Labs for ROW Geometry

Colorado Department of Transportation

CADD and Engineering Innovation
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Version V8i Select Series 2

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Notice

Software Versions

The software products referred to in this publication are furnished under a license and may only be used in accordance with the terms of such license. This document intended for use with the following software versions:

MicroStation® version 08.11.07.443
InRoads® version 08.11.07.428
CDOT Configuration Version 05.00.00

Document Conventions

There are several conventions that are used throughout this document to indicate actions to be taken or to highlight important information. The conventions are as follows:

Item	Meaning
View Perimeter	a command name or a file that you are to select
Tools > Options	a command path that you are to select – usually from the pull-down menus
Document Name	the name of a document that is not hyperlinked
Emphasis	style used when referring to important word or phrases
Hyperlink	style used when you have a direct link to another document on the web
Key in	entering data with the keyboard
Quote	style used to indicate an external source quotation
Note: text	information about a command or process that you should pay particular attention to
1. Numbered Steps	actions that you are to perform as part of the lab activities
<D> or Data	press the data button on the mouse
<R> or Reset	press the reset button on the mouse
<T> or Tentative	press the tentative button on the mouse

Table of Contents

LAB 1 - Getting Started in ROW Geometry and Plans

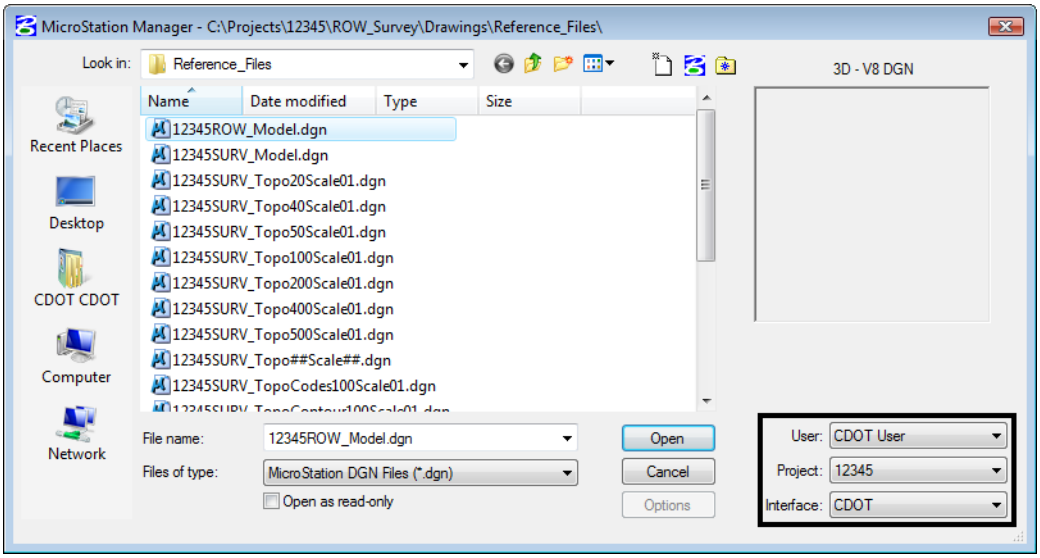
This lab demonstrates starting InRoads and InRoads Survey. If you are new user to InRoads it is recommended to check the setup to verify the correct standard resources are being used.

Chapter Objectives:

- To launch the applications InRoads and InRoads Survey
- To be able to set Project Defaults for working with the ROW Survey group

Lab 1.1 - Opening InRoads and Launching InRoads Survey

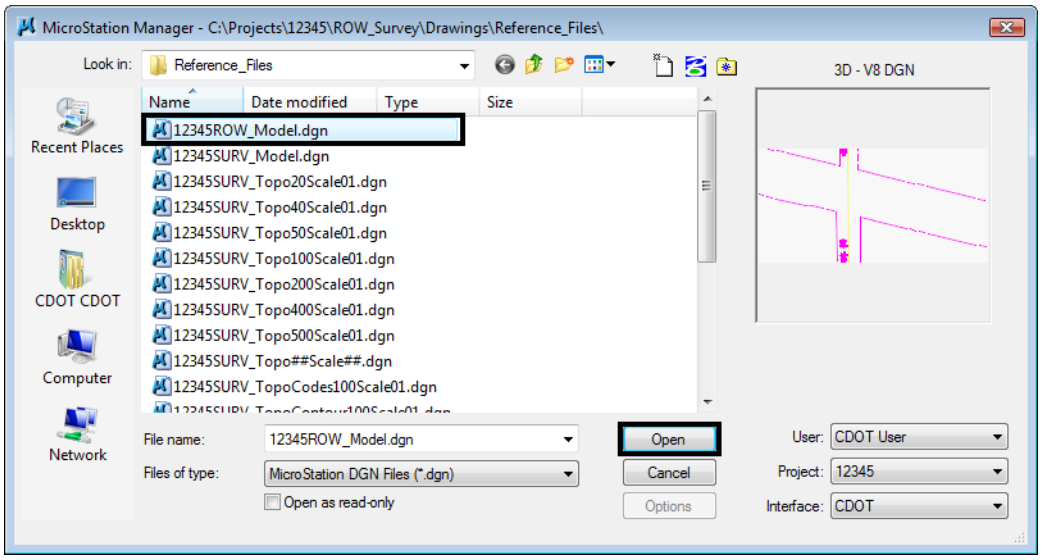
1. There are three main methods to Start InRoads: choose one of the followoing methods
   - Choose **Start > All Programs > Bentley > InRoads Group V89 (SELECTseries 2) > InRoads**. MicroStation will open allowing you to choose the design file; once the design file opens InRoads will start
   - Choose the Desktop icon for InRoads if one is available on your machine. MicroStation will open allowing you to choose the design file; once the design file opens InRoads will start
   - If you already have MicroStation open, you can choose the InRoads icon from the MicroStation main toolbar
2. In the MicroStation Manager dialog box, go to the Workspace group section and change the User field to **CDOT USER**, the Project field to **12345** and the Interface field to **CDOT**.



This workspace setup should load the correct MicroStation environment (including toolbars) when the selected MicroStation file is opened.

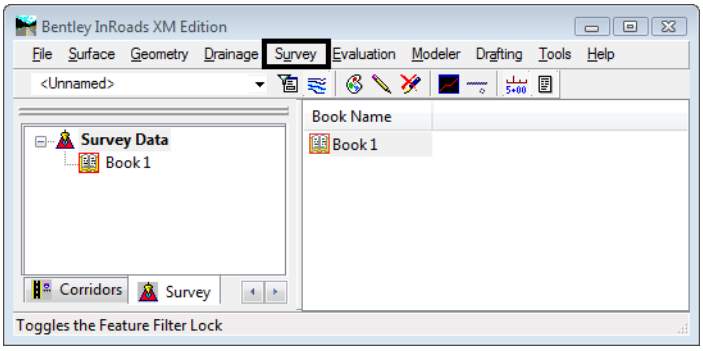
3. Navigate to the ROW_Survey\Drawings\Reference_Files directory and **<D>** the filename ***12345ROW_Model.dgn***

4. **<D> Open** to open the file.



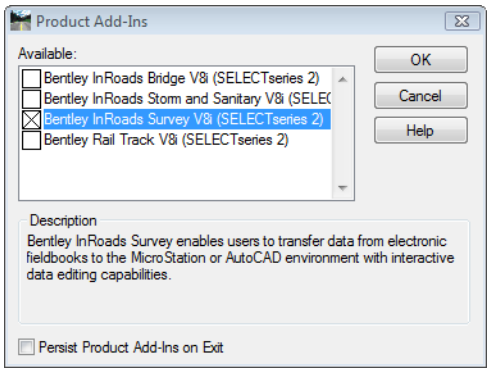
Note: InRoads was used to enter the CAD file. Using InRoads vs. InRoads Survey allows access to the full range of geometry commands available. By itself, InRoads Survey does provide somewhat limited geometry functions. By enabling InRoads initially, the full range of geometry functions is available to the user. Additionally, the functions of InRoads Survey are also required because a fieldbook will be used to export survey data to a geometry project. This data will serve as a foundation for establishing existing property and land lines. Once the electronic fieldbook has been exported, InRoads Survey will no longer be necessary.

5. Verify InRoads and InRoads Survey are both operating.



Note: The title bar for the InRoads interface is labeled: Bentley InRoads V8i (SELECTseries 2) denoting that InRoads is running. Additionally, if enabled, the functions of InRoads Survey are apparent in the menu and workspace bars.

6. If Either InRoads or InRoads Survey needs to be enabled select **Tools > Product Add-Ins**, and enable the appropriate application by selecting the application and **<D> OK**.



Note: From this point forward, unless specifically instructed to use MicroStation commands, all references to the selection of icons, tools, or menu pull-downs, refer to the InRoads interface.

Lab 1.2 - Project Defaults

Introduction

Defined default locations for both general InRoads resource files and project specific data files make it easier to conform to graphics standards and assist in navigating to the correct project directories when loading or saving data files.

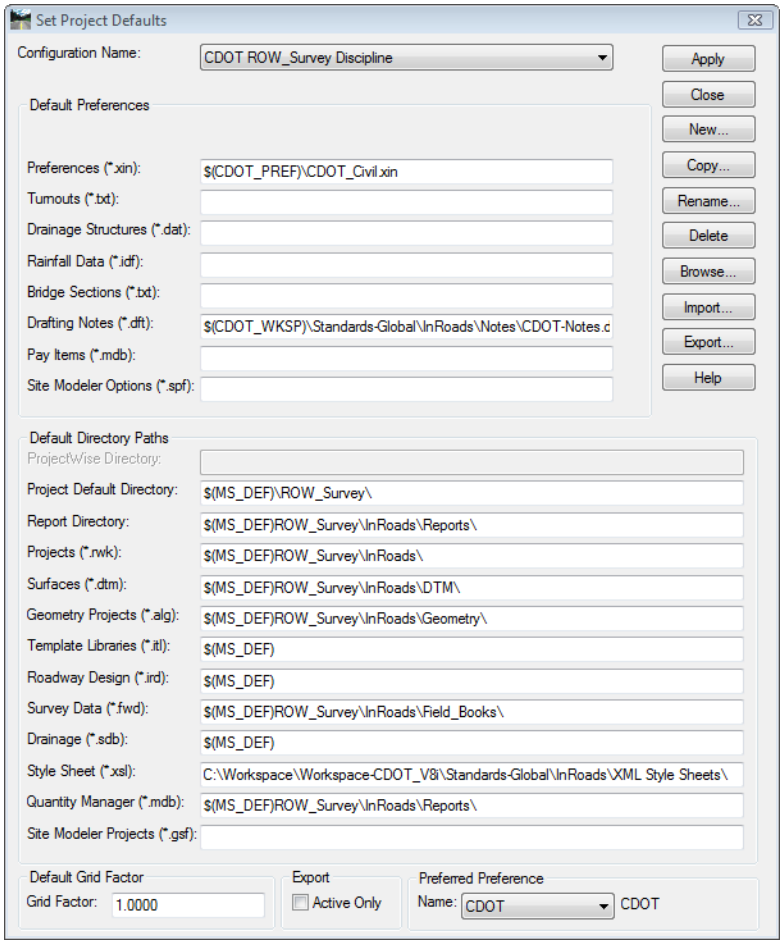
Setting project defaults

1. From the pull down menu select **File > Project Defaults**.

The CDOT environment is configured to read MicroStation variables defined when the project creation utility is run. These variables are automatically read when MicroStation is launched. Selecting the appropriate 'Project' in the MicroStation Manager dialog identifies the specific project folder referred to by the variable $(MS_DEF).

2. Select **CDOT ROW_Survey Discipline** from the drop-down Configuration Name: list.

3. **<D> Apply** and then **<D> Close**.



Note: Choosing the appropriate discipline from the Configuration Name selection list will modify directory paths as configured by CDOT. If necessary, <D> the Import button and select the file: C:\Projects\12345\Project_Configuration\CDOT_Disciplines.reg to populate the Configuration Name drop-down list.

LAB 2 - Working with Survey Data

This lab demonstrates working with survey data as a foundation for our initial geometry. Exporting the survey field book to an InRoads geometry project will generate alignments along linear items and Cogo points at all survey shot locations.

Chapter Objectives:

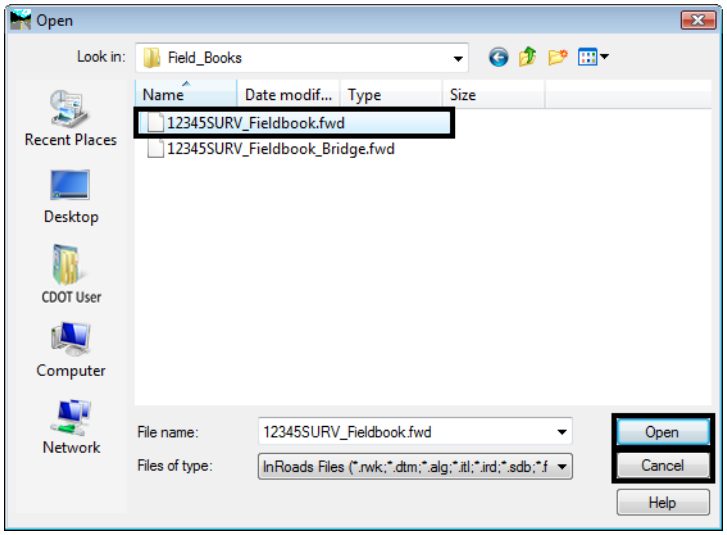
- Load existing completed survey data
- Filter survey data to select only points and alignments that will be needed
- Exporting filtered survey data to a Geometry Project as cogo points and horizontal and vertical alignments

Lab 2.1 - Load Project Data

The goal of this exercise is to export observations from an InRoads Survey fieldbook to a Geometry Project creating Cogo points and alignments.

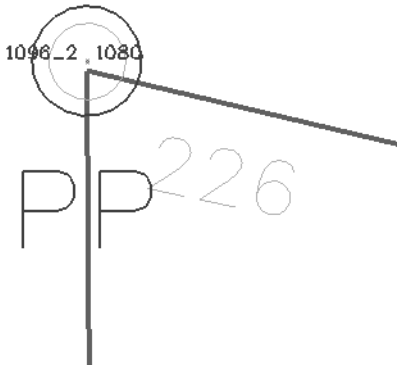
The fieldbook for this project, 12345SURV_Fieldbook.fwd contains control monuments, found monuments, and general topography observations. While this is all valid information, it is desirable to work with a subset of the survey information such as pavement centerlines, control lines, or other specific entities by excluding terrain strings and other topographic information that does not relate to the development of ROW geometry. Working with a subset of the information increases efficiency by working with a smaller data set and freeing-up additional resources for other operations. Exporting a portion of a survey fieldbook can be accomplished by using Survey Feature Filters when creating the InRoads geometry project.

1. From the pull down menu select **File > Open** the Open dialog appears.
2. Select the fieldbook file ***C:\Projects\12345\ROW_Survey\InRoads\Field_Books\12345SURV_Fieldbook.fwd***.
3. **<D> Open** button then **<D>** the **Cancel** button the file will be opened in InRoads Survey and the ***Open*** dialog will close.



Once the fieldbook has loaded, InRoads will automatically fit the extents of the fieldbook to the MicroStation screen.

4. From the pull down menu or View Survey Data toolbar toggle on **Survey > View Survey Data > Planametrics | Point Names | Symbols |Codes | Notes**.



5. Use the MicroStation **Fit View** command to get an indication of the survey information contained in the fieldbook.

6. Take a few minutes to zoom in and navigate around the MicroStation screen to investigate the survey data displayed as it relates to the project layout.

   Note: Fieldbook information is displayed dynamically in the MicroStation file. To adjust the size of the information displayed **Tools > Survey Options [Symbology]**. Select a category under ***Symbology*** and **<D> Edit View** to adjust text or symbol size.

   Note: Take notice of the various survey control, ROW and property monuments. Pavement shots, and general topography shots are seen representing terrain breaks, signs, culvert ends, and other features. It is desirable to filter unrelated topography information from our electronic fieldbook prior to exporting it to the right of way geometry project.

Lab 2.2 - Filtering the Survey Data

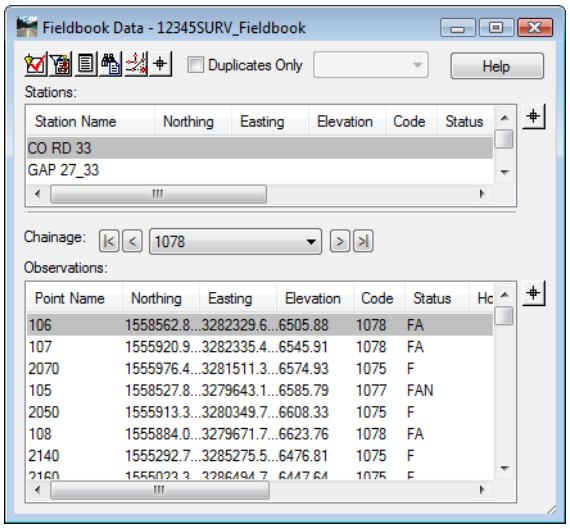
The goal is to write only the information important to establishing ownership and right of way parcels to a geometry project. The use of Survey feature filters will assist in sorting the data. When a Survey feature filter is activated, the displayed contents of the electronic fieldbook will update along with the associated graphics display. The dynamic graphics display can be used as a preview of the data being written to graphics, a DTM, or to the geometry project.

A survey feature filter affects commands for:

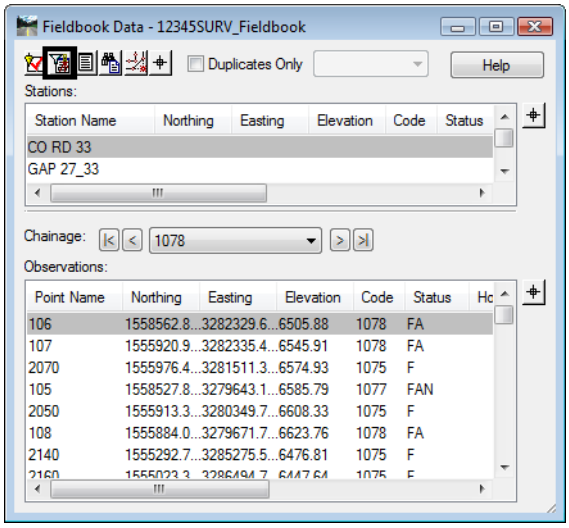
- Electronic fieldbook data
- Survey data to surface
- Survey data to geometry
- Survey data to graphics
- Viewing of dynamic survey data

1. Use MicroStation view commands to display any portion of the project area. This display can be used as a preview of our Fieldbook filter.

2. From the pull down menu select **Survey > Fieldbook Data** the ***Fieldbook Data*** dialog will appear.

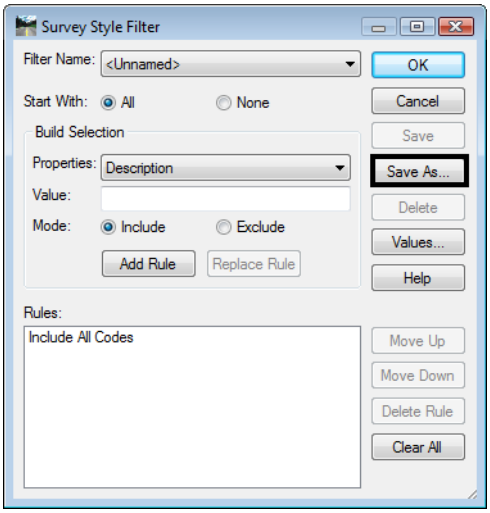


3. From the Fieldbook Data dialog **<D>** on the **Survey Style Filter** icon the Survey Style Filter dialog will appear.

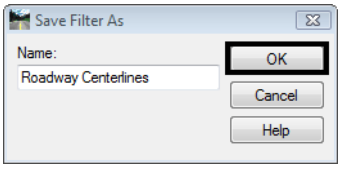


Create the Roadway Centerlines survey feature filter

1. In the Survey Style Filter dialog, **<D> Save As**

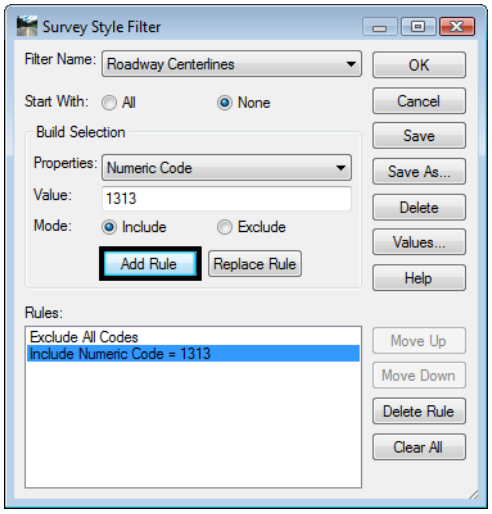


2. In the ***Save Filter As*** dialog, enter ***Roadway Centerlines***

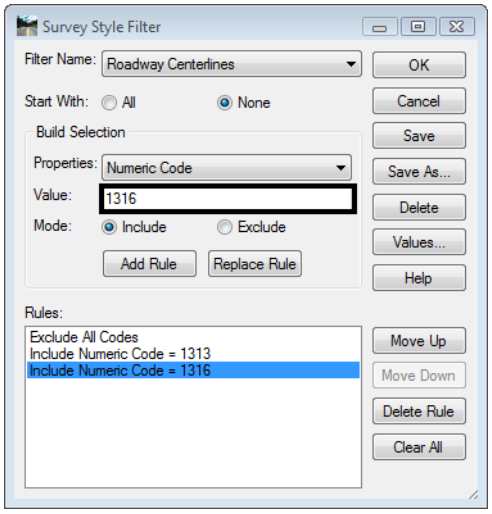


3. **<D> OK** button the ***Save Filter As*** dialog will close.

4. Toggle **None** for the ***Start With*** option.
5. From the ***Properties*** drop down menu select Numeric Code.
6. In the ***Value*** field enter a value of ***1313***.
7. Toggle **Include** for the ***Mode*** option.
8. **<D>** the **Add Rule** button the rule will be added to the list.

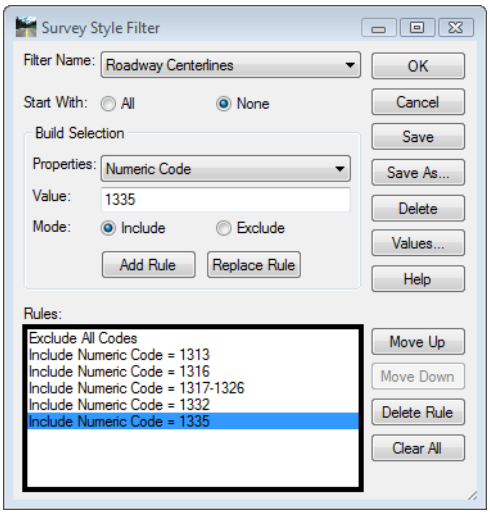


9. Back in the ***Value*** field enter a value of ***1316***. Keep the rest of the settings the same.
10. **<D>** the **Add Rule** button the rule will be added to the list.

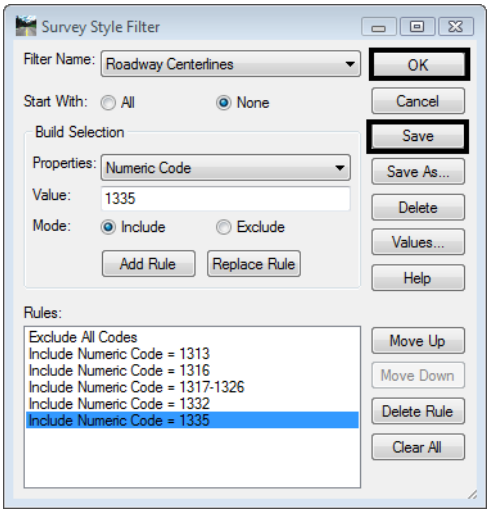


11. Continue this process to add the following Rules:

- ***1317-1326***, ***1332***, and ***1335***

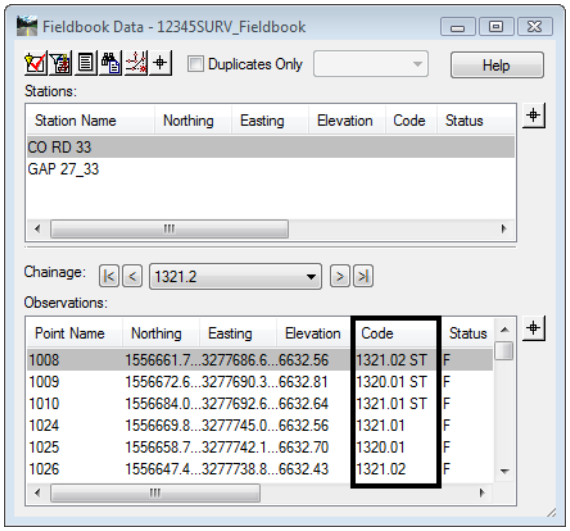


12. From the ***Survey Style Filter*** dialog **<D> Save** then **<D>** the **OK** button the dialog will close and the new filter will be saved.

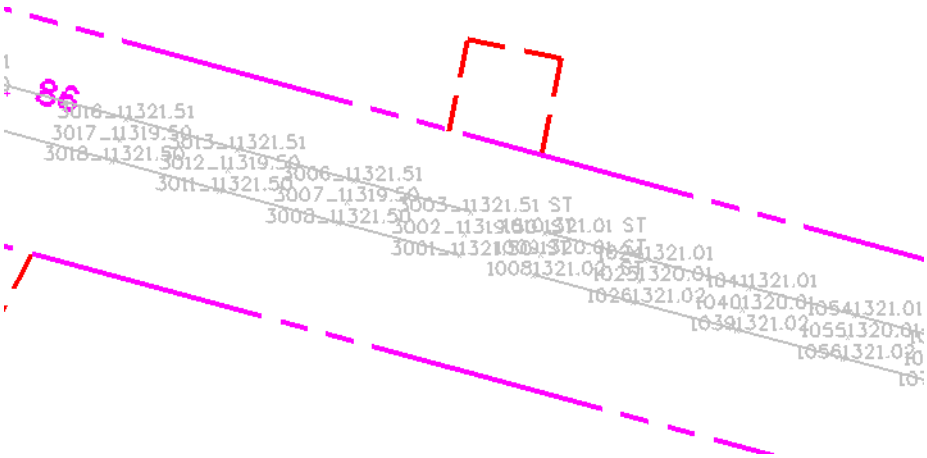


13. From the InRoads Locks toolbar, Toggle **ON** the ***Feature Filter Lock***

14. Open the ***Fieldbook Data*** dialog if it is not already opened. The Fieldbook Data will update to display only the data that passes the survey style filter.



15. View the MicroStation graphics displayed. The display graphics reflect the current contents of the fieldbook.

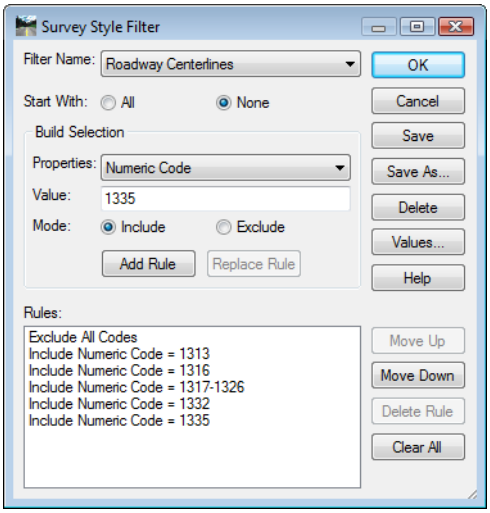


Note: The graphics automatically refresh by default, Automatic Refresh is toggled on under **Tools > Survey Options**. If it is not toggled on the graphics can be regenerated manually from the InRoads pull down menu **Survey > Regenerate Graphics**.

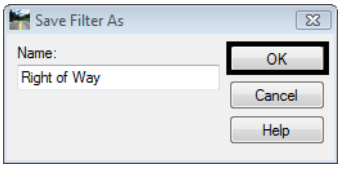
Create the Right of Way survey feature filter.

When a fieldbook is exported to graphics, geometry, or a DTM, only the survey shots that pass the filter will be exported. In this case, additional information is desired for the development of right-of-way.

1. Reopen the ***Survey Style Filter*** dialog from the pull down menu select **Survey > Survey Style Filter**.



2. From the ***Survey Style Filter*** dialog make sure the ***Roadway Centerlines*** filter is selected.
3. In the ***Survey Style Filter*** dialog, **<D>** the **Save As** button the ***Save Filter As*** dialog will appear.
4. In the ***Save Filter As*** dialog, enter ***Right of Way***.

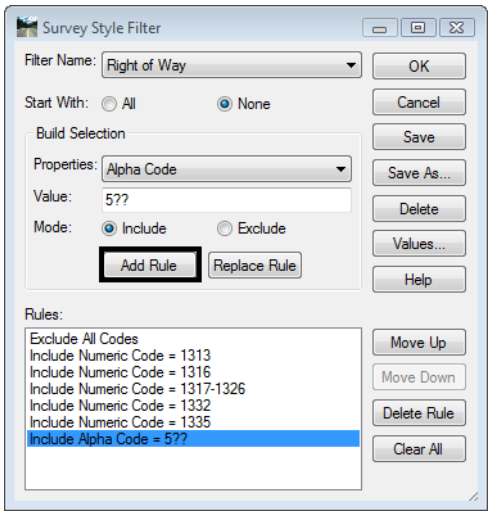


5. **<D>** the **OK** button the dialog will close and Right of Way will be the active Survey Style Filter.
6. Toggle **None** for the ***Start With*** option.
7. From the ***Properties*** drop down menu select **Alpha Code**.
8. In the ***Value*** field enter a value of ***5??***.

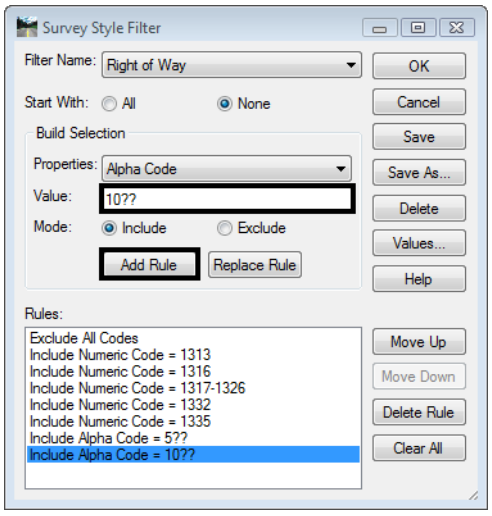
Note: The "??" in the key-in value is used as a wild card value when searching for data. The value of "5??" will return the range of codes 500-599.

9. Toggle **Include** for the ***Mode*** option.

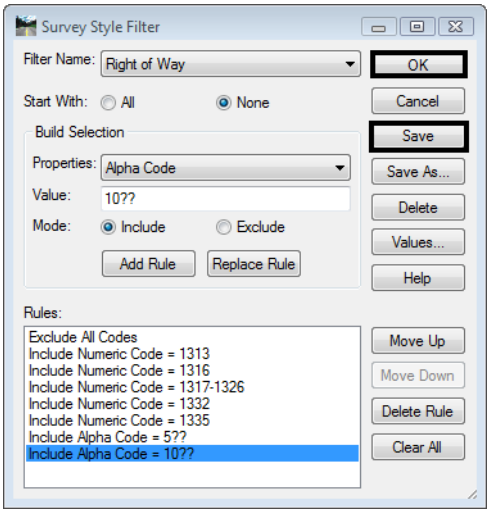
10. **<D>** the **Add Rule** button the rule will be added to the list.



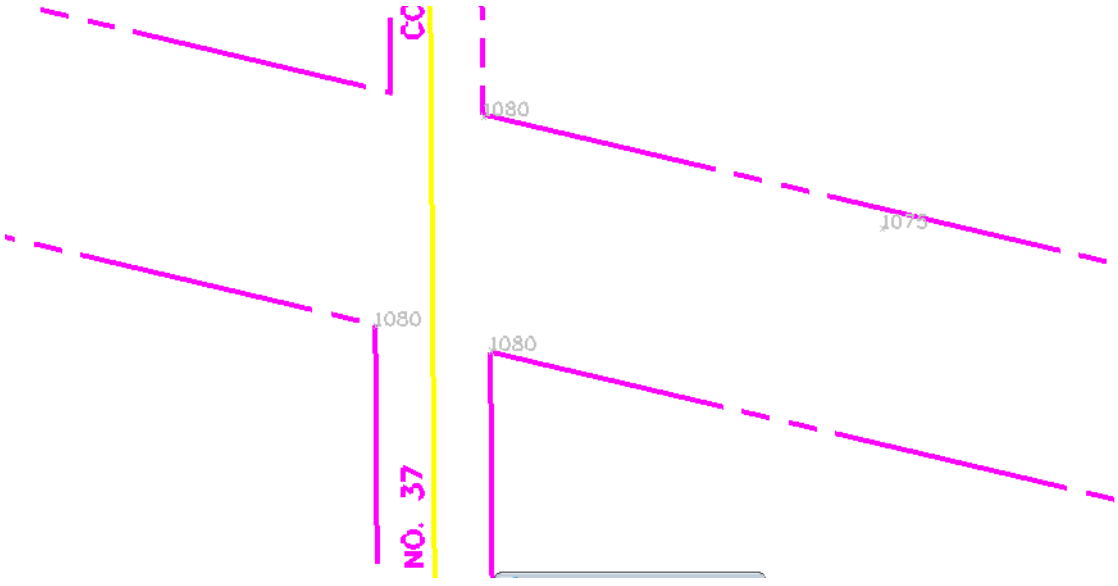
11. Back in the ***Value*** field enter a value of ***10??*** Keep the rest of the settings the same.
12. **<D>** the **Add Rule** button the rule will be added to the list.



13. From the ***Survey Style Filter*** dialog **<D> Save** then **<D>** the **OK** button the dialog will close and the new filter will be saved.



14. The ***Feature Filter Lock*** should still be toggled **ON**. The MicroStation display updates to display only the survey codes that pass the active filter.

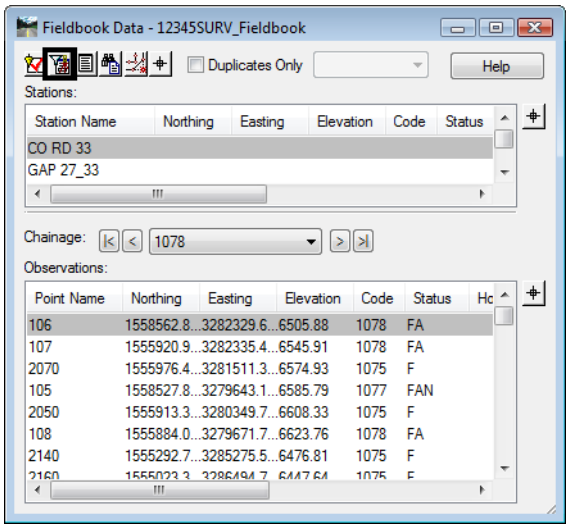


Note: The filter Right of Way includes codes for both property information and roadway centerline information. Now that a Survey Style Filter is active, it will be applied when exporting survey data to geometry.

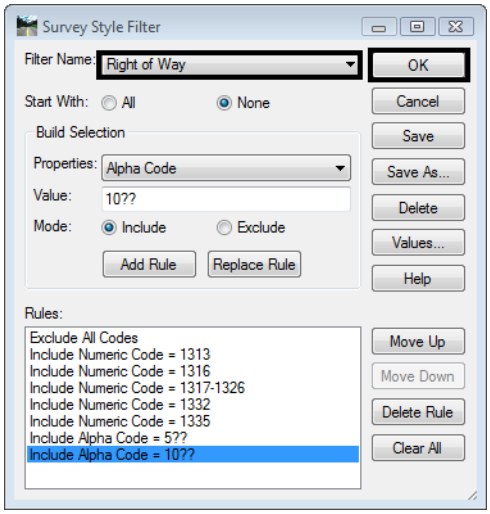
Lab 2.3 - Exporting a Filtered InRoads Survey Fieldbook to Geometry

When exporting a Fieldbook to graphics, a DTM, or to a geometry project, only the items active in the Fieldbook are exported. Using a Survey Feature filter allows control of which survey data gets exported.

1. From the pull down menu select **Survey > Fieldbook Data** the Fieldbook Data dialog will appear.
2. From the ***Fieldbook Data*** dialog select the **Survey Style Filter** icon.

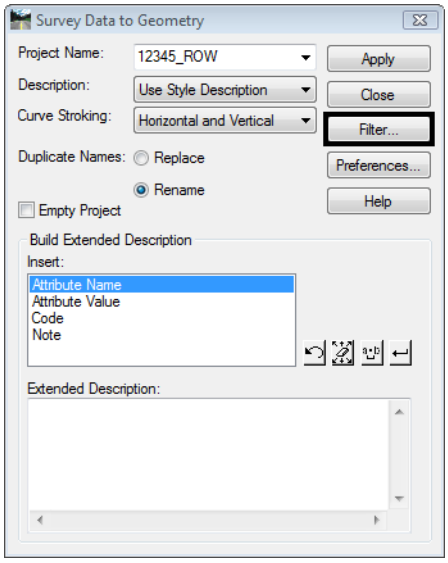


3. From the ***Survey Style Filter*** dialog select the filter name **Right of Way**
4. **<D>** the **OK** button. The Right of Way filter will be active and the Survey Style Filter dialog will close.

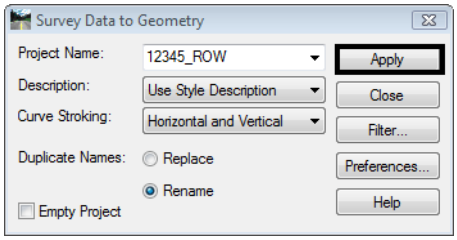


5. From the Locks toolbar toggle **ON** the InRoads **Feature Filter lock**.

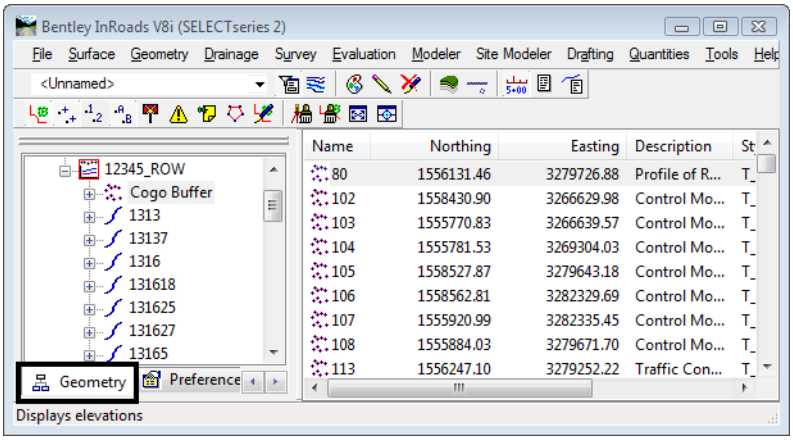
6. From the pull down menu select **Survey > Survey Data to Geometry**. The Survey Data to Geometry dialog will appear.
7. In the ***Project Name*** field key-in the Geometry Project Name ***12345_ROW***. A new Geometry Project will be created by that name.
8. From the ***Description*** drop down menu select **Use Style Description**.
9. From the ***Curve Stroking*** drop down menu select **Horizontal and Vertical**.
10. From the ***Duplicate Names*** section select the radio button **Rename**.
11. **<D>** the **Filter** button the Survey Style Filter dialog will appear. Review the filters rules prior to exporting.



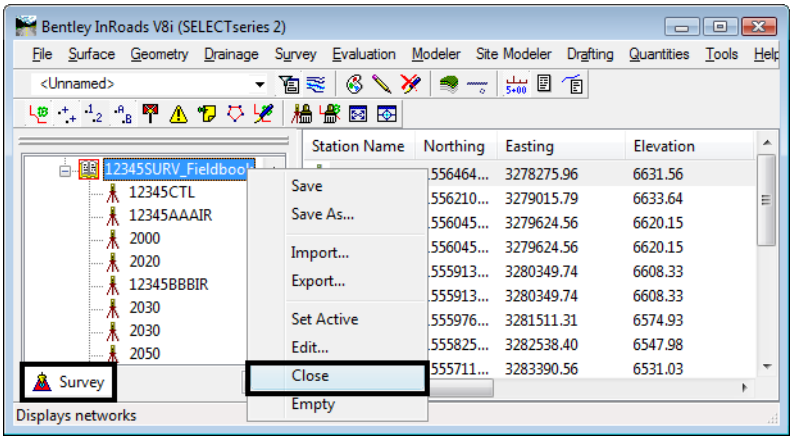
12. **<D> OK** to close the ***Survey Style Filter*** dialog as it was used for review and is not required to be open.
13. **<D> Apply** on the ***Survey Data to Geometry*** dialog. The geometry project is created, the Cogo points are created, and horizontal and vertical alignments are generated.



14. Examine InRoads Explorer to verify geometry data was created.



15. The survey fieldbook is no longer needed, go to the ***Survey Workspace*** tab and **<R>** ***12345SURV_Fieldbook*** and choose **Close** from the fly-out list. This will remove it from memory, saving the file should not be necessary.



16. From the InRoads Locks toolbar toggle **OFF** the **InRoads Feature Filter** lock.

Lab 2.4 - Saving a Geometry Project

InRoads is Memory based, not Disk based. The file(s) seen in the InRoads Workspace pane are copies from the disk drive and reside in the computer's memory. Any changes to these files (or creation of new data files) require saving back to the disk drive.

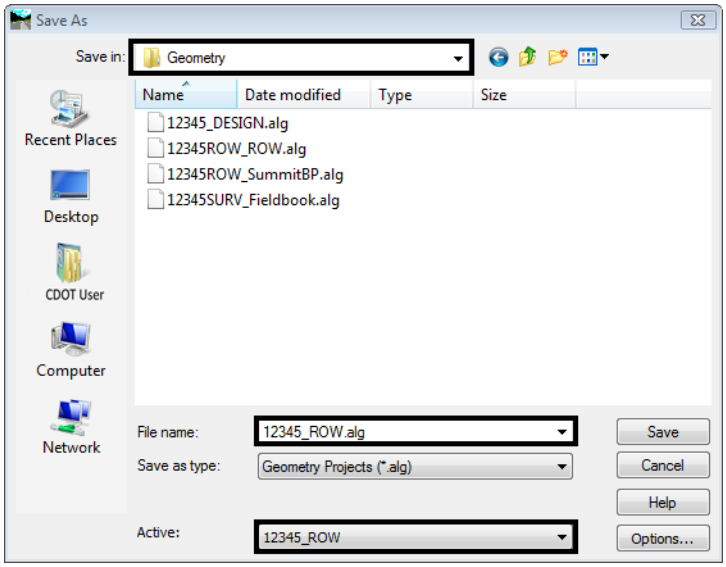
1. From the Geometry Workspace Pane **<R>** on the Geometry Project ***12345_ROW*** and select ***Save As*** from the fly-out menu the Save As dialog will appear.

2. Select the drop-down list for the ***Active:*** field and select ***12345_ROW*** from the list.

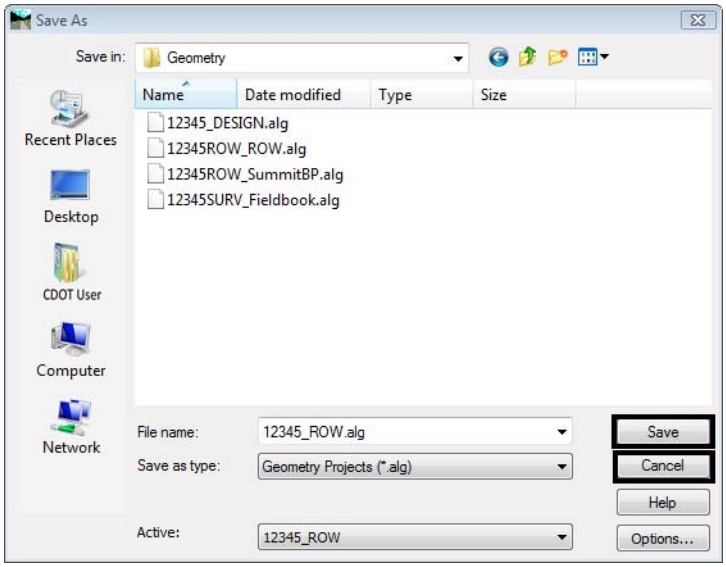
3. Verify the same name is populating the ***File Name: 12345_ROW***.

Note: By default it should be saved to the folder: ***C:\Projects\12345\ROW_Survey\InRoads\Geometry*** as this was the path for geometry files defined in the Project Defaults configuration file.

4. **<D>** on the ***Save in: Geometry*** to verify the folder location.



5. After the correct folder location is identified, **<D> Save** then **<D>** the **Cancel** buttons.



- When the Geometry Project is saved to the hard drive it takes on an extension of .alg
- The directory folder for geometry already contains four geometry projects. 12345_DESIGN.alg contains design centerline information and will be used to facilitate development of the right of way plans.

- The Geometry Styles associated with the exported fieldbook are derived from the Survey Feature Style definition at the time geometry is exported from InRoads Survey.
- Geometry styles can be assigned (or reassigned) to alignments in the Geometry > Copy Geometry dialog. No equivalent command exists for Cogo Points. However, a Geometry Style can be assigned to alignments or Cogo points when using the horizontal annotation command to view geometry information.

LAB 3 - Geometry Projects

This lab demonstrates opening and viewing Geometry Projects in MicroStation. Geometry data such as a horizontal alignment will be copied from one Geometry Project to another.

Chapter Objectives:

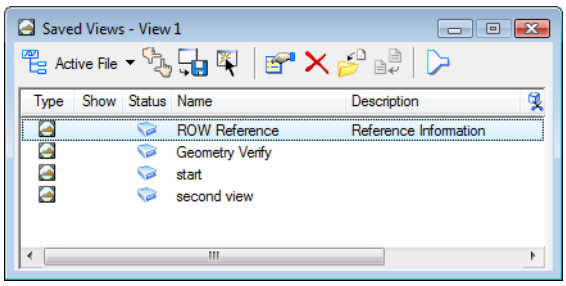
- Open an existing Geometry Project
- View the data stored in the Geometry Project such as the horizontal alignments and Cogo points
- Managing and copying Geometry Project data between files

Lab 3.1 - Opening and Viewing Geometry Projects

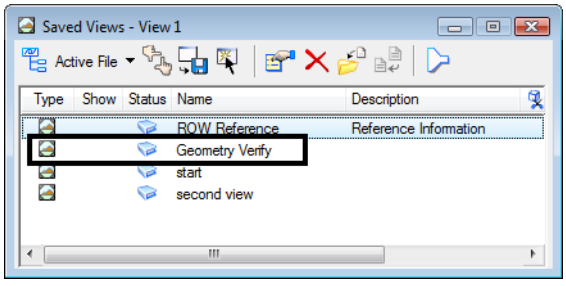
1. **Open** the MicroStation design file ***C:\Projects\12345\ROW_Survey\Drawings\Reference_Files\12345ROW_Model.dgn***

2. **Open** the Geometry Project ***C:\Projects\12345\ROW_Survey\InRoads\Geometry\12345_ROW.alg*** that was created in the earlier lab.

3. From the MicroStation pull down menu select **Utilities > Saved Views** the Saved Views dialog will appear.



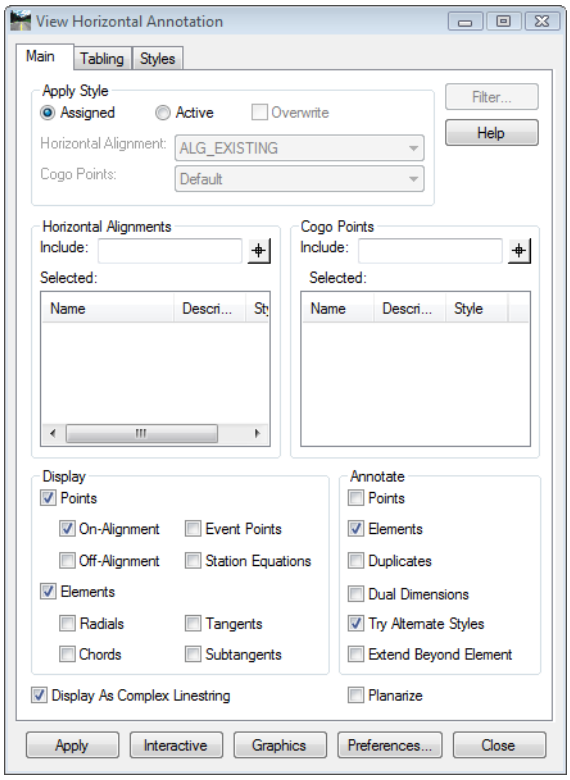
4. From the ***Saved Views*** dialog select the saved view name ***Geometry Verify*** then **<D>** in MicroStation view 1. This will make it easier to verify the geometry project information by turning off all the ROW_* levels.



5. Dismiss the ***Saved View*** dialog box.

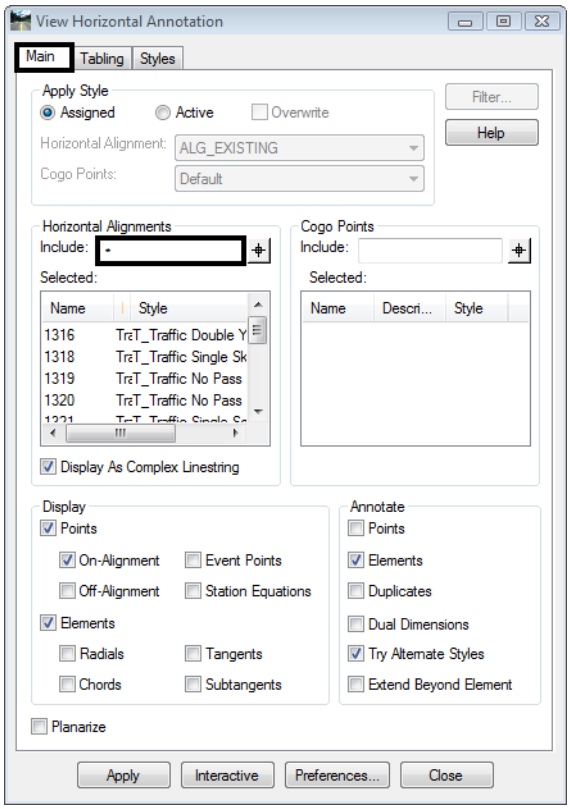
Note: When we need to see the ROW information in later steps, we will recall it using a different Saved View named ***ROW Reference***.

6. From the InRoads pull down menu select **Geometry > View Geometry > Horizontal Annotation** the View Horizontal Annotation dialog will appear.

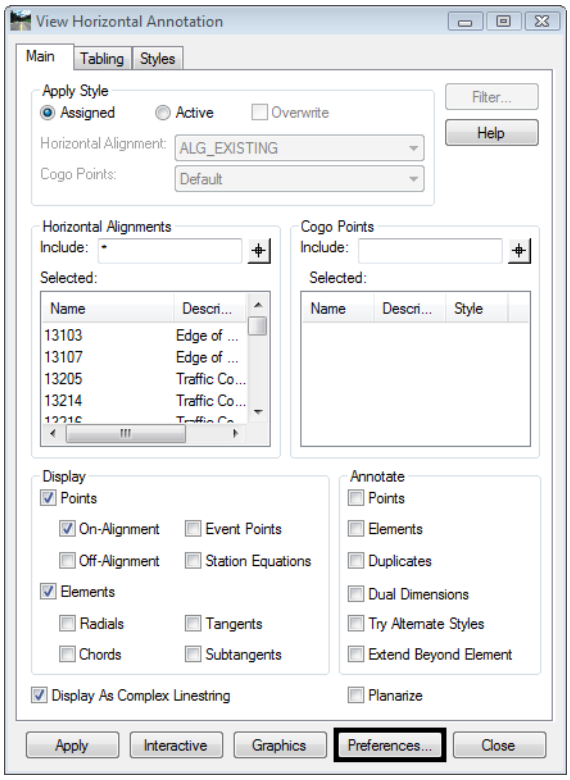


7. Select the ***Main*** tab in the ***View Horizontal Annotation*** dialog.

8. In the ***Include*** field for ***Horizontal Alignments*** key-in an asterisk ******* (wild-card) then ***Tab*** key to identify all horizontal alignments.

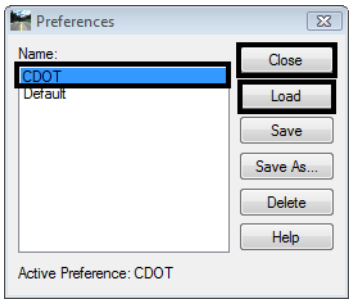


9. **<D>** the **Preferences** button at the bottom of the dialog the Preferences dialog will appear.



10. Select the preference name **CDOT**.

11. **<D>** the **Load** then **<D>** the **Close** buttons. The Preferences dialog will close and the default CDOT preference will be loaded.



12. In the ***Apply Style*** section of the ***Main*** tab select the **Active** radio button.

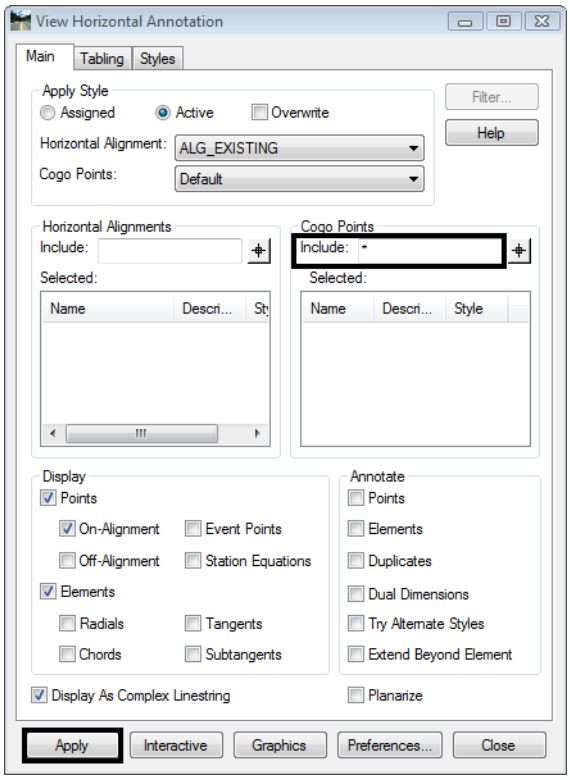
13. From the ***Horizontal Alignment*** drop down list select **ALG_Existing**.

14. In the ***Annotate*** section of the ***Main*** tab **uncheck** ***Elements***.

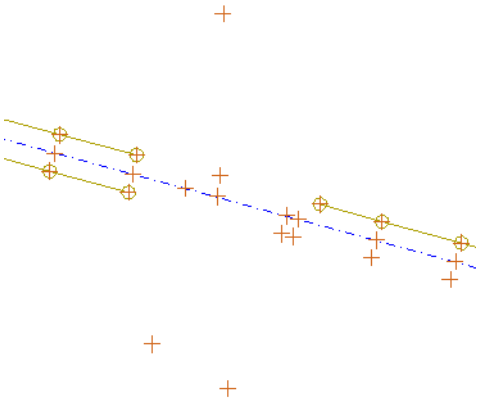
15. **<D>** the **Apply** button the selected horizontal alignments and alignment points will be displayed in the MicroStation view.

16. In the ***Include*** field for ***Cogo Points*** key-in an asterisk ***** (wild-card) then ***Tab*** key to identify all horizontal alignments.

17. **<D>** the **Apply** button the selected horizontal alignments, alignment points and Cogo points will be displayed in the MicroStation view.



18. Use MicroStation view commands to zoom into the graphics to review the display of alignments and Cogo points.

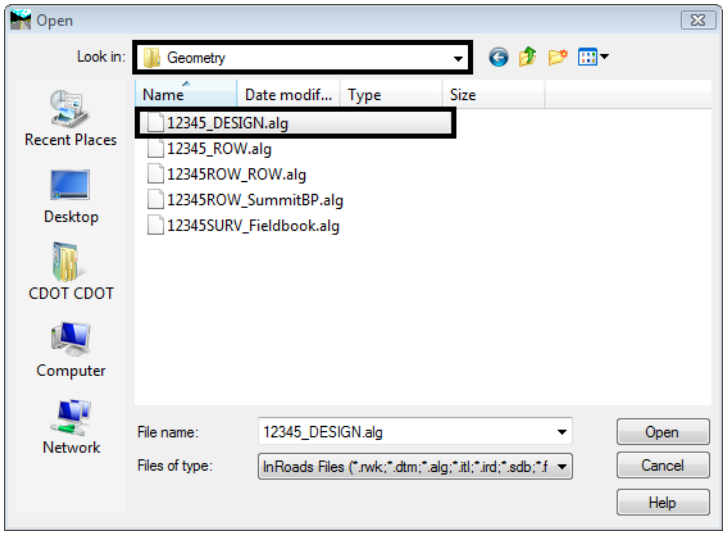


Lab 3.2 - Copying Geometry data

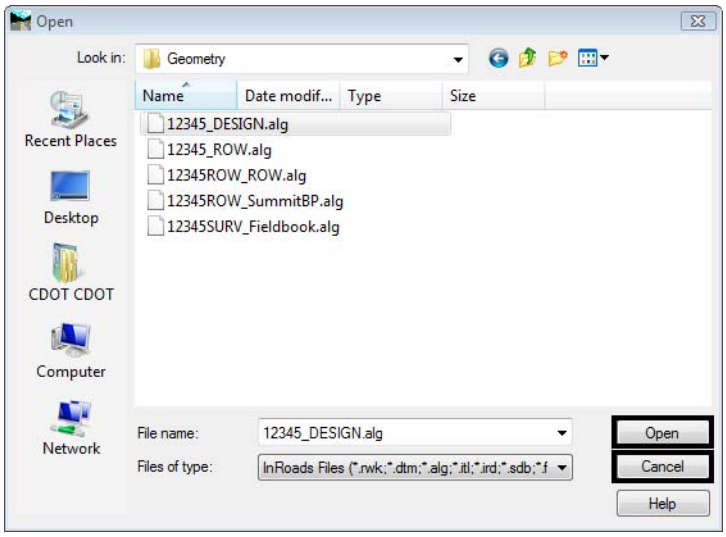
The current geometry project contains only information exported from the fieldbook. Another geometry project, 12345_DESIGN contains the design centerline alignment and is needed for development of right of way for this project.

The design section has developed a horizontal alignment representing the construction reference line for this project. Multiple geometry projects can be loaded into memory simultaneously and be accessed as needed. However, it is much easier (and sometimes necessary) to have the appropriate geometry information contained in a single geometry project. To that end, copy the design reference line from the geometry project 12345_DESIGN to the geometry project 12345_ROW. In order to copy geometry from one project to another, they must both be loaded into memory.

1. From the menu pull down select **File > Open** the Open dialog will appear.
2. Path to the file and folder
   C:\Projects\12345\ROW_Survey\InRoads\Geometry\12345_DESIGN.alg

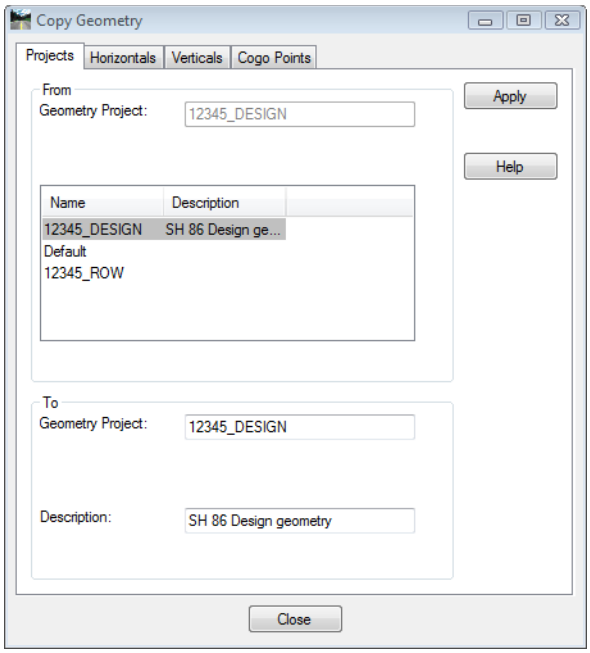


3. **<D>** the **Open** the **<D>** the **Cancel** buttons. The file will be loaded into memory and the dialog will be dismissed.

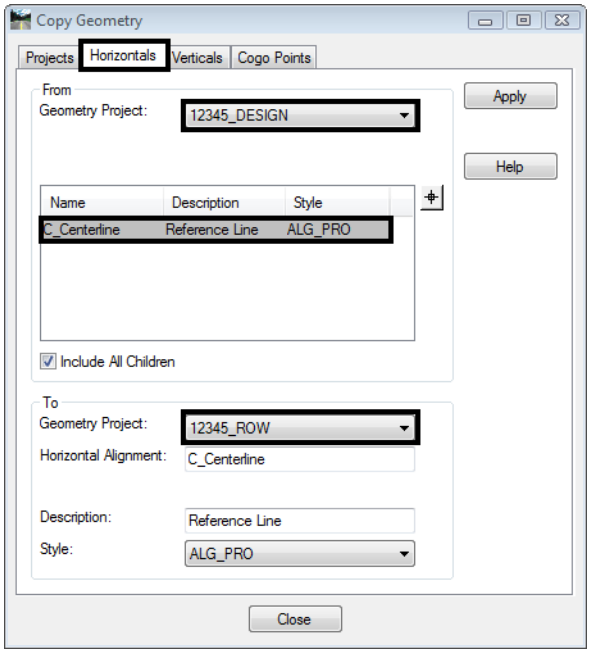


There is a single horizontal alignment needed from the 12345_DESIGN geometry project. It is named C_Centerline

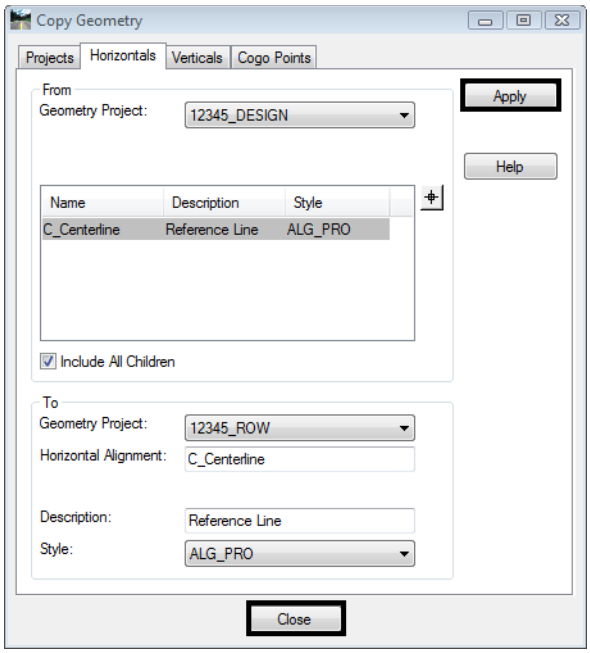
4. From the pull down menu select **Geometry > Copy Geometry** the Copy Geometry dialog will appear.



