GEOPAK V8i Edition

Table of Contents

SECTION 2: Geopak – EFLHD Procedures

2.1 - GEOPAK Plan & Profile Sheet Clipping (Geopak 8.x)

Note - The procedures outlined below is specific to creating plan & profile sheets, double plan, and separate plan and profile sheet for 11"X17" sheet sizes only.

GEOPAK will create **Plan sheets, Profile sheets**, **double plan sheets** and **plan/profile sheets**. These sheets are generally created at 20, 40, 50, and 100 scale English (ft/in).
Station range, drawing areas, and many other variables are contained in the sheet library files **eflhd_Eng_sheets.psl**. The sheet library file contains many values specific to EFLHD such as cell library names and locations, specific sheet cells to be used, drawing scales, and a variety of text parameters. It cannot be modified by the user.

The sheet library files for EFLHD projects are located at:
M:\Engineering_Software\Cadd_resource_v8i\Plan&Profile_Shts
The user copies this file into his/her working directory in order to run the Plan & Profile sheet smoothly.

Prior to using the GEOPAK Plan and Profile Sheet Composition tool, three files need to be created. **Clip.dgn**, **Plan_motif.dgn** and **Profile_motif.dgn** should be created to assure proper setup of plan and profile sheets. Outlined below are the uses and instructions for creating each file.

**2.1.1 - Create Clip Sheets and Motif Files**

Clip Sheet file   Creating a drawing to display the sheet boundaries will allow the user to always have a visual representation of each sheet layout in relation to the others. If the design changes, having this file will allow the user to move sheets around to better fit any design changes. Create this sheet, and reference the map file, the horizontal alignment design file and profile design file into this new file. By referencing the overall design into the "**01-ProjectName_Clip.dgn"** file, any future design changes will be displayed in this new file, instantly showing the designer which sheets, if any, will need to be adjusted.

Motif files

Motif files act as seed files for clipping plan and profile sheets. Each Motif file should be a blank file with the proper reference files attached, and the proper levels for each file turned on or off. The Plan and Profile Sheet Composition tool will use these files when clipping each sheet and each clip sheet will have the correct files displayed with the correct levels on. For example, if the plan view in a final plan sheet needs to show overall design, mapping, raster images, ROW, etc., with specific levels on or off for each of these files, you would only need to setup this combination once in the motif file. This information would be used to create each sheet. These sheets should be named **01-ProjectName-Plan_motif.dgn** and **01-ProjectName-Profile_motif.dgn**. Create Plan_motif design file, attach each reference file that should be shown in the plan view, and turn on or off any levels to make the display look exactly like the final plan sheets in plan view. Repeat these steps for the Profile_motif design file, referencing the profile sheet into the motif file.

2.1.2 - Plan/Profile sheets using GEOPAK

Open the Clip.dgn and select the Plan and Profile Sheet Composition tool from Project Manager by selecting the button for Plan & Profile Sheets. Select a Run or create a new Run.
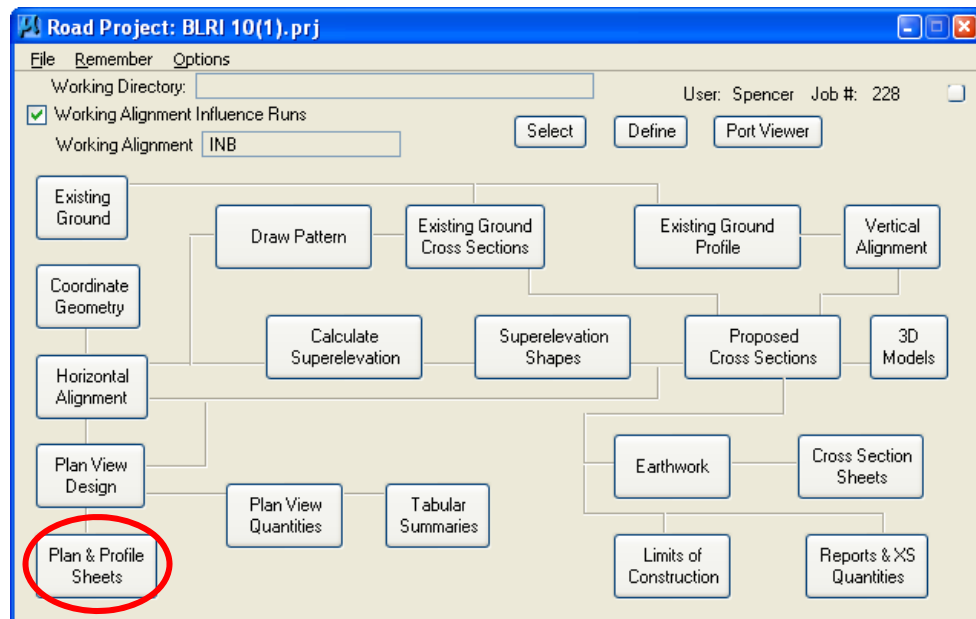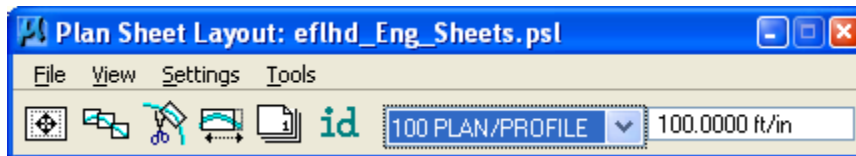
A row of icons is available to access the dialog boxes listed below. The corresponding menu access selections are noted in parenthesis.

Sheet Composition (**Tool>Sheet Composition**)

Layout Sheet (**Tools> Sheet Layout**)

Clip Sheets (**Tools>Sheet Clip**)

Modify Sheets (**Tools> Modify**)

Sheet Number Manager (**Tools>Sheet Number Manager**)

To the right of the icons are the Sheet Name list box and the scale. This list box contains a list of sheet types that are configured in the currently selected sheet library.

> ***Note : This tool requires what GEOPAK refers to as "Sheet Libraries" be set up ahead of time. These sheet libraries contain a variety of Agency specific information. Cell Library names and locations, drawing scales, variety of text parameters, locations for the graphics to be clipped and placed within the sheet cells..…..... and many others.***
> ***This documentation is not targeted at teaching the process of setting up the Sheet Libraries. It is already setup for EFLHD users.***

In order to complete the setup procedure you will need to know the scale you want the plan section of the P&P sheets to be drawn to. The following table outlines the available combinations of station range, horizontal, and overlaps for various scales that are commonly used in EFLHD.

TABLE 1

Sheet name	Scale	Station Range	Horizontal	Overlap	Remark
20 Plan/Profile	20	280	15	Multiple of 5	(Plan &Profile Sheet)
20 Sep P/P	20	280	15	Multiple of 5	(Separate Plan and Profile)
20 Double Plan	20	280	15	Any	(Double Plan Sheet)
40 Plan/Profile	40	550	15	Multiple of 10	(Plan &Profile Sheet)
40 Sep P/P	40	550	15	Multiple of 10	(Separate Plan and Profile)
40 Double Plan	40	550	15	Any	(Double Plan Sheet
50 Plan/Profile	50	700	12.5	Multiple of 12.5	(Plan &Profile Sheet)
50 Single Plan	50	700	12.5	Multiple of 12.5	(Plan Sheet)
50 Sep P/P	50	700	12.5	Multiple of 12.5	(Separate Plan and Profile)
50 Double Plan	50	700	12.5	Any	(Double Plan Sheet)
100 Plan/Profile	100	1400	25	Multiple of 25	(Plan &Profile Sheet)
100 Sep P/P	100	1400	25	Multiple of 25	(Separate Plan and Profile)
100 Double Plan	100	1400	25	Any	(Double Plan Sheet)
200 Double Plan	200	2800	50	Any	(Double Plan Sheet)
200 Plan/Profile	200	2800	50	Any	(Plan & ProfileSheet)

2.1.3 - Example -Clipping an English project using 100 Scale Plan/Profile sheets.

1. The following Plan Sheet Layout dialog box appears. Select 100 Scale Plan/Profile using the drop down arrow, and adjust the Scale field to 100 ft/in as shown below:
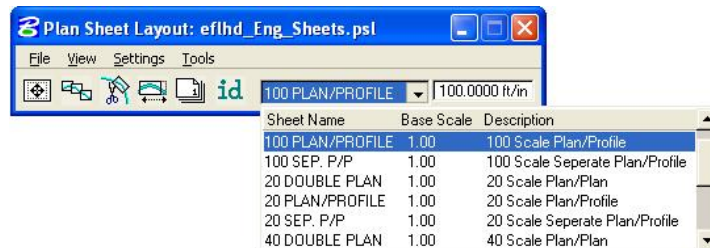
2. From the pull downs, select Settings > Sheet Layout and adjust the Sheet Layout Settings as shown below and press OK:
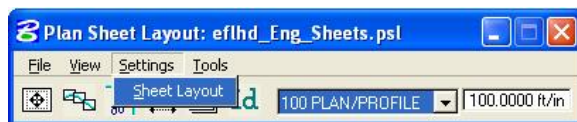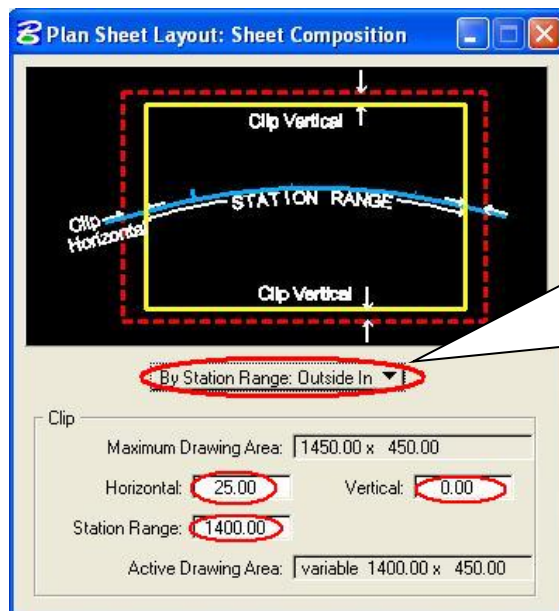
3. Invoke the Sheet Composition dialog by clicking on the Sheet Composition icon from the Plan Sheet Layout dialog as shown below:

4. Modify the Sheet Composition dialog box as shown below:

Select either of them:

By BeginStation/OverLap
By Station Range: Inside Out
▶ By Station Range: Outside In
By Station Range: Radial

Note
- Radial, it makes it very clear and clean.
- Others, need some clean up but have more control

< Use **Table 1** to populate the Clip area

Note - The dialog shown is settings for a 100 Scale PLAN/PROFILE "sheet style." Other "sheet styles" have been created for English projects. The settings can be found at the end of this documentation.

5. Invoke the Layout Sheets tools by selecting the Layout Sheets icon from the Plan Sheet Layout dialog as shown below:
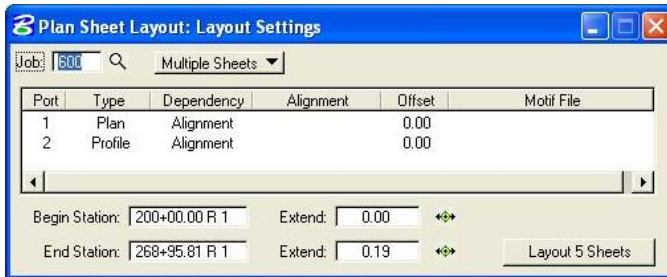
Layout Settings Tool

6. Select Multiple Sheets from the dialog box and Select the GPK file by keying it into the "Job:" box, or by browsing using the file open icon.

7. To populate the Plan Port Data dialog box, double click anywhere along the row for Port 1 in the Layout Settings dialog box and the following dialog box will be open.
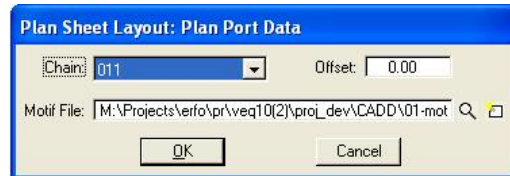

8. Select the correct Chain and the appropriate Plan Motif file. Press OK.

9. To populate the Profile Port Data dialog box, double click anywhere along the row for Port 2 in the **Layout Settings** dialog box and the following dialog box will be open.
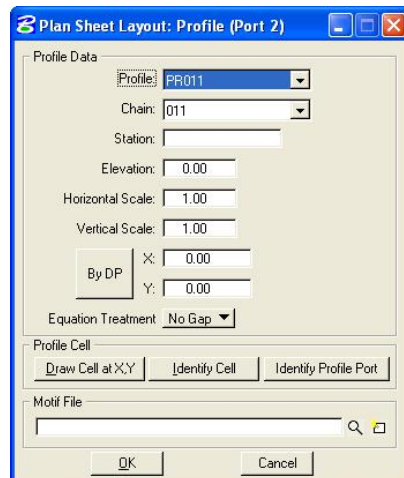

10. If a profile cell exists for the file that is referenced to the Clip.dgn file then click on Identify cell, place data point on the profile cell and accept. Profile Data dialog fields can be populated using this method, or by manually entering in the required information.

11. Select the appropriate Profile Motif file. Press OK.
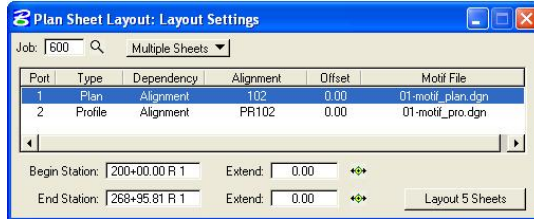
12. GEOPAK will calculate the number of sheets to layout; number of sheets calculated will be placed on the button at the bottom right of the Layout Settings dialog box. The extend distance filed will allow the user to enter a value that will shift the clipping shapes backwards or forwards a given distance. If the number of sheets is acceptable, press the Layout 8 Sheets button and GEOPAK will draw clipping shapes into the drawing.
The clipping shapes for both the Plan and Profile have now been placed as shown below:
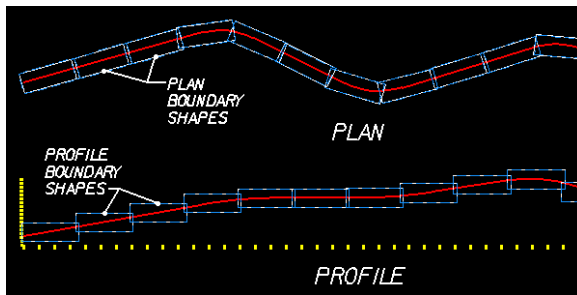
Close the Sheet Layout dialog by clicking on "X" at the top right.
Note: In order for the data to be clipped correctly, use the Sheet Layout Modify Tools. Two most common types of modification supported are sliding the sheets and modifying the drawing area. The drawing area cannot be increased in Length (Horizontal) or Height (Vertical) to exceed the Drawing Area setup in the sheet library.

