Labs for Using InRoads Survey for Data Reduction

Colorado Department of Transportation

CADD and Engineering Innovation
Updated December 8, 2009
Version XM

4201 E Arkansas Avenue
Denver, CO 80222
(303) 512-5204
http://www.dot.state.co.us/DesignSupport/

This document has been prepared for the Colorado Department of Transportation by:

Colorado Department of Transportation
Project Development Branch
CDOT CADD Department
4201 East Arkansas Ave., Rm 290
Denver, CO 80222
www.dot.state.co.us

Bohannan Huston, Inc.
Meridian One
9785 Maroon Circle
Suite 140
Englewood, CO 80112-5919
www.bhinc.com

And the following Sub-consultants:

The Envision Group
8517 Excelsior Drive
Suite 205
Madison, WI 53717
www.envisioncad.com

Copyright

Copyright © 2009 Colorado Department of Transportation. All Rights Reserved

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.

The Colorado Department of Transportation (CDOT) has accepted this document. By accepting this document, CDOT assumes ownership and all responsibilities associated with this document. This information is subject to change without notice

Disclaimer

Notice of Disclaimer: CDOT provides documents on an “as is” basis. All warranties and representations of any kind with regard to said documents are disclaimed, including the implied warranties of merchantability and fitness for a particular use. Under no circumstances will CDOT, or any of its officers or employees be liable for any consequential, incidental, special or exemplary damages even if appraised of the likelihood of such damages occurring. CDOT does not warrant the documents against deficiencies of any kind. The use of any of these documents for work which is under contract with CDOT, does not relieve the contractor from any obligation assumed by the contract, or from complete and proper fulfillment of the terms of the contract, nor does it entitle the contractor to compensation for damages or loss which could be attributed to such use.

Notice

This manual may be freely copied or distributed for the purpose of providing the Colorado Department of Transportation and Colorado customers a consistent guide to using the Bentley suite of products to meet CDOT's design and drafting standards.

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 08.09.04.88
InRoads® version 08.09.02.16
0209 – Version 04.00 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:

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

LAB 1 - Getting Started in InRoads Survey 7
Lab 1.1 - Set CDOT XM Environment and Verify Resources 7
Lab 1.2 - Setting Project Defaults 11
Lab 1.3 - Toolbars 14
Lab 1.4 - InRoads Survey Options - Overview 16
LAB 2 - Working with InRoads Survey 19
Lab 2.1 - Opening Survey Data 19
Lab 2.2 - CAD vs. Fieldbook Viewing 21
Lab 2.3 - Viewing the Fieldbook Data 27
LAB 3 - Feature Codes and Control Codes 37
Lab 3.1 - Viewing Survey Feature Table 37
LAB 4 - Exporting the Fieldbook - Overview 43
Lab 4.1 - Exporting Survey Data to Graphics - Overview 43
Lab 4.2 - Exporting Survey Data to Surface Overview 49
Lab 4.3 - Exporting Survey Data to Geometry Overview 54
LAB 5 - Importing Data 57
Lab 5.1 - Managing Survey Files 57
Lab 5.2 - Importing Control Files 58
Lab 5.3 - Importing Data collector files 68
Lab 5.4 - Importing ASCII files 79
LAB 6 - Fieldbook Edits 91
Lab 6.1 - Correcting Fieldbook Code Errors 91
Lab 6.2 - Correcting Fieldbook Control Code Errors 101
Lab 6.3 - Correcting Elevation Errors 118
Lab 6.4 - Adding points to the fieldbook 120
LAB 7 - DTM Evaluation 123
Lab 7.1 - Exporting Survey Data to Surface for Evaluation 123
Lab 7.2 - Correcting Crossing Segments 129
Lab 7.3 - Evaluate Surface Triangles 137
Lab 7.4 - Evaluate Surface Contours 142
Lab 7.5 - Multipoint Profile as Section check 148
LAB 8 - Exporting the Fieldbook 153
Lab 8.1 - Exporting Survey Data to Graphics 153
Lab 8.2 - Exporting Survey Data to Surface 160
Lab 8.3 - Exterior Boundary 166
Lab 8.4 - Exporting Survey Data to Geometry - FINAL 178
Lab 8.5 - Saving an InRoads Project file RWK 181
Lab 8.6 - Directory Clean up 184
LAB 9 - Additional Exercises 185
Lab 9.1 - Locks 185
Lab 9.2 - Advanced Locks 186
Lab 9.3 - Global Scale Factor 189
Lab 9.4 - View Surface Display Constrained 196
Lab 9.5 - View Contour Settings 200
Lab 9.6 - Profiles from existing alignments 204
Lab 9.7 - Cross Sections 209
Lab 9.8 - Survey 213
Lab 9.9 - Importing multiple files 218

Lab 9.10 - Metric Survey Data to Imperial Survey Data 219
Lab 9.11 - Exporting Survey Data to Sokkia SDR file 223
Lab 9.12 - Exporting Survey Data using Text Export Wizard 225
Lab 9.13 - Exporting DC File from TGO 231
Lab 9.14 - Merging InRoads Survey Fieldbook files 232

LAB 1 - Getting Started in InRoads Survey

Lab 1.1 - Set CDOT XM Environment and Verify Resources

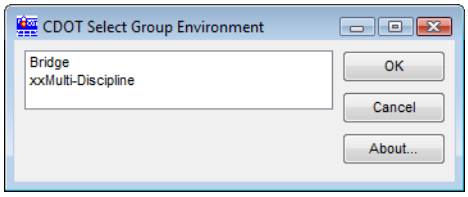
Section Objectives:

After completing this exercise you will know how to:

- Create a new design file for use with Topo collection.
- Verify the correct MicroStation resources are in place for topo data reduction and exporting.

1. From the Windows Start menu **Start > All Programs > _CDOT_CADD_Information > V09.08.XX-XM > Select Group Environment.** The CDOT Select Group Environment dialog will appear.

2. From the **CDOT Select Group Environment** dialog select ***xxMulti-Discipline***



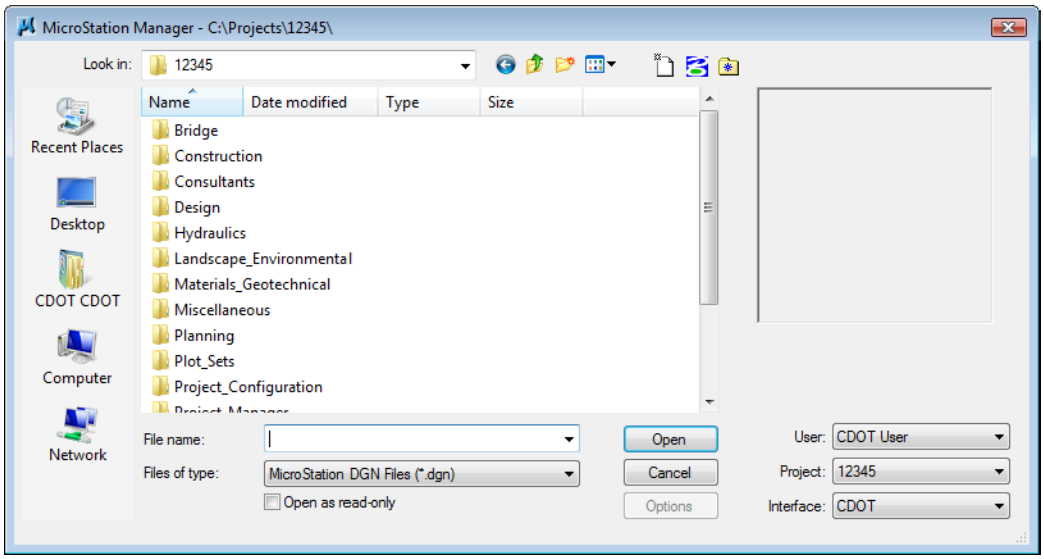
3. **<D>** the **OK** button. The dialog will close and the Workspace will be set.

   Note: By following these steps the correct MicroStation resources, such as the level and cell definitions have been defined.

4. Double-click on the InRoads Survey desktop button or select **Start > All Programs > Bentley> InRoads Group XM > InRoads Survey**.

5. In the **MicroStation Manager** dialog go to the Workspace group section and change

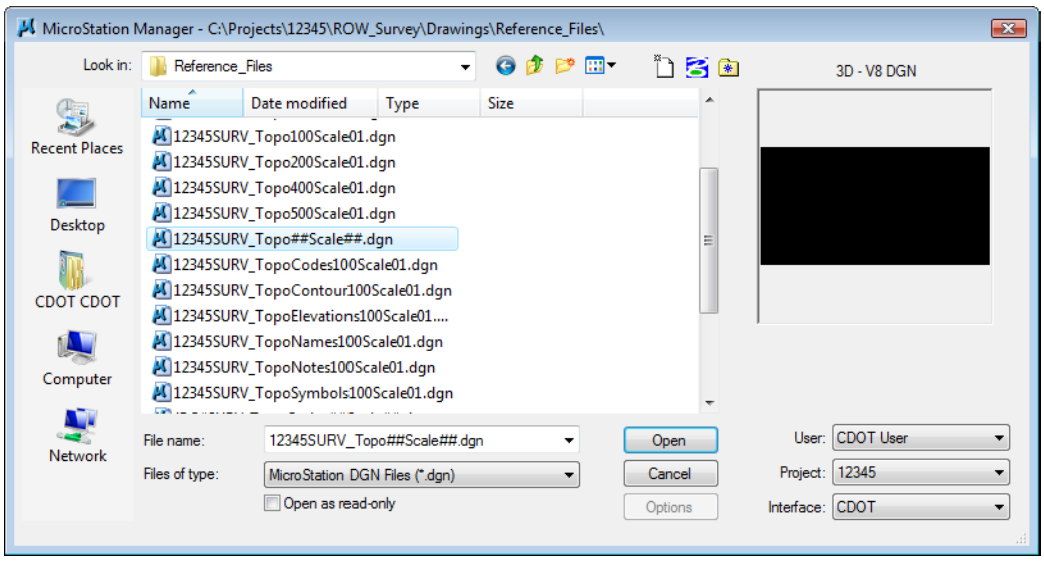
   - **User: CDOT User**
   - **Project: 12345**
   - **Interface: CDOT**



Note: In this class, the project name 12345 will be used as the 5 digit project code.This workspace setup will load the most current CDOT MicroStation environment.

6. In the **MicroStation Manager** dialog path to the directory: ***C:\Projects\12345\ROW_Survey\Drawings\Reference_Files***

7. Select the file **12345SurveyTopo##Scale##.dgn** from the **MicroStation Manager** dialog.



Note: The purpose of the files with "##" symbols are for creating new files with the correct naming convention.

8. **<D> Open** the **MicroStation Manager** dialog will close and open the file.

   Note: Be patient, MicroStation will first load the DGN file and will work as the CAD engine. InRoads Survey will then load and will run on top of MicroStation.

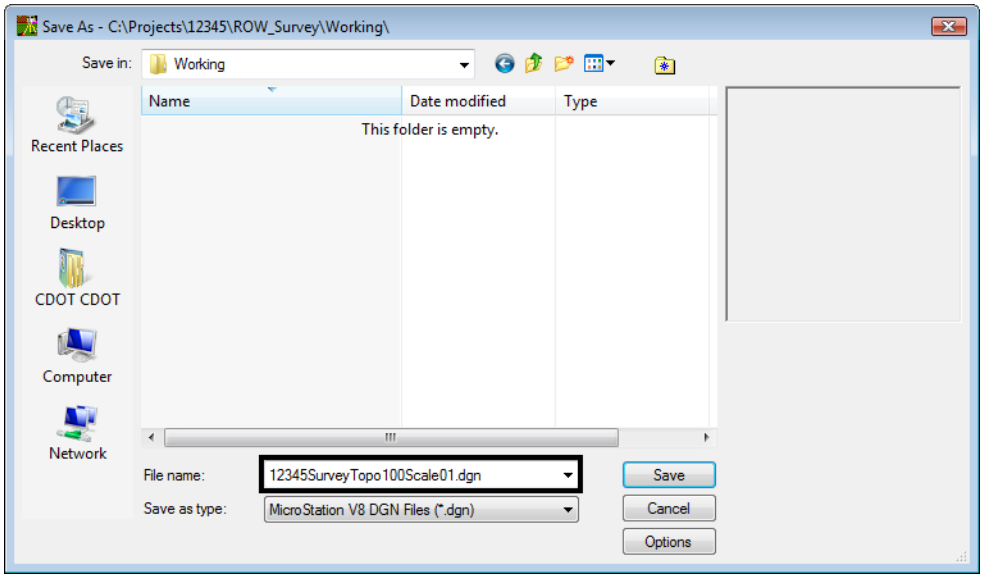
9. Once both programs are loaded the ***Tip of the Day*** dialog may open containing a different tip each time the program is started. To suppress this dialog in the future uncheck ***Show Tips on Startup***. To access the ***Tip of the Day*** dialog in the future, select **Help > Tip of the Day**.

10. **<D>** the ***Close*** button on the ***Tip of the Day*** dialog.

11. From the MicroStation pull-down menu **File > Save As The Save As** dialog will appear.

12. Path to the folder ***C:\Projects\12345\ROW_Survey\Working***

13. Replace the ## symbols with **100** scale and **01** model. Type in Files: ***12345SurveyTopo100Scale01.dgn***

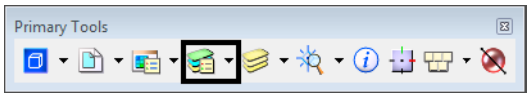


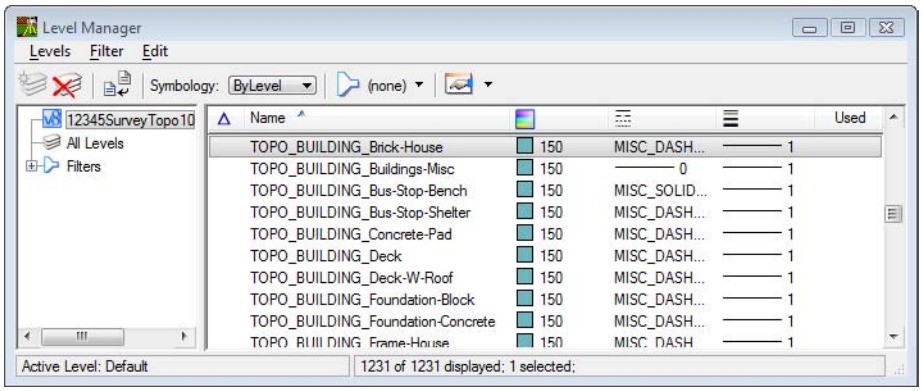
14. **<D>** the **Save** button the **Save As** dialog will close and MicroStation will open the file ***12345SurveyTopo100Scale01.dgn***

    Note: As shown at the beginning of this lab the steps for selecting the appropriate Group defined what MicroStation resources will be loaded. Before proceeding in InRoads, the level definition files ***Topo.dgnlib*** and ***ROW.dgnlib*** need to be attached.

15. From the MicroStation pull-down menu, select: **Settings > Level > Manager**. The ***Level Manager*** dialog will appear. Look for **[Topo]** and **[ROW]** in the Level Name.

    - You can also use the ***Level Manager*** button from the ***Primary Toolbar*** to open the ***Level Manager*** dialog.



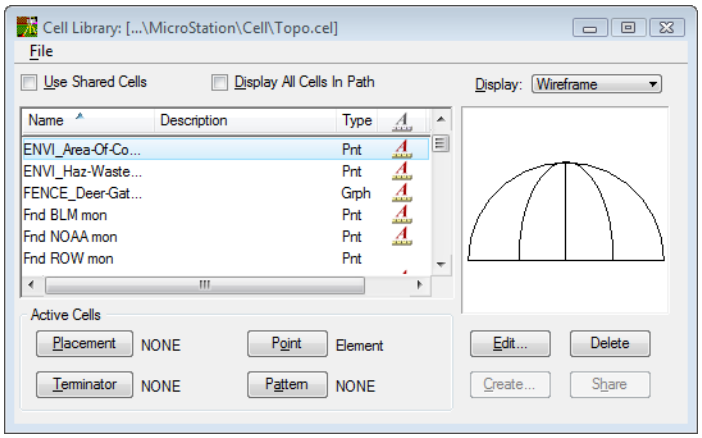


    - If one of the DGN libraries is not loaded close MicroStation and use the Select Group Environment utility to select the xxxMulti-Discipline environment.

16. Close the ***Level Manager*** dialog.

17. Verify that the cell library **CDOT-Topo cells.cel** is attached. From the MicroStation pull-down menu, select **Element > Cell**s the ***Cell Library*** dialog box will appear.

    - You can also use the ***Cell Library*** button from the ***Primary Toolbar*** to open the ***Cell Library*** dialog.



18. From the ***Cell Librar***y dialog select the **File** pull down menu and pick **Topo.cel** from the list of cell libraries.

    - If the Topo cell library is not loaded close MicroStation and use the Select Group Environment utility to select the xxxMulti-Discipline environment.

19. **Close** the ***Cell Library*** dialog.

20. From the Main MicroStation pull-down menu, select **File > Save Settings**

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

Section Summary:

- A new design file was created in MicroStation and InRoads Survey was started.
- MicroStation resources were verified prior to importing any survey data.

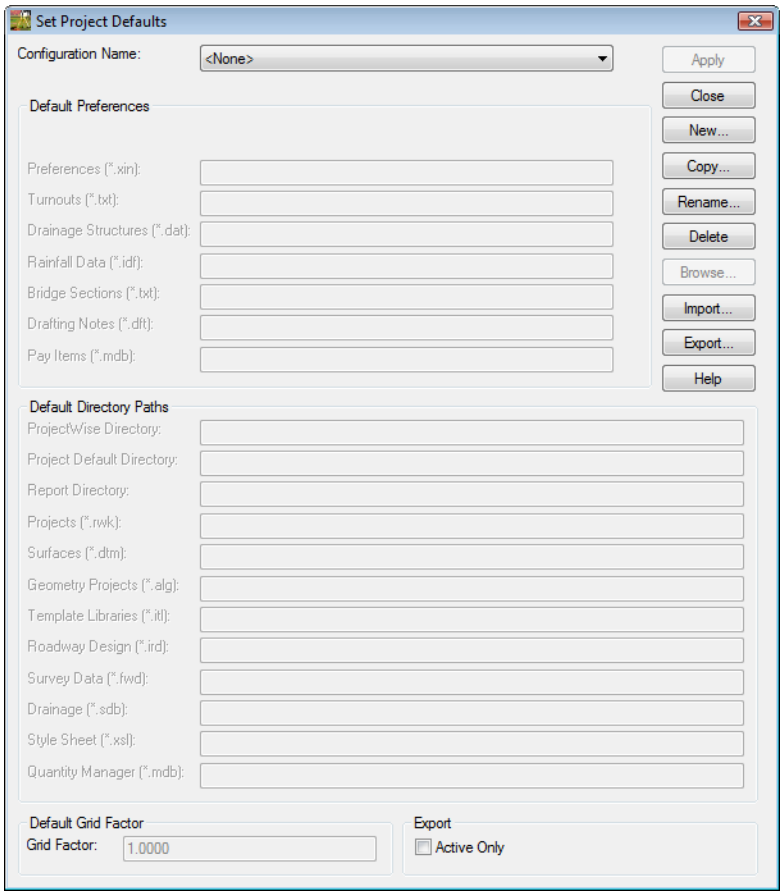
Lab 1.2 - Setting Project Defaults

Setting default directories and resource files provides the user with quick access to project folders for opening files and then saving them to the correct location. It also ensures the correct CDOT InRoads resource files will be used.

Section Objectives:

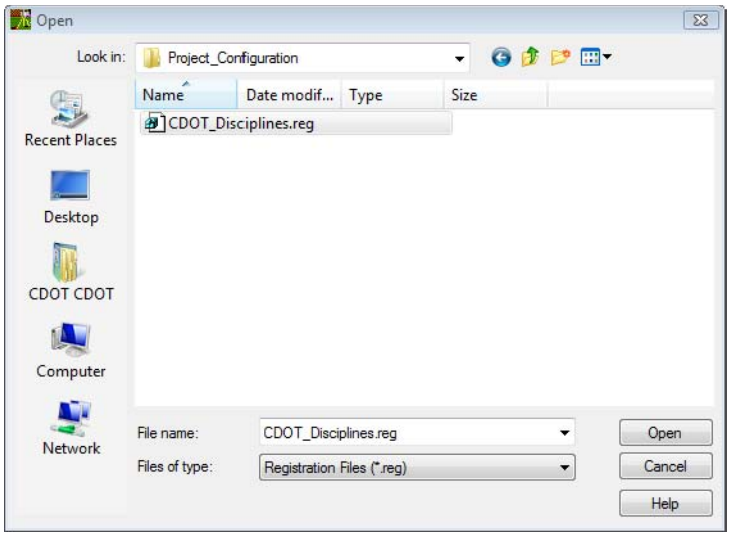
- Open and set CODT Project Defaults.
- Import and export Project Default settings.

1. From the InRoads pull down select **File > Project Defaults** the ***Set Project Defaults*** dialog will appear.

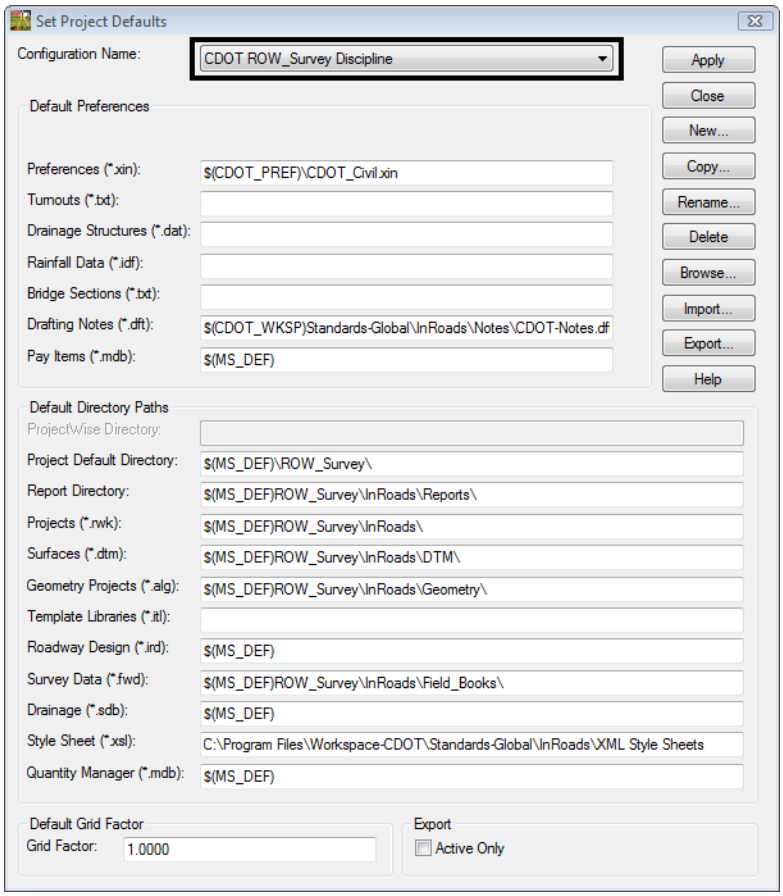


2. **<D>** the **Import** button. The ***Open*** dialog will appear.
3. Path to the folder ***C:\Projects\12345\Project_Configuration***
4. Select the file ***CDOT_Disciplines.reg***

5. **<D>** the **Open** button. The **Open** dialog will close and default project settings are imported.



6. From the drop down list Configuration Name select the discipline ***CDOT ROW_Survey Discipline***



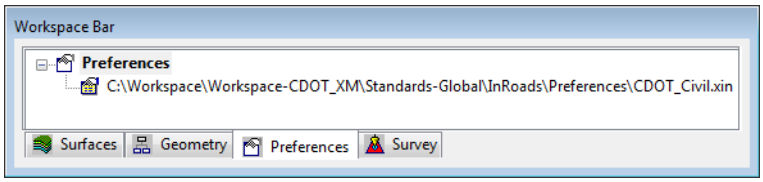
Note: The Default Directory Paths that are left blank are files that are not used by InRoads Survey.

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

   Note: The settings that have been created are stored in the Windows registry on your PC. To share this Project Default setup with other project staff export to a Registry file (REG).

8. **<D>** the **Close** button on the ***Set Project Defaults*** dialog.

9. Select the **Preferences** tab on the Workspace bar and verify that the correct InRoads Project resource files are now loaded.



Section Summary:

- In this lab Project Defaults were imported and set using a registry file.

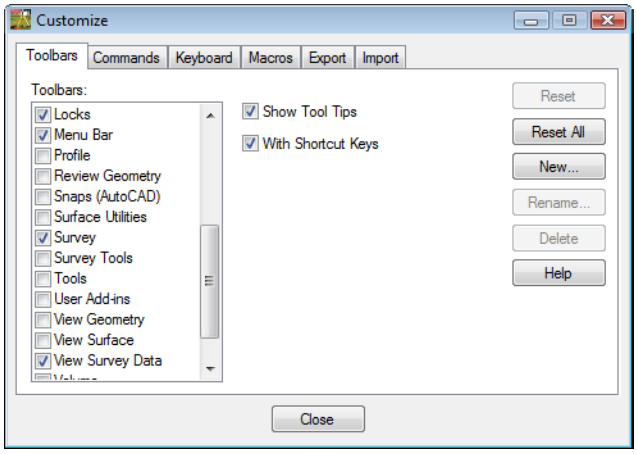
Lab 1.3 - Toolbars

Toolbars can be added from the pull-down menus. All InRoads Survey toolbars can be customized to fit your workflow or personal preferences. Start by opening Toolbars that will be used in class.

Section Objectives:

- Open an InRoads Survey toolbar.
- Dock, undock, and resize toolbars.

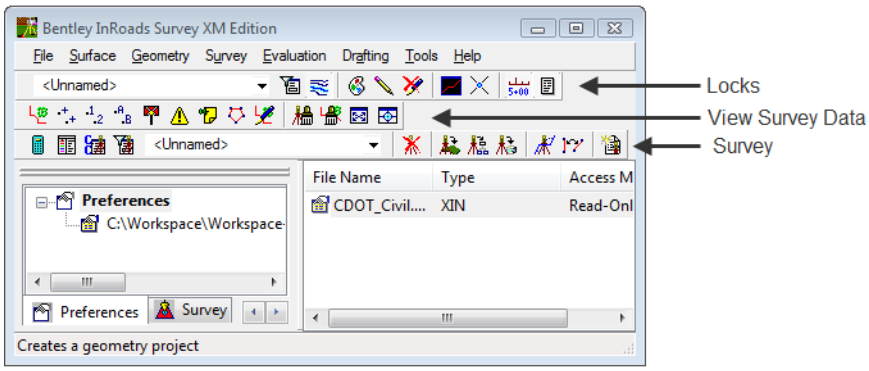
1. From the InRoads pull-down menu select **Tools > Customize**. The ***Customize*** dialog will appear.



2. Under the **Toolbars** tab check that the boxes for **Locks**, **Survey**, and **View Survey Data** are selected. The toolbars will appear either docked or floating in the InRoads interface.

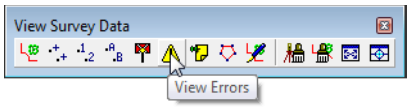
3. **<D>** the **Close** button.

4. **Dock**, **Undock**, and **Resize** the toolbars to become comfortable with the procedure. Notice how you cannot dock the toolbars into the MicroStation environment.



5. Move your cursor over a button in a docked or undocked toolbar and hover. A **Tool Tip** will appear at the lower right of your cursor.

   - This feature is controlled in the **Customize** dialog box **Show Tool Tips** check box and is turned on by default.



Section Summary:

- In this lab toolbars were opened and docked into the InRoads interface.

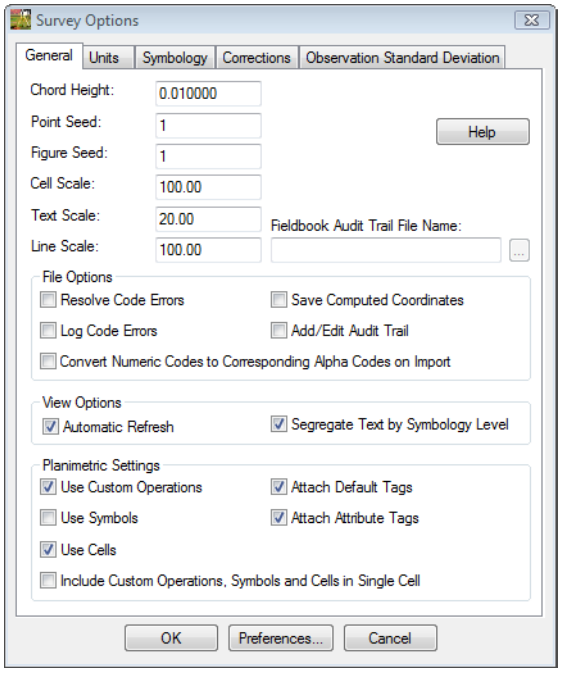
Lab 1.4 - InRoads Survey Options - Overview

The **Survey Options** dialog contains added preferences specific to the Survey commands. The file loaded from the **Project Defaults** dialog is ***CDOT-Survey_Preferences.fxp***

Section Objectives:

- Create an Audit Trail file.
- Setup up the Survey Options General tab.

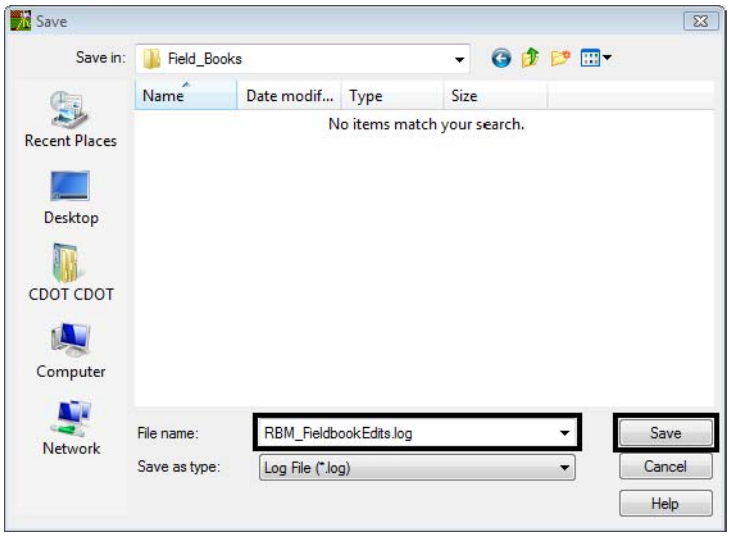
1. From the InRoads pull-down menu, select **Tools > Survey Options** the **Survey Options** dialog will appear.



Note: The first setting to look at will be the **Audit Trail**. The Audit Trail is useful for keeping track of any changes made to the Survey Fieldbook or Survey Feature Table.

2. Under the General tab move your cursor to the **Fieldbook Audit Trail File Name**: field and **<D>**. The Browse button will become active.

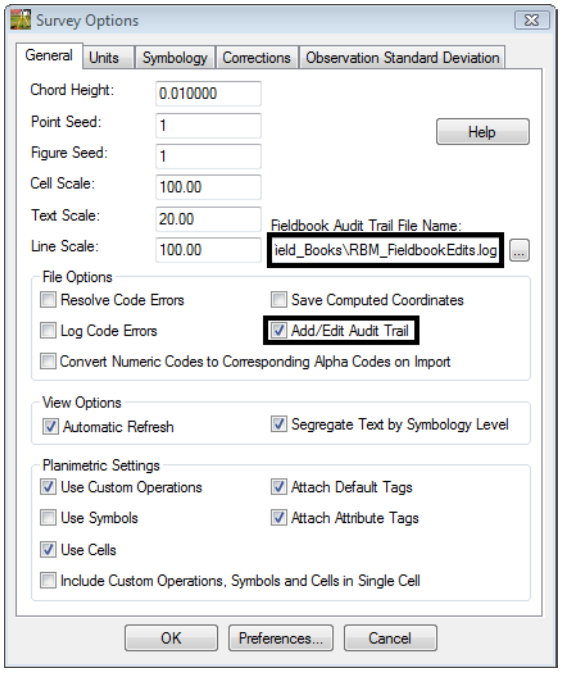
3. **<D>** the **Browse** button. The **Save** dialog will appear. Verify the correct directory, ***C:\Projects\12345\ROW_Survey\InRoads \Field_Books***



4. Key-in ***"UserInitials"_FieldBookEdits***

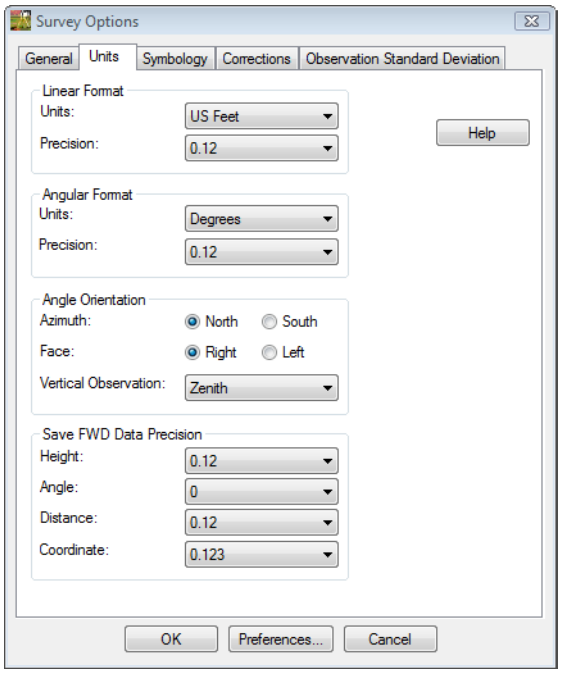
5. **<D>** the **Save** button. The Save dialog will close.

6. Check the box **Add/Edit Audit Trail** in the **File Options** section. All edits made will now be saved to the ***RBM_FieldBookEdits.log*** file.



Note: The Log file is a text file that can be opened and printed from Notepad.

7. **<D>** on the **Units** tab. Take a minute to review the settings and verify they are the same as the dialog below.



8. **<D>** on and review the tabs **Symbology**, **Corrections**, and **Observation Standard Deviation**.

9. From the **Survey Options** dialog **<D>** the **Save** then **OK** button.

   Note: The setup will not need to be done each time InRoads Survey is started. To demonstrate that, Exit out of the program.

10. From the **InRoads Survey** pull-down menu, select **File > Exit**. Nothing should need to be saved. If InRoads asks to save a file choose No.

11. From the **MicroStation** pull-down menu, select **File > Save Settings**. This will ensure when the file is opened in the next lab the cell library will be attached and view settings saved.

12. From the **MicroStation** pull-down menu, select **File > Exit**. By default MicroStation is always saving the design file so there is no reason to save the file. This will exit completely out of MicroStation.

Section Summary:

- In this lab an Audit Trail file was created to keep track of future edits to the fieldbook file.
- In this lab Survey Options were verified prior to importing any raw survey data.

LAB 2 - Working with InRoads Survey

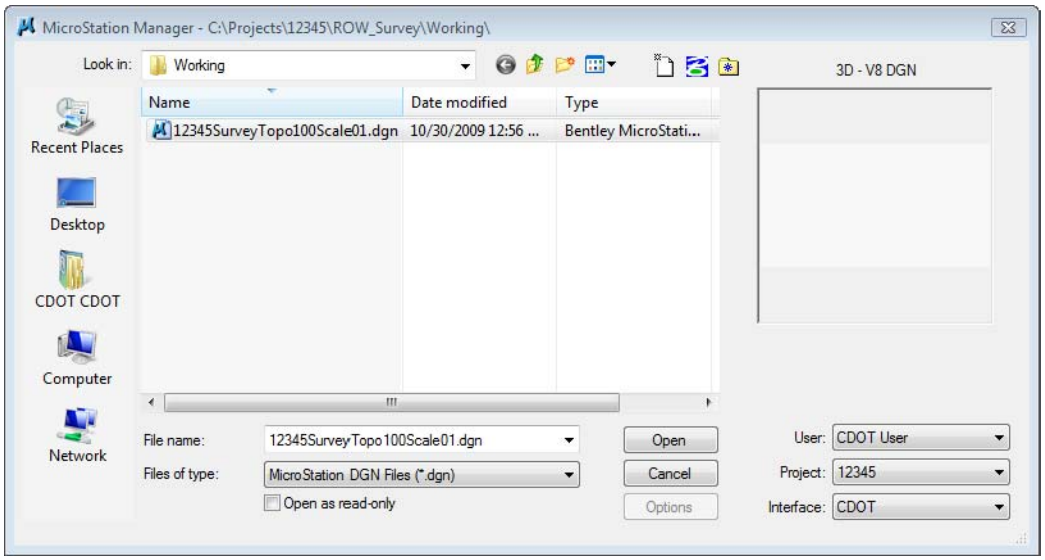
Lab 2.1 - Opening Survey Data

Start by viewing a survey fieldbook that is already complete.

Section Objectives:

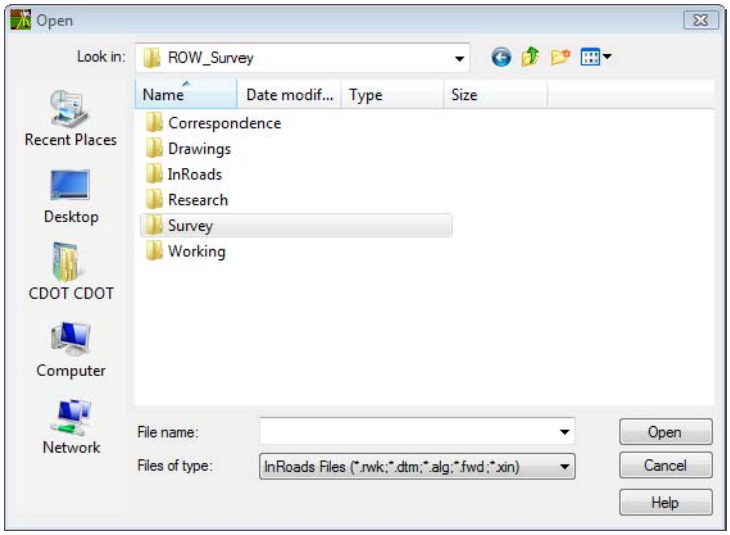
- Open a MicroStation file.
- Open an existing Survey Fieldbook.

1. Double-click on the InRoads Survey desktop button or select **Start > All Programs > Bentley > InRoads Group XM > InRoads Survey**.
2. In the **MicroStation Manager** dialog go to the Workspace group section and change
   - **User: CDOT User**
   - **Project: 12345**
   - **Interface: CDOT**

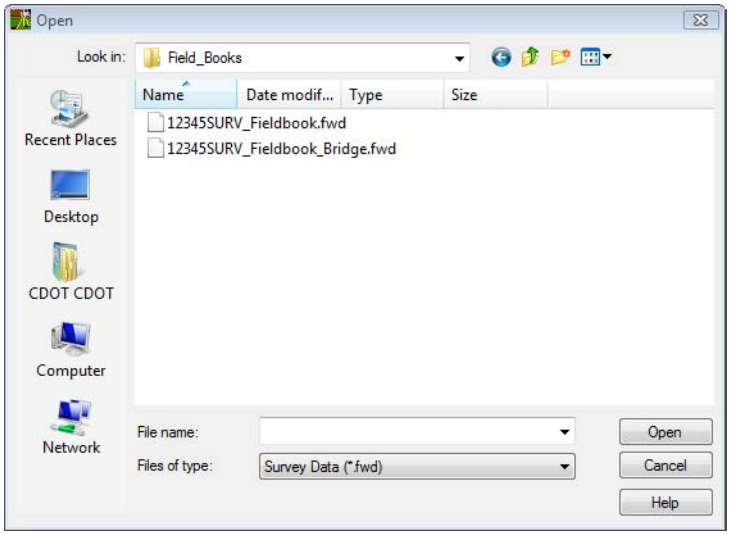


3. From the ***Working*** folder select the file ***C:\Projects\12345\ROW_Survey\Working\12345SurveyTopo100Scale01.dgn***
4. **<D>** the **OK** button or double click the filename.

5. From the InRoads Survey pull-down **File > Open**. The **Open** dialog will appear.



6. From the **Open** dialog change the Files of Type to **Survey Data (*.fwd)**.



Note: Notice how the directory folder changed to **Field_Books** when the Files of type changed. This is one of the benefits of setting up the Project Defaults for each discipline.

7. Select the file
C:\Projects\12345\ROW_Survey\InRoads\Field_Books\12345SURVFieldbook01.fwd

8. **<D>** the **Open** then **Cancel** buttons.

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

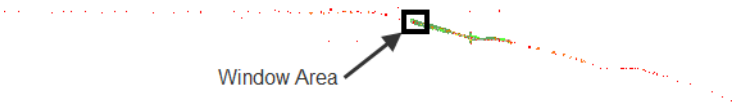
Lab 2.2 - CAD vs. Fieldbook Viewing

Take a look at the InRoads Survey interface; notice the two files loaded in the Survey tab. The file with the red box around the button is the active file. Any commands that are selected will use the active file.

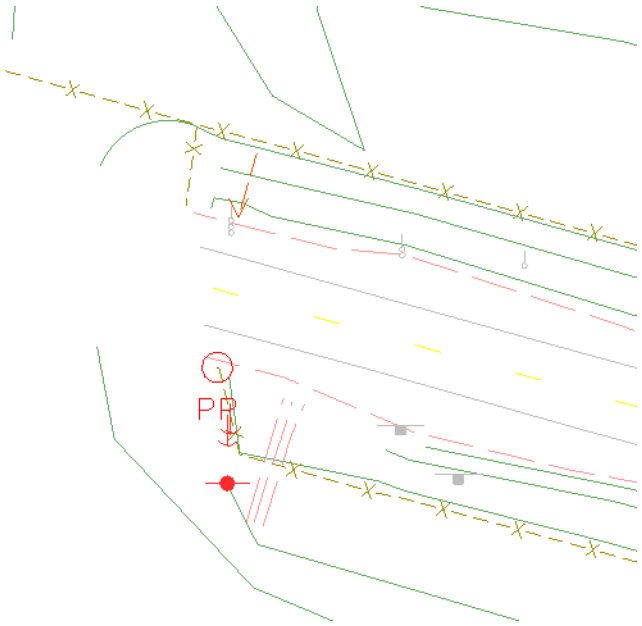
Section Objectives:

- View a fieldbook in the Survey Information Window.
- View the survey data in the MicroStation view.
- Fit the Survey data in a MicroStation view.
- Use the shortcut menus in the Interface.

1. Use your cursor and **<D>** on the default Survey fieldbook **Book 1**.
2. **<R>** on ***Book 1*** and from the fly out menu select **Set Active**. Notice how the red box moved to ***Book 1*** this indicates the active fieldbook.
3. **<R>** on ***12345SURVFieldbook01*** and from the fly out menu select **Set Active** and make that the active fieldbook book again.
4. Fit the survey data to the view from the pull-down **Survey > Fit View** the entire fieldbook will be displayed in the active view.

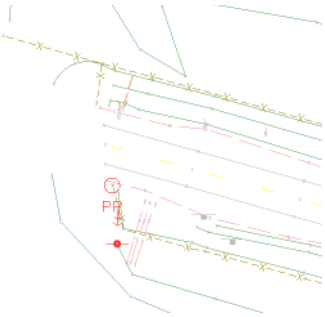


5. Use the MicroStation viewing tools to zoom to the west end of the project.

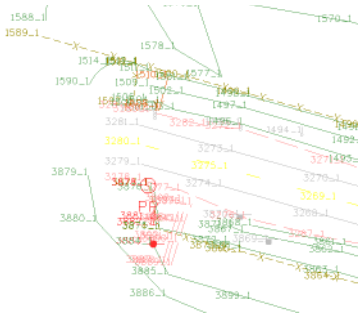


6. Investigate the viewing options of the Survey data. From the pull-down menu toggle the display on and off for:

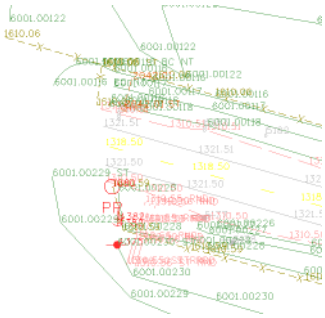
   - **Survey > View Survey Data > Planimetrics**
   - **Survey > View Survey Data > Symbols**
   - **Survey > View Survey Data > Names**
   - **Survey > View Survey Data > Codes**
   - **Survey > View Survey Data > Elevations**
   - **Survey > View Survey Data > Errors**
   - **Survey > View Survey Data > Notes**
   - **Survey > View Survey Data > Networks.**
   - Ignore **Write Survey Data to Graphics** for now.



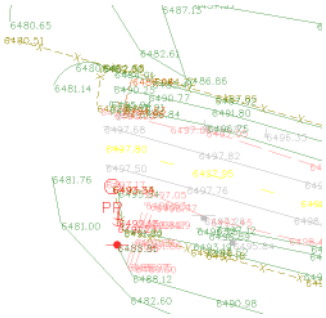
Symbols



Names



Codes



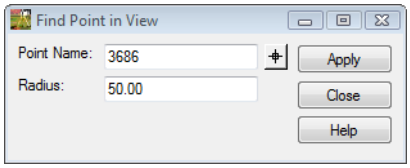
Elevations

7. Also practice viewing different combinations of data using the **View Survey** toolbar. Ignore **Write Survey Data to Graphics** for now.

Note: The survey data that is viewed is dynamic. Nothing is actually in the MicroStation design file. Control of the size of the dynamic text for Point Name, Elevation, and Code etc. from the Survey Options Text Symbology tab.

8. From the pull down menu **Survey > Find Point in View** the **Find Point in View** dialog will appear.

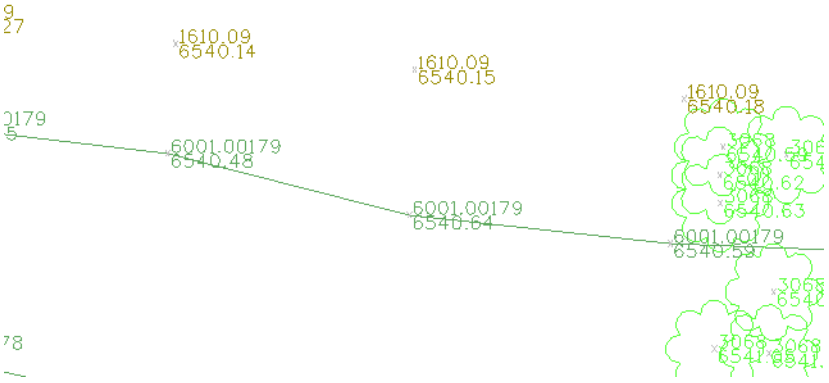
9. Type in the field Point Name: **3686** Radius: **50**



10. **<D>** the **Apply** button. The MicroStation view is updated and zoomed into point number 3686.

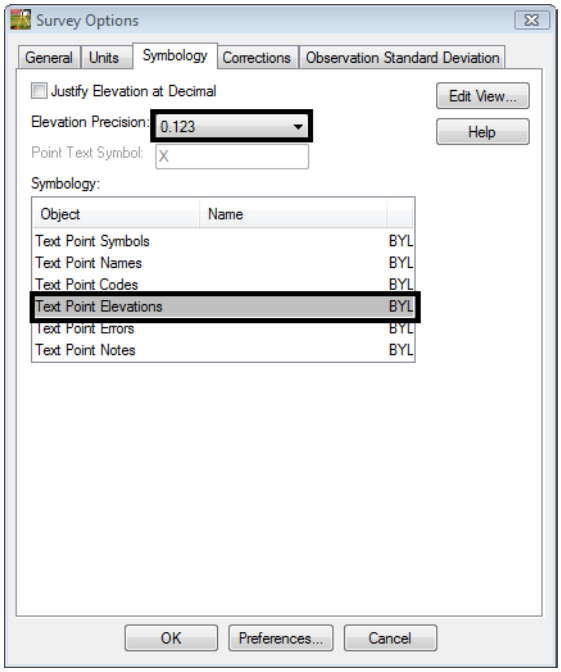
11. **<D>** the **Close** button in the **Find Point in View** dialog.

12. Toggle on **View Planimetrics**, **View Symbols**, **View Codes** and **View Elevations.**



13. From the pull-down menu, select **Tools > Survey Options** the **Survey Options** dialog will appear.

14. Select the **Symbology** tab.

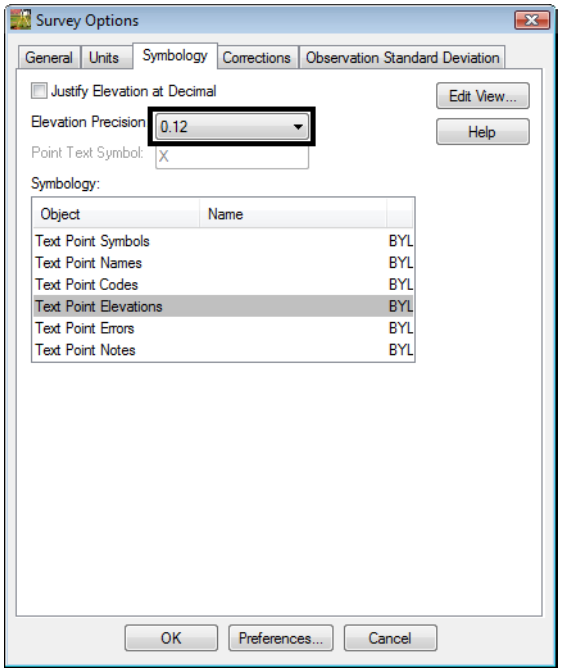


15. In the **Survey Options** dialog select the **Text Point Elevations**

16. In the Precision drop down list select .**123**. Then select the **Save** button. The elevations will update in the MicroStation view.

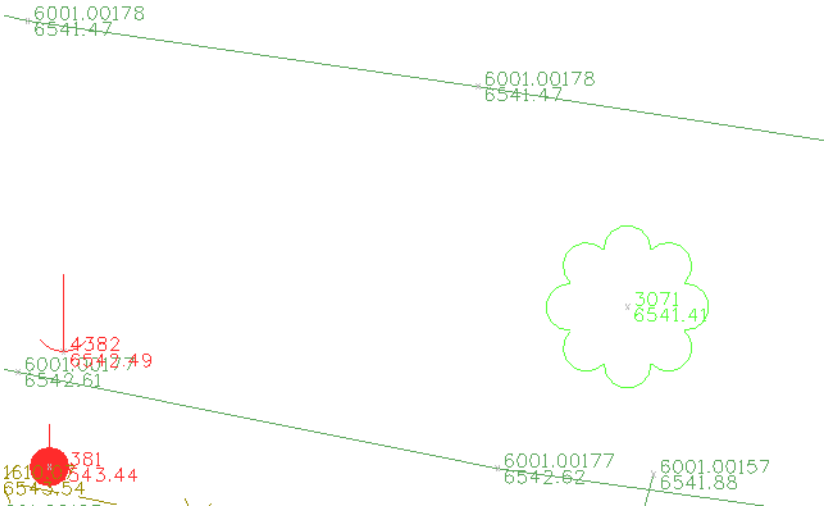
17. Review your results.

18. Set the Elevation precision back to **.12**



19. **<D>** the **Save** and **OK** buttons. The **Survey Options** dialog will close.

20. Use the MicroStation view commands to zoom in, out, and pan the view.



Note: Notice how the text changes size and remains legible based upon the zoom ratio.

21. **<D>** MicroStation **Fit View**. In the lower left hand corner of MicroStation the status bar states **No Elements Found**.

    Note: MicroStation Fit View command does not work because graphics displayed are ***dynamic*** graphics, not graphics written to the CADD file.

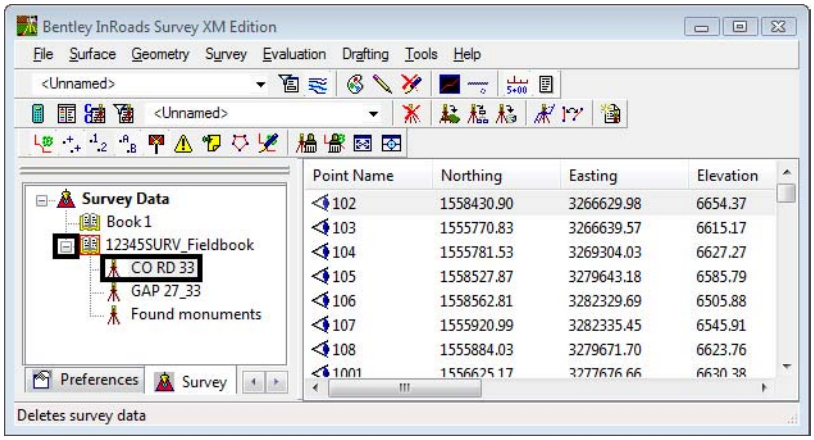
22. From the pull-down menu, select **Survey > Fit View** or use **Fit View** button from the **View Survey** toolbar.

23. Continue to **Pan**, **Zoom** and **Fit** the survey data until it is comfortable.

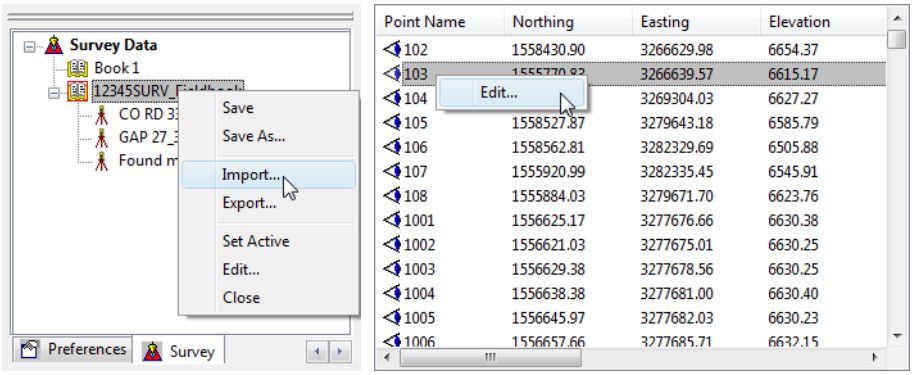
24. Continue to toggle Survey display data on and off as needed.

25. Explore the InRoads interface. **<D>** the "**+**" **(expand)** button next to the Survey data ***12345SURVFieldbook01.fwd***.

26. The workspace bar will display the Station names. Select the Station name at the top **CO RD 33**. When the Station name is selected the Observations from that Station will display in the Information Window pane.



27. Continue to explore the **12345SURVFieldbook01** Survey Data. Experiment right clicking in the different areas of the interface to find different useful shortcut menus.



Lab 2.3 - Viewing the Fieldbook Data

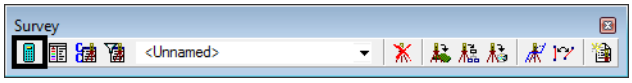
Open and explore some of the basic features of the electronic fieldbook. The Fieldbook will be covered in greater detail later in the manual.

Section Objectives:

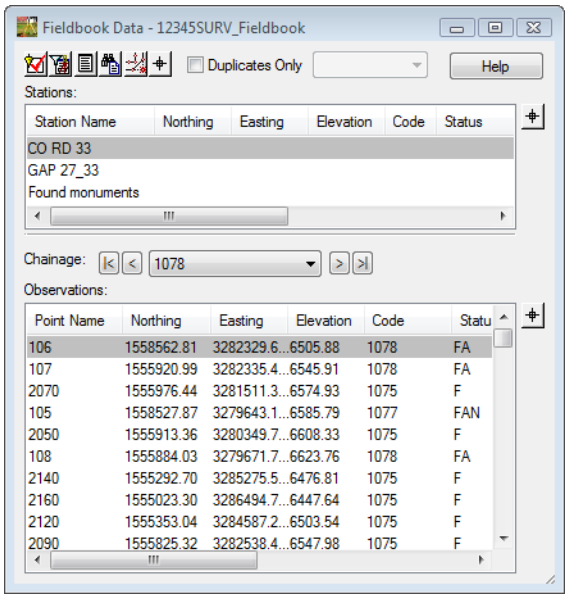
After completing this exercise you will know how to:

- Open the **Fieldbook** dialog.
- Find points in the **Fieldbook** dialog.
- Use the shortcut menus in the **Fieldbook** dialog.
- Use the Select Figure button.
- Use the chainage tool in the **Fieldbook** dialog.

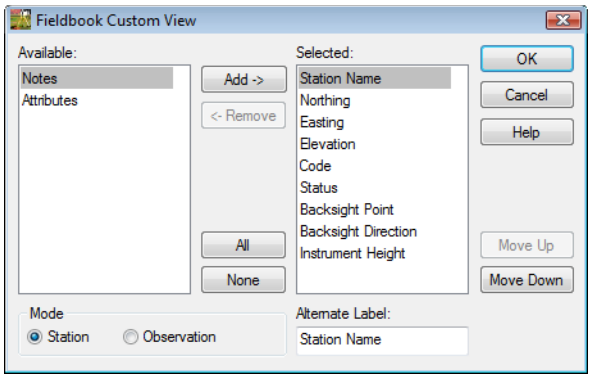
1. **<D>** the **Fieldbook** button from the Survey toolbar. The Survey Fieldbook will appear.



2. Take a minute to review the electronic Fieldbook.



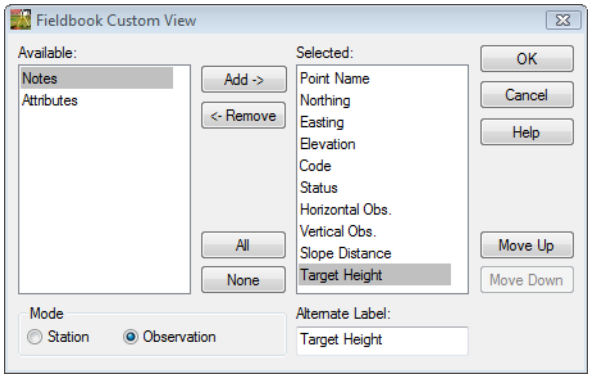
3. In the column headers of the Stations **<R>** on the Station Name. The **Fieldbook Custom View** dialog will appear.



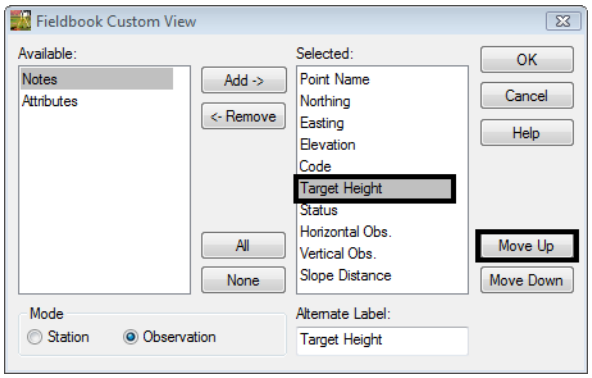
Note: This dialog allows the order of the columns to be customized in the Fieldbook.

4. In the **Mode** section of the dialog **<D>** on the **Observation** radio button.

5. Select **Target Height** in the **Selected**: section on the right side.

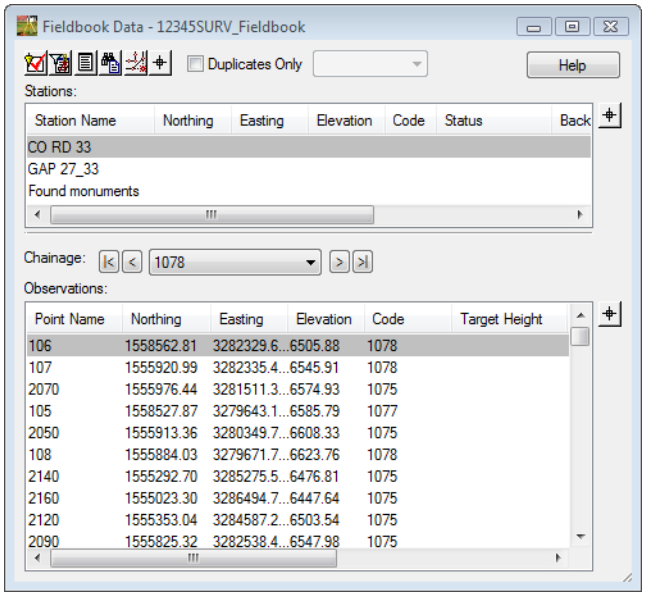


6. **<D>** the **Move Up** button until ***Target Height*** rests under the ***Code***.



7. **<D>** the **OK** button. The **Fieldbook Custom View** dialog will close.

8. **Resize** the Fieldbook so the column change for ***Target Height*** is in the view.

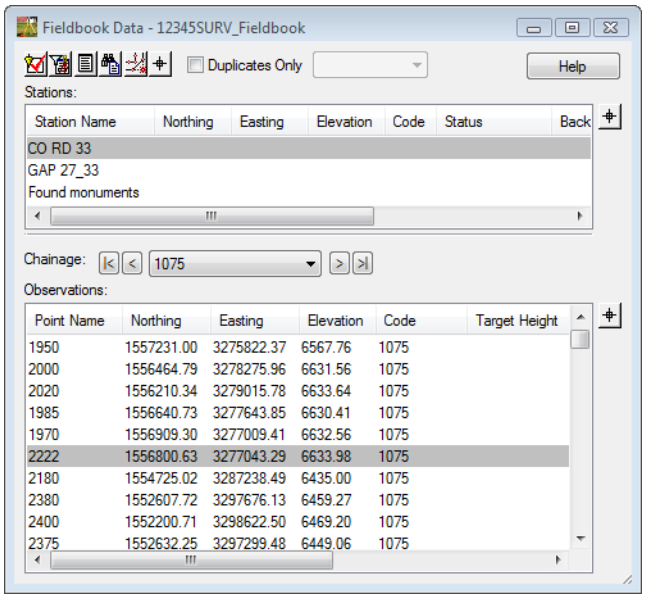


9. From the View Survey toolbar turn on only **View Planimetrics** , **View Symbols** , and **View Names** . Turn off all other View Survey Data commands.

10. **Select** Station Name **CO RD 33** in the top half of the **Fieldbook Data** dialog. Notice that the bottom half of the dialog updated with the observations collected from that instrument setup.

11. **Select** Point Name **2222** in the bottom half of the **Fieldbook Data** dialog.

    - Use dialog scroll bars or
    - Intelli-mouse wheel or
    - Page Up or Page Down keys or
    - Up or Down arrow keys



12. **Right click** on Point Name **2222** to access the shortcut menu. Select **Center** from the available list. Look in your MicroStation view Point Name ***2222*** is centered in ***View 1***.

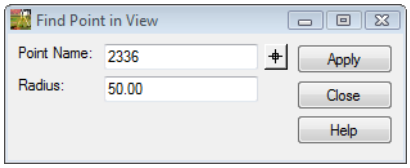
    Note: Center only centers the point to the active view zoom ratio. It may be necessary to zoom in closer and re-center from the shortcut menu.

