</u>**, select **Corridor ► Point Control**s… The **<u>Point Controls</u>** dialog opens as shown in *Figure L8-82*. • Notice the Point Control **OPS1** is listed in the **Horizontal and Vertical Controls:** section. • Click **Close** to close the **<u>Point Controls</u>** dialog when finished reviewing.

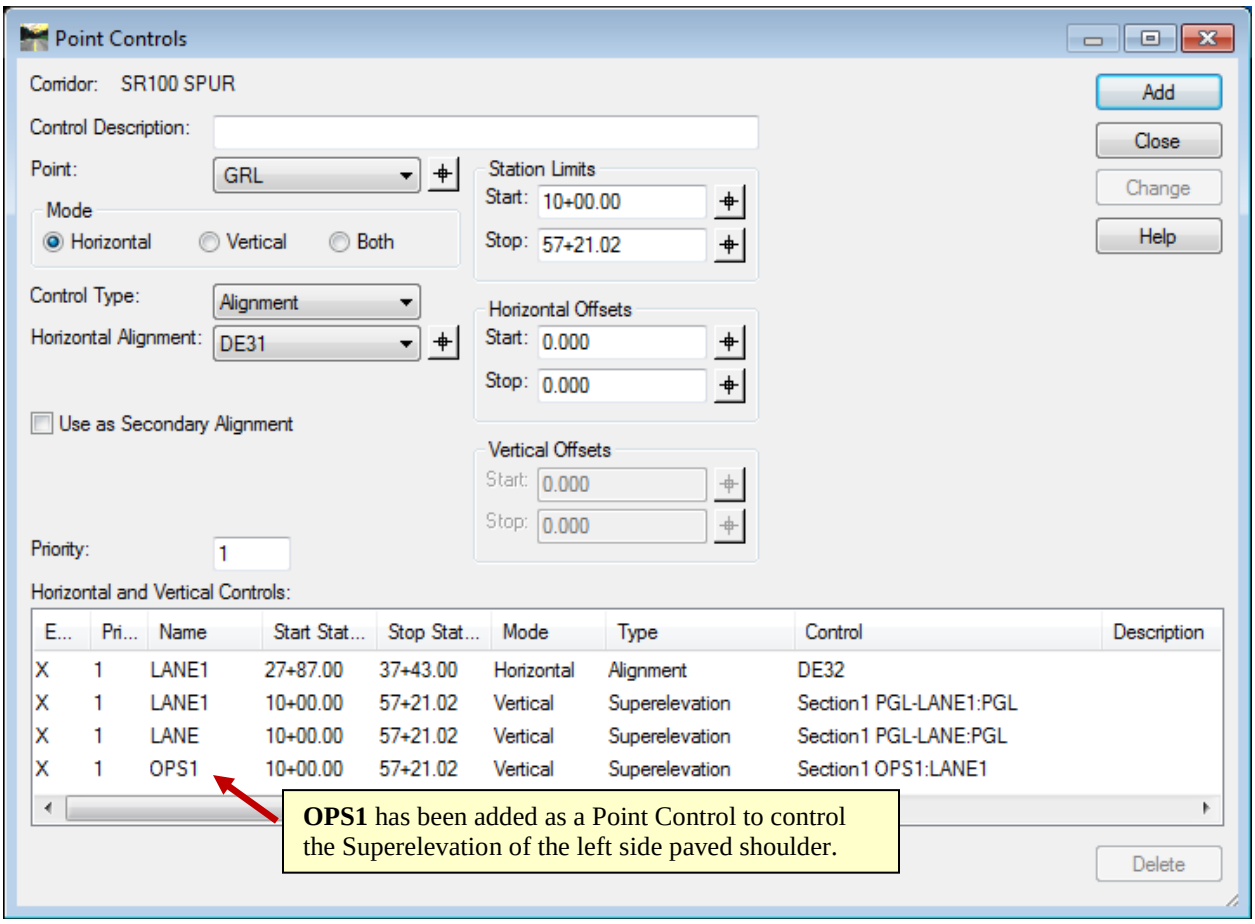


Figure L8-82 Point Controls

129.	**For Information Only:** Once a Point has been added as a Superelevation Control to the **Point Controls** dialog - it is no longer available to edit via the **Apply Shoulder Rollover Lock** dialog. **For Example:** Once **Apply** was clicked in the **Apply Shoulder Rollover Lock** dialog and **OPS1** was added as a Point Control - it became unavailable in the **Apply Shoulder Rollover Lock** dialog for further edits. If it is later determined that the shoulder rollover is still not behaving as desired, the Point Control, (in this case **OPS1)**, must first be deleted from the **Point Controls** dialog before it can be redefined in the **Apply Shoulder Rollover Lock** dialog.
130.	**Save Your Work and Exit the Roadway Designer.** • In the **Roadway Designer**, select **File ► Save**. • Click **File ► Close** to exit the **Roadway Designer**.

Lab 8I Creating the Final Surface

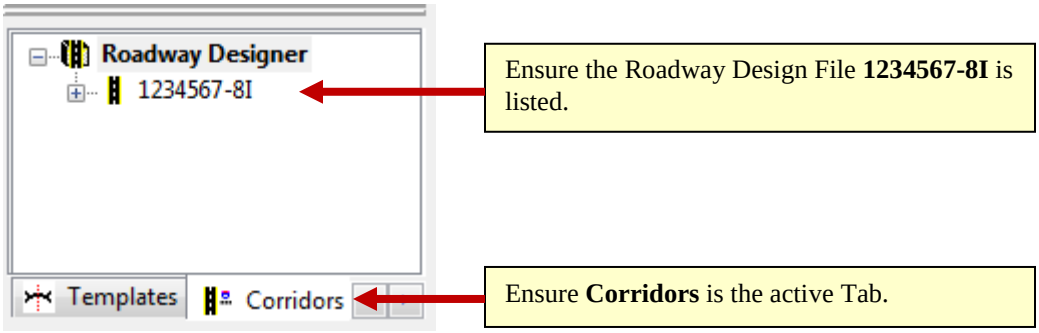
When Cross Section Plan Sheets are desired, a Final Surface (.DTM) must be created. The cross sections shown on the cross section sheets are generated from the Final Surface. The Construction Limits and the Roadway Ditches are also generated from the Final Surface. Lab 8I will demonstrate the steps in creating this Final Surface.

131. **If <u>not</u> still open from the Previous Section, open MicroStation and InRoads and the following files. Refer to Lab Section 8A for Help. (Omit this step if files are open).**

- GDOT 3D Working File.dgn
- 1234567_Exist.dtm
- GDOT_Lab8.itl
- 1234567_Design.alg

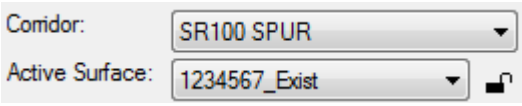
132. **To Ensure your Data Matches during this Section of Lab 8, a Roadway Design File (.IRD) has been prepared for you. Open the Roadway Design File 1234567-8I.ird.**

- In InRoads, select **File ► Open**. The **<u>Open</u>** dialog appears.
- **Browse** to the folder **C:\InRoads Data\1234567\Design Labs\Lab 8**
- **Highlight** the file **1234567-8I.ird**.
- Click **Open** and **Cancel**.
- In the InRoads workspace bar, ensure the **Corridors** tab is the active tab as shown here and that the file **1234567-8I** is listed. (You may need to click the Plus Symbol to expand the **Roadway Designer** to see the listed **1234567-8I** file.)



133. **Open the Roadway Designer and Ensure the Corridor is set to 'SR100 SPUR' and the Active Surface is set to '1234567_Exist'.**

- In InRoads, select **Modeler ► Roadway Designer**.
- In the bottom left of the **<u>Roadway Designer</u>** Window, verify the **Corridor:** and **Active Surface:** fields are set to **SR100 SPUR** and **1234567_Exist** respectively as shown here.



- In the **<u>Roadway Designer</u>**, click the **Process All** button.
- **Close** the **<u>Results</u>** Report if one opens.

134.	**Open the <u>Create Surface</u> dialog.** • In the **<u>Roadway Designer</u>**, select **Corridor ► Create Surface**… The **<u>Create Surface</u>** dialog opens as shown in *Figure L8-83*.

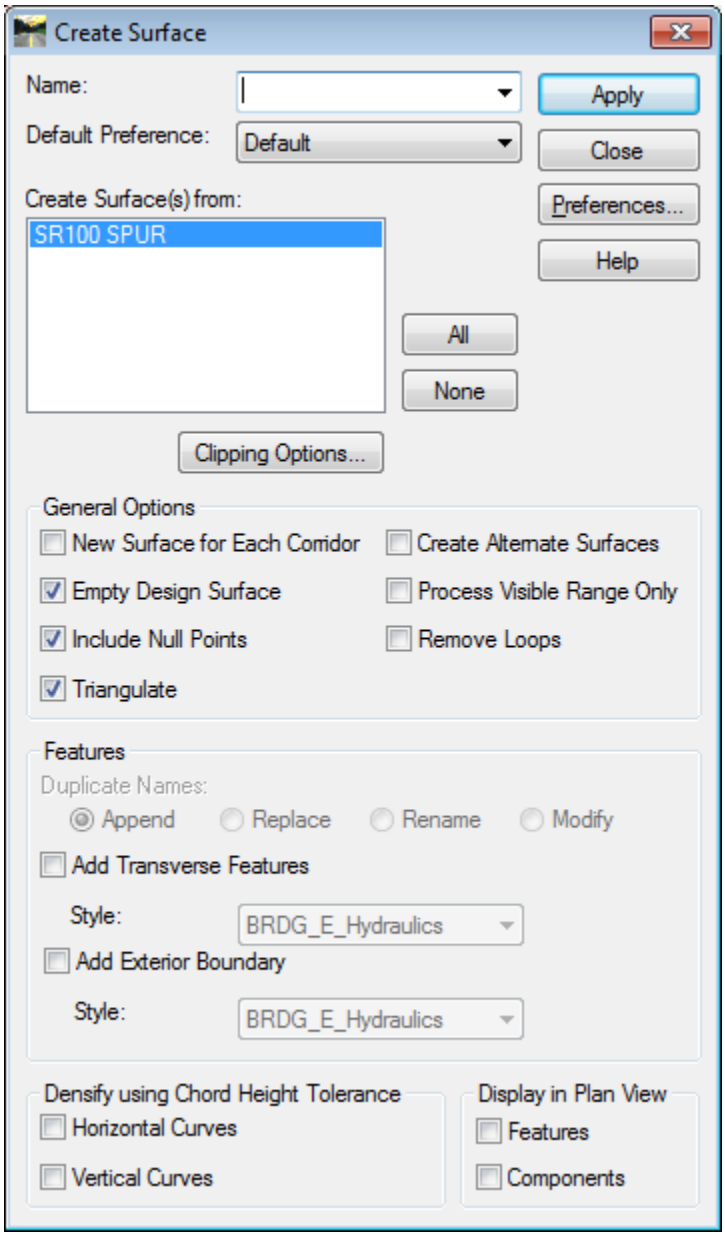
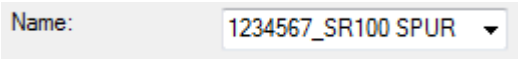


Figure L8-83 Create Surface

135. **Name the Surface.**

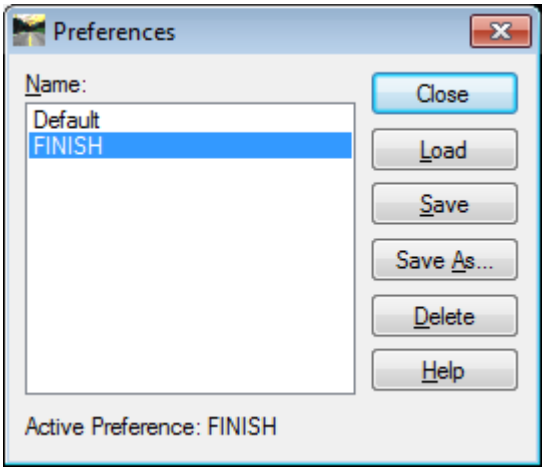
- In the **Name:** field of the **Create Surface** dialog, key-in ***1234567_SR100 SPUR*** as shown here.



IMPORTANT**: *In order to facilitate file management throughout the life of the Project and satisfy the Design Guidelines for GDOT Projects, a consistent file naming scheme shall be used. The finished design surfaces shall follow the syntax PI#_Corridor Name (i.e.* ***1234567_SR100 SPUR*). If a finished surface is required that includes the surfaces of all corridors it shall be named PI#_Finish (i.e.* ***1234567_Finish****).*

136. **Open the Create Surface 'Preferences' dialog.**

- In the **Create Surface** dialog, click the **Preferences** button. The **Preferences** dialog opens as shown here.



- Highlight **FINISH** as shown above.
- Click **Load** and **Close**.
- Ensure the settings in the **Create Surface** dialog match those shown in *Figure L8-84*.

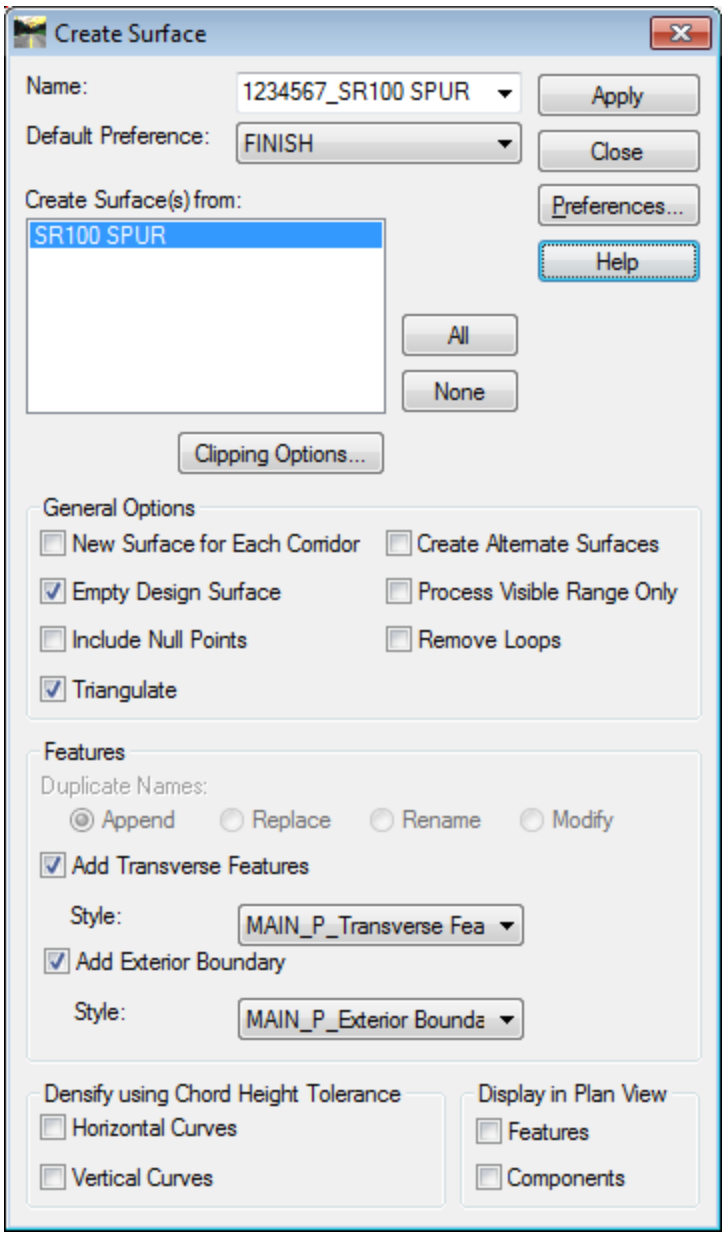


Figure L8-84 Create Surface

137. **Following is a Brief Overview of the Check Boxes in the <u>Create Surface</u> dialog.**

Default Preference
Determines the Default Cross Section and Profile Symbology.

New Surface for Each Corridor
When unchecked, allows you to enter a Surface Name and select the Default Preference to be applied to the cross sections and profiles. When checked the Surface Name and Default Preference are given the name of the Corridor.

Empty Design Surface
When checked, the Surface in the **Name:** field is emptied and replaced. When unchecked, the Duplicate Names section is activated and you are given the option to Append, Replace, Rename or Modify the Surface.

Include Null Points
When checked, Null Points placed in Templates are added as Features in the Surface.

Add Exterior Boundary – Style:
When checked, creates an exterior boundary feature with the name 'Exterior Boundary'. Having an exterior boundary prevents triangulation from occurring beyond the construction limits.

Densify Horizontal Curves using Chord Height Tolerance
When checked, the stationing from which the surface is created (through horizontal curves) is increased relative to the Horizontal Chord Height Setting (located under **Tools > Options > Tolerances > Horizontal Chord Height** setting). When unchecked the surface is processed only at the Template Drop stations.

Densify Vertical Curves using Chord Height Tolerance
When checked, the stationing from which the surface is created (through vertical curves) is increased relative to the Vertical Chord Height Setting (located under **Tools > Options > Tolerances > Vertical Chord Height** setting). When unchecked the surface is processed only at the Template Drop stations.

Triangulate
When checked, the new surface is immediately triangulated when **Apply** is selected.

Add Transverse Features – Style:
When checked, Transverse Features are added to the surface at each station processed. Transverse Features are breaklines that are not triangulated across. See *Figure L8-85* for further explanation.

	Create Alternate Surfaces When checked, creates an alternate surface. An alternate surface will only be created from the points in the Template that have been toggled to create an alternate surface. See *Figure L8-86* for further explanation of alternate surfaces. **Process Visible Range Only** When checked, only the Corridor showing in the plan view is processed. **Remove Loops** When checked, will attempt to remove loops in linear features and also will attempt to trim transverse feature so they do not cross one another. This can happen in areas with tight radii. **Display Features/Components in Plan View** When checked, all the Features/Components created will be displayed in MicroStation.

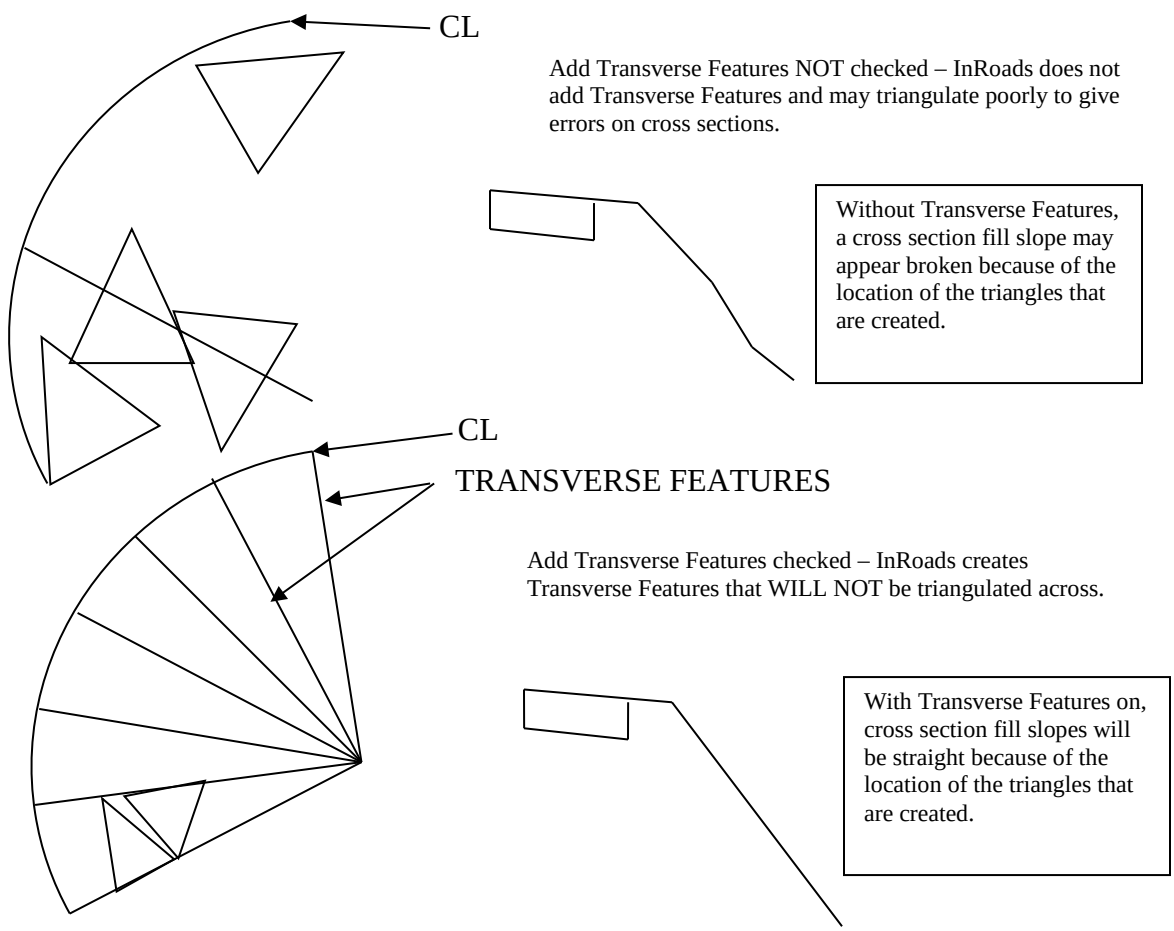
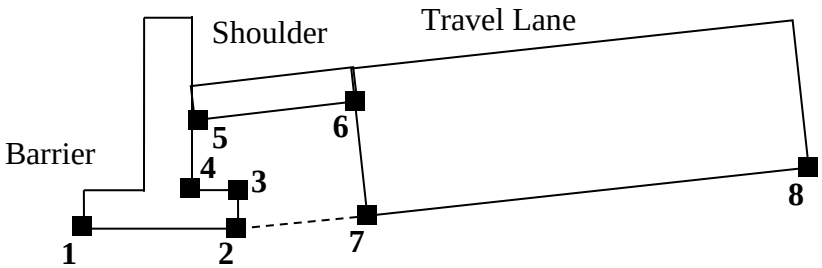


Figure L8-85 Transverse Features

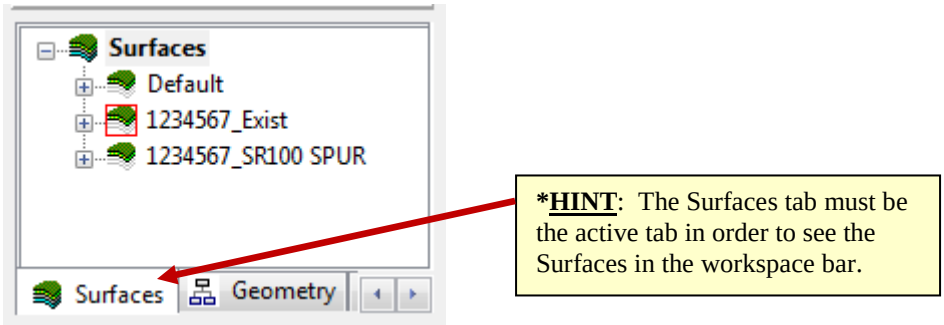


Assume the Template above is in a cut section. When the earthwork is calculated it is calculated from the bottom surface and will follow the points from **1 - 2 - 3 - 4 - 5 - 6 - 7 - 8**. The earthwork is calculated and paid for from this surface. Grading of the Project is to a different bottom surface. The grading surface is from **1 - 2 - 7 - 8**. The contractor will not attempt to meticulously grade the portion from **2 - 3 - 4 - 5 - 6 - 7**. This portion will be backfilled later. If toggled in the Template to create an alternate surface and the **Create Surface** dialog is toggled to create an alternate surface an alternate surface can be created that is from **1 – 2 – 7 – 8**. This alternate surface is useful for automated GPS Grading.

Figure L8-86 Alternate Surfaces

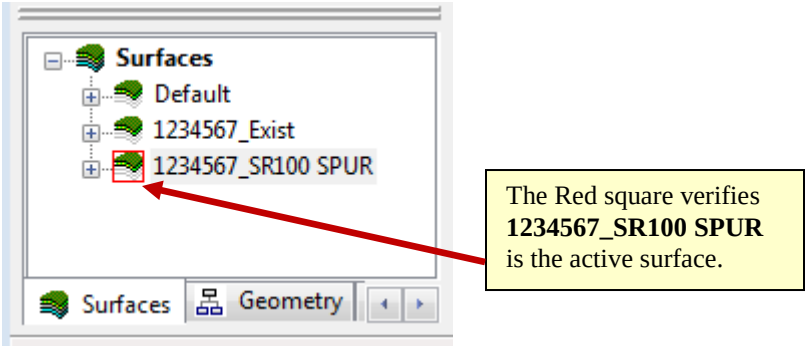
138. **Create the Surface 1234567_SR100 SPUR.**

- In the **Create Surface** dialog, click **Apply**. The Surface **1234567_SR100 SPUR** is created and triangulated.
- **Close** the **Results** Report if one opens.
- Click **Close** to exit the **Create Surface** dialog.
- Ensure the Surface **1234567_SR100 SPUR** is populated in the InRoads workspace bar as shown here.

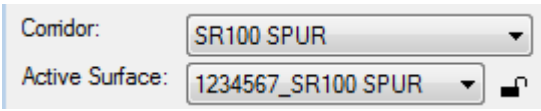


139. **Although the Surface 1234567_SR100 SPUR has been Created and is Visible in the InRoads Workspace Bar -- it has not yet been saved as a .DTM. Save the Surface as 1234567_SR100 SPUR.dtm.**

- Make sure the Surface **1234567_SR100 SPUR** is the active surface by Right mouse clicking over it in the InRoads workspace bar and selecting **Set Active**.
- Ensure the Surface **1234567_SR100 SPUR** is the active surface by verifying the presence of a Red square around the Surface as shown here.



- ***<u>IMPORTANT</u>**: Notice in the bottom left of the **<u>Roadway Designer</u>** - the **Active Surface:** is listed as **1234567_SR100 SPUR** as shown here. It is very important to be aware of the **Active Surface:** when working in the **<u>Roadway Designer</u>**. Processing a Corridor in the **<u>Roadway Designer</u>** with the wrong active surface will result in the Template's End Conditions projecting to the wrong surface.



- In InRoads, select **File ► Save ► Surface**.
- The **<u>Save As</u>** dialog opens as shown in *Figure L8-87*.
- Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 8**
- In the **File name:** field, enter **1234567_SR100 SPUR.dtm**
- Ensure your entries match those shown in *Figure L8-88*.
- Click **Save.** Notice **1234567_SR100 SPUR.dtm** now appears in the **<u>Save As</u>** dialog.
- Click **Cancel** to close the **<u>Save As</u>** dialog.

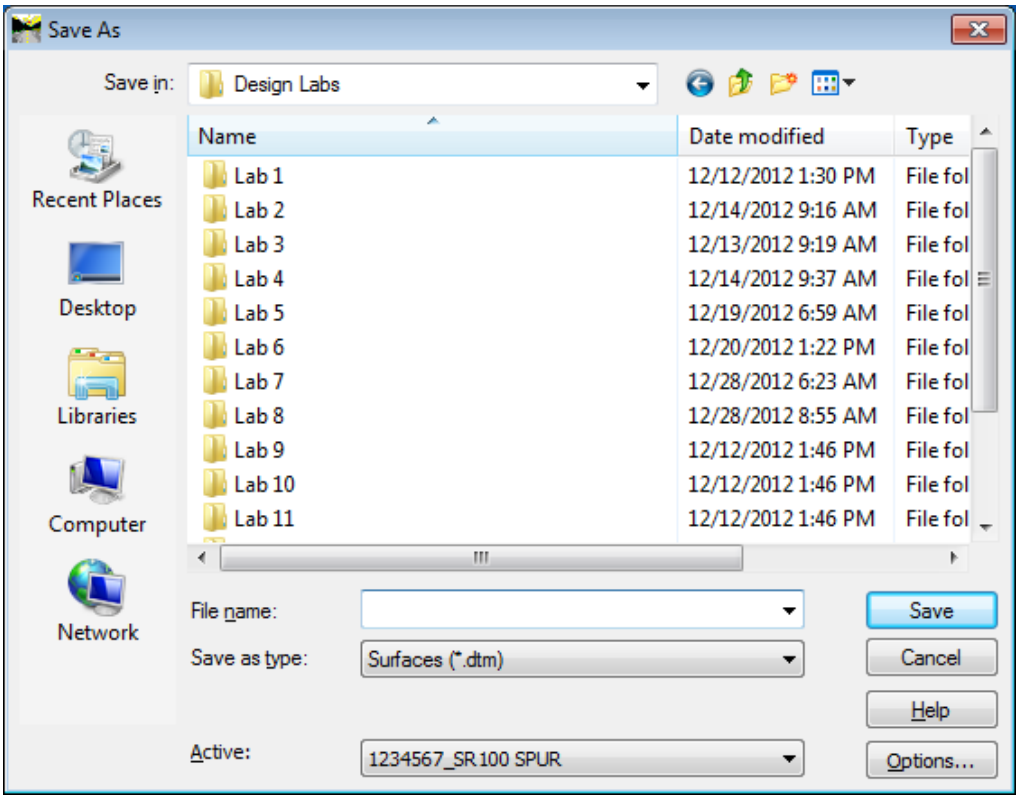


Figure L8-87 Save As

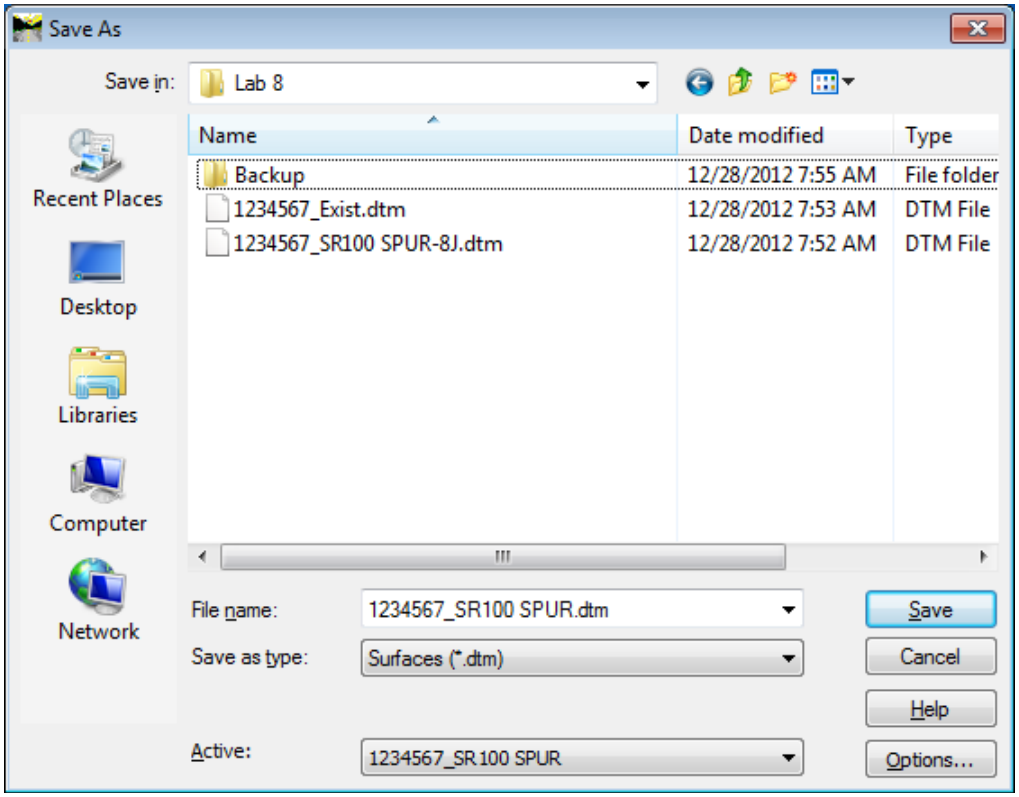


Figure L8-88 Save As

140. **This Completes the Creation of the '1234567_SR100 SPUR.dtm'. Close the <u>Roadway Designer</u>.**

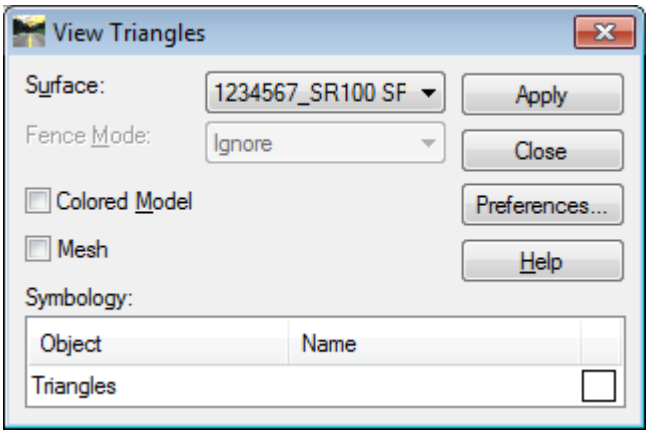
- In the **<u>Roadway Designer</u>**, select **File ► Close**.

141. **Clear the MicroStation Window.**

- In MicroStation, select **Edit ► Select All**.
- Then select the **<DELETE>** key on the computer keyboard.

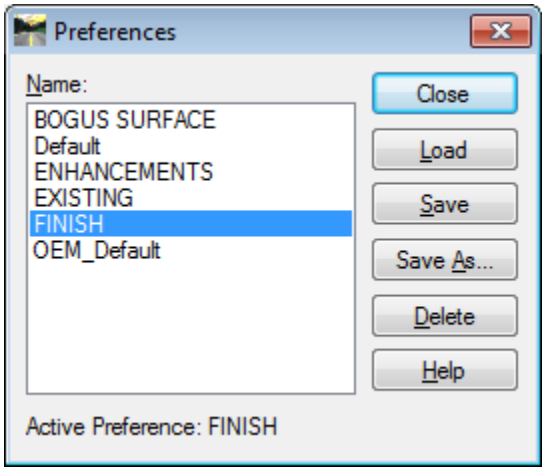
142. **Open the <u>View Triangles</u> dialog.**

- In InRoads, select **Surface ► View Surface ► Triangles**. The **<u>View Triangles</u>** dialog opens as shown here.



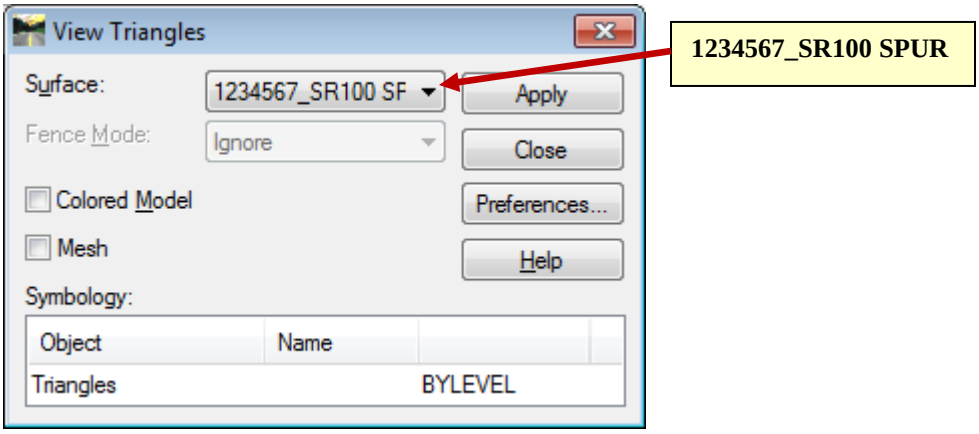
143. **Load the FINISH Preference.**

- In the **<u>View Triangles</u>** dialog, click the **Preferences** button. The **<u>Preferences</u>** dialog opens as shown here.
- Select the Preference **FINISH** by highlighting it in blue.
- Click **Load** and **Close**. You are returned to the **<u>View Triangles</u>** dialog and the viewing symbology has been loaded for a Finished Surface.



144. **View the Surface '1234567_SR100 SPUR'.**

- Ensure your entries in the **View Triangles** dialog match those shown here.



- Click **Apply** and **Close**.
- In MicroStation, click the **Fit View** icon ( ).
- Ensure your view in MicroStation matches that shown in *Figure L8-89*.
- **Please Note:** your MicroStation View Rotation may be different than the one in the screen capture depicted below.

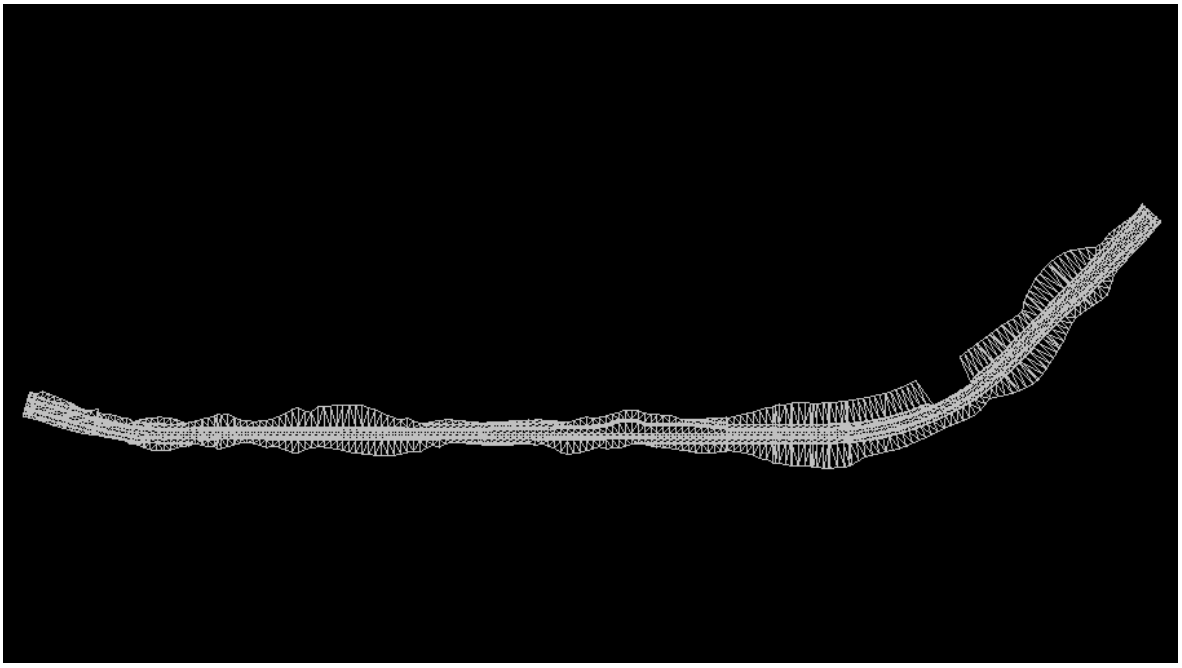
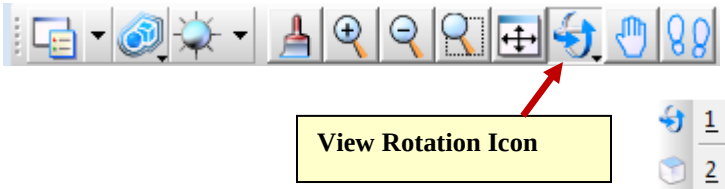
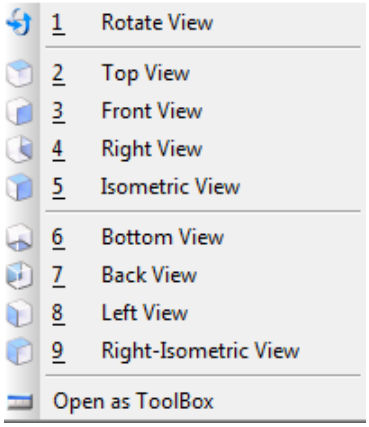


Figure L8-89 MicroStation View

145. **Orient the View in MicroStation so that North is at the top.**

- In MicroStation, click and hold the **View Rotation** icon.





- The Selection Window shown at the right appears.
- Select **Top View**. The view in MicroStation orients with North at the Top as shown in *Figure L8-90*.

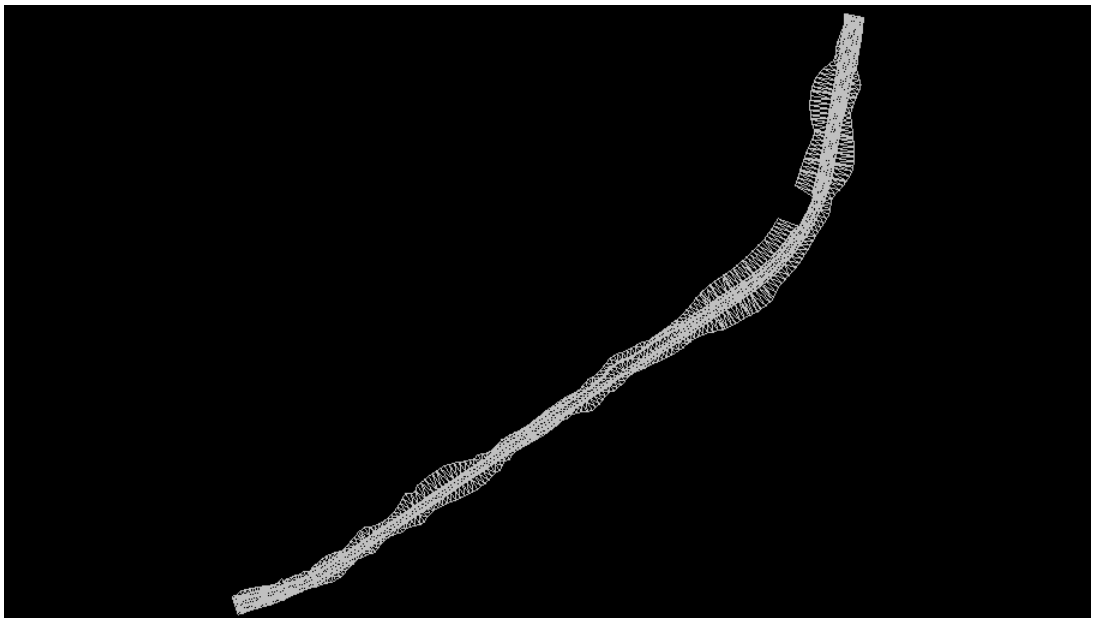


Figure L8-90 MicroStation View

146. **Clear the MicroStation Window.**

- In MicroStation, select **Edit ► Select All**.
- Then select the **<DELETE>** key on the computer keyboard.

Lab 8J Target Aliasing

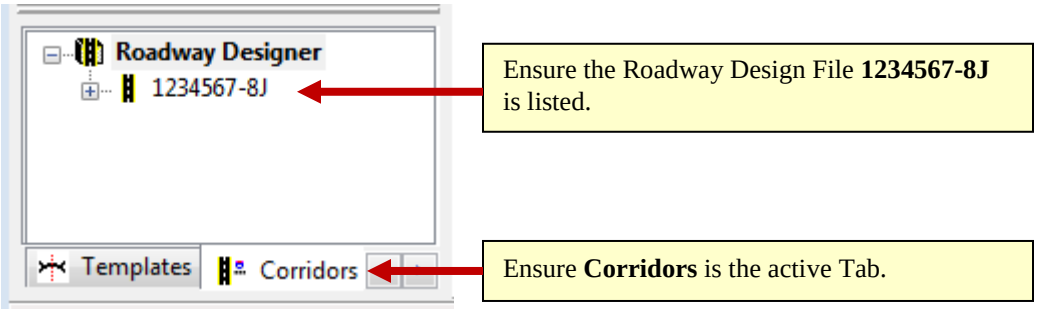
When a Template's End Condition encounters an obscured area or extends beyond the available Surface, the End Condition fails to solve and is not placed. InRoads does not extend the existing ground in order to finish the placement of the Template as CAiCE users are accustomed to experiencing. When these situations are encountered, the Designer is instructed to request additional DTM coverage from the Office of Design Policy and Support/Location Bureau. The Location Bureau will provide a new DTM to the Designer with the additional coverage. Often obscured areas cannot be accurately surveyed; such is the case with bodies of water or swampy areas. In order to place a Template through these types of areas and have it solve so that construction limits may be computed -- a 'Bogus Surface' must be created. Target Aliasing may then be used with the 'Bogus Surface'. In Lab 8J you will create a 'Bogus Surface' and utilize it with the Target Aliasing tool.

147. **If <u>not</u> still open from the Previous Section, open MicroStation and InRoads and the following files. Refer to Lab Section 8A for Help. (Omit this step if files are open).**

- GDOT 3D Working File.dgn
- 1234567_Exist.dtm
- GDOT_Lab8.itl
- 1234567_Design.alg

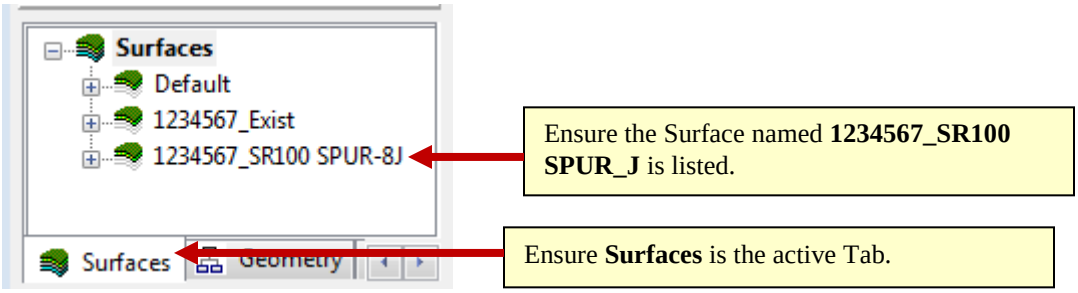
148. **To Ensure your Data Matches during this Section of Lab 8, a Roadway Design File (.IRD) has been prepared for you. Open the Roadway Design File 1234567-8J.ird**

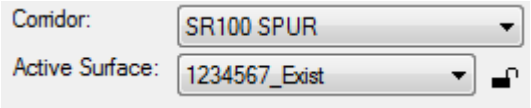
- In InRoads, select **File ► Open**. The **<u>Open</u>** dialog appears.
- **Browse** to the folder **C:\InRoads Data\1234567\Design Labs\Lab 8**
- **Highlight** the file **1234567-8J.ird**.
- Click **Open** and **Cancel**.
- In the InRoads workspace bar, ensure the **Corridors** tab is the active tab as shown here and that the file **1234567-8J** is listed. (You may need to click the Plus Symbol to expand the **Roadway Designer** to see the listed **1234567-8J** file.)



149. **To Ensure your Data Matches during this Section of Lab 8, a Final Surface (.DTM) has been prepared for you. Open the Surface 1234567_SR100 SPUR_8J.dtm**

- In InRoads, select **File ► Open**. The **<u>Open</u>** dialog appears.
- **Browse** to the folder **C:\InRoads Data\1234567\Design Labs\Lab 8**
- **Highlight** the file **1234567_SR100 SPUR_8J.dtm**.
- Click **Open** and **Cancel**.
- In the InRoads workspace bar, ensure the **Surfaces** tab is the active tab as shown here and that the file **1234567_SR100 SPUR_8J** is listed.



150.	**Open the Roadway Designer and Ensure the Corridor is set to 'SR100 SPUR' and the Active Surface is set to '1234567_Exist'.** • In InRoads, select **Modeler ► Roadway Designer**. • In the bottom left of the **<u>Roadway Designer</u>** Window, ensure the **Corridor:** and **Active Surface:** fields are set to **SR100 SPUR** and **1234567_Exist** respectively as shown here.  • In the **<u>Roadway Designer</u>**, click the **Process All** button. • **Close** the **<u>Results</u>** Report if one opens.
151.	**View Station 46+50.00 in the Roadway Designer** • In the **<u>Roadway Designer</u> Station:** entry field, key-in **46+50.00** and press Tab. • Ensure your view is similar to that shown in *Figure L8-91*. • Notice the left side End Condition has not found a solution and therefore was not placed. This is the result of an obscured area in the **1234567_Exist** surface. • Click **File ►Close** to close the **<u>Roadway Designer</u>**.

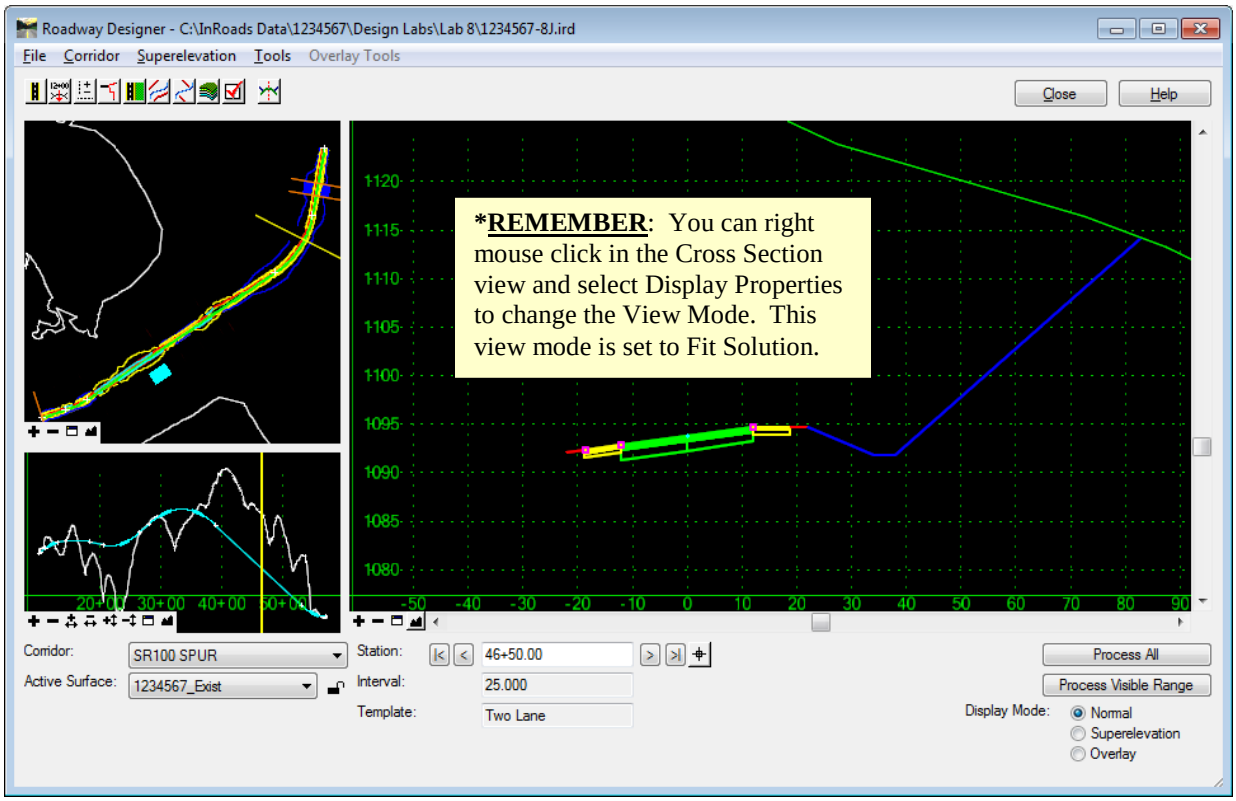
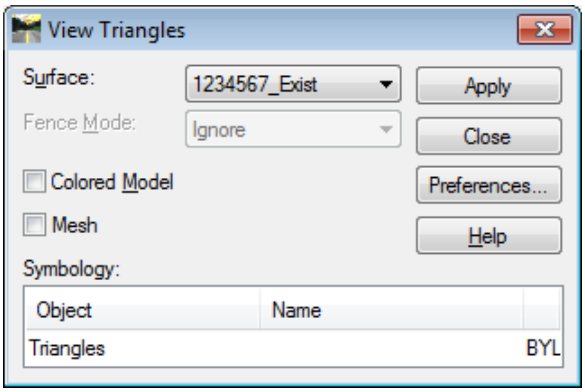


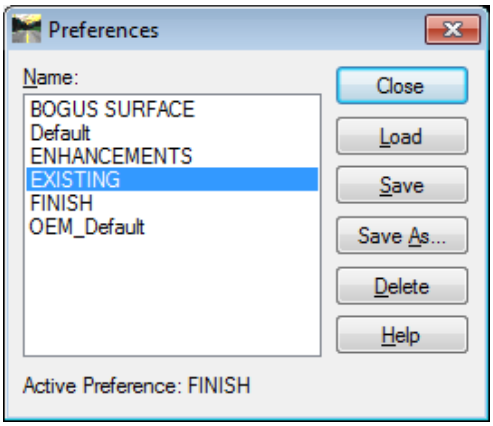
Figure L8-91 Roadway Designer

152. **View the 1234567_Exist Surface.**

- In InRoads, Select **Surface ► View Surface ► Triangles**. The **View Triangles** dialog opens as shown here.



- Click the **Preferences** button. The **Preferences** dialog opens as shown here.



- In the **Preferences** dialog, highlight **EXISTING**.
- Click **Load** and **Close**. The appropriate symbology has been loaded and you are returned to the **View Triangles** dialog.
- In the **View Triangles** dialog, click **Apply**. Please be patient -- this may take several seconds.
- **Close** the **View Triangles** dialog.
- In MicroStation, click the **Fit View** icon ( ).
- Ensure your view in MicroStation matches that shown in *Figure L8-92*. The Red square in *Figure L8-92* identifies the obscured area near the Alignment causing the End Condition failures.
- In MicroStation, click the **Window Area** ( ) icon and window area as identified by the Red square in *Figure L8-92*.
- Ensure your view in MicroStation matches that shown in *Figure L8-93*.

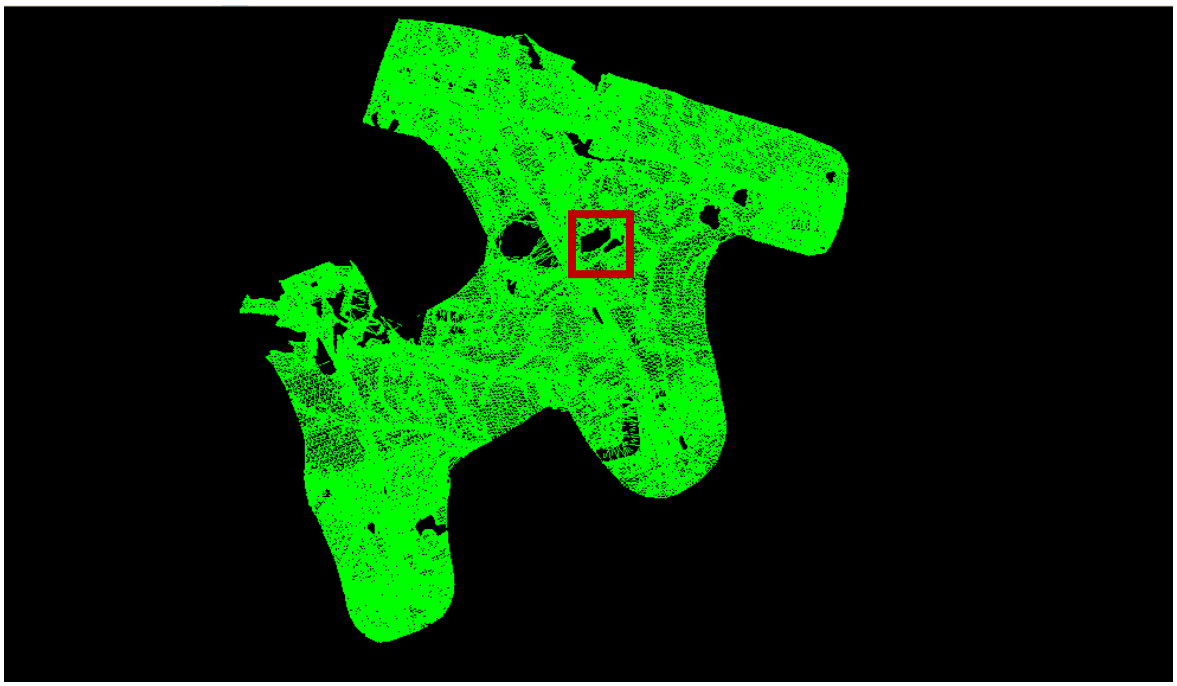


Figure L8-92 MicroStation View

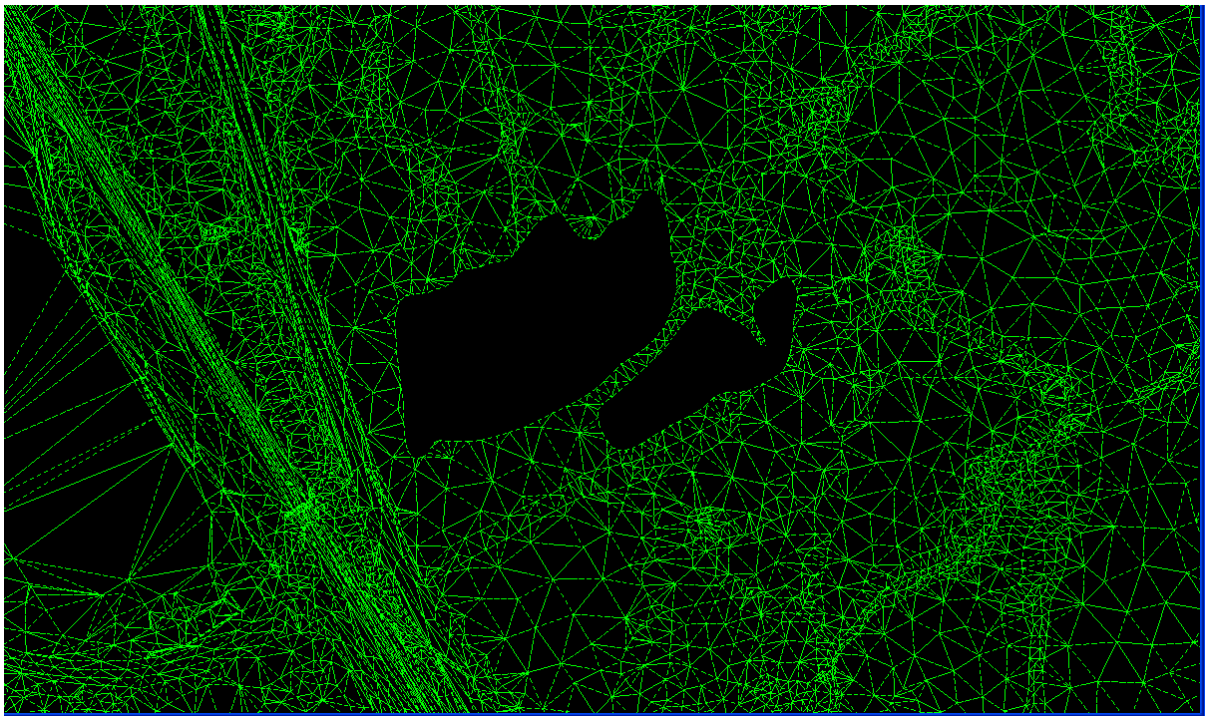


Figure L8-93 MicroStation View

153.	**View All the Surface Features.** • In InRoads, select **Surface ► View Surface ► Features**. The **<u>View Features</u>** dialog opens as shown in *Figure L8-94*. • Ensure all the Features are highlighted in Blue. This indicates they are selected. If they are not all selected they can be selected by Right mouse clicking in the window and clicking **Select All**. • Click **Apply**. Please be patient, this may take several minutes. • Click **Close** to close the **<u>View Features</u>** dialog. • Ensure your view matches that shown in *Figure L8-95* and that both the Surface Triangles and Surface Features are depicted.

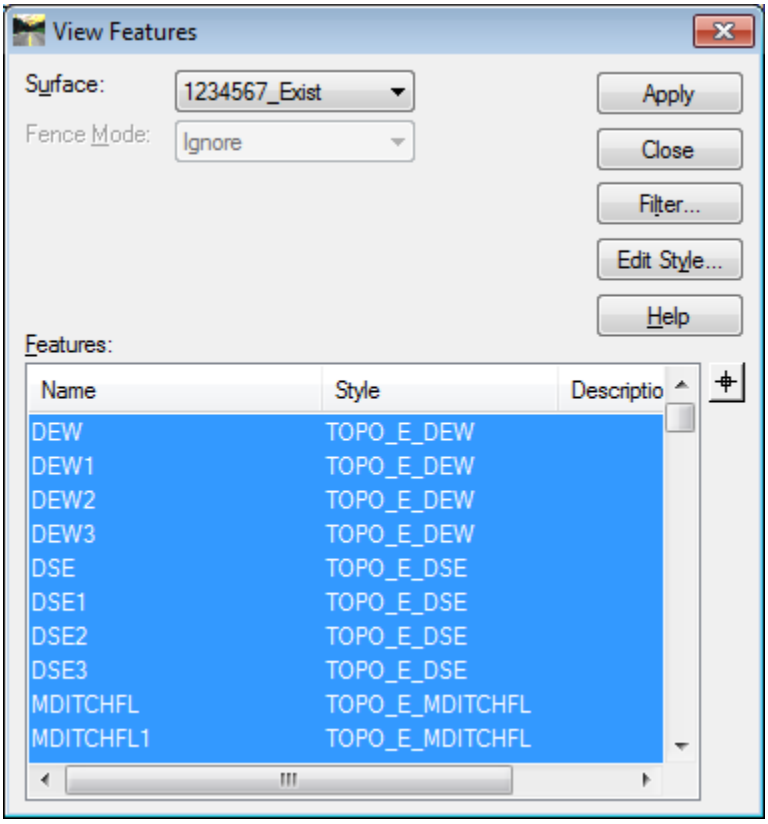


Figure L8-94 MicroStation View

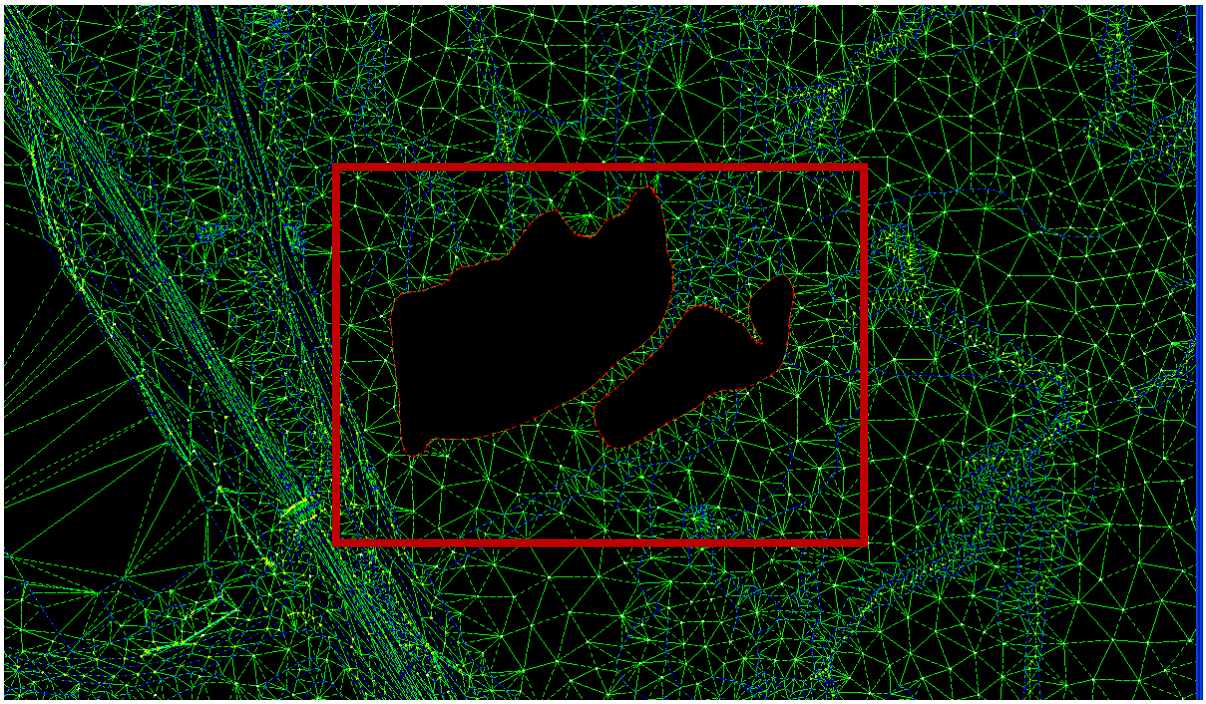
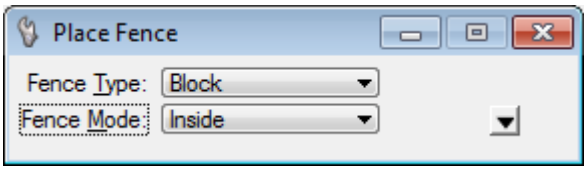


Figure L8-95 MicroStation View

154.	**We are going to Copy a Portion of the Surface 1234567_Exist.dtm containing the two obscured areas shown in *Figure L8-95* above into a new Surface called 1234567_Bogus1.dtm. We will then edit 1234567_Bogus1 to triangulate across the obscured areas. <u>1234567_Exist is always to remain un-edited by the Designer</u>. Place a fence around the area to be copied.** • In MicroStation, click the **Place Fence** Icon ( ). • Ensure the **Fence Type:** and **Fence Mode:** are set as shown here:  • Place a Fence to encompass the area identified by the Red square in *Figure L8-95*. • When placed the fence should look similar to that shown in *Figure L8-96*.
155.	**For Information Only:** *The File Naming scheme for a bogus surface is **PI#_Bogus#** (i.e. 1234567_Bogus1, 1234567_Bogus2, etc). This facilitates the use of data throughout the life of the Project and aids in file identification by users who will eventually utilize your data.*

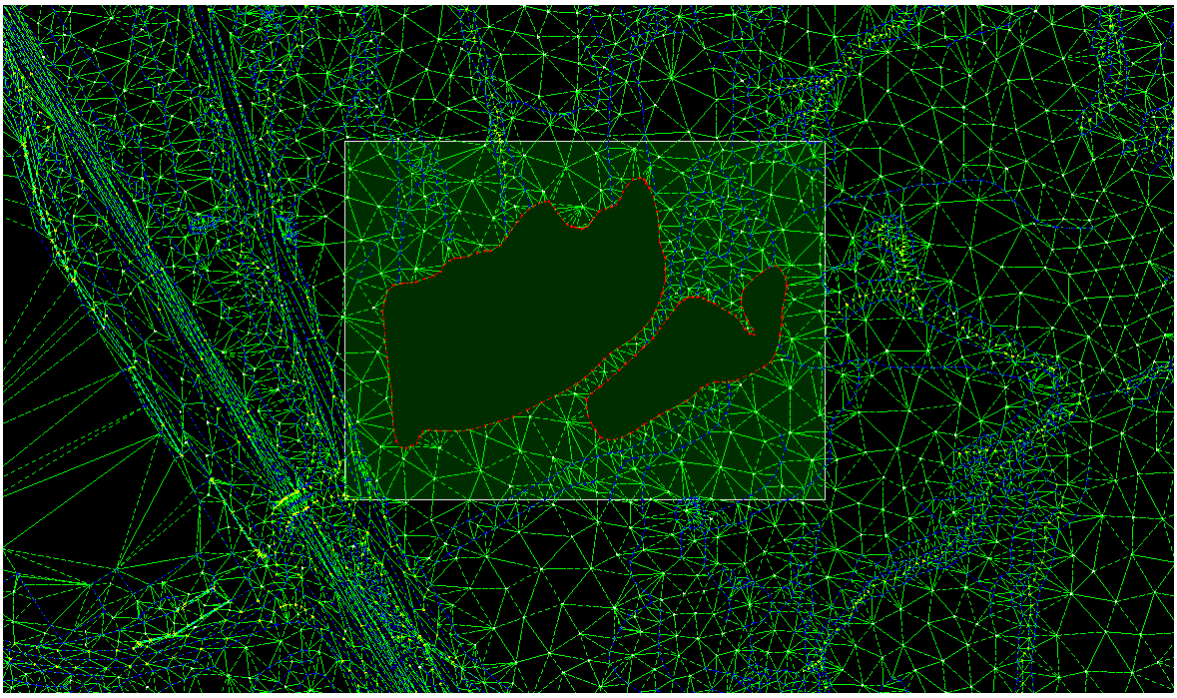
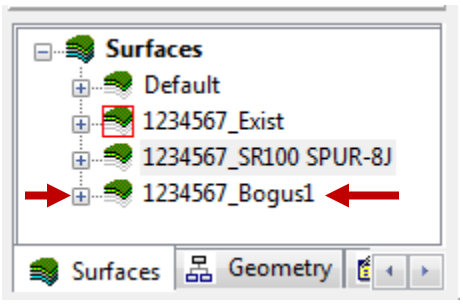


Figure L8-96 MicroStation View

156. **Create the Surface 1234567_Bogus1 from the Portion of the Surface 1234567_Exist inside the Fence shown in Figure L8-96.**

- In InRoads, select **Surface ► Edit Surface ► Copy Portion of Surface**. The **Copy Portion of Surface** dialog opens as shown in *Figure L8-97*.
- In the **Copy Portion of Surface** dialog enter the following information:
  - **Source Surface:** ***1234567_Exist***
  - **Destination Surface**: ***1234567_Bogus1***
  - **Clip By:** ***Fence***
  - **Fence Mode:** ***Inside***
- All Features must be highlighted in Blue. Remember: You can Right mouse click in the **Features:** field and click **Select All**.
- Ensure your entries match those shown in *Figure L8-97*.
- Click **Apply** and **Close**. The Surface **1234567_Bogus1** has been created as can be seen in the InRoads workspace bar.
- Ensure the Surface **1234567_Bogus1** is visible in the InRoads workspace bar as shown at right.



- In MicroStation, click the **Place Fence** Icon ( ) to remove the Fence from the MicroStation View.

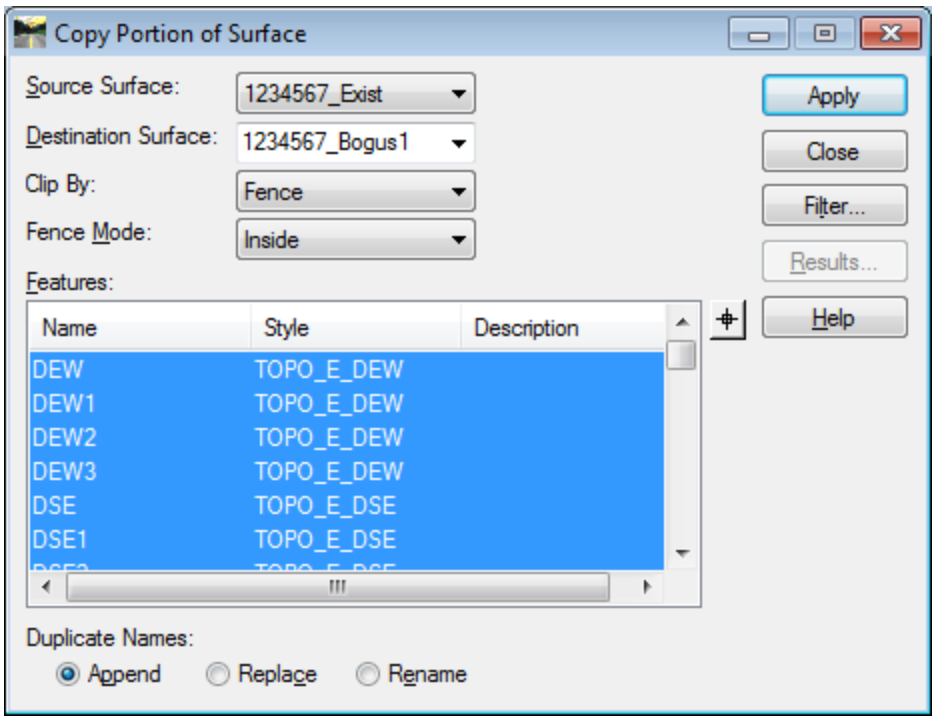


Figure L8-97 Copy Portion of Surface

157.	**Clear the MicroStation View.** • In MicroStation, select **Edit ► Select All**. • Then select the **<DELETE>** key on the computer keyboard. (Please be patient. It may take a while for the screen to clear). • The MicroStation view is now cleared.
158.	**View the Surface Triangles for 1234567_Bogus1.** • In InRoads, select **Surface ► View Surface ► Triangles**. The **View Triangles** dialog opens. • In the **View Triangles** dialog, click the **Preferences** button. The **Preferences** dialog opens. • In the **Preferences** dialog, highlight **BOGUS SURFACE**. • Click **Load** & **Close**. The symbology for a Bogus Surface is loaded. • In the **View Triangles** dialog, use the pull down arrow to select the Surface **1234567_Bogus1**. • Ensure your entries match those shown in *Figure L8-98*. • Click **Apply.** An Alert Message appears stating Triangles are out of date as shown in *Figure L8-99*. Click **Yes** to triangulate. • **Close** the **View Triangles** dialog. • Ensure your view in MicroStation matches that shown in *Figure L8-100*.

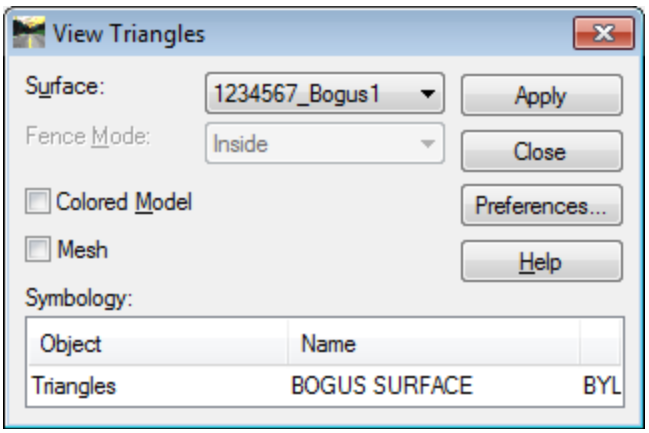


Figure L8-98 View Triangles

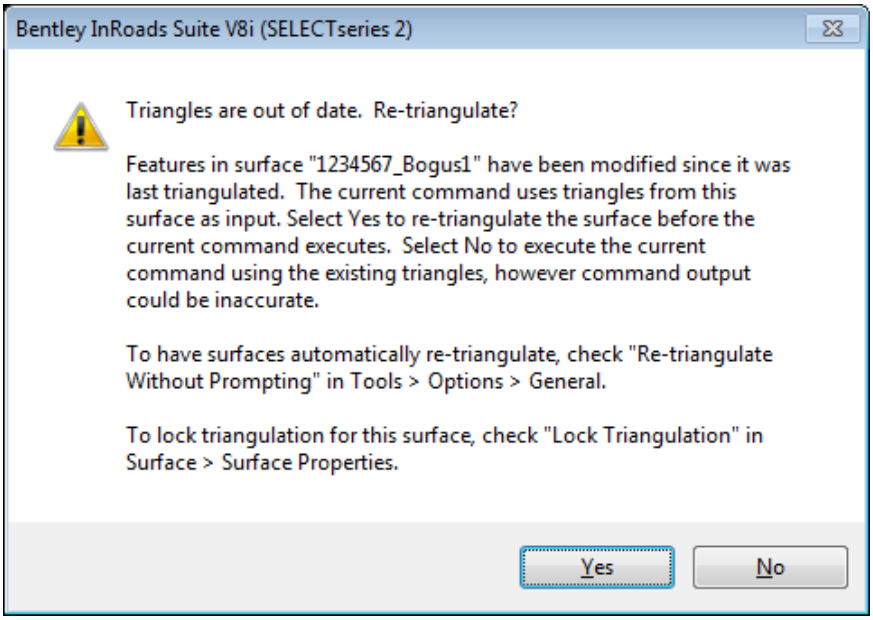


Figure L8-99 Alert Message

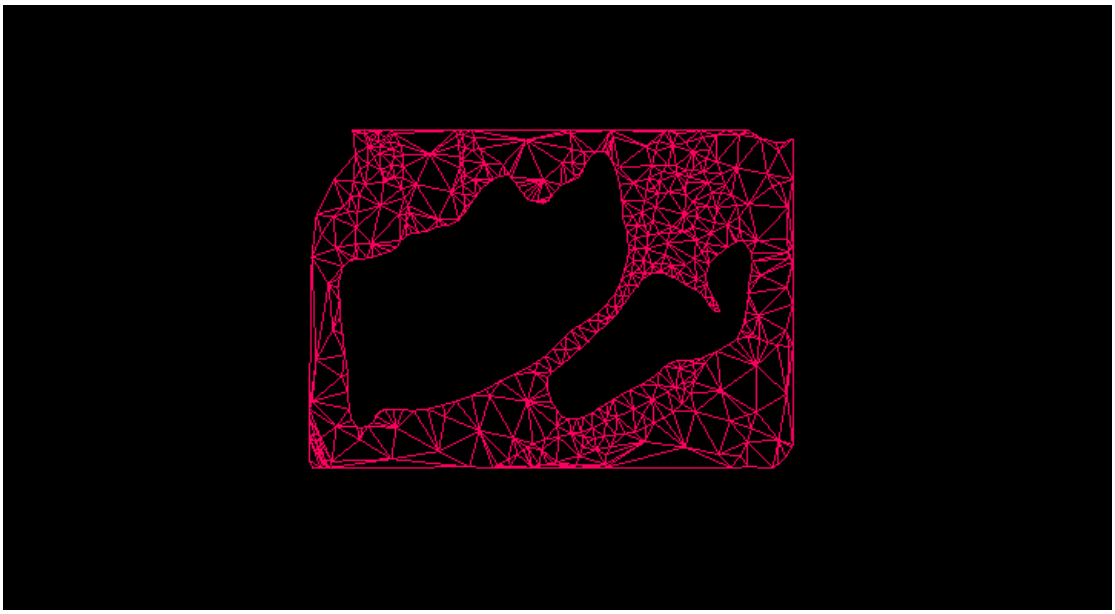


Figure L8-100 MicroStation View

159.	**View the Surface Features for 1234567_Bogus1.** • In InRoads, select **Surface ► View Surface ► Features**. The **View Features** dialog opens. • In the **View Features** dialog, ensure **1234567_Bogus1** is shown in the **Surface:** field. • Ensure All Features are selected and shown highlighted in Blue. • Click **Apply** and **Close**. • Ensure your view in MicroStation matches that shown in *Figure L8-101*.

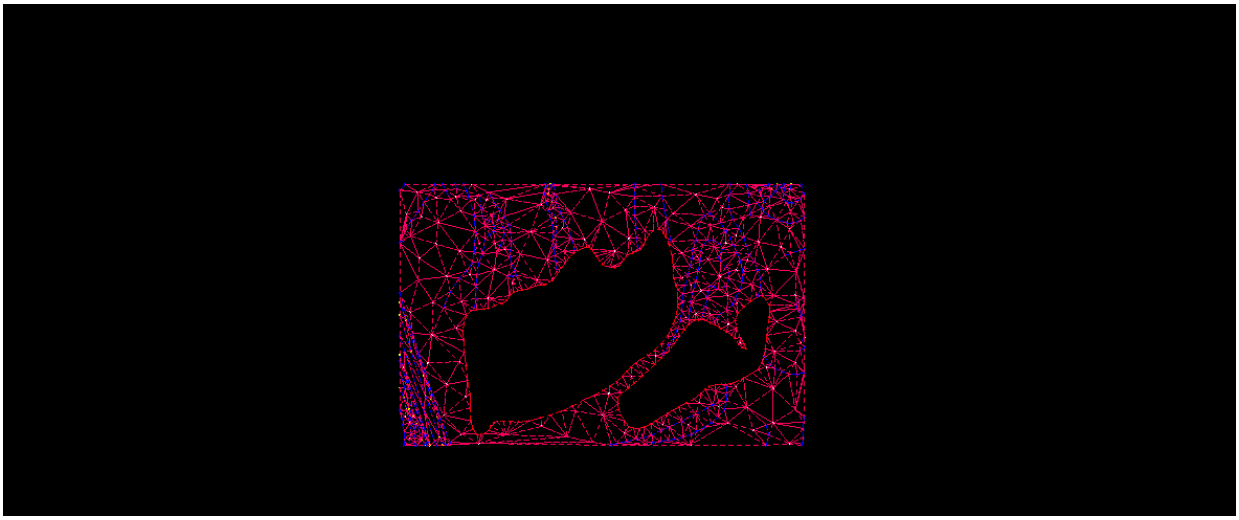


Figure L8-101 MicroStation View

160.	**In *Figure L8-101* above, which depicts the Surface 1234567_Bogus1, the obscured areas are still shown obscured. In order to triangulate across the obscured areas the Feature Type causing it to be obscured must be changed from 'Interior Boundary' to 'Breakline'. For more information on Feature Types the Designer is referred to the Survey Training Material. Open the <u>Feature Properties</u> Dialog.** • In InRoads, select **Surface ► Feature ► Feature Properties**. The **<u>Feature Properties</u>** dialog opens as shown in *Figure L8-102*. **<u>Please Note:</u>** Some of the Features in your view may not correspond with the screen capture depicted below in *Figure L8-102*. The reason for this is because the location of the Fence (which was selected in **Step 154)** to select the Features may be slightly different from what you selected.

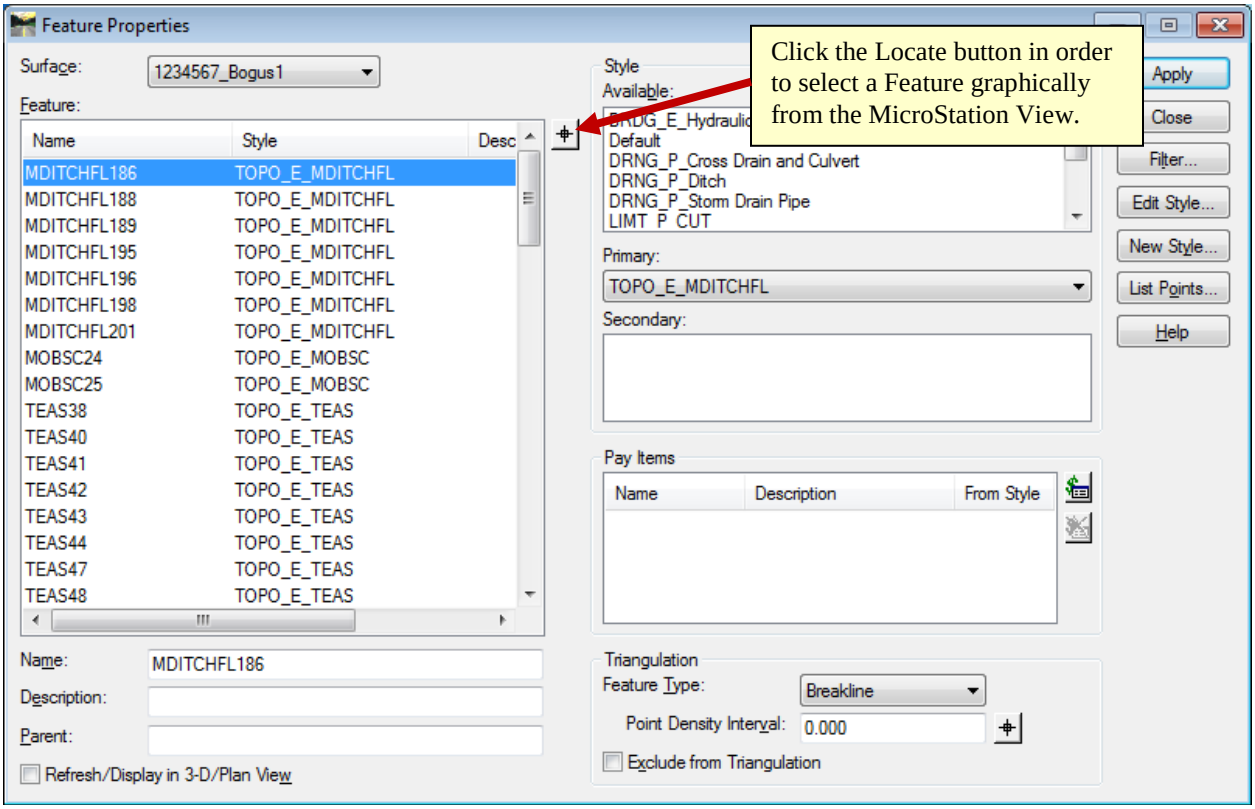


Figure L8-102 Feature Properties

161. **Select the Feature MOBSC24.**

- In the **Feature Properties** dialog, click the **Locate** button ( ) identified in *Figure L8-102*. The **Feature Properties** dialog disappears and makes the MicroStation Window active.
- Notice in the bottom left corner of the MicroStation Window you are prompted to: **<Select Feature**. Left Click on the border of the smaller of the obscured areas as shown in *Figure L8-103*.
- Notice in the bottom left corner of the MicroStation Window you are prompted to**: <Accept/Reject MOBSC24** indicating **MOBSC24** is the selected Feature.
- Left Click anywhere in a blank part of the MicroStation Window to accept. The **Feature Properties** dialog reappears with **MOBSC24** selected as shown here.

MDITCHFL198	TOPO_E_MDITCHFL
MDITCHFL201	TOPO_E_MDITCHFL
MOBSC24	TOPO_E_MOBSC
MOBSC25	TOPO_E_MOBSC

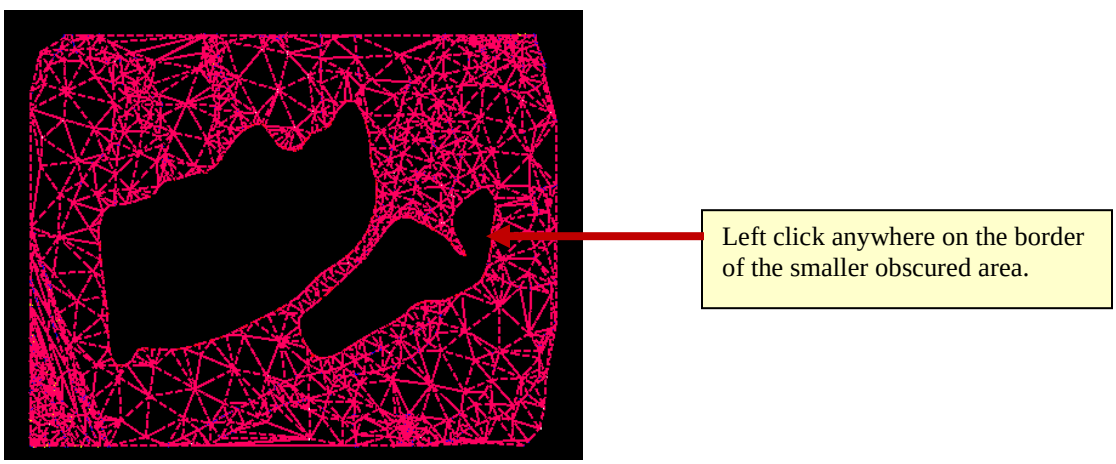


Figure L8-103 MicroStation

162. **Change the Feature Type of MOBSC24 from Interior to Breakline.**

- In the **Triangulation** frame of the **Feature Properties** dialog, use the pull down arrow to change the **Feature Type:** from Interior to ***Breakline***.
- Ensure the entries in your **Feature Properties** dialog match those shown in *Figure L8-104*.
- Click **Apply** but do **not** close the **Feature Properties** dialog.

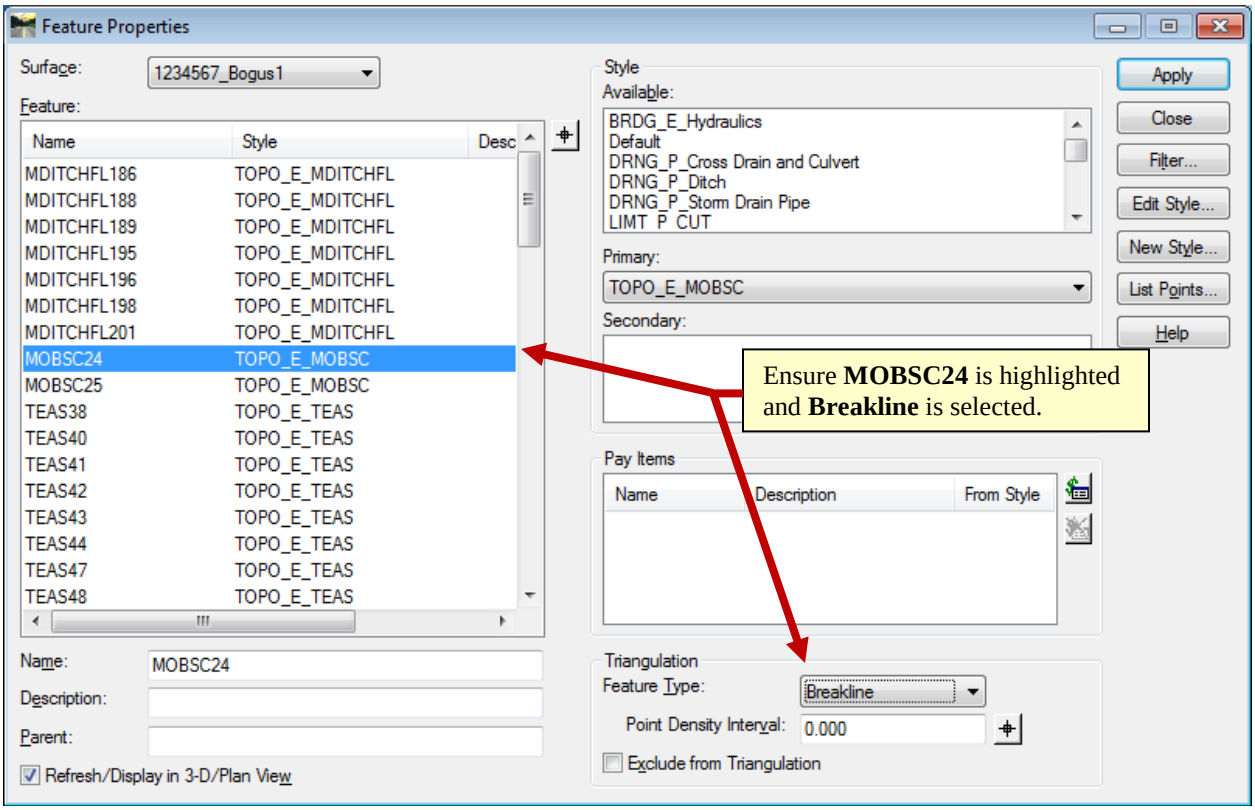
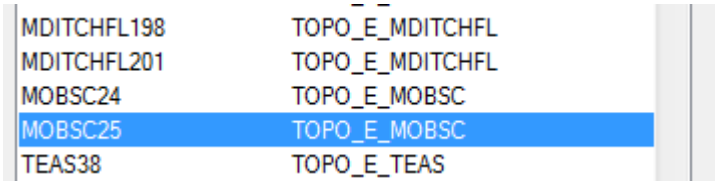


Figure L8-104 Feature Properties

163.	**Select the Feature Type of MOBSC25.** • In the **<u>Feature Properties</u>** dialog, click the **Locate** button ( ) identified in *Figure L8-102*. • Notice in the bottom left corner of the MicroStation Window you are prompted to: **<Select Feature**. Left Click on the border of the larger of the obscured areas as shown in *Figure L8-105*. • Notice in the bottom left corner of the MicroStation Window you are prompted to**: <Accept/Reject MOBSC25** indicating **MOBSC25** is the selected Feature. • Left Click anywhere in a blank part of the MicroStation Window to accept. The **<u>Feature Properties</u>** dialog reappears with **MOBSC25** selected as shown here. 

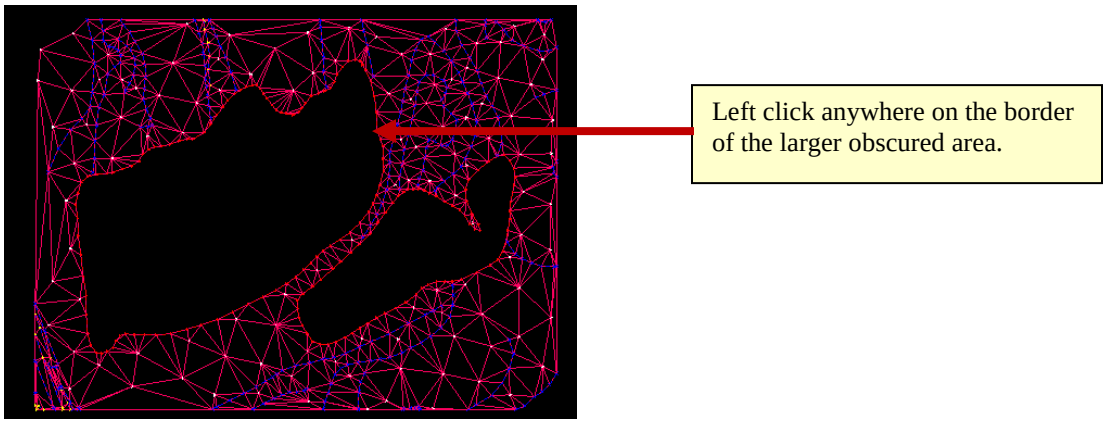


Figure L8-105 MicroStation

164.	**Change the Feature Type of MOBSC25 from Interior to Breakline.** • In the **Triangulation** frame of the **Feature Properties** dialog, use the pull down arrow to change the **Feature Type:** from Interior to ***Breakline***. • Ensure the entries in your **Feature Properties** dialog match those shown in *Figure L8-106*. • Click **Apply** and **Close** to exit the **Feature Properties** dialog.

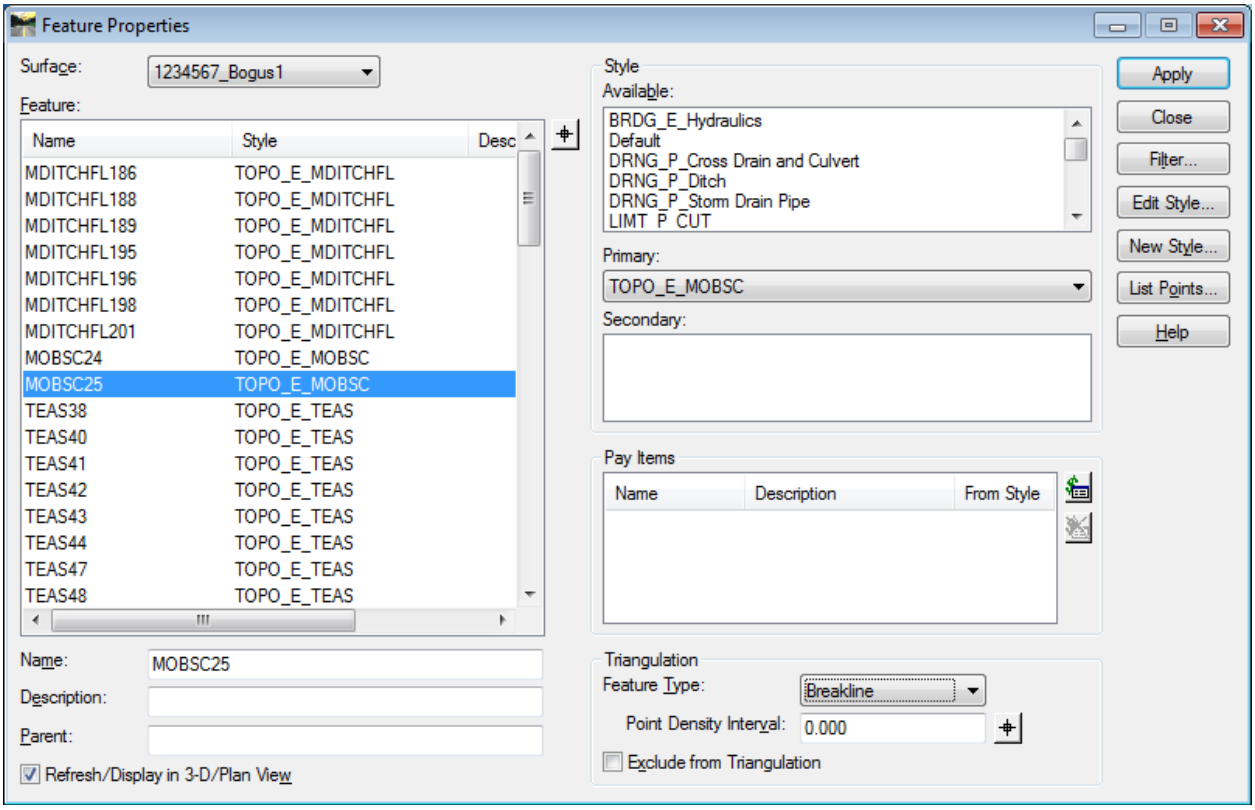


Figure L8-106 Feature Properties

165.	**Now that the Feature Types for both of the Features MOBSC24 and MOBSC25 have been changed from Interior to Breakline the obscured areas may be triangulated across. Retriangulate and review the Surface.** • In InRoads, select **Surface ► Triangulate Surface**. The **Triangulate Surface** dialog opens. • **Match** the entries shown in *Figure L8-107*. • Click **Apply** and **Close**.

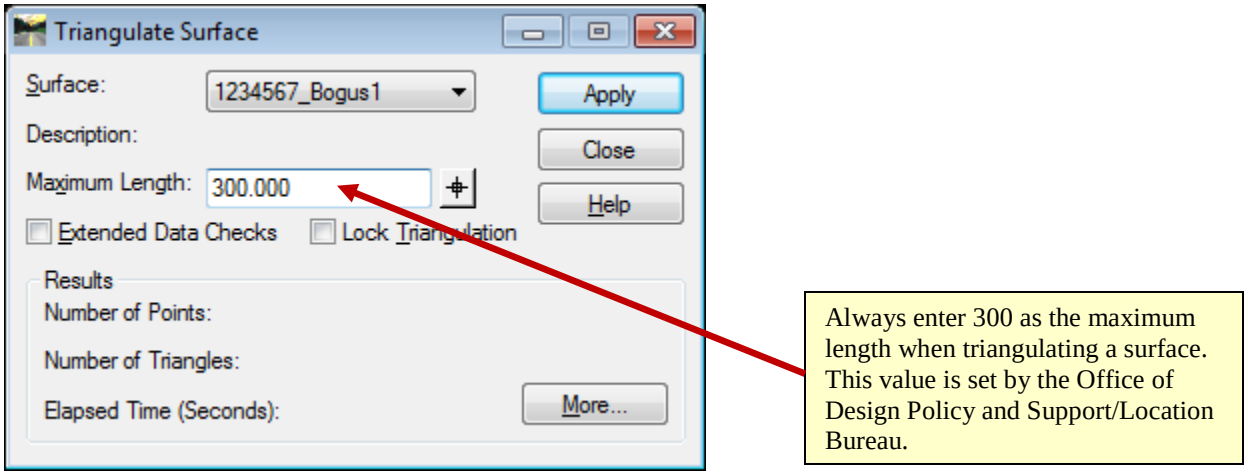
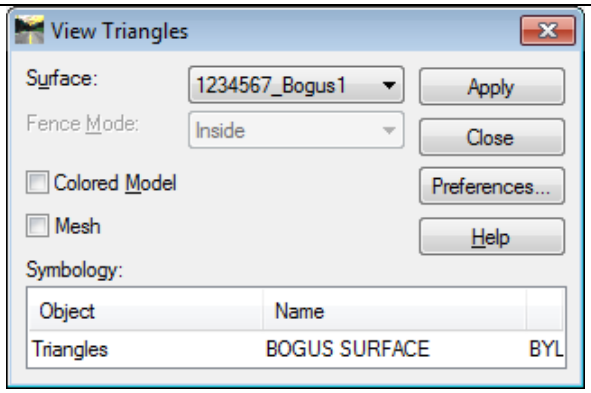


Figure L8-107 Triangulate Surface

166.	**Clear the MicroStation Graphics.** • In MicroStation, select **Edit ► Select All**. • In MicroStation, click the Delete icon ( ).
167.	**View the Surface 1234567_Bogus1.** • In InRoads, select **Surface ► View Surface ► Triangles**. The **View Triangles** dialog opens as shown here.



- Click the **Preferences** button. The **Preferences** dialog opens.
- Select the **BOGUS SURFACE** so that it is highlighted in blue.
- Click **Load** and **Close**.
- In the **View Triangles** dialog ensure the entries match those shown above, then click **Apply** and **Close**.
- Ensure your view in MicroStation matches that shown in *Figure L8-108*.
- Notice the obscure areas are now triangulated across.

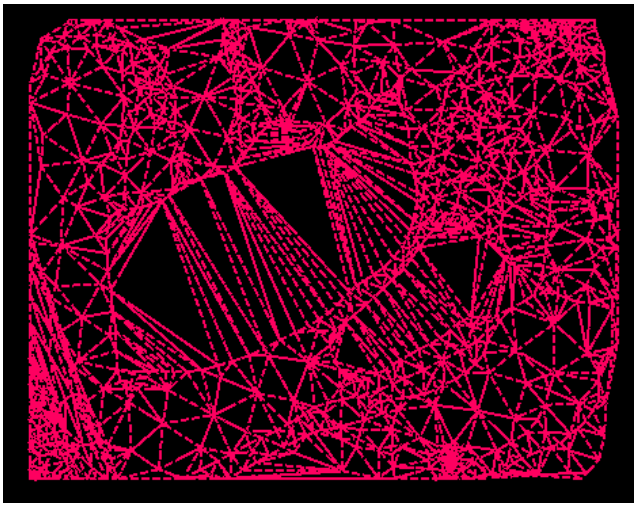


Figure L8-108 MicroStation

168. **IMPORTANT!**

Although the obscured areas have now been triangulated across, as shown in ***Figure L8-108****, it is important to remember that this data is* ***not*** *accurate and has been generated solely for use in the* ***Roadway Designer*** *to ensure that the end conditions solve for all Templates and allows construction limits to be generated. The only existing Surface data to be considered accurate comes from the Office of Design Policy and Support/Location*

	Bureau.
169.	**Now that the Surface 1234567_Bogus1 has been created and the Obscured areas triangulated across, it is time to use the Target Aliasing tool to have the <u>Roadway Designer</u> search for the Surface 1234567_Bogus1 when the Surface 1234567_Exist cannot be found. Open the Roadway Designer.** • In InRoads, select **Modeler ► Roadway Designer**. The **<u>Roadway Designer</u>** Opens.
170.	**Set the Corridor to SR100 SPUR.** • In the **<u>Roadway Designer</u>** Window, use the pull down arrow to select the **Corridor: *SR100 SPUR*** as shown in *Figure L8-109*.
171.	**Set the Active Surface to 1234567_Exist.** • In the **<u>Roadway Designer</u>** Window, use the pull down arrow to select the **Active Surface: *1234567_Exist*** as shown in *Figure L8-109*. • In the **<u>Roadway Designer</u>**, click the **Process All** button. • **Close** the **<u>Results</u>** Report if one opens.

