Labs for MicroStation V8i
Select Series 2

Colorado Department of Transportation

CADD and Engineering Innovation
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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:

Cad Productivity Incorporated
PO Box 281195
Nashville, TN 37228
www.cadprodinc.com

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

BSF
9200 W. Cross Drive
Suite 605
Littleton, CO 80123
www.bsf-inc.com

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Software Versions

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

MicroStation® version 0811.07.443
InRoads® version 08.11.07.428
CDOT Configuration Version 05.00.00

Document Conventions

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

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

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LAB 1 - Getting Started in MicroStation

Chapter Objectives:

After completing this exercise you will know how to:

- Start MicroStation
- Open a MicroStation design file
- Use the MicroStation mouse buttons
- Navigate the MicroStation interface
- Use the **View Control** commands
- Assign view controls to the mouse wheel
- Float and dock toolbars
- Show and hide tools on toolbars
- Access the MicroStation Key-in box

Lab 1.1 - Starting MicroStation

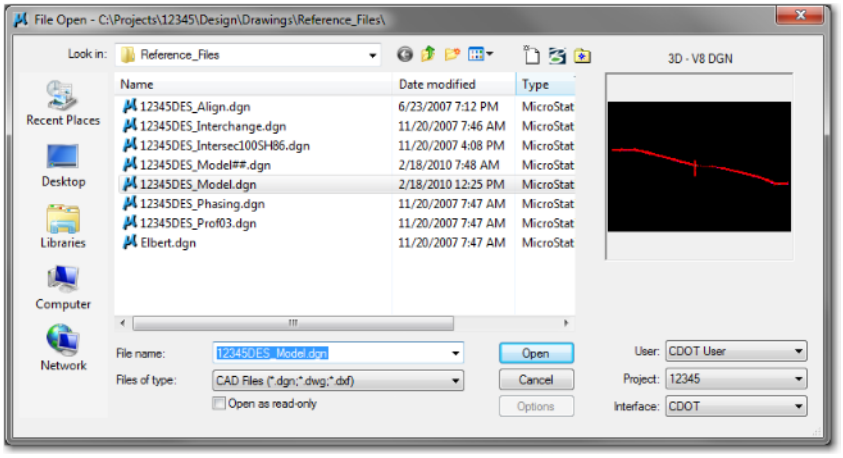
To start MicroStation:

1. Select **Start >All Programs > Bentley > MicroStation V8i (SELECTseries 2) > MicroStation V8 XM Edition**

   or

   Double-click on the **MicroStation V8i (SELECTseries 2)** icon located on your desktop.

   MicroStation will start and the **MicroStation Manager** dialog box will appear on your screen.



Lab 1.2 - The MicroStation Manager Dialog Box

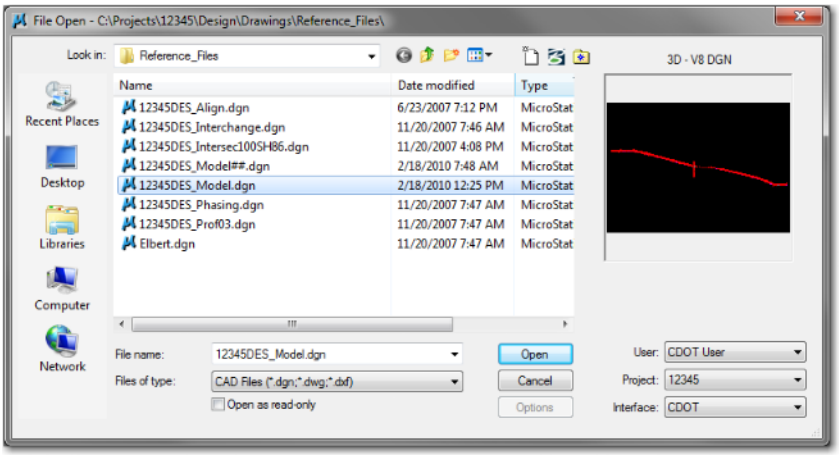
The **MicroStation Manager** is your file management interface in MicroStation. It allows you to create, rename, delete, and open files as well as set workspace parameters. Within MicroStation Manager the user will set three important components: User, Project, and Interface. Setting these components allow you to more easily access the project directory structure and customize the MicroStation interface.

Note: Do not press **<Enter>** after you key data in a dialog box unless you are ready to apply the settings. Use the **<Tab>** key or your mouse cursor to move from one field to the next to choose or enter your setup options before you **Apply** or **OK** the command.

Opening files

1. In the lower right-hand portion on the dialog box set the three components as shown below
   - User: **CDOT User**
   - Project: **12345**
   - Interface: **CDOT**

   Note: The Project option automatically sets the directory to **C:\Projects\12345.** You'll lean more about the project configuration file (**PCF**) in chapter 4.
2. In the **MicroStation Manager**, navigate to **\Design\Drawings\Reference_Files** folder.
3. Highlight **12345DES_Model.dgn** as the design file to open.
4. A thumbnail preview of the file is shown.
5. Select **Open** to open the design file.
6. This is a design model file of CDOT project SH 86, which will serve as the example project for this class as well as other CDOT training classes.



Note: The CDOT Menu opens automatically. You'll use this menu later. For now, minimize or close the CDOT menu.

Lab 1.3 - Working with the Mouse

While in MicroStation, your mouse operations include:

<D> Data (usually the ***left*** button) for selecting tools, highlighting fields, moving dialog boxes, confirming actions, etc.

<R> Reset (usually the ***right*** button) for terminating commands, rejecting actions, etc.

<T> Tentative (usually the ***middle*** button or scroll wheel) for snapping to existing elements at exact locations.

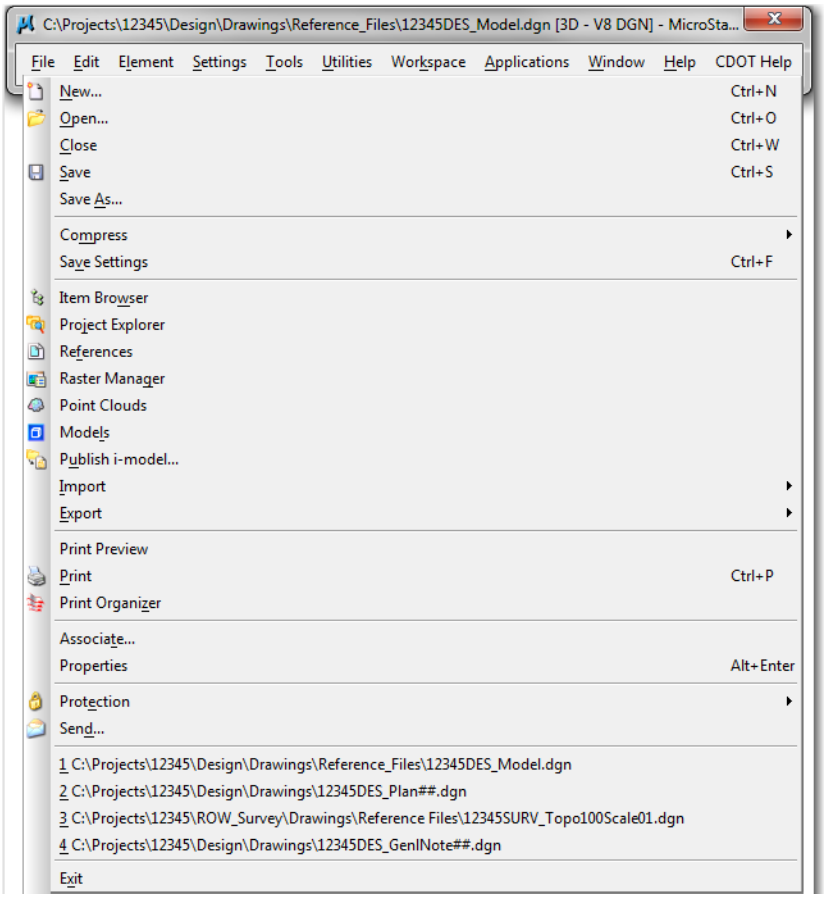
Lab 1.4 - Access Pull-Down Menus

Use pull-down menus to select settings and non-drawing commands from the application window. You can either post a menu (display it until you select a function from the menu) or open the menu and select a command all in one step.

Post a pull-down menu from the command window

1. Point your cursor to **File** in the application window and select it by **clicking** the data point once **<D>.**

   - The pull-down menu appears.

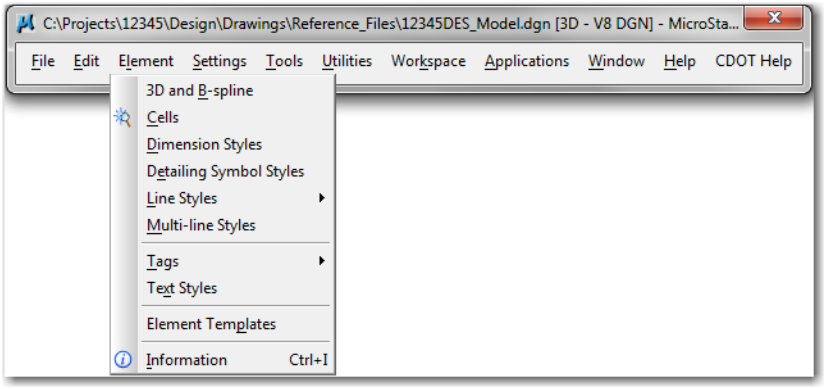


- Menu names followed by **...** indicate a dialog box will open when you select the item.
- Names with an arrow to the right indicate there is a sub-menu associated with the item.
- You can also use the keyboard to select a command from a menu.
- The bottom portion of the file menu will display a file history allowing the user to open previously opened files more easily.

2. Use the up and down arrow keys on your keyboard to move up and down an item list or move your cursor.

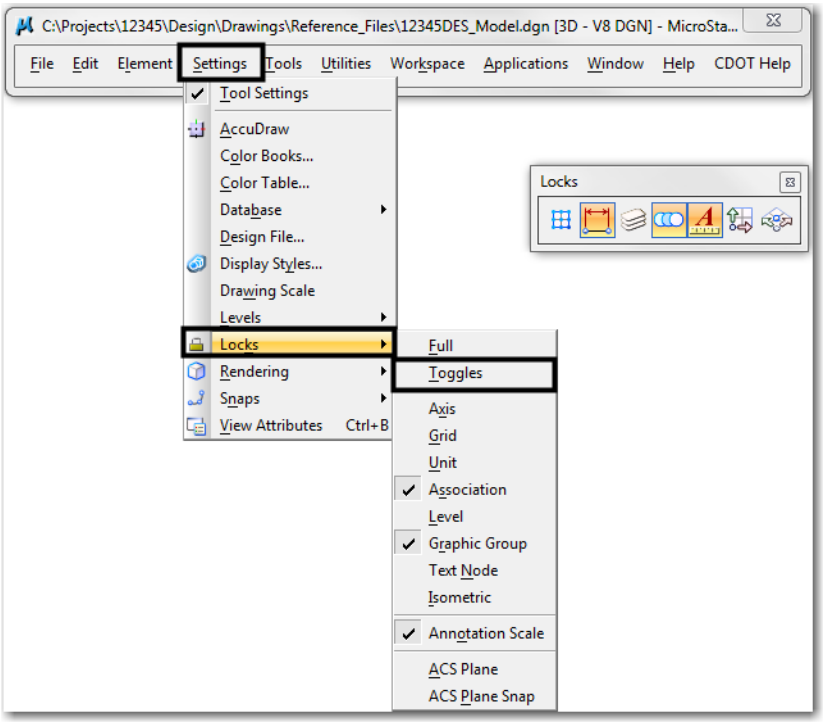
   - Text to the right of an item indicates the hot key or shortcut to use to activate the command (e.g., **Ctrl+N** means to hold down the **Ctrl** key and type **N**).
   - Underlined letters indicate a shortcut key to choose an item from a menu.

3. Move your cursor to **Element** to show the element pull-down menu.



Lab 1.5 - Open a Settings Box

1. Select **Settings > Locks > Toggles** to open the **Locks** settings box.



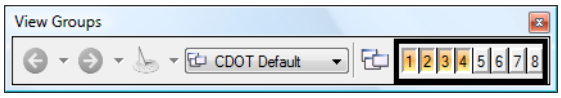
Note: A settings box, like the Locks box, does not have any command buttons (**OK**, **Close**, etc.). Settings boxes can be left open while working in MicroStation.

2. **Close** the Locks settings box by selecting the **X** in the upper right hand corner.

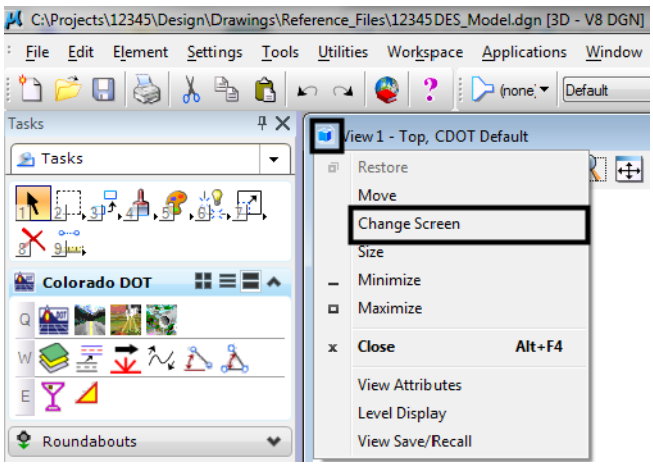
Lab 1.6 - Control Views

Turn on additional views

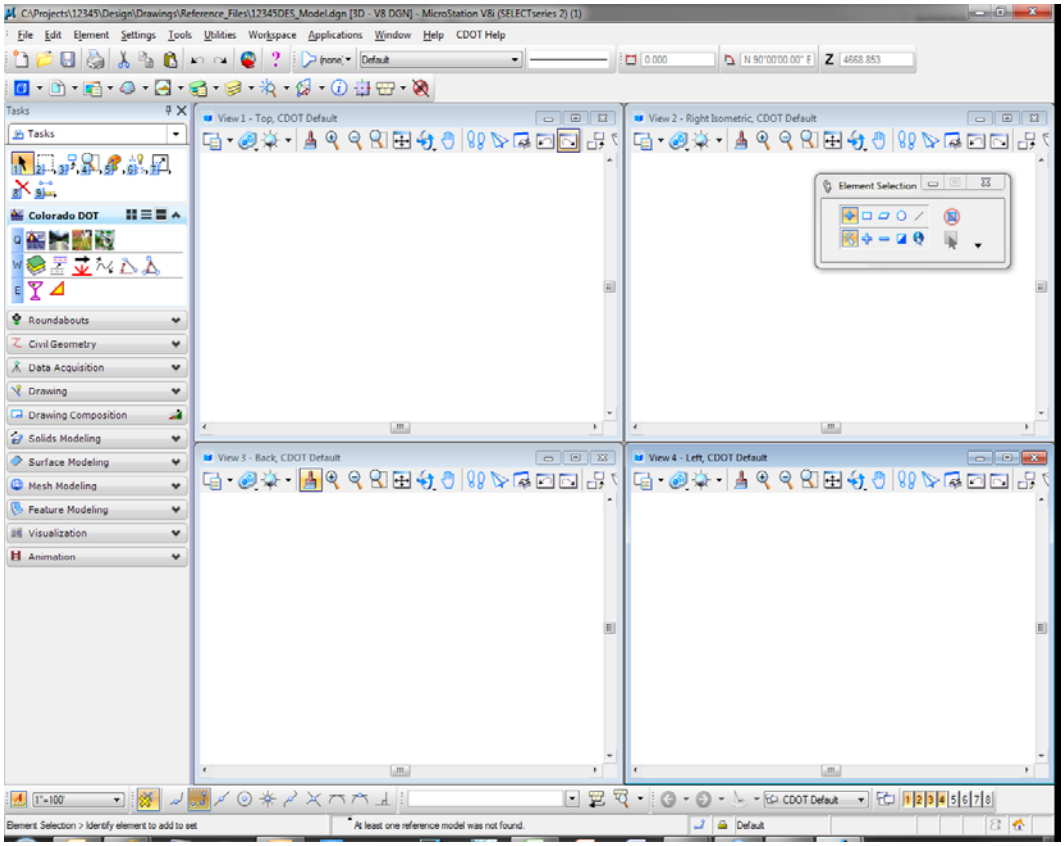
1. From the **View Toggles** box (lower left of the screen), toggle ***on*** views **2**, **3** and **4. <D>.**



Note: By default, views 1-4 open in screen 1, views 5-8 open in screen 2. To move a view to a different screen, select the "M" icon on the left side of the view title bar and choose **Change Screen**.

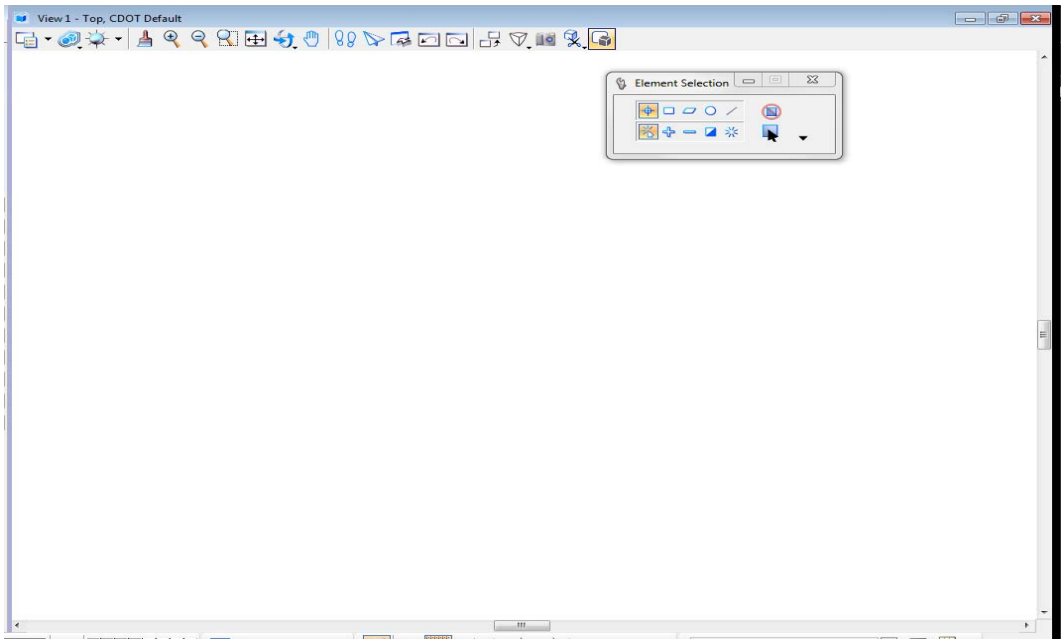


2. Select **Window > Tile** to arrange the views.

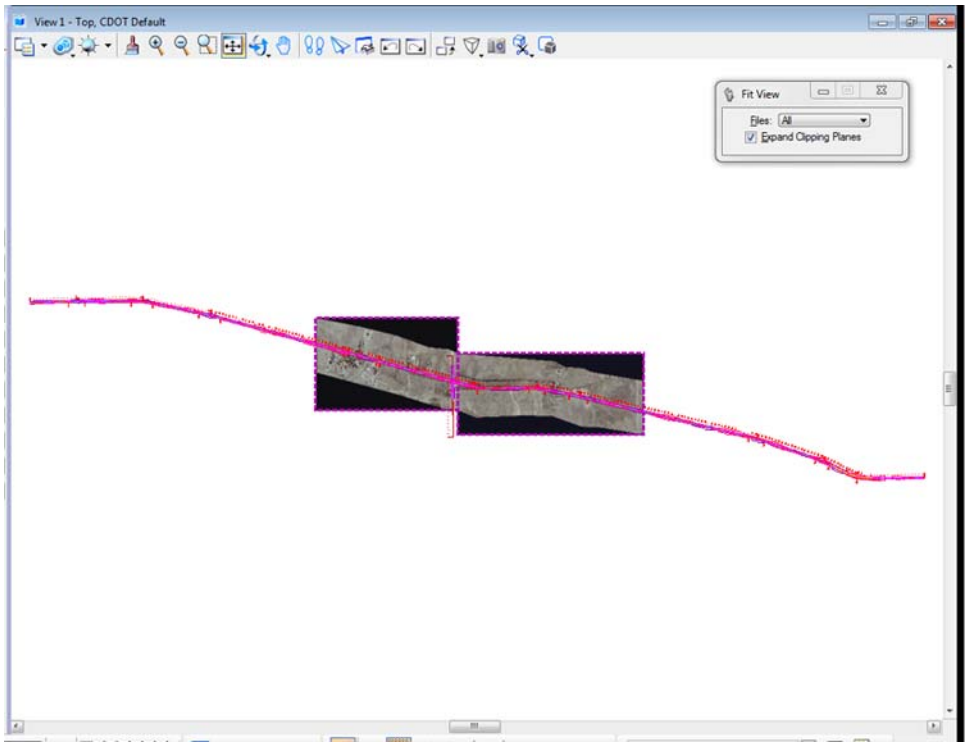


Fit View 1

1. From the View Control toolbar in View 1, select **Fit View**.

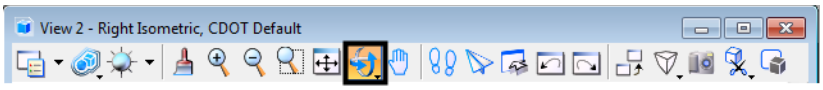


All of the plan view graphics appear in the view.

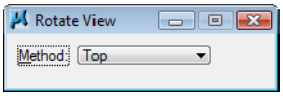


Rotate all views to top

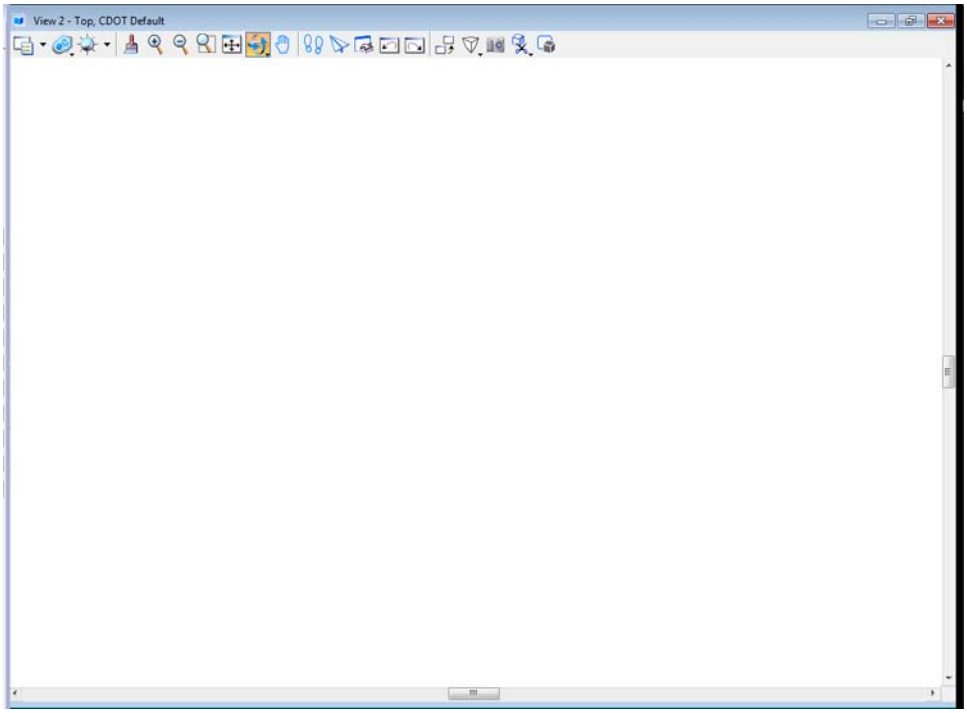
1. From the **View Control** toolbar in View 2 select **Rotate View.**



2. In the **Rotate View** tool settings box, set **Method** to **Top**.

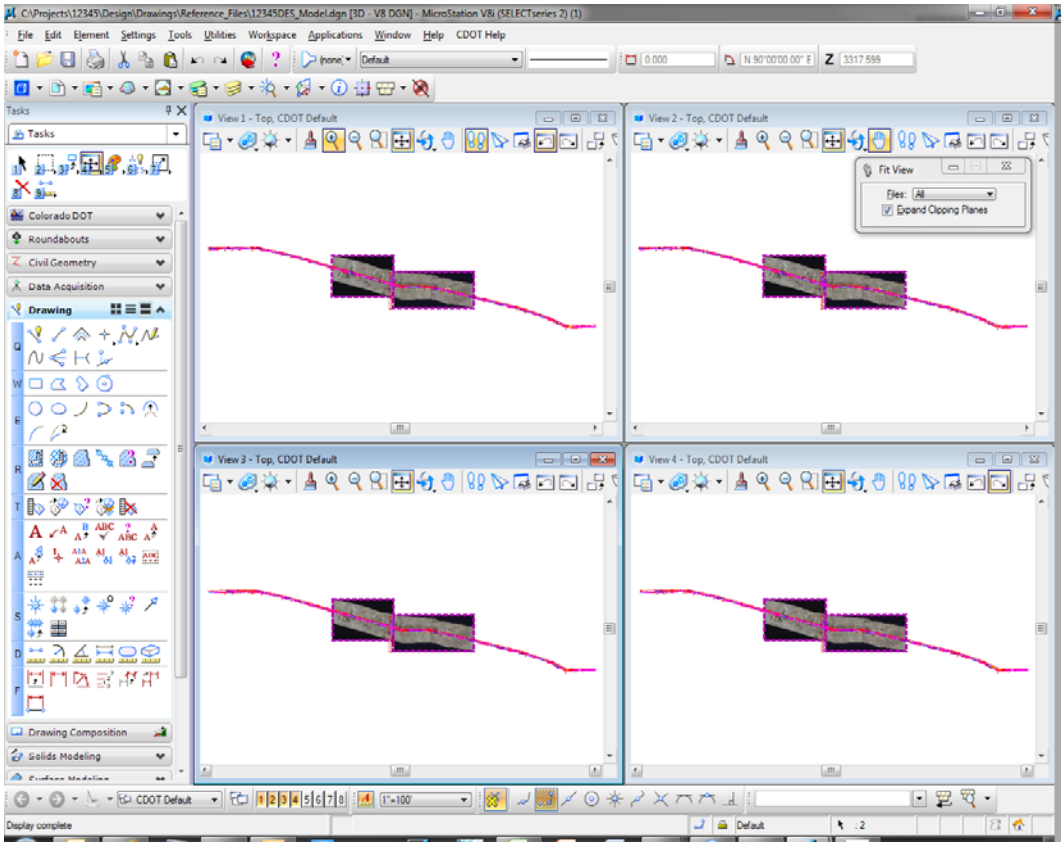


3. **<D>** in View 2 to change it to a top view (verify the view name is Top).



4. **Fit** view 2.

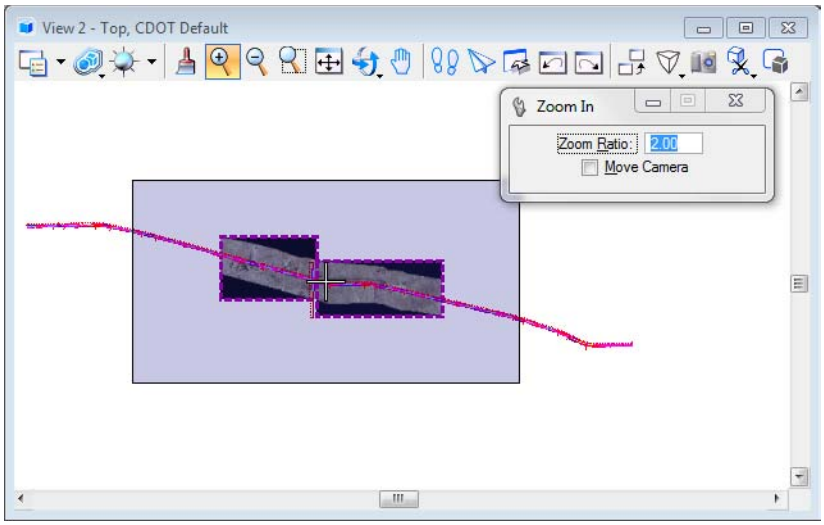
5. Repeat the above steps to rotate views 3 and 4 to a **Top** view and **Fit** the views.



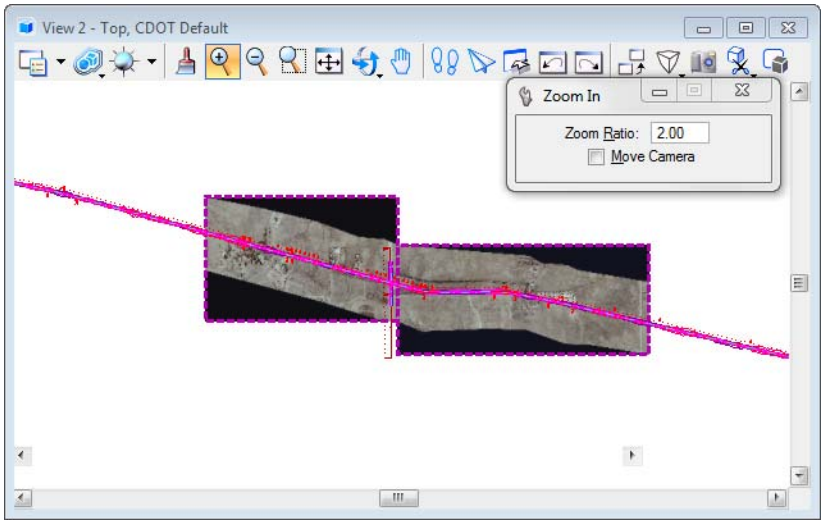
Zoom In within a view

1. From the **View Control** toolbar in View 2, select **Zoom In.**

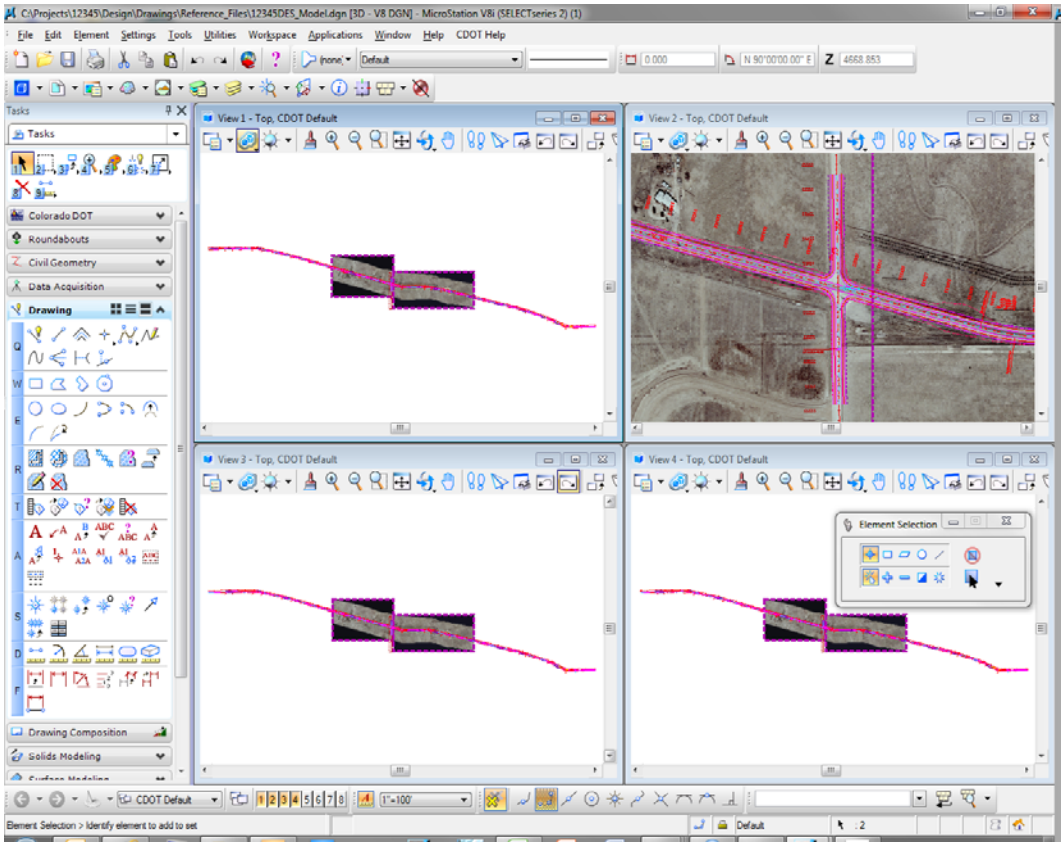
2. Place your cursor (the **X cross-hair**) in the center of the intersection and place a data point **<D>**.



The view is updated to **Zoom In** twice as close. The center of the view is the data point you identified.



3. Continue placing data points until you've zoomed in to the intersection as shown.

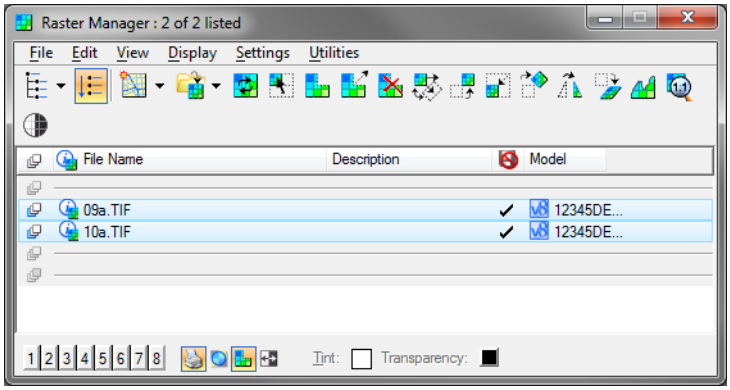


4. Reset **<R>** to end the **Zoom In** command.

Turn off the raster files

The model file has aerial photos attached. These raster images can be turned off while working in the file.

1. Select **File > Raster Manager**.



2. Select both .TIF files using the shift or ctrl key.

3. From the View toggles, bottom left of the dialog bog, toggle off all Views (1-8).

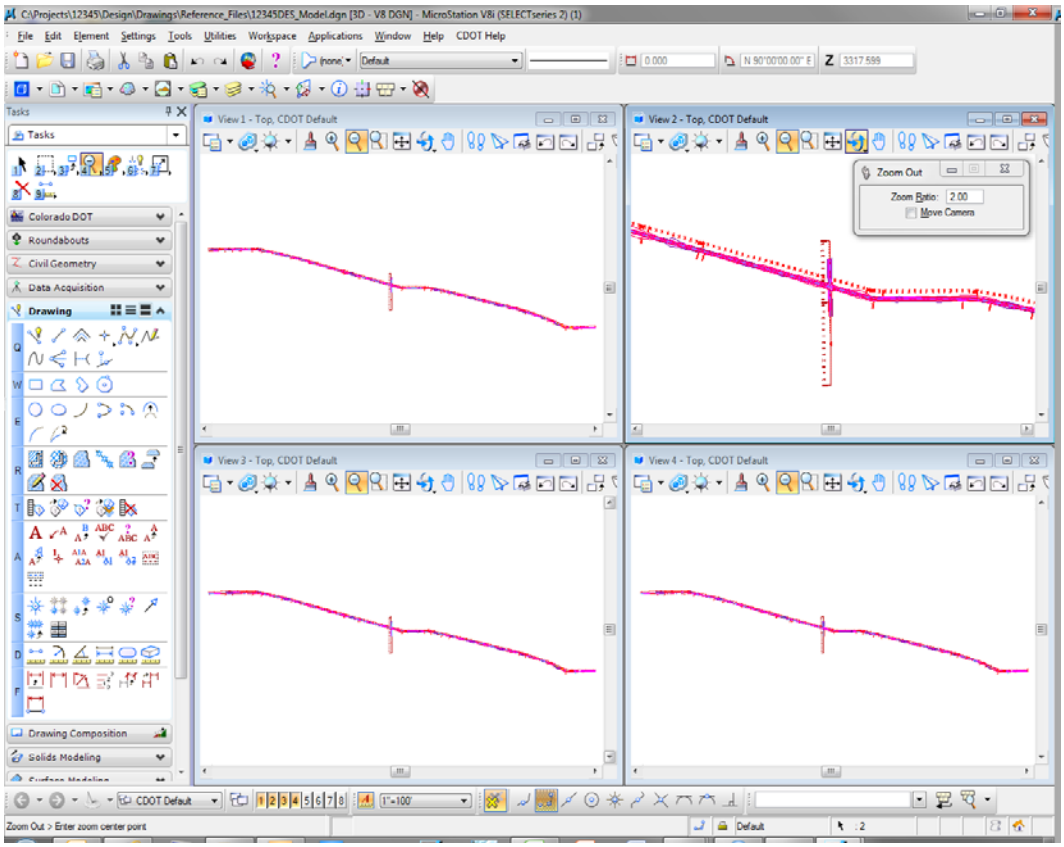
4. Close the **Raster Manager** box.

Zoom out in a view

1. From the **View Control** toolbar in View 2, select **Zoom Out.**

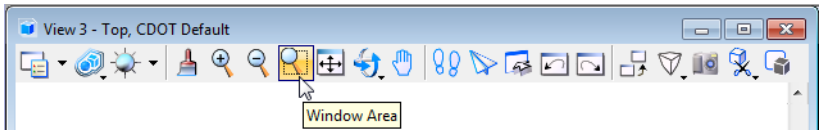
The view is updated to zoom out twice as far.

2. Again in View 2, **<D>** in the center of the intersection to zoom out again until you can see the entire intersection cross road.



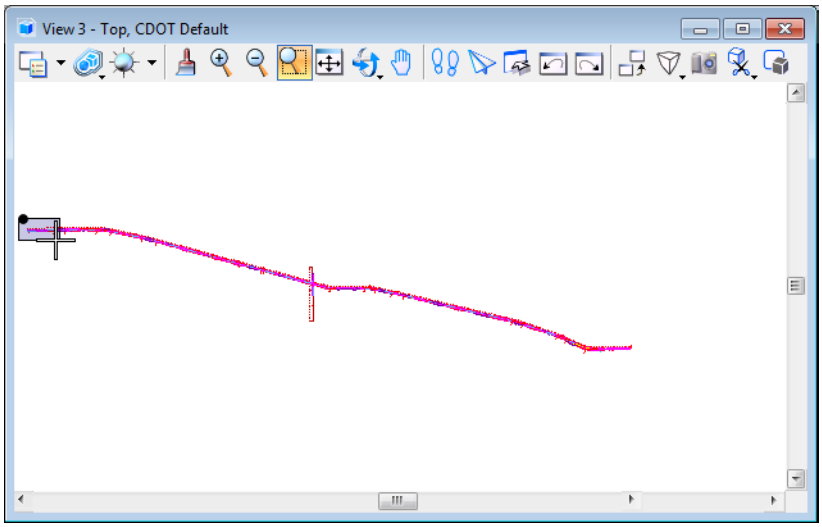
Use the Window Area command

1. From the **View Control** toolbar in View 3, select **Window Area.**

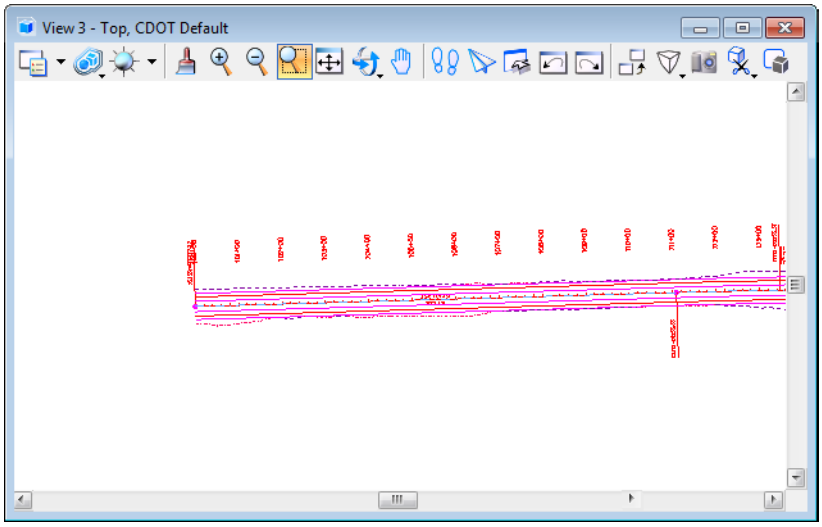


2. **<D>** above and to the left of the beginning of the project.

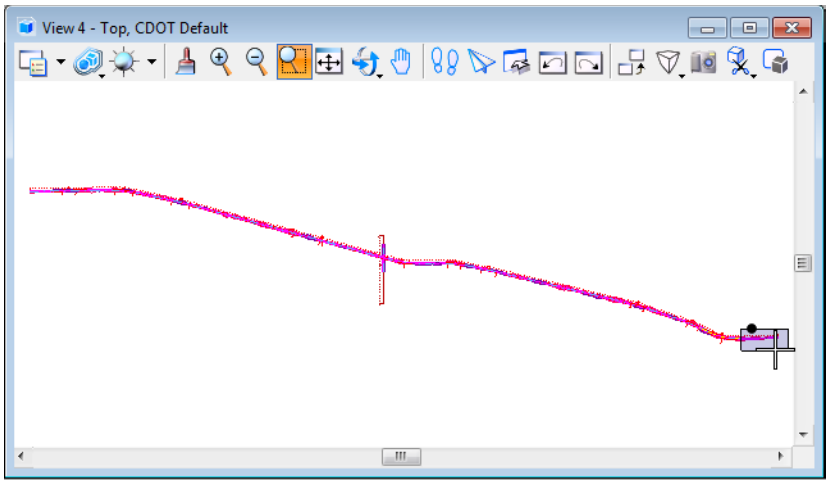
3. **<D>** again below and to the right of the first point as shown (this will draw a box around what you want to show close-up).



The view is updated to show the alignment at the beginning of the project.

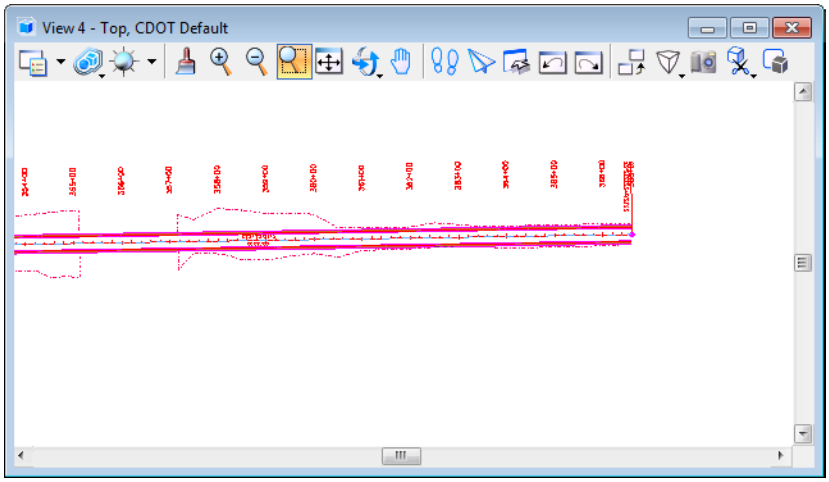


4. While still in the **Window Area command**, move your cursor over to View 4 and **<D>** above and to the left of the alignment end as shown.

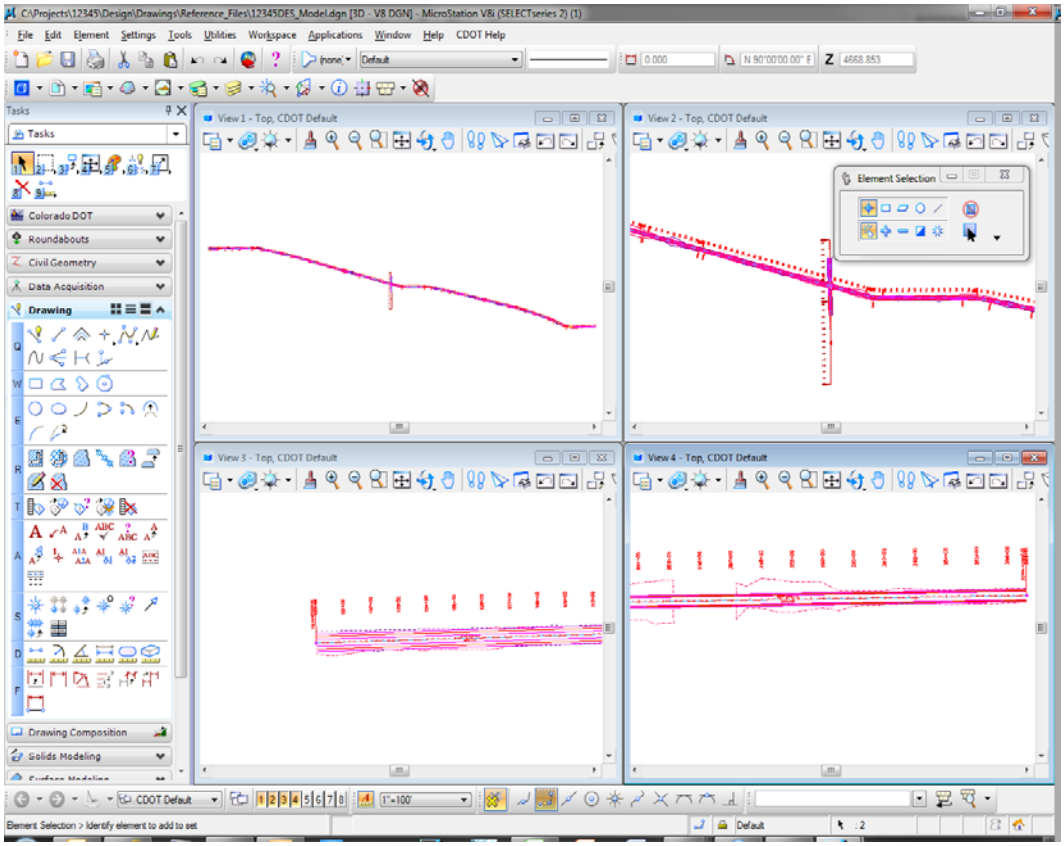


5. **<D>** again below and to the right of the alignment end.

   The view is updated to show the end of the project.



Your views should look similar to the illustration below.

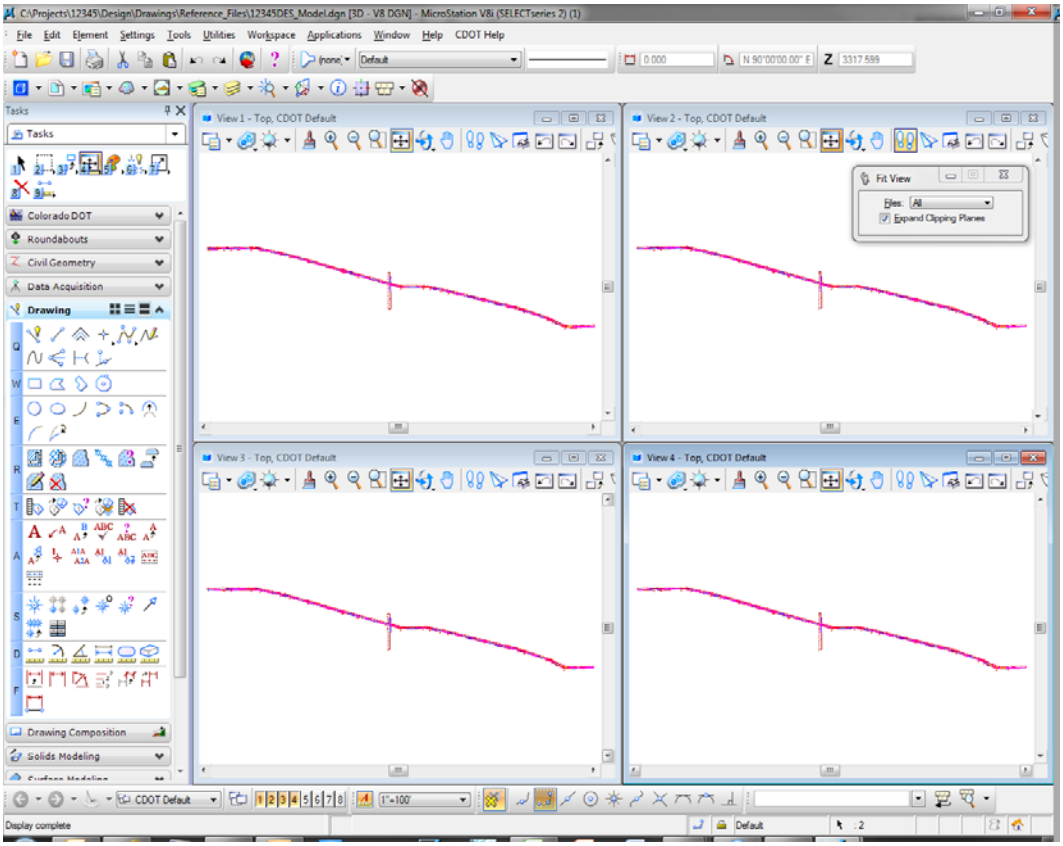


Fit views

1. From View 2, select **Fit View.**

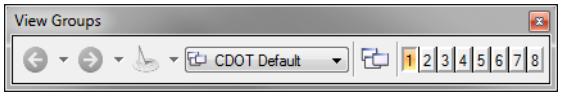
   All of the graphics in View 2 are displayed in the view. The **Fit View** command is a handy way to see all graphics on levels that are on.

2. With the **Fit** command active, **<D>** in views 3 and 4 to select these views to fit.

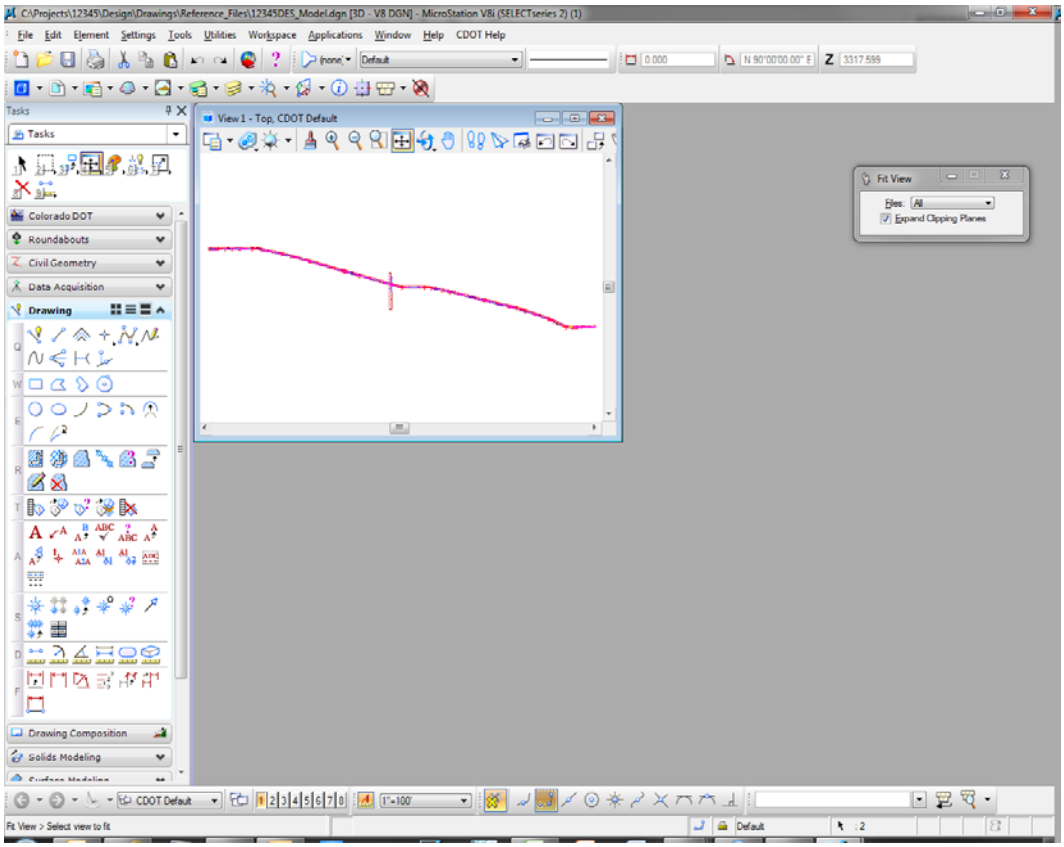


Close some views

1. Toggle ***off*** views 2, 3 and 4 on the **View Toggles** box.



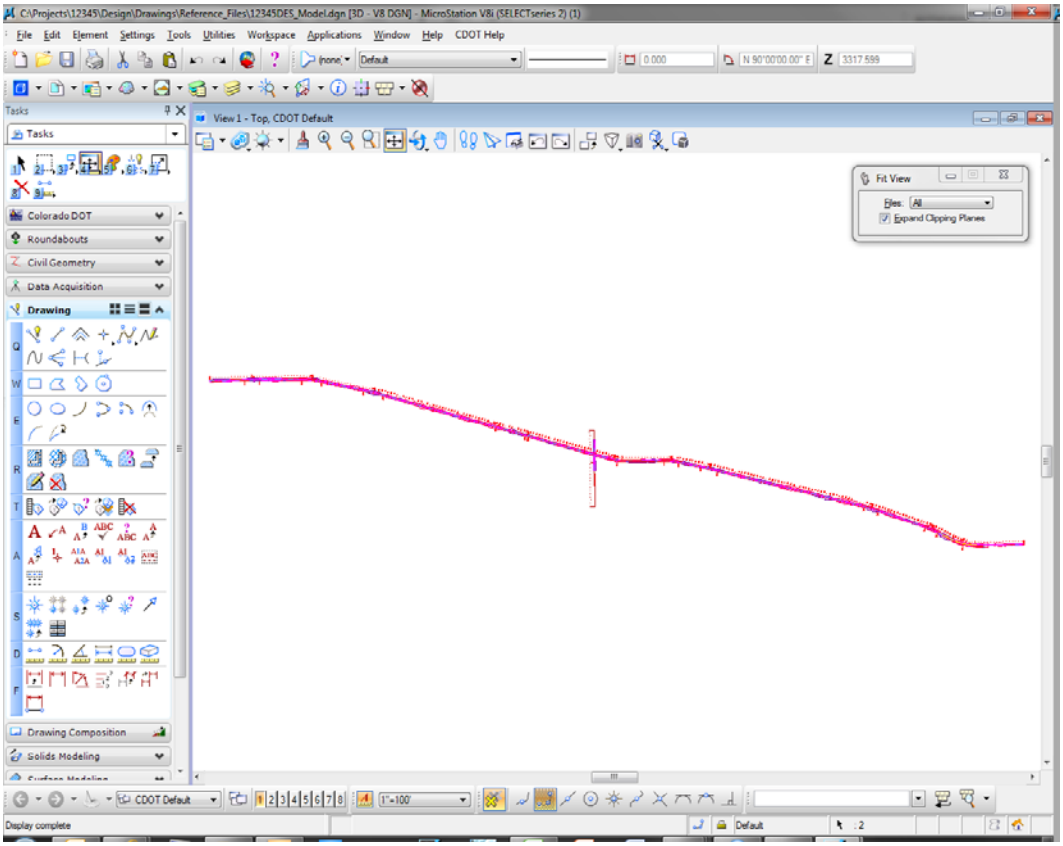
Note: You can also **click** the **X** icon in the view's upper right corner to close it or you can **double-click** on the **M** icon, the control menu icon, in the upper left corner of a view.



Make view one fill the screen

1. Select the **Maximize** button in the upper right corner of View 1.

2. **Fit** View 1.



Lab 1.7 - Mouse Wheel Settings

Note: If you do not have a mouse with a wheel, go to the next section titled *Try Out Tool Boxes*.

Use the wheel on the mouse to Zoom In/Out

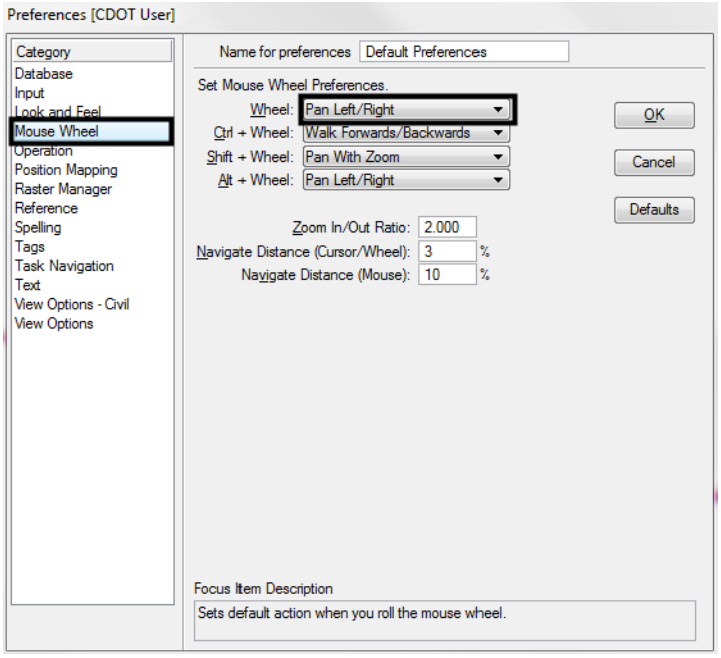
1. Position your cursor over the center of the intersection.
2. Roll the wheel up; this zooms in on your graphics.
3. Roll the wheel back; this zooms out.

Note: If you **<T>** on a location before rolling the wheel MicroStation will zoom in/out around that point.

Change the wheel settings

1. Select **Workspace > Preferences > Mouse Wheel.**

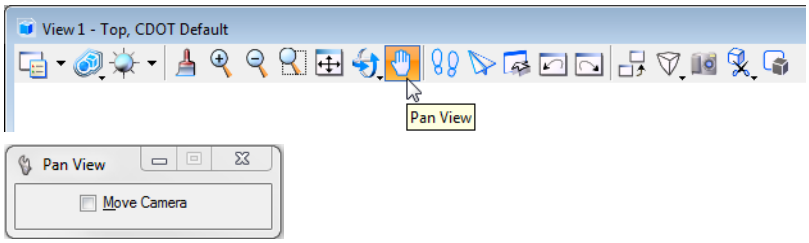
2. Set the **Wheel** to **Pan Left/Right.**



3. Select **OK** to accept the changes and close the dialog box.

4. Move your mouse wheel back and forth to pan in the view.

Note: You can also **Pan** by selecting the pan command on the **View Control** toolbar. Specify a "from" and "to" point to move in the view.



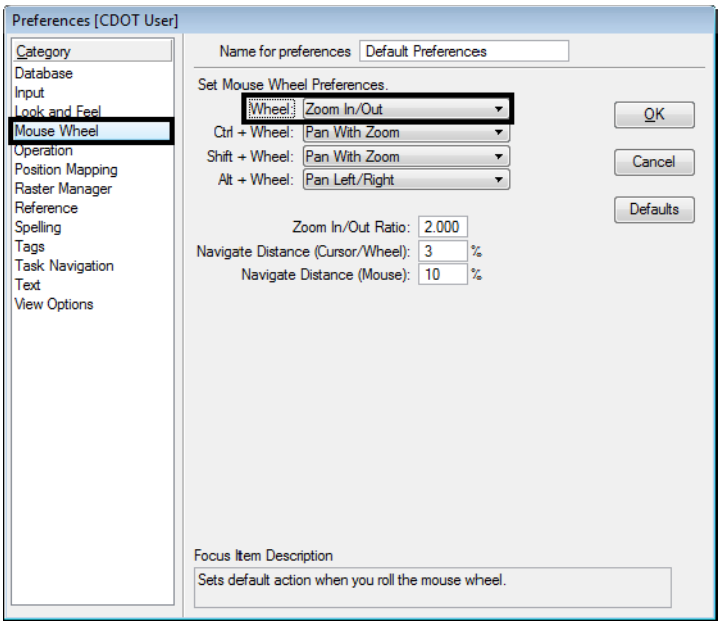
You can also **Pan** by pressing **<Shift>** on the keyboard and click **<D>** in the view. Then, drag your cursor in the direction you wish to move.

a. Practice panning with the **Pan** tool.

b. Practice panning using **<Shift>+<D>.**

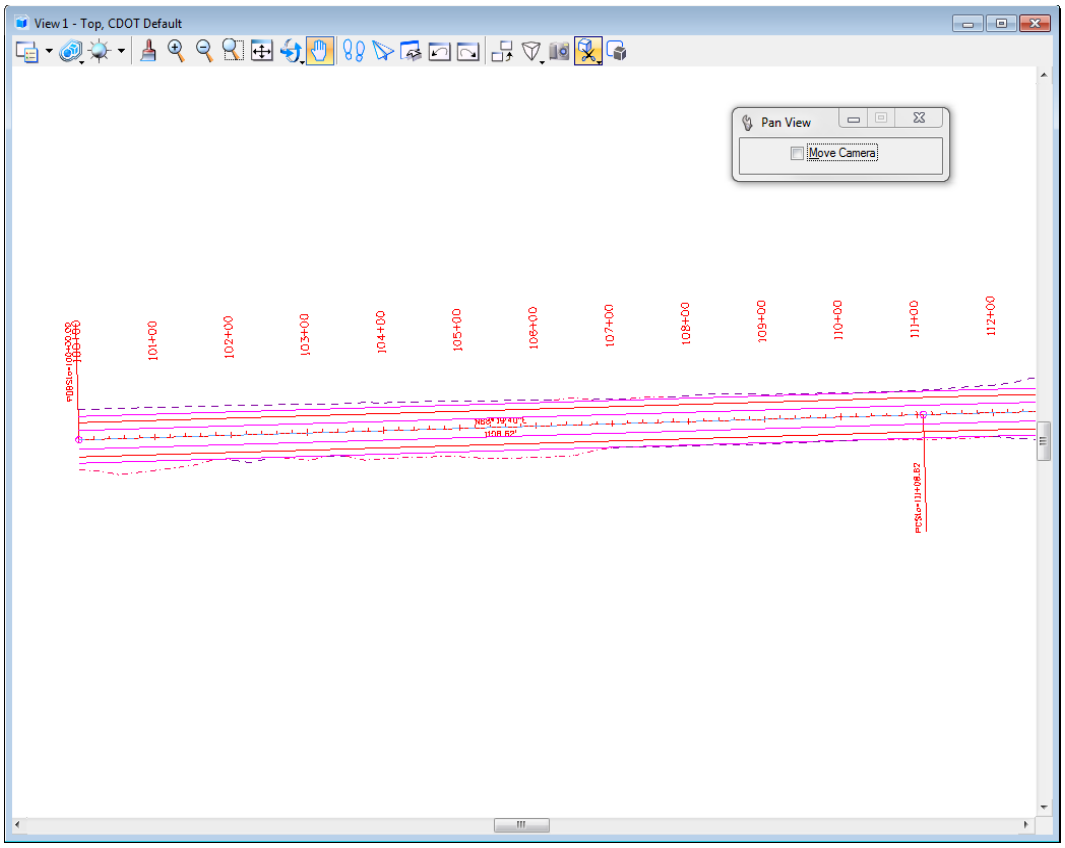
Note: After you start panning, you can release the both the **<Shift>** and the **<D>** keys. **<D>** again to end the command.

5. Set your wheel for the view control option you prefer (**Workspace > Preferences > Mouse Wheel).**



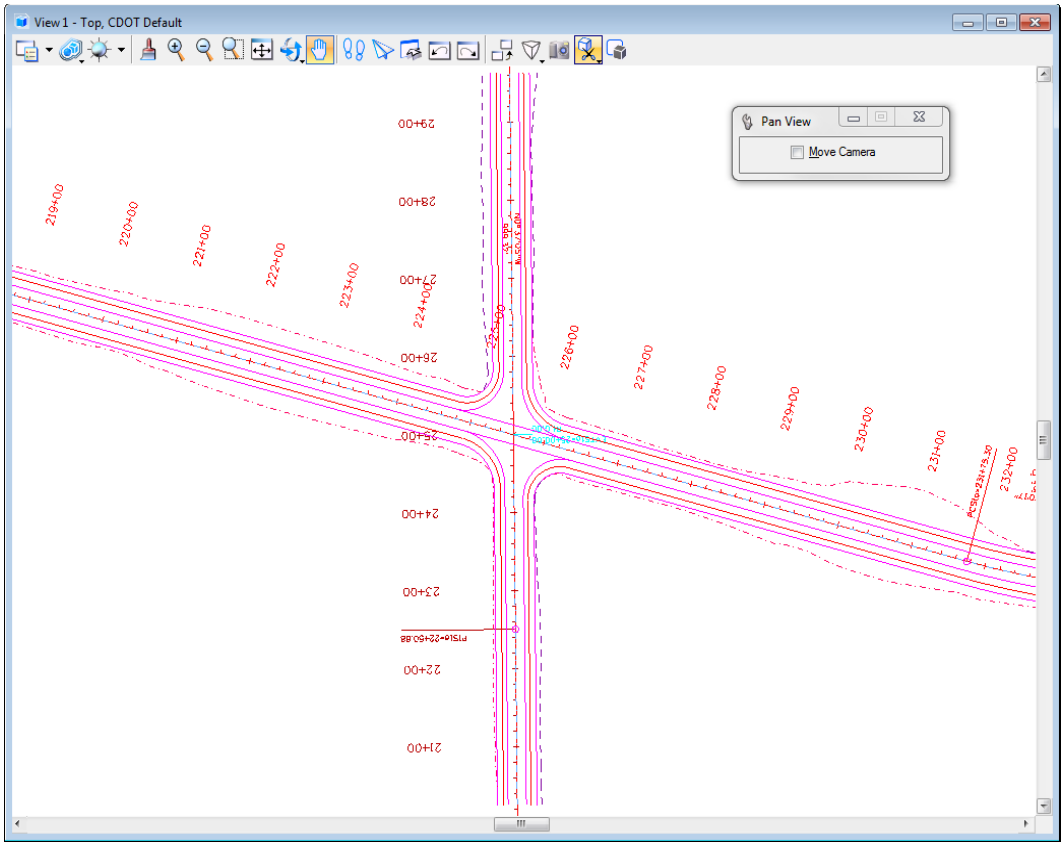
Pan the project site

1. **Window** in to the beginning of the project as shown.

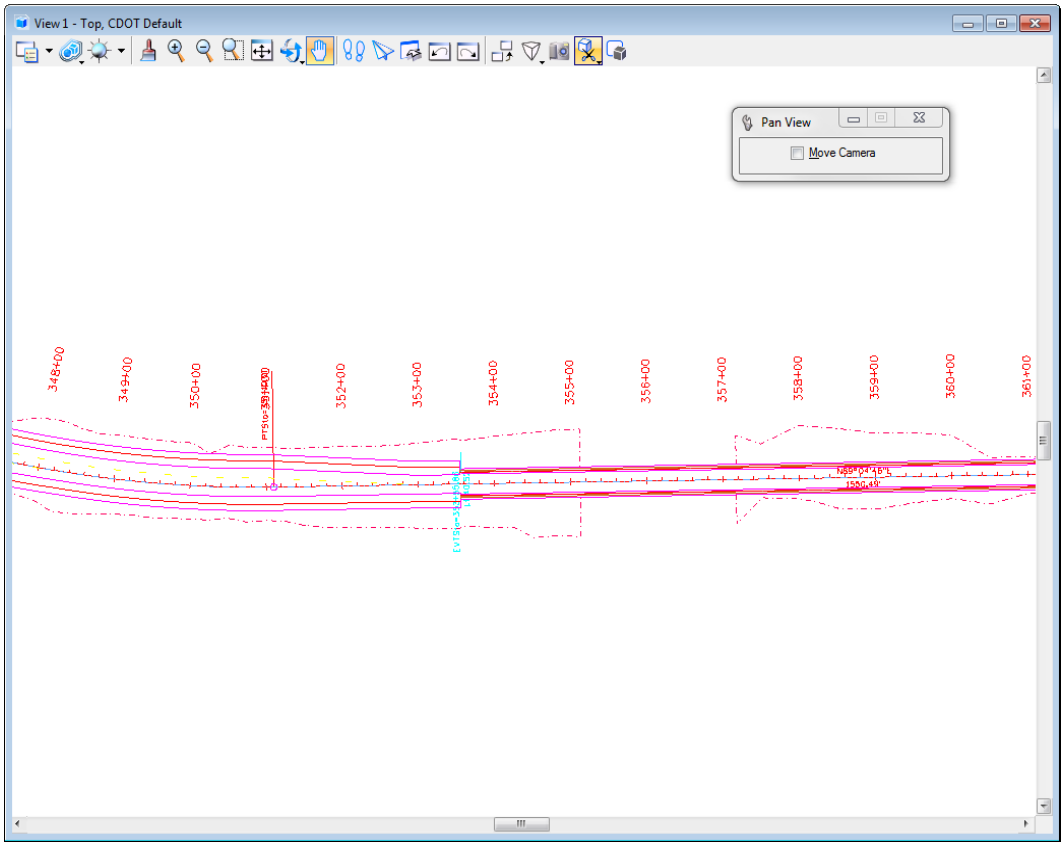


2. Use panning to review the SH 86 project site.
   - Start at the POB (STA 100+00) and pan to the right along SH 86.

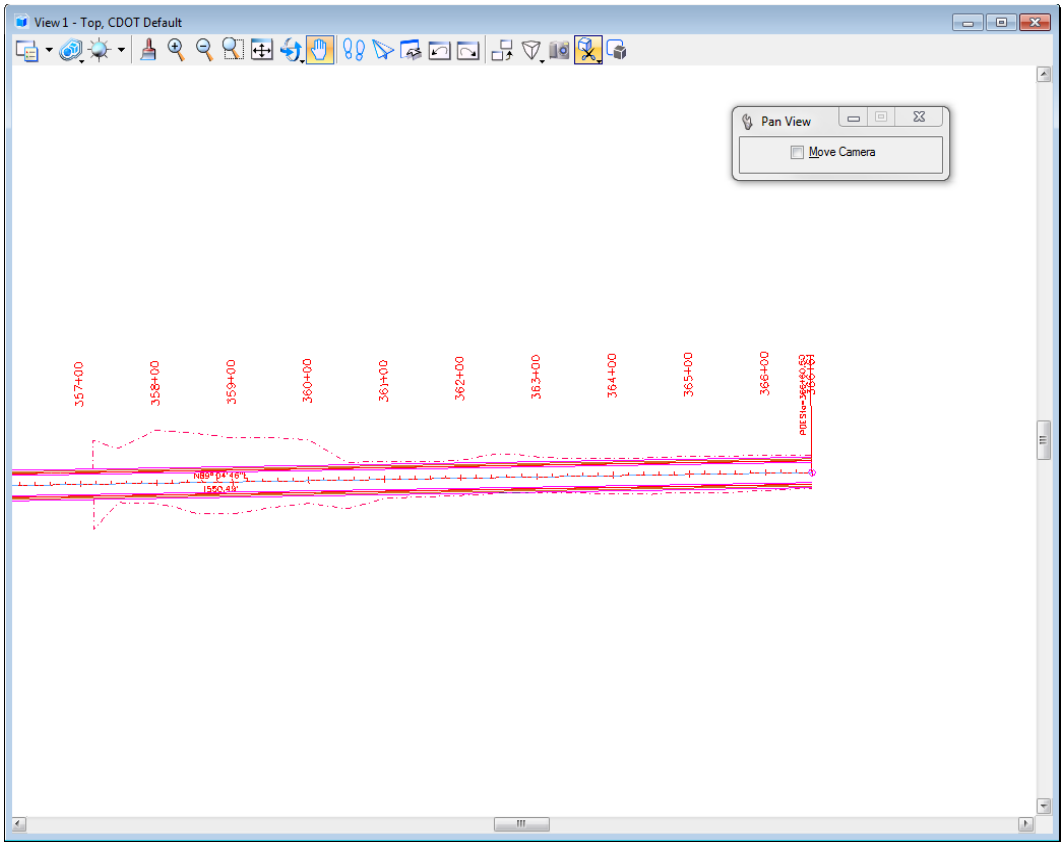
- Pan across the intersection (between STA 220+00 and 230+00).



- Continuing panning to the right through the transition from rural 2-lane to urban 2-lane with curb and sidewalk (around STA 353+00).



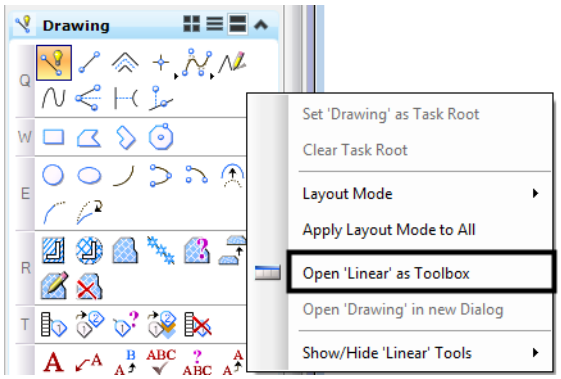
- Stop at the POE.



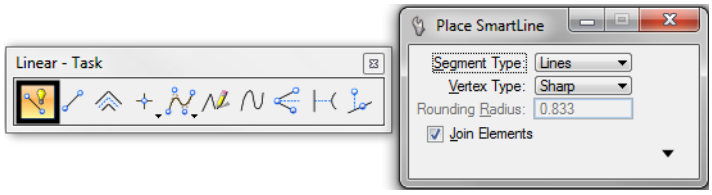
Lab 1.8 - Try Out Tool Boxes

Pull a tool bar from the main palette

1. **<R>** on the ***Linear Elements*** section of the **Drawing** task menu to display the Flyout menu.
2. **<D>** on the **Open 'Linear' as ToolBox** option.

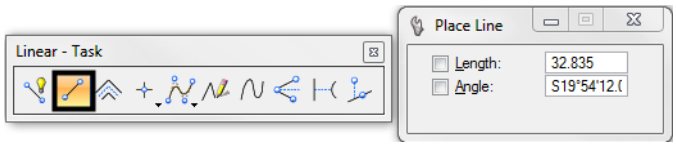


3. Select the **Place SmartLine** command.



The **Tool Settings** box shows this command's settings options.

4. Select the **Place Line** command from the **Linear Elements** toolbar and notice the changes in the Tool Settings box.



The **Tool Settings** box updates for each tool selected.

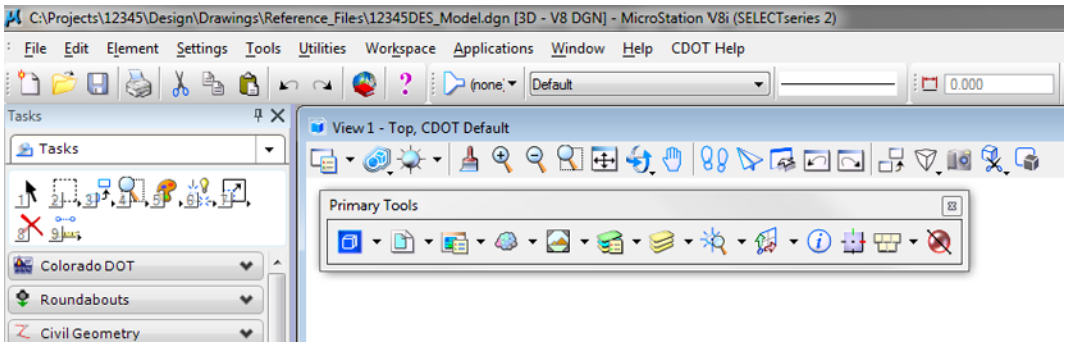
5. **Close** the **Linear Elements** toolbar by **clicking** the **x** in the upper right corner.

Float and Dock Toolbars

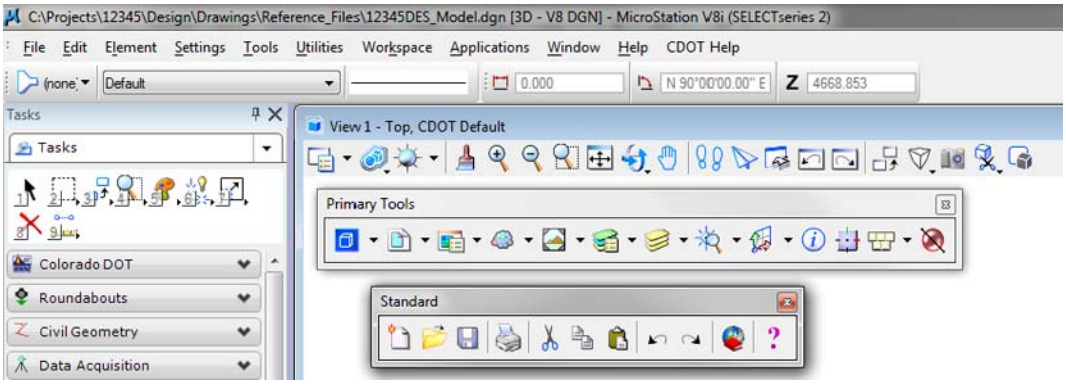
Float the Primary Toolbar

1. Position your cursor over the edge of the **Primary Tools** toolbar at the top of the application window.

2. Hold down the data button and drag the toolbar until it "floats" in the view.



3. Repeat for the **Standard** toolbar.



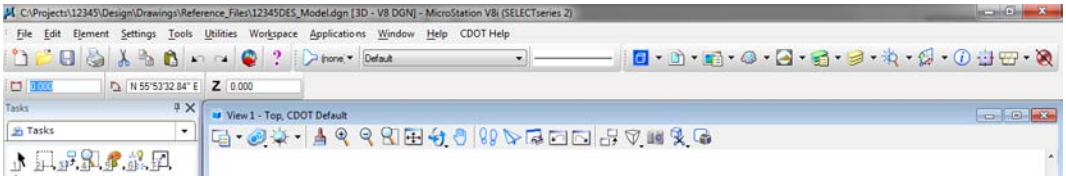
Toggle the Primary Tools toolbox off/on

1. Select **Tools > Primary**.

   The **Primary Tools** toolbox is turned off.

2. Select **Tools > Primary** again to toggle it back on.

3. Dock the **Primary Tools** and **Standard** toolbars back to the upper right corner of the application window by dragging the title bar with the data button.

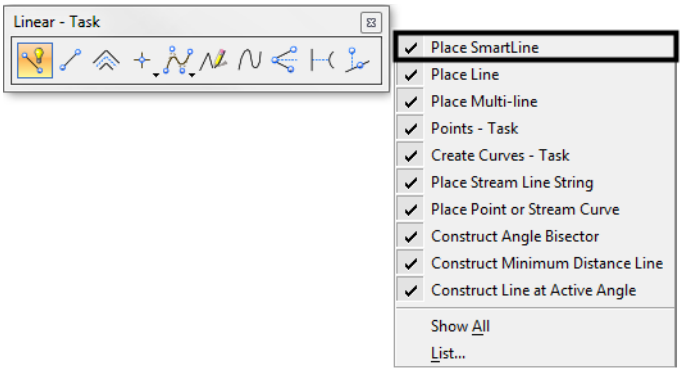


Note: Any toolbar can be docked on the perimeter (top, bottom, left, or right sides) of MicroStation's application window.

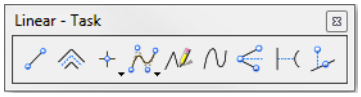
Show/Hide Tools

1. Open the **Linear Elements** toolbar as shown above.

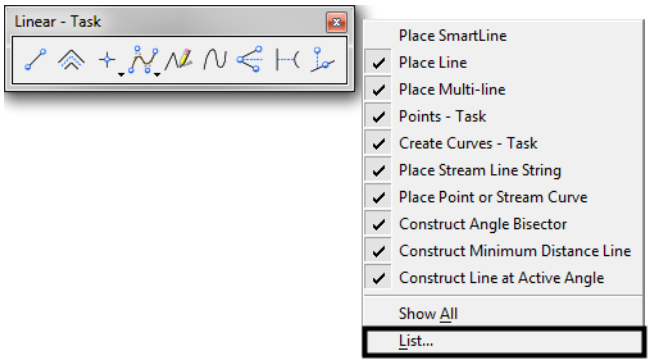
2. **Right-click** anywhere on the **Linear Elements** toolbar. In the list of tools, toggle ***off*** **Place SmartLine.**



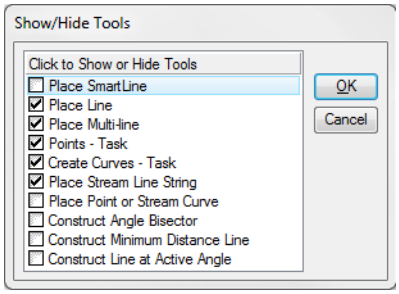
The **SmartLine** tool is removed from the toolbar.



3. **Right-click <R>** again and turn **Place SmartLine** back on.
4. **Right-click <R>** and choose **List.**

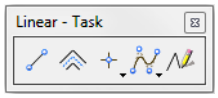


5. Toggle ***off*** the last four tools.

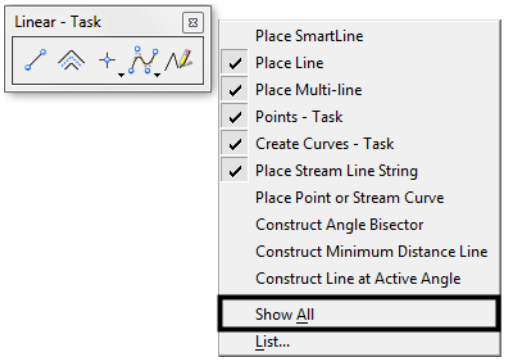


6. Choose **OK.**

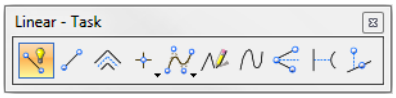
The toolbar is updated to show these tools hidden.



7. **Right-click <R>** and select **Show All.**



All tools are now shown on the toolbar.



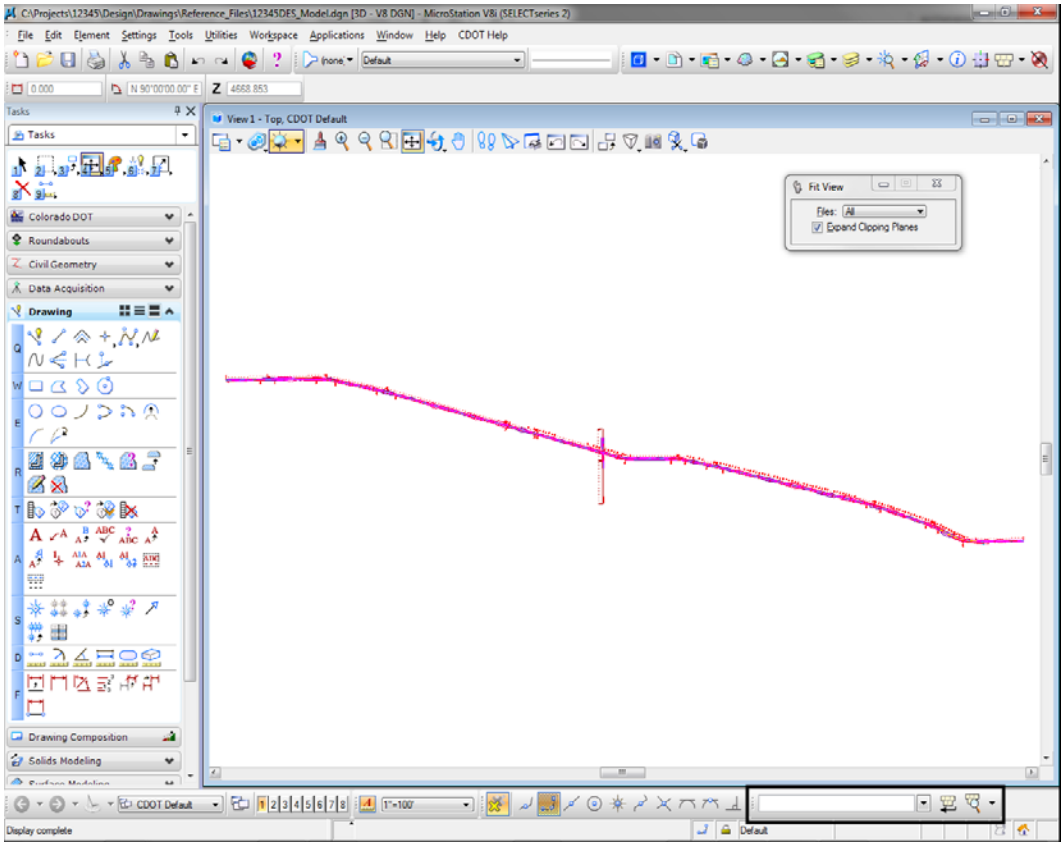
8. **Close** the **Linear Elements** toolbar (**click** the **X** in the upper right corner)

Note: Use this procedure to customize any toolbar to show just the tools you want.

Lab 1.9 - Using the Key-In Box

Open and dock the key-in box

1. Verify the **Key-in** box is opened and docked.



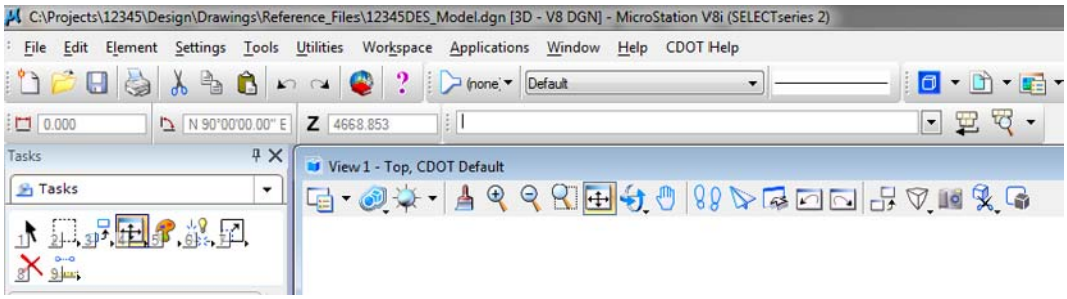
Note: If the **Key-In** box is not open, select **Utilities > Key**-in to open it.

2. Float the **Key-in** box from its docked position.

3. Expand it by grabbing the bottom of the box and dragging down.

Key-ins can be selected from the list but are typically typed directly into the box.

4. Grab the title bar of the key-in box and drag it to the blank space at the top of the application window.



The **Key-in** box docks beside the other tool bars in the application window.

Note: You can also dock the **Key-in** box at the bottom of the screen if you prefer.

Lab 1.10 - Save Settings

Save settings in the file so the views will look the same when you next open the design file.

1. **Fit** View 1.
2. In the **Key-in** box you just docked, place a data point to set the focus in this box (you will get a blinking cursor).
3. Key in ***File*** (short for **File design**), then press **<Enter>** on the keyboard.

Note: You ***always*** press **<Enter>** or **<Tab>** after key-ins in the **Key-in** box.

Keep the **Key-in** box docked. It is where you will key in all MicroStation commands.

Note: To **Save Settings**, you could also select **File > Save Settings** or use the short cut **CTRL-F**. Most commands can be accomplished with either key-ins or by selecting from the menu or toolbars.

By saving settings, the next time you enter this design file, it will be exactly as you left it.

4. Choose **File > Exit** to exit MicroStation and your design file.

Note: You can change your MicroStation user preferences to always save setting upon exiting the file. Select **Workspace > Preferences > Operation** and toggle on **Save Settings on Exit**. Just remember that if you're working in another user's file, you'll change their setting.

LAB 2 - Levels

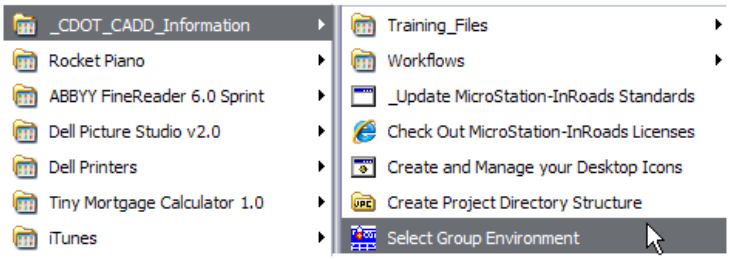
Chapter Objectives:

After completing this exercise you will know how to:

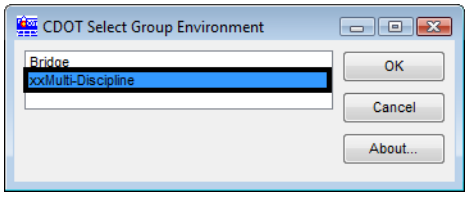
- Attach the appropriate levels by using the **Select Group** program
- Use **Level Display** to turn levels on/off
- Use key-ins to turn levels on/off
- Set the active level for placing graphics
- Use shortcuts for turning all levels on/off
- Turn levels off by graphically selecting an element
- Turn different levels on/off in different views
- Customize the **Level Display** and **Level Manager** boxes
- Sort levels
- Save a view for later recall
- Access CDOT standard level filters
- Use level filters to manage levels and turn groups of level on/off

Lab 2.1 - Starting MicroStation

1. From your desktop's **Start** Menu, choose **Start > All Programs > _CDOT_CADD_Information > Select Group Environment.**

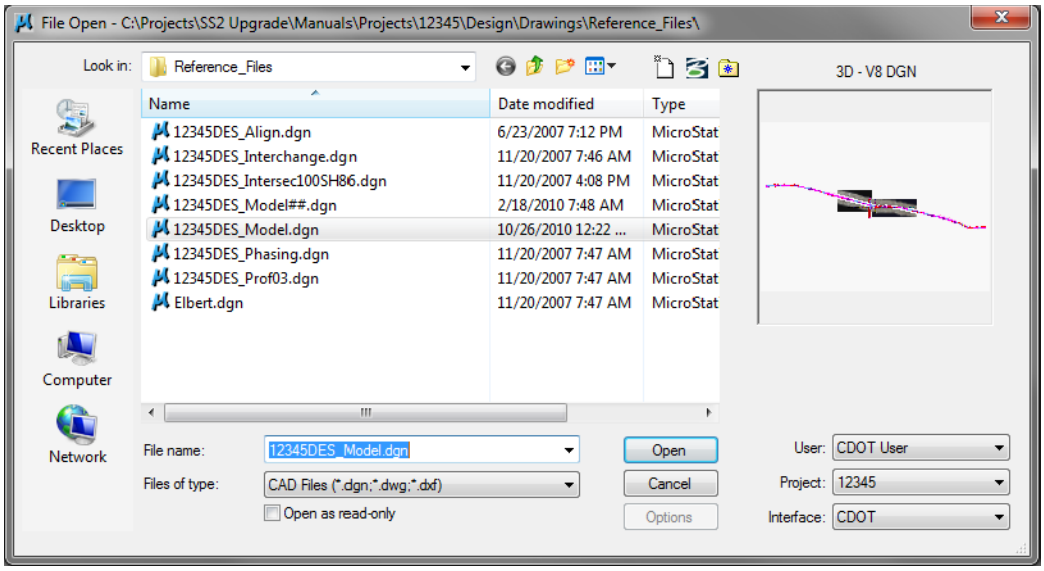


2. In the **Select Group Environment** box, select **xxMulti-Discipline**, and then select **OK**.



Note: This will allow you access to all discipline's levels.

3. Start MicroStation and open the design file **12345DES_Model.dgn** from the **c:\Projects\12345\Design\Drawings\Reference_Files** folder.



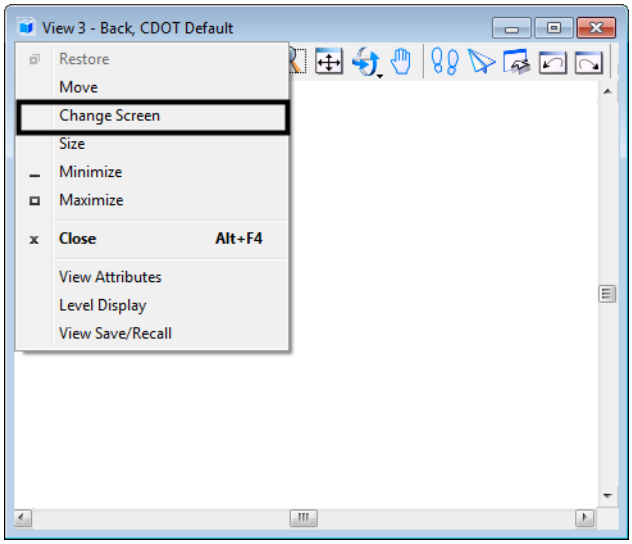
View 1 is a plan view of the entire project that you set up in the last lab.

4. Minimize or Close the CDOT Menu.

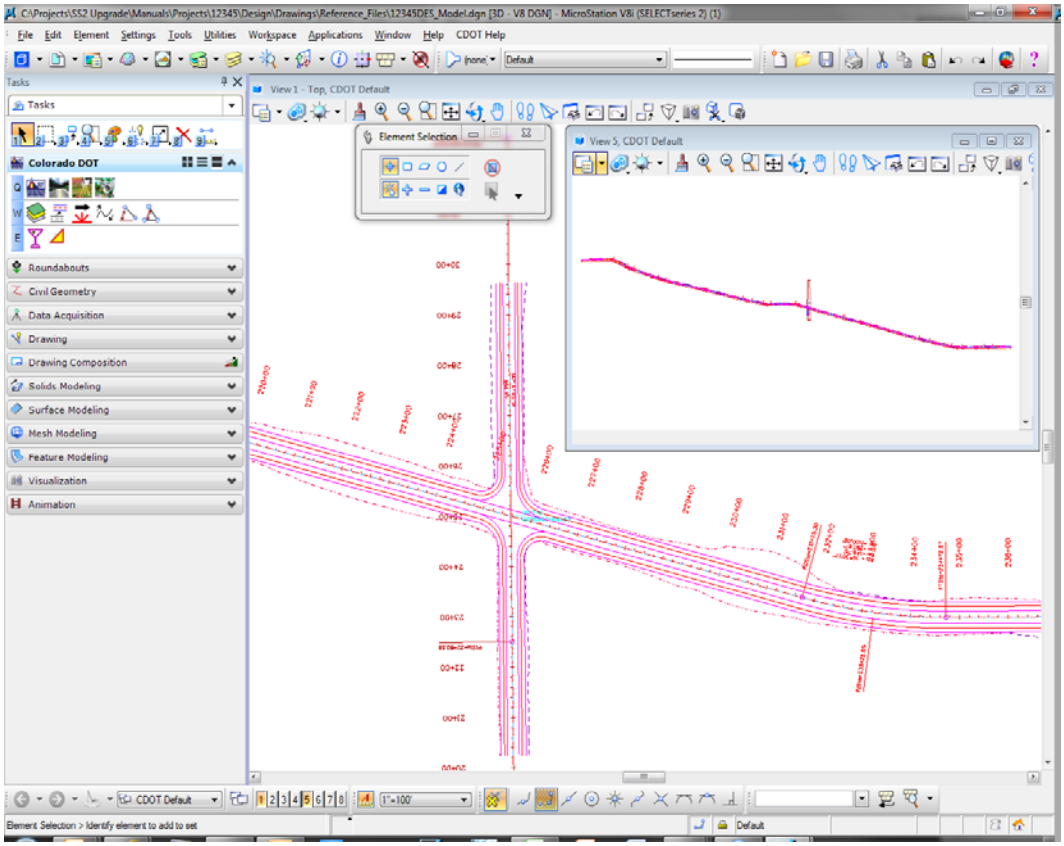
5. Open View 5 from the **View Toggles** toolbar (lower left).

6. **Fit** View 5.

Note: If you want to move View 5 to the left screen, select the **Change Screen** option from the view's control menu.



7. In View 1, **Window Area** around the intersection as shown.



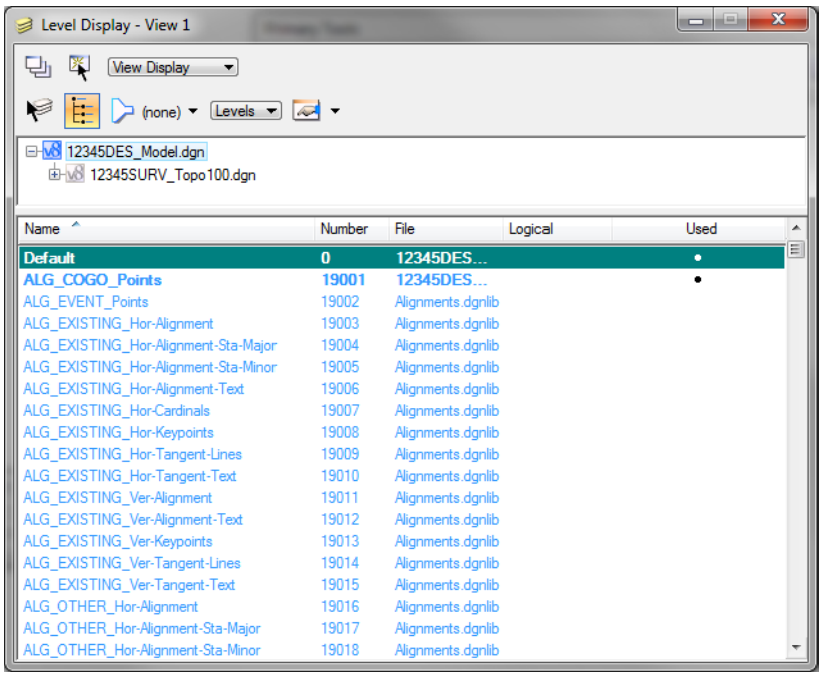
Lab 2.2 - Working with Levels

Sorting Levels

1. Select **Settings > Level > Display** (or, from the **Primary** toolbar select **Level Display**).

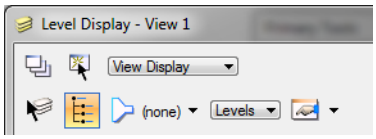
The **Level Display** box opens. It is used to turn levels on and off.

2. In the top left corner on the **Level Display** box, toggle ***off*** all of the **Views**.

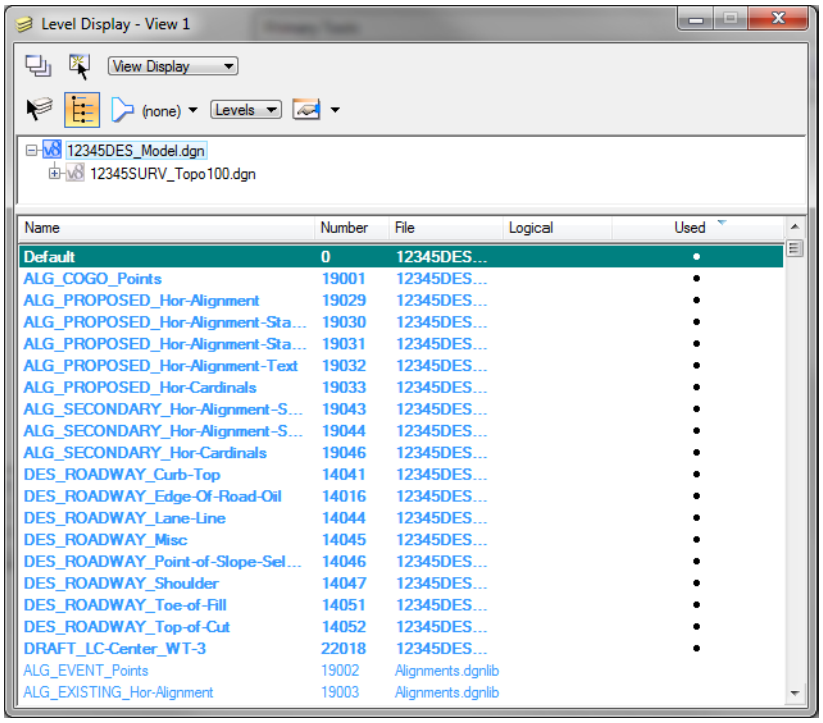


With all views off, there are no levels available to turn on/off (the levels are grayed-out).

3. Turn on **View Index 1** and leave all other views off.



4. **<D>** on the column heading **Name** to sort by name, then **<D>** on **Used** to bring the used levels to the top of the list.

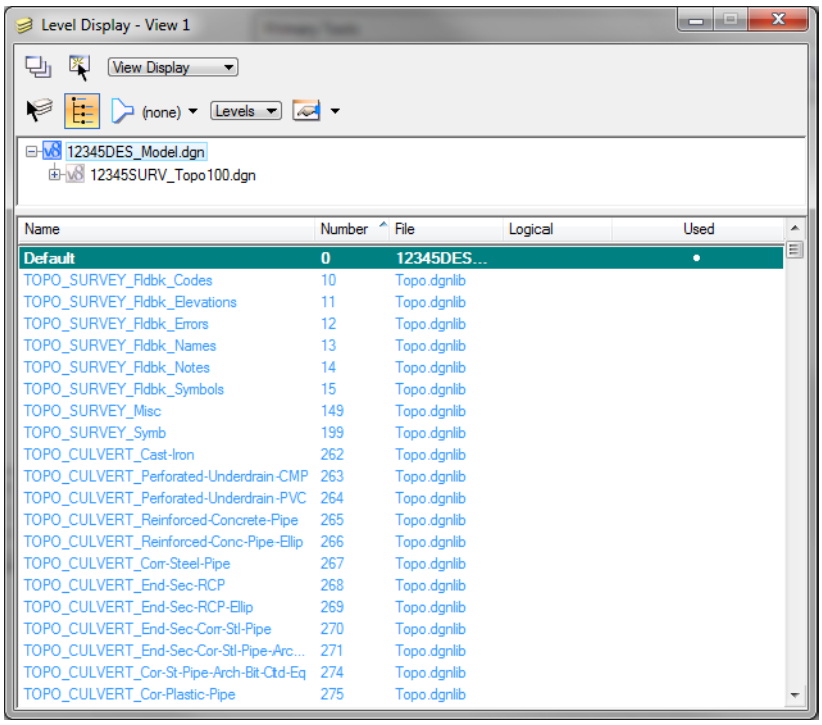


Note: The highlight color may vary based on your Windows Theme setting.

5. Scroll through the list of levels.

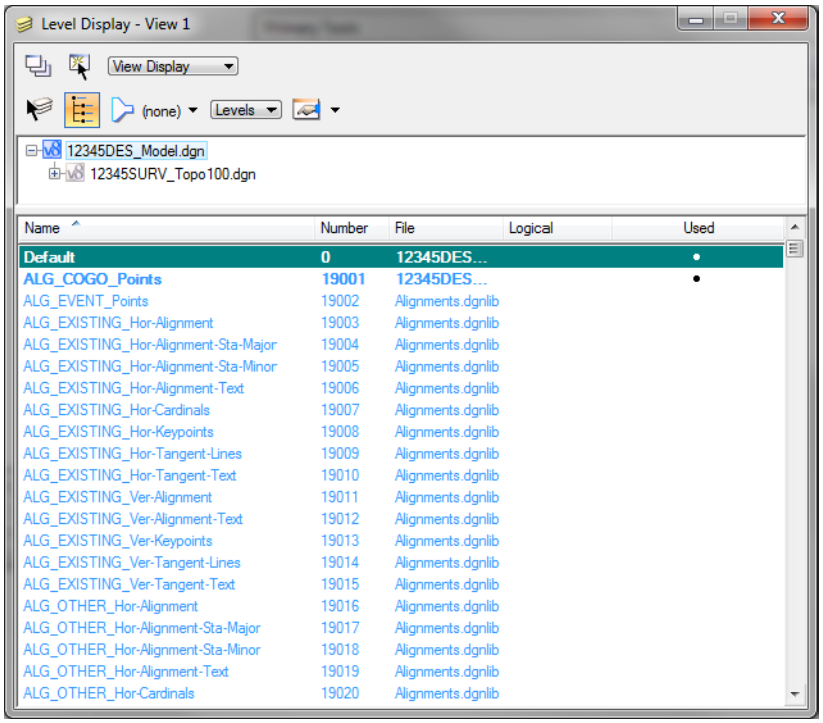
   The levels which are used (those with graphics placed on them) appear in bold text. All other unused levels are from the attached libraries.

6. **<D>** on the column heading **Number** to sort by level number.



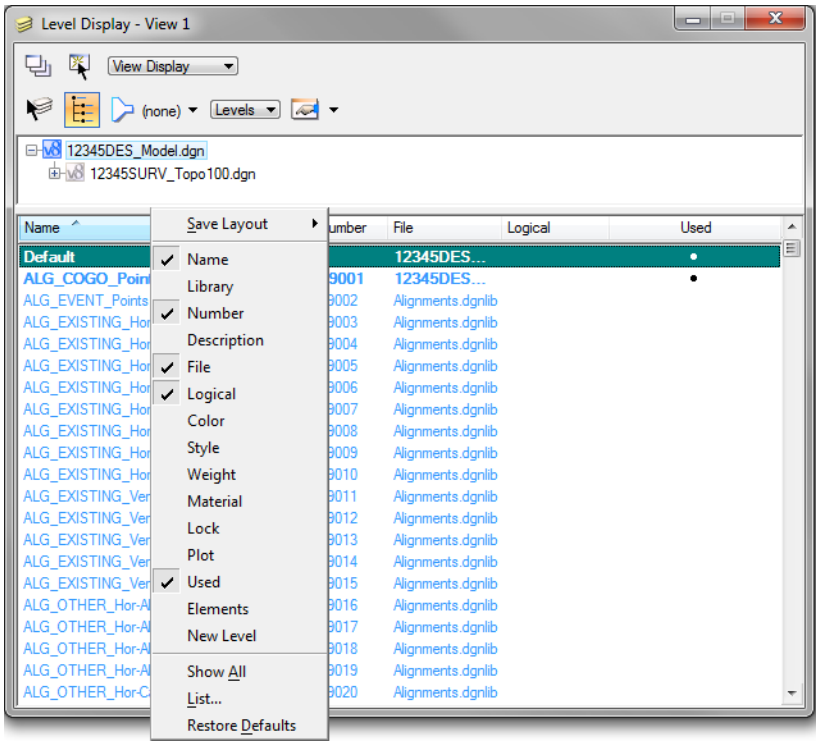
Note that levels are grouped by number. For example, all Roadway Design levels are 14000 series; all Right-of-Way levels are 15000 series, etc.

7. **<D>** on the column heading **Name** to sort the levels alphabetically by name and scroll through the level list. (If you toggle the **Name** column, you will sort A – Z, then Z – A). Toggle **Name** until you sort A – Z.



Note: All MicroStation levels are assigned both names and numbers.

8. Right-click in any column heading (**Name**, **Number**, etc.) and toggle off the column **Logical**.

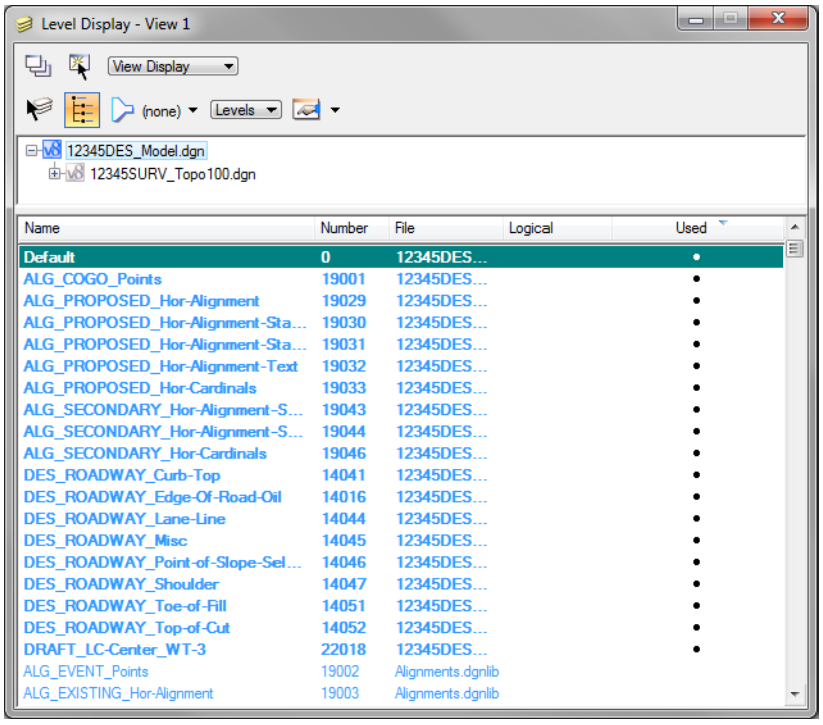


You can customize the look of the **Level Display** box by turning on/off information columns.

Turn levels on/off using Level Display

1. With the levels now sorted by name, **<D>** on the column heading **Used** until all used levels are brought to the top of the list. This now sorts all used levels alphabetically.

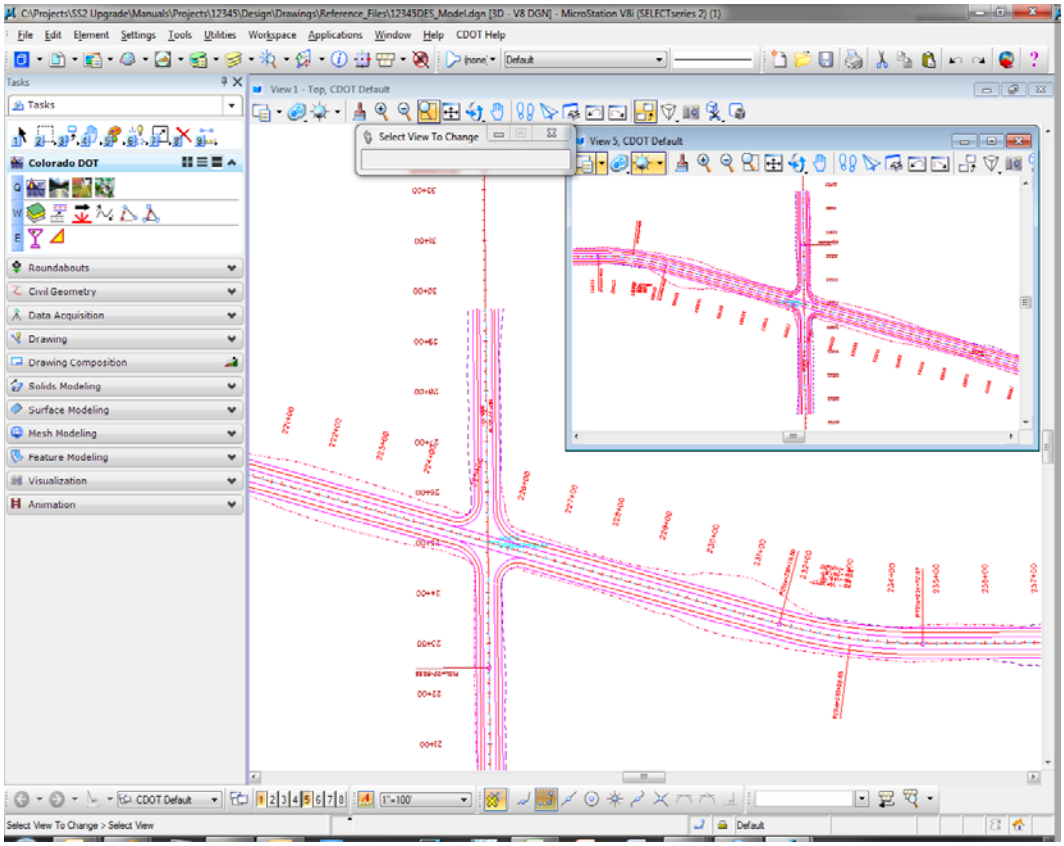
Note: You may have to click **Used** twice to get all used levels to the top.



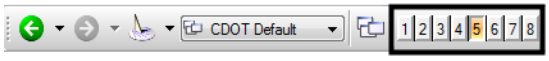
2. Scroll up to the top of the list to see the used levels.

Note: Sorting by **Used** is a handy way to quickly find a level that you want to turn on/off.

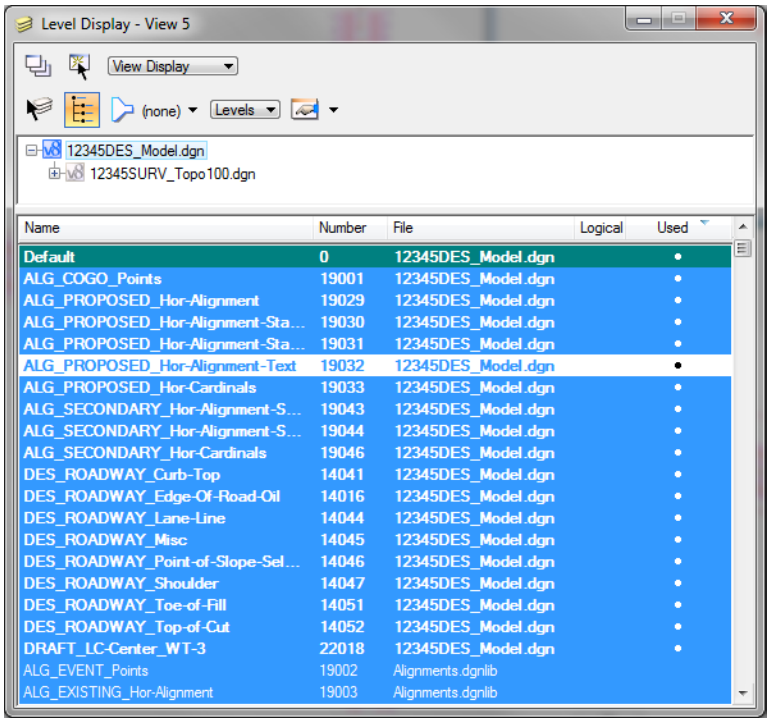
3. **Window Area** around the same intersection location in View 5 as in View 1.



4. From the **View Toggles** toolbar toggle ***off*** View Index 1 and toggle ***on*** View Index 5 and scroll through the level list.

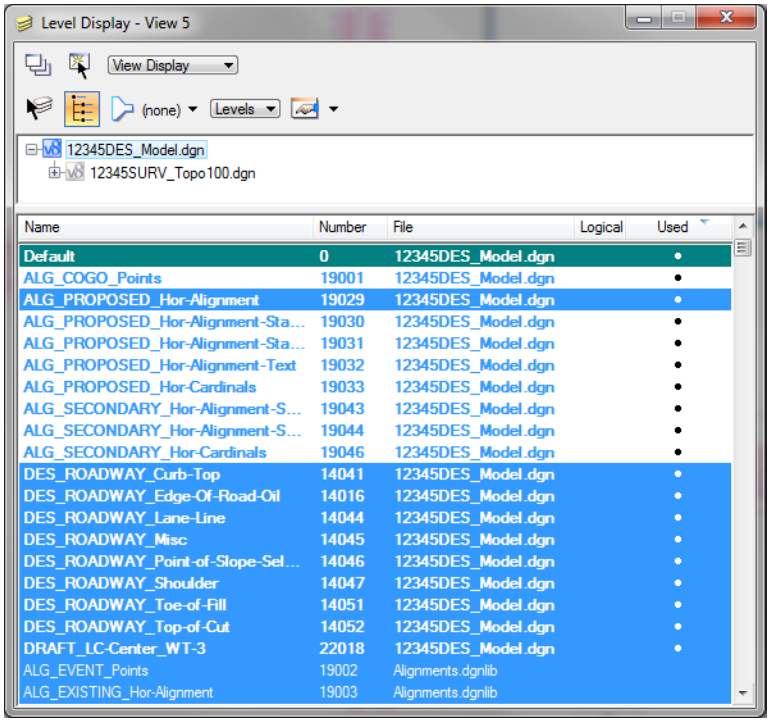


5. **<D>** on the level **ALG_PROPOSED_Hor-Alignment-Text** to turn it off.

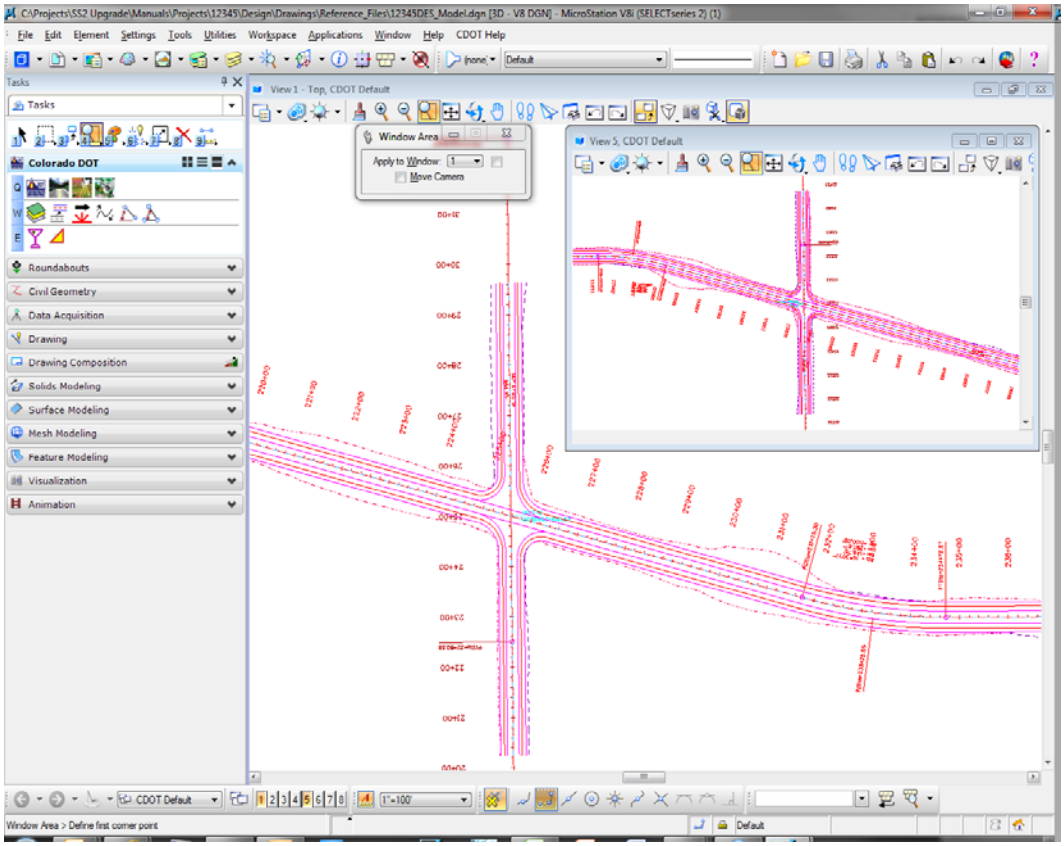


Note: Level displays are view dependent – you can have different levels on/off in different views.

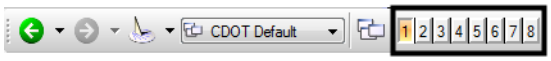
6. In View 5, hold down the data button and drag to turn off all **ALG** levels except the **ALG_PROPOSED_Hor-Alignment** level as shown.



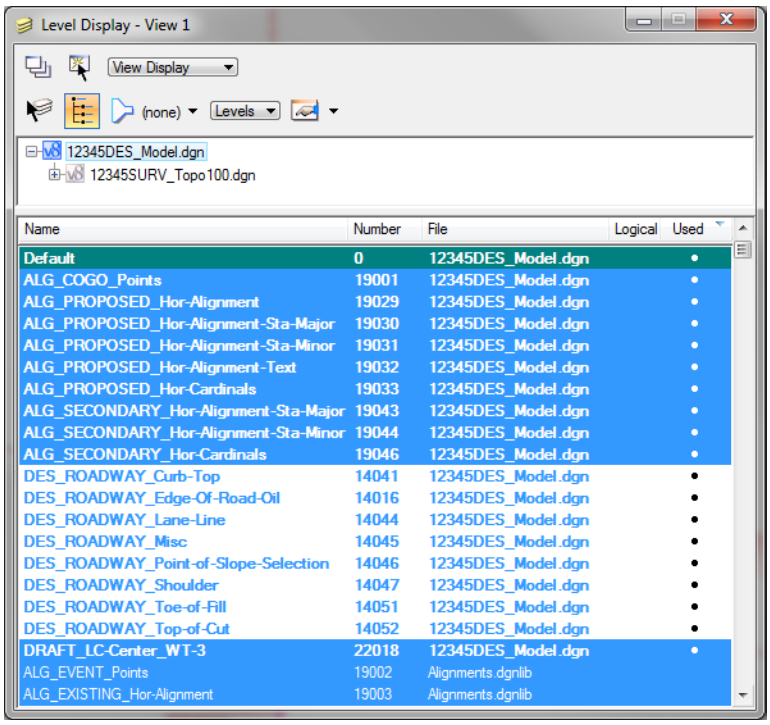
The intersection text is now off in View 5 but on in View 1.



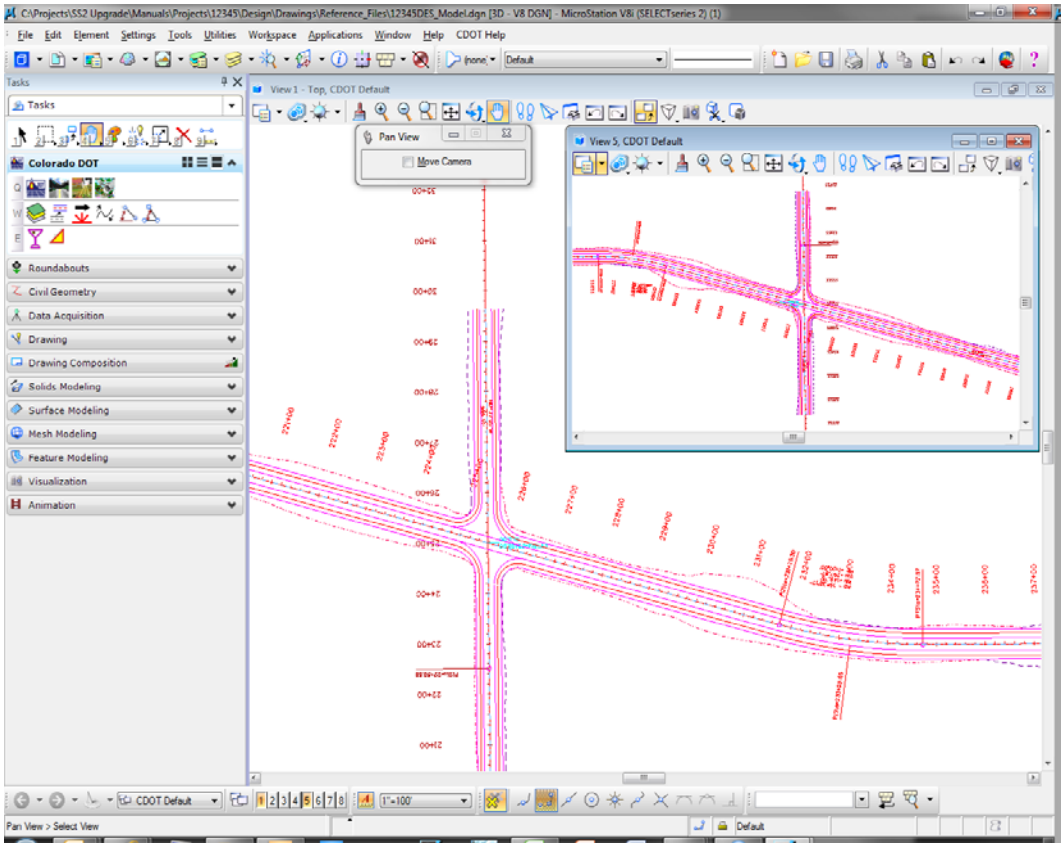
7. Turn ***off*** View Index 5 and turn View Index 1 back ***on***.



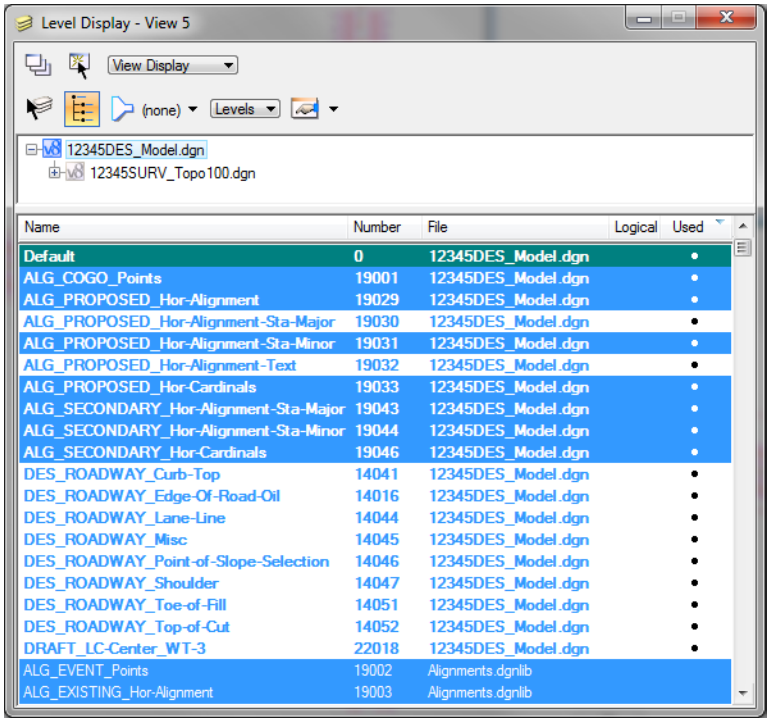
8. Hold down the data button and drag across all **DES**_ levels to turn them ***off*** in View 1.



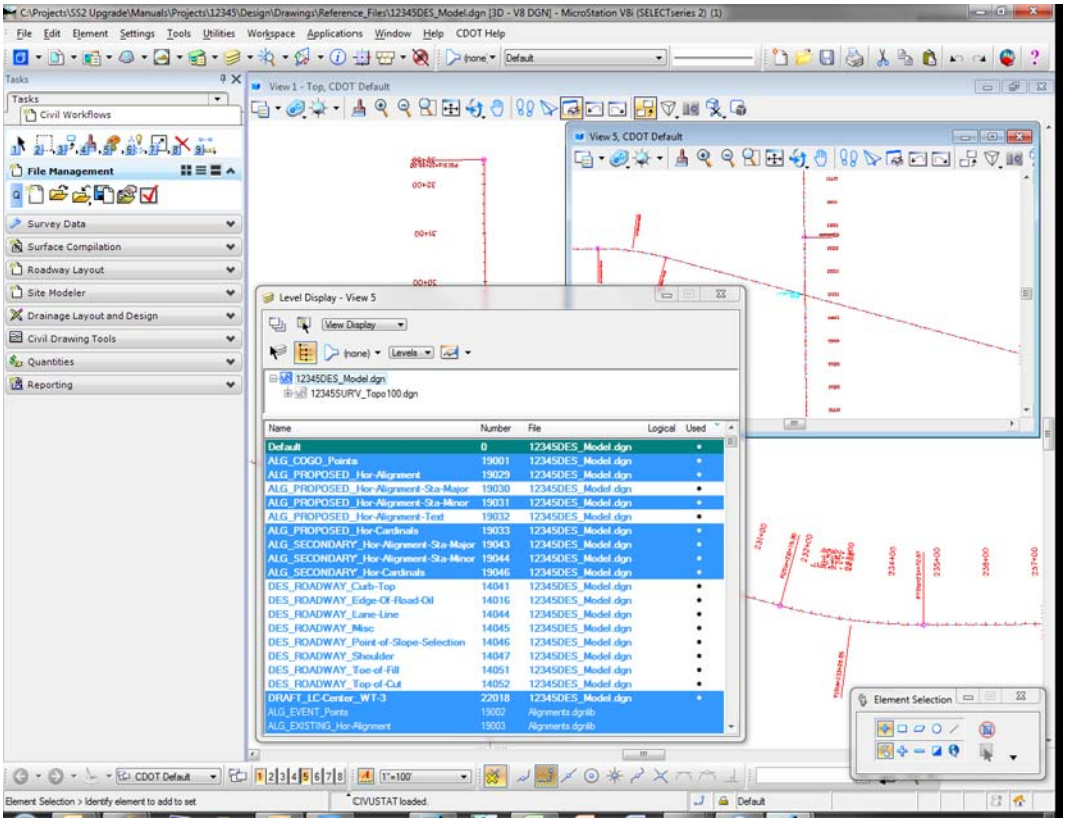
Only alignment levels are now on in View 1.



9. Turn ***off*** the levels **ALG_PROPOSED_Hor-Alignment-Text** and **ALG_PROPOSED_Hor-Alignment-Sta-Major** in View 1.



10. Turn ***on*** View Index 5 so that both View Index 1 and 5 are now ***on***.

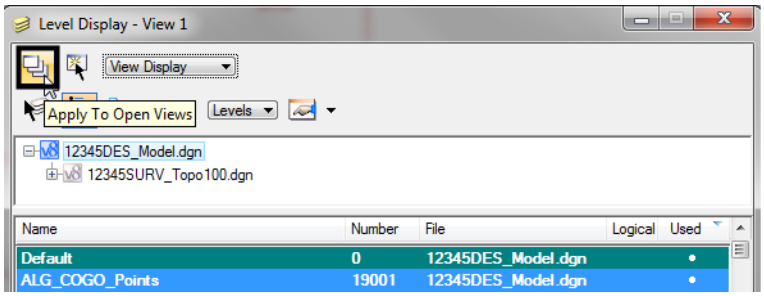


The Level Display dialog box reflects the active view's settings. The active view is recognized by a change in the color of the view title bar (in this example, View 5).

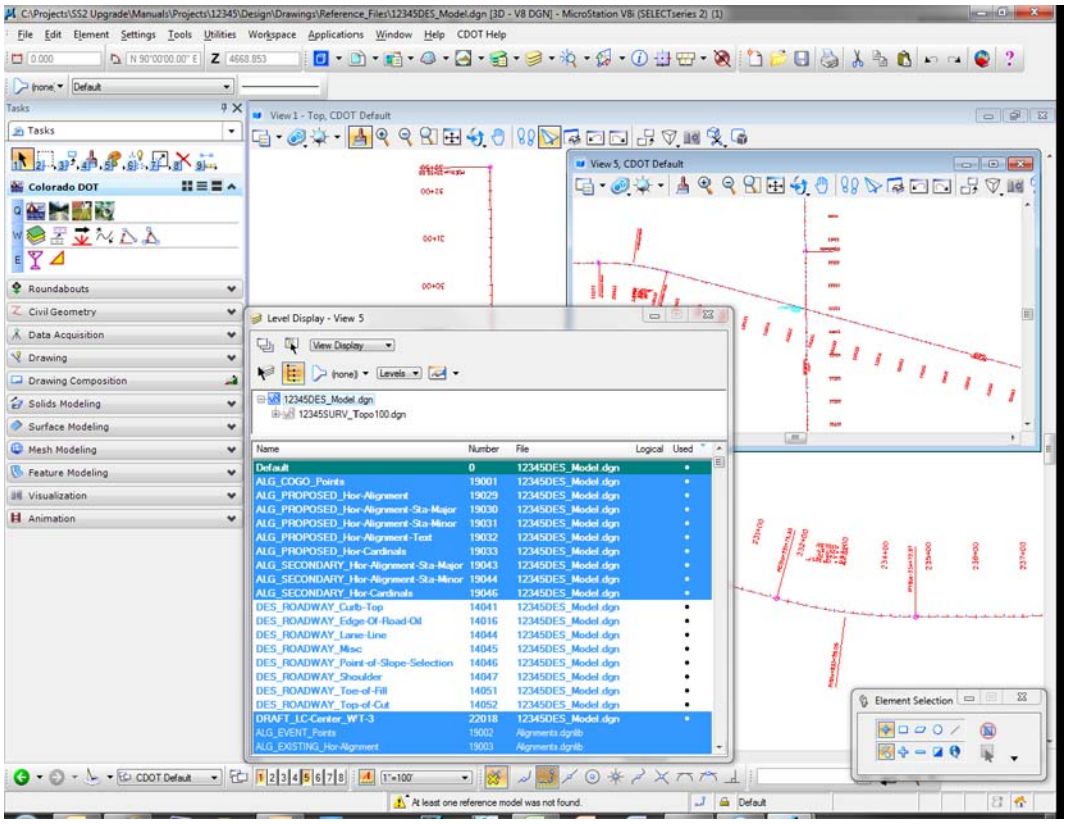
To make the displayed levels in View 5 match those in View 1;

11. Make View 1 the active view by left clicking on the View 1 title bar.

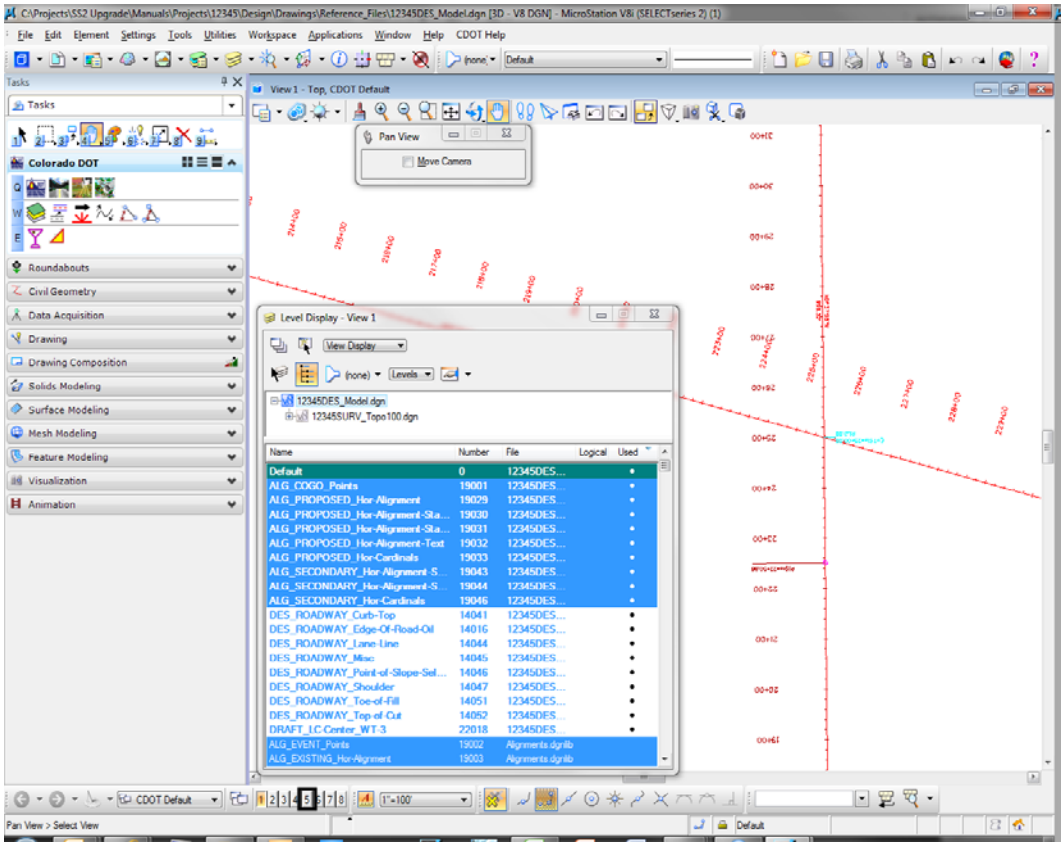
12. In the ***Level Display*** dialog box, **<D>** the **Apply to Open Views** button.



