

# INROADS GEOMETRY FOR ROW AND ROW PLAN DEVELOPMENT USING MICROSTATION

Document 1 of 2



**This document has been prepared for:**

Colorado Department of Transportation  
4201 E. Arkansas Ave.  
Denver, CO 80222

**This document has been prepared by:**

Bohannon Huston, Inc. Main Office: Courtyard I 7500 Jefferson St. NE Albuquerque, NM 87109	Bohannon Huston, Inc. Denver Office: Meridian One 9785 Maroon Circle Suite 140 Englewood, CO 80112-5919	The Envision Group, Inc. 8517 Excelsior Dr. Suite 102 Madison, WI 53717
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**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 08.05.02.55  
InRoads® version 08.05.00.00 – Service Pack 5

0408 – Version 03.02 CDOT Configuration

## 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:

<b><u>Example Item</u></b>	<b><u>Meaning</u></b>
View Perimeter	a command name or a file that you are to select, including directory path
Name:	field name, button or icon in a dialog box
Dialog Header	dialog box name
Tools > Options	a command path that you are to select - usually from the pull-down menus
<i>Dialog Area</i>	heading for separated areas within a dialog box
<i>Tab</i>	heading for tabs found within dialog boxes
<b>Key in</b>	entering data with the keyboard or items selected from drop-down list
<i>Document name</i>	style used when referring to another document
<b>Note:</b> text	information about a command or process that you should pay particular attention to
<b>Concept:</b> text	detailed definition of a concept, procedure or process
<i>Emphasis</i>	an important word or phrase
<i>Prompt</i>	user prompt
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

## **Terms and Abbreviations**

### **Right-of-Way (abbr. ROW)**

- 1) The limits of the rights of way possessed by an entity.
- 2) That specialty unit within CDOT engaged in the determination, acquisition, monumentation, documentation and management of CDOT rights of way.

### **Survey (abbr. SURV)**

- 1) The observation, measurement and integration of boundary, physical and documentary evidence pertaining to land features, rights and restrictions.
- 2) That part of the specialty unit within CDOT engaged in the activities involved in the practice of Land Surveying.

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# Getting Started

## Chapter Introduction

In this chapter you will be introduced to the overall course contents, goals, schedule, and organization and the training directory structure.

## Course Overview

These instructor led training sessions are targeted to ROW/Survey groups focusing on InRoads geometry functions applicable to ROW plat generation.

The intent of this training is to provide an increased knowledge base and skill set to ROW/Survey relating to InRoads geometry. This is in addition to the initial class training received from InRoads Geometry Fundamentals. The intent is to introduce additional tools for surveyors to facilitate land parcel information and aid in the development of geometry for the right-of-way process.

The course will also train in the development of alignment diagrams and right of way plats. These additional tools equip surveyors in the development of documents for the right-of-way plat process.

This course will address:

- Creating Geometry entities
- Creating Parcels, parcel closure & description generation
- Creating ROW Plan sets

## Foundation

### Intended Audience

The intended audience for this course is CDOT Survey and Right-of-Way Plans personnel who have completed the InRoads Survey Data Reduction class, the InRoads Geometry Fundamentals class and require further training on the use of the InRoads geometry tools specific to Right-of-Way development

### Prerequisites

The attendees must have a basic understanding of MicroStation prior to attending this course. Additionally, they must have attended the 2-day course *Fundamentals of InRoads Geometry* or otherwise have a genuine understanding of fundamental InRoads geometry.

It is assumed the student is familiar with the InRoads interface and coordinate geometry in general.

### Duration and Format

8 hours of InRoads geometry training focused on ROW parcels and 8 hours focused on plan sheet development. Format is instructor lecture and demonstration followed by hands-on lab exercises for students.

## **Focus**

- The Relationship and interaction of exporting InRoads Survey data to InRoads Geometry data files
- Development of InRoads geometry in the form of Cogo points, Alignments, and Parcels
- Development of property information for the generation of right-of-way plans
- Geometry annotation, MicroStation reference files, automation tasks for tabular/textural data in plan sheets.

## **Goal**

- Provide additional and available technologies to the survey and right-of-way staff to perform project tasks utilizing InRoads geometry tools.
- The purpose of this course is to provide CDOT personnel with an understanding of how to use specialized geometry features in InRoads. That understanding will aid them in the analysis of property data along with the design and development of right-of-way plans.

## **Introductions & Schedule**

### ***Instructor***

Introduction of Instructor(s) and brief summary of credentials.

### ***Students***

Introduction of students and a brief summary of student knowledge as it relates to MicroStation and InRoads and/or geometry.

### ***Student Interests***

Query as to specific interests of individual students and the class as a whole.

### ***Schedule***

Establish schedule for class breaks, lunch, and course termination.

## CDOT CADD Resources

There are many resources available to assist you when working on your CDOT CADD project. These resources can be found on the CDOT CADD & Engineering Innovation Web site.

### CDOT CADD & Engineering Innovation Web Site

The CDOT CADD & Engineering Innovation web page is available at:

<http://internal/cadd/> It can also be found on the internal CDOT website:

Organizations > Project Development > CADD and Engineering Innovation.

The website (presently only available to CDOT) provides CDOT users with up to date information, tools, and resources related to CADD and the Colorado Engineering Software Transition (CEST) project.



#### CADD Home Page

CADD Support News
[Tips & Tricks of the week](#)

- [Home](#)
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- [CADD Manual](#)
- [CDOT Work Flow](#)
- [Issue Logs](#)
- [Mtg Minutes & Agendas](#)
- [Requests & Support](#)
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**News from the CADD Manager**

On Wednesday 5-9-07, an update to the V3.01 configuration was deployed through the Standard Workspace Update procedure. Two items of particular importance are as follows. The **JPC#ApproximateQuantities#.dgn** (SAQ sheet) found in the C:\Projects\JPC#Design\Drawings folder was updated. Any project that was created the week of 4-25-07 through 5-9-07 with V3.01 workspace, should replace this file. Download the file from [Here](#). The **CDOT Preferences** file was updated to include the following features: *D\_CURB\_Back, D\_Hinge, D\_CONC\_Pvmt, D\_CONC\_Sw, D\_CURB\_FL\_LT and D\_CURB\_FL\_Rt*. If you need assistance with either of these updates, contact the Help Desk @ (303)757-9317 to have a support person contact you. [Click Here](#) to review the Configuration ReadMe file.

If you are noticing that your reference files are showing up RED, call the Help Desk (303)757-9317. A support person will contact you and guide you through the process of updating your PCF file. You should **NEVER** have to detach and re-attach your reference files once they have been attached.

**To view Previous CADD NEWS check:**  
[Past CADD Support News](#)

Tips & Tricks
[Back to CADD Support News tab](#)

**InRoads**  
*InRoads Menu Location*

**Did you know** that your Bentley InRoads Menu always want to open on your primary monitor? Through discussions with Bentley, it has been determined that this phenomenon is by design. It is necessary because Laptop computers can be used to run InRoads, and if the InRoads menu was banked on the secondary monitor, it would be lost when the laptop was used stand-alone. If you drag the InRoads menu to your secondary screen, leaving only a very small sliver on the primary screen, the menu will stay banked and you won't have to move it each time you open InRoads.  
**Thanks to Daniel Thomas with Region 4 Traffic.**

**To view additional tips and tricks check:**  
[All Tips & tricks](#)

20424



Email: [Page Master](#) regarding information on this page  
 Email: [Web Master](#) regarding website functionality



Last Modified: Tue, Feb 28, 2006  
[Back to Top](#)

This website is a valuable resource for CADD users and includes:

### ***CADD Library***

The **CADD Library** page provides links to manuals, newsletters, standard details, *etc.* One extremely useful link is to the **Tips and Tricks** section for MicroStation and InRoads. This information changes daily, so check back often.



## **CADD Library**

- [Details.](#) • [Manuals.](#) • [Newsletters.](#) • [Old Docs.](#)
- [Tips and Tricks.](#) • [Useful Links.](#)

### **Details**

- [Bridge...](#) • [Construction...](#) • [Design...](#) • [Environmental...](#)
- [Hydraulic...](#) • [ProjectWise...](#) • [Survey\ROW...](#) • [Traffic...](#) • [Utility...](#)

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## CADD Manual

The CDOT Computer Aided Design and Drafting (CADD) Manual outlines CDOT's use of Bentley's MicroStation and InRoads software. It documents standardized procedures for the exchange of information between CDOT regions, specialty groups, and consultants working on CDOT projects. The Manual also addresses software issues, tools, techniques, standards and procedures, etc. which will aid the user in the efficient production of CDOT plan sets.

The CDOT CADD Manual and the associated electronic files contained in the CDOT configuration are used in the generation of electronic plans by both CDOT internal designers and the consulting firms doing business with CDOT. The electronic version of the Manual provides hyperlinks to each chapter as well as context sensitive index and search functions. You can also print chapters or the entire manual.

The CDOT CADD Manual can be accessed several different ways including:

- From the CDOT internal CADD web site home page link;
- From the CDOT Design and Construction Project Support Page (external web site);
- From the CDOT Menu (Help > CADD Manual).

The screenshot shows a web browser window displaying the CDOT CADD Manual. The browser's address bar shows the URL 'http://www.cdot.state.co.us/cadd'. The page has a blue header with navigation buttons for 'Contents', 'Index', 'Search', 'Print', and 'Glossary'. A search box is on the right. The main content area is titled '1.0 Chapter One - Introduction' and includes a table of contents on the left. The text describes the manual's purpose and the CEST project. Below the introduction is section '1.1 Background', which lists the project's goals and a list of tasks: creating electronic files, updating existing projects, user training, and developing standard workflows. Section '1.2 Trademarks' is partially visible at the bottom.

**1.0 Chapter One - Introduction**

This document is intended to outline the Colorado Department of Transportation's (CDOT) use of Bentley's MicroStation V8 2004 Edition and InRoads V8.05, as well as internally developed tools and procedures. Following these standardized procedures will help to facilitate the exchange of information between CDOT regions, specialty groups, and consultants working on CDOT projects. The CDOT Computer Aided Design and Drafting (CADD) Manual will address issues such as: software, tools, techniques, standards, and procedures, which will aid the user in the efficient production of CDOT plan sets. The CDOT CADD Manual and the associated electronic files contained in the CDOT configuration are to be used in the generation of electronic plans by both CDOT internal designers and the consulting firms doing business with CDOT.

**1.1 Background**

At CDOT, the CADD migration project is known as the Colorado Engineering Software Transition (CEST) Project. Beginning in 2004 the CEST project began with 15 first adopter projects, migrating each to the Bentley suite of software. Growing from these 15 first adopter projects to a statewide rollout in 2005 the CEST project has encompassed, at some level, each critical item in a project of this magnitude. These include:

- Creation of electronic files making up a comprehensive standard, including, but not limited to:
  - Seed files
  - Levels and symbology
  - Cells
  - Linestyles
  - Text and dimensions
  - InRoads preferences
  - Standard templates and typical sections
- Updating existing projects to the Bentley suite of software.
- User training
- Development of standard workflows

In the initial phases of this project, Survey and Roadway Design were addressed to a much greater degree than other disciplines. The goal over the next three years is to continue the CEST vision by addressing each of the specialty groups within CDOT as well as continued enhancement of the current configuration. To accomplish this, CDOT will continually update and add to CDOT's software, configuration, workflows, and training programs. Ultimately, the CEST project will create a complete electronic project delivery system integrating each user and system from planning through construction. The combination of software, configuration, and workflows will allow all users to work seamlessly together in the most productive and efficient CADD environment available. At the end of FY08, the plan will be complete with interconnection of all groups and complete automation, including electronic bid letting.

**1.2 Trademarks**

Many of the designations used by manufacturers and sellers to distinguish their products are claimed as trademarks. MicroStation and InRoads are trademarks of Bentley Systems Incorporated. Where other designations appear in this book, and the authors were aware of a trademark claim, the designations have been capitalized.

## ***CDOT Workflows***

There are several standardized MicroStation and InRoads workflows that CDOT has developed to assist you. These workflows are step-by-step CDOT-specific procedures for certain tasks that you may encounter when working in MicroStation or InRoads on a CDOT project. Many of these workflows are referenced throughout the course.

In addition to accessing the workflows from the CDOT CADD Web site Home page link **CDOT Work Flow**, you can also access workflows:

- From the Windows Start menu  
(Start > All Programs > \_CDOT\_CADD\_Information > Workflows);
- From the CDOT Menu (Help > Workflows).

New workflows are typically added with CDOT configuration updates, so check back often.



## **CDOT Work Flow**

### **Work Flow :**

[CDOT Alignment Display in Cross Section.Ink](#)  
[CDOT Annotating Horizontal and Vertical Alignments.Ink](#)  
[CDOT Batch Printing.Ink](#)  
[CDOT Batch Processing.Ink](#)  
[CDOT Configuration ReadMe file.Ink](#)  
[CDOT Converting AutoCAD Files to MicroStation.Ink](#)  
[CDOT Creating Multiple Plan Sheets.Ink](#)  
[CDOT Directory Structure.Ink](#)  
[CDOT Displaying Features in Cross Section and Profile.Ink](#)  
[CDOT Exporting Fieldbook Files.Ink](#)  
[CDOT Greek Characters.Ink](#)  
[CDOT Level Update for V03.01.Ink](#)  
[CDOT Linking MicroStation to Excel Documents.Ink](#)  
[CDOT MicroStation Printing.Ink](#)  
[CDOT Note Sheets.Ink](#)  
[CDOT PCF Management.Ink](#)

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### ***Issue Logs***

Check the ***Issue Logs*** to determine the status of submitted requests.

### ***Requests & Support***

The ***Requests & Support*** page provides CADD help solutions where you can:

- Learn how to get help;
- Submit a questions;
- Submit a request (e.g. request a new MicroStation level or InRoads preference), as well as
- Obtain InRoads, InRoads Survey and MicroStation support.

There is also a link to **IT Services** for hardware support, “how to” instructions, installation, training files, and work space setup.

Intranet Home | CDOT External | Search

**Colorado**  **Department of Transportation** **CADD & Engineering Innovation**

Projects | Employee Info | Teams | Organizations | Resources | Contacts | News | Help

## Requests & Support

• [How to Get Help...](#)
• [Email CADD Manager...](#)

• [Team Members...](#)
• [Support Schedule...](#)
• [IT Services...](#)

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CADD Library

CADD Manual

### ***Training***

Use the ***Training*** link to obtain information regarding how to sign up for training classes. You can also review online computer-based training (CBT) for MicroStation, InRoads and InRoads Survey.

## Scope of Training Data

### Training Data Set

This training is a continuation of the course InRoads Geometry for ROW and will use the same data files.

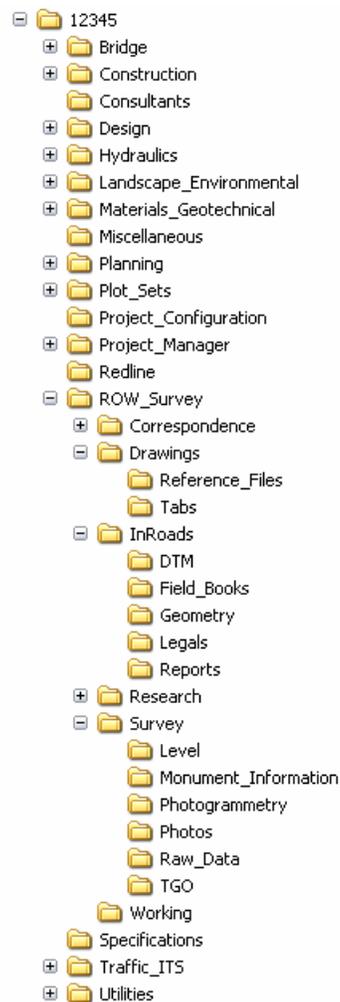
### *State Highway No. 86 - Elbert County*

This project has progressed to the point of having property information, design reference lines, proposed right-of-way limits, and easements developed. This data set will be used to generate the necessary data for development of Survey Control Diagrams and Right-of-Way parcels.

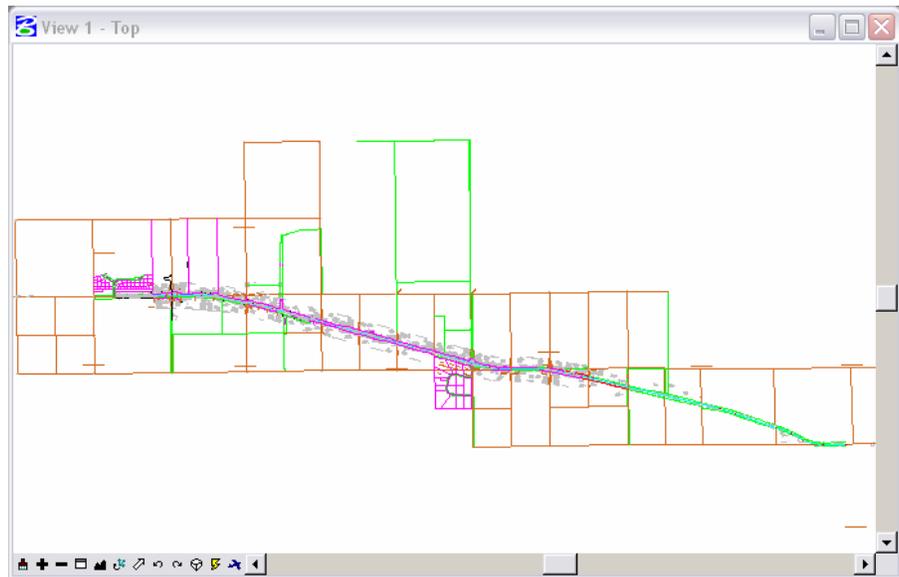
### Training Directory Structure

All class work files will be in the C:\Projects\12345 folder, which has a combination of design and survey sub-folders and data files.

The sample project in this document uses the standard CDOT file structure with 12345 = CDOT Project Code (sub account).



## Training Workflow



The project data for this training session is based on Colorado S.H. 86. The overall workflow will consist of:

### *InRoads Geometry*

- Exporting an InRoads Survey Fieldbook to geometry
- Importing the design centerline into the ROW geometry project
- Creation of Cogo points
- Creation of alignments by various methods
- Creation of parcels (closed alignments)
- Defining parcels by inputting deed information
- Generating parcels for ROW takes and remainders
- Annotation of Parcel information
- Generation of legal descriptions using XML

### *MicroStation Plans Generation*

- Creation of ROW plans using MicroStation reference file commands
- Creation of ROW plans using the InRoads Plan & Profile Generator command
- Generation of geometry output for use in coordinate tables



The area shown in the above graphic shows the Summit Business Park land division. This area will be used to demonstrate typical InRoads geometry commands that can be applied for a variety of uses and in varying situations.

# Working with InRoads

## Chapter Introduction

In this chapter you will receive detailed information about the training directory structure, specific lab files, and MicroStation resource files. Additionally you will work with InRoads Project Defaults to identify default directories for opening and saving InRoads resource and data files.

## Lab 1 - Getting Started in InRoads

### InRoads operation

1. There are three main methods to **Start InRoads**:

Choose **Start > All Programs > Bentley Civil Engineering > Bentley InRoads**. MicroStation will open allowing you to choose the design file; once the design file opens InRoads will start.

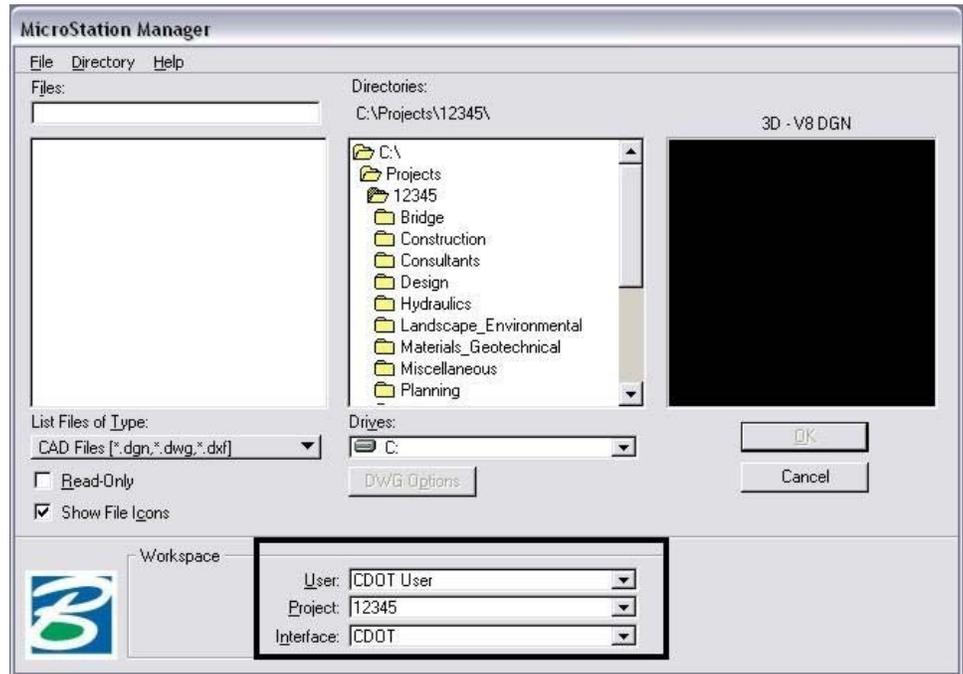
Choose the Desktop icon for InRoads if one is available on your machine. MicroStation will open n allowing you to choose the design file; once the design file opens InRoads will start.



If you already have MicroStation open, you can choose the InRoads icon from the MicroStation main toolbar.

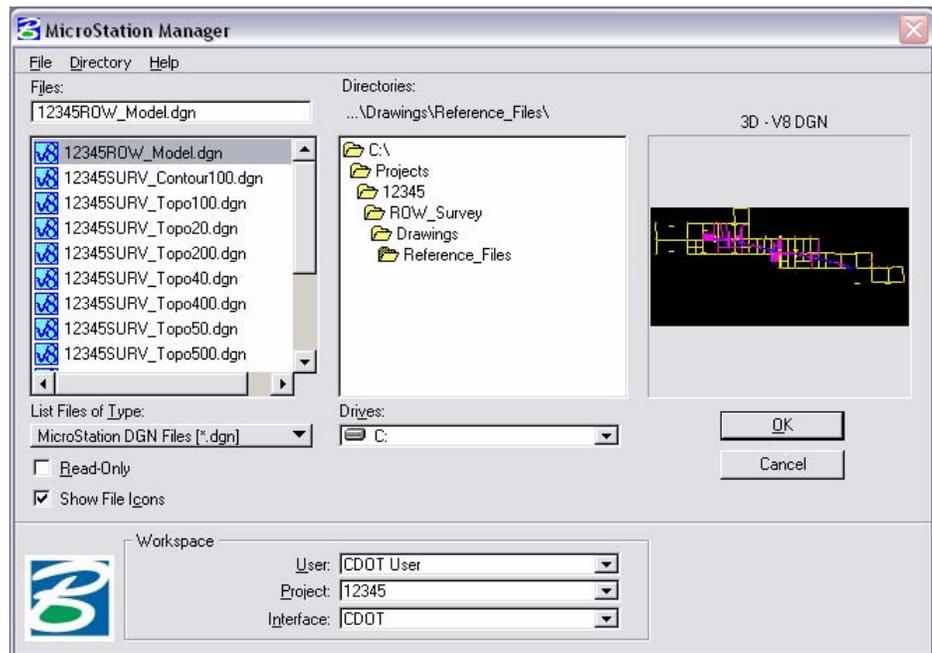


- In the **MicroStation Manager** dialog box, go to the **Workspace** group section and change the **User** field to **CDOT USER**, the **Project** field to **12345** and the **Interface** field to **CDOT**.



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

- Navigate** to the **ROW\_Survey\Drawings\Reference\_Files** folder.



- <D> the filename **12345ROW\_Model.dgn**  
(JPC#Right Of Way\_ Model )
- <D> OK to open the file.

6. **Save** the CADD file settings:

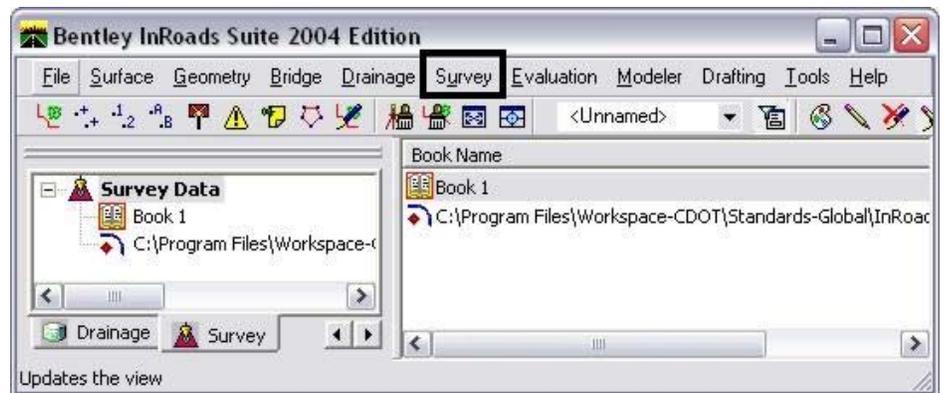
From the Main MicroStation pull-down menu Select **File > Save Settings**

By completing the above step, the attachments of level and cell libraries are cataloged with the specific MicroStation file, and will remain attached during subsequent MicroStation sessions.

**Software Application:**

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.

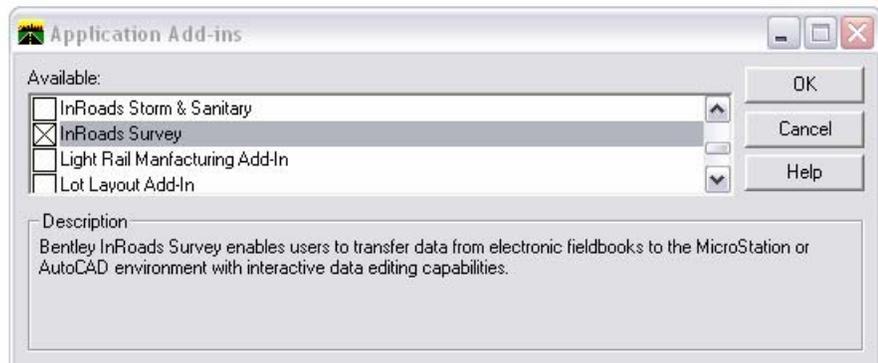
7. **Verify** InRoads and InRoads Survey are both operating:



**Note:** The title bar for the InRoads interface is labeled: **Bentley InRoads 2004 Edition** denoting that InRoads is running. Additionally the functions of InRoads Survey are apparent in the menu and workspace bars.

If Either InRoads or InRoads Survey needs to be enabled:

8. Select **Tools > Application 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 2 - Default directories and resource files

### Introduction

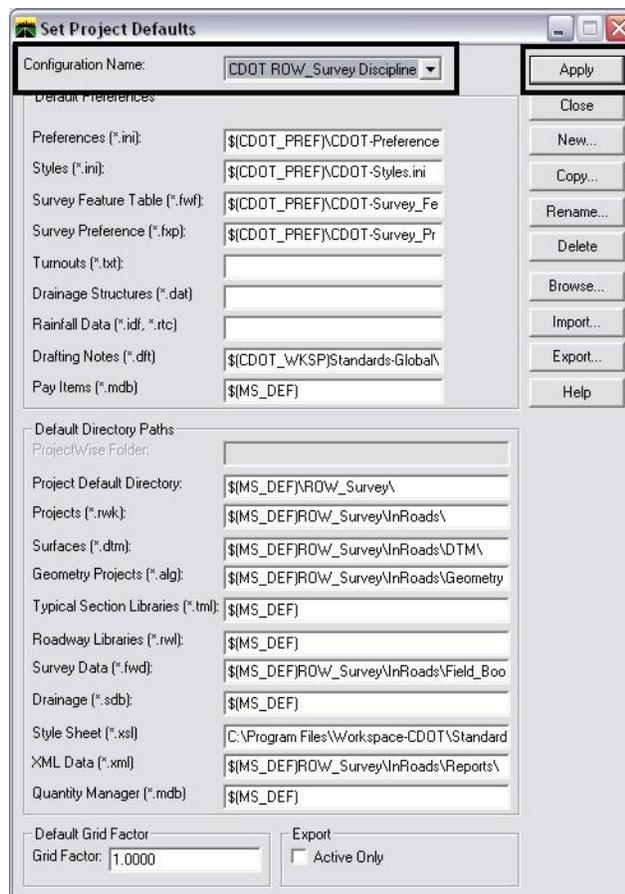
Defined default locations for both general InRoads resource files and project specific data files make it easier to conform to graphics standards and assist in navigating to the correct project directories when loading or saving data files.

### Setting project defaults

1. Select **File > Project Defaults** (from the InRoads interface).

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 and <D> **Apply**, and <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\_V3\_01.reg* to populate the **Configuration Name** drop-down list.

# Survey Feature Filters

## Chapter Introduction

Survey data will be used 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.

## Lab 3 – Working with Survey Data

### Introduction

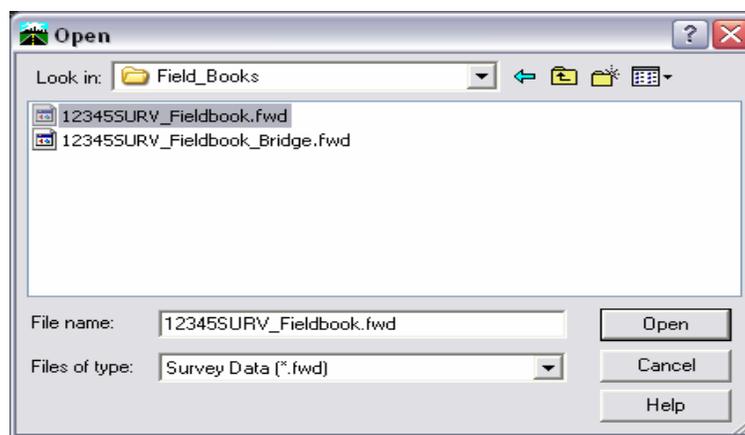
The goal of this exercise is to export observations from an InRoads Survey fieldbook to a Geometry Project creating Cogo points and alignments.

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.

### Load project data

**Note:** If not working with survey data and using this training guide for design or other purposes, you may jump to the next section and use (load) the geometry project *12345 ROW\_lab 4.alg* as found in the 'Completed Lab Files' folder located in the root training directory C:\12345\

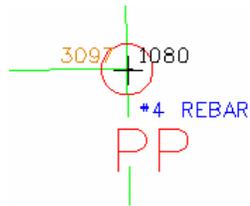
1. **Load** the Fieldbook **12345SURV\_Fieldbook.fwd** from the **\ROW\_Survey\InRoads\Field\_Books** directory.



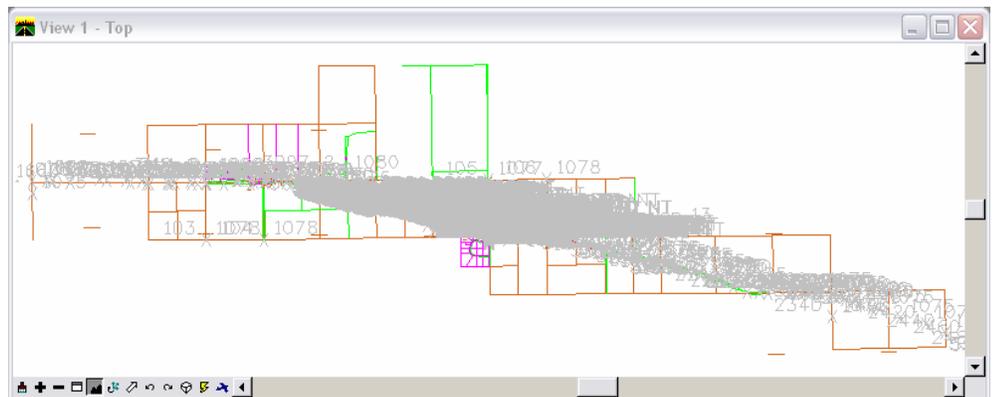
2. <D> Open
3. <D> Cancel

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

4. To *verify* the survey data, turn on dynamic shot numbers, codes, and notes.

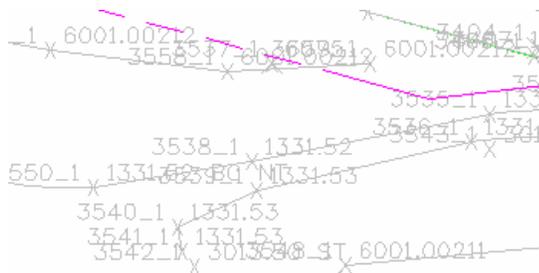


5. Use the MicroStation **Fit View** command to get an indication of the survey information contained in the fieldbook.



**Note:** The **Fit View** command only works if data has been written to graphics. If only field book data is in view, you must zoom manually.

