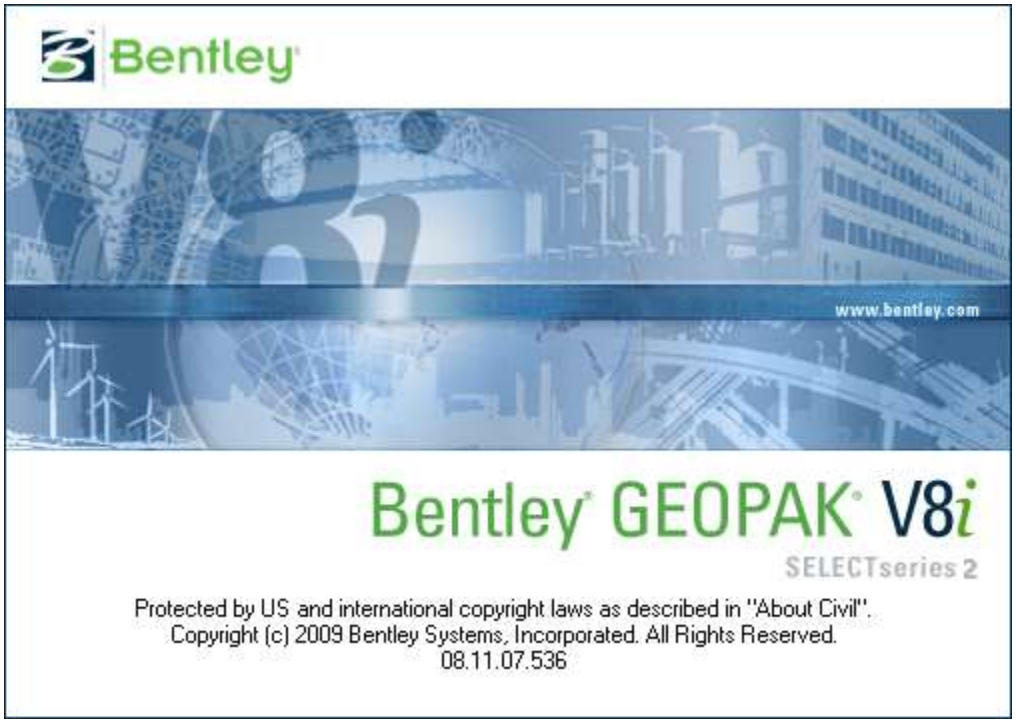
Criteria

User Manual



Montana Department of Transportation

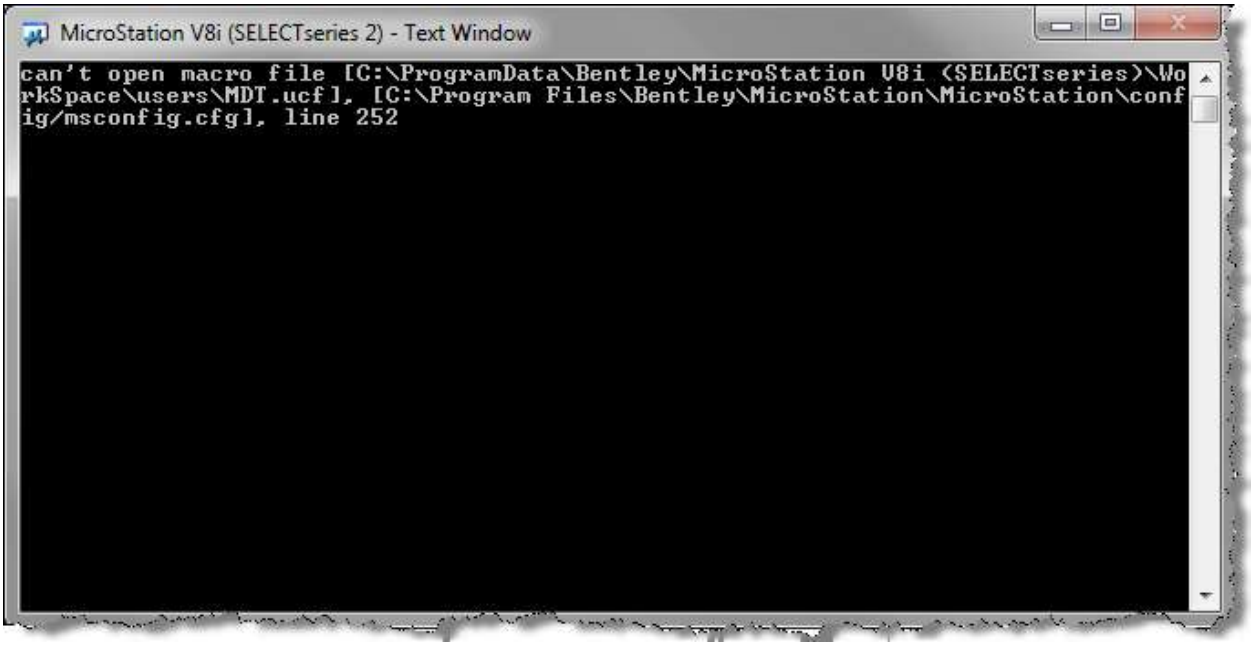
EISS CADD Unit

Table Of Contents

1 Introduction

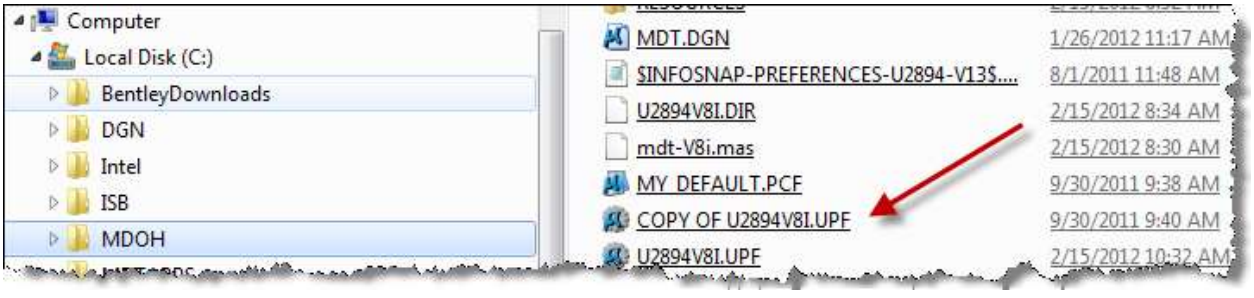
GEOPAK is a comprehensive software package for the design and production of plans for roadway and site projects. The software is fully integrated with the MicroStation CAD system to permit true interactive design.

For everyday design work map your W drive to the appropriate drive for all CADD support.
You then need to log off and back on to re-access the drive. If your W: drive is not properly mapped the following text window may appear when attempting to initiate MicroStation:



NOTE: Pictures depicted in this manual are from various samples and/or lab projects. Please double check all of your own dialogs to insure they represent what you want in your own project in order to have an accurate and trouble-free design.

Maintenance suggestion: Once you have all of the preferences set up as you like then go to C:\mdoh and make a copy of your .UPF file. Just copy it into your U: drive or make a copy and rename it right in C:\mdoh. This way you will not lose your preferences should you need to delete the .UPF file. (see below)



2 File Management

These are the Files that will need to be saved on DMS.
The criteria used to determine if the file should be saved was, is it necessary to run the Geopak program and how easily the information can be recreated. All the other files can easily be recreated either by Geopak or simple editing can be found in the w:\rdstd directory. Because of the nature of computers in general, files will become corrupt from time to time. To save work on recreating a corrupted file some but not all of the following files will need to be saved. The following files are the only files you will need to save out on DMS. When you are done using the files, delete any files not on this list.

###zzDTM001.DAT	This is an ASCII file that contains your survey data. You will need to keep this file in case you need to recreate Cross-sections.
JOB###.GPK	This is a binary file that contains all the information on your horizontal and vertical alignments. The number used when creating this file in Coordinate Geometry should be related to the control number. (i.e. CN 1426, JOB# 142 OR 426) It is necessary to keep this file because Geopak uses it when you run its programs.
NAME###.IOC	You may create this file if you code your alignment into Coordinate Geometry. This file can be used to recreate your .gpk file. You will want to save this just in case your .gpk file becomes corrupted. (OC stands for operator code) ***Not everyone will create this file and you will not have to create it just to save it.***
J###OOC.INP	This file may be created if you store an alignment graphically or when you store your profile. You will want to keep it for the same reason you save the NAME###.IOC file. (OC stands for operator code)
###zzMAP001.DGN	This is the design file that contains your Horizontal and Vertical alignments. You will want to save this file as you have previously.
###zzXSF001.DGN	This is the design file that contains your Working Cross-sections. These should contain all the information you wish to have plotted. You will want to make sure you save this file (or files if you have more than one).
###zzEWK001.LOG	This is the log file that is created when you do an earthwork run. This file is used to create your mass diagram. You will not want to save all of your EARTH.LOG files. Keep only the original unmodified log file and the final log file you will use to create your mass diagram with. Delete any other log files you have created.
###zzEWK001.TXT	This file is created when you do your earthwork run. You will need to save this file to put your unadjusted volumes in your Cross-section Layout file. When you put your Cross-sections into a file to be plotted this file needs to be present to put your unadjusted volumes on the Cross-sections.

Note:

####	=	this is the project number see the Cadd Standards for file naming.
zz	=	this is the design area see Cadd Standards for file naming.

3 Geopak Road Tools Dialog

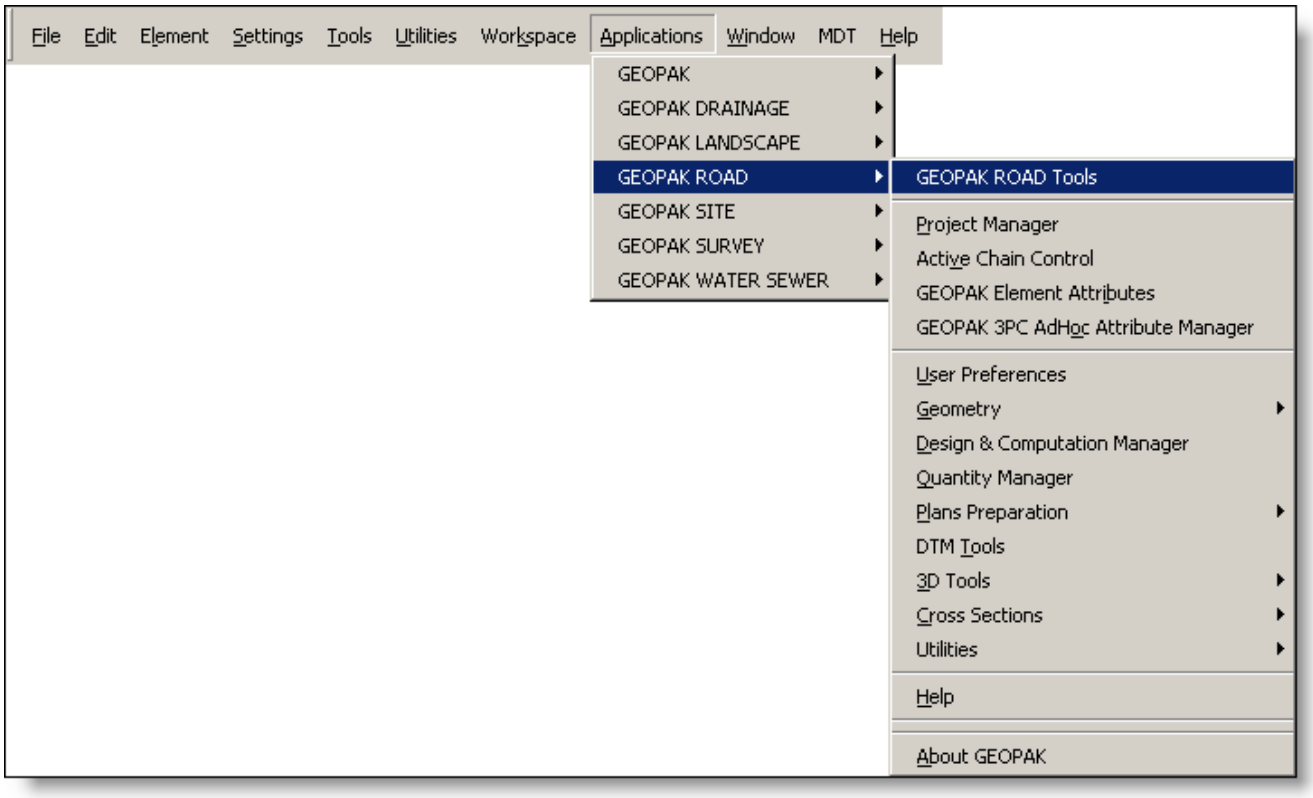
***Applications** will automatically appear in the menu bar.*

Geopak may need to be activated if only one menu appears.

After **GEOPAK** is activated, under **Applications** more menus and the **Deactivate GEOPAK** will be available.

There are two options when using GEOPAK ROAD. You can use the pull-down menu similar to the other menus or you can open a palette for most of the GEOPAK functions.

To pull up the palette for GEOPAK go to **APPLICATIONS-GEOPAK ROAD-GEOPAK ROAD Tools**



Project Manager

Design & Computation Manager

DTM

Cross Sections

Horizontal & Vertical Geometry

Plans Preparation

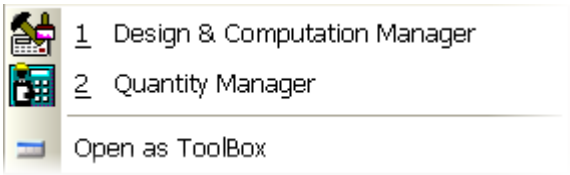
3D Tools

Utilities & Conversions

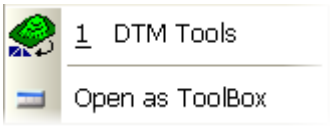
3.1 Project Manager

The Project Manager toolbox is depicted above and has four icons. The left tool invokes the Project Manager dialog as depicted below. (See Page 4.1) The second icon opens the Active Chain Control tool box. The third tool is GPK Attribute tool and is utilized to identify the GEOPAK attributes assigned to an element, if any. The fourth is 3PC AdHoc Manager.

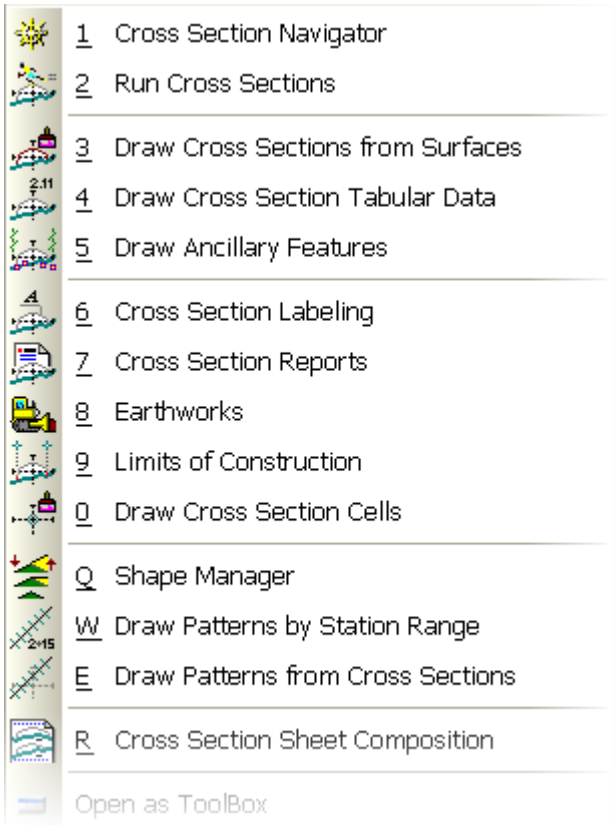
3.2 Design & Computation Manager



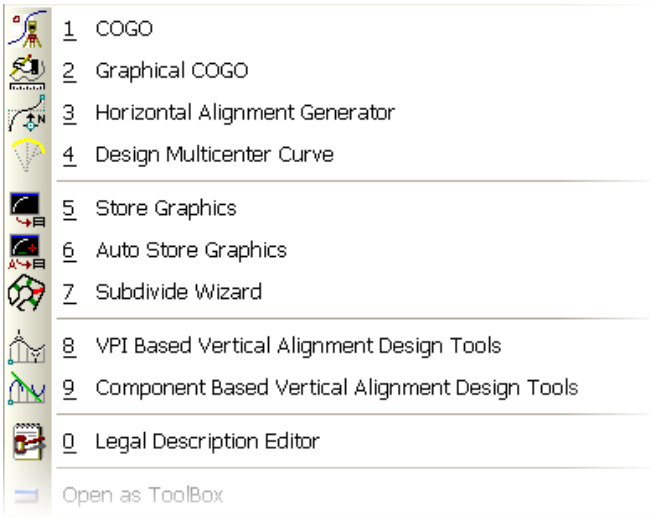
3.3 DTM



3.4 Cross Sections

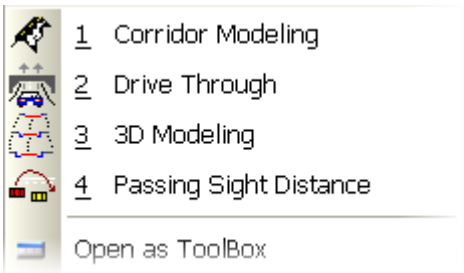


3.5 Horizontal & Vertical Geometry



3.6 Plans Preparation

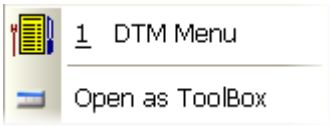
3.7 3D Tools



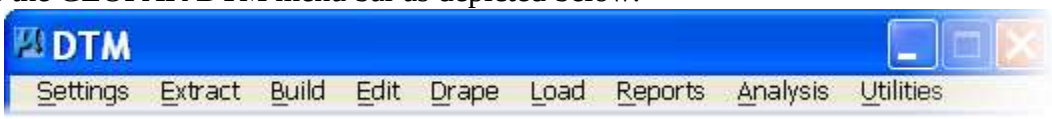
3.8 Utilities & Conversions

3.9 Geopak DTM Tools

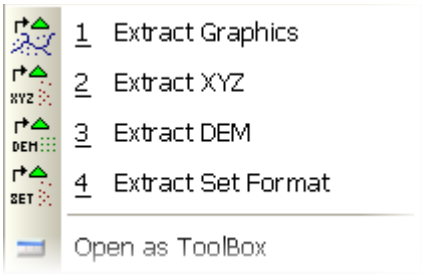
3.9.1 DTM Menu



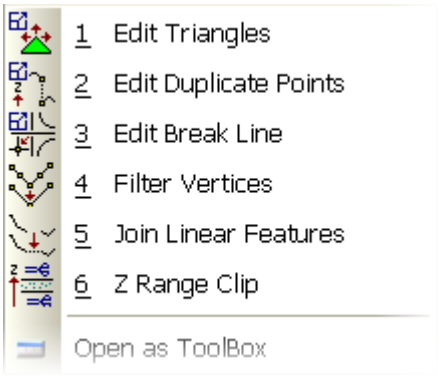
The DTM Menu tool box (first column, top box) is depicted above and is a single icon, which invokes the GEOPAK DTM menu bar as depicted below.



3.9.2 Extract tool box



3.9.3 Edit tool box

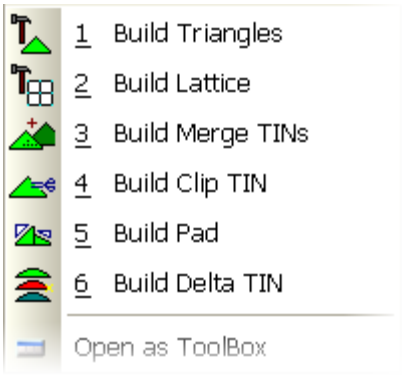


3.9.4 Load tool box

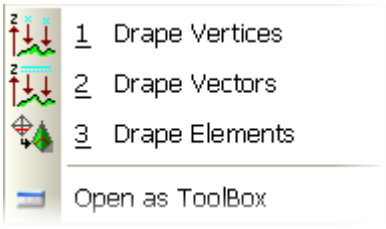
3.9.5 Analyze tool box

3.9.6 Stroking Options tool box

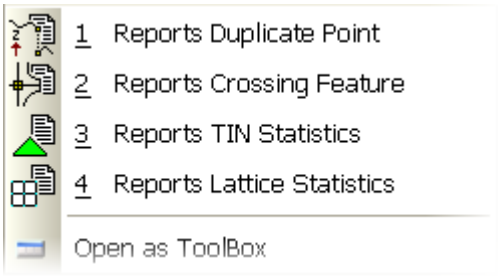
3.9.7 Build tool box



3.9.8 Drape tool box



3.9.9 Reports tool box

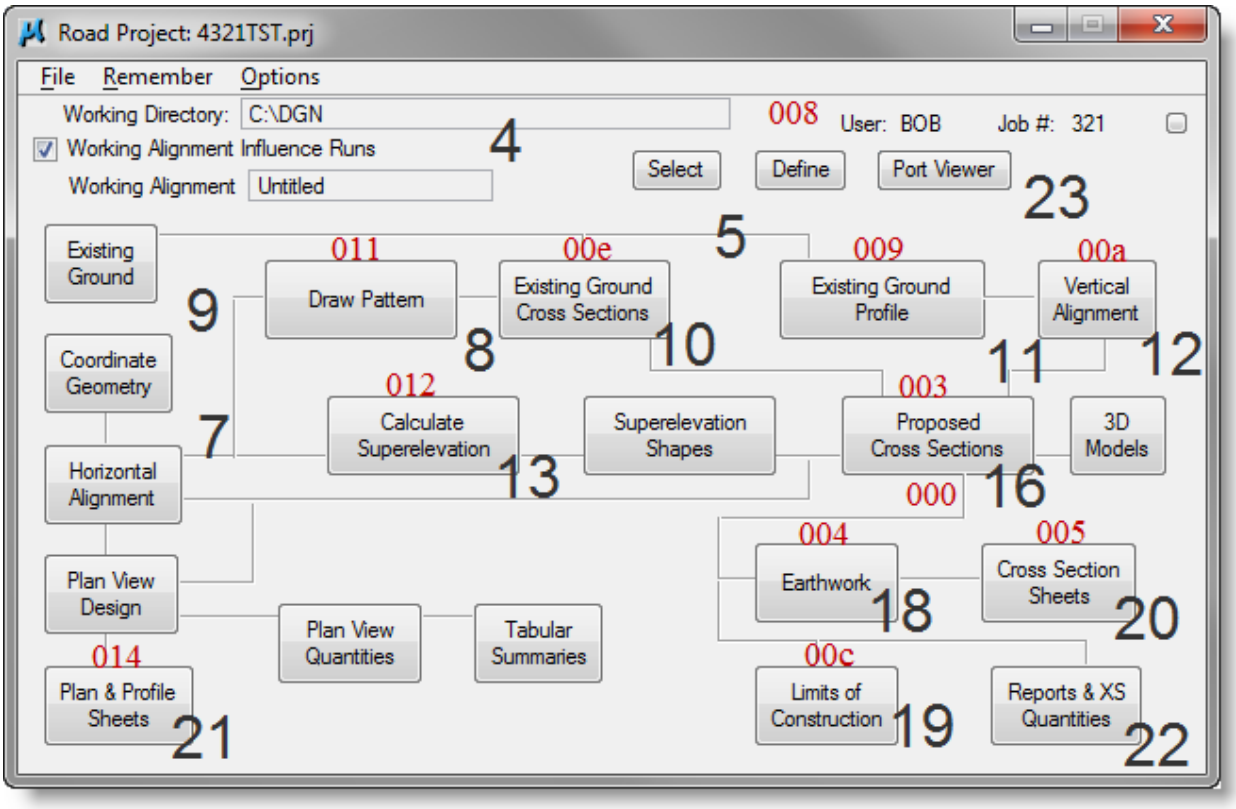


3.9.10 Utilities tool box

4 Project Manager

The Project Manager associates projects with their prospective job number, user, working directory, coordinate geometry, and the myriad of project files. This organization of the project keeps the user from having to maintain the different files and their locations associated with a particular project. In addition, many of the GEOPAK functions can be invoked by simply selecting the appropriate box from the dialog, which is set up in a workflow format. The dialog is depicted below.

The **Working Directory, User:** & **Job#:** are set when you create a project, from the Project Manager Dialogs.



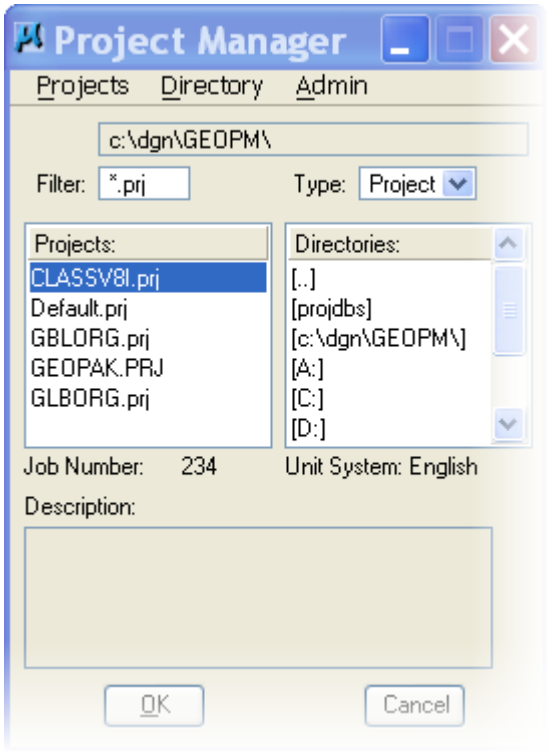
The LARGE BLACK numbers on the dialog above correspond to the chapter covering that function. The small RED numbers correspond to the file created when that function's dialog is saved in C:\DGN\geopm\projdbs\user\ folder.