13. Added Practice

    - **Find** and **Center** Station Setup ***GAP 27_33***
      Point Name ***107***
    - **Find** and **Center** Station Setup ***Found monuments***
      Point Name ***1088_2***

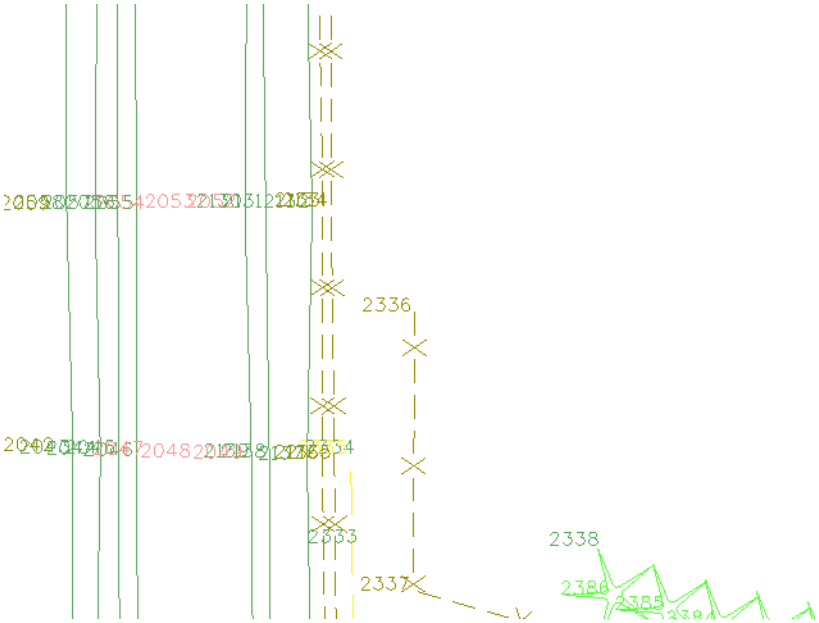
14. From the pulldown menu **Survey > Find Point in View** the **Find Point in View** dialog will appear.

15. Type n the field Point Name: **2336** Radius: **50**

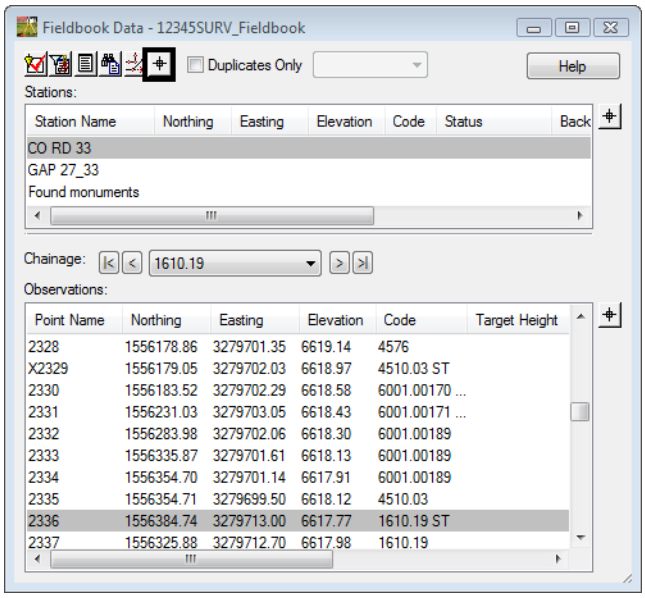


16. **<D>** the **Apply** button. The MicroStation view is updated and zoomed into point number ***2336***.

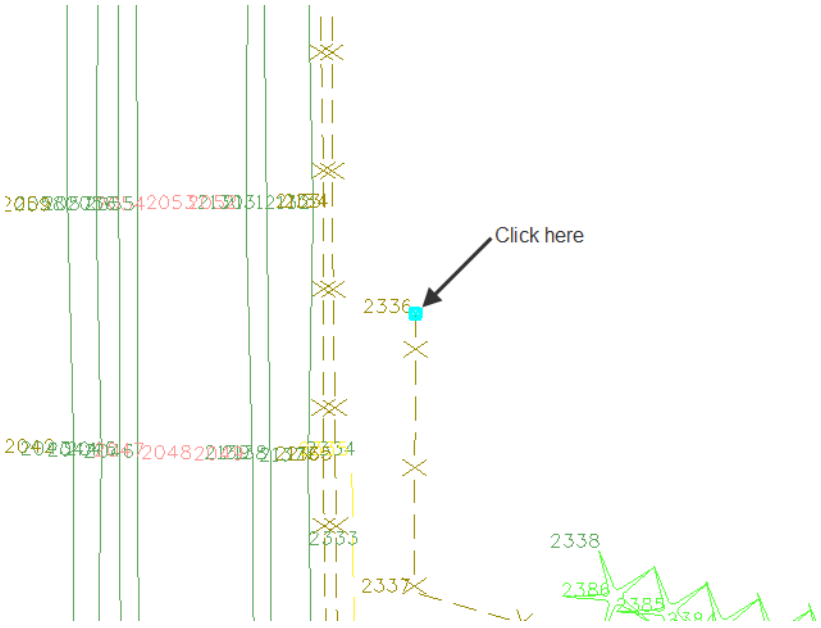
17. **<D>** the **Close** button in the **Find Point in View** dialog.



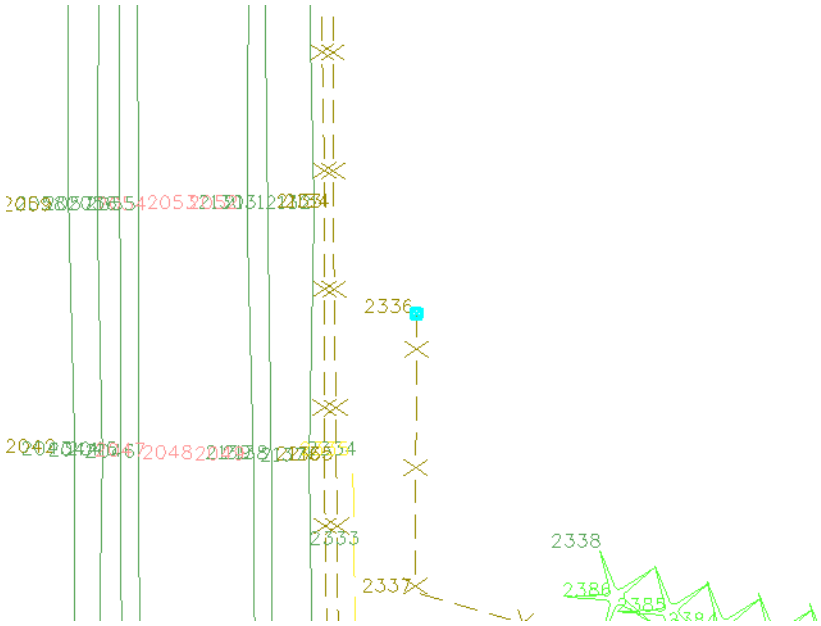
18. From the **Fieldbook Data** dialog **<D>** the **Select Figure** button. The **Fieldbook Data** dialog will contract allowing more screen space to make a selection.



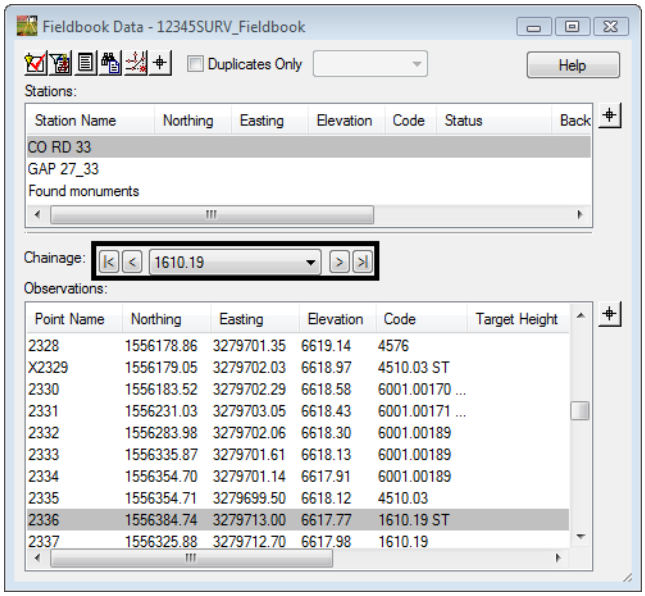
19. Select **<D>** at the start of the fence line. The **Fieldbook Data** dialog will expand with point name 2336 selected.



20. In the **Fieldbook Data** dialog **<R>** point name **2336** to access the shortcut menu and select **Highlight Observations**. Notice at the start of the line segment the **Box-X** in MicroStation View 1.



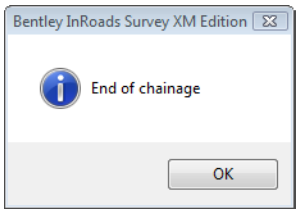
Note: In the middle of the **Fieldbook Data** dialog there is an option to follow a chainage. A chainage is a good way to follow a planimetric feature in the fieldbook and in the view.



21. Use the chainage buttons

    - **First** **Previous** **Next** and **Last** to follow the fence line chain. Notice the Highlighted Box-X that follows each point along the chain. As the point continues outside the current view the point becomes centered in the MicroStation view.

22. When the end of the chainage is reached **<D>** the **OK** button.

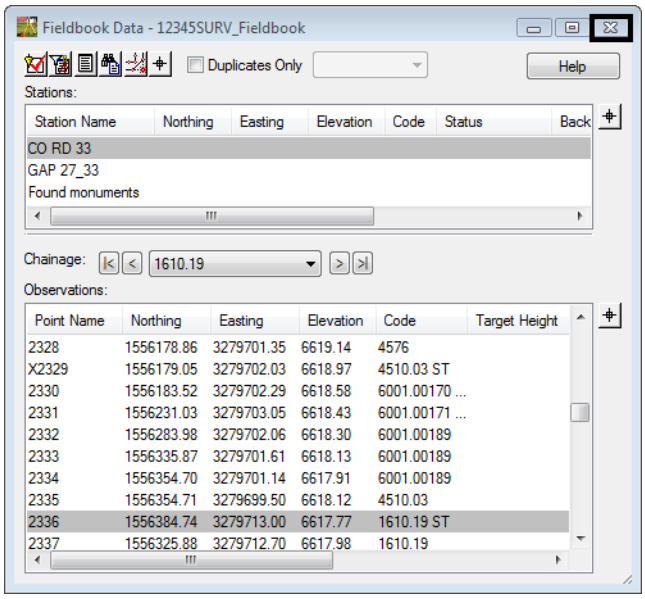


23. Added practice

    - From the west end of the project.
        - Follow the chainage for a code ***1310*** Edge of Oil
        - Follow the chainage for a code ***6001*** Terrain Breakline

    Note: When having difficulty locating any chains try selecting the line segment instead of the start or end points.

24. Close the **Fieldbook Data** dialog by clicking the **X** in the upper right hand corner of the dialog.



Summary:

- In *Lab 2.1 -Opening Survey Data* the existing MicroStation file and InRoads Survey Fieldbook file was opened.
- In *Lab 2.2 -CAD vs. Fieldbook Viewing* the fieldbook data was viewed in the MicroStation view.
- In *Lab 2.3 -Viewing the Fieldbook Data* the data in the fieldbook dialog was explored.

LAB 3 - Feature Codes and Control Codes

Lab 3.1 - Viewing Survey Feature Table

The Survey Feature Table controls how the graphics are displayed on the screen. These settings are the CDOT standard changes should not be made to the file. However, it is a good to understand what controls the display of the survey data and how the data is interpreted.

Section Objectives:

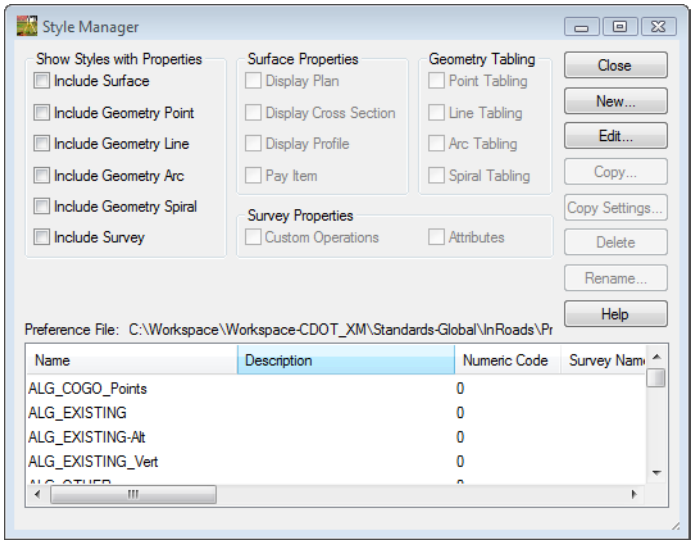
- Open the Style Manager dialog.
- Use the Survey Properties option to narrow a lookup.
- Review Control Codes settings.

1. Launch InRoads Survey if it is not already;

   a. Open ***12345SurveyTopo100Scale01.dgn*** from the ***Working*** folder.

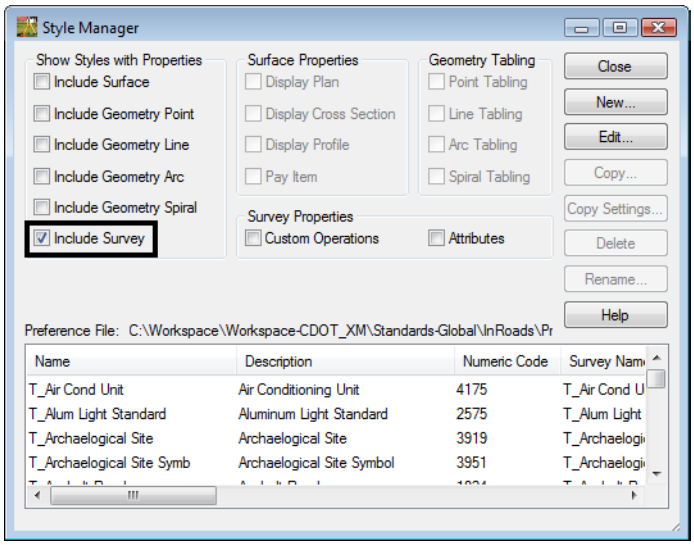
   b. Open ***12345SURV_Fieldbook.fwd*** from the ***Field_Books*** folder.

2. From the InRoads Survey pull-down menu, select **Tools > Style Manager**. The ***Style Manager*** dialog will appear.

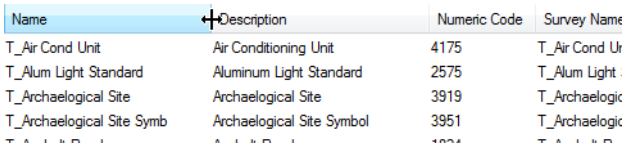


3. Take a minute to scroll through the list of **Names**. Using the scroll bars on the side or using your roller on the mouse.

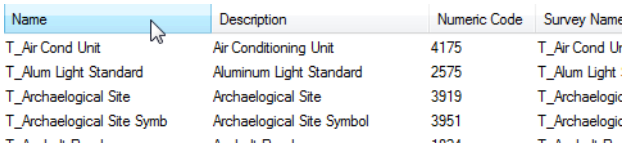
4. In the Show Styles with Properties section of the dialog ***Check* ON *Include Survey***. The list of Names is filtered to show only the Feature Styles that are used in Survey. Survey Feature Styles typically begin with "***T_***".



5. Move your cursor to the ***Name*** and hold on the gray line in the gray title bar between ***Name*** and ***Description***. Your cursor will change appearance to a vertical line and arrows, allowing each column in the Feature Table to be resized.



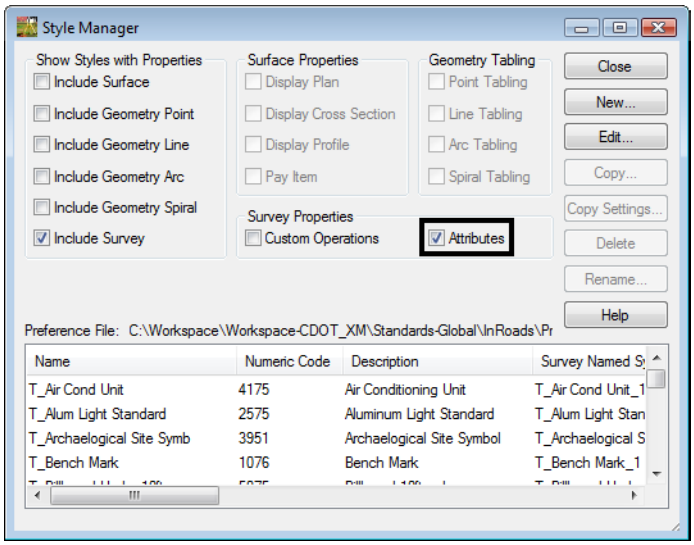
6. Move the cursor to the ***Name*** and **<D>** on the column heading **Name**. This will resort all the definitions in ascending or descending order.



7. **<D>** on the ***Numeric Code*** column twice to sort the codes in ascending and descending order.

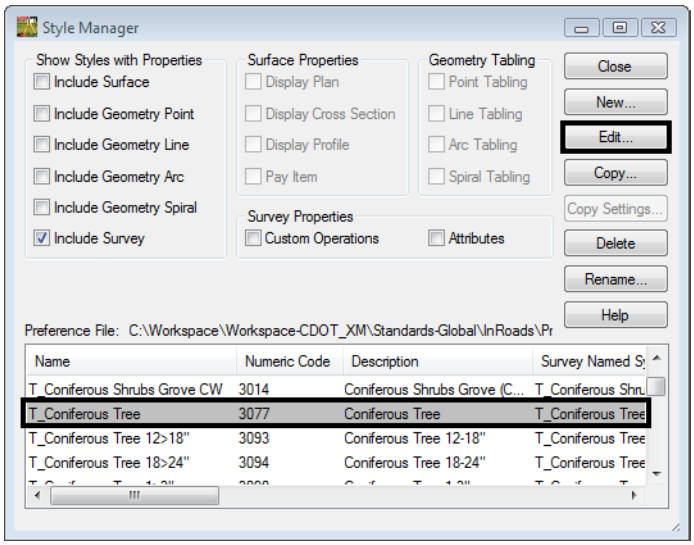
8. **<D> Hold** and **Drag** on the ***Numeric Code*** column, move it next to the ***Name*** column.

9. In the ***Survey Properties*** section ***Check* ON Attributes**. Notice how the feature list filters and displays only the survey features that have an attribute defined.



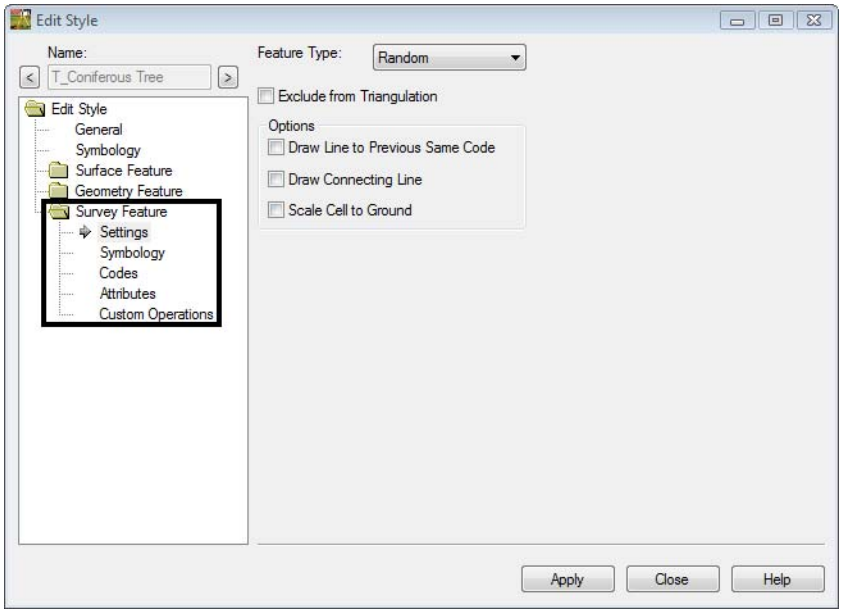
10. ***Check* OFF** the option **Attributes** to see all the codes again before continuing.

11. Locate the ***Style Name* T_Coniferous Tree *Numeric Code* 3077** in the Style Manager dialog.



12. **<D>** the name and then **<D> Edit** button. The ***Edit Style*** dialog will appear.

13. **<D>** the **Survey Feature** leaf additional sub categories will appear.



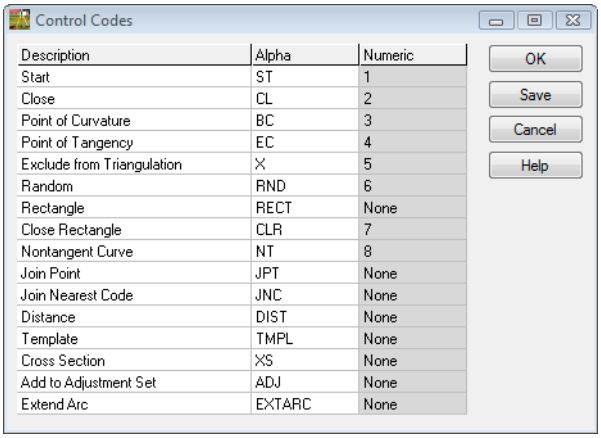
14. **<D>** the sub categories under ***Survey Feature*** and review the setings. DO NOT make any changes.

15. When finished **<D>** the **Close** button do not apply or save any changes.

16. **<D>** the **Close** button in the ***Style Manager*** dialog. Do not save any changes.

17. From the InRoads Survey pull down select **Survey > Control Codes**. The Control Codes dialog will appear.

18. Review the Control Codes refer to the reference material for explanation of the codes.



19. **<D>** the ***Cancel*** button. The ***Control Codes*** dialog will close not saving any changes.

Section Summary:

- In this lab the Style Mannger was opened and the settings were explored.
- In this lab the Control Codes dialog was opened.

LAB 4 - Exporting the Fieldbook - Overview

Lab 4.1 - Exporting Survey Data to Graphics - Overview

InRoads Survey can export the fieldbook in 3 different formats. These formats are CAD graphics, Surfaces, and Alignments. Begin by exporting graphics to a MicroStation DGN file. This will create a basemap to be used and referenced by the designers.

Section Objectives:

- Know what to modify in Survey Options prior to exporting.
- Export a Survey Fieldbook to a design file.
- Know the difference between CAD and Fieldbook viewing.
- Work with Survey levels and level filters.

1. Launch InRoads Survey if it is not already;

   a. Open ***12345SurveyTopo100Scale01.dgn*** from the ***Working*** folder.

   b. Open ***12345SURV_Fieldbook.fwd*** from the ***Field_Books*** folder.

2. Disable the display of any dynamic graphics shown on the screen.

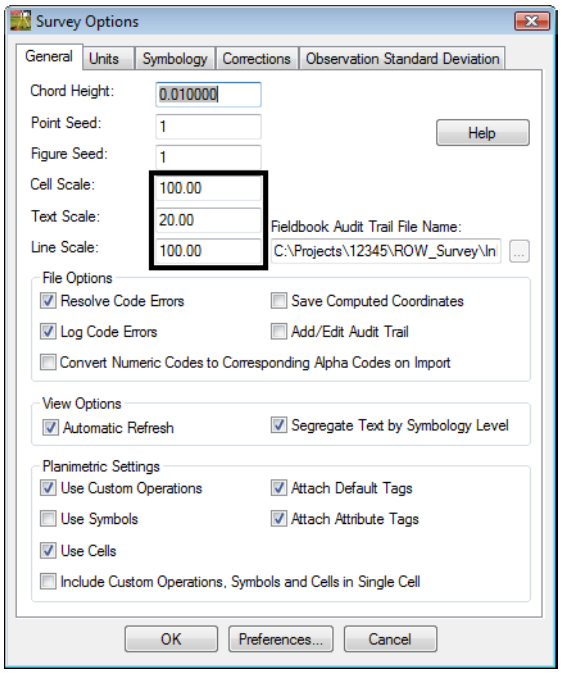
   Toggle on **View Planimetrics** button turn off any other symbols, names, codes, etc. that may have enabled.

3. Verify the ***12345SURV_Fieldbook.fwd*** fieldbook is active. The fieldbook that is active has the red box around the fieldbook button.

4. To modify the scale as it relates to cells, text, and linestyles go to **Tools > Survey Options > [General]**. The ***Survey Options*** dialog will appear.

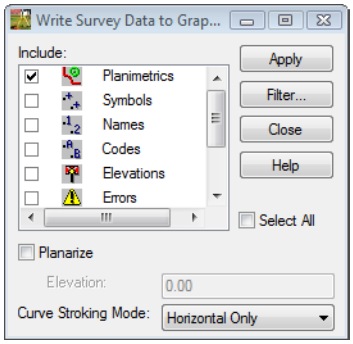
5. Set the Scales for ***Cell***, ***Text***, and ***Line*** as shown below.

   - Cell Scale:**100**
   - Text Scale:**20**
   - Line Scale:**100**



6. **<D>** the **OK** button. The ***Survey Options*** dialog will close.

7. Once the settings are complete, to write the survey data to graphics, go to the InRoads pull down menu **Survey > View Survey Data > Write Survey Data to Graphics…** the ***Write Survey Data to Graphics*** dialog will open.

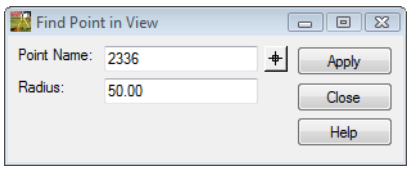


Note: By default having any dynamic graphics still toggled on, those same components would be toggled on in the Write Survey Data to Graphics dialog.

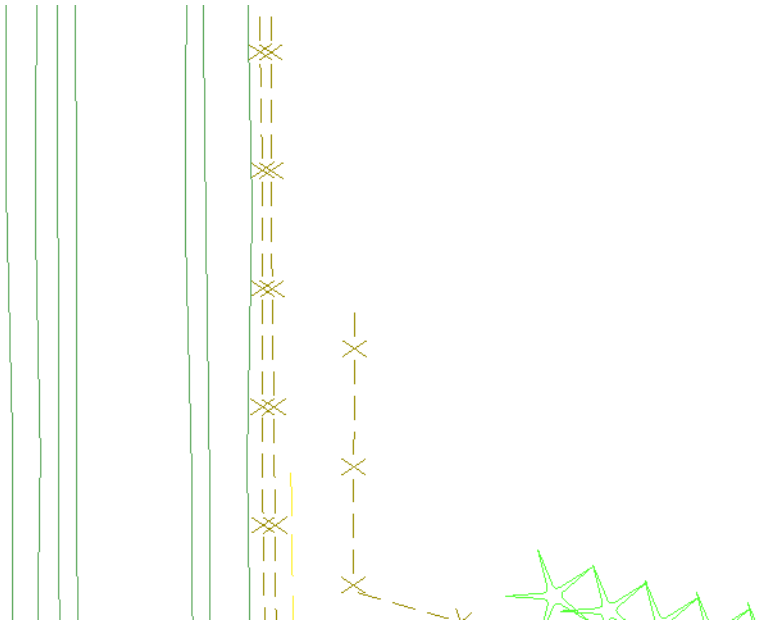
8. Set Curve Stroking: **Horizontal Only**

9. **<D>** the **Apply** button. The graphics will be created in the design file.
10. Watch the **Status Bar** as the graphics are written to the design file.
11. **<D>** the ***Close*** button in the ***Write Survey Data to Graphics*** dialog.
12. Toggle off all View Survey buttons.

13. From the InRoads Survey pull-down **Survey > Find a Point in a View** the ***Find a Point in a View*** dialog will appear.



14. Key-in Point Name: ***2336***
15. Key-in Radius: ***50***
16. **<D>** the ***Apply*** button. The MicroStation view will center to shot number ***2336***.



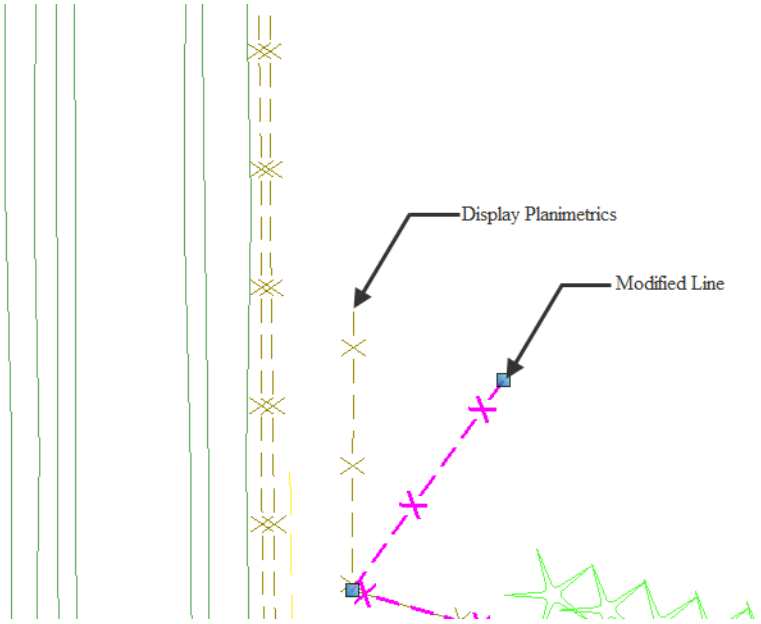
Note: The graphics displayed are MicroStation elements written to the design file. The graphics become independent from the survey data. There is no linkage from the MicroStation graphics back to the survey data. Therefore it is important to remember that if changes to the survey data are made, the survey data will need to be rewritten to the CAD file after editing.

To demonstrate this concept, use MicroStation tools to manipulate the displayed survey graphics.

17. Delete, move, or otherwise modify the on-screen graphics.

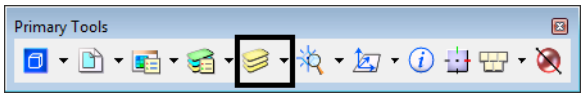
18. Review the survey fieldbook to verify data integrity.

19. Toggle on dynamic display of **Planimetrics** Notice the location of the fieldbook data vs. the modified MicroStation graphics.

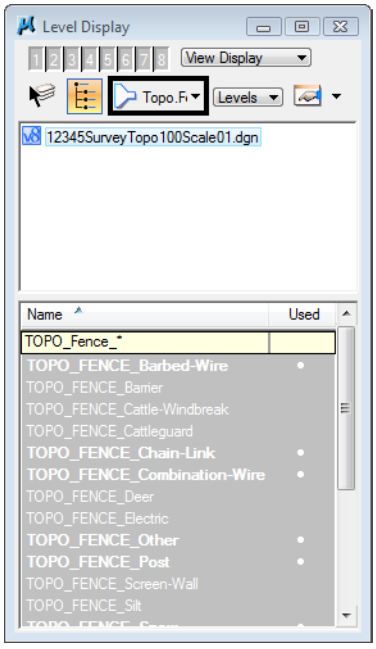


20. Toggle off dynamic display of **Planimetrics**

21. From the MicroStation ***Primary Tools*** toolbar **<D>** the **Level Display** dialog. The ***Level Display*** dialog will appear.

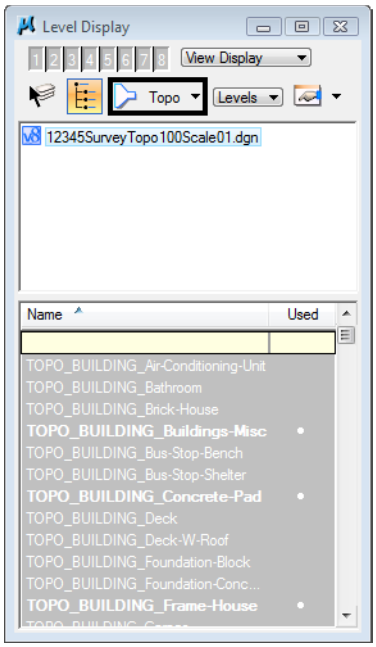


22. From the filters pull-down select the **Topo > Fence** filter.



23. Practice turning **ON** and **OFF** the fence levels in MicroStation.

24. From the filters pull-down select the **Topo** filter. This will help when viewing only the levels that pertain to the survey data.



Added practice:

- Sort the ***Name*** and ***Used*** columns by clicking on them.
- Right click on the level names to view the level popup options. Practice using these shortcuts.

25. Close the ***Level Display*** dialog.

Lab 4.2 - Exporting Survey Data to Surface Overview

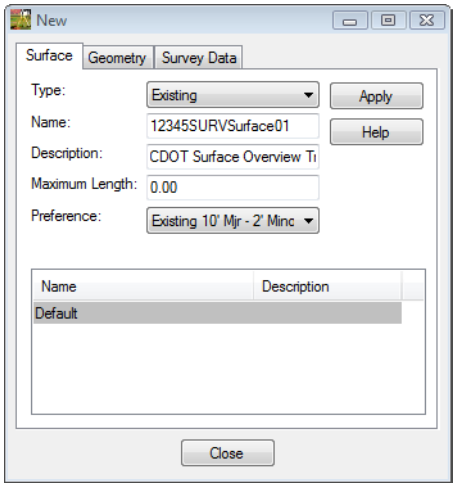
Exporting to a surface DTM will create a triangulation network used for displaying contours, features and spot elevations.

Section Objectives:

- To export a Survey Fieldbook to a Surface DTM file.
- Triangulate a surface.
- Set the surface property for display.
- Save a Surface DTM file.

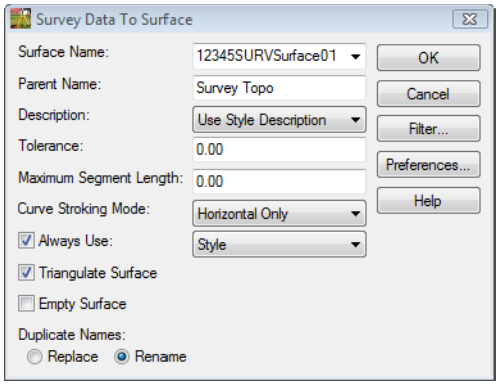
1. Verify the ***12345SURV_Fieldbook*** fieldbook is active. The active fieldbook will have a red box around the fieldbook button.
2. From the pull-down menu, select **File > New**. The ***New*** dialog will appear.
3. Select the **Surface** tab.
4. Key in the surface Name: ***12345SURVSurface01***
5. Key in the Description: ***CDOT Surface Overview Training***

   Note: Key in any additional file information in the ***Description*** field of the dialog, such as ***Date***, ***User***, and ***Design file*** name. There are up to 64 characters available in the Description field.
6. Keep the ***Maximum Length*** set to ***0.00***
7. Set ***Preferences***: **Existing 10' Mjr – 2' Minor**

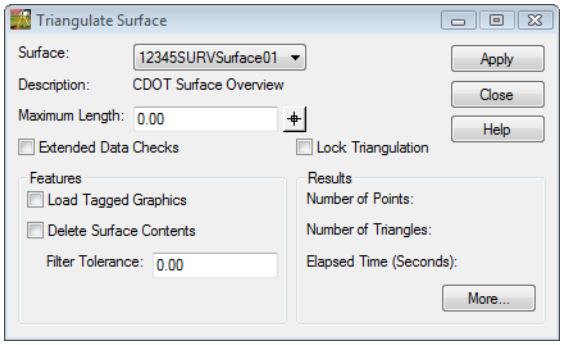


8. **<D>** the **Apply** then **Close** buttons.

9. From the pull down menu **Survey > Survey Data to Surface**. The ***Survey Data to Surface*** dialog will appear.
10. Pick **12345SURVSurface01** in the ***Surface Name*** field.
11. Set the ***Description*** to **Use Style Description**
12. Keep the ***Tolerance*** and ***Maximum Segment Length*** set to **0.00**
13. Set the ***Curve Stroking Mode*** to **Horizontal Only**
14. Check ***Always Use***: **Style**
15. Check **Triangulate Surface**

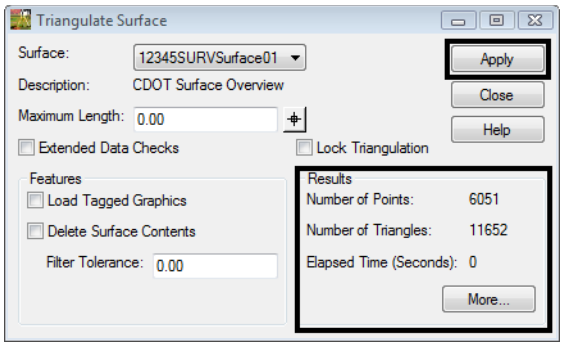


16. **<D>** the **OK** button and the ***Triangulate Surface*** dialog will appear.

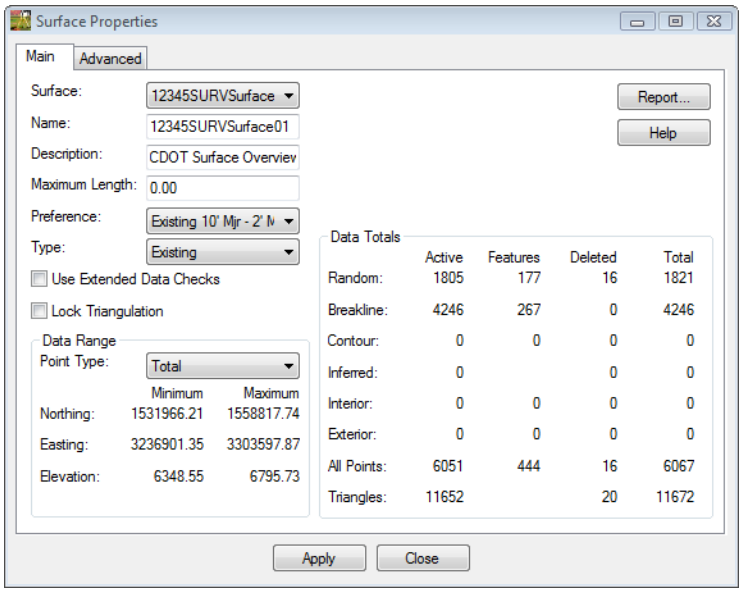


17. Leave all settings unchecked. ***Maximum Length*** should be set to **0.00.**

18. **<D>** the **Apply** button. The ***Results*** section of the dialog should look similar to the image below.



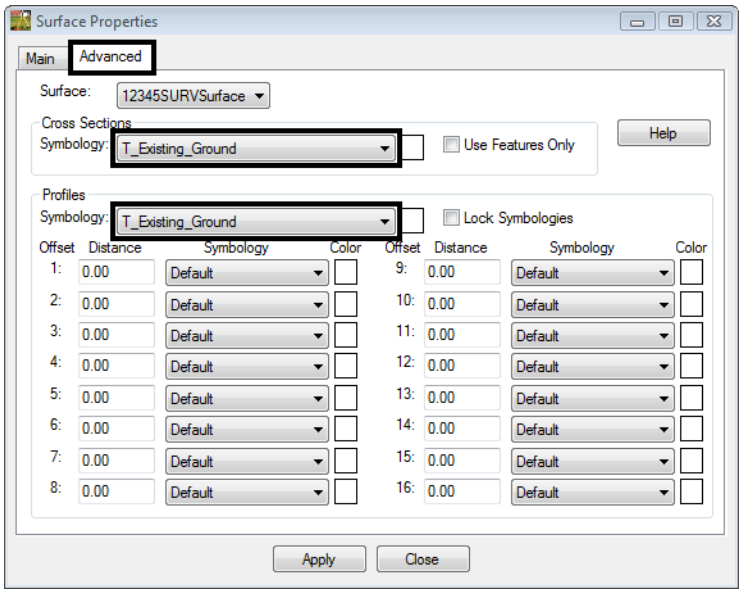
19. **<D>** the **More** button. The ***Surface Properties*** dialog will appear.



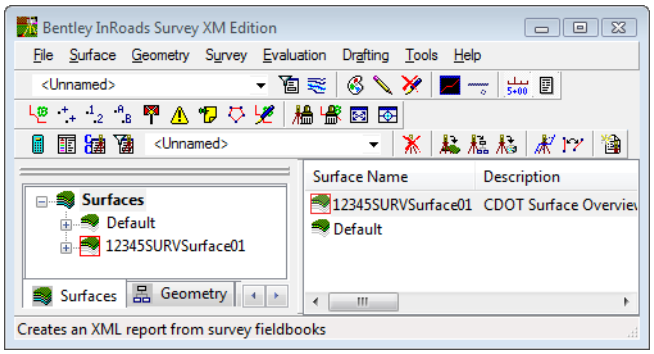
20. Verify the correct surface is being used **12345SURVSurface01**.

21. Review the section for ***Data Range***. The Easting, Northing, and Elevation values should fall within the project limits.

22. **<D>** the **Advanced** tab.
23. In the Cross Sections Section select ***Symbology*: T_Existing Ground**
24. In the Profiles section select ***Symbology*: T_Existing Ground**



25. **<D> Apply** then **Close** buttons in the ***Surface Properties*** dialog.
26. **<D>** the **Close** button in the ***Triangulate Surface*** dialog.
27. Use the ***Workspace Bar*** pane scroll ***arrows*** to view the **Surfaces** tab.

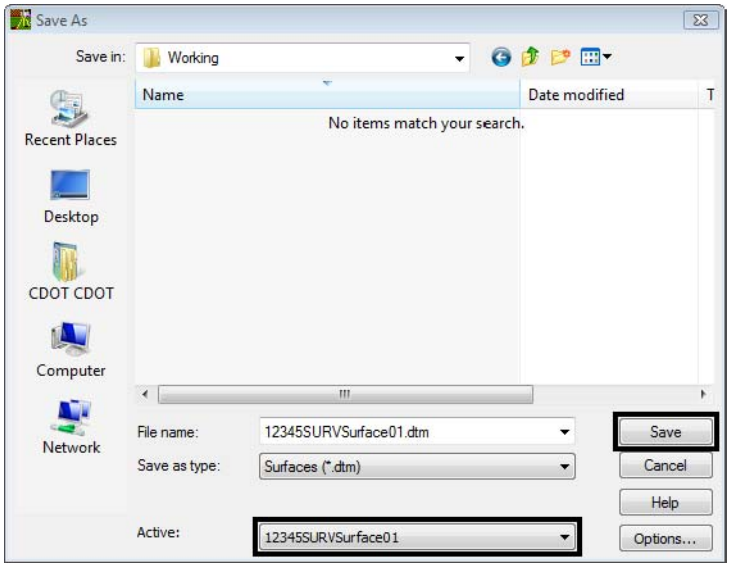


28. Verify ***12345SURVSurface01*** is the active surface.

Note: To change the active surface from the pull-down menu **Surface > Active Surface**; highlight the surface name and **<D>** the **Apply** button.

29. From the InRoads pull down menu select **File > Save > Surface**. The **Save As** dialog will appear with the **Save as type** set to **Surfaces (*.dtm)**.

30. Verify the correct project directory ***C:\Projects\12345\ROW_Survey\Working***



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

    Note: Ensuring that the saved Surface name in the project folder matches the Surface name displayed in InRoads explorer will minimize any confusion.

32. **<D>** the **Save** then **Cancel** buttons. The file will be saved to disk and the ***Save As*** dialog will close.

Lab 4.3 - Exporting Survey Data to Geometry Overview

These steps show how to export the electronic fieldbook to a Geometry Project or ALG file. Exporting to an ALG file will create horizontal and vertical alignments. InRoads refers to all exported topographic strings as alignments. InRoads will also write all survey shot locations to the Cogo buffer. The alignments and Cogo points will then be available for use for Right-Of-Way or design purposes.

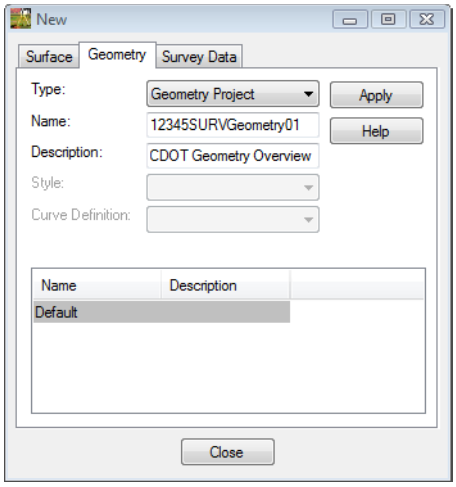
Section Objectives:

- To export a Survey Fieldbook to a Geometry Project.
- To view the geometry project in the InRoads interface.
- To save a Geometry Project.

1. Verify the ***12345SURVFieldbook01*** fieldbook is active. The fieldbook that is active has the red box around the fieldbook button.

2. From the pull-down menu, select **File > New**. The ***New*** dialog will appear.

3. Select the **Geometry** tab.



4. From the type pick list verify the ***Type***: **Geometry Project**

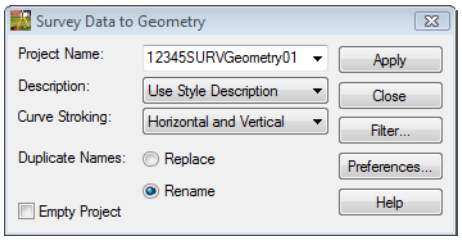
5. Key in the geometry ***Name***: ***12345SURVGeometry01***

6. Key in the ***Description***: ***CDOT Geometry Overview Training***

   Note: Key in any additional file information in the ***Description*** field of the dialog, such as **Date**, **User**, and **Design file** name. There are up to 79 characters available in the Description field.

7. **<D>** the **Apply** and **Close** buttons.

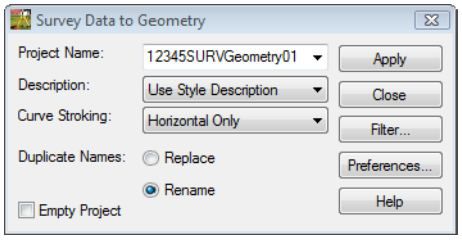
8. From the pull-down menu, select **Survey > Survey Data to Geometry**. The ***Survey Data to Geometry*** dialog will appear.



9. In the ***Project Name***: **12345SURVGeometry01**

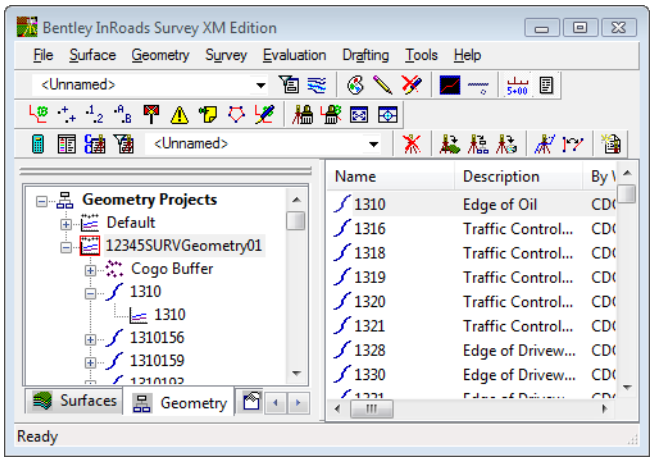
10. Set the ***Description***: **Use Style Description**

11. Set the ***Curve Stroking***: **Horizontal Only**



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

13. Use the **Workspace** pane scroll **arrows** to view the ***Geometry*** tab.

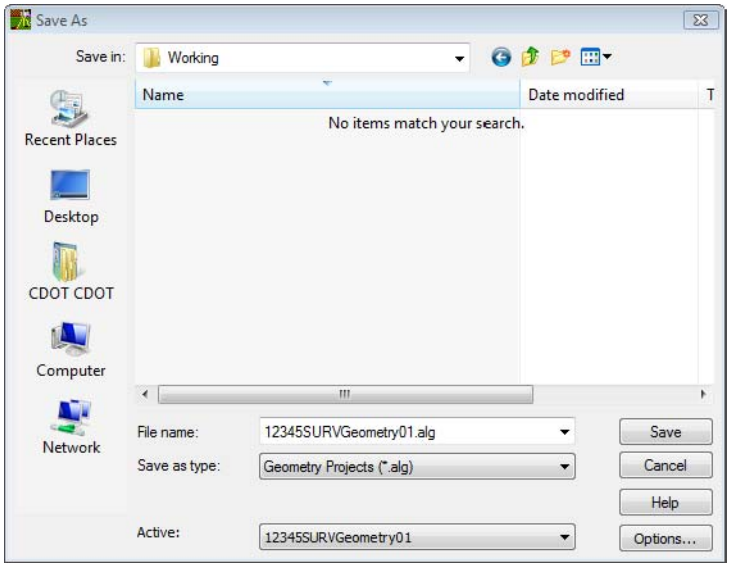


14. Verify **12345SURVGeometry01** is the active Geometry Project.

Note: To change the active Geometry from the pull down menu **Geometry > Active Geometry** then highlighting the desired geometry project name and **<D>** the ***Apply*** button.

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

16. Verify the correct project directory ***C:\Projects\12345\ROW_Survey\Working***



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

    Note: Ensuring that the saved Geometry name in the project folder matches the Geometry name displayed in InRoads explorer will minimize any confusion.

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

19. From the Inroads pull down menu select, **File > Exit**

20. From the MicroStation pull down select, **File > Save Settings**

21. From the MicroStation pull down select, **File > Exit**

The existing fieldbook has been exported and created 3 specific files from the Survey data. The ***MicroStation Design file (DGN)***, an ***InRoads Surface (DTM)***, and ***InRoads Geometry Project (ALG)***.

In the next section a fieldbook will be created from scratch and then look at the entire process in more detail. This was merely an overview to help getting familiar with the product and to begin to be familiar with the overall workflow. The next sections will work as reinforcement of the workflow process.

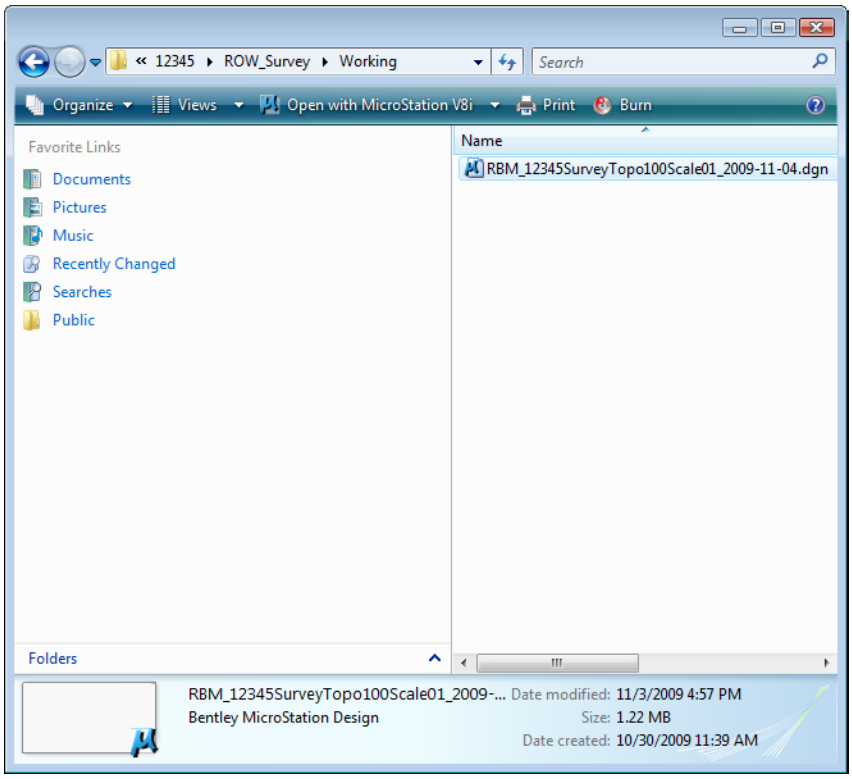
LAB 5 - Importing Data

Lab 5.1 - Managing Survey Files

In Section 1 of the training a fieldbook, design file, surface model, and geometry project were created. Consider that work to be out of date and those files will need to be managed in the Working directory.

1. Open Windows Explorer and path to the directory
   C:\Projects\12345\ROW_Survey\Working

2. Rename the working file with your initials and date YYYY-MM-DD for example
   RBM12345SurveyTopo100Scale01_**2009-11-04**.dgn



Note: Eventually when the design file has been finalized it will be moved to the ROW_Survey\Drawings\Reference_Files\ directory for use by the rest of the project team.

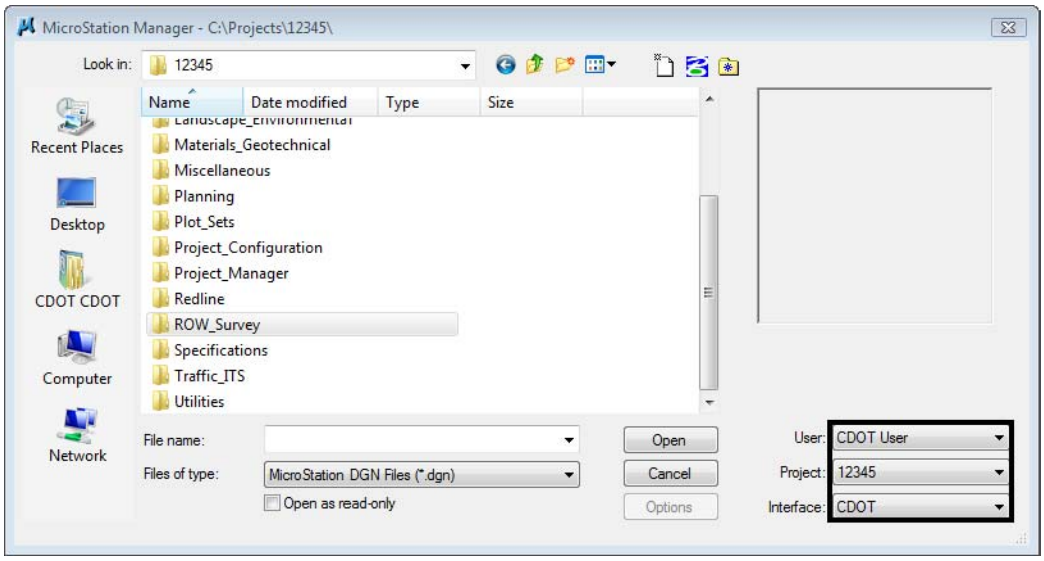
Lab 5.2 - Importing Control Files

Section Objectives:

- Import a CDOT survey control file that has the points fixed positions.
- View the control file points in the fieldbook dialog and in the MicroStation view.

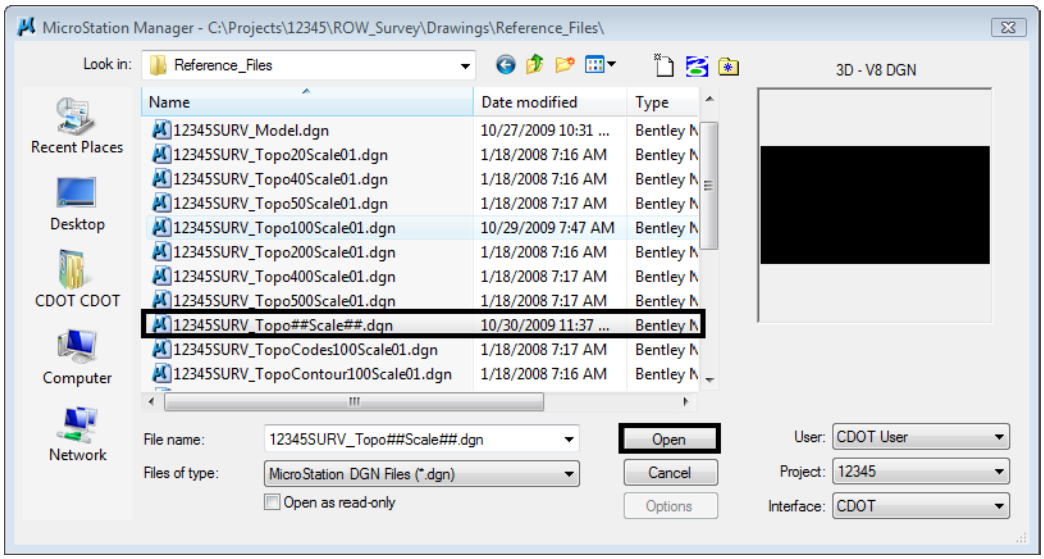
1. Double-click on the InRoads Survey desktop button or select **Start > All Programs > Bentley > InRoads Group XM > InRoads Survey.**

2. In the MicroStation Manager dialog go to the Workspace group section and change
   User: CDOT User
   Project: 12345
   Interface: CDOT



3. In the ***MicroStation Manager*** dialog path to the directory:
   C:\Projects\12345\ROW_Survey\Drawings\Reference_Files

4. Select the file **12345SURV_Topo##Scale##.dgn** from the ***MicroStation Manager*** dialog.



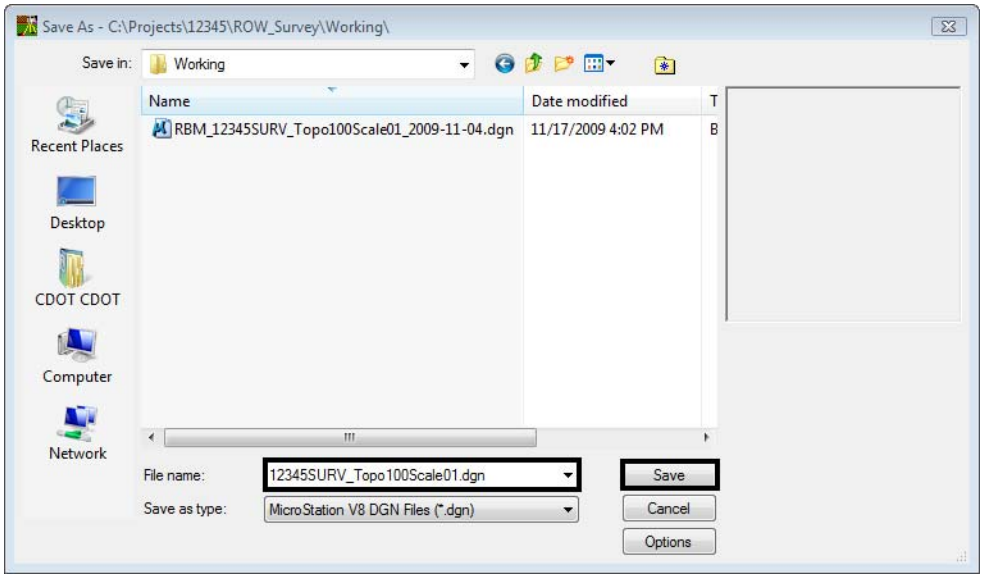
Note: The purpose of the files with "##" symbols are for creating new files with the correct naming convention.

5. **<D>** ***Open*** the ***MicroStation Manager*** dialog will close and open the file.

6. From the MicroStation pull-down menu **File > Save As** the ***Save As*** dialog will appear.

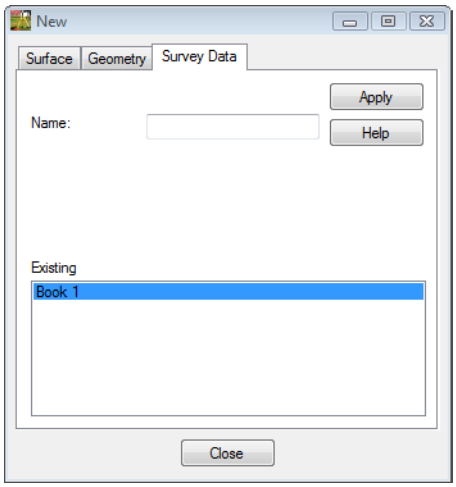
7. Path to the folder ***C:\Projects\12345\ROW_Survey\Working***

8. Replace the *##* symbols with **100** scale and **01** model.
   Type in ***Files: 12345SURV_Topo100Scale01.dgn***

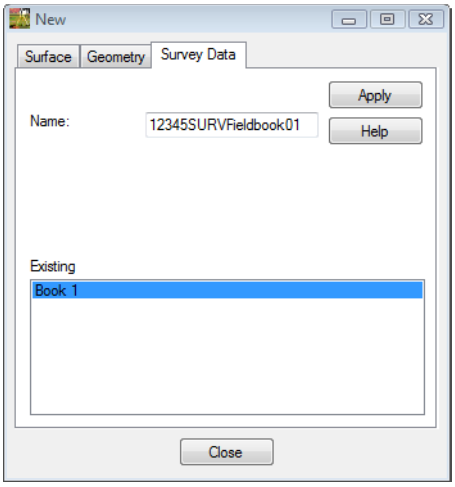


9. **<D>** the ***Save*** button the ***Save As*** dialog will close and MicroStation will open the file ***12345SURV_Topo100Scale01.dgn***.

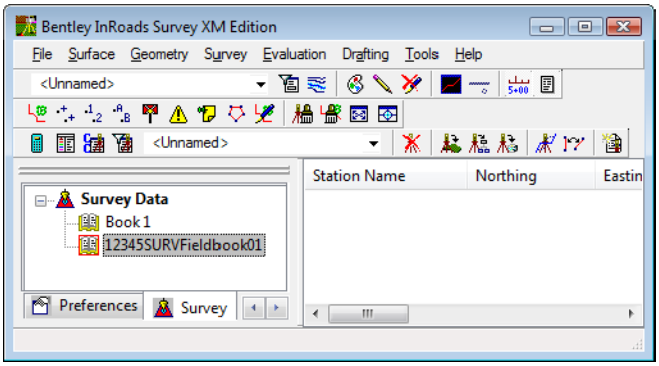
10. Once MicroStation and InRoads opens. From the InRoads pull down menu, select **File > New**. The ***New*** dialog will appear.



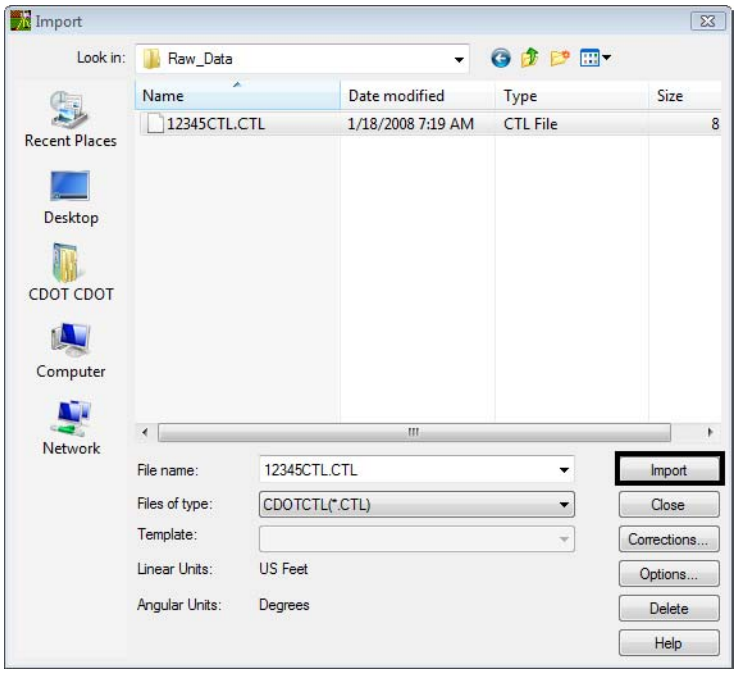
11. Select the **Survey Data** tab.
12. Key in the Name: ***12345SURVFieldbook01***



13. **<D>** the **Apply** button. The new survey fieldbook will appear below.
14. **<D>** the **Close** button. The ***New*** dialog will close.
15. From the **Workspace** bar the ***12345SURVFieldbook01*** will be active.