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.



Notice 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 4 - Filtering the Survey Data

### Introduction

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.

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

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.

### Using survey feature filters

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. Select **Survey > Fieldbook Data**
3. <D> on the **Filter** icon.

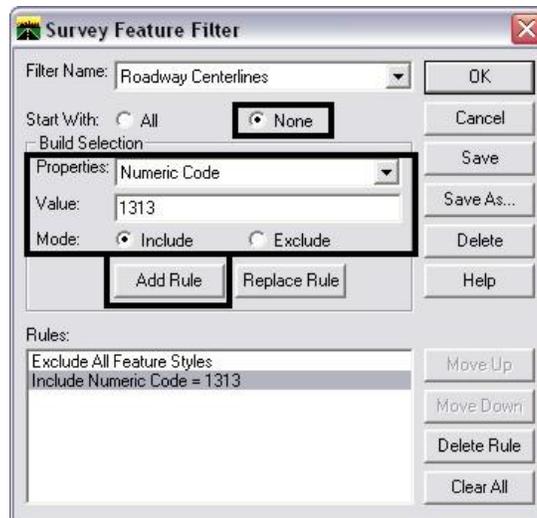


Create the Roadway Centerlines survey feature filter.

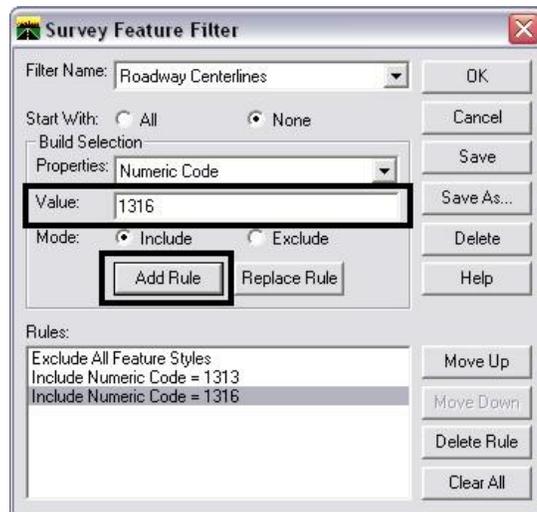
4. In the Survey Feature Filter dialog, <D> **Save As**
5. In the Save Filter As dialog, enter **Roadway Centerlines**
6. <D> **OK**



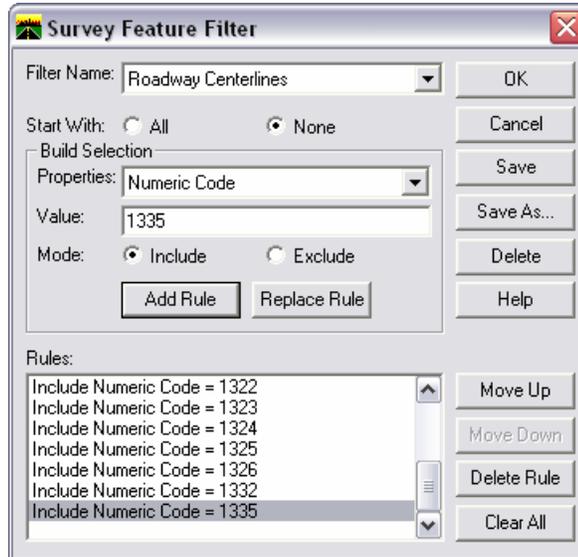
7. Toggle **None** for the Start With option.
8. Select the **Numeric Code** Property.
9. Enter a Value of **1313**
10. Toggle **Include** for the Mode option.
11. <D> Add Rule



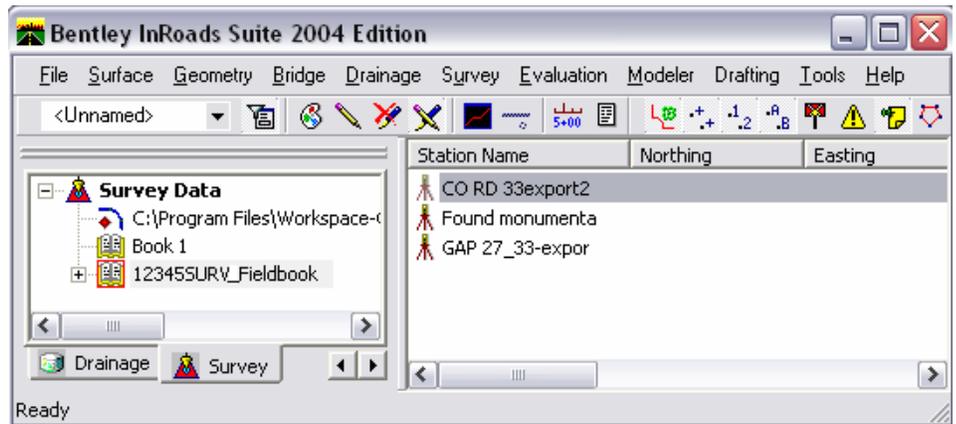
12. Enter a Value of **1316**
13. <D> Add Rule



14. Continue this process to add the following Rules:  
**1317-1326, 1332, and 1335**
15. <D> Save
16. <D> OK

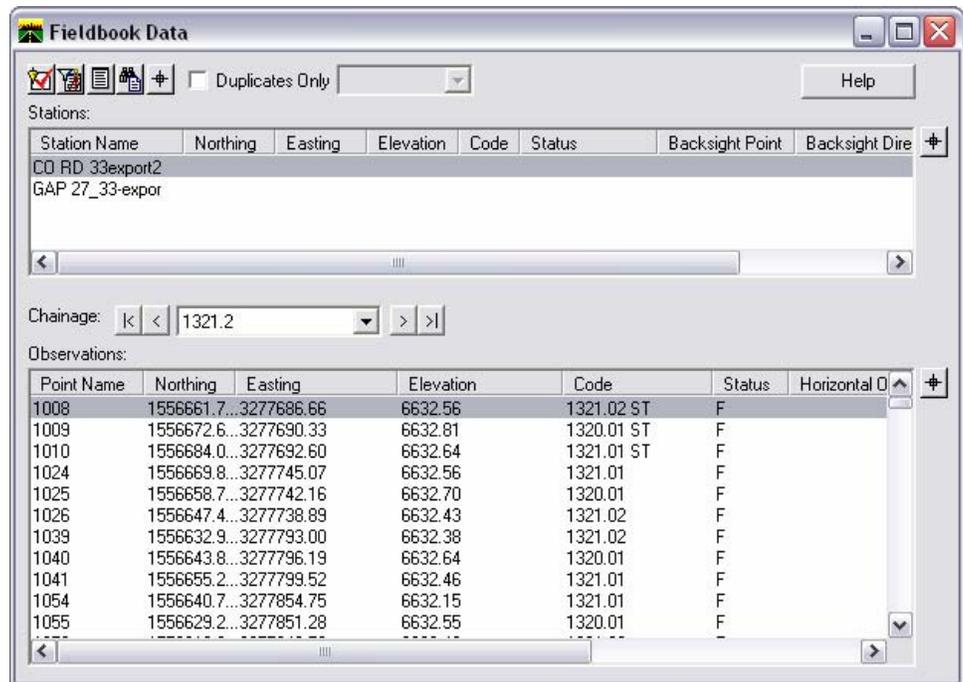


17. On the main InRoads dialog for Locks, **Toggle On** the Feature Filter Lock

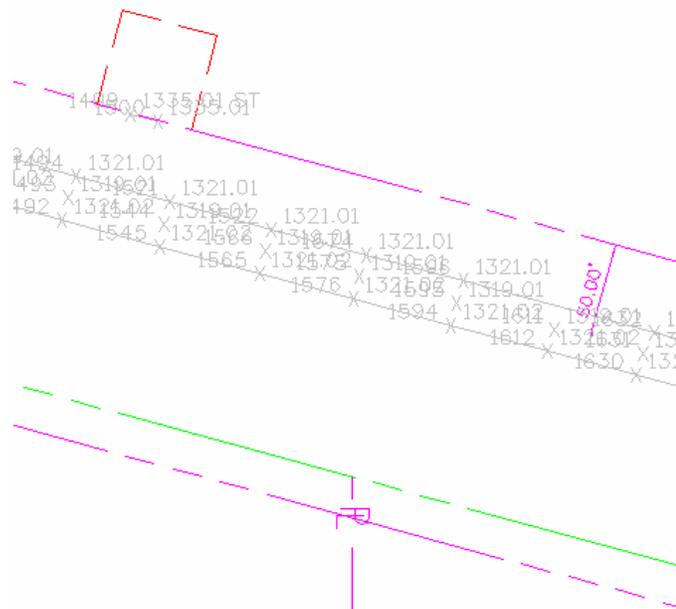


Notice that 2 things happen:

- The Fieldbook Data Pane, when opened, will update to display only the data that passes the filter.



- Also the MicroStation graphics will update to reflect the current contents of the fieldbook (if **Automatic Refresh** is toggled on under **Tools>Survey Options**). If not, select **Survey > Regenerate Graphics**



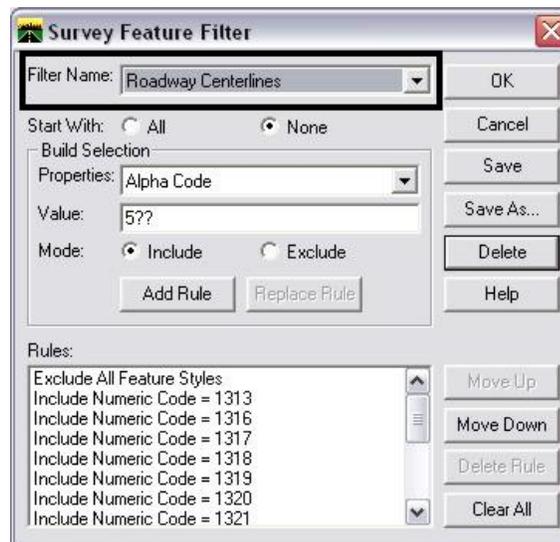
When a fieldbook is exported to graphics, geometry, or a DTM, only the survey shots that pass the filter will be exported.

In this case, additional information is desired for the development of right-of-way.

18. If closed, select **Survey > Survey Feature Filter** to re-open the survey feature filter dialog

Create the Right of Way survey feature filter.

19. Make sure the **Roadway Centerlines** filter is selected.



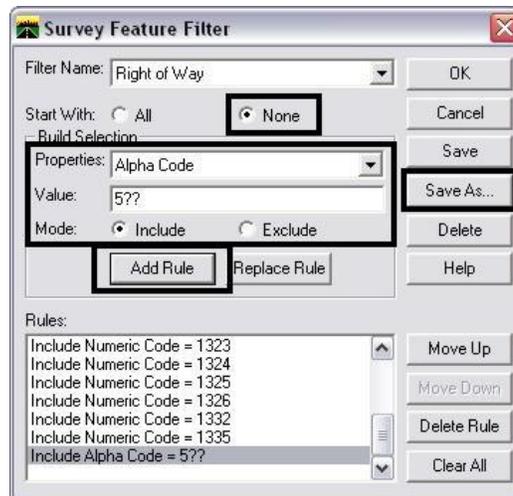
20. In the Survey Feature Filter dialog, <D> **Save As**
21. In the Save Filter As dialog, enter **Right of Way**
22. <D> **OK**



23. Toggle **None** for the Start With option.
24. Select the **Alpha Code** Property.
25. Enter a Value of **5??**

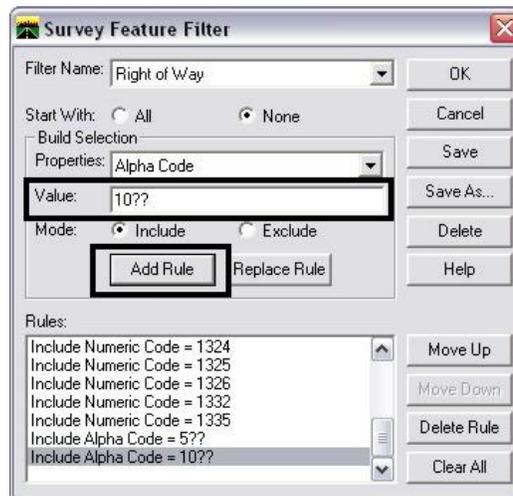
**Note:** The “??” in the key-in value is used as a wild card value when searching for data. The value of “5??” will return the range of codes 500-599.

26. Toggle **Include** for the Mode option.
27. <D> **Add Rule**



28. Enter a Value of **10??**

29. <D> **Add Rule**



30. <D> **Save**

31. <D> **OK**

The MicroStation display updates to display only the survey codes that pass the filter.

**Note:** The filter Right of Way includes codes for both property information and roadway centerline information.



## Lab 5 - Exporting a Filtered InRoads Survey Fieldbook to Geometry

### Introduction

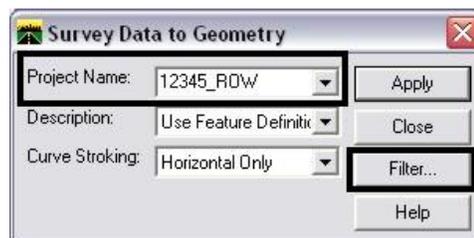
When exporting a Fieldbook to graphics, a DTM, or to a geometry project, only the items active in the Fieldbook are exported. Using a Survey Feature filter allows control of which survey data gets exported.

If not already set.

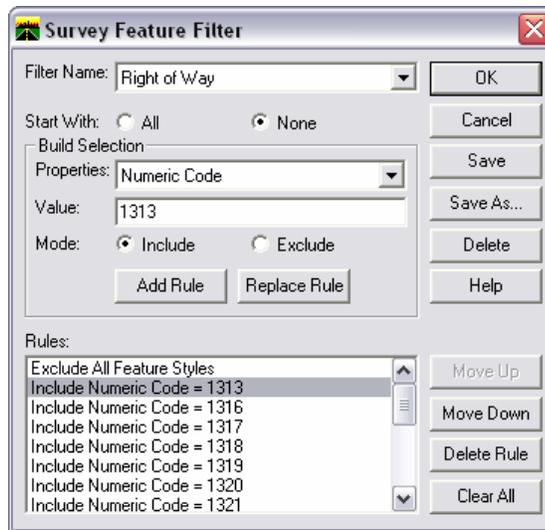
1. **Survey > Fieldbook Data**
2. **Select** the Survey Feature Filter icon. 
3. **Select** the filter **Right of Way**
4. <D> **OK** to close the Survey Feature Filter dialog.
5. **Toggle On** the InRoads Feature Filter lock



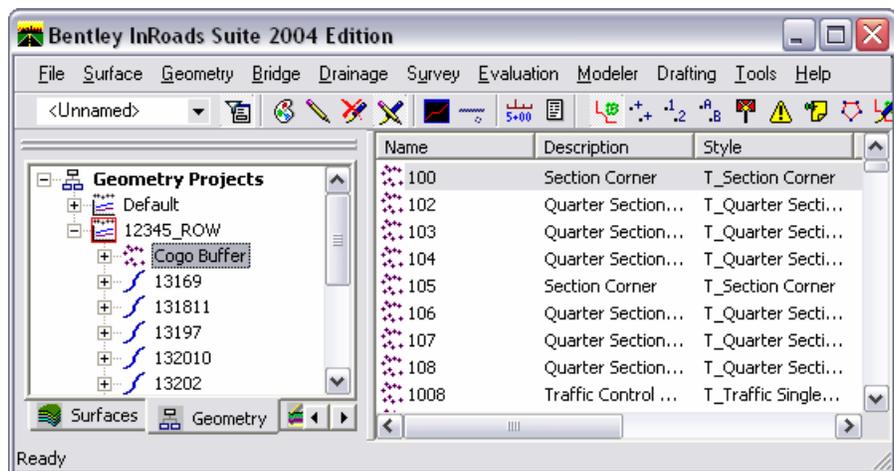
6. **Select Survey > Survey Data to Geometry**
7. **Key-in** the Geometry Project Name **12345\_ROW**. A new Geometry Project will be created by that name.



8. <D> the **Filter** button - this is another way to access the Survey Feature Filter dialog and to review the filters **Rules** prior to exporting.



9. <D> **OK** to close the Survey Feature Filter dialog as it was used for review and is not required to be open.
10. <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.
11. **Examine** InRoads explorer to verify geometry data was created



12. The survey fieldbook is no longer needed, <R> **12345SURV\_Fieldbook** and choose **Delete** from the fly-out list. This will remove it from memory.



13. **Toggle Off** the InRoads Feature Filter lock



# Geometry Display

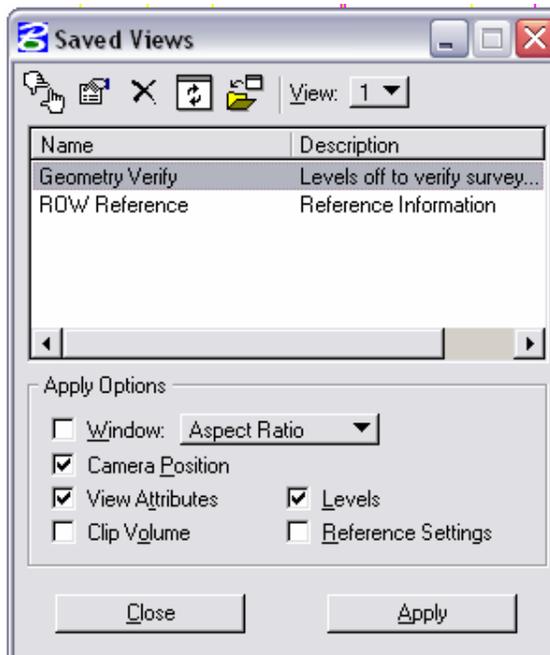
## Lab 6 – Displaying InRoads Geometry

### Introduction

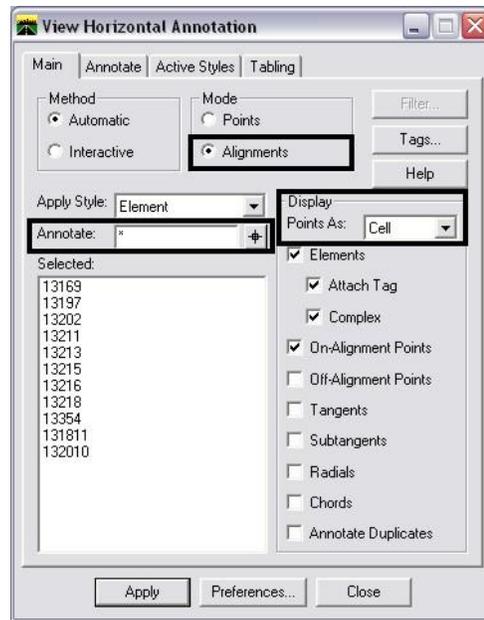
A graphic review of both the alignments and Cogo points created will assist in verifying the fieldbook information exported as expected.

1. Select **Utilities > Saved Views**
2. To make it easier to verify the import of geometry information, we need to turn off the display of right-of-way information. To do this we will use a saved view named Geometry Verify. This view turns has all ROW\_\* levels *turned off*. Highlight **Geometry Verify** and <D> **Apply**.
3. <D> **Close** to dismiss the **Saved View** dialog box.

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

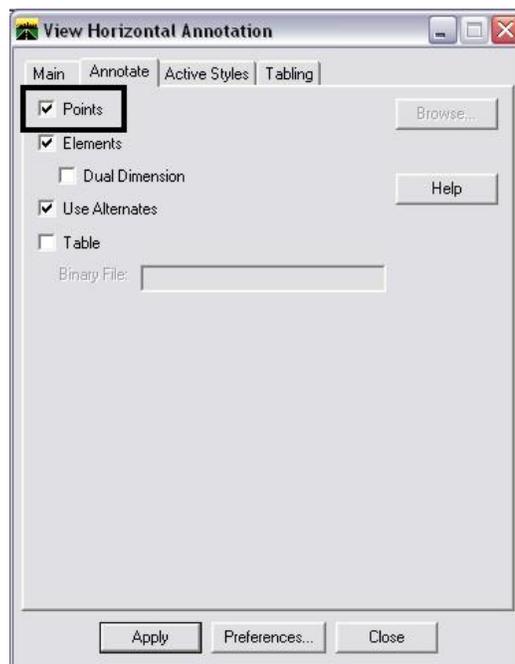


4. Select **Geometry > View Geometry > Horizontal Annotation** to view all alignments.
5. Select the **Main** tab.
6. Toggle on the **Alignments** mode.
7. Input an **asterisk** (wild-card) into the **Annotate** field to identify all alignments.
8. Display Points As: **Cell**



9. Select the *Annotate* tab.

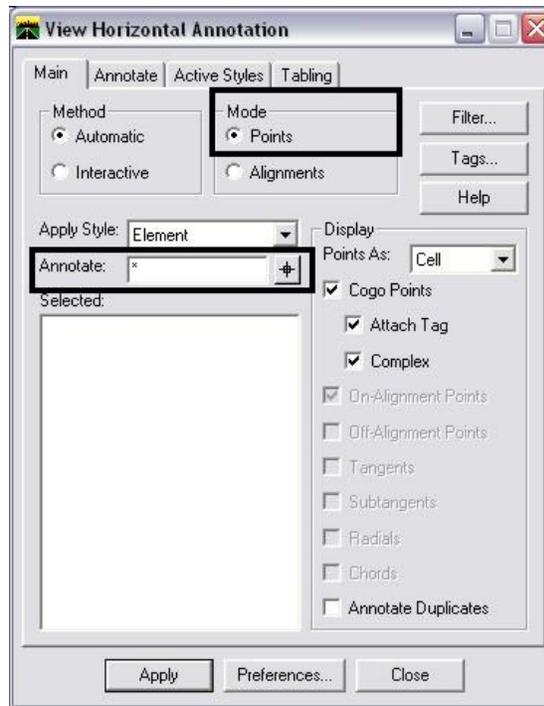
10. Toggle on **Points**



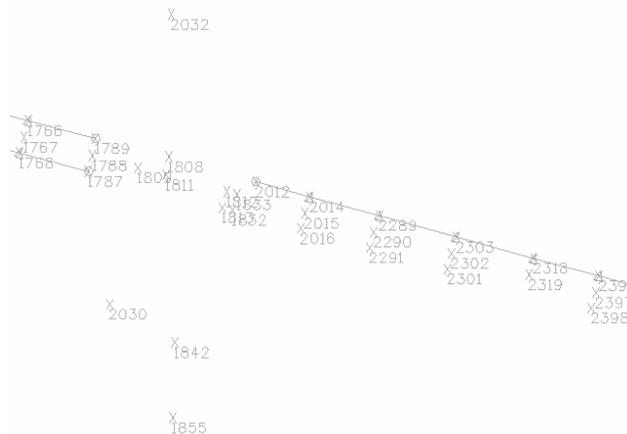
11. View all alignments, <D> **Apply**

12. **Repeat** the display command for *Cogo points* by turning on the radio button for **Points** (in the Main tab). Again input an **asterisk** in the **Annotate** field

13. <D> **Apply**

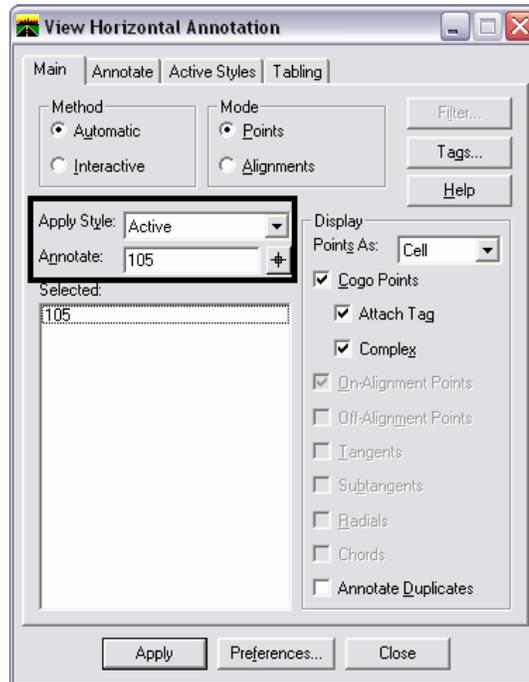


14. Use *MicroStation* view commands to zoom into the graphics to review the display of alignments and Cogo points.



Annotation symbology used when viewing points and alignments can be changed by applying the active style. The following steps demonstrate how this works.

15. In the **Main** tab, select the drop-down list for the **Apply Style:** field and select **Active**. In the **Annotate:** field type in **105**. Only the annotation of point 105 will be affected when the command is executed.



16. In the **Active Styles** tab, select the drop-down list for the **Point:** field and select **Cogo\_Label-Name\_Desc\_N\_E**.



17. <D> **Apply**. For this demonstration, *do not* overwrite the Current Style with the Active Style. In practice, this would be the way to assign (or reassign) a Geometry Style to Cogo points.
18. Use *MicroStation* view commands to zoom into the graphics to review the display of point 105.

105  
Section Corner  
N =1558527.87  
E =3279643.18

**Note:** When Lab 6 is complete, InRoads Survey is no longer required. If you wish to simplify the interface, it can be removed by selecting **Tools > Application Add-Ins** and toggling it off

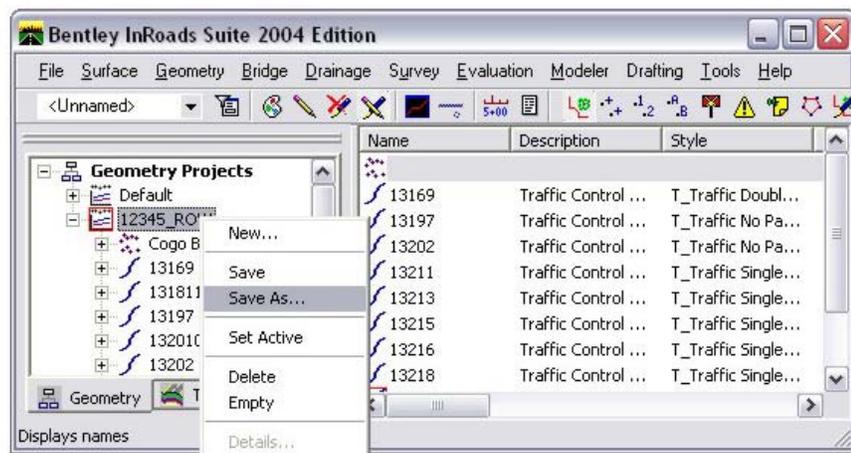
## Lab 7 - Saving a Geometry Project

### Introduction

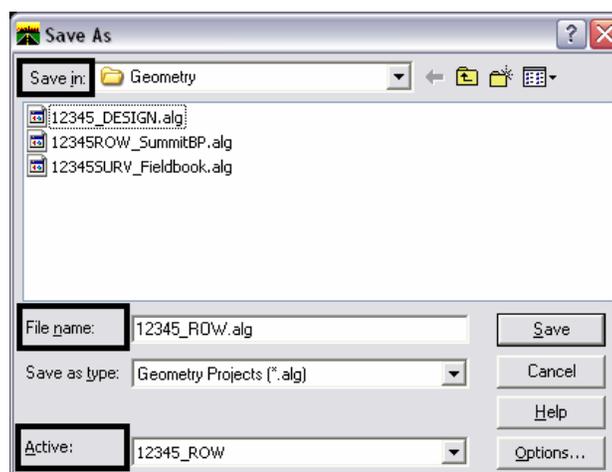
InRoads is **Memory** based, *not* Disk based. The file(s) seen in the **InRoads Workspace** pane are copies from the disk drive and reside in the computer's memory. Any changes to these files (or creation of new data files) require saving back to the disk drive.

Before proceeding, save the Geometry Project to **disk** to eliminate the possibility of data loss in the event you close or otherwise exit InRoads.

1. <R> on the Geometry Project **12345\_ROW** and select **Save As** from the fly-out menu.

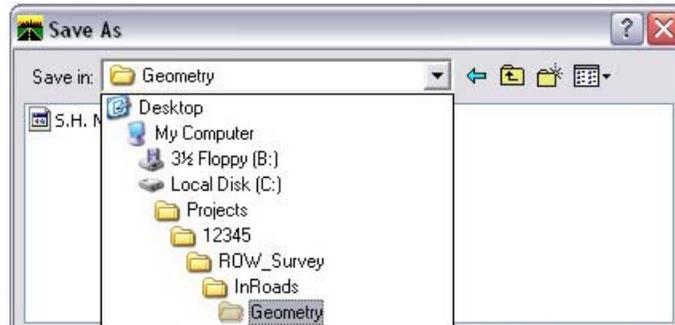


2. Select the drop-down list for the **Active:** field and select **12345\_ROW** from the list.
3. Verify this name is populating the **File Name:** field.



**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:** field to verify the folder path.



5. After the correct folder location is identified, <D> **Save**
6. Close the **Save As** dialog.

**Notes:**

- 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 Table* 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. Refer to page 33 for a demonstration of using Active Styles when viewing alignments and Cogo points.

## Lab 8 – Copying Geometry

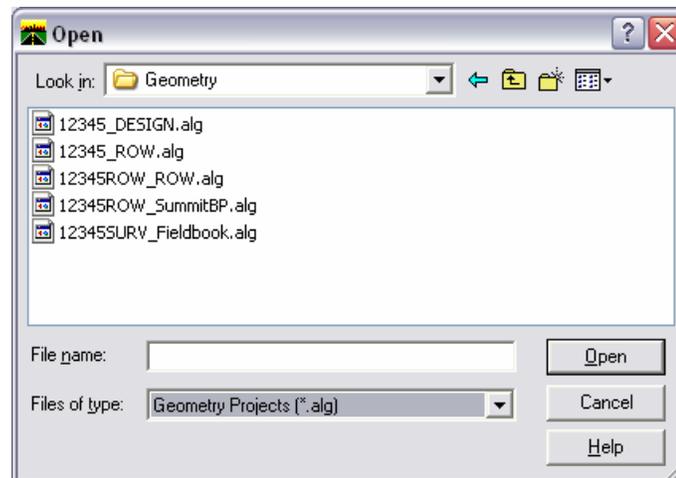
### Introduction

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.