13. For extremely curved chains and steep vertical curves it may be necessary to modify the clipping shapes once the clipping shapes are placed. Use the Modify Sheets icon, from the Plan Sheet Layout dialog to invoke the Modify tools, as shown below:
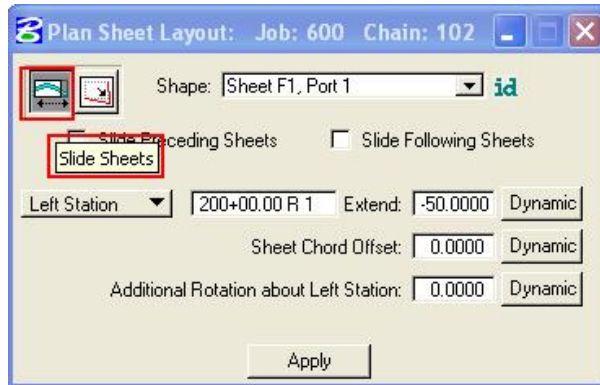
14. Identify the Sheet (Clipping Shape) to be modified by clicking on the ID button and then data pointing the clipping shape or simply select it from the pick list, via the down arrow.
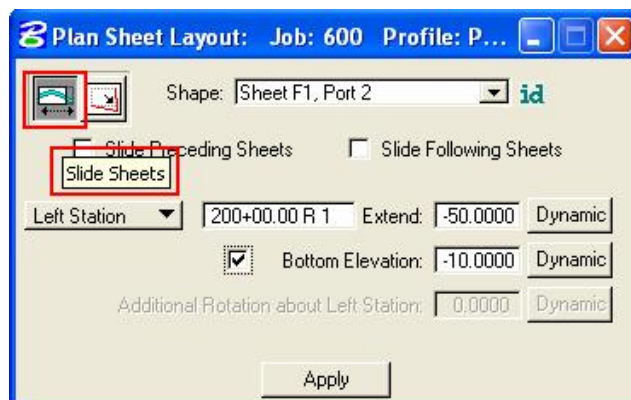
The application is intelligent enough to know whether a Plan clipping shape or Profile clipping shape has been identified. When a Profile clipping shape is identified, the "Sheet Chord Offset" "field changes to "Bottom Elevation","(as shown above). When modifying the vertical position of a Profile clipping shape, toggle "Bottom Elevation" ON, type in the desired "bottom of the shape" "elevation, or press Dynamic and move the shape up or down.
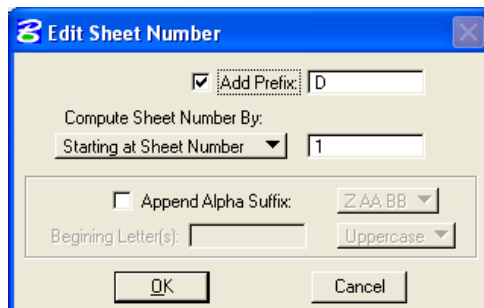
15. Use the Sheet Number Manager tool to number sheets according to EFL standards. To invoke the Sheet Number Manager tool, use the Sheet Number Manager icon, from the Plan Sheet Layout dialog, as shown below:
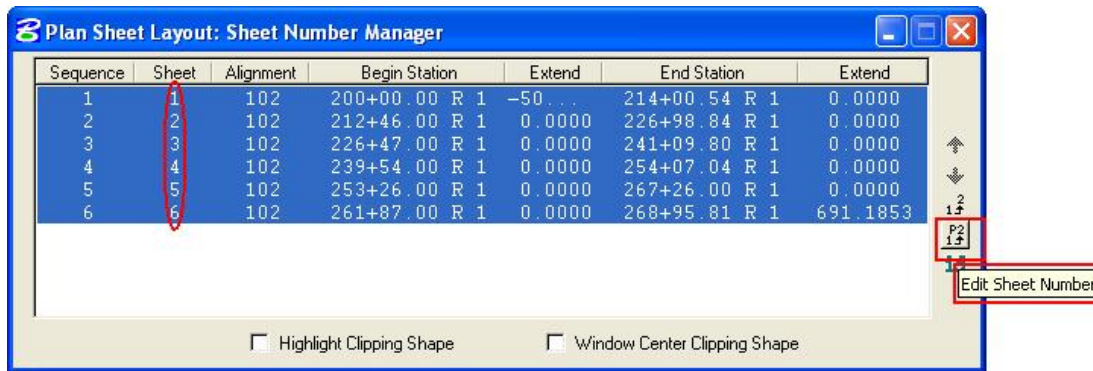
16. Click inside the white area anywhere on row one, hold down the shift key and click a second time anywhere on the last row. Once all rows are selected, click on Edit Sheet Number as shown above.

17. For EFL specific sheet numbering scheme where the sheets are numbered in sequence beginning with D1, complete the Edit Sheet Number dialog as shown below and press **OK**:
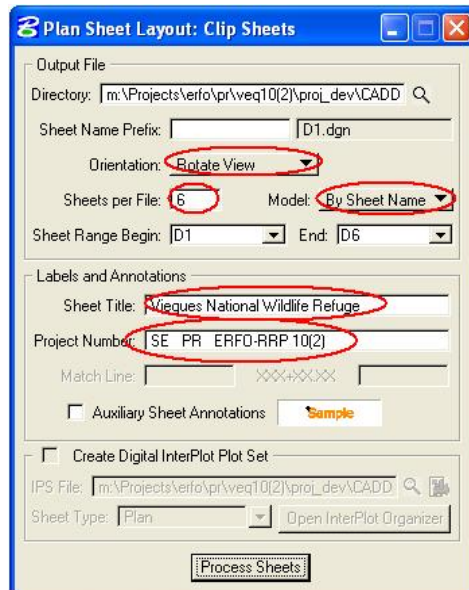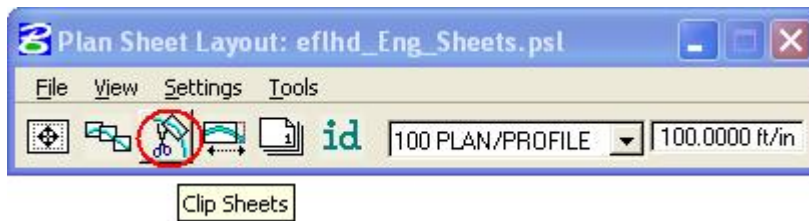

Edit Sheet Number Tool

18. When OK is pressed the Sheet Number Manager dialog will appear as shown below:
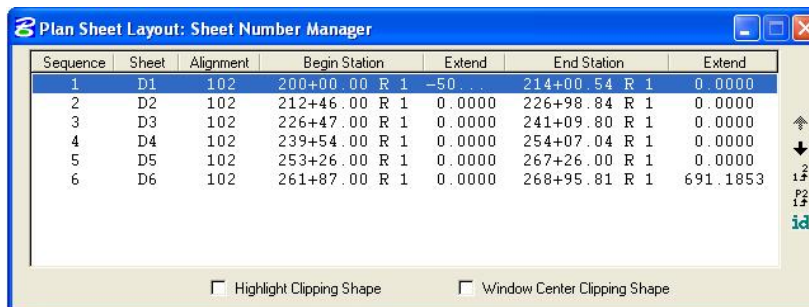
> ***Note - With different runs for the same alignment clip, the user must recheck the sheet number and sequence.***

19. Once the clipping shapes are placed and satisfactorily modified, invoke the Clip Sheets tool. Select the Clip Sheets icon from the Plan Sheet Layout dialog as shown below:

20. Select the working directory in the Output File box. Keep the sheet name prefix in the second field as blank, change the design file name latter after process. The Geopak appends the beginning sheet number to the "Sheet Name". You most likely will have to rename this (or these) file(s) later as per EFLHD Naming Convention (eg. D-LOP(2)_p&p.dgn).

21. Select Orientation to Rotate View. The sheet cell and the view are rotated and the clipped graphics maintains its coordinate grid intelligence, thus allowing for labeling right on the sheet.

> ***Note - EFLHD policy is to choose Rotate View, thus not to lose coordinate grid intelligence of the clipped graphics.***

22. Select Sheet per File to total number of sheets, thus sheet will be drawn in different models of the design file. EFLHD prefer to use all sheet shown in different models of one design file.

> ***Note - EFLHD prefers to use models for all the sheets in one design file.***

23. Select the Sheet Range required from the pick list, using the drop down arrows. Use the Sheet Number Manager Tool to renumber sheets to EFL specific sheet numbering scheme, (such as D1, D2, D3….) as explained earlier.

24. Enter Labels and Annotation. An example of a completed Clip Sheets dialog is shown below (illustrating the results of the completed Labels and Annotation fields)… when completed press Process Sheets.
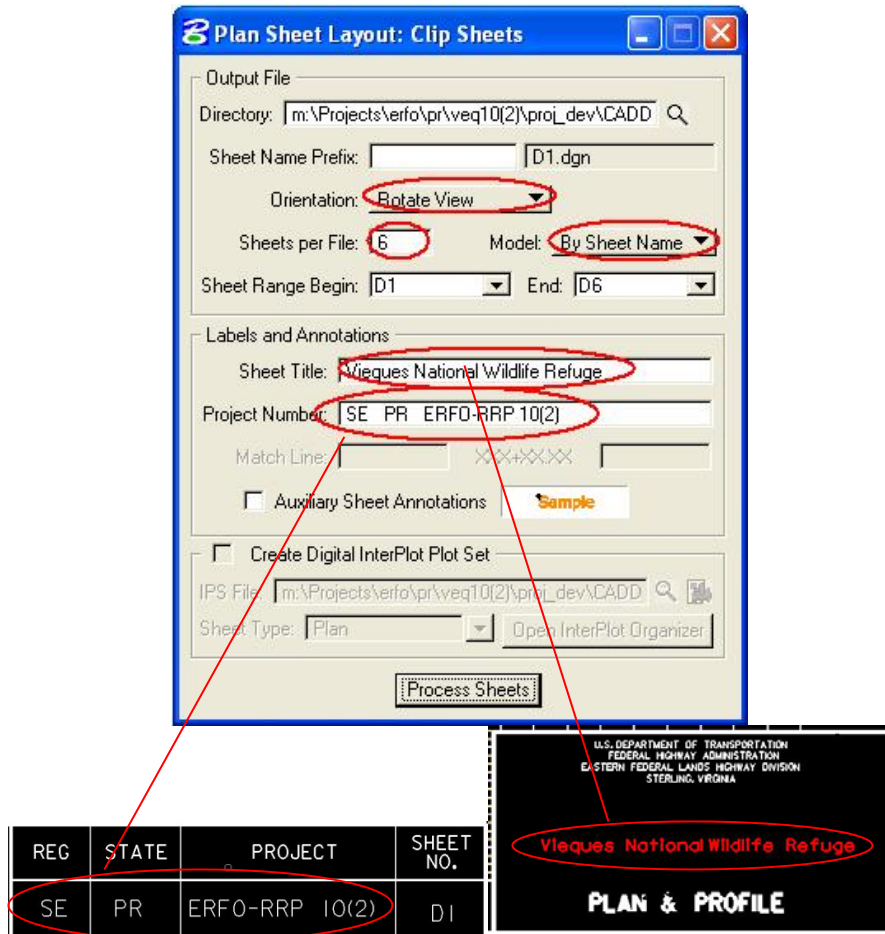

Note - Keep 9 spaces between SE (Region) and PR (state), and 11 spaces between PR(state) and ERFO-RRP 10(2)[Project Number]. These spaces depend on the length of the project number characters.

2.2 - Cross Section Sheets

2.2.1 - General Information:

The Cross Section Sheet dialog can be accessed by selecting **Application > GEOPAK > Road > Cross Sections > Cross Section Sheet Composition** from the Microstation pull down menu, or from the **GEOPAK Road** tool palette, or the Road Project dialog as shown below.
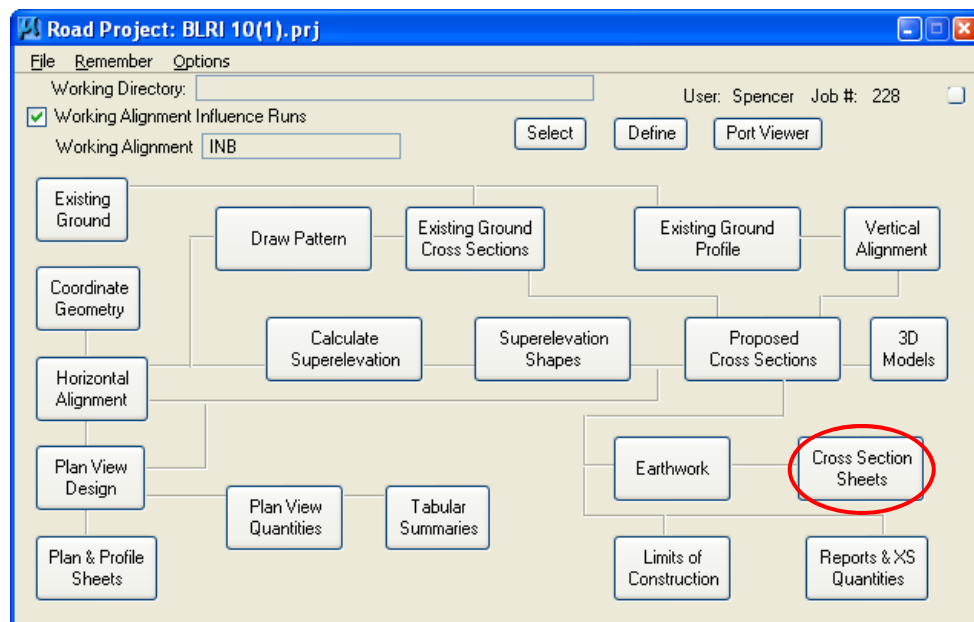
- Click on the Cross section Sheets icon as shown above.

> *Note - When you access the Geopak Cross section Sheets function from the Road Project dialog box, you will be prompted to select a run. From the Select Run dialog box, select Run > New to create a new cross section sheet run. The New Run Name dialog box is opened. Key-in the Run Name and an optional Description. Select OK. The new run is created and is available for selection from the Select Run dialog box. From the Select Run dialog box, select the name of the run that you would like to open. Select OK to open the run.*

- The **Cross Section Sheet Composition** dialog box will be open as shown below.
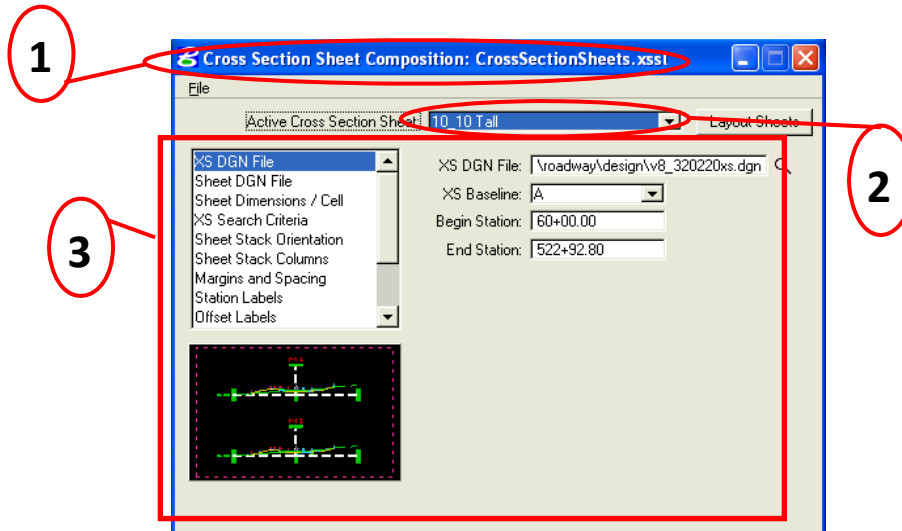
- The following step-by-step procedure refers to the marked-up graphic of the main **Cross Section Sheets Composition** dialog shown above.

(1) **Cross Section Sheet Composition's** file name is always displayed on the top of the dialog box. This file is the Sheet Library, which contains the parameters for the Cross Section Sheets and is saved in a Sheet Library file. Sheet layout configurations can be saved in the sheet library and recalled for future use. Sheet libraries have a default extension of "*.xssl ".

The sheet library "**EFLHD_xssheet.xssl**" has been configured for use with EFLHD's Standard Cross Section Sheet Cells. This sheet library can be obtained from the following directory;

M:\Engineering_Software\Cadd_resource_v8i\Cross-Section_Shts\

> *Note - For Consultants, this file is available through the CADD_Resources_V8.zip download.*

(2) **Active Cross Section Sheet:** EFLHD has defined Cross Section sheets in different formats and scales.   Select the format and scale from the **Table 1**:
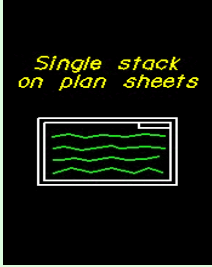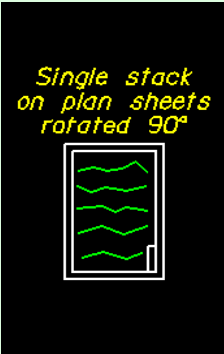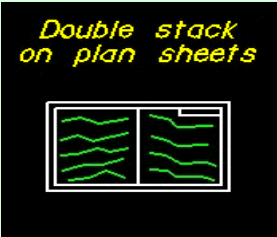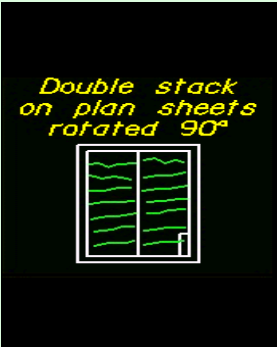
XS Sheet Format	English Scale			Active Cross section sheets	Notes
Single stack on plan sheets	1"=30'			xs_1xH_30_eng	
		1"=20'		xs_1xH_20_eng	
			1"=10'	xs_1xH_10_eng	
Single stack on plan sheets rotated 90°	1"=30'			xs_1xV_30_eng	
		1"=20'		xs_1xV_20_eng	
			1"=10'	xs_1xV_10_eng	
Double stack on plan sheets		1"=20'		xs_2xH_20_eng	
			1"=10'	xs_2xH_10_eng	
Double stack on plan sheets rotated 90°		1"=20'		xs_2xV_20_eng	
			1"=10'	xs_2xV_10_eng	

Table 1

(3) The left side of the Cross Section Sheet Composition dialog box contains a list of parameters. When a parameter is selected, a graphic explanation of the parameter appears in the lower left portion of   the dialog box and key-in fields for each variable appear to the right.