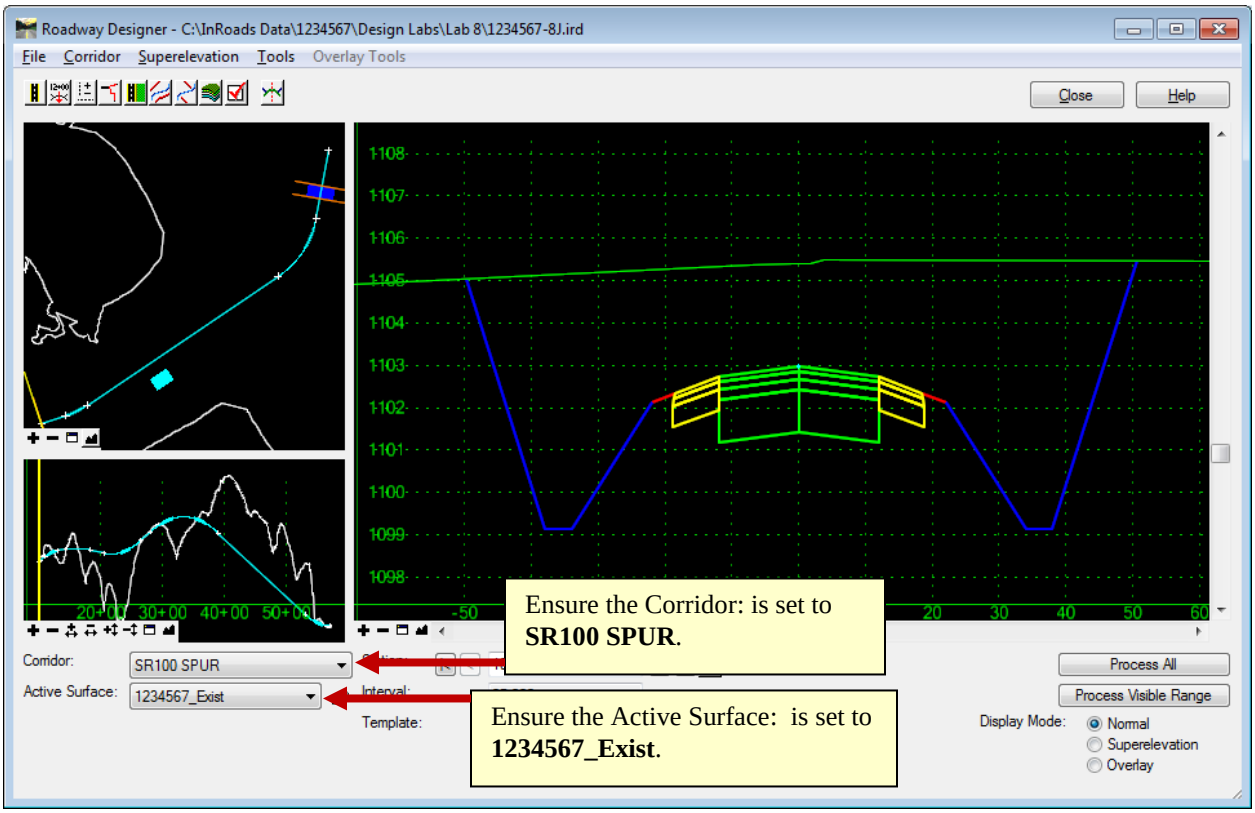


Figure L8-109 Roadway Designer

172.	**Open the <u>Target Aliasing</u> Dialog.** • In the **<u>Roadway Designer</u>**, select **Tools ► Target Aliasing**. The **<u>Target Aliasing</u>** dialog opens as shown in *Figure L8-110*.

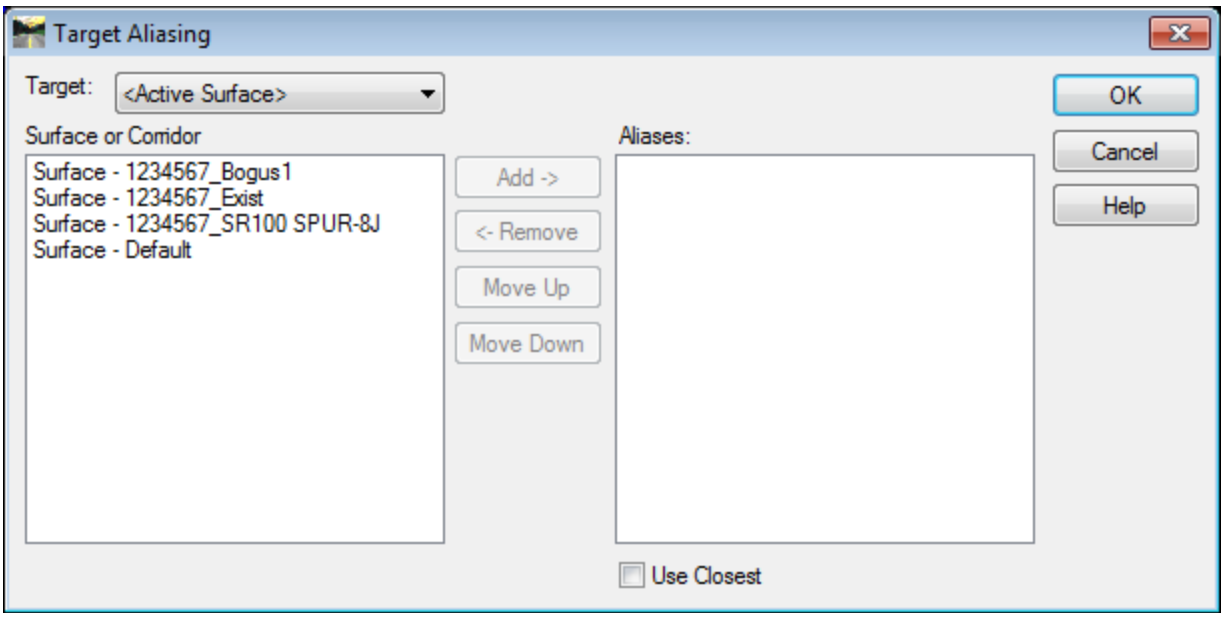
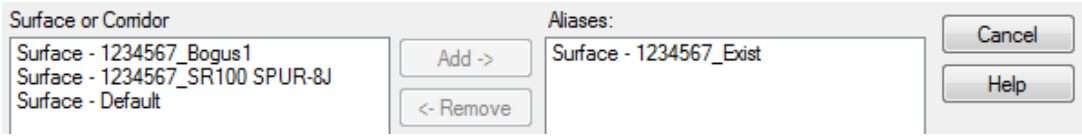


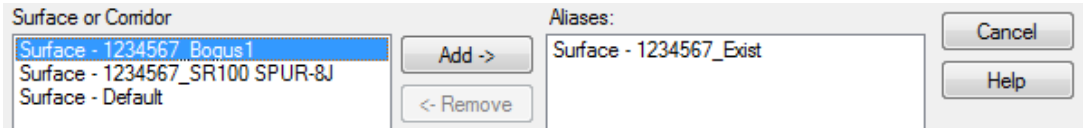
Figure L8-110 Target Aliasing

173.	**The Target Aliasing tool instructs the End Conditions to search the Surfaces listed in the 'Aliases:' field. The Surfaces are searched in the order in which they are listed in the 'Aliases:' field unless the 'Use Closest' check box is checked. Move the Surfaces 1234567_Exist and 1234567_Bogus1 from the Surface or Corridor field to the 'Aliases:' field.** • In the **Target Aliasing** dialog, highlight the Surface **1234567_Exist** as shown here.

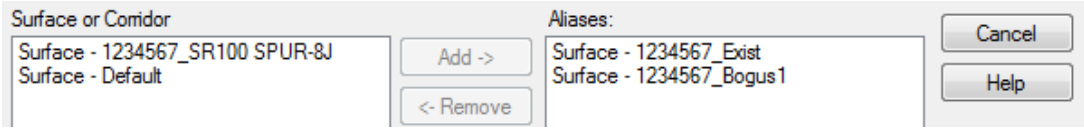
- Click the **Add->** button to move the Surface to the **Aliases:** field as shown here.



- In the **<u>Target Aliasing</u>** dialog, highlight the Surface **1234567_Bogus1** as shown here.



- Click the **Add->** button to move the Surface to the **Aliases:** field as shown here.



- Ensure your **<u>Target Aliasing</u>** dialog matches that shown in *Figure L8-111*.
- Click **OK**.

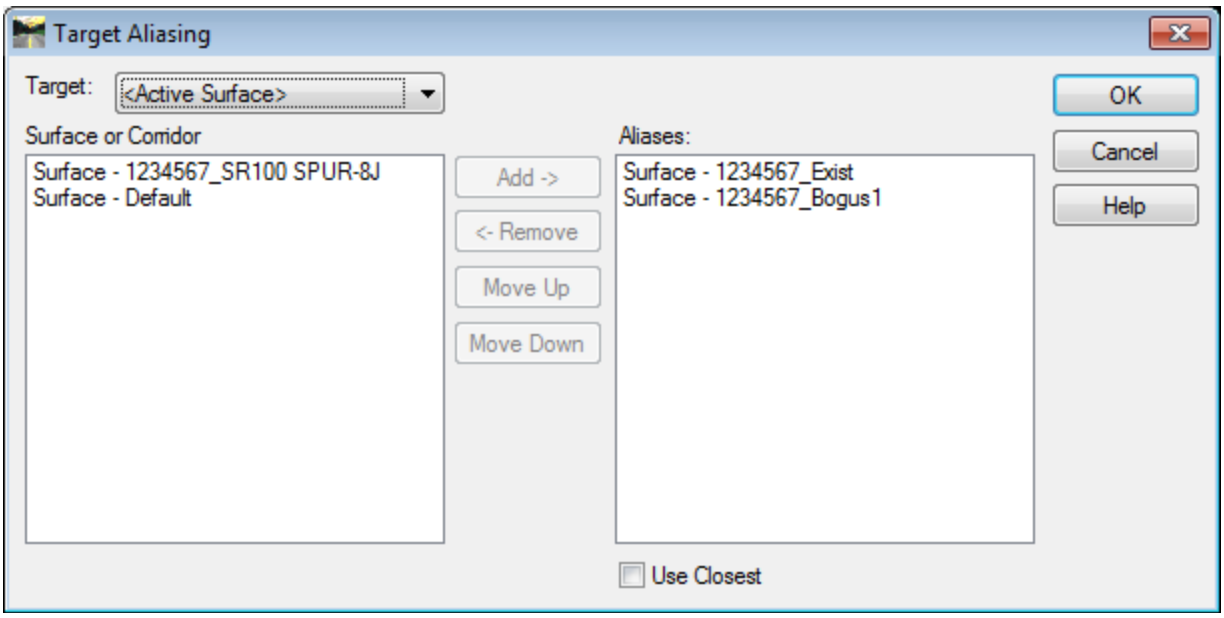
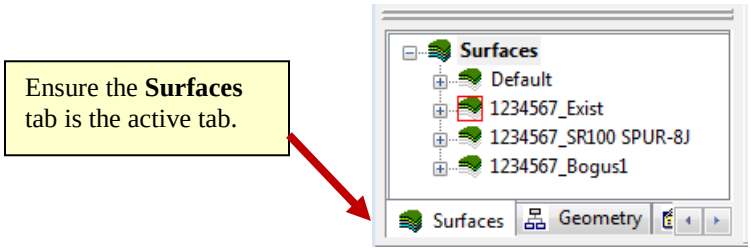


Figure L8-111 Target Aliasing

174.	**Process the Changes in the Roadway Designer.** • In the **Roadway Designer,** click the **Process All** button. • **Close** the **Results** Report if one opens.
175.	**View Station 46+50.00 in the Roadway Designer** • In the **Roadway Designer Station:** entry field, key-in **46+50.00** and press the Tab key. • Ensure your view matches that shown in *Figure L8-112*. • **Hint:** Use the **Zoom Out** button on the left side of the Cross Section View to zoom out to view the Existing/Bogus Surface and Template. • Notice the Left Side End Condition has now found a solution as opposed to **Step 151** and *Figure L8-91*. This is the result of the **Target Aliasing** tool and the Bogus Surface we created. • Notice also the color of the Bogus Surface in the Cross Section view is white rather than pink representing a Bogus Surface. This is because the Surface Properties have not yet been set.

Figure L8-112 Roadway Designer

176.	**Set the Surface Properties in the Surface 1234567_Bogus1.** • In the InRoads workspace bar, ensure the Surface tab is the active tab as shown here.  • Right mouse click over the Surface **1234567_Bogus1** and select **Properties**. The **Surface Properties** dialog opens as shown in *Figure L8-113*. • In the **Surface Properties** dialog, use the pull down arrow to select the **Preference: *BOGUS SURFACE***. • Ensure your entries match those shown in *Figure L8-114*. (Please Note that your numbers may not match the screen capture exactly due to differences in the creation of the border of the Bogus DTM). • In the **Surface Properties** dialog, click the **Advanced** tab. • Use the pull down arrows to select ***BOGUS SURFACE*** for both the **Cross Sections: Symbology** and the **Profiles: Symbology**. • Ensure your entries match those shown in *Figure L8-115*. • Click **Apply** and **Close**.

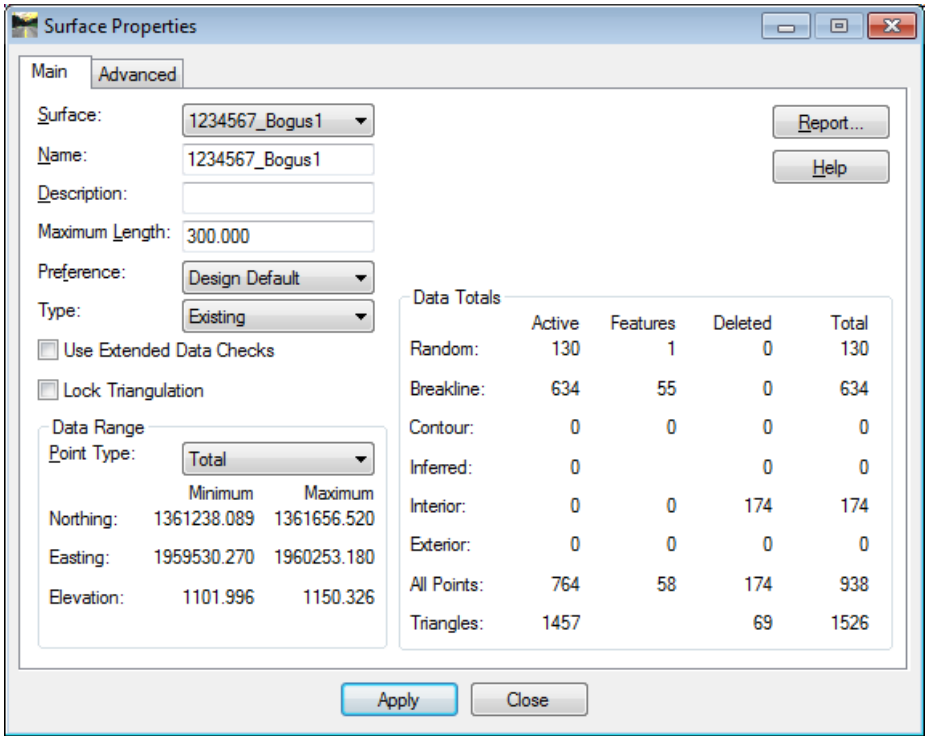


Figure L8-113 Surface Properties

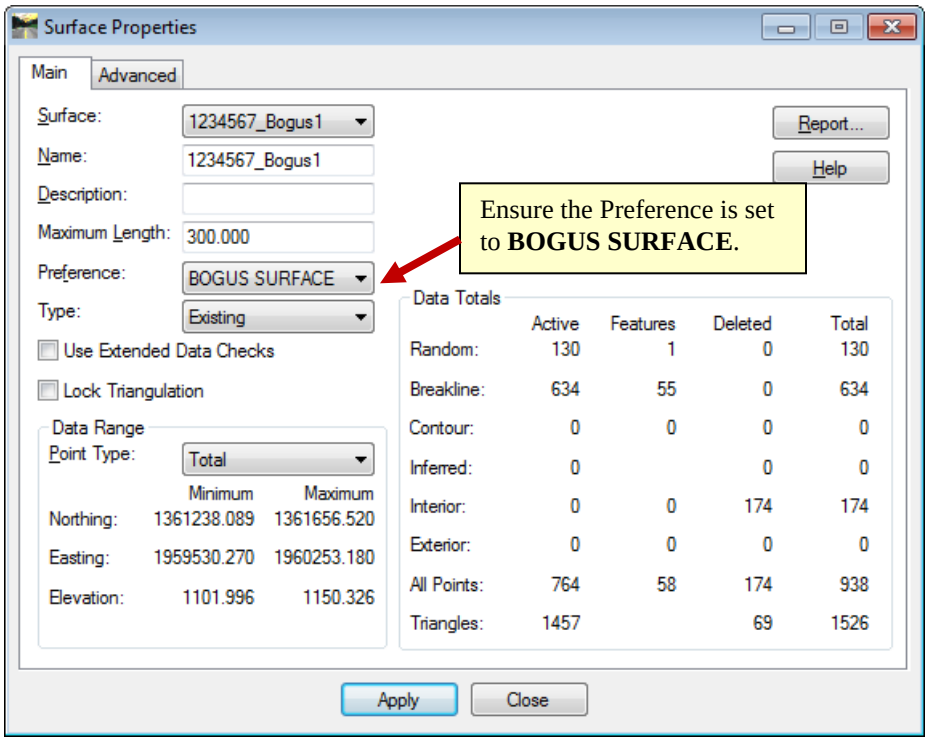


Figure L8-114 Surface Properties

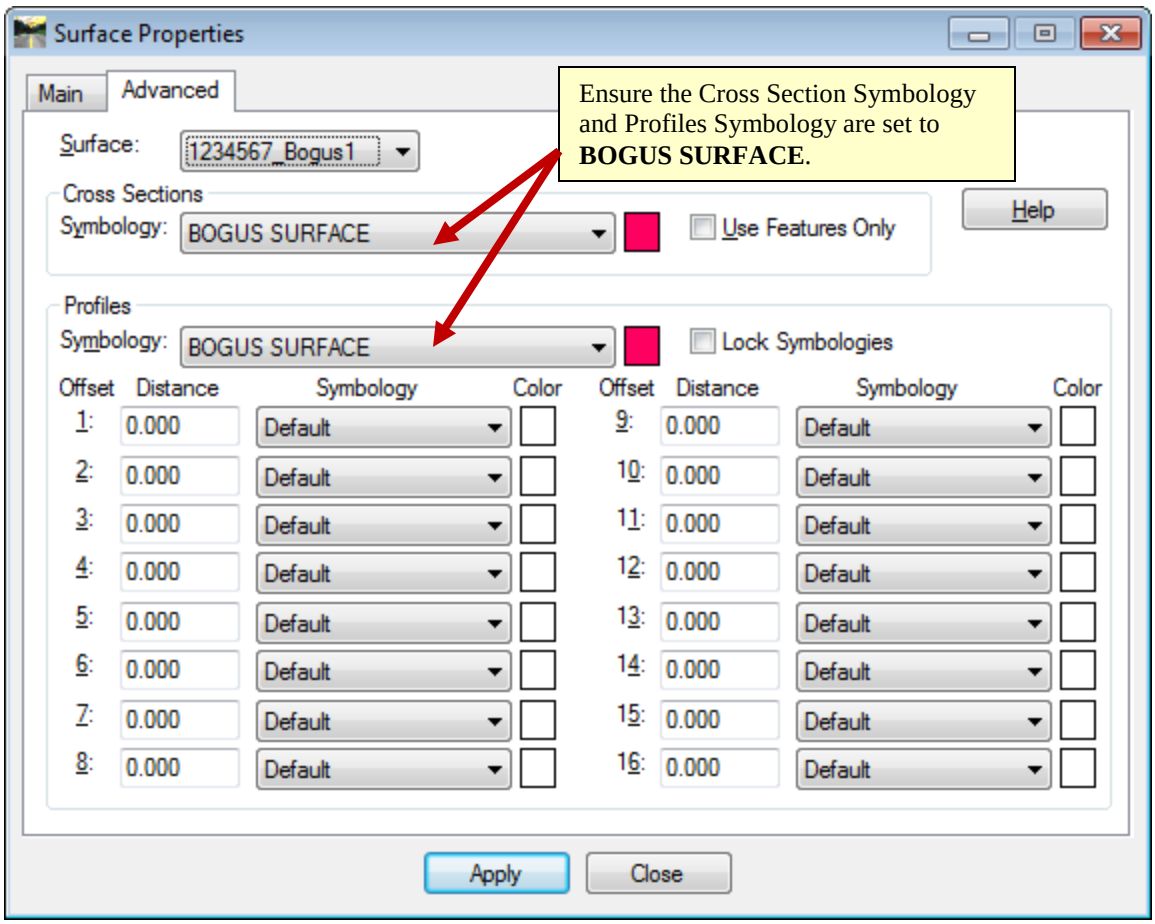


Figure L8-115 Surface Properties

177.	**Process the Roadway Designer and View Station 46+50.00 in the Roadway Designer.** • In the **Roadway Designer**, ensure **1234567_Exist** is the **Active Surface:**. • In the **Roadway Designer**, click the **Process All** button. • **Close** the **Results** Report if one opens. • In the **Roadway Designer Station:** entry field, key-in **46+50.00** and press the Tab key. • Ensure your view matches that shown in *Figure L8-116* and that the Bogus Surface is now colored Pink. • **Hint:** Use the **Zoom Out** button on the left side of the Cross Section View to zoom out to view the Existing/Bogus Surface and Template.

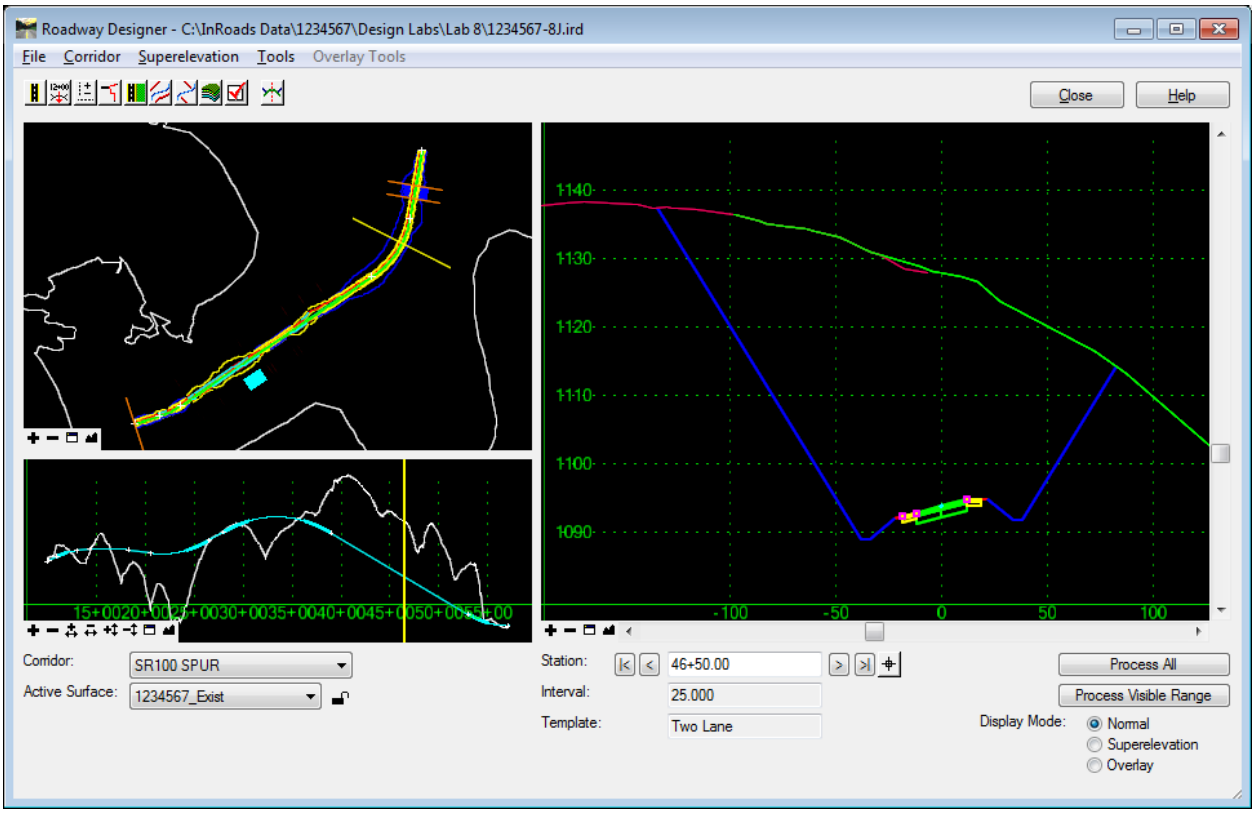
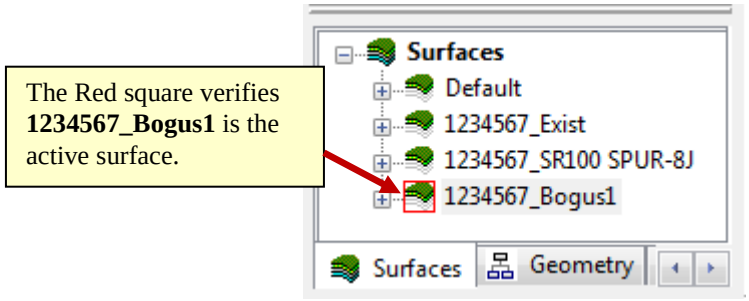
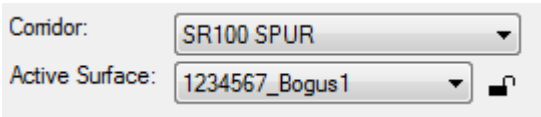


Figure L8-116 Roadway Designer

178.	**Although the Surface 1234567_Bogus1 has been Created and is Visible in the InRoads workspace bar, it has not yet been saved as a .DTM. Save the Surface as 1234567_Bogus1.dtm.** • Make the Surface **1234567_Bogus1** the active surface by Right mouse clicking over it in the InRoads workspace bar and selecting **Set Active**. • Ensure the Surface **1234567_Bogus1** is the active surface by verifying the presence of a Red square around the Surface as shown here. 

- ***IMPORTANT**: Notice in the bottom left of the **Roadway Designer**, the **Active Surface:** is listed as **1234567_Bogus1** as shown here. It is very important to be aware of the **Active Surface**: when working in the **Roadway Designer**. Processing a Corridor in the **Roadway Designer** with the wrong active surface will result in the Templates' End Conditions projecting to the wrong Surface.



- In InRoads, select **File ► Save ► Surface**.
- The **Save As** dialog opens as shown in *Figure L8-117*.
- Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 8**
- In the **File name:** field, enter **1234567_Bogus1.dtm**
- Ensure your entries match those shown in *Figure L8-118*.
- Click **Save.** Notice **1234567_Bogus1.dtm** now appears in the **Save As** dialog.
- Click **Cancel** to close the **Save As** dialog.

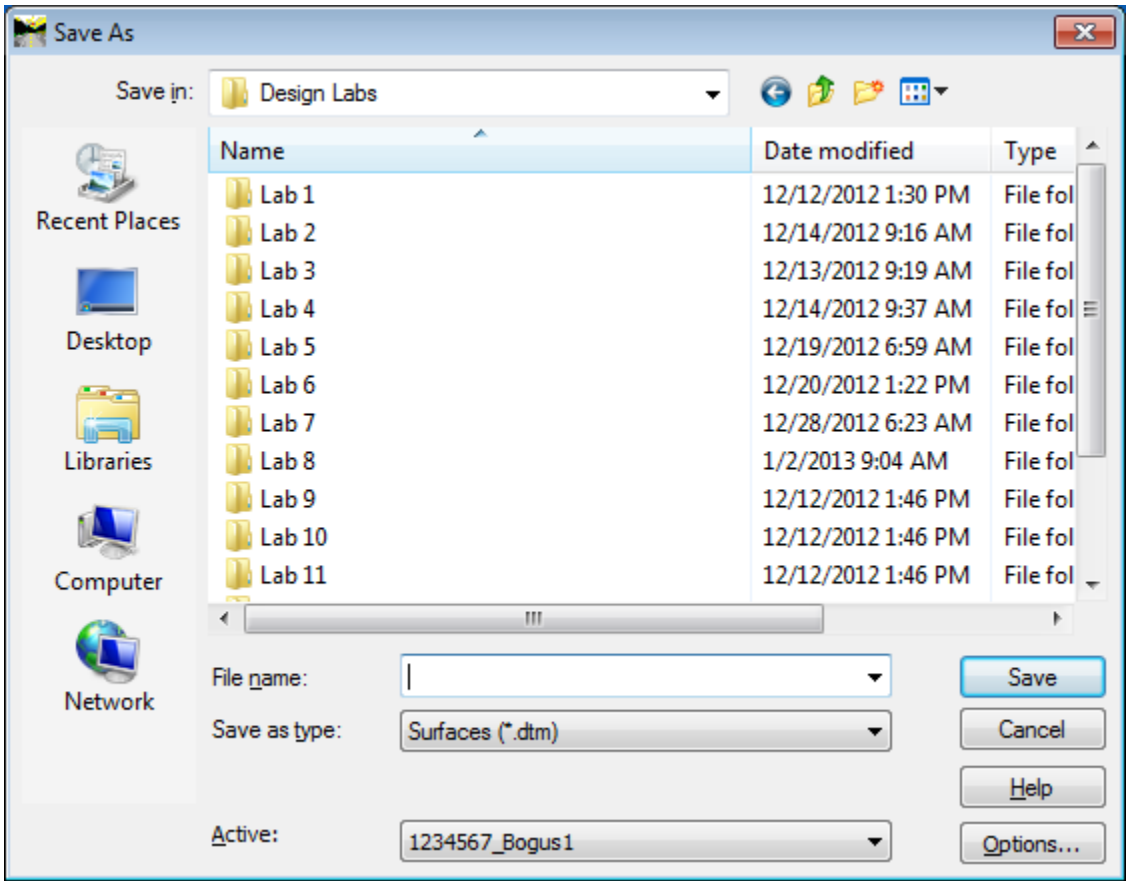


Figure L8-117 Save As

Lab 9
Cross Section Sheets and Annotation

Objective

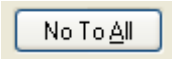
The objective of this Lab is to provide a brief workflow overview to generate Cross Sections on Cross Section Sheets and apply Annotation to the Cross Sections. The Create and Annotate Cross Sections are located under the InRoads Evaluation menu.

Lab 9A Set Project Defaults and Open Files

1. Starting Clean

In order to ensure that you are working with a "clean" database – you will close MicroStation and InRoads if they are still running from a previous Lab:

To CLOSE MicroStation and InRoads -

Select **File►Exit** from the [MicroStation Menu].
If any messages appear regarding the saving of projects – Select 

This closes BOTH the MicroStation and InRoads Software(s).

2. Starting MicroStation and InRoads in the GDOT Workspace.

From the desktop, double-click on the **MicroStation** icon labeled **GDOT MicroStation V8i SS2 (x86)**.

Double click on the icon labeled **GDOT MicroStation V8i SS2 (x86)**.

- When the **MicroStation Manager** dialog box appears – navigate to the **C:\InRoads Data\1234567\Design Labs\Standards** folder and select the "**GDOT 3D Working File.dgn**". (Creation of the 'GDOT 3D Working File.dgn' is documented in the Design Guidelines). Click **Open**.

- Now open InRoads from within MicroStation by selecting:
  InRoads ► InRoads Suite (SELECTseries 2) V8i 08.11.07.566 from the [MicroStation Menu].

The MicroStation and InRoads Software(s) will open.

3. Clear the MicroStation Window (*This step may be ignored if your MicroStation Window is already clear of graphics***)**

- Select **Edit ►Select All** from the [MicroStation Menu].
- Then select the **<DELETE>** key on the computer keyboard.

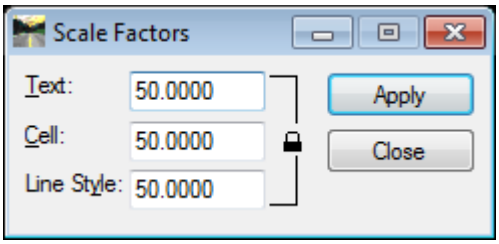
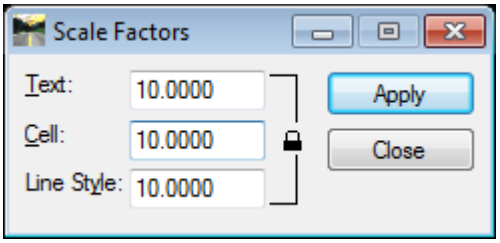
The MicroStation Window is now clear of all graphics from the previous lab and ready for this lab.

4.	**Verify Project Defaults** • In InRoads, select **File ►Project Defaults** • Use the pull down next to **Configuration Name:** to select ***1234567_Design*** which you created in **Lab 1**. • Click **Apply** & **Close.** *Sets Project Defaults.*
5.	**Set the Design Default Preferences** • Select **File ► Project Options** and the **<u>Project Options</u>** dialog box appears. • Select the **Factors** tab. • This will be a 50 scale project. Enter ***50*** for the **Text**, **Cell** & **Line Style Scale Factor(s)**. • Then in the same **<u>Project Options</u>** dialog box select the **Geometry** tab. • Click the **Preferences** button at the bottom of the dialog box. • Choose ***Design Default***. Click **Load** and **Close**. This will set the remainder of the Design Defaults. ****IMPORTANT**: As stated previously the ***Design Default*** Preference loads the appropriate settings for use during Design. These settings include the Alignment and Point name settings. These settings are of particular importance to the Designer. Alignments must have a **DE** prefix. Points must also have a **DE** prefix as well as beginning the point numbering scheme at Number 10000. In order for survey enhancements to be properly added during the design phase of a project, it is essential that Designers pay particular attention to this setting. • In the **<u>Project Options</u>** dialog box click **Apply** and **Close**. *Sets the Design Default Preference.*
6.	**Open 1234567_Design.alg** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 9** • Highlight **1234567_Design.alg** • Click **Open** & **Cancel**. *The Geometry Project 1234567_Design is opened.*
7.	**Open GDOT_Lab9.itl** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 9** • Highlight **GDOT_Lab9.itl** • Click **Open** & **Cancel**. *The Template Library GDOT_Lab9 is opened.*

8.	**Open 1234567_Lab9.ird** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 9** • Highlight **1234567_Lab9.ird** • Click **Open** & **Cancel**. *The Roadway Design File 1234567_Lab9 is opened.*
9.	**Open 1234567_Exist.dtm** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 9** • Highlight **1234567_Exist.dtm** • Click **Open** & **Cancel**. *The Surface Project 1234567_Exist is opened.*
10.	**Open 1234567_SR100 SPUR_Lab9.dtm** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 9** • Highlight **1234567_SR100 SPUR_Lab9.dtm** • Click **Open** & **Cancel**. *The Finish Surface 1234567_ SR100 SPUR_Lab9 is opened.*
11.	**Open 1234567_Bogus1_Lab9.dtm** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 9** • Highlight **1234567_Bogus1_Lab9.dtm** • Click **Open** & **Cancel**. *The Bogus Surface 1234567_Bogus1_Lab9 is opened.*

Lab 9B Process to Create Cross Sections

In Lab 9B, you will learn how to view Cross Sections on Cross Section Sheets in MicroStation. InRoads refers to this as Creating Cross Sections. To create Cross Sections depicting the Existing Ground and the Roadway Design, a minimum of an Existing Ground Surface .DTM and a Final Design Surface .DTM must exist. In this Section of Lab 9 three Surfaces have been prepared for you: an Existing Ground Surface named 1234567_Exist.dtm, a 'Bogus' Surface named 1234567_Bogus1_Lab9.dtm (for temporary handling of obscured areas) and a Roadway Design Surface named 1234567_SR100 SPUR_Lab9.dtm

12.	**Whenever Cross Sections are to be viewed in MicroStation, the Global Scale Factor must be changed from 50.00 to 10.00 for the Text, Cell, and Line Style. Open the 'Global Scale Factors' dialog.** • In InRoads, select **Tools ► Global Scale Factors**. The **<u>Scale Factors</u>** dialog opens as shown here. 
13.	**Change the Scale Factors of the Text, Cell and Line Style to 10.00** • Match the entries shown here.  • Click **Apply** and **Close**.
14.	**Open the <u>Cross Sections</u> dialog.** • In InRoads, select **Evaluation ► Cross Section ► Cross Sections**. The **<u>Cross Section</u>** dialog opens as shown in *Figure L9-1*.

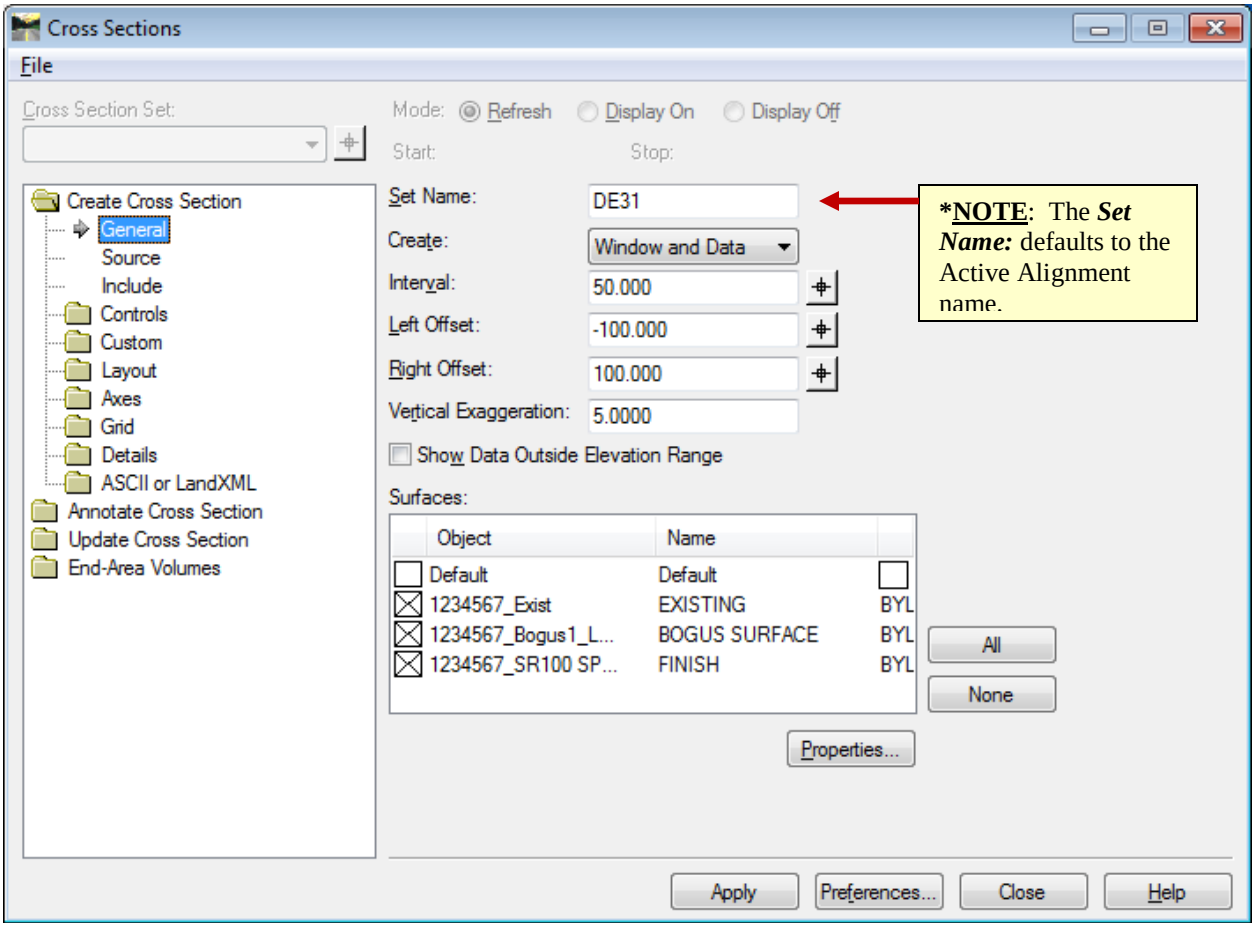
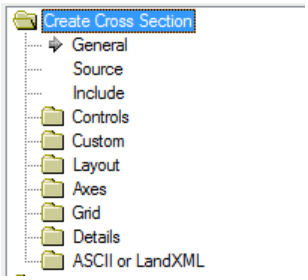


Figure L9-1 Create Cross Section

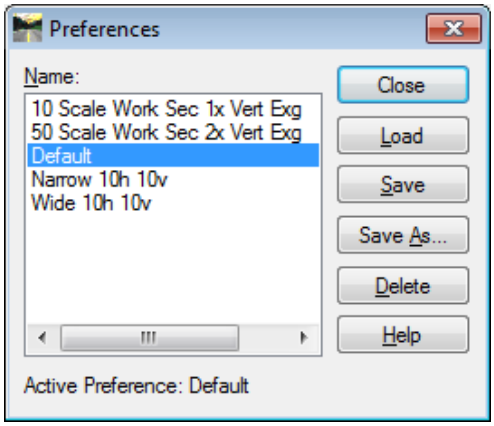
15. **Open the Preferences Dialog.**

- Ensure the **Create Cross Section** "folder" is highlighted/selected as depicted here:



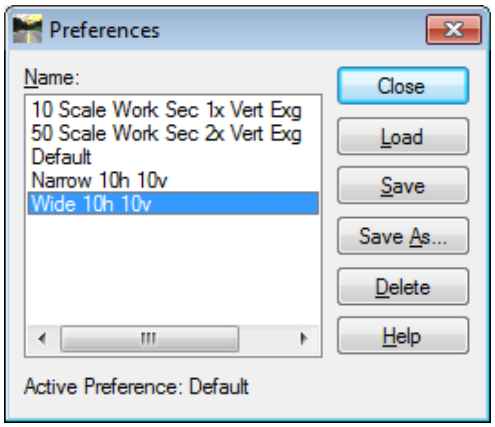
NOTE: Depending on which folder is selected (either "***Create Cross Section***, ***Annotate Cross Section***, ***Update Cross Section*** or ***End-Area Volumes***), the available **Preferences** will change.

- In the **Cross Sections** dialog, click the **Preferences** button. The **Preferences** dialog opens as shown here.



16. **Load the Preference for Wide Cross Sections.**

- In the **Preferences** dialog, highlight the Preference **Wide 10h 10v** as shown here.



***NOTE**: The **Wide 10h 10v** Preference loads the settings into the **Cross Sections** dialog to view Cross Sections in a Wide format on the GDOT **SUXSEW** Cross Section plan sheet cell. Likewise, the **Narrow 10h 10v** Preference loads the settings into the **Cross Sections** dialog to view Cross Sections in a Narrow format on the GDOT **SUXSEN** Cross Section plan sheet cell.

- Click **Load** and **Close**.

17.	**Select the Surfaces to View on the Cross Section Sheets.** • In the **<u>Cross Sections</u>** dialog, click the **General** tab to ensure it is the active tab as shown in *Figure L9-2*. • Ensure the check boxes for the following Surfaces are checked as shown in *Figure L9-2*. o ***1234567_Exist*** o ***1234567_SR100 SPUR_Lab9*** o ***1234567_Bogus1_Lab9***

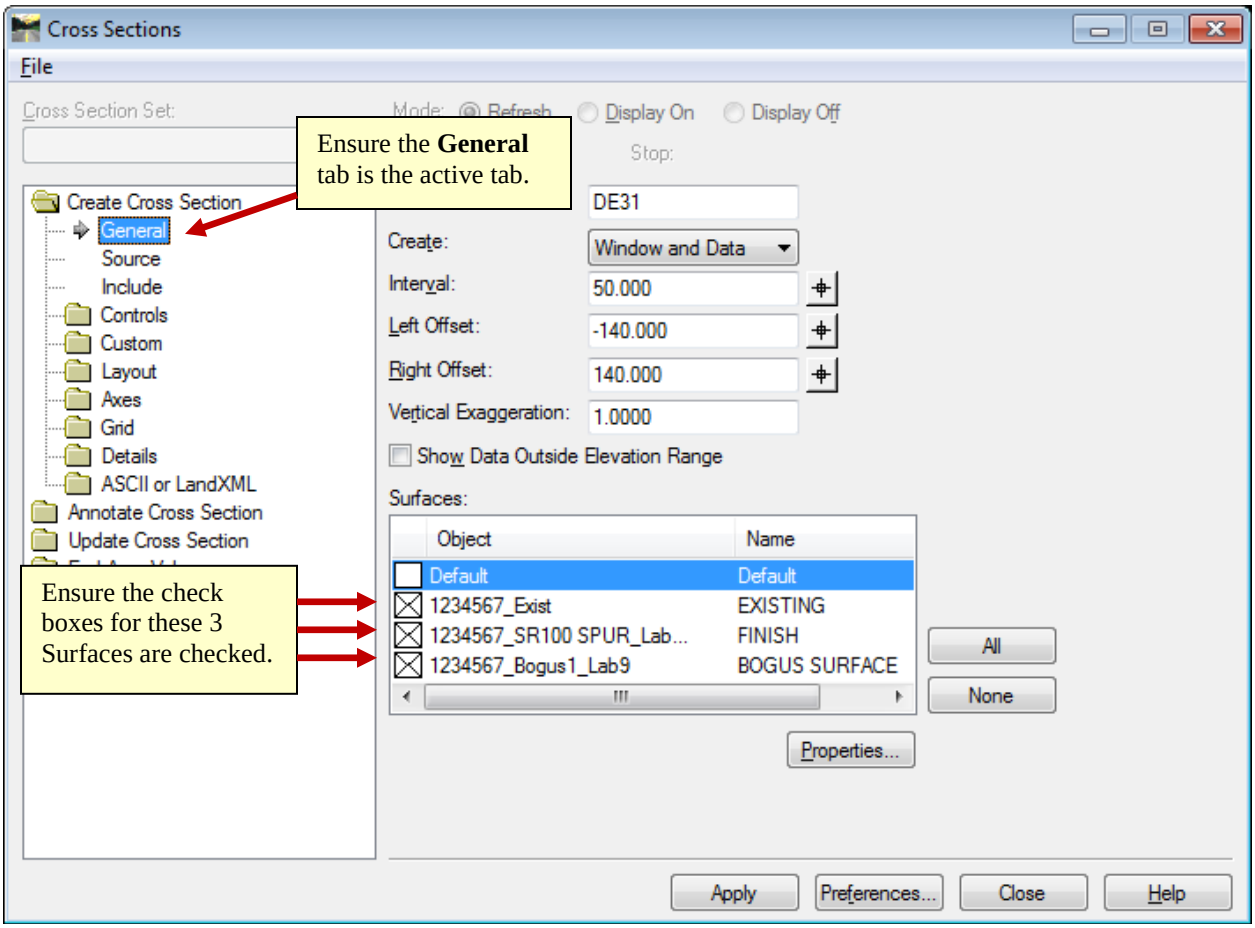


Figure L9-2 Create Cross Section

18.	**View the Cross Sections in MicroStation.** • In the **Cross Sections** dialog, click **Apply**. • In the bottom left corner of the MicroStation Window you are prompted to **>Identify Location**. Left click anywhere in the MicroStation Window. Please be patient while the Cross Sections are drawn in MicroStation. • When the Cross Sections have completed drawing in MicroStation, the **Cross Sections** dialog reappears. • Click **Close** to close the **Cross Sections** dialog. • In MicroStation, click the **Fit View** icon ( ). • Ensure your view in MicroStation matches that shown in *Figure L9-3*.

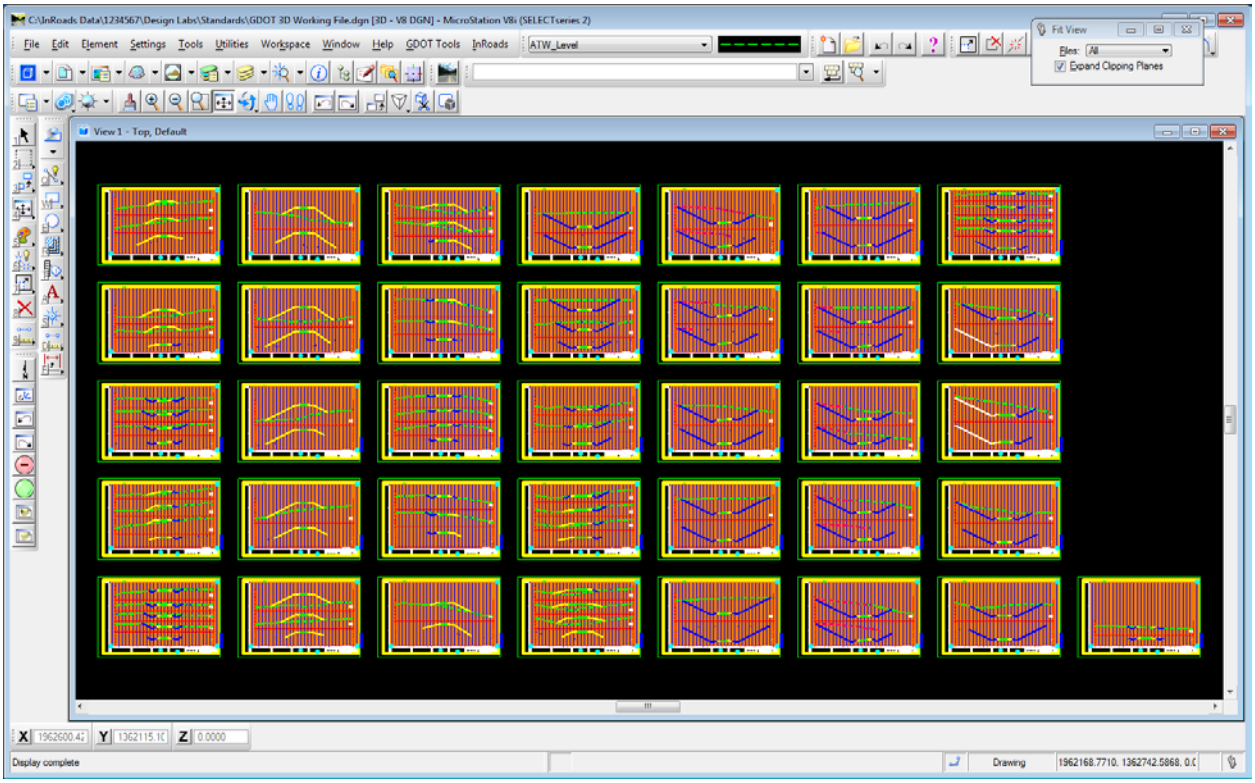


Figure L9-3 MicroStation

19.	**Open the Cross Section Viewer.** • In InRoads, select **Evaluation ► Cross Section ► Cross Section Viewer**… The **Cross Section Viewer** opens as shown in *Figure L9-4*.

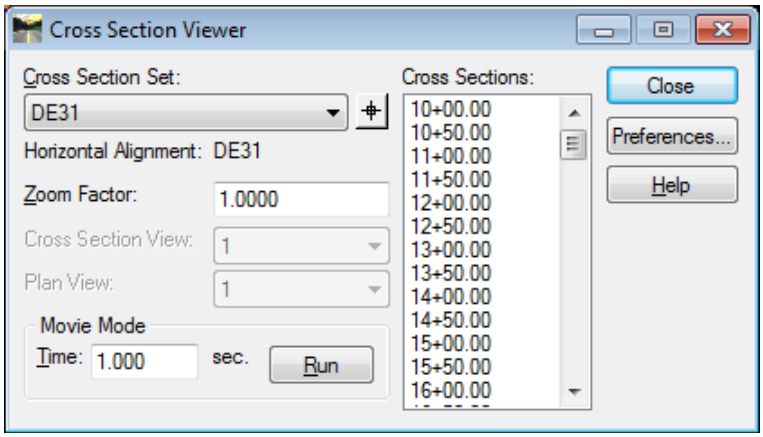
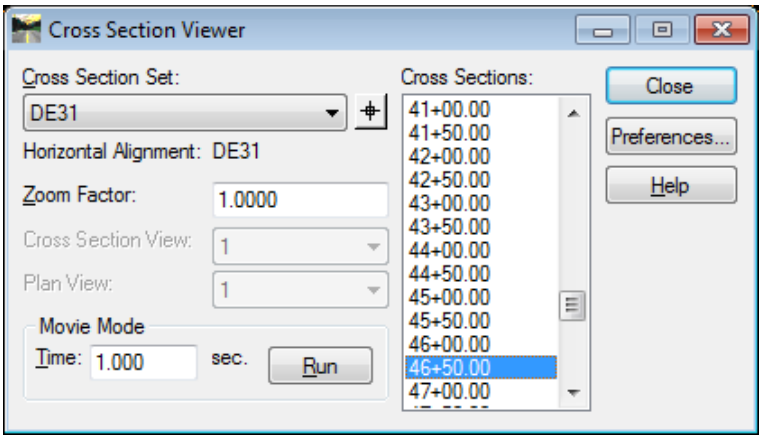


Figure L9-4 Cross Section Viewer

20.	**Use the Cross Section Viewer to View Station 46+50 in MicroStation.** • In the **Cross Section Viewer**, use the scroll arrows and scroll to **46+50** and Left click on **46+50** to highlight it as shown here.



- Notice in MicroStation - the View Window now contains the Cross Section at Station **46+50** as shown in *Figure L9-5*.
- Notice also in MicroStation at Station **46+50** the Pink section of the Existing Ground. This represents the Bogus Ground that was created in Lab 8 to represent obscured areas and ensures the End Conditions solve.
- Click **Close** to exit the **Cross Section Viewer**.
- In MicroStation, click the **Fit View** icon ( ) to fit the view.

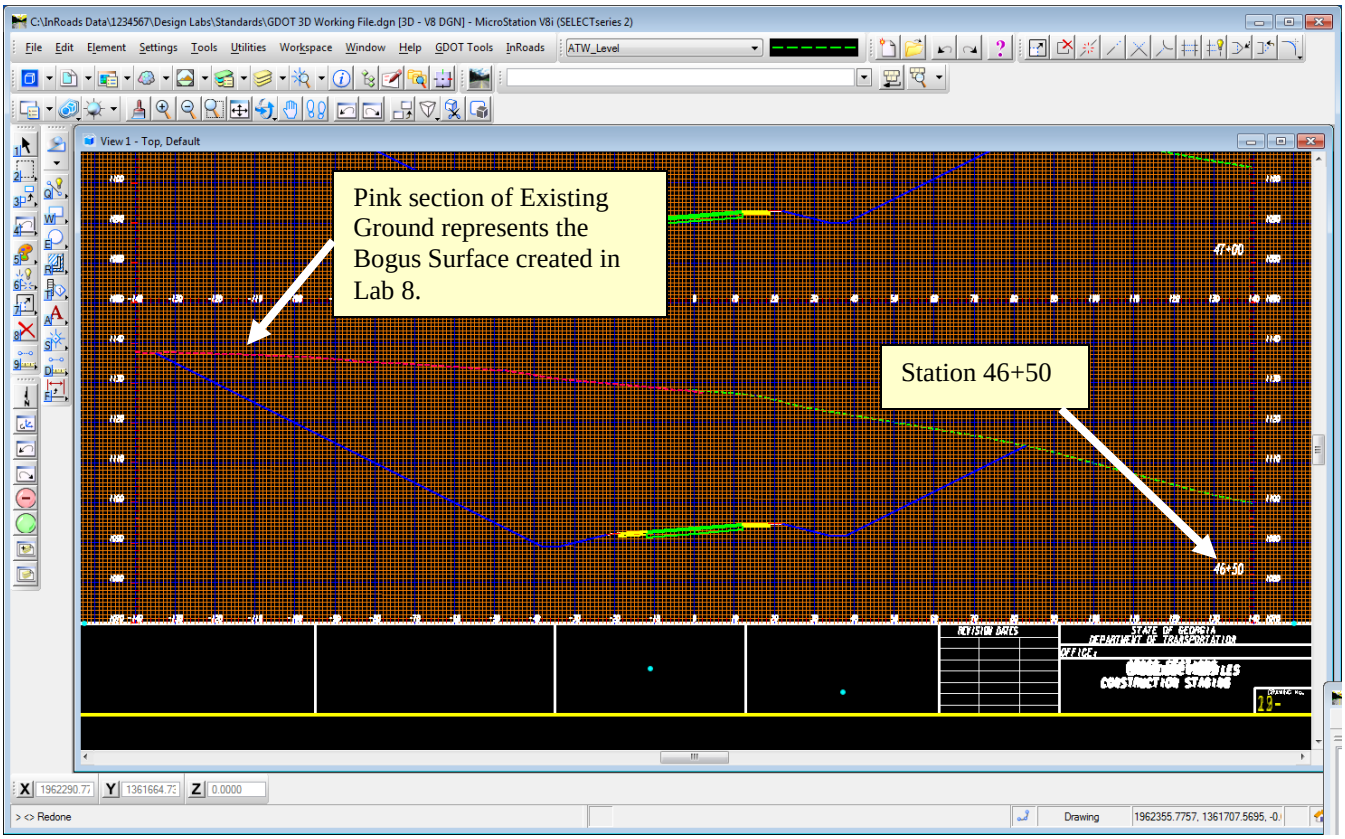
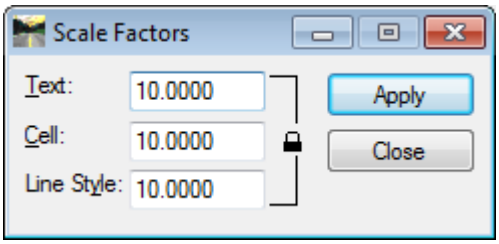


Figure L9-5 MicroStation

21.	**Clear the MicroStation View.** • In MicroStation, select **Edit ► Select All**. • In MicroStation, click the **Delete** icon ( ).

22.	**Open the <u>Cross Sections</u> dialog again.** • In InRoads, select **Evaluation ► Cross Section ► Cross Sections**. The **<u>Cross Sections</u>** dialog opens.
23.	**Verify the Global Scale Factors are set to 10.00** • In InRoads, select **Tools ► Global Scale Factors**. The **<u>Scale Factors</u>** dialog opens. • Ensure **10.00** is entered for each of the items as shown here.  • Click **Apply** and **Close**.
24.	**Load the Preference 'Wide 10h 10v'.** • Ensure the **Create Cross Section** "folder" is highlighted/selected. • In the **<u>Cross Sections</u>** dialog, click the **Preferences** button. • Select the Preference of **Wide 10h 10v**. • Click **Load** and **Close**.
25.	**Select the Surfaces to View on the Cross Section Sheets.** • In the **<u>Cross Sections</u>** dialog, click the **General** tab to ensure it is the active tab as shown in *Figure L9-6*. • Ensure the check boxes for the following Surfaces are checked as shown in *Figure L9-6*. o ***1234567_Exist*** o ***1234567_SR100 SPUR_Lab9*** o ***1234567_Bogus1_Lab9***

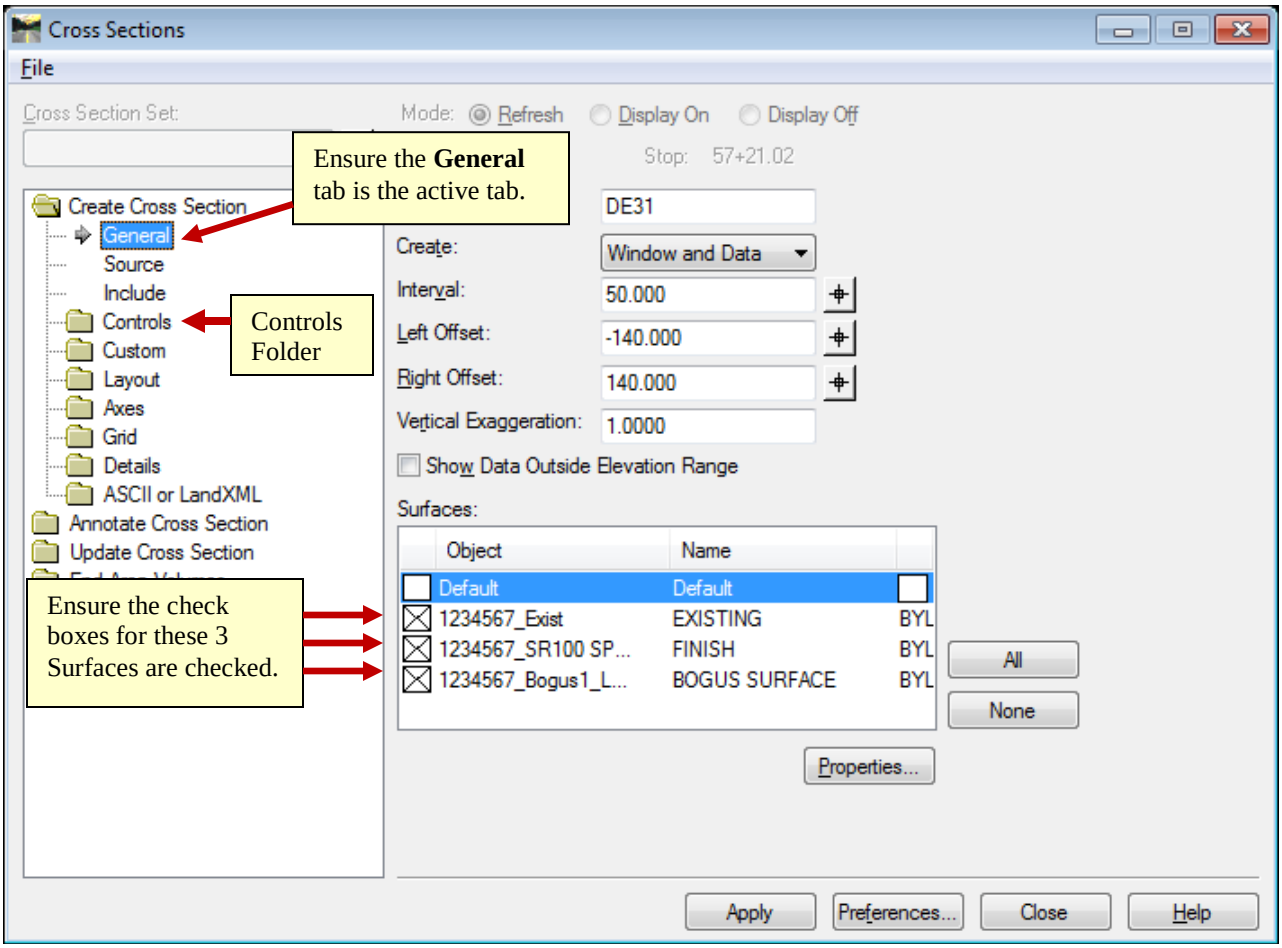


Figure L9-6 Create Cross Section

26.	**View Only Stations 10+00 to 25+00.** • In the **<u>Cross Sections</u>** dialog, click the **Controls** folder identified in *Figure L9-6*. • Highlight the **Limits** tab as shown in *Figure L9-7*. • Place a Check in the **Station** check box as shown in *Figure L9-7*. • Key-in ***10+00*** for the **Start:** station and ***25+00*** for the **Stop:** station as shown in *Figure L9-7*. • Click **Apply**. • You are prompted in the bottom left corner of the MicroStation Window to **>Identify Location**. Left click anywhere in the MicroStation Window. • Click **Close** to close the **<u>Cross Sections</u>** dialog. • In MicroStation, click the **Fit View** icon ( ). • Ensure your view in MicroStation matches that shown in *Figure L9-8* and that only Stations **10+00** to **25+00** were drawn. • Do **<u>not</u>** clear the MicroStation Window. The Graphics will be needed for Lab 9C.

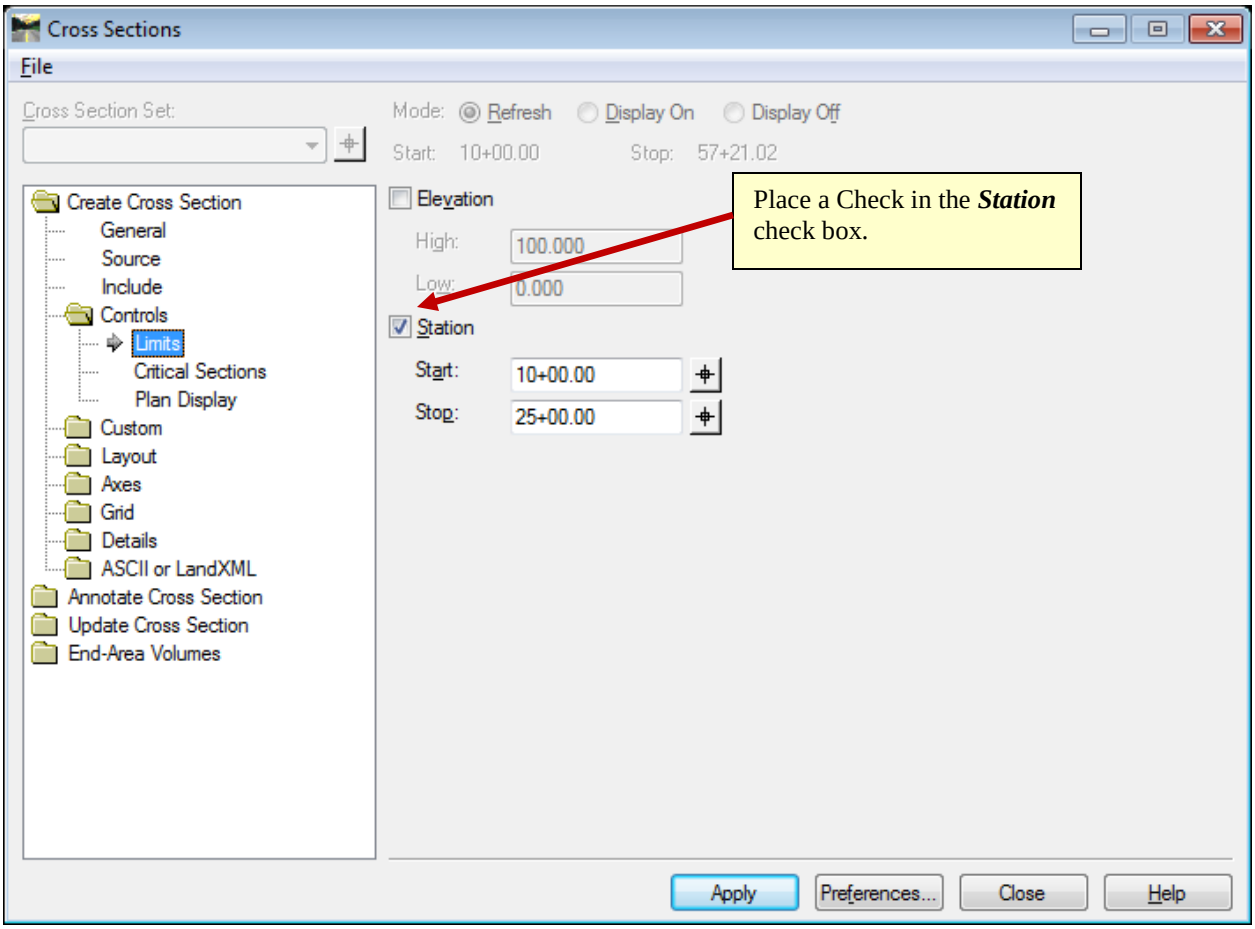


Figure L9-7 Create Cross Section

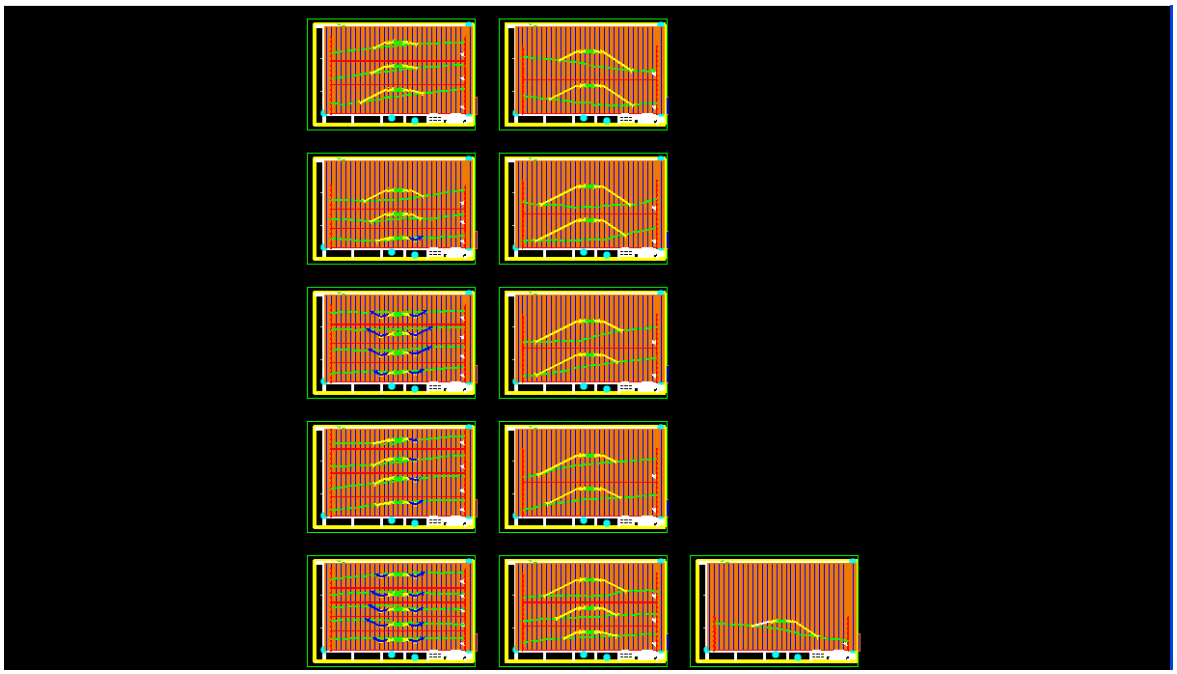


Figure L9-8 MicroStation View Window

Lab 9C Annotating Cross Sections

Annotation in InRoads is a manual process of identifying the Points, Segments or Features you wish to have annotated. Annotation includes loading the proper Preferences in order for the text to be viewed in the desired format (i.e. horizontal, vertical, diagonal, etc.) and symbology. In Lab 9C you will learn how to annotate the following items according to the GDOT Plan Presentation Guide.

- Profile Grade Elevations (Vertical Elevation Text)
- Existing Ground Elevations (Diagonal Elevation Text)
- Ditch Elevations (Horizontal Elevation Text)
- Roadway Slopes (Percent format)
- Shoulder Slopes (Percent format)
- Front Slopes (Ratio format)
- Back Slopes (Ratio format)
- Slope Stake Offset Distance (Vertical Offset Distance Text)

27.	**Zoom into Station 10+00.** • In InRoads, select **Evaluation ► Cross Section ► Cross Section Viewer**. • Change the **Zoom Factor:** to ***0.4000***. • Highlight Station **10+00**. • Your view in MicroStation should be similar to that shown in *Figure L9-9*. **NOTE:** At the end of the cursor, the Offset and Elevation text of the current location will display. The displayed text attributes (size, color, etc.), uses the following MicroStation Place Text settings: Height, Width, Font, and Justification. These settings can be adjusted in the MicroStation Place Text dialog if the text size is too large. • Click **Close** to exit the **<u>Cross Section Viewer</u>** dialog box.

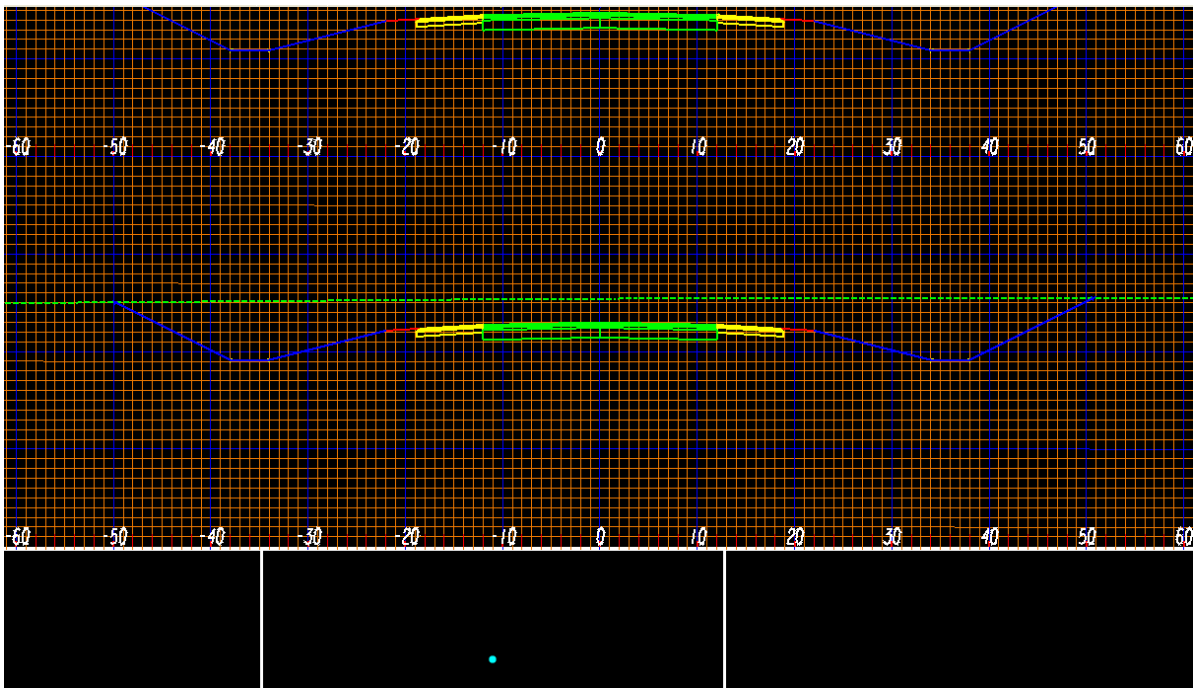


Figure L9-9 MicroStation View Window

28.	**Before Annotating, the 'Pencil/Pen Lock' and the 'Delete Ink' Lock must be set properly.** • In InRoads, select **Tools ► Locks**. Ensure the Pencil/Pen lock is set to **Pen**. A Blue pen should be shown next to Pencil/Pen as shown here and **not** a Yellow pencil. The Pen setting ensures successive labeling will not be erased. Ensure a Blue pen is shown → Pencil/Pen • In InRoads, again select **Tools ► Locks**. Ensure a check mark is **not** shown next to Delete Ink as shown here. This also prevents the labeling from being erased with each successive labeling. Ensure a Check is **not** shown → Delete Ink
29.	**Open the Cross Sections dialog.** • In InRoads, select **Evaluation ► Cross Section ► Cross Sections**. The **Cross Sections** dialog opens as shown in *Figure L9-10*.

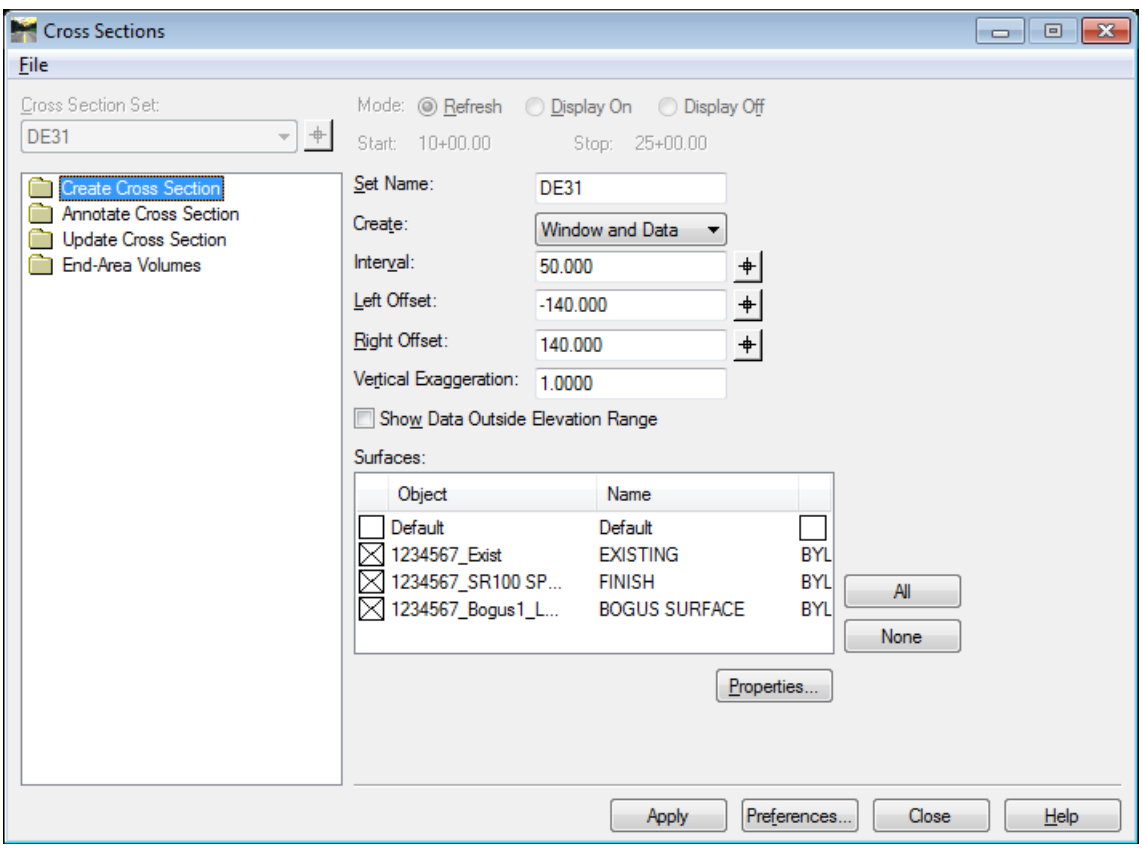
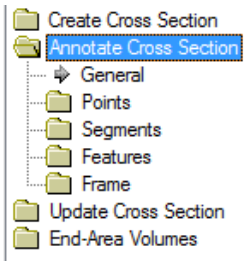


Figure L9-10 Annotate Cross Section

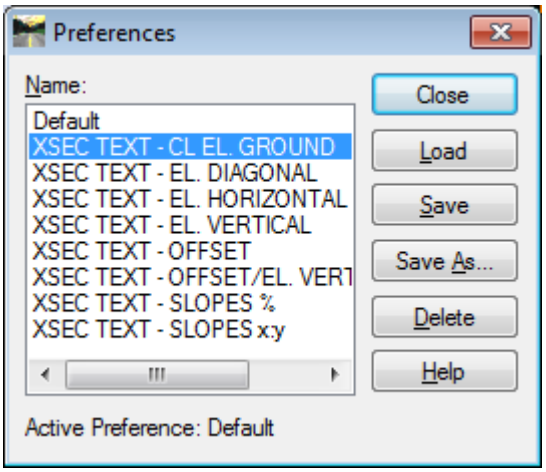
30. **Load the Preference 'XSEC TEXT – CL EL. GROUND'. This Preference Loads the Settings to Label the Existing Ground Elevation at the Centerline.**

- Ensure the **Annotate Cross Section** "folder" is highlighted/selected as depicted here:



NOTE: Depending on which folder is selected (either "***Create Cross Section***, ***Annotate Cross Section***, ***Update Cross Section*** or ***End-Area Volumes***), the available **Preferences** will change.

- In the **<u>Cross Sections</u>** dialog, click the **Preferences** button. The **<u>Preferences</u>** dialog opens as shown here.



- Select the Preference **XSEC TEXT – CL EL. GROUND**.
- Click **Load** and **Close**.

31.	**Review the Settings Loaded by the 'XSEC TEXT – CL EL. GROUND' Preference.** • In the **Annotate Cross Section** folder, make the **Points** folder the active folder as shown in *Figure L9-11*. • Notice, in *Figure L9-11*, that a check mark exists next to the **Include Points** check box. This makes the Points available for annotating. • Notice, in *Figure L9-11*, that the check box labeled **Center** is checked. This turns on the Center Point of the Alignment for labeling. • Notice, in *Figure L9-11*, the Name **XSEC_E_Ground**. This is the name of the Named Symbology that has been set up for this item and ensures that the labeling is viewed with the proper attributes in MicroStation and is placed on the proper Level in MicroStation for plotting. • Make the **Segments** folder the active folder as shown in *Figure L9-12*. Notice the **Include Segments** check box is unchecked. No Segments are set up to be annotated with the **XSEC TEXT – CL EL. GROUND** Preference. • Make the **Features** folder the active folder as shown in *Figure L9-13*. Notice the **Include Features** check box is unchecked. No features are set up to be annotated with the **XSEC TEXT – CL EL. GROUND** Preference.

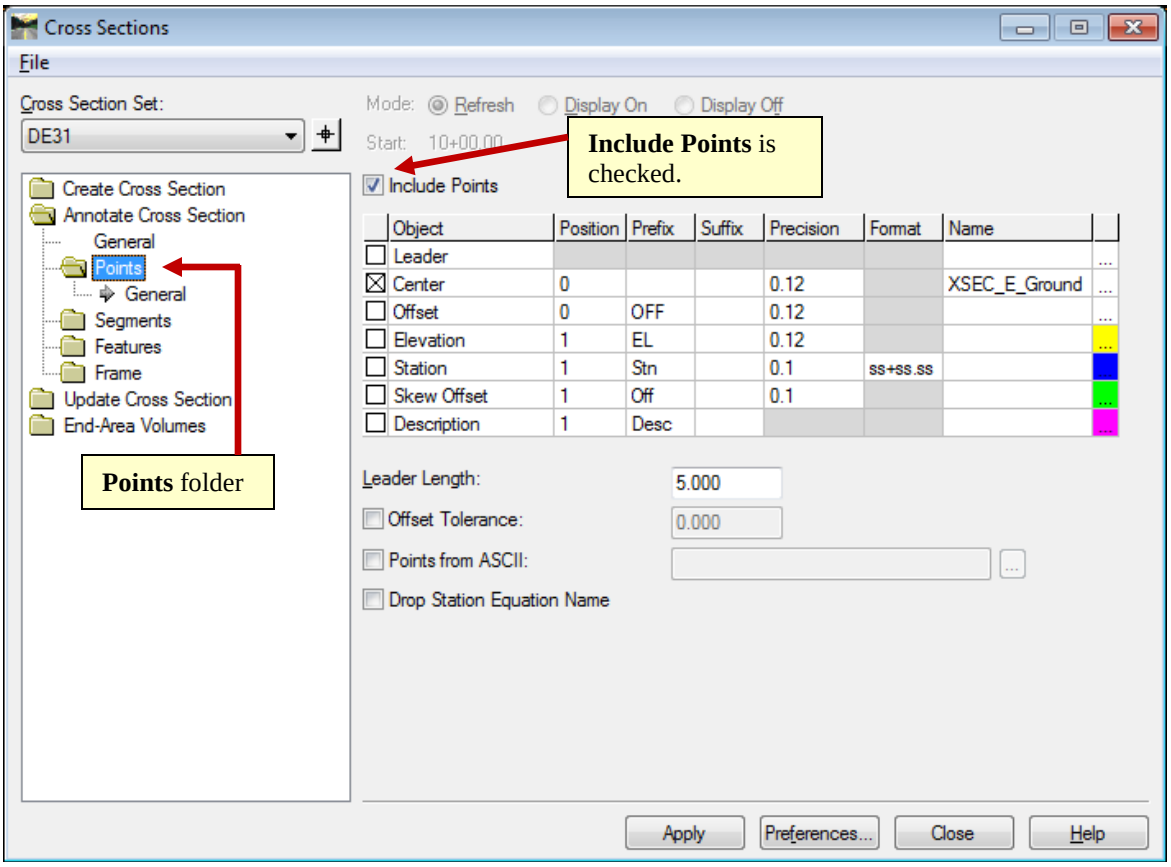


Figure L9-11 Annotate Cross Sections

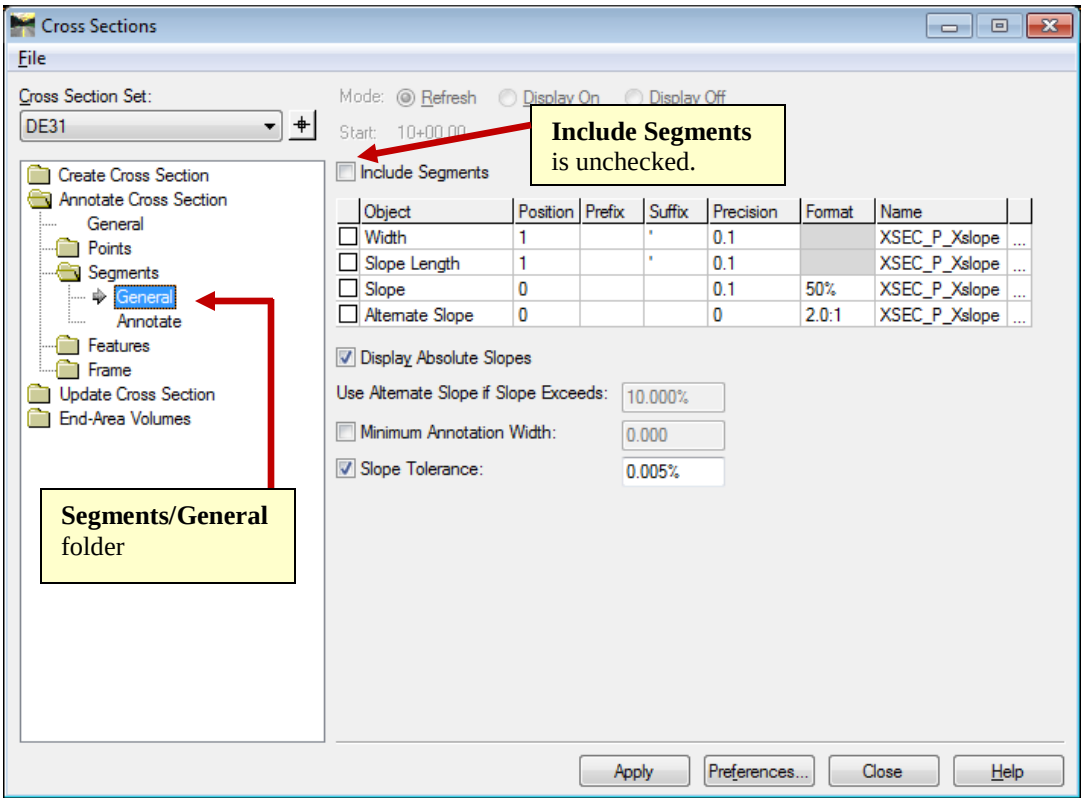


Figure L9-12 Annotate Cross Section

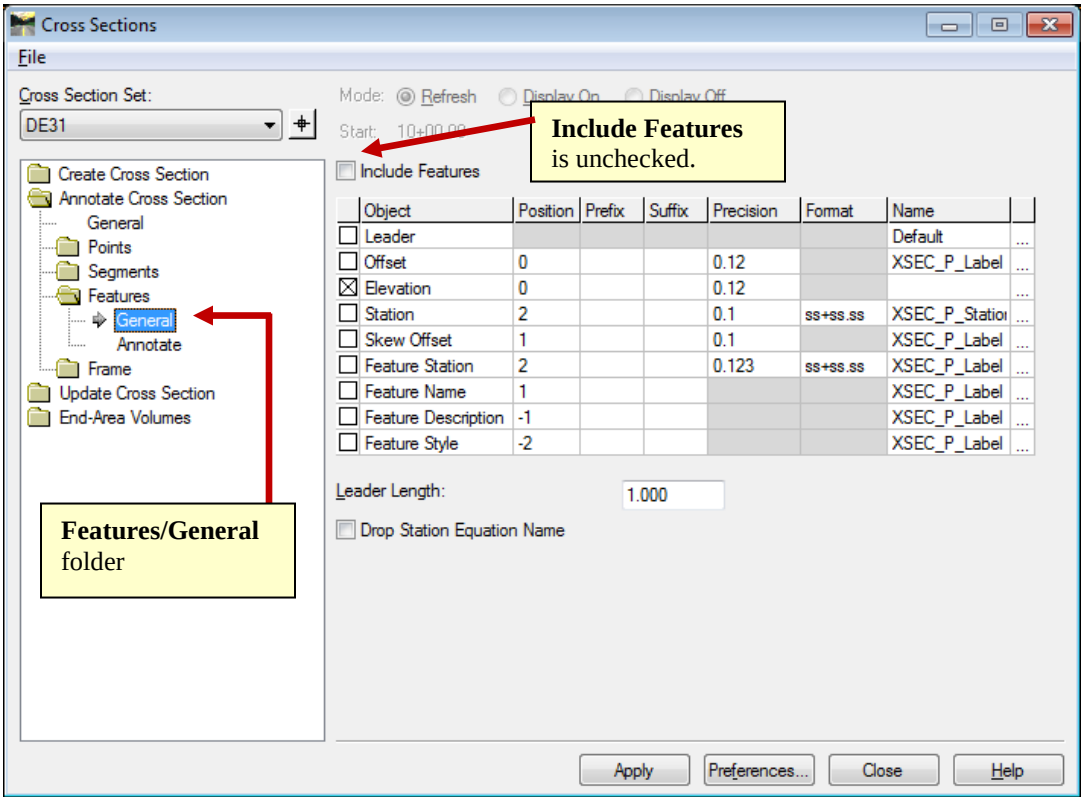


Figure L9-13 Annotate Cross Section

32.	**Even though the Settings have been loaded to Label the Elevation of the Existing Ground at the Centerline - the Surface to be labeled must still be selected. Select the Surface 1234567_Exist and Annotate the Cross Sections.** • In the **Annotate Cross Section** folder, ensure the **General** tab shown in *Figure L9-14* is the active tab. • Place a check in the check box for the Surface **1234567_Exist** as shown in *Figure L9-14*. • Click **Apply** but do **<u>not</u>** close the **<u>Cross Sections</u>** dialog. • Verify in MicroStation the Existing Ground was annotated at the Centerline as shown in *Figure L9-15*. ***<u>NOTE</u>**: *InRoads annotates the Existing Ground **<u>on</u>** the Existing Ground rather than on the pavement surface next to the proposed elevation as has been done in the past.*

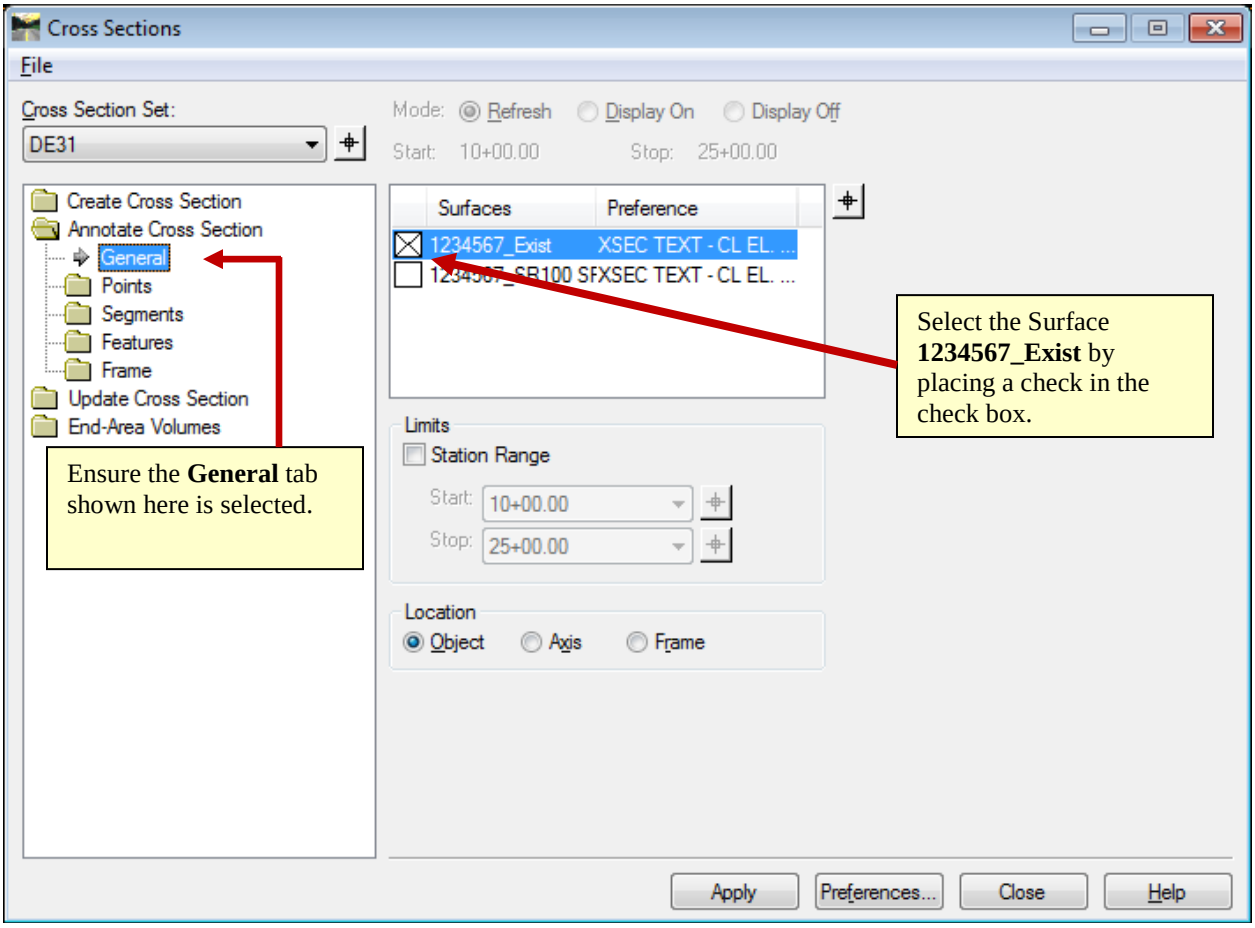


Figure L9-14 Annotate Cross Section

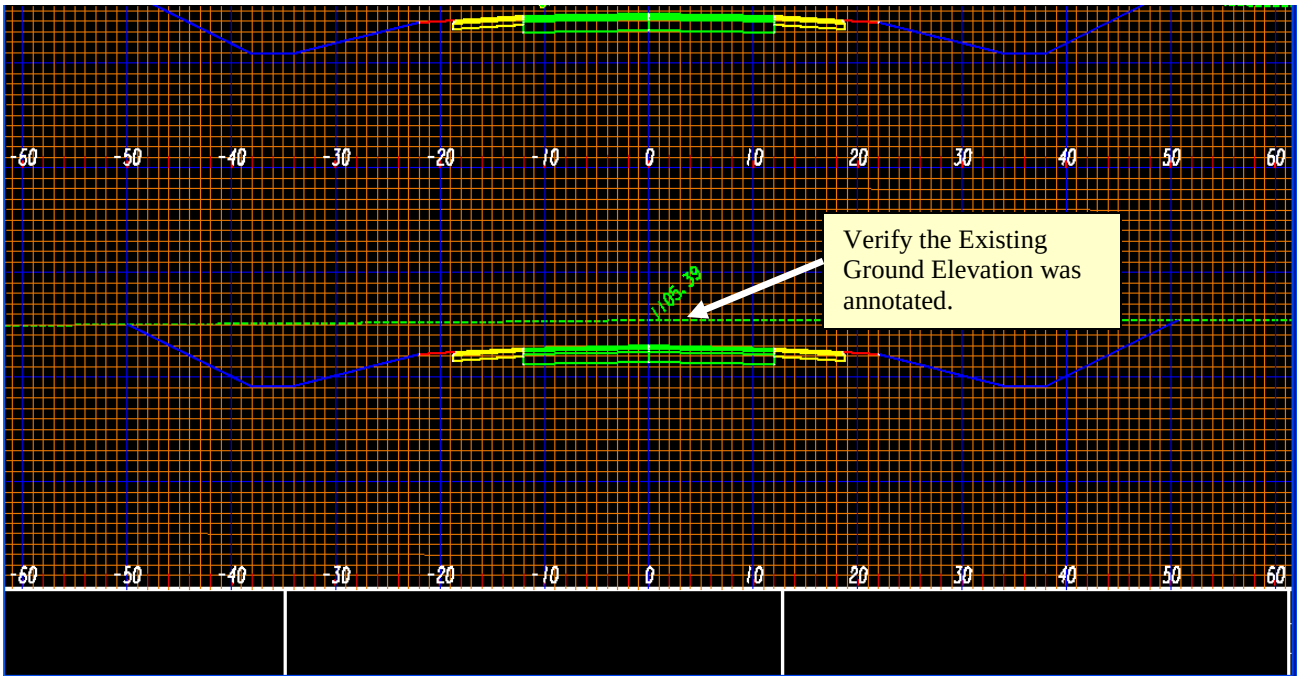
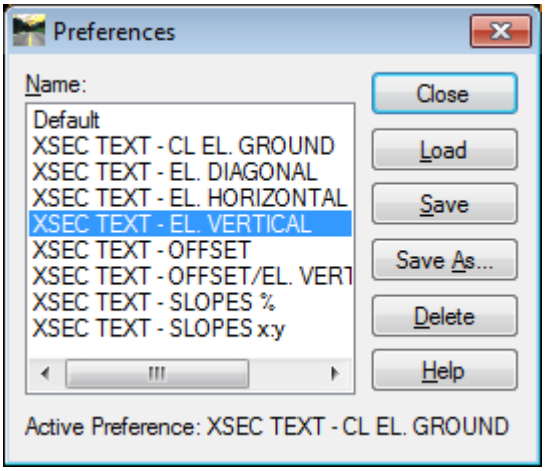


Figure L9-15 MicroStation View Window

33.	**Load the Preference 'XSEC – EL. VERTICAL'. This Preference Loads the Settings to Label the Proposed Profile Grade Elevations.** • Ensure the **Annotate Cross Section** folder is selected, and then click the **Preferences** button. The **Preferences** dialog opens. • Select the preference **XSEC – EL. VERTICAL** as shown here.  • Click **Load** and **Close**.

34.	**Even though the Settings have been loaded to Label the Proposed Profile Grade Elevations, the Surface to be Labeled must still be selected. Select the Surface '1234567__SR100 SPUR_Lab9' and Unselect the Surface '1234567_Exist'.** • In the **Annotate Cross Section** folder, ensure the **General** tab is the active tab. • Place a check in the check box for the Surface **1234567_SR100 SPUR_Lab9** as shown in *Figure L9-16*. • Ensure the Surface **1234567_Exist** does **<u>not</u>** have an **X** in the check box as shown in *Figure L9-16*. • Do **<u>not</u>** click **Apply**. Proceed to **Step 35**.

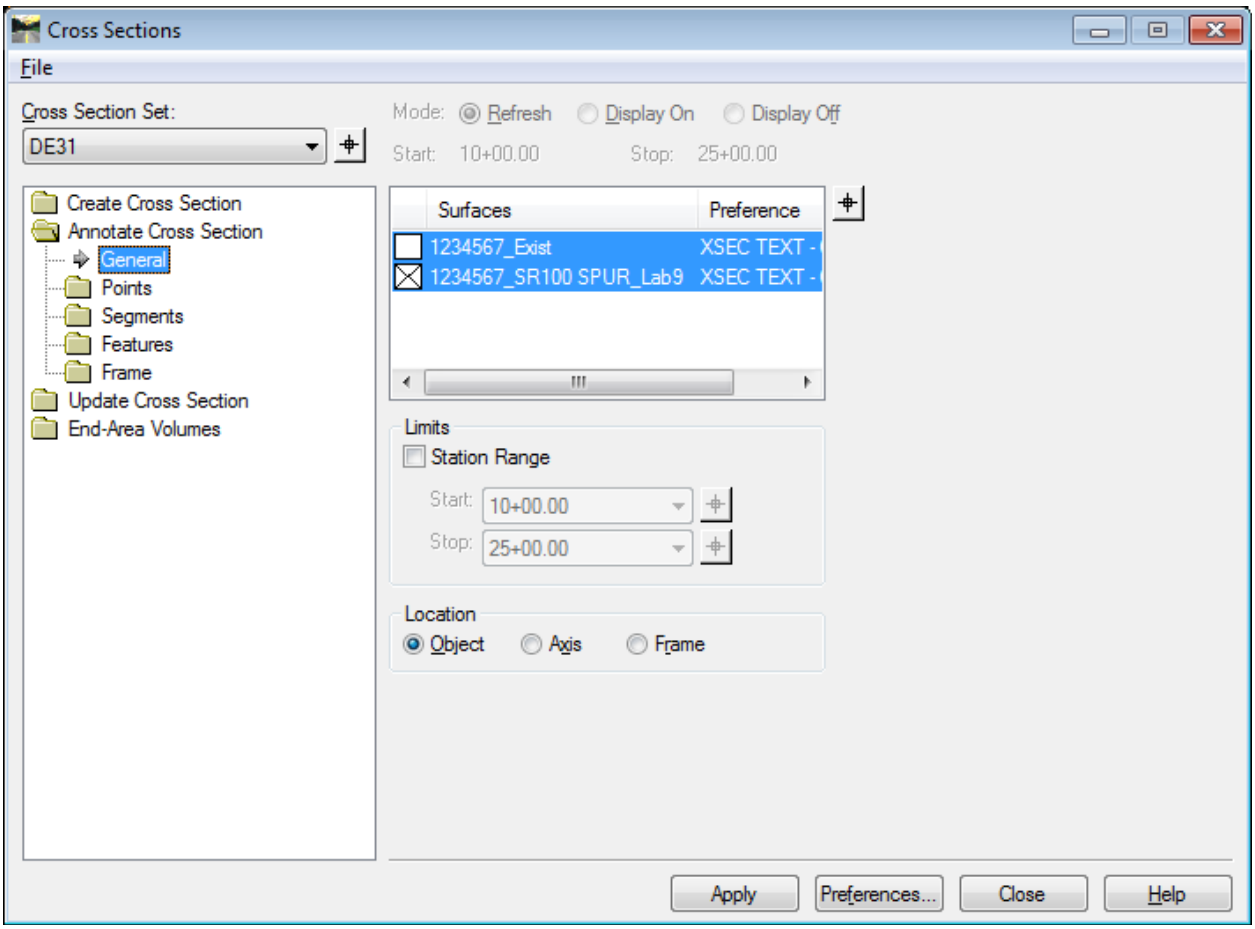


Figure L9-16 Annotate Cross Section

35.	**Review the Settings Loaded by the 'XSEC TEXT – EL. VERTICAL' Preference.** • In the **Annotate Cross Section** folder, make the **Points** folder the active folder. Notice the check box for **Include Points** is unchecked. No Points will be annotated with the **XSEC TEXT – EL. VERTICAL** Preference. • Make the **Segments** folder the active folder with **General** the active tab. Notice the **Include Segments** check box is also unchecked. No segments will be annotated with the **XSEC TEXT – EL. VERTICAL** Preference. • Make the **Features** folder the active folder with **General** the active tab. Notice the **Include Features** check box is checked and **Elevation** is checked. • **Click** the field identified by three dots (...) at the end of the **Elevation** line. The **Text Symbology** dialog opens as shown in *Figure L9-17*. • The proposed Profile Grade Elevation text is defined to view in MicroStation on the Level **XSEC_P_Label-Text** in order for it to view and plot correctly. The remainder of the attributes are also set up to properly view in MicroStation. • Click **Cancel** to exit the **Text Symbology** dialog.

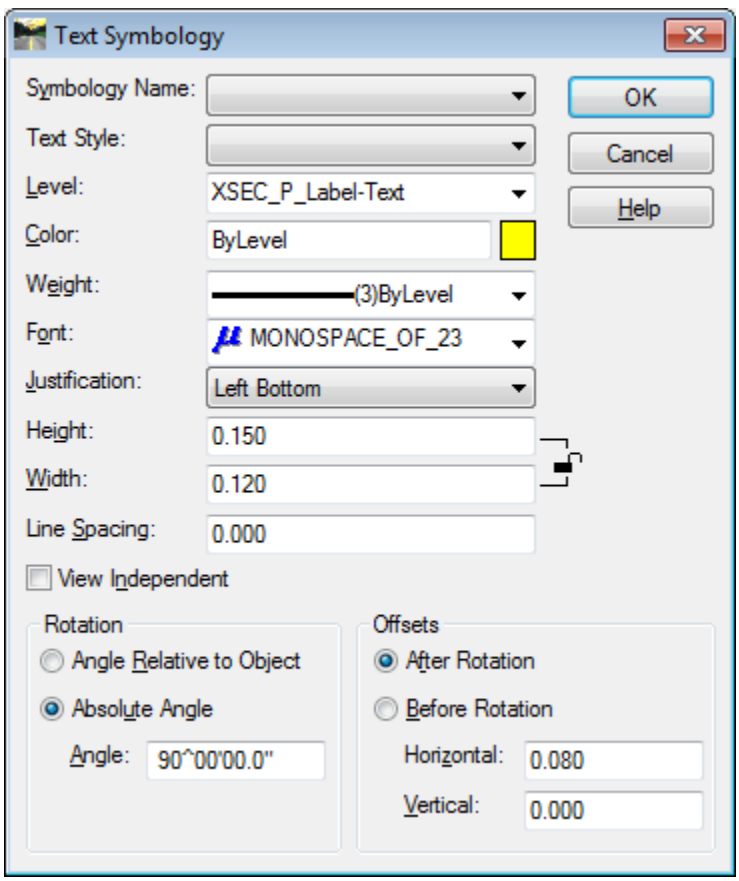


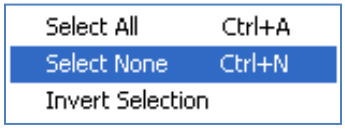
Figure L9-17 Text Symbology

36. **Unselect all the Features in the Feature: Field.**

- In the **Annotate Cross Section** folder, select the **Features-Annotate** folder as shown in *Figure L9-18*.