5. In the Copy Geometry dialog select the **Horizontals** tab.
6. In the ***From*** section select the ***Geometry Project:*** **12345_DESIGN**.
7. In the list of horizontals select the name **C_Centerline**.
8. In the ***To*** section, set the ***Geometry Project:*** **12345_ROW**.



9. **<D>** the **Apply** then **<D>** the **Close** buttons. The horizontal alignment will be copied and the dialog will be dismissed.



Note: The dialog is divided into 2 sections. The top half of the dialog being the geometry project being copied from, with the lower half being the geometry project being copied to. Alignments being copied can be assigned a new name, description, or style during the copy process.

10. From the Geometry Workspace pane **<R>** the Geometry Project ***12345_DESIGN*** and select **Close** from the fly out list. InRoads may ask to save the file select no.

Note: The geometry project 12345_ROW should be the active geometry project. By default any geometry viewing or creation commands operate on the active geometry project. The active geometry project is indicated by a red box next to the name. Deleting the active project leaves InRoads in the state of no active project being defined.

11. From the Geometry Workspace pane **<R>** on the Geometry Project name ***12345_ROW*** and select **Set Active** from the fly-out menu.

12. Expand the display tree of active Geometry Project by selecting the plus sign.

13. **<R>** the Horizontal Alignment ***C_Centerline*** and select **Set Active** from the fly out list.

For orientation purposes, display the graphics and stationing for alignment ***C_Centerline***

14. From the pull down menu select **Geometry > View Geometry > Active Horizontal**

15. From the pull down menu select **Geometry > View Geometry > Stationing**

Note: The global scale factor and selected preference influence the display of geometry and stationing.

16. In the InRoads Explorer pane, **<R>** on the Geometry Project ***13245_ROW*** and select **Save** from the fly-out menu.

LAB 4 - Creating Cogo Points

This lab demonstrates creating cogo points a number of different ways. The Cogo points will then be displayed in the MicroStation view.

Chapter Objectives:

- Enabling the Cogo audit trail
- Creating Cogo points graphically
- Creating Cogo points by coordinate input
- Writing geometry vertices to the Cogo buffer
- Geometry Snaps - review only
- Cogo point intersection commands
- Create alignments with Cogo Points
- Create parallel and offset alignments
- Create parcels

Lab 4.1 - Recording coordinate geometry results

Enabling the Cogo audit trail allows the InRoads user to record edits made to the geometry project. The edits are written to a text file sharing the location and name of the geometry project with the exception of the filename extension is defined as *. atf.

1. **Open** the MicroStation design file ***C:\Projects\12345\ROW_Survey\Drawings\Reference_Files\12345ROW_Model.dgn***

2. **Open** the Geometry Project ***C:\Projects\12345\ROW_Survey\InRoads\Geometry\12345_ROW.alg*** that was created in the earlier lab.

3. From the InRoads Locks toolbar, ***enable*** the Cogo audit trail.

Note: Activate the Cogo audit trail only after a geometry project has been written to disk. Doing so allows the *.atf to track filename and directory location. The audit trail file can not be executed to reconstruct geometry but tracks geometry results similar to results shown if the report lock is enabled.

4. The Cogo audit trail file, *.atf file, can be opened at anytime with a text editor such as notepad.

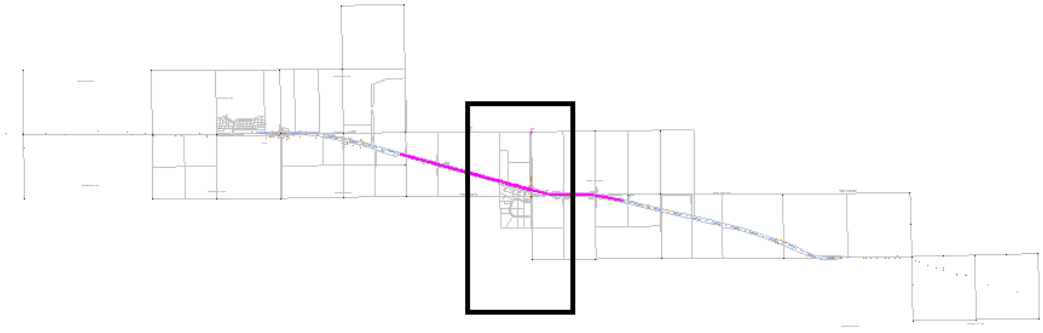
Lab 4.2 - Cogo point creation by graphic input

Prior to generating the proposed right-of-way geometry, the public land survey lines (section lines), existing right-of way, and existing parcels will be developed. Additionally the reference line alignment vertices will be sent to the Cogo buffer.

5. Use the MicroStation **Fit View** command to view the extents of the project.

6. From the pull down menu select **Utilities > Saved Views** the Saved Views dialog will appear.

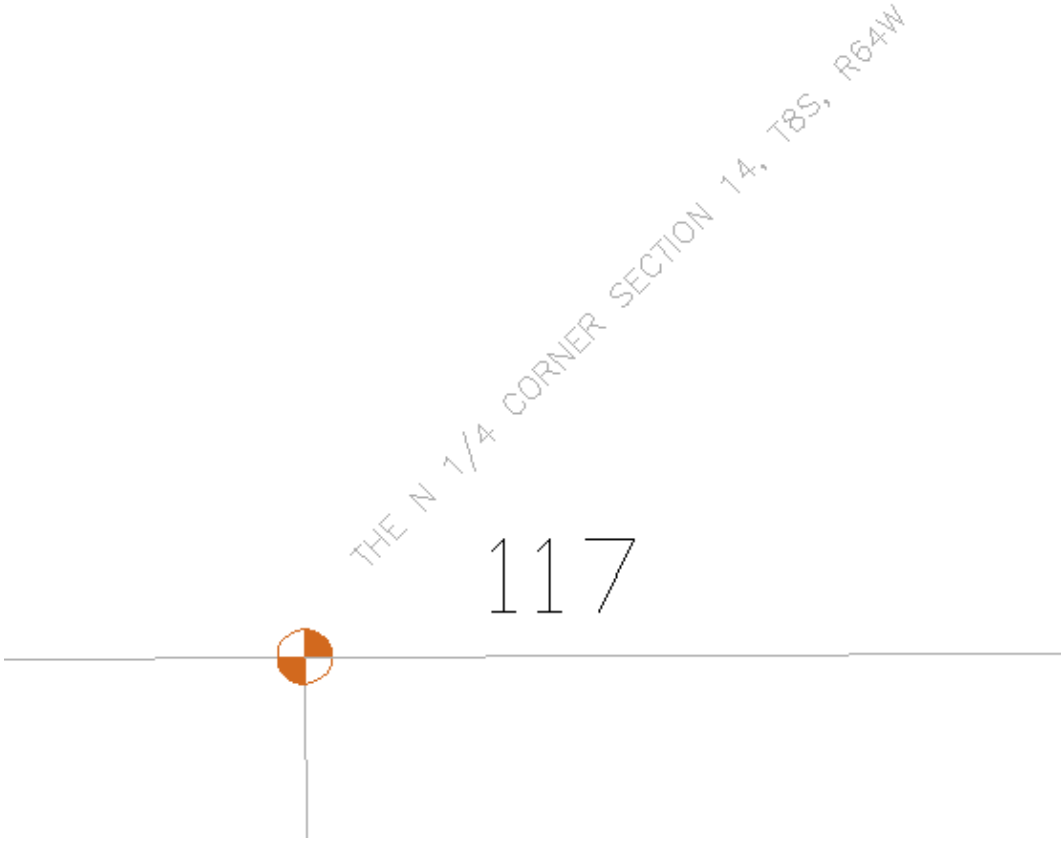
7. On the view named ***ROW Reference*** **<D><D>** and then **<D>** in the MicroStation view 1. This exercise will be working in the Summit Business Park area outlined below.



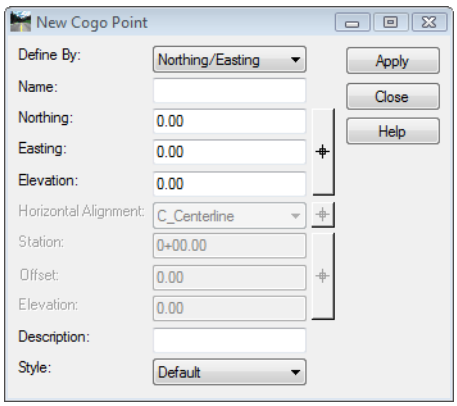
8. Use the MicroStation **Window** command to zoom into this area.

Note: Cogo point 105 was created by the fieldbook export. The locations marked as 117 & 120 are required to establish section lines that are necessary for the development of right of way. These 2 Cogo points will be created in the following exercises.

9. Use MicroStation to **Window** into the location for point ***117***.

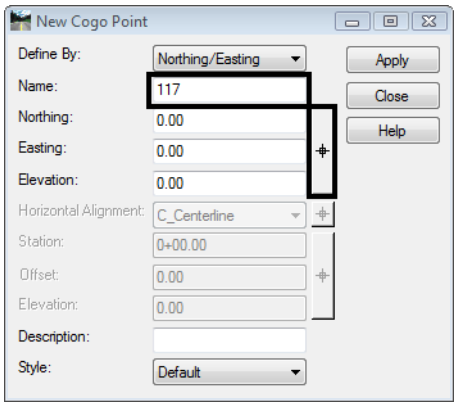


10. From the pull down menu select **Geometry > Cogo Points > New** the New Cogo Point dialog will appear.

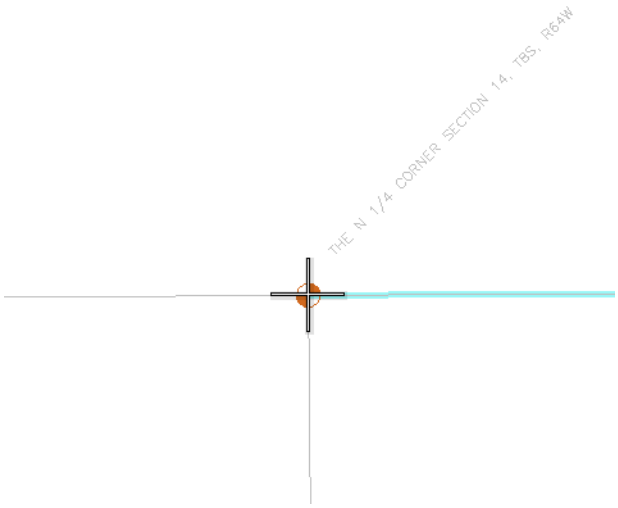


11. In the ***Name*** field key-in ***117***.

12. **<D>** the Northing Easting Elevation **Target** button to interactively define the coordinates. The New Cogo Point dialog will temporarily minimize to allow for more of the MicroStation view to be available.

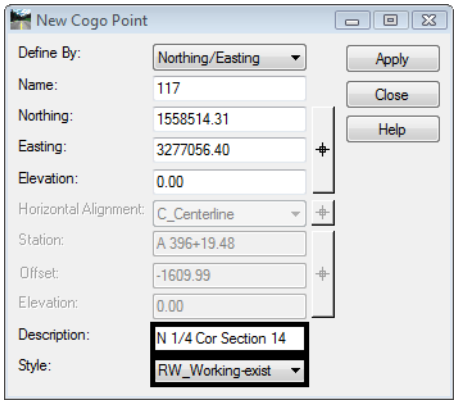


13. **<T>** then **<D>** to the CAD graphics at the section corner. The New Cogo Point dialog will reappear with the coordinates applied.

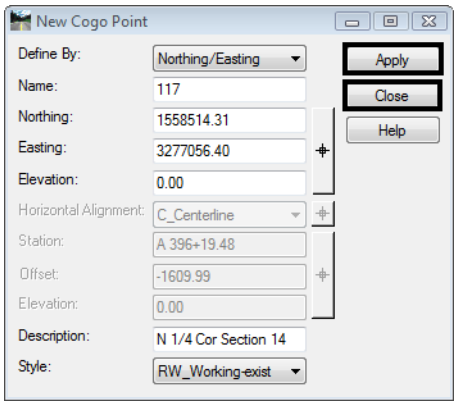


14. In the ***Description*** field key-in ***N 1/4 Cor Section 14***.

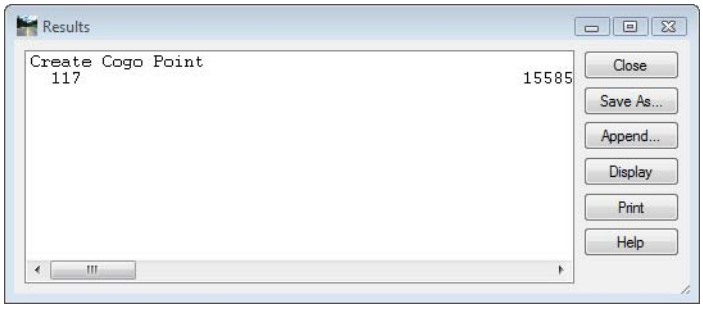
15. From the ***Style*** drop down list select the **RW_Working-exist**.



16. **<D> Apply** then **<D>** the **Close** buttons. The Cogo point is created and displayed to the MicroStation screen.



If Report lock is ON, a Results dialog opens.



17. **<D>** the **Close** button in the Results dialog.

Lab 4.3 - Cogo point creation by coordinate input

In the New Cogo Point dialog, define Cogo point 120 which is located south of Summit Business Park

1. In the ***Name*** field key-in ***120***.

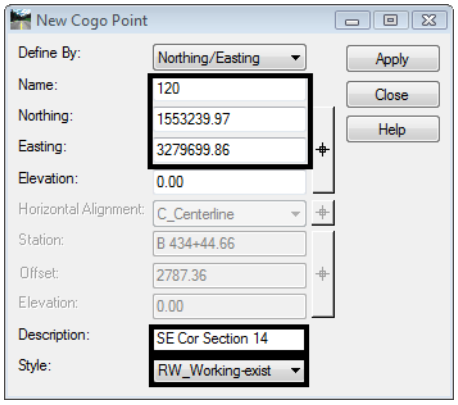
   Note: When entering subsequent Cogo points the Name field automatically increments to the next unused point identifier. Also when entering coordinates do not input commas, they are shown here for readability purposes.

2. From another source, the SE Corner of Section 14 (future point 120) has been determined as having the coordinate values of:

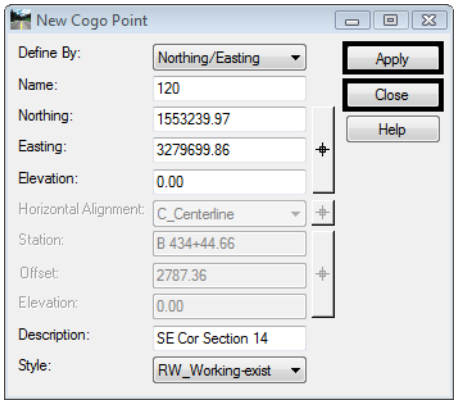
   - North = ***1,553,239.97***
   - East = ***3,279,699.86***

3. In the ***Description*** field key-in ***SE Cor Section 14***

4. From the ***Style*** drop down list select **RW_Working-exist**

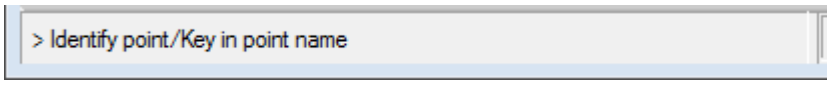


5. **<D> Apply** then **<D>** the **Close** buttons. The Cogo point is created and displayed to the MicroStation screen.

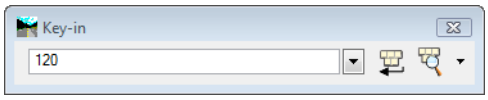


Lab 4.4 - Centering a MicroStation View on a Cogo Point

1. From the pull down menu select **Geometry > Cogo Points > Center Point** the Micro-Station status bar prompts you to ***Identify point/Key in point name***.



2. In the MicroStation Key-in window, key-in ***120*** **<Enter>**



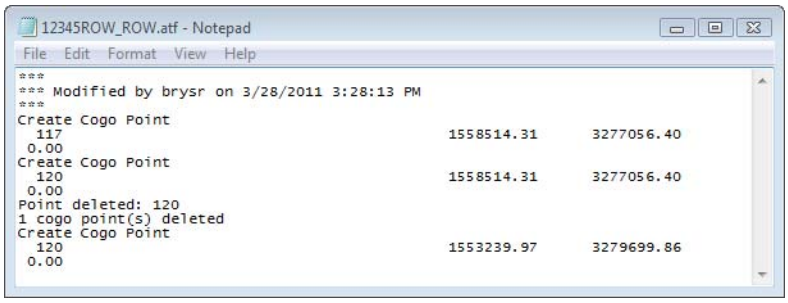
3. If more then one view is opened you are prompted to Select a View.

4. **<D>** in any MicroStation **View** the MicroStation view is repositioned to center the specified Cogo point.

   Note: The above command will not change the display volume of the MicroStation screen. You may be required to zoom in or out to achieve desirable results.

5. Continue to **Center** other cogo points ***105*** and ***117***.

6. Open the Cogo Audit trail file to view results.



LAB 5 - Alignment to Cogo Buffer

This lab demonstrates that alignment cogo point naming can be defined by the user or assigned by InRoads using a user specified seed name. While the overall alignment must be assigned a unique name, the vertices (PI's, PC's, PT's, etc) of said alignments can exist in three states, as: cogo points, named points, or unnamed points.

Chapter Objectives:

- Create cogo points from a horizontal alignment
- Review cogo points stored in the Cogo Buffer

1. **Open** the MicroStation design file ***C:\Projects\12345\ROW_Survey\Drawings\Reference_Files\12345ROW_Model.dgn***

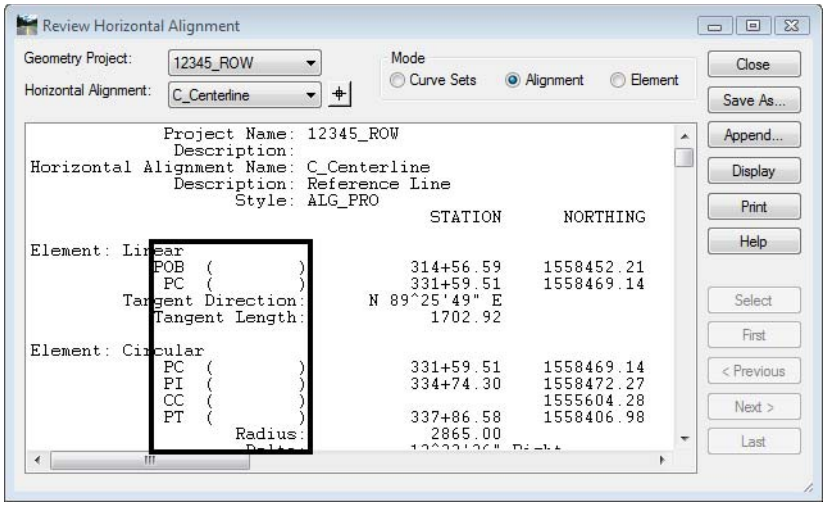
2. **Open** the Geometry Project ***C:\Projects\12345\ROW_Survey\InRoads\Geometry\12345ROW.alg*** that was created in the earlier lab.

3. From the Geometry Workspace pane **<R>** on the Geometry Project name ***12345_ROW*** and select **Set Active** from the fly-out menu.

4. Expand the display tree of active Geometry Project by selecting the plus sign.

5. **<R>** the Horizontal Alignment ***C_Centerline*** and select **Set Active** from the fly out list.

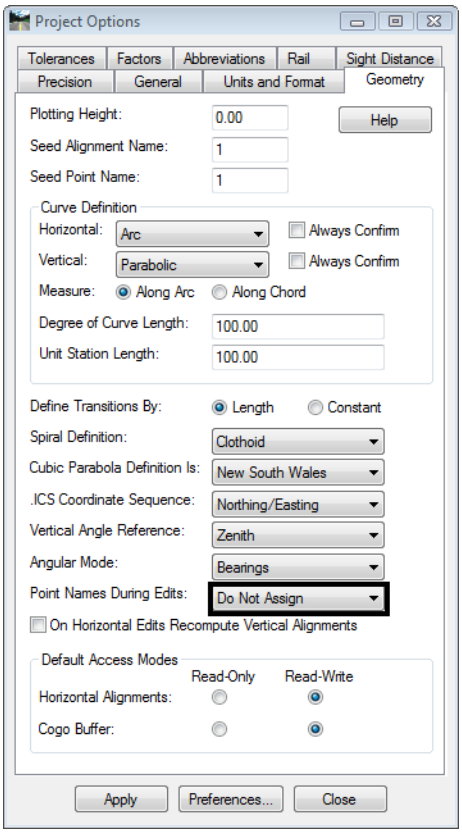
6. From the pull down menu select **Geometry > Review Horizontal** the Review Horizontal Alignment dialog will appear with ***C_Centerline*** as the active alignment.



As they relate to the Cogo buffer, InRoads reserves geometry point names. These are reserved as Cogo point ID's in the event the named geometry points are written to the Cogo buffer. If the alignment containing the named geometry points is written to the Cogo buffer, the naming between geometry points and cogo points is synchronized.

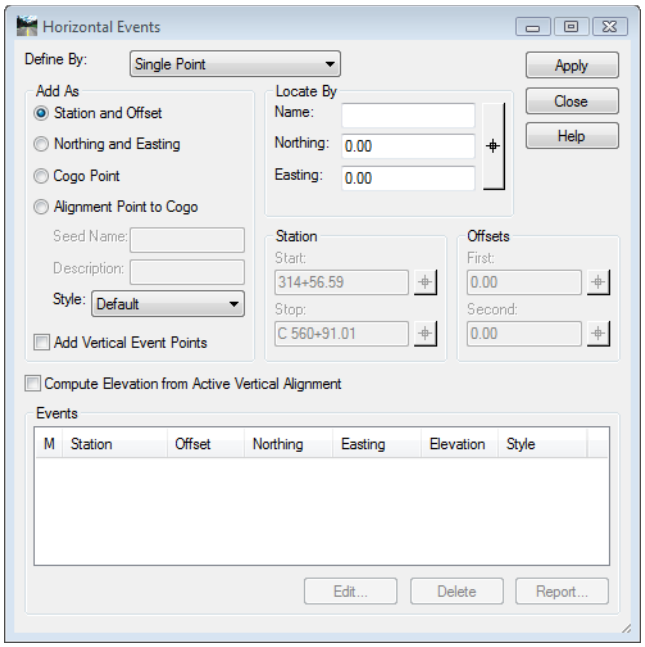
Note: The information in parenthesis shows the identifier of the vertices either as Cogo points or as named or unnamed geometry points. In this case, the alignment ***C_Centerline*** was created as ***unnamed*** geometry points.

The assignment of geometry names at time of creation (or editing) is controlled by: **File > Project Options [Geometry]** tab.



Write the vertices for alignment C_Centerline to the Cogo buffer. Doing so will facilitate the generation of additional geometry for the development of the project.

7. Select **Geometry > Horizontal Curve Set > Events** the Horizontal Events dialog opens.



8. **<D>** the radio button for Alignment Point to Cogo

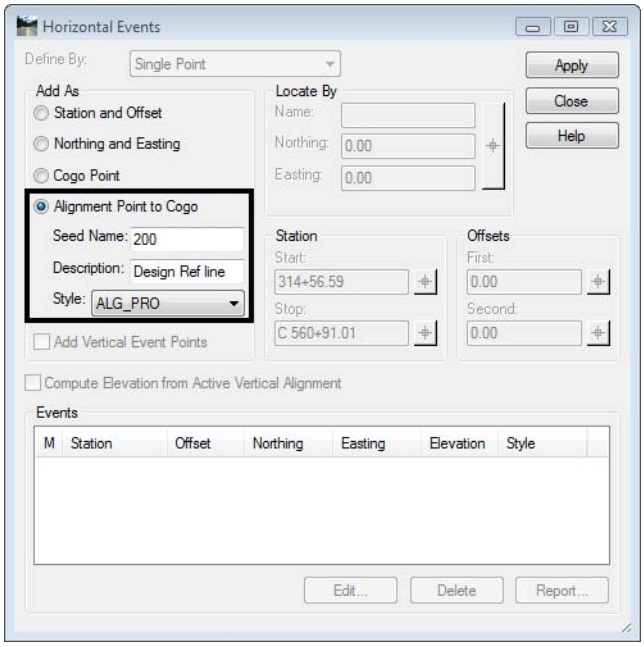
   Note: The seed name field only applies to unnamed geometry points. If names are already assigned to the alignment, the assigned names will be used regardless of input into the Seed Name field. The active alignment C_Centerline does not have geometry point names assigned so input here is desired. If no seed name is defined here, the next available Cogo point number would be used and incrementally increased.

Reviewing the Cogo buffer indicates that the range of number from 121-1007 are unused. For simplicity, set point number 200 as the initial Cogo point ID to assign to the alignment vertices (more on reviewing the Cogo buffer in the following lab).

9. Key-in ***200*** as the Seed Name

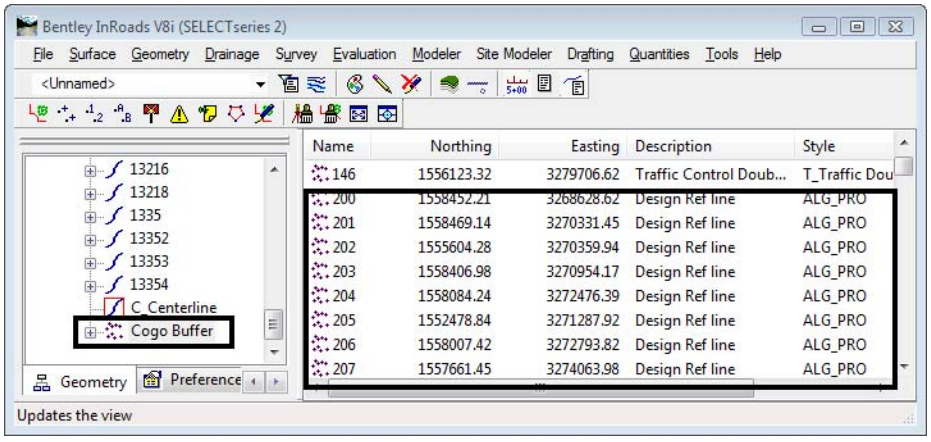
10. Key-in ***Design Ref line*** in the Description field

11. Select **ALG_PRO** as the geometry style to assign to the new Cogo points



12. **<D> Apply** then **<D>** the **Close** buttons the points will be added to the cogo buffer and the dialog will be dismissed.

13. In the Geometry Workspace pane review the Cogo Buffer to verify the results by **<D>** on the ***Cogo Buffer*** then reviewing the ***Feedback pane***.



14. **<R>** on the Geometry Project name **12345_ROW** from the pop up menu **<D> Save**

LAB 6 - Reviewing Cogo Points

This lab demonstrates that Cogo points can be reviewed in the InRoads feedback pane and then exported to a text file.

Chapter Objectives:

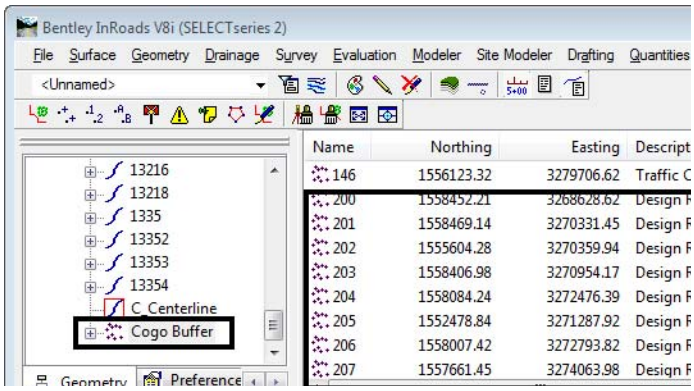
- Review Cogo points in the feedback pane of the InRoads interface
- Save Cogo points stored in the Geometry Project to a simple text file

1. **Open** the MicroStation design file ***C:\Projects\12345\ROW_Survey\Drawings\Reference_Files\12345ROW_Model.dgn***

2. **Open** the Geometry Project ***C:\Projects\12345\ROW_Survey\InRoads\Geometry\12345_ROW.alg*** that was created in the earlier lab.

3. From the Geometry Workspace pane **<R>** on the Geometry Project name ***12345_ROW*** and select **Set Active** from the fly-out menu.

4. In the Geometry Workspace pane review the Cogo Buffer to verify the results by **<D>** on the ***Cogo Buffer*** then reviewing the ***Feedback pane***.

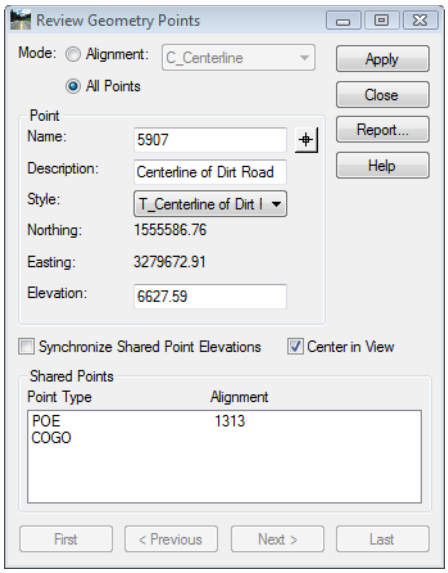


Note: Cogo points can be assigned either numbers or names. When alpha characters are used, names are case sensitive; RL_10 is not the same point as rl_10.

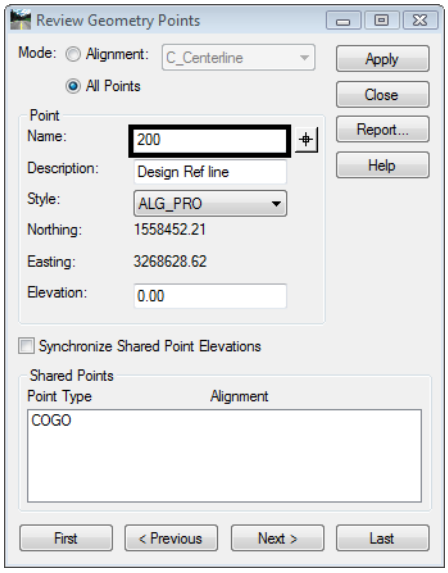
5. **<D>** on the ***column*** headers **Name** | **Northing** to sort the cogo points in ascending and descending order.

6. **<D> hold and drag** a column header to reorder the columns.

7. From the pull down menu select **Geometry > Review Geometry Points** the Review Geometry Points dialog will appear.



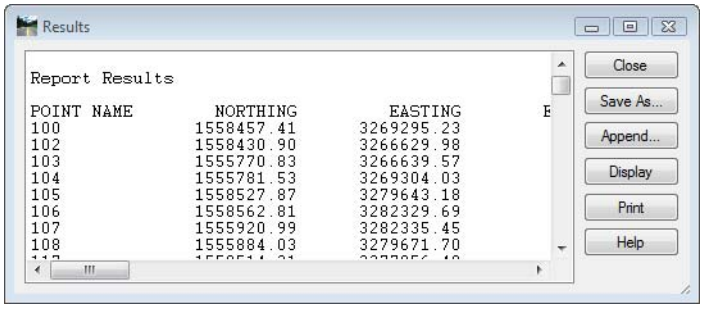
8. In the ***Name*** field key-in ***200*** then the ***Tab*** key the dialog will display the cogo point information.



Note: This dialog can be used to evaluate individual Cogo points (or named geometry points) by navigating with the provided buttons. Also if Center in View is enabled, the MicroStation view will center on the point selected.

9. **<D>** the **Next** | **Previous** | **First** | **Last** buttons to navigate the cogo points stored in the cogo buffer.

10. **<D>** the **Report** button the Results dialog will appear with all the cogo points listed.



Note: This Results dialog will list both Cogo points and named geometry points (named alignment vertices not stored as Cogo points). This is signified by the name of the command used to generate this report Review Geometry Points, not Cogo points. Named geometry points are not written to the Cogo buffer automatically. However they are reserved.

11. **<D>** the **Save As** button the Save As dialog will appear.
12. Path to the folder ***InRoads\Geometry***
13. Key-in the file name ***GeoPoints.txt***
14. **<D>** the **Save** button the file will be stored and the dialog will be dismissed.
15. **<R>** on the Geometry Project name **12345_ROW** from the pop up menu **<D> Save**

LAB 7 - Geometry Snaps

This lab demonstrates InRoads geometry snaps which allow the user added functions to ensure geometry point locations and direction criteria are selected at defined geometry locations. In this lab the geometry inverse command is used for illustration. Geometry snaps can be applied when creating alignments, using traverse commands or almost any geometry related command. Using geometry snaps will ensure specific locations are selected.

InRoads geometry snaps are analogous to MicroStation snaps such as the keypoint snap. When enabled, the software only allows selection at specific locations.

Chapter Objectives:

- Use both No Snap and Point Snap from the Locks toolbar
- Use the Inverse Direction tool on Cogo points

1. **Open** the MicroStation design file
   C:\Projects\12345\ROW_Survey\Drawings\Reference_Files\12345ROW_Model.dgn

2. **Open** the Geometry Project
   C:\Projects\12345\ROW_Survey\InRoads\Geometry\12345_ROW.alg that was created in the earlier lab.

3. From the Geometry Workspace pane **<R>** on the Geometry Project name ***12345_ROW*** and select **Set Active** from the fly-out menu.

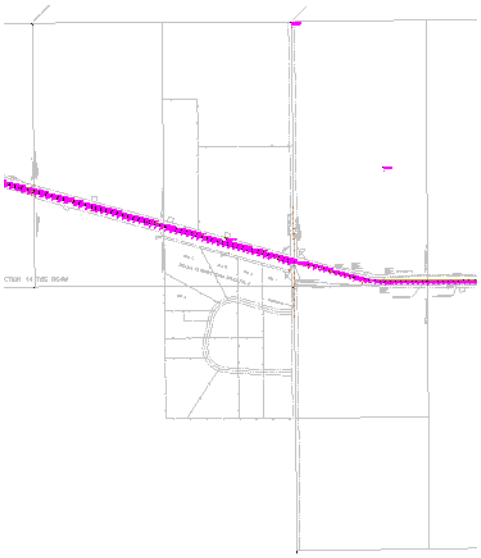
4. Make sure the locks toolbar is open from the pull down menu select
   Tools > Locks > Toolbar dock the toolbar into the InRoads interface.

5. **<D>** on the **Element Snap Lock** icon in the InRoads Locks toolbar.

6. **<D>** on the **Element Snap Lock** icon a second time to cycle through the three geometry snap modes:

   - No Snap - Element snap off
   - Point snap - locks to Cogo points or alignment vertices
   - Element snap - select tangents for direction definition

7. Window the MicroStation view as shown below.

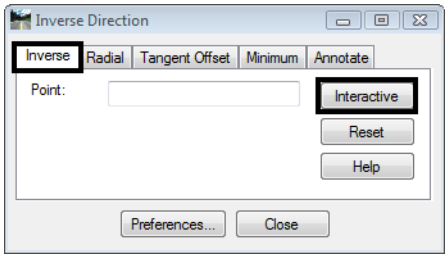


Note: To explore the Element Point snap use the inverse command to report distance and direction between cursor locations.

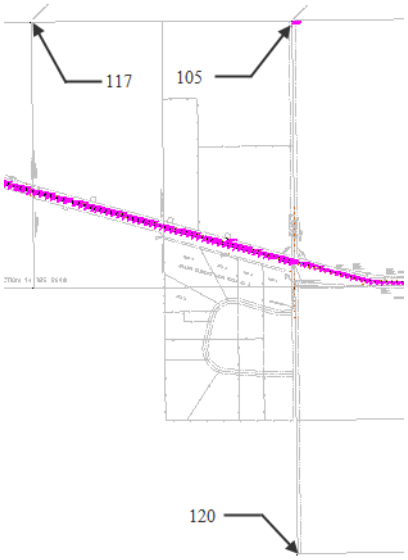
8. Set the ***Element Snap Lock*** **OFF**

9. From the pull down menu select **Geometry > Utilities > Inverse Direction** the Inverse Direction dialog will appear.

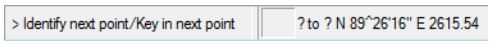
10. **<D>** the **Inverse** tab the **<D>** the **Interactive** button. After selecting the Interactive button you are prompted in the MicroStation status bar to Identify Initial Point/Key in Initial Point.



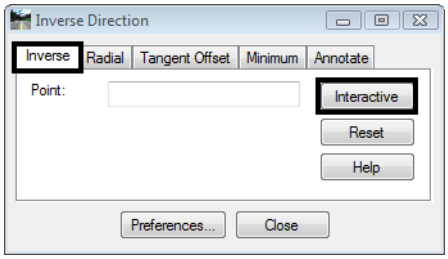
11. **<D>** near Cogo point **117** and then **<D>** near Cogo point **105**.



Dynamic graphics will appear and both the MicroStation and InRoads command fields will report the results. A question mark indicates that a specific Cogo point has not been selected. In this case, the bearing and distance readout reflects the values between the data <D> points given. Not between defined geometry points.



12. Toggle **ON** the ***Geometry Point Snap Lock*** to select defined geometry.
13. From the pull down menu select **Geometry > Utilities > Inverse Direction** the Inverse Direction dialog will appear.
14. **<D>** the **Inverse** tab the **<D>** the **Interactive** button. After selecting the Interactive button you are prompted to Identify Initial Point/Key in Initial Point.



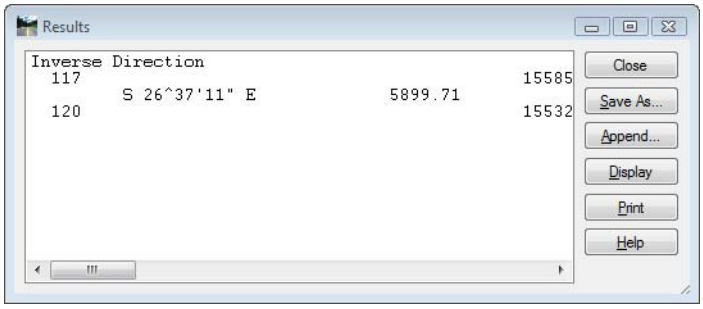
15. **<D>** near Cogo Point **117** and then **<D>** near Cogo point **105**. InRoads reports the bearing and distance between points 117 and 105.

16. Move the cursor around the MicroStation view. Note how the cursor 'snaps' between specific geometry vertices.
17. Toggle ***Geometry Snap Lock*** **OFF**.

Note: Geometry snaps, if enabled, operate whether the related graphics are visible or not.

After initializing the Inverse Direction command, point numbers can also be keyed into the Inverse Direction tab Point key-in field.

18. From the pull down menu select **Geometry > Utilities > Inverse Direction** the Inverse Direction dialog will appear.
19. **<D>** the **Inverse** tab.
20. In the Point field key-in ***117*** then ***Tab*** key.
21. In the Point field key-in ***120*** then ***Tab*** key the results dialog will appear with the distance and direction displayed.



Note: The geometry snap element will be covered in following exercises.

22. **<R>** on the Geometry Project name **12345_ROW** from the pop up menu **<D> Save**

LAB 8 - Cogo Point by Traverse

This lab demonstrates the use of the Traverse command to establish the West ¼ corner from Cogo point 105. Development of the right of way for the project requires the establishment of the West ¼ corner for Section 13 which lies South of the project reference line near the Northeast corner of the Summit Business Park development.

Chapter Objectives:

- Create Cogo points using direction and bearings key-ins

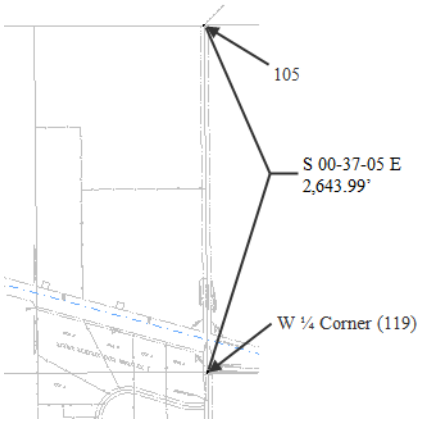
1. **Open** the MicroStation design file
   C:\Projects\12345\ROW_Survey\Drawings\Reference_Files\12345ROW_Model.dgn

2. **Open** the Geometry Project
   C:\Projects\12345\ROW_Survey\InRoads\Geometry\12345_ROW.alg that was created in the earlier lab.

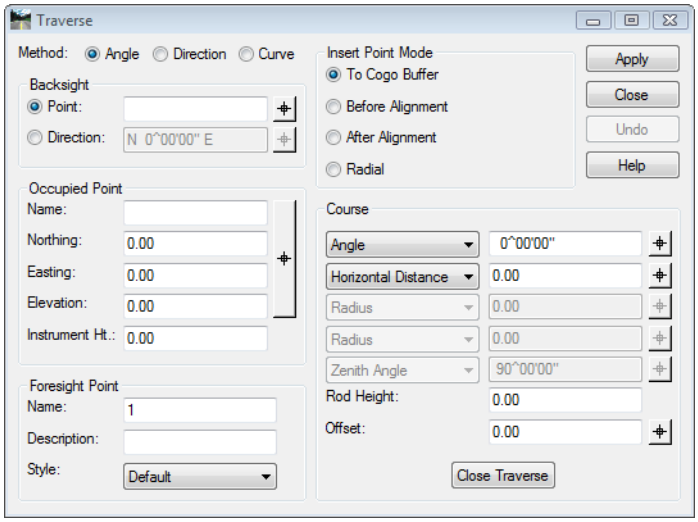
3. From the Geometry Workspace pane **<R>** on the Geometry Project name ***12345_ROW*** and select **Set Active** from the fly-out menu.

   The West ¼ corner has been determined to lie south of the NW corner of section 13 (Cogo point 105) at:

   - S 00-37-05 E
   - 2,643.99 feet



4. From the pull down menu select **Geometry > Traverse** the Traverse dialog will appear.



5. From the ***Method*** radio button select **Direction**.

6. From the ***Insert Point Mode*** radio button select **To Cogo Buffer**

7. In the ***Occupied Point*** section of the dialog key-in the ***Name: 105*** then ***Tab*** key. The coordinates for point 105 will display.

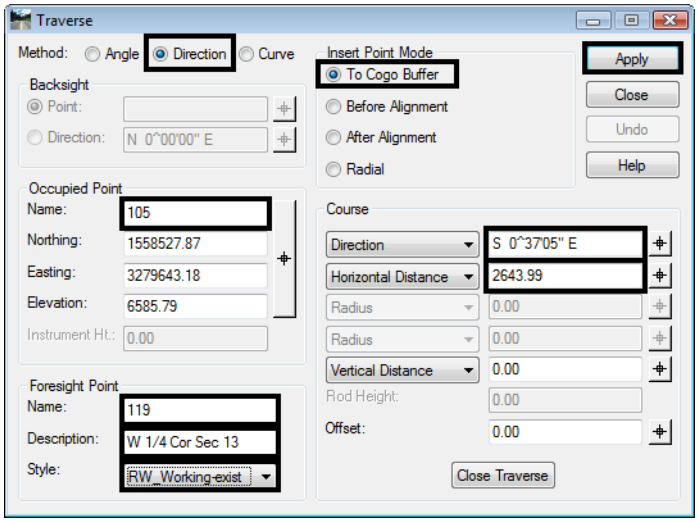
8. In the ***Course*** section of the dialog key-in the ***Direction: S 0 37 05 E***

9. In the ***Course*** section of the dialog key-in the ***Horizontal Distance: 2643.99***

10. In the ***Foresight Point*** section of the dialog key-in the ***Name: 119***

11. In the ***Foresight Point*** section of the dialog key-in the ***Description: W 1/4 Cor Sec 13***

12. In the ***Foresight Point*** section of the dialog select the ***Style*** **RW_Working-exist** from the drop down list.



13. **<D>** the **Apply** button the point 119 will be created and become the occupied point. The foresight point will automatically increment to the next available number.

    Note: If point 119 would have already existed, the next available point number would be used and 119 would not have been overwritten.

    From the newly created point 119, traverse to the east establishing point 121 on the South right-of-way line of S.H. No. 86. Said point lying at N 89^12'18" E, a distance of 30' (RW width) + 660.53' (ROW length).

14. From the ***Method*** radio button select **Direction**.

15. From the ***Insert Point Mode*** radio button select **To Cogo Buffer**

16. Verify the ***Occupied Point*** is the ***Name: 119***.

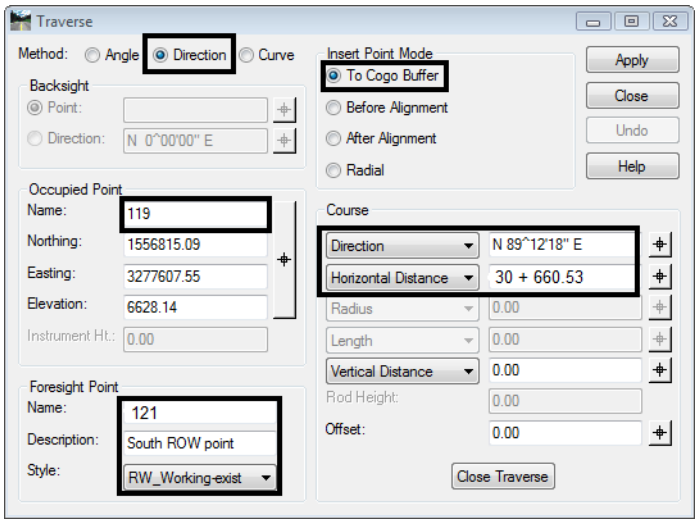
17. In the ***Course*** section of the dialog key-in the ***Direction: N 89 12 18 E***

18. In the ***Course*** section of the dialog key-in the ***Horizontal Distance: 30+660.53 <Tab>***

19. Verify the ***Foresight Point*** is the ***Name: 121***

20. In the ***Foresight Point*** section of the dialog key-in the ***Description: South ROW point***

21. In the ***Foresight Point*** section of the dialog select the ***Style*** **RW_Working-exist** from the drop down list.



22. **<D>** the **Apply** button the point 121 will be created and become the occupied point.

    Note: Notice the previous foresight point has become the occupied point. Also note math operations can be used in the input fields. Once you [tab] from the field, the math operation computes. Experiment using +, -, *, /

23. **Close** traverse dialog box.

24. **<R>** on the Geometry Project name **12345_ROW** from the pop up menu **<D> Save**.

LAB 9 - Horizontal Alignments from Cogo Points

This lab will expand on previous training to create alignments by chaining Cogo points together. This methodology, commonly referred to as the "PI Method" and will utilize the ***Geometry*** > ***Horizontal Curve Set*** tools.

Chapter Objectives:

- Become more familiar with the Geometry Point Snap Lock
- Create an alignment using Cogo points

Lab 9.1 - Generate Alignment using Cogo points

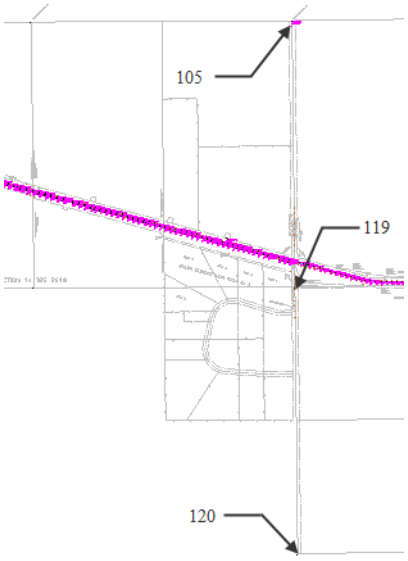
1. **Open** the MicroStation design file ***C:\Projects\12345\ROW_Survey\Drawings\Reference_Files\12345ROW_Model.dgn***

2. **Open** the Geometry Project ***C:\Projects\12345\ROW_Survey\InRoads\Geometry\12345_ROW.alg*** that was created in the earlier lab.

3. From the Geometry Workspace pane **<R>** on the Geometry Project name ***12345_ROW*** and select **Set Active** from the fly-out menu.

   Connect the 3 Cogo points 120, 119, and 105 established along the west line of Section 13 to form an alignment that represents the center line of County Road 303. Once established, this alignment can be used for establishing the right of way limits for said road.

4. Set the MicroStation View to show the subject area.



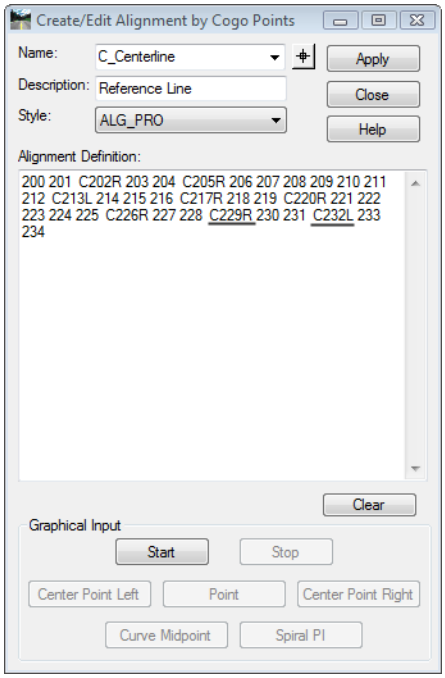
5. **<D>** ***Geometry Point Snap Lock*** **ON**.

6. From the pull down menu select **Geometry > Utilities > Create/Edit Alignment by Cogo Points**. A warning message may appear which indicates that the active alignment may have illegal (unassigned) point names.

Recall that the alignment C_Centerline was created with unnamed geometry points (you can verify this with Geometry > Review Horizontal). In a previous exercise the alignment points were written to the Cogo buffer. Doing so created Cogo points for the alignment vertices but did not associate the created Cogo points back to the alignment. You are presented with two options:

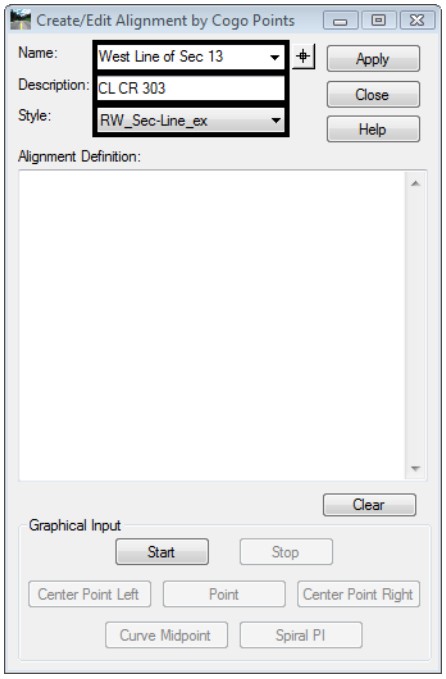
- Selecting ***No***: The identified alignment continues to exist using unnamed geometry points, which is OK and the Create/Edit Alignment by Cogo Points dialog will open.
- Selecting ***Yes***: InRoads will associate the Cogo points created back to the alignment vertices. Either solution is OK, ultimately it is at your discretion which to choose.

7. **<D>** the **Yes** button. The ***Create/Edit Alignment by Cogo Points*** dialog will open.



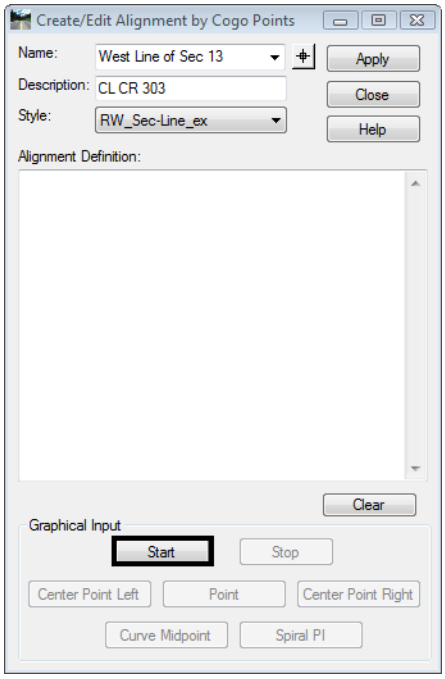
Note: The alignment C_Centerline is defined as having Cogo point numbers assigned at its vertices. The letter C indicates the Cogo point identified is the Center of a curve. The letters R or L indicate the curve direction (Right or Left).

8. In the Name field key-in ***West Line of Sec 13*** and then the <Tab> key. The dialog will clear and allow the creation of a new alignment
9. In the Description field key-in CL CR 303and then the Tab key.
10. From the Style drop down list select RW_Sec-Line_ex



Note: In this instance CL CR stands for Center Line of County Road 303. Do not confuse the L and R used in the description with the L and R used to indicate the curve direction, as described on the previous page.

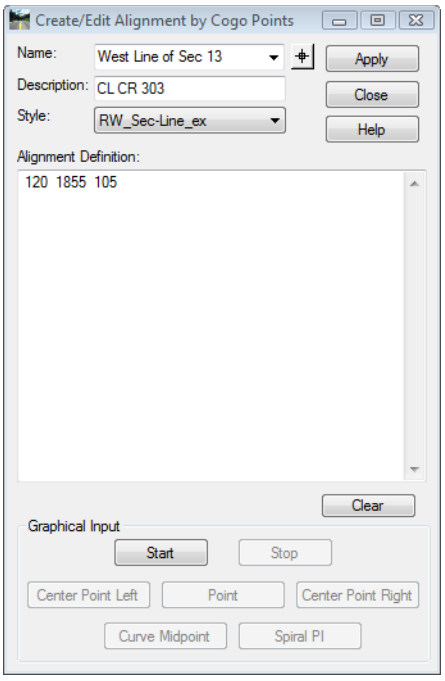
11. **<D>** the **Start** button the dialog will collapse and you are prompted to Identify Point.



12. **<D>** near the points on the screen starting on the south end. Continue to graphically select points to define the alignment. Graphics will display showing the alignment location. By default, the alignment will pass through the existing geometry points nearest the data point because the geometry point snap is enabled.

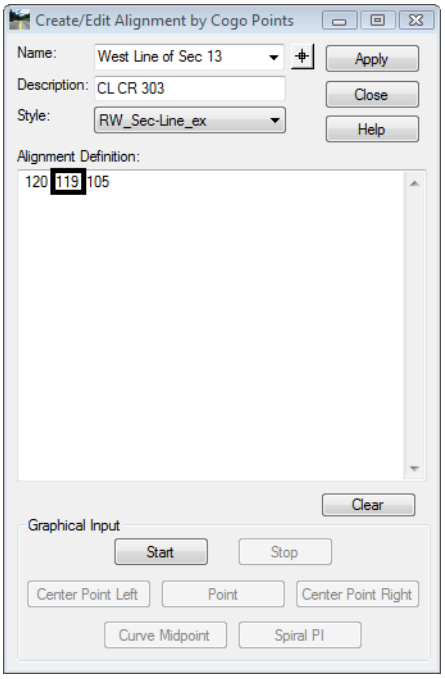
13. **<R>** when finished selecting points graphically, the ***Create/Edit Alignment by Cogo Points*** dialog will redisplay.

14. **<D>** Stop button the ***Create/Edit Alignment by Cogo Points*** dialog will show the selected points in the Alignment Definition.



Note:Cogo points can be deleted, inserted, cleared, or edited directly in the Alignment definition section of the Create/Edit Alignment by Cogo Points dialog. If desired, the entire definition can be input through the use of the keyboard.If any points were selected by mistake, they can be edited. Using the cursor and keyboard, simply replace the accidental input(s).

15. In the ***Alignment Definition*** area key-in **119** for the second point.

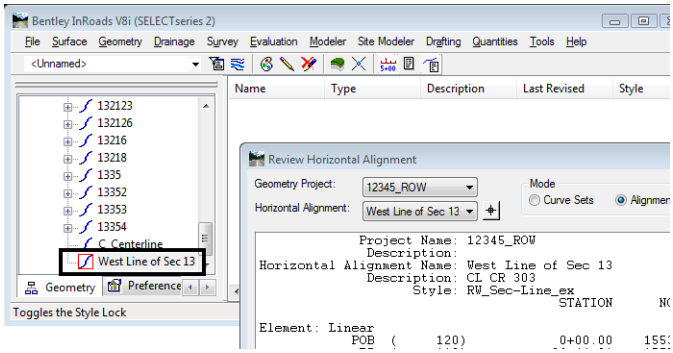


16. **<D> Apply** the horizontal alignment is created and displayed.

Note:

- Alignments are direction based. If the above workflow was followed, the created alignment runs South to North. This becomes important when offsetting the alignment to either the left or right (left is input as a negative number)
- Alignment direction can be ascertained by: reviewing the alignment, by tracking, or by displaying stationing
- Alignment direction can be 'reversed' by using the Geometry > Transpose command
- Alignments created by chaining Cogo points can be edited using the Geometry > Horizontal Curve Set tools

17. In the InRoads explorer pane, verify the alignment was created
18. **<R>** the alignment name ***West Line of Sec 13*** from the pop up menu **<D> Review**



19. **<R>** the Geometry Project name **12345_ROW** from the pop up menu **<D> Save**

LAB 10 - Cogo Intersection Commands

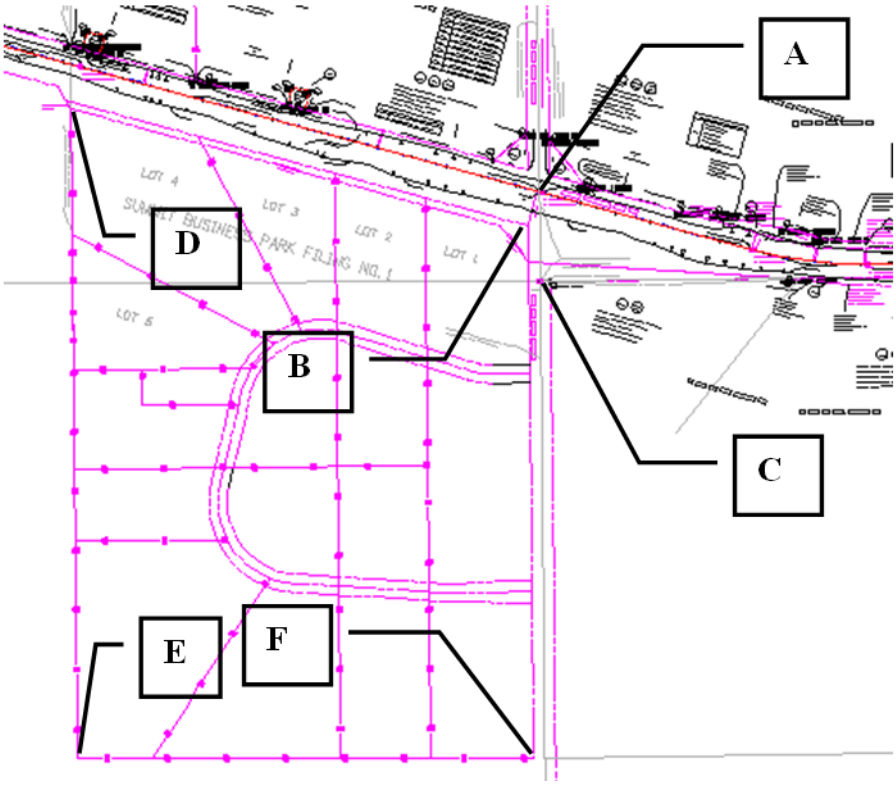
Development of right of way information can be facilitated using Cogo intersection commands. These Cogo points can then in-turn be used to define alignments (parcels). While this is a potential workflow, it is not necessary to first create Cogo points. It is simply one solution to establish required geometry information.

Chapter Objectives:

- Create Cogo points through various Intersection Commands
- Generate Alignments from Cogo Points

In order, create Cogo points for:

- A) The intersection of the design reference line and the west line of section 13, *"Lab 10.1 - Alignment-Alignment Intersection"*
- B) The NE corner of Summit Business Park, *"Lab 10.2 - Alignment - Alignment Intersection using Offsets"*
- C) A right of way point on the east side of County Road 303, *"Lab 10.3 - Direction - Alignment Intersection"*
- D) The NW corner of Summit Business Park, *"Lab 10.4 - Station & Offset"*
- E) The SW corner of Summit business Park, *"Lab 10.5 - Traversing"*
- F) The SE corner of Summit business Park, *"Lab 10.6 - Direction - Direction Intersection"*



Lab 10.1 - Alignment-Alignment Intersection

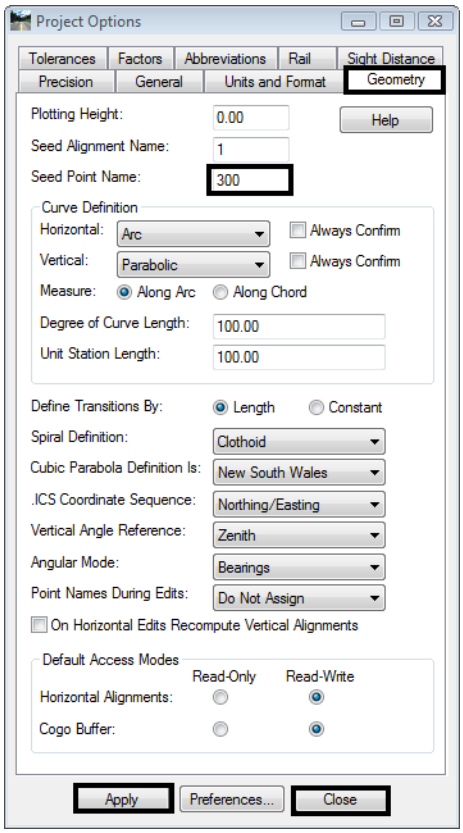
Grouping Cogo point numbers together is desired. All Cogo points for these exercises are to start with point number 300 and automatically increment. Establish a Cogo point at the intersection of the project reference line with the west line of section 13. Two alignments exist representing these features: ***C_Centerline & West Line Sec 13***

1. Select **File > Project Options >** ***[Geometry]***

   - Input a ***Seed Point Name*** of ***300***

2. **<D> Apply**

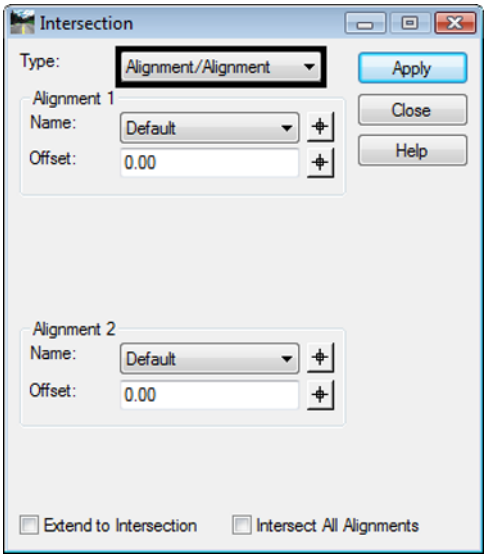
3. **<D> Close**



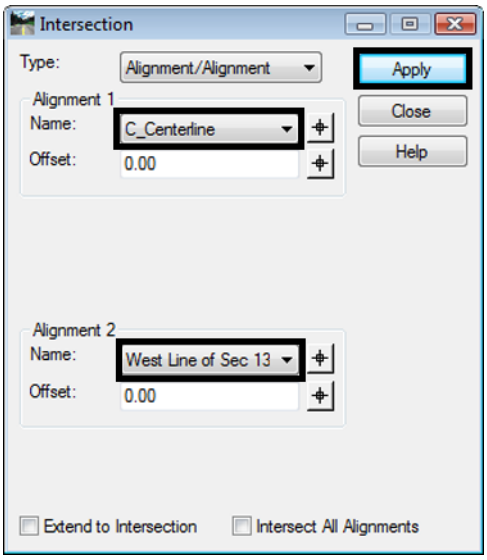
4. Select **Geometry > Locate > Intersection**

   The Intersection dialog opens. The ***Type*** selection list defines typical Cogo intersection commands.