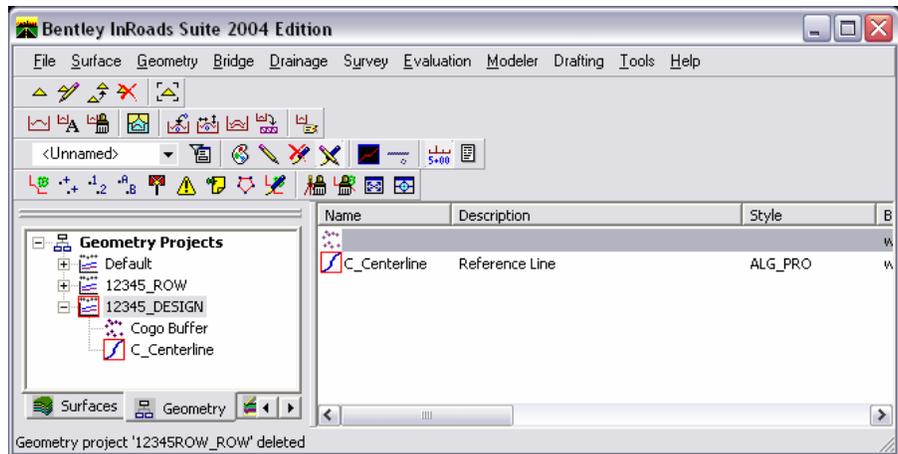
### Copy geometry information between geometry projects

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. **File > Open** and load the geometry project *12345\_DESIGN*



There is a single horizontal alignment needed from the *12345\_DESIGN* geometry project. It is named *C\_Centerline*



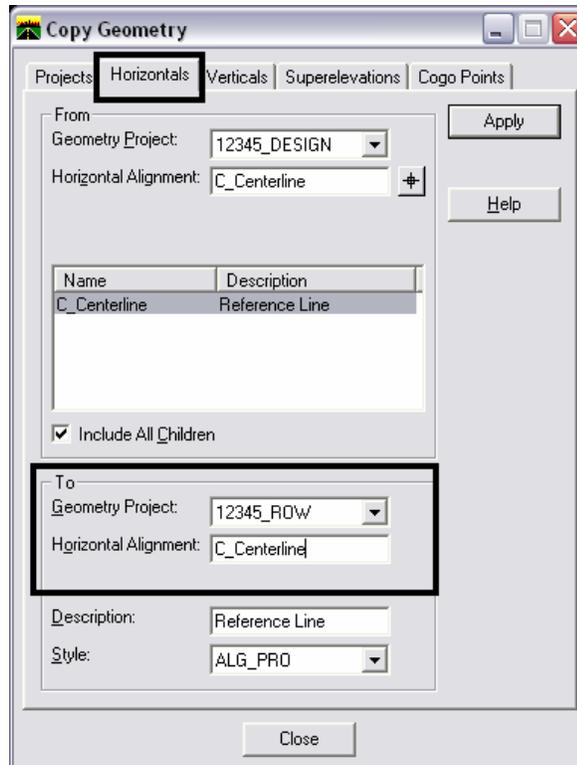
2. Select **Geometry > Copy Geometry**

3. *Select the **Horizontals** tab.*

**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.

4. In the *To* section, set the **Geometry Project** to **12345\_ROW**

5. <D> **Apply**



**Example Only – Do not execute this workflow**

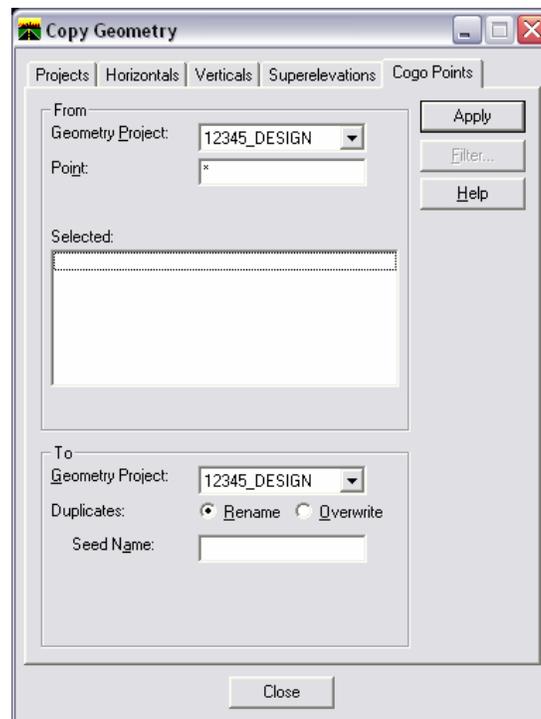
Cogo points can be copied by selecting the **Cogo Points** tab. The sample Cogo points shown are not required and are shown as an example only.

Select the **Cogo Points** tab.

Input point numbers, a range of point numbers, or an asterisk in the **Point:** field to select the desired Cogo points

Select **Rename** in the **Duplicate** field

The rename toggle instructs InRoads to reassign the imported Cogo point number/name if an identical point exists in the destination geometry project. A seed name can be specified, otherwise the seed name defined under **Tools > Options [Geometry]** will dictate the initial name. Overwrite will do just that, it will replace an existing Cogo point with the copied point if the names are identical.

**Unload the Geometry Project 12345\_DESIGN**

The geometry project **12345\_DESIGN** is no longer needed, remove it from memory.

6. <R> on the geometry name **12345\_DESIGN** and select **Delete** from the fly-out menu

***Defining the active geometry project***

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. If 12345\_ROW is not so indicated:

7. <R> on the geometry project name **12345\_ROW** and select **Set Active** from the fly-out menu.
8. For orientation purposes, *display* the *graphics* and *stationing* for alignment **C\_Centerline**

**Hint:**

- Define C\_Centerline as the active horizontal alignment
- Select **Geometry > View Geometry > Active Horizontal**
- **Geometry > View Geometry > Stationing**

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

# Cogo Commands

## Chapter Introduction

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.

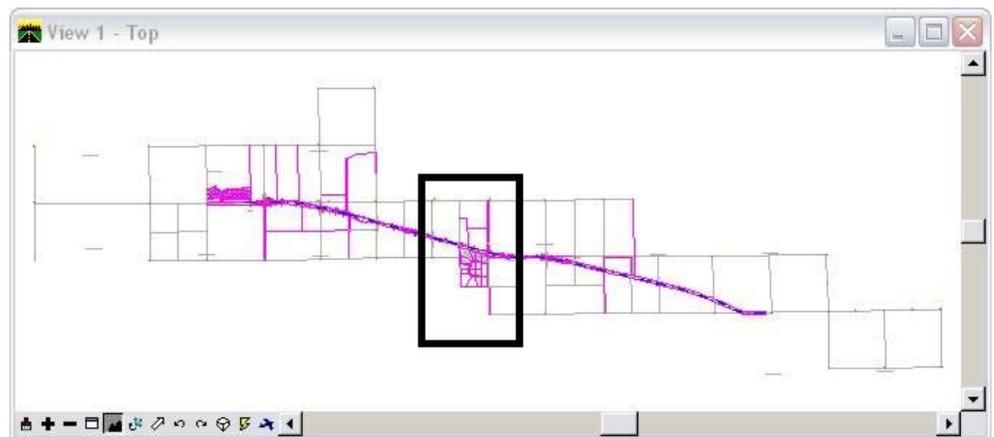
### Objectives

When completed you will have learned:

- 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

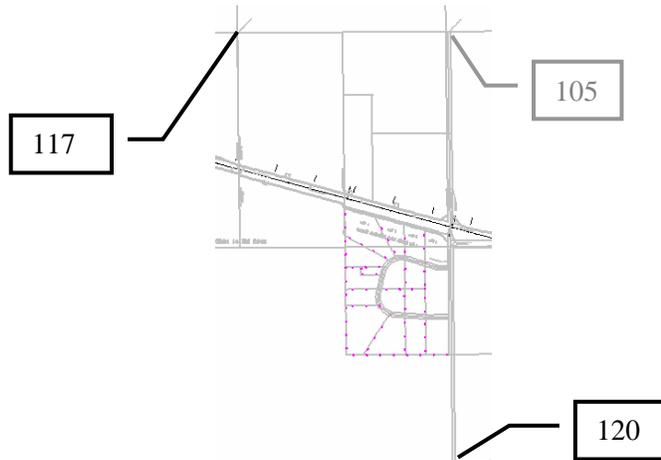
## Lab 9 - Creating Cogo Points

Working with a subset of the project, create and store Cogo points for project development



1. Use the *MicroStation* Fit command to view the extents of the project.
2. Since the Saved View Geometry Verify was used earlier to validate information. We want to display project information contained in a different saved view, ROW Reference. To do this, use the command **Utilities > Saved Views**. Highlight the view named **ROW Reference** and <D> **Apply**. This exercise will be working in the Summit Business Park area outlined above.

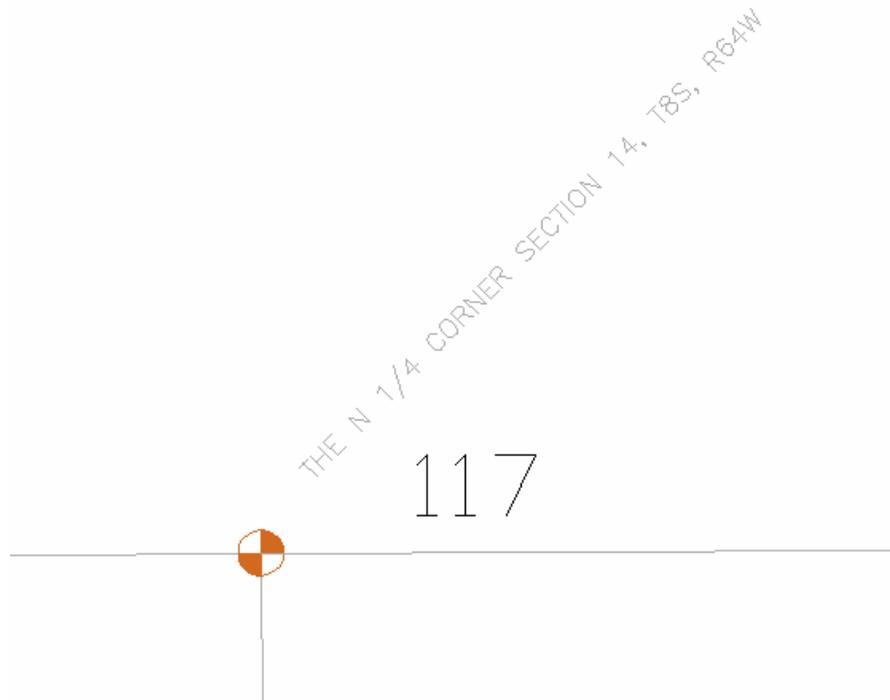
- Use the *MicroStation Window* command to zoom into this area.



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.

#### *Cogo point creation by graphic input*

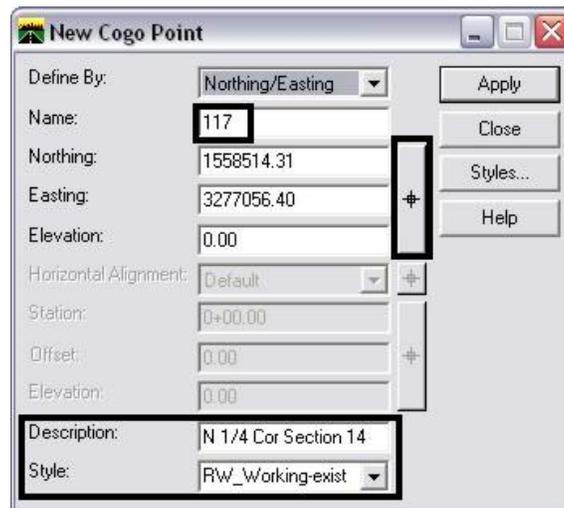
- Use *MicroStation* to *window* into the location for point **117**



- From the InRoads interface, select **Geometry > Cogo Points > New**

This self-explanatory dialog furnishes access to the basic functions of working with Cogo points.

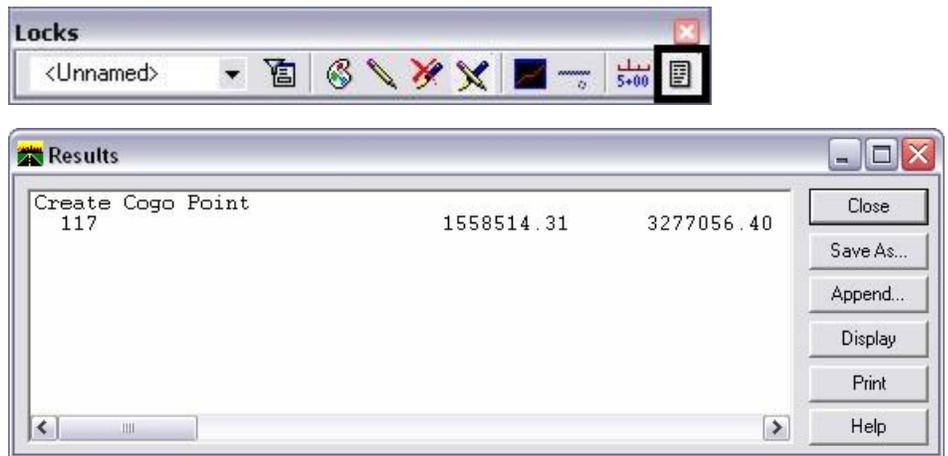
3. Enter the Name: **117**
4. <D> the selection button to interactively define the coordinates.
5. Snap <T> & then <D> to the CAD graphics at the section corner.
6. Verify the coordinates that were identified match those shown in the **Northing** and **Easting** fields below.
7. Key-in a **Description** as shown.
8. Select the Style **RW\_Working-exist**
9. <D> **Apply**



The Cogo point is created & posted to the MicroStation screen.



If Report lock is on, a Results dialog opens.



### ***Cogo point creation by coordinate input***

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

10. Notice the Name field automatically increments. **Replace** the number 118 with **120**
11. 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**  
Enter those values.
12. Enter the appropriate **Description** and **Style** as shown.
13. <D> **Apply**



Editing Cogo Points - Example Only – Do not execute this workflow

Once created, Cogo points can be modified.

Select **Geometry > Cogo Points > Edit**

Change data as necessary and select **Apply**

**Note:** Remove Shared Point Name refers to Cogo points that may be used for dual purposes such as a common point in crossing alignments. Removing the shared point name allows the user to modify the Cogo point location without modifying the associated (secondary) alignment.

**Note:** The **Edit Cogo Point** dialog cannot be used to rename a Cogo Point. To accomplish renaming, copy the Cogo point to the needed name and delete the original point.

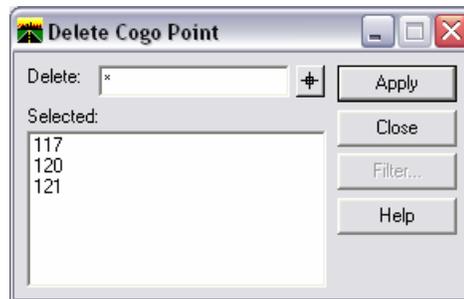
### ***Copying Cogo Points***

Select **Geometry > Cogo Points > Copy** to duplicate a Cogo point

Complete the **From:** and **To:** fields and <D> **Apply**. The point is duplicated.

### ***Deleting Cogo Points***

Select **Geometry > Cogo Points > Delete** to remove Cogo point(s).



All points listed in the **Selected** field will be deleted from the Cogo Buffer when **Apply** is selected.

Valid input to the Delete field includes:

- Individual Cogo points
- A range of points (117-120)
- Single character wild cards (11%)
- All Cogo points (\*) or multiple characters (1\*)

***Centering a MicroStation View on a Cogo Point***

Select **Geometry > Cogo Points > Center Point**

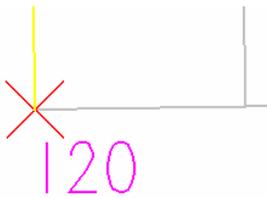
You are prompted to ***Identify point/Key in point name***

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

You are prompted to ***Select a View***

**<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.

## Lab 10 – Alignment to Cogo Buffer

### Chapter Introduction

Horizontal and vertical *alignments* must be assigned a name at the time of creation. 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.

### Name assignments

#### *Alignments*

Alignment names are created and stored in a geometry project:

- Using a combination of numbers or letters
- Alignments may or may not contain any data
- For some geometry commands, naming is automatic and renaming may be desirable

#### *Alignment Vertices*

Vertices along a horizontal alignment exist by one of three ways:

- Cogo Points
- Alpha or Numeric named geometry points (not stored in Cogo Buffer)
- Unnamed geometry points (not stored in Cogo buffer)

#### *Cogo Points*

Cogo Points must be assigned an identifier at time of creation, these can be:

- Numeric
- Alpha characters
- A combination of numbers or letters
- User specified or incrementally assigned by InRoads

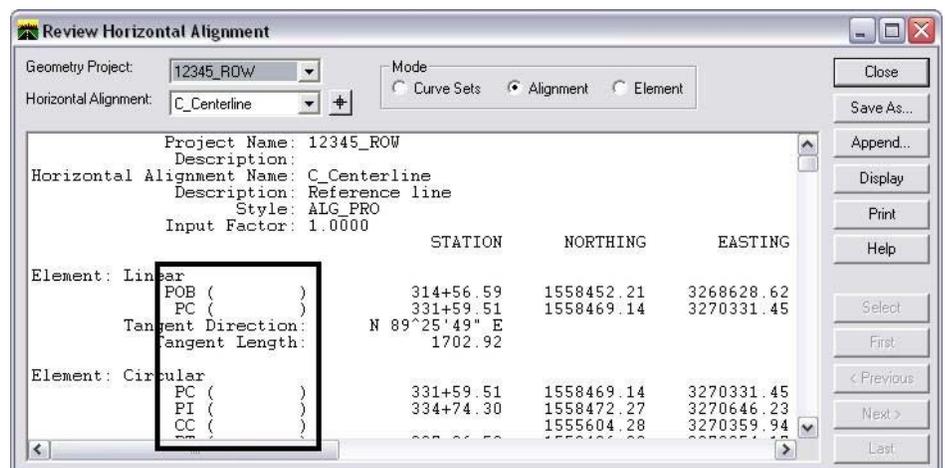
**Note:** In order to chain Cogo points together as an alignment (figure), the selected Cogo points must be defined by numbers only. Alpha or alphanumeric Cogo point names are not acceptable.

## Writing Alignment Points to the Cogo Buffer

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*.

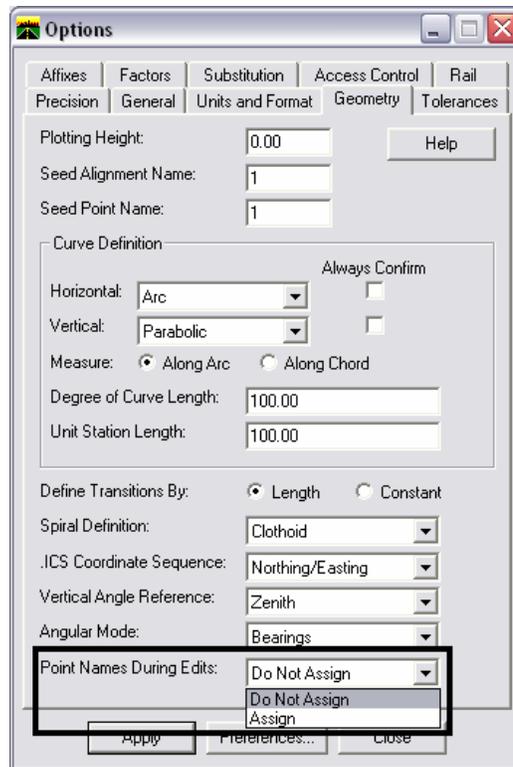
**Note:** The following workflow operates on the active horizontal alignment. Verify the active horizontal alignment is *C\_Centerline* prior to executing the following steps.

1. Select **Geometry > Review Horizontal** to review alignment *C\_Centerline*



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.

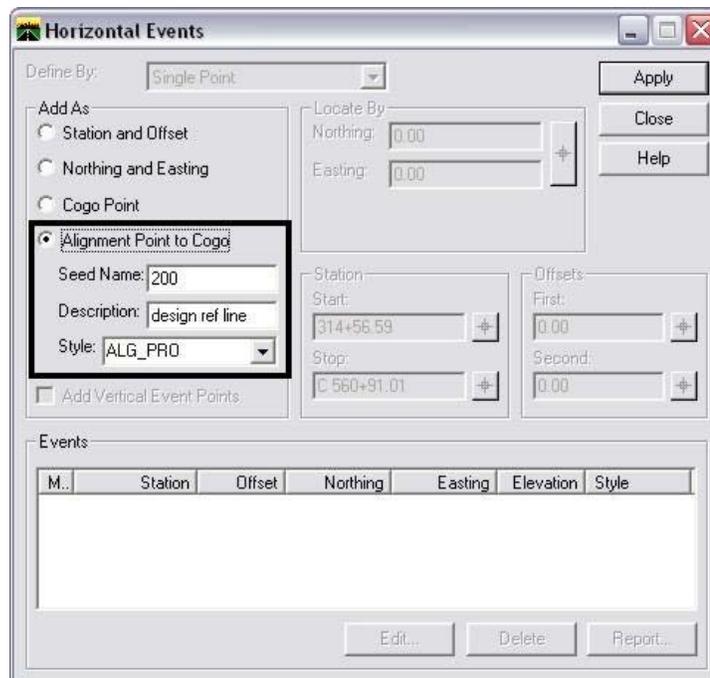
**Note:** The assignment of geometry names at time of creation (or editing) is controlled by: **Tools > Options [Geometry]** tab, as shown on the next page.



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.

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

The Horizontal Events dialog opens.



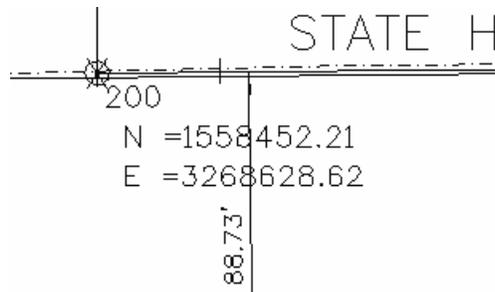
3. **Set** the radio button for **Alignment Point to Cogo: On**

**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.

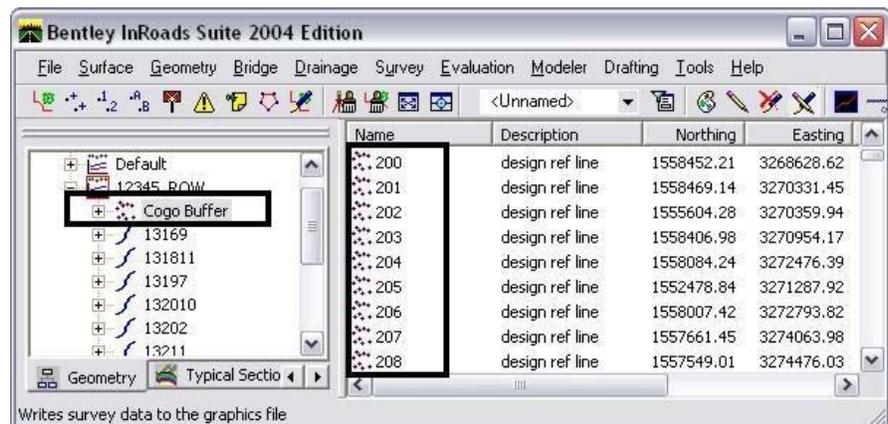
Reviewing the Cogo buffer indicates that the range of number from 121-1007 are unused. For simplicity, set point number 200 as the initial Cogo point ID to assign to the alignment vertices (more on reviewing the Cogo buffer in the following lab).

4. Key-in **200** as the Seed Name
5. Key-in **design ref line** in the Description field
6. Select **ALG\_PRO** as the geometry *style* to assign to the new Cogo points
7. <D> **Apply**

The Cogo points are created & posted to the MicroStation screen.

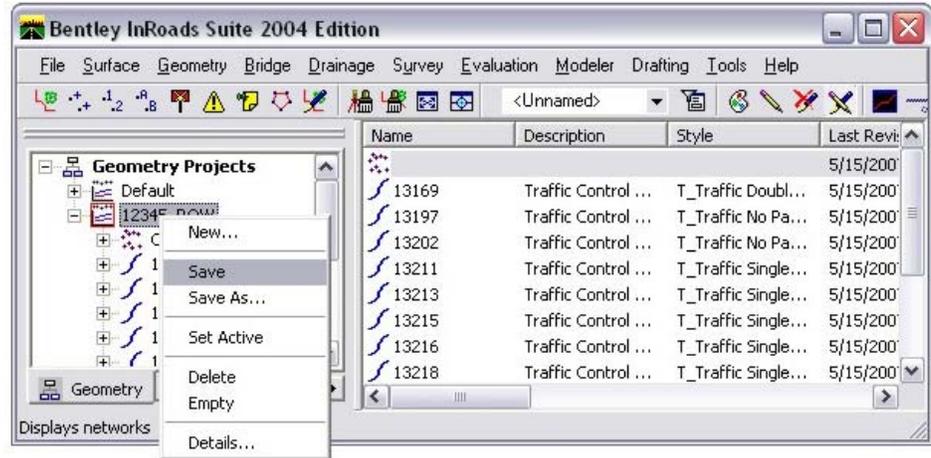


8. **Review** the Cogo Buffer to verify the results by <D> on the Cogo Buffer



Remember to periodically save the Geometry Project.

9. <R> on the Geometry Project name 12345\_ROW, <D> Save



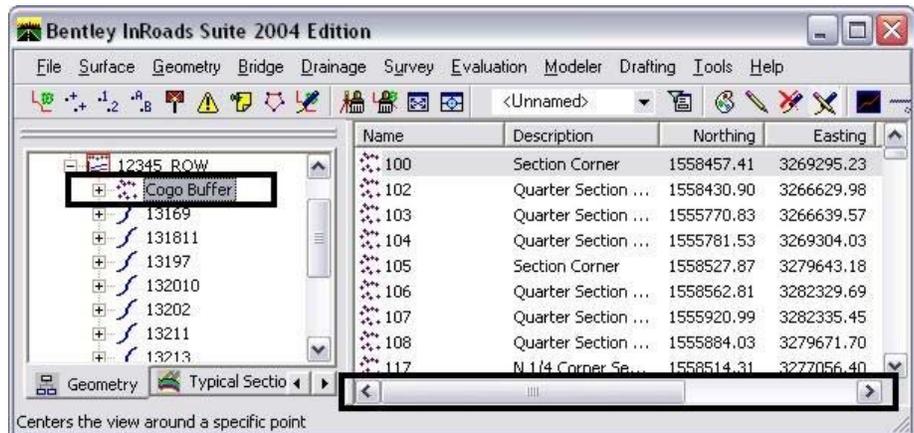
## Lab 11 – Reviewing Cogo Points

### Chapter Introduction

Cogo points can be reviewed in the InRoads feedback pane by placing a data point <D> on the Cogo Buffer. Note the feedback pane can be expanded or scrolled to view coordinate values. The columns can also be repositioned by <D> and dragging to reposition. The columns can also be sorted in either ascending or descending order by placing a <D> on the column headings.

### Quick Review of Cogo Buffer

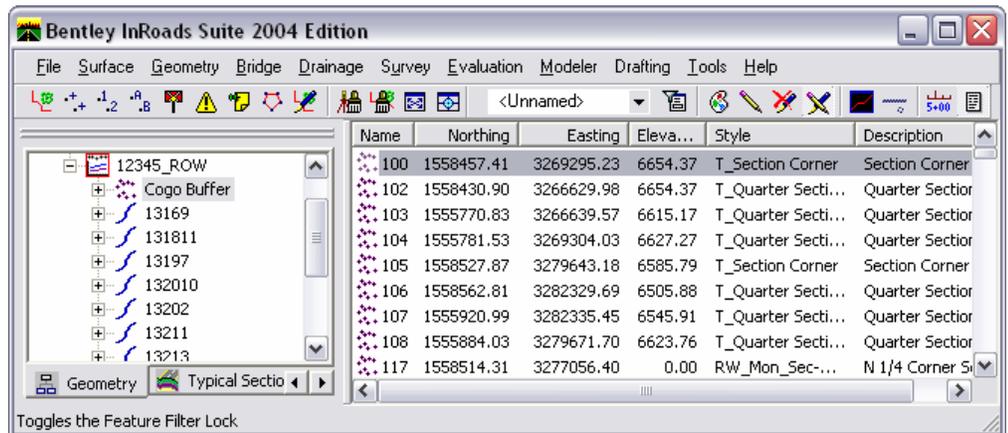
1. <D> on the Cogo Buffer.



The contents of the Cogo buffer are displayed in 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.

2. Reposition and sort the feedback pane as you see fit.

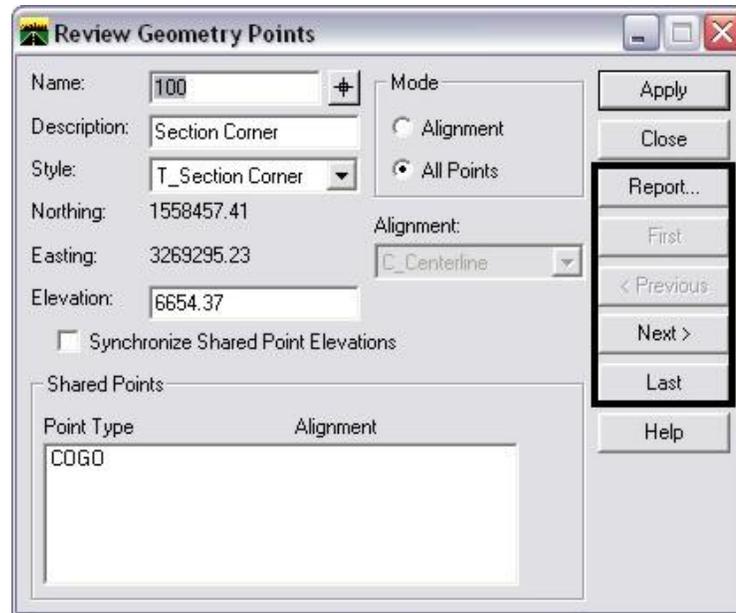


## Detailed Review of Geometry Points

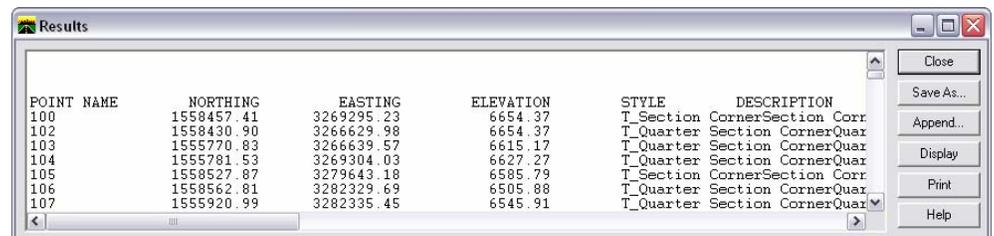
The **Review Geometry Points** command can be used to review individual geometry points. This dialog can also be used to generate ASCII output files of said points.

### 3. Select **Geometry > Review Geometry Points**

This dialog can be used to evaluate individual Cogo points (or named geometry points) by navigating with the provided buttons.



### 4. <D> the Report button.



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.

As with all InRoads **Results** dialogs, the **Save As..** command will write the displayed data to an ASCII file for documentation, reformatting, and other purposes.

# Creating Cogo Points

## Chapter Introduction

InRoads geometry snaps allow the user added functions to ensure geometry point locations and direction criteria are selected at defined geometry locations. The following chapters involve creating Cogo points and alignments. Using geometry snaps will ensure specific locations are selected.

## Lab 12 - Geometry Snaps

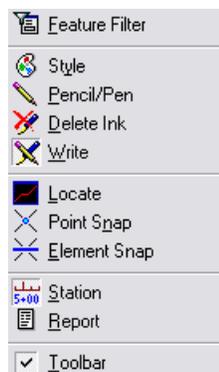
InRoads geometry snaps are analogous to MicroStation snaps such as the keypoint snap. When enabled, the software only allows selection at specific locations.

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.

Geometry snaps are accessed from the InRoads Locks toolbar.



They are also available under Tools > Locks

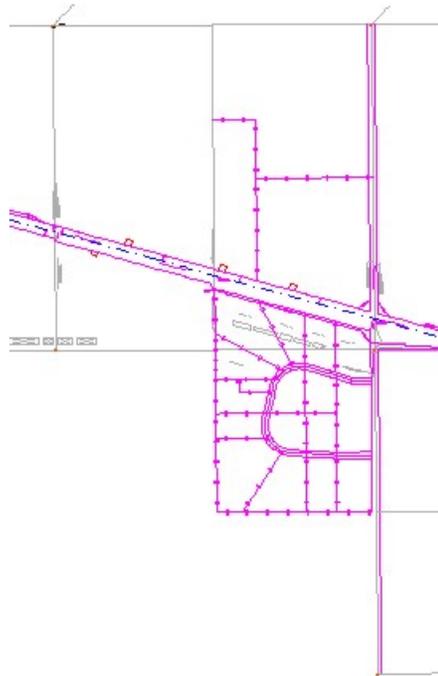


1. <D> on the Geometry lock icon in the InRoads Locks toolbar.