16. From the pull-down menu, select **File > Import > Survey Data**. The ***Import*** dialog will open.



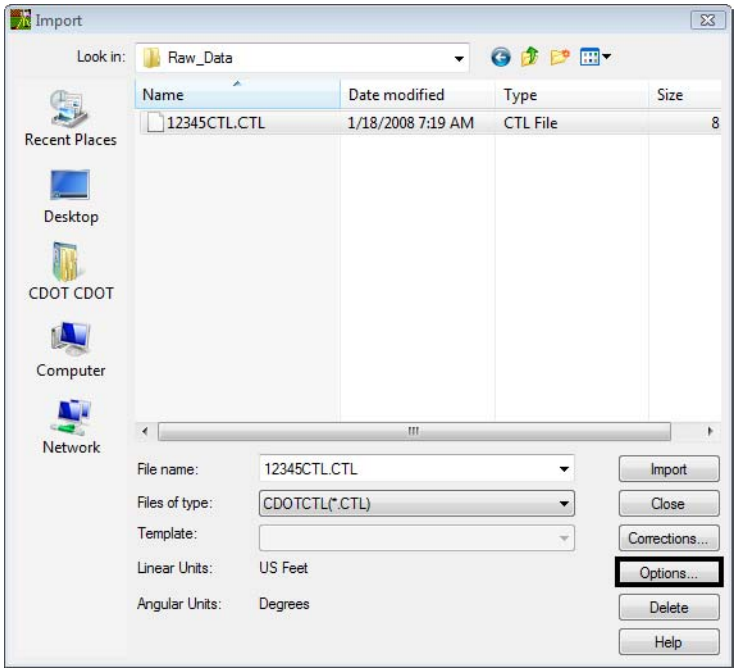
17. Change the **Look in**: folder to ***C:\Projects\12345\ROW_Survey\Survey\Raw_Data***

18. Verify the Files of type: **CDOTCTL (*.CTL)**

    - Importing the CTL file first is only needed if the field books being imported are conventional files. GPS (positional) files do not require the CTL file.

    Note: The **Files of type**: drop-down box works as a filter. Allowing to the files that have the particular file extensions to be viewed. This allows InRoads Survey to utilize a specific import wizard for each file type.

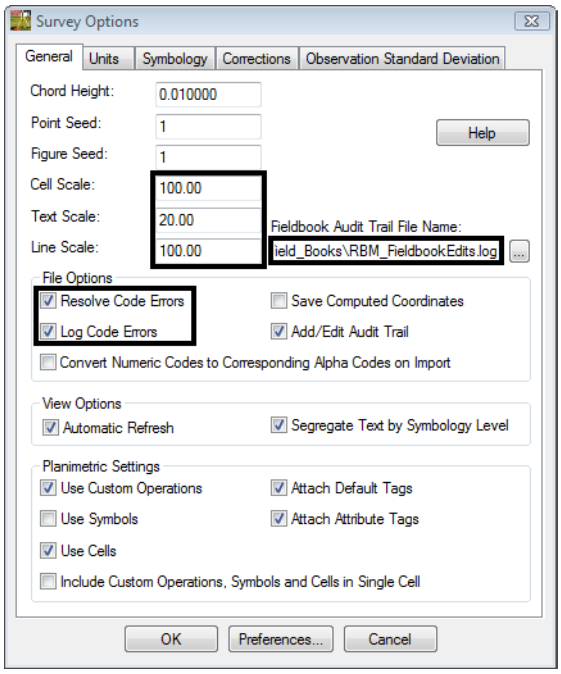
19. **<D>** the ***Options*** button.



Note: This is the same dialog that can be opened from **Tools > Survey Options**

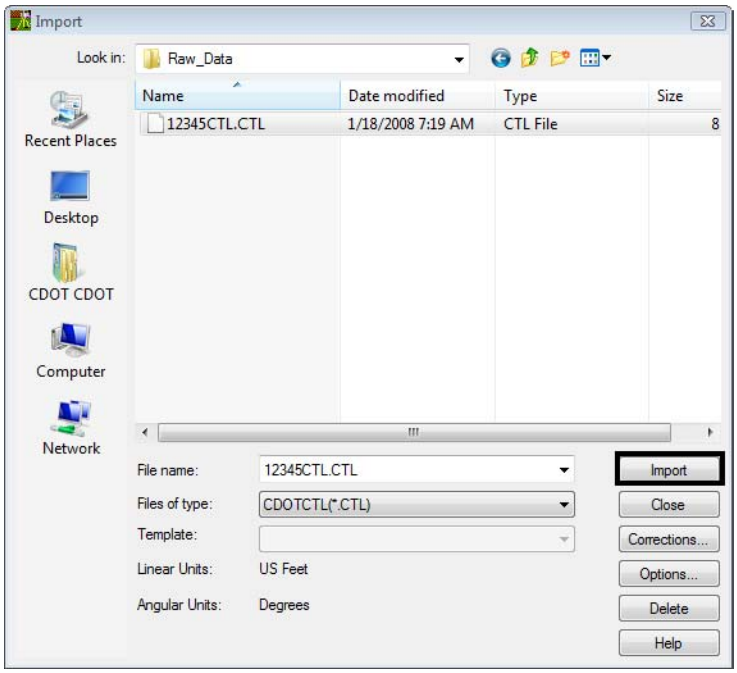
20. Verify the **Cell**, **Text**, and **Line** Scales are all set to ***100***, ***20*** ,***100***

21. Verify **Fieldbook Audit Trail File Name** is still set from Section 1. C:\Projects\12345\ROW_Survey\InRoads\Field_Books\ ***"UserInitials"_FieldBookEdits.log***



22. **<D>** the **OK** button. The ***Survey Options*** dialog will close.

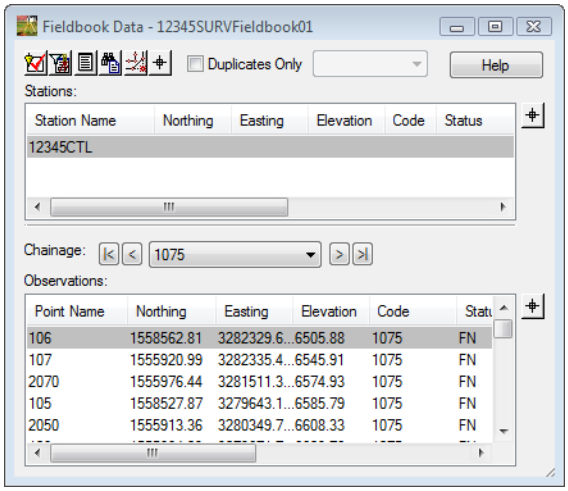
23. **<D>** the ***Import*** button. The ***Import*** dialog will remain open allowing additional files to be imported.



24. **<D>** the ***Close*** button.

    Note: Upon closing, InRoads Survey executes the import routine.

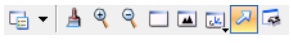
25. From the pull-down menu, select **Survey > Fieldbook Data…**. Take a minute to review the imported Survey control data that is now contained in the electronic Fieldbook.



26. While the **Fieldbook Data** dialog is open, also look at the MicroStation view and displayed graphics.

27. Practice changing the display graphics using the **View Survey Data** toolbar.

28. Continue to practice **zooming** and **panning** using the MicroStation view border buttons.

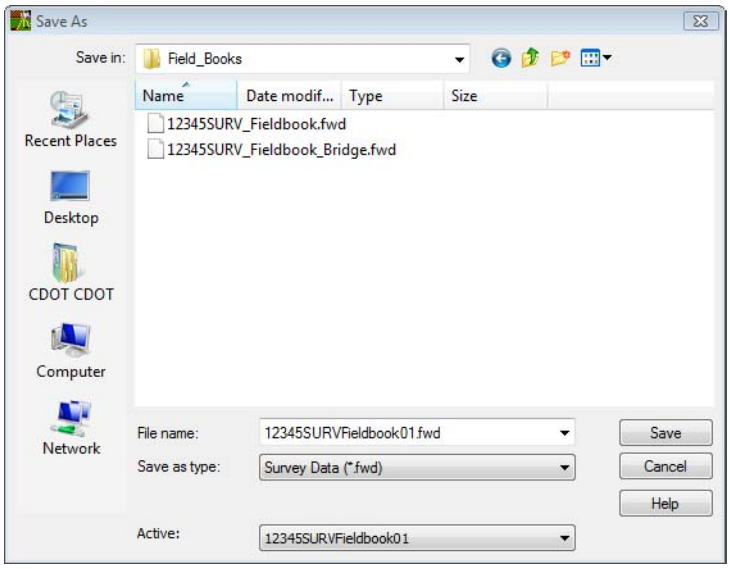


29. Close the **Fieldbook Data** dialog.

30. **Fit View** from the View Survey Data toolbar.

It is up to the user to determine when to save the data in InRoads Survey. Until now the fieldbook is being stored in memory. If something was to cause InRoads to close, your data would be lost.

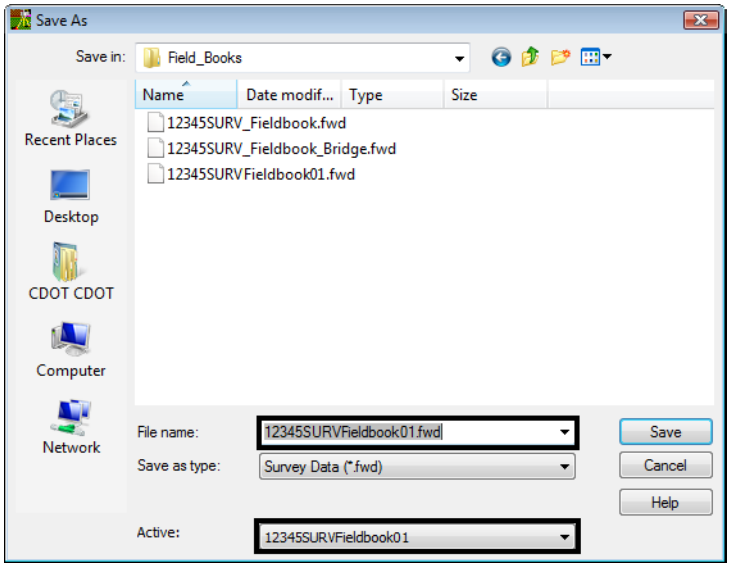
31. **File > Save > Survey Data** the ***Save As*** dialog will open.



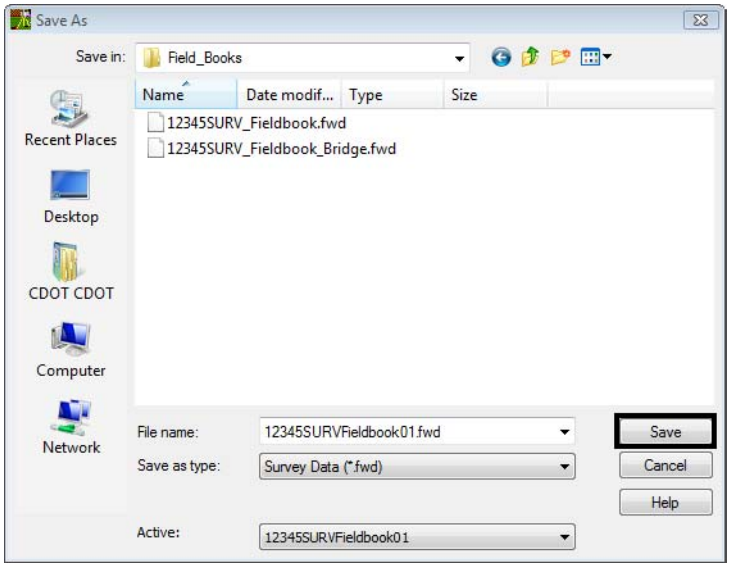
32. Verify the directory location:
C:\Projects\12345\ROW_Survey\InRoads**Field_Books**

33. Choose the ***Active:* 12345SURVFieldbook01** at the bottom of the dialog.

34. Verify the File Name: **12345SURVFieldbook01.fwd**



35. **<D>** the ***Save*** button. The file will be saved to disk and will show in the dialog.



36. **<D>** the ***Cancel*** button. The ***Save As*** dialog will close.

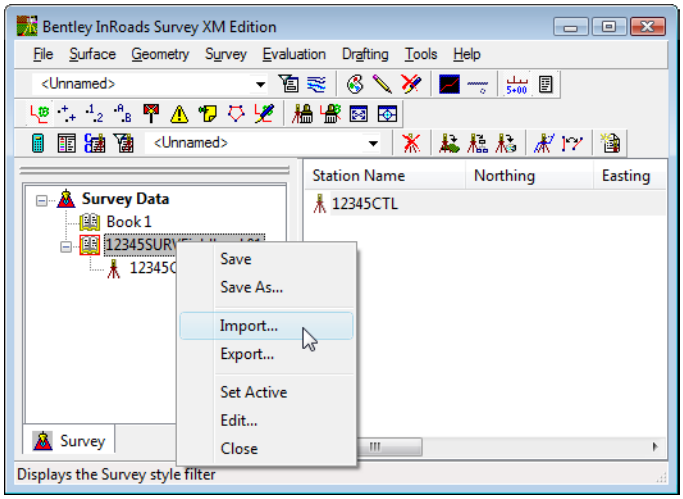
Lab 5.3 - Importing Data collector files

Section Objectives:

- Import multiple raw Sokkia SDR topo files into the InRoads Survey fieldbook file.
- Import a raw Trimble DC topo file into the InRoads Survey fieldbook file.
- Create an error log file for keeping track of code errors in the fieldbook file.
- Correct code error problems using the Resolve Code Error dialog.
- Review topo points in the Fieldbook dialog and MicroStation view.

Importing SDR files

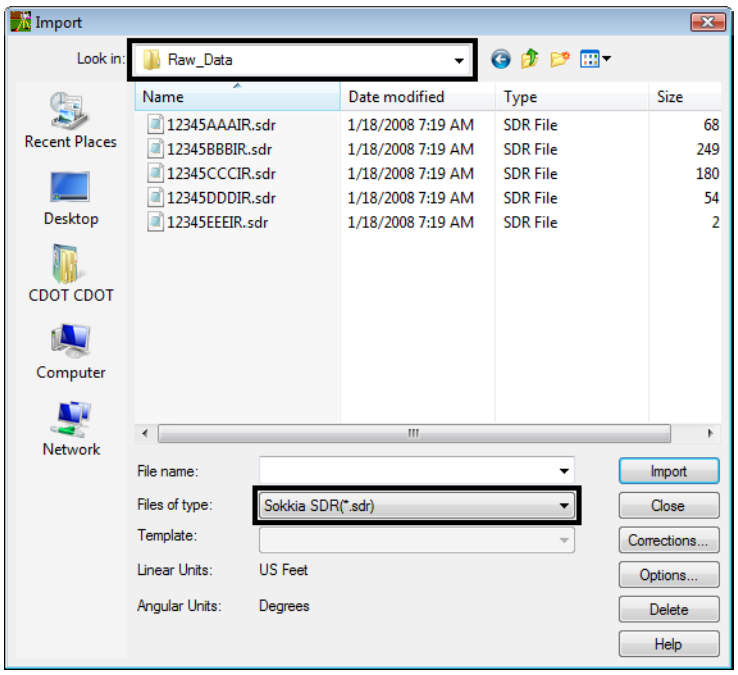
1. From the Workspace bar select and highlight 12345SURVFieldbook01 and <R> to view the shortcut menu.



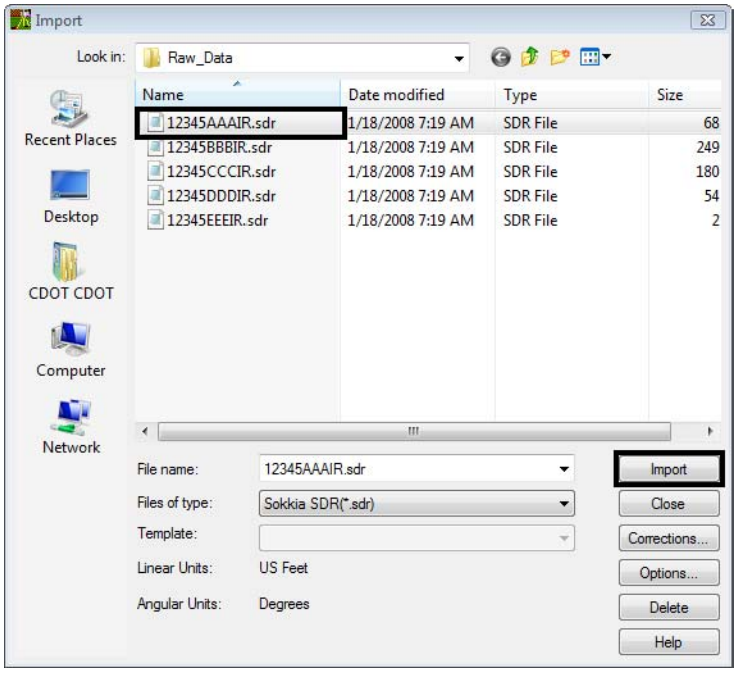
2. **<D> Import…** The ***Import*** dialog will appear.

   - This is a same as using the pull-down menu **File > Import > Survey Data.**

3. Change the **Look in**: folder to C:\Projects\12345\ROW_Survey\Survey**Raw_Data**
4. Change the drop-down arrow Files of type: **Sokkia SDR (*.sdr)**

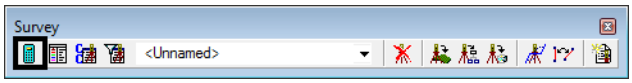


5. **Select** the file **12345AAAIR.sdr** from the filtered list of files.
6. **<D>** the **Import** button. The ***Import*** dialog will remain open allowing additional files to be imported.

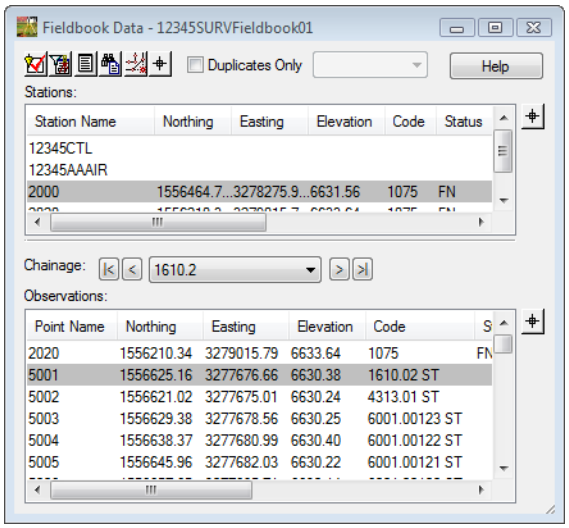


7. **<D>** the **Close** button.

8. **Select** the **Fieldbook** button from the Survey toolbar. The Survey Fieldbook will appear.



9. Take a minute to review the observations from Station Name ***2000*** that was imported into the electronic Fieldbook.



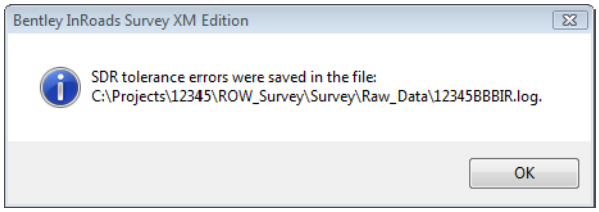
10. **Close** the ***Fieldbook*** dialog **<D>** the **X** in the upper right hand corner of the dialog.

Resolving Code errors

From the Tools > Survey Options dialog the choice was made to resolve any code errors when the data is imported. There are a couple of ways to handle code errors.

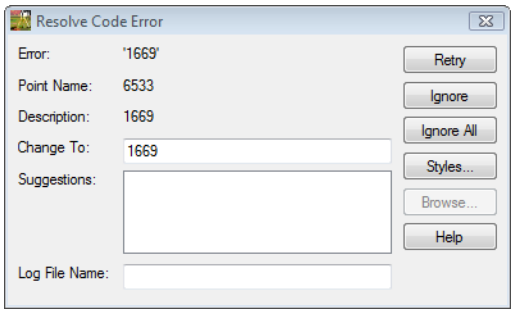
1. From the pull-down menu, select **File > Import > Survey Data**. The ***Import*** dialog will open.
2. Change the **Look in**: folder to C:\Projects\12345\ROW_Survey\Survey**Raw_Data**
3. Verify the drop-down arrow Files of type: **Sokkia SDR (*.sdr)**
4. **Select** the file **12345BBBIR.sdr** from the filtered list of files.
5. **<D>** the **Import** button. Only one file can be selected at a time. The ***Import*** dialog will remain open allowing for additional files to be imported.

6. **<D>** the **OK** button in the SDR Tolerance dialog box.



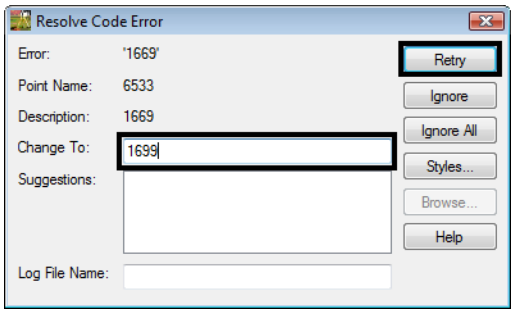
7. **<D>** the **Close** button. The imported SDR files will be processed.

   Note: There are code errors with these files; the Resolve Code Errors dialog will appear.



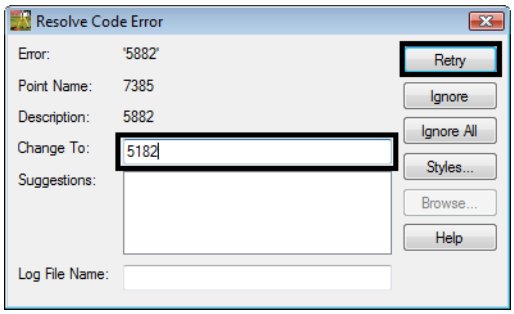
8. Key-in Change To: ***1699***

9. **<D>** the **Retry** button. The code will be processed and the next error will appear.

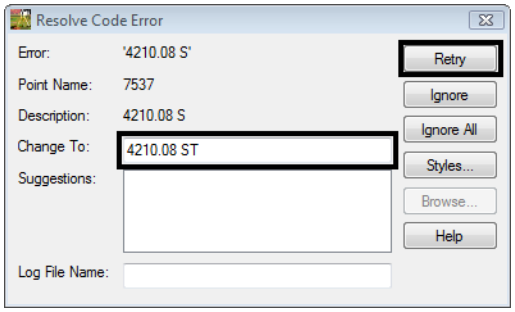


Continue this process for the next three code errors.

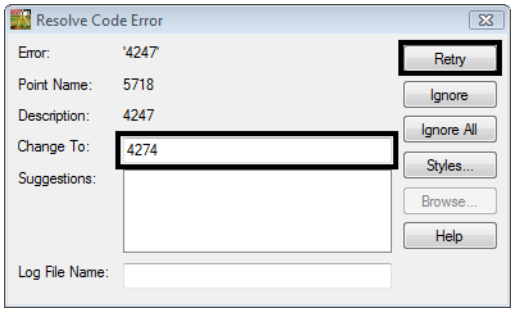
10. Key-in Change To: ***5182*** **<D>** the ***Retry*** button.



11. Key-in Change To: ***4210.08 ST*** **<D>** the **Retry** button.



12. Key-in Change To: ***4274*** **<D>** the **Retry** button. The ***Resolve Code Error*** dialog will close and Survey will process the data.

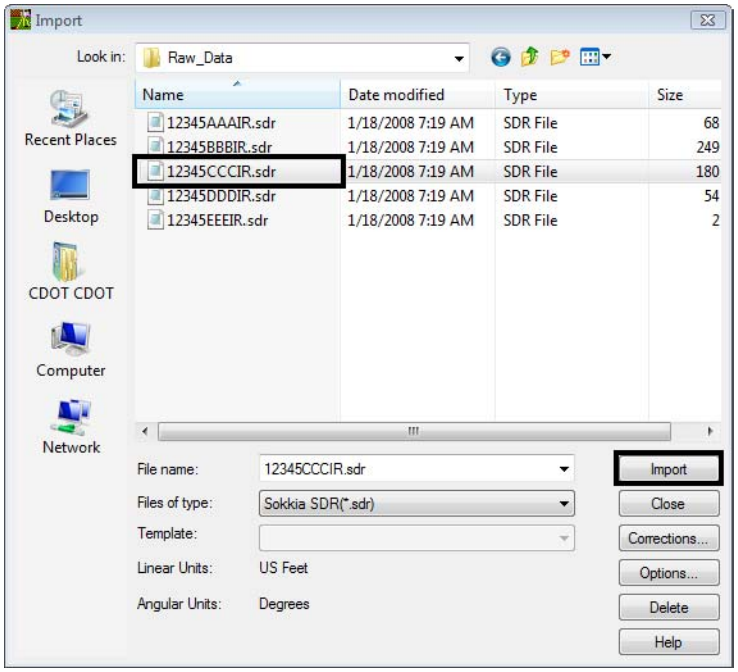


13. From the pull-down menu, select **File > Import > Survey Data**. The ***Import*** dialog will open.

14. Change the **Look in**: folder to C:\Projects\12345\ROW_Survey\Survey**Raw_Data**

15. Verify the drop-down arrow Files of type: **Sokkia SDR (*.sdr)**

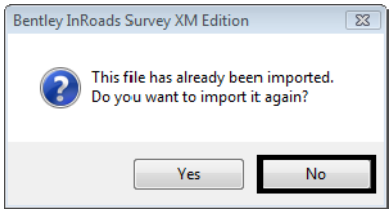
16. **Select** the file **1234500CCCIR.sdr** from the filtered list of files.



17. **<D>** the **Import** button. The ***Import*** dialog will remain open allowing for additional files to be imported.

18. Continue to import the remaining SDR files **1234500DDDIR- 123450EEEIR**

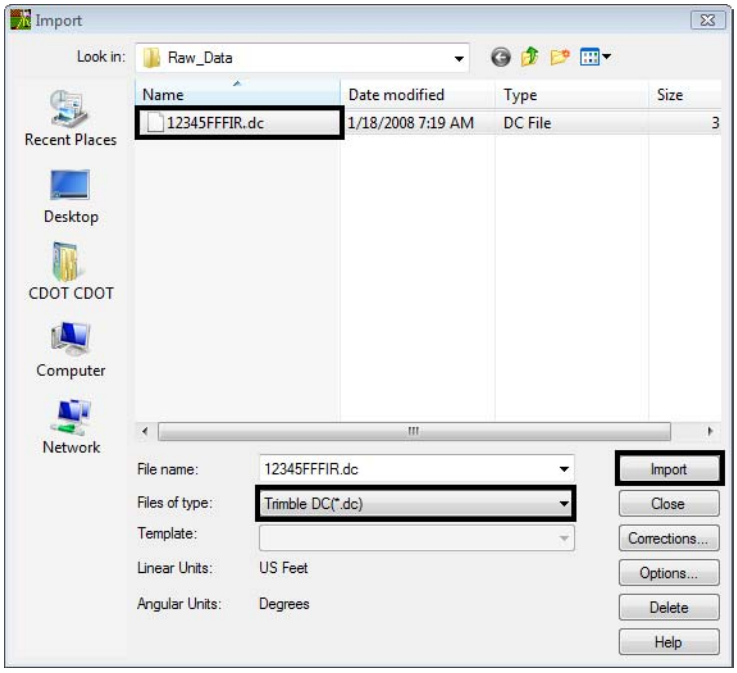
    - If a previously imported SDR file was selected the following dialog will appear.



19. **<D>** the ***No*** button and go back and select a different file.

Importing Trimble DC file

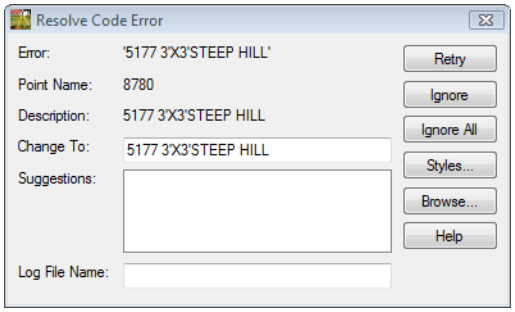
20. Change the drop-down arrow Files of type: Trimble DC (*.dc)



21. **Select** the file **12345FFFIR.dc** from the filtered list of files.

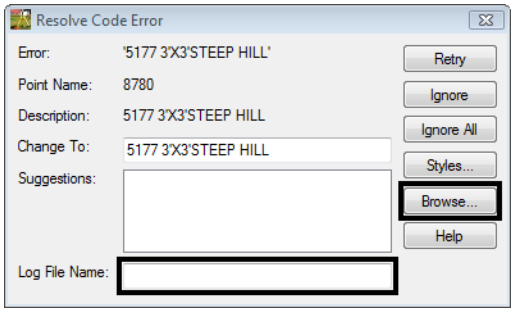
22. **<D>** the **Import** button. The ***Import*** dialog will remain open allowing for additional files to be imported.

23. **<D>** the **Close** button. If errors are present in the input files, the ***Resolve Code Errors*** dialog will appear.



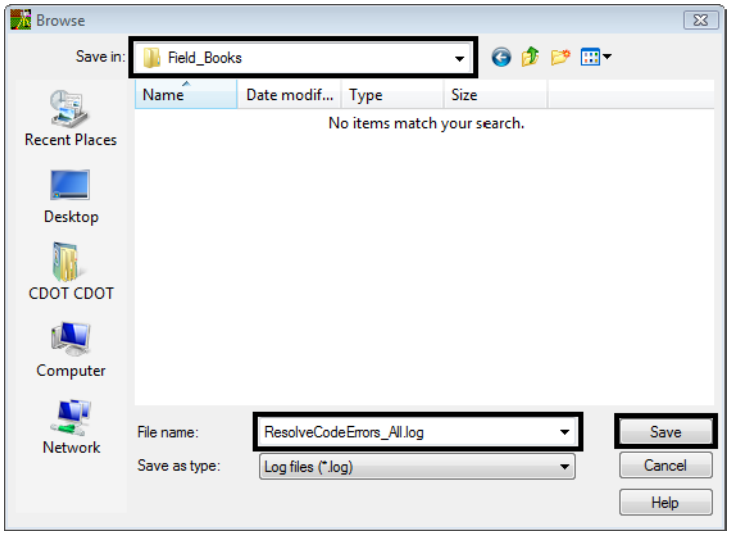
24. **<D>** the **Log File Name** key in field. The ***Browse*** button will become activated.

25. **<D>** the **Browse** button in the ***Resolve Code Error*** dialog. The ***Browse*** dialog will appear.

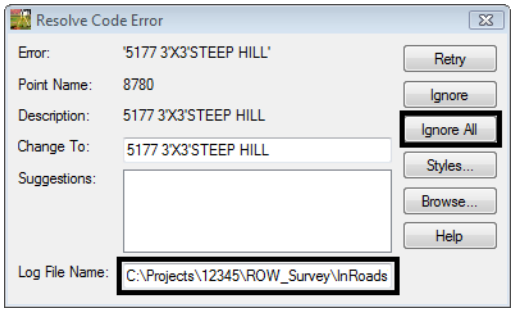


26. Path to the Save in folder ***C:\Projects\12345\ROW_Survey\InRoads\Field_Books***.

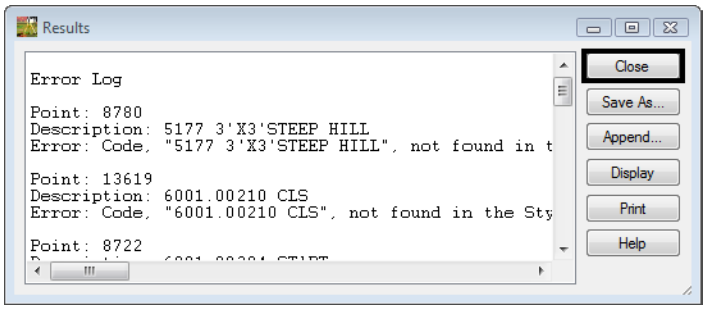
27. Key in the file name ***ResolveCodeErrors_All.log***



28. **<D>** the **Save** button the ***Browse*** dialog will close and the file name and path will appear in the ***Log File Name*** field.

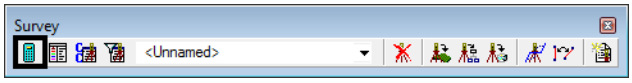


29. **<D>** the **Ignore All** button. The ***Results*** dialog will appear showing the errors and the log file will be saved.

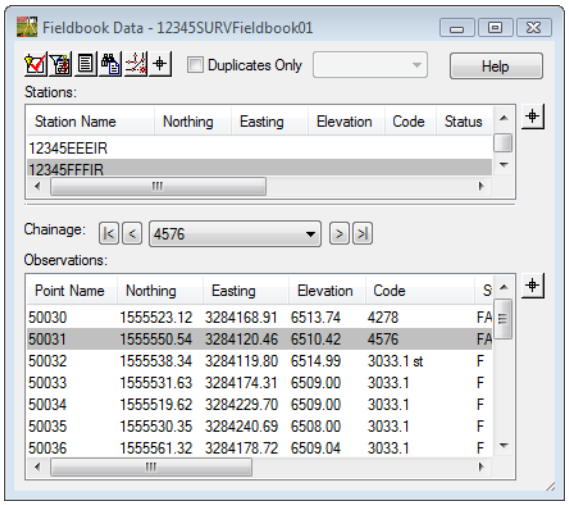


30. **<D>** the **Close** button in the ***Results*** dialog. Those errors will be addressed later in this lab.

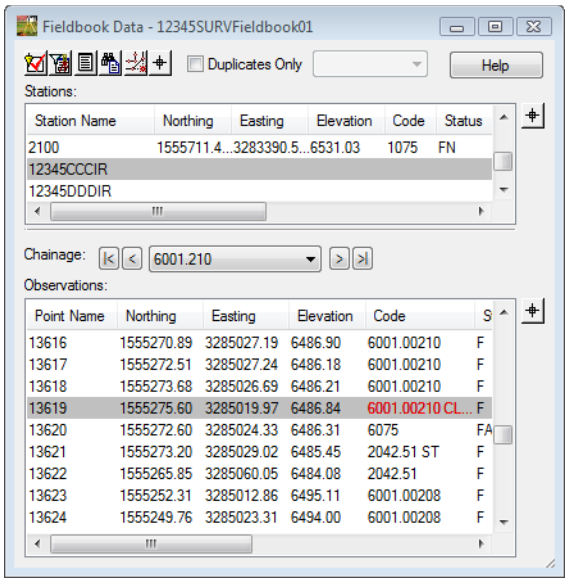
31. **Select** the **Fieldbook** button from the Survey toolbar. The Survey Fieldbook will appear.



32. Take a minute to review the observations from Station Name **12345FFFIR** that was imported into the electronic Fieldbook.



33. Locate Station Name: **12345CCCIR** Point Name: **13619**. Notice the code is red, representing an error.



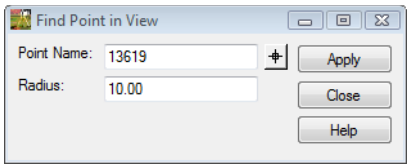
Note: While the **Fieldbook Data** dialog is open, look at the MicroStation view and displayed graphics.

34. Locate the same point in View 1 using one of the following methods.

- **<R>** Point Name to view the Fieldbook shortcut list and select **Center**

  or

♦ From the pull-down menu, select **Survey > Find Point in View**

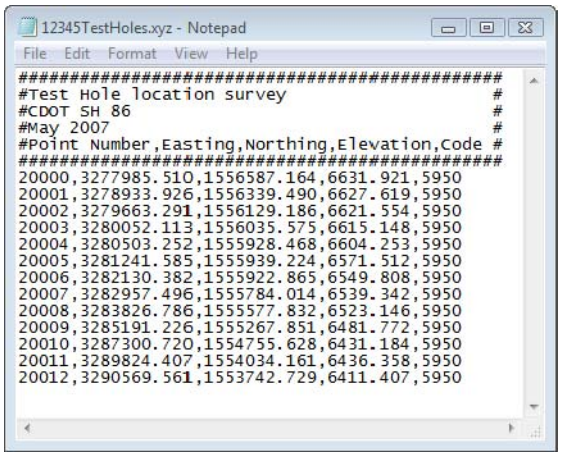


Note: The code errors will be corrected in the fieldbook later in the lab.

35. Close the **Fieldbook** dialog and any other dialogs.

Lab 5.4 - Importing ASCII files

In the following steps an ASCII file will be imported. To import ASCII files the Text Import Wizard (TIW) will be used. This format created for importing text can be saved and recalled for future use.

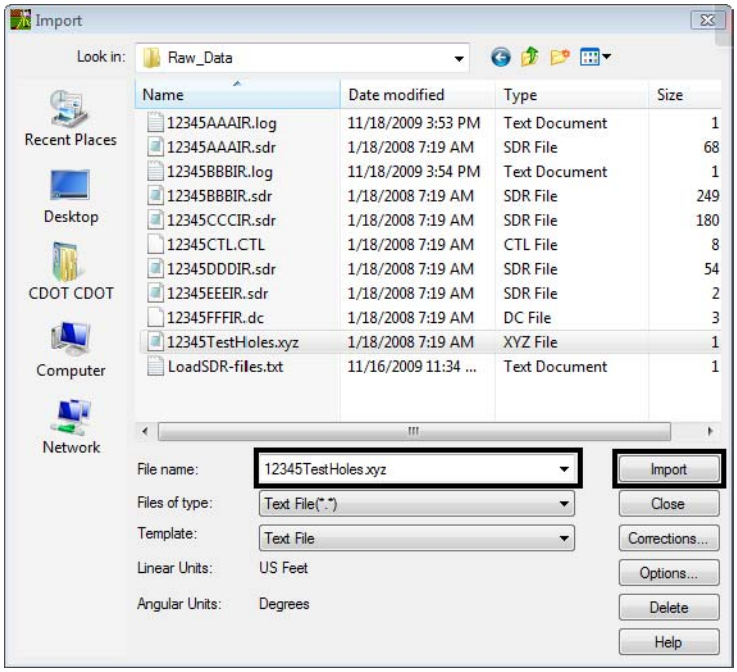


Section Objectives:

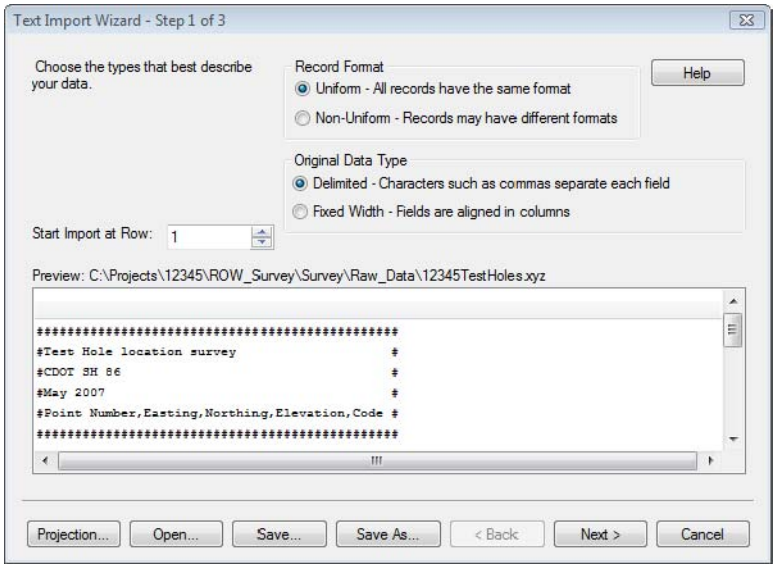
- Import a custom ASCII report with the Text Import Wizard.
- Create a new standard import selection for future use.
- Review the points in the Fieldbook file and MicroStation view.

1. From the pull-down menu, select **File > Import > Survey Data**. The ***Import*** dialog will open.
2. Change the **Look in:** folder to C:\Projects\12345\ROW_Survey\Survey**Raw_Data**
3. Change the drop-down arrow **Files of type: Text File (*.*)** All the files in the directory will be shown.

4. **Select** the file **12345TestHoles.xyz**



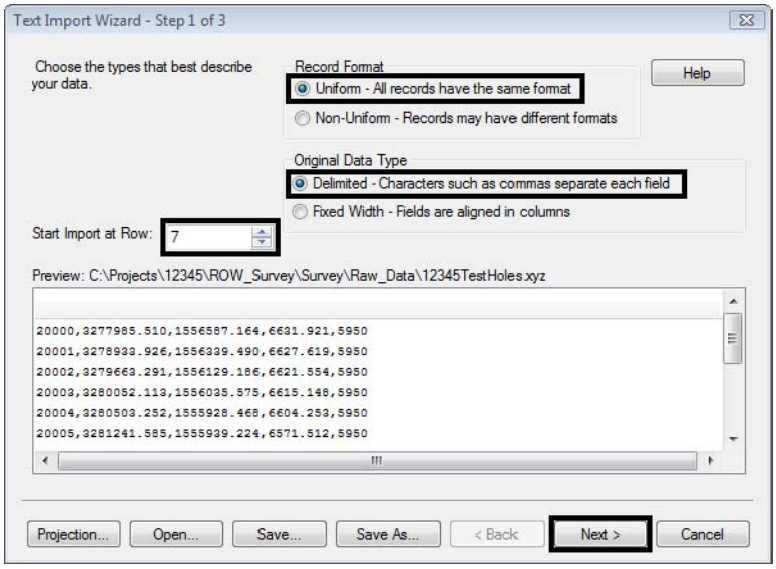
5. **<D>** the **Import** button. The ***Text Import Wizard*** dialog will appear.



6. Change the entry field **Start Import at Row: 7** and **Tab** out of the field. This will ignore the header information in the file.

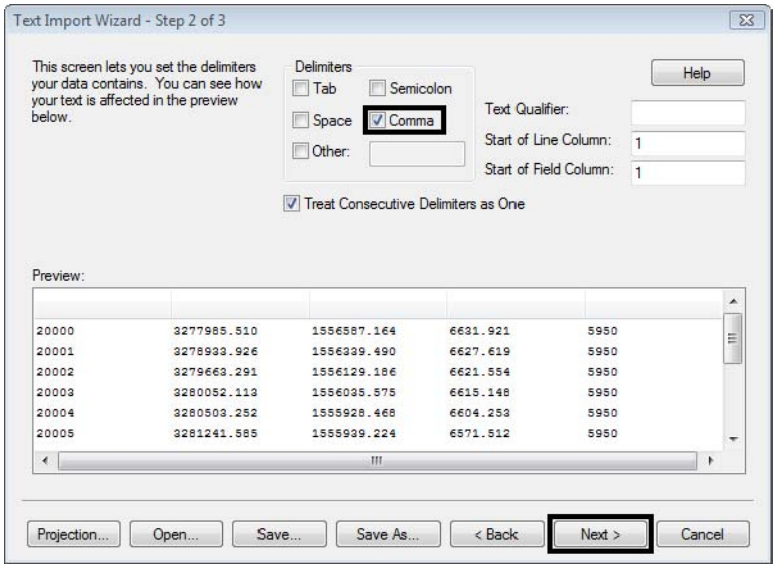
7. Verify the **Record Format** radio button is set to **Uniform**.

8. Verify the **Original Data Type** radio button is set to **Delimited**.

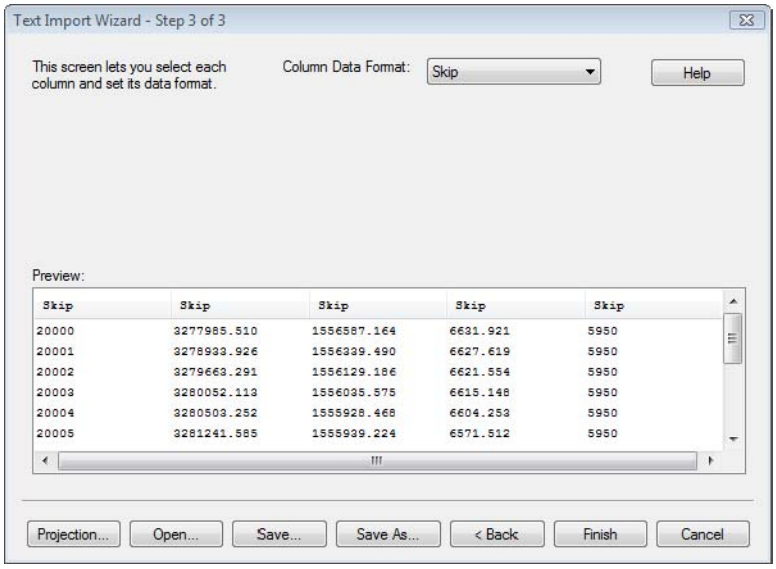


9. **<D>** the **Next >** button. The ***Step 2 of 3*** dialog will appear.

10. In the **Delimiters** section of the dialog check on the **Comma** delimiter field as this defines what separates our columns of data. Verify the rest of the dialog is set as shown below.

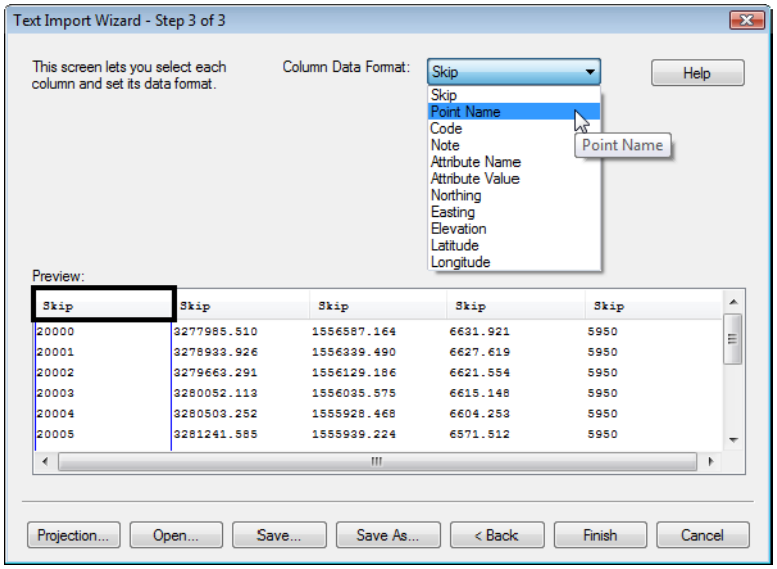


11. **<D>** the **Next >** button. The final ***Step 3 of 3*** dialog will appear.



12. Select the header of the first column labeled **Skip**. The column will highlight as shown below.

13. From the **Column Data Format** drop-down box select **Point Name**

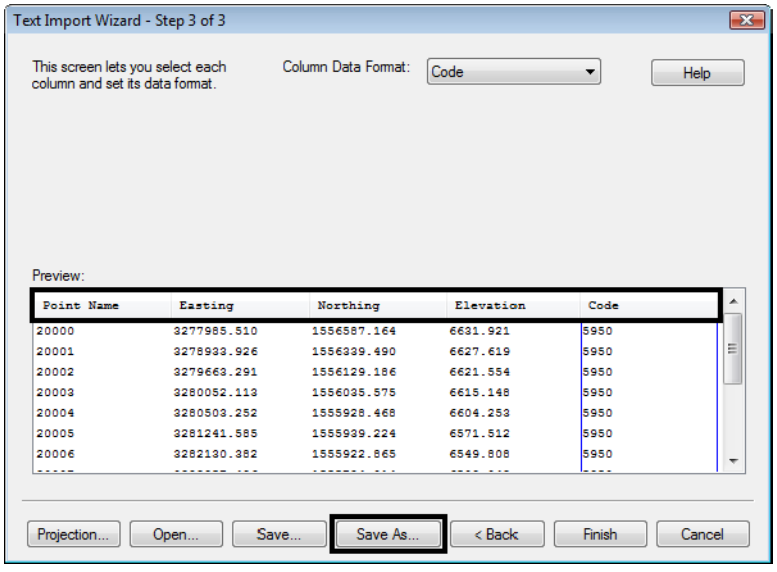


14. Select the second **Skip** column header then select **Easting** from the ***Column Data Format*** drop-down box.

15. Select the third **Skip** column header then select **Northing** from the ***Column Data Format*** drop-down box.

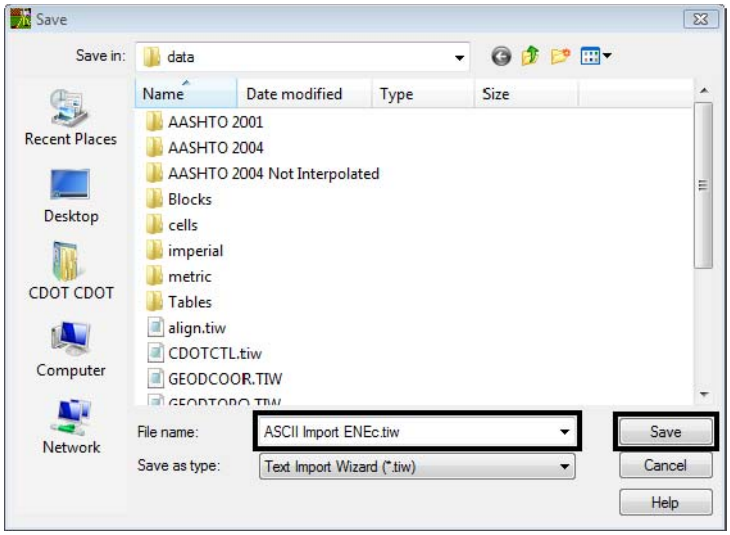
16. Select the fourth **Skip** column header then select **Elevation** from the ***Column Data Format*** drop-down box.

17. Select the fifth **Skip** column header then select **Code** from the ***Column Data Format*** drop-down box.

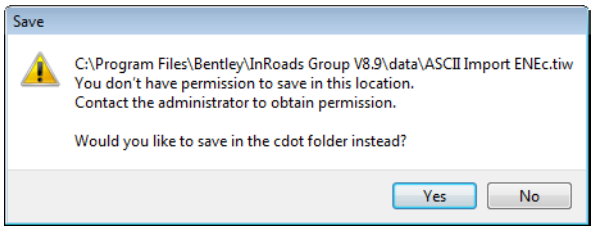


18. **<D>** the **Save As** button. The ***Save As*** dialog will appear.

19. Key in File name: ***ASCII Import ENEc***

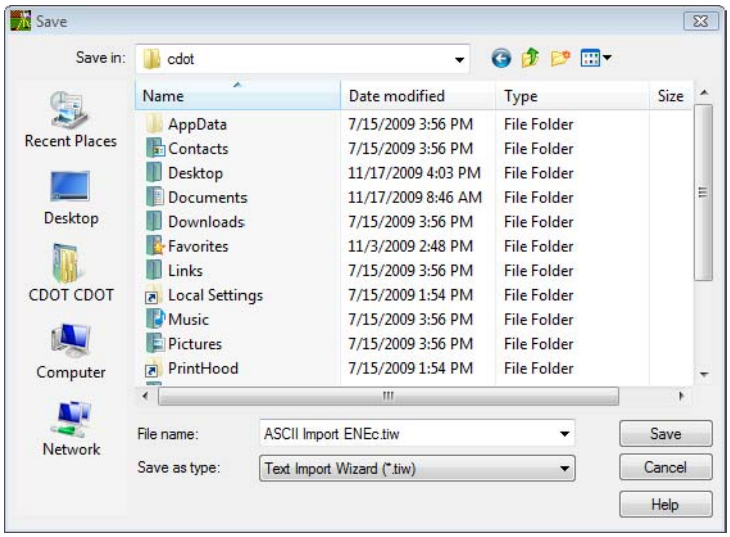


20. **<D>** the **Save** button. The ***Save As*** dialog will close and and error dialog will appear.



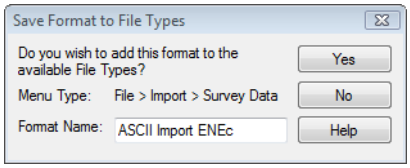
Note: Because files can not be saved to the ***Program Files*** directory on the computer the file will default to the users login ***C:\Users\cdot\Documents*** folder structure.

21. **<D>** the **Yes** button. The ***Save*** in the ***CDOT*** User folder will appear.



22. **<D>** the **Save** button and the dialog will close.

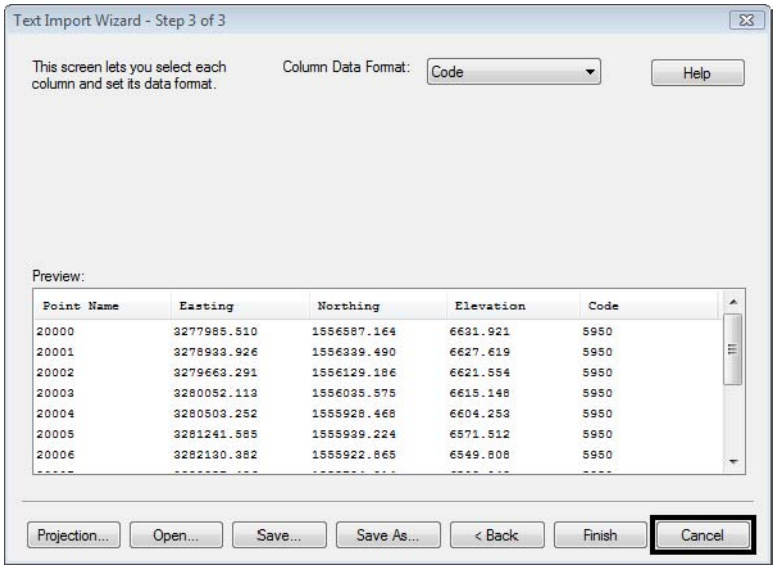
23. The **Save Format to File Types** dialog will appear. Verify **Format Name:** ***ASCII Import ENEc***



24. **<D>** the **Yes** button. The ***Save Format to File Types*** dialog will close and the ***Step 3 of 3*** dialog will reappear.

    Note: The Text Import Wizard has been created for future use.

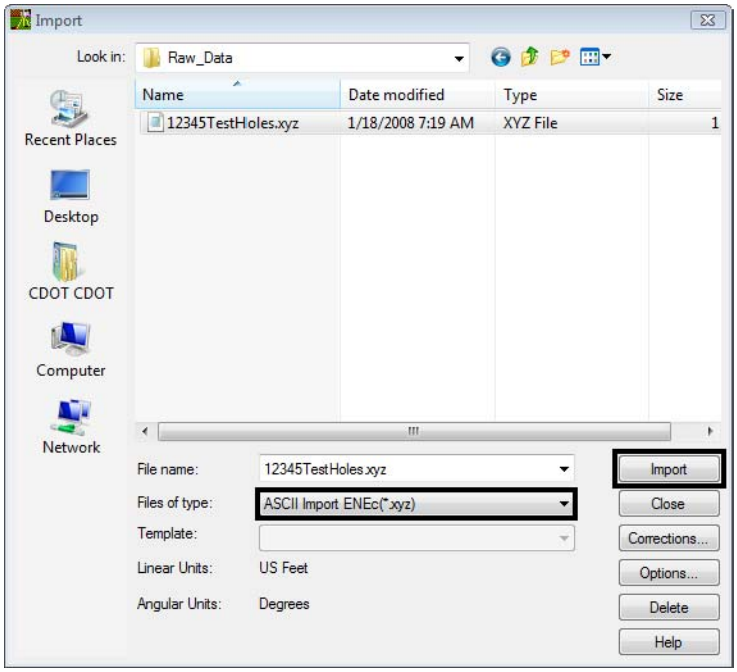
25. In the ***Step 3 of 3*** dialog **<D>** the **Cancel** button. The Step ***3 of 3*** dialog will close and the **Import** dialog will reappear.



26. In the ***Import*** dialog change the Files of type: **ASCII Import ENEc (*.xyz)**

    Note: The extension for the filter (*.xyz) came from the original file extensions that was imported.

27. Select the file **12345TestHoles.xyz**



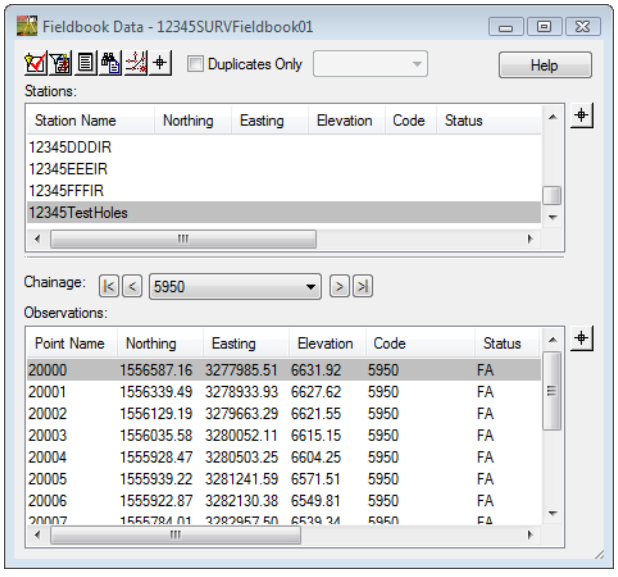
28. **<D>** the **Import** then **Close** buttons.

29. **<D> Ignore All** in the ***Resolve Code Error*** dialog and then close the dialog.

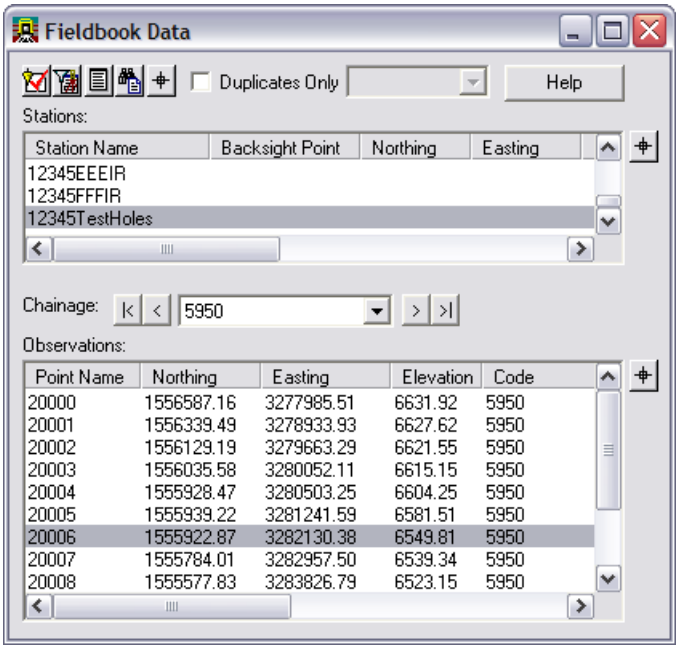
    Note: The ***Resolve Code Error*** dialog continues to open because the entire file is processed each time a file is imported.

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

31. Review the data that was imported **Survey > Fieldbook Data…**



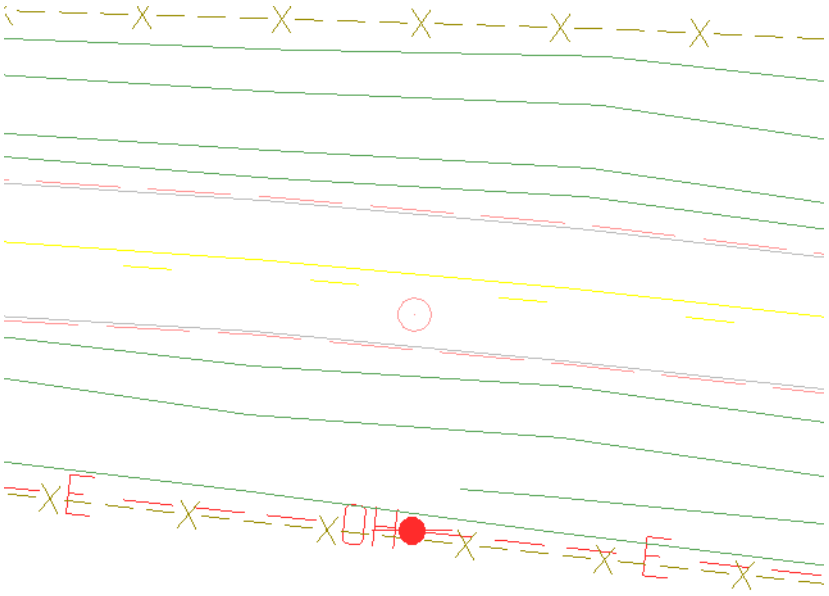
32. **Locate** the file that was imported into the **Fieldbook Data** dialog. As files are imported to the fieldbook they will always append to the active fieldbook.



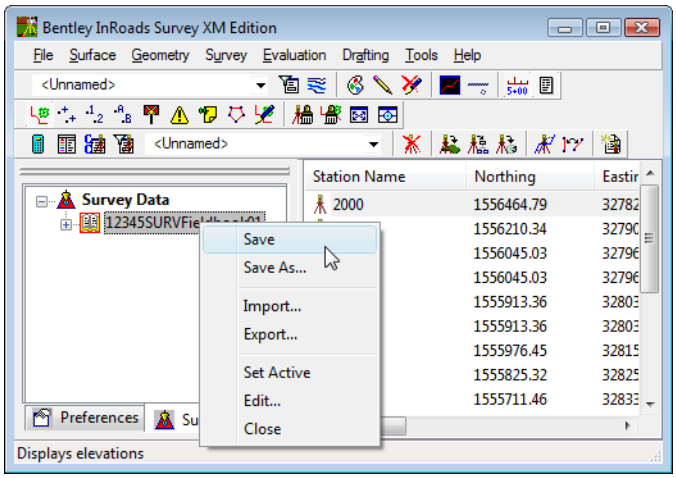
33. Select **Point Name** ***20006*** in the fieldbook.

34. **<R> Center** Point Name 20006 to the MicroStation view.

Note: The center command from the shortcut menu works with the current zoom ratio and will not zoom into the point.



35. Save the Survey fieldbook. From the Workspace Bar **<R>** on **12345SURVFieldbook01** select **Save** from the shortcut menu.



36. The Status Bar will show that it was saved.

Section Summary:

- In *Lab 5.1 -Managing Survey Files* the working directory was cleaned up to avoid any name conflicts.
- In *Lab 5.2 -Importing Control Files* the CDOT survey control file was added first to the InRoads Survey fieldbook file.
- *Lab 5.3 -Importing Data collector files* additional raw survey topo files from a Sokkia and Trimble data collectors were added to the InRoads Survey fieldbook file.
- In *Lab 5.4 -Importing ASCII files* a custom ASCII file was imported into the InRoads Survey fieldbook file and the settings were stored in the product for future use.

LAB 6 - Fieldbook Edits

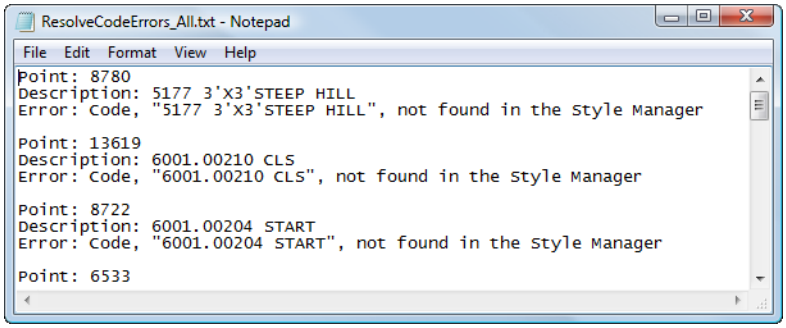
Lab 6.1 - Correcting Fieldbook Code Errors

Errors may include Survey Feature Styles (numeric codes) that are not defined in the Style Manager or control codes that are not defined by Survey>Control Codes.