13. Bring View 5 to the front and notice that the displayed levels match View 1.



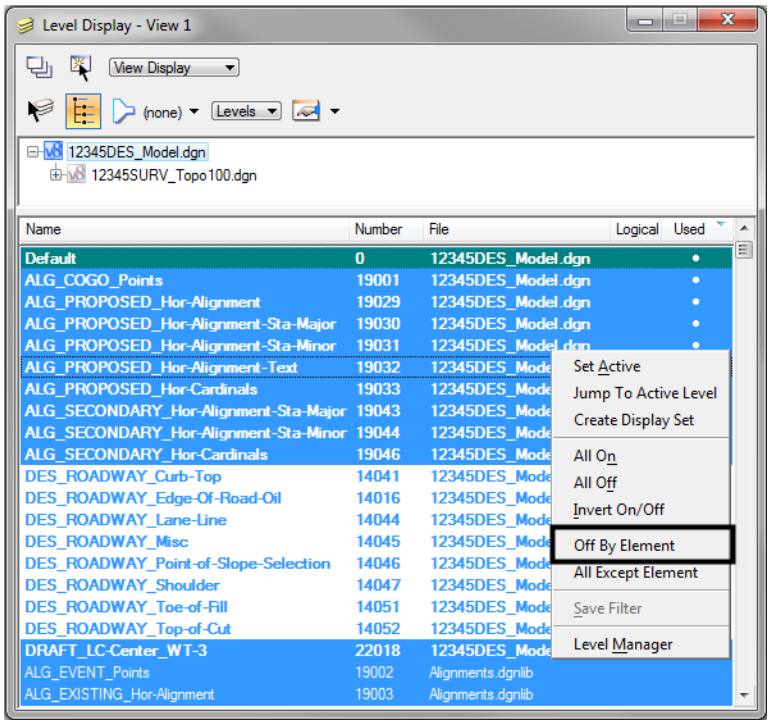
14. **Close** View 5 by toggling off View 5 in the View Groups tool box



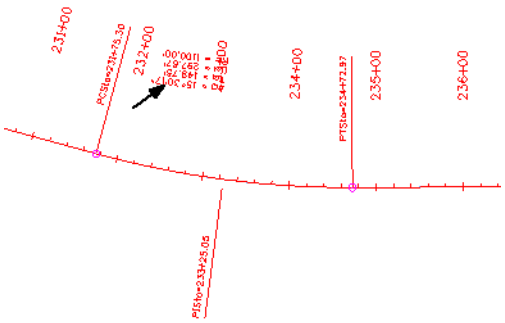
Note: Clicking on the X in the upper right corner of the view window will also close out of View 5

Turn levels on/off By Element

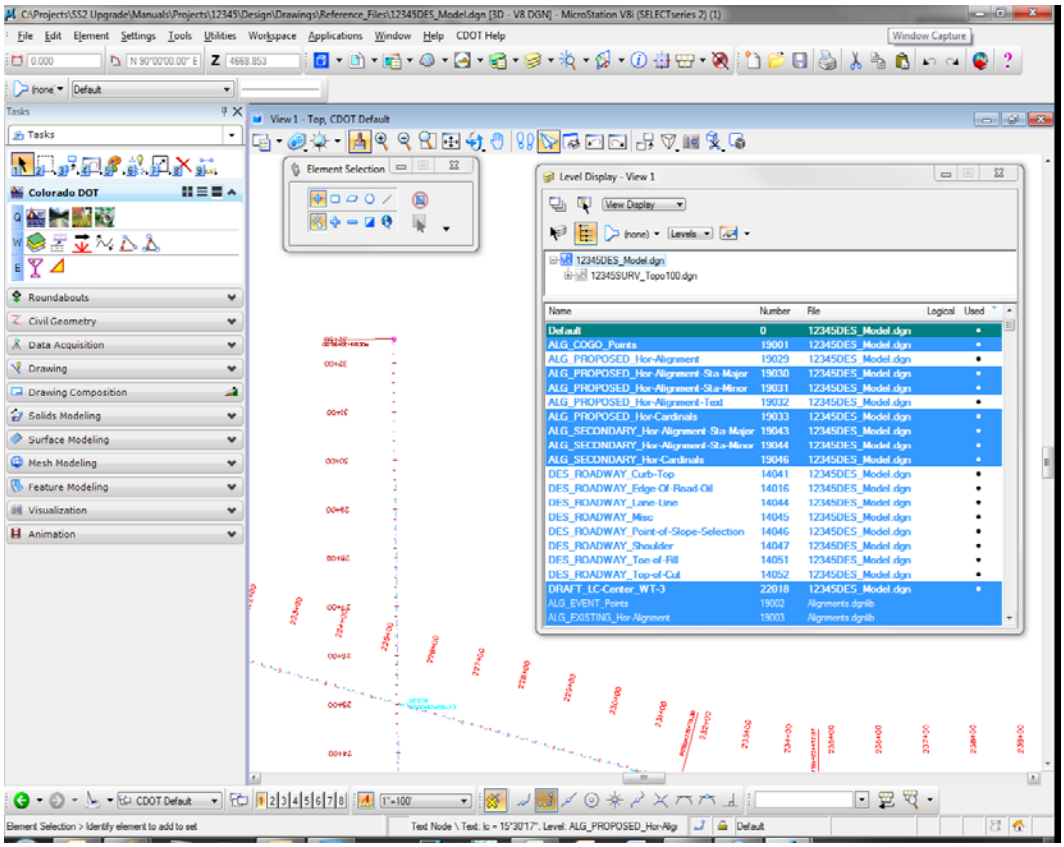
1. The station and alignment text levels are currently ***on***. **Right-click** anywhere over the level names and select **Off By Element.**



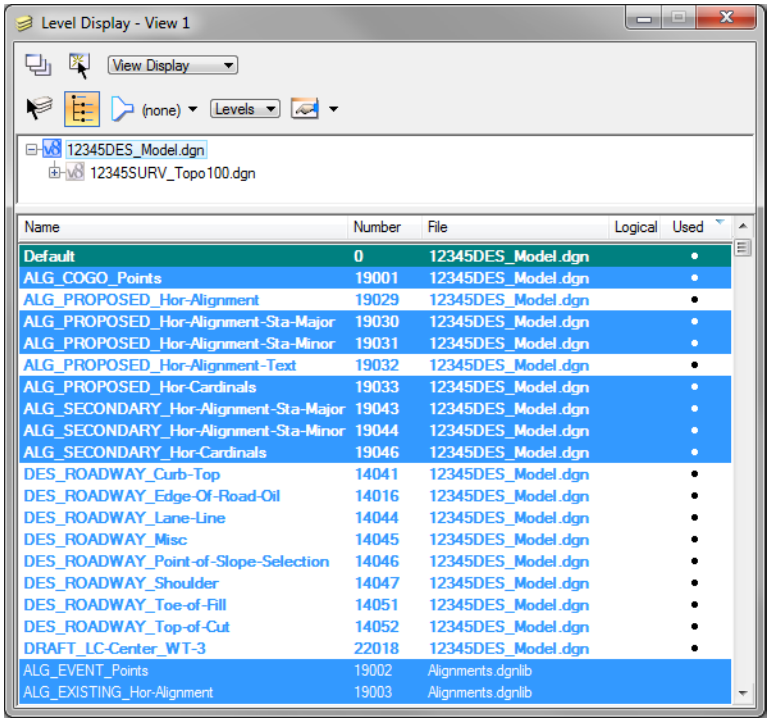
2. **<D>** on the red alignment curve text as shown.



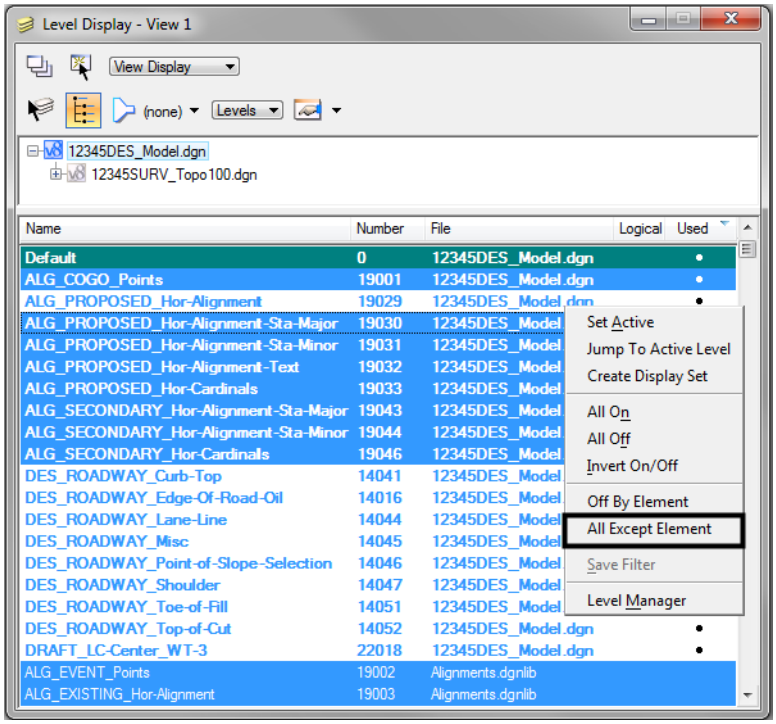
The level **ALG_PROPOSED_Hor-Alignment-Text** is turned ***off*** by graphically picking an element on that level.



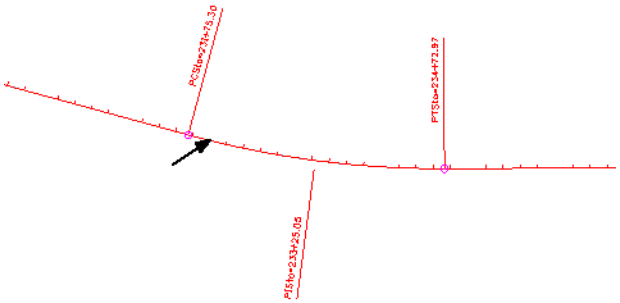
3. Turn off the Level **DRAFT_LC-Center_WT-3**.



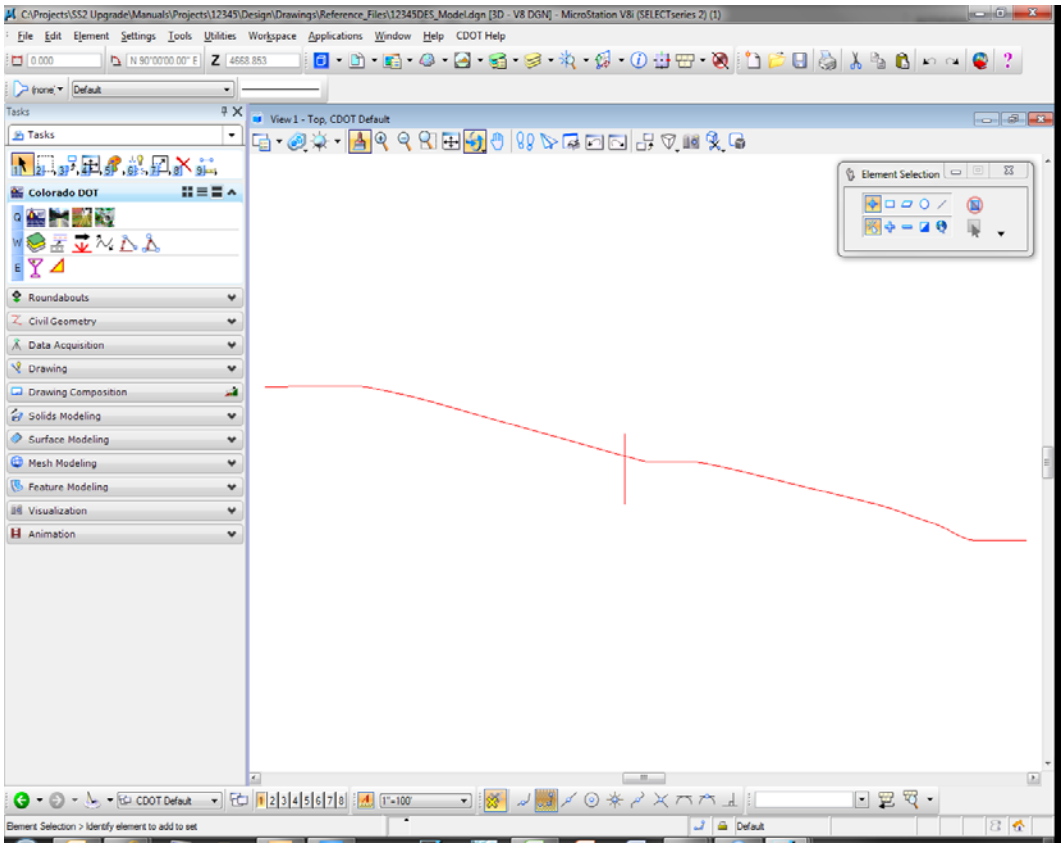
4. **Right-click** again anywhere in the **Level Display** box and select **All Except Element**.



5. **<D>** on the SH 86 (mainline) red-centerline.

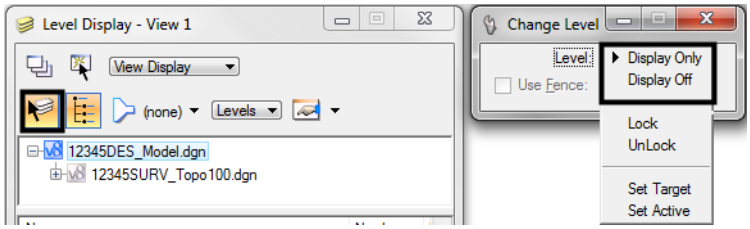


6. **Fit** View 1.

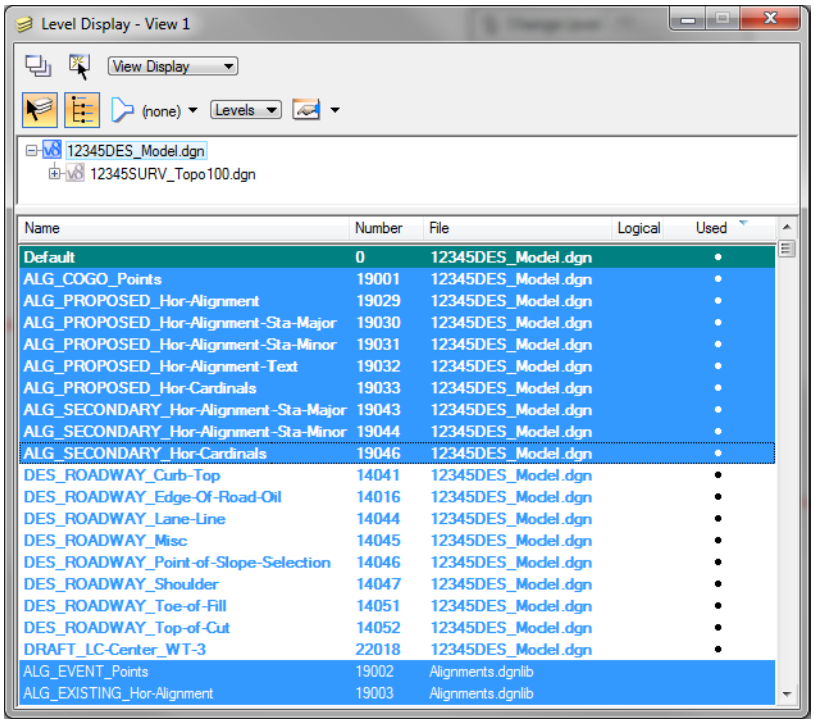


All elements except the centerlines are turned off in the view. The **Off By Element** and **All Except Element** are handy options to turn levels on/off without knowing the level names or number.

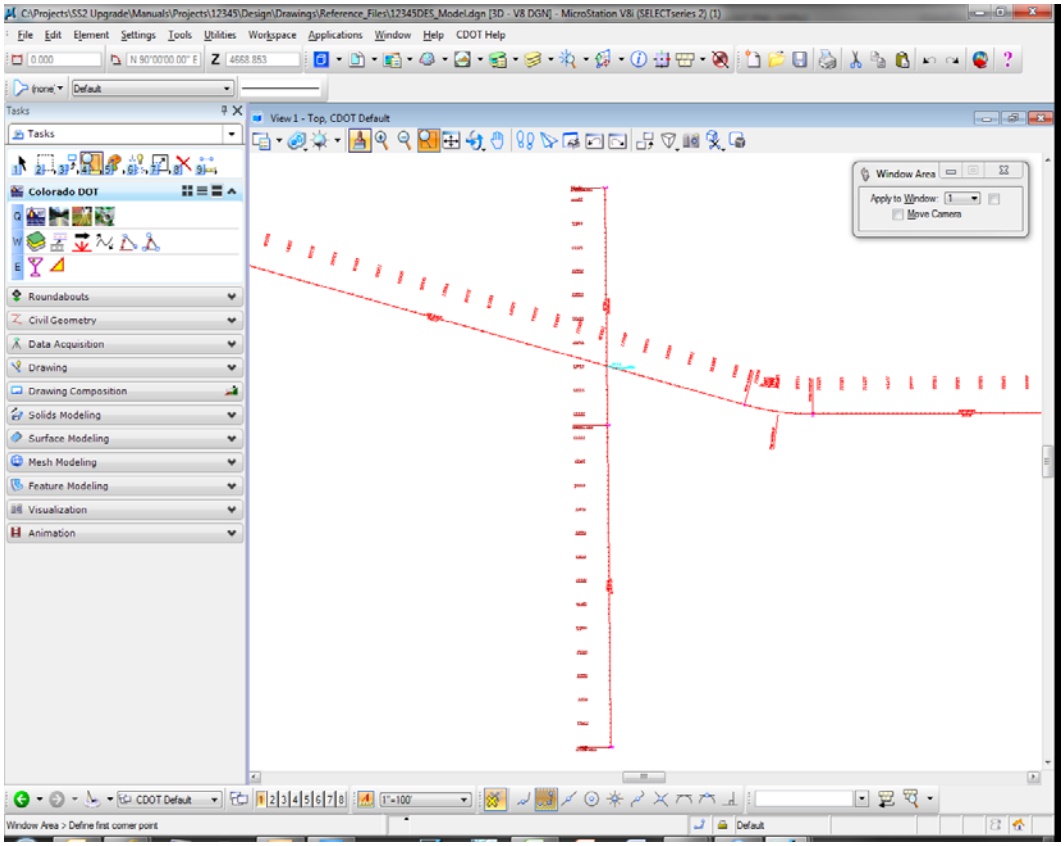
Note: You can also use the **Change Level** command, with the **Level** option set to **Display Only** or **Display Off**, to accomplish the same task.



Turn ***on*** all of the alignment levels (data point **<D>** and drag across all **ALG** levels.



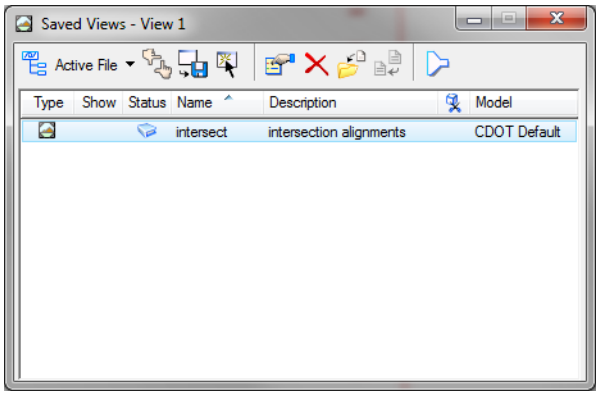
7. **Window** in to the intersection as shown.



Save a view

1. **<D>** in the **Key-in** box to set the focus.
2. Key in ***sv=intersect,intersection alignments*** and press **<Enter>.**

   Note: Always press **<Enter>** or **<Tab>** after key-ins.
3. **<D>** in View 1 to select it as the view to save.
4. Verify you saved the view. Select **Utilities > Saved Views.**



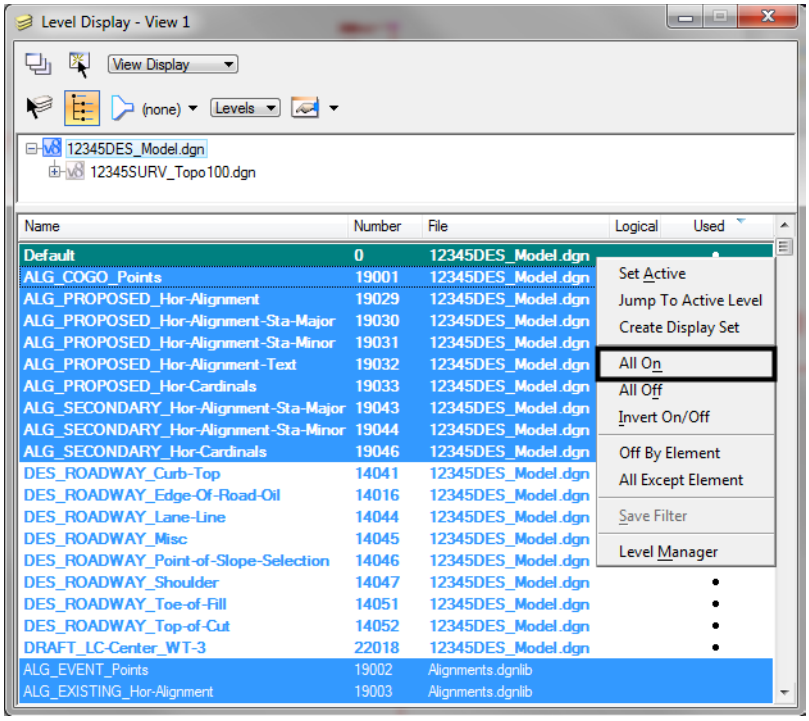
Note: The **Saved Views** dialog box opens and the saved view shows in the list. The **Saved Views** dialog is used to manage your saved views (create and delete views, edit view names and descriptions, and recall saved views).

5. **Close** the **Saved Views** dialog box.

   You may recall this saved view in upcoming labs.

Turn all levels on/off

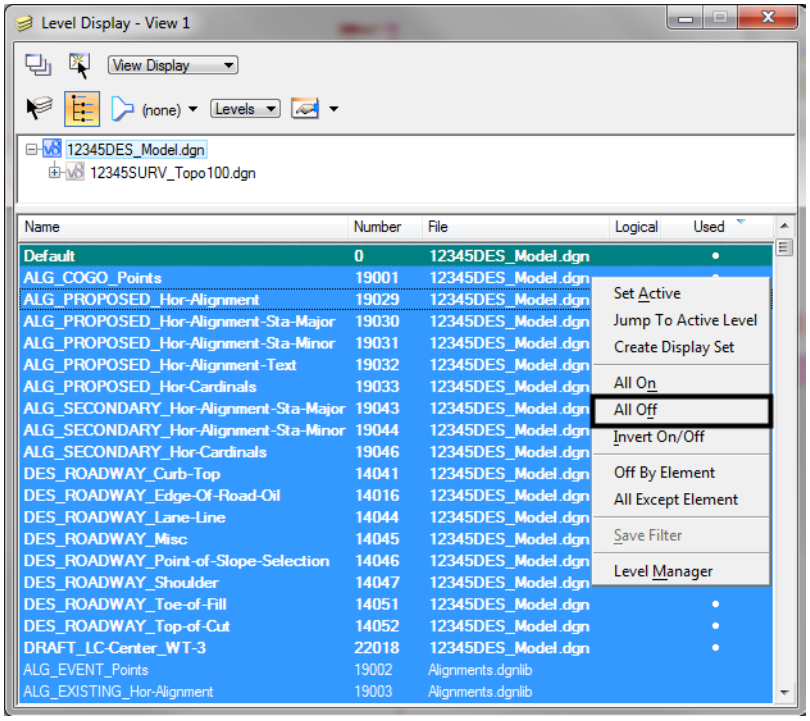
1. **Right-click** again in **Level Display** and select **All On.**



   All levels are turned on in View 1.

2. **Fit** View 1.

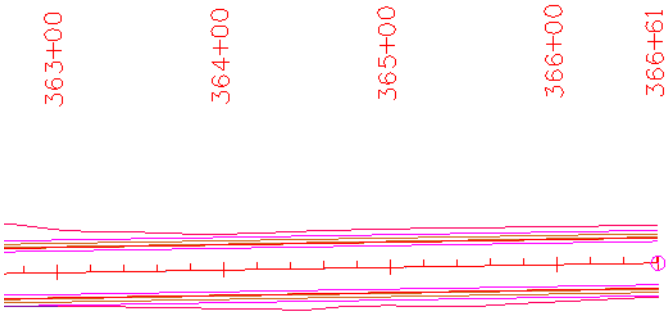
3. **Right-click** in the level display box and select **All Off** to turn all levels ***off*** in View 1.



Note: You can also turn all levels on or off with the key-ins ***on=all*** and ***of=all.***

4. Turn all levels back ***on*** in View 1.

5. Window in to the end of the project as shown.

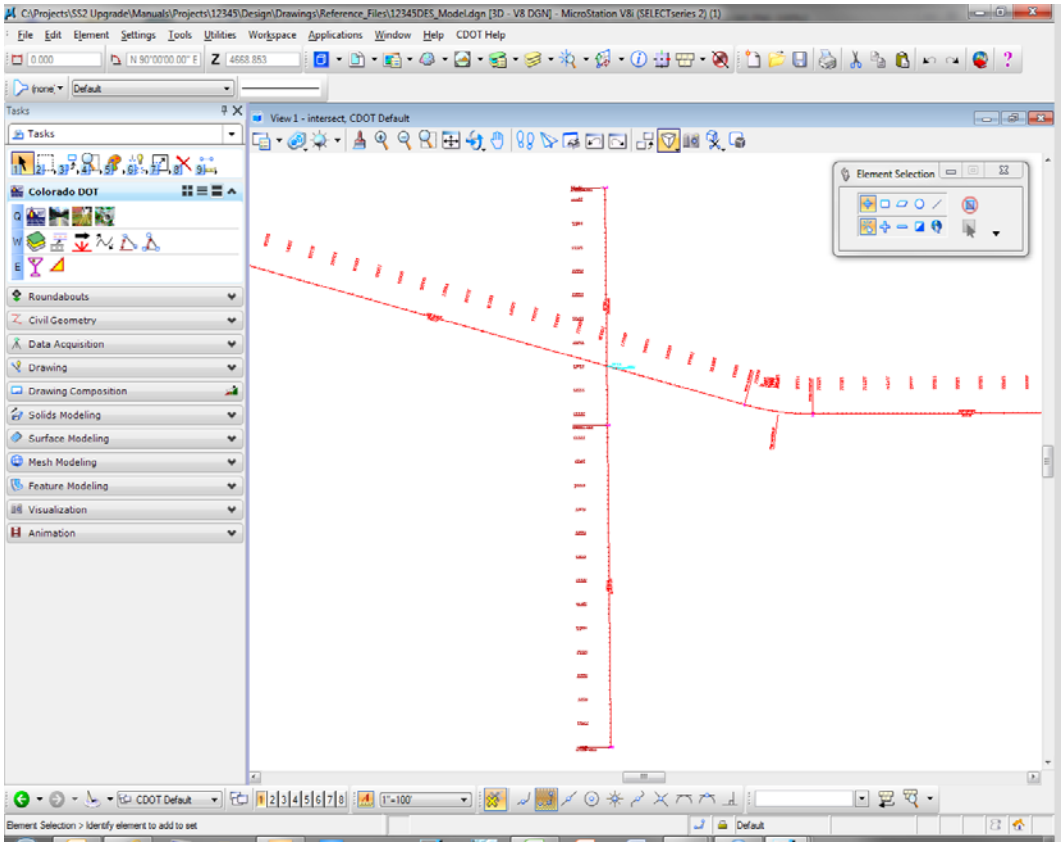


Recall the saved view

1. In the **Key-in** box, key in ***vi=intersect.***

   Don't forget to **<Tab>** or **<Enter>** after key-ins.

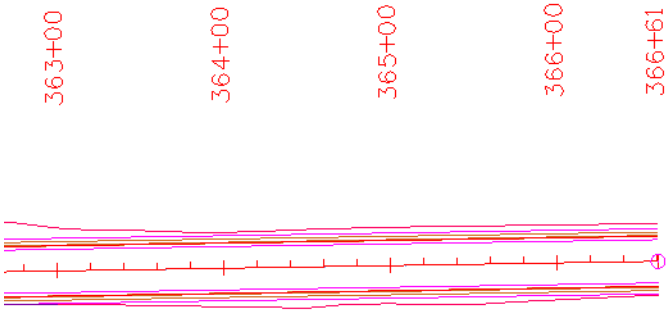
2. **<D>** in View 1.



The saved view of the alignment and stationing is recalled in View 1. The appropriate levels from the saved view are turned on/off.

3. From the **View Control** toolbar, select **View Previous**.

The previous view of the beginning of the project is recalled. Notice that all levels are turned back on from this previous view.

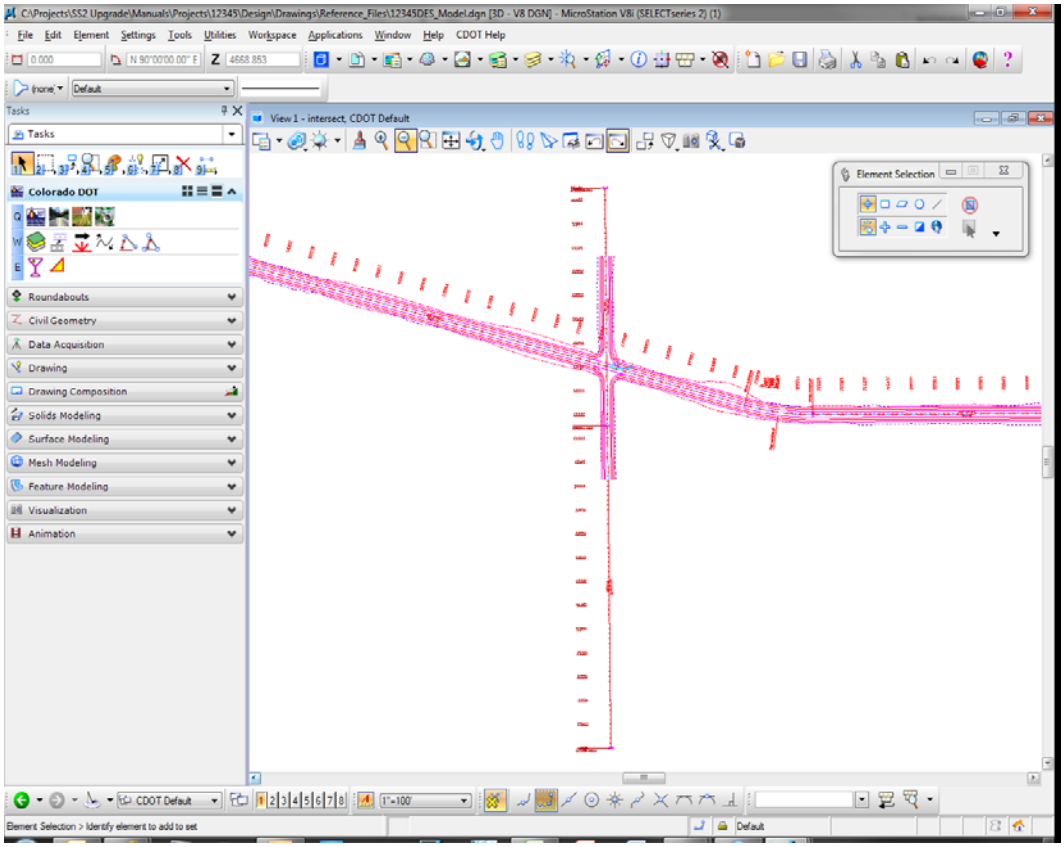


4. Select **View Next**.

This recalls the intersection view again with the design levels turned off.

Use key-ins to turn level on/off

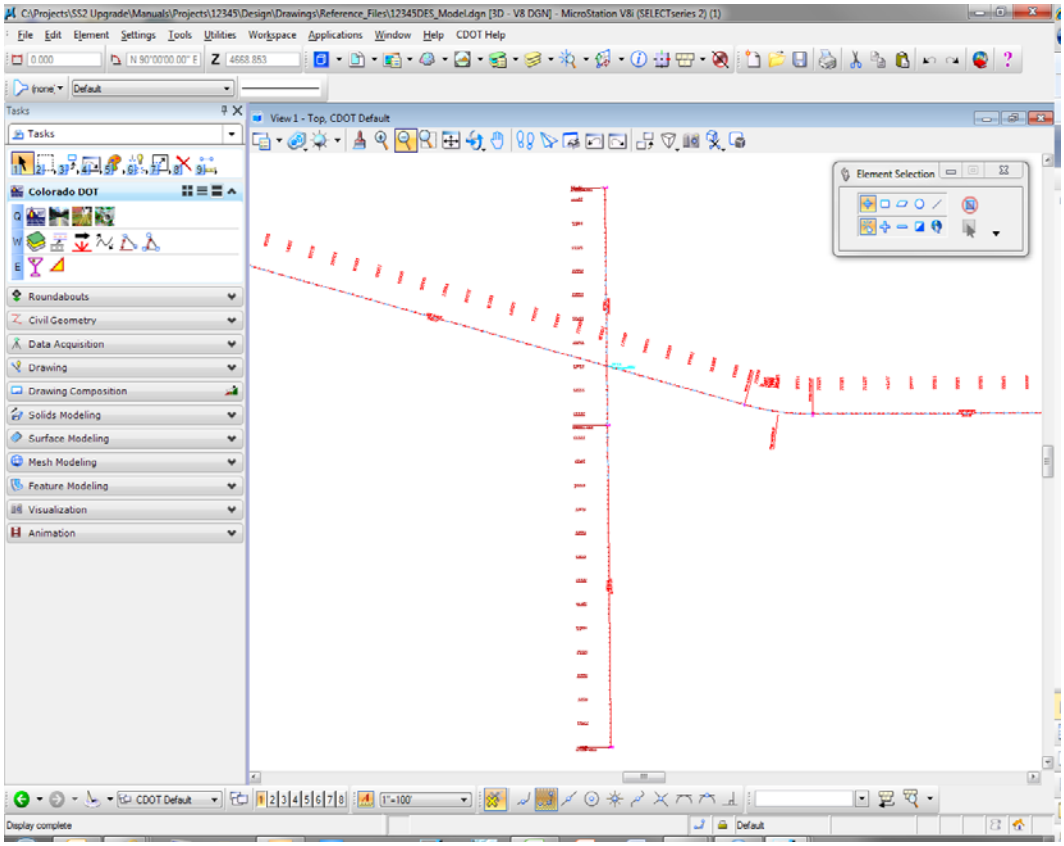
1. Key in ***on=all,*** then **<Tab>** or **<Enter>**.
2. **<D>** in View 1 to turn all level back on in this view.



Note: Levels are view-dependent. When using key-ins, you must select the view with a data point **<D>** to tell MicroStation which view to turn levels on or off.

3. Key in ***of=des****.

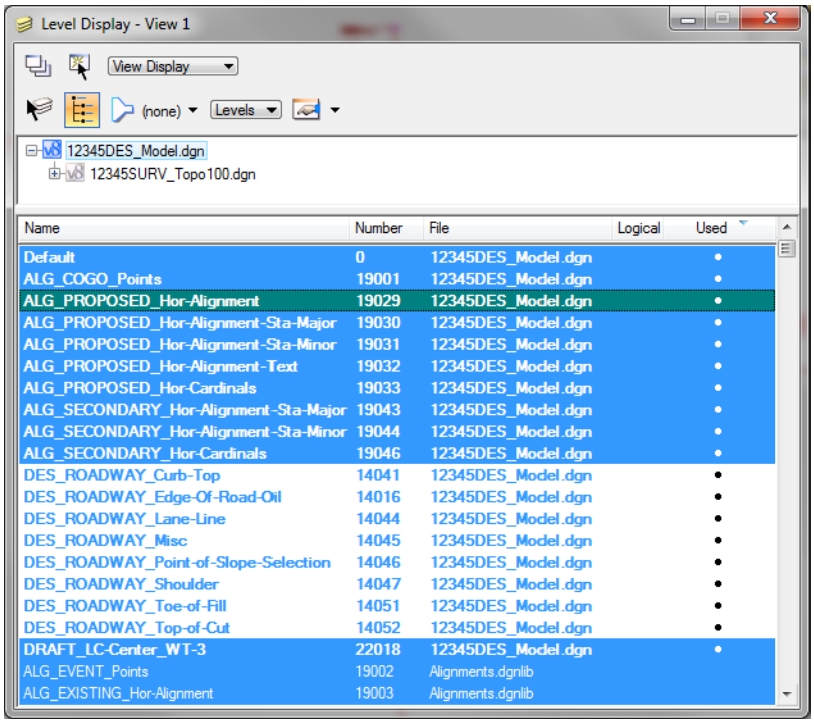
4. **<D>** in View 1 to select View 1.



All **DES_** levels are turned off in view 1. You can use wild cards with key-ins to turn a group of levels on or off.

Set the active level

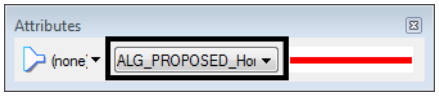
1. In the **Level Display** box, **double-click** on the level **ALG_PROPOSED_Hor_Alignment** to set it active.



The background color changes to green.

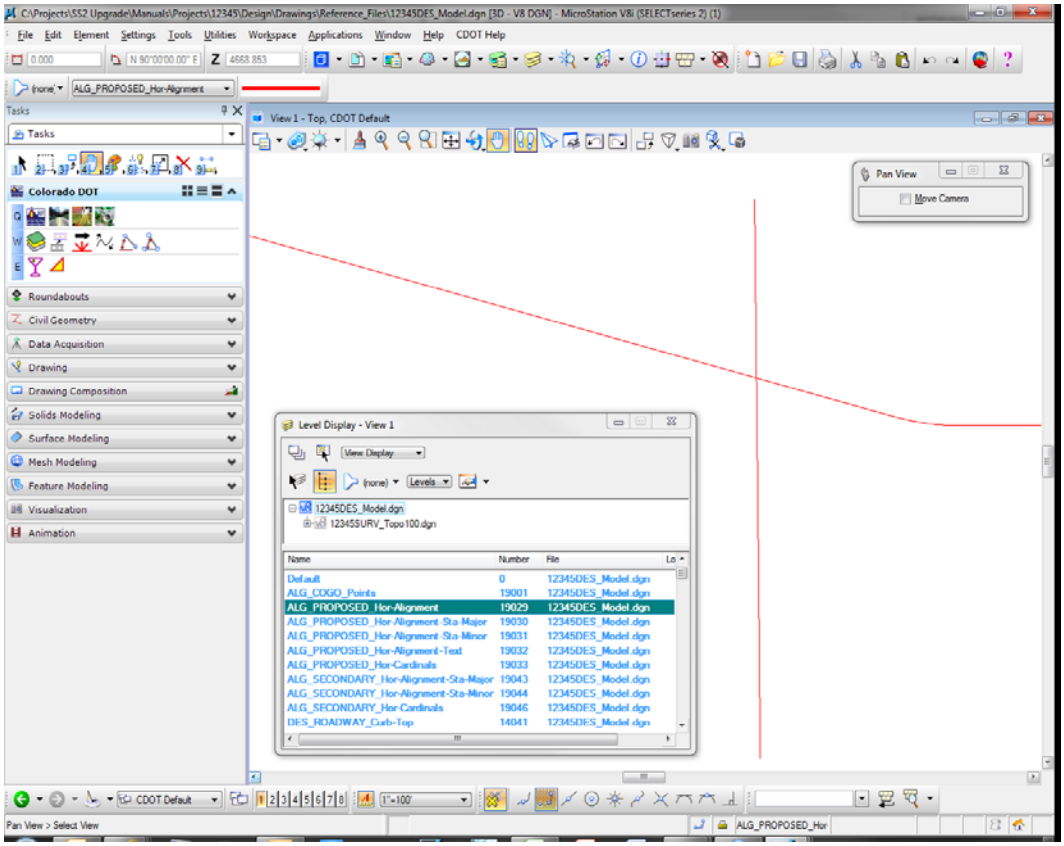
Note: You can also use the ***lv=*** key-in to set the active level.

The active level is also reflected in the Attributes toolbar at the top of the screen.



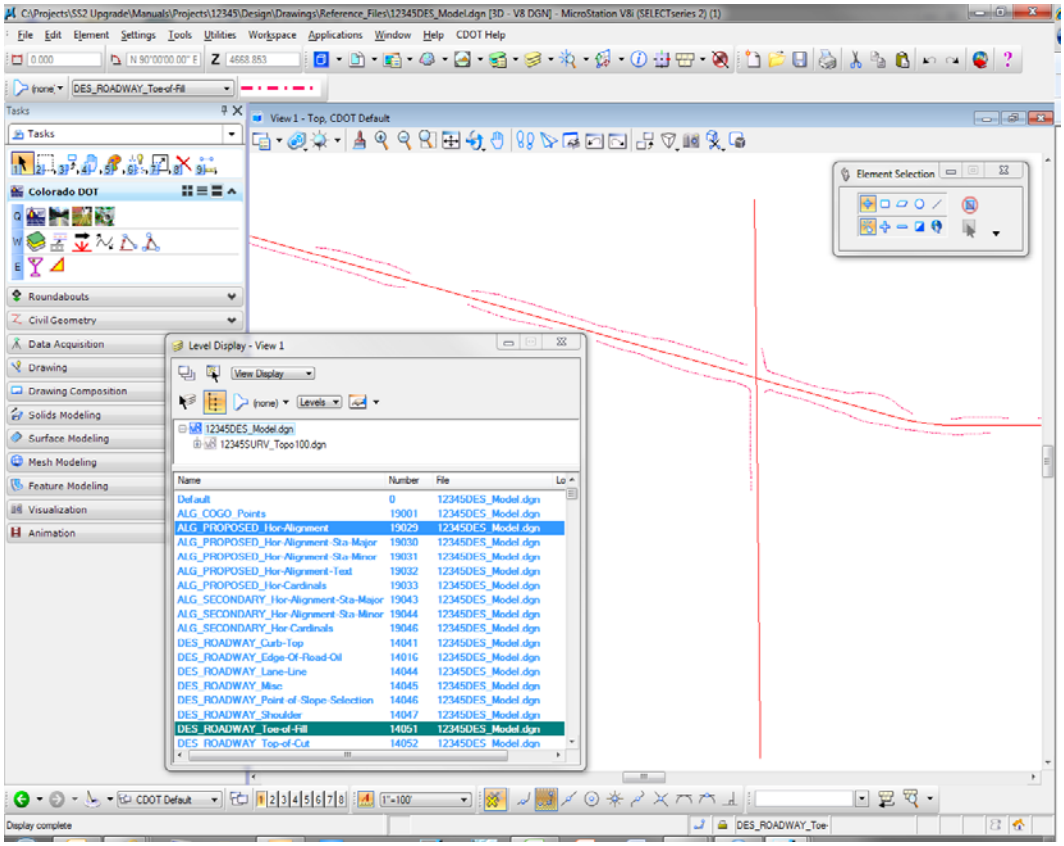
2. Turn all levels ***off*** in View 1.

All levels are turned off except the alignment centerline because it is the active level.



Note: The active level is always displayed provided the option **Display Active Level in All Views** is toggled on in **Workspace > Preferences > Operation**. If this option is turned off, you can also turn the active level on/off.

3. Key in ***lv=14051***, to change the active level to the **Toe-of-Fill** level.



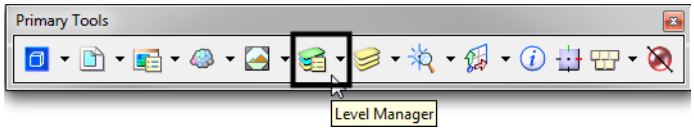
This level is automatically turned on in the view and now shows with a green background in the **Level Display** box.

4. **Close** the **Level Display** box.

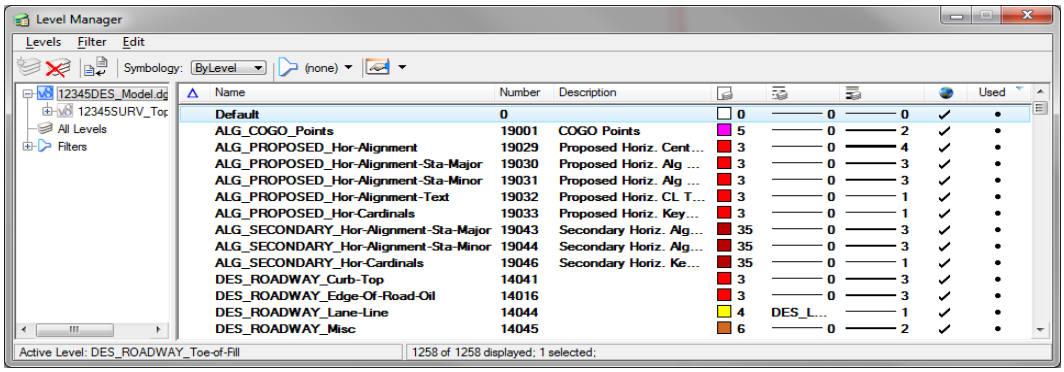
Lab 2.3 - Working with the Level Manager

The **Level Manager** shows all of the level libraries that are attached to your design file, level names, numbers, descriptions, etc. The **Level Manager** also displays each level's **ByLevel** symbology – the color, line style and weight assigned to that level, which conforms to CDOT's CADD standards. Additional information such as if the level is used, frozen, available for plotting, etc. are also shown in the **Level Manager**.

1. Open the **Level Manager**. Select **Settings > Level > Manager** or on the **Primary** toolbar select **Level Manager**.



2. Sort the **Level Manager** on **Used** to bring all the used levels to the top of the list, you may need to scroll over to the right to see the column **Used**.



Level Libraries

Level libraries are master templates of levels. The discipline-specific level libraries (Roadway Design, ROW, Alignments, etc.) are attached to your design file via the **Select Group Environment** utility program that you ran before starting MicroStation. The **Select Group** program has two options: ***Bridge*** and ***xxMulti-Discipline***. All groups except Bridge should choose ***xxMulti-Discipline*** to attach all level libraries. The Bridge option just attaches level libraries needed for the Bridge group.

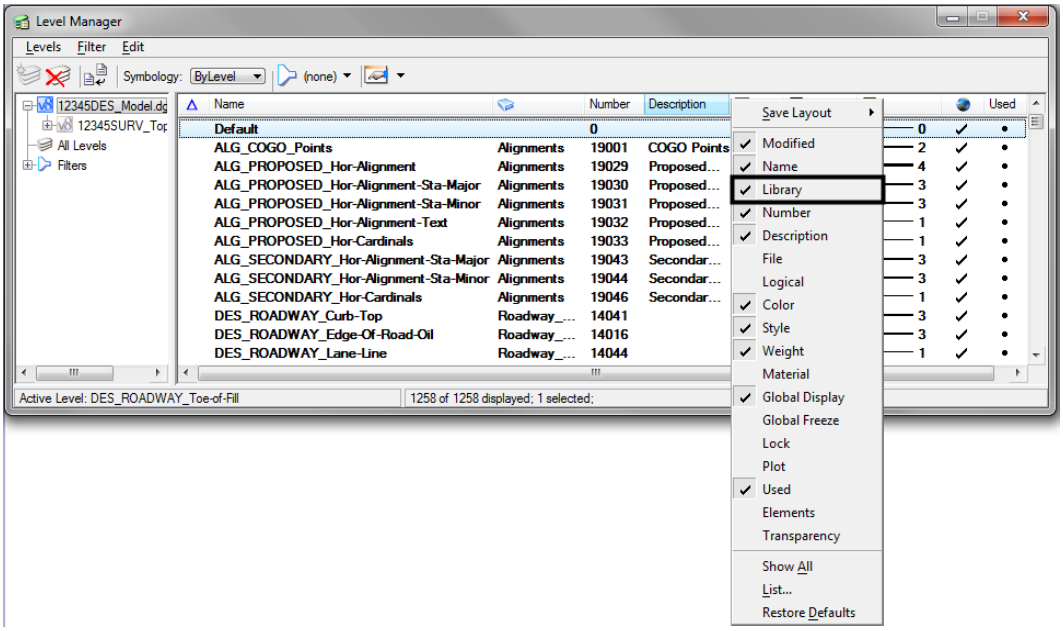
When a level is set active and graphics are placed on this level, the level is copied from the library file to the active design file.

Used levels that are copied to the design file appear bold in the **Level Manager**. All unused levels are in the library.

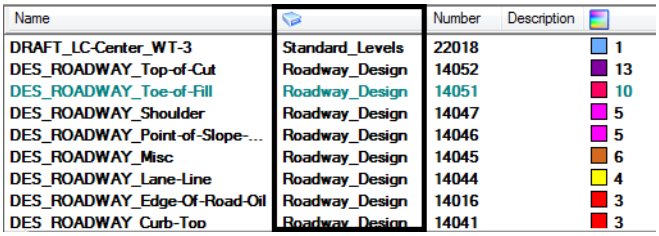
1. Scroll through the list of levels.

   All levels have a logical level naming convention according to their library (e.g. all roadway design levels start with **DES**, all alignment levels with **ALG**, topo levels with **TOPO**).

2. Right click in the column headings and toggle **Library** on.



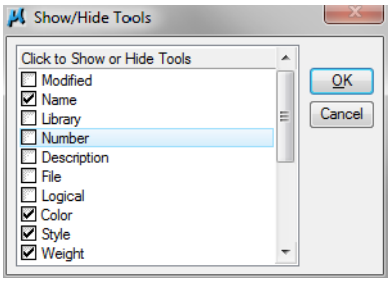
The library name is now shown in its own column in Level Manager.



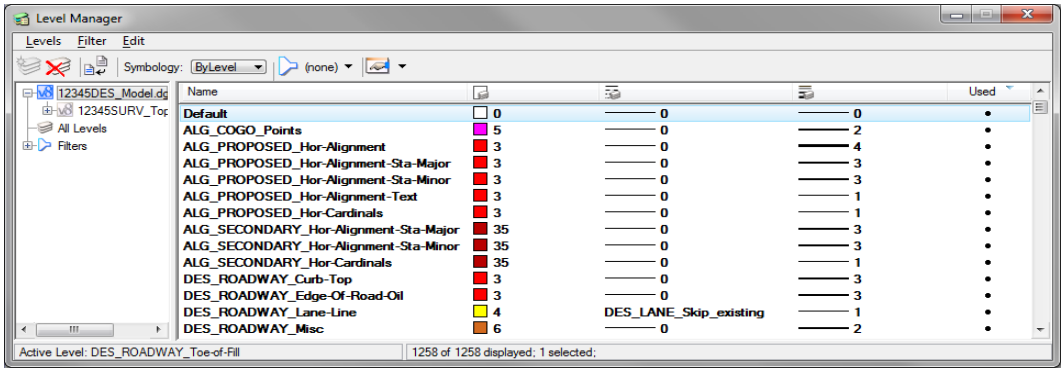
Change the look of the Level Manager box

1. **Right-click** in any column heading (**Name**, **Number**, etc.) and select **List.**

2. Toggle heading on or off so that **Name, Color, Style, Weight, and Used** are on and select **OK**.



The Level Manager box updates to reflect the changes.



3. **Close** the **Level Manager** box.

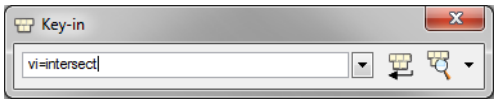
ByLevel Symbology

ByLevel symbology ensures that CDOT CADD standards are met by placing graphics **ByLevel** (the color, line style and weight assigned to that level in the level library).

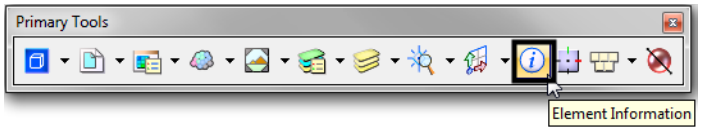
Note: When placing graphics using the **CDOT Group Menus**, the correct level, along with it's **ByLevel** symbology is automatically set for you.

Analyze an element

1. In the **Key in** box type ***vi=intersect***, Enter the keyin and then **<D>** in view 1 to recall the alignment saved view.

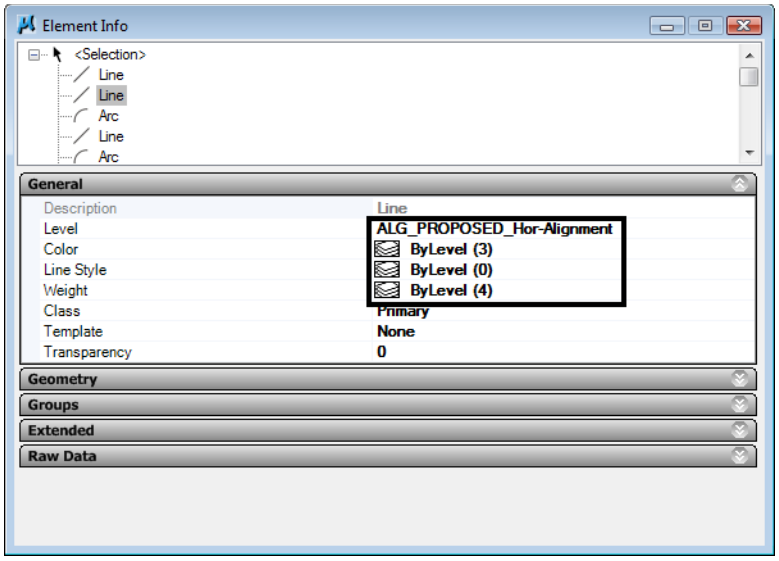


2. From the **Primary** toolbar, select **Element Information.**



3. **<D>** on the horizontal alignment centerline graphic.

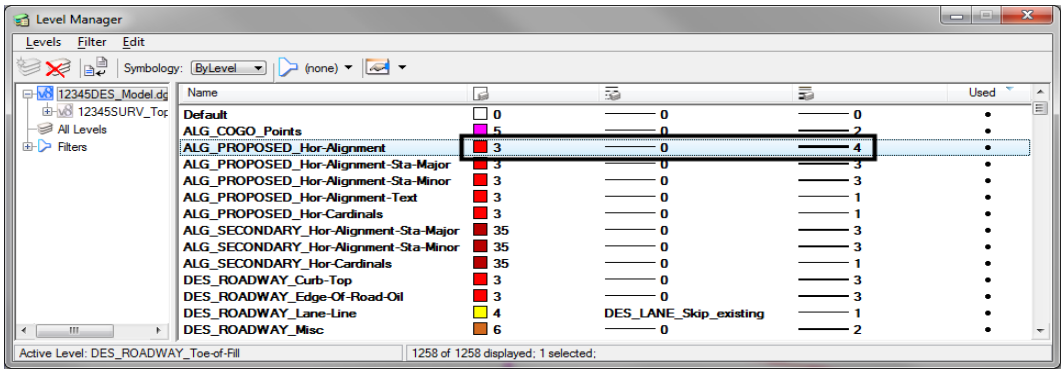
Element Information shows that the alignment was placed on **ALG_PROPOSED_Hor_Alignment** level and placed with **ByLevel** Symbology.



4. **Exit** out of the **Element Information** box.

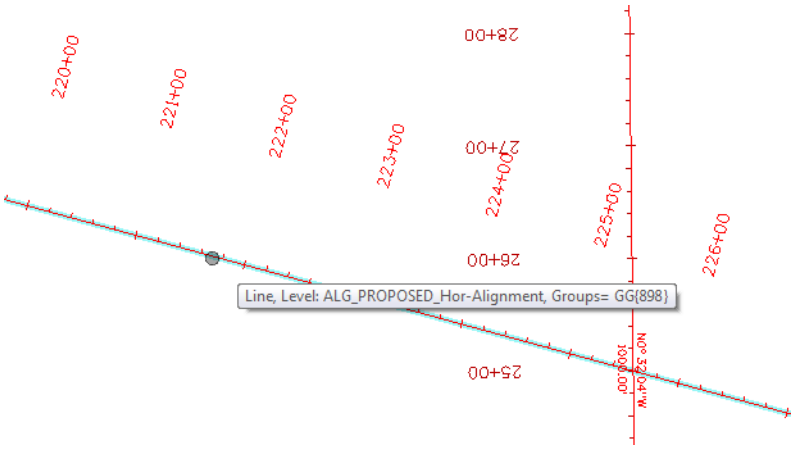
5. Open the Level Manager box.

6. Find the **ALG_PROPOSED_Hor_Alignment** level and note the ByLevel Symbology is set up in the **Level Manager**.



Review Pop-up information

1. Hold your cursor over the centerline of SH 86 (the mainline alignment).



MicroStation's "pop-up" information tells you the type of graphic (line) and the level on which it is placed (**ALG_PROPOSED_Hor_Alignment**.) Pop-up information is a quick way to determine what level graphics are on.

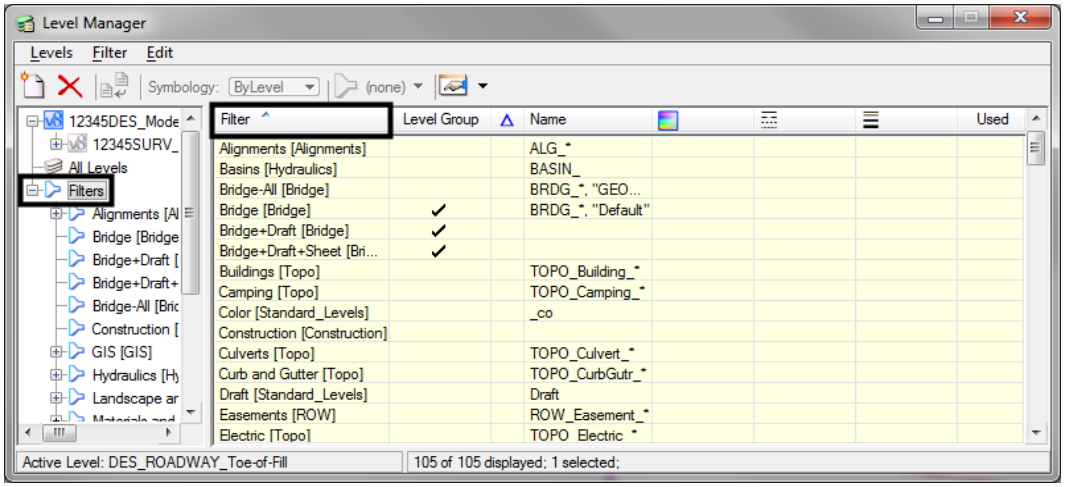
Level Filters

Level Filters are groups of levels created in the **Level Manager** by filtering on virtually any level criteria (name, number, color, etc.) and then naming the filter. These level groups can then be turned on/off using the filter.

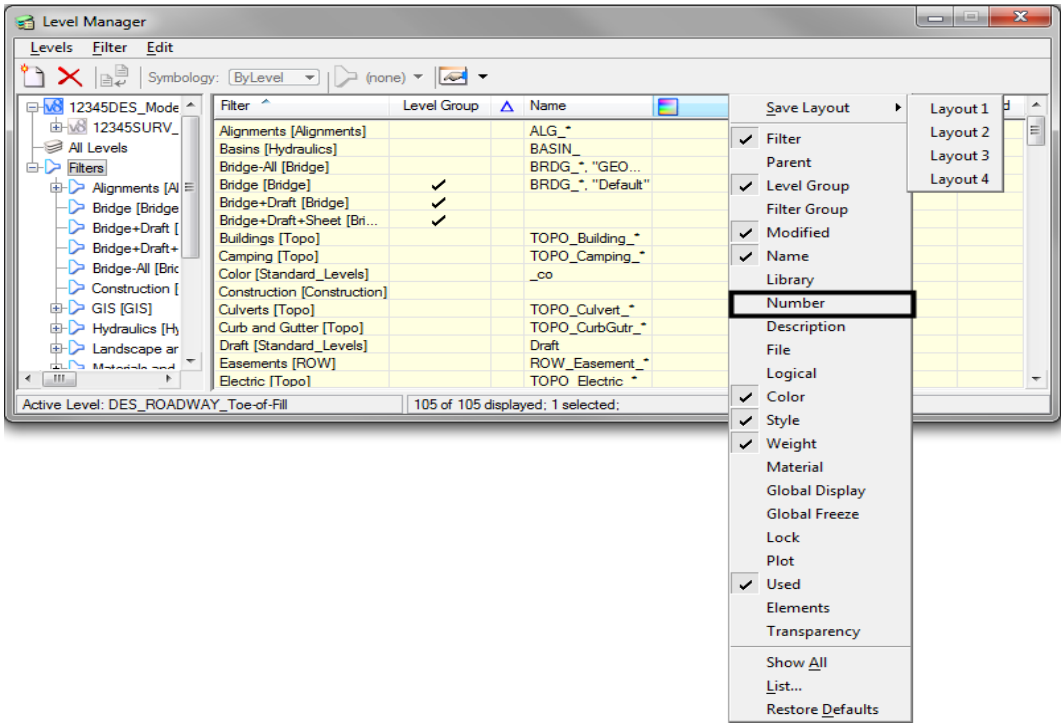
Review the filters

1. In the left pane of the **Level Manager** box, **click** on **Filters**.

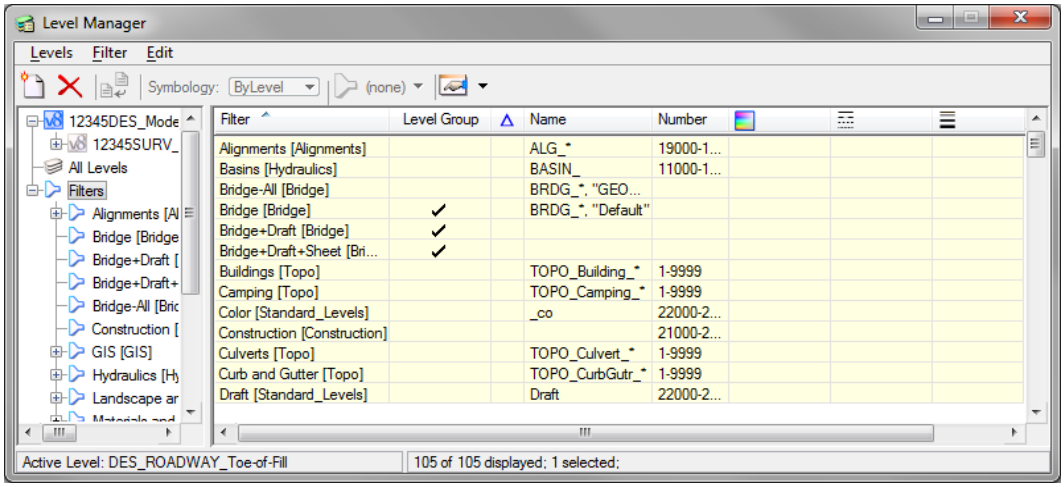
2. Click on the column name **Filter** to sort alphabetically by filter name**.**



3. Turn on the **Number** column.



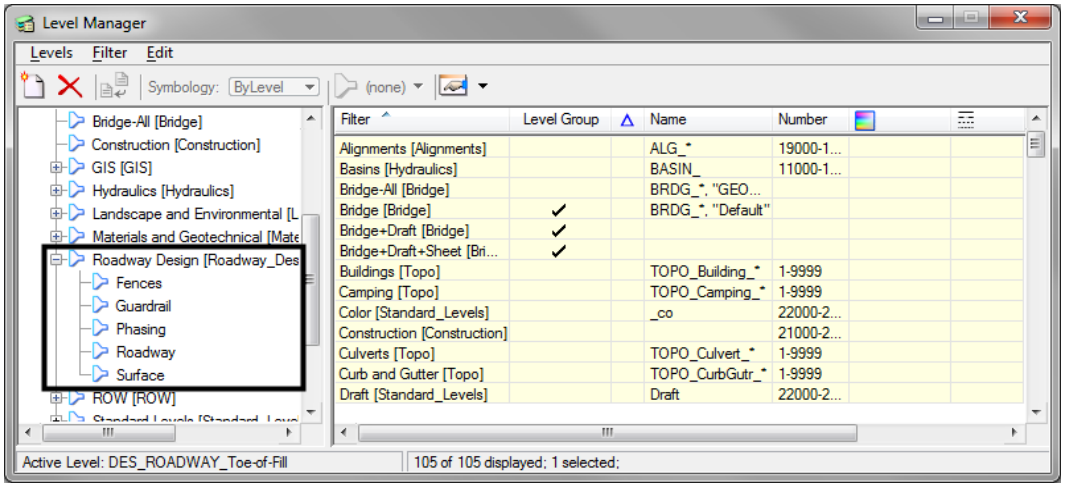
There are several standard CDOT filters, which are based on name and number. The CDOT standard level naming and numbering convention enables the efficient use of level filters.



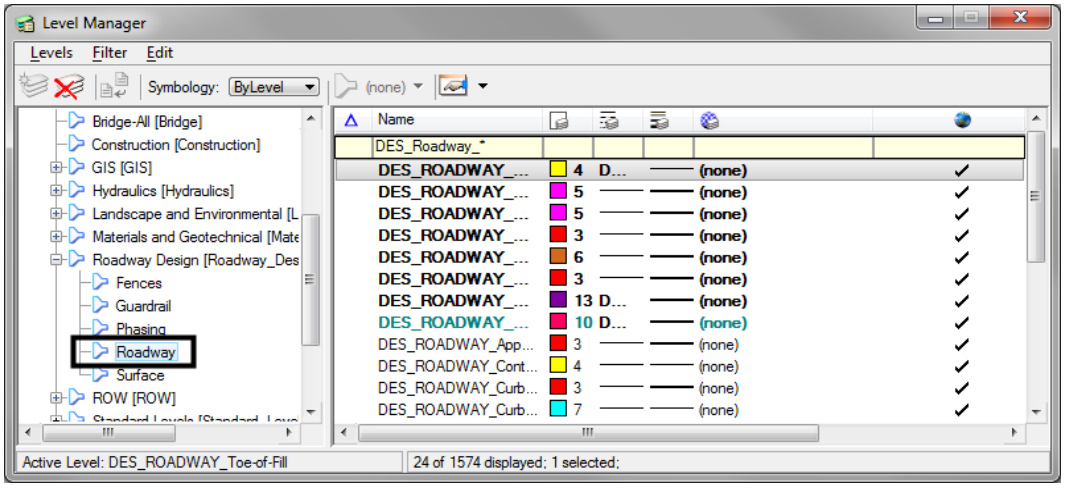
Note: Level filters are stored in level libraries (note the library name in brackets beside the filter).

4. In the left pane of the **Level Manager**, Click the **+** symbol next to the **Filters** to expand the list.

5. Click the **+** symbol next to the **Roadway Design** to expand this list.

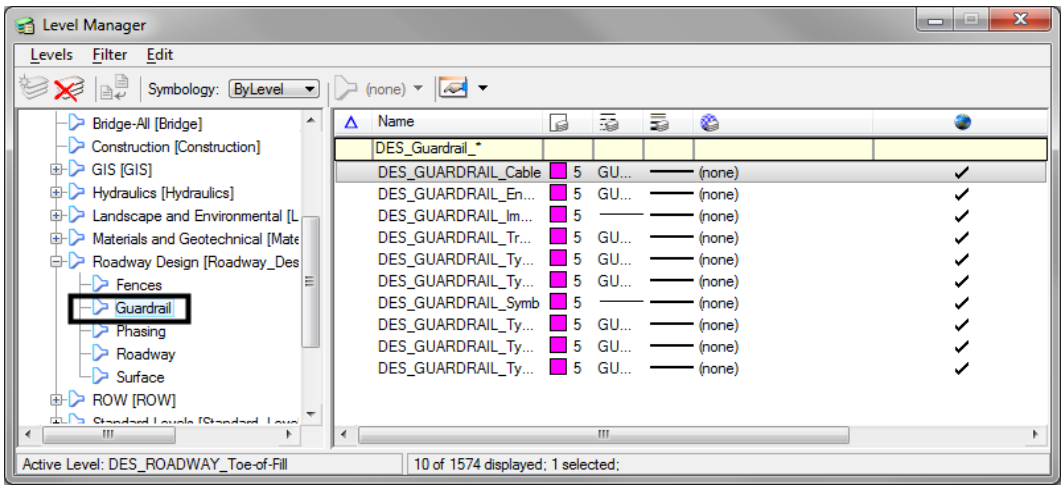


6. **Click** on **Roadway** to review the levels that make up this filter (all design levels with Roadway in the name).



Note that this filter contains both used levels in the active file and unused levels in the library.

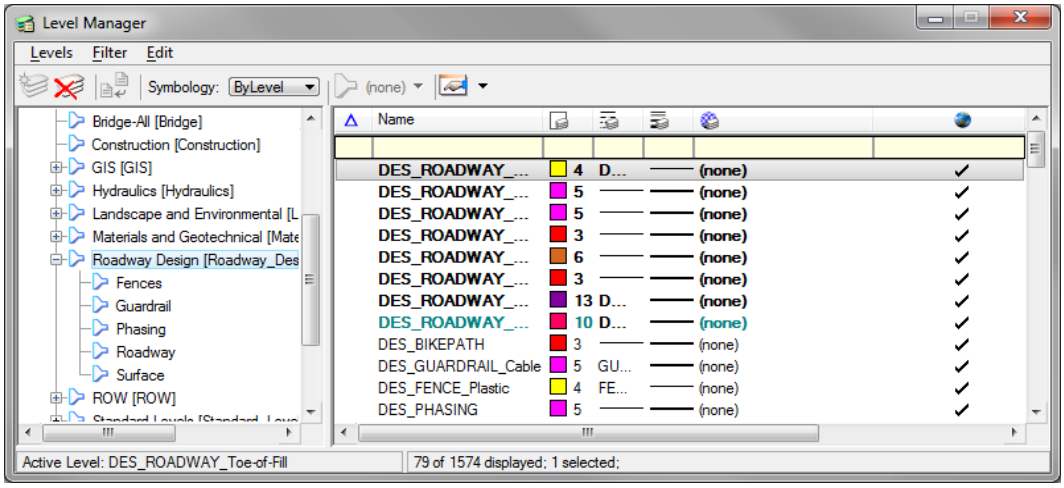
7. Click on **Guardrail** to review all design levels with Guardrail in the name.



Note: This filter does not have any used levels in the active design file. All levels are from the library.

8. Right-click in any column heading and turn on the **Number** column.

9. Click on the upper level **Roadway Design** filter and review levels.



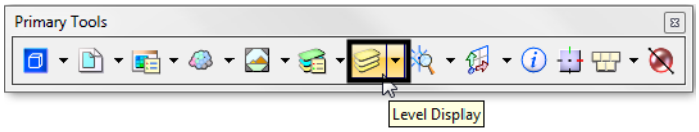
Note that this filter is not filtered on name, but instead contains all levels in the Roadway Design level number range (14000 – 14999). This includes all "children" filter levels like Guardrail and Roadway.

Use level filters to turn levels on/off

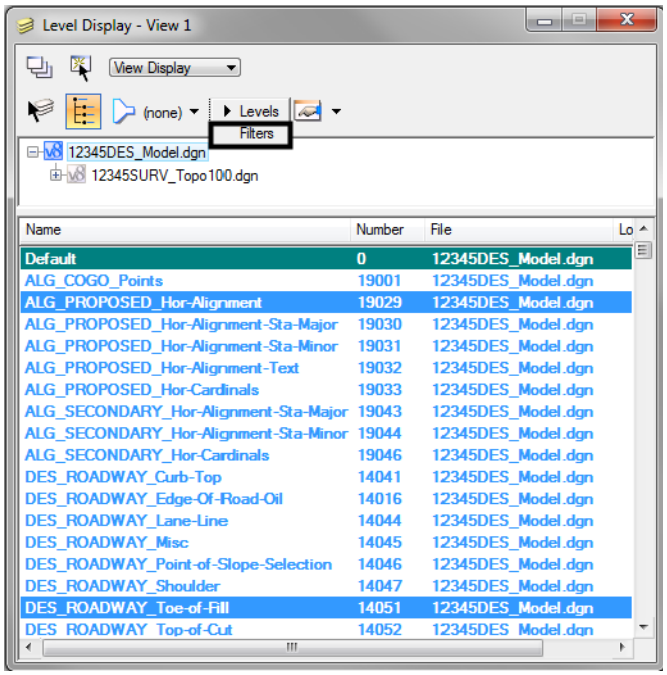
The level filters are stored in the level libraries, accessed via the **Level Manager**. However, to actually use the filters, you need to use **Level Display**.

1. **Close** the **Level Manager**.

2. **Open** the **Level Display** box from the **Primary** toolbar.

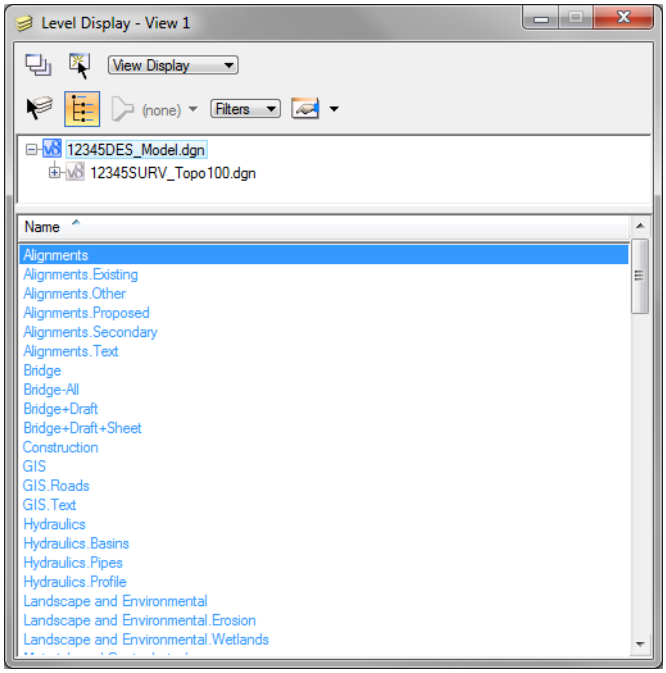


3. Set the active level to **Default** by **double-clicking** it in the **Level Display** box.
4. Turn ***off*** all levels.
5. Change the **Show** option from **Levels** to **Filters.**

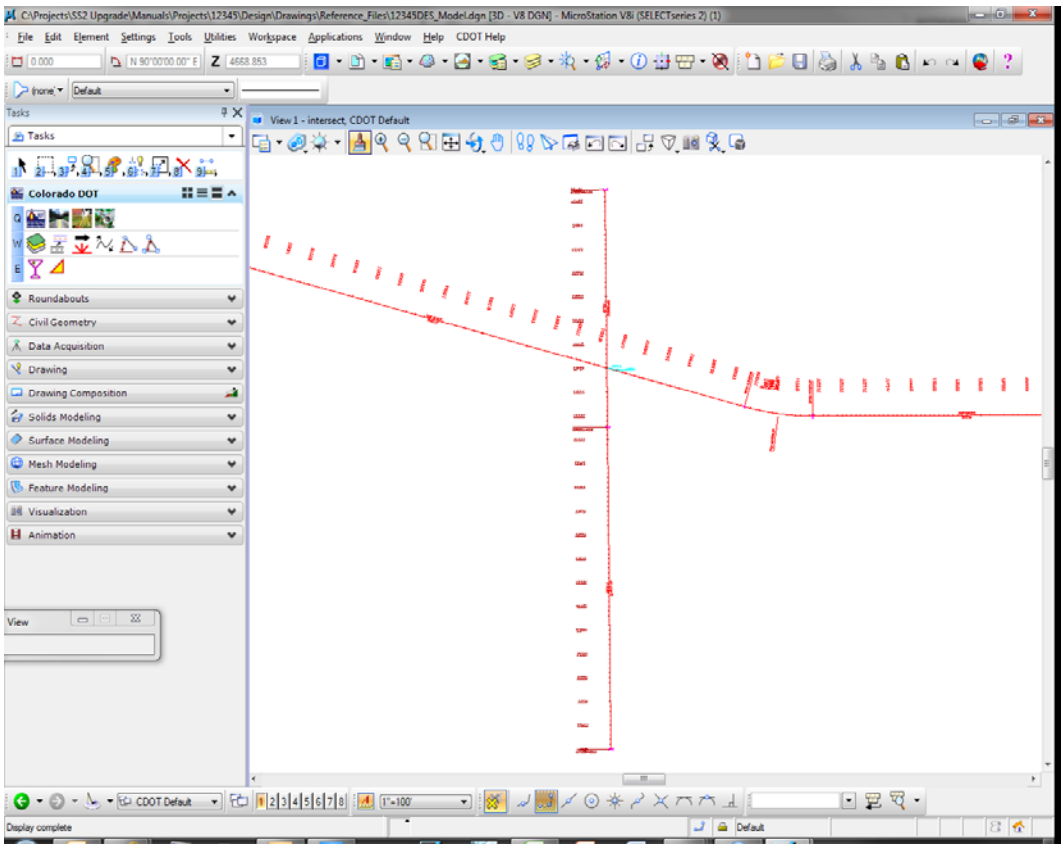


6. Sort the **Level filters** alphabetically in ascending order.

7. Toggle ***on*** the **Alignments** filter.



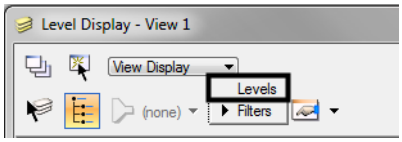
Only the alignment levels (centerline and stationing levels) are turned on. Choosing the filter turns on all levels in the filter.



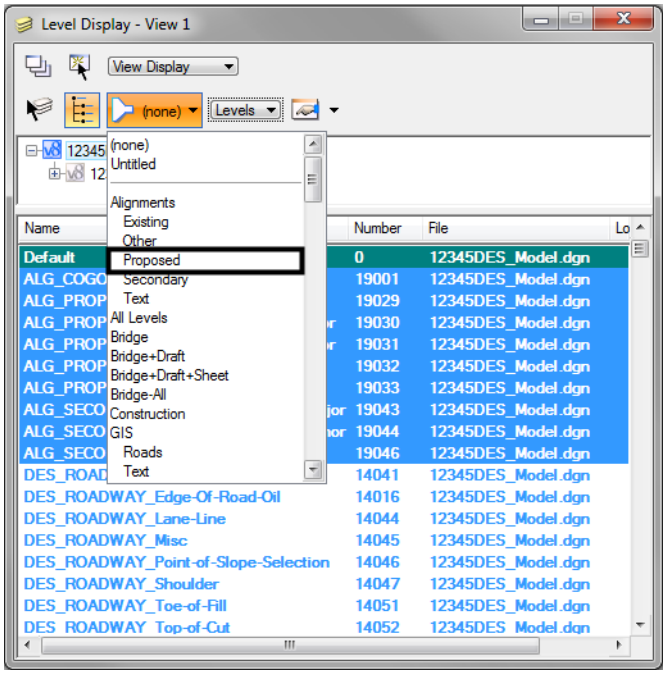
Note: If you toggle the filter off, it turns ***all levels*** on by default. However, selecting the filter again resets the filter and turns on only the filter levels.

Use level filters to select a group of levels

1. With the **Alignments** filter selected, change the **Show** option back to **Levels**.

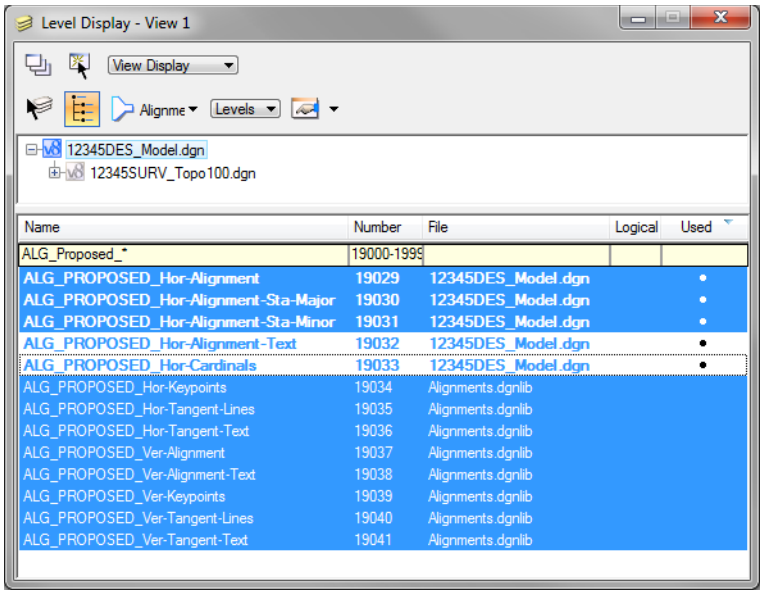


2. Change the **List Filter** from (none) to **Alignments > Proposed**.



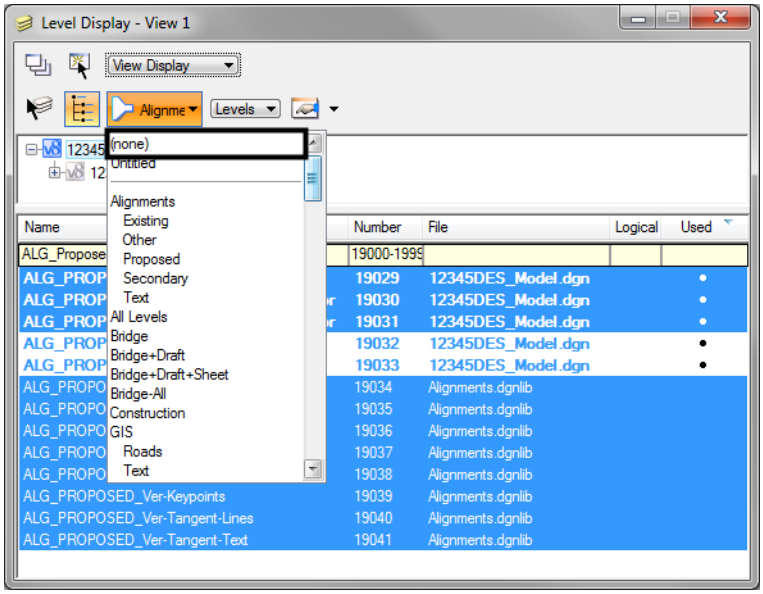
The list of hundreds of levels is filtered down to only a few (the levels contained in the Proposed Alignments filter).

3. Turn off the **ALG_Proposed_Hor-Alignment-Text** and **ALG_Proposed_Hor-Cardinals** levels.



Note: Use **Level Filters** to improve your MicroStation efficiency when searching for levels. Setting the **List Filter** is an efficient way to work with levels. Instead of scrolling through hundreds of levels to find a level to turn on, off or set active, the filter breaks the levels down into a logical and manageable group.

4. Set the **List Filter** back to (none) to show all levels in the **Level Display** list.



5. **Close** the **Level Display** box.

6. **Fit** View 1.

7. Save your settings (**File > Save Settings**).

8. **Exit** MicroStation.

LAB 3 - 3D View Control

Chapter Objectives:

After completing this exercise you will know how to:

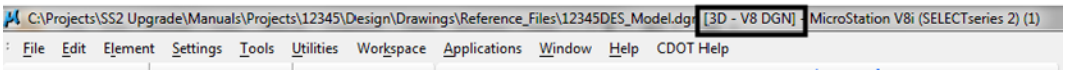
- Check the elevation of an element
- Rotate a view using the ***rv=*** keyin
- Rotate a view using the 3-point method
- Rotate a view by element
- Rotate to a standard view (Top, Front, etc.)
- Check and set the **Active Depth**
- Check and set the **Display Depth**

Lab 3.1 - Starting MicroStation

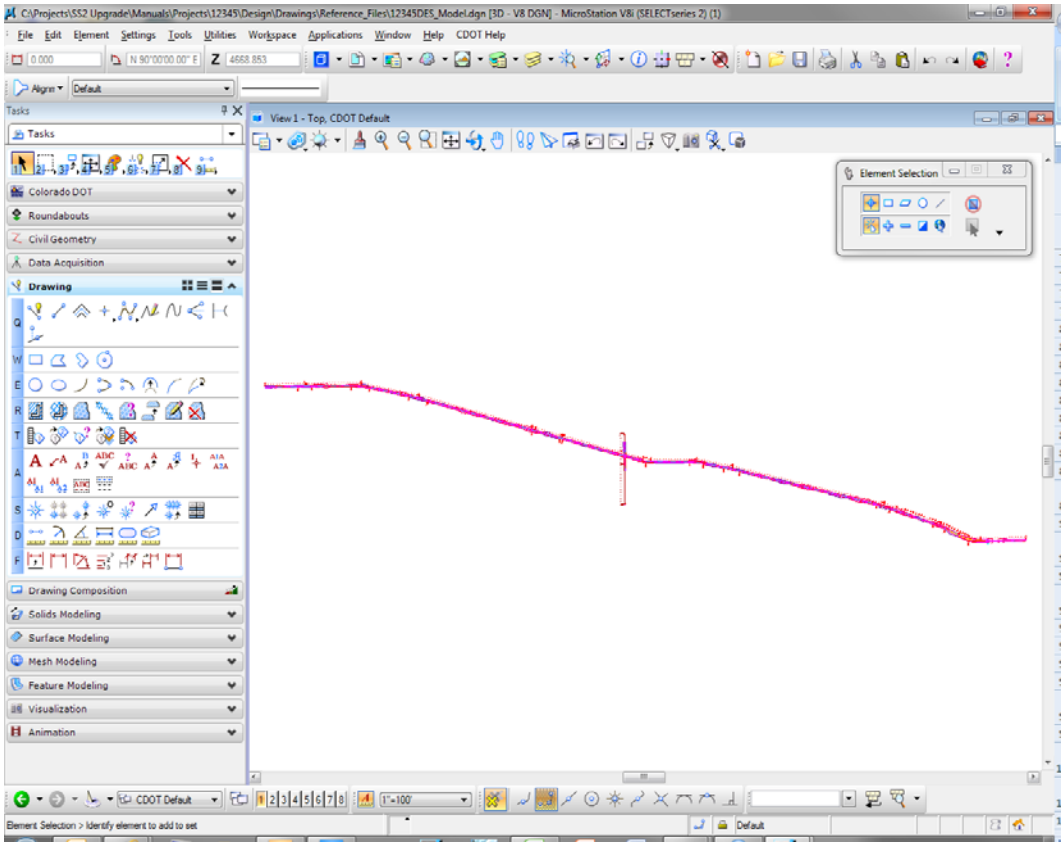
1. Start MicroStation and open the design file **12345DES_Model.dgn**from the **C:\Projects\12345\ Design\Drawings\Reference_Files** folder.

   You will use this CDOT project, which has proposed graphics placed at the correct elevations, to practice with the concept of 3D view controls.

2. Look in the top title bar of the MicroStation window and note that this is a 3D file.



3. **Fit View** 1



The design file shows only the proposed alignments because only the ALG levels were turned on when settings were last saved.

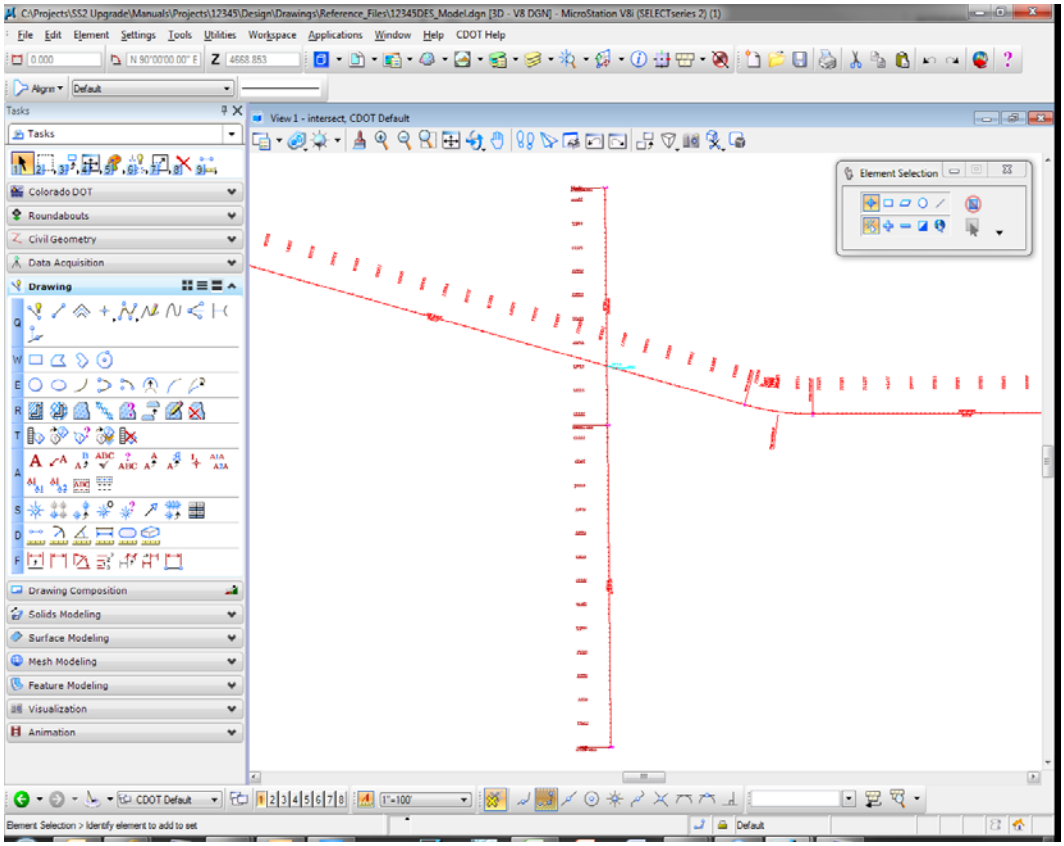
Lab 3.2 - Checking Element Elevations

You can quickly check the coordinates of any point (including the Z coordinate in a 3D file) by placing a tentative point.

1. Key in ***vi=intersect*** to recall the alignment saved view.

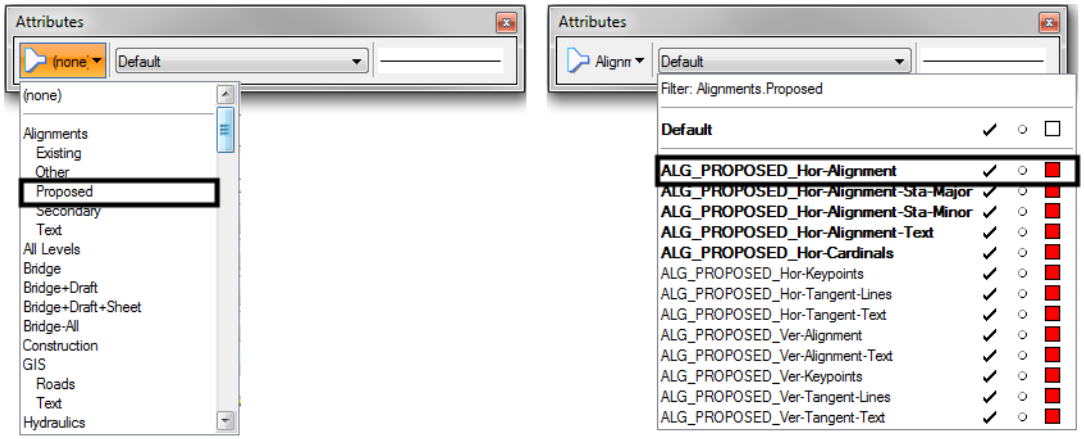
   Note: Always press **<Enter>** or **<Tab>** after keyins.

2. **<D>** anywhere in View 1 to recall the saved view.



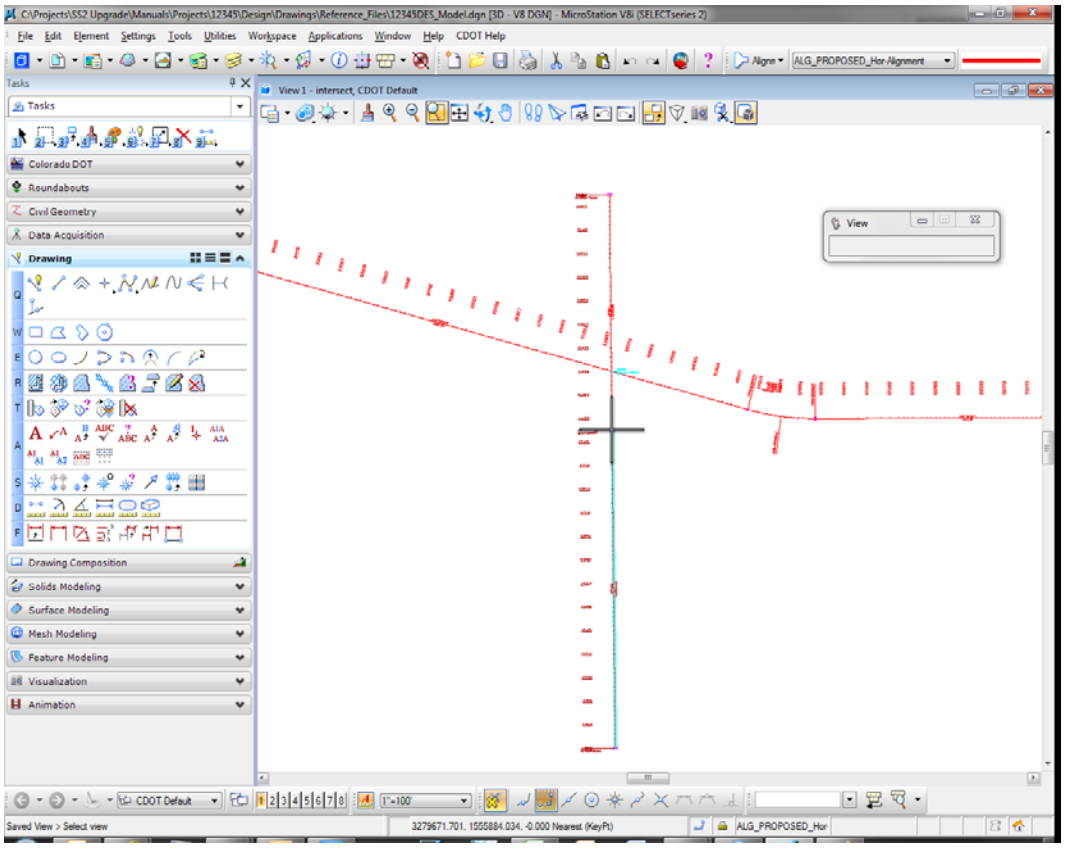
The design file has some graphics, like the horizontal alignment, placed at elevation 0. Other graphics, like contours generated by InRoads, are placed at an elevation range of approximately 6600 ft.

3. On the Attributes toolbar, set the filter to **Alignments-Proposed** and then set the active level to **ALG_PPROPOSED_Hor-Alignment**.



4. Place a **Tentative** point **<T>** on the North-South crossroad alignment just south of the intersection.

   Note: The **Tentative** button in the CDOT workspace is set to the ***Left and Right Cord*** on the mouse. If you want to change it, select **Workspace > Button Assignments**.

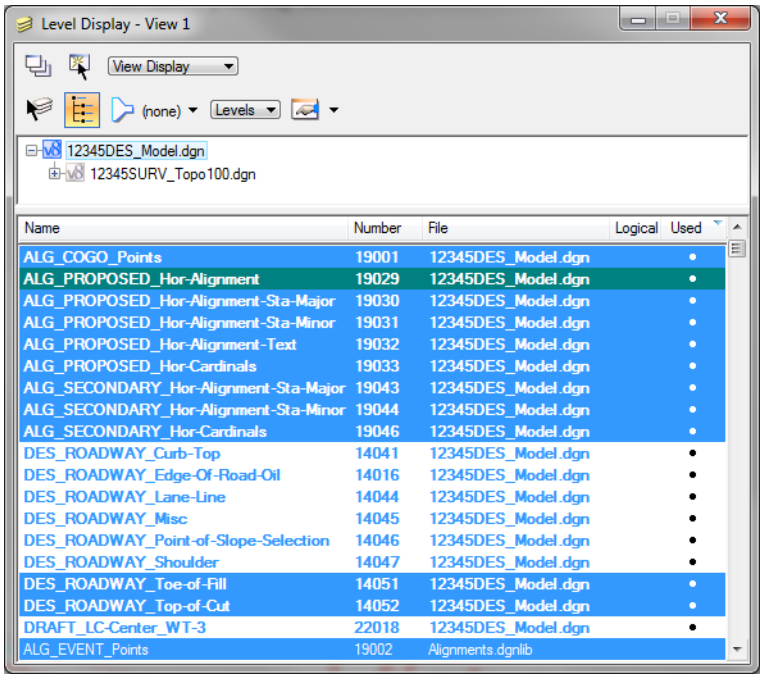


The tentative point jumps to the closest key-point on the element. You will see a large cross-hair at the key-point. You'll learn more about keypoint and other snap modes in other chapters.

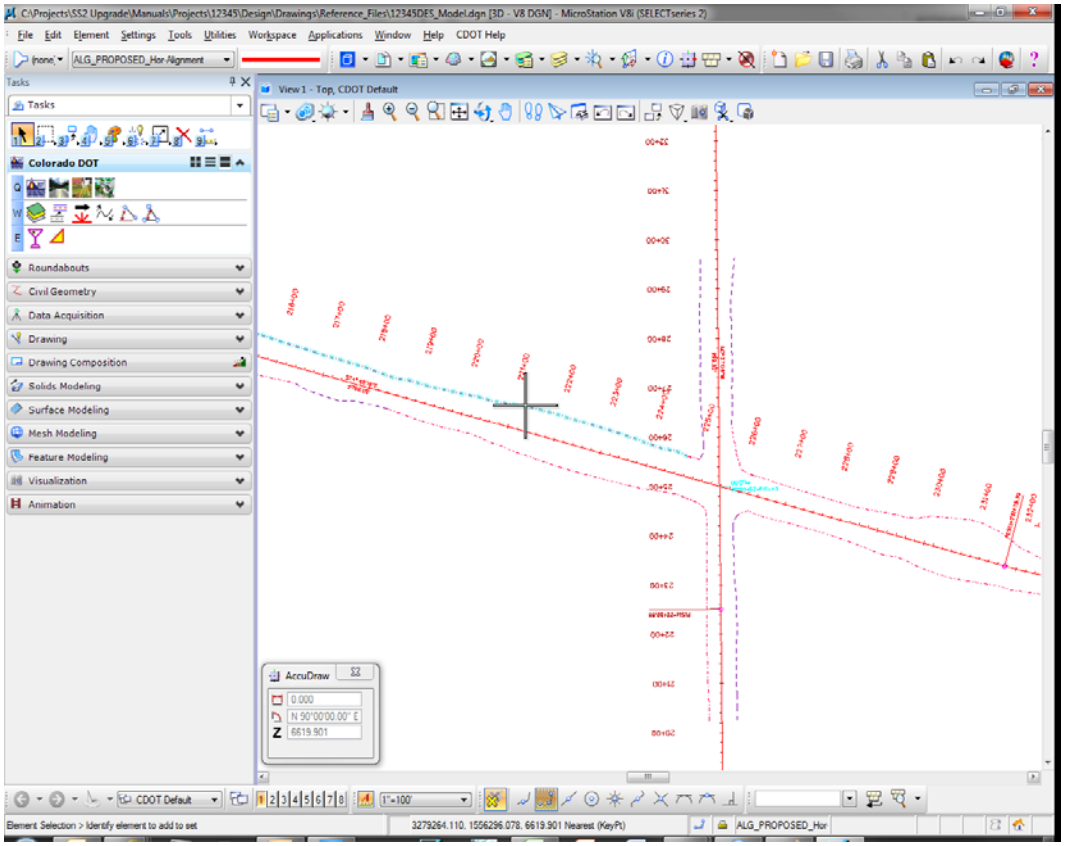
A tentative point is a temporary location that displays the coordinates for the point in the ***Message Field*** (bottom of screen).

Note that the centerline alignment graphic in the top view (plan view) has a Z value of **0**. Therefore it has an elevation of **0**.

5. Open **Level Display** and set the level **Filter** to **None** to show all levels. Sort by **Name** and then **Used** levels. Turn on the levels **DES_ROADWAY_Toe-of-Fill** and **DES_ROADWY_Top-of-Cut**.



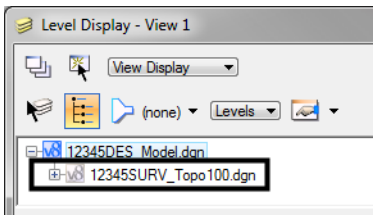
6. **<T>** on one of the cut or fill lines and note its elevation (Z coordinate).



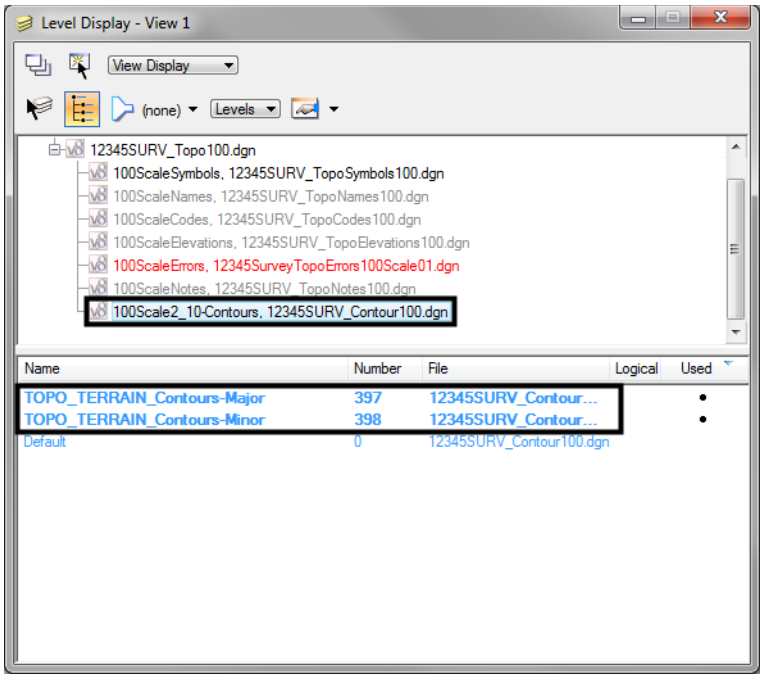
7. **<T>** on a few other top or toe lines and note the elevations.

   The graphics should be placed at a depth of approximately 6620 ft. or within a close range.

8. In **Level Display**, click on the + symbol next to the file **12345SurveyTopo100Scale.dgn** to expand the list of reference files.



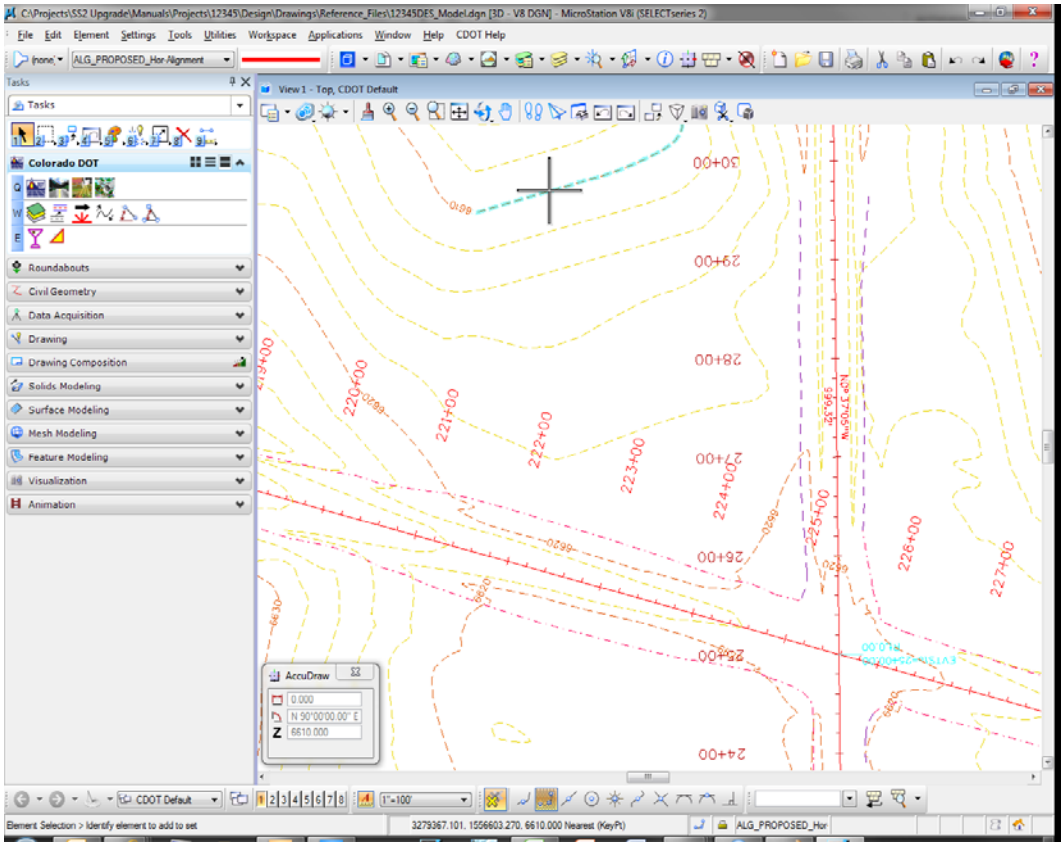
9. Highlight the reference **100Scale2_10-Contours, 12345SURV_Contour100.dgn** and turn on levels **TOPO_TERRAIN_Contours-Major** and **TOPO_TERRAIN_Contours-Minor**.



Note: The contour file is a reference to the design model file. You'll learn more about references in the ***Create the Project and Design Model*** lab.

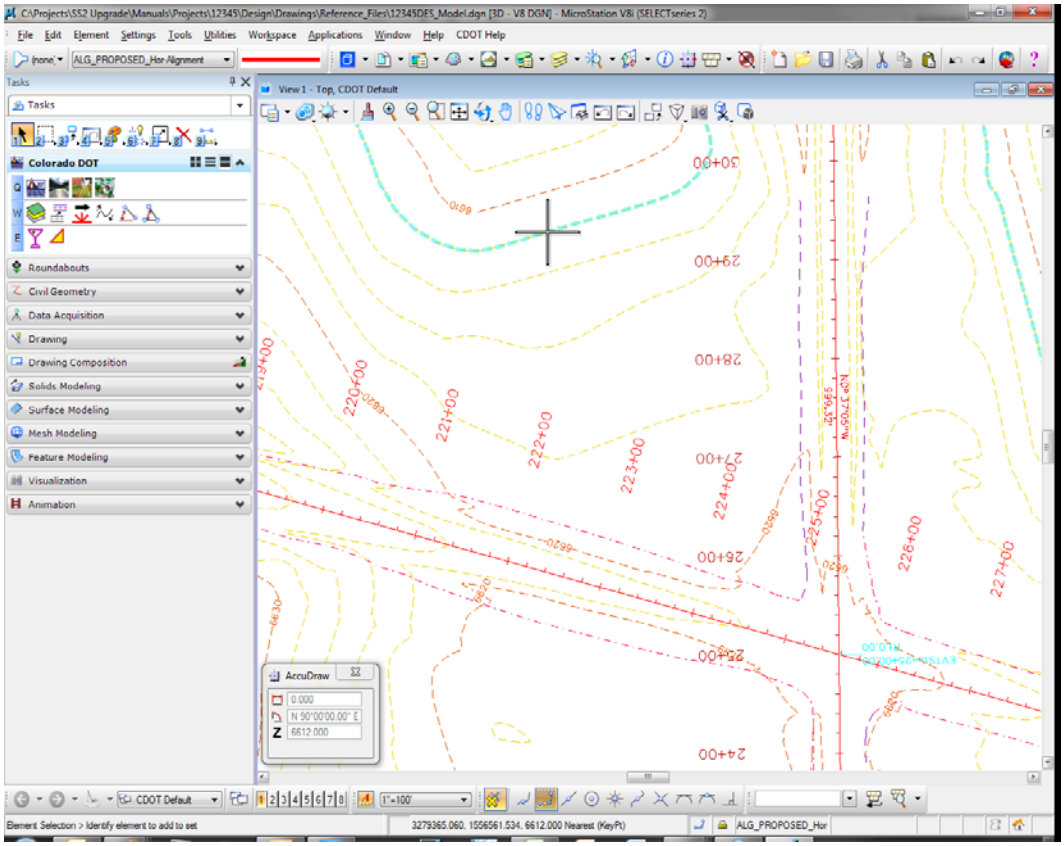
10. Window in on some of the contours to the right of the intersection so that you can easily read the labels.

11. **<T>** on some of the major contour graphics and note the elevations.



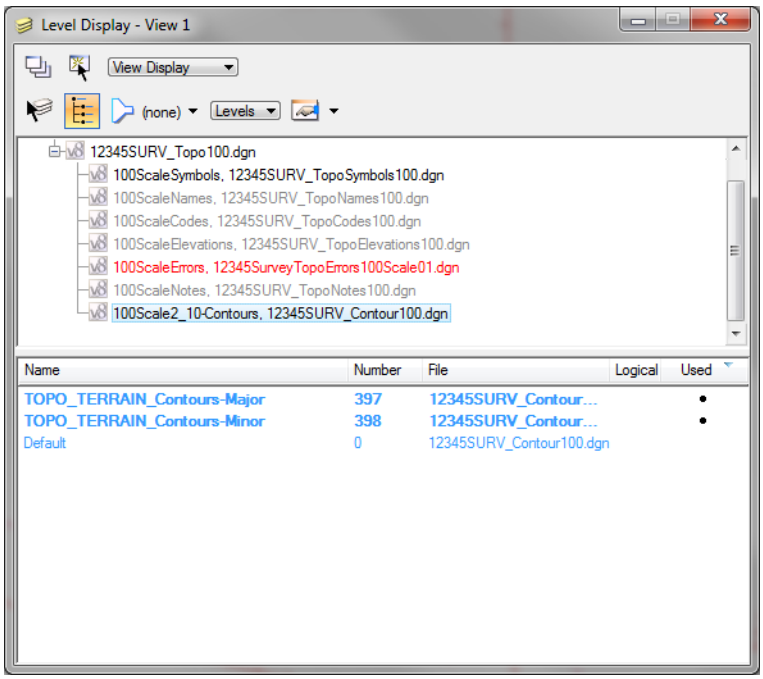
The major contours are placed at 10 ft. intervals.

12. **<T>** on some of the minor contour graphics and note the elevations.

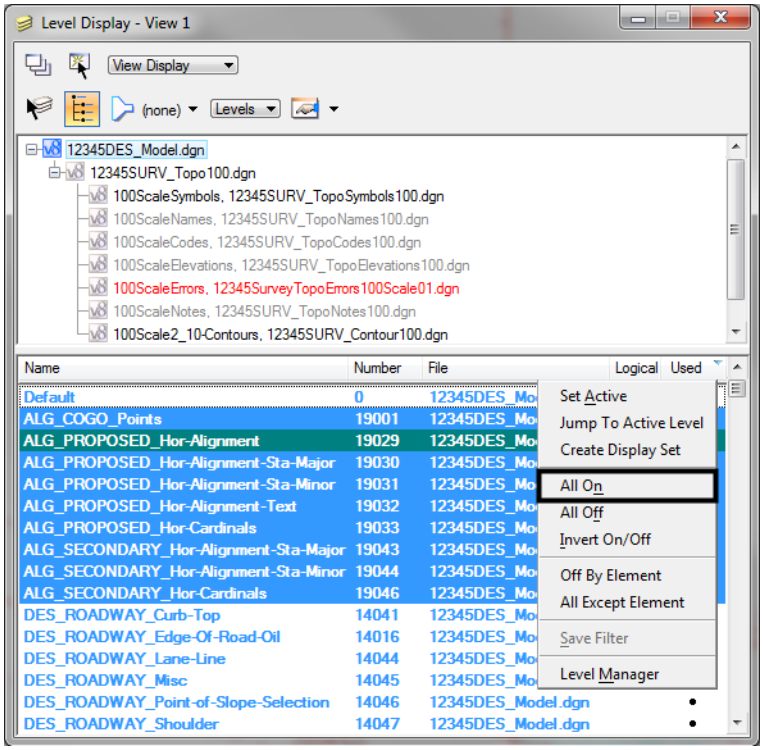


The minor contours are placed at 2 ft. intervals.

13. In **Level Display**, turn off the existing major and minor contour levels as shown.

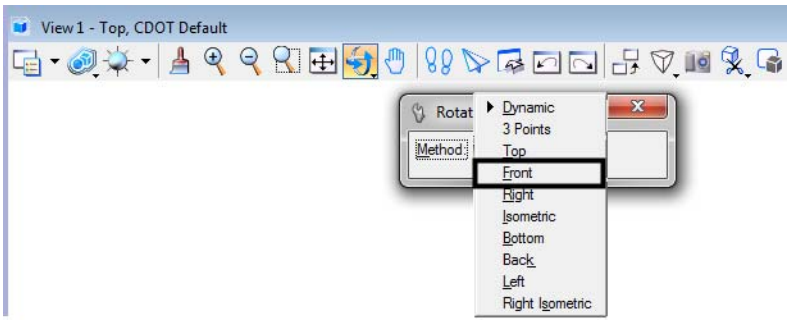


14. In Level Display, highlight the **12345DES_Model.dgn** file to work with the master file levels again and turn all levels on.



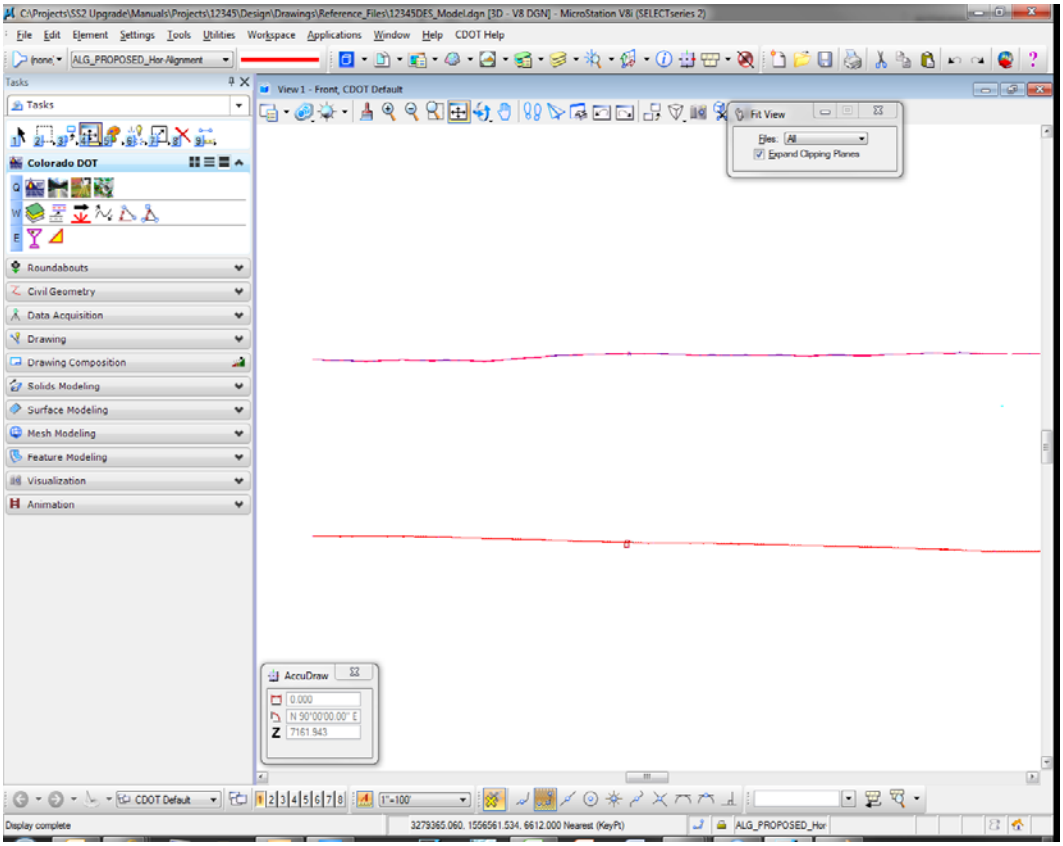
Lab 3.3 - Rotating a 3D Standard View

1. From the **View Control** toolbar, select **Rotate View**.



2. In the **Tool Settings** box, set **Method** to **Front**.

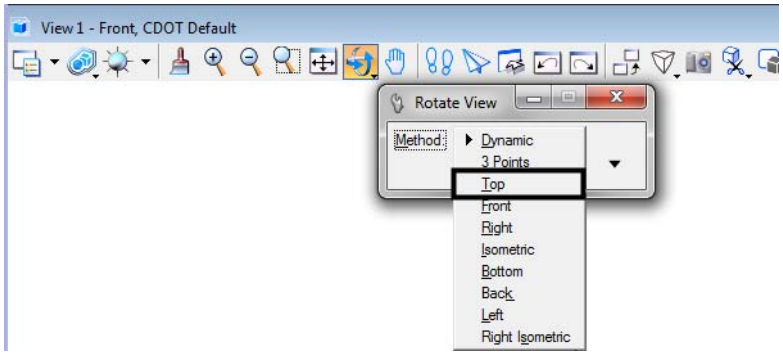
3. **Fit** View 1.

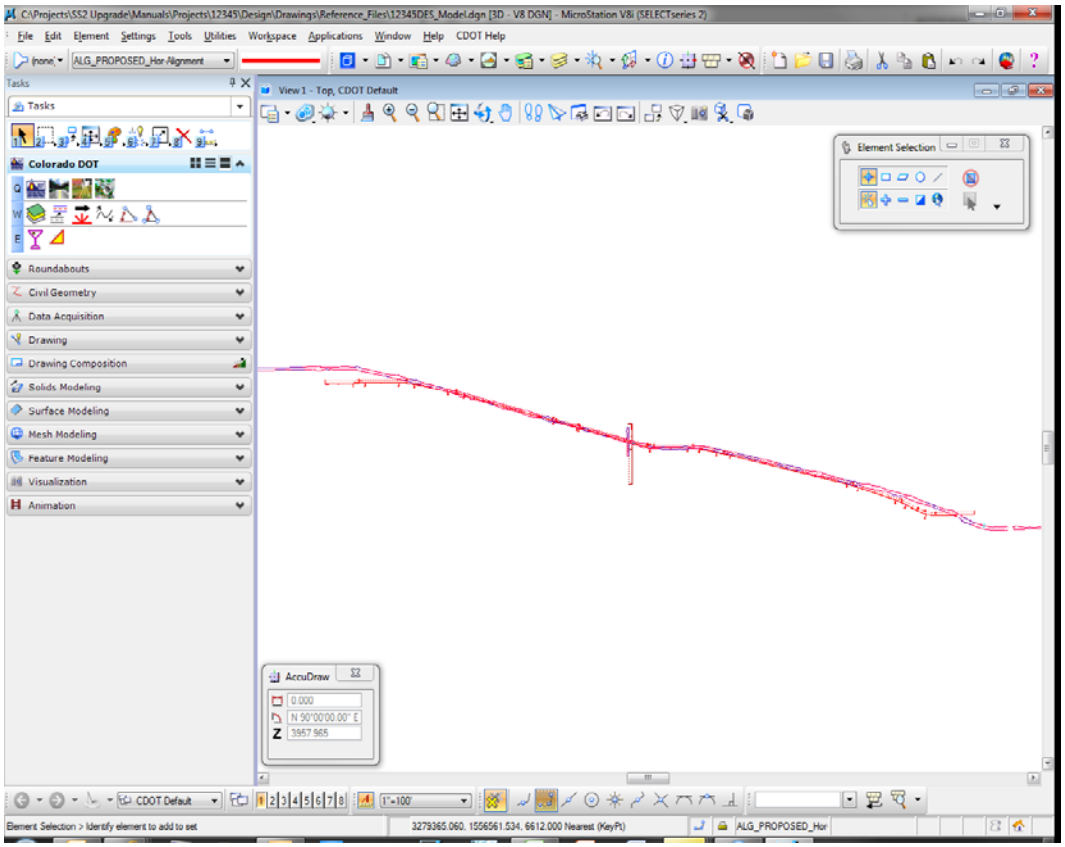


The view is rotated from Top (plan view) to Front (elevation view). Note that some graphics, (like the red horizontal alignments you checked earlier), are displayed at elevation 0 below the proposed graphics (edges of oil, cut/fill lines, etc.), which are displayed at the correct elevation (6620 ft. range).

Note: Rotating to the Front view is a handy way to visually check your file for erroneous information or bad elevations which "spike" down to 0.

4. Select the **Rotate View** command again and set the **Method** to **Top**.

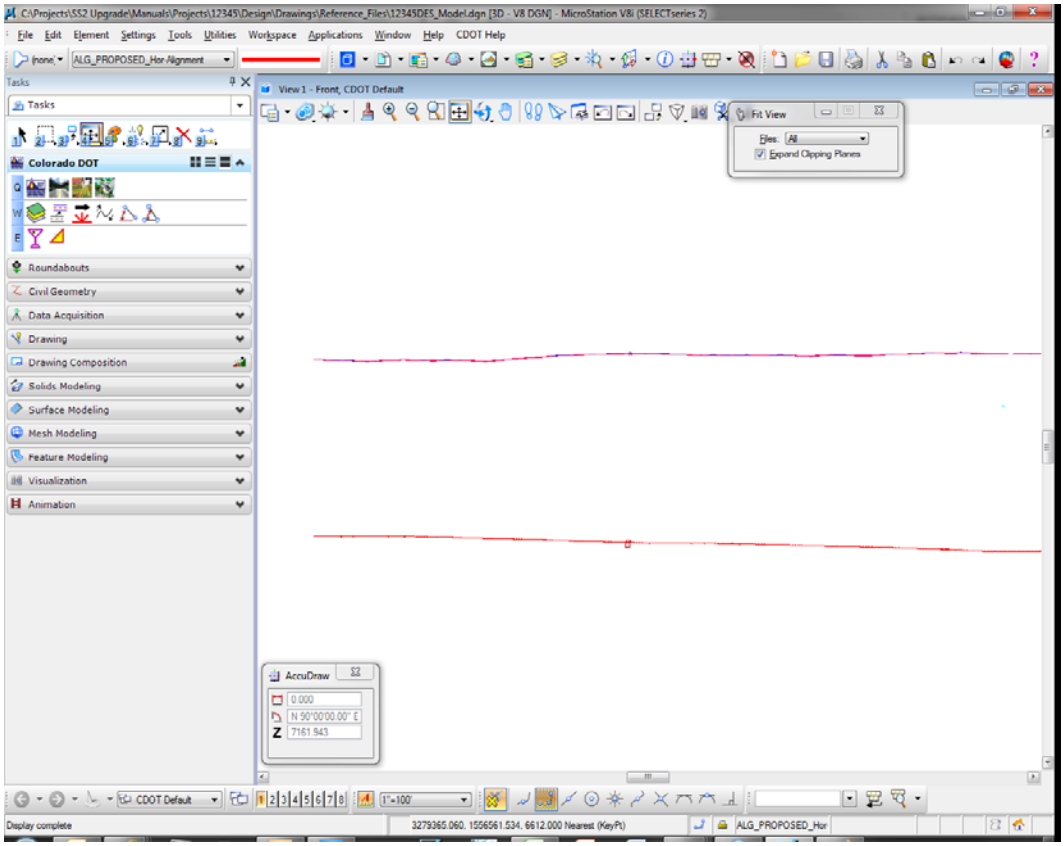




This returns the view to a plan view and its original un-rotated settings.

5. Key in ***vi=front***.

6. **<D>** to select the view.

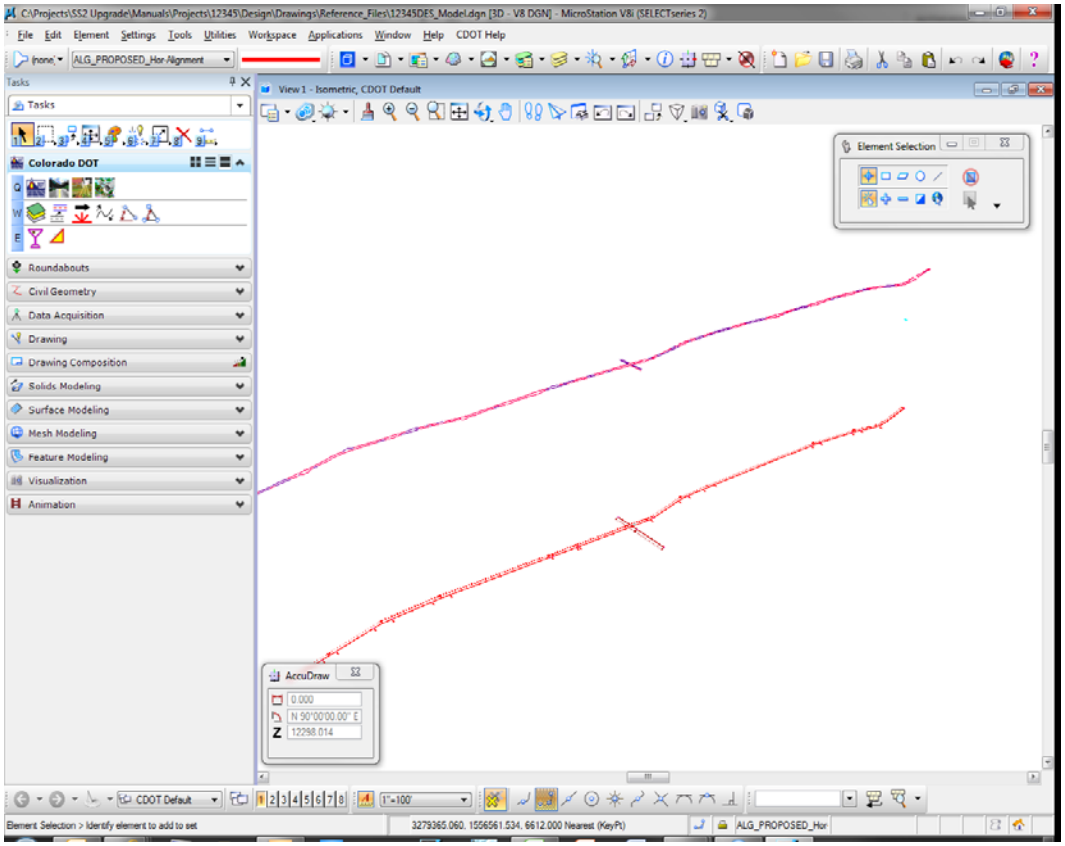


The view is rotated back to an elevation view. You can use the ***vi=*** keyin to rotate to standard views (top, front, isometric, etc.) as well as to recall saved views.

7. Key in ***vi=iso***.

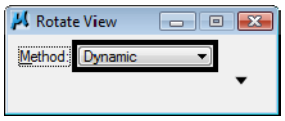
8. **<D>** to select the view.

9. **Fit** the view.



10. This gives another 3D perspective of the design file graphics.

11. Select the **Rotate View** command again and set the **Method** to **Dynamic.**

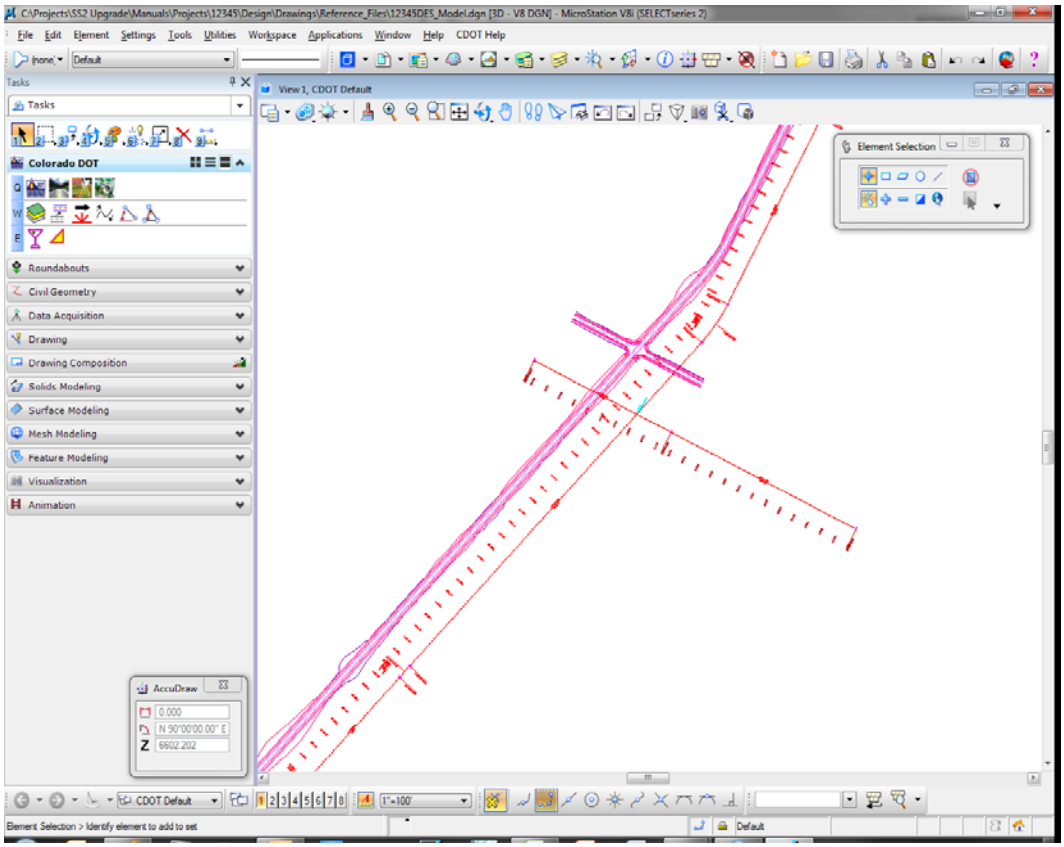


12. **<D>** near the intersection in the view to identify it for rotation, then move your cursor in a counter-clockwise motion.

    Note: You can also **<D> and hold** on the "+" displayed when the command is selected, then drag it to the location you would like to rotate about. The rotation point can be Accusnapped to a graphic element. This will make it easier to control the rotation and keep the desired elements within the view.

    As you move your cursor the view dynamically rotates.

13. **Zoom in** on the intersection and continue experimenting with the **Dynamic** rotation option until you're comfortable with the tool.



Note: If you **<T>** on a location (like the intersection center) after selecting the **Dynamic** method, you will rotate about the tentative point.

Lab 3.4 - Check the Active Display Settings

Check the Current Active Depth

1. **Rotate** the view back to **Top**.
2. **Fit** the view.
3. In the MicroStation **Key-in** box, key in ***az=$*** to check the active depth.

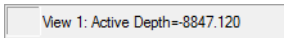
   Note: The dollar symbol ($) is used to request current settings. You can also use a question mark (?).

   MicroStation prompts: **Select View**.

4. **<D>** anywhere in View 1 (top view).

   Note: Active and Display depths are view dependent (i.e. you set these in each view). Therefore, you have to tell MicroStation which view you want to check the **Active Depth** in by data pointing in the view.

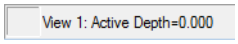
5. Check the **Message** field.



MicroStation returns the current active depth setting. Yours may be different than shown. This means if any graphics are placed in the design file's top view without giving them an elevation, they will go in at this elevation or depth.

Since the depth axis of the top view (plan view in a 3D file) is the Z axis, this means graphics will be placed at this elevation.

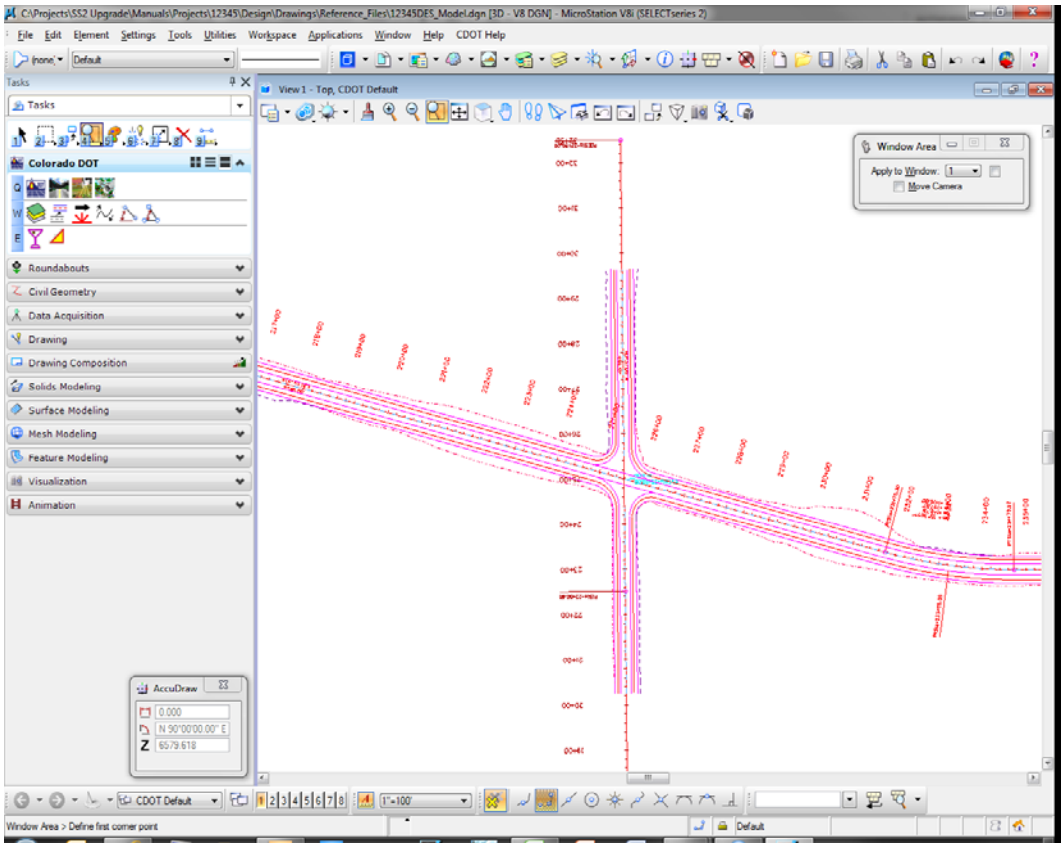
6. Key in ***az=0***.
7. **<D>** to select the view.
8. Key in ***az=$***.
9. **<D>** to select the view.



You have now set the active depth to 0. Any new graphics placed in the file will be placed at an elevation of 0, unless you snap to an element at another elevation.

Check Current Display Depth Settings

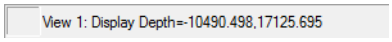
1. **Window** in around the intersection.



2. Key in ***dp=$***, then press **<Enter>**.

3. **<D>** in View 1.

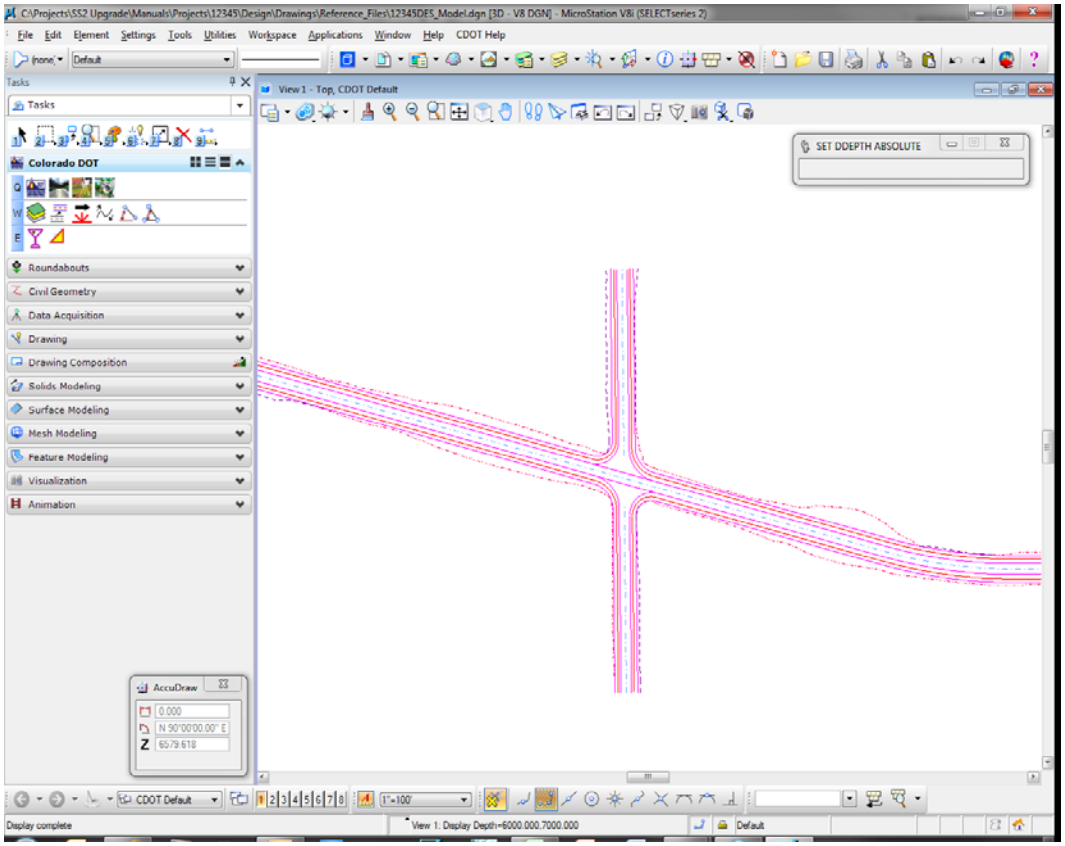
4. Check the **Message** for the current display depth settings.



The current display depth in the top view is set very large. Yours may vary from that shown. Therefore, you are able to see all the graphics in the top view since they fall in the depth (elevation) range.

5. Key in ***dp=6000,7000***.

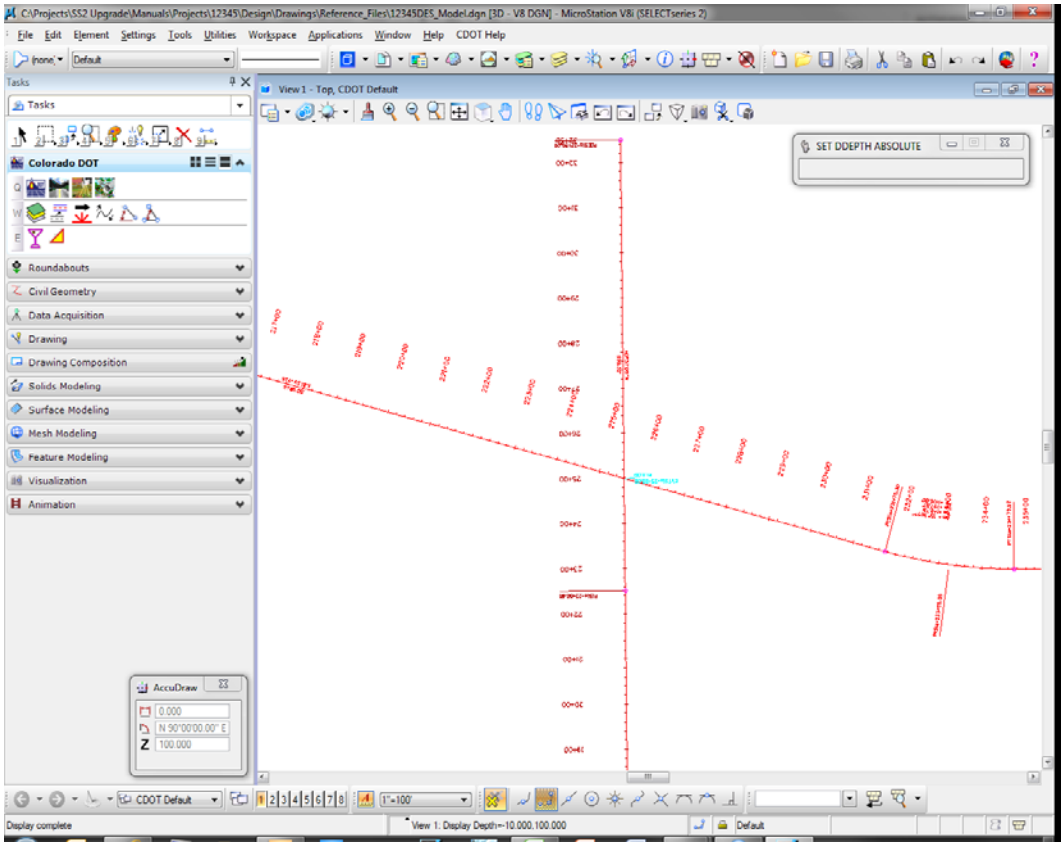
6. **<D>** anywhere in View 1 and look at your graphics.



The graphics placed at this elevation range (shoulder, edge-of-oil, cut/fill lines, etc.) now appear in the view. All of the graphics placed at elevation 0, like the red proposed horizontal alignment, stationing and alignment text, are not displayed.

7. Key in ***dp= –10,100***.

8. **<D>** anywhere in View 1 and look at your graphics.



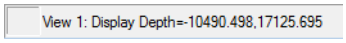
Only the elements placed in this elevation range (e.g. the proposed horizontal alignment and text placed at 0) appear in the view. All other graphics are outside of this elevation range and are not displayed.

9. **Fit** View 1.

   All of the graphics appear in the view.

10. Key in ***dp=$***.

11. **<D>** anywhere in View 1 and check the **Message** field.

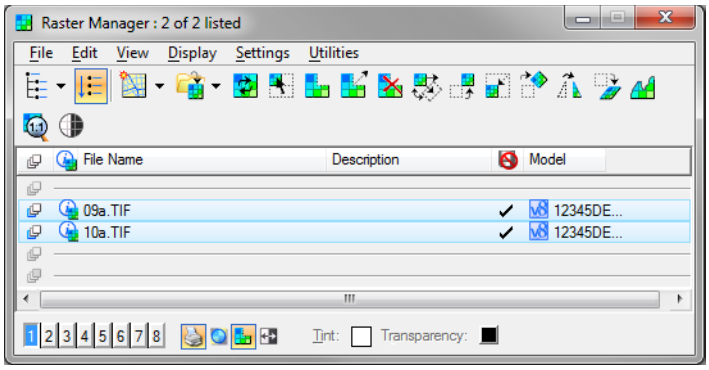


The display depth range is automatically expanded after using the **Fit** command to show all of the elements in the view.