<D> on the **Lock** icon to cycle through the three geometry snap modes:

- Geometry snap *off* 
- **Point snap** - locks to Cogo points or alignment vertices 
- **Element snap** - select tangents for direction definition 

- Position the MicroStation view as shown below



To explore the Geometry **Point** snap use the inverse command to report distance and direction between cursor locations.

- Select **Geometry > Utilities > Inverse Direction**
- Begin with the Geometry **Snap off**



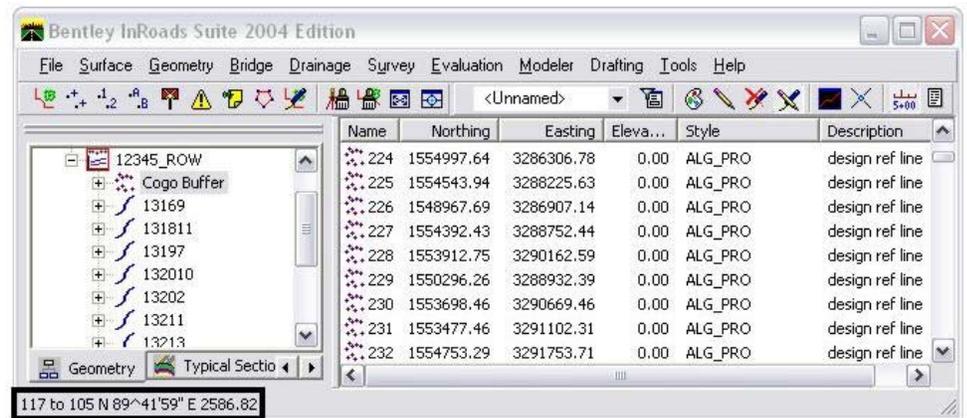
After selecting the inverse command you are prompted to **Identify Initial Point/Key in Initial Point**

- <D> near Cogo Point **117** & then <D> near Cogo point **105**  
(see following graphic for point locations)



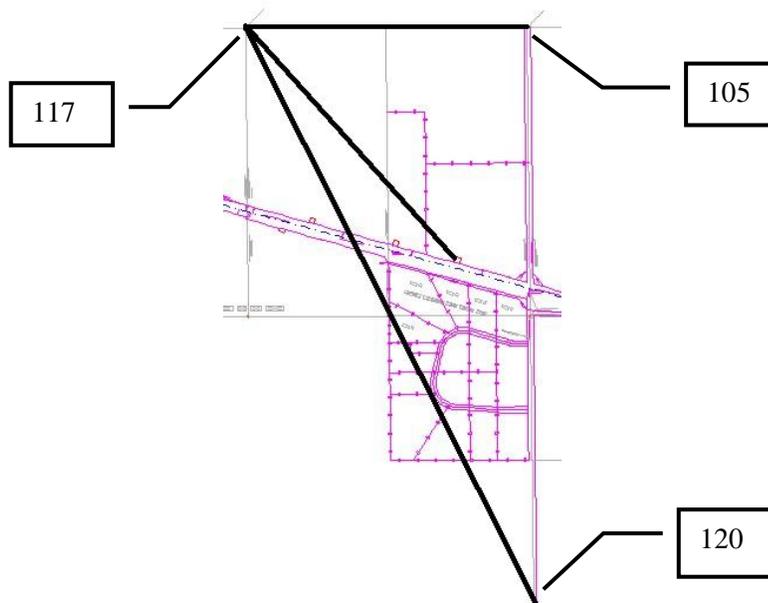
Dynamic graphics will appear and both the **MicroStation** and **InRoads** command fields will report the results. A question mark indicates that a specific Cogo point has not been selected. In this case, the bearing and distance readout reflects the values between the data <D> points given. Not between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

- Toggle **On** the Geometry Point  to select defined geometry.
- <D> near Cogo Point **117** & then <D> near Cogo point **105**



InRoads reports the bearing and distance between points 117 & 105.

8. **Move** the cursor around the MicroStation view.  
Note how the cursor 'snaps' between specific geometry vertices.



9. Toggle **Off** all geometry snaps 

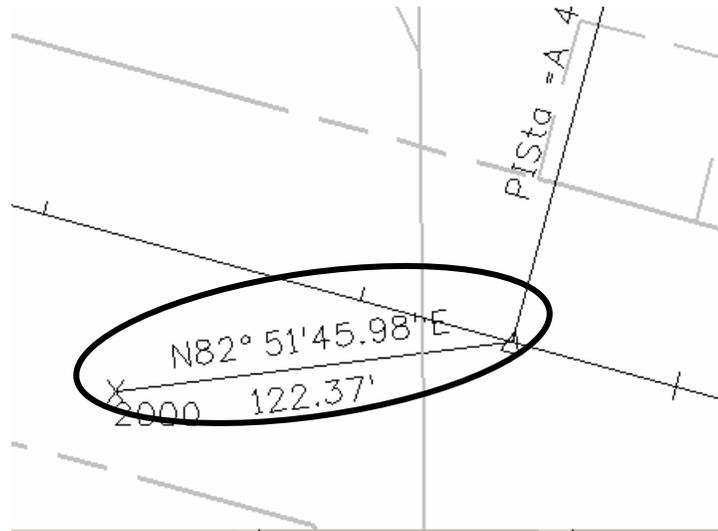
#### **Notes:**

- 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 MicroStation key-in window to inverse between point numbers.

#### **Challenge lab**

When using the geometry inverse command, issuing a second data point in the MicroStation view will draw a line between the identified locations and post the bearing and distance to the MicroStation File.

Try it

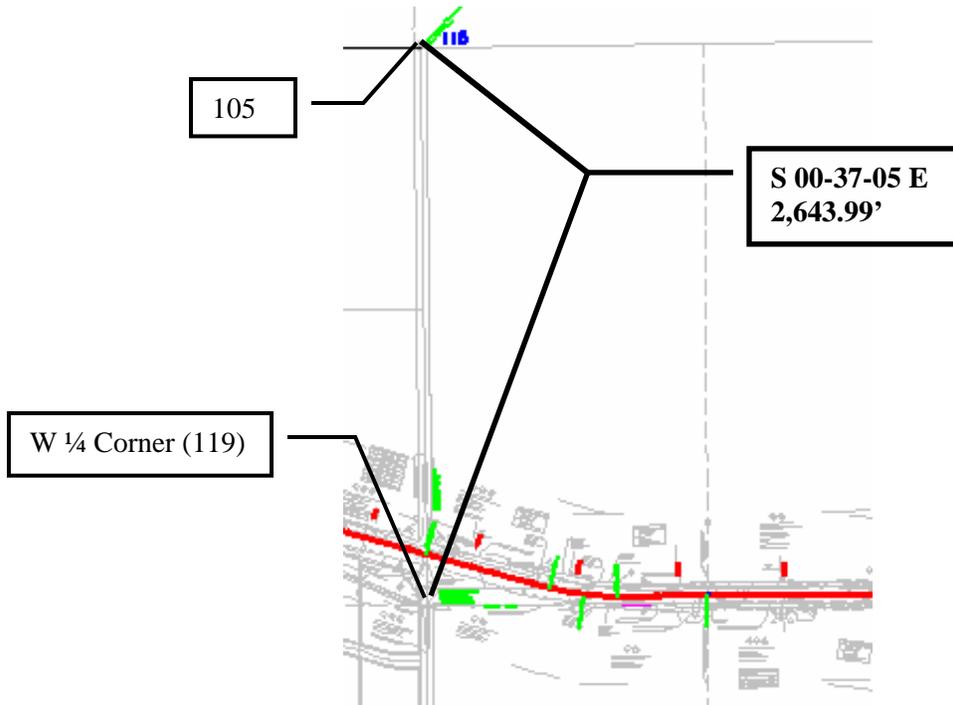


**Note:** As standard practice, the geometry snap should be left in the off position to avoid undesirable results. For example, if the geometry point snap is left on and a new Cogo point is created by keying-in or graphically selecting the desired position, once applied, the new point will be created at the nearest existing geometry point, not at the specified location.

The geometry snap element will be covered in following exercises.

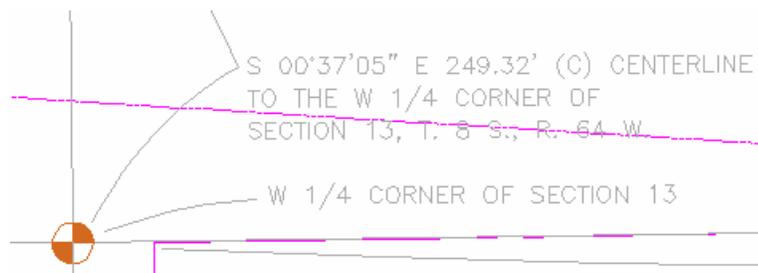
## Lab 13 - Cogo Point by Traverse

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. Use the Traverse command to establish the West ¼ corner from point 105.



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



1. Select **Geometry > Traverse**

The Traverse dialog opens.

There are **three** ways for establishing the foresight point (Method):

- Angle/Direction (angle or deflection angle from backsight point)
- Direction (bearing and distance)
- Curved (curve tangent, chord or radial information)

2. Select **Method: *Direction***

There are **four** options for creating a new geometry point or element (Insert Point):

- To Cogo Buffer
- Before Alignment (adds courses at beginning)
- After Alignment (adds courses at end)
- Radial (adds Cogo points from common occupied point)

3. Select **Insert Point: *To Cogo Buffer***

The dialog is divided into 3 other distinct sections:

- **Course** - direction/distance to travel
- **Occupied Point** - point of origin
- **Foresight Point** – point being established

The screenshot shows the 'Traverse' dialog box with the following fields and values:

- Method:** Direction
- Insert Point:** To Cogo Buffer
- Course Section:**
  - Direction: N 0°00'00" E
  - Distance Type: Horizontal Distance
  - Horizontal Dist.: 0.00
  - Horizontal Offset: 0.00
  - Vertical Type: Vertical Distance
  - Vertical Distance: 0.00
- Occupied Point Section:**
  - Name: (empty)
  - Northing: 0.00
  - Easting: 0.00
  - Elevation: 0.00
- Foresight Point Section:**
  - Name: 1
  - Description: (empty)
  - Style: Default

Buttons on the right side include Apply, Close, Styles..., and Help.

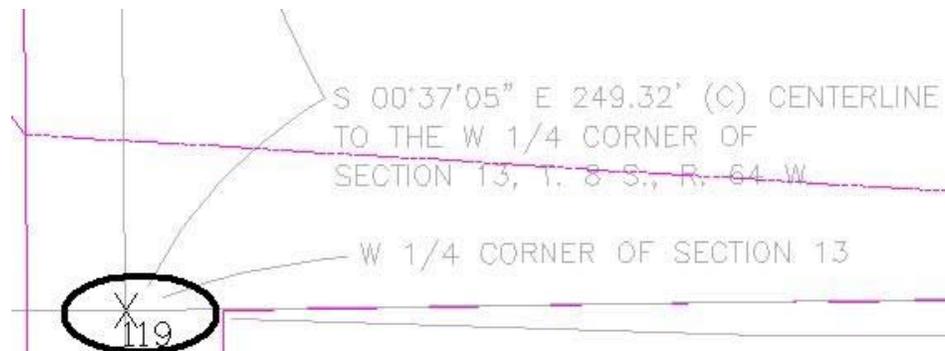
4. Occupied Point: Key-in **105** (the coordinates for point 105 will display)  
or use the *selection* button in conjunction with the geometry *point* snap to graphically select point 105.
5. Course Direction: Key-in **S 0 37 05 E**
6. Course Horizontal Distance: Key-in **2643.99**
7. Foresight Point Name: **119**

**Note:** If point 119 already exists, the next available point number would be used. 119 would not be overwritten.

8. Enter a *description* and choose the appropriate *geometry style*

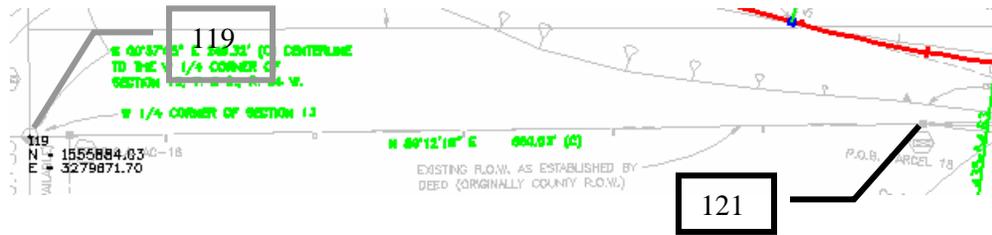
<D> Apply

Point 119 is created and will become the next *occupied* point.

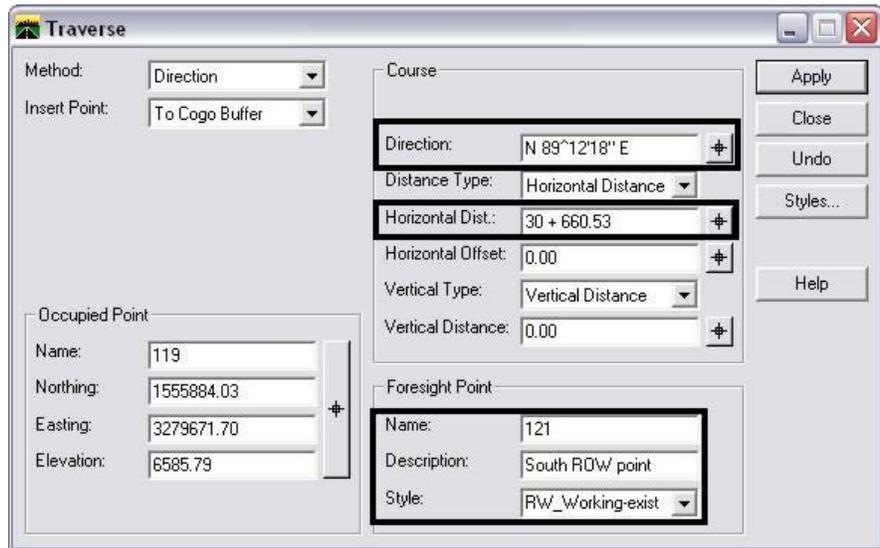


**Note:** A known problem is that the InRoads feed-back pane does not always synchronize correctly. If you do not see newly created geometry here, use **Geometry > Review Geometry Points** to verify point 119 was created.

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  $N 89^{\circ}12'18'' E$ , a distance of 30' (RW width) + 660.53' (ROW length).



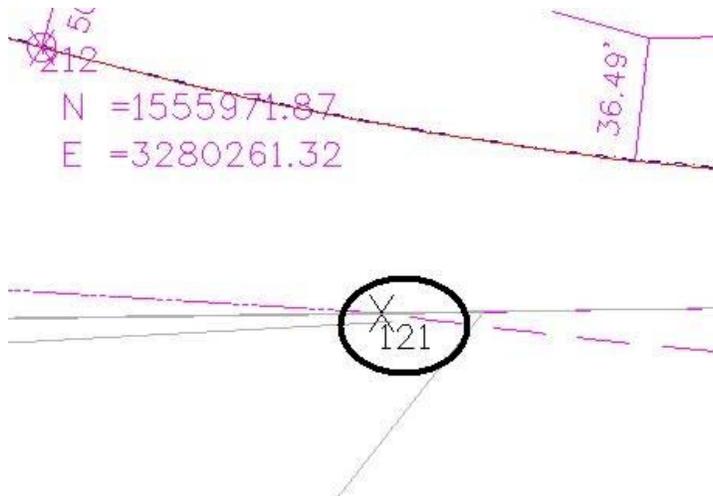
9. Complete the dialog as shown below.



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 +, -, \*, /

10. <D> Apply

Point 121 is created.



## 7. Creating Alignments

### Chapter Introduction

In this chapter you will expand on previous training to create alignments by chaining Cogo points together. This methodology, commonly referred to as the “*PI Method*”, uses the **Geometry>Horizontal Curve Set** tools.

### Lab 14 - Horizontal Alignments from Cogo Points

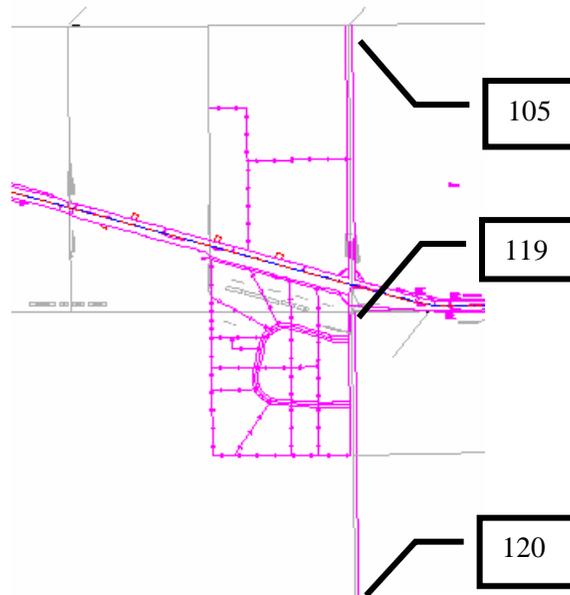
#### Objectives

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

#### Creating a new alignment

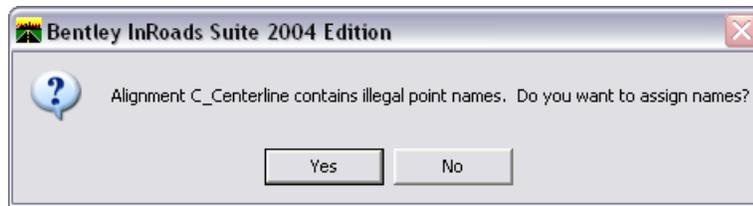
Create an alignment by *chaining* Cogo points 120, 119, and 105 together which represents the west line of section 13.

1. Set the *MicroStation* View to show the subject area.



2. 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.



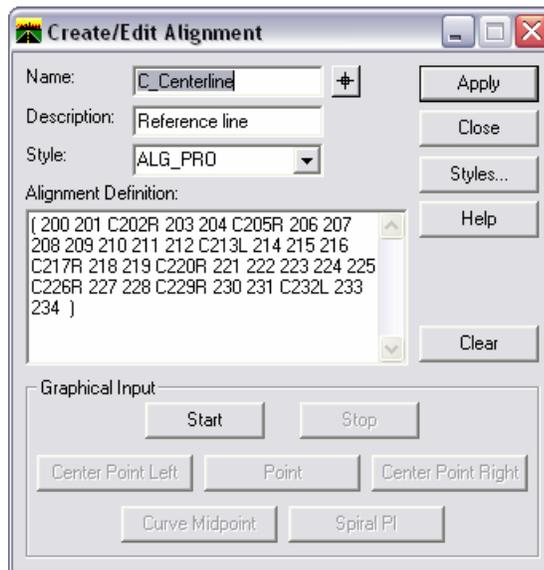
Recall that the alignment C\_Centerline was created with unnamed geometry points (you can verify this with Geometry > Review Horizontal). In a previous exercise the alignment points were written to the Cogo buffer. Doing so created Cogo points for the alignment vertices but did not associate the created 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.

3. For informational purposes, Select <D> Yes

The Create/Edit Alignment dialog opens.



As seen in the dialog above, 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 (**R**ight or **L**eft).

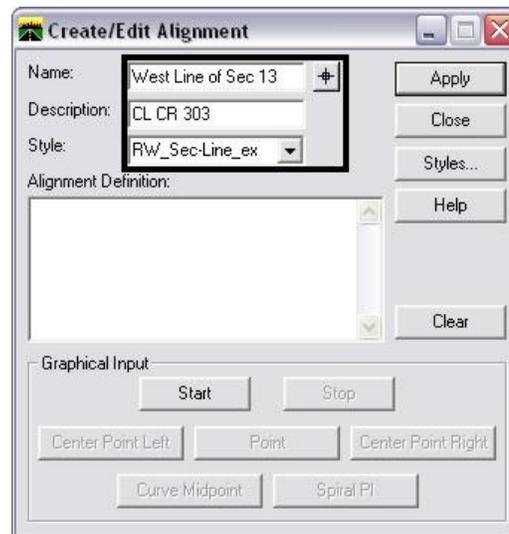
Entering a value in the Name field and pressing [tab] will blank the dialog and allow the creation of a new alignment.

4. Use the following:

- **Name: *West Line of Sec 13***
- **Description: *CL CR 303***

**Note:** In this instance CL CR stands for **C**enter **L**ine of **C**ounty **R**oad 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.

- **Style: *RW\_Sec-Line\_ex***

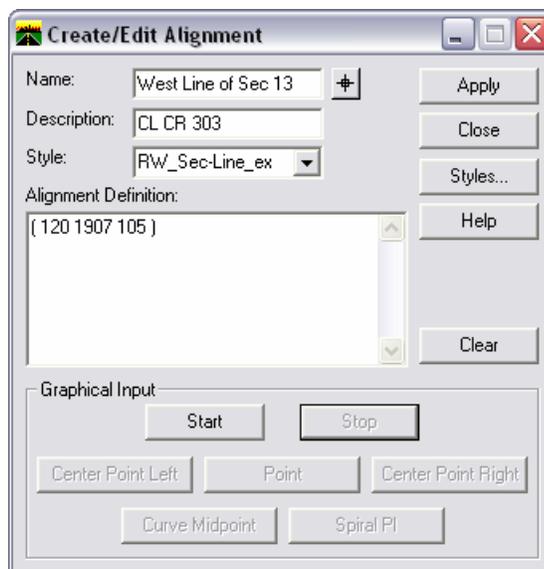
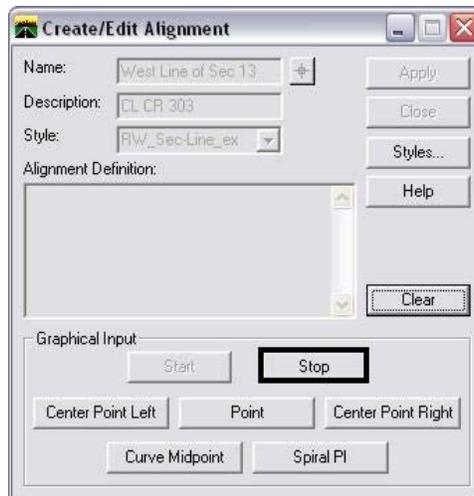


5. <D> Start

The dialog will collapse and you are prompted to **Identify Point**

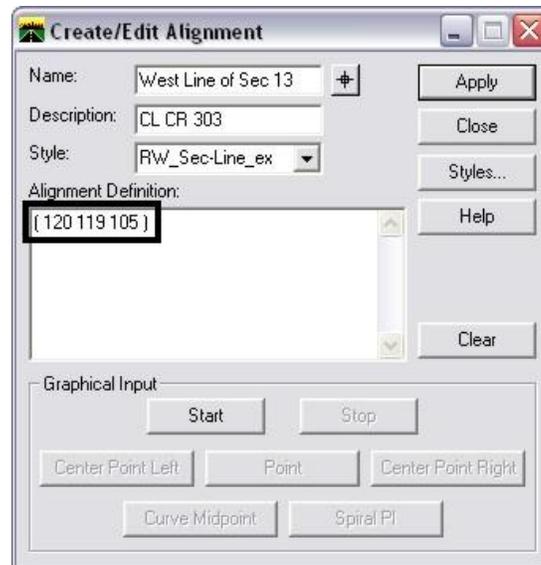
6. <D> near the points on the screen starting on the south end. Continue to graphically select points to define the alignment. Graphics will display showing the alignment location. By default, the alignment will pass through the points nearest the data point **without** the geometry point snap enabled.
7. <R> when finished selecting points graphically, the dialog will redisplay.
8. <D> Stop

The dialog will populate with the Cogo Points selected.

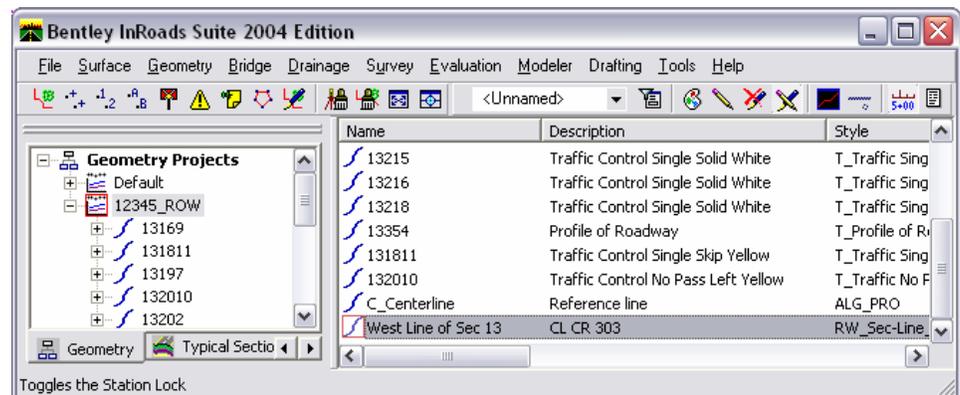


**Note:** Cogo points can be deleted, inserted, cleared, or edited directly in the Alignment definition section of the Create/Edit Alignment dialog. If desired, the entire definition can be input through the use of the keyboard. If using the keyboard, data must be included in parenthesis. Additionally, a space is required adjacent to the parenthesis.

If any points were selected by mistake, they can be edited. Using the cursor and keyboard, simply replace the accidental input(s).



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



**Notes:**

- Alignments are directionally 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

### **Challenge Lab:**

Reopen the dialog for creating alignments by chaining Cogo points:

- Create new alignments
- Experiment with deleting or adding Cogo point numbers in the dialog
- <D> the **Help** button and investigate adding curved elements to an alignment

# Cogo Intersections & Parcels

## Chapter Introduction

The following exercises employ a combination of geometry commands to define the boundary of the Summit Business Park land division and lots.

These will include:

- Establishing Cogo points by intersecting alignments
- Establishing Cogo points by traversing
- Establishing Cogo points by offset intersections
- Establishing the subdivision boundary as an alignment
- Creation of parcel(s) by inputting deed information
- Reviewing parcel closure

## Geometry

All property information that relates to right of way must be created as a component of a geometry project for InRoads to assist in the development of right of way parcels. This includes public land survey lines (section lines), deed limits, existing and proposed right-of-way, easements and other parcel information.

**Essential Concept:** Parcels are simply alignments that are closed.

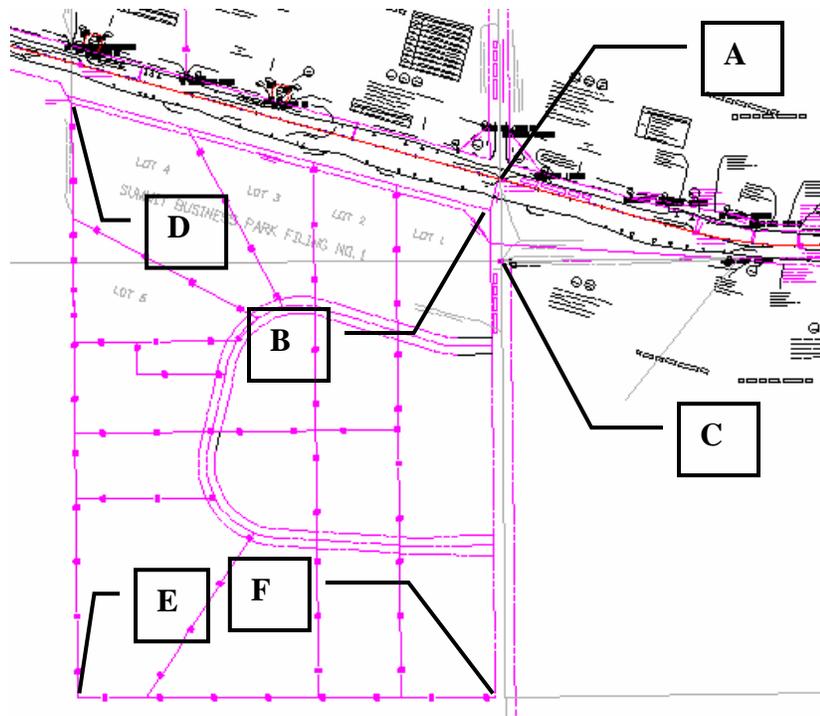
## Lab 15 - Cogo Intersection Commands

### Introduction

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.

In order, create Cogo points for:

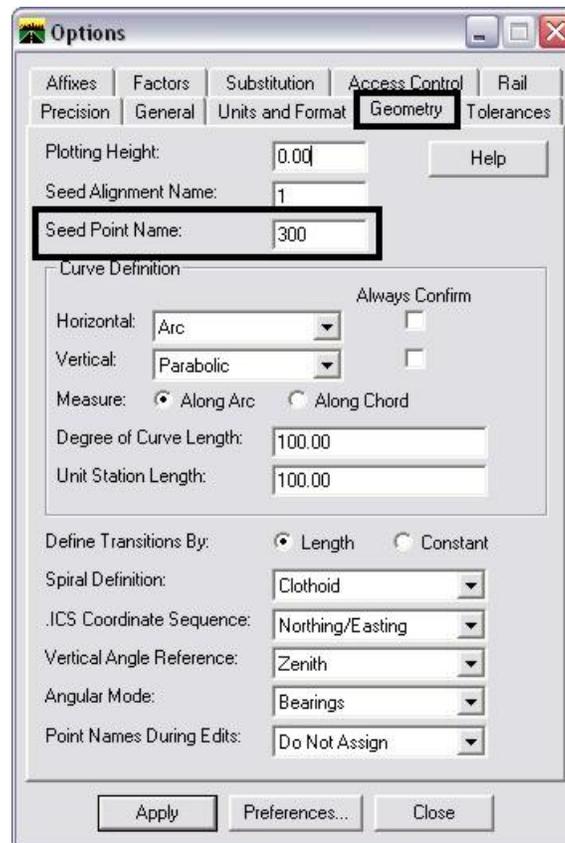
- A) The intersection of the design reference line and the west line of section 13  
*Alignment-Alignment intersection*
- B) The NE corner of Summit Business Park  
*Alignment-Alignment intersection using Offsets*
- C) A right of way point on the east side of County Road 303  
*Direction-Alignment intersection*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



**Before Beginning:**

Grouping Cogo point numbers together is desired. All Cogo points for these exercises are to start with point number 300 and automatically increment.

1. Select **Tools > Options > [Geometry]**
2. Input a Seed Point Name of **300**
3. <D> **Apply**
4. <D> **Close**

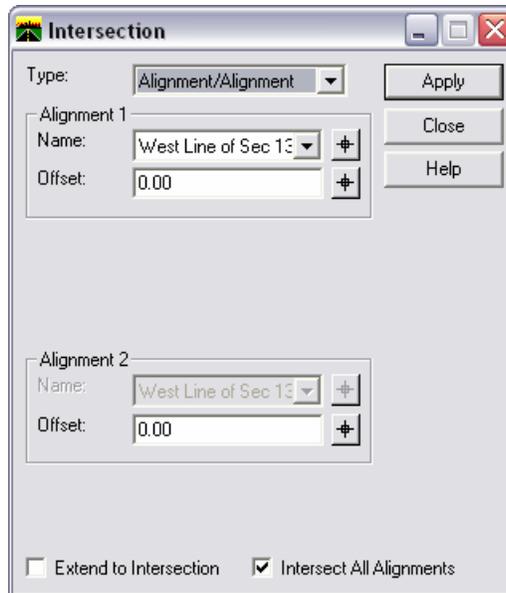
**Exercise A**

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***

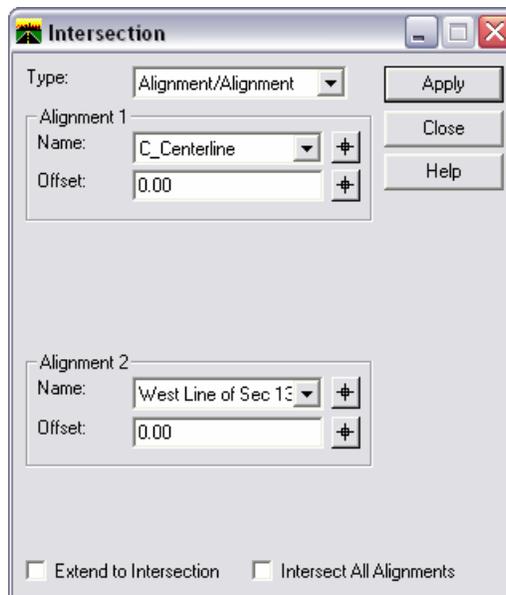
1. Select **Geometry > Locate > Intersection**

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

2. Select **Type: *Alignment/Alignment***



3. *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.