5. Select ***Type:*** **Alignment/Alignment**



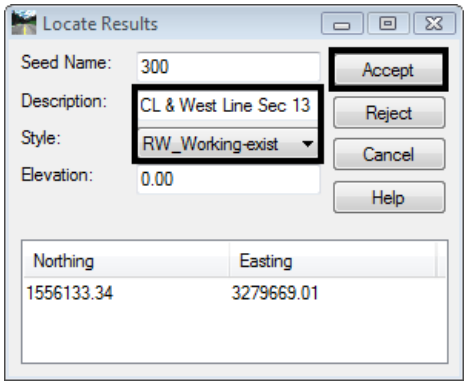
6. Complete the dialog as shown below.



Note: In addition to selecting the alignments to intersect, offsets can be defined. A negative sign (-) indicates an offset to the left.

7. **<D> Apply**, a results dialog opens if report lock is enabled. Also if Cogo Audit Trail is still enabled from a previous lab, the results are written to the *.atf

8. Key-in a ***Description,*** and choose a ***Style*** as shown.

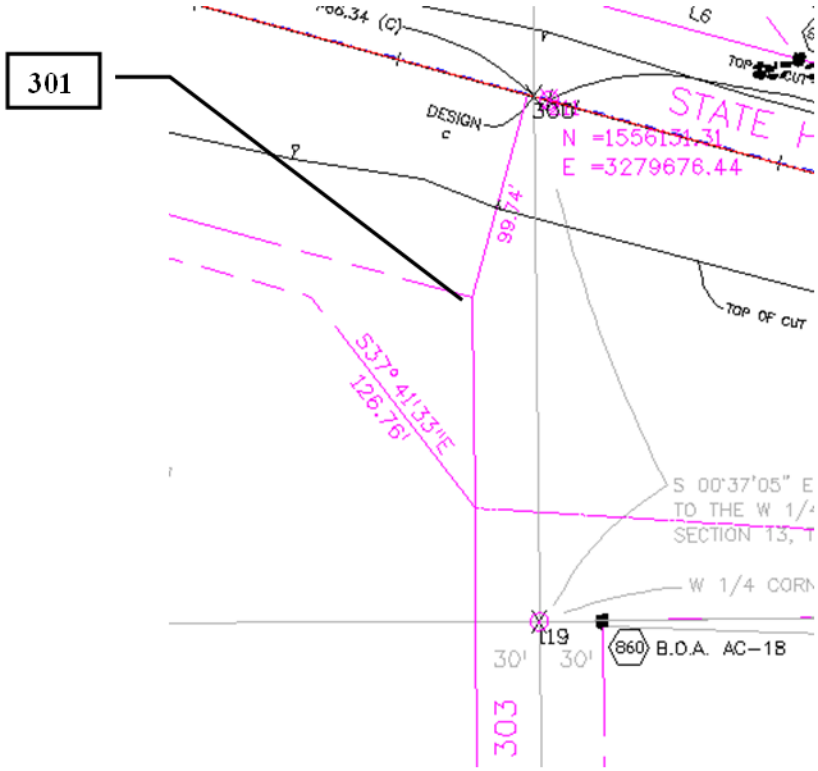


Note: If it is possible for the intersection command to provide another solution, selecting the Reject button will display the alternative results. Results are shown numerically in the dialog and dynamically on in the MicroStation screen.

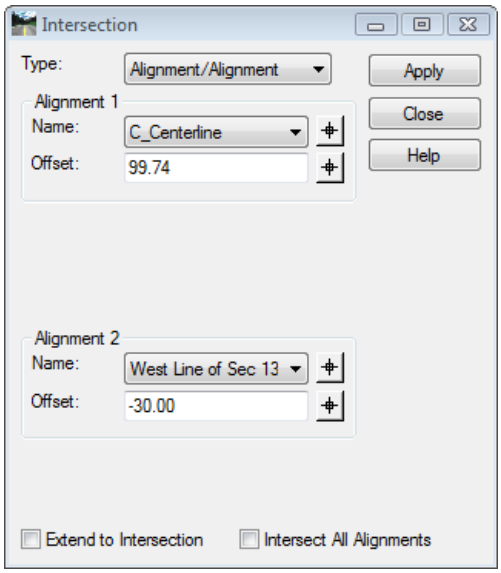
9. **<D> Accept** - the new Cogo point is created at the intersection.

Lab 10.2 - Alignment - Alignment Intersection using Offsets

Use the intersection command to establish point 301 at the intersection of the south right of way of S.H. 86 and the west right of way of CR 303.



1. Select **Geometry > Locate > Intersection**
2. Complete the dialog as shown.

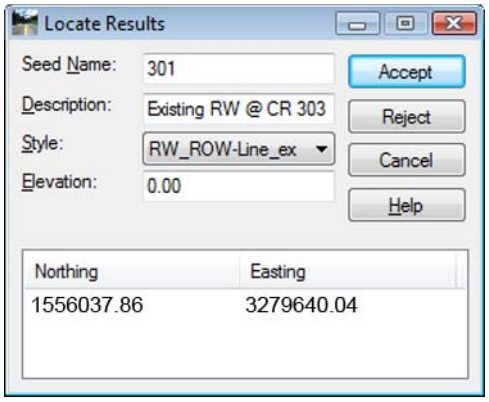


Note: Notice the negative offset defined for Alignment 2. The alignment representing the west line of section 13 runs south to north. A negative offset indicates a distance to the left.

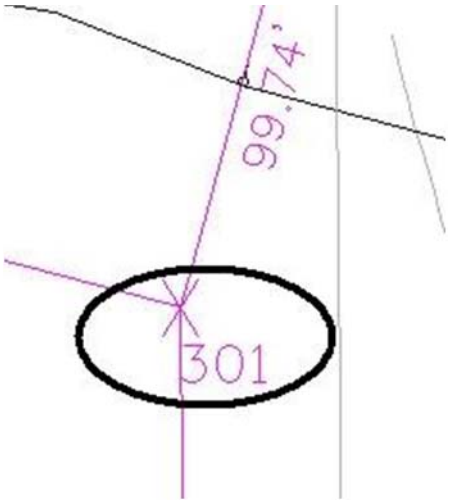
3. **<D> Apply**

4. In the Location Results dialog, Key-in:

   - ***Seed Name: 301***
   - ***Description: Existing RW @ CR 303***
   - ***Style: RW_ROW-Line_Exist***

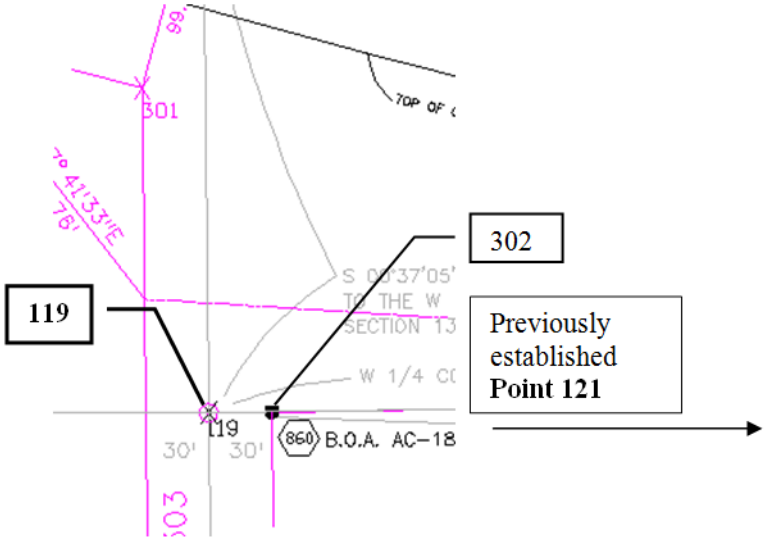


5. **<D> Accept** - to create point 301.

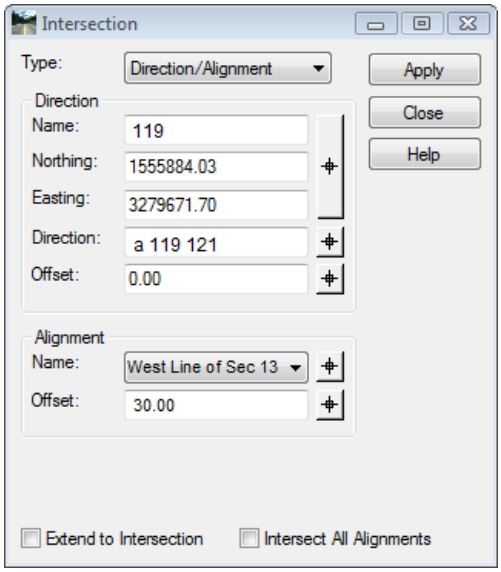


Lab 10.3 - Direction - Alignment Intersection

Use the intersection command to establish point 302 on the east right of way of county road 303.



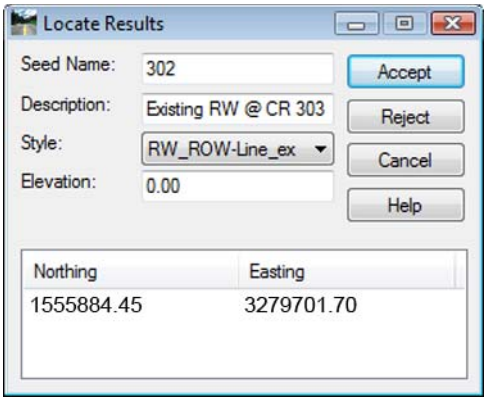
1. **Geometry > Locate > Intersection**
2. Complete the dialog as shown below:
   - ***Type: Direction/Alignment***
   - ***Name: 119*** (origin point)
   - ***Direction: a 119 121*** <tab> (computes the bearing from point 119 to 121)
   - ***Alignment: West Line of Section 13***
   - ***Offset: 30.00*** (to the right - positive)



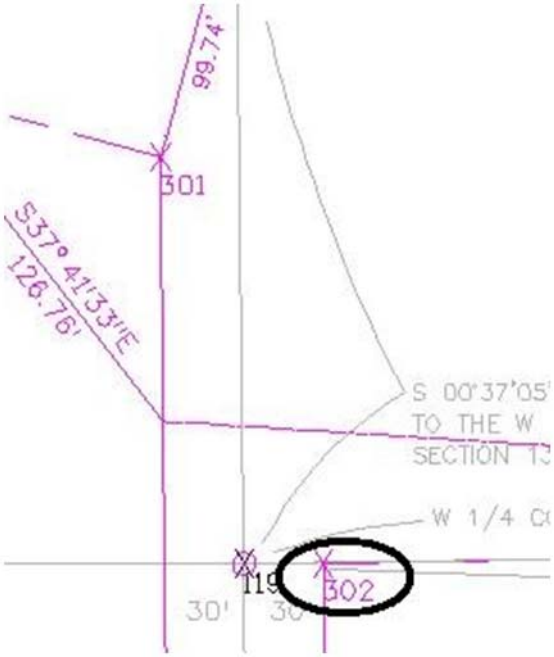
3. **<D> Apply**

The Locate Results dialog appears.

4. Seed name should reflect 302, if not, key it and a description in, and select a style.



5. **<D> Accept** - to create cogo point 302.

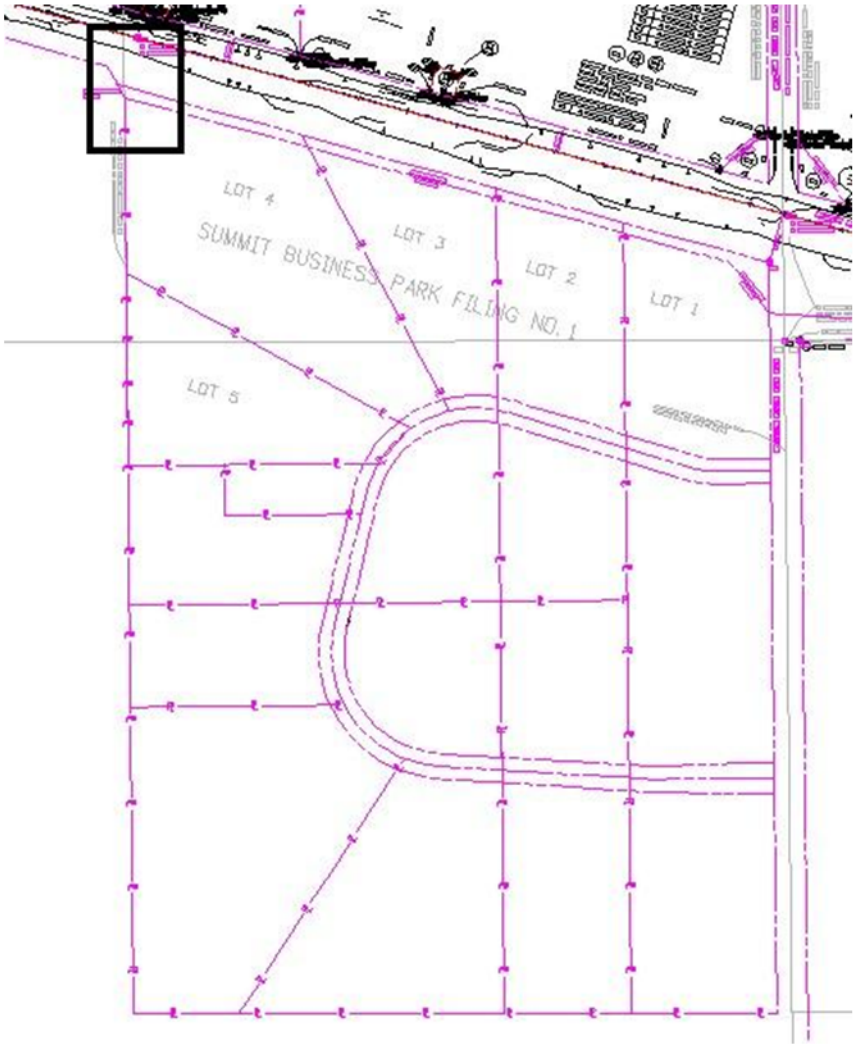


The limits of the adjacent subdivision, Summit Business Park, will be established. We had previously defined the NE corner of the plat at Cogo point 301.

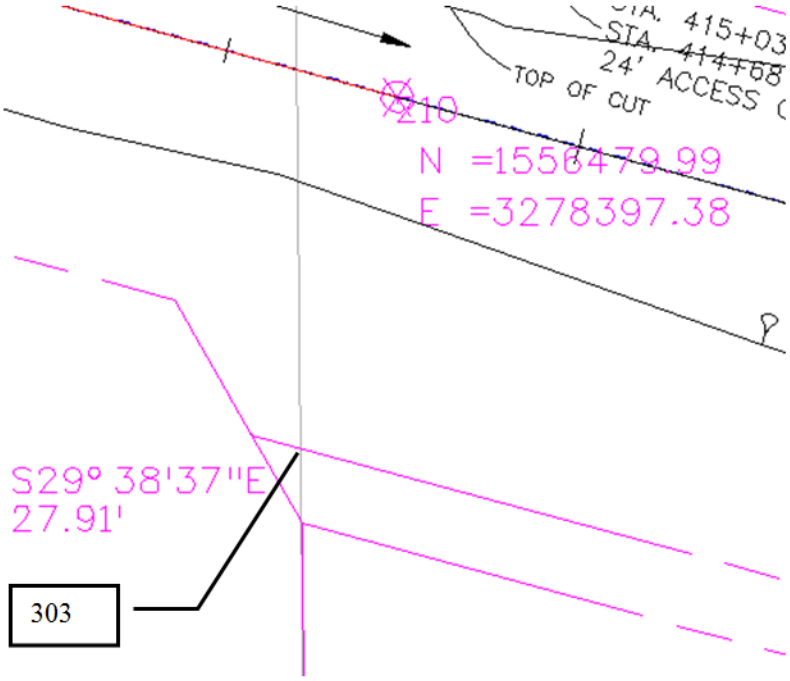
- Establishing the plat boundaries will be done in the following order:
- Establish the NW corner by Station and offset
- Establish the SW corner by bearing & distance
- Establish the SE corner by intersection
- Create an alignment representing the subdivision boundary

Lab 10.4 - Station & Offset

Use MicroStation to view the NW corner of the subdivision



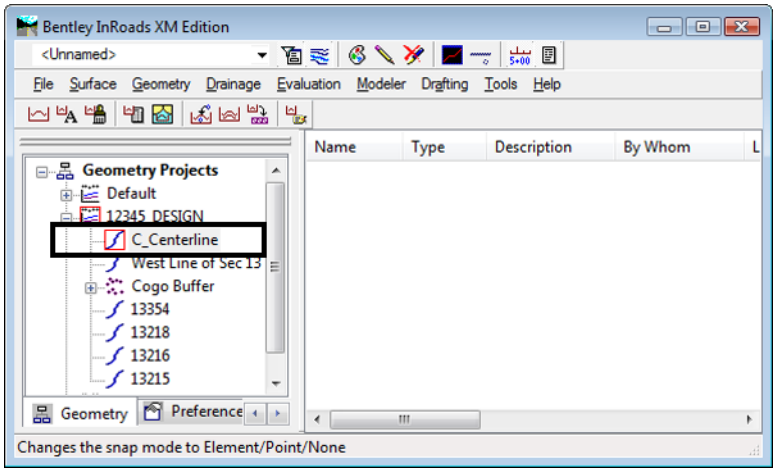
Establish a Cogo point at the NW corner of the subdivision.



A Cogo point is necessary at station A 414+48.30, 100.09’ RT

The stationing for establishing point 303 is relative to the reference line C_Centerline. The letter ‘A’ indicates this location falls within a station equation range.

1. Set **C_Centerline** as the ***active*** horizontal alignment.

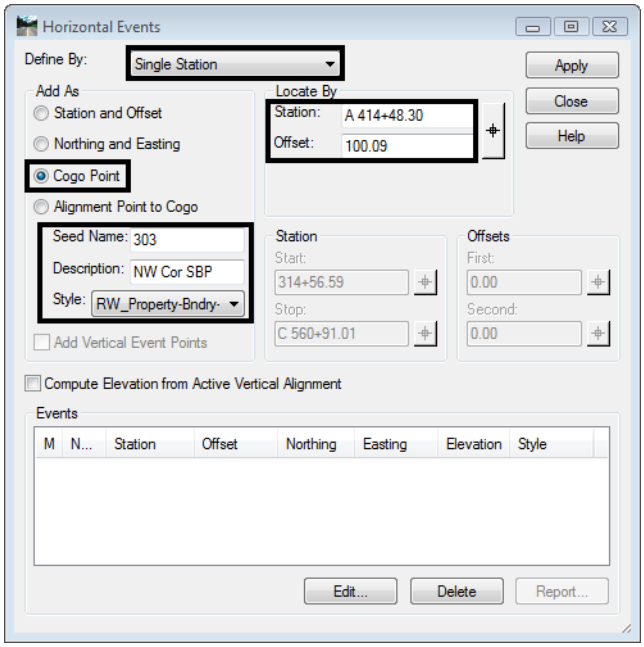


2. Select **Geometry > Horizontal Curve Set > Events**

   The Horizontal Events dialog is multi-functional; it provides the ability to enter:

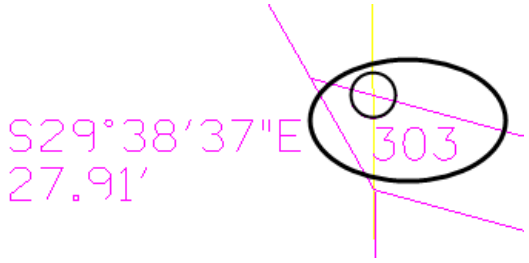
   - Event points relative to a horizontal alignment
   - Generates points in the Cogo buffer
   - Generates Cogo Points based on alignment vertices

3. In the **Add As** section: radio button ***on*** **Cogo Point**
4. Set **Define By** to: ***Single Station***
   - Single Station - defines a location by station, offset definition
   - Single Point - defines locations by coordinate values
   - Multiple Stations - defines locations at a specified intervals and offsets
5. Key-in a **Seed Name:** ***303***
6. Enter a ***Description*** and select a ***Style*** as shown.
7. Key-in ***Station: A 414+48.30***
8. Key-in **Offset** ***100.09***
9. **<D> Apply** - to create the Cogo point.



10. **<D> Close** to close the Horizontal Events dialog.

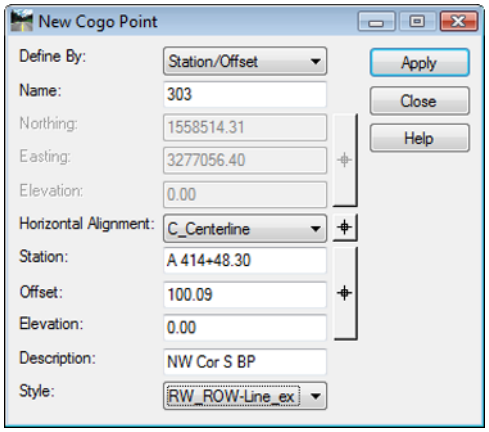
    The cogo point is created.



Alternative Solution

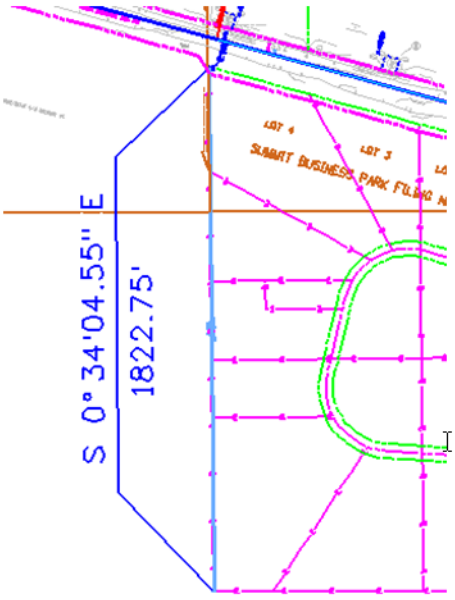
1. Select **Geometry > Cogo Points > New**

   The **Define By** field can be toggled between ***Northing/Easting*** and ***Station/Offset***.



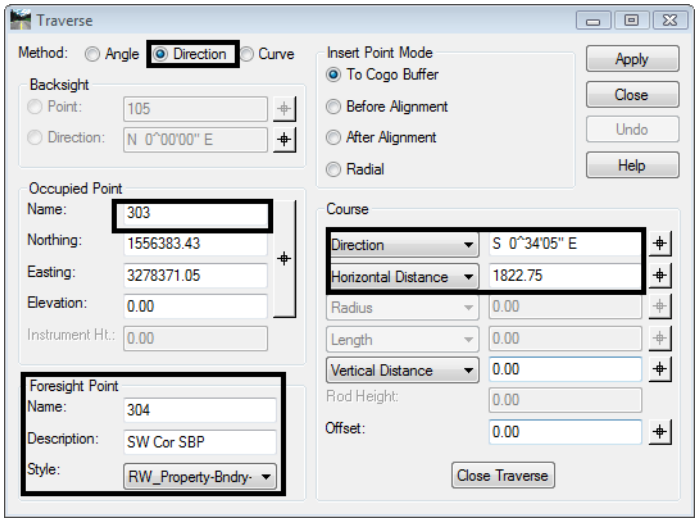
Lab 10.5 - Traversing

Create a Cogo point to establish the SW corner of Summit Business Park by bearing and distance. The corner lies S 0° 34' 04.55" E, 1822.75 feet south of the NW corner of the plat.

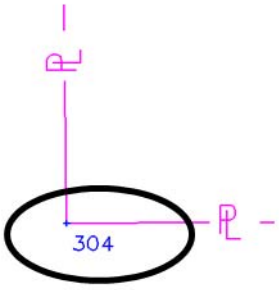


1. Select **Geometry > Traverse**

2. ***Input*** the data values as shown below.

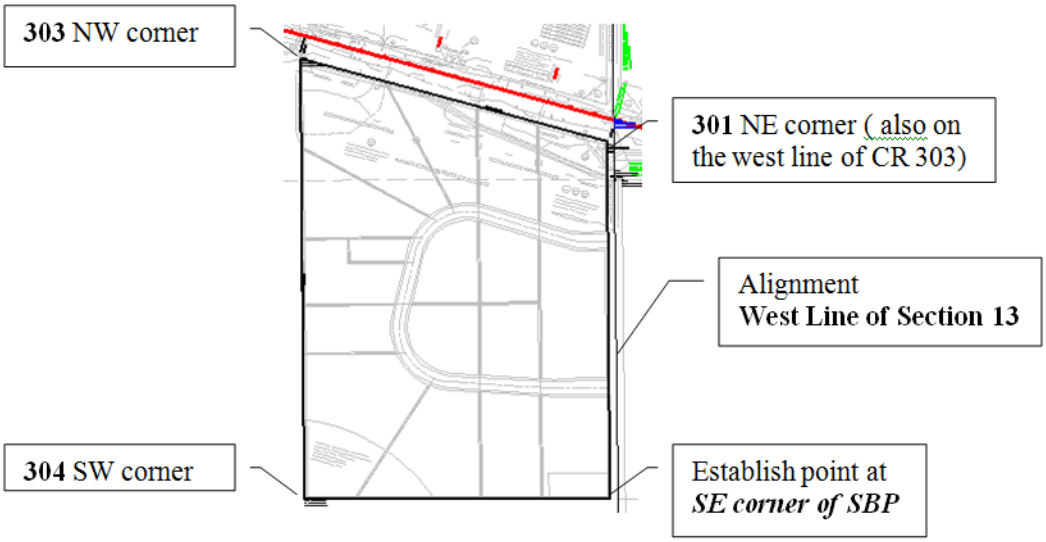


3. **<D> Apply** - to create a Cogo point at the Southwest corner of the plat.



Lab 10.6 - Direction - Direction Intersection

Three of the four corners for the plat Summit Business Park are created. Only the SE corner remains. Establish the SE corner by intersection.



Criteria for establishing the SE corner:

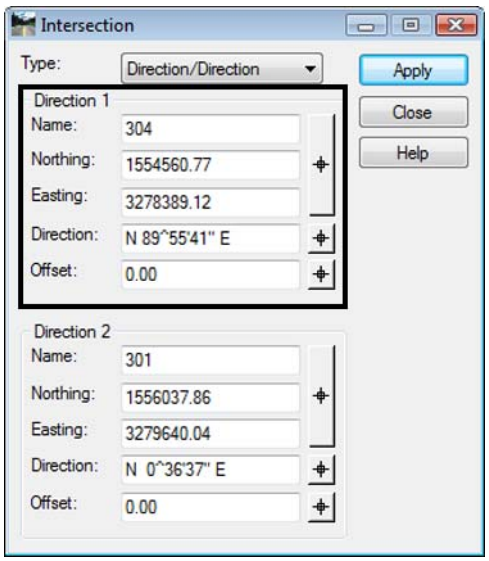
- The south line of the plat bears N 89 55 40.5 E
- The east line of the plat is parallel to the west line of Section 13

1. Select **Geometry > Locate > Intersection**
2. Set Type: **Direction/Direction**

Direction 1

- ***Name:*** ***304***
- ***Direction:*** Key-in ***N 89 55 40.5 E***

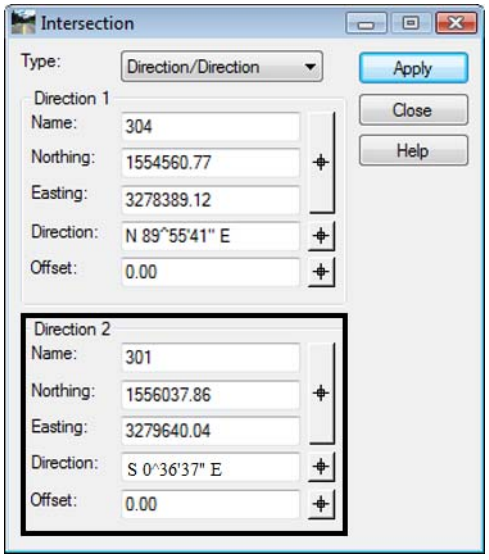
Note: The selection button on the dialog can be used to populate the Name (coordinate) fields. To select Cogo points the point snap must be toggled on. . Turn this lock off after use.



Direction 2

- ***Name: 301***
- ***Direction:*** Key-in ***S 0 36 36.66 E*** (SE or NW will both work)

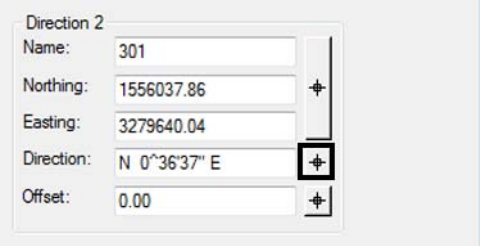
Note: The Angular Precision set by **Tools > Options > [Precision]** affects the display of **Direction** input fields throughout ***InRoads***. CDOT Preferences set the Angular Precision to 0, therefore an input of N 0 36 36.66 W will be reformatted by ***InRoads*** as N 0 36 37 W. The actual input will be used in the calculation.



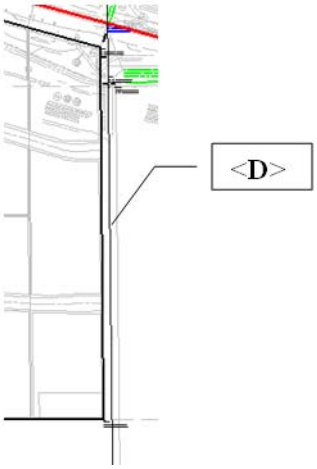
Note: The selection button on the dialog can be used to populate the Direction field.

The required direction is parallel to the west line of section 13

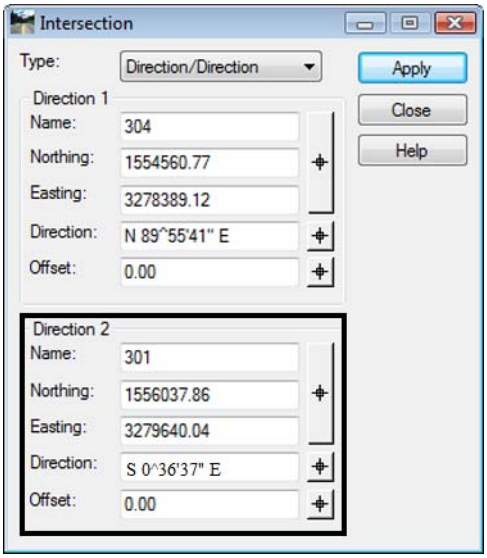
To use the selection button for direction definition:



- Toggle on the Element lock 
- **<D>** on the selection button
- **<D>** on the west line of the SW ¼ of Section 13



The direction of the identified geometry line populates the dialog.

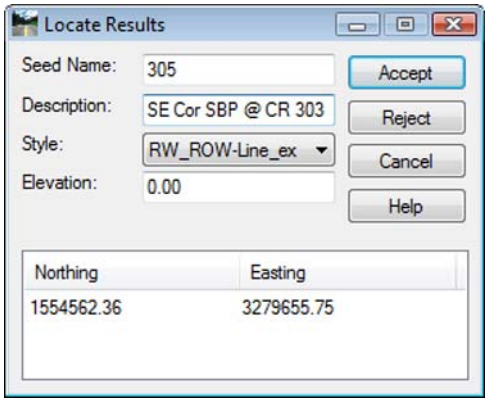


1. Make sure both offsets are set to ***zero***
2. **<D> Apply**

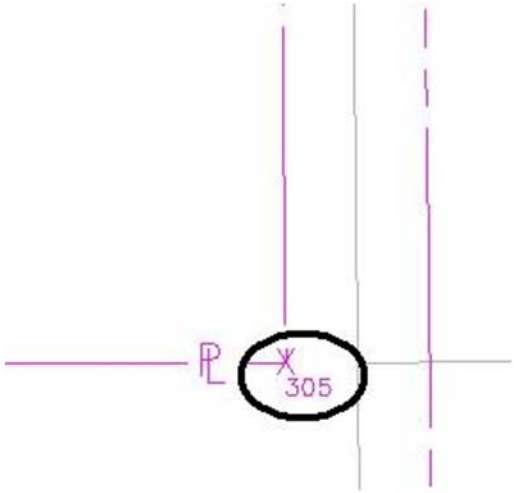
The Locate Results dialog appears.

Enter:

- ***Seed Name: 305***
- ***Description: SE Cor SBP @ CR 303***
- ***Style: RW_ROW-Line_ex***



1. **<D> Accept** - to create the final Cogo point at the Southeast corner of the plat.



2. Toggle the geometry snap ***Off*** 

Note: It is good practice to leave geometry snaps off except when explicitly required.

LAB 11 - Creating a Closed Alignment

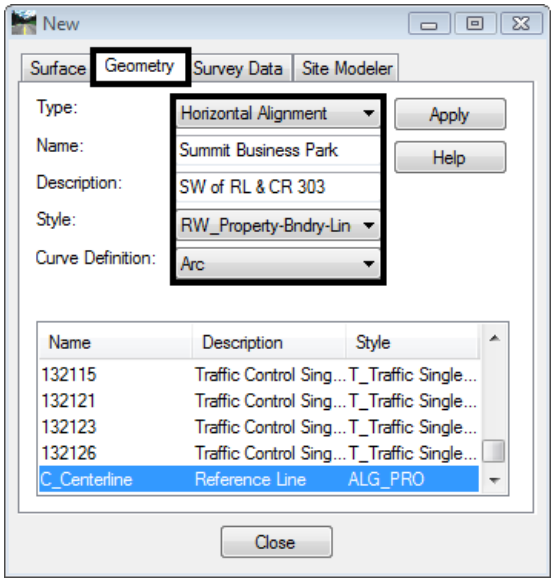
Chapter Objectives:

- Create Cogo points through various Intersection Commands
- Generate Alignments from Cogo Points

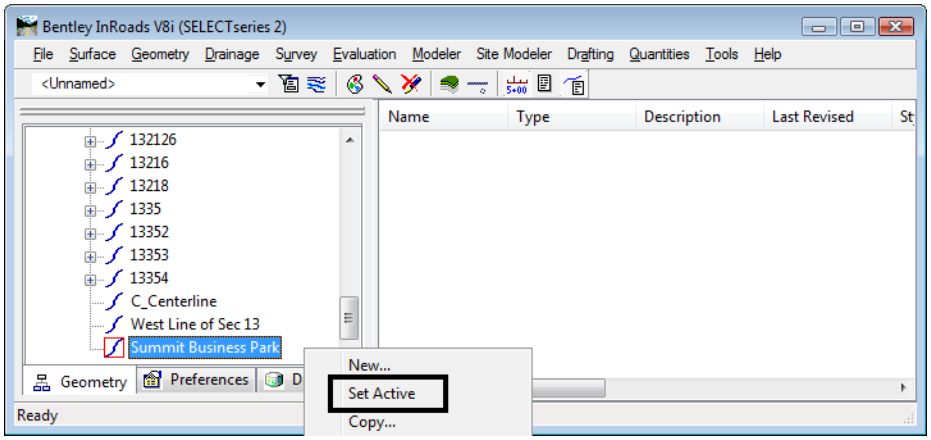
The plat of Summit Business Park has the 4 corners defined by Cogo points. Creating a closed alignment using the PI Method to represent the boundary of the plat will facilitate right of way creation.

Create a new horizontal alignment named ***Summit Business Park***.

1. Select **File > New >** ***[Geometry]***
2. ***Type: Horizontal Alignment***
3. ***Name: Summit Business Park***
4. ***Description: SW of int. of RL & CR 303***
5. ***Style: RW_Property-Bndry-Line_ex***
6. ***Curve Definition: Arc***
7. **<D> Apply**

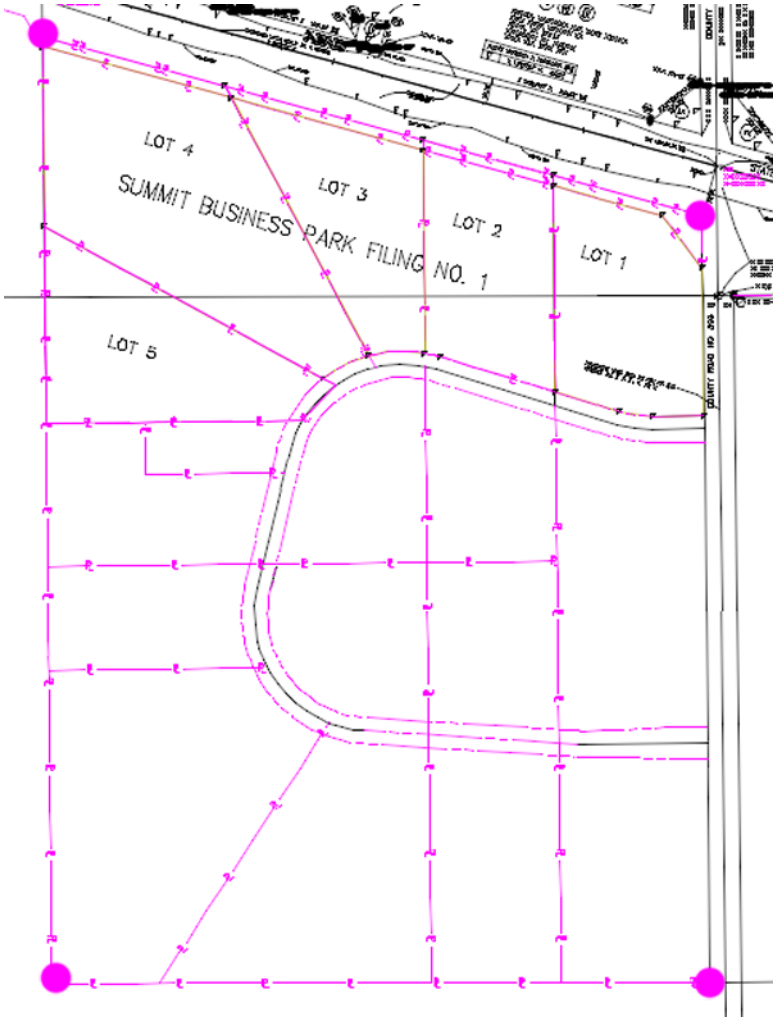


8. Set the active horizontal alignment: ***Summit Business Park***

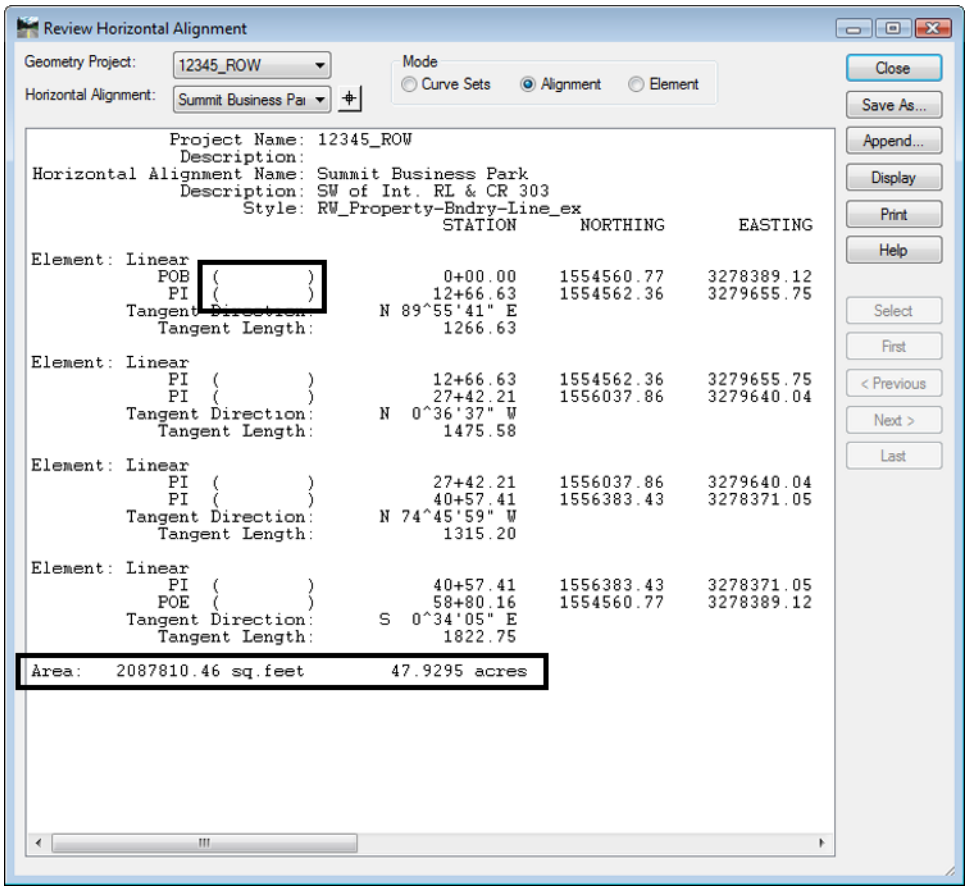


9. Select **Geometry > Horizontal Curve Set > Add PI**

10. You are Prompted to: ***Identify Alignment End***



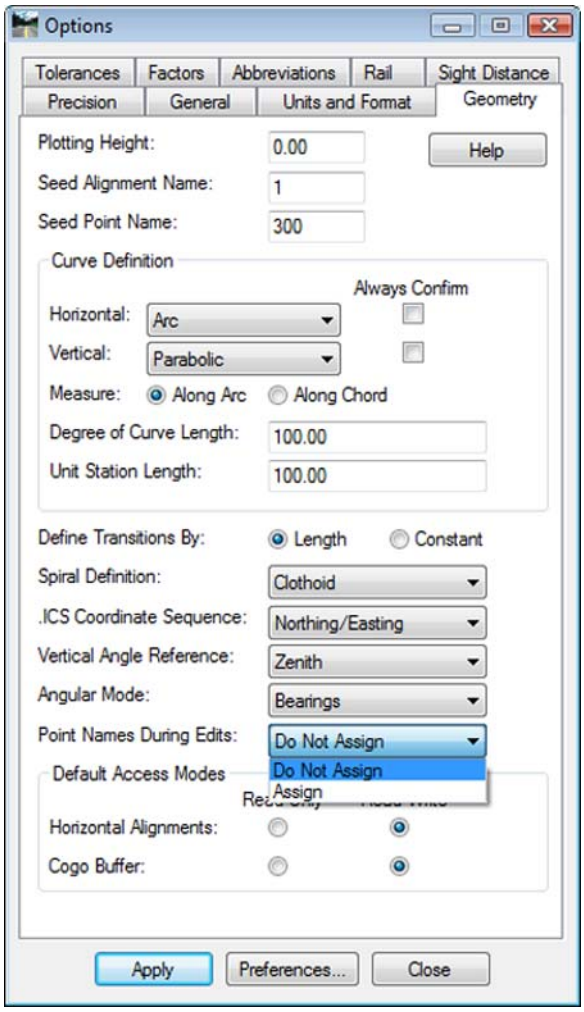
11. Toggle ***On*** the geometry Point snap 
12. Select the plat corners in a counter-clockwise direction
13. **<D>** near the ***SW*** corner of the plat (defines the POB)
14. **<D>** near the ***SE*** corner of the plat
15. **<D>** near the ***NE*** corner of the plat
16. **<D>** near the ***NW*** corner of the Plat
17. **<D>** near the ***SW*** corner of the plat (defines the POE)
18. **<R>** to cancel point selection, **<R>** to terminate the command
19. Toggle ***Off*** the geometry point snap 
20. Select **Geometry > Review Horizontal** to verify the contents of the alignment.



Note: Notice the lack of point names (or Cogo numbers) in the parentheses. Also note the parcel area information is displayed and the alignment is dynamically highlighted on the screen.

21. Close the Review Horizontal Alignment dialog

The population of the name/number field is contingent on the settings under **File > Project Options [Geometry]** at time of geometry creation.

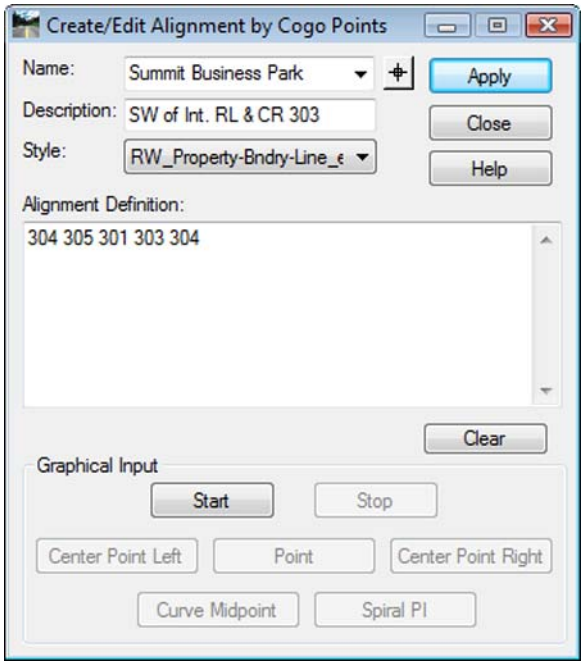


Geometry Verification

As seen above, the Cogo points selected to define the alignment are not necessarily a part of the definition of the alignment. To rectify this, 2 possible solutions exist. Firstly, the Create/Edit Alignment by Cogo Points command could have been used to generate the alignment initially. Secondly, this same command can be used to assign and verify the alignment.

1. Select **Geometry > Utilities > Create/Edit Alignment by Cogo Points**

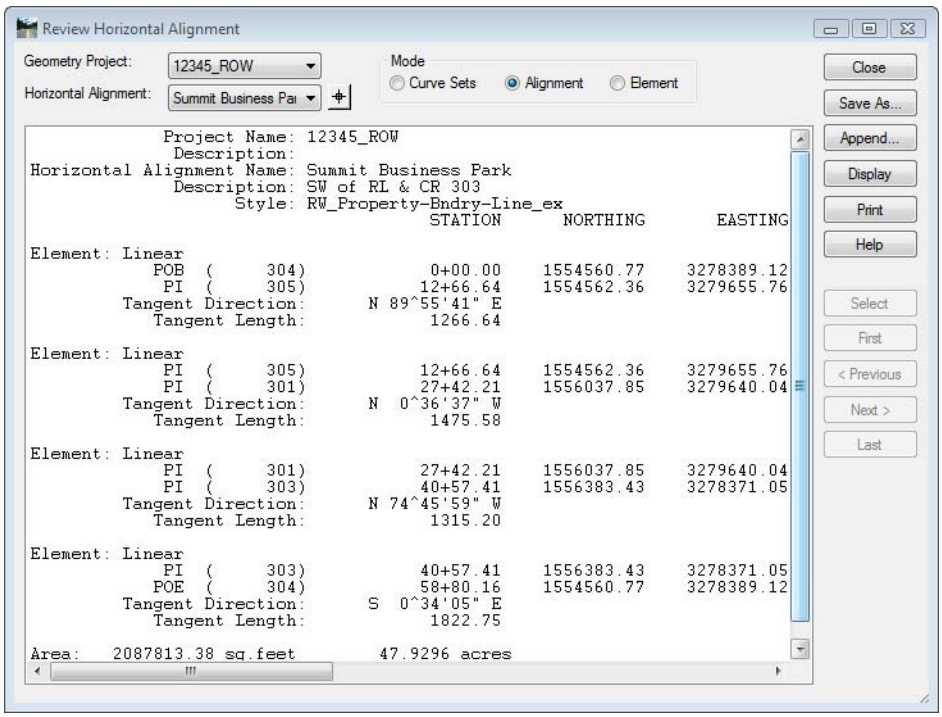
2. **<D> Yes**



The alignment is associated with the selected Cogo Points.

3. Edit points as necessary.

4. **<D> Apply** – verify results by reviewing the alignment.

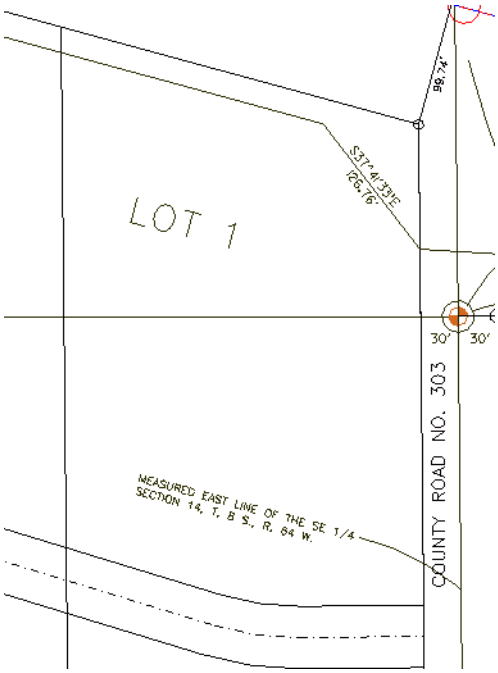


LAB 12 - Parcel Creation by Deed

Lot number 1 lies at the Northeast corner of the Summit Business Park plat. Right of way acquisition will occur along the northerly limits of the plat. A parcel needs to be created from the deed information for lot 1.

Chapter Objectives:

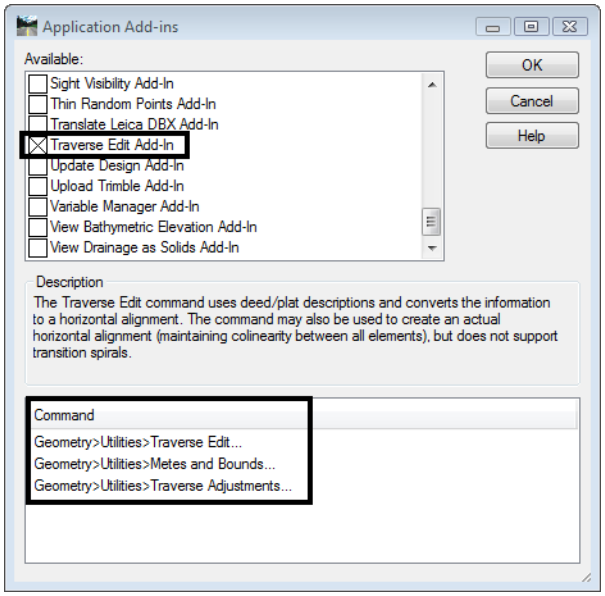
- Create a closed parcel
- Use Traverse Edit Add-In application



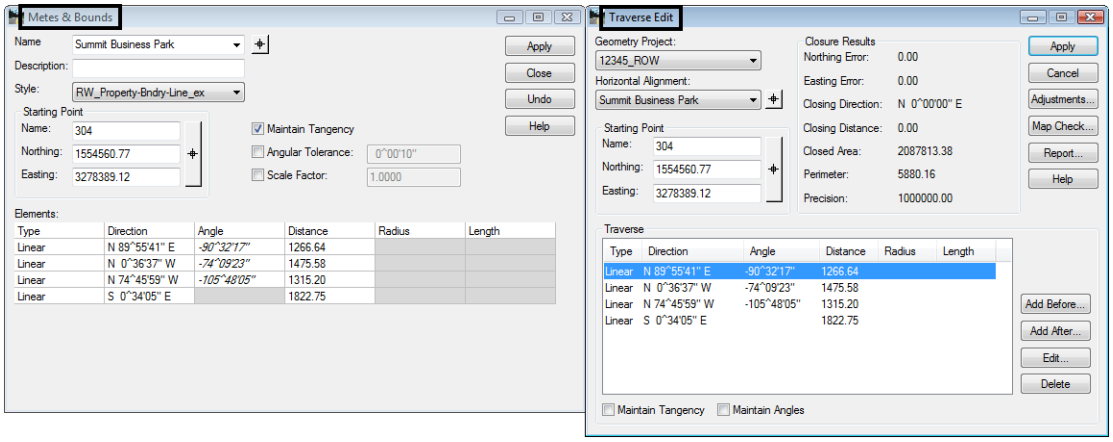
To create the parcel (closed alignment) for lot 1, the InRoads command **Geometry > Traverse** could be used. Another solution is to use the Traverse Edit command. Traverse Edit is an Application ADD-In command and must be enabled. In addition to allowing traversing, the traverse edit command reports on parcel closure and provides adjustment commands. Additionally a Mets and Bounds command could be used.

1. Using ***InRoads***, select: **Tools > Application ADD-Ins…**
2. Toggle **On** the ***Traverse Edit Add-in***

3. **<D> OK**



Note: When enabling the Traverse Edit Add-In, the Metes & Bounds and Traverse Adjustments command are also enabled.



These commands provide similar functions. The Metes & Bounds dialog is presented in a table format and edits can be accomplished directly in the dialog. Traverse adjustment can be accomplished by selecting Geometry > Utilities > Traverse adjustment. The Traverse edit dialog provides input, edits, and adjustment in a single dialog.

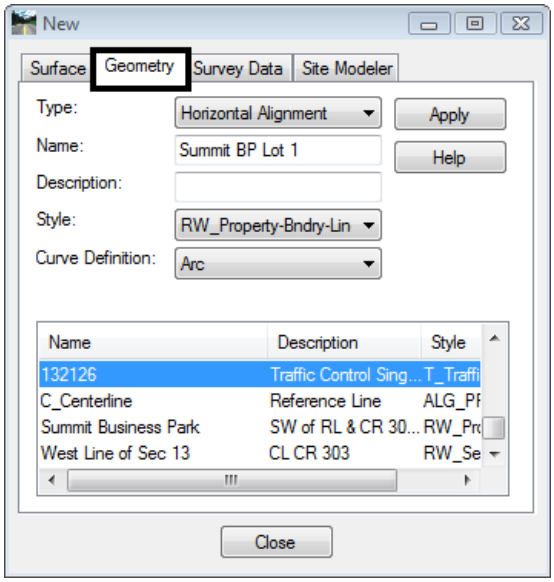
Note: The Traverse edit command will be used in this lab and requires an alignment to exist prior to populating the alignment. The Metes & Bounds dialog allows creation of an alignment in the dialog.

Create an alignment to store Lot number 1.

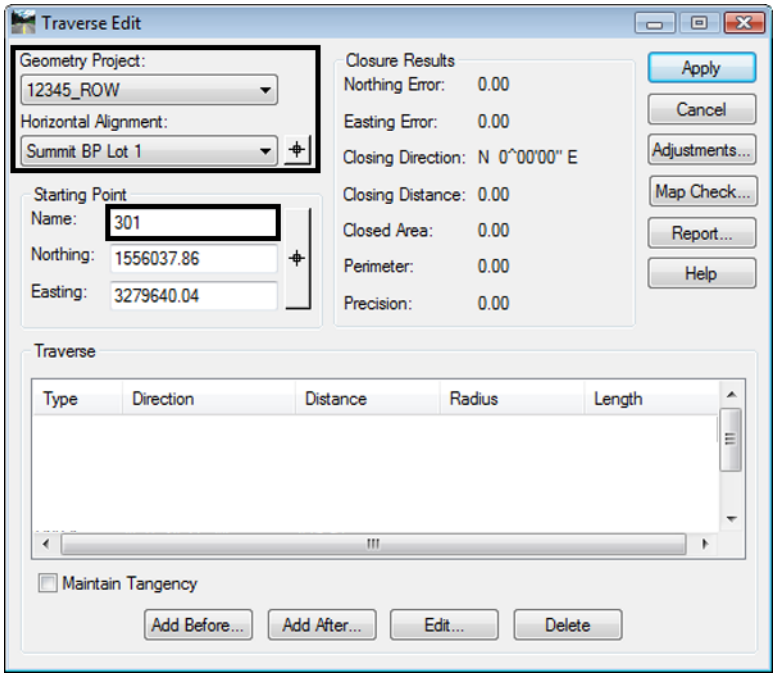
4. **File > New > [Geometry]**, Select the Geometry tab and input:

5. ***Type: Horizontal Alignment***

6. ***Name: Summit BP Lot 1***
7. ***Description: Lot 1 of Summit Business Park***
8. ***Style: RW_Property-Bndry-Line_ex***
9. **<D> Apply**



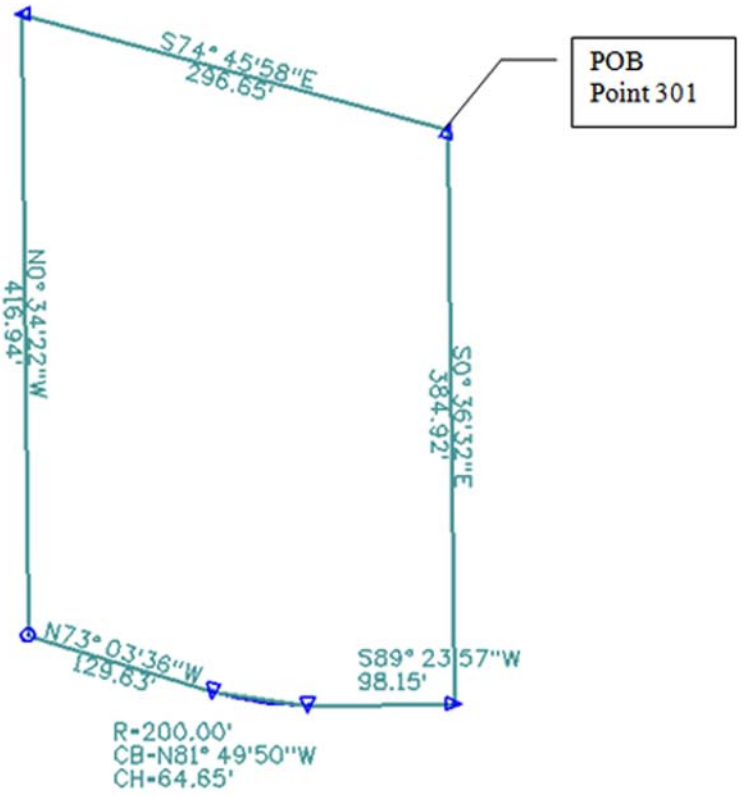
10. Select **Geometry > Utilities > Traverse Edit** to open the Traverse Edit dialog box.
11. Set the fields for the ***Geometry Project*** and ***Horizontal Alignment***.
12. Key-in: ***301*** for the ***Starting Point*** (Cogo point 301 is located at the NE corner of lot 1).



13. ***Lot 1 is described as:***

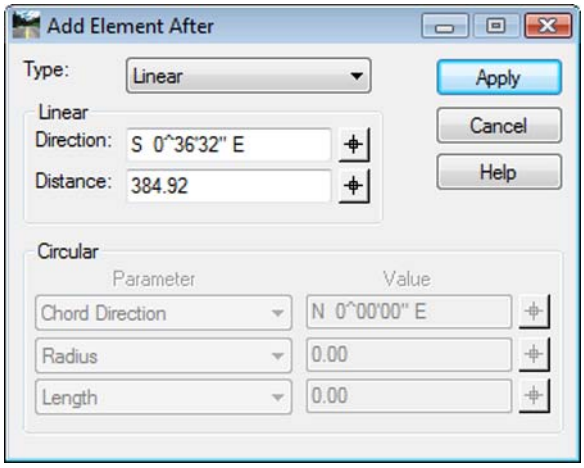
    Commencing at the West ¼ corner of Section 13, Township 8 South., Range 64 West. Thence along said section line N 0-37-05 W, 154.14 feet. Thence departing from said section line S 89-22-55 W, 30.00 feet to the westerly right-of-way line of County Road 33 and the Point of Beginning.

    1. Thence S 0-36-32 E, to the northerly right of way line of Summit Business Park Road, 384.92 feet.
    2. Thence along said right of way line, S 89-23-57 W, 98.15 to a point of curvature.
    3. Thence N 81-49-50 W, 64.65 feet along the chord of said curve, having a 200.00' radius to the right.
    4. Thence N 73-03-36"W, 129.63 feet. Thence departing from Summit Business Park Road, N 0-34-22 W to the southerly right of way line of S.H. 86, 416.94 feet.
    5. Thence along said right of way line, S 74-45-58 E, 296.65 to the point of beginning.

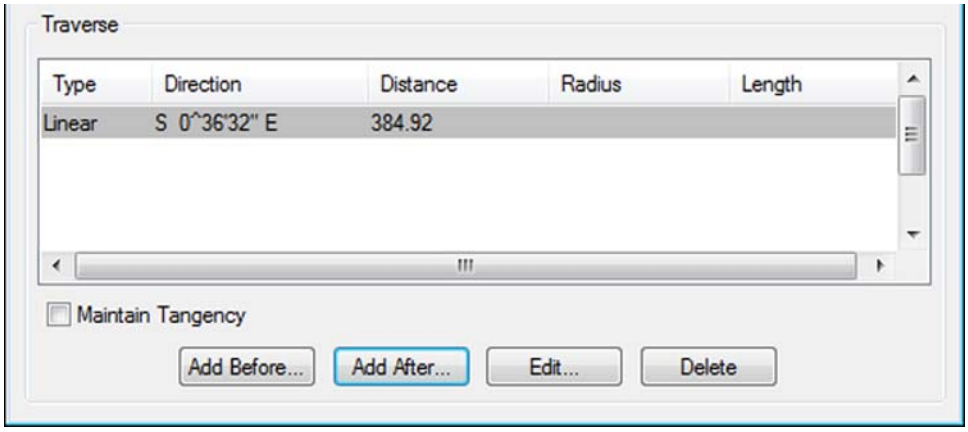


14. **<D>** the **Add After** button on the Traverse Edit dialog.
15. Set ***Type: Linear***

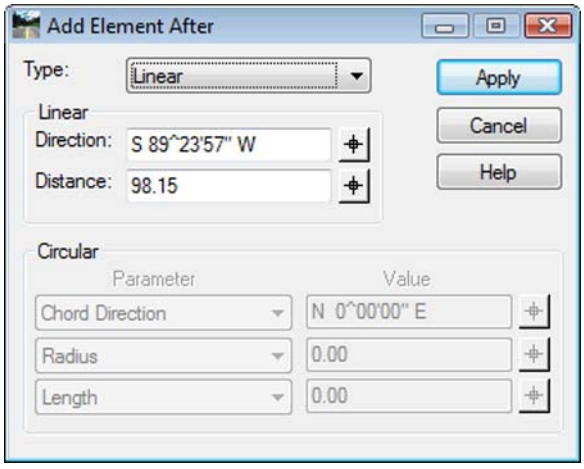
16. Input the **Direction** and **Distance** for the first course as shown.