Lab 3.5 - Turn On Raster Images

1. Select **File > Raster Manager**.

2. Select both raster images using the **Shift** or **CTRL** buttons and toggle on View 1 from the lower left of the dialog box.



3. Close the **Raster Manager** box.

4. Fit View 1.

   The raster images are now on for a future lab.

5. Select **File > Save Settings**.

6. This saves all settings changes, including open views, levels turned on/off, active and display depth settings, etc. The next time you enter this design file, it will appear just as you left it.

7. **Exit** MicroStation.

LAB 4 - Creating the Project and Design Model

In this lab, you'll create a new **12345** project using the **Create Project Directory Structure** program. Then, you'll create a new Roadway Design model from an auto-populated file (generated by the Create Project Directory Structure program) and by creating one from a CDOT 3D seed file. Once created, you'll reference other discipline's work in order to start the design.

In subsequent labs, you'll use a similar process to create other discipline model files (Bridge, Landscape & Environmental, Traffic, etc.).

Chapter Objectives:

After completing this exercise you will know how to:

- Create a new project and project configuration file (PCF) using the **Create Project Directory Structure** program.
- Re-assign a project number via the PCF.
- Create a new design model using a CDOT seed file.
- Create a new design model using an auto-populated model file.
- Attach a reference.
- Turn reference displays on/off.
- Turn reference levels on/off.

Lab 4.1 - Create a Sample 99999 Project

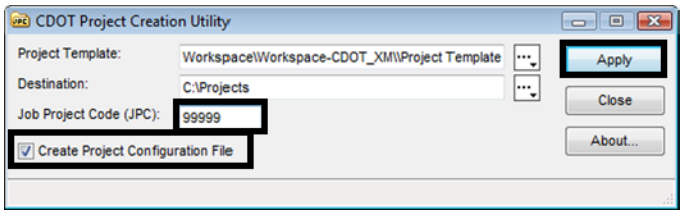
In this example, you are starting your project before a project number has been assigned. You will temporarily assign the project number 99999. Later in this lab, you will learn how to change this project number by updating MicroStation's project configuration file.

1. From the ***Windows Start Menu***, select **Start > All Programs > _CDOT_CADD_Information > V08.11.xx-V8i > Create V8i Project Directory Structure**.

2. Verify that the ***Project Template*** location is set to **C:\Workspace\Workspace-CDOT_V8i\Project Template**.

3. Set ***Destination*** to **C:\Projects**.

4. Key in ***99999*** for the ***Project Code***.



   The project number must be a 5-digit numeric code.

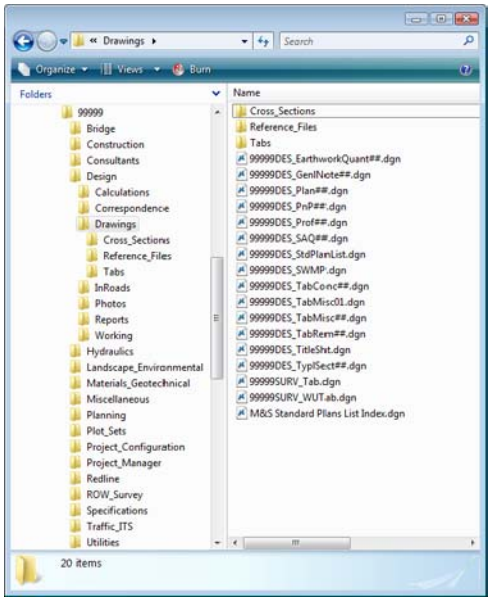
5. Toggle ***on*** **Create Project Configuration File**.

6. Select **Apply**.

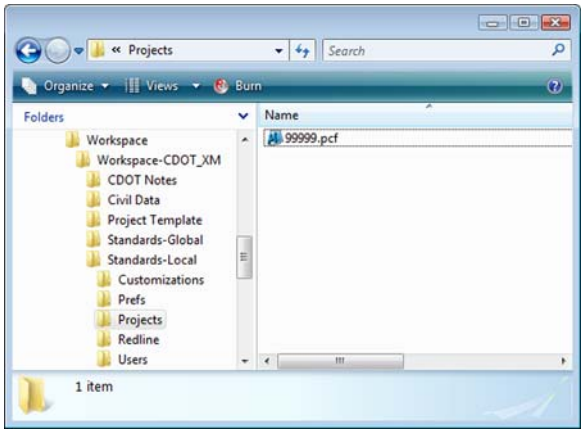
The project directory structure is created in the **C:\Projects** folder and the Project Configuration File (PCF) file is created.

7. **Close** the ***CDOT Project Creation Utility***.

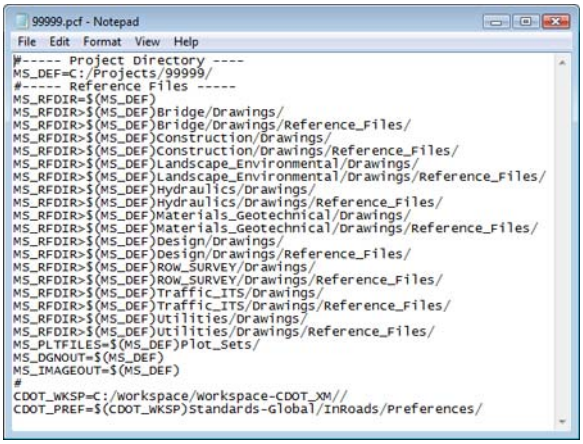
8. Use ***My Computer*** or ***Windows Explorer*** to navigate to the **C:\Projects\99999** folder to review your project directory structure. Note that several generic CDOT files (e.g. ***99999Des_Model.dgn***) have automatically been created.



9. Use ***My Computer*** or ***Windows Explorer*** to navigate to **C:\Workspace > Workspace-CDOT_V8i> Standards-Local > Projects**.



10. Double-click on the ***99999.pcf*** file to open it in ***Notepad***.



The PCF defines a specific directory that MicroStation defaults to when opening up a DGN file or referencing model files. It makes setting paths much easier in MicroStation.

If your project was installed on a project manager's machine, you could edit this file to specify the location. See the ***CDOT PCF Management*** workflow for more information.

11. Close the ***Notepad*** file. If prompted to save changes, select **No**.

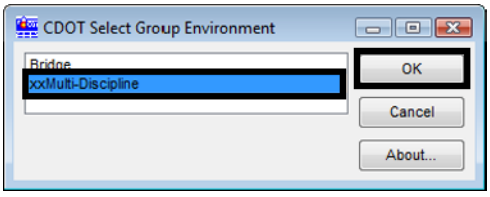
12. Close ***My Computer*** or ***Windows Explorer***.

You will later edit the 99999 project and update it with an actual project number. For now, you will continue working in the example 12345 project.

Lab 4.2 - Select Group Environment

Run the **Select Group Environment Utility** to determine which CDOT level libraries will be attached and available for use.

1. From your desktop's **Start** Menu, choose **Start > All Programs > _CDOT_CADD_Information > 08.11.xx-V8i > Select Group Environment.** In the ***Select Group Environment*** box, select **xxMulti-Discipline**, and then select **OK**.



Any MicroStation design file that is now opened will have all level libraries (general and all disciplines) automatically attached.

Note: You only have to run this program once. The only time you have to re-run it is if you wish to switch groups on the same machine.

Lab 4.3 - Starting MicroStation

1. Start MicroStation by double-clicking the desktop shortcut or by selecting **Start > All Programs > Bentley > MicroStation V8i (SELECTseries 2)**.

2. Set the MicorStation Workspace in the lower portion on the dialog box, set:

   - User: **CDOT User**

   This sets user preferences and users customized options like custom toolbars.

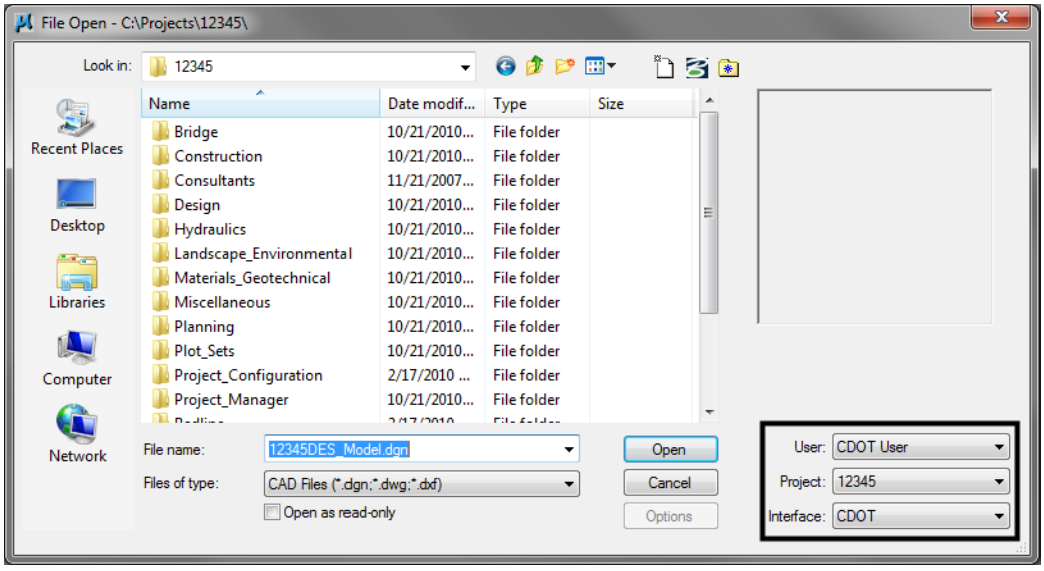
   - Project: **12345**

   Note: Be sure to re-set this option because it will default to you upper level project directory.

   This Project component of the workspace should already be set by the PCF file created by running the ***CDOT Project Creation Utility***. It sets the proper path for opening, saving and attaching files.

   - Interface: **CDOT**

   This loads custom menus and tools at the organizational level. The CDOT interface will load, among other things, the **CDOT Groups Menu**.

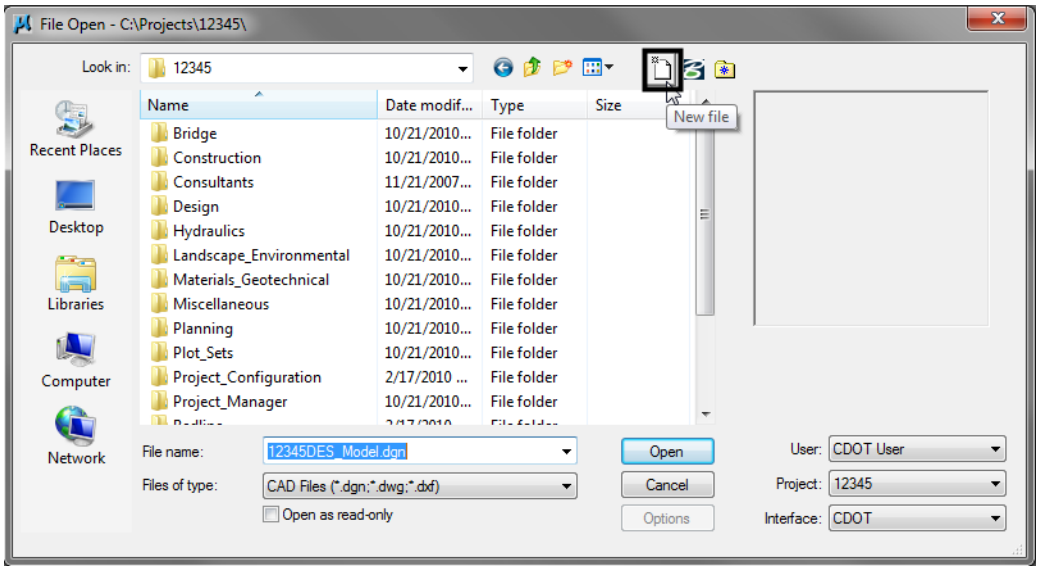


Lab 4.4 - Create a New Design Model File

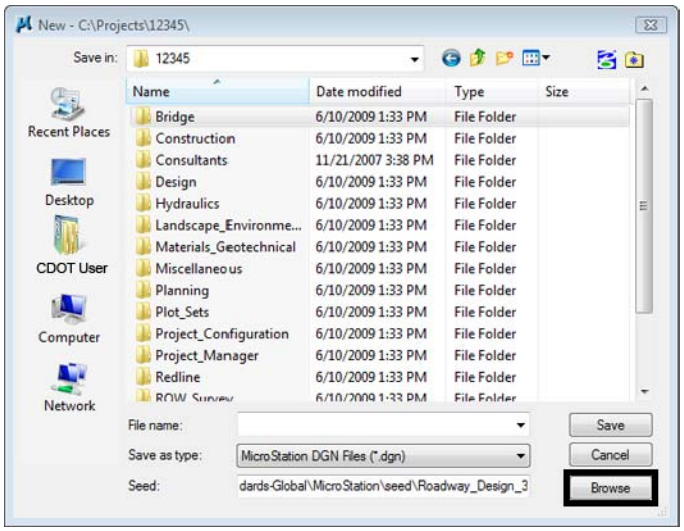
There are two ways you can create a new file: Using a seed file or from a CDOT auto-populated model file. You'll practice both in this session.

Creating a new design file using a CDOT seed file

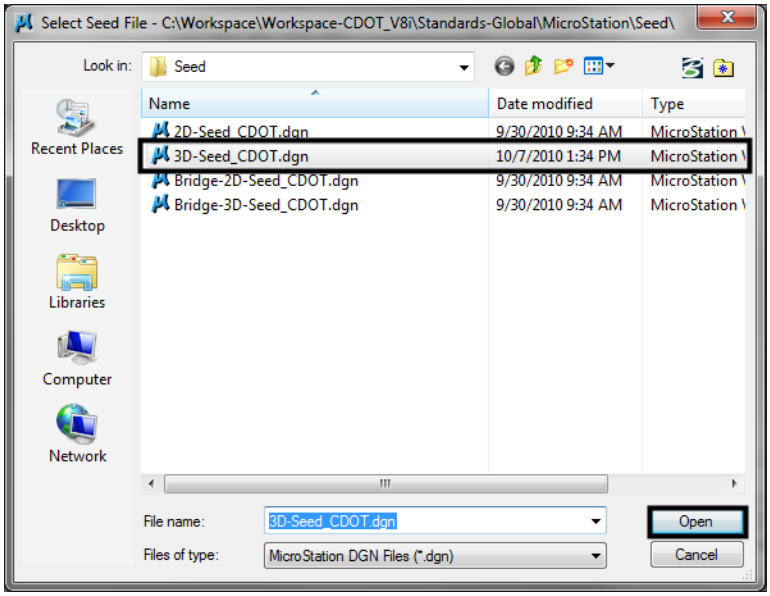
1. From the MicroStation Manager dialog box, select the **New File** icon.



2. In the **Seed File** section, choose the **Browse** button.



3. Highlight the seed file **3D-Seed_CDOT.dgn** and choose **Open**.



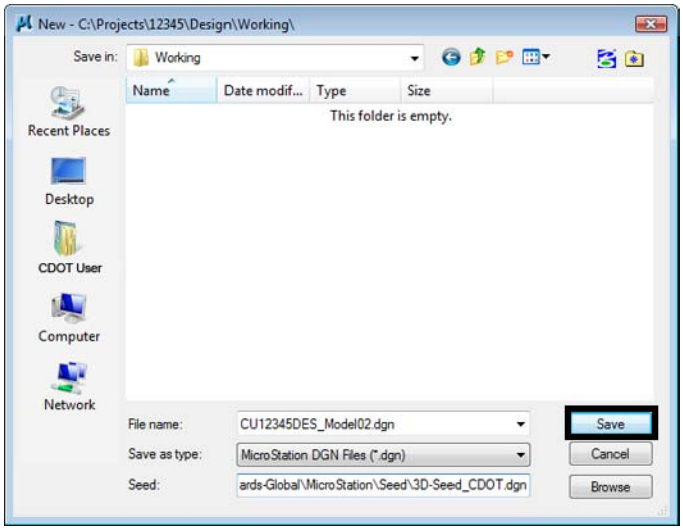
Note: The seed file will copy over all of CDOT's default MicroStation settings when creating the new file.

4. Set the **Directory** to **\Design\Working**.

5. Set **Save as Type:** to MicroStation DGN Files **(*.dgn).**

6. Key in the name **CU12345DES_Model02.dgn**.

7. Select Save to create the file.

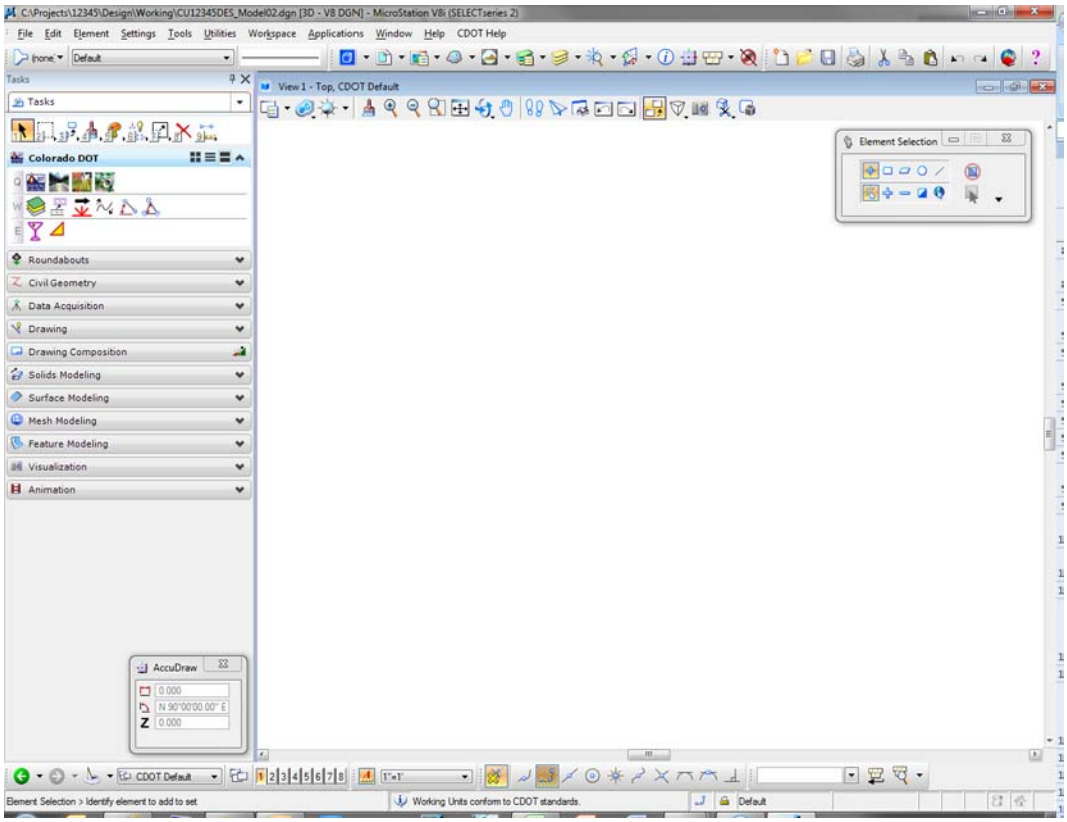


The file is created from the seed file and placed in the **Working** folder. When creating a new working model file, you'll prefix it with your initials (you'll use CU for CDOT USER for this class).

The working folder is for files that you are using for your design process prior to the design being finished. Once complete, you will move the files to the **Reference_Files** folder and take the CU off of the file name.

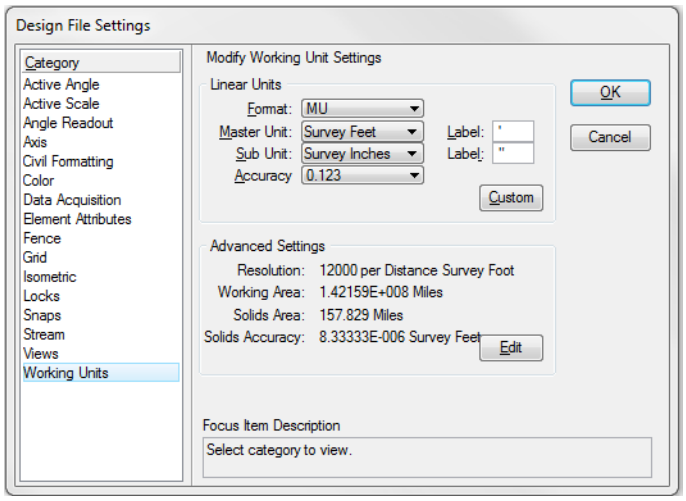
8. In the **MicroStation Manager** box, choose **Open**.

9. The blank file opens with all of the standard settings from the CDOT seed file.

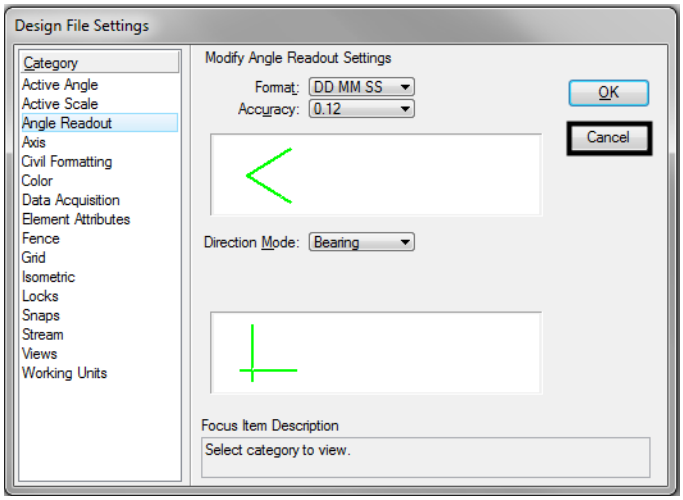


Check settings

1. Select **Settings > Design File > Working Units**. These are the CDOT standard units copied from the seed file.



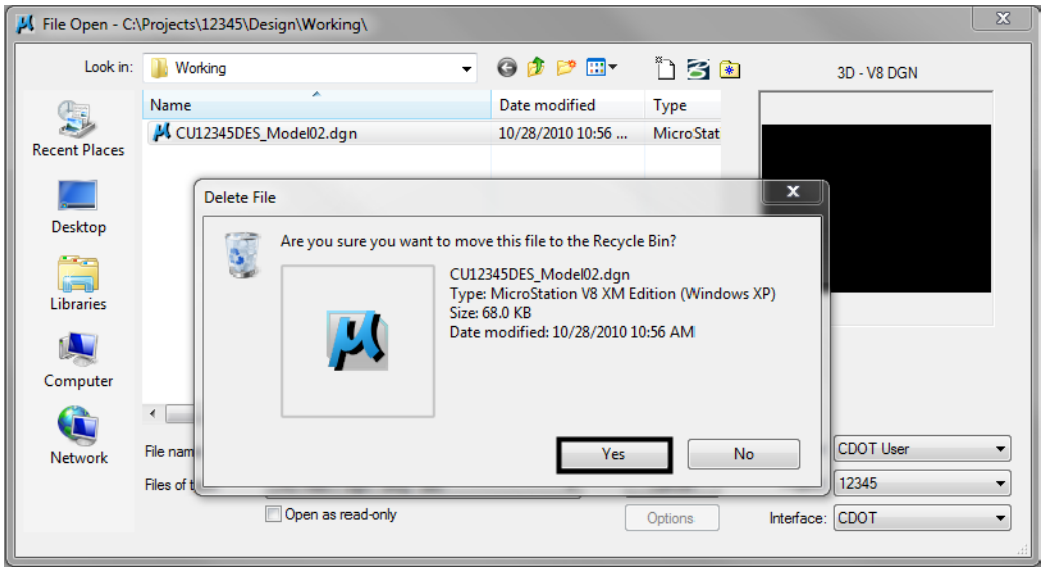
2. **<D> Angle Readout** from the ***Category*** list. These are the CDOT standard units copied from the seed file.



3. **Cancel** the dialog box.

4. Choose **File > Close** to return to the **MicroStation Manager**.

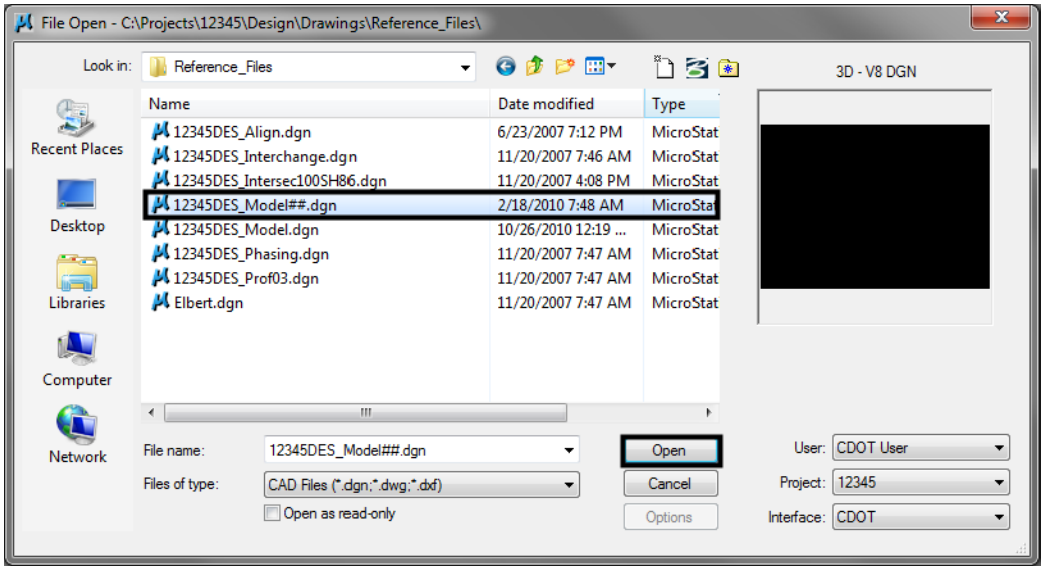
5. From the **MicroStation Manager** select the file and press the **Delete** key on your keyboard and choose **Yes** from the ***Delete File*** box to delete the file you just created.



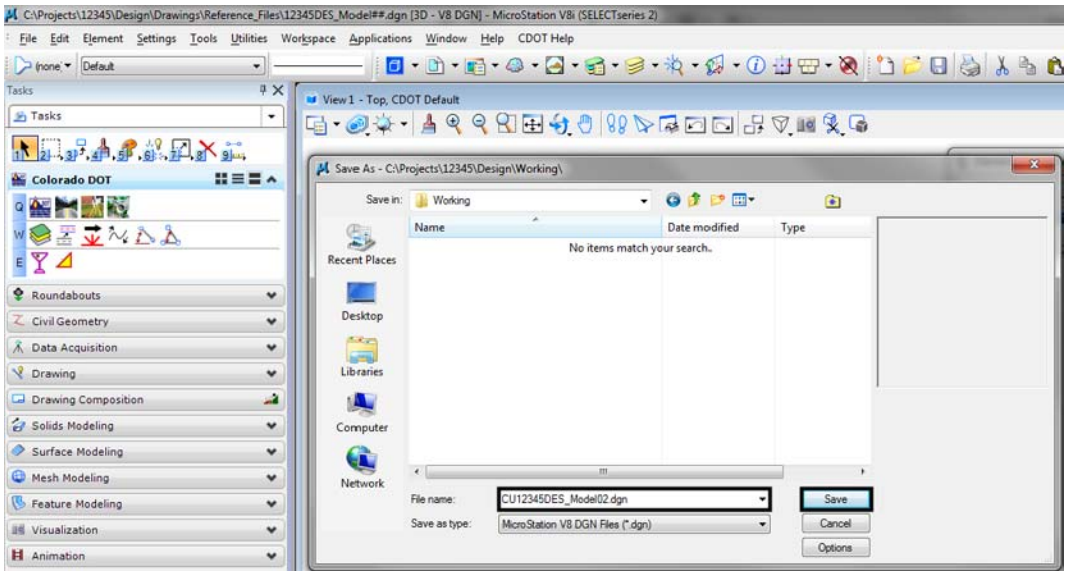
Lab 4.5 - Create a New File by Copying an Auto-populated Model File

1. In the **MicroStation Manager**, navigate to the **\Design\Drawings\Reference_Files** folder.

2. Select **12345DES_Model##.dgn** and choose **Open**.



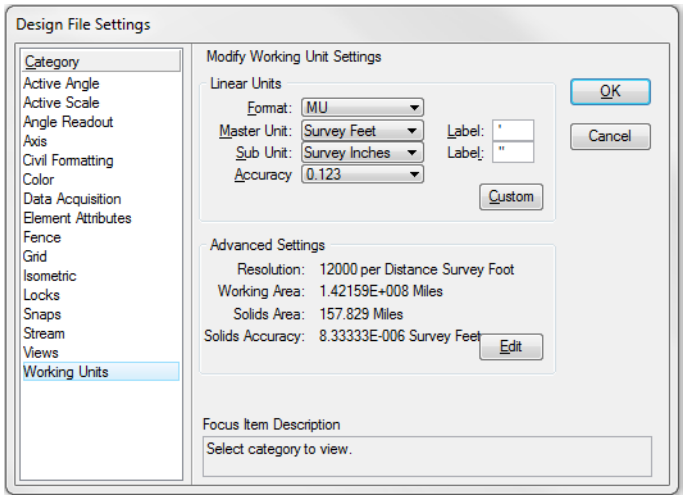
3. After opening the file, select **File > Save As**, navigate to the **\Design\Working** folder key in the name **CU12345DES_Model02.dgn** and select **Save**.



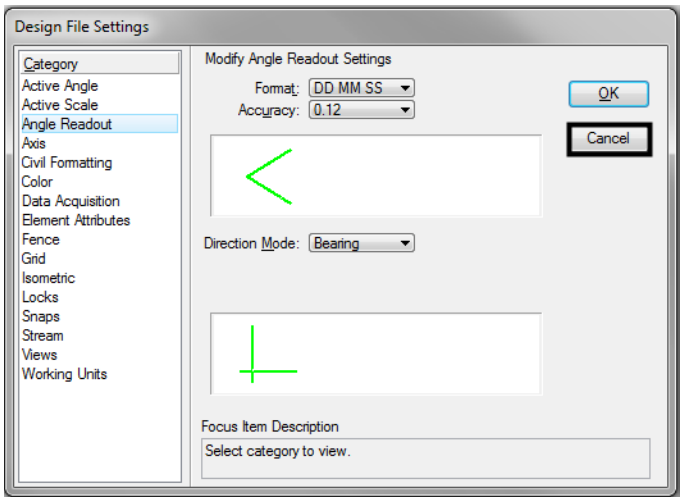
The file is copied to the new name into the working folder.

Check settings

1. Select **Settings > Design File > Working Units**. These are the CDOT standard units, which are the same as the seed file units.



2. **<D> Angle Readout** from the ***Category*** list. These are the CDOT standard units, which are the same as the seed file units.



3. **Cancel** the dialog box.

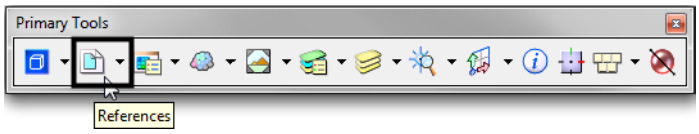
Note: The auto-populated file provides the same settings as a seed file. You can create a new file either way with the same results. However, by copying a CDOT auto-populated file, the name is automatically set to the CDOT standard, you only have to change the counter.

Lab 4.6 - Attach the Survey/Topo Reference

After creating your initial design model, you can attach other groups' work that you'll need to start your design. In this case, attach the existing survey and topographic information.

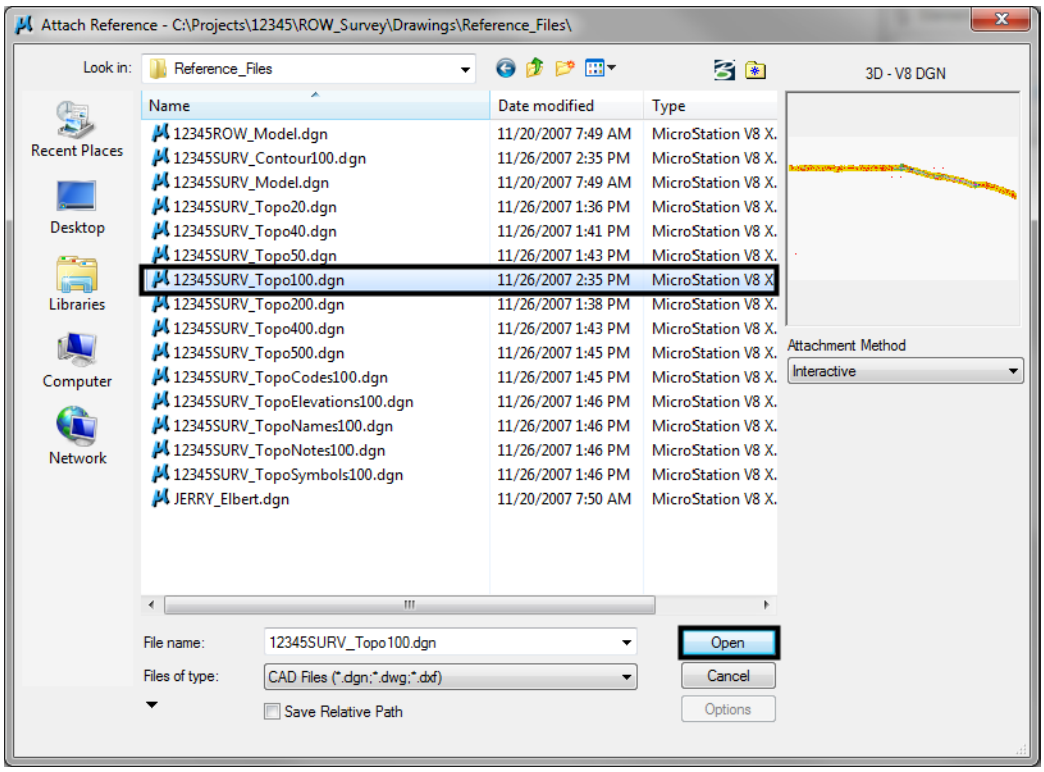
1. Select **File > Reference**.

Note: You can also choose **References** from the **Primary** toolbar.



2. On the **References** dialog, select **Tools > Attach**.
3. Your current **Directory** should be **C:\Projects\12345** (obtained from your PCF file).
4. Navigate to **\ROW_Survey\Drawings\Reference_Files.**

5. Select **12345SURV_Topo100.dgn** from the list of files.

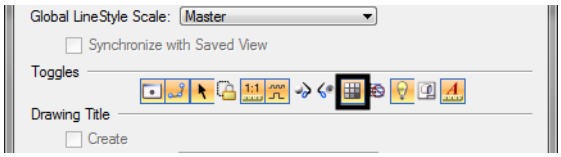


6. Set **Attachment Method** to **Interactive** and select **Open**.

   The Interactive method allows you to supply additional reference settings in the next dialog box.

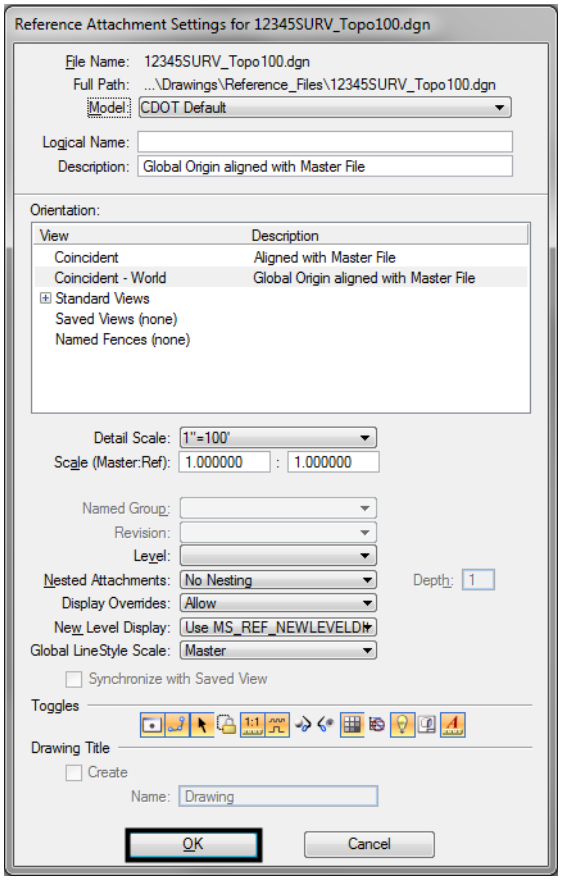
7. In the **Reference Attachment** settings box, key in a **Logical Name** of ***Survey/Topo*** and set:

   - **Orientation** to **Coincident World** (to align Master file and Reference file global origins)
   - **Scale** to ***1:1*** (to bring in graphics full scale)
   - **Nested Attachments** to **No Nesting**
   - **Display Raster Reference** ***on***

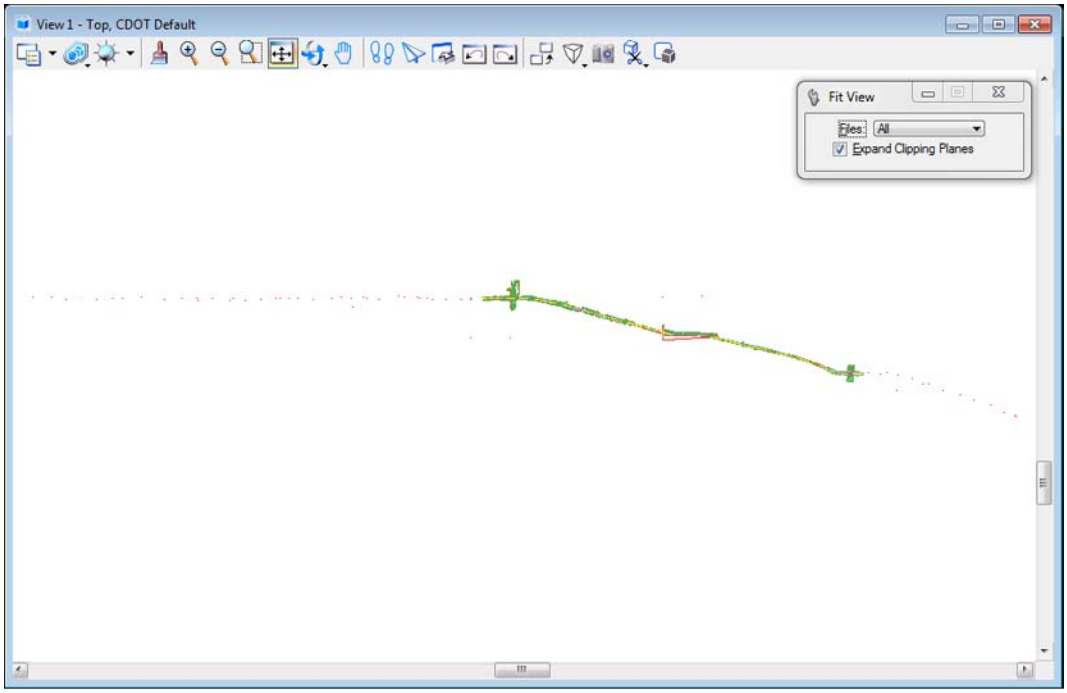


   - **Global Linestyle Scale** ***None***

8. Select **OK**.

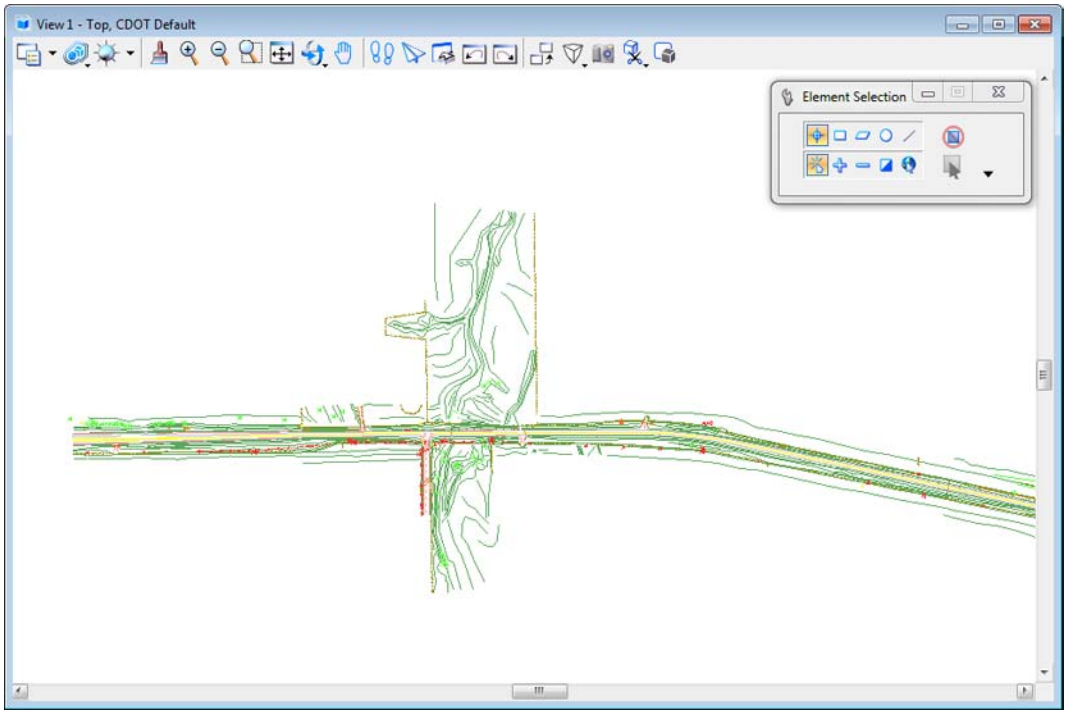


9. **Fit** the view.

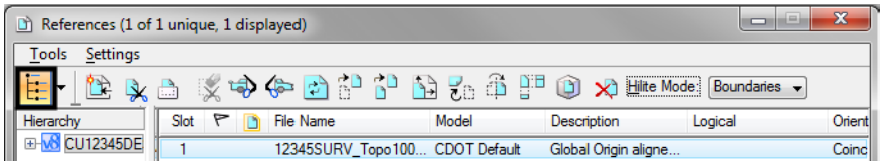


The Survey/Topo reference is attached to the design model master file. The graphics come in at their true coordinates (Coincident-World) and the actual size (1:1 scale).

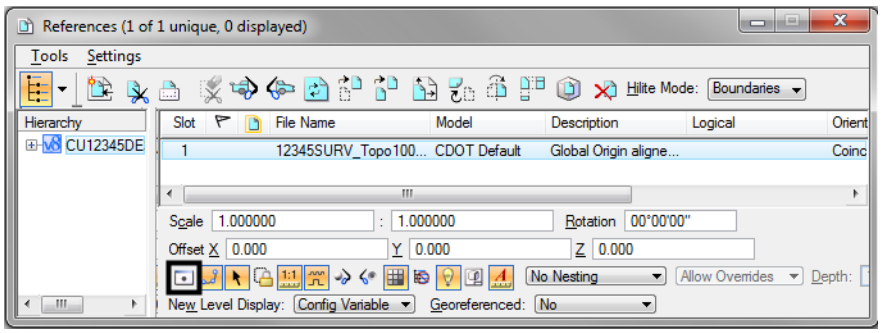
10. Window in on the Survey graphics at the beginning of the project.



11. In the **Reference** dialog, make sure **Show Hierarchy** is turned on and highlight the Survey/Topo reference on the right-side.



12. Toggle the **Display** option ***off***.



13. **Fit** the view.

With the reference display turned off, there are no graphics to display, since the design model is currently empty.

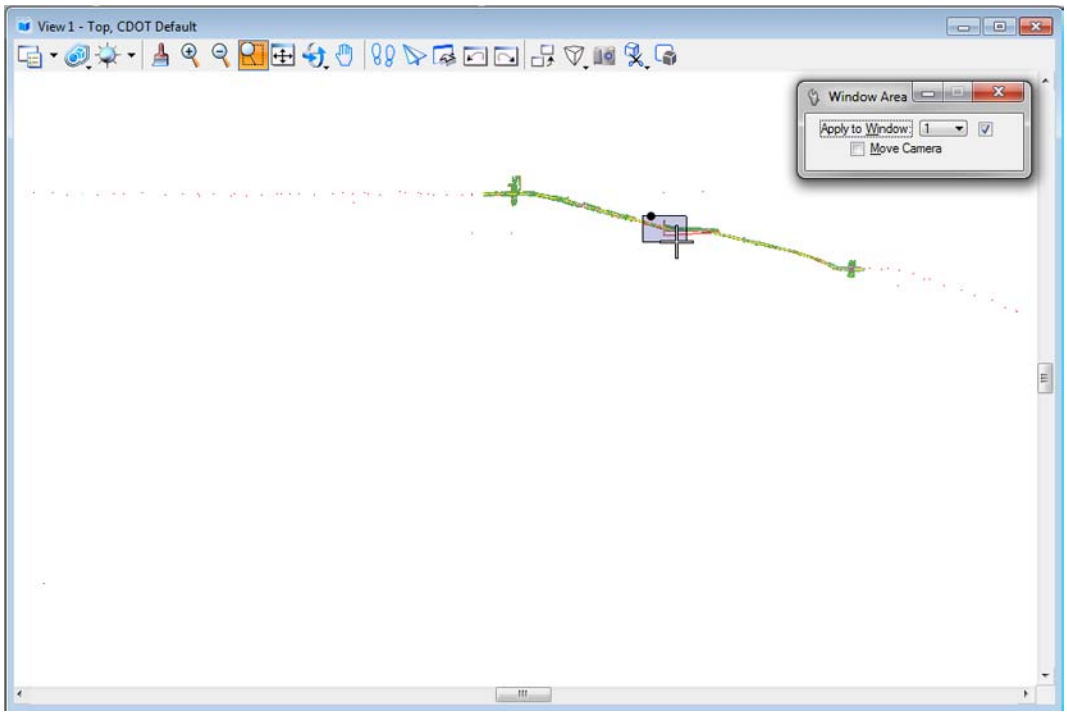
14. Toggle the **Display** option back ***on***.

15. **Fit** the view.

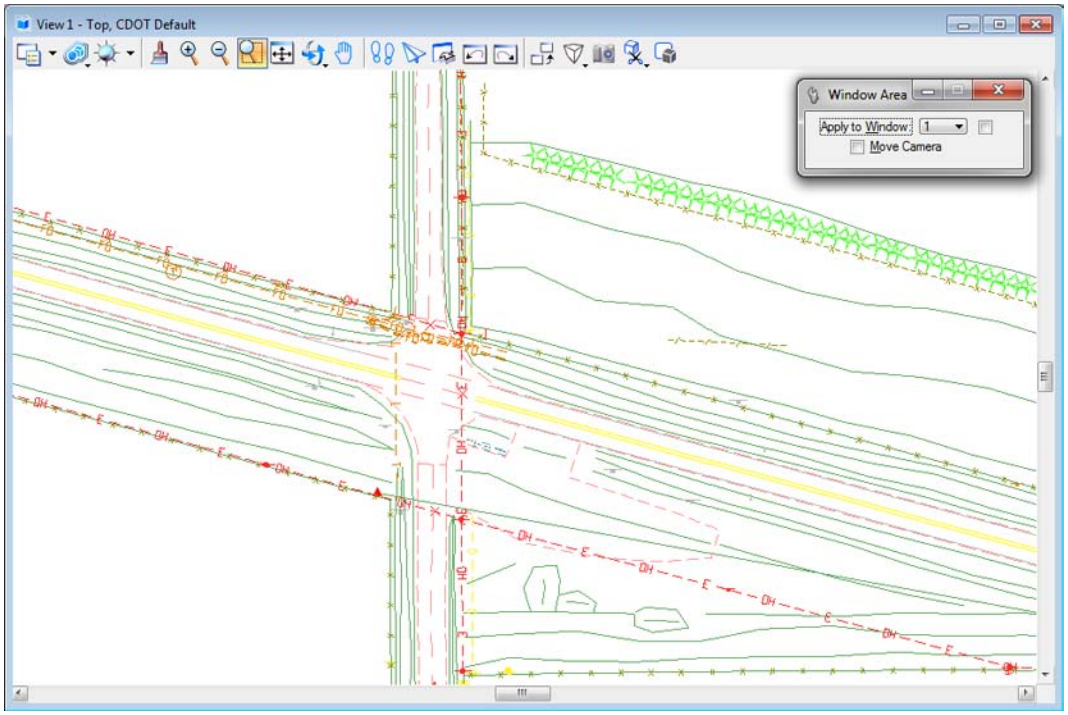
    The design file is now ready to placed proposed graphics with survey and topo graphics referenced for information purposes.

Turn survey levels on/off

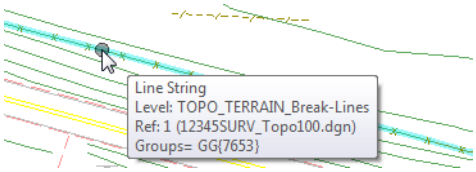
1. Window around the intersection near the center of the project.



2. **Zoom** in as shown.



3. Hover over one of the barbed wire fence lines.

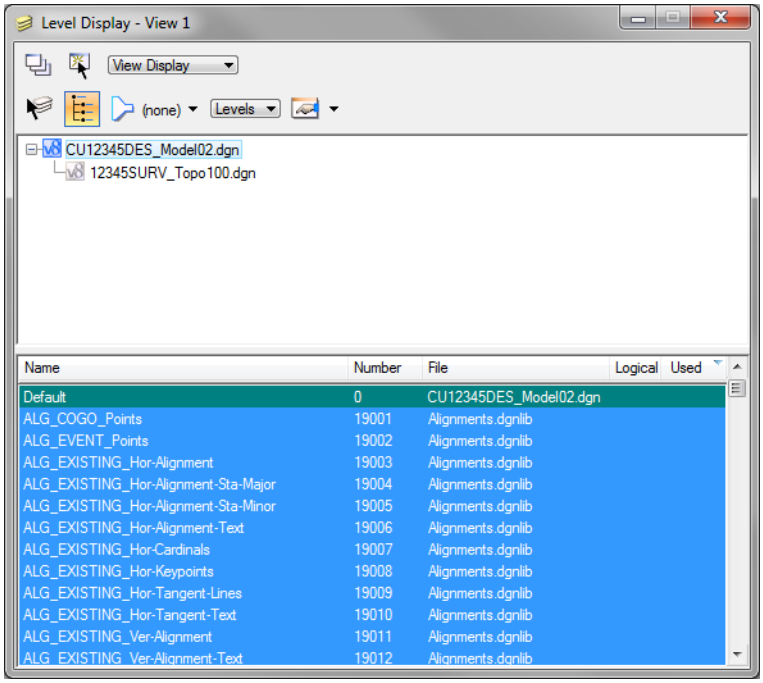


Basic element information "pops up" at your cursor location. MicroStation tells you that the element is on level **TOPO_FENCE_Barbed-Wire** and located in the **Survey/Topo** reference.

4. Open **Level Display** from the **Primary** toolbar.

5. Highlight the master file **CU12345Design_Model02.dgn**.

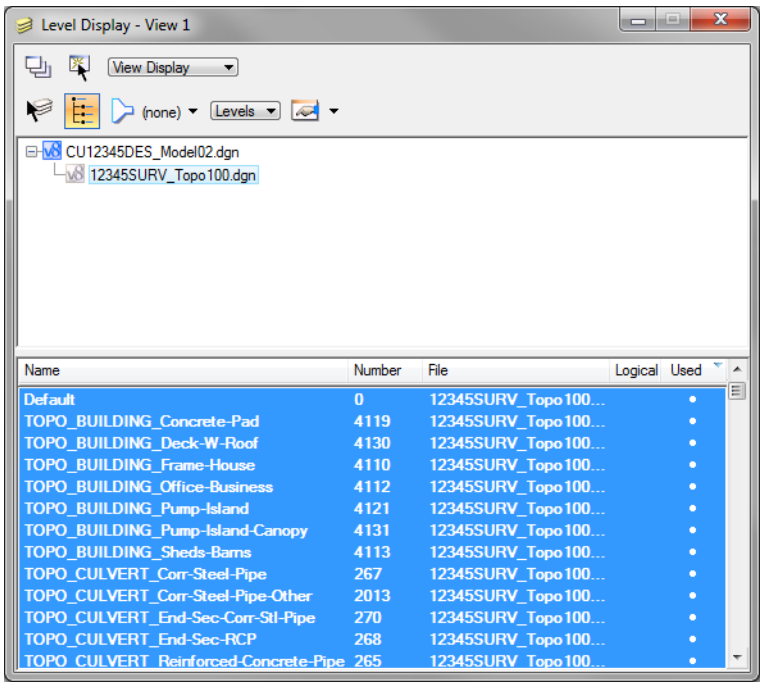
6. Sort on **Used** levels.



Note: That there are no used levels in the master file since there are no graphics in the design model file.

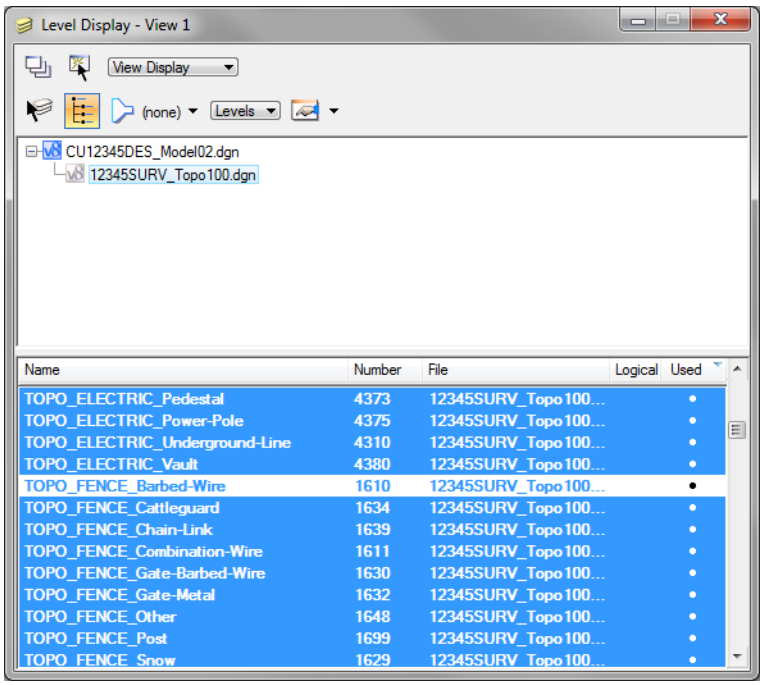
7. Highlight the **Survey/Topo** reference underneath the master file

8. Sort on **Name**, then sort on **Used**.

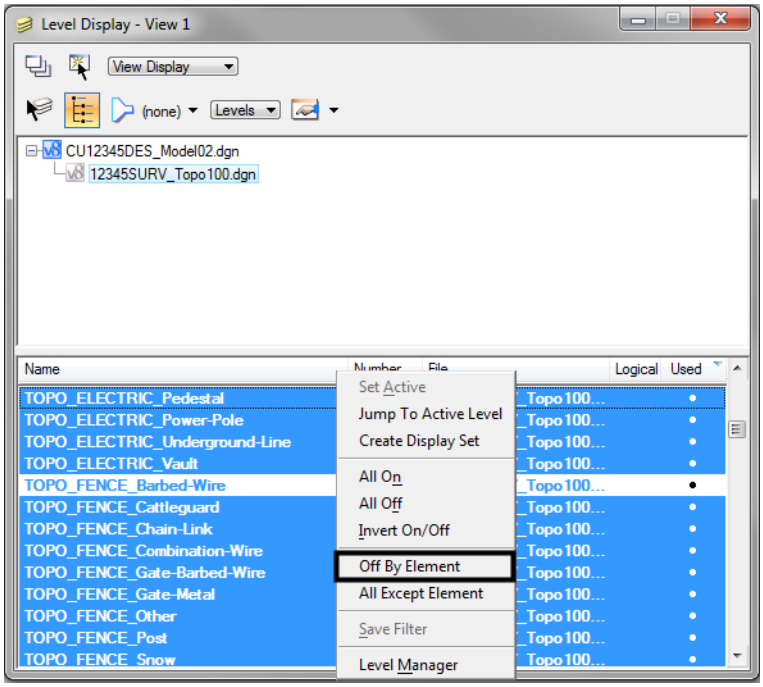


Note: That the reference has several used levels.

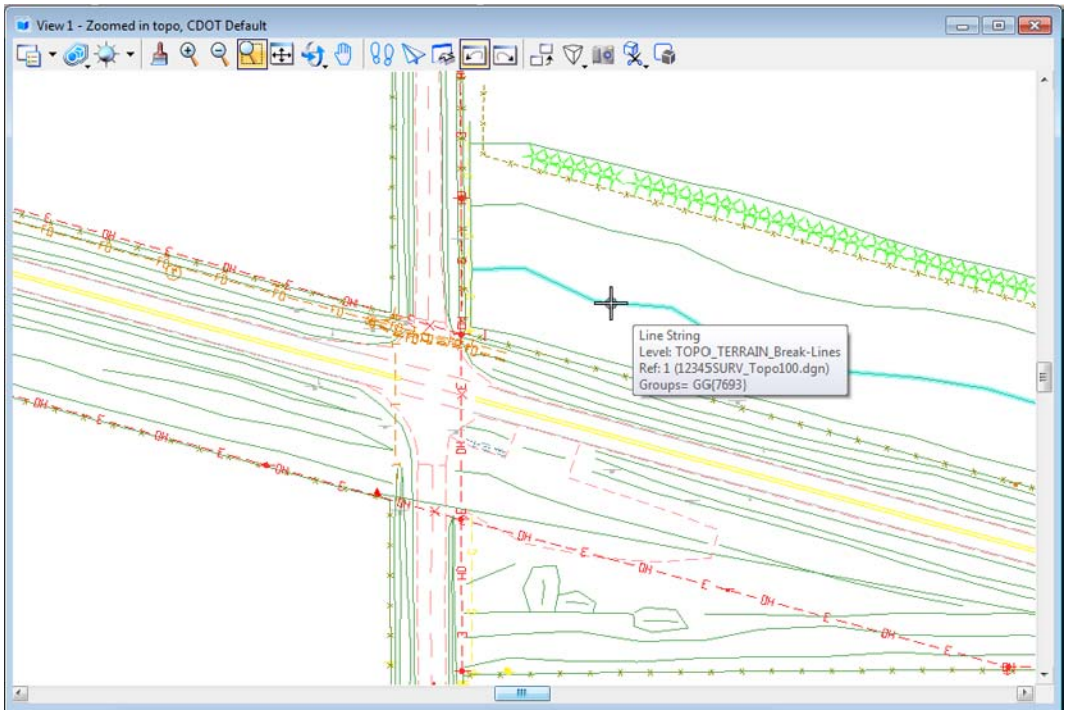
9. Turn ***off*** the level **TOPO_FENCE_Barbed-Wire**.



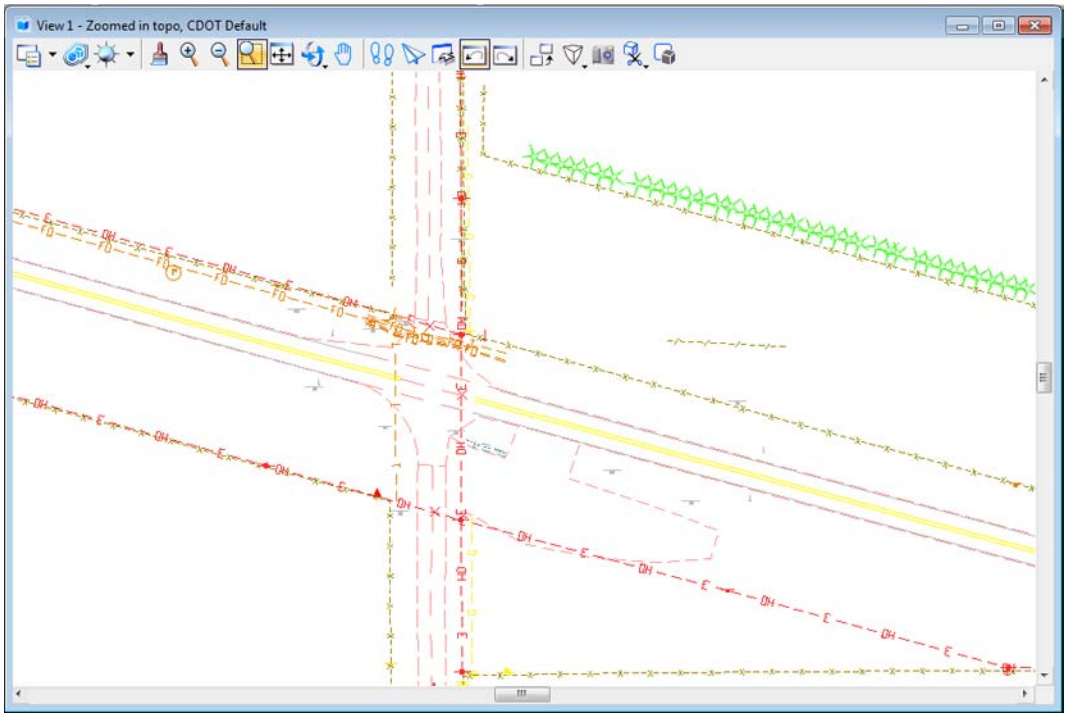
10. Right click in the list of levels and select **Off By Element**.



11. **<D>** on one of the green breaklines to turn off the level **TOPO_TERRAIN_Break-Lines.**



12. **Update** the view.

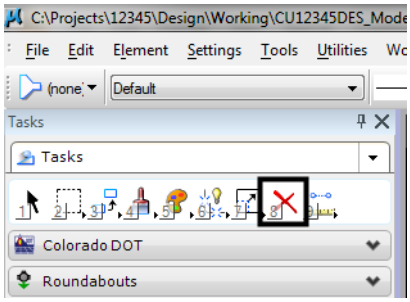


13. Turn other Survey levels on/off as desired.

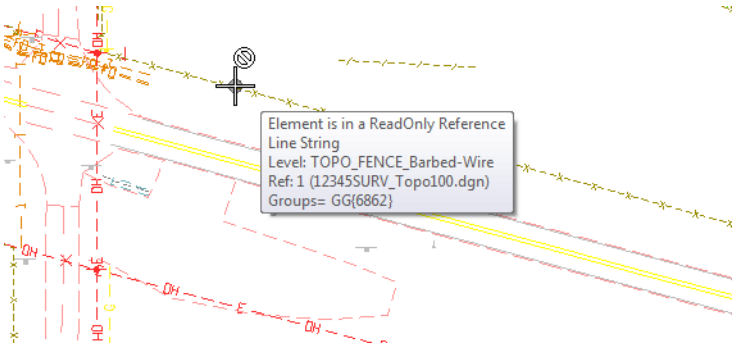
    Note: You have control over all reference levels just like levels in the master file.

14. Turn all Survey levels back ***on***.

15. From the MicroStation ***Main*** taskbar, select **Delete Element**.

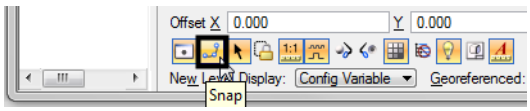


16. **<D>** on the barbed wire fence.



    The command is now not available because the barbed wire fence is in the reference file, not the active file. You can not delete or modify reference graphics.

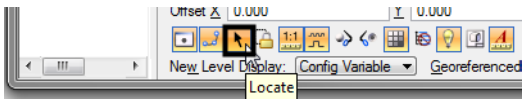
17. In the Reference dialog, turn off **Snap** for the **Survey/Topo** reference.



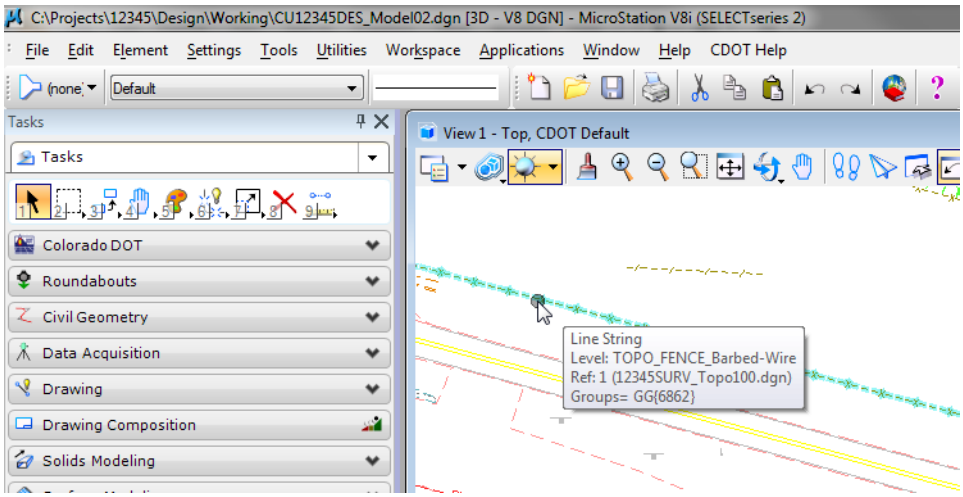
18. Try to tentative snap on some of the Survey graphics.

    With **Snap** turned off, you can't tentative to the graphics in the reference file.

19. In the Reference dialog, and turn off **Locate** for the **SurveyTopo** reference.



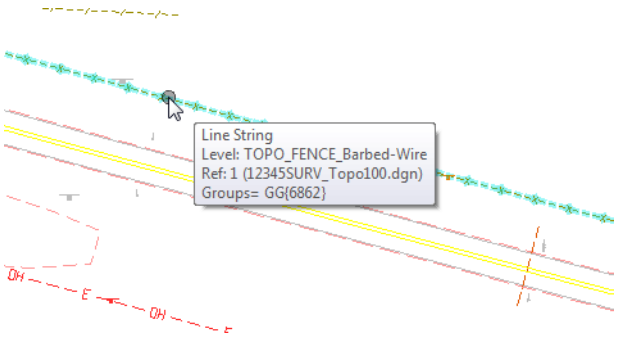
20. On the ***Main*** taskbar, choose the **Element Selection** tool and hold your cursor over some of the survey graphics.



With **Locate** off, you can't located reference elements for information, measuring, copying, etc.

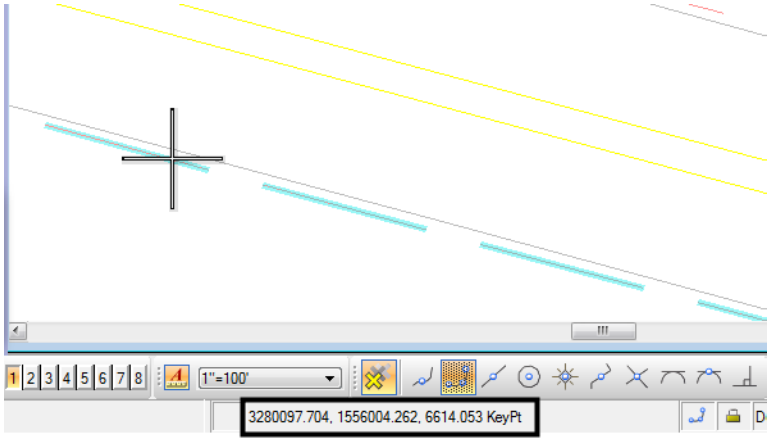
21. In the **References** dialog, turn **Snap** and **Locate** back ***on*** for the Survey/Topo reference.

22. Hold your cursor over some of the reference graphics.



You can now locate the graphics.

23. **<T>** on some reference graphics.

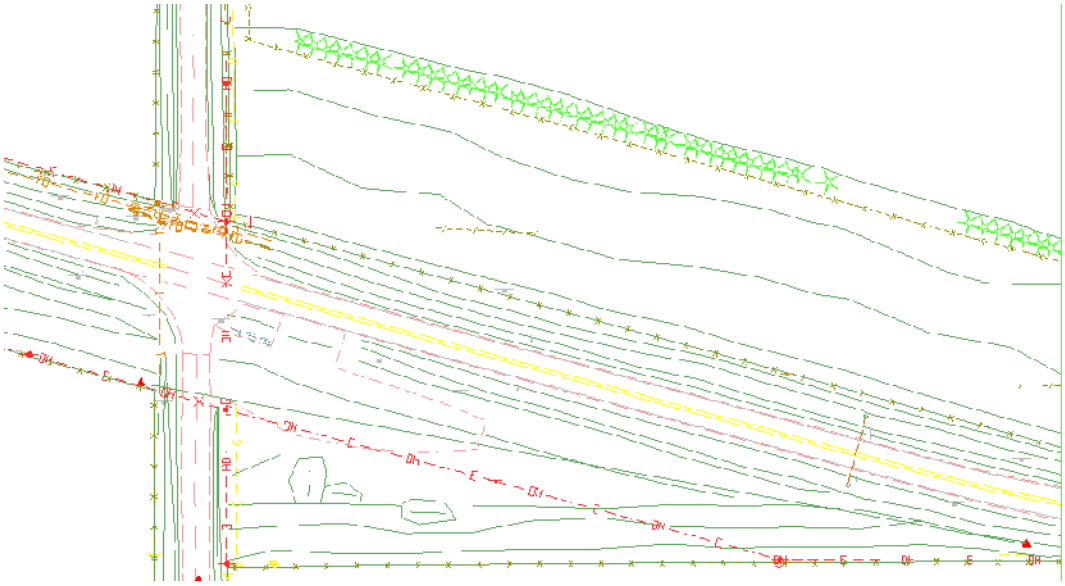


You can now snap to the reference graphics for coordinate information.

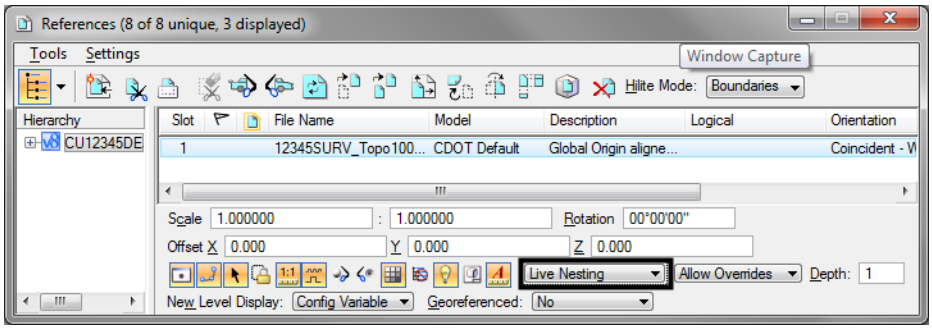
Note: It's often helpful to turn **Snap** off in a reference in dense areas where you don't want to snap to reference graphics. It's useful to turn **Locate** off for a reference if you're copying master file graphics and you don't want to accidentally copy the reference graphics.

Live Nesting

1. Window around the intersection as shown.

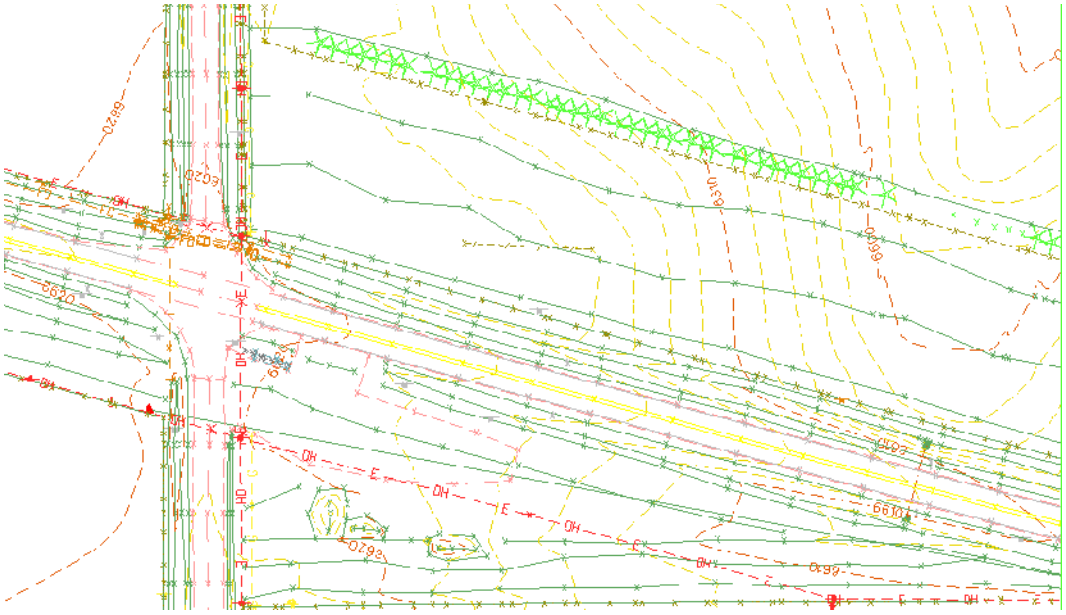


2. In the Reference dialog, change **No Nesting** to **Live Nesting** and set the **Depth** to **1**. Expand the **Hierarchy** list to show all nested references.



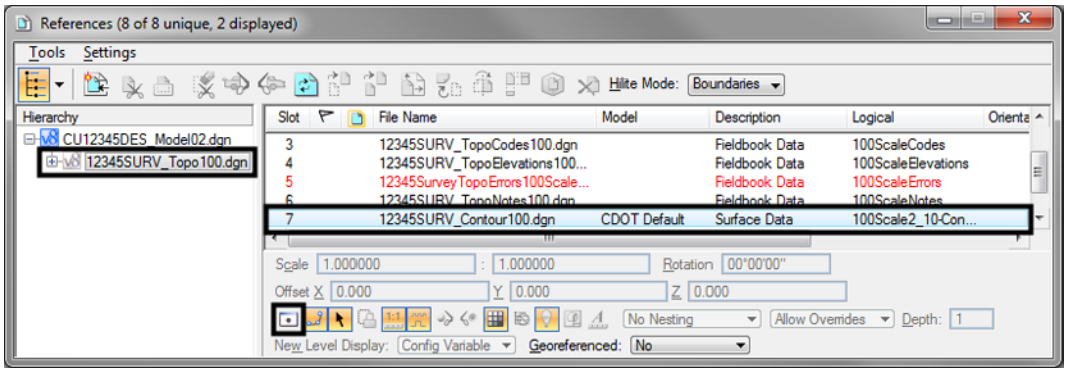
The Survey fieldbook data files, which are referenced to the Survey/Topo model, are now displayed in the file.

3. Review the graphics.

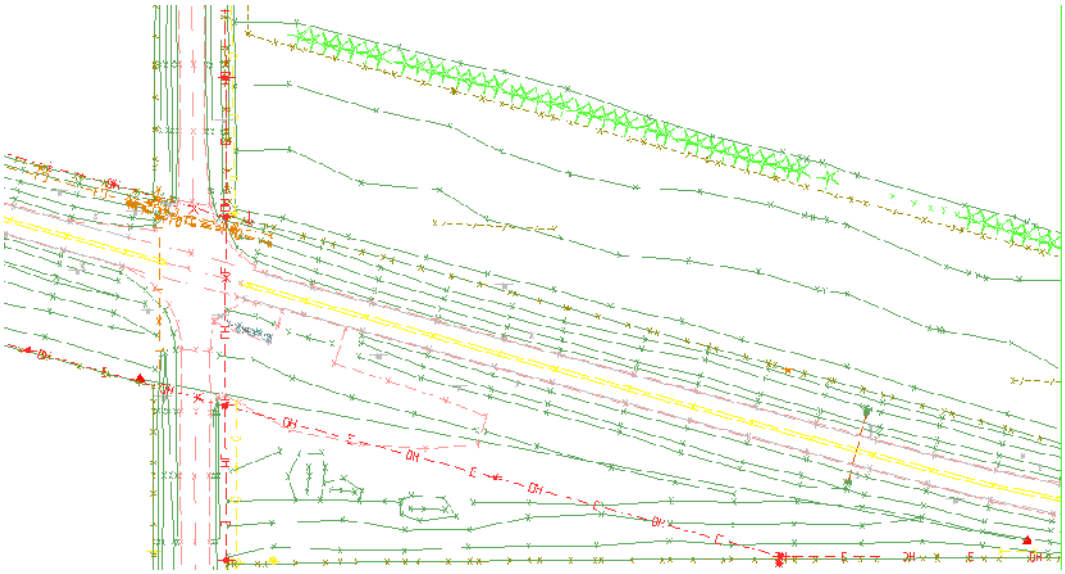


The Nested graphics, including the existing contours are now shown in the file.

4. On the left side of the **Reference** dialog, highlight the **Survey/Topo** reference. On the right-hand side of the **References** box, highlight the **Contour (Surface data)** nested reference and toggle **off** the **Display**.

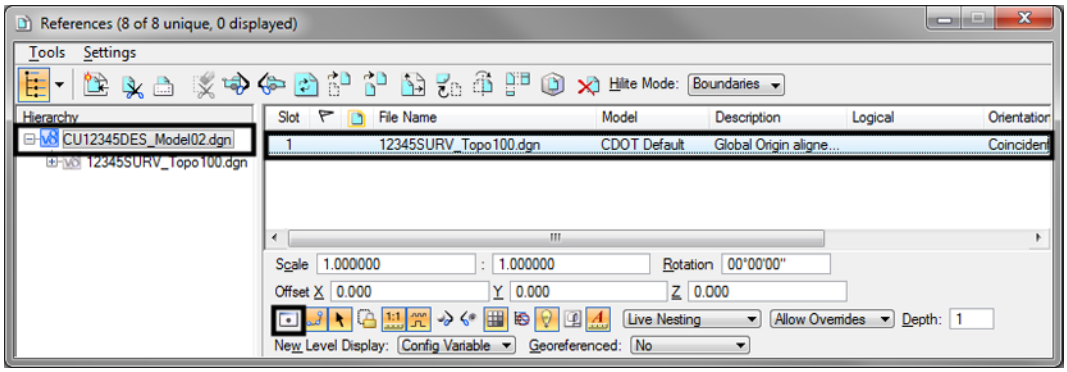


The display of just the nested contour graphics is turned off.



5. Turn the **Contour** reference **Display** back on.

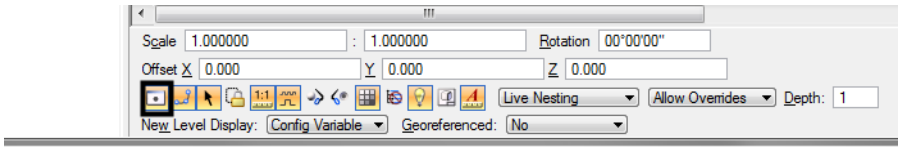
6. On the left side of the **Reference** dialog, highlight the **Design Model** master file. On the right-hand side of the **References** box, highlight the **Survey/Topo** reference and toggle **off** the **Display**.



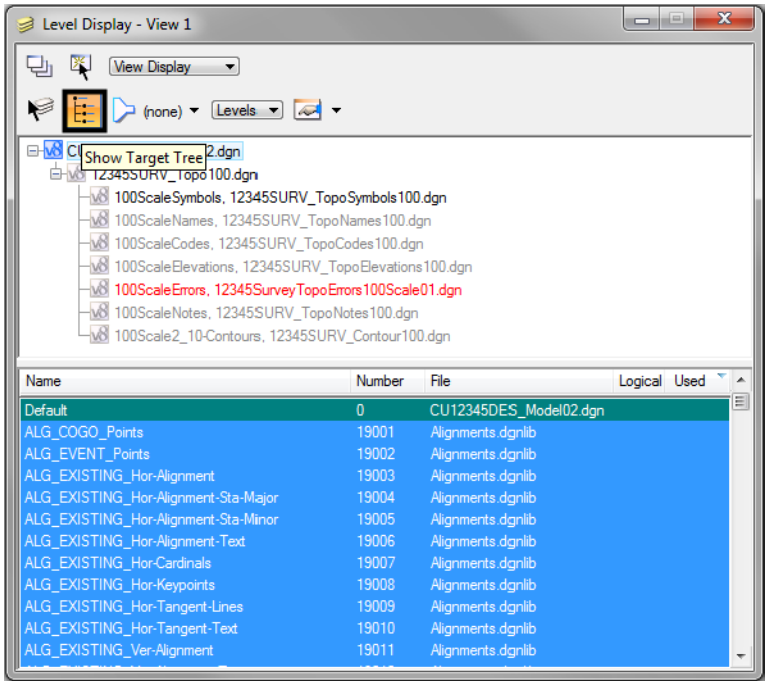
All graphics in the file are turned off.

Note: With a nested reference, when you turn off the display of the upper level reference, all nested references are turned off too.

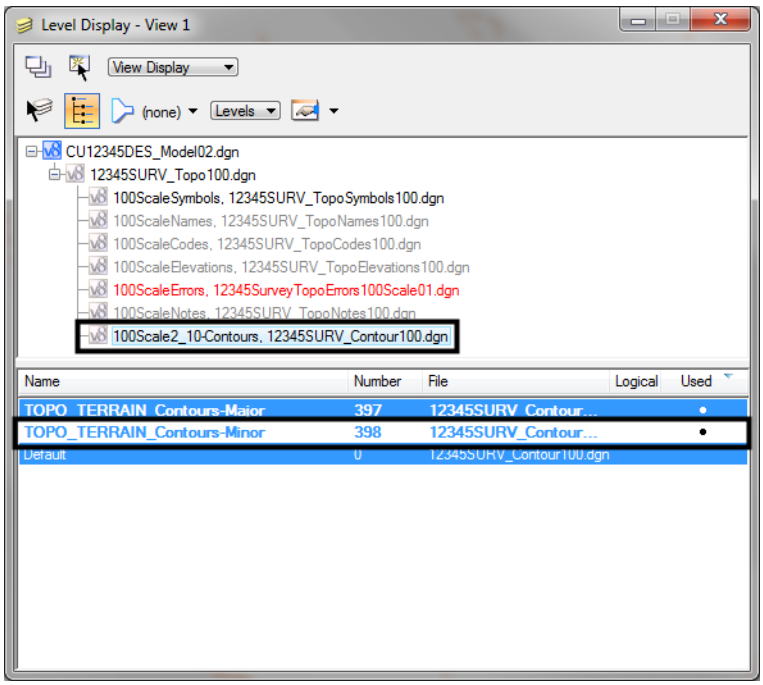
7. Turn the **Survey/Topo** reference display back **on**.

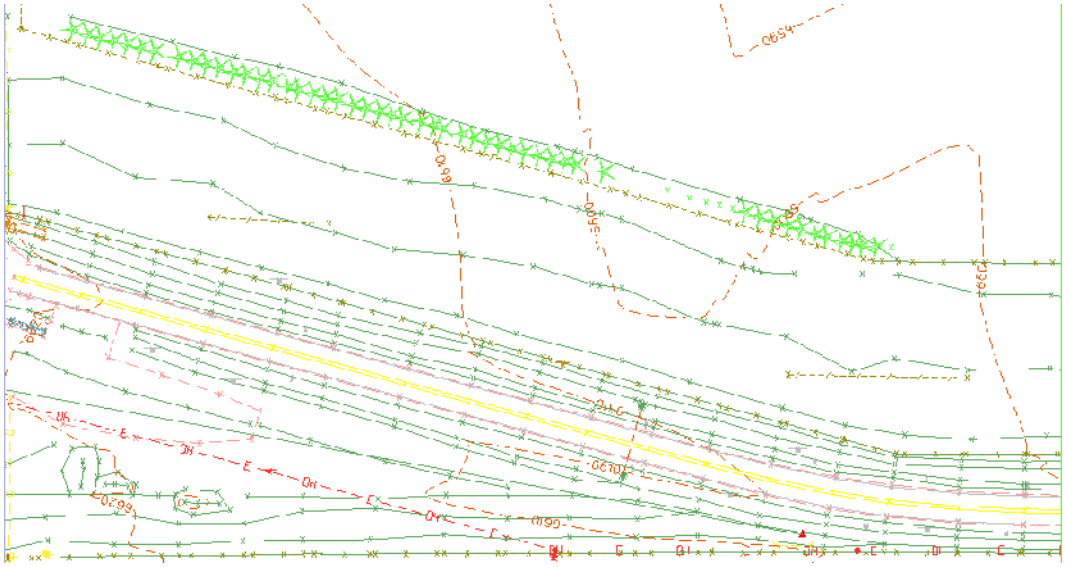


8. Open the Level Display box and expand the **Target Tree** list.



9. Select the Contour nested reference and toggle off the minor contour level.



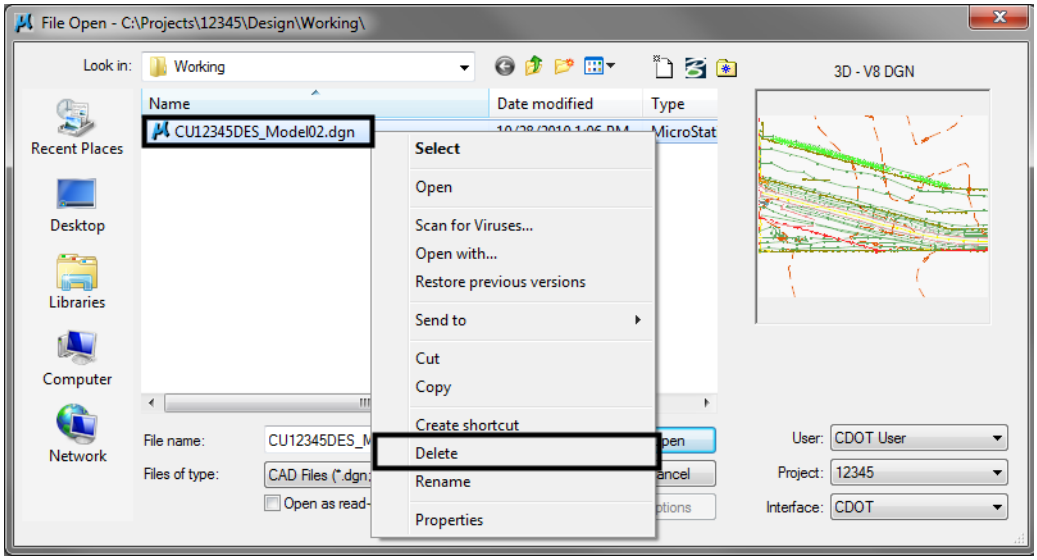


You have control over all nested reference levels via Level Display.

10. Turn the minor contours back ***on*** and **Close** the **Level Display** box.

You will work more with nested references and the Copy Attachment options in later labs.

11. Choose **File > Close** to return to the **MicroStation Manager**.



12. From the **MicroStation Manager** select the file **CU12345DES_Model02.dgn** and press the **Delete** key on your keyboard and choose **Yes** from the ***Delete File*** box to delete the file.

    Note: In this class, you'll work with the previously created Design Model file **12345DES_Model.dgn** in the Reference_Files folder.

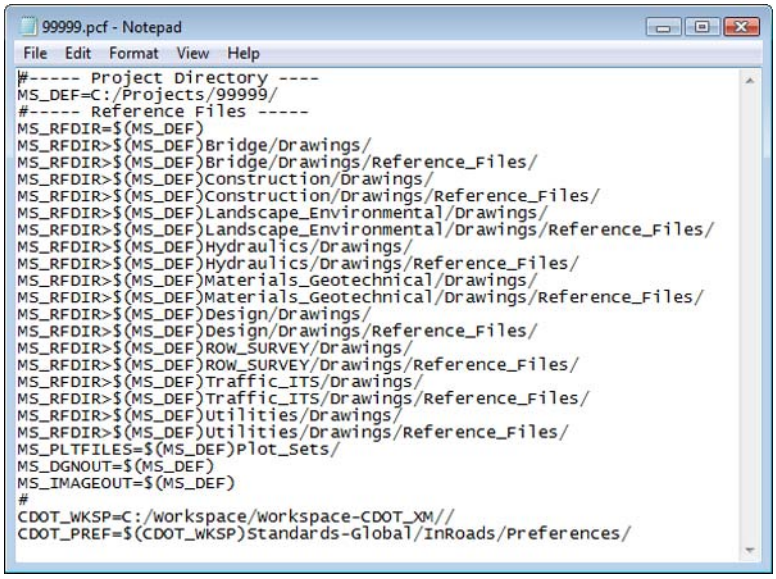
13. Cancel the **MicroStation Manager** box.

Lab 4.7 - Update Project 99999

You have now been assigned a project code of ***54321*** for the previously created 99999 project. Update the PCF to reflect this change.

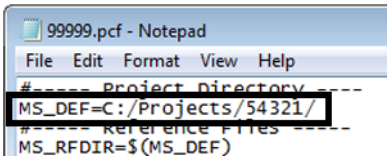
1. Using My Computer or Windows Explorer, navigate to the CDOT workspace (**C:\Workspace\Workspace-CDOT_V8i\Standards-Local\Projects**).

2. Double-click on **99999.pcf** to open it with **Notepad**.

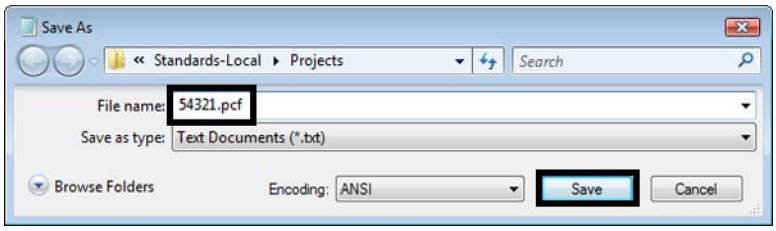


3. On the second line under **Project Directory**, edit it as follows:

MS_DEF=C:/Projects/54321/



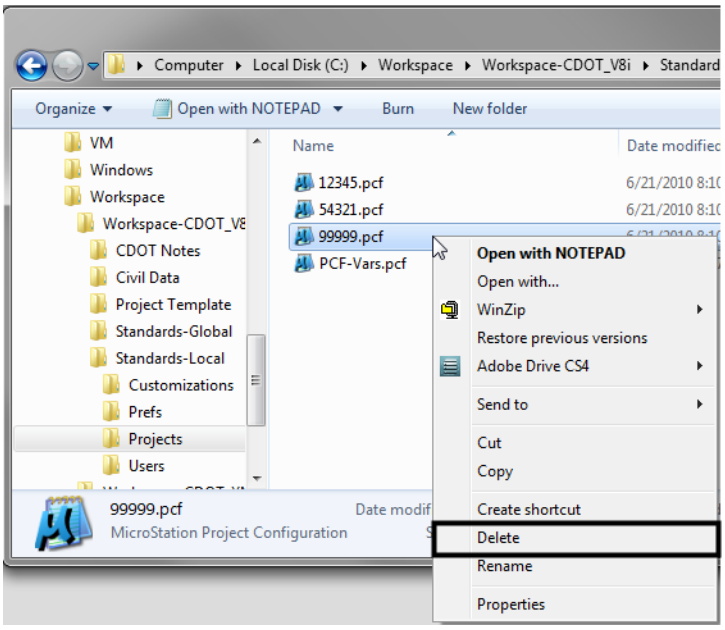
4. Select **File > Save As**, name the file **54321.pcf**. and select **Save**.



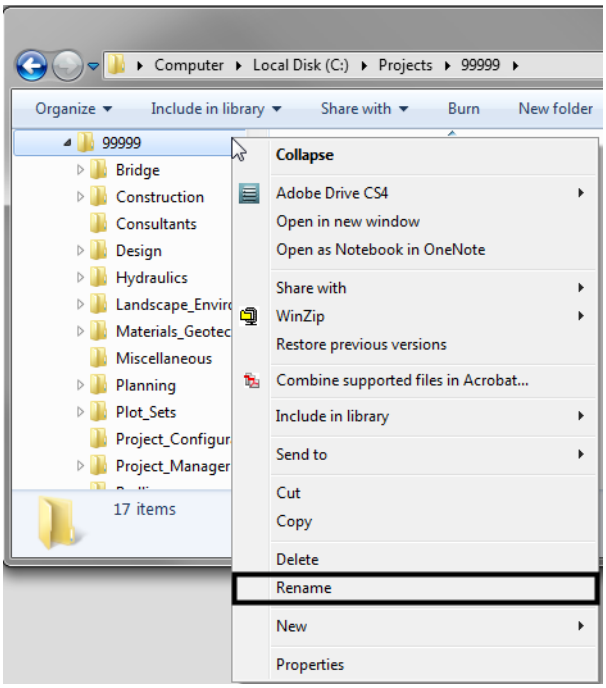
Note: By updating the MS_DEF path, all reference paths are updated as well.

5. Close the **54321.pcf** file in **Notepad**.

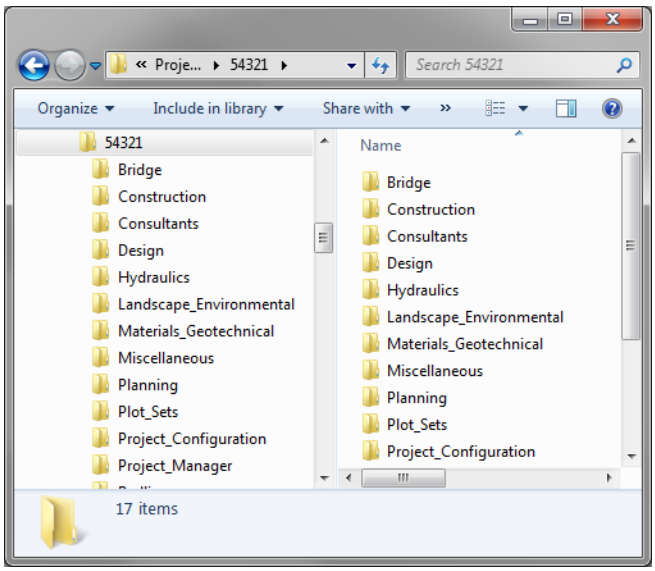
6. Delete the **99999.pcf** file from the **C:\Workspace\Workspace-CDOT_V8i\Standards-Local\Projects** folder.



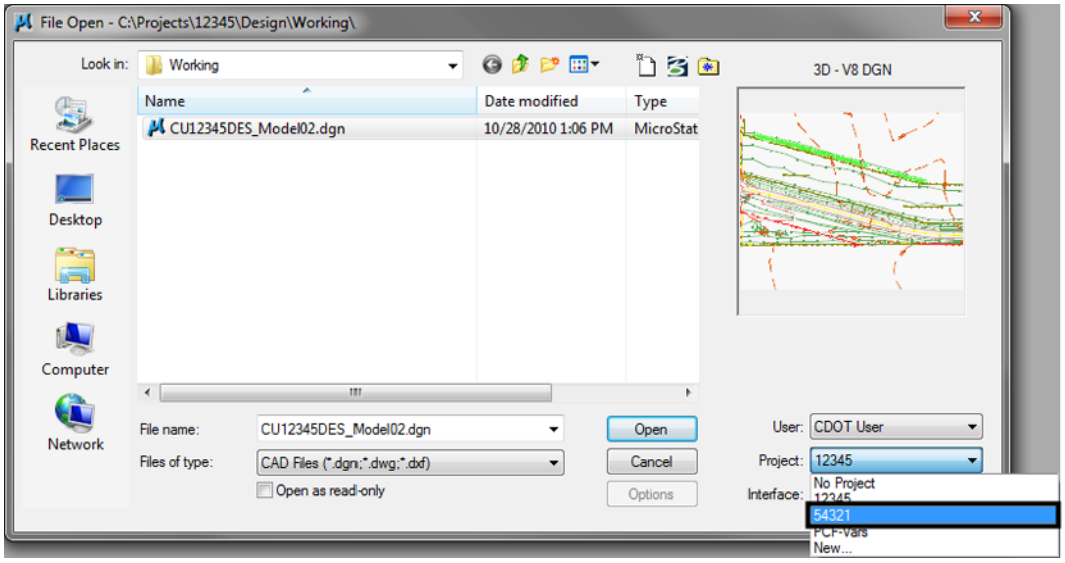
7. Using My Computer or Explorer, navigate to the **C:\Projects\99999** folder.



8. Rename the folder **C:\Projects\54321**.

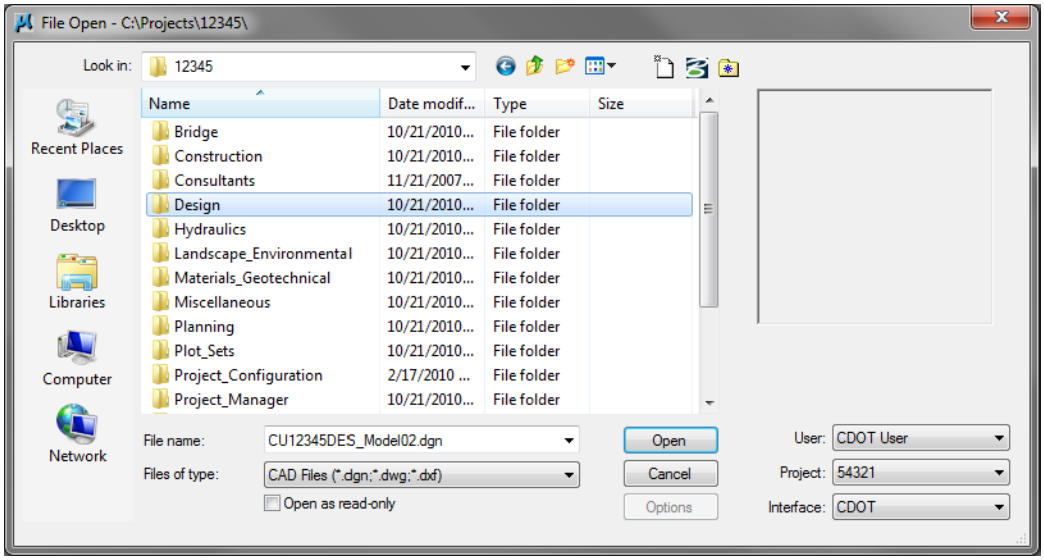


9. Start MicroStation and select the **Project** drop-down



Note that 99999 is no longer available and has been replaced by 54321.

10. Set **Project** to **54321**.



The project directory structure is selected.

Note: All files prefixed with 99999, would need to be renamed with the prefix 54321 on the hard drive.

11. **Cancel** the **MicroStation Manager**.

LAB 5 - Drawing Basics using the CDOT Menu

In this lab you will learn how to access the CDOT Menu and become familiar with its different components and operation. You will use the CDOT Menu to set standards (level, color, line style, line weight), automatically select drawing tools, and then place basic elements (lines, circles, arcs, etc.).

Chapter Objectives:

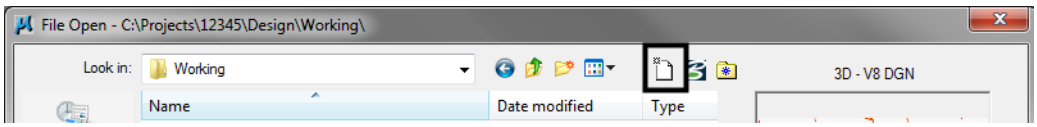
After completing this exercise you will know how to:

- Access the CDOT Menu
- Access the CDOT Bridge Menu
- Use the CDOT Menu to set element attributes
- Use the CDOT Menu to place basic elements (lines, arcs, circles, shapes, etc.)
- Use the **Delete** command
- Use the **Undo** and **Redo** functions
- Change the element highlight color

Lab 5.1 - Create a Miscellaneous Details file

Create this file to practice placing graphics using the CDOT Menu, as well as to draw a few miscellaneous details that later can be placed on a sheet.

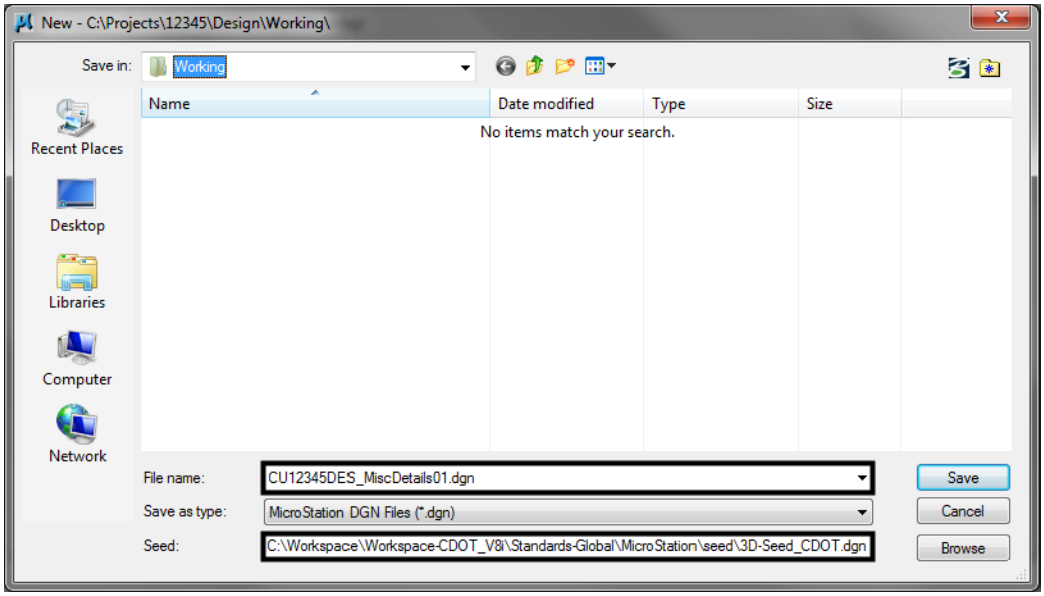
1. Start MicroStation from your desktop shortcut or from the **Start** Menu.
2. From **MicroStation Manager**, select the **New File** icon.



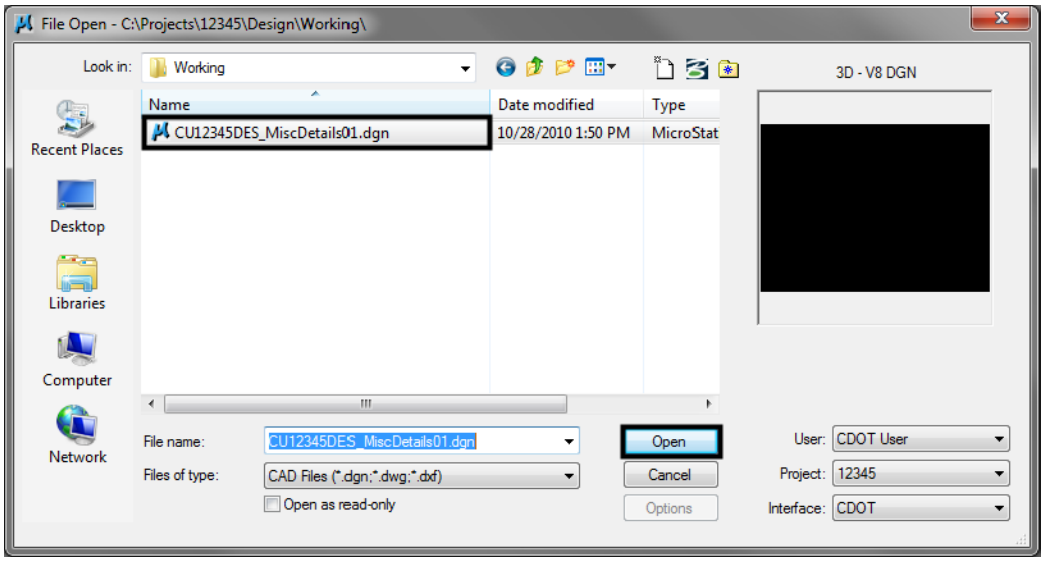
3. Verify the **Seed File** is set to **3D-Seed_CDOT.dgn**.
4. Set the **Directory** to **\Design\Working**.
5. Key in a file name **CU12345DES_MiscDetails01.dgn**.

   Note: CU stands for "CDOT User" the initials you'll use for training purposes.

6. Select **Save**.

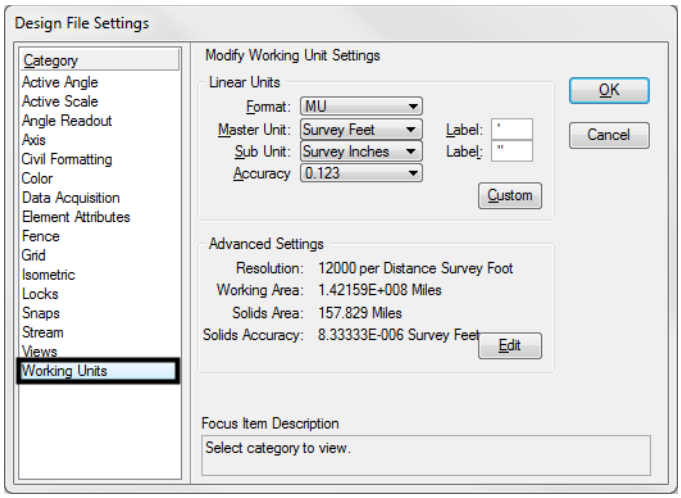


7. With the **CU12345DES_MiscDetails01.dgn** file highlighted in the **MicroStation Manager**, select **Open** to open it.

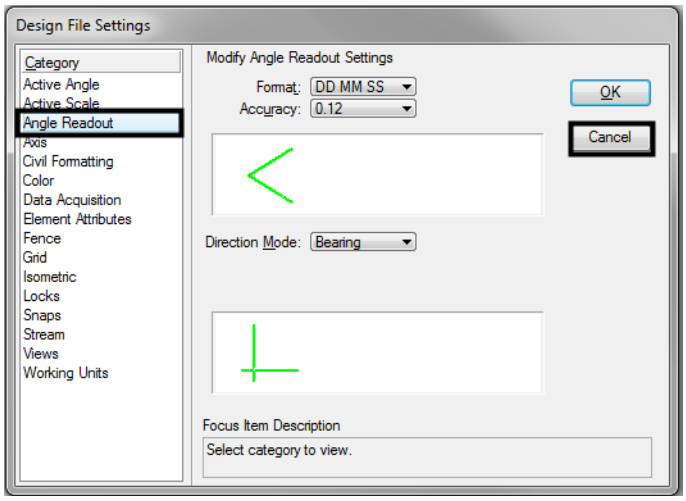


Check Seed File Settings

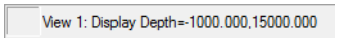
1. Select **Settings > Design File...** then select **Working Units** and review the CDOT defaults.



2. Select **Angle Readout** from the ***Category*** list.

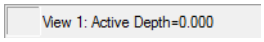


3. **Cancel** the dialog box.
4. Key in ***dp=$*** to check the display depth.
5. **<D>** anywhere in the view to select it.
6. Review the CDOT defaults in the message field.



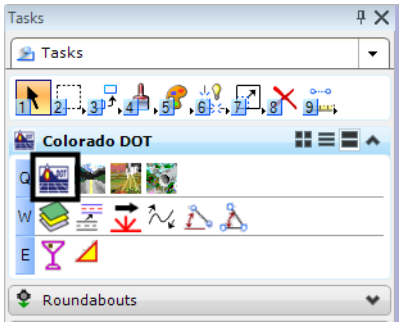
7. Key in ***az=$*** to check the active depth.
8. **<D>** anywhere in the view to select it.

9. Review the CDOT defaults in the message field.

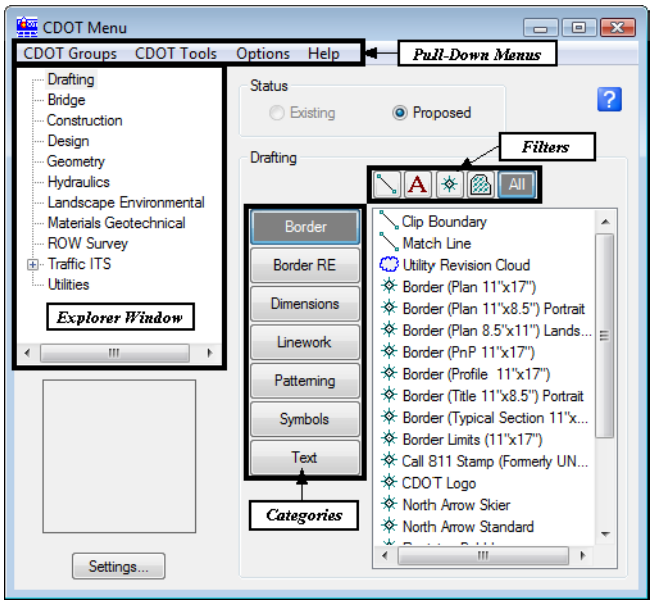


Open the CDOT Menu

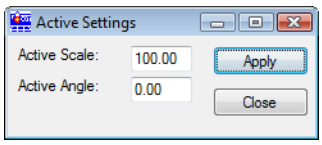
1. The CDOT Menu opens automatically when MicroStation is started. If it has been closed and needs to be re-opened, select the CDOT icon ***Colorado DOT*** Task Tab.



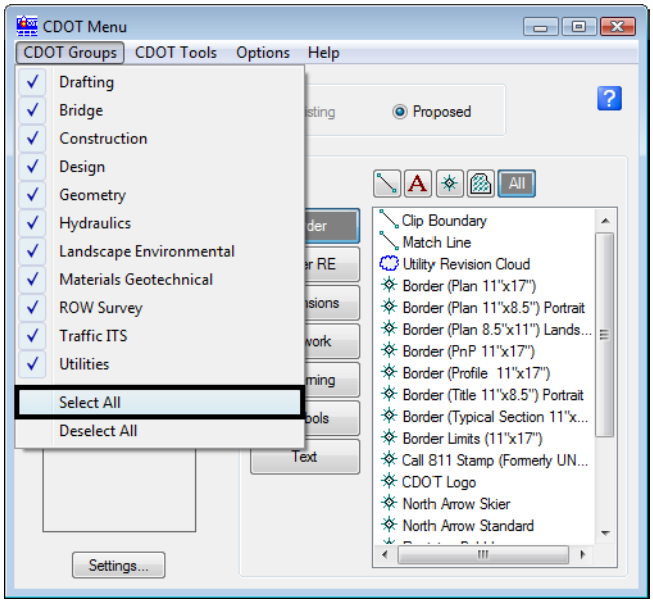
2. The CDOT Menu opens. The CDOT menu is broken up into several main parts, as shown below.



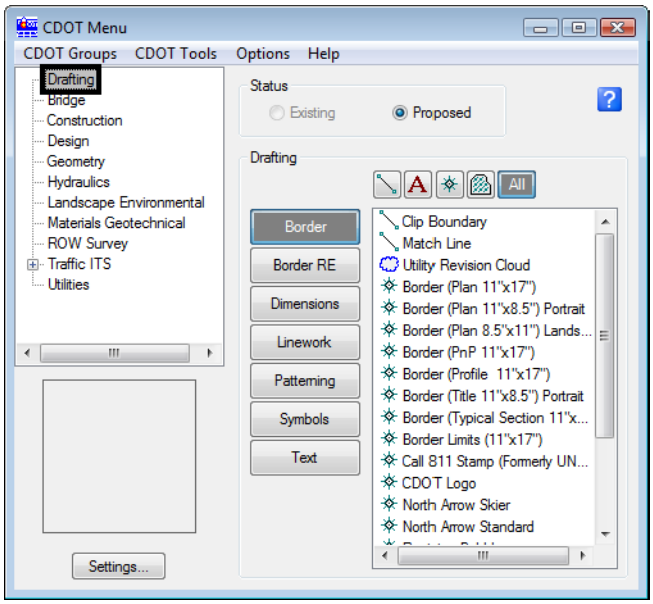
3. Selecting **Settings** allows the user to apply an ***Active Scale*** and ***Active Angle*** to elements being placed.



4. From the pull-down menus select **CDOT Groups > Select All.**

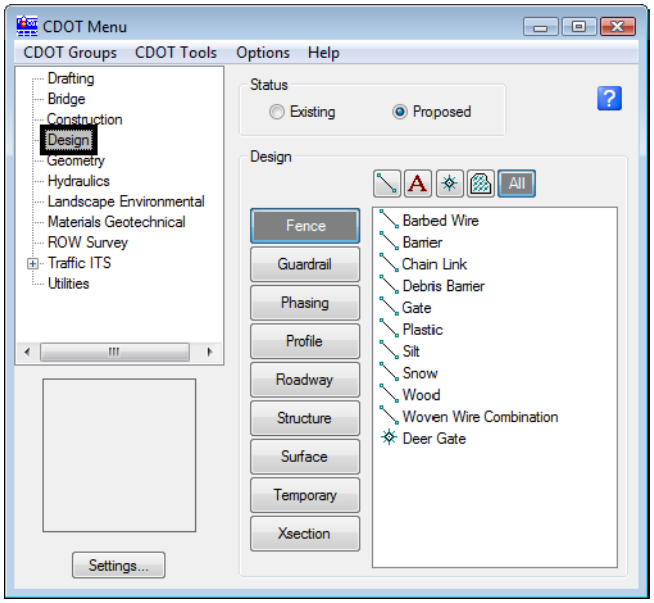


5. Select **Drafting** from the ***Explorer Window***.



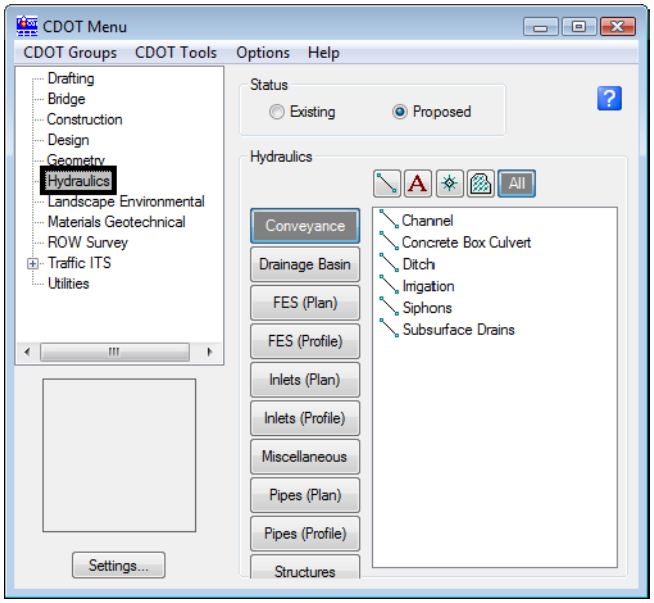
6. Review some of the categories and items available for general drafting.

7. Select **Design** from the ***Explorer Window***.



8. Review some of the categories and items available for the **Roadway Design Group**.

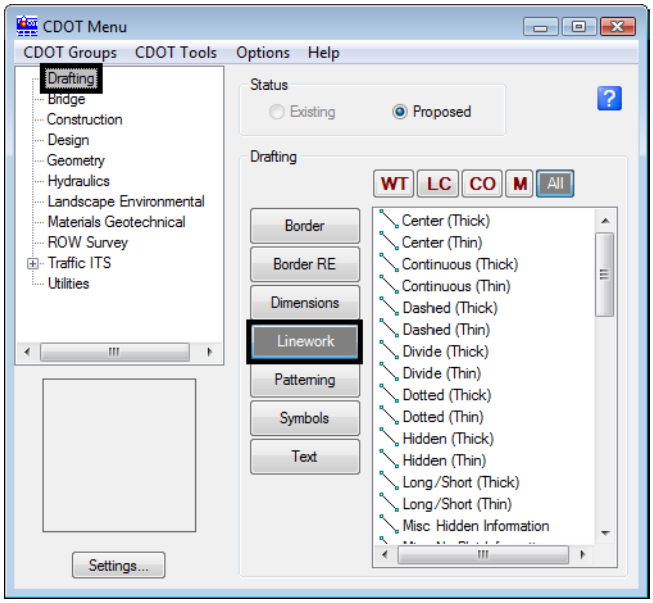
9. From the ***Explorer Window***, open other groups of interest (Hydraulics, Traffic, Utilities, etc.) and review the available categories and items.



Lab 5.2 - Place Graphics with the CDOT Menu

Place Lines

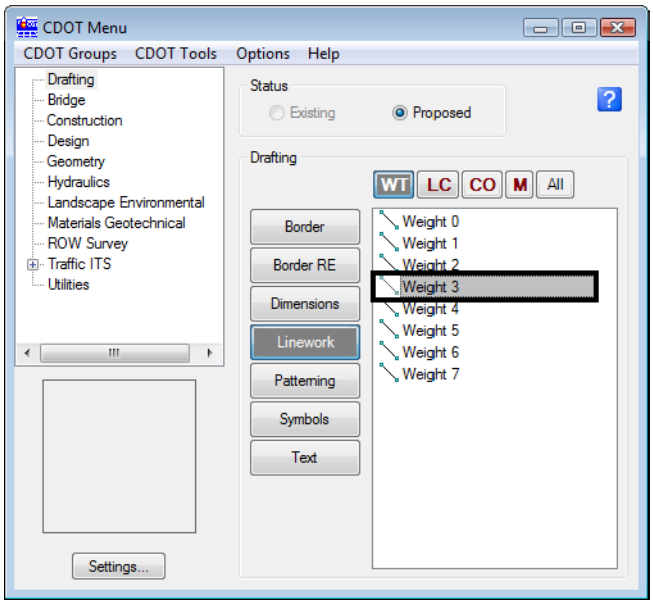
1. In the CDOT Menu Explorer select **Drafting**, then select the **Linework** category.



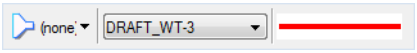
2. This category is used for general drafting work that is placed on standard drafting levels. The Filters are used to organize the different linework Items.

3. Set the Filter to **WT**, for line weight

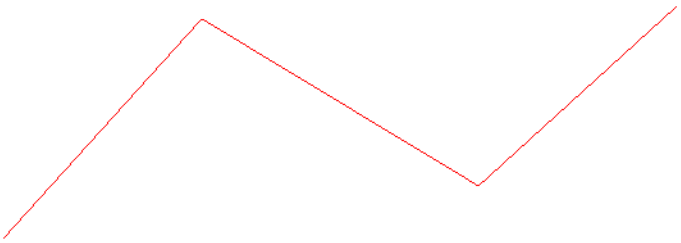
4. Select the Item **Weight 3**.



The filter determines the appropriate drafting level for the **SmartLine**. The Smartline command is the default for this menu item. All other drafting commands should be either be picked from the CDOT Main tool bar or entered as a key-in.



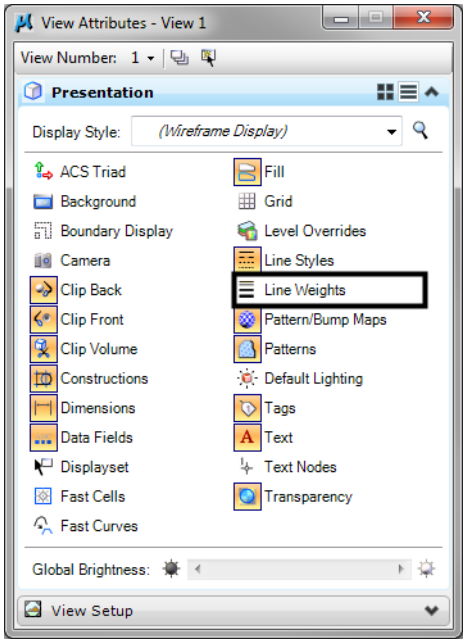
5. Data point in View 1 to enter vertices for the **SmartLine**.



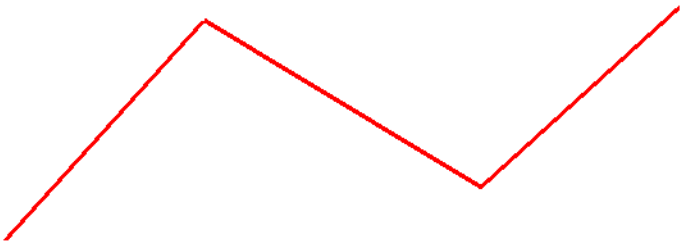
6. **<R>** when finished.

   Note: Always **<R>** when you are finished drawing an element. The active drawing tool (in this case SmartLine) remains active so that you can place another line without having to re-select the item from the menu.

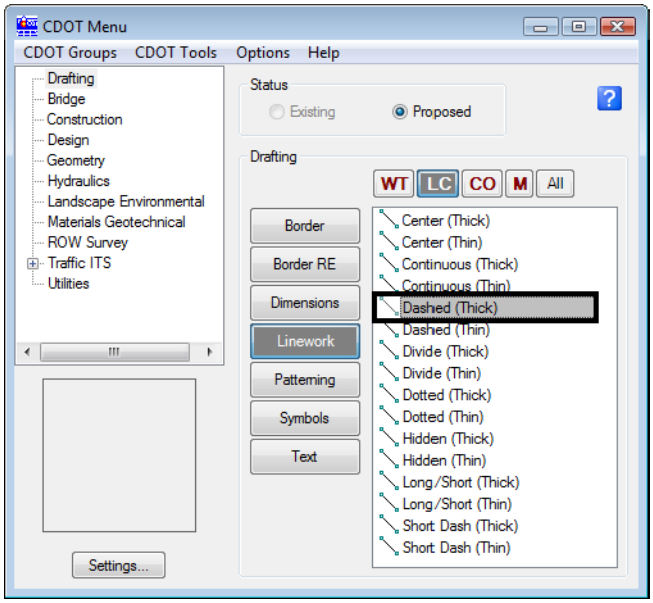
7. The seed file settings have line weights turned off to provide a better on screen display. To see the line weights, select the view attributes icon from the view tools at the bottom of each view window. You may also select **Settings > View Attributes** from the MicroStation pull-down menus. Toggle **Line Weights** on.



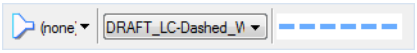
Note: Selecting the down arrow from the view attributes icon will open the dialog box temporarily allowing the user to toggle on line weights without bringing up the dialog box permanently. The dialog box will disappear when the mouse if moved away.

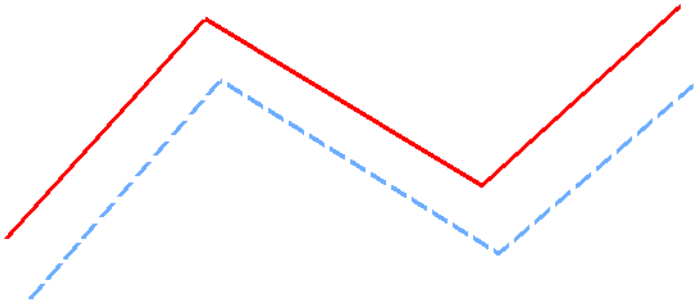


8. If you have opened the **View Attributes** dialog box, close it and return to the CDOT menu.
9. Set the **Filter to LC**, for linestyle.
10. Select the Item **Dashed (Thick).**



11. Place another **SmartLine** and note the change in line style and the active level on which it is placed.

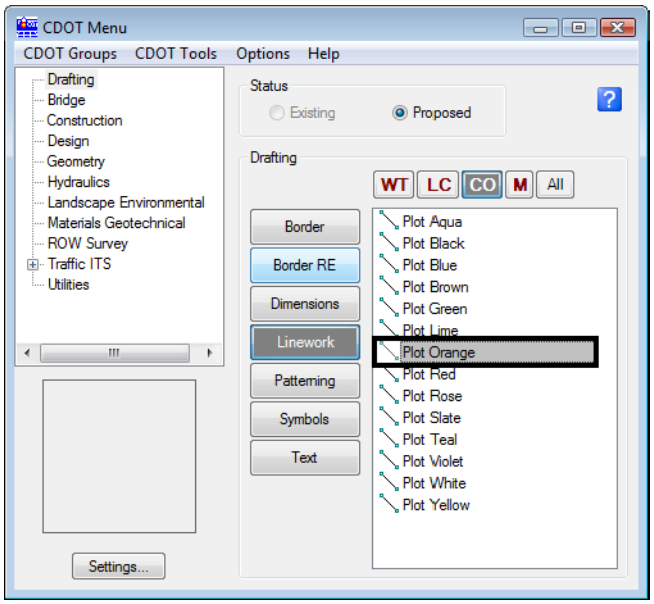




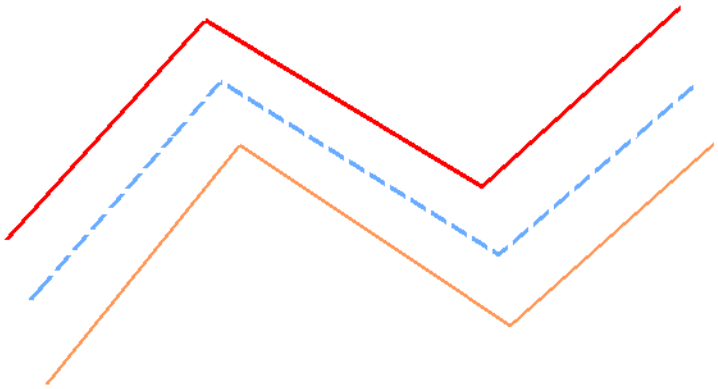
12. **<R>** when done.

13. Set the **Filter** to **CO, for Color.**

14. Select the Item **Plot Orange**.



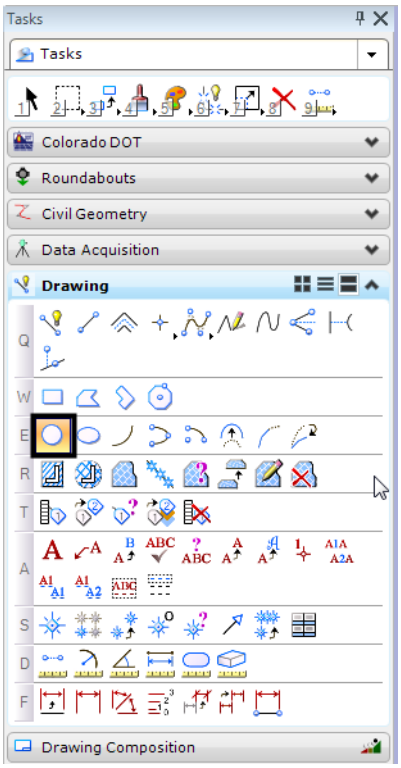
15. Place another **SmartLine** and note the change in both line style and color and the active level on which it is placed.



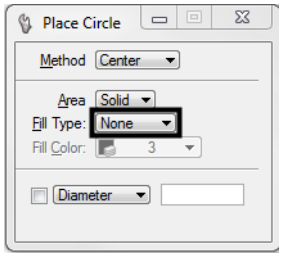
Place Circles

1. In the CDOT Menu, set the **Category**, **Filter** and **Item** to establish whatever level and symbology you like.

2. From the **Drawing** task tab, select the **Circle** icon.

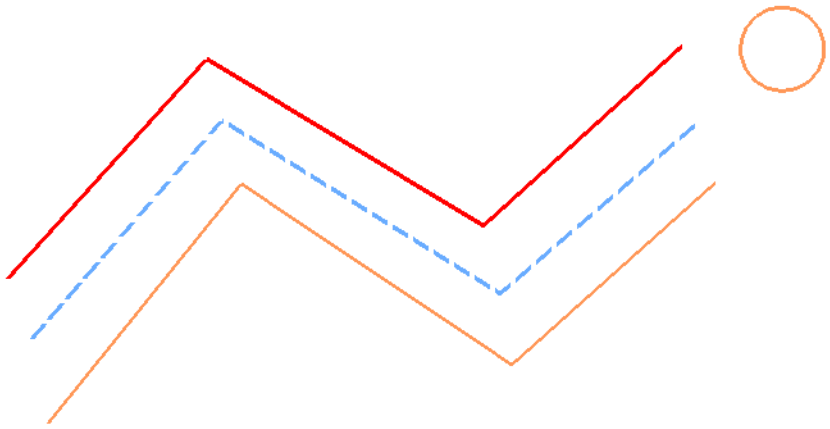


3. In the **Tool Settings** box, set **Fill Type** to **None.**



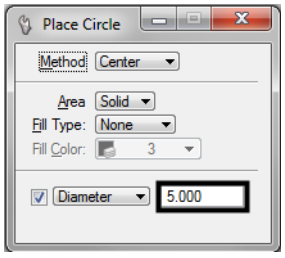
4. Follow your prompts and **<D>** to identify the center of the circle, then **<D>** to place a point on the circle.

   Note: As we started a new drawing the zoom area may be larger or smaller. Your drawing may not look exactly as shown below due to this; simply place the first circle then window area around the element.



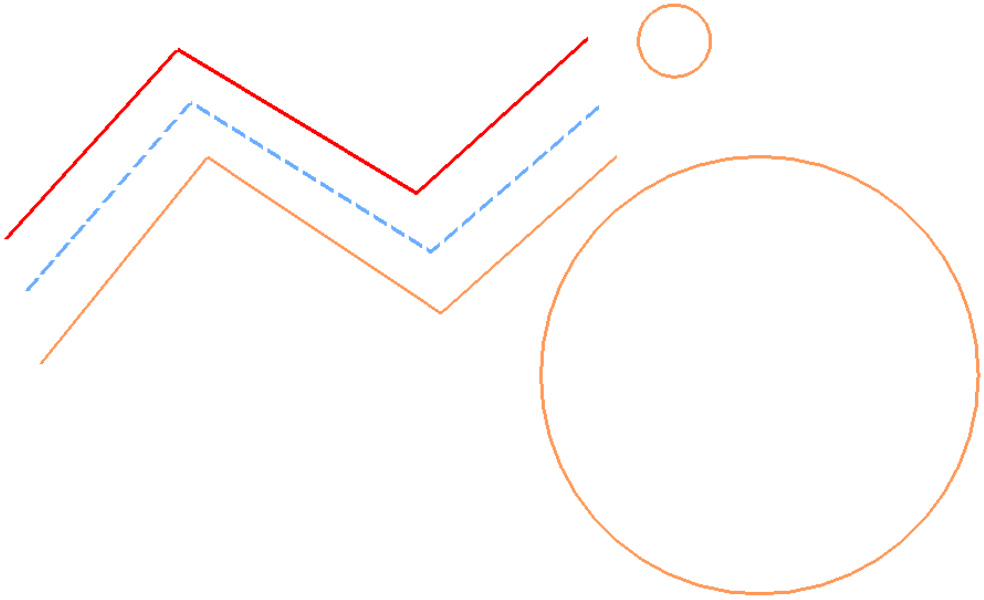
5. **<R>** when done.

6. In the **Tool Settings** box, toggle on **Diameter** and key in a value of ***5***.

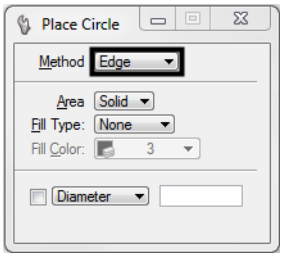


   Note: ***Important!*** Don't forget to tab after keying in the value. Otherwise, your entry will not be accepted. ***This is true for all fields in MicroStation dialog boxes.***

7. **<D>** to identify the center of the 5 ft. diameter circle.

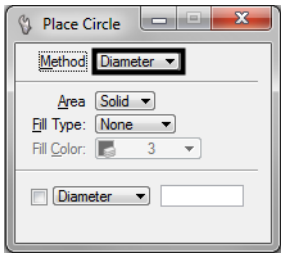


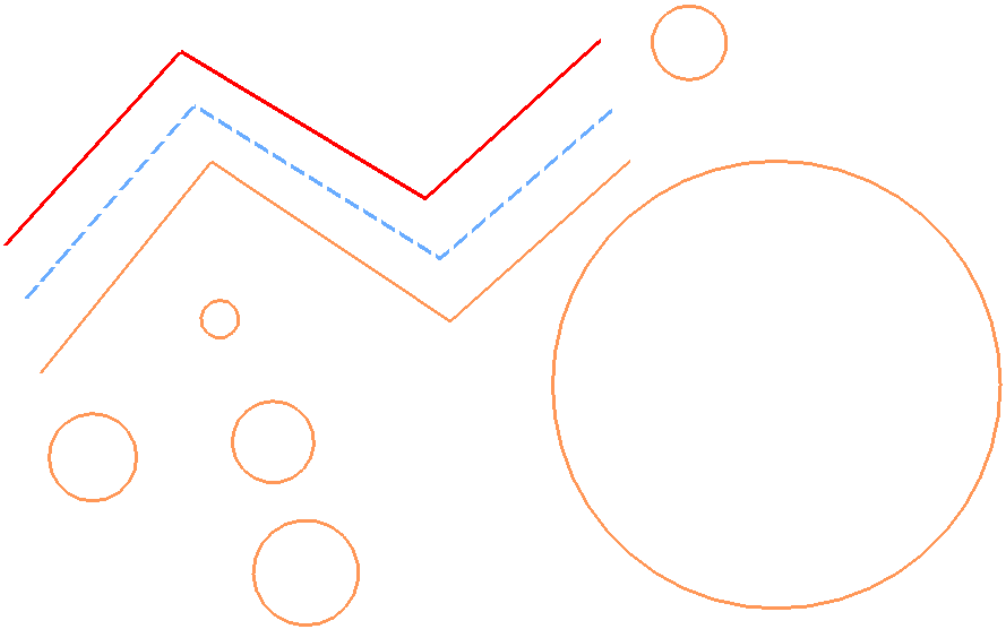
8. **<R>** when done.
9. Practice placing circles with other diameter or radius values.
10. In the **Tool Settings** box, set **Method** to **Edge** and toggle off the **Diameter** or **Radius** constraint.



11. Follow your prompts and **<D>** to place a circle by specifying three edge points. **<R>** when done.

12. In the **Tool Settings** box, set the **Method** to **Diameter** and follow your prompts to place a circle with two points for the diameter. **<R>** when done.

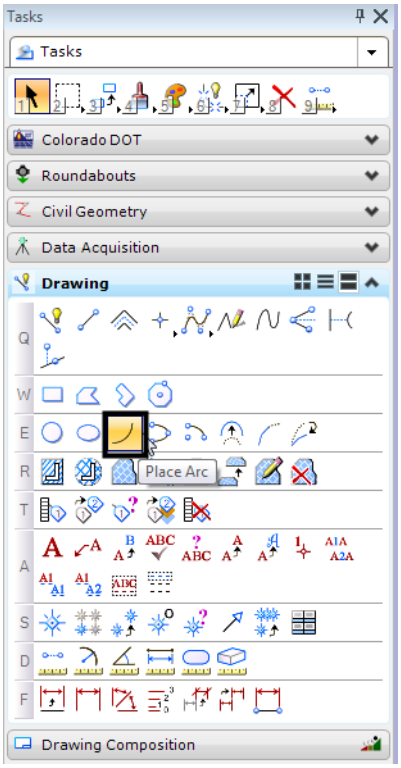




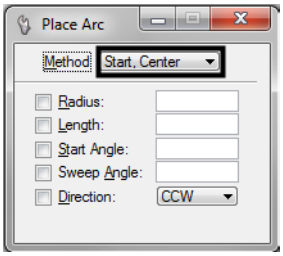
Place Arcs and Shapes

1. In the CDOT Menu, set the **Category**, **Filter** and **Item** to establish the correct level and symbology.

2. From the ***Drawing*** task tab, select the **Arc** icon.



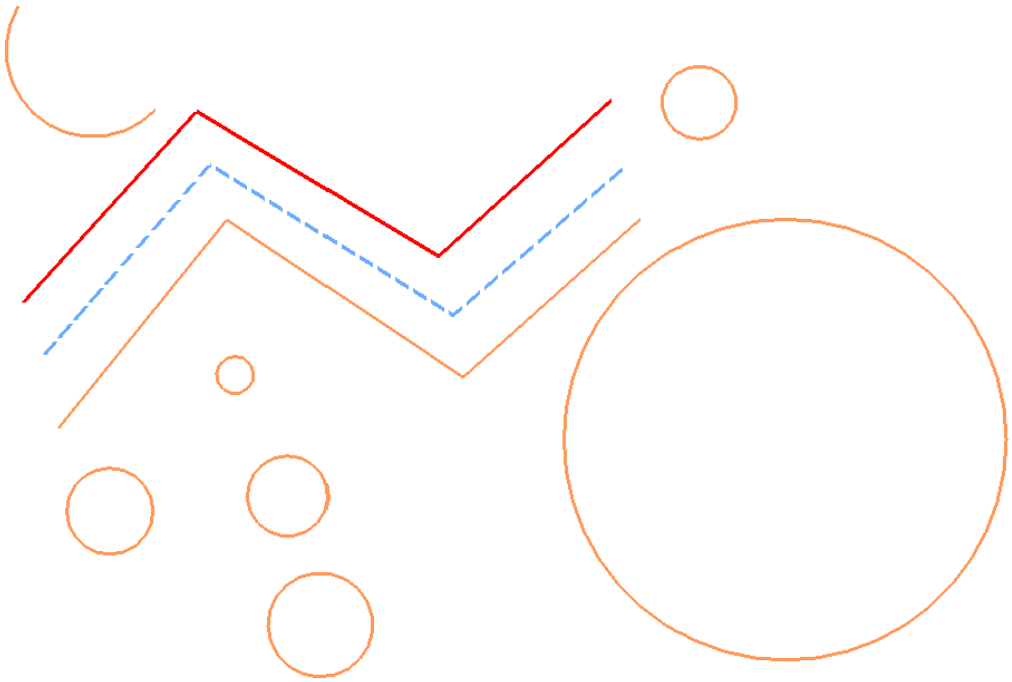
3. In the **Tool Settings** box, set the **Method** to **Start, Center**.



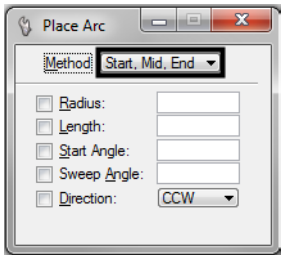
4. Follow the prompts and **<D>** anywhere to place the first arc endpoint.

5. **<D>** to define the arc center.

6. **<D>** to define the second endpoint.