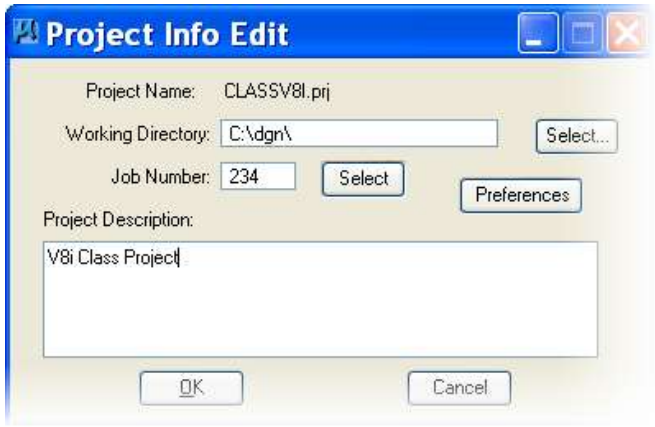
Setting up a project is shown in the following pages.

When Selecting Buttons from the Project Manager you will be asked to Create or Rename the run information. See Section 6

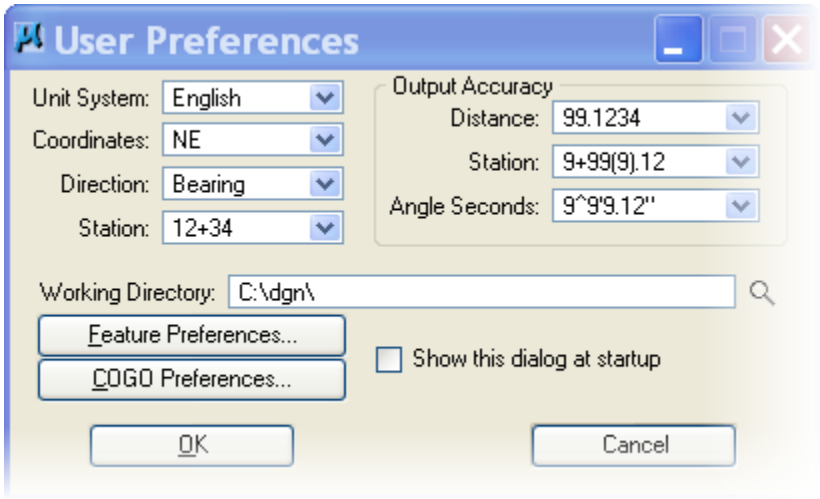
4.1 Setting up a project for Project Manager

Start Microstation and Geopak.
Then Start the Project manager 



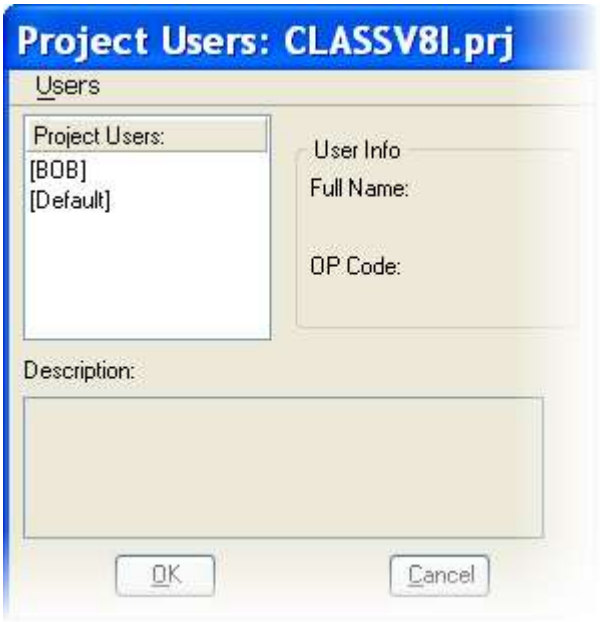


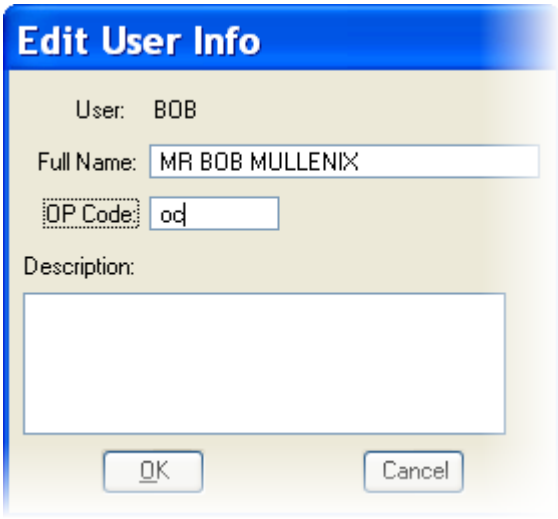
1. Fill-in Project Name (whatever you want)
2. Working Directory (always C:\dgn)
3. Job Number (creates JOBnnn.GPK)
4. Optional – Project Description
5. Select Preferences
6. Set Preferences for Project
   - Always set up as shown below
   - Geopak handles up to 12 decimal places
   - The Distance needs to be 4 decimals for doing the inverse process.



4.2 Setting up a User for the Project Manager

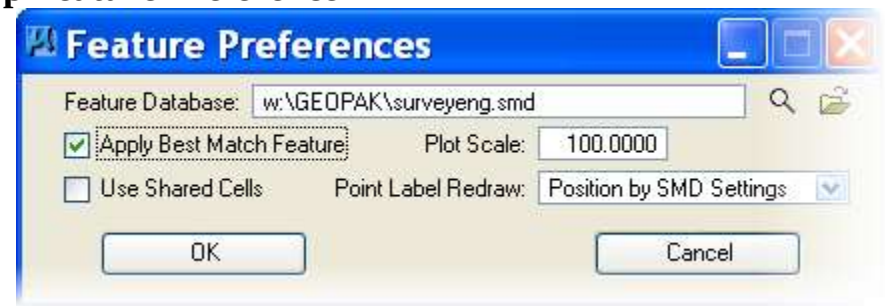
Select Users > New





1. Fill-in Name
2. Full Name
3. Operator Code – **Always use OC** (See file naming in Cadd Standards Manual)
4. DO NOT Password Protect the User

4.3 Setting up Feature Preference

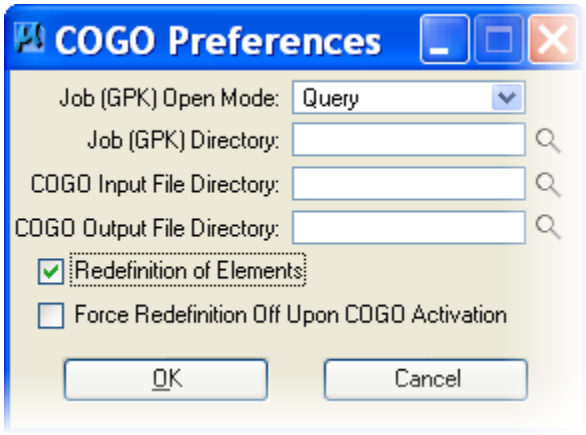


1) Set the SMD File , Directory is w:\Geopak\ US Customary = SURVEYENG.SMD
2) Select OK to return to Geopak Preference then Select COGO Preference

Directory Structure for User
C:\dgn\GEOPM – contains .prj file for each project
PROJDBS – contains .rpt file for each project
DEFAULT – contains default entries for the RUN's in a default project
USER (your name) – contains entries for the RUN's within your projects

4.4 Setting up COGO Preference

For More information on COGO Preference see Geopak Help Online – Command Reference > User Preference Optional direct link to Help press F1 when dialog is active



Job Open Mode - This is normally set to Query. It can also be set to Create or No Create.
When set to Query it will let you know if it is not finding the .gpk file when you open Coordinate Geometry.

When it does not find a .gpk file with the correct control number it will tell you "Job number XXX does not exist. Do you wish to create job number XXX?"

At this point you can create a new .gpk file if you wish by clicking on OK or cancel if you need to find out why it's not finding the correct .gpk file.

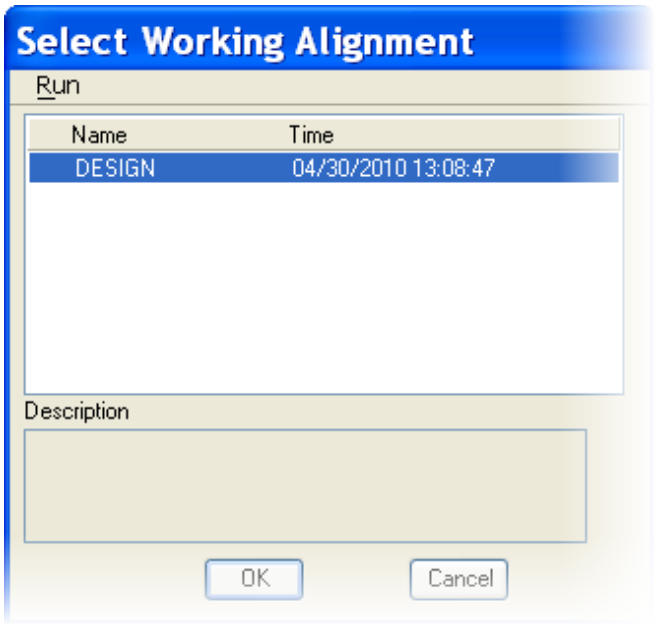
When set to Create it will automatically generate a new .gpk file if none is found in the working directory. It will not give you any message that it is creating a new .gpk file.

When set to No Create it will not allow a new .gpk file to be generated if no .gpk file is found.

Select Redefinition of Elements

5 *Setting Up Working Alignment*

The working Alignment is a place to keep track of or store all the information about your project, such as strip map file, working cross section file and symbology of the elements. You are able to create several working alignments for different alignments, such as mainline or detours.



To set up a Working alignment

1) Select the Select Button
2) At the Select Working Alignment Dialog Select Run > Modify

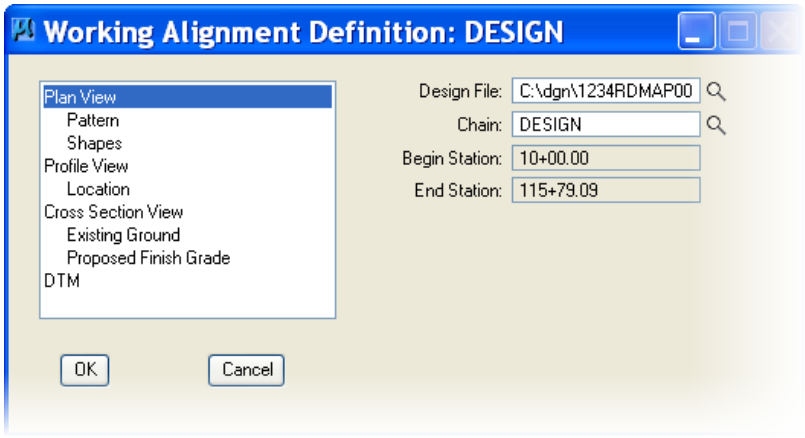
3) Type in a name for your working alignment
4) Type in a description
5) Select OK
6) At the Select Working Alignment Dialog select Ok

The working alignment name should now appear in the Project Manager

5.1 Entering Working Alignment Define Information

Select the DEFINE button from the Road Project Dialog and fill in the information as shown below.

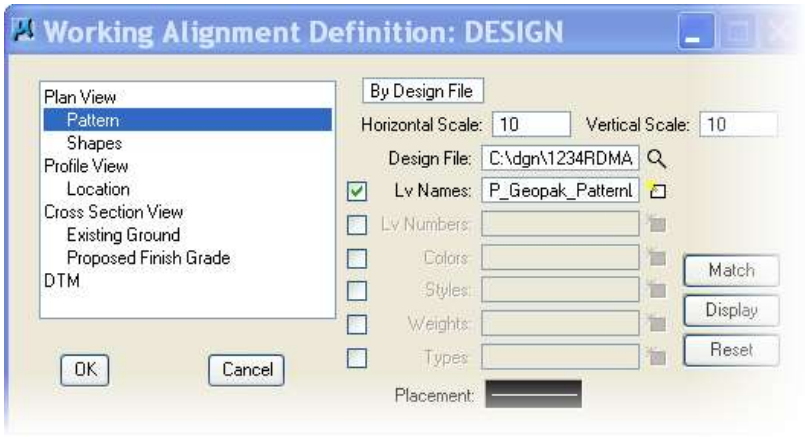
5.1.1 Plan View



1) Set Design file to the file that contains the alignment. Most likely this will be your strip map.
2) Set Chain to the alignment that will be used throughout the design process. You can delete C:\dgn\ from the Design File names to minimize name lengths.

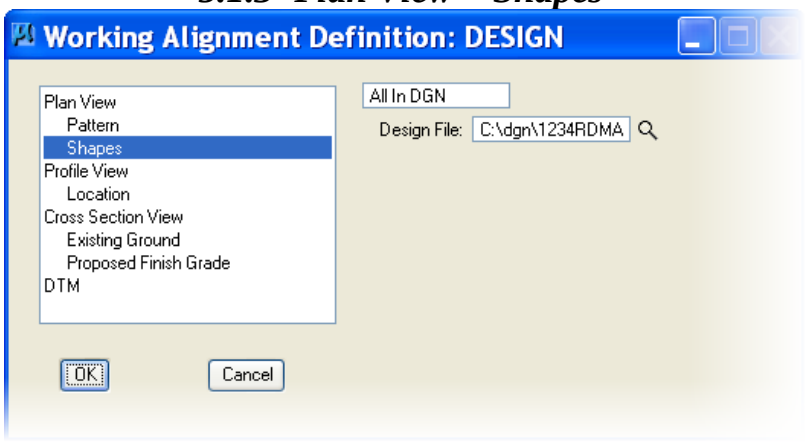
Note: This should be done after a design alignment has been created. This information is used in most of the dialogs

5.1.2 Plan View > Pattern



1) Set Button to By Design File
2) Set Hor. Scale to 10 &Ver. Scale to 10.
3) Set Design File to the file that contains the pattern lines.
4) Set Symbology to Lv= P_Geopak_PatternLines_Design, Wt=0 & Style=0. Color and Type can be left blank. *(See Cadd Standards Manual)*
5) Or you can use the RESET/MATCH buttons to set symbology.
6) Setting the symbology in the placement is for drawing.

5.1.3 Plan View > Shapes



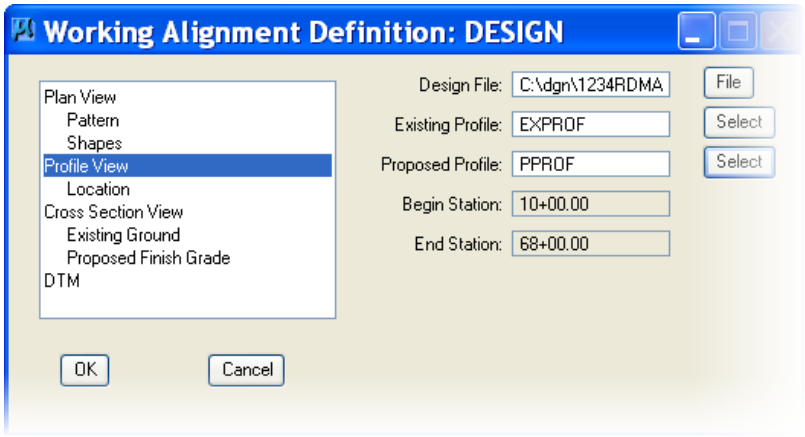
1) Set button to All In DGN
2) Set Design File to the file that contains the super elevation shapes

OR

1) Set button to By Search Criteria
2) Set Design File to the file that contains the super elevation shapes
3) Select Lv Names then Reset/Match. Select a shape element. This should be: P_Geopak_SuperShapes_Design

Note: This should be done after super shapes are drawn.

5.2 Profile View



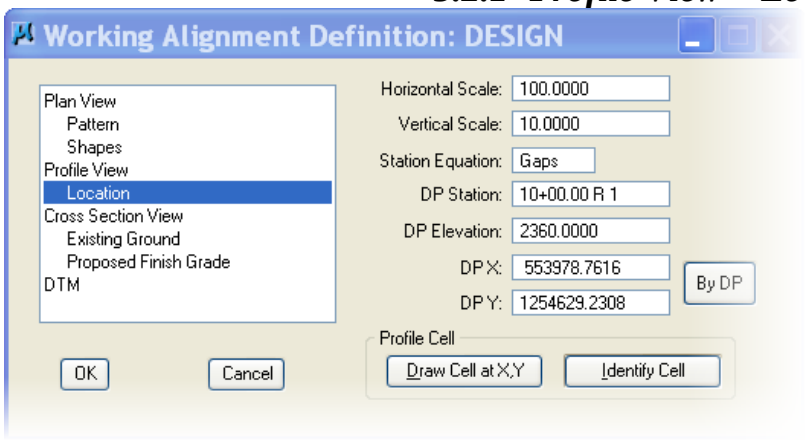
1) Set the Design File to the file that the profile is drawn in.

2) Set Existing profile to the ground profile

3) Set Proposed Profile to the design profile

Note: This should be done after Existing ground profile is created and after a Design profile is created.

5.2.1 Profile View > Location



1) Set the DP Station to the beginning station of the alignment.

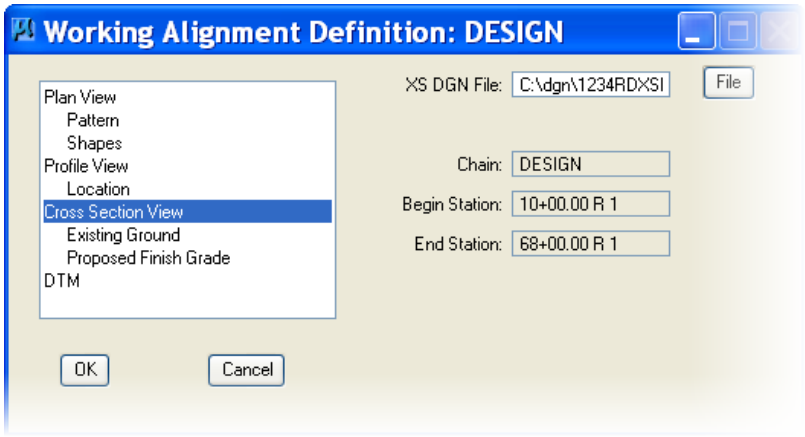
Hint: Try to set it to an even station before your alignment.

2) Set DP Elevation to an even elevation below the lowest point of the profiles

3) Set DP X & Y: By DP. Click Identify Cell and select the cell containing the profiles.

4) Set the scales to a 10:1 exaggeration

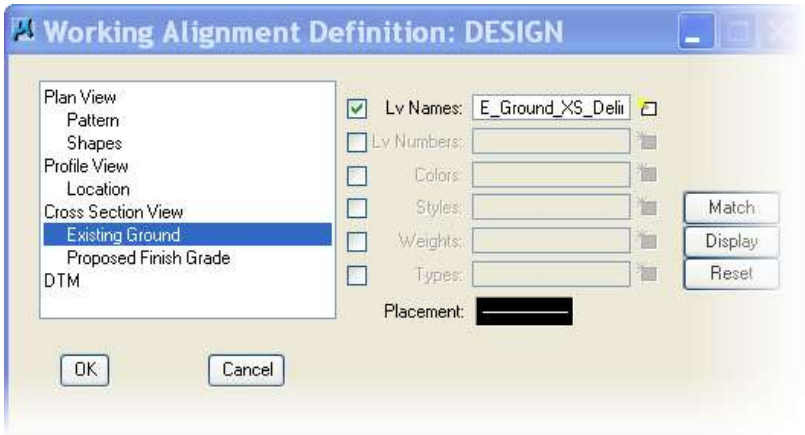
5.3 Cross Section View



1) Set the XS DGN File to the working cross section file (the file the cross sections are drawn in)

Note: This should be filled in after the working cross section file has been created.

5.3.1 Cross Section View > Existing Ground

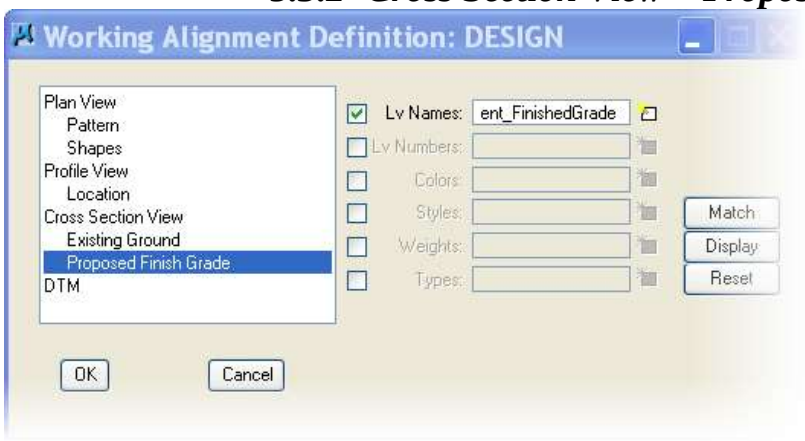


1) Set LV= E_Ground_XS_Delineation

Note: This should be filled in after the working cross section file has been created or it can be filled in at the beginning of the project.

Setting the Placement symbology is for drawing.

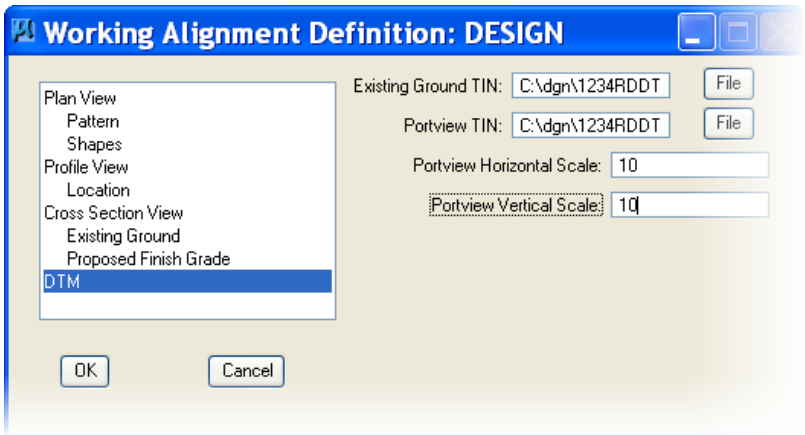
5.3.2 Cross Section View > Proposed Finish Grade



1) Set LV= P_Template_Design_Alignment_FinishedGrade & P_Template_Design_Alignment_SubGrade

Note: This should be filled in after the proposed surface is in the working cross section file or it can be filled in at the beginning of the project.

5.4 DTM



1) If you have a TIN file you may set the Existing ground & Port view TIN to that file

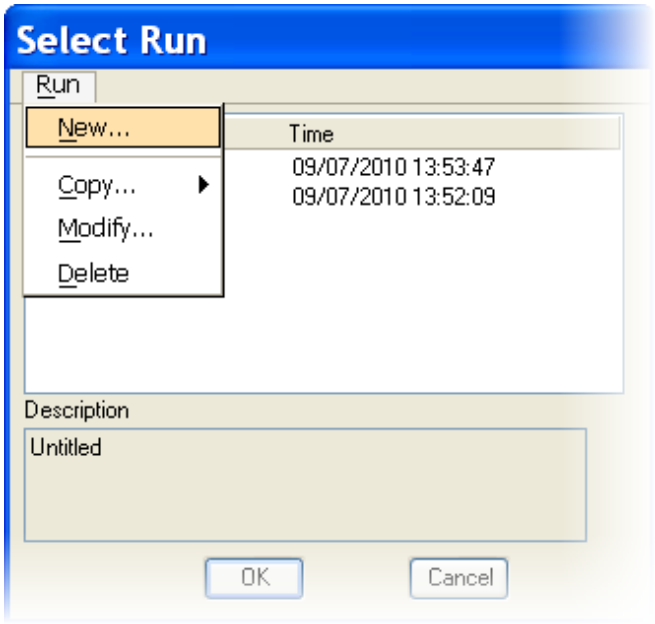
2) Set the Scales to 1 & 1 or 10 & 10, either works.

Note: This should be filled in after the DTM file has been created or it can be filled in at the beginning of the project.

NOTE: Setting up the symbology in the Pattern & Existing Ground dialog entries will save those settings and default to that symbology every place they are drawn in the project.

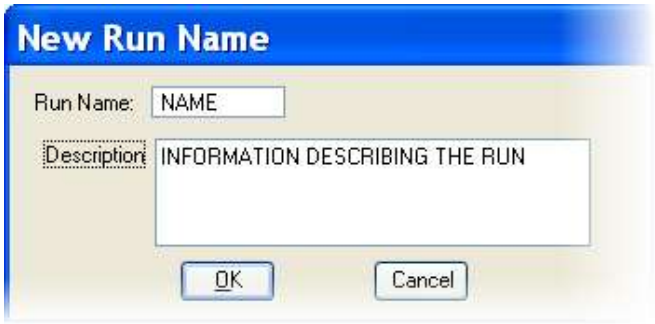
6 *Create or Rename a Run*

When Selecting Buttons from the Project Manager you will be asked to Create or rename the Run information.