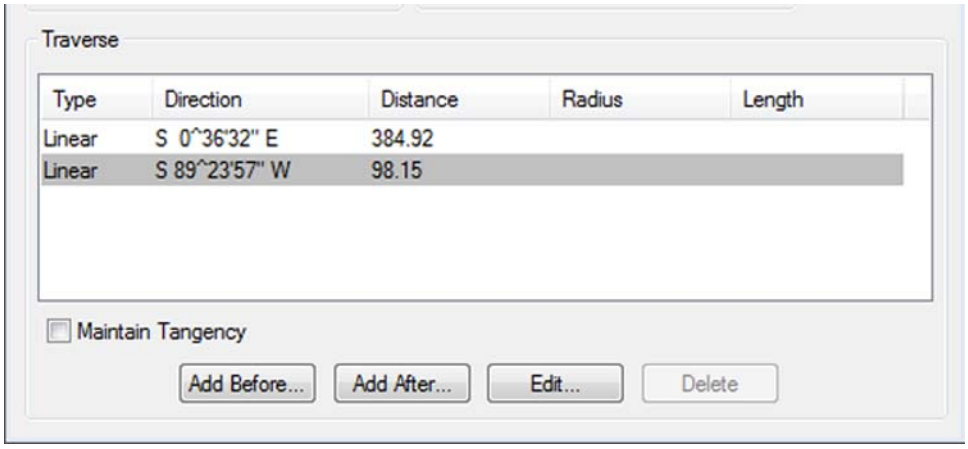
17. **<D> Apply** - the course is added to the alignment.



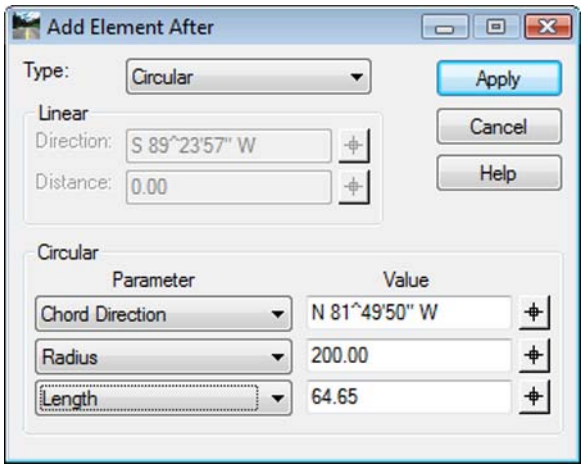
18. ***Input*** the second Course.



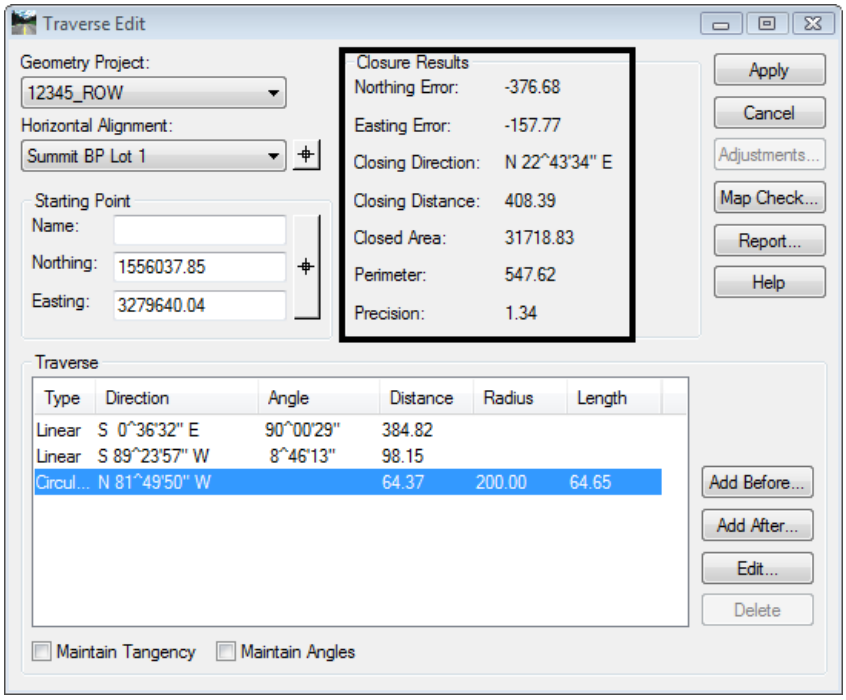
19. **<D> Apply** - the second course is added to the alignment.



20. ***Input*** the third course – change ***Type:*** **Circular**

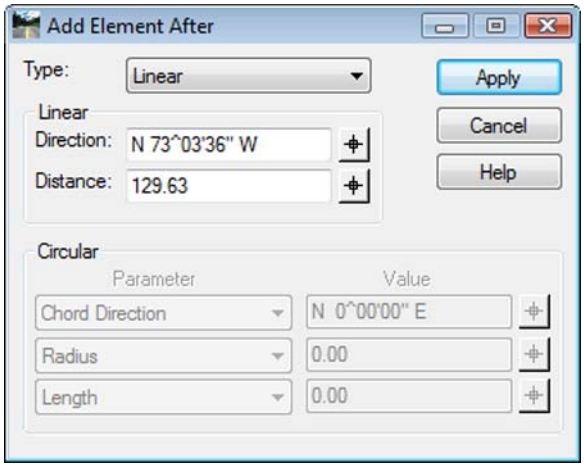


21. **<D> Apply** - the third course is added to the alignment.

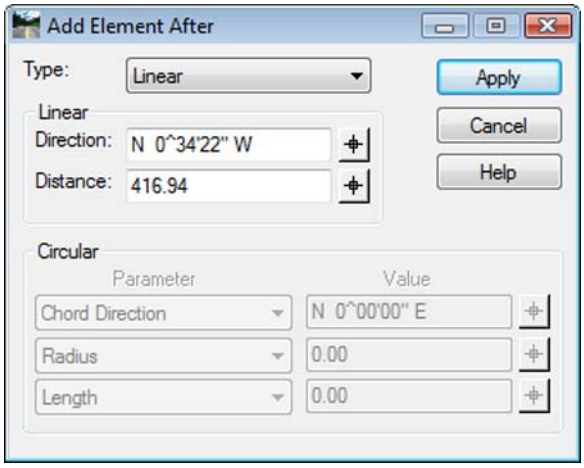


Note: As courses are entered, the parent dialog displays closure results.

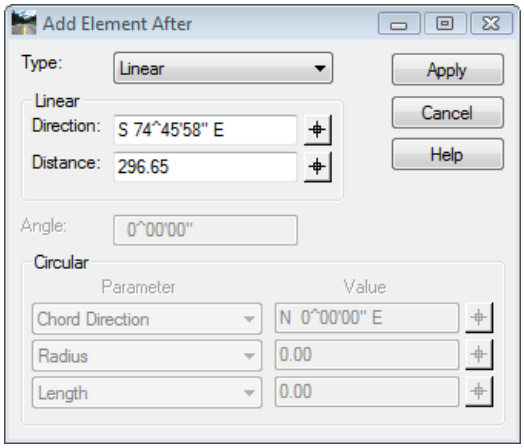
22. ***Input*** the fourth course and **<D> Apply**



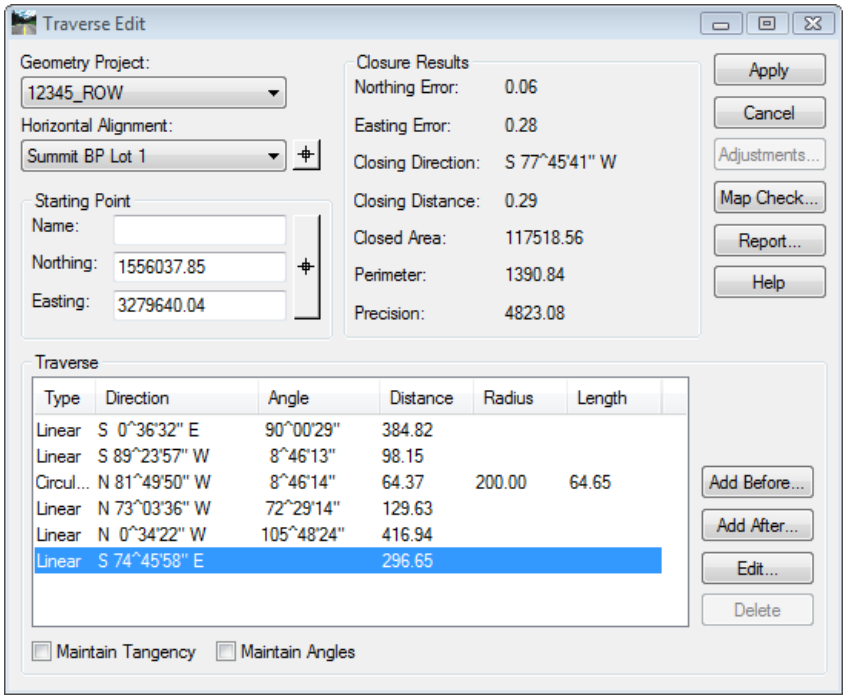
23. ***Input*** the fifth course and **<D> Apply**



24. ***Input*** the sixth and final course and **<D> Apply**



25. Review Closure Results in the parent dialog.



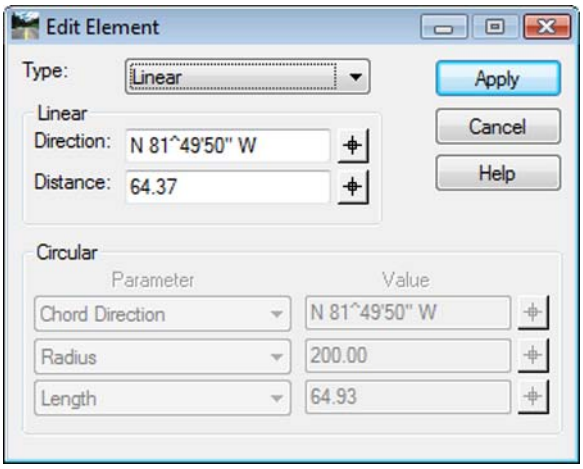
26. **<D> Apply** to create the alignment.

Note: The Report button on the dialog can be used to summarize the alignment. The report can be written to a text file.

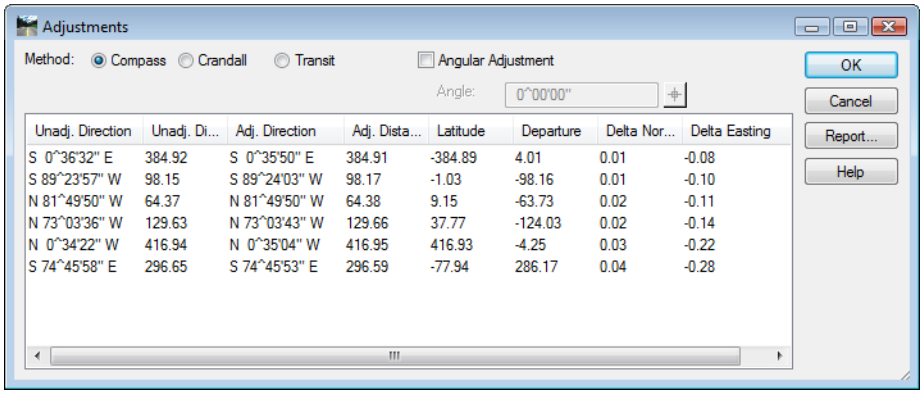
The Adjustments button on the Traverse Edit dialog is dithered. If the alignment contains circular elements, adjustments are not enabled.

Challenge Lab:

- Edit the record containing the curve by **<D>** on it and selecting **Edit**
- Change the record type to **Linear**
- Input the chord Direction and an the chord distance (which is incorrect) **<D> Apply**



- **Close** the ***Edit Element*** dialog
- **<D>** on the ***Adjustments*** button



Select the appropriate Method

<D> OK to apply the selected adjustment

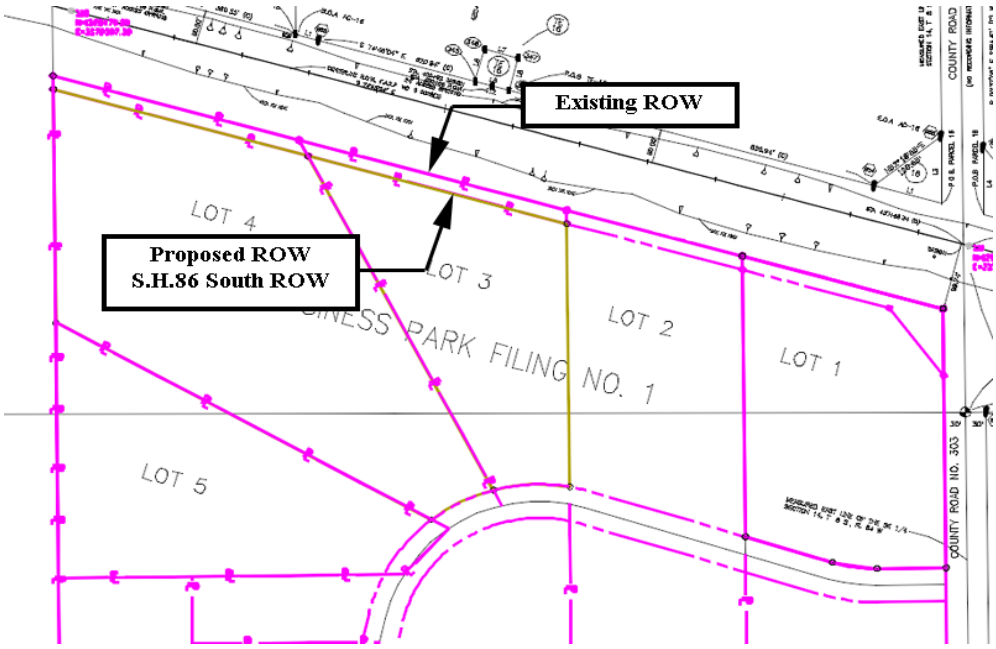
Note: The columns for Unadjusted and Adjusted values. As the various radio buttons for method are selected, the adjusted values update providing a preview of potential solutions.

LAB 13 - Right of Way Parcels

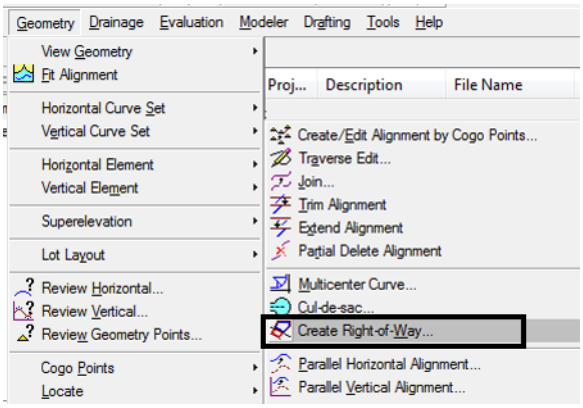
InRoads has a utility to create additional parcels (closed alignments) from existing parcels and crossing alignments. As illustrated below, lots 1-4 have been created and the proposed right of way indicates required right of way acquisition along the northerly limits of the lots.

Chapter Objectives:

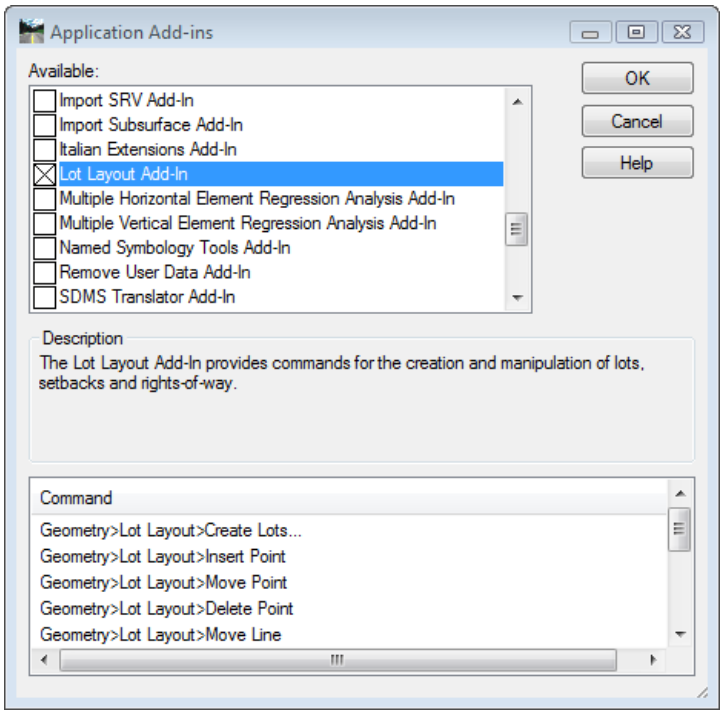
- Create a closed alignment from existing alignments



The command used for this exercise is another application ADD-In and is added to the **Geometry > Utilities** menu. The **Create Right-of-Way** menu item is a subset of the Lot Creation application.



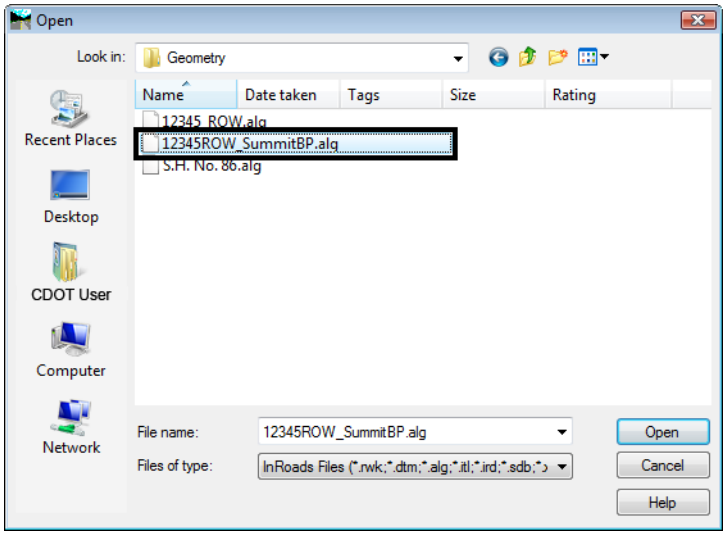
If you do not see the **Create Right-of-Way** option, go to **Tools > Applications Add-Ins** and activate **Lot Layout Add-In**.

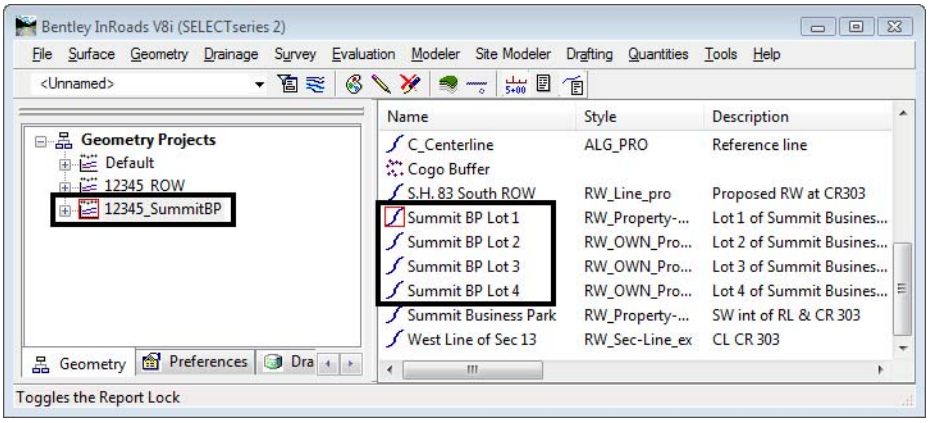


Parcels have been created for Lots 1-4 and stored in the Geometry Project **12345_SummitBP**. Load this geometry project from the folder:
C:\Projects\12345\ROW Survey\InRoads\Geometry

1. **File > Open** – Open the Geometry folder noted above.

2. ***Load*** the **12345_SummitBP.alg** file.



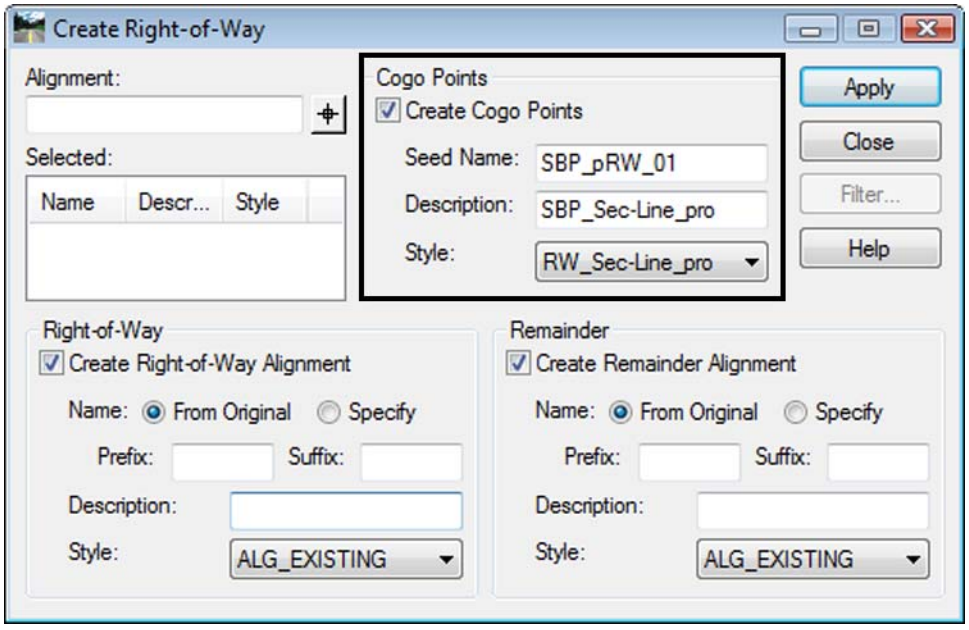


3. Select **Geometry > Utilities > Create Right-of-Way**

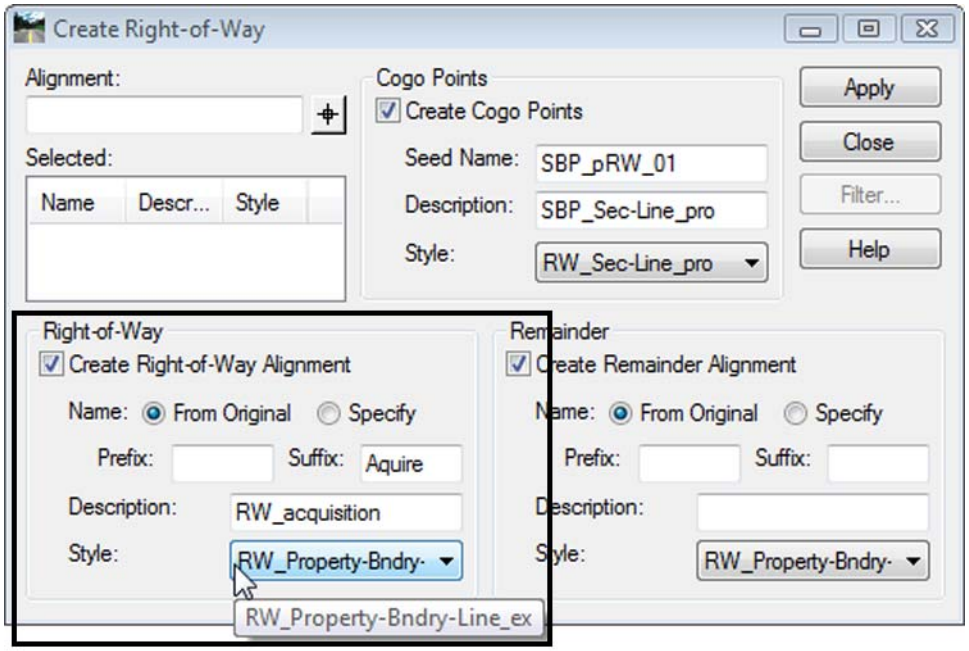
Dialog Settings:

- **Alignment** (selected) - Original parcels impacted by ROW acquisition
- ***Cogo Points*** - If enabled, will create Cogo points at the intersection of the proposed right of way and existing lot lines
- ***Right of Way*** - If enabled, creates parcels representing the acquisition area
- ***Remainder*** - If enabled, creates parcels representing the remainder of the selected lots

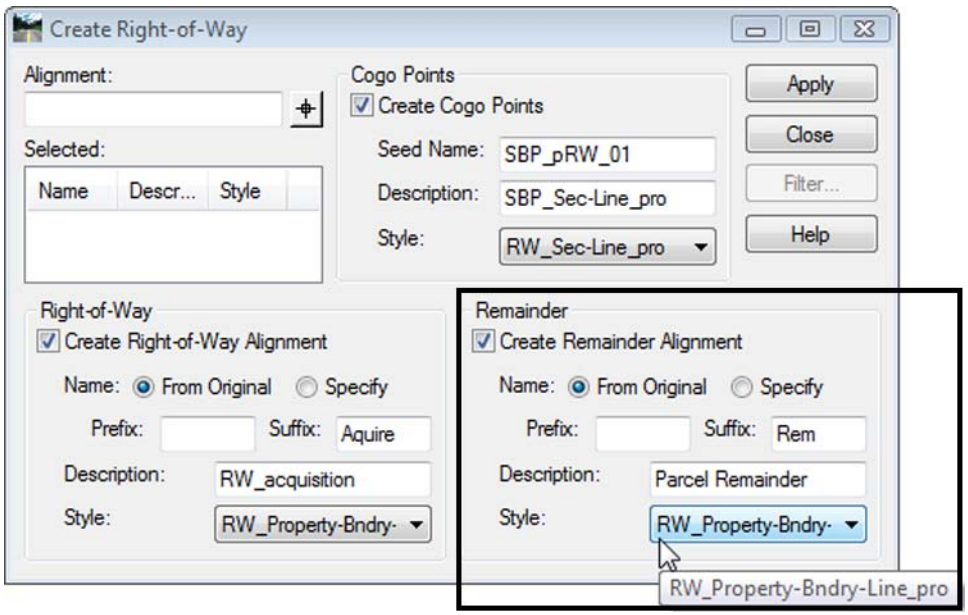
4. Complete the ***Cogo Points*** section as shown.



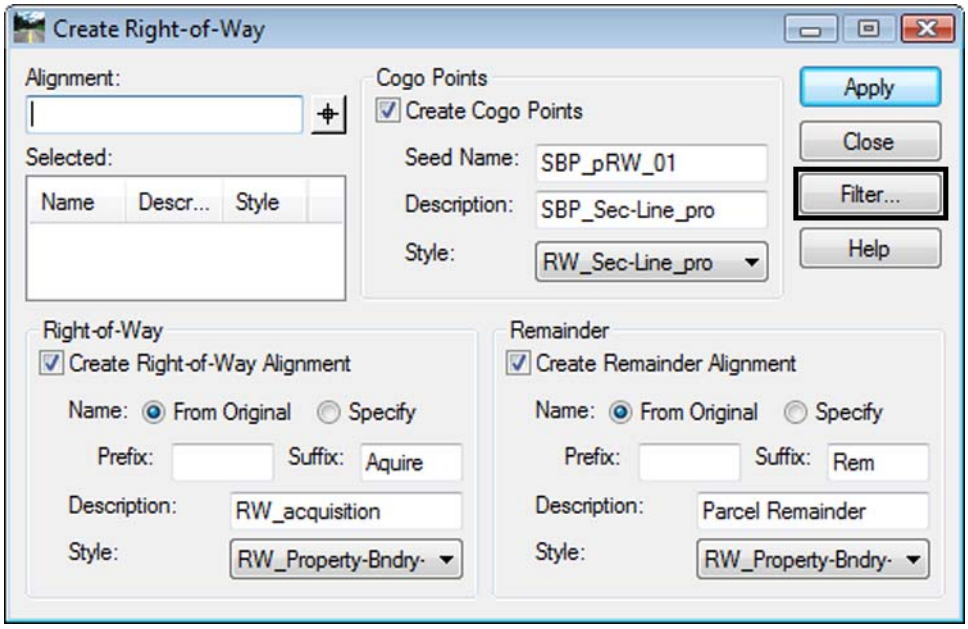
5. Complete the ***Right-of-Way*** section as shown.



6. Complete the ***Remainder*** section as shown.



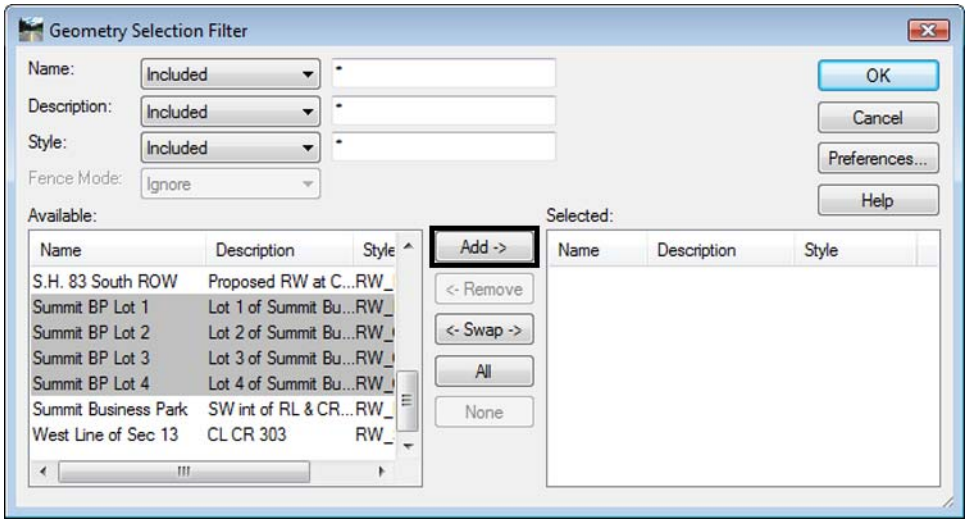
7. **<D>** in the Alignment field and then **<D>** on the ***Filter*** button.



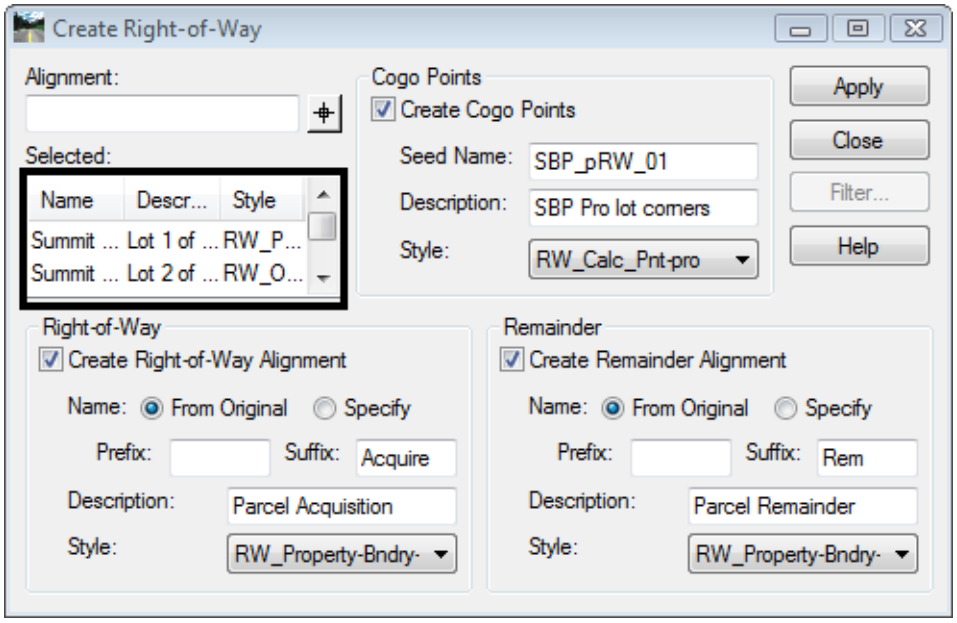
8. Under the Available column, select **Summit BP Lots 1-4**.

9. **<D>** the **Add** button.

10. <D> OK

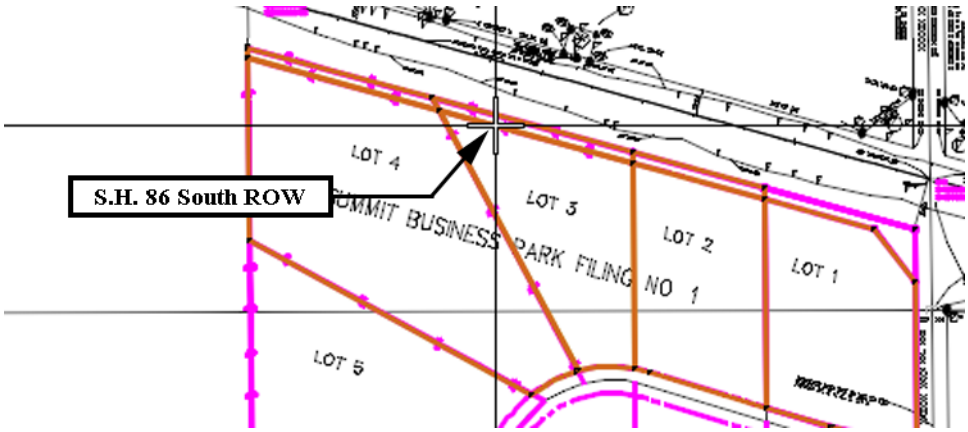


11. The parcels are added to the list.

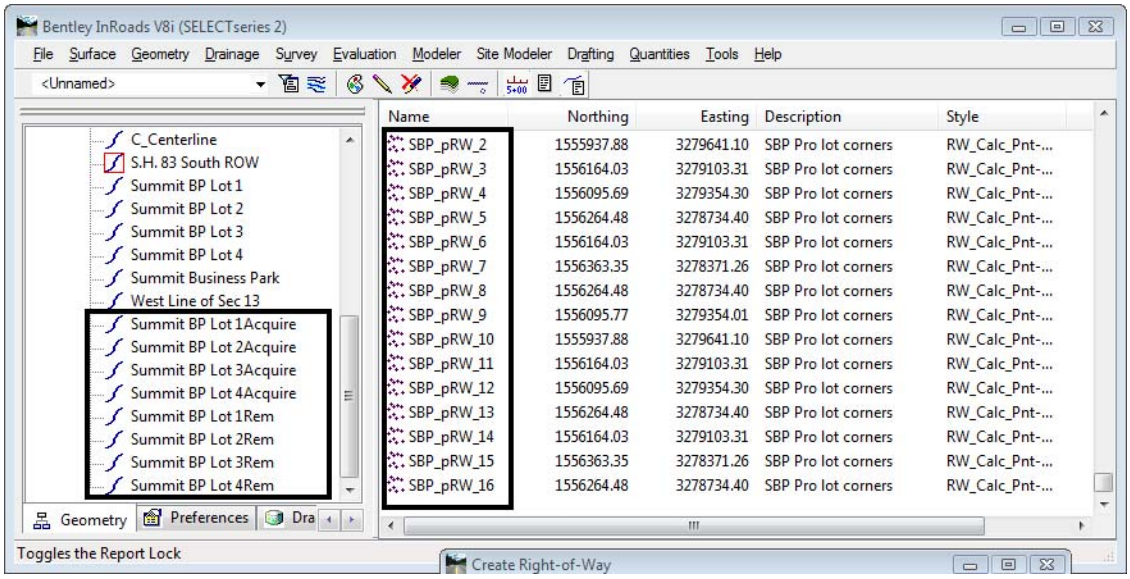


12. **<D> Apply** - you are prompted to identify the Right of Way Alignment.

13. **<D>** on the alignment **S.H. 86 South ROW** - parcel previews will highlight



14. **<D>** inside any acquisition parcel to define which side of the identified alignment the acquisition parcels lay - the parcels and Cogo points are then created.



LAB 14 - Annotation of Closed Parcels

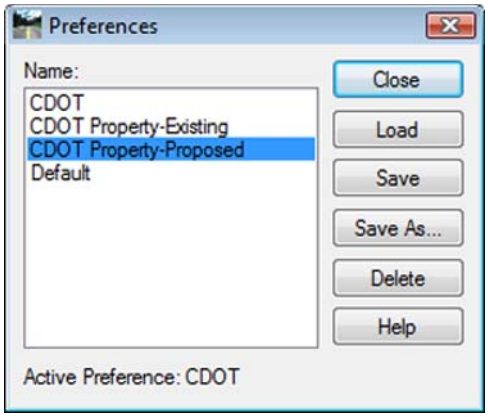
Parcel information can be annotated in the MicroStation drawing using InRoads geometry commands.

Chapter Objectives:

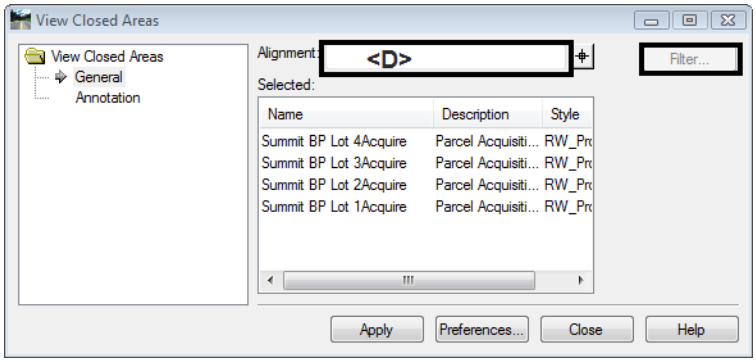
- Annotate traverse information

The InRoads command used for this exercise is located on the **Geometry > View Geometry** menu.

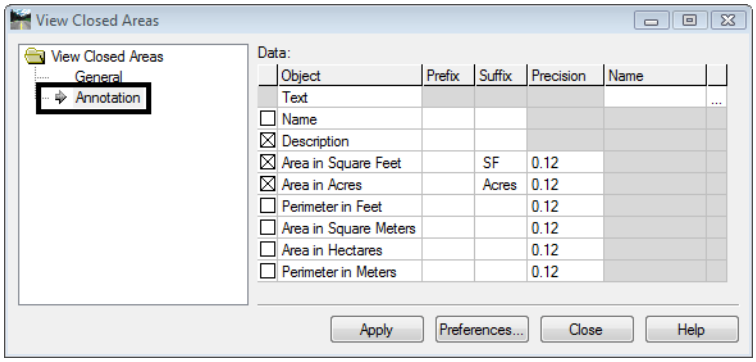
1. Select **Geometry > View Geometry > Closed Areas**
2. **<D>** the **Preferences** button.
3. Load the settings for proposed parcels.



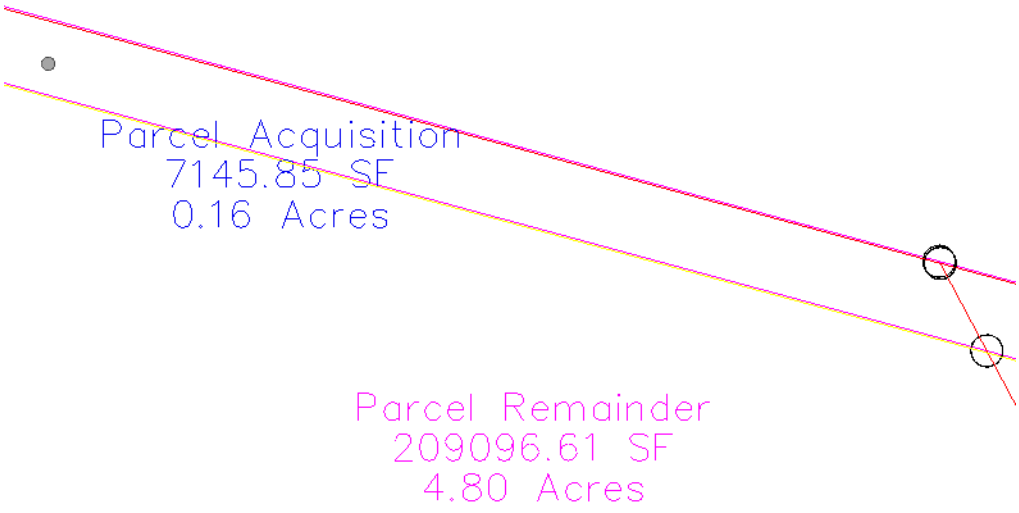
4. Define the acquisition parcels for annotation. Use the filter the select the alignments. Enter a data point in the ***alignment*** field and the filter button activates.

5. 

6. Toggle ***On*** the desired information in the ***Annotate*** section, **<D> Apply**



7. Repeat steps 2-5 for the Remainder parcels using the Property-Existing Preference.



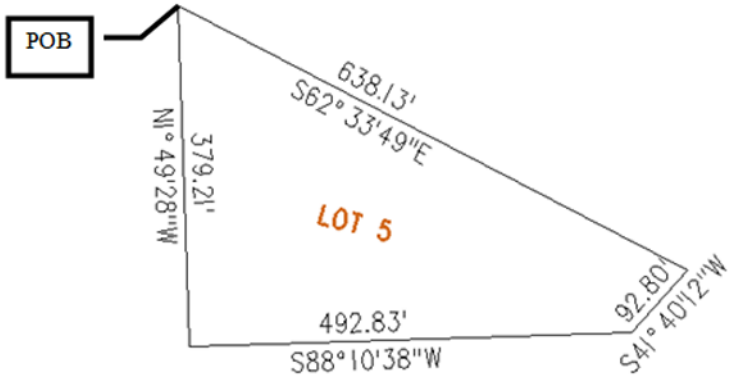
8. Toggle on ***all*** the **Annotate** radio buttons, **<D> Apply** - the graphics refresh.

Note:

- There are saved preferences in the **View Closed Area** dialog for existing vs. proposed annotation
- The number of decimal places, prefix, and Suffix annotation can be input by the user.

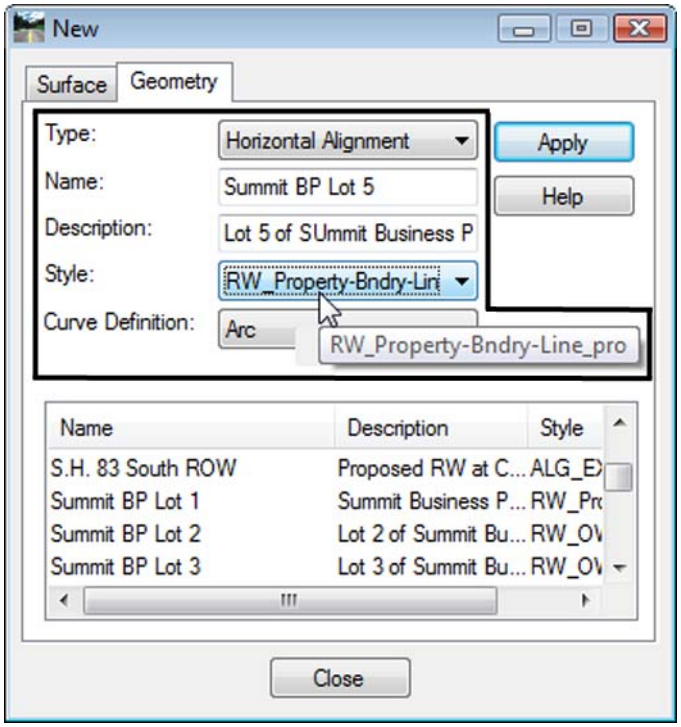
Challenge Exercise – Transforming a parcel

Use the **TravEdit** command to generate a parcel (alignment) for lot 5 of Summit Business Park. The graphic below shows the required courses to create said parcel. Once created, use the **Transform** command to move and rotate the parcel so that the NE line of Lot 5 coincides with the SW line of Lot 4.



Create a Horizontal Alignment to store Lot 5.

1. **Select File > New > [Geometry] – Horizontal Alignment**

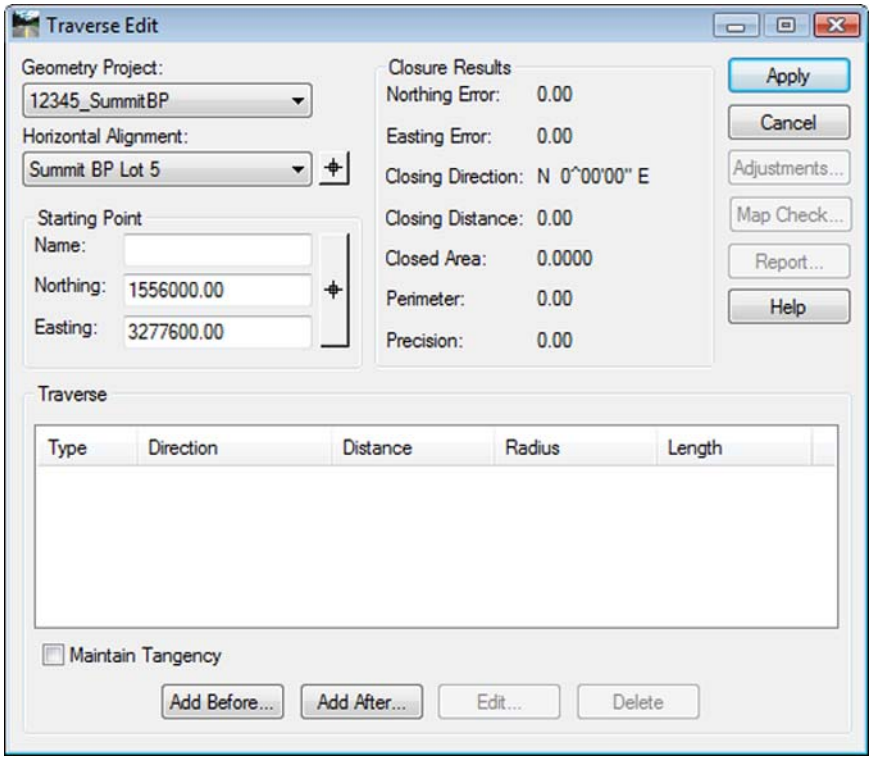


2. Select **Geometry > Utilities > Traverse Edit**

   Assume a starting location (this may be based on a call-out, existing geometry point, or an assumed location).

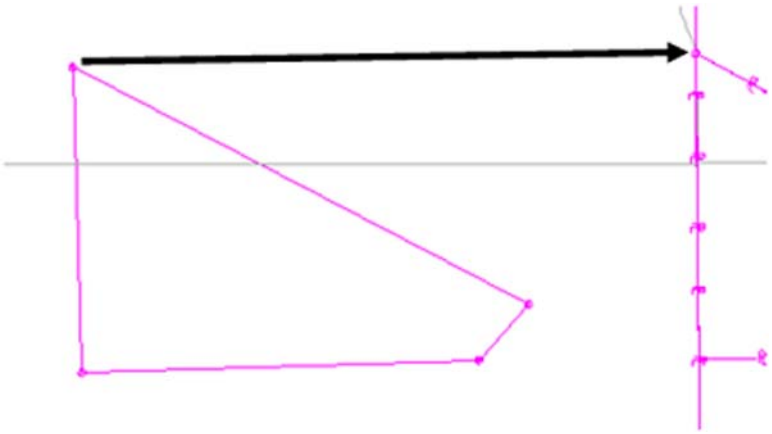
Key-in a Starting Point of: - **DO NOT INPUT COMMAS**
N = ***1,556,000.00***
E = ***3,277,600.00***

Enter clockwise courses beginning with the NW corner of Lot 5.



3. Select **Add After** and input:
   S 62-33-49 E, 638.13
   S 41-40-12 W, 92.80
   S 88-10-38 W, 492.83
   N 01-49-28 W, 379.21

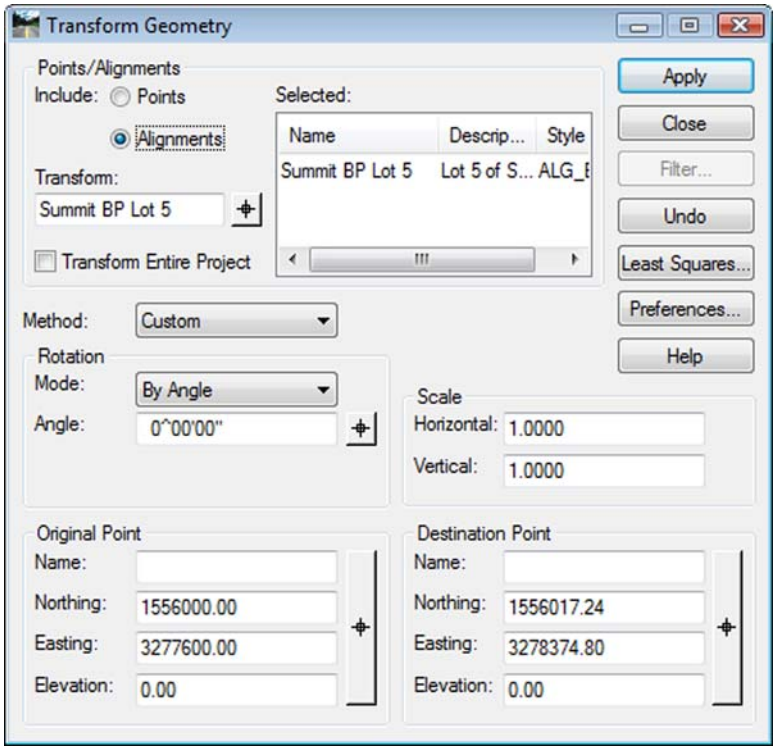
4. **<D> Apply** to create the parcel once all courses have been entered and verified by reviewing the closure results.



The parcel is created to the west of the true location. It also has a slight rotation.

Use the **Transform** command to relocate and rotate the parcel. Do so in 2 steps. First move the parcel, and then rotate it to align with Lot 4.

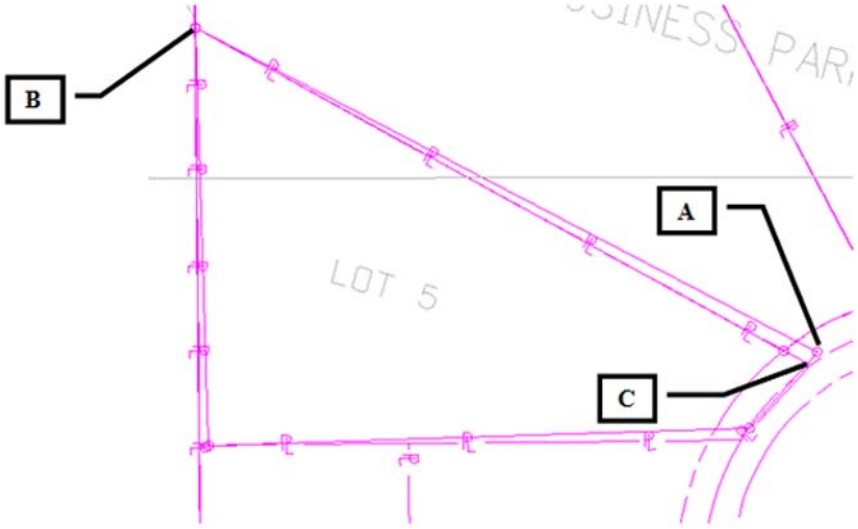
5. Select **Geometry > Utilities > Transform**



6. ***Identify*** the Alignment to transform

7. Identify the ***coordinate values for both the Original & Destination Points***

8. **<D> Apply**

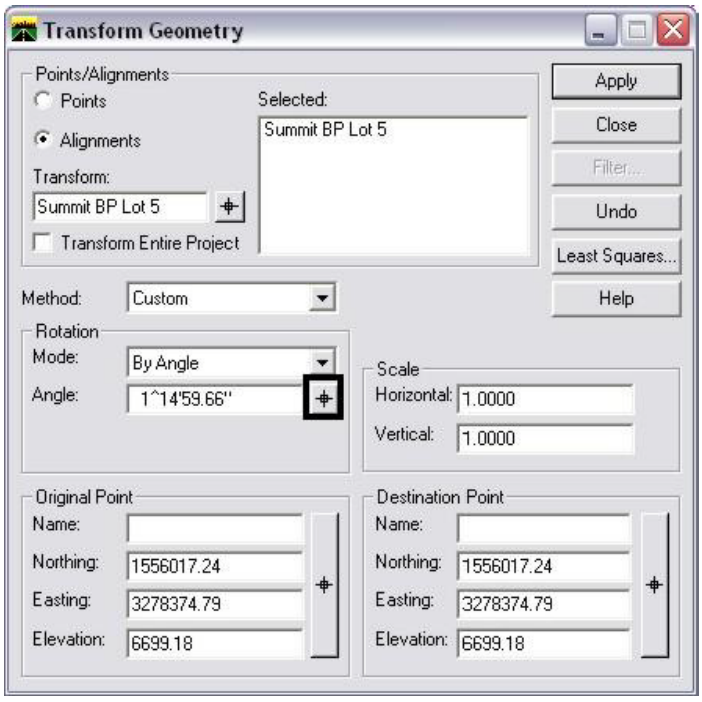


The parcel is relocated but a rotation is evident.

Continuing to use the transform dialog.

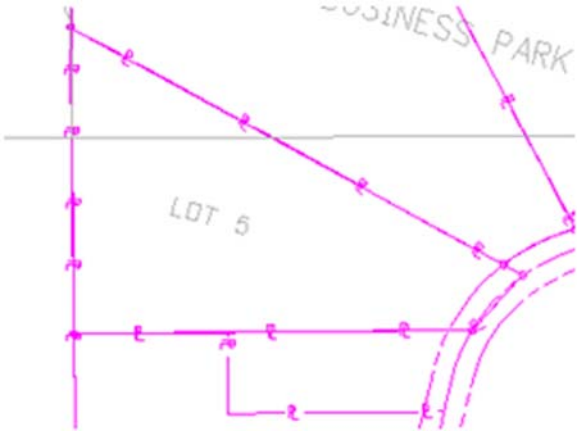
9. ***Set*** the ***Original Point*** and ***Destination Point*** to the ***same value*** (the point to rotate about)

10. ***Identify*** the ***value of rotation required*** by key-in or by using the selection icon to graphically pick points A, B, & C shown above to define the rotation angle.



11. <D> Apply

The parcel (alignment) is transformed.



Important! Verify the results with reports, display, annotation, or other means.

Note: Relocating and rotating the parcel could have been accomplished in a single operation if so desired

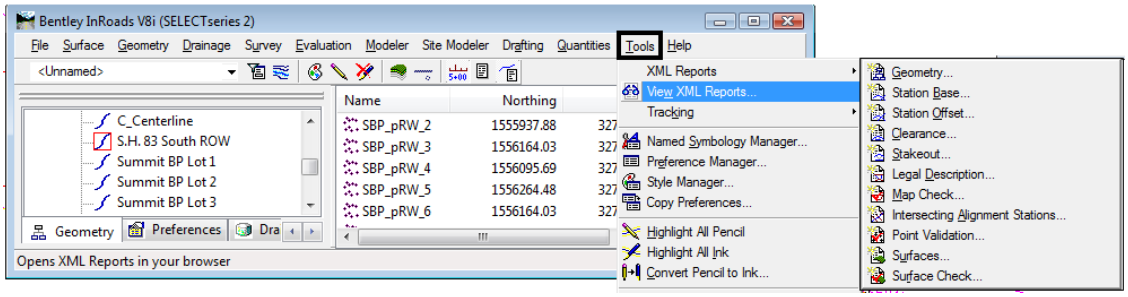
LAB 15 - Parcel Descriptions

The InRoads Report Browser allows the user to view reports using a reporting utility based on the e**X**tensible **M**arkup **L**anguage or more commonly referred to as XML. Like the HTML language used for web development, XML reporting is based on tags and attributes which delineate elements of data. Formatting of XML data is accomplished through the use of XSL, or style sheets and displays in a web browser page.

Chapter Objectives:

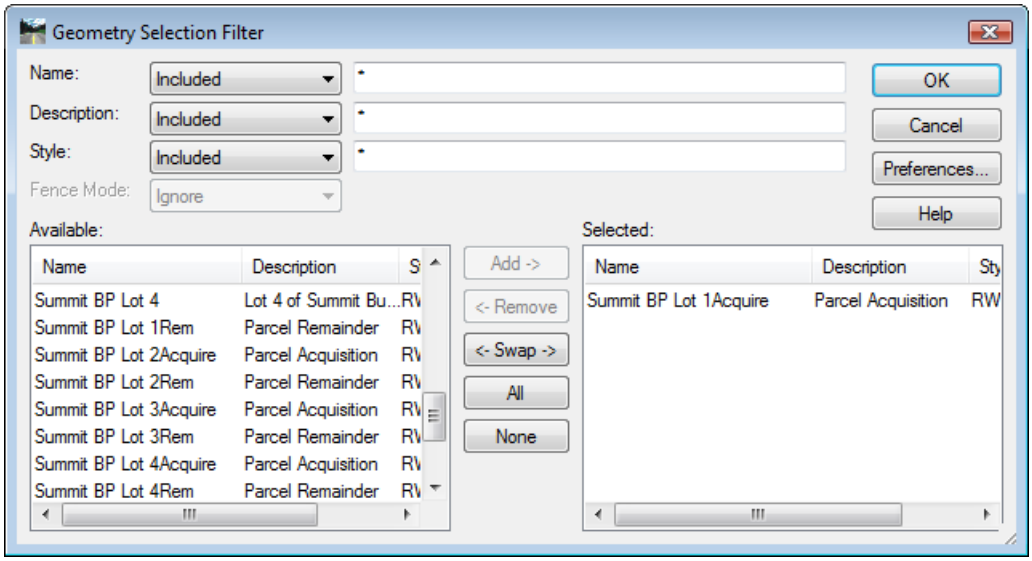
- Create a parcel legal description

1. Select the **Tools > XML Reports** menu item to check the available menu items.



2. Select **Legal Description**

3. **<D>** the ***Filter*** button and add ***Summit BP Lot 1Acquire*** as a ***selected*** alignment.

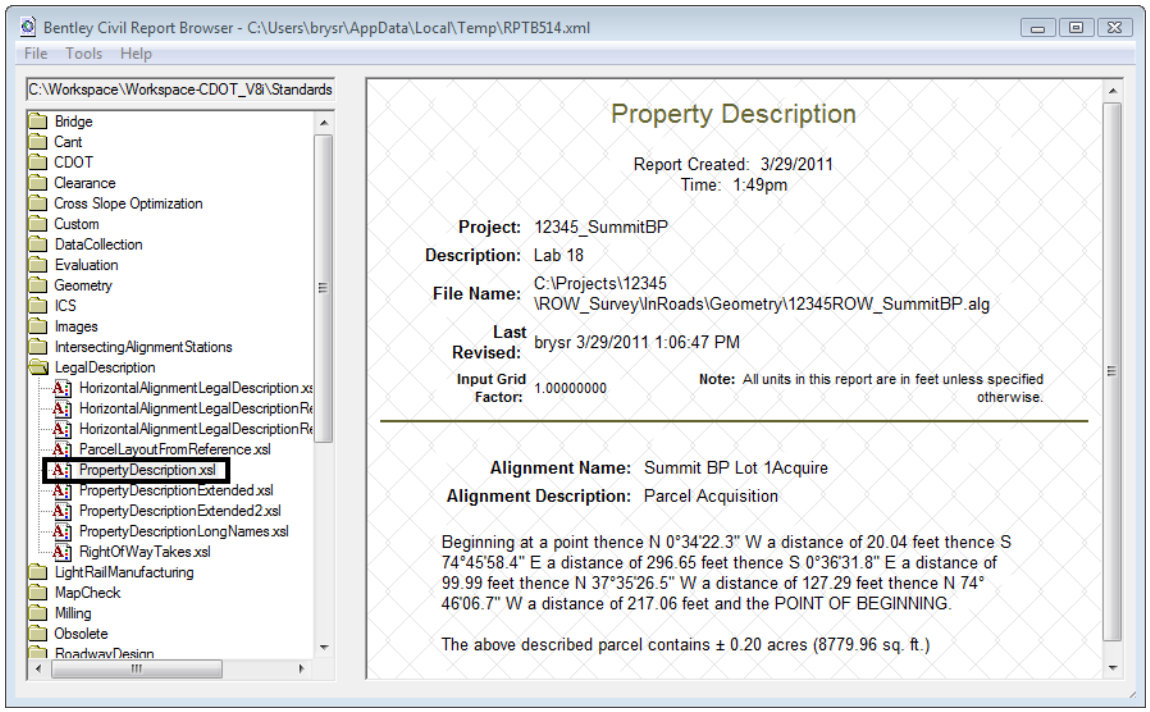


4. **<D> OK**

5. **<D> Apply**

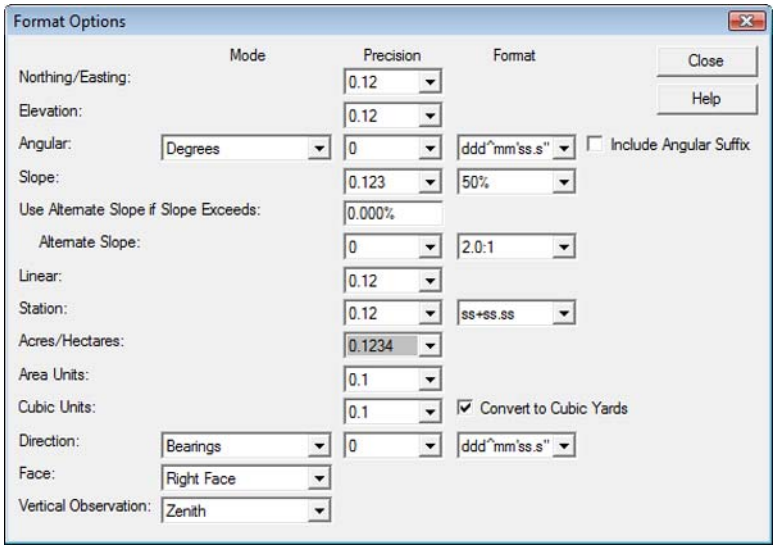
6.

An XML file and a report is created with format and display from an InRoads default style sheet.

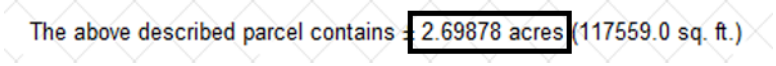


7. **<D>** on the various report styles (*.xsl) displayed in the left panel and notice the change to the format and contents of the displayed report.

8. In the Report display, select **Tools > Format Options**

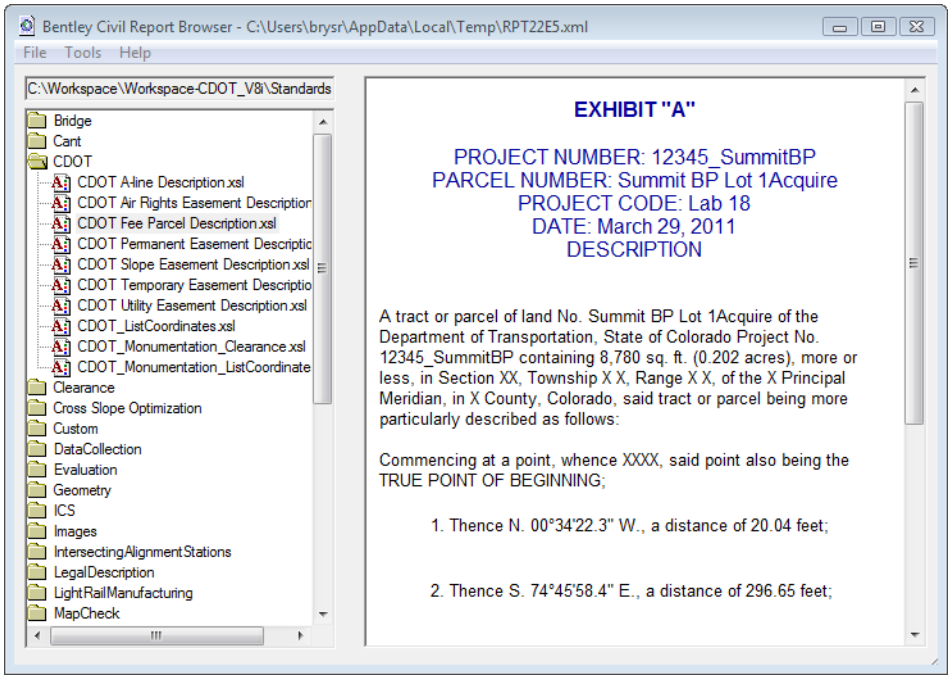


9. **<D> Acres/Hectares:** Set to 5 decimal places - the report updates.