***<u>NOTE</u>**: When the **Roadway Designer** was used in Lab 8 to create the Surface **1234567_SR100 SPUR**, a Feature was created from each Point in each Template used. Each Feature is named according to the Point name in the Template pre-appended with the Surface Name. Each Feature becomes available for annotating and it is these Features that are listed in the **Feature:** field in *Figure L9-18*.

- Right mouse click in the **Feature:** field shown in *Figure L9-18*. The pop-up box shown at right displays.
- Left click on **Select None**. This unselects all selections as shown in *Figure L9-19*.



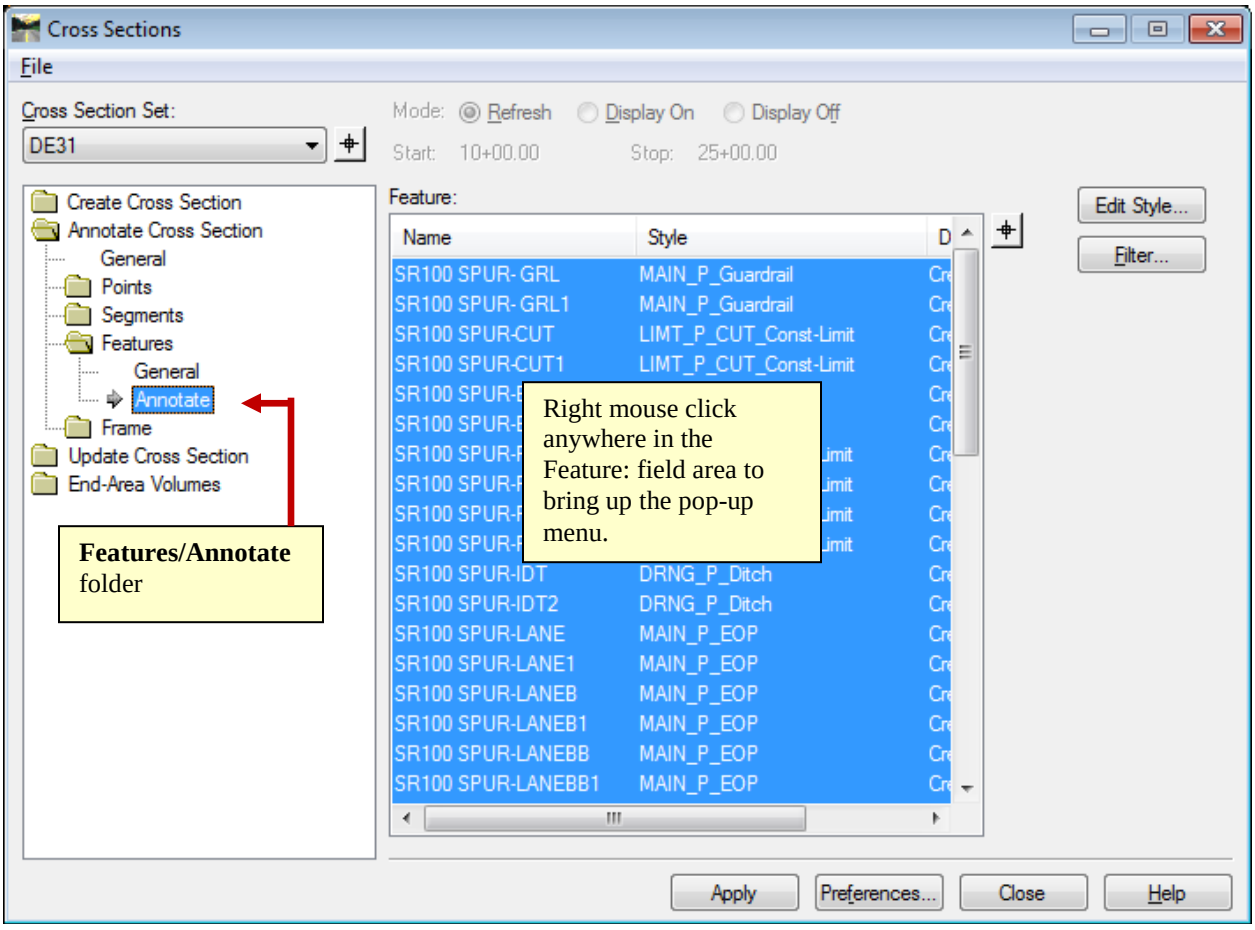


Figure L9-18 Annotate Cross Section

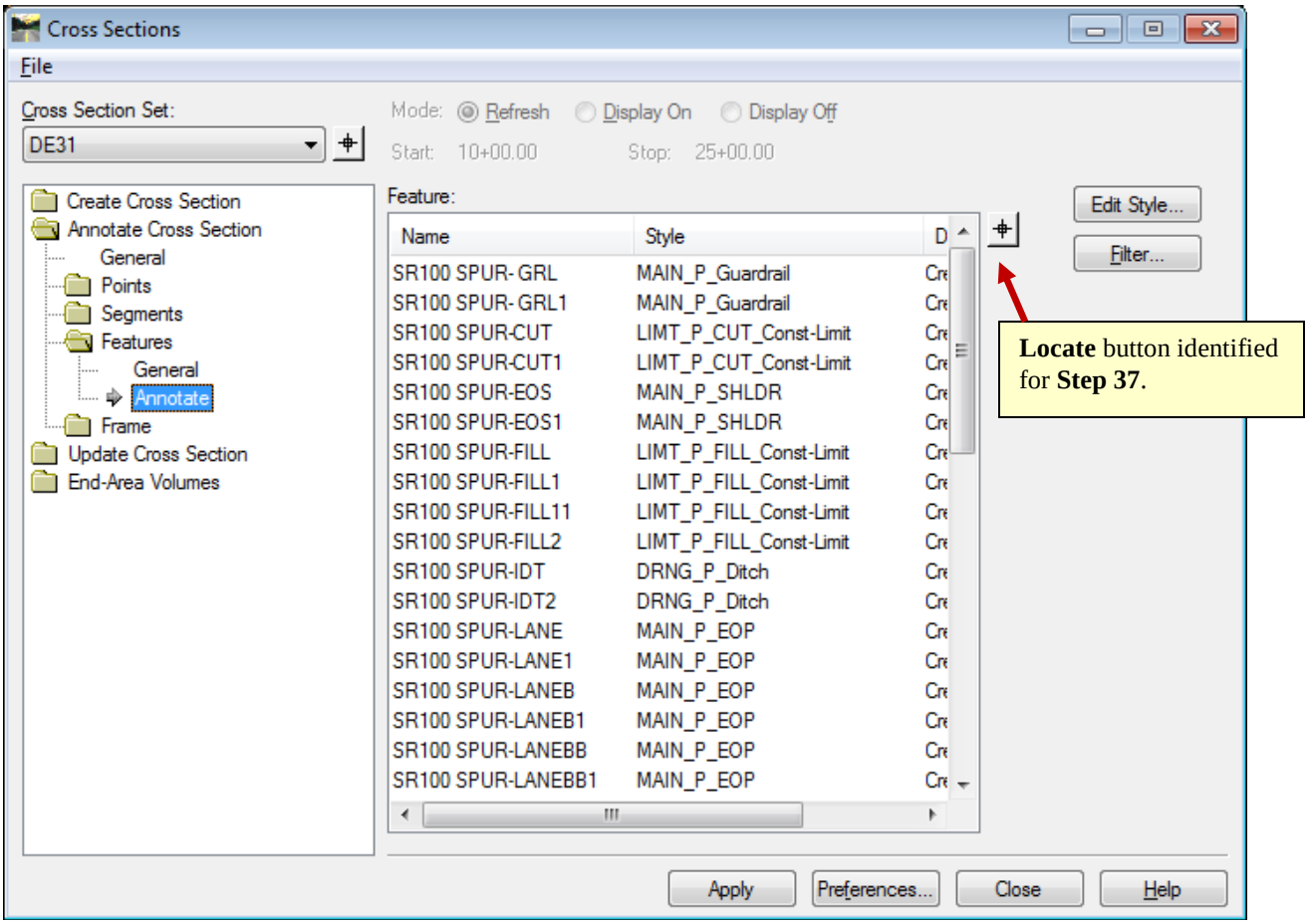


Figure L9-19 Annotate Cross Section

37.	**Select the Feature that will Annotate the Proposed Profile Grade Elevations and Annotate the Elevation.** • In the **Annotate Cross Section** folder, click the **Locate** button identified in **Figure L9-19** above next to the **Feature:** field. The **<u>Cross Sections</u>** dialog disappears and the MicroStation Window becomes active. • Notice in the bottom left corner of the MicroStation Window you are prompted to **>Select Feature**. Left click on the Crown Point identified as **PGL** as shown in *Figure L9-20*. • Notice in the bottom left corner of the MicroStation Window you are prompted to **<Accept/Reject** the Feature. Left click again in the MicroStation Window to accept. You are returned to the **<u>Cross Sections</u>** dialog and the Feature **SR100 SPUR-PGL** is selected as shown in *Figure L9-21*. • Verify the Feature **SR100 SPUR-PGL** is highlight in blue as shown in *Figure L9-21*. • Click **Apply** but do **<u>not</u>** close the **<u>Cross Sections</u>** dialog. • Verify the Proposed Elevation was annotated as shown in *Figure L9-22*.

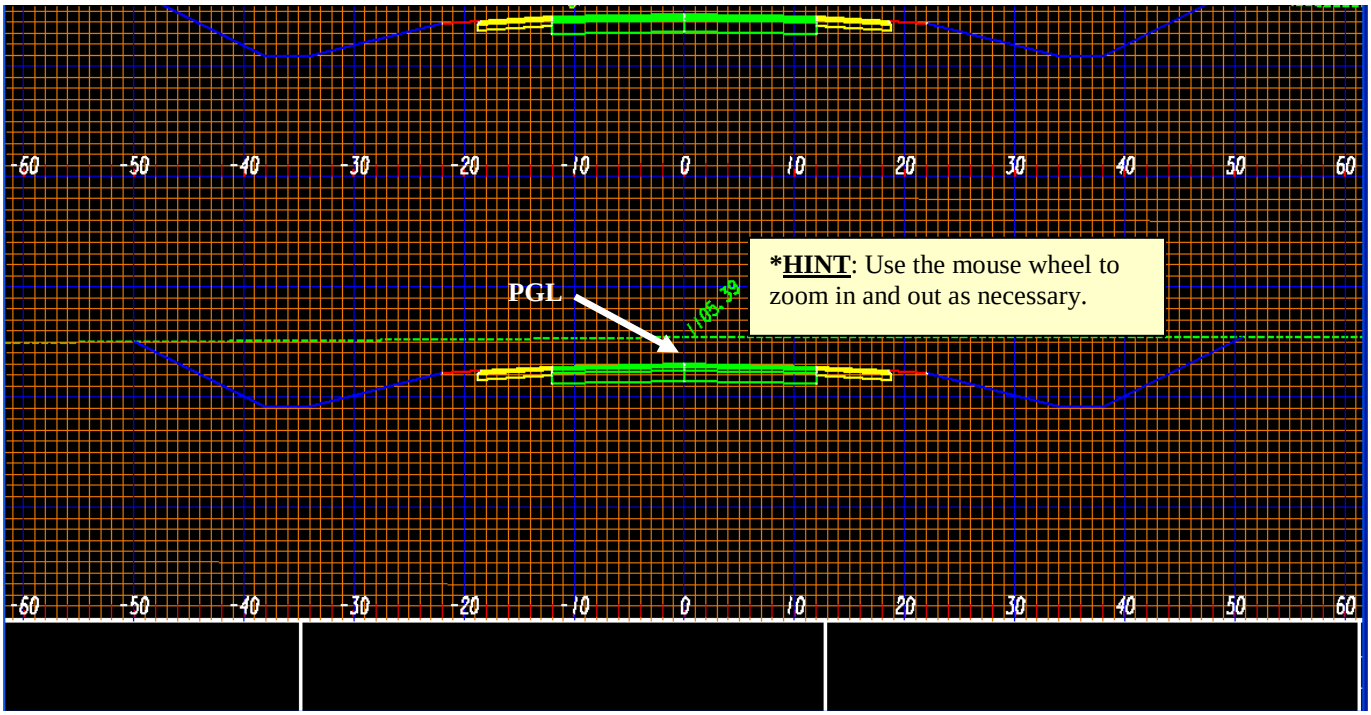


Figure L9-20 MicroStation View Window

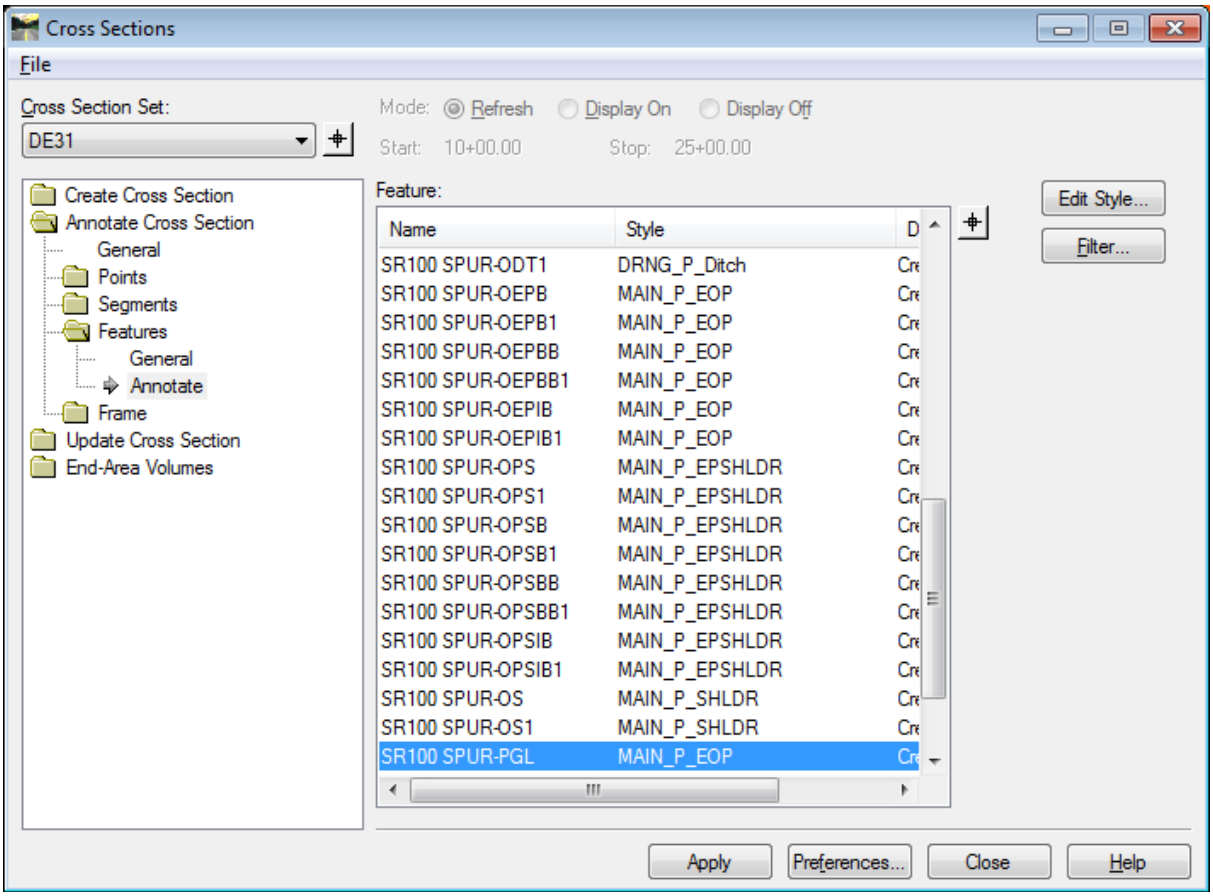


Figure L9-21 Annotate Cross Section

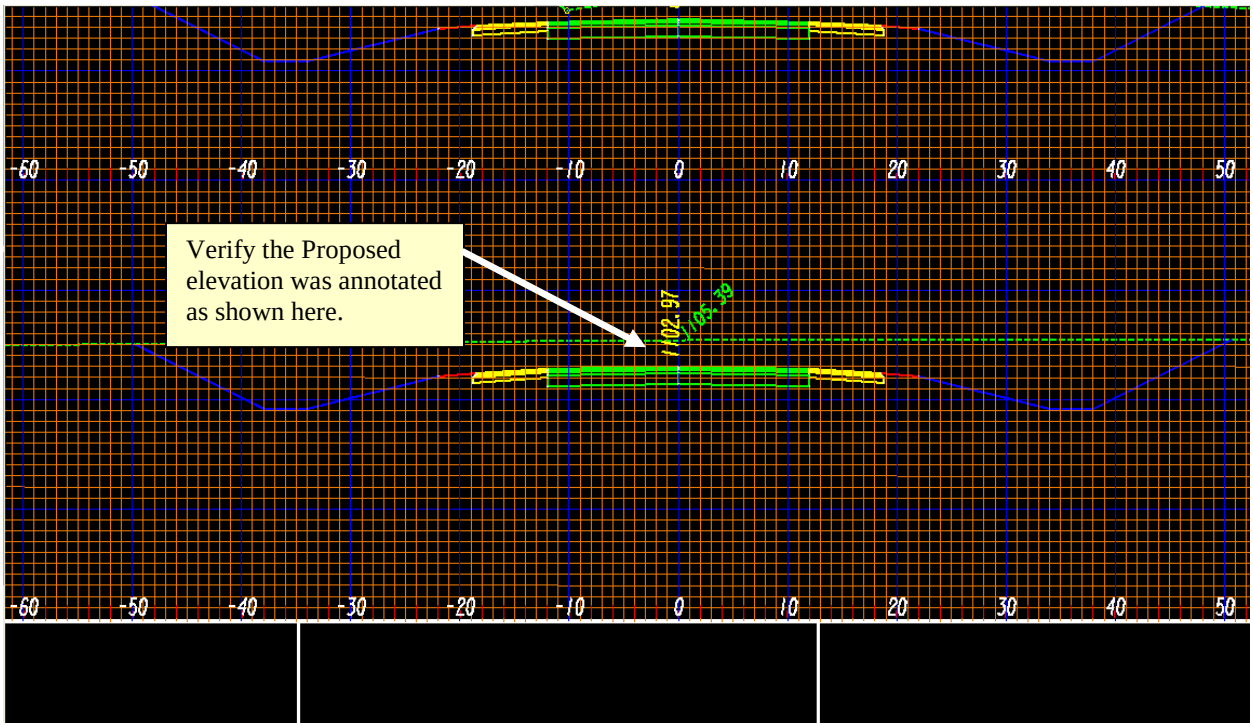
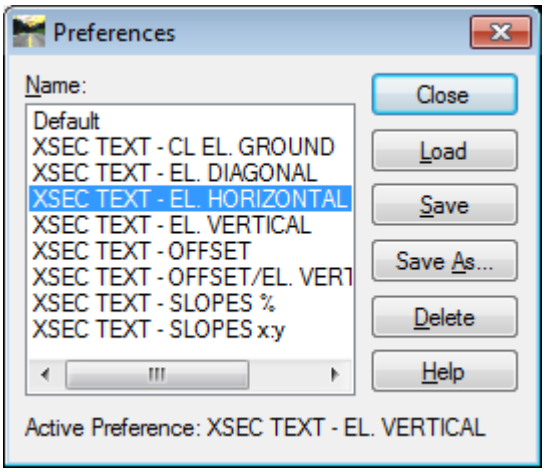


Figure L9-22 MicroStation View Window

38.	**Load the Preference 'XSEC – EL. HORIZONTAL'. This Preference Loads the Settings to Label the Proposed Ditch Elevations.** • In the **Annotate Cross Section** folder, click the **Preferences** button. The **Preferences** dialog opens. • Select the Preference **XSEC – EL. HORIZONTAL** as shown here. 

- Click **Load** and **Close**.
- In the **Annotate Cross Section** folder, make the **Features – General** folder the active folder as shown in *Figure L9-23*.
- Notice the **Include Features** check box is still checked.
- Notice also that the **Elevation** check box is still checked and that the Named Symbology is set to **XSEC_P_Label**.
- In the **Annotate Cross Section** folder, make the **Features – Annotate** folder the active folder as shown in *Figure L9-24*.

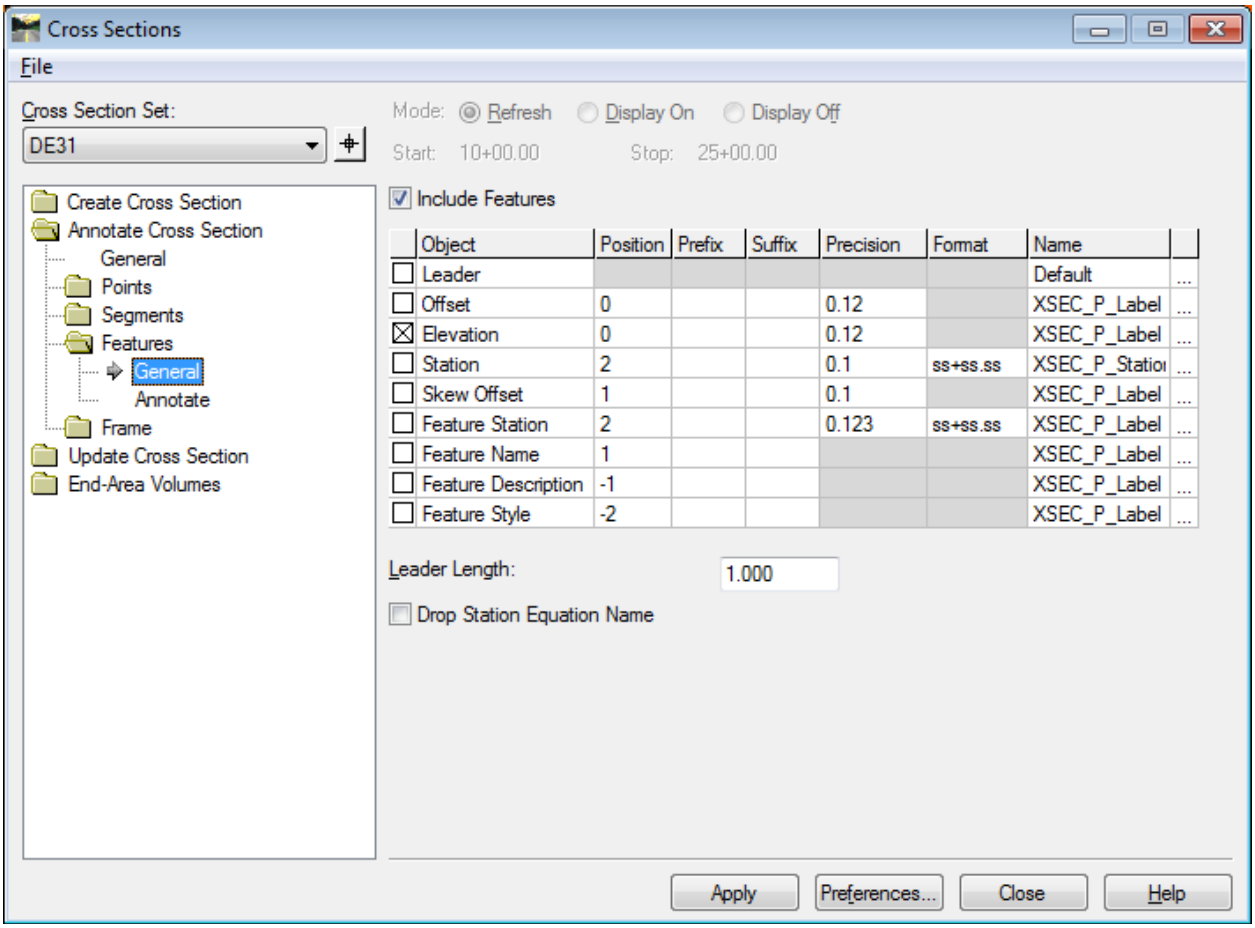


Figure L9-23 Annotate Cross Section

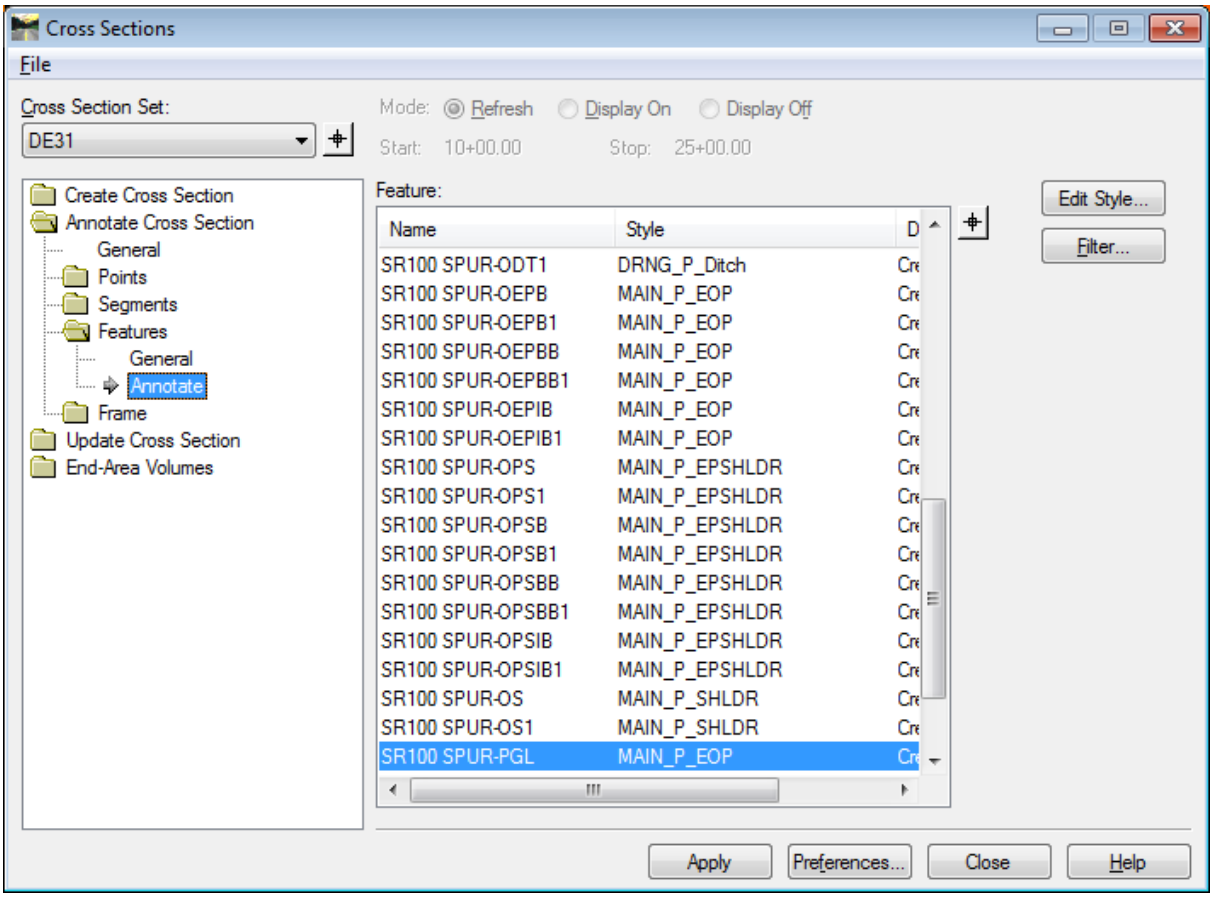


Figure L9-24 Annotate Cross Section

39.	**Select the Feature that will Annotate the Roadway Ditch Elevations.** • Right mouse click in the **Feature:** field. • Left click on **Select None**. This clears the selections in the **Feature:** field. • In the **<u>Cross Sections</u>** dialog, click the **Locate** button. The **<u>Cross Sections</u>** dialog disappears and the MicroStation Window becomes active. • Notice in the bottom left corner of the MicroStation Window you are prompted to **>Select Feature**. Left click on the Point identified as **IDT2** in *Figure L9-25*. • Notice in the bottom left corner of the MicroStation Window you are prompted to **>Accept/Reject** the Feature. Left click in the MicroStation Window to accept. You are returned to the **<u>Cross Sections</u>** dialog and the Feature **SR100 SPUR-IDT2 has** been selected as shown in *Figure L9-26*. • Click the **Locate** button again. • Left click on the Point identified as **ODT** in *Figure L9-25* and accept the Point. • Notice in *Figure L9-27* two Features are now selected: **SR100 SPUR-IDT2**, selected in the previous Locate operation, and **SR100 SPUR-ODT** selected in this operation. • Click **Apply** but do **<u>not</u>** close the **<u>Cross Sections</u>** dialog. • Verify your view in MicroStation matches that shown in *Figure L9-28* and the Ditch Elevations were annotated.

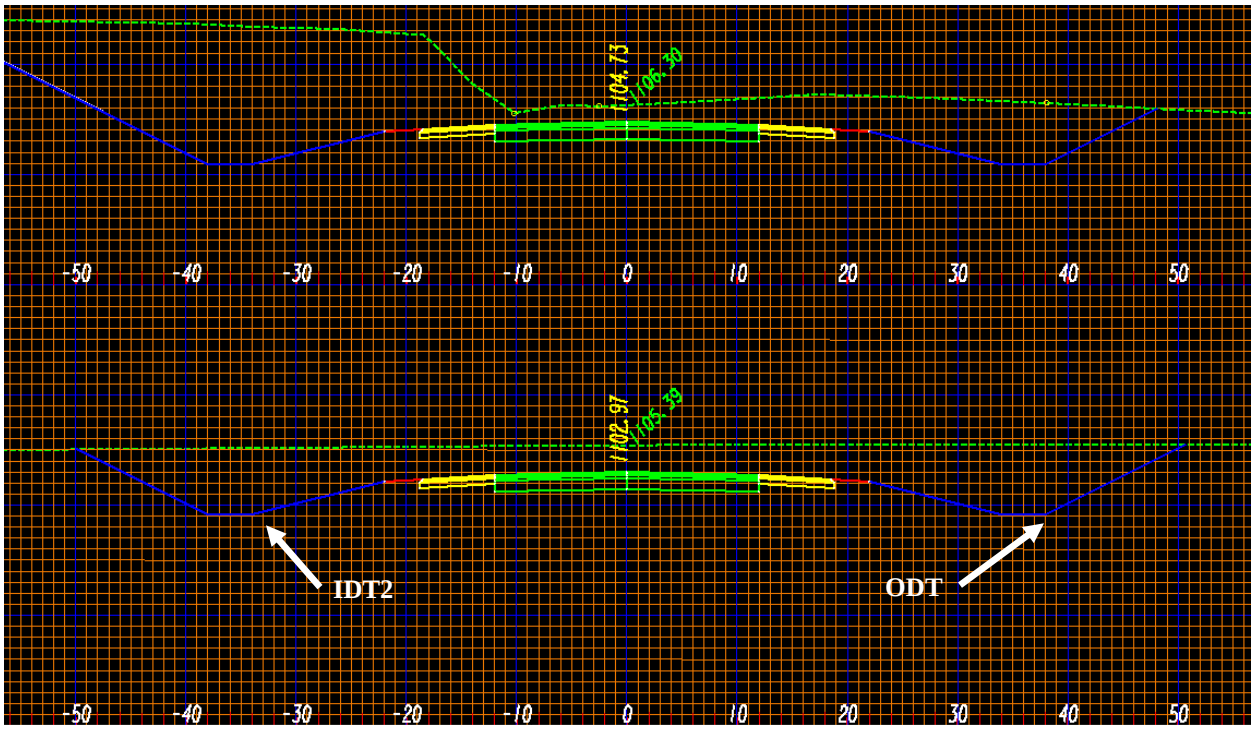


Figure L9-25 Annotate Cross Section

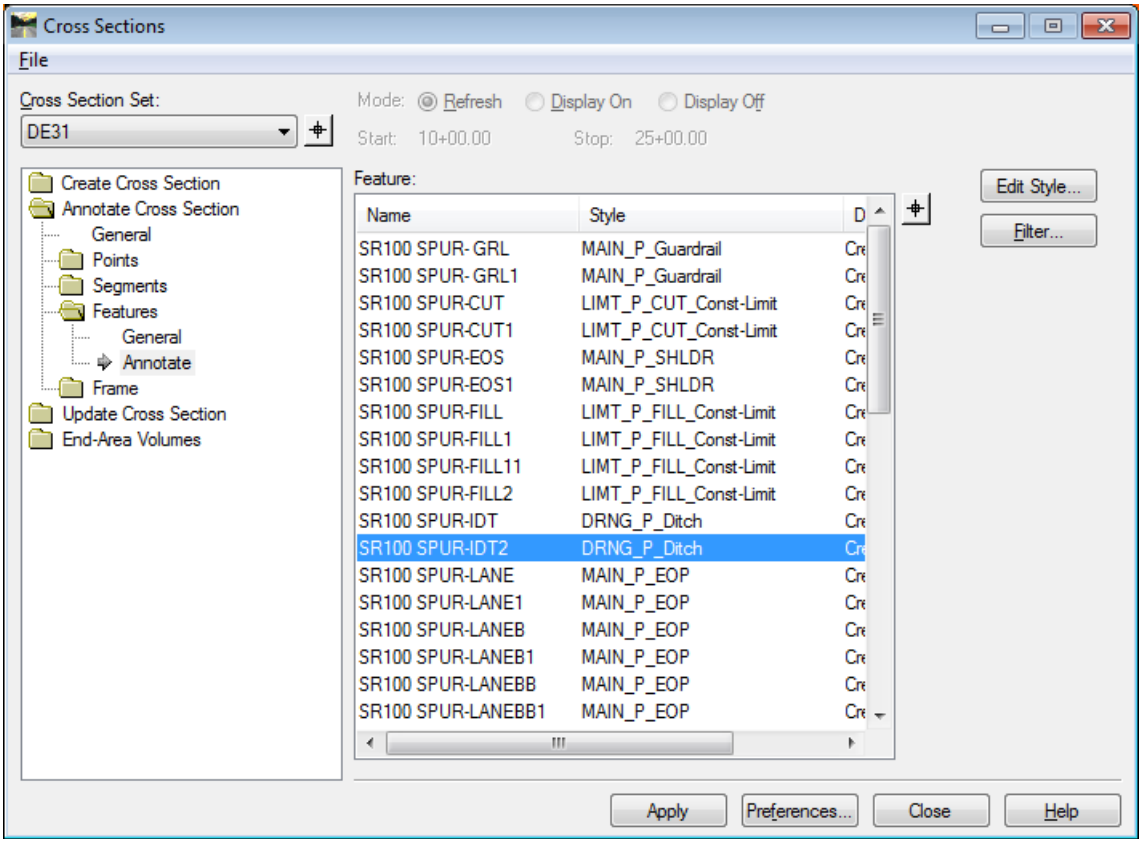


Figure L9-26 Annotate Cross Section

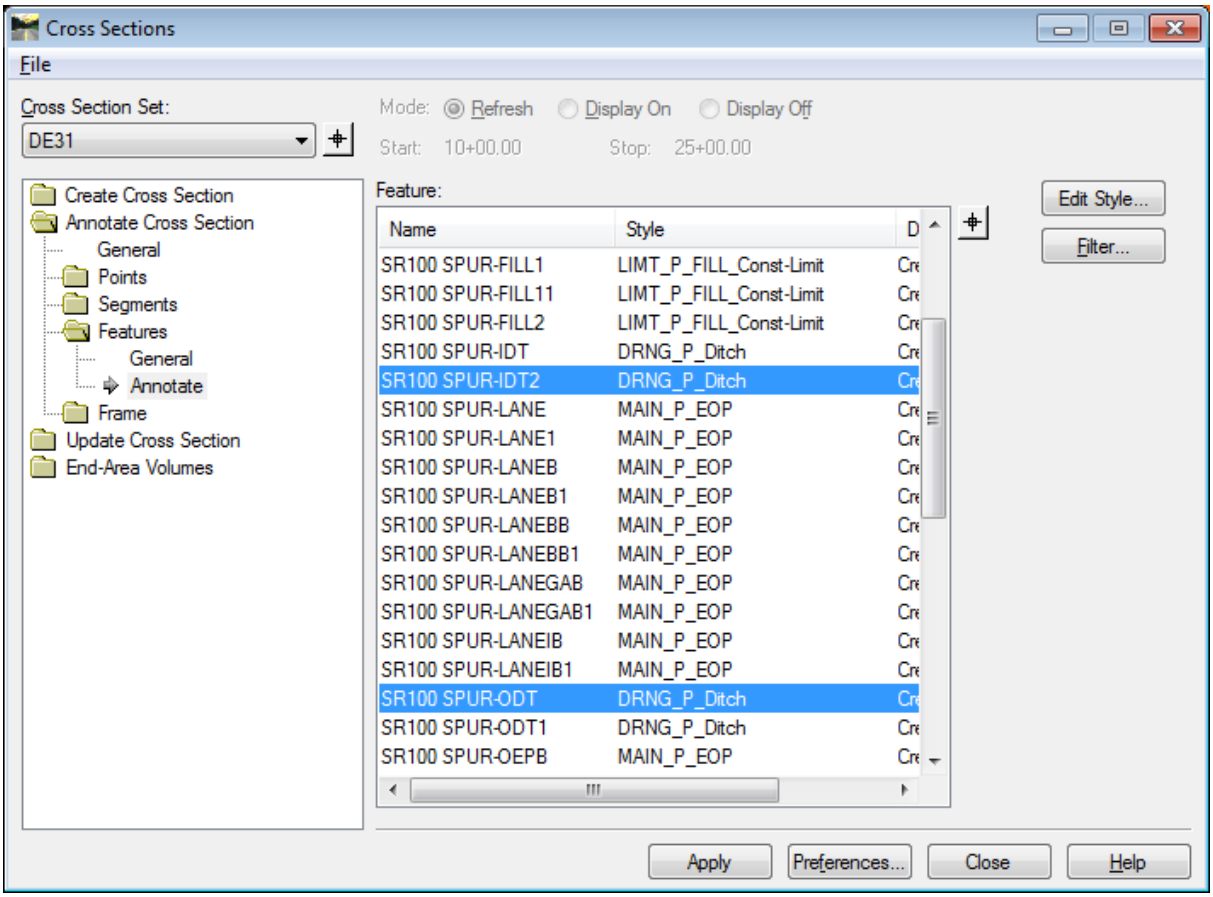


Figure L9-27 Annotate Cross Section

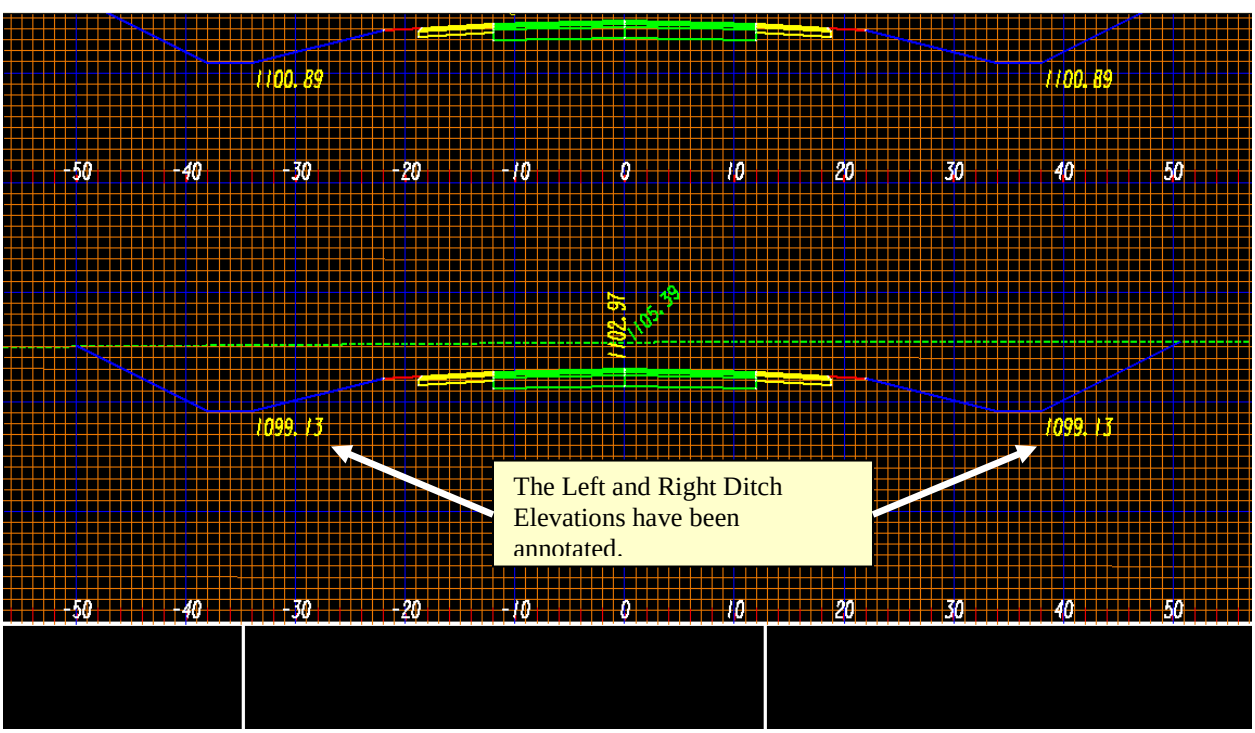


Figure L9-28 MicroStation View Window

40.	**Load the Preference 'XSEC TEXT – OFFSET'.** • In the **Annotate Cross Section** folder, click the **Preferences** button. The **Preferences** dialog opens. • In the **Preferences** dialog, select the Preference **XSEC TEXT – OFFSET.** • Click **Load** and **Close**. The settings are loaded into the **Annotate Cross Section** folder to annotate the slope stake offset distances on the proper level in MicroStation with the correct attributes.
41.	**Unselect All the Features in the Features-Annotate Folder.** • In the **Annotate Cross Section** folder, ensure the **Features** folder and the **Annotate** sub folder are the active folders. • In the **Features:** field, Right mouse click and choose **Select None** from the pop-up menu.
42.	**Select the Slope Stake Features to Annotate.** • Use the **Locate** button to select the Left and Right Slope Stake features identified in *Figure L9-29*.

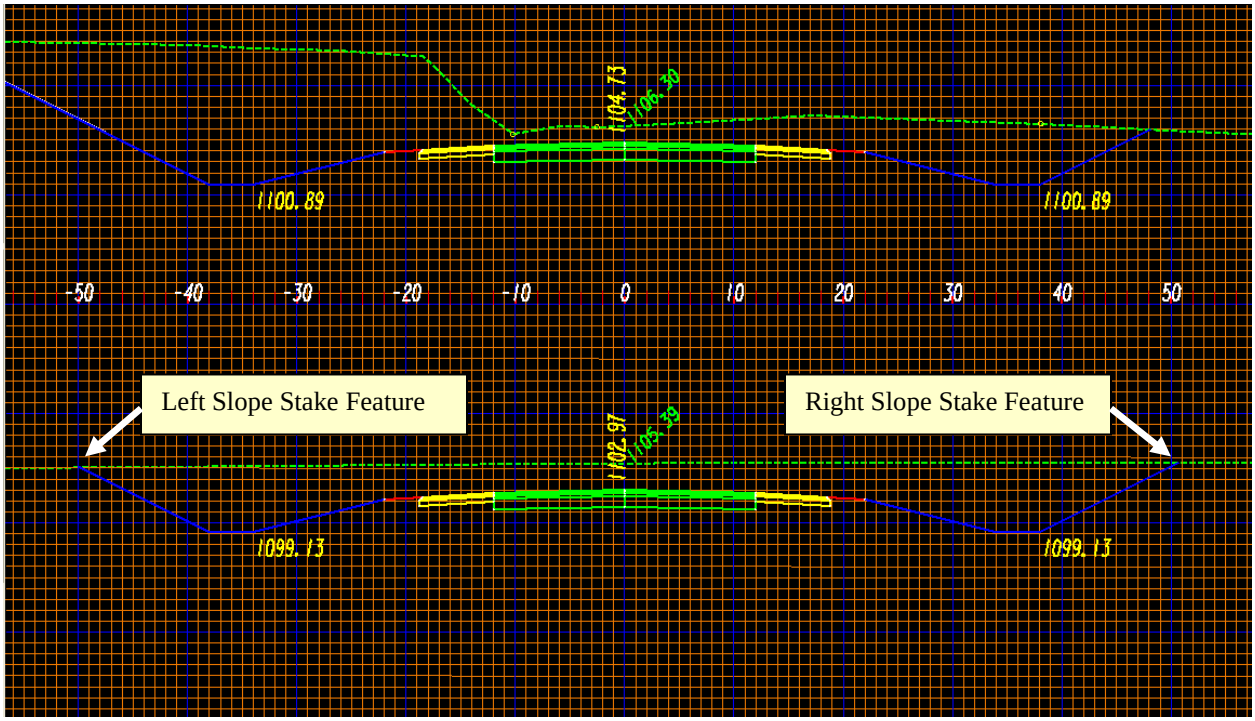


Figure L9-29 MicroStation View Window

43.	**Annotate the Slope Stake Features.** • In the **Annotate Cross Section** folder, ensure your selections match those shown in *Figure L9-30*. • Click **Apply** but do **not** close the **Cross Sections** dialog. • Verify your view in MicroStation matches that shown in *Figure L9-31* and the Slope Stake Offset distances were annotated.

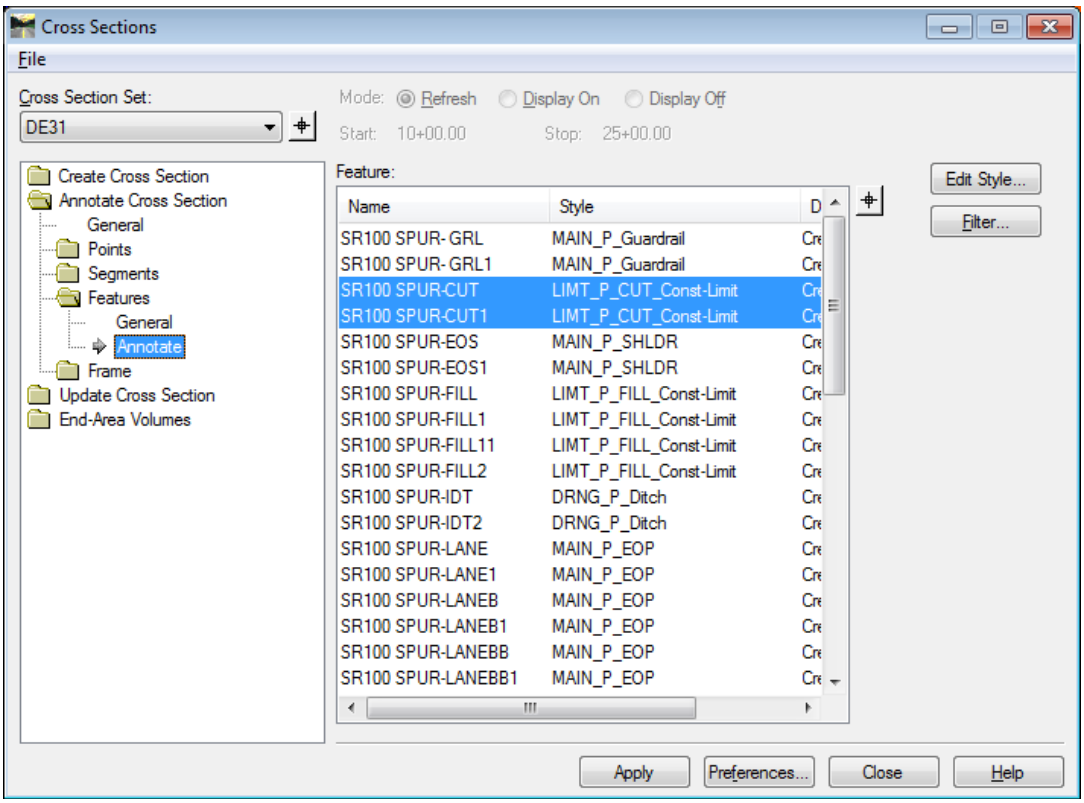


Figure L9-30 Annotate Cross Section

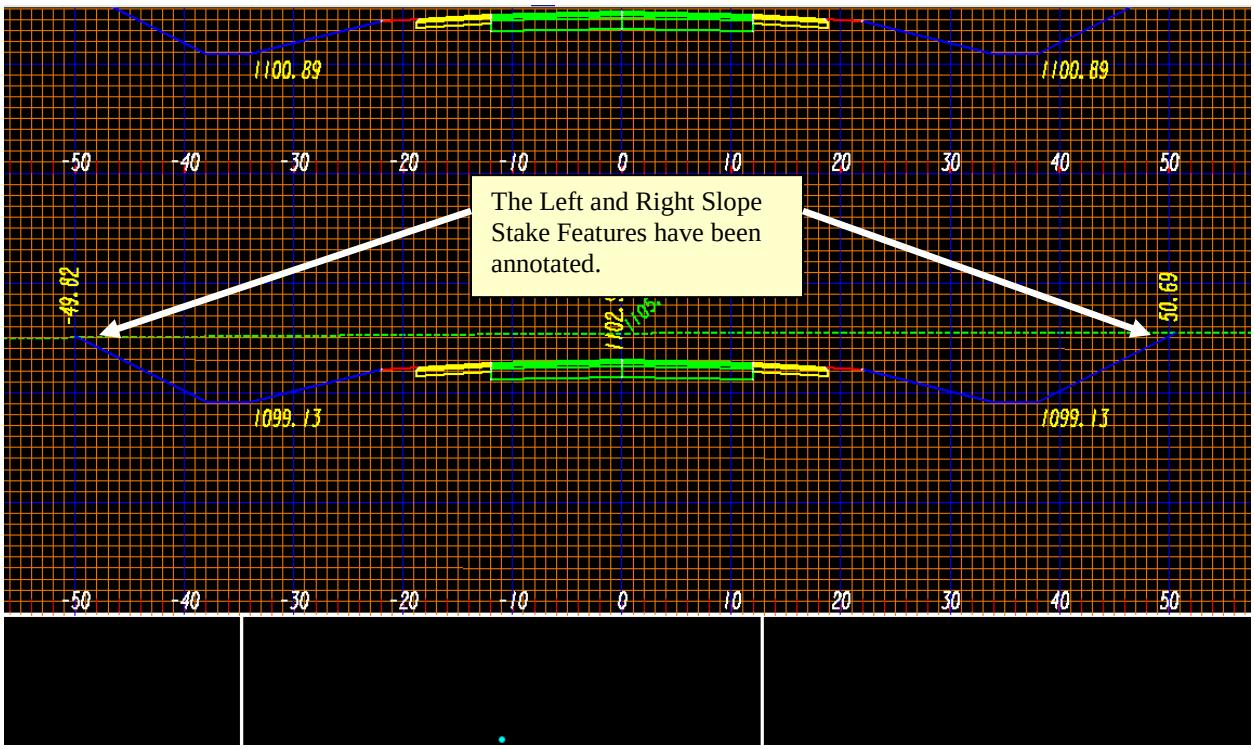


Figure L9-31 MicroStation View Window

44.	**Review Station 17+00.00.** • If not still open, open the **<u>Cross Section Viewer</u>**. Select **Evaluation ► Cross Section ► Cross Section Viewer**. The **<u>Cross Section Viewer</u>** dialog opens. • Set the **Zoom Factor:** to ***0.4000***. • Highlight station **17+00**. • Verify in MicroStation that Station **17+00** was centered in the MicroStation View Window as shown in *Figure L9-32*. • Notice the Slope Stake Offsets are not shown for the Fill Slopes. This is because the Fill Slopes have different Feature Names than the Cut Slopes and must be annotated also.

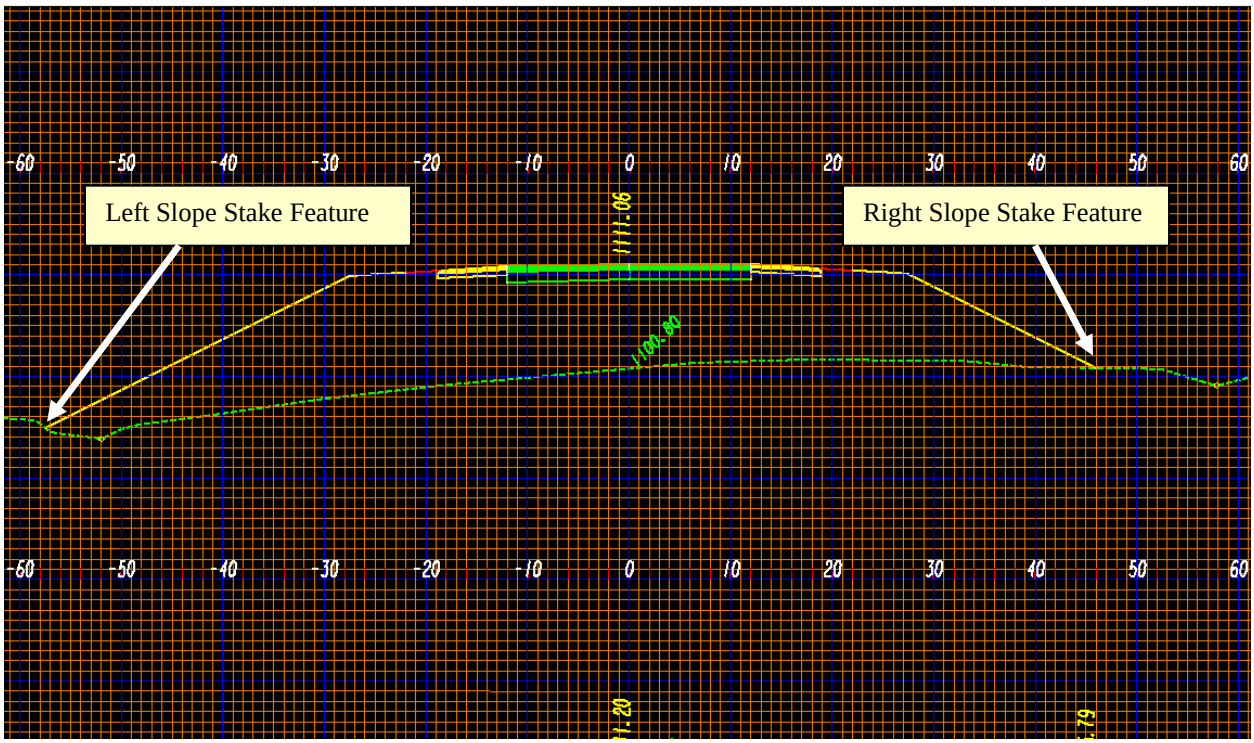


Figure L9-32 MicroStation View Window

45.	**Unselect All the Features in the Features-Annotate Folder.** • In the **Annotate Cross Section** folder, ensure the **Features** folder and the **Annotate** sub folder are the active folders. • In the **Features:** field, right mouse click and choose **Select None** from the pop-up menu.
46.	**Select the Fill Slope Stake Features to Annotate.** • Use the **Locate** button to select the Left and Right Fill Slope Stake Features identified in *Figure L9-32*.
47.	**Annotate the Fill Slope Stake Features.** • In the **Annotate Cross Section** folder, ensure your selections match those shown in *Figure L9-33*. • Click **Apply** but do **<u>not</u>** close the **<u>Cross Sections</u>** dialog. • Verify your view in MicroStation matches that shown in *Figure L9-34* and the Slope Stake Offset distances for the Fill Slopes were annotated.

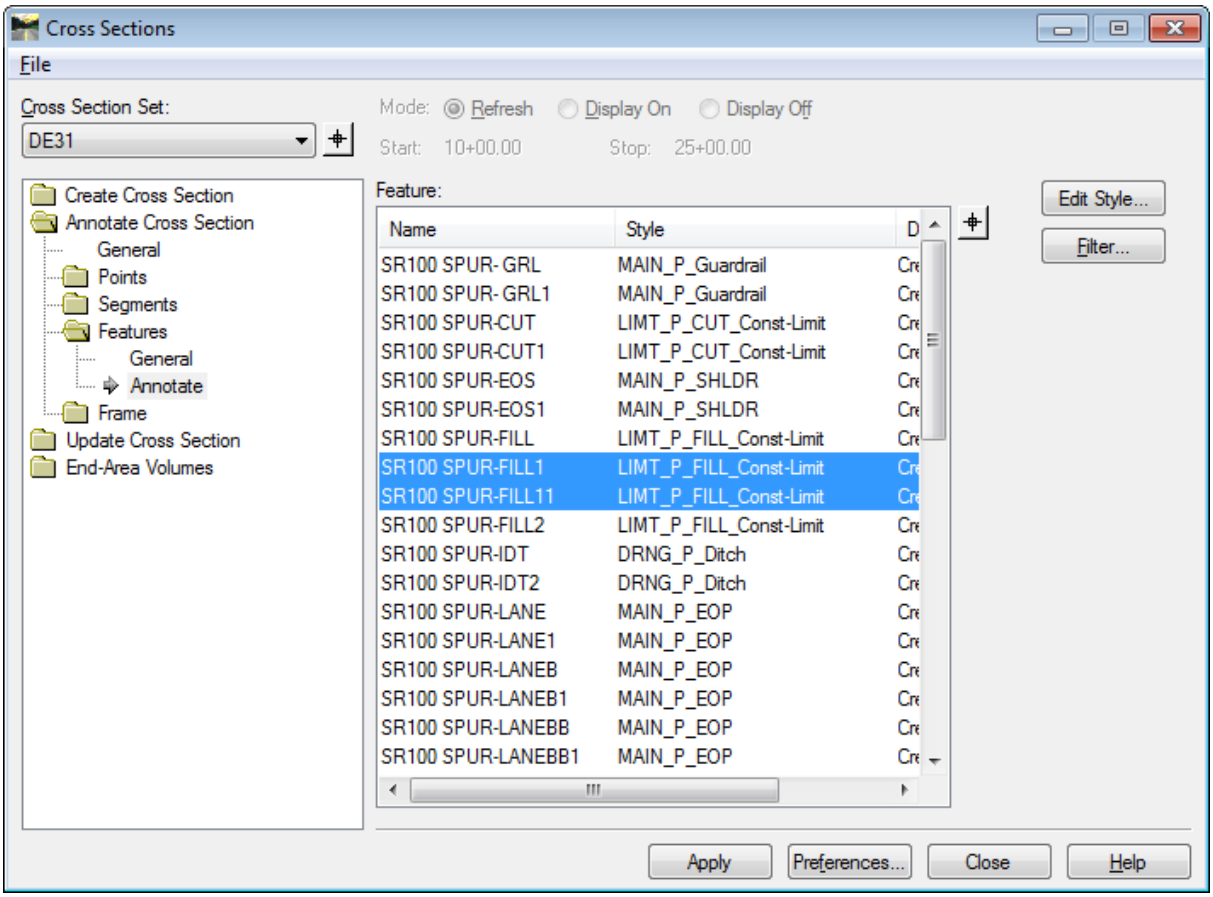


Figure L9-33 Annotate Cross Section

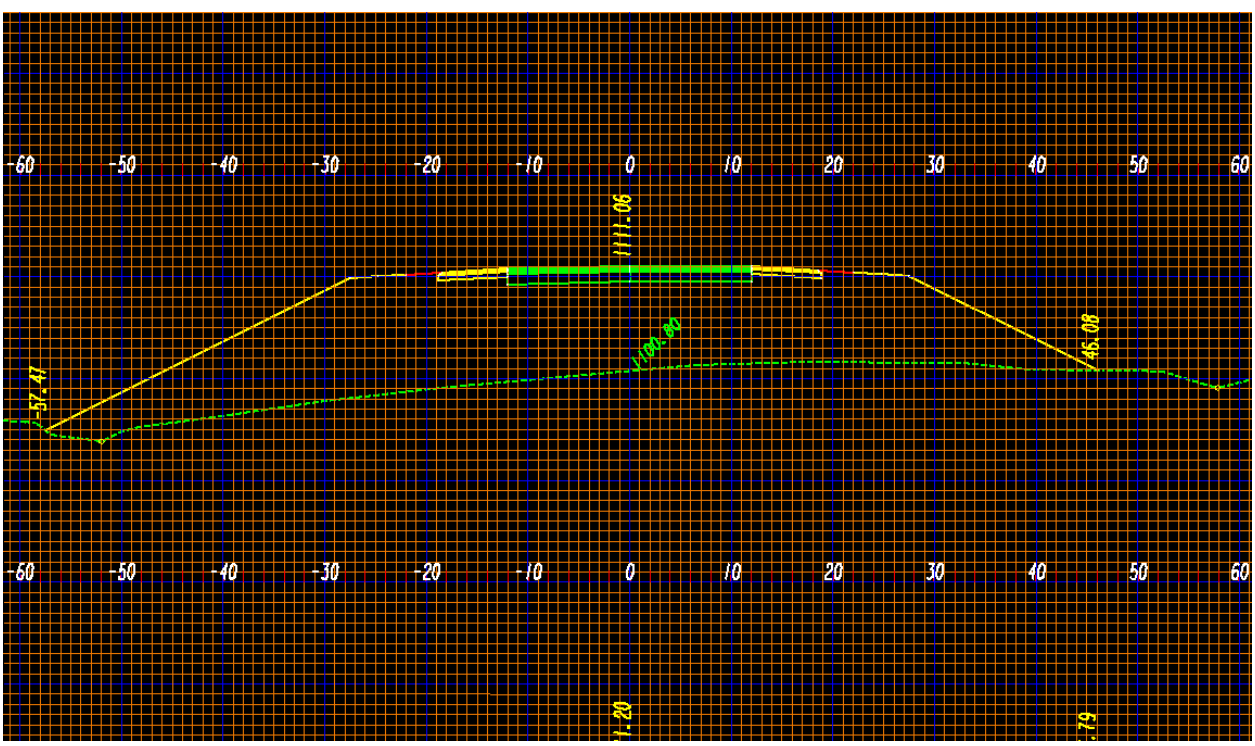


Figure L9-34 MicroStation View Window

48.	**Unselect All the Features in the Features-Annotate Folder.** • In the **Annotate Cross Section** folder, ensure the **Features** folder and the **Annotate** sub folder are the active folders. • In the **Features:** field, Right mouse click and choose **Select None** from the pop-up menu.
49.	**Load the Preference 'XSEC TEXT- SLOPES %'. This Preference is setup for annotating the Slopes in percentage format for the Travel Lane and Shoulder Cross Slopes.** • In the **Annotate Cross Section** folder, click the **Preferences** button. The **Preferences** dialog opens. • Select the Preference **XSEC TEXT – SLOPES %**. • Click **Load** and **Close**.
50.	**The 'XSEC TEXT – SLOPES %' Preference enables the Segments for Labeling and Disables the Features and Points. Make the Segments folder the active folder.** • In the **Annotate Cross Section** folder, left click on the **Segments** folder. • In the **Annotate Cross Section** folder, left click on the **General** tab beneath the S**egments** folder. • Verify your view matches that shown in *Figure L9-35*. • Notice the **Include Segments** check box is checked and the **Slope** check box now contains an **X**.

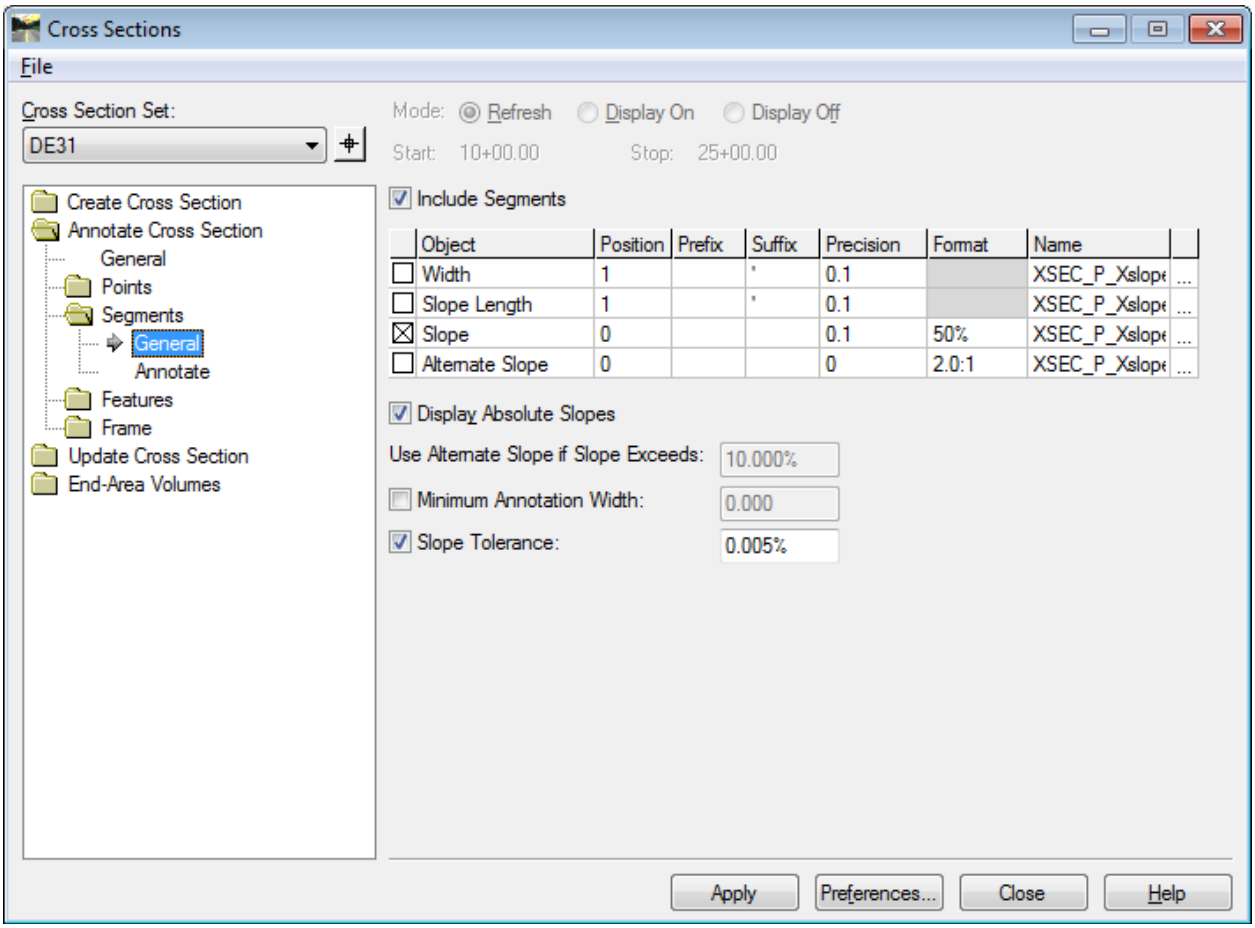


Figure L9-35 Annotate Cross Section

51.	**Make the Segments / Annotate Folder the Active Folder.** • Left click on **Annotate** under the **Segments** folder. • Right mouse click in the **Crossing** field and choose **Select None** from the pop-up menu. • Verify your view matches that shown in *Figure L9-36*.

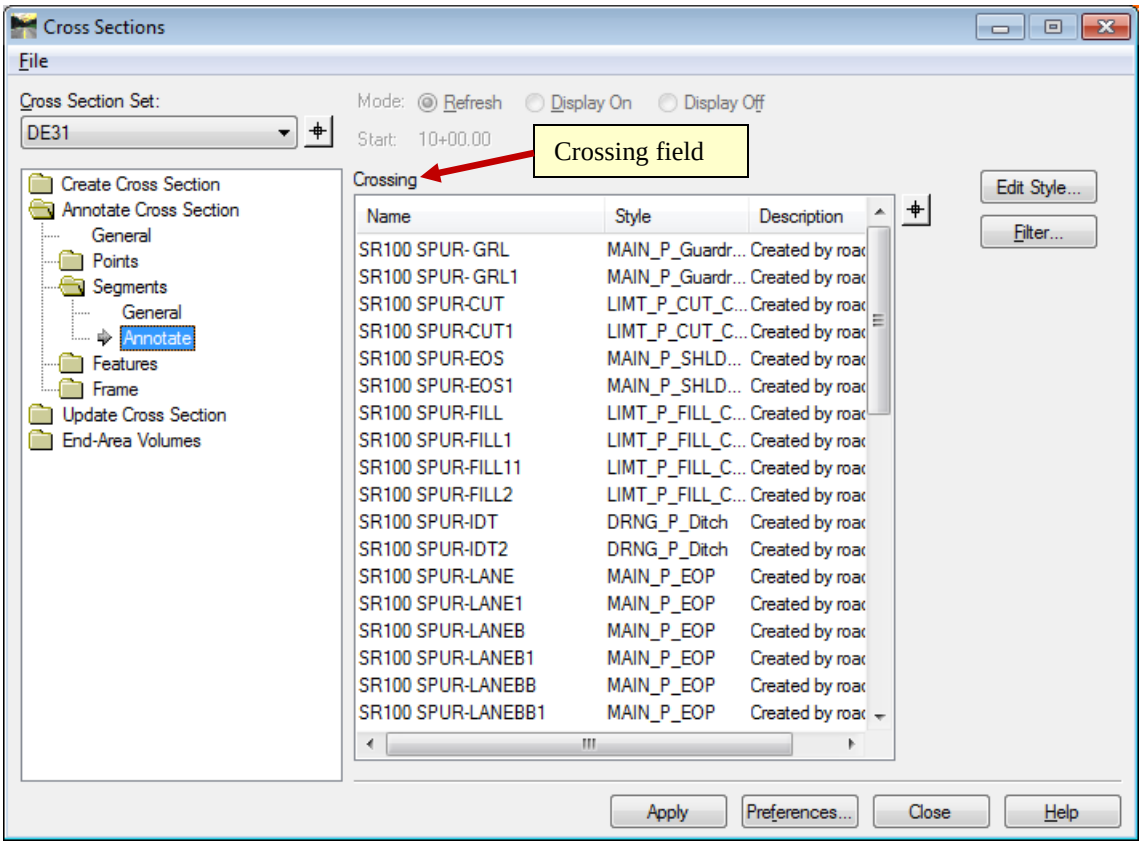
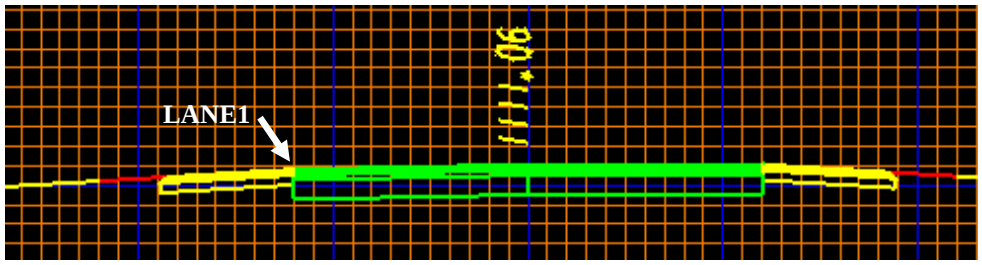
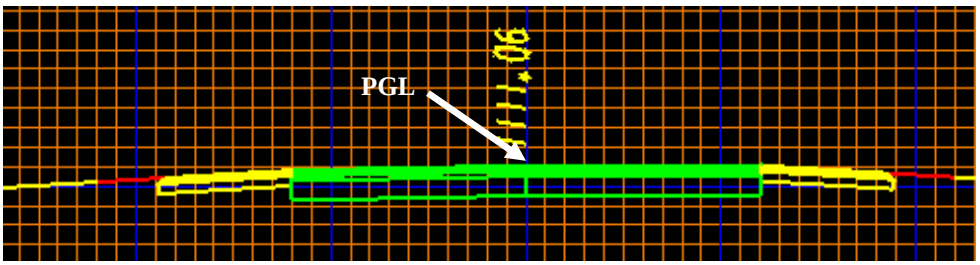


Figure L9-36 Annotate Cross Section

52.	**Segments are Annotated by Selecting Features from the Crossing Field that Define the Beginning of the Segment and the End of the Segment you want to Annotate. Identify the Beginning of the Segment on the Left Side of the Roadway.** • In the **Annotate Cross Section** folder, click the **Locate** button. You are prompted in the bottom left of the MicroStation Window to **>Select Feature**. • Identify the beginning of the Segment by Left clicking on the Feature identified as **LANE1** located between the shoulder pavement and the roadway pavement as shown here.  • Left click a second time to accept. You are returned to the **<u>Cross Sections</u>** dialog and the Feature **SR100 SPUR-LANE1** has been selected.

53. **Identify the Ending of the Segment on the Left Side of the Roadway and the Beginning of the Segment on the Right side of the Roadway.**

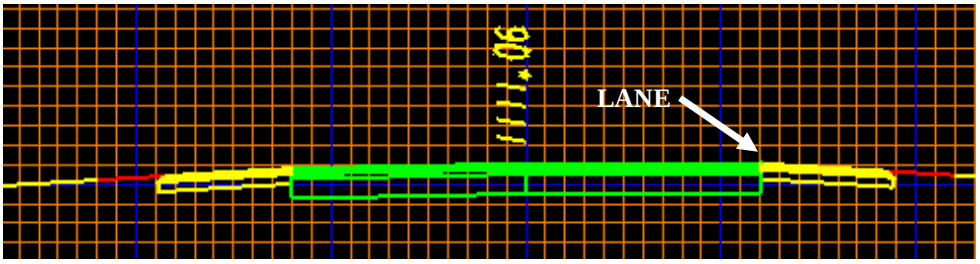
- In the **Annotate Cross Section** folder, click the **Locate** button again. You are prompted in the bottom left of the MicroStation Window to **>Select Feature**.
- Identify the end of the first Segment (which is also the beginning of the second Segment) by Left clicking on the Feature identified as **PGL** located at the center of the roadway as shown here.



- Left click a second time to accept. You are returned to the **Cross Sections** dialog and the Feature **SR100 SPUR-PGL** has also been selected.
- Scroll through the **Crossing** field and ensure that both Features are selected.

54. **Identify the Ending of the Segment on the Right Side of the Roadway.**

- In the **Annotate Cross Section** folder, click the **Locate** button again. You are prompted in the bottom left of the MicroStation Window to **>Select Feature**.
- Identify the end of the second Segment by Left clicking on the Feature identified as **LANE** located between the shoulder pavement and the roadway pavement as shown here.



- Left click a second time to accept. You are returned to the **Cross Sections** dialog and the Feature **SR100 SPUR-LANE** has also been selected.
- Scroll through the **Crossing** field list to see that all three Features are selected as shown in *Figure L9-37*.
- Click **Apply** but do **not** close the **Cross Sections** dialog.
- Verify the roadway slopes were annotated as shown in *Figure L9-38*.

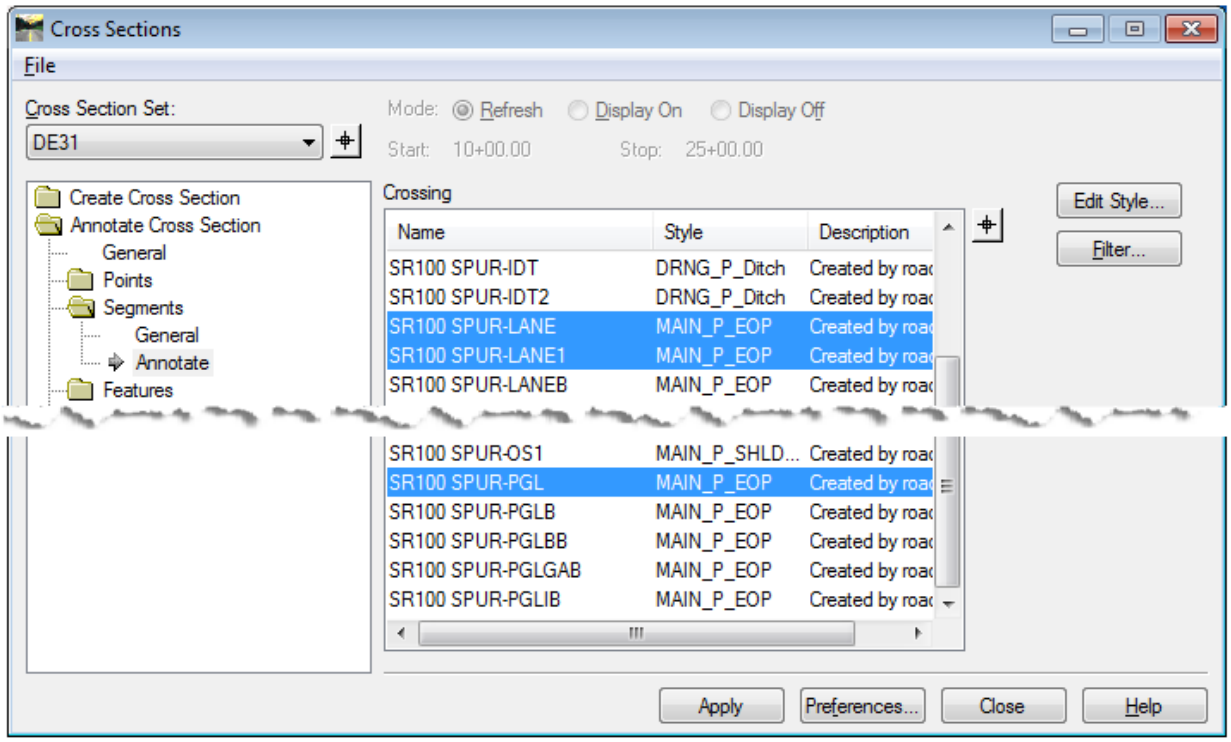


Figure L9-37 Annotate Cross Section

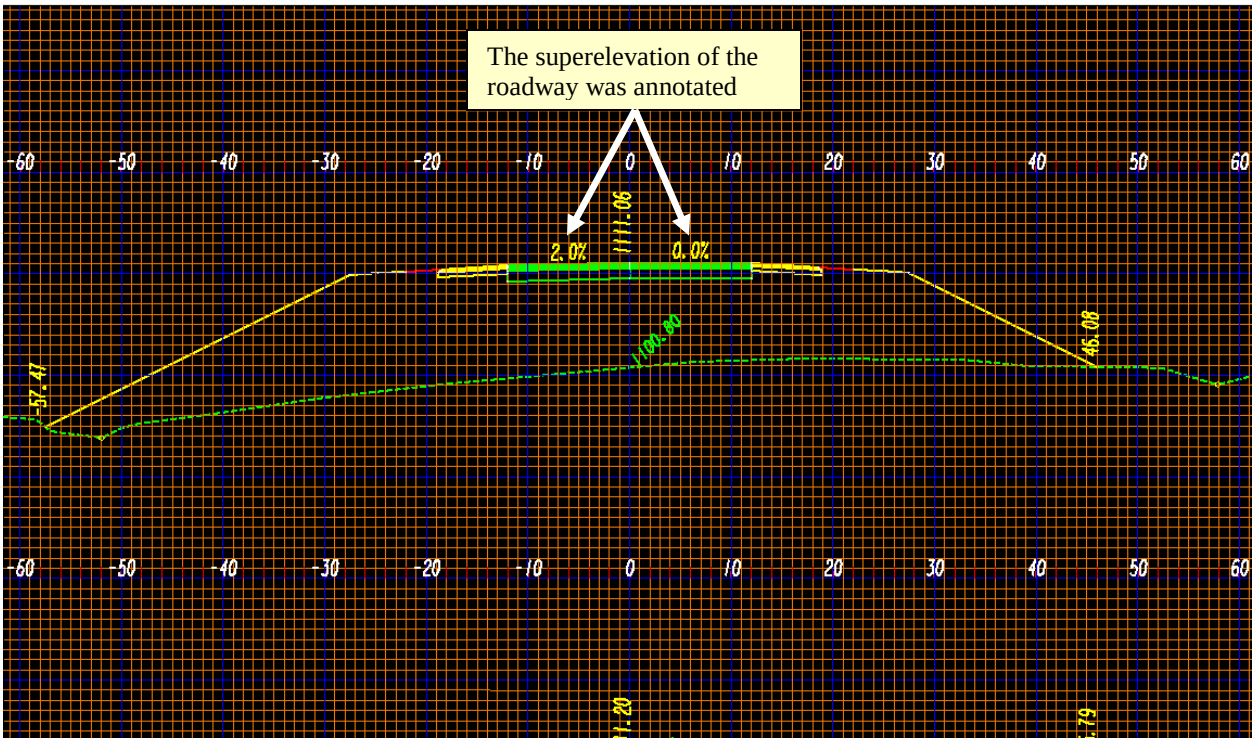


Figure L9-38 MicroStation View Window

55.	**Review Station 10+00.00** • If not still open, open the **<u>Cross Section Viewer</u>**. Select **Evaluation ► Cross Section ► Cross Section Viewer**. The **<u>Cross Section Viewer</u>** dialog opens. • Set the **Zoom Factor:** to ***0.4000***. • Highlight station **10+00**. • Verify in MicroStation that Station **10+00** was centered in the MicroStation View Window as shown in *Figure L9-39*. • Notice the Roadway Cross Slopes have been annotated.

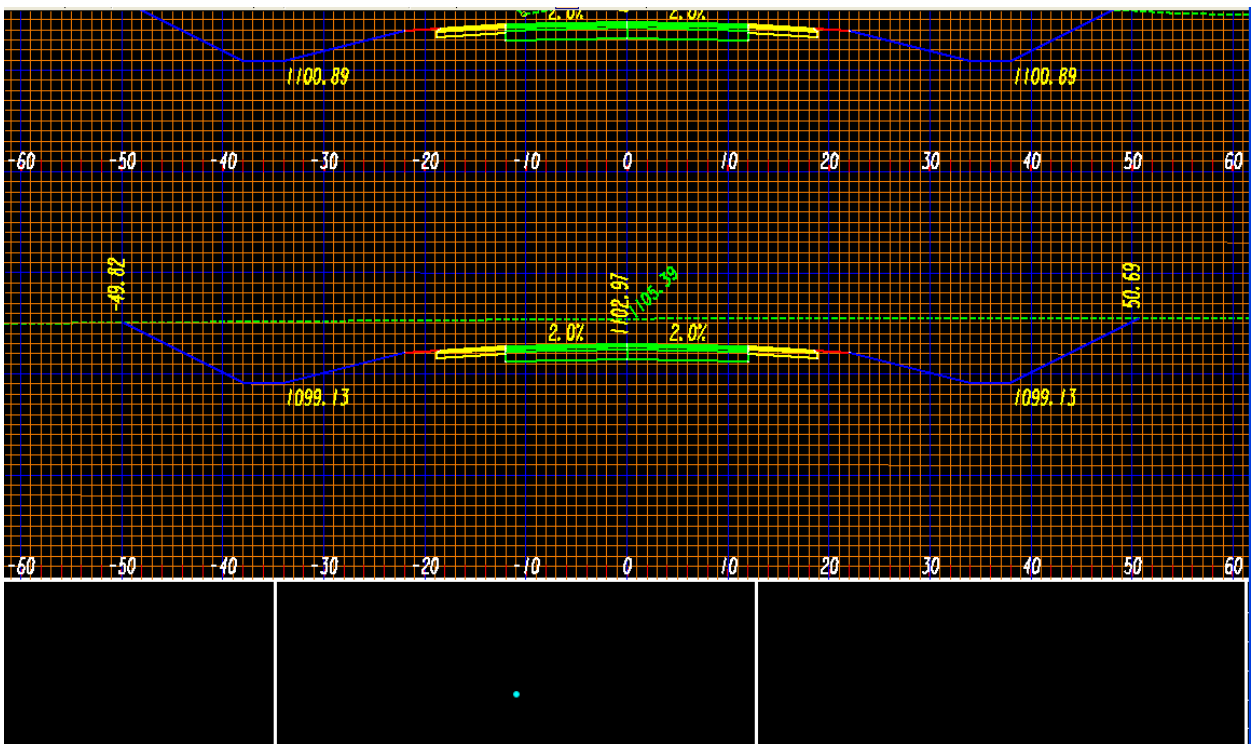
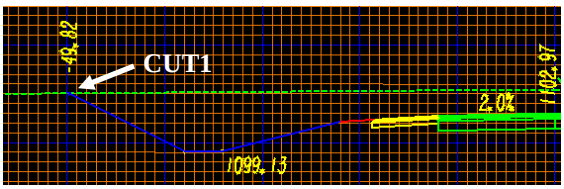
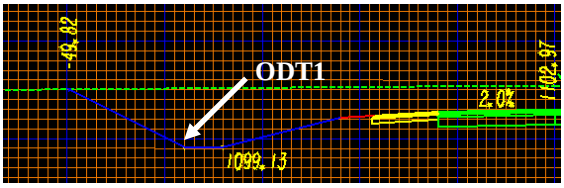
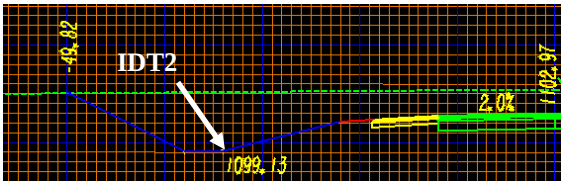
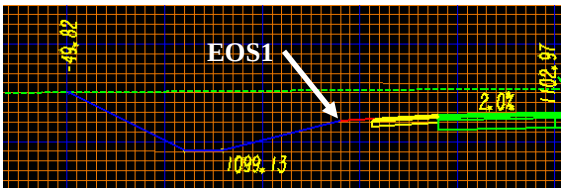
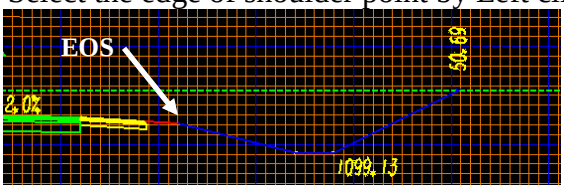
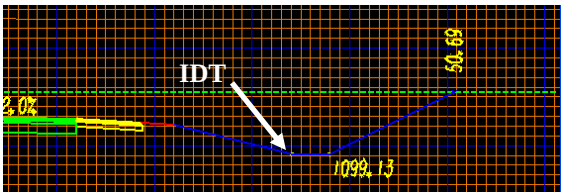
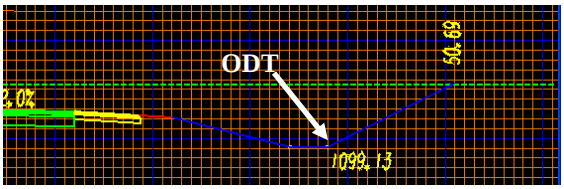
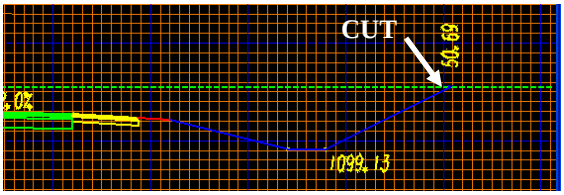


Figure L9-39 MicroStation View Window

56.	**Load the Preference 'XSEC TEXT- SLOPES x:y'. This Preference is setup for annotating the Front Slopes and Back Slopes in a Ratio Format.** • In the **Annotate Cross Section** folder, click the **Preferences** button. The **<u>Preferences</u>** dialog opens. • Select the Preference **XSEC TEXT – SLOPES x:y**. • Click **Load** and **Close**.

57.	**Unselect All the Features in the Segments-Annotate Folder.** • In the **Annotate Cross Section** folder, ensure the **Segments** folder and the **Annotate** sub folder are the active folders. • In the **Crossing** field, Right mouse click and choose **Select None** from the pop-up menu.
58.	**Define the Beginning Point of the Back Slope Segment for the Left Side of the Cross Section.** • In the **Annotate Cross Section** folder, click the **Locate** button. • Select the slope stake point by left clicking on the Feature identified below as **CUT1.**  • Left click again in the MicroStation Window to accept. You are returned to the **<u>Cross Sections</u>** dialog with the Feature **SR100 SPUR-CUT1** selected.
59.	**Define the Ending Point of the Back Slope Segment for the Left Side of the Cross Section.** • In the **Annotate Cross Section** folder, click the **Locate** button. • Select the outside ditch point by Left clicking on the Feature identified below as **ODT1.**  • Left click again in the MicroStation Window to accept. You are returned to the **<u>Cross Sections</u>** dialog with the Feature **SR100 SPUR-ODT1** selected.

60.	**Define the Beginning Point of the Front Slope Segment for the Left Side of the Cross Section.** • In the **Annotate Cross Section** folder, click the **Locate** button. • Select the inside ditch point by Left clicking on the Feature identified below as **IDT2.**  • Left click again in the MicroStation Window to accept. You are returned to the **<u>Cross Sections</u>** dialog with the Feature **SR100 SPUR-IDT2** selected.
61.	**Define the Ending Point of the Front Slope Segment for the Left Side of the Cross Section.** • In the **Annotate Cross Section** folder, click the **Locate** button. • Select the edge of shoulder point by Left clicking on the Feature identified below as **EOS1.**  • Left click again in the MicroStation Window to accept. You are returned to the **<u>Cross Sections</u>** dialog with the Feature **SR100 SPUR-EOS1** selected.
62.	**Define the Beginning Point of the Front Slope Segment for the Right Side of the Cross Section.** • In the **Annotate Cross Section** folder, click the **Locate** button. • Select the edge of shoulder point by Left clicking on the Feature **EOS.**  • Left click again in the MicroStation Window to accept. You are returned to the **<u>Cross Sections</u>** dialog with the Feature **SR100 SPUR-EOS** selected.

63.	**Define the Ending Point of the Front Slope Segment for the Right Side of the Cross Section.** • In the **Annotate Cross Section** folder, click the **Locate** button. • Select the inside ditch point by Left clicking on the Point identified as **IDT.**  • Left click again in the MicroStation Window to accept. You are returned to the **<u>Cross Sections</u>** dialog with the Feature **SR100 SPUR-IDT** selected.
64.	**Define the Beginning Point of the Back Slope Segment for the Right Side of the Cross Section.** • In the **Annotate Cross Section** folder, click the **Locate** button. • Select the outside ditch point by Left clicking on the Point identified as **ODT.**  • Left click again in the MicroStation Window to accept. You are returned to the **<u>Cross Sections</u>** dialog with the Feature **SR100 SPUR-ODT** selected.
65.	**Define the Ending Point of the Back Slope Segment for the Right Side of the Cross Section.** • In the **Annotate Cross Section** folder, click the **Locate** button. • Select the slope stake point by Left clicking on the Point identified as **CUT.**  • Left click again in the MicroStation Window to accept. You are returned to the **<u>Cross Sections</u>** dialog with the Feature **SR100 SPUR-CUT** selected.

66.	**Annotate the Front and Back Slopes.** • In the **Cross Sections** dialog, verify the eight Features listed here were selected in the previous steps. They should be highlighted in blue in the **Cross Sections** dialog as shown in *Figure L9-40*. ▪ **SR100 SPUR-CUT** ▪ **SR100 SPUR-IDT** ▪ **SR100 SPUR-CUT1** ▪ **SR100 SPUR-IDT2** ▪ **SR100 SPUR-EOS** ▪ **SR100 SPUR-ODT** ▪ **SR100 SPUR-EOS1** ▪ **SR100 SPUR-ODT1** • Click **Apply** but do **not** close the **Cross Sections** dialog. • Verify the Front and Back Slopes were annotated as shown in *Figure L9-41*.

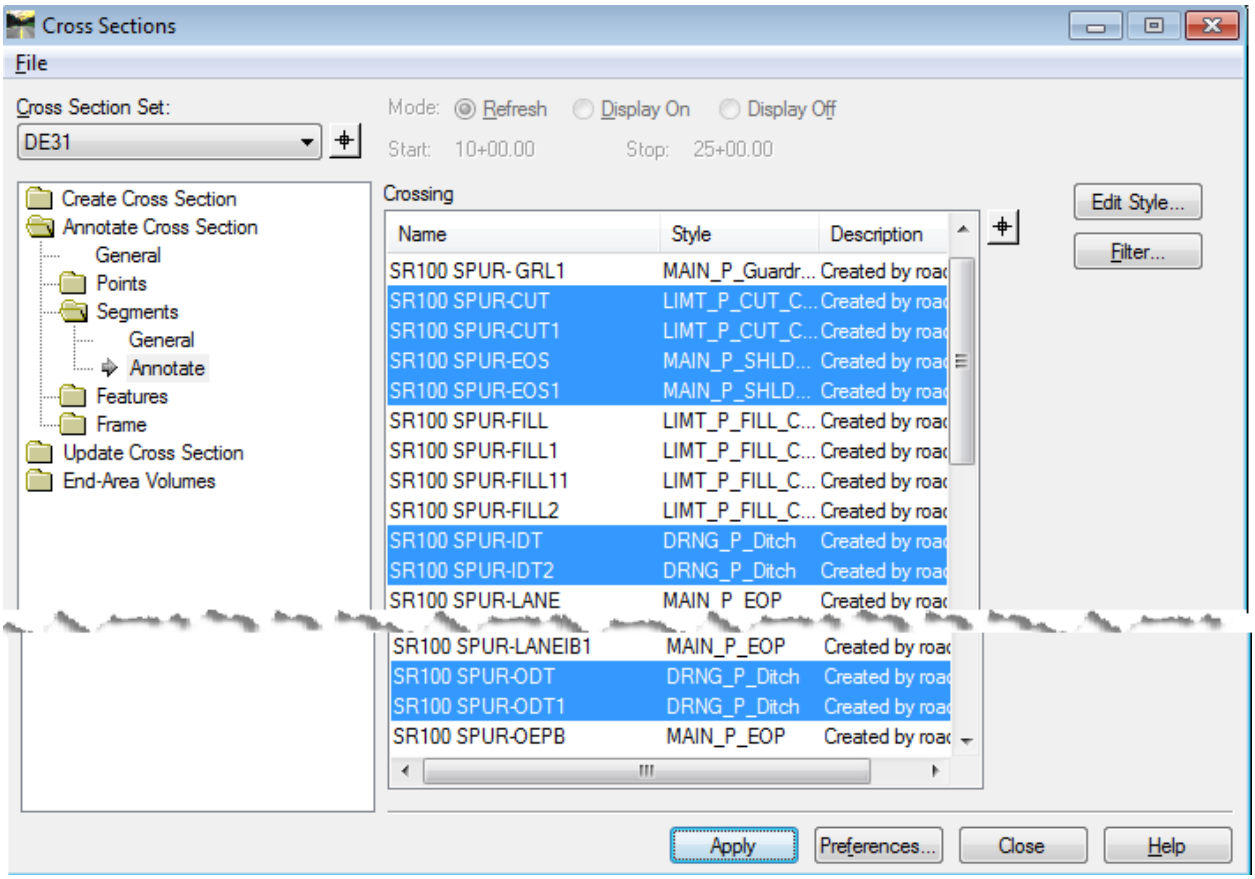


Figure L9-40 Annotate Cross Section

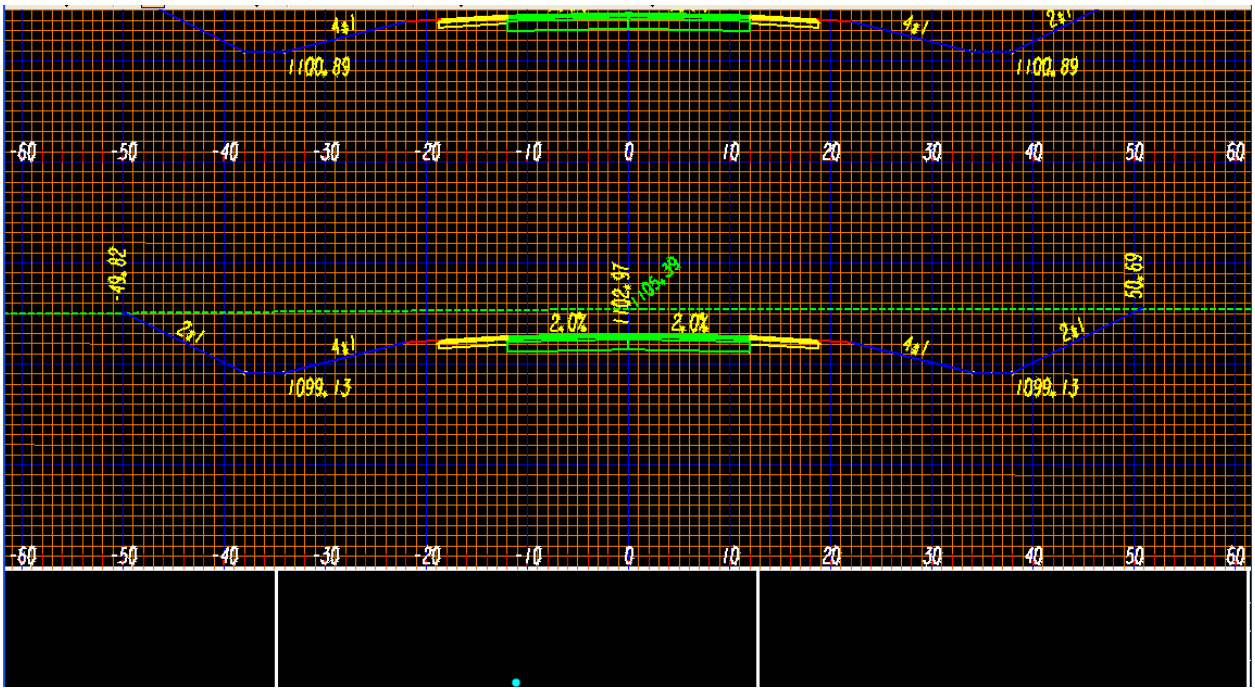


Figure L9-41 MicroStation View Window

67.	**Review Station 17+00.00.** • If not still open, open the **<u>Cross Section Viewer</u>**. Select **Evaluation ► Cross Section ► Cross Section Viewer**. The **<u>Cross Section Viewer</u>** dialog opens. • Set the **Zoom Factor:** to ***0.4000***. • Highlight station **17+00**. • Verify in MicroStation that Station **17+00** was centered in the MicroStation View Window as shown in *Figure L9-42*. • Notice the Front Slopes at Station **17+00** have not been annotated. This is because the Fill Slopes have different Feature Names than the Cut Slopes. ***<u>HINT</u>**: Careful consideration of the Point naming and use of the Feature Name Override during Component creation can help to minimize the number of steps required to annotate your Cross Sections.

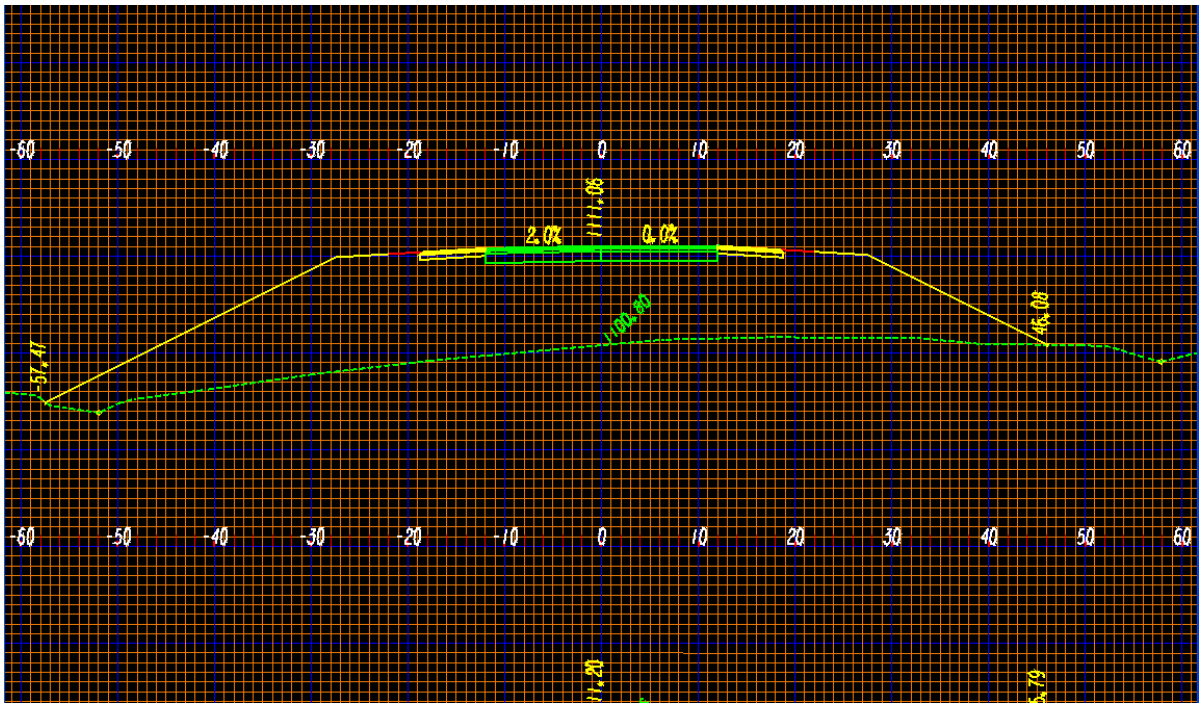
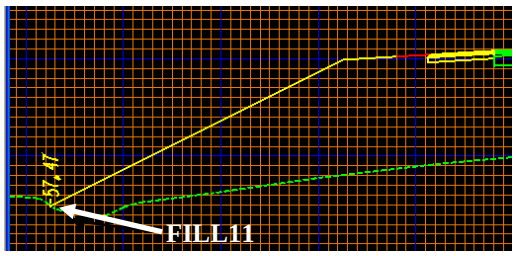
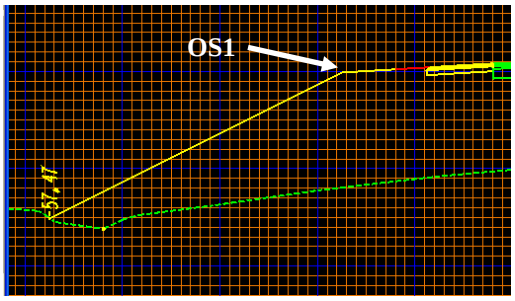
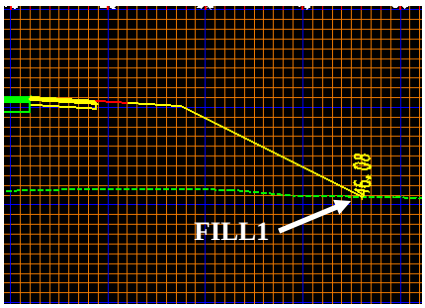
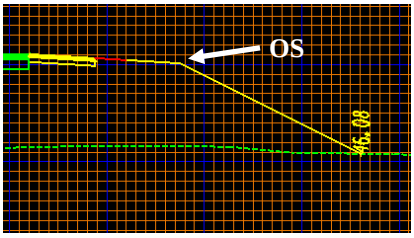


Figure L9-42 MicroStation View Window

68.	**Unselect All the Features in the Segments-Annotate Folder.** • In the **Annotate Cross Section** folder, ensure the **Segments** folder and the **Annotate** sub folder are the active folders. • In the **Crossing** field, Right mouse click and choose **Select None** from the pop-up menu.
69.	**Define the First Point of the Front Slope Segment for the Left Side of the Cross Section.** • In the **Annotate Cross Section** folder, click the **Locate** button. • Select the slope stake point by Left clicking on the Feature identified below as **FILL11**.  • Left click again in the MicroStation Window to accept. You are returned to the **<u>Cross Sections</u>** dialog with the Feature **SR100 SPUR-FILL11** selected.

70.	**Define the Second Point of the Front Slope Segment for the Left Side of the Cross Section.** • In the **Annotate Cross Section** folder, click the **Locate** button. • Select the shoulder break point by Left clicking on the Feature identified below as **OS1**.  • Left click again in the MicroStation Window to accept. You are returned to the **<u>Cross Sections</u>** dialog with the Feature **SR100 SPUR-OS1** selected.
71.	**Define the First Point of the Front Slope Segment for the Right Side of the Cross Section.** • In the **Annotate Cross Section** folder, click the **Locate** button. • Select the slope stake point by Left clicking on the Feature identified below as **FILL1**.  • Left click again in the MicroStation Window to accept. You are returned to the **<u>Cross Sections</u>** dialog with the Feature **SR100 SPUR-FILL1** selected.