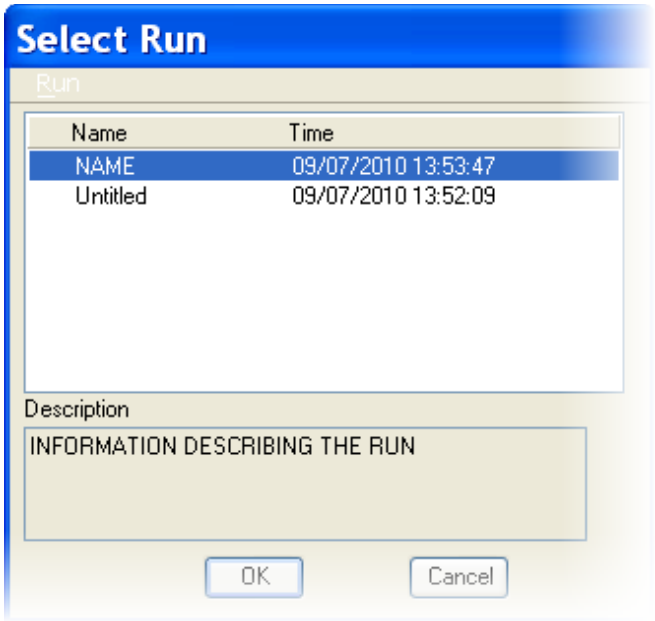


6.1 Creating a run

1) Select Run > New

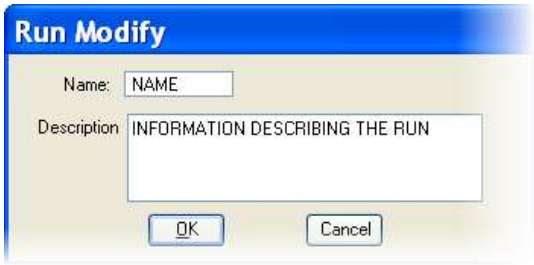


2) Fill-in Run Name
3) Description is optional
4) Select Ok
5) Select Ok From the Previous Dialog



6.2 Renaming a Run

1) Select Run > Modify
information describing the run

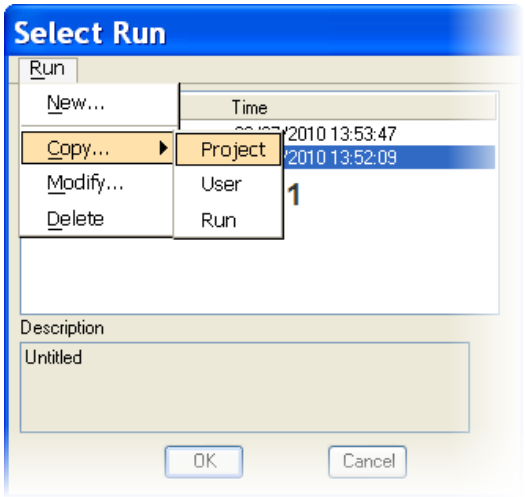


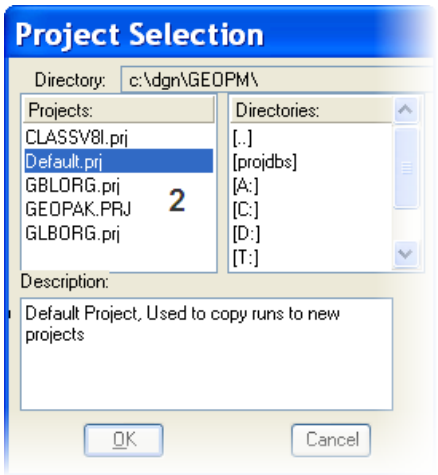
2) Fill-in Run Name
3) Description is optional
4) Select Ok
5) Select Ok From the Previous Dialog

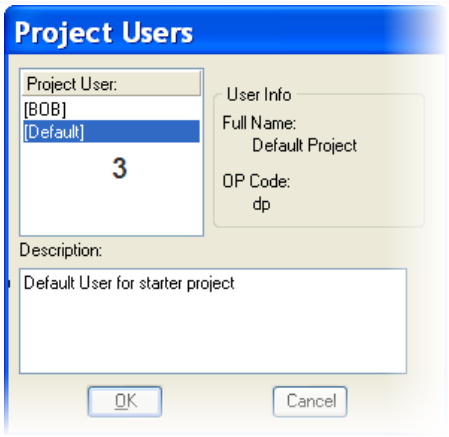
6.3 Copying a Run from one project to another

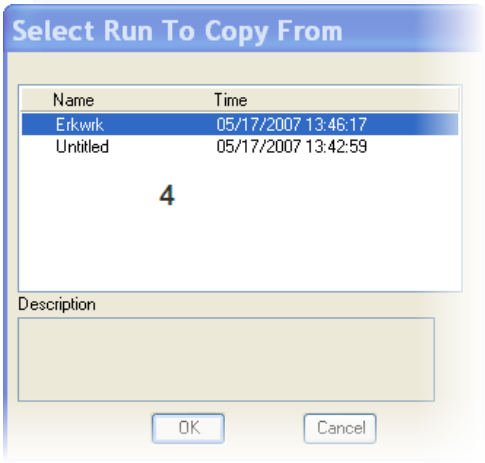
Whenever you invoke a Button from the Project Manager Diagram you will be asked to Select a Run. You have the option of creating a new run or copying a run from a previous project. Shown here is an example of how to copy a run from the default project.

1) Select Run > Copy > Project
2) Select Default Project
3) Select Default user
4) Select the Run
5) Rename the run for your project









Create or Rename Run

7 Coordinate Geometry & Horizontal Alignment

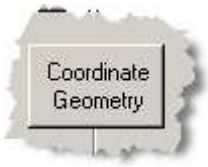
There are three ways to put an alignment into Geopak

1) Use the information from survey or as-built and code the information into Coordinate Geometry (described below.)
2) Store an existing alignment from the design file. (Section 33).
3) Draw the Alignment graphically in a design file and store it. (Section 32).

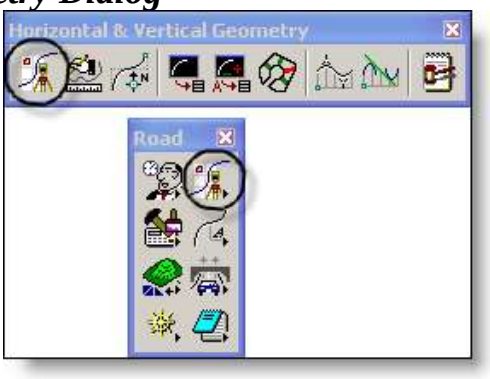
Before Starting any project in Geopak be sure to set up the Project Manager. See page 5-1

7.1 Store Existing Alignment in Coordinate Geometry

7.1.1 Geopak Coordinate Geometry Dialog

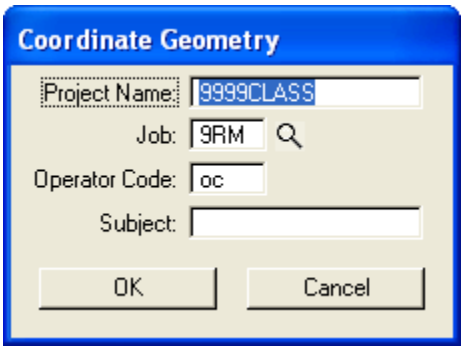


Within the Project manager dialog select **Coordinate Geometry,** or from the Road Tools Menu or Applications > Geopak Road > Geometry > Coordinate Geometry



Note: If you select COGO Button from the Road Tools Menu It does not Fill-in the information in the next dialog.

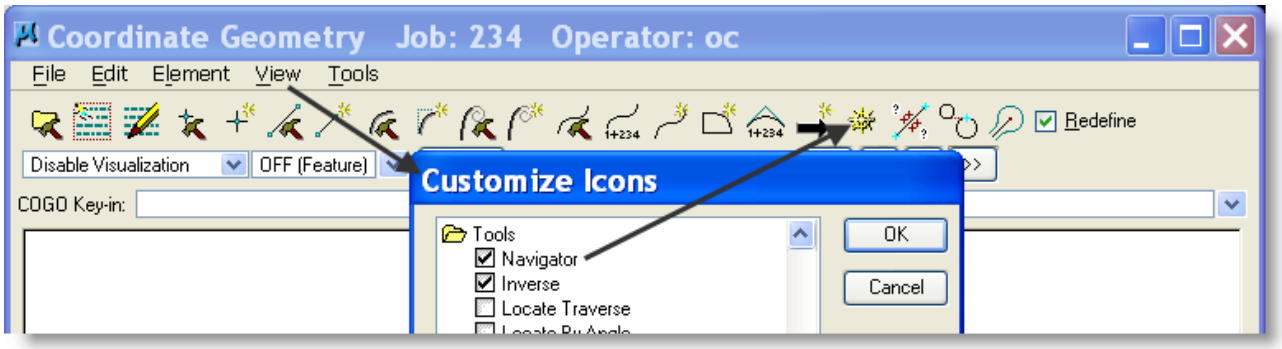
1) If you are using the Project manager the entire field should be filled in. See page 5-2.
   a. It is required to type in JOB NUMBER (up to 3 characters) & OPERATOR CODE (up to 2 characters)



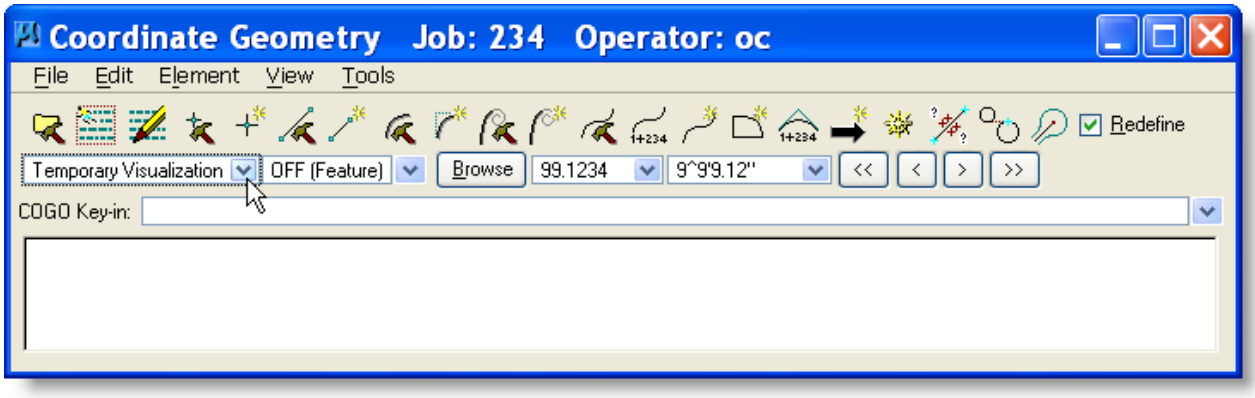
   b. Project Name & Subject are optional and do not have to be filled in.

   c. Click on OK

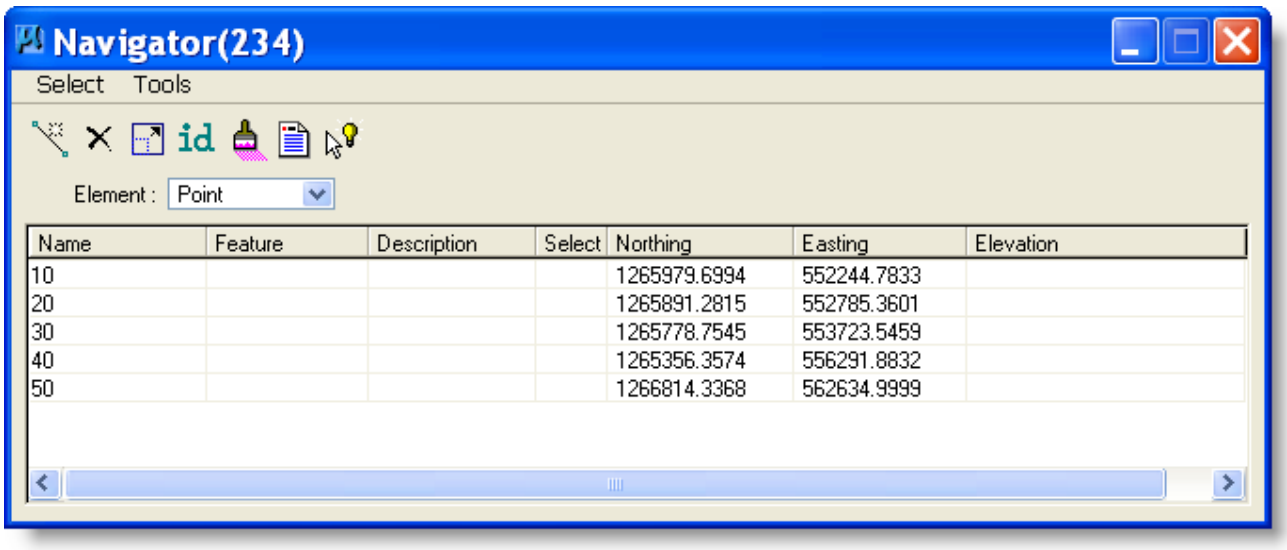
The Geopak Coordinate Geometry dialog box will open.



If the Navigator icon does not show – View > Icons > Customize > Tools > check Navigator



COGO Dialog Box
Setting Temporary Visualization shows elements when highlighted in COGO.
You will use this to store known points and create other elements needed to store a complete alignment.
You may use all or only a few of the following dialog boxes to create your alignment.



Name	Feature	Description	Select	Northing	Easting	Elevation
10				1265979.6994	552244.7833	
20				1265891.2815	552785.3601	
30				1265778.7545	553723.5459	
40				1265356.3574	556291.8832	
50				1266814.3368	562634.9999	

COGO Navigator: Use this Dialog to access the Store dialog boxes for Points, Curves, Spirals & Chains

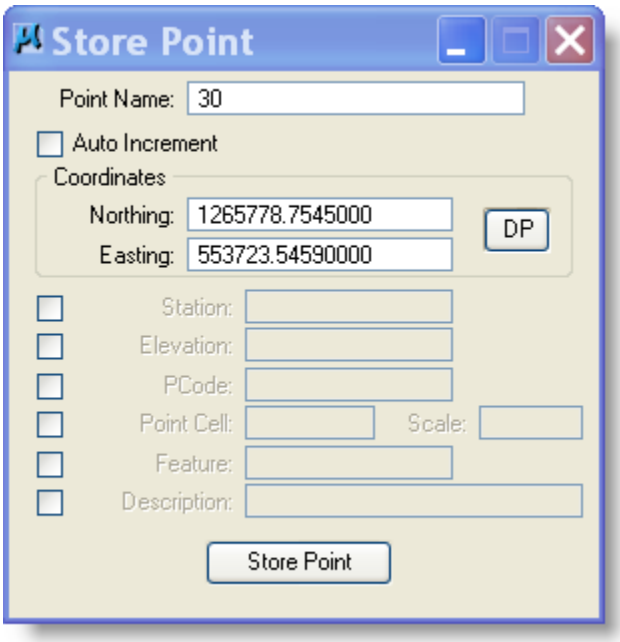
GEOPAK POINT NUMBERING assignments:

Min. req. pnts.		Proposed range
2000	Cad. Survey (Current 1-999)	1-1999
1000	Road Design (confirm w/RD)	2000-2999
4000	R/W	3000-6999
1000	Placeholder for Traffic	7000-7999
1000	Placeholder for HYD	8000-8999
1000	Placeholder for Bridge	9000-9999
10,000	R/W parcels	10,000-19,999
1000	Placeholder for GEOTECH	20,000-20,999
5000	Placeholder for ENVIRO.	21,000-25,999
	Unused placeholder	26,000-49,999
250,000	Pre-Survey (includes Constr.)	50,000-to end

This only affects areas utilizing GEOPAK to store points; placeholders represent potential future usage.

7.1.2 To Store Points

In the Navigator Dialog set ELEMENT to Point and Select the Add Element
Or from COGO click **ELEMENT>POINT>STORE**
This will open the store points dialog box. This is needed to store your points.



1. Fill in the following:
   - Point Number
   - Northing Value
   - Easting Value
2. Fill in any other optional information and make sure the switch to the left is turned on.
3. Click on Store Point.

In the Coordinate Geometry window, the information confirming the storing of the point will appear.

PCode is a value that identifies the point as a feature such as a power pole or edge of pavement. Cells can be associated with points and you can have Geopak place them using the Design and Computation Manager.

Note: Remember to hit return after filling in the fields. If you forget, it remembers the last numbers that were entered and those are the numbers that will be entered when you hit APPLY. Switches must be turned on to use any of the optional features or they will not register.
Important: When entering points that will be used for the alignment (Beginning, Ending & PI points) the Bearing and distance will need to be rounded. **Bearing to the nearest second (0^00'00")** and **Distances to the nearest one hundredth of a foot (0.01)**. Use the inverse command in COGO to check the Bearing and Distance then use the Tools > Locate > Traverse command to adjust the points.
Hint: Check each bearing and distance ahead after the point back has been corrected. For instance if you have 4 points stored check the bearing and distance between the first and second point and then correct the second point, then check the bearing and distance between the second and third point and correct the third and so on.

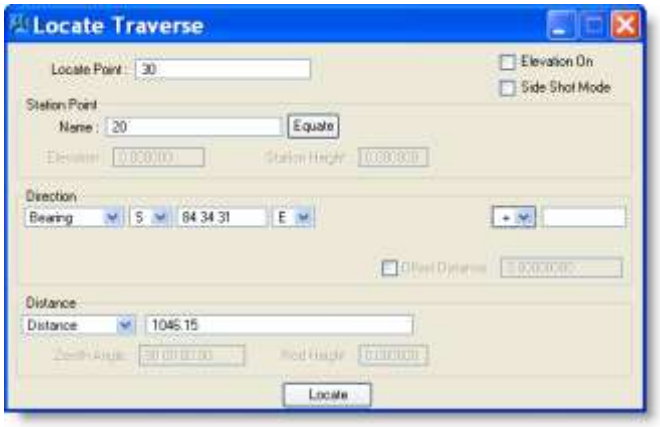
7.1.3 Inverse Tool

Go to **Tools > Inverse**
This will open the Inverse Tool Dialog.

Use Inverse to check the distance and bearing between point(s).
Use the Locate > Traverse to fix the points.
If points will not inverse then delete all c:\program files\bentley\geopak\bin*.rsc files from your local drive and retry.

7.1.4 *To Locate Points From Stored Points*

Go to **TOOLS > LOCATE > TRAVERSE**
This will open the Locate Traverse dialog box. This will locate points relative to points already stored.



1. Distance can be set to *Value, Between two points or Radius of a curve* and Direction can be set to *Value, Bearing, Azimuth, or between two points*.

2. Fill in the following
   Locate Point
   Start Point
   Distance (Round to the nearest .01)
   Direction (round to the nearest second 0^00'00")

3. It is optional to designate an offset distance left or right of centerline (Make sure Offset Distance switch is checked if you wish to use this).

4. When all the information is entered, click on Locate button.

In the Coordinate Geometry window, the information confirming the storing of the point will appear.

There are a number of other LOCATE commands available. For more information on other commands see Geopak Help Online – Command Reference > Geometry OR *press F1 when dialog is active.*

7.1.5 To Store Simple Curves

In the Navigator Dialog set ELEMENT to Curve and Select the Add Element
Or Go to **ELEMENT > CURVE > STORE > BY TANGENTS**

This opens the store curve dialog box which creates a curve using information that may be available. *Curve names should not be the same as the alignment name and can be up to eight characters long.*

1. Fill in the Curve name
2. Click the arrows on the back and ahead tangents until the diagram matches the type of information you have to enter.
3. Element Reference can be set to *Radius, Degree, Tangent or Length*.
4. Fill in the information asked for in the Back Tangent Reference, Element Reference, and Ahead Tangent Reference.
5. Click on STORE CURVE.

In the Coordinate Geometry window, the information confirming the storing of the curve will appear. Information such as PC, PI, PT, and other curve data will be displayed.

This is the most common dialog box you will use. For information on other methods of storing simple curves see Geopak Help Online – Command Reference > Geometry OR press F1 when dialog is active.

7.1.6 To Store Curves with Spirals

In the Navigator Dialog set ELEMENT to Point and Select the Add Element
Or Go to **ELEMENT > SPIRAL > STORE > BY TANGENTS**

1. Set the Spiral Type to SCS.
2. Fill in the Spiral name
3. Click the arrows on the back and ahead tangents until the diagram matches the type of information you have to enter.
4. Entry Length and Exit Length should be set to the Spiral length.
5. Element Reference can be set to *Radius, Degree, Tangent or Length*.
6. Fill in the information asked for in the Back Tangent Reference, Element Reference, and Ahead Tangent Reference.
7. Click on STORE SPIRAL.

In the Coordinate Geometry window, the information confirming the storing of the curve will appear. Information such as PISCS, Total tangent, Total Length, Total Delta, CS, ST, TS, SC and other curve data will be displayed.

This is the most common dialog box you will use. For more information on other methods of storing spiral curves see Geopak Help Online – Command Reference > Geometry OR *press F1 when dialog is active.*

Coordinate Geometry will make three separate elements with this command.

These elements are spiral C1B, Curve C1, Spiral C1A

The B stands for the spiral before the simple curve.
The A stands for the spiral after the simple curve.

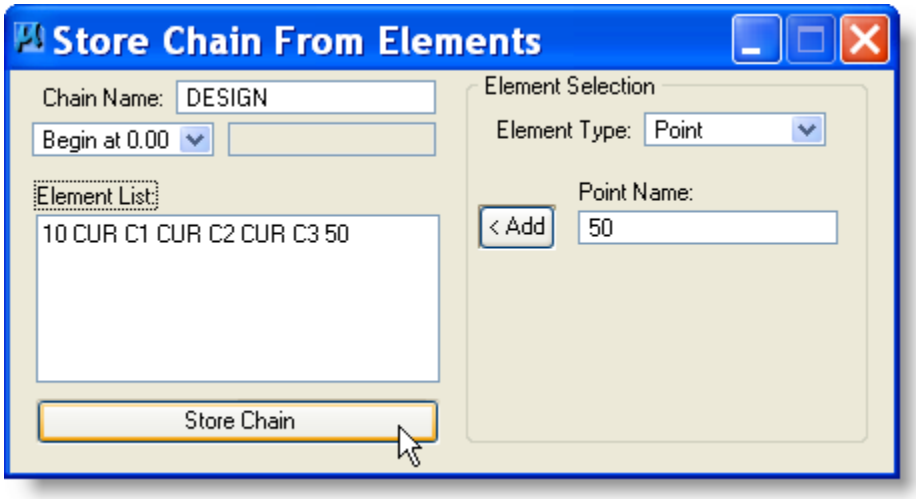
Make sure any points you use to store these curves have already been stored or created in a previous command.

See Appendix A: Storing a Spiral with Master PI

7.1.7 To Store the Chain from the Elements

In the Navigator Dialog set ELEMENT to Chain and Select the Add Element
Or Go to **ELEMENT > CHAIN > STORE > FROM ELEMENTS**

This will open the store chain dialog box. This allows you to create alignments from elements that have been stored. You may use alignment designations that you are familiar with such as G, A, B, etc. or names such as CL, ALT1, EXIST, etc. The only exception is if you are using RDS data, then the existing alignment has to be called G.



1. Fill in Chain Name (up to 8 characters)
2. The next box can be set to *Station, Begin at 0+00 or As Is.*
3. Fill in beginning station if you choose this option
4. You now have two options
    a. You can type the elements of the chain into the dialog box (This works best if you have several spiral curves. i.e. **SCS c1** This element doesn't exist under element types). Make sure to put a space between all the labels and elements.

Or

    b. Use box next to Add button
        1. Set to first element (i.e. curve)
        2. Choose first element
        3. Click on Add
        4. Repeat steps 1-3 until all elements are listed

5. When all the elements are listed in the dialog box, click on **Store Chain** button to create chain. Eg.
    STORE CHAIN DESIGN 10 CUR C1 SCS C2 SCS C3 50 STATION 0+00

After all the desired chains are saved and any necessary modifications such as equations (Section 30) are made, it is time to exit Coordinate Geometry. If you wish to save the COGO commands for future use or modification, you should go to FILE SAVE. ***Note:*** *this is not necessary because all the elements have been saved in a .gpk file. Element modification can be done without rerunning the commands.*

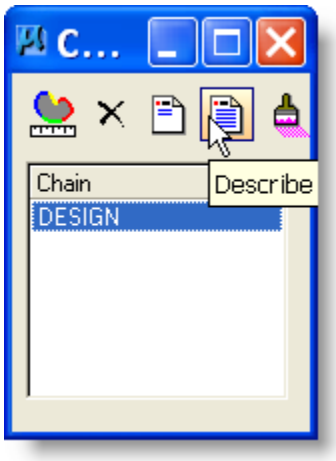
Rule of Thumb: If it is not easily recreated, such as having to type in commands, save the COGO file. If the computer easily recreates it, don't save the COGO file.

Important: **When storing Spiral-Curve-Spiral Curves be sure to enter them as <u>SCS cuvrename.</u> This is the only way to get the Master PI and Total Spiral information to show in the Describe Chain command. Eg. SCS SCS1 SCS SCS2 designates 2 spiral curves in a chain.**

7.1.8 To Get a Printout of Alignment Information

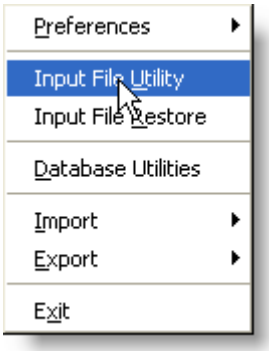
(This may be done *any* time after the chain has been created)

In the Navigator Dialog set ELEMENT to Chain and Select the Print/Describe Element
Or Go to **ELEMENT > CHAIN > UTILITY**
This will open the Chain > Describe dialog box



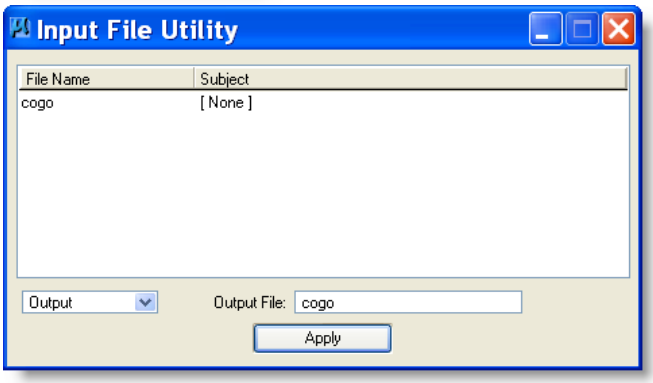
1. Highlight the chain you wish to see the information on.

2. Click on Describe. The information will appear in the Coordinate Geometry window.



Go to **FILE > INPUT FILE UTILITY**

This will open a dialog box in which you can enter a file name, select OUTPUT from the drop-down box and hit Apply.



You may now print this file from any file editor, such as NOTEPAD.

Close COGO dialog box.

Click NO to SAVE file.

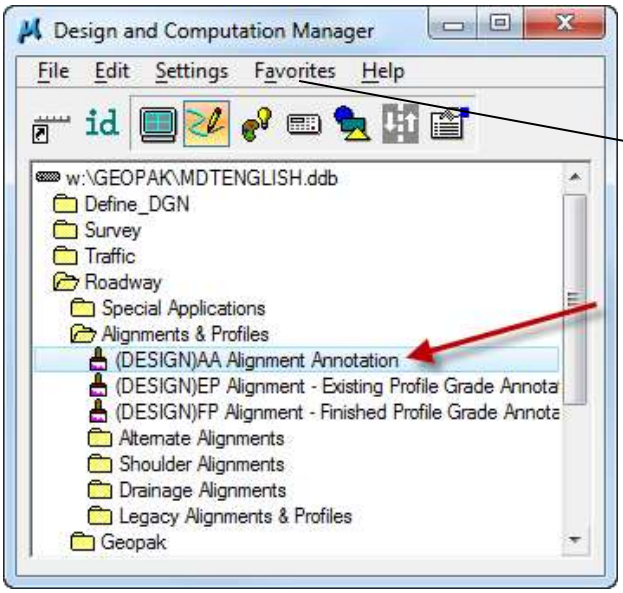
NOTE: The preferences > output accuracy > distance may be changed to 2 decimals for future processes. See page 4-2.