XS DGN File, Sheet DGN File, and Sheet Labels parameters need to be edited by the user. The rest of the parameter is already set through the EFLHD'S Sheet library file.
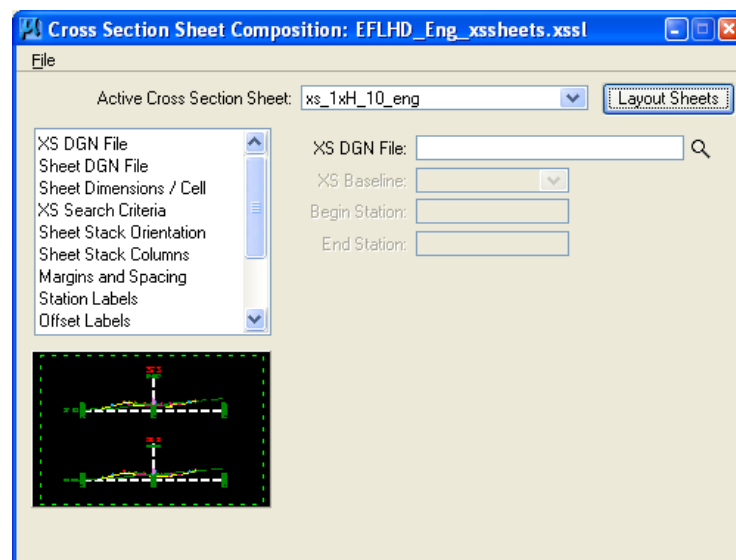
2.2.2 - Create Cross Section Sheets:

Step I

- Copy sheet library file "**EFLHD_xssheet.xssl**" from the "**M:\Engineering_Software\ Cadd_resource_v8i\Cross-Section_Shts**"   into your project working directory.

> *Note - For Consultants, this file is available through the CADD_Resources_V8.zip download.*

- Create a new MicroStation design file for your Cross Section Sheet in your *working directory as explained in Section 4.1.2. Give the name of the file according to* the Naming Convention as explained in Section 2.2 (e.g. T01-LOP(2)_xss.dgn)
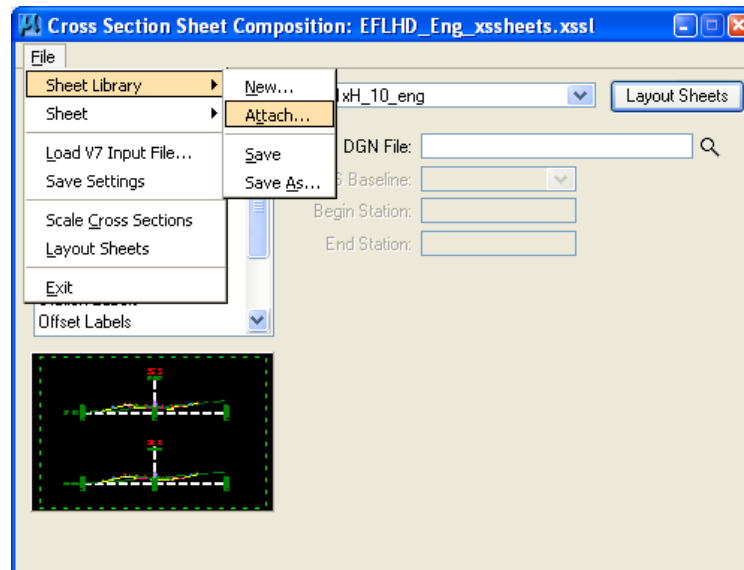
Step II

- Open the cross section file that contains the cross sections that need to be placed on sheets.

- Open the Cross section sheets dialog through your Road Project dialog (shown in General Information earlier). The Cross Section dialog will appear as shown below.

Step III

- Attach the cross section sheet library via the menu item File>Sheet Library>Attach (as shown below) and select "**EFLHD_Eng_xssheet.xssl**" from your working directory. The name of the attached Sheet Library is shown in the title bar.


Step IV

- After attaching the EFLHD cross section sheet library, the Active Cross Section Sheet option will display the sheet layout options shown below.
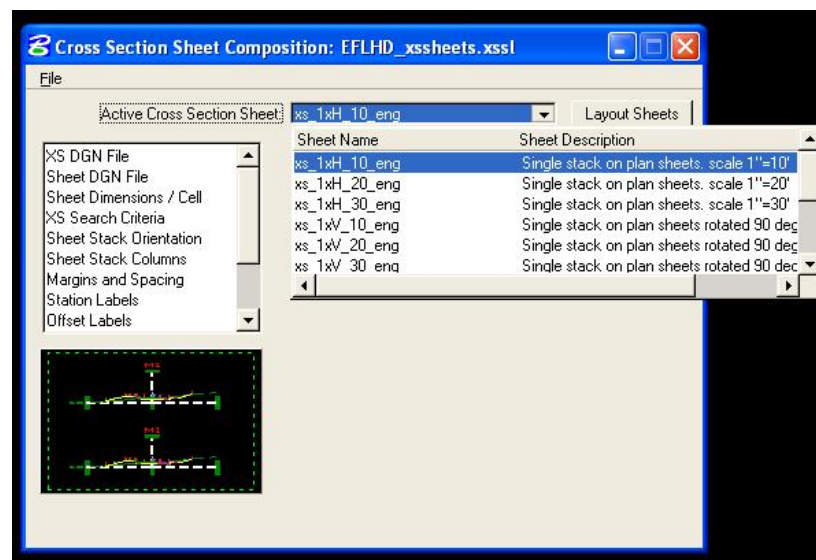
- Select the cross section sheet layout from the pull down menu of Active Cross Section Sheet. Use **Table 1** to select the sheet layout.
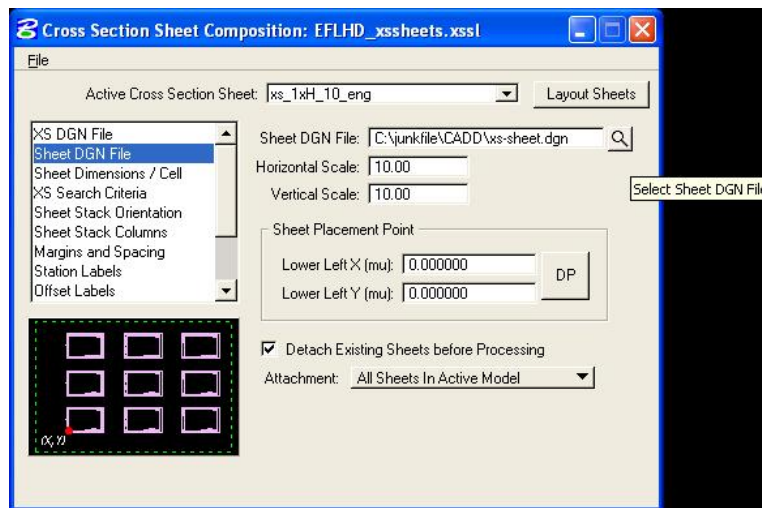
Step V

- Select XS DGN File option in the <u>left side</u> of the menu. The Cross Section Sheet dialog in the <u>right side</u> will appear as shown below**.**
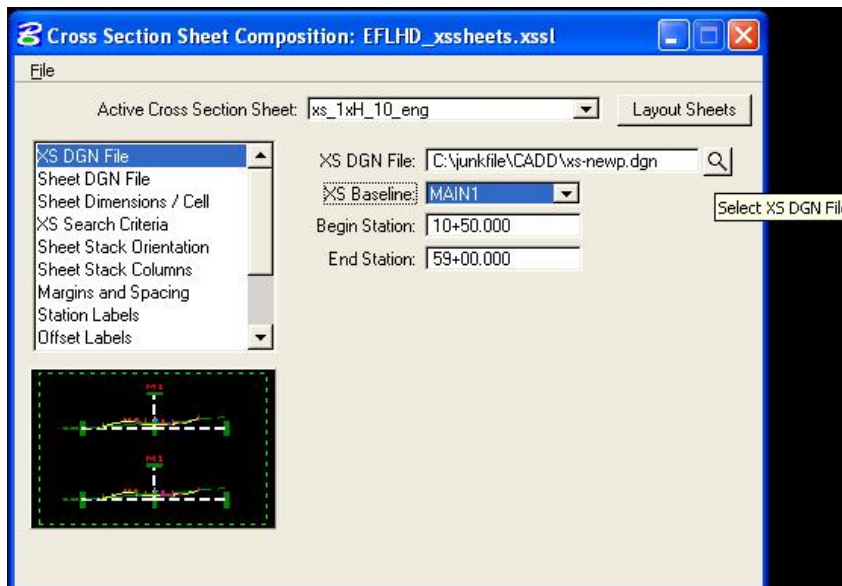
- XS DGN File field in the <u>right side</u> of the menu is used to specify the name of the design file containing   the original cross sections. Select the cross section file by use of the select XS DGN File icon. The Chain and stationing will be filled out automatically and the software will find all elements within the confines of the cross section cell.

Step VI

- Select Sheet DGN File option in the <u>left side</u> of the menu. The Cross Section Sheet dialog will appear in the <u>right side</u> as shown below.
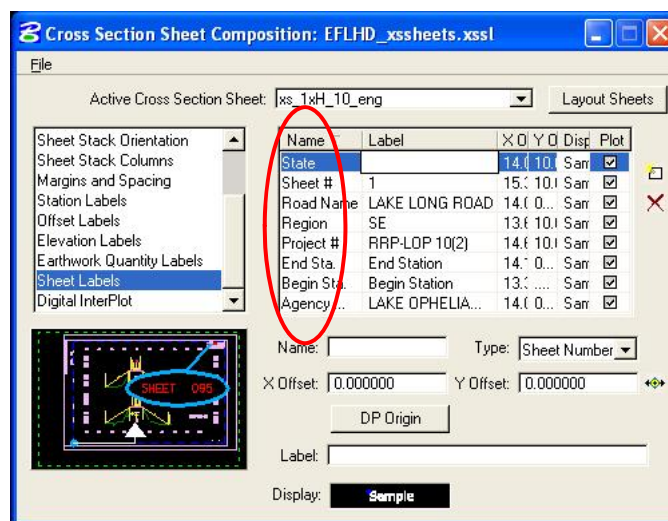
- Sheet DGN File field in the <u>right side</u> of the menu is used to specify the name of the design file where GEOPAK will compose the cross section sheets. Select the cross section sheet file created in STEP I by use of the select Sheet DGN File icon. Keep the rest of the key-in field of this option as default setup.
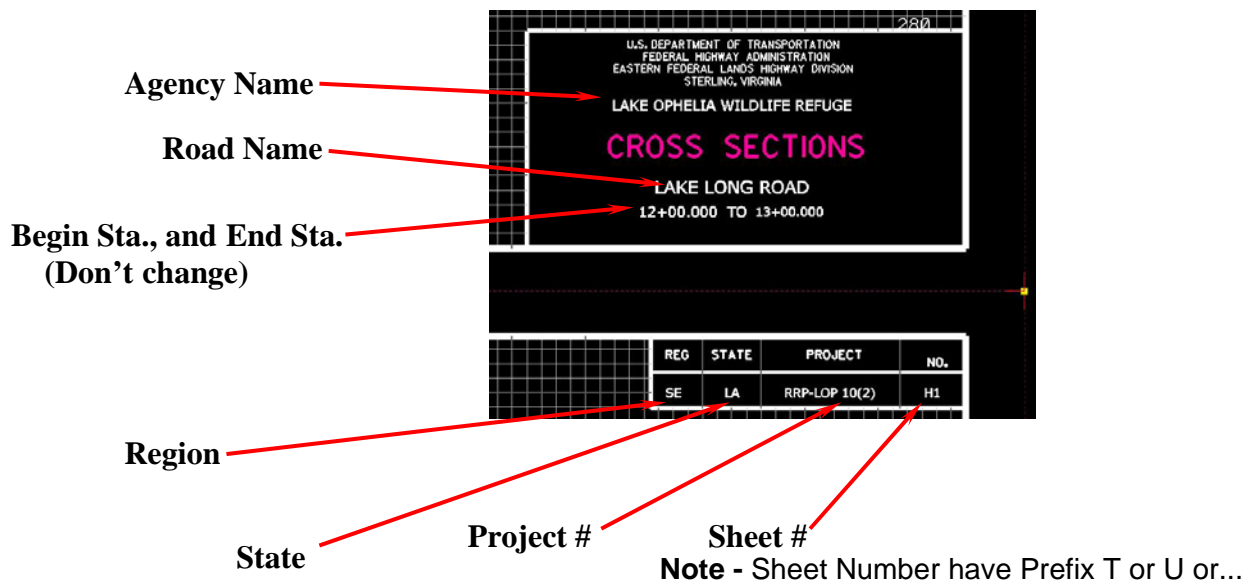
> ***Note - GEOPAK does not create the cross section sheet file. The file must be created prior to processing.***

Step VII

- Select Sheet Labels option in the <u>left side</u> of the menu. The Cross Section Sheet dialog will appear as shown below.

- Sheet Labels field in the <u>right side</u> of the menu has a table with Name, Label, X Coordinate, Y Coordinate, Display, and Plot column. EFLHD Sheet library has already been configured to place Sheet Labels on EFLHD Standard cross section sheet. Designer is only responsible for changing the field of Label column. Edit this field by selecting the row of the table and then click on the cell which needs to be change. The information for the Labels used by EFLHD is shown as below.

Agency Name

Road Name

Begin Sta., and End Sta.
(Don't change)

Region

State

Project #

Sheet #
Note - Sheet Number have Prefix T or U or...

Step VIII

- **Save your work by using** File>Sheet Library>Save**.**

- **Now click on** Layout Sheets **to process the cross section sheets layout.**

2.3 - <u>Draw Graphics Elements as Pay Items Using D&C Manager</u>

2.3.1 - <u>Intoduction:</u>

The D&C Manager is also used by Geopak to standardize graphics elements for drafting and pay items quantities.
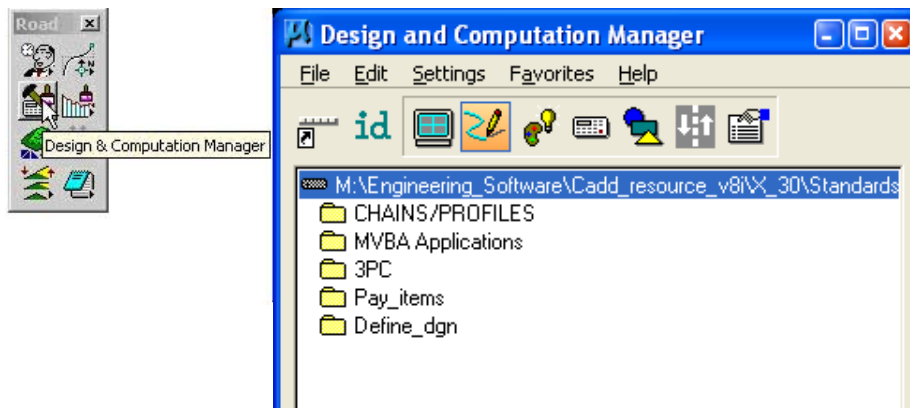
EFLHD Standard D&C Manager database "EFLHD_ENGLISH.ddb" has been developed by EFLHD to draw the graphics elements into the plan view sheets according to the EFLHD's symbols and abbreviations sheet and compute the quantity of the same.

The D&C Manager database "**EFLHD_ENGLISH.ddb**" is located in the following directory:
M**:**Engineering_Software****CADD_Resource_V8\X_30\Standards\DDBS\English\

> *Note - There are two D&C Manager Databases available in that directory, EFLHD_ENGLISH.ddb and V8_ENGLISH.ddb. The V8_ENGLISH.ddb database has been developed by FLH and is used to draw chain, chain stationing, profiles, and the elements for use with X30 criteria (for proposed cross section).*

- The **D&C Manager** can be accessed by using the MicroStation pull downs: **Applications > Geopak > Road > Design & Computation Manager** ... or from the Road Tools icon as shown below:


- The default **D&C Manager** database is attached as **V8_English.ddb** which is set by EFLHD Configuration setup. The user needs to change the database.

- Select **File > Open** from the D&C Manager dialog box to access "**EFLHD_ENGLISH.ddb**" from the "M**:**Engineering_Software****CADD_Resource_V8i\X_30\Standards\DDBS\English\" directory.