4. <D> **Apply** - a results dialog opens if report lock is enabled.
5. **Key-in a Description**, and choose a **Style** as shown.



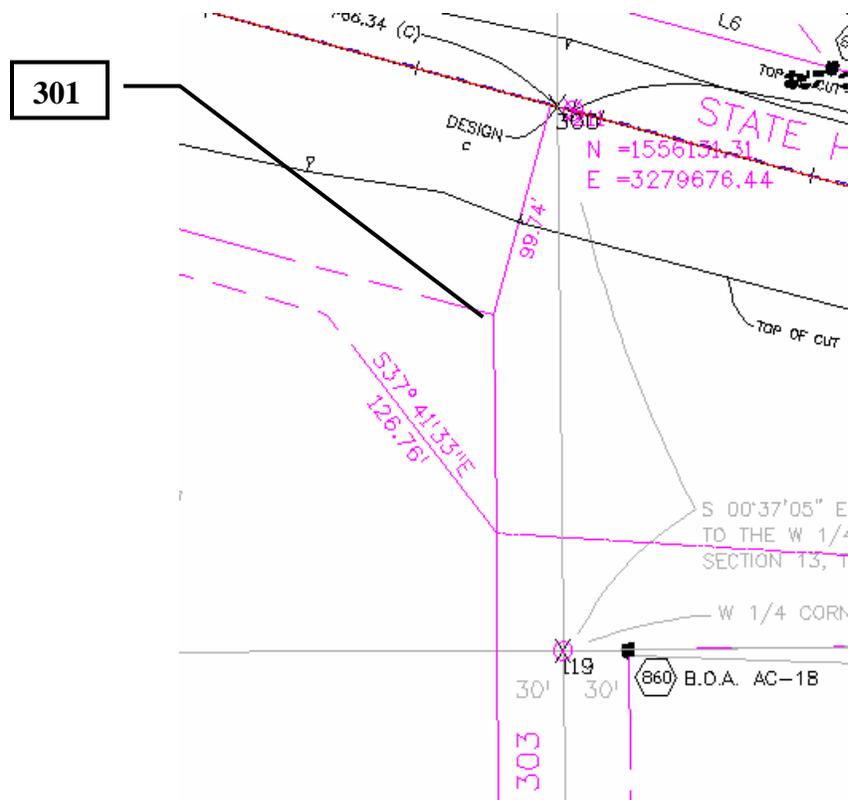
**Note:** If it is possible for the intersection command to provide another solution, selecting the Reject button will display the alternative results. Results are shown numerically in the dialog and dynamically on in the MicroStation screen.

6. <D> **Accept** - a Cogo point is created at the intersection.

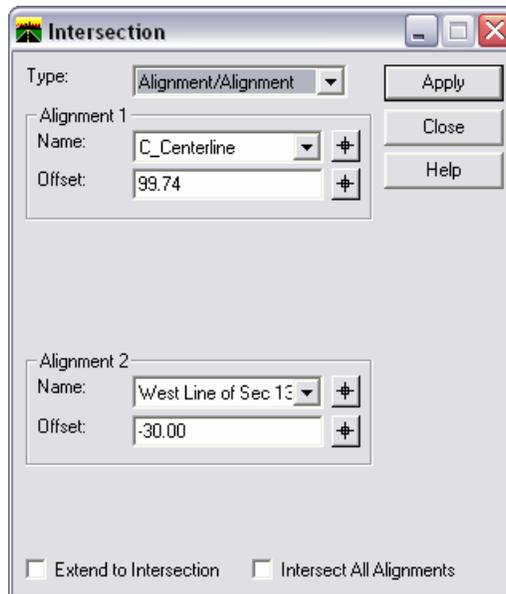


**Exercise B**

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.



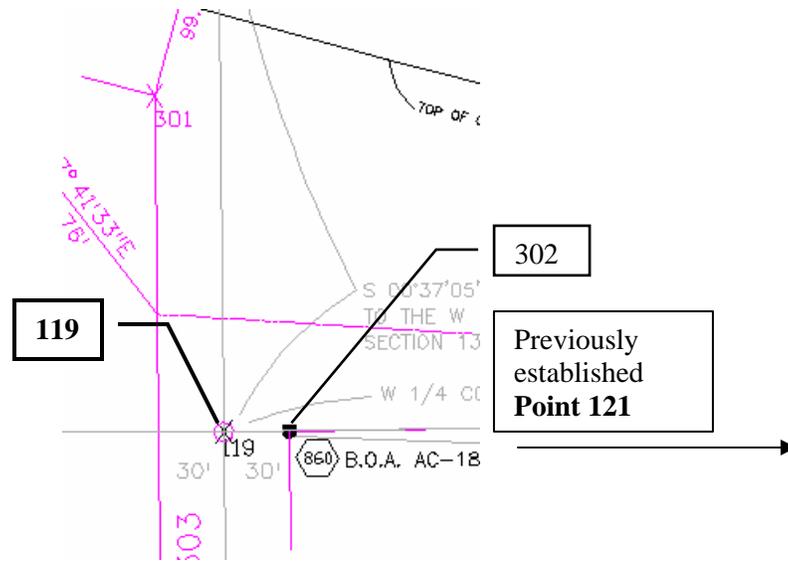
7. Select **Geometry > Locate > Intersection**
8. **Complete** the dialog as shown.





**Exercise C**

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



12. Geometry > Locate > Intersection

13. Complete the dialog as shown below:

Type: **Direction/Alignment**

Name: **119** (origin point)

Direction: **a 119 121** (computes the bearing from point 119 to 121)

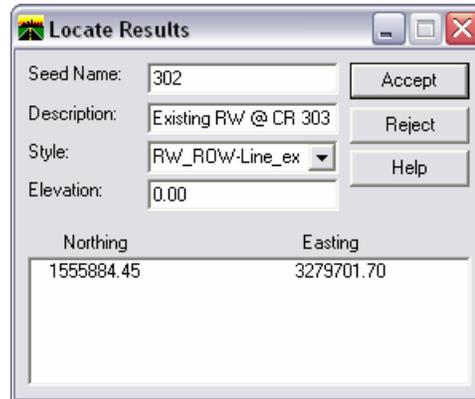
Alignment: **West Line of Section 13**

Offset: **30.00** (to the right - positive)

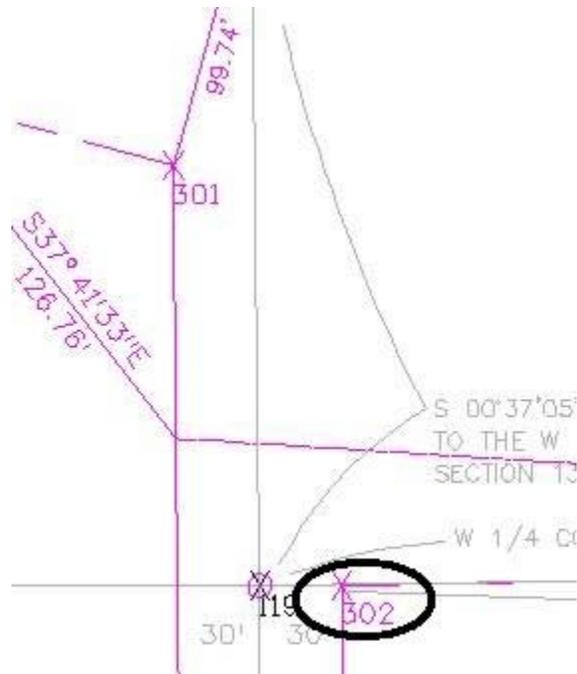
14. <D> **Apply**

The Locate Results dialog appears.

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



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



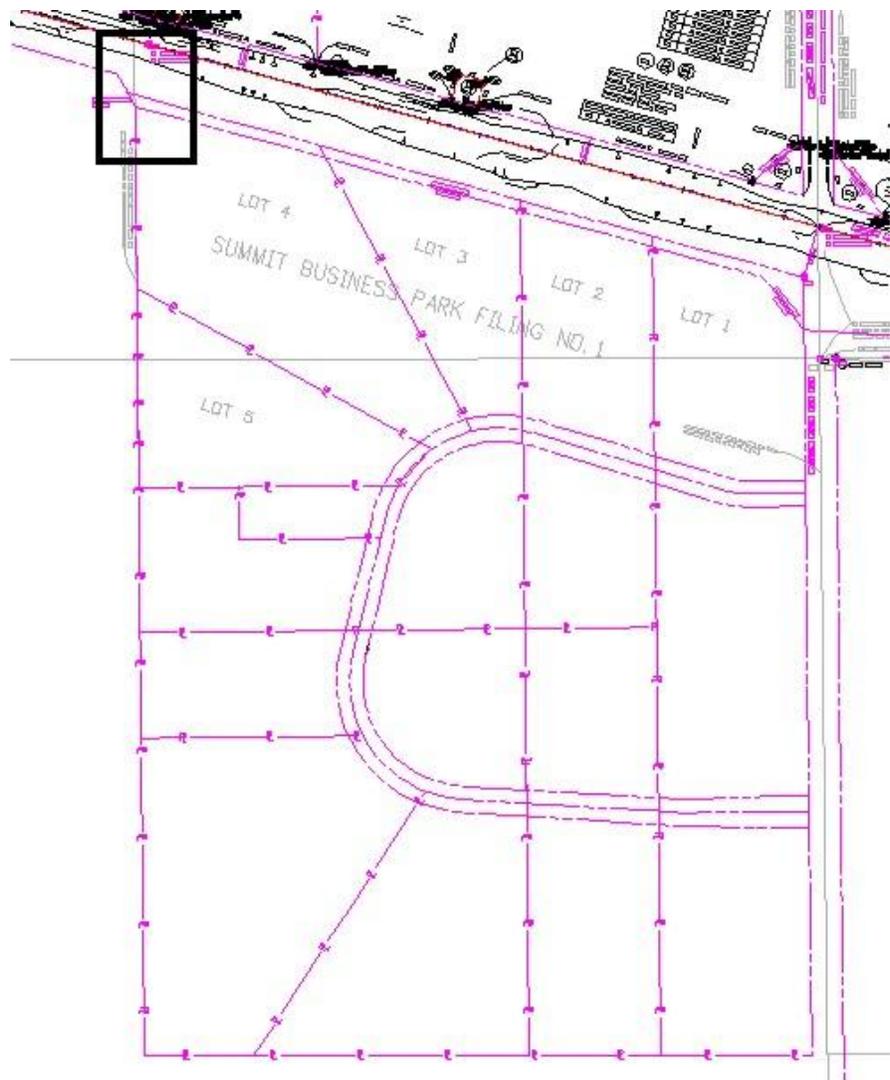
The limits of the adjacent subdivision, Summit Business Park, will be established. We had previously defined the NE corner of the plat at Cogo point 301.

Establishing the plat boundaries will be done in the following order:

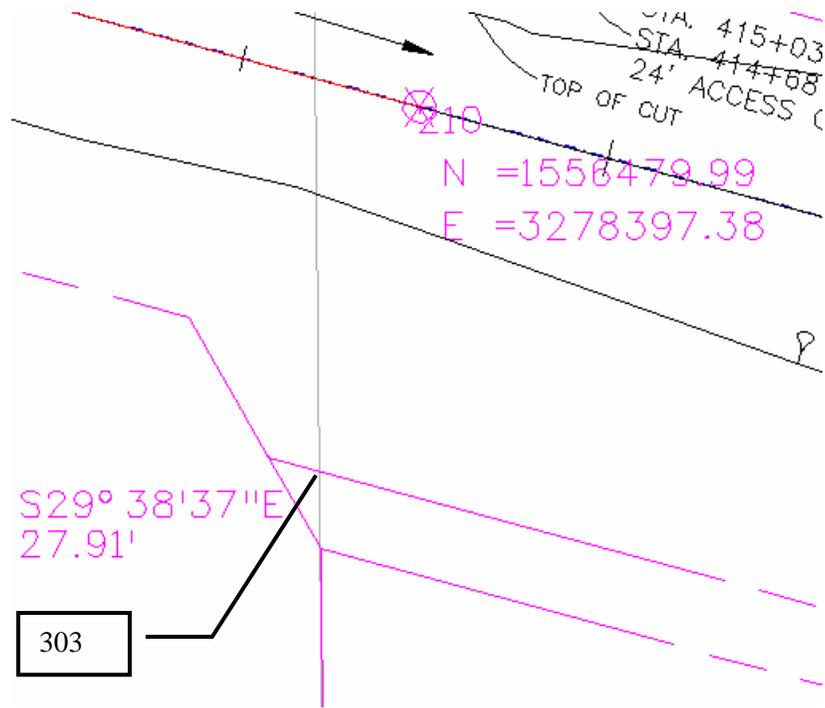
- Establish the NW corner by Station and offset
- Establish the SW corner by bearing & distance
- Establish the SE corner by intersection
- Create an alignment representing the subdivision boundary

### *Exercise D*

1. Use *MicroStation* to view the NW corner of the subdivision



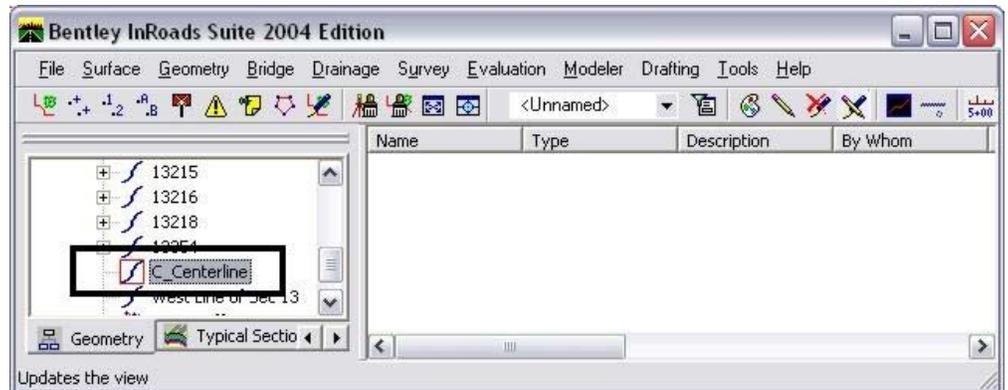
Establish a Cogo point at the NW corner of the subdivision.



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.

2. Set **C\_Centerline** as the *active* horizontal alignment.



3. 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
4. In the **Add As** section: radio button *on Cogo Point*
  5. 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
  6. Key-in a **Seed Name**: **303**
  7. Enter a **Description** and select a **Style** as shown.
  8. Key-in **Station**: **A 414+48.30**
  9. Key-in **Offset** **100.09**
  10. <D> **Apply** - to create the Cogo point.

**Horizontal Events**

Define By: Single Station

Add As:

- Station and Offset
- Northing and Easting
- Cogo Point
- Alignment Point to Cogo

Seed Name: 303

Description: NW Cor SBP

Style: RW\_Property-Esmnt

Add Vertical Event Points

Locate By:

Station: A 414+48.30

Offset: 100.09

Station:

Start: 314+56.59

Stop: C 560+91.01

Offsets:

First: 0.00

Second: 0.00

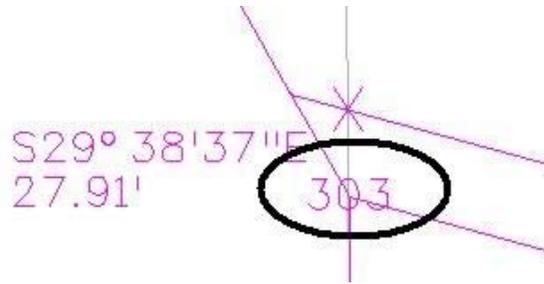
Events:

M..	Station	Offset	Northing	Easting	Elevation	Style
-----	---------	--------	----------	---------	-----------	-------

Buttons: Apply, Close, Help, Edit..., Delete, Report...

11. <D> Close to close the Horizontal Events dialog.

The cogo point is created.



### *Alternative Solution*

Select **Geometry > Cogo Points > New**

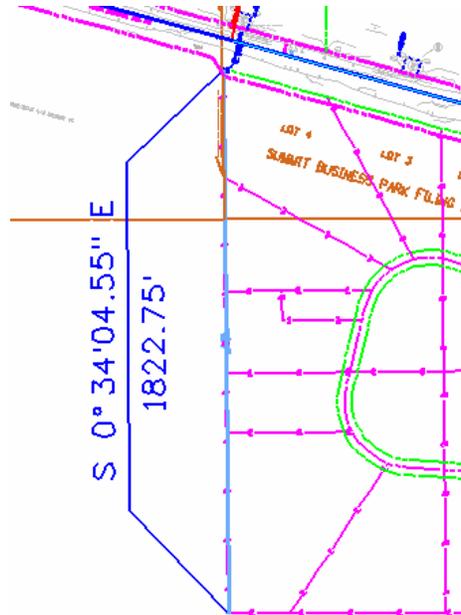
The **Define By** field can be toggled between **Northing/Easting** and **Station/Offset**.

The screenshot shows the 'New Cogo Point' dialog box with the following fields and values:

Field	Value
Define By:	Station/Offset
Name:	303
Northing:	1558514.31
Easting:	3277056.40
Elevation:	0.00
Horizontal Alignment:	C_Centerline
Station:	A 414+48.30
Offset:	100.09
Elevation:	0.00
Description:	NW Cor SBP
Style:	RW_ROW-Line_ex

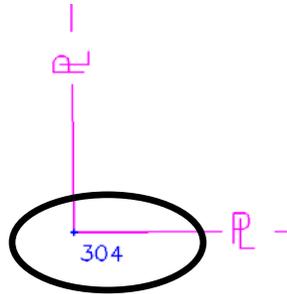
**Exercise E**

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.



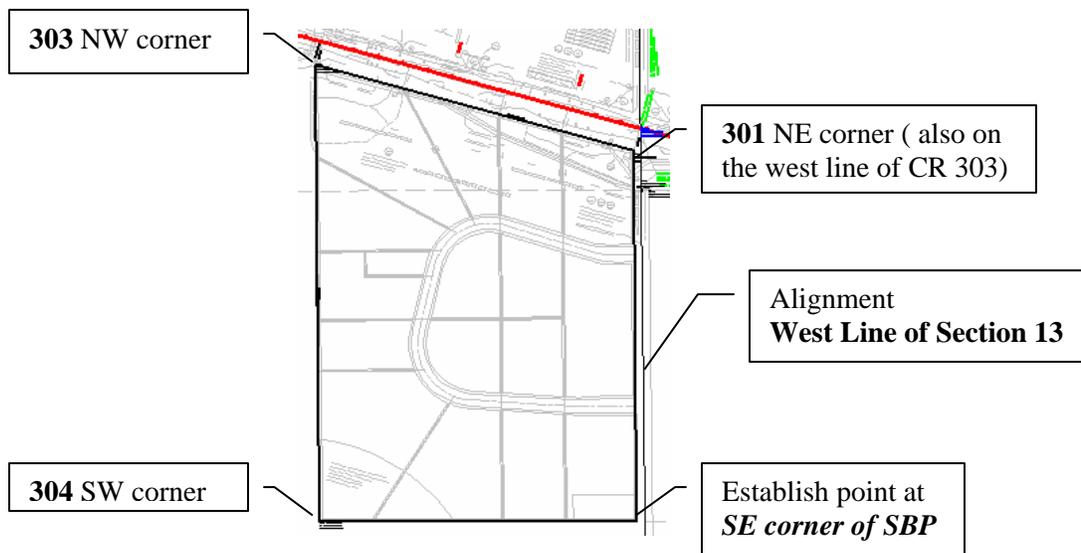
1. Select **Geometry > Traverse**
2. **Input** the data values as shown below.

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



***Exercise F***

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

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

5. 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.

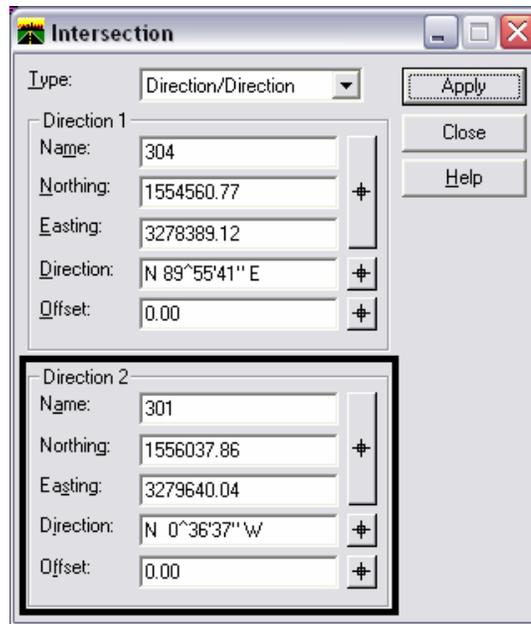


Turn this lock off after use.

#### Direction 2

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

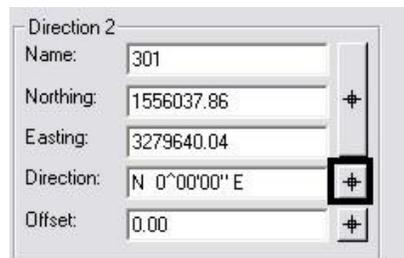
**Note:** The *Angular Precision* set by **Tools > Options > [Precision]** affects the display of **Direction** input fields throughout *InRoads*. CDOT Preferences set the *Angular Precision* to 0, therefore an input of N 0 36 36.66 W will be reformatted by *InRoads* as N 0 36 37 W. The actual input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



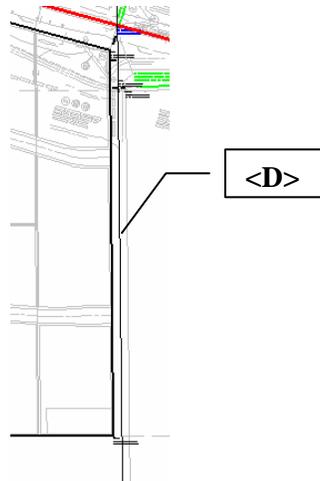
**Note:** The selection button on the dialog can be used to populate the **Direction** field.

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

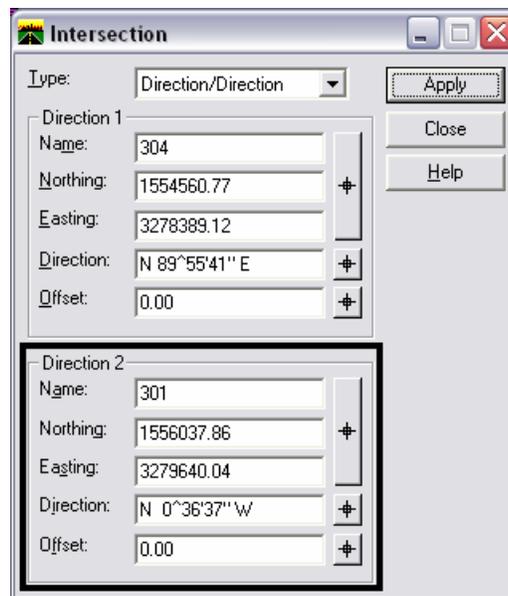
To use the selection button for direction definition:



- 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.



The screenshot shows the 'Intersection' dialog box with the following fields:

Type:	
Type:	Direction/Direction
Apply	
Direction 1	
Name:	304
Northing:	1554560.77
Easting:	3278389.12
Direction:	N 89°55'41" E
Offset:	0.00
Direction 2	
Name:	301
Northing:	1556037.86
Easting:	3279640.04
Direction:	N 0°36'37" W
Offset:	0.00
Close	
Help	

6. Make sure both offsets are set to **zero**
7. <D> **Apply**

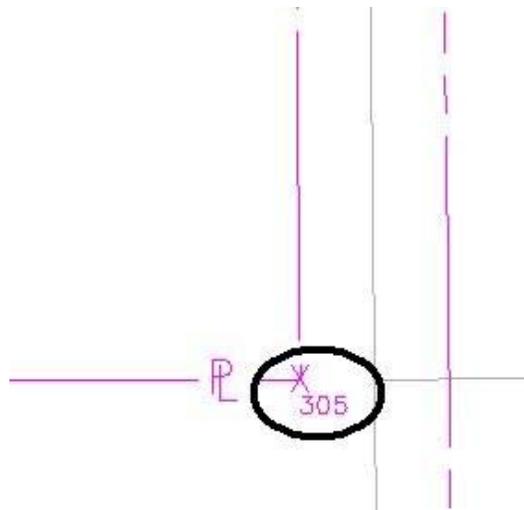
The Locate Results dialog appears.

**Enter:**

- Seed Name: **305**
- Description: **SE Cor SBP @ CR 303**
- Style: **RW\_ROW-Line\_ex**



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



9. Toggle the geometry snap *Off*



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

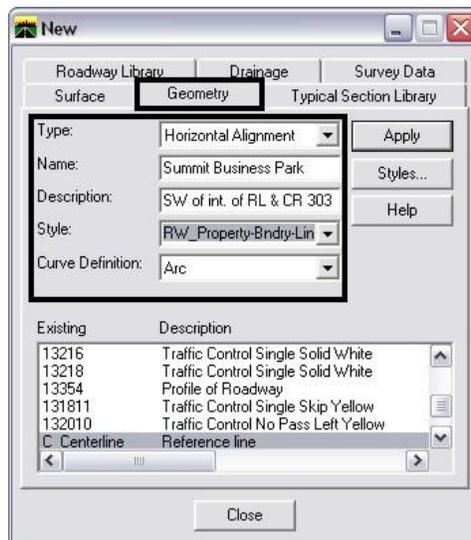
## Lab 16 - Creating a Closed Alignment

### Introduction

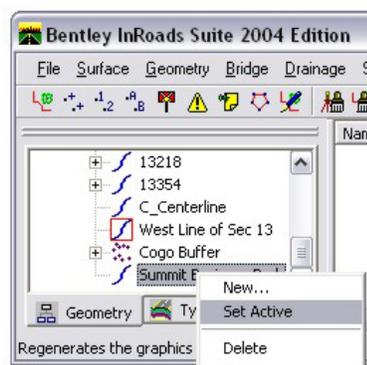
The plat of Summit Business Park has the 4 corners defined by Cogo points. Creating a closed alignment using the PI Method to represent the boundary of the plat will facilitate right of way creation.

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

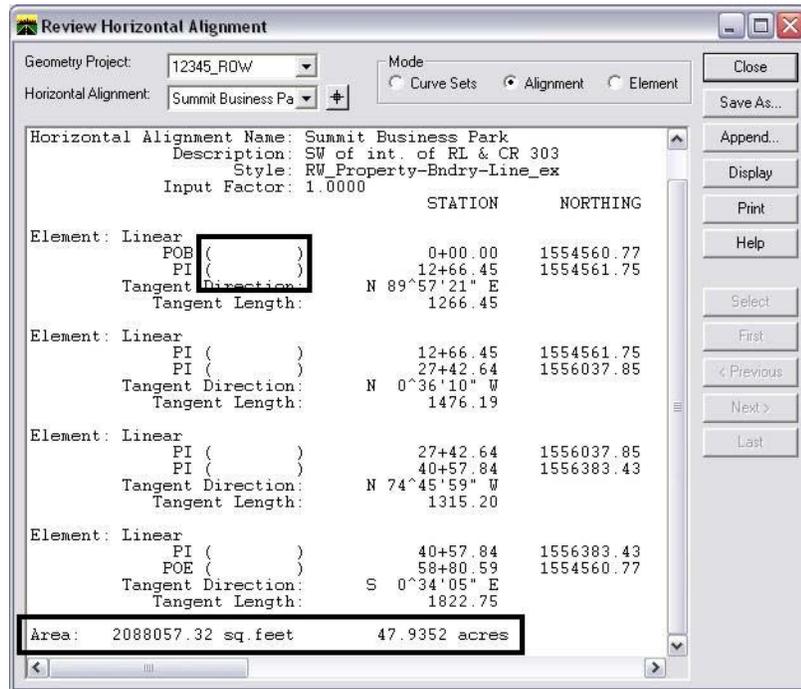
16. <D> near the **NW** corner of the Plat

17. <D> near the **SW** corner of the plat (defines the POE)

18. <R> to cancel point selection, <R> to terminate the command

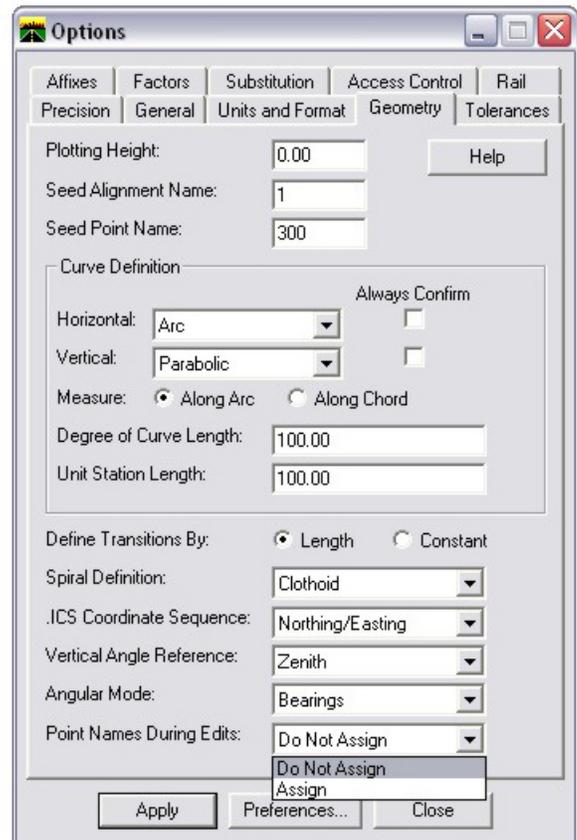
19. Toggle **Off** the geometry point snap 

20. Select **Geometry > Review Horizontal** to verify the contents of the alignment.



Notice the lack of point names (or Cogo numbers) in the parentheses. Also note the parcel area information is displayed.

The population of the name/number field is contingent on the settings under **Tools > 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.

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

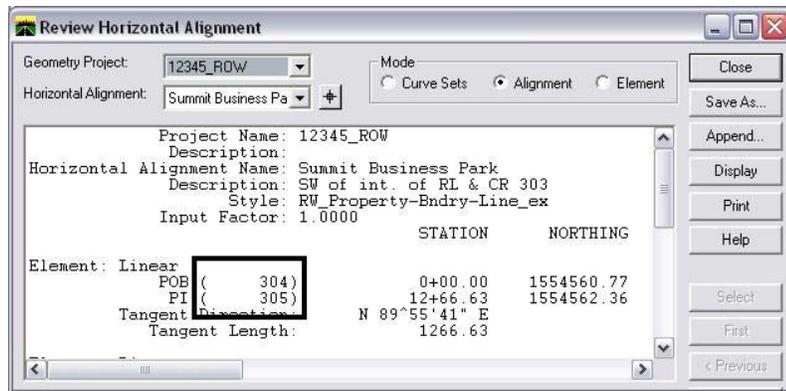


22. <D> Yes



The alignment is associated with the selected Cogo Points.