7.2 Draw Horizontal Alignment - Design and Computation Manager

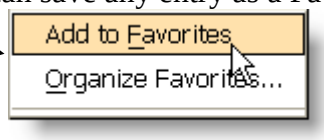
See Geopak Help Online – Command Reference > Design and Computation Manager
Optional direct link to Help press F1 when dialog is active

Select **Design and Computation Manager** from the Road Tools Menu

The Default D&C manager database should be w:\geopak\mdtenglish.ddb



1. Double Click on Roadway under Content.
2. Double click on Alignments & Profiles.
3. You can save any entry as a Favorite.

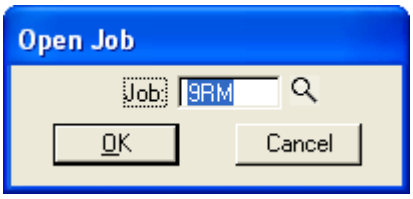


4. Select on (Design)AA Alignment Annotation (or the option that best fits your situation)

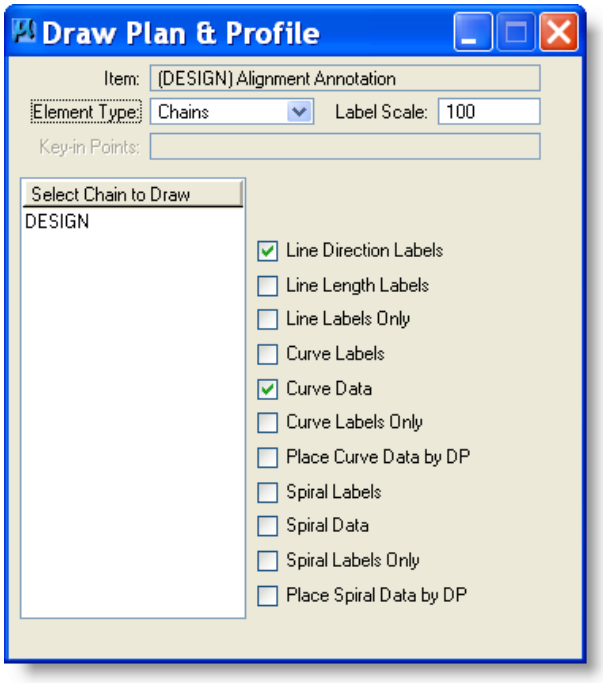
The Plan & Profile box should highlight at this point.

5. Click on Draw Plan & Profile button.

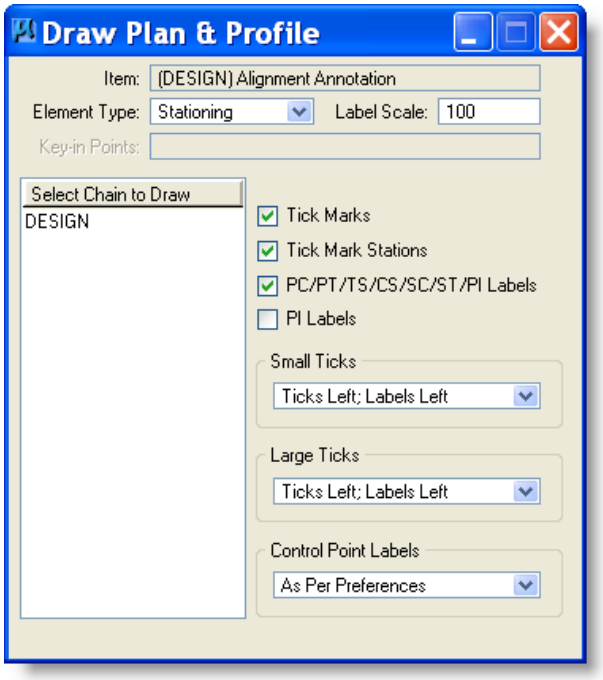
6. If you are using Project manager Geopak will go directly to Plan & Profile Draw, otherwise it will stop at this dialog.



Enter the Job Number and select OK



1. Change Element Type: to Chains.
2. Line Direction Label & Curve Data should be turned on.
3. Click **only once** on the Alignment you wish to draw – the Line Direction Labels and Curve Data should appear on the strip map.
4. Change Element Type: to Stationing
   See next dialog

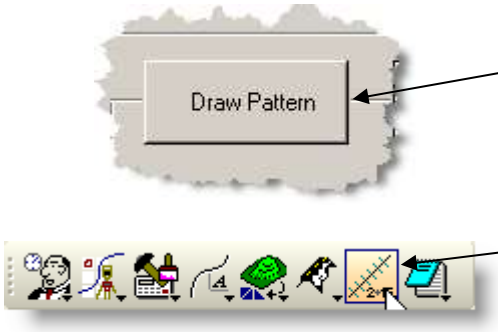


1. Tick Marks, Tick Marks Station & PC & PT & CS… labels should be turned on (PI's are not placed on our strip map any longer).
2. Click **only once** on the chain to be stationed. This draws in the items checked in the dialog box.
3. Close this dialog

Your Horizontal Alignment should now be drawn in your design file according to the Road Design and Cadd Standards Manual standards.

8 Draw Pattern

8.1 Draw pattern lines

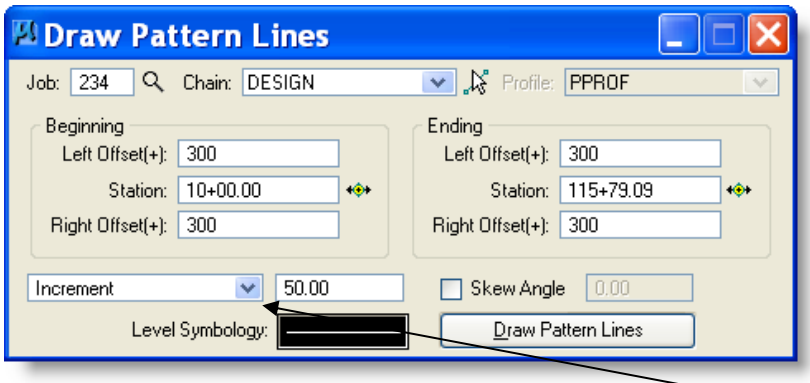


1) Within the Project manager dialog select **Draw Pattern**

Or

2) Select Draw Pattern Lines by Station from the Road tool Menu

If you are using Project manager you will need to Create or Rename a run.



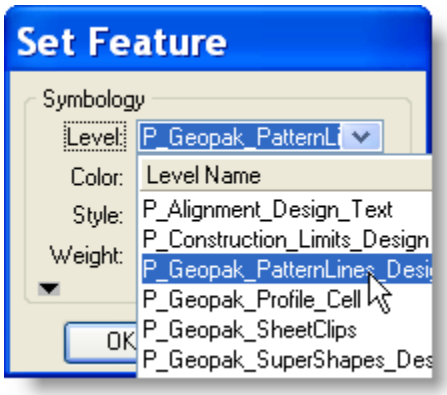
If you are using the Project manager the following will be filled in already

a) Job
b) Chain
c) Stations

Otherwise fill them in.

Set the Offsets to 300 Feet both left and right. This should be sufficient for most designs.

Set the Button to Increment and Rural = 50 Feet, Urban = 25 Feet.



The symbology may have been set in the Project Manager DEFINE of the pattern working alignment definition. See page 5-2. If so, then it should be saved and default to this each time this dialog box appears.

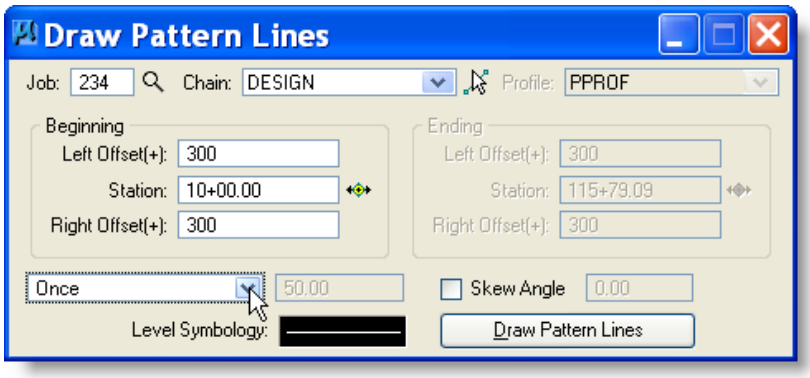
If pattern lines are within 3 ft of each other remove the 50 ft pattern lines. In some cases the first and last pattern line could be a 50 foot pattern line and a horizontal control point. There may be two pattern lines at the same station; one of the pattern lines will need to be deleted.

Set the Pattern Lines Symbology to Lv=(see levels to left), Wt=0, Style=0, Color is your preference.
NOTE: Draw each type of pattern line a different color to be able to get a critical cross section report.

US Customary - LV=P_Geopak_PatternLines_Design
and/or LV=P_Geopak_PatternLines_Approach
and/or LV=P_Geopak_PatternLines_Detour
and/or LV=P_Geopak_PatternLines_FrontRD
and/or LV=P_Geopak_PatternLines_Ramp

If symbology levels you need do not show go to level manager and select GEOPAK filter.

Select Draw Pattern Lines. The pattern lines will be drawn in your active file.



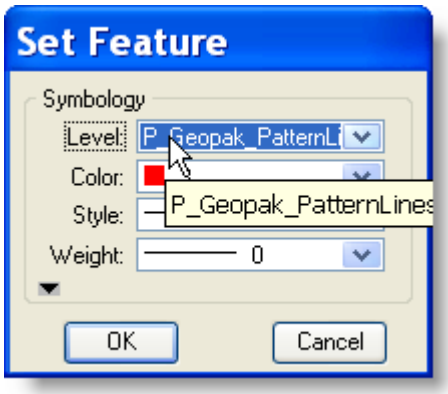
Options:
Draw pattern lines at **Horizontal Control points, Superelevation Transitions, and Bridge Ends.** Use the ONCE option and specify the station in Beginning for one pattern line.

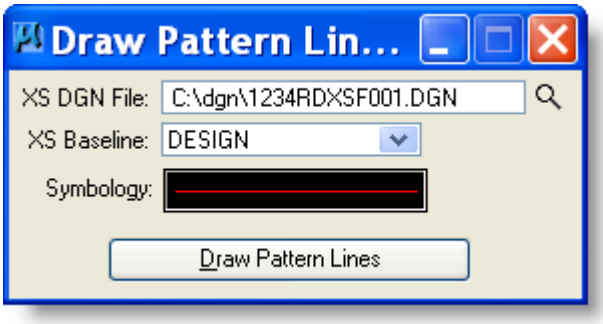
This is required in order to get the needed information to the survey crews. The survey crew needs the critical cross section for the data collects to allow them to stake out the project.

8.2 Draw Pattern Lines From Cross Sections

Select Create Pattern lines from X-sections from Road Tool Menu.

Note: Be sure you are in the strip map before drawing the pattern lines.





1. Check the Pattern Lines Symbology to Lv=(see levels to left), Wt=0, Style=0, Color is your preference. The symbology may have been set in the Project Manager DEFINE of the pattern working alignment definition. See page 5-2. If so, then it should be saved and default to this each time this dialog box appears.

If required levels do not show in the symbology selection dialog box, then open the level manager and select GEOPAK as the level filter.

2. Set the XS Dgn to the file you drew the cross sections in. (This is called the working cross section file)

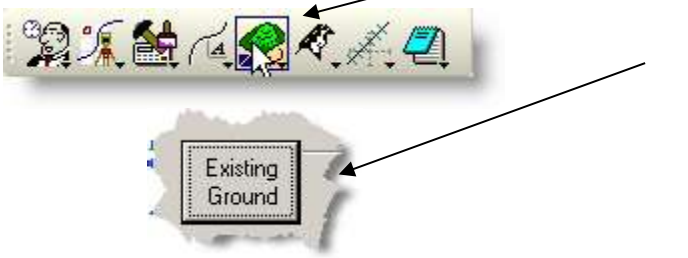
3. Select Draw Pattern Lines. The pattern lines will now be drawn in the active design file.

US Customary - LV=P_Geopak_PatternLines_Design
and/or LV=P_Geopak_PatternLines_Approach
and/or LV=P_Geopak_PatternLines_Detour
and/or LV=P_Geopak_PatternLines_FrontRD
and/or LV=P_Geopak_PatternLines_Ramp

Note: Be sure to set the pattern definition under working alignment definition. See Page 5-2

9 *Existing Ground – DTM*

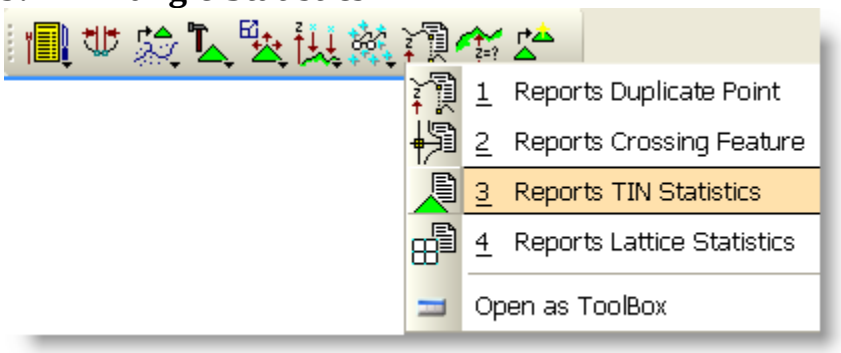
Survey/Photogrammetry generates the DTM (.tin) files so this chapter is to check that file and show what it contains.



Go to **Applications-GEOPAK ROAD > DTM Tools**, or **DTM on the Road Tools Dialog** or Click on **Existing Ground** button in *Road Project*.

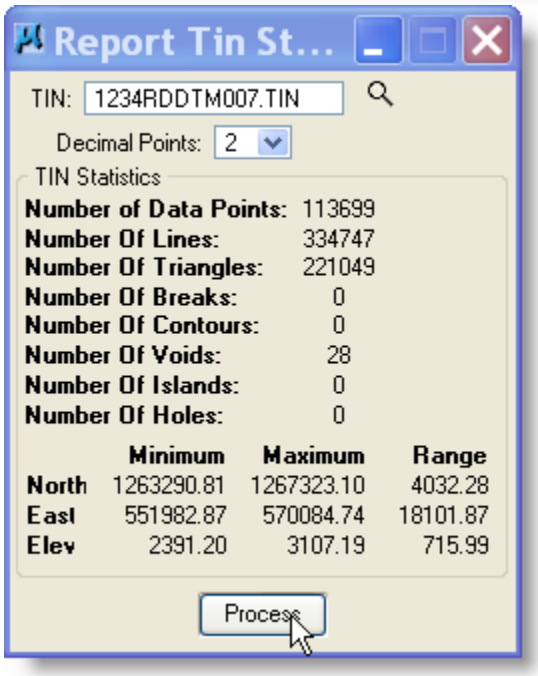
A TIN file, generated by Photogrammetry, should exist already for the project. This is the Digital Terrain Model file. The following may be done to check that file.

9.1 Triangle Statistics



Go to Reports TIN Statistics

This will open a dialog box that gives information about triangulated file.



This allows you to check and make sure that all your points are not at the same spot or any other mistakes that are obvious such as 1000-foot difference in elevations when you only have a max. 100 foot difference.

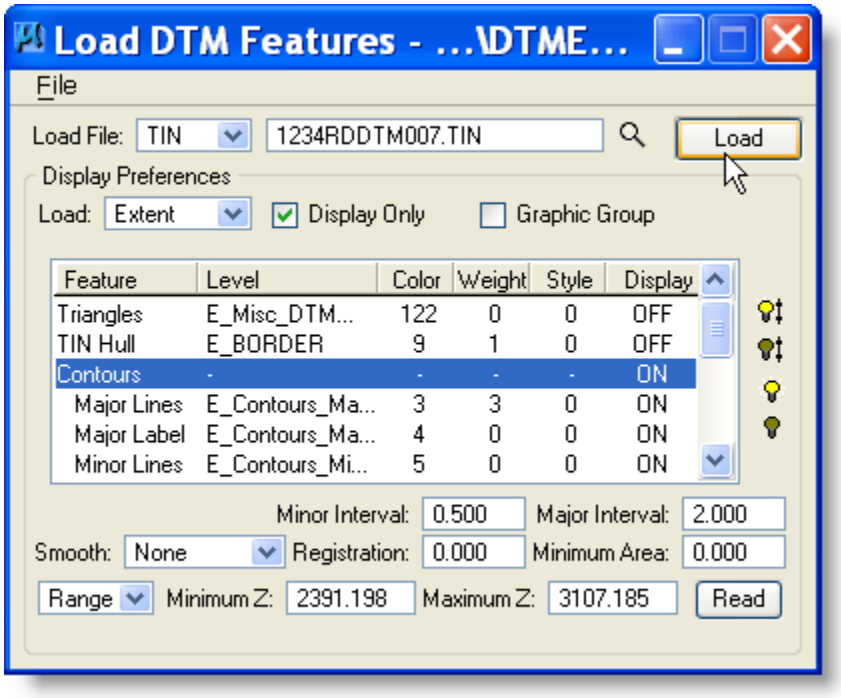
Existing Ground Profile

9.2 Display DTM Features

Go to LOAD > DTM Feature
This will open the Load DTM Feature dialog.

- Click File > Open
- Select W:\GEOPAK\
- DTMEXISTING.lpf or DTMPROPOSED.lfp or EROSION.lpf file that sets symbology for loaded features. (below)

Name	Number	Description	Logical	Color
*E_Misc_DTM_Boundary [STANDARD]	1137	Survey - Existing DTM Boundary - Line	Master	4
E_Misc_DTM_BoundaryPoint [STANDARD]	1138	Survey - Existing DTM Boundary - Point		4
E_Misc_DTM_BoundaryText [STANDARD]	1139	Survey - Existing DTM Boundary - Text		0
*E_Misc_DTM_GradeBreak [STANDARD]	1140	Survey - Existing Grade Break - Line	Master	7
E_Misc_DTM_GradeBreakPoint [STANDARD]	1141	Survey - Existing Grade Break - Point		7
E_Misc_DTM_GradeBreakText [STANDARD]	1142	Survey - Existing Grade Break - Text		0
*E_Misc_DTM_GroundShot [STANDARD]	1143	Survey - Existing Ground Shot - Point	Master	2
E_Misc_DTM_GroundShotText [STANDARD]	1144	Survey - Existing Ground Shot - Text		0
E_Misc_DTM_Island [STANDARD]	1145	Survey - Existing DTM Island - Line		5
E_Misc_DTM_IslandPoint [STANDARD]	1146	Survey - Existing DTM Island - Point		5
E_Misc_DTM_IslandText [STANDARD]	1147	Survey - Existing DTM Island - Text		0
E_Misc_DTM_MiscDTMLine [STANDARD]	1148	Survey - Existing DTM Misc Line - Line		0
E_Misc_DTM_MiscDTMLinePoint [STANDARD]	1149	Survey - Existing DTM Misc Line - Point		0
E_Misc_DTM_MiscDTMLineText [STANDARD]	1150	Survey - Existing DTM Misc Line - Text		0
E_Misc_DTM_MiscDTMPoint [STANDARD]	1151	Survey - Existing DTM Misc Point - Point		3
E_Misc_DTM_MiscDTMPointText [STANDARD]	1152	Survey - Existing DTM Misc Point - Text		0
*E_Misc_DTM_Obscure [STANDARD]	1153	Survey - Existing DTM Obscure - Line	Master	7
E_Misc_DTM_ObscurePoint [STANDARD]	1154	Survey - Existing DTM Obscure - Point		7
E_Misc_DTM_ObscureText [STANDARD]	1155	Survey - Existing DTM Obscure - Text		0
E_Misc_DTM_SurfaceExisting [STANDARD]	1156	Survey - Existing Surface - Line		2
E_Misc_DTM_SurfaceExistingPoint [STANDARD]	1157	Survey - Existing Surface - Point		2
E_Misc_DTM_SurfaceExistingText [STANDARD]	1158	Survey - Existing Surface - Text		0



1) Set Load File to TIN and use spy glass button to select the Tin file.

2) Set the Feature to the feature you wish to display.

3) If displaying contours be sure to click the READ button to get elevation information.

4) Select Load button

Notes: If displaying triangles, the triangles should now be displayed on the screen laid over your alignment. Now you can visually inspect the triangle file for any gaps that should not exist or if there are extra triangles that should not be there. If there are, go back to Build-Triangles and adjust the side length until it looks right. A contour map may be created by using the **macro**: RD > Create DGNs > select Contour Map File, English and use the PH file as the Base Map > Create DGN'S - creates ####RDCMA001.dgn.

10 Existing Ground Cross Sections

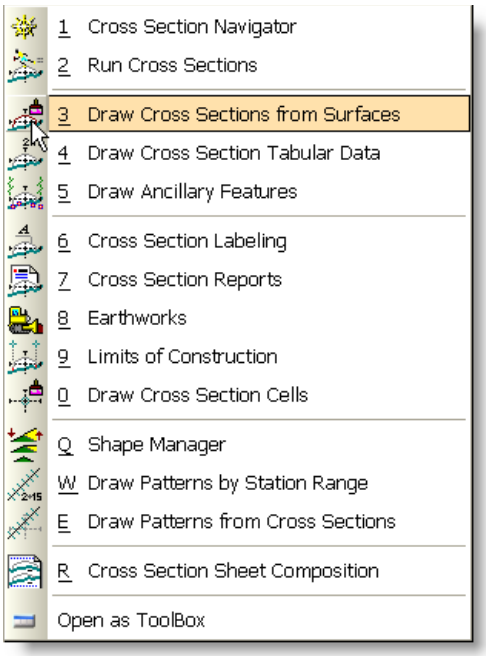
10.1 Creating Ground Cross Sections

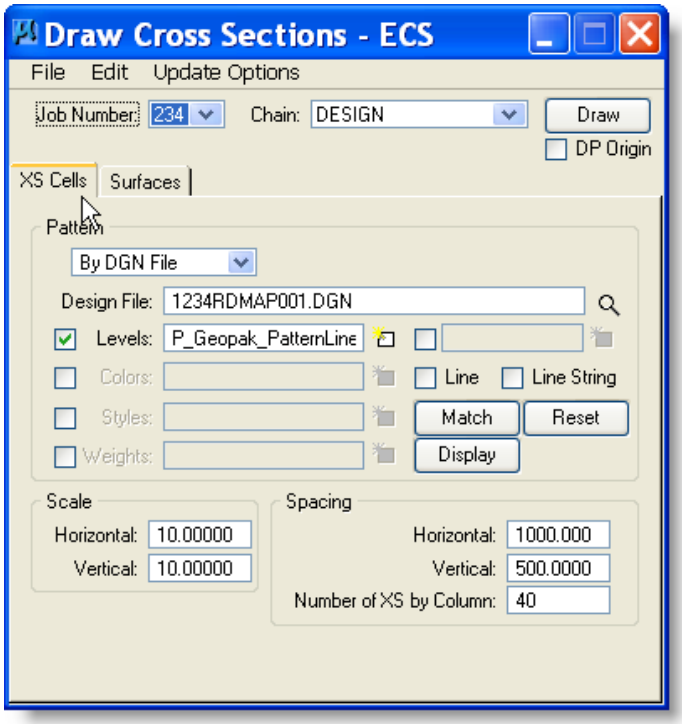
Be sure you have a pattern line before you create cross sections.

In Project manager Select **Existing Ground Cross Sections**. You will need to Create or Rename a run.

Or

Select Ground Cross Sections From DTM from the Geopak Road Tools Menu





1) The following will be filled in already
   a. Tin file
   b. Job number
   c. Chain
   d. Scales
   e. Begin & end stations
   Otherwise you will need to fill them in.

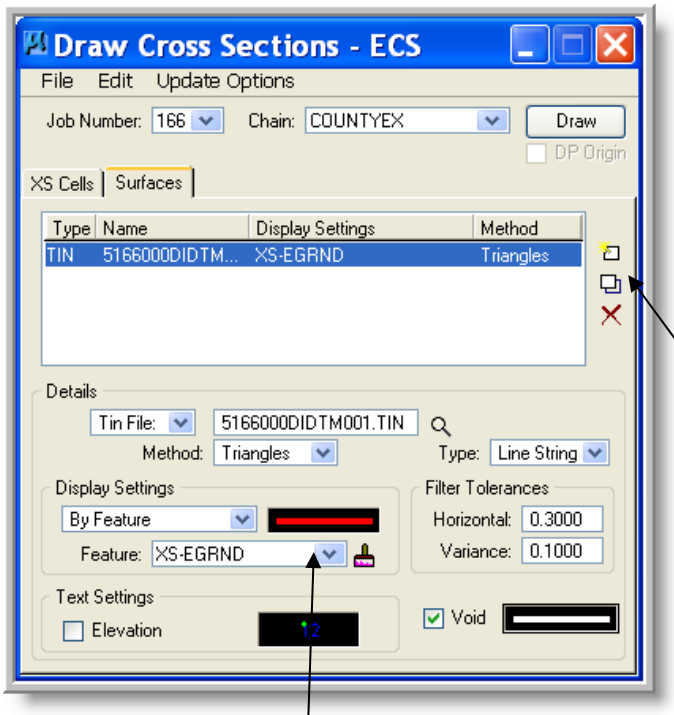
2) Set Button to Pattern By DGN file.

3) Select the Design File using the spy glass.

4) Check Levels then Match the Pattern lines in the design file drawing. These lines may be any of those listed in the left column.

5) Select Surfaces Tab

US Customary - LV=P_Geopak_PatternLines_Design
and/or LV=P_Geopak_PatternLines_Approach
and/or LV=P_Geopak_PatternLines_Detour
and/or LV=P_Geopak_PatternLines_FrontRD
and/or LV=P_Geopak_PatternLines_Ramp



1) Select a .TIN file using the spy glass icon next to TIN FILE.

2) Set Method to **Triangles** and Type to **Line String**.