- The currently selected database is displayed in the dialog as shown below.
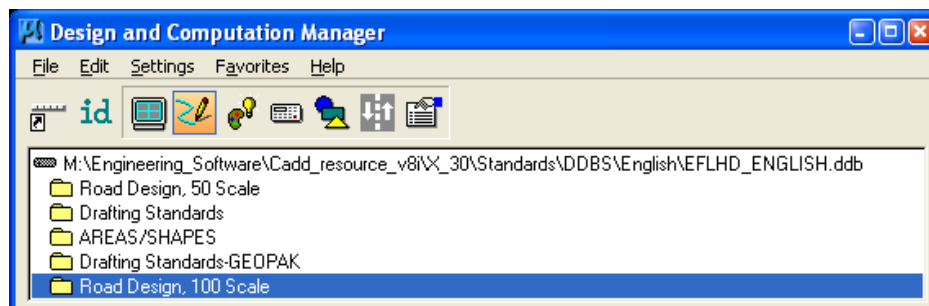
> *Note - The D&C Manager database is a password protected file and cannot be edited by the designer. Suggestions or request for enhancements should be forwarded to the CADD Coordinator at EFLHD.*

- The basic component of the hierarchical tree is the Category. The database EFLHD_ENGLISH.ddb contains four sub categories: Roadway Design, 20 Scale, 40 Scale, 50 Scale and 100 Scale (These categories will be selected according to the scale of the plan sheet "11X17 sheet size"). A double-click on the Roadway Design, 100 Scale category will reveal several categories as shown below.
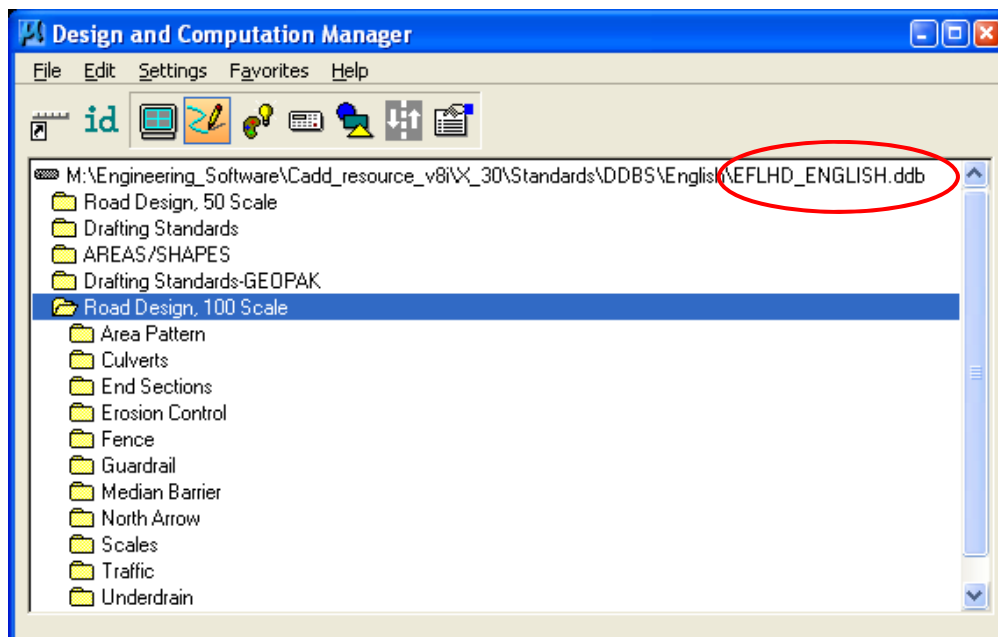
### 2.3.2 - <u>Drawing Custom Graphical Elements into Plan View</u>

- A double-click on the Erosion Control category reveals several items as shown below:
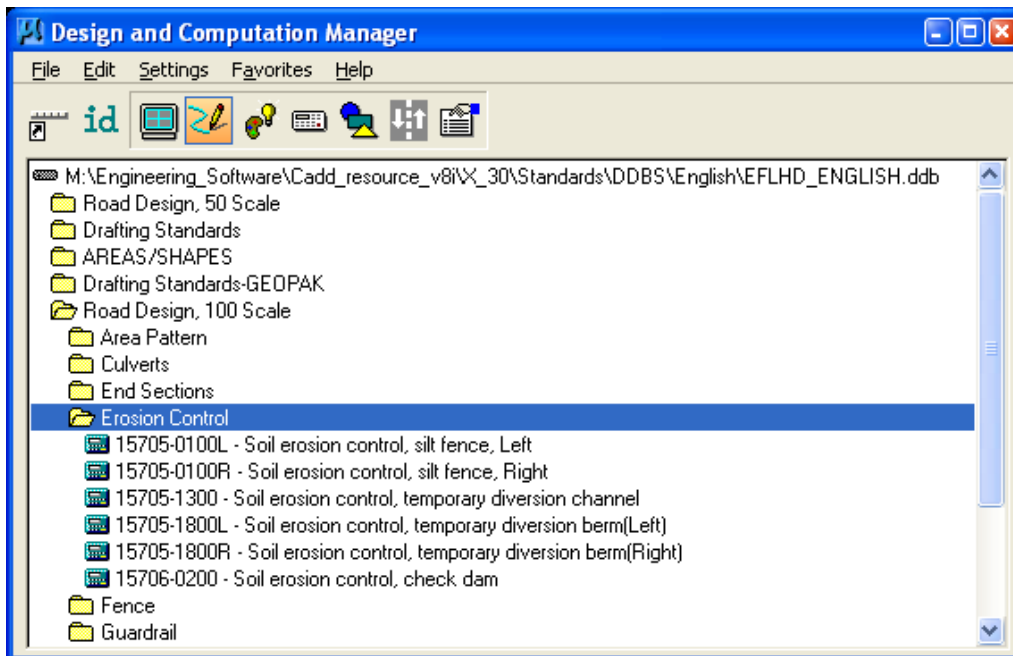
- Similarly each sub-category has several items within it.
- The items contain specific functions related to defining element symbology or placing pay items. These items will be used to set drafting standards for MicroStation commands and the resulting graphics are tagged with a pay item attribute that can be used to calculate plan quantities.

> ***Note - All item numbers are set according to the Pay Item number as per FP-03, US Customary Unit.***

- The Place Influence toggle is used to override the currently active MicroStation symbology settings. The Place Influence toggle button is located on the **D&C Manager** Tool Setting dialog as shown below.
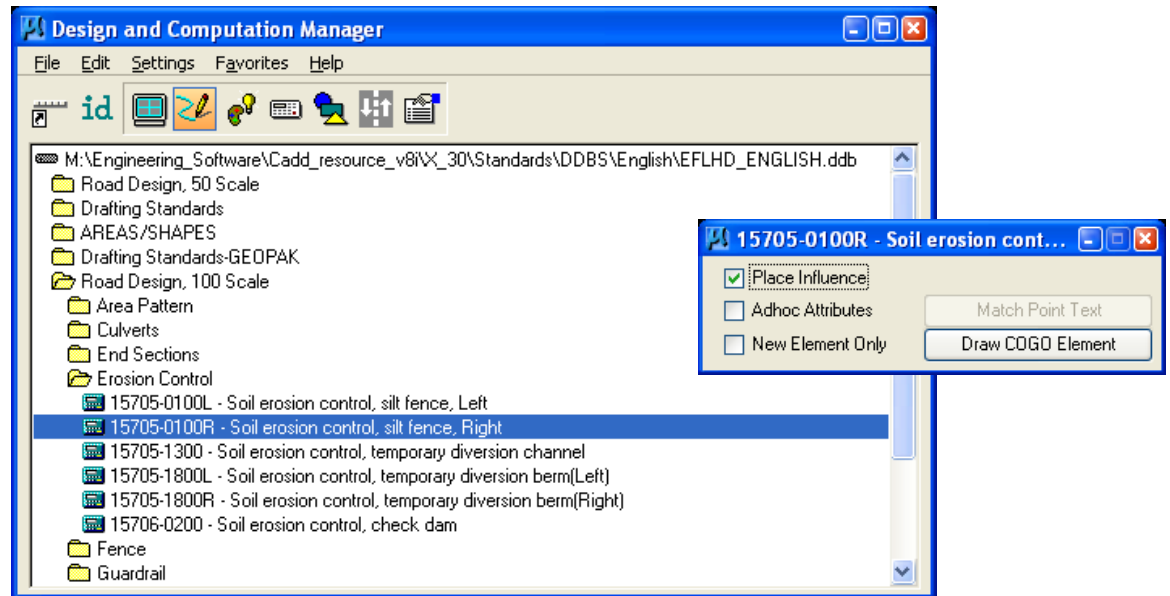
Note - When the Place Influence toggle is activated, elements are drawn using the level, symbology and attributes as defined in the GEOPAK database "EFLHD_ENGLISH.ddb".

- By toggling on Place Influence, you can use MicroStation commands to place elements utilizing the drafting standards established for the currently selected item in the D&C Manager database.

- If you double click the name of any item in EFLHD's D&C Manager that is used to place a cell, the place cell command will be automatically selected. If Place Influence is on, the cell will be floating on your cursor, ready to place in the design file. Similarly, if you click any item that is used to place line, the place line will be automatically selected. The line will be placed using the level, color, weight and custom line style setting associated with the line item.

2.3.3 - Generating Quantities in D&C Manager

When generating quantities, a collection set can be defined for computation and easy recall. Collection sets can consist of entire categories or individual items.

Step I:

- Click on the **Compute** icon.
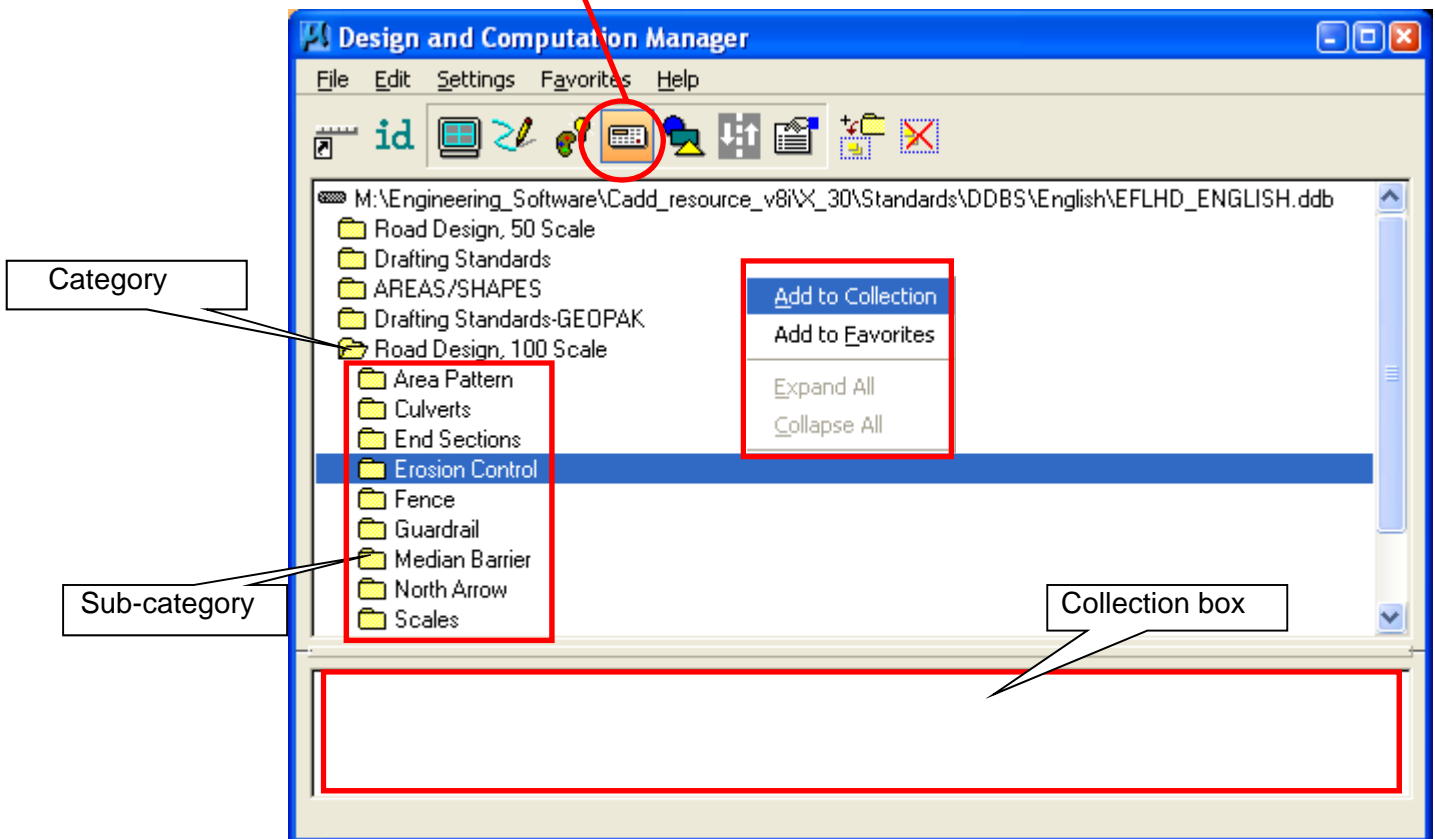
- Select the **Category**, and then with a right click, select the **Add to Collection** option from the pop-up menu. The designated category appears in the Collection list box located at the bottom of the dialog box. D&C Manager computes quantities for every item found in the selected Category as well as any Sub-categories.

   Note - To add individual items, select an individual Pay Item with a single click, and then right click on the highlighted item, selecting the Add to Collection option from the pop-up menu. You can also double click on the item to add the item into a collection set.

Step II

- **Plan Quantity Computation** dialog box as shown below will appear when user selects the **Compute** icon in **Step I**.
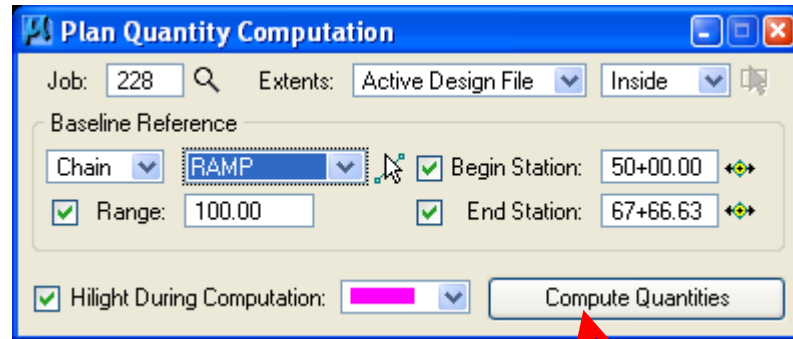
- Fill in the required information in the Plan Quantity Computation dialog box then click on Compute Quantities.

    Note - The "Extents" determines which elements are included in the set. In addition to the extents, if the Range option is active, the element must exist within the extents and range (distance left and right of the baseline) for the element to be computed.

- Computation Results are as shown below:

- The dialog box displays the pay items and associated computed quantity. The user has the option to select the format of the quantity output. Now click on the **Export**, a text file will be created on the selected directory, which can be opened by any text editor.

APPENDIXES

Appendix A

More Help for Editing Redefinable Variables

Note - Plan View Override Elements overwrite all Redefinable Variable values

_d_DefinePavementLayers

This variable defines the number of proposed surfacing layers that are to be closed off vertically, and not "daylighted" to the shoulder foreslope in guardrail or aggregate shoulder locations. Use the _d_DefinePavementLayers variable where guardrail or aggregate shoulder is present.

The default value = 1

EXAMPLE:

if (Sta >= 0+00 R 1) then

_d_DefinePavementLayers = 1
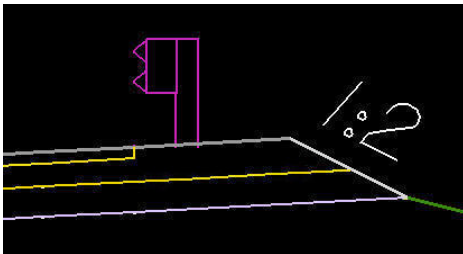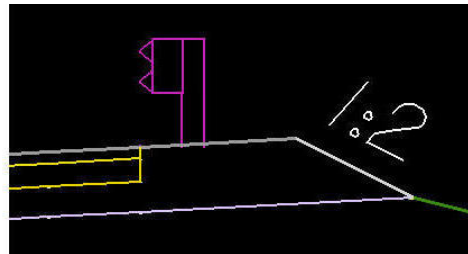

EXAMPLE:

if (Sta >= 0+00 R 1) then

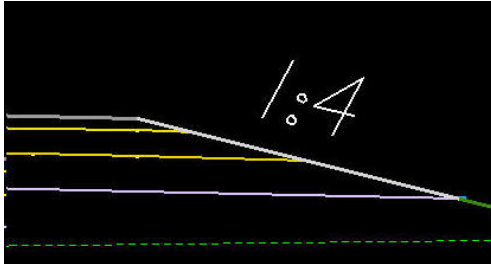*_d_DefinePavementLayers = 2*

_d_FirstFullLengthLayer

This variable defines the number proposed surfacing layers to "daylight" to the shoulder foreslope. Use the _d_FirstFullLengthLayer variable where no guardrail or aggregate shoulders are present.