72.	**Define the Second Point of the Front Slope Segment for the Right Side of the Cross Section.** • In the **Annotate Cross Section** folder, click the **Locate** button. • Select the shoulder break point by Left clicking on the Feature identified below as **OS**.  • Left click again in the MicroStation Window to accept. You are returned to the **<u>Cross Sections</u>** dialog with the Feature **SR100 SPUR-OS** selected.
73.	**Annotate the Front Slopes.** • In the **<u>Cross Sections</u>** dialog, verify the four Features listed here were selected in the previous steps. They should be highlighted in blue in the **<u>Cross Sections</u>** dialog as shown in *Figure L9-43*. ▪ **SR100 SPUR-FILL1** ▪ **SR100 SPUR-FILL11** ▪ **SR100 SPUR-OS** ▪ **SR100 SPUR-OS1** • Click **Apply** and click **Close** to exit the **<u>Cross Sections</u>** dialog. • If still open - click **Close** to exit the **<u>Cross Section Viewer</u>** dialog. • Verify the Front Slopes were annotated as shown in *Figure L9-44*.

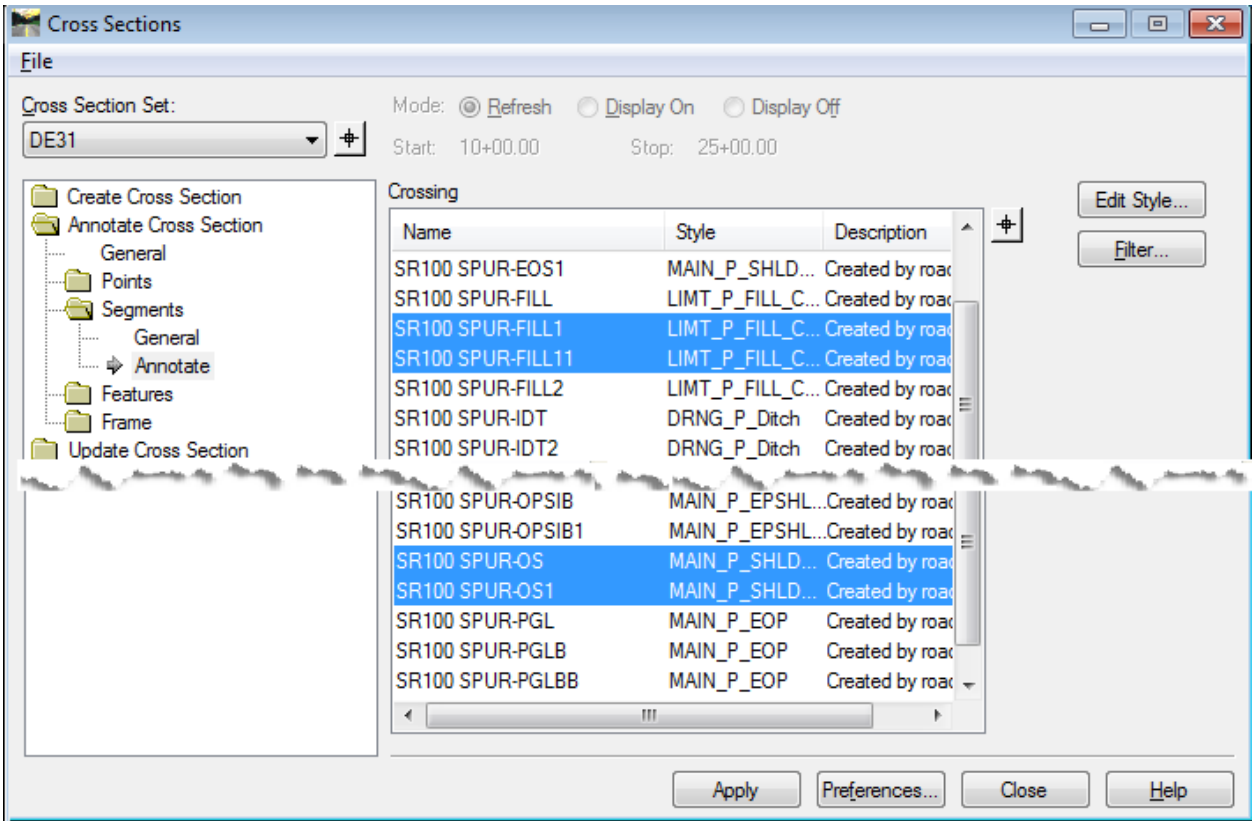


Figure L9-43 Annotate Cross Section

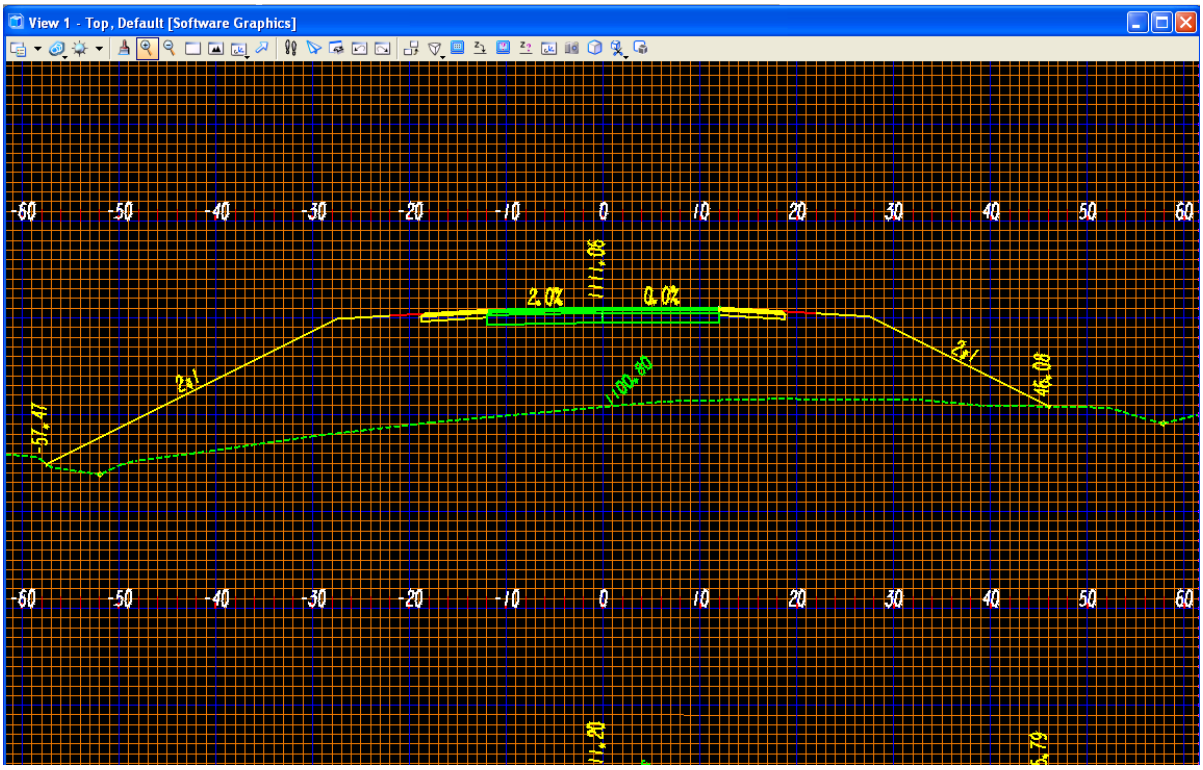


Figure L9-44 MicroStation View Window

74.	**Clear the MicroStation Window.** • In MicroStation, select **Edit ► Select All**. • In MicroStation, click the **Delete** icon ( ).
75.	This concludes Lab 9. Do not proceed until the Instructor directs you to do so.

Lab 10
Construction Limits

Objective

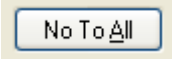
The objective of this Lab is to learn how to view construction limits, roadway ditches and ditch flow arrows from the InRoads Finish Surface in MicroStation. The process to save this data in MicroStation as DGN Reference Files will also be demonstrated.

Lab 10A Set Project Defaults and Open Files

1. **Starting Clean**

In order to ensure that you are working with a "clean" database – you will close MicroStation and InRoads if they are still running from a previous Lab:

To CLOSE MicroStation and InRoads -

Select **File►Exit** from the [MicroStation Menu].
If any messages appear regarding the saving of projects – Select 

This closes BOTH the MicroStation and InRoads Software(s).

2. **Starting MicroStation and InRoads in the GDOT Workspace.**

From the desktop, double-click on the **MicroStation** icon labeled **GDOT MicroStation V8i SS2 (x86)**.

Double click on the icon labeled **GDOT MicroStation V8i SS2 (x86)**.

- When the **MicroStation Manager** dialog box appears – navigate to the **C:\InRoads Data\1234567\Design Labs\Standards** folder and select the "**GDOT 3D Working File.dgn**". (Creation of the 'GDOT 3D Working File.dgn' is documented in the Design Guidelines). Click **Open**.

- Now open InRoads from within MicroStation by selecting:
  InRoads ► InRoads Suite (SELECTseries 2) V8i 08.11.07.566 from the [MicroStation Menu].

The MicroStation and InRoads Software(s) will open.

3. **Clear the MicroStation Window (***This step may be ignored if your MicroStation Window is already clear of graphics***)**

- Select **Edit ►Select All** from the [MicroStation Menu].
- Then select the **<DELETE>** key on the computer keyboard.

The MicroStation Window is now clear of all graphics from the previous lab and ready for this lab.

4.	**Verify Project Defaults** • In InRoads, select **File ►Project Defaults** • Use the pull down next to **Configuration Name***:* to select ***1234567_Design*** which you created in **Lab 1**. • Click **Apply** & **Close.** *Sets Project Defaults.*
5.	**Set the Design Default Preferences** • Select **File ► Project Options** and the **<u>Project Options</u>** dialog box appears. • Select the **Factors** tab. • This will be a 50 scale project. Enter ***50*** for the **Text**, **Cell** & **Line Style Scale Factor(s)**. • Then in the same **<u>Project Options</u>** dialog box select the **Geometry** tab. • Click the **Preferences** button at the bottom of the dialog box. • Choose ***Design Default***. Click **Load** and **Close**. This will set the remainder of the Design Defaults. ****IMPORTANT**: As stated previously the ***Design Default*** Preference loads the appropriate settings for use during Design. These settings include the Alignment and Point name settings. These settings are of particular importance to the Designer. Alignments must have a **DE** prefix. Points must also have a **DE** prefix as well as beginning the point numbering scheme at Number 10000. In order for survey enhancements to be properly added during the design phase of a project, it is essential that Designers pay particular attention to this setting. • In the **<u>Project Options</u>** dialog box click **Apply** and **Close**. *Sets the Design Default Preference.*
6.	**Open 1234567_Design.alg** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 10** • Highlight **1234567_Design.alg** • Click **Open** & **Cancel**. *The Geometry Project 1234567_Design is opened.*
7.	**Open GDOT_Lab10.itl** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 10** • Highlight **GDOT_Lab10.itl** • Click **Open** & **Cancel**. *The Template Library GDOT_Lab10 is opened.*

8.	**Open 1234567_Lab10.ird** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 10** • Highlight **1234567_Lab10.ird** • Click **Open** & **Cancel**. *The Roadway Design File 1234567_Lab10 is opened.*
9.	**Open 1234567_Exist.dtm** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 10** • Highlight **1234567_Exist.dtm** • Click **Open** & **Cancel**. *The Surface Project 1234567_Exist is opened.*
10.	**Open 1234567_SR100 SPUR_Lab10.dtm** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 10** • Highlight **1234567_SR100 SPUR_Lab10.dtm** • Click **Open** & **Cancel**. *The Finish Surface 1234567_ SR100 SPUR_Lab10 is opened.*
11.	**Open 1234567_Bogus1_Lab10.dtm** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 10** • Highlight **1234567_Bogus1_Lab10.dtm** • Click **Open** & **Cancel**. *The Bogus Surface 1234567_Bogus1_Lab10 is opened.*

Lab 10B View Construction Limits and Create 1234567LIMT.dgn

In order to view the Construction Limits, a 'Final' Surface must exist. The Final Surface is generated in the Roadway Designer from the Roadway Design file as was demonstrated in Lab 8 and contains the Features representing the construction limits, ditches and ditch flow arrows. In Lab 10B a Final Surface has been provided representing the SR100 SPUR and you will learn how to view the Features in the Surface representing the Construction Limits and the process to save the Construction Limits to the 1234567LIMT.dgn Reference File.

12.	**Attach the 1234567MAIN.dgn Reference File.** In order to view the Construction Centerline – the **1234567MAIN.dgn** Reference File will be attached. • In MicroStation, select **File ► References**. The **<u>References</u>** Window opens as shown in *Figure L10-1*.

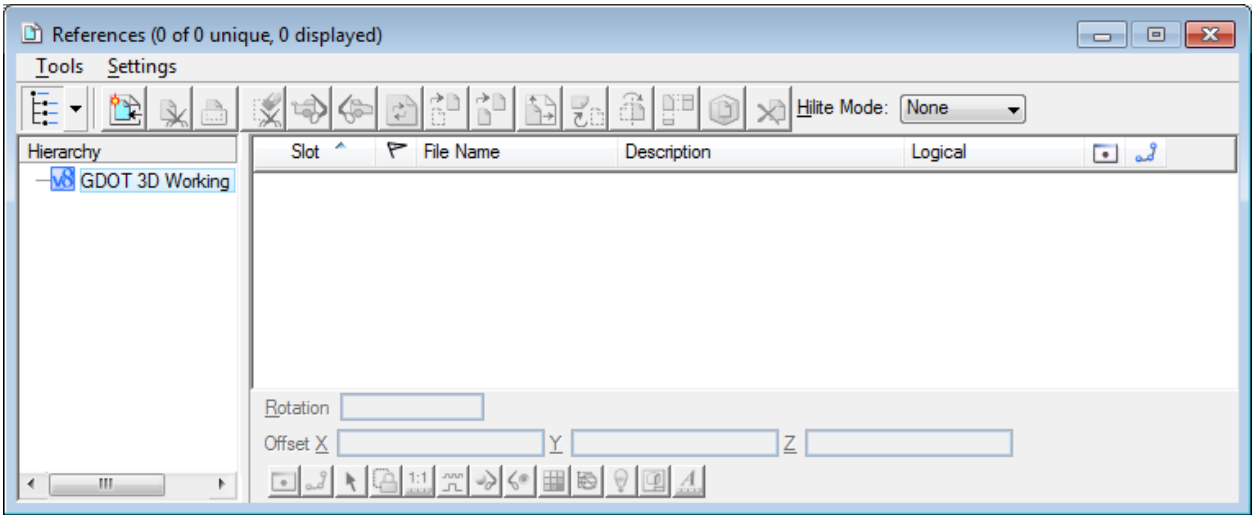


Figure L10-1 References Window

13.	**In the <u>References</u> Window – attach the File 1234567MAIN.dgn.** • Select **Tools ► Attach** and the **<u>Attach Reference</u>** dialog opens. • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 10** • Highlight **1234567MAIN.dgn** • Click **Open**. • The **<u>Reference Attachment Settings</u>** dialog opens as shown in *Figure L10-2*.

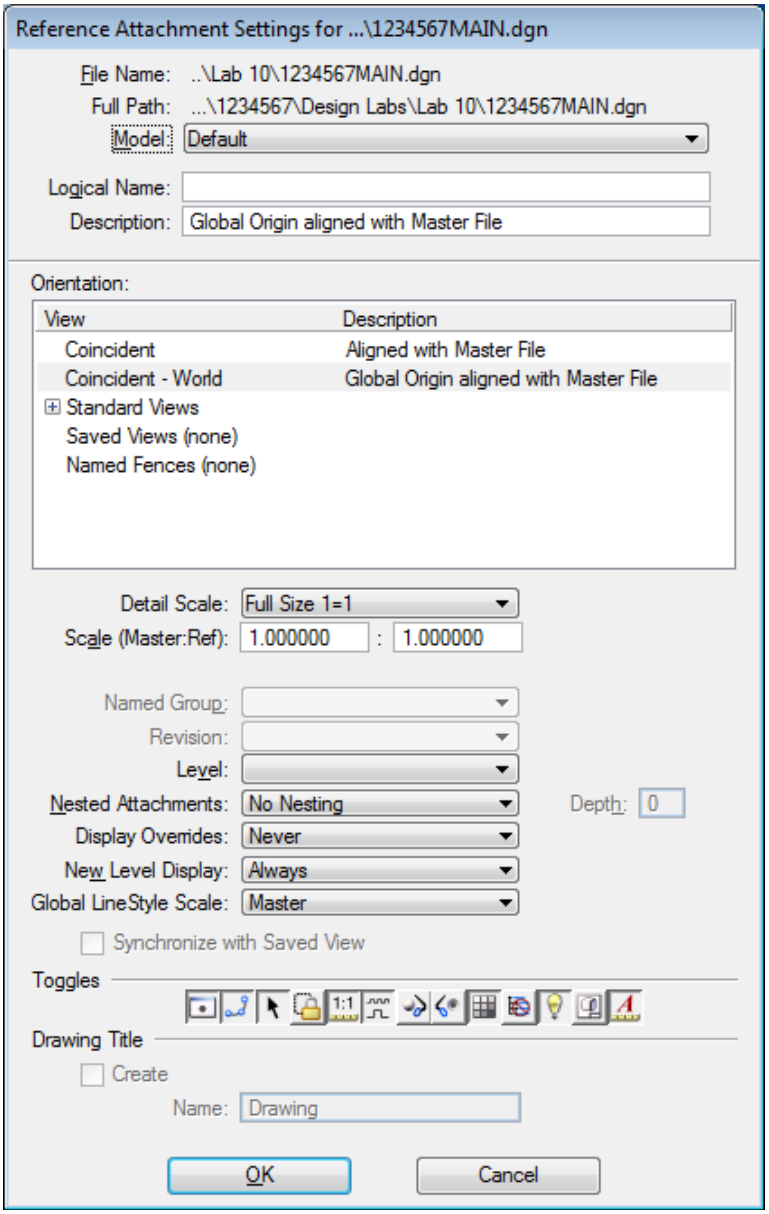


Figure L10-2 Reference Attachment Settings Dialog

14.	**Enter the Logical Name in the <u>Reference Attachment Settings</u> dialog.** • In the **Logical Name:** field -- enter the name: ***MAIN*** • Accept the rest of the Default Settings and click **OK**. • The **1234567MAIN.dgn** Reference File is attached. • **Close** the **<u>References</u>** Window by clicking the Red (X) in the upper right corner of the dialog box. • In MicroStation, click the **Fit View** icon ( ) and the Reference File (**1234567MAIN.dgn**) will view as shown in *Figure L10-3*.

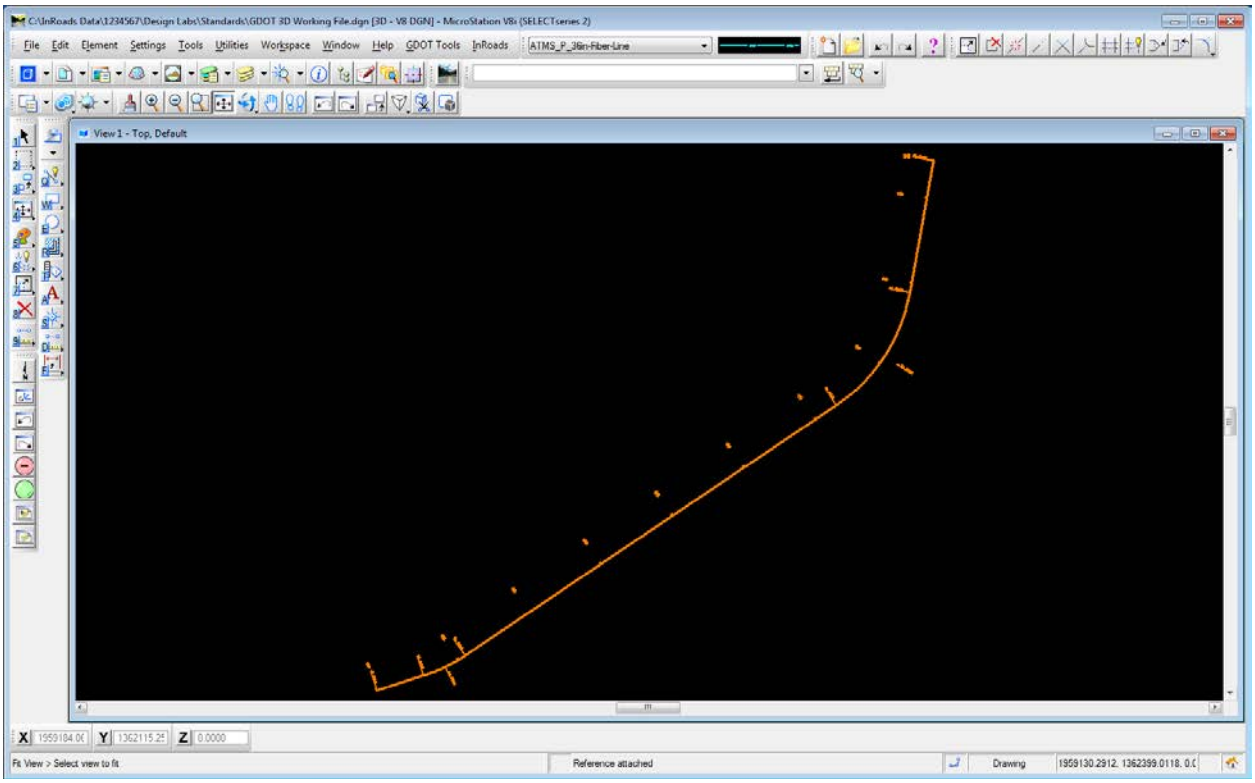


Figure L10-3 MicroStation View Window

15.	**Open the <u>View Features</u> dialog and Select the Surface 1234567_SR100 SPUR_Lab10.** • In InRoads, select **Surface ► View Surface ► Features**… The **<u>View Features</u>** dialog opens as shown in *Figure L10-4*. • Use the pull down arrow to select the Surface **1234567_SR100 SPUR_Lab10**. • Ensure your view matches that shown in *Figure L10-4*.

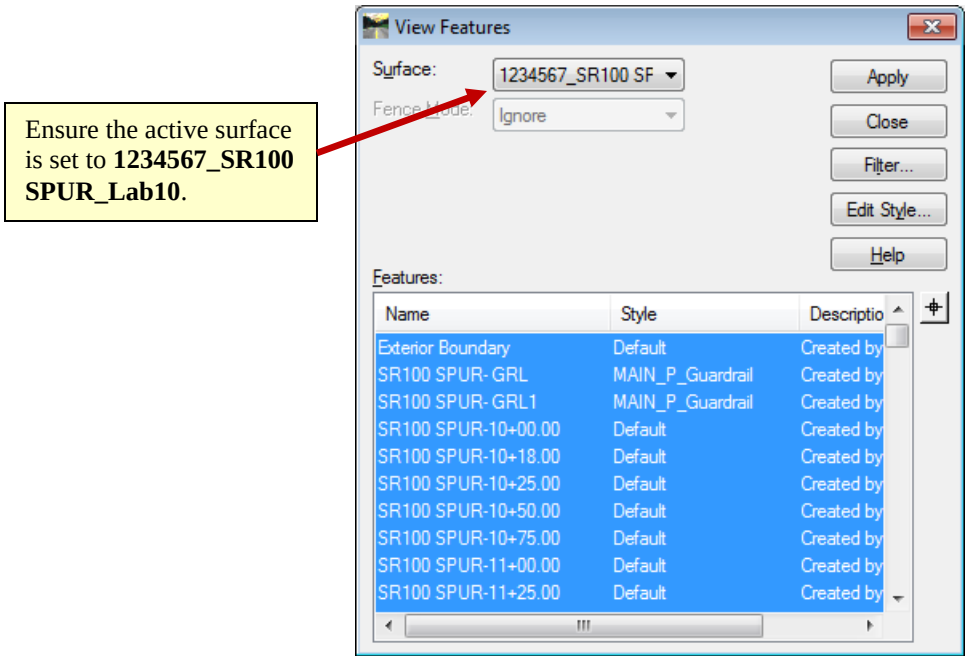


Figure L10-4 View Features

16.	**Clear the Feature Selection Field.** • In the **<u>View Features</u>** dialog, Right mouse click in the **Features:** field. A pop-up menu appears as shown in *Figure L10-5*. • Left click on **Select None**. The **<u>View Features</u>** '**Features:**' field now contains no selections as shown in *Figure L10-6*.

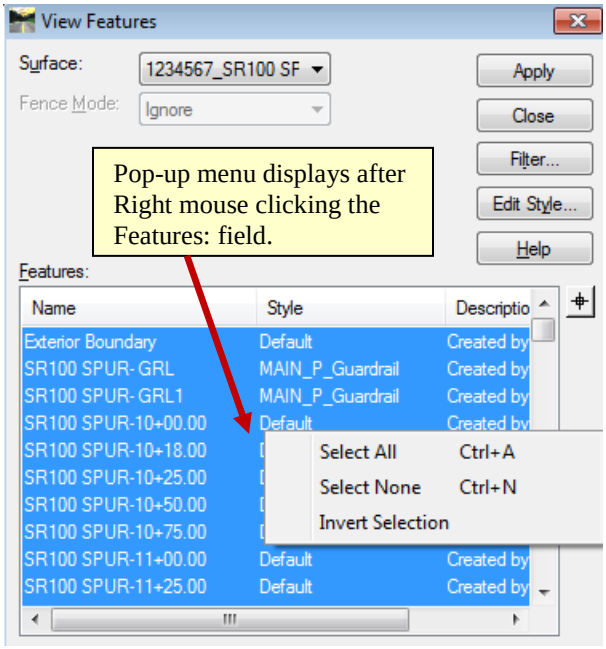


Figure L10-5 View Features

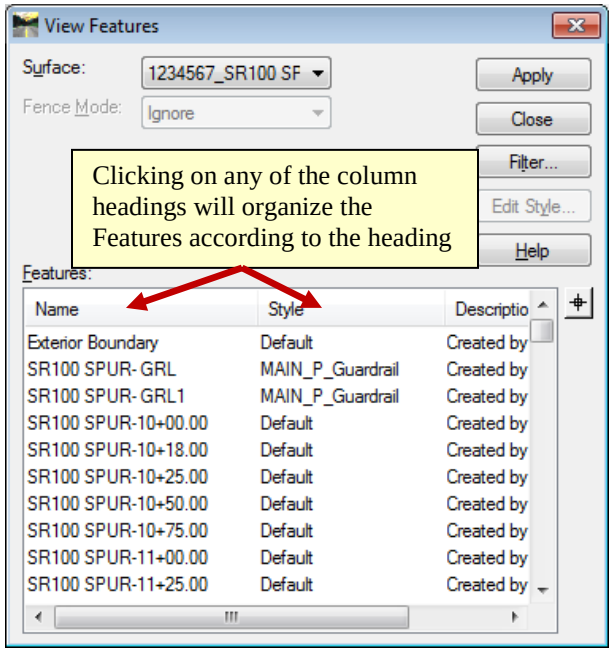


Figure L10-6 View Features

17.	**Select the Features that represent the Construction Limits.** • In the **View Features** dialog, click the **Style** column to organize the Features by Style. • In the **View Features** dialog, use the scroll bar to locate the Features **LIMT_P_FILL_Const-Limit** and **LIMT_P_CUT_Const-Limit.** • Select the Features with the Feature Style **LIMT_P_FILL_Const-Limit** and **LIMT_P_CUT_Const-Limit** by holding down the ***CTRL*** key on the keyboard and Left clicking each of the Features. • Ensure the Six Features with the Feature Styles **LIMT_P_FILL_Const-Limit** and **LIMT_P_CUT_Const-Limit** were selected as shown in *Figure L10-7*.

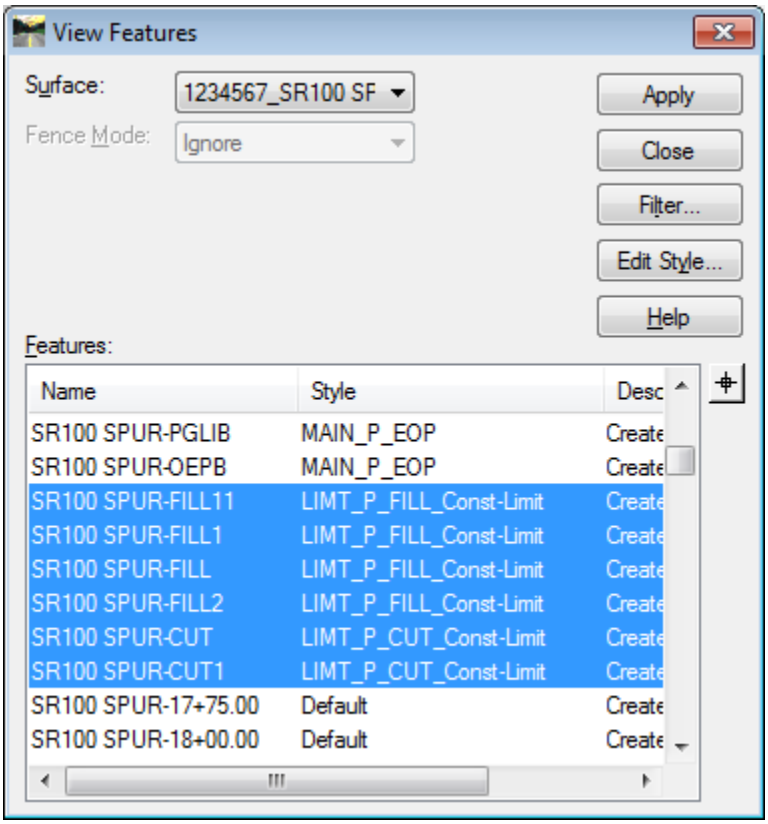


Figure L10-7 View Features

18.	**View the Features that represent the Construction Limits.** • In the **View Features** dialog, click **Apply** and click **Close** to exit the **View Features** dialog. • Verify the Features representing the Construction Limits have been drawn in MicroStation as shown in *Figure L10-8*.

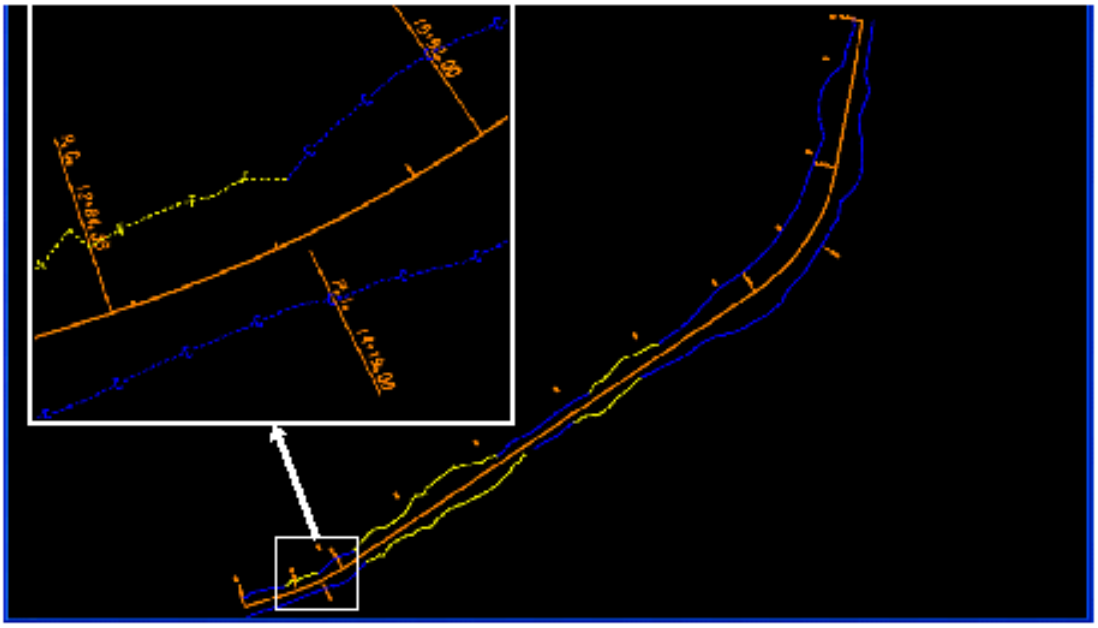


Figure L10-8 MicroStation View Window

19.	**Detach the 1234567MAIN.dgn Reference File.** The **1234567MAIN.dgn** Reference File will be detached in order to create the DGN file for the Construction Limits. • In MicroStation, select **File ► References**. The **References** Window opens as shown in *Figure L10-9*.

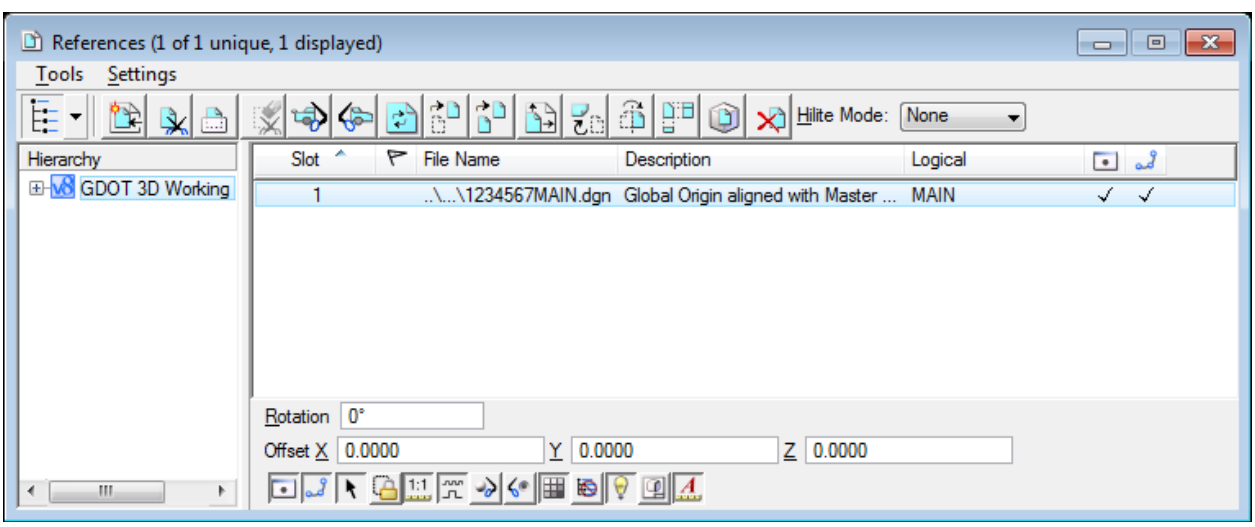


Figure L10-9 References Window

20.	**In the <u>References</u> Window – detach the File 1234567MAIN.dgn.** • In MicroStation, select **Tools ► Detach** and an **<u>Alert</u>** dialog will appear. • Click the **OK** button in the **<u>Alert</u>** dialog. • The **1234567MAIN.dgn** Reference File is detached. • **Close** the **<u>References</u>** Window by clicking the Red (X) in the upper right corner of the dialog box. • In MicroStation, click the **Fit View** icon ( ). • In MicroStation, verify that your view appears similar to *Figure L10-10*.

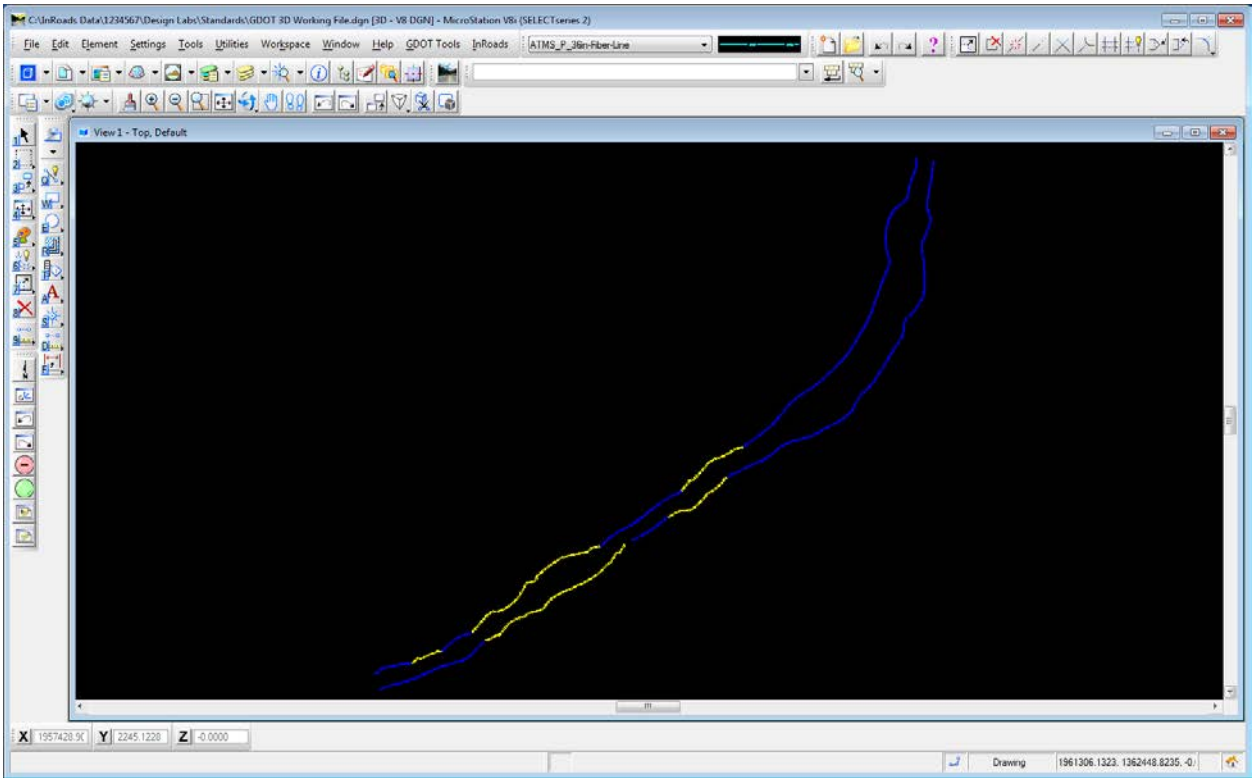


Figure L10-10 MicroStation View Window

21.	**Save the Construction Limits DGN File (1234567LIMT.dgn).** • In MicroStation, select **File ► Save As**. • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 10** • In the **File name:** field -- Enter the File name ***1234567LIMT.dgn*** • Click **Save**. *The MicroStation DGN File named 1234567LIMT.dgn is created and is made the current active DGN File. The DGN File has been saved in the 3D format.*

Lab 10C View Ditches & Ditch Flow Arrows and Create 1234567DRNG.dgn

In order to view the Ditches and Ditch Flow Arrows, a 'Final' Surface must exist. The Final Surface is generated in the Roadway Designer from the Roadway Design file as was demonstrated in Lab 8 and contains the Features representing the construction limits, ditches and ditch flow arrows. In Lab 10C a Final Surface has been provided representing the SR100 SPUR and you will learn how to view the Features in the Surface representing the Ditches and Ditch Flow Arrows and the process to save the Ditches/Ditch Flow Arrows to the 1234567DRNG.dgn Reference File.

22.	**Open the 'GDOT 3D Working File.dgn".** In the Previous Lab 10B – the **1234567LIMT.dgn** file was created and this became the active DGN file. In the following steps – the **'GDOT 3D Working File.dgn"** will need to be opened and made the active dgn file. • In MicroStation, select **File ► Open** and the **Open** dialog appears. • Navigate to **C:\InRoads Data\1234567\Design Labs\Standards** • Highlight **GDOT 3D Working File.dgn** • Click **Open**. Make Sure that the DGN file you are in is the correct file by looking at the MicroStation Title Bar: C:\InRoads Data\1234567\Design Labs\Standards\GDOT 3D Working File.dgn [3D - V8 DGN] - MicroStation V8i (SELECTseries 2) • In MicroStation, click the **Fit View** icon ( ). • In MicroStation, select **Edit ► Select All**. • In MicroStation, click the **Delete** icon ( ). *The GDOT 3D Working File.dgn is cleared of Graphics and is ready for the next Lab.*
23.	**Attach the 1234567MAIN.dgn Reference File.** In order to view the Construction Centerline – the **1234567MAIN.dgn** Reference File will be attached. • In MicroStation, select **File ► References**. The **References** Window opens as shown in *Figure L10-11*.

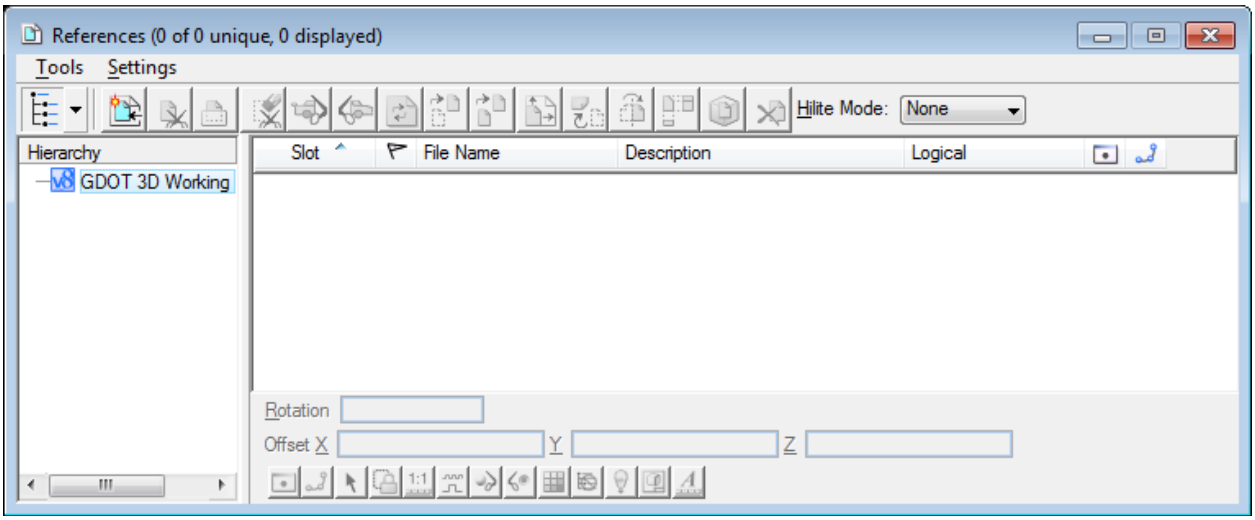


Figure L10-11 References Window

24.	**In the <u>References</u> Window – attach the File 1234567MAIN.dgn.** • Select **Tools ► Attach** and the **<u>Attach Reference</u>** dialog opens. • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 10** • Highlight **1234567MAIN.dgn** • Click **Open**. • The **<u>Reference Attachment Settings</u>** dialog opens as shown in *Figure L10-12*.

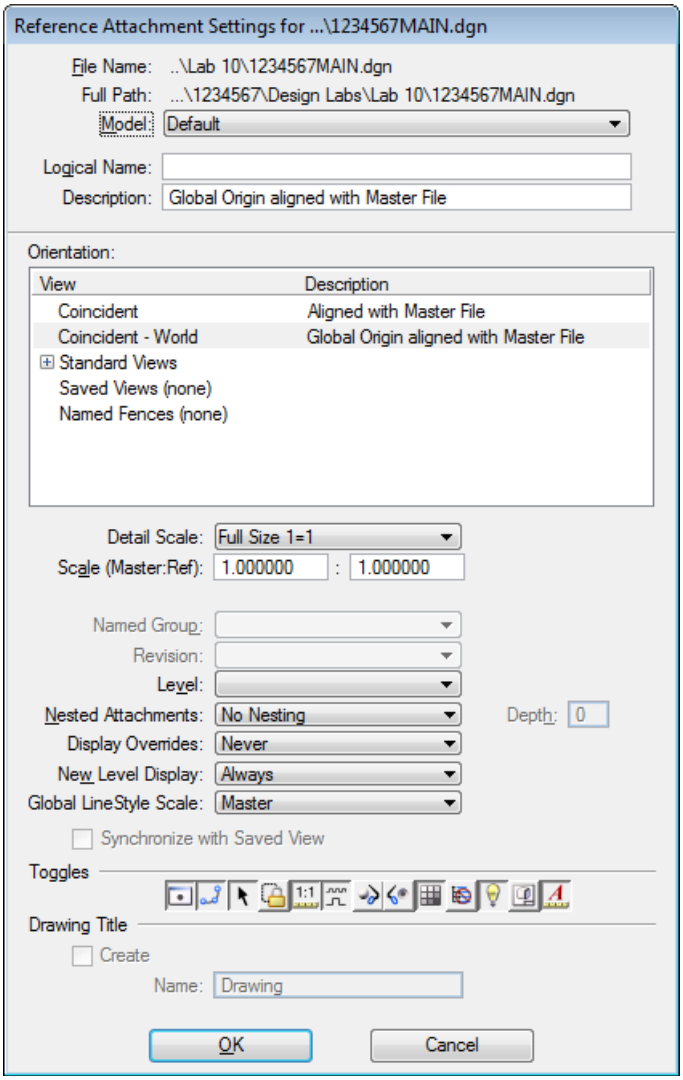


Figure L10-12 Reference Attachment Settings Dialog

25.	**Enter the Logical Name in the <u>Reference Attachment Settings</u> dialog.** • In the **Logical Name:** field -- enter the name: ***MAIN*** • Accept the rest of the Default Settings and click **OK**. • The **1234567MAIN.dgn** Reference File is attached. • In MicroStation, click the **Fit View** icon ( ) • **<u>DO NOT</u>** close the **<u>References</u>** Window.
26.	**In the <u>References</u> Window – attach the File 1234567LIMT.dgn.** • Select **Tools ► Attach** and the **<u>Attach Reference</u>** dialog opens. • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 10** • Highlight **1234567LIMT.dgn** • Click **Open**. • The **<u>Reference Attachment Settings</u>** dialog opens.
27.	**Enter the Logical Name in the <u>Reference Attachment Settings</u> dialog.** • In the **Logical Name:** field -- enter the name: ***LIMT*** • Accept the rest of the Default Settings and click **OK**. • The **1234567LIMT.dgn** Reference File is attached. • **Close** the **<u>References</u>** Window by clicking the Red (X) in the upper right corner of the dialog box. • In MicroStation, click the **Fit View** icon ( ) and the Reference Files (**1234567MAIN.dgn**) and (**1234567LIMT.dgn**) will view as shown in *Figure L10-13*.

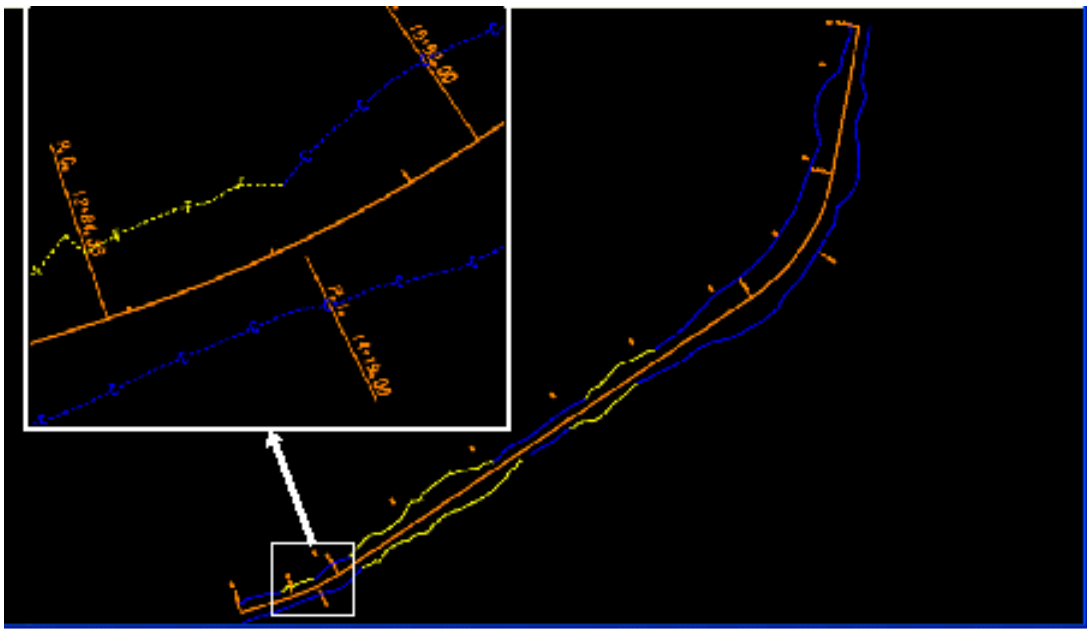


Figure L10-13 MicroStation View Window

28.	**Open the <u>View Features</u> dialog and Select the Surface 1234567_SR100 SPUR_Lab10.** • In InRoads, select **Surface ► View Surface ► Features**… The **<u>View Features</u>** dialog opens as shown in *Figure L10-14*. • Use the pull down arrow to select the Surface **1234567_SR100 SPUR_Lab10**. • Ensure your view matches that shown in *Figure L10-14*.

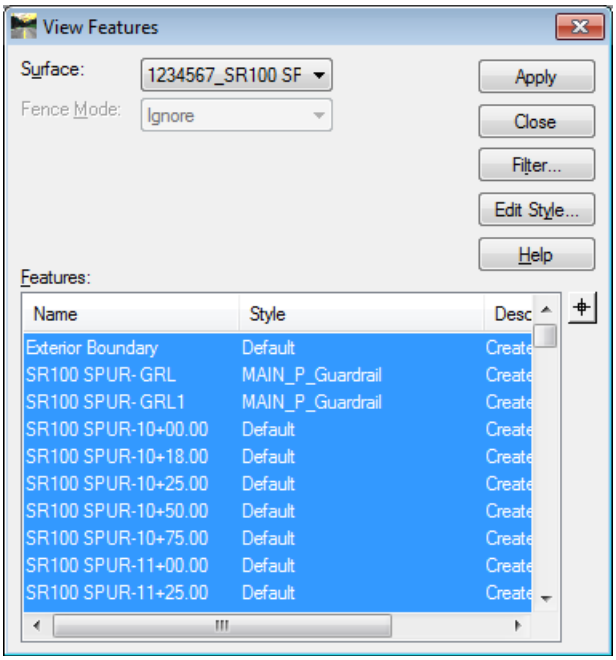


Figure L10-14 View Features

29.	**Clear the Feature Selection Field.** • In the **<u>View Features</u>** dialog, Right mouse click in the **Features:** field. In the pop-up menu, Left click on **Select None**.
30.	**Select the Features Representing the Roadway Ditches.** • In the **<u>View Features</u>** dialog, click the **Style** column to organize the features by style. • In the **<u>View Features</u>** dialog, use the scroll bar to locate the Features with the Feature Style **DRNG_P_Ditch**. • Select all the Features with the Feature Style **DRNG_P_Ditch** by holding down the ***CTRL*** key on the keyboard and Left clicking on each of the Features. • Ensure the Six Features with the Feature Style **DRNG_P_Ditch** were selected as shown *Figure L10-15*.

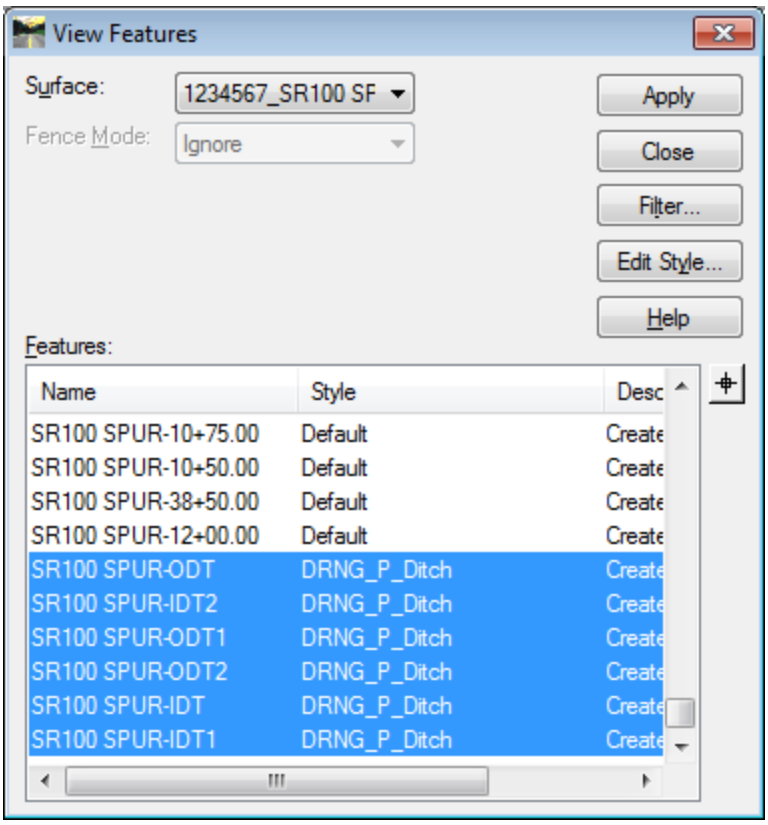


Figure L10-15 View Features

31.	**View the Features Representing the Roadway Ditches.** • In the **<u>View Features</u>** dialog, click **Apply** and click **Close** to close the **<u>View Features</u>** dialog. • Verify the Features representing the Roadway Ditches were drawn in MicroStation as shown in *Figure L10-16*.

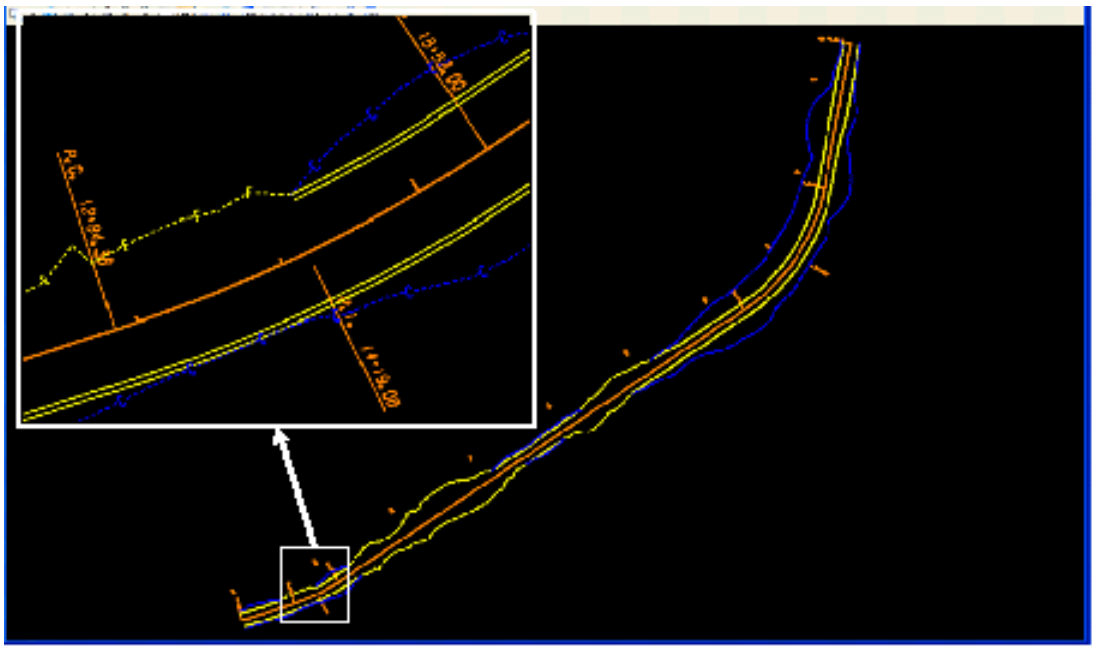


Figure L10-16 MicroStation View Window

32.	**Open the <u>Annotate Feature</u> dialog. The <u>Annotate Feature</u> dialog is how Ditch Flow Arrows are Displayed on the Roadway Ditches.** • In InRoads, select **Surface ► View Surface ► Annotate Feature**… The **<u>Annotate Feature</u>** dialog opens as shown in *Figure L10-17*.
33.	**Set the Active Surface to '1234567_SR100 SPUR_Lab10'.** • In the **<u>Annotate Feature</u>** dialog, use the pull down arrow and select the Surface **1234567_SR100 SPUR_Lab10** from the list as shown in *Figure L10-17*.

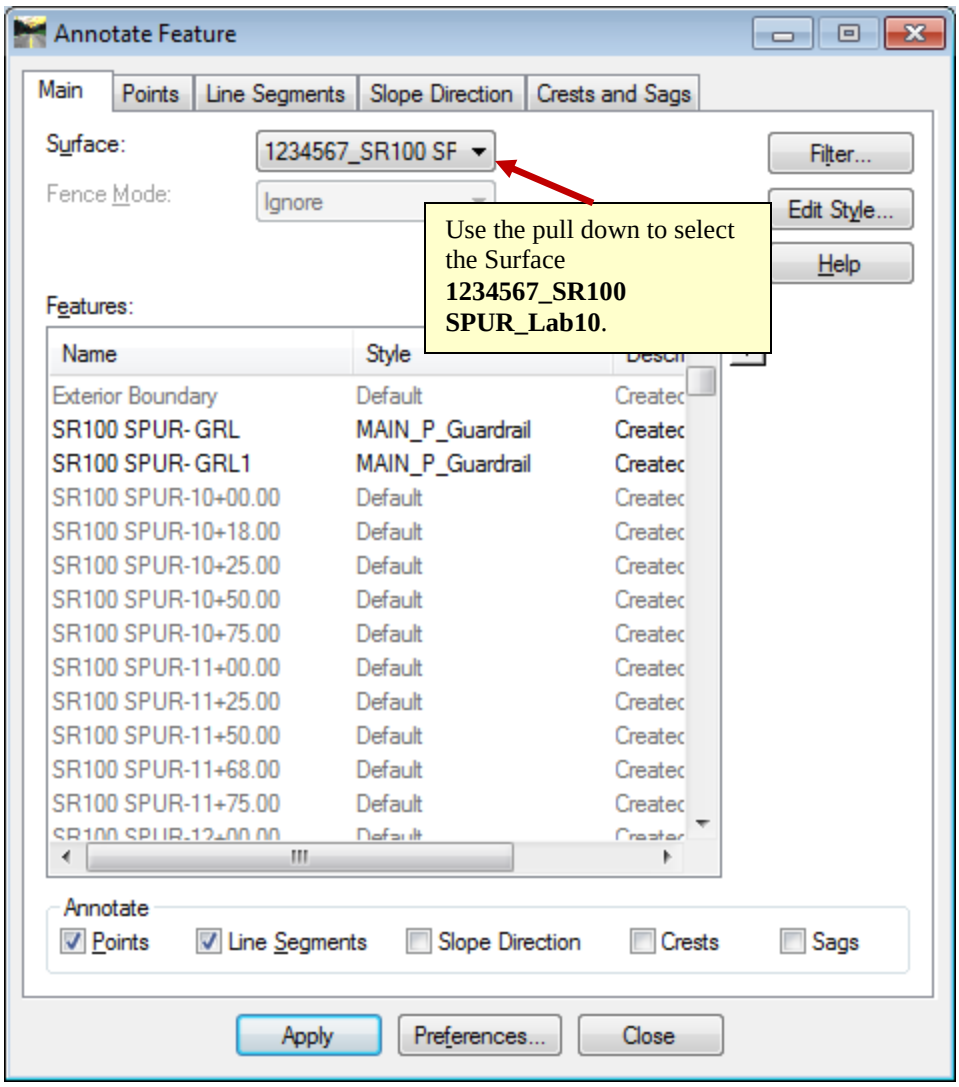
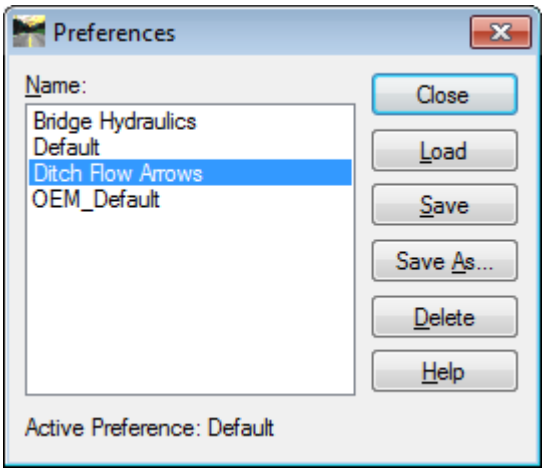


Figure L10-17 Annotate Feature

34. **Load the Preference 'Ditch Flow Arrows'.**

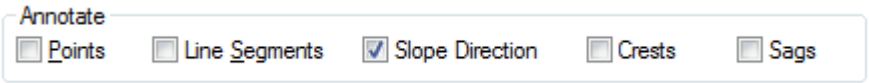
- In the **Annotate Feature** dialog, click the **Preferences** button. The **Preferences** dialog opens as shown below.



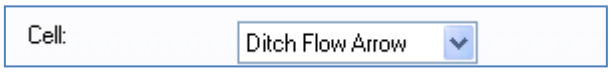
- Select the Preference **Ditch Flow Arrows** as shown above.
- Click **Load** and **Close.**

35. **Review the Settings Loaded by 'Ditch Flow Arrows' Preference in the Previous Step.**

- Verify only the **Slope Direction** check box is checked as shown here.



- In the **Annotate Feature** dialog, ensure the **Slope Direction** tab is the active tab. (Please be Patient – this tab may take a while to open).
- Verify the **Ditch Flow Arrow** is the active cell as shown here.



36.	**Even though the 'Ditch Flow Arrow' Preference was Loaded in the Previous Step, the Feature to Annotate must still be selected. Select the Features with the Feature Style 'DRNG_P_Ditch' to annotate with the Ditch Flow Arrow Cell.** • In the **Annotate Feature** dialog, ensure the **Main** tab is the active tab. • In the **Annotate Feature** dialog, organize the Features by Style by clicking the **Style** column heading. • Right mouse click in the **Features:** field. In the pop-up menu, Left click on **Select None**. • Use the scroll bar to locate and select the Features with the Feature Style **DRNG_P_Ditch**. • Verify your entries match those shown in *Figure L10-18* and that the Six Features with the Feature Style **DRNG_P_Ditch** were selected. • Ensure only the **Slope Direction** check box is checked as shown in *Figure L10-18*.

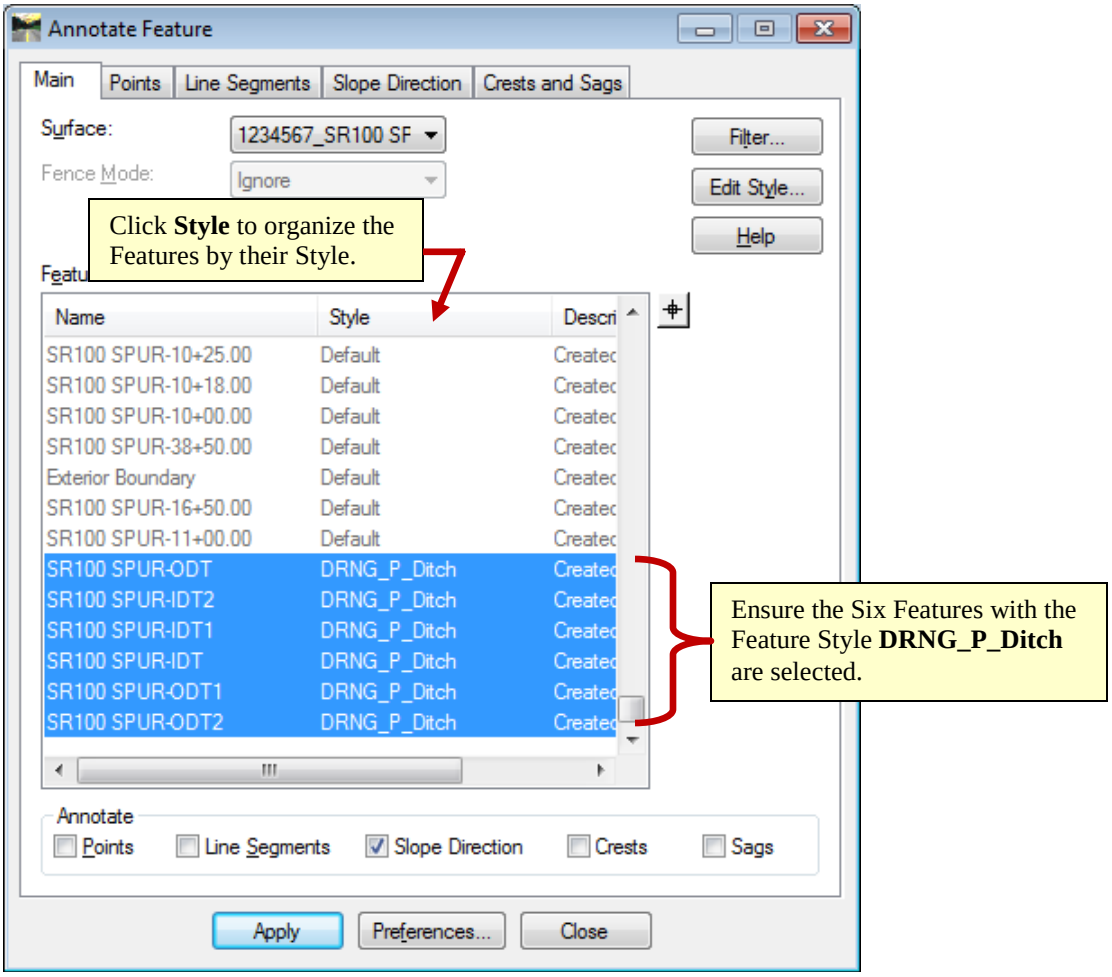


Figure L10-18 Annotate Feature

37.	**Annotate the Roadway Ditches with Ditch Flow Arrows.** • In the **<u>Annotate Feature</u>** dialog, click **Apply** and **Close**. • In MicroStation, verify the Ditch Flow Arrows were drawn as shown in *Figure L10-19*.

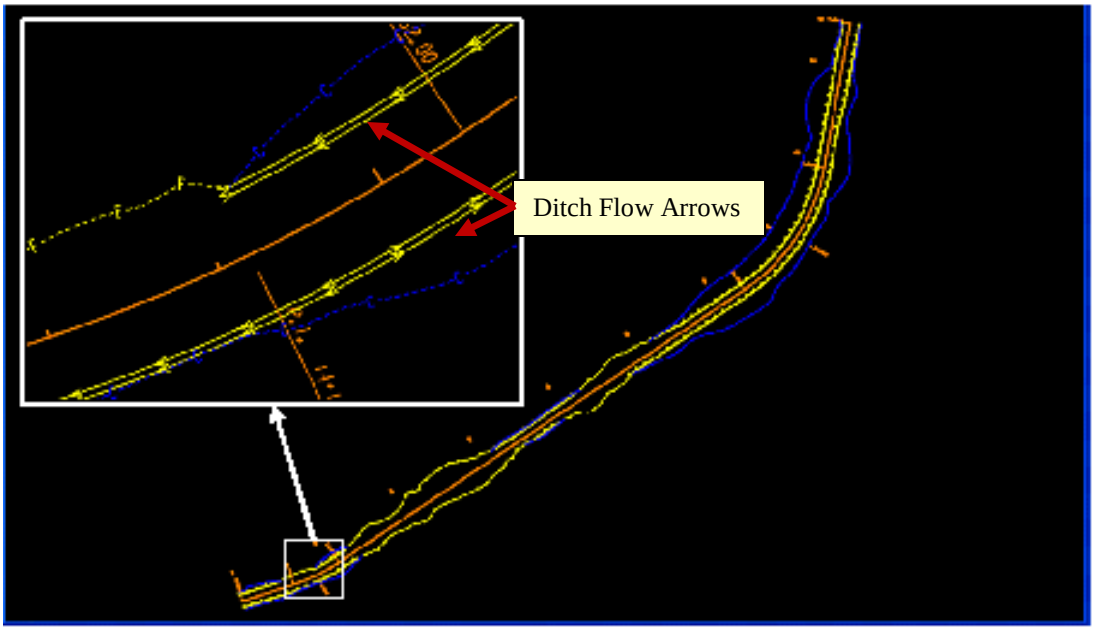


Figure L10-19 MicroStation View Window

38.	**Detach the 1234567MAIN.dgn and 1234567LIMT.dgn Reference Files.** The **1234567MAIN.dgn** and **1234567LIMT.dgn** Reference Files will be detached in order to create the DGN file for the Ditches and Ditch Flow Arrows. • In MicroStation, select **File ► References**. The **<u>References</u>** Window opens as shown in *Figure L10-20*.

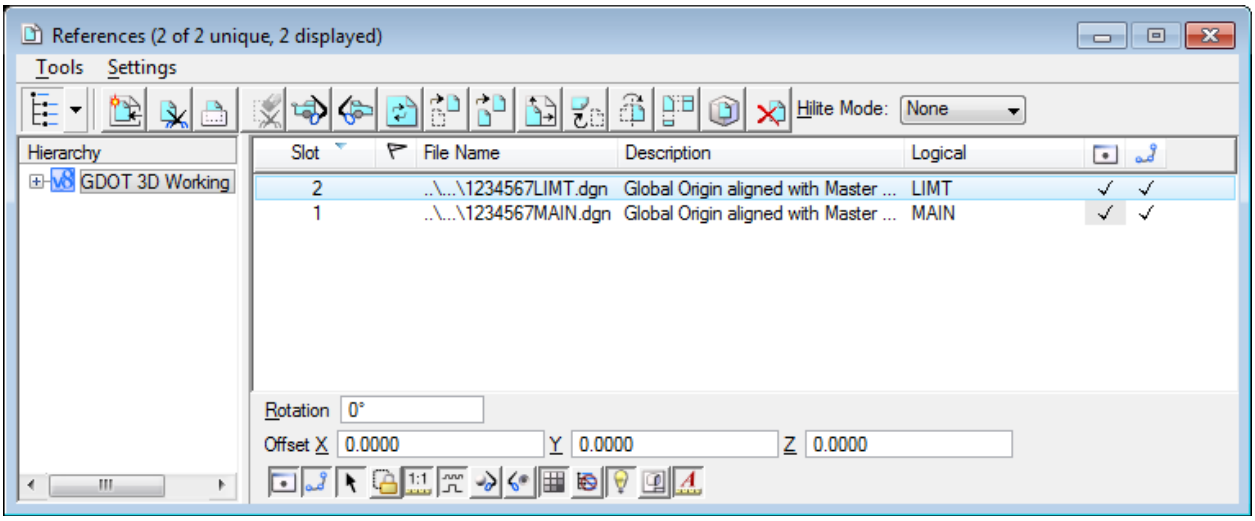


Figure L10-20 References Window

39.	**In the <u>References</u> Window – detach the File 1234567MAIN.dgn and 1234567LIMT.dgn.** • In the MicroStation **<u>References</u>** Window, select **Tools ► Detach All** and an **<u>Alert</u>** dialog will appear. • Click the **OK** button in the **<u>Alert</u>** dialog. • The **1234567MAIN.dgn and 1234567LIMT.dgn** Reference Files are detached. • **Close** the **<u>References</u>** Window by clicking the Red (X) in the upper right corner of the dialog box. • In MicroStation, click the **Fit View** icon ( ). • In MicroStation, verify that your view appears similar to *Figure L10-21*.

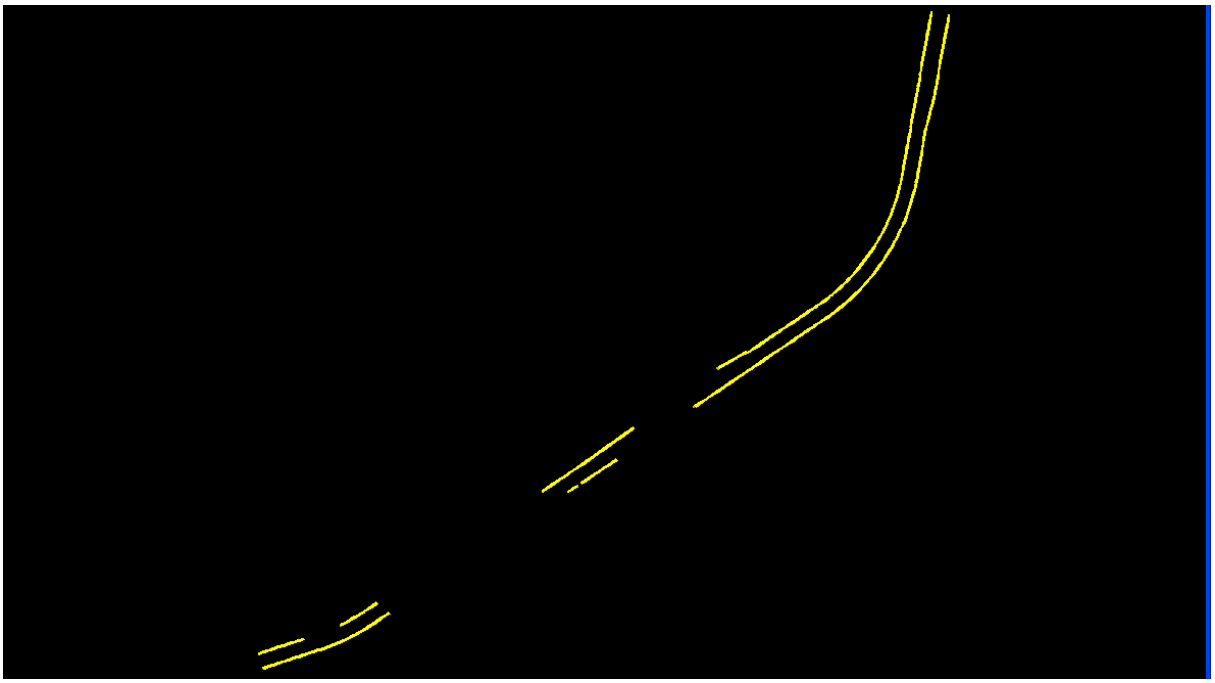


Figure L10-21 MicroStation View Window

40.	**Save the Ditches and Ditch Flow Arrows DGN File (1234567DRNG.dgn).** • In MicroStation, select **File ► Save As**. • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 10** • In the **File name:** field -- Enter the File name ***1234567DRNG.dgn*** • Click **Save**. *The MicroStation DGN File named 1234567DRNG.dgn is created and is made the current active DGN File. The DGN File has been saved in the 3D format.*

41.	**Open the 'GDOT 3D Working File.dgn".** In the previous steps – the **1234567DRNG.dgn** file was created and this became the active DGN file. In the following steps – the **'GDOT 3D Working File.dgn"** will need to be opened and made the active dgn file. • In MicroStation, select **File ► Open** and the **Open** dialog appears. • Navigate to **C:\InRoads Data\1234567\Design Labs\Standards** • Highlight **GDOT 3D Working File.dgn** • Click **Open**. Make Sure that the DGN file you are in is the correct file by looking at the MicroStation Title Bar: C:\InRoads Data\1234567\Design Labs\Standards\GDOT 3D Working File.dgn [3D - V8 DGN] - MicroStation V8i (SELECTseries 2) • In MicroStation, click the **Fit View** icon ( ). • In MicroStation, select **Edit ► Select All**. • In MicroStation, click the **Delete** icon ( ). *The GDOT 3D Working File.dgn is cleared of Graphics and is ready for the next Lab.*
42.	STOP This concludes Lab 10. Do not proceed until the Instructor directs you to do so.

Lab 11
Earthwork

Objective

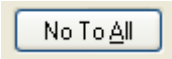
The objective of this Lab is to learn how to generate Earthwork Quantities and Earthwork Volume Reports from InRoads.

Lab 11A Set Project Defaults and Open Files

1. Starting Clean

In order to ensure that you are working with a "clean" database – you will close MicroStation and InRoads if they are still running from a previous Lab:

To CLOSE MicroStation and InRoads -

Select **File ▶ Exit** from the [MicroStation Menu].
If any messages appear regarding the saving of projects – Select 

This closes BOTH the MicroStation and InRoads Software(s).

2. Starting MicroStation and InRoads in the GDOT Workspace.

From the desktop, double-click on the **MicroStation** icon labeled **GDOT MicroStation V8i SS2 (x86)**.

Double click on the icon labeled **GDOT MicroStation V8i SS2 (x86)**.

- When the **MicroStation Manager** dialog box appears – navigate to the **C:\InRoads Data\1234567\Design Labs\Standards** folder and select the "**GDOT 3D Working File.dgn**". (Creation of the 'GDOT 3D Working File.dgn' is documented in the Design Guidelines). Click **Open**.

- Now open InRoads from within MicroStation by selecting:
  InRoads ▶ InRoads Suite (SELECTseries 2) V8i 08.11.07.566 from the [MicroStation Menu].

The MicroStation and InRoads Software(s) will open.

3. Clear the MicroStation Window.

Make Sure that the DGN file you are in is the correct file by looking at the MicroStation Title Bar:

- In MicroStation, click the **Fit View** icon ( ).
- In MicroStation, select **Edit ▶ Select All**.
- In MicroStation, click the **Delete** icon ( ).

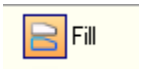
The GDOT 3D Working File.dgn is cleared of Graphics and is ready for this Lab.

4.	**Verify Project Defaults** • In InRoads, select **File ►Project Defaults** • Use the pull down next to **Configuration Name:** to select ***1234567_Design*** which you created in **Lab 1**. • Click **Apply** & **Close.** *Sets Project Defaults.*
5.	**Set the Design Default Preferences** • Select **File ► Project Options** and the **<u>Project Options</u>** dialog box appears. • Select the **Factors** tab. • This will be a 50 scale project. Enter ***50*** for the **Text**, **Cell** & **Line Style Scale Factor(s)**. • Then in the same **<u>Project Options</u>** dialog box select the **Geometry** tab. • Click the **Preferences** button at the bottom of the dialog box. • Choose ***Design Default***. Click **Load** and **Close**. This will set the remainder of the Design Defaults. ****IMPORTANT**: As stated previously the ***Design Default*** Preference loads the appropriate settings for use during Design. These settings include the Alignment and Point name settings. These settings are of particular importance to the Designer. Alignments must have a **DE** prefix. Points must also have a **DE** prefix as well as beginning the point numbering scheme at Number 10000. In order for survey enhancements to be properly added during the design phase of a project, it is essential that Designers pay particular attention to this setting. • In the **<u>Project Options</u>** dialog box click **Apply** and **Close**. *Sets the Design Default Preference.*
6.	**Open 1234567_Design.alg** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 11** • Highlight **1234567_Design.alg** • Click **Open** & **Cancel**. *The Geometry Project 1234567_Design.alg is opened.*
7.	**Open GDOT_Lab11.itl** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 11** • Highlight **GDOT_Lab11.itl** • Click **Open** & **Cancel**. *The Template Library GDOT_Lab11 is opened.*

8.	**Open 1234567_Lab11.ird** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 11** • Highlight **1234567_Lab11.ird** • Click **Open** & **Cancel**. *The Roadway Design File 1234567_Lab11 is opened.*
9.	**Open 1234567_Exist.dtm** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 11** • Highlight **1234567_Exist.dtm** • Click **Open** & **Cancel**. *The Surface Project 1234567_Exist.dtm is opened.*
10.	**Open 1234567_SR100 SPUR_Lab11.dtm** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 11** • Highlight **1234567_SR100 SPUR_Lab11.dtm** • Click **Open** & **Cancel**. *The Finish Surface 1234567_ SR100 SPUR_Lab11 is opened.*
11.	**Open 1234567_Bogus1_Lab11.dtm** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 11** • Highlight **1234567_Bogus1_Lab11.dtm** • Click **Open** & **Cancel**. *The Bogus Surface 1234567_Bogus1_Lab11 is opened.*

Lab 11B Generating Earthwork Reports: End-Area Volumes

InRoads computes Earthwork from the Cross Sections drawn in MicroStation. Before an Earthwork Volume Report can be generated in InRoads, a Cross Section Set must be drawn in MicroStation. Lab11B will guide you through viewing Cross Section Sets in MicroStation through generation of the **GDOT Earthwork Volumes Report**.

12.	**Important! Ensure that the "Fill" Attribute is turned <u>on</u> in MicroStation.** • In MicroStation, select **Settings ► View Attributes**. The **<u>View Attributes</u>** dialog opens. Ensure that the **Fill** Attribute is highlighted and selected.  The **Fill** Attribute should be highlighted as shown on the left. • The **Fill** Attribute must be turned on in MicroStation in order for the Volumes to view the Cut/Fill areas in the appropriate Fill or Cut Shaded color. • **Close** the **<u>View Attributes</u>** dialog by clicking the Red (X) in the upper right corner of the dialog box.
13.	**Open the <u>Cross Sections</u> Dialog.** • In InRoads, select **Evaluation ► Cross Section ► Cross Sections**. The **<u>Cross Sections</u>** dialog opens as shown in *Figure L11-1*.

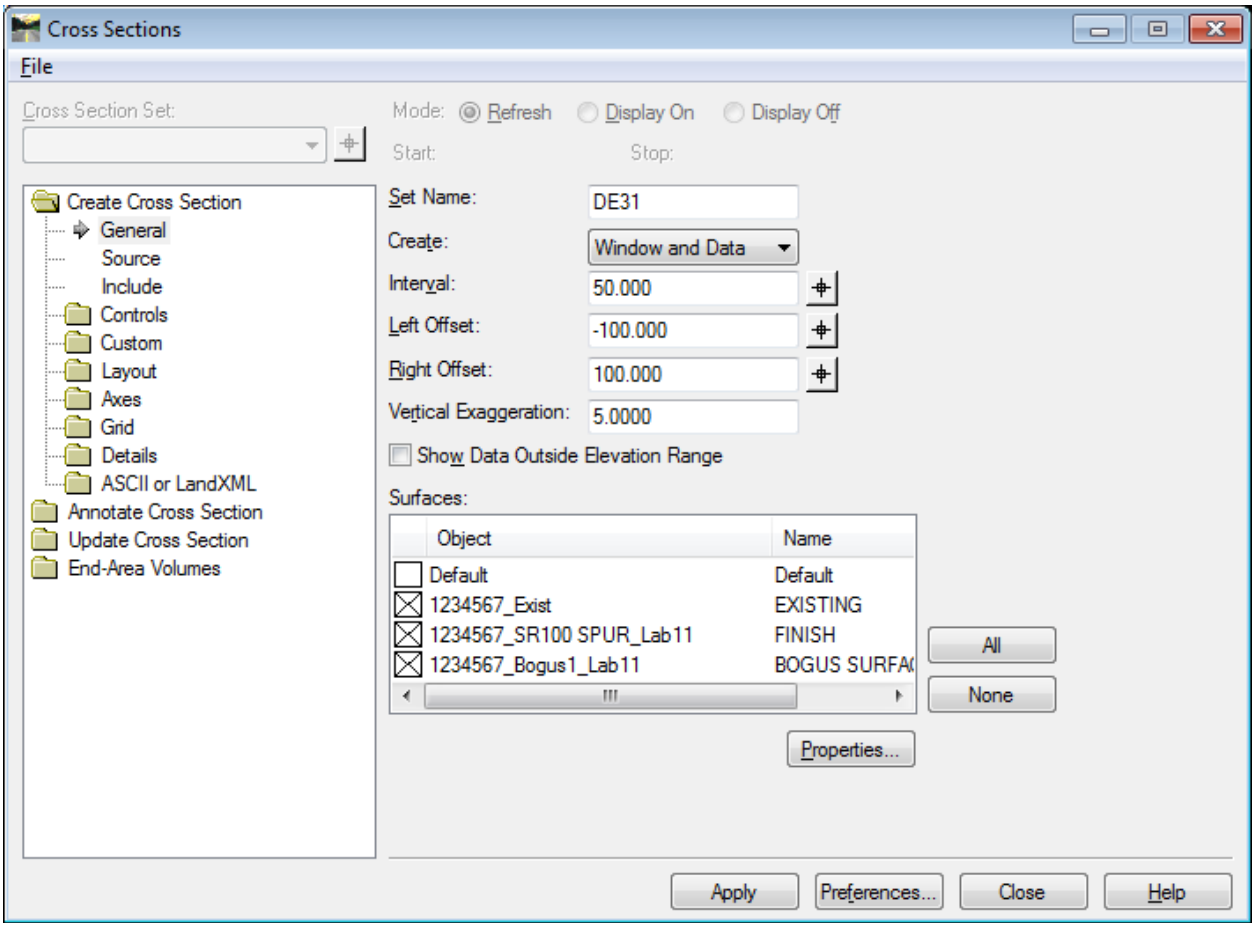
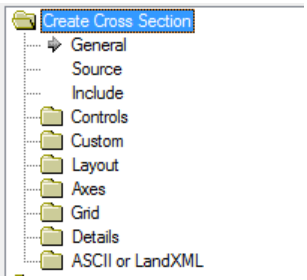


Figure L11-1 Create Cross Section

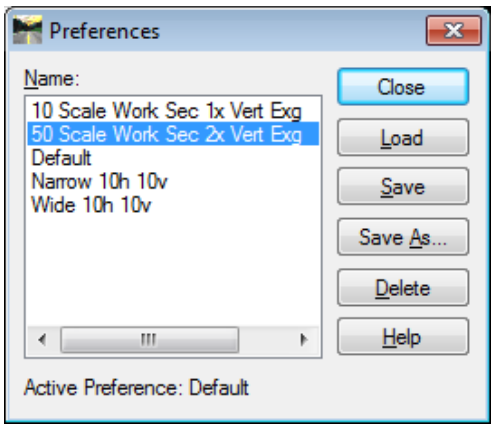
14. **Open the Preferences Dialog and load *'50 Scale Work Sec 2x Vert Exg'*.**

- Ensure the **Create Cross Section** "folder" is highlighted/selected as depicted here:



NOTE: Depending on which folder is selected (either "***Create Cross Section***, ***Annotate Cross Section***, ***Update Cross Section*** or ***End-Area Volumes***), the available **Preferences** will change.

- In the **<u>Cross Sections</u>** dialog, click the **Preferences** button. The **<u>Preferences</u>** dialog opens as shown here.



- Highlight the Preference **50 Scale Work Sec 2x Vert Exg**.
- Click **Load** and **Close**.

15. **For Information Only:**

*The **50 Scale Work Sec 2x Vert Exg** Preference as well as the **10 Scale Work Sec 1x Vert Exg** Preference uses the built in InRoads grid for viewing the cross sections rather than the GDOT Cross Section plan sheet cell. The InRoads grid is set up with fewer grid lines to help with the viewing of the cross sections in MicroStation during design. The Preference **50 Scale Work Sec 2x Vert Exg** is also setup with larger left and right offsets to ensure space is available to draw the entire cross section. When viewing cross sections for generating Earthwork Reports, it is important that the entire cross section is drawn at each station as the Earthwork Volumes for end area reports are computed directly from the areas of the cross sections in the MicroStation drawings. When high fill or cut slopes exceed the left and right offsets setup by the Preferences - the offsets must be increased manually in the <u>Create Cross Section</u> dialog or by manually extending the cut/fill lines to the existing ground.*

16.	**Select the Surfaces and View the Surfaces.** • In the **<u>Cross Sections</u>** dialog, click the **General** tab to ensure it is the active tab. • Verify an **X** is present in the check boxes for each of the **Surfaces:** listed here. ▪ ***1234567_Exist*** ▪ ***1234567_SR100 SPUR_Lab11*** ▪ ***1234567_Bogus1_Lab11*** • Verify your settings match those shown in *Figure L11-2*. • Click **Apply**. • Notice in the bottom left corner of the MicroStation Window you are prompted to **>Identify Location**, left click anywhere in the MicroStation Window. • The cross sections are drawn in MicroStation and the **<u>Cross Sections</u>** dialog re-appears. • Do **<u>not</u>** close the **<u>Cross Sections</u>** dialog.

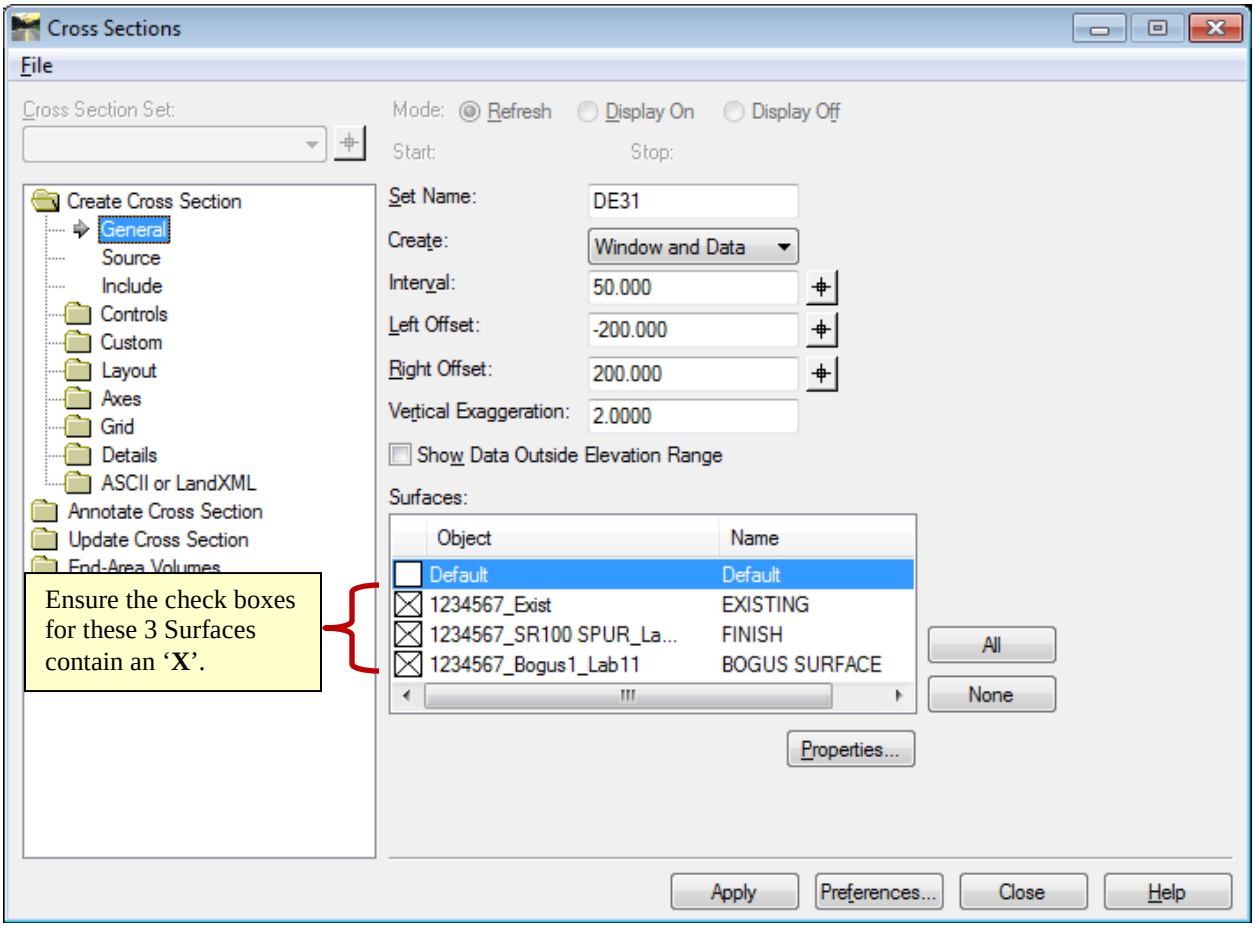


Figure L11-2 Create Cross Section

17.	**Open the <u>Cross Section Viewer</u> and Navigate to Station 10+00.00.** • In InRoads, select **Evaluation ► Cross Section ► Cross Section Viewer**. • Left click on Station **10+00.00** to center Station **10+00.00** in the MicroStation View Window. • Verify your view in MicroStation matches that shown in *Figure L11-3*.

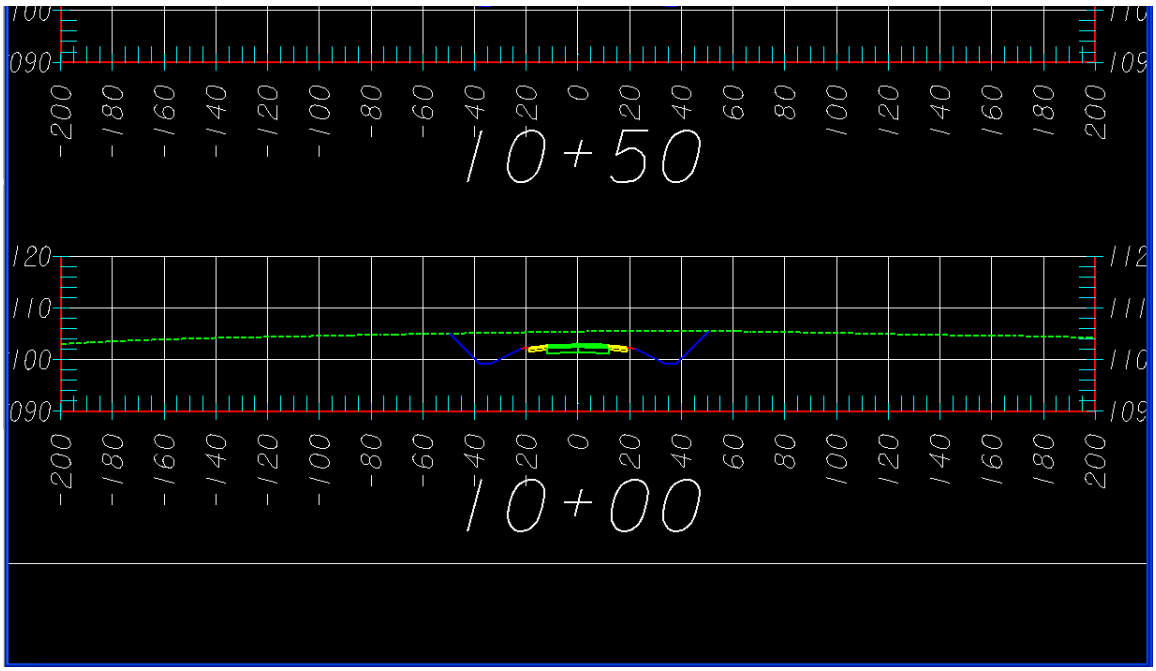
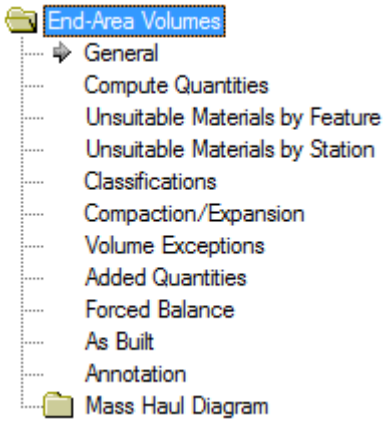


Figure L11-3 MicroStation View Window

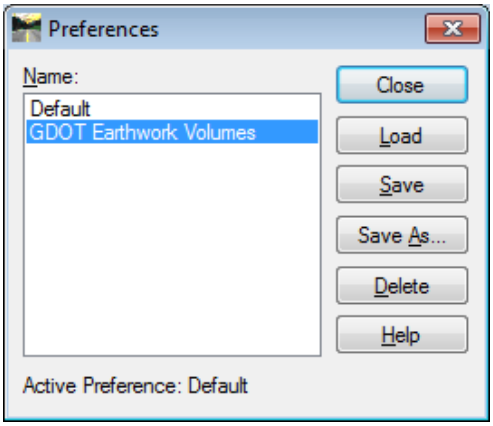
18. **Open the End-Area Volumes Folder in the Cross Sections dialog.**

- Ensure the **End-Area Volumes** "folder" is highlighted/selected as depicted here:



NOTE: Depending on which folder is selected (either "***Create Cross Section***, ***Annotate Cross Section***, ***Update Cross Section*** or ***End-Area Volumes***), the available **Preferences** will change.

- In the **Cross Sections** dialog, click the **Preferences** button. The **Preferences** dialog opens as shown here.



- Highlight the Preference **GDOT Earthwork Volumes**.
- Click **Load** and **Close**.
- Verify your settings match those as shown in *Figure L11-4*.

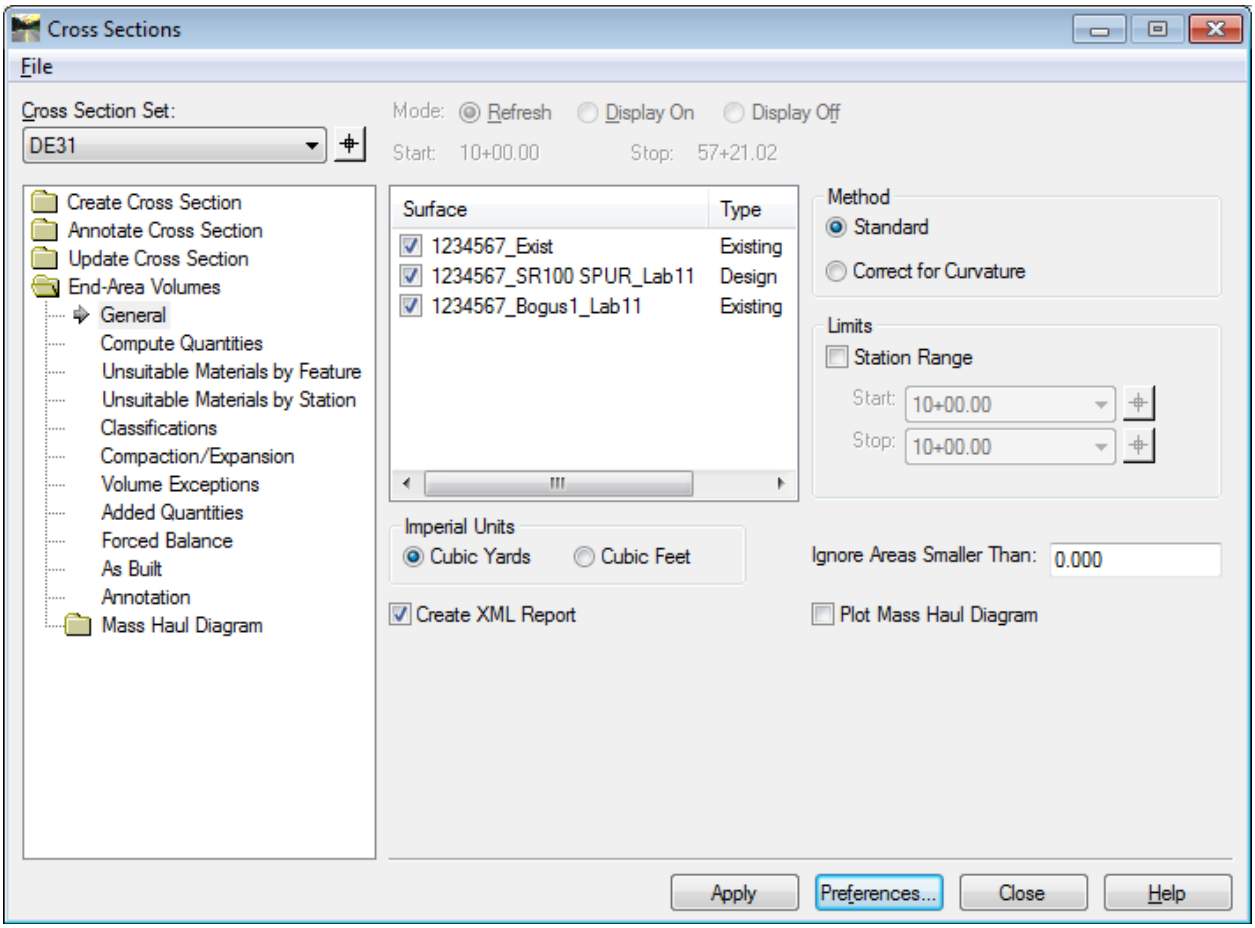
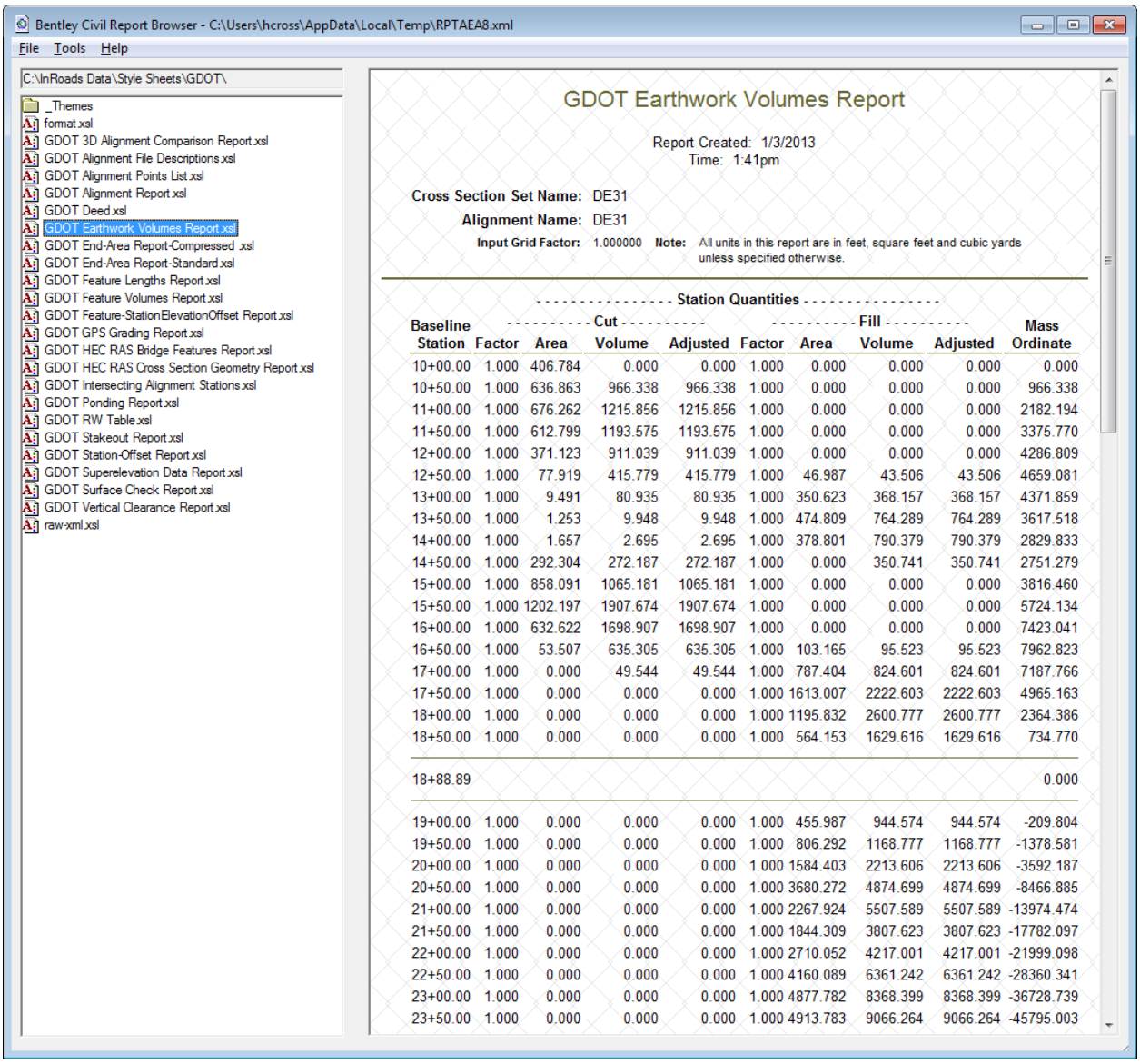


Figure L11-4 End-Area Volumes

19.	**For Information Only:** *The **GDOT Earthwork Volumes** Preference loads settings into the Cross Sections dialog to generate a Volumes Report. The Preference does not load settings to apply cut/fill adjustment factors. The Designer is referred to the R.O.A.D.S. webpage for GDOT examples of manually applying cut/fill adjustment factors.*
20.	**Generate and Review the Earthwork Volumes Report.** • In the **Cross Sections** dialog, click **Apply** but do **not** click **Close**. The **Bentley Civil Report Browser** opens. • In the **Bentley Civil Report Browser**, select the Style Sheet named **GDOT Earthwork Volumes.xsl** by Left clicking on it. • The GDOT Earthwork Volumes Report opens in the **Bentley Civil Report Browser**. • Verify your Report matches that shown in *Figure L11-5*. • Do **not** close the Report.



GDOT Earthwork Volumes Report

Report Created: 1/3/2013
Time: 1:41pm

Cross Section Set Name: DE31
Alignment Name: DE31
Input Grid Factor: 1.000000 **Note:** All units in this report are in feet, square feet and cubic yards unless specified otherwise.