Section Objectives:

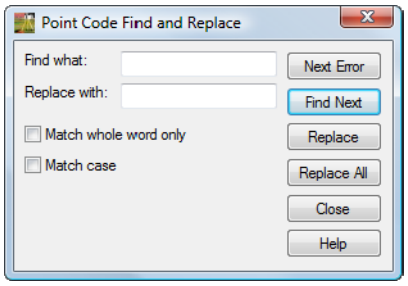
- Find and correct feature coding errors.

Use the log file that was generated when importing the raw survey data. This file logged all errors to be corrected. ***ResolveCodeErrors_All.txt***

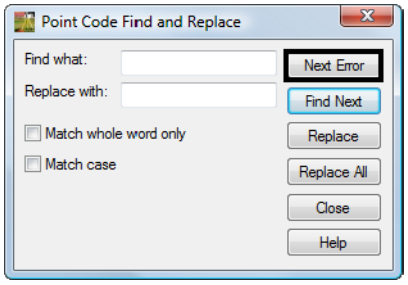


1. **<D>** the Fieldbook button from the Survey tool bar. The Survey Fieldbook will appear.

2. From the Fieldbook dialog select the **Find / Replace Codes** button. The ***Point Code Find a Replace*** dialog will appear.

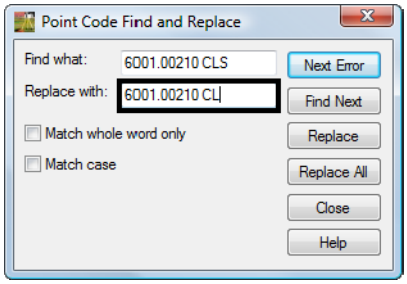


3. Select the **Next Error** button. The command will look in the current fieldbook and return the first code error it finds.



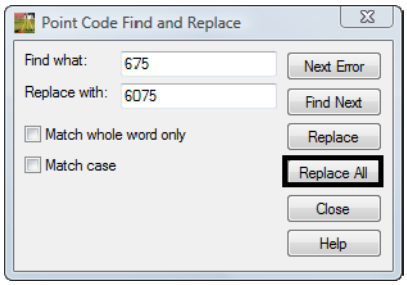
Note: This error has an incorrect Control Code for Close.

4. Type the correction in the field ***Replace with: 6001.00210 CL***



5. **<D>** the **Replace** button. The code in the fieldbook will be updated. The dialog will automatically locate the next error which is the first of multiple shots incorrectly coded as 675

6. In the Point Code Find and Replace dialog, **Replace** code 675 with code 6075



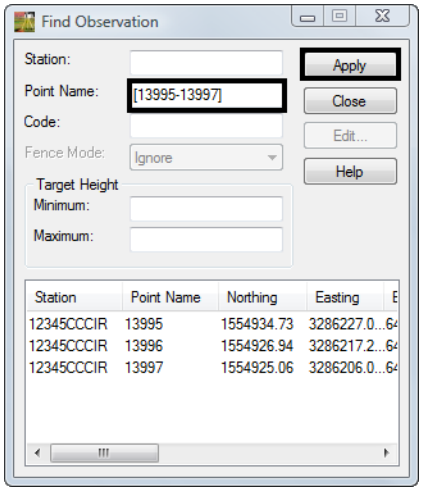
7. **<D>** the **Replace All** then **Close** buttons to replace the mis-coded points.

8. If not still open, reopen the **Find Observation** dialog by **<R>** on an observations in the **Fieldbook Data** dialog and select **Find** from the popup menu.

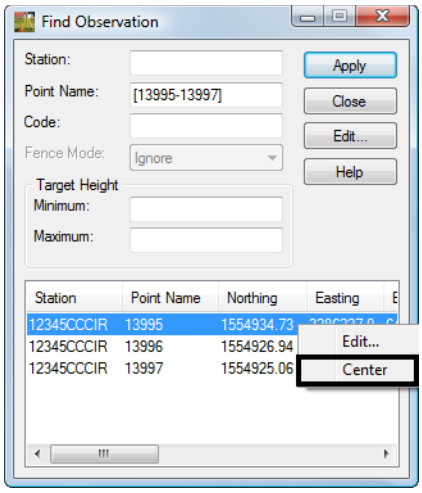
9. Key-in the **Point Name: [13995-13997]**

   Note: The point range must be enclosed in brackets.

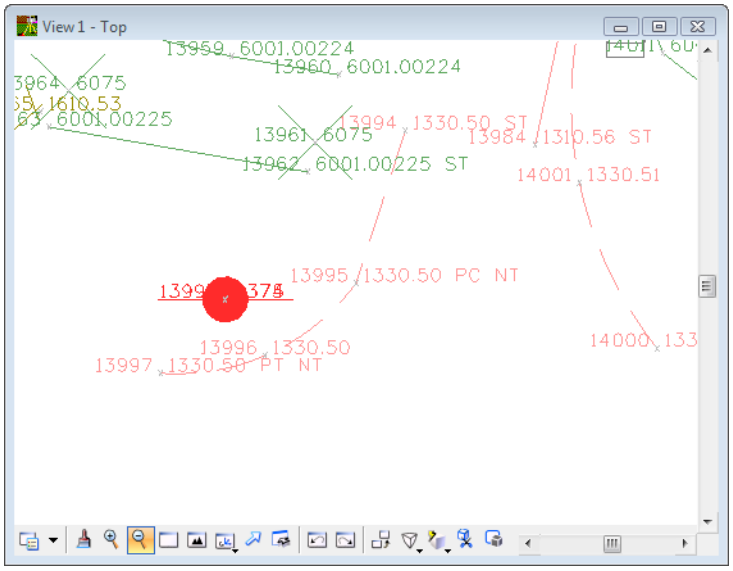
10. **<D>** the **Apply** button. The point names within the defined range populate the list.



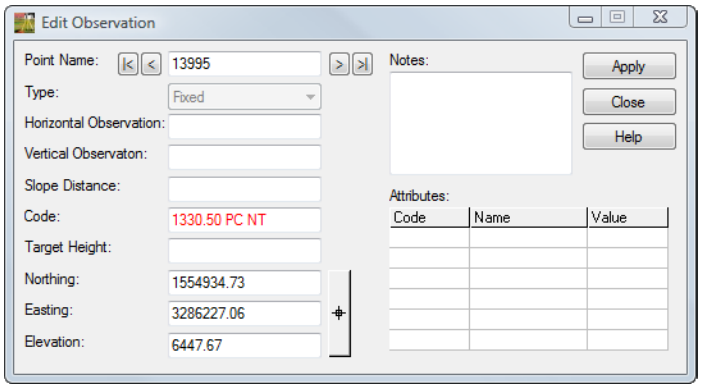
11. Select the point name **13995** and **<R>.** From the popup menu select **Center**. The point 13995 will center to MicroStation View 1.



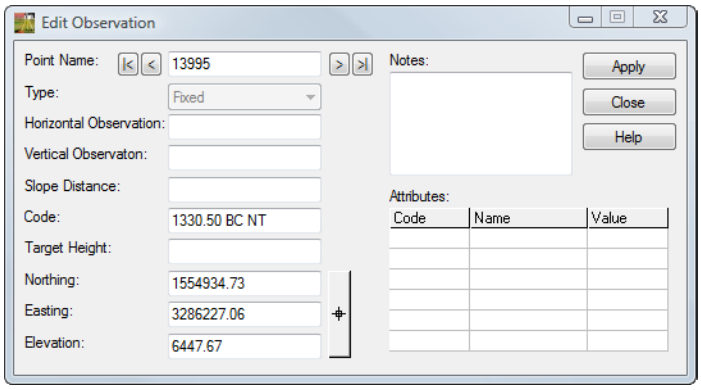
Note: The current zoom factor for the window will not change.



12. From the ***Find Observation*** dialog select the **Edit** button. The ***Edit Observation*** dialog will appear.

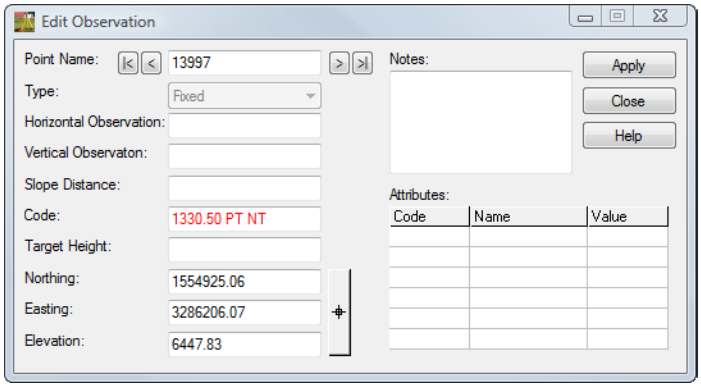


13. Type in the ***Code: 1330.50 BC NT***

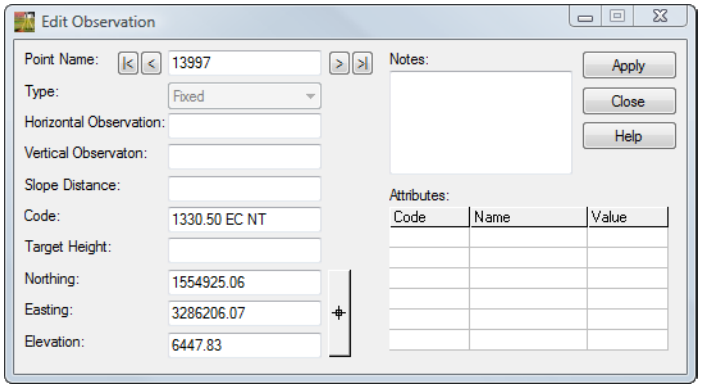


14. **<D>** the **Apply** button.

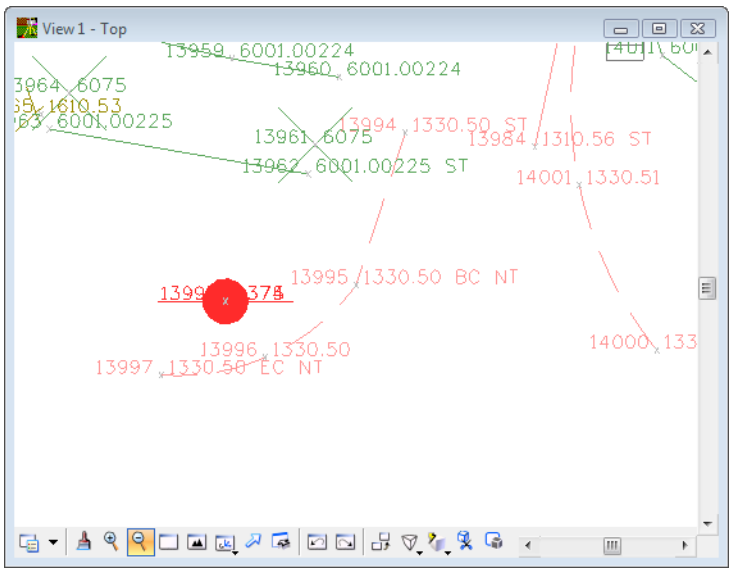
15. **<D>** the **Next** button at the top of the dialog, stop at point **13997**.



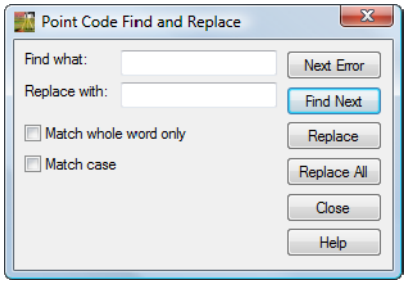
16. Type in the ***Code: 1330.50 EC NT***



17. **<D>** the **Apply** the **Close** buttons. Review your results in MicroStation View 1.

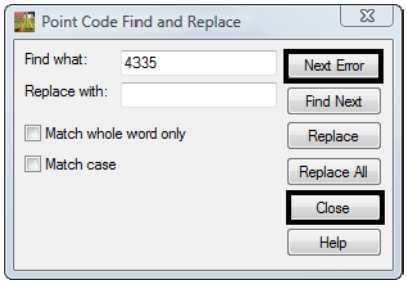


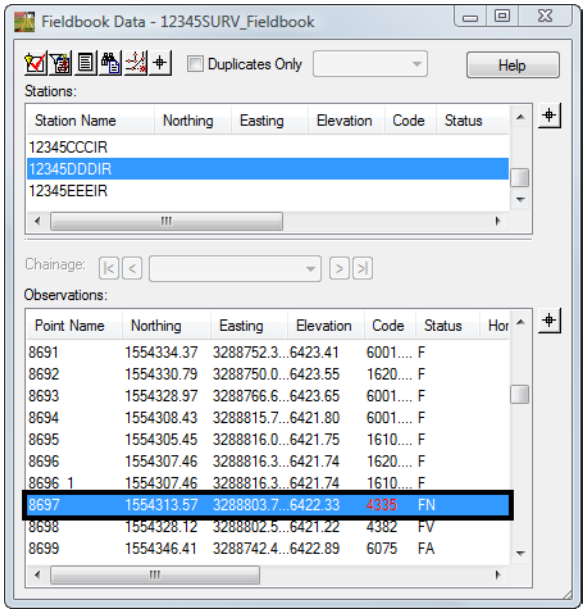
18. From the **Fieldbook** dialog select the **Find / Replace Codes** button. The ***Point Code Find a Replace*** dialog will appear.



19. **<D>** the **Next Error** button. The command will look in the current fieldbook and return the first code error it finds.

20. **<D>** the **Close** button. The incorrect point will be located in the ***Fieldbook Data*** dialog.

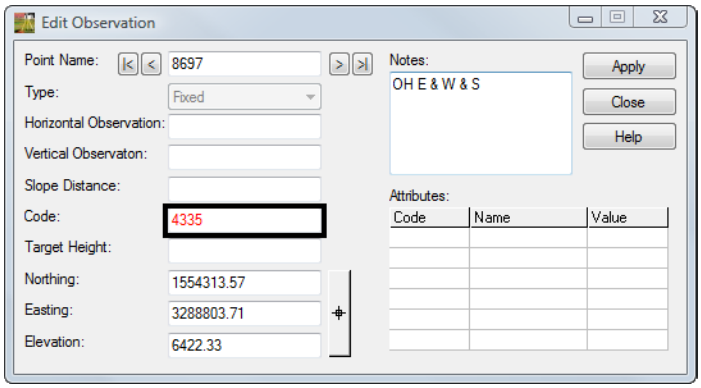




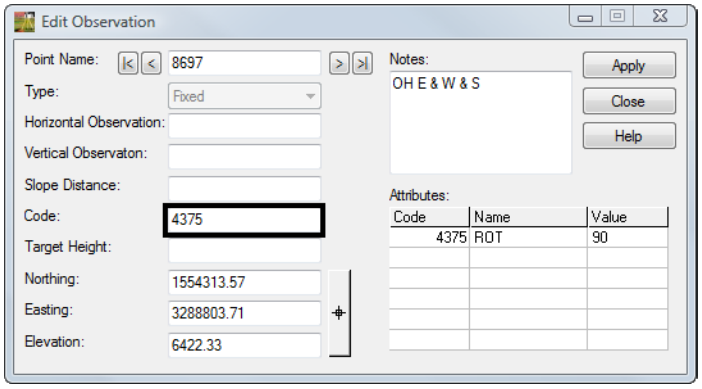
Note: This error has an incorrect Feature Code for a power pole.

21. In the ***Fieldbook Data*** dialog **<R>** on the point name ***8697*** from the popup menu select **Center**. The point name will be centered to the MicroStation View 1.

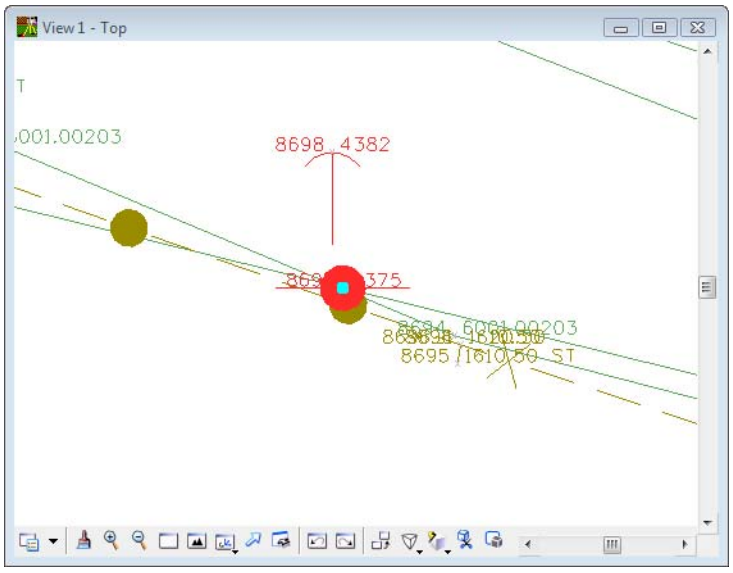
22. Again in the ***Fieldbook Data*** dialog <***R***> on the point name ***8697*** from the popup menu select **Edit**. The ***Edit Observation*** dialog will appear for point 8697.



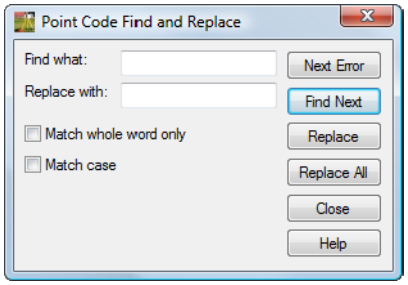
23. Type in the ***Code: 4375***



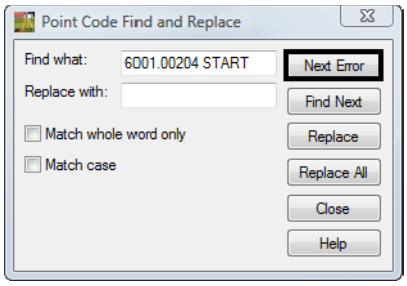
24. **<D>** the **Apply** then Close buttons. In the MicroStation View 1 the point has been updated and a power pole cell is at the location.



25. From the ***Fieldbook*** dialog select the **Find / Replace Codes** button. The ***Point Code Find a Replace*** dialog will appear.

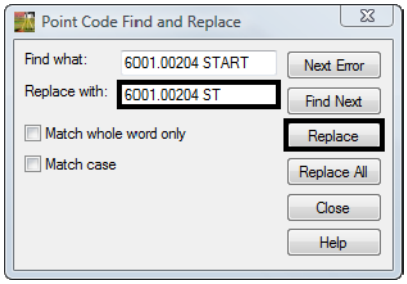


26. Select the **Next Error** button. The command will look in the current fieldbook and return the first code error it finds.



Note: This error has an incorrect Control Code for Start.

27. Type the correction in the field ***Replace with: 6001.00210 ST***



28. **<D>** the **Replace** button. The code in the fieldbook will be updated. The dialog will automatically locate the next code error **5177 3'X3'STEEP HILL**

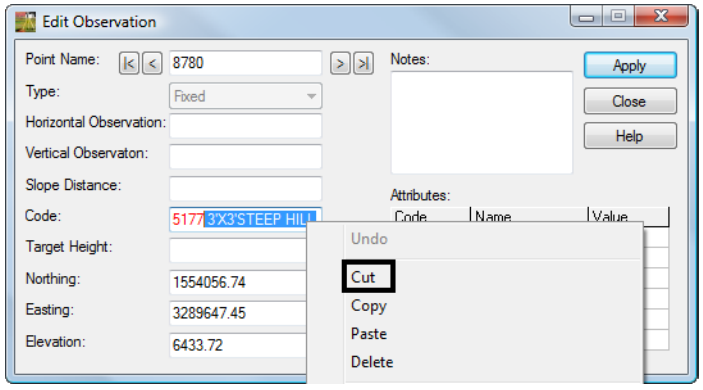
29. **<D>** the **Close** button in the ***Point Code Find and Replace*** dialog. The point name 8780 will be selected in the ***Fieldbook Data*** dialog.

30. **<R>** the point name 8780 and from the popup menu select **Edit**. The ***Edit Observation*** dialog will appear.

This error is because a note is entered into the code field. The note will be cut and then pasted into the ***Notes*** field, where it belongs.

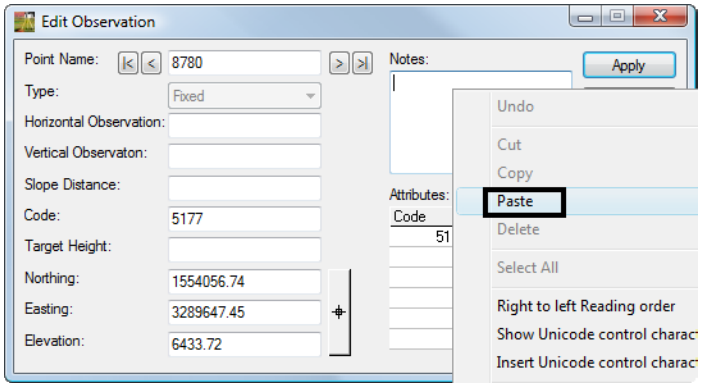
31. In the Code field highlight the additional text in the code line **"3'X3'STEEP HILL"**

32. **<R>** on the highlighted note and select **Cut** from the popup menu.

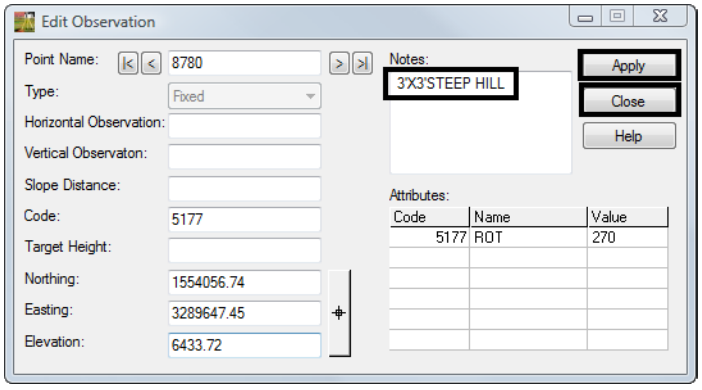


33. **<D>** in the ***Notes*** field so the field has focus.

34. **<R>** in the ***Notes*** field and select **Paste** from the popup menu.

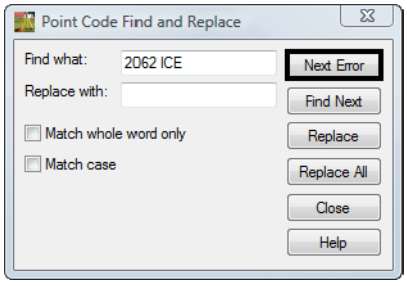


35. In the ***Edit Observation*** dialog **<D>** the **Apply** then **Close** buttons.



36. From the **Fieldbook** dialog select the **Find / Replace Codes** button. The ***Point Code Find a Replace*** dialog will appear.

37. Select the **Next Error** button. The command will look in the current fieldbook and return the last coding error in this fieldbook.

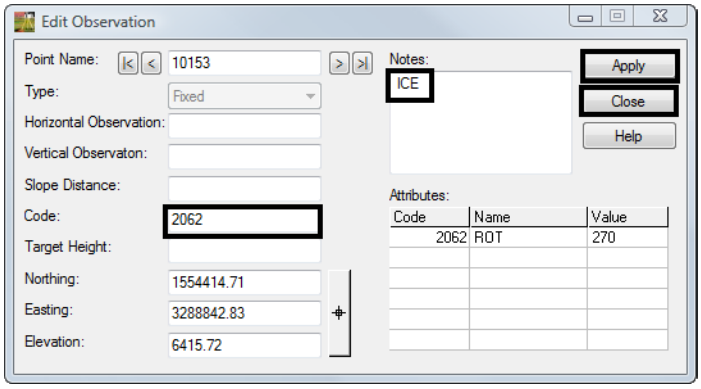


38. **<D>** the **Close** button in the ***Point Code Find and Replace*** dialog. The point name 10153 will be selected in the ***Fieldbook Data*** dialog.

39. **<D> <D>** the point name ***10153***. The ***Edit Observation*** dialog will appear.

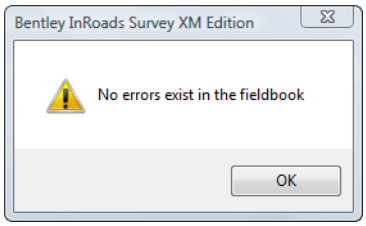
Again this error is because of the note being entered into the code field. The note will be cut and then pasted into the Notes field, where it belongs.

40. In the Code field highlight the additional text in the code line "**ICE**"
41. **<R>** on the highlighted note and select **Cut** from the popup menu.
42. **<D>** in the ***Notes*** field so the field has focus.
43. **<R>** in the ***Notes*** field and select **Paste** from the popup menu.
44. In the ***Edit Observation*** dialog **<D>** the **Apply** then **Close** buttons.



This should have taken care of all errors in the fieldbook.

45. Verify this by opening the ***Point Code Find and Replace*** dialog and selecting **Next Error**. An alert dialog will appear stating that no errors exist in the fieldbook.



46. Save the Survey fieldbook. From the Workspace Bar **<R>** on **12345SURVFieldbook01** select Save from the shortcut menu.

Lab 6.2 - Correcting Fieldbook Control Code Errors

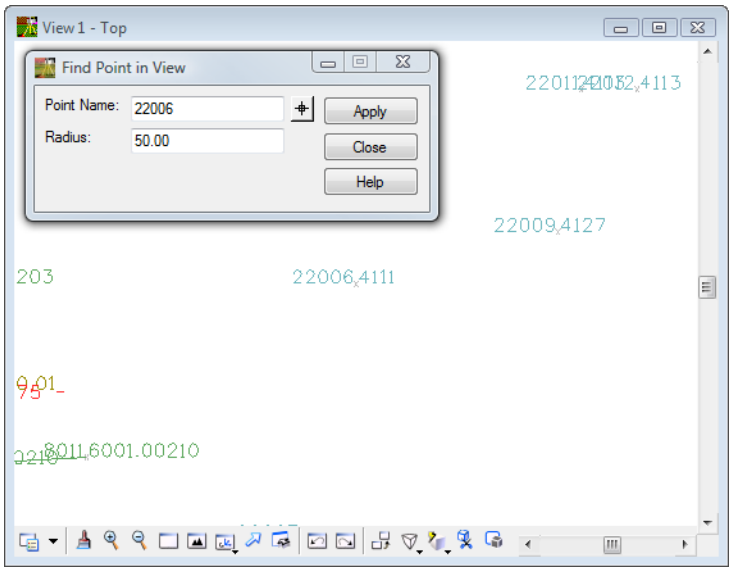
Control codes are the drawing tools for InRoads Survey. When collecting data in the field think of the range pole as a large pencil and using control codes allows you to draw the lines. Even though CDOT has standardized on Numeric feature codes, InRoads Survey is configured to allow the use of Alpha control codes only.

Section Objectives:

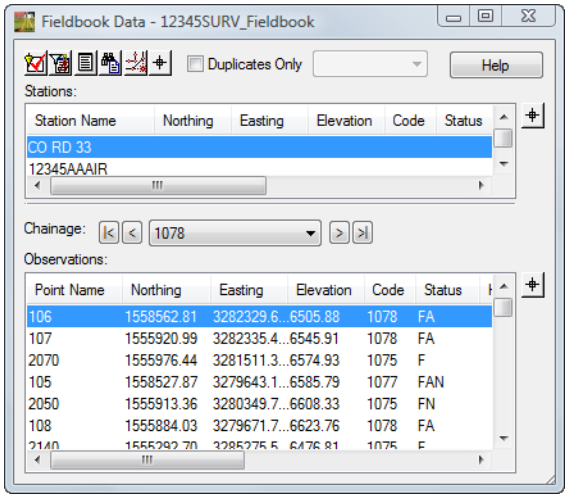
- Find and correct control coding errors.
- Add additional control coding to observations.

1. From the pull-down menu **Survey > Find Point in View** The ***Find Point in View*** dialog will appear.

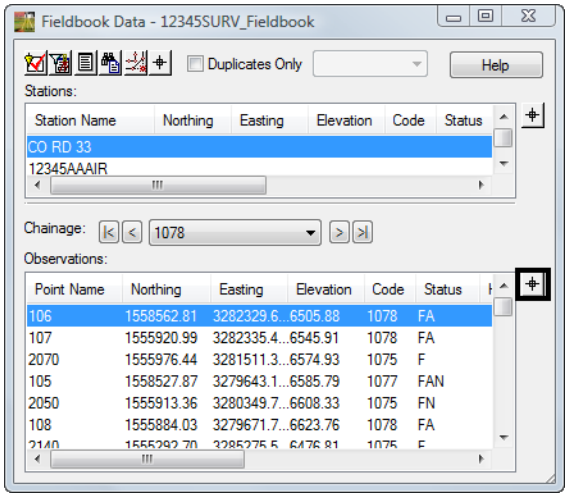
2. Key-in the ***Point Name: 22006***
   Radius: 50



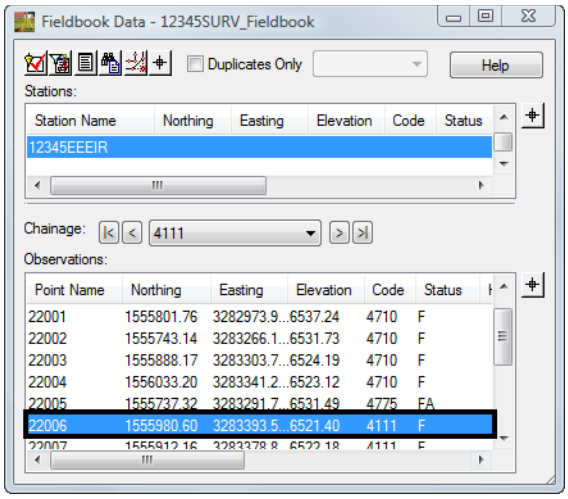
3. Open the ***Fieldbook Data*** dialog **Survey > Fieldbook Data**



4. From the ***Fieldbook Data*** dialog **<D>** the **Select Observation** target button. The ***Fieldbook Data*** dialog will minimize allowing more of the view to be displayed.

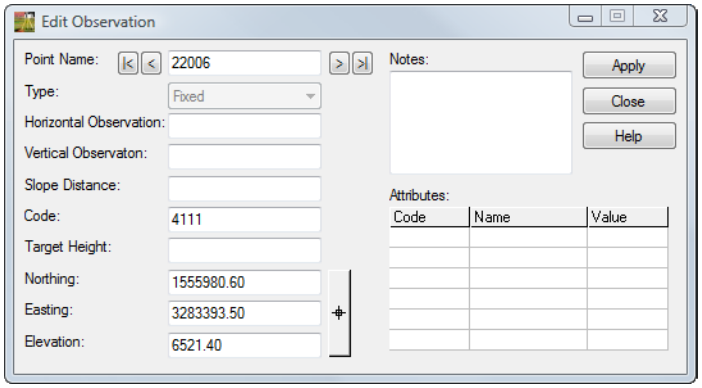


5. **<D>** point ***22006*** in the MicroStation View 1. The **Fieldbook Data** dialog will restore to the screen and the point name ***22006*** will be highlighted in dialog.



6. **<D> <D>** the point name ***22006***. The Edit Observation dialog for point 22006 will appear.

The brick house point code is missing the control code ST to start the line work. Also the distance control code DIST will be utilized to complete the planimetrics of the house.



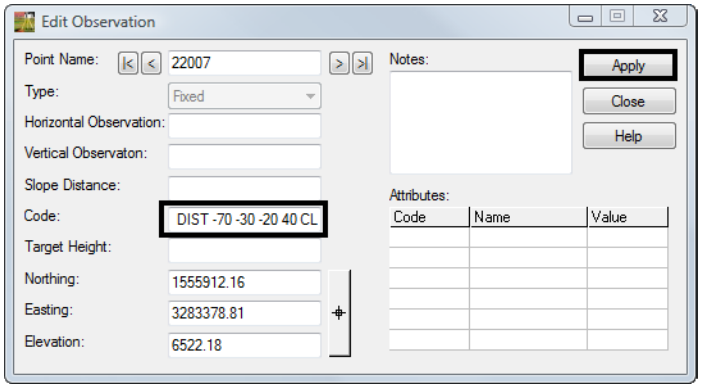
7. Type in the ***Code: 4111 ST***

8. **<D>** the **Apply** button. The line work for the house will start.

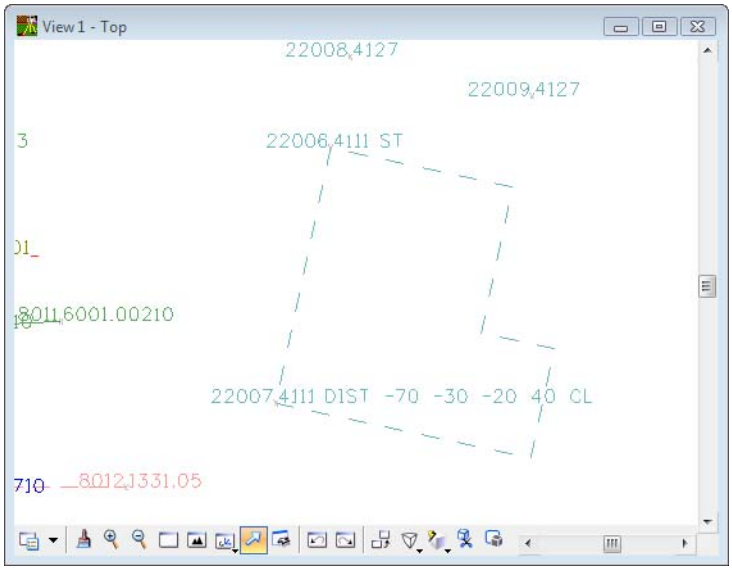
9. **<D>** the **Next** button in the Edit Observation dialog stop at point name **22007**.

10. Type in the ***Code: 4111 DIST -70 -30 -20 40 CL***

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



Note: A ***positive number*** will place the line to the ***right*** of the two base line points. A ***negative number*** will place the line to the ***left side*** of the two base line points.

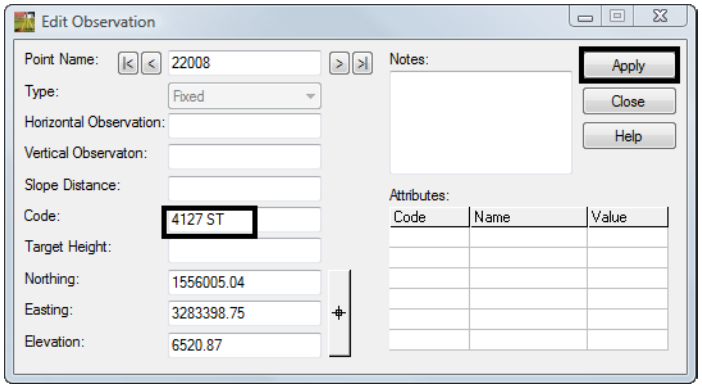


12. Locate point name **22008** in the ***Fieldbook Data*** dialog. Also ***center*** it in the MicroStation window.

13. **<D> <D>** the point name ***22008***. The ***Edit Observation dialog*** will appear.

The next edits will be to create the deck on the back of the house using two shots and a measured distance with the rectangle RECT control code.

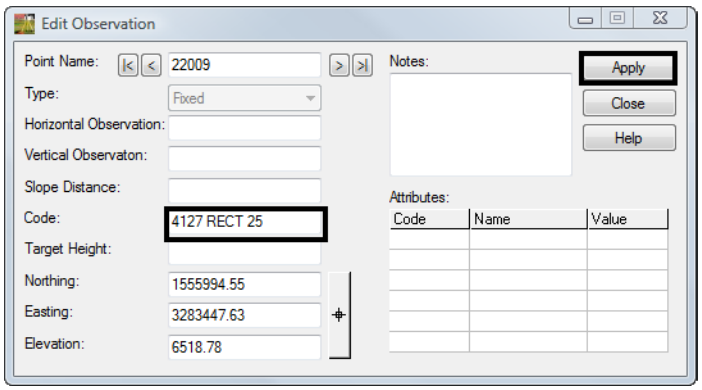
14. Type in the ***Code: 4127 ST***



15. **<D>** the **Apply** button. The line work for the deck will start.

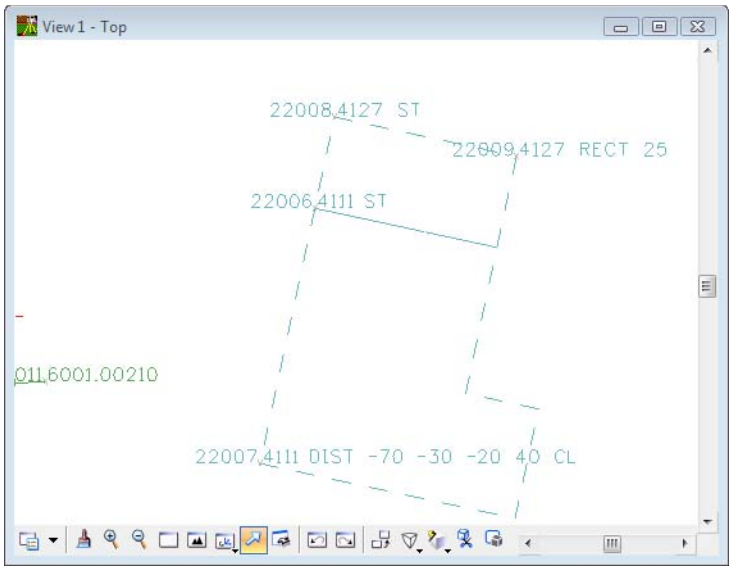
16. **<D>** the **Next** button in the Edit Observation dialog stop at point name ***22009***.

17. Type in the ***Code: 4127 RECT 25***



Note: A positive number will place the rectangle on the right side of the two base line points. A negative number will place the rectangle on the left side of the two base line points.

18. **<D>** the **Apply** button the rectangle control code will have finished creating the line work.

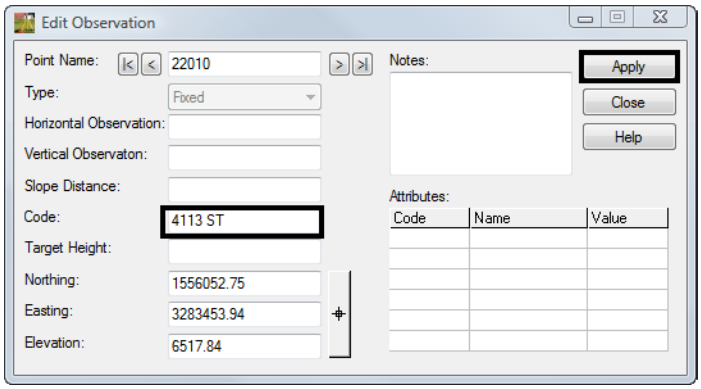


19. Locate point name ***22010*** in the **Fieldbook Data** dialog. Also ***center*** it in the MicroStation window.

20. **<D> <D>** the point name ***22010***. The ***Edit Observation*** dialog will appear.

The next edits will be to create the shed using three shots with the close rectangle CLR control code.

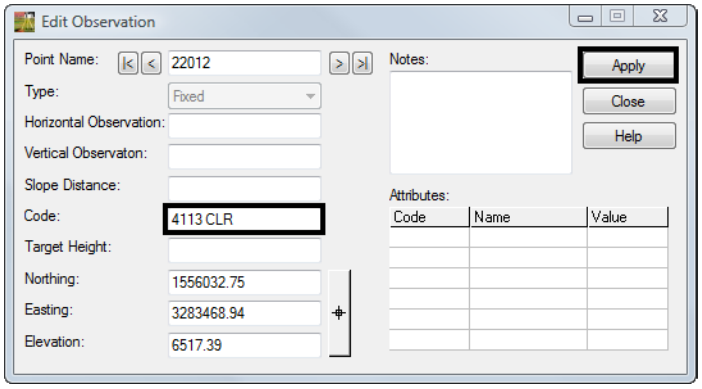
21. Type in the ***Code: 4113 ST***



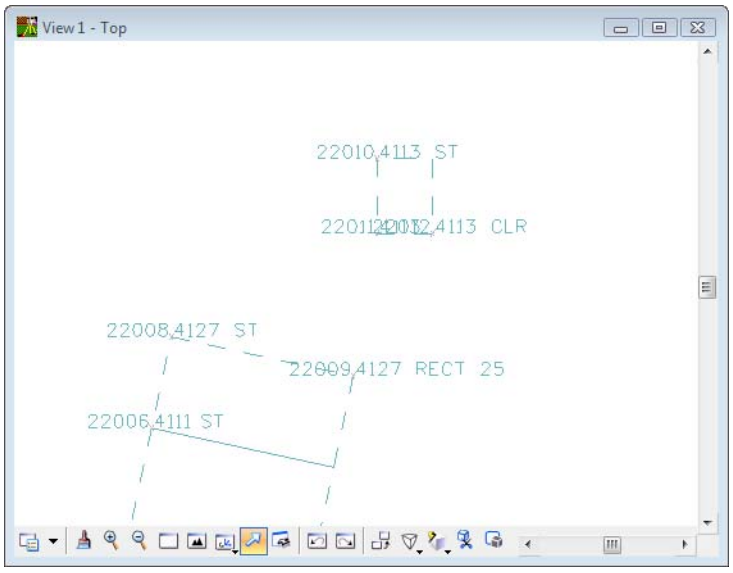
22. **<D>** the **Apply** button. The line work for the deck will start.

23. **<D>** the **Next** button in the ***Edit Observation*** dialog stop at point name ***22012***

24. Type in the ***Code: 4113 CLR***



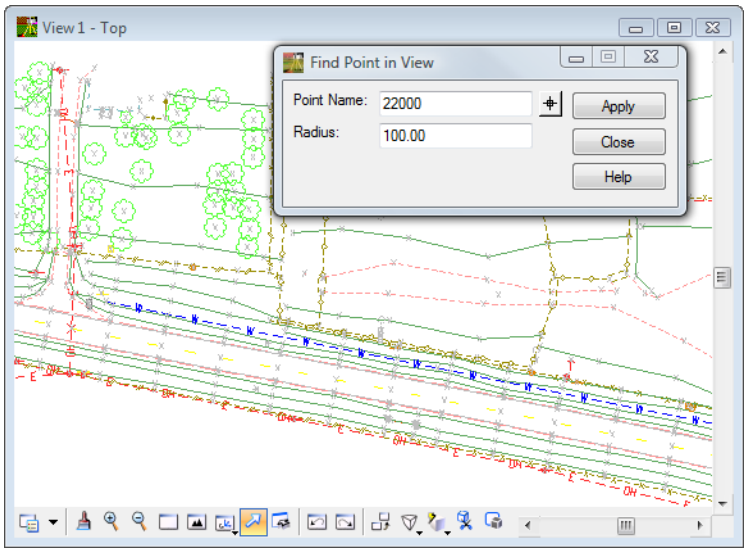
25. **<D>** the **Apply** button the close rectangle control code will have finished creating the line work.



The watermain and a hydrant have been surveyed The control code JNC will be utilized to tie the hydant to the watermain.

26. From the pull-down menu **Survey > Find Point in View** The ***Find Point in View*** dialog will appear.

27. Key-in the ***Point Name: 22000***
Radius: 100

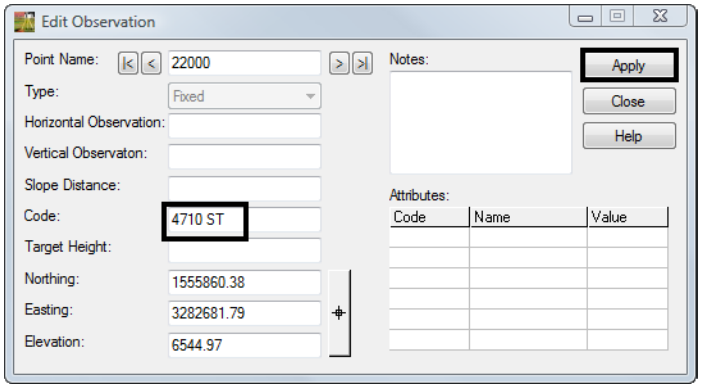


28. Locate point name ***22000*** in the ***Fieldbook Data*** dialog.

29. **<D> <D>** the point name ***22000***. The ***Edit Observation*** dialog will appear.

<D> the figure shown in the MicroStation View 1. The ***Fieldbook Data*** dialog will restore to the screen and the point name ***8026*** will be highlighted in dialog.

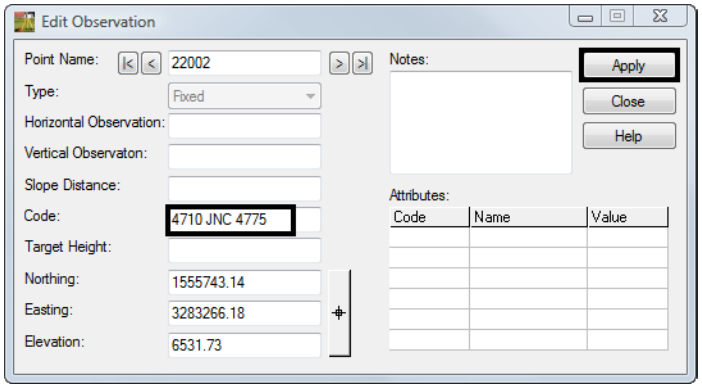
30. Type in the ***Code: 4710 ST***



31. **<D>** the **Apply** button. The line work for the deck will have started.

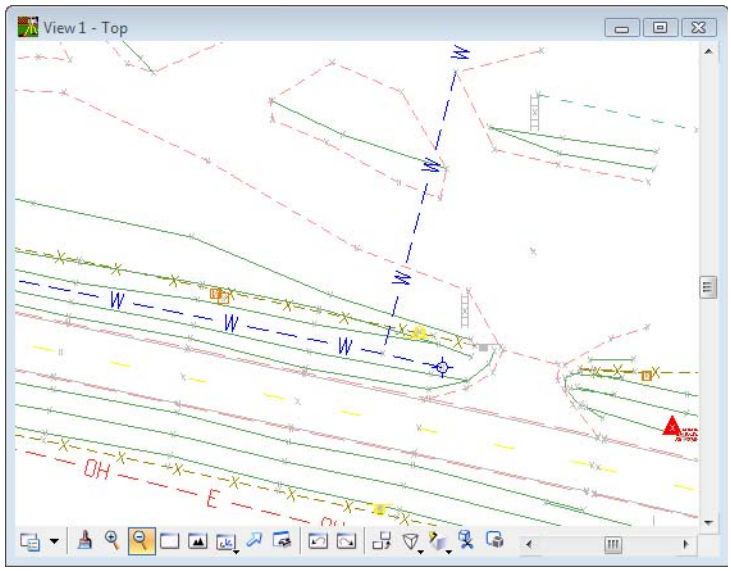
32. **<D>** the **Next** button in the ***Edit Observation*** dialog stop at point name ***22002***

33. Type in the ***Code: 4710 JNC 4775***



Note: The Join Nearest Code JNC will locate the nearest fire hydrant 4775 feature code and connect a line to that code.

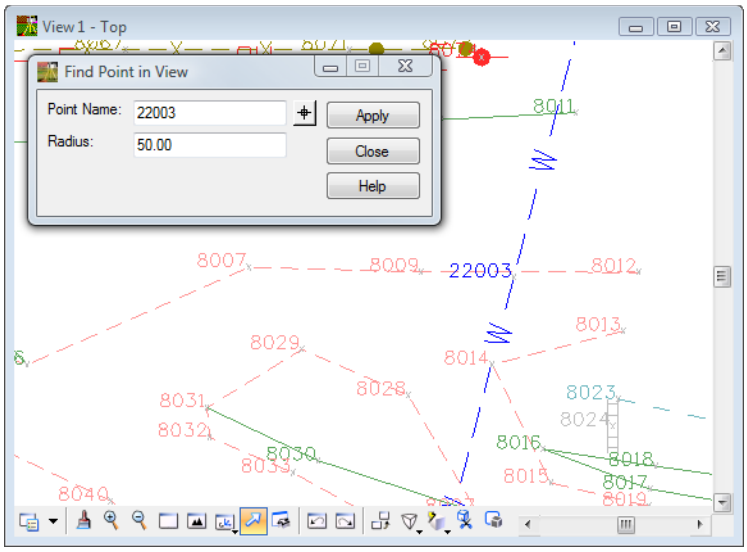
34. **<D>** the **Apply** button the Join Nearest Code control code will have finished creating the line work.



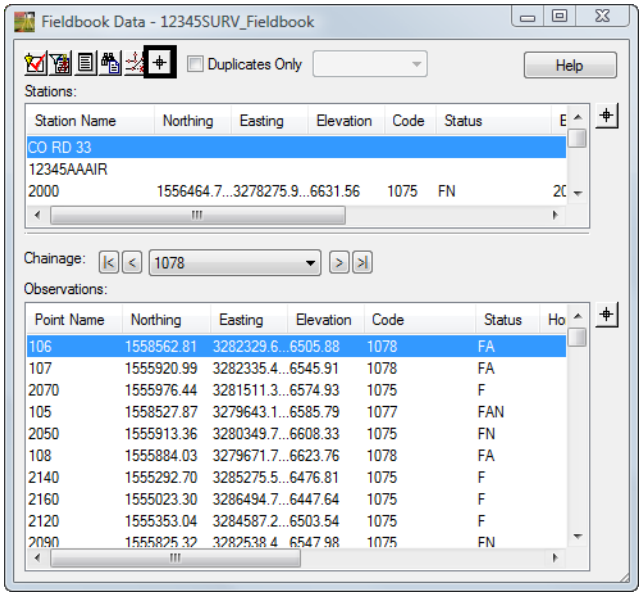
The next edits will smooth he edge of driveway using the begin curve BC control code.

35. From the pull-down menu **Survey > Find Point in View** The ***Find Point in View*** dialog will appear.

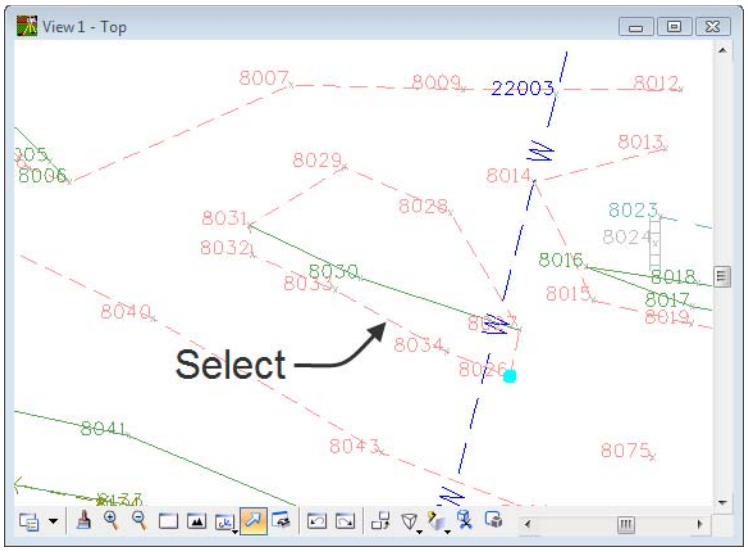
36. Key-in the ***Point Name: 22003***
Radius: 50



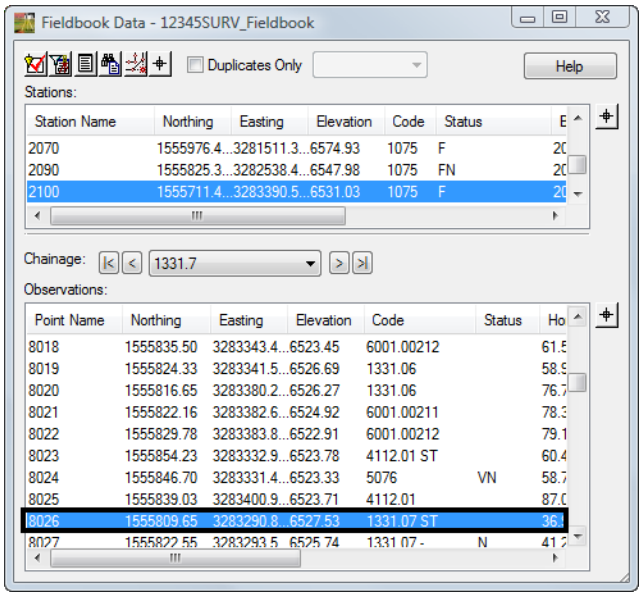
37. From the ***Fieldbook Data*** dialog **<D>** the **Select Figure** target button. The ***Fieldbook Data*** dialog will minimize allowing more of the view to be displayed.



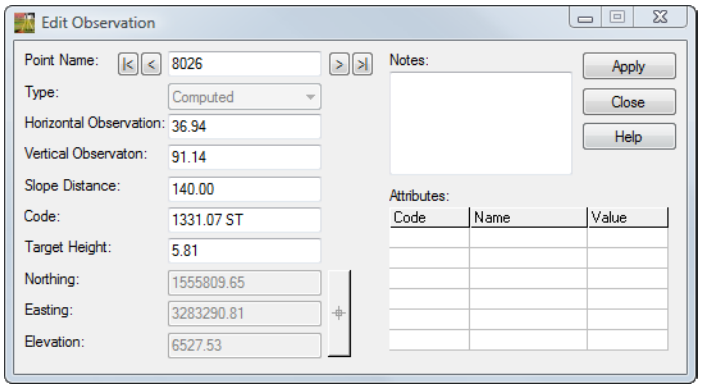
38. **<D>** the figure shown in the MicroStation View 1. The ***Fieldbook Data*** dialog will restore to the screen and the point name ***8026*** will be highlighted in dialog.



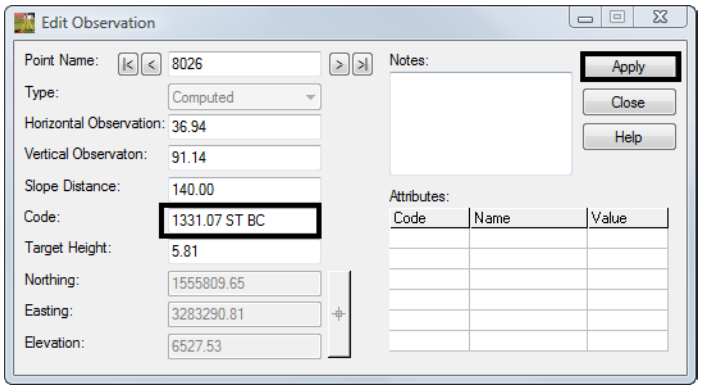
39. **<D> <D>** the point name ***8026***. The ***Edit Observation*** dialog for point ***8206*** will appear.



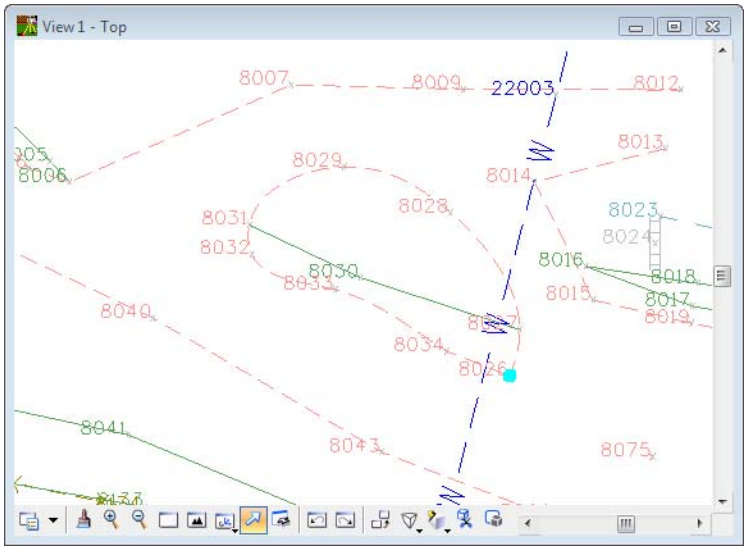
The figure shown in plan view has sharp edges and should be smoothed for a better looking basemap.



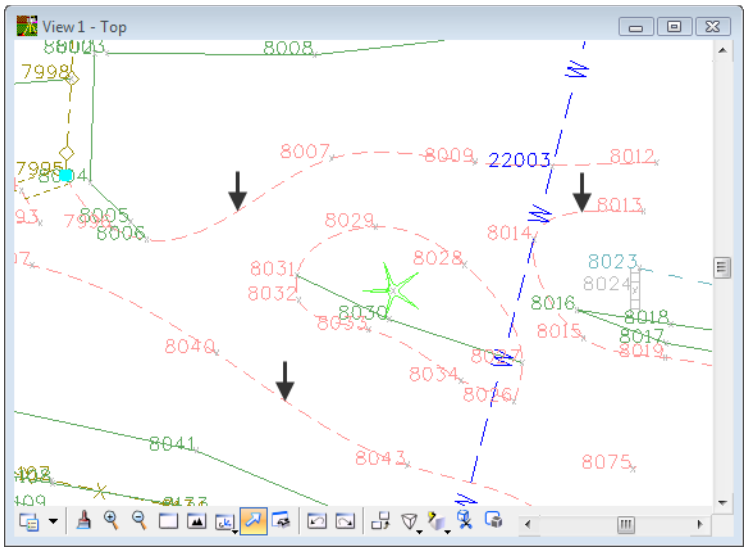
40. Type in the ***Code: 1331.07 ST BC***



41. **<D>** the **Apply** button. The line work for the figure will be smoother.



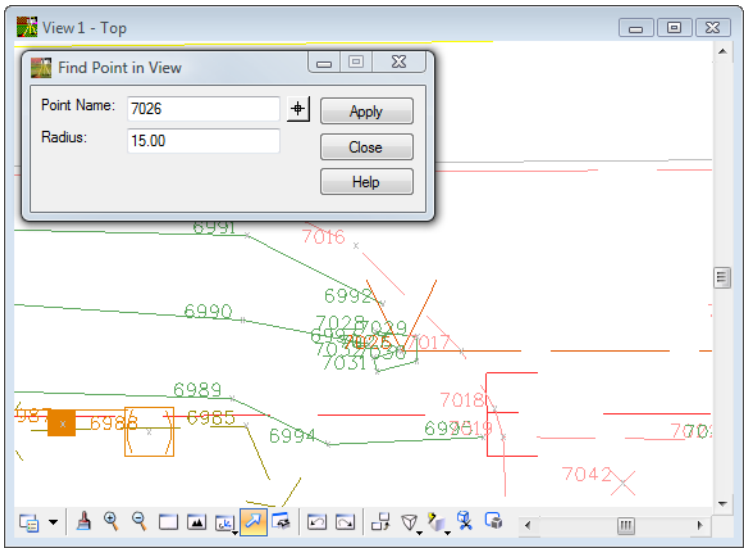
42. Continue to edit the rest of the Dirt Driveway figures in the area with the Begin Curve BC control code.



The next edit will be to rotate culvert end wall to the correct orientation

43. From the pull-down menu **Survey > Find Point in View** The ***Find Point in View*** dialog will appear.

44. Key-in the ***Point Name:*** **7026**
Radius: **15**

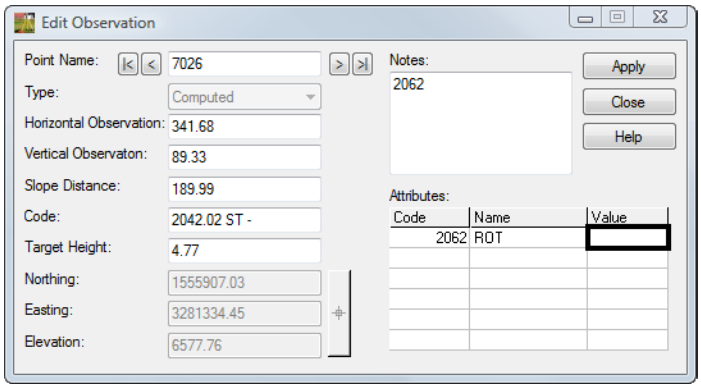


45. Locate point name ***7026*** in the ***Fieldbook Data*** dialog.

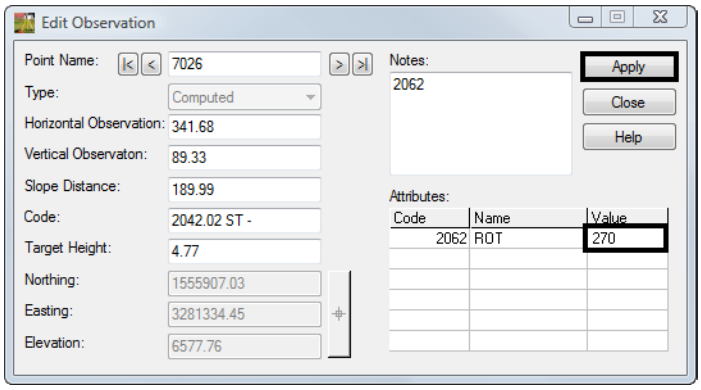
46. **<D> <D>** the point name **7026**. The ***Edit Observation*** dialog will appear.

The next edits will be to rotate the culvert end sections into the direction of the pipe.

47. Move your mouse to the ***Attributes*** section of the dialog and **<D>** the Value for Code 2062. The Value field will open allowing keyboard input.



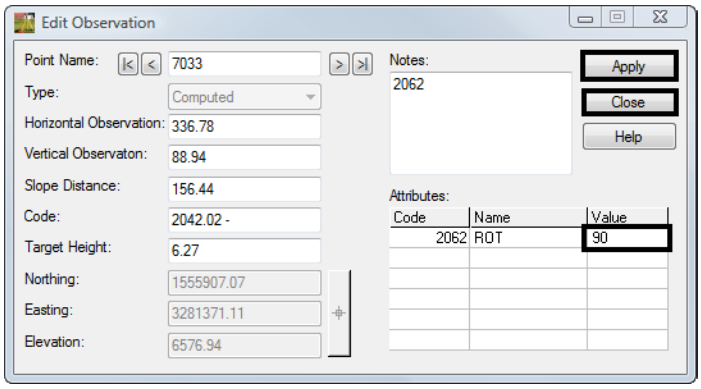
48. Type in the ***Value:* 270**



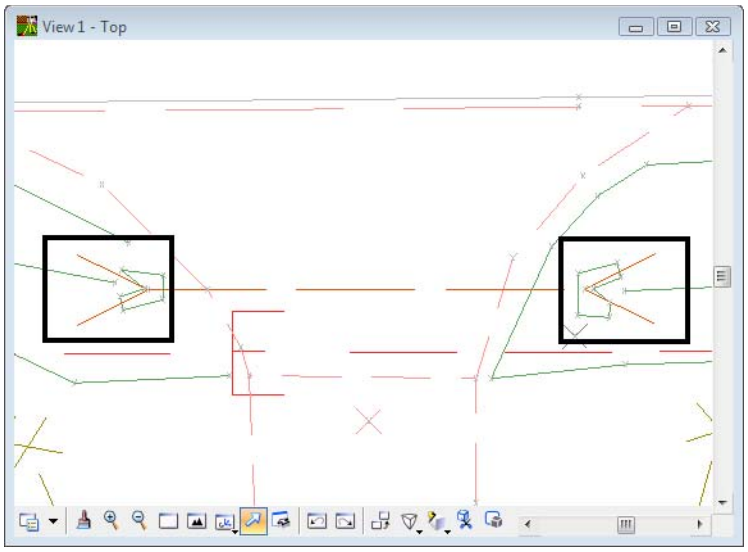
49. **<D>** the **Apply** button. The end section cell will have rotated into the direction of the pipe.