10. ***Change*** any of the fields in the ***Format Options*** dialog and notice the report interactively updates.

11. <D> on the CDOT folder and select the various formats.



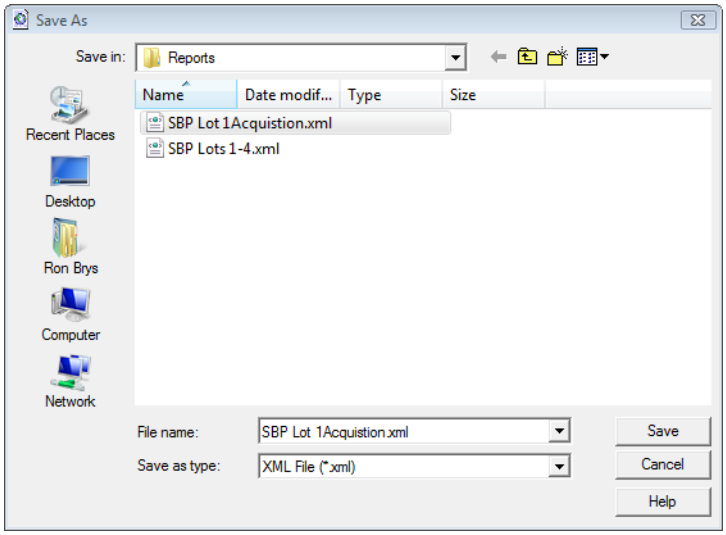
12. In the **Report** display, select **File > Save As...**

    Save As:

    Path: **C:\Projects\12345\ROW_Survey\InRoads\Reports**

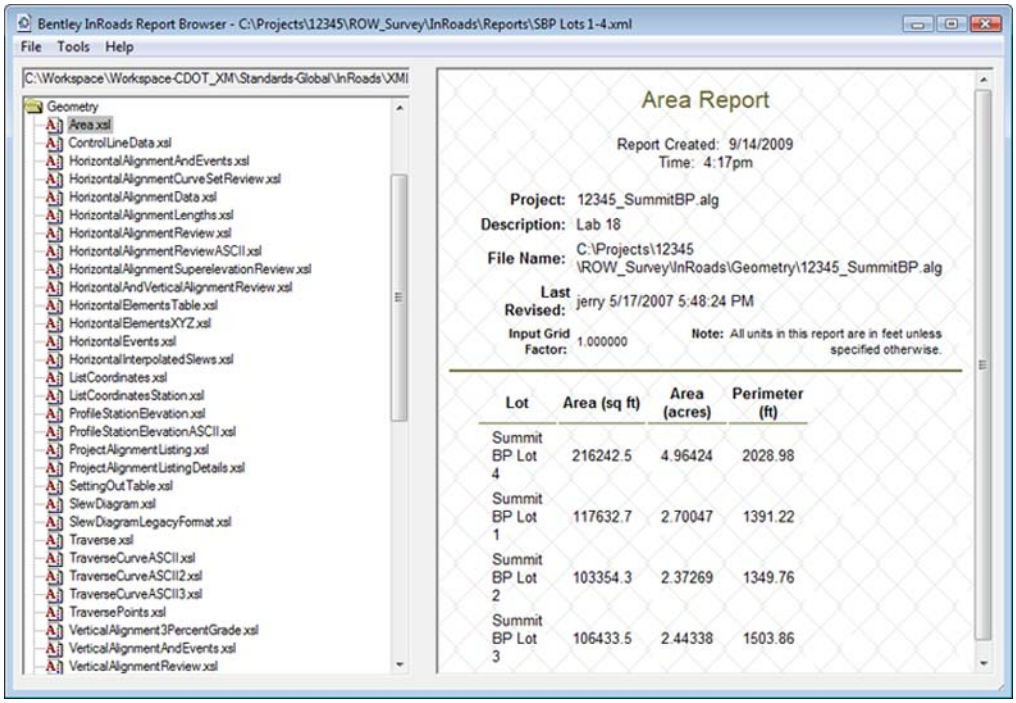
    File Name: **SBP Lot 1Acquistion.xml**

13. <D> Save



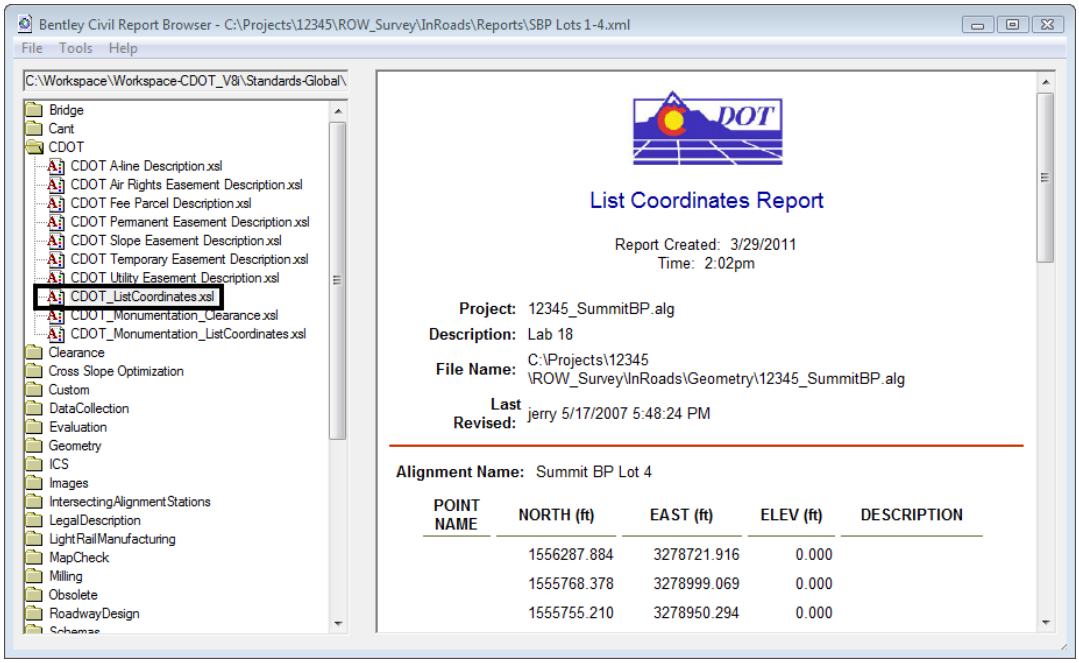
Reports can also be recalled for reformatting, etc.

14. Select **Tools > View XML Reports**
15. From the report browser **File > Open**
16. Open the **SBP Lots 1-4.xml** file from the folder:
    C:\Projects\12345\ROW_Survey\InRoads\Reports
17. Select the folder and style sheet to apply to the XML data.
18. **<D>** on the category ***Geometry*** and style sheet ***Area.xsl***



Note: Lot areas and perimeter distances are reported.

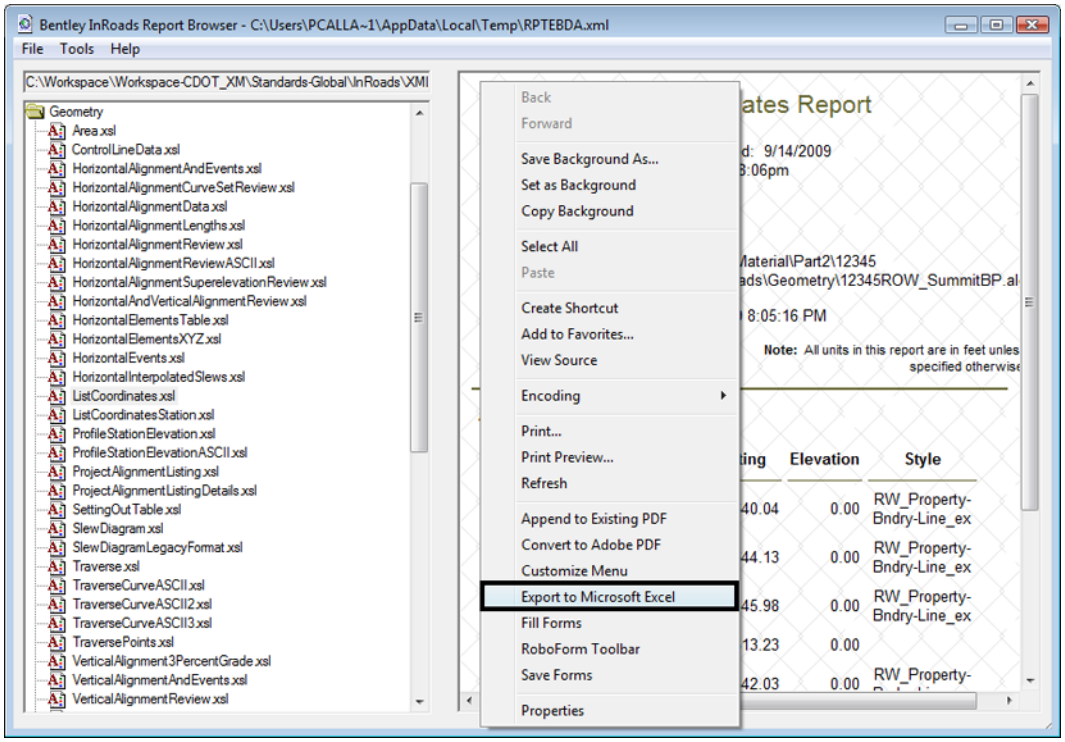
19. In the category ***CDOT***, access style sheet ***List Coordinates***



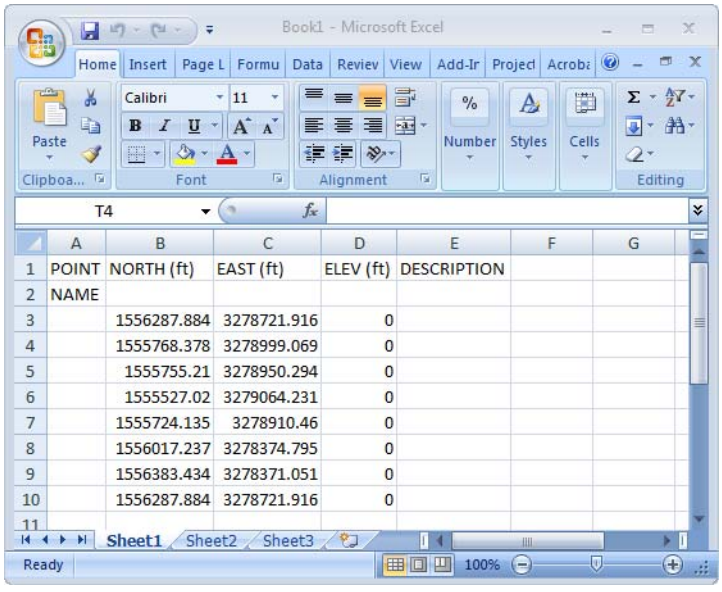
The report is redisplayed to display alignment coordinates.

20. While viewing the xml report, **<R>** in the area of the screen listing the coordinates. A fly-out menu appears.

21. **<D>** on **Export to Microsoft Excel**

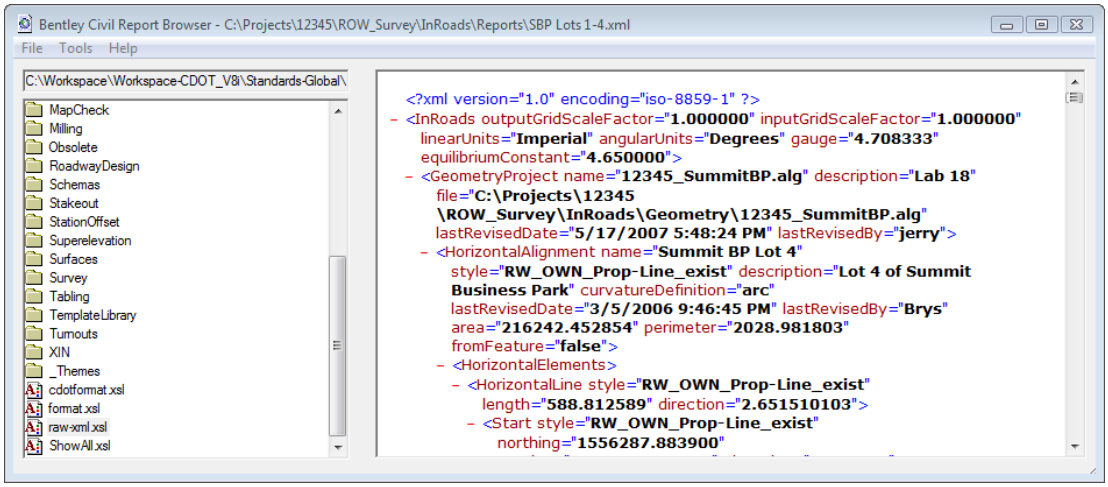


Excel will launch Excel.



To view the source information the xml report was generated from:

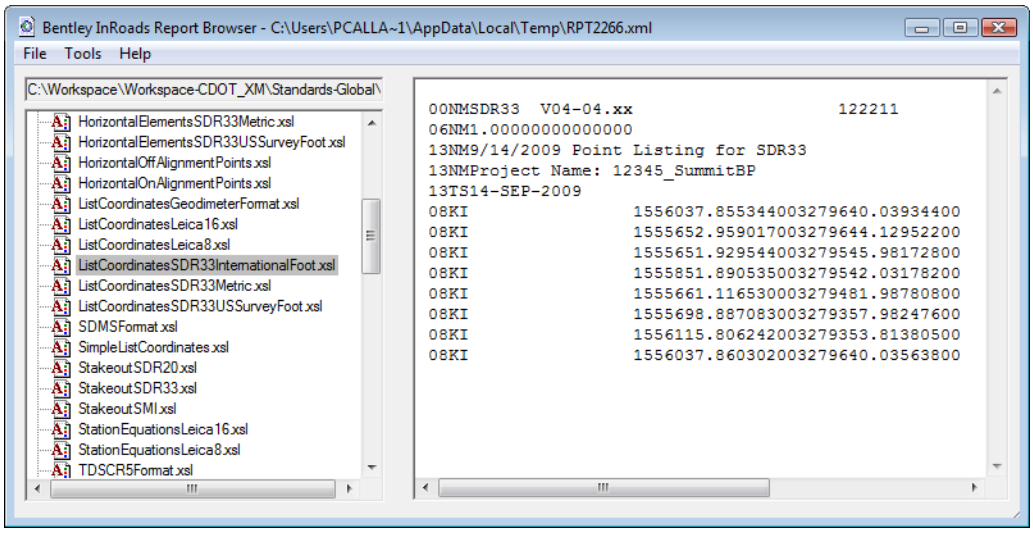
22. In the Report browser, select **Raw-xml.xsl** in the left panel



What you see are the xml tags and attributes which define the report contents. Formatting of this data for display is accomplished through the use of xsl, or style sheets. Style sheets can be developed by the user for customized reports or formats.

Other formats:

In the category **DataCollection** access style sheet
ListCoordinatesSDR32InternationalFoot



Experiment with other style sheets such as HorizontalElementsSDR33 as well as other style sheets in the Geometry category.

LAB 16 - Importing Cogo Points

Chapter Objectives:

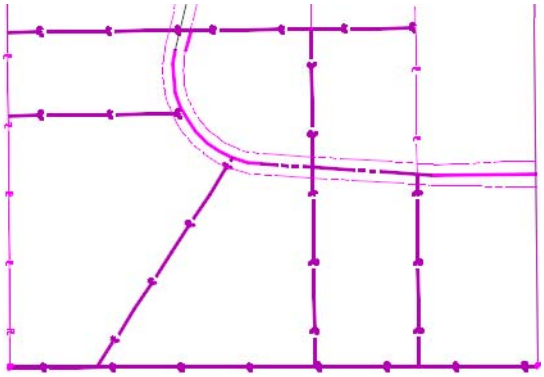
- Import Cogo Points from graphics
- Import Cogo Points from ICS

Lab 16.1 - Importing Cogo Points from Graphics

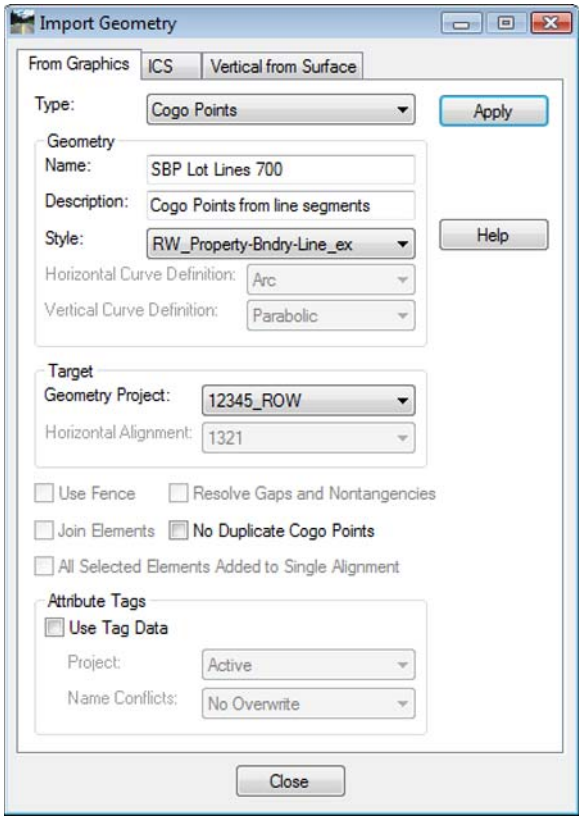
Graphic elements can be imported to generate geometry. Some of the valid element types are: lines, linestrings, cells, text, shapes, etc. Refer to the InRoads help topic Import Geometry

To import Cogo points from a graphics file;

1. Identify graphics using a selection set or a MicroStation fence

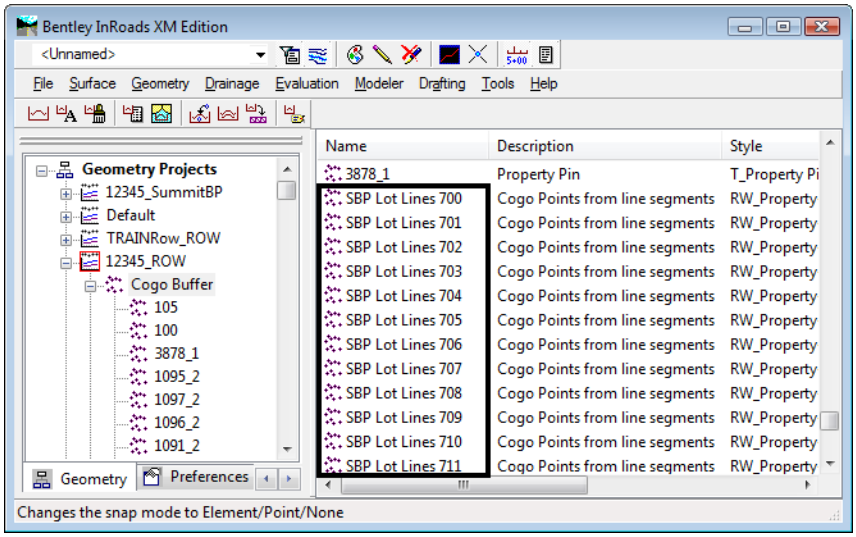


2. Select **File > Import > Geometry > [From Graphics] Type – Cogo Points**



3. **<D> Apply**

4. Verify the results

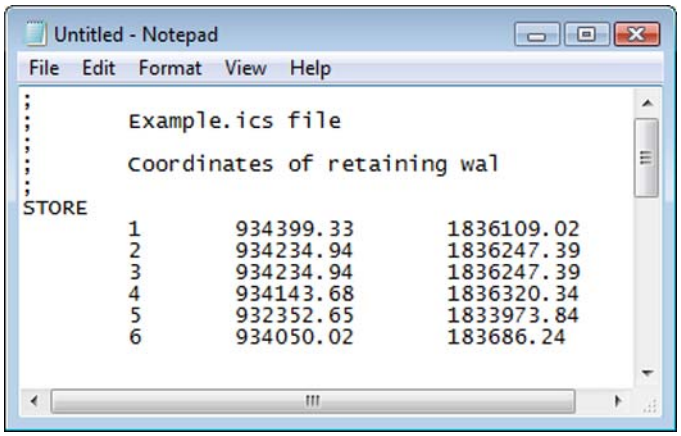


Lab 16.2 - Importing Cogo Point from ICS

From the CDOT manual: Roadway Design Using InRoads – Importing Geometry from text files

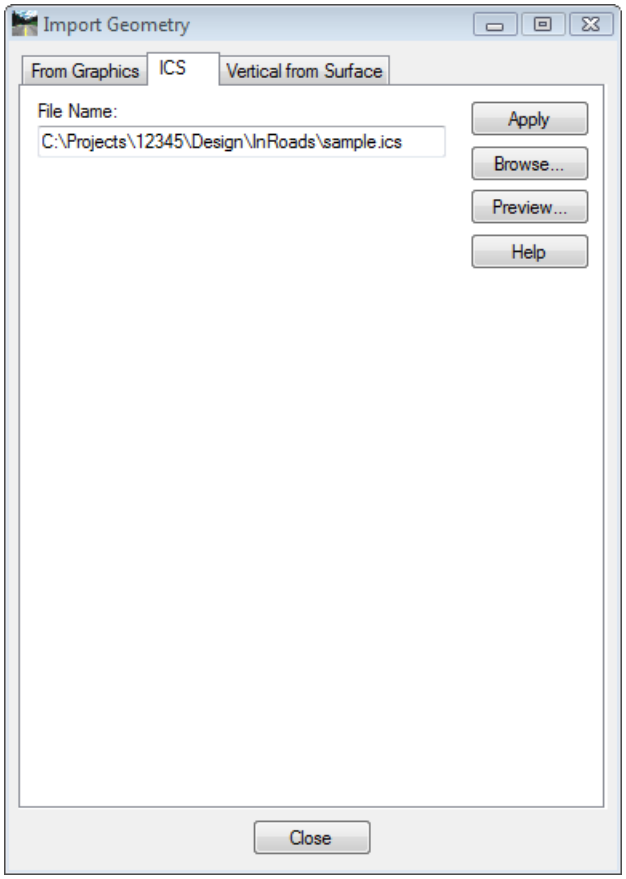
Text files may be imported from several formats, the easiest of which to create is an ***.ics*** file. (Interactive Coordinate geometry Subsystem) This file type was first used with a product of the same name many years ago, but is still in use with InRoads today. It is basically a list of cogo commands along with the input for those commands.

If you have a text file of coordinates, you can create an .ics file by adding a **Store** command at the top and formatting the file similar to the one shown below.



1. Choose **File > Import > Geometry > [ICS]**

2. **Browse** to find the file then choose **Apply**.



The cogo points will be added to the active geometry project. You may then use **Geometry > Utilities > Create/Edit Alignment** to join the points, forming an Alignment and **Geometry > Horizontal Curve Sets > Define Curves** to add curves to the alignment. You can also accomplish these same tasks within the **.ics** file. See the Bentley Help topic ***Alpha Cogo***

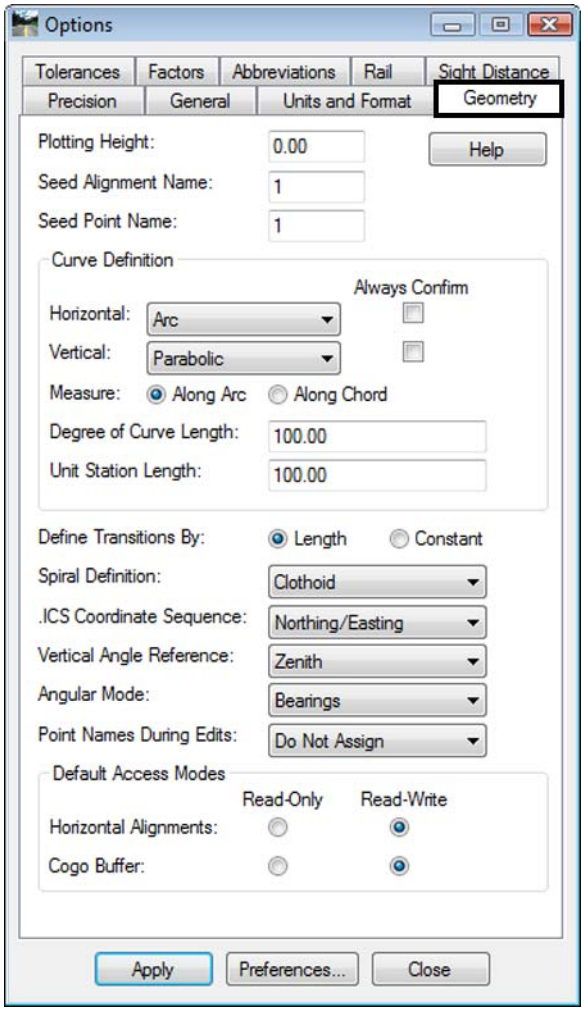
LAB 17 - Geometry Options

Chapter Objectives:

- Setup project parameters

Project geometry parameters are defined by the user.

1. Select **File > Project Options > [Geometry]**



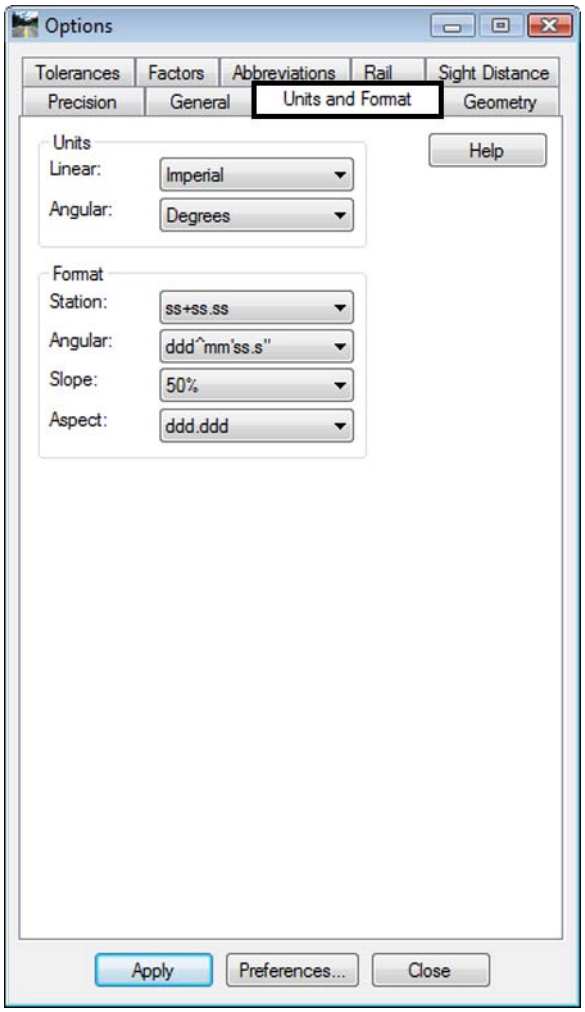
Geometry Defaults

- **Plotting Height** - default elevation assigned to geometry points. Defines the elevation at which annotation will be placed in a 3D file.
- **Seed Alignment Name** - initial name assigned to alignments
- **Seed Point Name** - initial Cogo point name or alignment vertices name
- **Curve Definition** - arc, chord, length of curve definitions
- **Angular Mode** - Bearings or Azimuth settings
- **Point Names During Edits** - horizontal alignment vertices
- **Do not assign** - creates ***unnamed*** points

- **Assign** - creates sequential alignment vertices names based on the seed point name

Note: Alignment vertices defined with alphanumeric characters are not entered into the Cogo buffer by default. The Horizontal Event Point command can be used to send alignment key points to the Cogo buffer.

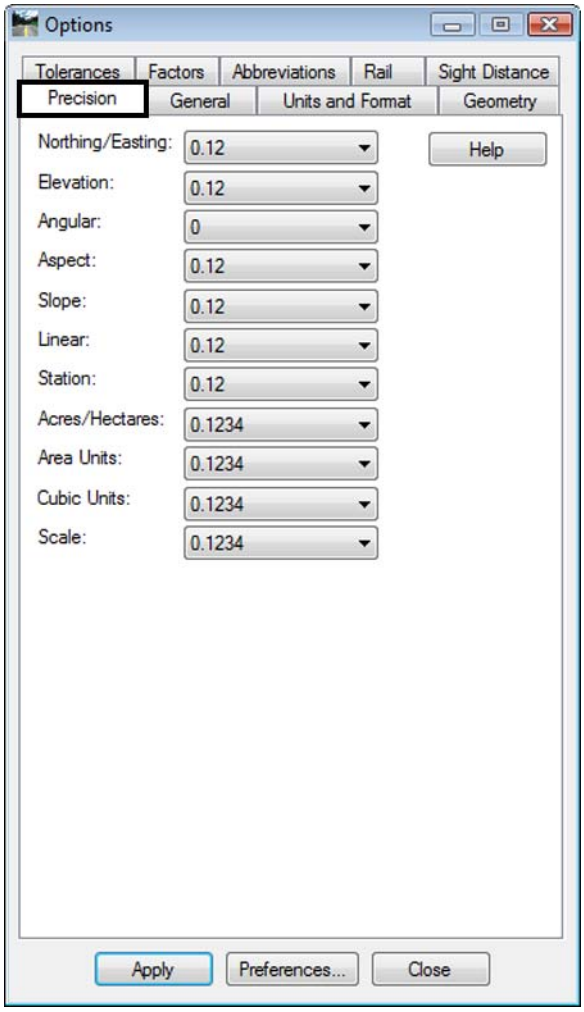
2. **<D> Units and Format**



InRoads does not recognize or use the unit definition associated with the host MicroStation file. The units defined under the ***units and format*** tab define the units of measure for InRoads data. For commands that utilize distance or area parameters, InRoads looks to the settings in this dialog to determine if the distance or area defined is imperial or metric units.

- **Units Linear** - Imperial or Metric
- **Units Angular** - Degrees, Grads, or Radians
- **Format Angular** - Degrees, Minutes, Seconds or Decimal Degrees

3. **<D> Precision**



The ***precision*** tab defines the number of decimal places displayed in dialogs. It also defines the number of decimal places displayed when posting information to the MicroStation screen or when writing data to an ASCII file.

Note: The settings in the precision tab only effect display settings. It does not define computational parameters.

LAB 18 - Horizontal Regression Analysis

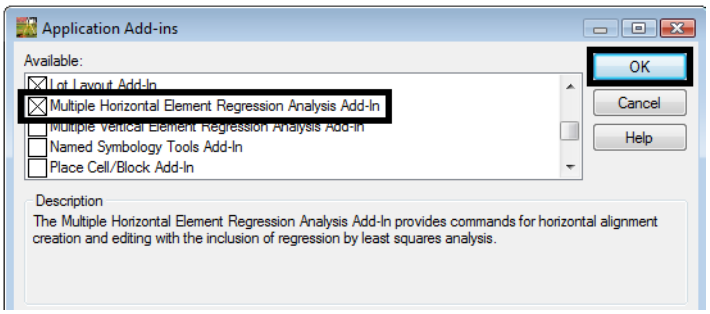
Regression analysis can be used to facilitate the development of horizontal alignments by creating a 'best-fit' alignment through defined points.

Chapter Objectives:

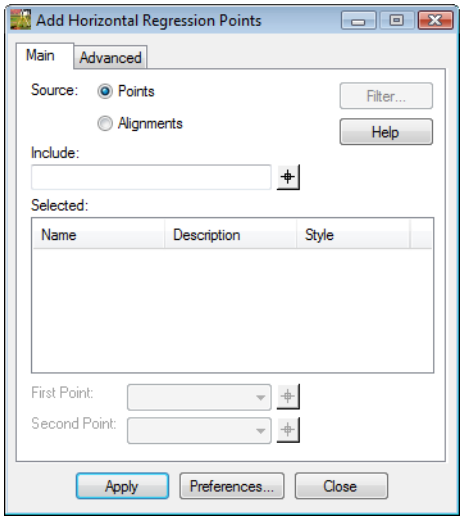
- Setup horizontal regression analysis project parameters

Regression analysis setup.

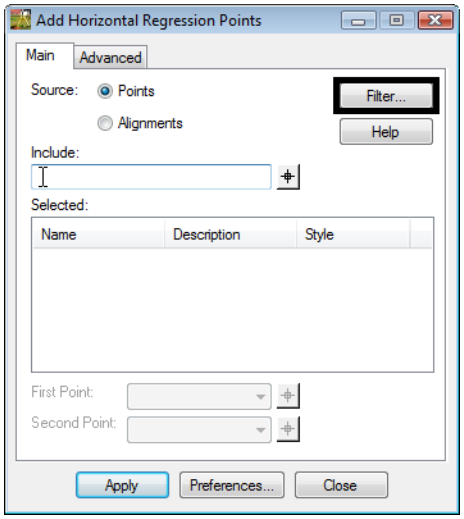
1. Create a horizontal alignment to store the results in.
2. Select **Tools > Application Add-ins** to enable the command.



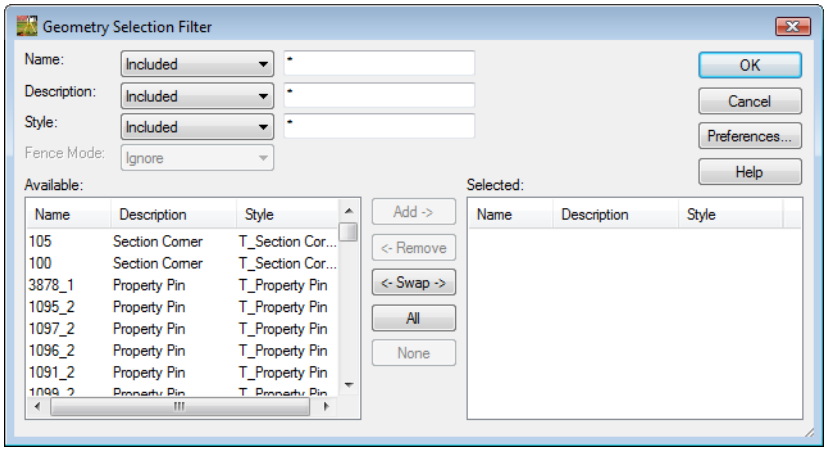
3. Select **Geometry > Horizontal Regression > Add Regression Point** The **Add Horizontal Regression Points** dialog will appear.



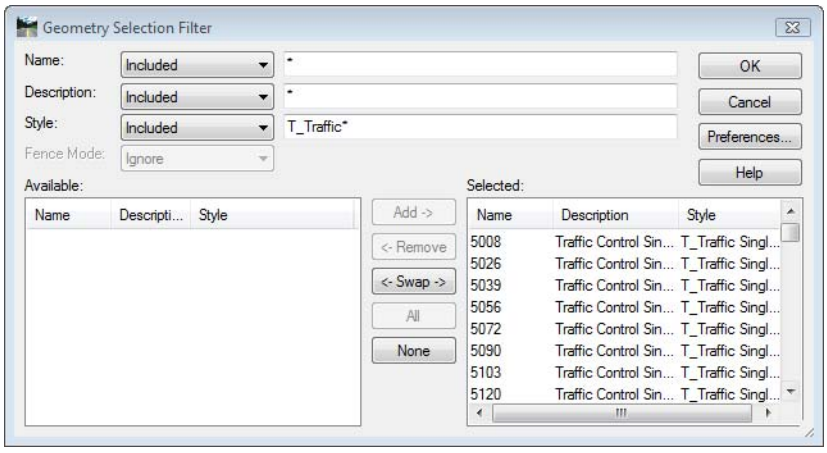
4. **<D>** in the ***Include*** field so the **Filter** button becomes activated.



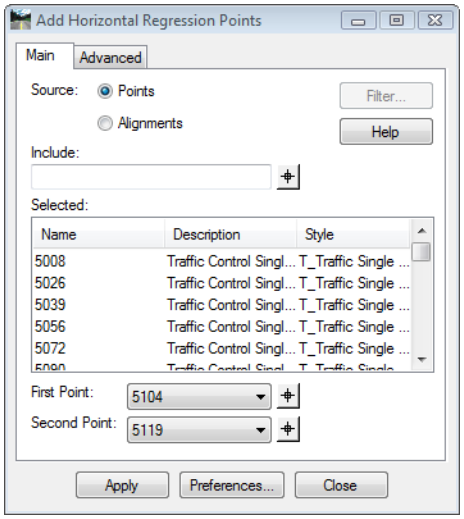
5. **<D>** the **Filter** button. The ***Geometry Selection Filter*** dialog will appear.



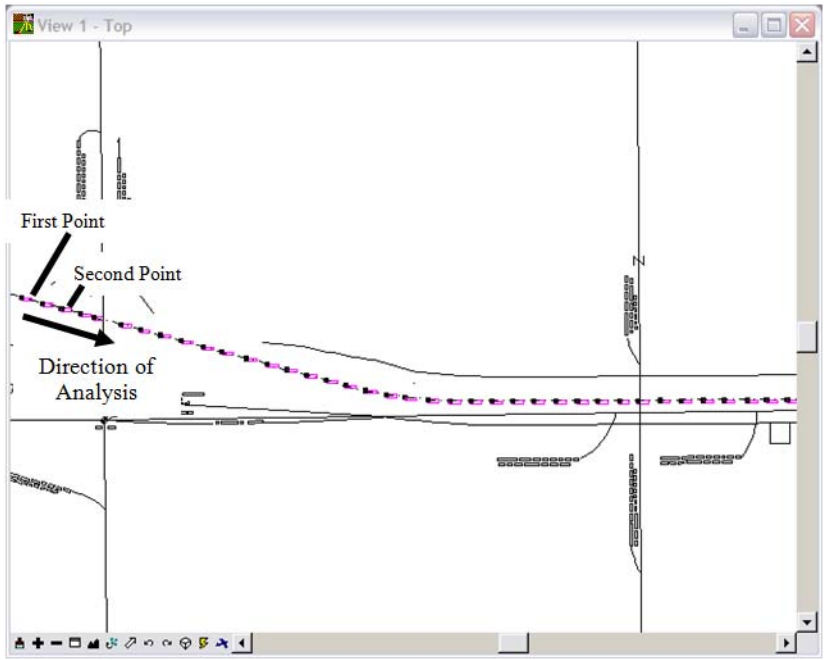
6. Create a selection of centerline points to be used for analysis.



7. **<D>** the **OK** button in the ***Geometry Selection Filter*** dialog.



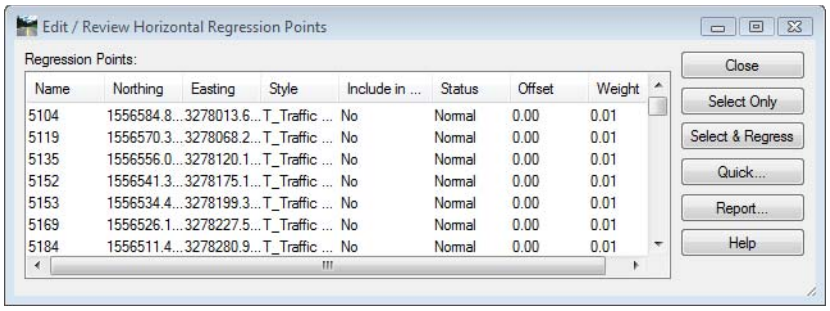
8. **<D>** the **selection** button. Use the combination box or graphically define the first and second points to define initial point and direction for evaluation.



9. **<D>** the first point in the MicroStation view and **<D>** second point in the view to define the ***direction of the analysis***.

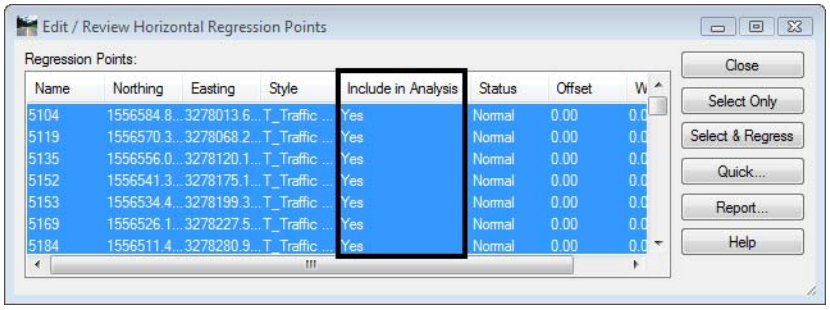
10. **<D>** the **Apply** & **Close** buttons.

11. Select **Geometry > Horizontal Regression > Edit/Review Regression Points**. The **Edit / Review Horizontal Regression Points** dialog will appear.



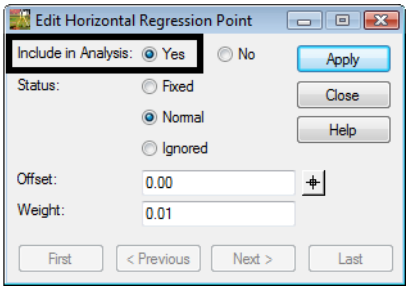
12. Refine the selection of points to be used for analysis by using the Ctrl and Shift keys or using the Select button to define a selection area. Alternatively a fence can be placed around the points to be included in the regression. If a fence is used, a **<Shift> <D>** on the ***Select Only*** button will include fenced points in the regression analysis.

    Note: Additional information can be access by selecting the Help button found in all dialogs.



13. **<R>** on points and select **Edit** from the fly-out menu to edit. The **Edit Horizontal Regression Point** dialog will appear.

14. **<D>** the radio button **Yes** to **Include in Analysis**.

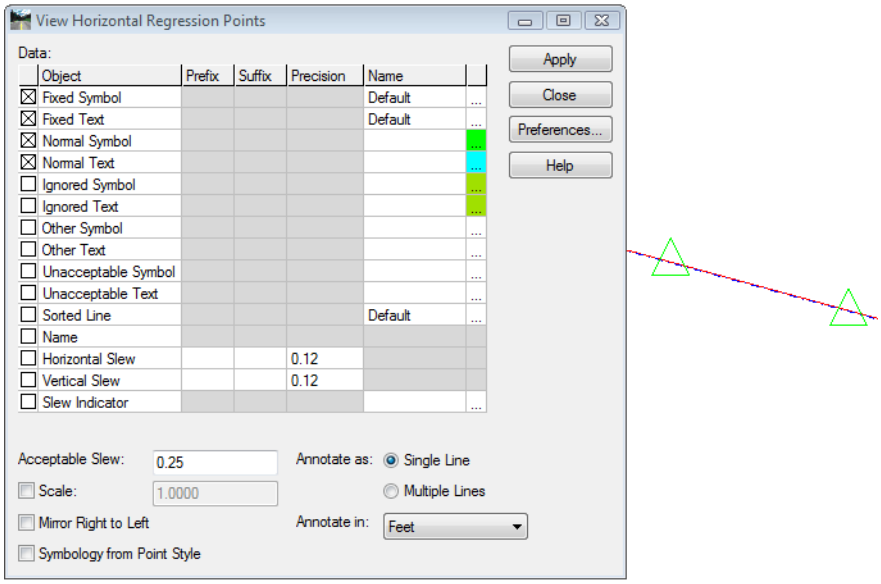


15. **<D> Apply** to effect any changes then **Close**.

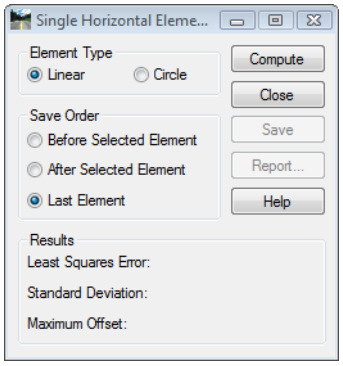
    Note: The Offset value show above regresses through a point at the defined offset from the selected point. To define a regression bandwidth, select the Quick button on the Edit/Review dialog. Tolerance defines only points that are offset less than or equal to the tolerance defined.

16. Select **Geometry > Horizontal Regression > Single Element Regression Analysis** The **Single Horizontal Element** dialog will appear.

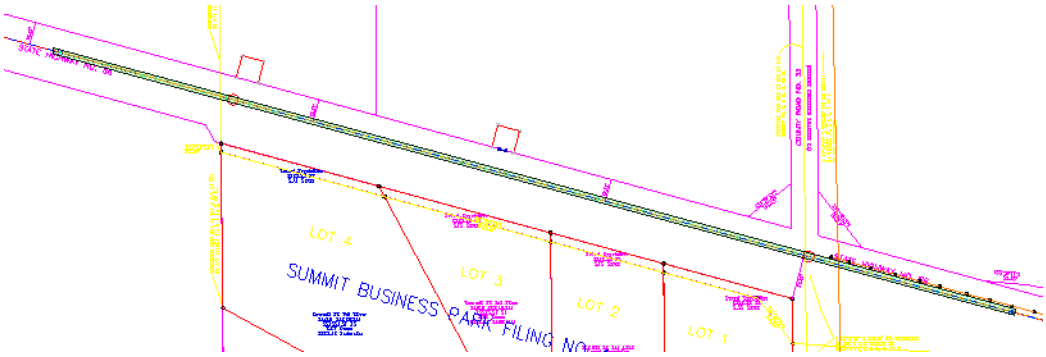
17. Select **Geometry > Horizontal Regression > View Regression Point** to display symbology for the selected points.



18. Select **Element Type:** ***Linear or Circle***

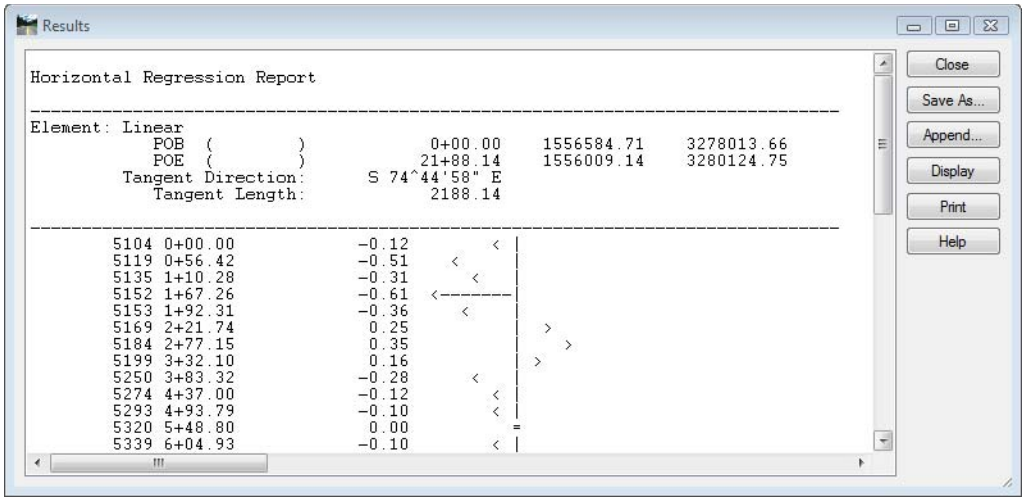


19. **<D> Compute** to view the results in the MicroStation view.

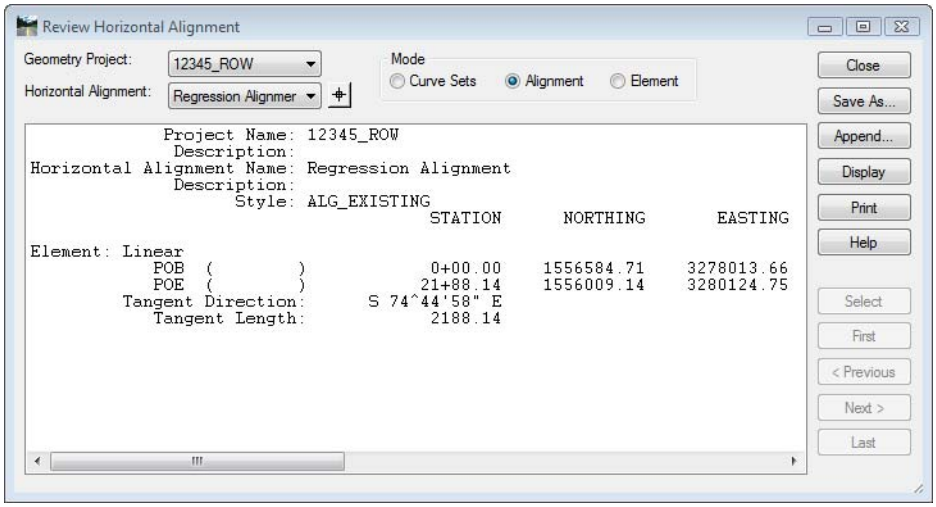


20. **<D> Save** to create the alignment element.

21. **<D>** the **Report** button to view a summary.



22. Review the results.



Note: Additional curves and tangents would have to be regressed to complete the alignment. Once created, regressed elements could be managed using the advanced geometry Horizontal Element commands.

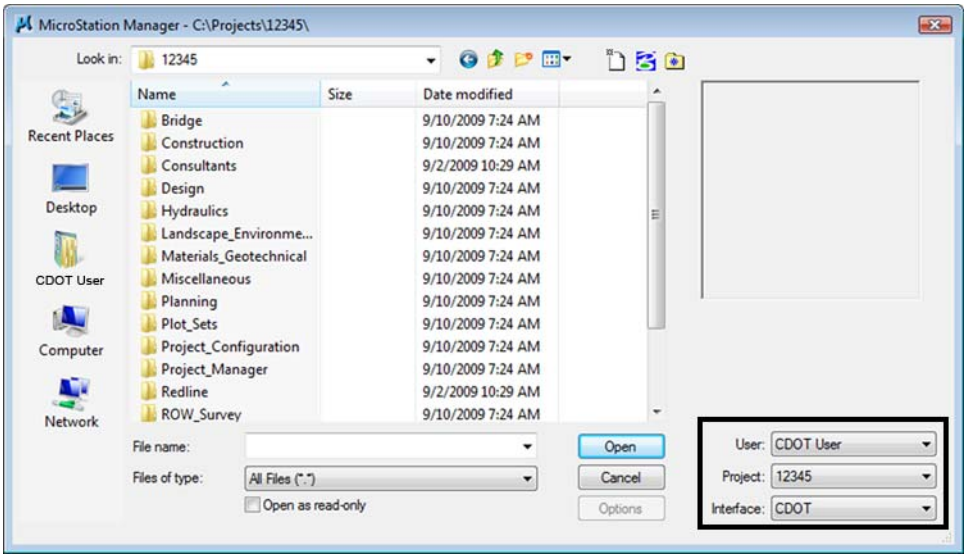
LAB 19 - Placing cells

Standard sheets have been provided to facilitate plan development. These sheet require customization for specific projects

Chapter Objectives:

- Open MicroStation Title Sheet using CDOT User workspace
- Place RLS Stamp at correct scale for Title Sheet

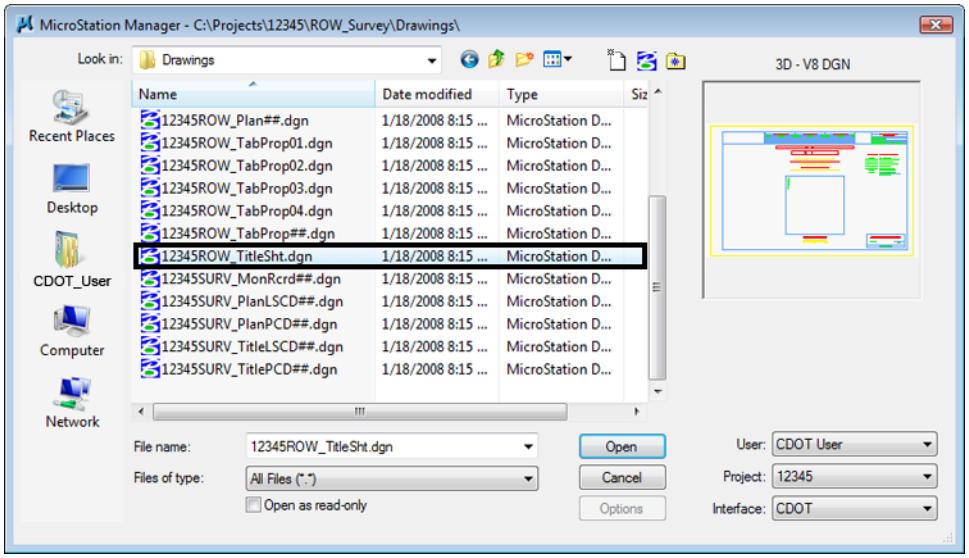
1. In the **MicroStation Manager** dialog box, go to the ***Workspace*** group section and change the **User** field to ***CDOT USER***, the **Project** field to ***12345*** and the **Interface** field to ***CDOT***.



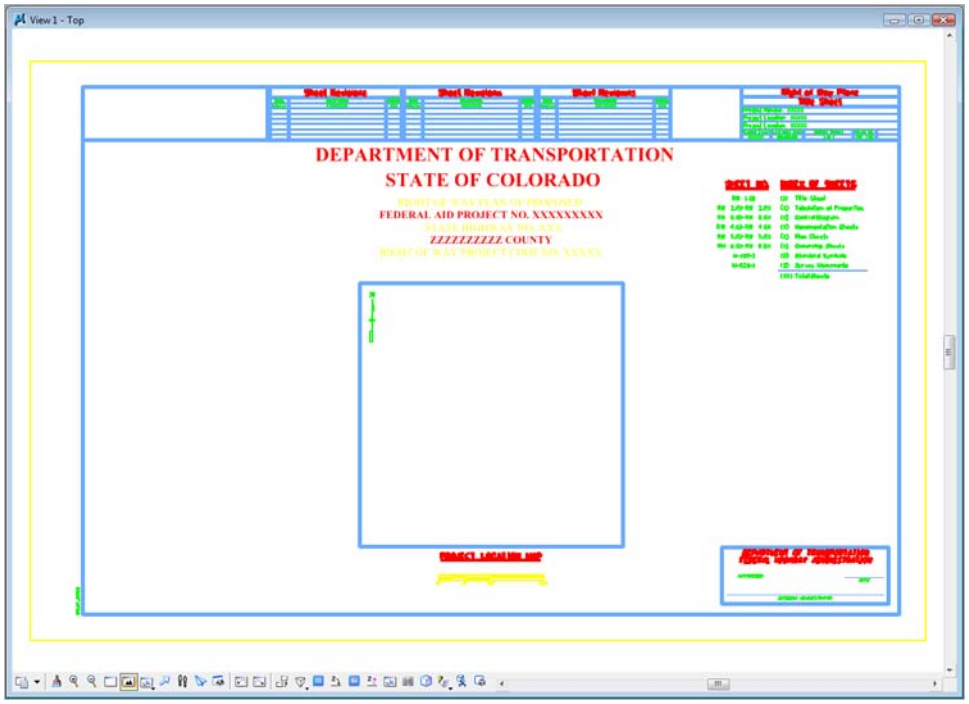
This workspace setup should load the correct MicroStation environment (including toolbars) when the selected MicroStation file is opened.

2. Navigate to the folder **ROW_Survey \ Drawings**
3. **<D>** on file ***12345ROW_TitleSht.dgn***

4. **<D> Open** in the ***MicroStation Manager*** dialog box to open the file.



Your graphics window should appear as shown.

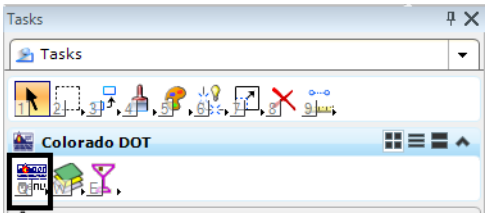


Note: The file names and directory structure used in this course are based on current information. As the CDOT configuration develops and directory structure and file naming conventions are standardized, these may change.

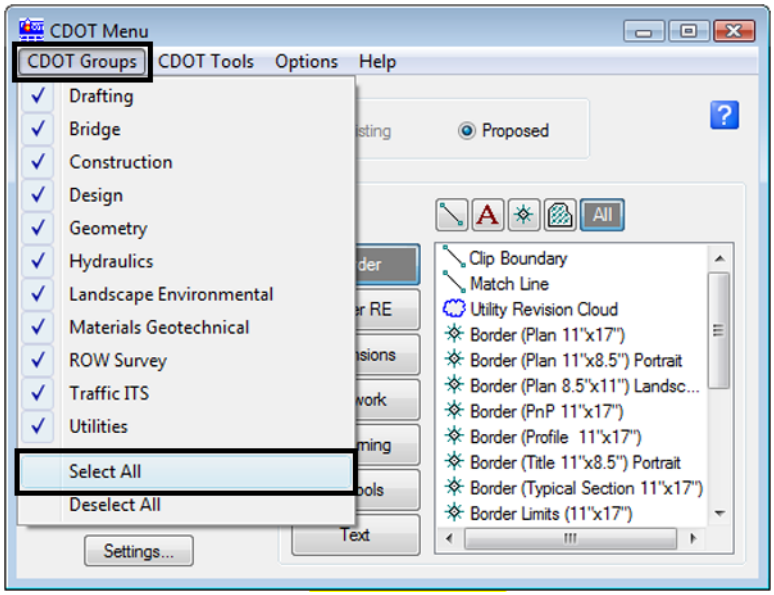
The default Model scale for CDOT plan sheets is 1:100. For sheets that are text based such as title sheets, and tabulation sheets, the Model scale is set to 1:1. Using the annotation scale lock synchronizes both graphics and text placed in the drawing. For drawings at other scales, the model properties will require modification. See the instructor if additional information is required.

Insert the Region, Designer information in the upper-left corner of the sheet.

5. The ***CDOT Menu*** should open by default when MicroStation is launched. If for any reason the ***CDOT Menu*** is not open, you can open it from the Main Task menu.



6. From the **CDOT Menu <D>** on **Group Display>Select All**.

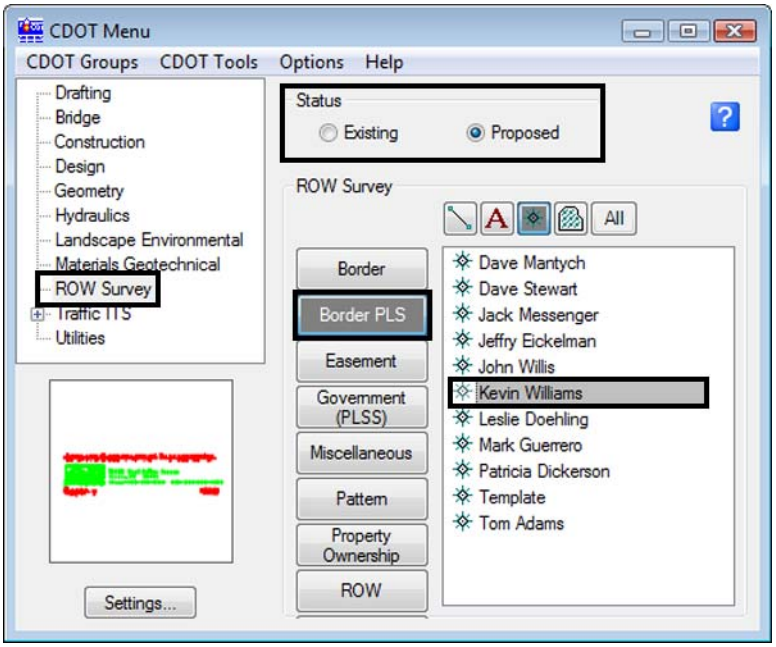


7. Select **ROW Survey** in ***Group Display***

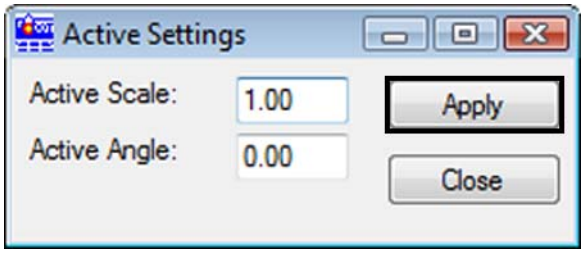
8. Set the ***Status*** to **Proposed**

9. Select **Borders PLS**

10. Select the Survey Supervisor **Kevin Williams**



11. In the **Active Settings** dialog box set **Active Scale** to ***1.00*** and **Active Angle** to ***0.00***



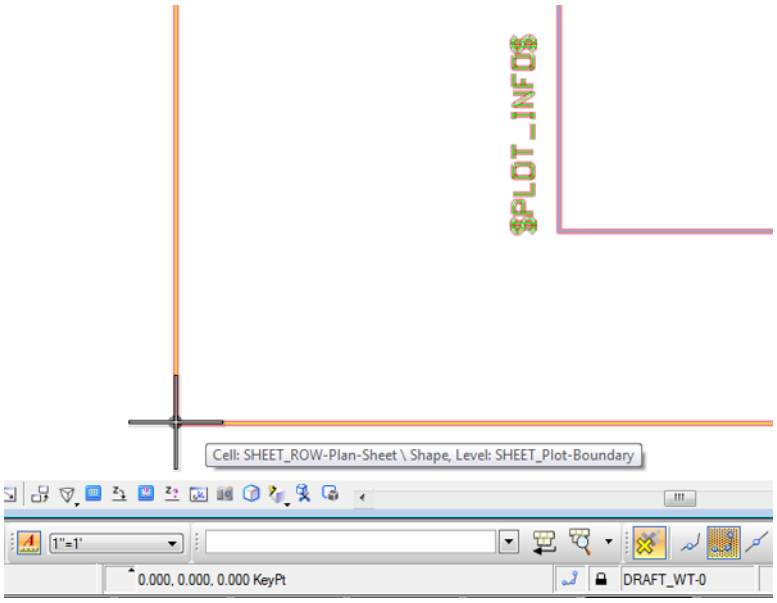
12. <D> Apply

13. <D> Close

14. ***Place*** the **cell** at the upper-left corner of the sheet as shown

Challenge Exercises

- Verify the coordinates at the lower left corner of the sheet (tentative snap). Should be at 0,0,0



- Determine the length and height of sheet (measure tools or AccuDraw). Should be 11 x 17
- Investigate the levels the graphics are on (level display, element information, or pop-up information)

LAB 20 - Editing Text

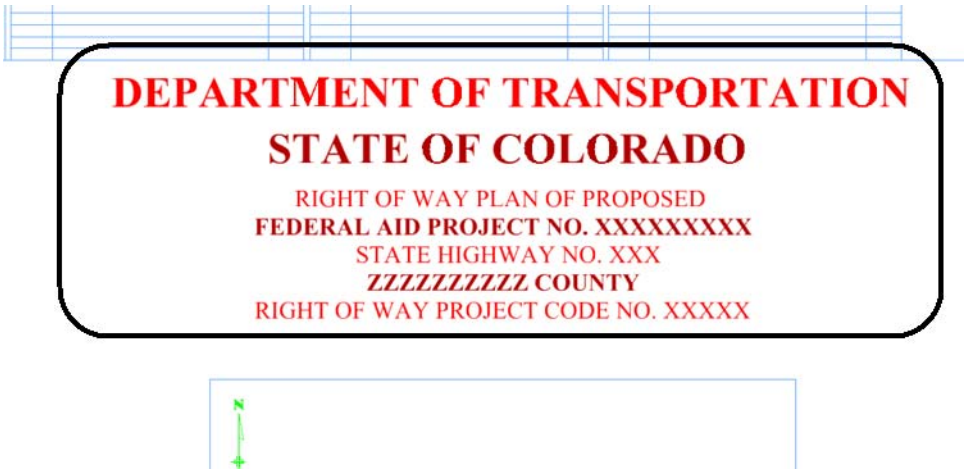
Chapter Objectives:

- Edit existing text
- Add additional text

Formatting has been defined for standard sheets. Text fields indicated with an 'X' indicates the user needs to input project or sheet specific information.