Baseline	Station Quantities								Mass
	Cut				Fill				
Station	Factor	Area	Volume	Adjusted	Factor	Area	Volume	Adjusted	Ordinate
10+00.00	1.000	406.784	0.000	0.000	1.000	0.000	0.000	0.000	0.000
10+50.00	1.000	636.863	966.338	966.338	1.000	0.000	0.000	0.000	966.338
11+00.00	1.000	676.262	1215.856	1215.856	1.000	0.000	0.000	0.000	2182.194
11+50.00	1.000	612.799	1193.575	1193.575	1.000	0.000	0.000	0.000	3375.770
12+00.00	1.000	371.123	911.039	911.039	1.000	0.000	0.000	0.000	4286.809
12+50.00	1.000	77.919	415.779	415.779	1.000	46.987	43.506	43.506	4659.081
13+00.00	1.000	9.491	80.935	80.935	1.000	350.623	368.157	368.157	4371.859
13+50.00	1.000	1.253	9.948	9.948	1.000	474.809	764.289	764.289	3617.518
14+00.00	1.000	1.657	2.695	2.695	1.000	378.801	790.379	790.379	2829.833
14+50.00	1.000	292.304	272.187	272.187	1.000	0.000	350.741	350.741	2751.279
15+00.00	1.000	858.091	1065.181	1065.181	1.000	0.000	0.000	0.000	3816.460
15+50.00	1.000	1202.197	1907.674	1907.674	1.000	0.000	0.000	0.000	5724.134
16+00.00	1.000	632.622	1698.907	1698.907	1.000	0.000	0.000	0.000	7423.041
16+50.00	1.000	53.507	635.305	635.305	1.000	103.165	95.523	95.523	7962.823
17+00.00	1.000	0.000	49.544	49.544	1.000	787.404	824.601	824.601	7187.766
17+50.00	1.000	0.000	0.000	0.000	1.000	1613.007	2222.603	2222.603	4965.163
18+00.00	1.000	0.000	0.000	0.000	1.000	1195.832	2600.777	2600.777	2364.386
18+50.00	1.000	0.000	0.000	0.000	1.000	564.153	1629.616	1629.616	734.770
18+88.89									0.000
19+00.00	1.000	0.000	0.000	0.000	1.000	455.987	944.574	944.574	-209.804
19+50.00	1.000	0.000	0.000	0.000	1.000	806.292	1168.777	1168.777	-1378.581
20+00.00	1.000	0.000	0.000	0.000	1.000	1584.403	2213.606	2213.606	-3592.187
20+50.00	1.000	0.000	0.000	0.000	1.000	3680.272	4874.699	4874.699	-8466.885
21+00.00	1.000	0.000	0.000	0.000	1.000	2267.924	5507.589	5507.589	-13974.474
21+50.00	1.000	0.000	0.000	0.000	1.000	1844.309	3807.623	3807.623	-17782.097
22+00.00	1.000	0.000	0.000	0.000	1.000	2710.052	4217.001	4217.001	-21999.098
22+50.00	1.000	0.000	0.000	0.000	1.000	4160.089	6361.242	6361.242	-28360.341
23+00.00	1.000	0.000	0.000	0.000	1.000	4877.782	8368.399	8368.399	-36728.739
23+50.00	1.000	0.000	0.000	0.000	1.000	4913.783	9066.264	9066.264	-45795.003

Figure L11-5 Bentley Civil Report Browser

21.	**Save the Earthwork Volumes Report in HTML Format.** • In the **<u>Bentley Civil Report Browser</u>**, click **File ▶ Save As** to save the .html file. • The **<u>Save As</u>** dialog box will appear as shown in *Figure L11-6*.

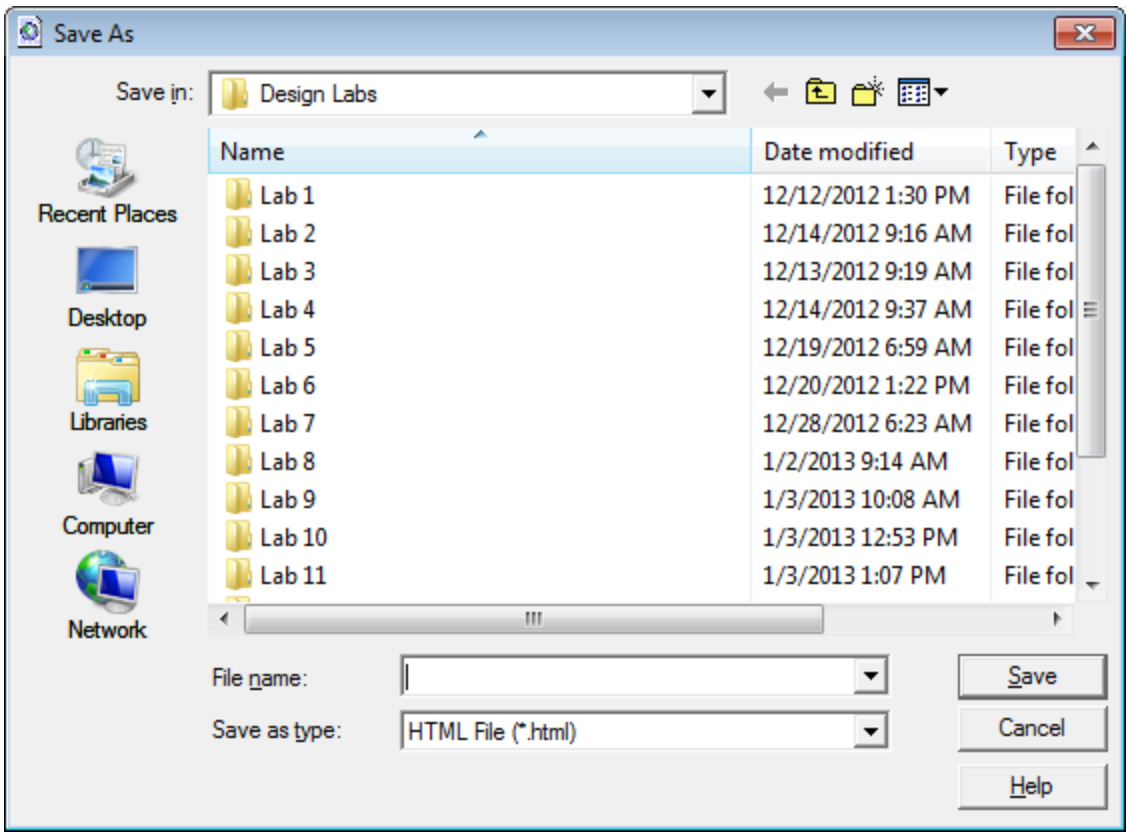


Figure L11-6 Save As

22.	**Save the Earthwork Volumes Report in HTML Format.** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 11** • Enter the **File name:** as ***1234567_SR100 SPUR_Lab11*** • Enter the **Save as type:** as ***HTML File (*.html)*** • Click **Save.** The HTML File is saved to the following location: **C:\InRoads Data\1234567\Design Labs\Lab 11** The HTML File can also been printed as needed. **<u>Please Note:</u>** After the HTML file is created – the file information can also be opened by using Microsoft Office Excel to review the End-Area Volume information in a spreadsheet format.

23.	**Set the Style Sheet 'GDOT Earthwork Volumes.xsl' to be the Default Style Sheet that opens whenever the <u>End-Area Volumes</u> command is processed.** • In the **<u>Bentley Civil Report Browser,</u>** Right click over the Style Sheet **GDOT Earthwork Volumes.xsl**. • In the pop-up menu, Left click on **Set as Default End Area Volume** and ensure a check mark exists next to it as shown in *Figure L11-7*. • In the **<u>Bentley Civil Report Browser</u>** click **File ▶ Exit** to close out of the Report Browser.

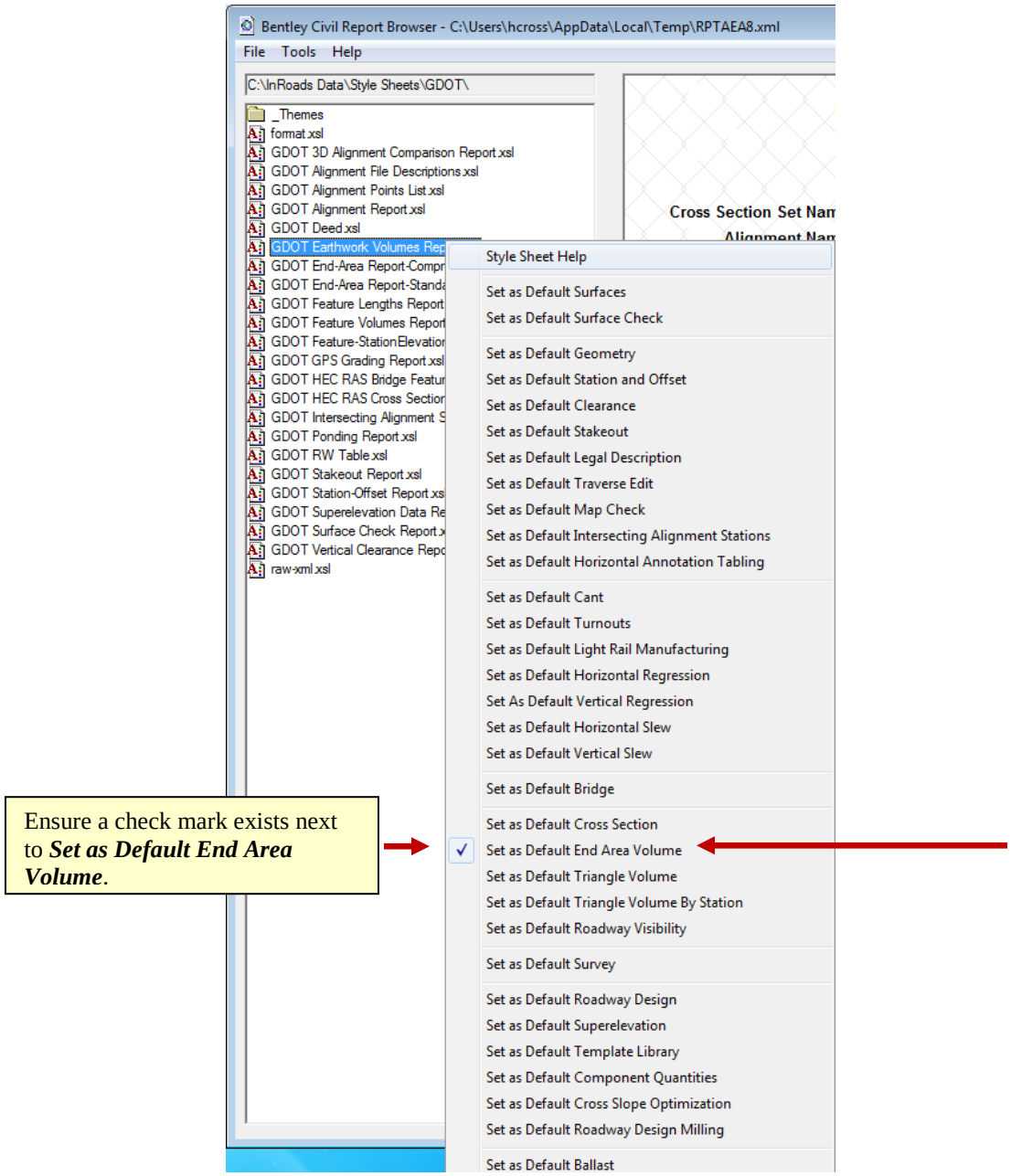


Figure L11-7 Report Browser

24.	**Verify the 'GDOT Earthwork Volumes Report' was set as the Default End Area Volume Report.** • In the **Cross Sections** dialog, click **Apply**. • The **Bentley Civil Report Browser** opens and is defaulted to the **GDOT Earthwork Volumes.xsl**. • The **GDOT Earthwork Volumes.xsl** will now be the Default End Area Volume Report and will open whenever End Area Volumes are generated.
25.	**Information Only:** • Brief Style Sheet Help Information is provided by Right clicking on the **GDOT Earthwork Volumes.xsl** Style Sheet Name and selecting **Style Sheet Help**. • Help information is provided as shown in *Figure L11-8*. • **Close** the **Style Sheet Help** dialog by clicking the Red (X) in the upper right corner of the dialog box.

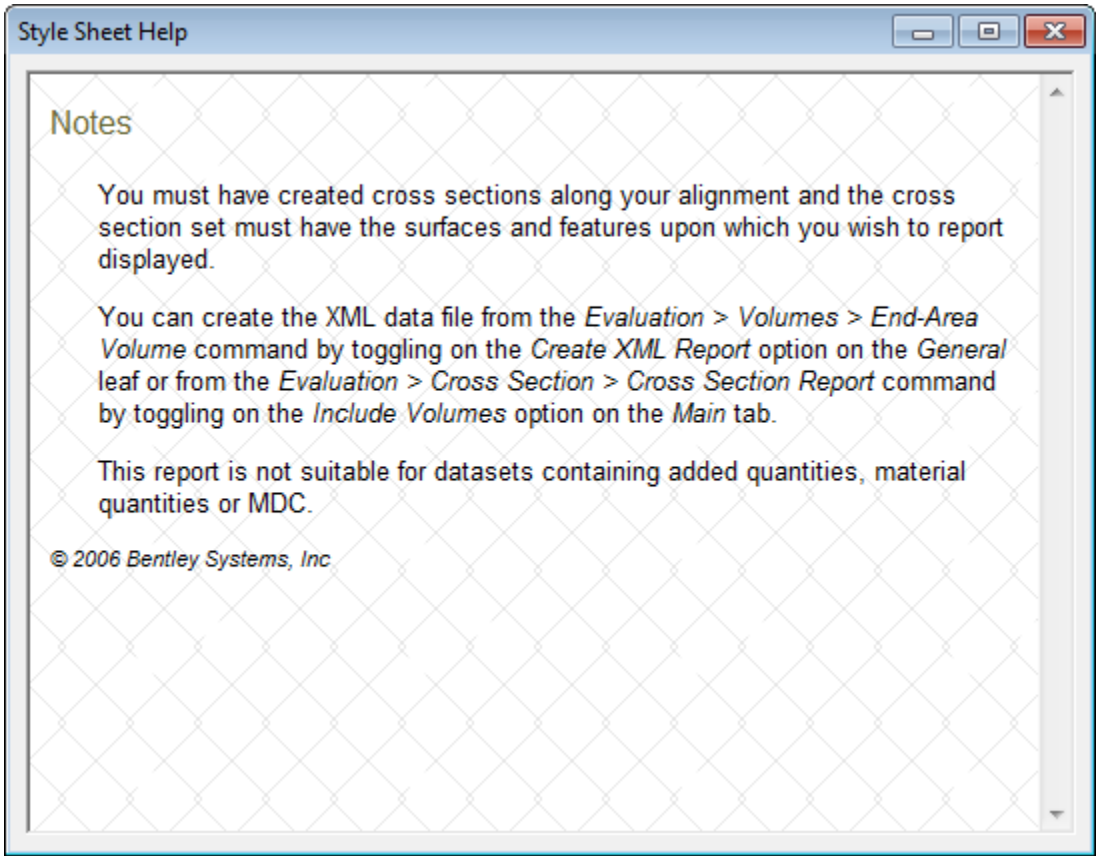


Figure L11-8 Style Sheet Help

26.	**Close the GDOT Earthwork Volumes Report.** • In the **Bentley Civil Report Browser** click **File ► Exit** to close out of the Report Browser.
27.	**IMPORTANT:** • The **Cross Sections** dialog should still be open. Click **Close** – to close out of the **Cross Sections** dialog. • Click **No** if a Message appears asking if you want to save the modified parameter values.
28.	**Review Station 10+00.00 in MicroStation.** • If not still open from previous steps, open the **Cross Section Viewer** dialog by selecting **Evaluation ► Cross Section ► Cross Section Viewer**. • Highlight Station **10+00.00**. • Verify your view in MicroStation matches that shown in *Figure L11-9*. • Notice the cross section is filled in Green. The **End-Area Volumes** command executed in previous steps shades all Cut sections Green.

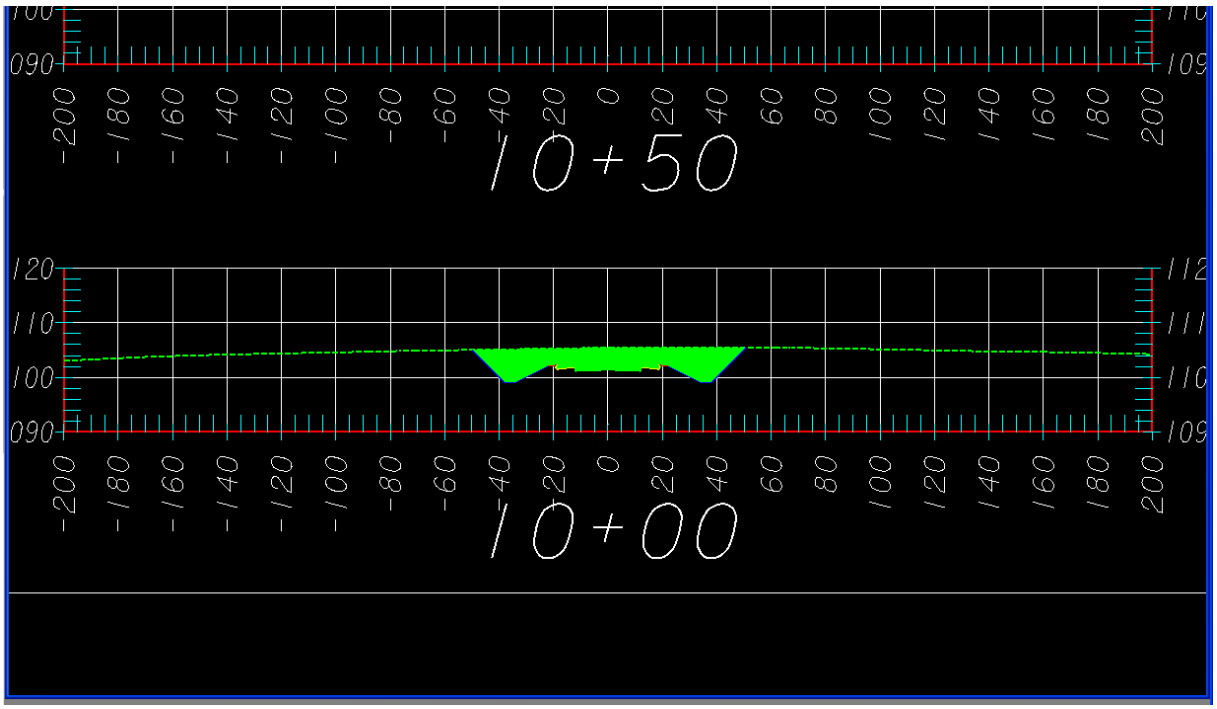


Figure L11-9 MicroStation View Window

29.	**Review Station 13+50.00 in MicroStation.** • In the **Cross Section Viewer**, highlight Station **13+50.00**. • Verify your view in MicroStation matches that shown in *Figure L11-10*. • Notice the cross section is filled in Blue. The **End-Area Volumes** command executed in previous steps shades all Fill sections Blue.

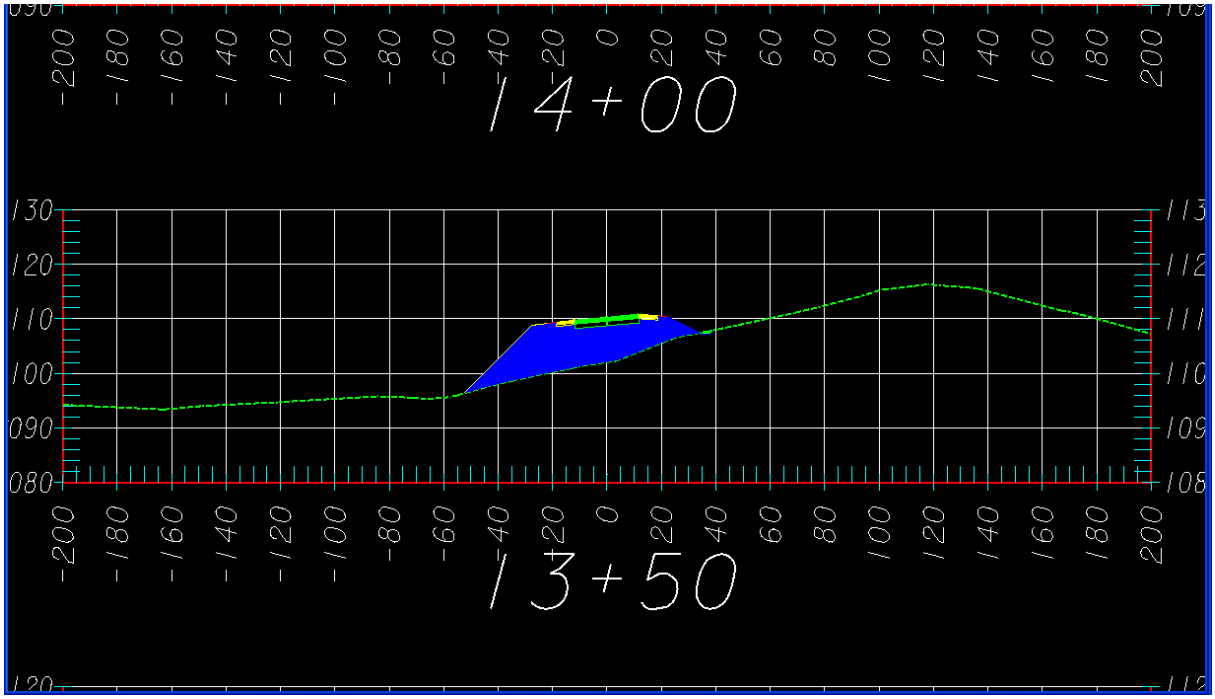


Figure L11-10 MicroStation View Window

30.	**Review Station 46+50.00 in MicroStation.** • In the **Cross Section Viewer**, highlight Station **46+50.00**. • Verify your view in MicroStation matches that shown in *Figure L11-11*. • Notice there is a Gap (that is not filled in with Cut) that exists in the cross section. • Read **IMPORTANT!** in the next step.
31.	**IMPORTANT!** Even though **'Target Aliasing'** was used in the Roadway Designer in Lab 8 to allow the Template to solve correctly, the Earthwork Volumes may only be computed between two Surfaces. An example of this is an 'Existing' Surface and a 'Design' Surface. The Surfaces **1234567_Exist.dtm** and **1234567_Bogus1_Lab11.dtm** have both been assigned the type '**Existing**' in the **Surface Properties** dialog. When obscured areas exist in the Existing Ground DTM, the proper course of action is to request additional survey for the obscured areas. When temporary earthwork volumes are needed while waiting for additional survey information to arrive or in areas where lakes or marshy areas prevent additional survey from being collected -- the Designer may draw the missing Existing Surface and Design Surface in MicroStation for the temporary determination of earthwork volumes. Doing so will provide the areas needed for InRoads to calculate the volumes. It should be restated though that this method of resolving obscured areas is not survey quality and is only for the temporary evaluation of preliminary earthwork volumes.

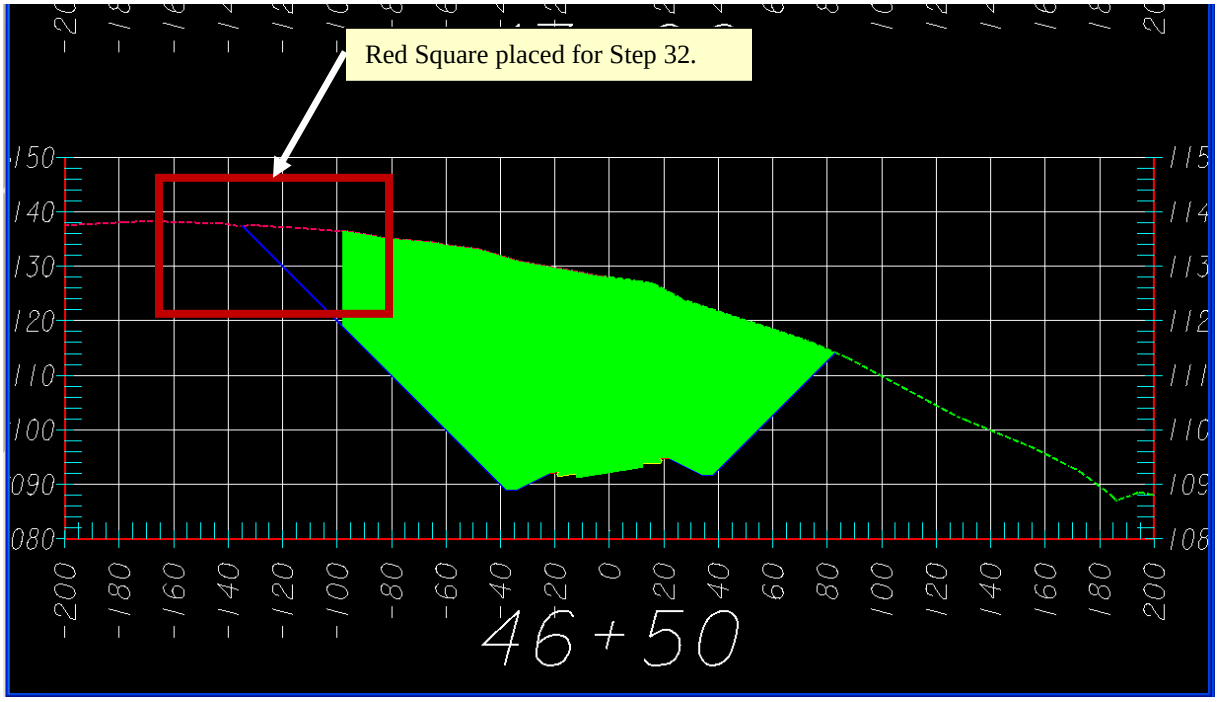


Figure L11-11 MicroStation View Window

32.	**Zoom into the Cross Section.** • In MicroStation, click the **Window Area** icon and window to the extents identified by the Red Square in *Figure L11-11*. • Verify your view in MicroStation matches that shown in *Figure L11-12*.
33.	**Delete the Green Fill Shape and Line representing the Bogus Ground at Station 46+50.00.** • In MicroStation, click the **Delete** icon ( ). • Left click on the Green Shape to select the Shape and then Left click again to delete the Shape as shown in *Figure L11-12*. • In MicroStation, click the **Delete** icon ( ) again. • Left click on the Pink Line to select the Line and then Left click again to delete the Line as shown in *Figure L11-12*. • Verify your view in MicroStation matches that shown in *Figure L11-13*.

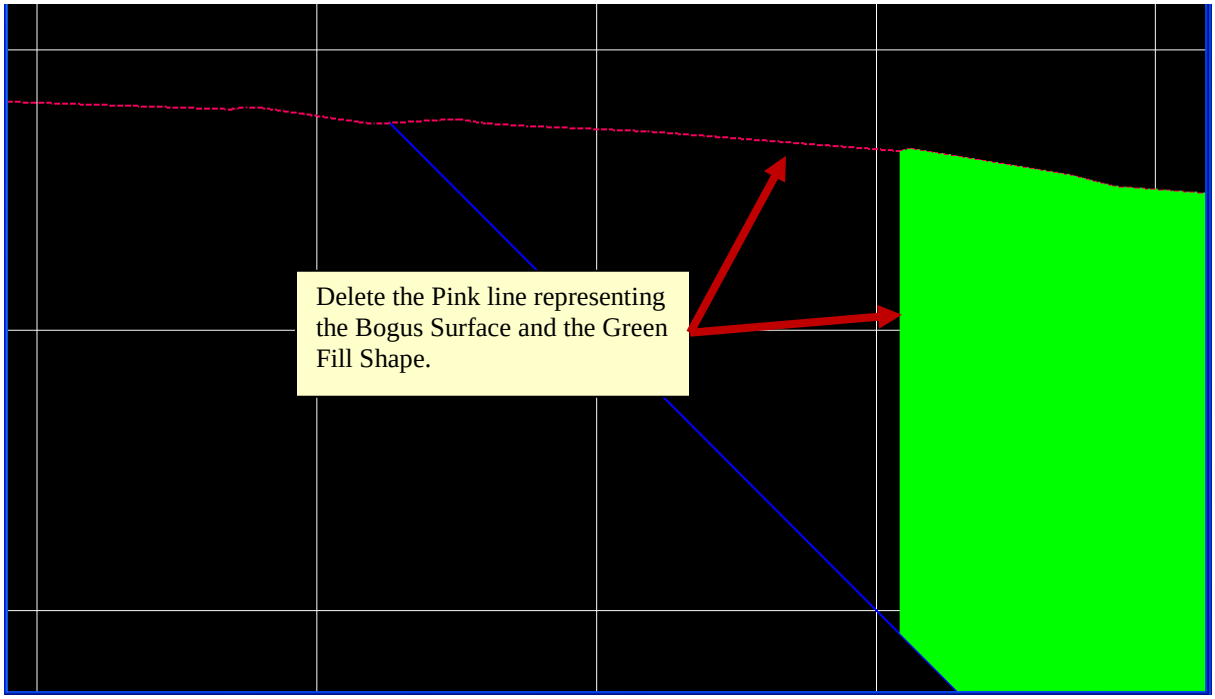


Figure L11-12 MicroStation View Window

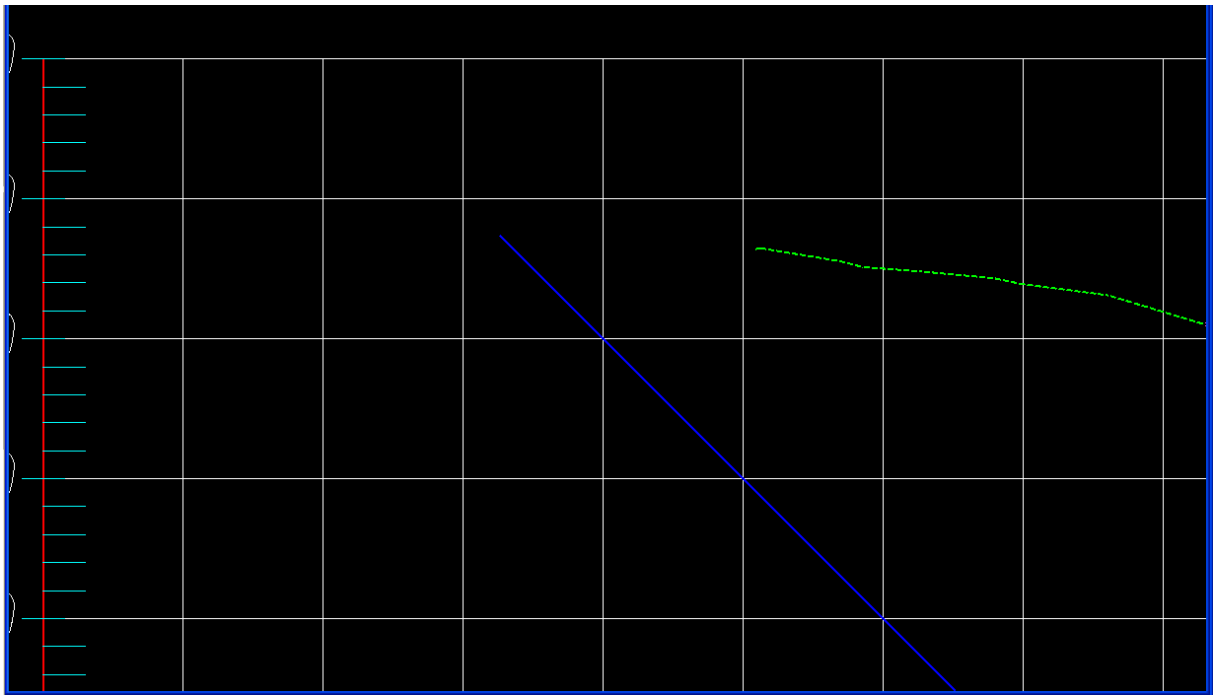


Figure L11-13 MicroStation View Window

34.	**Extend the Green Dashed Line Representing the Existing Ground.** • In MicroStation, click the **Modify** element icon ( ). • Left click on the end of the Existing Ground (dashed green line). • The Existing Ground now dynamically follows the mouse as you move it across the screen. • Snap to the slope stake point at the end of the blue cut line. If you do not snap to the end of the line the fill shape may not draw correctly. • Verify in MicroStation that your view matches that shown in *Figure L11-14* and that the existing ground was drawn correctly.

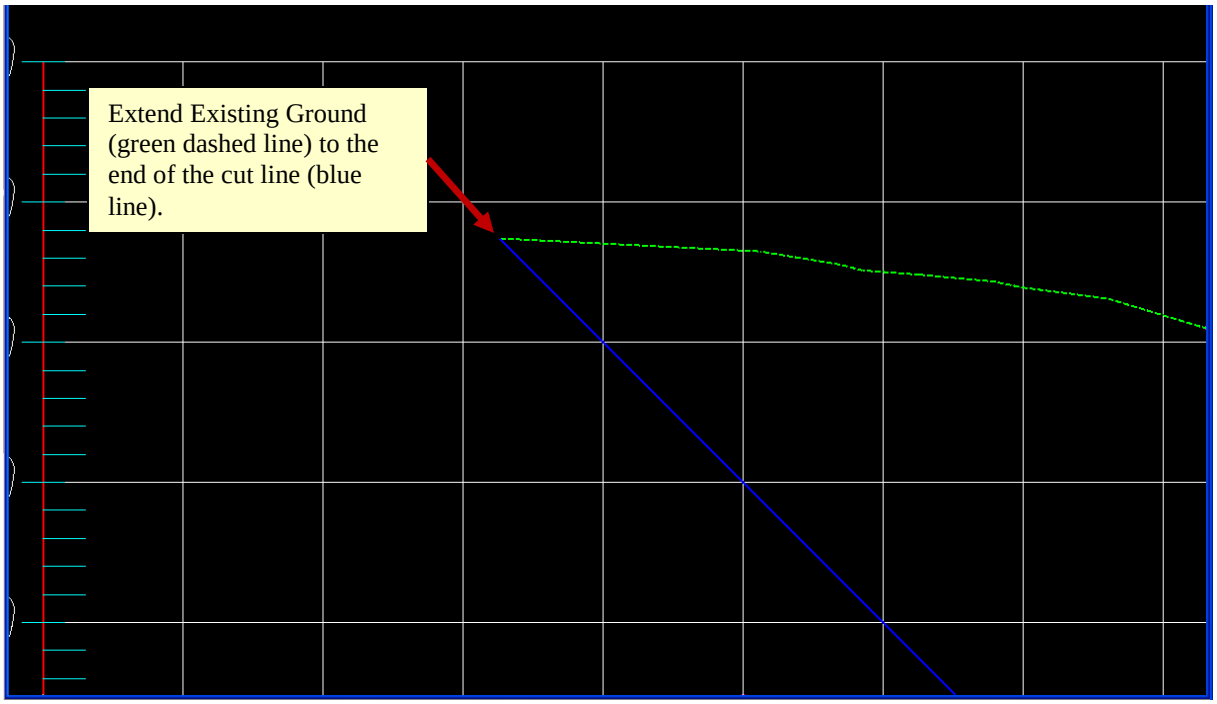


Figure L11-14 MicroStation View Window

35.	**Open the <u>Cross Sections</u> Dialog.** • In InRoads, select **Evaluation ► Cross Section ► Cross Sections**.
36.	**Load the Preference 'GDOT Earthwork Volumes'.** • In the **<u>Cross Sections</u>** dialog, click on the **End-Area Volumes** folder. (Make sure it is highlighted in Blue). • Next, click the **Preferences** button. • In the **<u>Preferences</u>** dialog, highlight the Preference **GDOT Earthwork Volumes.** • Click **Load** and **Close**.
37.	**Re-compute the End-Area Volumes.** • In the **<u>Cross Sections</u>** dialog, click **Apply**. • The **<u>Bentley Civil Report Browser</u>** opens. • In the **<u>Bentley Civil Report Browser</u>**, click **File ► Exit** to close out of the Report Browser. • Click **Close** to exit the **<u>Cross Sections</u>** dialog.

38.	**Review Station 46+50.00 in MicroStation.** • If not still open, open the **Cross Section Viewer** by selecting **Evaluation ► Cross Section ► Cross Section Viewer**. • Highlight Station **46+50.00**. • Verify your view in MicroStation matches that shown in *Figure L11-15*. • Notice the cross section is filled and no gap exists.

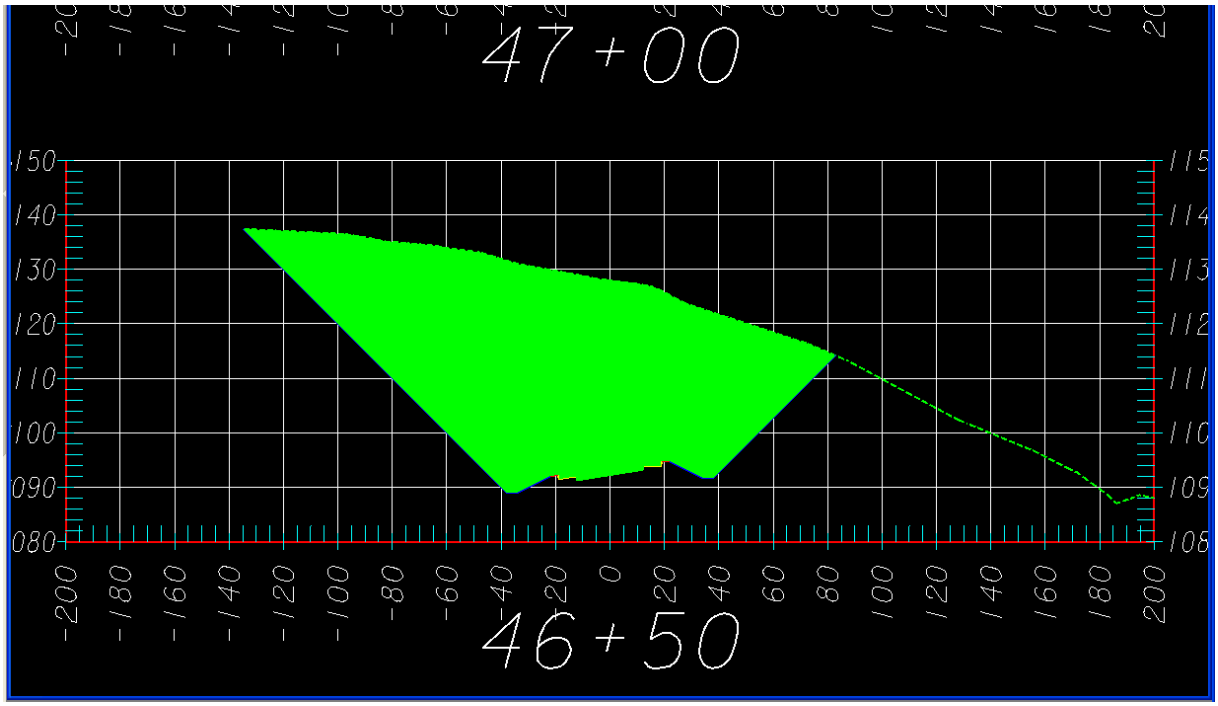


Figure L11-15 MicroStation View Window

39.	**Review Station 47+00.00 in MicroStation.** • In the **Cross Section Viewer**, highlight Station **47+00.00**. • Verify your view in MicroStation matches that shown in *Figure L11-16*. • Notice the cross section contains a gap in the upper left corner. • Click **Close** to exit the **Cross Section Viewer** dialog.

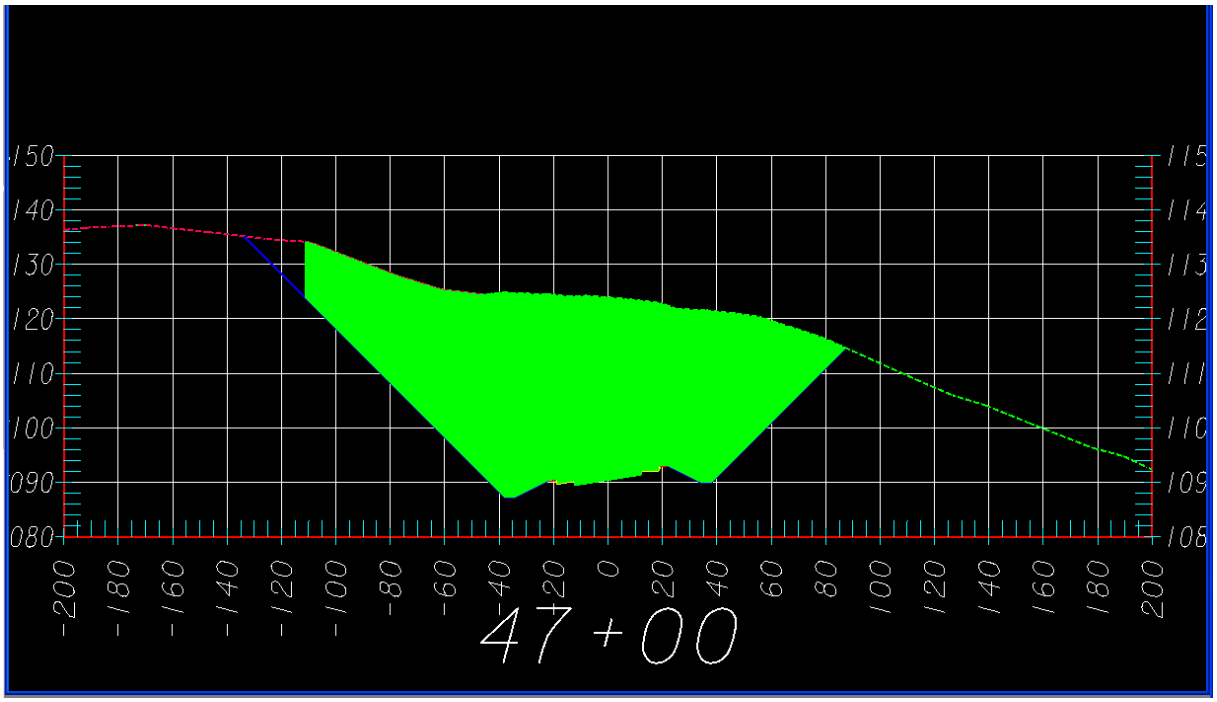


Figure L11-16 MicroStation View Window

40.	**For Information Only:** *Even though Station 46+50.00 was revised in order to calculate earthwork volumes, the changes made don't affect any of the other Stations with the same or similar situations. Each Station must be individually edited. Those of you who are transitioning from* ***CAiCE*** *to* ***InRoads*** *are currently accustomed to* ***CAiCE's*** *ability to extend the Existing Ground and cut or fill slope to intersect one another in order to generate preliminary earthwork and/or construction limits. Unfortunately InRoads does not currently have this ability. The Designer is reminded to make no edits to the Existing DTM provided by the Office of Design Policy and Support/Location Bureau. All edits required to the Existing DTM are only to be made by the Survey Data Engineer (SDE).*
41.	**Prepare MicroStation and InRoads for the Next lab.** • In MicroStation, select **Edit ► Select All**. • In MicroStation, click the **Delete** icon ( ).
42.	This concludes Lab 11. Do not proceed until the Instructor directs you to do so.

Lab 12
Required R/W

Objective

The objective of this Lab is to learn the process of storing Required R/W Parcels and generating Right of Way Tables.

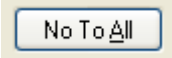
Lab 12A Set Project Defaults and Open Files

The objective of Lab 12A is to ensure that the proper settings are in place before attempting to store a Required Right of Way Alignment. It is very important to remember that all Points a Designer stores must use the prefix 'DE' and start numbering at '10000' (i.e. DE10000). It is also very important that all Required Right of Way Alignments stored by a Designer uses the prefix 'DE'. The Required Right-of-Way Alignments may begin numbering at '1' (i.e. DE1). Surveyors and/or SDE's store Alignments using the prefix 'SV' (i.e. SV1). The original field survey Points are imported into InRoads without prefixes and Surveyors/SDE's store all additional Points with no prefixes. The Surveyor/SDE is instructed not to store Cogo Points beyond Point 9999. The Surveyor/SDE has been instructed to contact the Designer when additional Points beyond 9999 are required. The Designer then sets aside a range of Points for the Surveyor to use and which they (the Designer) will not use. Failure by the Designer to follow the correct Point and Alignment naming convention may cause problems with Survey Enhancements during the life of the project and with Stakeout Report generation.

1. **Starting Clean**

In order to ensure that you are working with a "clean" database – you will close MicroStation and InRoads if they are still running from a previous Lab:

To CLOSE MicroStation and InRoads -

Select **File►Exit** from the [MicroStation Menu].
If any messages appear regarding the saving of projects – Select 

This closes BOTH the MicroStation and InRoads Software(s).

2. **Starting MicroStation and InRoads in the GDOT Workspace.**

From the desktop, double-click on the **MicroStation** icon labeled **GDOT MicroStation V8i SS2 (x86)**.

Double click on the icon labeled **GDOT MicroStation V8i SS2 (x86)**.

- When the **MicroStation Manager** dialog box appears – navigate to the **C:\InRoads Data\1234567\Design Labs\Standards** folder and select the "**GDOT 3D Working File.dgn**". (Creation of the 'GDOT 3D Working File.dgn' is documented in the Design Guidelines). Click **Open**.

- Now open InRoads from within MicroStation by selecting:
  InRoads ► InRoads Suite (SELECTseries 2) V8i 08.11.07.566 from the [MicroStation Menu].

The MicroStation and InRoads Software(s) will open.

3. **Clear the MicroStation Window (***This step may be ignored if your MicroStation Window is already clear of graphics***)**

- Select **Edit ►Select All** from the [MicroStation Menu].
- Then select the **<DELETE>** key on the computer keyboard.

The MicroStation Window is now clear of all graphics from the previous lab and ready for this lab.

4.	**Verify Project Defaults** • In InRoads, select **File ►Project Defaults** • Use the pull down next to **Configuration Name:** to select ***1234567_Design*** which you created in **Lab 1**. • Click **Apply** & **Close.** *Sets Project Defaults.*
5.	**Set the Design Default Preferences** • Select **File ► Project Options** and the **<u>Project Options</u>** dialog box appears. • Select the **Factors** tab. • This will be a 50 scale project. Enter ***50*** for the **Text**, **Cell** & **Line Style Scale Factor(s)**. • Then in the same **<u>Project Options</u>** dialog box select the **Geometry** tab. • Click the **Preferences** button at the bottom of the dialog box. • Choose ***Design Default***. Click **Load** and **Close**. This will set the remainder of the Design Defaults. ****IMPORTANT**: As stated previously the ***Design Default*** Preference loads the appropriate settings for use during Design. These settings include the Alignment and Point name settings. These settings are of particular importance to the Designer. Alignments must have a **DE** prefix. Points must also have a **DE** prefix as well as beginning the point numbering scheme at Number 10000. In order for survey enhancements to be properly added during the design phase of a project, it is essential that Designers pay particular attention to this setting. • In the **<u>Project Options</u>** dialog box click **Apply** and **Close**. *Sets the Design Default Preference.*
6.	**Open 1234567_Design.alg** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 12** • Highlight **1234567_Design.alg** • Click **Open** & **Cancel**. *The Geometry Project 1234567_Design.alg is opened.*
7.	**Open GDOT_Lab12.itl** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 12** • Highlight **GDOT_Lab12.itl** • Click **Open** & **Cancel**. *The Template Library GDOT_Lab12 is opened.*

8.	**Open 1234567_Lab12.ird** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 12** • Highlight **1234567_Lab12.ird** • Click **Open** & **Cancel**. *The Roadway Design File 1234567_Lab12 is opened.*
9.	**Open 1234567_Exist.dtm** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 12** • Highlight **1234567_Exist.dtm** • Click **Open** & **Cancel**. *The Surface 1234567_Exist.dtm is opened.*
10.	**Open 1234567_SR100 SPUR_Lab12.dtm** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 12** • Highlight **1234567_SR100 SPUR_Lab12.dtm** • Click **Open** & **Cancel**. *The Finish Surface 1234567_ SR100 SPUR_Lab12 is opened.*
11.	**Open 1234567_Bogus1_Lab12.dtm** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 12** • Highlight **1234567_Bogus1_Lab12.dtm** • Click **Open** & **Cancel**. *The Bogus Surface 1234567_Bogus1_Lab12 is opened.*

Lab 12B Getting Started

This Lab will depict the process of attaching the following Reference Files with the appropriate Logical Name.

Filename	Logical Name
• 1234567MAIN.dgn	MAIN
• 1234567PROP.dgn	PROP
• 1234567LIMT.dgn	LIMT

12.	**Open the <u>References</u> Window.** • In MicroStation, select **File ► References**. The **<u>References</u>** Window opens.
13.	**Attach the 1234567MAIN.dgn as a Reference File.** • In the **<u>References</u>** Window, select **Tools ► Attach** and the **<u>Attach Reference</u>** dialog opens. • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 12** • In the **<u>Attach Reference</u>** dialog, select **1234567MAIN.dgn** and click **Open**. • The **<u>Reference Attachment Settings</u>** dialog opens. • In this dialog, Key-in the **Logical Name:** ***MAIN*** • Ensure **Coincident - World** is selected in the **Orientation:** field. • Verify your entries match those shown in *Figure L12-1* and then click **OK**.

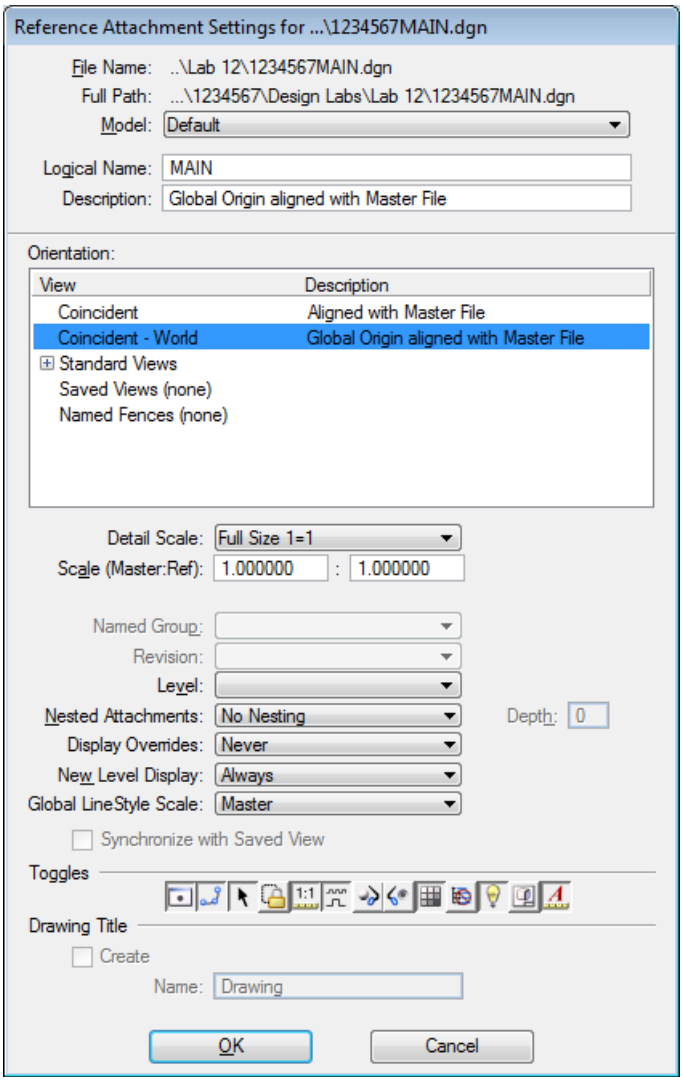


Figure L12-1 Reference Attachment Settings

14.	**Using Step 13 as a Guide, Attach the Files 1234567PROP.dgn and 1234567LIMT.dgn as Reference Files.** **Filename** — **Logical Name** • 1234567PROP.dgn — PROP • 1234567LIMT.dgn — LIMT • **Close** the **References** Window by clicking the Red (X) in the upper right corner of the dialog box. • In MicroStation, click the **Fit View** icon ( ). • Verify your view in MicroStation matches that shown in *Figure L12-2*.

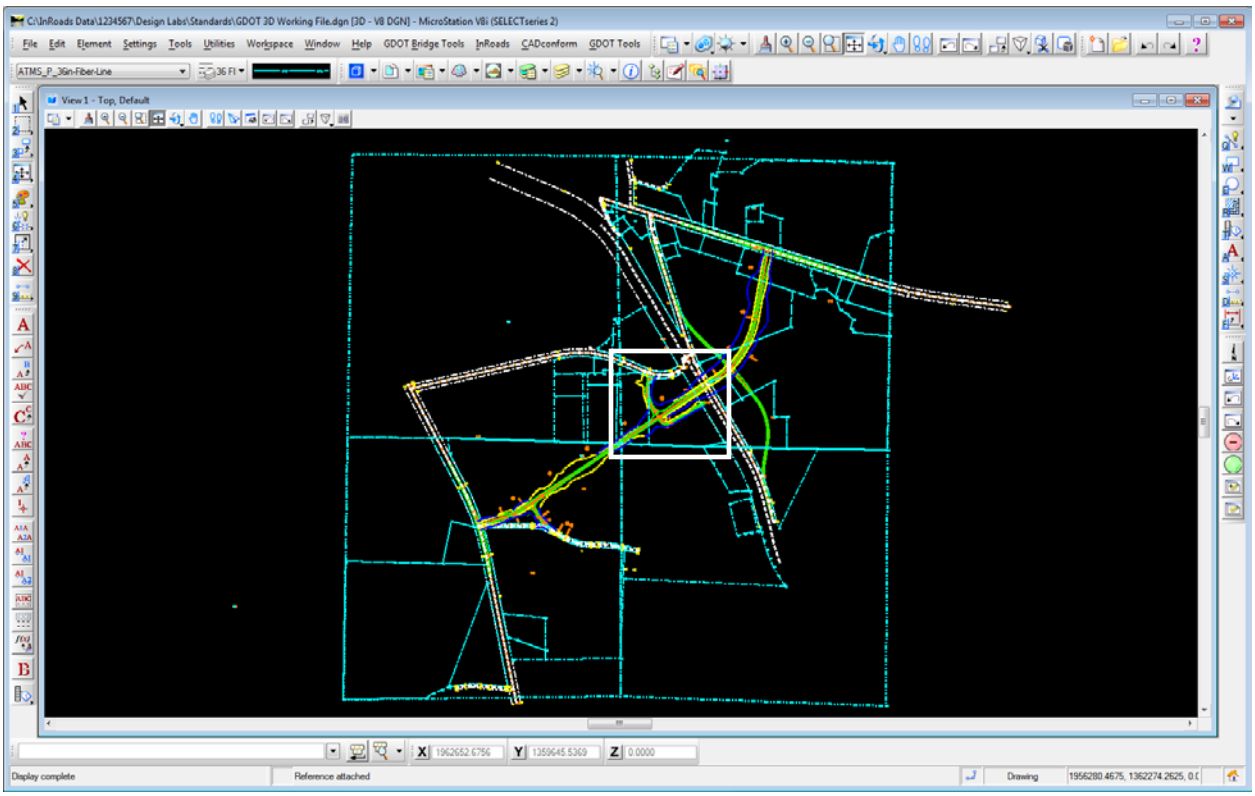


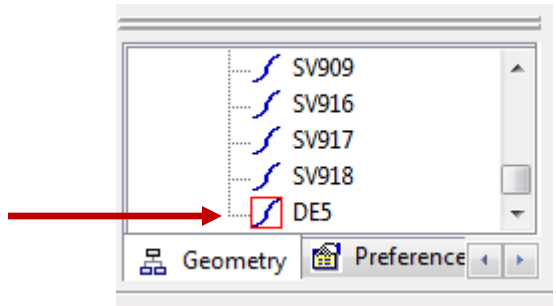
Figure L12-2 MicroStation View

Lab 12C Create a New Alignment for the Required R/W for SV47

The objective of Lab 12C is to create a new Alignment for the Required Right-of-Way take from Property Alignment SV47.

15. **Open the New Dialog.**

- In InRoads, select **File ► New**. The **New** dialog opens.
- In the **New** dialog, make the **Geometry** tab the active tab.
- Enter the following information:
  - **Type**: ***Horizontal Alignment***
  - **Name**: ***DE5***
  - **Description**: ***REQD R/W – PAR 71 / SV47***
  - **Style**: ***REQD_P_REQD***
  - **Curve Definition**: ***Arc***
- Verify your entries match those shown in *Figure L12-3*.
- Click **Apply** & **Close**.
- Verify Alignment **DE5** is added to the InRoads workspace bar as shown here and is the Active Alignment (has a Red Square) as depicted below.



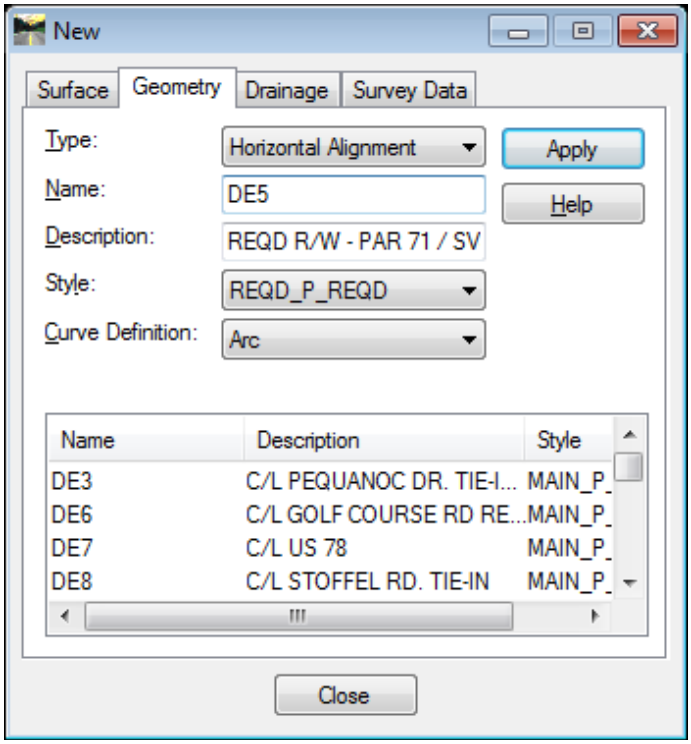


Figure L12-3 New

16.	**InRoads does not have an Undo Button with most commands. In order to correct mistakes, it is necessary to exit your Geometry File without saving and then reopen. Save your work now so you can return to this point if you make a mistake.** • In InRoads, select **File ► Save ► Geometry Project**.

Lab 12D Add the Required R/W to Alignment DE5

The primary objective of Lab12D is to become familiar with the Horizontal Alignment and Cogo Point tools useful in completing the creation of the Required R/W Alignment for **DE5.** The proposed R/W for DE5 is depicted in the inset below by a red outline. (**DE5** is the empty Required R/W Alignment you created in Lab 12C). In this Lab, you will add the Required R/W to Alignment **DE5**.

17.	**Zoom to Property Alignment SV47 in MicroStation.** • In MicroStation, select the **Window Area** icon ( ) and window area as shown outlined by a Red Square in *Figure L12-4* • Verify your view matches that shown in *Figure L12-5*.

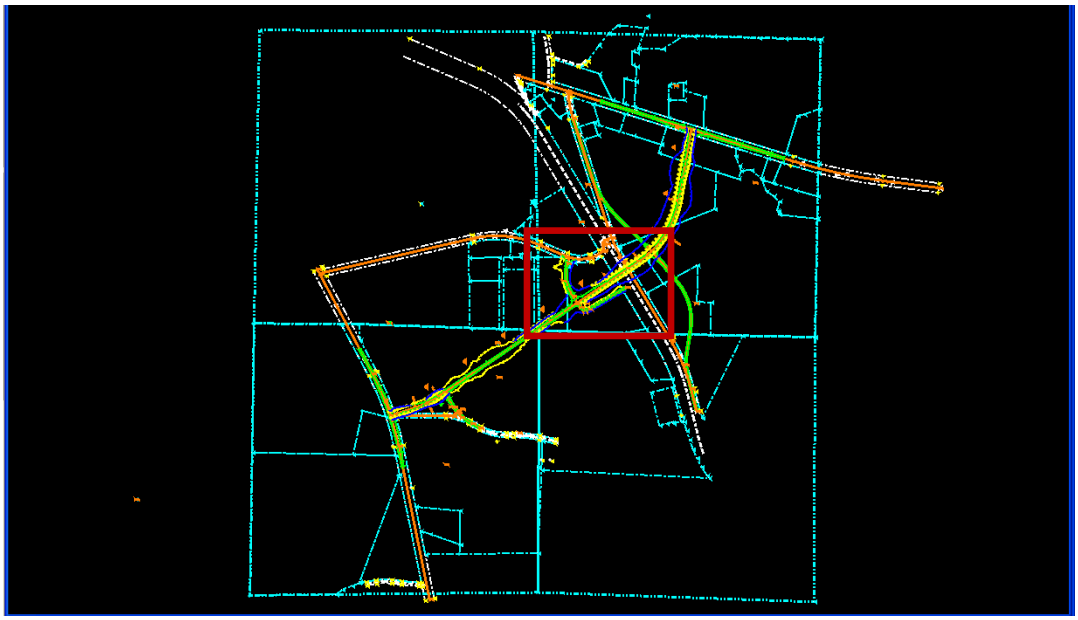


Figure L12-4 MicroStation View

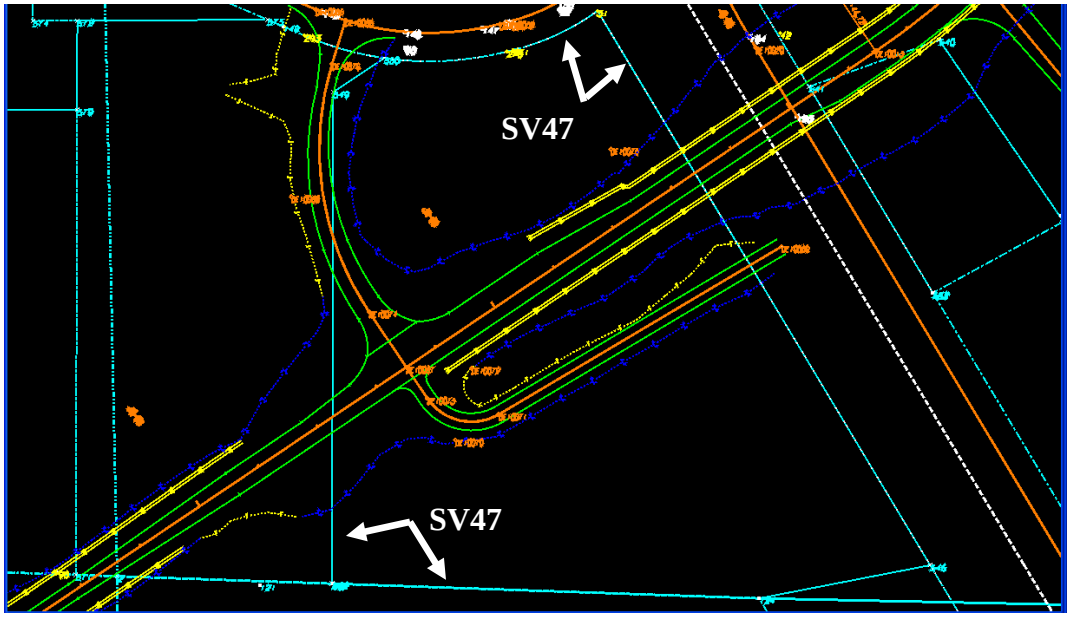


Figure L12-5 MicroStation View

18.	**The Intersection Command Allows a Cogo Point to be Stored at the Intersection of two Alignments. Open the <u>Intersection</u> Dialog.** • In InRoads, select **Geometry ► Locate ► Intersection**. The **<u>Intersection</u>** dialog opens as shown in *Figure L12-6*.

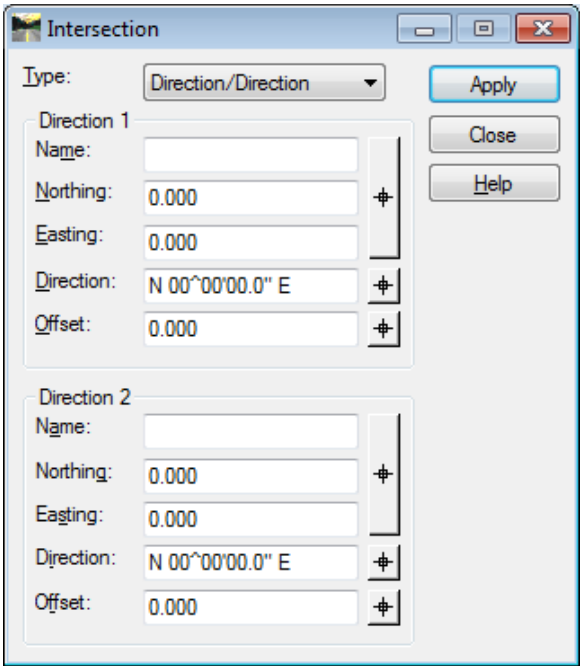


Figure L12-6 Intersection

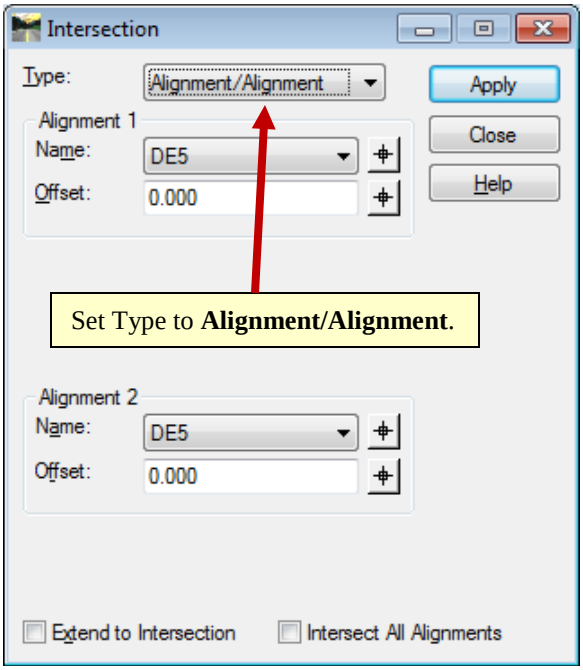


Figure L12-7 Intersection

19.	**Change the Intersection 'Type:' from <u>Direction/Direction</u> to <u>Alignment/Alignment.</u>** • In the **<u>Intersection</u>** dialog, use the pull-down arrow to select **Alignment/Alignment** as shown in *Figure L12-7* above.
20.	**Define Alignment 1 to be DE31 (SR100 Spur).** • In the **<u>Intersection</u>** dialog next to the **Name:** field, click the **Locate** button (⌖). • Notice in the lower left corner of the MicroStation window you are prompted to **>Identify alignment**. • Left click on Alignment **DE31** shown in *Figure L12-8*. It turns purple as shown in *Figure 12-9*. • Notice in the bottom left corner of the InRoads window and the bottom middle of the MicroStation window the phrase **Selected Alignment 'DE31'** appears. • Notice in the bottom left corner of the MicroStation window you are prompted to **>Accept/Reject**. Left click in the MicroStation window to **Accept**. • The **<u>Intersection</u>** dialog re-appears with **DE31** entered in the **Name:** field.

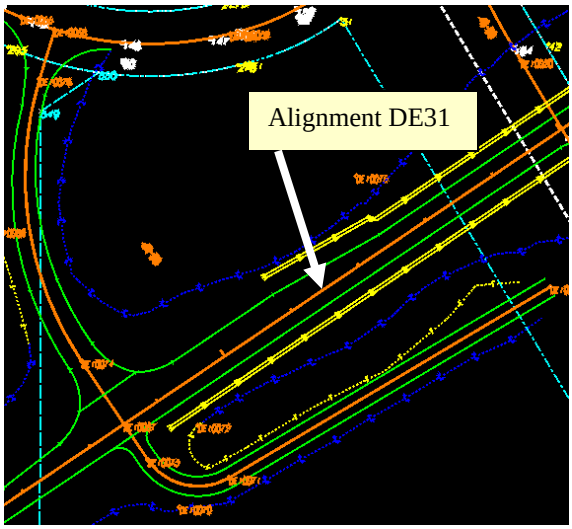


Figure L12-8 MicroStation

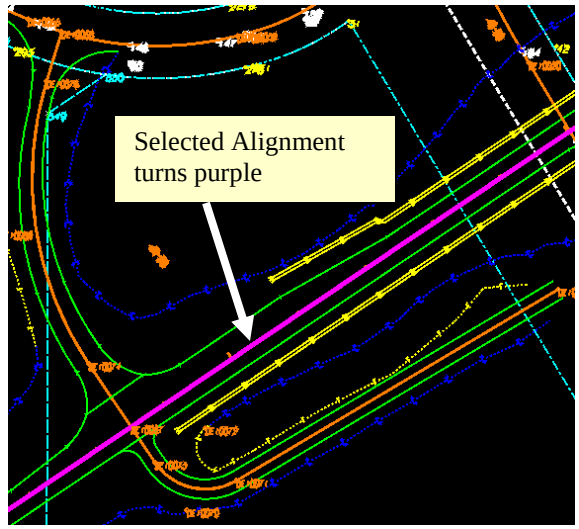


Figure L12-9 MicroStation

21.	**Define Alignment 1 to be offset 190' to the Right.** • In the **Intersection** dialog next to the **Offset:** field, key-in **190**. ***NOTE**: A positive value offsets to the right and a negative value offsets to the left. • Verify the **Intersection** dialog at this point matches *Figure L12-10*.

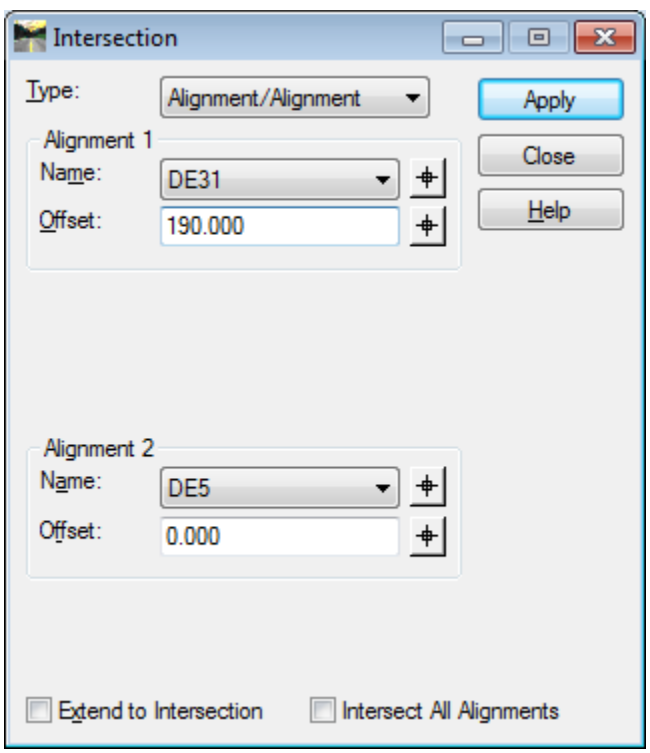


Figure L12-10 Intersection

22.	**Define Alignment 2 to be SV47.** • In the **Intersection** dialog next to the **Name:** field, click the **Locate** button ( ). • Notice in the lower left corner of the MicroStation window you are prompted to **>Identify alignment**. • Left click on Alignment **SV47** in the area shown in *Figure L12-11*. • Notice in the bottom left corner of the InRoads window the phrase **Selected Alignment 'SV14'** appears. • Notice in the bottom left corner of the MicroStation window you are prompted to **>Accept/Reject**. Right mouse click in the MicroStation window to **Reject**. • Notice in the bottom left corner of the InRoads window the phrase **Selected Alignment 'SV47'** now appears and all of **SV47** is highlighted in purple as shown in *Figure L12-12*. • Notice in the bottom left corner of the MicroStation window you are prompted to **>Accept/Reject**. Left mouse click in the MicroStation window to **Accept**. • The **Intersection** dialog re-appears with **SV47** entered in the **Name:** field.

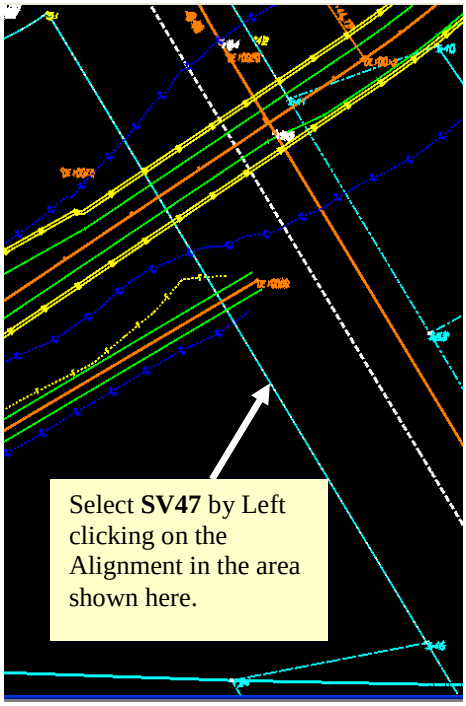


Figure L12-11 MicroStation

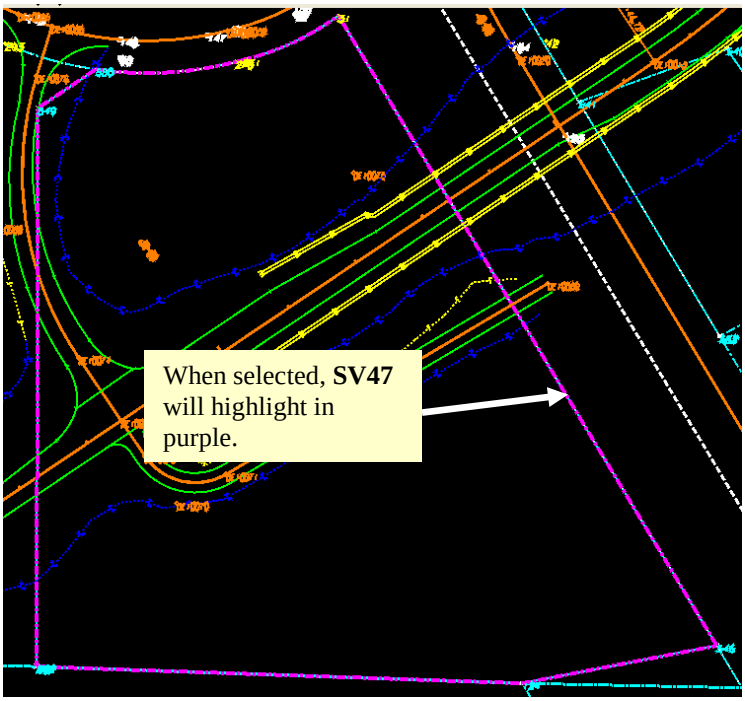


Figure L12-12 MicroStation

23.	**Store a COGO Point at the Intersection of DE31 offset 190' and SV47.** • In the **Intersection** dialog, verify your settings match those shown in *Figure L12-13*. • Click **Apply**. The **Locate Results** dialog opens as shown in *Figure L12-14* and the Point is tentatively marked by a purple X ( ) as shown in *Figure L12-15*. • In the **Locate Results** dialog, change the **Style:** to ***REQD_P_RWRM*.** This style ensures a Required Right-of-Way Marker symbol ( ) is drawn. • Verify your entries in the **Locate Results** dialog match those shown in *Figure L12-16*. • Click **Accept** and then click **Cancel**. The **Intersection** dialog reappears. • If a **Results** window appears – click **Close** to exit the **Results** window. • Next – click **Close** to exit the **Intersection** dialog. • Verify point **DE10238** was drawn in MicroStation as shown in *Figure L12-17*.

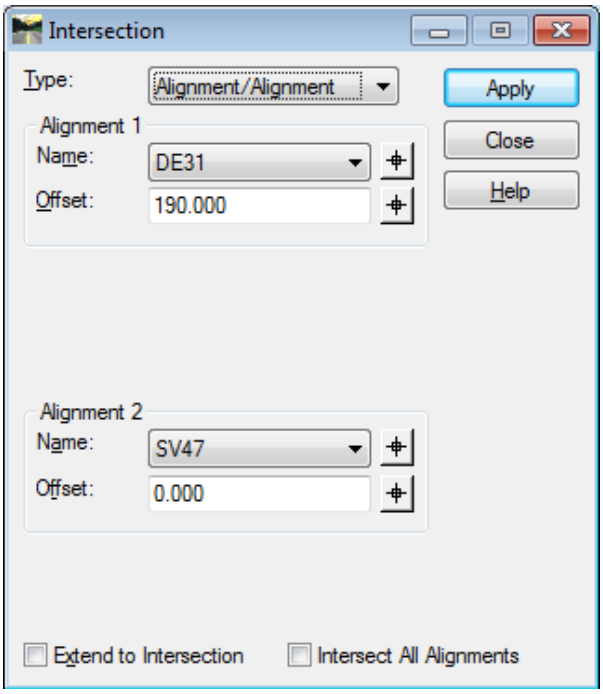


Figure L12-13 Intersection

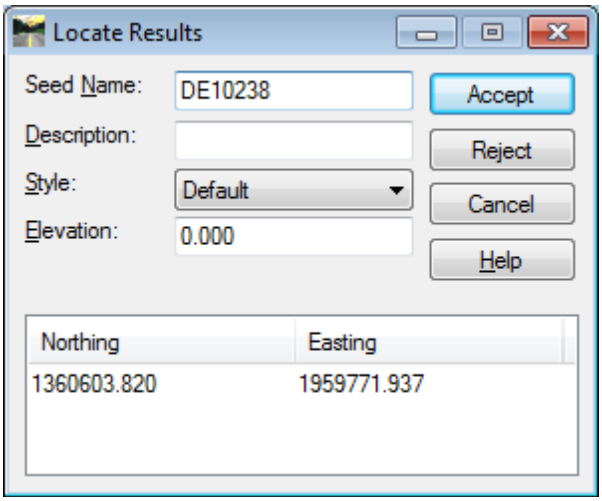


Figure L12-14 Locate Results

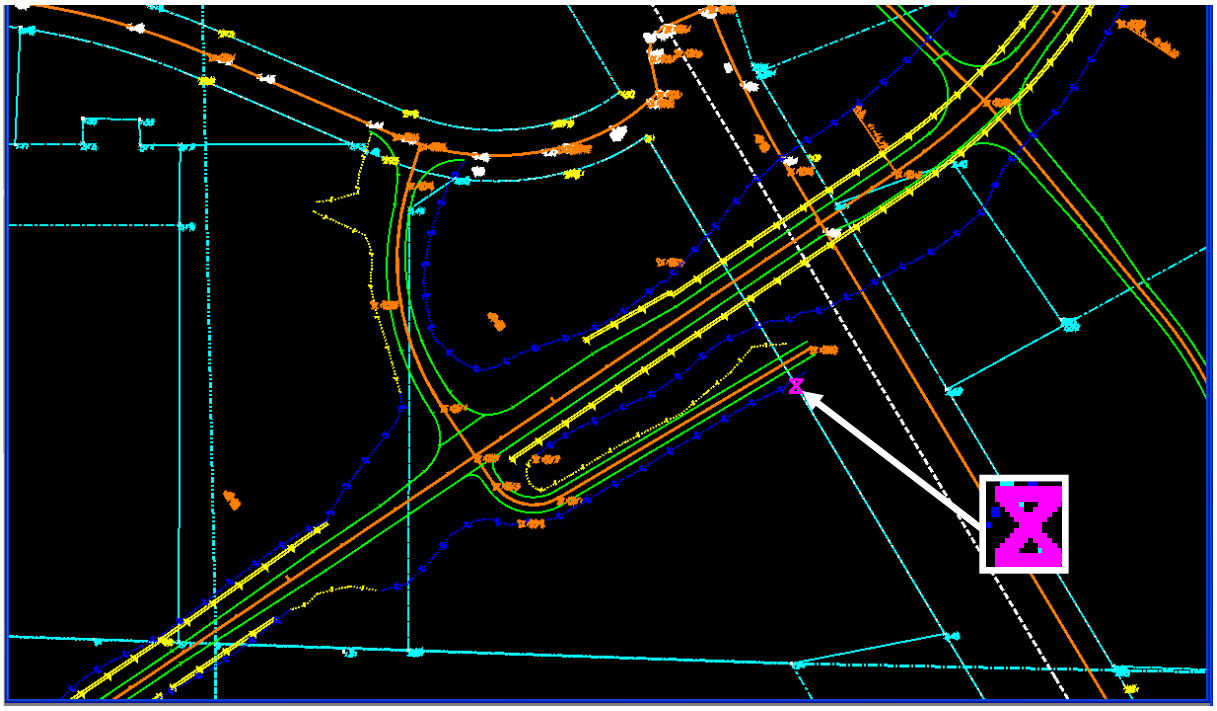


Figure L12-15 MicroStation View

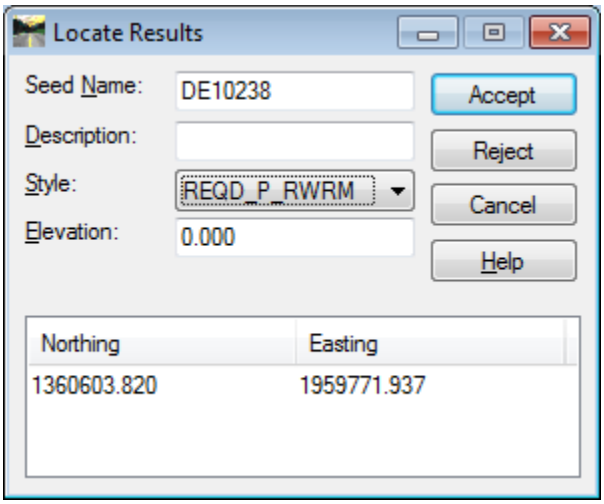


Figure L12-16 Locate Results

Figure L12-17 MicroStation View

24.	**Open the <u>New Cogo Point</u> Dialog.** • In InRoads, select **Geometry ► Cogo Points ► New**. The **<u>New Cogo Point</u>** dialog opens as shown in *Figure L12-18*.

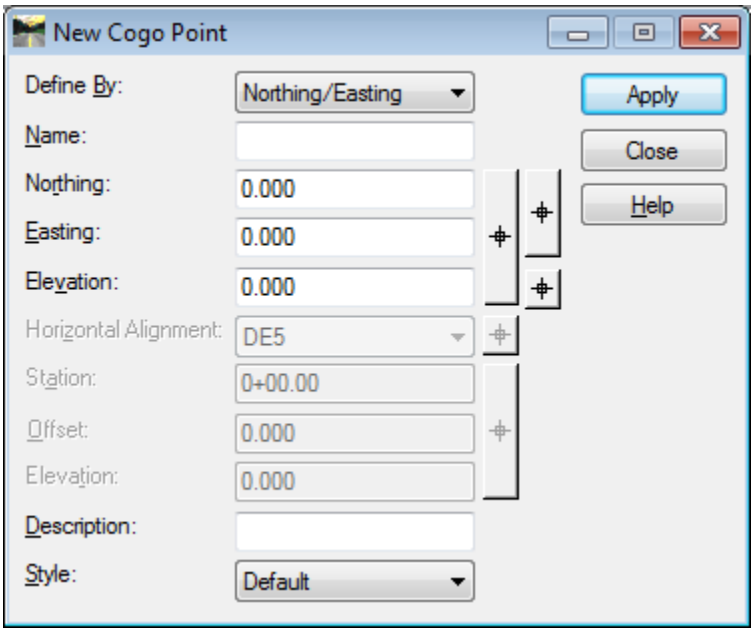


Figure L12-18 New Cogo Point

25.	**Store a Cogo Point at Station 34+00 on Alignment DE31 Offset 160' Right.** • In the **New Cogo Point** dialog, use the pull down arrow to change the **Define By:** method to **Station/Offset**. • Match the remaining entries as shown in *Figure L12-19*. • Click **Apply** but do **not** close the **New Cogo Point** dialog. • If a **Results** window appears – click **Close** to exit the **Results** window. • Ensure Point **DE10243** was stored and drawn in MicroStation as shown in *Figure L12-20*.

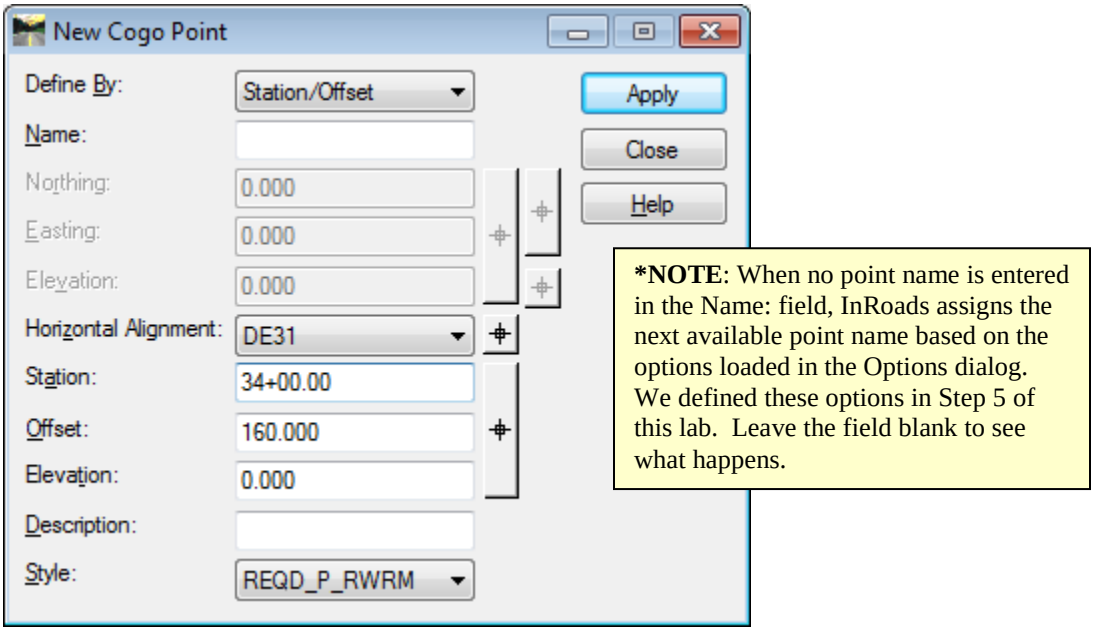


Figure L12-19 New Cogo Point

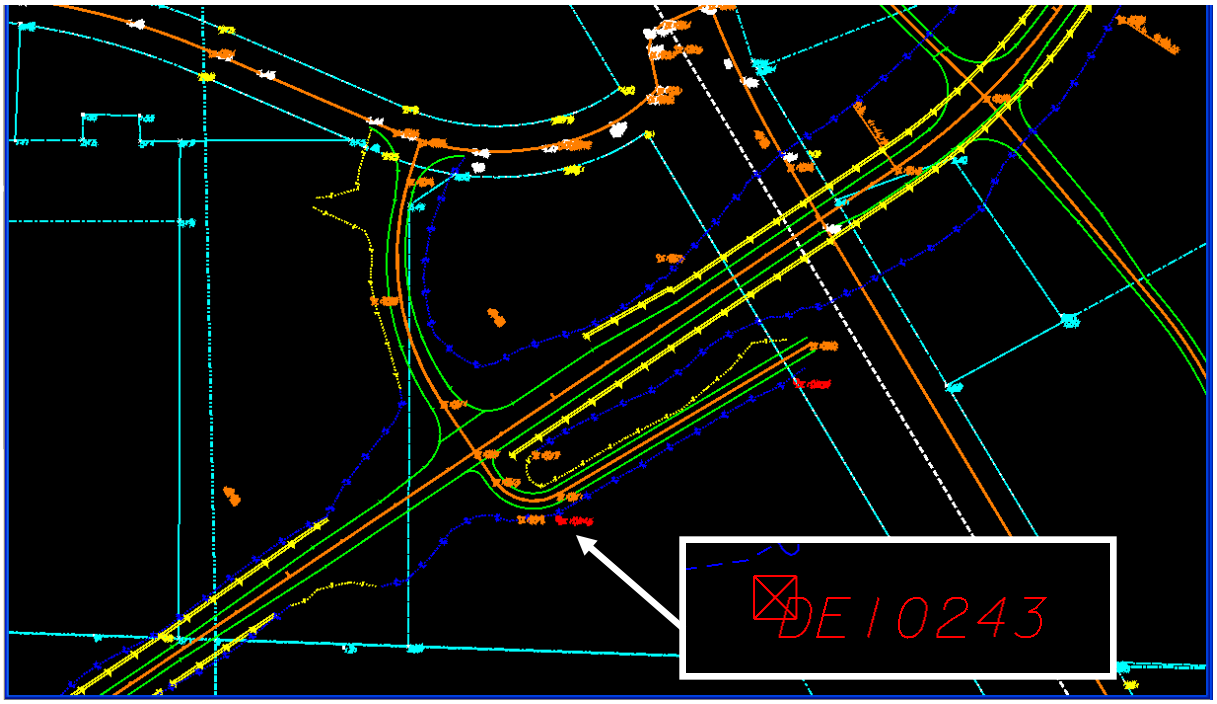


Figure L12-20 MicroStation View

26.	**Store a Cogo Point at Station 33+00 on Alignment DE31 Offset 115' Right.** • In the **New Cogo Point** dialog, match the entries as shown in *Figure L12-21*. • Click **Apply** and **Close** the **New Cogo Point** dialog. • If a **Results** window appears – click **Close** to exit the **Results** window. • Ensure Point **DE10244** was stored and drawn in MicroStation as shown in *Figure L12-22*.

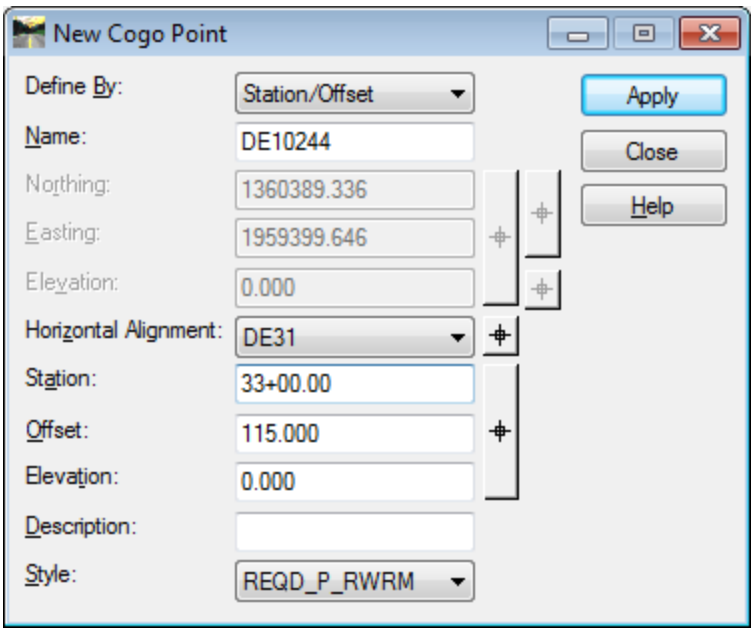


Figure L12-21 New Cogo Point

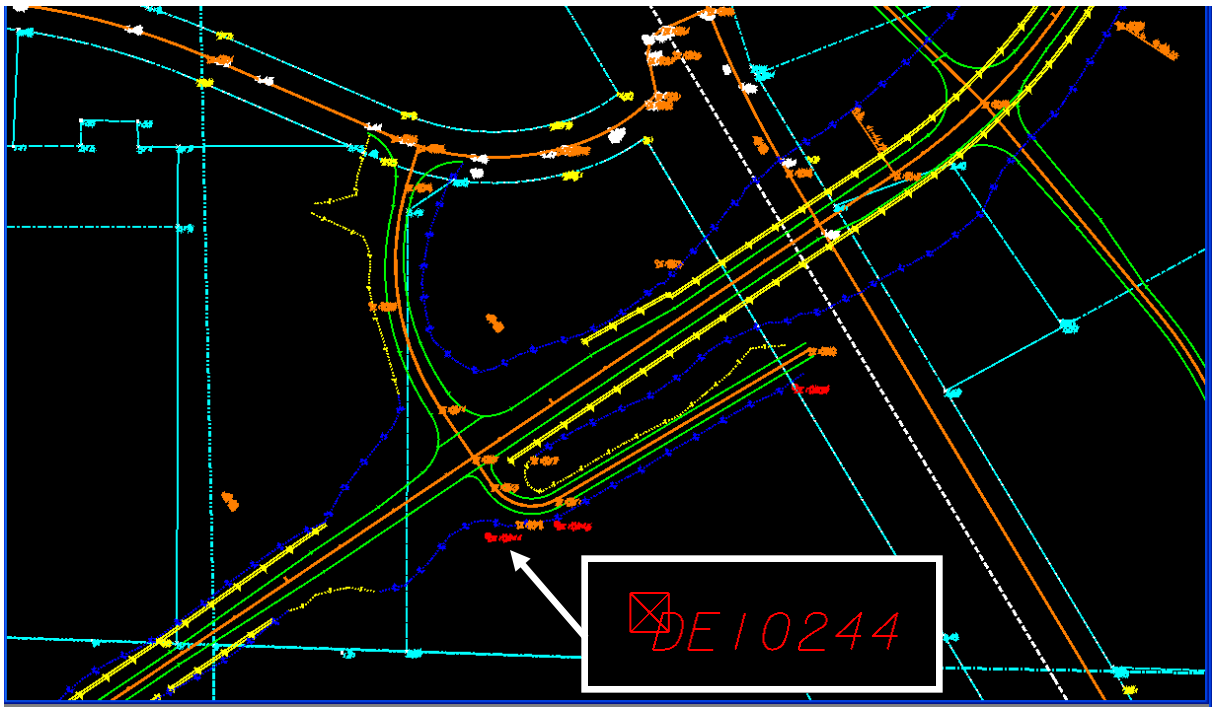


Figure L12-22 MicroStation View

27.	**Store a Point at the Intersection of SV47 and Alignment DE31 Offset 115' Right.** • In InRoads, select **Geometry ► Locate ► Intersection**. • **Match** the entries shown in *Figure L12-23*. • Click **Apply**. The **Locate Results** dialog opens. • In the **Locate Results** dialog, select the **Style:** ***REQD_P_RWRM***. • Notice in MicroStation a purple X ( ) identifies the tentative location of the Point as shown in *Figure L12-24*. The first tentative location is the wrong location. • In the **Locate Results** dialog, click **Reject** to select a new tentative location as shown in *Figure L12-25*. • The new location shown in *Figure L12-25* is the correct location. • Click **Accept** to accept the location and store the Point. • If a **Results** window appears – click **Close** to exit the **Results** window. • **Close** the **Intersection** dialog. • Verify point **DE10245** was stored and drawn in MicroStation as shown in *Figure L12-26*.

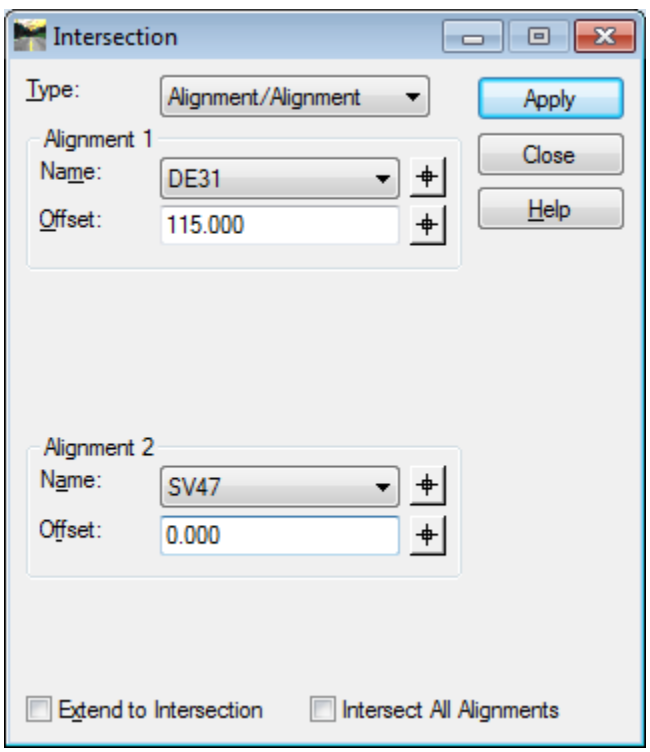


Figure L12-23 Intersection

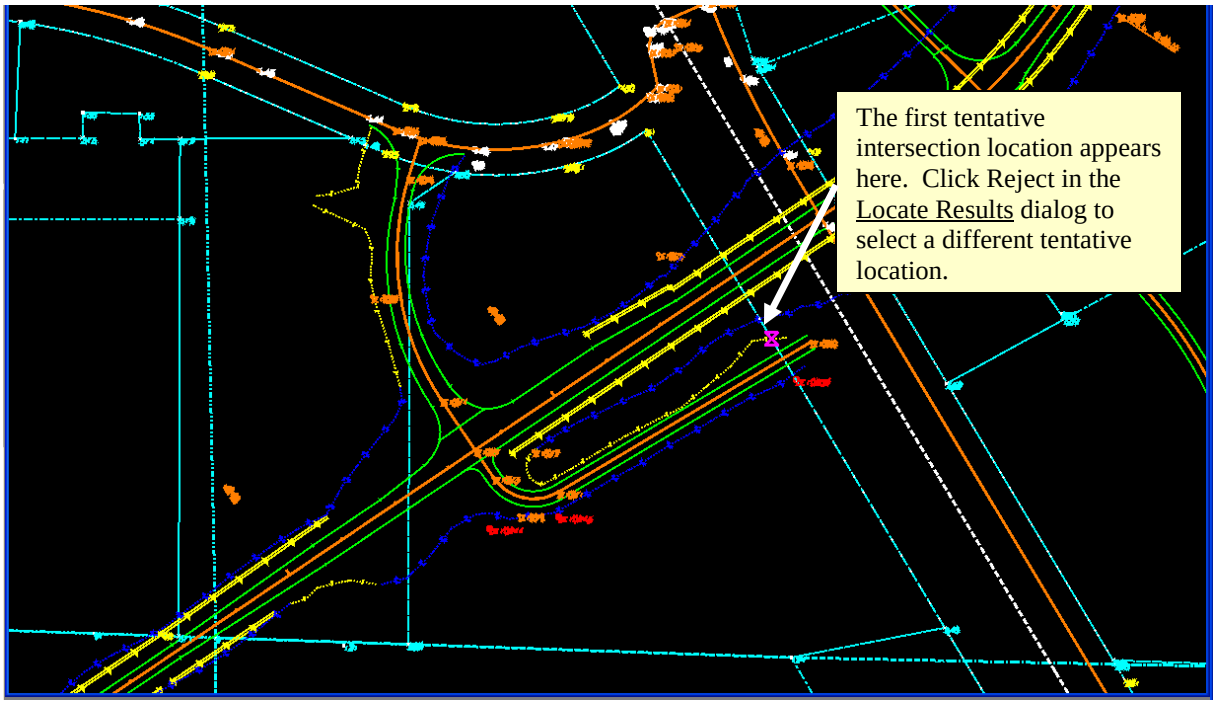


Figure L12-24 MicroStation View

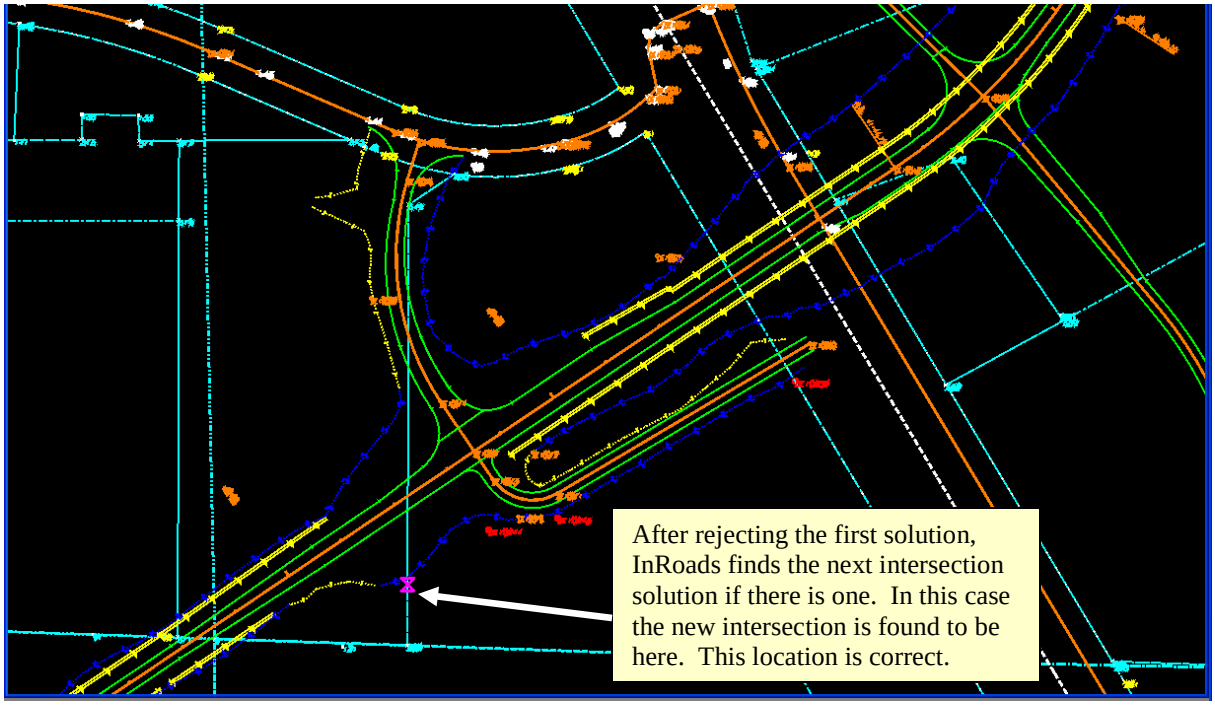


Figure L12-25 MicroStation Window

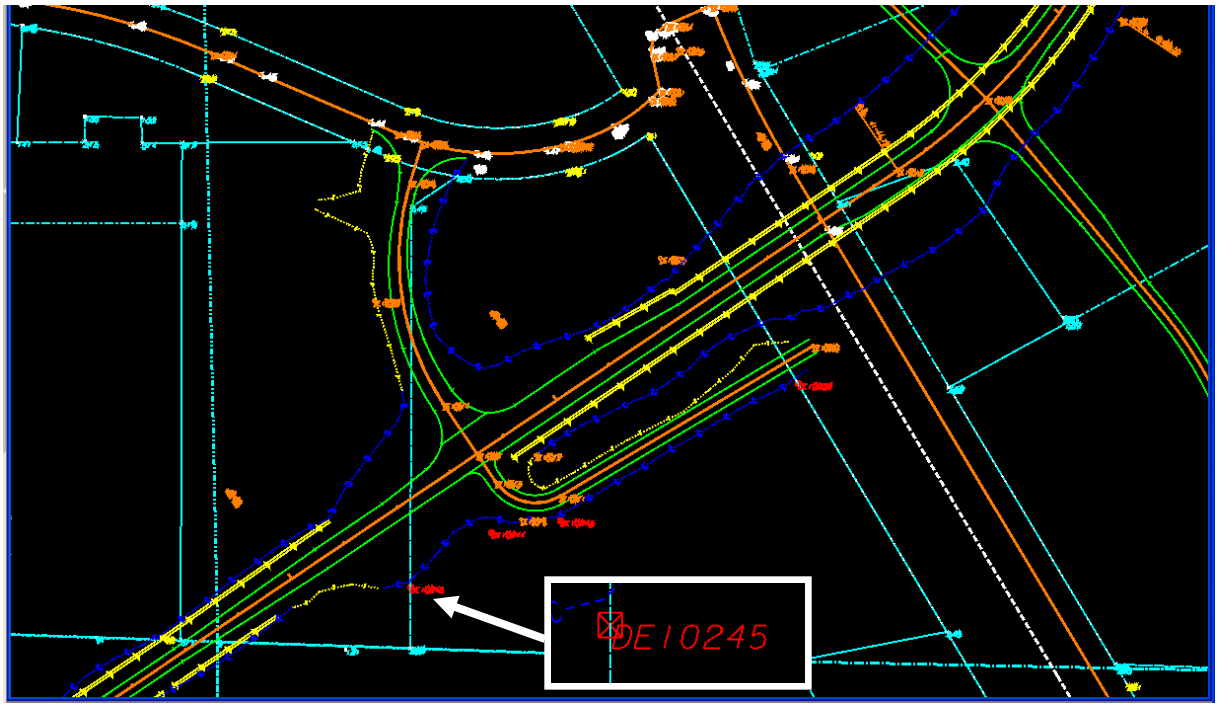


Figure L12-26 MicroStation View

28.	**InRoads does not have an Undo Button with most commands. In order to correct mistakes, it is necessary to exit your Geometry File without saving and reopen. Save your work now so you can return to this point if you make a mistake.** • In InRoads, select **File ► Save ► Geometry Project**.
29.	**Store a Cogo Point at Station 12+00 on Alignment DE8 Offset 60' Right.** • In InRoads, select **Geometry ► Cogo Points ► New**. • In the **New Cogo Point** dialog, match the entries as shown in *Figure L12-27*. • Click **Apply** but do **not** close the **New Cogo Point** dialog. • If a **Results** window appears – click **Close** to exit the **Results** window. • Ensure Point **DE10246** was stored and drawn in MicroStation as shown in *Figure L12-28*.