50. **<D>** the **Next** button in the ***Edit Observation*** dialog to locate point name ***7033*** which is the east end of the pipe.

51. Type in the ***Value:* 90**



52. **<D>** the **Apply** then **Close** buttons. The end section cell will have rotated into the direction of the pipe.



The next edits will be to change the feature code 3033 (tree grove) to run counter clockwise CCW so the planimetrics will be correct.

53. From the pull-down menu **Survey > Find Point in View** The ***Find Point in View*** dialog will appear.

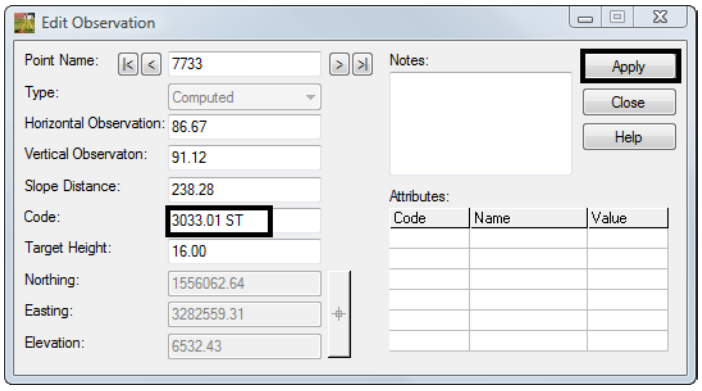
54. Key-in the ***Point Name:*** **7734**
Radius: **40**

55. Locate point name ***7733*** in the ***Fieldbook Data*** dialog.

56. **<D> <D>** the point name ***7733***. The ***Edit Observation*** dialog will appear.

57. Move your mouse to the ***Codes*** section of the dialog.

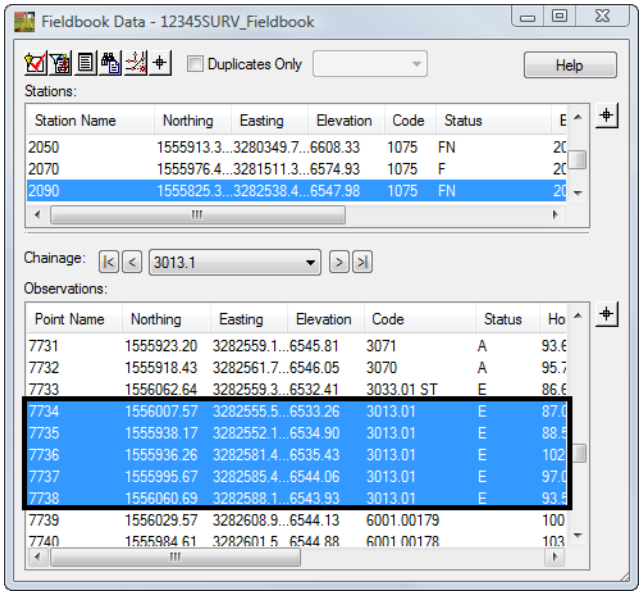
58. Type in the ***Code: 3033.01 ST***



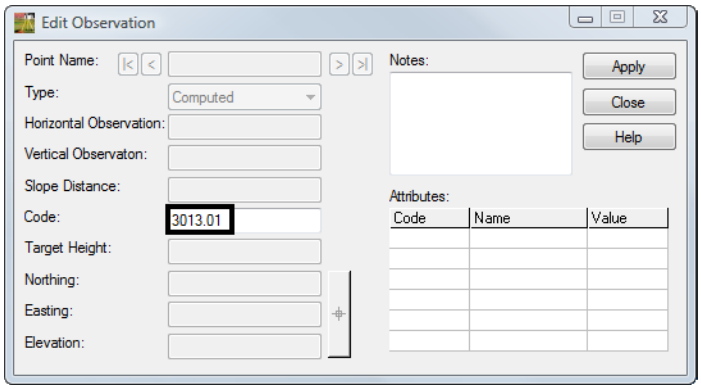
59. **<D>** the **Apply** then Close buttons. The change in direction for the feature code will correct the planimetric display.

Note: Notice that at this point the entire display of the line has disappeared. The remaining shots that make up this figure will also need to be changed to feature code 3033.

60. In the ***Fieldbook Data*** dialog **<D>** the point name ***7734***, then holding down the **Shift** key **<D>** the point name ***7738***. A selection set of points 7734-7738 have been highlighted in the fieldbook.

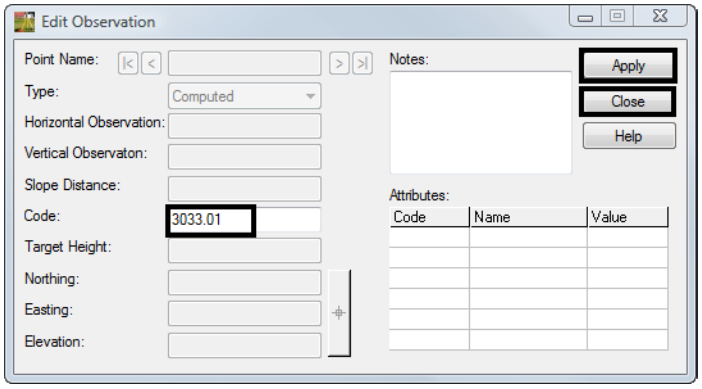


61. **<R>** the select point list. From the popup menu select **Edit**.

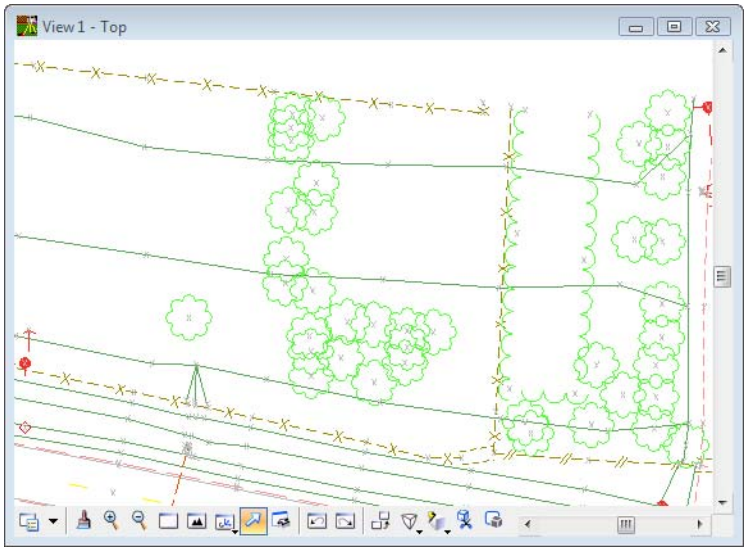


Note: Notice that the only fields that can be edited are the ones that are identical among the selected observations.

62. Type in the ***Code: 3033.01***



63. **<D>** the **Apply** then **Close** buttons. The planimetrics will display correctly.



64. Save the Survey fieldbook. From the Workspace Bar **<R>** on ***12345SURVFieldbook01*** select Save from the shortcut menu.

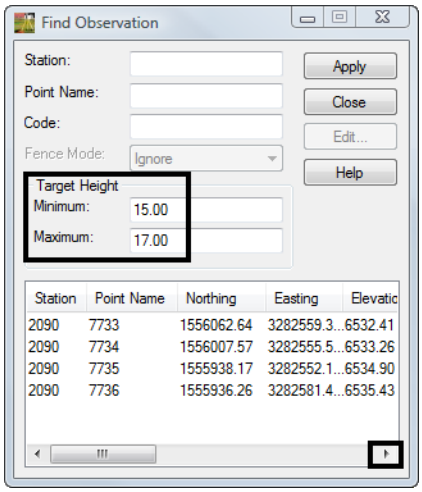
Lab 6.3 - Correcting Elevation Errors

There are four shots (7733-7736) that were collected with incorrect rod heights (16.0' vs. 6.0'). The shots can be located and edited as a group.

Section Objectives:

- Find observations based on search criteria
- Correct multiple observations with a single operation.

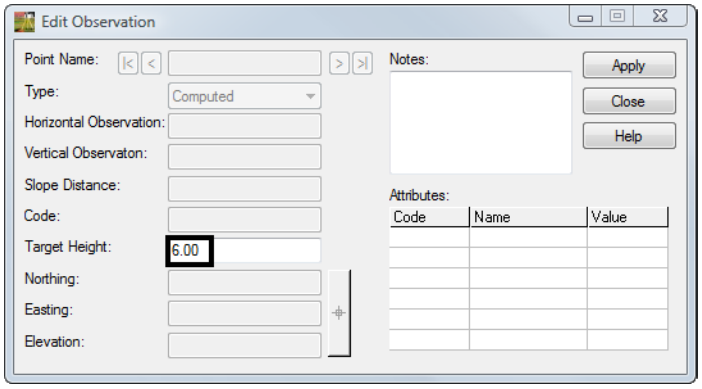
1. **<D>** the Fieldbook button from the Survey tool bar. The Survey Fieldbook will appear.
2. In the ***Fieldbook Data*** dialog **<R>** any Point Name in the observation section of the dialog. From the shortcut menu Select ***Find***. The ***Find Observation*** dialog will appear.
3. Target Height
   Minimum: 15
   Maximum: 17
4. **<D>** the **Apply** button.



5. <***D***> the first point in the list. The Fieldbook focus will move to that point.
6. **Close** the Find Observation dialog
7. **Select** observations 7733-7736

   Note: Use the Shift and Ctrl keys on the keyboard to select and deselect multiple points in the Find Observation list.

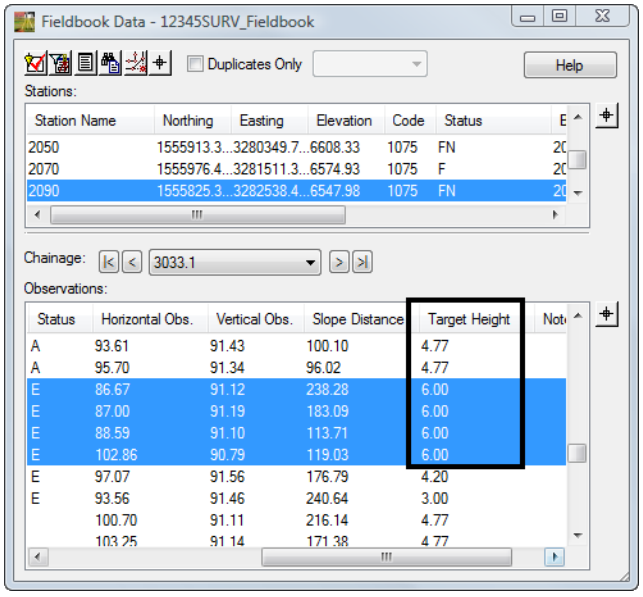
8. **<r>** and select ***Edit…*** from the flyout menu. The ***Edit Observation*** dialog will appear.



9. Type the correct **Target Height: 6.00**

10. **<D>** the **Apply** then **Close** buttons to accept the change for all the selected points.

11. Verify the change was applied to the observations.



12. Save the Survey fieldbook. From the Workspace Bar **<R>** on **12345SURVFieldbook01** select Save from the shortcut menu.

Lab 6.4 - Adding points to the fieldbook

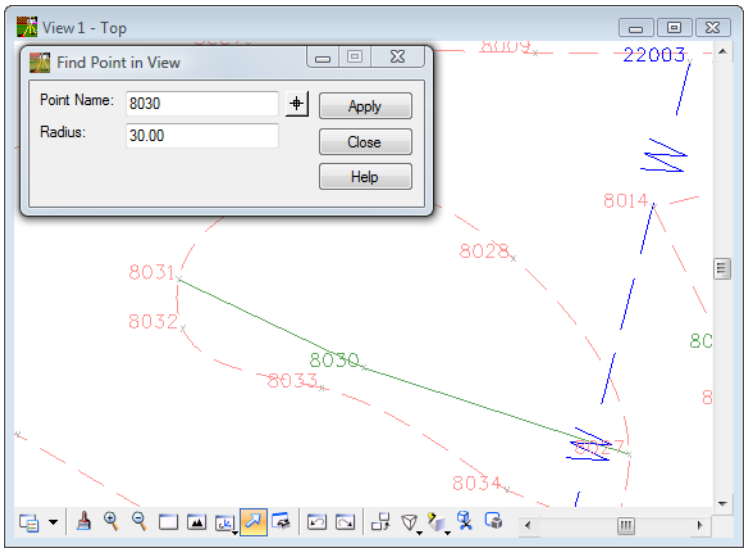
The ability to add points to a fieldbook is simple to accomplish. Points can be added based on computed, fixed, or known geometry locations.

Section Objectives:

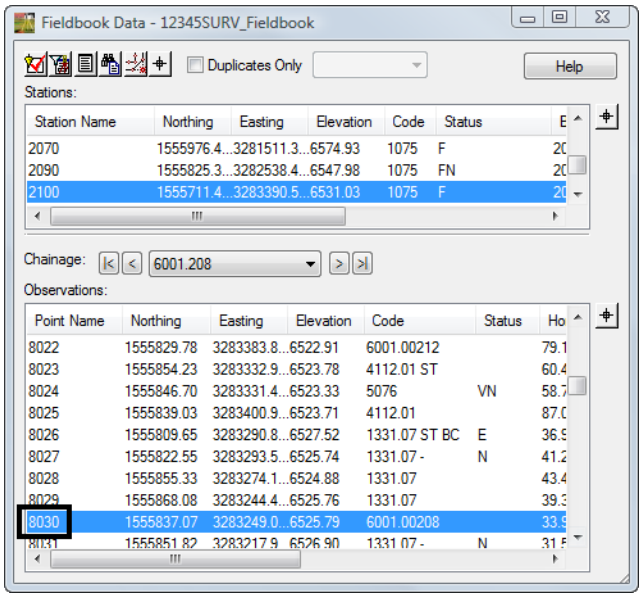
- To add an observation to a fieldbook by selecting the location graphically from the MicroStation file.
- Define the elevation for the added point and add notes to the observation.

In this example a tree will be added to the fieldbook.

1. In the MicroStation view ***Find Point Name:*** **8030 Radius: 30**



2. In the InRoads Survey Fieldbook Locate point ***8030***

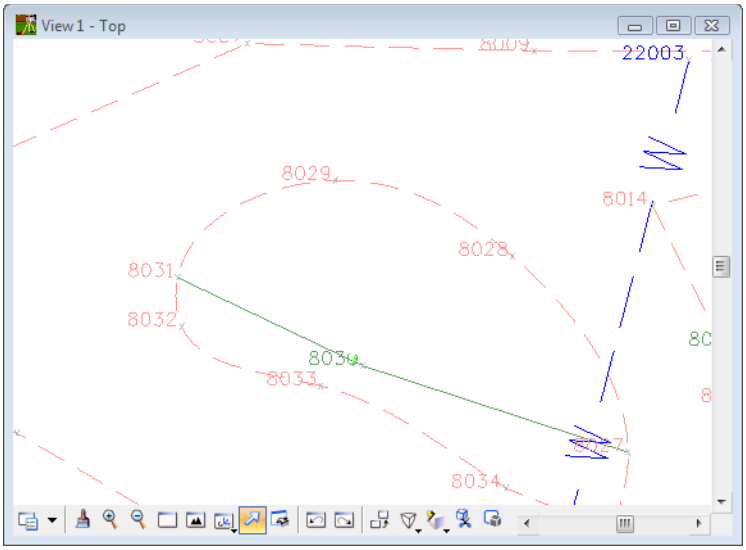


3. **<R>** the point name ***8030*** and select **Add After** from the shortcut menu. The ***Add Observation*** dialog will open.

Note: The Point Name field will populate with the next available number starting with the Point Seed number defined in Survey Options.

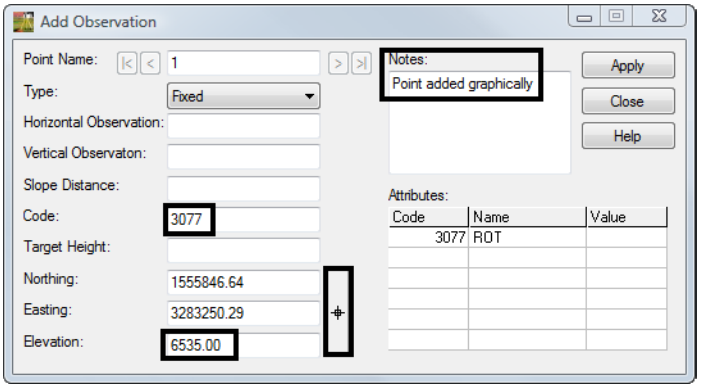
4. Type in the ***Code: 3077***

5. **<D>** the **Target** button for the Northing Easting and Elevation. The **Add** Observation dialog will minimize. **<D>** a point in the MicroStation view somewhere inside the island of the driveway. The ***Add Observation*** dialog will reappear.

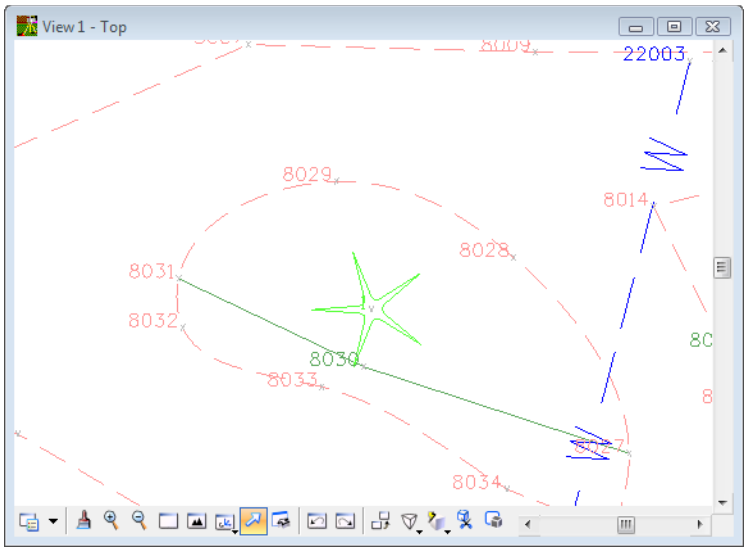


6. Type in the ***Elevation:*** **6535.00**

7. Type in the ***Note:*** **Point added graphically**



8. **<D> t**he **Apply** then Close buttons. The tree will dynamically display in the MicroStation view.



9. Save the Survey fieldbook. From the Workspace Bar **<R>** on ***12345SURVFieldbook01*** select **Save** from the shortcut menu.

Section Summary:

- In *Lab 6.1 -Correcting Fieldbook Code Errors* tools were used to both find and correct codes that were incorrectly logged in the data collector.
- In *Lab 6.2 -Correcting Fieldbook Control Code Errors* control codes were corrected. Additionally control code additions were made to observations to refine the data collected.
- In *Lab 6.3 -Correcting Elevation Errors* search criteria was used to locate a group of observations. A single edit was executed to correct multiple observations.
- In *Lab 6.4 -Adding points to the fieldbook* an additional observation was added to the electronic fieldbook based on a graphic location.

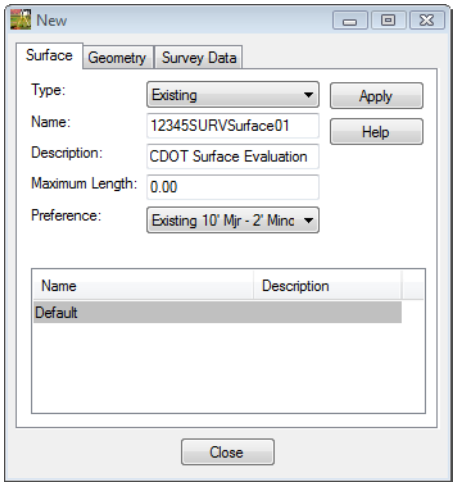
LAB 7 - DTM Evaluation

Lab 7.1 - Exporting Survey Data to Surface for Evaluation

Exporting to a DTM surface will create a triangulation network used for displaying contours, features and spot elevations.

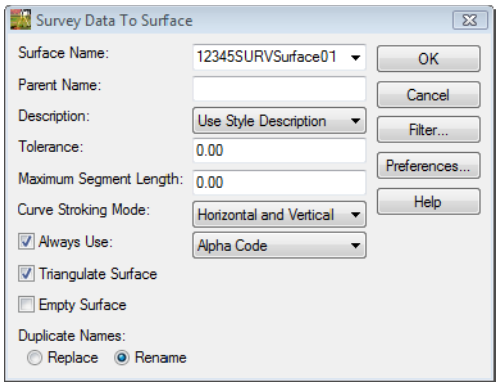
1. Verify the **12345SURVFieldbook01** fieldbook is active as this is the survey data to be exported to a DTM. You can tell which fieldbook is active by the red box around the fieldbook button.
2. Write Survey Data to Graphics if they are not already. The planimetrics will make viewing in the MicroStation model easier.
3. From the pull-down menu, select **File > New**. The ***New*** dialog will appear.
4. Select the **Surface** tab.
5. Key in the surface Name: **12345SURVSurface01**
6. Key in the Description: **CDOT Surface Evaluation**

   Note: Key in any additional file information in the ***Description*** field of the dialog, such as **Date**, **User**, and **Design file** name. You have up to 34 characters even though you may not see all the characters in the Description field.
7. Keep the **Maximum Length** set to ***0***
8. Set pick list to the Preference: **Existing 10' Mjr – 2' Minor**

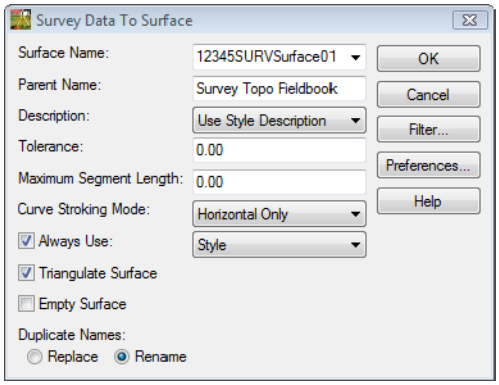


9. **<D>** the **Apply** then **Close** buttons.

10. From the pull down menu **Survey > Survey Data to Surface**. The ***Survey Data to Surface*** dialog will appear.



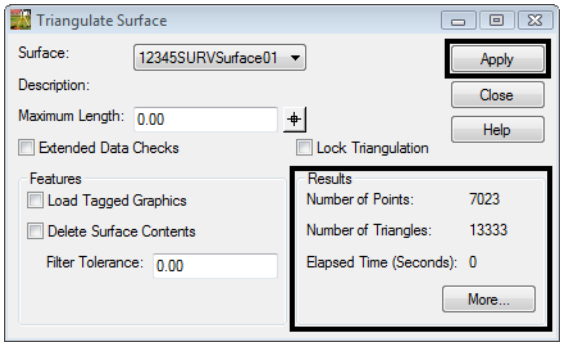
11. Pick from the list in the ***Surface Name*** **12345SURVSurface01** in the Surface Name field.
12. Set the ***Description*** to **Use Style Description**
13. Keep the ***Tolerance*** and ***Maximum Segment Length*** set to **0.00**
14. Set the ***Curve Stroking Mode*** to **Horizontal Only**
15. Check ***Always Use***: **Style**
16. Check ***Triangulate Surface***



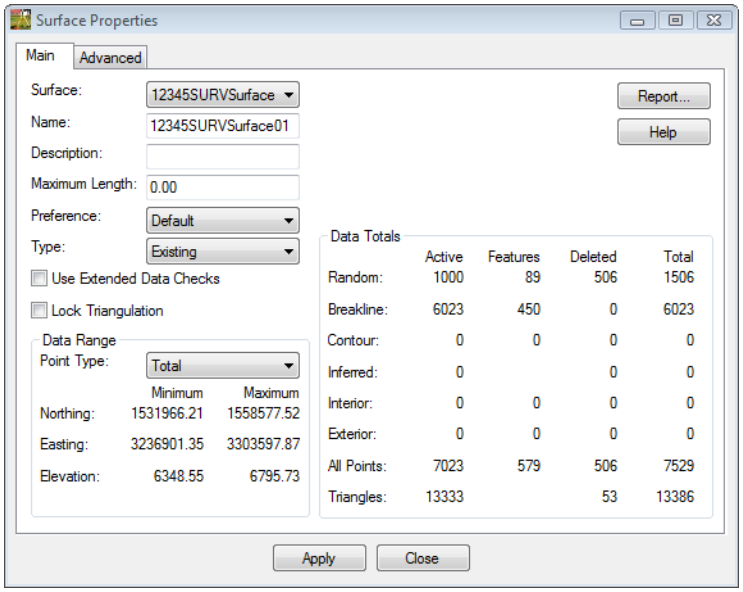
17. **<D>** the **OK** button the ***Survey Data to Surface*** dialog will close and the ***Triangulate Surface*** dialog will appear.

18. Leave all settings unchecked. ***Maximum Length*** should be set to **0.00**.

19. **<D>** the **Apply** button. The Results section of the dialog should look similar to the image below. (Numbers may not match exactly)



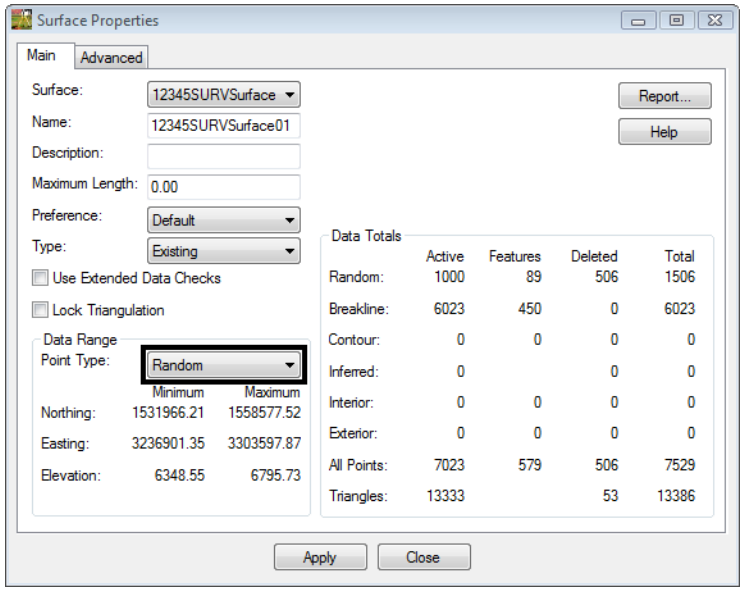
20. **<D>** the **More** button. The ***Surface Properties*** dialog will appear.



21. Verify you are working with the correct surface ***12345SURVSurface01***.

22. Review the section for ***Data Rang***e. The Northing, Easting, and Elevation values should fall within the project limits.

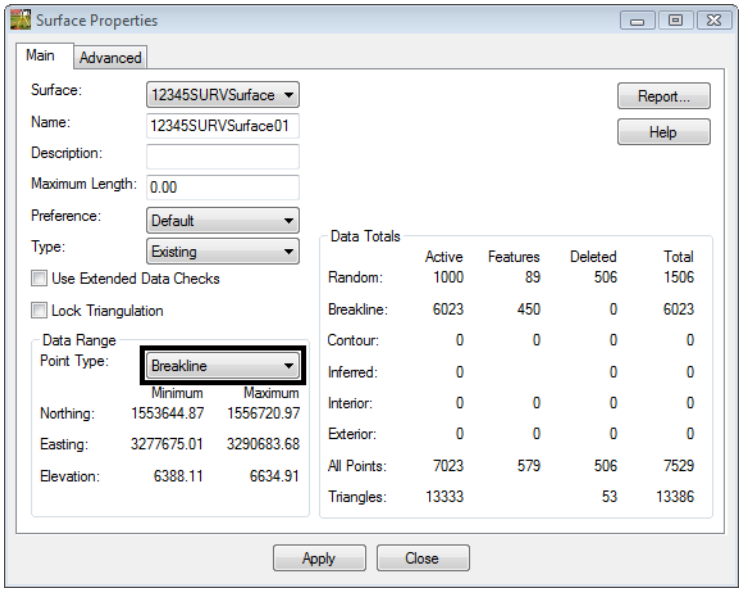
23. In the ***Data Range*** section, change the drop down selection to **Random**.



24. Review the ***Random*** point range.

Note: As part of your evaluation of the surface you are looking for a large error in the data such as a zero elevation, or truncated coordinates.

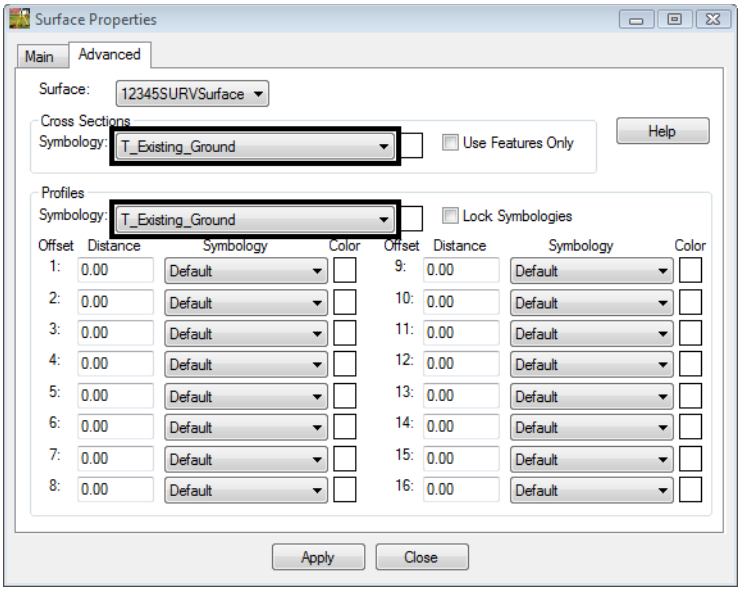
25. In the ***Data Range*** section, change the drop down selection to **Breakline**.



26. Review the ***Breakline*** point range.

Note: Having the flexibility to review our data by type can help when trying to track down errors in the DTM.

27. On the ***Advanced*** tab choose **Cross Sections - Symbology: T_Existing_Ground**
28. On the ***Advanced*** tab choose **Profiles - Symbology: T_Existing_Ground**

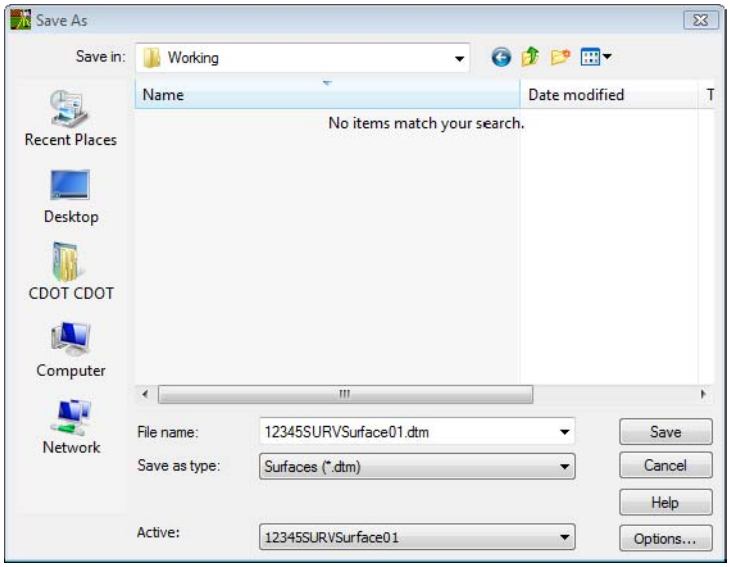


29. **<D> Apply** then **Close** in the ***Surface Properties*** dialog.
30. **<D>** the **Close** button in the ***Triangulate Surface*** dialog.
31. Use the ***Workspace*** pane scroll **arrows** to view the ***Surfaces*** tab.
32. Verify ***12345SURVSurface01*** is the active surface.

    Note: You can change the active surface from the pull down menu **Surface > Active Surface**; highlight the surface name and **<D>** the **Apply** button.

33. From the pull-down **File > Save > Surface**. The ***Save As*** dialog will appear with the **Save as type** set to **Surfaces (*.dtm)**.

34. Verify you are in the correct project directory. ***C:\Projects\12345\ROW_Survey\Working***



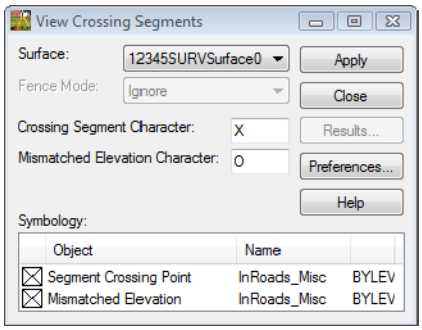
35. The file name should match the **Active** name at the bottom of the **Save As** dialog. If necessary, use the drop-down arrow in the **Active** field and reselect the desired name to ensure the saved file name will match the surface name.

    Note: Ensuring that the saved Surface name in the project folder matches the Surface name displayed in InRoads explorer will minimize any confusion.

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

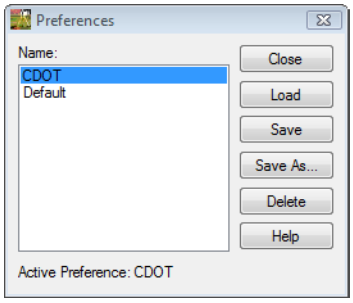
Lab 7.2 - Correcting Crossing Segments

1. From the pull-down menu select, **Surface > View Surface > Crossing Segments**. The ***View Crossing Segments*** dialog will appear.



2. Verify from the ***Surface*** drop down **12345SURVSurface01** is selected.

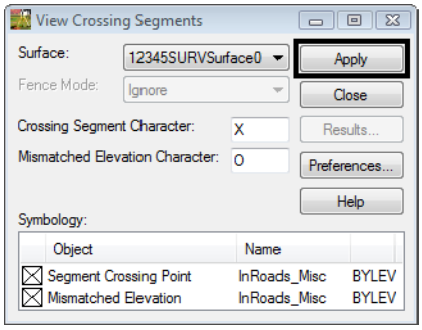
3. **<D>** the **Preferences…** button. The ***Preferences*** dialog will appear.



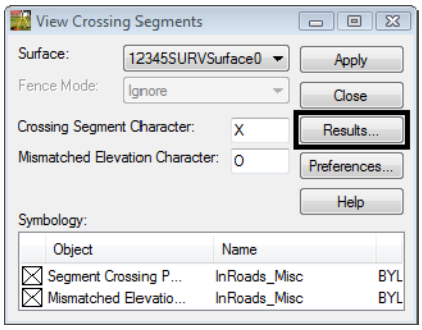
4. ***Select*** the **CDOT** preference

5. **<D>** the **Load** then **Close** buttons.

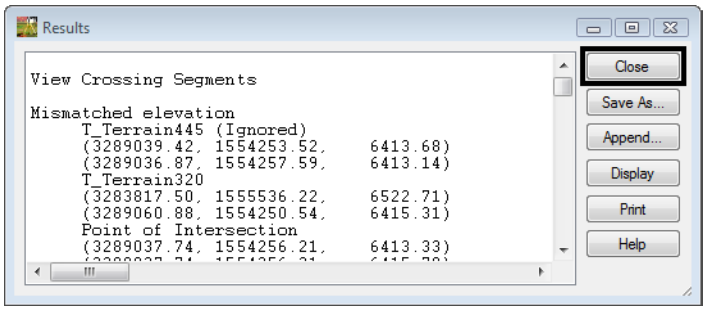
6. **<D>** the **Apply** button from the ***View Crossing Segments*** dialog. The graphics ***X*** and ***O*** will be displayed and the ***Results*** button will be come active.



7. **<D>** the **Results** button. The ***Results*** report will appear locating all mismatched and crossing segments.



8. Review the results.

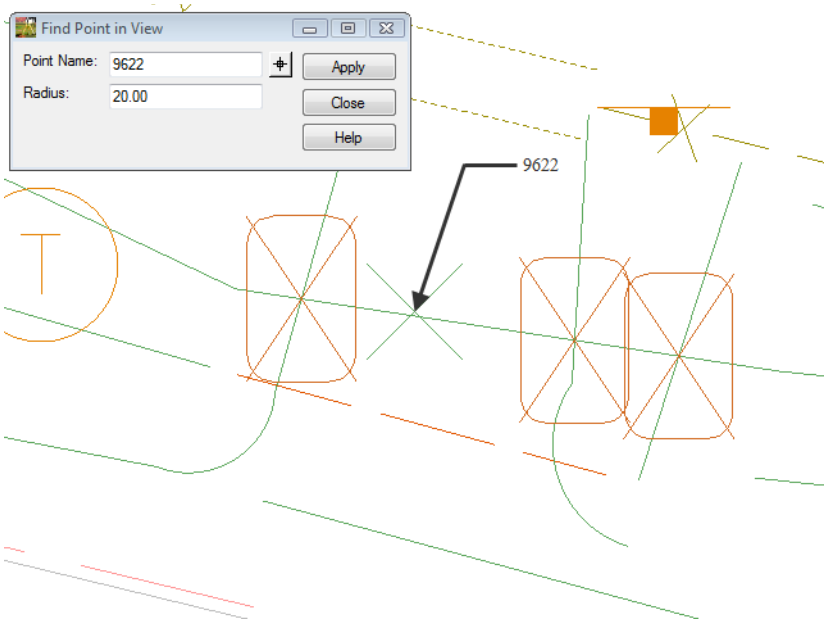


Note: This report can be saved to the design file or text file if needed.

9. **<D>** the **Close** button on the ***Results*** dialog.

10. From the pull down menu, select **Survey > Find Point in View**

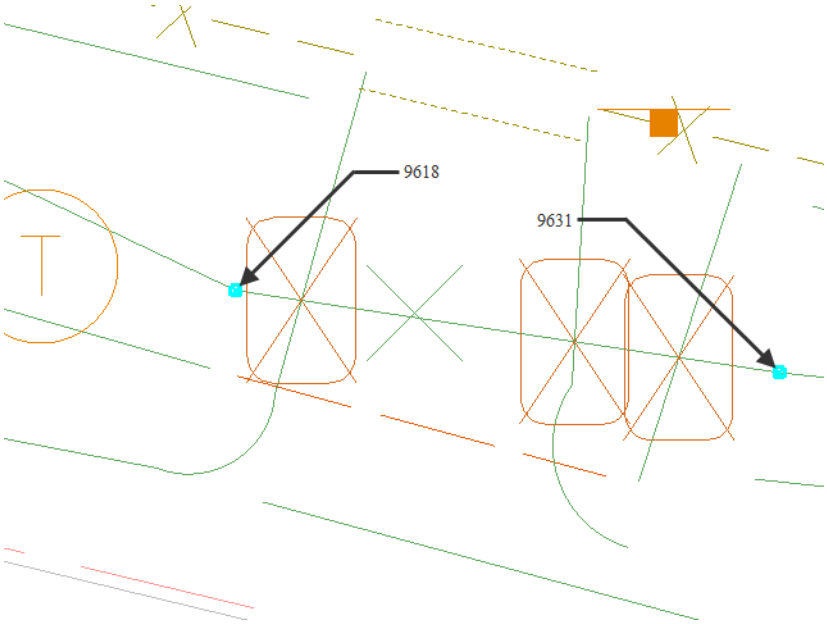
11. Find ***Point Name:* 9622** Radius: **20**



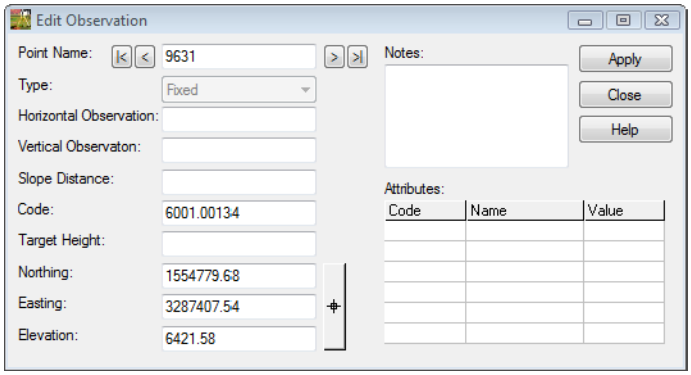
Note: The terrain breakline running left to right is crossing multiple other terrain breaklines. In this particular situation a solution would be to break the terrain line using a Start control code.

12. **<D>** the ***Fieldbook*** button from the Survey toolbar. The survey ***Fieldbook Data*** dialog will appear.

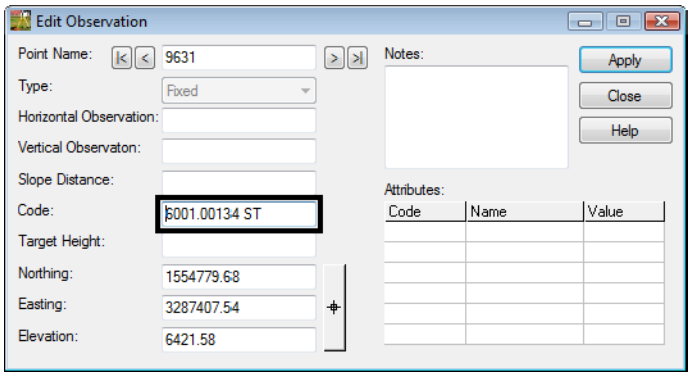
13. Locate point name **9631** in the fieldbook using the ***Select Observation*** button from the ***Fieldbook Data*** dialog.



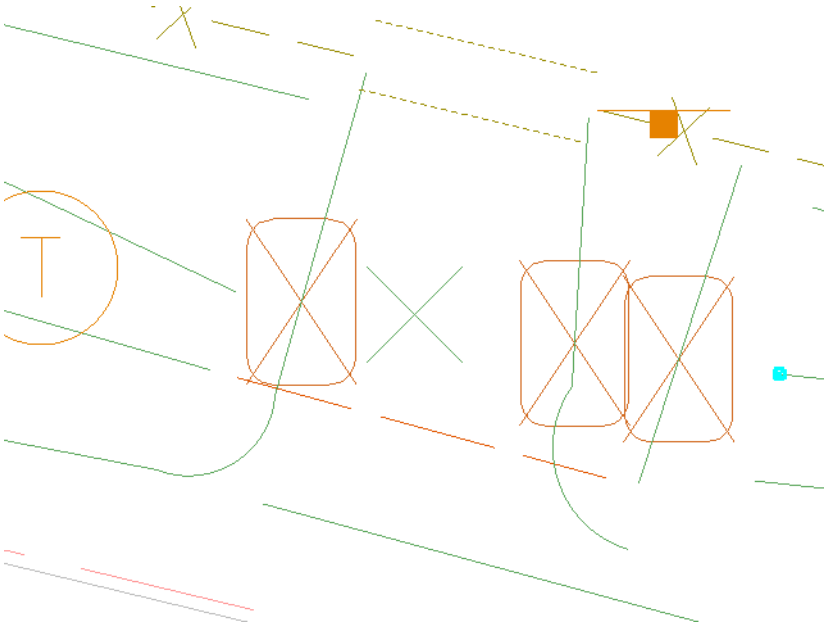
14. **<R>** the point name **9631** and select **Edit** from the shortcut menu or double click the point name. The ***Edit Observation*** dialog will appear for point ***9631***



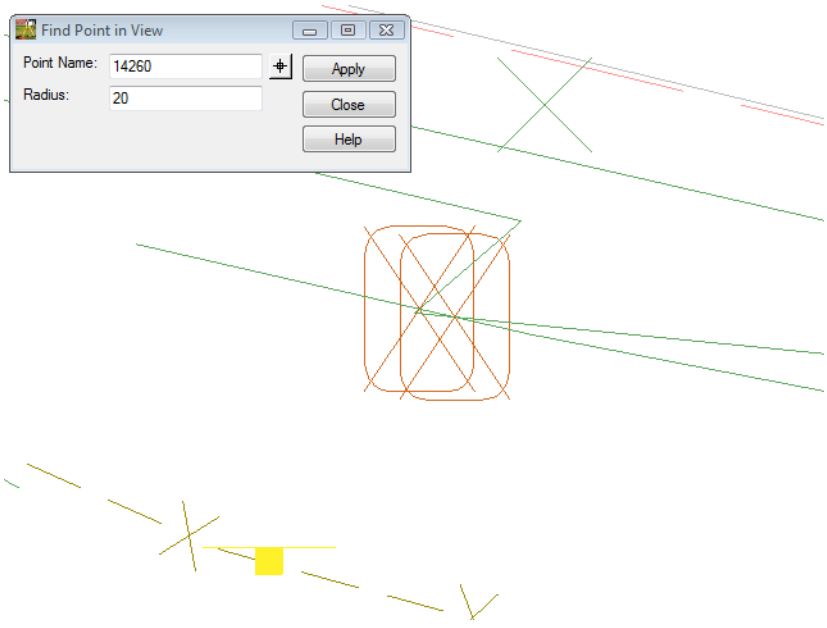
15. Type in the **Code**: ***6001.00134 ST***



16. **<D>** the **Apply** then **Close** buttons.
17. Review your results dynamically from the fieldbook. The terrain breakline was restarted so the breaklines are no longer crossing.



18. From the pull-down menu, select **Survey > Find Point in View**
19. Find ***Point Name:*** **14260** Radius: **20**

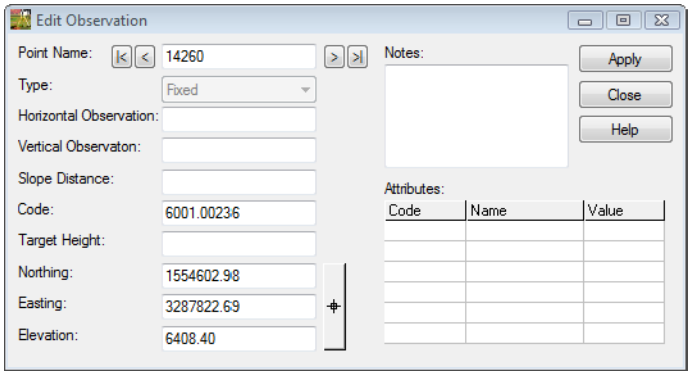


Note: The terrain breakline is overlapping slightly where the line zig-zags. In this particular situation a solution would be to edit the XY location of the point.14

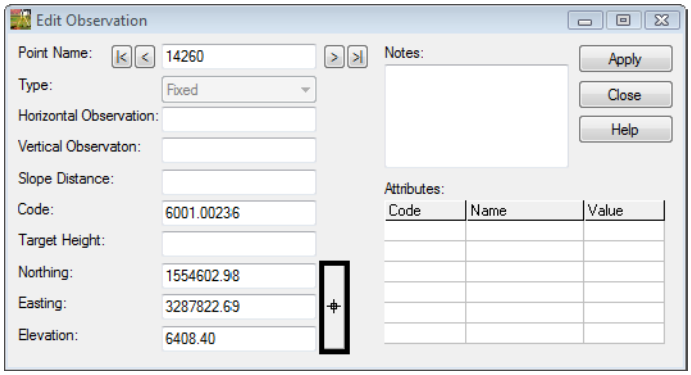
20. **<D>** the ***Fieldbook*** button from the Survey toolbar. The survey ***Fieldbook Data*** dialog will appear.

21. Locate point name **14260** in the fieldbook using the **Select Observation** button from the ***Fieldbook Data*** dialog.

22. **<R>** the point name **14260** and select **Edit** from the shortcut menu or double click the point name. The ***Edit Observation*** dialog will appear for point ***14260***



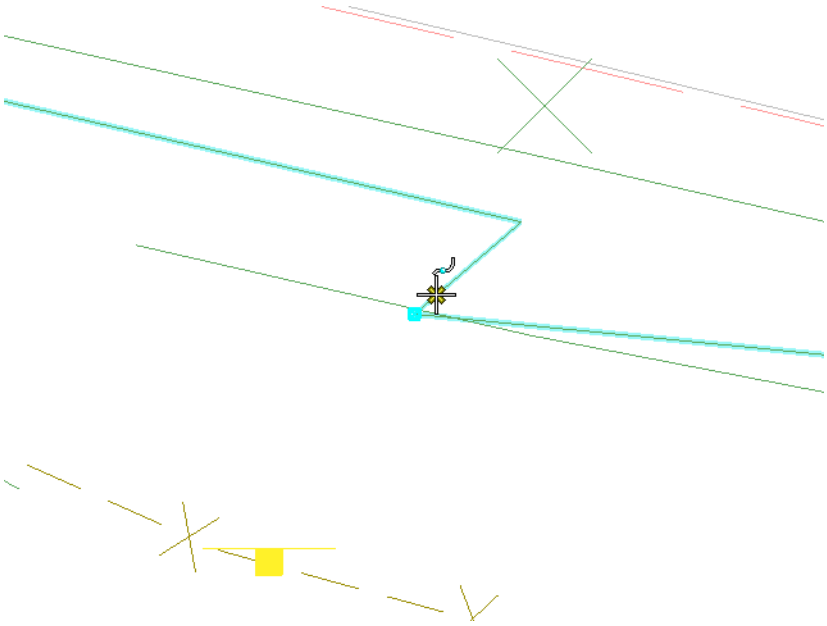
23. **<D>** the **Target** button. The ***Edit Observation*** dialog will minimize allowing to select a point in the MicroStation view.



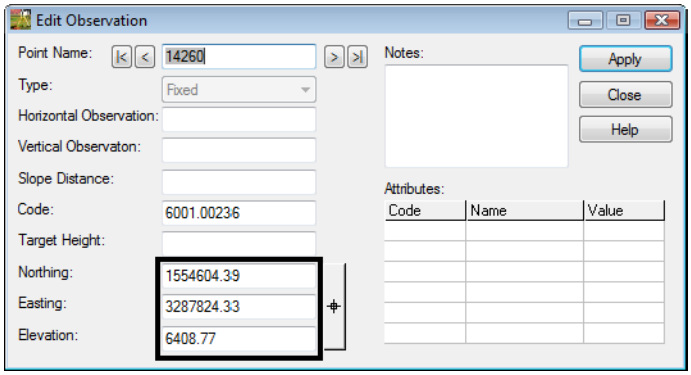
24. Using MicroStation snaps set the temporary snap to **Nearest**.

25. Hold down the **Ctrl** and **Shift** keys. This will enable AccuSnap when using an InRoads command.

26. Move the cursor to a point along the line string making sure the lines are not overlapping.

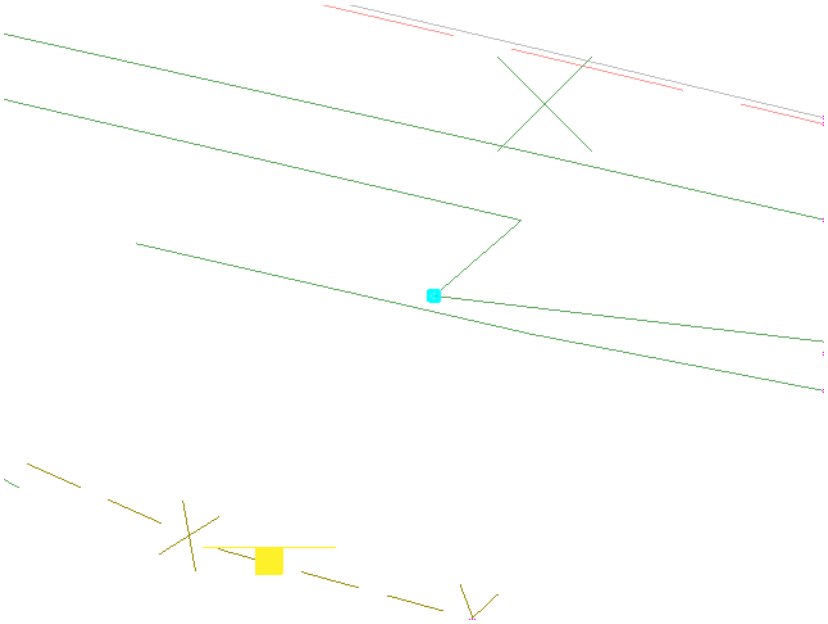


27. **<D>** a point in the MicroStation view to accept the point. The ***Edit Observation*** dialog will reappear. The new XYZ locations will be updated.



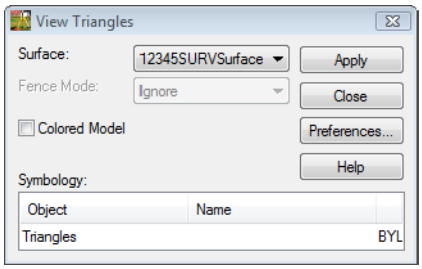
28. **<D>** the **Apply** then **Close** buttons.

29. Review your results dynamically from the fieldbook. The terrain breakline was restarted so the breaklines are no longer crossing.



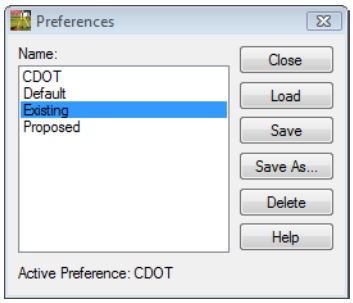
Lab 7.3 - Evaluate Surface Triangles

1. From the InRoads pull-down select, **Surface > View Surface > Triangles**. The ***View Triangles*** dialog will appear.



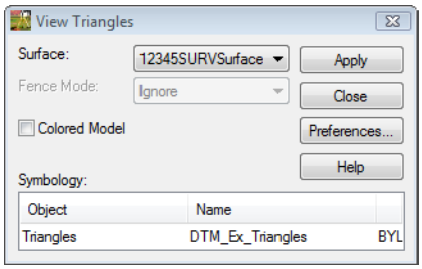
2. Verify **12345SURVSurface01** is the active surface.

3. **<D>** the **Preferences…** button. The **Preferences** dialog will appear.



4. Select the **Existing** preference.

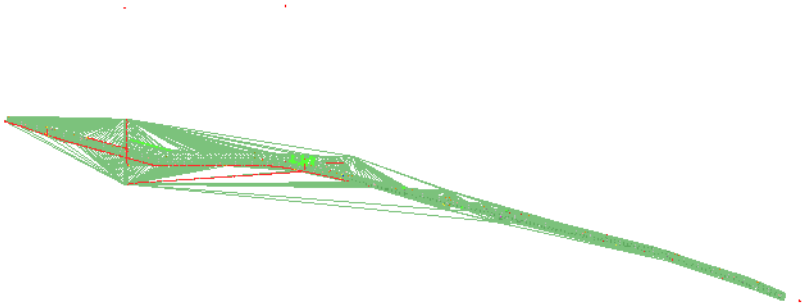
5. **<D>** the **Load** then **Close** buttons.



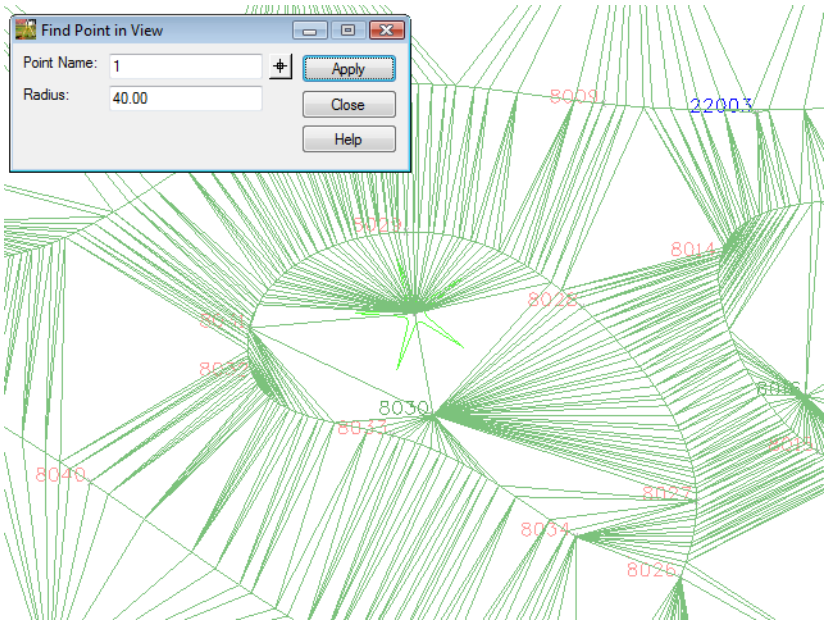
6. **<D>** the **Apply** button. The ***View Triangles*** dialog will minimize as the triangles are generated. The dialog will reappear when it is finished.

7. **<D>** the **Close** button in the ***View Triangles*** dialog.

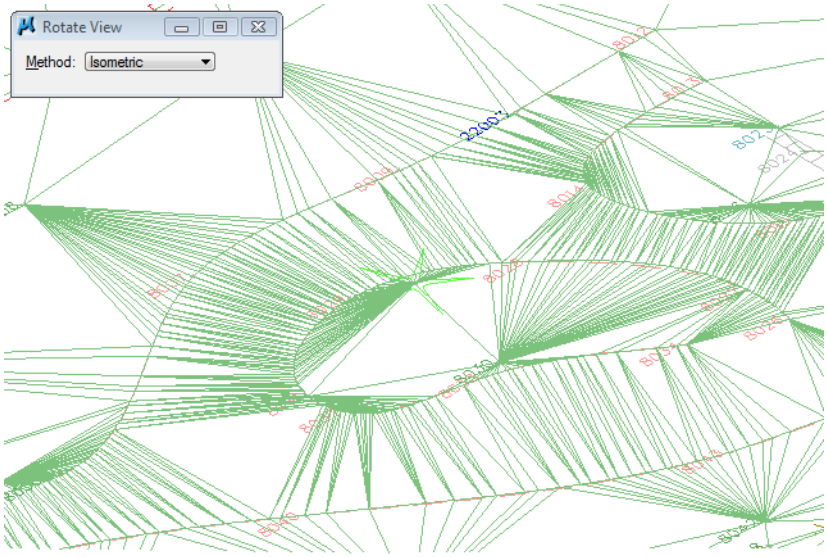
8. Using **MicroStation** viewing commands **Fit Active** to review your results.



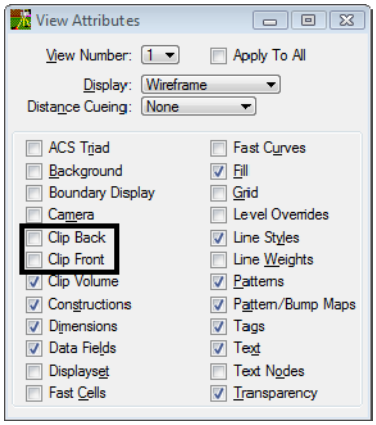
9. From the pull-down menu, select **Survey > Find Point in View**
10. Find ***Point Name:*** **1** Radius: **40**



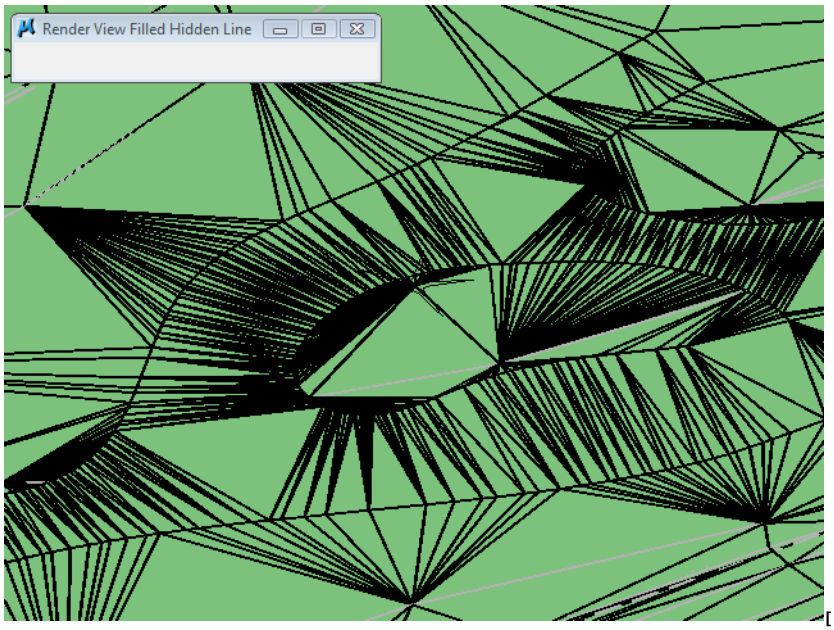
11. Using ***MicroStation*** viewing commands **Rotate View** to review your results.
12. From the tool settings dialog select **Method: Isometric**



13. If you can not see all the triangles in the view. Go to the MicroStation pull down **Settings > View Attributes** and check off ***Clip Back*** and ***Clip Front*** then **Apply** and exit the dialog.

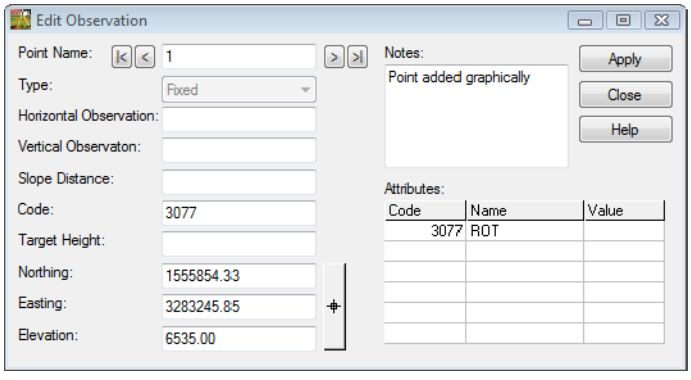


14. From the MicroStation pull down menu select, **Utilities > Render > Filled Hidden Line**.
15. Place a **<D>** in **View 1**
16. Review your results

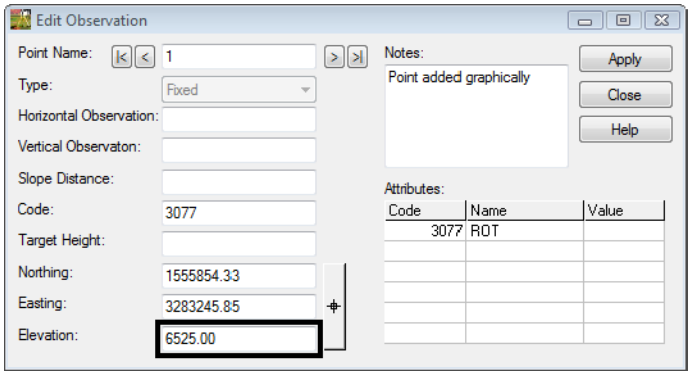


Note: The tree feature code 3077 that was added to the fieldbook had the elevation incorrect. The elevation error will be corrected back in the fieldbook.

17. Locate point name **1** in the fieldbook using the **Select Observation** button from the ***Fieldbook Data*** dialog.
18. **<R>** the point name **1** and select **Edit** from the shortcut menu or double click the point name. The ***Edit Observation*** dialog will appear for point ***1***.