1. Navigate to the ROW_Survey\Drawings\ directory and open the filename ***12345ROW_TitleSht.dgn***

2. ***Window*** into the top center of the title sheet.



3. Select the **Edit Text** command.

4. **<D>** on the FEDERAL AID PROJECT NO. XXXXXXXXX text string.

5. In the Text Editor dialog box, correct the project identifier text and change to ***STA 086A – 039*** as shown.

6. **<D>** on the MicroStation screen to execute the edit.

DEPARTMENT OF TRANSPORTATION
STATE OF COLORADO
RIGHT OF WAY PLAN OF PROPOSED
FEDERAL AID PROJECT NO. STA 086A - 039
STATE HIGHWAY NO. XXX
ZZZZZZZZZZ COUNTY
RIGHT OF WAY PROJECT CODE NO. XXXXX

7. Optional – complete edits to the other project identification text.

Challenge Exercises

- Add another line of text that matches both the text and symbology of the existing text

DEPARTMENT OF TRANSPORTATION
STATE OF COLORADO
RIGHT OF WAY PLAN OF PROPOSED
FEDERAL AID PROJECT NO. STA 086A - 039
STATE HIGHWAY NO. 86
ELBERT COUNTY
CONSTRUCTION PROJECT CODE NO. 14072
M.P. 18.10 TO 21.00
RIGHT OF WAY

- Complete the upper right-hand corner of the sheet as shown

Right of Way Plans			
Title Sheet			
Project Number: STA 086A-039			
Project Location: State Highway No. 86 Corridor PE			
Project Location: County Rd. 25 & 27 & 33			
Project Code:	Last Mod. Date	Subset Sheets	Sheet No.
12345	07-26-09	1 of 1	RW 1.01

- Use the Edit Text command to complete the scale bar

PROJECT LOCATION MAP

LAB 21 - Vicinity Map - Vector

Vicinity maps can be referenced to the title sheet. These maps can be in the form of vector files (CADD elements) or raster files (images).

The CDOT standard procedure is to use county maps that have been translated from GIS information, these maps can be found on the shared drive at: ***\\public\CADD County Maps***. The county of interest should be copied to your project location drawings folder and can be attached as a reference file to the Title Map. The local map can be edited as desired without affecting the original.

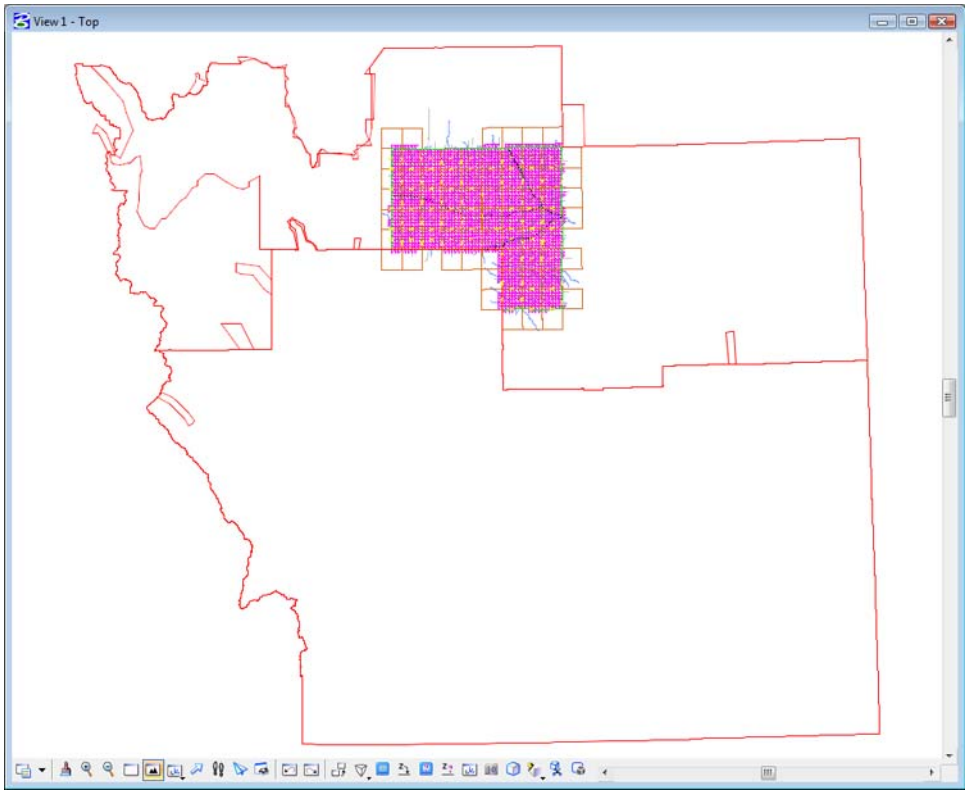
Chapter Objectives:

- Reference CADD County Map into Title Sheet
- Trim Vicinity Map reference file

For training purposes, a vicinity map has been stored in the ***References*** folder.

Review the vicinity map.

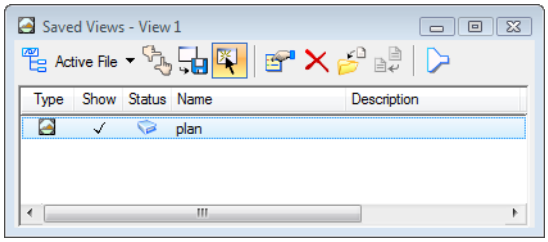
1. ***Open*** the MicroStation file **Elbert.dgn**
   this file is located in: **C:\Projects\12345\Design\Drawings\Reference_Files**



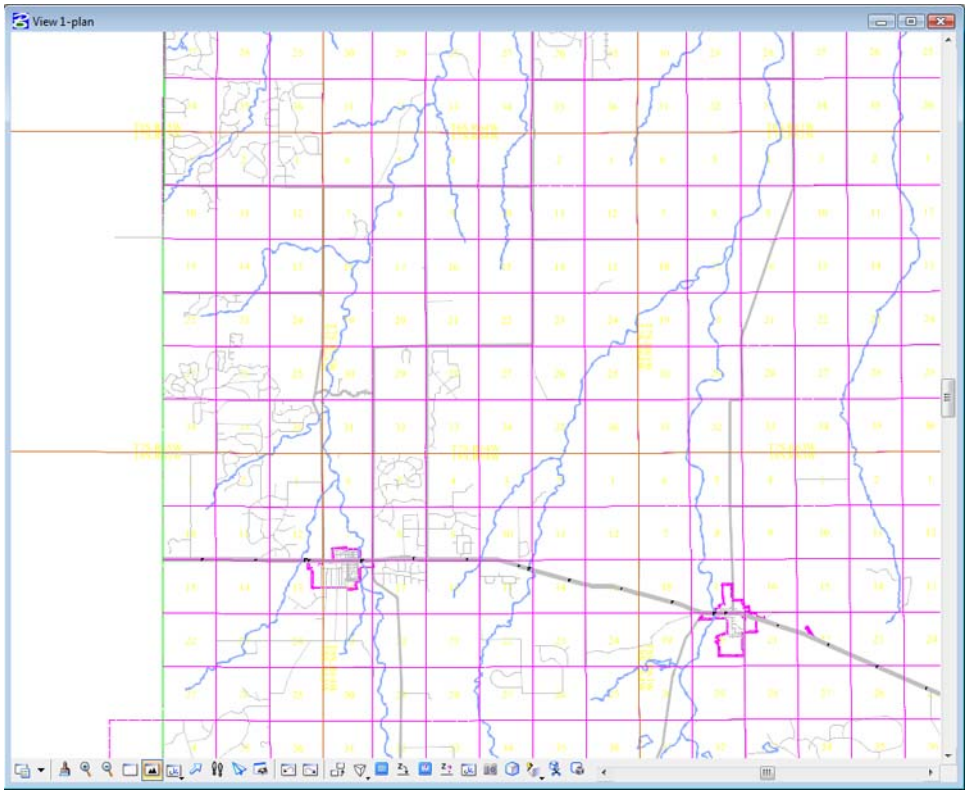
This file contains a Saved View to assist in attaching it as a reference file.

2. Select **Utilities > Saved Views** from the MicroStation pull-down menu.
3. **<D>** on the saved view by the name of ***plan***

4. **<D>** in the MicroStation view

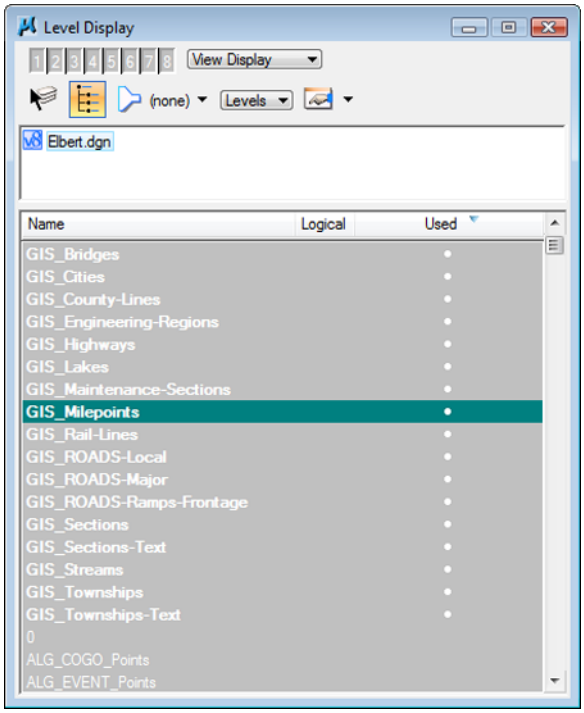


The MicroStation view updates to the limits of the saved view.



5. Use other MicroStation view commands to investigate the contents of the drawing.

Open the MicroStation **Level Display** dialog to investigate level stratification by choosing, **Settings > Level > Display**. Note all information resides on GIS_* levels.



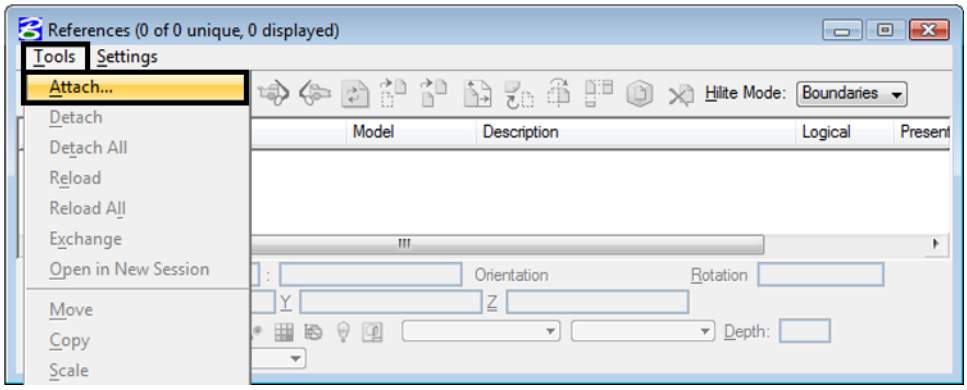
6. Turn level displays on and off to verify data stratification, then Close the Level Display dialog.

Attaching a vicinity map as a reference file

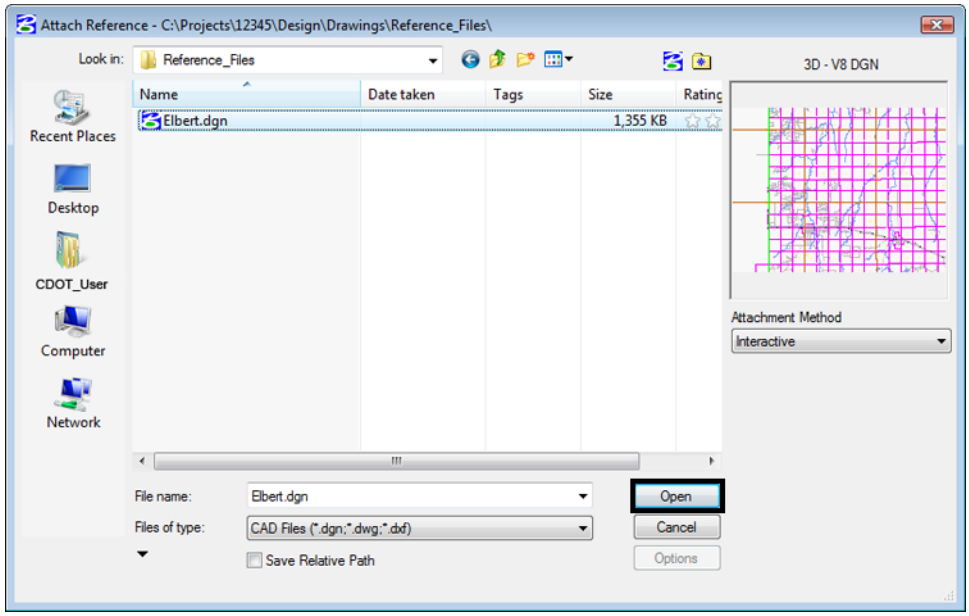
Attach the vicinity file as a reference file to the title sheet. Once attached, move, scale, and constrain the display limits.

Reopen the title sheet: ***12345ROW_TitleSht.dgn***. Once open:

1. Select **File > References** from the MicroStation menu bar.
2. In the References dialog box, select **Tools > Attach**

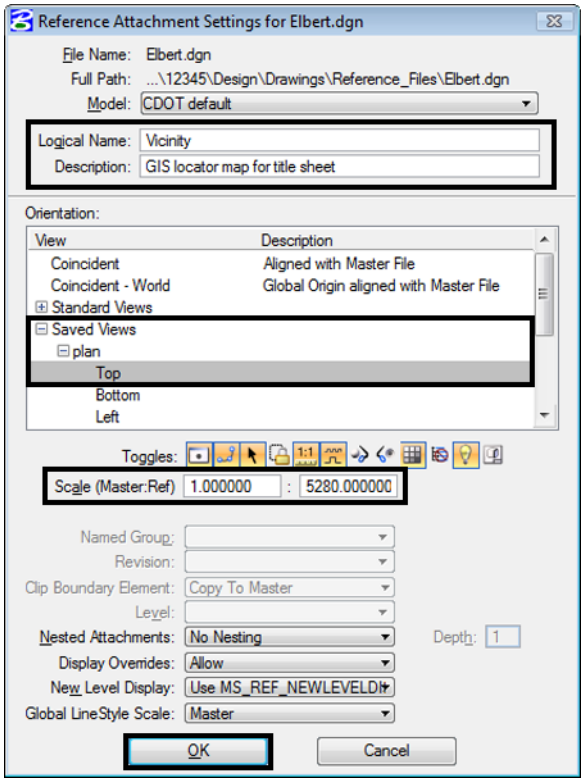


3. **<D>** the file ***Elbert.dgn*** from the ***….Design\Drawings\Reference_Files*** directory.
4. **<D> Open**

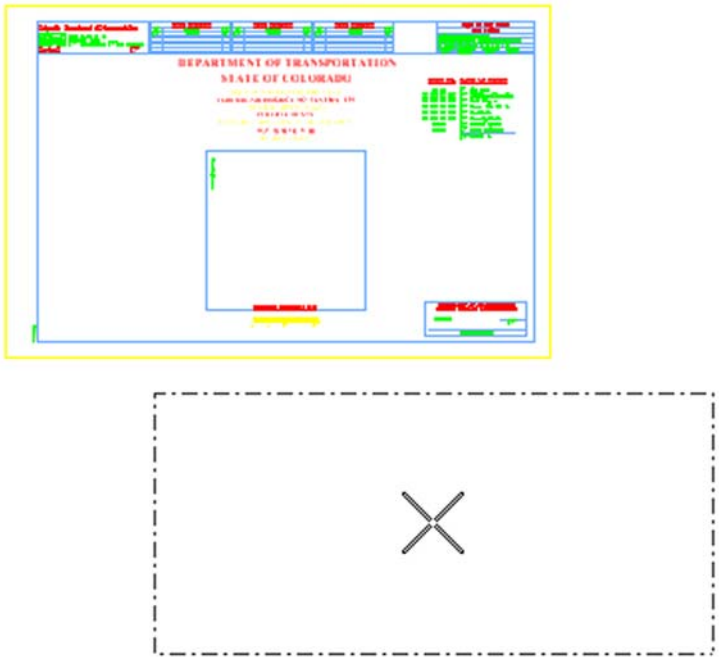


5. **Key-in** the Logical Name: ***Vicinity***
6. **Key-in** the Description: ***GIS locator map for title sheet***
7. Select the ***Saved View > plan*** option in the ***Orientation*** section of the dialog box.
8. GIS maps have been designed to be inserted at a scale factor of 1:***5280*** (Master : Reference). Enter that value for the Scale option.

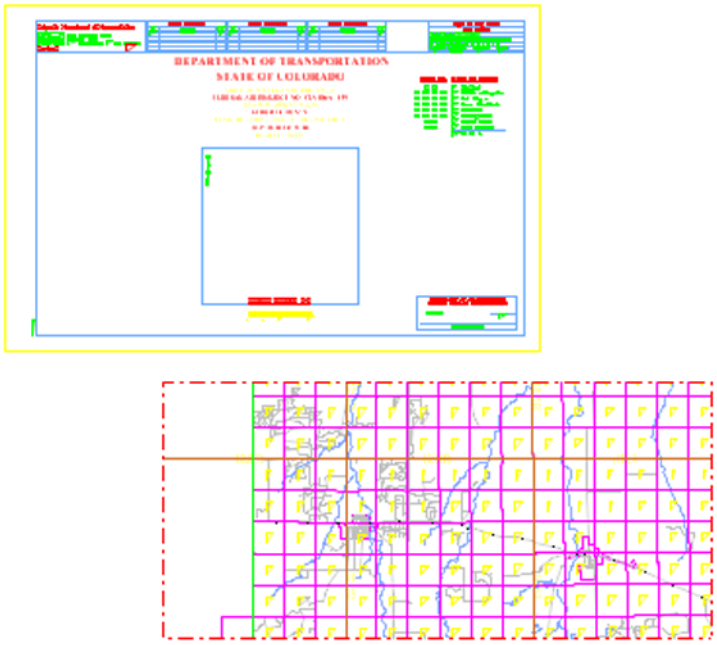
9. **<D> OK**



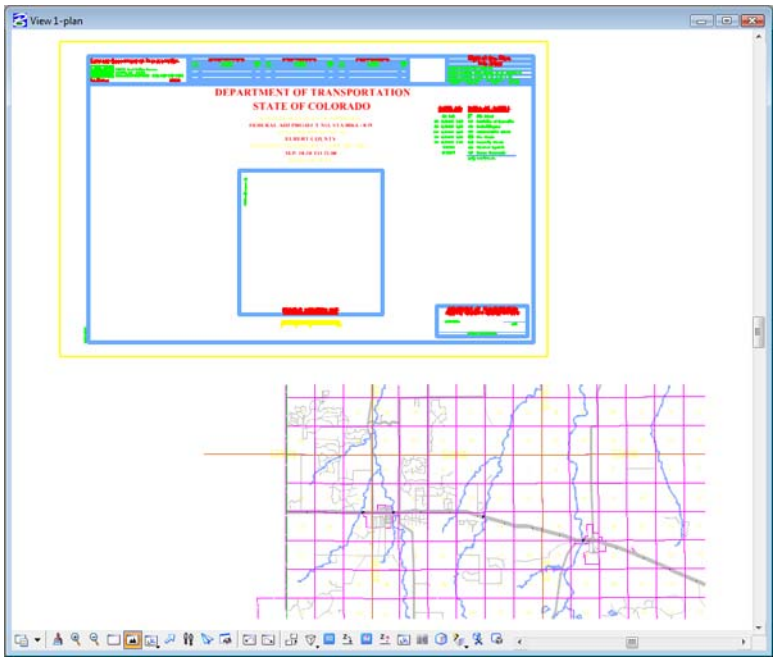
In the MicroStation view window, the limits of the saved view dynamically display relative to the location of the cursor.



10. **<D>** in the MicroStation view window area to attach and display the contents of the reference file.

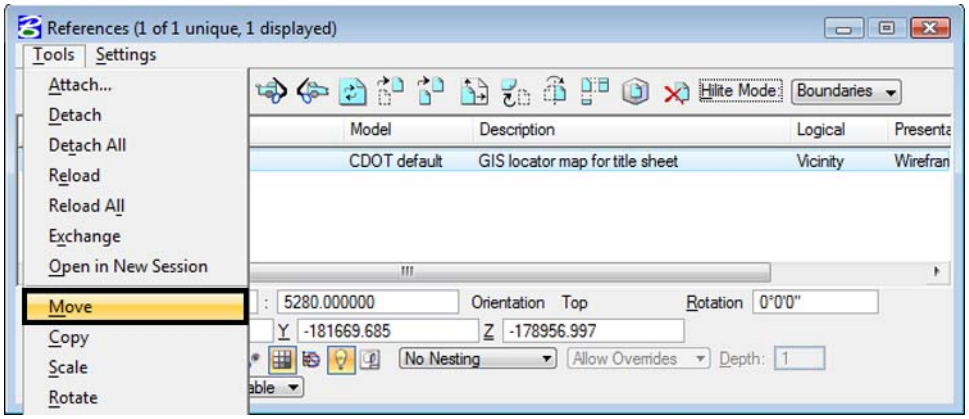


11. Select the MicroStation ***Fit*** command.

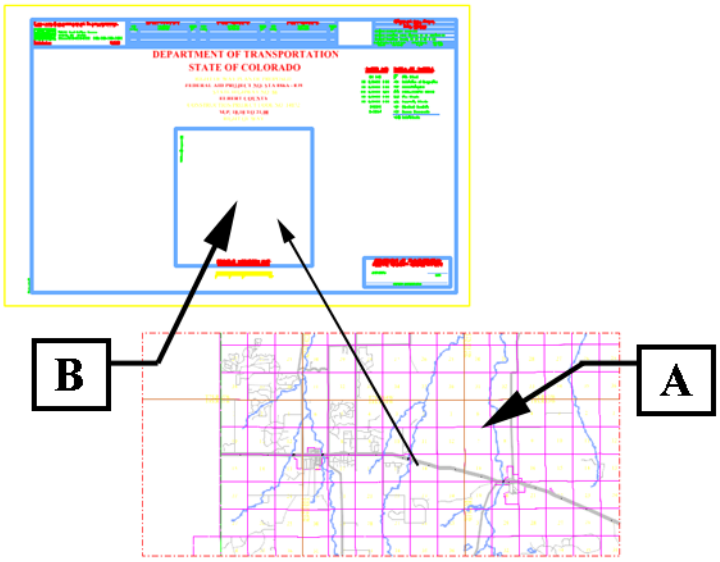


Move the reference file to align with the title sheet.

12. Select **Tools > Move** in the **References** dialog.



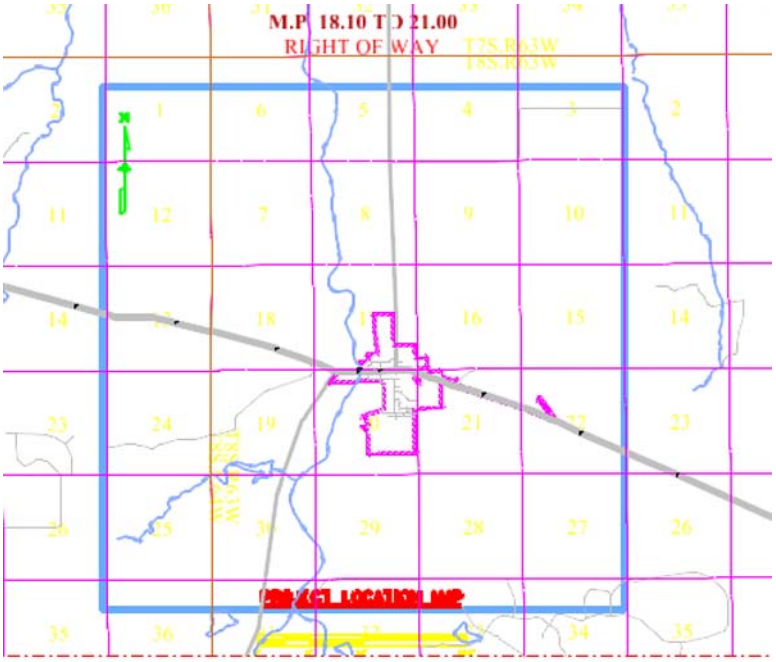
13. **<D>** at point ***A*** and then **<D>** at point ***B*** to move the attached reference file.



Execute additional move commands to reposition the reference file as necessary.

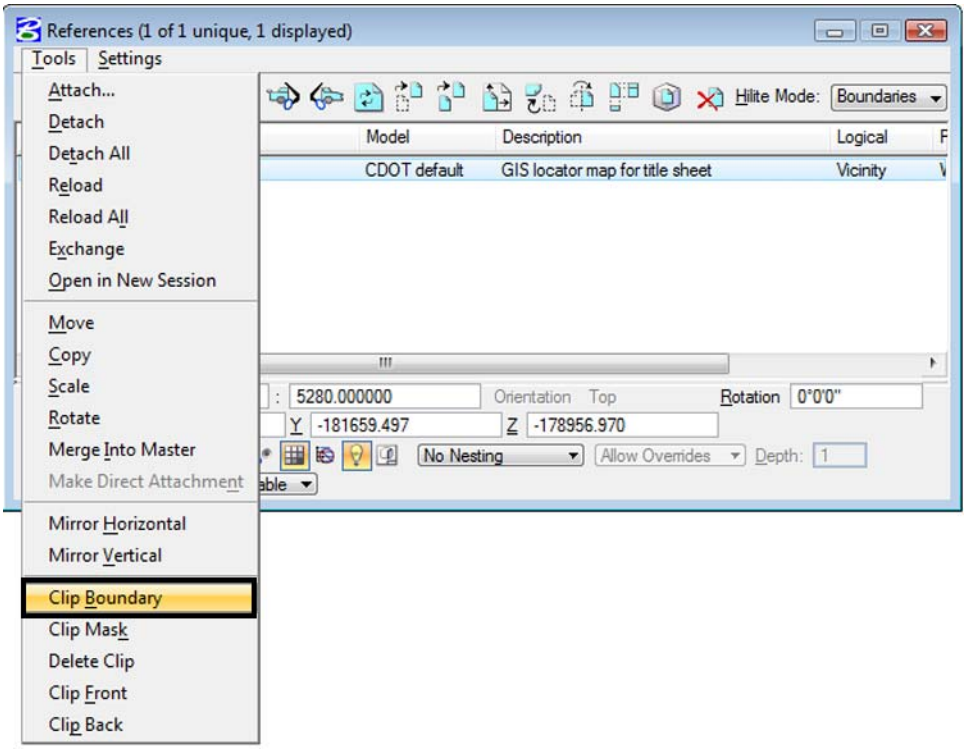
14. **<R>** to exit the Move References command.

15. **Zoom** into the ***Project Location Map*** area of the Title Sheet.

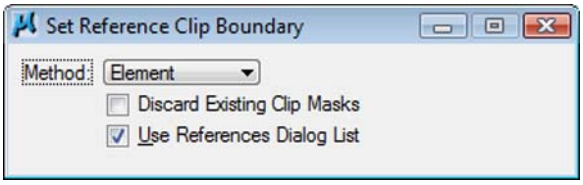


Constrain the display limits of the reference file (clip boundary)

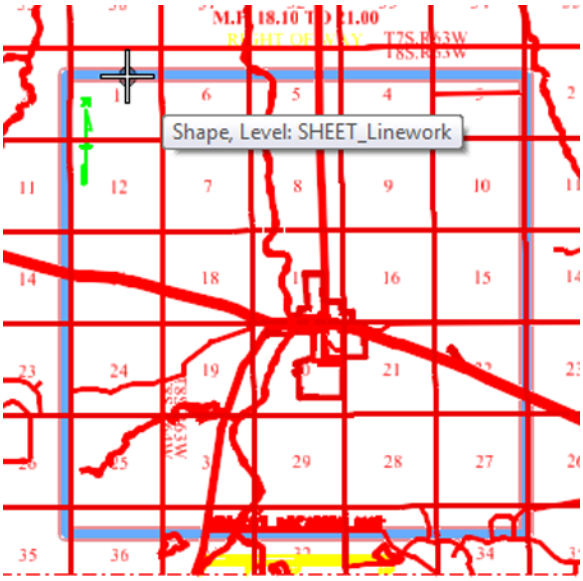
16. Select **Tools > Clip Boundary** from the Reference File dialog.



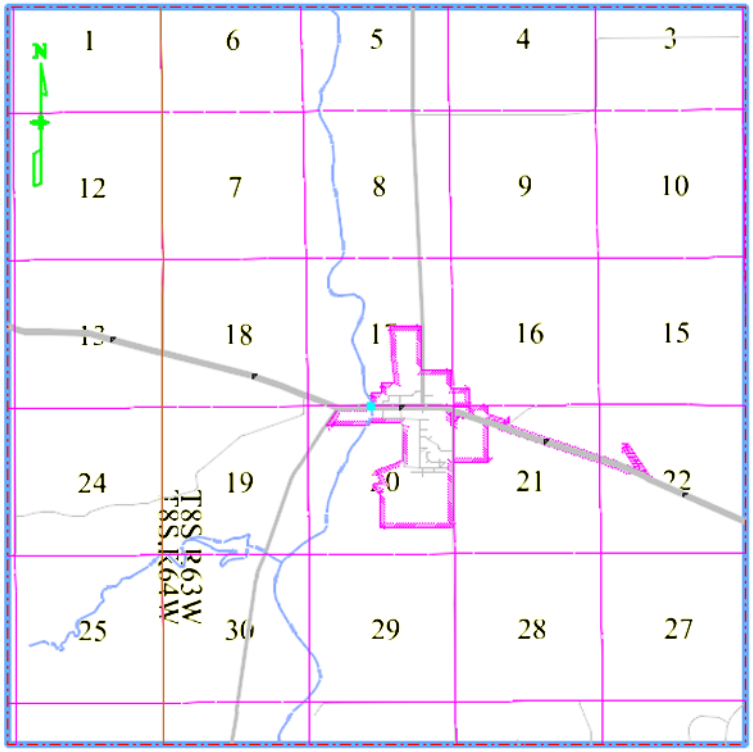
17. In the ***Tool Settings*** dialog. Set method to **Element**



18. **<D>** on the shape representing the limits of the location map display.



19. **<D>** a second time (anywhere on the screen) to accept the displayed solution.



20. Use the MicroStation command ***Modify Element*** command to resize the shape identified to define the clip boundary.

The reference file clip boundary will reconfigure with the shape modifications.

Note: The exercise just completed used an existing MicroStation shape to define reference file clipping boundaries. The same process can be followed by using a MicroStation Fence to define (and redefine) the reference file clip boundary.

Challenge Exercises:

- Move the shape used to define the reference file limits. What happens to the graphics limits displayed?
- Use the References dialog to move the vicinity map after it has been clipped.
- Delete the shape used to define the reference file limits. What happens? (select undo, to restore the shape)
- Turn levels on and off for the reference file attachment
- Constrain the reference file display using a fence block
- Try using a circular fence to define the clipping limits
- Define a clip mask within the reference file limits

- Modify elements in the file Elbert.dgn, what happens to the graphics displayed in the vicinity map?

LAB 22 - Locator Map – Raster Reference File

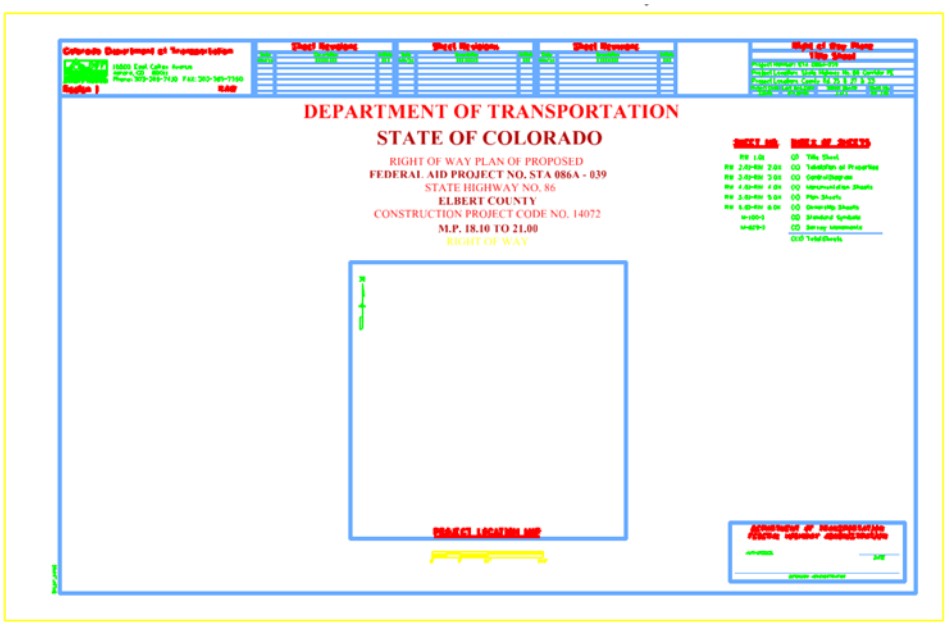
Chapter Objectives:

- Reference locator map into Title Sheet
- Trim locator map reference file

Attach a raster reference file for the locator map. Once attached, move, scale, and constrain the display limits.

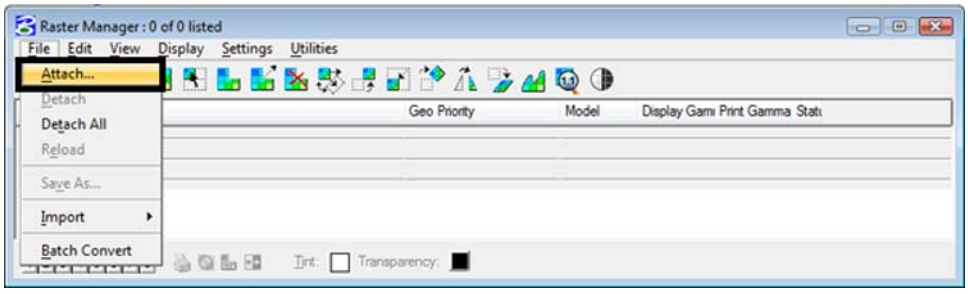
In the CADD file for the title sheet:

1. Remove the reference file (Elbert.dgn) from the previous exercise by selecting **Tools > Detach** from the References dialog box.



2. Select **File > Raster Manager** from the MicroStation menu bar.

3. Select **File > Attach > Raster** in the Raster Manager dialog.

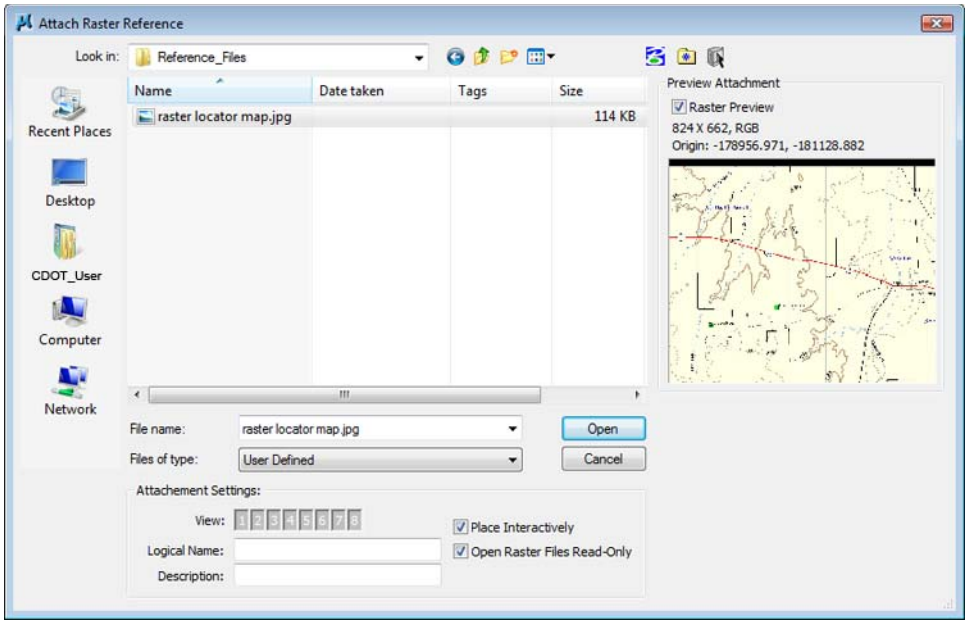


4. Browse to the …***ROW_Survey\Drawings\Reference_File** folder and **select** the file **Raster locator map.jpg**

5. ***Key-in*** the Logical Name ***Locator***

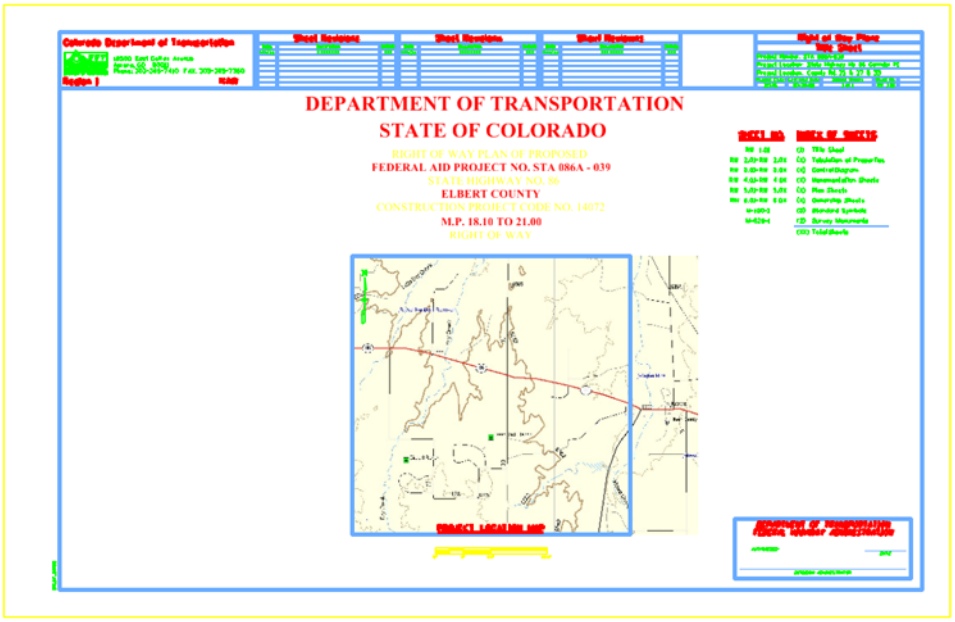
6. ***Key-in*** the Description ***Raster location map***

7. **<D> OK**

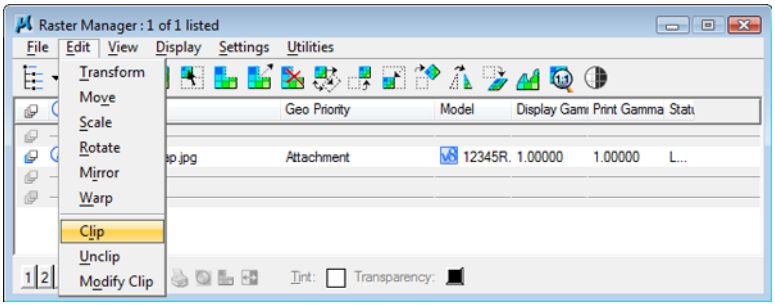


8. As in the previous lab, **<D>** to define the lower left and upper right corners that define the desired limits for the reference file.

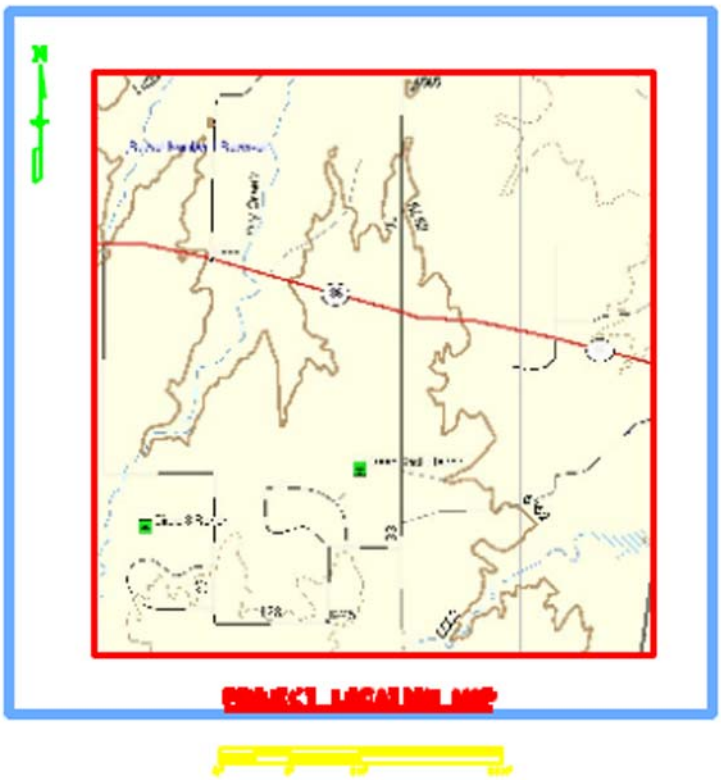
The raster reference file is attached to the title sheet



9. In the **Raster Manager** dialog, select **Edit > Clip**



10. Follow the MicroStation prompts to ***define*** the clip of the raster so it appears approximately as shown.



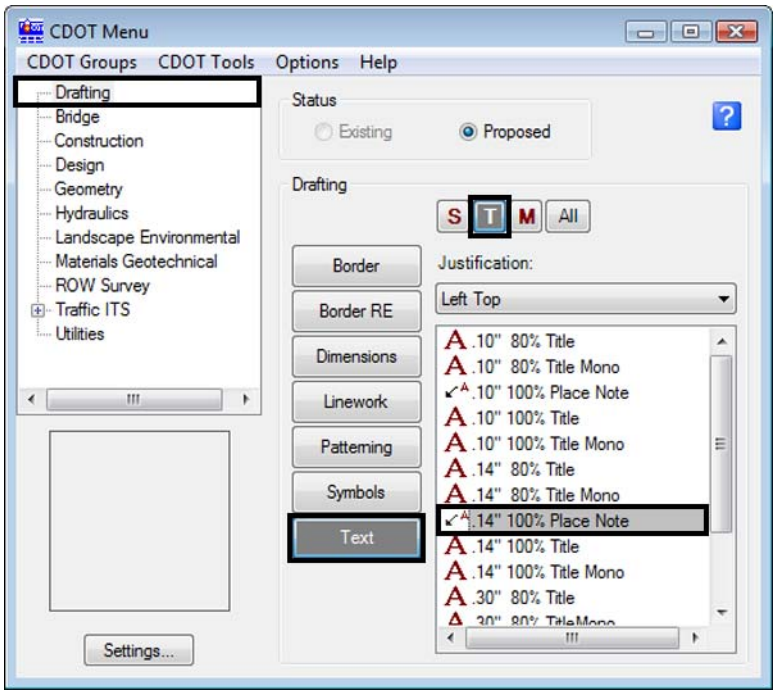
LAB 23 - Annotation

Chapter Objectives:

- Annotate using the Place Note command

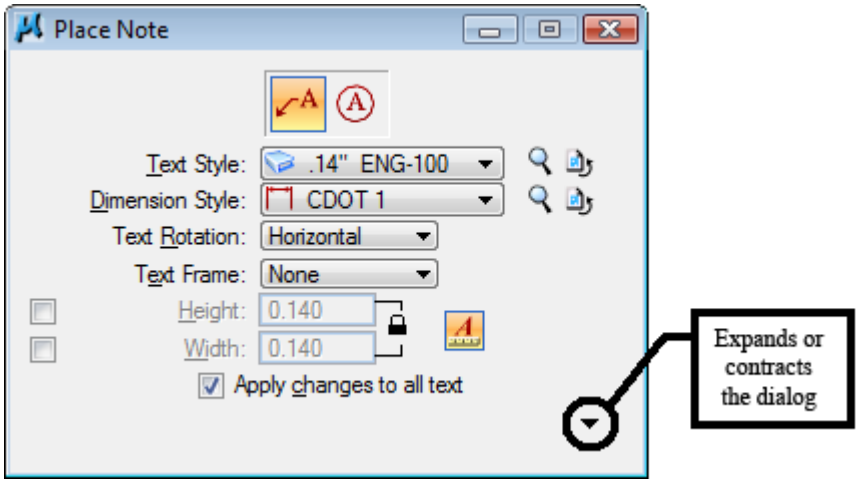
Annotate the locator map using the MicroStation place note command. First select the correct symbology using the CDOT Menu.

1. Activate the **Drafting** Group Display.
2. **<D>** Text button in Drafting area.
3. Set the Title Text Type (button labeled **T** in ***Drafting*** area).
4. Set the **Justification** to ***Left Top***
5. Select ***.14" 100% Place Note*** as shown.

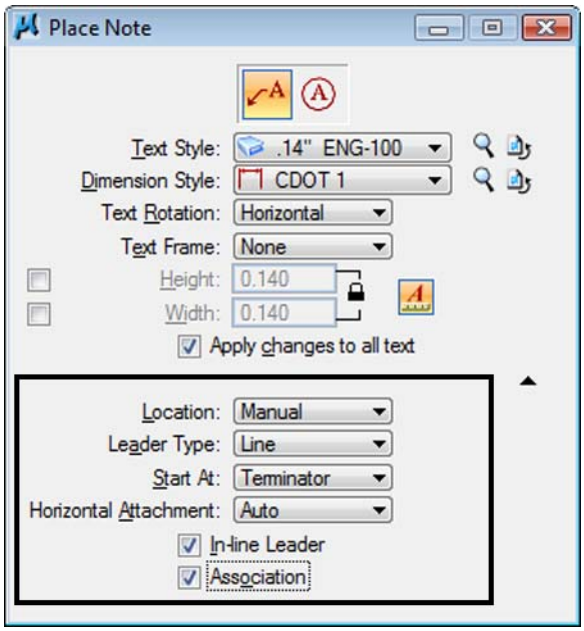


The correct settings and symbology are now set and the MicroStation Place Note command should automatically execute with the correct Text Style specified in the Place Note dialog.

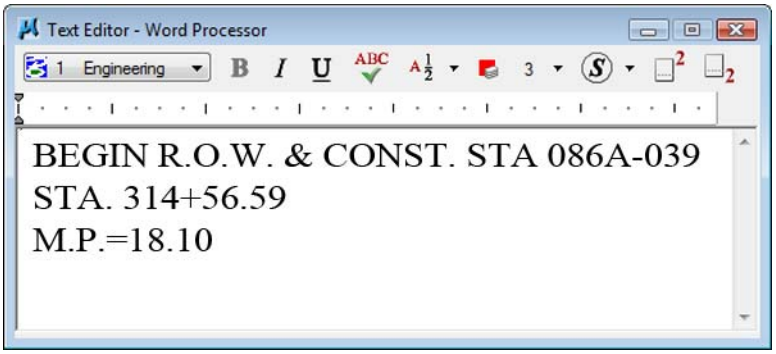
6. **Select** the **Dimension Style** ***CDOT 1***



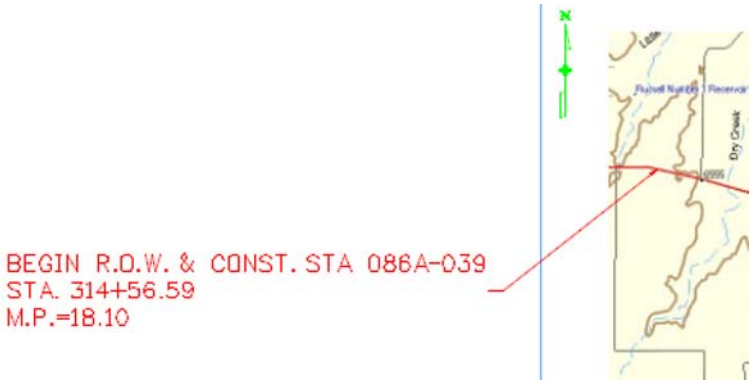
7. **Expand** the Place Note dialog and note the available options. Make sure the options selected match those shown below.



8. **Key-in** the required text as shown.

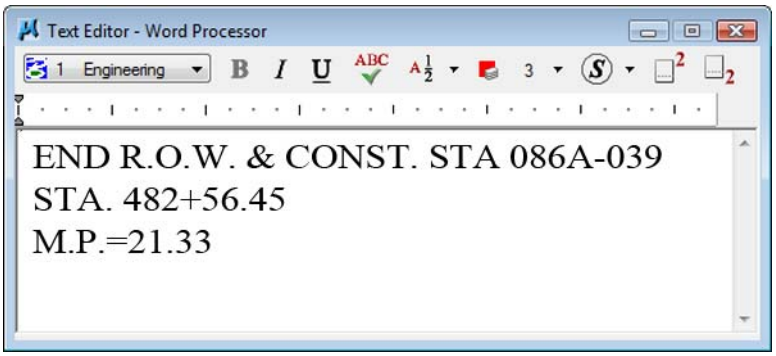


9. ***Follow the MicroStation prompts*** to place the leader line and text (the first **<D>** will define the location of the arrow).

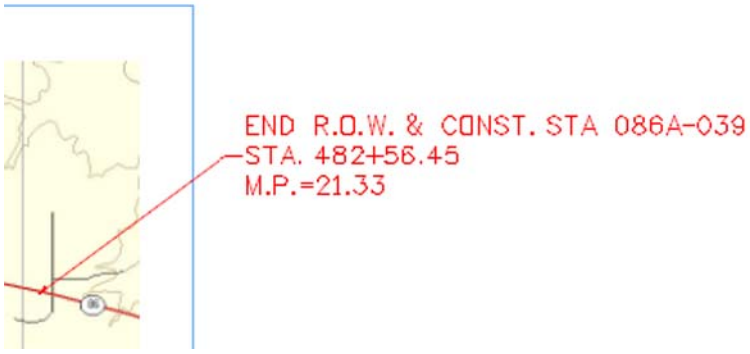


Repeat for the end of project information.

10. Key-in the required text as shown.



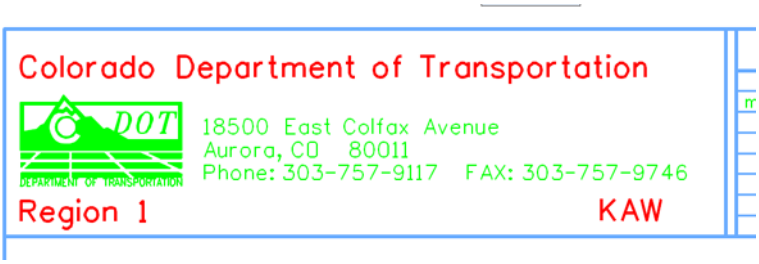
Follow the ***MicroStation prompts*** to place the leader line and text



11. Select **File > Save Settings**

Challenge Exercises:

- Insert a scale bar cell and/or north arrow (General.cel)
- Input a basis of bearing note
- Replace the information in the top-left corner of the sheet (ROW.cel)



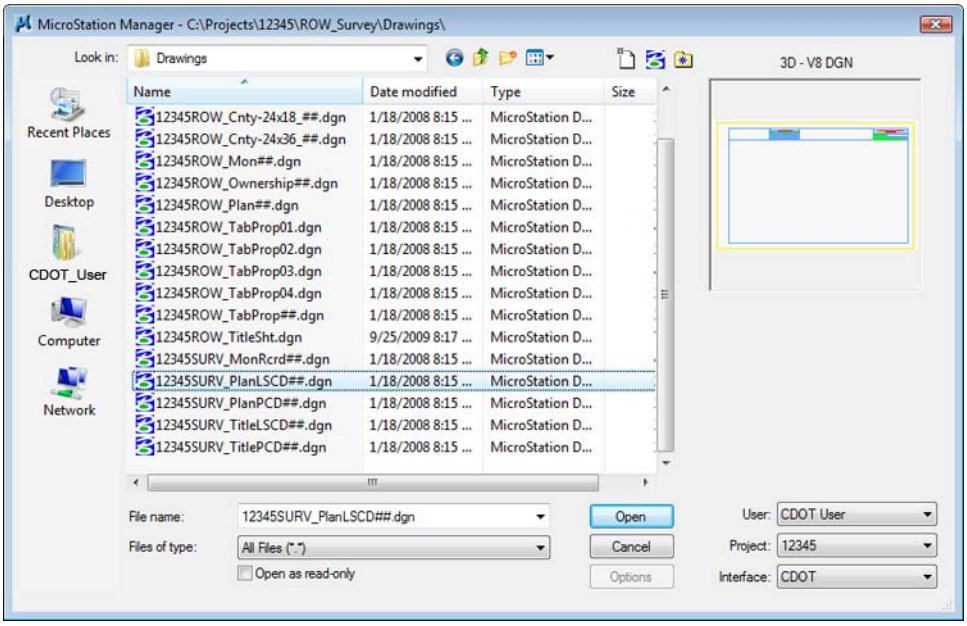
LAB 24 - Land Survey Control Diagram Plan Sheet

Chapter Objectives:

- Import XML data into a MicroStation file

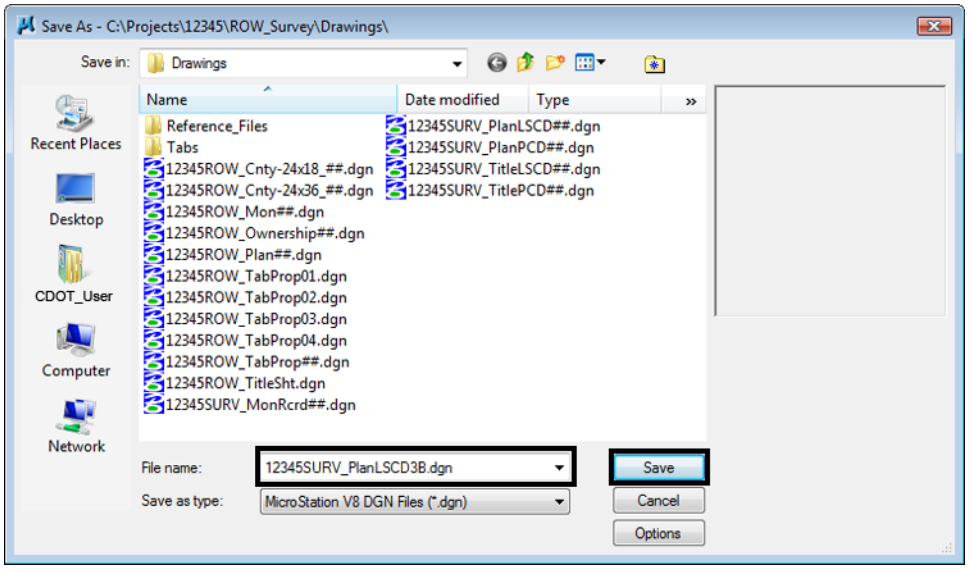
In this sheet, coordinate information will be input in a tabular format.

1. Select **File > Open** (if MicroStation is currently open).



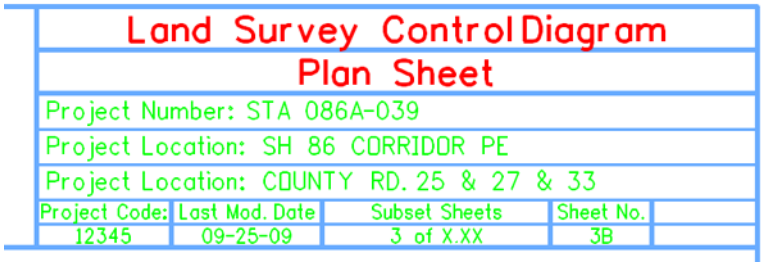
2. **<D>** the filename ***12345SURV_PlanLSCD##.dgn***
3. Select **File > Save As** from the MicroStation Manger dialog.
4. Key-in ***12345SURV_PlanLSCD3B.dgn***

5. **<D> Save**



6. **Zoom/Window** into the upper-right corner of the sheet.

7. **Edit** the text as shown using **Edit Text** command.

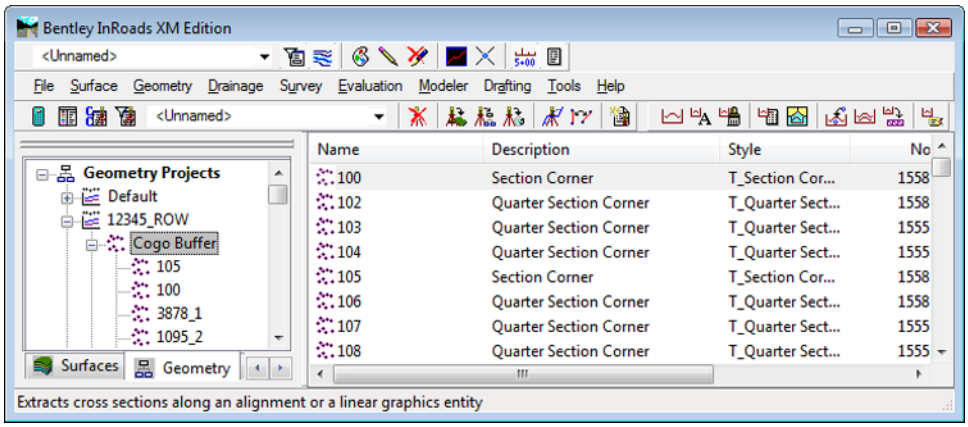


8. Use the MicroStation **Fit** command to view the entire sheet.

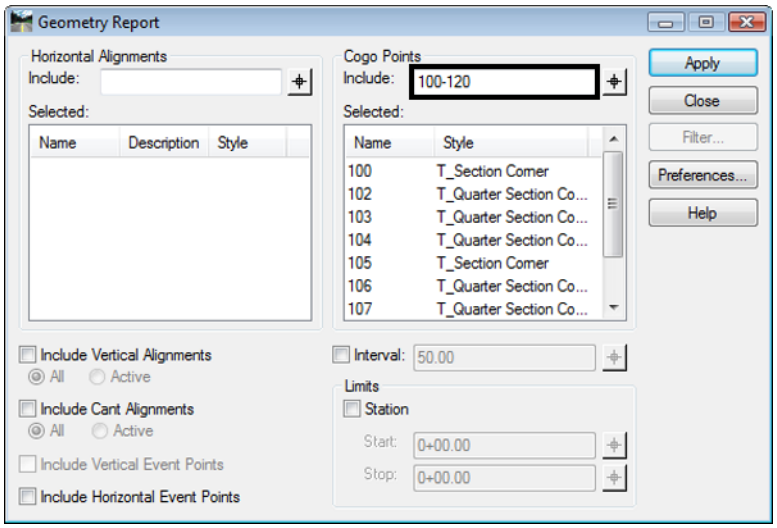
In this sheet, place coordinate information representing a Project Coordinate Summary Table. This coordinate information will be extracted from InRoads using the reporting utility XML.

Using XML to report on Coordinates

Use InRoads and XML reporting to insert a Project Coordinate Summary Table. Report on points 100-120.

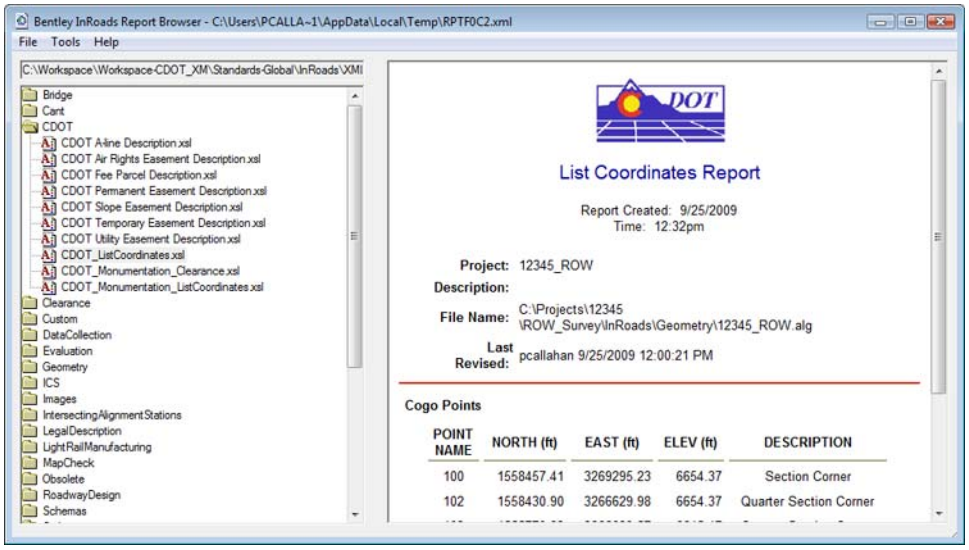


9. If not already running and loaded:
    - ***Launch*** InRoads & Load the Geometry Project **12345_ROW.alg** from ***C:\Projects\12345\ROW_Survey\InRoads\Geometry***
10. Select **Tools > XML Reports > Geometry** from the InRoads interface.
11. In the XML Reports dialog, **<D>** the Geometry folder and identify Cogo points ***100-120***



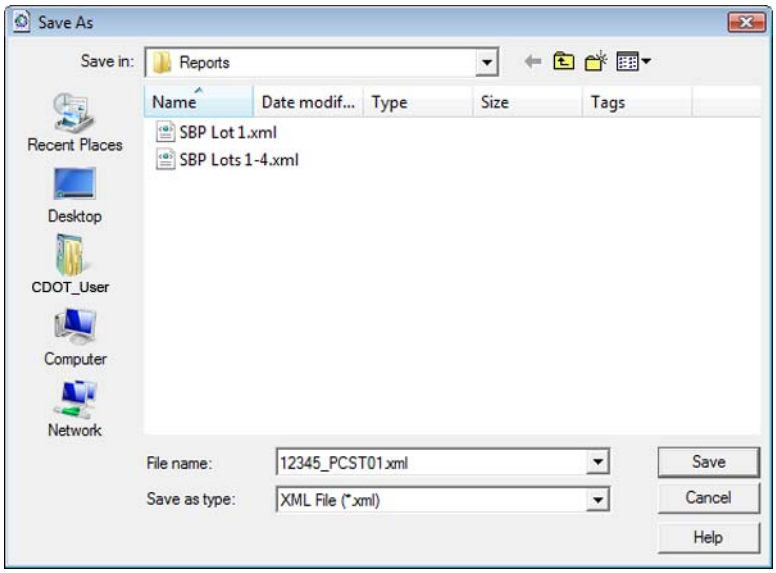
12. **<D> Apply**. The report browser will open to a default report style.
13. **<D>** the CDOT Folder.