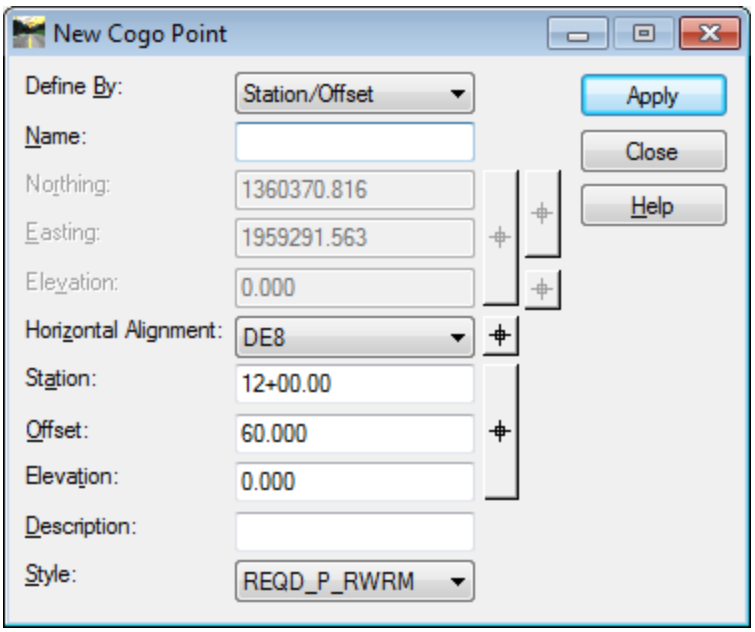


Figure L12-27 New Cogo Point

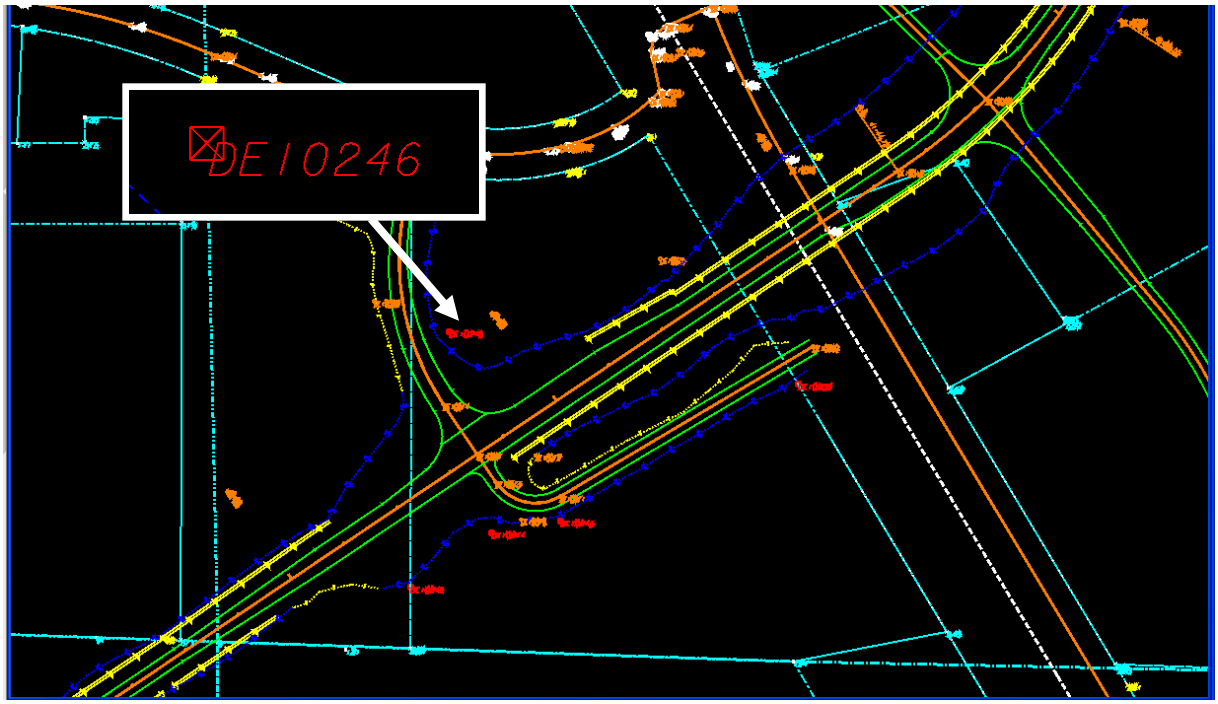


Figure L12-28 MicroStation View

30.	**Store a Cogo Point at Station 34+50 on Alignment DE31 Offset 110' Left.** • In the **New Cogo Point** dialog, match the entries as shown in *Figure L12-29*. • Click **Apply** but do **not** close the **New Cogo Point** dialog. • If a **Results** window appears – click **Close** to exit the **Results** window. • Ensure Point **DE10247** was stored and drawn in MicroStation as shown in *Figure L12-30*.

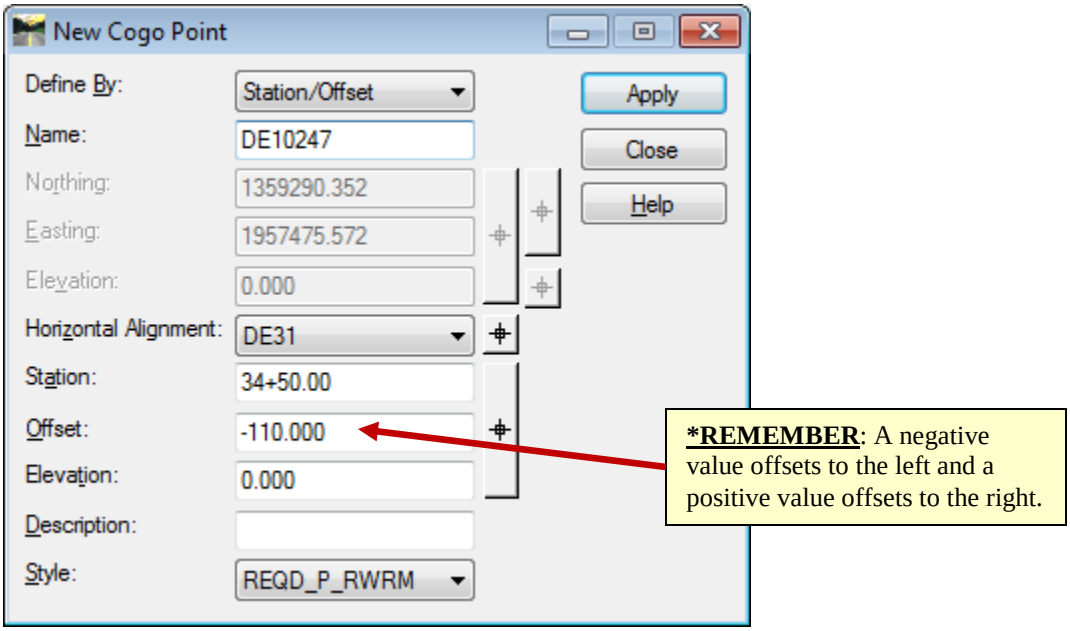


Figure L12-29 New Cogo Point

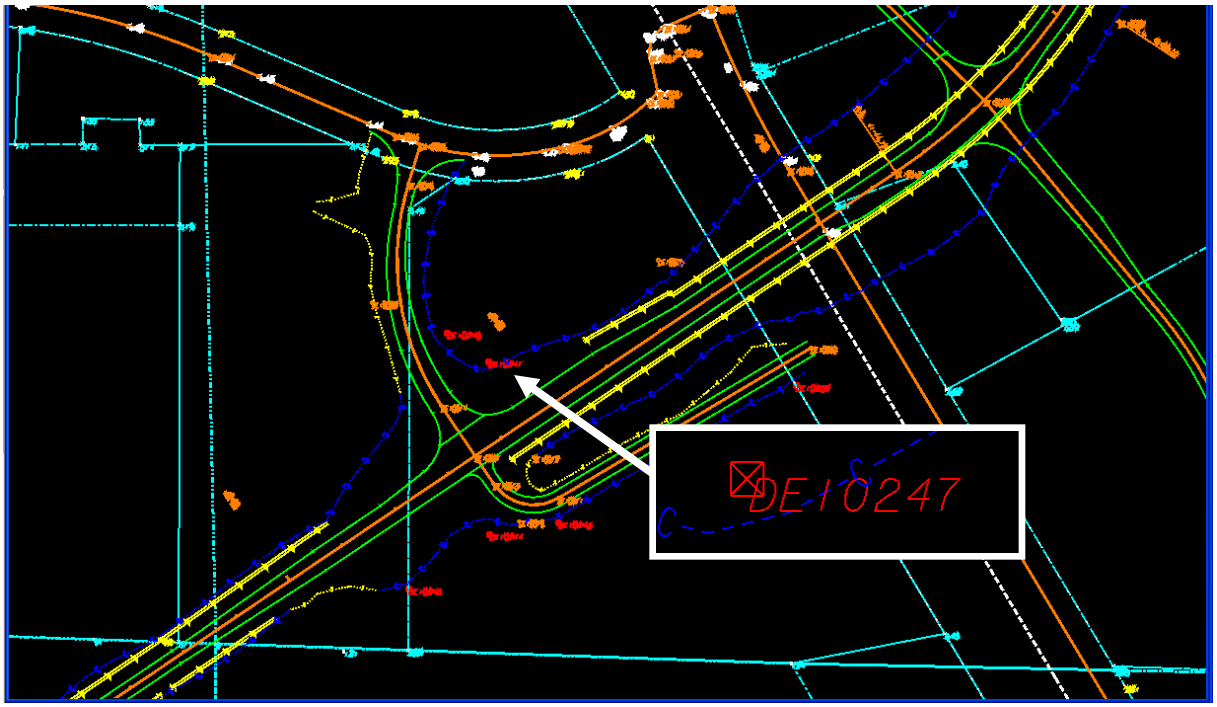


Figure L12-30 MicroStation View

31.	**Store a Cogo Point at Station 35+25 on Alignment DE31 Offset 100' Left.** • In the **New Cogo Point** dialog, match the entries as shown in *Figure L12-31*. • Click **Apply** and **Close** the **New Cogo Point** dialog. • If a **Results** window appears – click **Close** to exit the **Results** window. • Ensure Point **DE10248** was stored and drawn in MicroStation as shown in *Figure L12-32*.

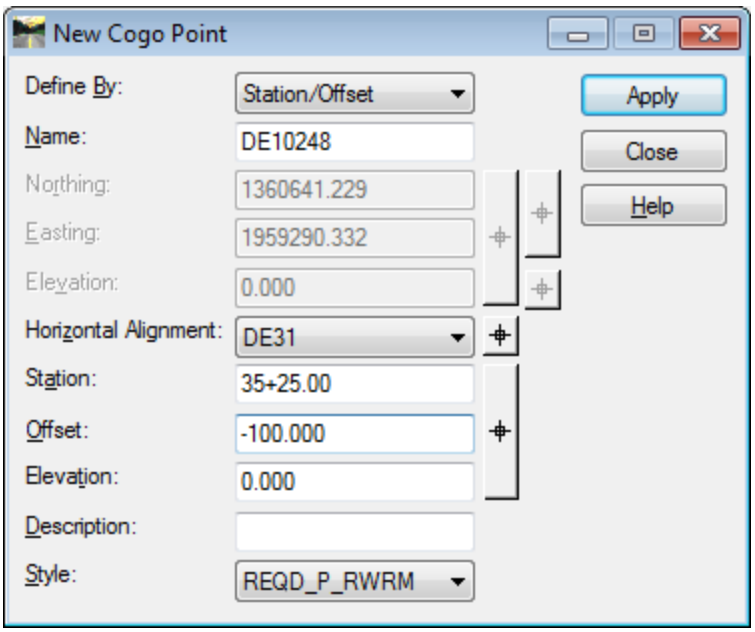


Figure L12-31 New Cogo Point

Figure L12-32 MicroStation View

32.	**InRoads does not have an Undo Button with most commands. In order to correct mistakes, it is necessary to exit your Geometry File without saving and reopen. Save your work now so you can return to this point if you make a mistake.** • In InRoads, select **File ► Save ► Geometry Project**.
33.	**Store a Point at the Intersection of SV47 and Alignment DE31 Offset 100' Left.** • In InRoads, select **Geometry ► Locate ► Intersection**. • **Match** the entries shown in *Figure L12-33*. • Click **Apply**. The **Locate Results** dialog opens. • Notice in MicroStation a purple X ( ) identifies the tentative location of the Point as shown in *Figure L12-34*. • In the **Locate Results** dialog, select the **Style:** ***REQD_P_RWRM***. • In the **Locate Results** dialog, click **Accept** to accept the location and store the Point. • The **Locate Results** dialog finds a second solution after storing the first solution. Click **Reject**. • Click **Cancel** to close the **Locate Results** dialog if it is still open. • **Close** the **Intersection** dialog. • If a **Results** window appears – click **Close** to exit the **Results** window. • Verify Point **DE10249** was stored and drawn in MicroStation as shown in *Figure L12-35*.

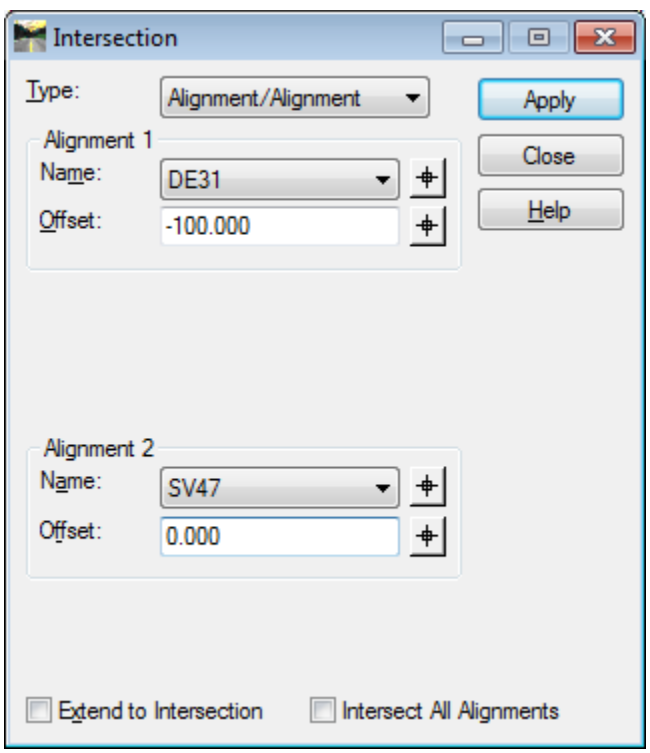


Figure L12-33 Intersection

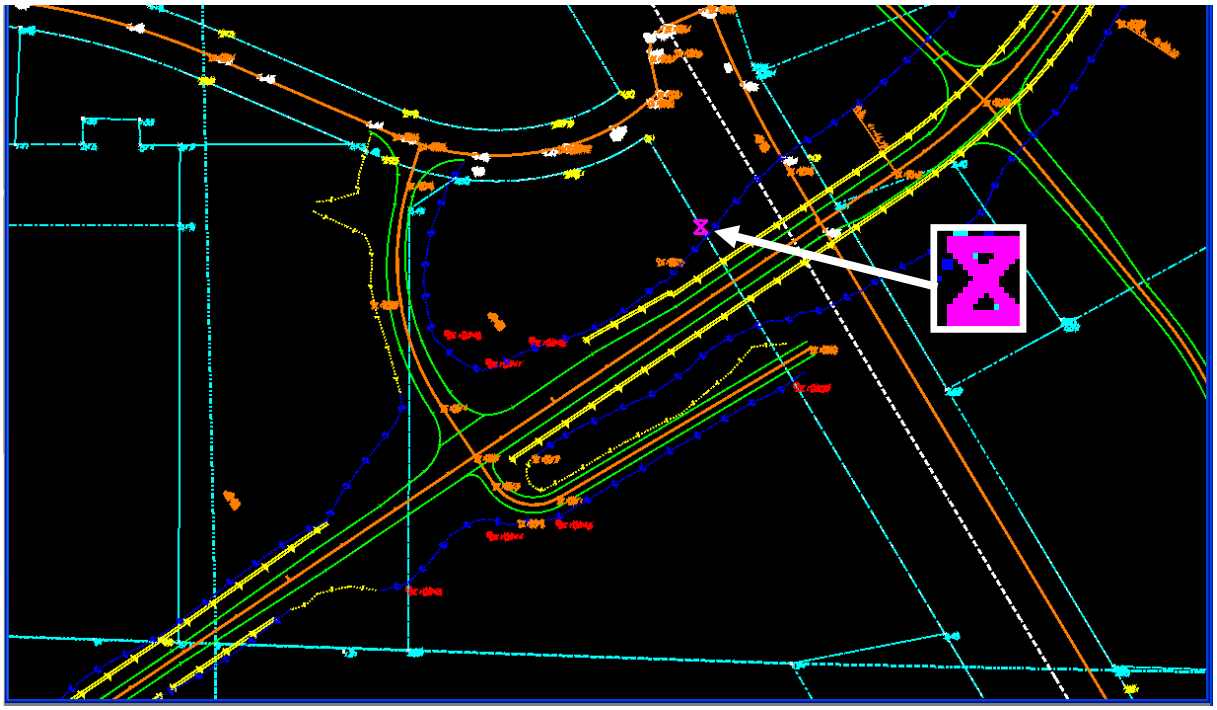


Figure L12-34 MicroStation View

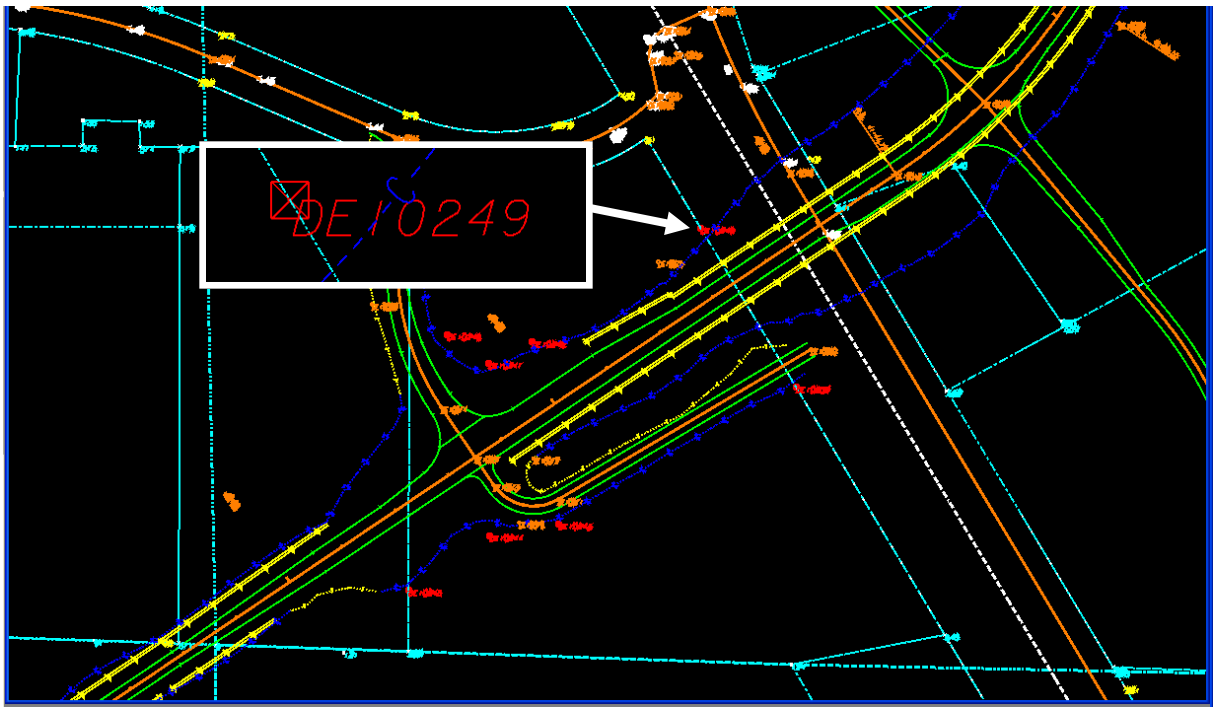


Figure L12-35 MicroStation View

34.	**InRoads does not have an Undo Button with most commands. In order to correct mistakes, it is necessary to exit your Geometry File without saving and reopen. Save your work now so you can return to this point if you make a mistake.** • In InRoads, select **File ► Save ► Geometry Project**.
35.	**Store a Cogo Point at the PT of the Curve identified in *Figure L12-36* on Alignment DE8 Offset 60' Right.** • In InRoads, select **Geometry ► Cogo Points ► New**. • In the **<u>New Cogo Point</u>** dialog, ensure **Station/Offset** is selected as the **Define By:** mode. • Select the **Horizontal Alignment: *DE8*** from the pull down menu. • The **Station:** of the PT will be selected using the **Locate** button. Press the **Locate** button to the right of the **Station:**, **Offset:**, and **Elevation:** fields. • Notice in the bottom right corner of the MicroStation window you are prompted to < **Identify station**. • Move your mouse around the MicroStation View and notice the dynamic line that jumps from one point to another along Alignment **DE8**. Notice also as you do this that in the bottom middle of the MicroStation window the occupied Station is given. • Move your mouse so that the dynamic line is drawn from the PT identified in *Figure L12-36* and **Station 14+57.77** is listed in the bottom middle of the MicroStation Window. • While Station **14+57.77** is listed in the bottom middle of the MicroStation window, **Left click** to select this Station. The **<u>New Cogo Point</u>** dialog returns with the Station ***14+57.77*** entered in the **Station:** field. ***NOTE**: Even though the Station is listed to only 2 decimal places, all the decimal places are retained in InRoads memory because of the manner in which we selected the Station. • In the **Offset:** field key-in ***60.00***. • Notice the Elevation **1147.663** has been entered in the **Elevation:** field. This value is obtained from the Active Vertical Alignment associated with the Horizontal Alignment. • In the **Elevation:** field, key-in ***0.000*** ***NOTE**: All 2D Points, which include Property Points such as those being stored here, should always be given a value of **0.000**. • In the **Style:** field, select ***REQD_P_RWRM***. • Verify your entries match those shown in *Figure L12-37*. Click **Apply** and **Close**. • If a **<u>Results</u>** window appears – click **Close** to exit the **<u>Results</u>** window. • Verify Point **DE10250** was drawn in MicroStation as shown in *Figure L12-38*.

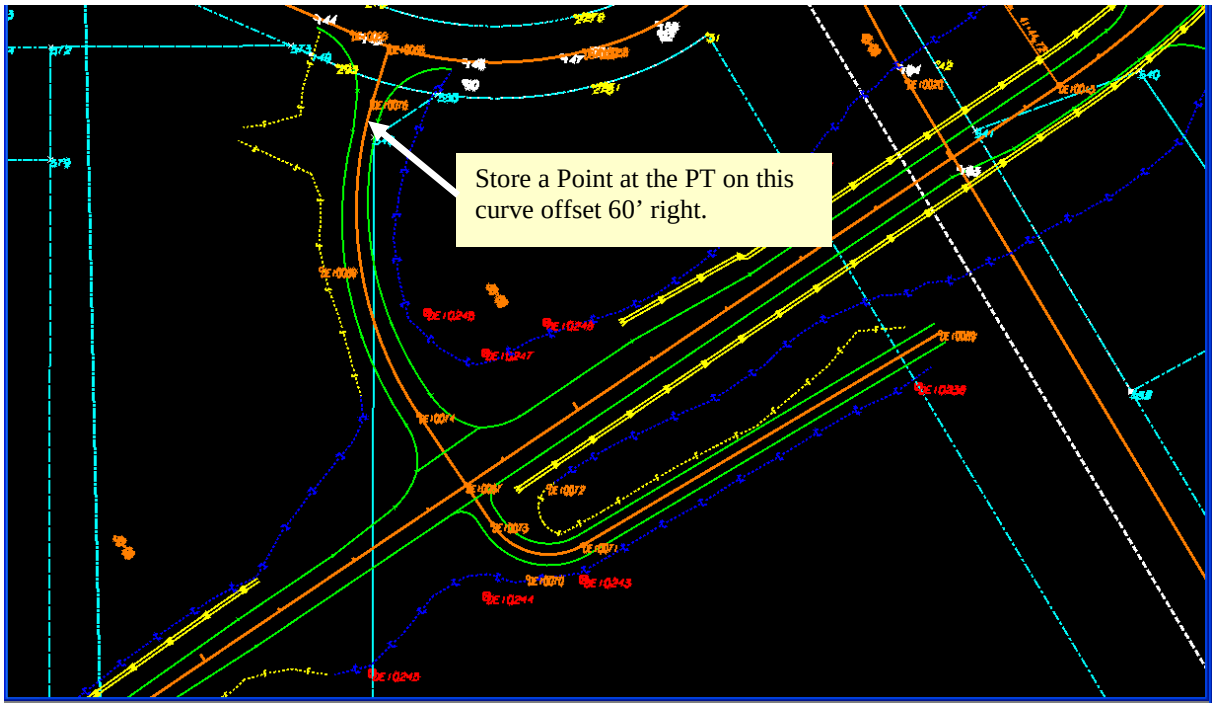


Figure L12-36 MicroStation View

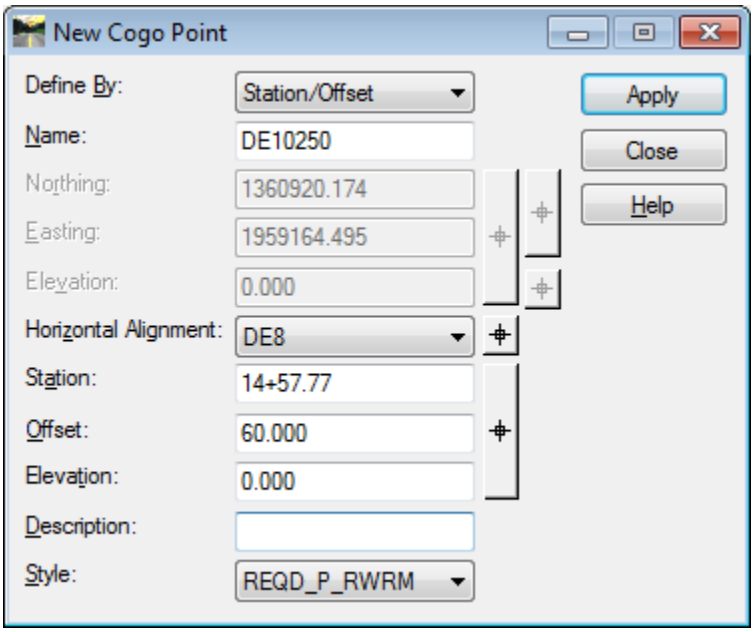


Figure L12-37 New Cogo Point

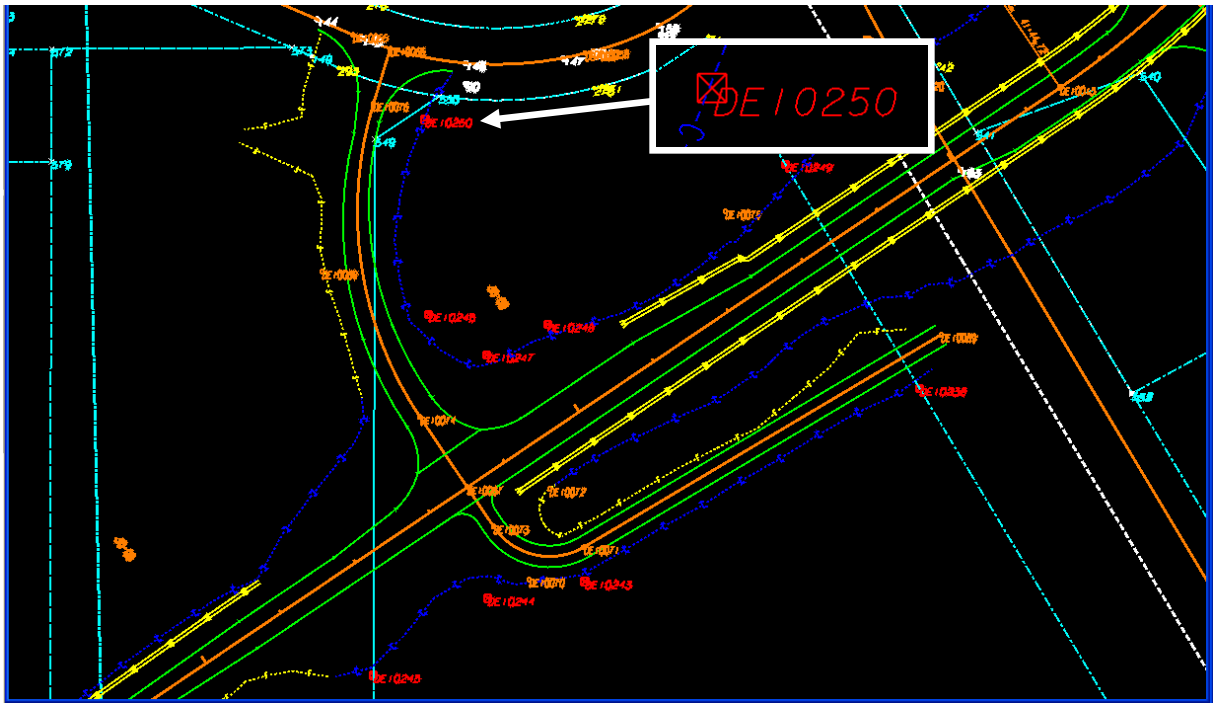
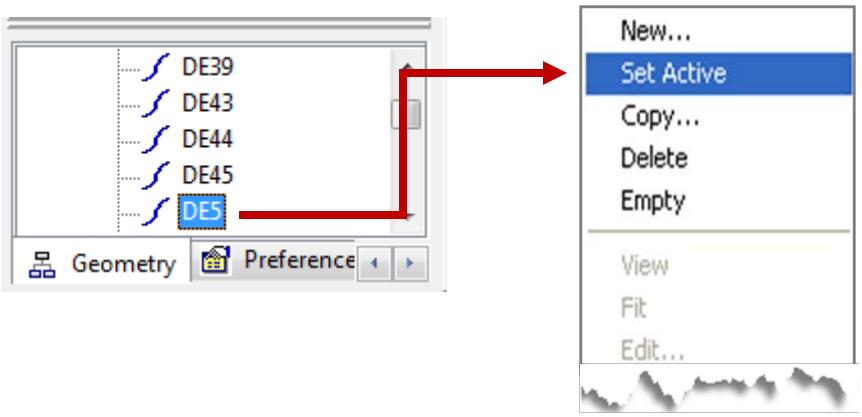


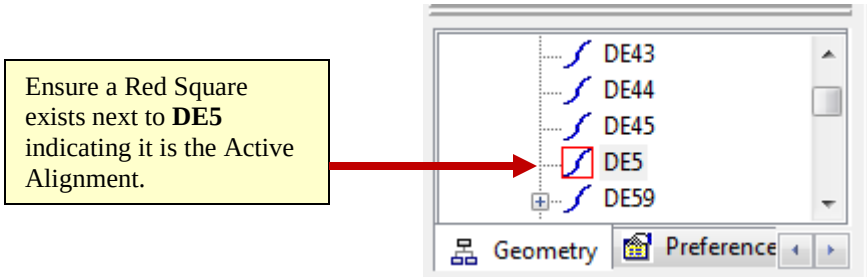
Figure L12-38 MicroStation View

36. **At this Point we have stored 9 Cogo Points to define the Required R/W for Property Alignment SV47. We will now add these Points to Alignment DE5 which was created earlier in the Lab. In Lab 3 you were introduced to the <u>Create/Edit Alignment by Cogo Points</u> command to add Points to an Alignment. In this Lab you will again use the <u>Create/Edit Alignment by Cogo Points</u> command. Before using the command, ensure Alignment DE5 is the Active Alignment.**

- In the InRoads Workspace bar, ensure the **Geometry** tab is the active tab.
- Right mouse click over Alignment **DE5** and select **Set Active** as shown here.

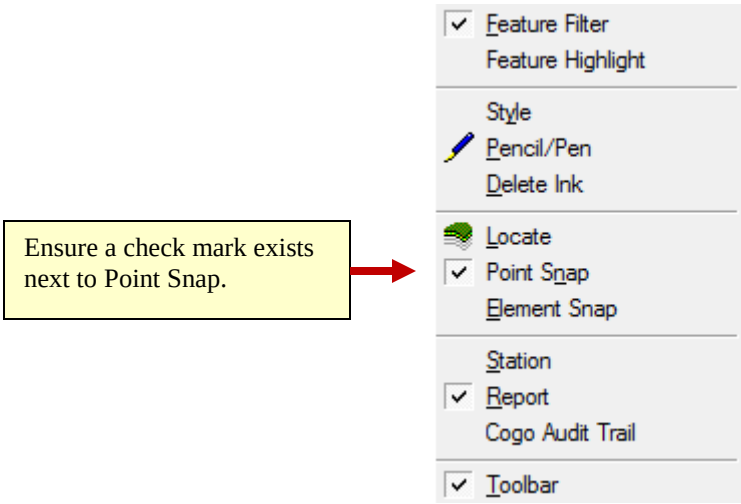


- Ensure a Red Square now exists next to **DE5** as shown here.



37. **Before using the <u>Create/Edit Alignment by Cogo Points</u> command, it is also important to set the InRoads Lock setting to Point Snap.**

- In InRoads, select **Tools ► Locks** and ensure a check mark exists next to **Point Snap** as shown here.



* **<u>REMEMBER</u>:** The **Point Snap** lock is an InRoads snap setting that snaps directly to InRoads stored Points such as the Cogo Points stored in the previous steps.

38. **Open the <u>Create/Edit Alignment by Cogo Points</u> command.**

- In InRoads, select **Geometry ► Utilities ► Create/Edit Alignment by Cogo Points**. The **<u>Create/Edit Alignment…</u>** dialog opens as shown in *Figure L12-39*.

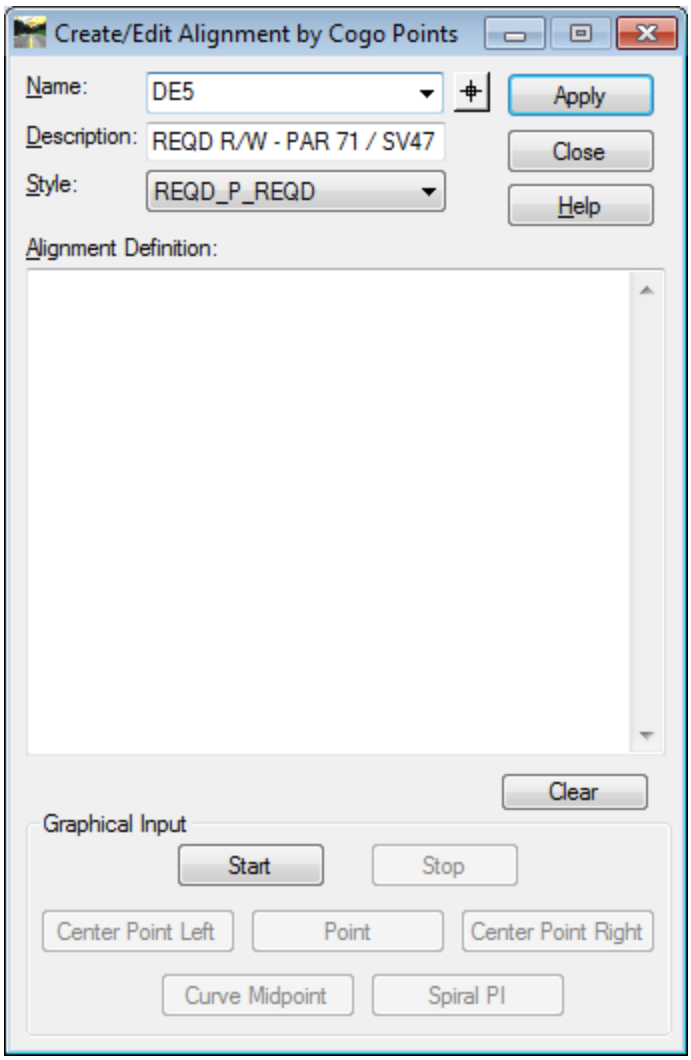


Figure L12-39 Create/Edit Alignment by Cogo Points

39.	**Add Points DE10238, DE10243, DE10244, DE10245, 549, 550 and DE10250 to the <u>Create/Edit Alignment by Cogo Points</u> dialog.** • In the **<u>Create/Edit Alignment…</u>** dialog, click the **Start** button. • Notice in the bottom left corner of the MicroStation window you are prompted to > **Identify Point**. • Left click on Point **DE10238** as shown in *Figure L12-40*. • Notice in the bottom middle of the MicroStation window and the bottom left corner of the InRoads window you are prompted: **Point DE10238 selected**. • Also, notice in the bottom left corner of the MicroStation window you are prompted > **Identify Point**. • Left click on Point **DE10243** as shown in *Figure L12-40*. • Ensure the Point **DE10243** selected is displayed in the bottom middle of the MicroStation window before selecting the next Point.

	NOTE**: If at any time the wrong Point is selected, Right mouse click and you will be returned to the **Create/Edit Alignment…** dialog. Click the **Stop** button and the selected Points will be returned to the **Alignment Definition**: field in ***the Create/Edit Alignment… dialog. From here you can manually remove the incorrect Point. Once the incorrect Point is removed - you can click the **Start** button and continue selecting Points in MicroStation. • Left click on Point **DE10244**. • Ensure Point **DE10244** selected is displayed in the bottom middle of the MicroStation window before selecting the next Point. • Left click on Point **DE10245**. • Ensure Point **DE10245** selected is displayed in the bottom middle of the MicroStation window before selecting the next Point. • Continue adding Points **549**, **550** and **DE10250** in the same manner. • Right mouse click to return to the **Create/Edit Alignment…** dialog. • In the **Create/Edit Alignment…** dialog, click the **Stop** button. • Ensure your **Create/Edit Alignment by Cogo Points** dialog matches that shown in *Figure L12-41*.

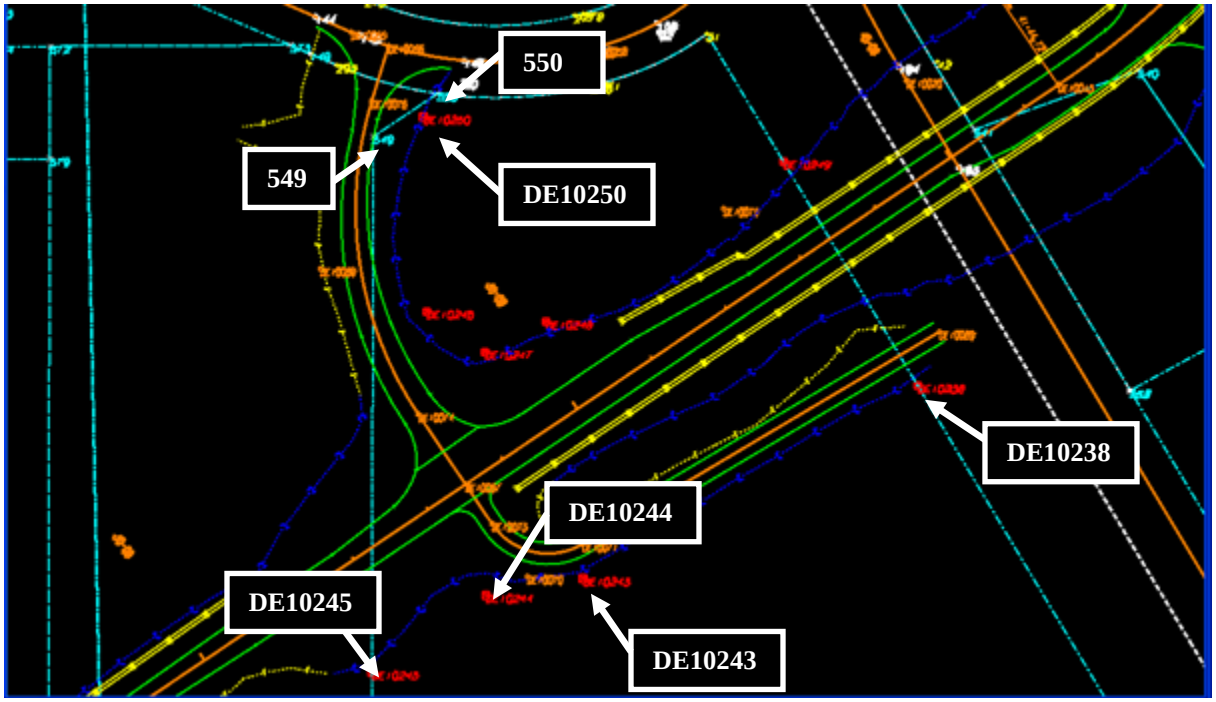


Figure L12-40 MicroStation View

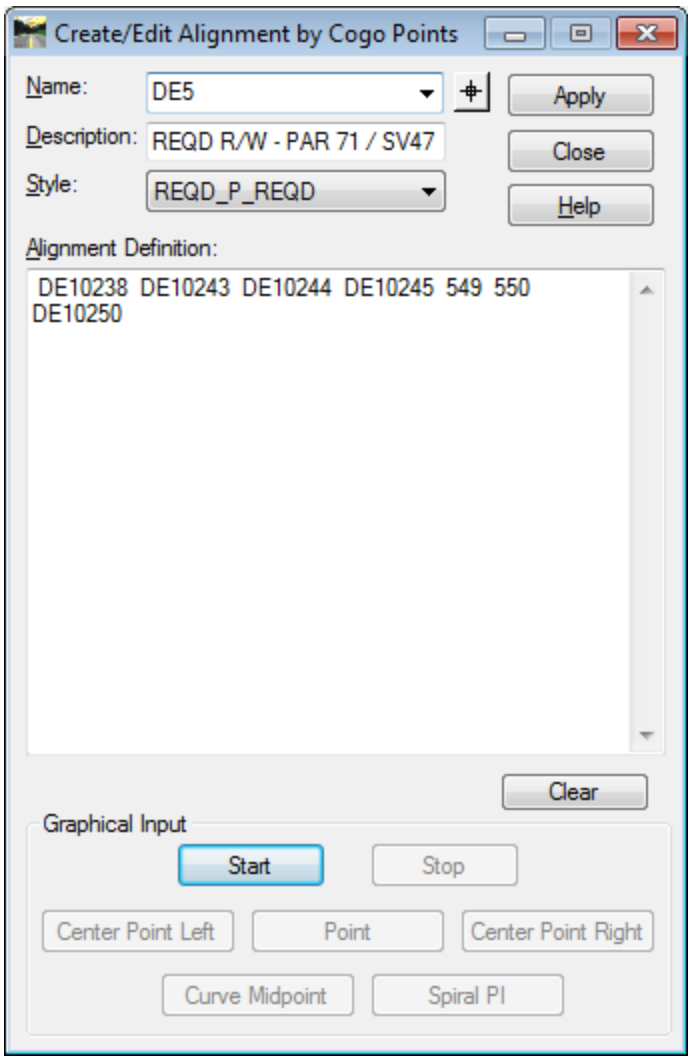


Figure L12-41 Create/Edit Alignment by Cogo Points

40.	**The next step is to add a Curve between Points DE10250 and DE10246.** • In the **<u>Create/Edit Alignment…</u>** dialog click **Start**. • Immediately **Right mouse click** over the MicroStation window to return to the **<u>Create/Edit Alignment…</u>** dialog. • Notice the remaining buttons in the dialog are now active. • Click **Center Point Left**. • Notice in the bottom left corner of the MicroStation window you are prompted to **< Identify circle left**. InRoads is requesting the Center Point of a Curve. • In MicroStation, change the snap setting from Keypoint to Center. This may be accomplished by clicking the Snap icon ( ), located in the bottom middle of the MicroStation window and selecting **Center**. • Using the MicroStation snap procedure (typically a combination of the left/right mouse buttons or Tentative), snap onto the Curve identified in *Figure L12-42*.

- Notice in the bottom middle of the MicroStation window, the statement **Point DE10075 selected**. **DE10075** is the Center Point of the Curve.

***NOTE:** If an error is made, return to the **Create/Edit Alignment…** dialog by Right mouse clicking in the MicroStation window. In the **Create/Edit Alignment…** dialog, click the **Stop** button to return the selections to the **Alignment Definition:** field. At this point you can back out the incorrect Curve Data and try again. Proper use of the **Create/Edit Alignment…** command requires practice.

- Notice in the bottom left corner of the MicroStation window you are prompted to > **Identify Point**. Once the Center of the Curve was selected, InRoads immediately returned to requesting normal Points.
- **Left click** on Point **DE10246** identified in *Figure L12-42*.
- Continue selecting Points **DE10247**, **DE10248**, **DE10249** and **DE10238**, identified in *Figure L12-42*.
- Right mouse click to return to the **Create/Edit Alignment…** dialog.
- In the **Create/Edit Alignment…** dialog, click **Stop** to return the selections to the **Alignment Definition:** field.
- Verify your entries match those shown in *Figure L12-43*.
- Click **Apply** & **Close**.
- Verify your view in MicroStation matches that shown in *Figure L12-44* and the Required R/W Alignment **DE5** was drawn.

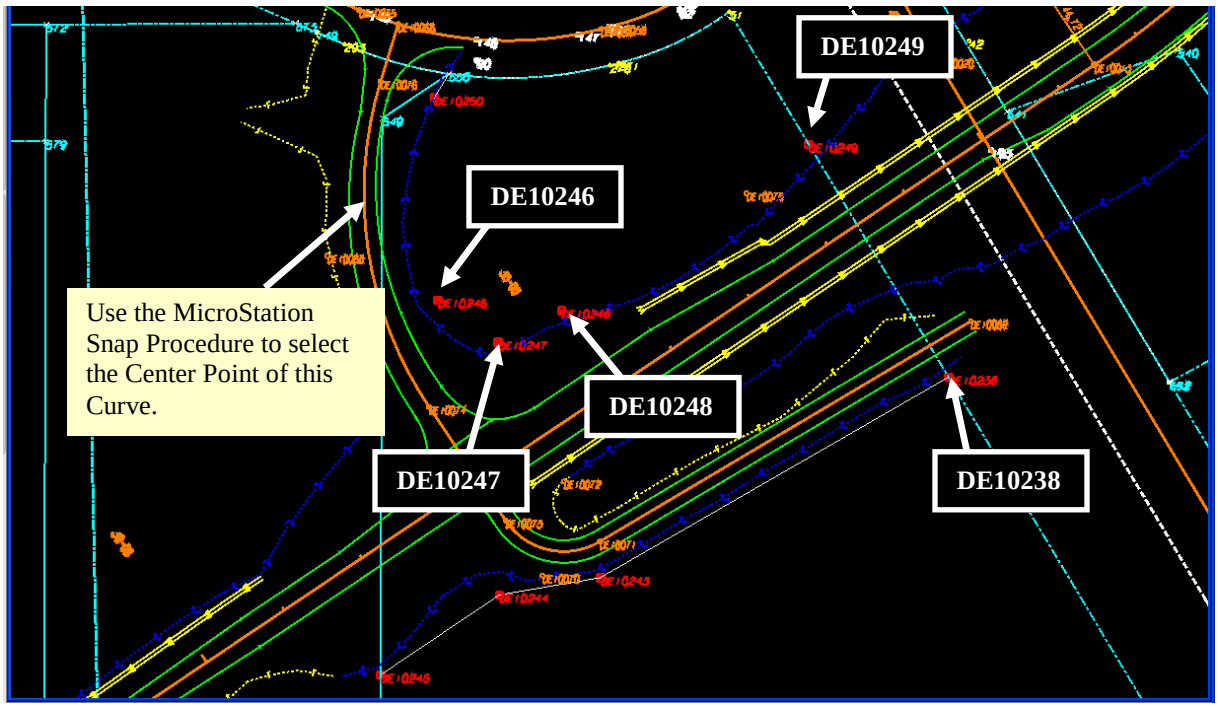


Figure L12-42 MicroStation View

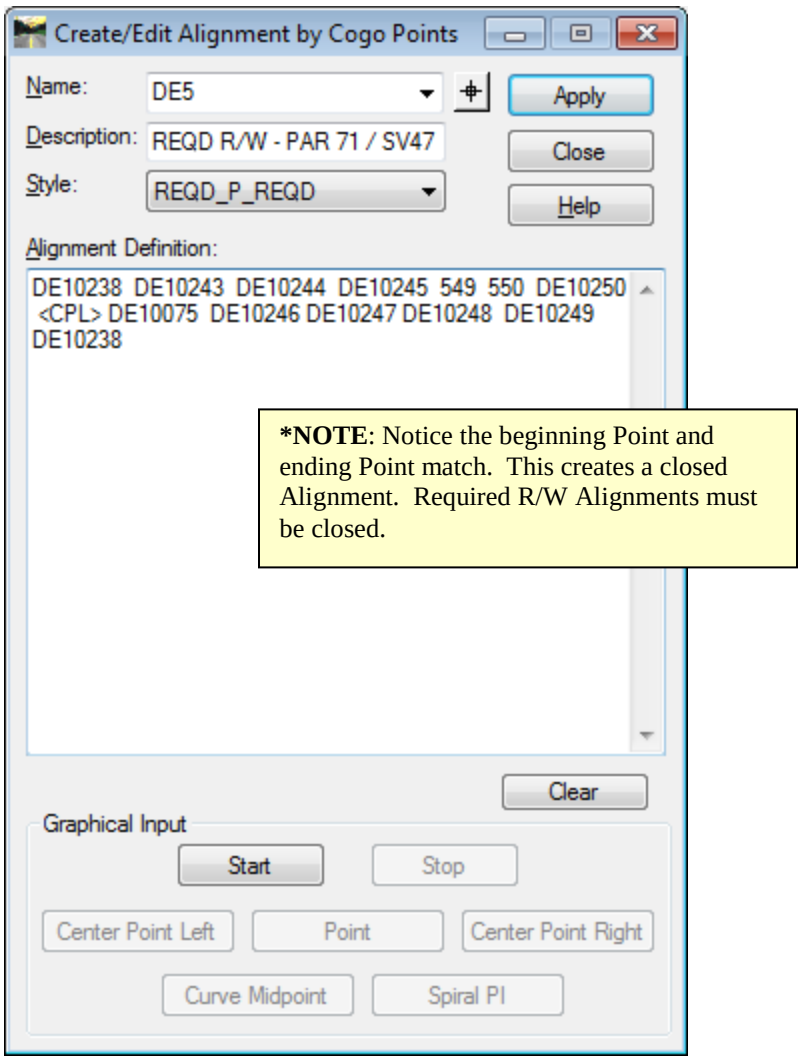


Figure L12-43 Create/Edit Alignment by Cogo Points

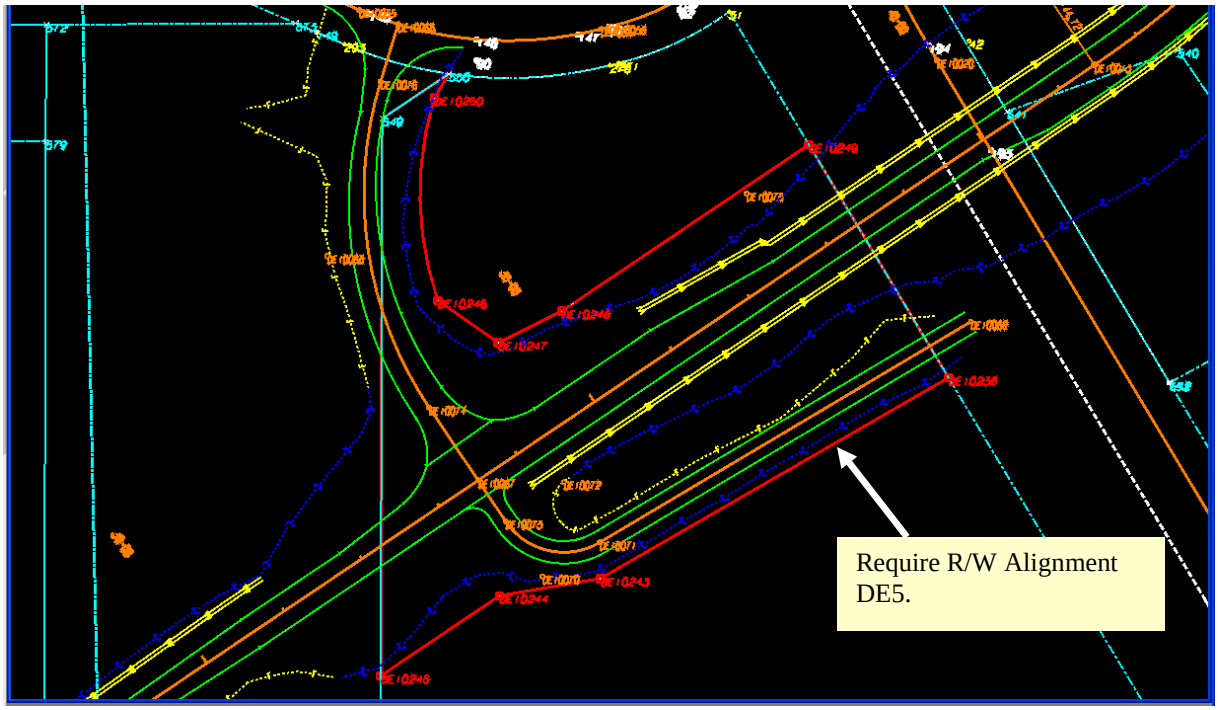


Figure L12-44 MicroStation View

41.	**This completes the Creation of Required R/W Alignment DE5. Save your Work.** • In InRoads, select **File ► Save ► Geometry Project**.

Lab 12E Create the 1234567REQD.dgn File

When all the Required R/W Alignments for a Project have been created, they should be viewed in MicroStation and saved as a PI#REQD.dgn file per the Electronic Data Guidelines (i.e. 1234567REQD.dgn).

42.	**Prepare MicroStation.** • In MicroStation, select **Edit ► Select All**. • Click the **Delete** icon ( ). • In MicroStation, select **File ► References**. • In the **References** dialog, select **Tools ► Detach All**. • If an **Alert** dialog box appears – click **OK**. • **Close** the **References** Window by clicking the Red (X) in the upper right corner of the dialog box.
43.	**Open the View Horizontal Annotation dialog.** • In InRoads, select **Geometry ► View Geometry ► Horizontal Annotation**… and the **View Horizontal Annotation** dialog appears.
44.	**Load the 'NO BEARING & DISTANCE Preference.** • In the **View Horizontal Annotation** dialog, click the **Preferences** button. • In the **Preferences** dialog, highlight **NO BEARING & DISTANCE**. • Click **Load** and **Close**.
45.	**Select the Required R/W and Easement Alignments.** • Place your cursor in the **Horizontal Alignments Include:** key-in field to activate the **Filter** button. • Click the **Filter** button. • In the **Geometry Selection Filter** dialog, click the **Preferences** button. • **Select** the **REQD.dgn Alignments** Preference and click **Load** and **Close**. • Verify the **Geometry Selection Filter** dialog matches that shown in *Figure L12-45*. ***NOTE**: The **REQD.dgn Alignments** Preference filters the data so only the Alignments with the Feature Styles ***REQD_P_DWESMT, REQD_P_PESMT, REQD_P_REQD,*** and ***REQD_P_TESMT*** are included. • In the **Geometry Selection Filter** dialog, click the **All** button to move the **Available:** Alignments to the **Selected:** field. • In the **Geometry Selection Filter** dialog, click **OK**. • In the **View Horizontal Annotation** dialog, verify Alignment **DE5** is showing in the **Horizontal Alignments Selected:** field as depicted in *Figure L12-46*.

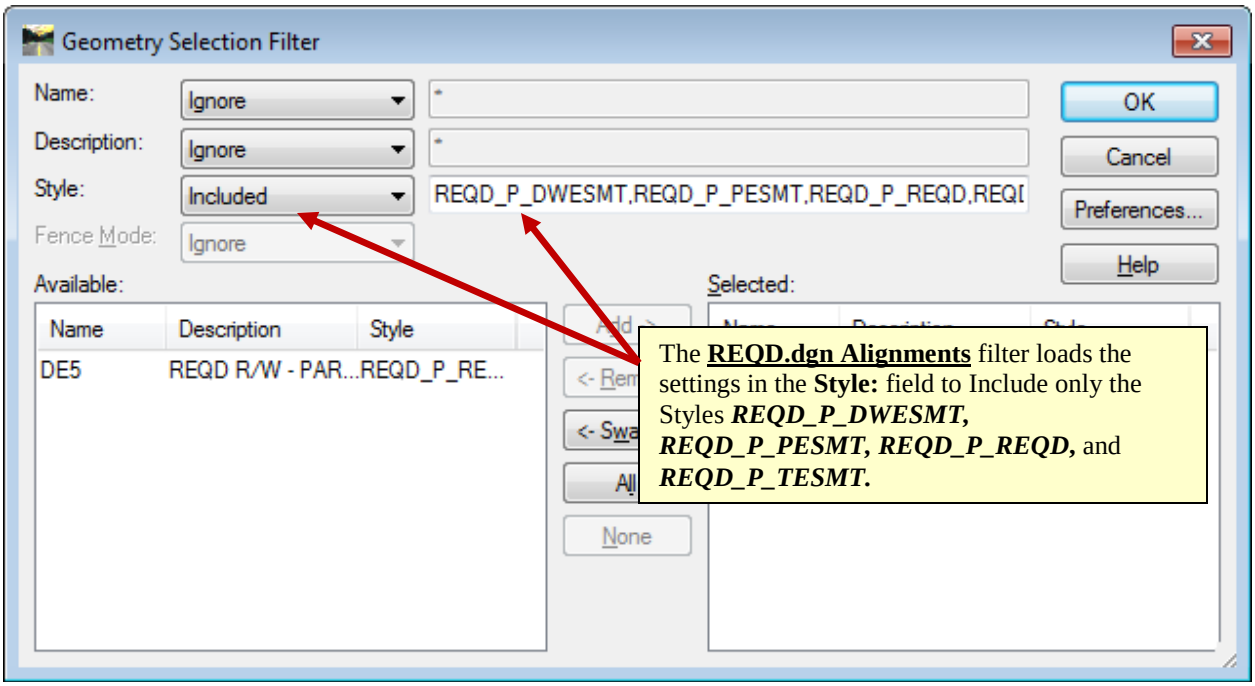


Figure L12-45 Geometry Selection Filter

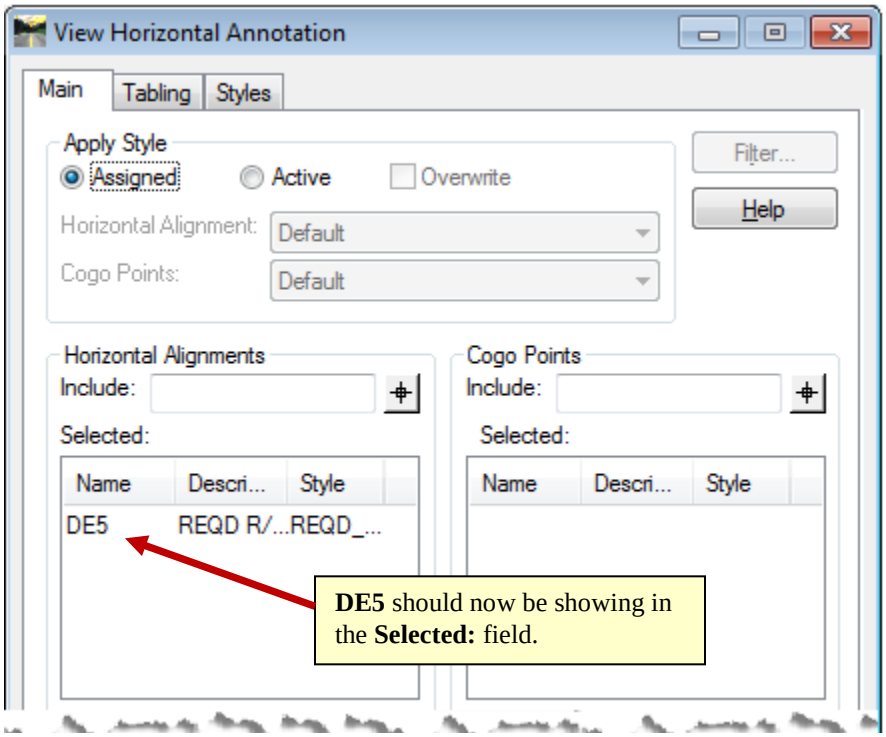


Figure L12-46 View Horizontal Annotation

46. **Select the Required R/W and Easement Points.**

- Place your cursor in the **Cogo Points Include:** key-in field to activate the **Filter** button.
- Click the **Filter** button.
- In the **Geometry Selection Filter** dialog, click the **Preferences** button.
- **Select** the **REQD.dgn Points** Preference and click **Load** and **Close**.
- Verify the **Geometry Selection Filter** dialog matches that shown in *Figure L12-47*.

NOTE**: The **REQD.dgn Points** Preference filters the data so only the Points with the Feature Styles ***REQD_P_DWESMT, REQD_P_PESMT, REQD_P_REQD, REQD_P_TESMT and ***REQD_P_RWRM*** are included.

- In the **Geometry Selection Filter** dialog, click the **All** button to move the **Available:** Points to the **Selected:** field.
- In the **Geometry Selection Filter** dialog, click **OK**.
- In the **View Horizontal Annotation** dialog, verify the Points **DE10238, DE10243, DE10244, DE10245, DE10246, DE10247, DE10248, DE10249 and DE10250** are showing in the **Cogo Points Selected:** field as shown in *Figure L12-48*.
- Click **Apply** and **Close**.
- In MicroStation, click the **Fit View** icon ( ).
- Verify your view in MicroStation matches that shown in *Figure L12-49*.

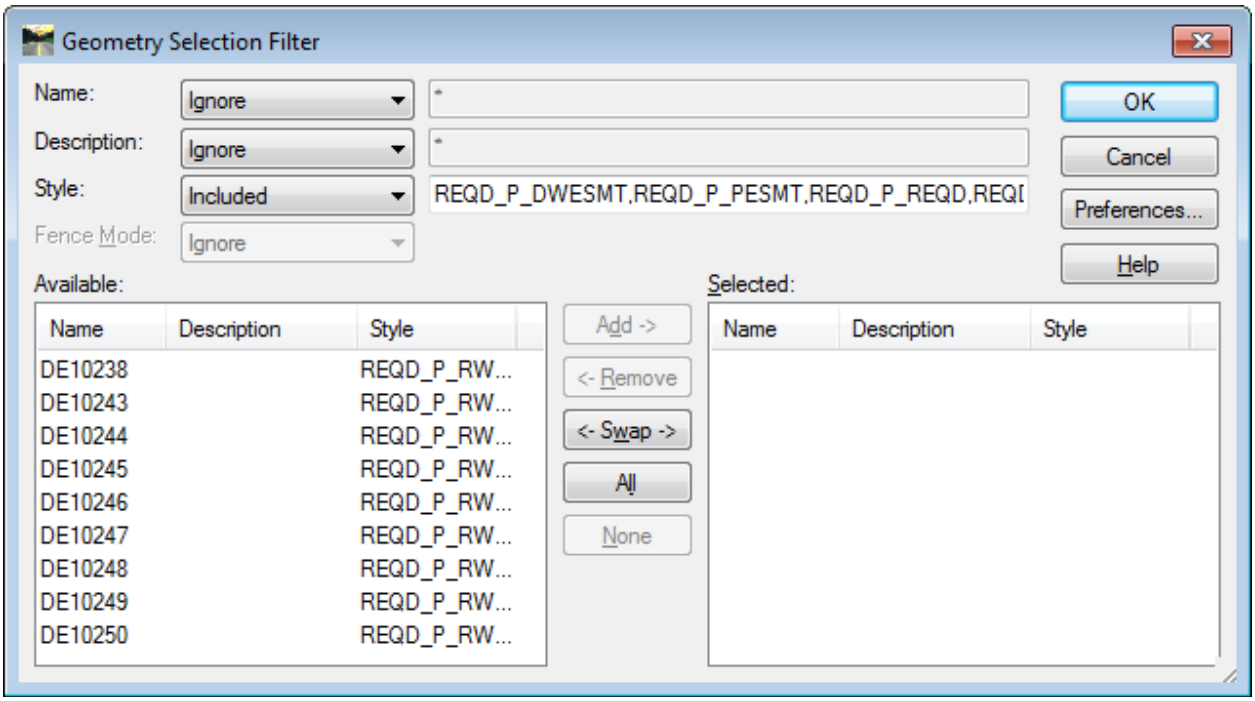


Figure L12-47 Geometry Selection Filter

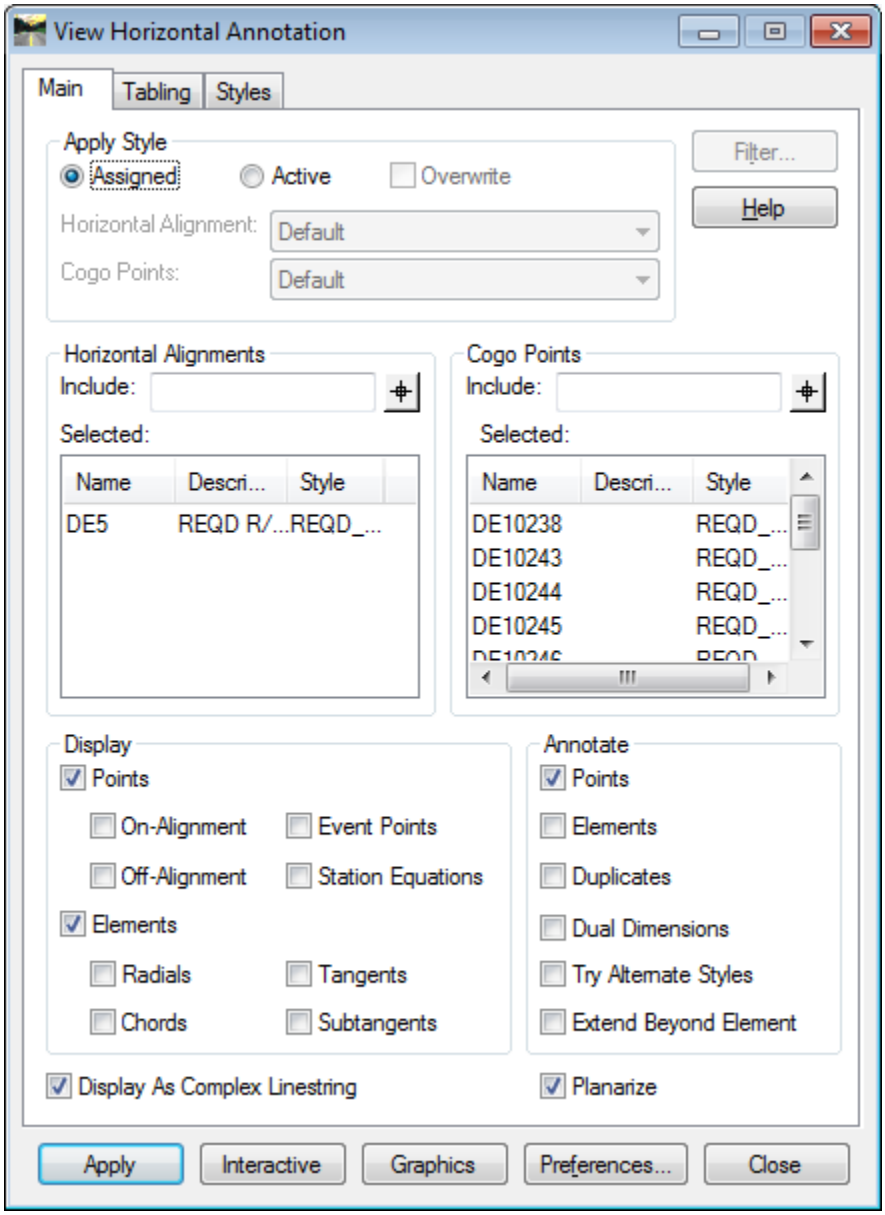


Figure L12-48 View Horizontal Annotation

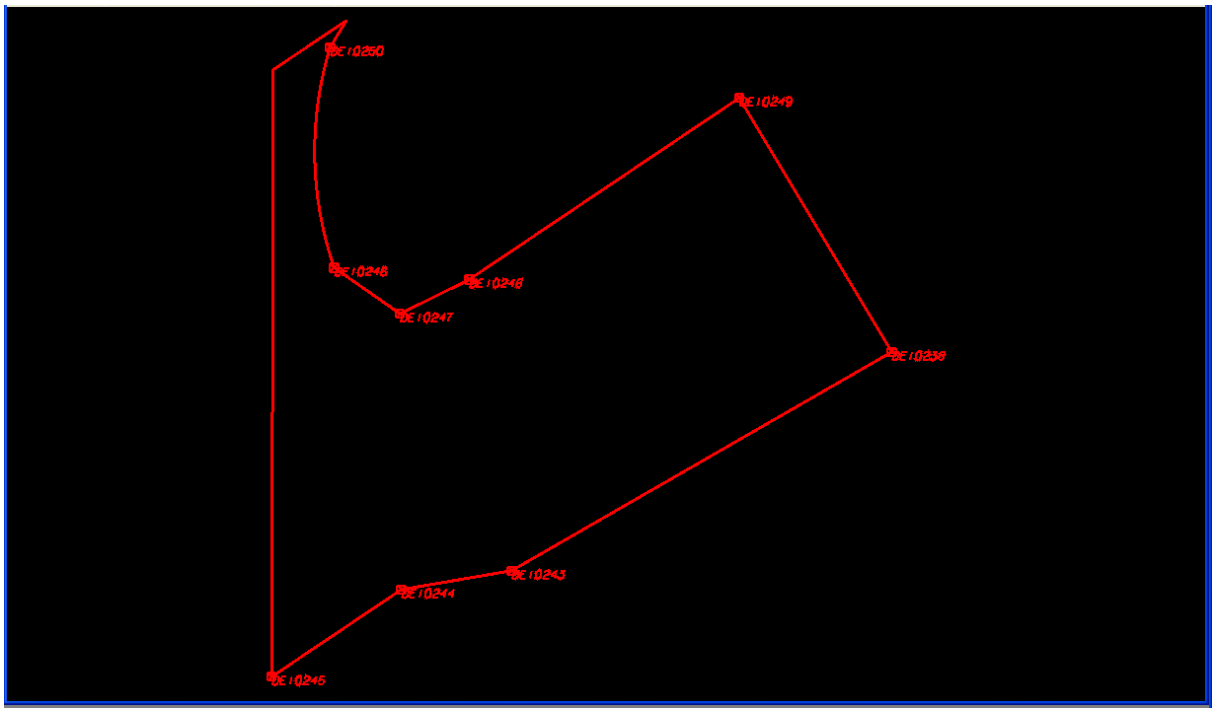


Figure L12-49 MicroStation View

47.	**Create the 1234567REQD.dgn File.** • In MicroStation, select **File ► Save As**. • In the **<u>Save As</u>** dialog, navigate to **C:\InRoads Data\1234567\Design Labs\Lab 12** • In the **<u>Save As</u>** dialog, key-in **1234567REQD.dgn** as shown in *Figure L12-50*. • Change the ***Save as type:*** to **MicroStation V8 DGN Files (*.dgn)** as shown in *Figure L12-50*. • Click **Save**. • The **1234567REQD.dgn** file is now created and ready for any cleanup that may be required.

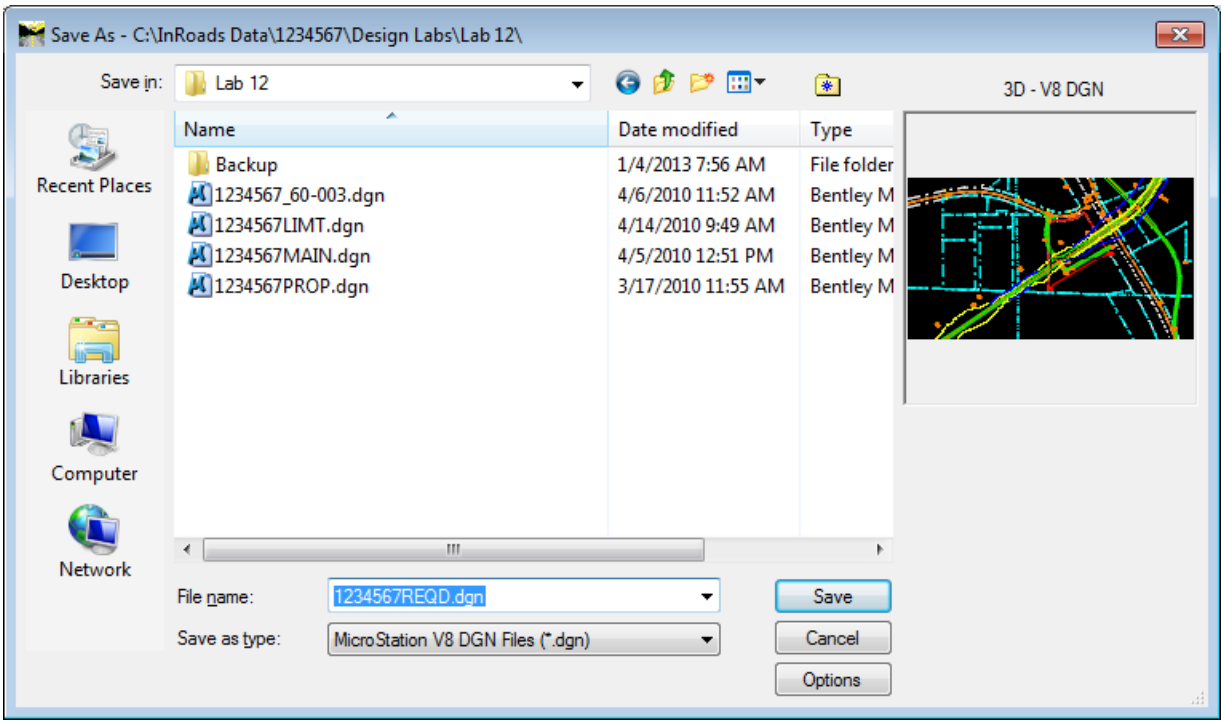
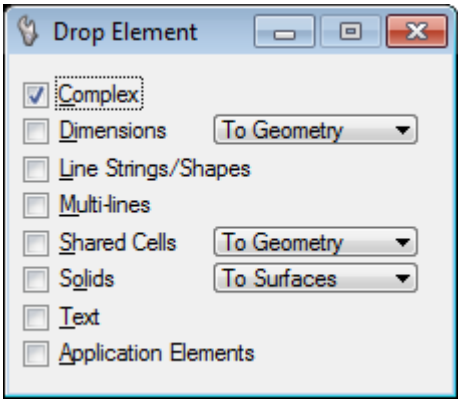


Figure L12-50 Save As

48.	**The Required R/W Lines that are drawn on top of Existing R/W Lines are normally deleted from the MicroStation File. Delete the Required R/W Lines that are drawn on top of existing R/W Lines.** • In MicroStation, click the **Drop Element** icon ( ). The **<u>Drop Element</u>** dialog should open. • Match the settings shown here in the **<u>Drop Element</u>** dialog.  • In MicroStation, Left click on Alignment **DE5** to drop complex. • Left click in the MicroStation window again to **Accept** the operation. • In MicroStation, click the **Delete** icon and delete the Lines identified as **Line 1** and **Line 2** in *Figure L12-51*. • Ensure your view matches that shown in *Figure L12-52*.

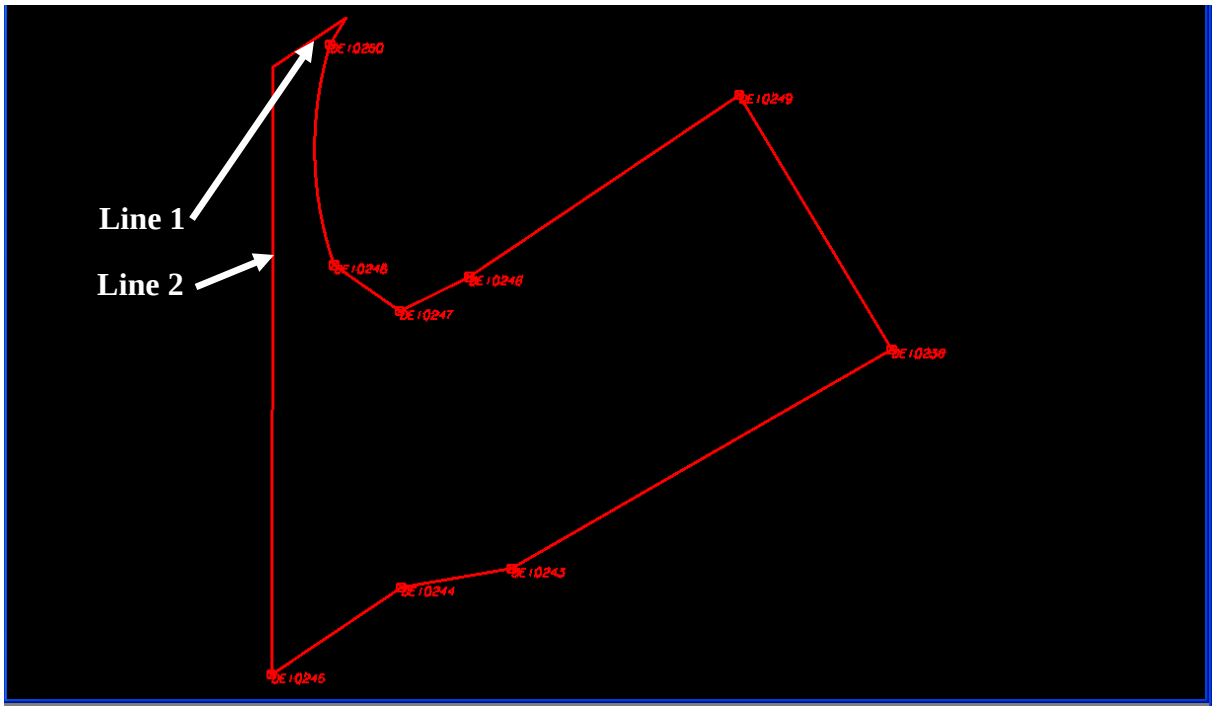


Figure L12-51 MicroStation View

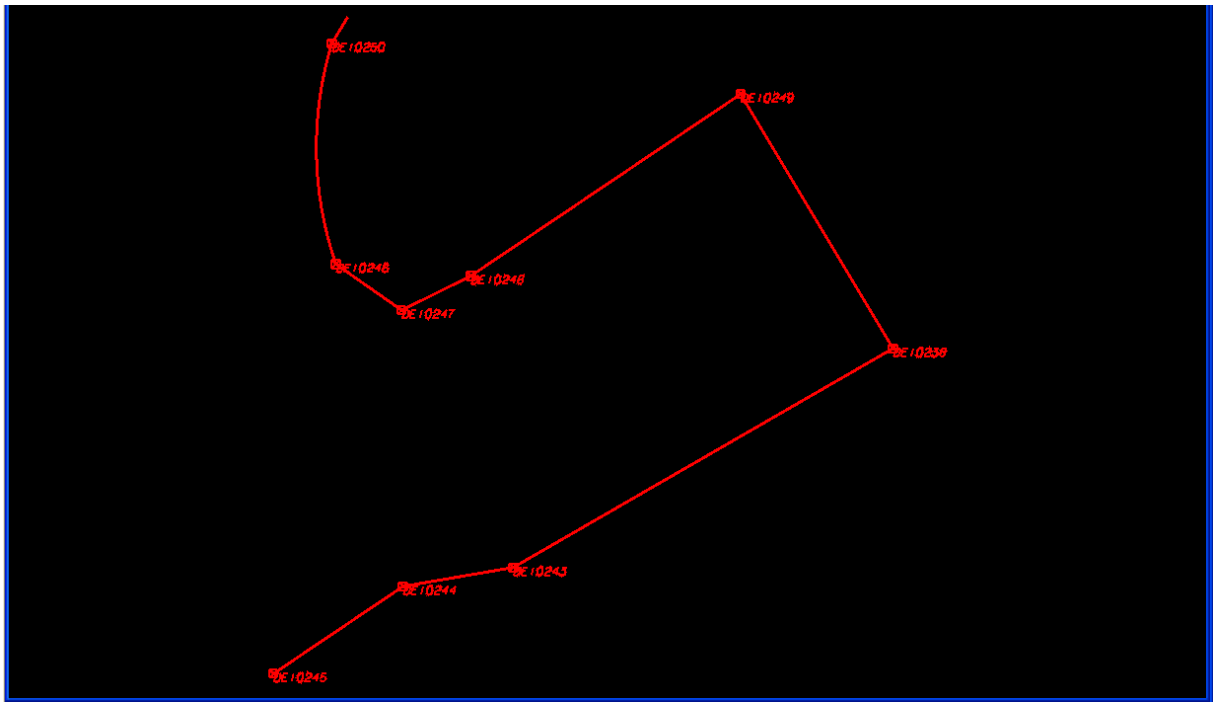


Figure L12-52 MicroStation View

Lab 12F Create the R/W Table for REQ'D R/W Alignment DE5

All Required R/W Alignments on a Project require a Table like the one shown below. This Lab guides you through the creation of this Table in preparation for its placement in MicroStation.

```
*************************************************************
REQD R/W - PAR 71 / SV47     REQ'D R/W   DE5
*************************************************************
  PNT       OFFSET/        STATION/         ALIGNMENT
              DIST         BEARING
-------------------------------------------------------------
 DE10238    190.00  R      38+28.61         C/L SR100 SPUR
            429.66      S 60^03'10.5" W
 DE10243    160.00  R      34+00.00         C/L SR100 SPUR
            109.66      S 80^16'36.6" W
 DE10244    115.00  R      33+00.00         C/L SR100 SPUR
            153.05      S 56^02'56.7" W
 DE10245    115.00  R      31+46.95         C/L SR100 SPUR
            595.36       N 0^09'16.9" E
     549     11.44  R      14+19.39         C/L STOFFEL RD. TIE-IN
             85.83      N 56^11'08.0" E
     550     67.42  R      14+87.05         C/L STOFFEL RD. TIE-IN
             30.20      S 31^12'53.6" W
 DE10250     60.00  R      14+57.77         C/L STOFFEL RD. TIE-IN
ARC LENGTH = 219.98
CHORD BEAR = S 1^02'38.0" E
LNTH CHORD = 216.36
    RADIUS = 349.26
    DEGREE = 16^24'18.4"
 DE10246     60.00  R      12+00.00         C/L STOFFEL RD. TIE-IN
             78.70      S 55^03'29.5" E
 DE10247    110.00  L      34+50.00         C/L SR100 SPUR
             75.66      N 63^38'37.4" E
 DE10248    100.00  L      35+25.00         C/L SR100 SPUR
            318.76      N 56^02'56.7" E
 DE10249    100.00  L      38+43.76         C/L SR100 SPUR
            290.40      S 30^57'32.4" E
 DE10238    190.00  R       38+28.6         C/L SR100 SPUR
  REQD R/W  =  182364.982   SF
  REQD R/W  =  4.187    ACRES
REMAINDER   =  +/- __________  ACRES
```

49.	**The R/W Tables are placed directly in the Right of Way Plan Sheets. Open the MicroStation Right of Way Sheet File where the R/W Table is to be placed.** • In MicroStation, select **File ► Open**. • Browse to **C:\InRoads Data\1234567\Design Labs\Lab12** • Highlight **1234567_60-003.dgn** and click **Open**. • Ensure your view in MicroStation matches that shown in *Figure L12-53*.

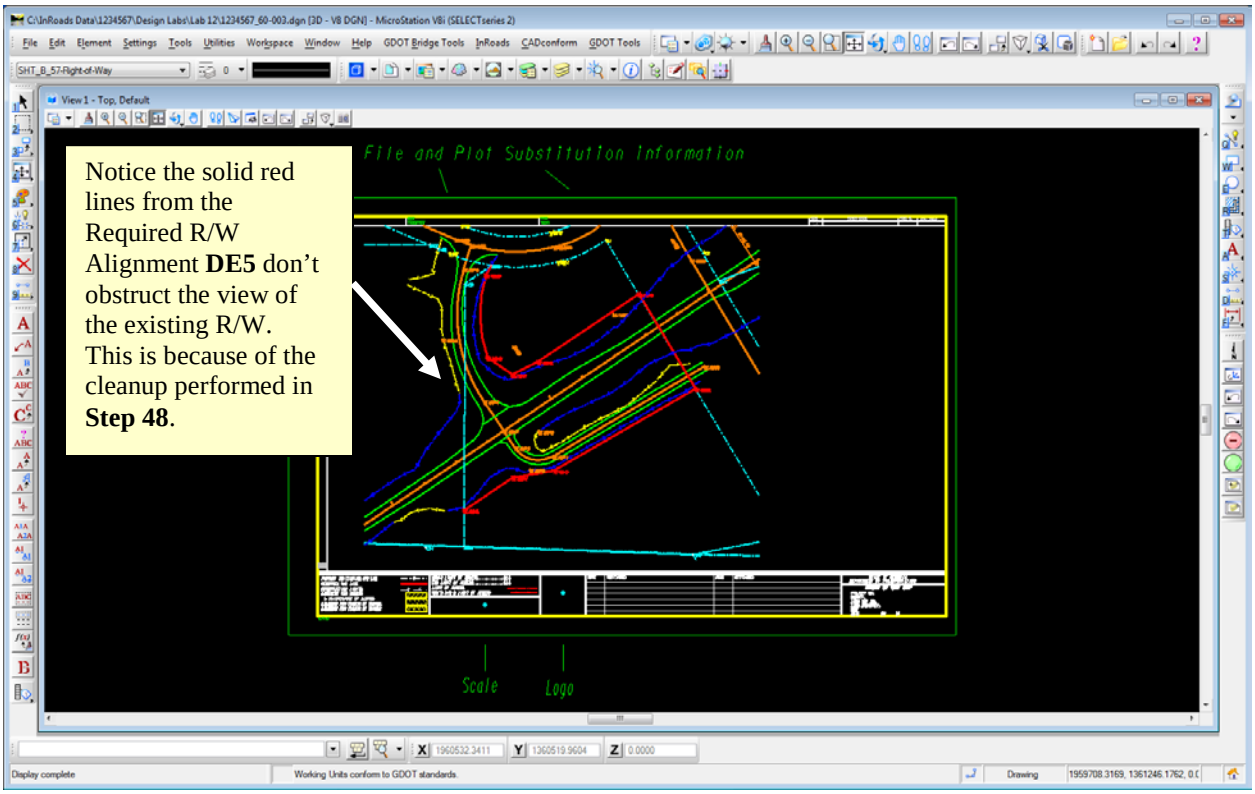


Figure L12-53 MicroStation View

50.	**The GaDOT Legal Description is used to create the GDOT R/W Table. It is the same as other XML Reports used in InRoads except that it is accessed differently than other XML Reports. Open the GaDOT Legal Description Tool.** • In InRoads, select **Tools ► XML Reports ►** Hold down the **CTRL** key on your key board while Left clicking **Legal Description**. The **GaDOT Legal Description** dialog opens as shown in *Figure L12-54*.

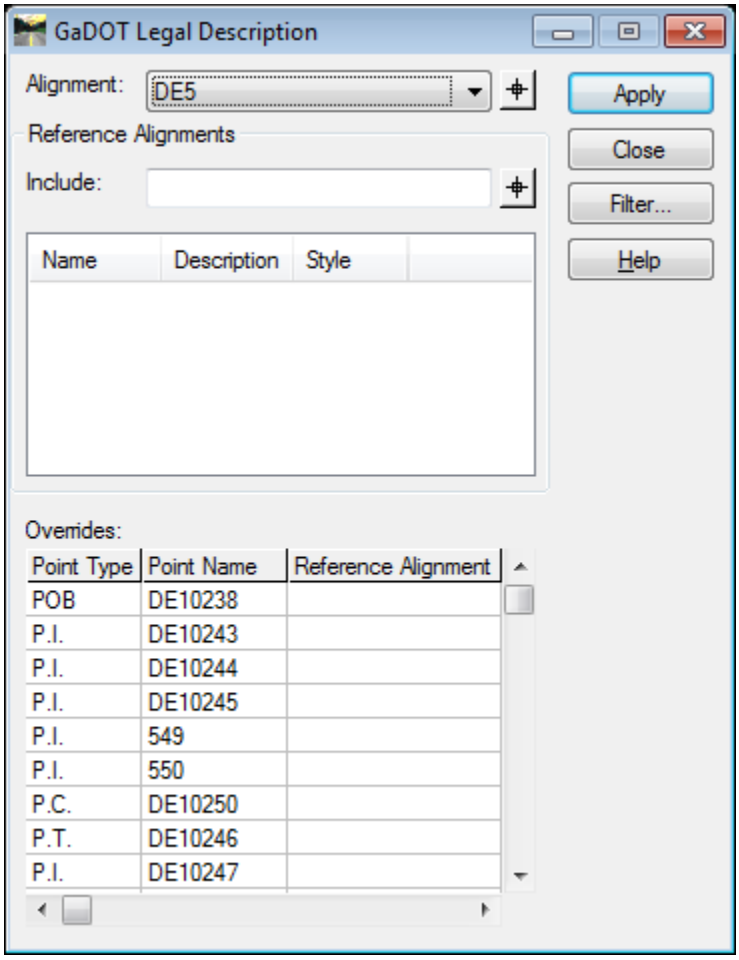


Figure L12-54 GaDOT Legal Description

51.	**The Alignment: field is where the Required R/W Alignment is entered. Enter the Required R/W Alignment DE5.** • In the **<u>GaDOT Legal Description</u>** dialog, use the pull-down arrow next to **Alignment:** to select ***DE5*** as shown in *Figure L12-55*.

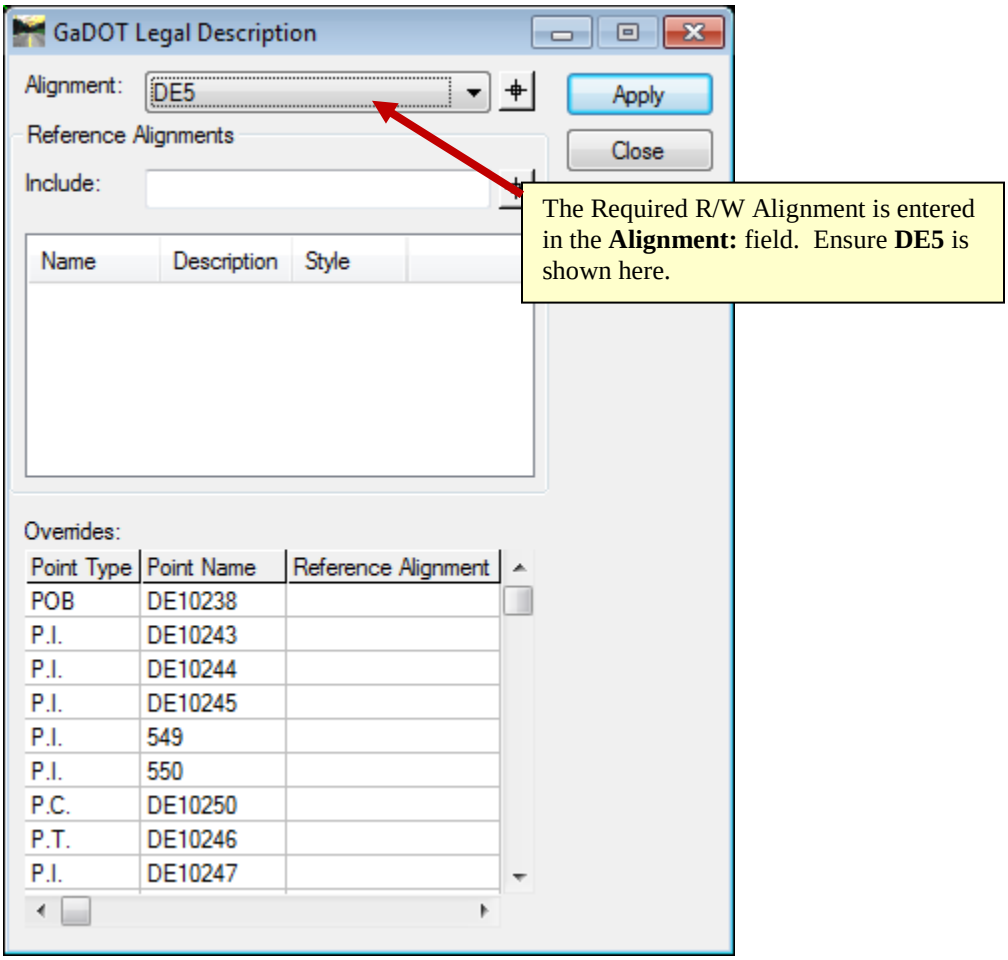


Figure L12-55 GaDOT Legal Description

52.	**The Reference Alignment: field is where the primary Centerline Alignment from which all Points in the Required R/W Alignment will be referenced. Enter the Reference Alignment DE31 (SR 100 SPUR).** • In the **GaDOT Legal Description** dialog, use the Locate button next to the **Reference Alignments Include:** field to select ***DE31*** as shown in *Figure L12-56*. • Notice when this is done that all the Points in the **Overrides:** field change to refer to the **Reference Alignment:** ***DE31***.

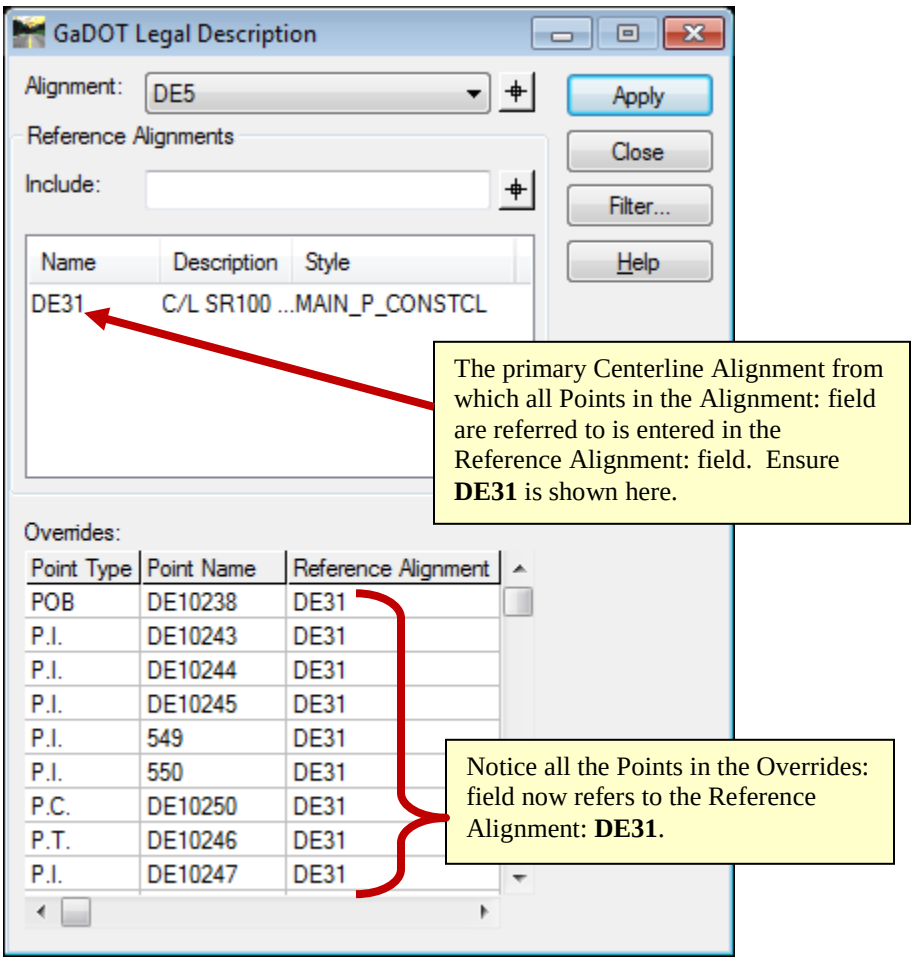


Figure L12-56 GaDOT Legal Description

53.	**Many Right-of-Way Alignments are bound by two or more Roadways. In such cases the Designer may choose to reference some Right-of-Way Alignment Points to different Roadway Centerline Alignments. The <u>GaDOT Legal Description</u> dialog allows Points to be manually edited to reference different Roadway Alignments in the 'Overrides:' field. Change Points 549, 550, DE10250 and DE10246 to reference the Centerline Alignment DE8 (Stoffel Rd.).** • In the **<u>GaDOT Legal Description</u>** dialog, Left click on **DE31** next to Point **549**. • Notice the cell now contains a pull-down arrow as shown in *Figure L12-57*. • Use the pull-down arrow to select Alignment **DE8** as shown in *Figure L12-58*. • Use the pull-down arrow to select Alignment **DE8** for the Points **550**, **DE10250** and **DE10246**. • Ensure your **<u>GaDOT Legal Description</u>** dialog matches that shown in *Figure L12-59*.

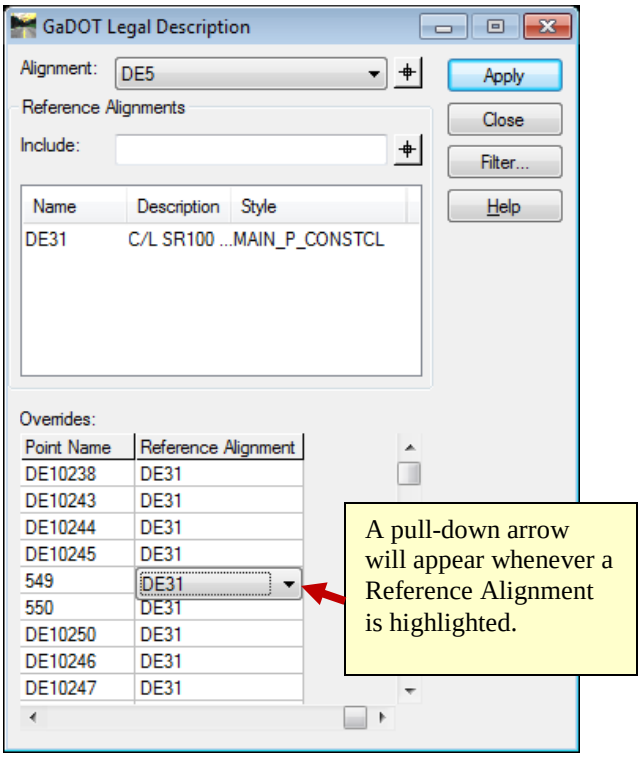


Figure L12-57 GaDOT Legal Description

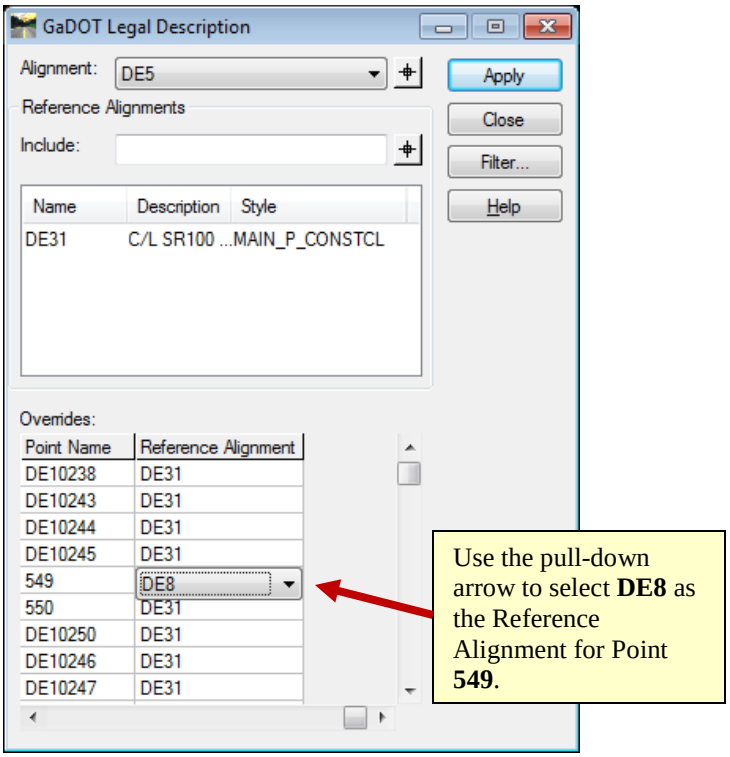


Figure L12-58 GaDOT Legal Description

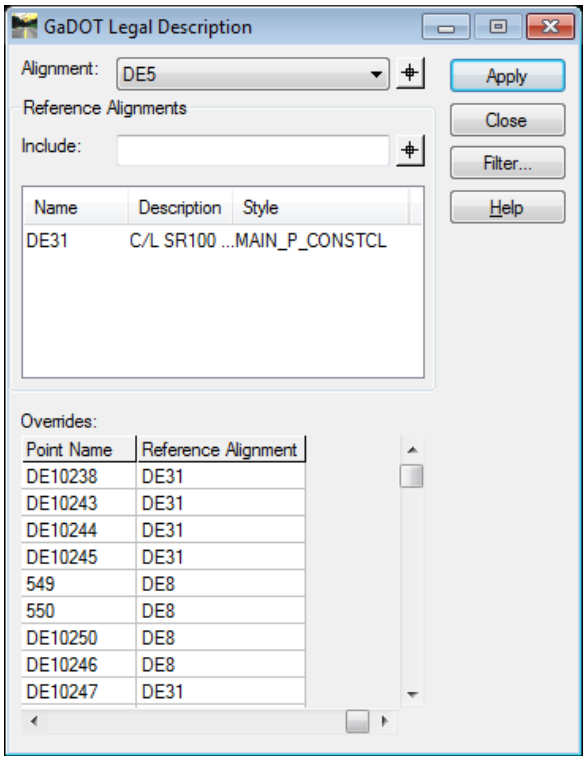


Figure L12-59 GaDOT Legal Description

54.	**Open the Bentley Civil Report Browser.** • In the **<u>GaDOT Legal Description</u>** dialog, click **Apply**. The **<u>Bentley Civil Report Browser</u>** opens as shown in *Figure L12-60*.