19. Key-in the ***Elevation: 6525.00***



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

21. From the View Survey toolbar toggle **ON View Planimetrics**

22. Review your results.

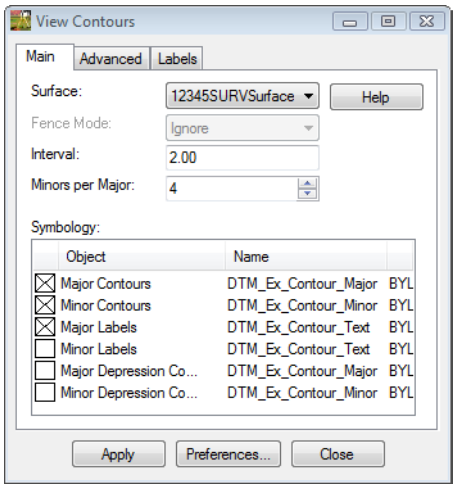
    Note: The fieldbook data is now correct when the fieldbook is re-exported the Survey data to Surface the surface data will be corrected also.

23. From the View Survey toolbar toggle **OFF View Planimetrics**

24. In the MicroStation view border **Rotate** view to **Top**

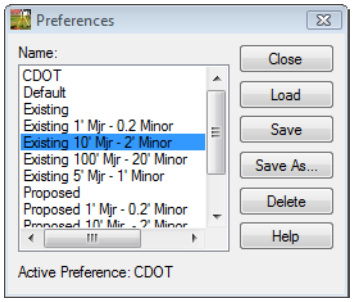
Lab 7.4 - Evaluate Surface Contours

1. From the InRoads pull-down select, **Surface > View Surface > Contours**. The ***View Contours*** dialog will appear.



2. Verify **12345SURVSurface01** is the active surface.

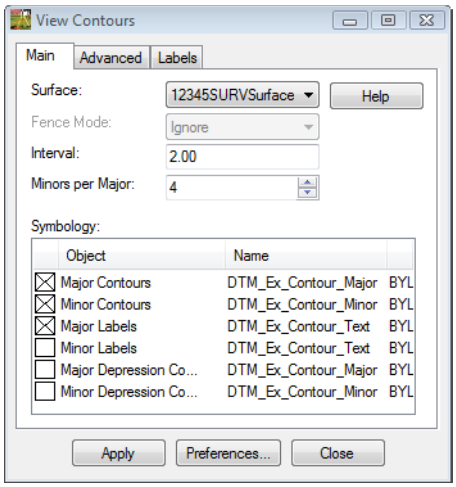
3. **<D>** the **Preferences…** button. The **Preferences** dialog will appear.



4. Select the ***Existing 10' Mjr – 2'Minor*** preference.

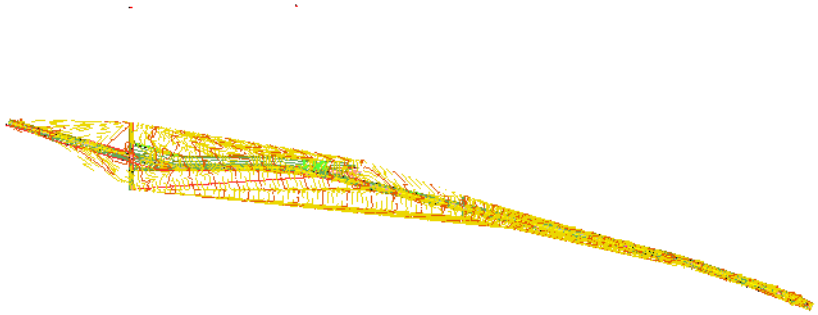
5. **<D>** the **Load** then **Close** buttons.

6. **<D>** the **Apply** button. The **View Contours** dialog will minimize as the triangles are generated. The dialog will reappear when it is finished.



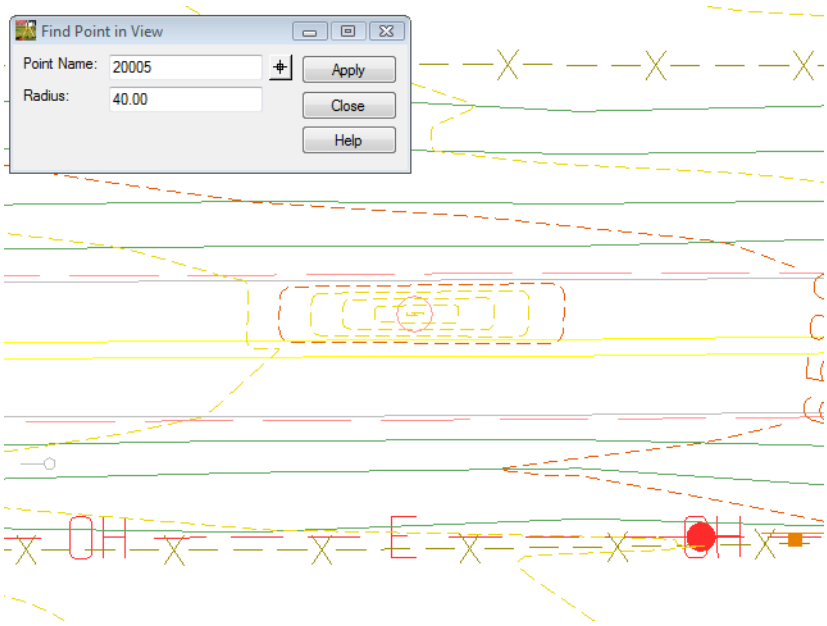
7. **<D>** the **Close** button in the **View Contours** dialog.

8. Using ***MicroStation*** viewing commands **Fit Active** to review your results.



9. From the pull-down menu, select **Survey > Find Point in View**

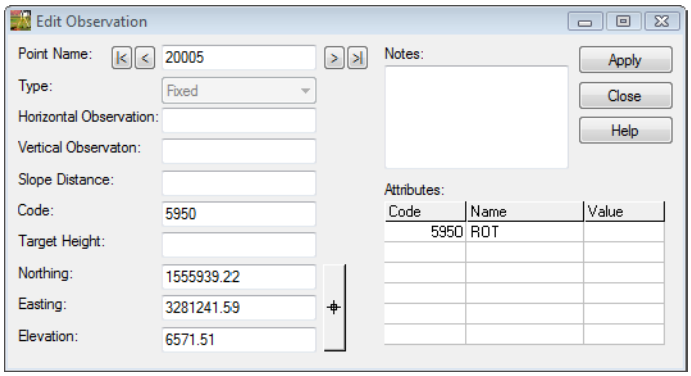
10. Find ***Point Name:*** **20005** Radius: **40**



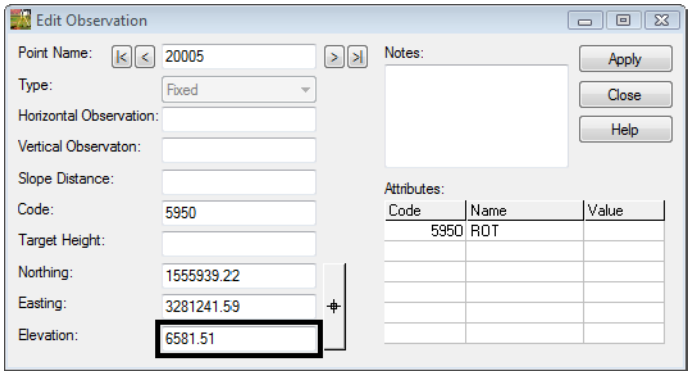
Note: There is a problem with a random point in the roadway. The test hole location that were imported with the import wizard has a busted elevation.

11. Locate point name **20005** in the fieldbook using the **Select Observation** button from the ***Fieldbook Data*** dialog.

12. **<R>** the point name **20005** and select **Edit** from the shortcut menu or double click the point name. The ***Edit Observation*** dialog will appear for point ***20005***.



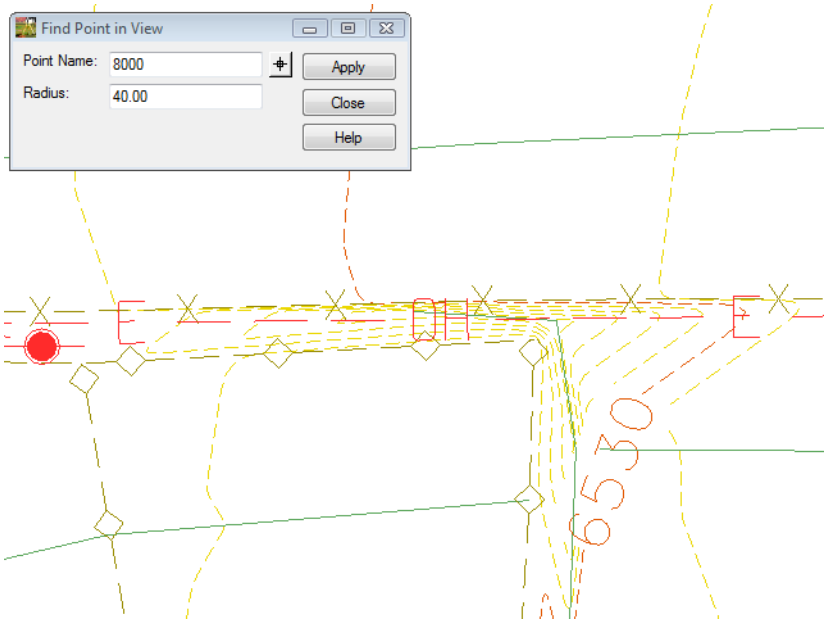
13. Key-in the ***Elevation***: ***6581.51***



14. **<D>** the **Apply** then **Close** buttons. The elevation will be corrected for the final DTM export.

15. From the pull-down menu, select **Survey > Find Point in View**

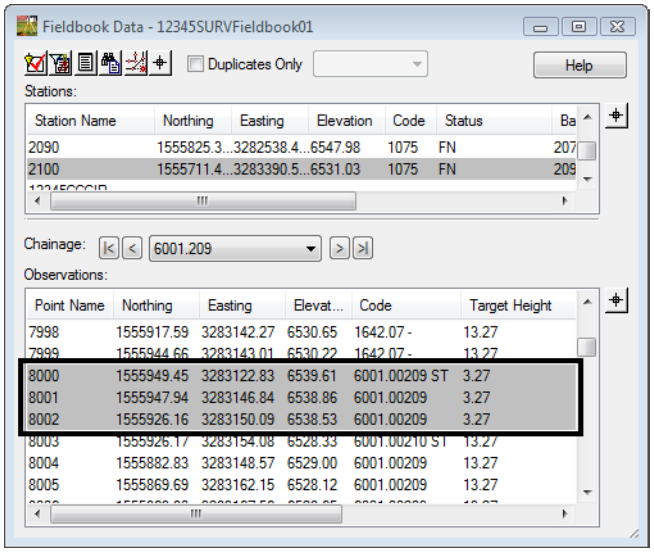
16. Find ***Point Name***: **8000** ***Radius***: **40**



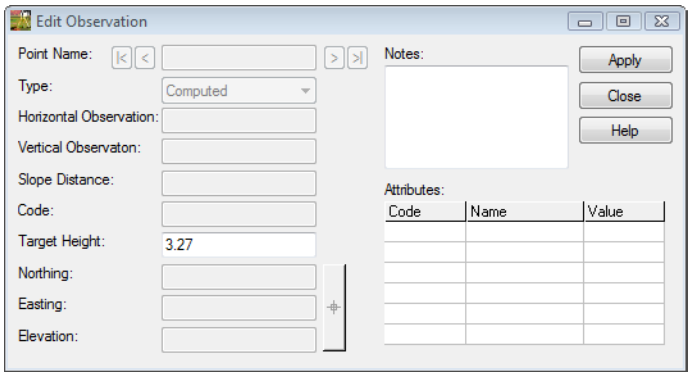
Note: There is a problem with the breakline. The breakline has a bust in the rod height.

17. Locate point name ***8000*** in the fieldbook using the **Select Observation** button from the ***Fieldbook Data*** dialog.

18. **<D>** the point name ***8000*** then hold down the **Shift** key and select point name ***8002***.

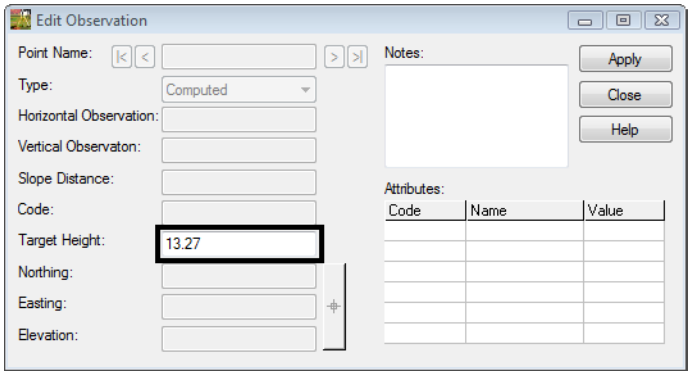


19. **<R>** the selected list and select **Edit** from the shortcut menu. The ***Edit Observation*** dialog will appear.



Note: The target height is the only field that can be edited because it has the same value for all 3 points.

20. Key-in the ***Target Height:*** **13.27**



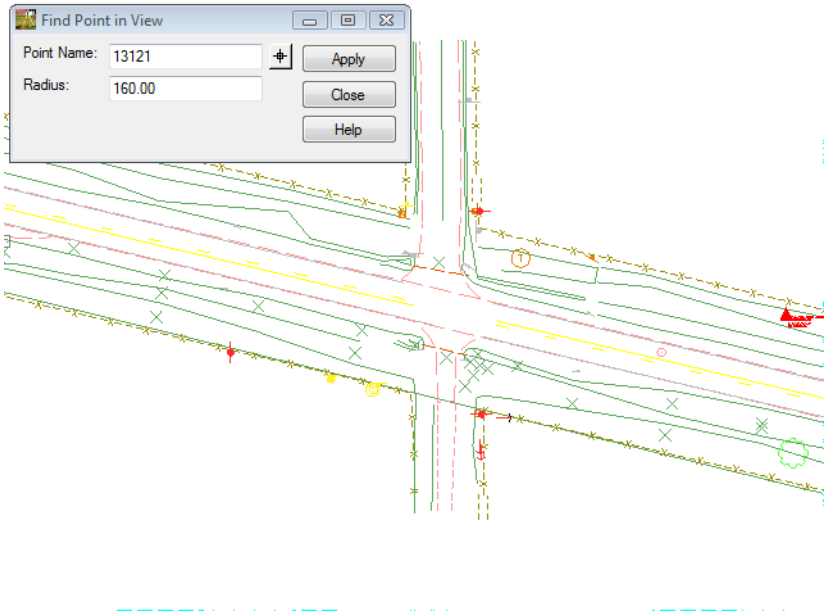
21. **<D>** the **Apply** then **Close** buttons. The elevation will be corrected for the final DTM export.

Note: The fieldbook data is now correct when the fieldbook is re-exported the Survey data to Surface the surface data will be corrected also.

22. Save the Survey fieldbook. From the Workspace Bar **<R>** on **12345SURVFieldbook01** select **Save** from the shortcut menu.

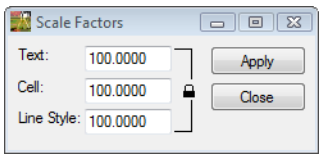
Lab 7.5 - Multipoint Profile as Section check

1. From the pull-down menu, select **Survey > Find Point in View**
2. Find ***Point Name:*** **13121** Radius: **160**

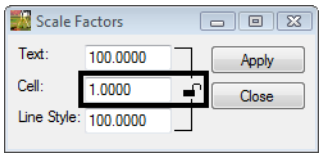


Note: Using the Multipoint Profile command will be used to evaluate key areas such as this culvert crossings.

3. Using MicroStation Level Display, **Turn OFF** all Terrain levels as shown above.
4. From the pull down menu select, **Tools > Global Scale Factors…** The ***Scale Factors*** dialog will appear.

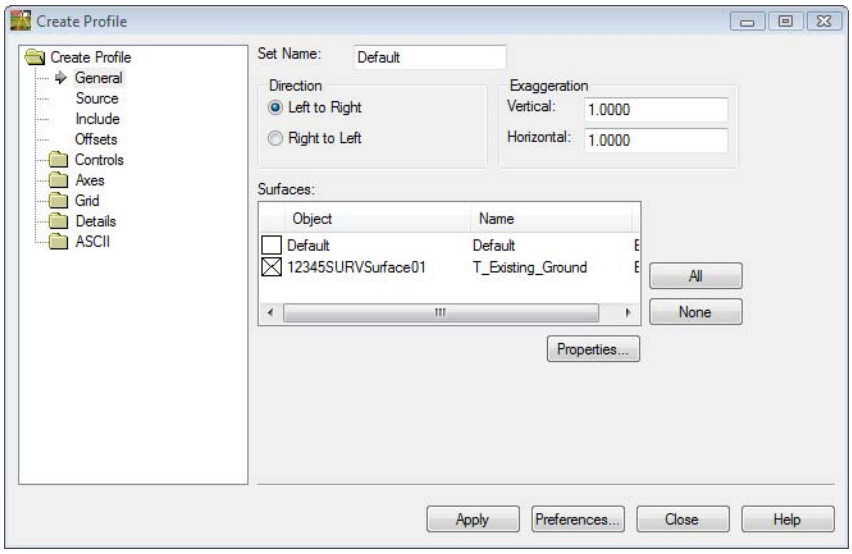


5. If Global Scale Factors is not an option go to the InRoads pull down menu and select: **Tools > Application Add-Ins > Global Scale Factors Add-In**
6. **<D>** the **Lock** button. The button display will change showing as unlocked.

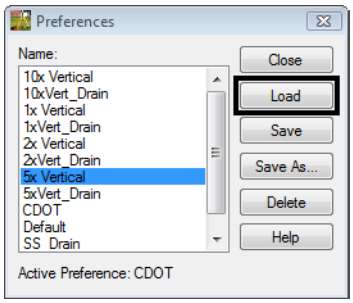


7. Key-in scale **Cell: 1**
8. **<D>** the **Apply** then **Close** buttons.

9. From the pull down menu select, **Evaluation > Profile > Create Profile**. The ***Create Profile*** dialog will appear.



10. **<D>** the **Preferences…** button. The **Preferences** dialog will appear.

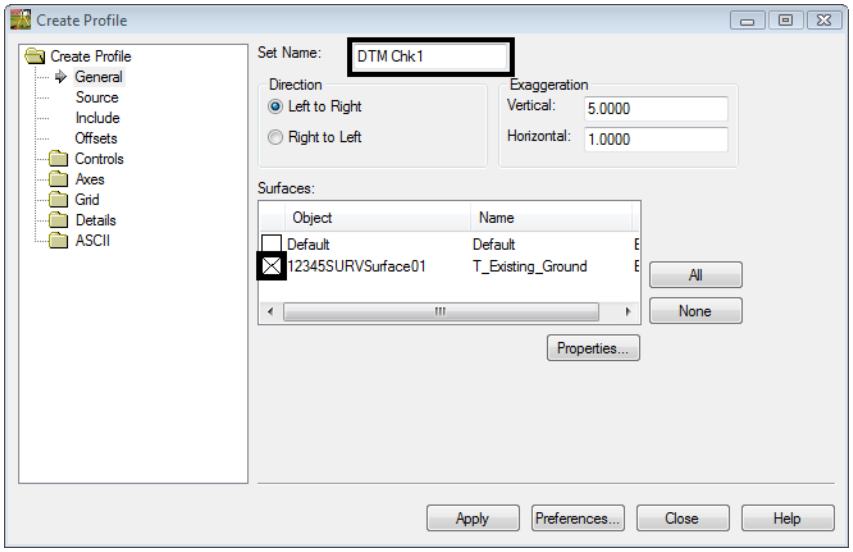


11. Select the preference name **5x Vertical**

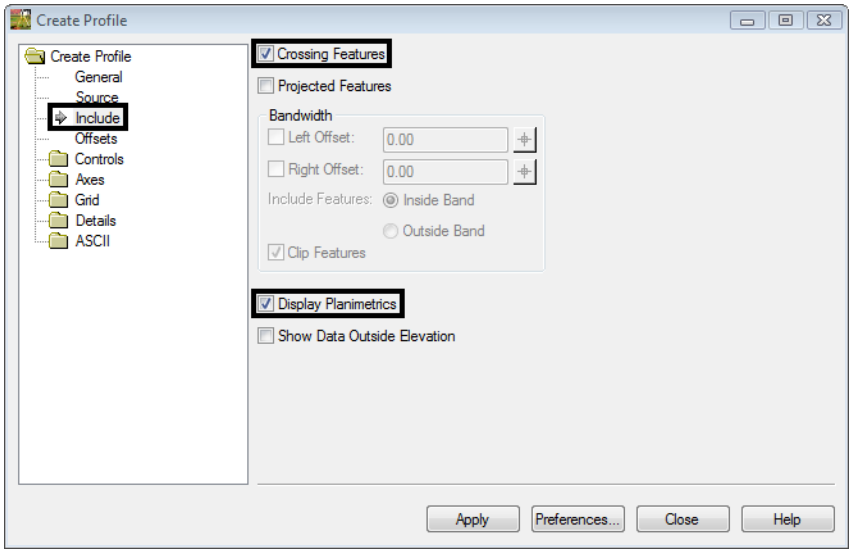
12. **<D>** the **Load** then **Close** buttons.

13. On the **General** leaf key in ***Set Name***: **DTM Chk1**

14. Verify **12345SURVSurface01** is checked in the ***Surfaces*** section.



15. **<D>** the **Include** leaf.

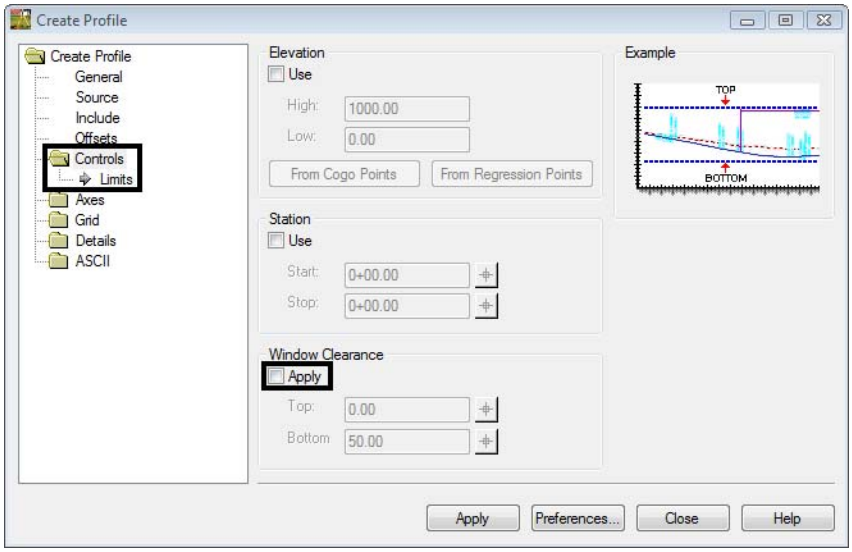


16. **Check ON** the ***Crossing Features*** box.

17. **Check ON** the ***Display Planimetrics*** box.

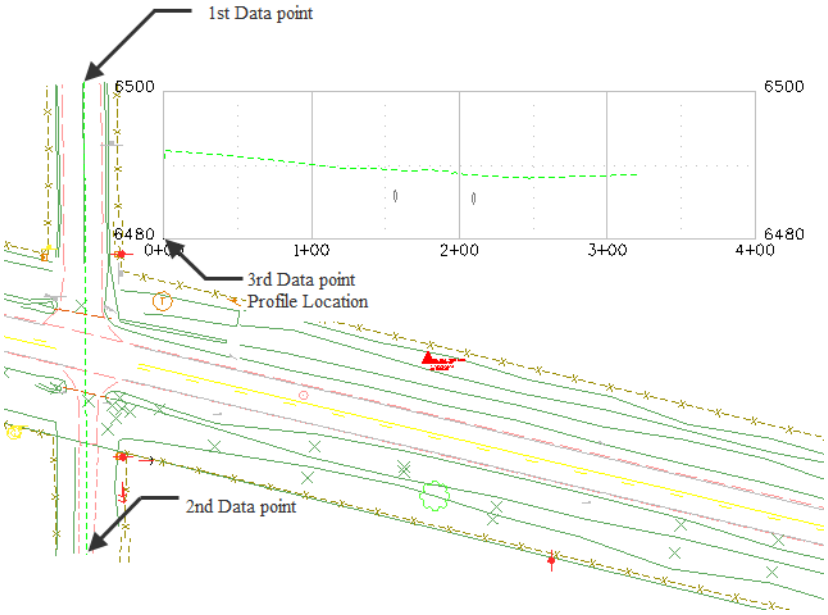
18. **<D>** the **Controls > Limits** leaf.

19. **Check Off** the ***Window Clearance Apply*** box.



20. **<D>** the **Apply** button. The dialog will minimize allowing you to select points in the MicroStation view.

21. **<D>** a point in the MicroStation view at the north end of the and center of the road.
    - There is no need to hold down on the Left mouse button.
22. Move the cursor, a line will begin to generate



23. **<D>** a second point perpendicular across the roadway crossing the culvert, as shown above.
24. **<R>** to quit defining profile extraction vertices.
25. **<D>** a location in the MicroStation view to draw the profile. The ***Create Profile*** dialog will reappear and the Profile is generated in the view.
26. Review your results.
27. Continue to Create Profiles at key locations.
    - Culvert Crossings
    - Driveway Entrances
    - Centerlines

When finished:

28. Using **MicroStation Delete** button. Delete all DTM Check profiles.
29. Save the Survey fieldbook. From the Workspace Bar **<R>** on ***12345SURVFieldbook01*** select Save from the shortcut menu.

LAB 8 - Exporting the Fieldbook

Lab 8.1 - Exporting Survey Data to Graphics

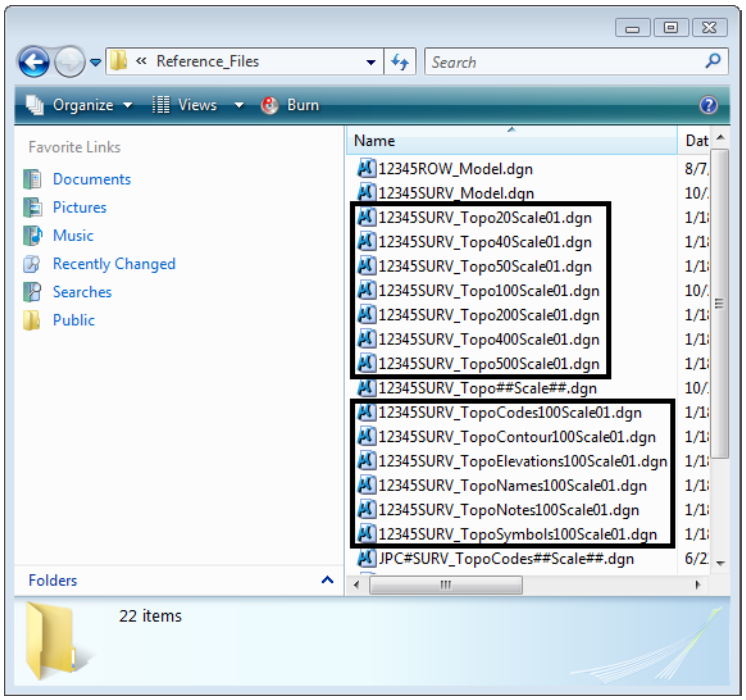
Managing Drawings in the Reference Files folder

The files in the Reference Files folder are for other disciplines to reference. Other disciplines are to reference in the 01 model file. There are already 01 files in the Reference Files folder that are out of date. The new Survey Fieldbook that is exported will become the new 01 file.

Section Objectives:

- Create a new design file to write survey data to graphics.
- Run the CDOT Stratify Survey tool from the CDOT Menu.

1. Open Windows Explorer.
2. Navigate to the folder ***C:\Projects\12345\ROW_Survey\Drawings\Reference_Files***



3. Rename each file ***12345SURV_Topo**** with a ***01*** counter and rename it to ***02***.

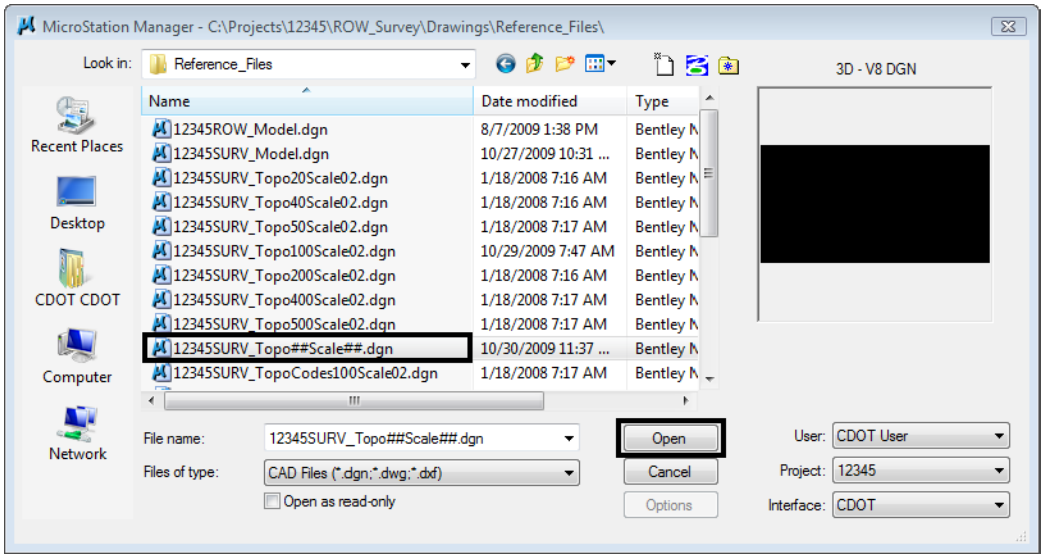
Note: The next steps will create these model files with an updated InRoads Survey fieldbook.

Creating new 01 design files.

4. From the MicroStation pull down menu select **File > Open** the Open dialog will appear.

5. In the MicroStation Manager dialog path to the directory:
   C:\Projects\12345\ROW_Survey\Drawings\Reference_Files

6. Select the file ***12345SURV_Topo##Scale##.dgn*** from the ***Open*** dialog.

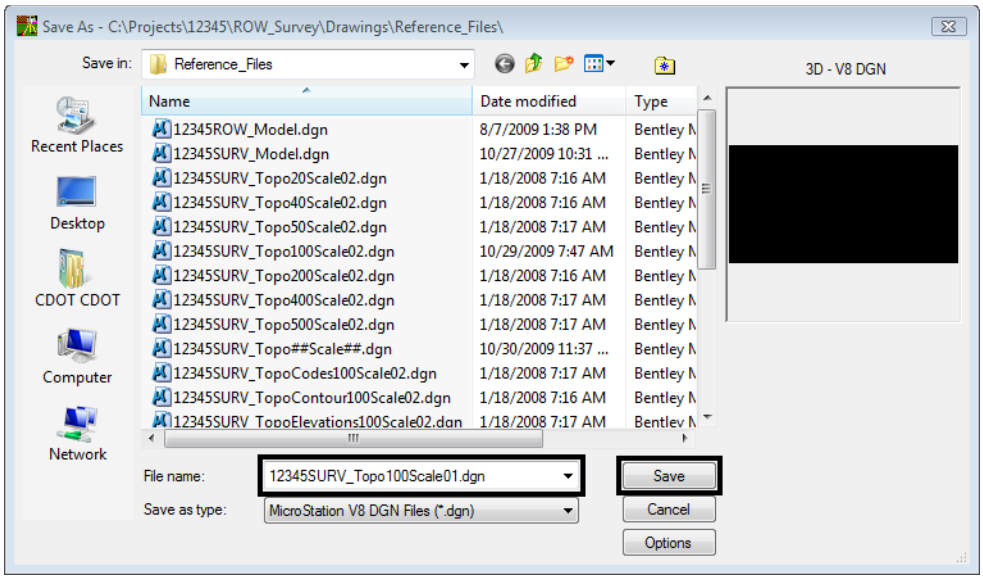


Note: The purpose of the files with "##" symbols are for creating new files with the correct naming convention.

7. **<D>** the **Open** button MicroStation Manager dialog will close and open the file.

8. From the MicroStation pull down menu select **File > Save As** the ***Save As*** dialog will appear.

9. Replace the *##* symbols with ***100*** scale and ***01*** model.
   Type in ***File name***: ***12345SURV_Topo100Scale01.dgn***



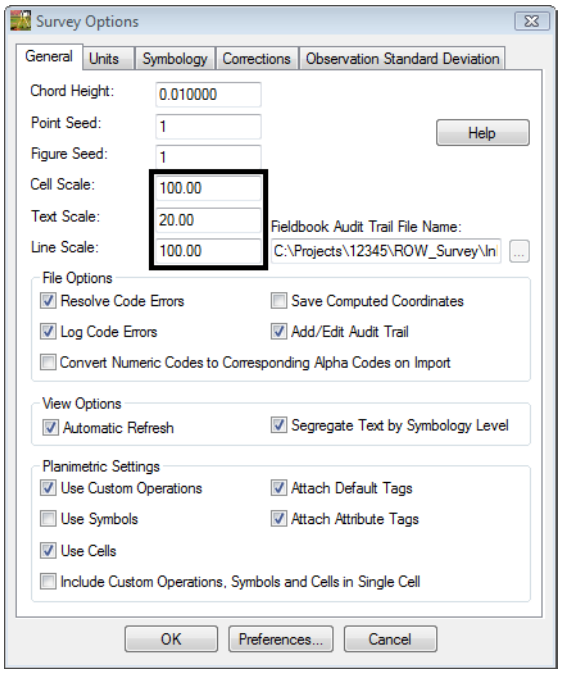
10. **<D>** the **Save** button the ***Save As*** dialog will close and MicroStation will open the file ***12345SURV_Topo100Scale01.dgn***

11. Verify the ***12345SURVFieldbook01*** survey fieldbook is active. You can tell which fieldbook is active by the red box around the fieldbook button.

12. To modify the scale as it relates to cells, text, and linestyles go to **Tools > Survey Options > [General]**. The ***Survey Options*** dialog will appear.

13. Set the Scales for ***Cell***, ***Text***, and ***Line*** as shown below.

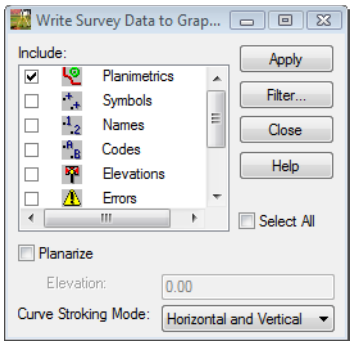
    - Cell Scale: ***100***
    - Text Scale: ***20***
    - Line Scale: ***100***



Note: Segregate Text by Feature Level, should be checked on, this will save the symbols, point names, codes, notes, errors, and elevations to the same level as the survey feature.

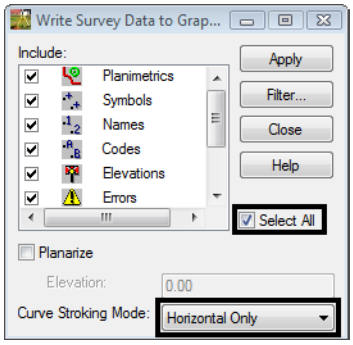
14. **<D>** the **OK** button the ***Survey Options*** dialog will close.

15. From the InRoads pull down menu select, **Survey > View Survey Data > Write Survey Data to Graphics…** the ***Write Survey Data to Graphics*** dialog will open.



Note: By default if you had dynamic graphics still toggled on, those same components would be toggled on in the Write Survey Data to Graphics dialog.

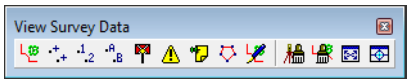
16. **Check ON** the **Select All** box.



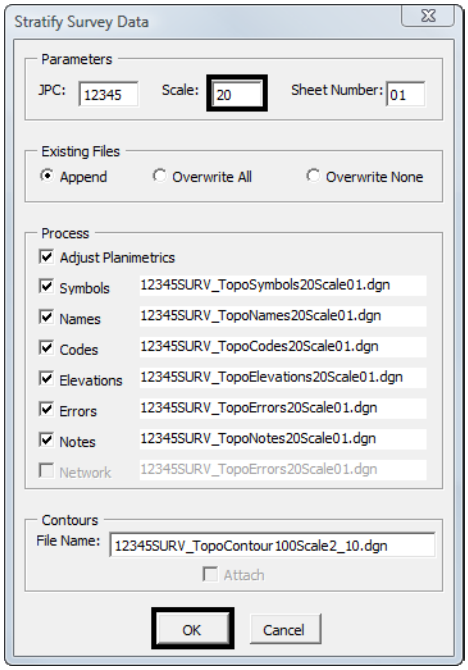
17. From the drop down list for ***Curve Stroking:*** **Horizontal Only**

18. **<D>** the **Apply** then **Close** button. The Survey fieldbook planimetrics has been written to graphics.

19. Verify all View Survey Data buttons are toggled display off.



20. From the MicroStation view border **Fit** the design file.
21. Review your results.
22. From the CDOT Menu pull-down select **CDOT Tools > Stratify Survey**. The ***Stratify Survey*** dialog will appear.
23. Type in the ***Scale***: ***20***

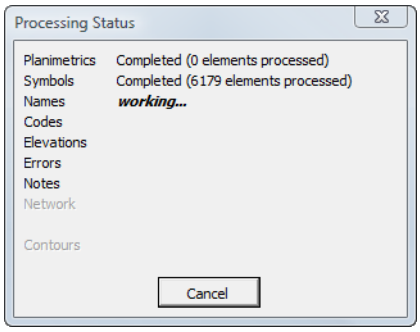


Note:

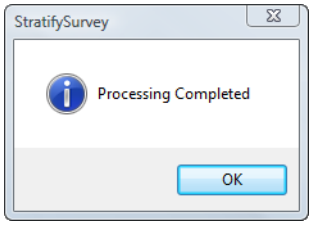
- Under Existing Files, the Append option will add or merge the new data into an existing file. A new file will be created if the file does not already exist.
- Under Existing Files, the Overwrite All option will create a new file, deleting any previously existing file.
- Under Existing Files, the Overwrite None option will disable the processing option for a file if the file already exists.
- The Process option Adjust Planimetrics will resize the planimetrics text (if necessary) and convert the grouped text strings to view independent cells in order to allow for viewing this text in any 3D view.

24. Verify the JPC, Scale, and Sheet Number entries are correct. Altering any of those values will automatically alter the output file names. If the Attach check box in the Contours section is grayed out, the contour file does not exist. You may edit the name specified in the File Name field to enter the name of an existing contour file.
25. **<D> OK** button to start the process.

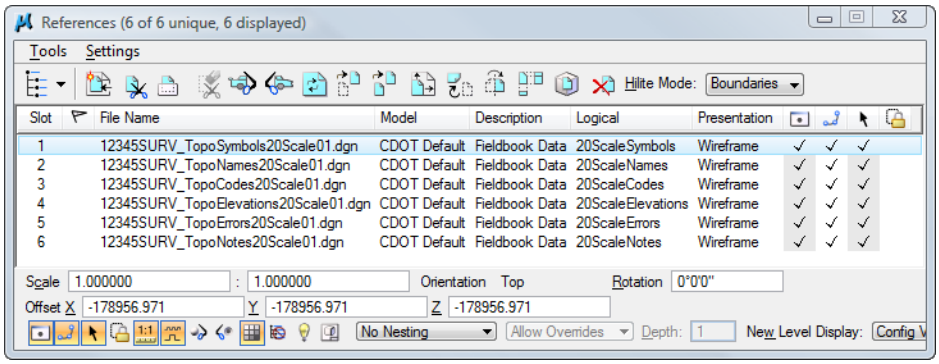
26. As the data is being moved to the appropriate reference file a Processing Status dialog provides an update on the progress. You may Cancel at any time to stop the processing, if necessary.



27. When completed, a Processing Completed message is displayed. **<D> OK** to exit the program.



28. The fieldbook data has now been stratified into separate reference files. The planimetrics will be in the master design file with all of the symbols, names, codes, etc., attached as reference files. To view these attachments select **File > Reference** from the MicroStation pull down menu.



Lab 8.2 - Exporting Survey Data to Surface

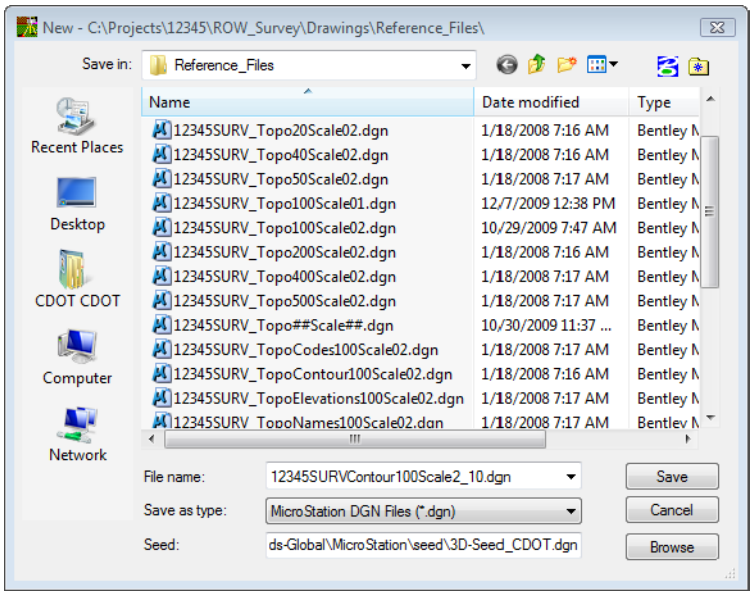
Managing Drawings in the Reference Files folder

The files in the Reference Files folder are for other disciplines to reference. Other disciplines are to reference in the contour model file. There is already a contour file in the Reference Files folder that is out of date. The new Survey Fieldbook that is exported will become the new contour file.

Section Objectives:

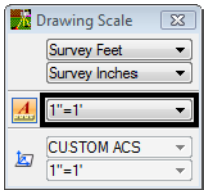
- Create a new design file to create the surface display graphics.
- Export the survey data to a surface file for a final deliverable.
- Use the delete triangle command to constrain the triangles to the survey points collected in the field.
- View the new surface perimeter.
- Import new perimeter into the surface as an exterior boundary.

1. From the MicroStation pull down menu select **File > New**. The ***New*** dialog will appear.
2. Navigate to the file folder ***Reference_Files*** by double clicking the directory folders.
3. At the bottom of the dialog box verify that the seed file is set to ***Roadway_Design_3D.dgn***.
4. Key in the file to be created ***12345SURVContour100Scale2_10.dgn***
5. **<D>** the **OK** button in the New dialog. The New dialog will close and the file ***12345SURVContour100Scale2_10.dgn*** will open.



6. From the MicroStation menu pull down select Settings > Drawing Scale the Drawing Scale dialog will appear.

7. In the ***Annotation*** drop down list select **1" = 1**'



8. From the MicroStation pull down menu select **File > Save Settings**.

Note: The reason annotation scale needs to be set to 1"=1' is so that the linestyles will be displayed correctly from InRoads Survey.

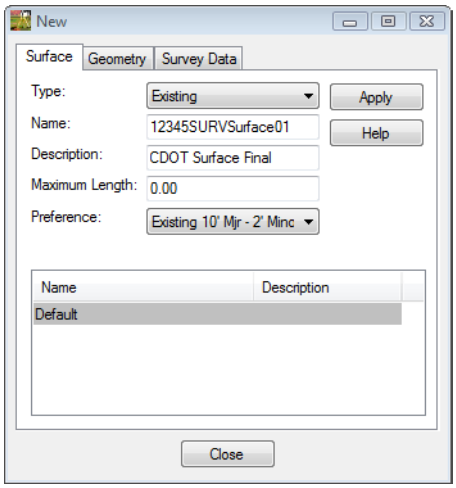
9. Verify the ***12345SURVFieldbook01*** fieldbook is active. You can tell which fieldbook is active by the red box around the fieldbook button.

Survey Data to Surface

10. From the InRoads pull down menu, select **File > New**. The ***New*** dialog will appear.
11. **<D>** the **Surface** tab.
12. From the drop down list select ***Type***: **Existing**
13. Key in the surface ***Name: 12345SURVSurface01***
14. Key in the ***Description: CDOT Surface Final***

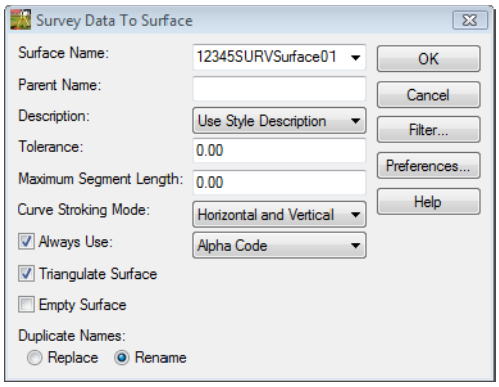
Note: Key in any additional file information in the Description field of the dialog, such as Date, User, and Design file name. You have up to 34 characters even though you may not see all the characters in the Description field.

15. Keep the ***Maximum Length*** set to ***0***
16. From the drop down list ***Preference:*** **Existing 10' Mjr – 2' Minor**

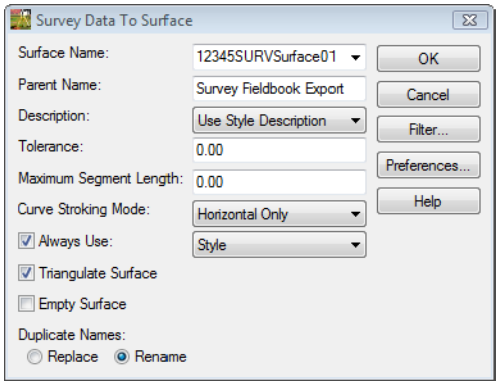


17. **<D>** the **Apply** then **Close** buttons.

18. From the pull down menu **Survey > Survey Data to Surface**. The ***Survey Data to Surface*** dialog will appear.

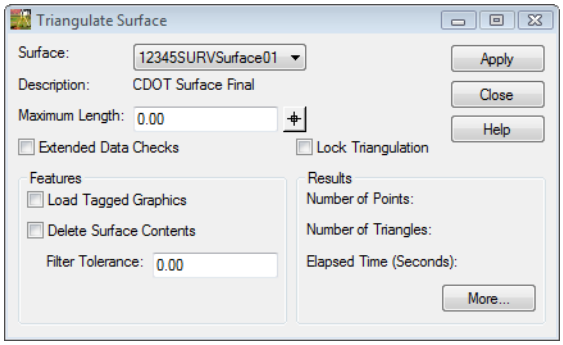


19. From the drop down list ***Surface Name:*** **12345SURVSurface01**
20. Type in the ***Parent Name***: ***Survey Fieldbook Export***
21. From the drop down list ***Description:*** **Use Style Description**
22. Keep the ***Tolerance*** and ***Maximum Segment Length*** set to ***0.00***
23. From the drop down list ***Curve Stroking Mode:*** **Horizontal Only**
24. Check **ON** ***Always Use:*** **Style**
25. Check **ON** ***Triangulate Surface***

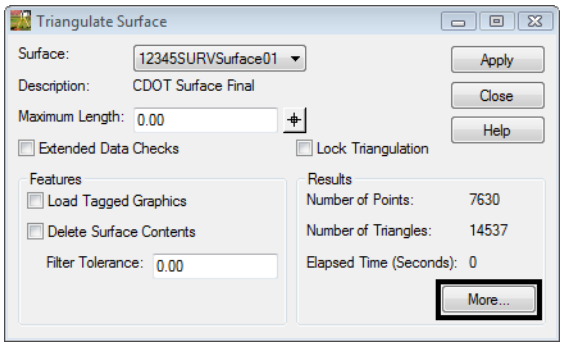


26. **<D>** the **OK** button the ***Triangulate Surface*** dialog will appear.

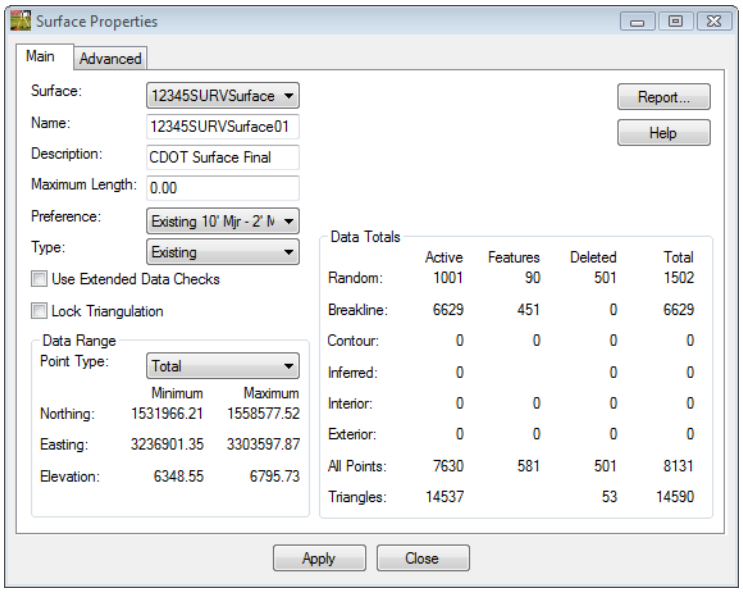
27. Leave all settings unchecked. ***Maximum Length*** should be set to ***0.00***.



28. **<D>** the **Apply** button. The Results section of the dialog should look similar to the image below.



29. **<D>** the **More** button. The ***Surface Properties*** dialog will appear.

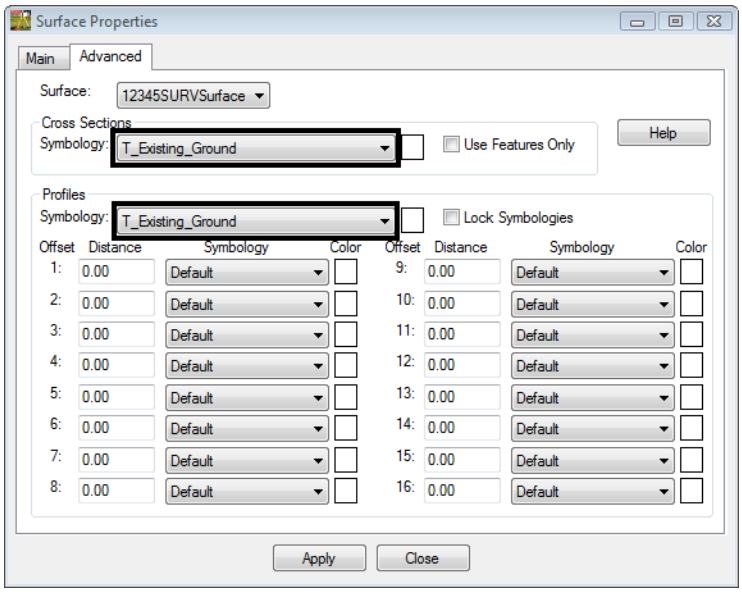


30. Verify you are working with the correct surface ***12345SURVSurface01***.

31. Review the section for ***Data Range***. The Northing, Easting, and Elevation values should fall within the project limits.

32. On the Advanced tab choose
Cross Sections - Symbology: **T_Existing_Ground**

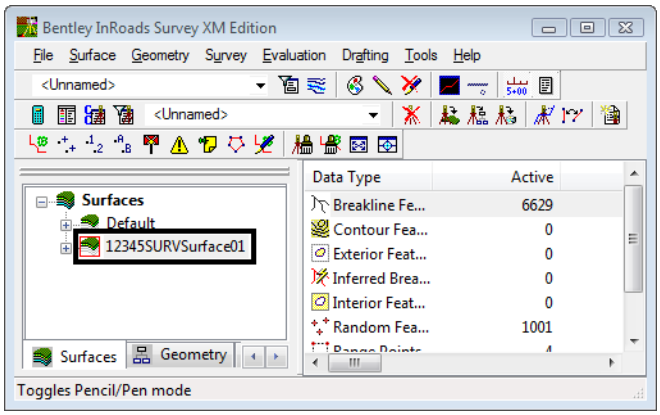
33. On the Advanced tab choose
Profiles - Symbology: **T_Existing_Ground**



34. **<D> Apply** then **Close** in the ***Surface Properties*** dialog.

35. **<D>** the **Close** button in the ***Triangulate Surface*** dialog.

36. Use the Workspace bar scroll arrows to view the Surfaces tab.

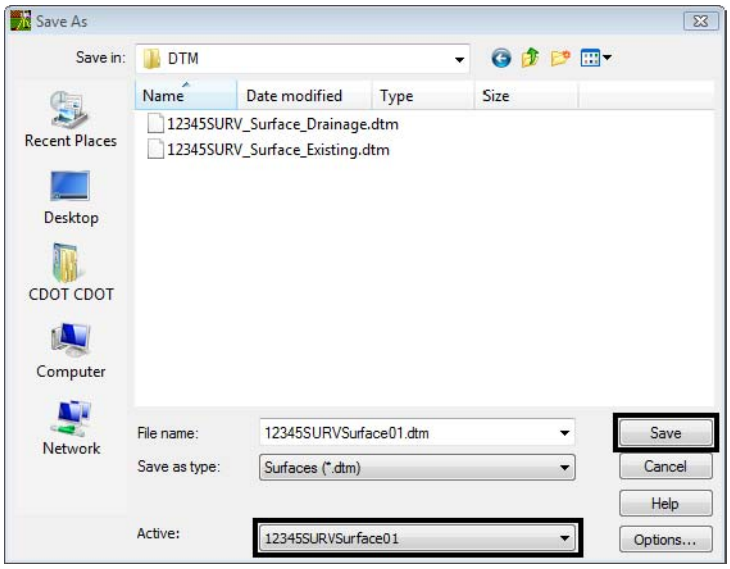


37. Verify ***12345SURVSurface01*** is the active surface.

Note: You can change the active surface from the pull-down menu Surface > Active Surface; highlight the surface name and <D> the Apply button.

38. From the InRoads pull down **File > Save > Surface**. The ***Save As*** dialog will appear with the ***Save as type:*** **Surfaces (*.dtm)**.

39. Verify you are in the correct project directory.
C:\Projects\12345\ROW_Survey\InRoads\DTM



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

Note: Ensuring that the saved Surface name in the project folder matches the Surface name displayed in InRoads explorer will minimize any confusion.

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

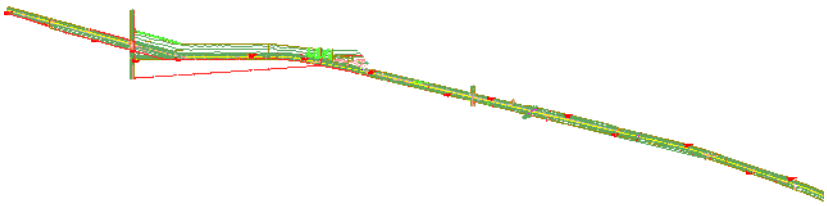
Lab 8.3 - Exterior Boundary

Errant triangles can be eliminated by controlling the maximum triangle length. However this can cause problems in areas of the DTM where data density varies. A more refined method is to add an exterior boundary that constrains the triangles to fall within the limit of the exterior boundary.

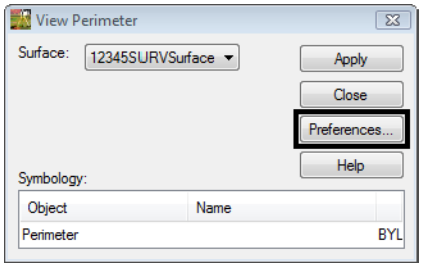
Section Objectives:

- Delete unwanted triangles from the design file.
- Display the perimeter of the model (active triangle limits).
- Import the displayed perimeter into the DTM as an exterior feature.
- Verify the results.

1. Open the MicroStation file - ***12345SURVContour100Scale2_10.dgn***
2. Open the InRoads Survey Fieldbook file - ***12345SURVFieldbook01.fwd***
3. Open the InRoads Survey Surface file - ***12345SURVSurface01.dtm***
4. Using MicroStation **Delete**. Delete all graphics from the design file.
5. Using MicroStation **Window Area** button center the survey fieldbook dynamic display planimetric graphics to ***View 1 Top rotation***.

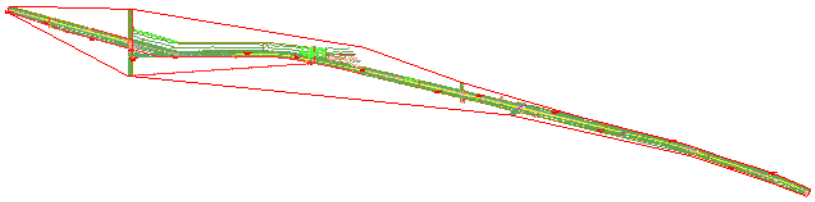


6. From the pull down menu select, **Surface > View Surface > Perimeter**. The ***View Perimeter*** dialog will appear.



7. **<D>** the **Preferences...** button. The Preferences dialog will appear.
8. Select **CDOT** from the Preferences dialog
9. **<D>** the **Load** then **Close** buttons in the Preferences dialog.
10. **<D>** the **Apply** button in the ***View Perimeter*** dialog.

11. Review your results.

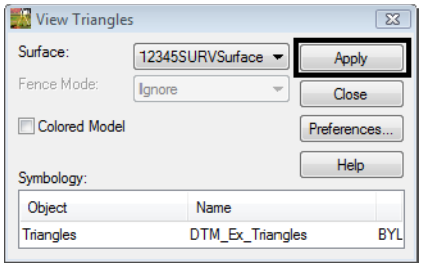


12. Close the ***View Perimeter*** dialog.

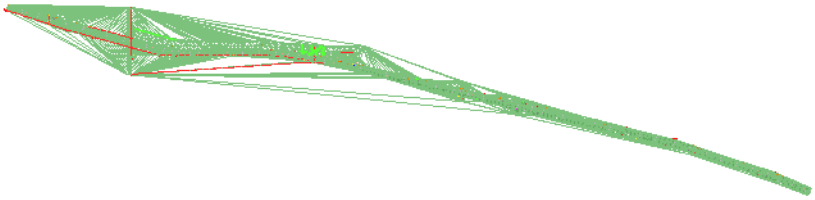
Note: The perimeter will be used as a reference line as triangles are deleted.

13. Redisplay the triangles **Surface > View Surface > Triangles**. The ***View Triangles*** dialog will appear.

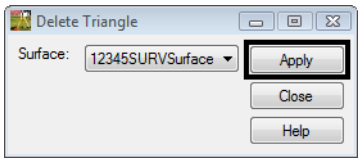
14. **Load** the ***Existing Preferece*** for View Triangles.



15. **<D>** the **Apply** button in the ***View Triangles*** dialog.

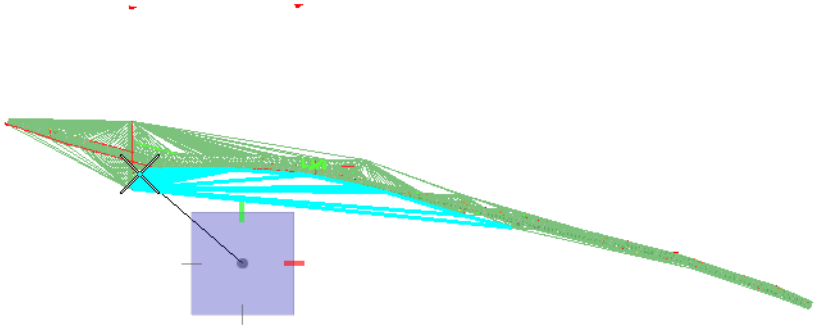


16. From the InRoads pull down menu select, **Surface > Edit Surface > Delete Triangles**. The ***Delete Triangle*** dialog will appear.



17. **<D>** the **Apply** button. The ***Delete Triangle*** dialog will minimize allowing you to select a point in the view.

18. **<D>** a point in the MicroStation view off to the side of the surface limits.
    - ♦ There is no need to hold down on the Left mouse button.



19. Move the cursor, a line will be displayed
20. Sweep the cursor over the surface model to dynamically highlight surface triangles

Note: The line highlights triangles as they are crossed. Highlighted triangles will be removed from the surface model once a data point <D> is given to establish the endpoint of the line (selection).

21. **<D>** a second point to define the line at the point shown above.
22. **<D>** a point in the view to accept and delete the triangles.
23. Continue drawing lines to remove undesirable triangles from other areas of the surface.
24. **<R>** when you have completed deleting triangles from this zoom ratio. The ***Delete Triangle*** dialog will reappear.

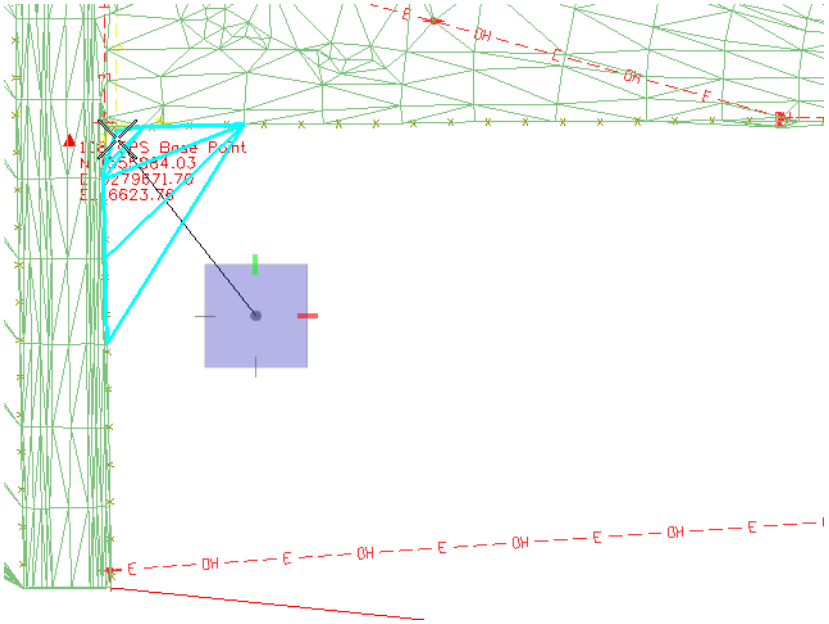
Note: You can write triangles to the display as MicroStation graphics at any time. Do not re-triangulate the surface before defining an exterior boundary as deleted triangles will be re-established.

Note: If the triangles are redisplayed, keep in mind, displayed triangles are a reflection of what InRoads has in memory at a specific point in time. If triangles are deleted (from memory) the MicroStation graphics displayed will not reflect this change until the triangles written to graphics are redisplayed (refreshed).

25. Use MicroStation to view **Window** into an area of the survey.

26. From the ***View Survey*** toolbar toggle display **ON** for **Symbols**

    ♦ If your symbols are not displaying make sure the level is turned on.



Note: Triangles should only span between known (collected) points. The above graphic shows a group of triangles that should be eliminated.

27. Continue to **Pan** along the file and deleting triangles. Don't be concerned that the model may not be perfect for this training.