23. Edit points as necessary.
24. <D> **Apply** – verify results by reviewing the alignment.



## Lab 17 - Parcel Creation by Deed

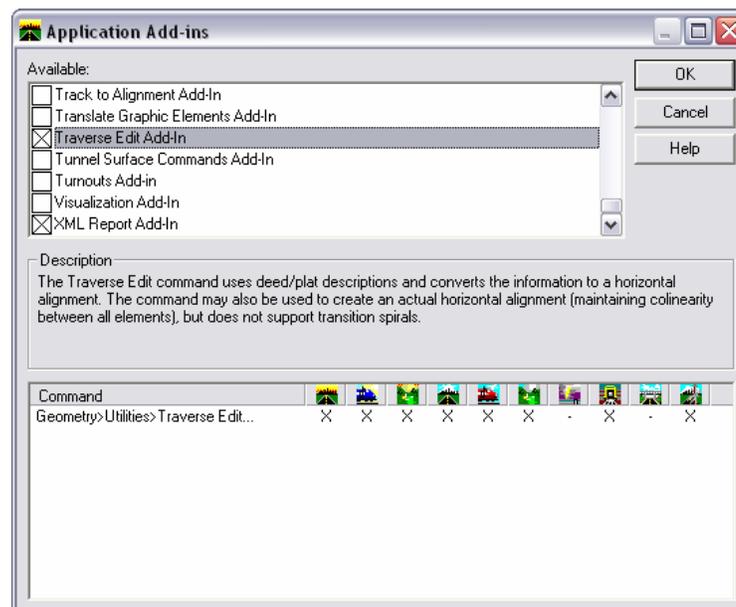
### Introduction

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.



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 another 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.

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



Before using the Traverse Edit command, create an alignment to store Lot number 1.

4. **File > New > [Geometry]**

Select the Geometry tab and input:

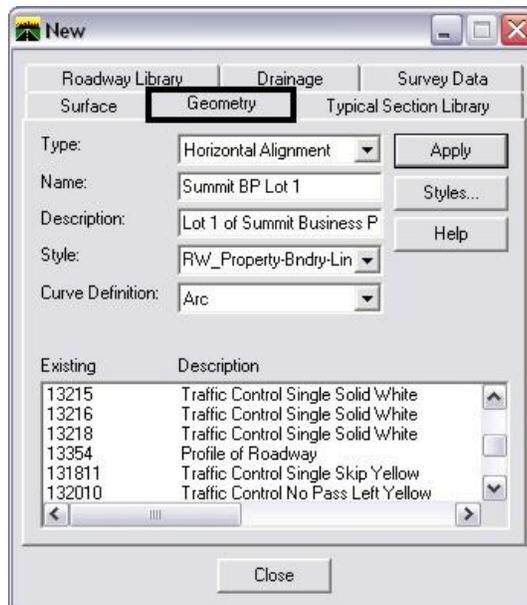
5. **Type: *Horizontal Alignment***

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***

The Traverse Edit dialog opens.

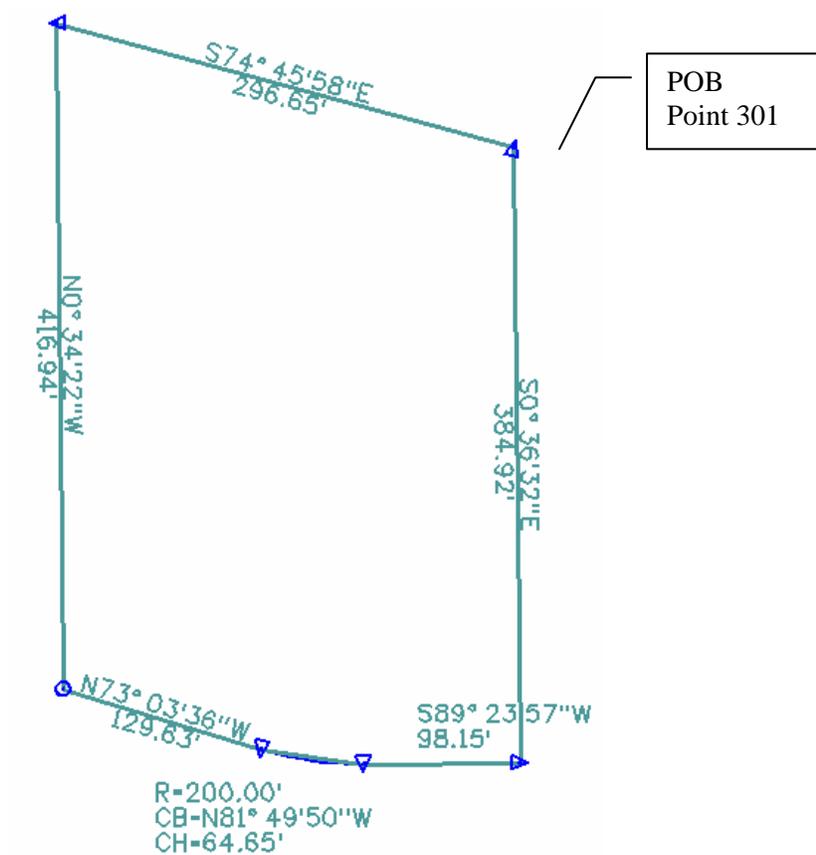
11. **Set the fields for the *Geometry Project* and *Horizontal Alignment***

12. **Key-in : *301* for the *Starting Point* (Cogo point 301 is located at the NE corner of lot 1).**

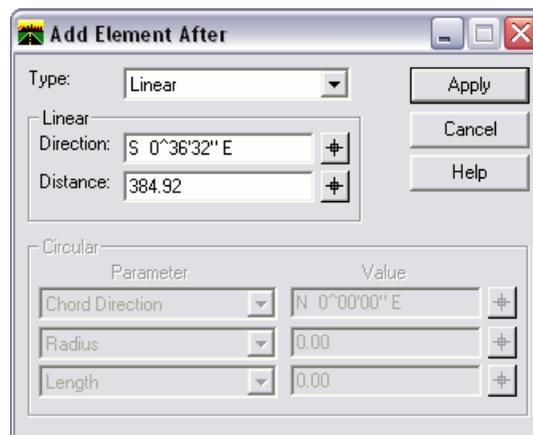
**Lot 1 is described as:**

Commencing at the West  $\frac{1}{4}$  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.



13. <D> the **Add After** button on the Traverse Edit dialog.
14. Set **Type: Linear**
15. Input the **Direction** and **Distance** for the first course as shown.



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

Traverse

Type	Direction	Distance	Radius	Length
Linear	S 0°36'32" E	384.92		

Maintain Tangency

Add Before... Add After... Edit... Delete

17. **Input** the second Course.

Add Element After

Type: Linear

Linear

Direction: S 89°23'57" W

Distance: 98.15

Circular

Parameter	Value
Chord Direction	N 0°00'00" E
Radius	0.00
Length	0.00

Apply  
Cancel  
Help

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

Traverse

Type	Direction	Distance	Radius	Length
Linear	S 0°36'32" E	384.92		
Linear	S 89°23'57" W	98.15		

Maintain Tangency

Add Before... Add After... Edit... Delete

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

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

Type	Direction	Distance	Radius	Length
Linear	S 0°36'32" E	384.92		
Linear	S 89°23'57" W	98.15		
Circular	N 81°49'50" W	64.65	200.00	64.93

Notice as courses are entered, the parent dialog displays closure results.

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

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

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

Review Closure Results in the parent dialog.

**Traverse Edit**

Geometry Project: 12345\_ROW

Horizontal Alignment: Summit BP Lot 1

Starting Point

Name:

Northing: 1556037.86

Easting: 3279640.04

Closure Results

Northing Error: 0.00

Easting Error: 0.00

Closing Direction: N 75°09'07" E

Closing Distance: 0.00

Closed Area: 117631.18

Perimeter: 1391.22

Precision: 289118.46

Buttons: Apply, Cancel, Adjustments..., Report..., Help

Traverse

Type	Direction	Distance	Radius	Length
Linear	S 0°36'32" E	384.92		
Linear	S 89°23'57" W	98.15		
Circular	N 81°49'50" W	64.65	200.00	64.93
Linear	N 73°03'36" W	129.63		
Linear	N 0°34'22" W	416.94		
Linear	S 74°45'58" E	296.65		

Maintain Tangency

Buttons: Add Before..., Add After..., Edit..., Delete

24. <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.

Notice 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 incorrect chord distance, <D> **Apply**

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

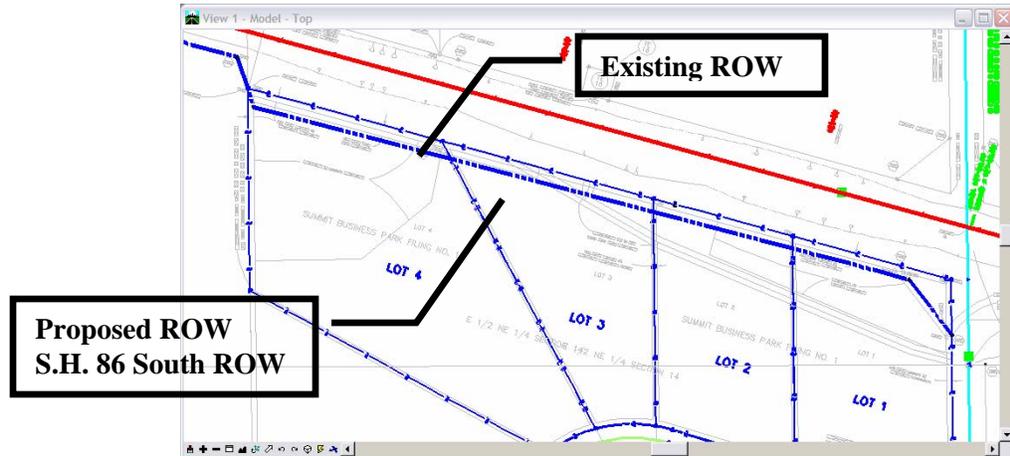
Unadj. Direction	Unadj. Dis...	Adj. Direction	Adj. Dista...	Latitude	Departure	Delta
S 0°36'32\" E	384.92	S 0°35'50\" E	384.91	-384.89	4.01	0.01
S 89°23'57\" W	98.15	S 89°24'03\" W	98.17	-1.03	-98.16	0.01
N 81°49'50\" W	64.37	N 81°49'50\" W	64.38	9.15	-63.73	0.02
N 73°03'36\" W	129.63	N 73°03'43\" W	129.66	37.77	-124.03	0.02
N 0°34'22\" W	416.94	N 0°35'04\" W	416.95	416.93	-4.25	0.03
S 74°45'58\" E	296.65	S 74°45'53\" E	296.59	-77.94	286.17	0.04

- **Select** the appropriate Method
- <D> **OK** to apply the selected adjustment

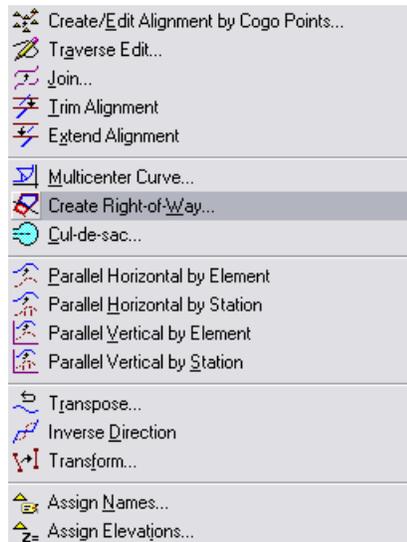
Notice the columns for Unadjusted and Adjusted values. As the various radio buttons for method are selected, the adjusted values update providing a preview of potential solutions.

## Lab 18 - Right of Way Parcels

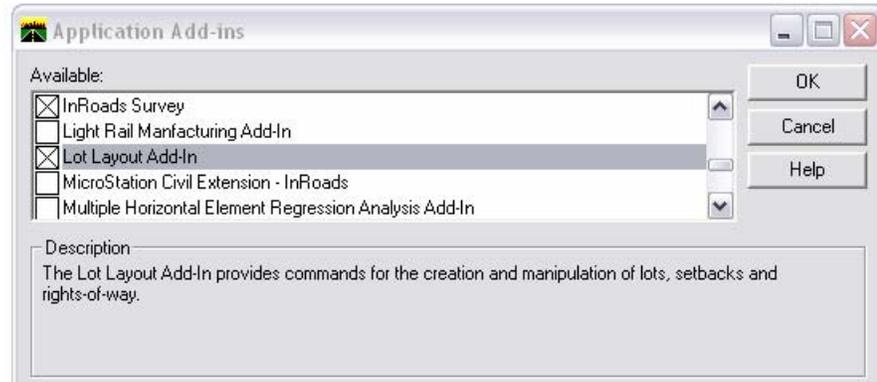
InRoads has a utility to create additional parcels (closed alignments) from existing parcels and crossing alignments. As illustrated below, lots 1-4 have been created and the proposed right of way indicates required right of way acquisition along the northerly limits of the lots.



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.

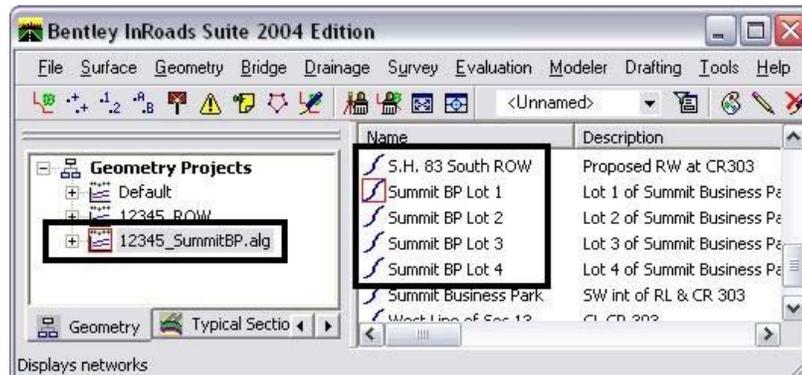
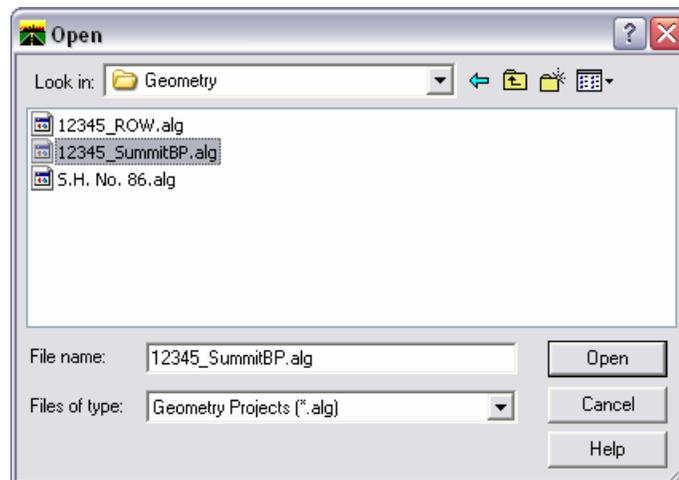


If you do not see the **Create Right-of-Way** option, go to **Tools > Applications Add-Ins** and activate *Lot Layout Add-In*.



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:**

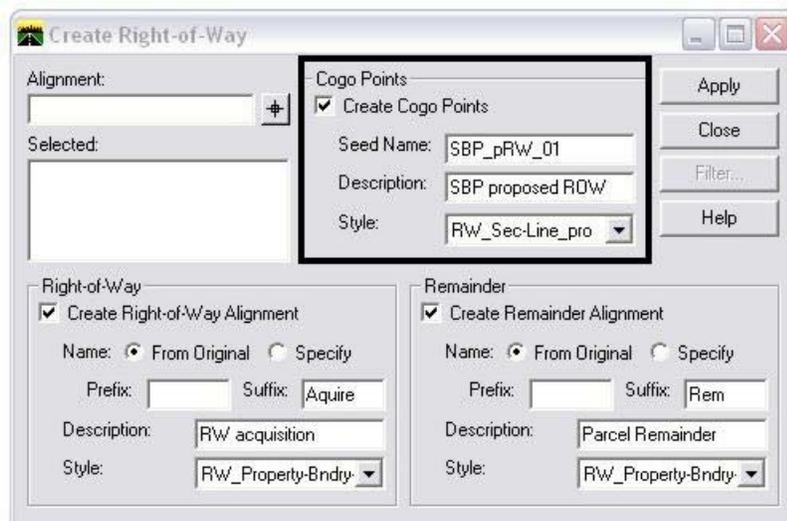
**Alignment** (selected) - Original parcels impacted by ROW acquisition

**Cogo Points** - If enabled, will create Cogo points at the intersection of the proposed right of way and existing lot lines

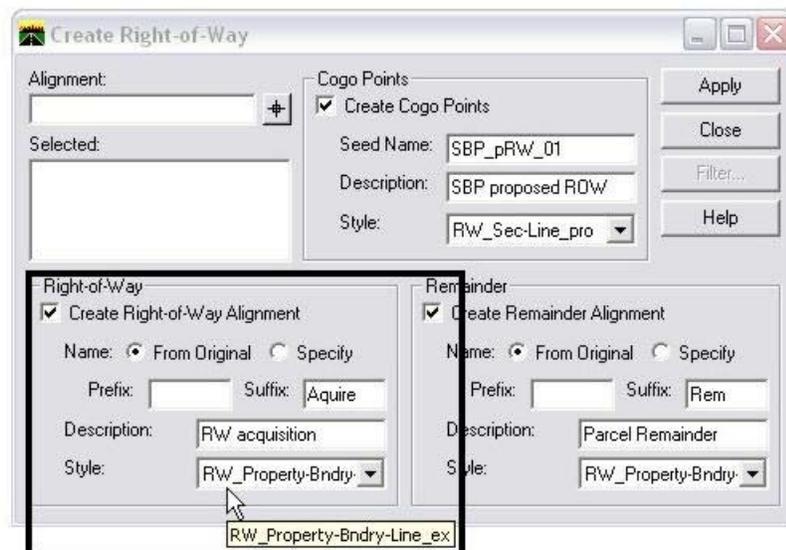
**Right of Way** - If enabled, creates parcels representing the acquisition area

**Remainder** - If enabled, creates parcels representing the remainder of the selected lots

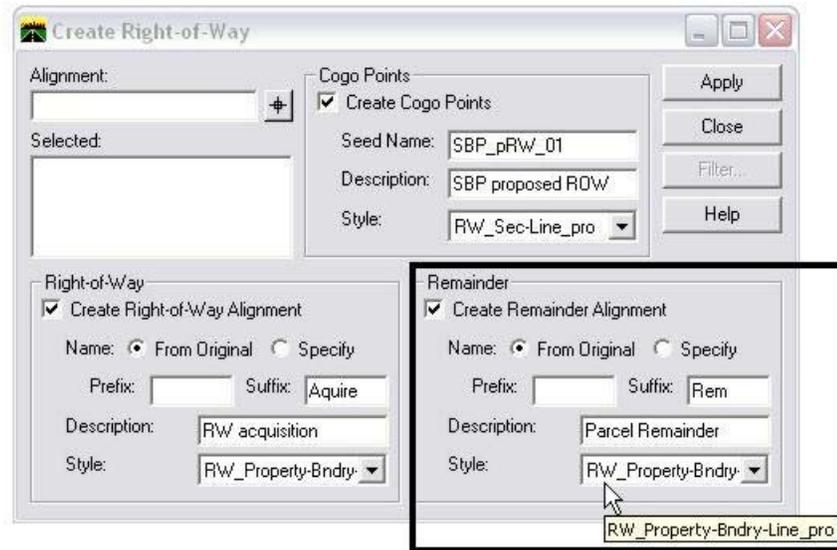
4. Complete the **Cogo Points** section as shown.



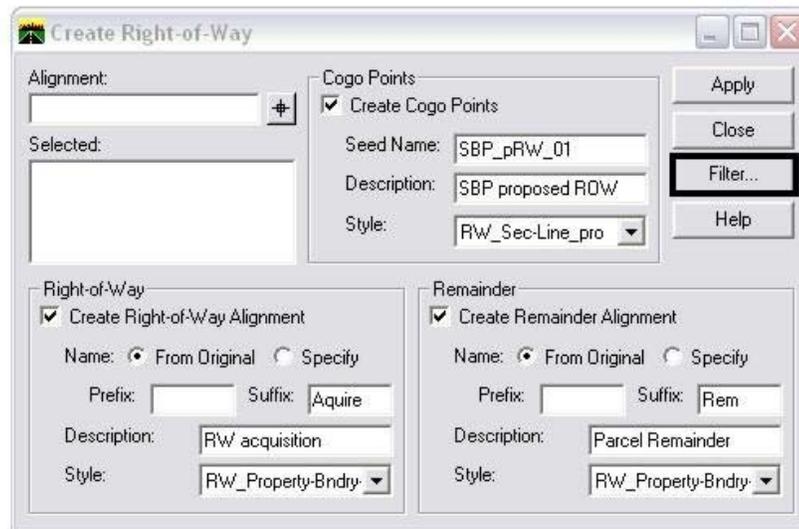
5. Complete the **Right-of-Way** section as shown.



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



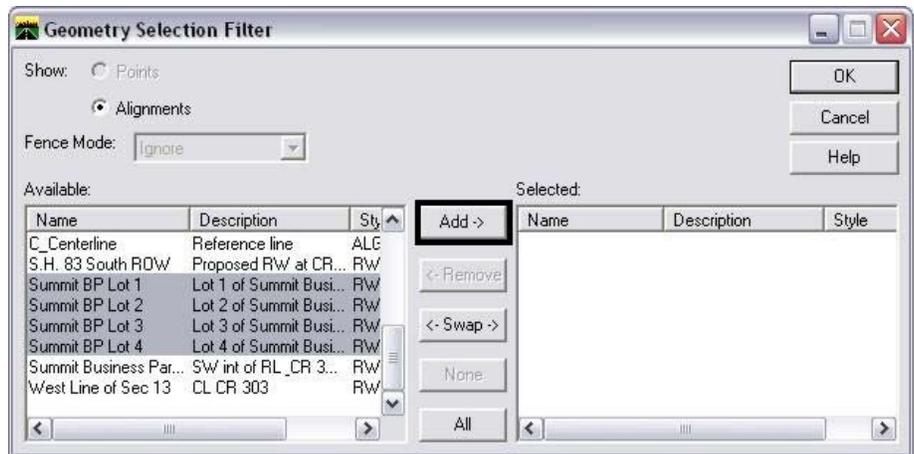
7. <D> on the Filter button.



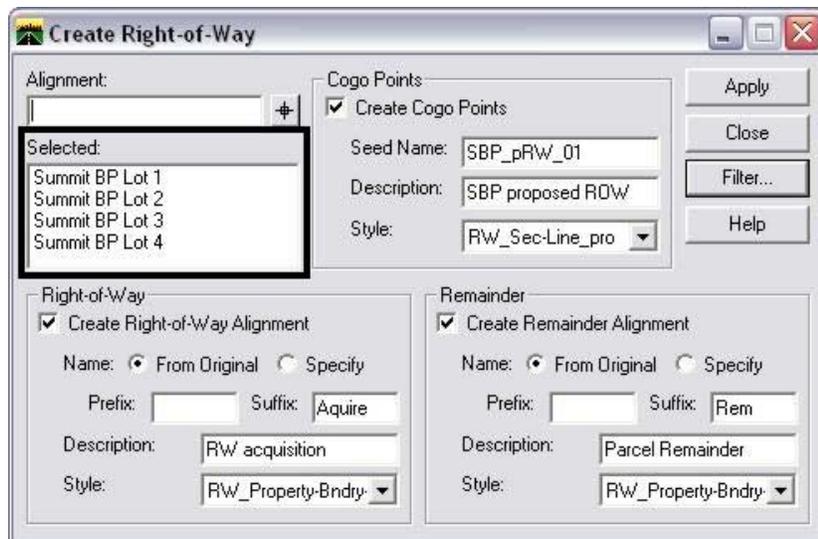
8. Under the Available column, select **Summit BP Lot 1-4**.

9. <D> the Add button.

10. <D> OK

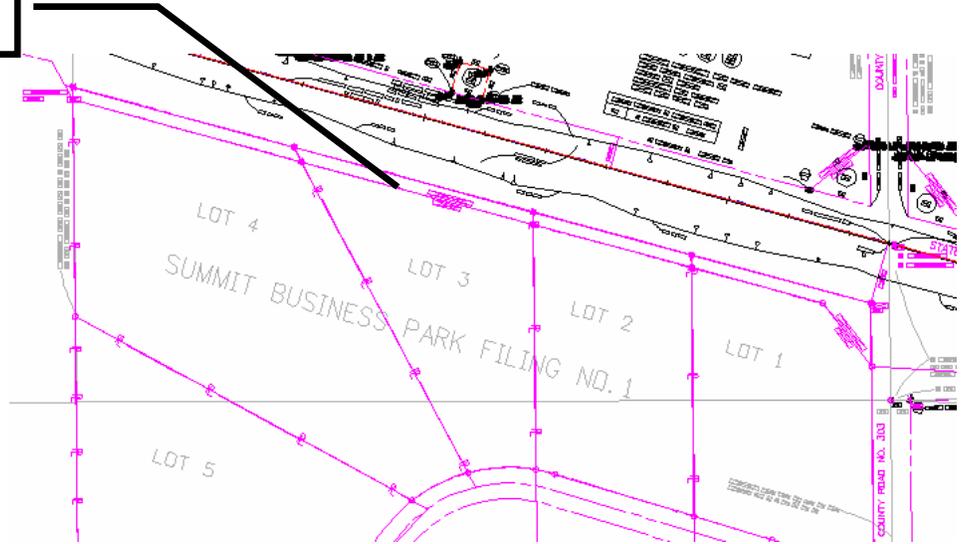


The parcels are added to the list.



11. <D> **Apply** - you are prompted to identify the Right of Way Alignment.
12. <D> on the alignment **S.H. 86 South ROW** - parcel previews will highlight.

S.H. 86 South ROW



13. <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

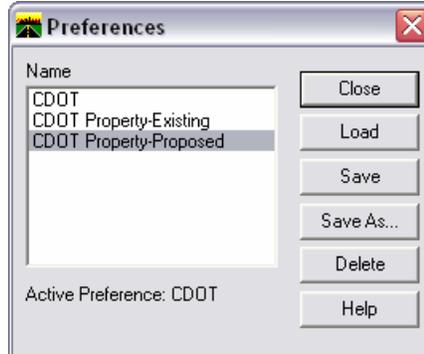
The screenshot shows the Bentley InRoads Suite 2004 Edition software interface. The project tree on the left lists various acquisition parcels, with 'Summit BP Lot 1 Acquire' through 'Summit BP Lot 4 Rem' highlighted. The main window displays a data table with the following columns: Name, Northing, Easting, Elevation, and Description.

Name	Northing	Easting	Elevation	Description
*100	1558457.41	3269295.23	6654.37	Section C
*102	1558430.90	3266629.98	6654.37	Quarter 5
*103	1555770.83	3266639.57	6615.17	Quarter 5
*104	1555781.53	3269304.03	6627.27	Quarter 5
*105	1558527.87	3279643.18	6585.79	Section C
*106	1558562.81	3282329.69	6505.88	Quarter 5
*107	1555920.99	3282335.45	6545.91	Quarter 5
*108	1555884.03	3279671.70	6623.76	Quarter 5
*117	1558514.31	3277056.40	50000.00	N 1/4 Cor
*119	1555884.03	3279671.70	6585.79	W 1/4 Cor
*120	1553239.97	3279699.86	0.00	SW Cor 5

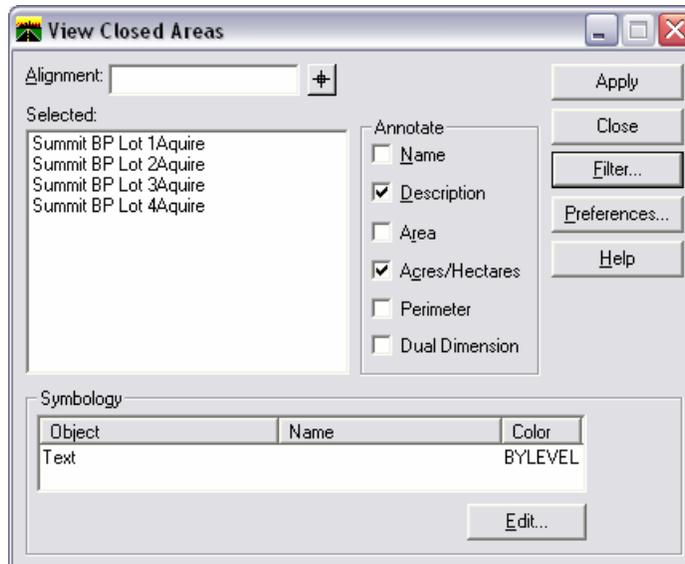
## Lab 19 - Annotation of Closed Parcels

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

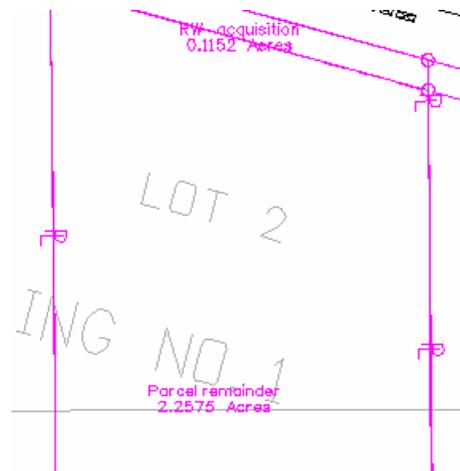
1. Select **Geometry > View Geometry > Closed Areas**
2. <D> the **Preferences** button.
3. Load the settings for proposed parcels.



4. Define the acquisition parcels for annotation (use the filter).
5. Toggle **On** the desired information in the **Annotate** section, <D> **Apply**



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

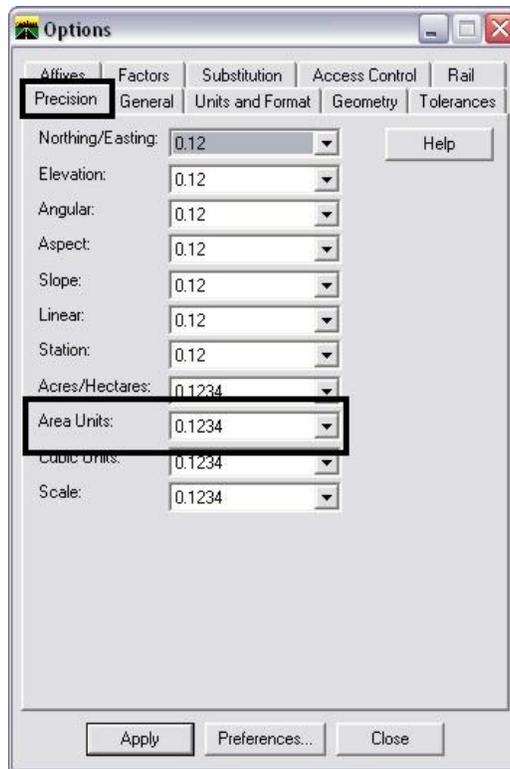


7. Toggle on **all** the **Annotate** radio buttons, <D> **Apply** - the graphics refresh.

Summit BP Lot 4Rem  
Parcel remainder  
209096.61 Sq. Ft. ( 19425.79 Sq. M. )  
4.8002 Acres ( 1.9426 Hectares )  
1995.10 FT. ( 608.11 M. )

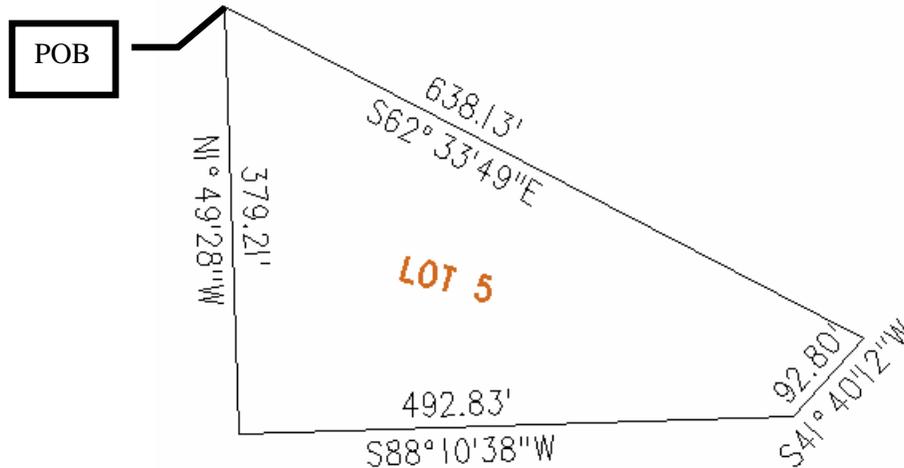
**Notes:**

- Annotation will only be applied to alignments that are closed. Parcels that have closure errors are ignored
- There are saved preferences in the **View Closed Area** dialog for existing vs. proposed annotation
- The number of decimal places carried out in the annotation is controlled by **Tools > Options** on the **Precision** tab
- Selecting the **Dual Dimension** radio button will annotate in both square feet and square meters



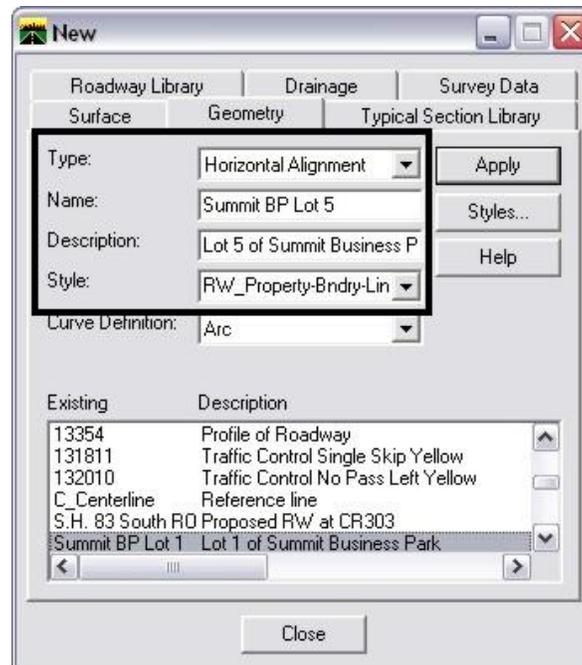
**Challenge Exercise – Transforming a parcel**

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.