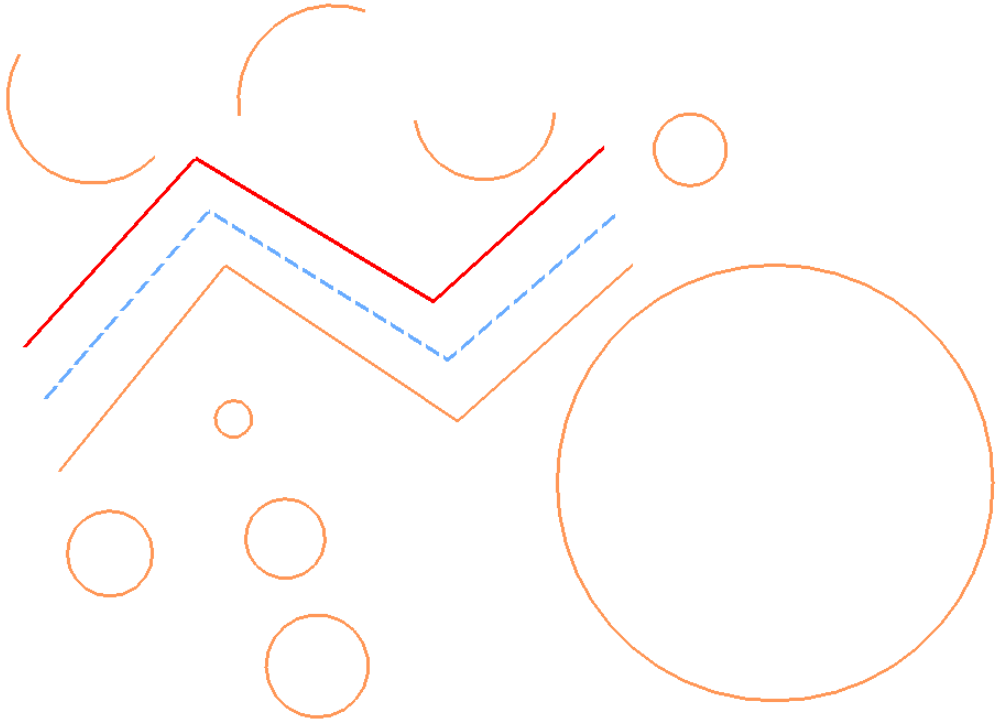


7. **<R>** when done.
8. In the **Tools Settings** box, set the **Method** to **Start, Mid, End**.

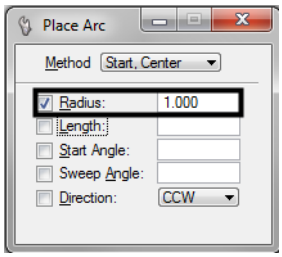


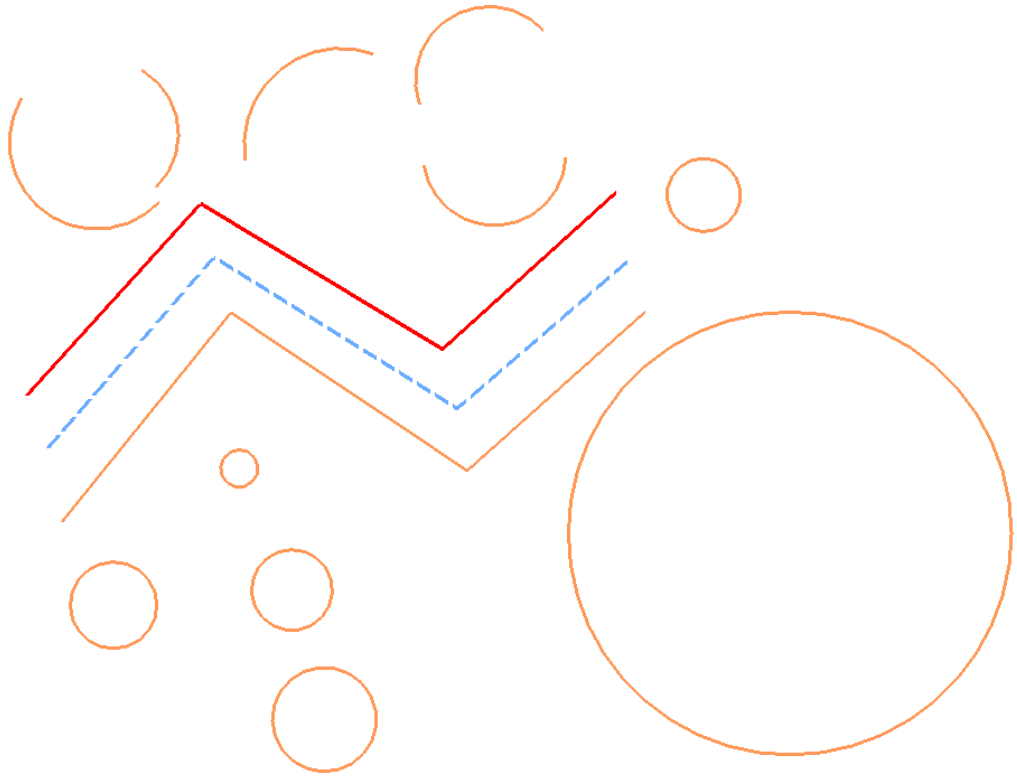
9. Follow the prompts to place an arc by 3 points.

10. Repeat the above step, but place the arc in the opposite direction.



11. Using any of the available methods, constrain the radius by clicking in the check box as shown, and place another arc.

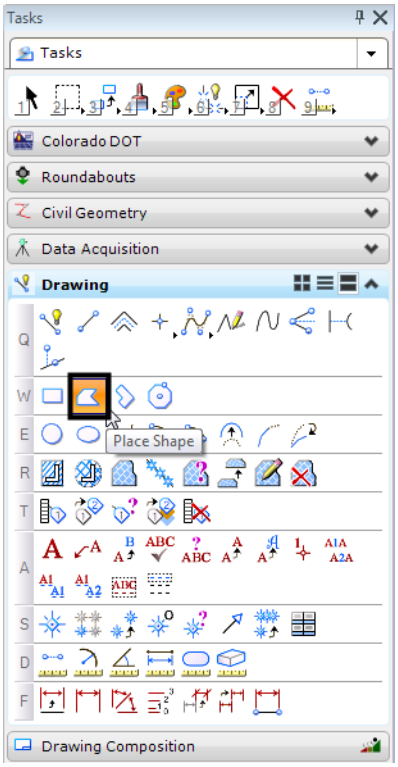


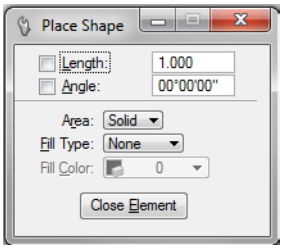


12. Try setting other constrains and place additional arcs.

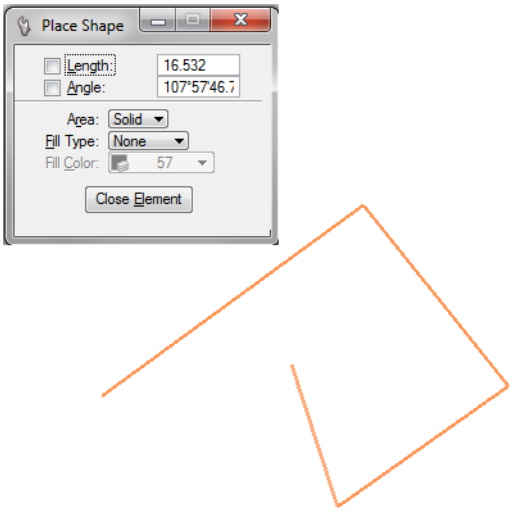
13. **<R>** when done.

14. In the ***Drawing*** task tab, select the **Place Shape** icon.

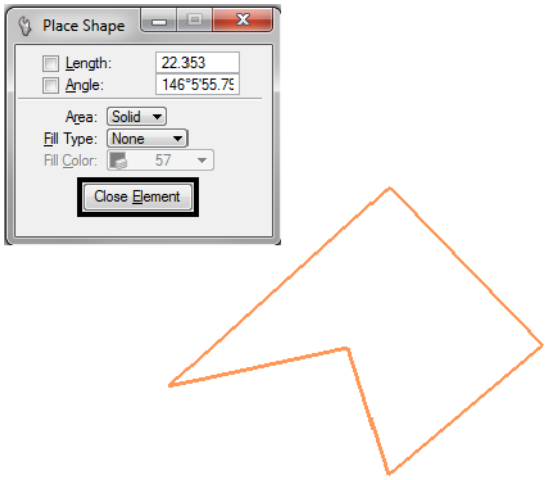




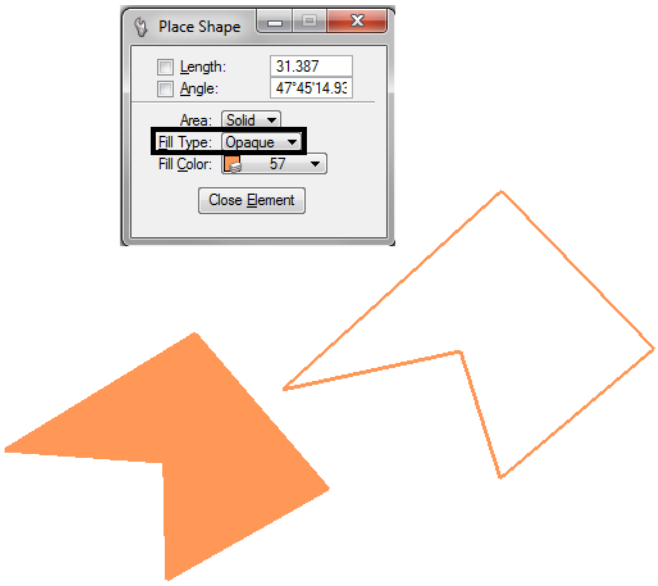
15. **<D>** to place vertices for an unconstrained shape.



16. For the last data point (to close the shape), select **Close Element**.

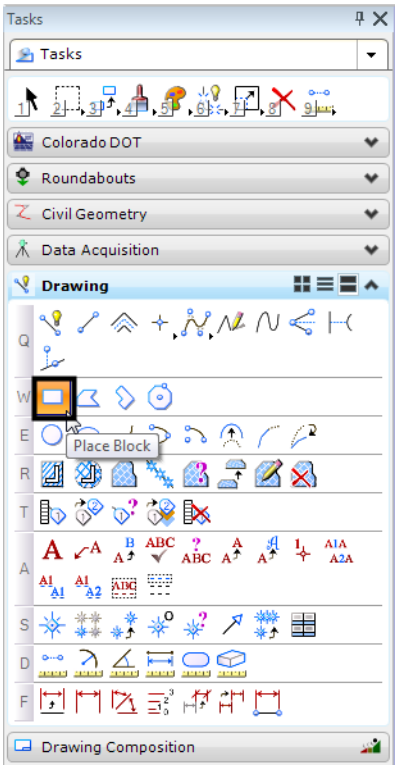


17. In the Tool Settings box, set **Fill Type** to **Opaque** and place another shape.



18. Set Fill Type back to **None**.

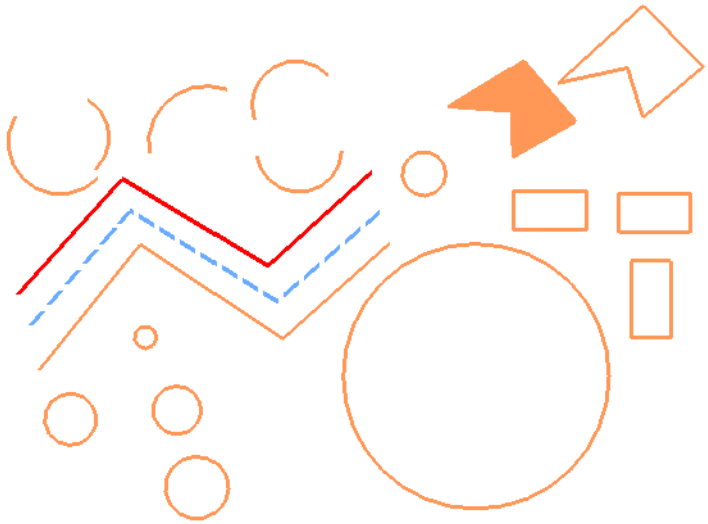
19. On the ***Drawings*** task tab, select **Place Block**.



20. **<D>** for the first corner of the block.

21. **<D>** for the opposite corner.

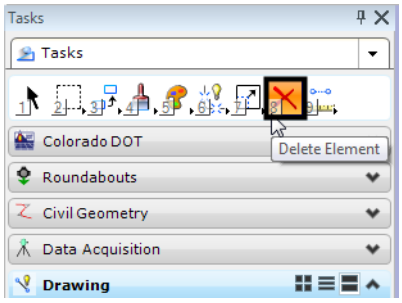
22. Place a few more blocks until you're comfortable with the command.



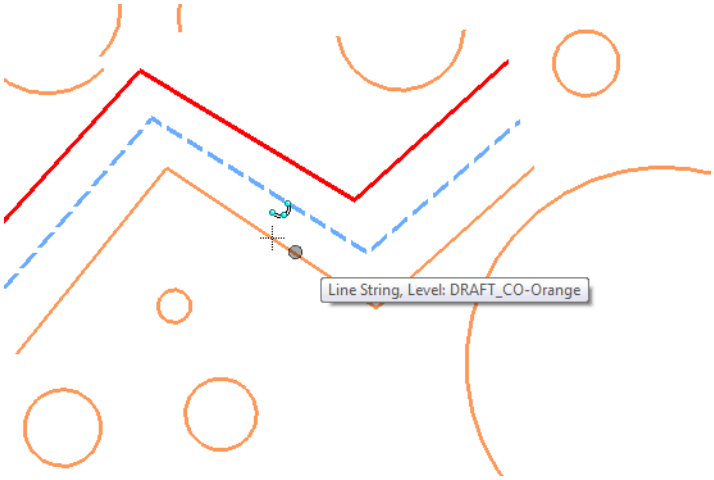
Lab 5.3 - Delete and Undo

Delete an element

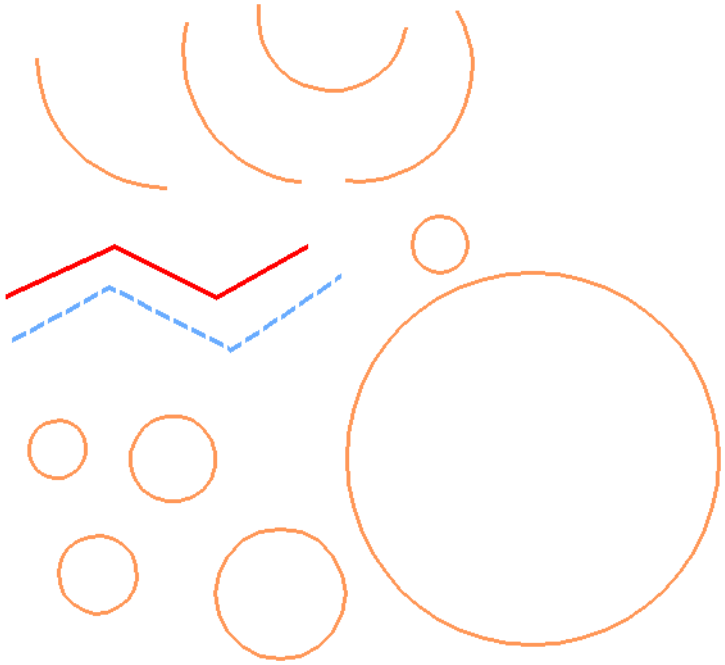
1. **Fit** View 1.
2. From the **Main** task toolbar, select **Delete Element.**



3. Move your cursor over the orange line until it highlights.



4. **<D>** to delete.

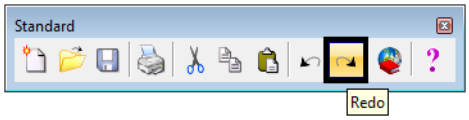


Undo and Redo the deletion

1. From the **Standard** toolbar, select **Undo.**

The line reappears.

2. Select `Redo`.



The line is deleted again.

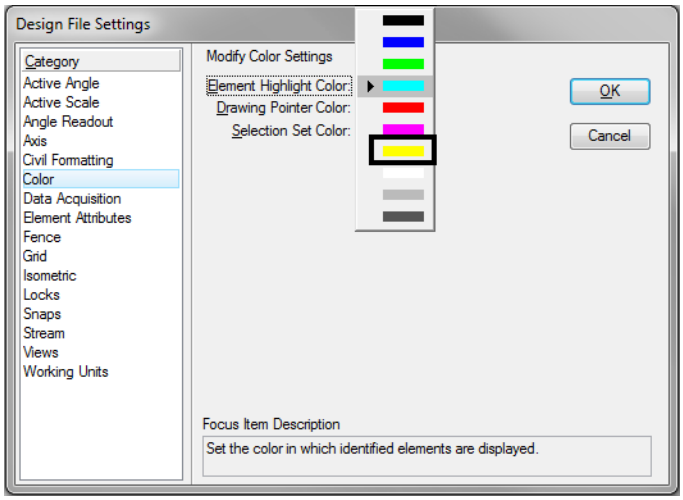
Note: You can also choose **Edit > Undo** to reverse the previous action and get a description of what you are undoing.

In addition to the **Delete** command, the **Undo**/**Redo** commands work for most MicroStation drawing tools.

If you have elements that are close to or on top of each other, **<R>** until the element you want to delete highlights, then **<D>** to delete.

Lab 5.4 - Change the Element Highlight Color

1. Select **Settings > Design File > Color.**
2. Set **Element Highlight Color** to **Yellow.**



3. Select **OK.**
4. Choose **Delete Element** from the **Main** toolbar.
5. Move your cursor over an element until it highlights.
6. Notice the highlight color is now yellow.
7. **<D>** to delete the element.

   The **Delete Element** command remains active and you can continue deleting elements.
8. Set the highlight to a color you prefer.

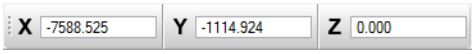
Lab 5.5 - Delete All

1. Select **Edit > Select All** to put all elements you've drawn in a MicroStation selection set.
2. Choose **Delete** from the **Main** toolbar.
3. All elements selected are deleted.

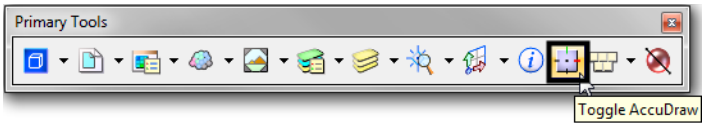
LAB 6 - Draw the Median Island Nose Section

In this lab, you'll draw the nose section shown below using AccuDraw and precision keyins.

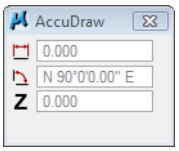
1. If AccuDraw is docked, as shown below, drag the AccuDraw Window and float it in the view.

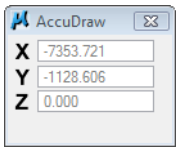


Note: If AccuDraw is not on, toggle it on from the **Primary** toolbar.



If your compass is set to **Polar** mode, below left, switch it to **Rectangular** mode, below right, by pressing **<spacebar>** on the keyboard.



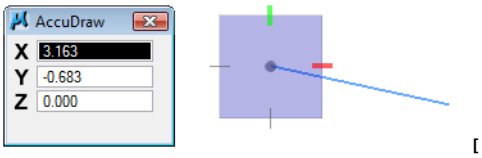


Lab 6.1 - Draw a Concrete Gutter Pan Section

1. On the CDOT Menu, set the **Explorer** to **Drafting**, the **Category** to **Linework**, the **Filter** to **WT** and select Item **Weight 1**.
2. Key in ***xy=990,990*** to define the begin of the line
3. Key in ***xy=1100,1100*** to define the end of the line
4. Select **Fit View** to zoom around the line
5. Delete the line
6. Select **Place Smartline**
7. Key in ***xy=1000,1000*** to define the starting coordinate for drawing the section (the upper left corner).

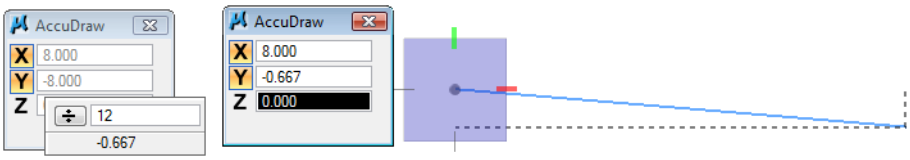
   Note: If you can't see the line's endpoint and it is "rubber banding" into the view, **Zoom Out** and then ***reset once*** **<R>** back into the **Place Line** command. If you zoom with your mouse wheel, you don't have to reset.

8. Set your cursor to slope down and to the right to establish the direction.



9. Use the **AccuDraw's** rectangular compass to place the median's 8 ft. gutter pan at a 1:12 slope. Key in ***8*** for **X** and ***8/12*** for **Y.** (The Y value updates to -0.667). Make sure your cursor is set to slope ***down*** before entering the values.

   Note: Remember, ***do not*** move your cursor into the AccuDraw window to key in your values; you may lose your positive/negative axis orientation. The focus (blinking cursor) is already set for you in the **X** field – just start typing! Then, **<Tab>** or arrow down to the next field.

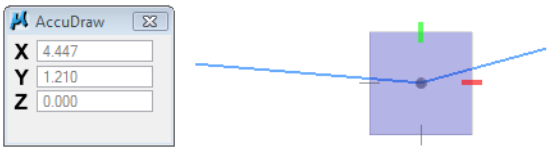


10. **<D>** to place the point.

11. **Zoom in**, if necessary, to see the line.

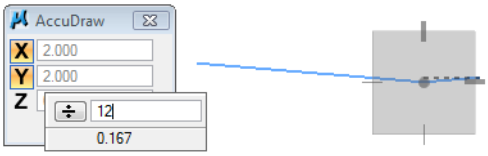
    Note that the compass rotates to the segment. You actually want to place the next line from the horizontal axis, so you need to rotate the compass so that X is horizontal.

12. Press **V** on the keyboard to rotate the compass to the view. The X-axis (red tic mark) should now be horizontal.

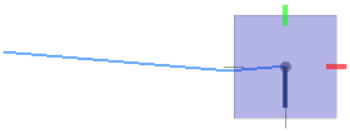


13. Position your cursor up and to the right to establish the direction of the next segment.

14. Key in ***2*** for **X** and **2/12** for ***Y***. (The Y value updates to 0.167 to establish the slope on the next line).



15. **<D>** to place the point.
16. Press **V** on the keyboard to rotate the compass to the view.

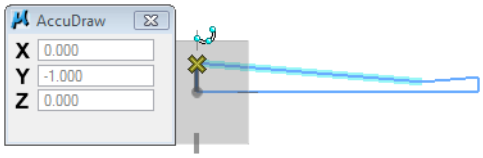


17. Lock your cursor on the –Y axis by moving your mouse to the left and hitting enter; then key in .5 in the Y field for the next segment. **<D>** to place the point.

    Note: You don't have to key in the negative, AccuDraw knows the direction from your cursor location.

18. Press **V** on the keyboard to rotate the compass back to the view.
19. Lock your cursor on the –X axis and key in 10 in the X field. **<D>** to place the point.

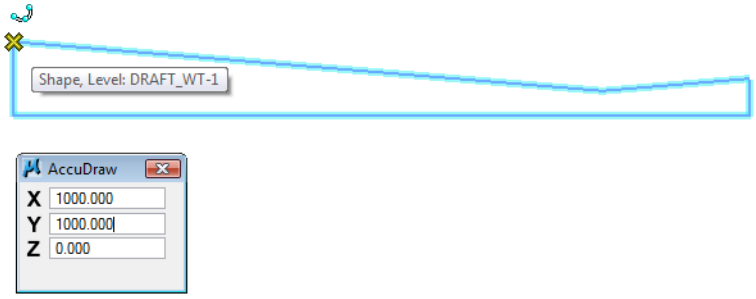
20. Hover over the starting point of the median section. When you see the bold X, **<D>** to AccuSnap to the point to complete.



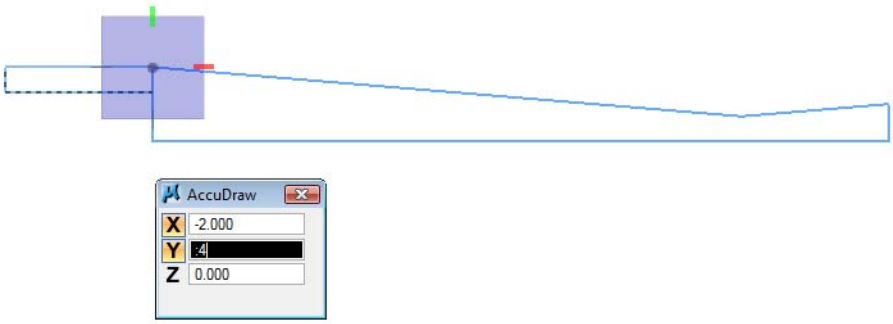
Draw the median cover

1. **Fit** the view.

2. Select the **Place Block** command.
3. **AccuSnap** on the upper-left corner of the median.



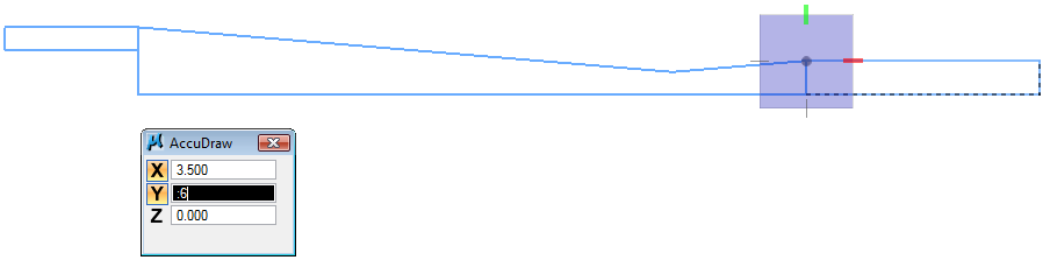
4. Place your cursor down and to the left to establish the direction.
5. Using **AccuDraw's** rectangular window, place a 2 ft. X 4 in. block as shown. Key in 2 for X and :4 for Y (don't forget the colon in front of the 4 to specify inches.) **<D>** to place the point.
6. **<R>** when done.



Draw the pavement section

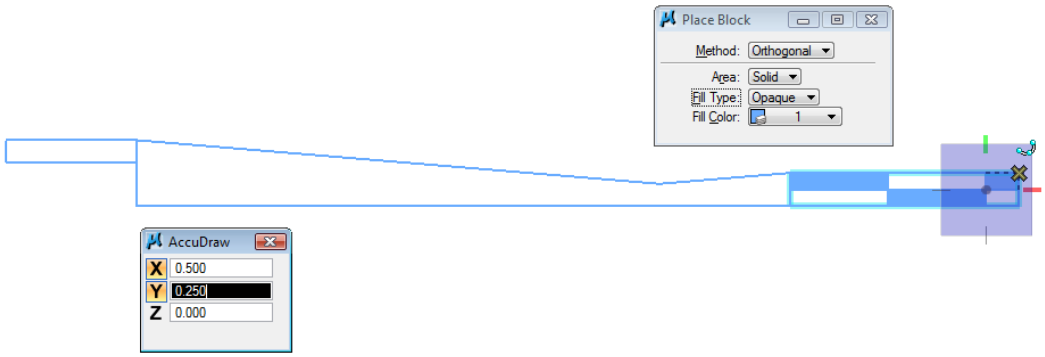
1. While still in the **Place Block** command, **AccuSnap** on the upper-right corner of the concrete section.

   a. Using **AccuDraw**, place a 3.5 ft X 6” block as shown.



2. In the **Place Block Tool Settings**, toggle **Fill Type** to **Opaque**.

   a. Use AccuDraw to place two 1.5 ft X 3 in. and one 6 in. X 3 in. filled blocks to create the pattern as shown.

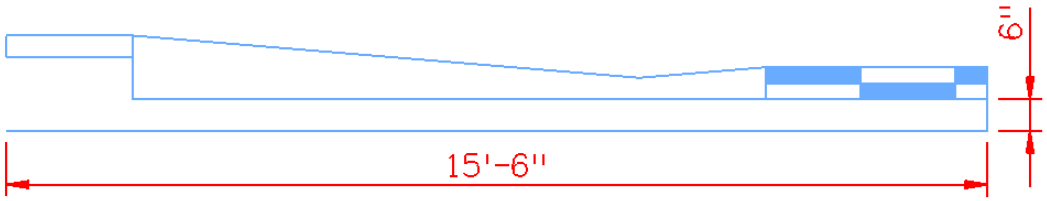


3. Set **Fill Type** back to **None**.

Draw the Subgrade Section

1. Select the **Place SmartLine** tool.

2. **AccuSnap** on the lower-right corner of the asphalt to start the subgrade.



3. Use the information above to place the **SmartLine** using **AccuDraw**.

4. To practice drawing these lines again using precision keyins, **Delete** the two lines you just placed to start over.

5. Re-draw the two lines using the ***dx=*** precision keyin (delta keyin).

   - AccuSnap to the starting point.
   - Key in ***dx=,-:6*** for the first line.
   - Key in ***dx=-15.5*** for the second line.

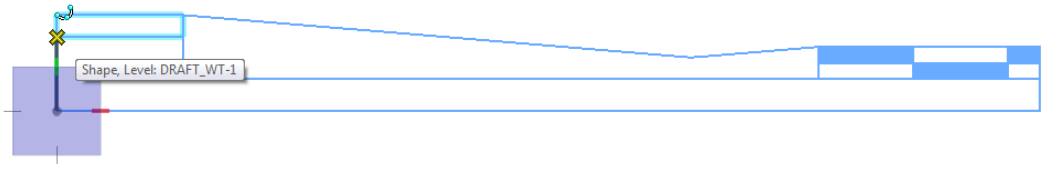
   Note: Don't forget the negative signs. You could also key in ***.5*** instead of ***:6*** and ***15:6*** instead of ***15.5***.

6. Again, **Delete** the two lines you just place to start over.

7. Re-draw the two lines using the ***di=*** precision keyin (distance, direction keyin).

   - Select the Smartline command
   - AccuSnap to the starting point
   - Key in ***di=:6,-90*** for the first line
   - Key in ***di=15.5,180*** for the second line
   - AccuSnap to the location shown to finish

   Note: You don't need the negative signs because of the direction you move the mouse.



8. **Fit** the view.

You've now used MicroStation's two main techniques for precision placement – precision keyins and **AccuDraw**. By using each method, you can compare the two methods and determine which you prefer.

You'll practice more with precision keyins and AccuDraw in other labs.

9. Save Settings (**File > Save Settings**).
10. **Exit** MicroStation.

LAB 7 - Place Guardrail Lines

In this exercise, you'll place guardrail lines in the design model file and then work with the custom line styles.

Chapter Objectives:

After completing this exercise you will know how to:

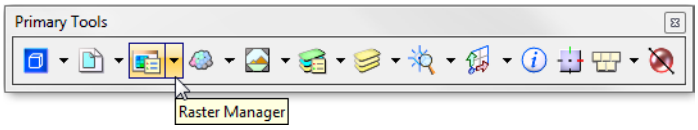
- Use the CDOT Menu to place custom lines styles
- Change the direction of a directional line style
- Change the elevation of an element after placement
- Change the level on which an element was placed
- Update graphics to ***ByLevel Symbology***

Lab 7.1 - Open the Design Model File

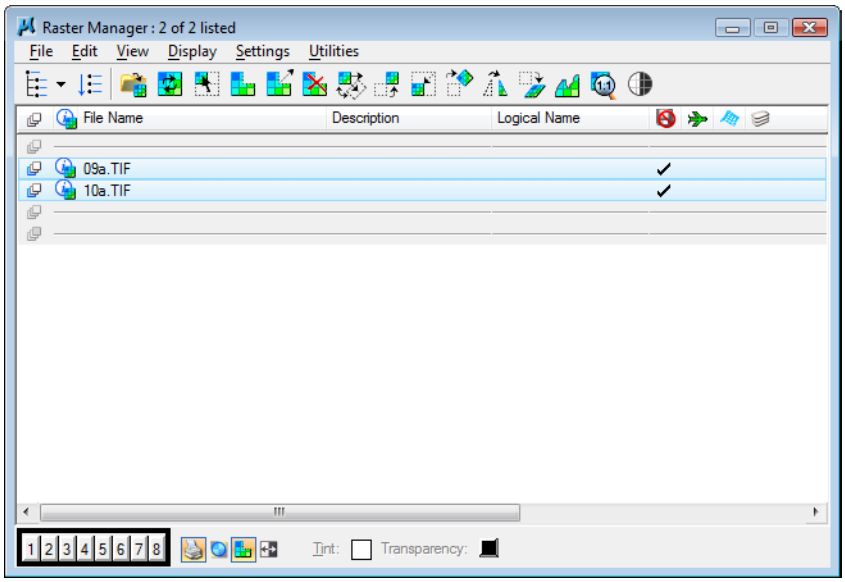
1. From the MicroStation Manager, open the ***12345DES_Model.dgn*** file from the ***\Design\Drawings\Reference_Files*** folder

   Note that the aerial photo raster images are attached.

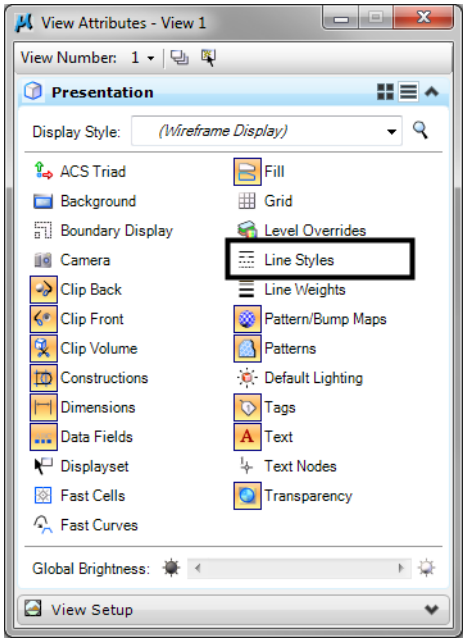
2. Select the **Raster Manager Icon** from the Primary toolbar, or you may select **File > Raster Manager**.



3. Select both raster images, **09a.tif** and **10a.tif**, and turn off their display in View 1.



4. Select the **View Attributes** icon from the view toolbar and toggle **Off Line Styles**



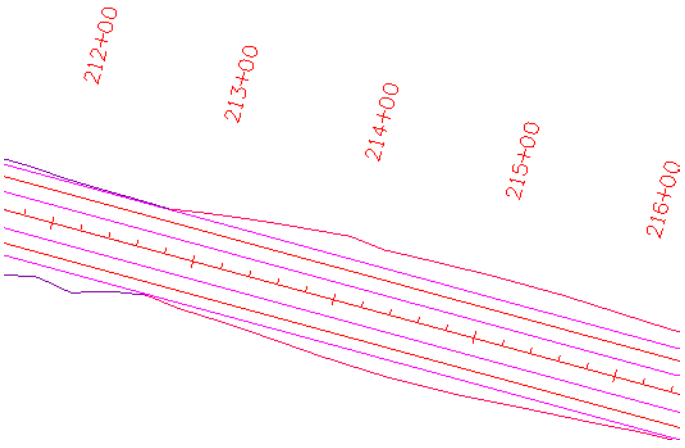
Lab 7.2 - Draw the Guardrail

Next, you'll follow the steps below to place guardrail along the fill area approaching the intersection.

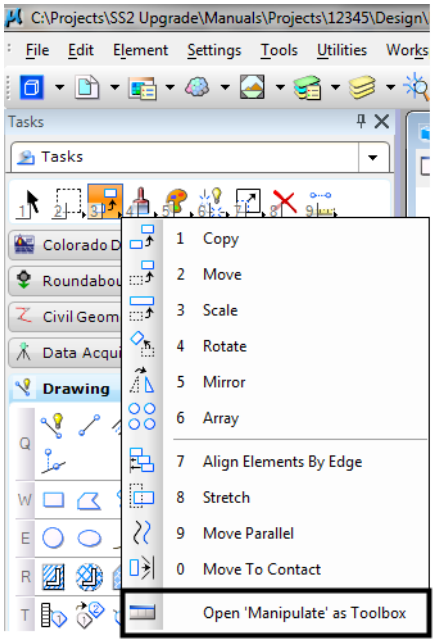
Create the guardrail trace lines

Create temporary lines using the **Move/Copy Parallel** command.

1. **Window** in to the area to the left of the intersection around station range 212+00 – 216+00 as shown.



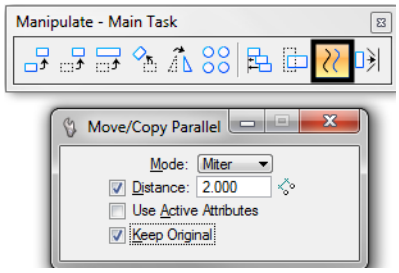
2. From the ***Main*** task toolbar, open **Manipulate** as a toolbar.



3. Select the **Move Parallel** tool from the ***Manipulate*** toolbar.

4. In the ***Tool Settings*** box:

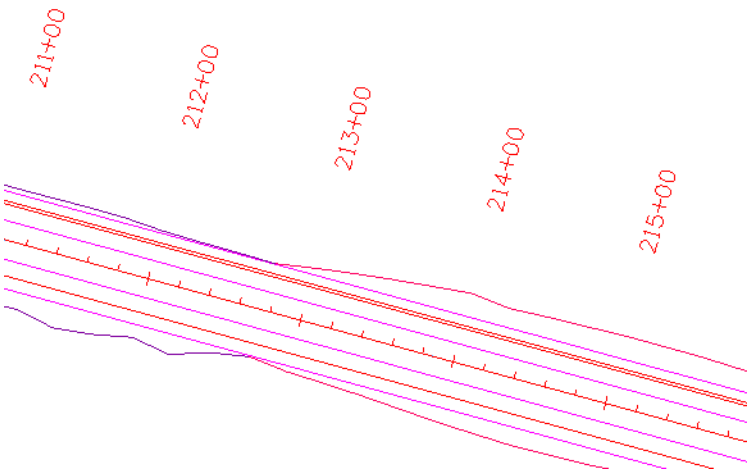
   - Toggle on **Distance** and key in ***2***.
   - Toggle on **Keep Original**.



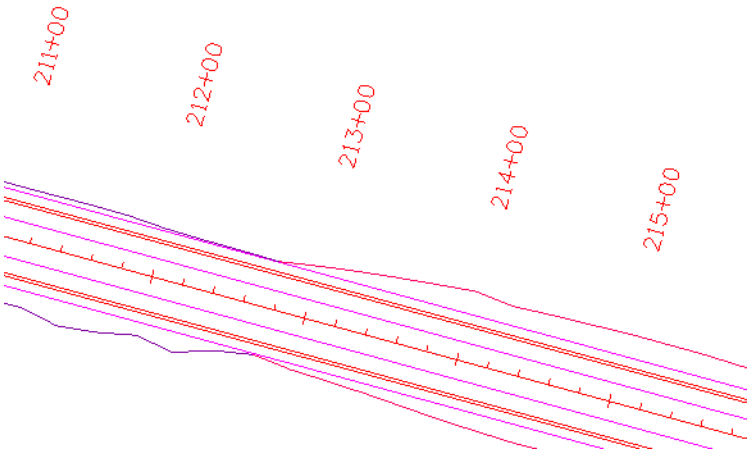
5. **<D>** on the red Edge of Oil line on the upper (North) side of the road.

6. Move your cursor up to establish the direction for the parallel copy.

7. **<D>** to copy the Edge of Oil line.



8. Repeat the above steps to create a guardrail trace line for the lower (South) side of the road. Be sure to parallel copy the Edge of Oil line.

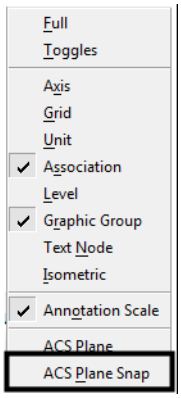


Trim the trace line for the extent of the guardrail

1. On the ***CDOT Menu***, select **Drafting > Linework**.
2. Set the **Line Weight** category to **1**.

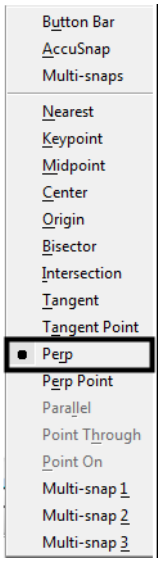
   Note: This should automatically select the ***Place SmartLine*** tool.

3. On the Status bar, turn Off **ACS Depth Snap**.



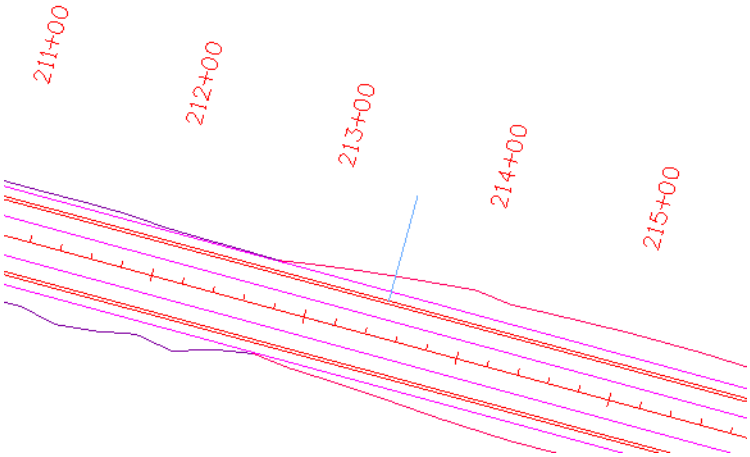
Note: Make sure that **ACS Depth Snap** lock does ***not*** have a check mark beside of it to ensure that it is off.

4. On the Status bar, set the active snap mode to **Perp**.

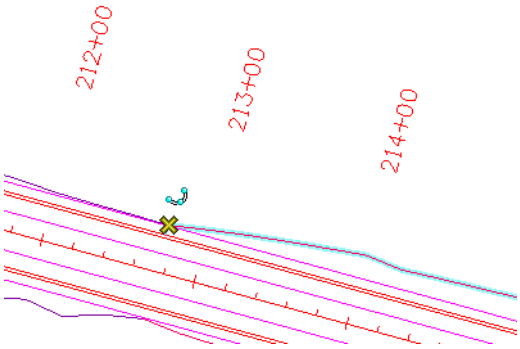


5. **<D>** on the guardrail trace line you just copied.

As you move your cursor, note how you can only place perpendicular to the trace line.



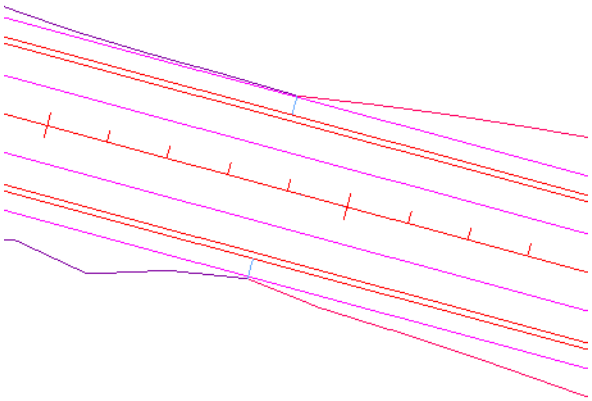
6. **AccuSnap** on the endpoint of the Toe of Fill line as shown to draw the perpendicular line.



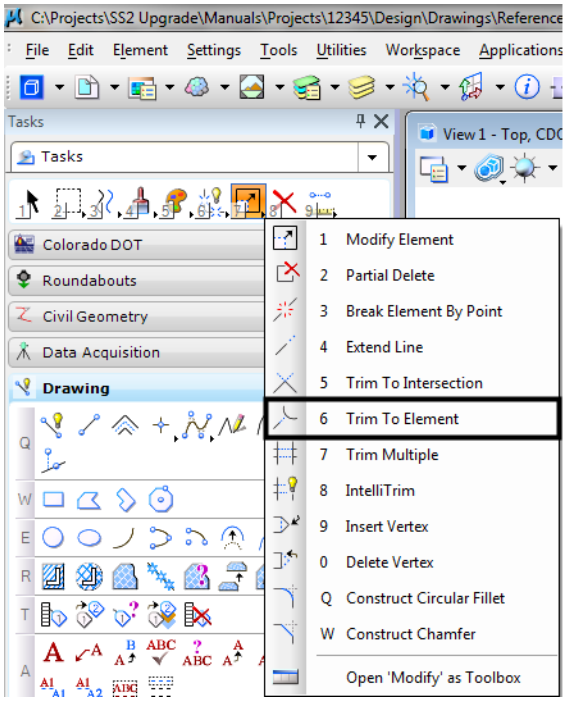
This will serve as the cutting element for the trace line. The guardrail starts at the beginning of the toe of fill line.

7. **<R>** when done.

8. Repeat the above steps to create a trim line for the other side of the road and be sure to **AccuSnap** to the end of the toe of fill line.

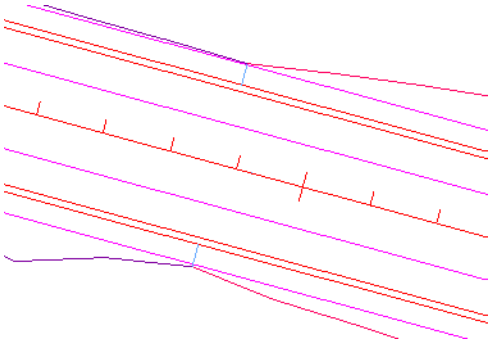


9. Select the **Trim To Element** command.

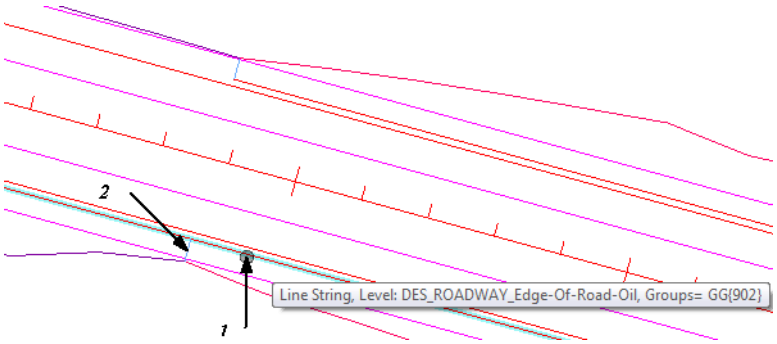


10. **<D>** on the trace line on the side of the element to keep, to the right of the perpendicular line.

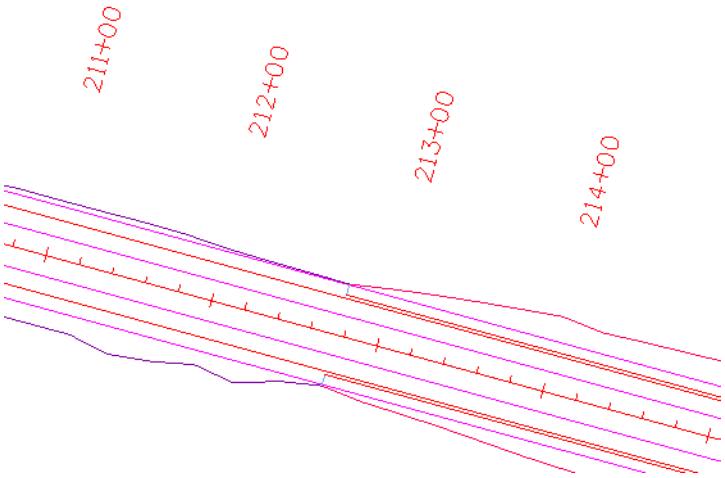
11. **<D>** on the perpendicular line to trim the trace element to this point.



<D> to accept.



12. **Update** your view, if necessary.
13. Repeat to trim the lower side as shown.



14. Delete the blue perpendicular trim lines.

Check the ACS Plane Snap lock

1. **<T>** on the left end of the upper trace line.

Note that the trace lines were copied at the same elevation as the edge of oil lines. When you place the guardrail lines, you want to place them at an elevation of 0.

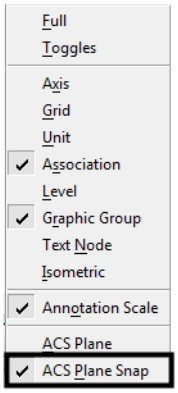
Note: If you want the guardrail lines to pick up the correct elevations of the roadway surface, you can drape them with InRoads.

2. Key in ***az=0***
3. **<D>** anywhere in the view to set the active depth.

Note: The CDOT default active depth is set to 0.

4. Select the **Locks** button from the ***Status*** bar.

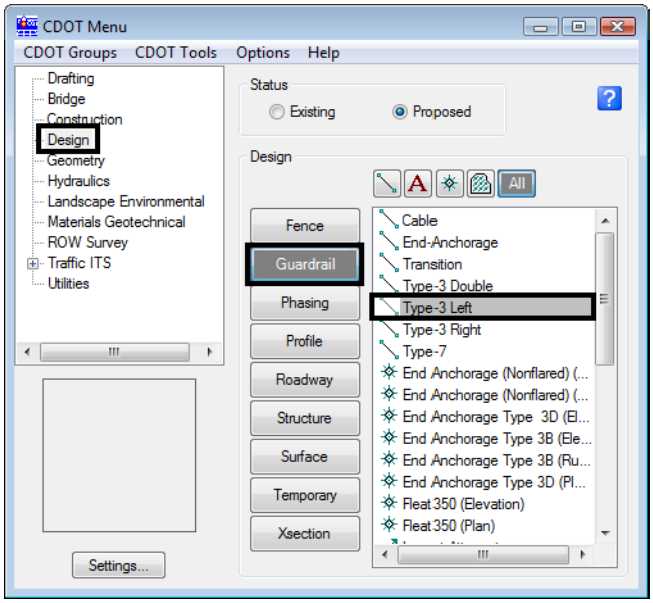
5. Turn **ACS Plane Snap** lock On.



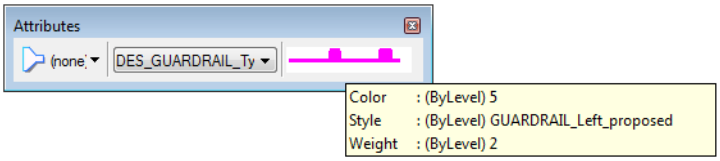
With **ACS Plane Snap** lock turned on, you will place elements at the active depth instead of picking up the elevation of elements you snap on.

Place the guardrail lines

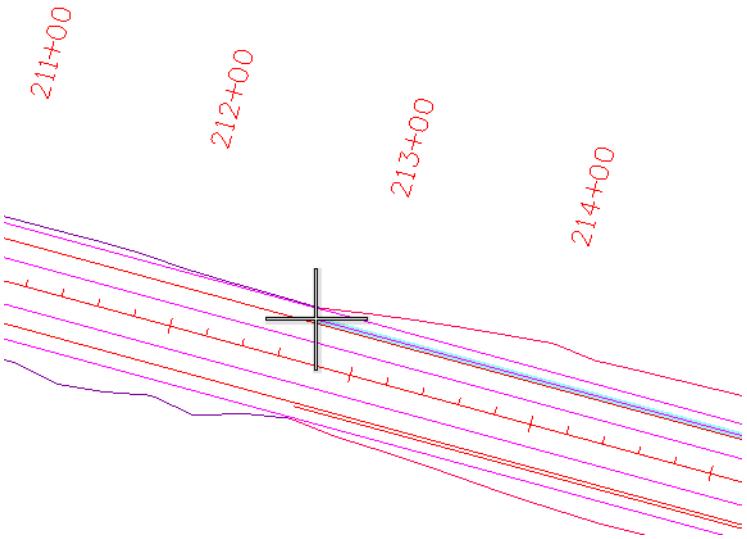
1. On the CDOT Menu, select **Design** from the ***Explorer Window***.
2. Set the **Category** to **Guardrail** and select the item **Type 3 left**.



Note: This ***automatically*** sets the active level to ***DES_GUARDRAIL_Type-3_Left*** with all ***ByLevel*** settings (color, style and weight), and ***automatically*** selects the **Place SmartLine** command. Note that the ByLevel style is a directional custom line style called GUARDRAIL_Left_Proposed.



3. **<T>** on the left endpoint of the upper trace line as shown.



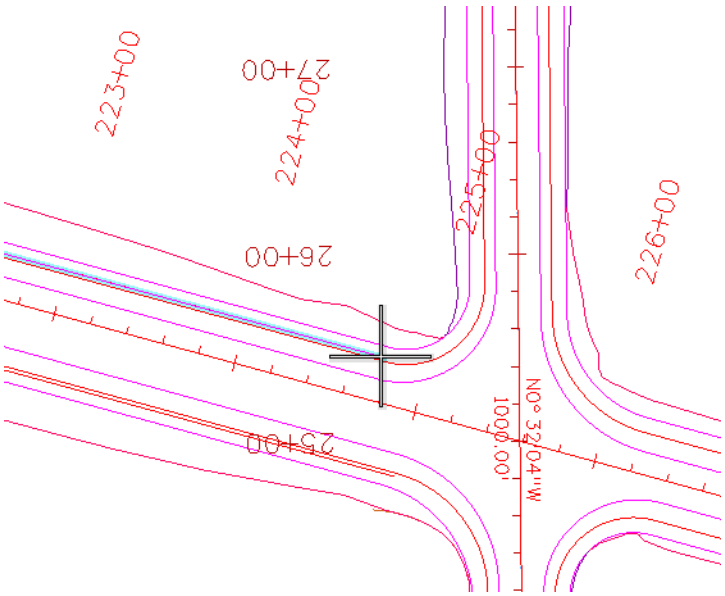
Check the message field. Note that with ***ACS Plane Snap*** lock on, you're placing the line at a Z value of 0 instead of the elevation of the line's endpoint.

4. **<D>** to accept.

5. **Pan** or **Zoom** to locate the other endpoint of the trace line near the intersection.

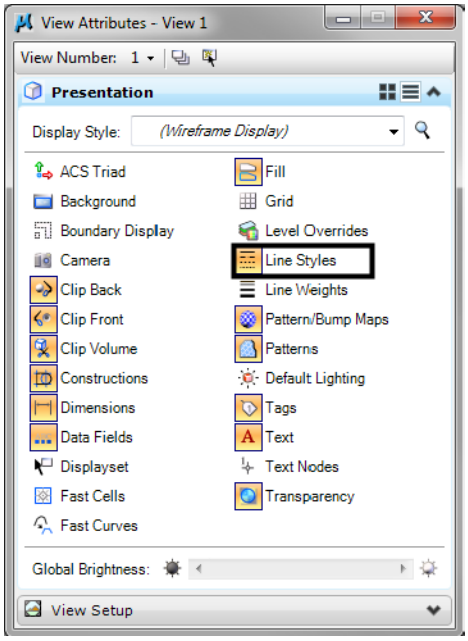
Note: Remember when using View Controls in the middle of a drawing command, reset **<R>** once to get back to the command.

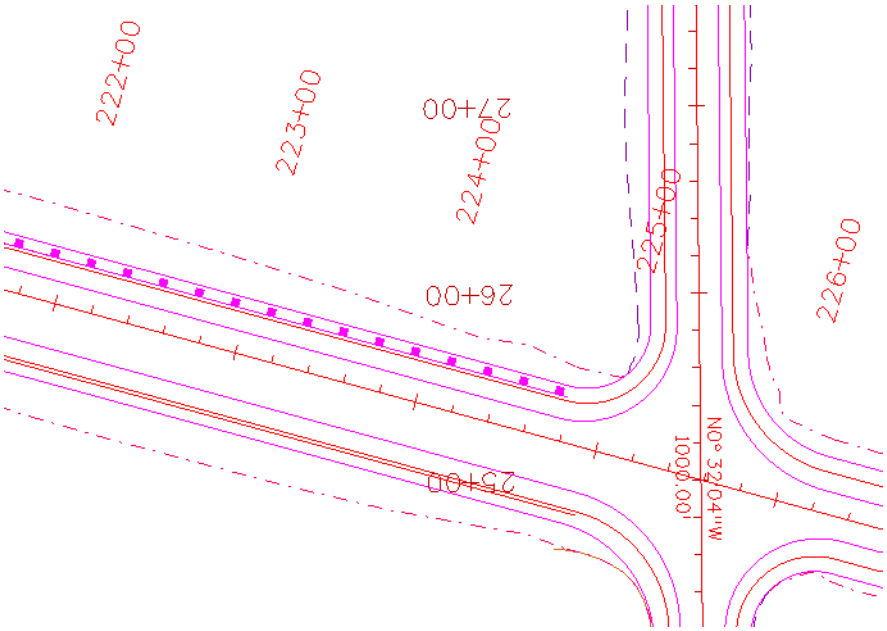
6. Snap **(<T>**, then **<D>**) on the right endpoint as shown.



7. **<R>** when done.

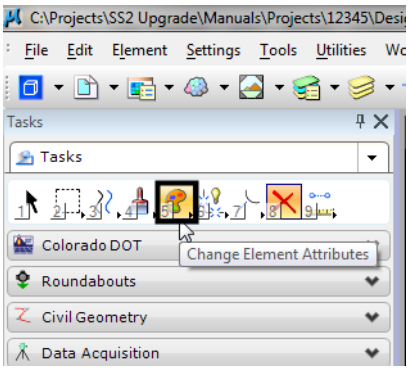
8. Select **Settings > View Attributes** and toggle on **Line Styles**.



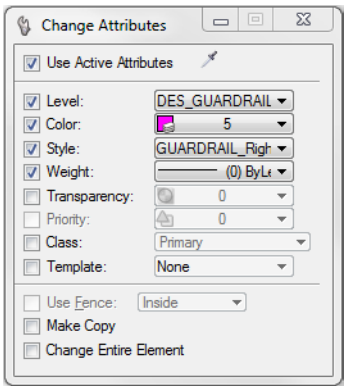


9. On the CDOT Menu select **Guardrail Type-3 Right**.

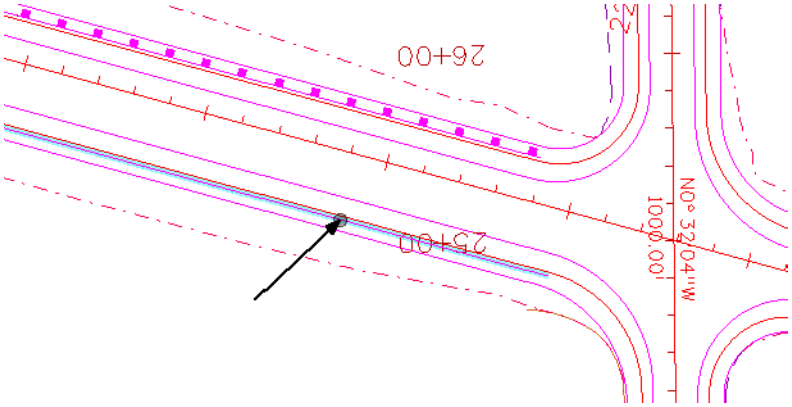
10. For the South side of the road we will use a different method. Select the **Change Element Attributes** from the Main task toolbar.



11. From the Tool Settings window toggle on Use Active Attributes, as well as Level, Color, Style, and Weight, this will use the correct guardrail line as selected from the CDOT menu.



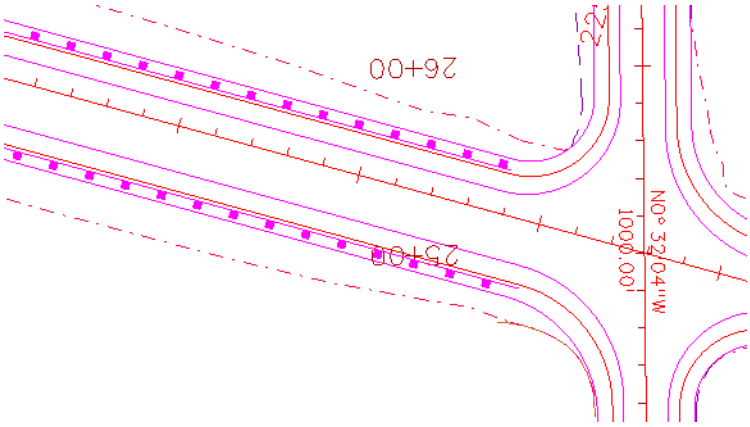
12. Select the South guardrail line.



Note: We have changed the attributes of the trace line to be the new guardrail line. Some custom line styles, like these, depend on the direction they are drawn. If the new guardrail line is placed in the wrong direction (the posts should be on the outside), select the **Change Direction** tool from the ***Misc. Tools*** task toolbar in the Colorado DOT task tab.

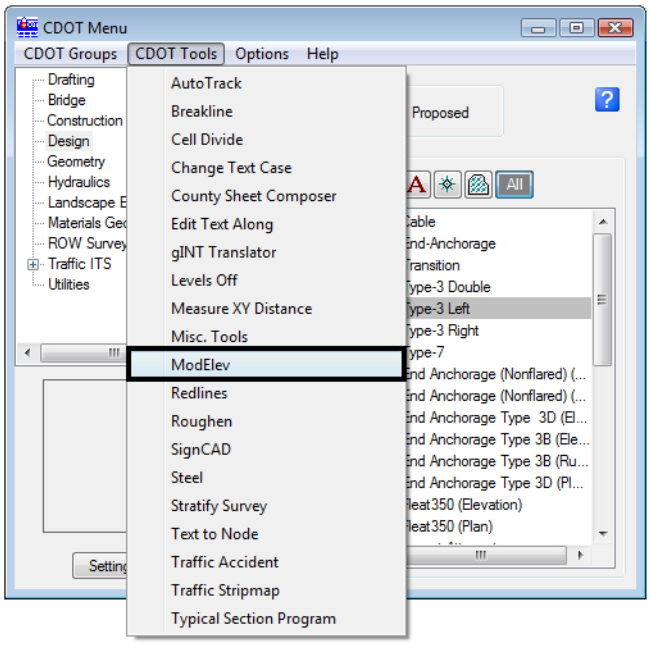
Note: The ***Misc. Tools*** toolbar was created for CDOT using handy tools from within MicroStation.

13. Select the South guardrail line.

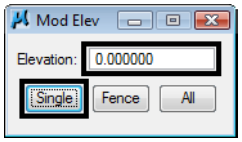


Note: Since we simply changed the attributes of the line we offset, it remains at its original elevation. We must now change the elevation of the new element to 0.

14. From the CDOT Menu, select **CDOT Tools > ModElev**.

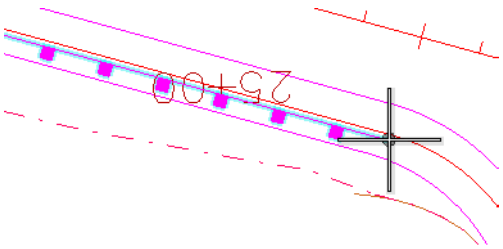


15. From the Tool Settings window, type an elevation of ***0*** and select **Single**.



16. Select **<D>** the new guardrail line.

17. The elevation has been changed to 0. To check, snap **<T>** to the endpoint of the line and notice the elevation in the status bar.



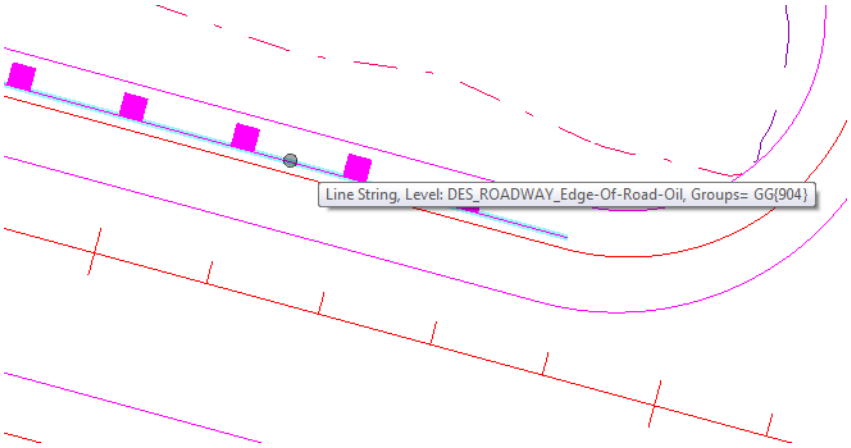
18.

19. Turn **AccuSnap** back **On**.

Delete the North trace line

1. Select **Delete** from the **Main** task toolbar.
2. Hover over on the trace line with your mouse.

   Note: Watch for the trace line (not the guardrail line) to highlight. If you see the guardrail posts highlighted, **<R>** until the trace line highlights (watch for pop-up information to show the line on level ***DES_ROADWAY_Edge-of-Road-Oil***).

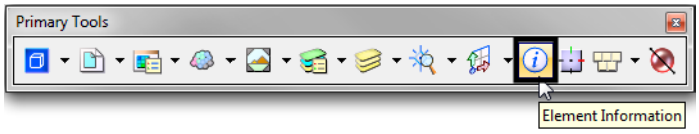


When using the **Delete** command, use the reset button to select coincident elements.

3. With the correct line highlighted, **<D>** to accept.

Lab 7.3 - Use Element Information to Change Levels

1. Select **Element > Information** or select this command from the ***Primary*** toolbar.

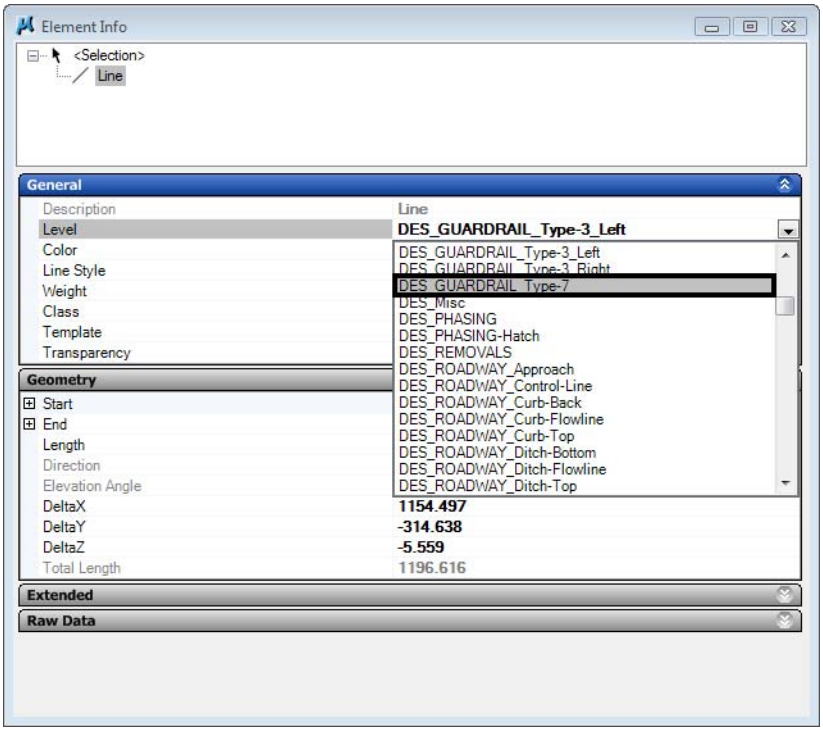


2. **<D>** on the upper ***Type 3*** guardrail lines you've just placed.
3. Read the basic element information in the ***Message*** field.

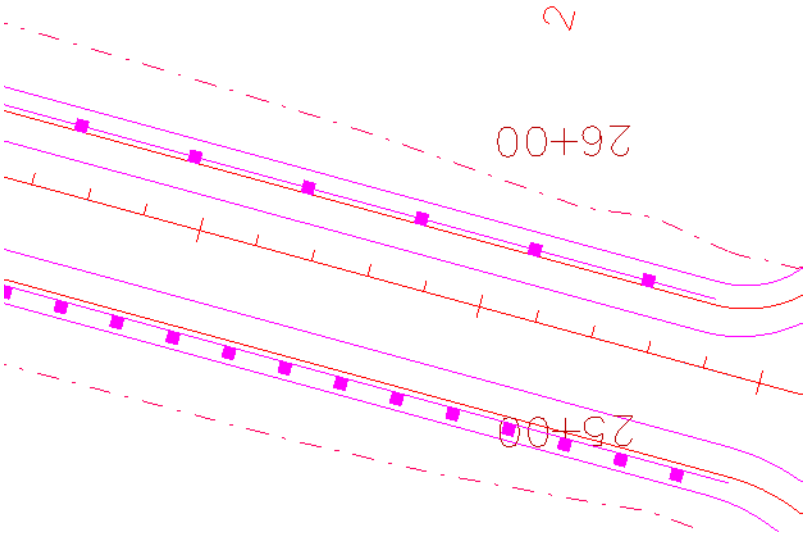
This is the same as the pop-up information provided when you "hover" over an element with your cursor.

4. In the ***General*** section of the ***Element Information*** box review the element attributes and properties.

5. Set the **Level** to **DES_GUARDRAIL_Type_7**.



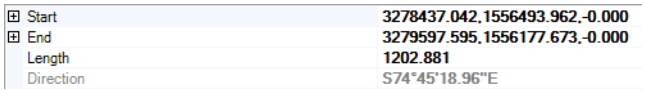
The element is moved to the ***DES_GUARDRAIL_Type_7*** level and the graphics update.

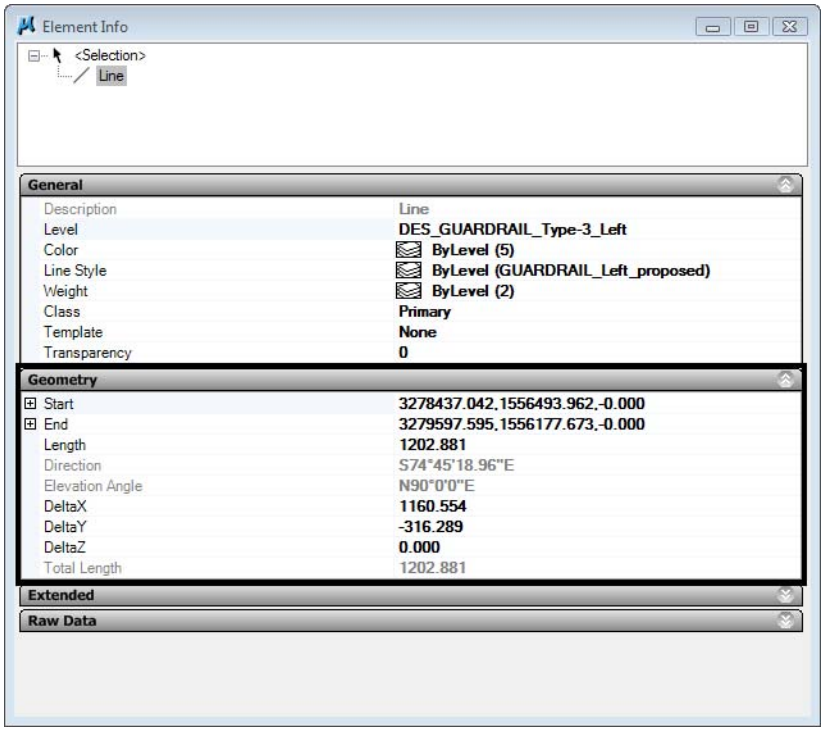


Note: ***Element Information*** is one way to change element attributes or properties if the element was originally placed incorrectly.

6. Select the Element Information command again and change the **Level** back to **DES_GUARDRAIL_Type-3_Left**.

7. Select the **Geometry** section to review the element geometry.





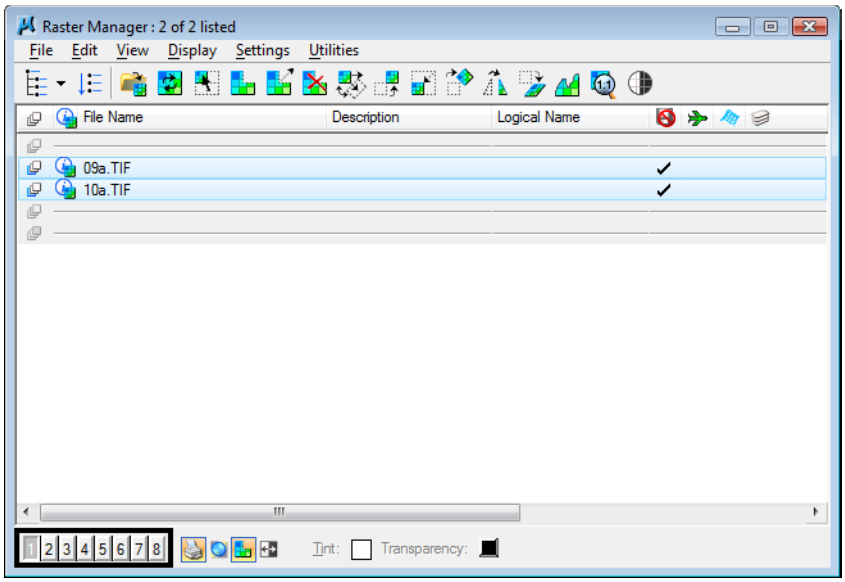
Note: The element was placed at the CDOT default active depth of 0 in the 3D file.

8. **Close** the **Element Information** dialog box when done.

Lab 7.4 - Turn Rasters Back On

1. **Fit** the view.

2. Select the **Raster Manager** icon from the ***Primary Toolbar*** and turn both raster files back on in View 1.



3. **Fit** your view if you don't see the raster images.

4. Select **File > Save Settings**.

LAB 8 - Create 3D Utility Graphics

In this example, you'll create a Utility model file, work with references, and then place proposed 3D utility lines using the CDOT Menu and the parallel copy tool. You'll also modify the graphics as necessary.

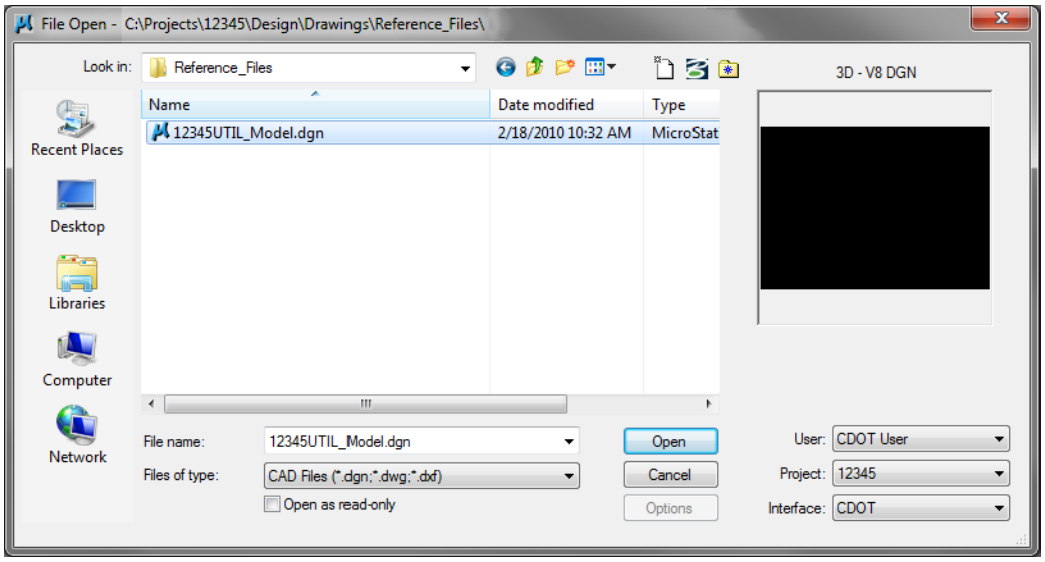
Chapter Objectives:

After completing this exercise you will know how to:

- Work with nested references
- Use the **Copy Attachment** option for references
- Use the CDOT Menu to place custom line styles (Utility lines).
- Place elements in 3D using **Depth Lock**
- Manipulate elements using the **Parallel Copy** tool
- Modify elements using the **Trim** tools

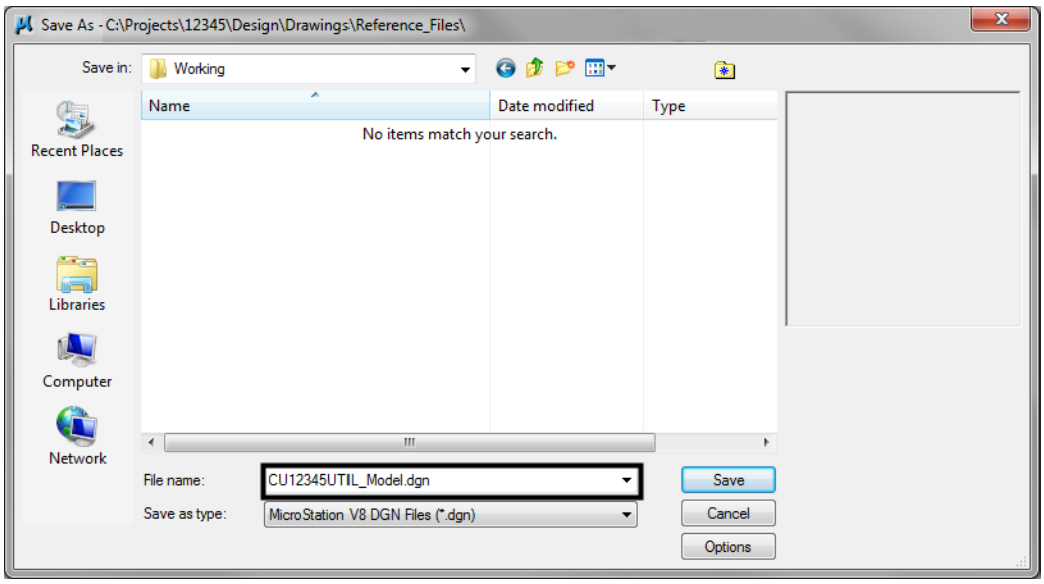
Lab 8.1 - Create the Utility Model File

1. Open the **MicroStation Manager** and set the ***Project*** to **12345**.
2. Set the directory to **\Utilities\Drawings\Reference Files**.



3. Open the file **12345UTIL_Model.dgn**. The blank Utility model file opens.
4. Select **File > Save As...**
5. Set the Directory to **\Utilities\Working**.

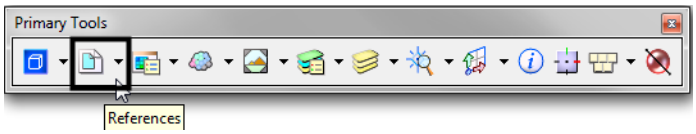
6. Change the file name to **CU12345UTIL_Model.dgn** and select **Save**.



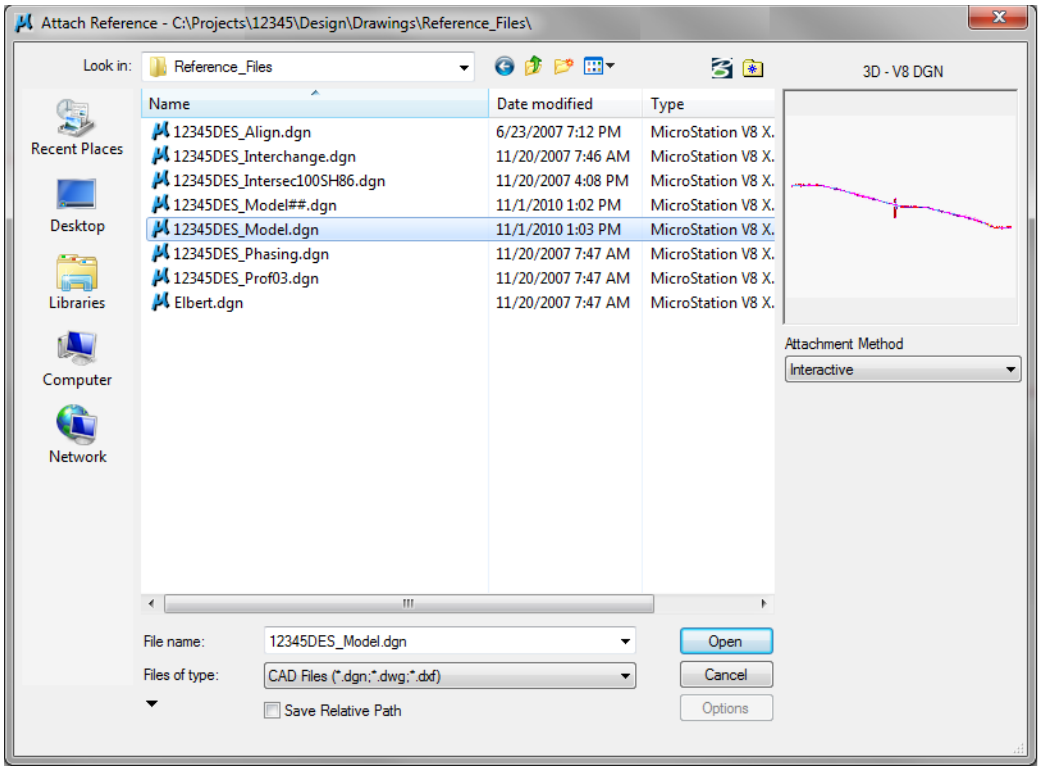
The new file is created in the ***Working*** folder.

Lab 8.2 - Attach References

1. Select **References** from the **Primary** toolbar.

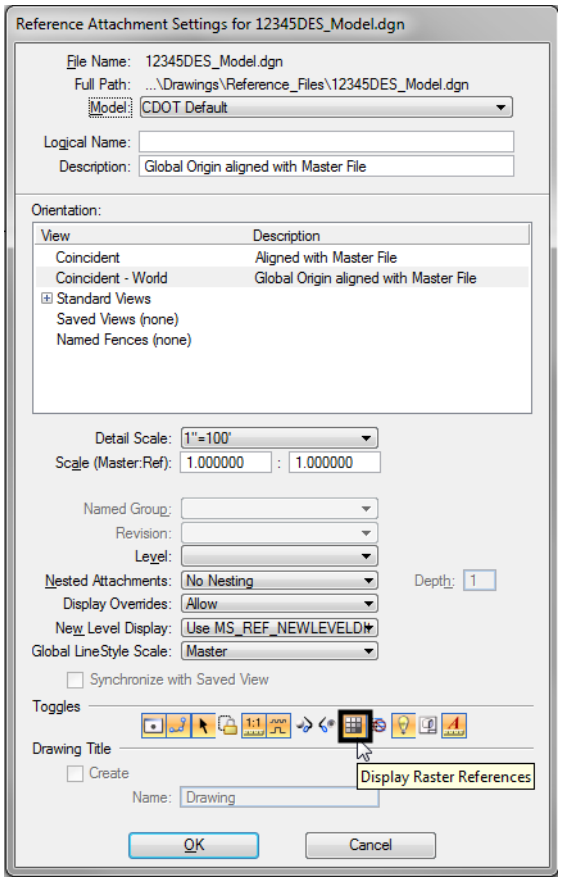


2. From the ***References*** dialog box, select **Tools > Attach** and select the **12345DES_Model.dgn** file from the **Design****Drawings****Reference Files** folder.



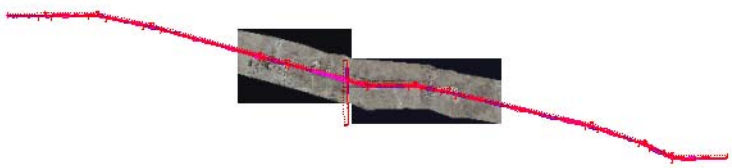
3. Verify the ***Attachment Method*** is set to **Interactive** and select **Open**.

4. In the ***Attachment Settings*** box, keyin a ***Logical Name*** of ***Design*** and a ***Description*** of ***Design Model Plan***. Make sure ***Display Raster Reference*** is ***on***. Set the other options as shown and select **OK**.



5. **Fit** the view.

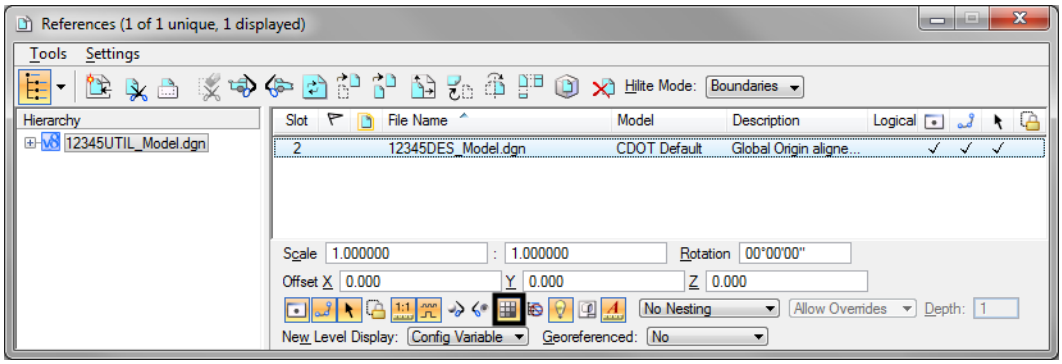
   The Design reference graphics, along with the raster photos, appear in the Utility model file.

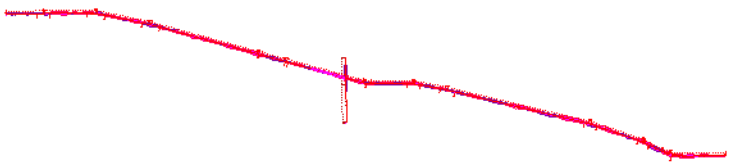


Lab 8.3 - Raster Images

Since ***Display Raster References*** was turned on when attaching the reference, the aerial photos were attached with the design model file (they were turned on in the Design Model file from the last lab). You can quickly turn them off from the ***Reference*** dialog instead of opening the ***Raster Manager***.

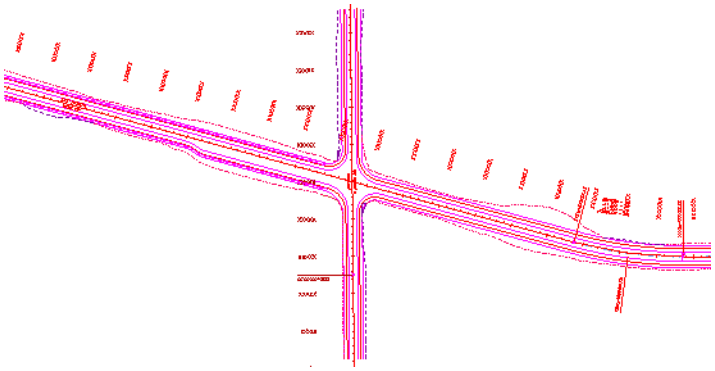
1. In the ***References*** box, highlight the **Design** reference and toggle **Display Raster** References ***off.***



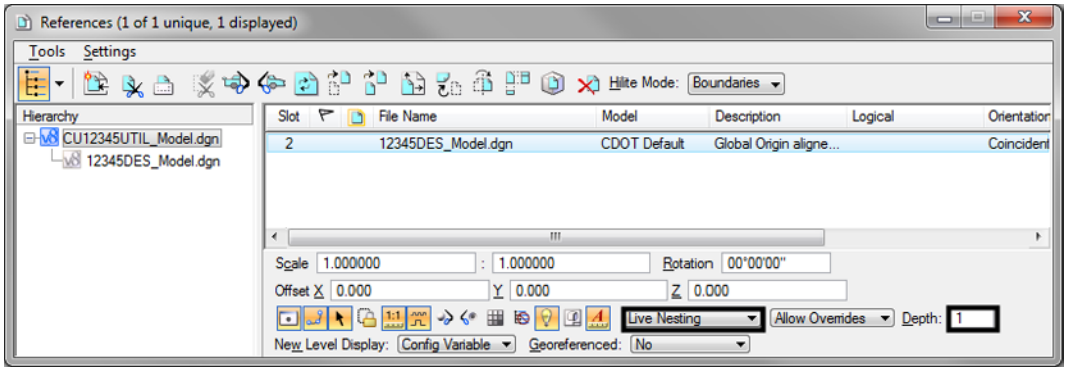


Lab 8.4 - Work with Reference Files

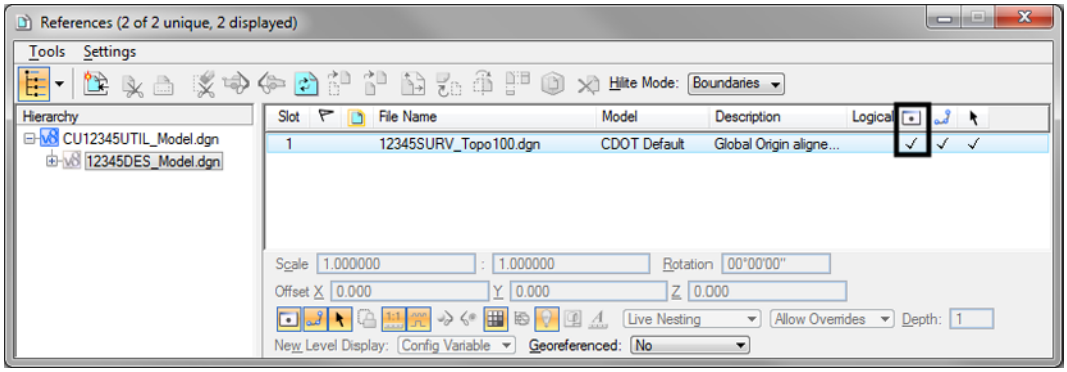
1. **Window** in on the Intersection.



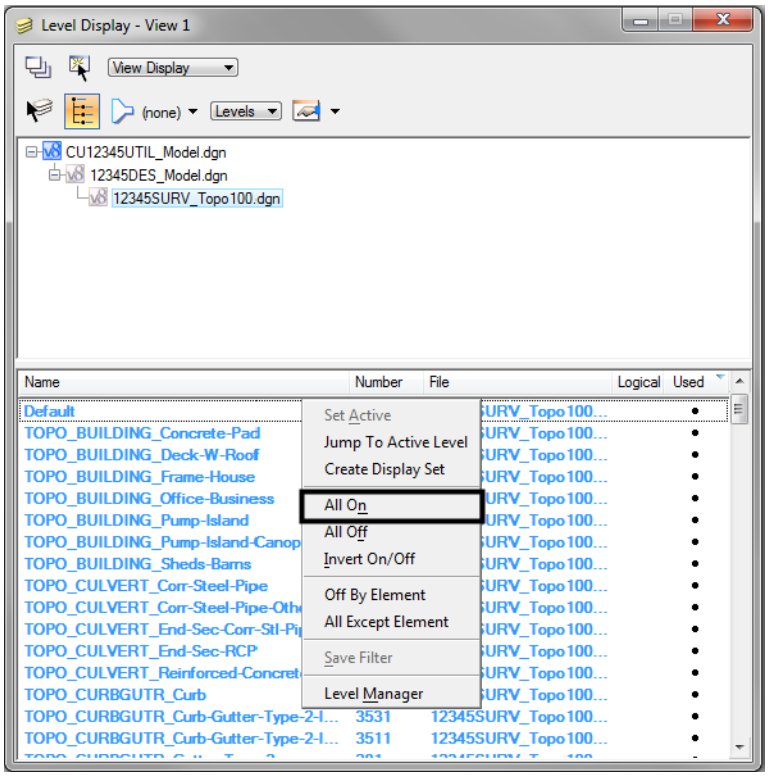
2. On the **Reference** dialog, change **No Nesting** to **Live Nesting** and set ***Depth*** to **1.**



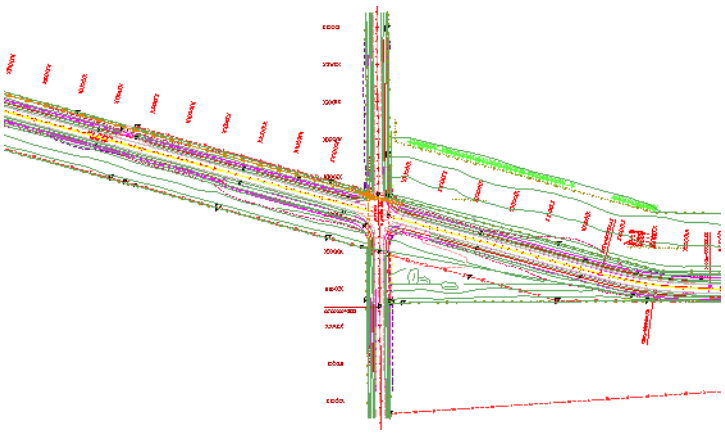
3. In the ***Hierarchy*** pane, select the **Design** reference file as shown below. On the right, select the **Survey/Topo** nested reference and make sure that **Display i**s toggled **on**.



4. Open the ***Level Display*** box, make sure the ***Show Target Tree*** button is **On,** and select the **Survey/Topo** Reference. Right click on the bottom pane and choose **All On** to turn on all reference levels.



The nested Survey/Topo graphics are displayed.



5. Back in the Reference dialog box, select the upper-level **CU12345UTIL_Model.dgn** master file in the ***Hierarchy*** pane. On the right, select the **12345DES_Model.dgn** reference and **toggle off *Display***.

   Both Design and Survey/Topo are turned off since Survey/Topo is nested.

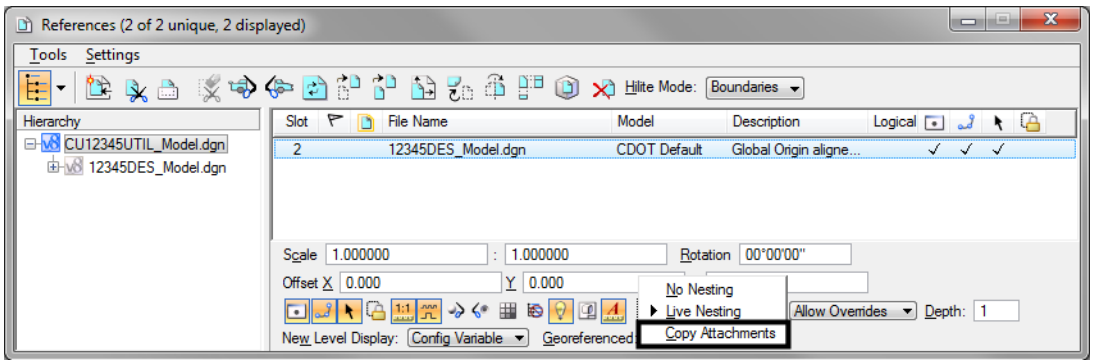
6. Turn the display of the **Design** reference back **On**.

7. How would you turn off the Design graphics and leave the Survey/Topo graphics on? Currently, as nested references, you can't do this. However, in the next section you will accomplish this using **Copy Attachments**.

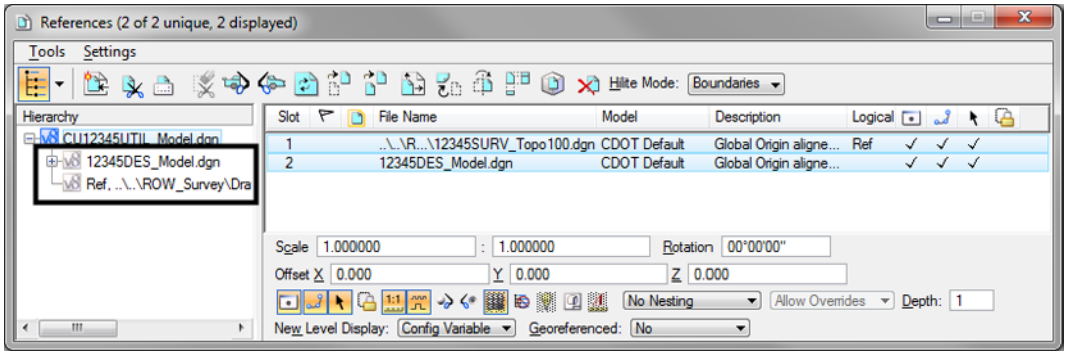
Use the Copy Attachments Option

Many times, especially in Model files, you want all your references to be upper level references (as opposed to nested references) so that you can turn on/off the display of individual reference files. To accomplish this you can either reference all the nested files one by one or you can use the **Copy Attachments** option.

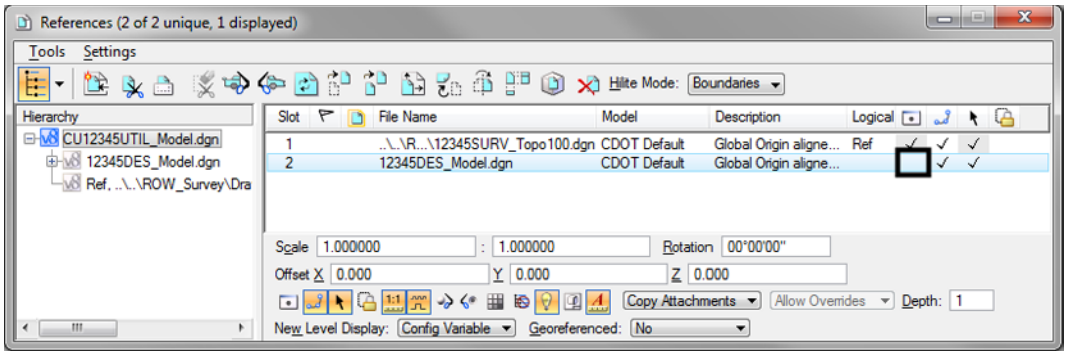
1. With the ***Design*** reference selected on the right, change the **Live Nested** option to **Copy Attachments.**

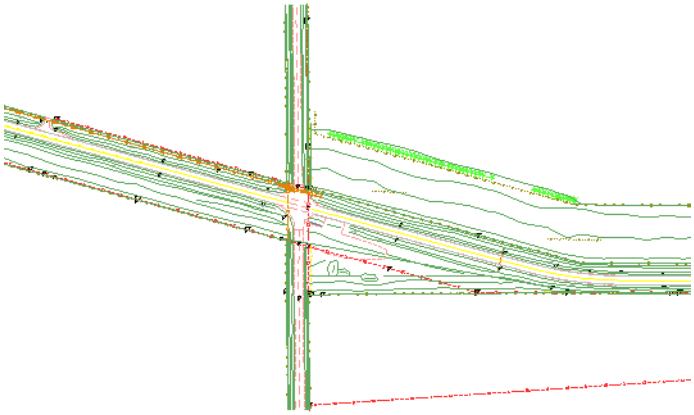


Note: Notice that in the Hierarchy pane of the ***References*** dialog box both the Design and the Survey/Topo references are now upper level references. As a result of changing ***Live Nesting*** to ***Copy Attachments***, the nested Survey/Topo reference was copied in as a direct attachment.



2. On the right-hand side of the ***References*** box, select the reference for the **Design** model and toggle the ***Display*** **off**.

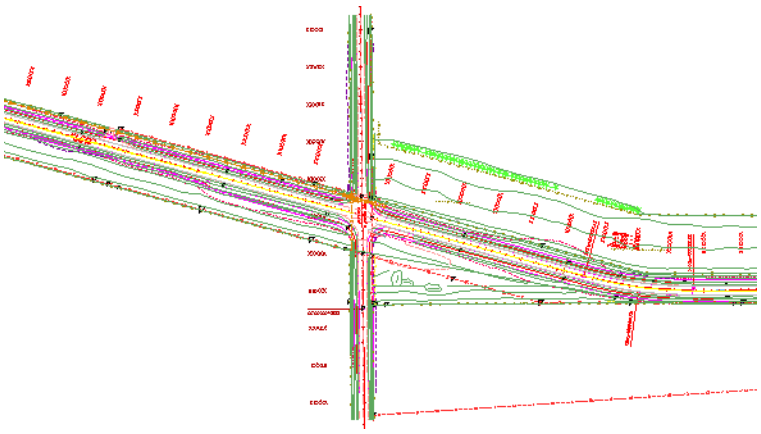




With both references as direct attachments, each reference can be individually turned on/ off. In this example the Design reference is turned off while the Survey/Topo graphics remain on.

Note: As a rule of thumb for Model files, you can reference nested to avoid having to attach multiple times. Then, once the nested references are attached, use the **Copy Attachments** option to make all nested references direct attachments. For Sheet files (see Chapter 9), you should typically use nested attachments.

3. Turn the ***Design*** reference display back **On**.



Lab 8.5 - Drawing in 3D (Using ACS Plane Snap Lock)

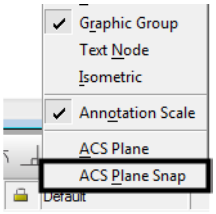
In the next series of steps, you will practice placing utility graphics from the CDOT Menu with and without ***ACS Plane Snap lock***. The ACS Plane Snap lock sets the elevation of the graphics are placed in a 3D file.

Place overhead electrical lines

1. To check your active depth, key in ***az=$*** then **<D>** in the view.

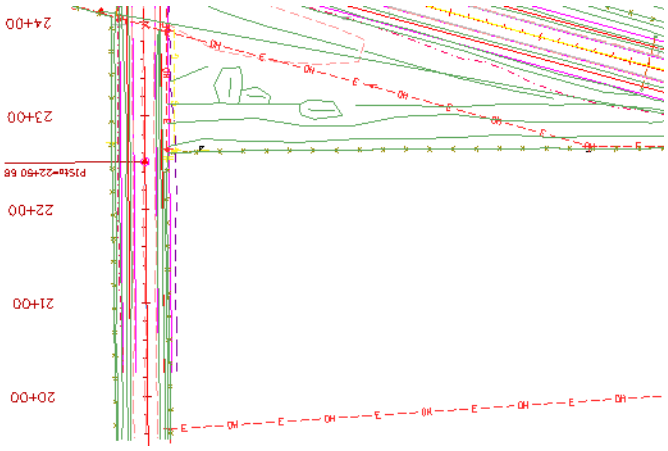
   The default active depth for the CDOT for the Utility model file is ***0.00***.

   Select the **Locks** button on the status bar and verify that ***ACS Plane Snap lock*** is turned **Off**.

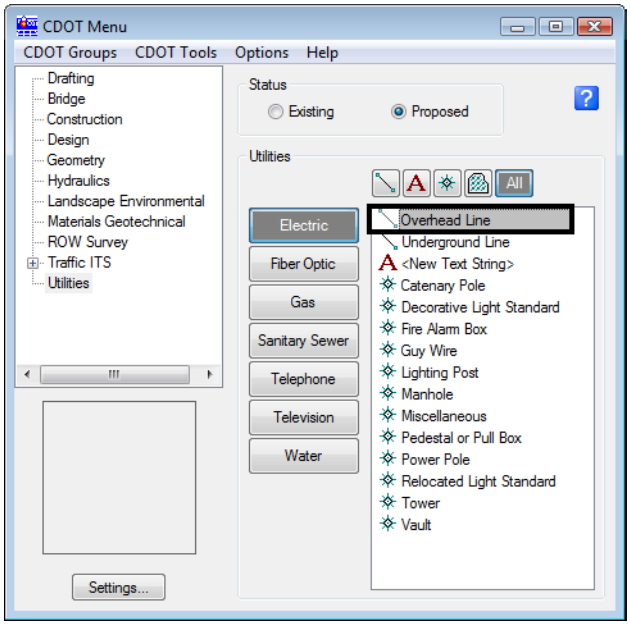


   With ***ACS Plane Snap lock*** turned off, you will pick up the elevation of elements you snap to in a 3D file.

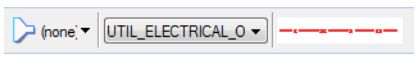
2. **Zoom in** on the south side of the intersection cross road.



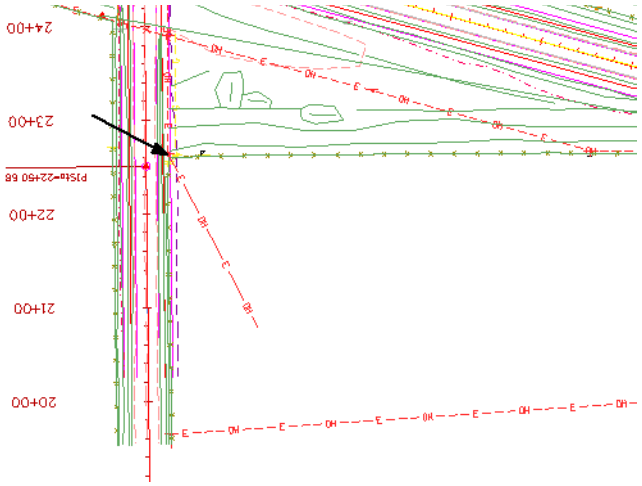
3. On the CDOT Menu highlight the **Utilities** group and set ***Status*** to **Proposed.**
4. Select the **Electric** category.
5. Set the ***Filters*** category to **All.**
6. Select the **Overhead Line** item.



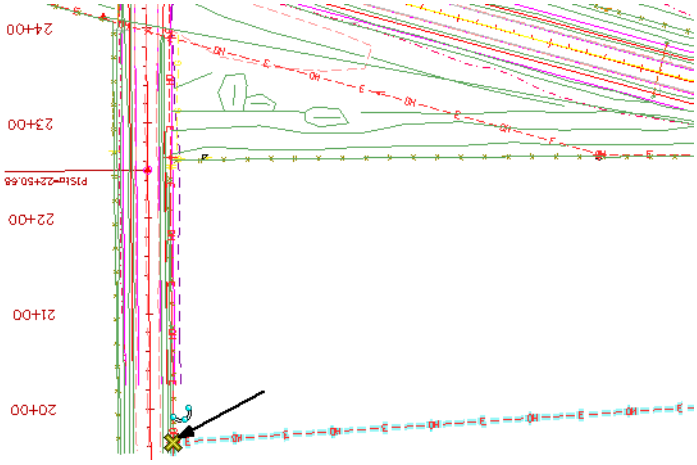
Note that the active level is automatically set to ***UTIL_ELECTRICAL_Overhead*** and the ***Place SmartLine*** command is started.



7. **AccuSnap** to the end of the existing North/South overhead line at the power pole as shown.



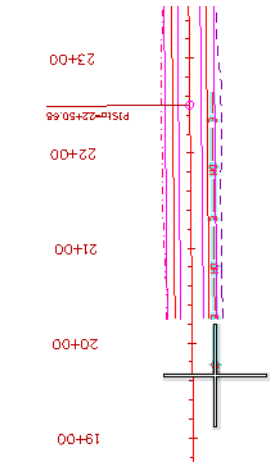
8. **AccuSnap** to the end of the existing east/west overhead line at the power pole as shown.



9. **<R>** to complete this line.

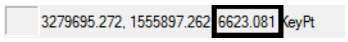
10. Turn **Off** the display of the Topo/Survey reference to better see the proposed graphics**.**

11. **<T>** on the end of the proposed overhead electrical line you just placed.



Note: Even though the active depth is 0, since **Depth lock** is turned off the line was placed at the elevation of the existing overhead line (6627.317).

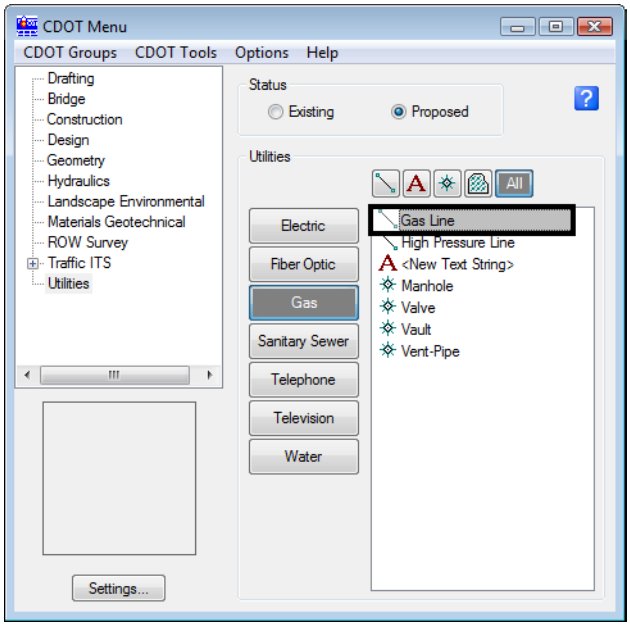
12. **<T>** on the other end of the proposed overhead electrical line to check its elevation.



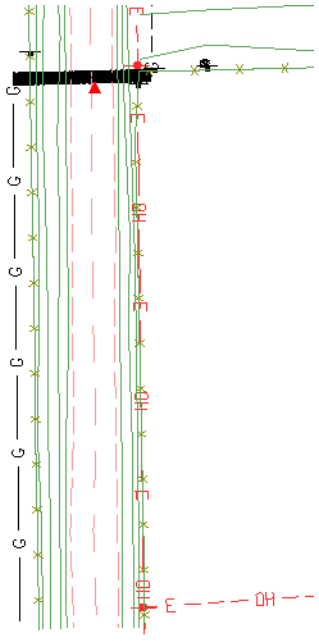
Place proposed gas lines

1. Turn **Off** the display of the ***Design*** reference and turn **On** the display of the ***Survey/Topo*** reference.
2. On the CDOT Menu, select the ***Gas*** category.

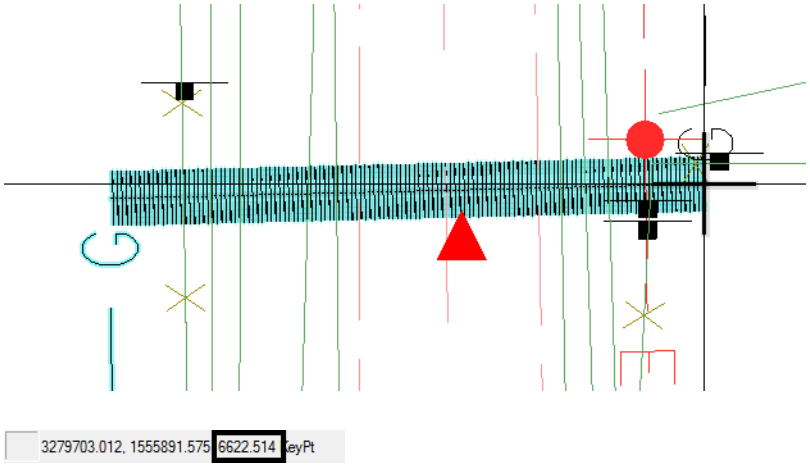
3. Select the **Gas Line** item.



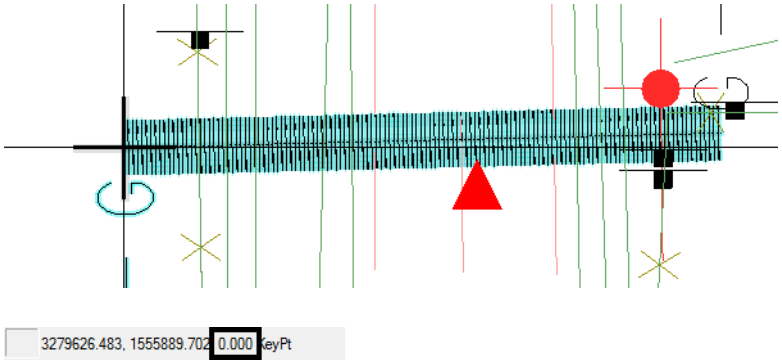
4. **<T>** on the end of the existing gas line on the east side of the road.
5. Place data points to draw the gas line in the approximate location shown.
6. **<R>** when done.



Note: The line does not look as expected. **<T>** on the East end of East-West section of the newly placed gas line and note the elevation.

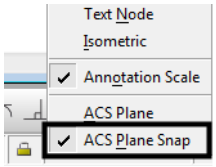


<T> on the West end and note the elevation

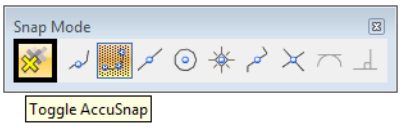


<T> snapping to an existing element positions the starting point of the new element at the elevation of the original element. Subsequent points that are not snapped to are placed at the ***Active Depth*** (Elevation) ***of 0.*** In this case, what you see is a proposed gas line that goes from an elevation of +/- 6622 to an elevation of 0 making the utility much longer than it should be. Because there are now so many "G" symbols in a line that is over 6000' long, it gives the appearance of a thick line.

7. **Delete** the proposed gas utility line you just placed.
8. Select the **Locks** from the status bar.
9. Toggle **On *ACS Plane Snap Lock***.



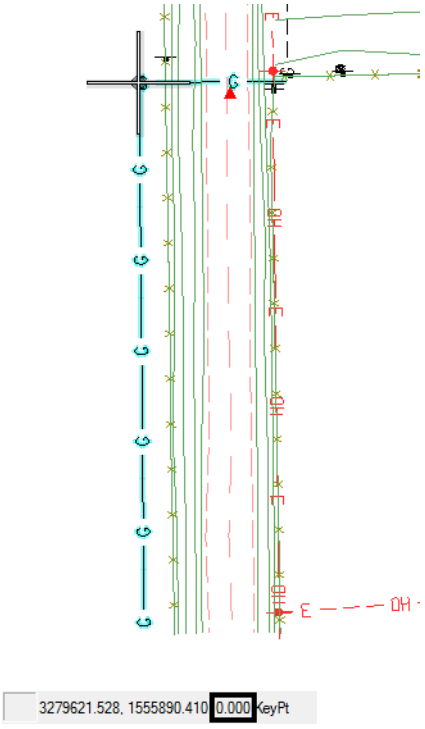
10. On the **Snap Mode** toolbar, toggle ***AccuSnap*** **Off**.



Note: ***AccuSnap*** doesn't work consistently when ***Depth Lock*** is on. Therefore, to ensure Depth lock works correctly, toggle ***AccuSnap*** off.

11. Place the proposed gas line again by a **<T>** on the end of the existing gas line and then placing the other data points in the approximate location shown.

12. **<T>** anywhere on the proposed gas line you just placed and note the elevation.



Since ***ACS Plane Snap lock*** is on, the proposed gas line was placed at an elevation of ***0***.

Note: To return to the default settings, turn ***ACS Plane Snap lock*** **Off** and toggle ***AccuSnap*** back **On**.

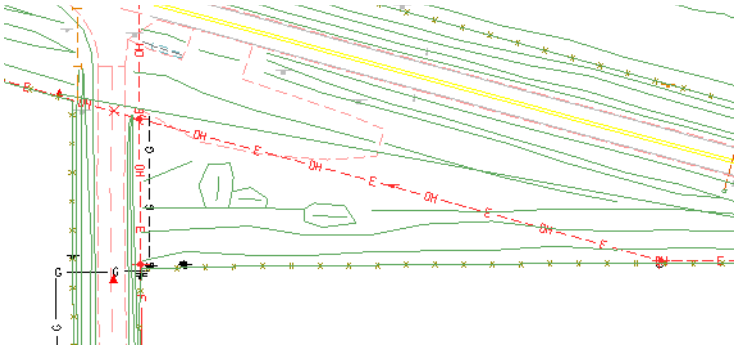
Place fiber optic lines using parallel copy

Follow the steps below to place a fiber optic line by copying parallel an existing telephone line.

Locate reference graphics for copying

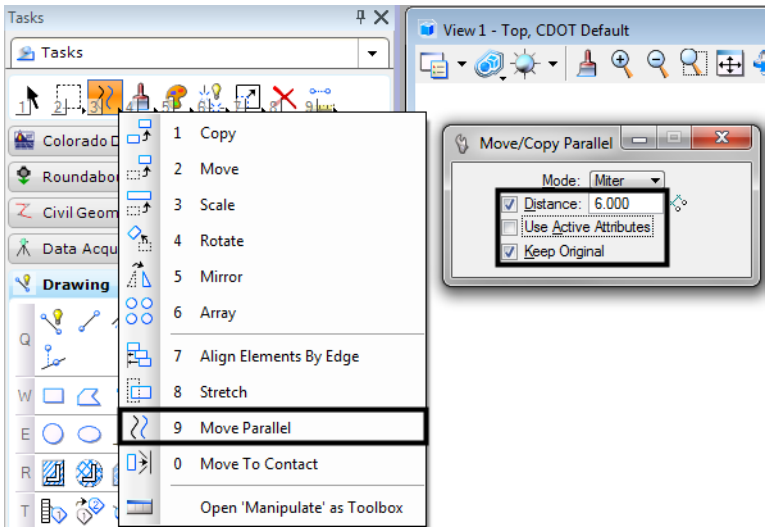
1. Turn off the **TOPO_TERRAIN_Break-Lines** level in the SurveyTopo reference.

2. **Window** in on the existing overhead electrical line in the southeast quadrant of the intersection as shown.



3. Select the **Move Parallel** tool from the ***Main*** task toolbar.

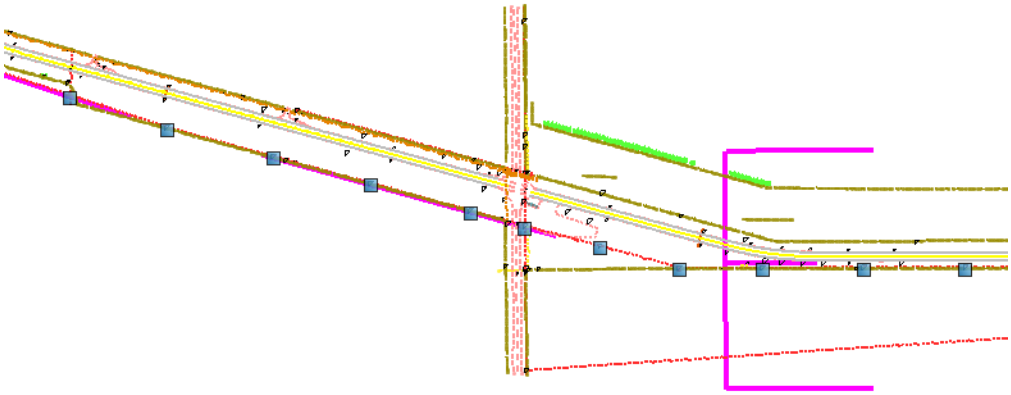
4. In the ***Tool Settings*** box, set the options as shown below.



5. **<D>** on the existing overhead line

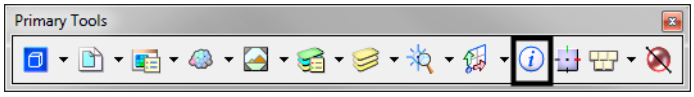
6. Move the cursor down to specify the direction of the parallel copy.

7. **<D>** to place the copy.



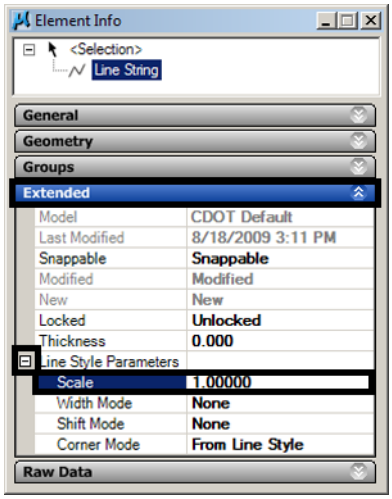
Note: When copying graphics from a Topo file, elements will maintain a hard coded linestyle scale and thus appear at the incorrect scale. This scale needs to be adjusted using the Element Info tool. In this example the linestyle scale of the new utility line need to be changed from a value of 100 to 1.

8. Select the new graphic and **<D>** on the ***Element Info*** tool.



9. Expand the ***Extended*** category and ***Line Style Parameters*** sub-category.

10. Change the value of the ***Scale*** option to **1**.

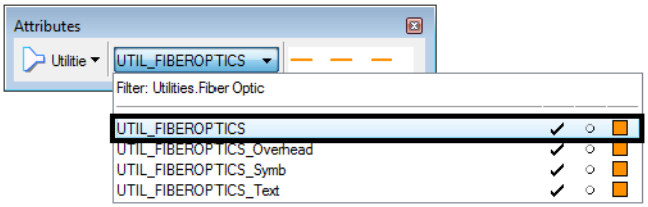


11. **Close** the Element Info

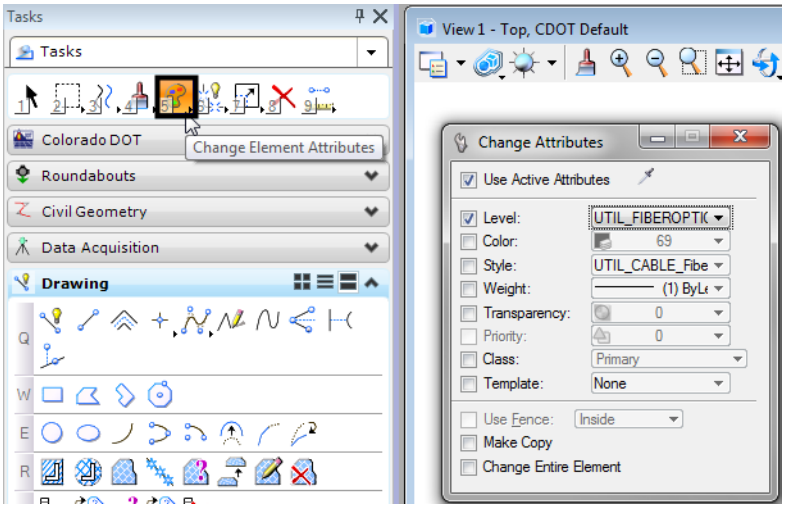
Change element attributes

Change the overhead electrical line to an underground fiber optic line using the ***Change Element Attributes*** command.

1. Set the active level to **UTIL_FIBEROPTICS** (hint: use a filter to help you set the level).

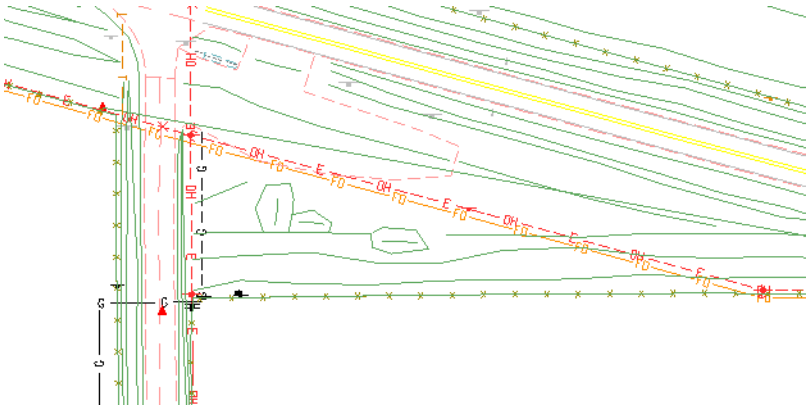


2. Select the **Change Element Attributes** command from the ***Main*** task toolbar.
3. Set ***Method*** to **Change.**
4. **Toggle On *Use Active Attributes***.
5. **Toggle On *Level*** (this picks up the active level).



6. **<D>** on the overhead electrical line you just copied as the element to change.

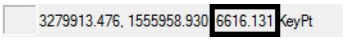
7. **<R>** when done.



Since the ***Use Active Attributes*** option was turned on, the element was changed to the active level **UTIL_FIBEROPTICS**.

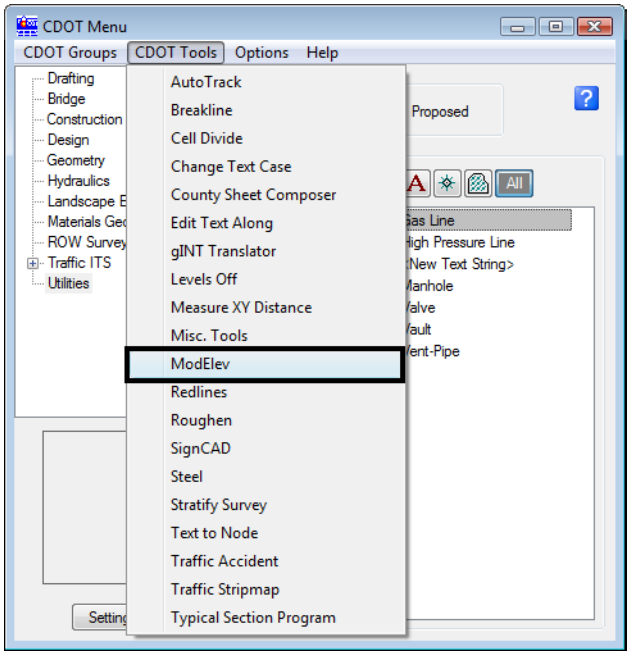
Set the elevation

1. **<T>** on the fiber-optics line you just placed.

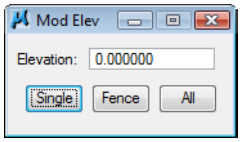


The proposed fiber-optics line is in the 6615 elevation range (your exact elevation may be vary depending on where you placed a tentative point). This elevation is wrong for the fiber optic line since you copied the overhead electrical line. For now, you can set the elevation of this line to 0 and later, it can be placed as a feature in the InRoads surface at the correct elevation. One way to set the elevation of an element is to use the **ModElev** command on the CDOT Menu.

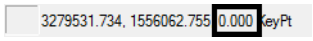
2. On the CDOT Menu, select **CDOT Tools > ModElev**.



3. In the ***ModElev*** tool settings box, set the elevation to ***0***.



4. Select **Single** (to identify a single element).
5. **<D>** on the new fiber-optics line you created.
6. **<D>** to accept.
7. **<R>** when done.
8. **<T>** on the fiber-optics line to check its elevation.

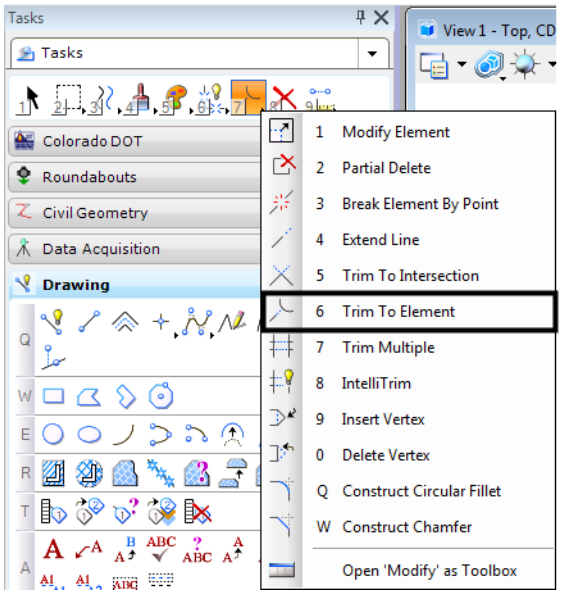


The Z value is now at 0. Use the ModElev command to easily set the elevation of any element or group of elements (selected with a fence).

Trim graphics

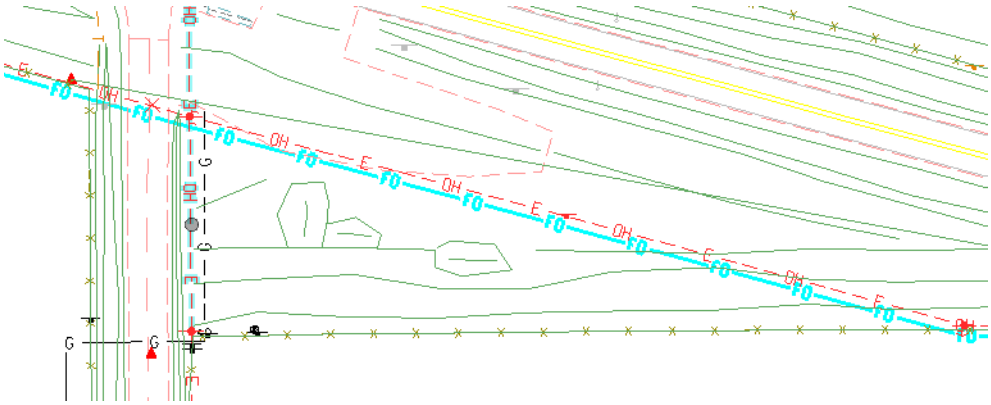
The new fiber optic line is only going in on the east side of the intersection cross road. Follow the steps below to use the ***Extend Element to Intersection*** command to trim the fiber optic graphics.

1. Select the **Trim to Element t**command from the ***Main*** task toolbar.

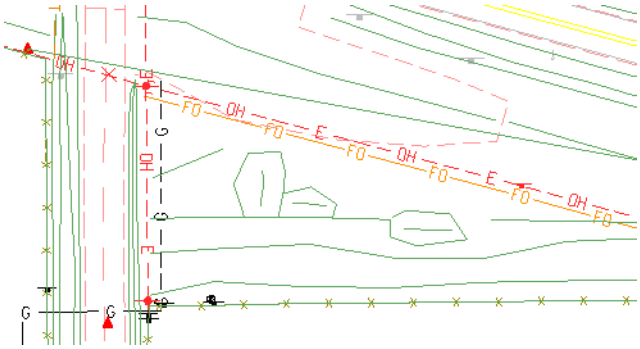


2. **<D>** on the fiber optic line to the right of the intersection, this is the section we wish to keep.

3. **<D>** on the north/south proposed overhead electrical line as the cutting element.



The fiber-optics lines are trimmed as shown.

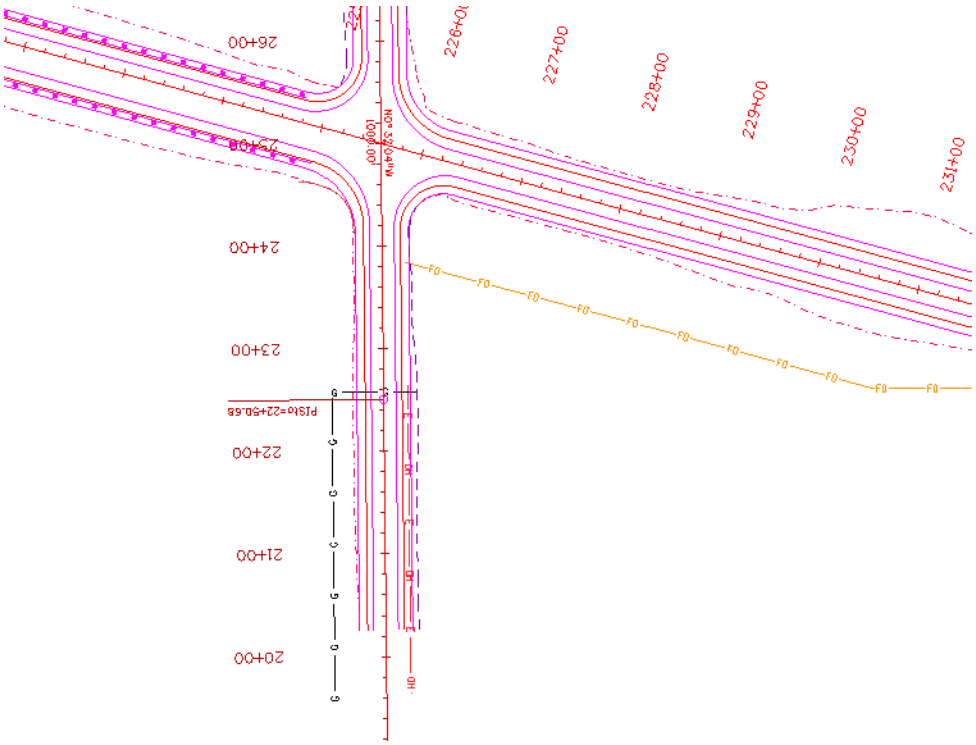


4. Turn off the display of the **Survey/Topo** references.

5. **Fit** the view.

Only the proposed gas, electric and fiber-optic utility graphics should appear in the ***CU12345UtilityModel01.dgn*** file.

6. Turn the display of the ***Design*** reference **On** and window into the intersection as shown.

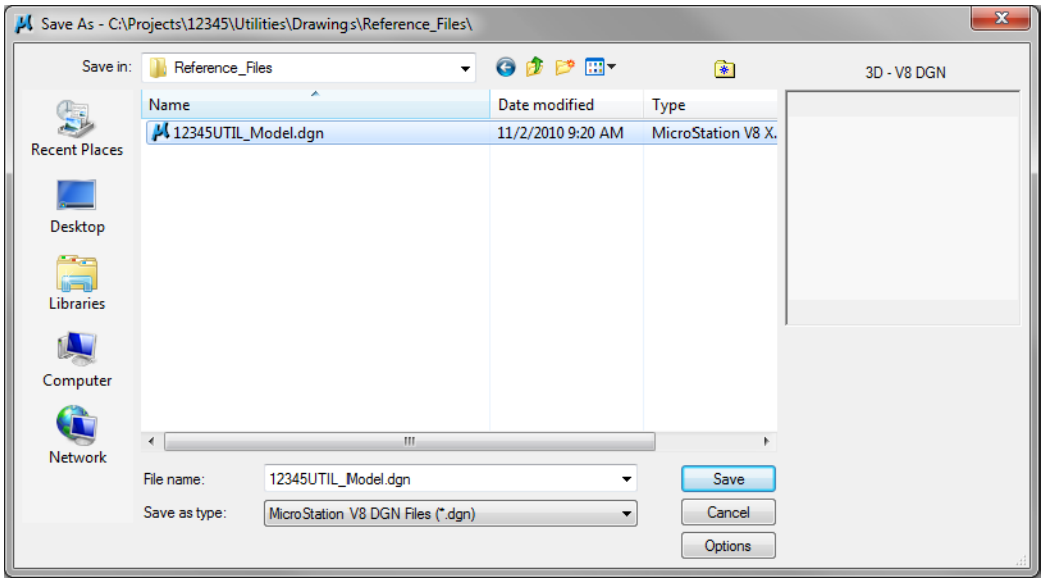


Move the utility model to the Reference Files folder

Move the utility model so that other groups can reference your work.

1. Select **File > Save As** and set the directory to the project's **\Utilities\Drawings\Reference_Files** folder.

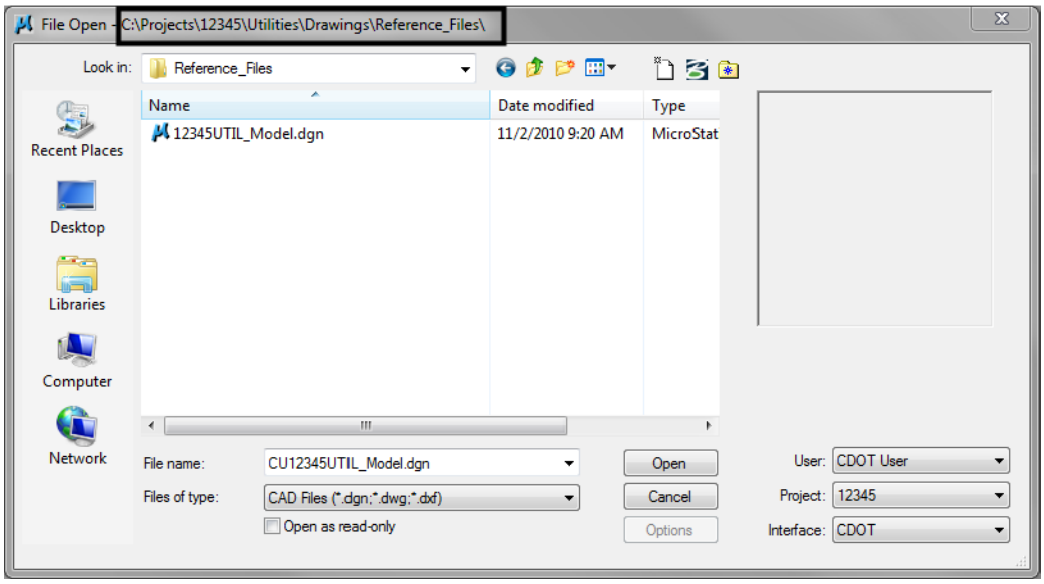
2. Remove the **CU** initials from the file name and select **Save**.



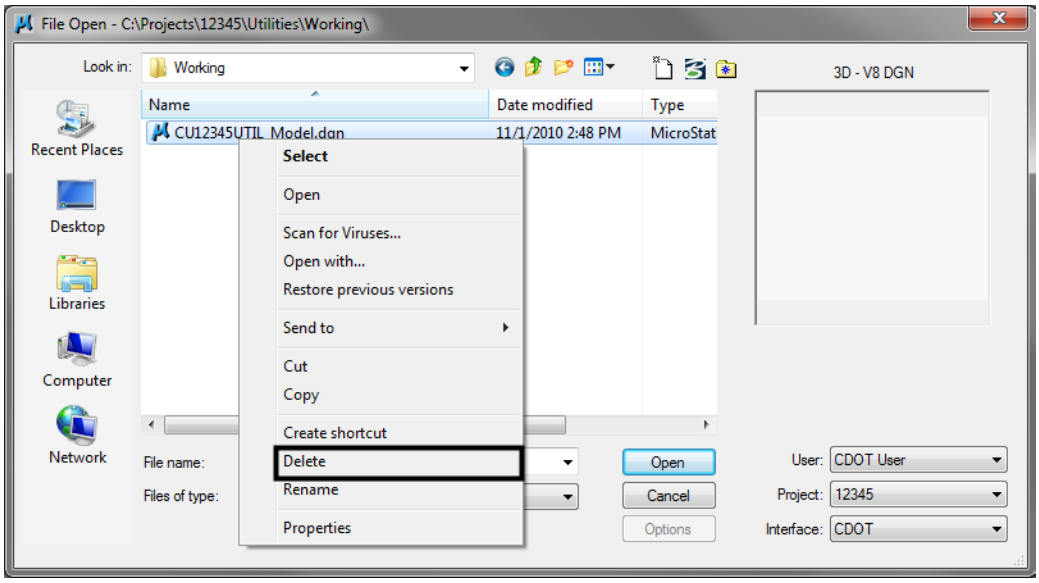
The file is saved to the new location.

Note: The project template delivers standard dgn's for model and sheet files as starter files. Use caution when prompted to confirm saving over an existing file as you could lose data.

3. Select **File > Close**.
4. In the ***MicroStation Manager*** verify that the file was saved to the ***Reference_Files*** folder.



5. Set the directory to **\Utilities\Working**.
6. **Right-click** while hovering over the file and select **Delete** to delete the file from the Working folder.



7. **Cancel** the MicroStation Manager to exit.

LAB 9 - Create Landscape Graphics

In this lab you'll create a Landscape & Environmental (L&E) model file and then use the CDOT Menu to place silt fence lines, hay bale cells and wetlands regions.