When you have finished:

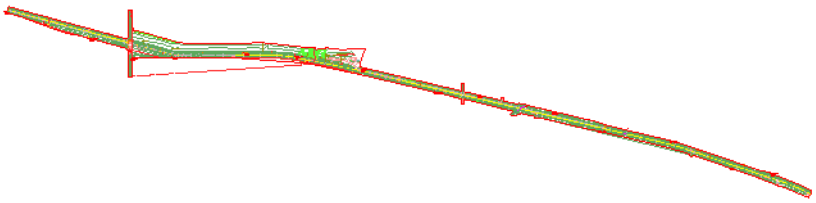
28. **<D>** the **Close** button in the ***Delete Triangle*** dialog.

29. From the ***View Survey*** toolbar toggle display **OFF** for **Symbols**

30. Redisplay the perimeter **Surface > View Surface > Perimeter**. The ***View Perimeter*** dialog will appear.

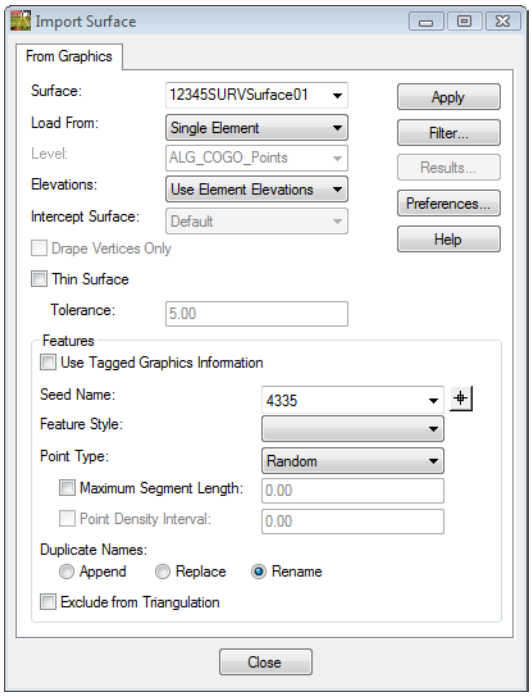
31. **<D>** the **Apply** button in the ***View Perimeter*** dialog.

32. Review your results.



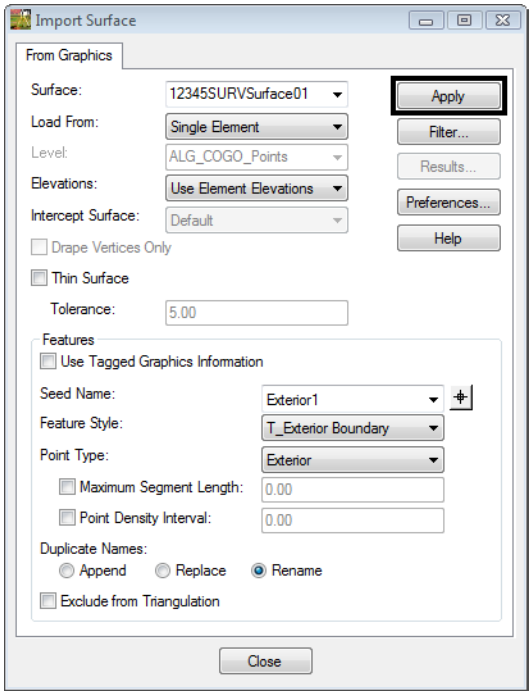
Note: This closed shape represents the edge of the surface (triangles) spatially correct (location and elevation). Importing this shape into the DTM will act as an exterior boundary to constrain the triangulation process.

33. From the InRoads pull down menu select, **File > Import > Surface**. The ***Import Surface*** dialog will appear.



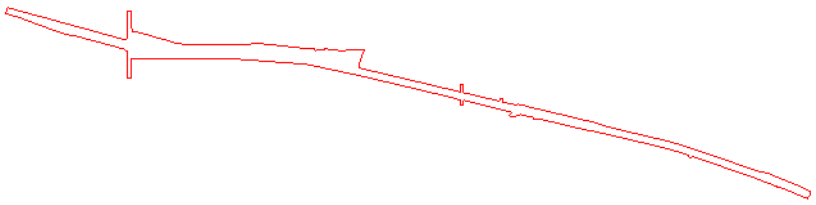
34. Set the following dialog items:

    - ***Surface: 12345SURVSurface01***
    - ***Load From:*** **Single Element**
    - ***Elevations:*** **Use Element Elevations**
    - ***Key-in Seed Name: Exterior1***
    - ***Feature Style:*** **T_Exterior Boundary**
    - ***Point Type:*** **Exterior**



35. **<D>** the **Apply** button. The ***Import Surface*** dialog will minimize allowing you to select the perimeter element.

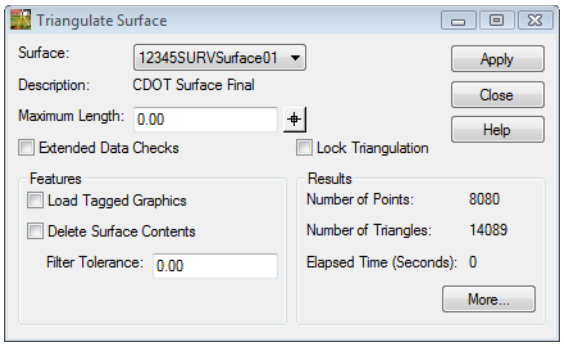
36. **<D>** on the surface ***Perimeter graphics*** displayed in MicroStation View 1.



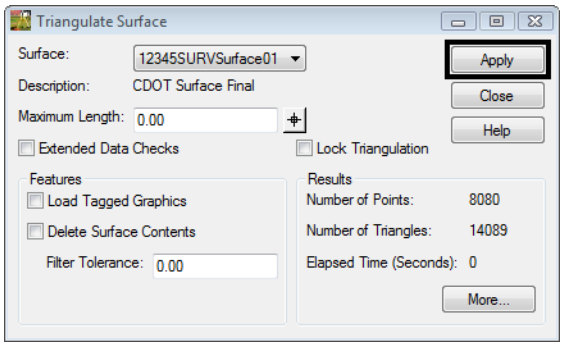
37. **<D>** again to accept this element. The ***Import Surface*** dialog will reappear.

38. **<D>** the **Close** button in the ***Import Surface*** dialog.

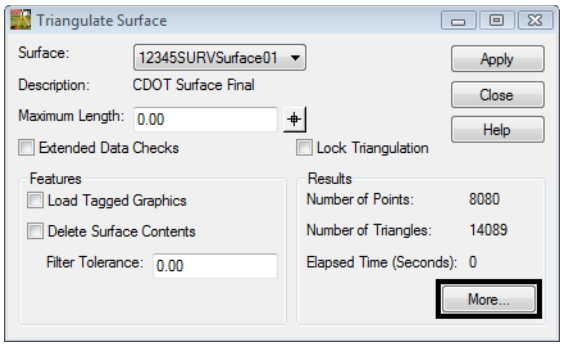
39. From the pull down menu select, **Surface > Triangulate Surface**. The ***Triangulate Surface*** dialog will appear.



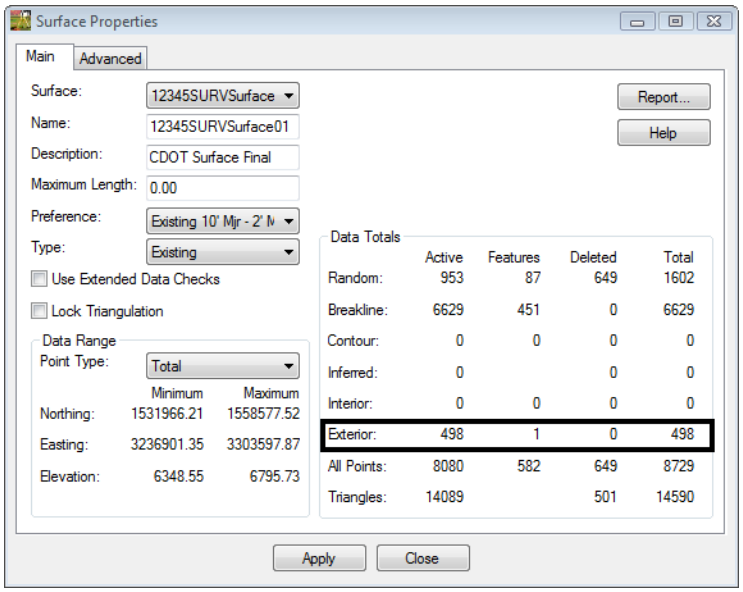
40. **<D>** the **Apply** button in the ***Triangulate Surface*** dialog.



41. **<D>** the **More** button on the ***Triangulate Surface dialog***. The ***Surface Properties*** dialog will appear.



42. Review your results.



Note: The surface now has Exterior point data, your numbers will not match exactly.

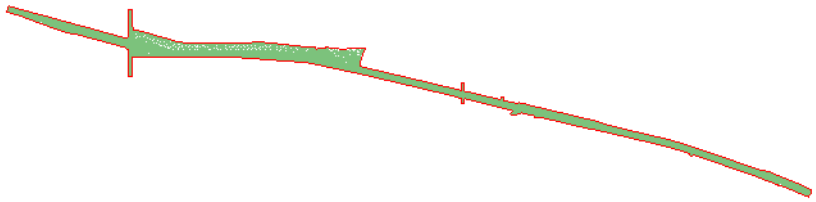
43. **<D>** the **Close** button in the ***Surface Properties*** dialog.

44. **<D>** the **Close** button in the ***Triangulate Surface*** dialog.

45. Redisplay the triangles **Surface > View Surface > Triangles**. The ***View Triangles*** dialog will appear.

46. **<D>** the **Apply** button in the ***View Triangles*** dialog.

47. Review your results.



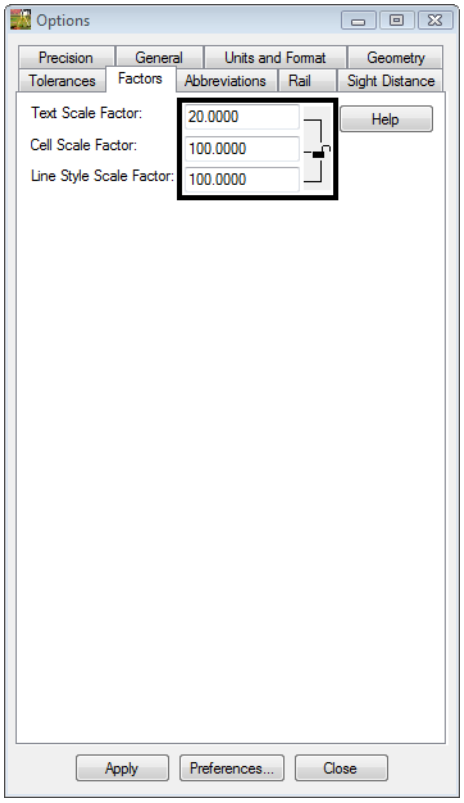
48. In the Workspace bar Surface tab **<R>** on ***12345SURVSurface01*** select **Save** from the shortcut menu.

Contour Files

Contour information will be saved to separate files for ease of referencing and level control. Each scale and contour interval will have a unique name.

49. From the pull-down menu select, **Tools > Options**. The InRoads ***Options*** dialog will appear.

50. **<D>** the **Factors** tab.



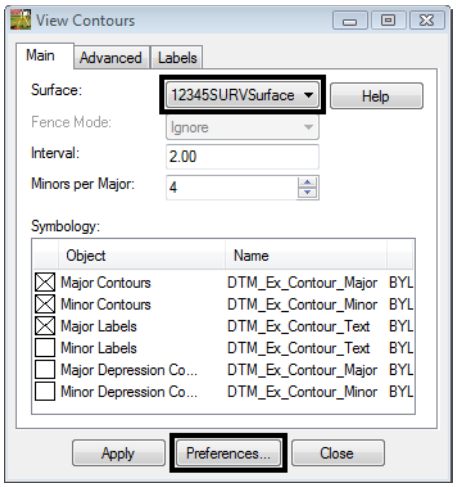
Note: The values shown here will be applied to all commands that display text, cells, or linestyles.

51. Verify the Scale Factors

- ***Text***: ***20***
- ***Cell***: ***100***
- ***Linestyle***: ***100***

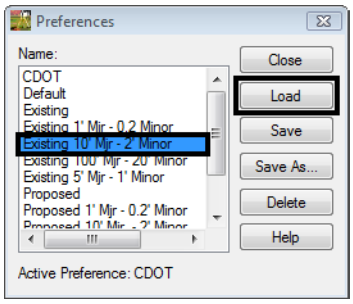
52. **<D>** the **Apply** then **Close** buttons.

53. From the pull-down menu select, **Surface > View Surface > Contours**. The ***View Contours*** dialog will appear.



54. Verify the active ***Surface***: ***12345SURVSurface01***

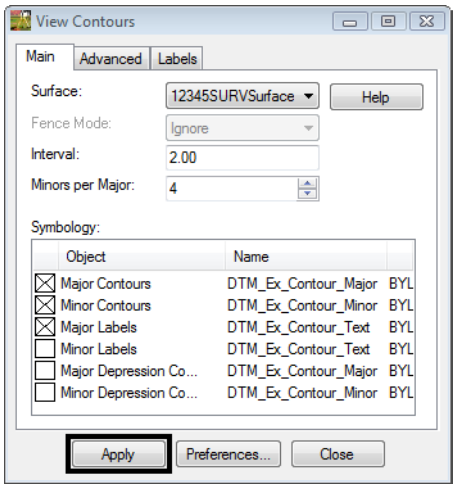
55. **<D>** the **Preferences** button.



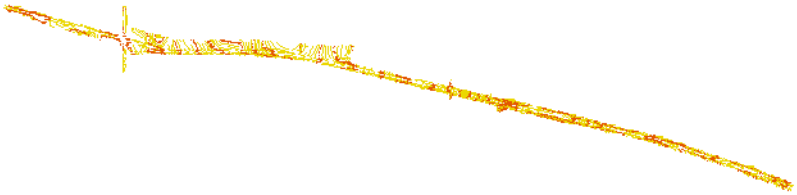
56. Select the preference **Existing 10' Mjr – 2' Minor**

57. **<D>** the **Load** then **Close** buttons.

58. **<D>** the **Apply** button. The View Contours dialog will temporarily minimize as the surface is processed and the contours are generated the dialog will reappear when the contours have been generated.



59. Review your results.

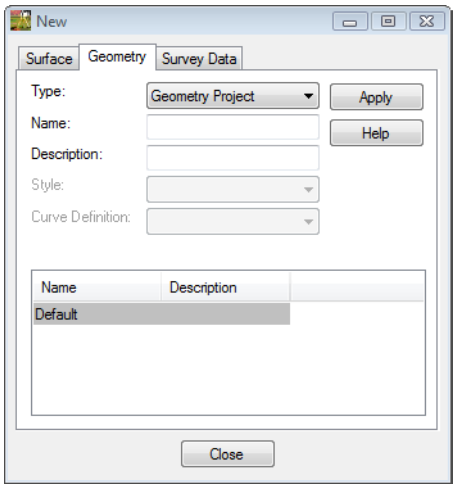


Lab 8.4 - Exporting Survey Data to Geometry - FINAL

Section Objectives:

- Export survey data to a Geometry Project for a final deliverable.

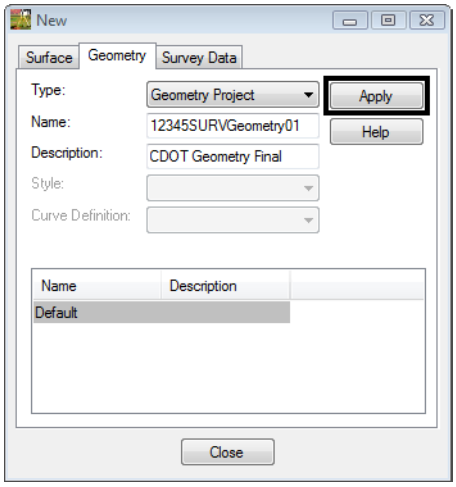
1. Verify the ***12345SURVFieldbook01*** fieldbook you want to export is active. You can tell which fieldbook is active by the red box around the fieldbook button.
2. From the InRoads pull down menu, select **File > New**. The ***New*** dialog will appear.
3. Select the **Geometry** tab.



4. From the type pick list verify the ***Type***: **Geometry Project**
5. Key in the geometry ***Name***: ***12345SURVGeometry01***
6. Key in the ***Description***: ***CDOT Geometry Final***

Note: Key in any additional file information in the Description field of the dialog, such as Date, User, and Design file name. You have up to 34 characters even though you may not see all the characters in the Description field.

7. **<D>** the **Apply** and **Close** buttons.

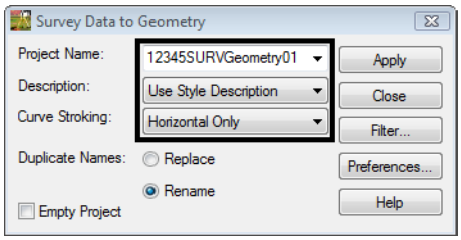


8. From the InRoads pull down menu, select **Survey > Survey Data to Geometry**. The ***Survey Data to Geometry*** dialog will appear.

9. From the drop down list select ***Project Name***: **12345SURVGeometry01**

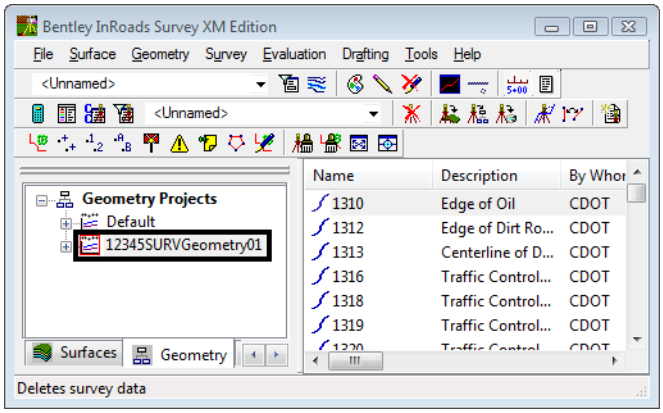
10. Set the ***Description:*** **Use Style Description**

11. Set the ***Curve Stroking:*** **Horizontal Only**



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

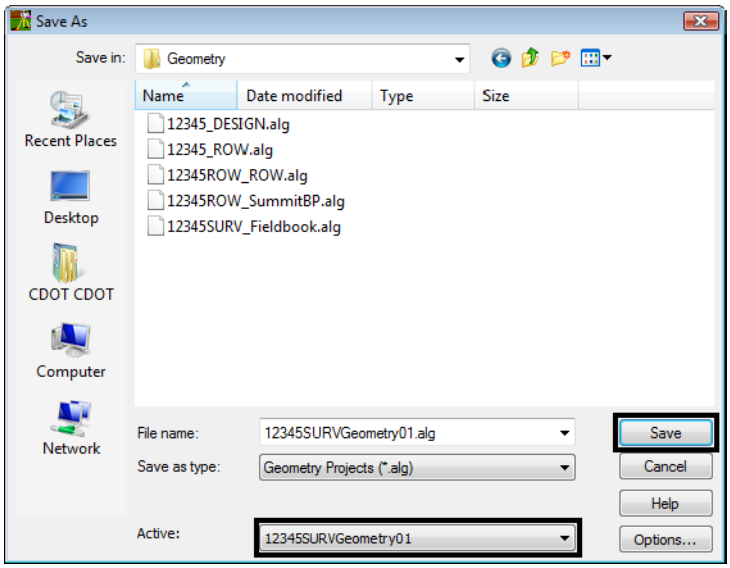
13. Use the Workspace pane scroll arrows to view the Geometry tab.



14. Verify ***12345SURVGeometry01*** is the active ***Geometry Project***.

15. From the InRoads pull down select **File > Save > Geometry Project**. The ***Save As*** dialog will appear with the ***Save as type***: **Geometry (*.alg)**.

16. Verify you are in the correct project directory.
C:\Projects\12345\ROW_Survey\InRoads\Geometry



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

Note: Ensuring that the saved Geometry name in the project folder matches the Geometry name displayed in InRoads explorer will minimize any confusion.

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

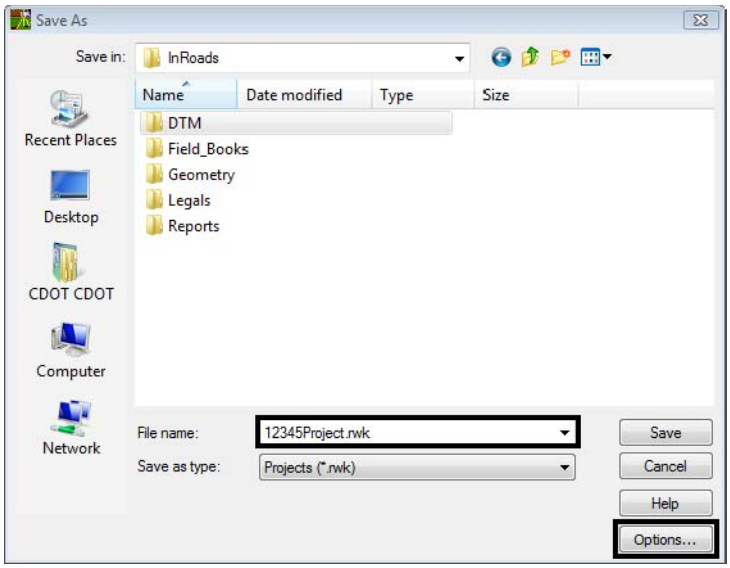
Lab 8.5 - Saving an InRoads Project file RWK

Project file stores the location of multiple InRoads files. RWK files allow the user to open just one RWK which could load a survey, surface, and geometry project. The RWK can be opened and edited in Notepad incase there are changes in the directory structure.

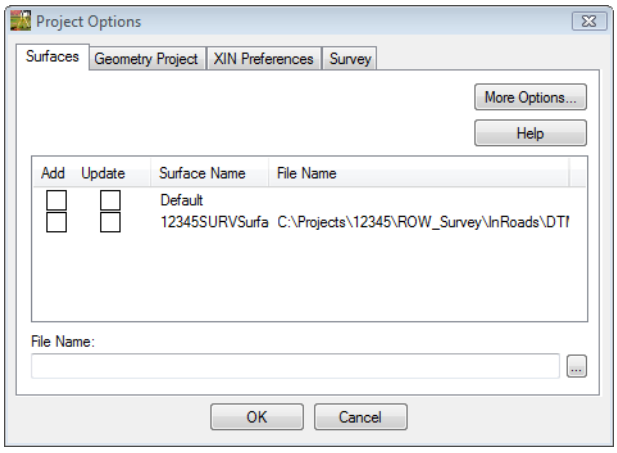
Section Objectives:

- Create a new Project file that will autoload the survey fieldbook file and final deliverable.

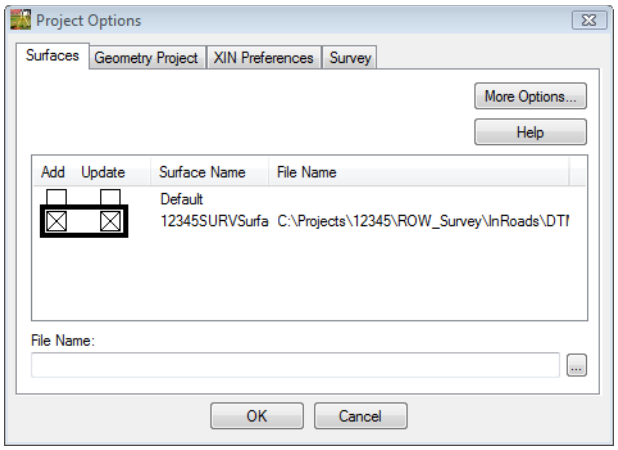
1. From the pull down menu, select **File > Save > Project**. The ***Save As*** dialog will appear.
2. Key-in the ***File name: 12345Project.rwk***



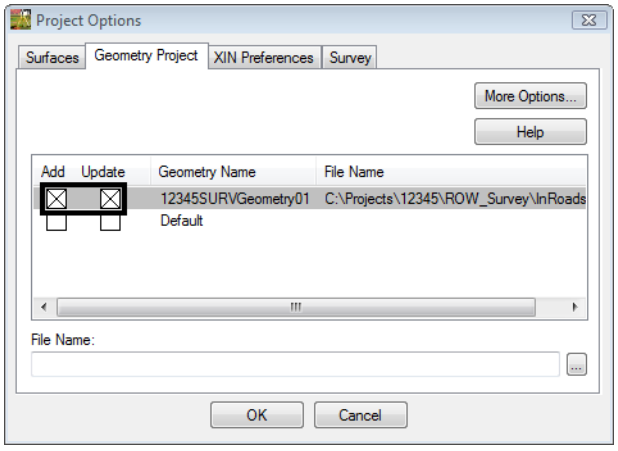
3. **<D>** the **Options…** button. The ***Project Options*** dialog will appear.



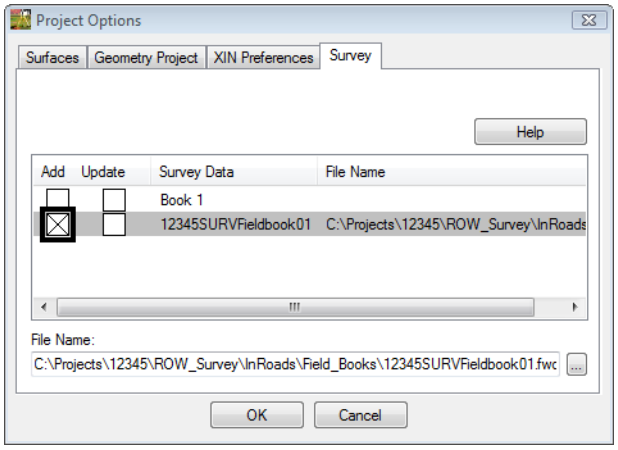
4. From the **Surfaces** tab check the **Add** and **Update** boxes for Surface Name ***12345SURVSurface01***.



5. From the **Geometry Project** tab check the **Add** and **Update** boxes for Geometry Name ***12345SURVGeometry01***.

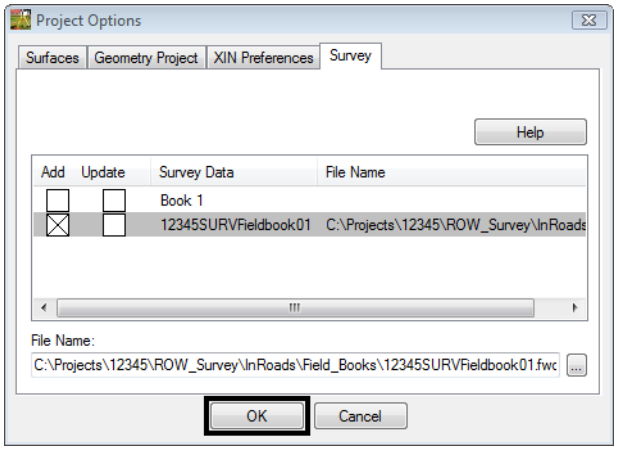


6. From the **Survey** tab check only the **Add** box for Survey Name ***12345SURVFieldbook01***.

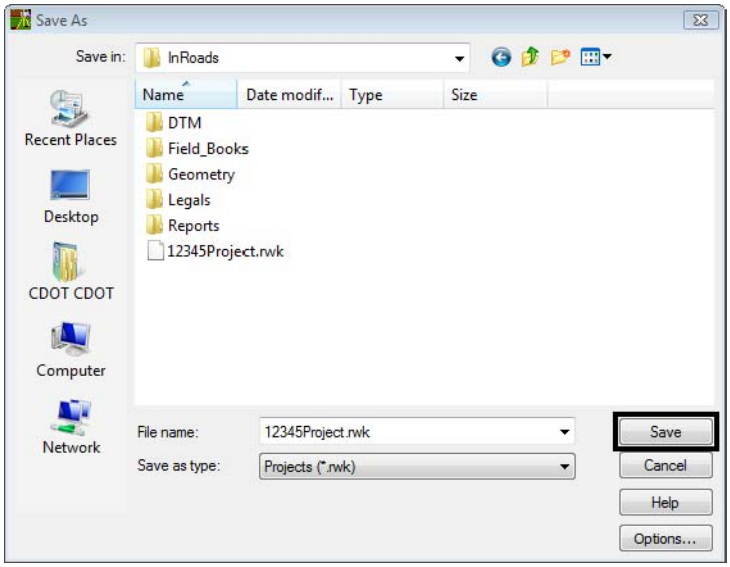


Note: By only selecting the Add check box for the Survey tab the file will act as read only when opened and saved with the RWK file in the future.

7. **<D>** the **OK** button. The ***Project Options*** dialog will close.

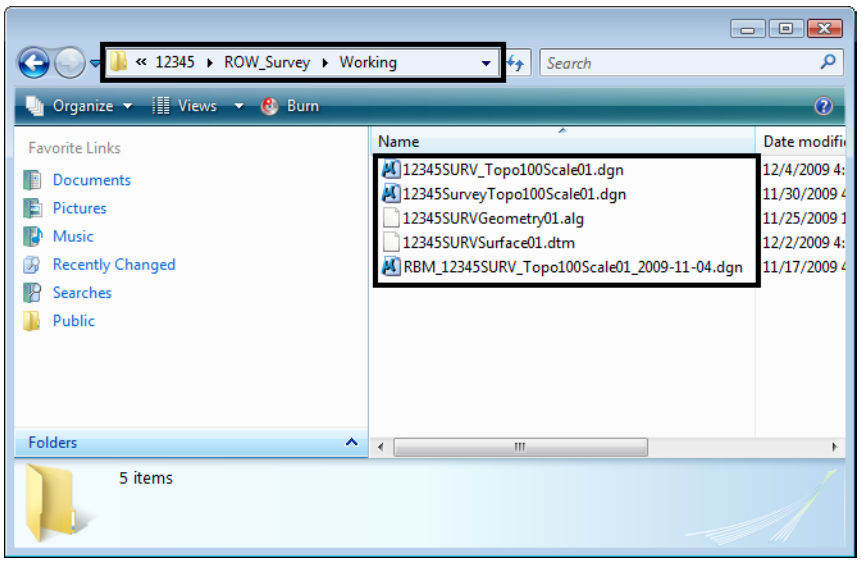


8. **<D>** the **Save** then **Cancel** buttons. The ***Save As*** dialog will close.



Lab 8.6 - Directory Clean up

1. Open Windows Explorer Windows + E
2. Navigate to the folder ***C:\Projects\12345\ROW_Survey\Working***
3. Delete any old or duplicated files for the Working directory.



Section Summary:

- In *Lab 8.1 -Exporting Survey Data to Graphics* the survey fieldbook was exported to graphics including the point names, codes, etc. The file was then stratified using the custom application CDOT Stratify Survey to create multiple survey files and reference the files appropriately.
- In *Lab 8.2 -Exporting Survey Data to Surface* the survey fieldbook was exported to the final surface file.
- In *Lab 8.3 -Exterior Boundary* the surface was then cleaned up by deleting errant triangles and a new exterior boundary was created.
- In *Lab 8.4 -Exporting Survey Data to Geometry - FINAL* the survey fieldbook file was exported as a final geometry project.
- In *Lab 8.5 -Saving an InRoads Project file RWK* the final deliverable survey files were used to create a Project file to help the user load multiple files.
- In *Lab 8.6 -Directory Clean up* the working directory was cleaned up to make sure all files that were no longer needed were removed from the folder.

LAB 9 - Additional Exercises

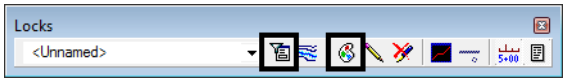
Lab 9.1 - Locks

Section Objectives:

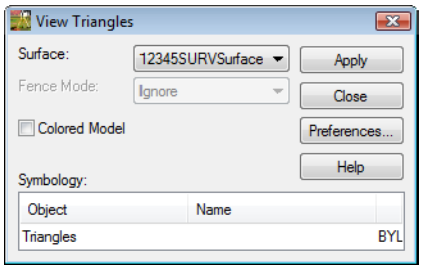
- View surface triangles using Pencil lock with different Preferences.

Locks Toolbar

1. Open a new working MicroStation model file.
2. Open an InRoads Surface.
3. Verify both the Feature Filter Lock and Style Lock are toggled **OFF**. The Locks are toggled OFF when the button appears darker.



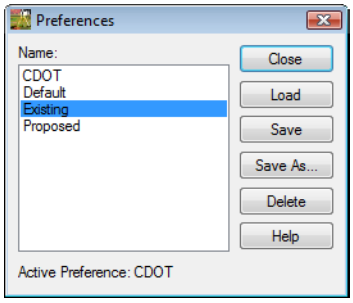
4. From the InRoads pull down menu select, **Surface > View Surface > Triangles**. The ***View Triangles*** dialog will appear.



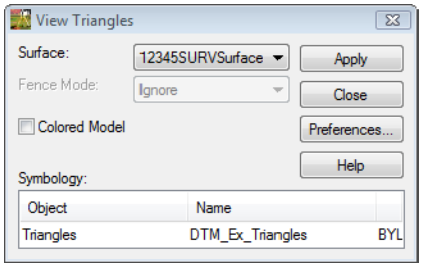
5. **<D>** the **Apply** button. The ***View Triangles*** dialog will minimize as the triangles are generated. The dialog will reappear when it is finished.

   Note: The triangles displayed are not using the correct element attributes for color and level. Using the Pencil mode will erase the current displayed triangles and redisplay the correct element attributes for existing triangles.

6. **<D>** the **Preferences…** button. The ***Preferences*** dialog will appear.



7. Select the **Existing** preference.
8. **<D>** the **Load** then **Close** buttons.



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

   Note: Notice how the old triangles are "erased" and the new triangles are redrawn using the loaded existing preference.

Section Summary:

- In this lab we viewed surface triangles using Pencil lock with different Preferences.

Lab 9.2 - Advanced Locks

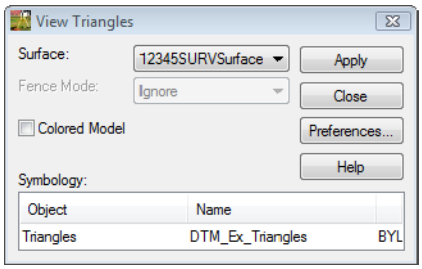
Section Objectives:

- In this lab the difference between Pencil and Pen lock will be shown.

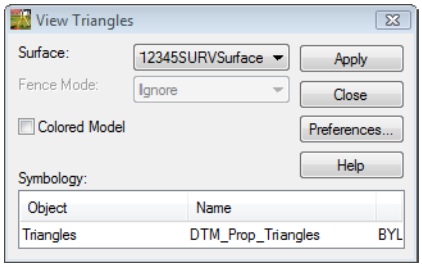
These are only generalized steps to guide you. Ask your instructor if you have any questions.

1. Using MicroStation **Delete**. Delete all triangles from the DGN file.
2. Toggle the Write lock from **Pencil** mode to **Pen** mode.

3. Display the triangles using **Preference Existing**.



4. Redisplay the triangles using **Preference Proposed**.



Note: You should end up with two sets of triangles. Pen mode can be used for other display operations such as perimeter and contours.

When you have finished:

5. Using MicroStation **Delete** button. Delete all triangles from the DGN file.
6. From the MicroStation pull down menu select,
   File > Compress > Design
7. Verify your Locks toolbar is set back to **Pencil** mode.

Section Summary:

- In this lab Pen lock was demonstrated using View Triangles command.

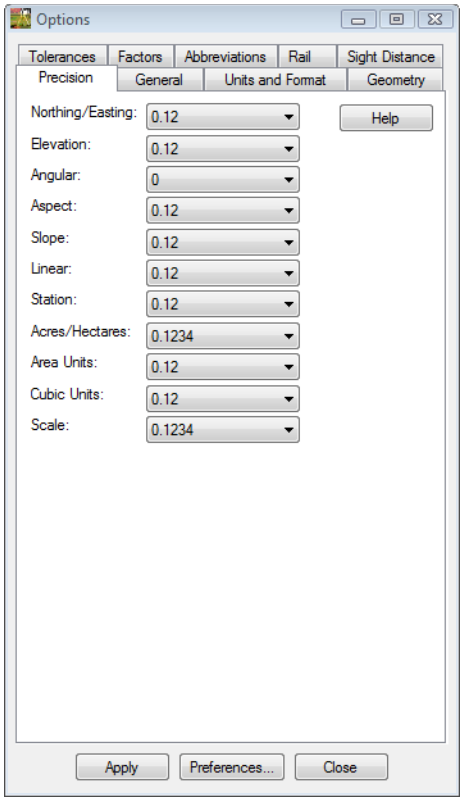
Lab 9.3 - Global Scale Factor

InRoads annotation (text, cells, and linestyles) is controlled with configurable scale settings. In the case of contour labeling, text size is driven by 2 factors. The text size specified in the **View Contours** dialog box and the active settings (multiplier) defined through the use of a Global Scale Factor.

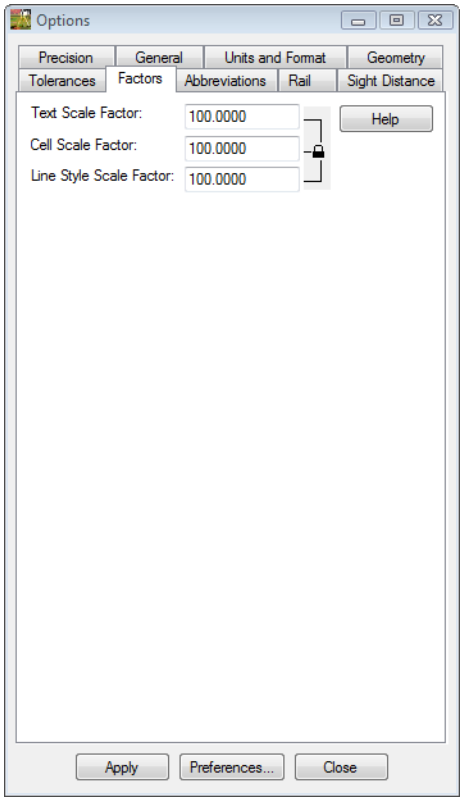
Section Objectives:

- In this lab the text scale factor will be changed to show how to modify text sizes when displaying contour labels.
- In this lab the Global Scale factor Add-in will be added to the Tools pull down menu for easier access to the scales.

1. Open a new working MicroStation model file.
2. Open an InRoads Surface.
3. From the pull-down menu select, **Tools > Options**. The InRoads ***Options*** dialog will appear.

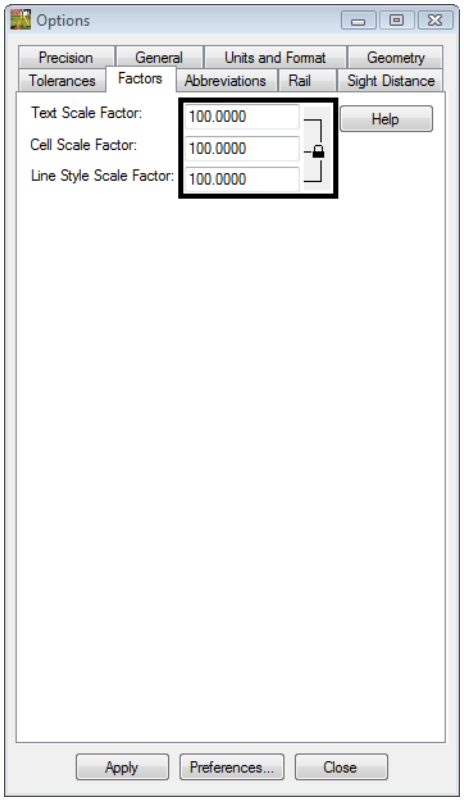


4. **<D>** the **Factors** tab.



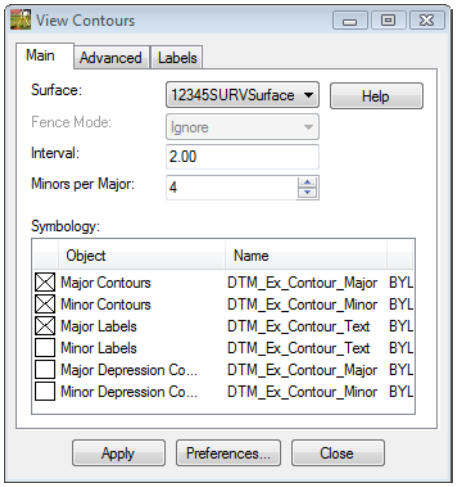
Note: The values shown here will be applied to all commands that display text, cells, or line styles.

5. Set the **Text**, **Cell** and **Line Style** Scale Factors to ***100***



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

7. From the pull-down menu select,
Surface > View Surface > Contours. The ***View Contours*** dialog will appear.

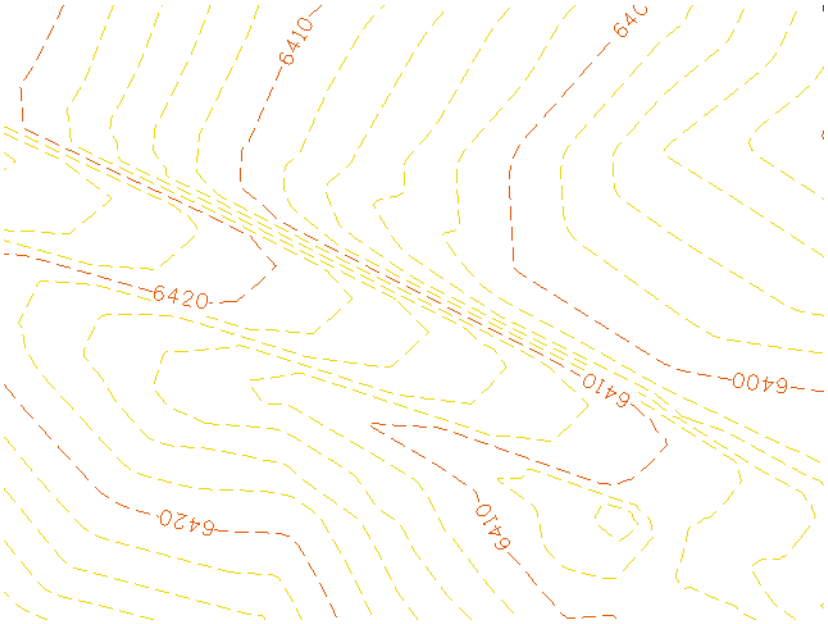


8. Verify the active Surface: ***12345SURVSurface01***

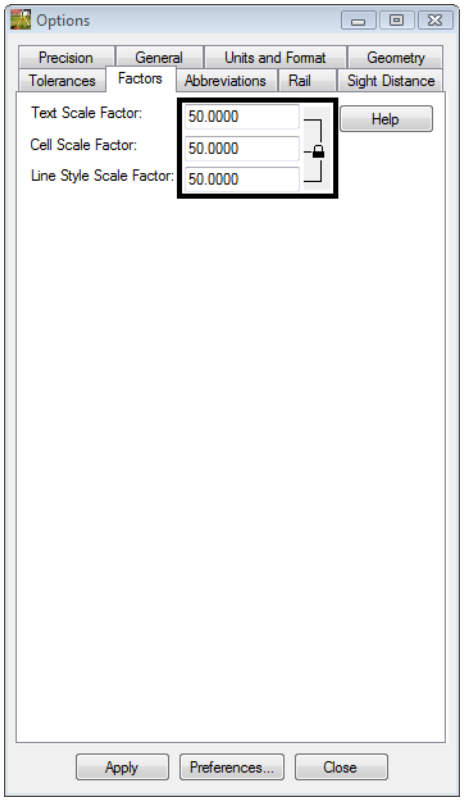
9. Load the **CDOT** Preference

10. **<D>** the **Apply** button. The ***View Contours*** dialog will temporarily minimize as the surface is processed and the contours are generated the dialog will reappear when the contours have been generated.

11. Review your results.

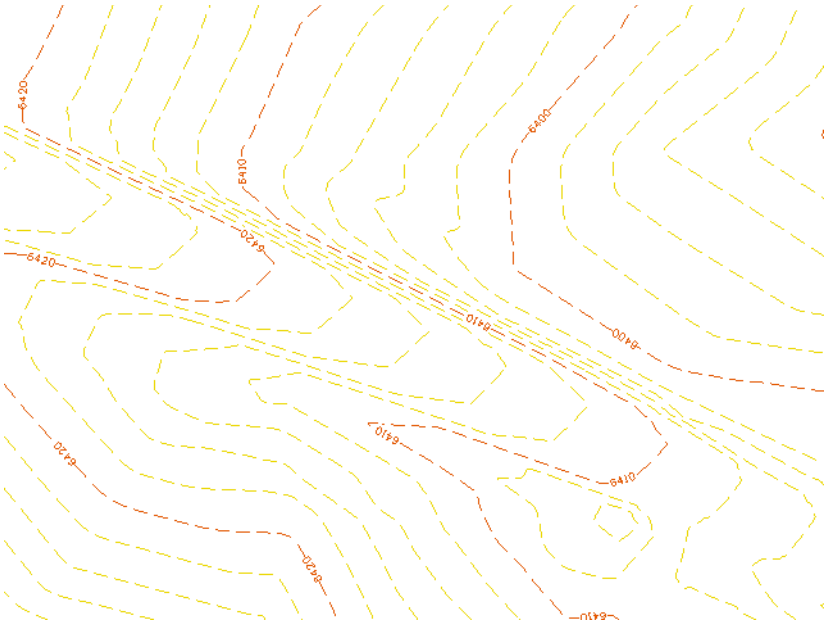


12. From the pull-down menu select, **Tools > Options**. The InRoads ***Options*** dialog will appear.
13. **<D>** the **Factors** tab.
14. Set the **Text**, **Cell** and **Line Style** Scale Factors to ***50***



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

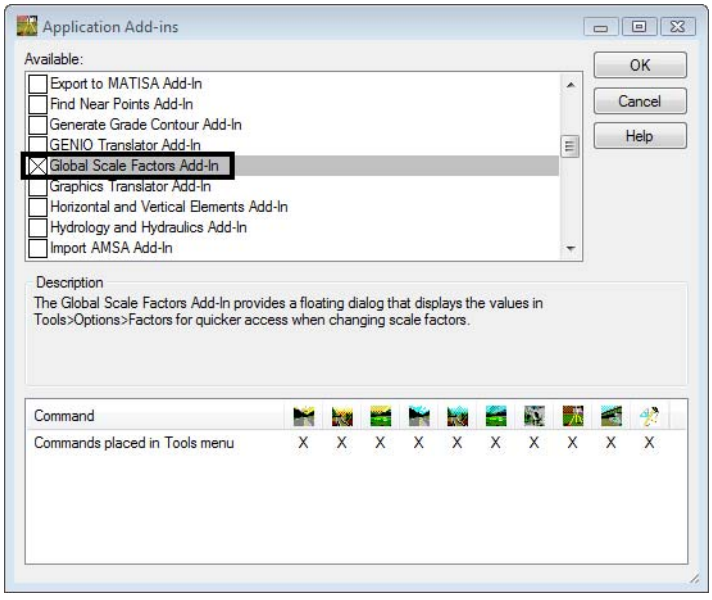
16. **<D>** the **Apply** button in the ***View Contours*** dialog. Notice the change in the annotation size.



The Global Scale Factor dialog is frequently used. It can be added to the interface for easy access.

17. From the pull down menu select, **Tools > Application Add-Ins**, the ***Applications Add-ins*** dialog will appear.

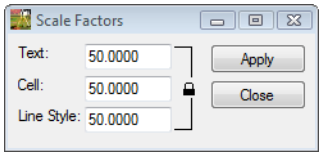
18. Check **ON** ***Global Scale Factor Add-In***.



Note: The Description section of the dialog will give details where to find the added command in the pull down menus.

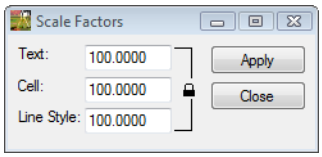
19. **<D>** the **OK** button. The ***Application Add-ins*** dialog will close.

20. From the pull down menu select, **Tools > Global Scale Factors...** The ***Global Scale Factors*** dialog will appear.



Note: The ***Scale Factors*** dialog can remain open saving space and time.

21. Key-in the **Text**, **Cell**, and **Line Style** Scale Factors dialog to ***100***



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

Section Summary:

- In this lab the text scale factor was changed to show how to modify text sizes when displaying contour labels.
- In this lab the Global Scale factor Add-in was added to the Tools pull down menu for easier access to the scales.

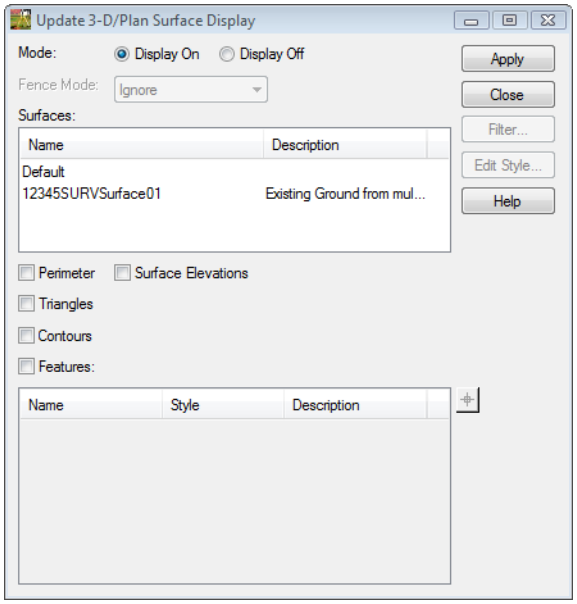
Lab 9.4 - View Surface Display Constrained

Most surface display commands have the option to display within the limits of a fence place in a MicroStation model.

Section Objectives:

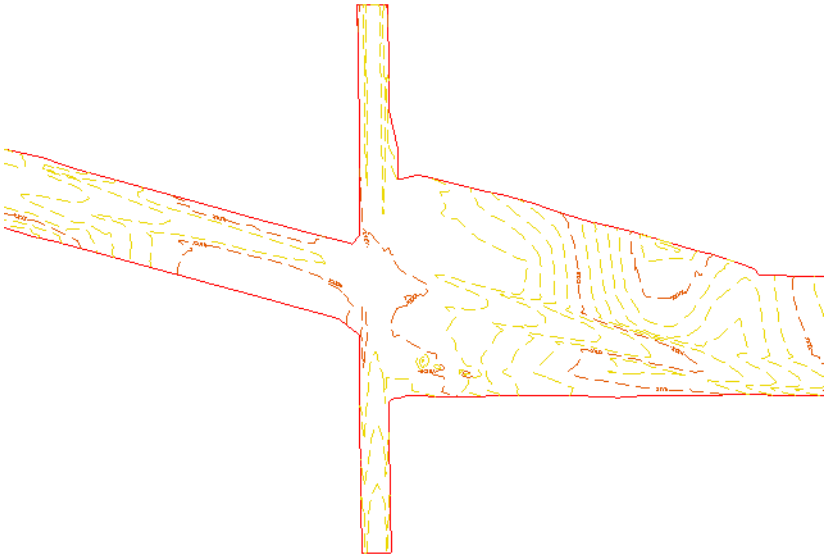
- In this lab a MicroStation fence will be placed in the file to constrain the triangles inside the fence.

1. Open a new working MicroStation model file.
2. Open an InRoads Surface.
3. From the InRoads pull down menu select, **Surface > Update 3-D/Plan Surface Display**. The ***Update 3-D/Plan Surface Display*** dialog will appear.

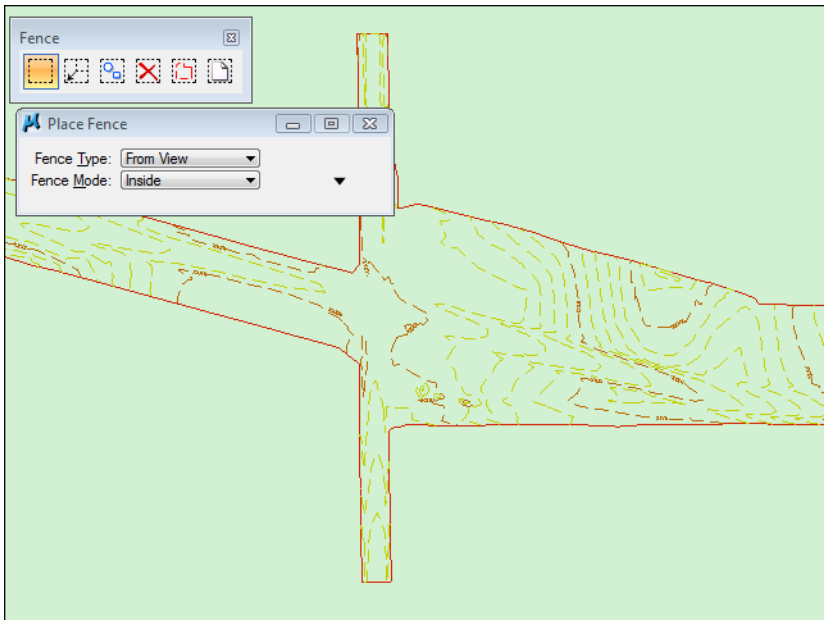


4. Select the ***Mode:*** **Display On** radio button.
5. Verify ***12345SURVSurface01*** is the active surface.
6. Check **ON** ***Perimeter*** box.
7. Check **ON** ***Contours*** box.
8. **<D>** the **Apply** buttons. The Contours and Perimeter graphics will be displayed to the design file.

9. Using MicroStation view commands window into a portion of the surface.

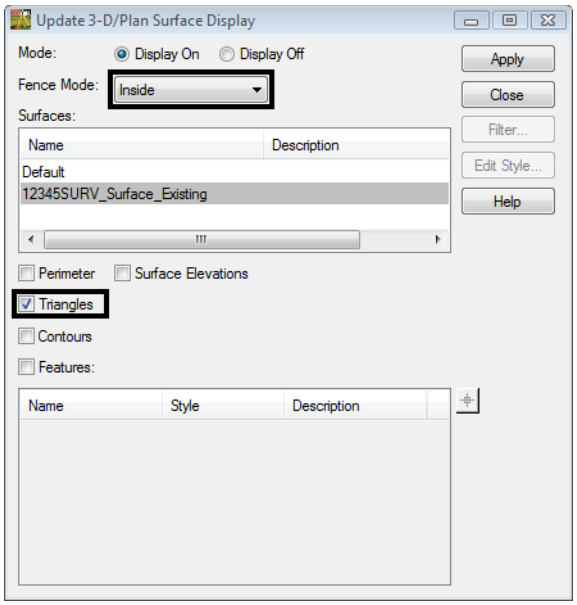


10. From the MicroStation Main toolbar **<D>** the **Place Fence** button.
11. From the Tool Settings dialog select ***Fence Type:*** **From View**



12. **<D>** a point in **View 1**. The Fence will appear around the edge of the view border.

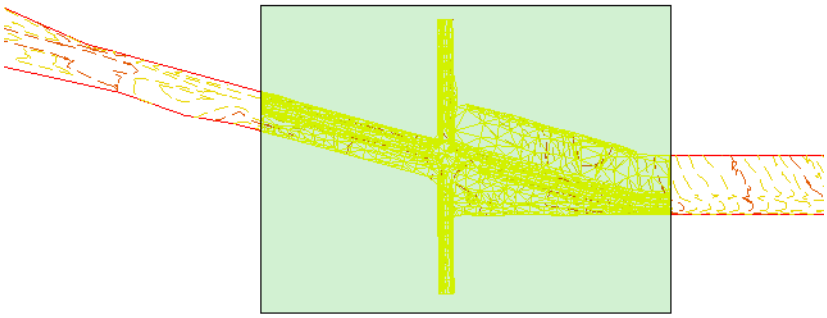
13. From the InRoads pull down menu select, **Surface > Update 3-D/Plan Surface Display**. The ***Update 3-D/Plan Surface Display*** dialog will appear.



Note: Notice this time ***Fence Mode*** became active and the mode is set to ***Inside***.

14. **<D>** the **Apply** button. The triangles will display inside the fence.

15. Using MicroStation view commands zoom out from the triangles and review your result



16. **<D>** the **Close** button in the ***Update 3-D/Plan Surface Display*** dialog.

Section Summary:

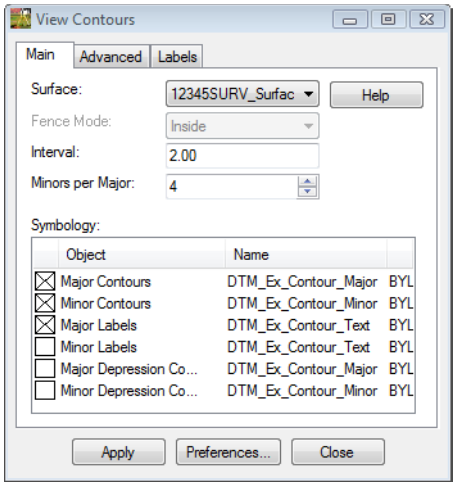
- In this lab a MicroStation fence was be placed in the file to constrain the triangles inside the fence.

Lab 9.5 - View Contour Settings

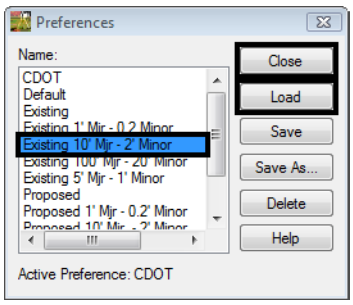
Section Objectives:

- Use different Preferences will be used to display contours.
- Change settings in the Advanced tab of the View Contours dialog to view contours smooth or between an elevation range.
- Change settings in the Labels tab of the View Contours dialog to view contour labels at different intervals and display options.

1. Open a new working MicroStation model file.
2. Open an InRoads Surface.
3. Using MicroStation **Delete** button. Delete all Contours in the drawing.
4. From the pull-down **Surface > View Surface > Contours**. The ***View Contours*** dialog will appear.
5. Verify the active ***Surface: 12345SURV_Surface_Existing***

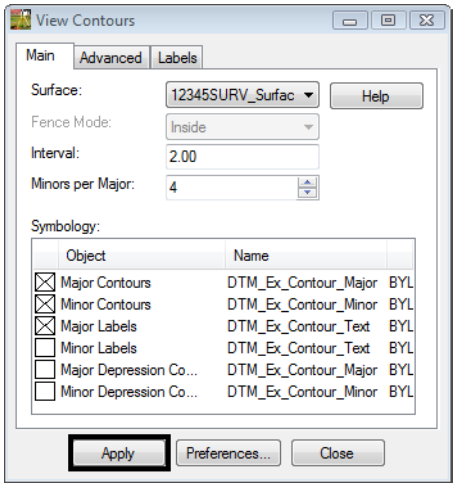


6. **<D>** the **Preferences…** button. The ***Preferences*** dialog will appear.



7. Select the preference **Existing 10'Mjr – 2' Minor**.

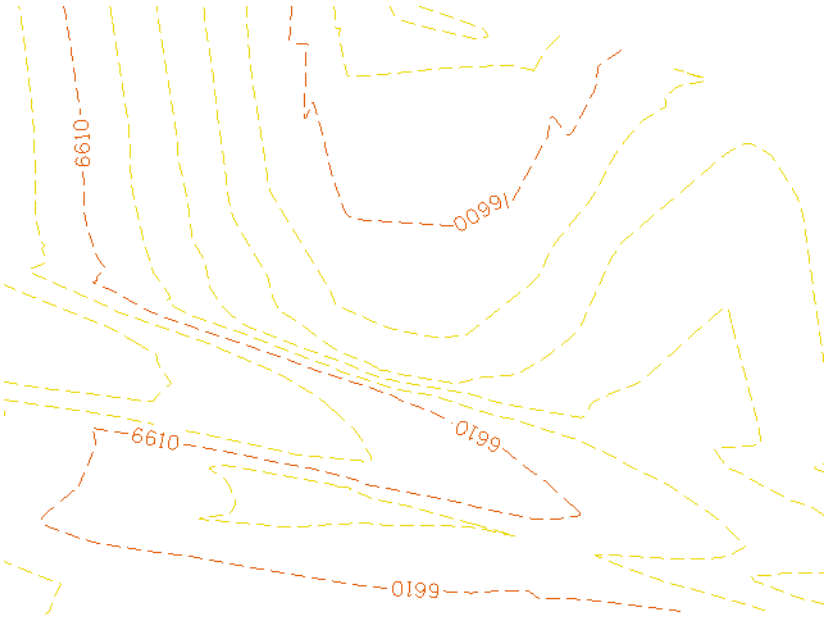
8. **<D>** the **Load** then **Close** buttons.



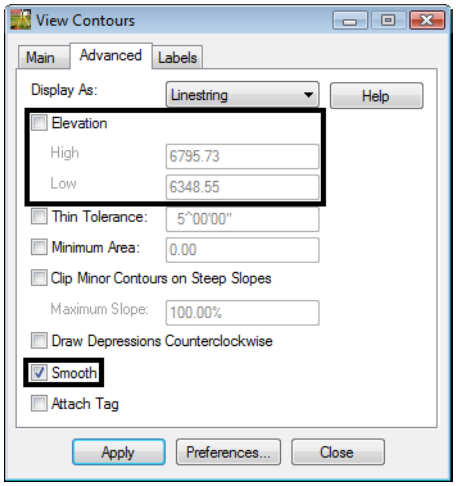
Note: Notice the change in the Interval and Minors per Major settings.

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

10. Review your results.



11. **<D>** the **Advanced** tab in the ***View Contours*** dialog.

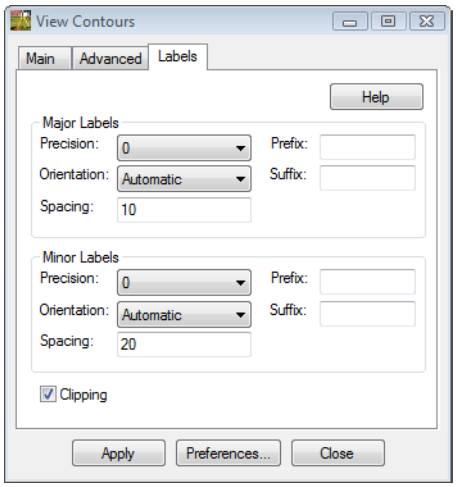


12. Check **OFF Smooth** in the ***View Contours*** dialog.
13. **<D>** the **Apply** button and review your results.
14. Check **ON Elevation** in the ***View Contours*** dialog.
15. Set the ***Elevation High*** and ***Low*** values that will work with the loaded surface.
16. **<D>** the **Apply** button and review your results.

17. **<D>** the **Labels** tab in the ***View Contours*** dialog.

18. Continue to display contours using different settings in the ***Major Labels*** and ***Minor Labels*** sections.

    - Precision
    - Orientation
    - Spacing
    - Prefix
    - Suffix



Note: Ask your instructor if you have a question on any of these settings.

When you have finished:

19. Reload the Preference **Existing 10'Mjr – 2' Minor**.

20. Redisplay the contours.

Section Summary:

- In this lab different Preferences were used to display contours.
- In this lab changes in the Advanced tab were made to view contours smooth or displayed between an elevation range defined by the user.
- In this lab change settings in the Labels tab were made to view contour labels at different intervals and display options.