**Traverse Edit**

Geometry Project: 12345\_SummitBP

Horizontal Alignment: Summit BP Lot 5

Starting Point

Name:

Northing: 1556000.00

Easting: 3277600.00

Closure Results

Northing Error: 0.00

Easting Error: 0.00

Closing Direction: N 0^00'00'' E

Closing Distance: 0.00

Closed Area: 0.00

Perimeter: 0.00

Precision: 0.00

Traverse

Type	Direction	Distance	Radius	Length
------	-----------	----------	--------	--------

Maintain Tangency

Add Before... Add After... Edit... Delete

Apply Cancel Adjustments... Report... Help

3. Select **Add After** and input:

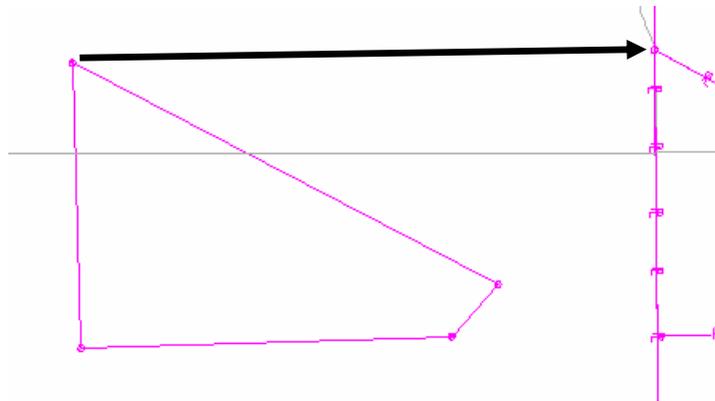
**S 62-33-49 E, 638.13**

**S 41-40-12 W, 92.80**

**S 88-10-38 W, 492.83**

**N 01-49-28 W, 379.21**

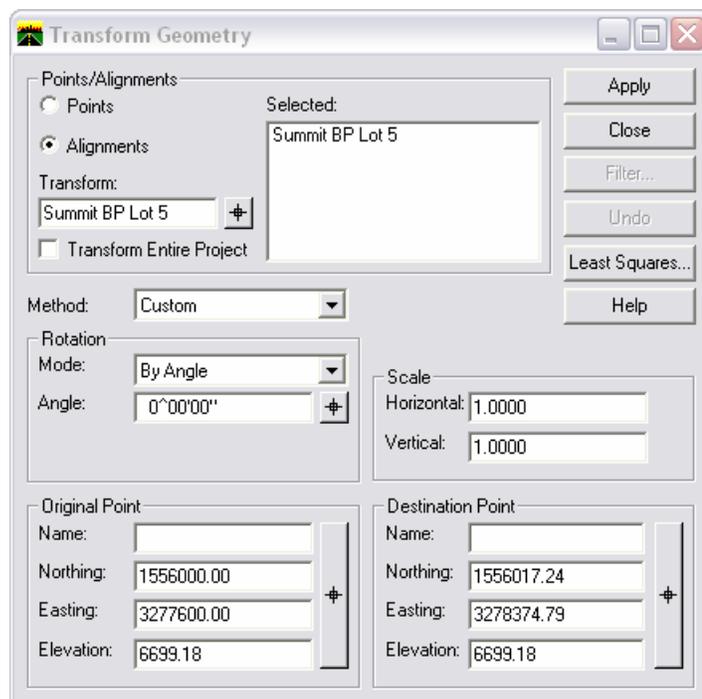
4. **<D> Apply** to create the parcel once all courses have been entered and verified by reviewing the closure results.



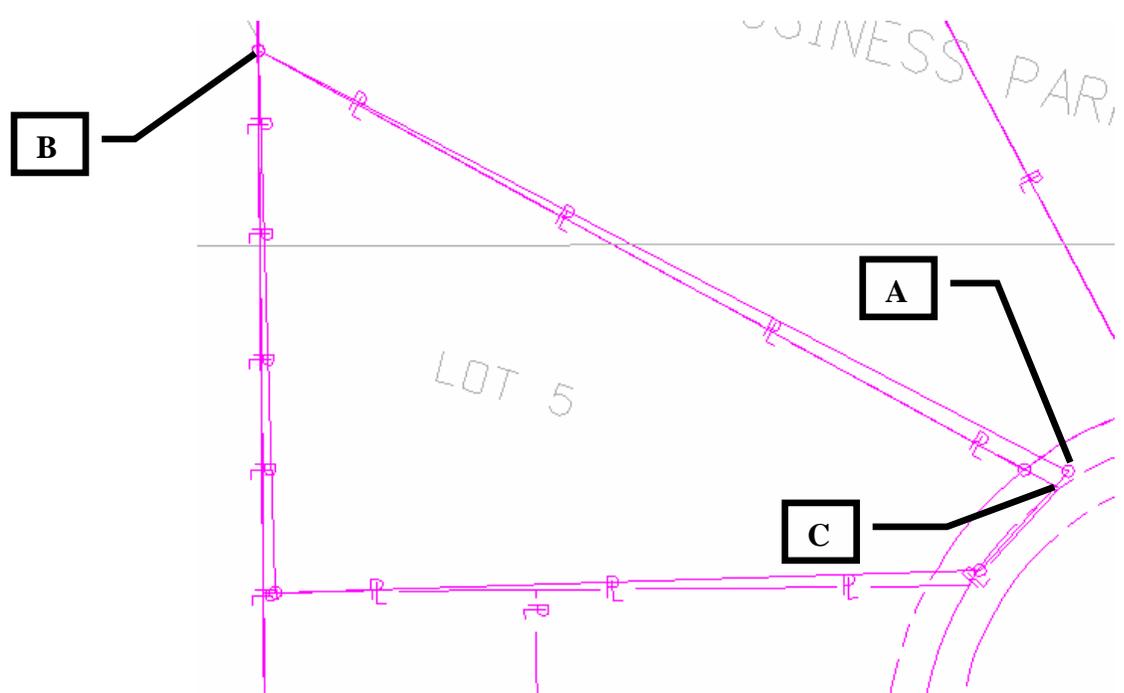
The parcel is created to the west of the true location. It also has a slight rotation.

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**



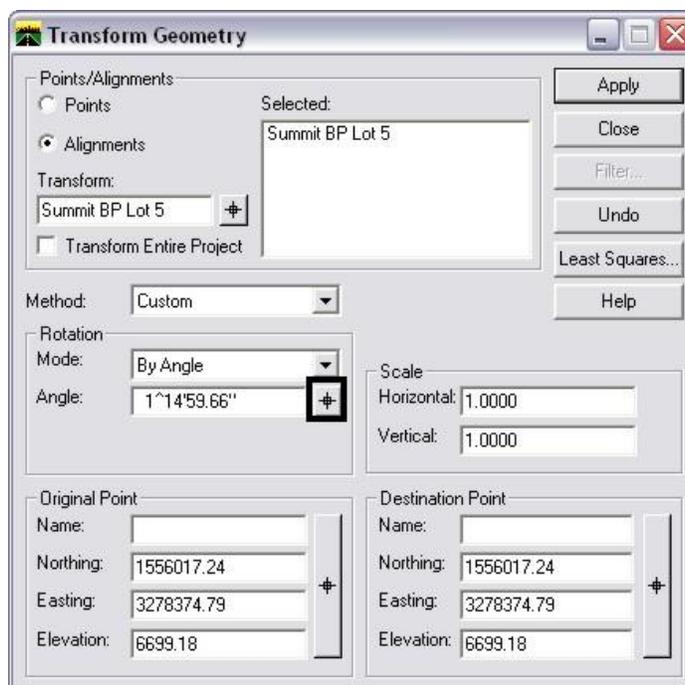
6. **Identify** the Alignment to transform
7. Identify the *coordinate values* for **both the Original & Destination Points**
8. <D> **Apply**



The parcel is relocated but a rotation is evident.

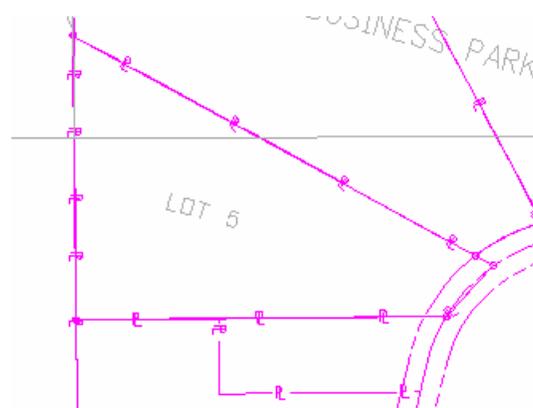
Continuing to use the transform dialog.

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.



**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.

# XML Reports

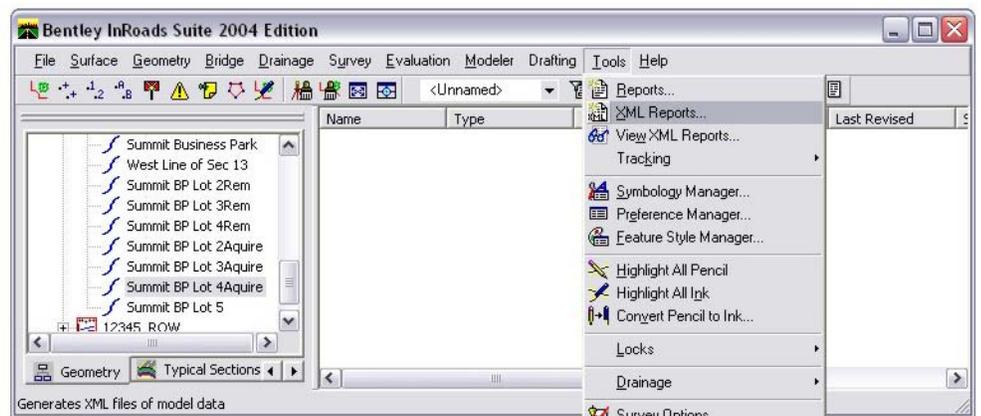
## Chapter Introduction

Two types of reporting are currently available within InRoads. The older version which is based on DBAccess reports is being discontinued with an upcoming release of InRoads. The old format is being replaced with a reporting utility based on the eXtensible Markup Language 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.

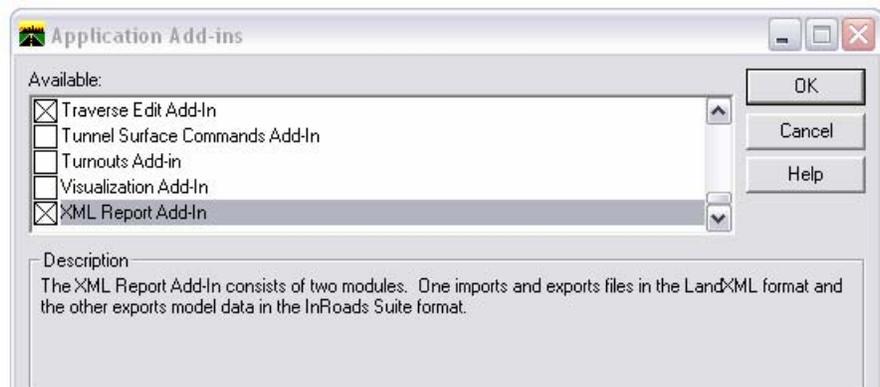
## Lab 20 - Parcel Descriptions

XML reporting is another Application ADD-In. Select the InRoads Tools menu to determine if XML reporting is activated.

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



2. If XML Reports is *not* visible, select **Tools > Application Add-Ins**. Toggle on the **XML Report Add-In**.

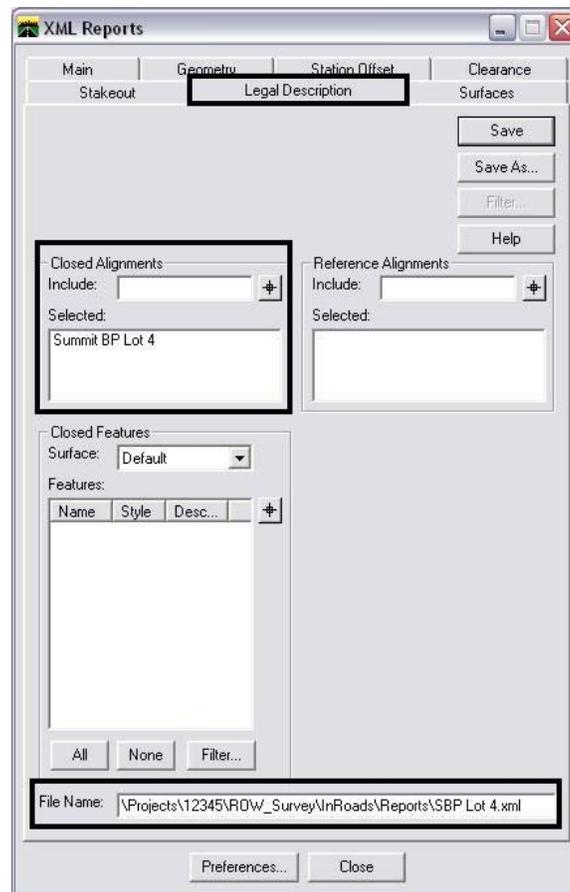


3. Select **Tools > XML Reports**

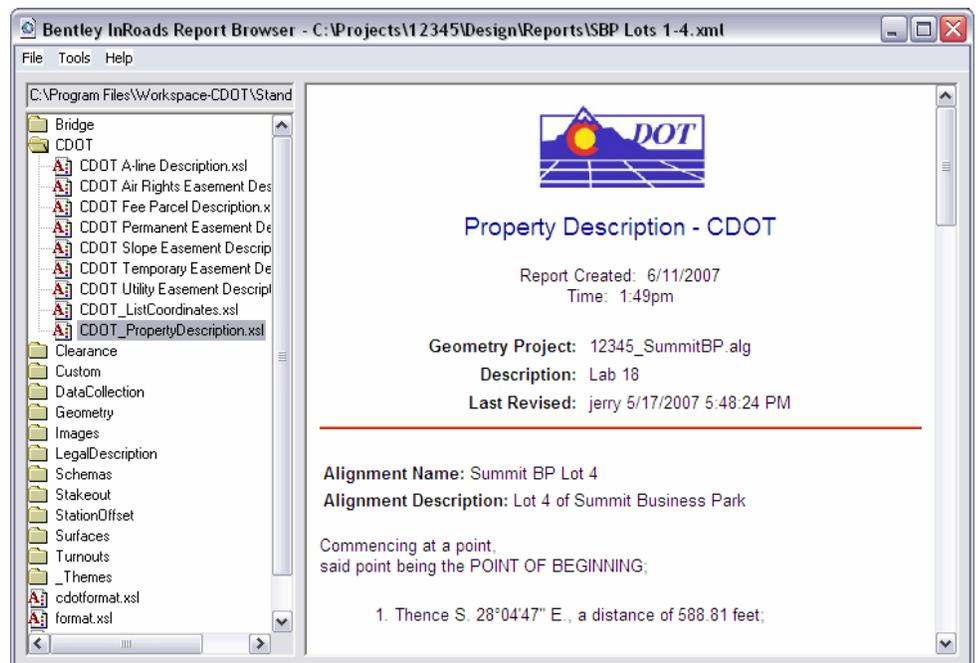
4. <D> the *Legal Description* Tab.
5. <D> in the **Closed Alignments** field.
6. <D> the **Filter** button and add **Summit BP Lot 4** as a *selected* alignment.
7. At the bottom of the dialog, input the file name:  
C:\Projects\12345\ROW\_Survey\InRoads\Reports\SBP Lot 4.xml

**Note:** You can also select the Save As button to define the path and filename.

8. <D> **Save**

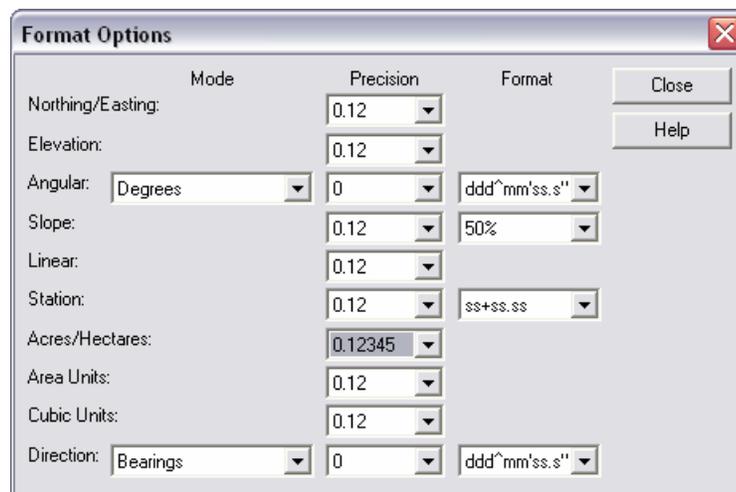


An XML file and a report is created with format and display from an InRoads default style sheet.



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

10. In the Report display, select Tools > Format Options



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

The above described parcel contains **4.96424** acres (216,242.45285 square feet).

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

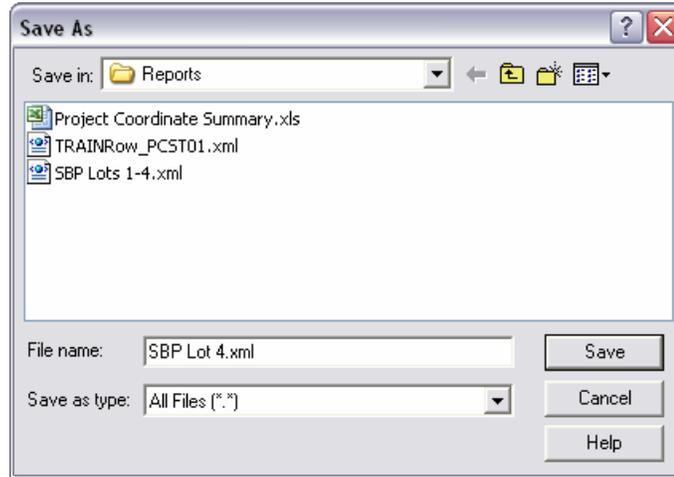
13. In the **Report** display, select **File > Save As...**

Save As:

**Path:** C:\Projects\12345\ROW\_Survey\InRoads\Reports

**File Name:** SBP Lot 4.xml

14. <D> Save

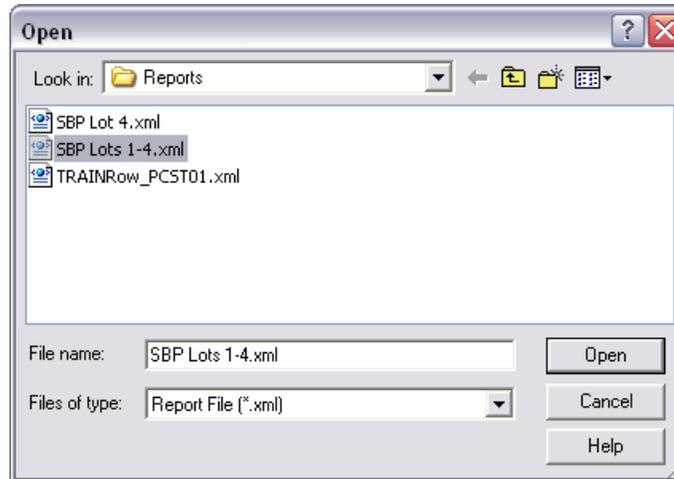


Reports can also be recalled for reformatting, etc.

15. Select **File > Open** from the report browser.

16. Open the **SBP Lots 1-4.xml** file from the folder:

**C:\Projects\12345\ROW\_Survey\InRoads\Reports**



17. <D> on the category *Geometry* and style sheet *Area.xml*

**Area Report**  
Report Created: 5/18/2007  
Time: 9:51am

**Project:** 12345\_SummitBP.alg  
**Description:** Lab 18  
**File Name:** C:\Projects\12345\ROW\_Survey\InRoads\Geometry\12345\_SummitBP.alg  
**Last Revised:** jerry 5/17/2007 5:48:24 PM  
**Input Grid Factor:** 1.000000 **Note:** All units in this report are in feet unless specified otherwise.

Lot	Area (sq ft)	Area (acres)	Perimeter (ft)
Summit BP Lot 4	216242.45	4.96424	2028.98
Summit BP Lot 1	117632.66	2.70047	1391.22
Summit BP Lot 2	103354.27	2.37269	1349.76
Summit BP Lot 3	106433.48	2.44338	1503.86

**Note:** Lot areas and perimeter distances are reported.

18. In the category *Geometry*, access style sheet *List Coordinates*

**List Coordinates Report**  
Report Created: 5/18/2007  
Time: 9:53am

**Project:** 12345\_SummitBP.alg  
**Description:** Lab 18  
**File Name:** C:\Projects\12345\ROW\_Survey\InRoads\Geometry\12345\_SummitBP.alg  
**Last Revised:** jerry 5/17/2007 5:48:24 PM  
**Input Grid Factor:** 1.000000 **Note:** All units in this report are in feet unless specified otherwise.

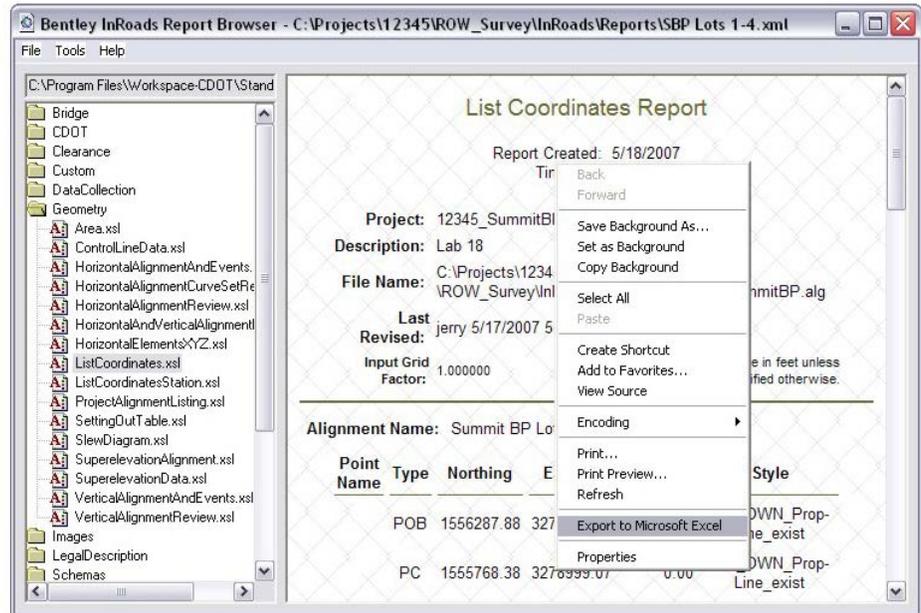
**Alignment Name:** Summit BP Lot 4

Point Name	Type	Northing	Easting	Elevation	Style
POB		1556287.88	3278721.92	0.00	RW_OWN_Prop-Line_exist
PC		1555768.38	3278999.07	0.00	RW_OWN_Prop-Line_exist

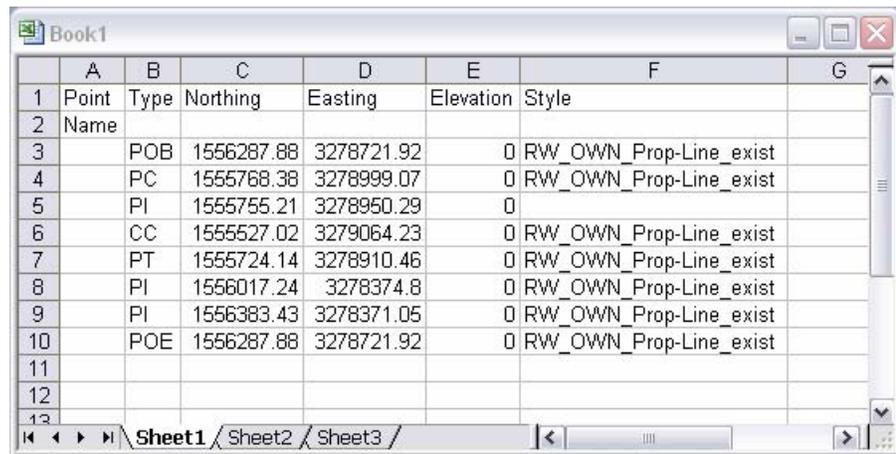
The report is redisplayed to display alignment coordinates.

## 19. While viewing the xml report, &lt;R&gt; on the screen - a fly-out menu appears.

20. <D> on Export to Microsoft Excel



Excel will launch and display the results.



**Note:** The output to Excel will only contain data from individual alignments based on the location in the xml report the fly-out menu was activated.

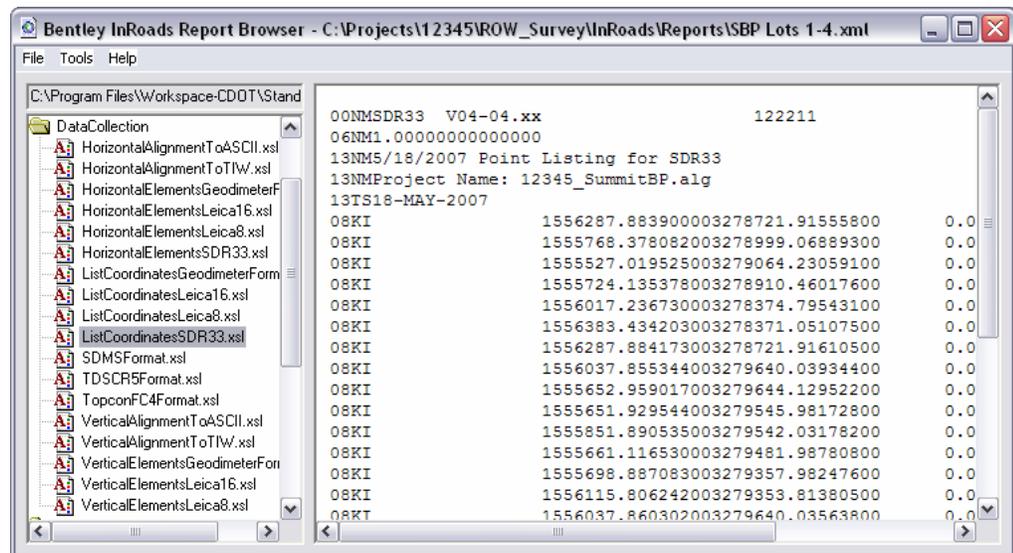
To view the source information the xml report was generated from:

21. In the Report browser, select **Raw-xml.xml** 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 **ListCoordinatesSDR33**



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

# Appendix A

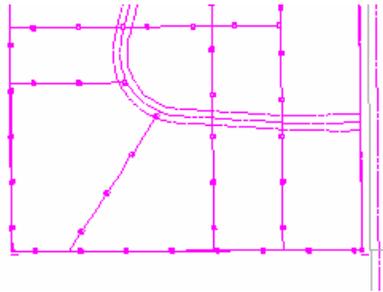
## Importing Cogo Points

### Importing Cogo Points from Graphics

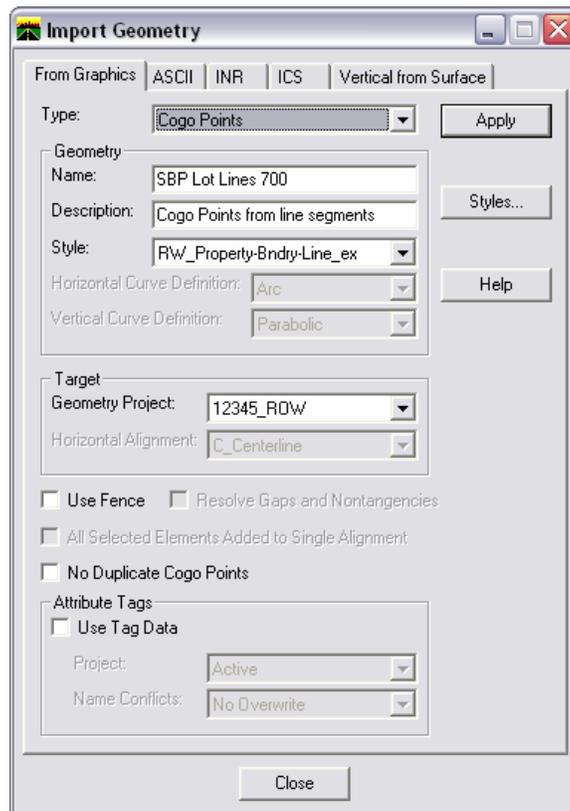
Graphic elements can be imported to generate geometry. Some of the valid element types are: lines, linestrings, cells, text, shapes, etc. Refer to the InRoads help topic Import Geometry

To import Cogo points from a graphics file;

Identify graphics using a selection set or a MicroStation fence

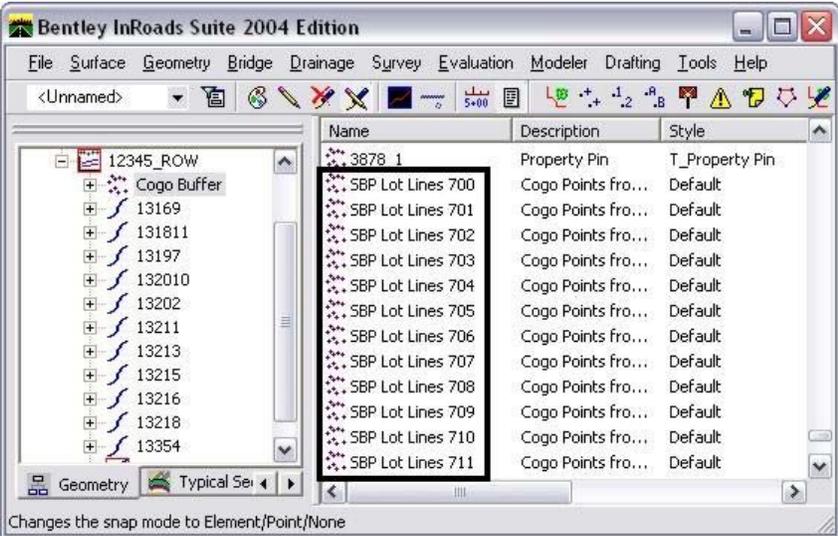


Select **File > Import > Geometry > [From Graphics] Type – Cogo Points**



<D> Apply

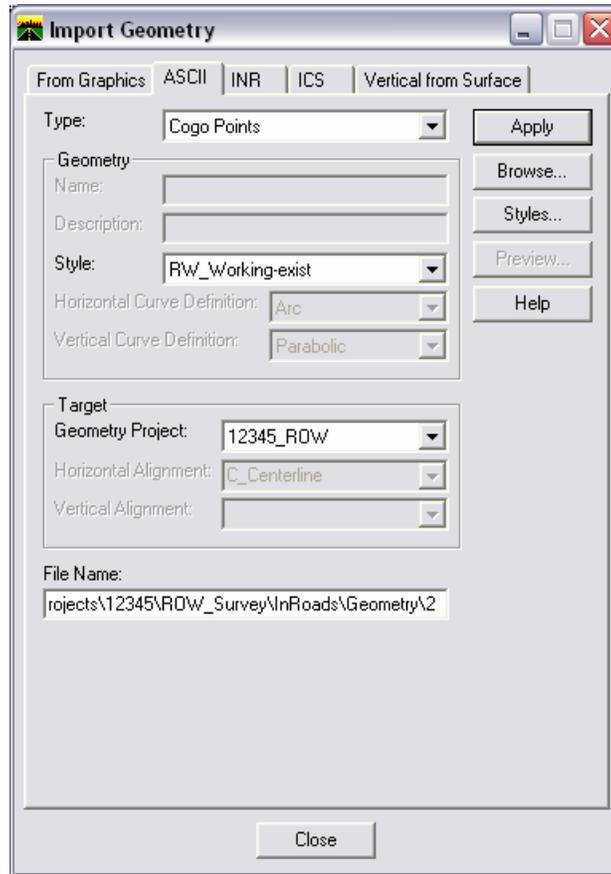
Verify the results



## Importing Cogo Points from ASCII

To import Cogo points from an ASCII file;

Select File > Import > Geometry > [ASCII] Type – **Cogo Points**



- See following page for a separate discussion on Cogo Points from InRoads Help -

**From the InRoads help topic – Importing Geometry from ASCII**

Coordinates should be input as decimal numbers and have the same units of measure as the master units of the currently active graphics file. If the data file contains point IDs, they should be input as integer numbers. All columns may be separated by blanks or tabs. Records contained in the file having no data or beginning with a semicolon (;), exclamation point (!), or asterisk (\*) are ignored.