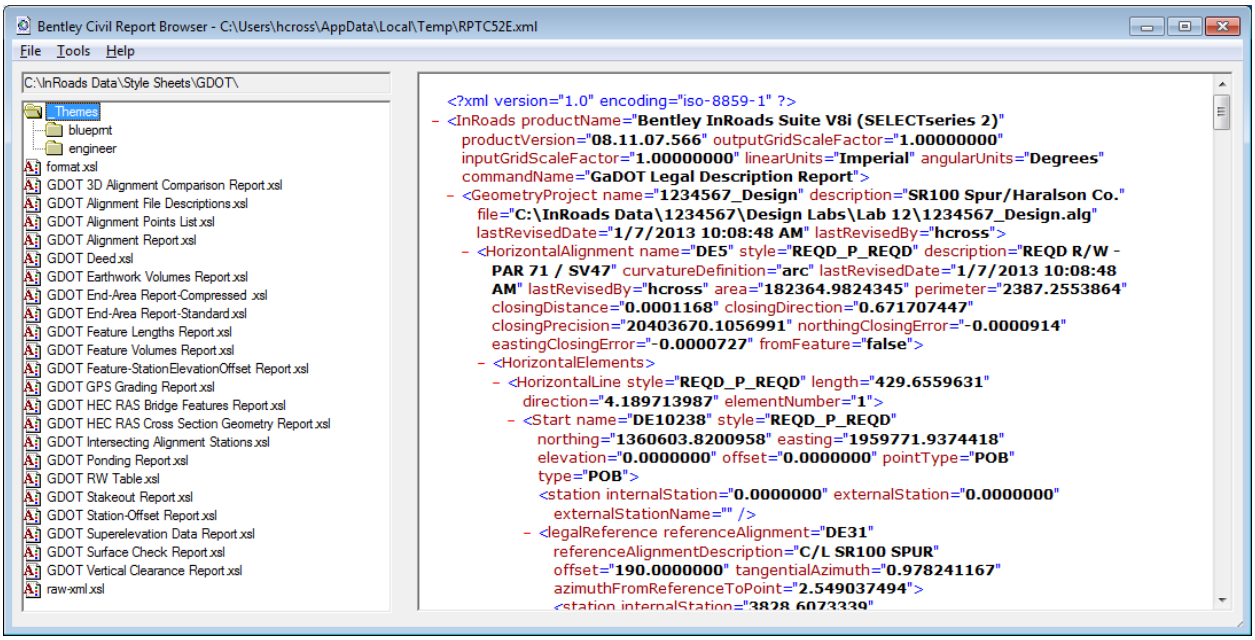


Figure L12-60 Bentley InRoads Report Browser

55.	**Create the R/W Table.** • In the **Bentley Civil Report Browser**, highlight **GDOT RW Table.xsl**. • Verify your view matches that shown in *Figure L12-61*.

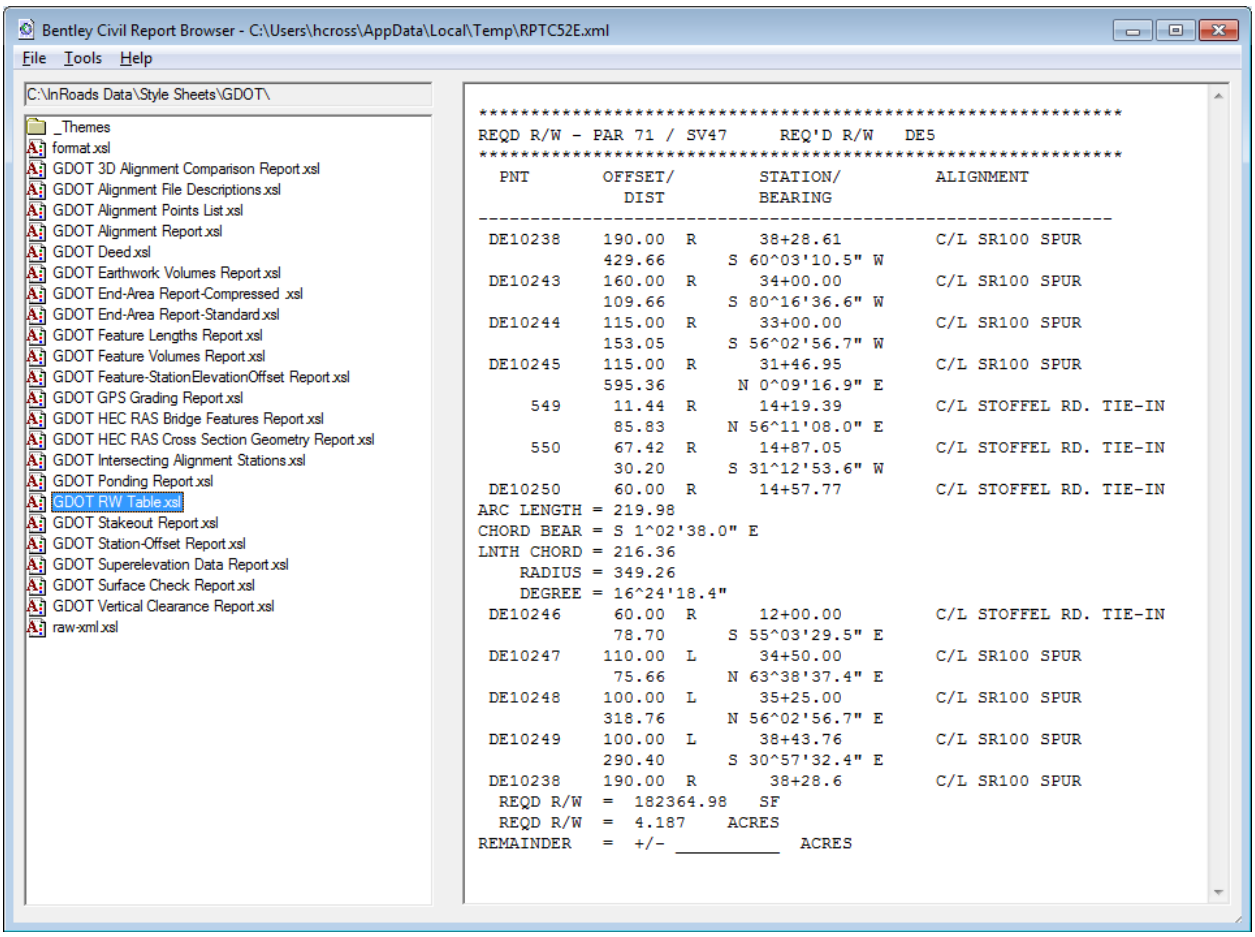


Figure L12-61 Bentley Civil Report Browser

56.	**Before the R/W Table can be included in MicroStation it must be saved as a .TXT file. Save the R/W Table as 'DE5 R/W Table.txt'.** • In the **Bentley Civil Report Browser**, select **File ► Save As**. The **Save As** dialog opens. • Browse to **C:\InRoads Data\1234567\Design Labs\Lab 12.** • In the **File name:** field, key-in **DE5 RW Table.txt.** • Verify your **Save As** dialog matches that shown in *Figure L12-62*. • Click **Save** to create the text file **DE5 RW Table.txt**.

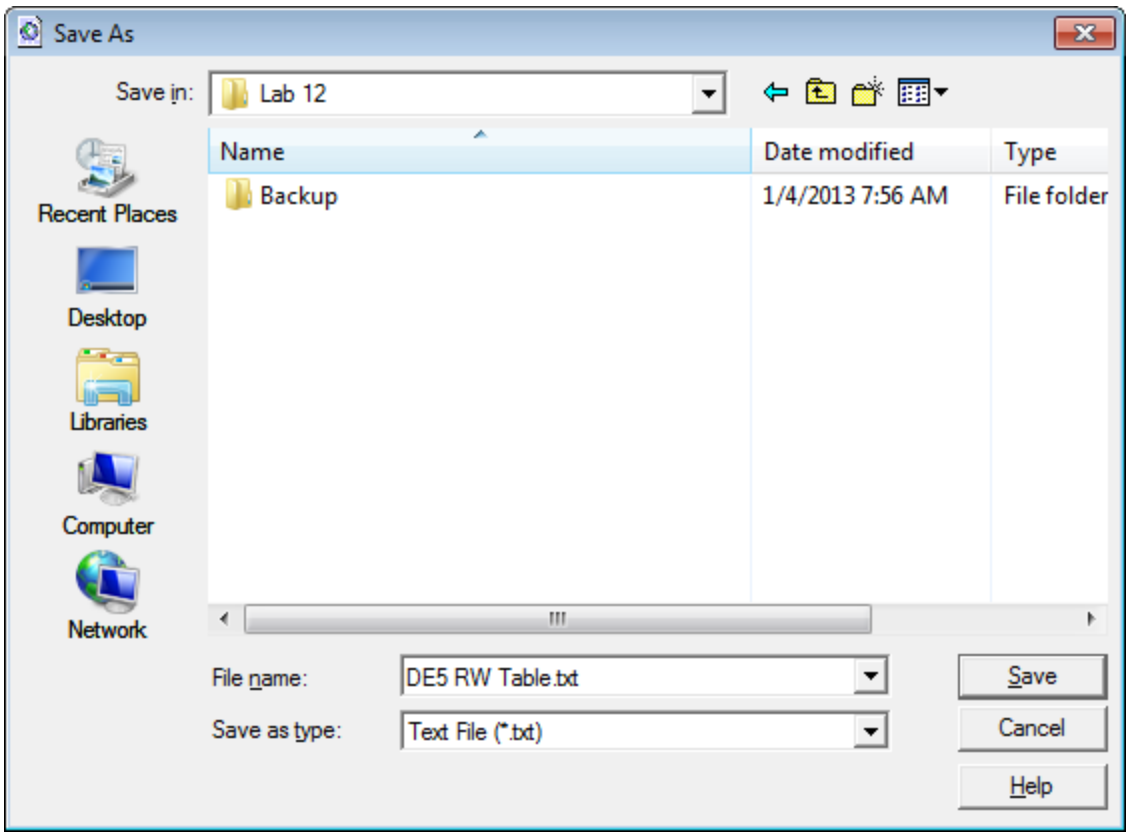
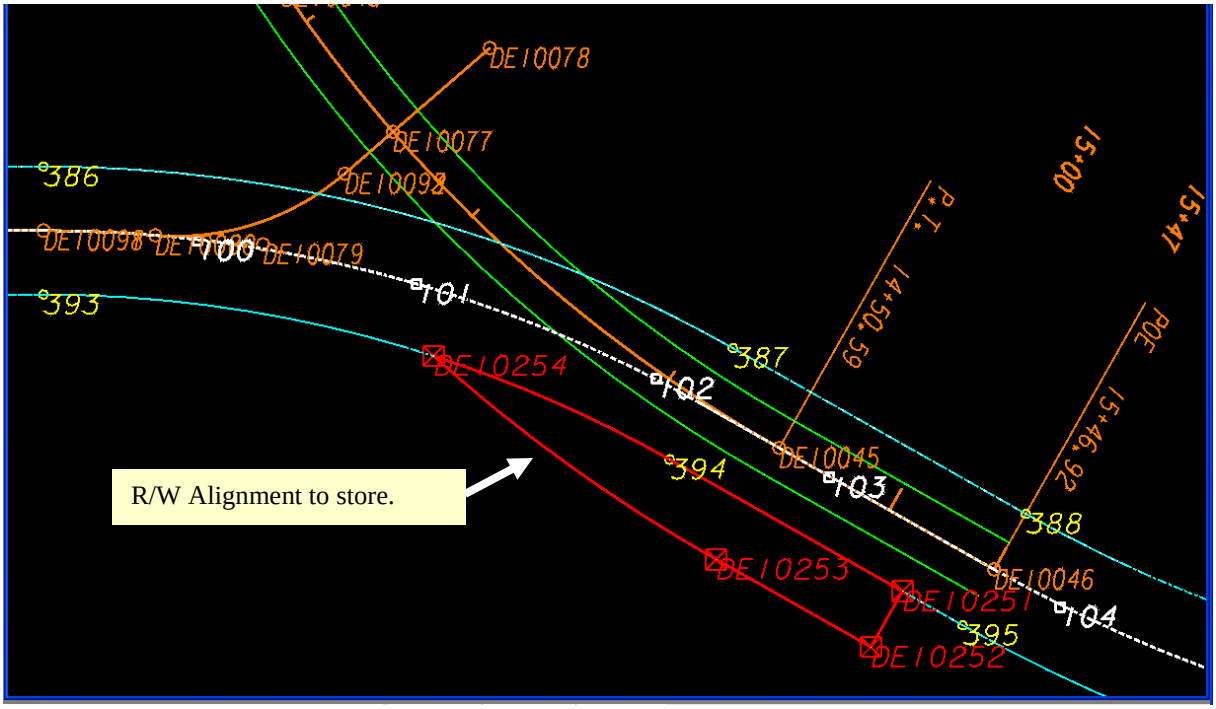


Figure L12-62 Save As

57.	**Close the <u>Bentley Civil Report Browser</u> and the <u>GaDOT Legal Description Tool</u>.** • In the **<u>Bentley Civil Report Browser</u>**, select **File ► Exit.** • In the **<u>GaDOT Legal Description</u>** dialog, click **Close**.
58.	**For Information Only.** A MicroStation Macro has been developed for the proper placement of the R/W Table text file in MicroStation. The Macro is accessed via the **GDOT Menu** in MicroStation under the **GDOT Tools** menu.

Lab 12G Alternate Method of Storing REQ'D R/W Alignment

In Lab 12G you will be shown an alternate method of storing the R/W Alignment shown below in Red. The commands shown in this section of Lab 12 are useful on any type of Horizontal Alignment not just R/W Alignments.



59.	**Open the MicroStation Working File.** • In MicroStation, select **File ► Open**. • Browse to **C:\InRoads Data\1234567\Design Labs\Standards**. • Highlight **GDOT 3D Working File.dgn**. • Click **Open**. • Attach the Reference Files **1234567MAIN.dgn**, **1234567LIMT.dgn** and **1234567PROP.dgn**. This may be accomplished in MicroStation by selecting **File ► References** and selecting **Tools ► Attach** from the **References** dialog. Remember to attach as ***Coincident World*** with the **Logical Names** of **MAIN**, **LIMT**, and **PROP** respectively. (NOTE: See Previous **Step 13** in this Lab for Reference File Attachment instructions if needed). • When completed – Close the **References** dialog. • In MicroStation, click the **Fit View** icon. • Ensure your view in MicroStation matches that shown in *Figure L12-63*. • In MicroStation, **Window Area** the location identified by the Red Square in *Figure L12-63*. • Ensure your view matches that shown in *Figure L12-64*.

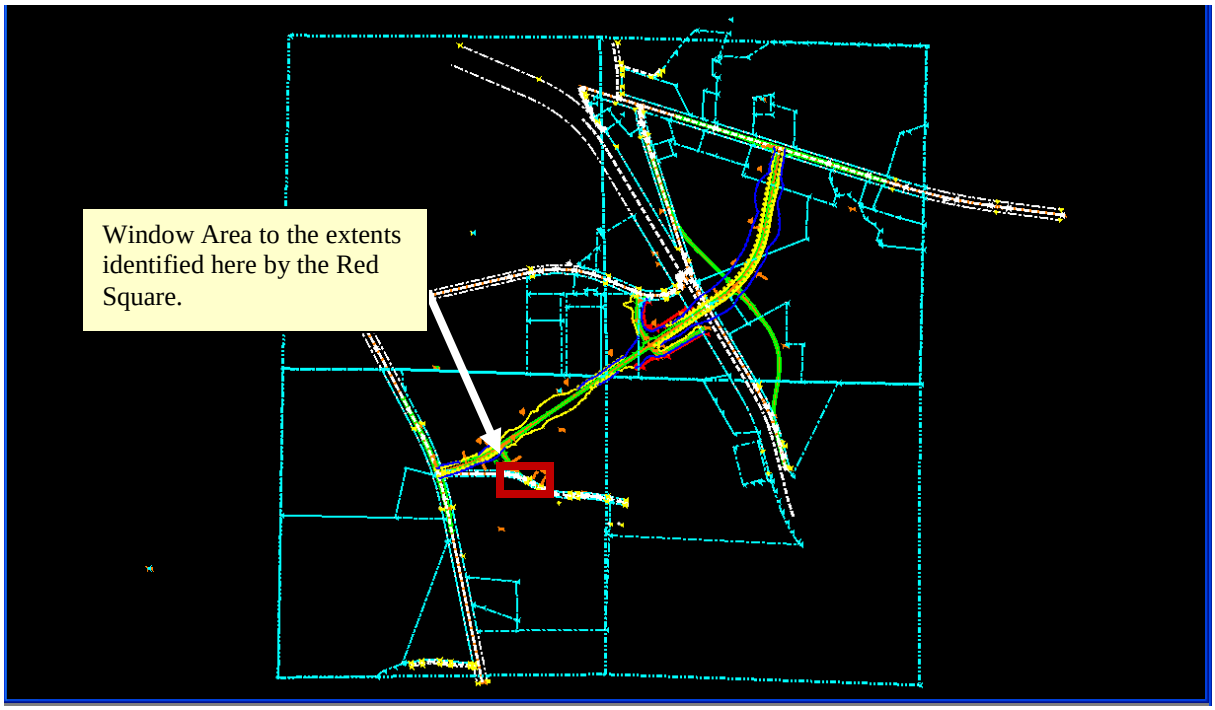


Figure L12-63 MicroStation View

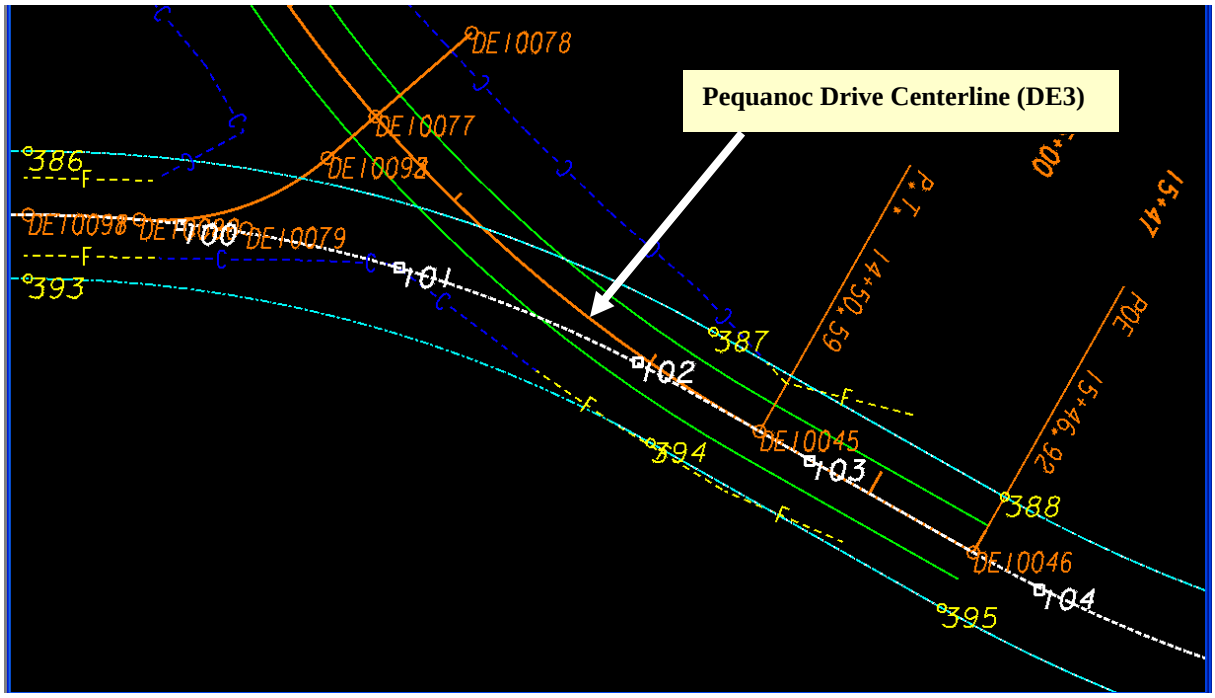


Figure L12-64 MicroStation View

60.	**Store a Cogo Point at Sta. 15+20 offset 25' Right of Pequanoc Drive Tie-in (DE3).** • In InRoads, select **Geometry ► Cogo Points ► New**. • Match the entries shown in *Figure L12-65*. • Click **Apply** but do **not** close the **New Cogo Point** dialog. • If a **Results** window appears – click **Close** to exit the **Results** window. • Ensure Point **DE10251** was drawn in MicroStation as shown in *Figure L12-66*.

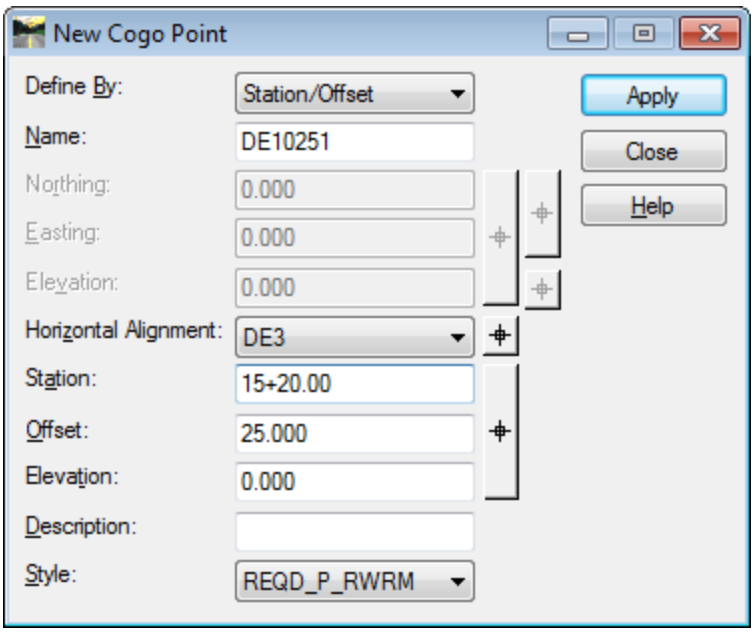


Figure L12-65 New Cogo Point

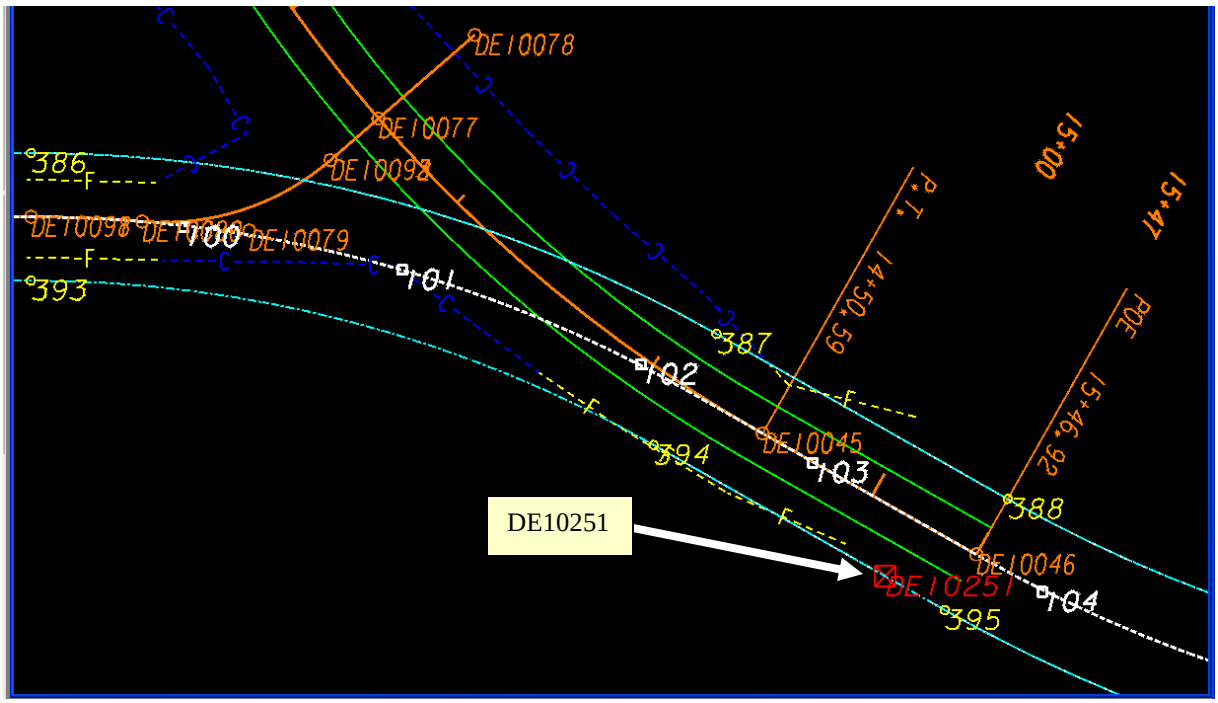


Figure L12-66 MicroStation View

61.	**Store a Cogo Point at Sta. 15+20 offset 50' Right of Pequanoc Drive (DE3).** • Match the entries shown in *Figure L12-67*. • Click **Apply** but do **<u>not</u>** close the **<u>New Cogo Point</u>** dialog. • If a **<u>Results</u>** window appears – click **Close** to exit the **<u>Results</u>** window. • Ensure Point **DE10252** was drawn in MicroStation as shown in *Figure L12-68*.

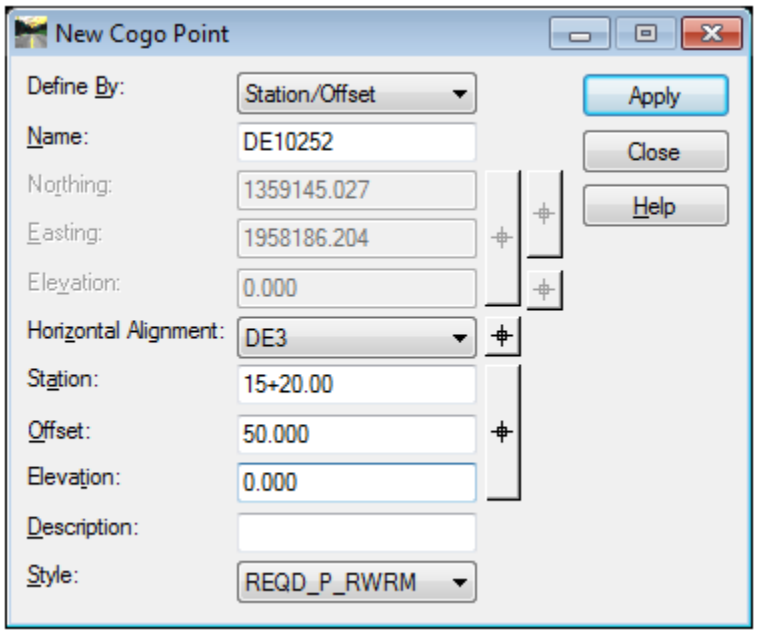


Figure L12-67 New Cogo Point

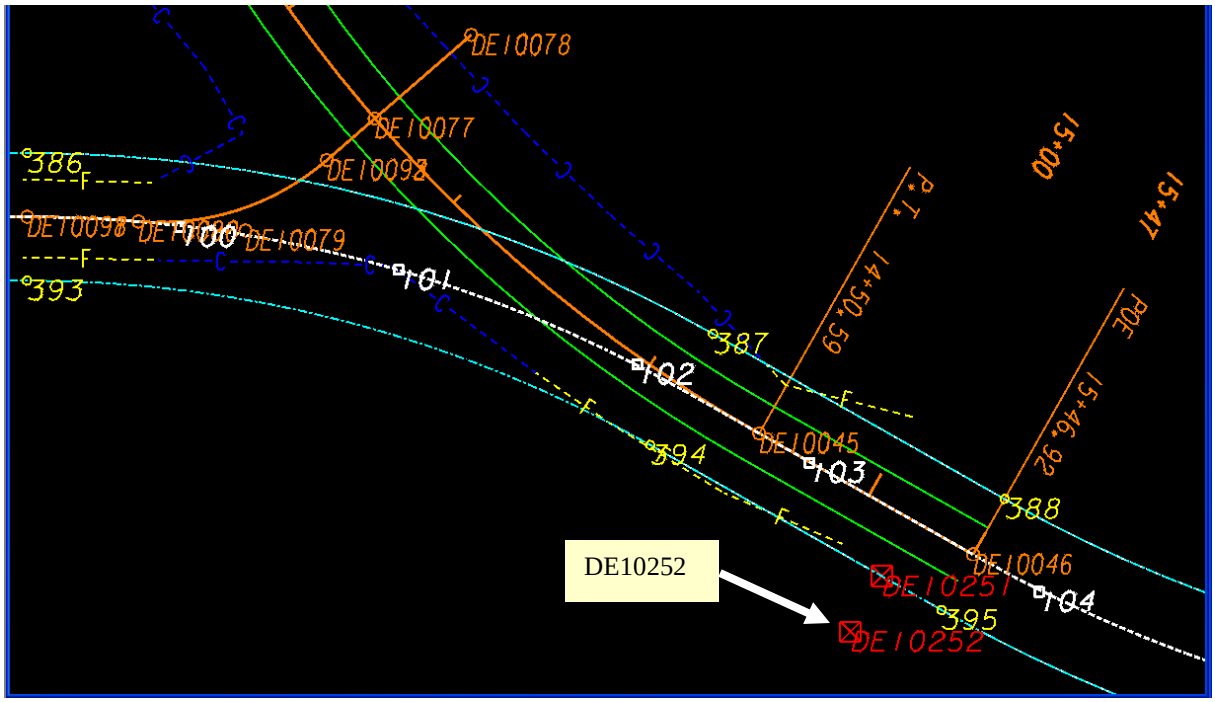
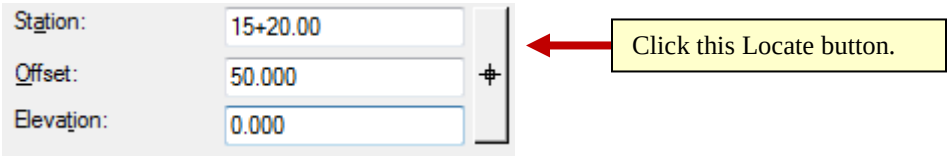


Figure L12-68 MicroStation View

62.	**Store a Cogo Point at the PT located at Station 14+50.59 offset 50' Right of Pequanoc Drive (DE3).** • In InRoads, ensure **Point Snap** is the active **Lock**. This may be accomplished by: o Selecting **Tools ► Locks** and ensure a check mark is showing next to **Point Snap**. • In the **<u>New Cogo Point</u>** dialog, click the **Locate** button next to the **Station**:, **Offset:** and **Elevation:** fields as shown here.  • Notice a dynamic line 'jumps' along Alignment **DE3** and in the bottom left corner of the MicroStation window you are prompted to > **Identify Station**. • Notice also in the bottom middle of the MicroStation window you are provided the Station and Offset information which changes as you move your cursor. • Move the cursor so that the dynamic line is shown extending from the **PT** at Station **14+50.59** and **'Station 14+50.59 Offset 0.00'** is shown in the bottom middle of the MicroStation window.

	• Left click in the MicroStation window. The **New Cogo Point** dialog reappears and **Station 14+50.59** is in the **Station:** entry field. Selecting the Station for the PT in this way ensures the exact Station value has been captured and stored in memory even though only 2 decimal places are showing. • Notice the **Elevation:** has also been captured. Since this is a Property Point, manually key-in **0.000** for the **Elevation:** . • In the **Offset:** field, key-in **50.000**. • Ensure your entries match those shown in *Figure L12-69*. • Click **Apply** and **Close** the **New Cogo Point** dialog. • If a **Results** window appears – click **Close** to exit the **Results** window. • Ensure Point **DE10253** was drawn in MicroStation as shown in *Figure L12-70*.

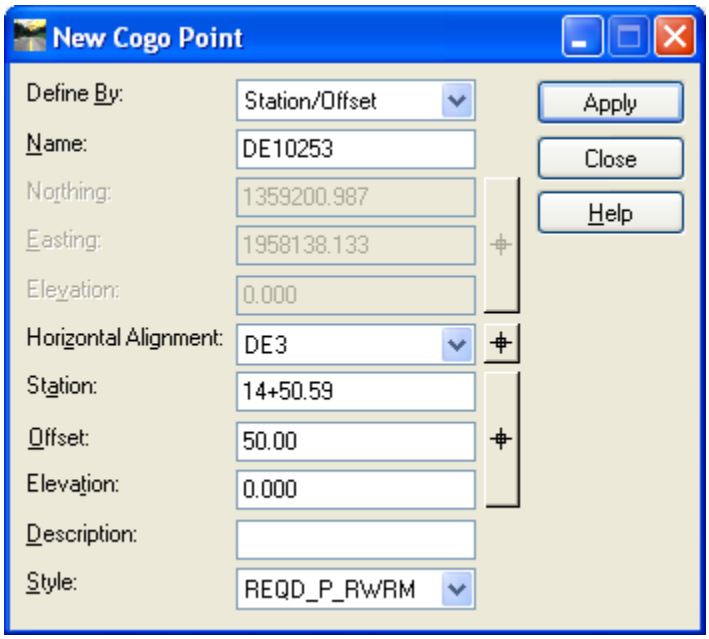


Figure L12-69 New Cogo Point

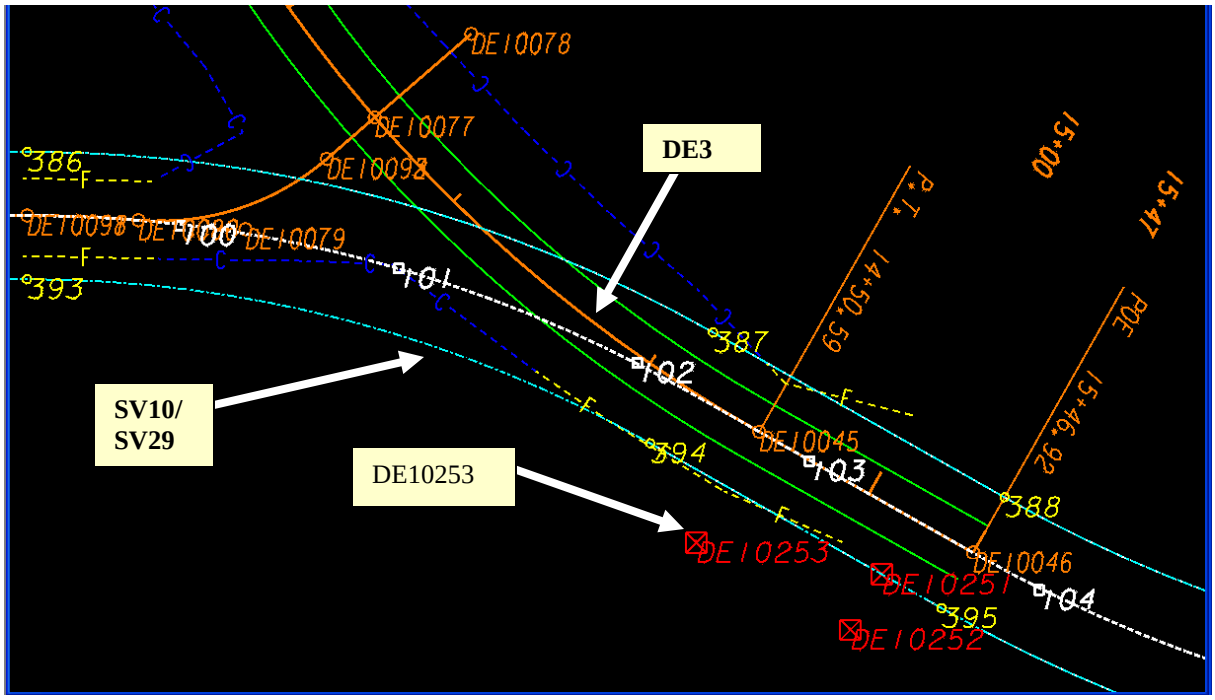


Figure L12-70 MicroStation View

63.	**Store a Cogo Point at the Intersection of DE3 offset 50' Right and the Property Alignment SV29.** • In InRoads, select **Geometry ► Locate ► Intersection**. • Match the entries shown in *Figure L12-71*. • Click **Apply**. The **<u>Locate Results</u>** dialog opens. • Notice in MicroStation a purple X ( ) identifies the tentative location of the Point. • In the **<u>Locate Results</u>** dialog, select the **Style:** ***REQD_P_RWRM***. • In the **<u>Locate Results</u>** dialog, click **Accept** to accept the location and store the Point. • Close the **Intersection** dialog. • If a **<u>Results</u>** window appears – click **Close** to exit the **<u>Results</u>** window. • Ensure Point **DE10254** was drawn in MicroStation as shown in *Figure L12-72*.

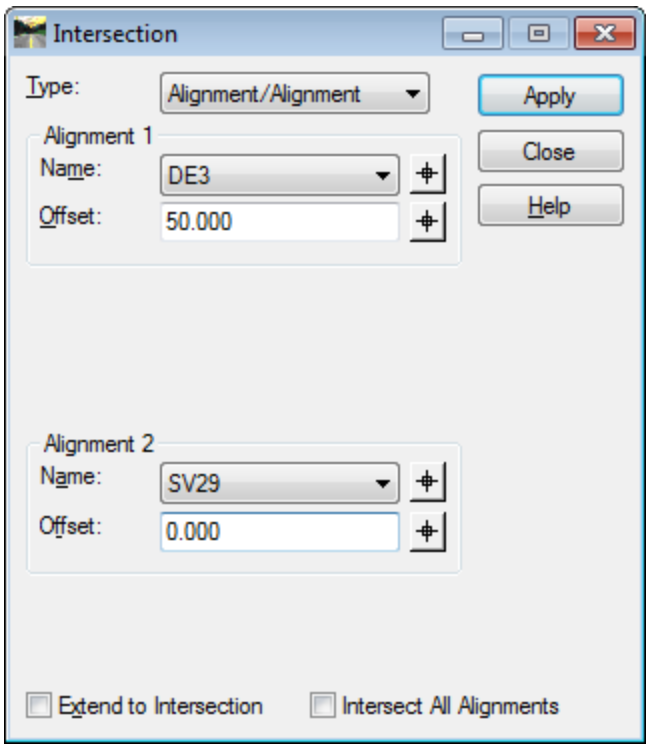


Figure L12-71 Intersection

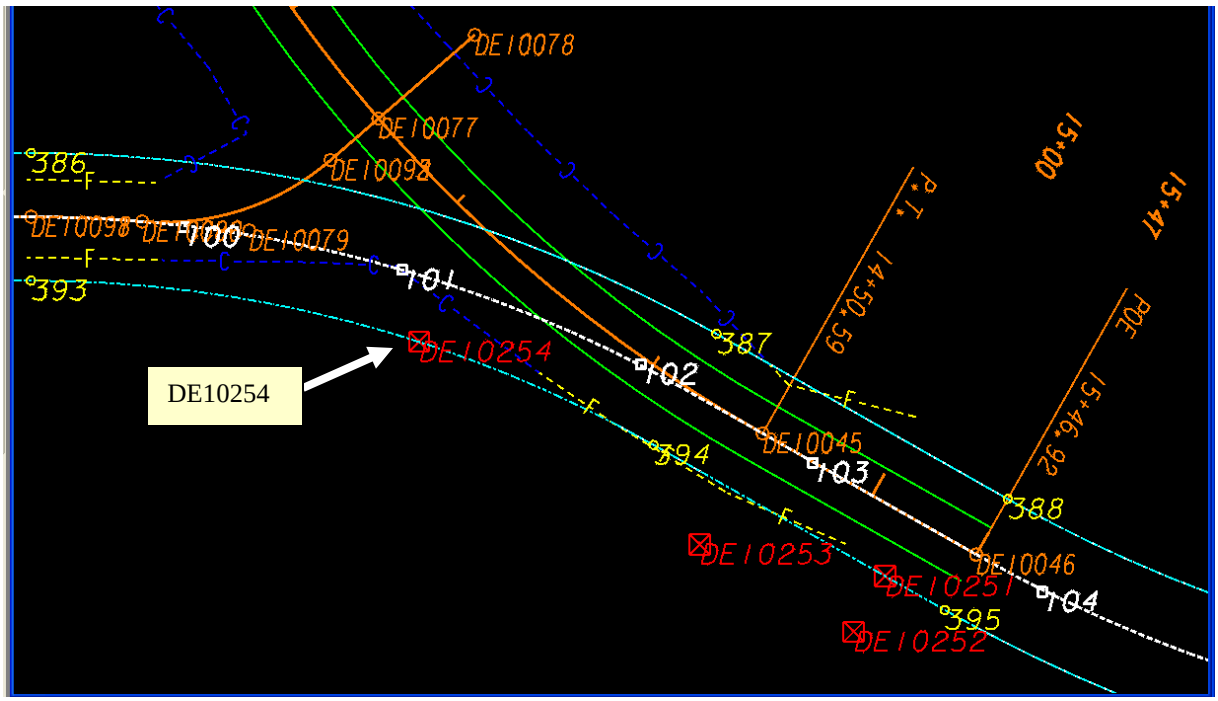


Figure L12-72 MicroStation View

64.	**Create a new Horizontal Alignment for the Required Right-of-Way take from SV29.** • In InRoads, select **File ► New**. • Match the entries shown in *Figure L12-73*. • Click **Apply** and **Close**.

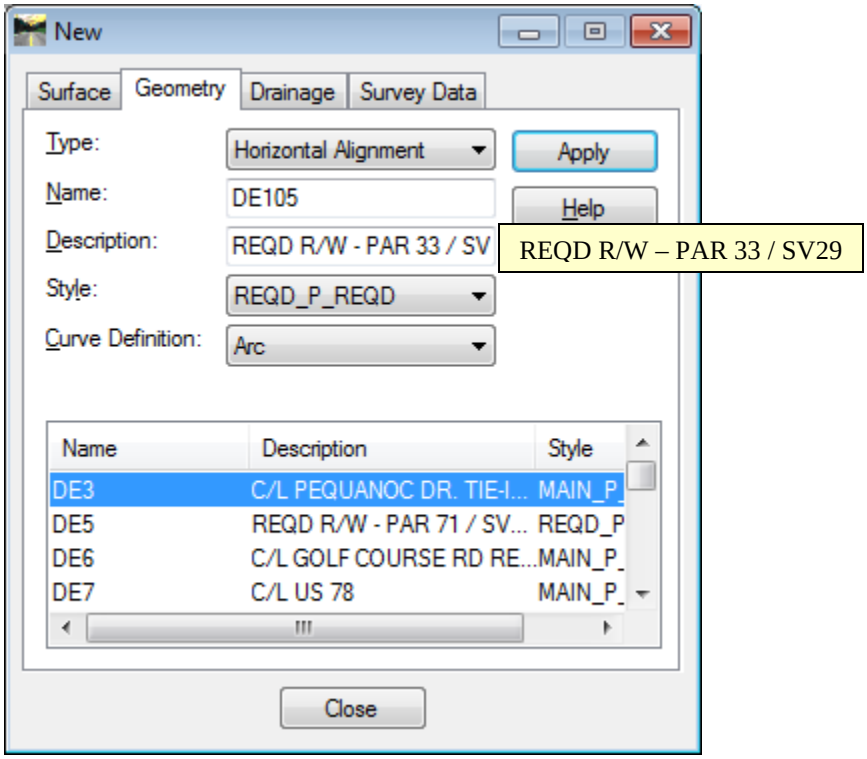


Figure L12-73 New

65.	**Save your work.** • In InRoads, select **File ► Save ► Geometry Project**.
66.	**The Commands you will use to Define Alignment DE105 place data directly into the Active Alignment. Ensure Alignment DE105 is the Active Alignment.** • In the InRoads Workspace bar, Right mouse click over Alignment **DE105** and select **Set Active**. • **DE105** should now have a Red Square next to it indicating it is the Active Alignment.

67.	**Create a Line from DE10251 to DE10252.** • In InRoads, select **Geometry ► Horizontal Element ► Add Fixed Line**. The **Add Fixed Horizontal Line** dialog opens as shown in *Figure L12-74*. • Place check marks in the check boxes for both **Point 1** and **Point 2**. • Use the **Locate** button for **Point 1** to select Point **DE10251**. • Use the **Locate** button for **Point 2** to select Point **DE10252**. • Ensure your entries match those shown in *Figure L12-75*. • Click **Apply**. • Notice in the bottom left corner of the MicroStation window you are prompted to > **Accept/Reject**. Left click in the MicroStation window to **Accept**. • Do **not** close the **Add Fixed Horizontal Line** dialog. • Verify your view in MicroStation matches that shown in *Figure L12-76* and the Line from **DE10251** to **DE10252** was drawn in MicroStation.

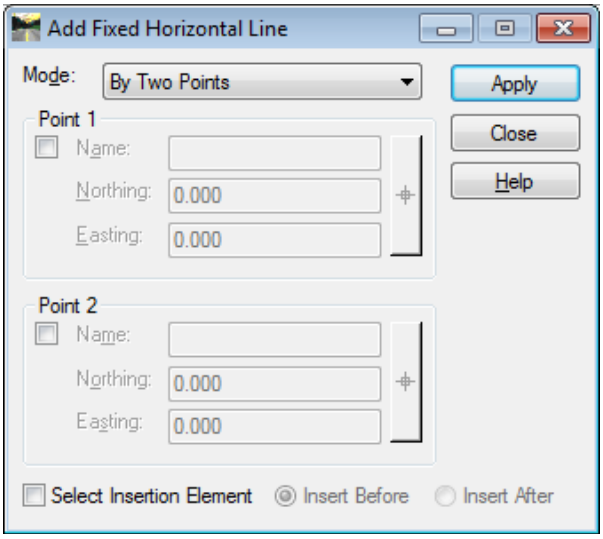


Figure L12-74 Add Fixed Horizontal Line

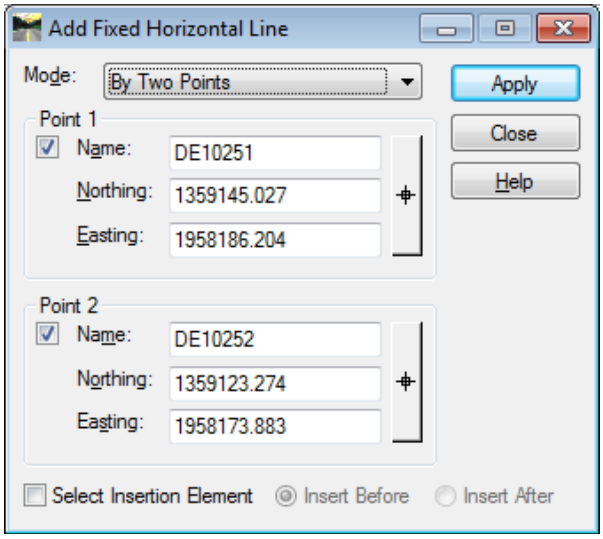


Figure L12-75 Add Fixed Horizontal Line

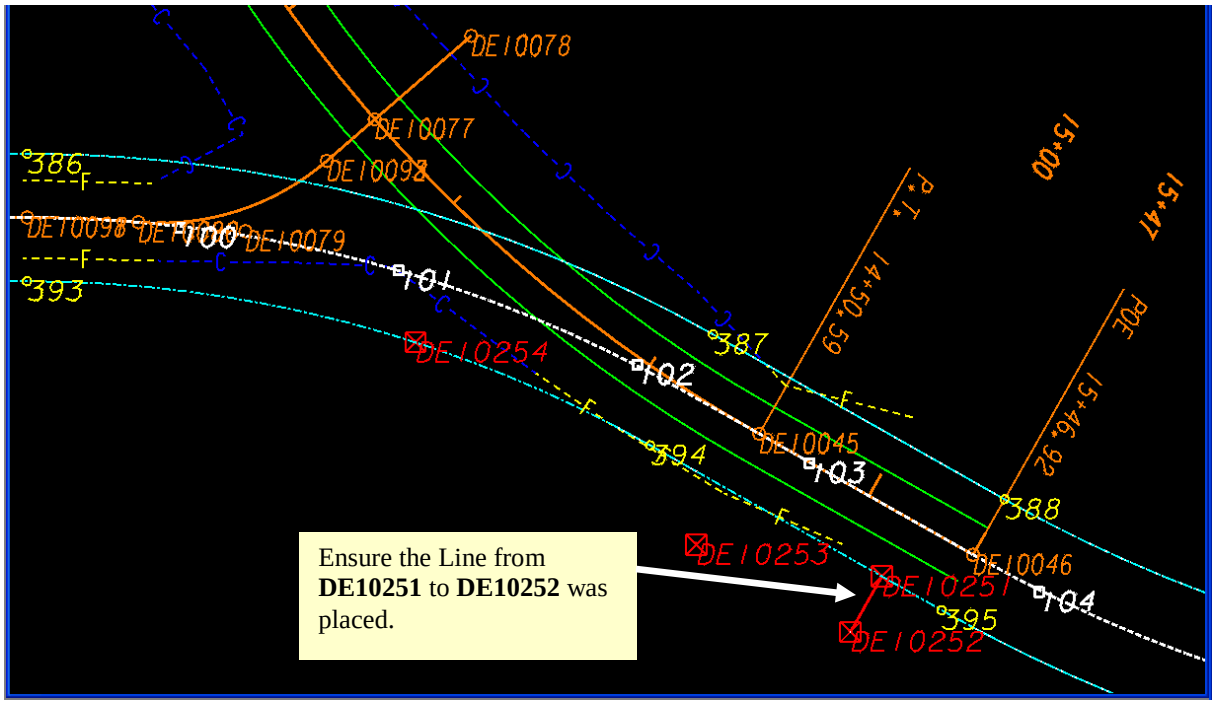


Figure L12-76 MicroStation View

68.	**Review Alignment DE105.** • In InRoads, select **Geometry ► Review Horizontal**. The **<u>Review Horizontal Alignment</u>** window opens as shown in *Figure L12-77*. • Notice the Line from Point **DE10251** to **DE10252** is already added to **DE105**. • Click **Close** to exit the **<u>Review Horizontal Alignment</u>** window.

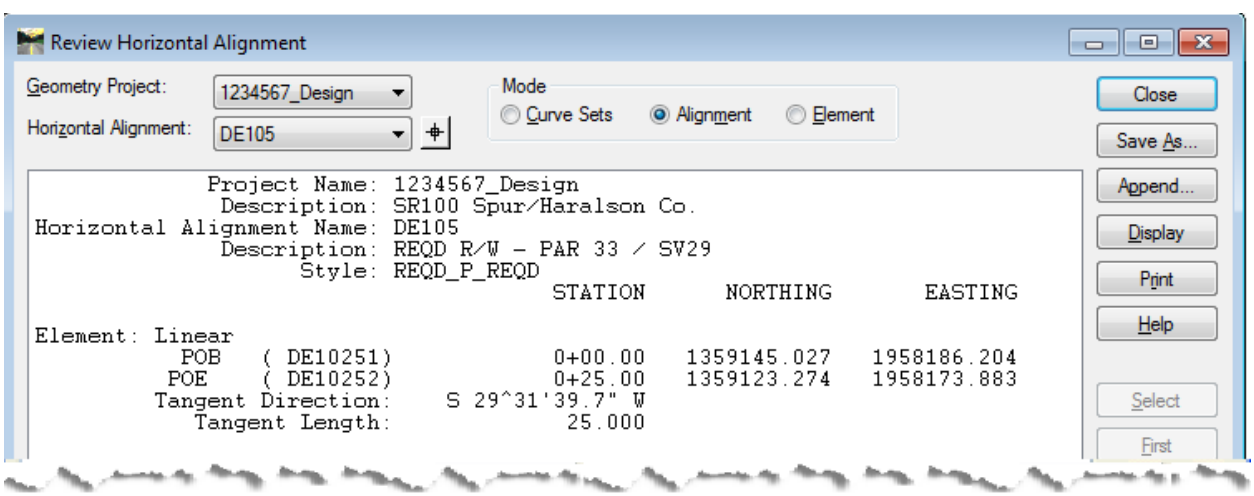


Figure L12-77 Review Horizontal Alignment

69.	**Create a Line from DE10252 to DE10253.** • In the **Add Fixed Horizontal Line** dialog, use the **Locate** button for **Point 1** to select **DE10252**. • In the **Add Fixed Horizontal Line** dialog, use the **Locate** button for **Point 2** to select **DE10253**. • Verify your entries in the **Add Fixed Horizontal Line** dialog match those shown in *Figure L12-78*. • Click **Apply**. • Left click in the MicroStation window to **Accept** the operation. • Verify your view in MicroStation matches that shown in *Figure L12-79* and the Line from **DE10252** to **DE10253** was drawn in MicroStation. • Do **not** close the **Add Fixed Horizontal Line** dialog.

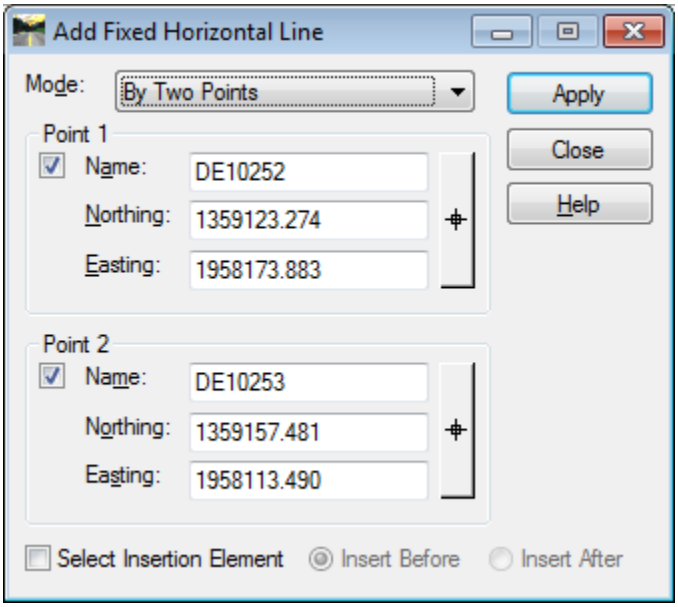
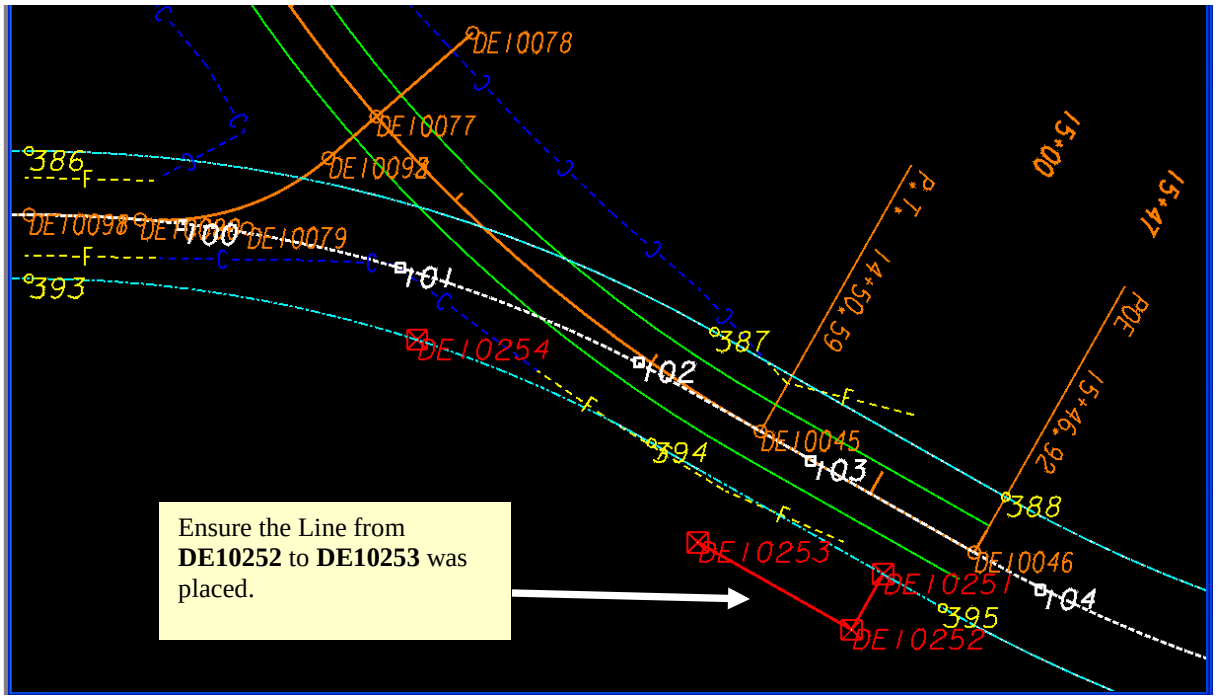


Figure L12-78 Add Fixed Horizontal Line



Ensure the Line from **DE10252** to **DE10253** was placed.

Figure L12-79 MicroStation View

70.	**Create a Line from 394 to DE10251.** • In the **<u>Add Fixed Horizontal Line</u>** dialog, use the **Locate** button for **Point 1** to select **394**. • In the **<u>Add Fixed Horizontal Line</u>** dialog, use the **Locate** button for **Point 2** to select **DE10251**. • Verify your entries in the **<u>Add Fixed Horizontal Line</u>** dialog match those shown in *Figure L12-80*. • Click **Apply**. • Left click in the MicroStation window to **Accept** the operation. • Verify your view in MicroStation matches that shown in *Figure L12-81* and the Line from **394** to **DE10251** was drawn in MicroStation. • **Close** the **<u>Add Fixed Horizontal Line</u>** dialog.

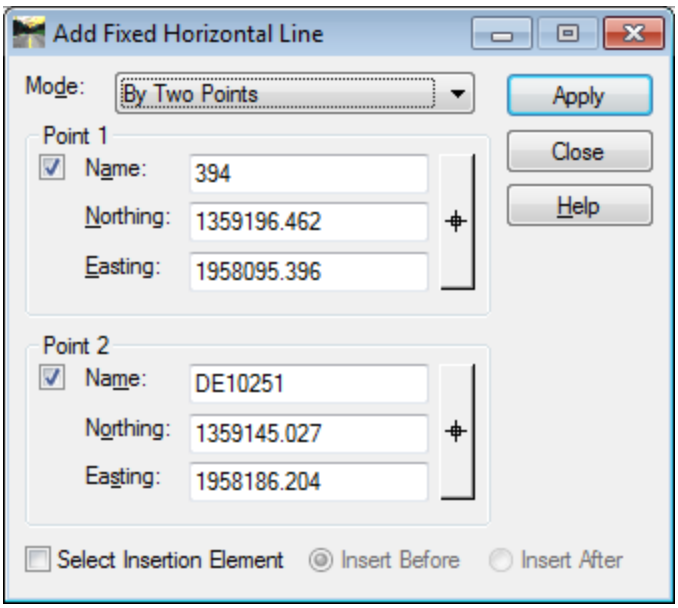


Figure L12-80 Add Fixed Horizontal Line

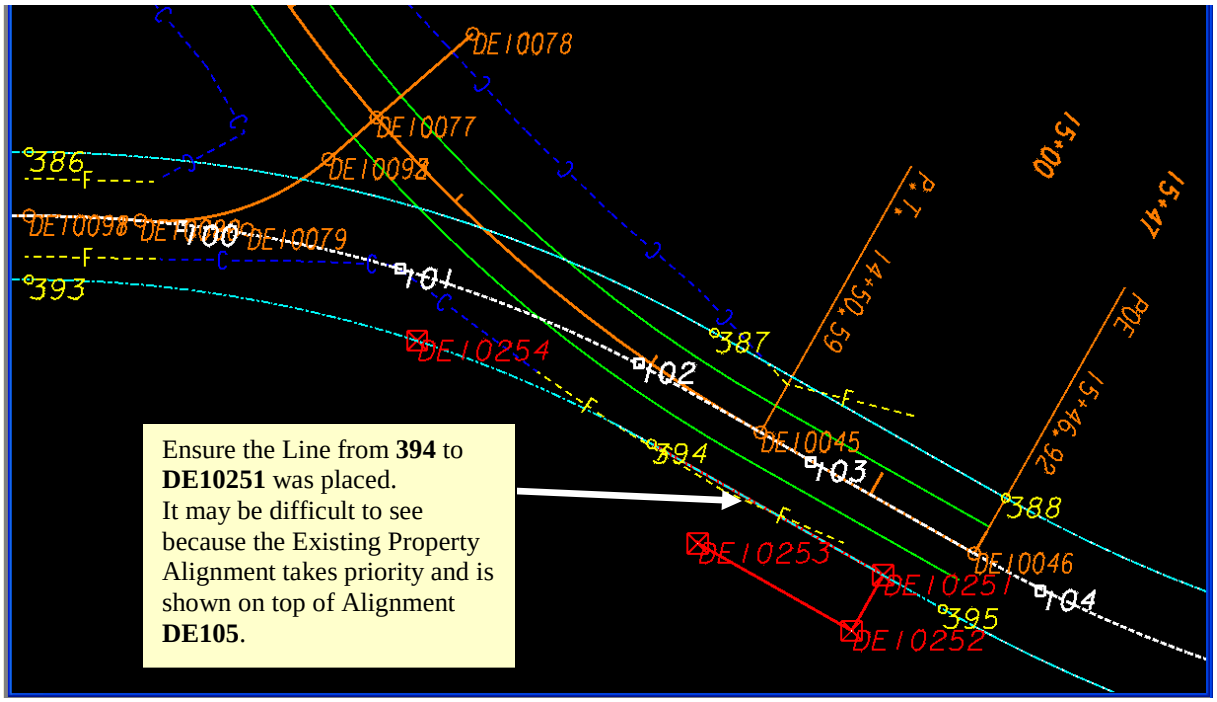


Figure L12-81 MicroStation View

71.	**Save your work.** • In InRoads, select **File ► Save ► Geometry Project**.

72.	**Open the <u>Add Fixed Horizontal Curve</u> dialog in order to add a Curve to Alignment DE105.** • In InRoads, select **Geometry ► Horizontal Element ► Add Fixed Curve**. The **<u>Add Fixed Horizontal Curve</u>** dialog opens as shown in *Figure L12-82*.

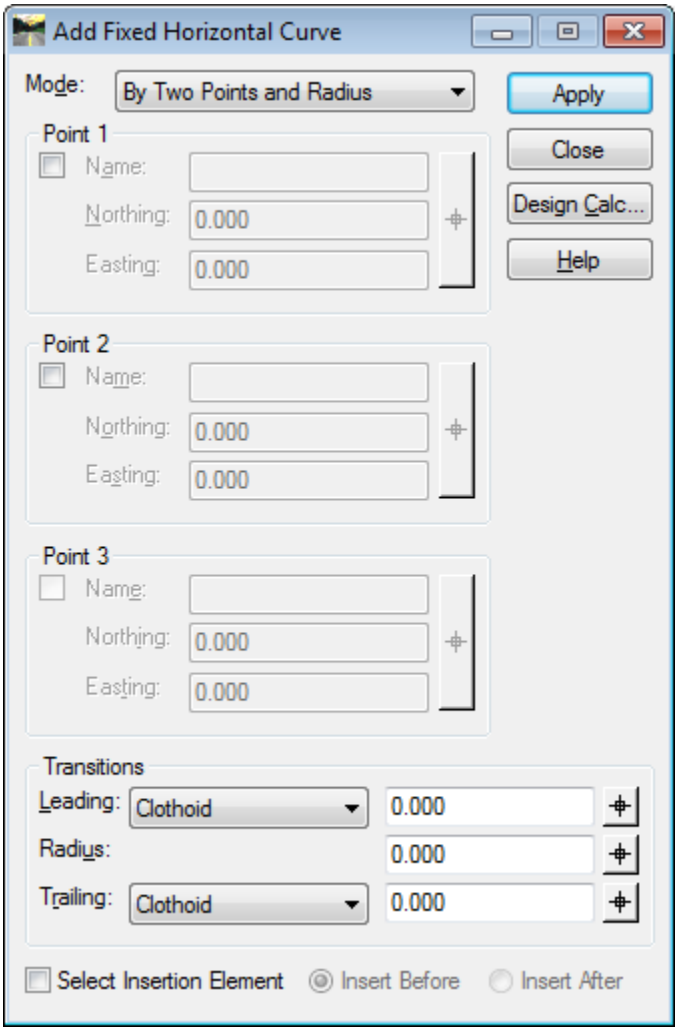
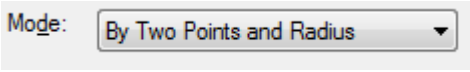
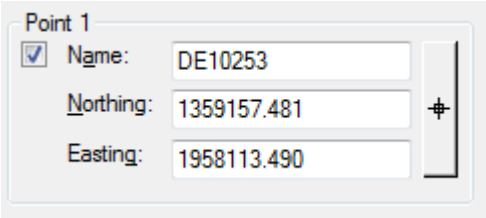
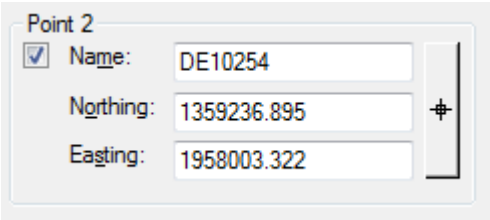


Figure L12-82 Add Fixed Horizontal Curve

73.	**Set the Mode.** • In the **<u>Add Fixed Horizontal Curve</u>** dialog, use the pull-down arrow next to **Mode:** and ensure the Mode is set to **By Two Points and Radius** as shown here. 

74.	**Define Point 1** • In the **Add Fixed Horizontal Curve** dialog, place a check in the check box for **Point 1.** • Use the **Locate** button for **Point 1** to select Point **DE10253** as shown here. 
75.	**Define Point 2** • In the **Add Fixed Horizontal Curve** dialog, place a check in the check box for **Point 2.** • Use the **Locate** button for **Point 2** to select Point **DE10254** as shown here. 
76.	**Define the Radius** • In the **Add Fixed Horizontal Curve** dialog, click the **Locate** button next to the **Radius:** entry field. • Notice in the bottom right corner of the MicroStation window you are prompted to > **Identify first radius point**. • Left click on Point **DE10253**. • Notice in the bottom right corner of the MicroStation window you are prompted to > **Identify second radius point**. • Change the MicroStation snap mode to **Center** by clicking the snap icon ( ) near the bottom center of the MicroStation window and selecting Center from the pop-up window. • Using the MicroStation snap procedure, tentative snap to the center of the Curve identified in *Figure L12-83*. • If snapped properly the message > **Radius from 'DE10253' to 'DE10044': 622.958** will appear in the bottom middle of the MicroStation window. • Left click in the MicroStation window to accept the tentative snap location and return to the **Add Fixed Horizontal Curve** dialog. • Ensure your entries match those shown in *Figure L12-84*.

	• Click **Apply**. • Left click in the MicroStation window to **Accept** the operation. • Verify your view in MicroStation matches that shown in *Figure L12-85* and the Curve from **DE10253** to **DE10254** was drawn in MicroStation. • Do **<u>not</u>** close the **<u>Add Fixed Horizontal Curve</u>** dialog.

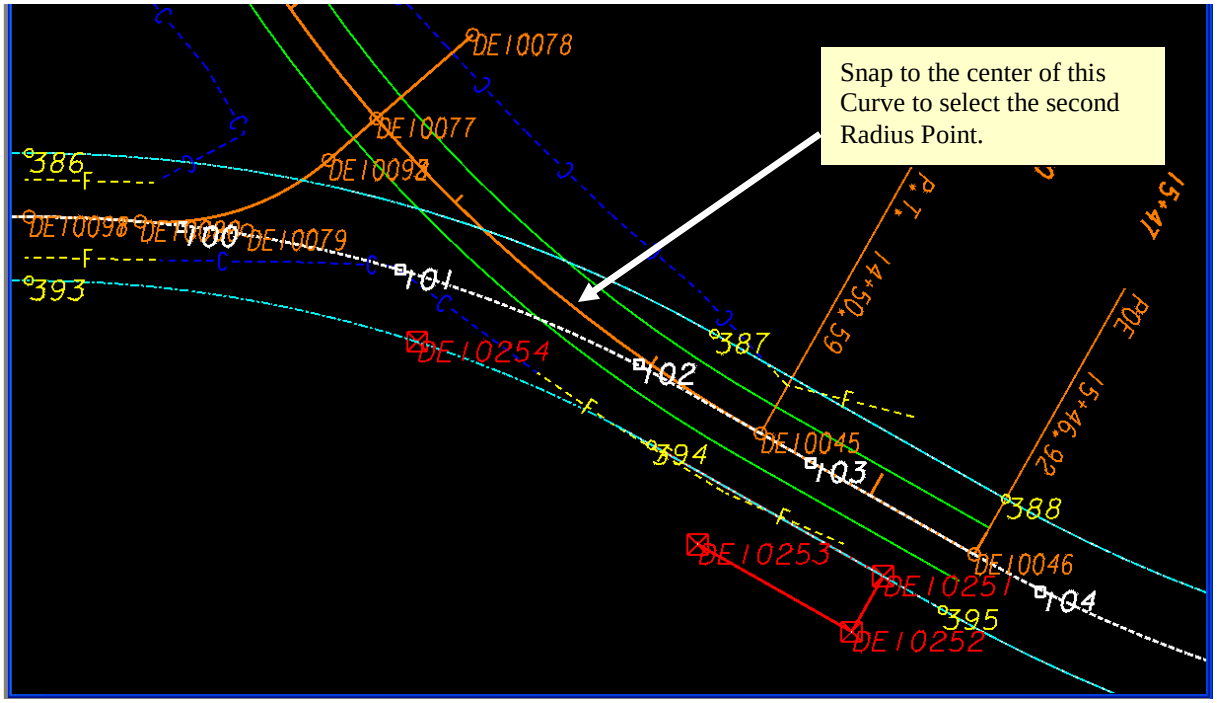


Figure L12-83 MicroStation View

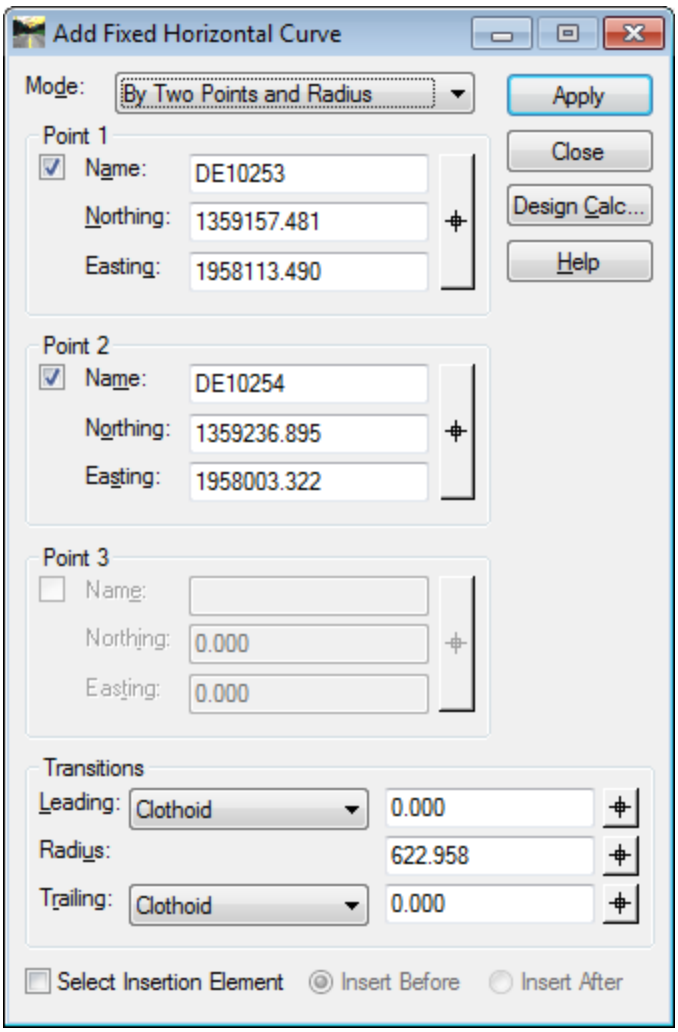


Figure L12-84 Add Fixed Horizontal Curve

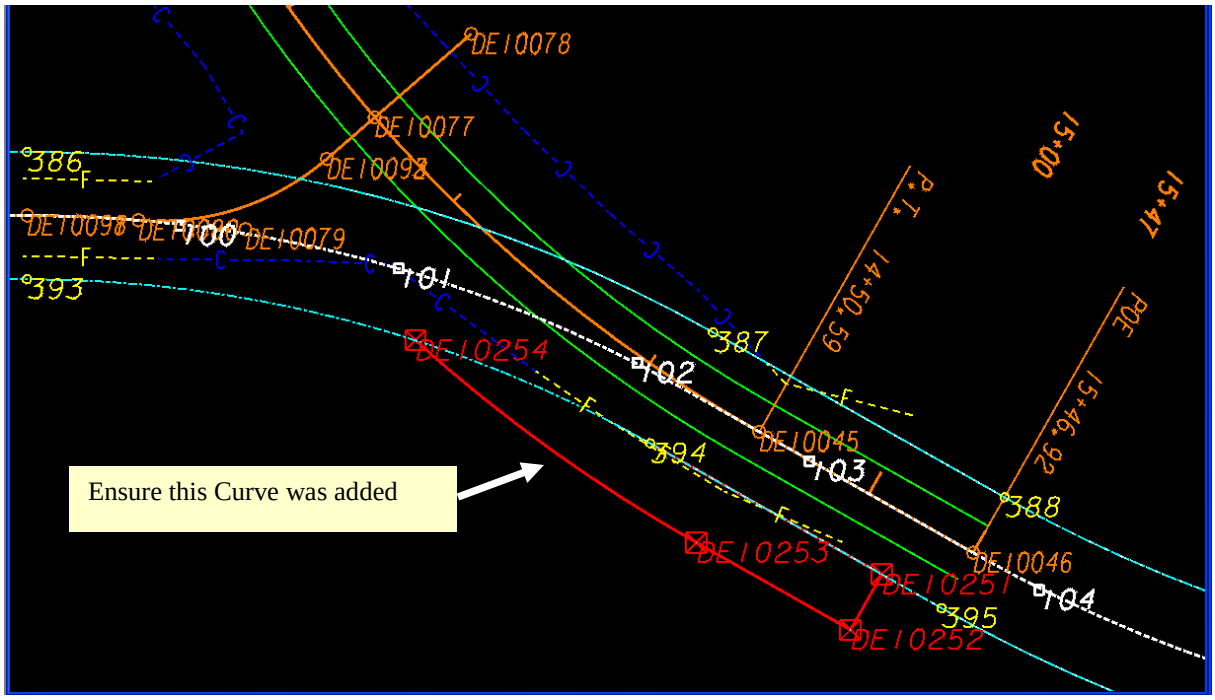


Figure L12-85 MicroStation View

77.	**Add a Curve to Alignment DE105 from Point DE10254 to 394.** • In the **<u>Add Fixed Horizontal Curve</u>** dialog, use the **Locate** buttons to select **Point 1** and **Point 2** as **DE10254** and **394** respectively. • In the **<u>Add Fixed Horizontal Curve</u>** dialog, click the **Locate** button next to the **Radius:** entry field. • Notice in the bottom right corner of the MicroStation window you are prompted to > **Identify first radius point**. • Left click on Point **DE10254**. • Notice in the bottom right corner of the MicroStation window you are prompted to > **Identify second radius point**. • Change the MicroStation snap mode to **Center** by clicking the snap icon ( ) near the bottom center of the MicroStation window and selecting Center from the pop-up window. • Using the MicroStation snap procedure, tentative snap to the center of the Curve identified in *Figure L12-86*. • If snapped properly the message > **Radius from 'DE10254' to 'DE10094': 495.871** will appear in the bottom middle of the MicroStation window. • Left click in the MicroStation window to accept the tentative snap location and return to the **<u>Add Fixed Horizontal Curve</u>** dialog. • Ensure your entries match those shown in *Figure L12-87*. • Click **Apply**.

	• Left click in the MicroStation window to **Accept** the operation. • Verify your view in MicroStation matches that shown in *Figure L12-88* and the Curve from **DE10254** to **394** was drawn in MicroStation. • **Close** the **<u>Add Fixed Horizontal Curve</u>** dialog.

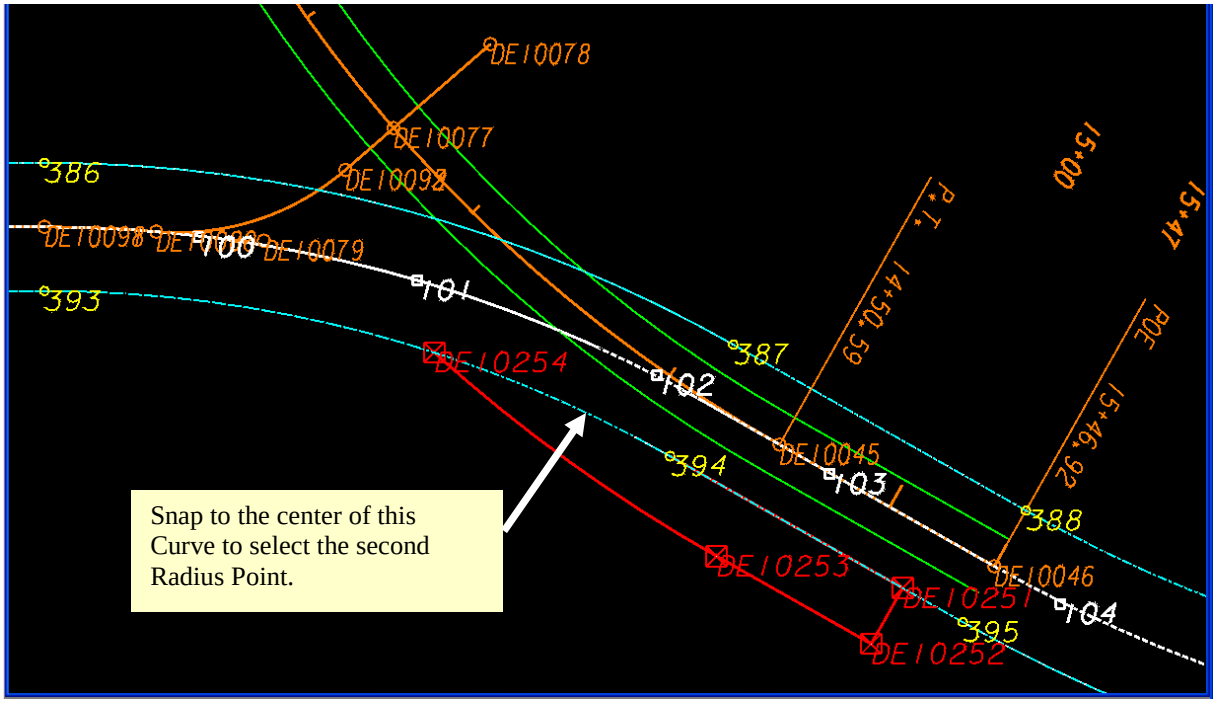


Figure L12-86 MicroStation View

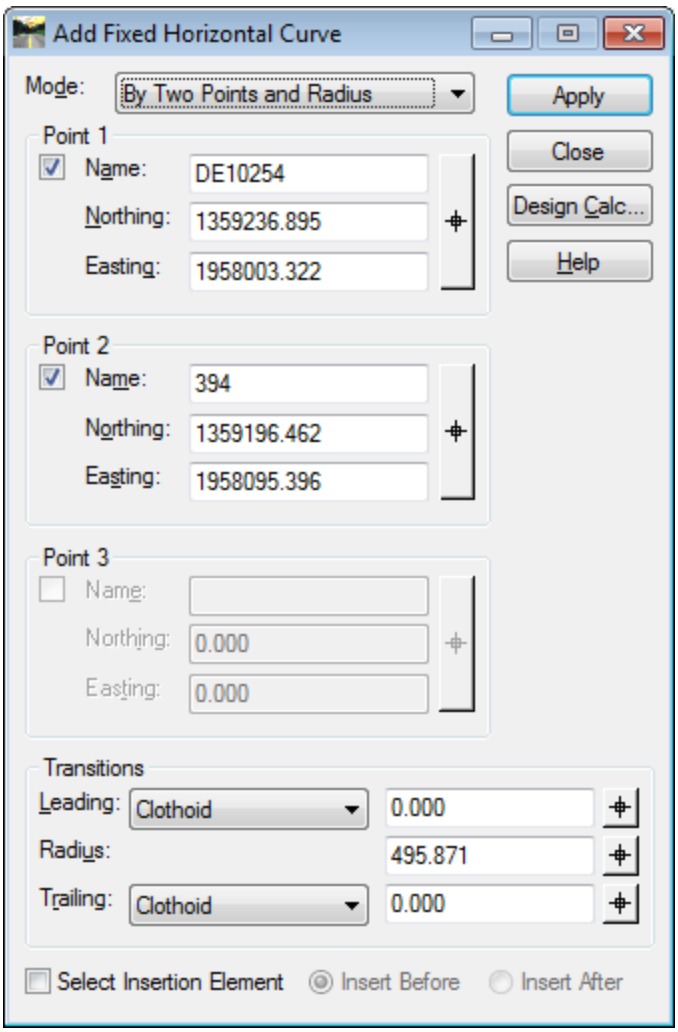


Figure L12-87 Add Fixed Horizontal Curve

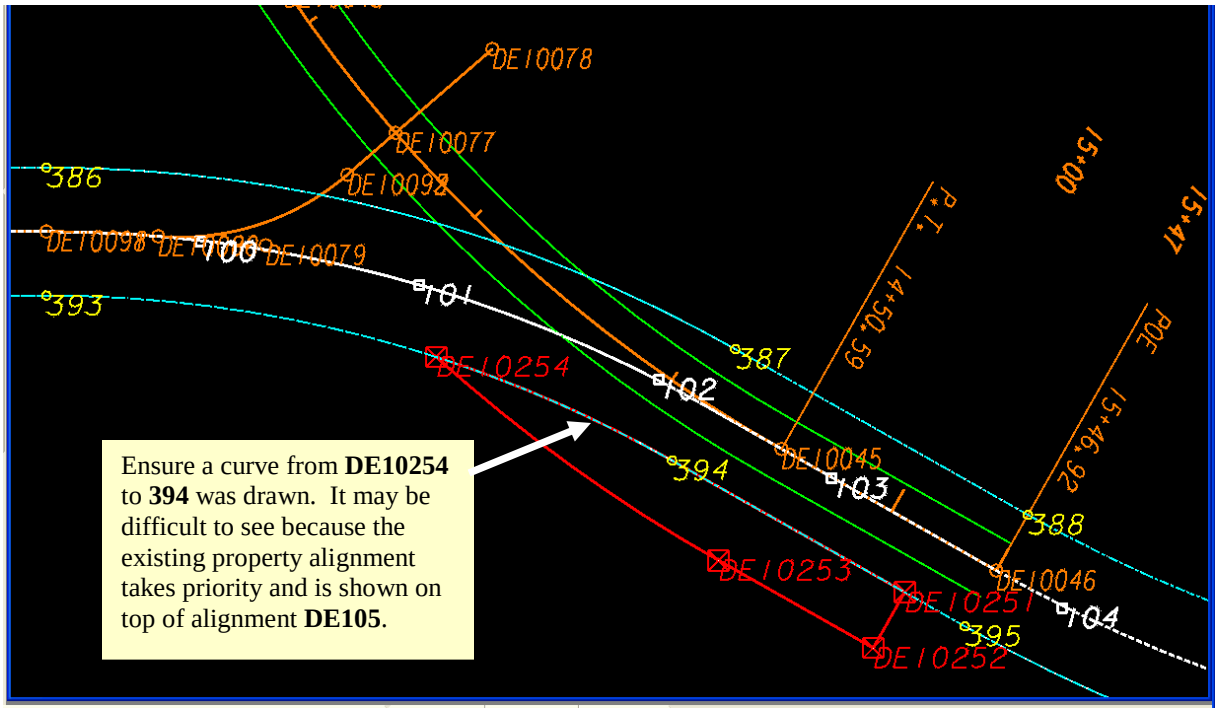


Figure L12-88 MicroStation View

78.	**Review Alignment DE105** • In InRoads, select **Geometry ► Review Horizontal**. The **Review Horizontal Alignment** window opens as shown in *Figure L12-89*. • Notice the Alignment appears correct in MicroStation but is not stored in a clockwise order. It is stored DE10251, DE10252, DE10253, 394, DE10251, Curve, Curve. ***NOTE**: Many commands in InRoads allow Alignments to be pieced together in a non-coincident manner yet still view correctly in MicroStation. In the case of Centerline Alignments and R/W Alignments the order of the Points and Curves must be in order and in a clockwise direction. The **Check Integrity** command in InRoads can be used to properly order the elements in an Alignment. • Click **Close** to exit the **Review Horizontal Annotation** window.

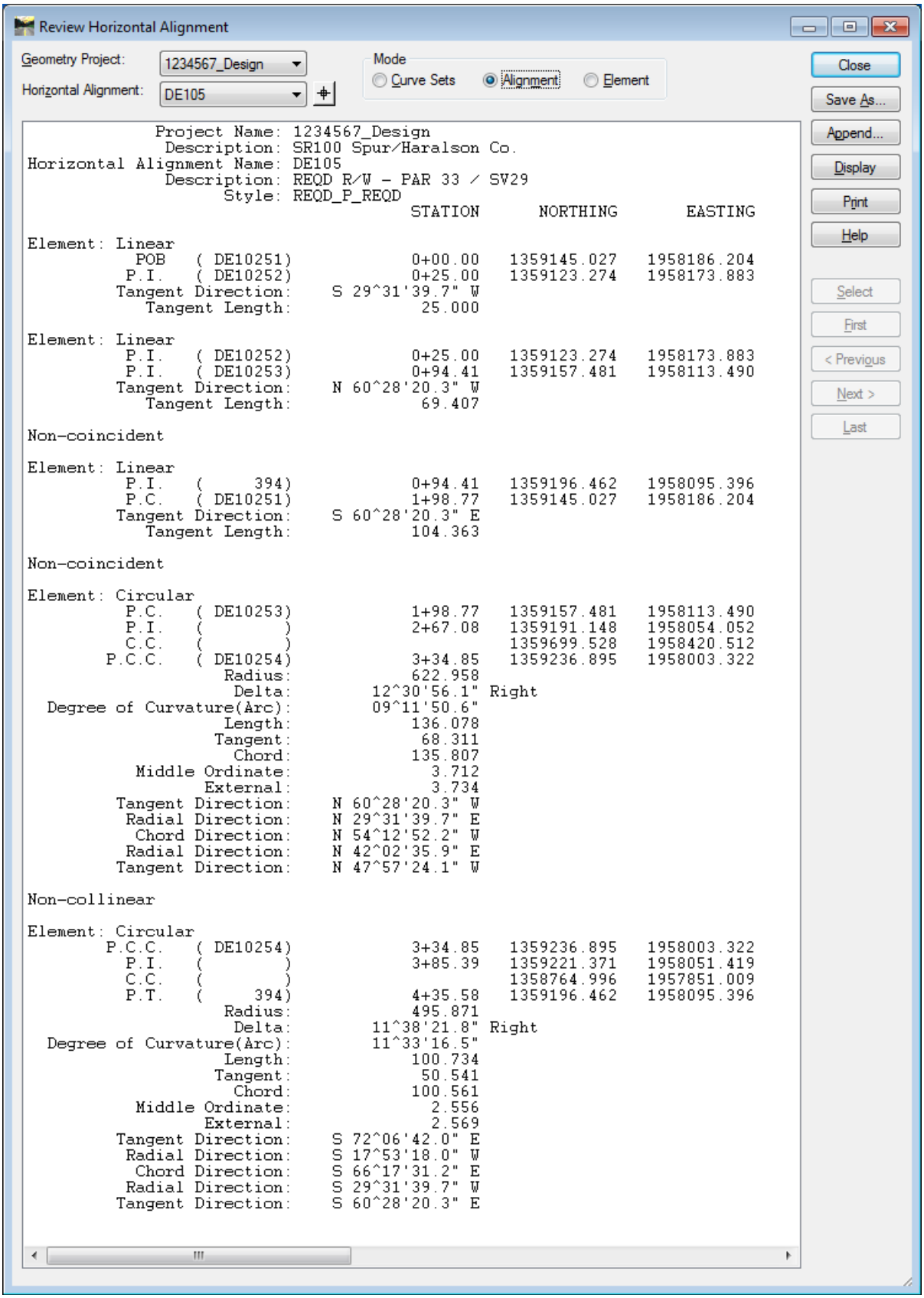


Figure L12-89 Review Horizontal Alignment

79. **Open the <u>Check Integrity</u> dialog.**

- In InRoads, select **Geometry ► Horizontal Element ► Check Integrity**.
- If an **<u>Alert</u>** dialog box appears, click **OK**.
- The **<u>Check Horizontal Integrity</u>** window opens as shown in *Figure L12-90*.
- Notice the Line highlighted in the **<u>Check Horizontal Integrity</u>** tool is also highlighted purple in MicroStation.
- Click the **Next** button several times and notice as you do this the elements are not in order.

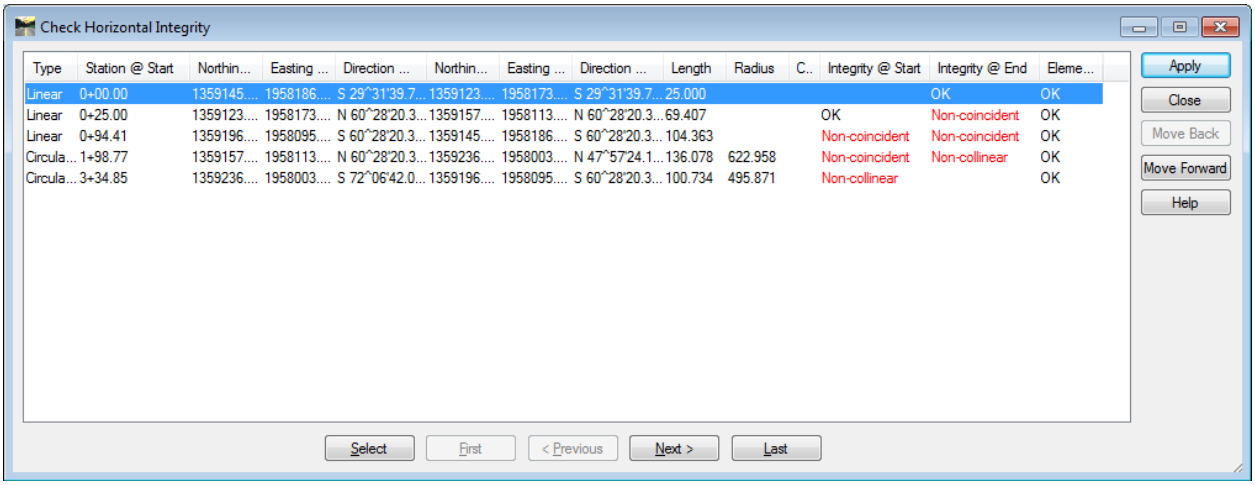
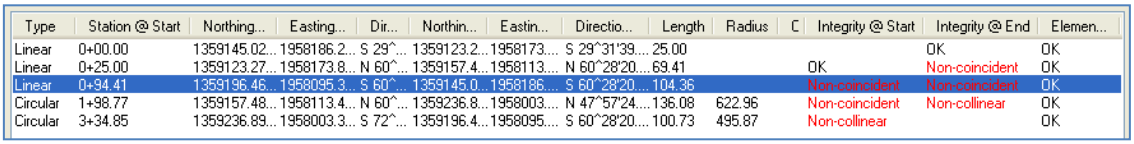


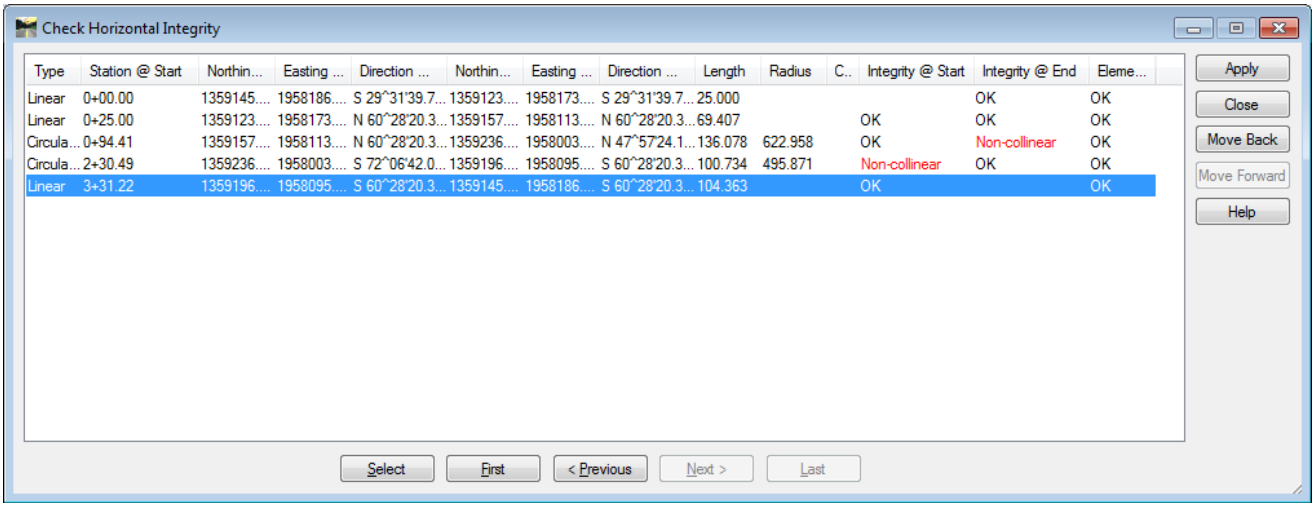
Figure L12-90 Check Horizontal Integrity

80. **Place the elements in Alignment DE105 in coincident and clockwise order beginning and ending at Point DE10251.**

- In the **<u>Check Horizontal Integrity</u>** dialog, highlight the third **Linear** element from the top as shown here.



- Click the **Move Forward** button twice.
- Verify the Elements are now in the order shown in *Figure L12-91*.
- Notice the Integrity comments **Non-coincident** are no longer listed.
- Click **Apply** and **Close**.



Type	Station @ Start	Northin...	Easting ...	Direction ...	Northin...	Easting ...	Direction ...	Length	Radius	C..	Integrity @ Start	Integrity @ End	Eleme...
Linear	0+00.00	1359145....	1958186....	S 29^31'39.7...	1359123....	1958173....	S 29^31'39.7...	25.000				OK	OK
Linear	0+25.00	1359123....	1958173....	N 60^28'20.3...	1359157....	1958113....	N 60^28'20.3...	69.407			OK	OK	OK
Circula...	0+94.41	1359157....	1958113....	N 60^28'20.3...	1359236....	1958003....	N 47^57'24.1...	136.078	622.958		OK	Non-collinear	OK
Circula...	2+30.49	1359236....	1958003....	S 72^06'42.0...	1359196....	1958095....	S 60^28'20.3...	100.734	495.871		Non-collinear	OK	OK
Linear	3+31.22	1359196....	1958095....	S 60^28'20.3...	1359145....	1958186....	S 60^28'20.3...	104.363			OK		OK

Figure L12-91 Check Horizontal Integrity

81.	**Review Alignment DE105.** • In InRoads, select **Geometry ► Review Horizontal**. The **<u>Review Horizontal Alignment</u>** report opens as shown in *Figure L12-92*. • Notice the Alignment now follows a coincident clockwise path. • Click **Close** to exit the Report.

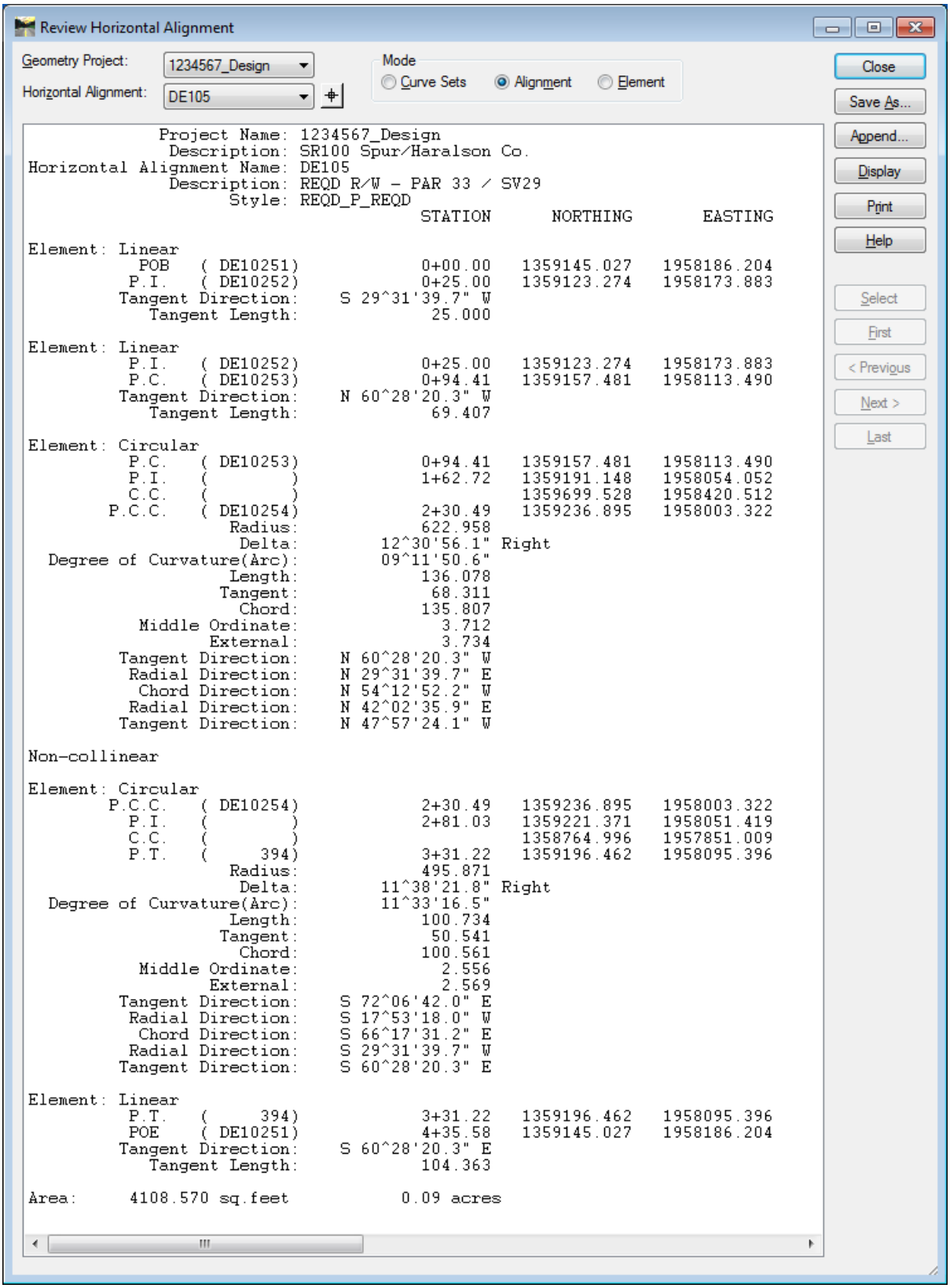


Figure L12-92 Review Horizontal Alignment

82.	**Prepare MicroStation for Design Lab 13.** • In MicroStation, select **Edit ► Select All**. • Click the **Delete** icon ( ). • In MicroStation, select **File ► References**. • In the **References** dialog, select **Tools ► Detach All**. • If an **Alert** dialog box appears – click **OK**. • **Close** the **References** Window by clicking the Red (X) in the upper right corner of the dialog box. • In MicroStation, select **File ► Compress ► Design**
83.	This concludes Lab 12. Do not proceed until the Instructor directs you to do so.

Lab 13
Survey Enhancements

Objective

The objective of this Lab is to learn how to include Survey Enhancements received during the Design Phase of a Project.

Enhancements --- PI#_SDE.dtm
When the Designer receives a new PI#_SDE.dtm from the SDE, the Designer will delete their PI#_Exist.dtm and replace it with this new one. The Designer will then rename the PI#_SDE.dtm both externally and internally to PI#_Exist.dtm (as previously described in Lab 2). The steps outlined in this Lab will instruct the user how to do this.

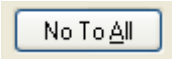
Enhancements --- PI#_SDE.alg
When the Designer requests additional property or additional existing alignment enhancements that affect the InRoads .ALG file, the SDE will add or change the data in the original PI#_SDE.alg file that is kept by the Survey Office. When changes are complete, the Designer will be notified and provided with a copy of the revised PI#_SDE.alg file. The Designer will delete out all Survey Data from the PI#_Design.alg file they are working in and will import all Survey Data from the revised PI#_SDE.alg to the PI#_Design.alg they are working in, using the LandXML Translator. The steps outlined in this Lab will instruct the user how to do this.

Lab 13A Set Project Defaults

1. Starting Clean

In order to ensure that you are working with a "clean" database – you will close MicroStation and InRoads if they are still running from a previous Lab:

To CLOSE MicroStation and InRoads -

Select **File►Exit** from the [MicroStation Menu].
If any messages appear regarding the saving of projects – Select 

This closes BOTH the MicroStation and InRoads Software(s).

2. Starting MicroStation and InRoads in the GDOT Workspace.

From the desktop, double-click on the **MicroStation** icon labeled **GDOT MicroStation V8i SS2 (x86)**.

Double click on the icon labeled **GDOT MicroStation V8i SS2 (x86)**.

- When the **MicroStation Manager** dialog box appears – navigate to the **C:\InRoads Data\1234567\Design Labs\Standards** folder and select the "**GDOT 3D Working File.dgn**". (Creation of the 'GDOT 3D Working File.dgn' is documented in the Design Guidelines). Click **Open**.

- Now open InRoads from within MicroStation by selecting:
  InRoads ► InRoads Suite (SELECTseries 2) V8i 08.11.07.566 from the [MicroStation Menu].

The MicroStation and InRoads Software(s) will open.

3. Clear the MicroStation Window (*This step may be ignored if your MicroStation Window is already clear of graphics***)**

- Select **Edit ►Select All** from the [MicroStation Menu].
- Then select the **<DELETE>** key on the computer keyboard.

The MicroStation Window is now clear of all graphics from the previous lab and ready for this lab.

4.	**Verify Project Defaults** • In InRoads, select **File ►Project Defaults** • Use the pull down next to **Configuration Name:** to select ***1234567_Design*** which you created in **Lab 1**. • Click **Apply** & **Close.** *Sets Project Defaults.*
5.	**Set the Design Default Preferences** • Select **File ► Project Options** and the **<u>Project Options</u>** dialog box appears. • Select the **Factors** tab. • This will be a 50 scale project. Enter ***50*** for the **Text**, **Cell** & **Line Style Scale Factor(s)**. • Then in the same **<u>Project Options</u>** dialog box select the **Geometry** tab. • Click the **Preferences** button at the bottom of the dialog box. • Choose ***Design Default***. Click **Load** and **Close**. This will set the remainder of the Design Defaults. ****IMPORTANT**: As stated previously the ***Design Default*** Preference loads the appropriate settings for use during Design. These settings include the Alignment and Point name settings. These settings are of particular importance to the Designer. Alignments must have a **DE** prefix. Points must also have a **DE** prefix as well as beginning the point numbering scheme at Number 10000. In order for survey enhancements to be properly added during the design phase of a project, it is essential that Designers pay particular attention to this setting. • In the **<u>Project Options</u>** dialog box click **Apply** and **Close**. *Sets the Design Default Preference.*

Lab 13B Copy the Enhanced 1234567_SDE.dtm and Rename the File Externally and Internally to 1234567_Exist.dtm

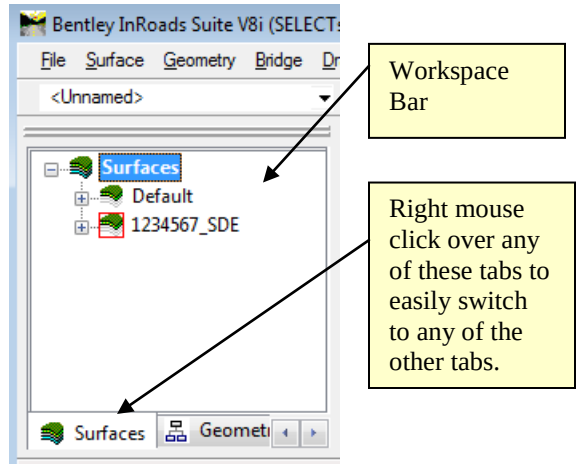
In Lab13B, you will copy the Enhanced 1234567_SDE.dtm file from the Survey Data (SDE) folder to the proper InRoads Data folder for use in this Lab. The 1234567_Exist.dtm will then be deleted and replaced using the new Enhanced DTM. The 1234567_SDE.dtm will be renamed both internally and externally to 1234567_Exist.dtm.

Please Note: A new Enhanced DTM may not always be provided to the Designer if no changes were made to the DTM by the SDE. The SDE will only provide an Enhanced DTM if new Features have been surveyed and incorporated into the DTM.