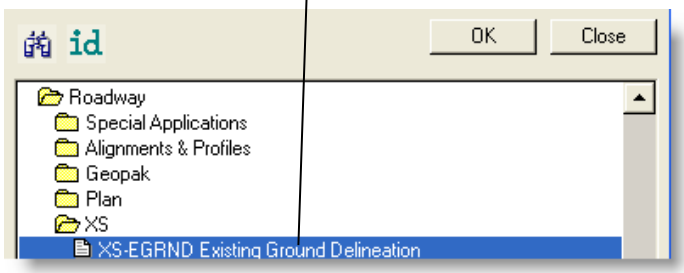
3) **Display Settings:**
   1) Select Feature
   2) Select D&C Manager (paintbrush icon)
   3) Select Roadway > XS > XS-EGRND
   4) Select OK (see below left)

4) Set Void symbology, using COPY/PASTE from display settings.

5) Change Void color to 0 (white).

6) You must ***Add or Modify Surface*** before plotting cross sections.

The symbology may have been set in the Project Manager DEFINE of the cross section. See page 5-4. If so, then it should be saved and default to this each time this dialog box appears.

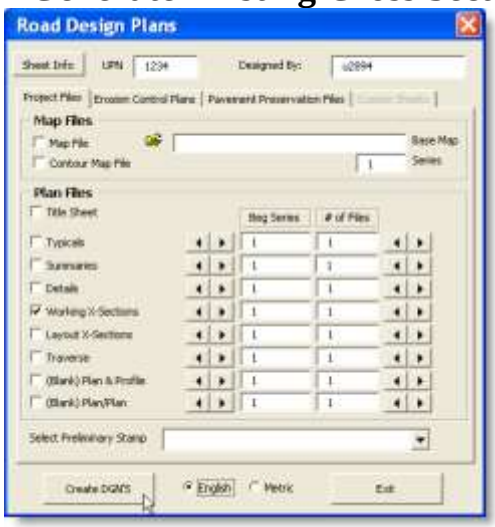


7) Generate Working XS dgn, if you haven't yet. See section 10.2 below.

8) Make sure you're in the cross section file. Select ***Draw***. This will plot the cross section in the active design file. (This is called the working cross section file)

Note: Be sure to set the Cross section view & existing ground definition under working alignment definition. See page 5-3.

10.2 Generate Existing Cross Section Drawing:



Macro – Road Design > Create DGN > Select Working X-Sections and English > Create DGN'S
This creates a ____RDXSF001.dgn file.

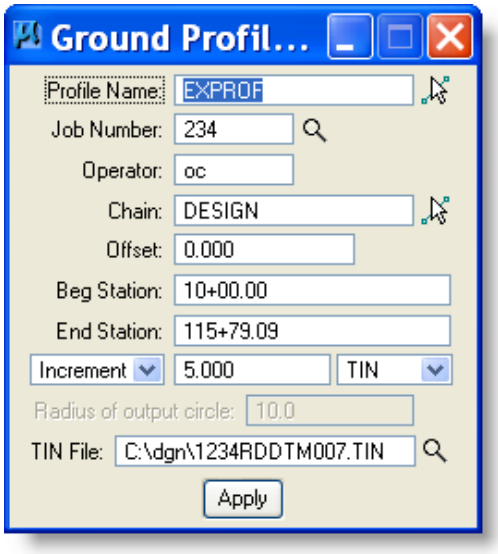
This may be done at any time during this process **before** the DRAW button is selected.

11 Existing Ground Profile

Open **GROUND PROFILE** dialog

1) Within the Project manager dialog select **Existing Ground Profile**

If you are using Project manager you will need to Create or Rename a run.



1) If you are using the Project manager working alignment Define then the following will be filled in already. See page 5-3
   a. Job number
   b. Operator
   c. Chain
   d. Begin & end stations
   e. Tin File (from survey, district or photo)

   Otherwise you will need to fill them in.

2) Set the Offset to 0.00 (for the centerline elevations)

3) Set Increment to 5 or 10 depending how detailed the DTM data is. (Photogrammetry = 5, Data Collector = 10)

4) Select Apply.

1) Select OK. This will save the input data into the file selected

Note: You may change the file name to a COGO Input to save the file as a backup.

1) Press the YES button. This will store the profile in the GPK file.

Note that the profile can be stored later if the NO button is selected using the input file stored above. Open the input file within COGO and process it to store the profile.

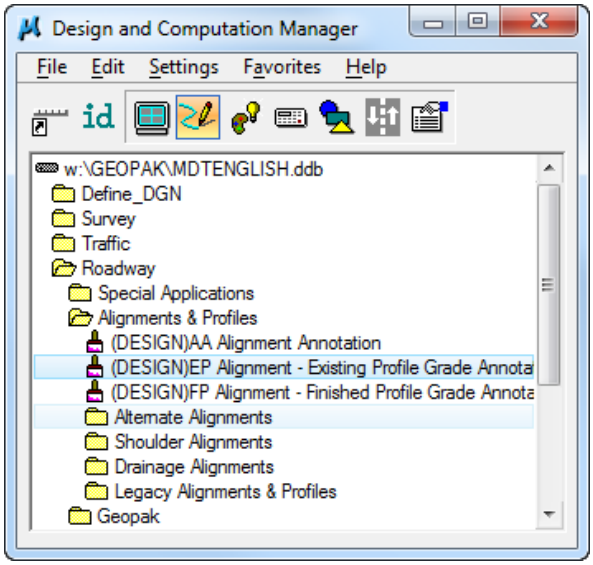
2) Press the Yes button to remove the temporarily 3D element use to create the profile.

3) Close Ground Profile window and click YES to save settings.

11.1 Draw Vertical Alignment - Design and Computation Manager

Select **Design and Computation Manager** from the Road Tools Menu

Be sure you have the W:\GEOPAK\MDTENGLISH.DDB file loaded.



1) Double Click on **Roadway** under Content.

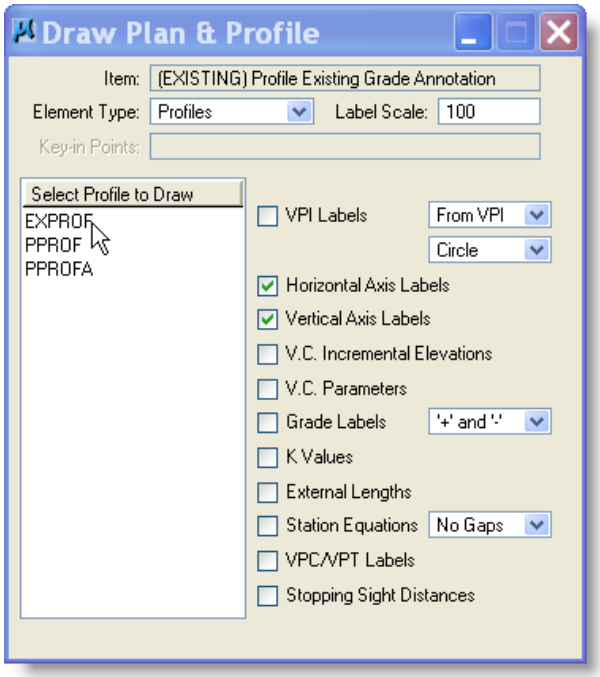
2) Double click on **Alignment & Profiles** under Content.

3) Select on **(DESIGN)EP Alignment - Existing Profile Grade Annotation**

4) Click on Draw Plan & Profile button.

If you are using Project manager Geopak will go directly to Plan & Profile Draw, otherwise it will stop at this dialog.

5) Enter the Job Number and select OK



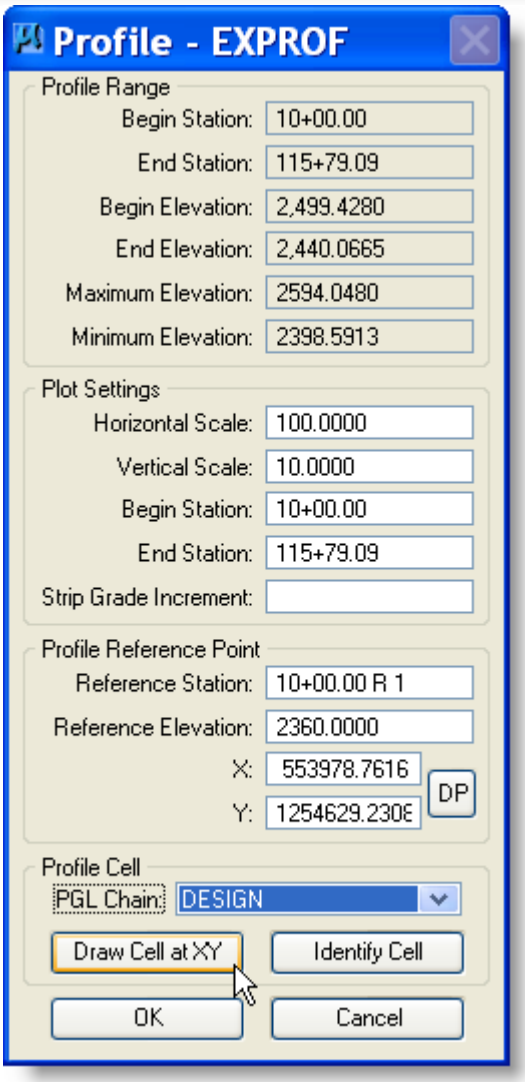
Open the design file ____RDMAP001.dgn you are working on.

Select a space in your design file away from the current drawings.

Horizontal & Vertical Axis Labels should be turned on for *Existing Profile.*

Select the profile you wish to plot.

The profile dialog will open. See below.



The top of this dialog will give you information about the profile and allow you to set the scale, stations and increment.

Leave the Strip grade Increment blank.

The bottom of this dialog allows you to set the parameters of how the vertical alignment will be placed in the design file.

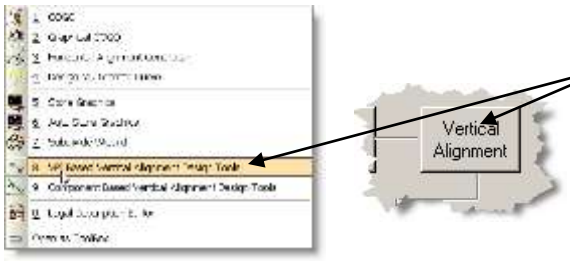
The DP Station should be your beginning station of your reference grid. Use the closest even station before your alignment.

DP Elevation is the lowest elevation of your reference grid. This should be below the minimum elevation of your profile. Use the closest 30 feet below the Minimum Elevation.

DP X & DP Y set the location of the lower left corner of the reference grid. Hint: **Draw cell At XY**. This will allow easy recall of profile location.

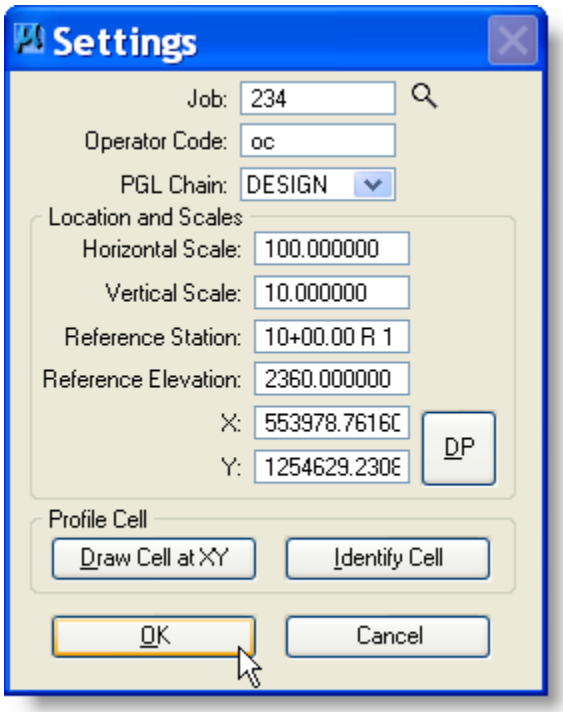
When everything is set to draw the vertical alignment, select OK.

12 Vertical Alignment



1) Within the Project manager dialog select **Vertical Alignment** or select VPI Based Vertical Alignment Generator from the Road tool Menu

2) If you are using Project manager you will need to Create or Rename a run.

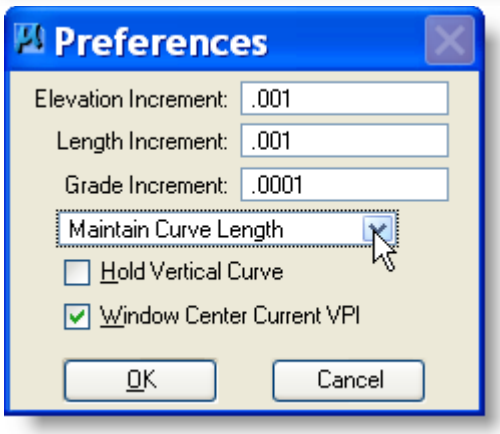


1) If you are using the Project manager working alignment Define then the following will be filled in already. See page 5-3.
a. Job number
b. Chain
c. Reference Station (this is for reference grid)
d. Reference Elevation (this is for reference grid)
e. Horizontal Scale
f. Vertical Scale

Otherwise you will need to fill them in.

2) Click Identify Cell then Tentative and Select the Profile Cell. This should fill in the above information.

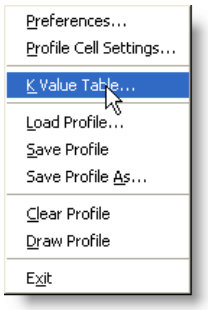
3) Select on OK

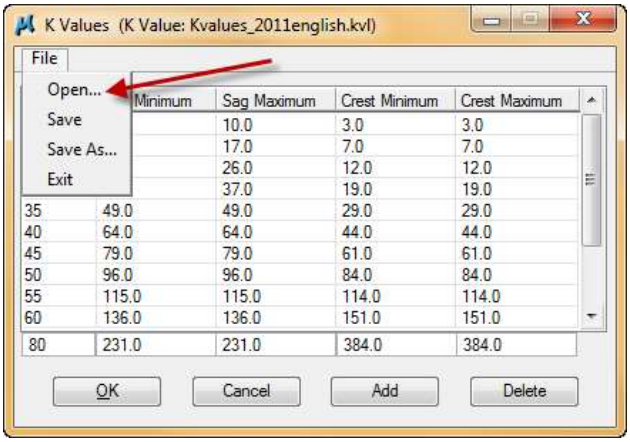


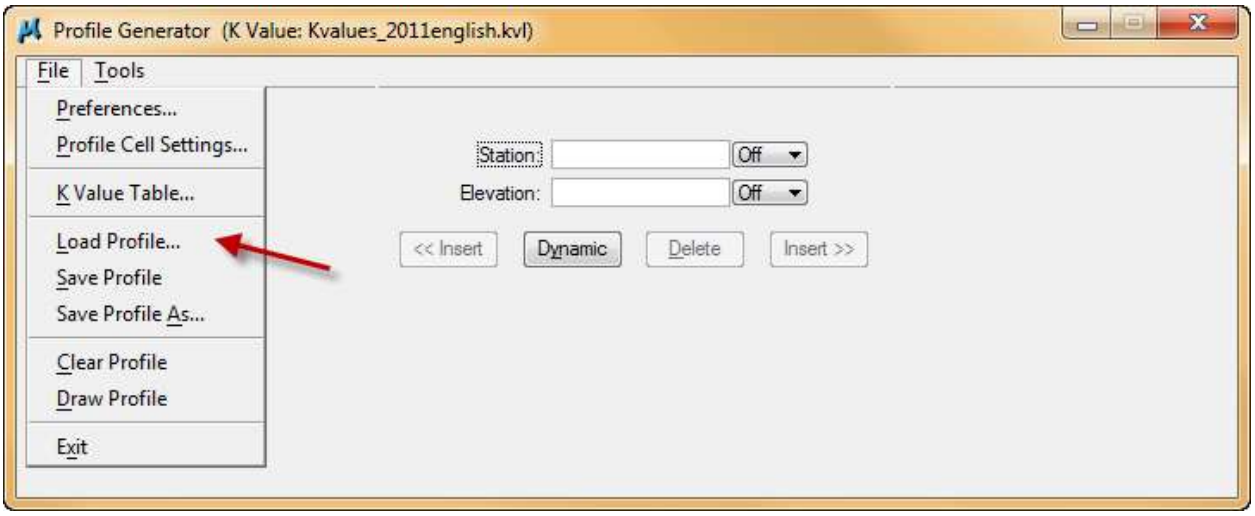
User Preference for the profile Generator.

Click File > Preferences on Profile Generator. If using the COGO Best Fit tool, make sure the Max Shot Distance preference is set correctly. This preference should be set so that no two points are farther apart than the distance specified in this preference. The program uses this Max Shot Distance when determining the order of the candidate points.

Insure the K Value Table being used is:
W:\GEOPAK\Kvalues_2011english.kvl



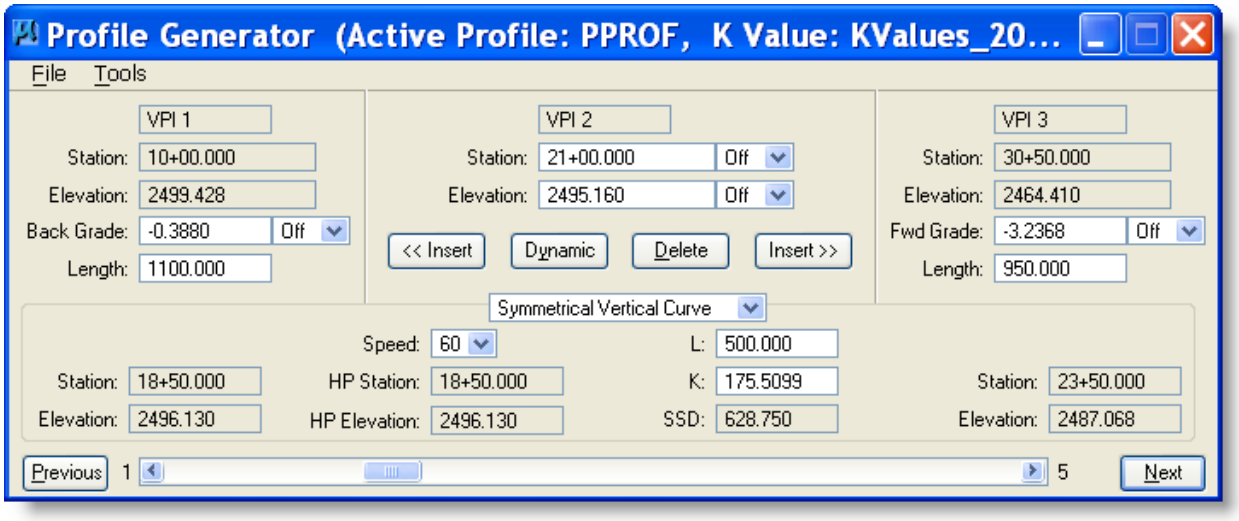




If you have a profile you wish to edit, go to **FILE-LOAD**. This allows you to edit already created vertical alignments.

If you are creating a new vertical, begin by entering your first station. If you Select on dynamic, you will be able to place your VPI graphically or you may key-in the value.

Note: If you are typing the Station, Elevation, Grade etc. be sure to select return to enter the numbers.



To create the 2nd VPI Select on **INSERT-AFTER**. This will move you to the next VPI.

The VPI in the center is always the one that you will be creating or editing.

Clicking on DYNAMIC will allow you to graphically move and place VPI's. Clicking on INSERT will always create new VPI's. Clicking on **NEXT** or **PREV** will allow you to move back and forth between the VPI's.

If you have a profile you wish to edit, go to **FILE-LOAD**. This allows you to edit already created vertical alignments.

Normal vertical entry process:

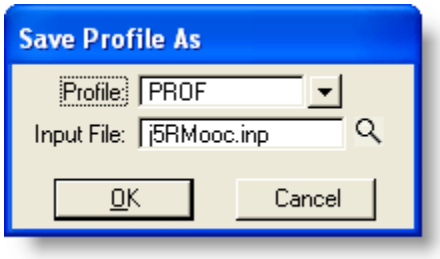
1. Enter beginning VPI dynamically and place at starting elevation.
2. Place next VPI at some multiple of 20' and set elevation to nearest .05 of where you want it.
3. Lock the elevation and go through setting the L (length) to a good round number.
4. Adjust as needed to match your speed, length and sight distance.

To create a vertical curve for the design speed, change the **Speed** to the desired speed. Beware if a zero appears in the speed box it will kick you out and you will have to start over. This will give you the desirable length of curve for that speed in the Length box. Round the length up to the nearest 50' increment.

Note: The Speed, Length, or K values can be entered to determine the vertical curve length. The length should always be rounded up to the nearest 5 foot increment.

Adjustments can be made to the station, elevation, forward or back grade. When these are adjusted the vertical curve desirable length is adjusted automatically.

1. Go to **FILE > SAVE PROFILE**.



2. Type in name of profile. (Max. 5 characters) like PROF

This will append the input lines used to create the profile to the job input file created by Geopak. The file name will be call JjobOoc.inp. Where "job" is the Job Number and "oc" is the operator code. For example the file may be called j9RMOoc.inp. Shown below is an example of the input lines.

Coordinate Geometry Input lines created by Profile Generator

```
STORE PROFILE PROF
VPI 1 S 1000.0000000000 E 2799.8800000000
VPI 2 S 1200.0000000000 E 2799.9500000000 L 224.8275862073
VPI 3 S 2224.6600000001 E 2809.1719400000    Bridge end
VPI 4 S 2693.6000000001 E 2813.3924000000    Bridge end
VPI 5 S 2786.1600000001 E 2814.2254400000
END PROFILE
```

3. Hit return and Select on OK.

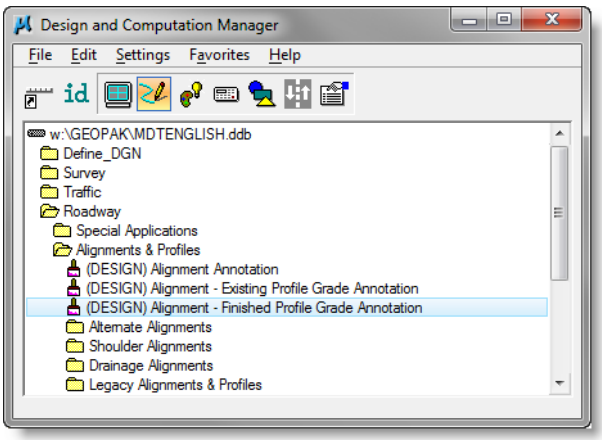
The next step is to draw the new profile over the existing ground profile.

12.1 Draw Vertical Alignment - Design and Computation Manager

Open Design and Computation Manager

Be sure the you have the MDTENGLISH.DDB file loaded

1) Double Click on **Roadway** under Content.



2) Double click on **Alignment & Profiles** under content

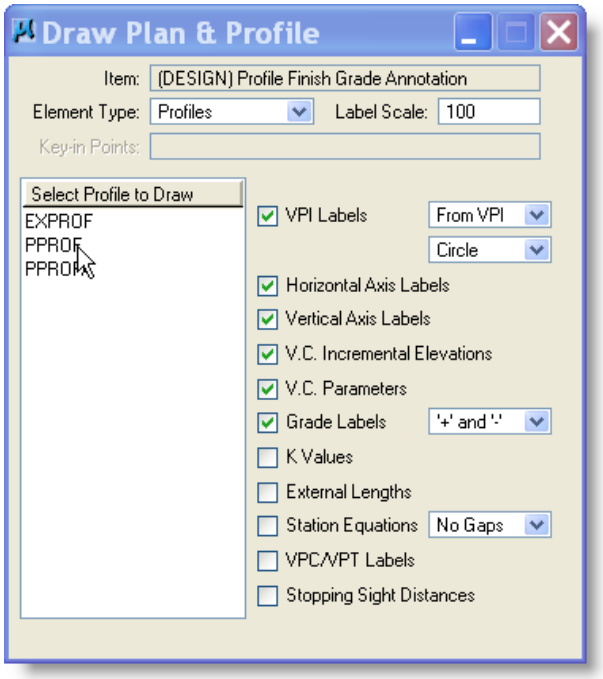
3) Double click on either **Urban** or **Rural** under Content

4) Select on **(DESIGN) Alignment – Finished Profile Grade Annotation**

5) Click on Draw Plan & Profile button.

If you are using Project manager Geopak will go directly to Plan & Profile Draw, otherwise it will stop at this dialog.

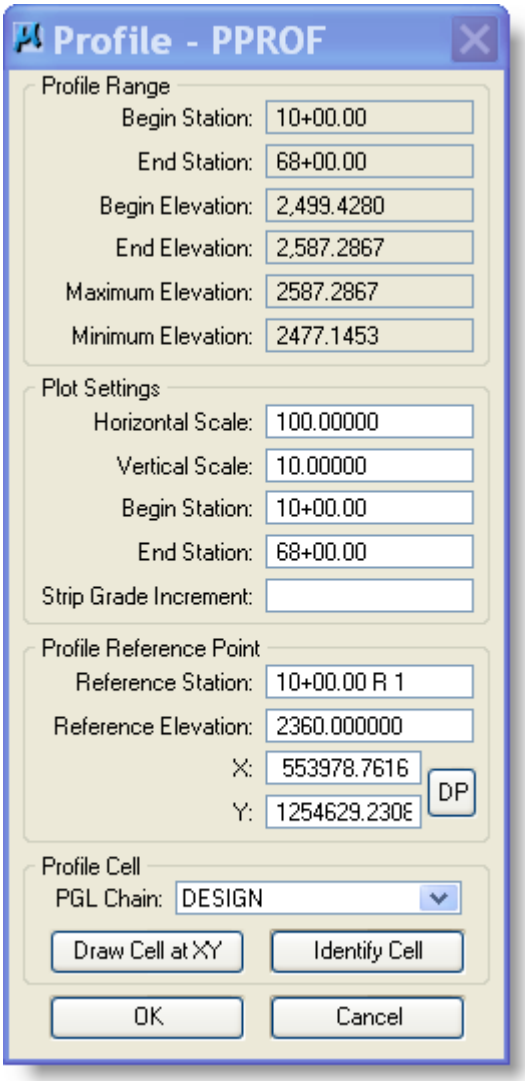
7) Enter the Job Number and select OK



VPI Labels, Horizontal & Vertical Axis Labels, V.C. Increment Elevations, V.C. Parameters & Grade Labels should be turned on for *Design Profile.*

Click on the profile you wish to plot.