14. **<D>** the **CDOT_ListCoordinates.xsl** style sheet.



15. Select **File > Save As**

16. Navigate to the **12345\ROW_Survey\InRoads\Reports** folder and input the file name ***12345_PCST01.xml***



17. **<D> Save** to save the file.

Excel in MicroStation

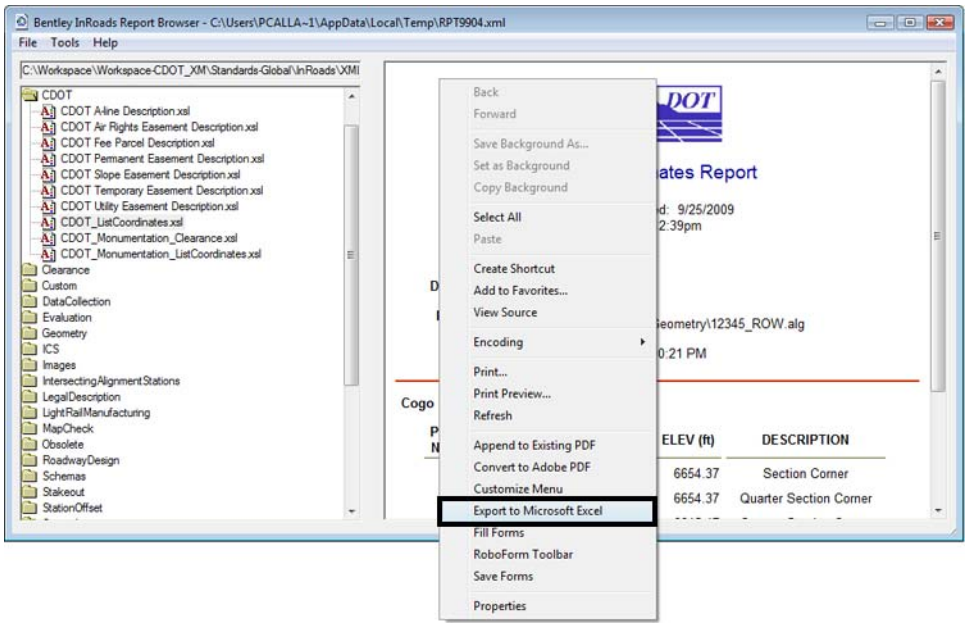
Tables can be created in MicroStation by linking information that is contained in an Excel spreadsheet. There are several advantages to using the linked spreadsheet method. Some of these are:

- Text formatting in the spreadsheet is retained by MicroStation
- Graphics (borders, girds, etc) are retained from the Excel file

- Updates to the Excel file are reflected in the MicroStation file

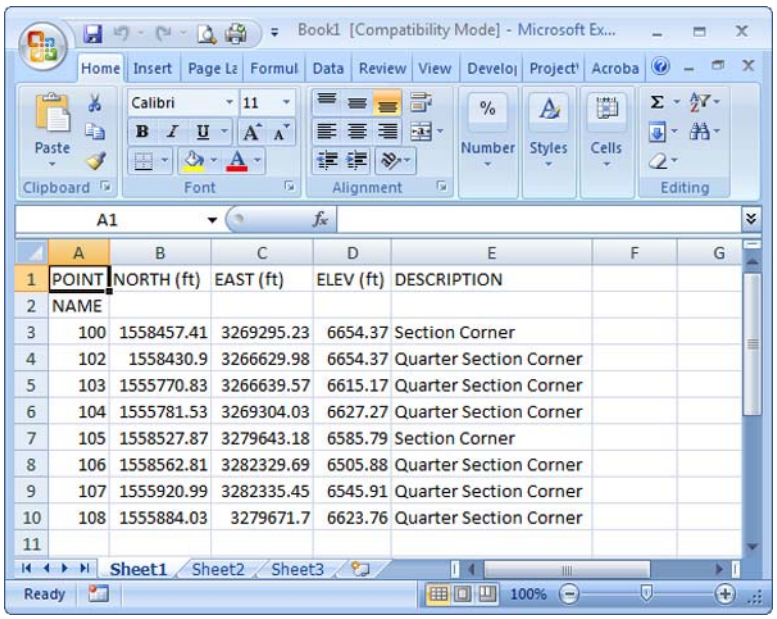
In the Bentley InRoads Report Browser:

18. **<R>** on the report in the coordinate list area as shown. A fly out menu will appear.



19. Place the cursor over the coordinates (the bottom half of report) and select **Export to Microsoft Excel** from the fly-out menu.

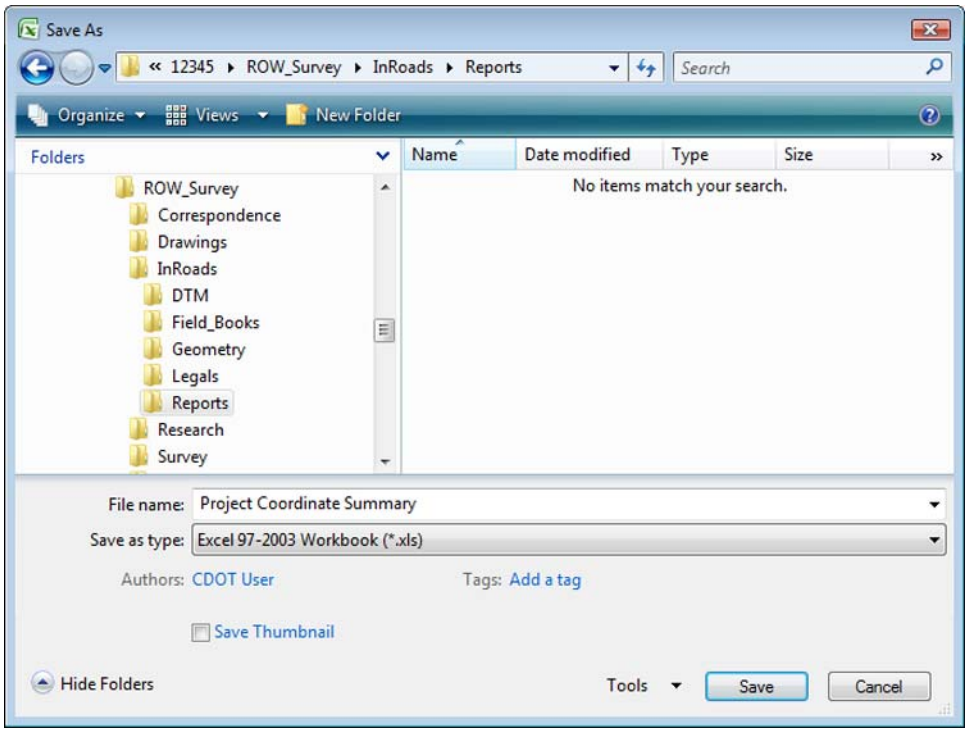
Excel should automatically launch if it is installed on the PC being used.



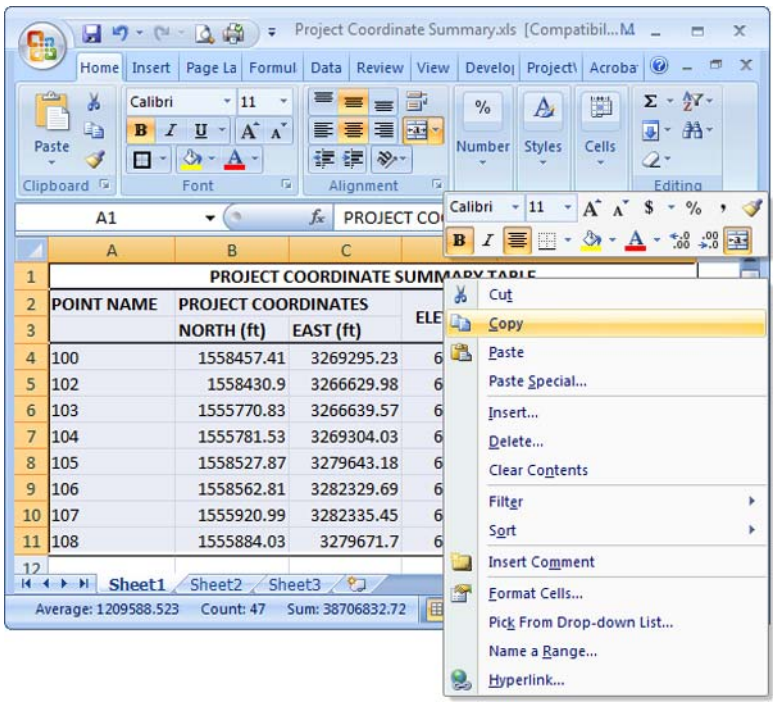
20. Make changes to the data or add formatting.

	A	B	C	D	E
1	PROJECT COORDINATE SUMMARY TABLE				
2	POINT NAME	PROJECT COORDINATES		ELEV (ft)	DESCRIPTION
3		NORTH (ft)	EAST (ft)		
4	100	1558457.41	3269295.23	6654.37	Section Corner
5	102	1558430.9	3266629.98	6654.37	Quarter Section Corner
6	103	1555770.83	3266639.57	6615.17	Quarter Section Corner
7	104	1555781.53	3269304.03	6627.27	Quarter Section Corner
8	105	1558527.87	3279643.18	6585.79	Section Corner
9	106	1558562.81	3282329.69	6505.88	Quarter Section Corner
10	107	1555920.99	3282335.45	6545.91	Quarter Section Corner
11	108	1555884.03	3279671.7	6623.76	Quarter Section Corner
12					

21. and **save** the spreadsheet to the ***…\ROW_Survey\InRoads\Reports*** directory.



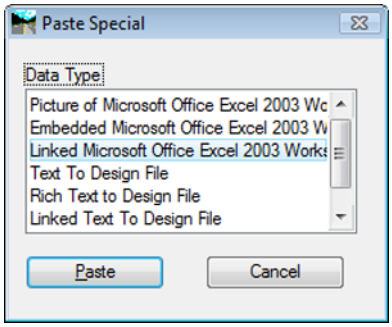
22. **Select** the range of information to be displayed in the MicroStation file.



23. **<R>** on the spreadsheet data and select **Copy** from the fly-out menu.

RETURN TO MICROSTATION

24. Select **Edit > Paste Special** from the MicroStation menu bar.

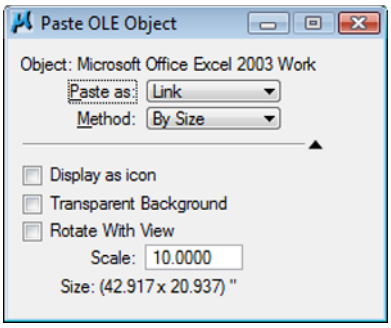


25. **<D>** the **Linked Microsoft Office Excel 2003 Worksheet** option.

26. **<D> Paste**

Note: By choosing linked, updates made to the Excel file can be passed back to the MicroStation file through updating. Selecting embedded does not provide this dynamic ability.

27. In the **Paste OLE** dialog box, set **Paste as** to ***Link***, **Method** to ***By Size***, and input a **Scale** of ***10***



Note: At this time, we do not fully understand the correlation between the scale and resulting text size. For this example, 10 seemed to produce reasonable results. Once placed, the text height can be measured and the bounding shape of the linked Excel table can be scaled up or down accordingly to achieve required text size.

POINT	NORTH (ft)	EAST (ft)	ELEV (ft)	DESCRIPTION
102	1,558,430.90	3,266,629.98	6,654.37	Control Monument-Project
103	1,555,770.83	3,266,639.57	6,615.17	Control Monument-Project
104	1,555,781.53	3,269,304.03	6,627.27	Control Monument-Project
105	1,558,527.87	3,279,643.18	6,585.79	Control Monument-Project
106	1,558,562.81	3,282,329.69	6,505.88	Control Monument-Project
107	1,555,920.99	3,282,335.45	6,545.91	Control Monument-Project
108	1,555,884.03	3,279,671.70	6,623.76	Control Monument-Project
113	1,556,247.10	3,279,252.22	6,624.10	Traffic Control Double Yellow
117	1,558,514.31	3,277,056.40	-	N 1/4 Cor Section 14
119	1,555,884.03	3,279,671.70	6,585.79	W 1/4 Cor Sec 13
120	1,553,239.97	3,279,699.86	-	SE Cor Section 14

Note: Hatching on the MicroStation representation of the linked Excel data indicates the spreadsheet is currently open for editing.

28. Close Excel and note the hatching is eliminated from the display.

    Activating the Element Selection tool and entering a **<D><D>** on the border of the linked table in MicroStation will launch the Excel application. If the Excel file is initialized from MicroStation the linked data will automatically update when the Excel file is saved and closed.

29. Use the MicroStation Element Selection Tool and **<D><D>** on the border of the linked data.

30. Make an edit to the spreadsheet data or formatting.

31. **Save and Close** the Excel file. Note the linked data in the MicroStation file updates.

POINT	NORTH	EAST	ELEV	DESCRIPTION
102	1,558,430.90	3,266,629.98	6,654.37	Control Monument-Project
103	1,555,770.83	3,266,639.57	6,615.17	Control Monument-Project
104	1,555,781.53	3,269,304.03	6,627.27	Control Monument-Project
105	1,558,527.87	3,279,643.18	6,585.79	Control Monument-Project
106	1,558,562.81	3,282,329.69	6,505.88	Control Monument-Project
107	1,555,920.99	3,282,335.45	6,545.91	Control Monument-Project
108	1,555,884.03	3,279,671.70	6,623.76	Control Monument-Project
113	1,556,247.10	3,279,252.22	6,624.10	Traffic Control Double Yellow
117	1,558,514.31	3,277,056.40	N/A	North 1/4 Cor Section 14

If the linked data is edited by launching the application outside of MicroStation, a manual update command must be executed. Select **Edit > Update Links** from the MicroStation menu bar to refresh the linked MicroStation graphics.

The linked data can be moved, scaled, or otherwise manipulated with MicroStation commands by selecting the border of the linked object.

LAB 25 - Tabulation Properties Sheet

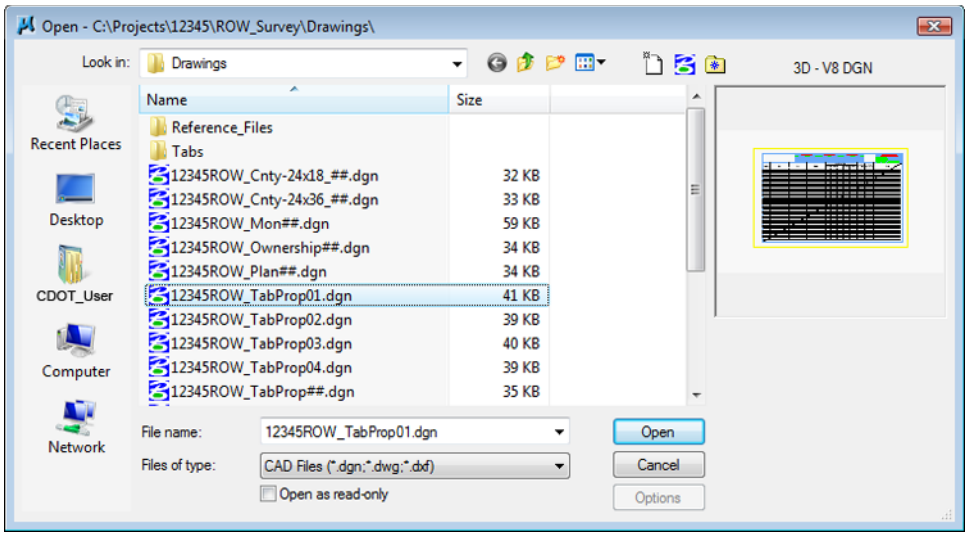
Chapter Objectives:

- Edit Microsoft Excel information from within MicroStation

In this sheet, information will be updated using Microsoft Excel.

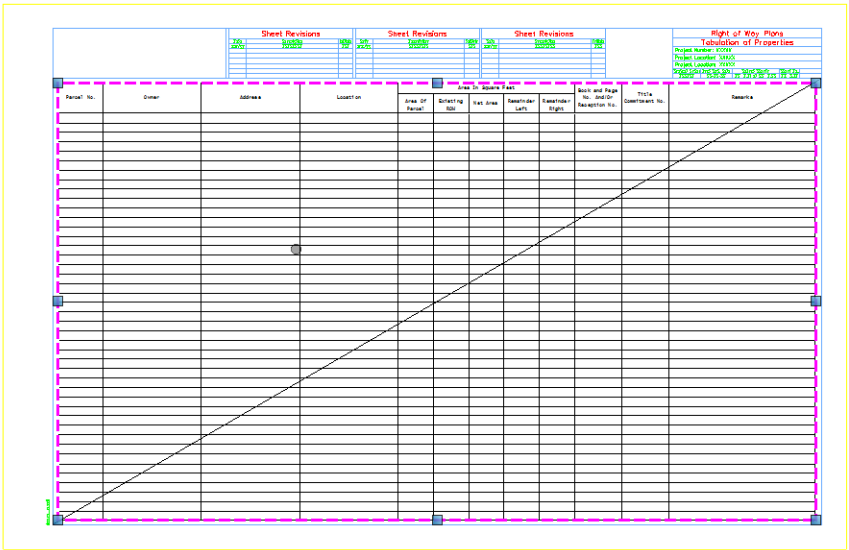
Return to the MicroStation manager dialog.

1. Select **File > Open**



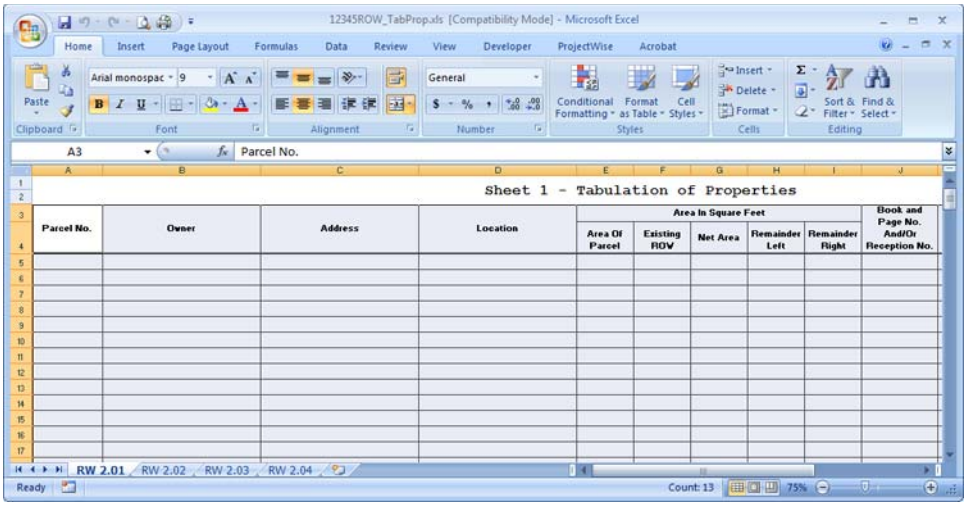
2. **<D>** the filename **12345ROW_TabProp01.dgn**

3. **<D> Open**

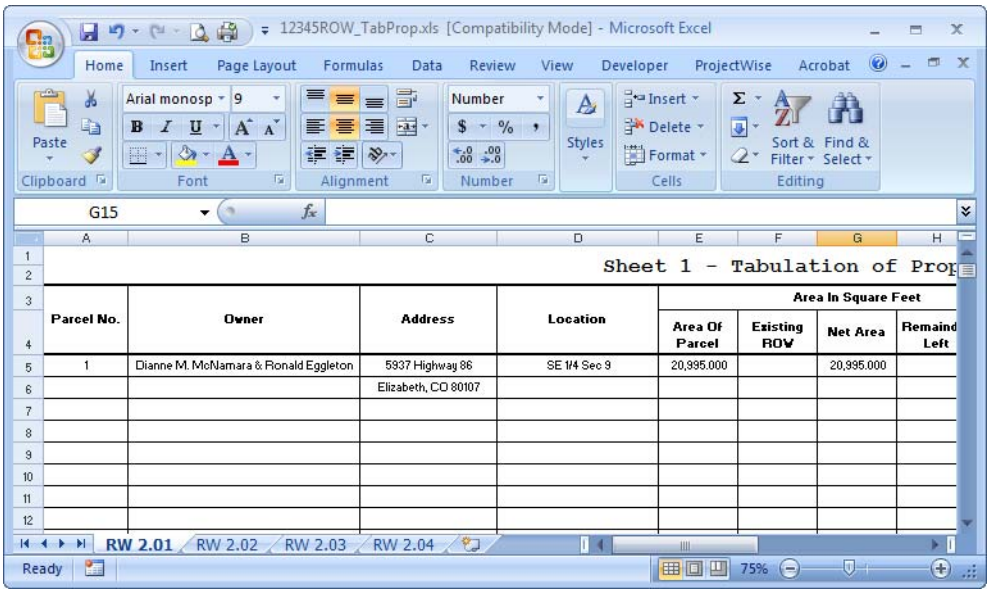


4. **<D> <D>** on the outline of linked data to open up XLS link in Excel.

Note: When a linked excel file is opened for editing in Excel a hatched pattern displays in your MicroStation view. This is to indicate that the file is being accessed from an external program.

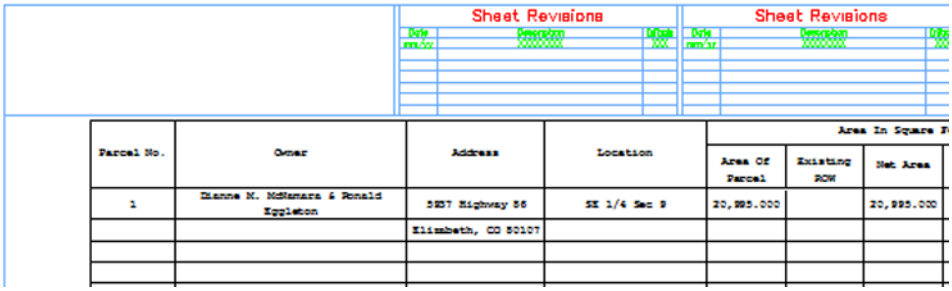


5. Insert data into Excel. (sample data is provided below)



Parcel No: 1
Owner: Dianne M. McNamara & Ronald Eggleston
Address: 5937 Highway 86
Elizabeth, CO 80107
Location: SE 1/ 4 Sec 9
Area of Parcel: 20,995 s.f.
(0.51 acre)
Net Area: 20,995 s.f.
(0.51 acre)

6. Save and Exit in Excel; the MicroStation file will update.



7. To update MicroStation without exiting Excel: Save edited Excel data. Then select **Edit>Update Links** from the MicroStation pull-down.

LAB 26 - Reference Files for Plan Sheets

Chapter Objectives:

- Create plan sheets referencing in files
- Clipping reference files
- Rotate reference files

Two approaches can be used to assemble plan sheets. In the first part of this chapter the 'manual' method of attaching reference files will be used. This is followed by using the InRoads sheet generation command known as the Plan and Profile Generator.

The contents of the reference files are not important to this process and may not accurately reflect the contents and layout of a final plan sheet.

This lab will relocate the border sheet to align with the design graphics.

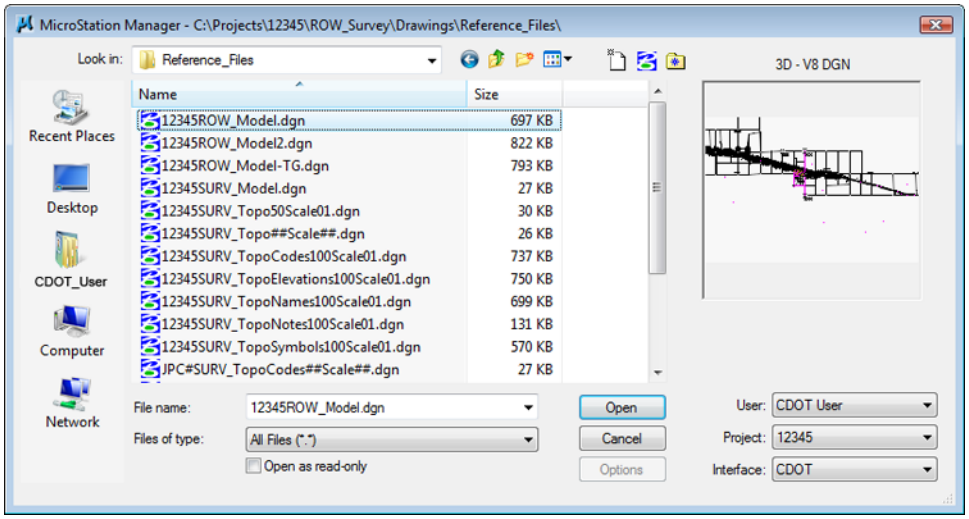
Moving border sheets to align with design information

In a previous exercise graphics (locator map) were moved to align with the title sheet. This may suffice for information that is not coordinate dependent but is not an acceptable practice in the generation of engineering drawings. The following workflow will result in a product that conforms to CDOT standards.
This first lab uses the 'manual' method for designing a plan set layout and assembling the plan sheets. A following lab will use the InRoads Plan and Profile generator command to 'automate' the process.

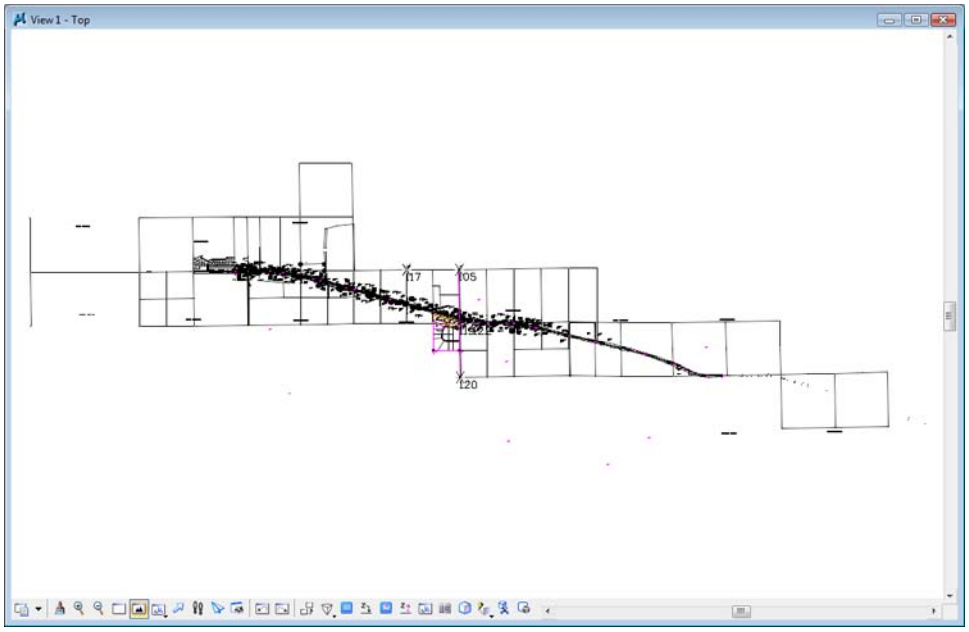
The process for this lab is:

- Define the plan sheet limits, rotation, and size(s)
- Create a sheet file containing a border for each plan sheet
- Attach the appropriate reference files
- Rotate sheets normal to the MicroStation view for ease of use
- Define reference file clip boundaries

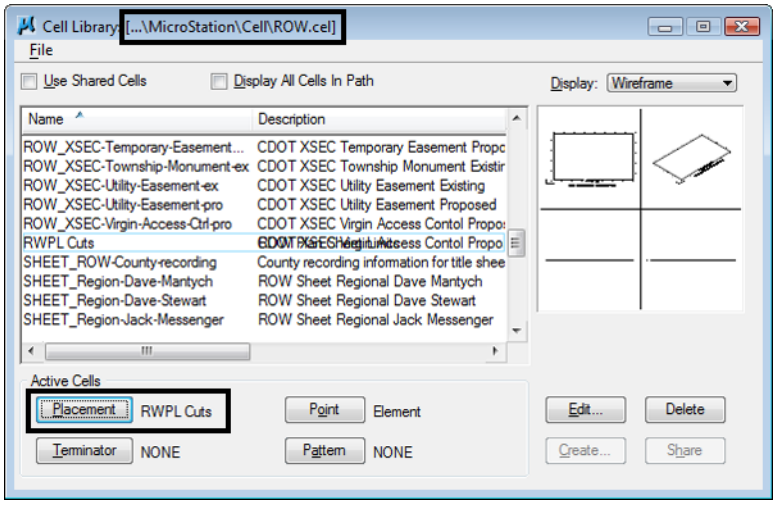
1. ***Open*** the MicroStation file **12345ROW_Model.dgn**



2. Select the MicroStation **Fit** command to expand the view to show all graphics.

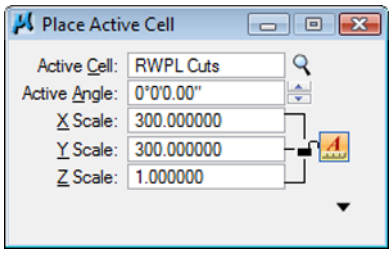


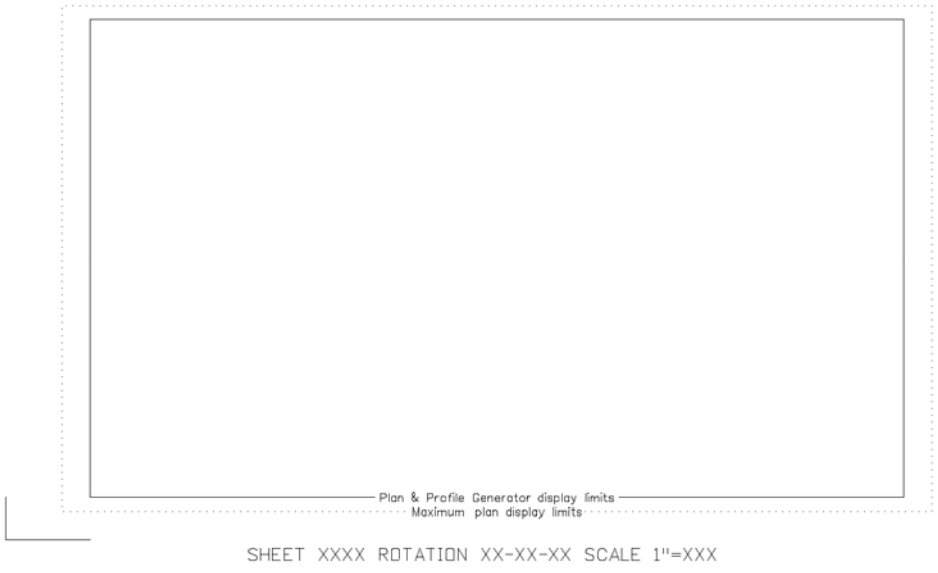
3. Select **Element > Cells** to verify the ***ROW*** cell library is attached.
If not, select **File > Attach** from the **Cell Library** dialog and attach **ROW.cel** from the cell library list.



4. **<D><D>** rapidly on the cell name ***RWPL Cuts*** to identify this as the 'Placement' cell and activate the place cell command.

5. In the **Place Active Cell** dialog, set the **X** and **Y** scale to ***300***, and **Active Angle** to ***0***. A **Z** scale of ***1.0*** should be used. An X and Y scale of 300 is used because this reflects the scale the survey control diagram sheets will be developed at.

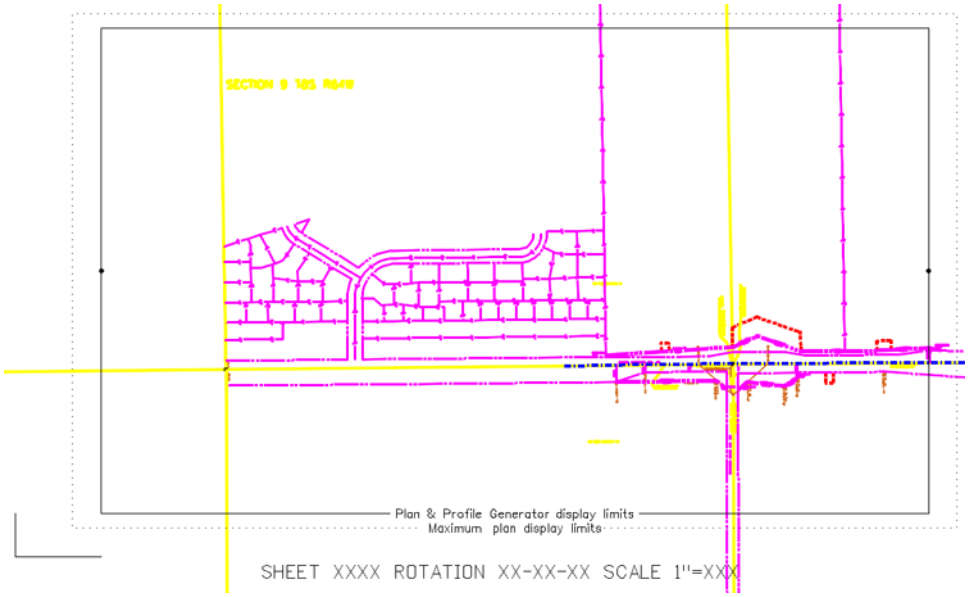




About this cell:

This cell was created to facilitate the planning of eventual sheets. It contains text characters that can be edited to indicate sheet name, rotation, & scale. The outer line-work depicts the maximum display limits for graphics as it relates to the border sheet. The inside shape reflects ½ inch inside this maximum limit. It also reflects the maximum limits that would be displayed if the sheet was created with the Plan and Profile generator command within InRoads. The 'dots' in the vertical lines represent ½ of the sheet height and assist in centering planimetrics information on the sheet. All information is written to the MicroStation level ***DRAFT_INFO_No-Plot***.

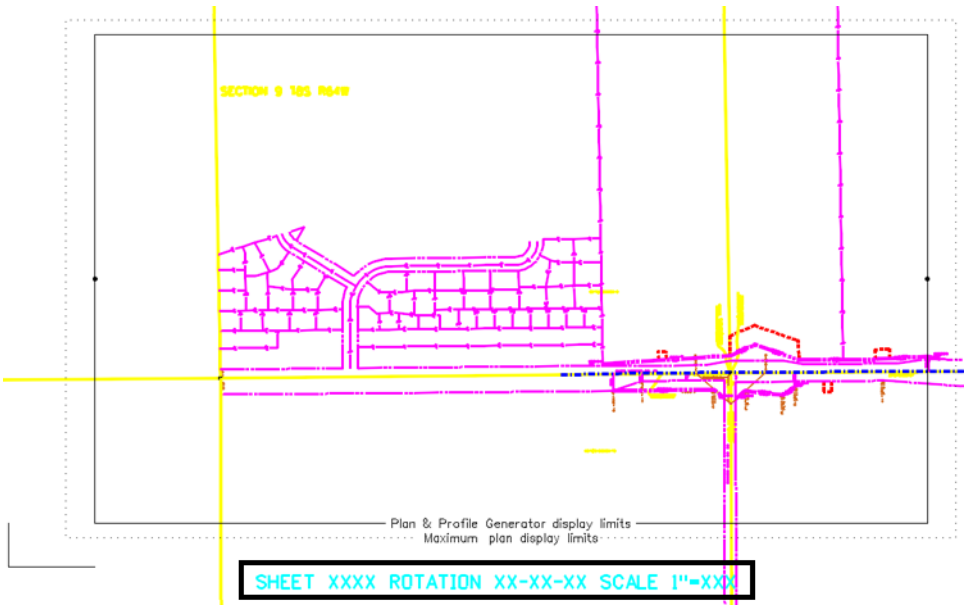
6. **<D>** to place the cell in the MicroStation file, move as necessary. These graphics will define the limits for the plan sheet when referenced back to the border.



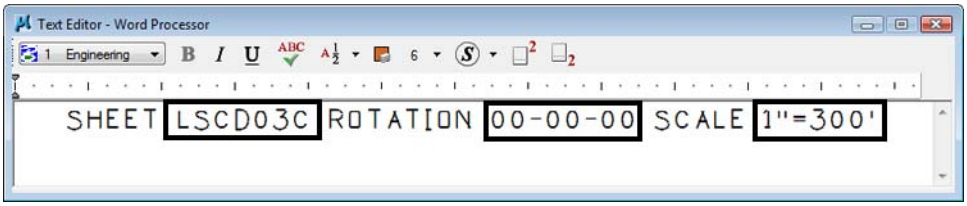
The above graphics approximately represent the required limits for the first sheet. Position the sheet limit cell as you see fit.

7. Use the **Edit Text** command to complete the text at the bottom of the sheet. This will assist in managing the sheets as reference files.

8. **<D>** on the text at the bottom of the layout sheet.



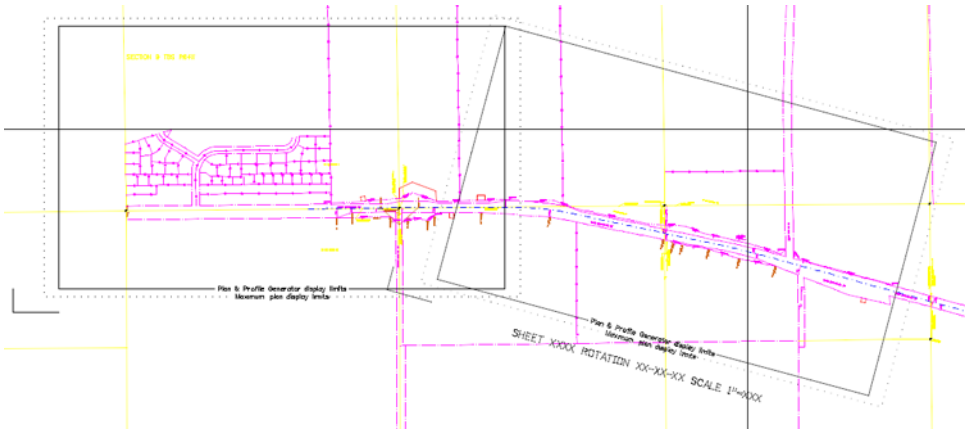
9. **Replace** the appropriate sheet information in the ***Text Editor*** as follows:
   LSCD03C
   00-00-00
   1”=300’



10. **<D>** anywhere to accept the change.

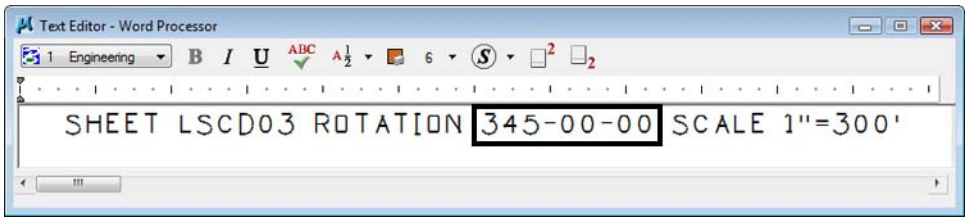
11. Use the MicroStation **Copy** command to duplicate the graphics for the second sheet.

12. Use the MicroStation **Rotate** command to align the graphics for the second sheet (345 degrees, -15 also works).

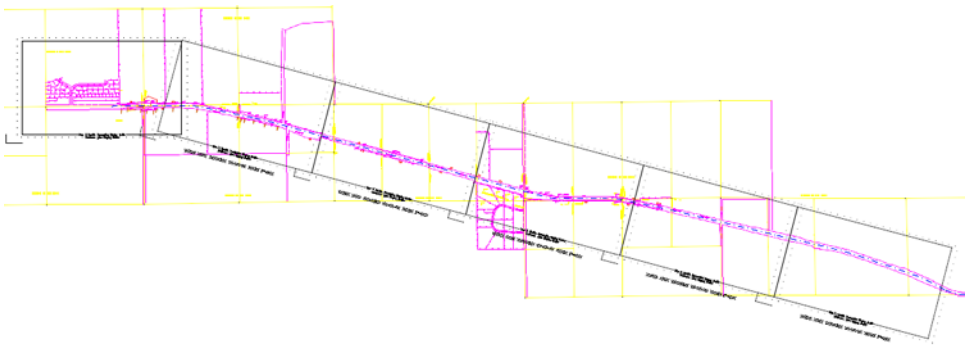


Replace the appropriate sheet information at the bottom of the copied sheet.

13. In the Text Editor enter:
    345-00-00

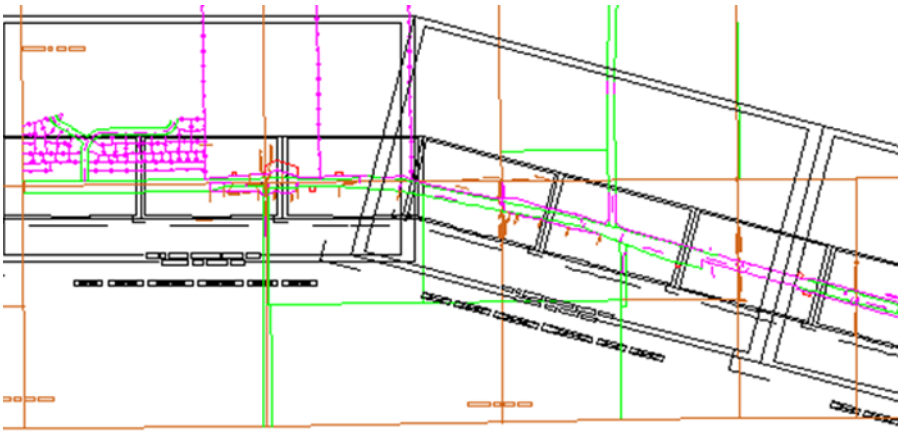


14. Continue planning the sheet layout for the remainder of the project.



Complete a few sheets to understand the concept. It is not the intention of this lab to complete the layout for the entire project.

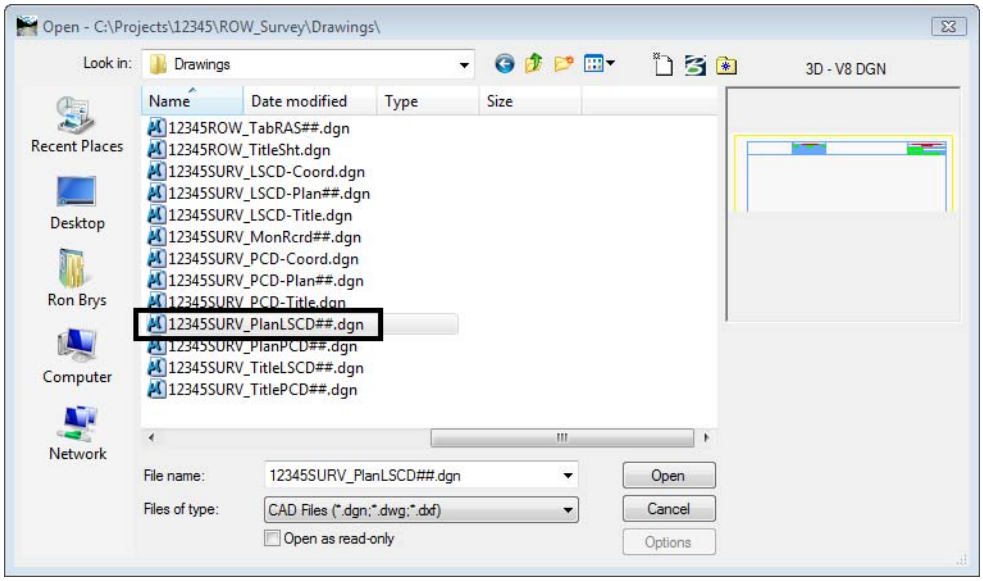
Note: Sheets at other scales could also be laid-out at this time. For instance, monumentation or right of way plan sheets at a scale of 1"=100'



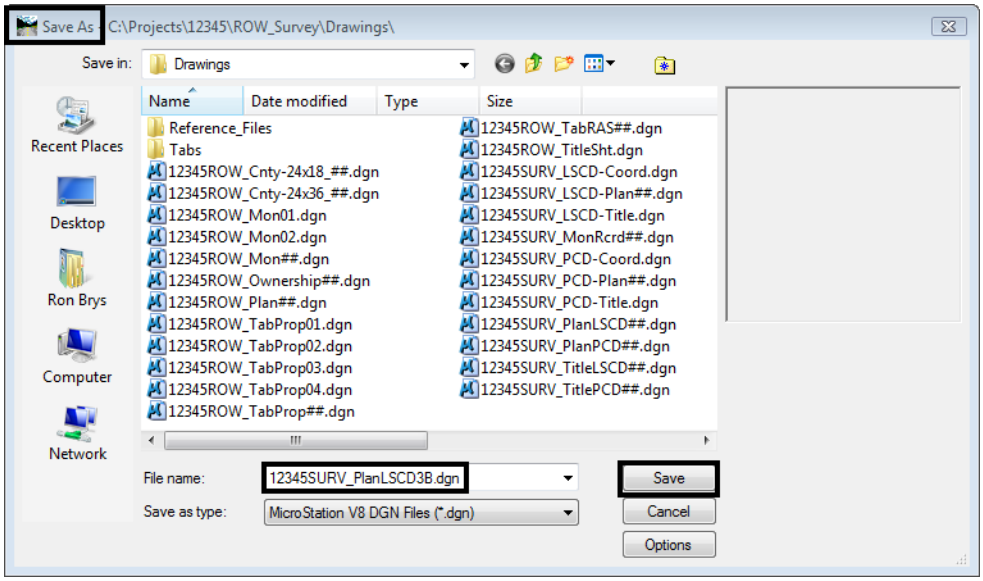
A major benefit of this workflow is that the eventual limits and orientation of sheets are determined early in the process. These sheet limits can be used to identify proper positioning, size, and rotation of text and tables. This is in addition to acting as a guide for attaching the planimetrics to the border sheets.

Assembling the plan sheets

15. ***Open*** the MicroStation file ….**ROW_Survey \ Drawings \ 12345SURV_PlanLSCD##.dgn**



16. **File > Save** the MicroStation file as ….**ROW_Survey \ Drawings \ 12345SURV_PlanLSCD3B.dgn** the new file is written to disk and opened.



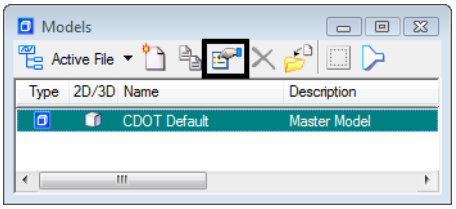
This file will be used to assemble drawing 4 of the plan subset. This will be accomplished by aligning a cell representing the border with the planimetrics. The current graphics will not be used.

17. ***Delete*** the border sheet graphics contained in the MicroStation file.

This sheet will be developed at a scale of 1:300. The MicroStation model properties require modification so that the annotation scale matches the plot scale.

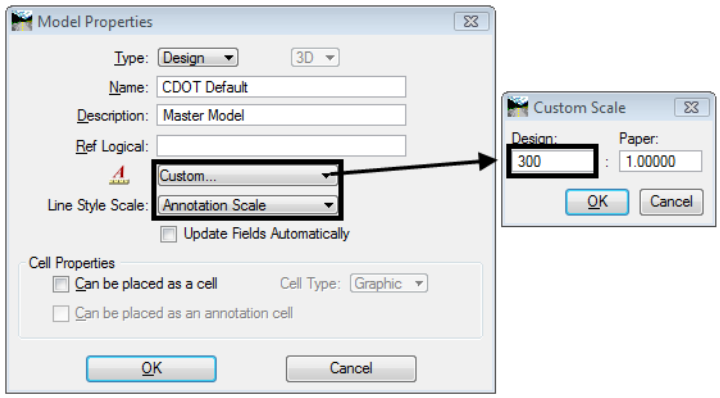
18. Open the Models dialog.

19. **<D>** the **Edit Model Properties** icon.

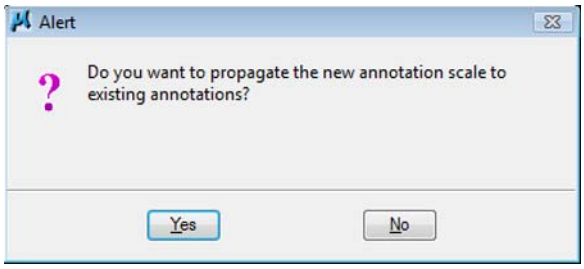


20. **<D>** the drop-down list and select ***CUSTOM***, then input ***300:1***

21. Set the ***Line Style Scale*** to **Annotation Scale**.



22. **<D> OK**

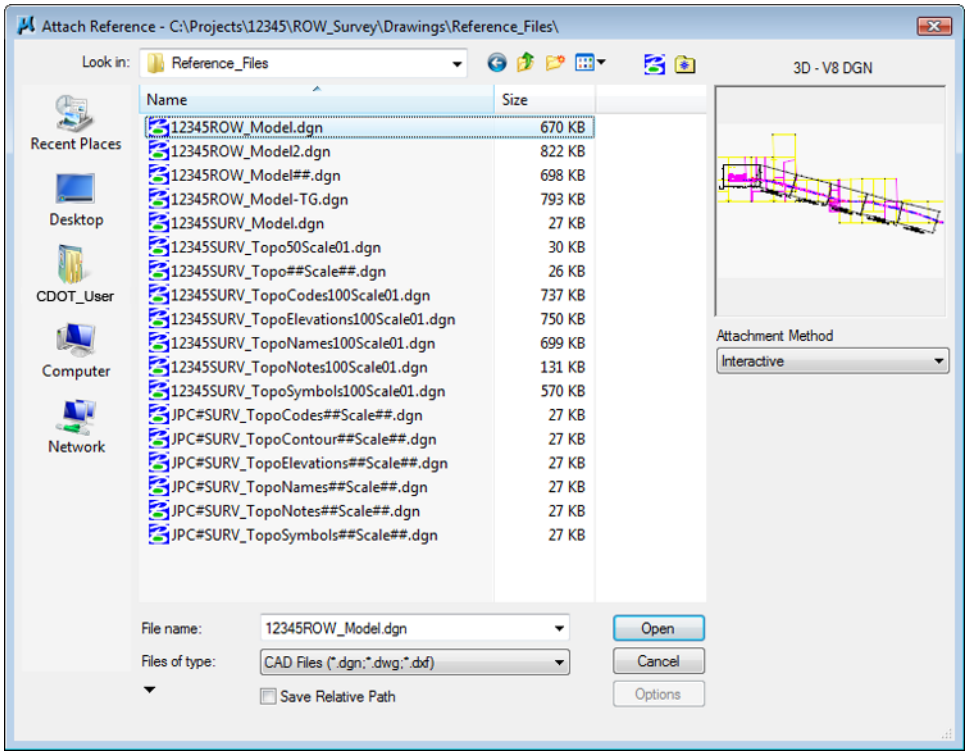


23. Attach the file used in the geometry training portion of this course from the **...\ROW_Survey\Drawings\Reference_Files** folder;

    - 12345ROW_Model.dgn

24. Select **File > References**

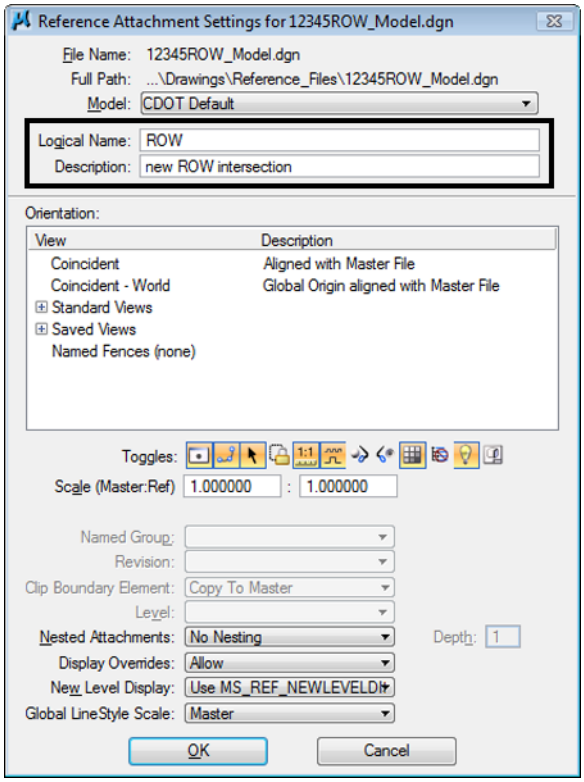
25. From the **References** menu select **Tools > Attach**



26. Highlight the file ***12345ROW_Model.dgn*** and **<D> Open**.

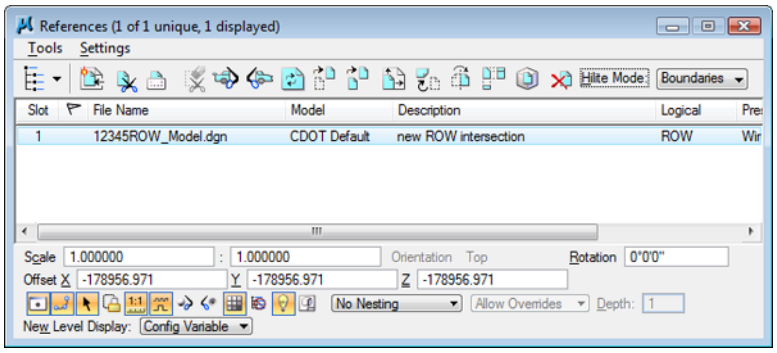
The **Reference Attachment Settings** dialog appears for the **12345ROW_Model.dgn** file.

27. Enter a **Logical Name** and **Description** as shown.



28. **<D> OK**

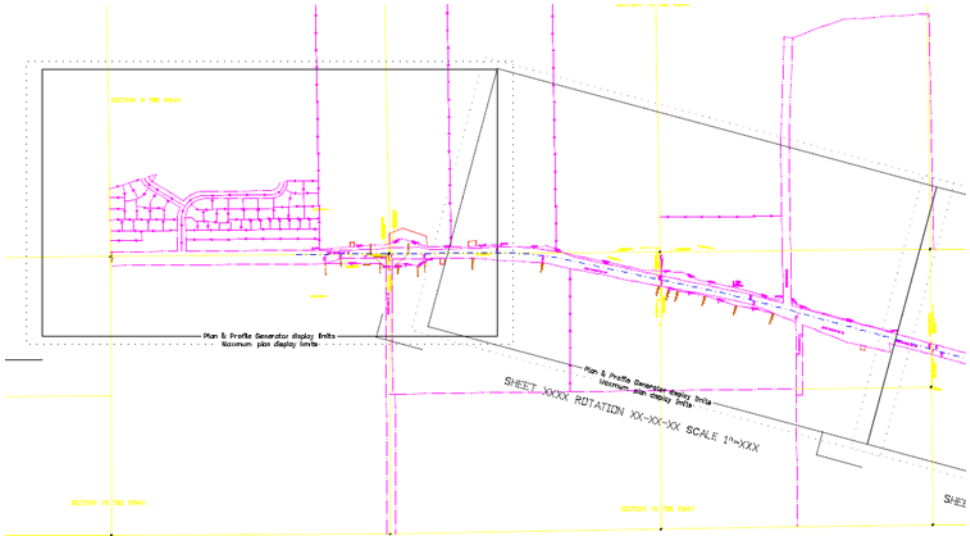
The file is now attached.



29. ***Close*** the **References** dialog.

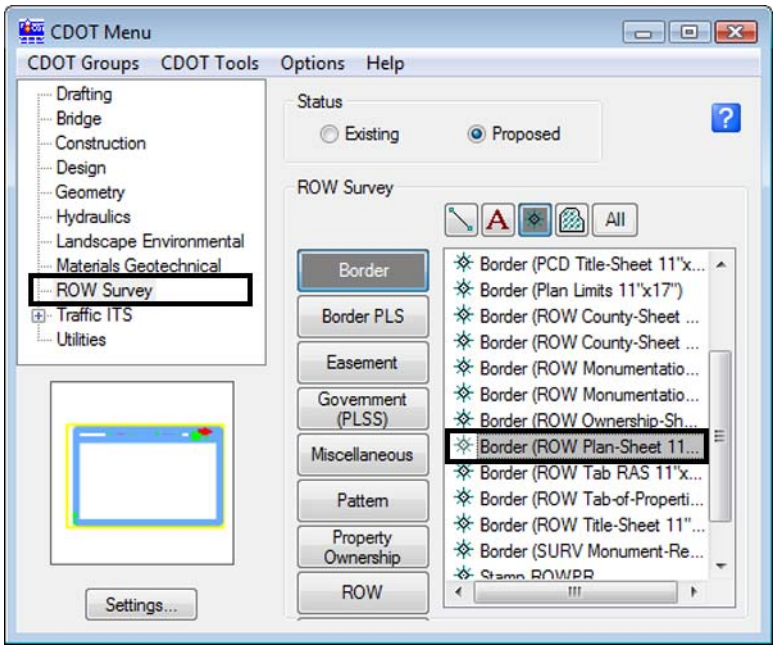
30. Select the MicroStation **Fit** command.

31. **Window** or **Zoom** into the beginning of the project.

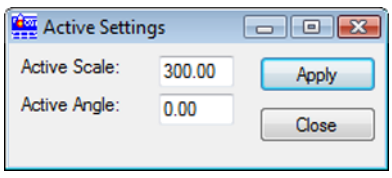


Note the graphics placed previously to indicate sheet limits.

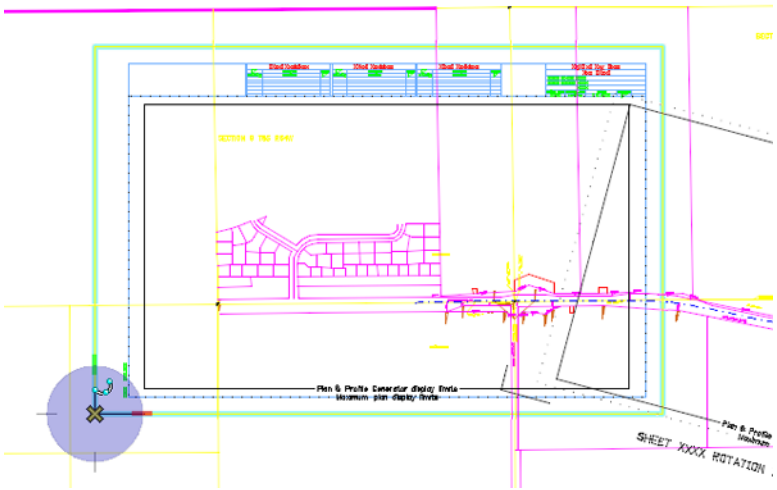
32. Place the ***cell*** called ROW Plan border **sheet** from the CDOT Menu.



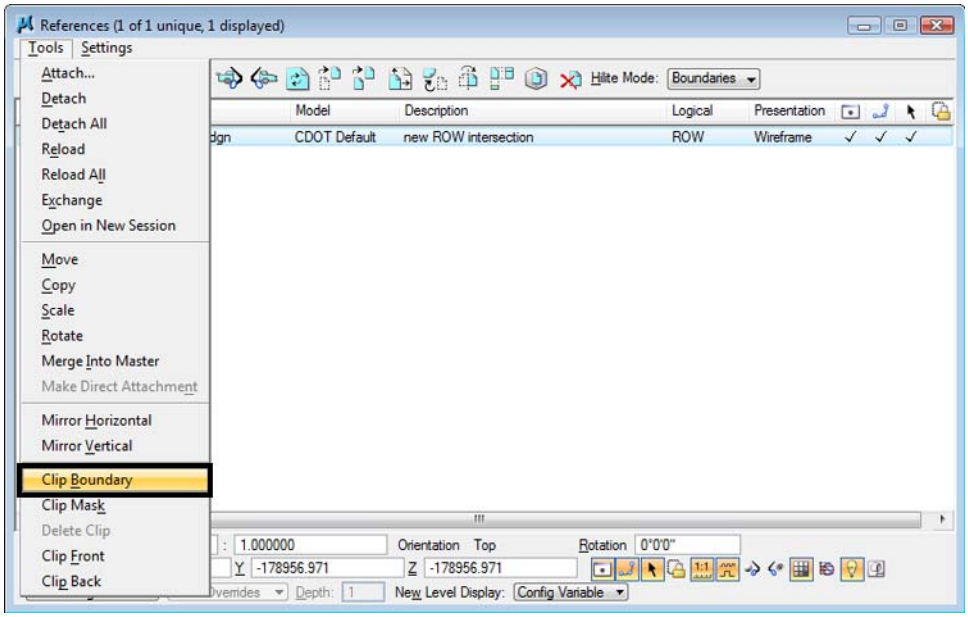
33. **<D>** Settings to and change the **Active Scale** to ***300*** and **<D> Apply**



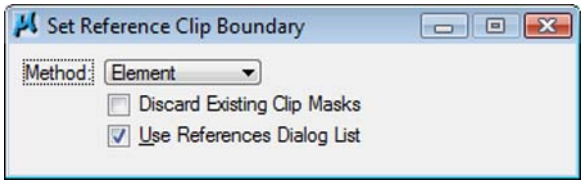
34. Place the sheet border cell so the lower-left corner coincides with the corner indicated on the sheet limits cell placed previously.



35. In the Reference dialog, identify the reference file and select **Tools > Clip Boundary**



36. In the **Set Reference Clip Boundary** dialog, select the ***Element*** Method.

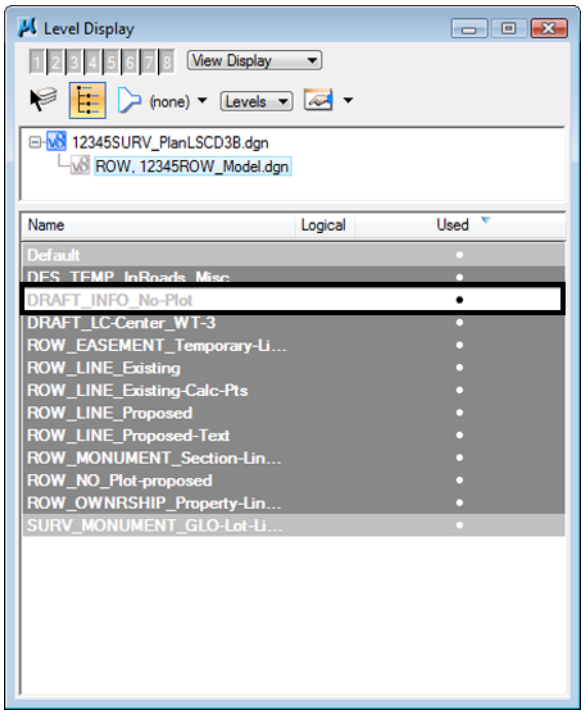


37. **<D>** on the shape inset ½ inch from the border.