The ASCII files are free format, so the first line of each file specifies the order of the columns of information. The column order can vary from one file to the next as long as the first line indicates the contents of each column. As points are loaded, they are checked to verify that they all fall within the current design plane.

You can select the following format types from the Types box on the ASCII tab of the Import Geometry dialog box:

**Cogo Points**

X_CRD	easting (required)
Y_CRD	northing (required)
Z_CRD	elevation
POINT_TXT	name
FEATURE	preference
STATION	station number
STA_EQN	station equation
OFFSET	offset
DUMMY	

The following is typical of the format used for an ASCII point file:

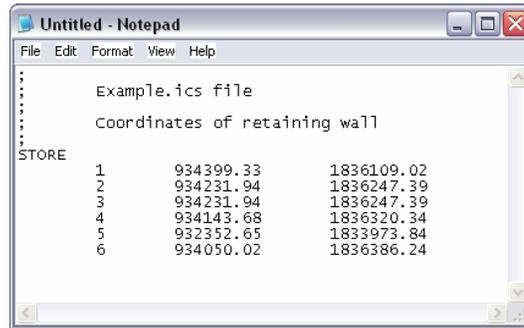
```
{ FEATURE POINT_TXT Y_CRD X_CRD Z_CRD
ESP 1000          9202.984   2425.017   52.230
ESP 1001          9221.065   2415.948   51.984
ESP 1002          9239.307   2407.651   51.730
ESP 1003          9257.879   2400.100   51.466
ESP 1004          9276.719   2393.293   51.204
ESP 1005          9295.811   2387.244   50.938
*ENDOF LINE
ESP 1006          9352.376   2374.042   50.373
ESP 1007          9372.199   2371.057   50.305
ESP 1008          9392.131   2368.864   50.236
ESP 1009          9412.127   2367.496   50.187
*ENDOF LINE
*EOF
```

## 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.



```

Example.ics file
Coordinates of retaining wall
STORE
1      934399.33      1836109.02
2      934231.94      1836247.39
3      934231.94      1836247.39
4      934143.68      1836320.34
5      932352.65      1833973.84
6      934050.02      1836386.24

```

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

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



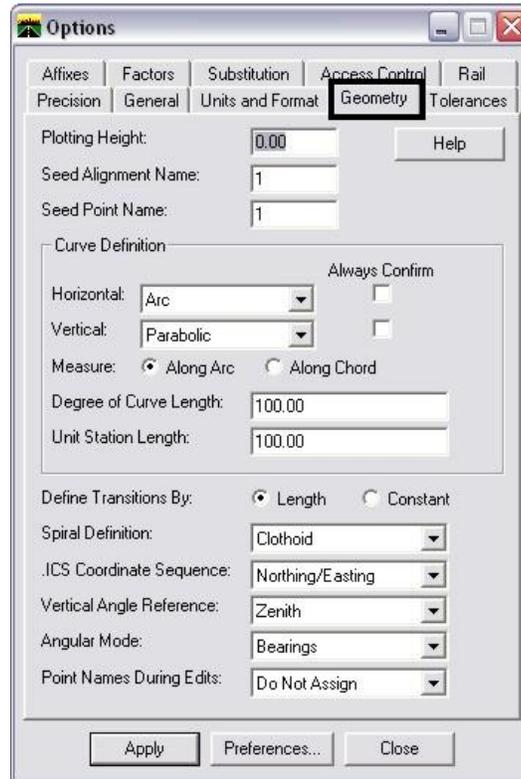
The cogo points will be added to the active geometry project. You may then use **Geometry > Utilities > Create/Edit Alignment** to join the points, forming an Alignment and **Geometry > Horizontal Curve Sets > Define Curves** to add curves to the alignment. You can also accomplish these same tasks within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

## Appendix B

### Geometry Options

Project geometry parameters are defined by the user.

1. Select Tools > Options > *[Geometry]*



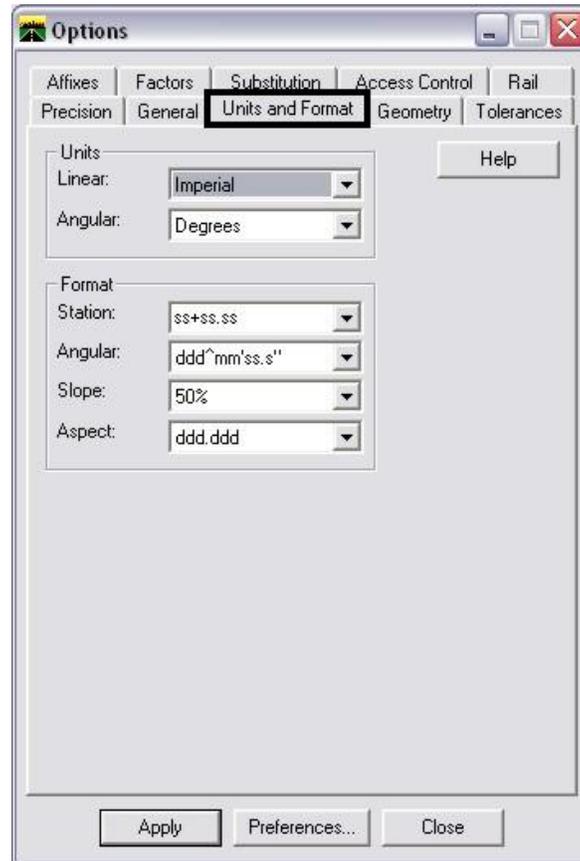
### Geometry Defaults

- **Plotting Height** - default elevation assigned to geometry points
- **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.

## Units and Format

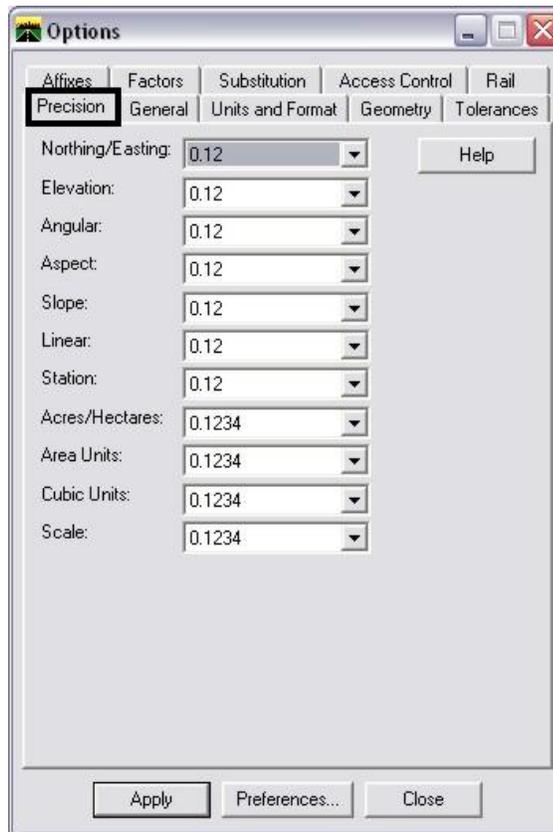
### 2. <D> *Units and Format*



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

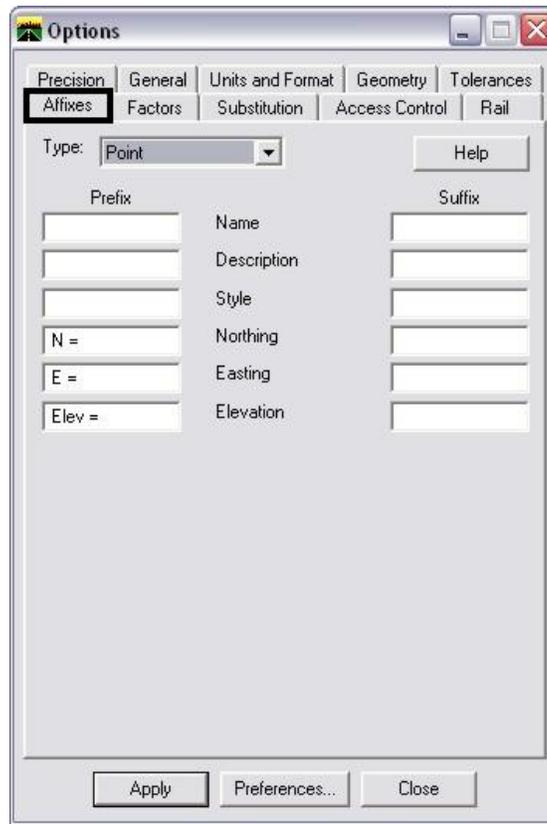
### 3. <D> Precision



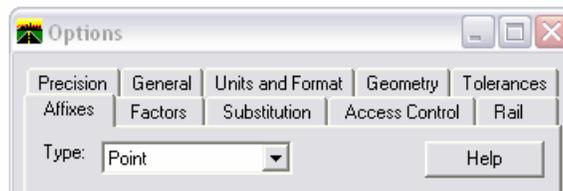
The *precision* tab defines the number of decimal places displayed in dialogs. It also defines the number of decimal places displayed when posting information to the MicroStation screen or when writing data to an ASCII file.

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

#### 4. <D> *Affixes*

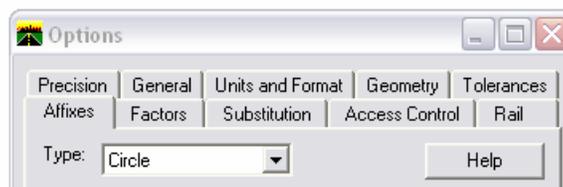


a. Set Type to: **Point**



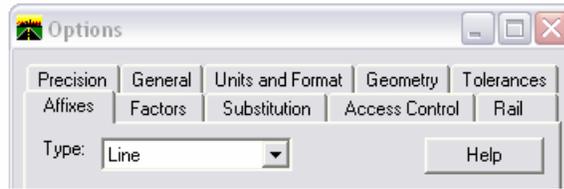
Used for Cogo points and alignment vertices annotation commands.

b. Set Type to: **Circle**



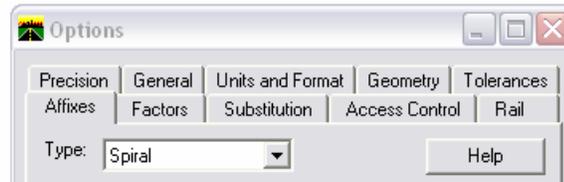
Used for horizontal curve annotation commands.

c. Set Type: **Line**



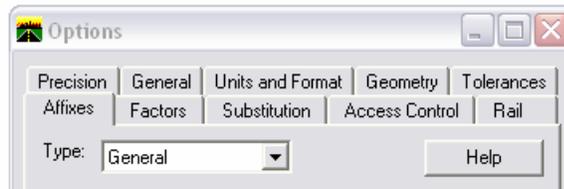
Used for annotating horizontal alignment segments.

d. Set Type: **Spiral**



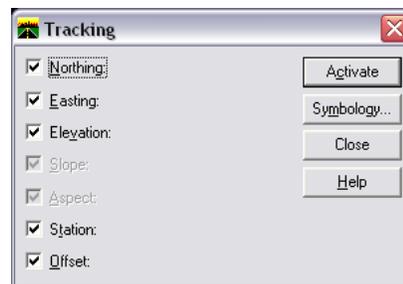
Used for spiral curves.

e. Set Type: **General**



Used by miscellaneous commands.

An example of a command that uses the Affixes specified under Type: **General** is **Tools > Tracking > Tracking**.



With this command, Station and Offset information can be displayed for select locations. Prefixes or suffixes used as part of the display of this information are controlled by the settings under Type: **General**.

+N =1556131.54  
 E =3277128.58  
 Sta=A 403+15.82  
 Rt.669.90

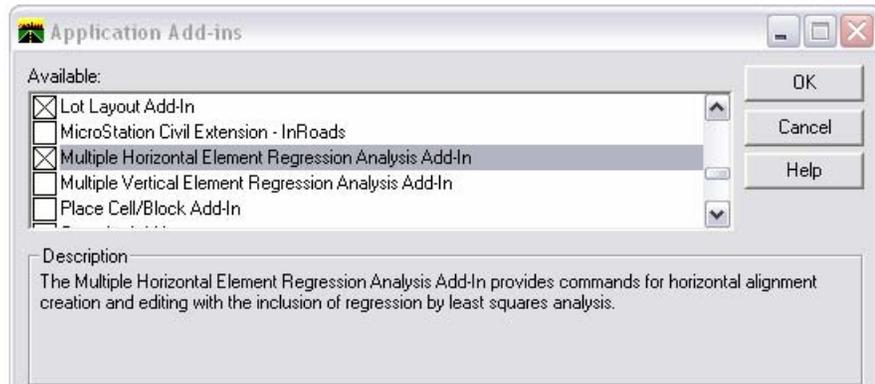
In this example, the Station prefix setting is 'Sta=' and the Right prefix setting is 'Rt.'.

## Appendix C

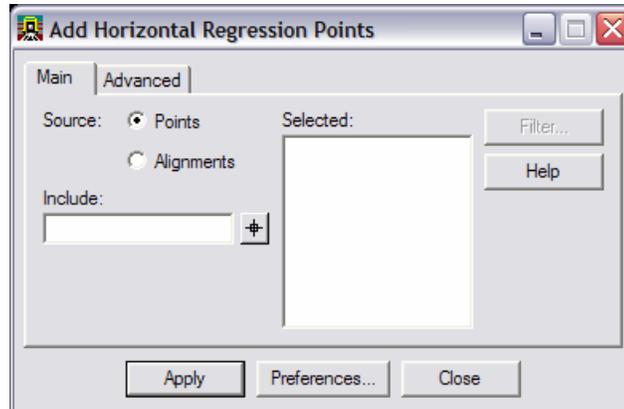
### Horizontal Regression Analysis

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

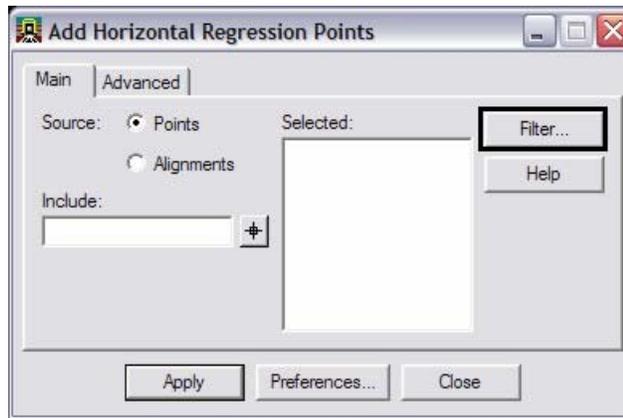
1. Create a horizontal alignment to store the results in.
2. Select **Tools > Application Add-ins** to enable the command.



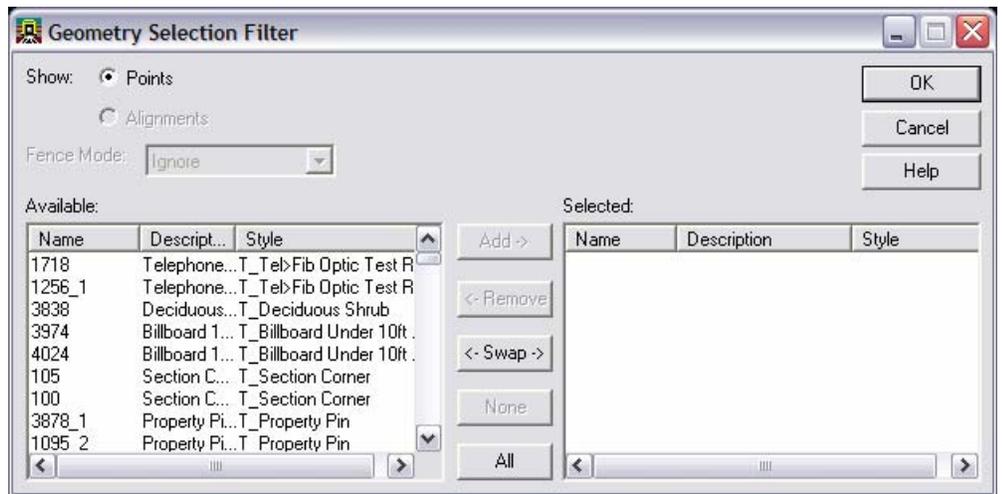
3. Select **Geometry > Horizontal Regression > Add Regression Point** The **Add Horizontal Regression Points** dialog will appear.



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



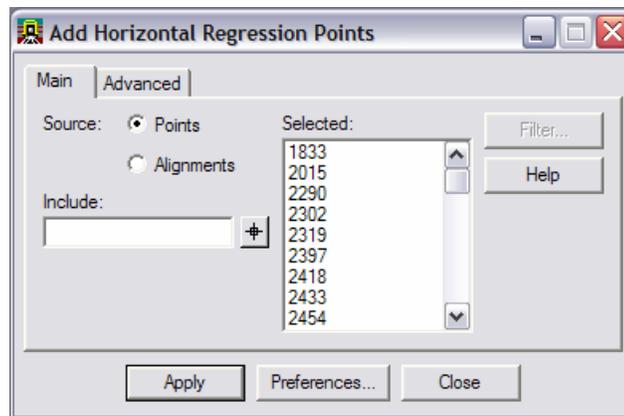
- <D> the Filter button. The Geometry Selection Filter dialog will appear.



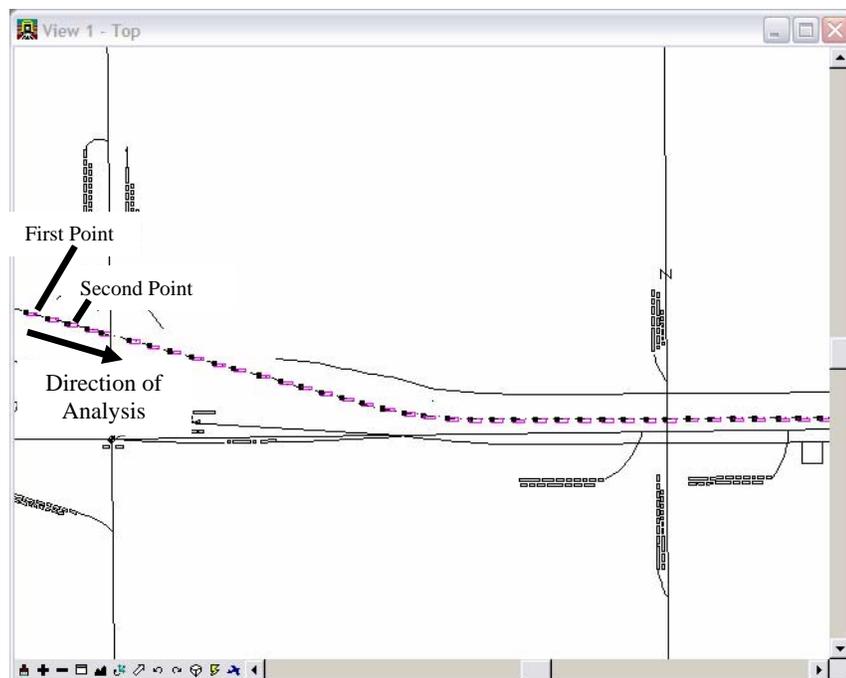
- Create a selection of centerline points to be used for analysis.



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

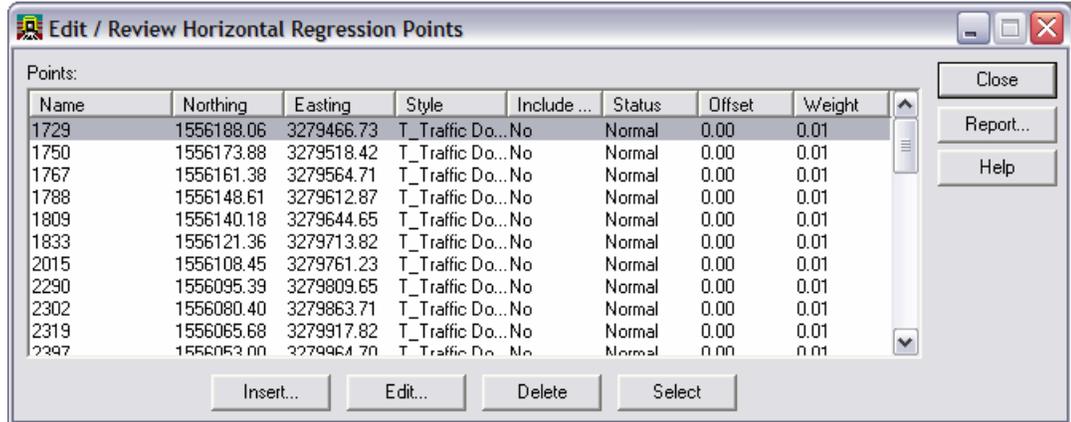


8. <D> the **Apply** button. The dialog will minimize allowing you to graphically define the first and second points to define initial course for evaluation.

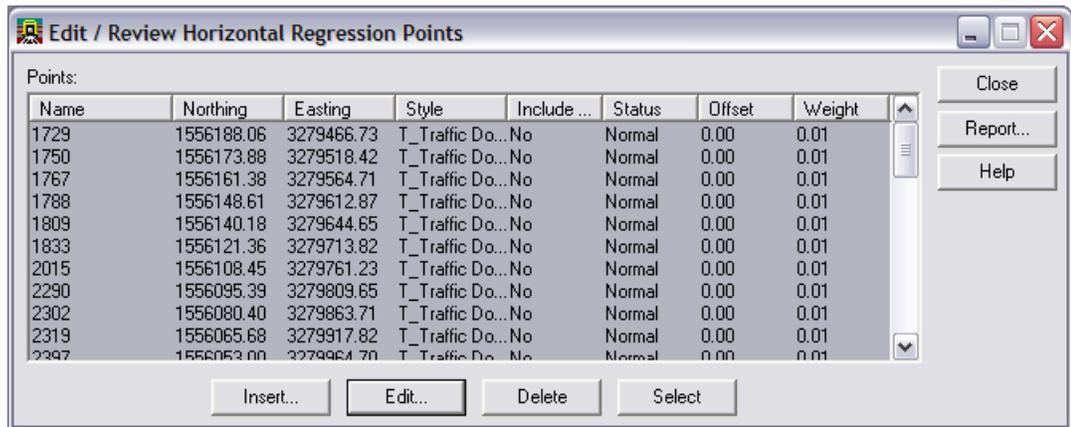


9. <D> the first point in the MicroStation view and <D> second point in the view to define the *direction of the analysis*. The *Add Horizontal Regression Points* dialog will reappear.
10. <D> the **Close** button.

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

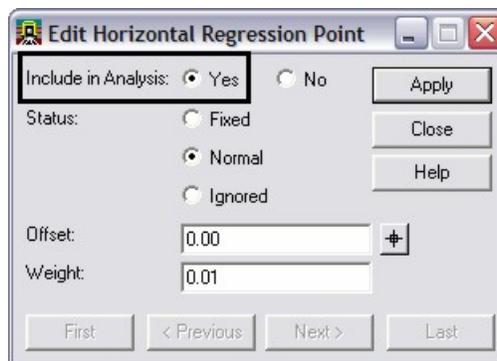


11. Refine the selection of points to be used for analysis by using the **Ctrl** and **Shift** keys or using the **Select** button to define a selection area.



12. <D> the **Edit** button. The **Edit Horizontal Regression Point** dialog will appear.

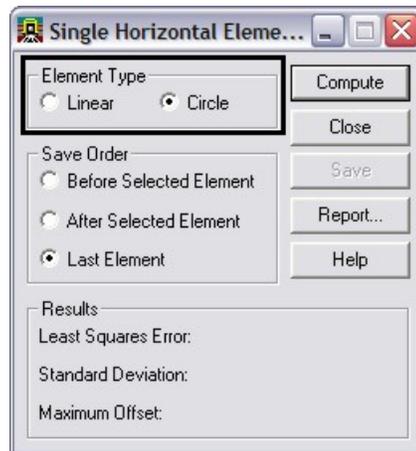
13. <D> the radio button **Yes** to **Include in Analysis**.



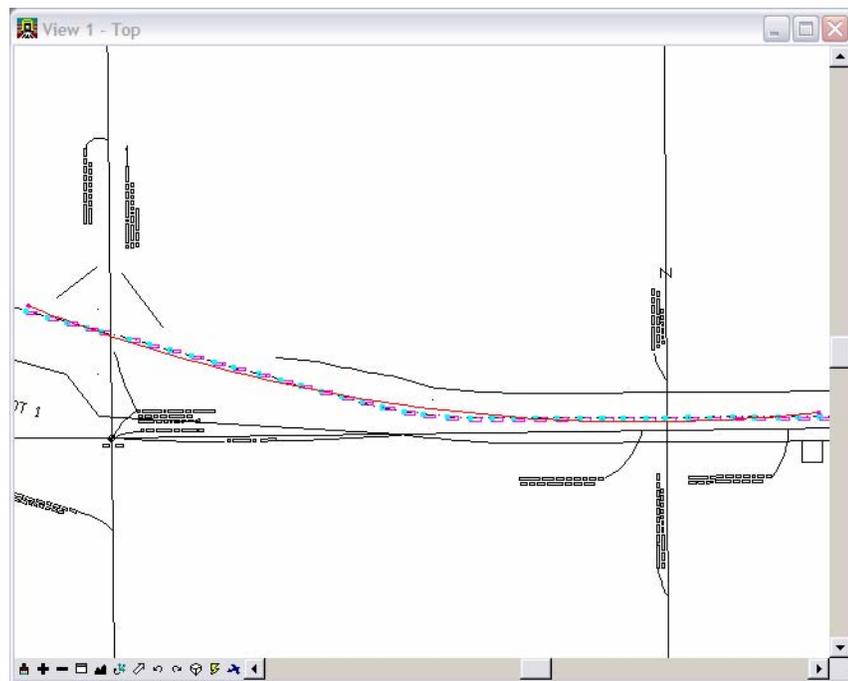
14. <D> the **Apply** then **Close** buttons. Leave the **Edit / Review Horizontal Regression Points** open for further edits.

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

## 16. Select Element Type: Linear or Circle

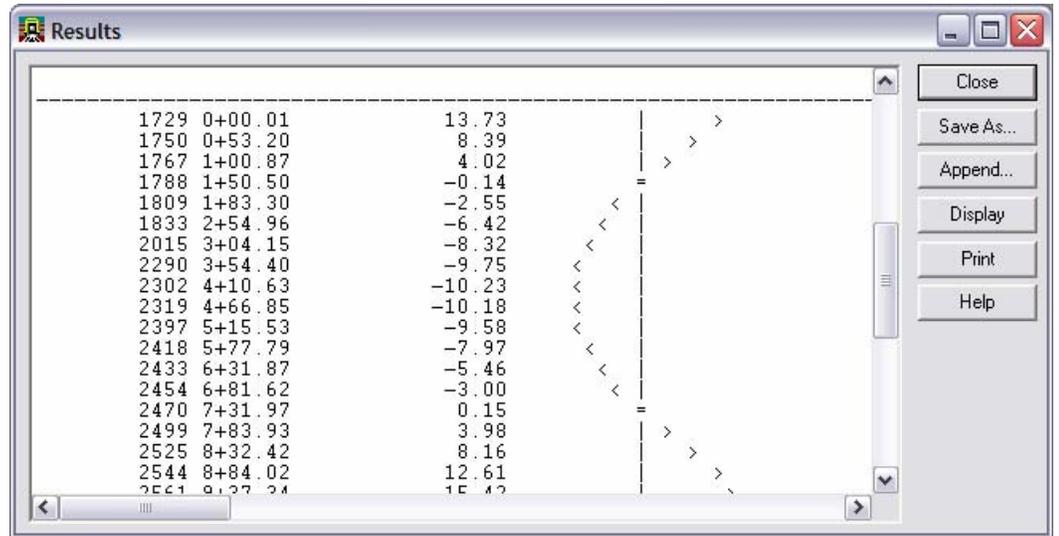


## 17. &lt;D&gt; Compute to view the results in the MicroStation view.

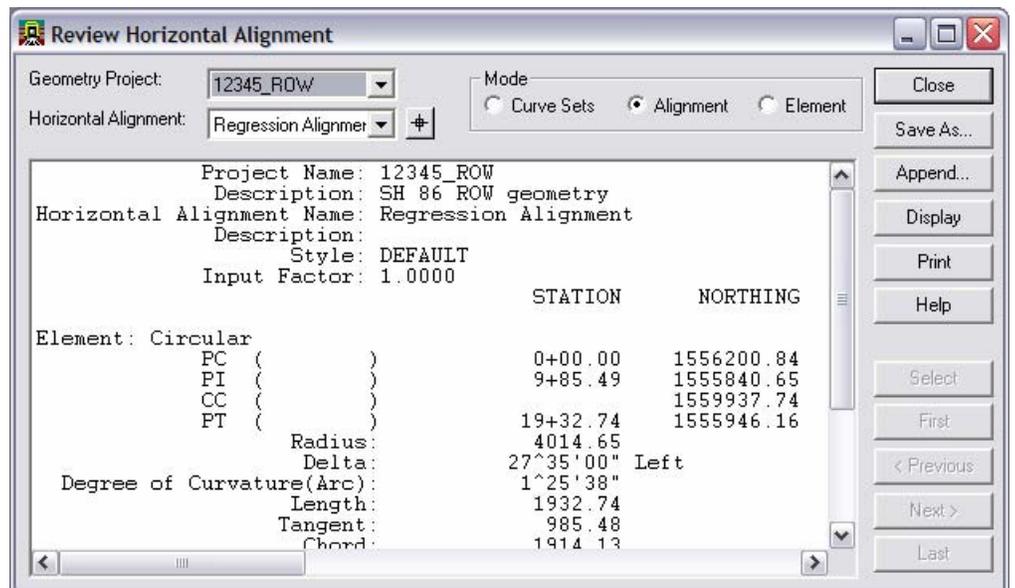


## 18. &lt;D&gt; Save to create the alignment element.

19. <D> the Report button to view a summary.



20. *Review* the results.



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