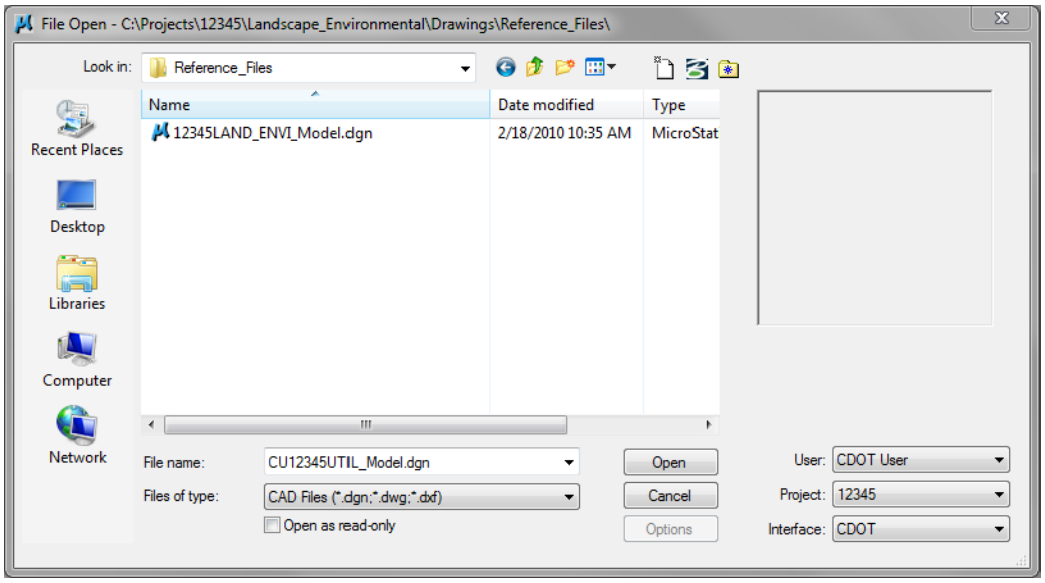
Chapter Objectives:

After completing this exercise you will know how to:

- Use the CDOT Menu to place L&E custom lines
- Use the CDOT Menu to place L&E cells
- Use the CDOT Menu to place L&E shapes (wetlands)
- Use the CDOT Menu to pattern areas

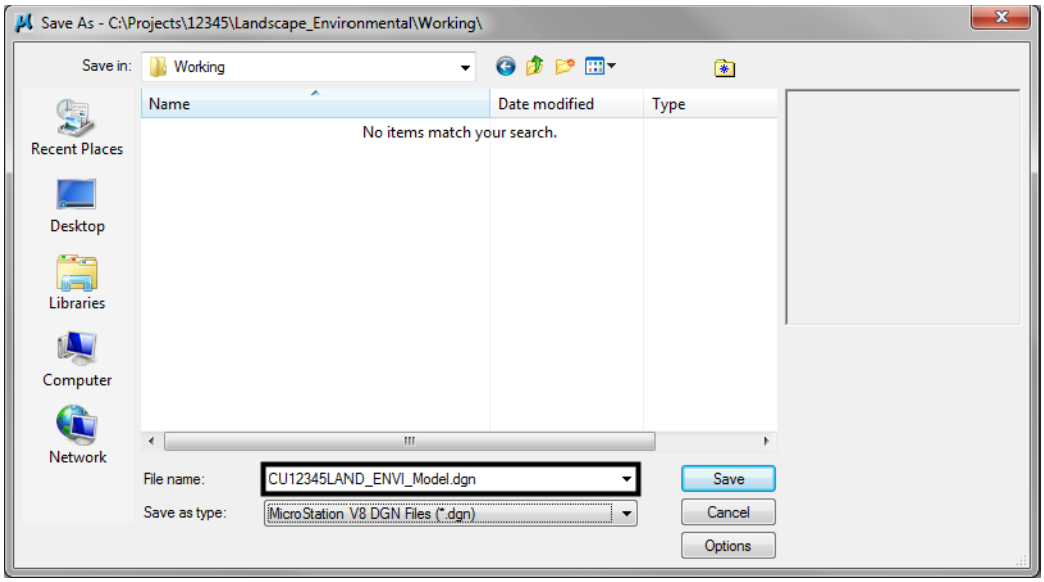
Lab 9.1 - Create the L&E Model File

1. Start MicroStation.
2. Re-set **Project** to **12345**.
3. Set the directory to **\Landscape_Environmental\Drawings\Reference Files**.
4. Select the file **12345LAND_ENVI_Model.dgn** and select **Open**.



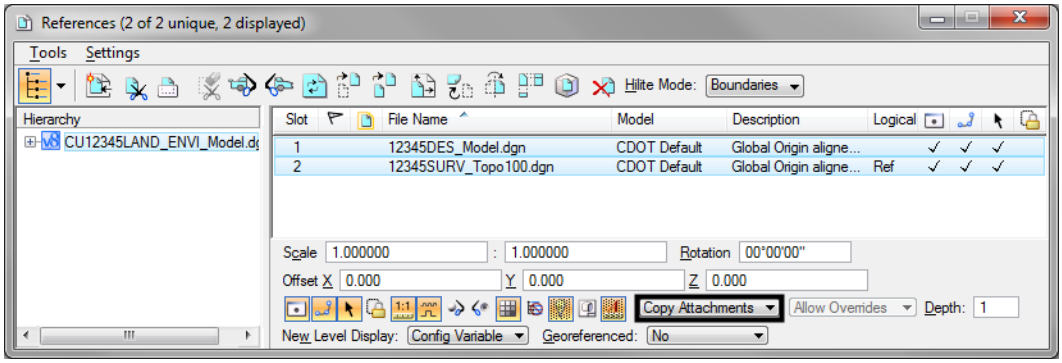
5. After opening the file, select **File > Save As…** and set the directory to **C:\Projects\12345\Landscape_Environmental\Working**.

6. Change the file name to **CU12345LAND_ENVI_Model.dgn** and select **Save** to save a copy to the **Working** folder.

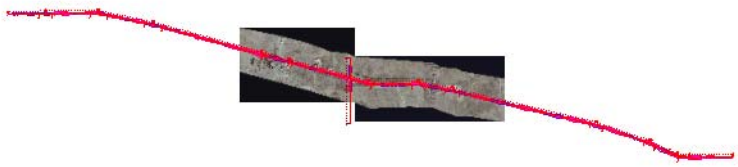


7. Select **References** from the **Primary** toolbar.

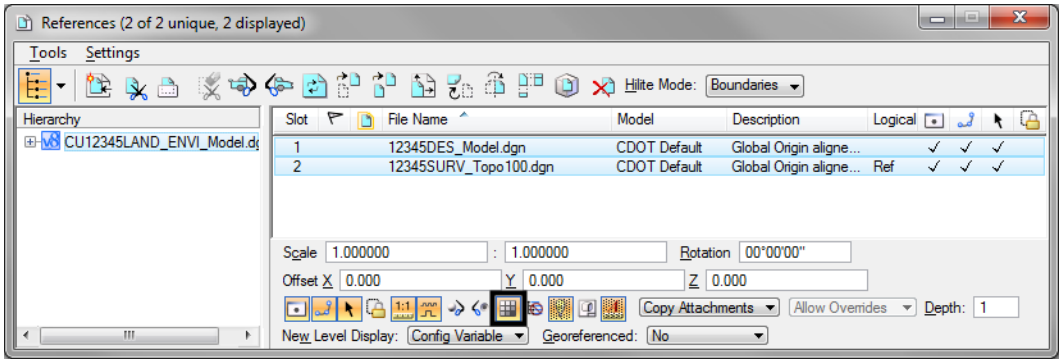
8. Using what you've learned, attach the Design model reference (from Design's **\Drawings\ Reference_Files** folder), **Coincident-World** and at a **1:1** scale. **Copy Attachments** at a depth of **1** to bring in the **Survey/Topo** as direct attachments. See below.



9. Fit the view.

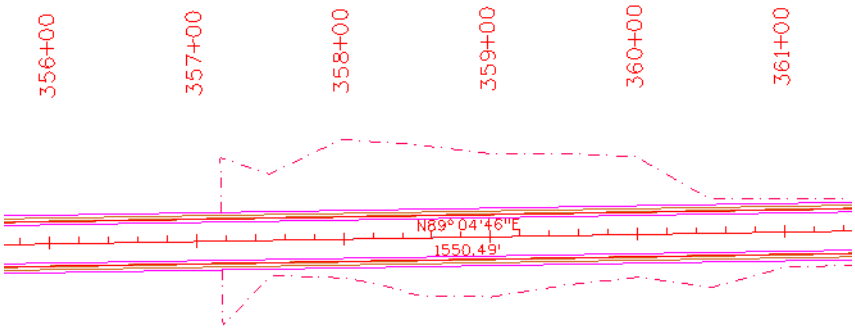


10. From the **Reference** dialog, Turn ***off*** the display of Design's raster references.



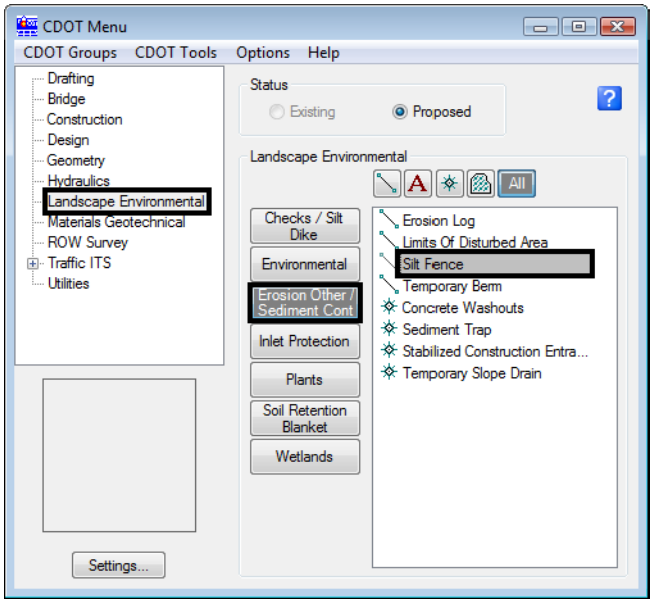
Place silt fence

1. Window around the end of the project just east of the existing bridge.



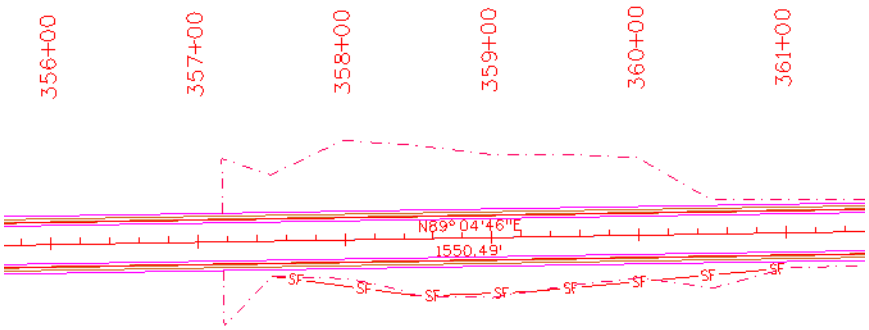
2. From the CDOT Menu, select the **Landscape Environmental** Group.
3. Set **Status** to **Proposed**.
4. Set the category to **Erosion Other / Sediment Control**.

5. Select the **Silt Fence** item.



This automatically sets the active level to **LAND_ENVI_Erosion-Silt-Fence** and selects the **Place SmartLine** tool.

6. Place data points to draw the silt fence along the toe-of-fill line on the south side of the proposed road (similar to the one shown).

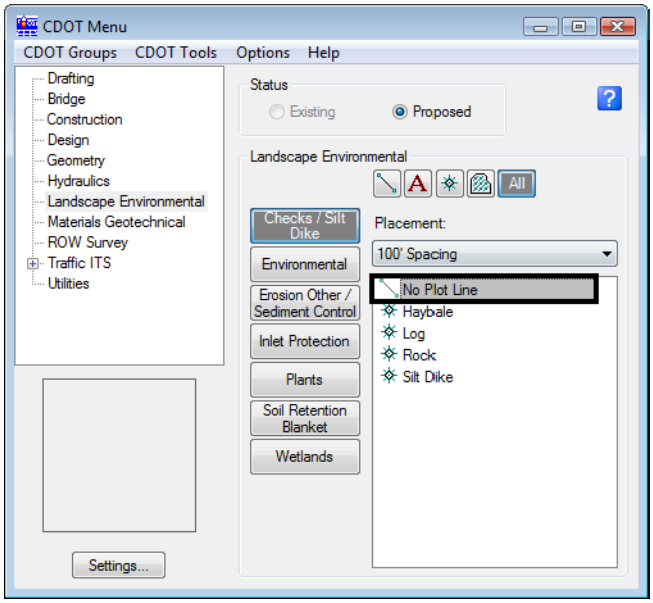


7. **<R>** when done.

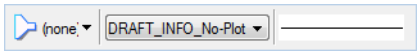
Place Haybales

1. Set the category to **Checks / Silt Dike**.

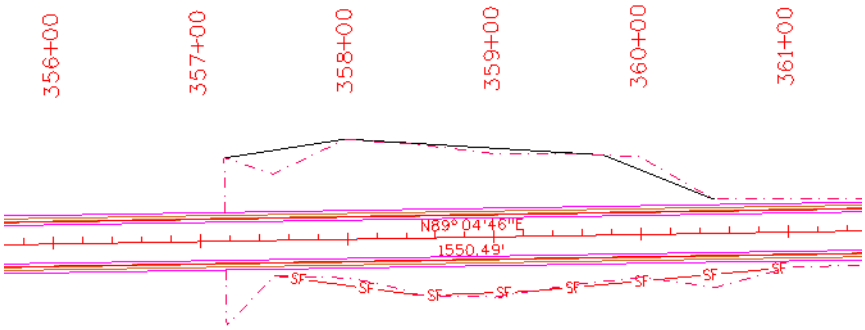
2. Select the item **No Plot Line**.



This automatically sets the active level to **DRAFT_INFO_No-Plot** and selects the **Place SmartLine** tool. The **No Plot** level allows you to place a construction line representing the location of haybales, silt dikes, etc. that you can later divide with a cell.

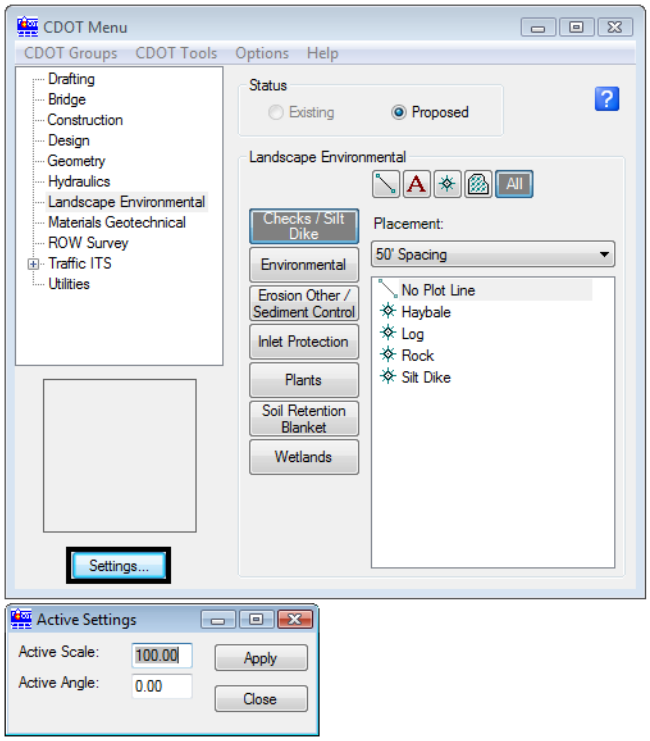


3. Place data points to draw the haybale construction line on the north side of the proposed road as shown.



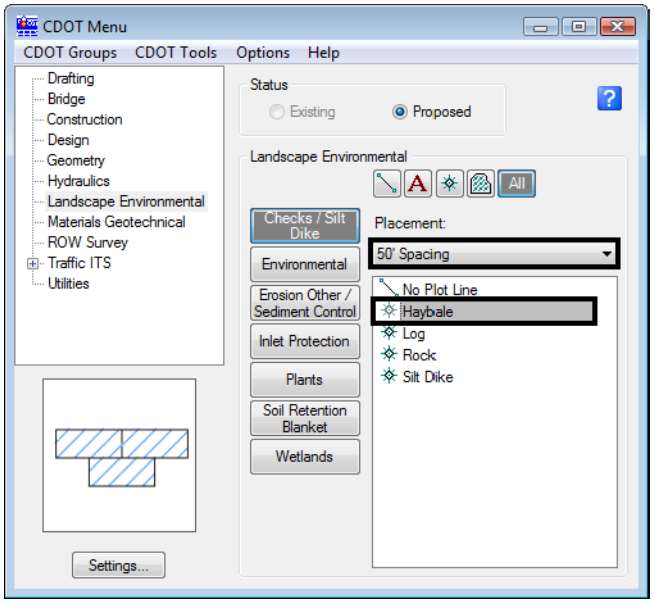
4. **<R>** when done.

5. On the CDOT Menu, select **Settings** and set **Active Scale** to ***100,*** **Apply** and then **Close**.



6. Set **Placement** to ***50'*** **Spacing**.

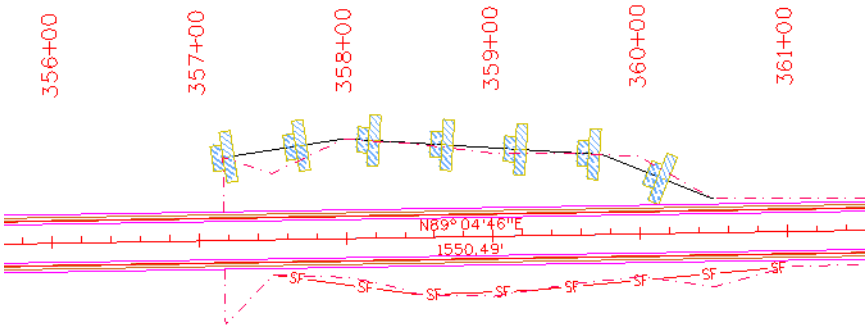
7. Set the item to **Haybale**.



This automatically selects the **Place Cell** command and starts the **Cell Divide** program.

8. When prompted to **Identify Element**, **<D>** on the No Plot line you just placed.

9. **<D>** to accept.

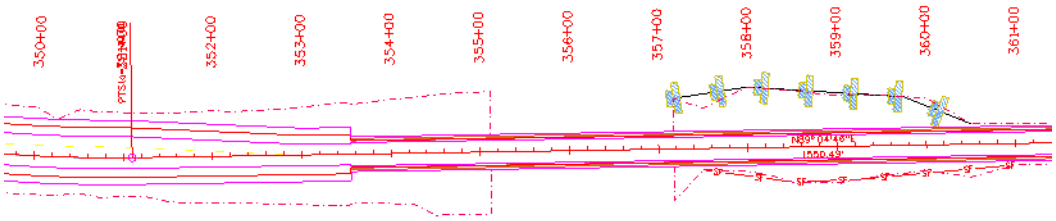


The No Plot line is divided with the haybale cells at 50 ft. intervals.

Create wetlands

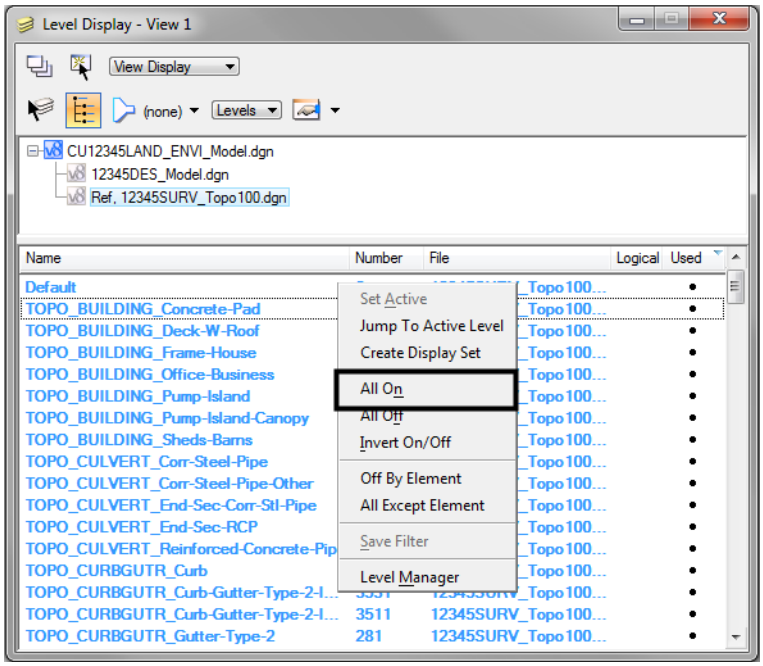
Draw the wetland shapes

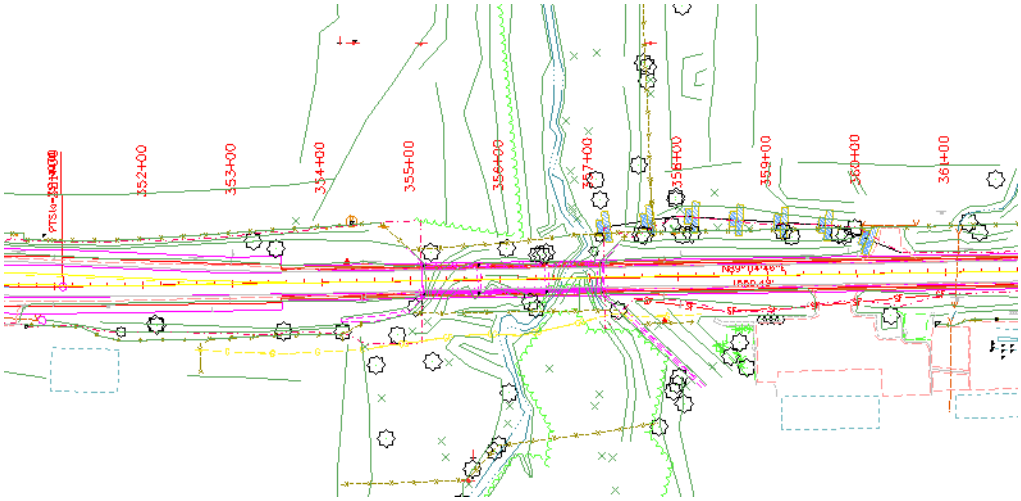
1. Pan over to the left to the area around the bridge as shown.



2. From the Reference File dialog box, turn on the display of the **Survey/Topo** file.

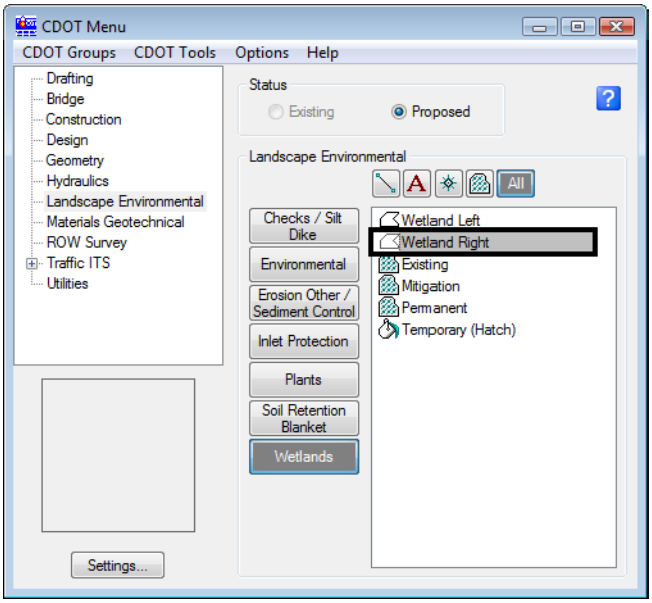
3. Open ***Level Display***, highlight the **Survey/Topo** reference, right-click in the list of levels and turn on all of the **Survey/Topo** reference levels.





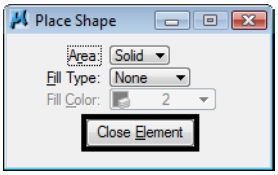
4. On the CDOT Menu, set the category to **Wetlands**.

5. Select the item **Wetland Right**.

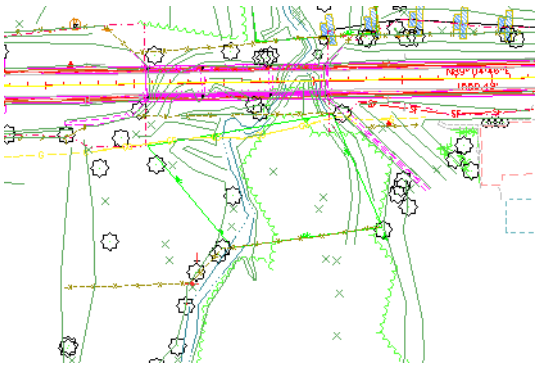


This automatically sets the active level **LAND_ENVI_Wetland-Right** and selects the **Place Shape** tool.

6. Place data points to define the wetlands region as shown. To close the shape, select **Close Element** in the **Place Shape Tool Settings** box.

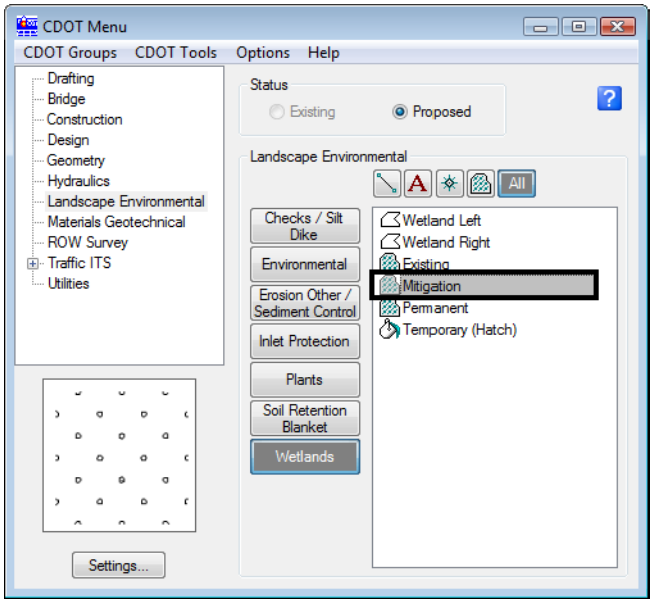


7. Repeat for the area on the other side of the bridge as shown.



Pattern the wetlands

8. On the CDOT Menu, select the **Mitigation** item from the **Wetlands** category.

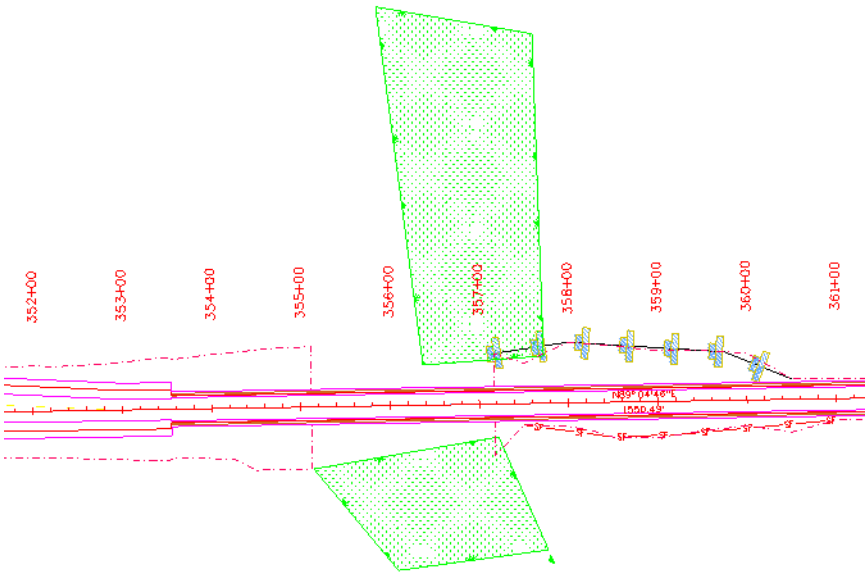


This automatically selects the **Pattern Area** command and sets the active pattern cell.

9. When prompted, **<D>** on the wetland shape you just drew and then **<D>** to accept.

10. Repeat for the other wetlands shape on the north side of the bridge.

11. Turn ***off*** the display of the **Survey/Topo** reference.



12. **Save Settings**.

13. Proceed to the next lab.

LAB 10 - Create Hydraulics Graphics

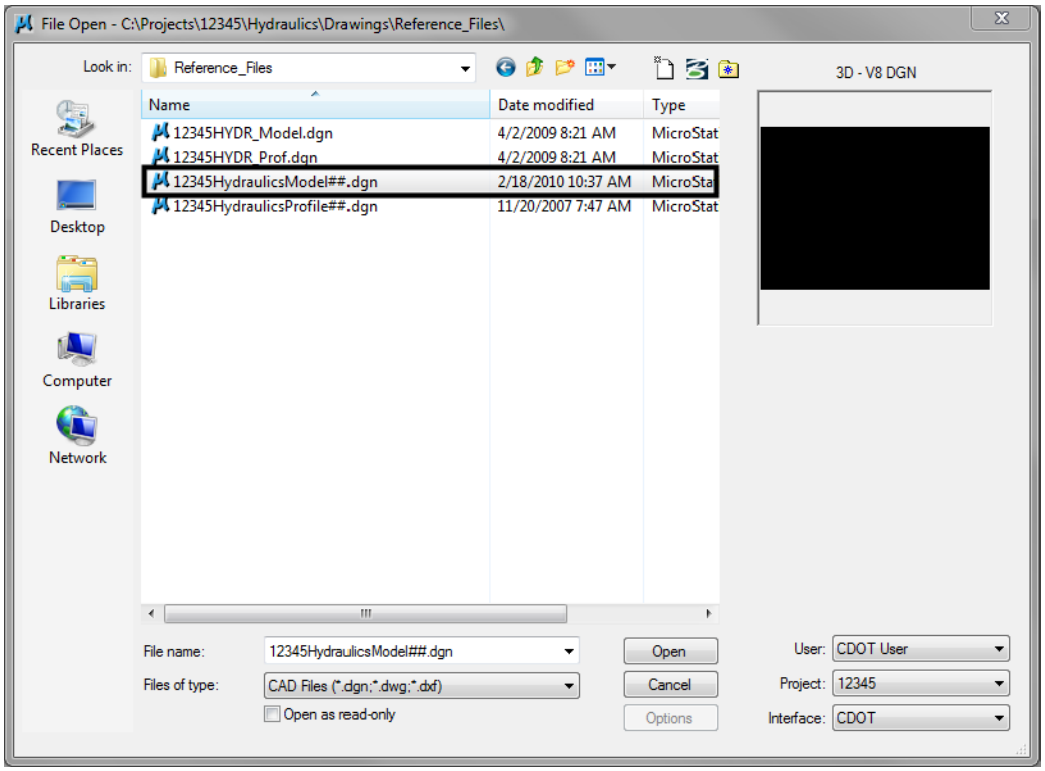
Chapter Objectives:

After completing this exercise you will know how to:

- Use the CDOT Menu to place Hydraulics custom lines (pipes)
- Use the CDOT Menu to place Hydraulics cells (inlets)
- Use the CDOT Menu to place Hydraulics terminators (RCES)

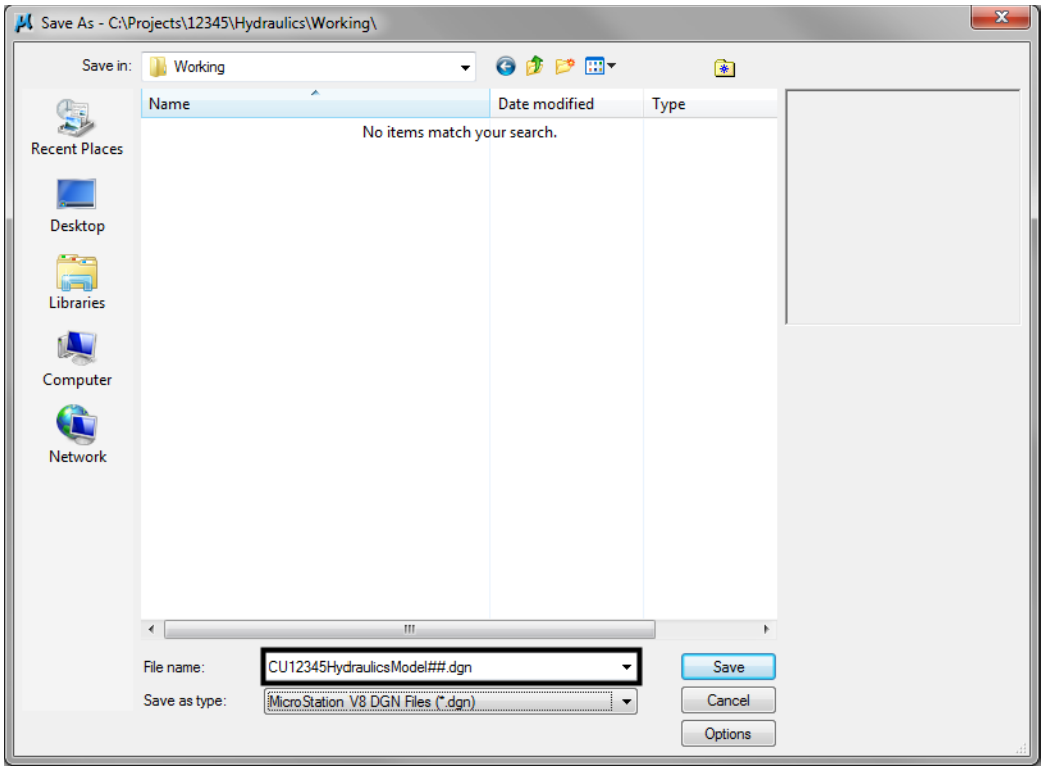
Lab 10.1 - Create the Hydraulics Model File

1. In MicroStation, select **File > Open**.
2. Set the directory to **\12345\Hydraulics\Drawings\Reference Files**
3. Select the file **12345HydraulicsModel##.dgn** and select **Open**.



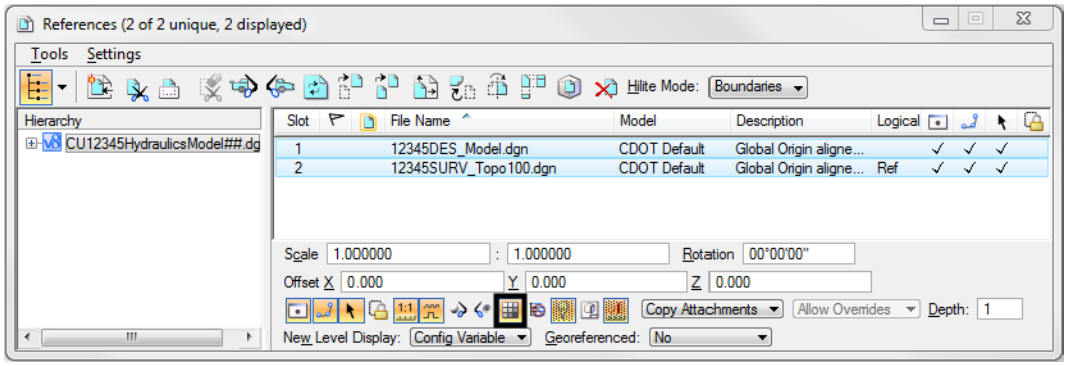
4. Select **File > Save As…** and set the directory to **\Hydraulics\Working**

5. Change the file name to **CU12345HydraulicsModel.dgn** and select **Save** to save a copy to the **Working** folder.



6. Select **References** from the **Primary** toolbar.

7. Using what you've learned, attach the Design model reference (from Design's **\Drawings\ Reference_Files** folder), **Coincident-World** and at a **1:1** scale. **Copy Attachments** at a depth of ***1*** to bring in the Survey/Topo file as direct attachments. See below.

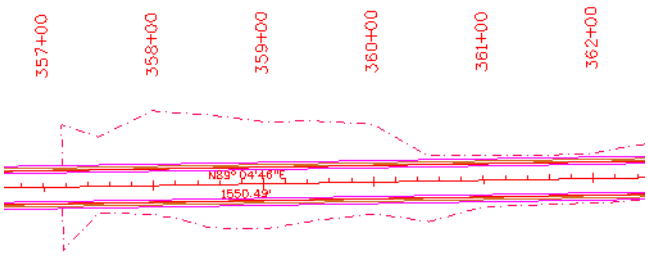


8. From the **References** dialog, turn off the display of the design model's raster references.

Place Inlets

Using known coordinates and the **CDOT Menu**, place proposed Type R inlets along the curb flowline at the end of the project.

1. Window into the area shown near the end of the project.

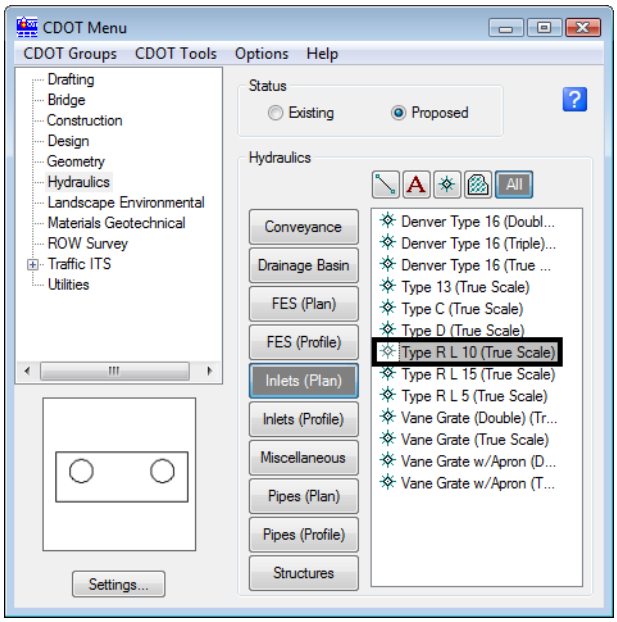


This area of the projects is a proposed 2-Lane urban section with curb, gutter and sidewalk. You'll first place inlets along the curb flowline.

2. Select **Locks** from the status bar and make sure **ACS Plane Snap lock** is turned **off**.

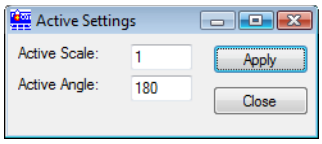
3. On the CDOT Menu, select the **Hydraulics Group**.

4. Set the **Status** to **Proposed**, select the **Inlets (Plan)** category, and then select the **Type *R L 10*** item.



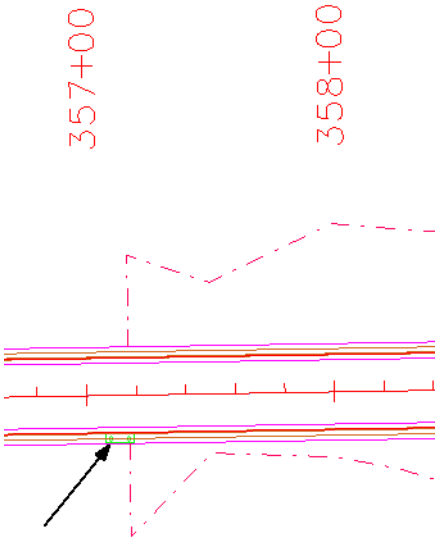
Note: This automatically sets the active level to **HYDR_Inlets** and selects the **Place Cell** command. The inlet cell is attached to your cursor at the origin point. Since you know the coordinate location for the inlets, you can place them with precision keyins.

5. Select **Settings** and set **Active Scale** to ***1*** and **Active Angle** to ***180***. **Apply** and then **Close**.



6. For the 1st inlet, key in ***xy=3292424.652, 1553316.387, 6351.8***

   The inlet appears in the location shown.



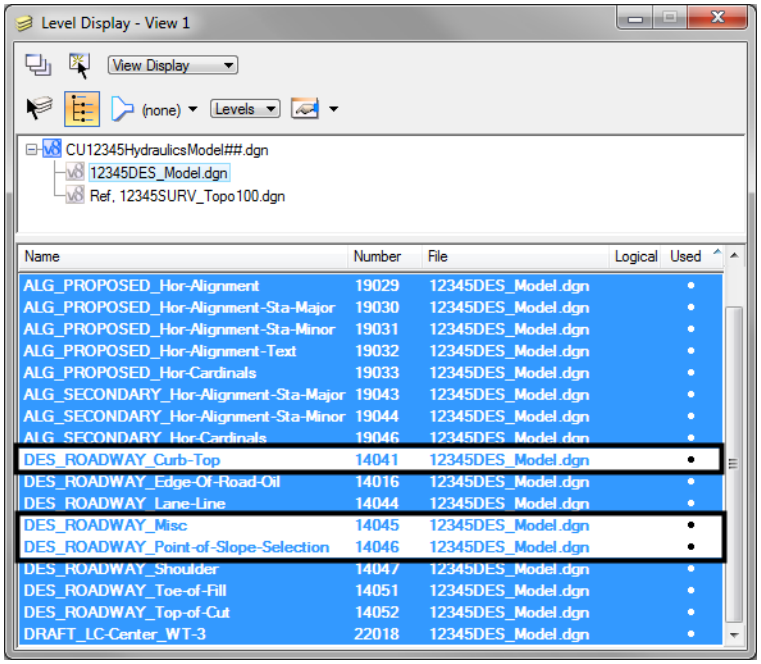
   Note: If you don't see the inlet, it could be outside your display depth. Key in ***dp=0,7000.*** **Enter**, and then select the view. You could also fit the view and then window back to this location.

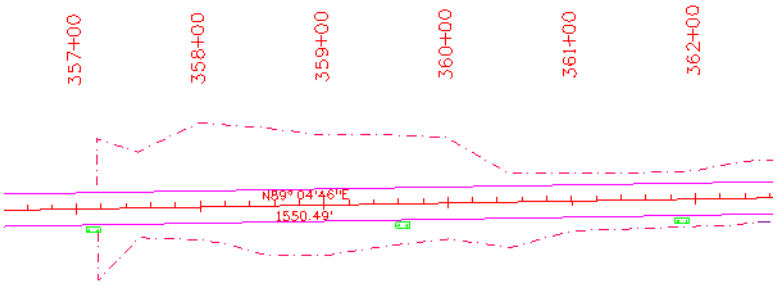
7. For the 2nd inlet, key in ***xy=3292674.652, 1553320.404, 6350.4***

8. For the 3rd inlet, key in ***xy= 3292900.384, 1553324.031, 6348.8***

9. **<R>** to exit the **Place Active Cell** command

10. Turn off the **Design** reference levels shown to better see the inlets.

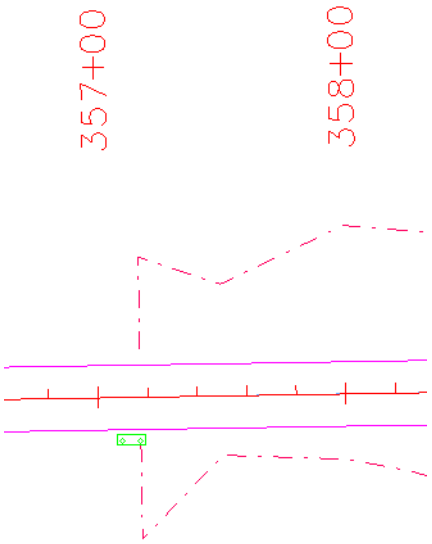




Connect the inlets with pipes

Place the pipes

1. Zoom in on the first inlet.

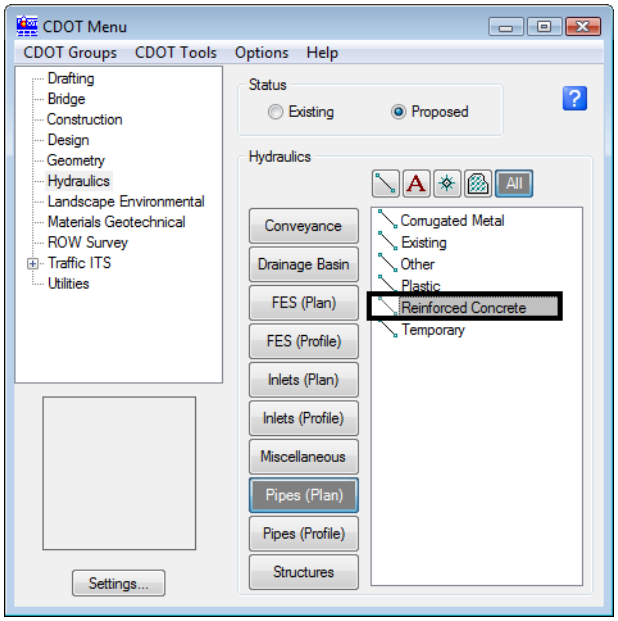


2. Verify that **Depth lock** is still turned **off**.

   When placing pipes, you want to pick up the elevation of the inlets, therefore you need to turn **Depth lock off**.

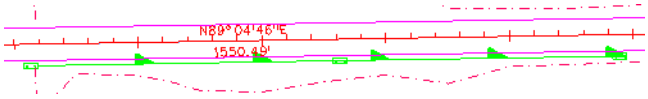
3. On the **CDOT Menu**, set the category to **Pipes (Plan)**.

4. Select the item **Reinforced Concrete**.

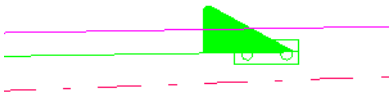


Note: This automatically set the active level to **HYDR_PIPES_Concrete** and selects the **SmartLine** tool.

5. **AccuSnap** on the right-side midpoint of the inlet to begin the pipe.
6. Pan to the right and **AccuSnap** on the left-midpoint of the second inlet.
7. Pan to the right and **AccuSnap** on the right-midpoint of the third inlet.
8. **<R>** when done.

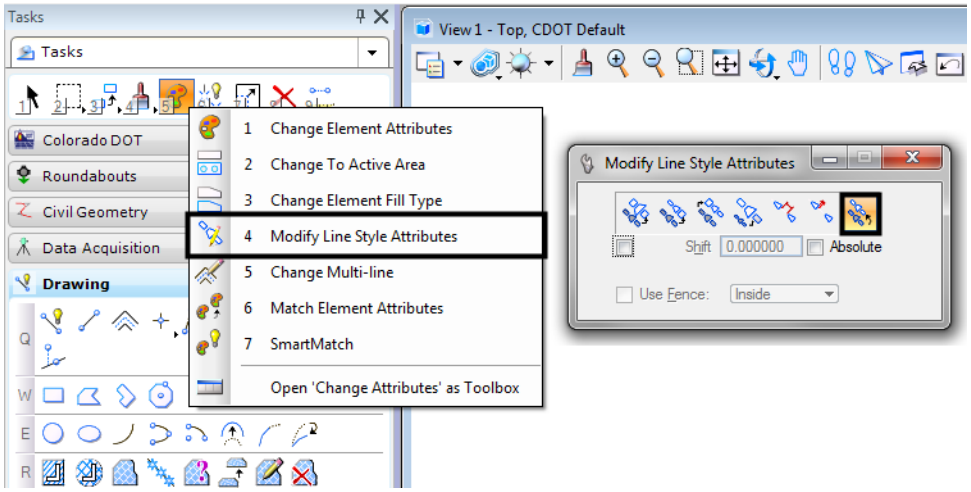


Note: This connects the inlets with the concrete pipe. Notice how the directional arrow on the pipe custom line style falls on top of the last inlet. You can correct this by shifting the custom line style.

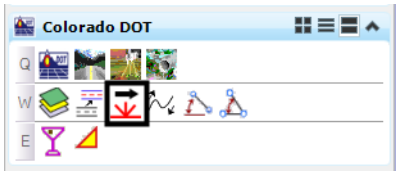


Shift the line

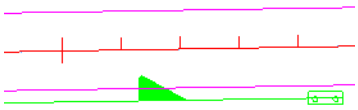
1. Select the **Change Element Attributes** toolbar from the **Main** toolbar.
2. Select the **Modify Line Style Attribute** command.
3. Set the **Modify** option to **Shift**.



Note: The Shift command is also located on the CDOT Misc. Toolbar under the Colorado DOT task tab.



4. **<D>** on the concrete pipe that you just placed and move your cursor to the left. Note how the custom line style shifts as you move your cursor. When the arrow is moved off of the inlet, **<D>** to accept.



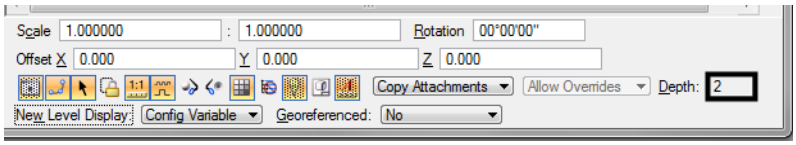
Note: Use the **Modify Line Style** command to shift custom lines styles as needed, especially in corners where there may be gaps.

Place a Type C inlet and connect pipes

Turn on the Survey/Topo reference

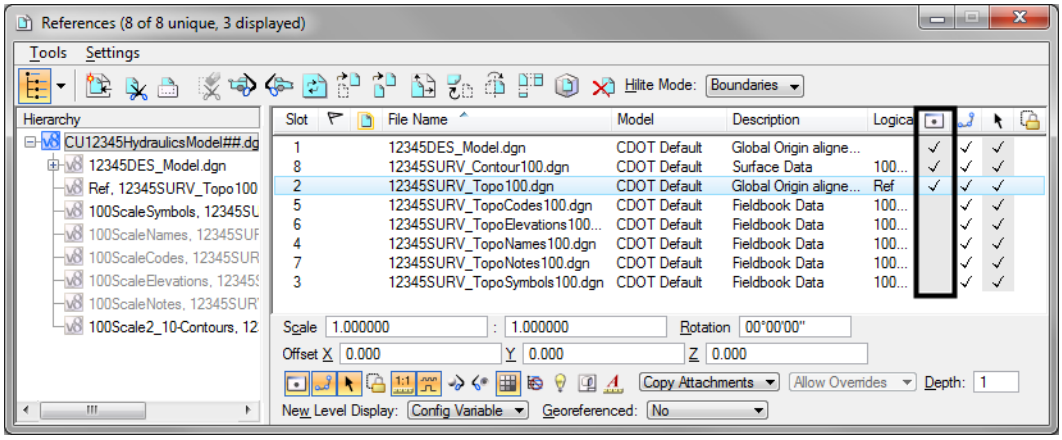
To help determine the location of the inlet, turn on the Survey/Topo Reference and the Contour reference.

1. On the Reference dialog, select the Design reference set the **Copy Attachment Depth** to ***2***.



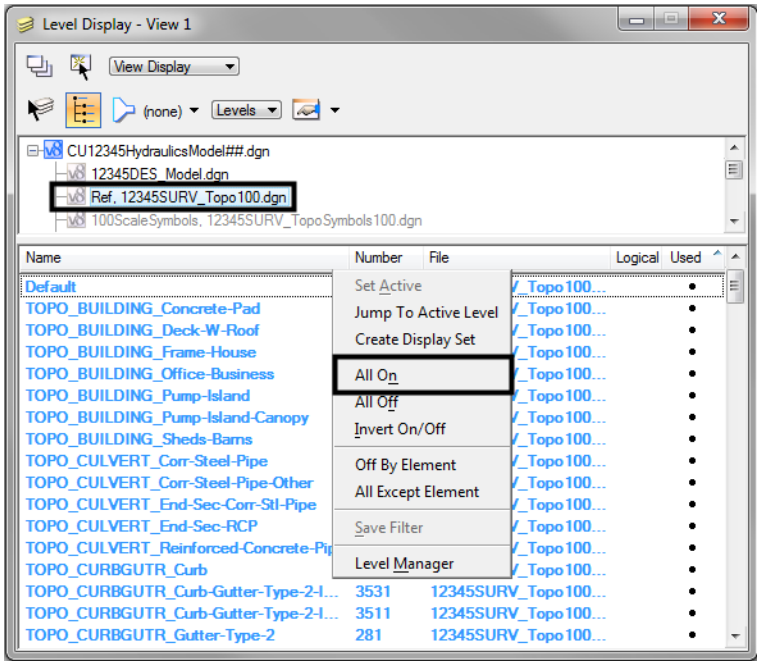
Note: This brings in the Contour reference since the Contour model file is referenced to the Survey/Topo file.

2. Be sure the display of all other reference files are off.

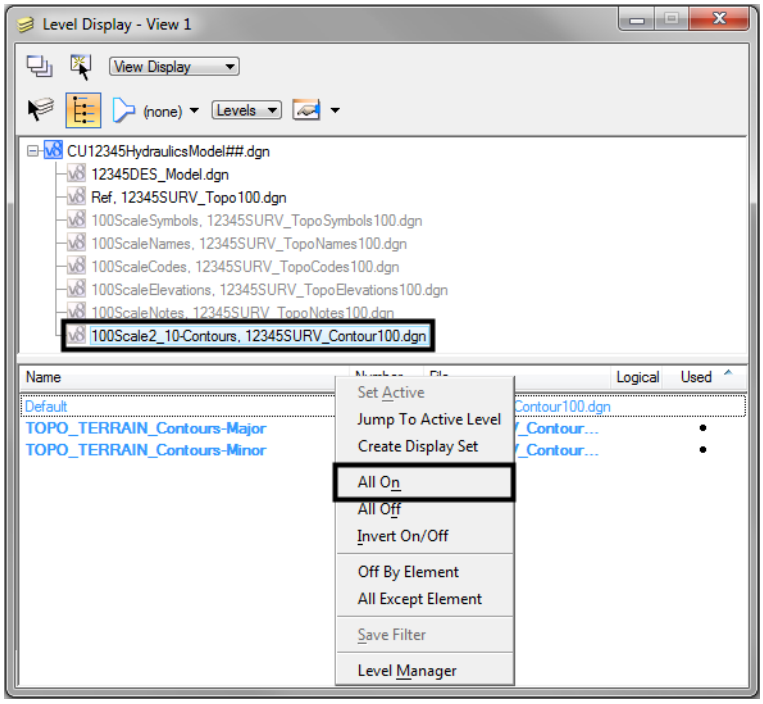


Turn on reference levels

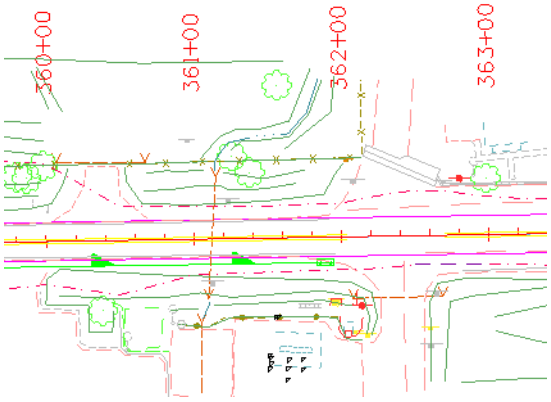
1. In the **Level Display** box, turn **on** all of the **Survey/Topo** reference levels.



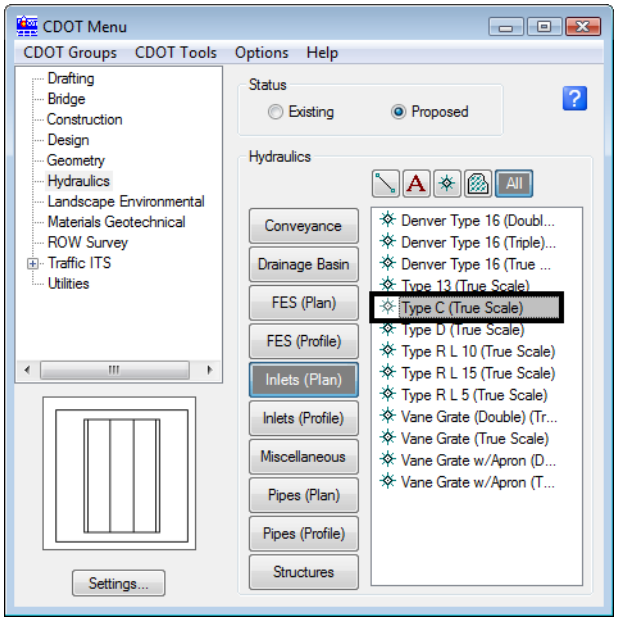
2. Turn **on** all **Contour** reference levels.



3. Window into the location shown.



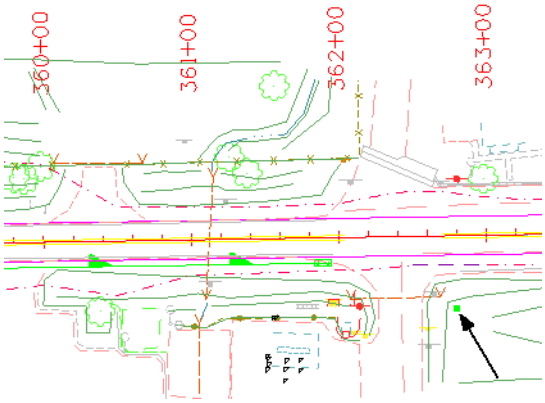
4. On the CDOT Menu, select the **Inlets (Plan)** category and then select the **Type C** item.



Note: This automatically sets the active level to **HYDR_Inlets** and selects the **Place Cell** command. The inlet cell is attached to your cursor at the origin point.

5. Key in ***xy= 3292986.899, 1553291.431, 6347.0***

6. **<R>** to exit the **Place Active Cell** command.

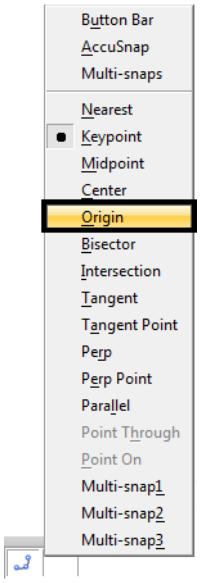


7. On the **CDOT Menu**, set the category to **Pipes (Plan)** and select the **Reinforced Concrete** item again.

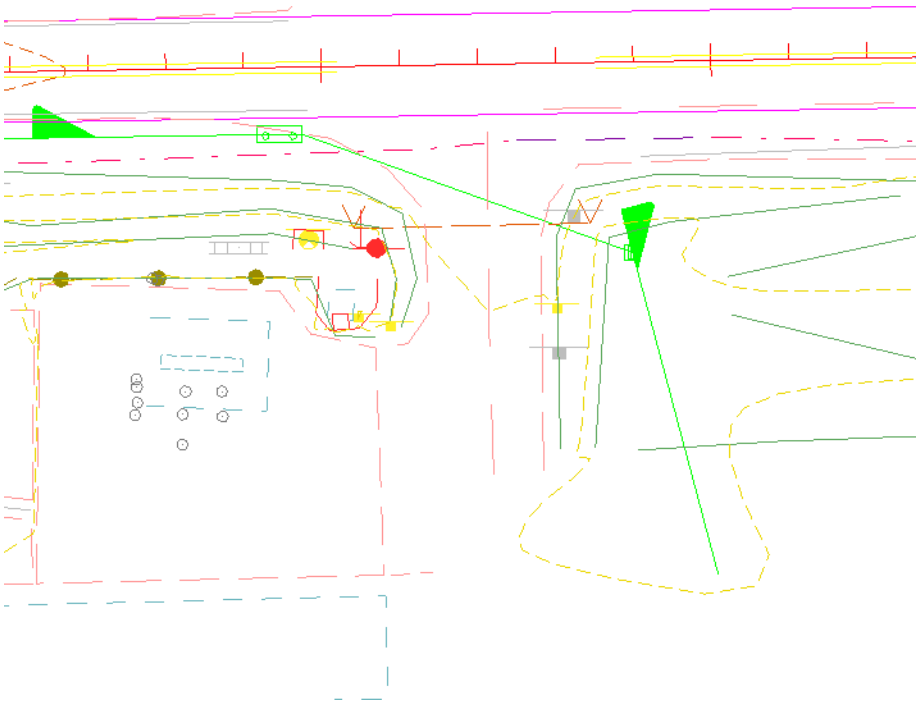
8. Key-in **AZ=6346** then **<D>** in the view to set the active depth to 6346.0. This will allow the placement of the pipe outlet at the correct elevation.

9. **AccuSnap** on the right-midpoint of the last Type R L 10 inlet.

10. Select the **Origin** snap mode and **AccuSnap** on the Type C inlet. (see below).

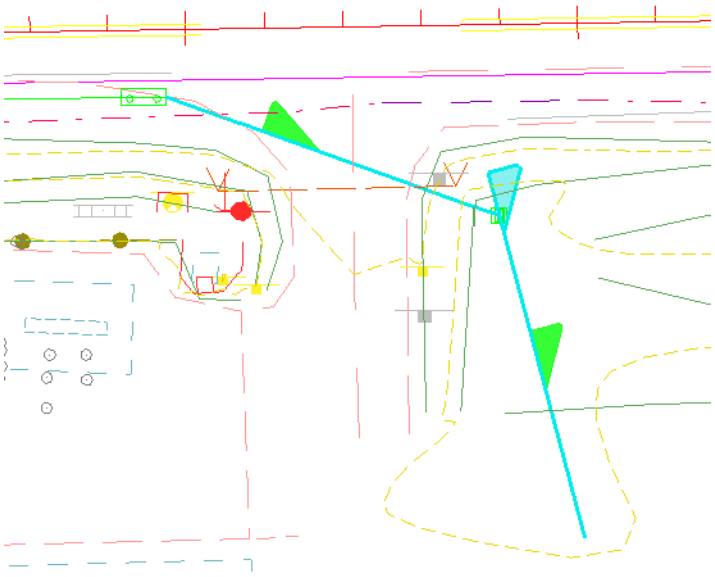


11. Place a final **<D>** in the location shown for the end of the pipe near the contour line (see below).



12. **<R>** when done.

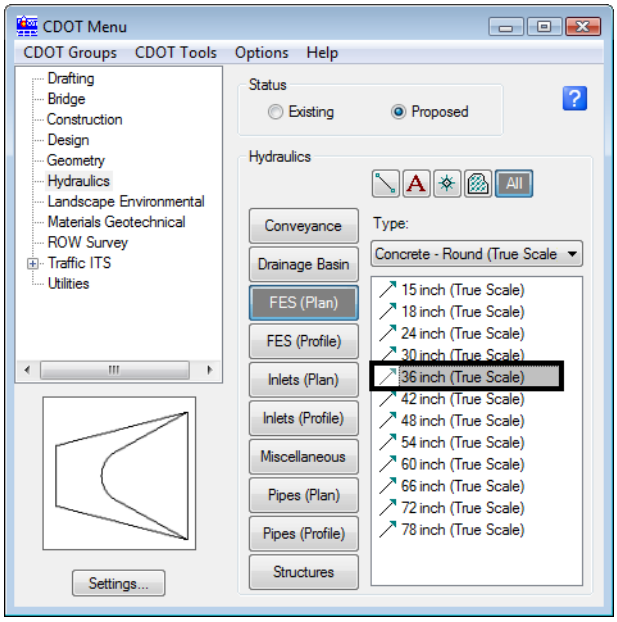
13. Use the **Modify Line Style** command again and **Shift** the pipe line style as necessary to ensure the arrow does not fall on top of an inlet.



Place the pipe terminator

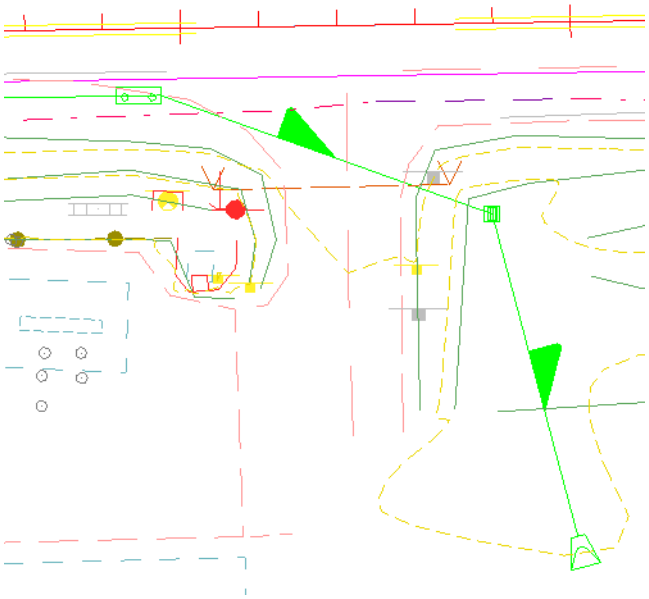
The pipe terminates at a 36” RCES, which you can place as a cell line terminator.

1. On the CDOT Menu, set the category to **FES (Plan)**.
2. Set **Type** to **Concrete – Round**.
3. Select the **36 inch** item.



Note: This automatically set the active level to **HYDR_FES** and selects the **Place Active Line Terminator** tool from the **Cells** toolbar.

4. **<D>** on the end of the concrete pipe as shown.
5. **<D>** to accept.

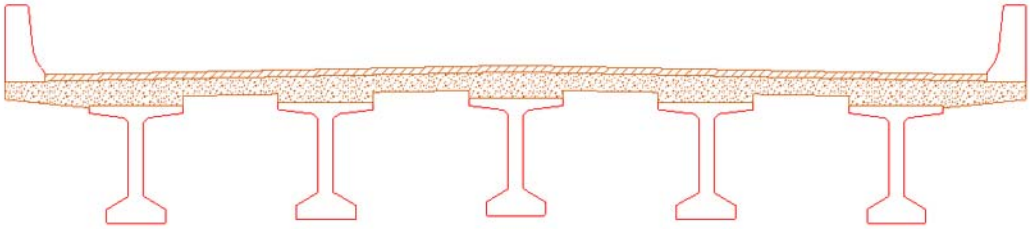


Note: The RCES terminator is automatically rotated to the appropriate angle and placed on the end of the pipe.

6. **Save Settings**.
7. **Exit** MicroStation.

LAB 11 - Draw a Bridge Typical Section

In this lab, you'll practice all of the drawing concepts you've learned so far to create a bridge typical section.



Chapter Objectives:

After completing lab 11, you will know how to:

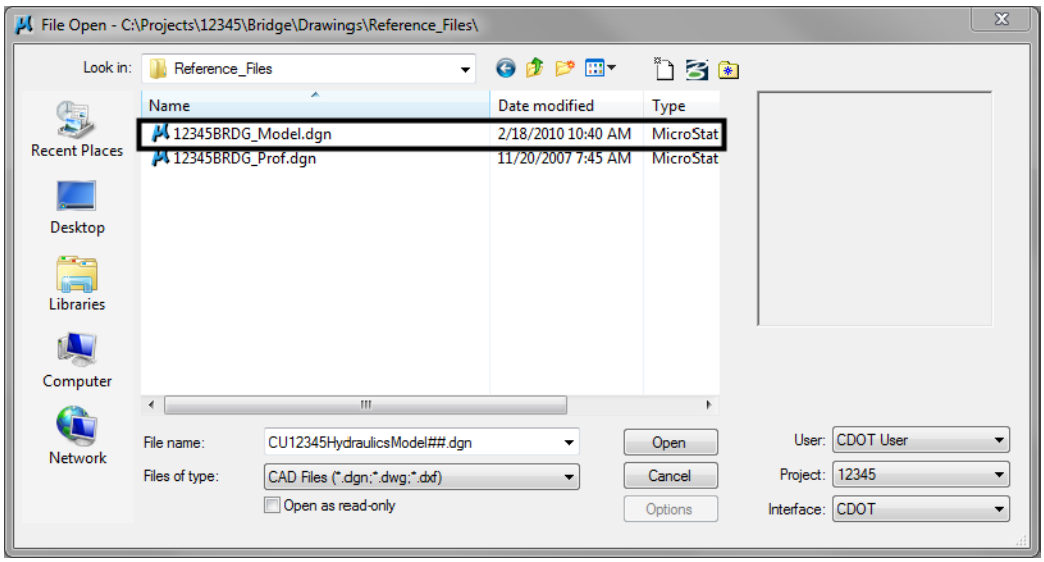
- Use the CDOT Menu to set active attributes (level, color, line style, weight).
- Use basic drawing tools (***AccuDraw***, ***AccuSnap***, ***Modify*** and ***Manipulation*** tools, ***cells***, ***patterns***, etc.) to draw a bridge typical section and a reinforcement detail.
- Use ***Selection Sets*** to group graphics.

Lab 11.1 - Create a Bridge Model File for Details

Note: Since you have already selected ***xxMulti-Discipline*** from the ***Select Group*** utility, you have access to all Bridge levels. However, you could also select the Bridge Group before starting MicroStation to limit your levels to just those needed for Bridge.

1. Start MicroStation.
2. In the MicroStation Manager dialog box, re-set ***Project*** to **12345.**
3. Set the directory path to **\Bridge\Drawings\Reference_Files.**

4. Select the file ***12345BRDG_Model.dgn*** and then select **Open**.

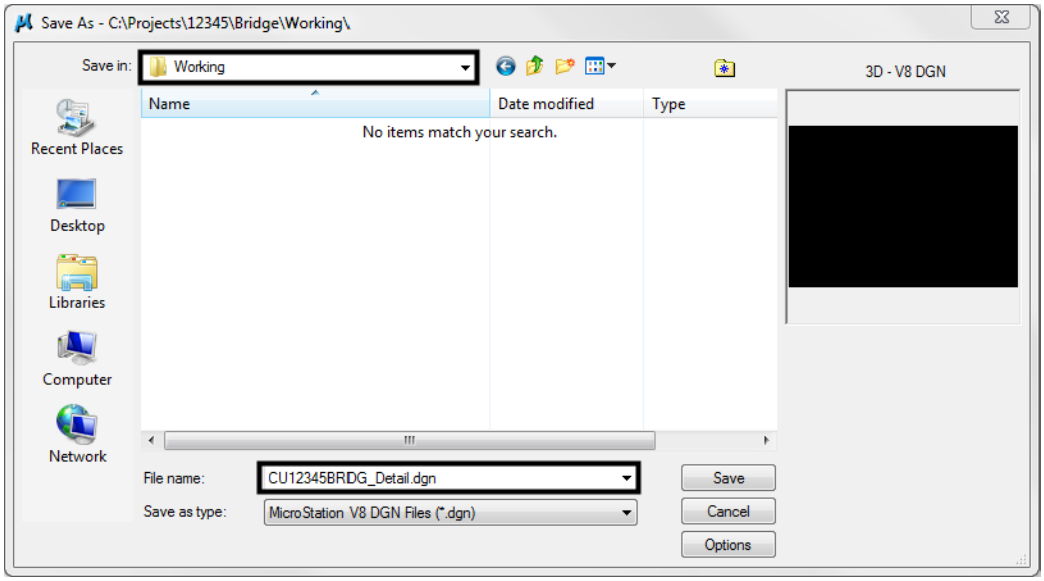


The blank model file opens.

5. Select **File > Save As...** and set the directory to the project's ***\Bridge\Working*** folder.

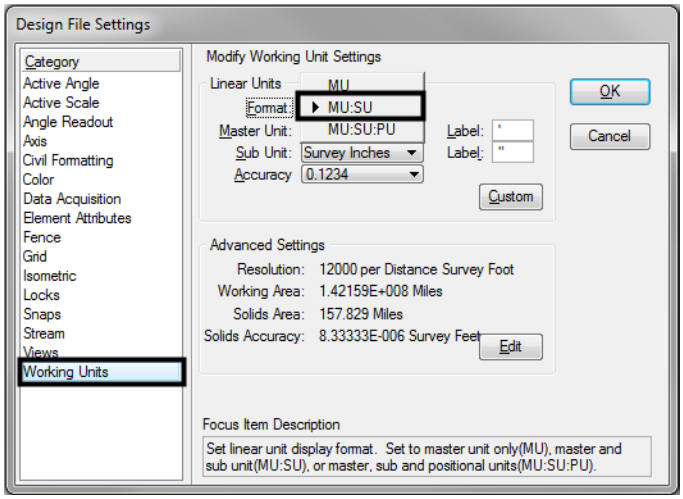
6. Rename the file ***CU12345BRDG_Detail.dgn*** and select **Save**.

Note: Note that you are renaming this file from "***Model***" to "***Detail***".



The file is copied to the working folder with the initials ***CU*** (CDOT User, for training purposes).

7. Select **Settings > Design File > Working Units** and set the ***Format*** to **MU:SU**.



8. Select **OK** to change the coordinate readout. Your readout will now show values in feet and inches.

Lab 11.2 - Draw a Bridge Typical Section

In the next series of steps, you'll use ***AccuDraw*** and MicroStation tools (***drawing tools***, ***manipulation and modify tools***, ***grouping tools***, etc.) to create the bridge typical section shown.

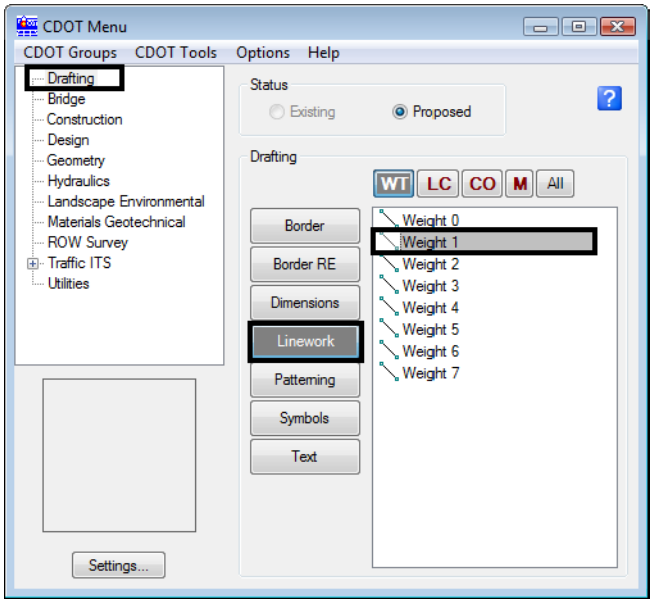
You'll begin by drawing construction lines on a drafting level, and then create the final detail on the appropriate bridge level.

Draw the slab construction lines

You'll draw the right side of the top of slab starting at the crown point of the road. The right side consists of a 12 ft. travel lane and a 6 ft. shoulder, both at a 2% cross slope.

1. On the CDOT Menu ***Drafting*** group select the **Linework** category.

2. Set the filter to **WT** and select **Weight 1**.

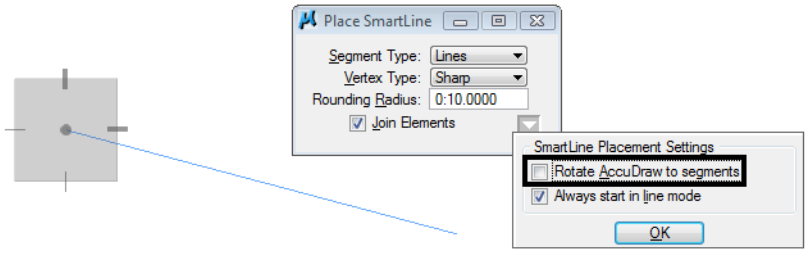


This sets the active level to ***DRAFT_WT-1***.

3. **<D>** anywhere to place the first point.

4. Make sure your ***AccuDraw*** compass is in ***Rectangular*** mode. If it is not press **<spacebar>**.

5. In the ***SmartLine Tool Settings*** box, make sure ***Rotate AccuDraw to Segments*** is turned **Off**.



This will keep the X axis horizontal as you draw ***SmartLine*** segments.

6. Move your cursor down and to the right to establish the direction of the ***SmartLine***.

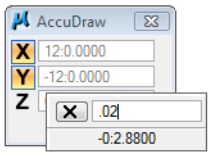
7. In ***AccuDraw***, key in ***12*** for ***X***, then **<TAB>**.

8. In ***AccuDraw***, key in ***12*.02*** for ***Y***, then **<TAB>**.

9. **<D>** to place the first ***SmartLine*** segment.

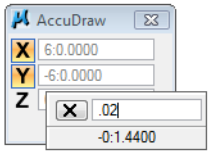
10. **Zoom In** if needed to see the line.

Note: Do not reset out of the ***SmartLine*** command. This will break the ***SmartLine***, which you do not want to do. You want the top slab line to be all one element.



This creates the 12 ft. travel lane at a 2% slope.

11. For the next shoulder segment, move your cursor down and to the right to establish the direction of the ***SmartLine***.
12. In ***AccuDraw***, key in ***6*** for ***X***, then **<TAB>**.
13. In ***AccuDraw***, key in ***6*.02*** for ***Y***, then **<TAB>**.

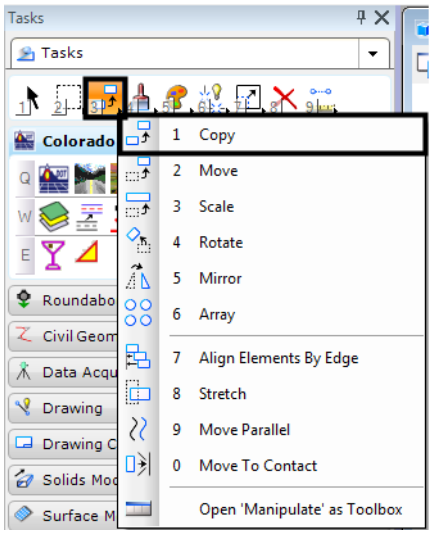


14. **<D>** to place the second ***SmartLine*** segment, this creates the 6 ft. shoulder at a 2% slope.
15. **<R>** out of the ***SmartLine*** command.

Create the bottom slab construction line

Vertically copy the top slab line down 8 inches for the bottom of slab on the right side.

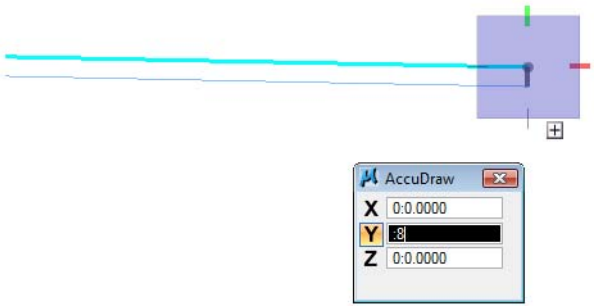
1. Select the **Copy** command from the ***Main*** task toolbar.



2. **AccuSnap** on the right end of the top slab to identify the element to copy.

3. Move your cursor down and lock on to the –Y AccuDraw axis to establish the copy direction. In ***AccuDraw***, key in ***:8*** for ***Y*** and the press **<TAB>** to accept the entry. The value converts to 0.667 feet.

   Note: Don't forget to key in the colon before the 8 to specify 8 inches.

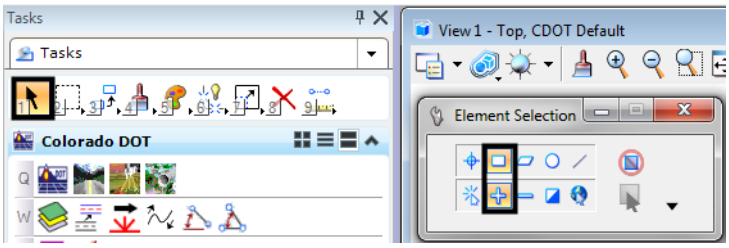


4. **<D>** to place the copy, then **<R>** to complete.

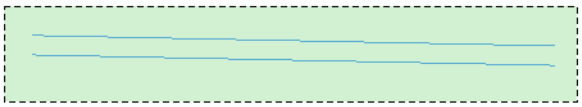
Create the slab left side

Since the right and left sides of the road are symmetrical, you can ***mirror*** the right side to create the left side.

1. Select the **Element Selection** command and set the ***Tool Settings*** as shown.

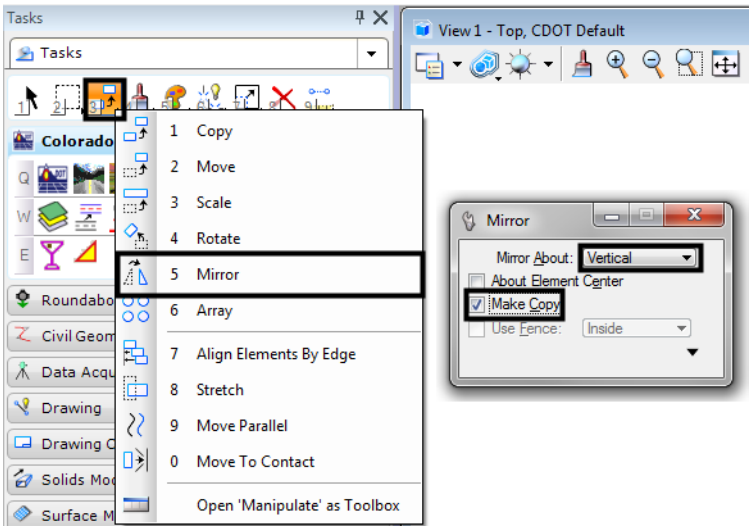


2. Place a fence around the slab graphics (**<D>** for upper left corner and then **<D>** for lower right corner).

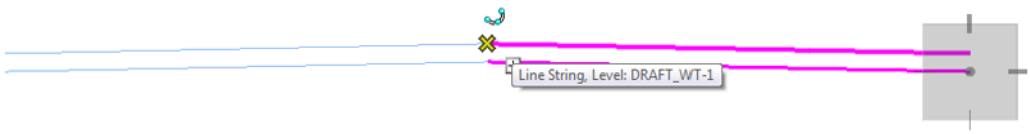


3. Select the **Mirror** command from the ***Main*** task toolbar:

   - Set ***Mirror About*** to **Vertical.**
   - Toggle on **Make Copy.**

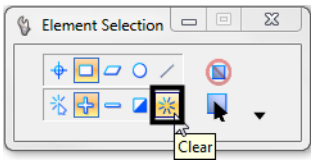


4. **<D>** on the left endpoint of the upper slab line (the crown point) for the mirror copy.



5. **<R>** when done.

6. Select the **Element Selection** command again and select the **Clear** icon from the tool settings window to remove the selection set.

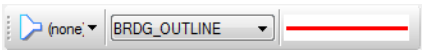


7. **Fit** the view.

Place the girders

1. On the ***CDOT menu***, select the **Bridge** Group.
   - Set the ***Category*** to **Bridge Levels**
   - Set the ***Type*** to **Basic**
   - Select the **Outline** item

   Note: This changes the active level from a ***DRAFT*** level to the ***BRIDGE_OUTLINE*** level for placing the girders.

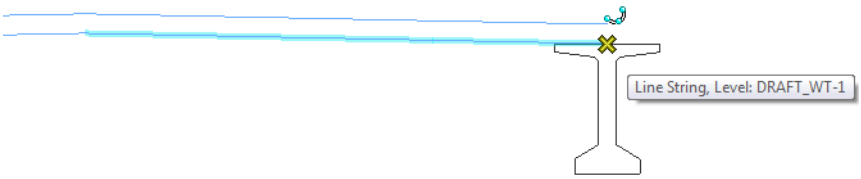


2. On the ***CDOT menu***, select the **Bridge** Group.
   - Set the ***Category*** to **Cells**
   - Set the ***Type*** to **Girders-BT**
   - Select the **BT54** item

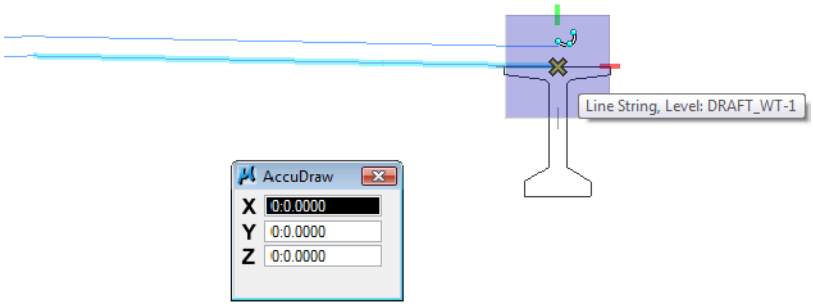
   Note: This automatically selects the correct girder cell from the bridge cell library and activates the ***Place Cell*** command.

3. On the CDOT menu, select the **Settings** button
   - Set ***Active Scale*** to ***1***
   - Set ***Active Angle*** to ***0***
   - **<D> Close** to exit the Settings window

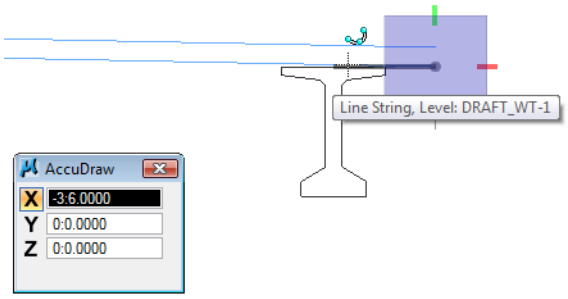
4. Using AccuDraw we can establish an orientation point from which to place the first girder. With the girder cell attached to your cursor, hover over right endpoint of the bottom slab line (don't ***AccuSnap***, just hover and lock on to the point).



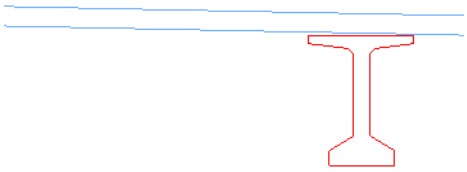
5. Click into the ***AccuDraw*** box to set it active and press the letter ***O*** on the keyboard to move the ***AccuDraw*** compass origin to this point.



6. Move you cursor to the left to establish the placement direction, and key in ***3:6*** in the ***X*** field.



7. With your cursor locked on the ***X*** axis **<D>** to place the girder cell.



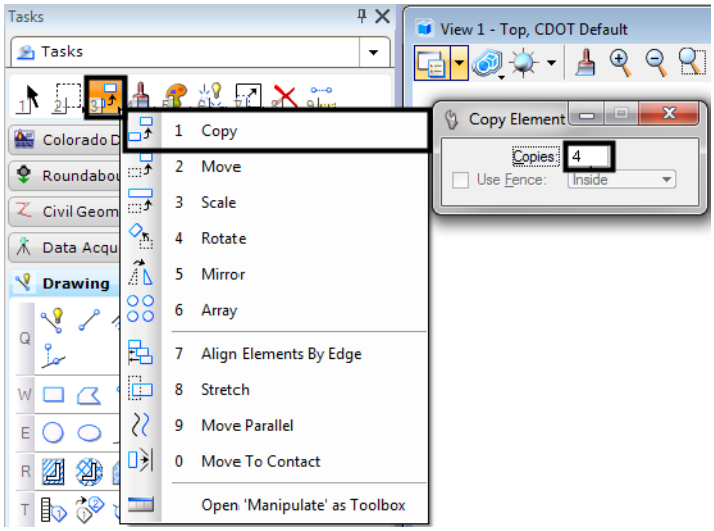
This places the first girder 3 ft. – 6 in. from the right side of the slab. You'll later move the girder down for the proper haunch depth.

Place additional girders

Copy the girder cells to space them 7 ft. 3 in on center.

1. Select the **Copy** command.

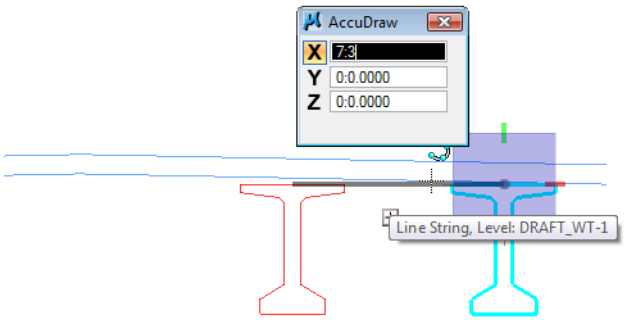
2. In the ***Tool Settings*** box, key in ***4*** for the number of copies.



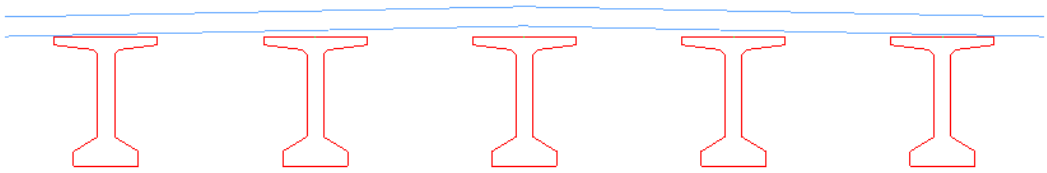
3. Click into the ***AccuDraw*** window to set it active.

4. **<D>** on the girder at the top midpoint.

5. Move your cursor to the left to establish the copy direction and key in ***7:3*** in the ***X*** field in ***AccuDraw***.

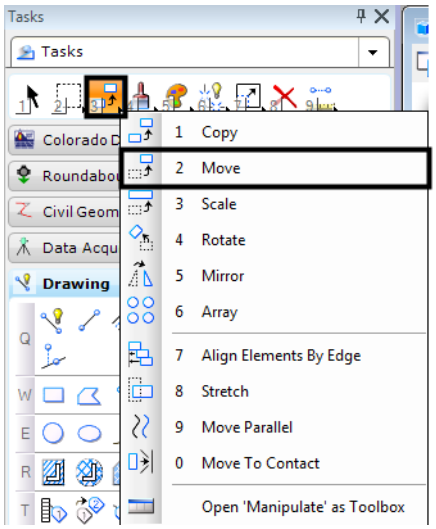


6. With your cursor locked on the ***X axis***, **<D>** to place the copies.



Move the girders down to establish the haunch depth

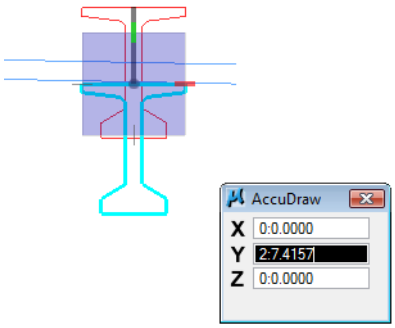
1. Select the **Move** command from the ***Main*** task toolbar.



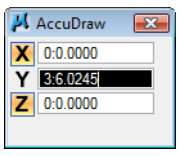
2. Click into the ***AccuDraw*** window to set active.

3. **<D>** on the right end girder at the top midpoint for the move from location.

4. Move your cursor up and lock on the ***Y axis*** to establish the direction, then press **<Enter>** on the keyboard.

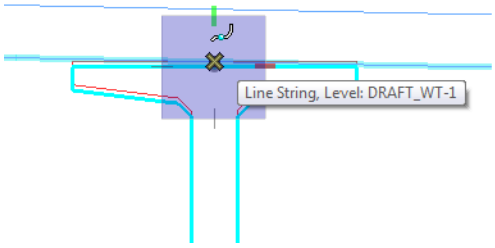


By pressing **<Enter>** you "smartlock" the ***AccuDraw X*** and ***Z*** axes, so that you can only move in the ***Y*** direction.

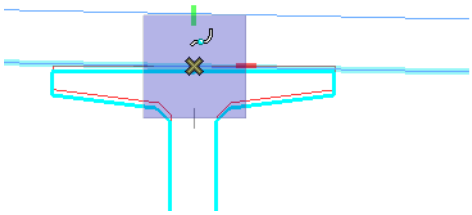


5. Press ***N*** on the keyboard for the ***Nearest*** snap mode.

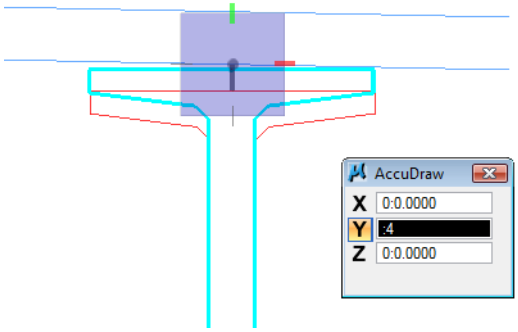
6. ***Hover over*** (do not data point) at the nearest snap point on the bottom slab line.



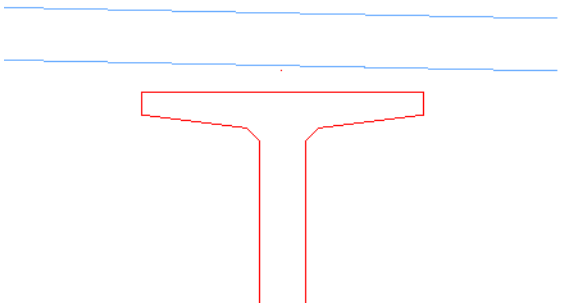
7. Press the letter ***O*** on the keyboard to move the ***AccuDraw*** origin to this point.



8. Move your cursor down to establish the move direction, lock on to the ***-Y*** axis and key in ***:4*** in the ***AccuDraw Y*** field.

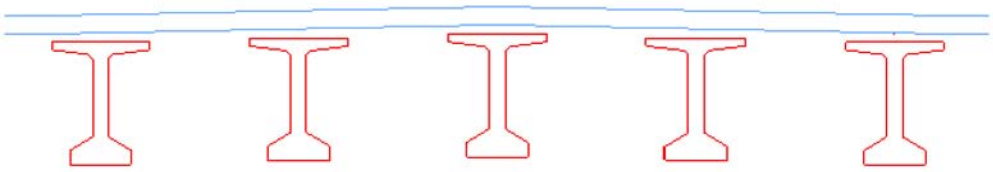


9. **<D>** to move the girder.



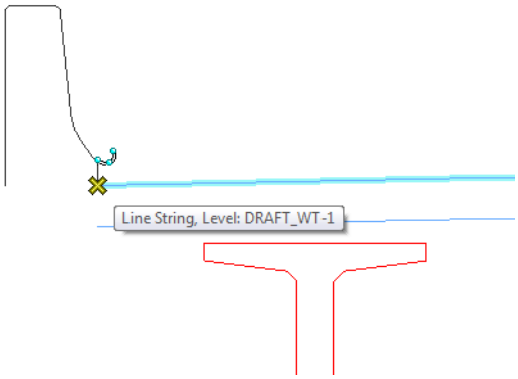
This moves the girder down 4 inches from the bottom of the slab for the correct haunch thickness.

10. Repeat the above steps to vertically move the remaining girders down 4 inches from the bottom of the slab.

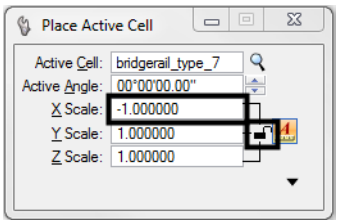


Place the Bridge Rail

1. On the CDOT menu, select the **Bridge** Group.
   - Set the ***Category*** to **Bridge Rail**
   - Select the **Rail Type 7** item
2. **AccuSnap** on the left end of the top of slab as shown.

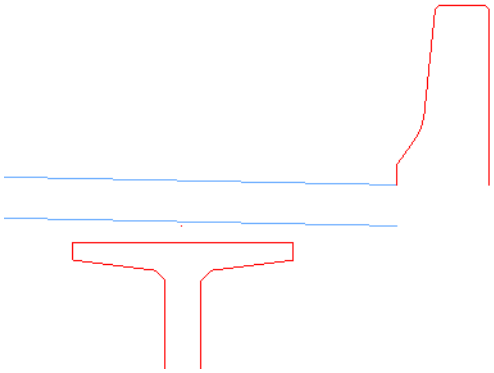


3. For the right-side rail, select the **Place Active cell** command again.
4. In the ***Tool Settings*** box, **Unlock** the ***XYZ lock*** and set the ***X*** scale to ***-1***.



Note: ***-1*** X-axis scale will mirror the cell about the X axis.

5. Place the cell as shown.

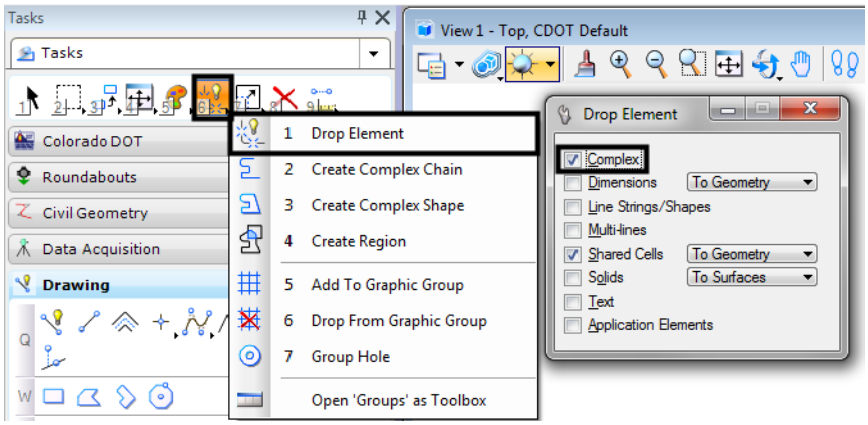


6. **<R>** when done.

Extend elements

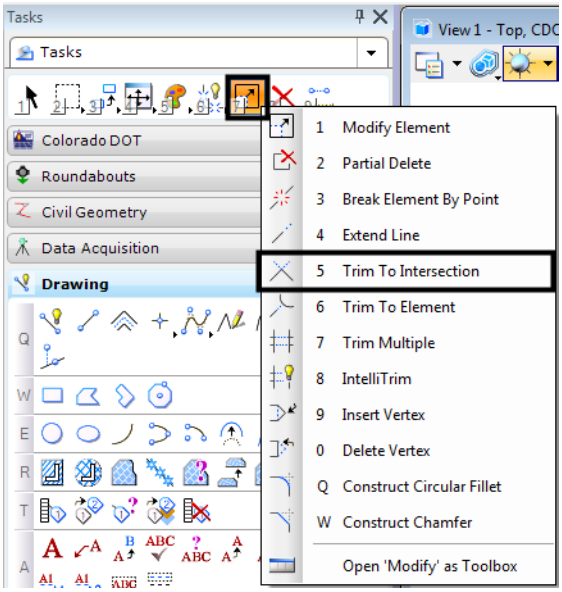
Extend the slab lines to join up with the bridge rail. To do this, you'll need to drop the bridge rail cell to its original elements.

1. Select the **Drop Element** command from the ***Main*** task toolbar.

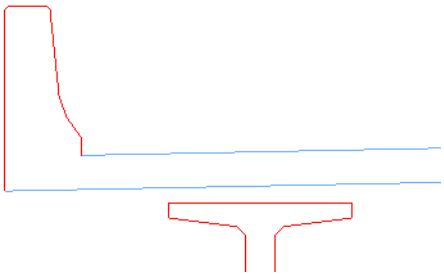


2. Toggle on **Complex** (the cell is considered a complex element).
3. **<D>** on the right-side bridge rail cell.
4. The cell is dropped to its original elements.

5. Select the **Trim to Intersection** from the ***Main*** task toolbar.



6. **<D>** on the bottom slab line and then **<D>** on the back of rail line to extend these elements.

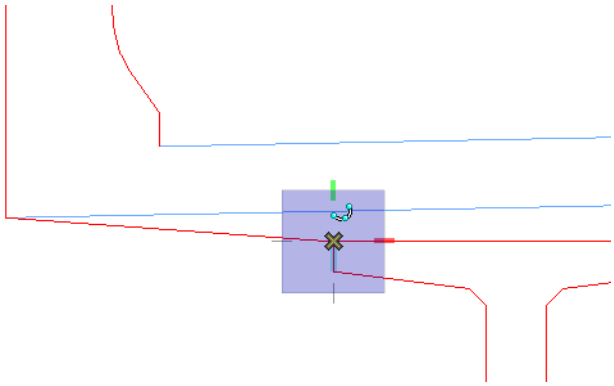


7. Repeat the above steps for the right side.

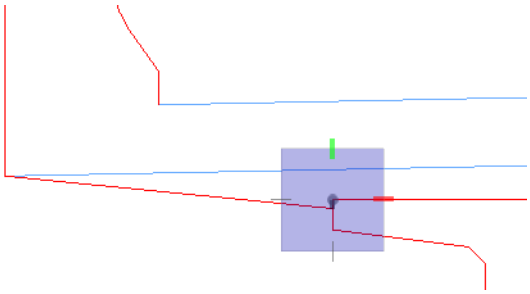
Draw the slab

1. With the active level set to **BRIDGE_OUTLINE**, select the **Place SmartLine** tool.
2. Click in the ***AccuDraw*** window to set it active.
3. Starting on the left side, **AccuSnap** on the bottom of the bridge rail.
4. You want the next point to be 1” below the left-top of the first girder. To do this, you’ll need to move the ***AccuDraw*** origin to the top of the girder and then locate 1” down.

5. Hover over the left-top of the girder as shown, click in the ***AccuDraw*** box and press the letter ***O*** on the keyboard to move the ***AccuDraw*** origin to this point.

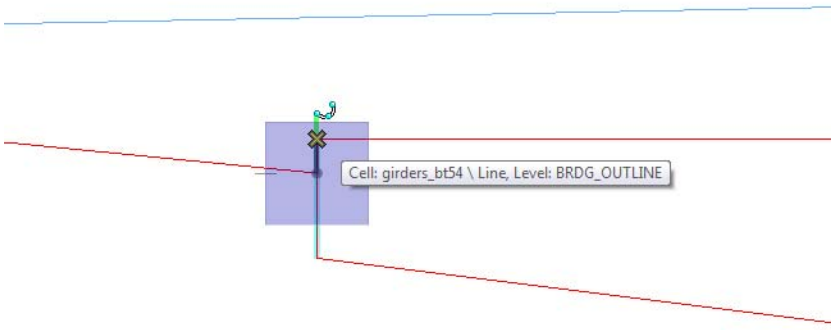


6. Move your cursor down, lock on the ***Y*** axis and key in a value of ***:1*** (1 inch).



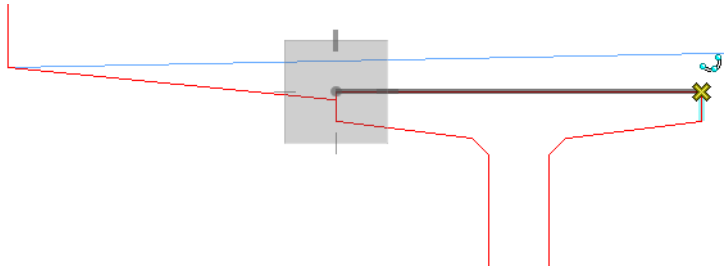
7. **<D>** to place the ***SmartLine*** segment.

8. **AccuSnap** on the left-top of the girder as shown.

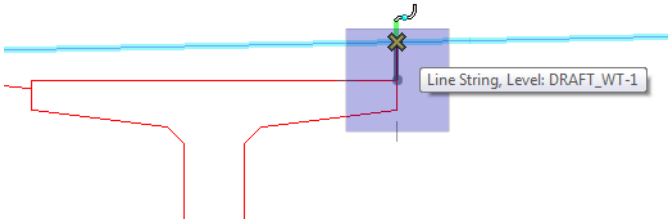


Note: Remember, if you make a mistake, **Undo** the last data point, don't reset out of the SmartLine command.

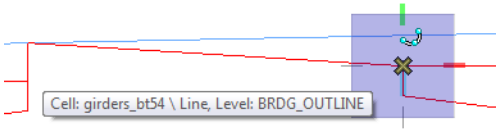
9. **AccuSnap** on the right-top of the girder as shown.



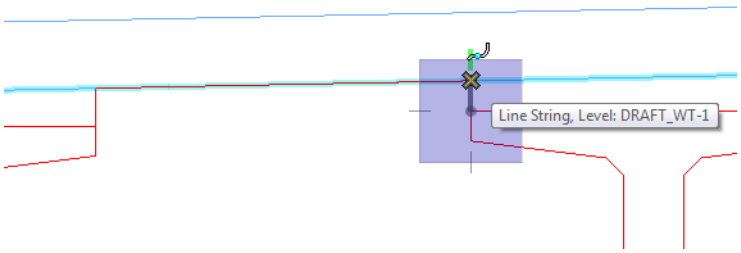
10. Move your cursor up, lock on to the ***Y*** axis and press **<Enter>** to smartlock the axis. You can now only move in the ***Y*** direction.
11. Press ***N*** on the keyboard for the nearest snap point.



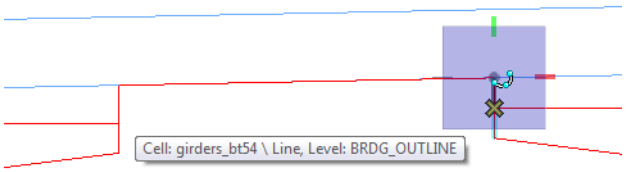
12. **<D>** on the bottom slab line as shown.
13. ***Hover*** over the next girder's top-left endpoint as shown.



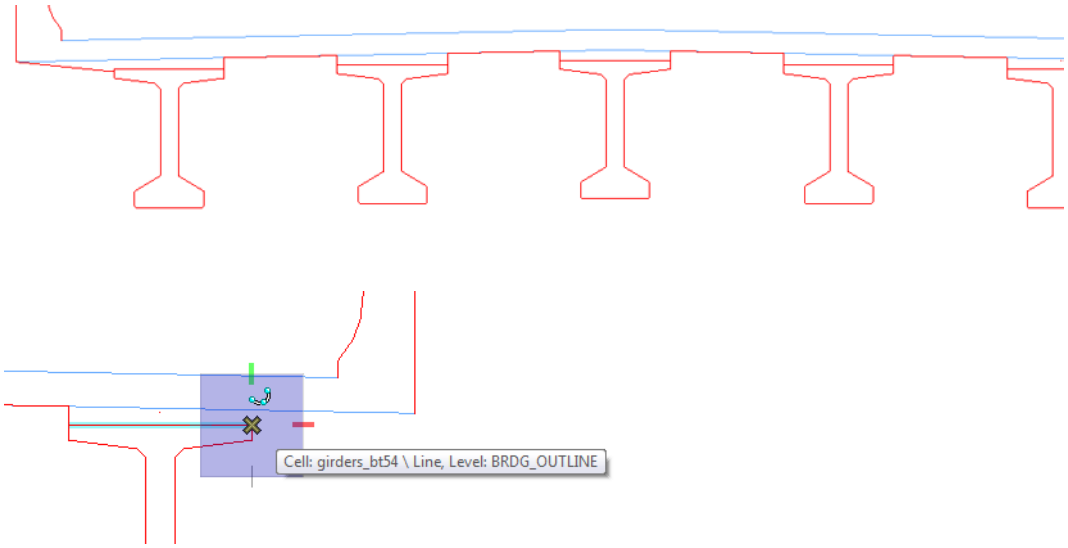
14. Press ***O*** on the keyboard to move the ***AccuDraw*** origin to this point (do not data point).
15. Move your cursor up, lock on to the ***Y*** axis, and press **<Enter>** to smartlock the axis.
16. Press ***N*** for the nearest snap point.
17. **<D>** on the bottom slab line as shown.



18. **<D>** on the top left girder edge as shown.



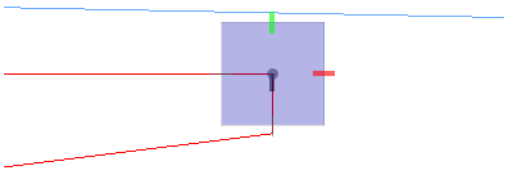
19. Continue these steps on each girder to place ***SmartLine*** segments as shown until you get to the last girder location shown below.



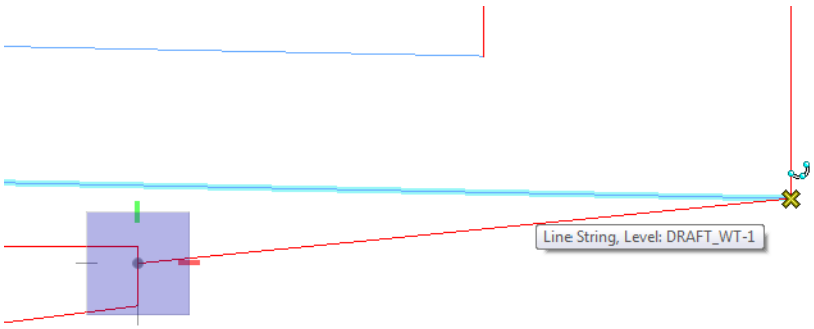
Remember to **Undo**, not reset, if you make a mistake on a segment.

20. On the last girder (far right), move your cursor down, lock on to the ***Y*** axis and key in a Y value of ***:1*** (1 inch).

21. **<D>** to place the point.

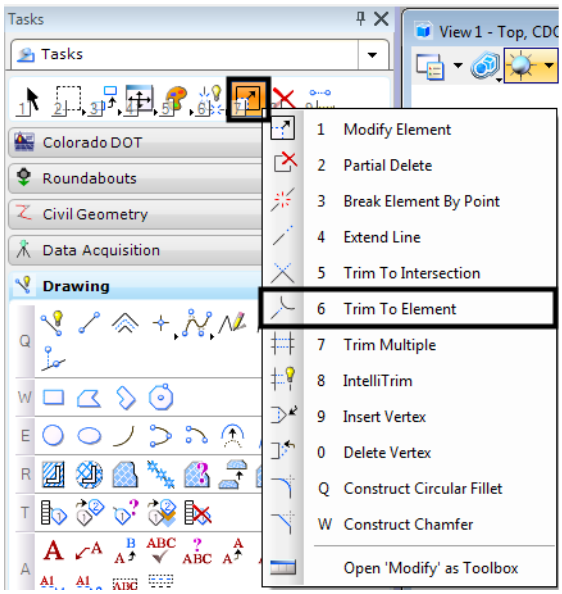


22. **<D>** on the right end of the bottom slab line.

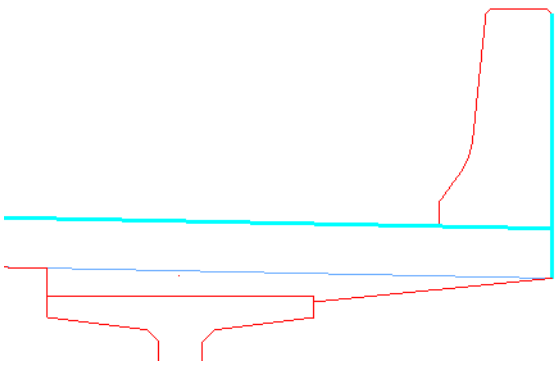


23. **<R>** out of the ***Place SmartLine*** command.

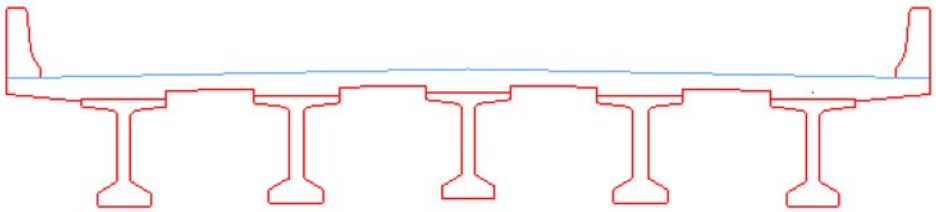
24. Select the **Trim to Element** tool from the ***Main*** task toolbar.



25. **<D>** on the blue top of slab line and then **<D>** on the back of bridge rail line to extend these elements.



26. Repeat for the left side.
27. **Delete** the blue bottom of slab lines.
28. Fit the view.

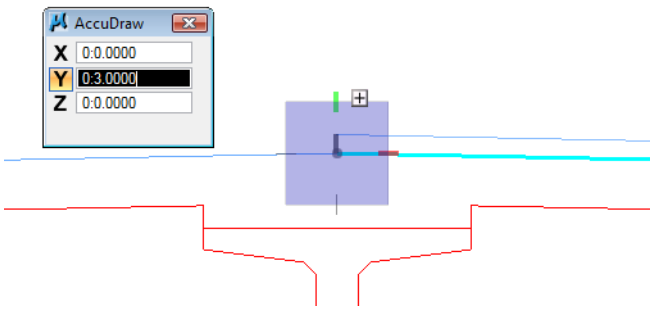


Create the top of pavement

1. **Fit** the view.
2. Select the **Copy** command.
3. **<D>** on the right-side top slab line (blue construction line) at the crown point to select it for copying.

   Note: If you select the bridge slab shape (red element), **<R>** until the top slab line highlights.

4. Move your cursor up and lock-in on AccuDraw's ***Y*** axis.
5. In **AccuDraw**, key in a ***Y*** value of ***:3*** (3 inches).



6. **<D>** to copy the top slab line.
7. Repeat for the left side.

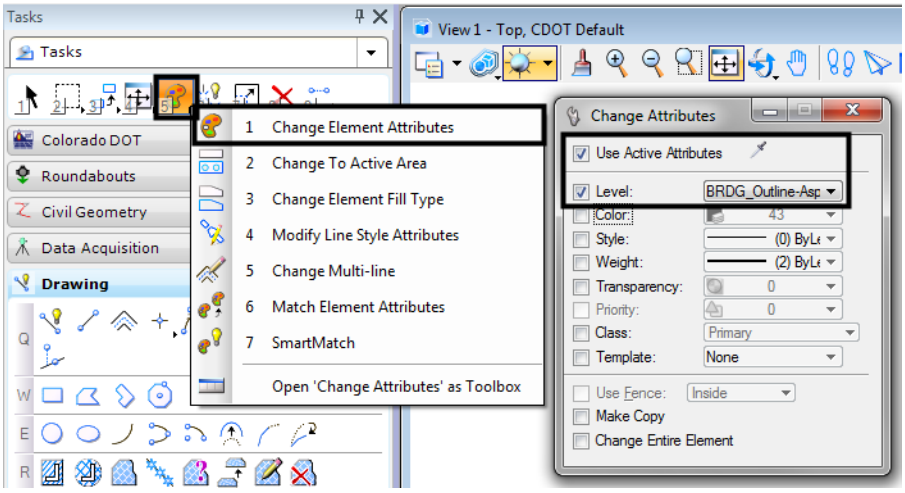
   Note: You can move your cursor up and lock in on the last distance tic mark of 3 inches, eliminating the need to key in the Y value.

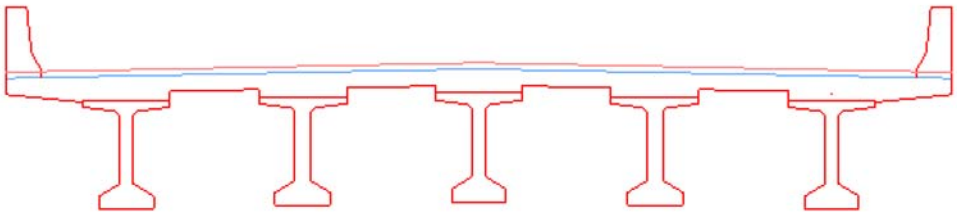
8. On the CDOT menu, select the **Bridge** Group.

- Set the ***Category*** to **Bridge Levels**
- Set the ***Type*** to **Outline**
- Select the **Outline-Asphalt** item

This sets the active level to the asphalt level.

9. Change the top of pavement lines to the active asphalt level.

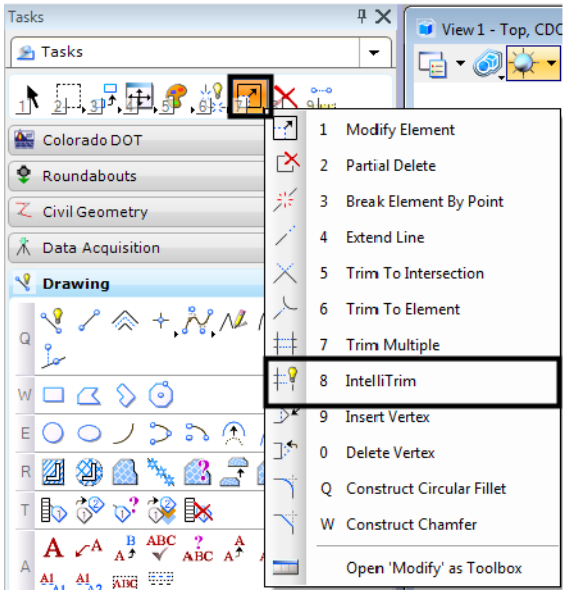




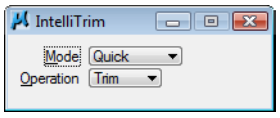
Clean-up lines at the rails

You now need to trim the top of pavement lines that run through the bridge rails, as well as the bottom of the rail that extends below the top of slab.

1. Select the **IntelliTrim** command from the ***Main*** task toolbar.

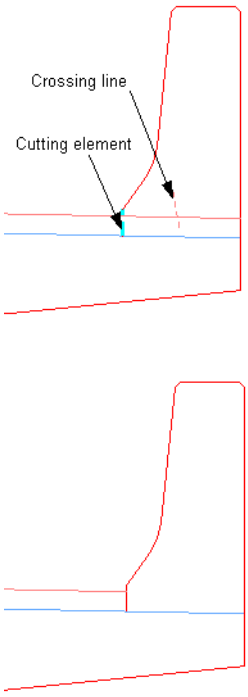


2. Set the ***Mode*** to **Quick** and the ***Operation*** to **Trim**.



3. **<D>** on the vertical edge of the rail to select it as the cutting element, as shown below.

4. Draw a ***crossing line*** on the top of pavement line inside the rail as the portion to trim.

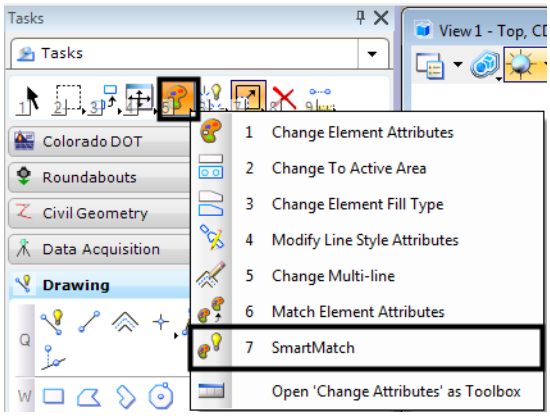


5. Repeat the above steps for the left-side rail.

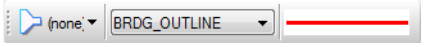
Lab 11.3 - Complete the Bridge Rail Graphics

Since you dropped the bridge rail cell to trim the graphics it is no longer one entity. Instead it was dropped to individual lines. You will now group the lines into a complex chain.

1. Select the **SmartMatch** command and **<D>** on any red bridge line to match it.

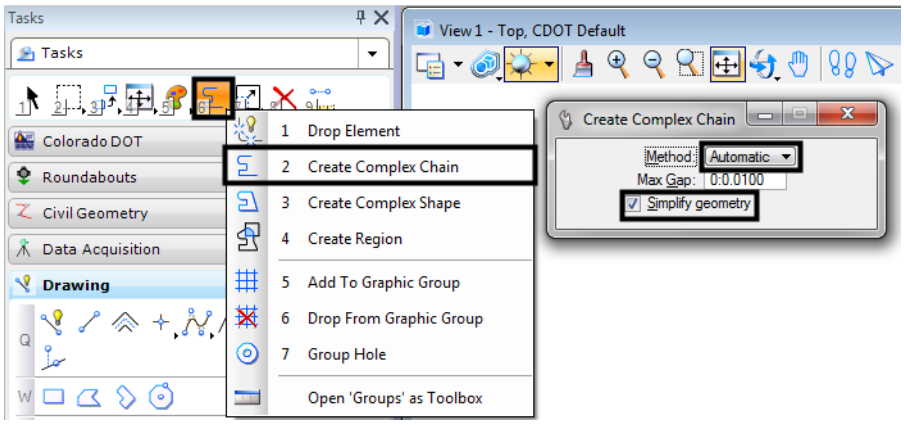


This sets the active level to ***Bridge_Outline*** to match the slab.

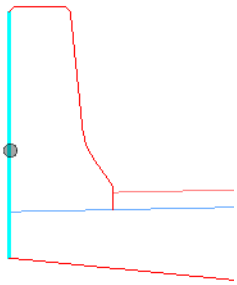


2. Select **Create Complex Chain** from the ***Groups*** toolbar.
3. Set the ***Method*** to **Automatic** and toggle on **Simplify Geometry**.

   Note: With the ***Automatic*** method, you do not have to individually identify each element to add to the complex chain. The elements are found automatically within a maximum gap range. ***Simplify geometry*** will make the new element a ***SmartLine*** instead of a complex element.

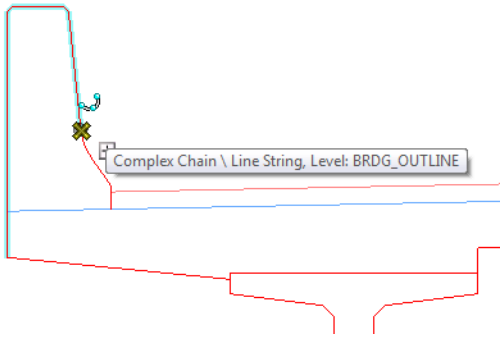


4. **<D>** on the first segment of the bridge rail as shown.

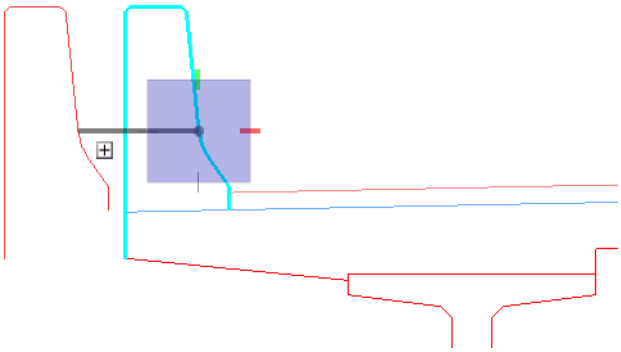


5. **<D>** anywhere above this element to define the direction for adding elements. The remaining bridge rail elements are added to the chain and placed on the active ***Bridge_Outline*** level.
6. **<D>** to accept.
7. Repeat for bridge rail on other side of bridge.

Note: With some MicroStation commands (like the ***Complex Chain*** command), if you hover over the complex element it will still show you the individual elements that make up the chain. However, notice that pop-up information tells you it really is a complex chain. When you use the ***Copy*** command in the next step, you'll see the chained elements behave as one element.



8. Select the **Copy** command from the ***Primary*** toolbar and copy the bridge rail to a clear area of the design file.



The individual graphics are now chained together into one element.

9. **Undo** the copy.

Note: You can use the ***Create Complex Shape*** in a similar fashion to create closed shapes from individual graphics.

Lab 11.4 - Create a Selection Set of the Bridge Section

1. **Fit** the view.
2. Choose the **Element Selection** tool from the ***Main*** task toolbar.
3. Hold down the data button **<D>** and drag across the bridge section (corner to opposite corner). Be sure to include all of the section graphics in this area.

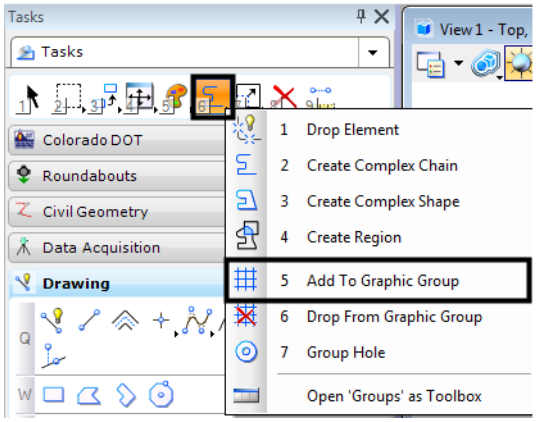
Note: The elements are added to the selection set and are highlighted purple (the selection set color). To change the color, choose **Settings > Design File > Color > Selection Set Color**. The lower right corner of the status bar shows how many elements are now in the selection set.

4. **<D>** in the center of the typical section, hold down the data button and drag the selection set to a new location in the file.
5. Drag the selection set back to its original location.
6. **<D>** anywhere in a clear area of your design file to remove the selection set.

Note: The selection set is a temporary group of graphics until you drop the set.

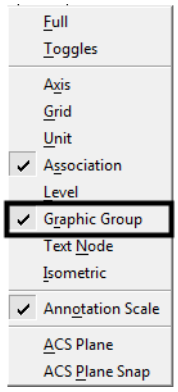
Lab 11.5 - Create a Graphic Group of the Bridge Section

1. Use the **Element Selection** tool and place the bridge typical section graphics into a selection set again.
2. From the ***Main*** task toolbar, select **Add to Graphic Group**.

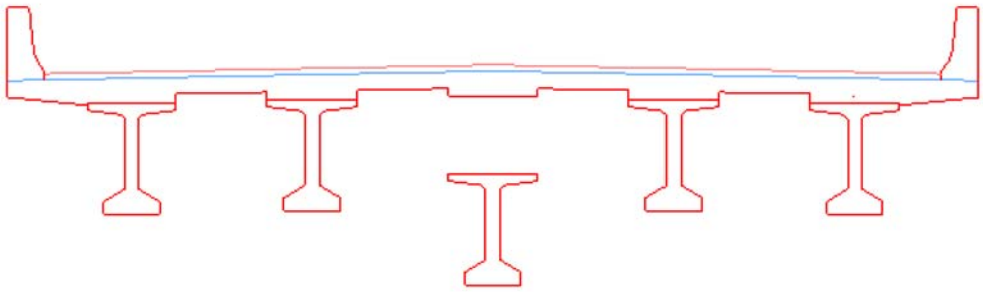


3. **<D>** to accept the selection set element to add to the group.
4. **<R>** out of the command.
5. **<D>** anywhere in a clear area of your design file to remove the selection set. The elements "un-highlight" and return to their normal symbology.

6. On the status bar, check your locks and make sure ***Graphic Group lock*** is **On**.



7. Select the **Move** command.
8. **<D>** on the bridge typical section graphics. All elements in the graphic group highlight.
9. Move the graphics and a new location and **<D>** to accept. With ***Graphic Group lock*** **On**, the elements behave as a group.
10. On the status bar, turn the ***Graphic Group lock*** **Off**.
11. Select the **Move** command again.
12. **<D>** on one of the BT 54 girders. Only the girder highlights.
13. Move it to a new location and **<D>** to accept.



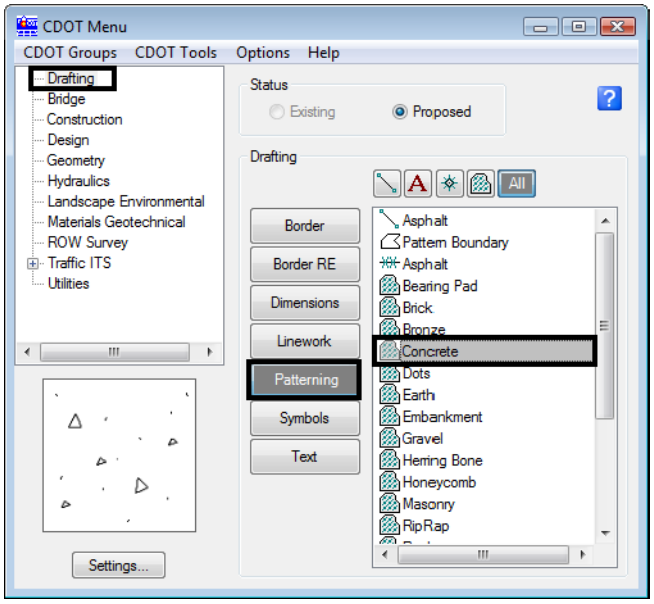
With the ***Graphic Group lock Off***, you can manipulate the individual elements in the group.

14. **Undo** the ***Move*** command on the girder.
15. Turn the ***Graphic Group lock*** back **On**.
16. Move the bridge typical section graphics back to their original location.

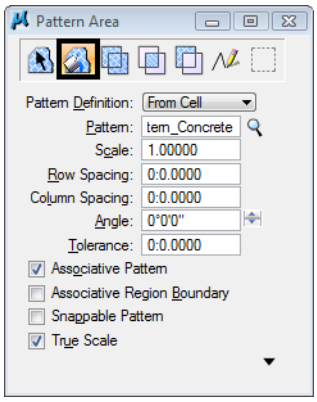
Note: When working in design model files, most InRoads graphics are displayed as graphic groups (*e.g.* contours, profiles, cross sections).

Pattern pavement and slab

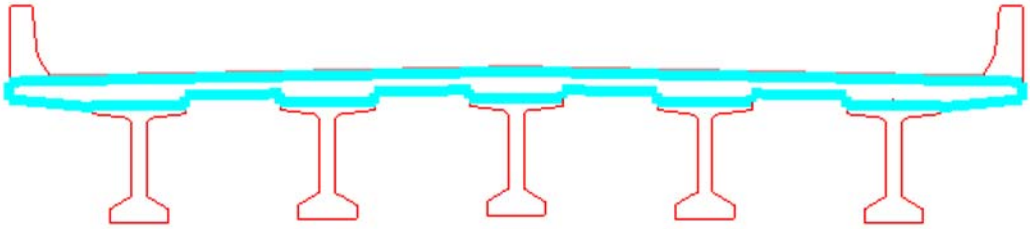
1. **Fit** the view.
2. From the **CDOT Menu** Explorer:
   - Select **Drafting**.
   - Set the ***Category*** to **Patterning**.
   - Select the **Concrete** item.



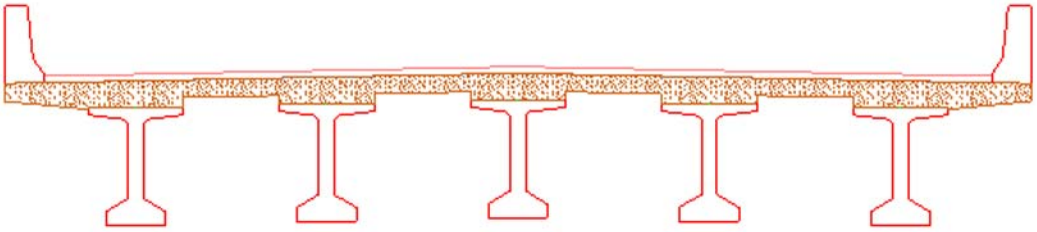
3. In the ***Pattern Area Tool Settings*** box set the ***Method*** to **Flood**, ***Active Scale*** to ***1*** and the ***Active Angle*** to ***0***.



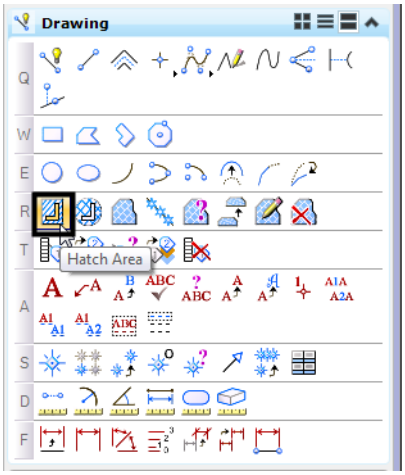
4. Make sure the entire region to flood is shown in your view. Then, **<D>** anywhere inside the bridge slab region. The region to flood with the pattern highlights.



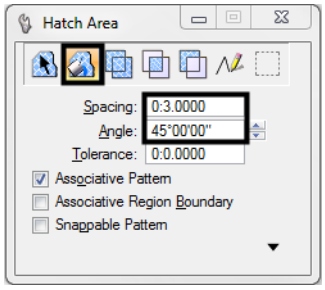
5. **<D>** to accept. The shape is patterned with the concrete cell.



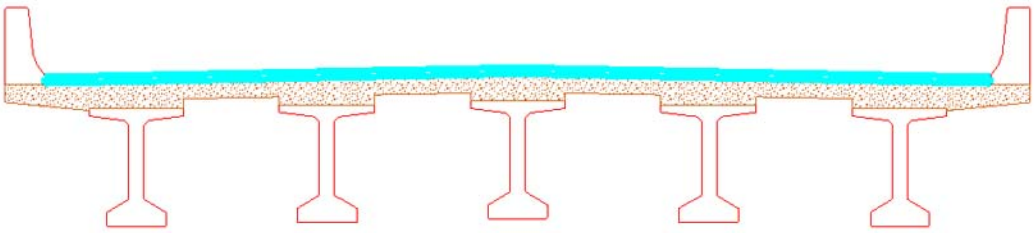
6. Select the **Hatch Area** command from the ***Patterns*** task toolbar.



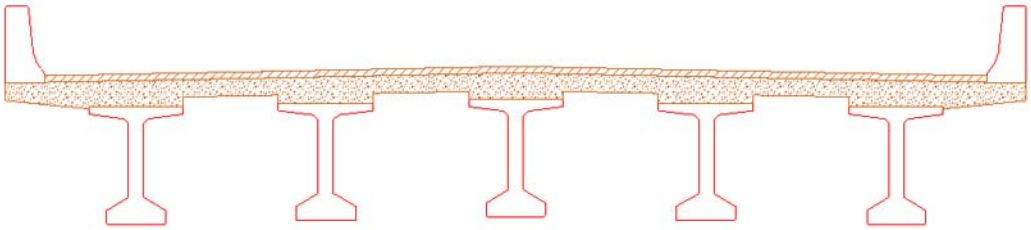
7. In ***Tool Settings***, select the **Flood** method, set ***Spacing*** to ***:3*** and the ***Angle*** to ***45***.



8. **<D>** anywhere inside the pavement area. A dynamic display shows the flooded area.



9. **<D>** to accept. The region is flooded with the hatch pattern.



10. **Save Settings**.
11. **Exit** MicroStation.

LAB 12 - Create a Plan/Profile Sheet for the Intersection

Several plan/profile sheets have already been created using the InRoads ***Plan/Profile Generator.*** However, there are times when you need to create special plan or plan/profile sheets not created by the ***Generator***. In this lab, you'll create a plan/profile sheet for the side road that runs through the intersection.

Chapter Objectives:

After completing this exercise you will know how to:

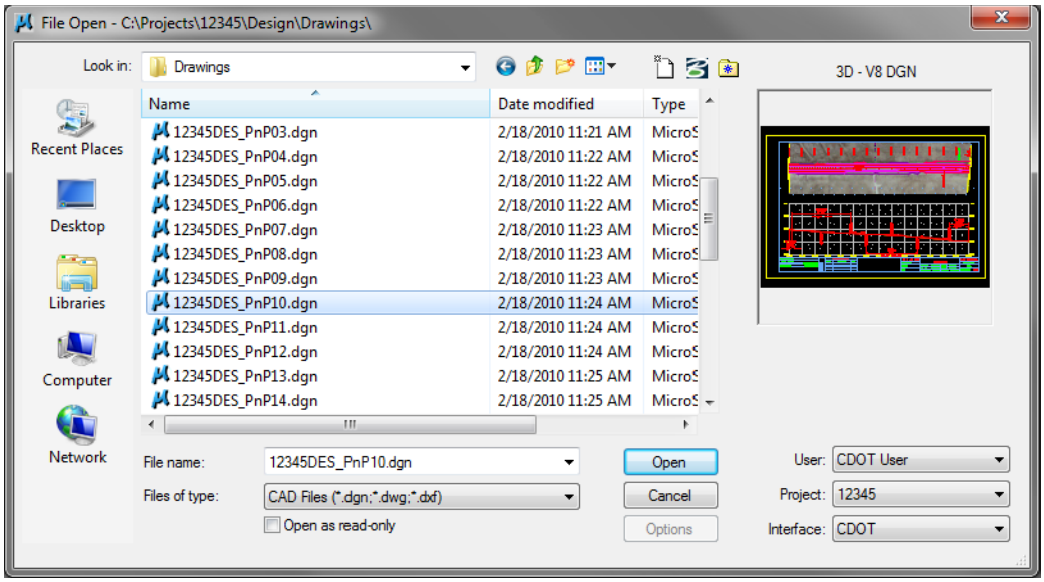
- Create a sheet file using a generic project file.
- Attach model files coincident-world
- Attach model files as saved views.
- Rotate the view to horizontal
- Use the CDOT Menu to place a border and associated information (bar scale, north arrow, region cell, etc.)
- Use the CDOT Menu to place a clipping boundary.
- Clip references
- Work with reference levels.
- Move references

Lab 12.1 - Review Plan/Profile Sheets

Review the Plan/Profile sheets for this project previously created by the InRoads ***Plan/Profile Generator***.

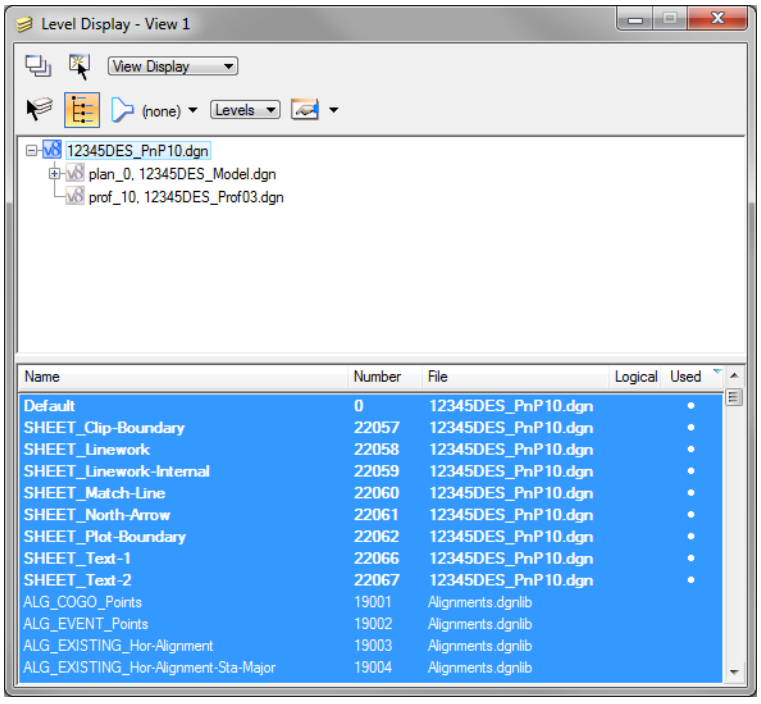
1. Start MicroStation.

2. In the MicroStation Manager, open **12345DES_PnP10.dgn** from the project's …**Design\Drawings** folder.



The ***InRoads Plan/Profile Generator*** automates the creation of sheet files along the mainline alignment. This includes rotating the plan-view to horizontal, placing the corresponding profile, placing the border, north arrow and match lines. MicroStation references are used to bring in plan and profile graphics to the active sheet file.

3. Use **Level Display** to review the reference levels on which plan and profile graphics are placed in the sheet file.



Note: Only levels with graphics in the sheet file are sheet levels for the border, match line, north arrow, *etc*.

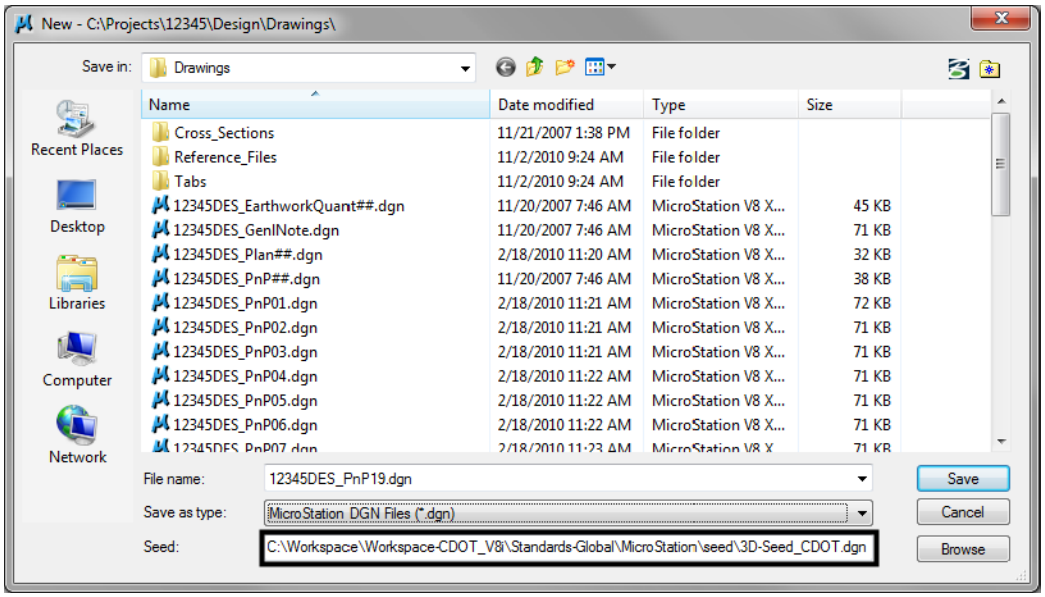
4. Open other plan/profile sheets, as desired, from the ***Drawings*** folder and review the sheets.