The profile dialog will open. See below.



Click Identify Cell and select the cell of that grid. This will fill in some needed information.

The top of this dialog will give you information about the profile and allow you to set the scale, stations and increment.

Leave the Strip grade Increment blank.

The bottom of this dialog allows you to set the parameters of how the vertical alignment will be placed in the design file.

The DP Station should be your beginning station of your reference grid. Use the closest even station before your alignment.

DP Elevation is the lowest elevation of your reference grid. This should be below the minimum elevation of your profile. Use the closest 30 feet below the Minimum Elevation.

DP X & DP Y set the location of the lower left corner of the reference grid. The grid should already be defined for existing profile

When everything is set to draw the vertical alignment, select OK.

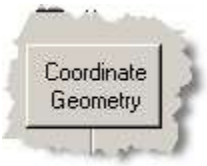
You may now close all dialog boxes.

13 Calculate Superelevation

13.1 Storing Superelevation rate on Curves

NOTE: Storing the Superelevation rates on the curves only needs to be done to get the super elevation on the curve data.

Prior to creating the Superelevation file the Superelevation rates need to be stored in Coordinate Geometry for the curves. If you wish to have the super information appear in you curve data on your horizontal alignment, you will need to do this before you draw the alignment.



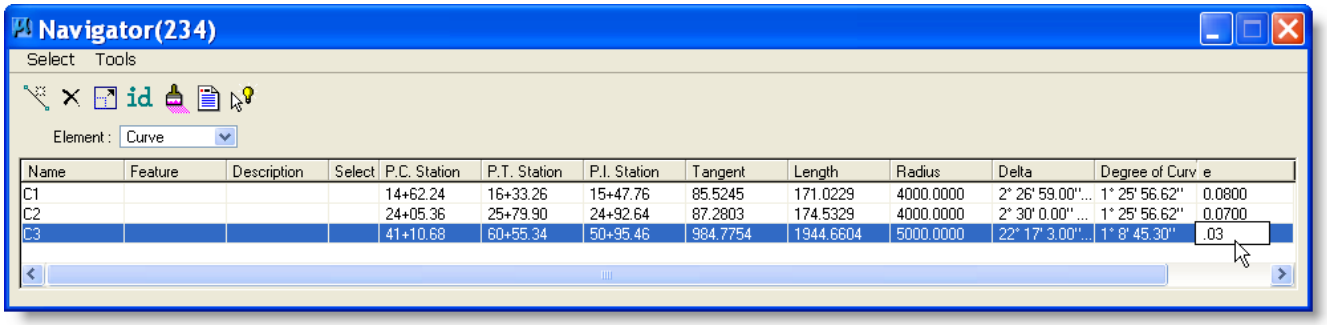
1) Within the Project manager dialog select **Coordinate Geometry**

Or

2) Select Coordinate Geometry from the Road tool Menu

If you are using Project manager you will need to Create or Rename a run.

To determine the proper Superelevation rates see pages 9.3(3) (English) and 9.3(4) (Metric) in the Road Design Manual.



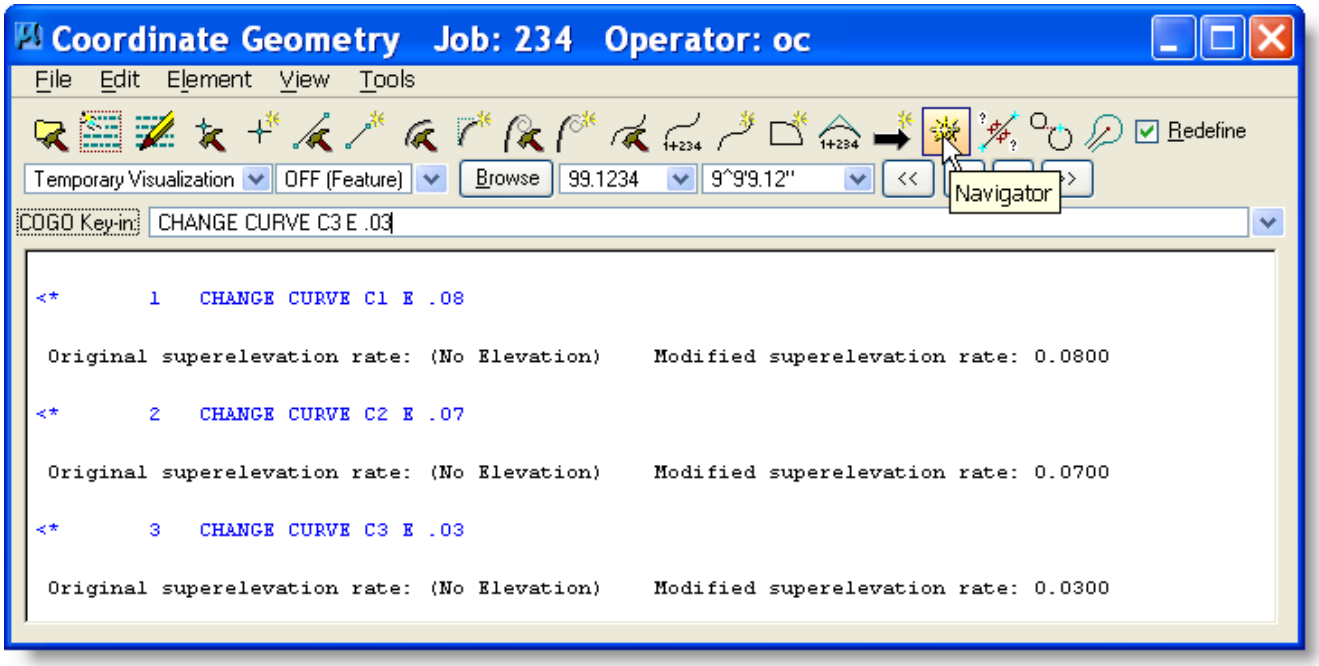
1) Go to COGO Navigator

2) Set Element to Curve

3) Select the curve to change in the "e" column. Determine super rate for curve in table by radius and design speed. If normal crown then leave e column blank.

4) Type in the super rate (i.e. .03)

5) For curves with spirals there is no need to store the super rate on the spirals**.**

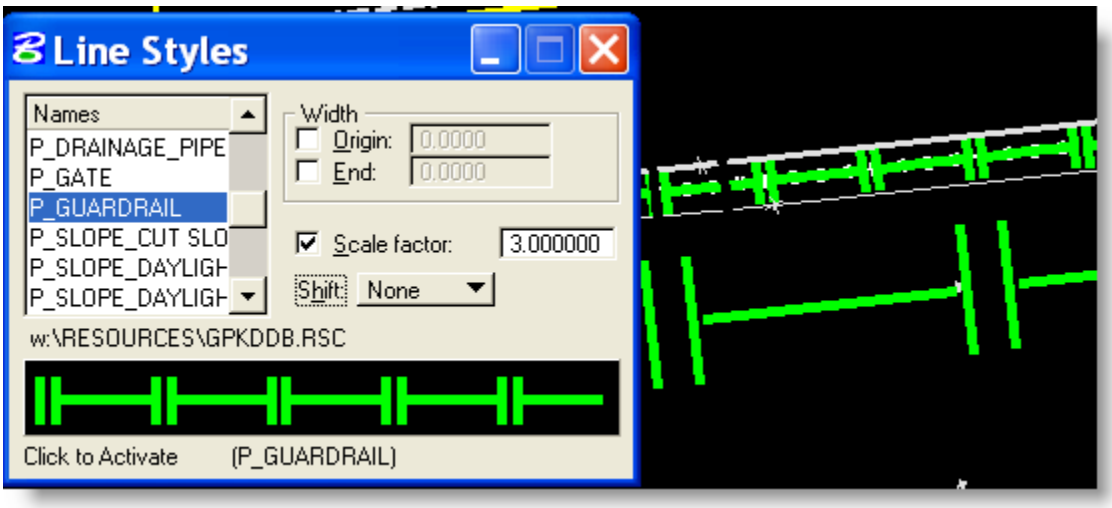


After the Curves have the super rate stored on them you can draw the Horizontal alignment and the Super rate will appear in the curve data. See page 7-8 on how to draw the Horizontal Alignment. ***Important:*** The curve data will need to be edited for the super rate. Geopak places it as **S = 0.06%** it should be shown as **S = 6%**.

14 Custom Line Styles

Sometimes a line style defined in the D&C Manager is correct, but just doesn't fit the purpose in your drawing. That's when custom line styles can be used. Elements > Line Styles > Custom

This shows the default line style (top) and scaled up line style (bottom). Many uses for this too



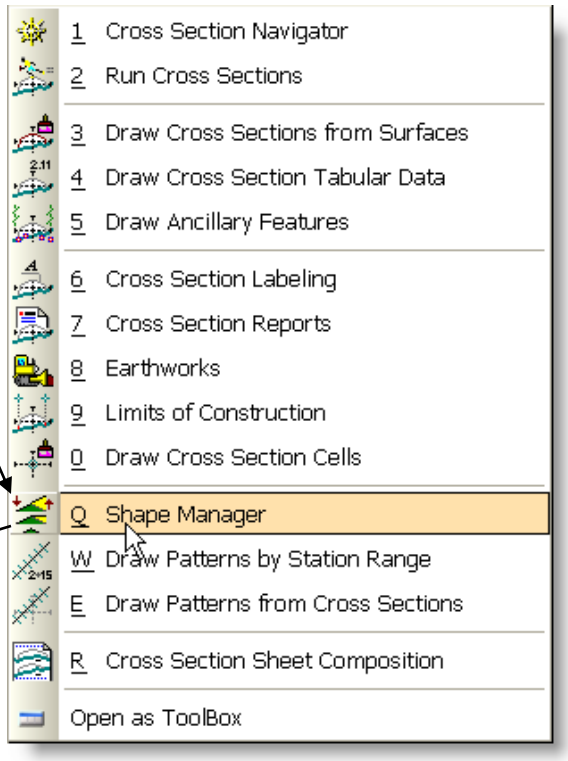
15 Generate Superelevation (SHAPES)

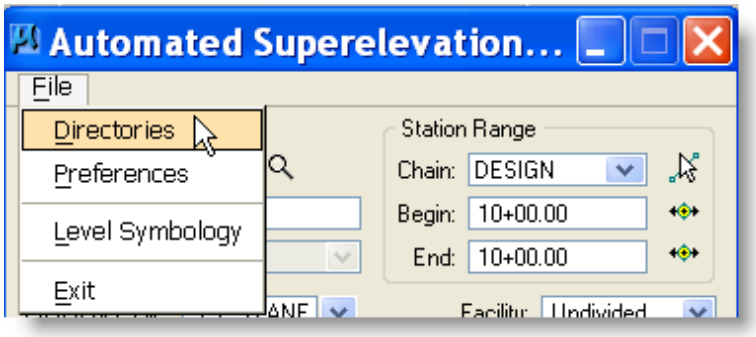
1) Within the Project manager dialog select **Calculate Superelevation**

Or

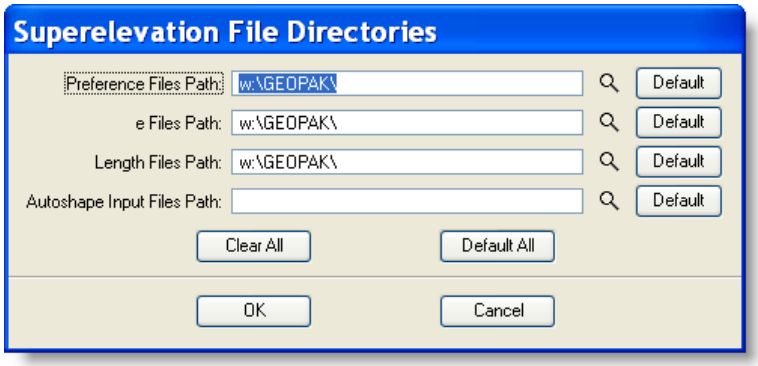
2) Select Shape Manager from the Road tool Menu
3) Click on Automated Superelevation (1st Icon)

If you are using Project manager you will need to Create or Rename a run.

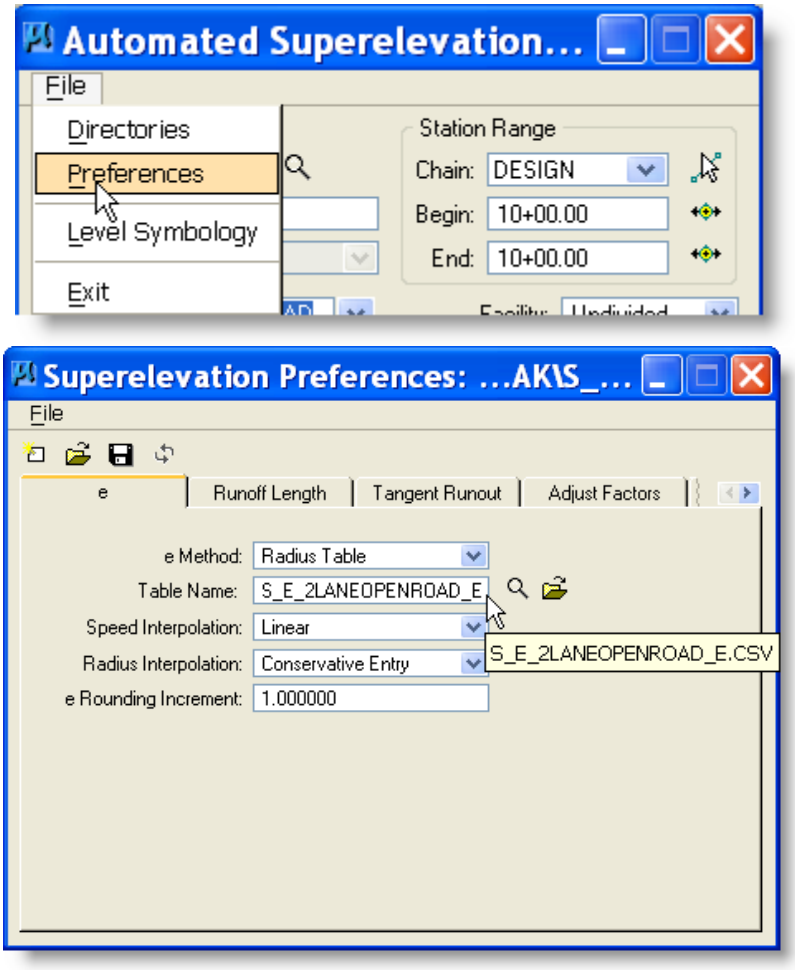




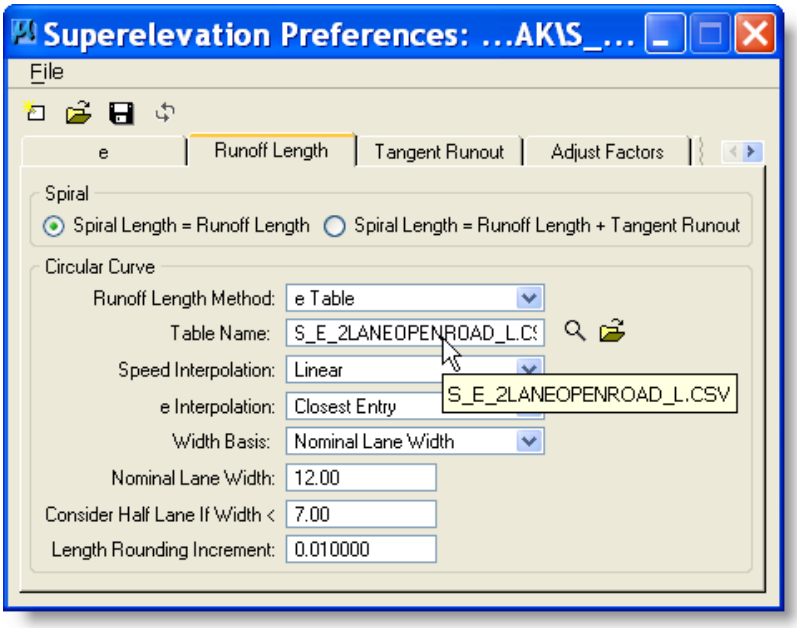
See below for information on the Directories, Preference and symbology dialogs.



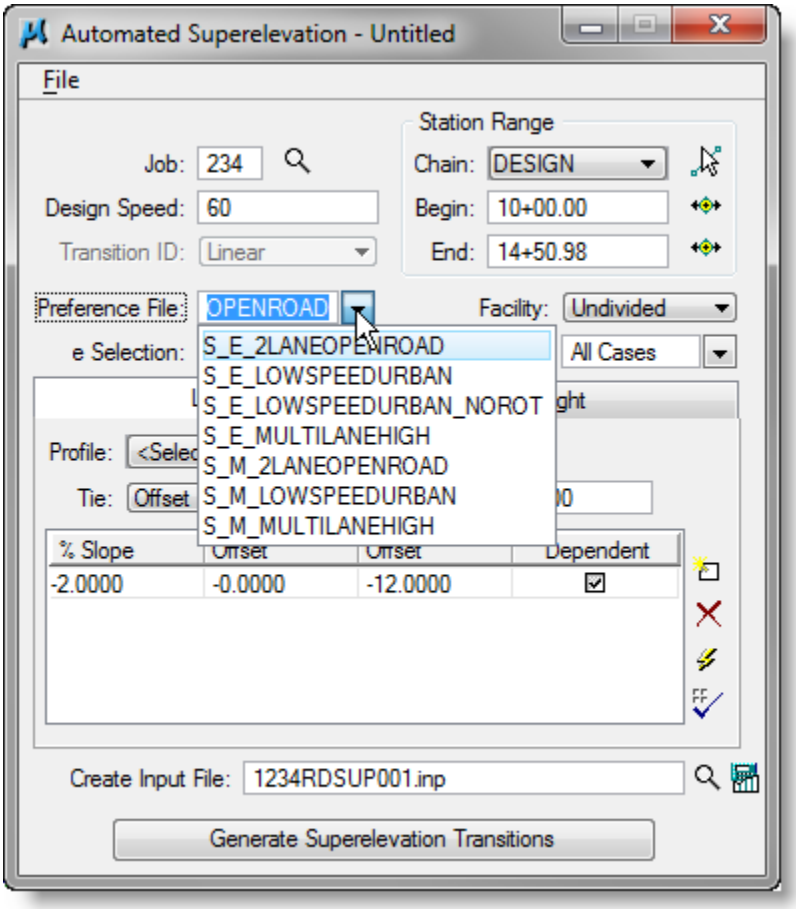
Default Directory set by the system for the Geopak Superelevation setup files.



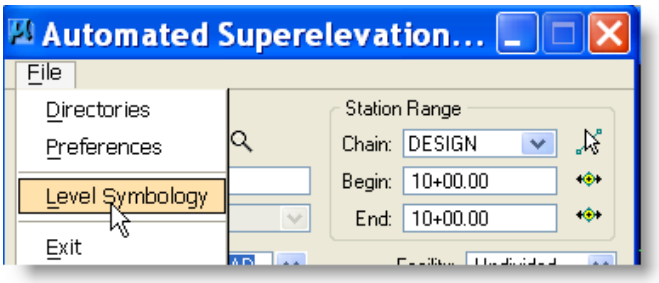
The _E file is used in this preference tab (e).



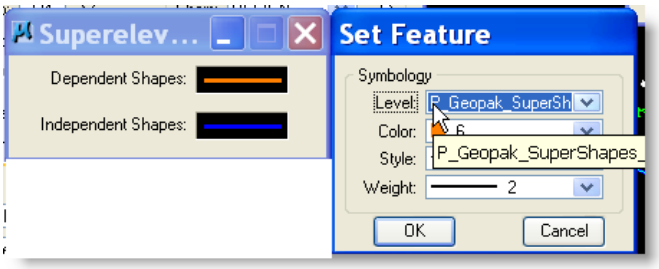
The _L file is used in this preference tab (Runoff Length)



Then the corresponding preference file (.sep) is used in the superelevation dialog drop-down.



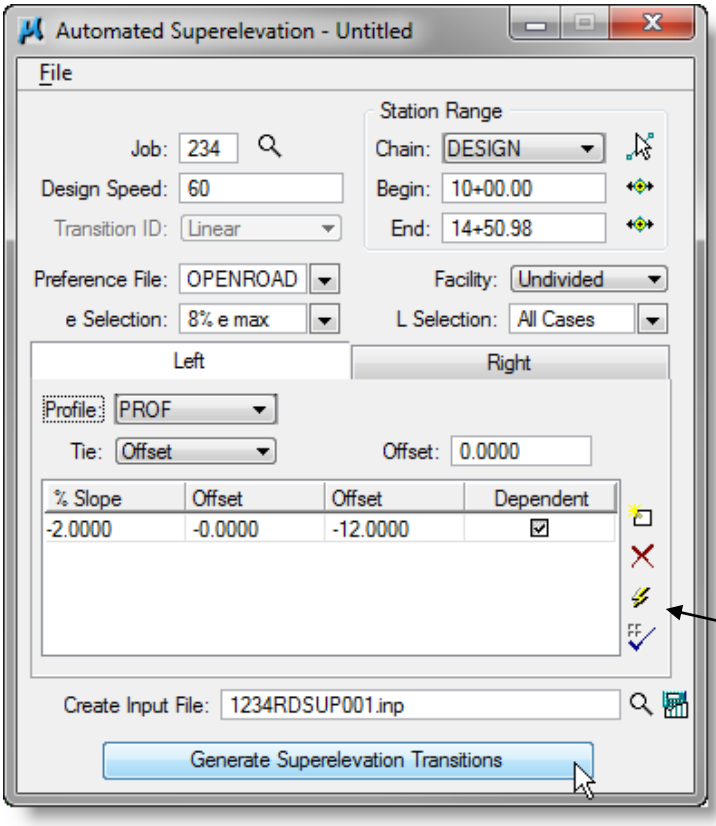
Set Symbology:
File > Level Symbology
Double-click in black boxes to set each one.



Dependant Shapes:
Level = (see levels at left), Co=6, Style=0, Wt=2

Independent Shapes:
Level = (see levels at left), Co=1, Style=0, Wt=2

Levels for US Customary:
P_Geopak_SuperShapes_Approach
P_Geopak_SuperShapes_Design
P_Geopak_SuperShapes_Detour
P_Geopak_SuperShapes_Frontage
P_Geopak_SuperShapes_Ramp



If you are using Working Alignment Define skip to step 5

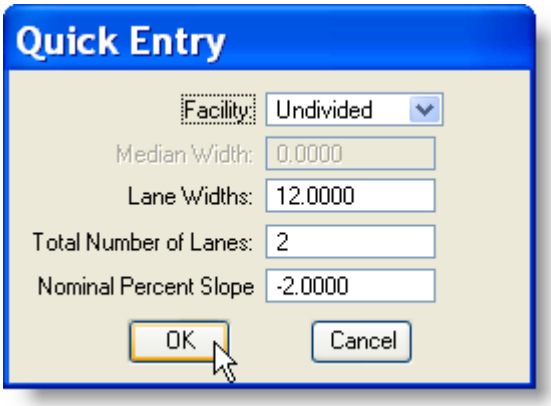
1) Fill in Job Number
2) Fill in the Design Speed
3) Fill in Chain
4) Fill in Begin and End Station
5) Set Preference File
6) The following should be set automatically by Preference file.
    a) e Selection
    b) Facility
    c) L Selection

    If not set to defaults see Directory Setting above.

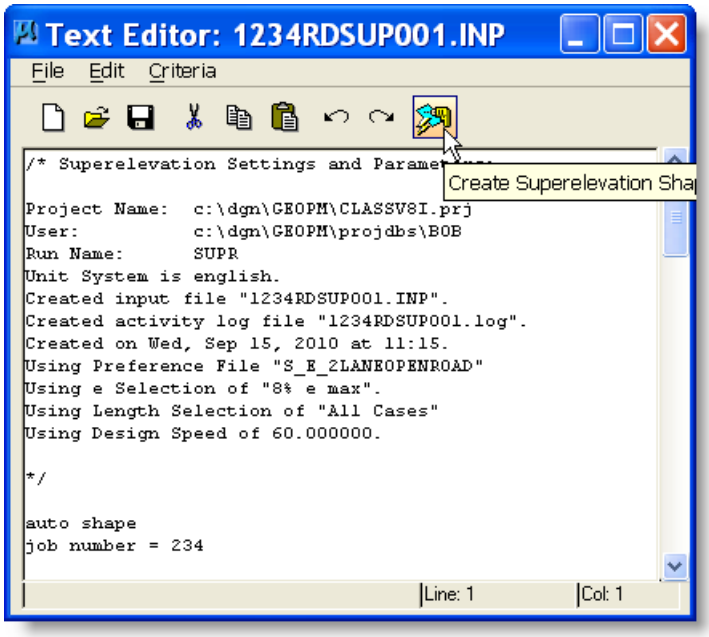
Setting up the Left and Right shape clusters

1) Fill in the profile to be used
2) Select Quick entry
   See dialog below
3) Fill in name of super input file to be created.
4) Select Generate Superelevation Transition and see Superelevation Text Editor Dialog .

QUICK ENTRY



1) Fill in Lane widths
2) Fill in number of lanes
3) Fill in nominal percent slope
4) Select OK and return to dialog above.