Lab 9.6 - Profiles from existing alignments

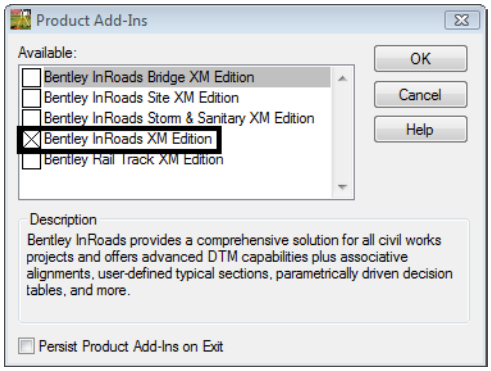
Section Objectives:

- Create a Profile from an existing horizontal alignment to create a profile to help evaluate the existing surface.

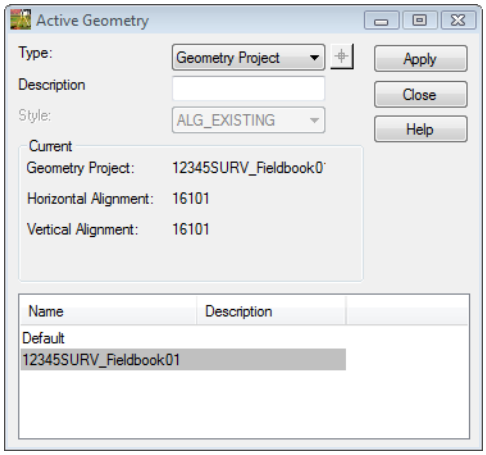
1. Open a new working MicroStation model file.
2. Open an InRoads Surface.
3. Open an InRoads Geometry Project.

   InRoads Survey only allows for multipoint profiles. To create profiles from an existing alignment InRoads needs to be added.

4. From the InRoads pull down menu select **Tools > Product Add-ins**. The ***Product Add-ins*** dialog will appear.



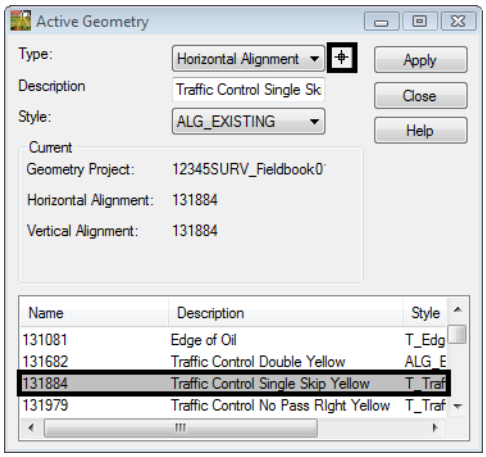
5. Select the **Bentley InRoads XM Edition** application and select the **OK** button. InRoads application will be added to the InRoads Survey interface.
6. From the InRoads pull down menu select **Geometry > Active Geometry**. The ***Active Geometry*** dialog will appear.



7. Select the ***Type:*** **Horizontal Alignment**

8. **<D>** the **Target** button. The Active Geometry dialog will minimize allowing you to select the centerline in the MicroStation view.

9. **<D>** the centerline of the road. The centerline of road will highlight and the ***Active Geometry*** dialog will reappear.

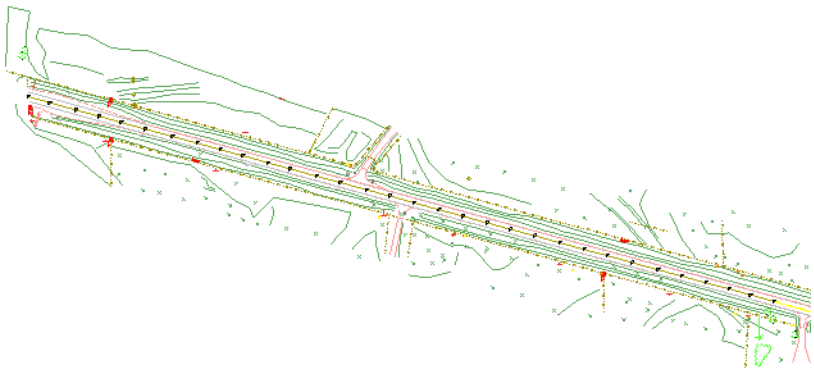


10. **<D>** the **Apply** then **Close** buttons. The Horizontal Alignment name will be active.

11. From the InRoads pull down menu select, **Geometry > Fit Alignment**.

12. **<R>** for the active alignment in the MicroStation View.

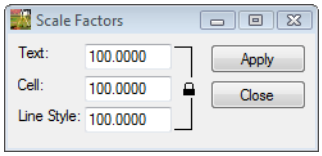
13. From the pull down menu select, **Geometry > View Geometry > Active Horizontal**



Note: The above graphic is where the profile will be extracted.

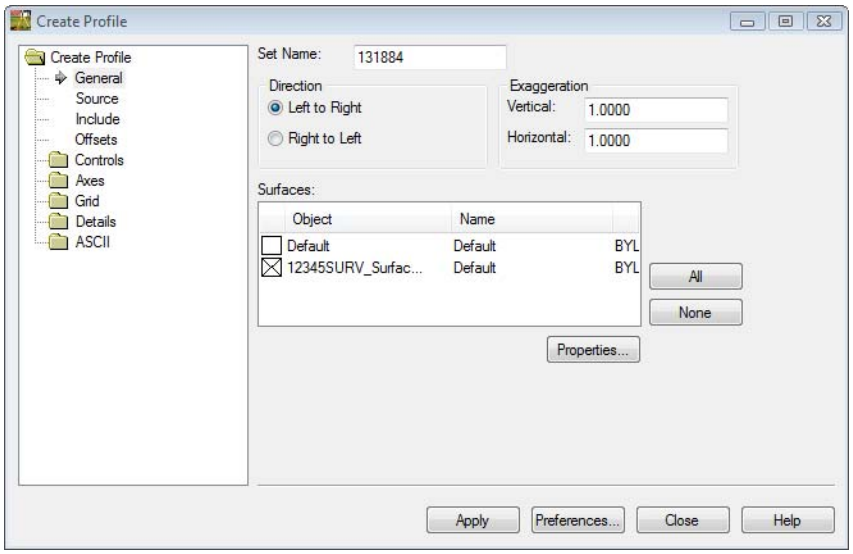
14. From the pull down menu select, **Tools > Global Scale Factors…** The ***Scale Factors*** dialog will appear.

15. Key-in the scale factor ***100***

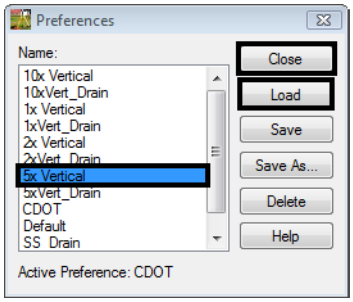


16. **<D>** the **Apply** then **Close** buttons.

17. From the InRoads pull down menu select **Evaluation > Profile > Create Profile**. The ***Create Profile*** dialog will appear.



18. **<D>** the **Preferences…** button. The ***Preferences*** dialog will appear.

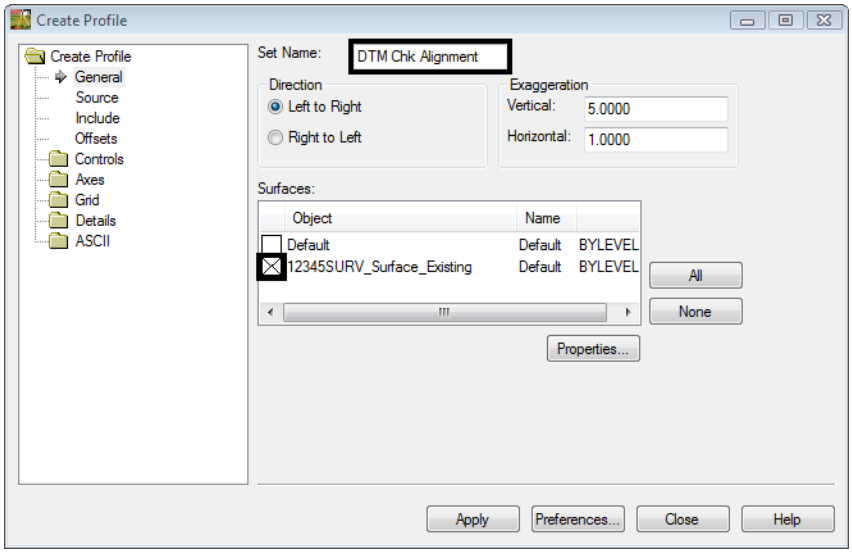


19. Select the preference name **5x Vertical**.

20. **<D>** the **Load** then **Close** buttons.

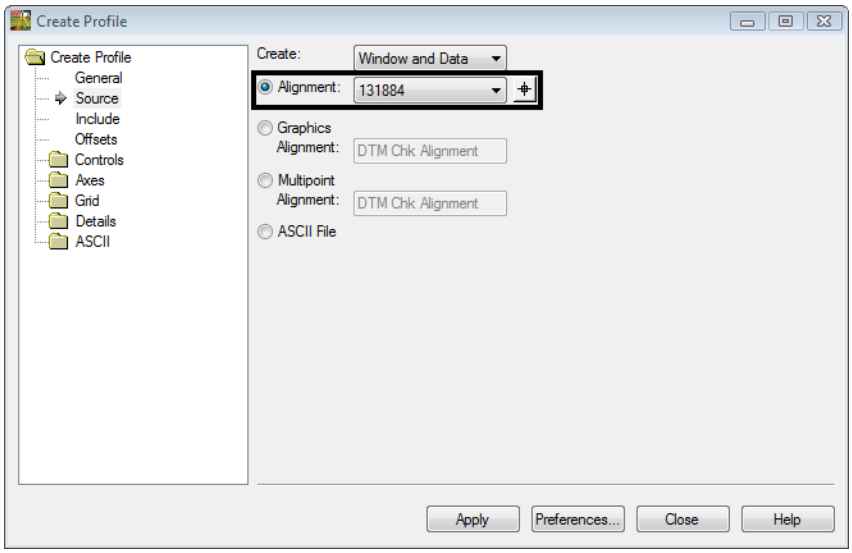
21. On the Create Profile dialog **Create Profile > General** leaf
Set Name: DTM Chk Alignment

22. Verify ***12345SURV_Surface_Existing*** is checked in the ***Surfaces*** section.



23. On the Create Profile dialog **Create Profile > Source** leaf**.**

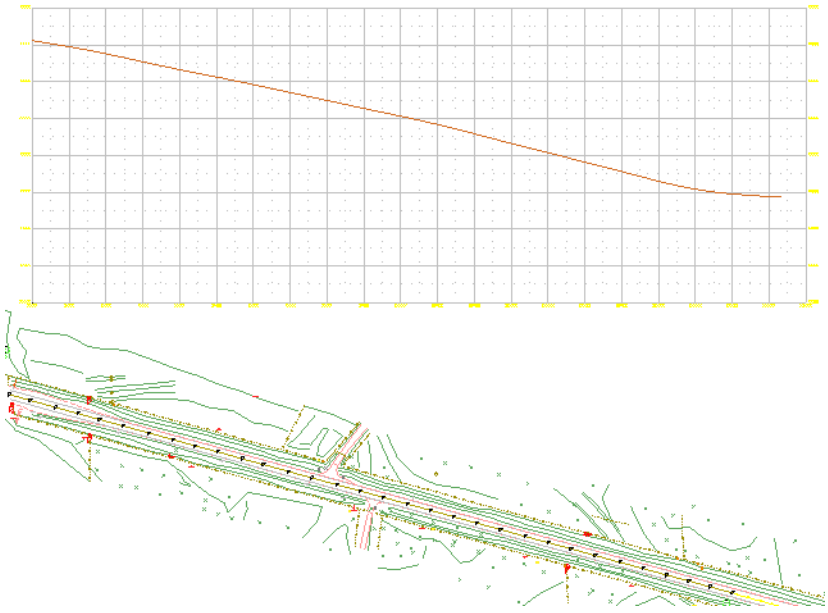
24. Set the Radio button to **Alignment**



25. **<D>** the **Apply** button. The dialog will minimize allowing you to select the location of the profile in the MicroStation view.

26. **<D>** a location in the MicroStation view to draw the profile. The ***Create Profile*** dialog will reappear and the Profile is generated.

27. Review your results.



28. Continue to generate profiles along the remainder of the centerline.

When finished:

29. Using MicroStation **Delete** button. Delete all DTM Check profiles.

Section Summary:

- In this lab a profile was created from an existing horizontal alignment to help evaluate the existing surface.

Lab 9.7 - Cross Sections

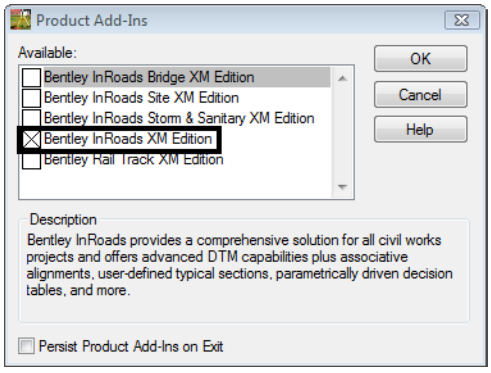
Section Objectives:

- Create a Cross Section set from an existing horizontal alignment to help evaluate the existing surface.

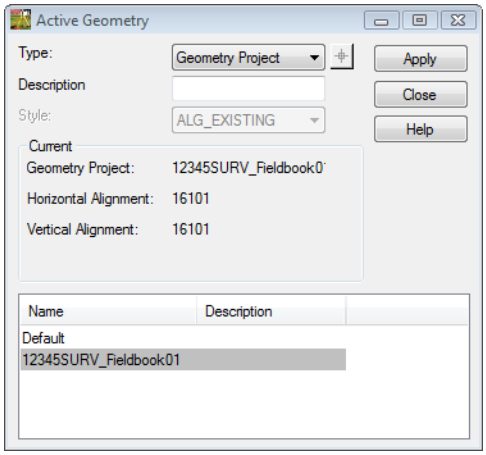
1. Open a new working MicroStation model file.
2. Open an InRoads Surface.
3. Open an InRoads Geometry Project.

   InRoads Survey only allows for multipoint profiles. To create profiles from an existing alignment InRoads needs to be added.

4. From the InRoads pull down menu select **Tools > Product Add-ins**. The ***Product Add-ins*** dialog will appear.



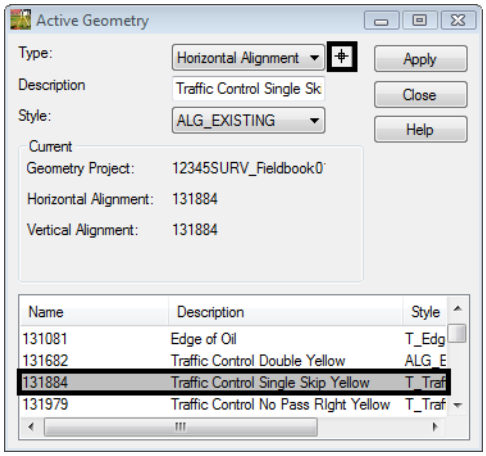
5. Select the **Bentley InRoads XM Edition** application and select the **OK** button. InRoads application will be added to the InRoads Survey interface.
6. From the InRoads pull down menu select **Geometry > Active Geometry**. The ***Active Geometry*** dialog will appear.



7. Select the ***Type:*** **Horizontal Alignment**

8. **<D>** the **Target** button. The Active Geometry dialog will minimize allowing you to select the centerline in the MicroStation view.

9. **<D>** the centerline of the road. The centerline of road will highlight and the ***Active Geometry*** dialog will reappear.

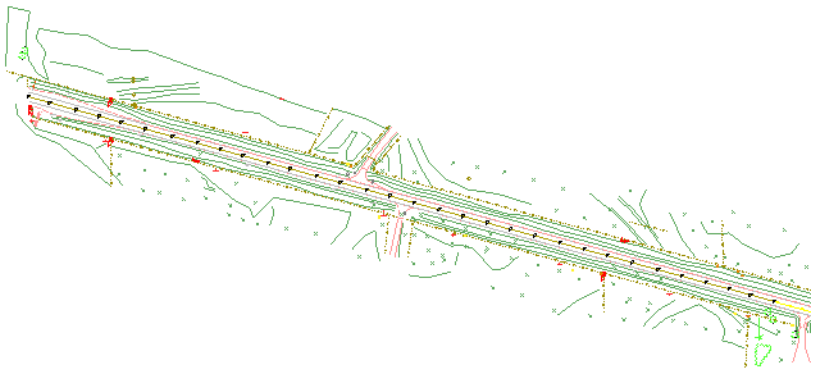


10. **<D>** the **Apply** then **Close** buttons. The Horizontal Alignment name will be active.

11. From the InRoads pull down menu select, **Geometry > Fit Alignment**.

12. **<R>** for the active alignment in the MicroStation View.

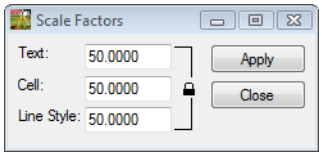
13. From the pull down menu select, **Geometry > View Geometry > Active Horizontal**



Note: The above graphic is where the profile will be extracted.

14. From the pull down menu select, **Tools > Global Scale Factors…** The ***Scale Factors*** dialog will appear.

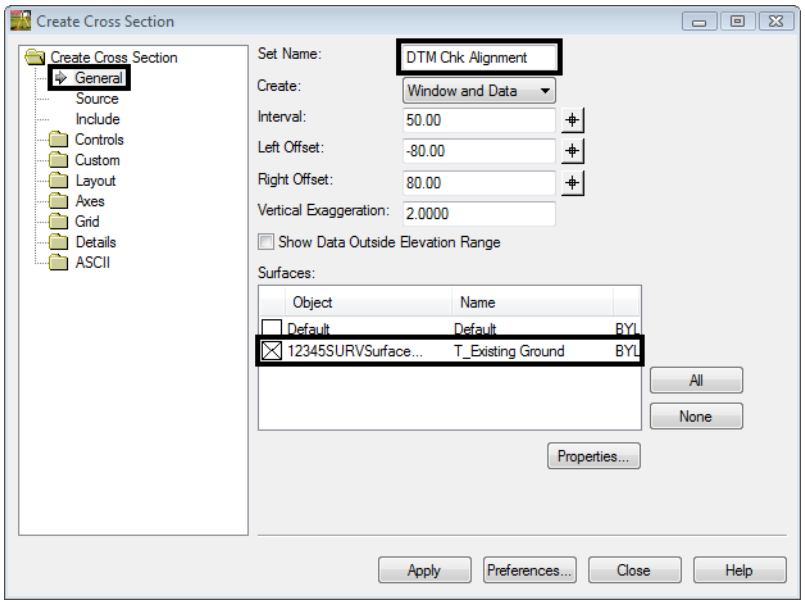
15. Key-in the scale factor ***50***



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

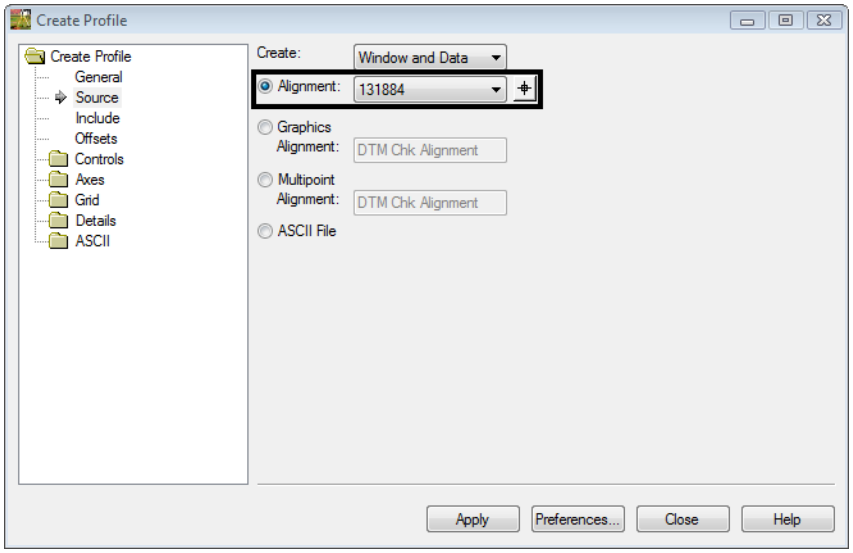
17. On the Create Cross Section dialog **Create Cross Section > General** leaf ***Set Name: DTM Chk Alignment***

18. Verify ***12345SURV_Surface_Existing*** is checked in the ***Surfaces*** section.



19. On the Create Cross Section dialog **Create Cross Section > Source** leaf**.**

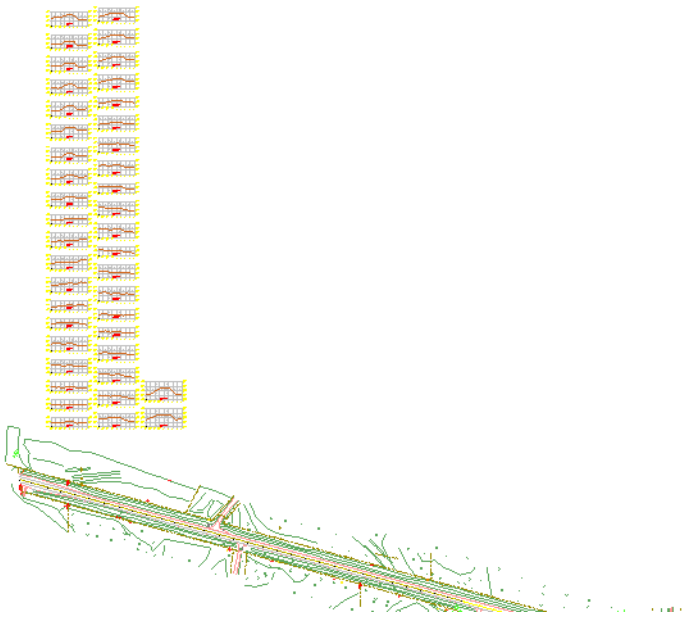
20. Set the Radio button to **Alignment**.



21. **<D>** the **Apply** button. The dialog will minimize allowing you to select the location of the profile in the MicroStation view.

22. **<D>** a location in the MicroStation view to draw the profile. The ***Create Cross Section*** dialog will reappear and the cross sections will be generated.

23. Review your results.



Section Summary:

- In this lab a cross section set was created from an existing horizontal alignment to help evaluate the existing surface.

Lab 9.8 - Survey

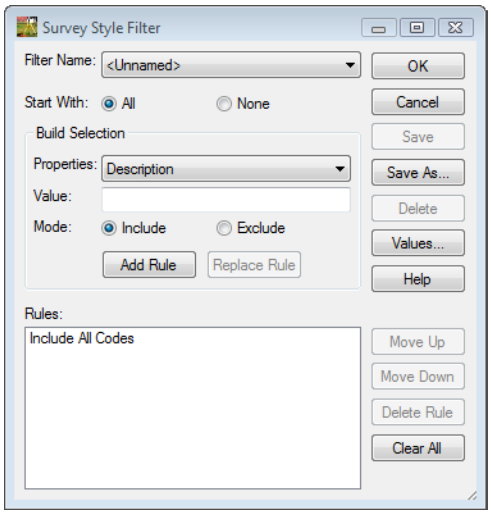
Survey Feature Filters

The geometry project ***12345SURVGeometry01*** contains horizontal and vertical alignments for every linear item that was surveyed. Additionally the Cogo buffer contains points for every survey shot collected. While this may be desirable information, often it is desirable to work with a subset of the survey information such as pavement center lines, control lines, or other specific entities. Working with a subset of the information increases efficiency by working with a smaller data set and freeing-up additional computer memory for other operations. This can be accomplished by using Survey Feature Filters when exporting survey data (Fieldbook) to a geometry project.

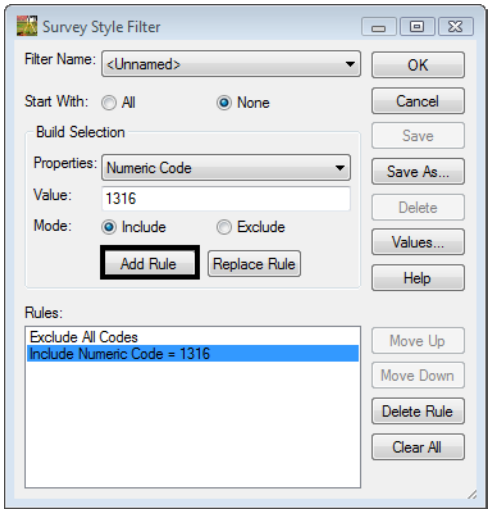
Section Objectives:

- The goal is to have a geometry project that contains only the information important to establishing the centerline of the existing road.
- The use of survey style filters will assist in sorting the data.

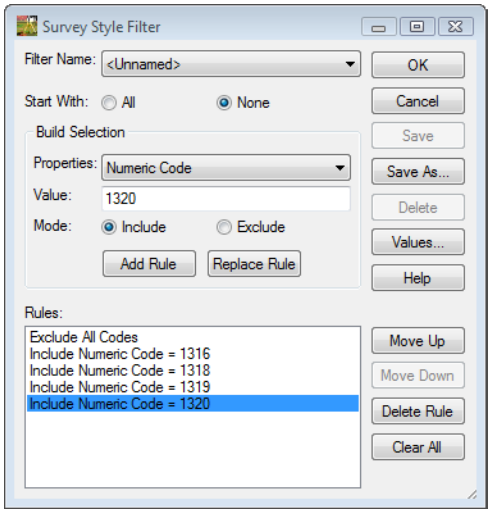
1. Open a new working MicroStation design file.
2. Open an InRoads Survey Fieldbook.
3. From the pull down menu select **Survey > Survey Style Filter**. The ***Survey Style Filter*** dialog will appear.



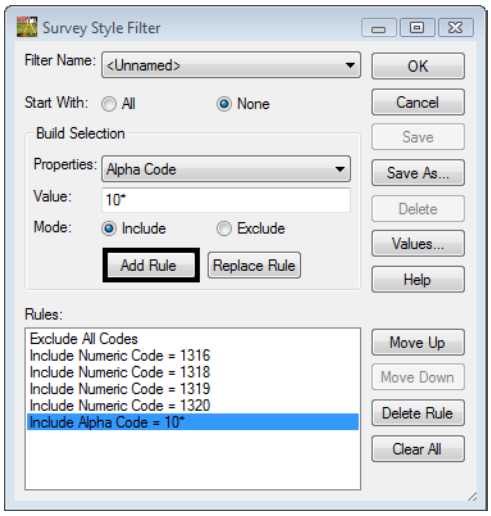
4. Toggle the radio button ***Start With:*** **None**
5. Select ***Properties:*** **Numeric Code**
6. Key-in the ***Value:*** ***1316***
7. Toggle the radio button ***Mode:*** **Include**



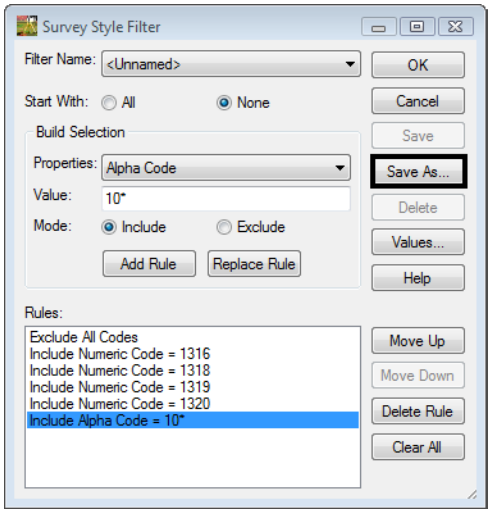
8. **<D>** the **Add Rule** button. The rule will be added to the Rules List.
9. Add additional numeric rules for:
   - ***1318***
   - ***1319***
   - ***1320***



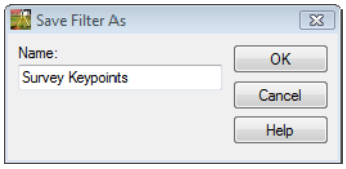
10. Select ***Properties:*** **Alpha Code**
11. Key-in the ***Value:*** ***10****
12. Toggle the radio button ***Mode:*** **Include**



13. **<D>** the **Add Rule** button. The rule will be added to the Rules List.
14. **<D>** the **Save As** button. The ***Save Filter As*** dialog will appear.



15. Key-in the ***Name:*** ***Survey Keypoints***



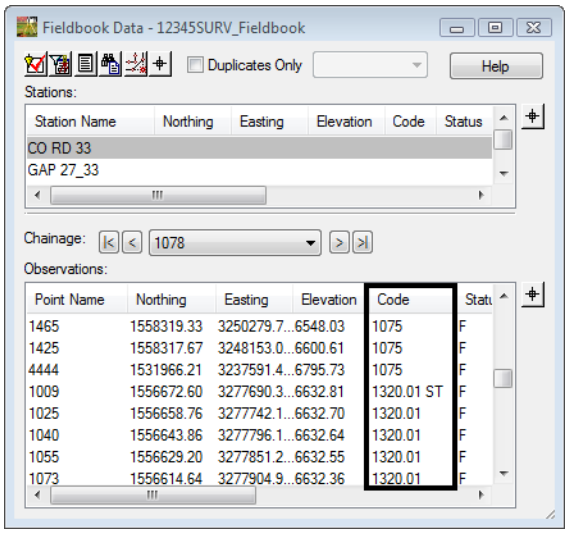
16. **<D>** the **OK** button in the ***Save Filter As*** dialog.

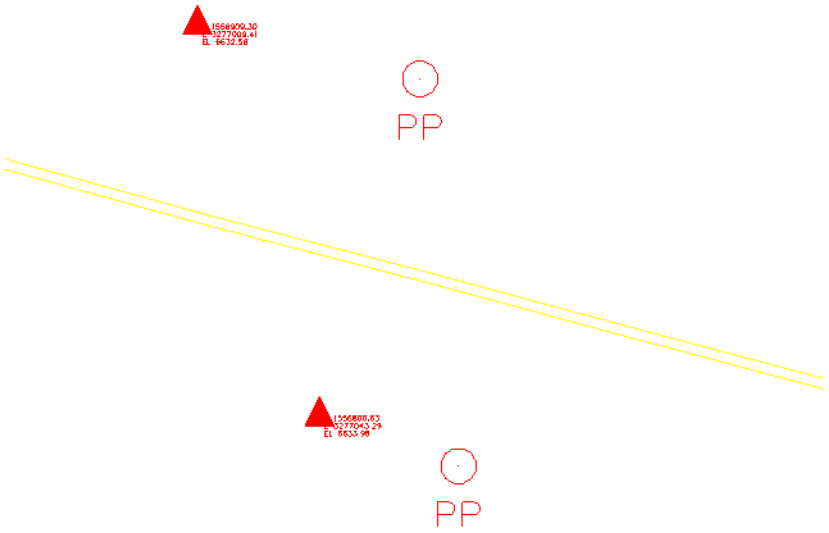
17. **<D>** the **OK** button. The ***Survey Feature Filter*** dialog will close.

    Note: The Survey Feature Filter just built is for filtering information contained in a Survey Fieldbook and gets saved in the Survey Feature Table (fwf) file vs. in the InRoads Civil.ini file as Feature Filters do. Therefore, it gets applied within the Fieldbook and not in the InRoads Feature Filter interface. However the Filter Lock needs to be turned on in the InRoads Locks toolbar for it to be active.

18. On the Locks toolbar, toggle **ON** the **Feature Filter Lock**

Note: Notice that 2 things happen, the Fieldbook Data dialog will update to display only the data that passes the filter. Also the MicroStation display will only display survey data that passes the filter.





Section Summary:

- In this lab a survey style filter was created to only export data from the fieldbook to a Geometry Project that pertained to reestablishing the mainline.

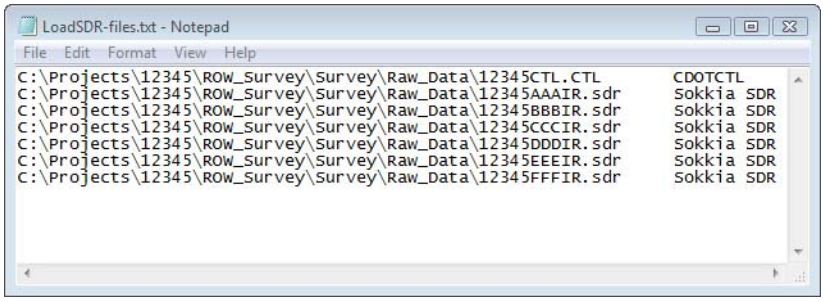
Lab 9.9 - Importing multiple files

To speed up the process of importing multiple files you can create a Group file. This.is a simple text file that points to the file location and import wizard to use. When it is available these are the steps for using Group Files on import.

Section Objectives:

- Import multiple Sokkia SDR files as one into InRoads Survey using a Group of files ASCII file.

1. From the pull-down menu, select **File > Import > Survey Data**. The ***Import*** dialog will open.
2. Change the drop-down arrow ***Files of type:*** **Group of Files (*.*)**
3. Path to the folder ***C:\Projects\12345\ROW_Survey\Survey\Raw_Data***
4. Select the file ***LoadSDR_files.txt*** from the unfiltered list of files.
   - The Group of files option is a handy way to load multiple files at one time. The file is a simple ASCII text file that shows the file location and import type. Below is a screen shot of the file opened in Notepad. This file would need to be created prior to using it on a different project.



5. In the ***Import*** dialog **<D>** the **Import** button.
6. **<D>** the **Close** button. All the files listed in the text file will be imported.

Section Summary:

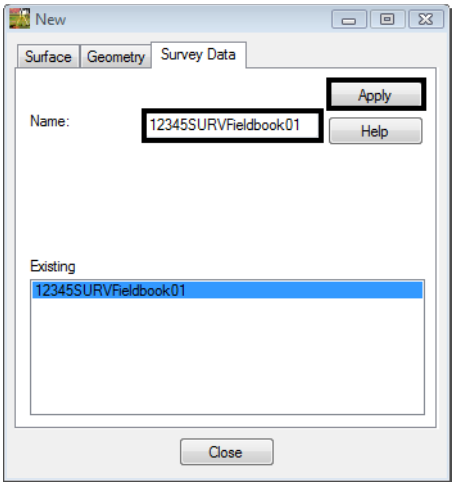
- In this lab a Group of SDR files were imported at one time using an existing ASCII.

Lab 9.10 - Metric Survey Data to Imperial Survey Data

Section Objectives:

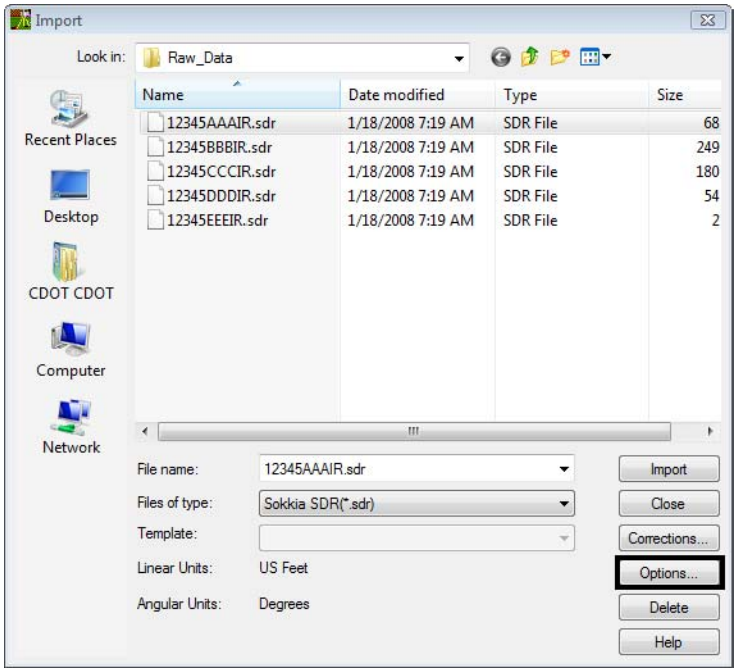
- To convert an existing InRoads Survey fieldbook file units from Metric to US Feet.

1. Open a new working MicroStation model file.
2. Once MicroStation and InRoads Survey opens. From the InRoads pull-down menu, select **File > New.** The New dialog will appear.



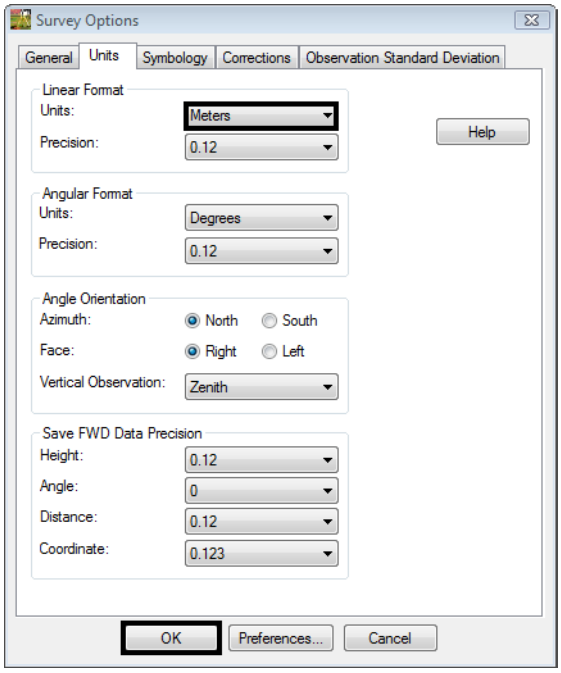
3. Select the **Survey Data** tab.
4. Key in the ***Name: 12345SURVFieldbook01***
5. Select the **Apply** button. The new fieldbook will appear below.
6. **<D>** the **Close** button.
7. From the Workspace bar the ***12345SURVFieldbook01*** should be active.
8. From the pull-down menu, select **File > Import > Survey Data**. The ***Import*** dialog will open.
9. Path to the ***Look in: C:\Projects\12345\ROW_Survey\Survey\Raw_Data***

10. Verify the ***Files of type:*** **Sokkia SDR (*.sdr)**



11. **<D>** the **Options** button.

12. Select the **Units** tab.
13. Change the ***Linear Format Units:*** **Meters**

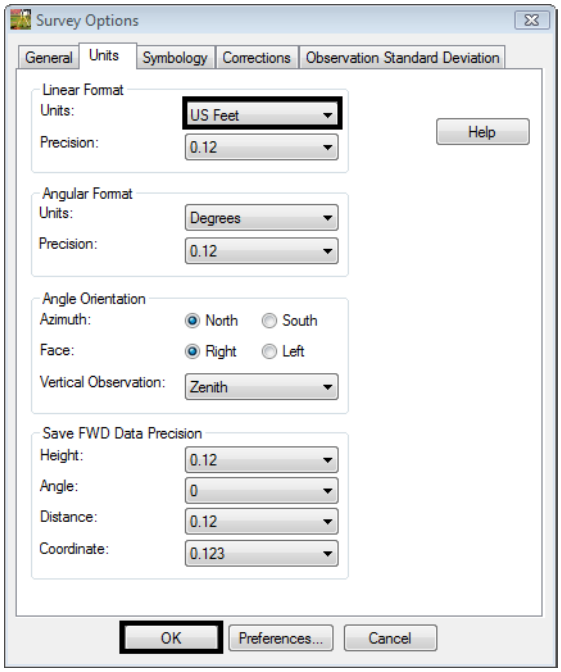


14. **<D>** the **OK** button. The ***Survey Options*** dialog will close.
15. In the Import dialog select the data collector file you will be importing.
16. **<D>** the **Import** then **Close** buttons.
17. From the pull-down menu, select **Survey > Fieldbook Data**. Take a minute to review the imported Survey control data that is now contained in the electronic Fieldbook.

18. From the pull-down menu, select **Tools > Survey Options** the ***Survey Options*** dialog will appear.

19. Select the **Units** tab.

20. Change the ***Linear Format Units:*** **US Feet**



21. **<D>** the **OK** button. The ***Survey Options*** dialog will close.

22. From the pull-down menu, select **Survey > Fieldbook Data**. Take a minute to review the transformed Survey data that is now contained in the electronic Fieldbook.

Note: The file has now been converted to US Feet Units.

23. From the pull-down menu, select **File > Save > Survey Data** the ***Save As*** dialog will appear.

24. **<D>** the **Save** and **Cancel** buttons. The **Save As** dialog will close.

Section Summary:

- In this lab an existing Metric fieldbook file was converted to US Feet units.

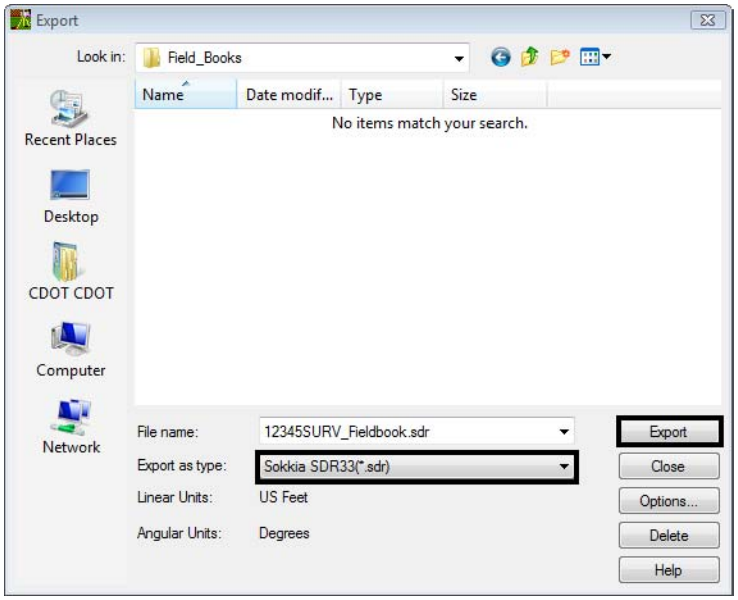
Lab 9.11 - Exporting Survey Data to Sokkia SDR file

Exporting the fieldbook out to a SDR format would be required if you wanted to use the points and stake them out in the field.

Section Objectives:

- Create a Sokkia SDR file format file from the InRoads Survey fieldbook.

1. Verify the ***12345SURV_Fieldbook*** fieldbook you want to export is active. You can tell which fieldbook is active by the red box around the fieldbook button.
2. From the pull-down menu, select **File > Export > Survey Data**. The ***Export*** dialog will appear.
3. Change the directory to:
   C:\Projects\12345\ROW_Survey\InRoads\Field_Books
4. Select the down arrow for ***Export as type:*** review the available file formats available.
5. Select from the list ***Export as type:*** **Sokkia SDR33 (*.sdr)**
6. Key-in the new file name ***12345SURV_Fieldbook.sdr***



7. **<D>** the **Export** button. The ***Export*** dialog will close.
8. Open **Windows Explorer** ***Windows + E***
9. Open and review the file in Notepad.
   C:\Projects\12345\ROW_Survey\InRoads\Field_Books\ 12345SURV_Fieldbook.sdr

Note: This file is ready to be uploaded into the data collector. If you need to import this file back into InRoads Survey for any reason you will need to add survey header information into file.

Section Summary:

- In this lab a Sokkia SDR file was created using the Export as type tool.

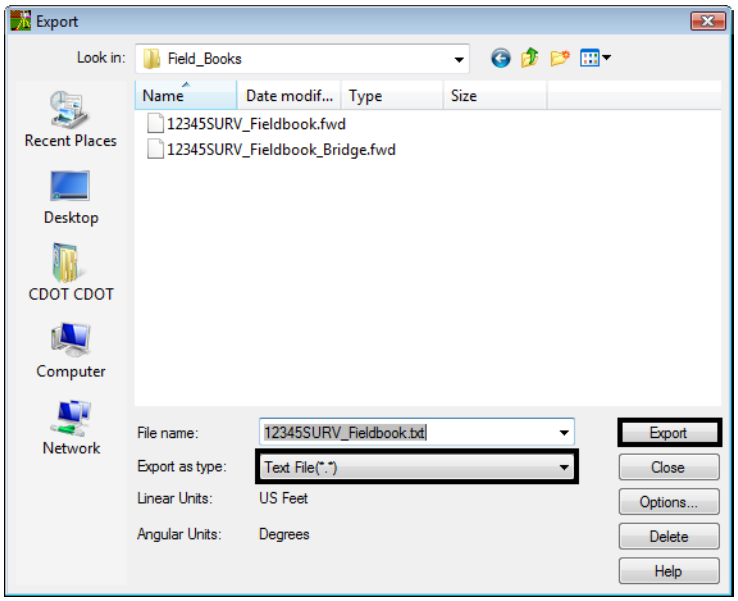
Lab 9.12 - Exporting Survey Data using Text Export Wizard

Exporting the fieldbook out to another format would be required if you wanted to use the points and stake them out in the field.

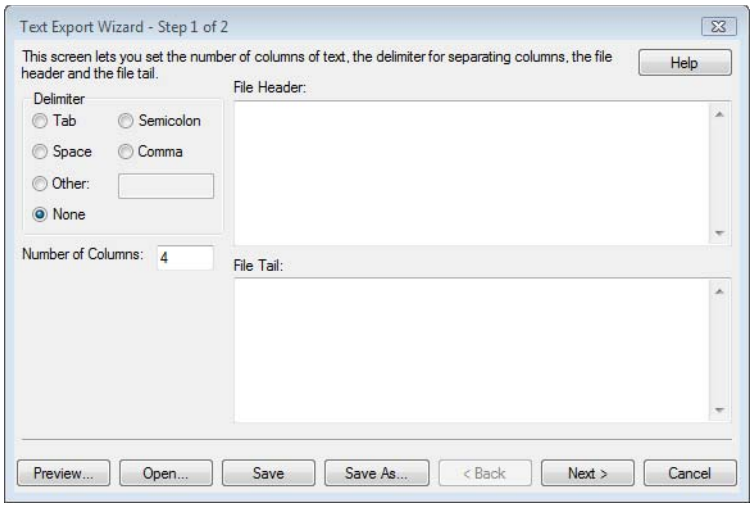
Section Objectives:

- Create a customized exported ASCII file from the InRoads Survey Fieldbook using Text Export Wizard.

1. Verify the ***12345SURV_Fieldbook*** fieldbook you want to export is active. You can tell which fieldbook is active by the red box around the fieldbook button.
2. From the pull-down menu, select **File > Export > Survey Data**. The ***Export*** dialog will appear.
3. Change the directory to:
   C:\Projects\12345\ROW_Survey\InRoads\Field_Books
4. Select the down arrow for ***Export as type:*** review the available file formats available.
5. Select from the list ***Export as type:*** **Text File (*.*)**
6. Key-in the new file name ***12345SURV_Fieldbook.txt***



7. **<D>** the **Export** button. The ***Export*** dialog will close and the ***Text Export Wizard*** dialog will appear.

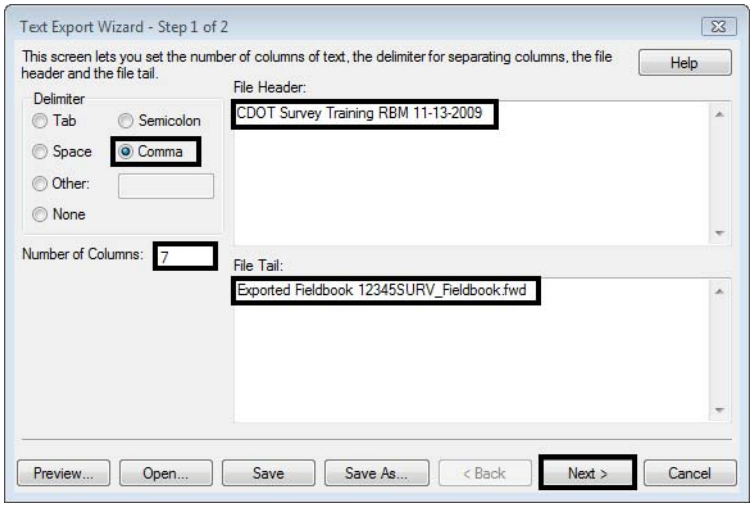


8. **<D>** the radio button **Comma**

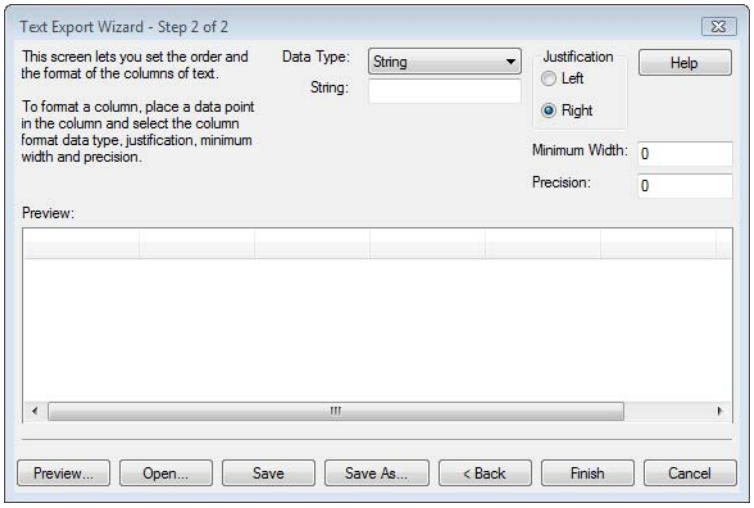
9. Key-in ***Number of Columns: 7***

10. Key-in ***File Header: CDOT Survey Training "Initials" "Date"***

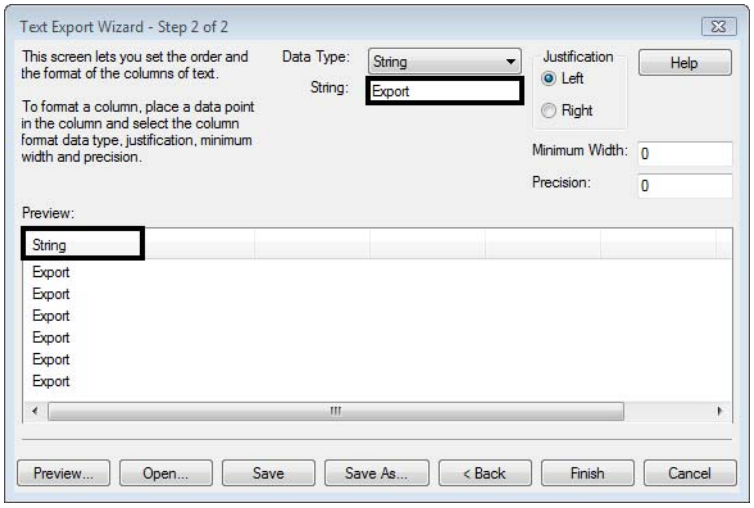
11. Key-in ***File Tail: Exported Fieldbook 12345SURV_Fieldbook.fwd***



12. **<D>** the **Next >** button. The final ***Step 2 of 2*** dialog will appear.



13. **<D>** the header of the **first column**. The column will highlight as shown below.
14. From the ***Data Type*** radio button select ***String: Export***
15. In the ***Justification*** section of the dialog set the radio button to **Left**



16. **<D>** the **second column** header then select **Point Name** from the Data Type radio button.
    - ***Justification:*** **Left**
17. Select the third column header then select **Northing** from the Data Type radio button.
    - ***Justification:*** **Left**
    - ***Precision: 2***

18. Select the fourth column header then select **Easting** from the Data Type radio button.

    - ***Justification:*** **Left**
    - ***Precision:*** ***2***

19. Select the fifth column header then select **Elevation** from the Data Type radio button.

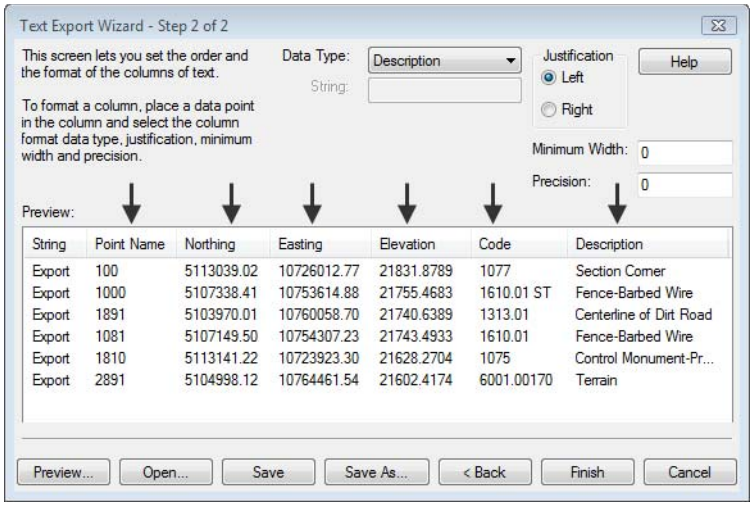
    - ***Justification:*** **Left**
    - ***Precision:*** ***4***

20. Select the sixth column header then select **Code** from the Data Type radio button.

    - ***Justification:*** **Left**

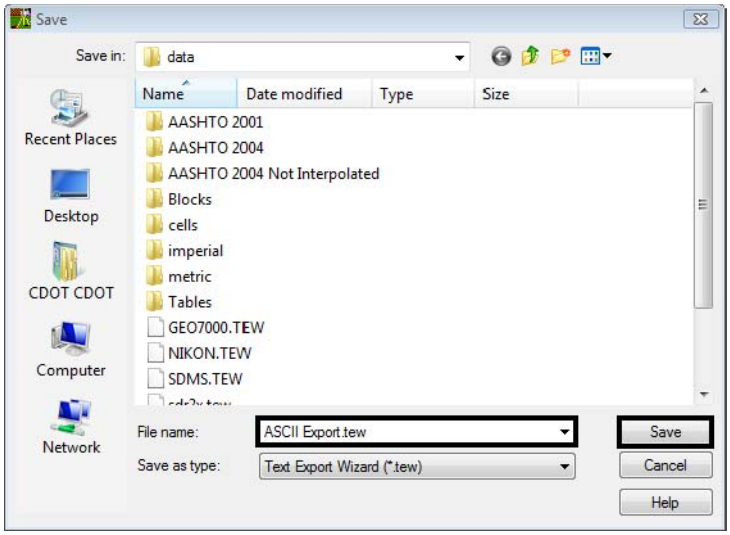
21. Select the seventh column header then select **Description** from the Data Type radio button.

    - ***Justification:*** **Left**



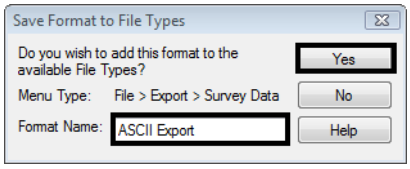
22. **<D>** the **Save As** button. The ***Save As*** dialog will appear.

23. Key in ***File name: ASCII Export.tew***



24. **<D>** the **Save** button. The ***Save As*** dialog will close.

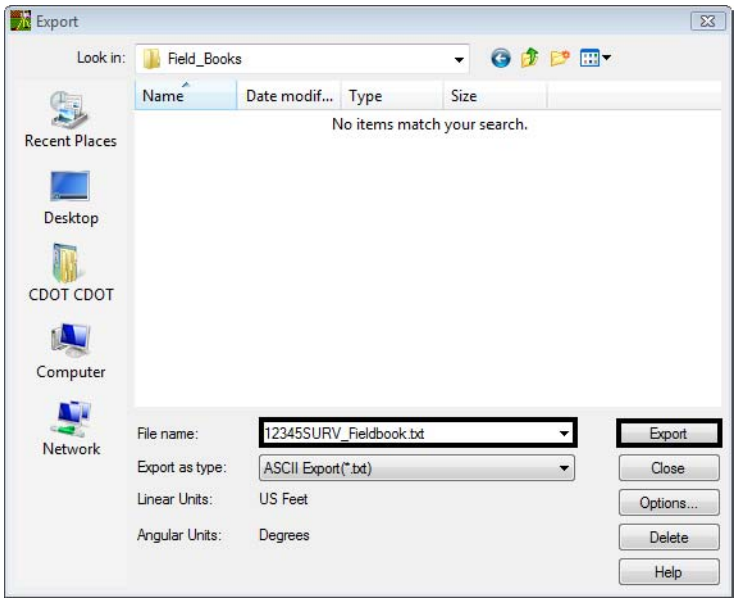
25. The ***Save Format to File Types*** dialog will appear. Verify ***Format Name: ASCII Export***



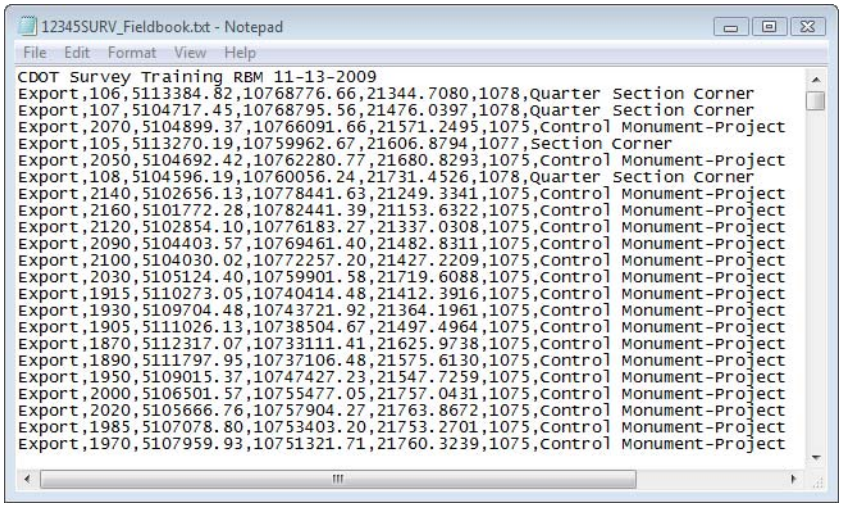
26. **<D>** the **Yes** button. The ***Save Format to File Types*** dialog will close and the ***Step 2 of 2*** dialog will reappear.

27. In the ***Step 2 of 2*** dialog **<D>** the **Cancel** button. The ***Step 2 of 2*** dialog will close.

28. From the pull down menu select, **File > Export > Survey Data**
29. In the Export dialog change the ***Export as type: ASCII Export (*.txt)***
30. Path to the directory: ***C:\Projects\12345\ROW_Survey\InRoads\Field_Books***



31. File name ***12345SURV_Fieldbook.txt***
32. **<D>** the **Export** button. The ***Export*** dialog will close.
33. Open ***Windows Explorer*** **Windows + E**
34. Open and review the file created in Notepad.
C:\Projects\12345\ROW_Survey\InRoads\Field_Books\12345SURV_Fieldbook.txt

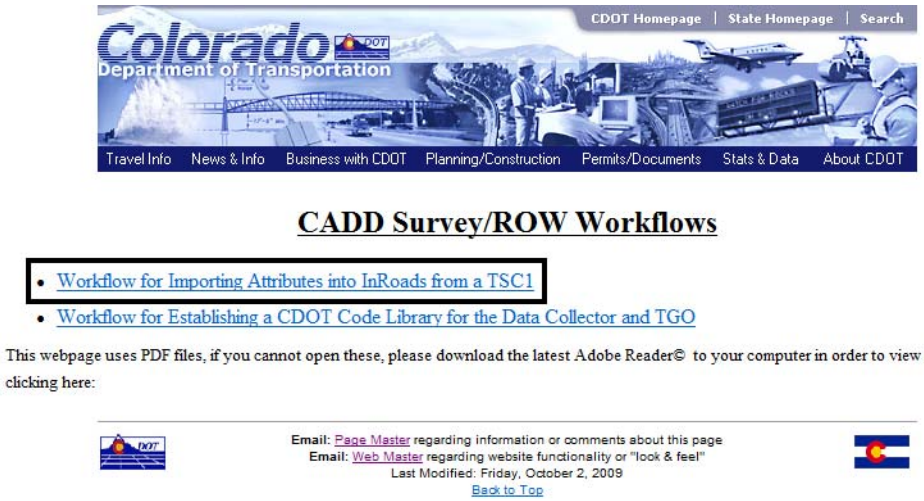


Section Summary:

- In this lab the Text Export Wizard was used to create a customized ASCII file from an open InRoads Survey Fieldbook.

Lab 9.13 - Exporting DC File from TGO

The workflows for exporting a DC file that will include the notes and attributes can be found on the CDOT CADD Library web page.



Lab 9.14 - Merging InRoads Survey Fieldbook files

When a project is using more then one fieldbook for a particular job it is possible to merge those fieldbook files together.

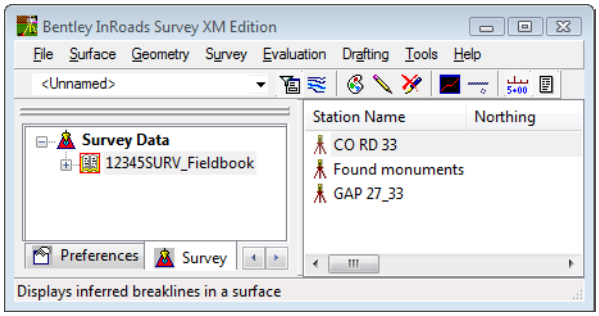
Items to address prior to merging fieldbooks:

- There can not be duplicate point names between the fieldbooks.
- If you are using figure strings make sure they are not going to conflict with the figure strings in the other fieldbook.

Section Objectives:

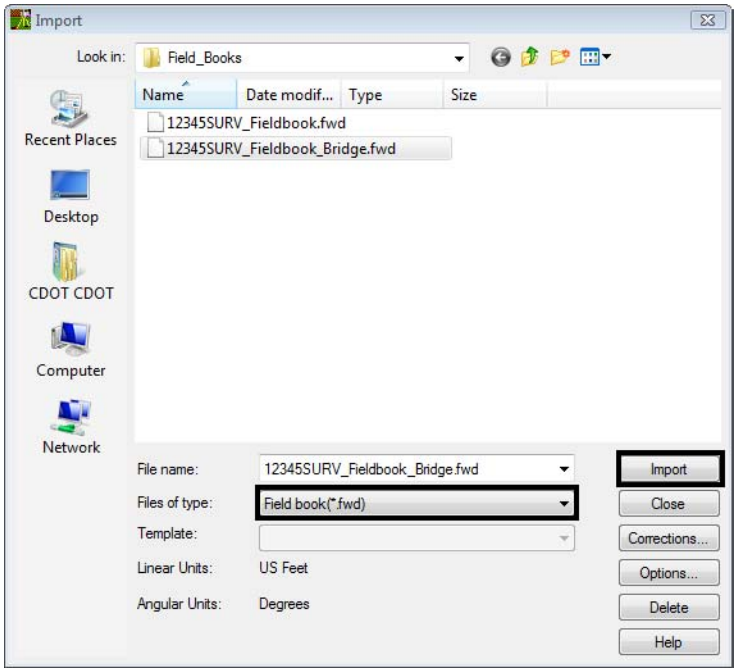
- Merge two existing InRoads Survey Fieldbook files into one InRoads Survey Fieldbook file using the Import FWD tool.

1. Open a new working MicroStation model file.
2. Open an InRoads Survey Fieldbook.



3. From the InRoads pull down menu select **File > Import > Survey Data** The ***Import*** dialog will appear.
4. Select the ***Files of type:*** **Field book (*.fwd)**

5. Select the fieldbook name you want to import.



6. **<D>** the **Import** then **Close** buttons. The fieldbook files are now merged.

Section Summary:

- In this lab we merged two InRoad Survey Fieldbook files into one fieldbook file.

Index