Lab 12.2 - Create a New Sheet File

Since the ***InRoads Plan/Profile Generator*** did not create a sheet for the county cross road at the intersection, you'll create this P&P sheet file manually.

5. Select **File > New**.
6. Set the directory to the project's ***\Design\Drawings*** folder.
7. In the New box, make sure that the seed file is set to ***3D-Seed_CDOT.dgn***. If not, pick the **Browse** button and then select this file. Key in the name ***12345DES_PnP19.dgn***.

   Nineteen is the next number in the plan/profile set of sheets.

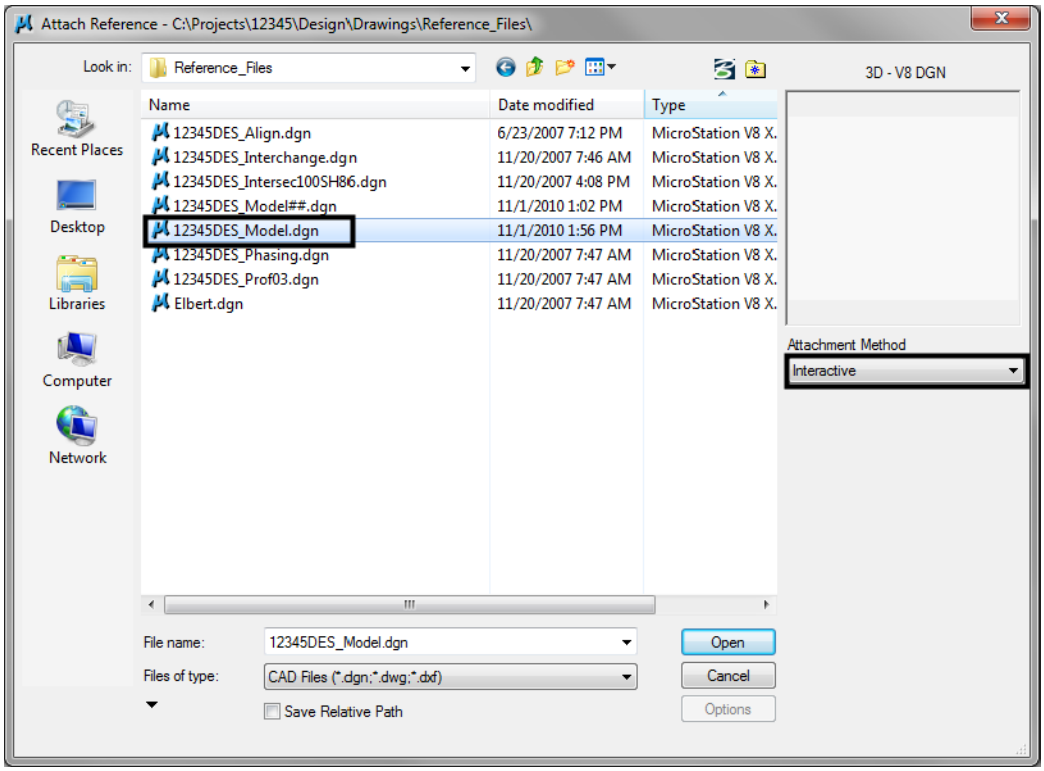


8. Select **Save** to create the file.

Lab 12.3 - Attach the Model file

9. Select the **Reference** icon from the ***Primary Tools*** toolbar.
10. In the ***References*** dialog box, select **Tools > Attach**.

11. Use the Directory pull-down menu and select the ***C:\Projects\12345\Design\Drawings\Reference_Files*** folder and select the file ***12345DES_Model.dgn***

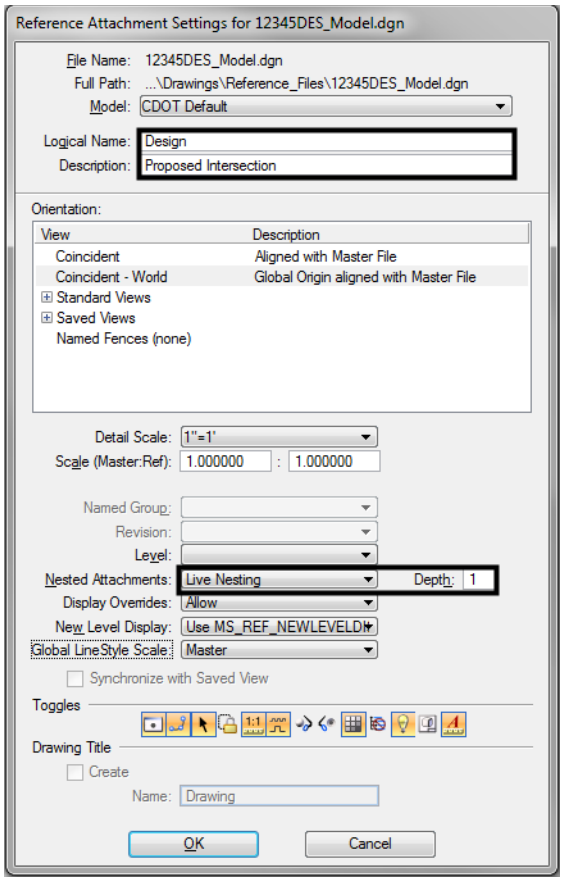


12. Verify the ***Attachment Method*** is set to ***Interactive***. Select **OK**.

13. In the ***Reference Attachment Settings*** box:

- Key in a logical name of ***Design*** and ***Proposed Intersection*** for a description.
- Verify that ***Orientation*** is set to **Coincident-World** and the ***Scale*** is set at ***1:1***
- Set ***Nested Attachment*** to **Live Nesting** and set ***Depth*** to ***1***.
- Set ***Global Linestyle Scale*** to **Master**

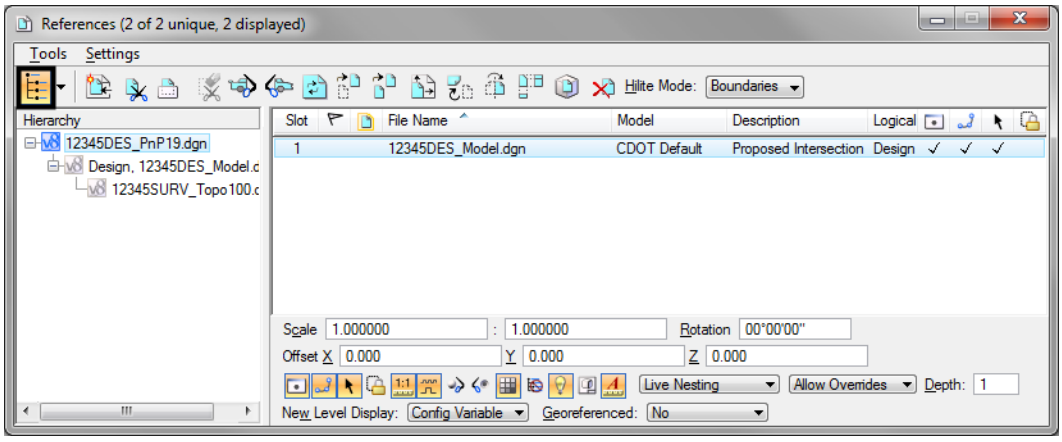
- Turn ***off*** **Display Raster References**.



14. Select **OK**.

Note: The ***Coincident World*** option ensures that references are attached with their true coordinate information. A scale factor of ***1:1*** ensures that plan graphics are referenced in actual size. These two options allow plan sheet graphics to maintain their true model coordinates and size.

15. Turn on the **Show Hierarchy** to expand the hierarchy list.



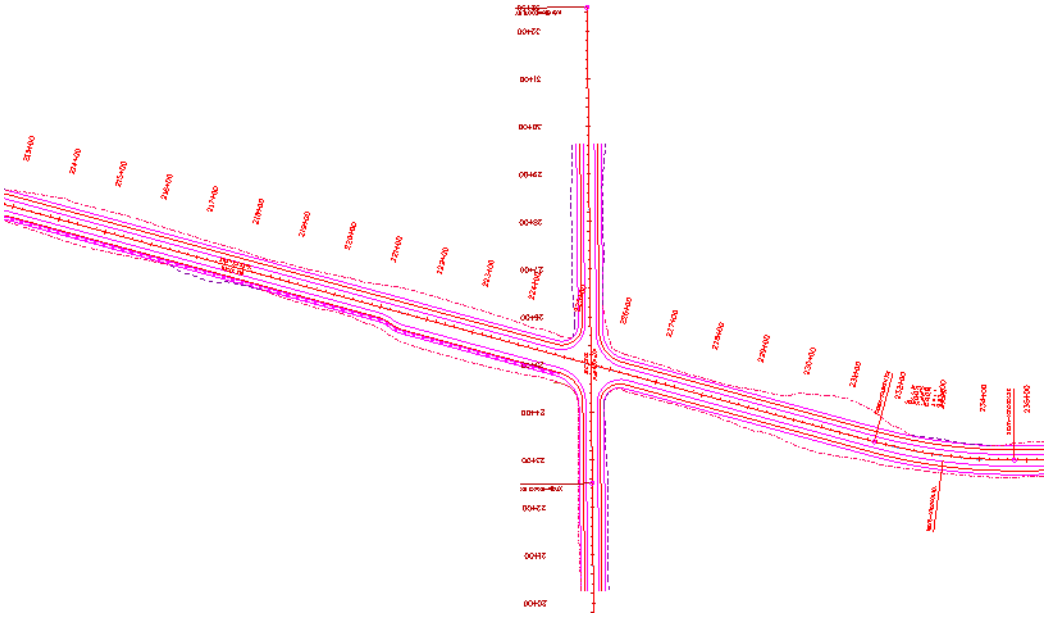
Note: Note that with nested references, the Survey/Topo reference is nested below the Design model file. You can typically reference model files as nested to sheet files instead of using the ***Copy Attachment*** command (as in this case, you want to show both Design and Survey/Topo graphics in the sheet file). However, if you need to control individual references in the sheet file, then use the ***Copy Attachment*** command.

16. ***Close*** the ***References*** dialog.
17. **Fit View** using the icon so all graphics are displayed.
18. Select **File > Save Settings** from the menu.

Lab 12.4 - Rotate the View Using the 3-Point Method

Rotate the view so that the side road appears horizontal in the view.

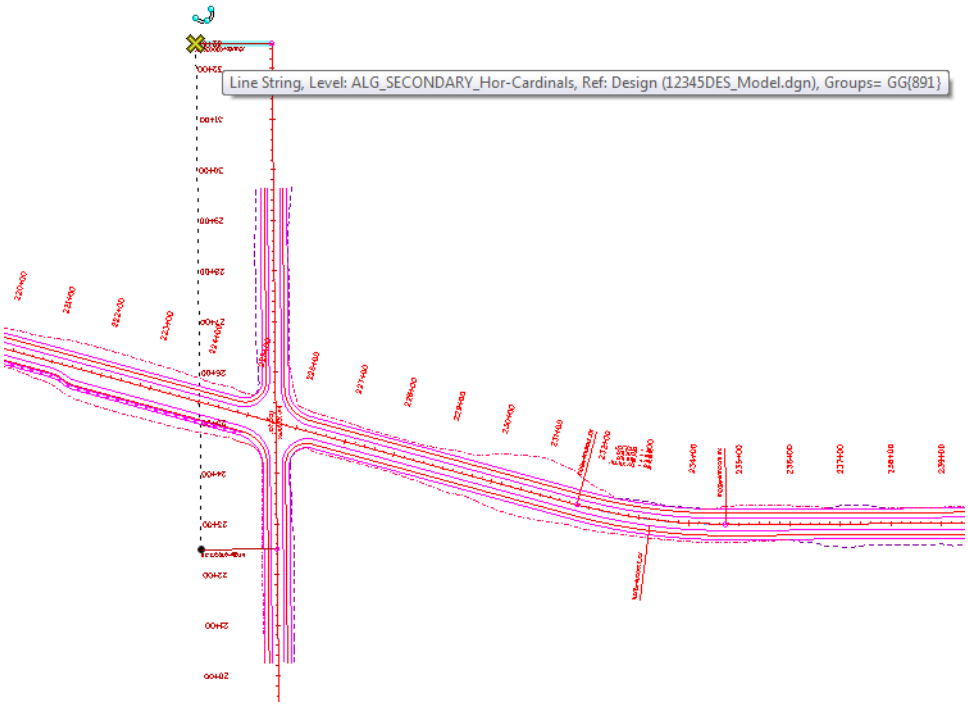
1. Window around the intersection as shown.



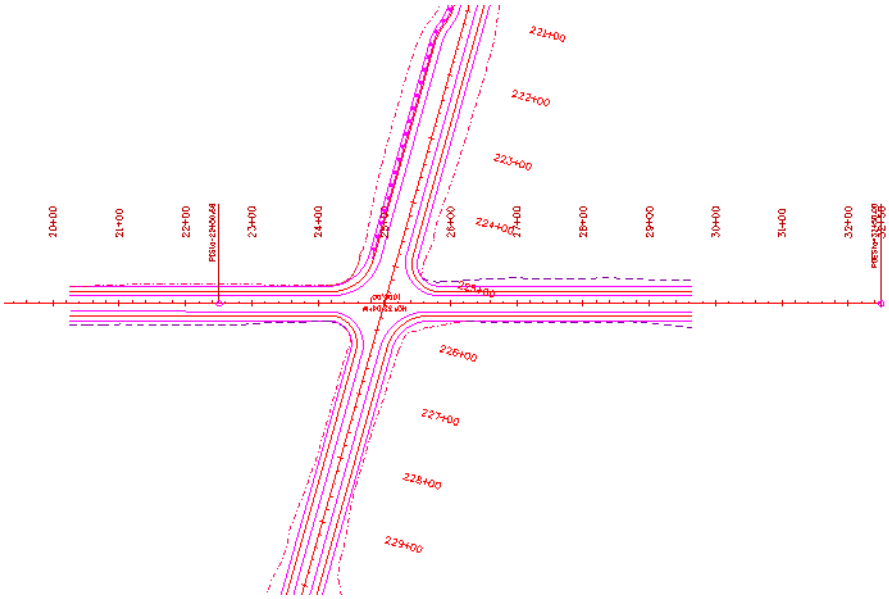
2. Select the **Rotate View** command and set the ***Method*** to **3 Points**.

3. Follow your prompts and ***AccuSnap*** on the end of the PI leader line shown.
4. For the second point (X axis of the view), ***AccuSnap*** on the POE leader line.

5. For the third point (Y direction), **<D>** anywhere to the left of the first two points.



The view is rotated so that the side road appears horizontal.

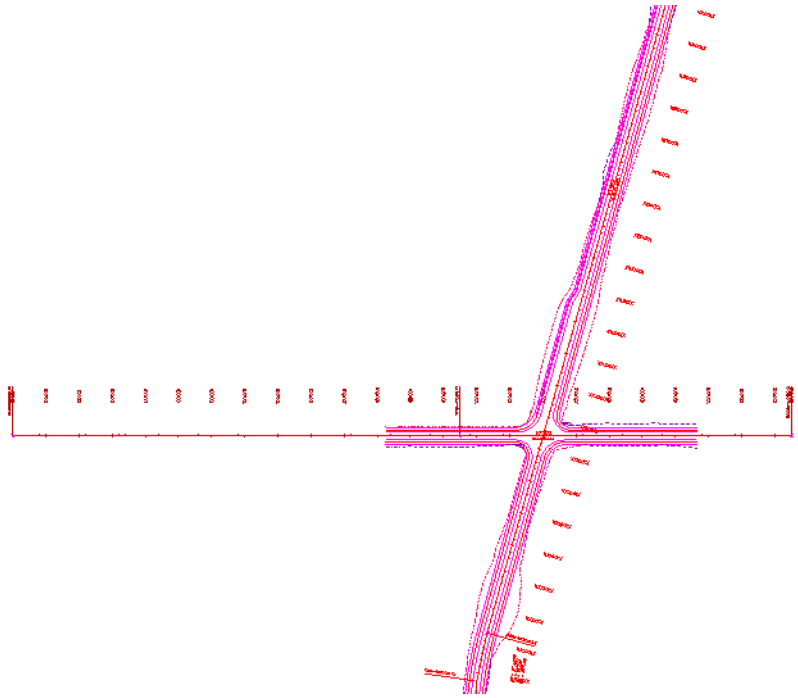


Note: Remember that you are rotating the view, not the graphics. The graphics maintain their original coordinate position in the sheet file.

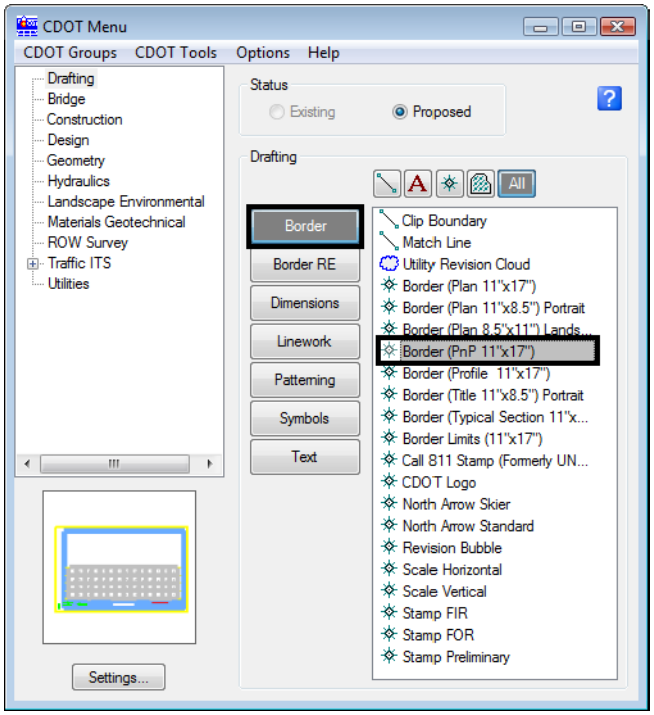
Note: The leader lines are both placed at elevation 0. If you pick points at different elevations, you'll need to first turn on Depth lock before choosing the 3-Point rotation command to avoid a skewed rotation.

Lab 12.5 - Place the Border Cell

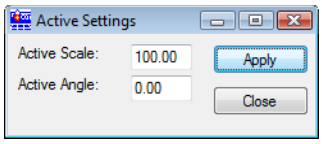
6. **Zoom out** as shown.



7. From the ***CDOT Menu*** Explorer, select **Drafting** and then select the **Border** category and choose the **Border (PnP 11"x17") Item.**



8. Select **Settings** and set ***Active Scale*** to ***100*** and ***Active Angle*** to ***0***.

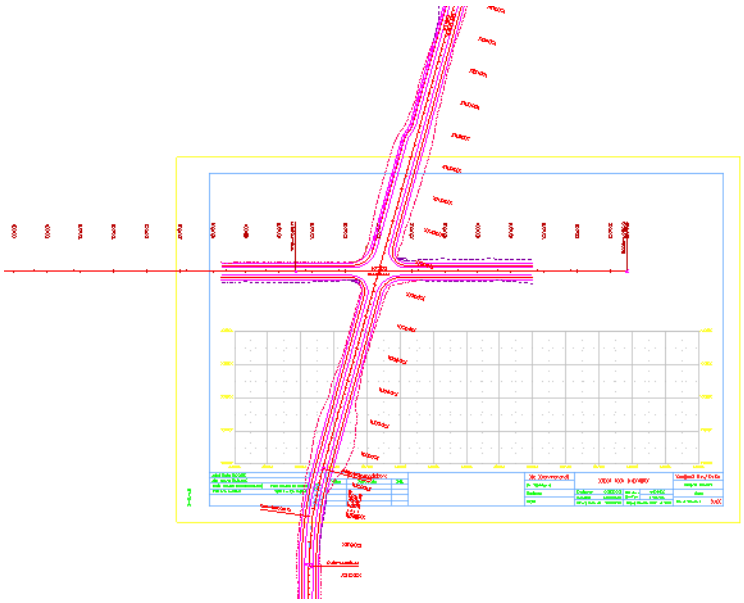


Note: Coordinate with the Region Surveyor when you are creating sheets that are not at a 1:100 scale. They will provide you with the topography and survey MicroStation files at a different scale. Otherwise, the line work and cells will not be the correct size for the print scale.

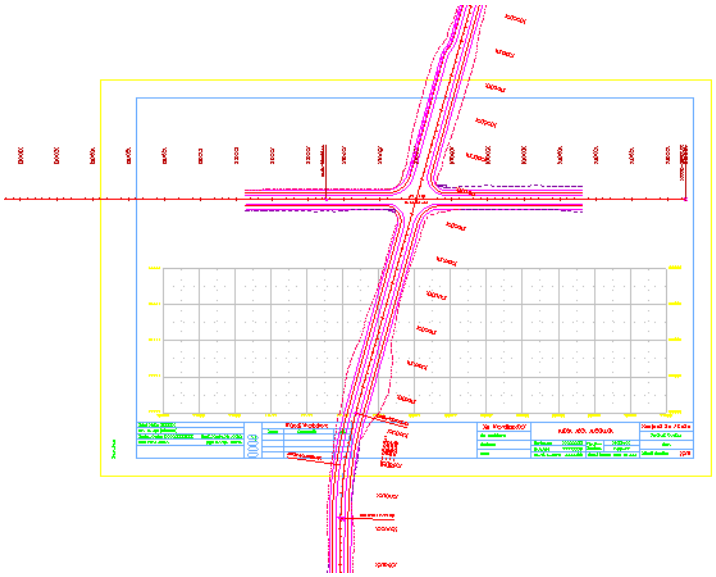
The ***Active Angle*** is view independent and not associated with view rotation. Therefore, the x-axis is always horizontal regardless of the view rotation. You will not need to set this for correct placement of the North Arrow or other cells.

9. Select **Apply** and **Close** in the ***Active Settings*** box.

10. When prompted to locate the cell origin of the sheet border, **<D>** in the approximate location shown to place it. Don't worry about an exact location – you'll move it in the next step.



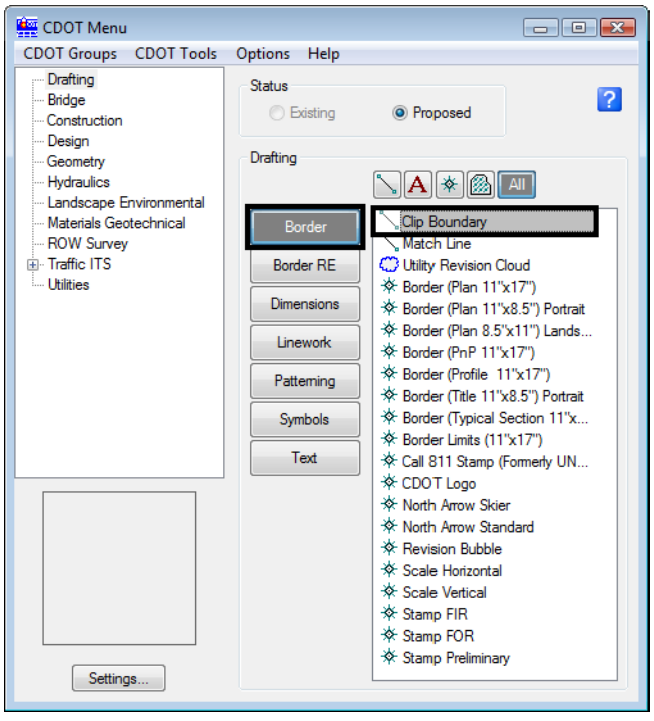
11. If necessary, use the **Move** command and move the border cell so that the intersection is centered in the upper plan portion as shown.



Lab 12.6 - Placing a Clip Boundary

1. From the CDOT Menu Explorer select **Drafting.**

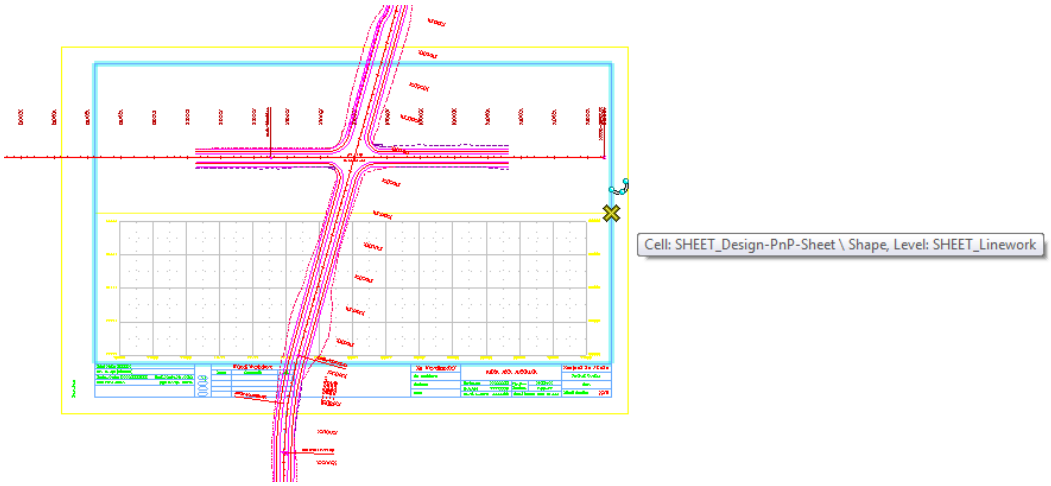
- Set the ***Category*** to **Border**
- Select the **Item Clip Boundary**
- Verify the ***SHEET_Clip-Boundary*** level is active.



Note: Since ***Plot*** is turned off for the level ***SHEET_Clip-Boundary*** in the ***Level Manager***, it will not print.

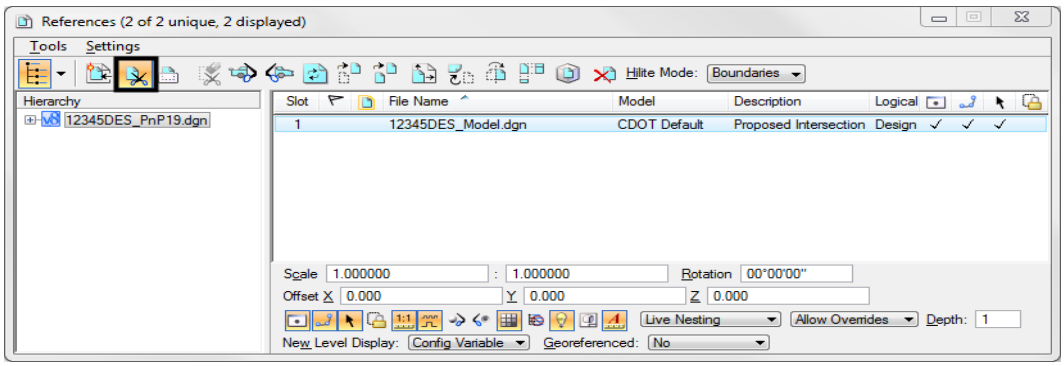
The ***Place SmartLine*** command is now automatically selected, allowing you to draw an irregular closed shape that represents your clipping boundary of the model file. However, if your clipping boundary is a rectangle, you can use the ***Place Block*** command.

2. Select the **Place Block** icon from the ***Main*** toolbar and draw the clipping boundary as shown (corner to opposite midpoint on the blue inside margin).



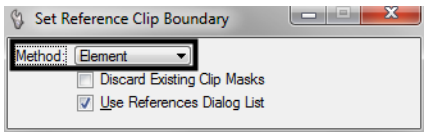
Lab 12.7 - Clip the Reference File

1. In the ***References*** dialog box, highlight the **Design** reference.
2. Select the **Clip Reference** icon.



Note: You can select more than one reference file at a time by holding the **<Shift>** or **<Control>** keys down while you are making your selection. You can clip multiple drawings in one step when they are all selected.

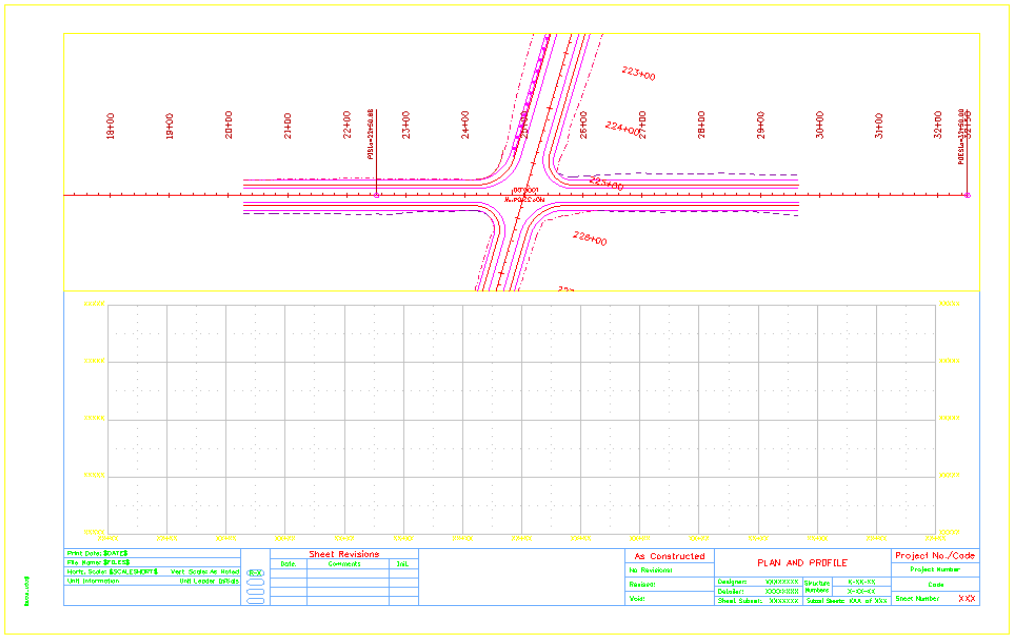
3. In the ***Tool Settings*** box, verify ***Method*** is set to **Element**.



4. When prompted to ***Identify Clipping Element***, **<D>** on the rectangular clipping boundary you just placed.

5. **<D>** to accept.

6. **Fit** the MicroStation view and **Save Settings** after clipping the reference files.



Note: Once the clipping boundary is placed, do not delete it. The clipping region of the reference file will be lost if the boundary is deleted.

In the next Chapter, you'll edit the border text to add project specific information.

Lab 12.8 - Turn Off the Profile Grid and Text

1. Open the ***Level Display*** box and turn **Off** the following levels:

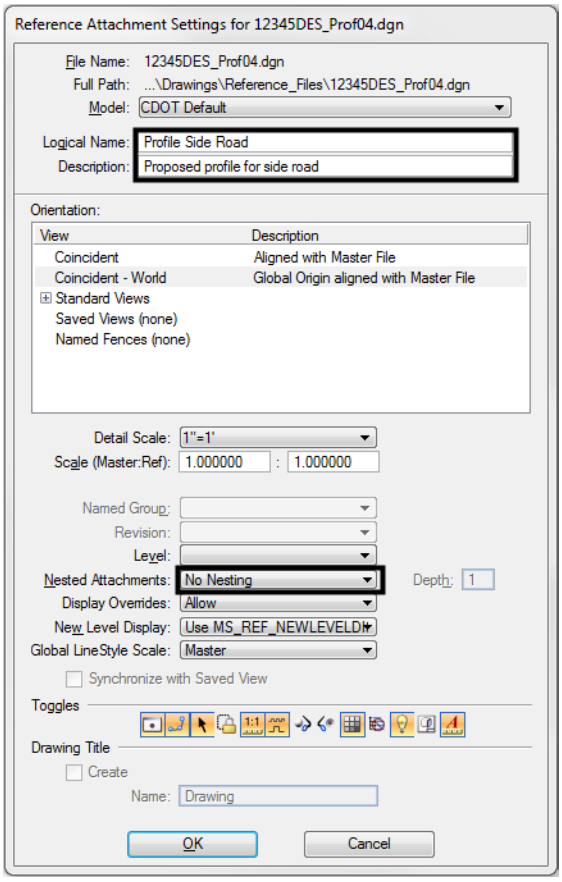
- ***SHEET_Grid***
- ***SHEET_Grid-Minor***
- ***SHEET_Grid-Text***

This turns off the border's grid for the profile. You'll use the grid provided by the InRoads profile.

Lab 12.9 - Attach the Design Profile

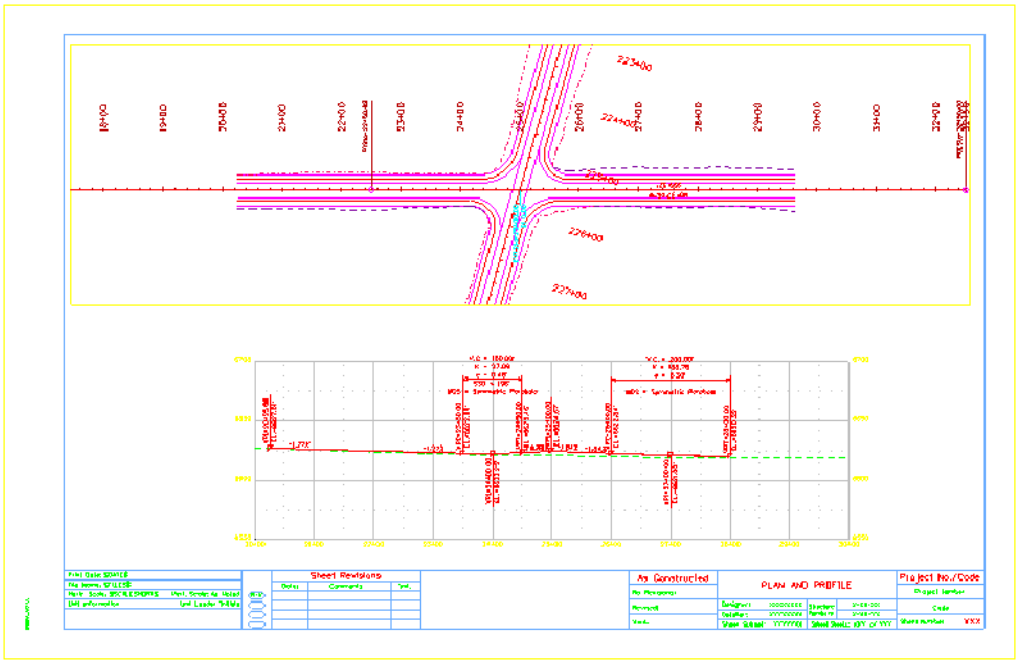
1. In the ***References*** dialog box, select **Tools > Attach**.
2. Use the **Directory** pull-down to navigate to the **C:\Projects\12345\Design\Drawings\Reference_Files** folder and select the file ***12345DES_Prof04.dgn***
3. Verify the ***Attachment Method*** is set to ***Interactive***. Select **Open**.
4. In the ***Reference Attachment Settings*** box:

- Set ***Orientation*** to **Top**
- Key in a ***Logical Name*** of ***Profile Side Road*** and ***Proposed profile for side road*** as the ***Description***.
- Set ***Scale*** to ***1:1***
- Set ***Nested Attachment*** to **No Nesting**.



5. Select **OK**.

6. The outline of the profile reference is attached to your cursor. **<D>** in the approximate location shown to place the profile.

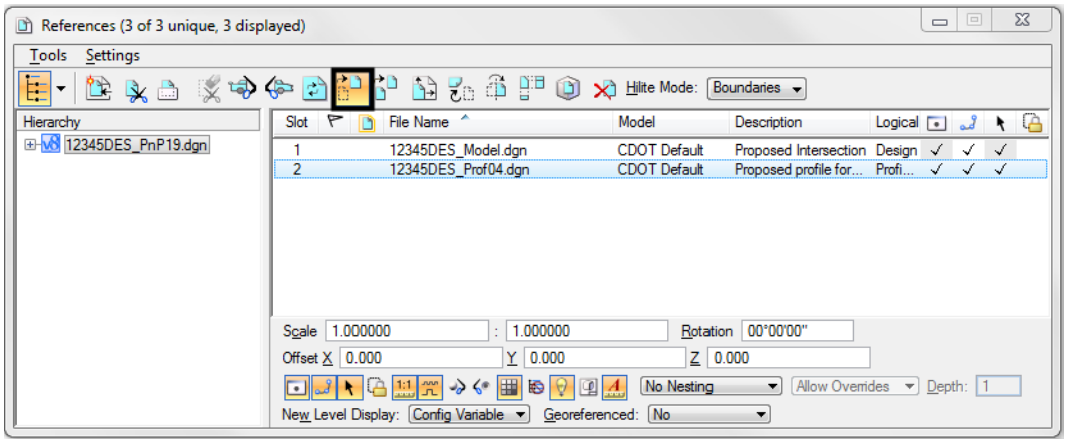


Move the profile reference

Since you attached the profile reference by a top view, it did not come in at a precise location. Next, you'll move the profile to line it up better with the plan.

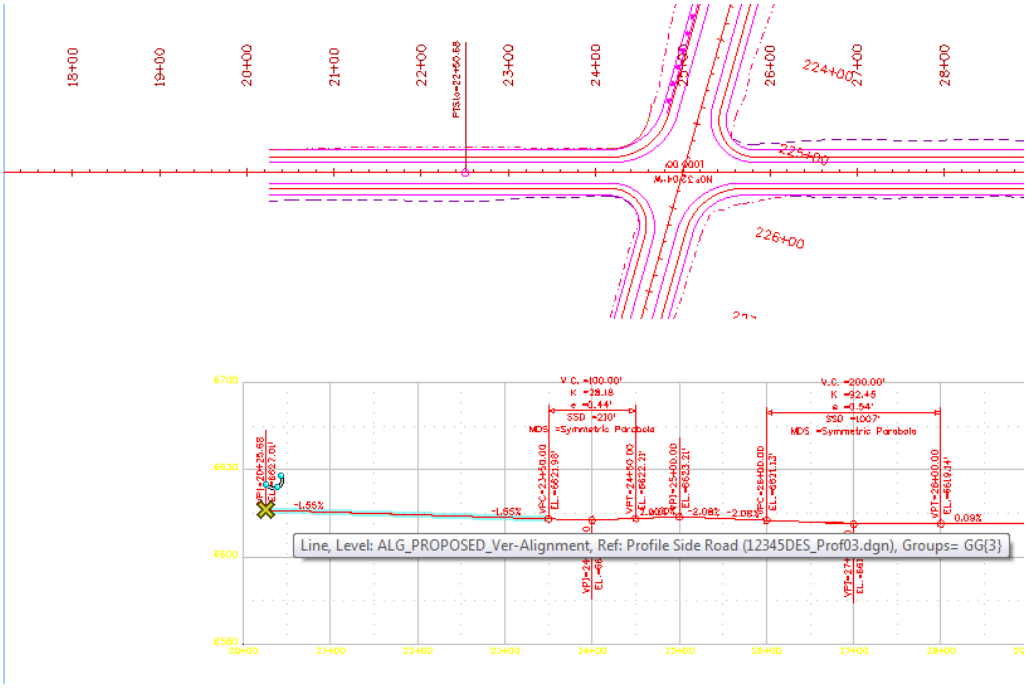
1. Turn on **AccuDraw** if it's not already on.

2. Highlight the ***Profile*** in the ***Reference*** dialog and select the **Move Reference** icon or select **Tools > Move**.

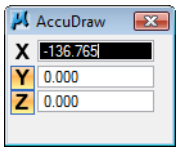


- Click into the AccuDraw window to set it active.

- Snap to the left end of the vertical alignment (the first VPI) as the Move From point.

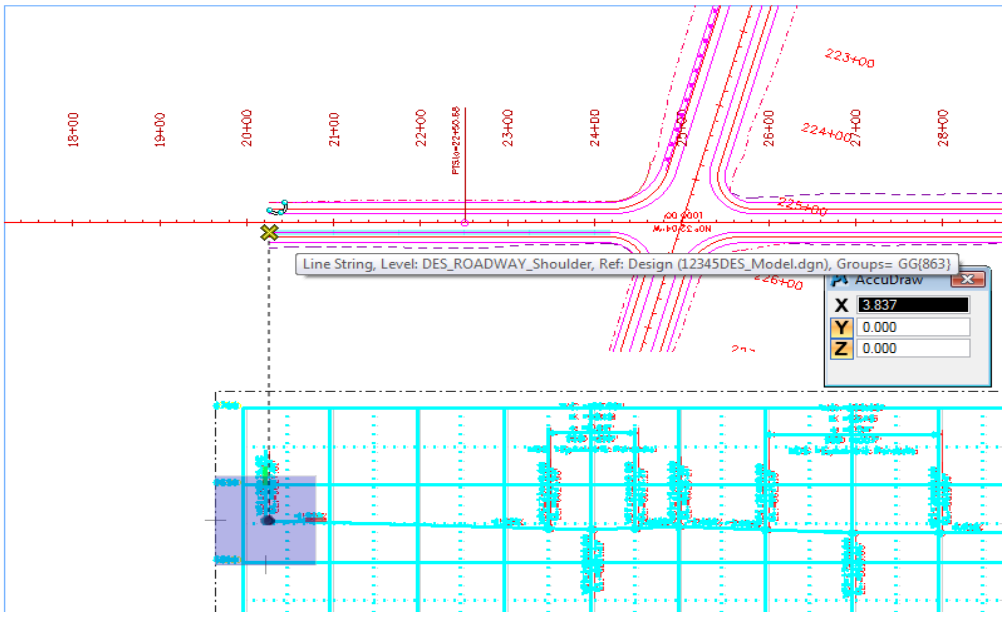


Move your cursor to the left along AccuDraw's **X** axis to set the focus (blinking cursor) in the AccuDraw **X** field, then Press **Enter**.



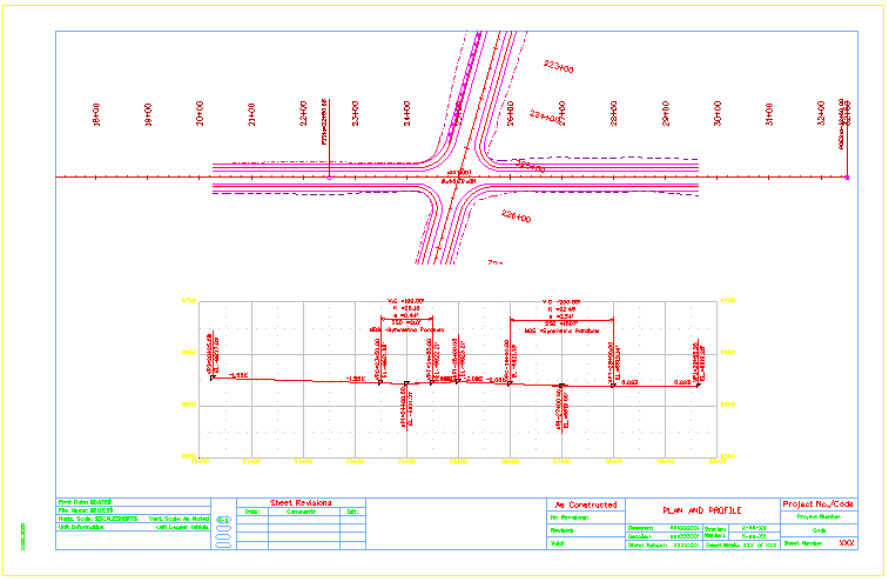
Note: The ***Enter*** key executes AccuDraw's ***SmartLock***. It locks the Y and Z axes to 0 so you can only move in the X direction.

- Move your cursor and **AccuSnap** on the end of the shoulder line as shown. You can zoom in, if needed.



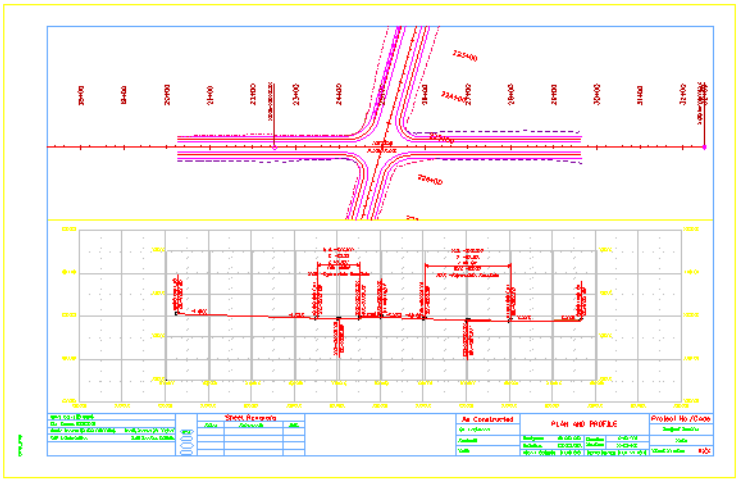
The beginning of the vertical alignment is now aligned with the beginning of the horizontal alignment.

3. **<R>** when done.
4. **Fit** the MicroStation view.

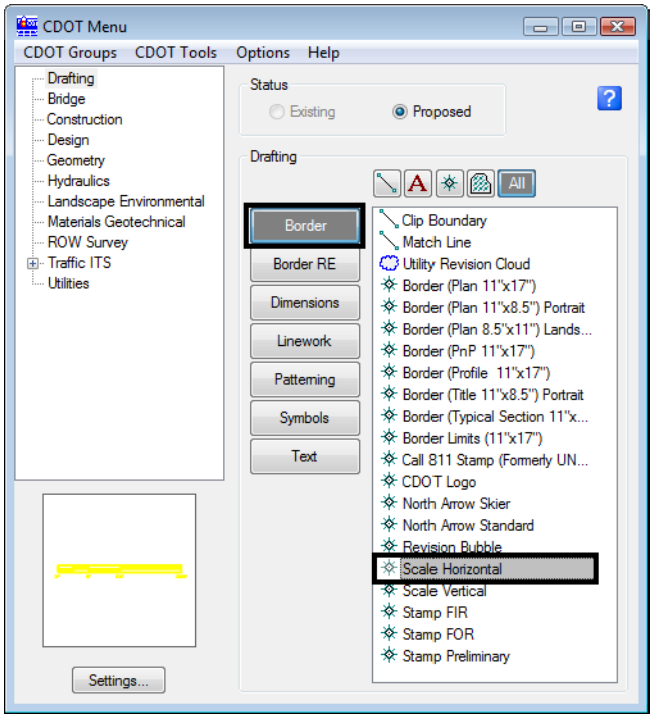


Lab 12.10 - Place the Bar Scale, North Arrow, and RE Cells

Follow the steps on the next page and use the diagram below to place the various border cells.

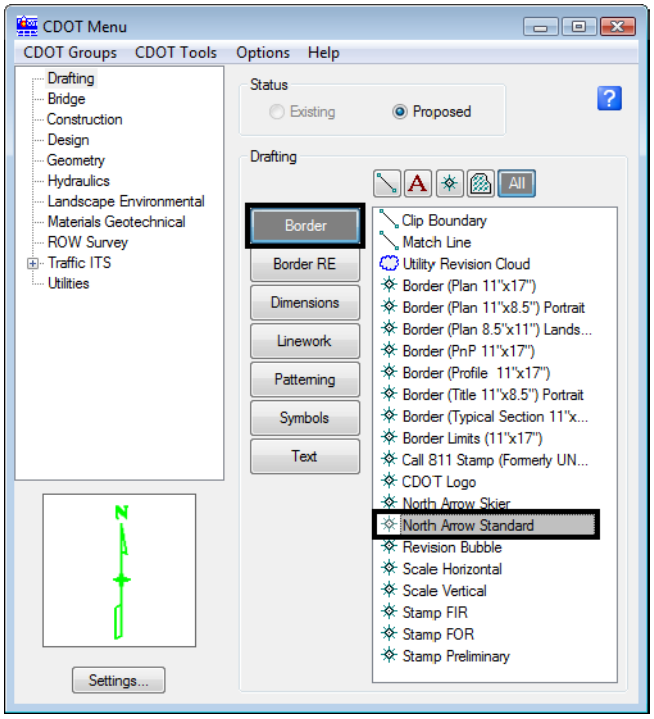


1. From the ***CDOT Menu*** Explorer, select **Drafting**. Set the ***Category*** to **Border**.
2. Select the Item **Scale Horizontal**.

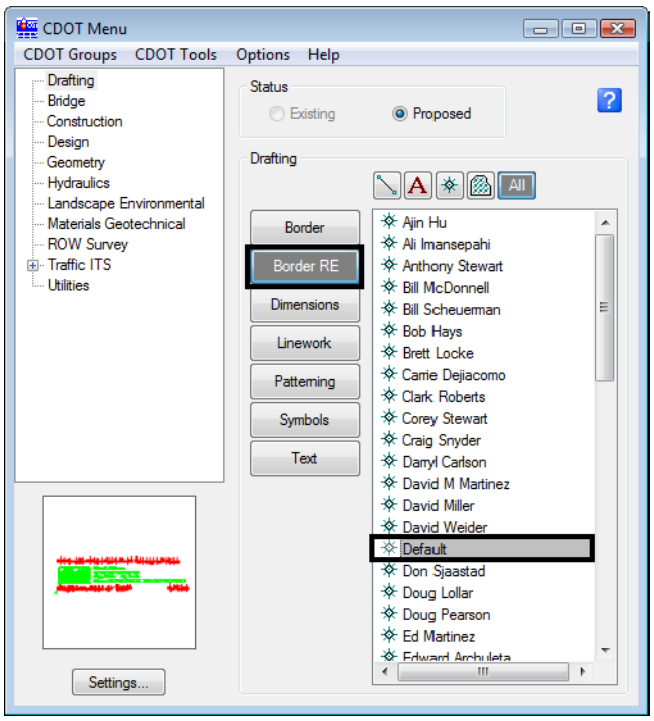


3. When prompted to locate the cell origin of the ***Bar Scale***, **<D>** inside the sheet border.

4. Select the Item **North Arrow Standard**



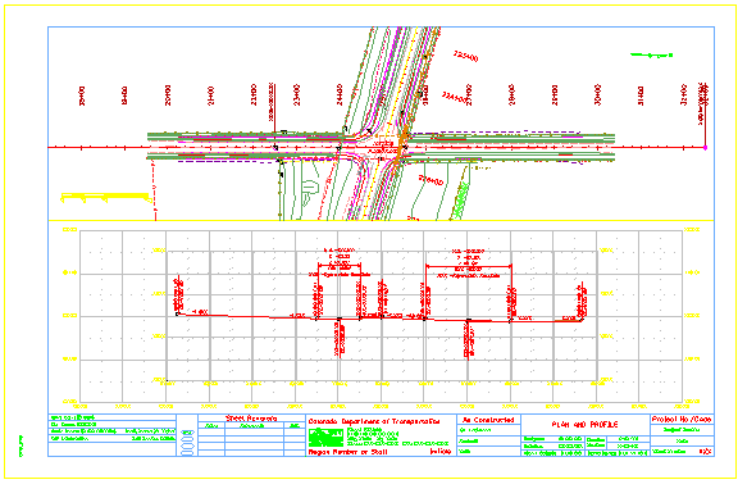
5. When prompted to locate the cell origin of the ***North Arrow***, **<D>** inside the sheet border.
6. Set the Category to **Border RE**.
7. Select the Item **Default**.



8. When prompted to locate the cell origin of the ***Region Engineer*** cell, **Zoom in** as necessary on the bottom portion of the border and **<T>** to the correct location and then **<D>** to accept.

Lab 12.11 - Turn On the Reference Display

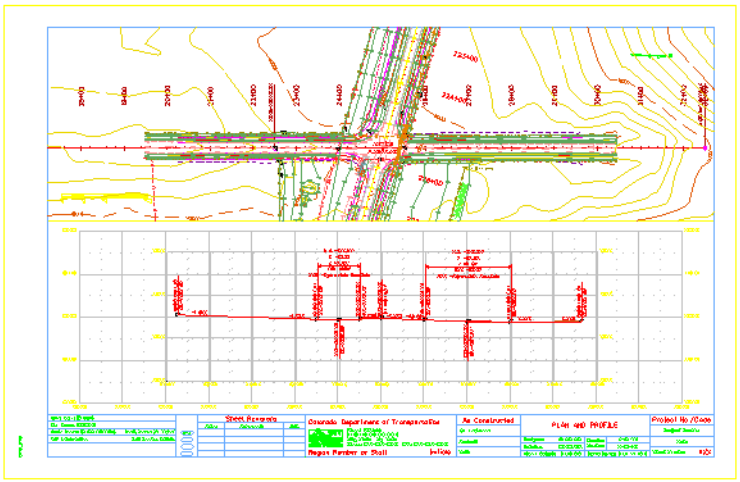
1. On the ***References*** dialog, select the **Survey/Topo** reference nested under the ***Design*** Reference.
2. Toggle on **Display** for the ***Survey/Topo*** reference.
3. Use ***Level Display*** to turn **On** all ***Survey/Topo*** levels.
4. **Fit** the view.



5. **Save Settings**.

Lab 12.12 - Optional Exercise

Change the Design reference's nested depth to ***2*** and turn on the display of the contour reference – ***12345SURV_Contour100.dgn***. Use ***Level Display*** to turn **On** the contour levels to display the existing contours in the plan sheet.



LAB 13 - Create a Project Specific Border

In the last section, you placed a generic border for your plan/profile sheet from the CDOT menu. This is handy when you have only one or two sheets to create since you have to edit the border with project specific information for each sheet. But what if you had several sheets to create? You wouldn't want to edit every sheet to add the project information. Instead, you can create a project-specific border that can be used for all sheets of the same type. This way, you only have to fill in the project information one time.

Chapter Objectives:

After completing this exercise you will know how to:

- Create a project-specific border cell library.
- Use the CDOT Menu to place the border and associated information.
- Edit the border text to place project-specific information.
- Make the border graphics a cell.

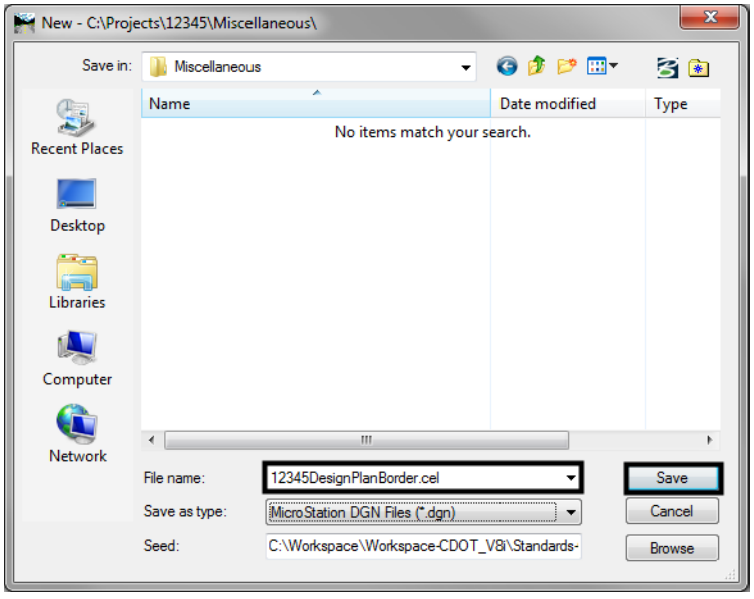
Lab 13.1 - Create the Border File

Since you will use this border for multiple sheets, create one project border to avoid editing multiple borders later.

1. In **MicroStation Manager**, select **File > New**.
2. Set the directory to **C:\Projects\12345\Miscellaneous**.
3. Verify the **Seed File** is set to **3D-Seed_CDOT.dgn**, if not then select it as the seed file.
4. In the **Name** field, key in a drawing file name ***12345DesignPlanBorder.cel***.

   Note: The **.cel** extension denotes this file as a cell library.

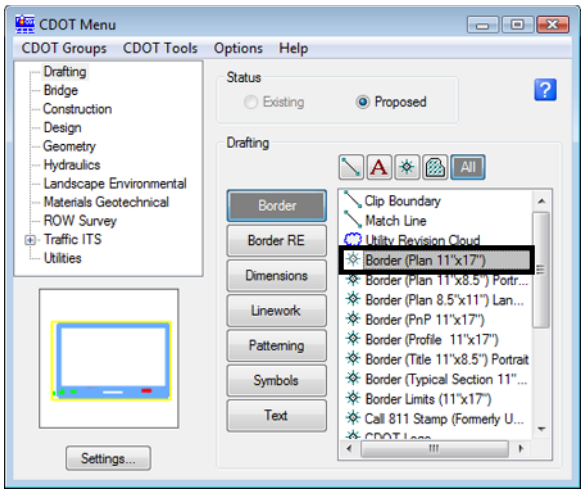
5. In the **New** dialog box, select **Save**.



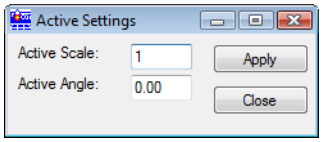
6. The file you created will be highlighted. Select **Open** to open that file.

Lab 13.2 - Use the CDOT Menu to Create the Border

1. From the **CDOT Menu** Explorer, select **Drafting** and set the **Category** to **Border**.
2. Select the Item **Border (Plan 11"x17")**



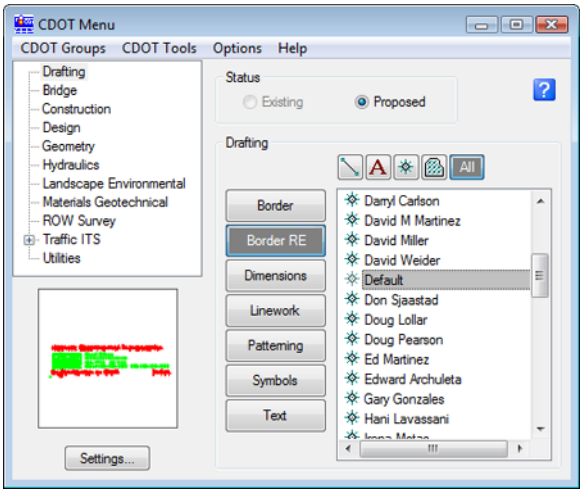
3. Select **Settings** and set **Active Scale** to ***1*** and **Active Angle** to ***0***.



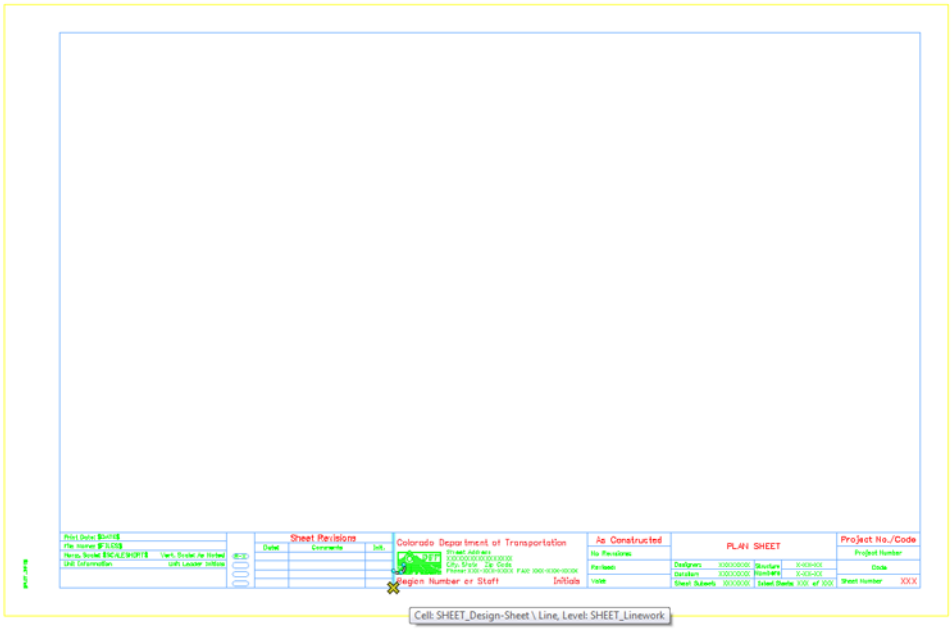
Note: You will create the generic project border cell at a scale of 1 (11 x 17 master units). You'll actually scale the border, according to your plot scale, later when the cell is placed in the sheet file.

4. Select **Apply** and **Close** in the **Active Settings** box.
5. **<D>** to place the border anywhere in the blank file.
6. Set the Category to **Border RE**.
7. Select the Item **Default**.

8. **Fit** the view.



9. When prompted to locate the **Region Engineer** cell, **<D>** to the location shown.



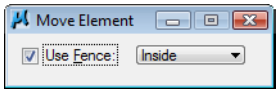
Note: You will not place the bar scale and north arrow cell now, but later in each individual sheet.

Move the border

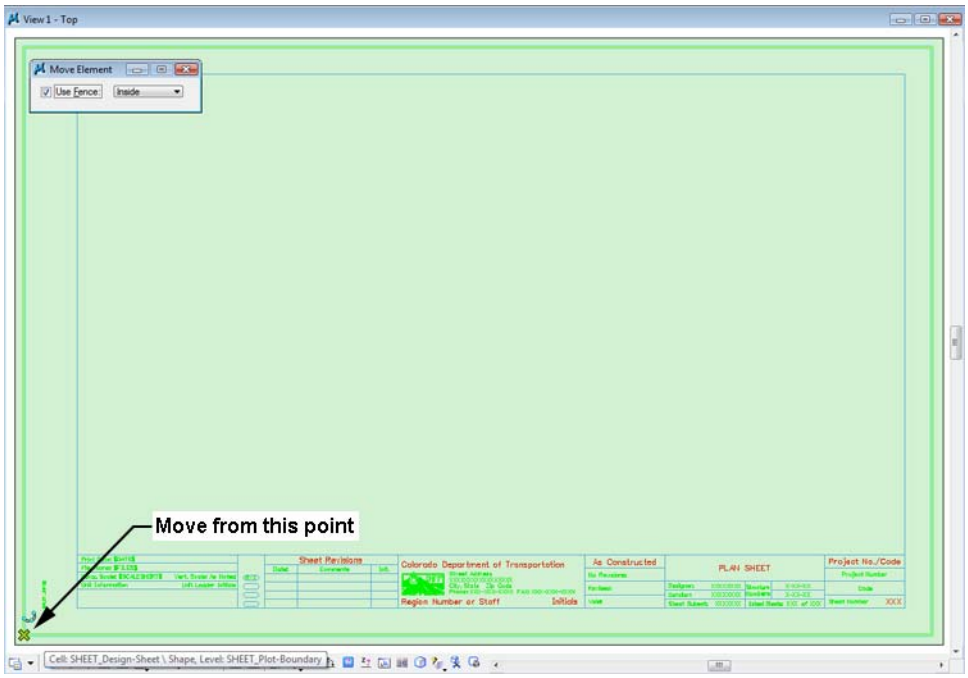
The lower left corner of the border ***must*** be located at the 0,0 coordinate in the file since this will be the origin of the cell. So, move it to this location.

1. Place a **Fence** block around the entire border.

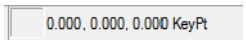
2. Select the **Move** command and toggle on **Use Fence**. Set the mode to **Inside**.



3. Snap to the lower-left corner of the yellow block (outside edge) as the move from point.

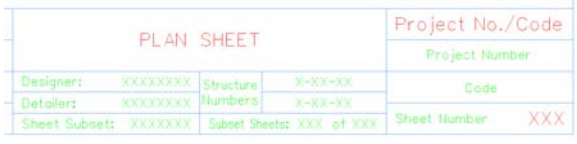


4. Key in ***xy=0,0*** as the move to point.
5. The border moves to the new location.
6. Reset **<R>**.
7. **Fit** the view.
8. **<T>** on the lower-left edge to verify it's at 0,0.

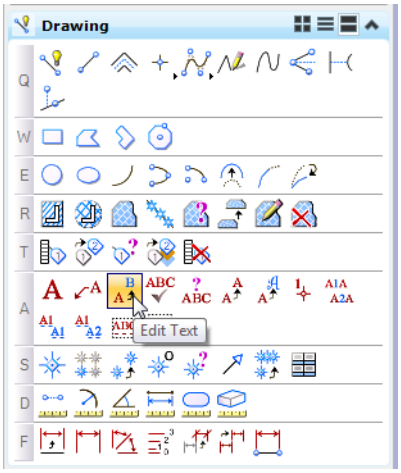


Lab 13.3 - Edit the Border Text with Project Specific Information

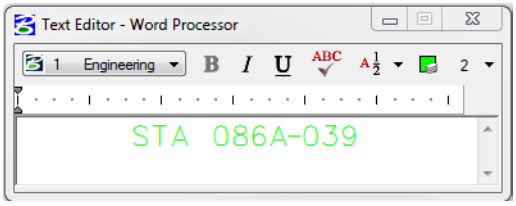
1. **Zoom in** on the lower-right corner of the border as shown.



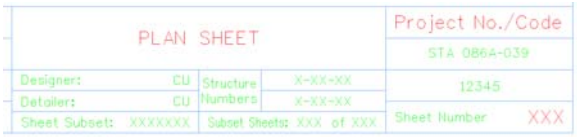
2. Select the **Edit Text** command from the **Text** toolbar under the Drawing task tab.



3. **<D>** on the **Project Number** text.
4. In the **Text Editor**, replace this with ***STA 086A-039***.



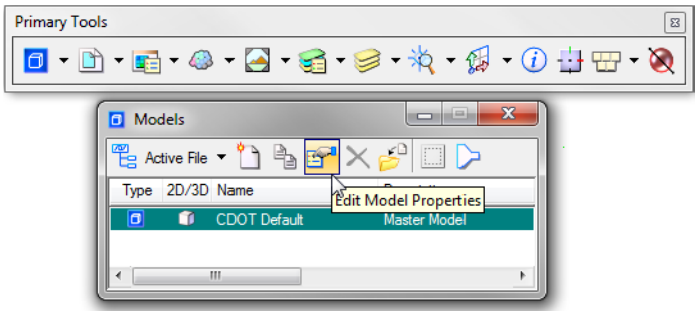
5. **<D>** anywhere to accept.
6. **<D>** on the **Code** text.
7. In the **Text Editor**, replace this with ***12345*** and **<D>** to accept.
8. Edit the **X**'s beside Designer and replace with your initials (CU is used in the illustration, but you can use yours).
9. **<D>** anywhere to accept.
10. Edit the **X**'s beside Detailer and replace with your initials.
11. **<D>** anywhere to accept.



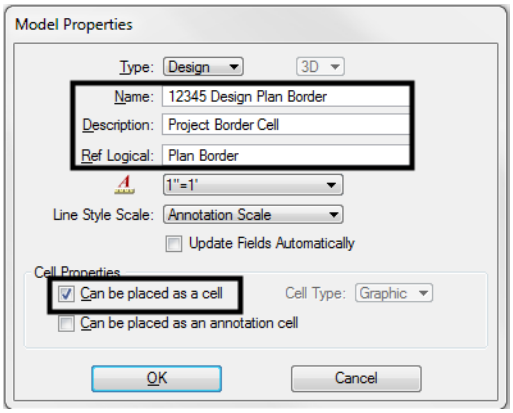
12. **Fit** the view.

Lab 13.4 - Make the Border a Cell

1. Select **Models** from the **Primary** toolbar.



2. In the **Models** dialog box, select **Edit Model Properties**.
3. In the **Model Properties** box:
   - Toggle on **Can be placed as cell.**
   - Change the **Name** to ***12345 Design Plan Border.***
   - Change the **Description** to ***Project Border Cell.***
   - For **Ref. Logical** key in ***Plan Border.***
   - Leave all other options as shown



4. Select **OK**.
5. **Close** the **Models** box.
6. **Save Settings** (**File > Save Settings**).
7. **Exit** MicroStation.

LAB 14 - Create a 40-Scale Plan Sheet

The CDOT default scale for plan sheets is 100. This lab illustrates how to create a special 40-scale plan sheet for the intersection.

Chapter Objectives:

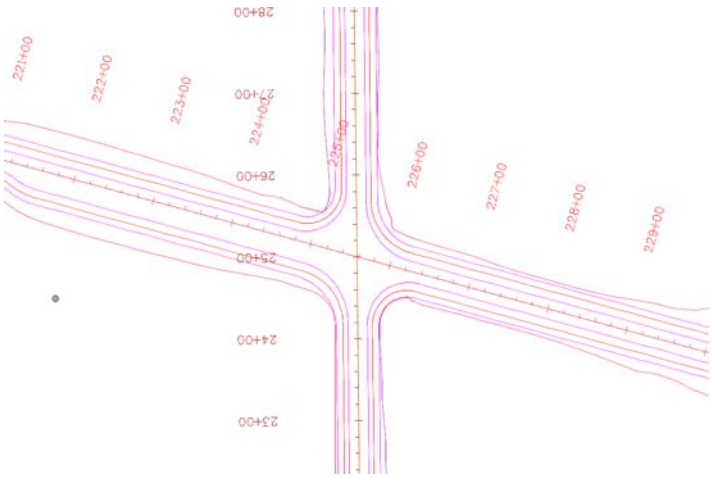
After completing this exercise you will know how to:

- Create a Plan sheet
- Scale the border for a 40-scale drawing
- Set the **Annotation Scale** to match the border and plot scale.

Lab 14.1 - Open the Model File

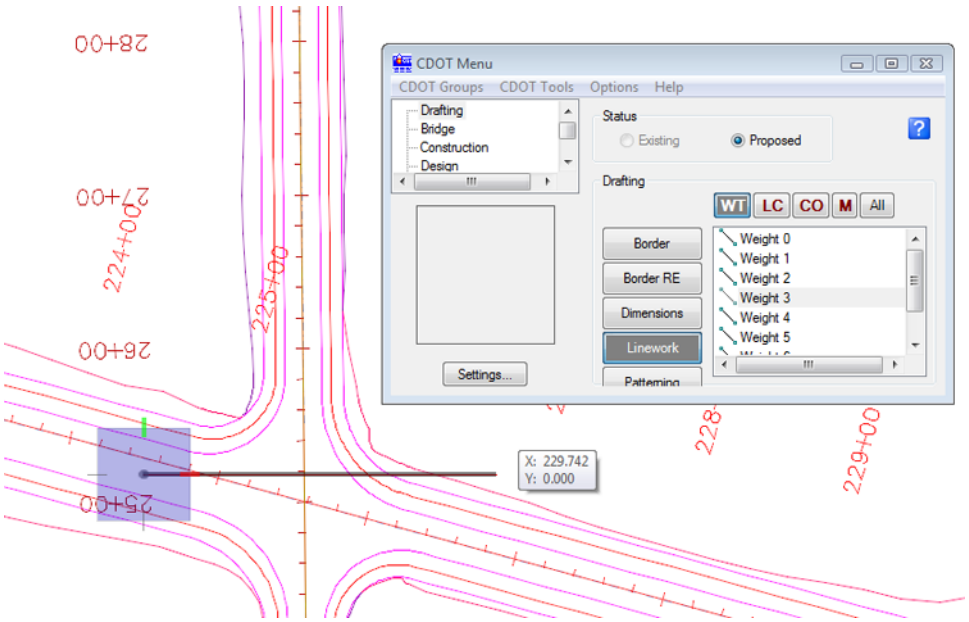
1. Start MicroStation and open **12345DES_Model.dgn** form the project's **\Design\Drawings\Reference_Files** folder.
2. Select **File > Raster Manager** and turn off the display of the raster files.
3. **Fit** the view.

4. Window around the intersection as shown.

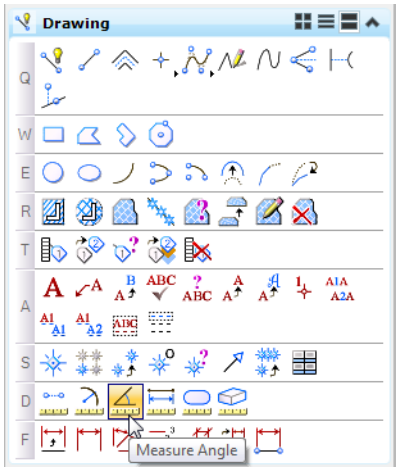


Lab 14.2 - Determine the Rotation Angle for the Sheet

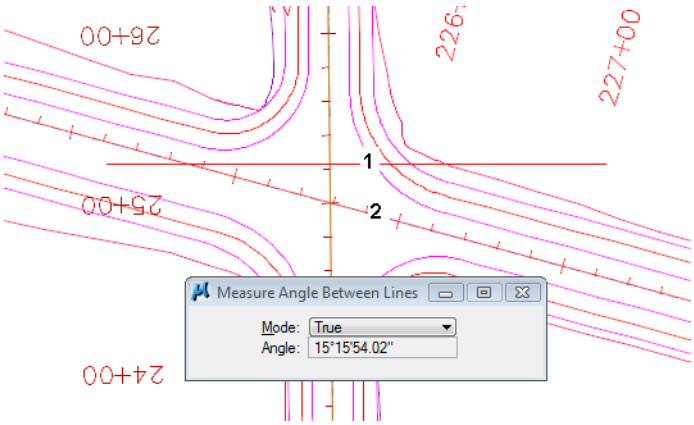
1. On the **CDOT Drafting Menu**, set **Line Weight** to **3**.
2. Using **AccuDraw**, draw temporary horizontal line in the approximate location shown.



3. Select the **Measure Angle** command from the **Measure** toolbar under the ***Drawing*** task tab..



4. **<D>** on the horizontal line, then **<D>** on the SH86 proposed centerline.

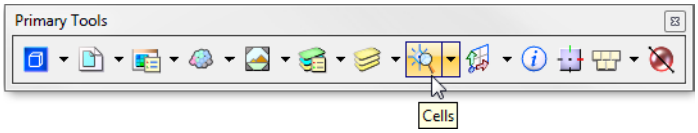


MicroStation displays the result as approximately 15 degrees. This is the rotation angle needed to rotate the view to horizontal at the intersection in a counter-clockwise direction.

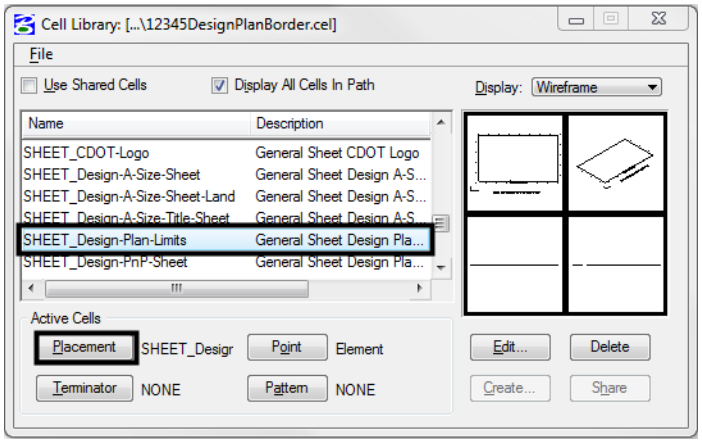
5. **Delete** the temporary measurement line.

Lab 14.3 - Placing the Plan Limits Cell

1. Select **Cells** form the **Primary** toolbar to open the cell library.

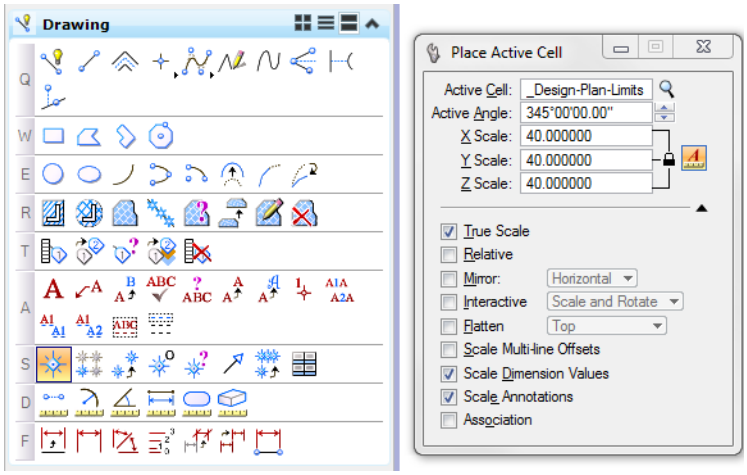


2. Toggle on **Display All Cells in Path** and select the **SHEET_Design-Plan-Limits** cell and make it the active placement cell.



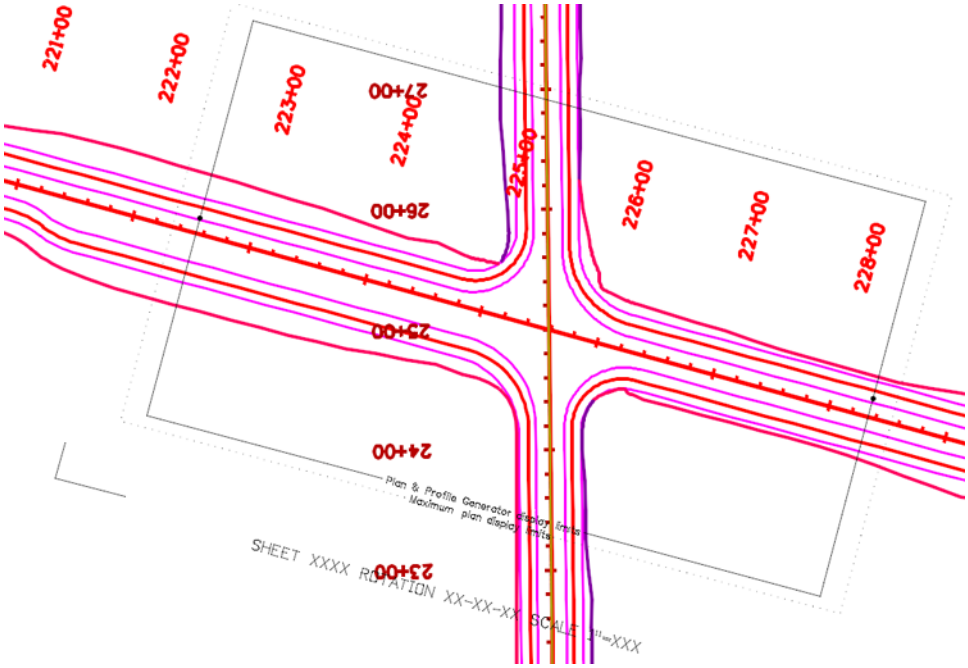
Note: This cell helps to define the plan sheet limits in the model file before placing the border in the sheet file. It contains text characters that can be edited to indicate sheet name, rotation, & scale. The outer line-work depicts the maximum display limits for graphics as it relates to the border sheet. The inside shape reflects ½ inch inside this maximum limit and is the clipping boundary. All graphical information for this cell is on to the MicroStation level, **DRAFT_INFO_No-Plot**.

3. **Close** the **Cell Library** dialog box.
4. Turn on the level **DRAFT_INFO_No-Plot** if it is not currently on.
5. Select the **Place Active Cell** command and set the **Active Angle** to ***-15*** and the **Scale** to ***40***.

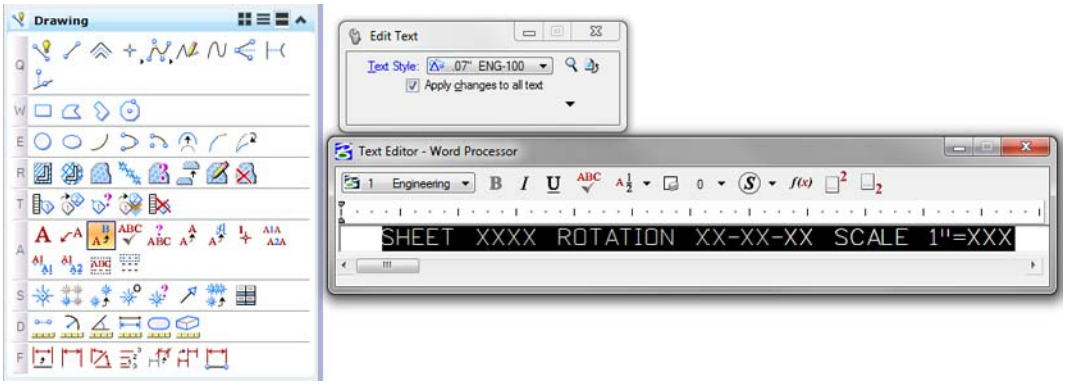


Note: The scale should be set to the plot scale of the sheet. Since the positive angles are measured counterclockwise in MicroStation, enter the 15 degree angle as ***negative***. MicroStation converts this to a positive 345 degree angle.

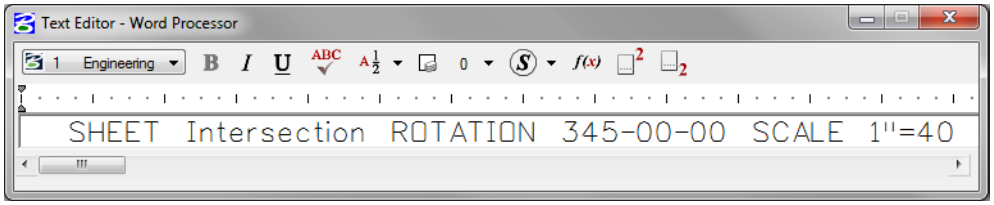
6. Place plan limit cell in the approximate location shown.



7. Select the **Edit Text** command and **<D>** on the text at the bottom of the cell.



8. In the **Text Editor**, make the edits as shown.



9. **<D>** anywhere in the view to accept.

Lab 14.4 - Create the Drawing File

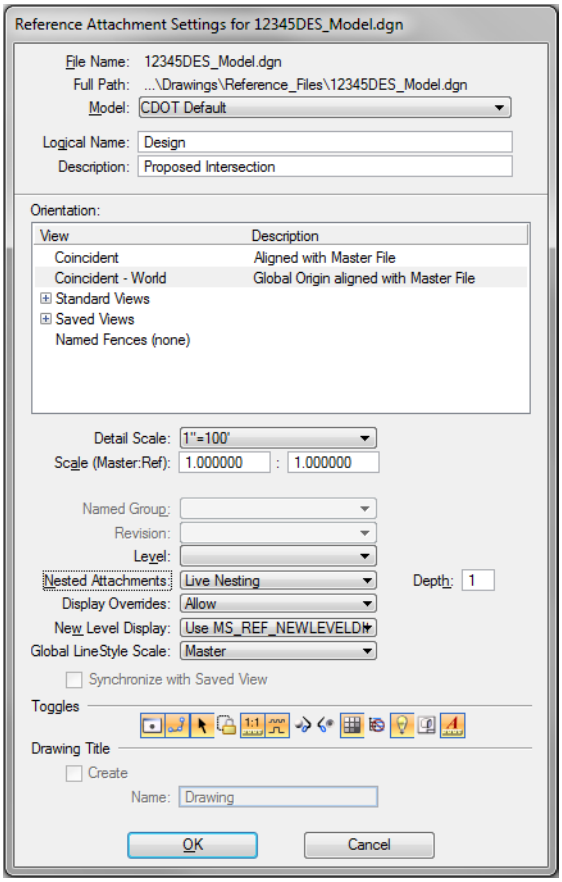
1. From the MicroStation menu bar, select **File > New**.
2. Set the directory to **C:\Projects\12345\Design\Drawings**.
3. Verify the **Seed File** is set to **3D-Seed_CDOT.dgn**, if not then select it as the seed file.
4. In the **Name** field, key in a drawing file name **12345DES_Plan21.dgn**
5. In the **New** dialog box, select **Save**. The Open button is used to accept the new file name and open the drawing at the same time.
6. The file you created will be highlighted. Select **Open** to open that file.

Lab 14.5 - Attach the Model File

1. Attach the **12345DES_Model.dgn** reference from the **C:\Projects\12345\Design\Drawings\Reference_Files** folder (use the Directory pull-down to quickly find the folder).
2. Verify the **Attachment Method** is set to **Interactive**. Select **Open**.
3. In the **Reference Attachment Settings** box:

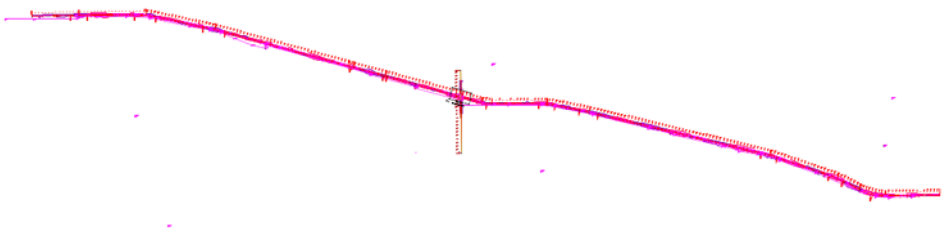
- Key in a **logical name** of ***Design*** and ***Proposed Intersection*** for a **Description**.
- Verify that **Orientation** is set to **Coincident-World** and the Scale is set at ***1:1***

- Set **Nested Attachment** to **Live Nesting** and set **Depth** to ***1***.

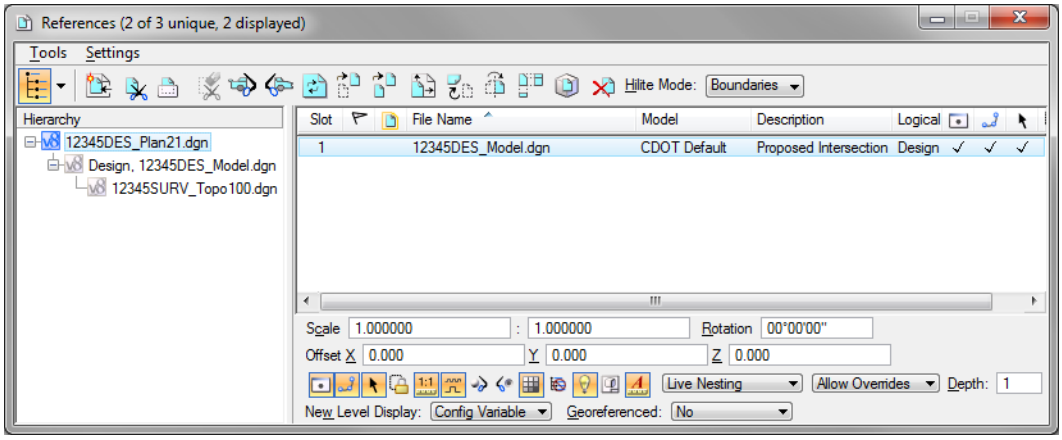


4. Select **OK**.

5. Fit the view.



6. Turn on the **Show Hierarchy** and expand the hierarchy list.

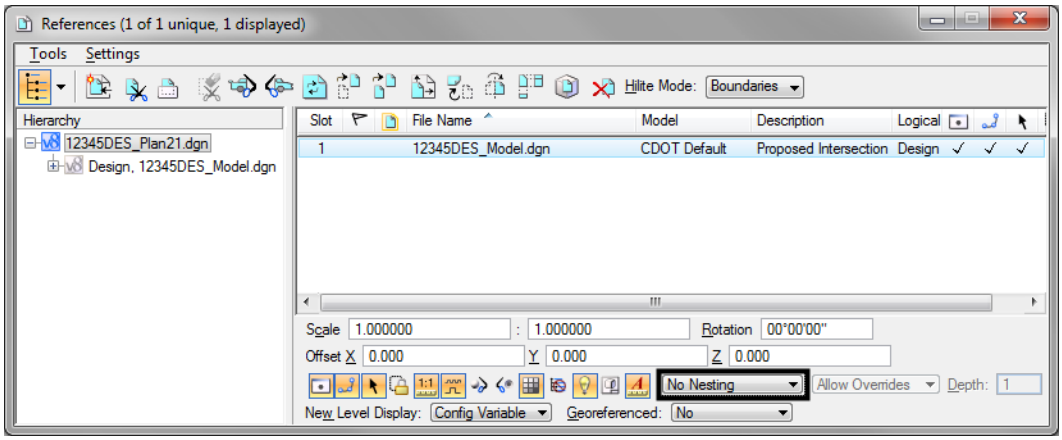


Note that with nested references, the **Survey/Topo** reference is nested below the Design model file.

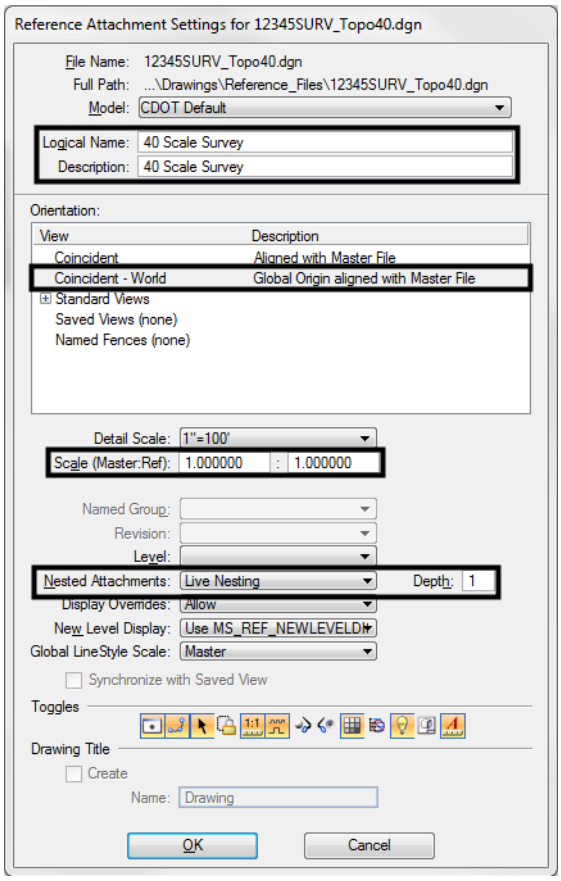
The **Survey/Topo file** that is attached nested to the Model file is for a 100 scale plot. However, you're creating an intersection sheet at a 40 scale. Therefore, you need to attach the correct scale Survey/Topo reference.

Note: Coordinate with the Region Surveyor when you are creating sheets that are not at a 1:100 scale. They will provide you with the topography and survey MicroStation files at a different scale. Otherwise, the line work and cells will not be the correct size for the print scale.

7. Select the Design model reference and change the nesting to **No Nesting** to remove the 100 scale **Survey/Topo** reference.



8. Attach the **12345SURV_Topo40.dgn** file from the project's **\ROW_Survey_Drawings\Reference_Files** folder with the options shown.

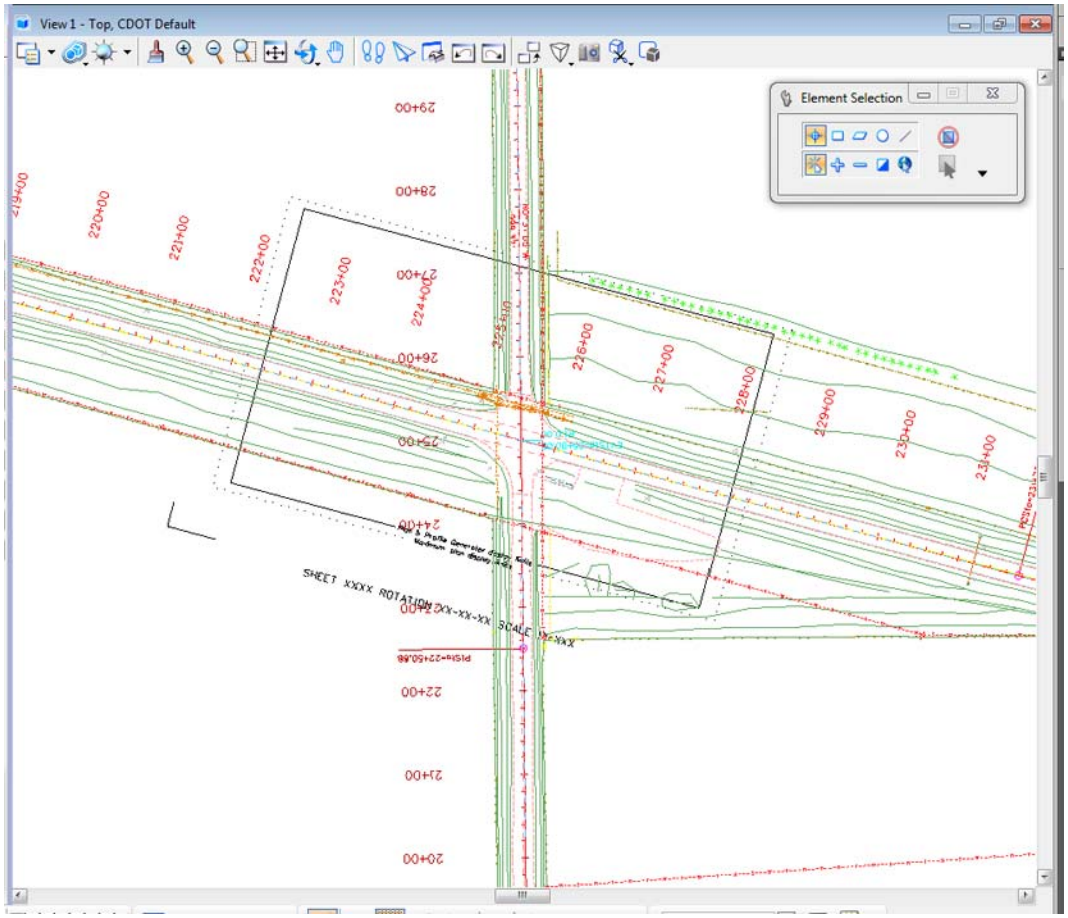


9. **Fit** the view.

Lab 14.6 - Rotate the View

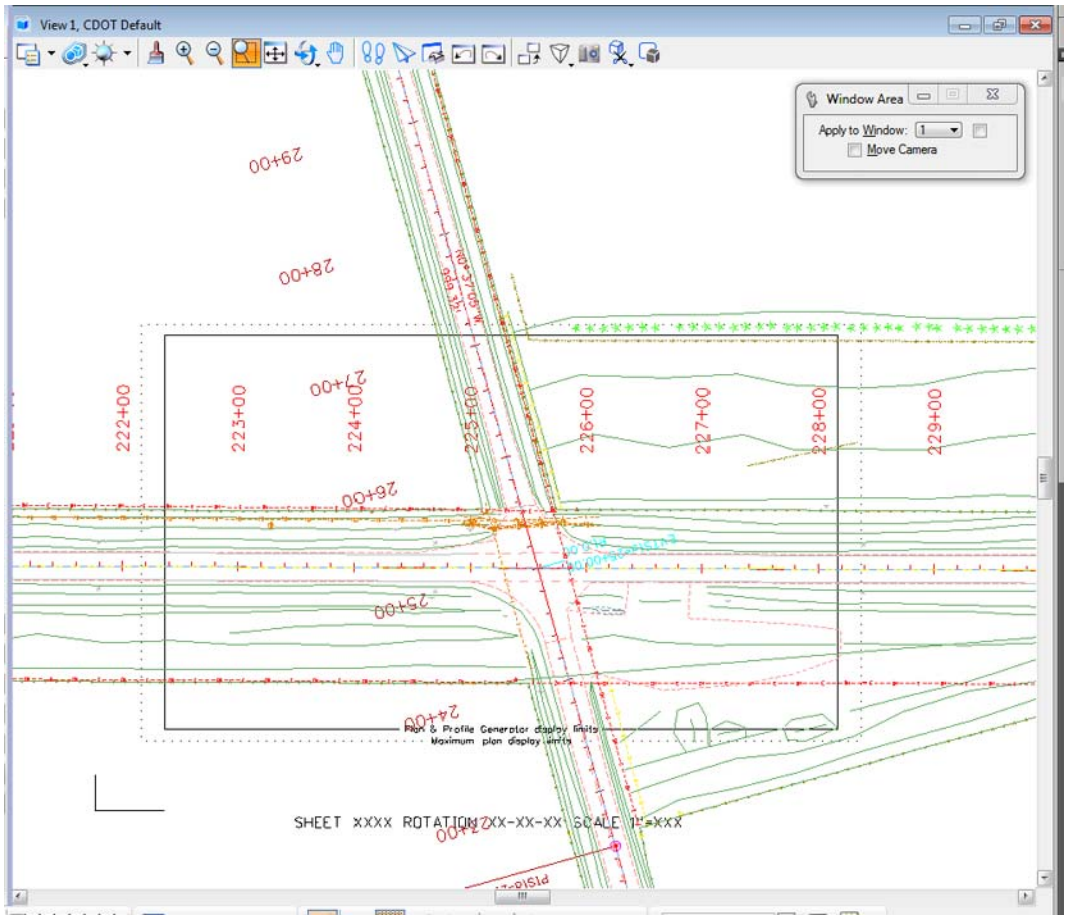
Rotate the view so that the portion of the mainline alignment through the intersection appears horizontal in the view.

1. **Window** around the intersection as shown.



2. Use the **Rotate View**, **3-Point** method to rotate the view so that the plan limits cell is horizontal to the view

Note: You can also use the keyin ***rv=,,15*** since you know the rotation angle from the plan limits cell. The commas are used as placeholders since you are not rotating about X and Y axis. You are only rotating about the Z axis – the perpendicular axis to the Top View.



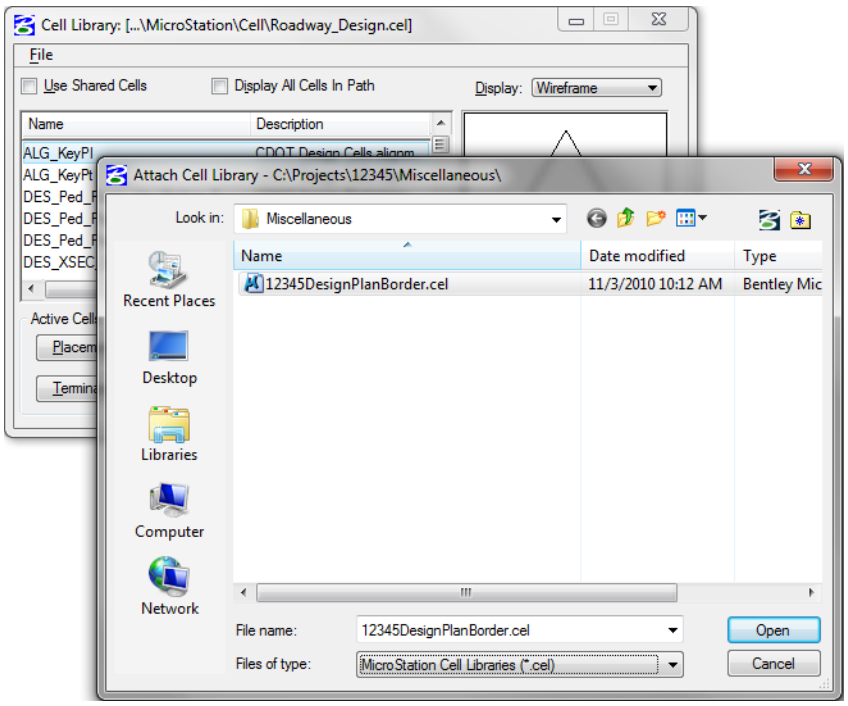
The view is rotated so that the alignment appears horizontal.

Note: Remember that you are rotating the view, not the graphics. The graphics maintain their original coordinate position in the sheet file.

Lab 14.7 - Attach the Border Cell

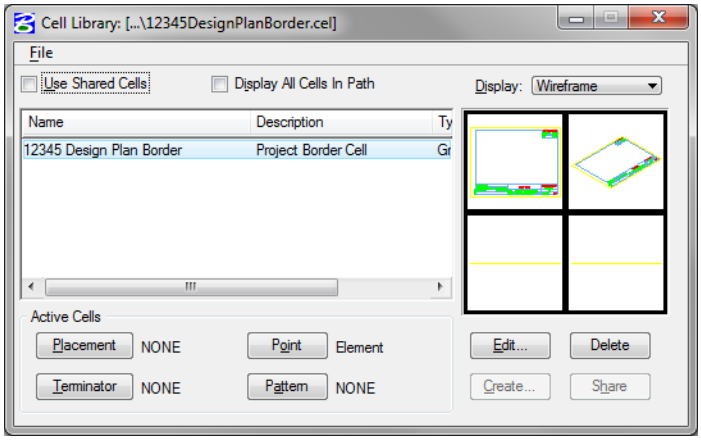
1. Select **Cells** from the **Primary** toolbar.
2. In the **Cell Library** dialog box, select **File > Attach** and navigate to the **C:\Projects\12345\Miscellaneous** folder.

3. Select the **12345DesignPlanBorder.cel** file.



This is the project-specific border created earlier.

4. Select **Open** to attach the cell library.



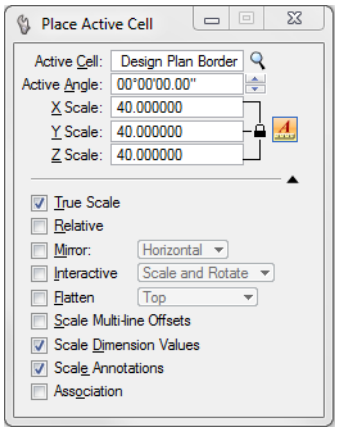
The cell library only has one cell (model) – the **12345 Design Plan Border** that you previously created.

5. Select **Placement** to make the border the active placement cell.

6. Close the **Cell Library** dialog box.

Lab 14.8 - Place the Border

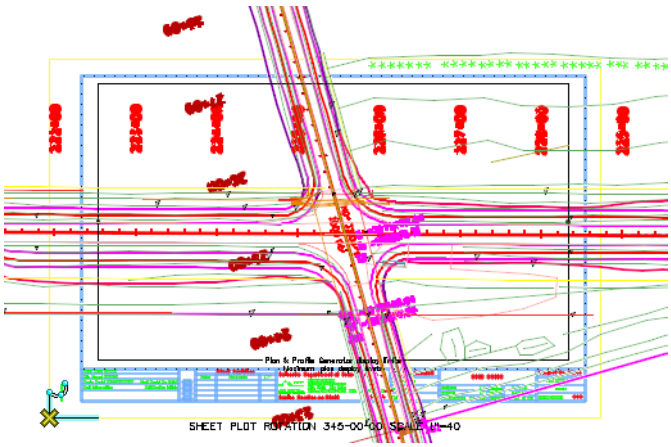
1. Select **Place Active Cell** from the **Cells** toolbar.
2. In the **Tool Settings** box, set **Active Angle** to ***0*** and the **Active Scale** to ***40*** for X, Y and Z.



Note: The **Active Angle** is view independent and not associated with view rotation. Therefore, the x-axis is always horizontal regardless of the view rotation. You will not need to set this for correct placement of the North Arrow or other cells.

Note: The **Active Scale** scales the border up 40 times around the full-sized graphics to match the plot scale.

3. AccuSnap on the lower left corner of the plan limits cell as shown to place the border.

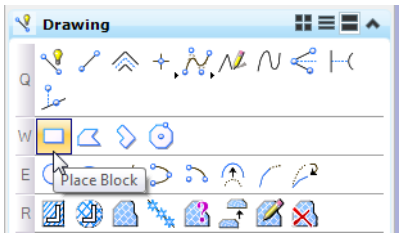


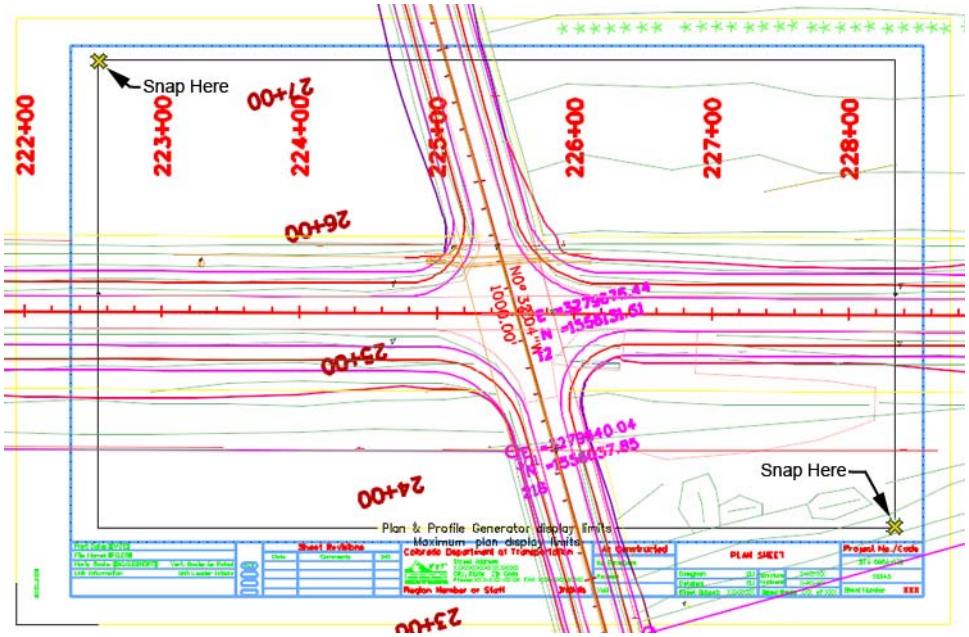
4. **<D>** to place the cell.
5. **<R>** to exit the command.

Lab 14.9 - Place the Clip Boundary

1. From the CDOT Menu Explorer select **Drafting**.

2. Set the Category to **Border**.
3. Select the Item **Clip Boundary**.
4. Select the **Place Block** icon from the ***Polygons*** toolbar under the ***Drawing*** task tab and draw the clipping boundary by snapping on the opposite corners of the plan limits cell as shown (interior most line).

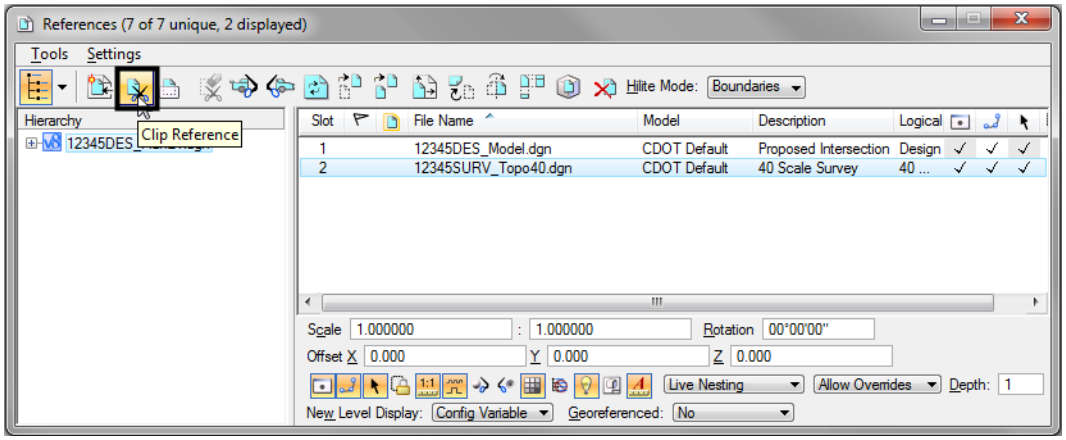




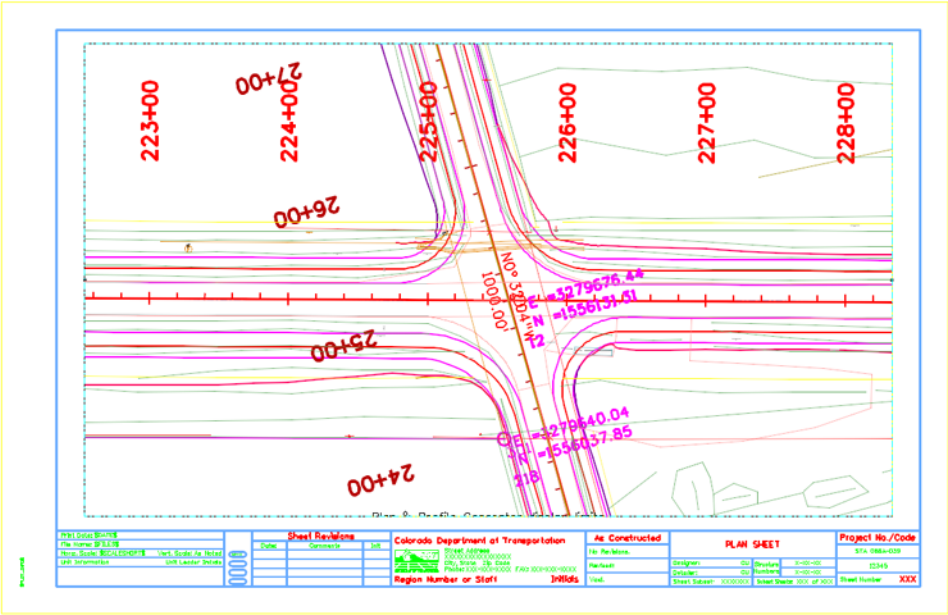
Lab 14.10 - Clip the Reference File

1. In the **References** dialog box, highlight both the **Design** and **Survey/Topo** references for clipping.

2. Select the **Clip Reference** icon.



3. In the **Tool Settings** box, verify **Method** is set to **Element**.
4. When prompted to **Identify Clipping Element**, select the rectangular clipping boundary you just placed.
5. **<D>** to accept.
6. **Fit** the MicroStation view and **Save Settings** after clipping the reference files.

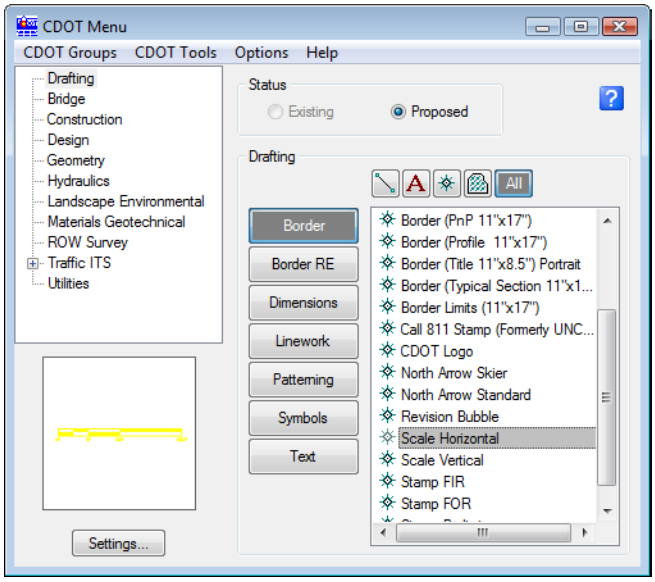


Note: Once the clipping boundary is placed, do not delete it. The clipping region of the reference file will be lost if the boundary is deleted.

Lab 14.11 - Place the Bar Scale and North Arrow

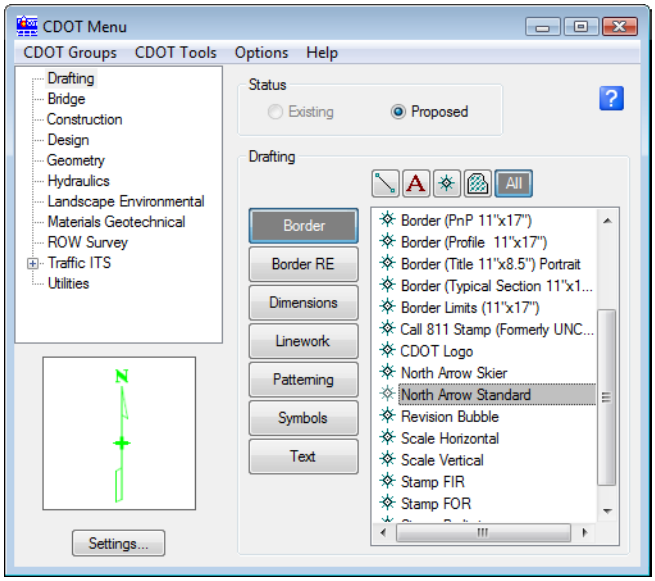
1. From the CDOT Menu Explorer, select **Drafting**.
2. Set the Category to **Border**.

3. Select the Item **Scale Horizontal**.

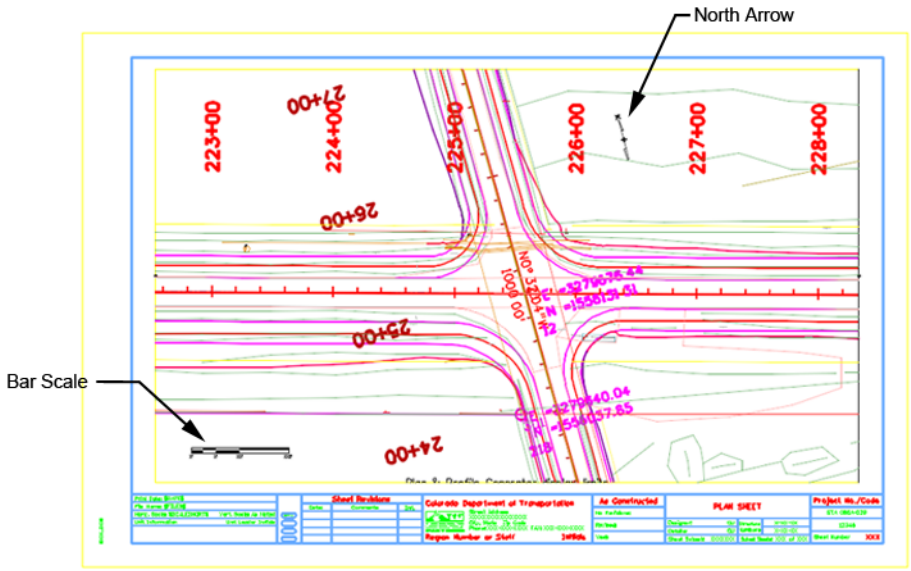


4. When prompted to locate the origin of the **Bar Scale**, **<D>** inside the sheet border as shown below.

5. Select the Item **North Arrow Standard**.



6. When prompted to locate the **North Arrow**, **<D>** inside the sheet border as shown.



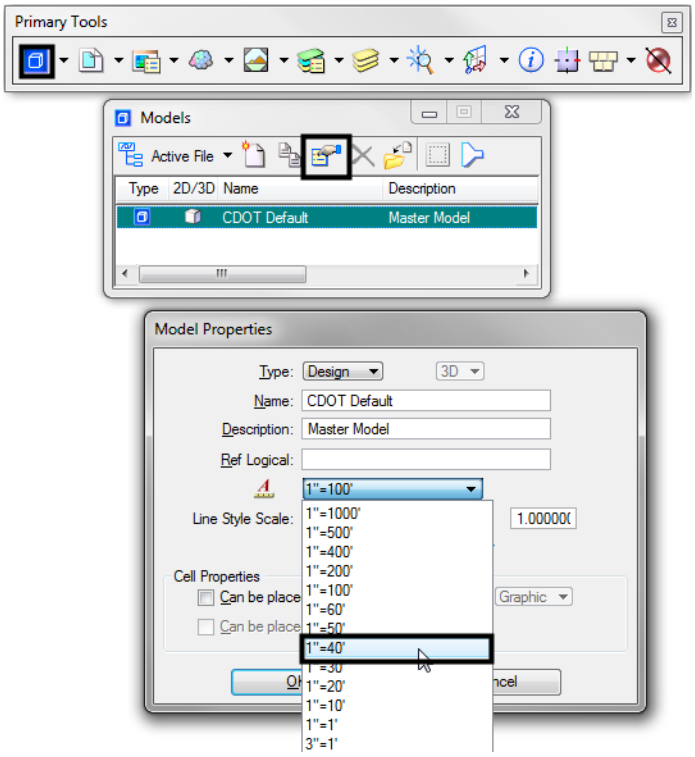
Lab 14.12 - Set the Text Scale Factor

Set the **Text Scale Factor** to match the border and plot scale factors.

1. Select **Models** from the **Primary** toolbar.
2. In the **Models** box, select **Model Properties**.

   Note the **Annotation Scale** is set to **1:100** – the CDOT default.

3. Change the **Annotation Scale** to ***1:40***.



4. Select **OK**.

5. At the **Alert** message, select **Yes** to propagate the changes.

6. **Close** the **Models** box.

   The **Annotation Scale** for the file now matches the border and plot scales. Later, when text and dimensions are placed in this file, they will be the correct size.

Lab 14.13 - Edit the Bar Scale

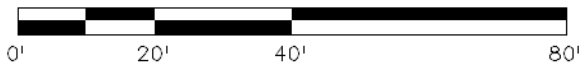
1. Window in to the bar scale cell.

2. Select the Edit Text command from the Text toolbar.

3. **<D>** on the **X'** text on the bar scale.

4. Change the text to 20' and **<D>** to accept.

5. Make the other edits as shown.



6. **Fit** the view.
7. **Save Settings**.
8. **Exit** MicroStation.

LAB 15 - Create a Typical Section Sheet

Normally, all graphics are created in the model file and referenced to the sheet file. The sheet file contains the border, annotations and dimensions. However, typical section sheets are an exception to this rule.

Roadway Design typical sections can be created with the **CDOT Typical Section Generator Program**. The **Generator Program** not only creates the graphics, but it also annotates and dimensions the typical section. It uses a **Text Scale Factor** of 10 for all text. Therefore, the program must be run in a sheet file set up at a 10 scale. The auto-populated file **JPC#DES_TyplSect##.dgn** is automatically created with the text scale factor set to 10 and the border placed at a 10-scale. Therefore, run the **Typical Section Generator** in the sheet file.

Chapter Objectives:

After completing this exercise you will know how to:

- Create a Typical Section sheet.
- Attach a project-specific border cell library.
- Use the **Replace Cell** command to replace a generic border with a project border.
- Use the **CDOT Typical Section Program** to automatically create a typical section based on input values.
- Use **AccuDraw** and "**SmartLock**" to align graphics.
- **Save** the typical section input file.

Lab 15.1 - Create a New Sheet File

1. Start MicroStation and open the file **12345DES_TyplSect##.dgn** from the **\12345\Design\Drawings** folder.

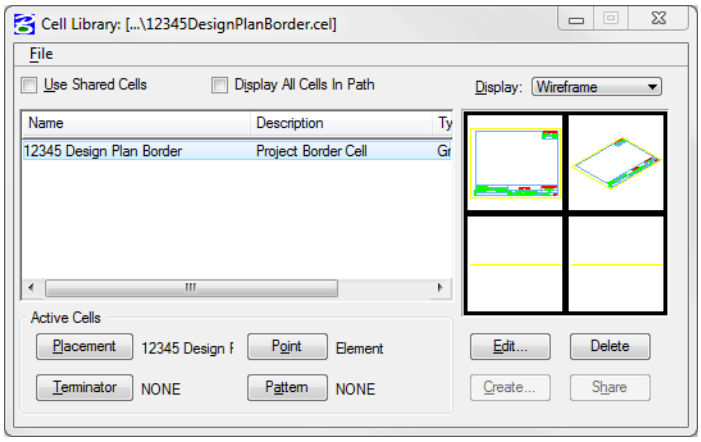
The file opens and contains the generic border.

2. Select **File > Save As…** and rename the file to ***12345DES_TyplSect01.dgn*** and select **OK**.

   The file is copied to the **Drawings** folder with the new name.

Lab 15.2 - Attach the Border Cell Library

1. Select **Cells** from the **Primary** toolbar.
2. In the **Cell Library** dialog box, select **File > Attach** and navigate to the **C:\Projects\12345\Miscellaneous** folder.
3. Select the **12345DesignPlanBorder.cel** file.
4. This is the project-specific border created earlier.
5. Select **Open** to attach the cell library.

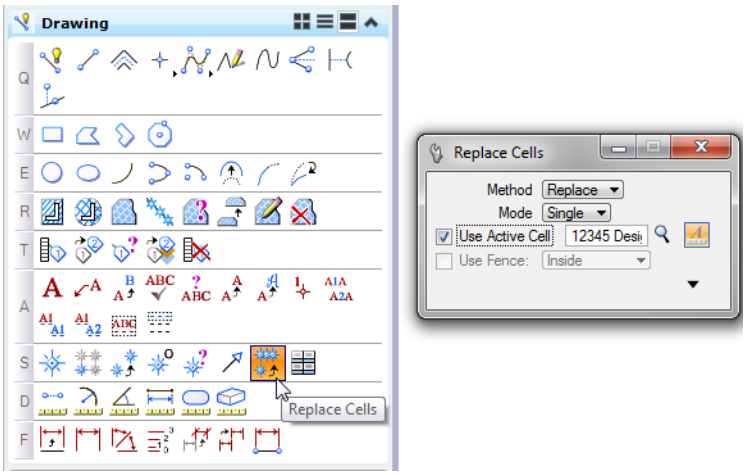


   The cell library only has one cell (model) – the **12345 Design Plan Border** that you previously created.

6. Select **Placement** to make the border the active placement cell.
7. **Close** the **Cell Library** dialog box.

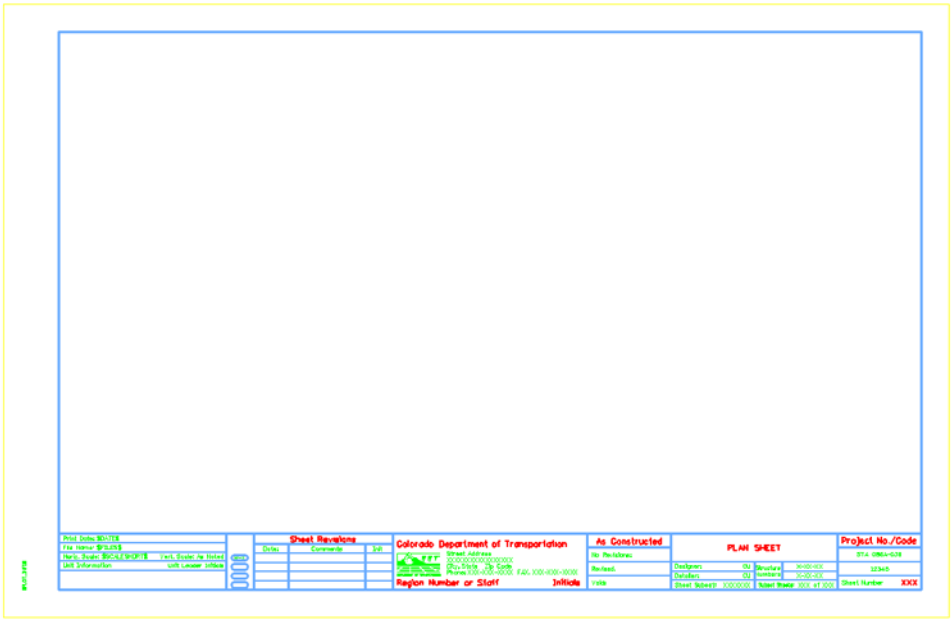
Replace the border

1. Select **Replace Cells** from the ***Cells*** toolbar under the Drawing task tab.



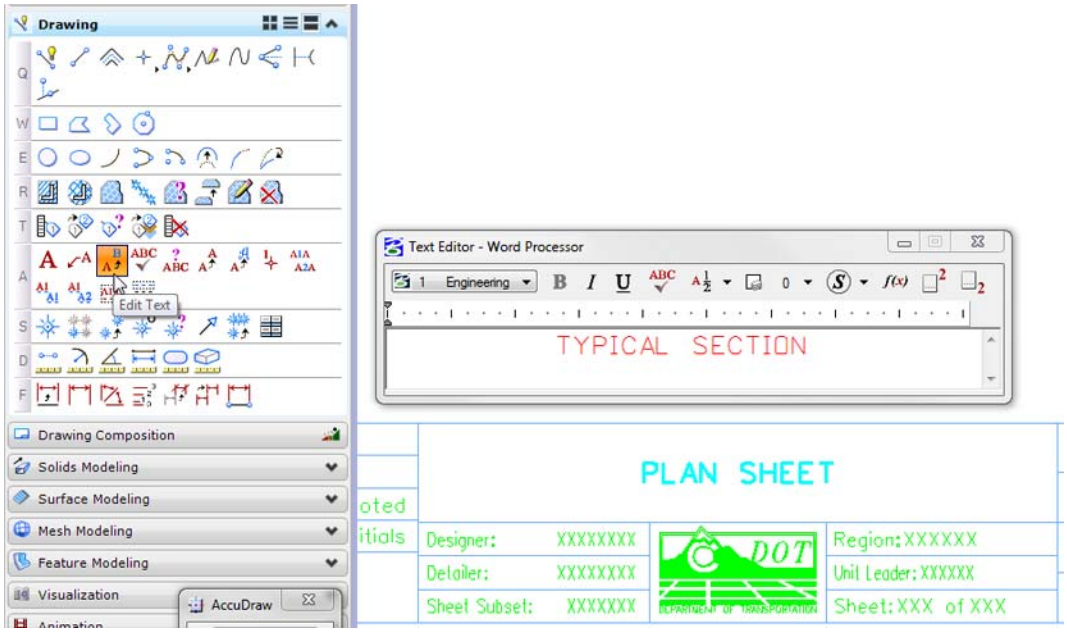
2. In the **Tool Settings** box
   - Set **Method** to **Replace**
   - Set **Mode** to **Single**
   - Toggle on **Use Active Cell**
3. When prompted to **Identify Cell**, **<D>** on the Typical Section Border.
4. **<D>** to accept.

   The generic border is replaced with the project border.

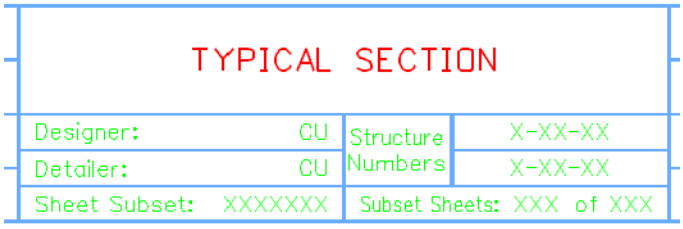


Lab 15.3 - Edit the Border Text for a Typical Section Sheet

1. Select the **Edit Text** Command from the ***Text*** toolbar under the ***Drawing*** task tab.
2. **<D>** on the **Plan Sheet** text.
3. Change the text to ***Typical Section***.



4. **<D>** to accept.



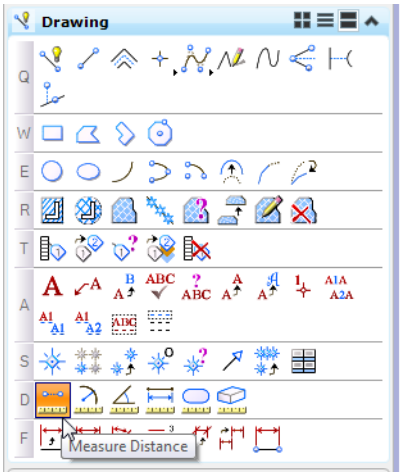
Lab 15.4 - Check Model Properties

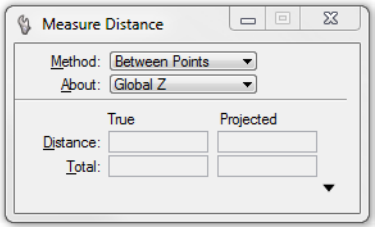
1. Select **File > Models** from the menu (or select the **Models** icon from **Primary Tools**).
2. Select the **Edit Model Properties** icon

   Note that the **Annotation Scale** factor is set to 1:10 for running the CDOT Typical Section Program. The text placed from the program will appear the correct size.

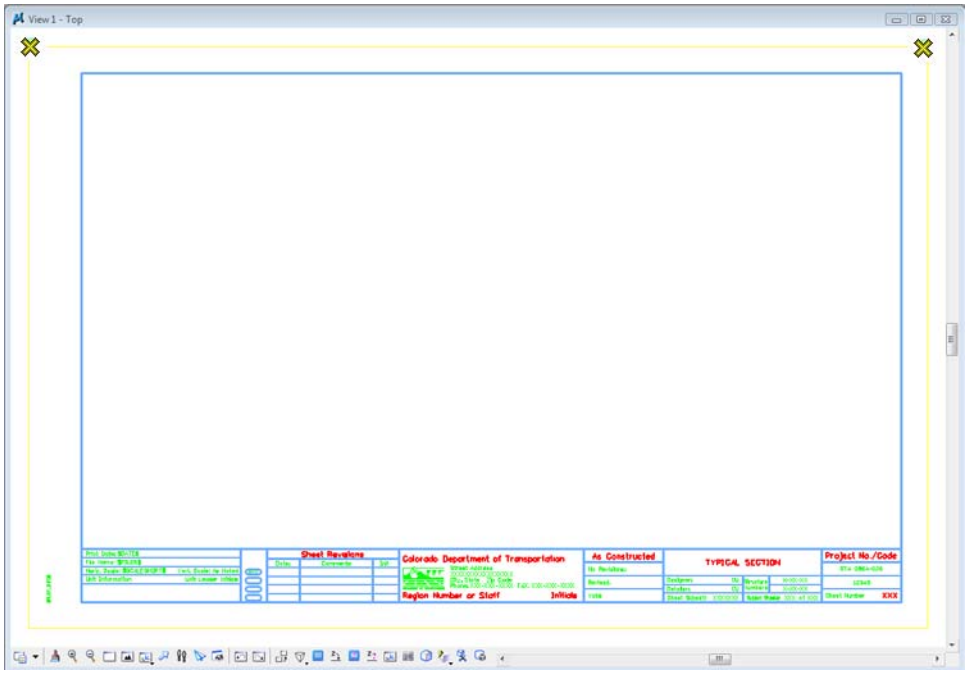
   Note: You must change the **Annotation Scale Factor** if you run the **Typical Section Program** in any file other than the **JPC#DES_TypISect##.dgn** file.

3. Select the **Measure Distance** command and set the **Distance** to **Between Points**.





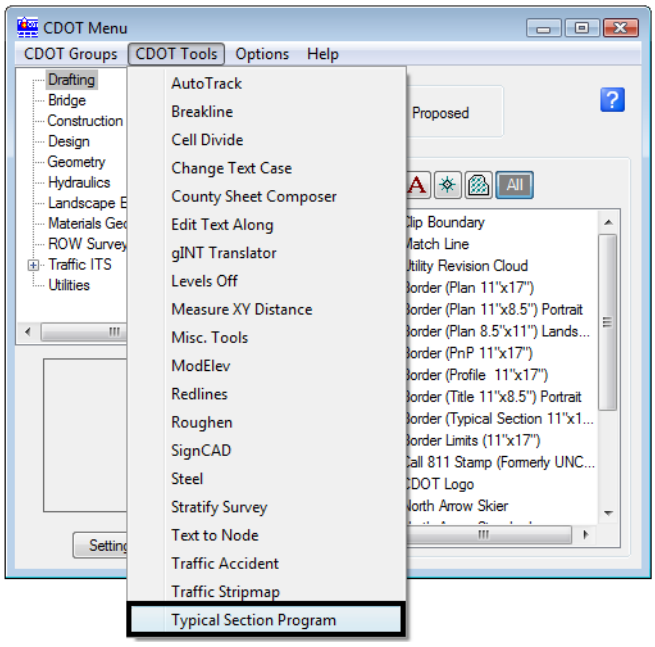
4. Measure the height and length of the border (AccuSnap along the yellow edge).



Note that the border measure 110 x 170, or 10 times the actual size. If the border cell was scaled to a factor other than 1:10 (like 1:100 for a plan sheet), then it must be re-scaled or replaced at the proper scale of 10.

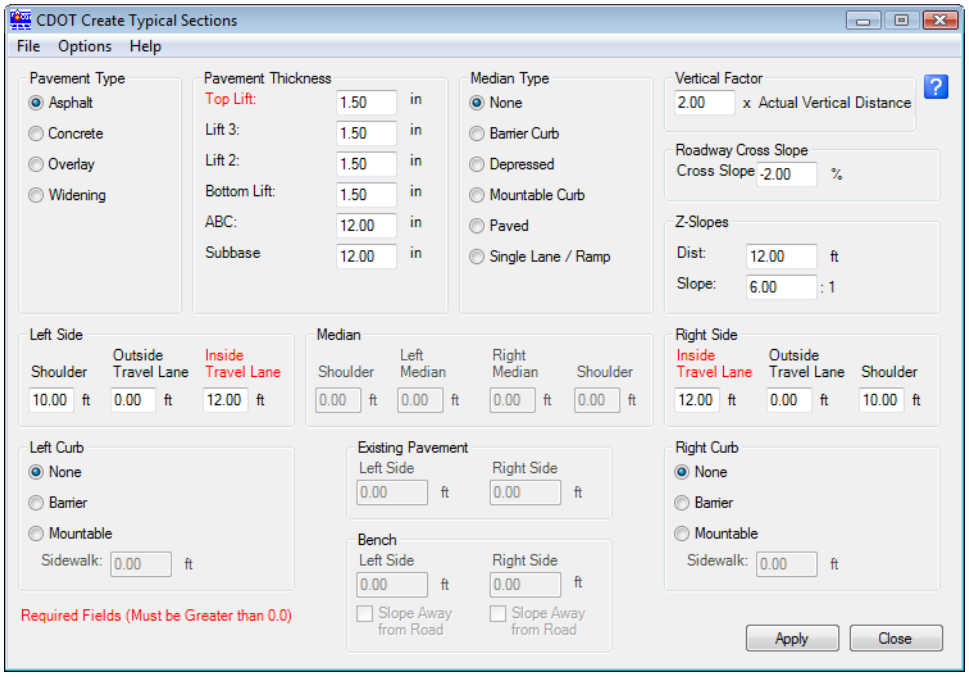
Lab 15.5 - Start the Typical Section Program

1. On the CDOT Menu, select **CDOT Tools > Typical Section Program**.



The **CDOT Typical Section Program** lets the user input different values based on the desired roadway section. The various options are highlighted in blue.

Note: Items that require input are shown in red.

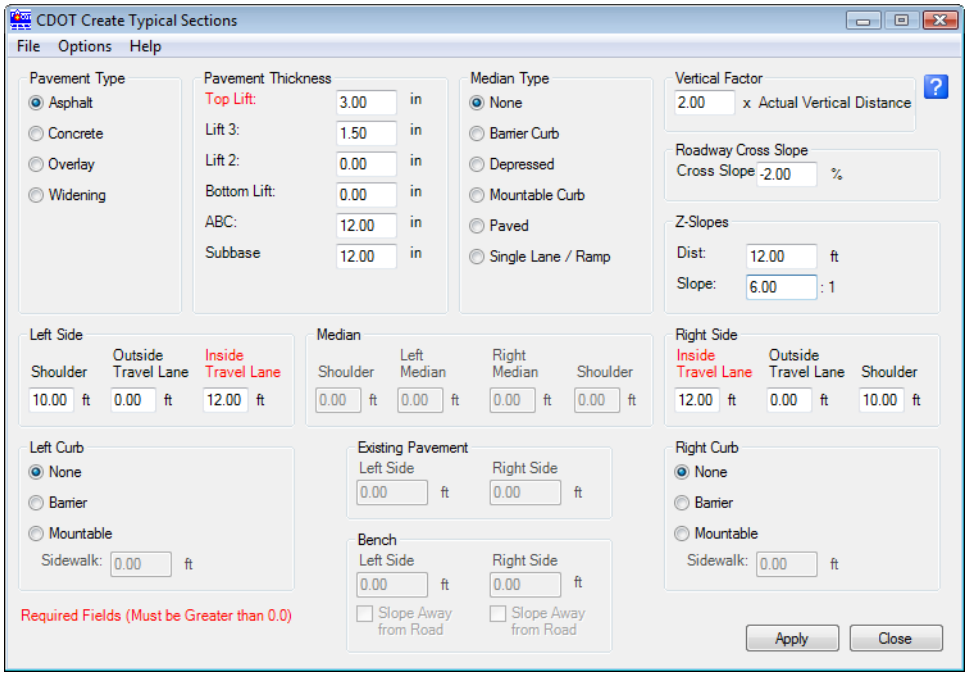


Create a 2-Lane Rural Typical Section

1. On the Create Typical Sections dialog box, select **Options > Writelock** to toggle it **On** (a check mark.

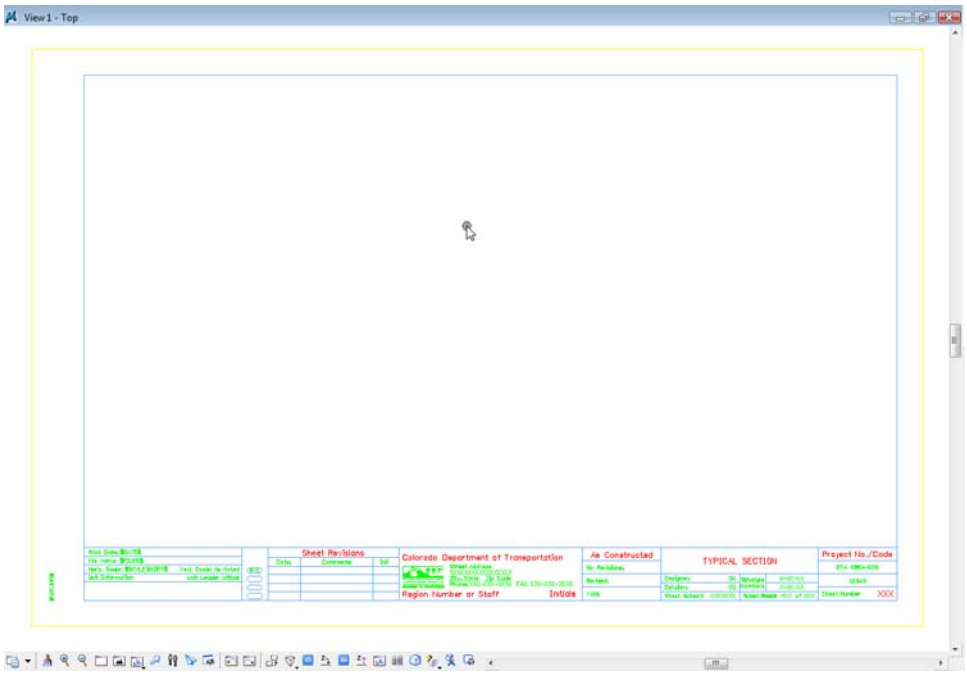
   Note: If **Writelock** is **On**, permanent graphics will be generated in the file. If **Writelock** toggle is **Off,** the graphics are temporary and if you zoom or pan, the graphics will disappear. A check mark next to **Writelock** indicates that it is on.