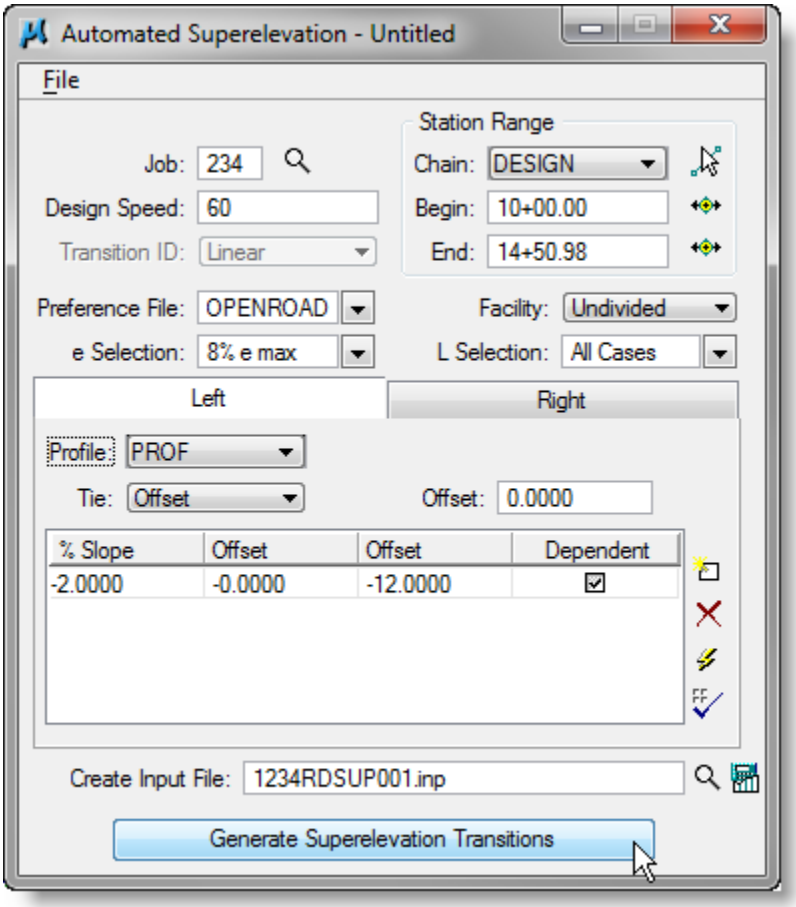
This Dialog appears when you select Generate Superelevation Transition from the Automated Superelevation dialog.

Review the super input file and once you are satisfied that it is correct then – File > Save

NOTE: Using Save As ALWAYS attempts to save the file to C:\ thus it doesn't show up in C:\dgn

Click Create Superelevation Shapes to draw the shapes into the design file.

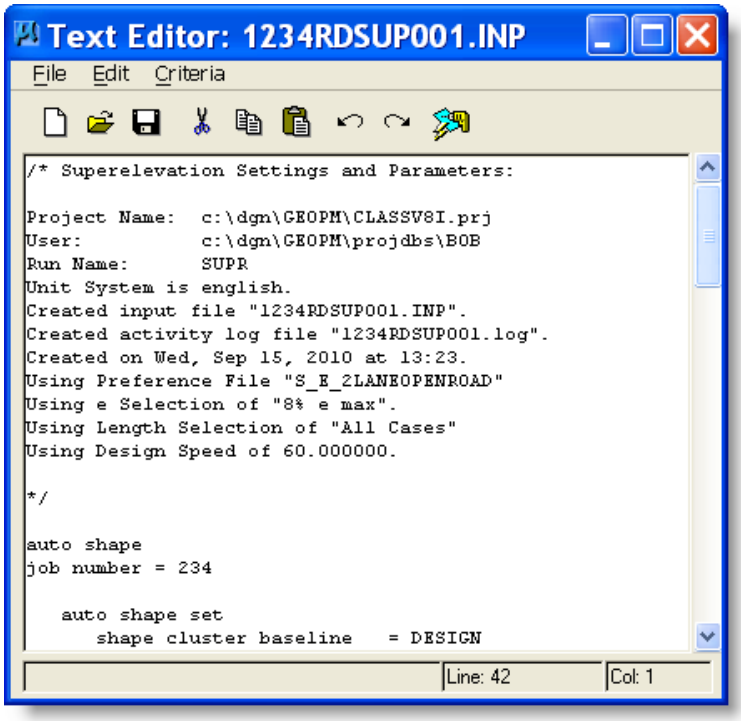
15.1 Adjusting super transitions



This new option in Geopak has replaced the option of using the _eop profile.

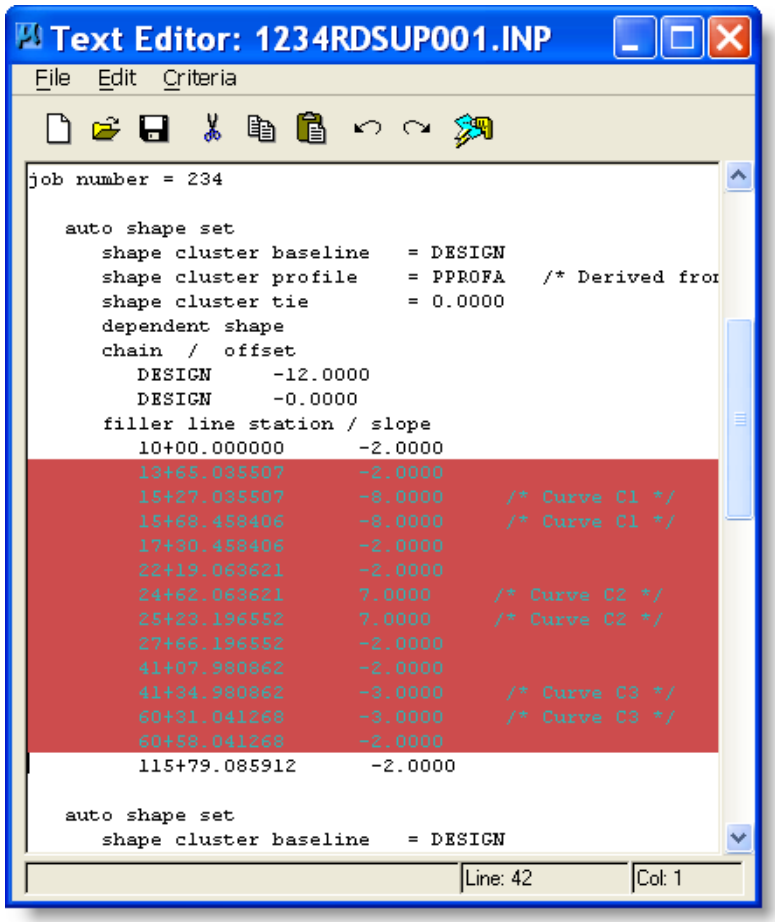
If you have no superelevations calculated then there should be NO "A" profile generated.

The "A" profile adjusts the profile for superelevations and stays on centerline. The design profile goes from centerline to inside edge of pavement on corners.

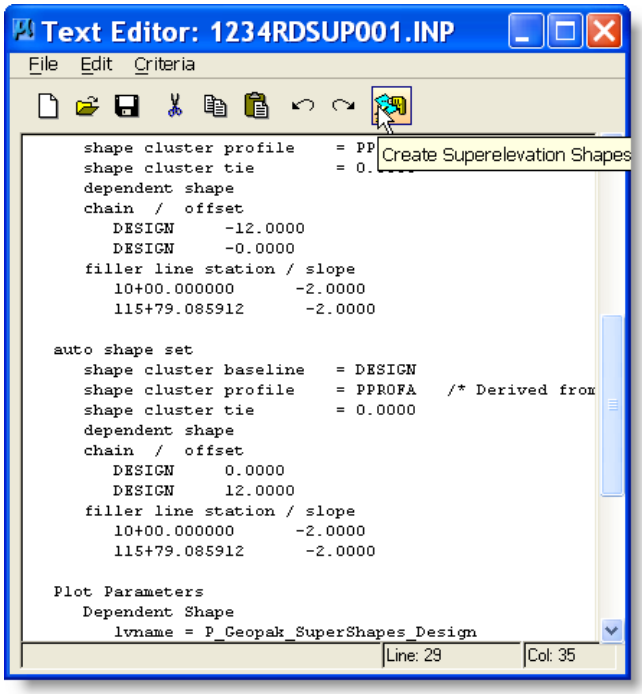


The following is only for example and should not be used unless changes are needed to the generated superelevations.

After Generating Superelevation transitions change the transitions length in the Geopak text editor and save the changes.

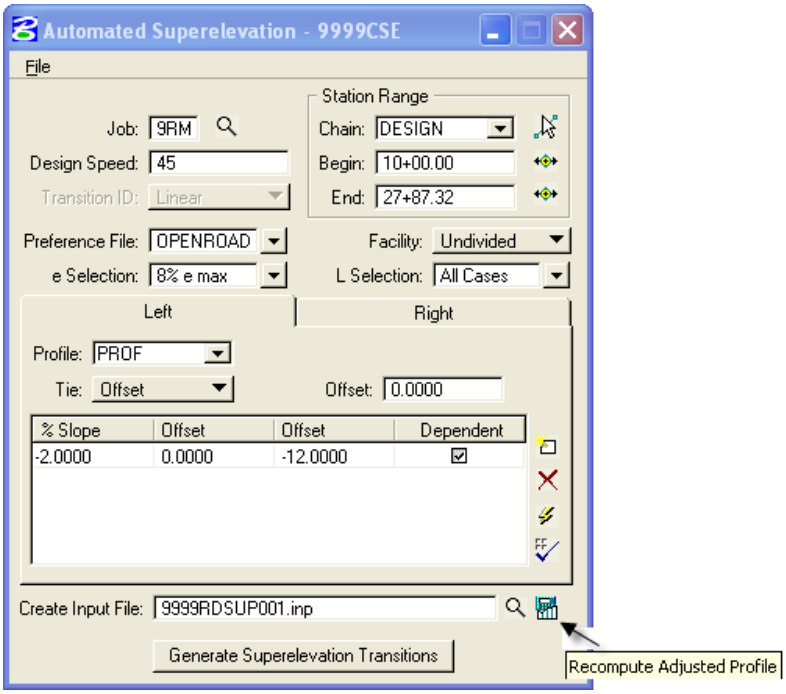


Before



After
Be sure to save the changes.

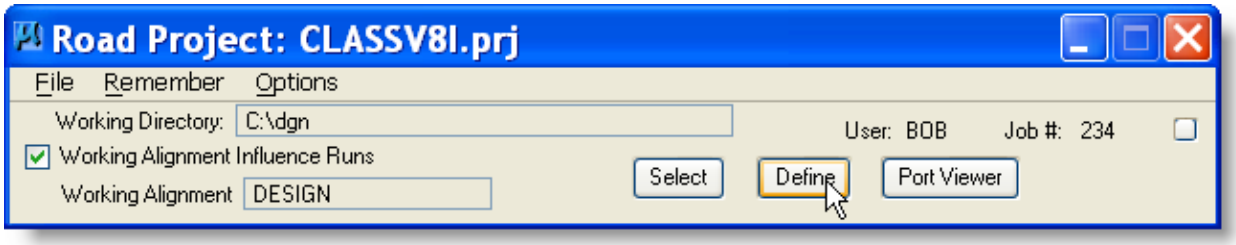
Draw the Super shapes and close the editor.



If you changed the original superelevation file input file then click on the Recompute Adjusted Profile button.

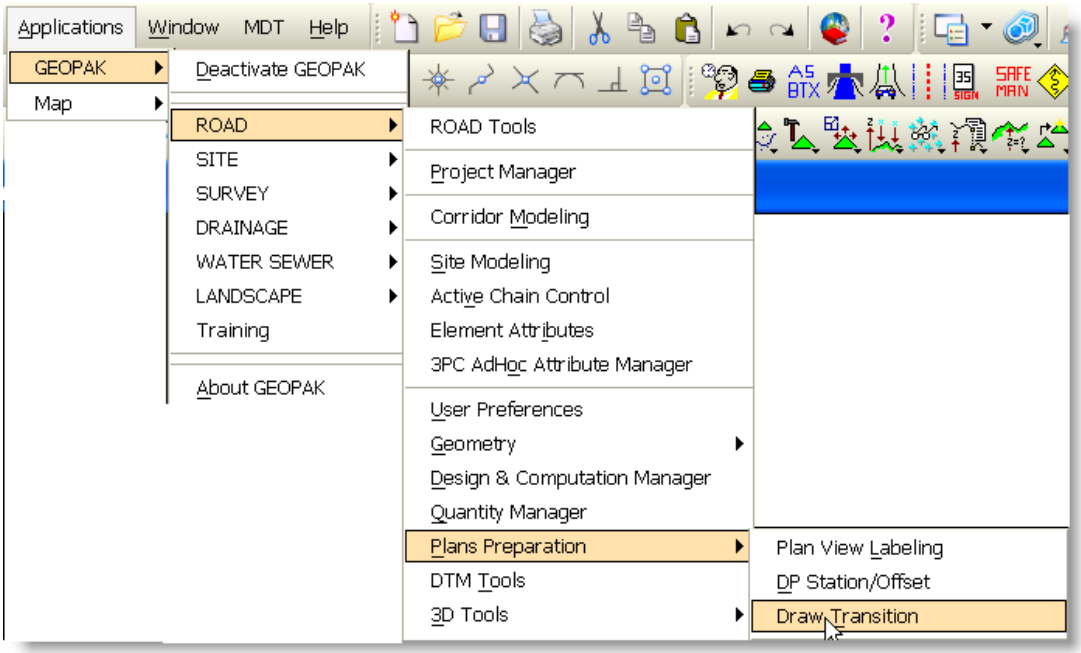
This updates the A profile file with the changes you entered in the generated superelevation input file.

Don't forget to keep the Working Alignment Definition up-to-date. (section 5).

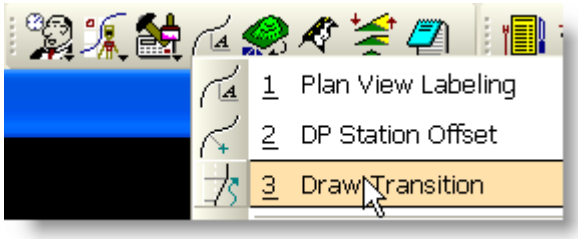


16 Draw Transition Data

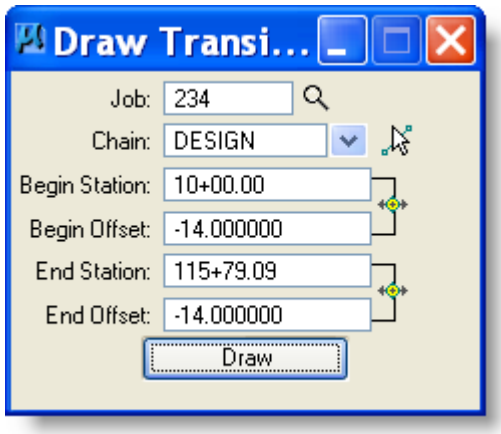
Applications > GEOPAK > ROAD > Plans Preparation > DRAW TRANSISTION



OR



Open **Draw Transition** Dialog from the Geopak Tools Menu.



If you are using Project manager the Job # and Chain will be filled-in.

Fill in:

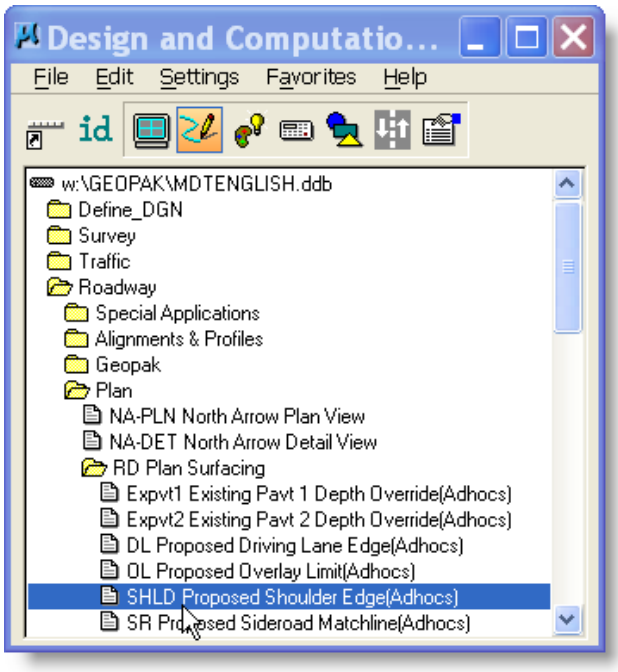
1) Beginning Station
2) Beginning Offset
3) Ending Station
4) Ending Station
5) Select Apply

Note: The Element that is drawn will be placed at the Active Symbology.

Geopak Help Online – Command Reference > Plans Preparations or F1 on active dialog

16.1 Draw Shoulder/Widening Areas

This example: Add 2’ shoulders for entire project.



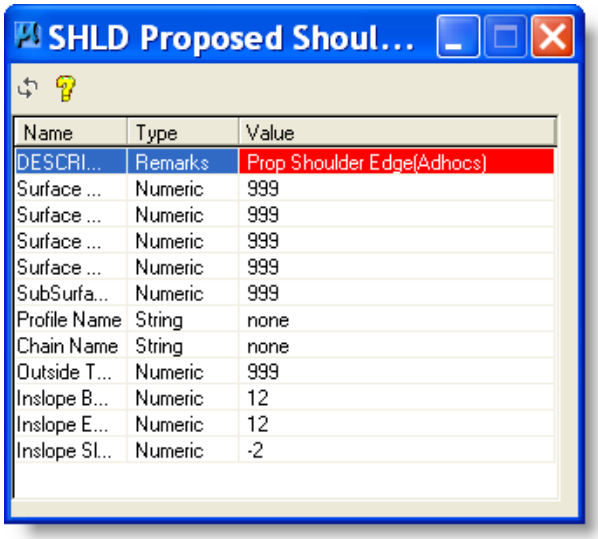
Step One

Select **Paved Shoulder**
D&C Path = Roadway/Plan/RD Plan Surfacing/SHLD

NOTE: Commonly used entries should be set up in your favorites.

Step Two

Check on Place Influence and Adhoc Attributes.

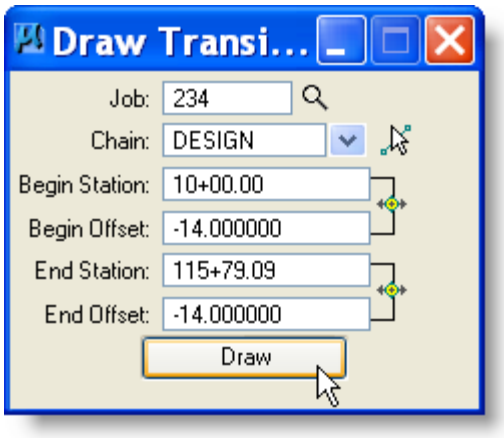


Step Three

Within the Adhoc Attribute setting window enter the appropriate values.

Hint: *This is the only place to enter the Inslope Widths.*

Note: For help select Question Mark



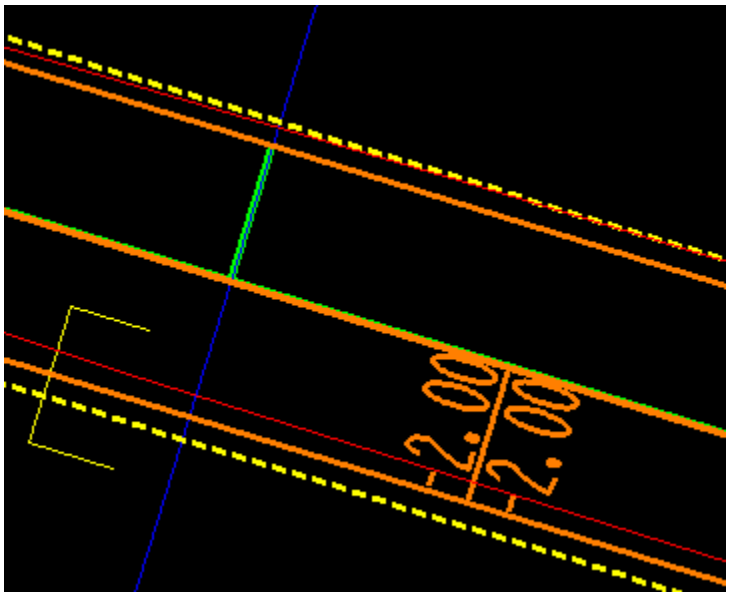
Step Four

Draw a MicroStation Element that represents the shoulder.

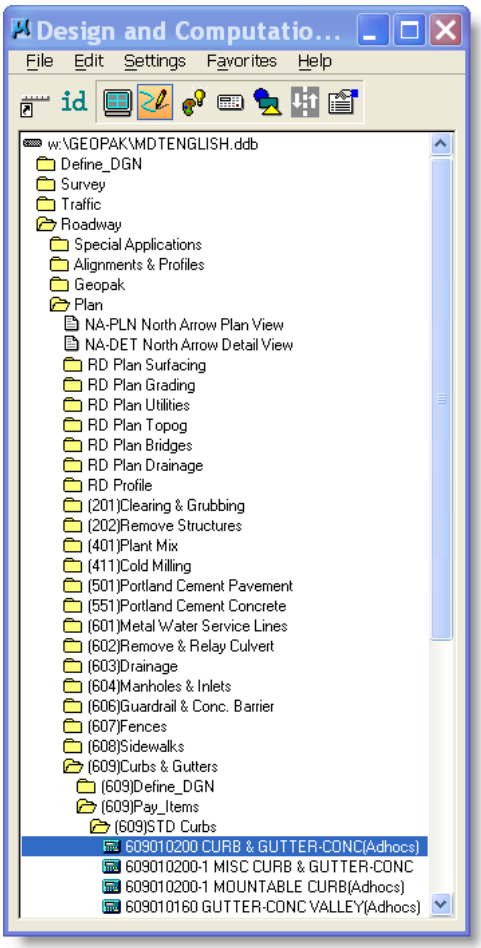
You may wish to use Draw Transition to place a line in the MicroStation map file that represents the shoulder of the new roadway.

Change offsets to + for other side of centerline.

This Example shows the Shoulder line that represents the shoulder point drawn 14’ from center line.



16.2 Curb & Gutter



Requirements

1) Graphical line that represents the Shoulder at the face of the curb and gutter.
2) Graphical line that represents the Curb & Gutter.

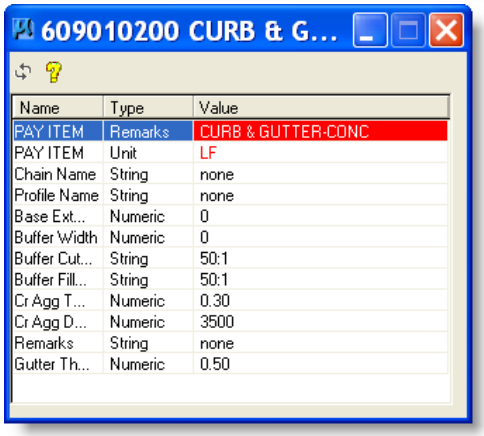
Step One

Curb and Gutter
D&C Path = Roadway/Plan/(609) Curbs & Gutters/(609) Pay_Items/(609) STD Curbs/609010200

NOTE: Commonly used entries should be set up in your favorites.

Step Two

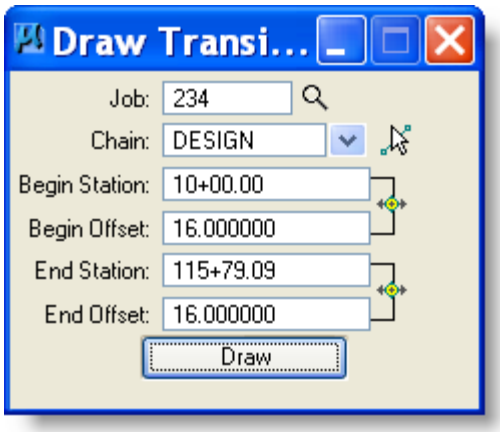
Check on Place Influence and Adhoc Attributes.



Step Three

Within the Adhoc Attribute setting window enter the appropriate values.

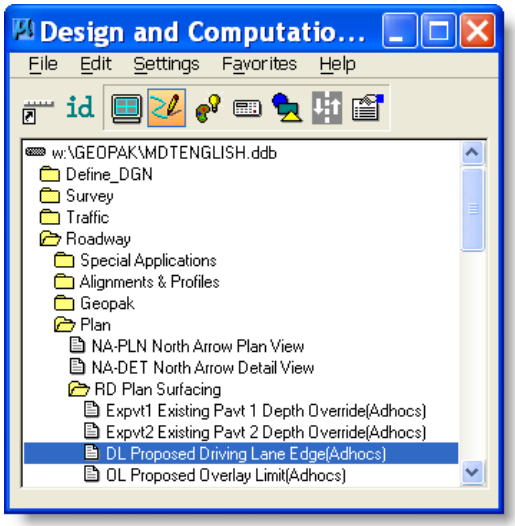
Note: For help select Question Mark



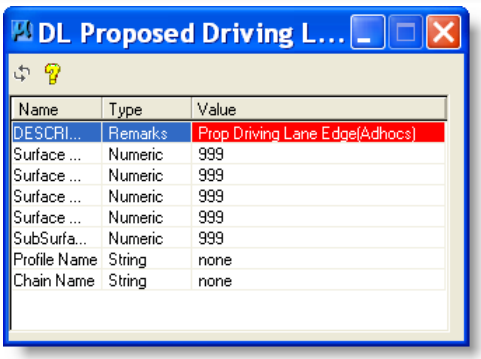
Step Four

Draw a Microstation Element that represents the Curb & Gutter.

Hint: When Drawing the Right Curb & Gutter put the Stations in backwards. Or use "Change Direction" keyin to reverse the Curb & Gutter line.

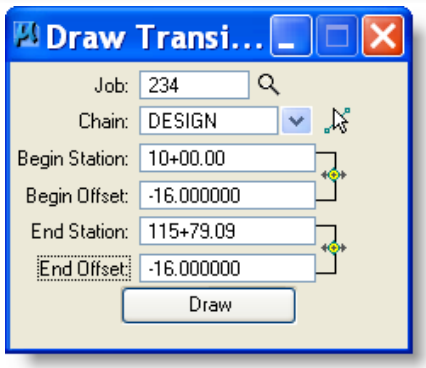


Step Five
Draw a MicroStation Element that represents a Driving Lane. *The Driving Lane line is required for the criteria to change from Asphalt to Concrete.*



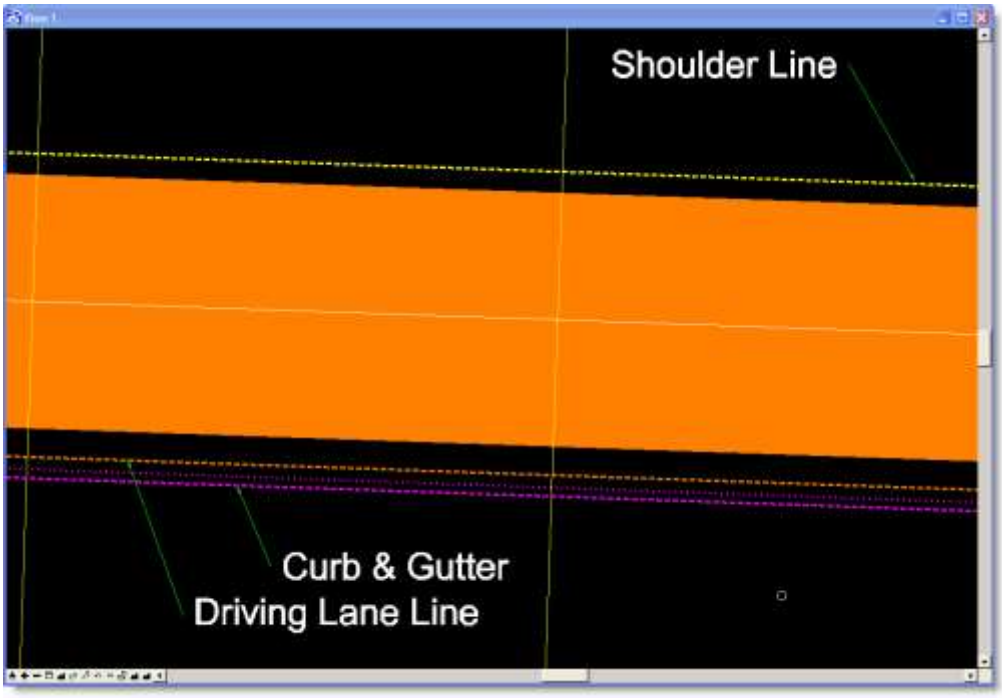
Step Six
Within the Adhoc Attribute setting window enter the appropriate values.