The default value = 1

EXAMPLE:

if (Sta >= 0+00 R 1) then

_d_FirstFullLengthLayer = 1

EXAMPLE:

if (Sta >= 0+00 R 1) then

_d_ FirstFullLengthLayer = 2
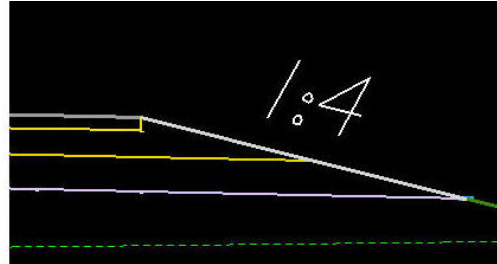
_s_PavementClosureOption

This variable sets how the edge of pavement is to be closed if not "daylighted" to the shoulder foreslope (i.e. _d_FirstFullLengthLayers = 2 or more). The option was created for the different needs of the three FHWA divisions. Use a 1:1 pavement edge for typical Central Federal Lands (CFL) projects and a vertical edge for Easter Federal Lands (EFL) projects. Use ^V^ for a vertical closure or ^S^ for a one to one slope closure. The selected closure option also applies when guardrail is present.
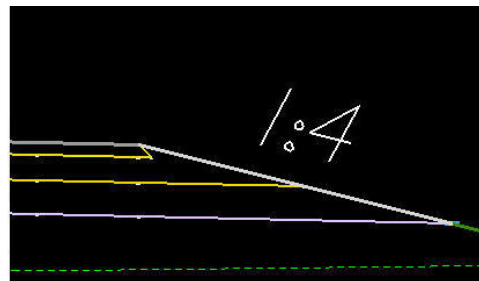
*The default value = ^V^*

EXAMPLE:

if (Sta >= 0+00 R 1) then

*_s_PavementClosureOption = ^V^*

EXAMPLE:

if (Sta >= 0+00 R 1) then

*_s_PavementClosureOption = ^S^*

_d_SurfacingLayer1Thickness

This defines the thickness of the first layer in the proposed pavement structure. Use this variable for all projects with a proposed driving surface. The first surfacing layer thickness must be greater than zero and expressed in master units.

The default values = 4/12 or .100

> ***EXAMPLE:***

if (Sta >= 0+00 R 1) then

_d_SurfacingLayer1Thickness = 3/12

_d_SurfacingLayer2Thickness to _d_SurfacingLayer5Thickness

These variables define the thickness of additional layers in the proposed pavement structure. Use these variables when more than one proposed pavement structure layers are desired. The surfacing layer thicknesses 2 through 5 may be set to zero.

> ***Note: Cross Sections with guardrail will not be drawn correctly, without at least two layers of surfacing. The fill slope will begin at the top of the foreslope, instead of the bottom. One work around for this is to use two layers of surfacing, and then delete out the 'dummy' layer. For consistency in Staking Reports, use a 'dummy' layer through out the entire project.***

_d_WedgeDepth

This variable defines the depth of the wedge adjacent to the non-daylighted surfacing layer(s) and is expressed in master units. Use this variable for projects that require a different shoulder material other than a surfacing lever. When used, the wedge will be drawn with different symbology (shoulder backfill) so that earthwork values can be separated. If the wedge depth is set to a value greater than the depth of the surfacing layers which are not "daylighted", the wedge will be drawn to the same depth as the surfacing layers which are not "daylighted". If no wedge is desired, set the value to zero.

The default value = 0 (no wedge)

EXAMPLE: *In this example, the first layer thickness is 3/12, the second layer is 6/12 and the third layer thickness is 8/12.*

if (Sta >= 0+00 R 1) then
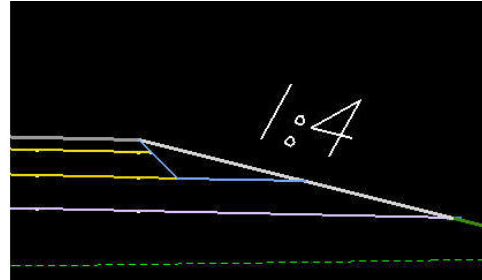
_d_WedgeDepth = 10/12

if (Sta >= 0+00 R 1) then

_d_WedgeDepth = 10/12

with: _d_FirstFullLengthLayer = 2
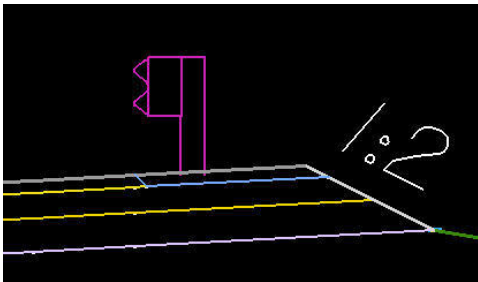
with: _d_FirstFullLengthLayer = 3

if (Sta >= 0+00 R 1) then
          {
   _d_WedgeDepth = 10/12
}

if (Sta >= 0+00 R 1) then
          {
   _d_WedgeDepth = 10/12
          }
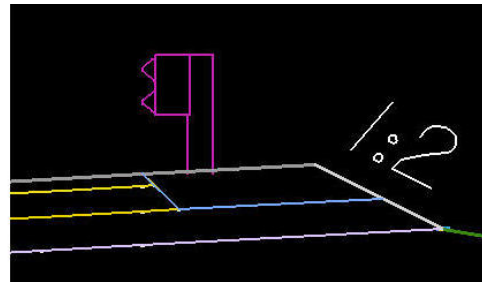
with: _d_FirstFullLengthLayer = 2

with: _d_FirstFullLengthLayer = 3

_d_ShoulderForeSlope

This variable defines the shoulder foreslope and is expressed in a rise:run format. All proposed cross section use this variable. The slope will always be assumed to be negative in value.

The default value = 1:4

Note: The shoulder foreslope variable can be overridden with plan view overrides.

EXAMPLE:

```
if (Sta >= 0+00 R 1) then
      {
_d_ShoulderForeSlope = 1:2
      }
```

_s_RecoverableShoulderForeSlope

This variable is used to override the 'normal' shoulder foreslope when a recoverable slope is used. Only use this variable when the recoverable slope is pref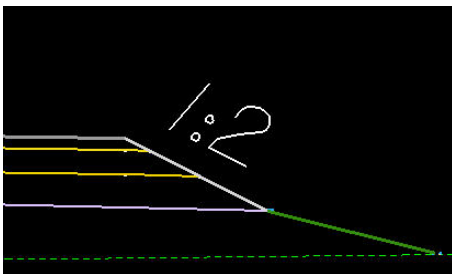erred over the shoulder foreslope. Set this variable to ^Yes^ to override the shoulder foreslope variable with a recoverable slope. If set to ^No^, the shoulder foreslope will equal the shoulder foreslope variable.

This variable must be used in conjunction with the redefinable variable _d_RtRecoverableSlopeDist (or Lt). If these variables are set to zero, no override will occur. The slope of the recoverable distance is set with the Redefinable variable _d_RtRecoverableSlope (or Lt). The use of the variable _d_RtSecondarySlope is optional, if the value is set to 0:0 then the secondary fill slope will be selected from the fill slope criteria table.

The default value = Yes

EXAMPLE:

```
if (Sta >= 0+00 R 1) then
    {
       _s_RecoverableShoulderForeSlope = ^Yes^
    }
```
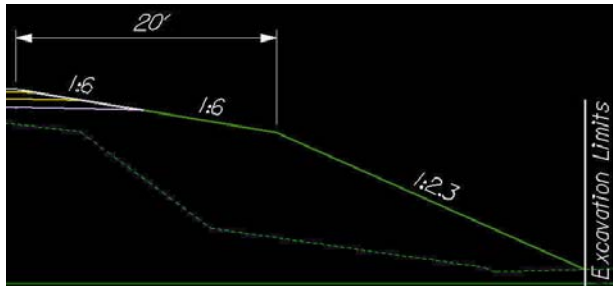

with:
```
_d_ShoulderForeSlope = 1:2
_s_RecoverableShoulderForeSlope = ^Yes^
_d_RtRecoverableSlopeDist = 20
_d_RtRecoverableSlope = -1:6
_d_RtSecondarySlope = -1:2.3
```
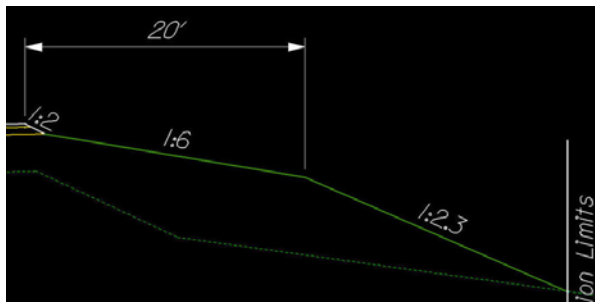
```
if (Sta >= 0+00 R 1) then
    {
       _s_RecoverableShoulderForeSlope = ^No^
    }
```


with:
```
_d_ShoulderForeSlope = 1:2
_s_RecoverableShoulderForeSlope=^No^
_d_RtRecoverableSlopeDist = 20
_d_RtRecoverableSlope = -1:6
_d_RtSecondarySlope = -1:2.3
```

_d_SubExDepth and _d_SubExType

These variables set the location, depth and type of subexcavation to be drawn in the proposed cross sections. Use these variables whenever it is necessary to show subexcavation in cross section views or to accurately measure the earthwork volumes associated with subexcavation.

The variable _d_SubExDepth defines the depth of subexcavation. Use the variable in all locations of subexcavation regardless of the type of subexcavation defined (Type 1 or 2) which also must be defined. The variable needs to be expressed in master units and no negative sign is required. The depth is measured differently, depending upon the type of subexcavation selected; see the description of _d_SubExType for an explanation.

The default value = 0

EXAMPLE:

```
if (Sta >= 0+00 R 1) then
        {
 _d_SubExDepth = 24/12
        }
```

The variable _d_SubExType defines the type of subexcavation. Use in conjunction with _d_SubExDepth for all subexcavation locations. Type 1 subexcavation, which is defined as below proposed subgrade, is invoked by setting the variable equal to 1. Type 2 subexcavation, which is defined as below existing ground, is invoked by setting the variable equal to 2.

*The default value = ^2^*

> **Note: The subexcavation type and depth variables can be overridden with plan view overrides.**

EXAMPLE 1: *Note: The bottom of the Type 1 subexcavated area is parallel to the proposed subgrade and it automatically ends when it intersects the fill slope or the bottom of the ditch. No plan view elements are required.*

```
if (Sta >= 0+00 R 1) then
        {
 _d_SubExType = ^1^
        }
```
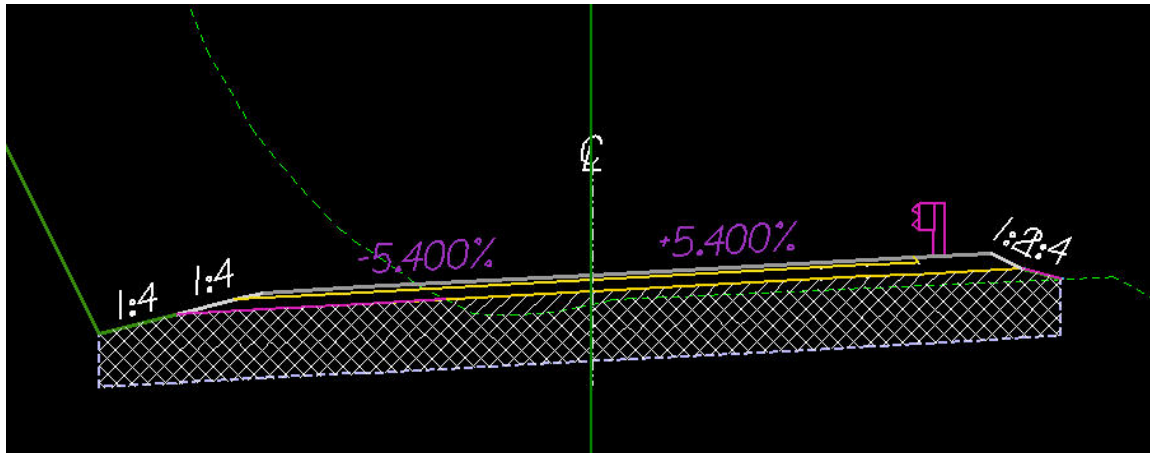
Subexcavation quantity = Crosshatched area

Subexcavation Backfill quantity = Crosshatched area + Hatched area

EXAMPLE 2: *Note: Type 2 Subexcavation requires two plan view lines (LV=
P_RDW_Edge_of_Subexcavation) to define the offset distances from centerline. The bottom
of the subexcavated area is horizontal and the depth is measured from the existing ground
on the left hand side.*

```
if (Sta >= 0+00 R 1) then
        {
_d_SubExType = ^2^
        }
```


Subexcavation quantity = Hatched area + Crosshatched area

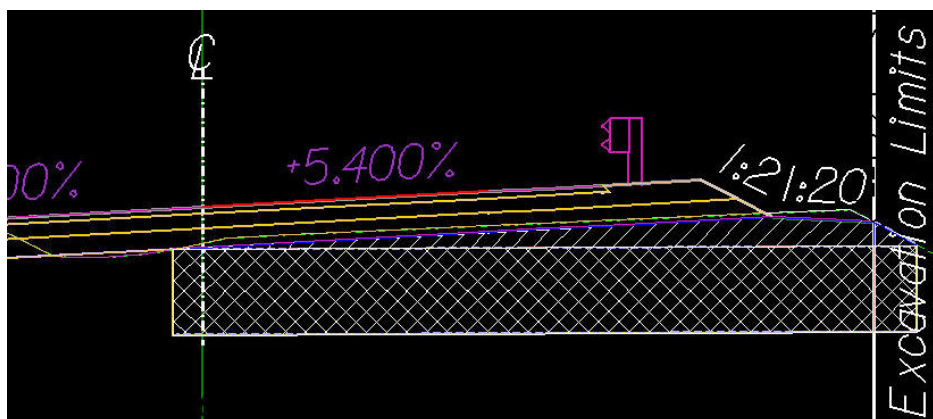*Subexcavation Backfill quantity = Crosshatched area*

_d_MaxWidenSearchDistance

This variable defines the distance in master units to search for a pavement widening line in plan view. The distance is measured from centerline. This variable is used when cross sections may cross other edges of pavement widening from other roads or in switchbacks. Extraneous lines will cause errors when proposed cross sections are drawn.

The default values = 12 (ft) or 3.6 (m)

EXAMPLE:

```
if (Sta >= 0+00 R 1) then
      {
 _d_MaxWidenSearchDistance = 40
      }
```

_d_BackofCurbSearchDistance

This variable defines the distance in master units to search for the back of Type 1 or Type 2 curb in plan view. The distance is measured from the edge of traveled way. Type 1 and Type 2 curb lines in plan view act as a trigger and exact horizontal position is not important. Use this variable to work with the plan view offset values drawn.

The default values = 3 (ft) or 1 (m)

EXAMPLE:

```
if (Sta >= 0+00 R 1) then
      {
 _d_BackofCurbSearchDistance = 40
      }
```

_d_Type3CurbSearchDistance

This variable defines the distance in master units to search for Type 3 curb in plan view. The distance is measured from centerline. Type 3 curb lines in plan view act as a trigger and exact horizontal position is not important. Use this variable to work with the plan view offset values drawn.

The default value = 20

EXAMPLE:

```
if (Sta >= 0+00 R 1) then
      {
 _d_Type3CurbSearchDistance = 20
      }
```

_d_ClrZoneRecovCutDist and _d_ClearZoneCutSlope

These redefinable variables are used define cut situation clear zone distances and allowable slopes. Additionally, these variables are used to label or check proposed cut slopes that do not meet the defined distance or exceed the allowable cut slopes within a clear zone. Any cut slope that exceeds the allowable slope within the defined clear zone will be labeled. The criteria will also label a case where the clear zone distance is not met.

> ***Note: Use of these variables does not draw a "barn roof" clear zone section. These variables are used where "barn roof" sections are not proposed.***

The variable _d_ClrZoneRecovCutDist defines the distance to perform the check from the top of the shoulder foreslope to the outer edge of the clear zone in a cut situation.

The variable _d_ClearZoneCutSlope sets the allowable clear zone slope in a cut situation.

If no check of the slopes is required, leave the _d_ClrZoneRecovCutDist variable set to 0 (default).