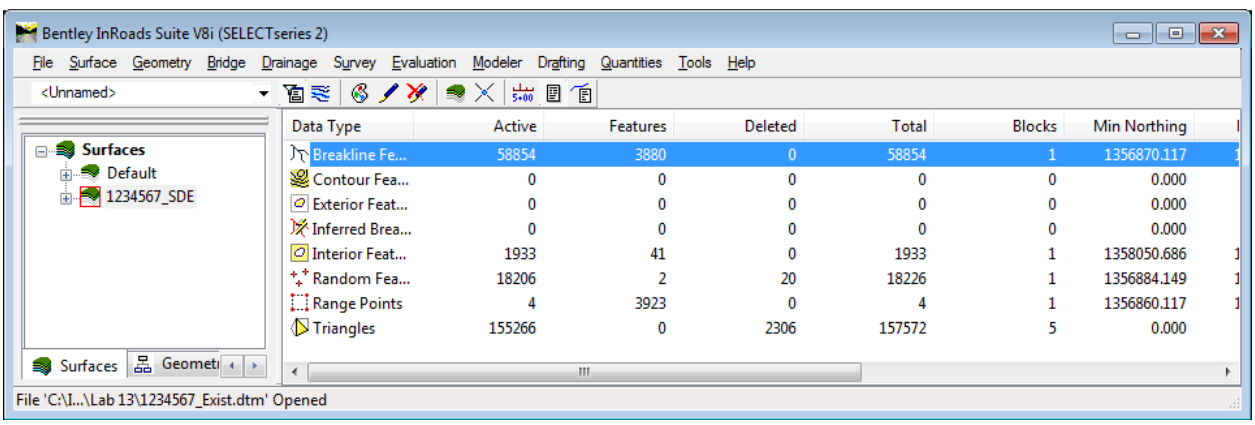
6.	**Copy the Enhanced 1234567_SDE.dtm file.** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 13\SDE**. The Enhanced 1234567_SDE.dtm and the 1234567_SDE.alg files (as well as any applicable Enhanced DGN Files) which are provided by Survey will be in this folder for use in the Lab. • Copy the **1234567_SDE.dtm** file From: **C:\InRoads Data\1234567\Design Labs\Lab 13\SDE** To: **C:\InRoads Data\1234567\Design Labs\Lab 13** • Next – **Delete** the current **1234567_Exist.dtm** file located in **C:\InRoads Data\1234567\Design Labs\Lab 13**.
7.	**Change the External Project Name from 1234567_SDE to 1234567_Exist.** In Windows Explorer -- Rename the file called 1234567_SDE.dtm which is located in **C:\InRoads Data\1234567\Design Labs\Lab 13** to the following: **1234567_Exist.dtm**. This may be accomplished by Right mouse clicking over the file and selecting **Rename**. ***NOTE**: Although you have now renamed the file, it is only renamed Externally. It must still be renamed internally to InRoads as will be demonstrated later.
8.	**Open the 1234567_Exist.dtm Surface.** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 13** • Highlight **1234567_Exist.dtm** • Click **Open** and **Cancel**.

9. **Make the InRoads Surface tab the active tab**

- In InRoads, Right mouse click over any of the tabs in the Workspace Bar and select **Surfaces**.
- Verify your view matches that shown in *Figure L13-1* and that the **Surfaces** tab is the active tab showing the **Surface(s)** listed.



** **NOTE**: Even though you opened **1234567_Exist**, **1234567_SDE** is showing as the Active Surface. Even though we changed the Name of the file externally, InRoads retains the Project Name internally and must also be changed internally to match.



Data Type	Active	Features	Deleted	Total	Blocks	Min Northing
Breakline Fe...	58854	3880	0	58854	1	1356870.117
Contour Fea...	0	0	0	0	0	0.000
Exterior Feat...	0	0	0	0	0	0.000
Inferred Brea...	0	0	0	0	0	0.000
Interior Feat...	1933	41	0	1933	1	1358050.686
Random Fea...	18206	2	20	18226	1	1356884.149
Range Points	4	3923	0	4	1	1356860.117
Triangles	155266	0	2306	157572	5	0.000

Figure L13-1 Main InRoads Window

10. **Change the Internal Project Name from 1234567_SDE to 1234567_Exist.**

- Select **Surface ► Rename Surface.** The **Rename Surface** dialog opens.
- In the **Rename Surface** dialog, match the entries shown in *Figure L13-2*.
- Click **Apply**.
- Click **Close** to exit the **Rename Surface** dialog.
- In the InRoads workspace bar **verify** that the Surface is now renamed **1234567_Exist** as shown in *Figure L13-3*.

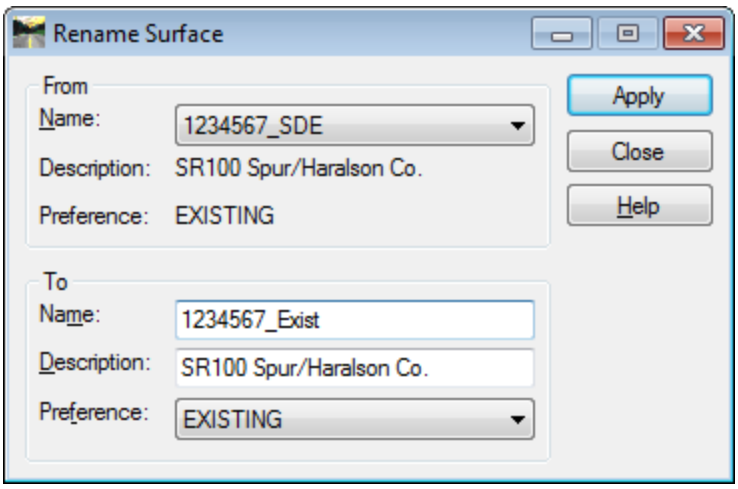


Figure L13-2 Rename Surface

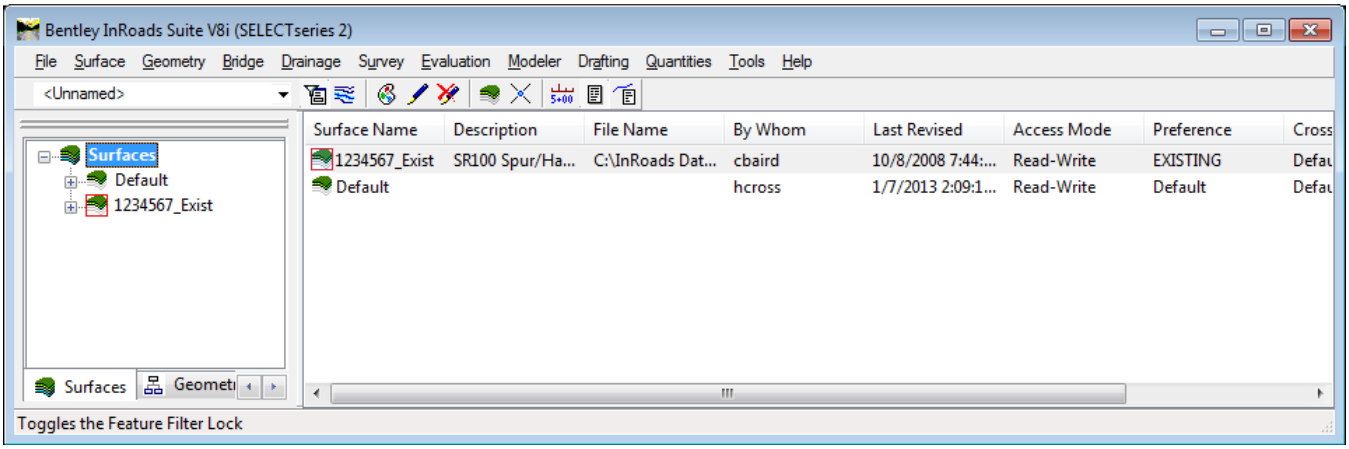


Figure L13-3 Main InRoads Window

11.	**Save the InRoads Surface File** Even though the Surface has been renamed – the data has not yet been saved. InRoads retains the data in <u>temporary</u> memory but does not <u>save</u> the data on the fly. Whenever a change has been made to an InRoads Surface – <u>Save</u> the Project and its associated modifications or changes. • Select **File ▶ Save ▶ Surface** from the **InRoads Menu**. The Surface Project (***1234567_Exist.dtm***) will be saved to **Lab 13** in the following path: **C:\InRoads Data\1234567\Design Labs\Lab 13** Note that the **<u>InRoads</u>** and **<u>MicroStation Status Bar</u>** (Located at the bottom of both the InRoads and MicroStation Interface) will depict a message when the Surface Project has been saved. The Enhanced DTM has now been added to the InRoads Surface Project.

Lab 13C Copy the Enhanced 1234567_SDE.alg

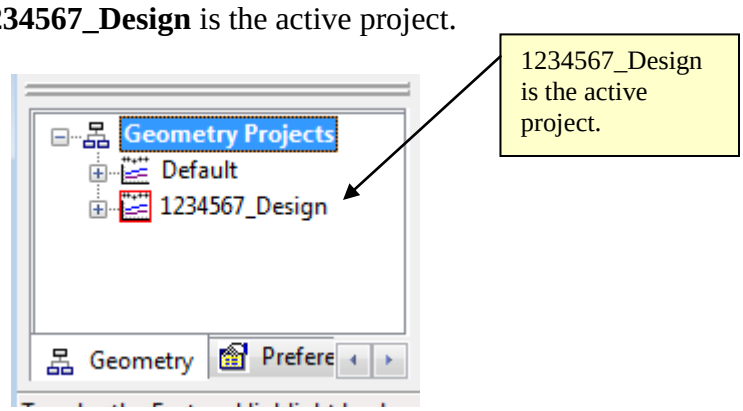
In Lab13C, you will copy the Enhanced 1234567_SDE.alg file from the Survey Data (SDE) folder to the proper InRoads Data folder for use in this Lab.

Please Note: A new Enhanced Survey ALG file may not always be provided to the Designer if no changes were made to the Property or Existing Alignment data by the SDE. The SDE will only provide an Enhanced ALG if new data has been surveyed and incorporated into the ALG.

12.	**Copy the Enhanced 1234567_SDE.alg File.** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 13\SDE**. The Enhanced 1234567_SDE.dtm and the 1234567_SDE.alg files (as well as any applicable Enhanced DGN Files) which are provided by Survey will be in this folder for use in this Lab. • Copy the **1234567_SDE.alg** File From: **C:\InRoads Data\1234567\Design Labs\Lab 13\SDE** To: **C:\InRoads Data\1234567\Design Labs\Lab 13**
13.	**Open 1234567_Design.alg** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab13** • Highlight **1234567_Design.alg** • Click **Open** & **Cancel**. *The Geometry Project 1234567_Design is opened.*

Lab 13D Delete All Alignments with an SV Prefix in the 1234567_Design.alg File

In Lab13D, you will delete all Survey Alignments (i.e. those Alignments with an SV Prefix) in the 1234567_Design.alg file. This will remove all of the Survey Alignments from the database but all of the Design data will remain in the ALG file. When the SDE stores Alignments, the Prefix of SV is always given. The reason for this is so when Survey Enhancements must be performed during the design phase of a project - there is a method to get the Survey Enhancements into the Designer's Project. This method begins by deleting all Alignments with an SV Prefix in the Designer's PI#_Design.alg file.

14.	**Make the InRoads Geometry tab the active tab** In InRoads, ensure the **Geometry** tab is the active tab as shown here and that the file **1234567_Design** is listed and has a Red Square. A Red Square next to the project reflects that **1234567_Design** is the active project. 
15.	In InRoads, select **Geometry ►Delete Geometry** and the **<u>Delete Geometry</u>** dialog opens as shown in *Figure L13-4*.

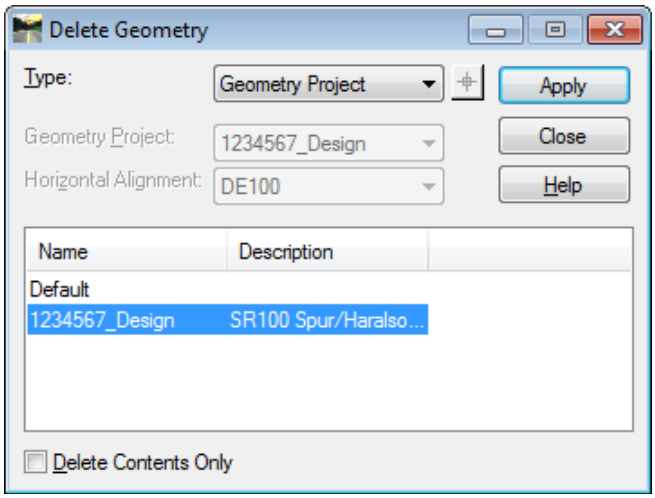


Figure L13-4 Delete Geometry

16.	• In the **Delete Geometry** dialog, change the **Type:** to ***Horizontal Alignment.*** • In the **Geometry Project:** pull down – select ***1234567_Design*** • Select all the Alignments (highlight in blue) that have an **SV** prefix. ***HINT**: This may be accomplished by Left clicking on the first Alignment with an **SV** prefix to highlight it in blue and then scrolling to the last Alignment with an **SV** prefix and holding down the Shift key while Left clicking the Alignment with the mouse. All the Alignments between the first and last **SV** Alignment should now be highlighted in blue indicating they are selected. ****WARNING**: Be careful not to select any of your Design Alignments (i.e. those Alignments that begin with the **DE** prefix).
17.	• Verify the settings in the **Delete Geometry** dialog match those shown in *Figure L13-5*. • Click **Apply**. • An **Alert** dialog prompting whether or not you want to Delete Alignments will be displayed. Click **Yes** to delete the Alignments. • Click **Close** to close the **Delete Geometry** dialog.

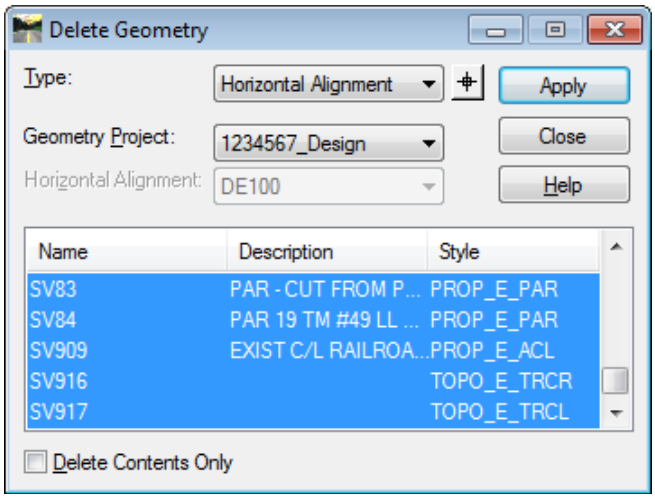


Figure L13-5 Delete Geometry

Lab 13E Delete All Points without a Prefix in 1234567_Design.alg

In Lab13E, you will delete all Survey Cogo Points (i.e. those Cogo Points without a Prefix). When the SDE stores Cogo Points or includes Cogo Points from the Data Collector, no Prefix is applied to them. The reason for this is when Survey Enhancements must be performed during the design phase of a project; there is a method to get the Survey Enhancements into the Designer's project. This method includes deleting all Cogo Points without a Prefix in the Designer's PI#_Design.alg file.

18.	Select **Geometry ► Cogo Points ► Delete** and the **Delete Cogo Point** dialog opens as shown in *Figure L13-6*.

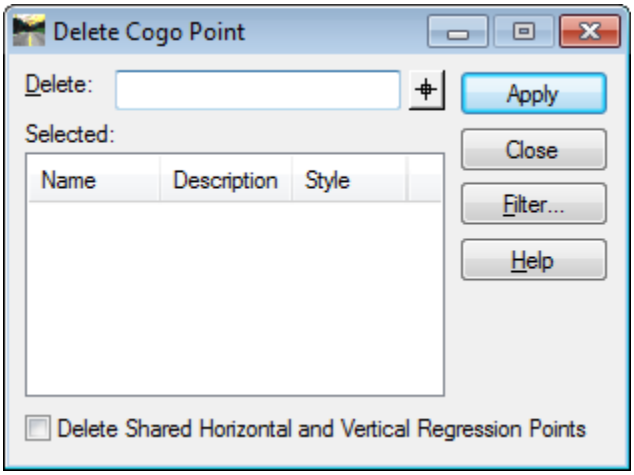


Figure L13-6 Delete Cogo Point

19.	In the **Delete Cogo Point** dialog, click the **Filter** button. The **Geometry Selection Filter** dialog opens.
20.	• Select (highlight in blue) all the Points that do not contain a Prefix. ***HINT**: This may be accomplished by Left clicking on the first Point without a Prefix to highlight it in blue and then scrolling to the last Point without a Prefix and holding down the Shift key while Left clicking the Point with the mouse. All the Points between the first and last should now be highlighted in blue indicating they are selected. ****WARNING**: Be careful not to select any of your Design Points (i.e. those Points that begin with the **DE** Prefix). • Verify the **Geometry Selection Filter** dialog matches that shown in *Figure L13-7*.

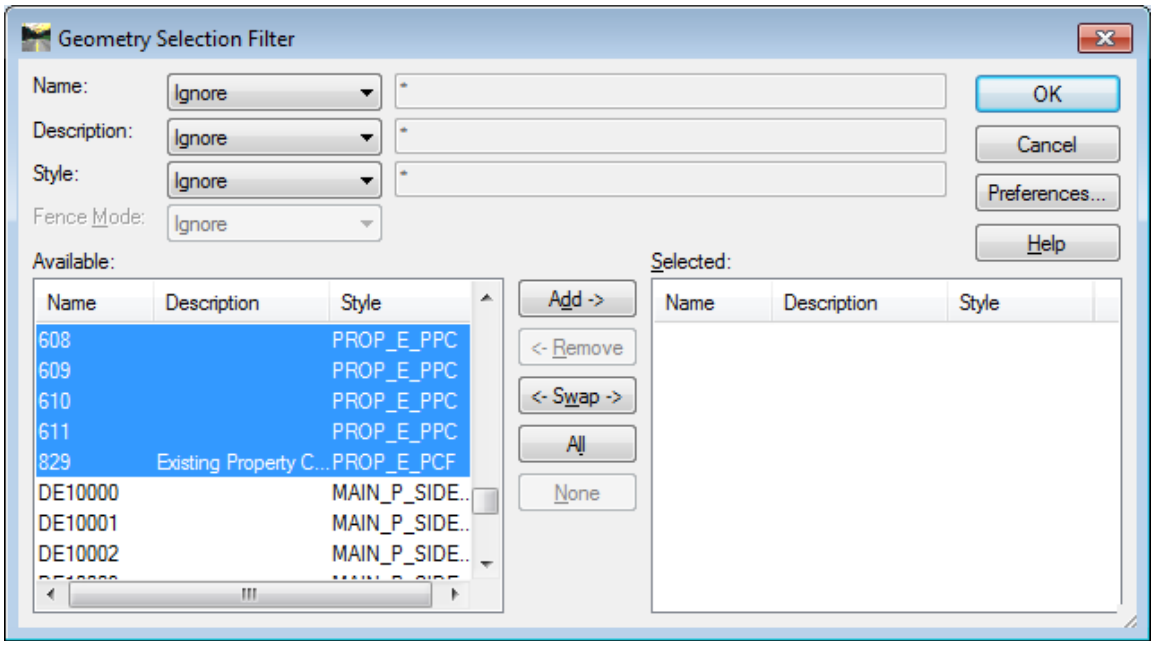


Figure L13-7 Geometry Selection Filter

21.	• In the **Geometry Selection Filter** dialog, click the **Add ->** button. This will move the highlighted Points from the **Available:** field to the **Selected:** field. • Click **OK**. The selected Points are populated in the **Delete Cogo Point** dialog as shown in *Figure L13-8*.

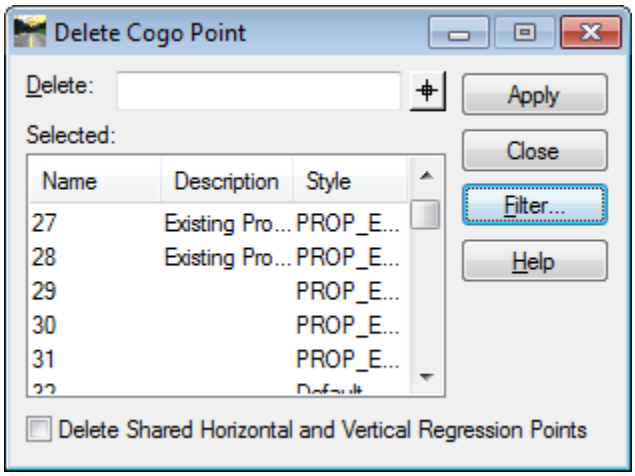


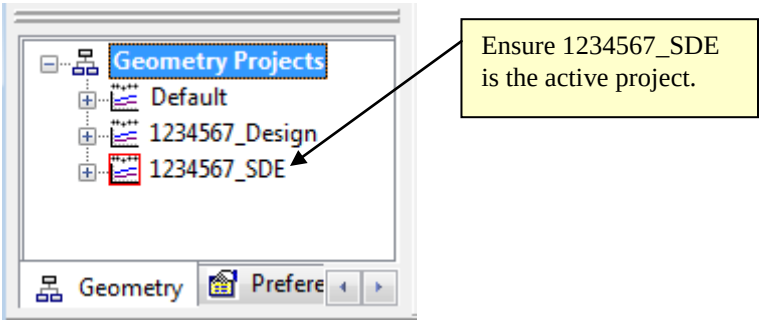
Figure L13-8 Delete Cogo Point

22.	• Click **Apply**. • An **Alert** dialog will appear prompting whether or not you want to delete the data. Click **Yes** to delete the Points. • Click **Close** to exit the **Results** Report if one opens. • Click **Close** to exit the **Delete Cogo Point** dialog.

Lab 13F Export Survey Data from 1234567_SDE.alg using LandXML

At this point you have deleted all the Survey Data (Survey Points and Survey Alignments) in the 1234567_Design.alg. In Lab13F you will open the new 1234567_SDE.alg and export all the Survey Data to an .XML file using the LandXML Translator. The Survey Data will then be imported into your 1234567_Design.alg file.

****WARNING**: Be careful and always ensure that you are in the correct ALG file before importing and/or exporting data during this process.

23.	**Open 1234567_SDE.alg** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab13** • Highlight **1234567_SDE.alg** • Click **Open** & **Cancel**.
24.	In InRoads, ensure the **Geometry** tab is the active tab as shown here and that the file **1234567_SDE** is the active project (has a Red Square next to it). A Red Square next to the project reflects that **1234567_SDE** is the active project. 
25.	Select **File ► Translators ► LandXML Translator** and the **LandXML** dialog opens as shown in *Figure L13-9*.

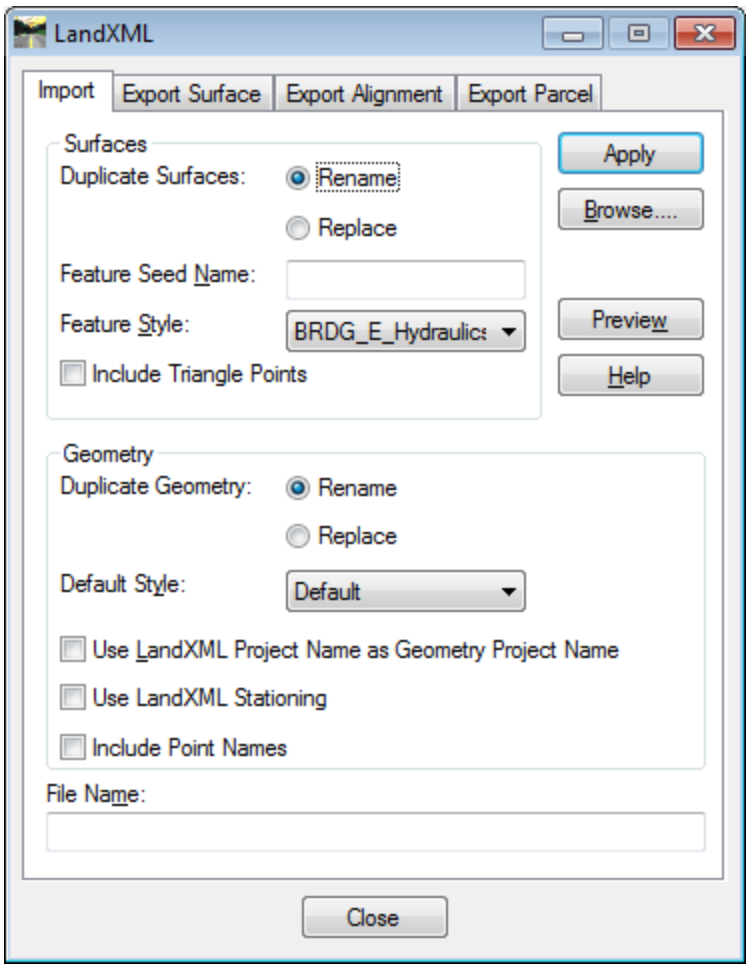


Figure L13-9 LandXML

26.	**Make the Export Alignment tab the active tab.** • Click on the **Export Alignment** tab. • In the **Geometry Project:** pull down – select ***1234567_SDE***. • Place a check mark in the ***Include All Cogo Points*** check box. • Place your cursor in the **Include:** field to activate the **Filter** button. • Click the **Filter** button and the **<u>Geometry Selection Filter</u>** dialog opens. • In the **<u>Geometry Selection Filter</u>** dialog, click the **All** button to move all the Survey Alignments from the **Available:** field to the **Selected:** field. • Click **OK**. • In the **Linear Units:** pull down – select ***US Feet***. • In the **State:** pull down – select ***existing***. • The selected Alignments are populated in the **<u>LandXML</u>** dialog as shown in *Figure L13-10*. Ensure your inputs match the screen capture below.

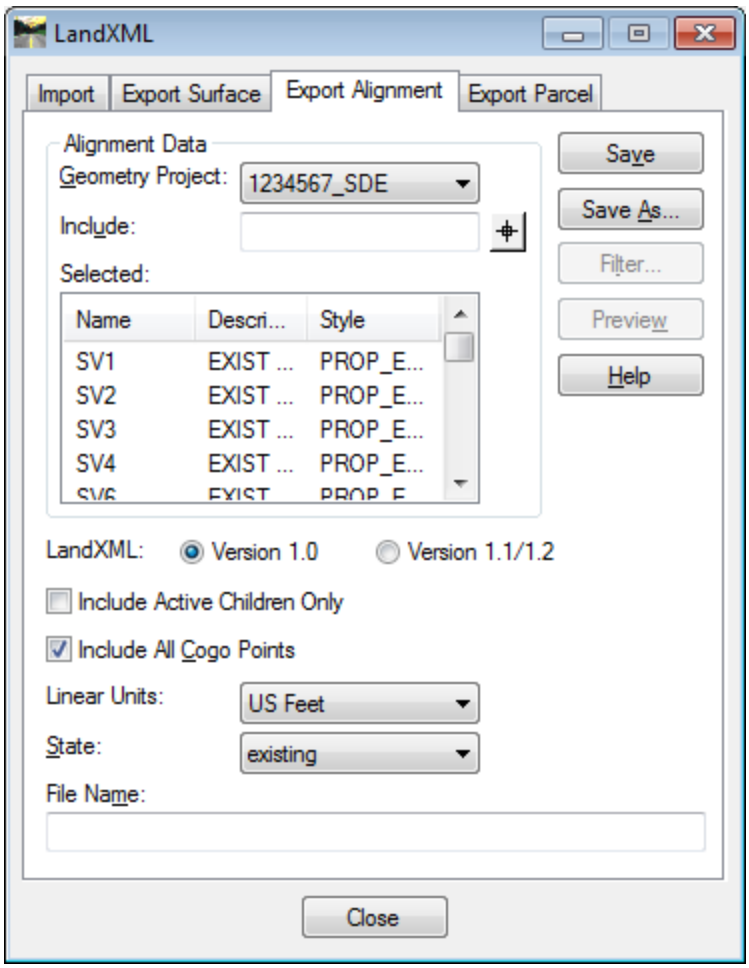
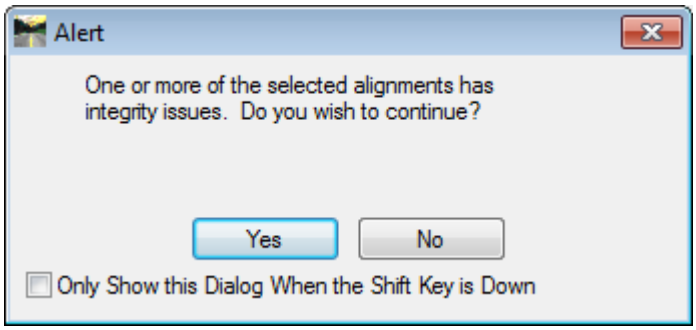


Figure L13-10 LandXML

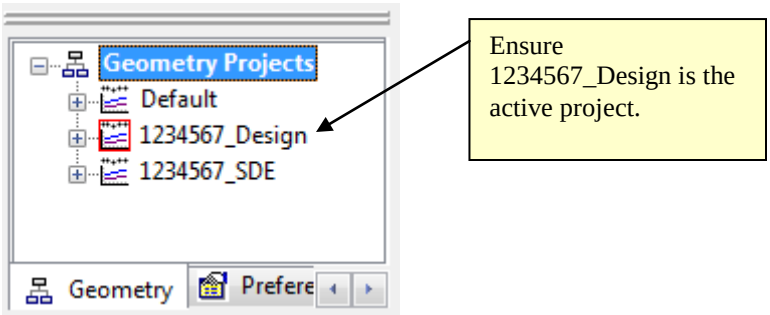
27.	• Click the **Save As** button. An **Alert** dialog box may appear which informs you that "***One or more of the selected Alignments has an integrity issue***" as shown below. A **Results** Report listing the Alignments may also appear. 

28.	**Save the XML File.** • Click **Yes** in the **Alert** dialog to continue. The **Export** dialog opens. • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab13** • In the **File name:** field – enter ***NEW SURVEY.xml*.** • Click the **Save** button**.** • Click **Close** to exit the **LandXML** dialog. • Click **Close** to exit the **Results** Report if it is still open.

Lab 13G Import Survey Data into 1234567_Design.alg using LandXML

At this point you have created an XML file that contains all the Survey information (Survey Alignments and Survey Cogo Points) for the Project from the **1234567_SDE.alg** file provided by the Survey Office. The remaining Steps will be to import the XML file into the Designer's **1234567_Design.alg** file.

****WARNING**: Be careful and always ensure that you are in the correct ALG file before importing and/or exporting data during this process.

29.	In InRoads, ensure the **Geometry** tab is the active tab as shown here and that the file **1234567_Design** is the active project (has a Red Square next to it). To make **1234567_Design** the active project – Right mouse click and select **Set Active**. A Red Square next to the Project reflects that **1234567_Design** is the active project. 
30.	Select **File ► Translators ► LandXML Translator** and the **LandXML** dialog opens as shown in *Figure L13-11*.

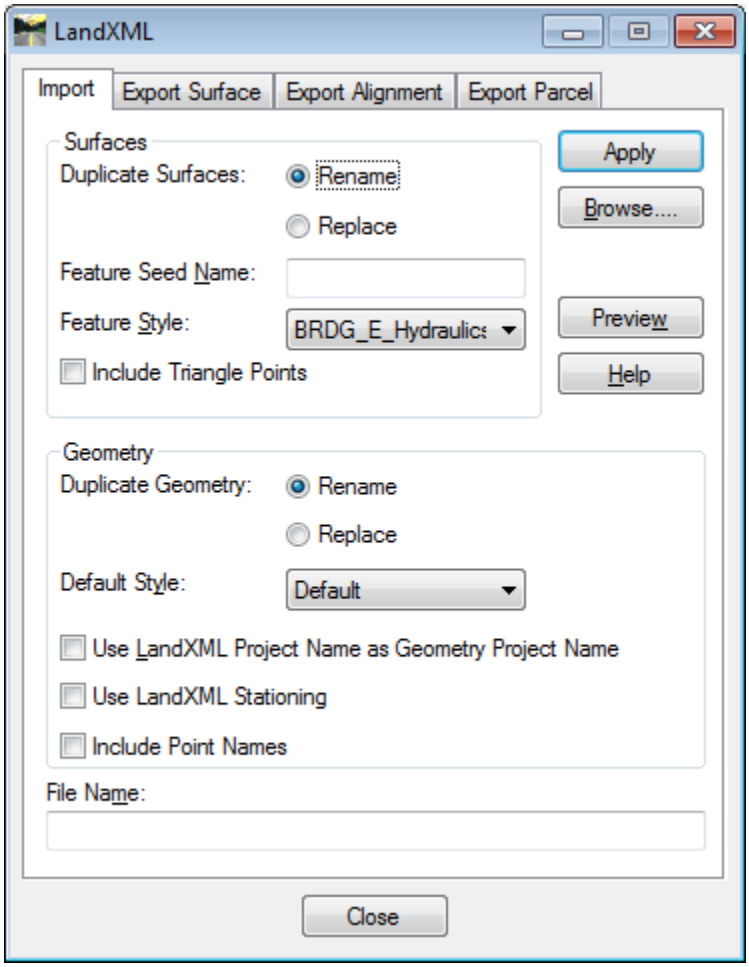


Figure L13-11 LandXML

31.	**Make the Import tab the active tab.** • Click on the **Impor**t tab. **In the Geometry Frame – input in the following:** • In the **Duplicate Geometry:** radio button – select ***Replace***. • Leave all other entries as Default. • Click the **Browse** button and navigate to **C:\InRoads Data\1234567\Design Labs\Lab 13**. • Select the File **'NEW SURVEY.xml'** and click **Open**. • Verify your entries match those shown in *Figure L13-12*.

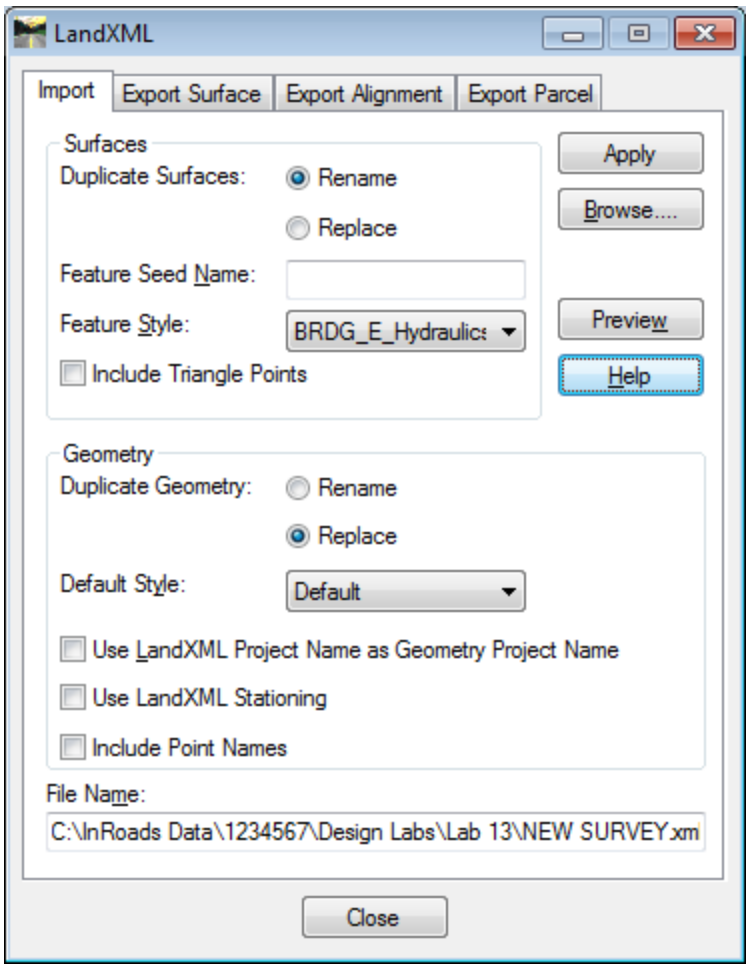


Figure L13-12 LandXML

32.	Click **Apply** and **Close** to exit the **<u>LandXML</u>** dialog. Importing of the Survey Data into the **1234567_Design.alg** file is now complete.
33.	**Save the InRoads 1234567_Design.alg File** Even though the Enhanced Survey Data has been imported – the data has not yet been saved. • Select **File ▶ Save ▶ Geometry Project** from the **InRoads Menu**. The Geometry Project (***1234567_Design.alg***) will be saved to **Lab 13** in the following path: **C:\InRoads Data\1234567\Design Labs\Lab 13**

34.	**Delete the 1234567_SDE.alg File** In Windows Explorer – delete the **1234567_SDE.alg** file currently located in **C:\InRoads Data\1234567\Design Labs\Lab 13** ***NOTE**: Make sure that you retain a backup copy of this Enhanced **1234567_SDE. alg** file on the Server.
35.	**For Information Only:** The Enhanced Survey Data (both the DTM and Property/Existing Alignment Information) have been added to the 1234567_Design.alg File. • The Enhanced Existing DTM contains all of the Surface Points, Breaklines and Features along with the triangulated data. • The Enhanced Property/Existing Alignment information contains all of the SV Prefix Alignments and the Survey Cogo Points.
36.	This concludes Lab 13 Do not proceed until the Instructor directs you to do so.

Lab 14
InRoads Style Sheets

Objective

Style sheets are used by InRoads to present data in a particular format. The purpose of this lab is to introduce InRoads style sheets to the designer by generating 2 of the Style Sheet reports required in the ***GDOT Designers Checklist for Plans Submittal to the Office of Construction Bidding Administration***. The **GDOT Alignment Report** and **End-Area Report-Standard** are required deliverables in electronic format to the Office of Construction Bidding Administration when submitting final plans. Listed here are 22 GDOT customized style sheets which are available by downloading and running the **InRoadsALL.exe** from the R.O.A.D.S webpage.

- **GDOT 3D Alignment Comparison Report**
- **GDOT Alignment File Descriptions**
- **GDOT Alignment Points List**
- **GDOT Alignment Report**
- **GDOT Deed**
- **GDOT Earthwork Volumes Report**
- **GDOT End-Area Report-Compressed**
- **GDOT End-Area Report-Standard**
- **GDOT Feature Lengths Report**
- **GDOT Feature Volumes Report**
- **GDOT Feature-StationElevationOffset Report**
- **GDOT GPS Grading Report**
- **GDOT HEC RAS Bridge Features Report**
- **GDOT HEC RAS Cross Section Geometry Report**
- **GDOT Intersecting Alignments Stations**
- **GDOT Ponding Report**
- **GDOT RW Table**
- **GDOT Stakeout Report**
- **GDOT Station-Offset Report**
- **GDOT Superelevation Data Report**
- **GDOT Surface Check Report**
- **GDOT Vertical Clearance Report**

The **InRoadsALL.exe** places the Style Sheets listed above in the following location:

C:\InRoads Data\Style Sheets\GDOT

The **InRoadsALL.exe** places Style Sheet help files for the Style Sheets listed above in the following location:

C:\InRoads Data\Style Sheet Documentation

In addition to the 22 GDOT customized Style Sheets listed above, InRoads includes numerous Style Sheets in the **C:\InRoads Data\Style Sheets** folder.

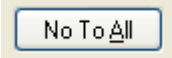
Lab 14A Set Project Defaults and Open Files

The objective of Lab 14A is to ensure that the proper settings are in place and open the files necessary for demonstrating the use of the Style Sheets.

1. **Starting Clean**

In order to ensure that you are working with a "clean" database – you will close MicroStation and InRoads if they are still running from a previous Lab:

To CLOSE MicroStation and InRoads -

Select **File►Exit** from the [MicroStation Menu].
If any messages appear regarding the saving of projects – Select 

This closes BOTH the MicroStation and InRoads Software(s).

2. **Starting MicroStation and InRoads in the GDOT Workspace.**

From the desktop, double-click on the **MicroStation** icon labeled **GDOT MicroStation V8i SS2 (x86)**.

Double click on the icon labeled **GDOT MicroStation V8i SS2 (x86)**.

- When the **MicroStation Manager** dialog box appears – navigate to the **C:\InRoads Data\1234567\Design Labs\Standards** folder and select the "**GDOT 3D Working File.dgn**". (Creation of the 'GDOT 3D Working File.dgn' is documented in the Design Guidelines). Click **Open**.

- Now open InRoads from within MicroStation by selecting:
  InRoads ► InRoads Suite (SELECTseries 2) V8i 08.11.07.566 from the [MicroStation Menu].

The MicroStation and InRoads Software(s) will open.

3. **Clear the MicroStation Window (***This step may be ignored if your MicroStation Window is already clear of graphics***)**

- Select **Edit ►Select All** from the [MicroStation Menu].
- Then select the **<DELETE>** key on the computer keyboard.

The MicroStation Window is now clear of all graphics from the previous lab and ready for this lab.

4.	**Verify Project Defaults** • In InRoads, select **File ►Project Defaults** • Use the pull down next to **Configuration Name:** to select ***1234567_Design*** which you created in **Lab 1**. • Click **Apply** & **Close.** *Sets Project Defaults.*
5.	**Set the Design Default Preferences** • Select **File ► Project Options** and the **<u>Project Options</u>** dialog box appears. • Select the **Factors** tab. • This will be a 50 scale project. Enter ***50*** for the **Text**, **Cell** & **Line Style Scale Factor(s)**. • Then in the same **<u>Project Options</u>** dialog box select the **Geometry** tab. • Click the **Preferences** button at the bottom of the dialog box. • Choose ***Design Default***. Click **Load** and **Close**. This will set the remainder of the Design Defaults. ****IMPORTANT**: As stated previously the ***Design Default*** Preference loads the appropriate settings for use during Design. These settings include the Alignment and Point name settings. These settings are of particular importance to the Designer. Alignments must have a **DE** prefix. Points must also have a **DE** prefix as well as beginning the point numbering scheme at Number 10000. In order for survey enhancements to be properly added during the design phase of a project, it is essential that Designers pay particular attention to this setting. • In the **<u>Project Options</u>** dialog box click **Apply** and **Close**. *Sets the Design Default Preference.*
6.	**Open 1234567_Design.alg** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 14** • Highlight **1234567_Design.alg** • Click **Open** & **Cancel**. *The Geometry Project 1234567_Design.alg is opened.*
7.	**Open 1234567_Exist.dtm** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 14** • Highlight **1234567_Exist.dtm** • Click **Open** & **Cancel**. *The Surface 1234567_Exist.dtm is opened.*

8.	**Open 1234567_SR100 SPUR_Lab14.dtm** • In InRoads, select **File ► Open** • Navigate to **C:\InRoads Data\1234567\Design Labs\Lab 14** • Highlight **1234567_SR100 SPUR_Lab14.dtm** • Click **Open** & **Cancel**. *The Finish Surface 1234567_ SR100 SPUR_Lab14 is opened.*

Lab 14B GDOT Alignment Report

This Lab will depict the process to create a **GDOT Alignment Report.** The **GDOT Alignment Report** is a required deliverable with the Final Plans submittal package and must include information on all centerline alignments in the projects ALG database.

9.	**Open the <u>Geometry Report</u> dialog.** • In InRoads, select **Tools ► XML Reports ► Geometry**. The **<u>Geometry Report</u>** dialog opens as shown in *Figure L14-1*.

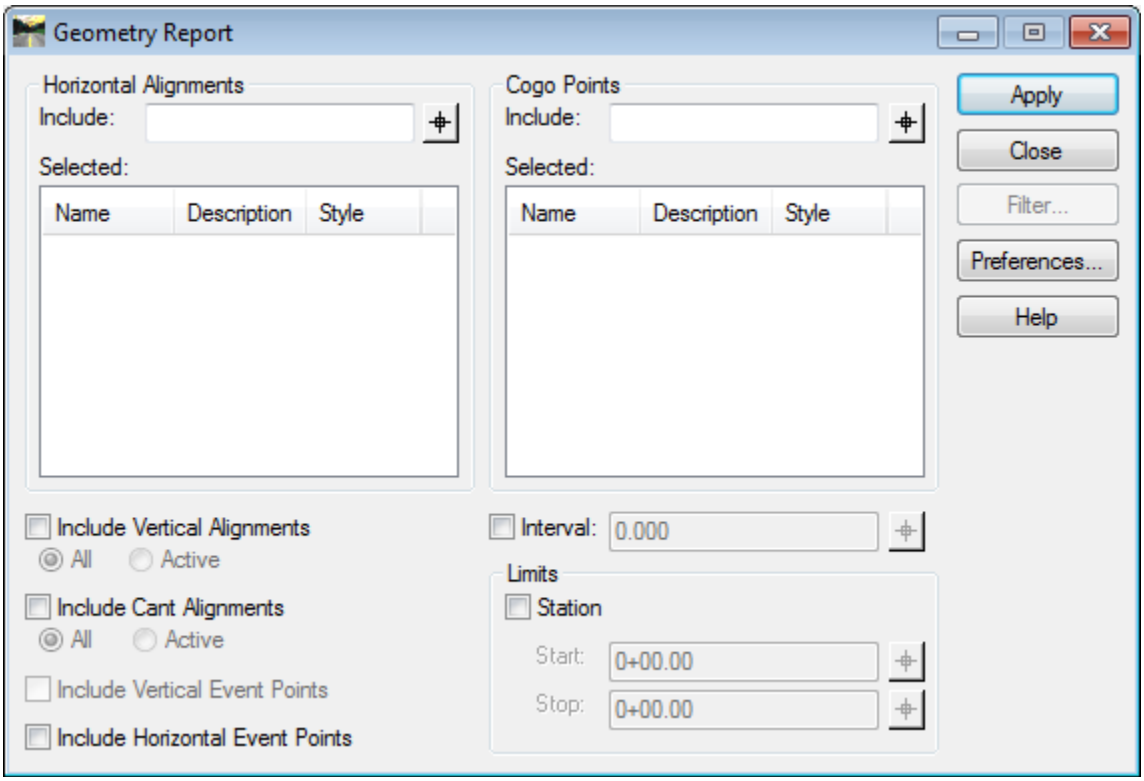


Figure L14-1 Geometry Report

10.	**Open the <u>Geometry Selection Filter</u> dialog.** • In the **<u>Geometry Report dialog</u>**, left click in the **Horizontal Alignments – Include:** field. This activates the **Filter** button. • Click the **Filter** button. The **<u>Geometry Selection Filter</u>** opens as shown in *Figure L14-2*.

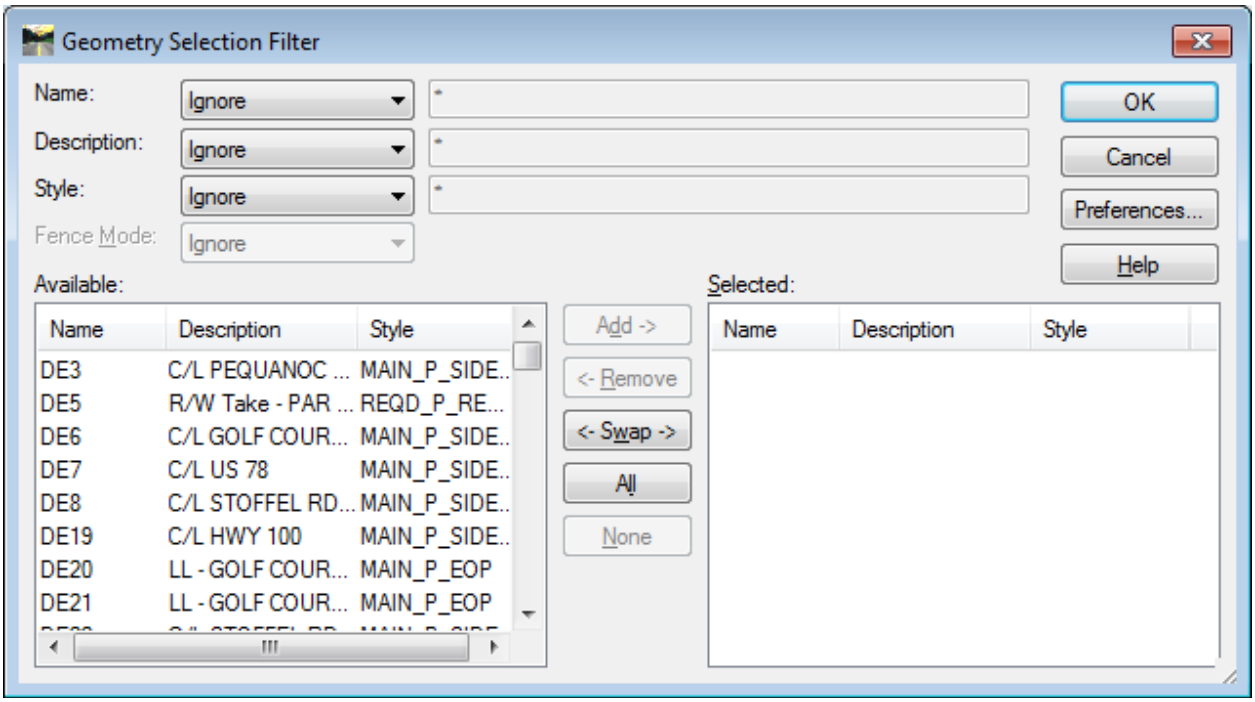


Figure L14-2 Geometry Selection Filter

11.	**Filter the 'Available:' field to Include only those Alignments with the Feature Styles MAIN_P_CONSTCL and MAIN_P_SIDECL.** • Use the pull-down arrow next to the **Style:** field to change the entry from **Ignore** to **Included**. • In the **Style: – Included** key-in field, key-in: **MAIN_P_CONSTCL;MAIN_P_SIDECL** and click the **Tab** key on the keyboard to accept the entry. ***IMPORTANT**: Ensure no spaces are entered either before or after the semi-colon (;) when entering the feature styles. A space entered after the semi-colon will prevent additional feature styles from being recognized. • The alignments in the **Available:** field should now be filtered as shown in *Figure L14-3*.

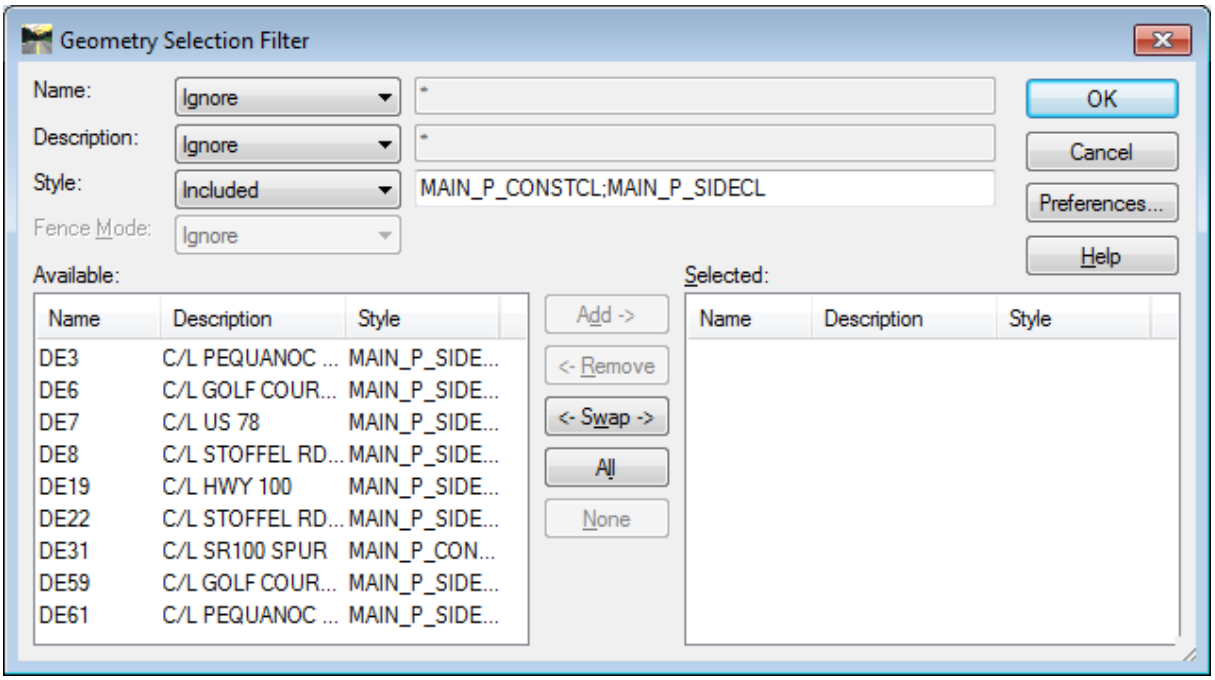


Figure L14-3 Geometry Selection Filter

12.	**Move all the Filtered Alignments from the 'Available:' field to the 'Selected:' field.** • In the **<u>Geometry Selection Filter</u>** dialog, click the **All** button. This moves all the alignments visible in the *Available:* field to the *Selected:* field as shown in *Figure L14-4*.

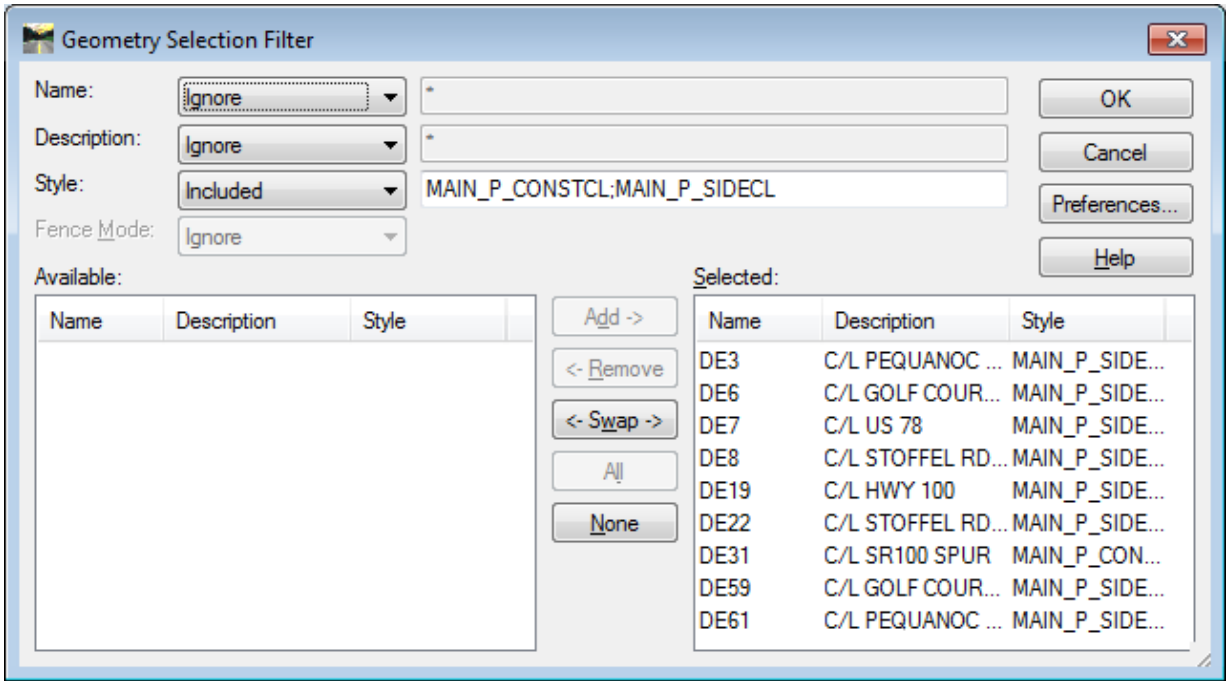


Figure L14-4 Geometry Selection Filter

13.	**Move all the Selected Alignments to the <u>Geometry Report</u> dialog and set the Reporting Interval to 50.00.** • In the **<u>Geometry Selection Filter</u>** dialog, click **OK**. The **<u>Geometry Selection Filter</u>** dialog closes and returns the selected alignments to the **<u>Horizontal Alignments</u>** – **Include:** field of the **<u>Geometry Report</u>** dialog. • Place a check in the **Interval:** check box and enter **50.000** in the entry field for the interval. • Verify your entries match those shown in *Figure L14-5*.

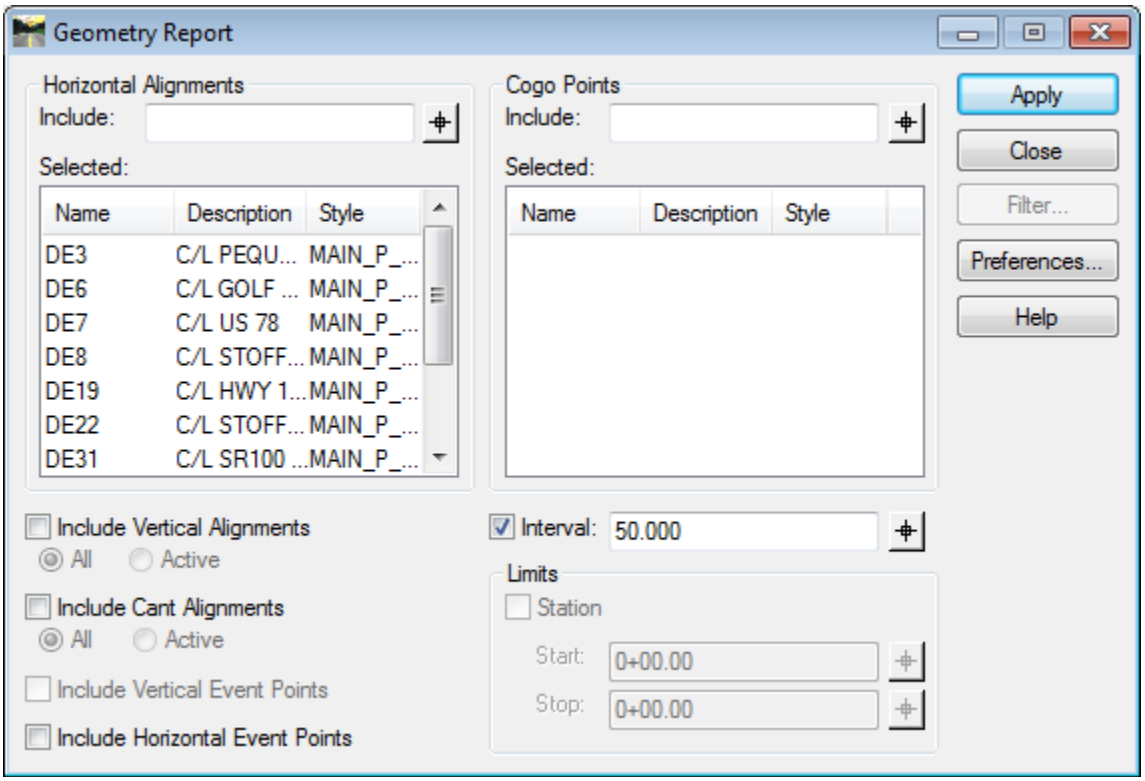


Figure L14-5 Geometry Report

14.	**Open the Bentley Civil Report Browser.** • In the **<u>Geometry Report</u>** dialog, click **Apply**. The **<u>Bentley Civil Report Browser</u>** opens similar to that shown in *Figure L14-6*.

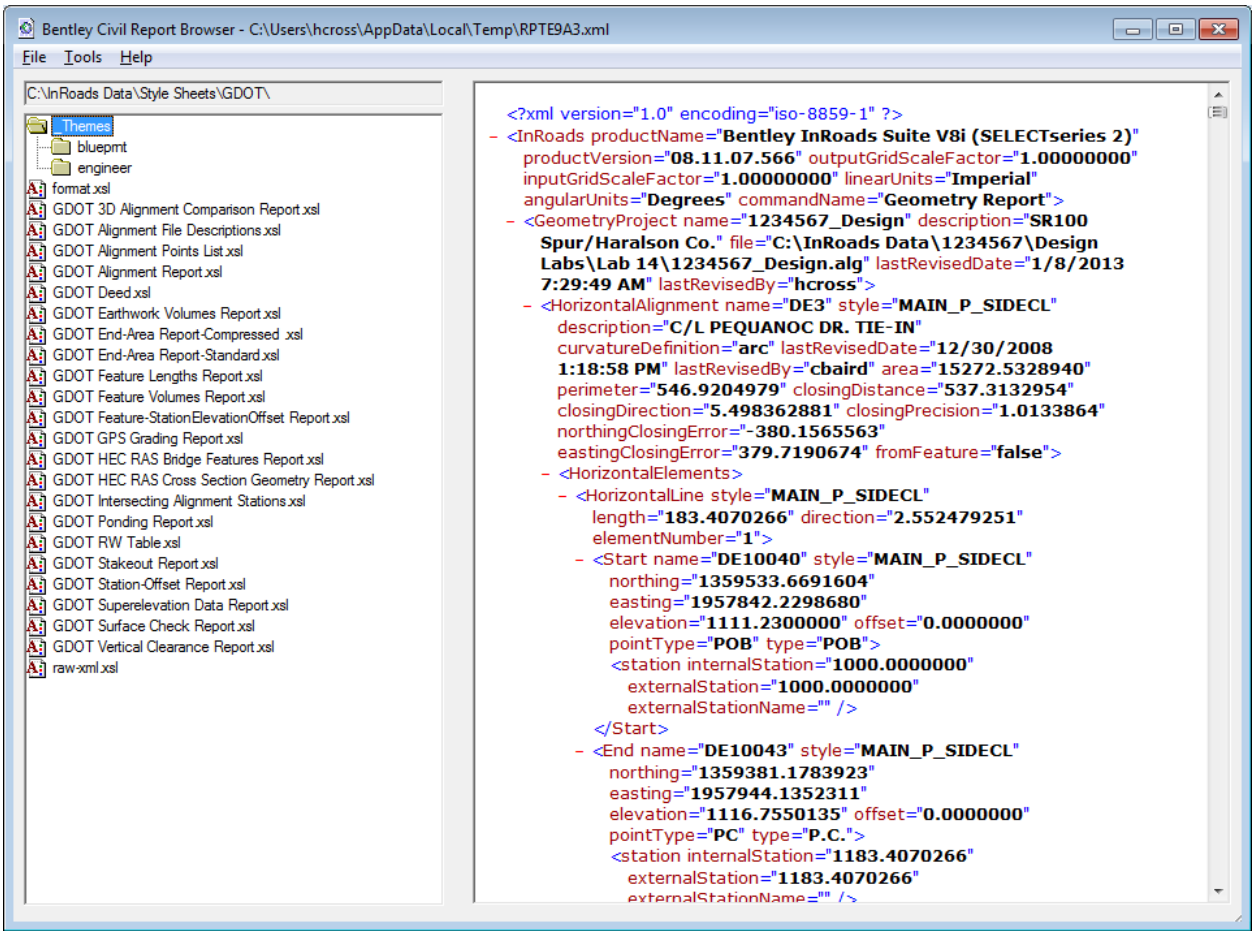


Figure L14-6 Bentley InRoads Report Browser

15.	**View the 'GDOT Alignment Report'.** • In the **<u>Bentley Civil Report Browser</u>**, highlight the style sheet **GDOT Alignment Report.xsl**. The **GDOT Alignment Report** displays as shown in *Figure L14-7*.

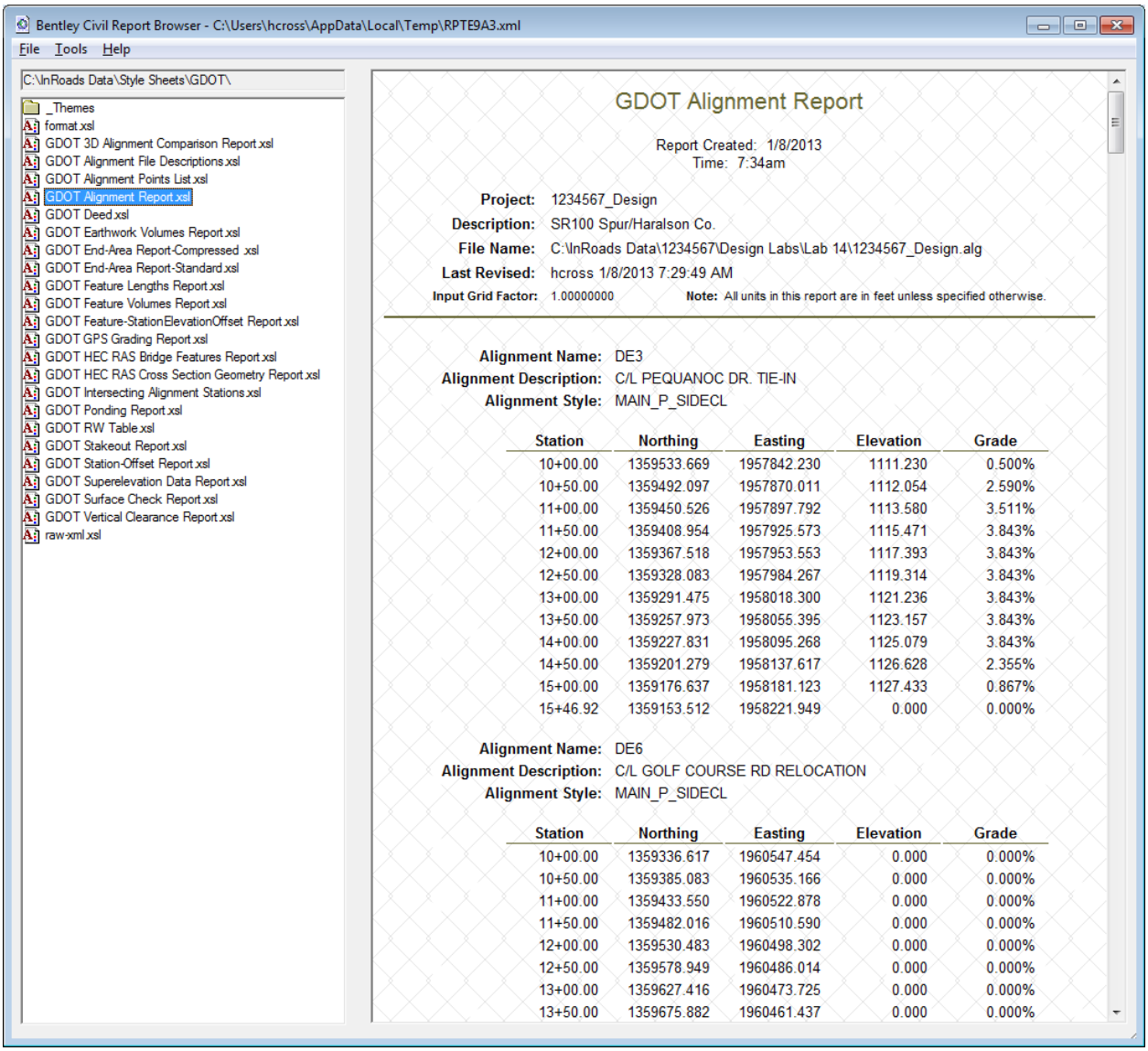


Figure L14-7 Bentley InRoads Report Browser

16.	**Save the 'GDOT Alignment Report'.** • In the **<u>Bentley Civil Report Browser</u>**, select **File ► Save As**. The **<u>Save As</u>** dialog opens as shown in *Figure L14-8*.

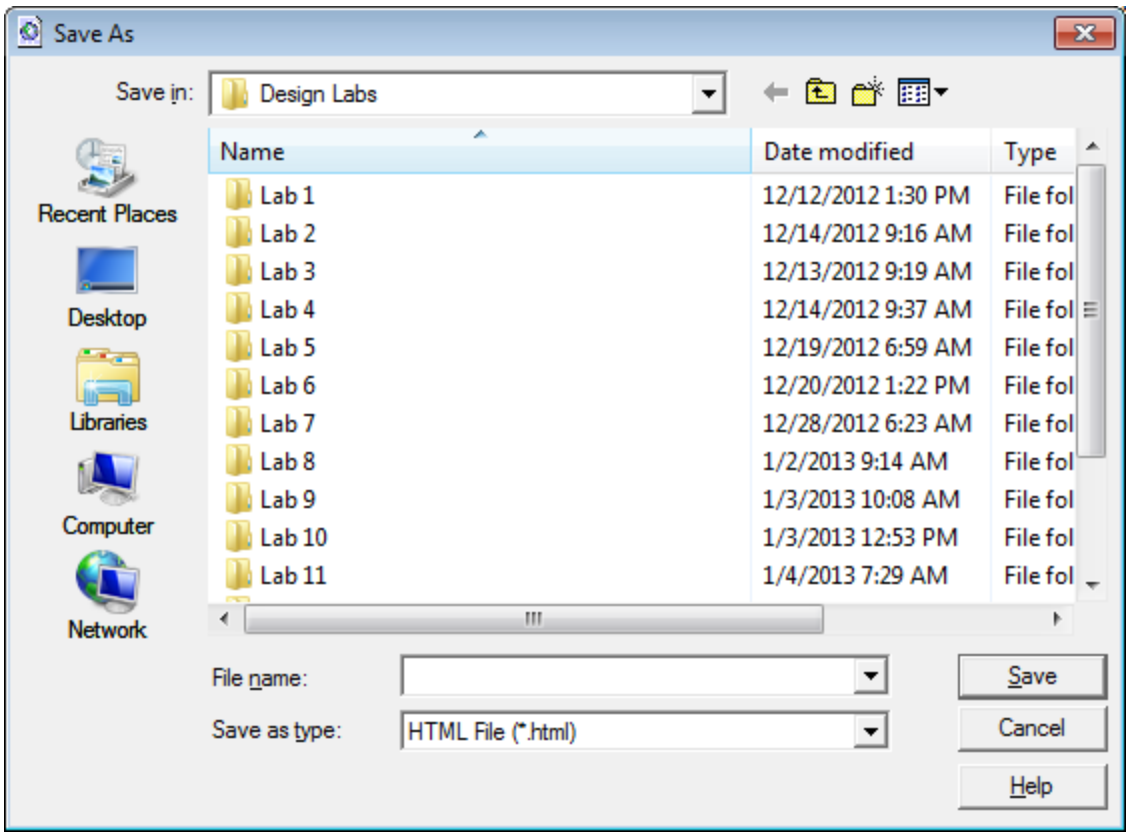


Figure L14-8 Save As

17.	**Save the 'GDOT Alignment Report' in HTML format** • In the **Save As** window, navigate to ***C:\InRoads Data\Design Labs\Lab14***. • In the **File name:** entry field, key-in **GDOT Alignment Report**. • Enter the **Save as Type:** as **HTML File (*.html)**. • Verify your entries match those shown in *Figure L14-9*. • Click **Save**.

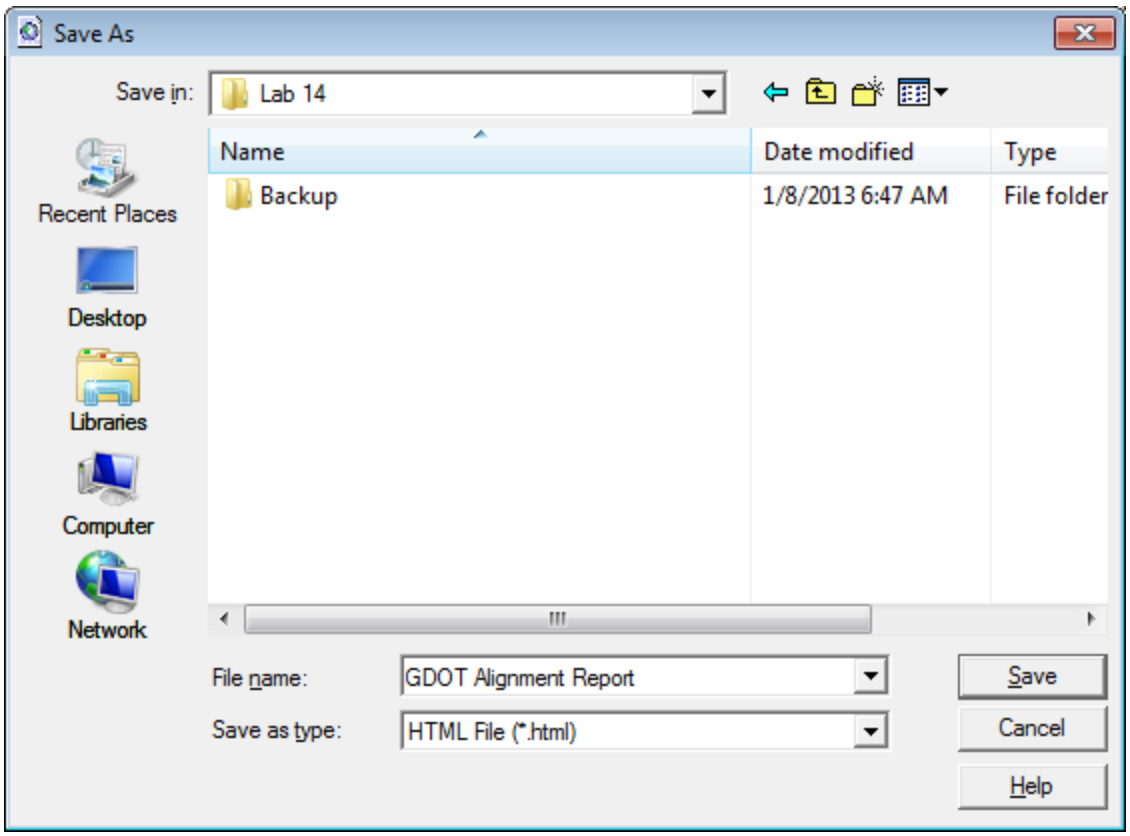


Figure L14-9 Save As

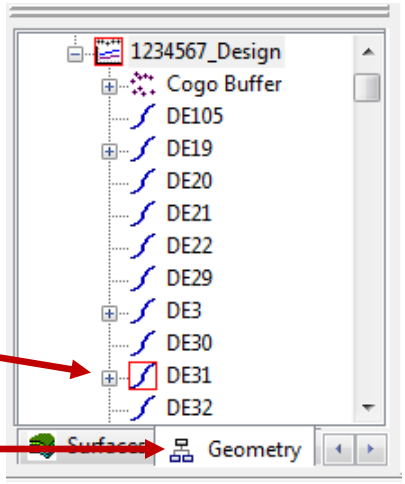
18.	**Prepare InRoads for Lab 14C.** • Close the **Bentley Civil Report Browser**. • Close the **Geometry Report** dialog.

Lab 14C GDOT End-Area Report-Standard

This Lab will depict the process to create a **GDOT End-Area Report-Standard** for the proposed DTM **1234567_SR100 SPUR_Lab14**. The **GDOT End-Area Report - Standard** is a required deliverable with the Final Plans submittal package for all cross sections.

19. **Ensure the Active Alignment is set to DE31 (SR 100 Spur).**

- In the InRoads Workspace bar, ensure the **Geometry** tab is the active tab as shown at right.
- Ensure **DE31** is the active alignment by right mouse clicking over it and selecting **Set Active**.



Ensure **DE31** is the active alignment. It should have a red square as shown here.

Make the **Geometry** tab the active tab.

20. **Before the 'GDOT End-Area Report-Standard' can be generated, Cross Sections must be created in MicroStation. Open the <u>Cross Sections</u> dialog.**

- In InRoads, select **Evaluation ► Cross Section ► Cross Sections**. The **<u>Cross Sections</u>** dialog opens as shown in *Figure L14-10*.

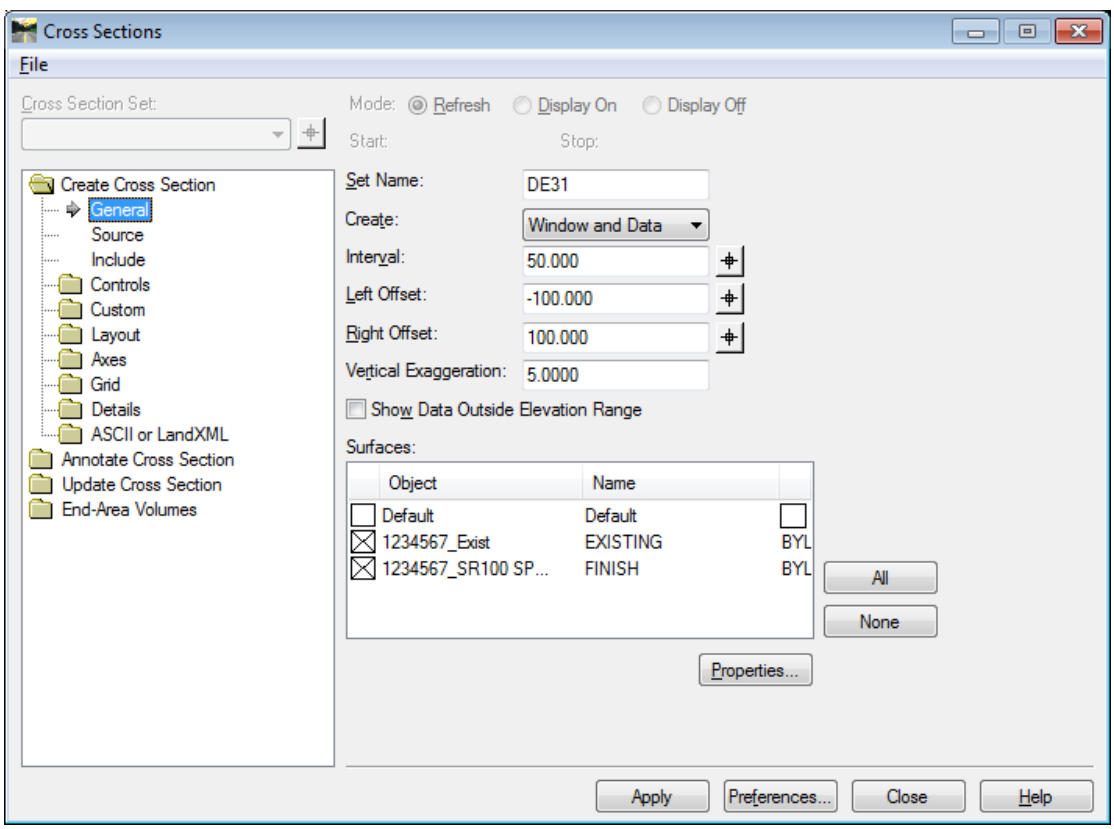
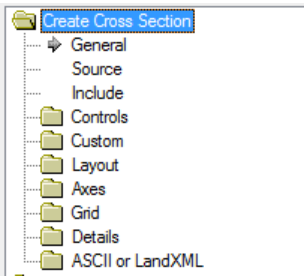


Figure L14-10 Create Cross Section

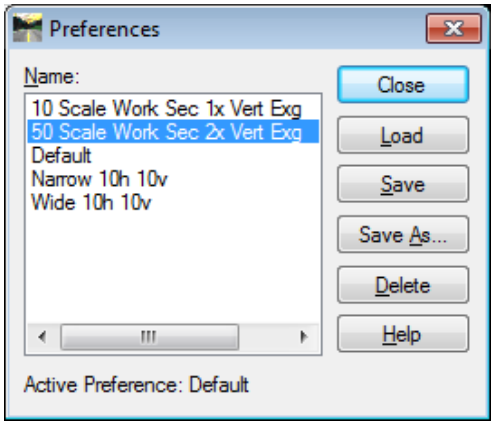
21. **Load the Preference '50 Scale Work Sec 2x Vert Exg'.**

- Ensure the **Create Cross Section** "folder" is highlighted/selected as depicted here:



NOTE: Depending on which folder is selected (either "***Create Cross Section***, ***Annotate Cross Section***, ***Update Cross Section*** or ***End-Area Volumes***), the available **Preferences** will change.

- In the **<u>Cross Sections</u>** dialog, click the **Preferences** button. The **<u>Preferences</u>** dialog opens as shown here.



- Highlight the Preference **50 Scale Work Sec 2x Vert Exg**.
- Click **Load** and **Close**.

*** NOTE**: This loads settings into the **Cross Sections** dialog intended to be enough to fit the entire cross section at each station.

***NOTE**: For projects with cross sections whose cut or fill slopes that extend beyond the range set up by this preference, the user is instructed to manually set the Left and Right Offsets to a distance that will encompass the entire cross section.

22.	**Select the Surfaces for the 'GDOT End-Area Report-Standard' to be created from.**
	
	• In the **<u>Cross Sections</u>** dialog, place an 'X' in check boxes for the surfaces listed here.
	  o **1234567_Exist**
	  o **1234567_SR100 SPUR_Lab14**
	
	• Ensure your settings match those shown in *Figure L14-11*.

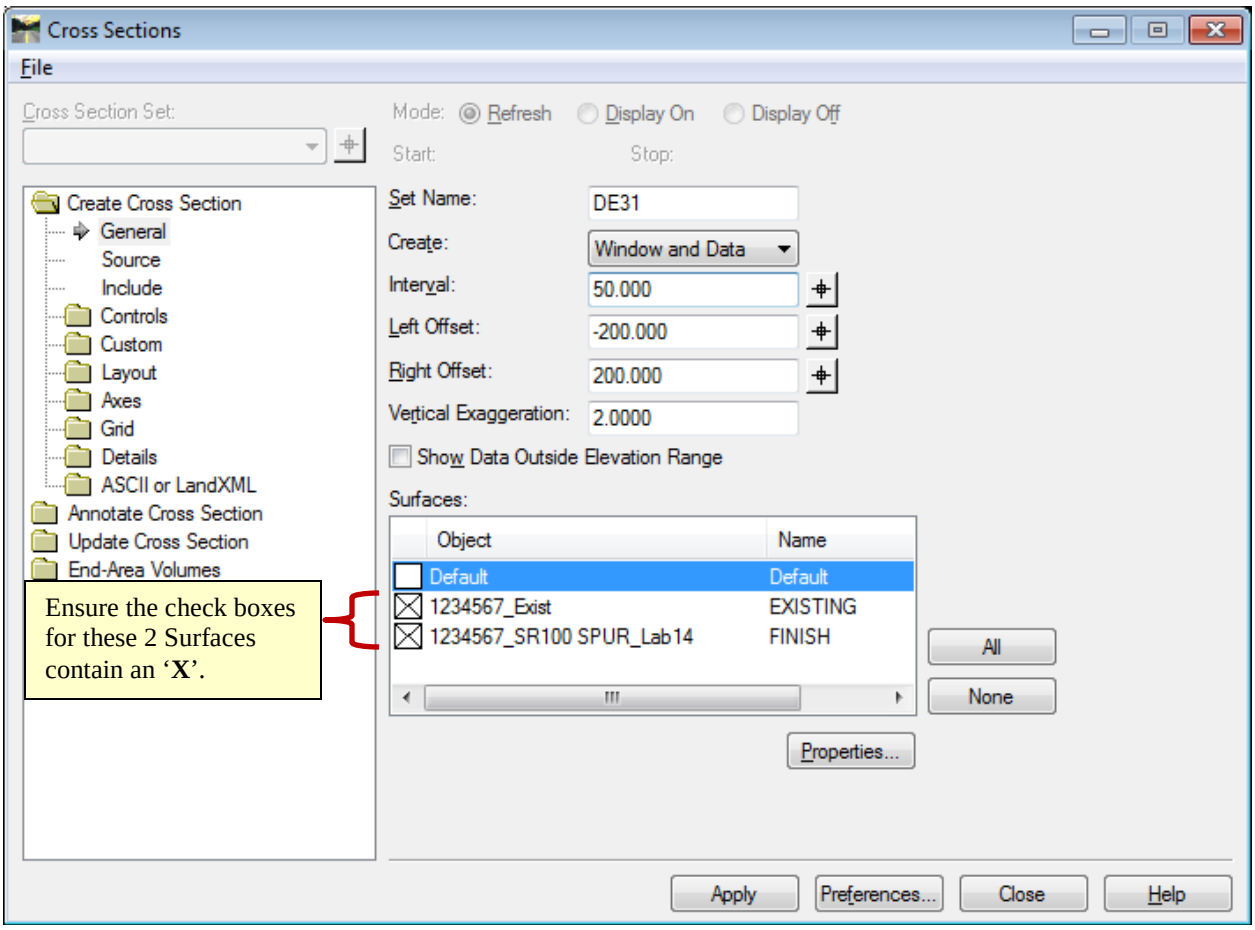


Figure L14-11 Create Cross Section

23.	**Create the Cross Sections.** • In the **<u>Cross Sections</u>** dialog, click **Apply**. • Notice, in the bottom left corner of the MicroStation window you are prompted to **> Identify Location**. • Left click anywhere in the MicroStation window. The cross sections are drawn and the **<u>Cross Sections</u>** dialog reappears. • Do **<u>Not</u>** close the **<u>Cross Sections</u>** dialog. • In MicroStation, click the **Fit View** button ( ). • Your view in MicroStation should now match that shown in *Figure L14-12*.

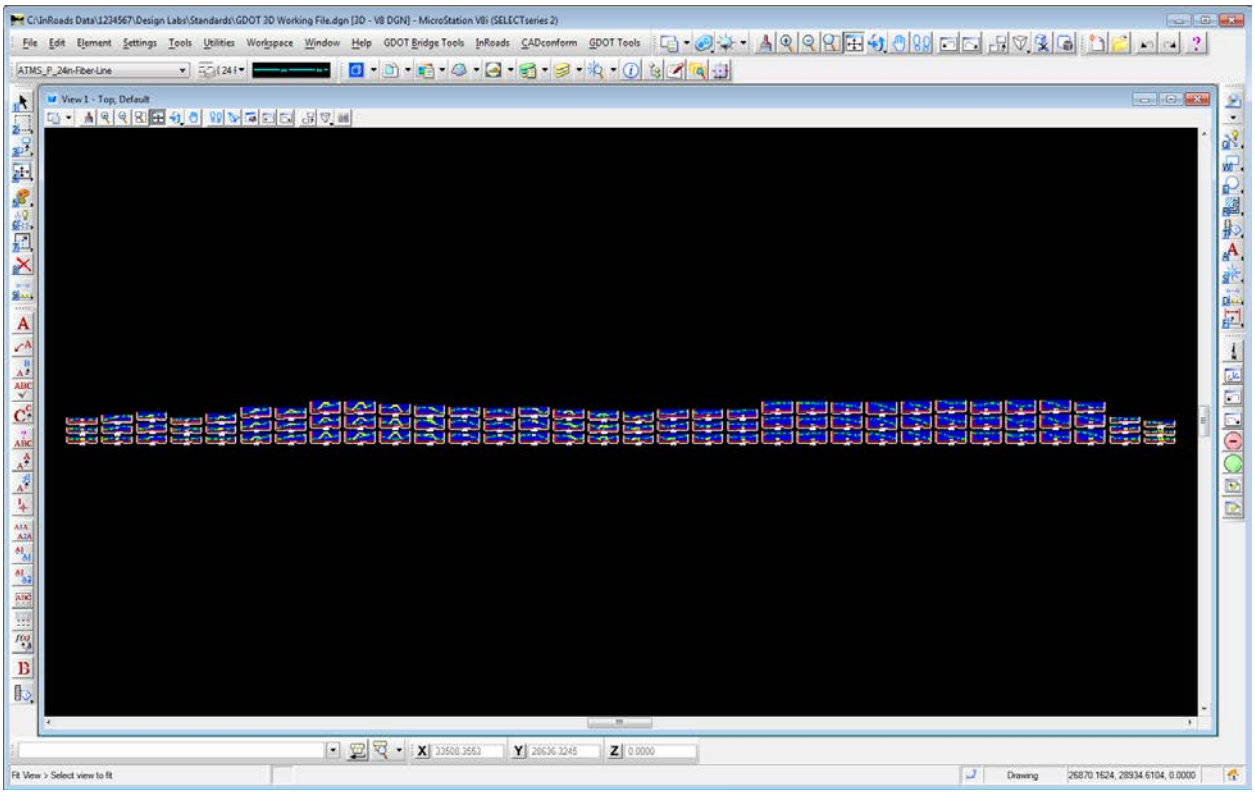
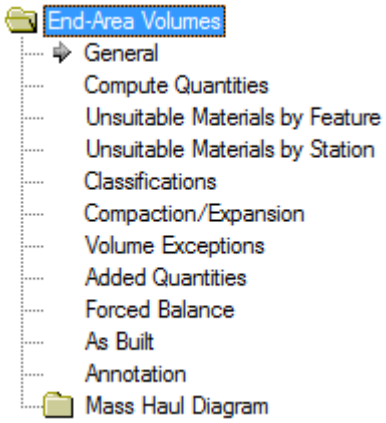


Figure L14-12 MicroStation View

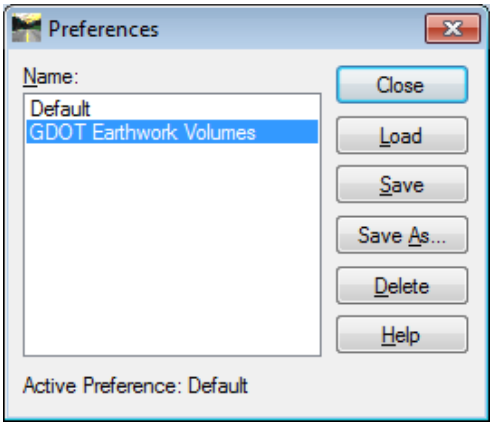
24. **Open the End-Area Volumes Folder in the Cross Sections dialog.**

- Ensure the **End-Area Volumes** "folder" is highlighted/selected as depicted here:



NOTE: Depending on which folder is selected (either "***Create Cross Section***, ***Annotate Cross Section***, ***Update Cross Section*** or ***End-Area Volumes***), the available **Preferences** will change.

- In the **<u>Cross Sections</u>** dialog, click the **Preferences** button. The **<u>Preferences</u>** dialog opens as shown here.



- Highlight the Preference **GDOT Earthwork Volumes**.
- Click **Load** and **Close**.
- Verify your settings match those as shown in *Figure L14-13*.

<u>*NOTE</u>: As our ultimate goal is to generate a **GDOT End-Area Report-Standard** and not a **GDOT Earthwork Volumes Report**, loading the **GDOT Earthwork Volumes** preference is technically not necessary. This step is added here because loading the **GDOT Earthwork Volumes** preference is a good habit to get into. If you choose not to load the **GDOT Earthwork Volumes** preference when creating the **GDOT End-Area Report-Standard** ensure the **Create XML Report** check box is checked as shown in *Figure L14-13*.

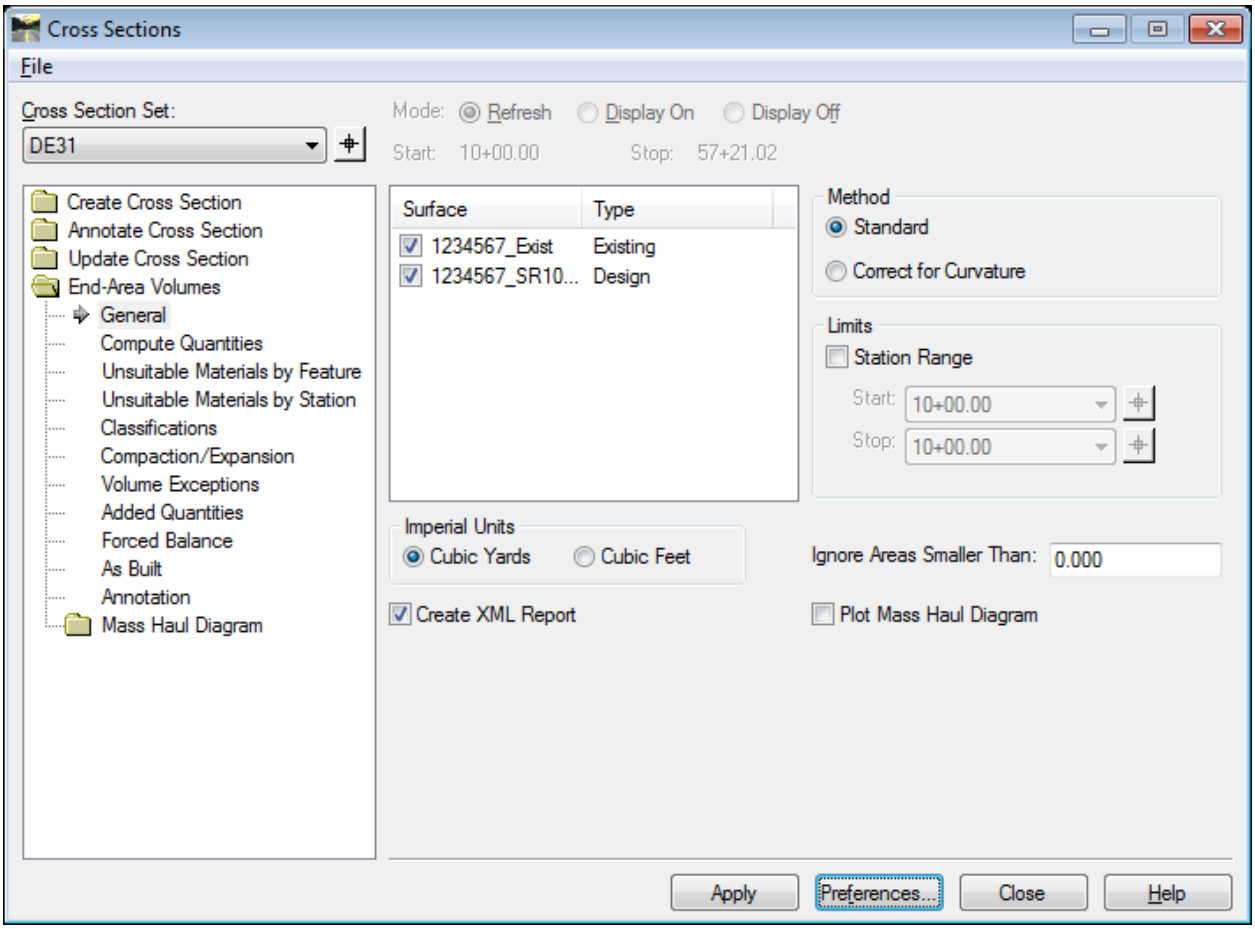


Figure L14-13 End-Area Volumes

25.	**Open the <u>Bentley Civil Report Browser</u>.** • In the **<u>Cross Sections</u>** dialog, click **Apply** and click **Close** to exit the **<u>Cross Sections</u>** dialog. The **<u>Bentley Civil Report Browser</u>** opens similar to that shown in *Figure L14-14*.

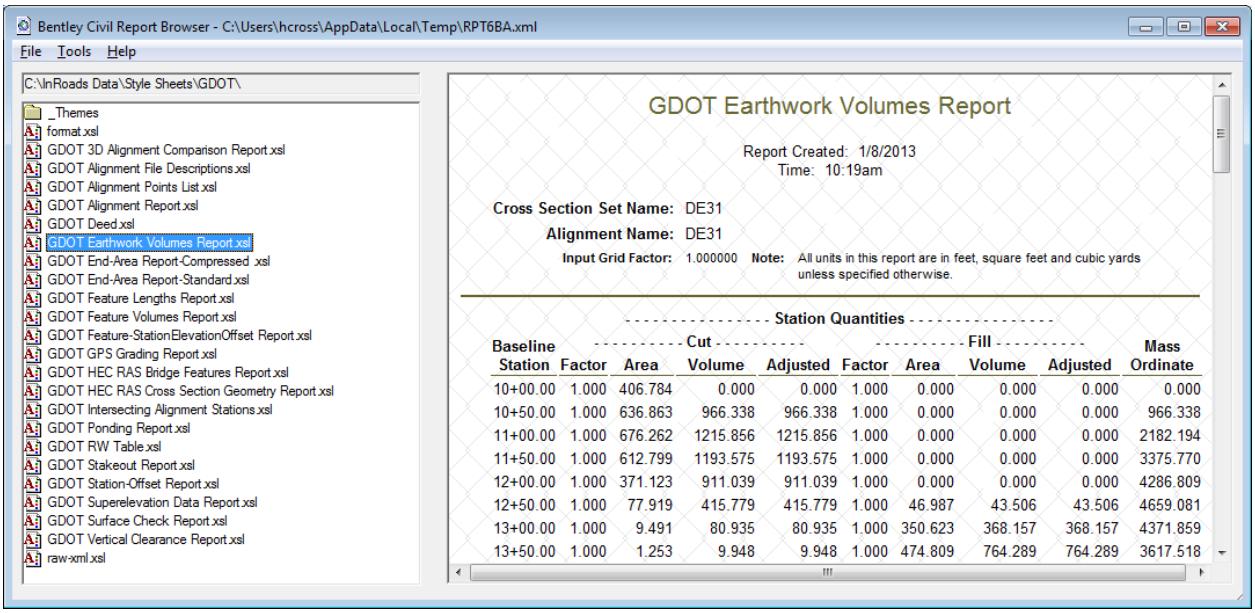


Figure L14-14 Bentley InRoads Report Browser

26.	**View the 'GDOT End-Area Report-Standard' Style Sheet.** • In the **<u>Bentley Civil Report Browser</u>**, highlight the style sheet **GDOT End-Area Report-Standard** as shown in *Figure L14-15*.

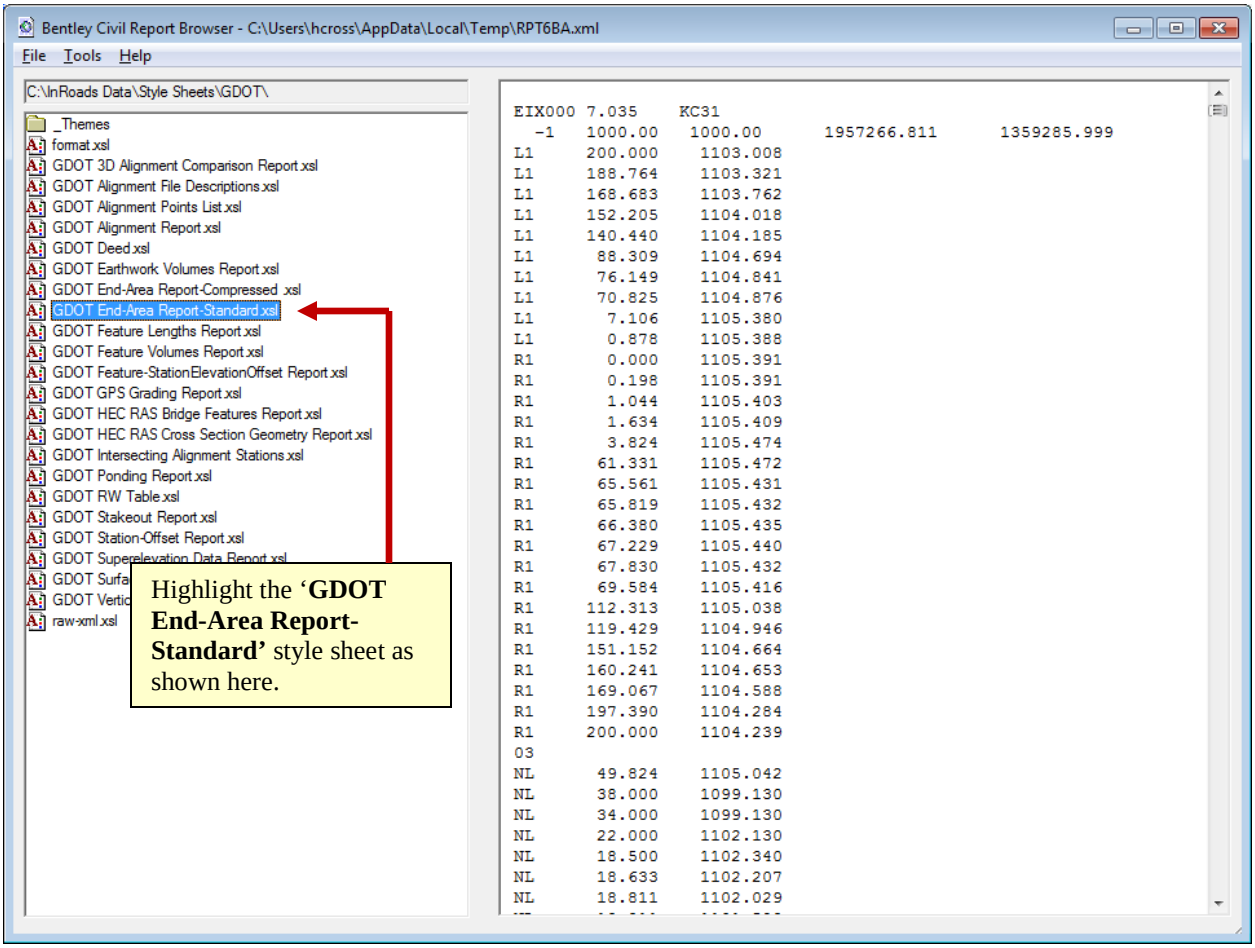


Figure L14-15 Bentley InRoads Report Browser

27.	**Save the Report as a Text (.end) file.** • In the **<u>Bentley Civil Report Browser</u>**, select **File ► Save As**. The **<u>Save As</u>** dialog opens. • Navigate to ***C:\InRoads Data\Design Labs\Lab 14*** • Change the **Save as type:** to **All Files (*.*).** • Enter the **File name:** as **1234567_ DE31.end** • Verify your entries match those shown in *Figure L14-16*. • Click **Save**.

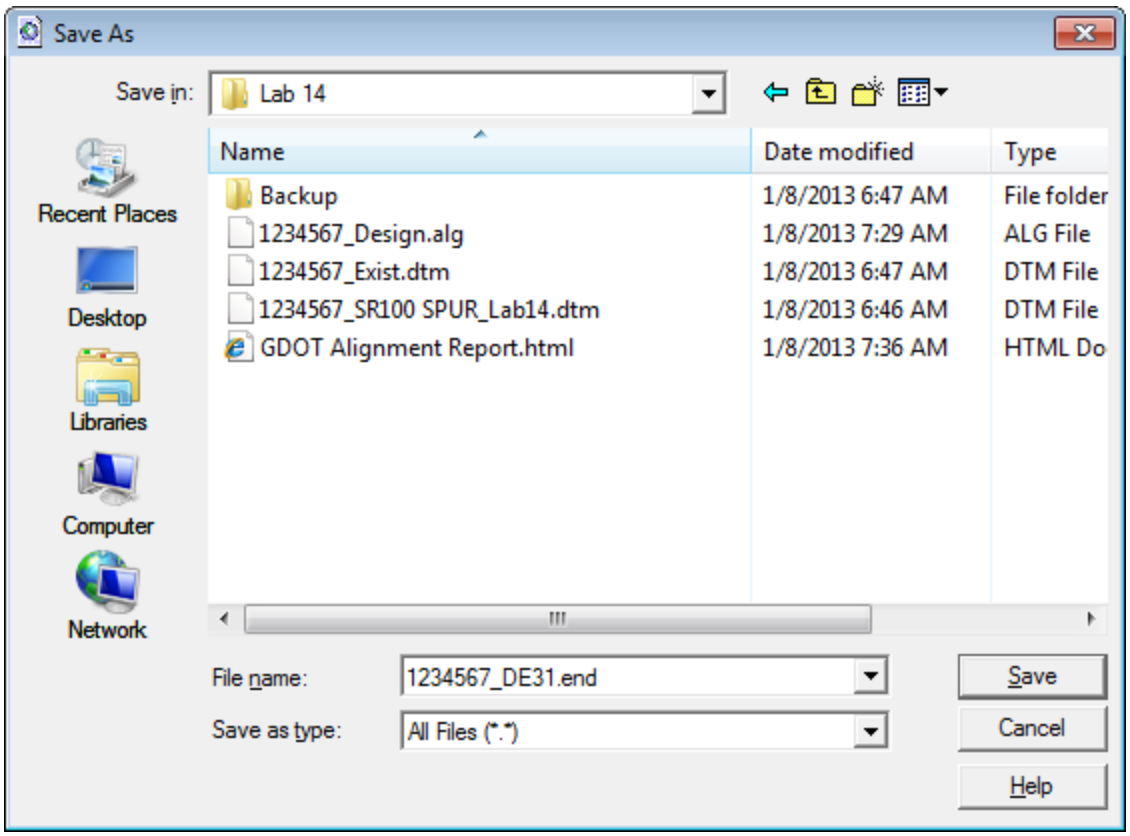


Figure L14-16 Save As

28.	**Prepare MicroStation for the next student.** • In MicroStation, select **Edit ► Select All**. • Click the **Delete** icon ( ). • In MicroStation, select **File ► Compress ► Design**
29.	This concludes Lab 14. Do not proceed until the Instructor directs you to do so.