2. Set the **Typical Section Program** options as shown.



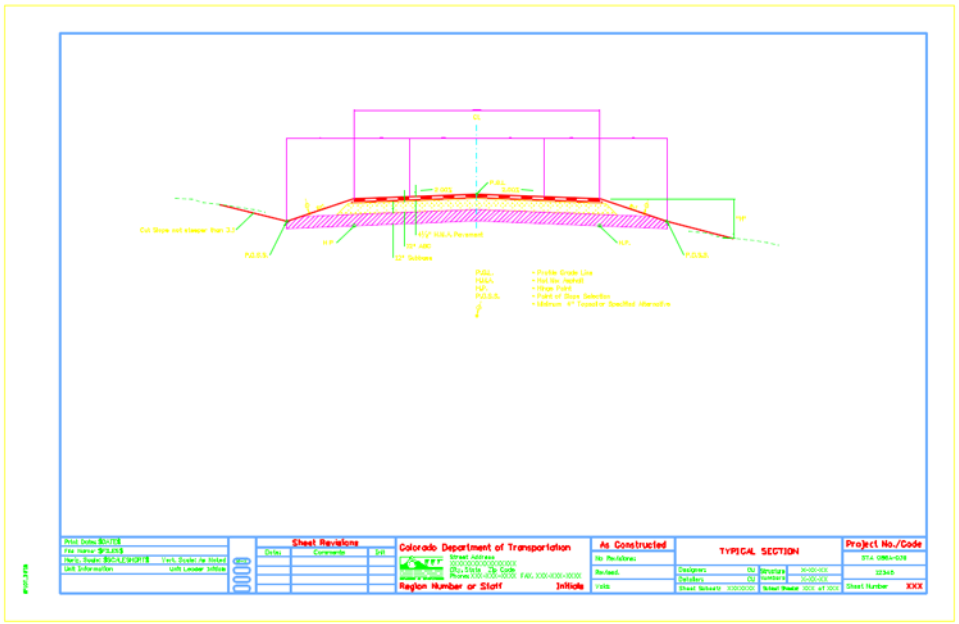
3. Select **Apply**.

4. When prompted to locate the profile grade point, **<D>** near the top-center of the sheet as shown.



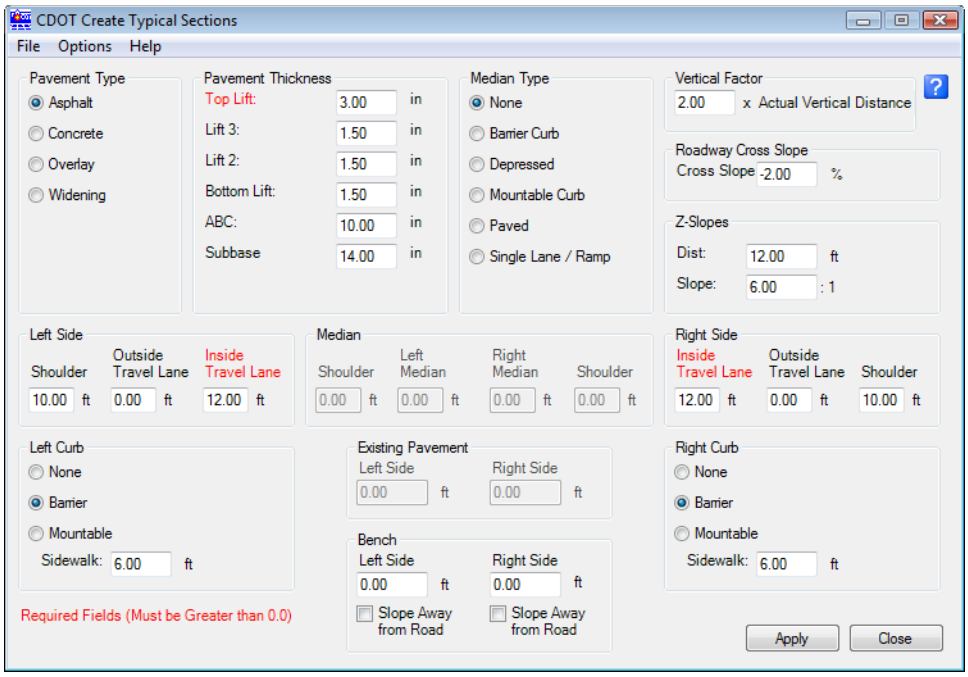
The 2-Lane rural section is automatically drawn, annotated and dimensioned.

5. ***Do not*** close the **Create Typical Section** dialog box.



Create a 2-Lane Urban Typical Section

1. Set the **Typical Section Program** options as shown.

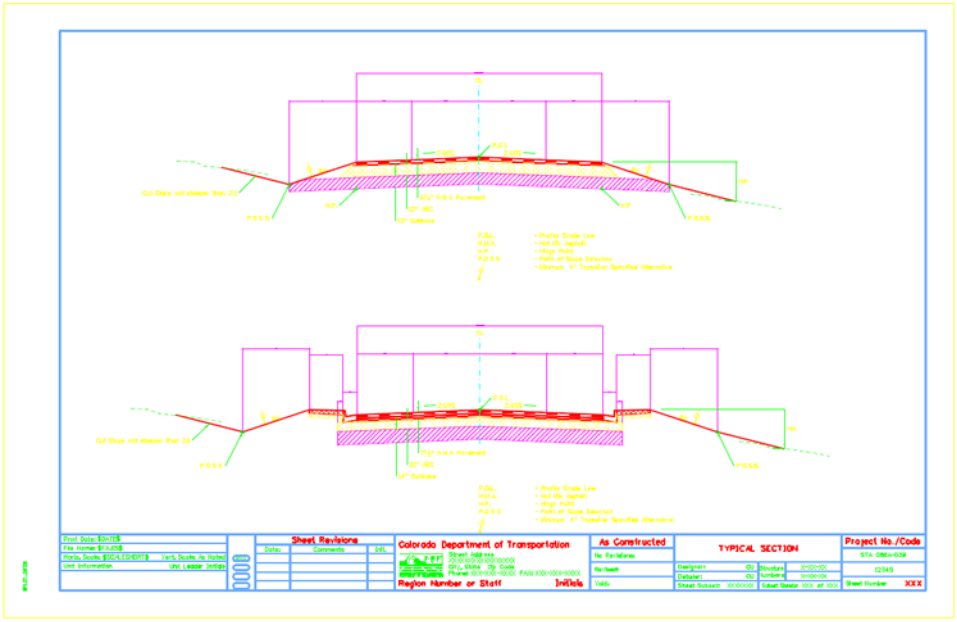


2. Select **Apply**.

3. When prompted to locate the profile grade point, **<D>** near the bottom-center of the sheet below the first section.

   The 2-Lane urban section is automatically drawn, annotated and dimensioned.

4. ***Do not*** close the **Create Typical Sections** dialog box.



Save the 2-Lane Urban Section Input File

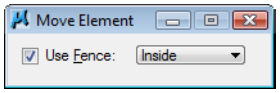
1. From the **Create Typical Section** dialog box, select **File > Save**.
2. Navigate to the **C:\Projects\12345\Miscellaneous** folder.
3. Key in a **File name *SH86_2L_Urban_Typical*** and select **Save**.

   The input file is saved. If you need to generate this typical section again, Select **File > Open** form the **Create Typical Section** dialog box and select this text file.
4. **Close** the **Create Typical Section** dialog box.

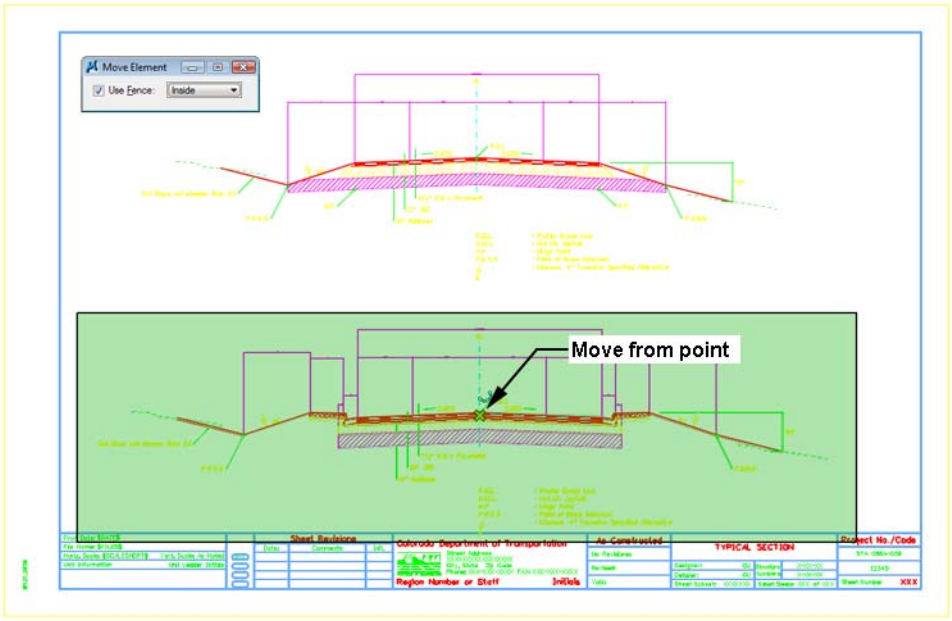
Align the Sections

Since you did not snap to a location for the sections, you may need to align the sections at their centerlines as well as move the section graphics into the border.

1. Place a fence block around the urban section.
2. Select the **Move** command from the **Manipulation** toolbar and toggle on **Use Fence**.



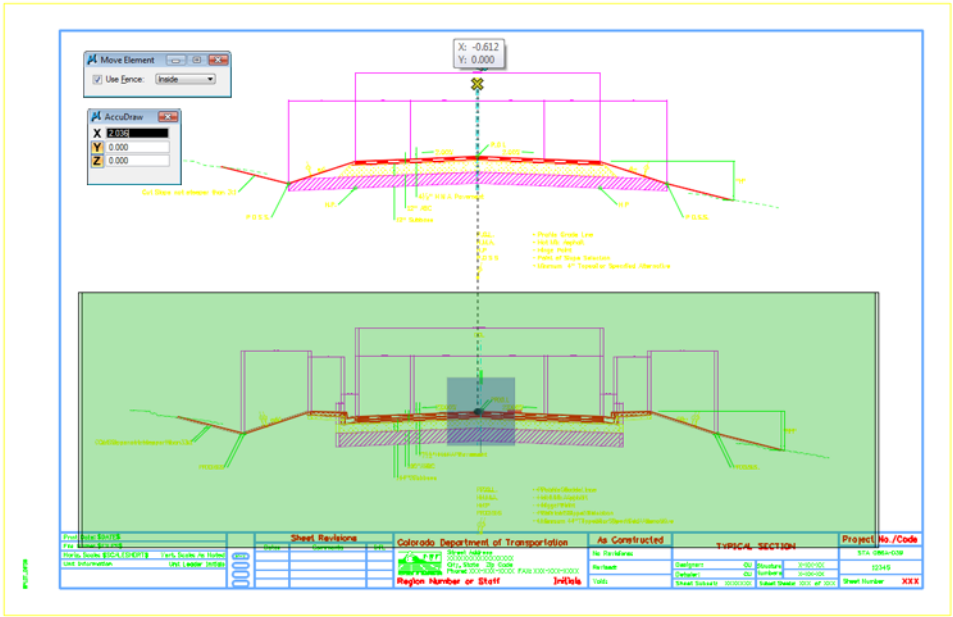
3. **AccuSnap** on the centerline of the urban section as shown for the move from point.



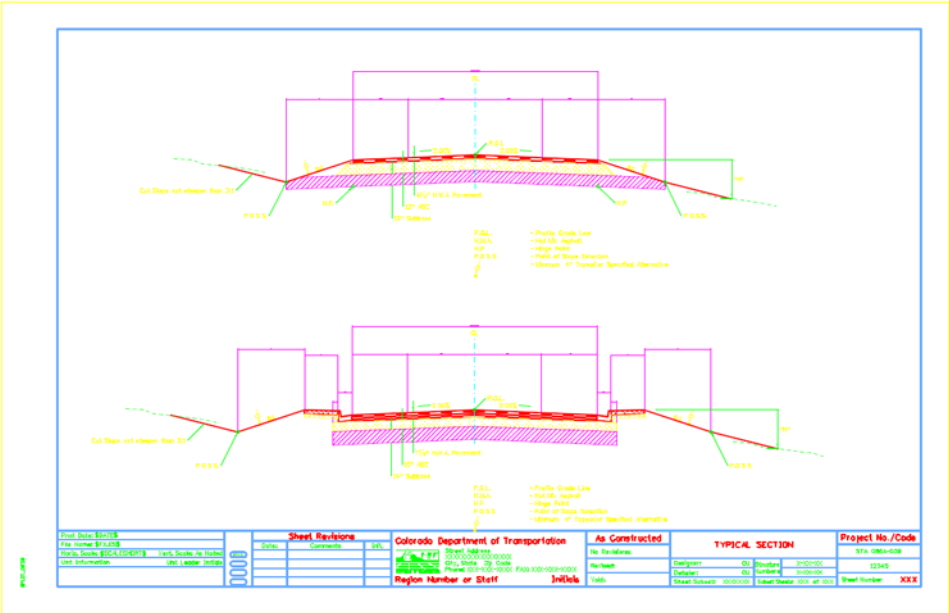
4. **Move** your cursor horizontally (either to the right or left), lock on AccuDraw's X-axis then press **<Enter>** on the keyboard.

   This **smartlocks** the **AccuDraw** axis so that you can only move in the horizontal direction.

5. **<D>** on the rural section centerline as shown for the move to point.



The two sections are now aligned at the centerlines.



6. **Fit** the view.
7. **Save Settings**.
8. **Exit** MicroStation.

LAB 16 - Create a Bridge General Layout Sheet at Different Scales

In this exercise, you'll create a General Layout sheet using the bridge graphics drawn earlier. The exercise will demonstrate how to create a sheet with graphics at different scales.

Chapter Objectives:

After completing this exercise you will know how to:

- Place a border at a 40-scale.
- Create saved views in the model file for referencing to the sheet.
- Reference plan graphics coincident-world at 1:1
- Reference saved-view section and detail graphics at different scales on the same sheet

Lab 16.1 - Setup Bridge Model File

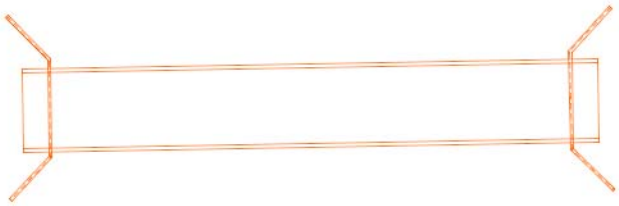
Open the bridge model file for plan

1. Start MicroStation.
2. **Open** the file **CU12345BRDG_Model.dgn** in the project's **\Bridge\Working** folder.

   The blank bridge model file opens.

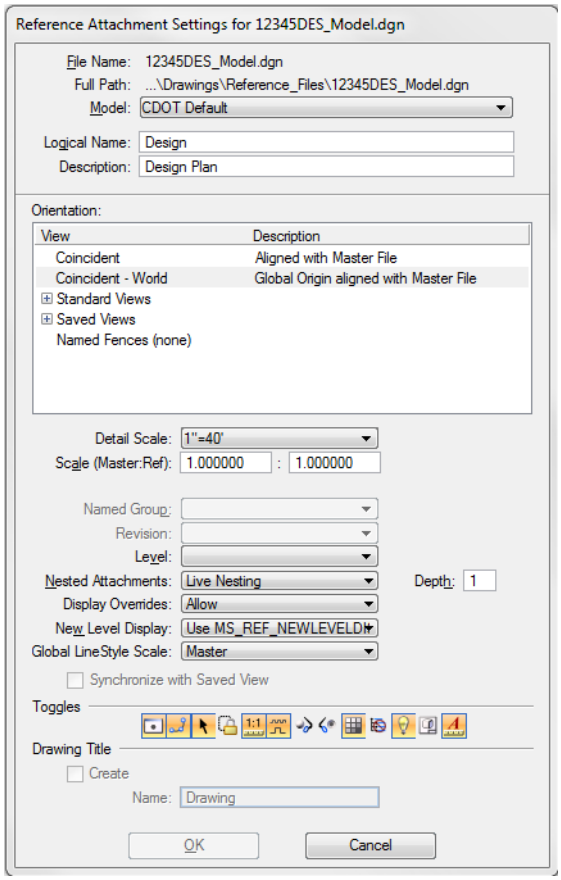
Reference the Design Model file

1. Open **Level Display** and turn on the **BRDG_TOOLS_Outline-Bridge** level.
2. **Fit** the view.



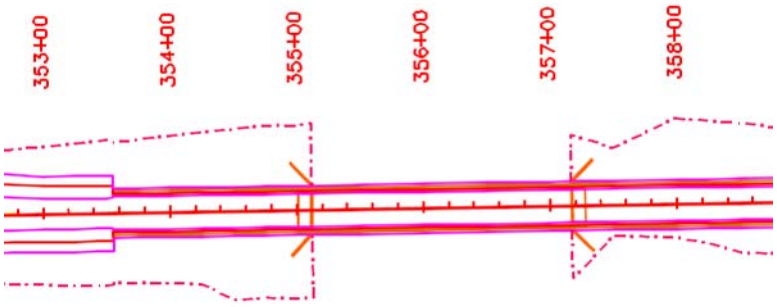
The proposed outline graphics for the bridge have been already created in plan view.

3. Attach the **12345DES_Model.dgn** from the project's **\Design\Drawings\Reference_Files** folder as shown. Attach Coincident-World at a Nesting Depth of 1. Do not attach raster references.



The design model is attached coincident to the proposed bridge graphics. A nested depth of 1 also references the Survey/Topo file (currently the Survey/Topo display is off). You will later reference the bridge plan to a sheet file.

4. **Zoom out** as shown.



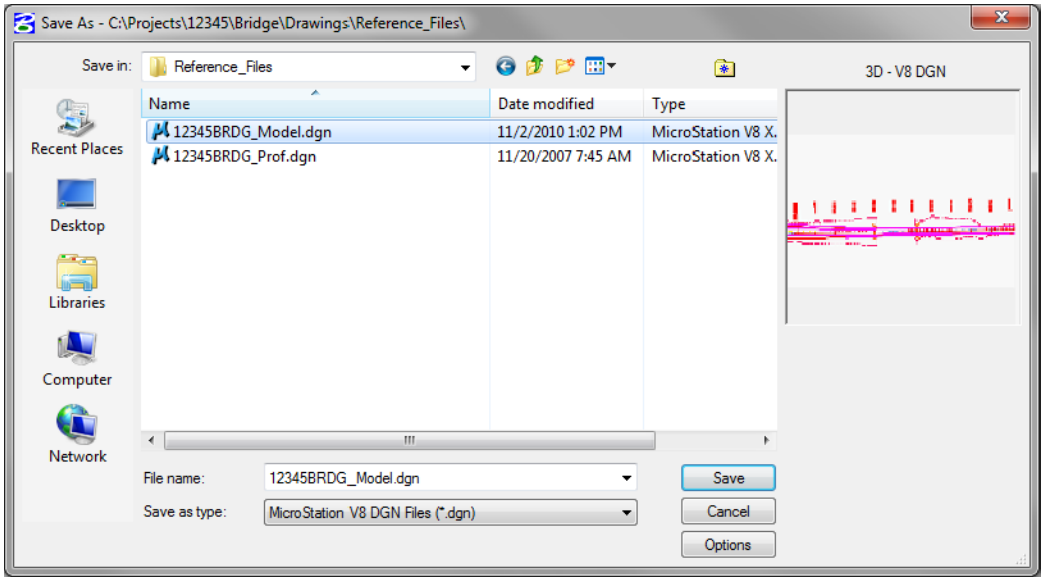
5. **Save Settings**.

Move the Bridge Model to the Reference_Files folder

Since the work in the model file is complete, move from the **Working** folder to the **Reference_Files** folder so that other groups can reference, if needed.

1. Select **File > Save As…**
2. Set the directory to **C:\Projects\12345\Bridge\Drawings\Reference_Files**
3. Remove the CU (CDOT User) initial prefix and rename the file to **12345BRDG_Model.dgn.**

Note: Your initials are removed from the file when it is ready to transfer to the **Reference_Files** folder.

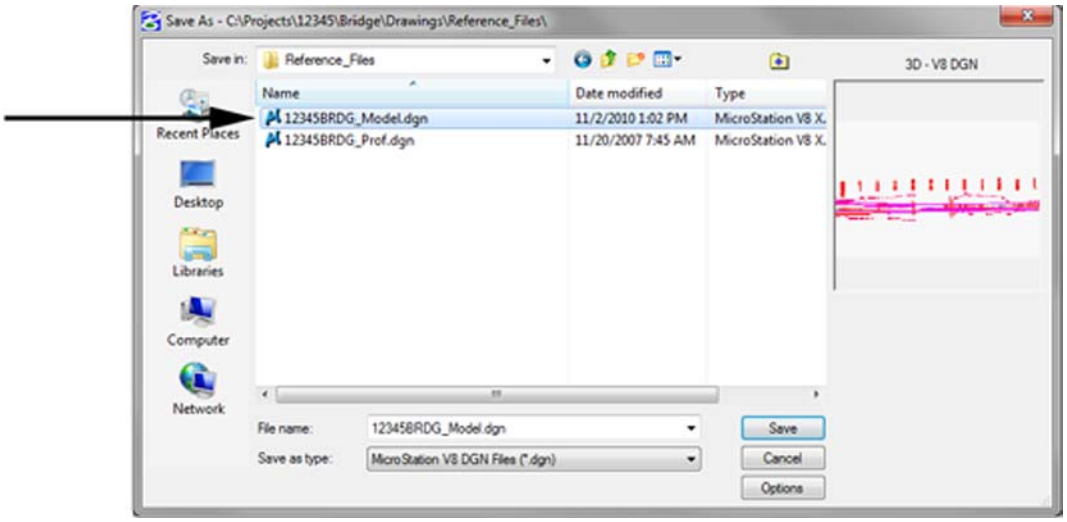


Note: The project template delivers standard dgn's for model and sheet files as starter files. You may be prompted to confirm saving over an existing file. Please use caution when performing these tasks as you could lose data. Be sure the files are empty or you are working with the latest files.

4. Select **OK** to save the file.

5. Select **File > Close** to return to the **MicroStation Manager**.

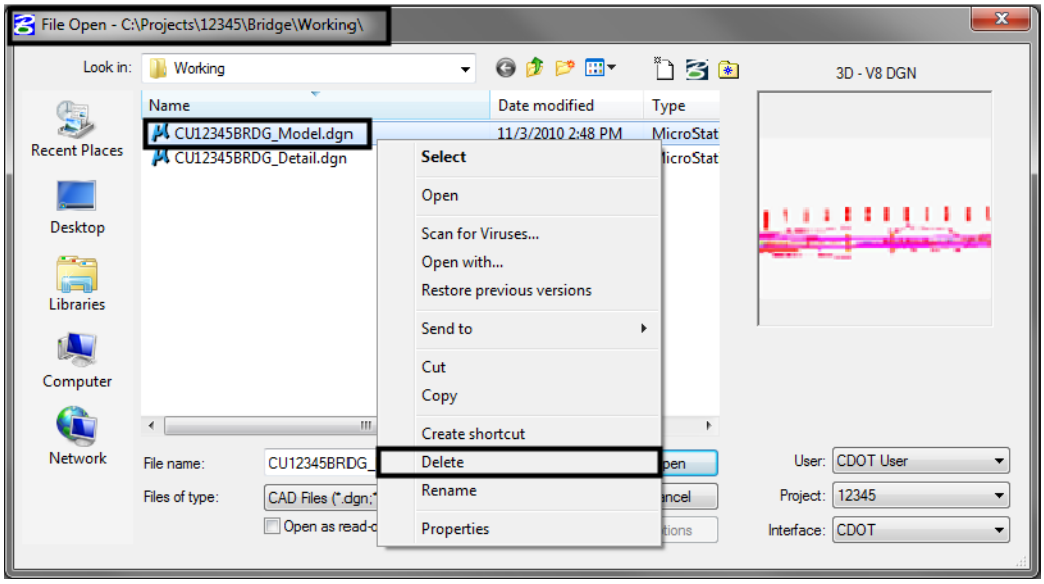
6. In the **MicroStation Manager**, verify your **12345BRDG_Model.dgn** file was copied to **Reference_Files** folder.



7. Change the directory to **\Bridge\Working.**

8. Select the **CU12345BRDG_Model.dgn** from the **Working** folder. ***Right*** click on the file and select **Delete**.

   Note: Make sure you select the BRDG_Model file and ***not*** the BRDG_Detail file.



9. Select **Yes** to delete the working file if prompted to confirm deleting an existing file.

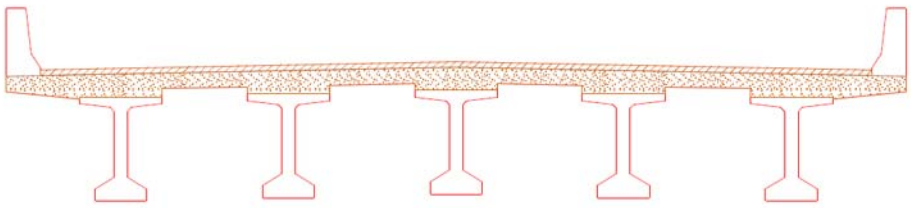
Open the bridge model file for section and details

1. Open the **CU12345BRDG_Detail.dgn** file from the **C:\Projects\12345\Bridge\Working** folder.

   a. Create Saved Views

1. **Fit** the view.

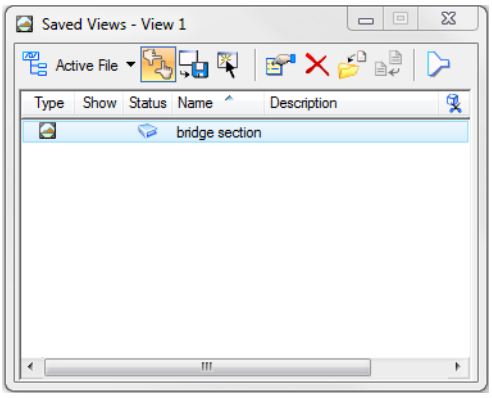
2. Make sure that only the section graphics are showing in the view. If not, **Window** around the bridge section. Be sure that the entire section encompasses the view and no other graphics are shown in the view.



3. Save the view by keying in ***sv=bridge section***

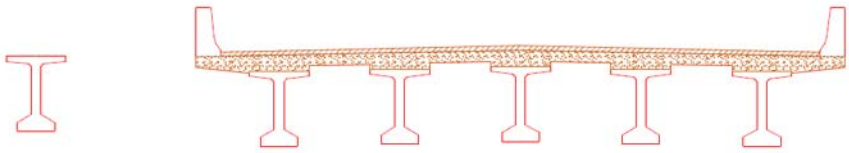
4. When prompted, **<D>** to in the view to save it.

5. Select **Utilities > Saved Views** to open the **Saved Views** dialog box and verify that the view was saved.



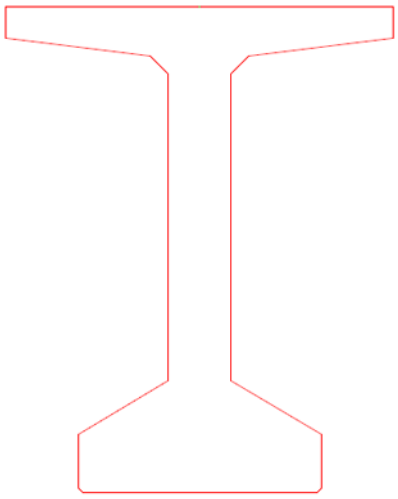
6. Make sure the **Graphic Group** lock is turned ***off***.

7. Select the **Copy** command and copy one of the BT 54 girder cells to the approximate location shown (outside of the section saved view).



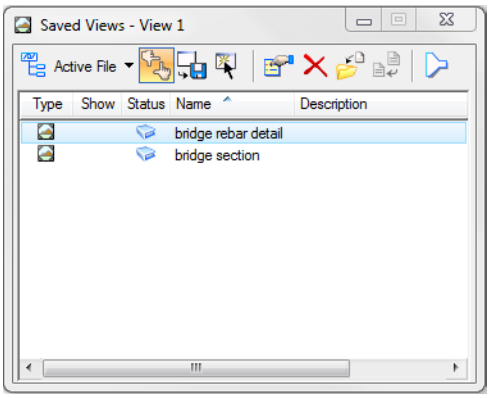
This will be used as a reference on your details sheet.

8. **Window** around the single girder you just copied to create a saved view for the girder detail. Make sure only the girder is shown in the view.



9. Key in ***sv=bridge rebar detail*** and **<D>** in the view to save.

   Note: You can either use the ***sv=*** keyin or the dialog box option to create saved views.



10. **Fit** the view.

11. **Save Settings**.

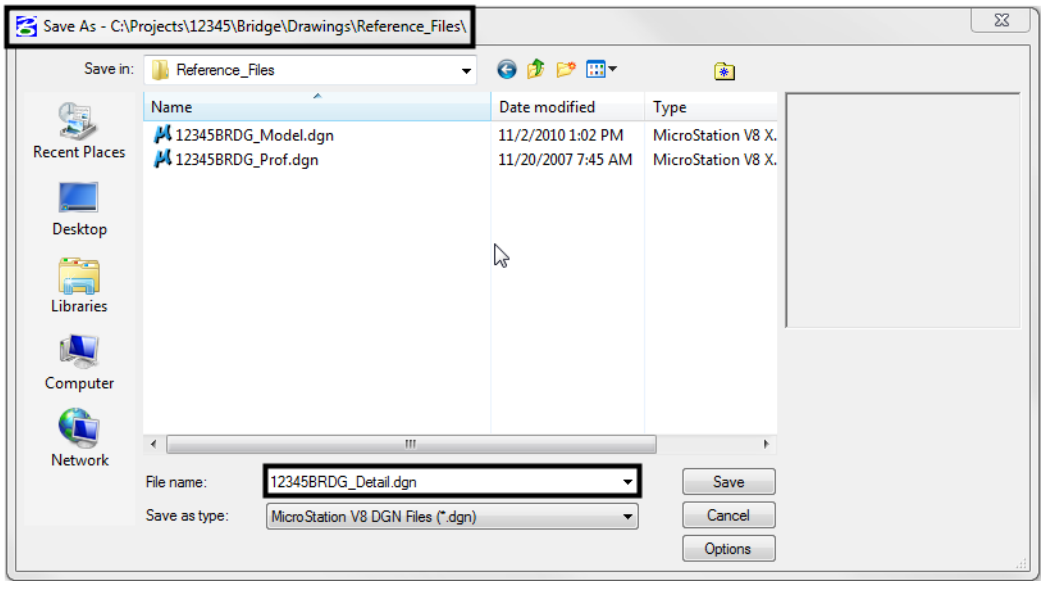
Move the model file to the Reference_Files folder

You're finished working in this bridge model file, so move it to the **Reference_Files** folder.

1. Select **File > Save As...**

2. Set the directory to **C:\Projects\12345\Bridge\Drawings\Reference_Files**

3. Remove the CU (CDOT User) initial prefix and rename the file to **12345BRDG_Detail.dgn.**

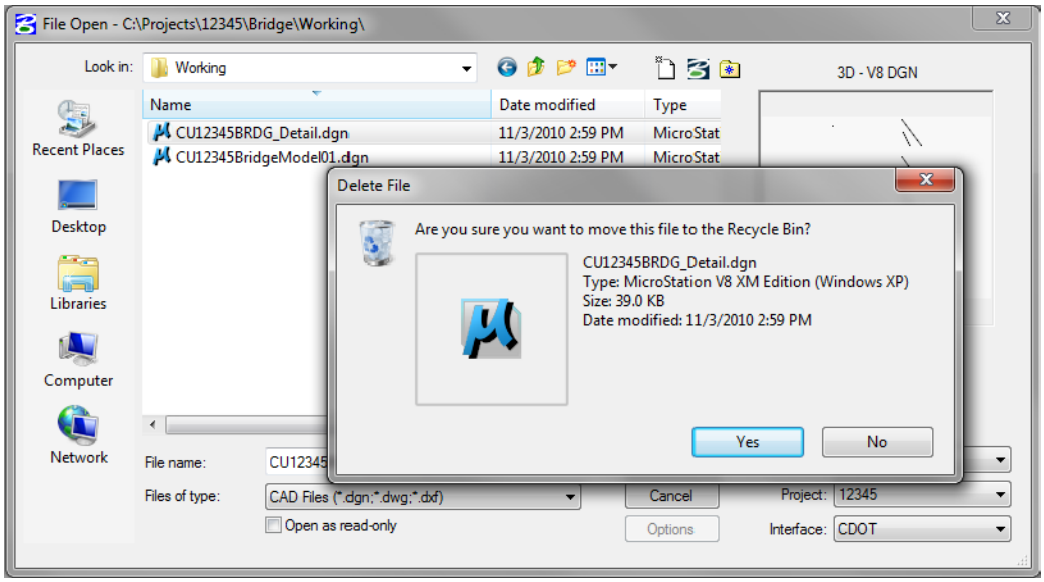


4. Select **Save** to save the file.

5. Select **File > Close** to return to the **MicroStation Manager**.

6. In the **MicroStation Manager**, verify your **12345BRDG_Detail.dgn** file was copied to **Reference_Files** folder.

7. Change the directory to the **\Bridge\Working** folder. Right click on the file and select **Delete** to delete the **CU12345BRDG_Detail.dgn** file.



8. Select **Yes** to delete the working file if prompted to confirm deleting an existing file.

Lab 16.2 - Create the Sheet File

Create a new sheet file from a seed file.

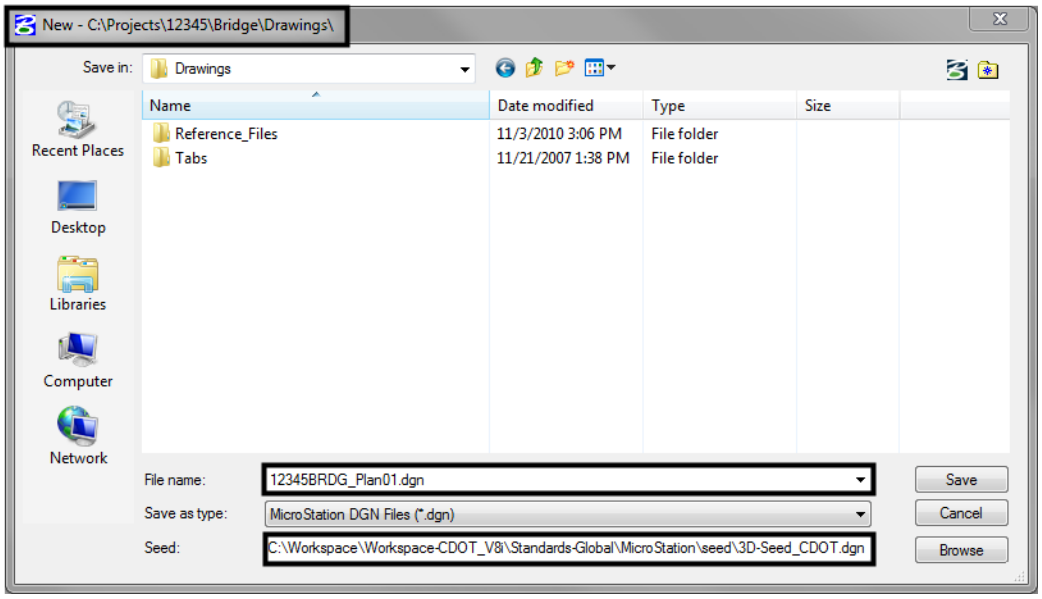
1. In the **MicroStation Manager**, set the folder location to **C:\Projects\12345\Bridge\Drawings**.

2. Select the **New File** icon from the **MicroStation Manager**.

3. In the **Seed File** section, choose the **Browse** button.

4. Select the seed file **3D-Seed_CDOT.dgn** and select **OK**.

5. In the **Files** field, key in the name ***12345BRDG_Plan01.dgn.***



6. Select **Save**.

   The file appears in the folder list.

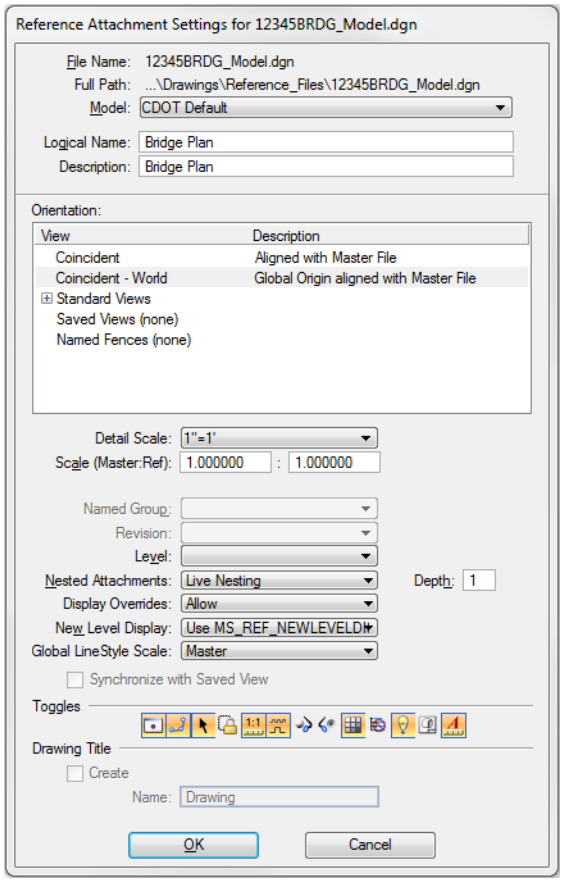
7. Select **Open** to open the file.

   The empty file is created with all of the Bridge default settings from the seed file.

Reference the Plan graphics

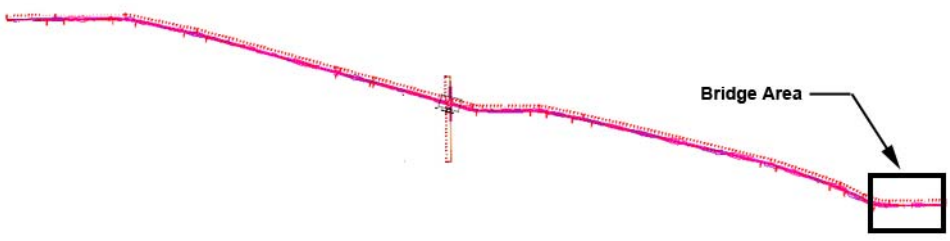
1. Reference the **12345BRDG_Model.dgn** file from the **\Bridge\Drawings\Reference_Files** folder.

2. In the **Attachment Settings** box, set the options as shown and select **OK**.

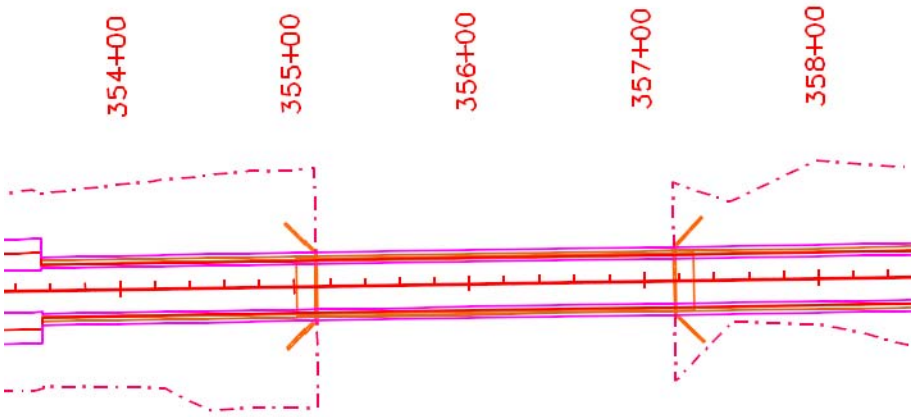


The bridge plan and the nested design reference are attached to the sheet file. Since you attached at a 1:1 scale and Coincident-World, all of the bridge plan graphics are in their true coordinate locations and actual size.

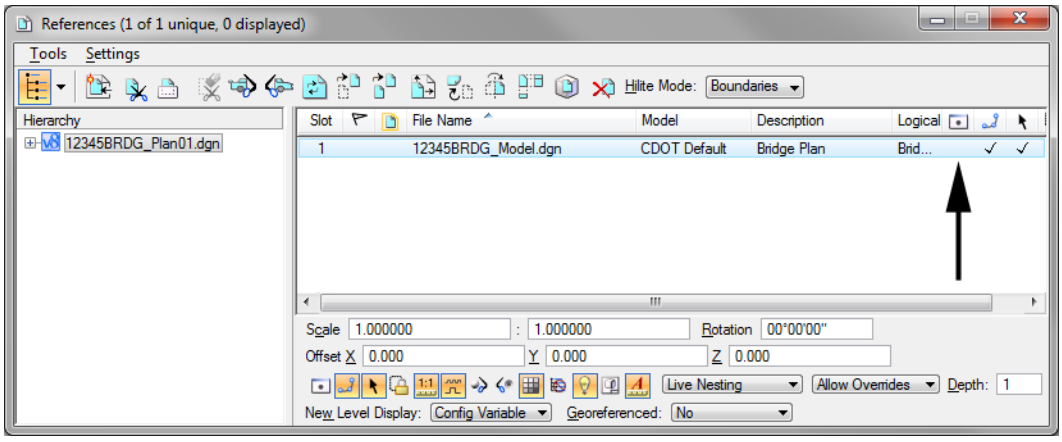
3. **Fit** the view.



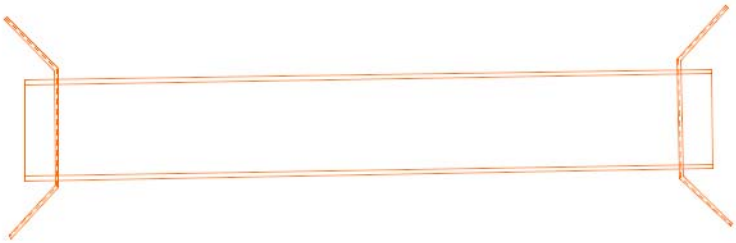
4. Window in on the bridge area as shown.



5. Toggle off the display of the Design reference.



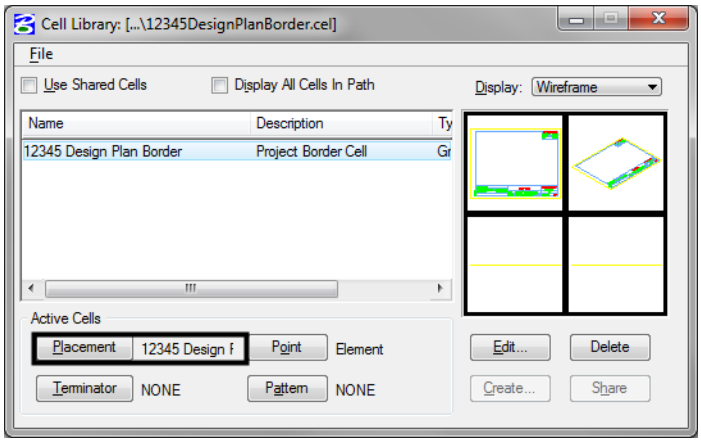
6. Only the graphics from the Bridge model are shown.



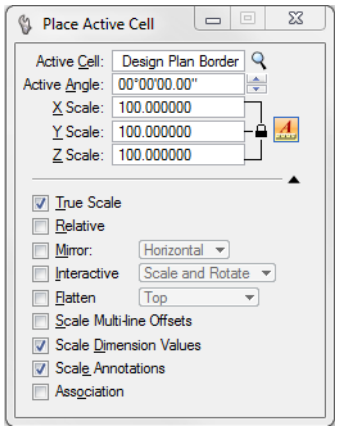
Place the border

With the bridge plan graphics in place, you can now place the border around them.

1. Select **Cells** from the **Primary** toolbar.
2. Select **File > Attach File** and attach the **12345DesignPlanBorder** cell library from the **C:\Projects\12345\Miscellaneous** folder.
3. Select the **Placement** option for this cell.

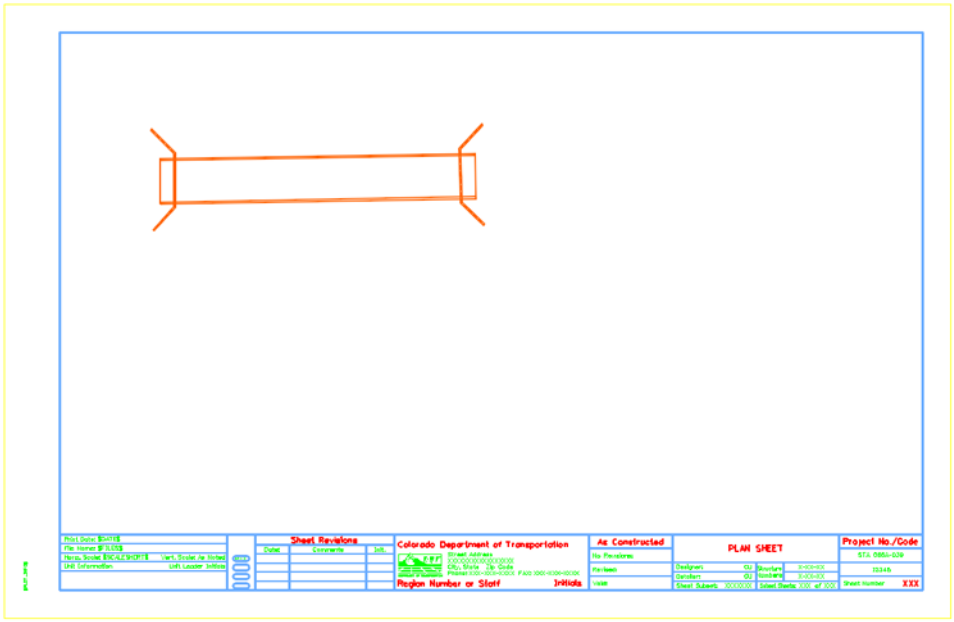


4. Select the **Place Active Cell** command and place the border at a 40 scale.

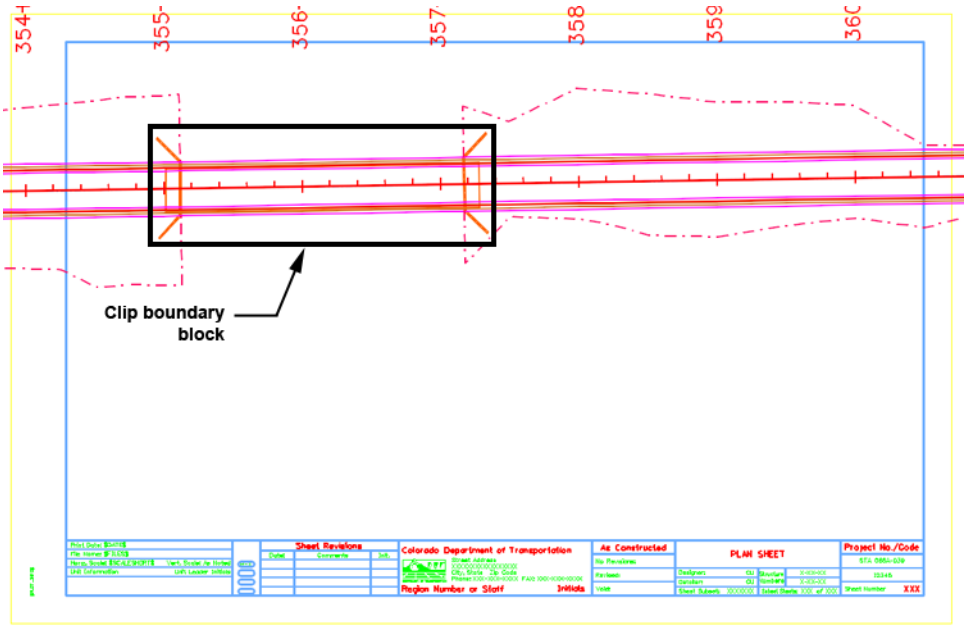


The border scale is the same as the plot scale of 1”=40’.

5. **<D>** to place the border in the location shown. Be sure to position the border so that the bridge plan is in the upper left corner.

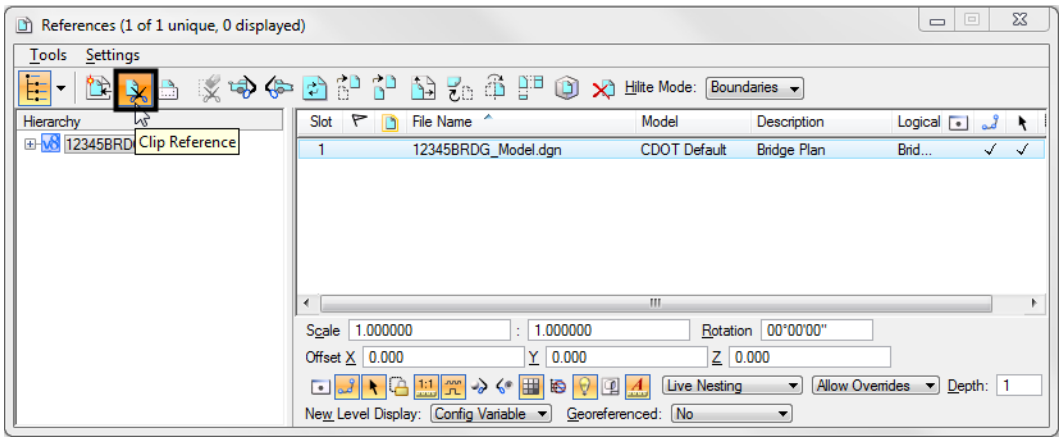


6. Turn on the display of the design reference.

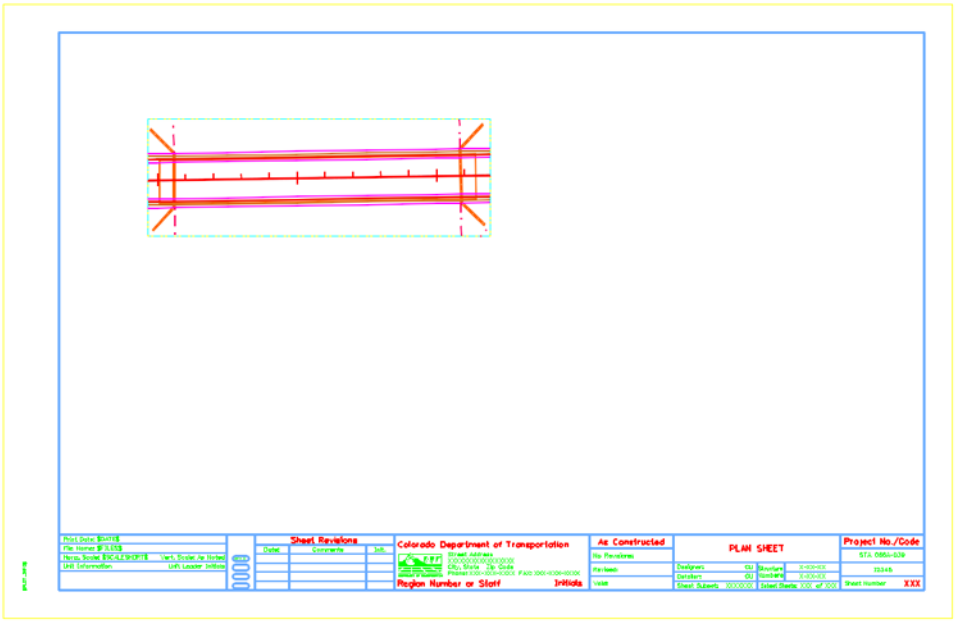


7. On the CDOT Menu Explorer, select **Drafting**.
   - Select the **Border** category.
   - Select the **Clip Boundary** item.
8. Select the **Place Block** command and place the clip boundary block as shown.

9. From the **Reference** dialog box, select the Bridge model reference and then select **Tools > Clip Boundary**.



10. **<D>** on the clip boundary to clip the design model reference.



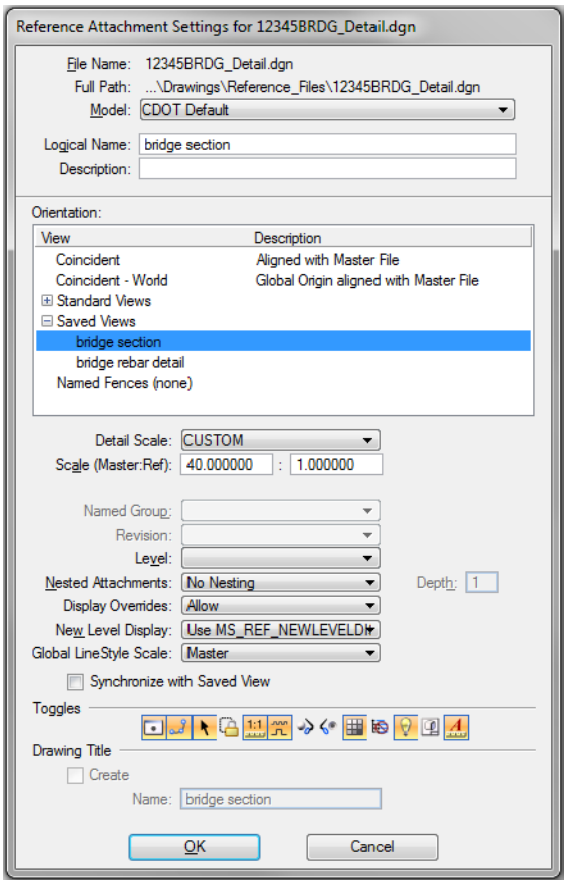
The bridge plan is now place inside the border at the proper coordinates. Design graphics levels can be turned on/off as needed.

Reference additional graphics at various scales

Reference the typical section at a scale of 1" = 10'

1. From the References dialog, attach the file **12345BRDG_Detail.dgn** from the **\Bridge\Drawings\Reference_Files** folder.

2. In the **Attachment Settings** box:

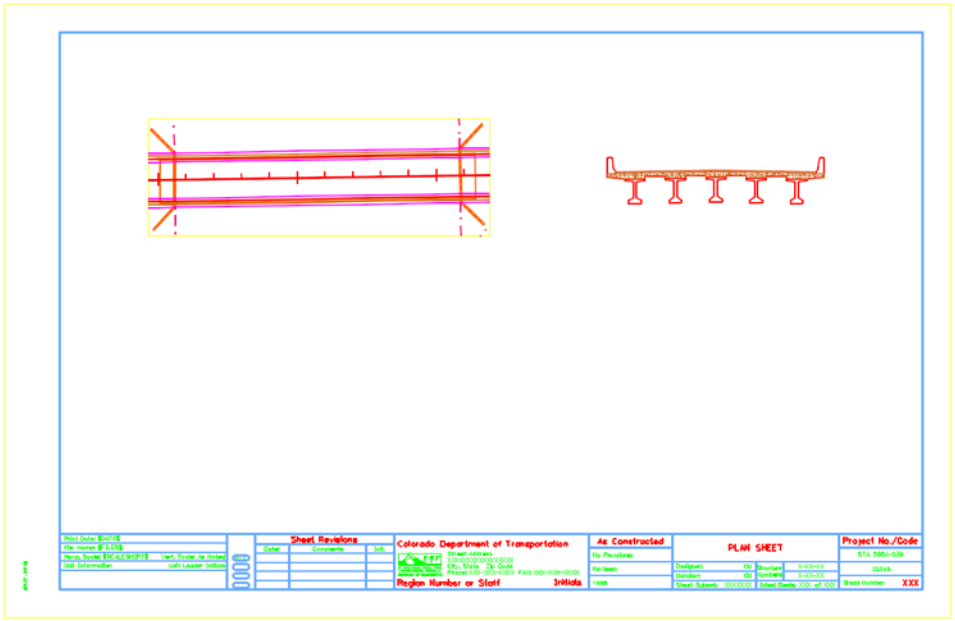


- Select the saved view **Bridge Section** (the logical name will update to the saved view name).
- Set the **Scale** to ***40:10***

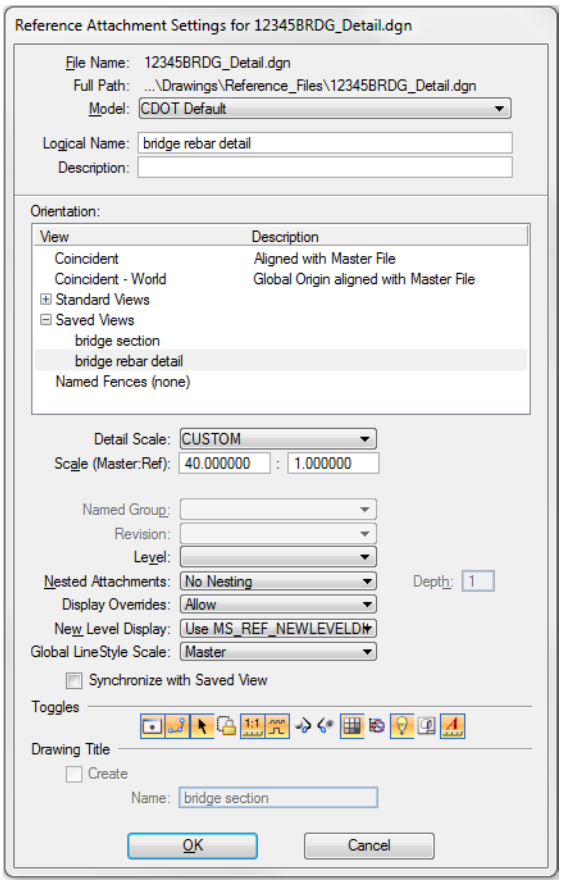
Note: When working with multiple scales, always key in the border scale in the first field (Master) and the detail scale in the second field (Ref). MicroStation will calculate the scale for your, or you could calculate it yourself and enter ***4:1***.

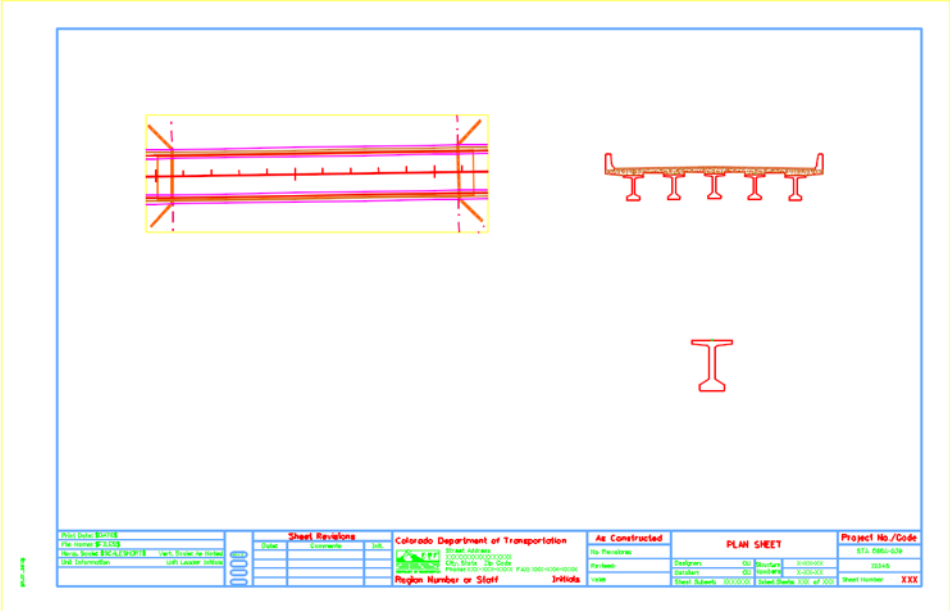
- Set the other options as shown.

3. Select **OK** and **<D>** to position the saved view reference in the location shown.



4. Reference the **12345BRDG_Detail.dgn** again and repeat the above process and reference the bridge rebar detail at a scale of 1”=5’.





Note: You'll annotate and dimension this sheet in the next lab.

5. **Fit** the view.
6. **Save Settings**.
7. **Exit** MicroStation.

LAB 17 - Create a General Notes Sheet

The **12345DES_GenNote.dgn** has been created in the project's **\Design\Drawings** folder through the create project utility. This sheet file currently is linked to a generic notes doc file in the CDOT workspace. However, the sheet files should reference the project-specific notes file, **12345GemeralNote.dgn** located in the **\Design\Drawings\Reference Files** folder. You must first update the references in the sheet file to point to the project notes, and then edit the project notes file to be project-specific.

Note: This process is the same for any specialty group.

Chapter Objectives:

After completing this exercise you will know how to:

- Open a project notes sheet file.
- Update the Word document link to point to the 12345 project directory.
- Edit the project-specific general notes Word file.
- Re-link the General Notes Word file to the Notes sheet file.

Lab 17.1 - Create Project General Notes Sheet

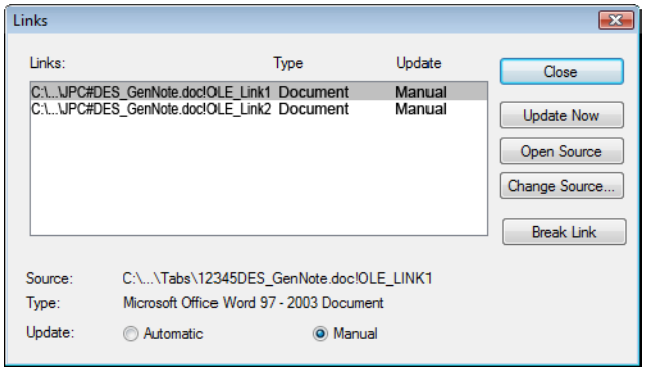
Updating Links

1. Start MicroStation and open the file **12345DES_GenNote##.dgn** from the **C:\Projects\12345\Design\Drawings** folder.

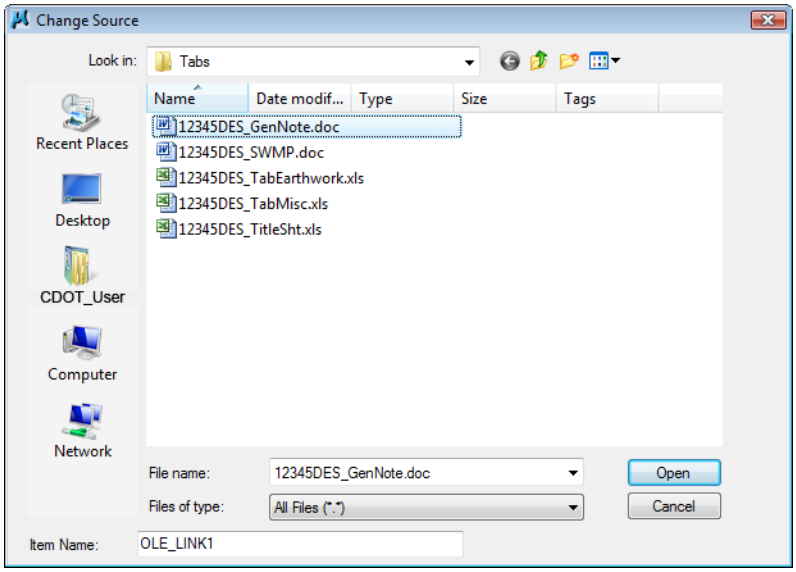
This file was automatically generated by the create project utility program and contains links to a General Notes Word document in the generic project template folder. You will need to update these links to the General Notes Word document in the project folder.

2. Select **Edit > Links**.

3. Highlight the first link in the list and select **Change Source**.

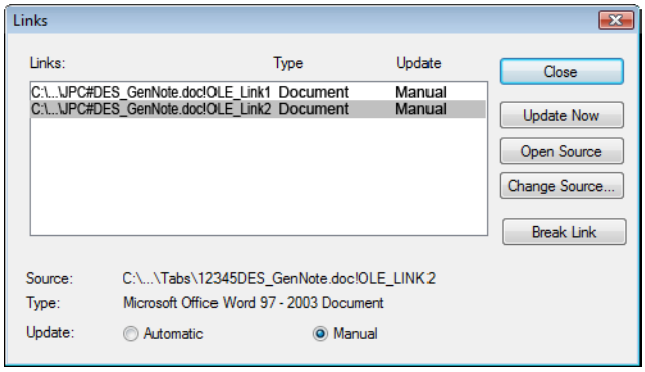


4. In the **Change Source** dialog box, set the Look in folder to **C:\Projects\12345\Design\Drawings\Tabs** and select the file **12345DES_GenNote.doc**.



5. Select **Open** to update the link.

6. Repeat this process for the second link.



7. **Close** the **Links** dialog box.

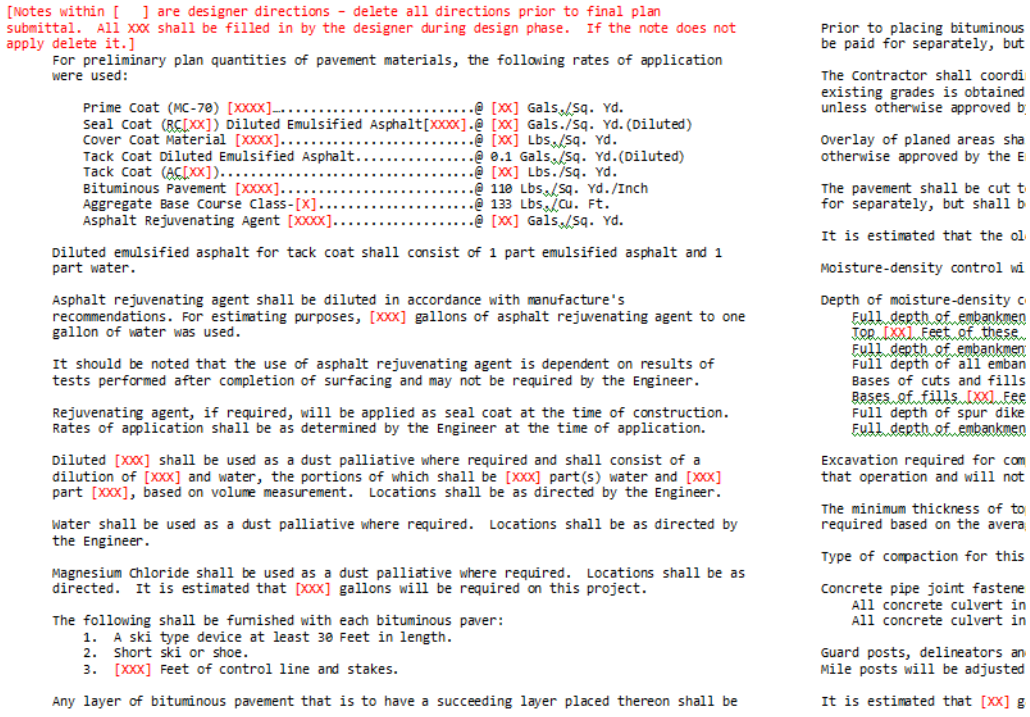
8. **Save Settings** (**File > Save Settings**).

   The General Notes sheet file is now linked to the GenNotes.doc file in the project-specific folder. You can now edit the Word file for your project-specific requirements.

Editing the Notes

1. Double click on the first notes link (left sheet).

   This opens Microsoft Word and the **GenNotes.doc** file.



[Notes within [ ] are designer directions - delete all directions prior to final plan submittal. All XXX shall be filled in by the designer during design phase. If the note does not apply delete it.]

For preliminary plan quantities of pavement materials, the following rates of application were used:

Prime Coat (MC-70) [XXXX].....@ [XX] Gals./Sq. Yd.
Seal Coat (RC[XX]) Diluted Emulsified Asphalt[XXXX].@ [XX] Gals./Sq. Yd.(Diluted)
Cover Coat Material [XXXX].....@ [XX] Lbs./Sq. Yd.
Tack Coat Diluted Emulsified Asphalt.....@ 0.1 Gals./Sq. Yd.(Diluted)
Tack Coat (AC[XX]).....@ [XX] Lbs./Sq. Yd.
Bituminous Pavement [XXXX].....@ 110 Lbs./Sq. Yd./Inch
Aggregate Base Course Class-[X].....@ 133 Lbs./Cu. Ft.
Asphalt Rejuvenating Agent [XXXX].....@ [XX] Gals./Sq. Yd.

Diluted emulsified asphalt for tack coat shall consist of 1 part emulsified asphalt and 1 part water.

Asphalt rejuvenating agent shall be diluted in accordance with manufacture's recommendations. For estimating purposes, [XXX] gallons of asphalt rejuvenating agent to one gallon of water was used.

It should be noted that the use of asphalt rejuvenating agent is dependent on results of tests performed after completion of surfacing and may not be required by the Engineer.

Rejuvenating agent, if required, will be applied as seal coat at the time of construction. Rates of application shall be as determined by the Engineer at the time of application.

Diluted [XXX] shall be used as a dust palliative where required and shall consist of a dilution of [XXX] and water, the portions of which shall be [XXX] part(s) water and [XXX] part [XXX], based on volume measurement. Locations shall be as directed by the Engineer.

Water shall be used as a dust palliative where required. Locations shall be as directed by the Engineer.

Magnesium Chloride shall be used as a dust palliative where required. Locations shall be as directed. It is estimated that [XXX] gallons will be required on this project.

The following shall be furnished with each bituminous paver:
1. A ski type device at least 30 Feet in length.
2. Short ski or shoe.
3. [XXX] Feet of control line and stakes.

Any layer of bituminous pavement that is to have a succeeding layer placed thereon shall be

Prior to placing bituminous
be paid for separately, but

The Contractor shall coordi
existing grades is obtained
unless otherwise approved b

Overlay of planed areas sha
otherwise approved by the E

The pavement shall be cut t
for separately, but shall b

It is estimated that the ol

Moisture-density control wi

Depth of moisture-density c
Full depth of embankmen
Top [XX] Feet of these
Full depth of embankmen
Full depth of all emban
Bases of cuts and fills
Bases of fills [XX] Fee
Full depth of spur dike
Full depth of embankmen

Excavation required for com
that operation and will not

The minimum thickness of to
required based on the avera

Type of compaction for this

Concrete pipe joint fastene
All concrete culvert in
All concrete culvert in

Guard posts, delineators an
Mile posts will be adjusted

It is estimated that [XX] g

2. Read the first instructional paragraph (red text) and then delete it.

3. Delete the following text:

   Prime Coat (MC-70) [XXXX] .....@ .XX Gals./Sq. Yd.

   Seal Coat (RC[XX]) Diluted Emulsified Asphalt [XXXX] .....@ XX Gals./Sq. Yd. (Diluted)

   Cover Coat Material [XXXX].....@ XX Lbs./Sq. Yd.

   Tack Coat (AC[XX].....@ XX Lbs./Sq. Yd.

   Asphalt Rejuvenating Agent [XXXX].....@ XX Gals./Sq. Yd.

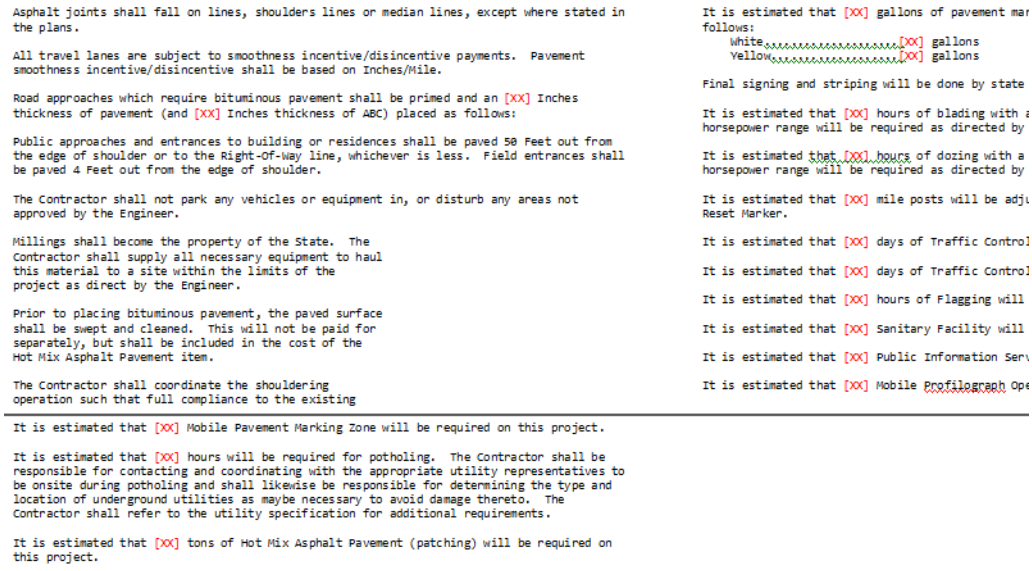
4. Edit the following text to read as follows:

   Tack Coat Diluted Emulsified Asphalt.....@ 0.1 Gals./Sq. Yd. (Diluted)

Bituminous Pavement…….....@ 110 Lbs./Sq. Yd./Inch

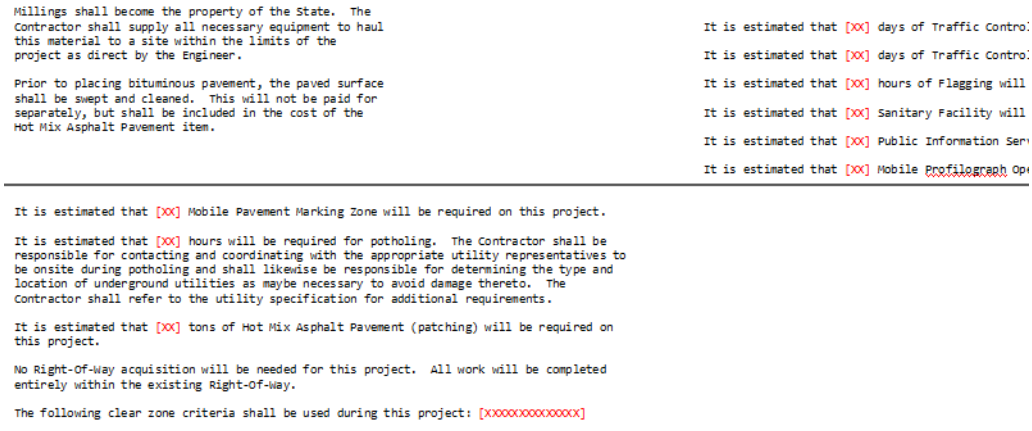
Aggregate Base Course (Class 6).....@ 133 Lbs/Cu Yd

5. At the bottom of the first column, add a blank line to place the paragraph beginning "*The Contractor shall coordinate the shouldering…*" at the top of the next column.



6. Look at the top of the next page and note that your edits have adjusted the text wrapping. The next page now starts with the note:

   It is estimated that [XX] Mobile Pavement Marking Zone will be required on this project.



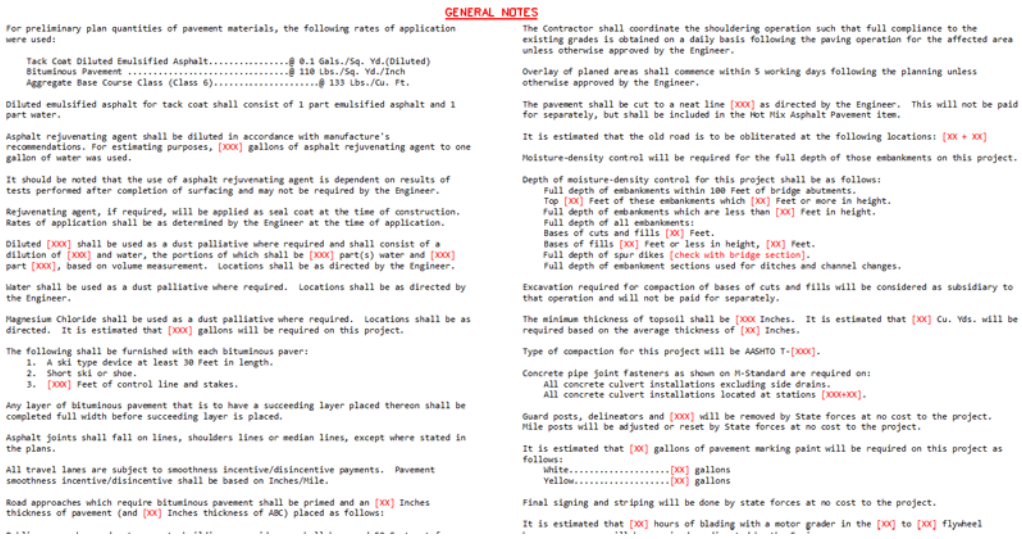
7. Review the text to make sure the edits are correct. If not, edit the text again until you're satisfied.

8. In Word, select **File > Exit** and select **Yes** when prompted to save changes.

   You are returned to the General Notes sheet in MicroStation.

Review the changes in the sheet file

1. Zoom in on the notes on the first sheet and note your text edits have been updated in the DGN file.



GENERAL NOTES

For preliminary plan quantities of pavement materials, the following rates of application were used:

Tack Coat Diluted Emulsified Asphalt.....@ 0.1 Gals./Sq. Yd.(Diluted)
Bituminous Pavement .....@ 110 Lbs./Sq. Yd./Inch
Aggregate Base Course Class (Class 6).....@ 133 Lbs./Cu. Ft.

Diluted emulsified asphalt for tack coat shall consist of 1 part emulsified asphalt and 1 part water.

Asphalt rejuvenating agent shall be diluted in accordance with manufacture's recommendations. For estimating purposes, [XXX] gallons of asphalt rejuvenating agent to one gallon of water was used.

It should be noted that the use of asphalt rejuvenating agent is dependent on results of tests performed after completion of surfacing and may not be required by the Engineer.

Rejuvenating agent, if required, will be applied as seal coat at the time of construction. Rates of application shall be as determined by the Engineer at the time of application.

Diluted [XXX] shall be used as a dust palliative where required and shall consist of a dilution of [XXX] and water, the portions of which shall be [XXX] part(s) water and [XXX] part [XXX], based on volume measurement. Locations shall be as directed by the Engineer.

Water shall be used as a dust palliative where required. Locations shall be as directed by the Engineer.

Magnesium Chloride shall be used as a dust palliative where required. Locations shall be as directed. It is estimated that [XXX] gallons will be required on this project.

The following shall be furnished with each bituminous paver:
1. A ski type device at least 30 Feet in length.
2. Short ski or shoe.
3. [XXX] Feet of control line and stakes.

Any layer of bituminous pavement that is to have a succeeding layer placed thereon shall be completed full width before succeeding layer is placed.

Asphalt joints shall fall on lines, shoulders lines or median lines, except where stated in the plans.

All travel lanes are subject to smoothness incentive/disincentive payments. Pavement smoothness incentive/disincentive shall be based on Inches/Mile.

Road approaches which require bituminous pavement shall be primed and an [XX] Inches thickness of pavement (and [XX] Inches thickness of ABC) placed as follows:

The Contractor shall coordinate the shouldering operation such that full compliance to the existing grades is obtained on a daily basis following the paving operation for the affected area unless otherwise approved by the Engineer.

Overlay of planed areas shall commence within 5 working days following the planning unless otherwise approved by the Engineer.

The pavement shall be cut to a neat line [XXX] as directed by the Engineer. This will not be paid for separately, but shall be included in the Hot Mix Asphalt Pavement item.

It is estimated that the old road is to be obliterated at the following locations: [XX + XX]

Moisture-density control will be required for the full depth of those embankments on this project.

Depth of moisture-density control for this project shall be as follows:
Full depth of embankments within 100 Feet of bridge abutments.
Top [XX] Feet of these embankments which [XX] Feet or more in height.
Full depth of embankments which are less than [XX] Feet in height.
Full depth of all embankments:
Bases of cuts and fills [XX] Feet.
Bases of fills [XX] Feet or less in height, [XX] Feet.
Full depth of spur dikes [check with bridge section].
Full depth of embankment sections used for ditches and channel changes.

Excavation required for compaction of bases of cuts and fills will be considered as subsidiary to that operation and will not be paid for separately.

The minimum thickness of topsoil shall be [XXX Inches. It is estimated that [XX] Cu. Yds. will be required based on the average thickness of [XX] Inches.

Type of compaction for this project will be AASHTO T-[XXX].

Concrete pipe joint fasteners as shown on M-Standard are required on:
All concrete culvert installations excluding side drains.
All concrete culvert installations located at stations [XXX+XX].

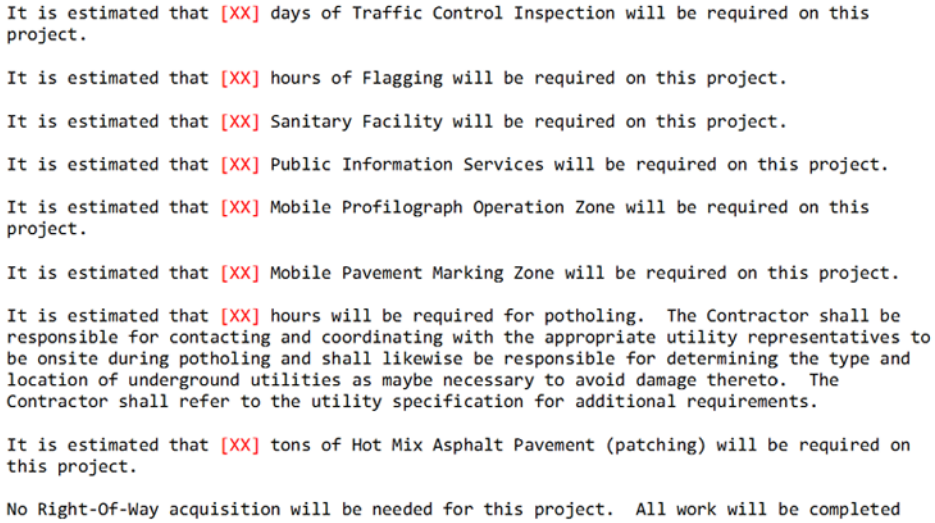
Guard posts, delineators and [XXX] will be removed by State forces at no cost to the project. Mile posts will be adjusted or reset by State forces at no cost to the project.

It is estimated that [XX] gallons of pavement marking paint will be required on this project as follows:
White.....[XX] gallons
Yellow.....[XX] gallons

Final signing and striping will be done by state forces at no cost to the project.

It is estimated that [XX] hours of blading with a motor grader in the [XX] to [XX] flywheel

2. Zoom in on the notes on the second sheet (right side) and notice that your edits have ***not*** been updated in the file.



It is estimated that [XX] days of Traffic Control Inspection will be required on this project.

It is estimated that [XX] hours of Flagging will be required on this project.

It is estimated that [XX] Sanitary Facility will be required on this project.

It is estimated that [XX] Public Information Services will be required on this project.

It is estimated that [XX] Mobile Profilograph Operation Zone will be required on this project.

It is estimated that [XX] Mobile Pavement Marking Zone will be required on this project.

It is estimated that [XX] hours will be required for potholing. The Contractor shall be responsible for contacting and coordinating with the appropriate utility representatives to be onsite during potholing and shall likewise be responsible for determining the type and location of underground utilities as maybe necessary to avoid damage thereto. The Contractor shall refer to the utility specification for additional requirements.

It is estimated that [XX] tons of Hot Mix Asphalt Pavement (patching) will be required on this project.

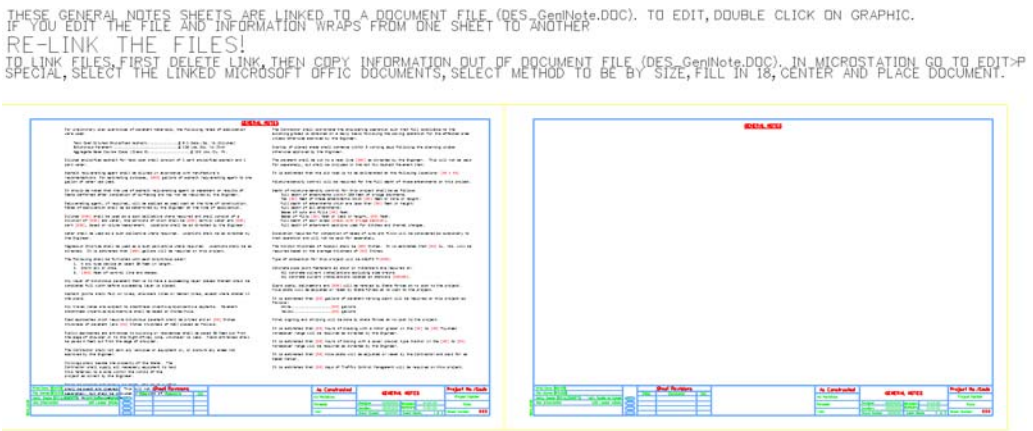
No Right-Of-Way acquisition will be needed for this project. All work will be completed

Note: If you make edits that change the wrapping of text between pages in the Word document, you must re-link the file for the edits to update in the MicroStation DGN file.

Re-link the Word document

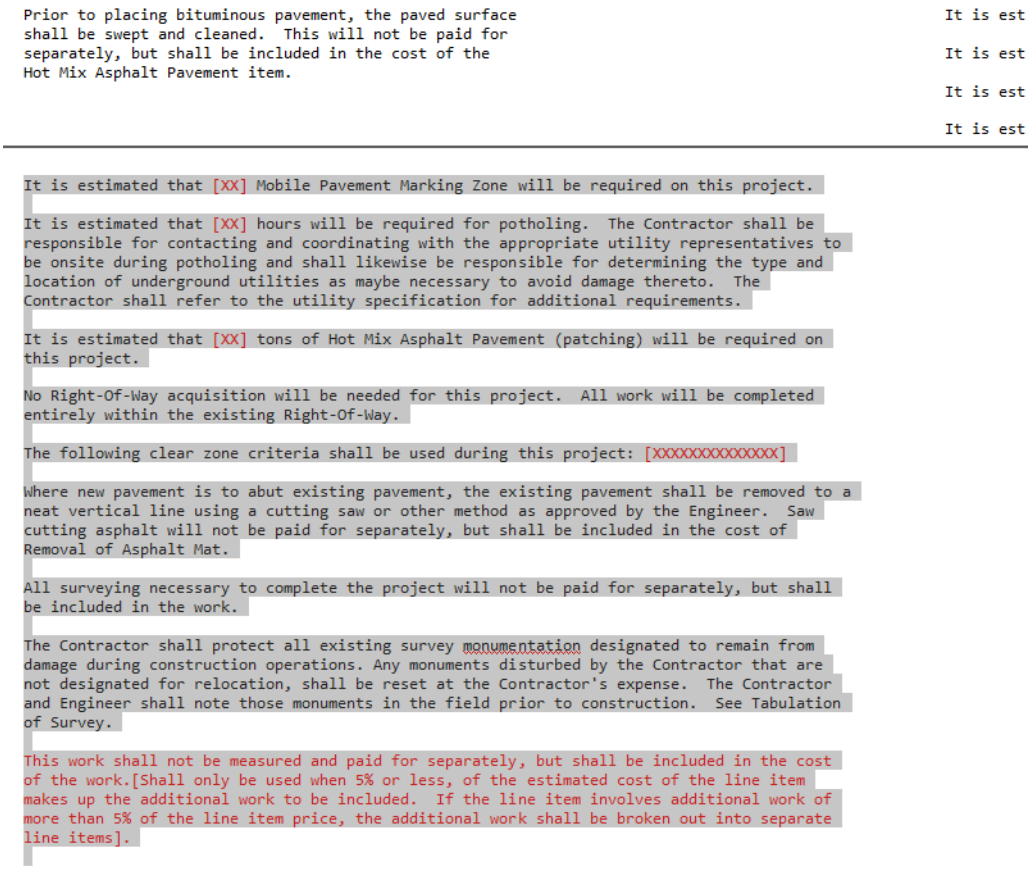
1. Use the **Element Selection** tool to select the Word document link on the second (right-side) sheet.

2. Select **Delete**.



3. Double-click on the Word document link on the first sheet to open the **GenNotes.doc** file.

4. Highlight all of the text on the second page and select **Edit > Copy** in Word.



Prior to placing bituminous pavement, the paved surface shall be swept and cleaned. This will not be paid for separately, but shall be included in the cost of the Hot Mix Asphalt Pavement item.

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It is est

It is estimated that [XX] Mobile Pavement Marking Zone will be required on this project.

It is estimated that [XX] hours will be required for potholing. The Contractor shall be responsible for contacting and coordinating with the appropriate utility representatives to be onsite during potholing and shall likewise be responsible for determining the type and location of underground utilities as maybe necessary to avoid damage thereto. The Contractor shall refer to the utility specification for additional requirements.

It is estimated that [XX] tons of Hot Mix Asphalt Pavement (patching) will be required on this project.

No Right-Of-Way acquisition will be needed for this project. All work will be completed entirely within the existing Right-Of-Way.

The following clear zone criteria shall be used during this project: [XXXXXXXXXXXXX]

Where new pavement is to abut existing pavement, the existing pavement shall be removed to a neat vertical line using a cutting saw or other method as approved by the Engineer. Saw cutting asphalt will not be paid for separately, but shall be included in the cost of Removal of Asphalt Mat.

All surveying necessary to complete the project will not be paid for separately, but shall be included in the work.

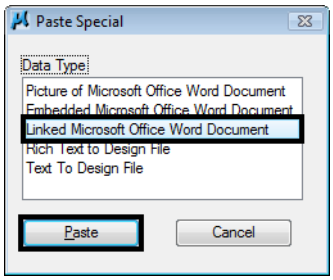
The Contractor shall protect all existing survey monumentation designated to remain from damage during construction operations. Any monuments disturbed by the Contractor that are not designated for relocation, shall be reset at the Contractor's expense. The Contractor and Engineer shall note those monuments in the field prior to construction. See Tabulation of Survey.

This work shall not be measured and paid for separately, but shall be included in the cost of the work.[Shall only be used when 5% or less, of the estimated cost of the line item makes up the additional work to be included. If the line item involves additional work of more than 5% of the line item price, the additional work shall be broken out into separate line items].

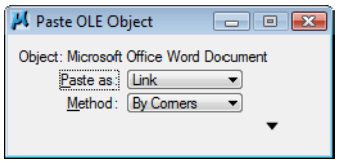
5. ***Do not*** close Word.

6. Switch to the MicroStation application.

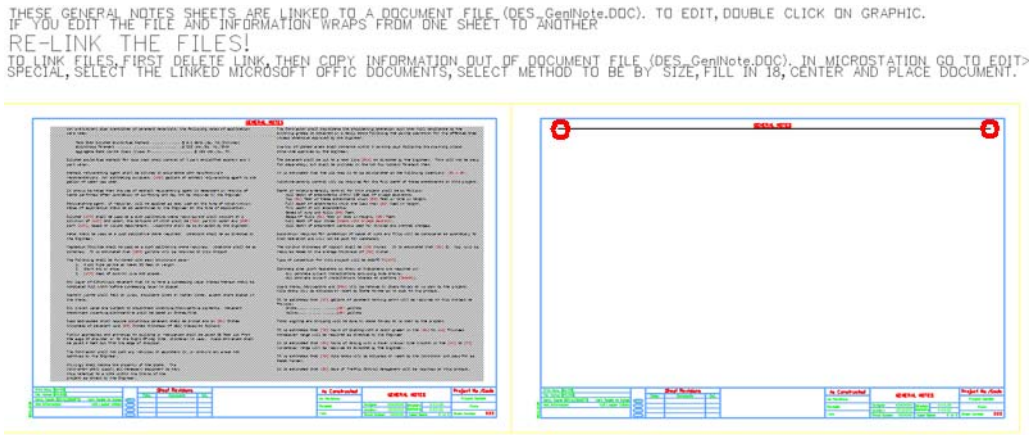
7. In MicroStation, select **Edit > Paste Special** and select the **Linked Microsoft Office Word Document** option and then select **Paste**.



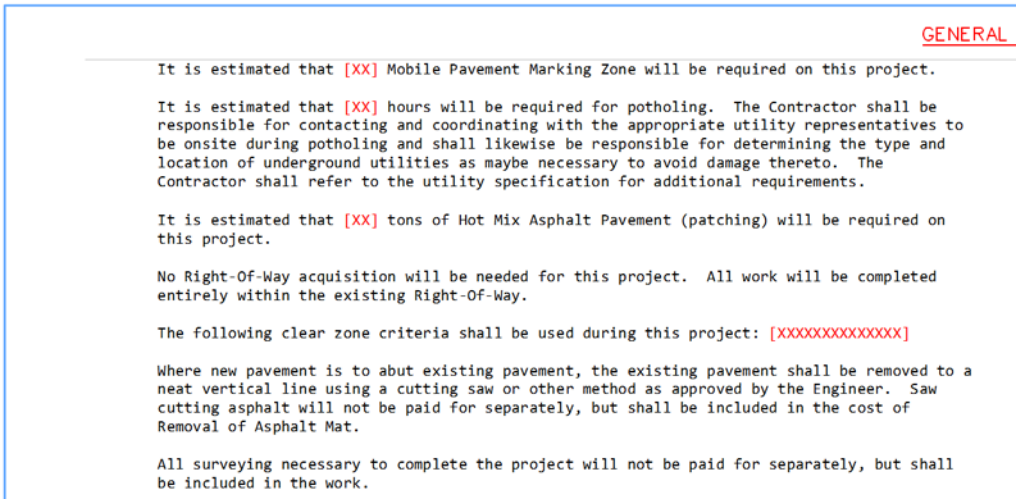
8. In the **Paste OLE** box, set **Paste As** to **Link** and **Method** to **By Corners**.



9. Snap to the two ends of the top guideline as shown.



10. Zoom in to review the notes and notice that the link has been updated to reflect your edits.



11. Switch over to the Word document and select **File > Exit**. If prompted to save the file, select **Yes**.

12. In MicroStation, **Fit** the view.

13. **Save Settings**.

14. **Exit** MicroStation.

LAB 18 - Create the Standard Plans List Sheet

The M&S standard sheet is created by downloading the M&S Standards Plan List Index file from the CDOT web site. You can then update the reference in the M&S sheet file to point to this downloaded file.

Chapter Objectives:

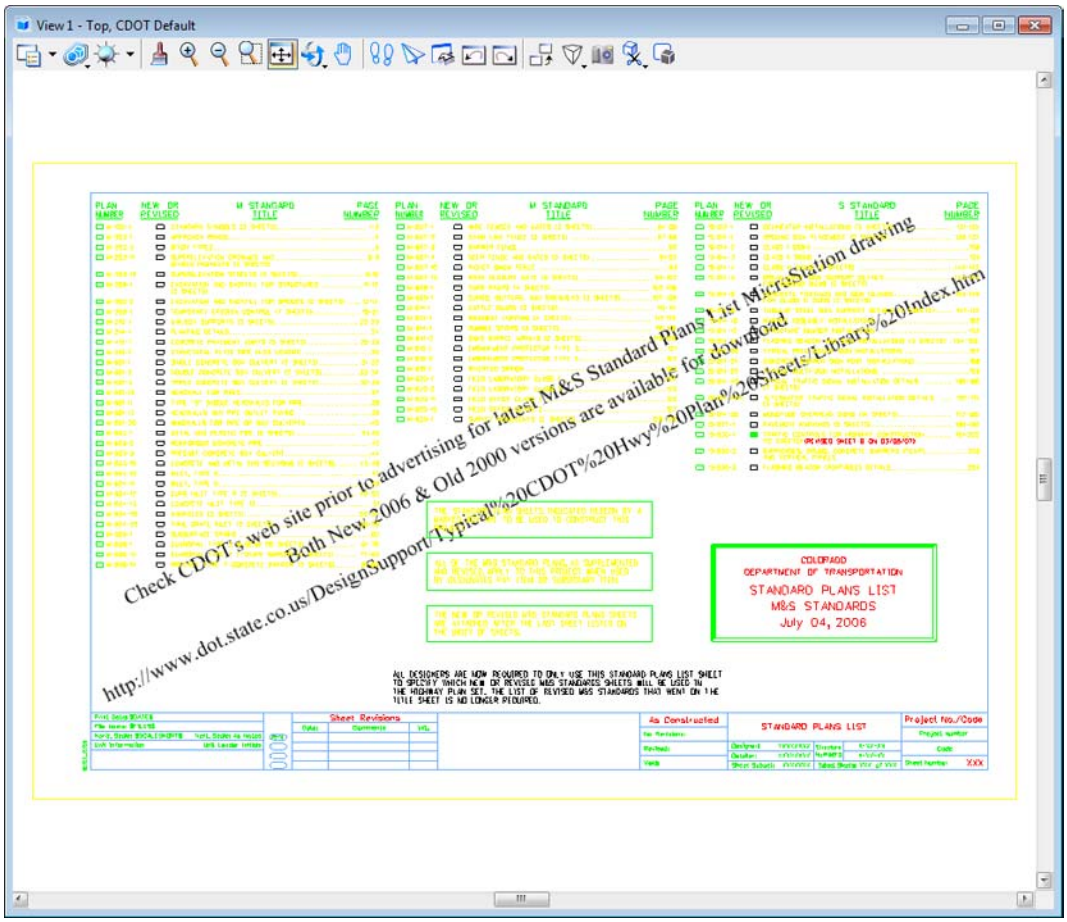
After completing this exercise you will know how to:

- Download the M&S Index file from the CDOT web site.
- Update the M&S sheet file reference to the downloaded file.
- Use the **Create Region** command to update the M&S Index Sheet for the project.

Lab 18.1 - Create Project Standard Plans List Sheet

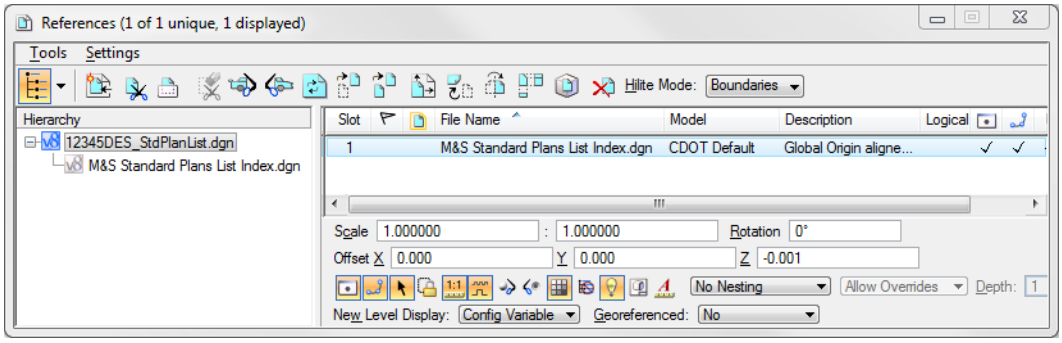
Open the Sheet File

1. Start MicroStation and open the **12345DES_StdPlanList.dgn** file from the **C:\Projects\12345\Design\Drawings** folder.



The file opens and contains the border along with the M&S Standards Plan List reference. It also contains the web address to obtain the latest M&S Index file.

2. Select **References** from the **Primary** toolbar.



Note that the **M&S StandardPlansListIndex.dgn** file is already referenced from the project's **\Design\Drawings** folder. It was automatically placed here from the **Create Project Directory** utility.

Note: If you need newer or different version of the M&S Standards, you can download it from the following web address: www.dot.state.co.us/DesignSupport/. Save the appropriate file to the project's **\Design\Drawings** folder and then re-attach this reference.

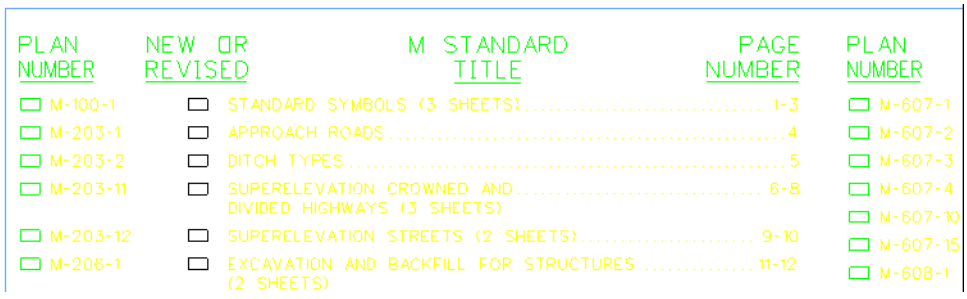
Update the M&S Index

1. Turn off the **DRAFT_INFO_No-Plot** level to turn off the text.

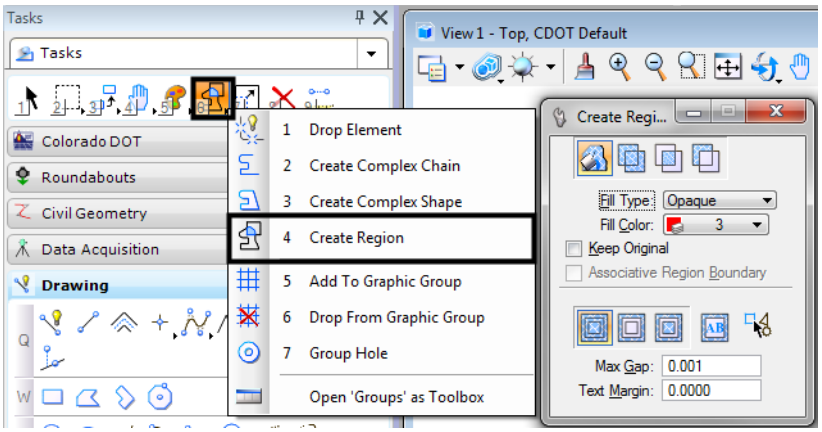
   Note: Since the text is on a "no plot" level, you don't have to turn off the text. However, it just makes working in the file a bit easier.

2. Set the active level to **DRAFT_WT-3**.

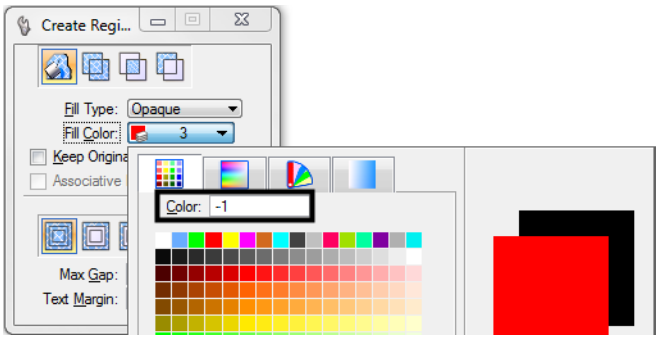
3. Window in to the top of the sheet as shown.



4. Select the **Create Region** command from the **Main** task toolbar and set the options as shown.



Note: The Fill Color drop down shows the color number assigned to that level when it is set to By Level. To check if it set to By Level, **<D> Fill Color** drop down. If the Color field reads "***-1***", then it is set to By Level.



Note: If the Fill Color is set to By Level, the Tool Settings dialog box will not be updated if the active level is changed. However, the color of the new active level will be used when the region is created.

5. For the first plan in the list (M-100-1), **<D>** inside the block under the **Plan Number** column.

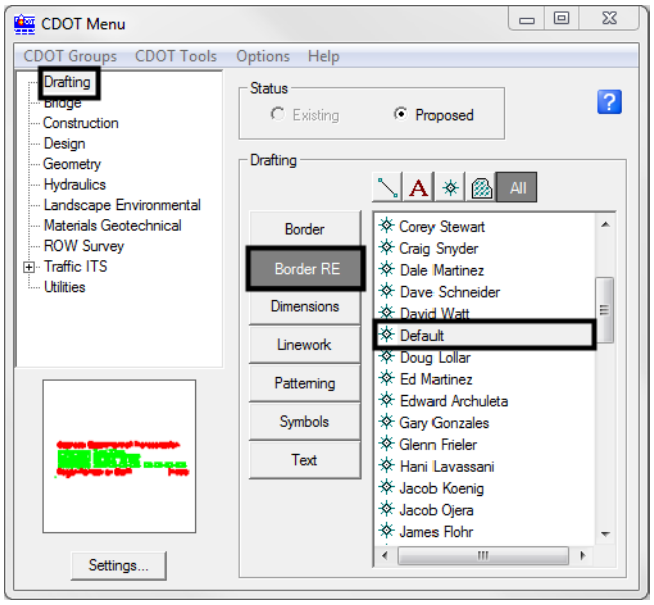
6. **<D>** to accept.

The block is filled-in using this tool.

7. Fill in other blocks as desired.

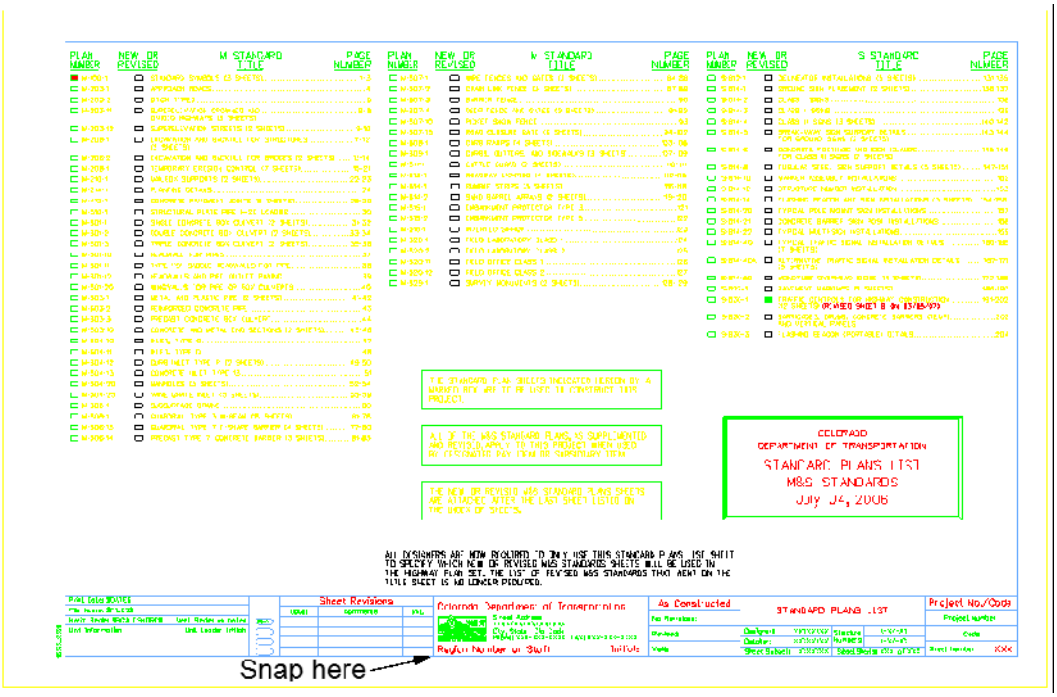
Fill in the Border Information

1. From the CDOT Menu Explorer, select **Drafting**, then the **Border RE** category and select the **Default** Resident Engineer cell.



2. **Apply**.

3. **Snap** to the location shown to place the cell.



4. Use the **Edit Text** command to edit the **Project Number** and **Code** as shown.
5. Use the **Edit Text** command to place your initials in the **Designer** and **Detailer** blocks.

6. **Fit** the view.
7. **Save Settings** (**File > Save Settings**).
8. **Exit** MicroStation.

LAB 19 - Create a Title Sheet

In this lab, you'll learn how to insert a Vicinity Map into the Project Title Sheet.

Chapter Objectives:

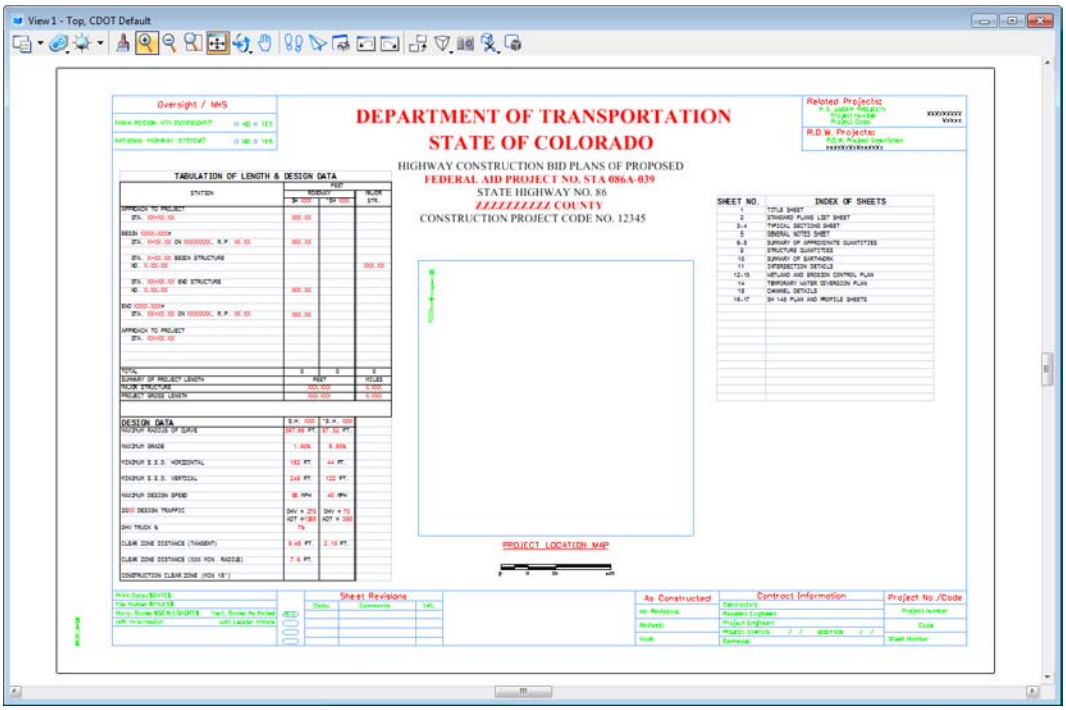
After completing this exercise you will know how to:

- Open a project Title Sheet.
- Locate a vicinity map.
- Attach a vicinity map as a reference to the Title Sheet.
- Move and Clip the vicinity reference.

Lab 19.1 - Create Project Title Sheet

Open the Title Sheet file

1. Start MicroStation and open the file **12345DES_TitleSht.dgn** for the **C:\Projects\12345\Design\Drawings** folder.

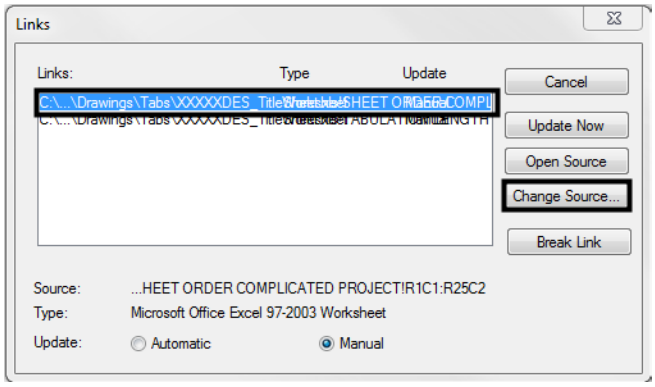


This file was automatically generated by the Create Project Utility program and contains a links to an Excel spreadsheet file in the generic project template folder. You will need to update these links to the **12345DES_TitleSht.xls** file in the project folder.

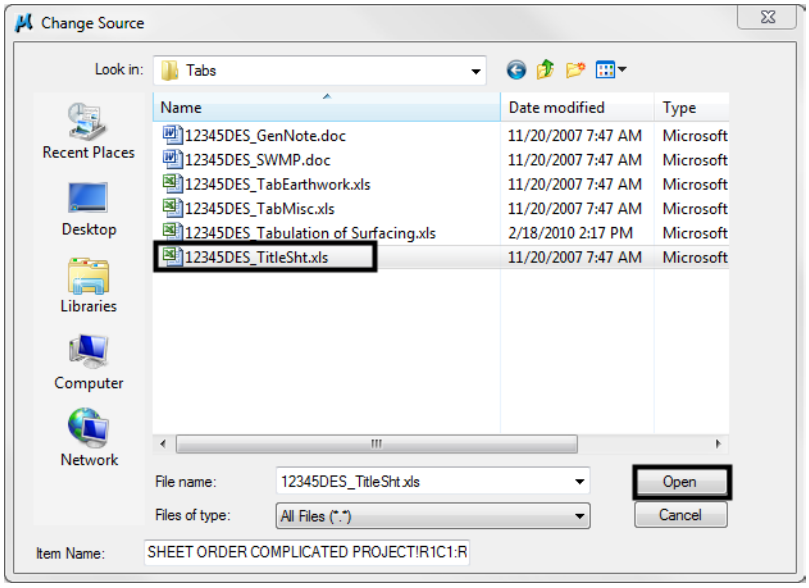
Updating Links

1. Select **Edit > Links**.

2. Highlight the first link in the list and select **Change Source**.

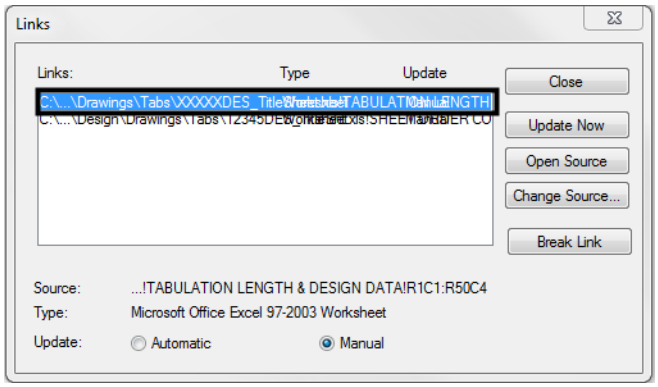


3. In the **Change Source** dialog box, set the Look in folder to **C:\Projects\12345\Design\Drawings\Tabs** and select the file **12345DES_TitleSht.xls**.



4. Select **Open** to update the link.

5. Repeat this process for the second link.



Note: If the text is garbled (like in th eimage above), look for the "XXXXX" in the file path. Those are the links that need to be updated.

6. **Close** the **Links** dialog box.

7. **Save Settings** (**File > Save Settings**).

   The Title sheet design file is now linked to the Excel spreadsheet file in the project-specific folder. You can now edit the Excel file for your project-specific requirements.

Edit the spreadsheet file

1. Double-click on the **Tabulation of Length & Design Data** link.

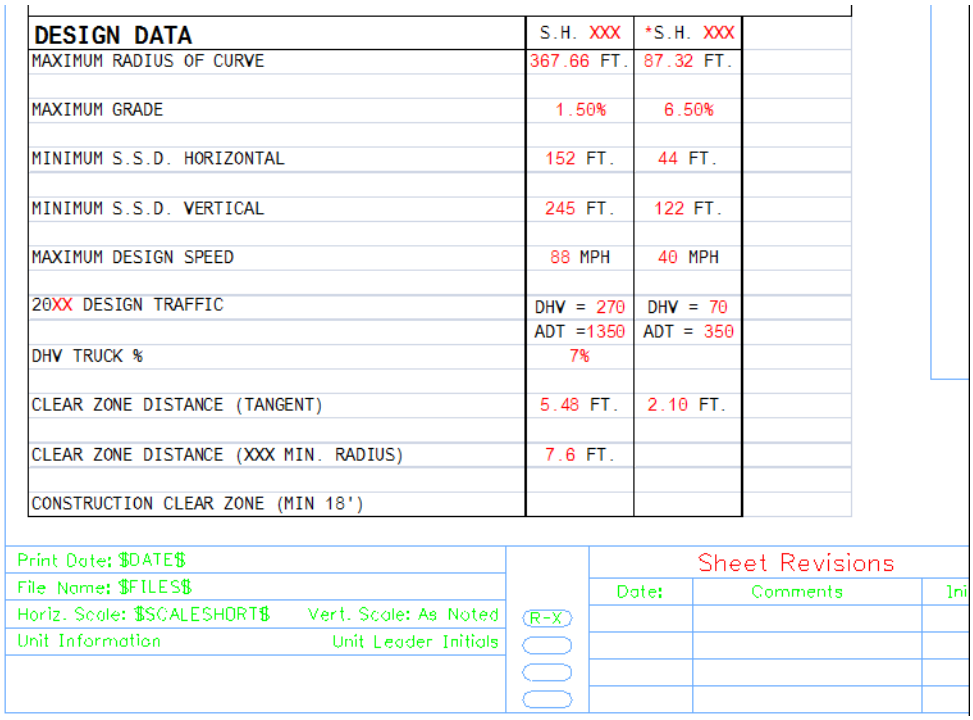
2. Excel starts and opens the **12345DES_TitleSht.xls** file.

3. In the *Design Data* portion of the file, make the following edits:

31	**DESIGN DATA**	S.H. XXX	*S.H. XXX
32	MAXIMUM RADIUS OF CURVE	367.66 FT.	87.32 FT.
33			
34	MAXIMUM GRADE	1.50%	6.50%
35			
36	MINIMUM S.S.D. HORIZONTAL	152 FT.	44 FT.
37			
38	MINIMUM S.S.D. VERTICAL	245 FT.	122 FT.
39			
40	MAXIMUM DESIGN SPEED	88 MPH	40 MPH
41			
42	20XX DESIGN TRAFFIC	DHV = 270	DHV = 70
43		ADT =1350	ADT = 350
44	DHV TRUCK %	7%	
45			
46	CLEAR ZONE DISTANCE (TANGENT)	5.48 FT.	2.10 FT.
47			
48	CLEAR ZONE DISTANCE (XXX MIN. RADIUS)	7.6 FT.	
49			
50	CONSTRUCTION CLEAR ZONE (MIN 18')		
51			

4. When finished, select **File > Exit** In Excel. When prompted to save changes to the file, select **Yes**.

5. Switch back to the MicroStation file and note that the edits are now updated in the DGN file.



DESIGN DATA	S.H. XXX	*S.H. XXX
MAXIMUM RADIUS OF CURVE	367.66 FT.	87.32 FT.
MAXIMUM GRADE	1.50%	6.50%
MINIMUM S.S.D. HORIZONTAL	152 FT.	44 FT.
MINIMUM S.S.D. VERTICAL	245 FT.	122 FT.
MAXIMUM DESIGN SPEED	88 MPH	40 MPH
20XX DESIGN TRAFFIC	DHV = 270	DHV = 70
	ADT =1350	ADT = 350
DHV TRUCK %	7%	
CLEAR ZONE DISTANCE (TANGENT)	5.48 FT.	2.10 FT.
CLEAR ZONE DISTANCE (XXX MIN. RADIUS)	7.6 FT.	
CONSTRUCTION CLEAR ZONE (MIN 18')		

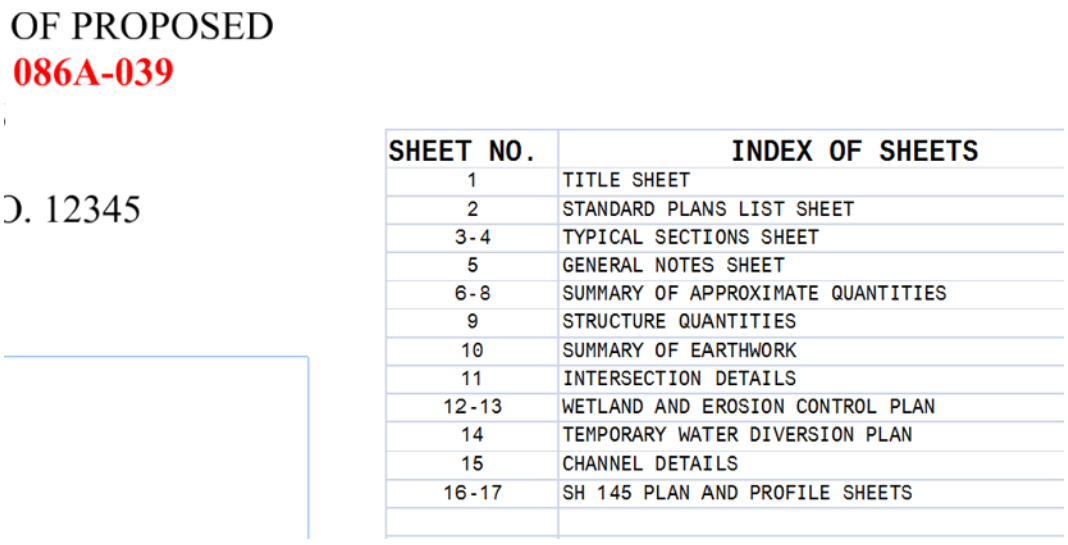
Print Date: $DATE$
File Name: $FILES$
Horiz. Scale: $SCALESHORT$ Vert. Scale: As Noted
Unit Information Unit Leader Initials

R-X

Sheet Revisions

Date:	Comments	Ini

6. Window in on the *Index of Sheets* link on the right side of the sheet.



OF PROPOSED
086A-039

D. 12345

SHEET NO.	INDEX OF SHEETS
1	TITLE SHEET
2	STANDARD PLANS LIST SHEET
3-4	TYPICAL SECTIONS SHEET
5	GENERAL NOTES SHEET
6-8	SUMMARY OF APPROXIMATE QUANTITIES
9	STRUCTURE QUANTITIES
10	SUMMARY OF EARTHWORK
11	INTERSECTION DETAILS
12-13	WETLAND AND EROSION CONTROL PLAN
14	TEMPORARY WATER DIVERSION PLAN
15	CHANNEL DETAILS
16-17	SH 145 PLAN AND PROFILE SHEETS

7. Using what you've learned, Edit the **12345DES_TitleSht.xls** file and update the DGN file to read as shown below.

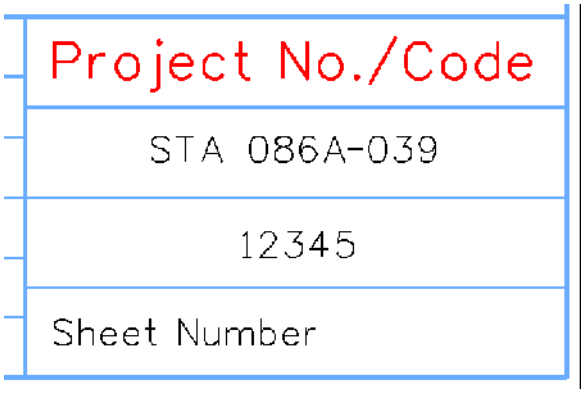
Note: When entering page ranges (e.g. 3-4) be sure to put a quote mark (') at the beginning of text entry, otherwise Excel will interpret this as a date (i.e. March 4).

Note: You can insert and delete rows as needed in Excel.

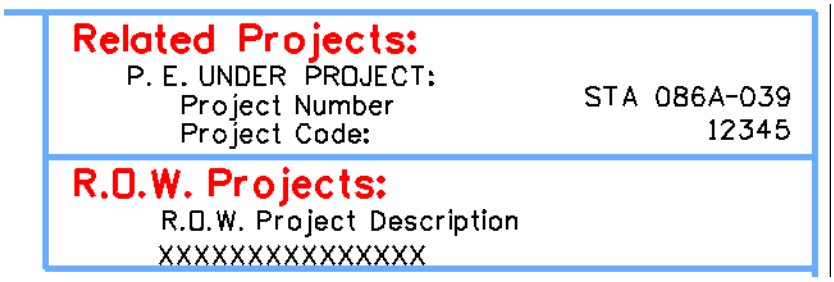
SHEET NO.	INDEX OF SHEETS
1	TITLE SHEET
2	STANDARD PLANS LIST SHEET
3-4	TYPICAL SECTIONS SHEET
5	GENERAL NOTES SHEET
6-8	SUMMARY OF APPROXIMATE QUANTITIES
9	STRUCTURE QUANTITIES
10	SUMMARY OF EARTHWORK
11	INTERSECTION DETAILS
12-13	WETLAND AND EROSION CONTROL PLAN
14	TEMPORARY WATER DIVERSION PLAN
15	CHANNEL DETAILS
16-17	SH 145 PLAN AND PROFILE SHEETS

8. Edit the Border Text
9. Use the **Edit Text** command to make project specific edits to the border as shown.
10. **Window** in to the top center of the title sheet and edit the project numbers, highway number and county name as shown.

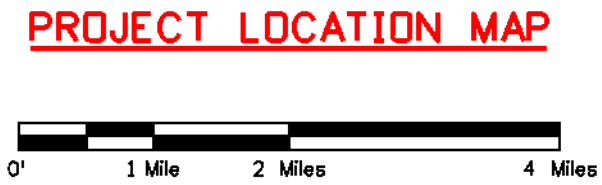
11. **Window** in to the lower-right corner and make the project edits as shown.



12. **Window** in to the upper-right corner and make the project edits as shown.

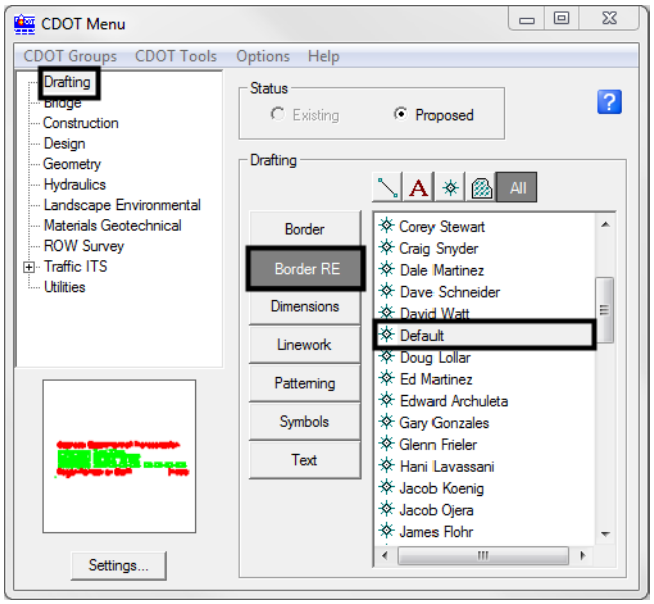


13. **Window** around the bar scale and edit the text as shown.

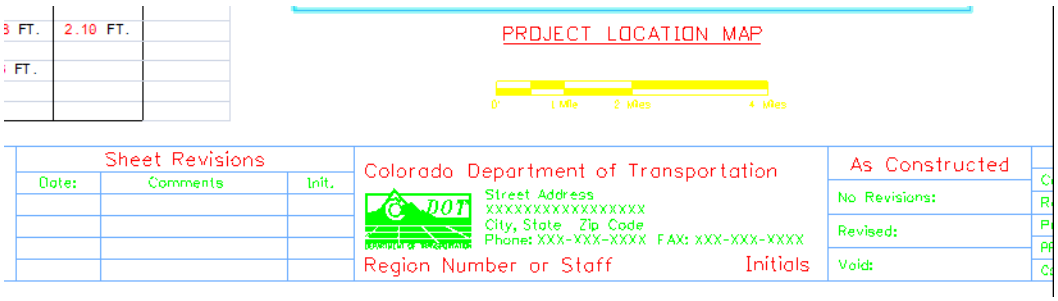


Place the RE cell

1. From the **CDOT Menu**, select **Border RE** from the **Drafting** group.



2. Place the **Default** RE cell in the location shown by snapping to the lower-left corner.



3. **Fit** the View.

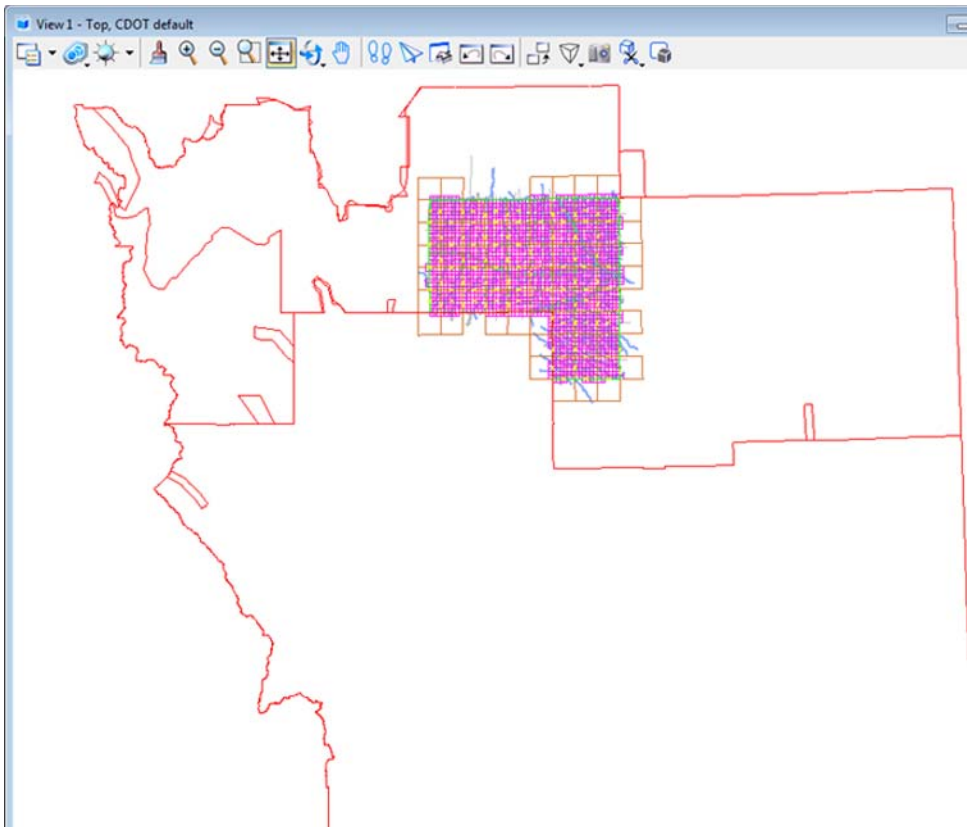
4. **Save Settings**.

Lab 19.2 - Review the Vicinity Map

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

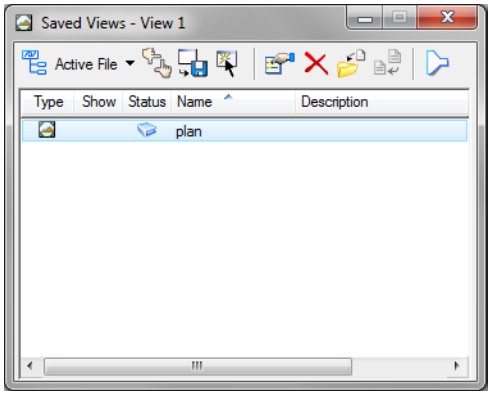
The CDOT standard procedure is to use county maps that have been translated from GIS information, these maps can be found on the shared drive at: \\public\CADD County Maps\. The county of interest should be copied to your project's **…\Design\Drawings\Reference_Files** folder and can be attached as a reference to the project's Title Sheet file.

5. Select **File > Open** and open **Elbert.dgn** from the **C:\Projects\12345\Design\Drawings\Reference_Files** folder.

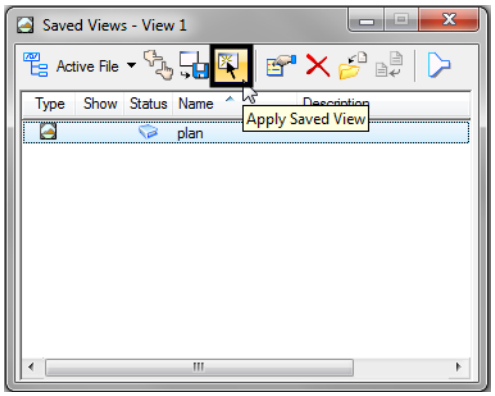


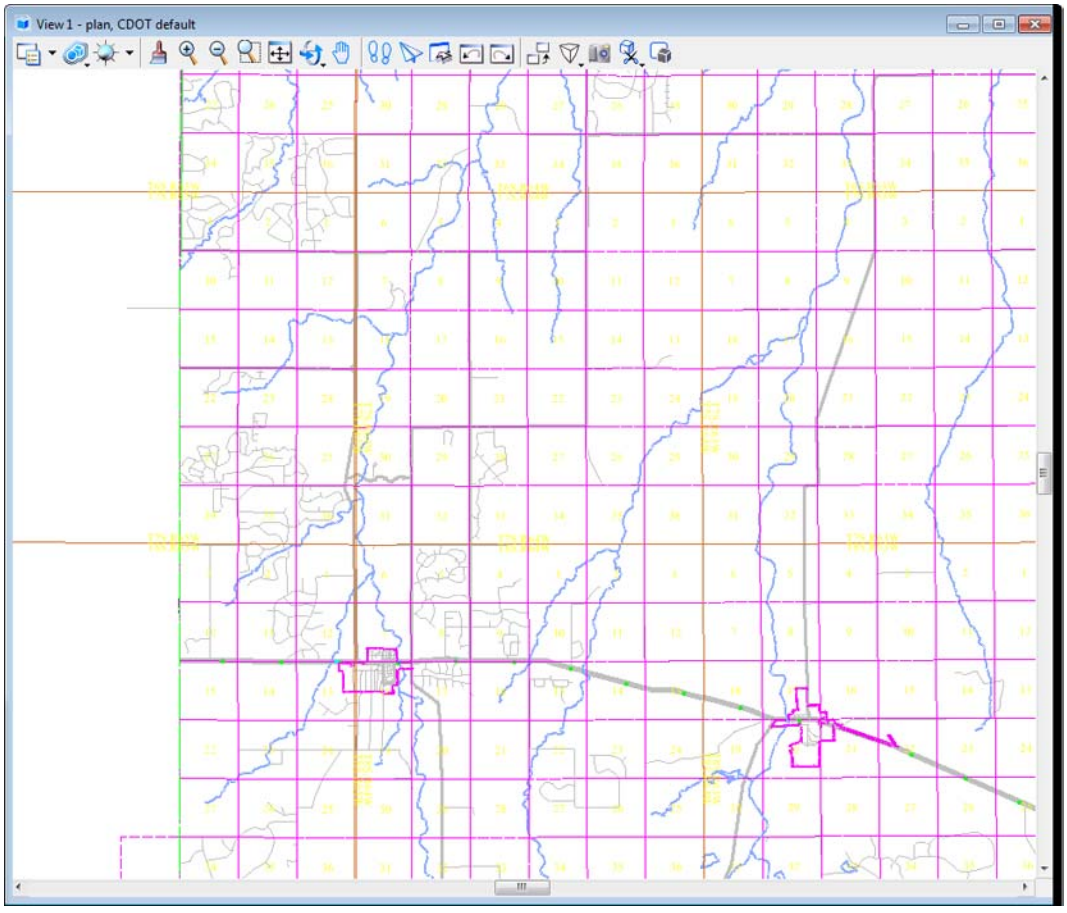
The Elbert county map was translated from GIS and copied from the \\public\CADD County Maps\ shared drive. This file contains a ***Saved View*** to assist in attaching it as a reference file.

6. Select **Utilities > Saved Views** from the MicroStation pull-down menu



7. **<D>** on the saved view by the name of ***plan*** and select the **Apply Saved View** button, then **<D>** in the view.

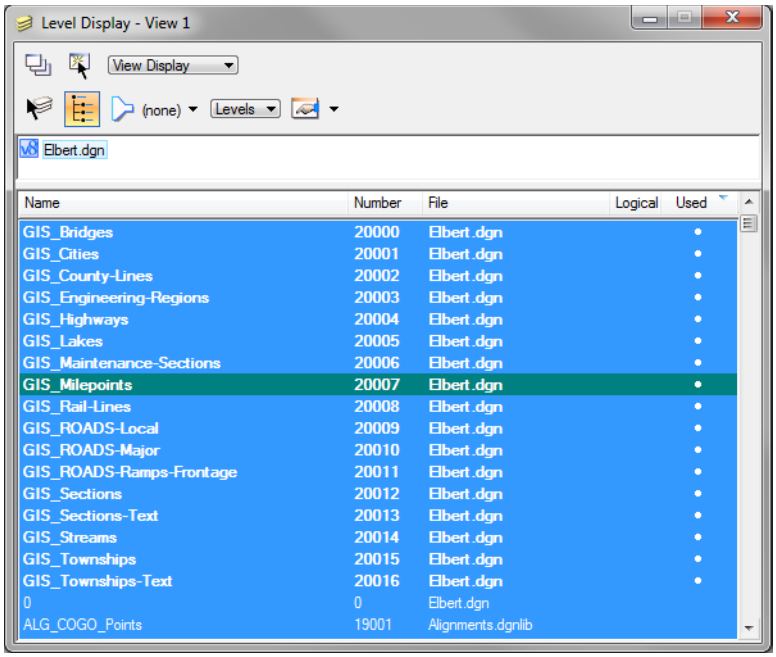




The MicroStation view updates to the limits of the saved view.

8. **Close** the **Saved Views** dialog box.

9. **Open** the **Level Display** from the **Primary** toolbar. Note that all information resides on **GIS_*** levels.



10. Turn level displays **on** and **off** to verify the data is on the correct levels. Turn all levels **on** when finished.

Attaching a vicinity map as a reference file

In the next series of steps, you will attach the vicinity file as a reference to the title sheet. Once attached, you can move, scale and clip the reference to fit the display limits in the sheet file.