EXAMPLE:
```
 if (Sta >= 0+00 R 1) then
     {
          _d_ClrZoneRecovCutDist = 10
     }
```
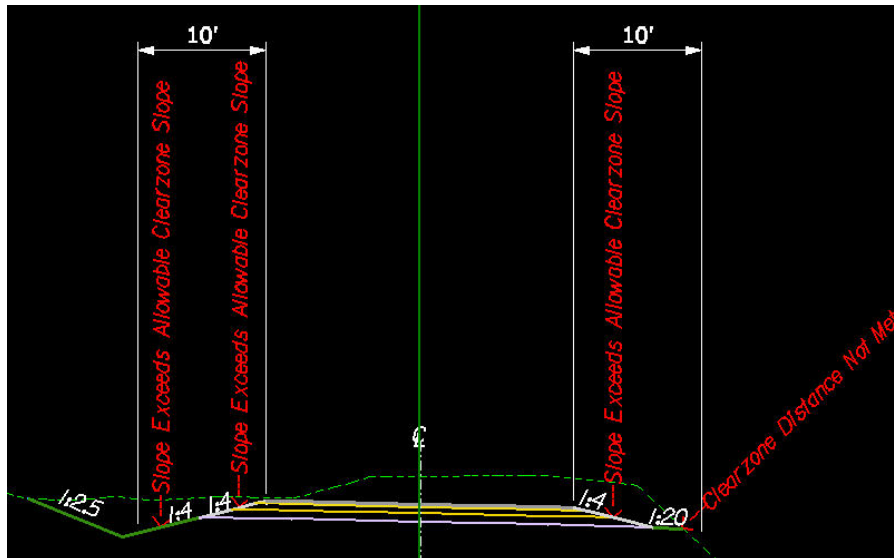

> **with**: _d_ClearZoneCutSlope = 1:6

_d_ClrZoneRecovFillDist and _d_ClearZoneFillSlope

These redefinable variables are used define fill situation clear zone distances and allowable slopes. Additionally, these variables are used to label or check proposed fill slopes that do not meet the defined distance or exceed the allowable fill slopes within a clear zone. Any fill slope that exceeds the allowable slope within the defined clear zone will be labeled. The criteria will also label a case where the clear zone distance is not met.

> ***Note: Use of these variables does not draw a "barn roof" clear zone section. These variables are used where "barn roof" sections are not proposed.***

The variable _d_ClrZoneRecovFillDist defines the distance to perform the check from the top of the shoulder foreslope to the outer edge of the clear zone in a fill situation.

The variable _d_ClearZoneFillSlope sets the allowable clear zone slope in a fill situation.

If no check of the slopes is required, leave the _d_ClrZoneRecovFillDist variable set to 0 (default).

> ***EXAMPLE:***

```
if (Sta >= 0+00 R 1) then
  {
    _d_ClrZoneRecovFillDist = 10
  }
```
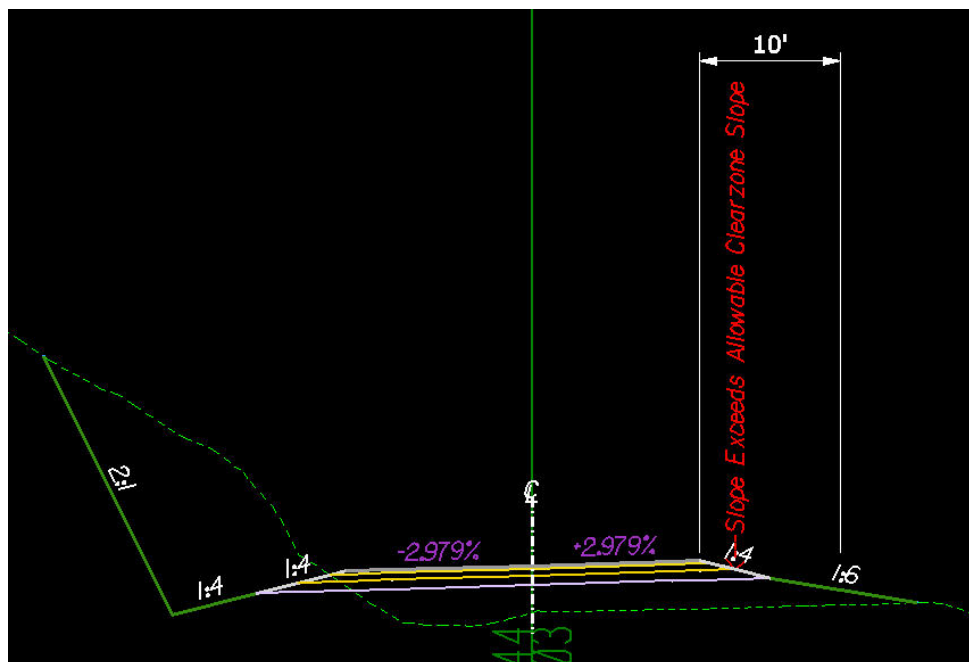

> ***with***: *_d_ClearZoneFillSlope = 1:6*

_d_LtRecoverableSlopeDist and _d_LtRecoverableSlope and _d_LtSecondarySlope

These redefinable variables are used to create a safe recovery area or "barn roof" section in cut and fill situations on the left side of the roadway. Use these variables to build safety into the proposed roadway or when the defined clear zone requirements are not met.

The variable _d_LtRecoveralbeSlopeDist defines the horizontal distance for the recoverable slope and is measured from the top of the shoulder foreslope or edge of pavement if no shoulder is proposed.

The variable _d_LtRecoverableSlope defines the slope for the recoverable slope and is expressed as negative rise:run values.

The variable _d_LtSecondarySlope defines a secondary slope and is used to set fill slopes when recoverable slopes are used. Use this variable if it is necessary to have a constant fill slope or if the standard fill slopes are not desired. Any value, expressed in a rise:run format, other than 0 (default) will override the fill slope table. If the secondary slope is flatter that the recoverable slope, the recoverable slope will be used instead. It is not necessary to set this variable when using recoverable slopes
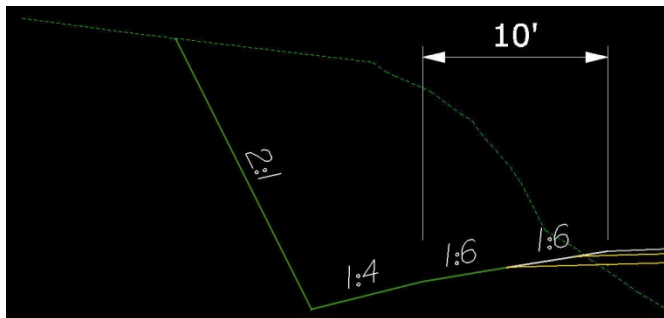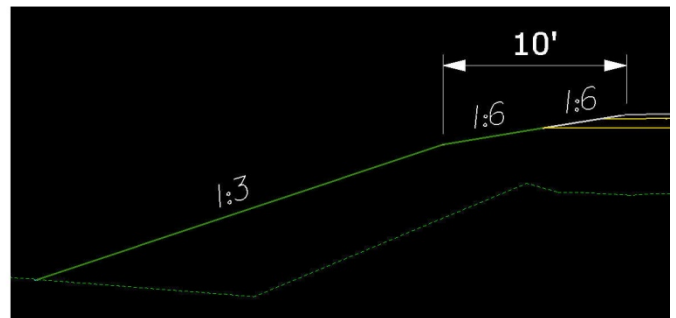
If no recoverable slope is desired, set _d_LtRecoverableSlopeDist = 0 (default).

> **EXAMPLE:**

if (Sta >= 0+00 R 1) then
*   {*   **with**:   *_d_LtRecoverableSlope = -1:6*
_d_LtRecoverableSlopeDist = 10   *_d_LtSecondarySlope = -1:3*
*   }*   *_d_RecoverableShoulderForeSlope =*
*^Yes^*

> **Note : If _d_RecoverableShoulderForeSlope is set to ^No^, then the shoulder foreslope is controlled by the _d_ShoulderForeSlope variable.**

Cut Situation	**Fill Situation**

> **Note: In the cut situation, the secondary slope does not override the ditch slope, which is controlled by the redefinable variable _d_DitchForeslopeLt**

_d_RtRecoverableSlopeDist and _d_RtRecoverableSlope and _d_RtSecondarySlope

These redefinable variables are used to create a safe recovery area or "barn roof" section in cut and fill situations on the right side of the roadway. Use these variables to build safety into the proposed roadway or when the defined clear zone requirements are not met. See the description above for the Left side variables.

_d_FillSlope1 and _d_ FillSlope1Height (and Fill Slopes 2 through 9)

These redefinable variables define the fill slope selection criteria, based on the height of the fill slope. The slope is expressed in a rise:run format. The slope will be assumed to be negative. The fill height is a maximum height for the corresponding slope and is expressed in master units.

Note: All fill slope variables can be overridden with plan view overrides.

EXAMPLE:

```
if (Sta >= 0+00 R 1) then
  {
    _d_FillSlope1 = 1:6
  }
```

EXAMPLE:

```
if (Sta >= 0+00 R 1) then
  {
    _d_FillSlope1Height = 2.0
  }
```

In the example, all fill slopes with a height of two feet or less will be drawn at a -1:6 slope.

_d_CutSlope1 and _d_ CutSlope1Height (and Cut Slopes 2 through 9)

These redefinable variables define the cut slope selection criteria, based on the height of the cut slope. The slope is expressed in a rise:run format. The slope will be assumed to be positive. The cut height is the maximum height for the corresponding slope and is expressed in master units.

Note: All cut slope variables can be overridden with plan view overrides.

EXAMPLE:
```
if (Sta >= 0+00 R 1) then
  {
    _d_CutSlope1 = 1:6
  }
```

EXAMPLE:
```
if (Sta >= 0+00 R 1) then
  {
    _d_CutSlope1Height = 2.0
  }
```
In the example, all cut slopes with a height of two feet or less will be drawn at a 1:6 slope.

_d_DitchForeslopeLt and _d_DitchForeslopeHeightLt and _d_FlatBottomDitchWidthLt

These redefinable variables set the design parameters of the left roadside ditches. Use them to vary the heights, slopes and shapes of ditches throughout a proposed project.

This variable _d_DitchForeslopeLt variable defines the slope of the left ditch from the subgrade hinge point in a rise:run format. The slope will always be assumed to be negative.
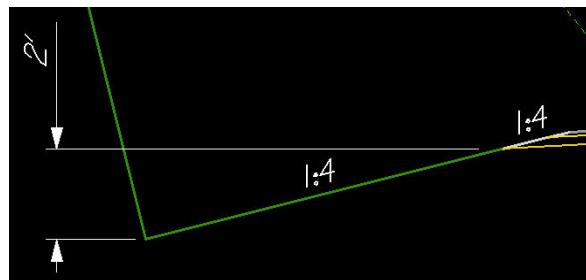
The default value = 1:4

> **EXAMPLE:**
> if (Sta >= 0+00 R 1) then
>   {
>   _d_DitchForeslopeLt = 1:4
>   }

This variable _d_DitchForeslopeHeightLt defines the vertical height of the left ditch from the subgrade hinge point in master units.

The default values = 1.5 (ft) and 0.5 (m)

> **EXAMPLE 1:**
> if (Sta >= 0+00 R 1) then
>   {
>   _d_DitchForeslopeHeightLt = 2.0
>   }

> ***Note: The ditch foreslope and the ditch foreslope height variables can be overridden with plan view overrides.***

The variable _d_ FlatBottomDitchWidthLt defines the width of the left flat bottom ditch and is measured in master units. This variable is used when a flat bottom ditch is preferred over a "V" ditch. If a "V" ditch is desired, leave this variable set to zero (default).
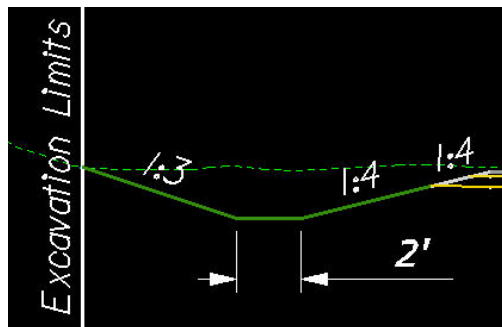
> ***Note: The flat bottom ditch width variable can be overridden with plan view overrides.***

EXAMPLE 2:

```
if (Sta >= 0+00 R 1) then
    {
      _d_FlatBottomDitchWidthLt = 2
    }
```


_d_DitchForeslopeRt and _d_DitchForeslopeHeightRt and _d_FlatBottomDitchWidthRt

These redefinable variables define the dimensions of the ditch on the right side. See the descriptions above for the left side ditch variables.

> **Note: The all these variables can be overridden with plan view overrides.**

_d_GroundDropOffSearchDistance and _d_GroundDropOffSampleDistance

These variables are used to define how and when a ditch is created in a fill situation. If the shoulder subgrade point is above ground and the bottom of the ditch foreslope is below ground, the criteria will check to see if the ground slopes to a point below the defined ditch bottom. If this is the case, a fill slope will be drawn intersecting existing ground and a ditch will not be drawn.

> **Note: The bottom if the ditch foreslope is set by the variable for ditch foreslope height.**

The variable _d_GroundDropOffSearchDistance defines the distance in master units used to determine how far to search to see "if" the ground falls below the ditch bottom in a fill situation. This distance is defined in master units and is measured horizontally from the shoulder subgrade point.

The default values = 50 (ft) and 15 (m)

EXAMPLE:

```
if (Sta >= 0+00 R 1) then
    {
      _d_GroundDropOffSearchDistance = 50
    }
```

The variable _d_GroundDropOffSampleDistance sets the distance in master units used to determine the increment to move along the ground to determine if the ground falls off below the bottom of ditch in a fill situation.

The default values = 1 (ft) and 0.3 (m)

EXAMPLE:

```
if (Sta >= 0+00 R 1) then
    {
      _d_GroundDropOffSampleDistance = 1
    }
```

_d_DaylightSlope and _d_DaylightWidth and _d_DaylightOption

These variables are used to define the slope width and type of "daylighted" slope that is drawn. "Daylighted" slopes are used in cut situations when there is a possibility to grade out a slope instead of having a roadside ditch.

_d_DaylightSlope defines the slope in rise:run format to draw the daylight slope.

The default value = -1:20

EXAMPLE:
```
if (Sta >= 0+00 R 1) then
    {
      _d_DaylightSlope = -1:20
    }
```

_d_DaylightWidth *is a redefinable variable that defines the maximum width of the "daylighted" slope measured horizontally from the bottom of the ditch foreslope in master units. Use the variable in cut situations where there is a choice to either create a ditch or grade out to an existing slope.*

The default values = 30 (ft) and 10 (m)

EXAMPLE:

```
if (Sta >= 0+00 R 1) then
    {
      _d_DaylightWidth = 10
    }
```

_d_DaylightOption defines the method of daylighting a slope. Use ^S^ to daylight from the shoulder subgrade; use ^D^ to daylight from a ditch foreslope and use ^N^ if no daylight slope is desired.
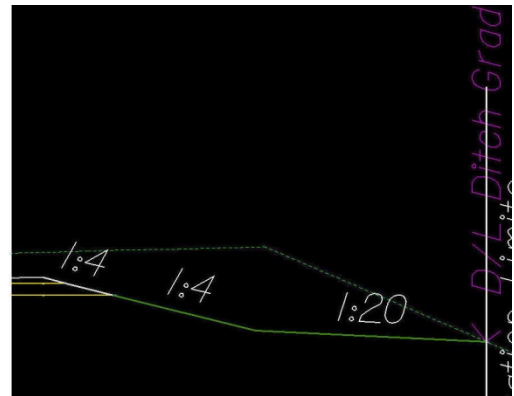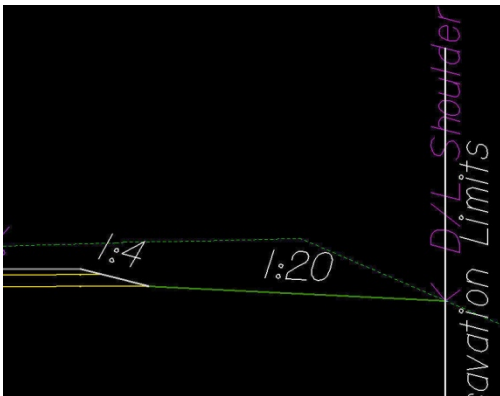
*The default value = ^D^*

EXAMPLE:

```
if (Sta >= 0+00 R 1) then          if (Sta >= 0+00 R 1) then
    {                                  {
      _d_DaylightOption = ^S^            _d_DaylightOption = ^D^
    }                                  }
```

_d_RockSlopeLT and _d_RockSlopeRT

These redefinable variables are used to define the slope of the lower portion of a broken back cut slope. The slope of the upper portion of the broken back cut slope is defined by the slope selection criteria or by plan view overrides. The elevation where the change in slope occurs is triggered by a line drawn on the cross section with the D&C Manager.