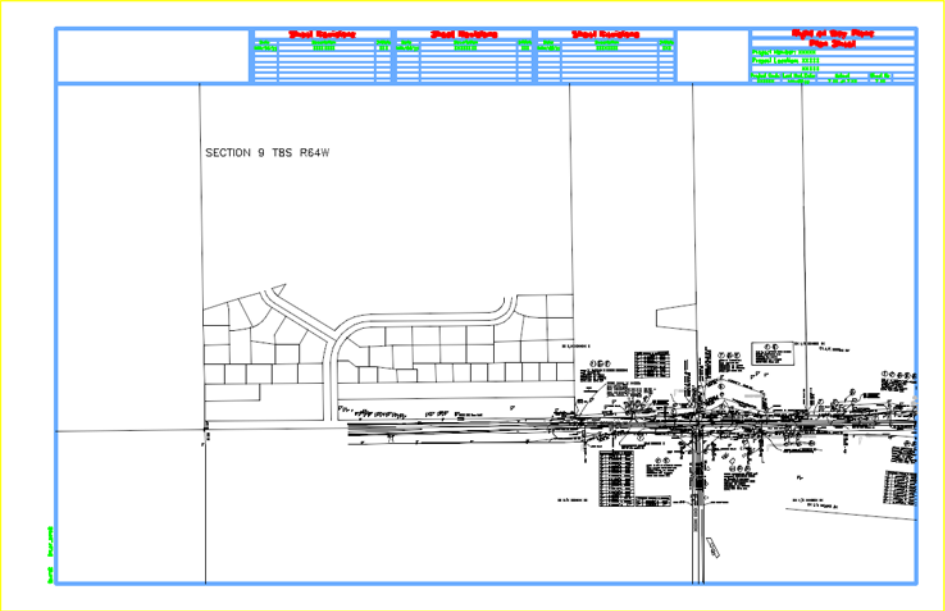
38. **<D>** anywhere to accept the clip.

The plan sheet display limits are now constrained to a desirable limit.

39. ***Turn off*** level ***DRAFT_INFO_No-Plot*** in the reference file ***12345ROW_Model.dgn*** to turn off the sheet lay-outs (Select **Settings > Level Display**).



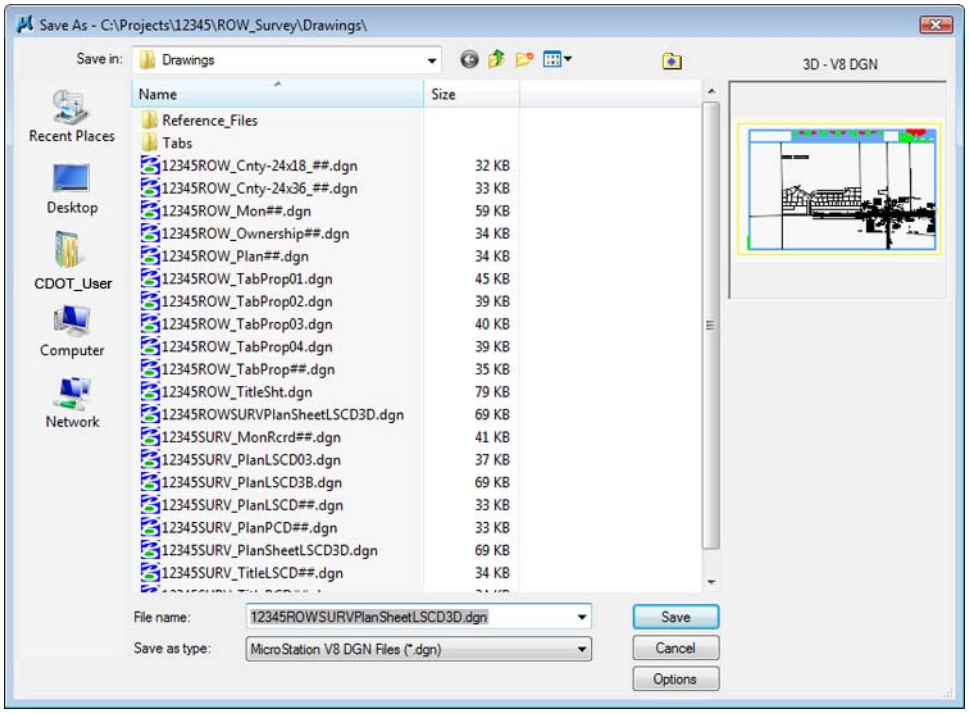
Make appropriate edits to the title block and add any sheet specific information necessary.



Using the tentative (snap) button <T> to query coordinate values that correctly reflect project coordinates. Additionally an InRoads command, such as tracking, will verify the graphics are coordinately correct.

Once the first sheet is complete subsequent sheets are much easier. The reason being is the sheet file can be duplicated with the reference files already attached. Moving the border sheet and redefining the clipping boundaries will define subsequent sheets.

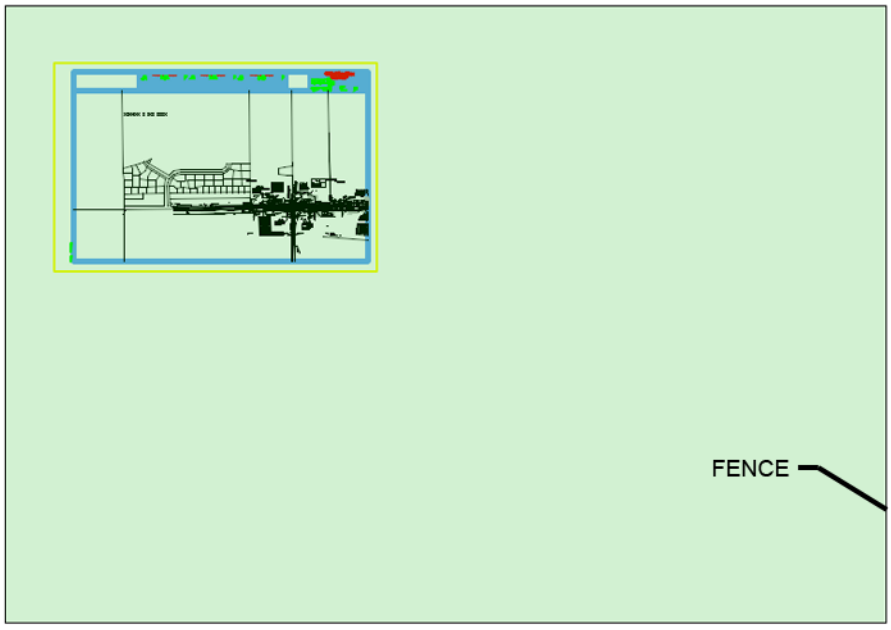
40. Select **File > Save** as, input name ***12345ROWSURVPLlanSheetLSCD3D.dgn***



41. **<D> Save**.

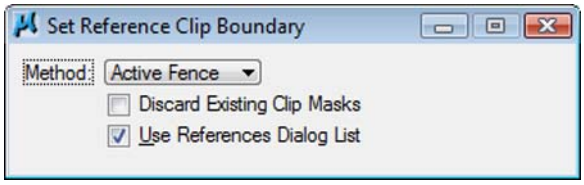
Note: The Save As command will automatically save the current drawing to the hard drive, then copy and rename to the specified file name and open the new drawing.

42. Place a MicroStation ***fence*** over an area that would encompass the next sheet in the set.

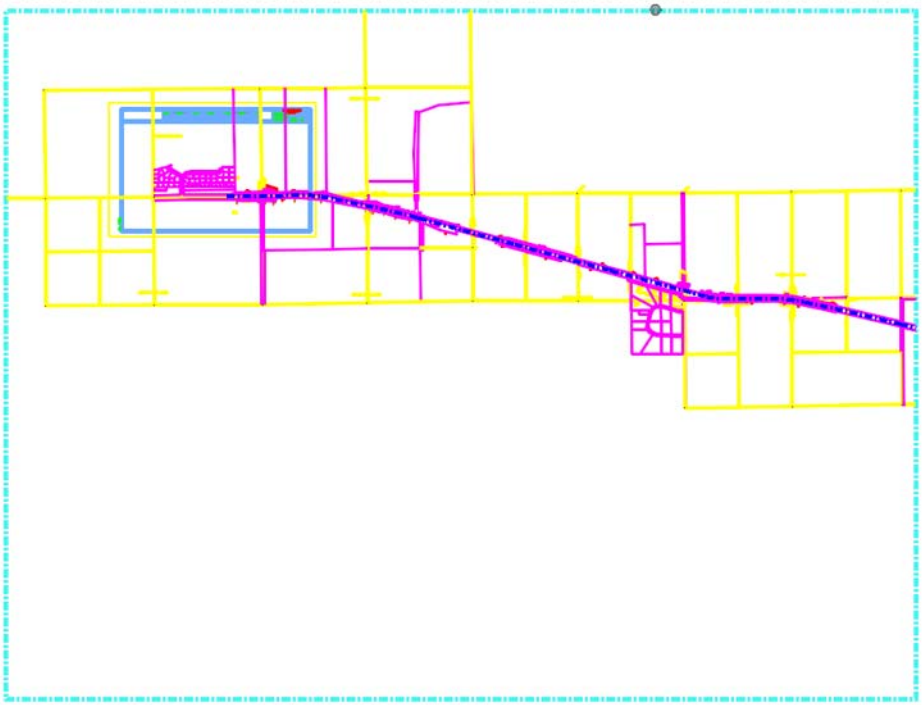


43. In the **References** dialog, identify the **12345ROW_Model.dgn** file and Select **Tools > Clip Boundary**

44. In the **Set Reference Clip Boundary** dialog, select the ***Fence*** Method.

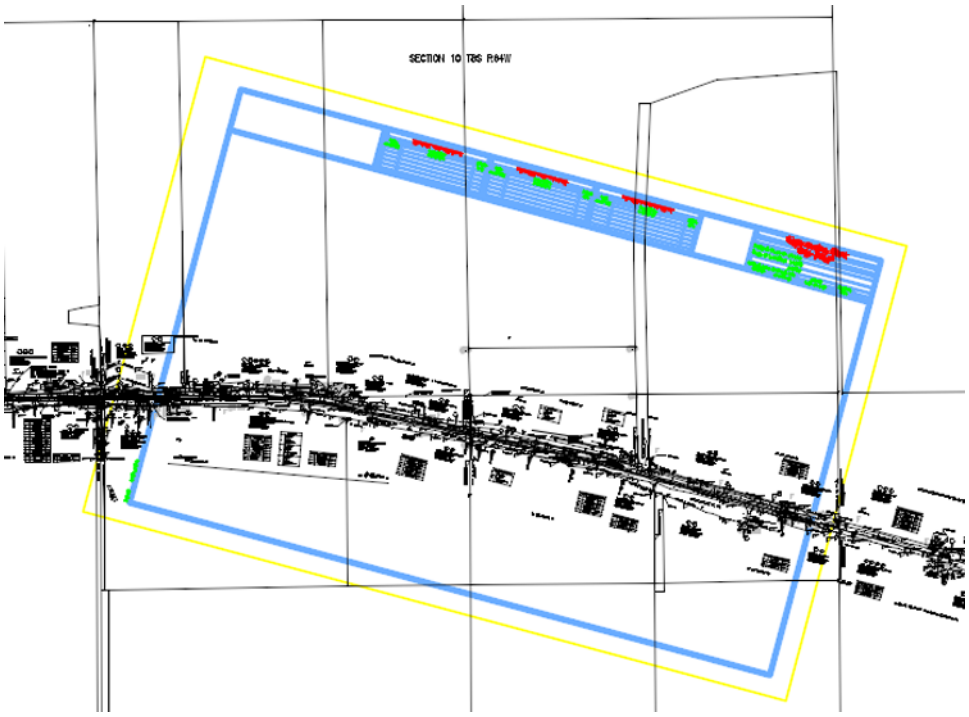


45. **<D>** on the MicroStation screen to accept the new clip boundary.



46. Turn On the level ***DRAFT_INFO_No-Plot*** in the reference file ***12345ROW_Model.dgn*** to turn the sheet lay-outs back on.

47. Use the MicroStation **Move** command to relocate the border sheet. Also **Rotate** the border sheet to align with the predefined sheet limits.

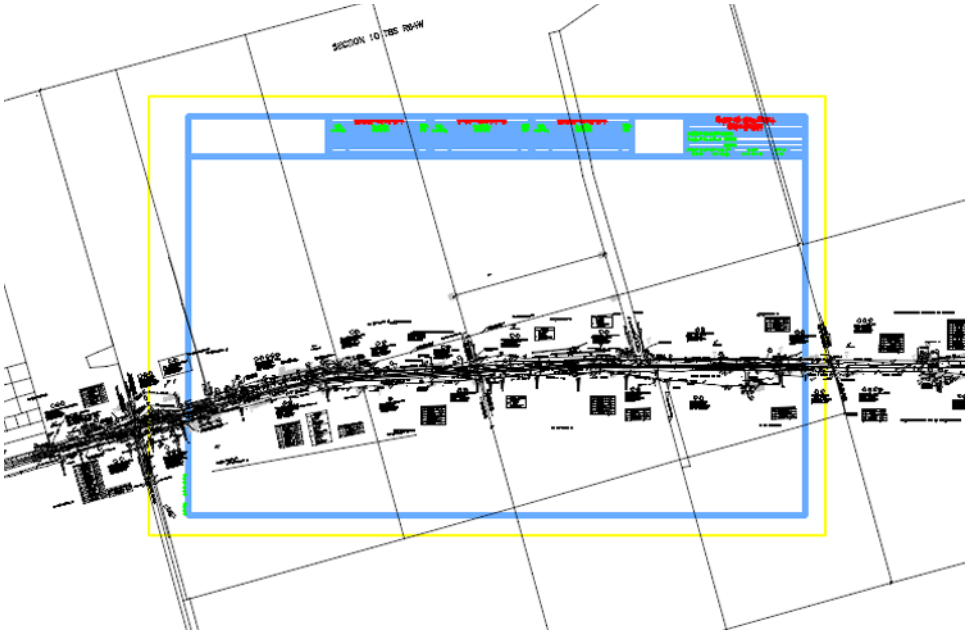


Rotate the MicroStation view so that the sheet is normal to the view.

48. Key-in ***rv=0,0,15*** (rotate view = X,Y, Z) for this **3D** file
rv=15 if in a ***2D*** file.

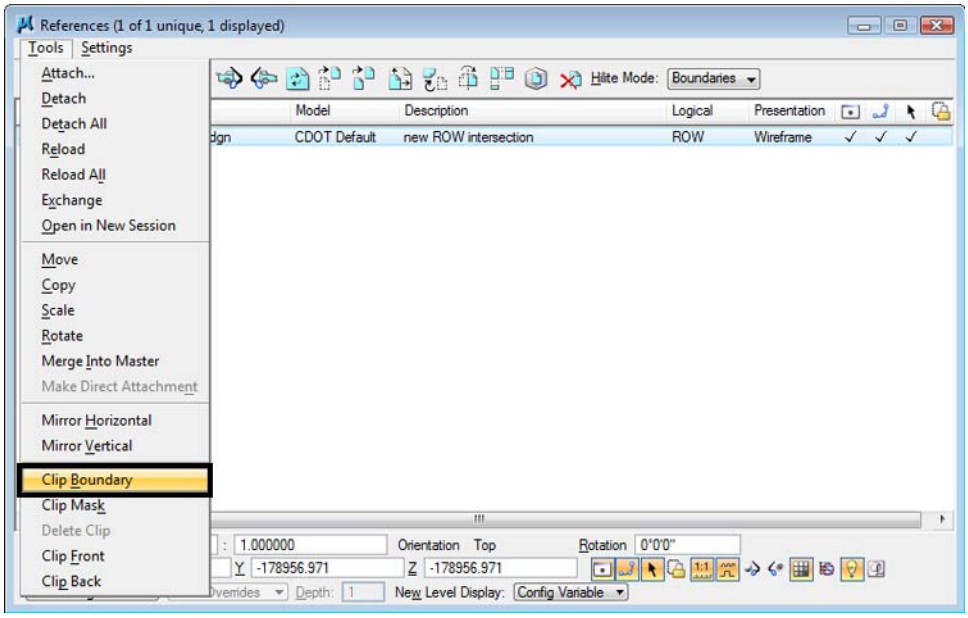
49. **<D>** on the MicroStation screen to initialize the rotation.

Note: The above key-ins vary based on the dimension of the MicroStation file, 2D or 3D. When working in a 3D file, the key-in is: rv=0,0,15 (rotate view=x-value, y-value, z-value). Rotation is specified in relative to the Z axis as that is the axis perpendicular to the view. Also, rotating a MicroStation view simply rotates the viewing of the graphics. The coordinate system is still relative to the graphics and any coordinate or alignment information extracted will be correct.

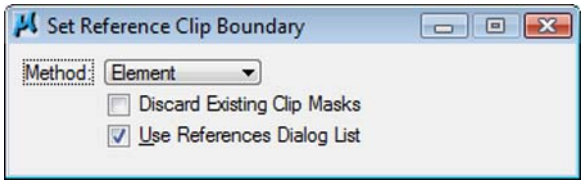


Define a reference clip boundary, as you did earlier.

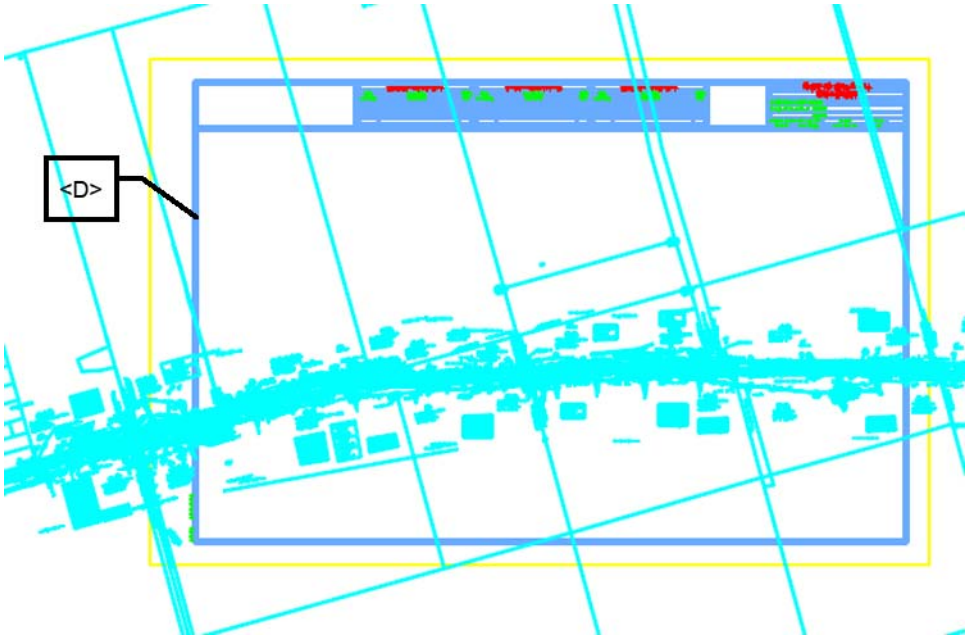
50. In the Reference dialog, identify the reference file and select **Tools > Clip Boundary**



51. In the **Set Reference Clip Boundary** dialog, select the ***Element*** Method.



52. **<D>** on the shape inset ½ inch from the border.



53. **<D>** anywhere to accept the clip.
54. ***Update*** information in the title block of the sheet as necessary.
55. Select **File > Save Settings**

This same procedure can be repeated to complete the remainder of the sheets.

LAB 27 - Project Specific Plan Sheets

The following exercise will step through creating a full plan view depicting right of way plan sheets (sheet subset 5) at a scale of 1”100’. The plan sheets will be centered along the design alignment for the project S.H. 86.

Chapter Objectives:

- Create plan sheets using InRoads Plan and Proflile Generator
- Edit reference clip boundary

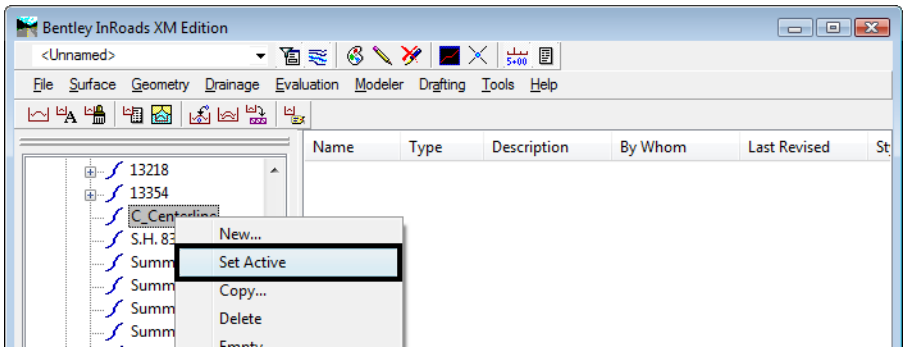
1. Open the MicroStation file **12345ROW_Model.dgn** from the **...\Survey_ROW\Drawings\Reference_Files** folder.

   Note: The MicroStation file opened is immaterial and only acts as an interface to InRoads. New plan sheets will be created and the open drawing will not be impacted.

2. ***Load*** the geometry project **12345_ROW** if not already in memory

3. Select **Tools > Options [*Factors*]** and set the global scale factors to ***100*** then **<D>** Close to dismiss the **Options** dialog box.

4. **<R>** on the alignment **C_Centerline** and select **Set Active** from the fly-out list.



5. Select **Drafting > Plan and Profile Generator...** from the InRoads interface.

By default, the dialog will populate with the CDOT preferences (100 horiontal scale by 1x vertical exageration Plan & Profile sheet).

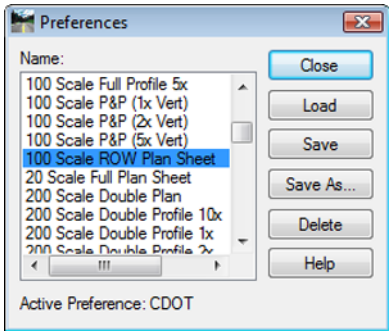
Note: Drafting notes is an InRoads Application Add-In. If the Drafting category is not shown in the InRoads menu bar, select Tools > Application Add-Ins and enable Drafting Production Add-In.

6. Select the **Preferences** button (at the bottom of the **Plan and Profile Generator** dialog).

7. Select the preference named - **100 Scale ROW Plan Sheet**

8. **<D> Load**

9. <D> Close

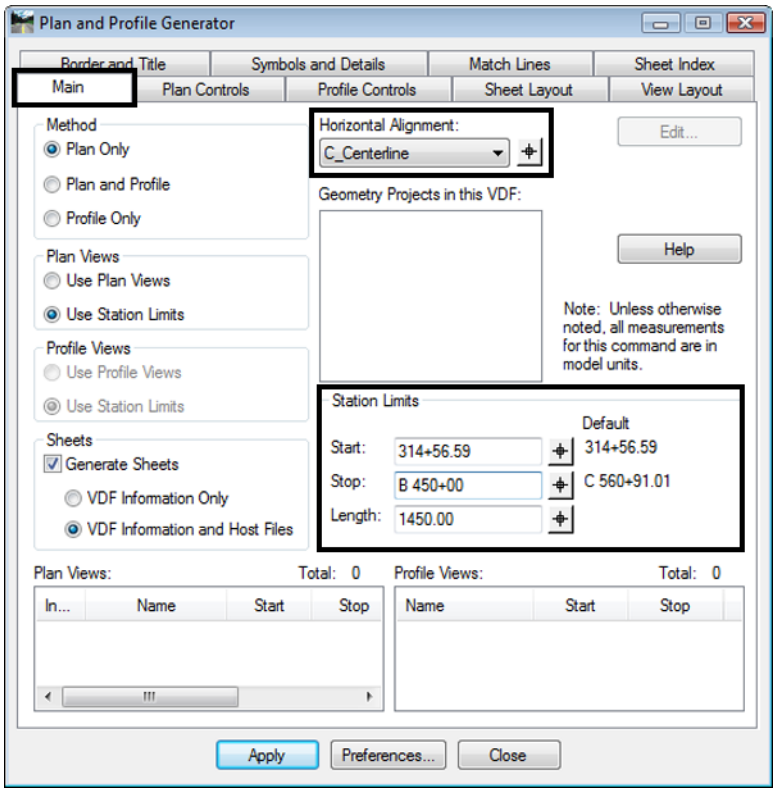


Preferences developed for ROW are:

- 100, 200, and 300 scale full plan view ROW Sheets

Main Tab

By default, the active horizontal alignment and the begin/end station limts for said alignment will populate the dialog.



10. **Load** the appropriate ***Preference*** (if not done in step 6)

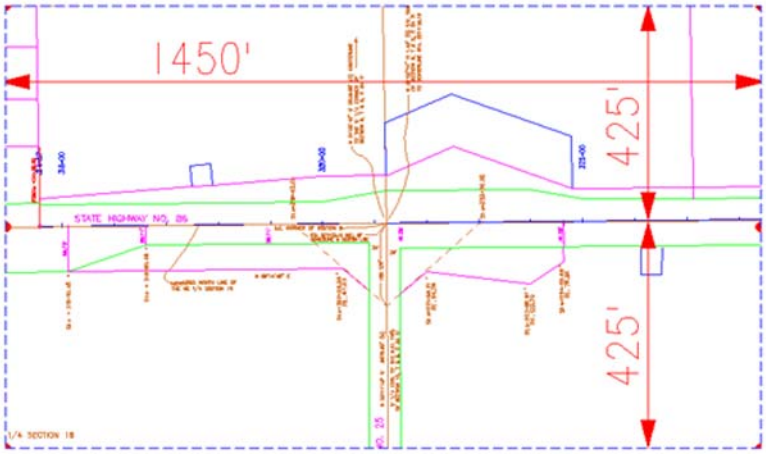
11. **Select** the appropriate ***Horizontal Alignment***
(the sheet will be centered on the defined alignment).

12. **Redefine** start and stop station limits to:

- Start: 314+56.59
- Stop: B 450+00.00

Note: The 'B' in the 'stop' station defined above is required as it indicates the stop station falls within a station-equation range.

Length defines the length along the alignment that will fit in a plan view. 1450 feet is the default for a 100 scale 11" x 17" plotted sheet.



Changing Scale:

A 200 scale plot will display 2,900 feet along the alignment in plan view, a 300 scale plot will display 4,350 feet.

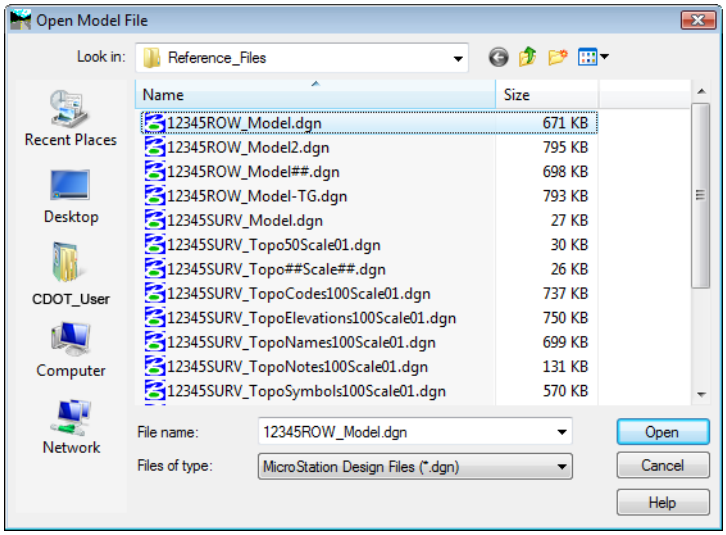
If something other than 100 scale is desired, the user must proportionally change:

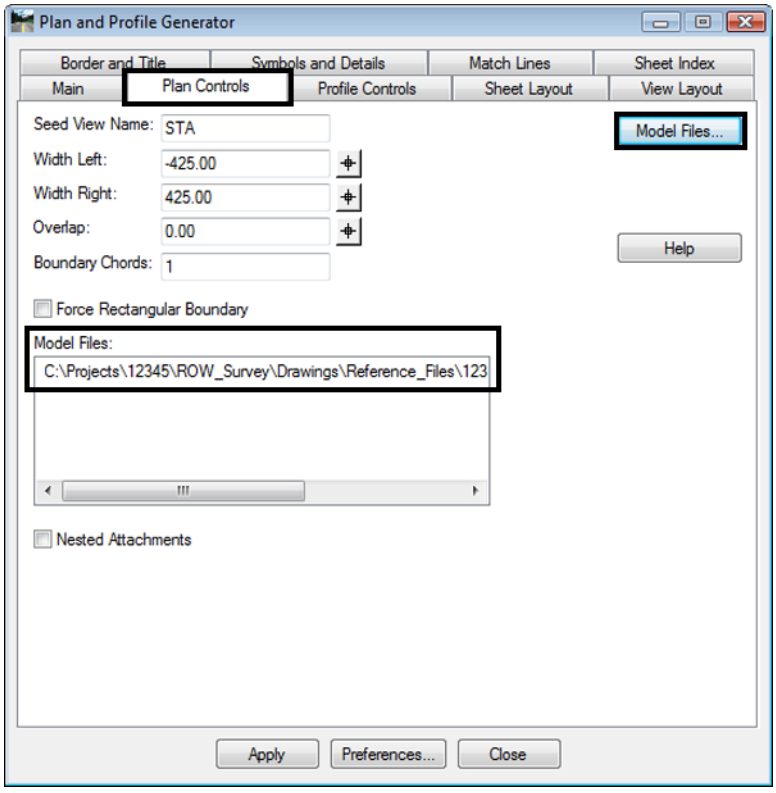
- Main tab – modify Length
- Plan Controls tab – modify Width Left, & Width Right
- View Layout tab – modify Scale
- Symbols and Details – modify Scale

Plan Controls tab

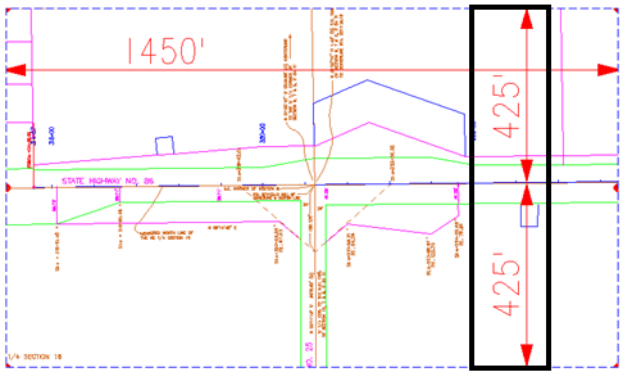
13. Select the **Model Files** button to pick the Drawing files (references) for display in plan view.
14. Select the file **12345ROWModel01.dgn** in the Open Model File dialog.

15. <D> Open


Open Model File
Look in:
Reference_Files
Recent Places
Desktop
CDOT_User
Computer
Network
Name
Size
12345ROW_Model.dgn 671 KB
12345ROW_Model2.dgn 795 KB
12345ROW_Model##.dgn 698 KB
12345ROW_Model-TG.dgn 793 KB
12345SURV_Model.dgn 27 KB
12345SURV_Topo50Scale01.dgn 30 KB
12345SURV_Topo##Scale##.dgn 26 KB
12345SURV_TopoCodes100Scale01.dgn 737 KB
12345SURV_TopoElevations100Scale01.dgn 750 KB
12345SURV_TopoNames100Scale01.dgn 699 KB
12345SURV_TopoNotes100Scale01.dgn 131 KB
12345SURV_TopoSymbols100Scale01.dgn 570 KB
File name:
12345ROW_Model.dgn
Files of type:
MicroStation Design Files (*.dgn)
Open
Cancel
Help


Plan and Profile Generator
Border and Title
Symbols and Details
Match Lines
Sheet Index
Main
Plan Controls
Profile Controls
Sheet Layout
View Layout
Seed View Name:
STA
Width Left:
-425.00
Width Right:
425.00
Overlap:
0.00
Boundary Chords:
1
Model Files...
Help
Force Rectangular Boundary
Model Files:
C:\Projects\12345\ROW_Survey\Drawings\Reference_Files\123
Nested Attachments
Apply
Preferences...
Close

Width Left and **Width Right** define plan view limits perpendicular from the reference line (left is negative).



The **Boundary Chords** setting will create a clipping limit that will fit the extents of the plan window area. This reference file clipping edge should be considered a "first pass limit" and may have to be edited on curved portions of the corridor path in locations where the desired limits extend beyond this "calculated" clipping limit. This plan limit editing, along with any shifting of the plan window position, is accomplished on the **Sheet Index** tab after the sheets have been created or through the use of the MicroStation references dialog.

Model Files & Levels

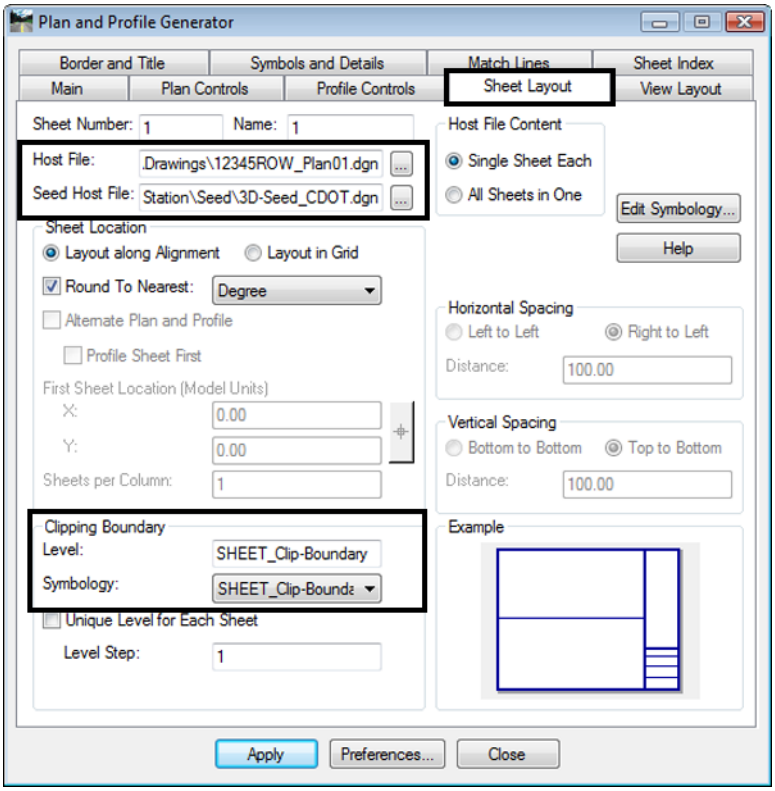
The Model files selected will be attached as reference files. The attached files will have all levels turned on that contain data. If additional data (levels) are added to the referenced files after the sheets are created, the user is required to turn on the appropriate levels through the use of the references dialog box.

Additionally, the files referenced will have the design file 'Default' model attached. The user should not use any model space other than 'Default'.

Profile Controls tab

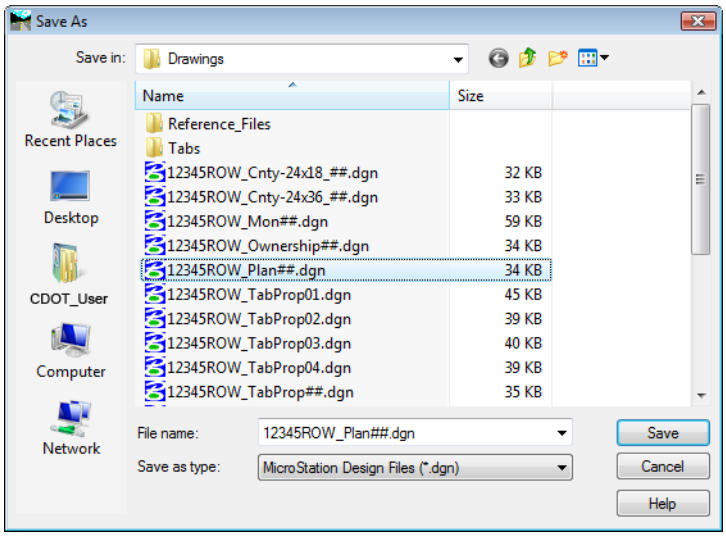
No action required

Sheet Layout tab



16. **<D>** the … button next to **Host File** to identify the path and initial sheet name for the new drawing set. The **Host File** refers to the new MicroStation plan drawings that will be created by this tool. The last number, "1", will be automatically incremented as each new sheet is created. Set to the project directory, i.e. ***…..ROW_Survey\Drawings\ 12345ROW_Plan01.dgn***

17. **<D>** Save in the Save As dialog.

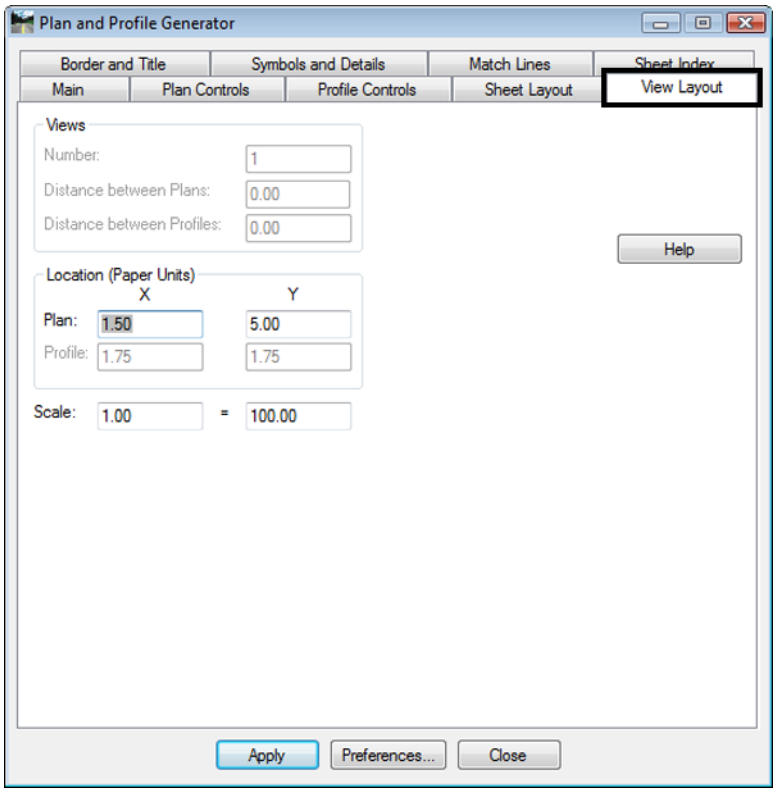


18. The **Seed Host File** is the 'prototype' file used to create the Host files and should be set to:
C:\Program Files\Workspace-CDOT\Standards-Global\MicroStation\Seed\3D-Seed_CDOT.dgn

19. Make sure the **Level** and **Symbology** options in the ***Clipping Boundary*** section display ***SHEET_Clip-Boundary***.

View Layout tab

This tab sets location (origin) for the plan views relative to the border sheet. No user input is required in this dialog.



Note: The Location of the Plan position is computed from the outside edge of the border sheet in paper (plotted) units.

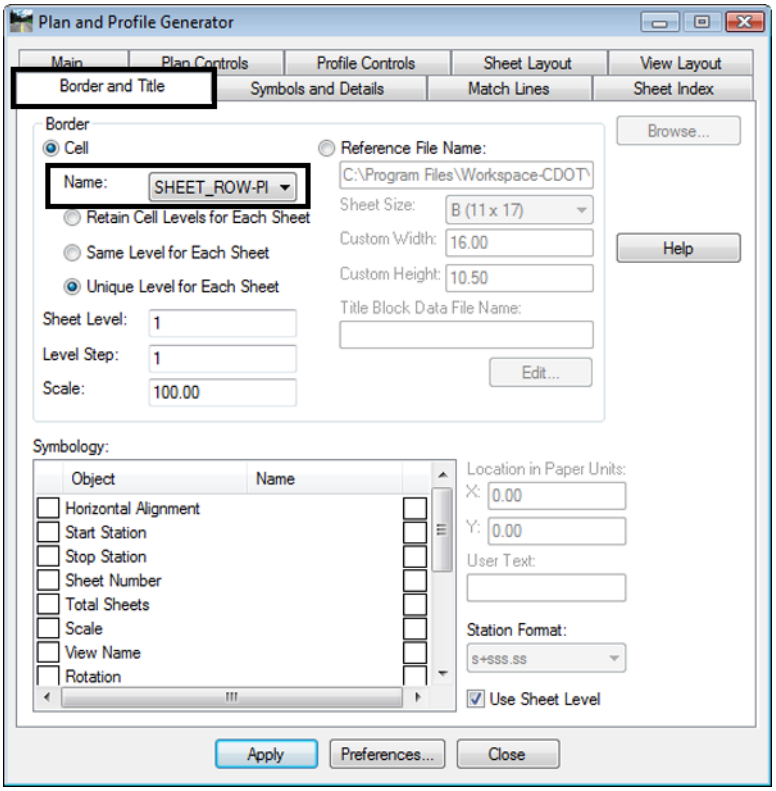
Border and Title tab

The only user input on this tab is to ensure the correct cell is specified for the border sheet. No other user input is required in this dialog unless creating sheets at a scale other than 1"=100'.

Source cell library: C:\Program Files\Workspace-CDOT\Standards-Global\MicroStation\cells**General.cel**

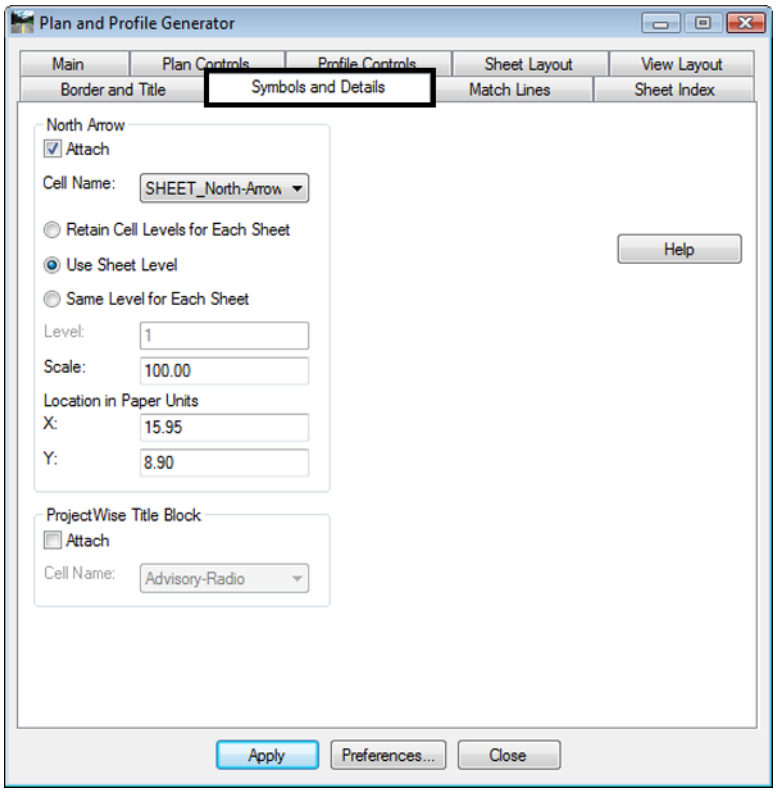
Cell Placed:

20. Verify Cell Name: **SHEET_ROW-Plan-Sheet**



Symbols and Details tab

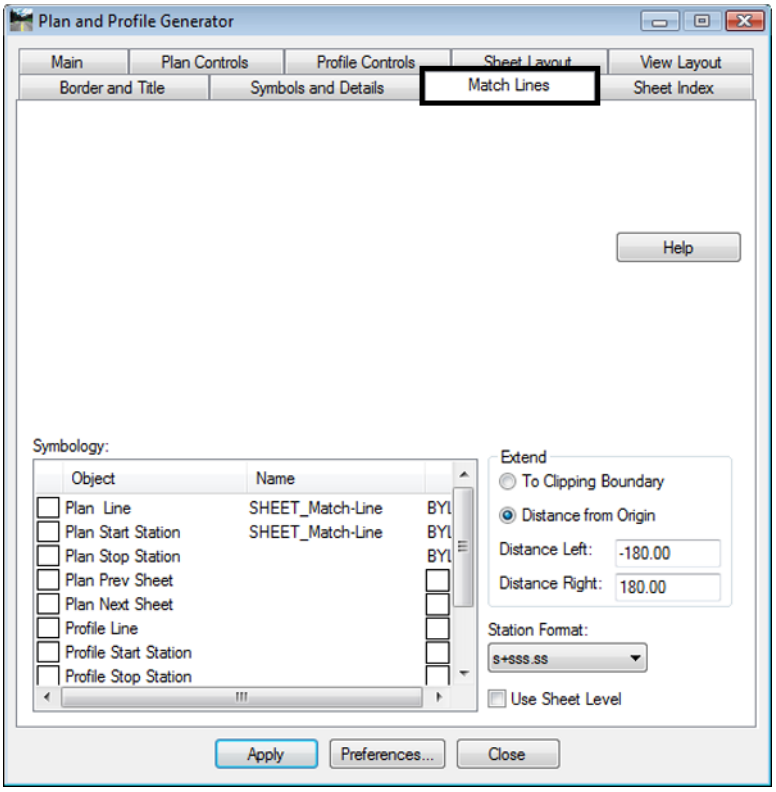
No user input is required in this dialog unless modifications to the stored preference are required.



The **North Arrow** position set by the **Location in Paper Units** and is set to the upper right corner of the sheet. This is a rough placement and will likely have to be moved for clarity and conflicts on many sheets. Once the sheets are constructed each sheet should be checked for optimum cell position.

Match Lines tab

No user input is required in this dialog. Match lines are not being used for ROW sheets.



Executing the Plan & Profile Command

Once the Apply command is executed, the workflow process for this command follows the following sequence:

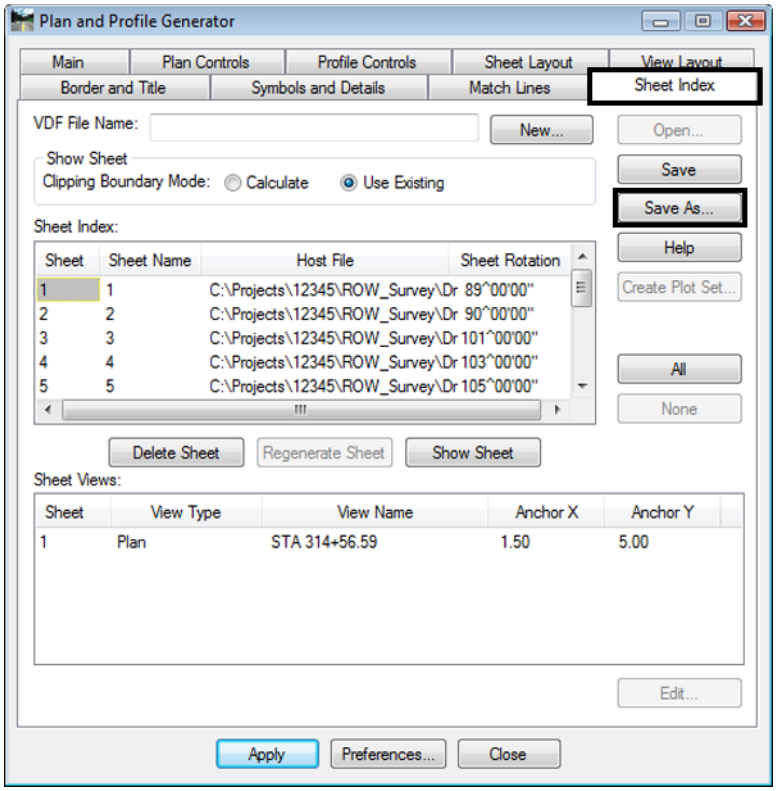
- Plan view reference limits are established.
- New drawing files are created based on the host file name.
- Each new drawing file has 3 items generated.
  - ♦ Plan views
  - ♦ Border sheet placed as a cell in each generated drawing
  - ♦ North arrow placed on each sheet
- The Plan and Profile dialog (sheet index tab) will populate with sheets created and sheet limits.

Sheet Index tab

Nothing is required by the user on this tab prior to executing the PnP command. A summary of sheets created is displayed after successful execution of the command.

21. **<D> Apply**, the routine will run and MicroStation will cycle through the sheets as they are created – be patient and wait for the command to complete.

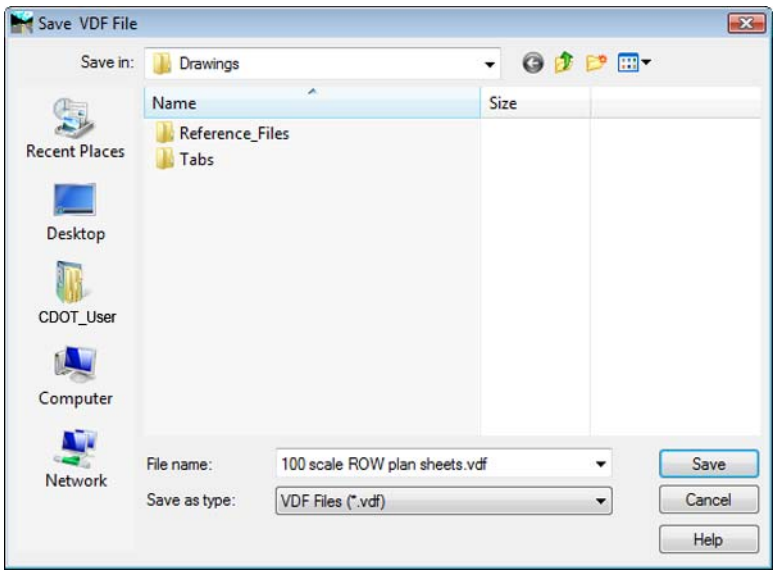
The Sheet Index tab will display a list of sheets created and MicroStation will display the last sheet created.



22. Select **Save As** from the Sheet Index tab to store a project specific ***View Definition File*** (VDF). A VDF file allows sheet definitions to be recalled and modified in subsequent MicroStation/InRoads sessions if necessary.

23. Name the file ***100 scale ROW plan sheets.vdf***

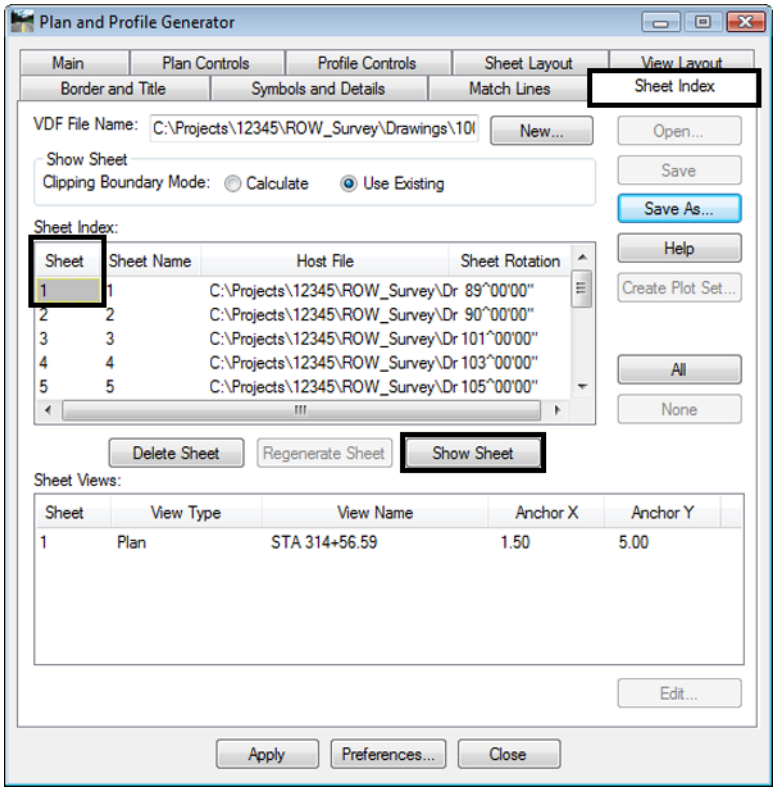
24. **<D> Save**



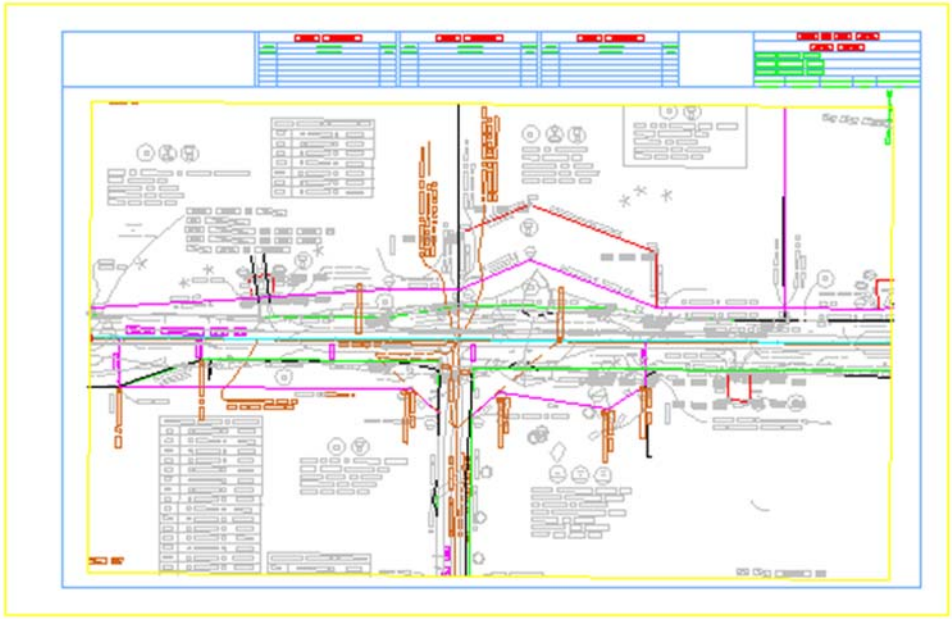
Displaying sheets

By highlighting a specific sheet in the Sheet Index tab and selecting Show Sheet, MicroStation will open the selected drawing.

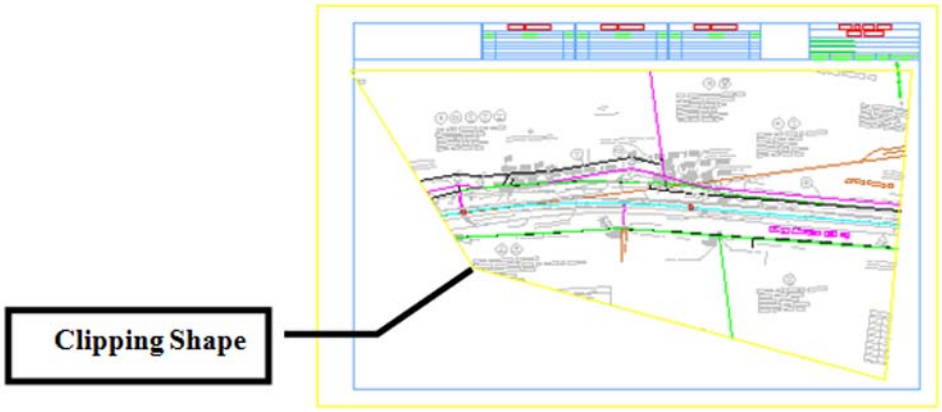
25. Identify ***Sheet 1*** and **<D> Show Sheet**



MicroStation opens the identified sheet



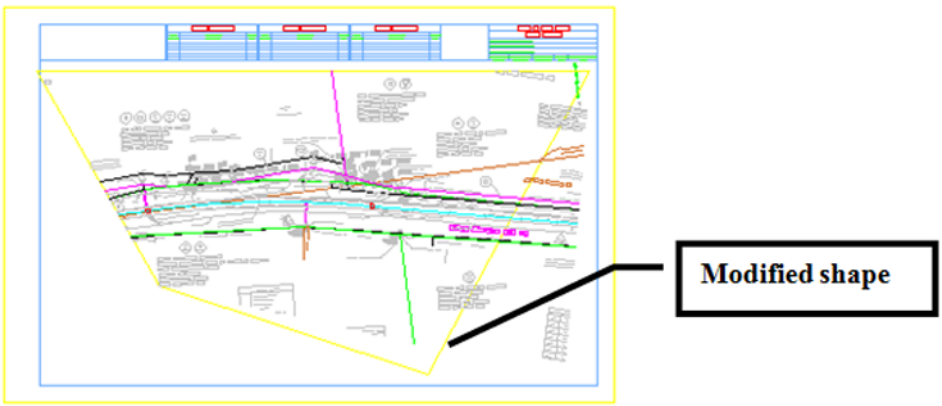
26. Identify ***Sheet 2*** and **<D> Show Sheet**
27. Use the MicroStation **Modify** command to adjust the clipping shape to any new location.
28. **<D> Show Sheet** to redefine the clipping limits after modifying the clipping shape.



Note: Other modification tools such as insert vertex and delete vertex can be used also.

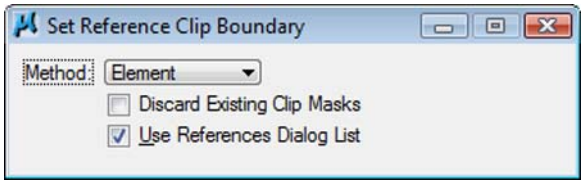
Standard MicroStation References commands can also be applied.

29. Use the MicroStation **Modify** command to adjust the clipping shape to any new location.

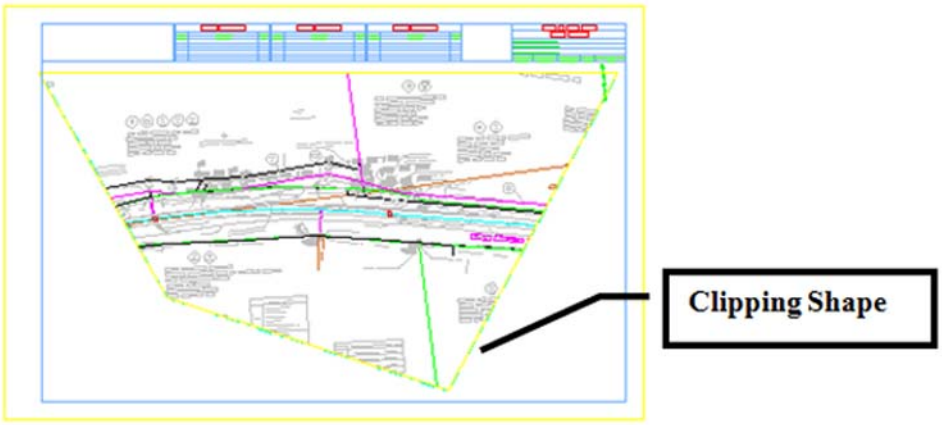


30. Select **File > References** from the MicroStation menu bar.
31. ***Highlight*** the **12345ROW_Model.dgn** file.

32. Select **Tools > Clip Boundary** from the **References** dialog.



33. Set the **Method** to **Element**
34. **<D>** on the modified clipping shape in the MicroStation view.
35. **<D>** to accept the command.



Notes:

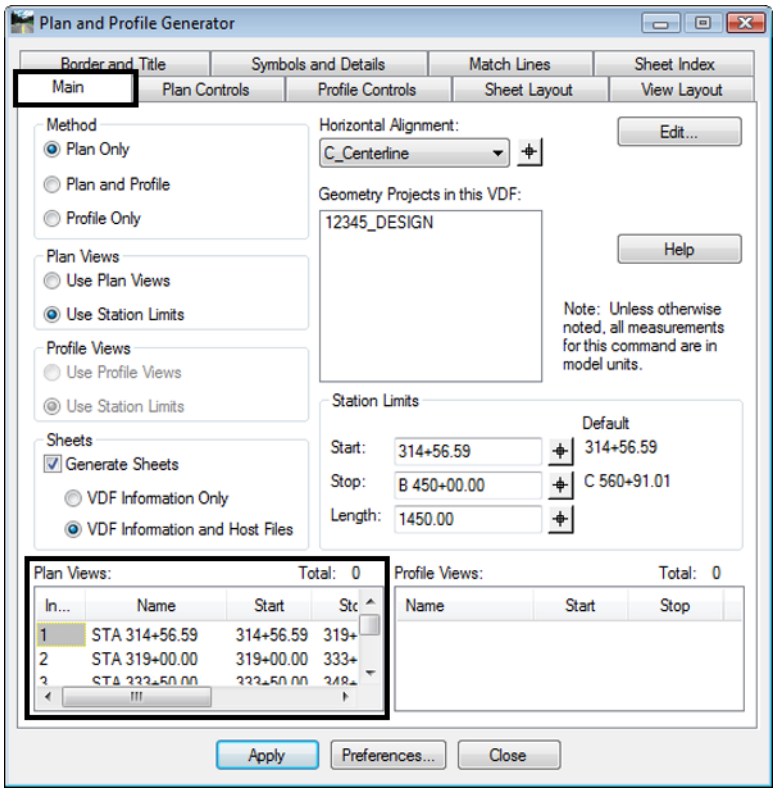
- The clipping boundary is now defined by the identified shape. Using any MicroStation command to modify this shape will automatically update the reference file clipping boundary. This shape is on the level GEN_SHEET_Clip-Boundary. This level is configured as a non-plotting level.
- Deleting the clipping boundary shape will result in the reference file display limits reverting to the initial limits defined by the PnP command.
- Regenerating a sheet from the PnP Sheet Index tab will also cause the sheet to revert to the reference file display limits initially defined by the PnP command.

After the Plan and Profile Generator has been run, each sheet should be reviewed for:

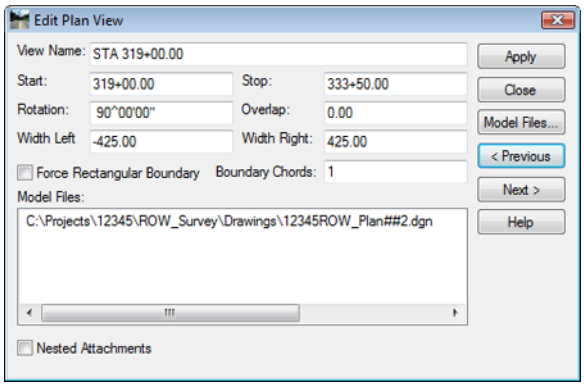
- North Arrow position (move the cell using MicroStation move command)
- Plan view Clipping limits
- Title block information

Main tab – After running the P&P command

Once the command has been run, the Geometry Project field will populate and the Plan and Profile view limits display.



Double clicking on a specific Plan View sheet opens an Edit Plan View dialog. Sheet limits can be modified numerically and reference files can be added or removed.



Challenge Exercises:

- Modify the last sheet to add 500’ to the stop station
- Modify any sheet to change the left and/or right offsets
- Add or subtract from the model file list
- Modify the station limits on the first sheets and ‘adjust’ adjacent sheet

Index