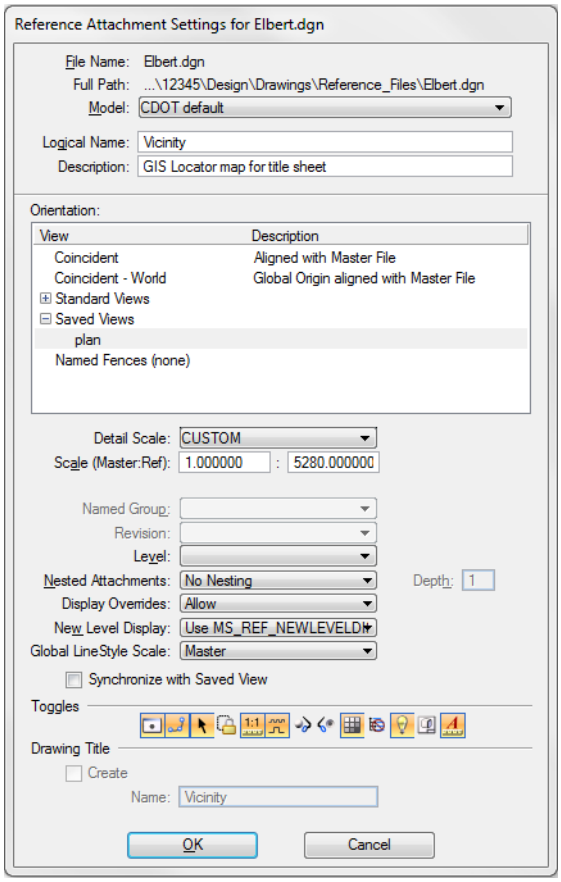
1. Select **File > Open** and reopen the title sheet **12345DES_TitleSht.dgn** from the project's **…\Design\Drawings folder.**

2. Select **References** from the **Primary** toolbar.

3. In the **References** dialog, select **Tools > Attach**.

4. Set the directory to the project's **…\Design\Drawings\Reference_Files** folder and select **Elbert.dgn**.

5. In the **Attachment Settings** box:



- Under **Orientation**, select **plan** (the saved view).
- Key in a **Logical Name** of ***Vicinity*** and a **Description** of ***GIS locator map for title sheet***.
- Key in a **Scale** of ***1:5280***

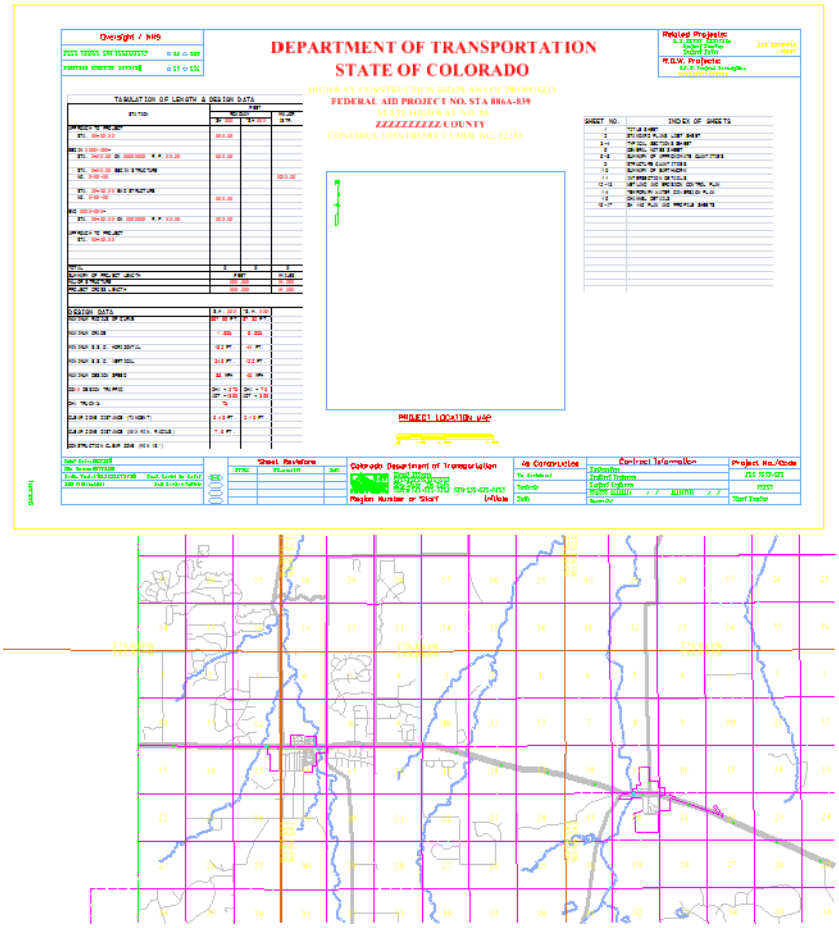
Note: CDOT GIS maps are designed based on a 1-mile insertions scale (1 inch = 1 mile) for graphics. The linestyle and text scale factors are also based on this scale.

6. Select **OK**.

   The outline of the saved view reference is attached to your cursor.

7. **<D>** anywhere underneath the plan sheet to attach the reference.

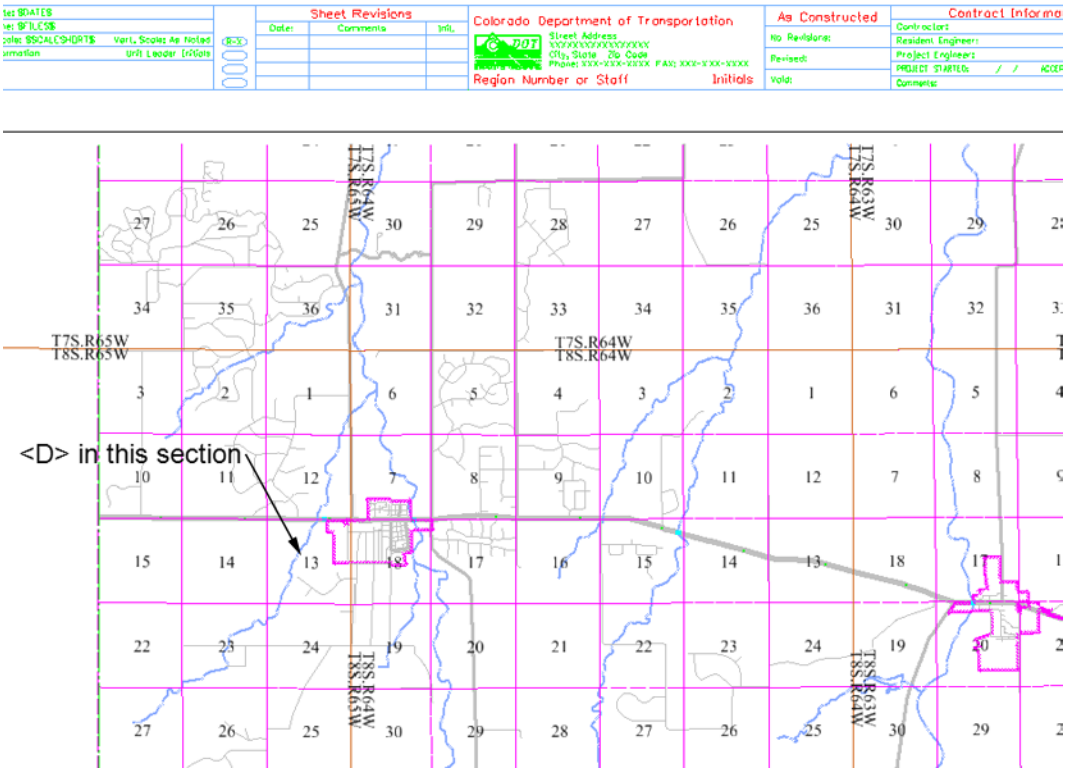
8. Select the MicroStation **Fit** command



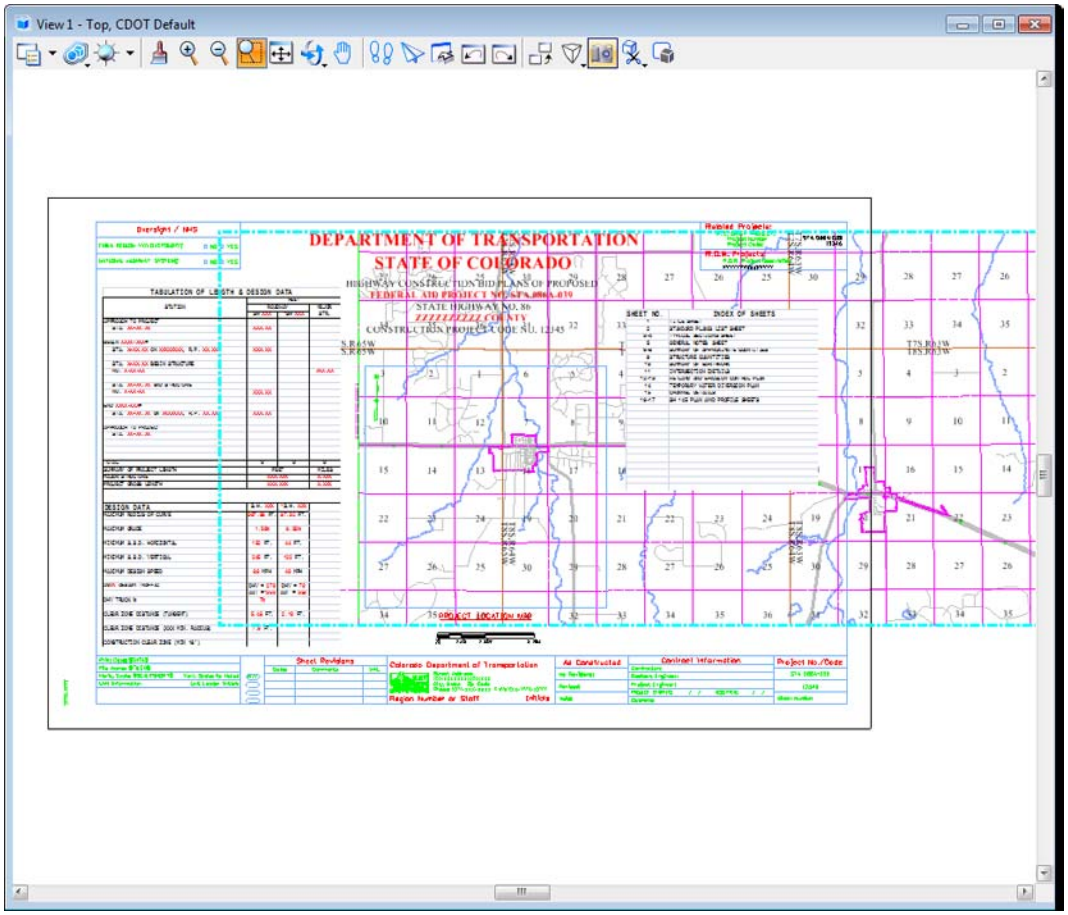
Move the reference file to align with the title sheet

1. In the **References** dialog box, select **Tools > Move.**

2. When prompted to enter a point to move from, **<D>** on section 13 on the vicinity reference.



3. **<D>** approximately in the center of the project location map block for the move to point.



4. Continue to use the **Move Reference** command as needed to position the reference as shown.

5. **<R>** when done.

Clip the vicinity map reference

1. In the **Reference** dialog, highlight the **Vicinity** reference

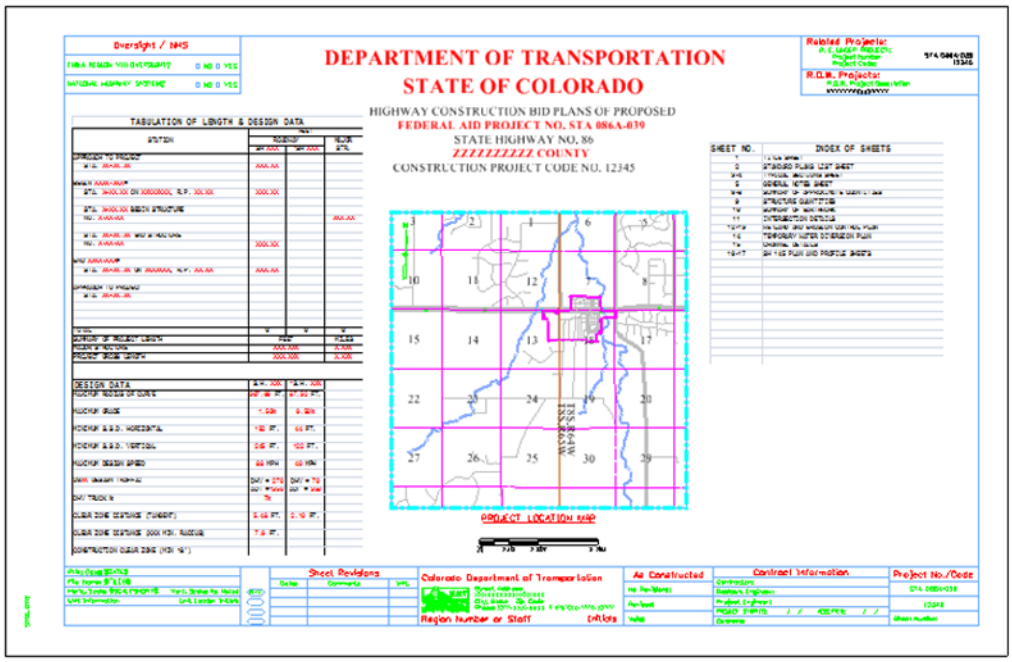
2. Select **Tools > Clip Boundary** from the **Reference File** dialog.

3. In the **Tool Settings** box, set **Method** to **Element**.

4. MicroStation prompts 'Select clipping element'

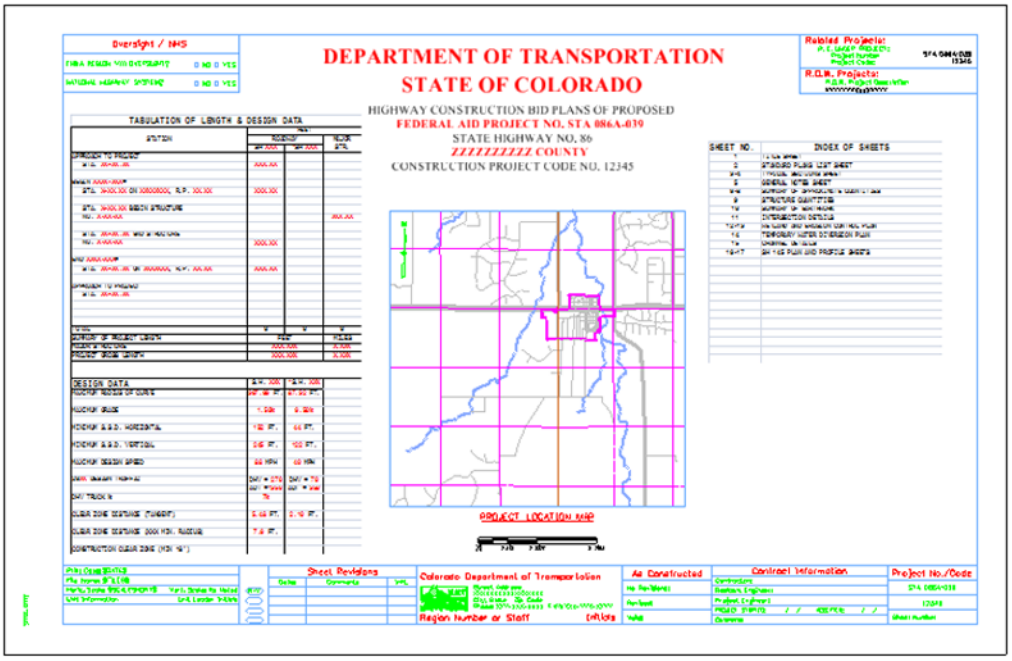
5. **<D>** on the shape representing the limits of the project location map.

6. **<D>** to accept.



7. Open **Level Display** and turn off the **GIS_Sections-Text** and **GIS_Township-Text**.

8. **Fit** the view.



9. **Save Settings**.

10. **Exit** MicroStation.

LAB 20 - Annotate the Intersection Plan/Profile Sheet

In this lab, you'll annotate the plan/profile sheet with text, notes, and custom text strings using the CDOT Menu.

Chapter Objectives:

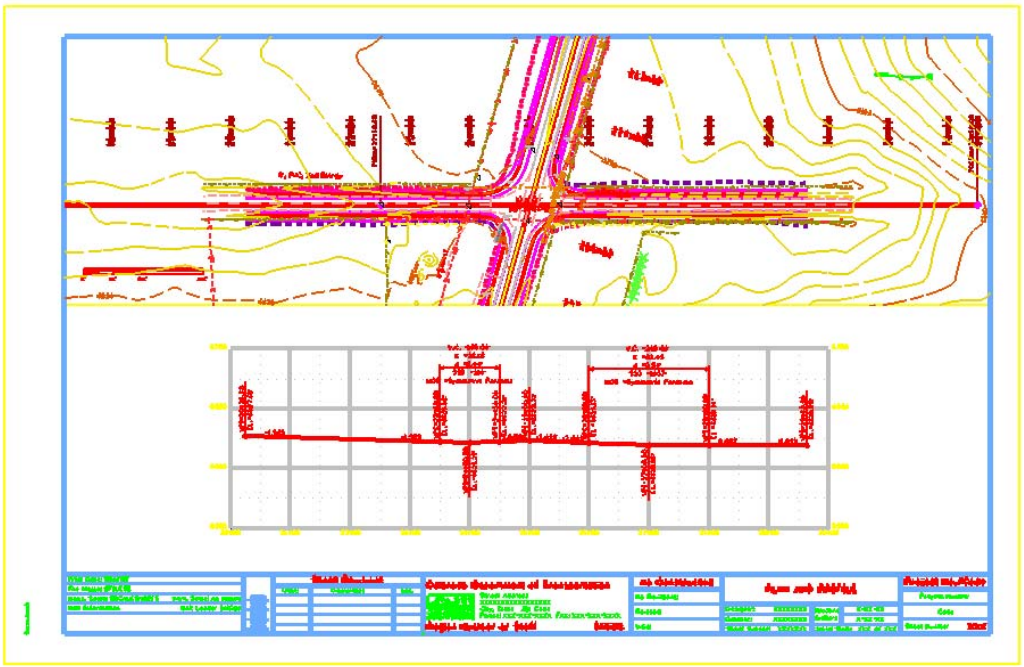
After completing this exercise you will know how to:

- Set the active angle for placing text
- Place Text using the CDOT Menu
- Rotate text
- Place notes with leader lines and a line terminator
- Create and place custom text strings for utility lines using the CDOT Menu

Lab 20.1 - Open Project Plan/Profile Sheet

Start MicroStation

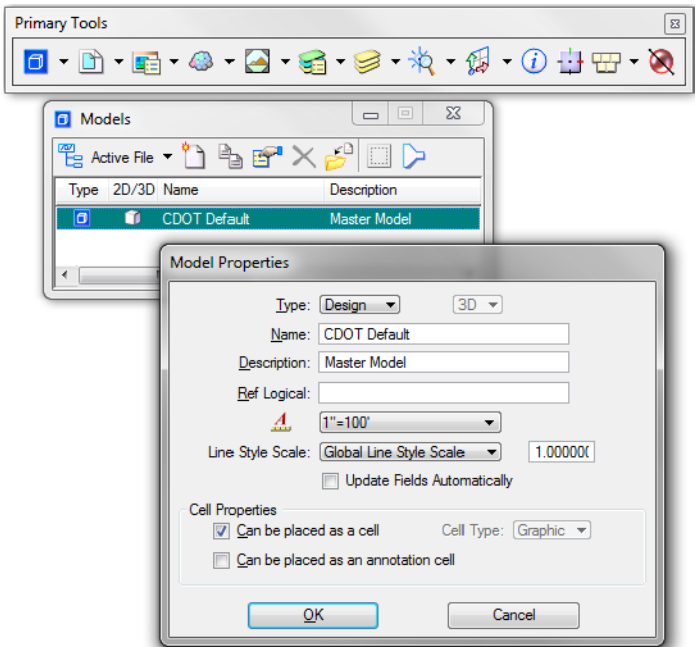
1. Start MicroStation and open ***12345DES_PnP19.dgn*** from the ***C:\Projects\12345\Design\Drawings*** folder.



Check Text Annotation Scale

1. Select **Models** from the ***Primary*** toolbar.

2. In the ***Model*** box, select **Edit Model Properties**.



3. Note that the ***Text Annotation Scale*** is set to **1"=100'** (the default setting from the seed file).

   Note: The ***Text Annotation Scale*** matches the border scale, which matches the scale for plotting – 1"=100'.

4. **Cancel** the ***Model Properties*** box.

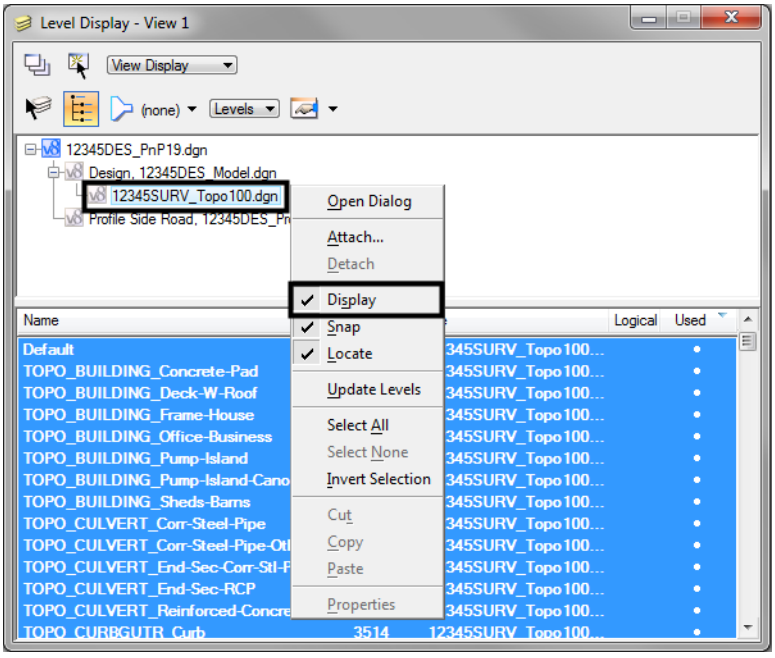
5. **Close** the ***Models*** box.

Work with sheet levels and references

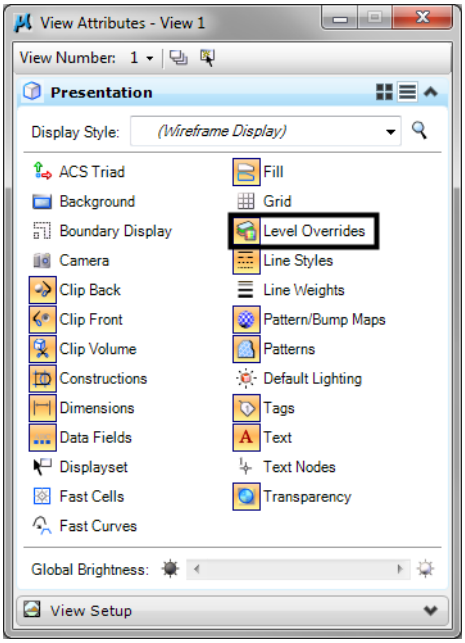
The plan limits cell placed along the mainline alignment in the Design model file appears in the sheet. This is on a No Plot level. However, if you don't want to see it, you can turn it off.

1. Open **Level Display** and turn off the **DRAFT_INFO_No_Plot** level in the ***Design*** reference.

2. In Level Display, turn off the **Survey/Topo** reference.



3. Select **Settings > View Attributes**, toggle on **Level Overrides**.



This applies the Symbology Overrides set in the CDOT level libraries for "graying out" the existing contour levels.

Edit the bar scale text

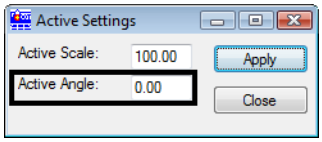
1. **Window** in on the bar scale cell in the lower left portion of the plan view.

2. Use the **Edit Text** command to edit the text as shown for a 100 scale plot.

Label the Intersection Alignments

Set the active angle for placing the county road text

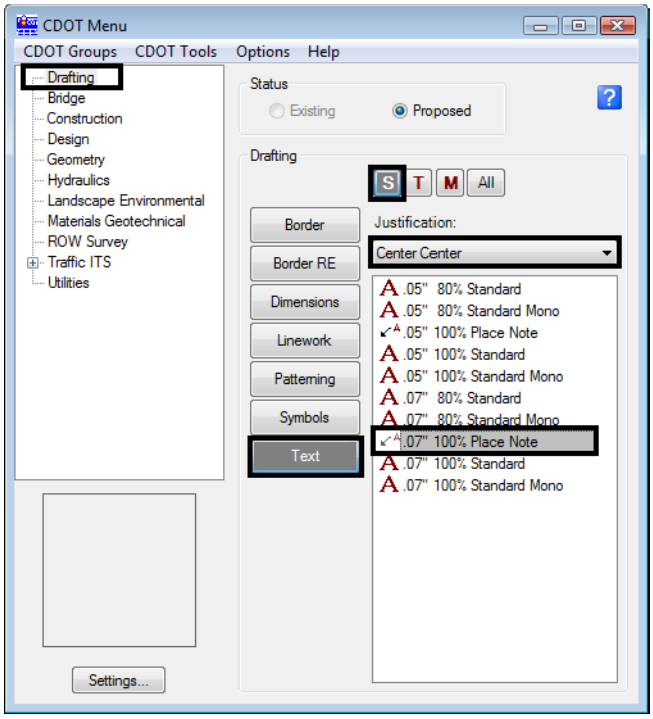
1. On the ***CDOT Menu***, select **Settings**.
2. Set the **Active Angle** to ***0***, **Apply** and then **Close** the box.



Set the text attributes using the CDOT Menu

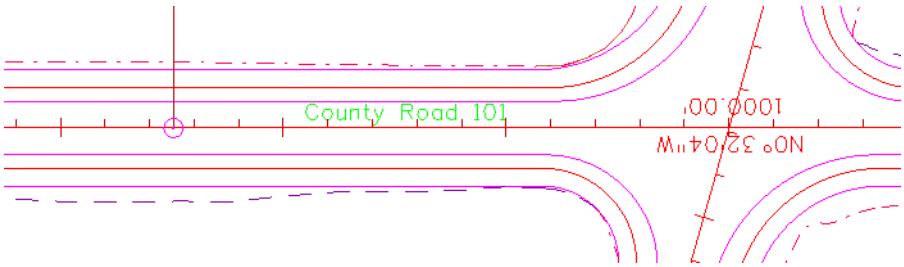
1. On the ***CDOT Menu*** Explorer, select **Drafting**. Set the category to **Text** and set the following options:
   - **Filter: Standard (S)**
   - **Justification**: **Center Center**

- **Item: .07" 100% Standard**



This sets the active level to ***DRAFT_Text-3*** and automatically selects the ***Place Text*** command.

2. In the ***Word Processor*** box, key in ***County Road 101***.
3. **<D>** to the left of the intersection as shown to label the road.

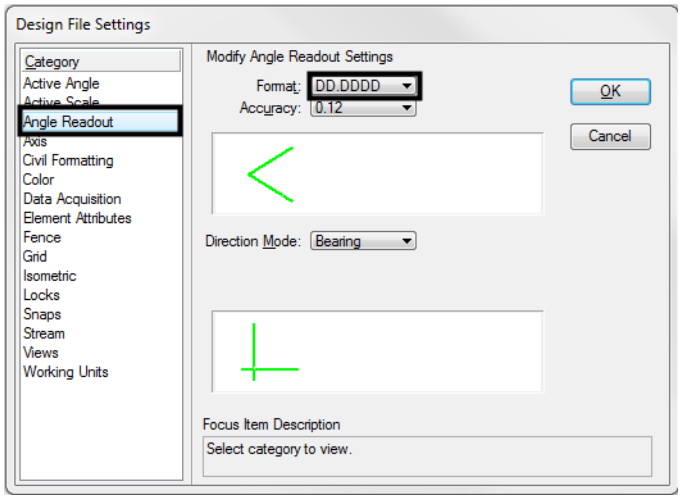


4. **<R>** out of the ***Place Text*** command when done.

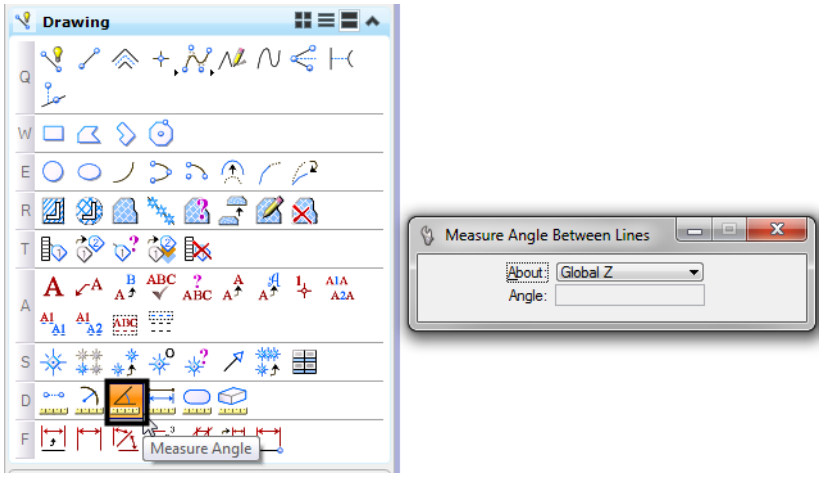
Set the active angle for the main alignment text

1. Select **Settings > Design File > Angle Readout**.

2. Set the ***Options*** as shown for ***Decimal Degrees***.



3. Select the **Measure Angle** command from the ***Measure*** toolbar under the ***Drawing*** task tab.

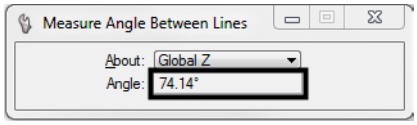


4. **<D>** on the centerline of the side road.

5. **<D>** on the centerline of SH 86.

   The angle reads out at 74.14 degrees.

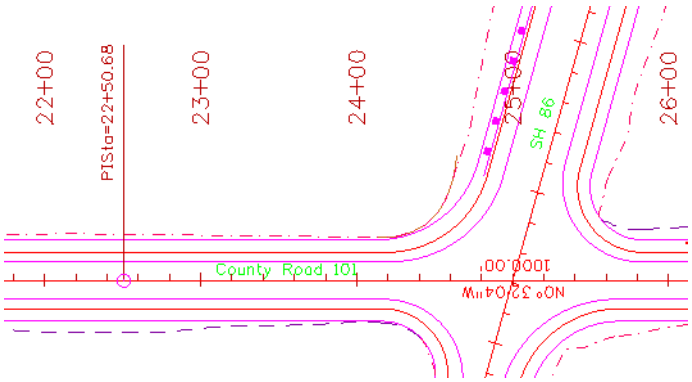
6. From the CDOT Menu, select **Settings** and set the **Active Angle** to ***74.14***, **Apply** and then **Close**.



Place the SH 86 text at the active angle

1. On the ***CDOT Menu*** select **Drafting > Text** and select **.07** again.

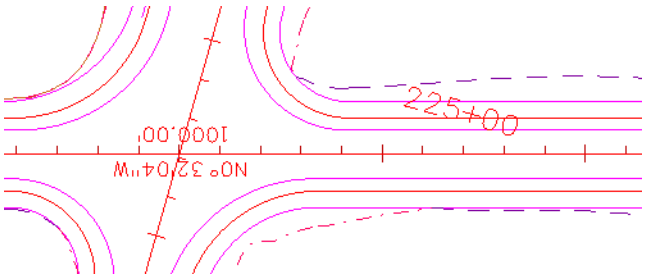
2. In the **Word Processor** box, key in ***SH 86***.
3. **<D>** when shown to label the road.



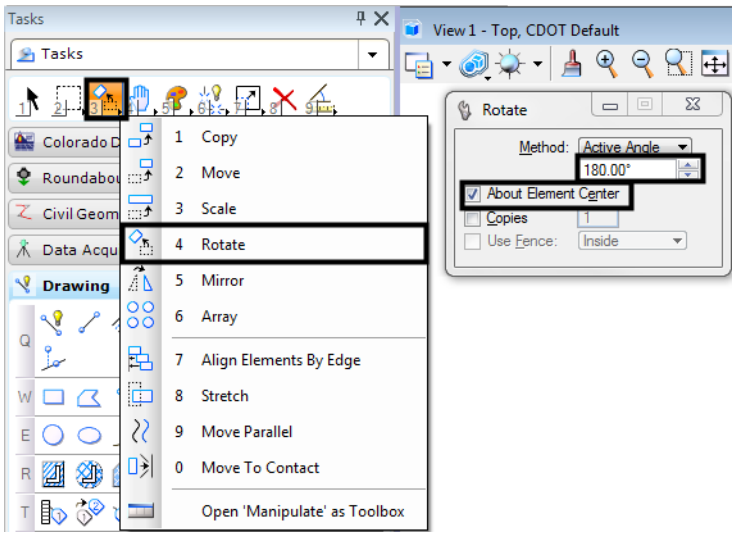
4. **<R>** out of the ***Place Text*** command when done.

Lab 20.2 - Rotate the InRoads Alignment Text

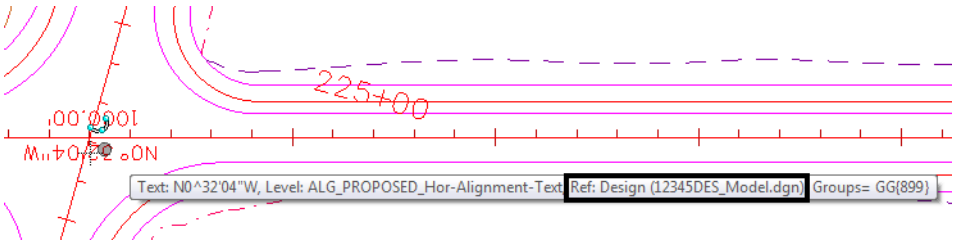
1. Window in at the intersection as shown.



2. Select the **Rotate** command from the ***Main*** task toolbar.
3. Set the **Method** to **Active Angle**, set the **Angle** to ***180*** and toggle **On About Element Center**.



4. **<D>** on the bearing text.

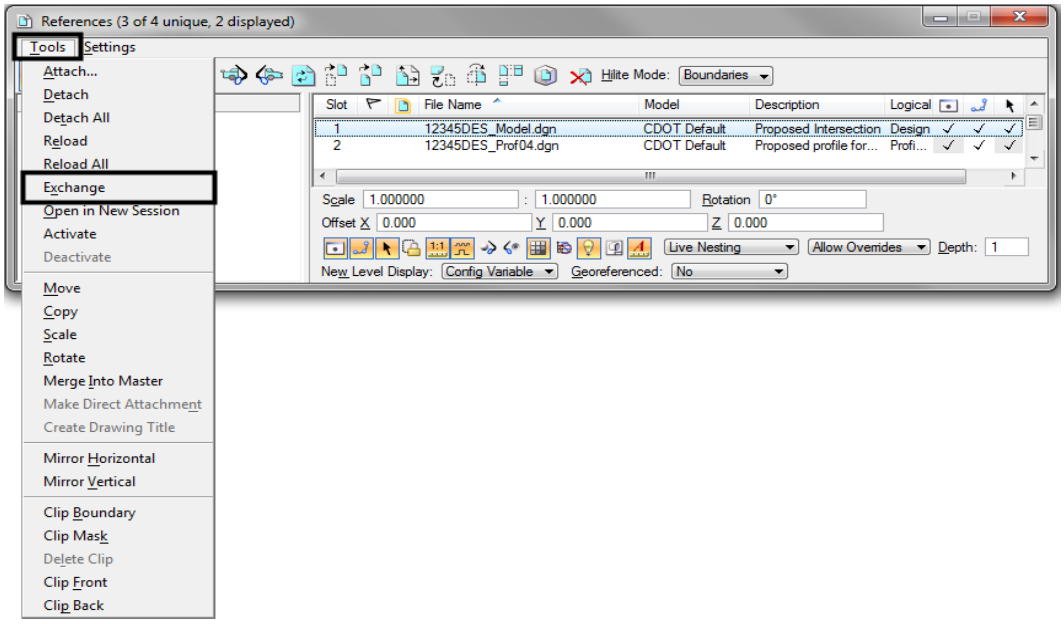


You can't rotate the text because it's in a reference.

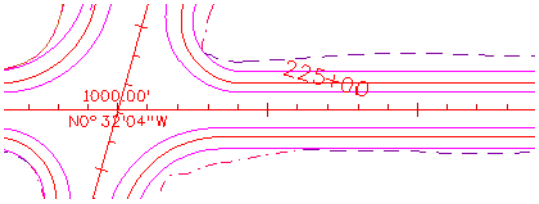
Important! If you're in the Design group and "own" the Design reference, you can "exchange" to that reference to make modifications. Otherwise, contact Design.

5. Select **File > Save Settings**.

6. On the ***References*** dialog, select the Design reference and then select **Tools > Exchange**.



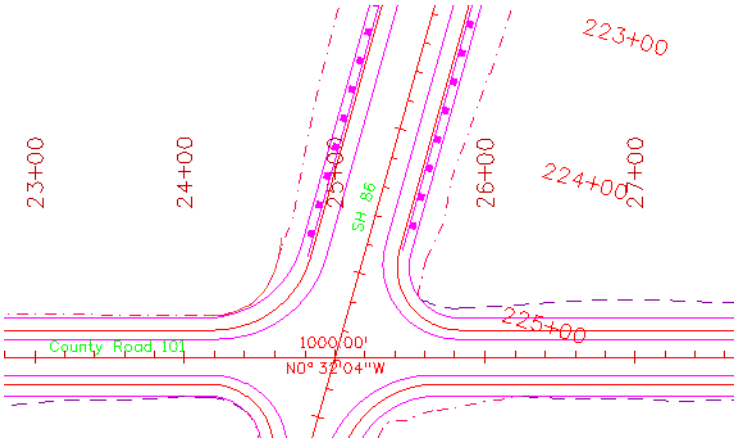
7. Select the **Rotate** command, **<D>** on the bearing text and then **<D>** to accept.



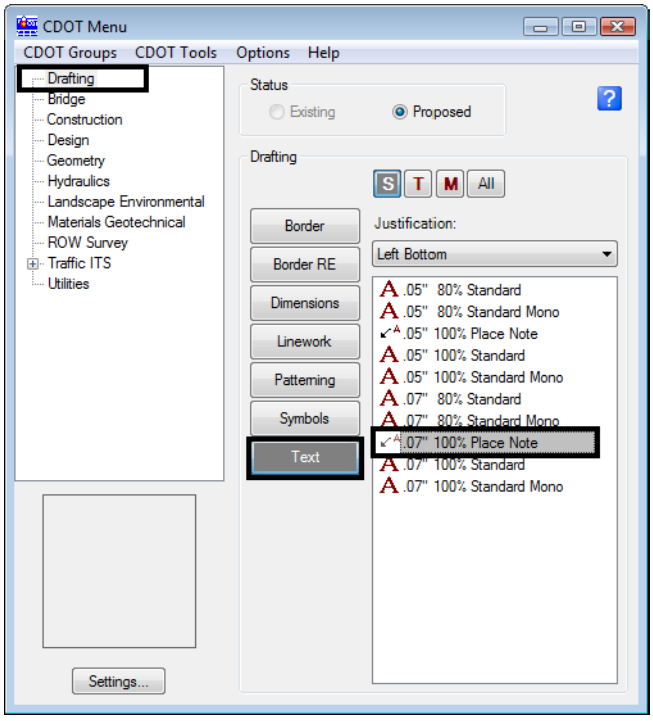
8. Select the **File** pull-down menu and open the sheet file from the list of last open files.

Lab 20.3 - Place Notes

1. Window in above the intersection to view the guardrail as shown.



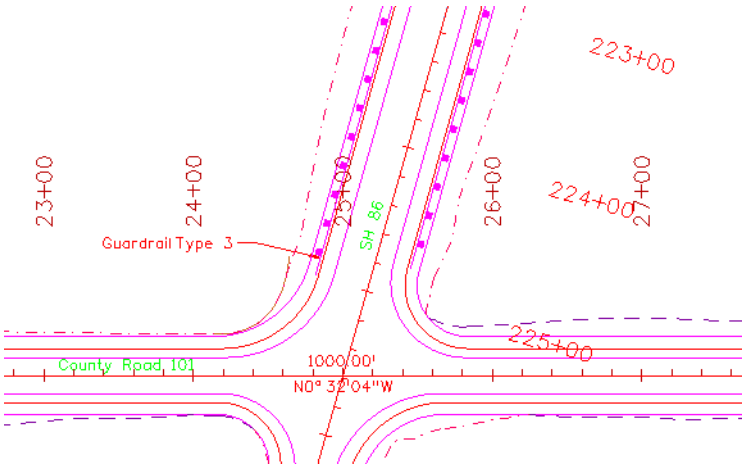
2. On the **CDOT Menu** Explorer, select **Drafting > Text** and select the **.07" 100% Place Note** item.



3. Click inside the **Word Processor** box and key in ***Guardrail Type 3***.

4. **<D>** on the guardrail as shown to define the start point of the note (note terminator).

5. Drag the cursor to the location shown and **<D>** to place the note leader.



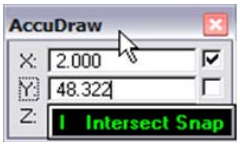
6. ***IMPORTANT:*** With your cursor on the ***LEFT SIDE*** of the leader line, **<R>** to place the text.

   Note: If your cursor is on the right side of the leader when you reset, your note will be placed on the right side.

7. With the ***Place Note*** command still active, click in the **Word Processor** box and key in ***SH 86 STA 225+57.20***.

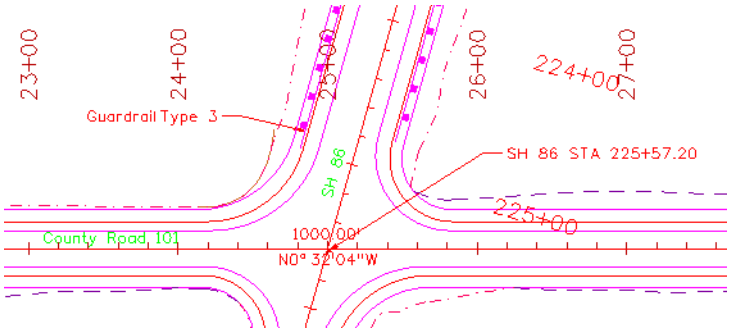
8. On the ***Snap Mode*** toolbar select the **Intersection Snap**.

   Note: You can also click in **AccuDraw** and press ***I*** on the keyboard.



9. **AccuSnap** to the intersection of the two centerlines as shown for the note terminator.

10. Drag your cursor out and **<D>** to place the leader line.



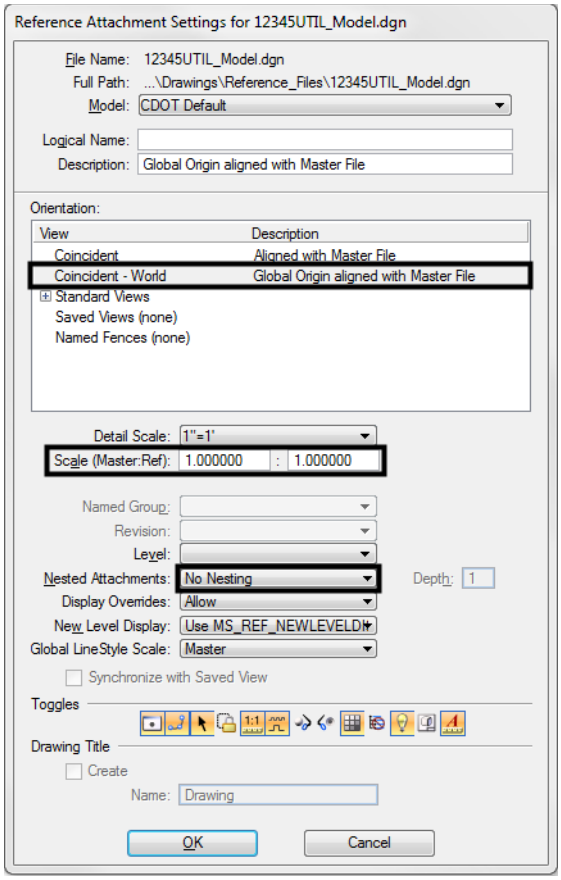
11. With our cursor on the ***RIGHT*** side of the leader, **<R>** to place the note.

Lab 20.4 - Attach and Annotate Utility Lines

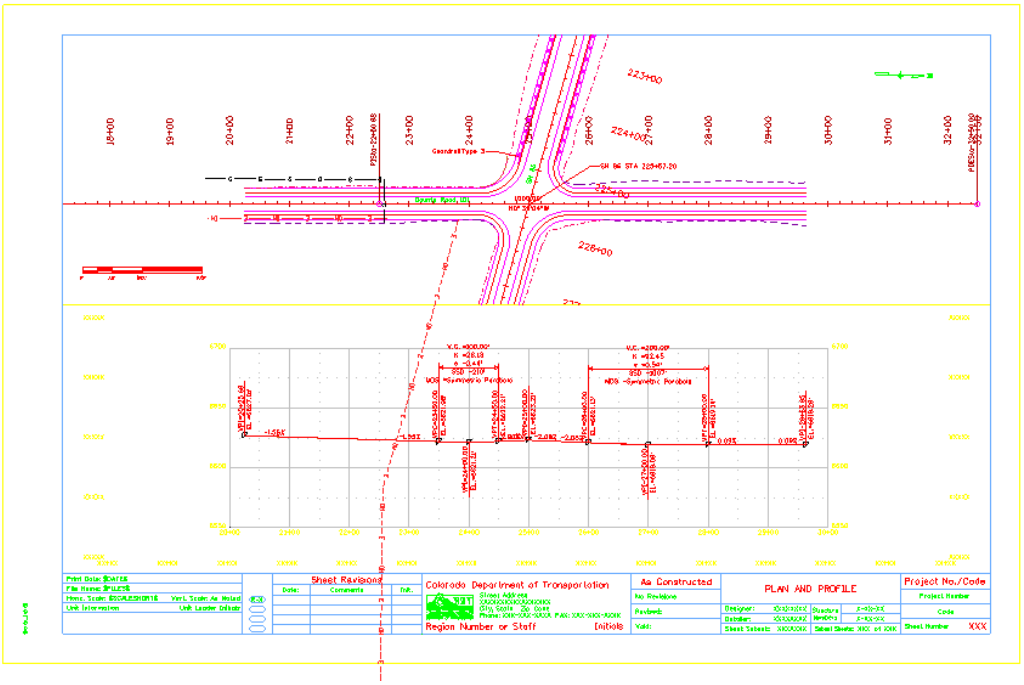
Next, you'll annotate proposed utility lines using the CDOT menu. However, the Utility model was not attached to plan sheet when it was created. Therefore, you must attach the Utility model after-the-fact in order to reference the utility lines for annotation.

Reference the proposed Utility model

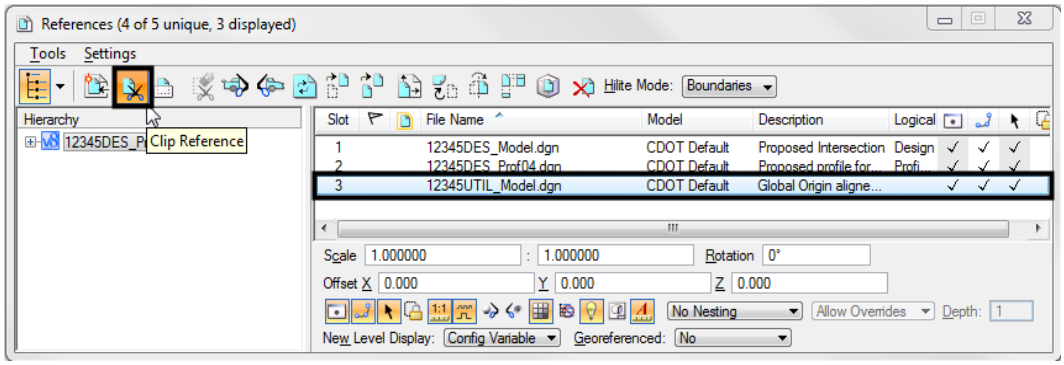
1. **Fit** the view.
2. Open the **References** dialog box.
3. Attach the ***12345UTIL_Model.dgn*** file from project's **\Utilities\Drawings\Reference_Files** folder. Be sure to attach **Coincident-World** at a ***1:1*** scale with **No Nesting**.



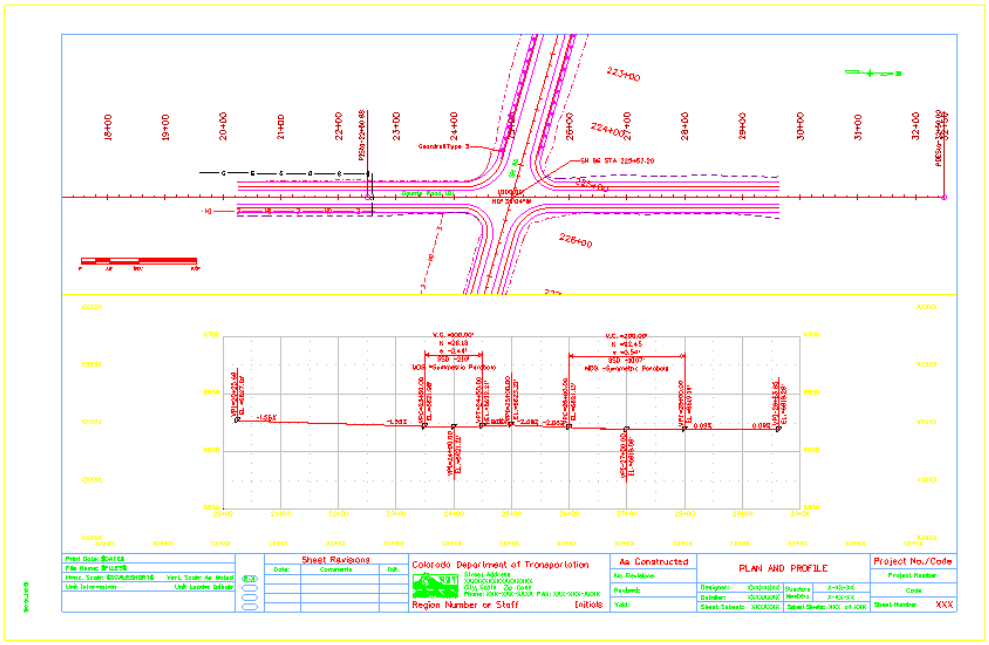
The Utility model is reference, but needs clipping.



4. On the ***References*** toolbar, select the Utility reference and then select **Tools > Clip Boundary**.

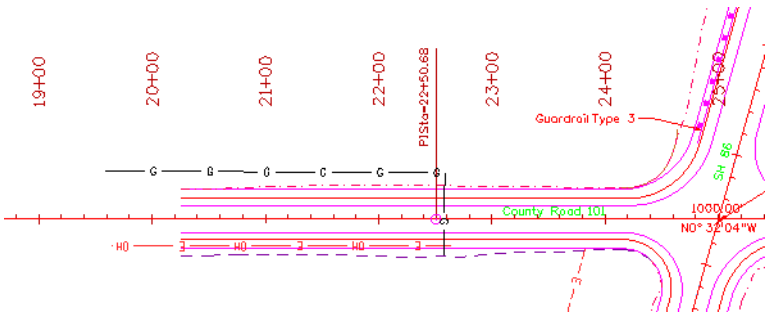


5. **<D>** on the clip boundary block and then **<D>** to accept.



Annotate the gas line

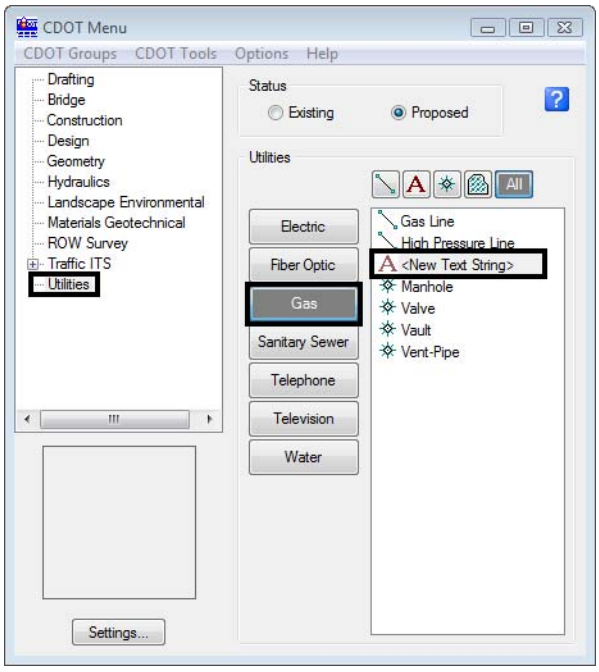
1. Window in on the plan sheet area shown.



2. From the ***CDOT Menu*** Explorer, select **Group Display > Utilities** and set the following options:

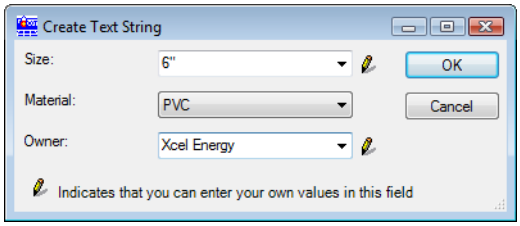
   - Set **Status** to **Proposed**
   - Set the **Category** to **Gas**
   - Set **Filters** to **All** (or Text)

- Select the item **<New Text String>**



3. In the **Create Text String** dialog box set the following from the drop down options:

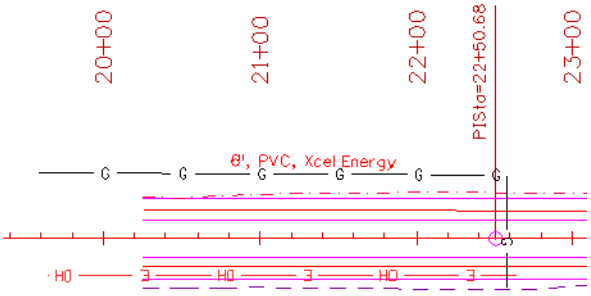
- Set **Size** to **6”**
- Set **Material** to **PVC**
- For **Owner**, key in ***Xcel Energy***



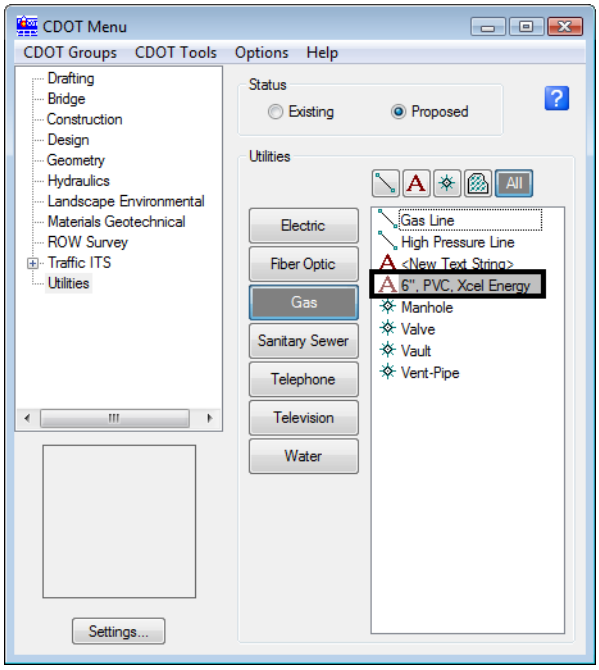
4. Select **OK**.

5. When prompted to ***Identify Element***, **<D>** on the proposed gas line.

6. **<D>** above the line to accept the text placement.



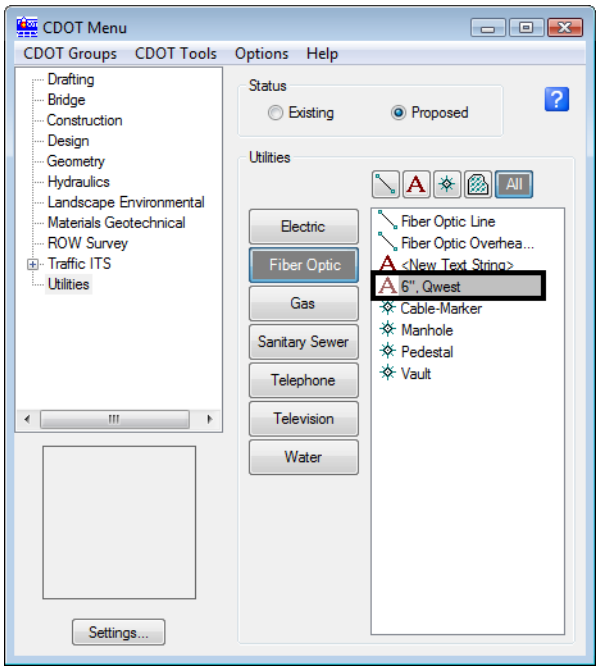
Note: Your custom text 6", PVC, Xcel Energy is saved as an item in the Gas category for placement again.

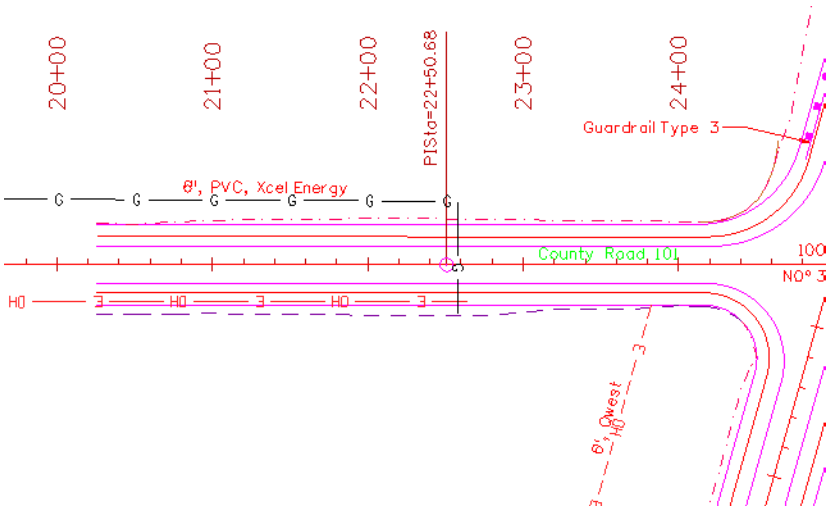


You can right-click on a custom text string and either edit or delete it.

Annotate the fiber optic line

1. Create a custom text string (6”, Qwest) for the fiber optic line and annotate as shown.





Note: Be sure to **<D>** near the bottom of the line to fit the annotation.

Lab 20.5 - Measure Graphics

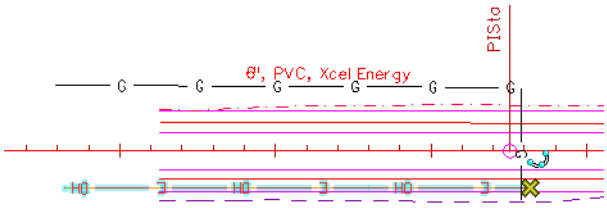
Since you referenced your plan view graphics at a 1:1 scale, they are the actual size in the sheet file. Therefore, you can measure plan graphics in the sheet file and get the same results as measuring in the model file. Make sure that Locate is turned on for the reference before using the measuring tools on reference graphics.

Measure Distance

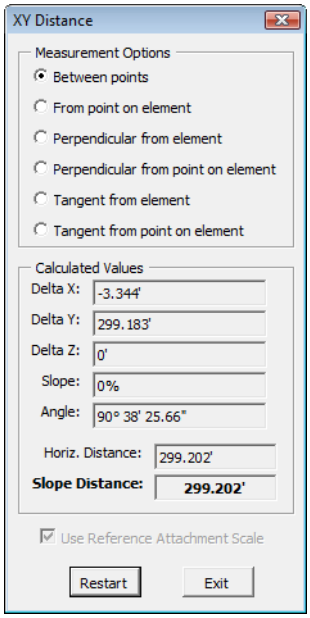
Between points

1. Measure the OH Electrical Line with the CDOT custom add-on tool.

   - From the ***CDOT Menu*** select **CDOT Tools > Measure XY Distance**
   - In the **XY Distance** Dialog box, set **Measurement Option** to **Between points**
   - **AccuSnap** on the ***two*** endpoints of the proposed Overhead electrical line as shown (snap to tie-in at power pole symbols – see arrows below)



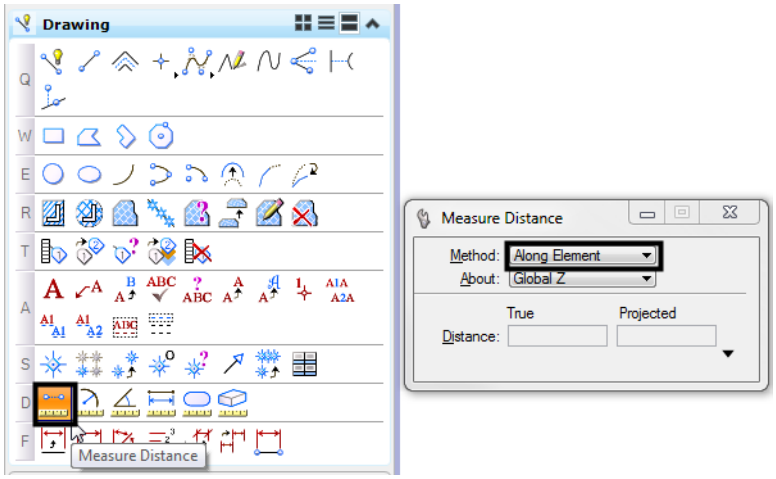
   - **<R>** when done
   - Your results should match the dialog box



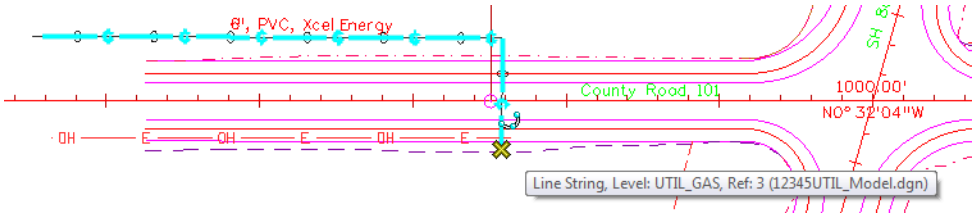
Along element

1. Measure the Gas Line with standard MicroStation tools.

- Select the **Measure Distance** command from the ***Measure*** toolbar under the ***Drawing*** task tab.



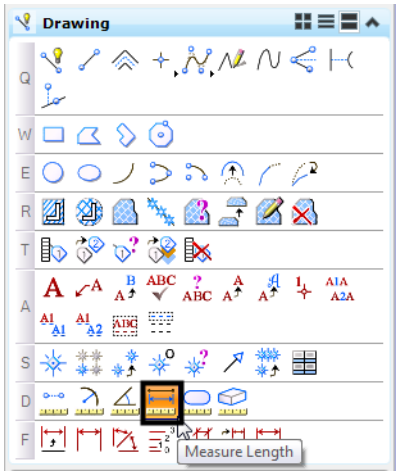
- Set the ***Method*** to **Along Element**
- **AccuSnap** on the ***start*** and ***end*** points of proposed 6" gas line as shown (see arrows).



- Record your results: _____ft.

Note: Individual results will vary based on how the line was originally drawn.

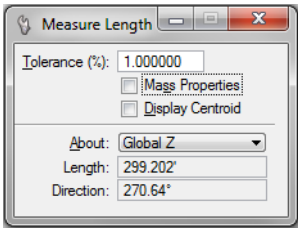
2. Select the **Measure Length** command.



- **<D>** on the gas line.
- Record your results: _____ft.

Your results should be the same as in step 2. With this command, you only have to select the element with a data point to get its entire length.

3. Use **Measure Length** to measure the length of the OH Electrical line.



Your results should be the same as step 1 where you measure with the CDOT custom **XY Distance** tool.

Note: When measuring a straight line with this method, you also get the angle of the line.

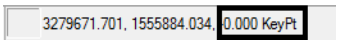
Measure perpendicular

1. In the **Design** Model reference, turn **Off** the level **DRAFT_LC-Center_WT-3**.

   This element (a blue dashed line) is a coincident to the alignment centerline. Since you will only be working with the alignment, turn this level off and leave the **ALG_PROPOSED_Hor-Alignment** turned on.

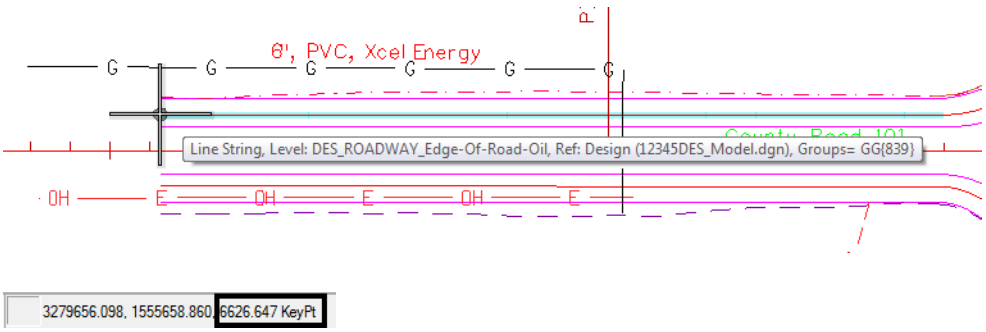
2. Turn **Depth** lock **Off**.

3. **<T>** on the side road horizontal alignment and note the Z value.



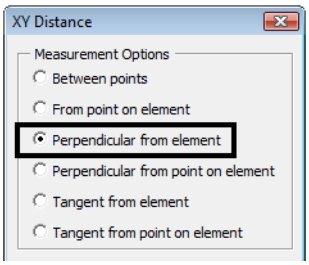
Horizontal Alignments, like this one, are typically placed at elevation 0.

4. **<T>** on the red upper edge of oil line at the beginning of the alignment and note the Z value.



The edge of oil line is placed at the correct elevation.

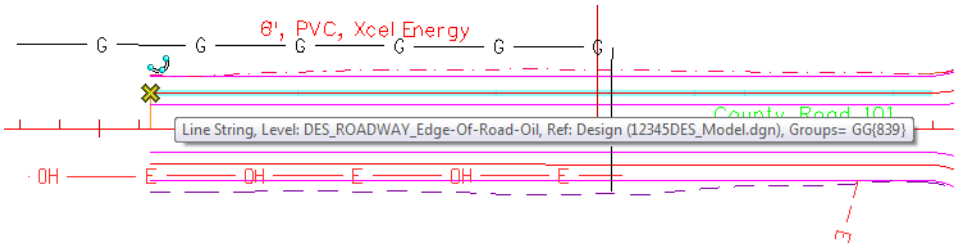
5. In the ***XY Distance*** dialog box, set the **Option** to **Perpendicular from element**.



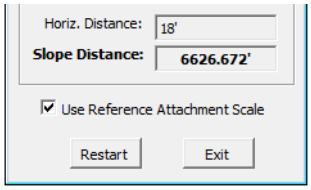
6. **<D>** on the side road horizontal alignment.

   MicroStation displays a horizontal tracking line.

7. **AccuSnap** on the end of the upper edge of oil line.



8. Review your results:



   Note that even though the two elements are at different elevations, the CDOT custom ***XY Distance*** tool provides both the ***Horizontal Distance*** of 18 feet along with the true 3D slope measurement (or ***Total Distance***) of 6626.672 feet.

LAB 21 - Annotate the Bridge General Layout Sheet

In this lab, you'll annotate the bridge general layout sheet with text, notes and dimensions.

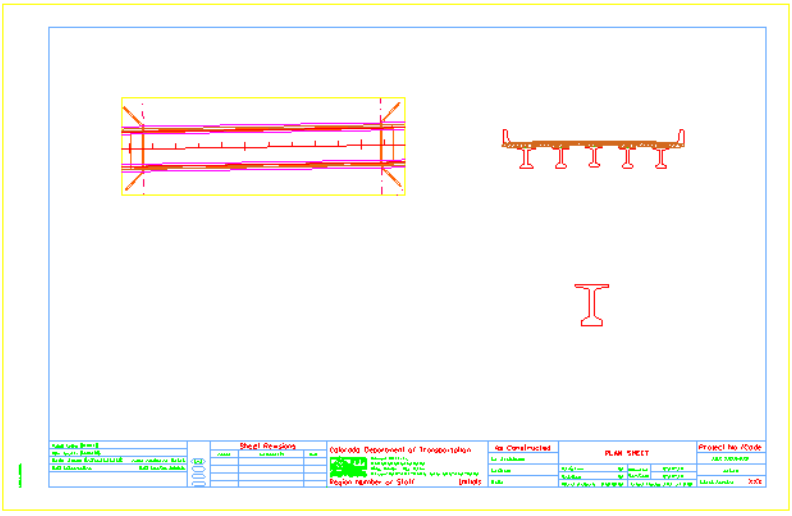
Chapter Objectives:

After completing this exercise you will know how to:

- Set and change the **Text Annotation Scale** to match the drawing scale.
- Place dimensions using the following methods:
  - Element
  - Linear
  - Angle between lines
  - Bearing and Distance
- Edit dimension text.
- Place notes with curved leaders.

Lab 21.1 - Open Project Plan Sheet

1. Start MicroStation
2. Start MicroStation and open **12345BRDG_Plan01.dgn** from the ***C:\Projects\12345\Bridge\Drawings*** folder.



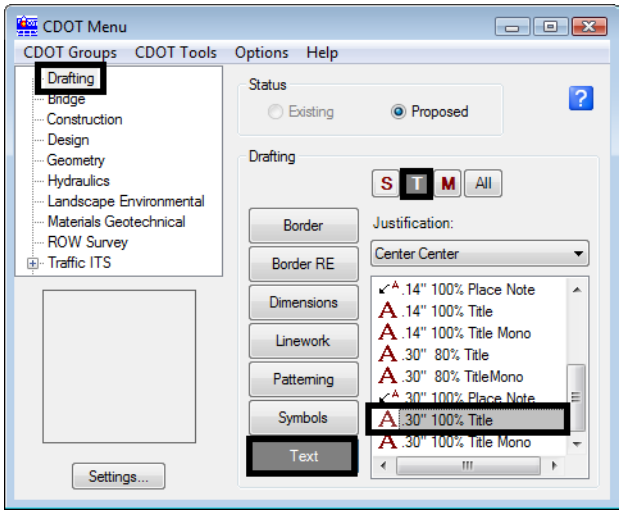
Lab 21.2 - Place Text

Label the different part of the general layout sheet (plan, typical section, etc.)

Set text attributes

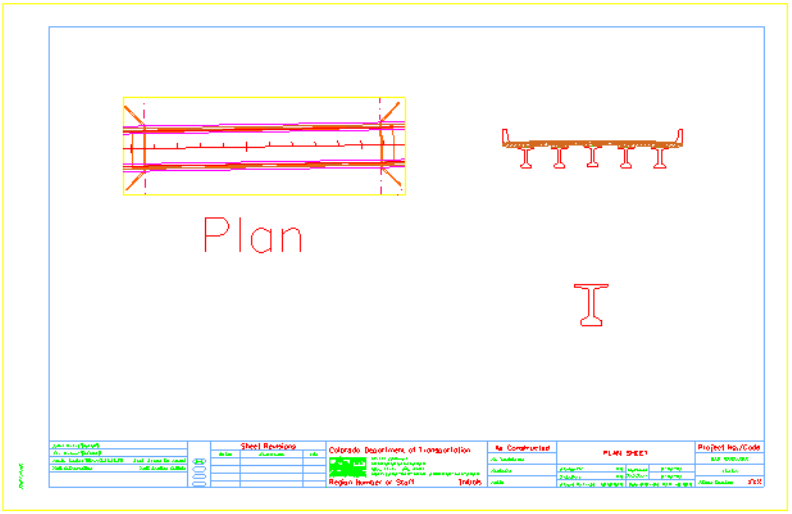
1. On the ***CDOT Menu Explorer***, select **Drafting > Text** and set the following options:

   - **Filter: Title (T)**
   - **Justification: Center Center**
   - **Item: .30" 100% Title**



Note: This sets the active level to **DRAFT_Text-2** and automatically selects the **Place Text** command.

2. In the **Word Processor** box, key in **Plan**
3. Drag your cursor into the view.
4. **<D>** to place the text as shown.



Note: The text is extremely large implying the text annotation scale is obviously wrong.

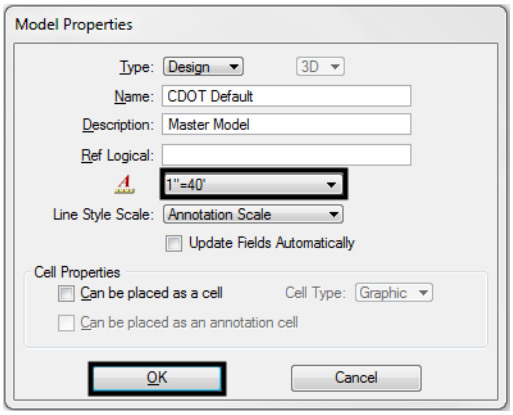
5. **<R>** out of the **Place Text** command.

Change the Text Annotation Scale

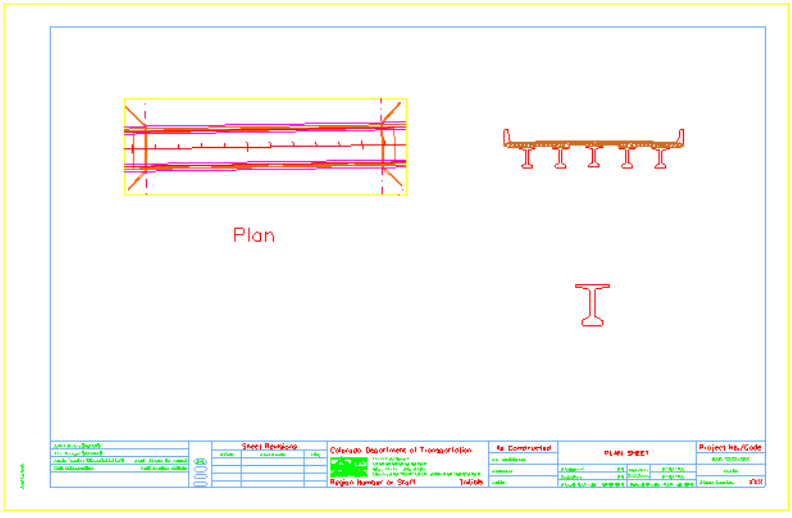
1. Select **Models** from the **Primary** toolbar.
2. In the **Model** box, select **Edit Model Properties.**
3. The **Text Annotation Scale** is set to **1:100** (the default setting from the seed file).

   Note: This is a 40-scale drawing (the border was placed at a 40 scale around the graphics). Scaling the text 100 times results is text that is the wrong size.

4. Change the **Text Annotation Scale** to **1:40** and select **OK**.

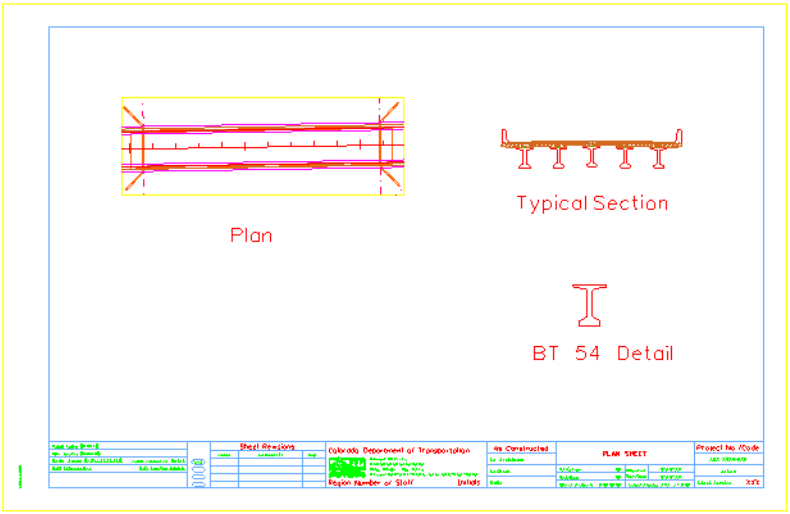


5. The text “Plan” is automatically resized for a 40-scale drawing and will now measure correctly when plotted.



6. Close the ***Models*** box.
7. Select **File > Save Settings** to save the new settings.

8. Using the same text attribute settings, place the following text in the locations shown:
   - **Typical Section**
   - **BT 54 Detail**
9. Use the **Move** command to move the text to the desired location, if necessary.

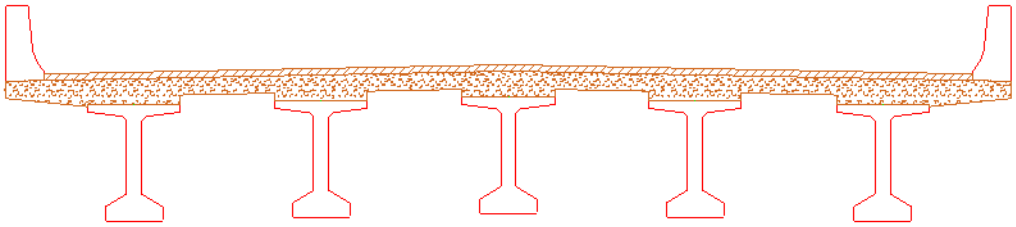


Lab 21.3 - Dimension the Bridge Typical Section

Use the CDOT Menu to dimension the bridge typical section.

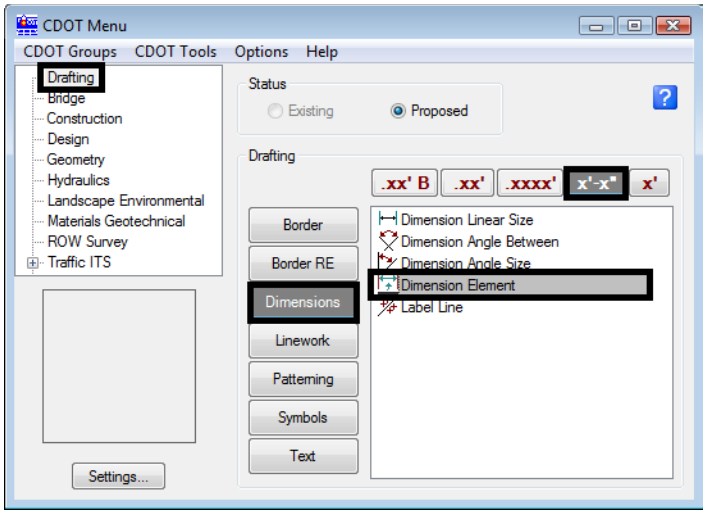
Dimension the travel lanes and shoulder by element

1. **Window** around the typical section.



2. On the **CDOT Menu Explorer**, select **Drafting** and set the following options:
   - **Category: Dimensions**
   - **Filter: x'-x"**

♦ **Item: Dimension Element**

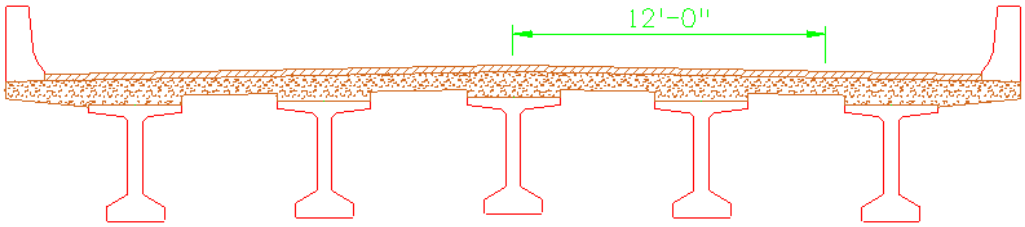


Note: The **Dimension Element** command is automatically selected.

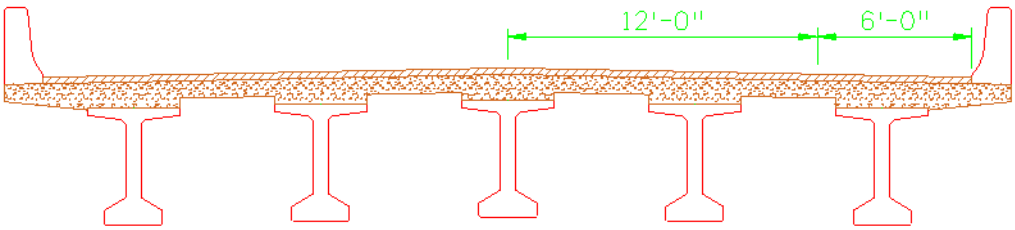
3. When prompted to select the element to dimension, **<D>** on the top pavement to the right of the centerline.

   Note: This should select the 12 ft **SmartLine** segment which represents the travel lane, if not, **<R>** until you select the correct element.

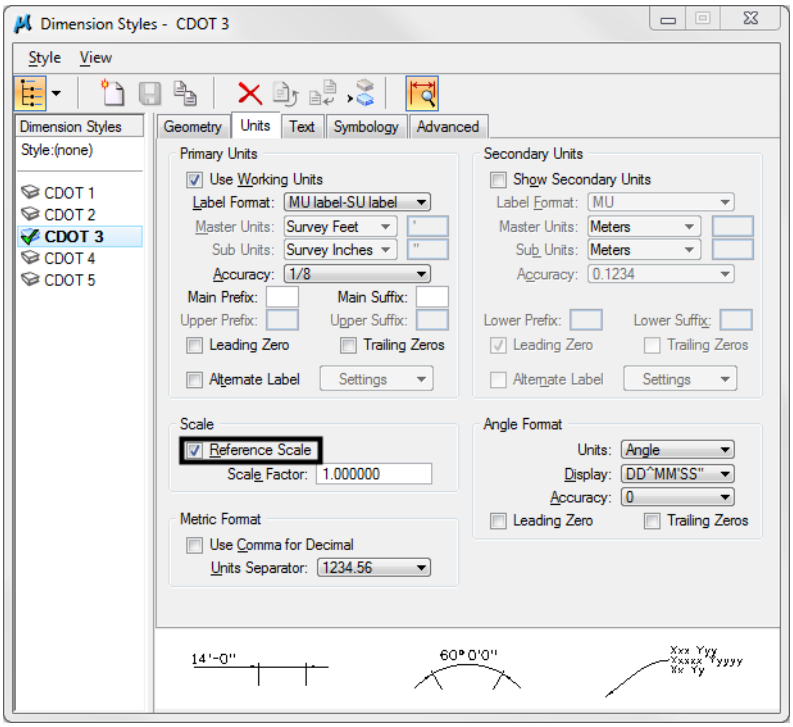
4. Move your cursor up to establish the length of the extension line and **<D>** to place the dimension.



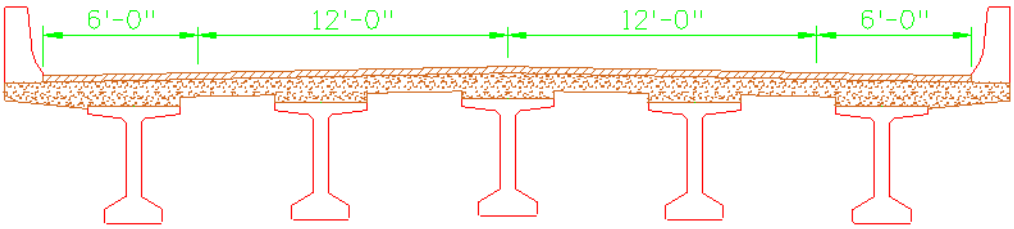
5. Repeat for the 6 ft. right-shoulder segment. **<D>** on the segment near the extension line and then **AccuSnap** on the 12 ft. dimension's terminator to place the dimension.



Note: The elements dimension actual size even though the bridge typical section was scaled up 4 times (40: 10 or 1:10 at a 40-scale). This is because **Reference Scale** is turned on in the **Units** tab of the dimension style. The units for dimensioning are, therefore, read from the model file instead of the sheet file. **Reference Scale** is on by default in all CDOT dimension styles.

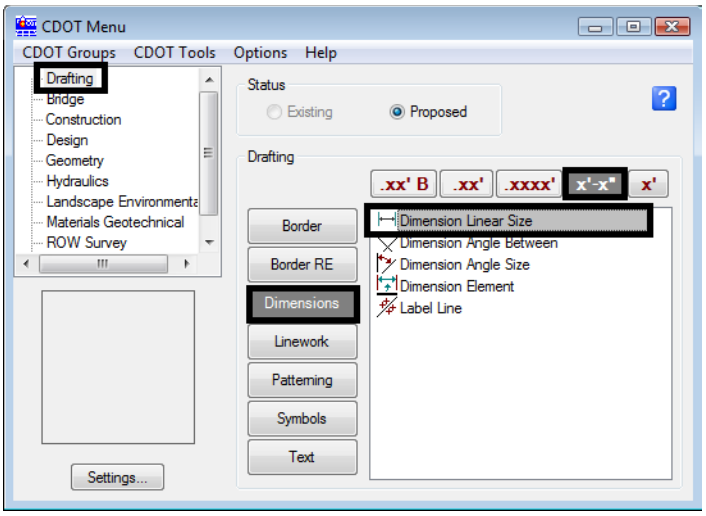


6. Repeat for the left side of the road. Be sure to **AccuSnap** on the adjacent dimension's terminator to line up the dimensions.



Dimension the bridge rail curb using linear dimensions

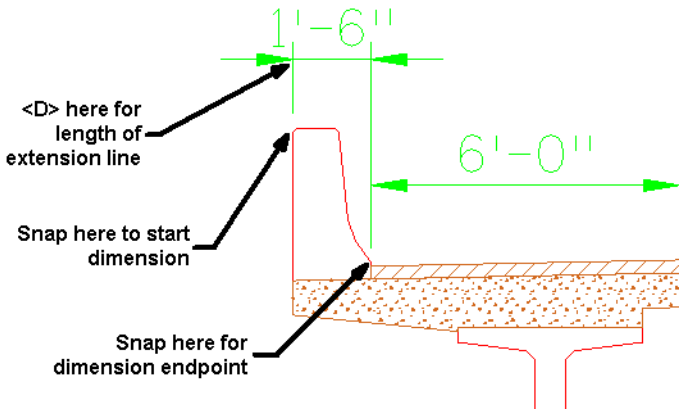
1. On the CDOT Menu Explorer, change the **Item** to **Dimension Linear Size**



2. Following your prompts, **AccuSnap** on the end of the back of the rail for the start of the dimension.

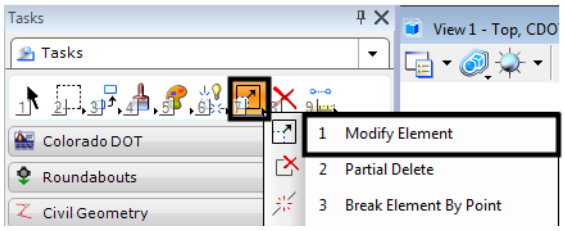
3. Move your cursor up to the approximate location shown and **<D>** to define the length of the extension line.

4. **AccuSnap** on the face of the curb as shown to define the end of the dimension.



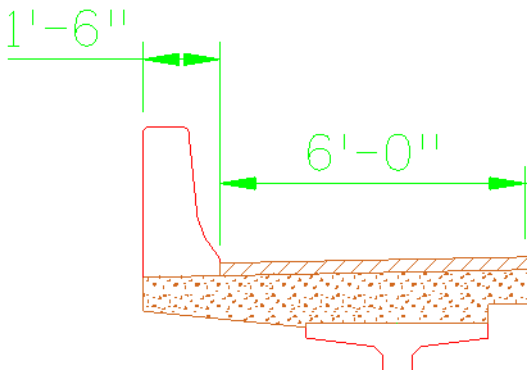
Note: The dimension text is too large for the dimension when placed inside the extension lines. You can **Modify** the text to solve this problem.

5. Select the **Modify** tool from the **Main** task toolbar.



6. **<D>** on the 1'-6" curb dimension text.

7. Lock your cursor on **AccuDraw X** axis and move the text to the left as shown.

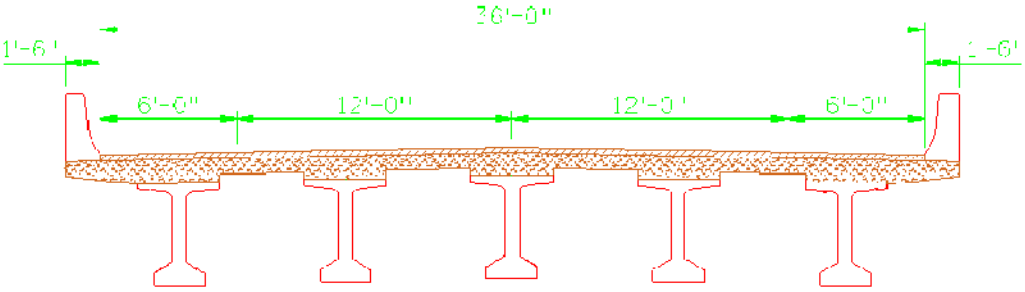


8. **<R>** when done.

9. Repeat the above steps and dimension the curb on the right side.

Place additional linear dimensions

1. Using the **Linear Dimension** command, place additional dimensions for the width of the section as shown.



Measure the typical section

1. Select the **Measure Distance** command and set the method to **Between Points.**

2. **AccuSnap** on the left outside curb line.

3. **AccuSnap** on the right outside curb line.

4. Review your results.

   The typical section measures 144 ft, which is 4 times the actual size since the detail was scaled up on the drawing. While dimension commands can read reference units (via the **Reference Scale** option in the dimension style), measuring command can not. You should only use **Measuring** command in sheet files where the graphics have been referenced 1:1 (like plan view graphics). If graphics have been scaled in the sheet, you must return to the model file for true measurements.

Edit dimensions

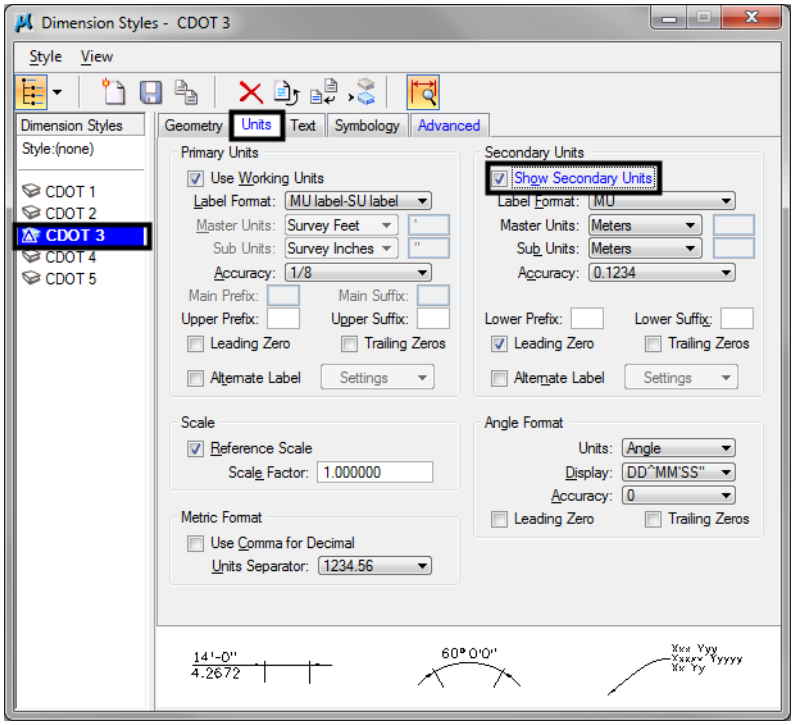
Edit the dimension style

You can change the dimension style to show secondary units below the dimension line. While this is intended for dual dimensioning in metric, you can edit this text to add descriptions to your dimensions.

1. Select **Element > Dimension Styles**.

   The **Dimension Styles** box opens. This is where all the CDOT standard dimension attributes are set. Typically, you will not need to change these settings for most dimensions.

2. Select the **CDOT 3** style and then select the **Unit** category and toggle on **Show Secondary Units**

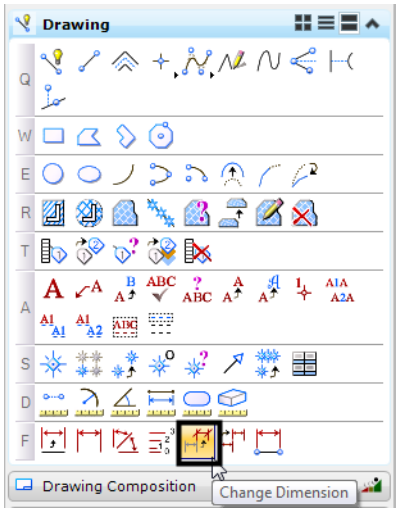


Note: Do not select the **save** icon.

3. Close the **Dimension Styles** box.

Change dimensions

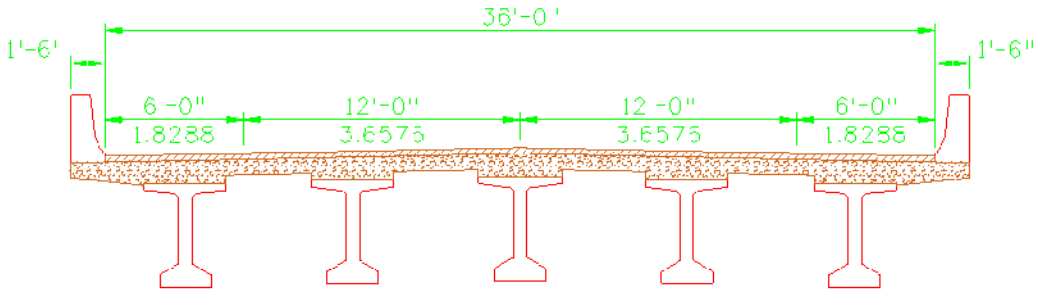
1. From the ***Dimension*** toolbar under the ***Drawing*** task tab, select **Change Dimension**.



2. **<D>** on the 12 ft travel lane dimension and then **<D>** to accept.

   The dimension is updated to show the secondary units.

3. Repeat for the other dimensions as shown.



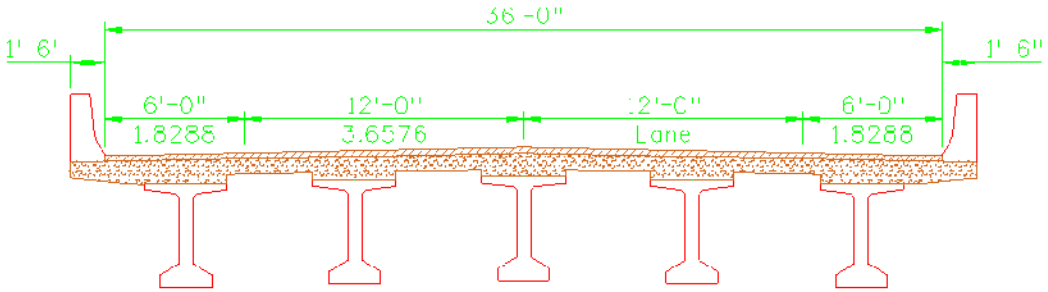
Change dimension text

1. Select the **Edit Text** command from the **Text** toolbar.
2. **<D>** on the 12 ft lane metric text.

   Note: In the **Text Editor**, the dimension text appears as an asterisk (*) to denote that it is associative text.

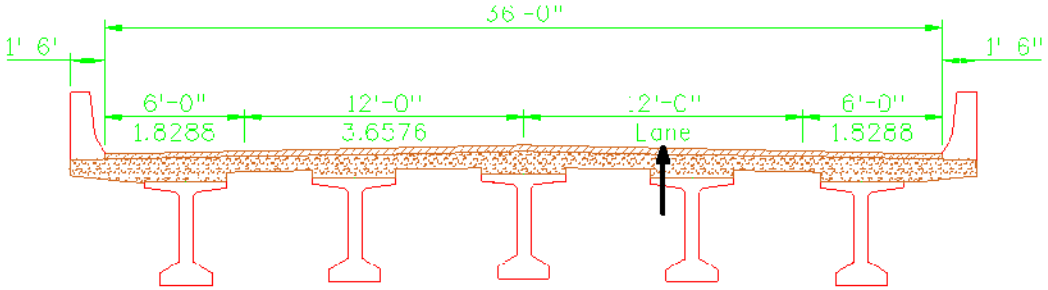
3. Change the text to **Lane**.

4. **<D>** to accept.



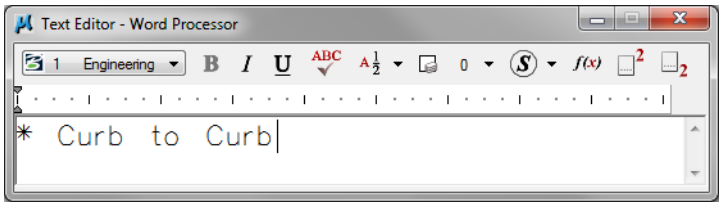
The text is updated on the dimension.

5. Repeat for the other travel lane and the shoulders as shown.

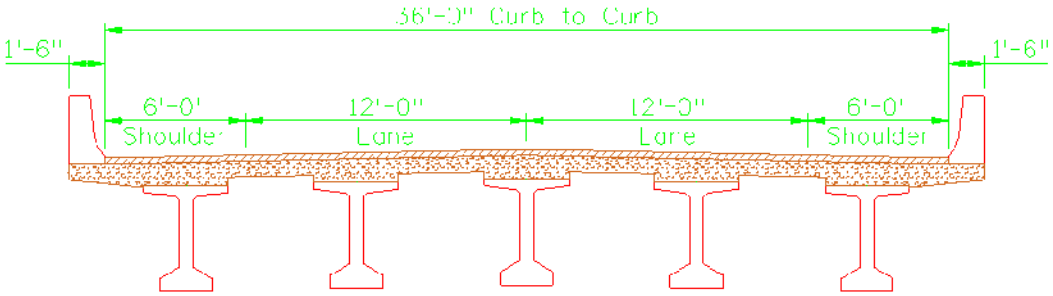


Edit dimension text

1. Using the **Edit Text** command, **<D>** on the 36 ft text.
2. In the **Text Editor**, click to the right of the asterisk to get a blinking cursor.
3. **Space** once and key in **Curb to Curb**.



4. **<D>** to accept.

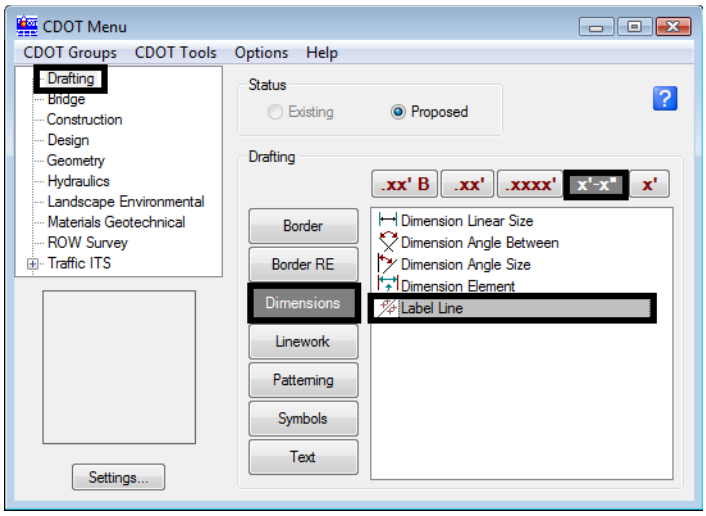


Since you did not delete the asterisk, the text is still associated with the element. You just added text to the associated dimensions.

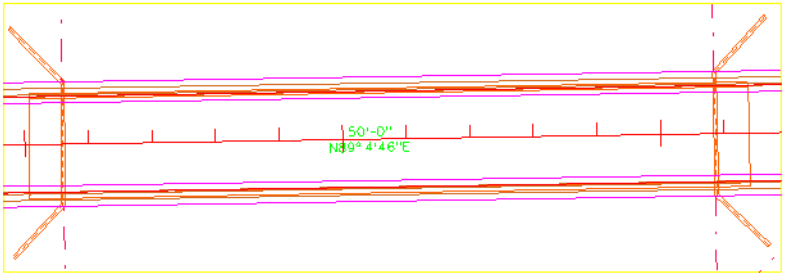
Dimension the Plan

Dimension the bearing of the centerline

1. On the CDOT menu, select **Label Line**.



2. **<D>** on the SH 86 centerline.

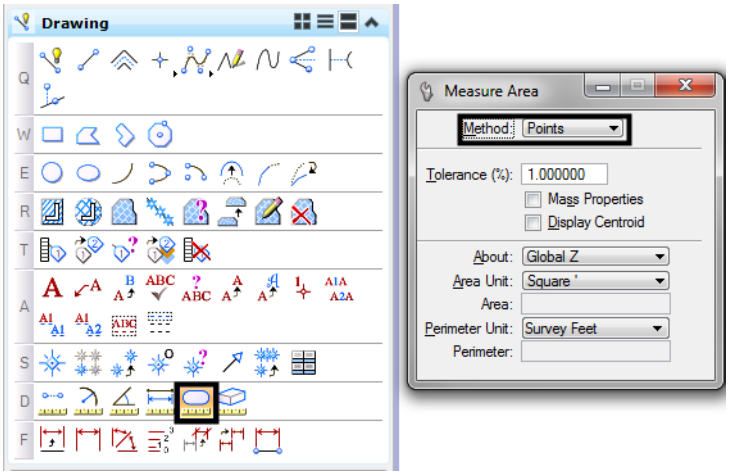


Note: Both Bearing and Distance are placed. If you do not want one of the dimensions, you can drop the dimension, turn off the **Graphic Group** lock and then delete the dimension.

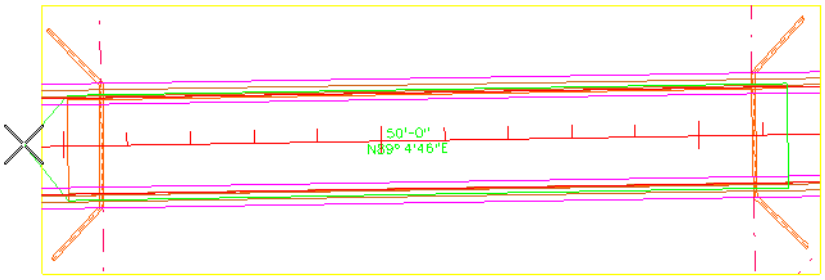
Measure the bridge area

1. Turn **ASC Plane Snap** lock on.
2. Turn **AccuSnap** off.
3. Select the **Measure Area** command from the ***Measure*** toolbar under the ***Drawing*** task tab.

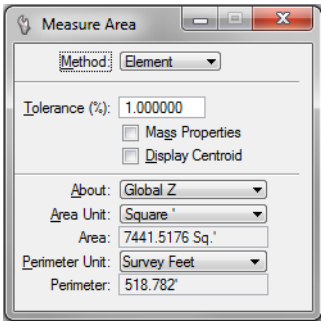
4. Set the **Method** to **Points**.



5. Snap to the four corners of the bridge as shown (see arrows) to dynamically draw a shape to measure.



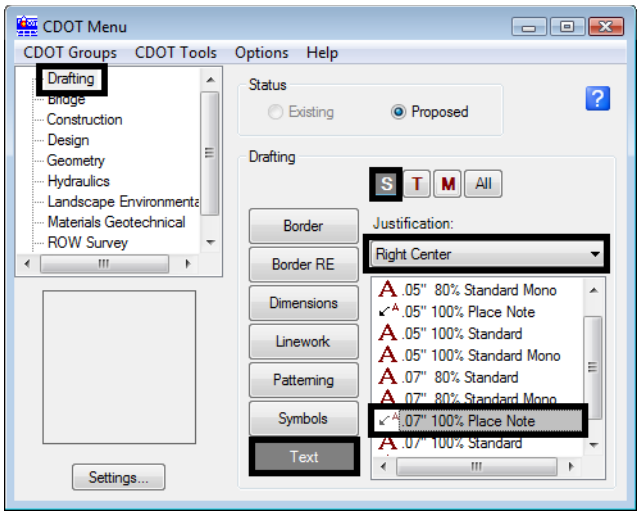
6. Reset **<R>** to close the shape to compute the area (do not loop back and snap on the first point).



Note: The Points method is the only method that gives you a planar area with Depth lock turned on.

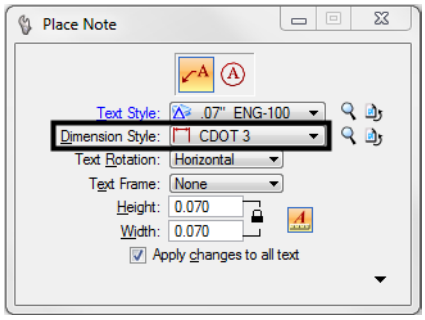
Place a note with a curved leader

1. From the CDOT Menu, set the text options as shown.



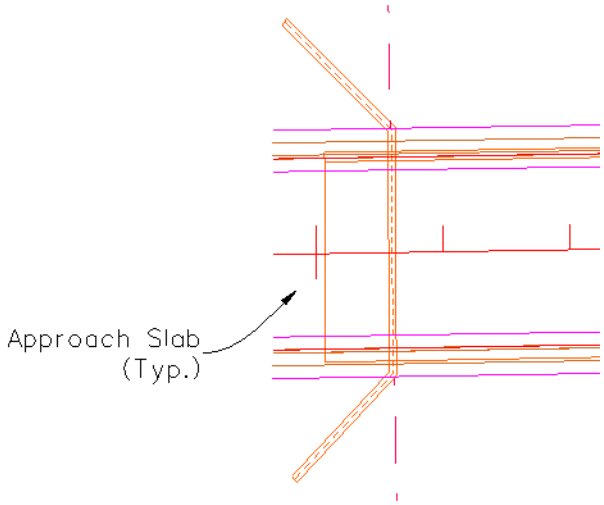
2. Select the **Place Note** command.

3. In the **Tool Settings** box, set the **Dimension Style** to **CDOT 3**.



Note: The **Place Note** command uses a dimension style for the leader and terminator as well as a text style. The CDOT 3 style will place a curved leader without an in-line leader.

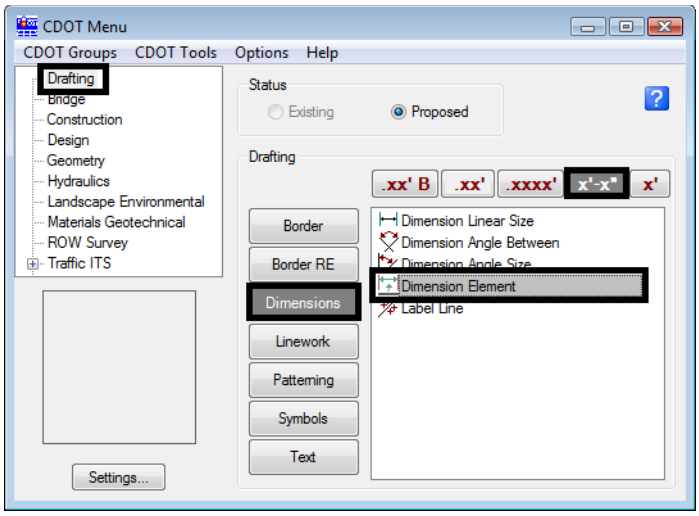
4. Place the note as shown.

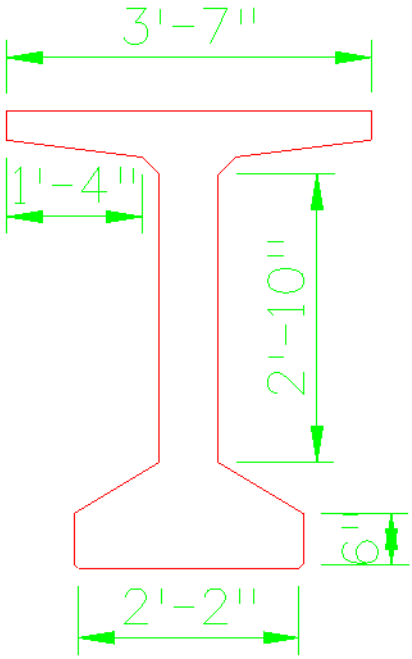


Note: Since this style does not use an in-line leader, you can place the text with a data point instead of a reset point on the side of the leader.

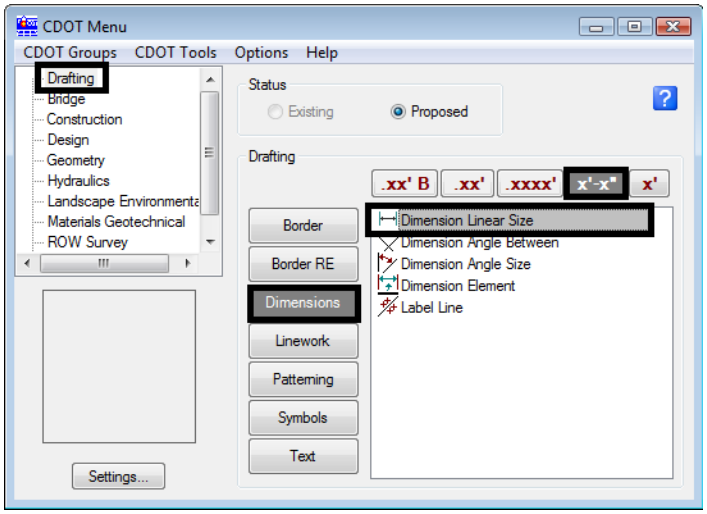
Dimension the Girder Detail

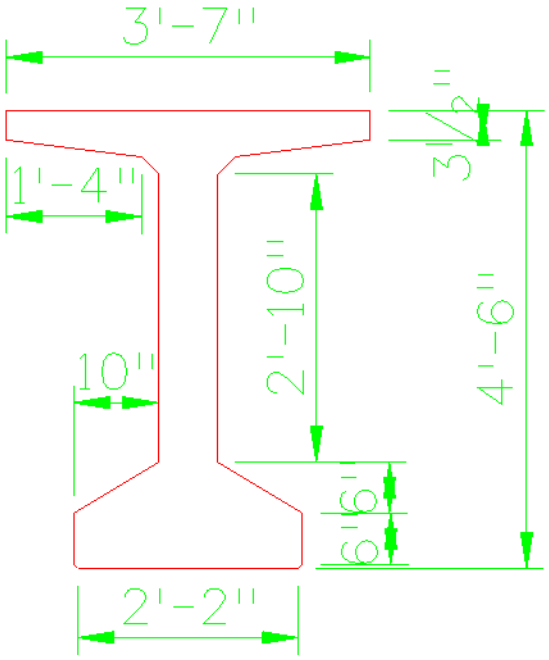
1. Use the **Element** method to dimension the girder as shown.



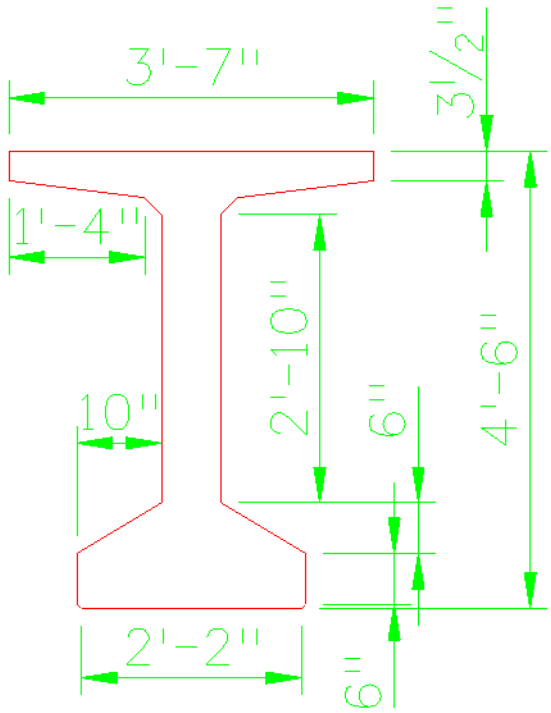


2. Use the **Linear** method to finish placing dimensions.





3. Use the **Modify** command to move the dimension text as shown.



4. **Fit** the view.
5. **Save Settings**.
6. **Exit** MicroStation.

LAB 22 - Printing to a Printer

In this lab, you'll plot a single sheet to the classroom 11 x 17 printer.

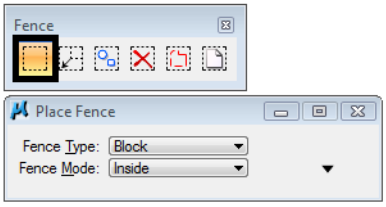
Chapter Objectives:

After completing this exercise you will know how to:

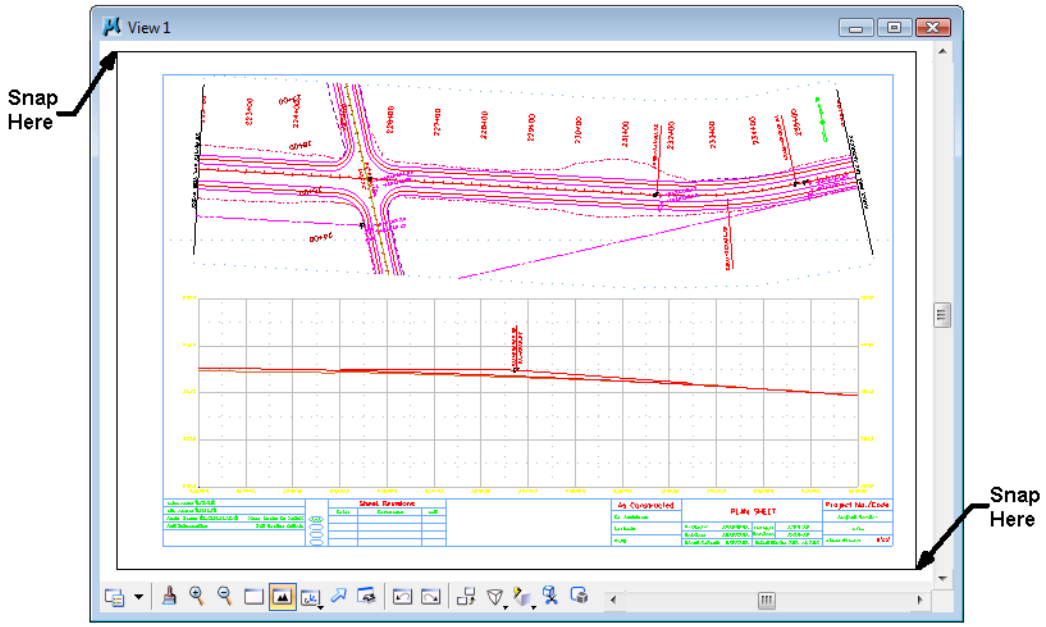
- Prepare a single sheet for printing.
- Print an 11x17 sheet to a printer.

Lab 22.1 - Prepare the Sheet for Plotting

1. Start MicroStation and open **12345PDES_PnP9.dgn** from the project's **…\Design\Drawings** folder.
2. **Fit** the view.
3. Use the **Edit Text** command and edit the border text to add your initials as the Designer.
4. Select **Place Fence** and set the **Fence Type** to **Block** and **Fence Mode** to **Inside**.

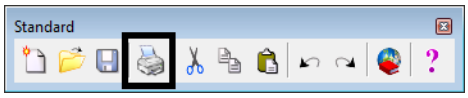


5. **Snap** (**<T>**, then **<D>**) to the corners of the outer-most shape that goes all the way around the plan and profile sheet to place the fence.



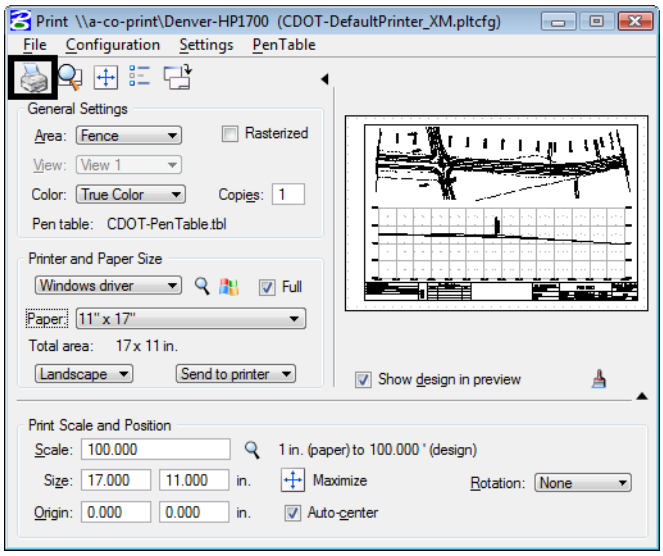
Lab 22.2 - Print the Sheet (Classroom Printer)

1. Select **File > Print** or choose the **Print** icon from the **Standard** toolbar.



2. From the Print dialog box, select **File > Select Windows Printer** and double-click on the **Denver-HP1700** printer..

3. Set the dialog as shown here. Be sure to set the **Print Scale** to **100**.



4. Select the **Print** icon or **File > Print**.

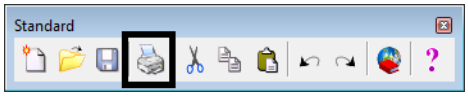
   The file is printed to the 11x17classroom plotter.

   Note: For tips on printing raster references (e.g. aerial photos), see the workflow **Printing Raster Images**.

5. Do not exit. Keep MicroStation open for the final plotting exercise.

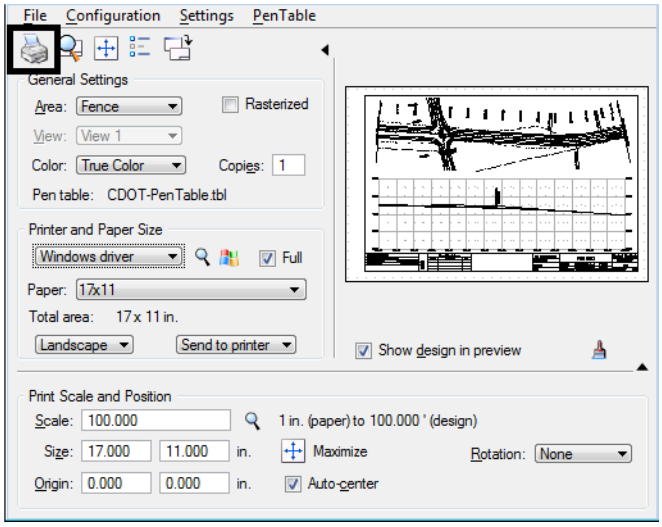
Lab 22.3 - Print the Sheet (CDOT Workflow)

1. Select **File > Print** or choose the **Print** icon from the **Standard** toolbar.



2. If prompted, select **CDOT-DefaultPrinter_XM.pltcfg** for the print driver, and then select **OK**.

3. Set the dialog as shown here. Be sure to set the **Print Scale** to **100**.



4. Select the **Print** icon or **File > Print**.

   Note: For tips on printing raster references (e.g. aerial photos), see the workflow **Printing Raster Images**.

5. Do not exit. You'll keep MicroStation open for the final plotting exercise.

Optional Exercise

1. Open the **12345BRDG_Plan01.dgn** file from the project's **...\Bridge\Drawings** folder.

2. Plot the sheet to the classroom printer. Be sure to set the **Print Scale** to **40**.

3. Do not exit. You'll keep MicroStation open for the final plotting exercise.

LAB 23 - Batch Printing to PDF

In this lab, you'll use **Batch Printing** to print multiple files at one time. Instead of printing to a printer, you'll print to PDF for the reproduction department (i.e. a plot set for a milestone submittals).

Note: To batch print to a printer, see the workflow CDOT Batch Printing.

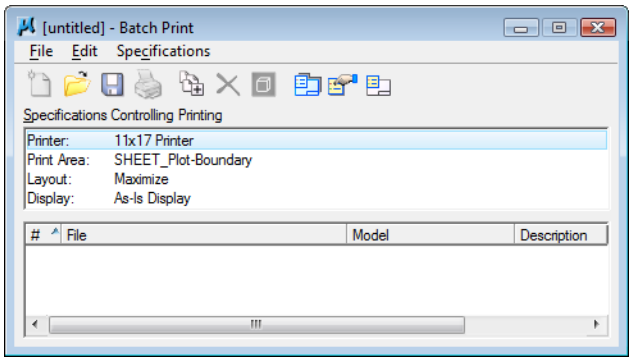
Chapter Objectives:

After completing this exercise you will know how to:

- Select files to batch print.
- Set and change batch process specifications.
- Create a batch process job file (*.job).
- Batch print to PDF files.

Lab 23.1 - Select Files to Batch Print

1. Select **Batch Print** in MicroStation from the file pull down menu.



Note: You can be in any MicroStation file when you run the **Batch Print** process.

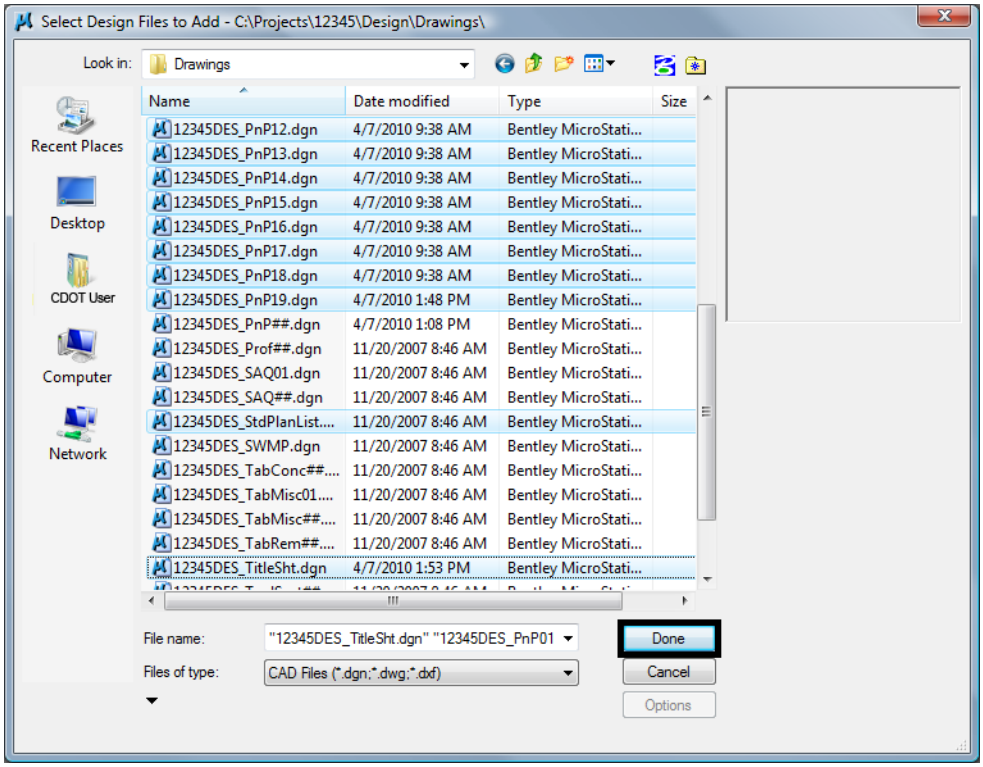
2. In the **Batch Print** dialog box, select **Edit > Add Files**.

Note: **Add Active File** adds the design file that is open in MicroStation.

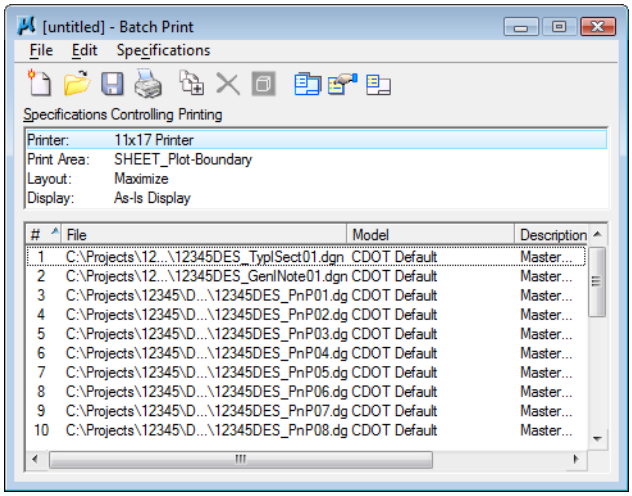
3. Navigate to the C**:\Projects\12345\Design\Drawings** folder. Select the following files to add to the batch process (you can hold down the **Ctrl** or **Shift** key to select multiple files):

- **12345DES_GenNote.dgn**
- **12345DES_PnP01.dgn – 12345DES_PnP19.dgn**
- **12345DES_StdPlanList.dgn**
- **12345DES_TitleSheet.dgn**
- **12345DES_TyplSect01.dgn**

4. Select **Done**.

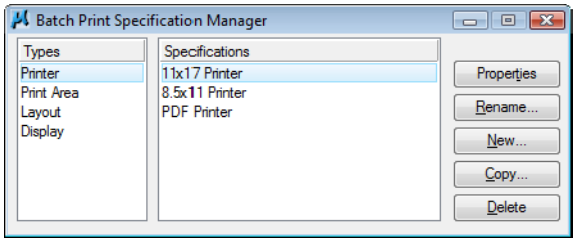


5. When finished adding files, select **Done**.

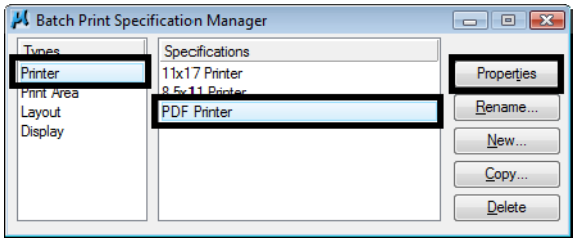


Lab 23.2 - Set Batch Process Specifications

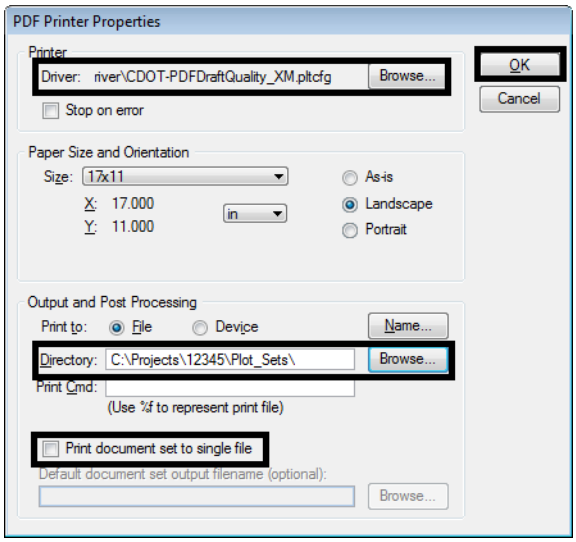
1. The batch process default specifications are:
   - **Printer: 11x17 Printer**
   - **Print Area: SHEET_Plot-Boundary**
   - **Layout: Maximize**
   - **Display: As-Is Display**
2. Select **Specifications > Manage** to change the default specifications.



3. Under **Types**, select **Printer** and **PDF Printer**
   - Select Properties

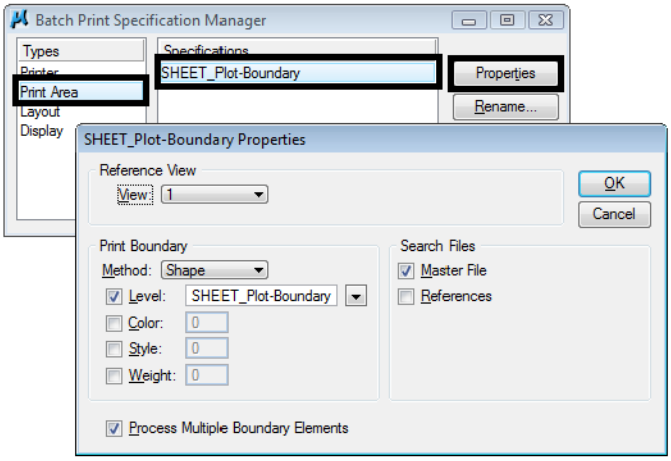


   - Select ***Driver*** and select **CDOT-PDFDraftQuality_XM.pltcfg** and select **OK**
   - Toggle off **Print document set to single file**
   - Set the **Directory** to **c:\projects\12345\Plot_Sets**



Note: To print all these sheets to a single PDF, the toggle for **Print document set to single file** must be **ON**

- Select **OK**
- Under Types, select **Print Area** and then select **Properties**.

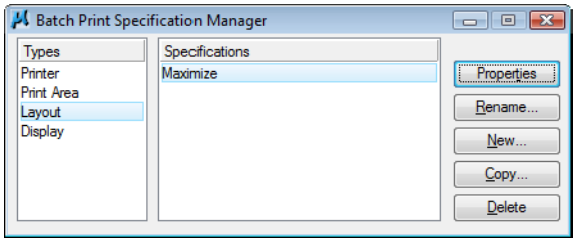


Note: The printable area defaults to the outer boundary of the standard CDOT sheet border (the yellow shape on level **SHEET_Plot-Boundary**).

Just **Master File** is checked **ON** under **Search Files**.

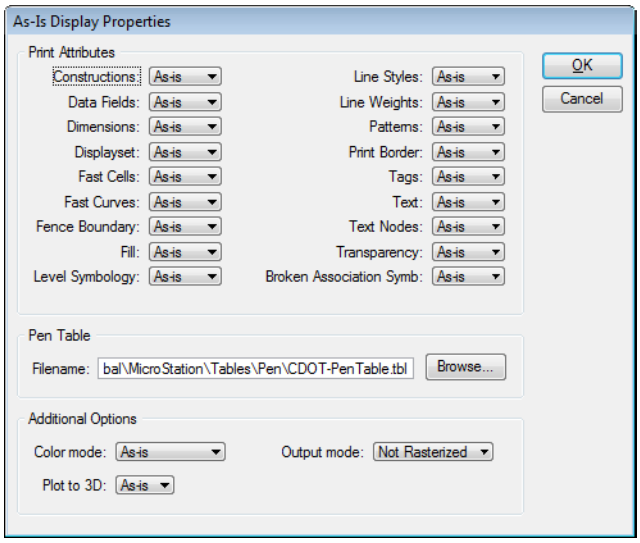
If **References** is toggles **ON** and the level **SHEET_Plot-Boundary** is not found in the **Master File** as a cell, it will search for the level in the Reference files associated with the sheet file. This might cause blank sheets to be generated.

4. Cancel the **Properties** box.
5. Under **Types**, select **Layout** and then select **Maximize**.



6. Under **Types**, select **Display**
   - Select **As-Is Display**

- Select **Properties**



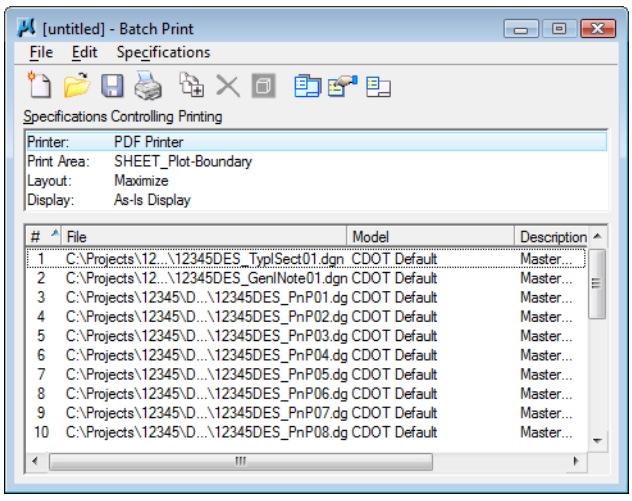
Note: The **As-Is Display Specification** sets up the print properties for various elements. The **As-Is** setting reads MicroStation's View Attributes setting for each design file.

The Pen Table defaults to **CDOT-PenTable.tbl**, which is the table used for black-and-white printing.

7. **Cancel** out of the **Properties** box.

8. **Close** the ***Batch Print Specification Manager*** box by selecting the **X** in the upper-right corner.

Your changes are shown in the main **Batch Print** dialog box.



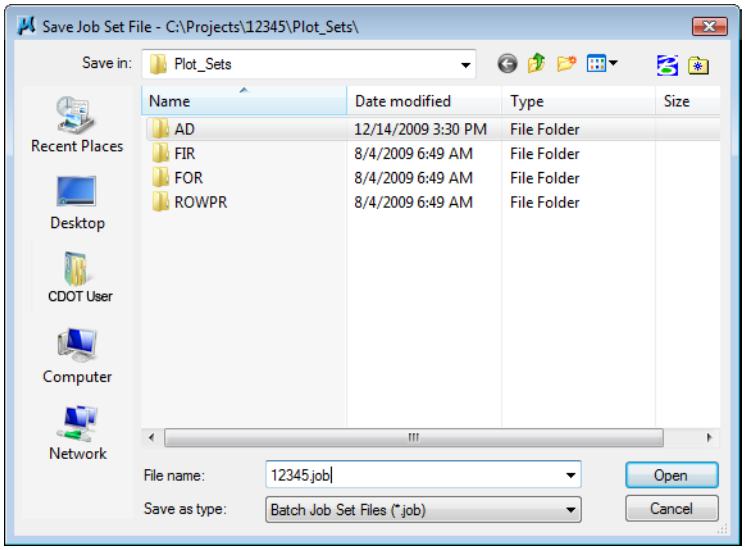
Lab 23.3 - Save the Specifications to a Job file (*.job)

1. From the Batch Print dialog box, select **File>Save As…**

2. Navigate to the project's **…Plot_Sets** folder.

   Note: You should select one of the subfolders (FIR, FOR, etc.) for the appropriate plot set. For training purposes, you'll plot to the upper level Plot Sets folder.

3. In the **Files** field, key in **12345** and select **OK**.

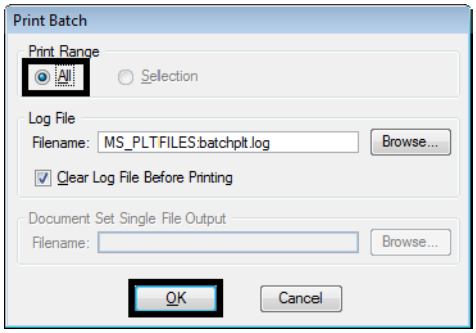


The job file should be saved to the project in the appropriate folder under the **Plot_Sets**. The file is automatically assigned a .job extension. If you want to process this job again, select **File > Open** from the **Batch Print** dialog box and choose the **12345.job** file.

Lab 23.4 - Create the Batch Prints

1. Select the **Print** icon to open the ***Print Batch*** dialog box.

2. In the **Print Batch** dialog box, set ***Print Range*** to **All** to print all the files selected



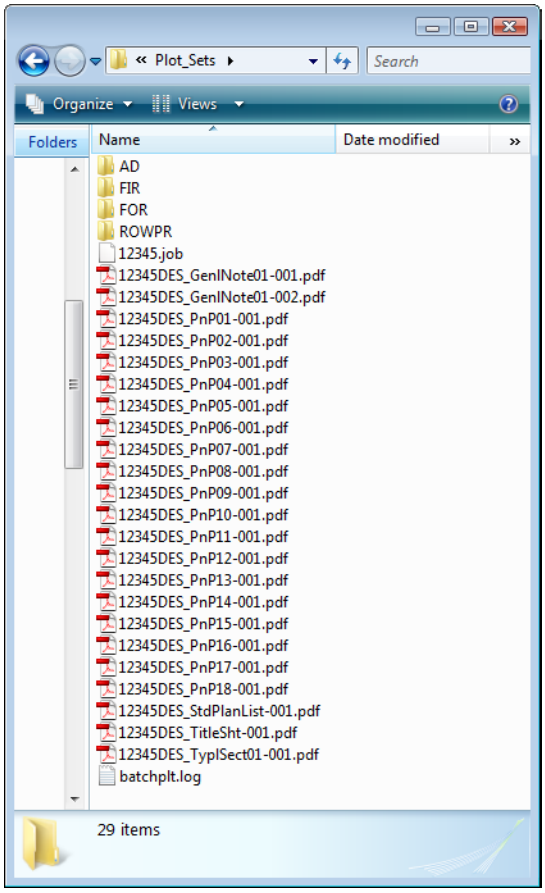
Note: The option **Selection** would print only the files that you highlight in the list.

3. Select OK to start the batch process.

   The process will take a few minutes to complete. If errors are encountered, open the error log **batchplt.log** in the **C:\Projects\12345\Plot_Sets** folder for more information.

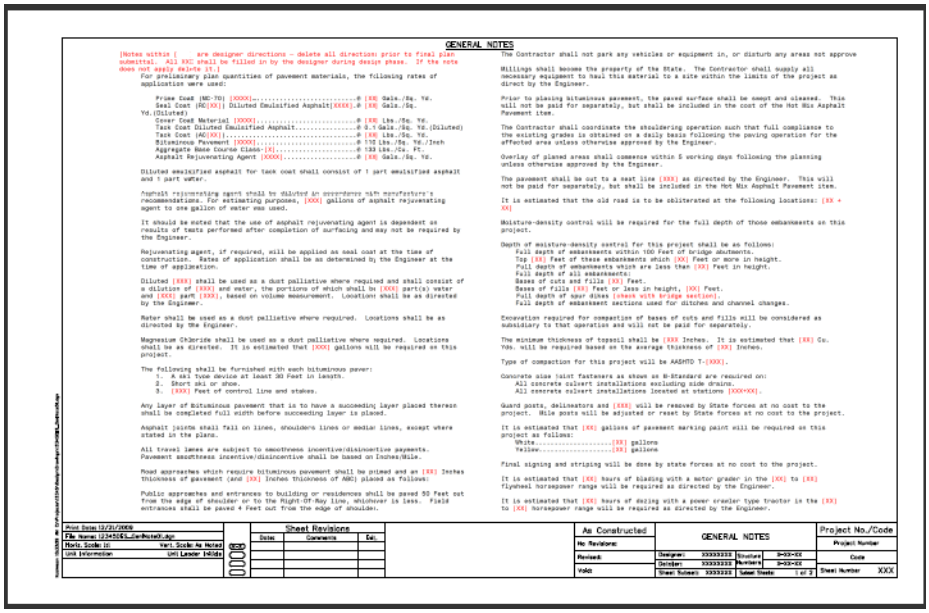
Lab 23.5 - Review the PDF files

1. In Windows, open **My Computer**.
2. Navigate to the **C:\Projects\12345\Plot_Sets** folder.

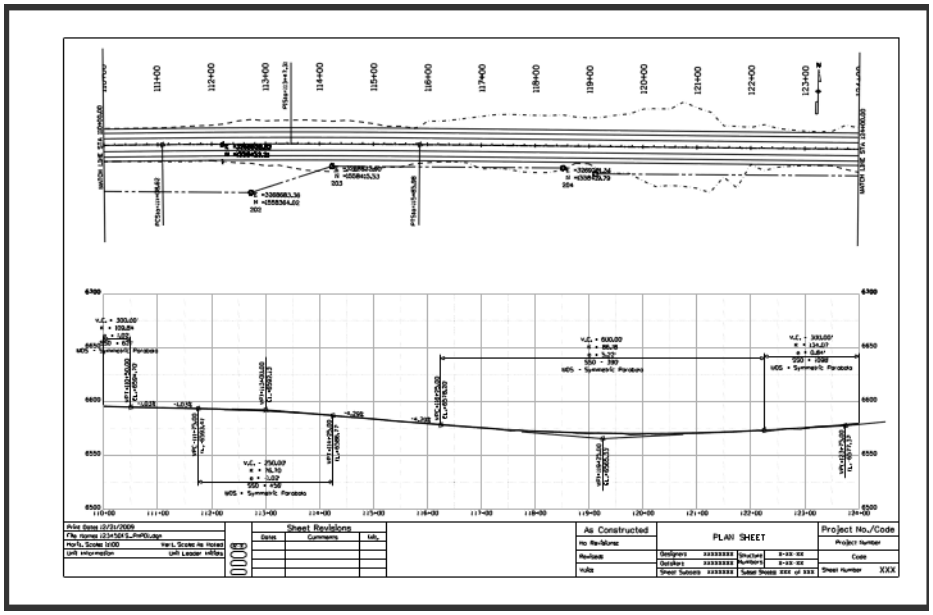


Note: The folder contains the all the individual pdf file sheets plus the **12345.job** file and batch log file.

3. Double-click on one of the **pdf** files to open.



4. Continue opening sheets as desired.



5. **Close** My Computer.

6. Return to MicroStation and **Exit**.

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