*The default value = 4:1*

> ### EXAMPLE:

```
if (Sta >= 0+00 R 1) then
    {
      _d_RockSlopeLt = 8:1
    }
```
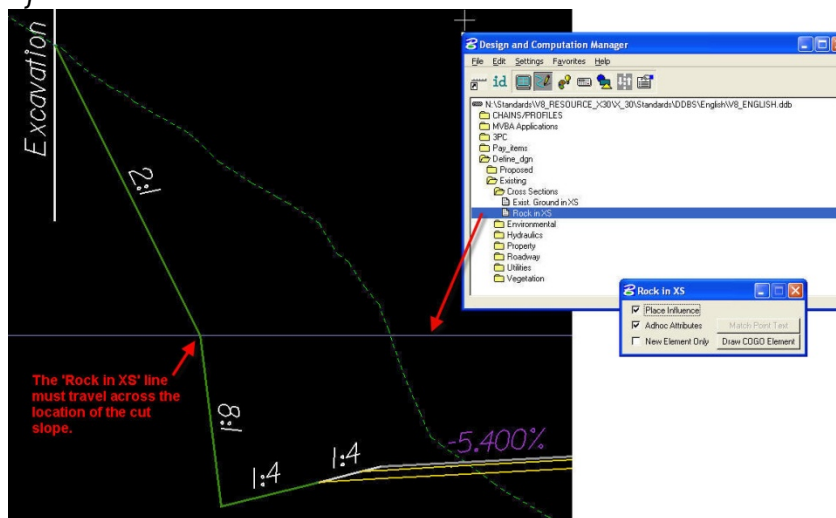
_s_ExcavationLimit and _s_ExcavationLimitOffset

These redefinable variables are used to label the limits of excavation. If no labels are desired, set the variable _s_ExcavationLimit to ^N^. The offset of the label can be positive (outside of tie) or negative (inside of tie).

> ***EXAMPLE:***

if (Sta >= 0+00 R 1) then
  {
   *_s_ExcavationLimit = ^Y^*
  }

if (Sta >= 0+00 R 1) then
  {
   _s_ExcavationLimitOffset = 0
  }
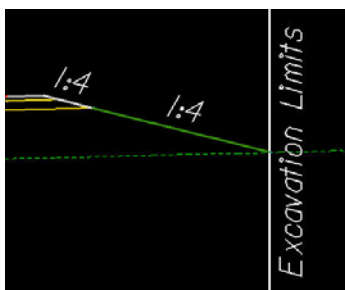
Note: Earthwork processes require the use of Excavation Limit labels.

Appendix B

Using the Safety Edge Shoulder_SE.x30 Criteria File

In **Project Manager > PROPOSED CROSS SECTIONS** Tool

Scroll down to **Shape Clusters**, Highlight the **RT Side Slope Condition**, in the **Criteria Files** window,
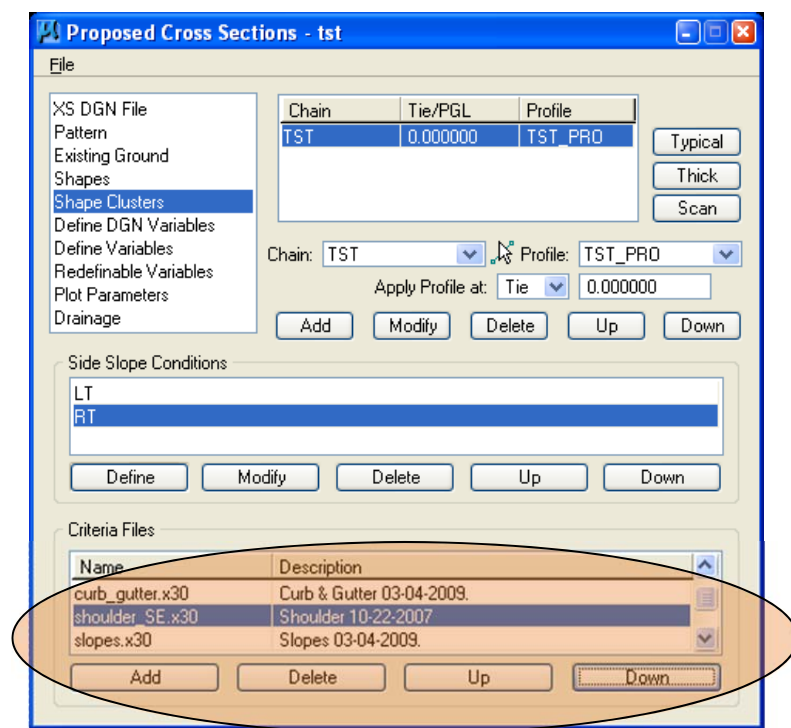
1. **Delete** the shoulder.x30 criteria file (answer "yes" to the prompt)

2. **Add** the shoulder_SE.x30 criteria file (you may have to navigate to M:\Engineering_Software\Cadd_resource_v8i\X_30\Typicals\English with the **Select** button)

Highlight and Hit "To Criteria"

Close the dialog with "Done"
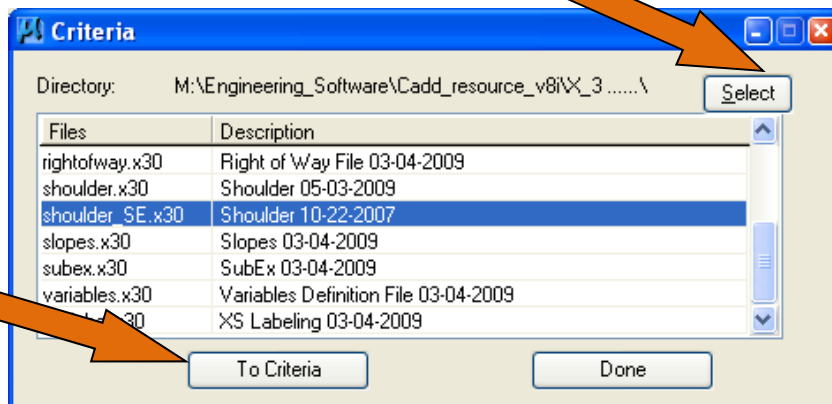
This will add the Safety Edge criteria file shoulder_SE.x30 at the bottom of the list.

It is IMPORTANT that the sequence of the criteria files is maintained for the order in which Geopak wants to build your cross sections.

Use the "Up" button to move the file back into its proper order (directly AHEAD of the slopes.x30 criteria file)

**** REPEAT THE SAME FOR THE LT SLOPE CONDITION ****

Scroll down to **Redefinable Variables**, find and highlight the **_s_PavementClosureOption**
Variable.
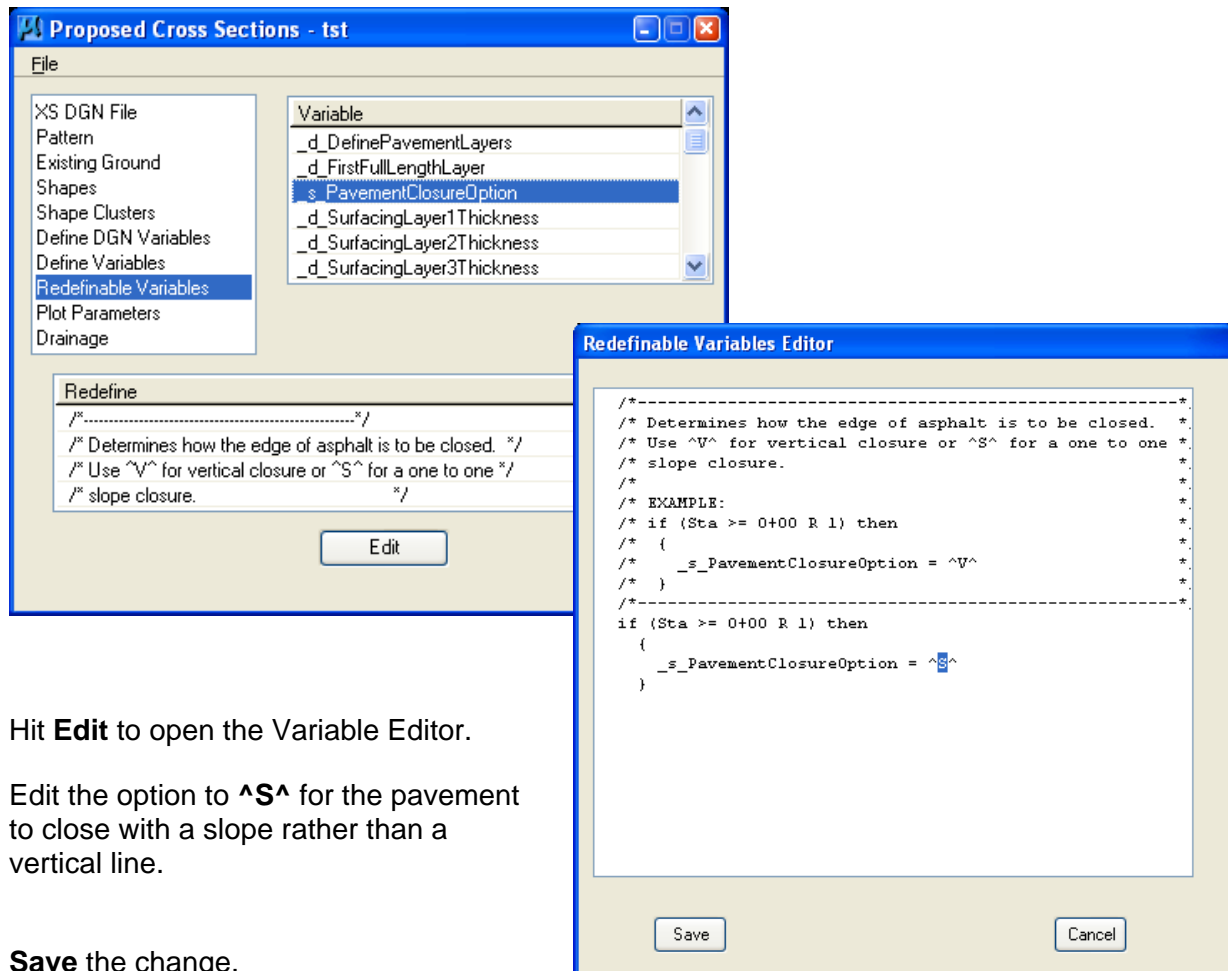
Hit **Edit** to open the Variable Editor.

Edit the option to **^S^** for the pavement
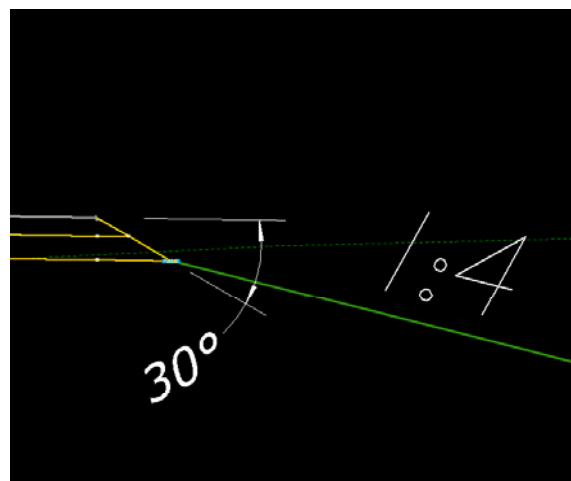to close with a slope rather than a
vertical line.

Save the change.

(although the description still says "one to one slope" , the shoulder_SE.x30 we just added
will build a 30 degree edge)
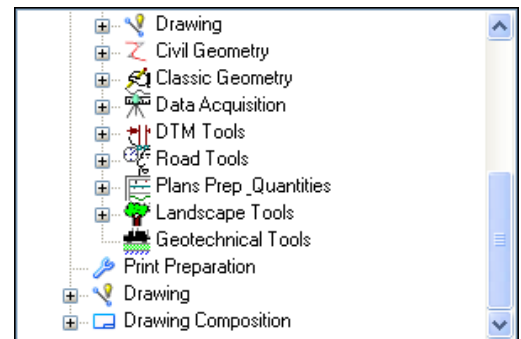
Save Settings and

(re)Run your cross sections.

Ex.;

Appendix C

Miscellaneous Microstation Tips

CREATE HYPERLINKS IN DGN

- Pull down the **Tasks** menu to **Drawing Composition**.

- Select **Organize** > **Add a Link to an Element**.

• Options are shown for linking from a file, keying in the path or URL (web).
• Select **From File**.
• Navigate to the file you want linked. Highlight the file.
• Hit **Add**. (multiple files may be added) > **Open**.
• Highlight the file in the Link Target window.
• Hit OK.
• You are prompted to identify the element.
 Select the element or text and accept.
• Hold the right-click and select Follow Link.
• The link OPENS !

Link to other dgn's, pictures, spreadsheets,
WORD documents, websites, etc.
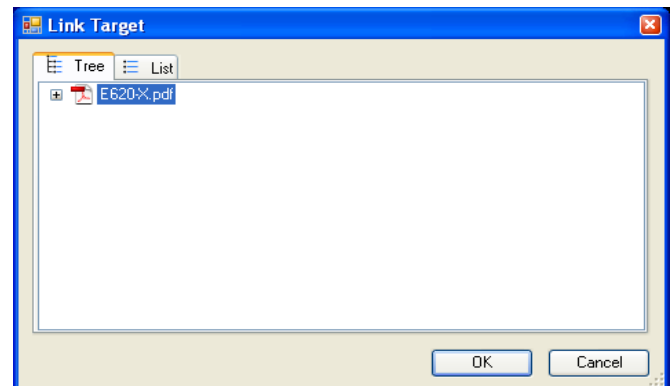
To remove them;
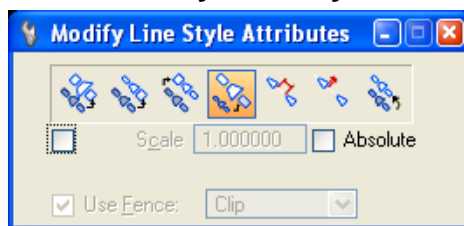Go to **Element > Information** to delete the links.

MODIFY ACTIVE LINESTYLE SCALE

- This will allow you to scale a line style without redrawing it.

- Go to the **Change Element Attributes** Tool.

Change Element Attributes

- Pull down to **Modify Line Style Attributes**.

•Select **Scale**.
•Toggle on **Scale** setting. Set your desired scale factor.

    (this is a scale factor, not an active scale setting for your file or model)
   (for additional information on setting up/resetting line style scales, see
   Chapter 5 in the V8i CPG)

•Identify the element and Accept.

MAKE REFERENCE FILES ACTIVE FOR MANIPULATION

- This will allow you activate an attached reference file (dgn) to make changes to that reference. This is done without opening the reference file.
- Open the **References** tool.
 - You will see a list of all attached references.
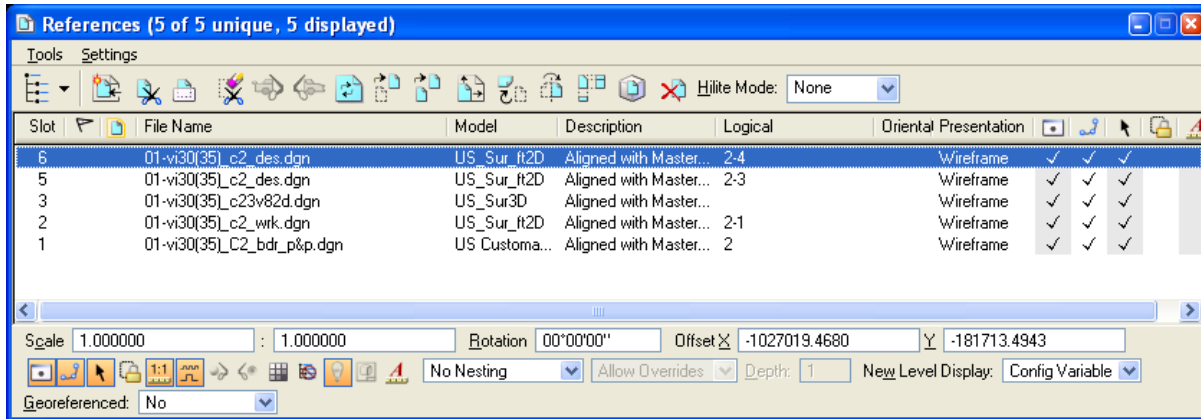
- The third column in the tool box is the **Activate Status** setting.
- Highlight the reference file you want to activate.

- Double-click the highlighted file in the Activate Status column.(all other references become grayed out).

- Elements in the activated reference file can now be modified, as if you had opened that file.

- When finished, double-click the Activate Status column again to release the reference file. You will be asked if you are sure you want to release the file;
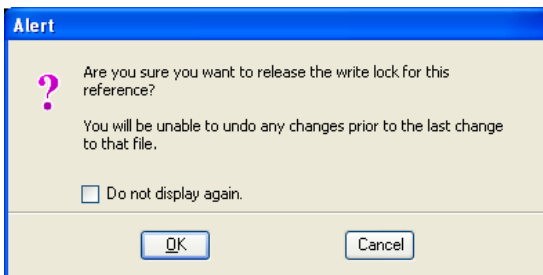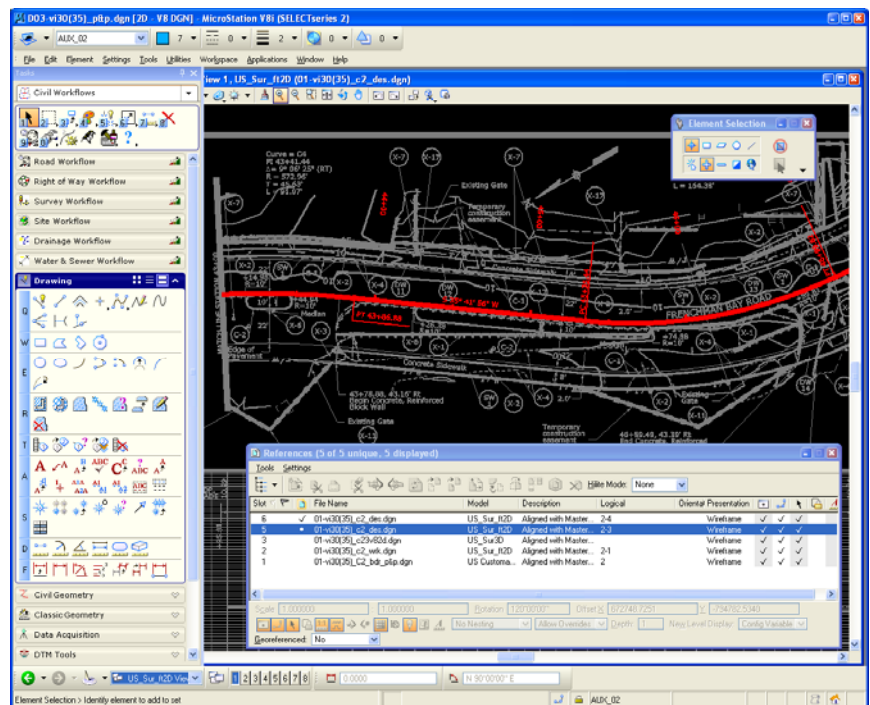
Note that **you will be unable to undo the changes you just made to the reference file**.
These changes are reflected in the activated reference and any other files with this file attached.

If you do not "release" the activated reference file when exiting your file, the activated reference is considered to be an open dgn file.
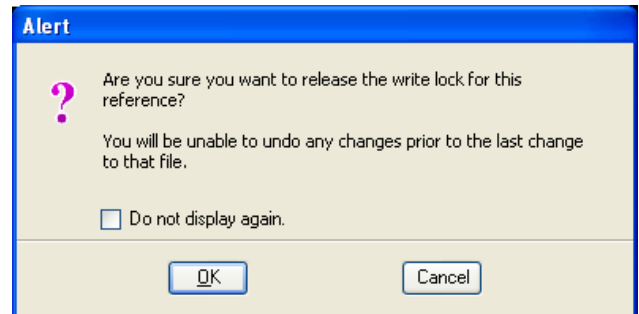
This would mean, the file would be read-only when you attempt to open the reference file directly.

- Hit **OK** to release the file.

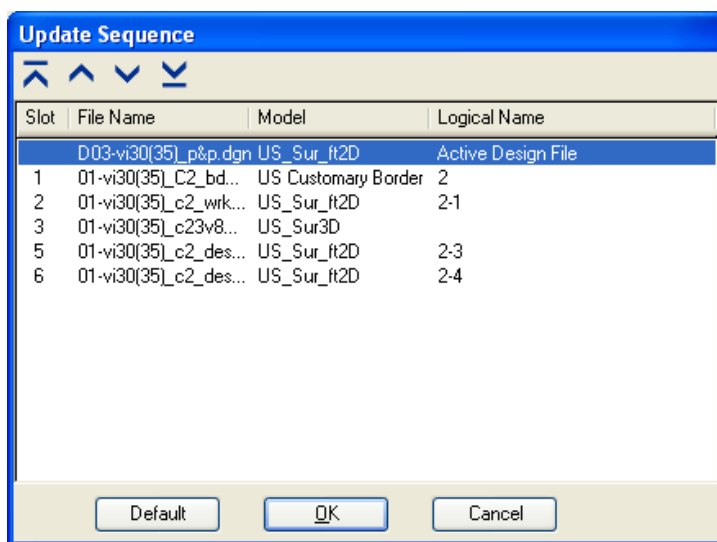**CHANGE REFERENCE FILE UPDATE SEQUENCE**

If your active and reference files are not updating in the correct order,

(ex; your referenced sheet border is displayed on top of your design file elements and your active file elements) you can change the order in which the files are updated.

- Open the **References** tool.

You will see a list of all attached references.

- Pull down **Settings** to **Update Sequence**.

- Change the update sequence as desired by moving file up or down in the sequence. The Slot number indicates the update order.

- Usually, the border file is updated first, then the mapping file, design file, with the active (sheet) file updated last in the sequence.

- Hit **OK** to accept the changes.

CHANGE UPDATE PRIORITY OF ACTIVE ELEMENTS

Sometime you have to change the update sequence of your reference files (see previous slide), but when elements in your **active** file are not updating properly, you will need to change the *priority* of the elements themselves.
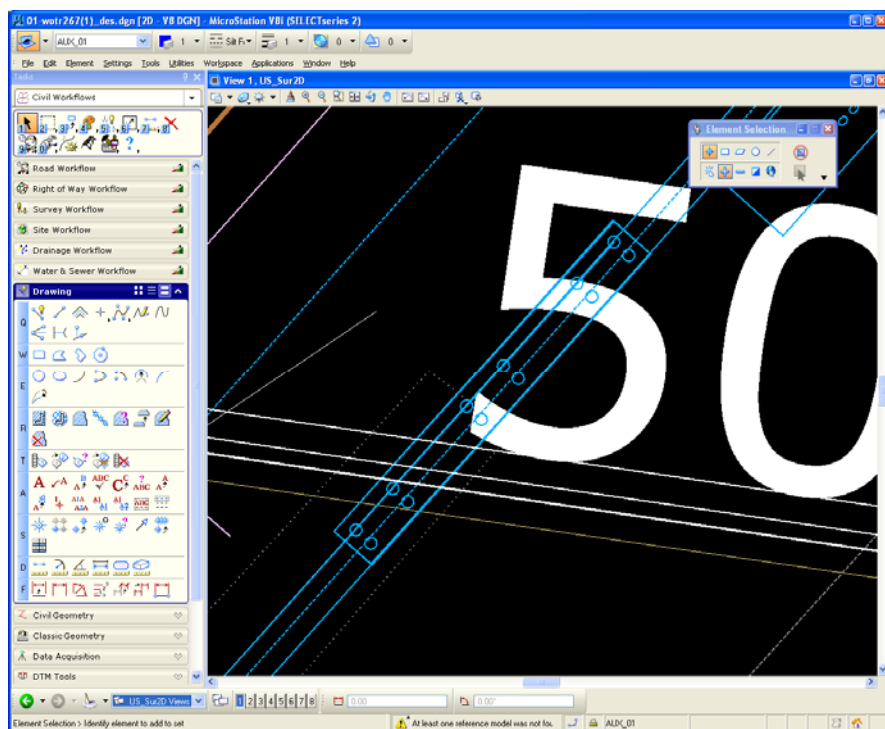
In this case, you see a planimetric element is falling on top of a station call out. Both elements are in the active dgn.
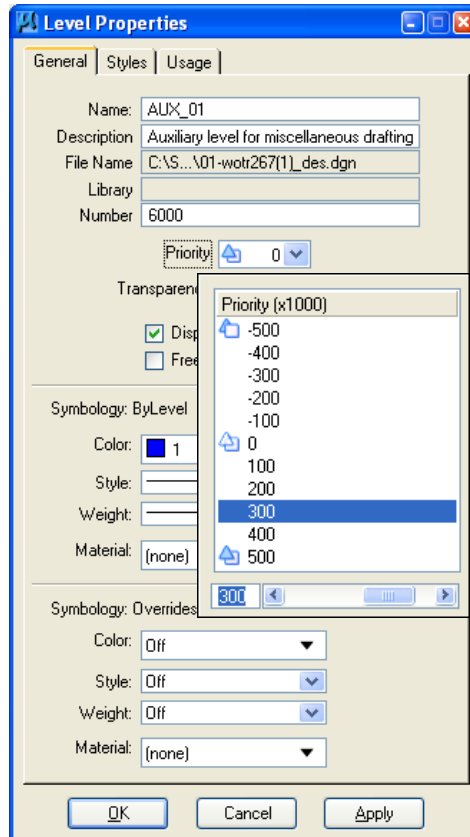
To change priority of the station call-out,
Go to **Settings** > **Levels** > **Manager**

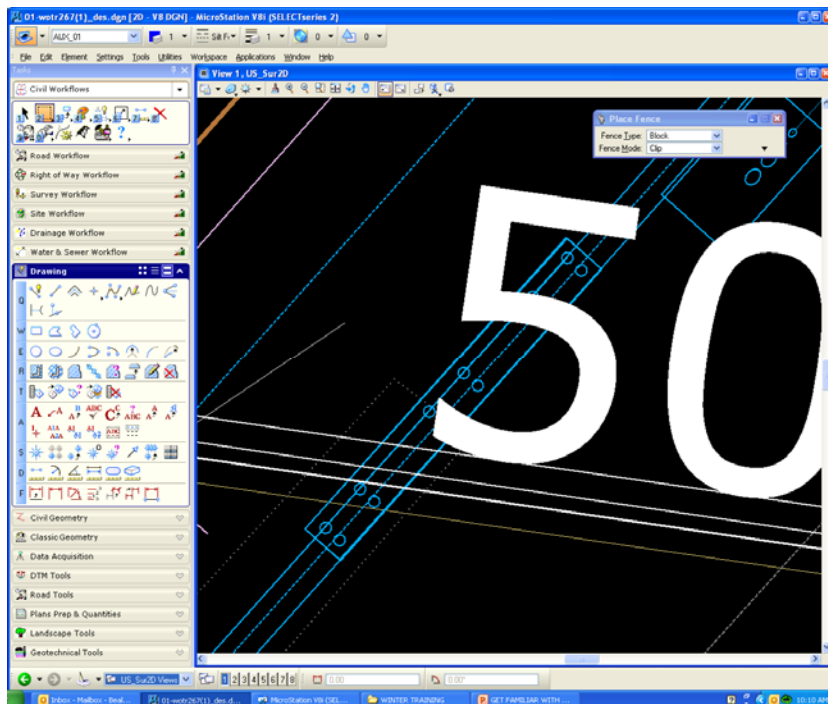Identify the level of the element you want to bring forward. (AUX01 here)

Right-click the level, pull down to **Properties**.

•Pull down **Priority**, and assign a higher value to the element.
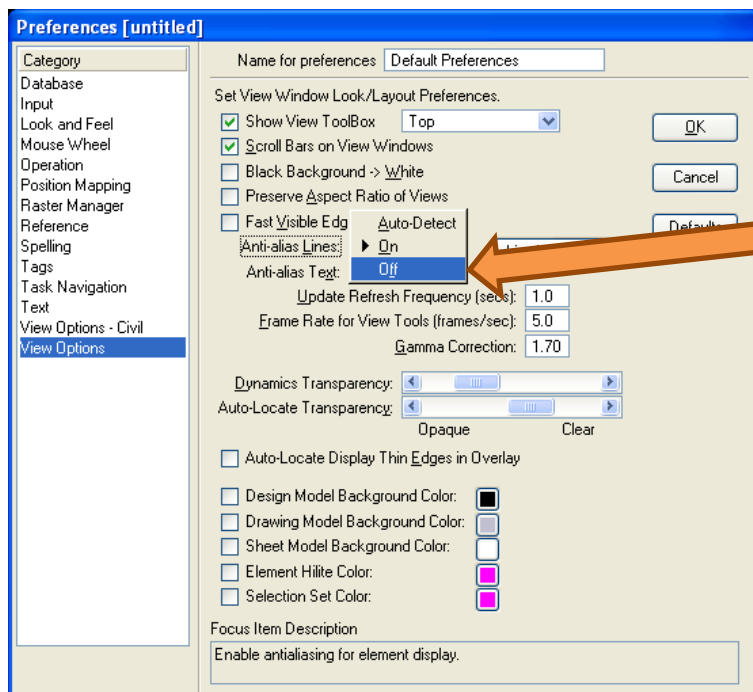
•Hit **Apply** > **OK**.

You can see the station call-out is now in front of the other element.

V8i TEXT LOOKS SHADED OR GRAYED OUT

Microstation V8i display settings make text look fuzzy, shaded, or grayed out. (when zoomed out to a certain view) You can change the preference to make the text ALWAYS show clearly at any zoom level.

- Go to **Workspace > Preferences > View Options.**

Toggle **Anti-alias Text** to **OFF.**

Hit **OK.**
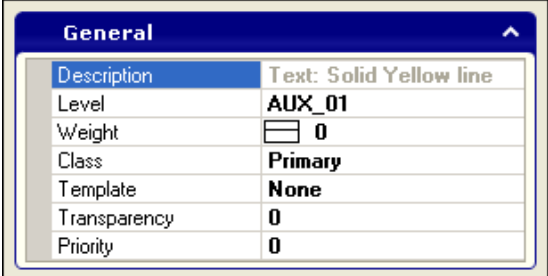
Update the View.

QUICKLY SET ACTIVE ATTRIBUTES

Set active element attributes; level, color, style, weight, and line style) in Microstation V8i by using the **ALT** key.

- Hold the **ALT** key **while data pointing** on an element you want the active settings to be changed to.

- One data point changes the level, color, style, weight, and line style setting to the same as the element selected.

QUICKLY FIND ELEMENT INFORMATION

Rather than using the Element > Information tool. Simply hold the **ALT** key and **hit your mouse RESET button** while hovering over the element you want info on.

- A dialog will open, displaying the element information.

- You can also edit some of the element information here.

| General	^
Description	Text: Solid Yellow line
Level	AUX_01
Weight	0
Class	Primary
Template	None
Transparency	0
Priority	0

QUICKLY FIT THE VIEW

Double-click the middle button (on a three button mouse) to quickly perform a "fit view".

MAP A MOUSE BUTTON TO CLEAR A SELECTION SET

Microstation V8i uses the power selector exclusively, sometimes an element from a previous command will still be selected when the user selects a new element and performs another action. The user may not be aware that the previous element was also modified. This button assignment allows the user to hit a mouse button and automatically deselect everything before performing a new task.

• Go to **Workspace** > **Button Assignments**.

• Select an empty button and, under **Action**, type in "choose none" (without the quotation marks)

• Hit **Remap Buttons**.
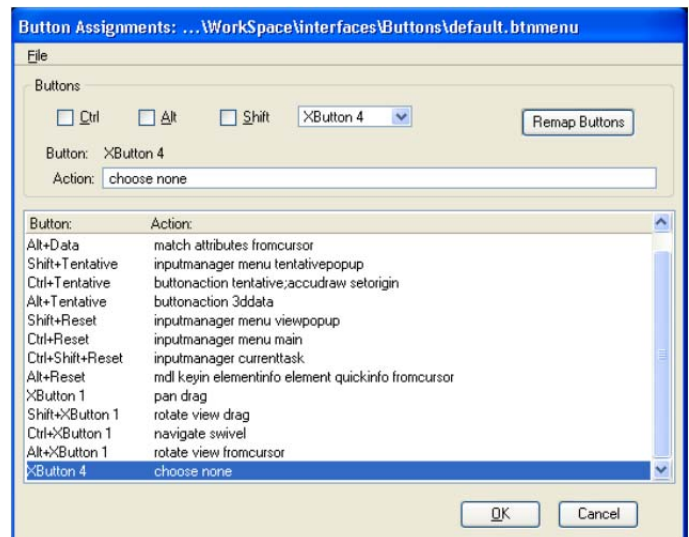
Select the button you chose in the previous window, hover the mouse over the **Button Definition Area**, and click the button you wish to use for this command.
The small button on the left of a new Logitech mouse, (the one under your thumb) work well for this.
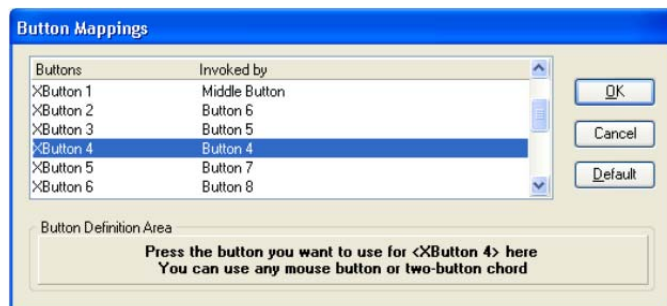
WARNING: if you choose a button already being used for something else (like the left or right mouse button), whatever function it did before will now be assigned to this new button.

You should now be able to use the extra mouse button to deselect everything. You can similarly map any other key-in'able command to the extra mouse buttons.