Note: For help select Question Mark

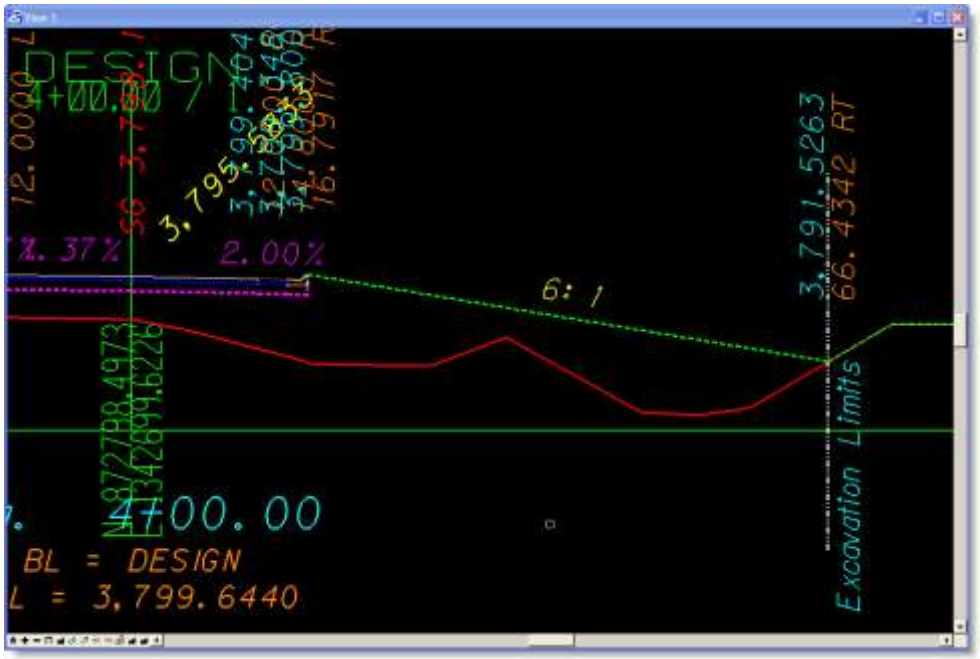


Draw a MicroStation Element that represents the Driving Lane.

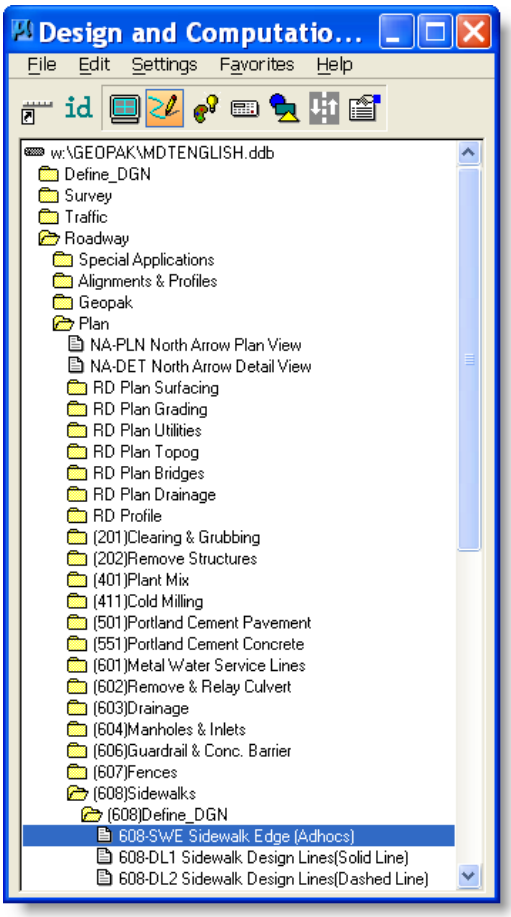
This Example shows the Curb & Gutter line that represents the face of curb drawn 15 feet from center line. Shoulder line is also draw at face of curb.

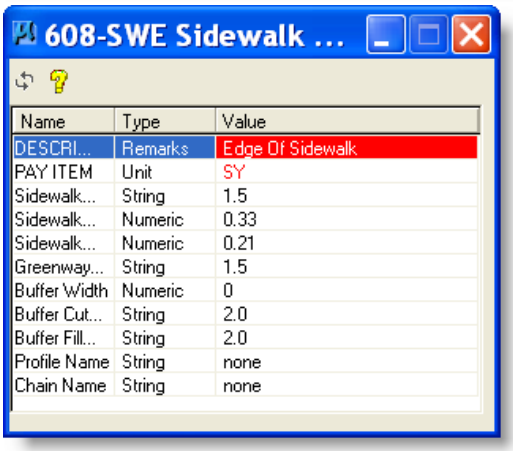


Completed process



16.3 Sidewalk





Requirements

1) Graphical line that represents the Curb & Gutter.
2) Graphical line that represents the Driving Lane.
3) Graphical line that represents the front and back of sidewalk

Step One

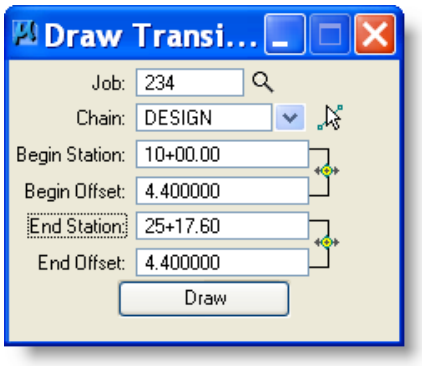
Select **Sidewalk**
D&C Path = Roadway/Plan/(608) Sidewalks/ (608) Define_DGN/608-SWE

Step Two

Check on Place Influence and Adhoc Attributes.

Step Three

Within the Adhoc Attribute setting window enter the appropriate values.



Step Four

Draw a Microstation Element that represents the Sidewalk.

Hint: Be sure to draw a line for front and back of sidewalk.

Note: For help select Question Mark

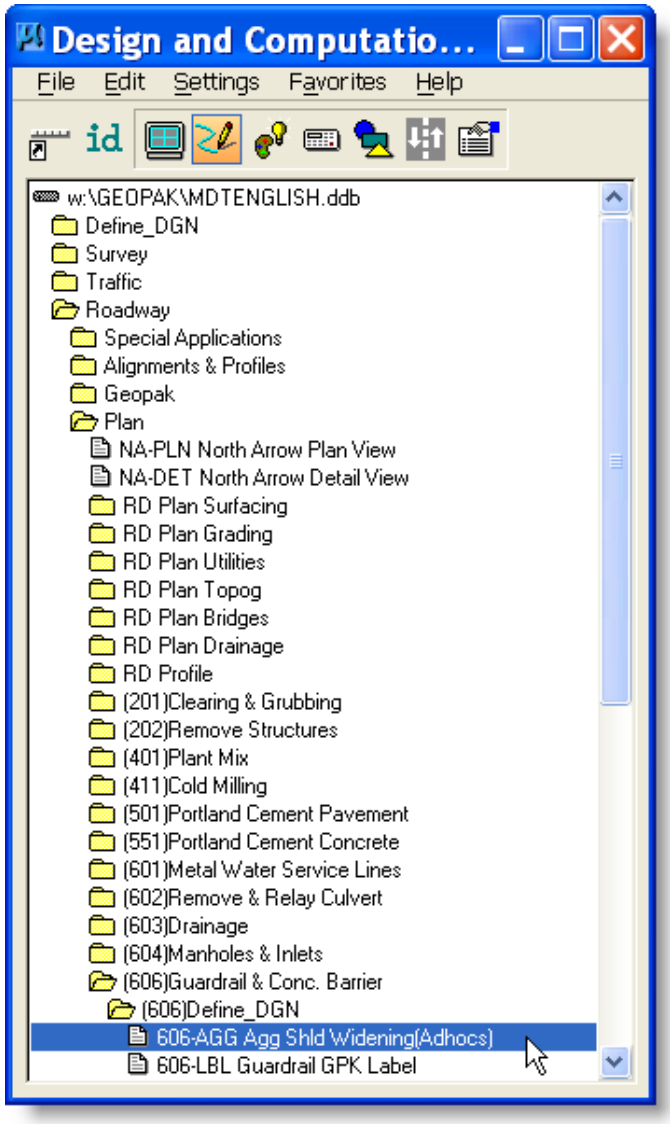
This Example shows the Curb & Gutter line that represents the face of curb drawn 15 feet from center line. Shoulder line is also draw at face of curb.

Completed process example:

16.4 Guardrail and Guardrail Widening

Requirements:

1) Graphical line that represents the Widening.
2) Graphical line that represents the Box Beam Guardrail.

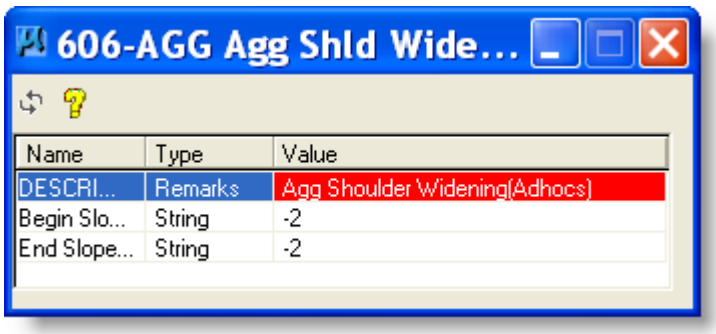


Step One

Guardrail Widening
D&C Path = Roadway/Plan/ (606)Guardrail & Conc. Barrier/ (606)Define_DGN/ (606)AGG Agg Shld Widening(Adhocs)

Step Two

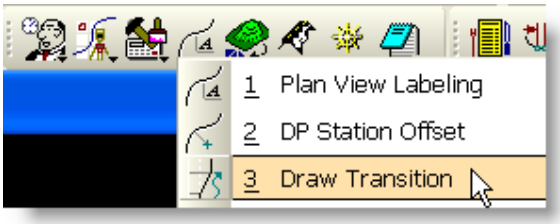
Check on Place Influence and Adhoc Attributes.



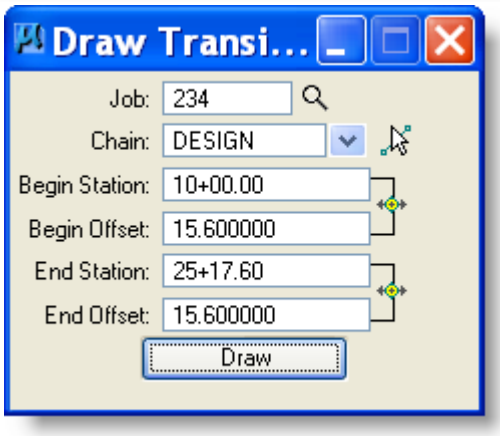
Step Three

Within the Adhoc Attribute setting window enter the appropriate values.

Note: For help select Question Mark

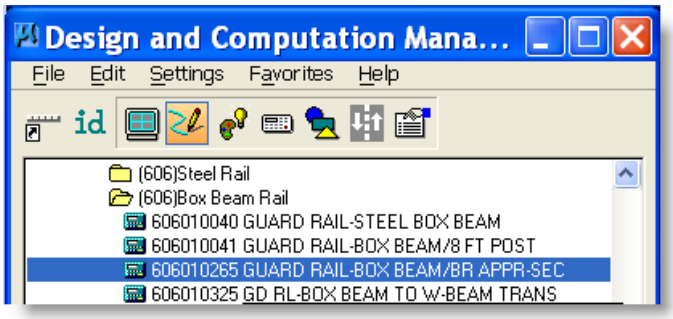


Initiate Draw Transition, if not active.



Step Four

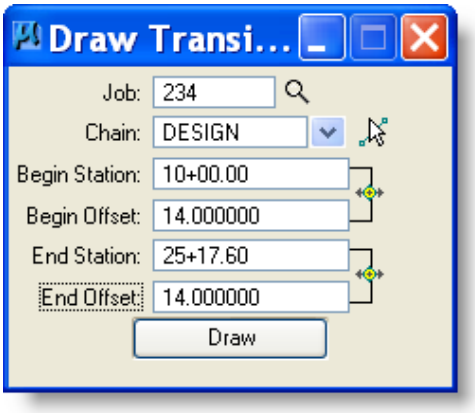
Draw a Microstation Element that represents the Guardrail Widening.



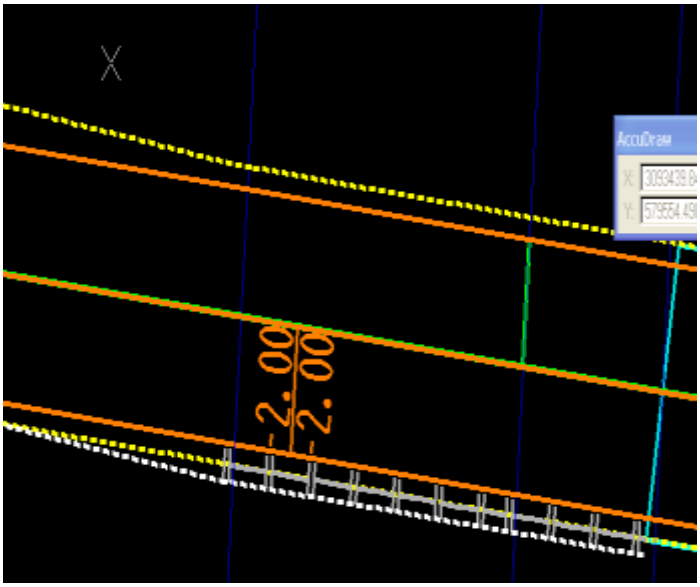
Step Five
Box Beam Guardrail
D&C Path = Roadway/Plan/ (606)Guardrail & Conc. Barrier/ (606)Pay_Items/ (606)Box Beam Rail/ 606010265 GUARD RAIL-BOX BEAM/BR APPR-SEC

Step Six

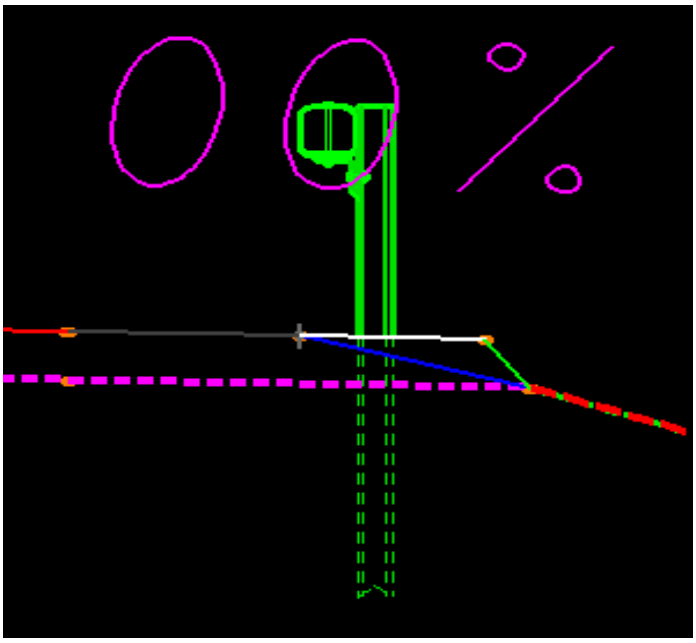
Check on Place Influence and Adhoc Attributes.



Step Seven
Draw a MicroStation Element that represents the Guardrail.



Example shows guardrail drawn on the shoulder and guardrail widening drawn 1.5' beyond the shoulder.

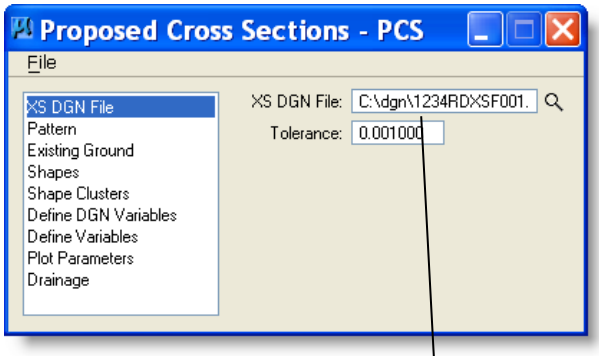


Example shows cross-section with box beam guardrail and guard rail widening beyond shoulder.

17 Proposed Cross Sections

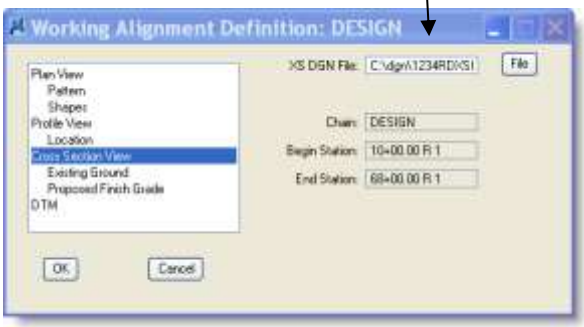
Because of the complexity of this process only the simplest method will be explained. This Method requires that the Geopak Project Manager DEFINE is used. (see Chapter 5)

In Project Manager Select **Proposed Cross Sections**

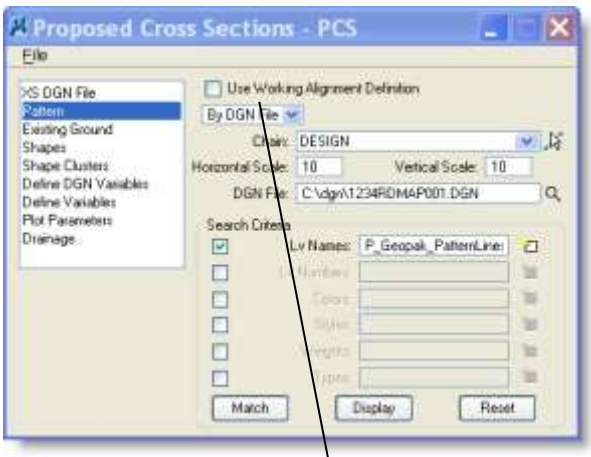


XS DGN FILE:

If you are using the Define Alignment this will fill-in the XS DGN File. This is file created for the existing cross sections. The tolerance defaults to .1, but should be changed to .001.
Note: Sometimes a super XS shows as flat (0 slope). Changing this to 0.01 or 0.015 may fix that problem.

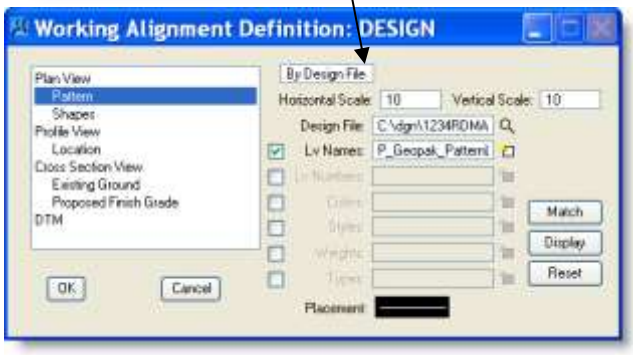


Example: Working Alignment Definition – Cross Section View

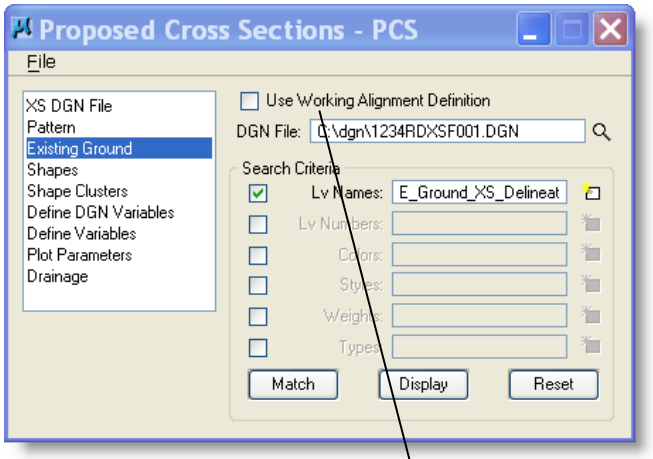


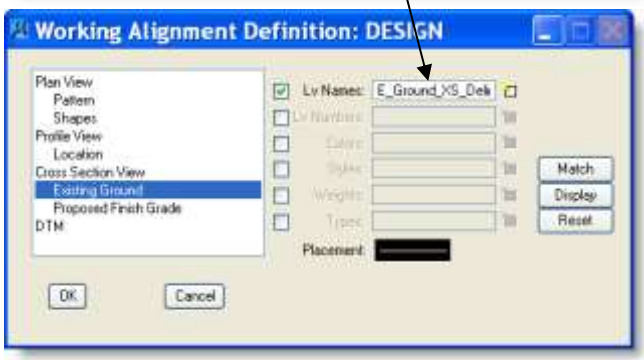
PATTERN:

Check "Use Working Alignment Definition" if you have defined this information.
Or
Fill-in The Chain, Scale & Design File.
Lv=P_Geopak_PatternLines_Design



Example: Working Alignment Definition – Plan View - Pattern

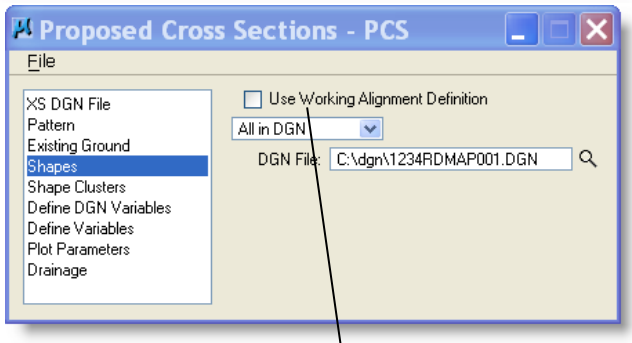


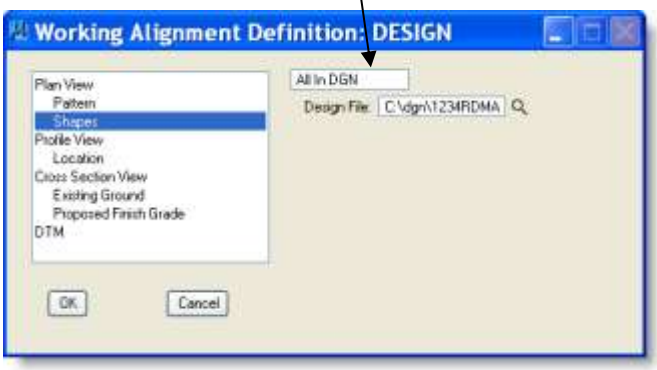


EXISTING GROUND:

Check "Use Working Alignment Definition" if you have defined this information.
Or
Fill-in the Design File where cross sections are located.
LV=E_Ground_XS_Delineation

Example: Working Alignment Definition – Cross Section View – Existing Ground

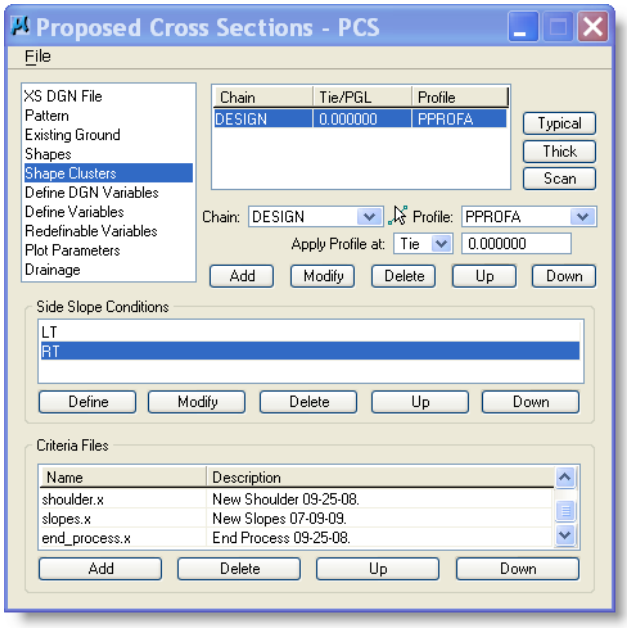


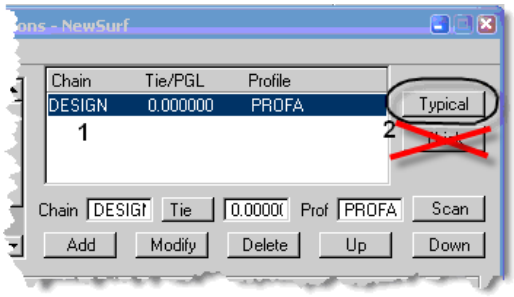


SHAPES:

Check "Use Working Alignment Definition" if you have defined this information.
Or
Fill-in Design File where the Super Elevation shapes were drawn.
Note: Existing features must always be run in shapeless mode.

Example: Working Alignment Definition – Plan View - Shapes





SHAPE CLUSTERS:

See Following Pages for 2 steps on filling out this dialog.

Note: Steps 1 & 2 can be done manually without the help of the Dialogs.

Shape Clusters Step 1

1) Select the **Scan** button and the **List of Clusters** dialog box will open.

2) Then select a shape cluster from the **List of Cluster** dialog.

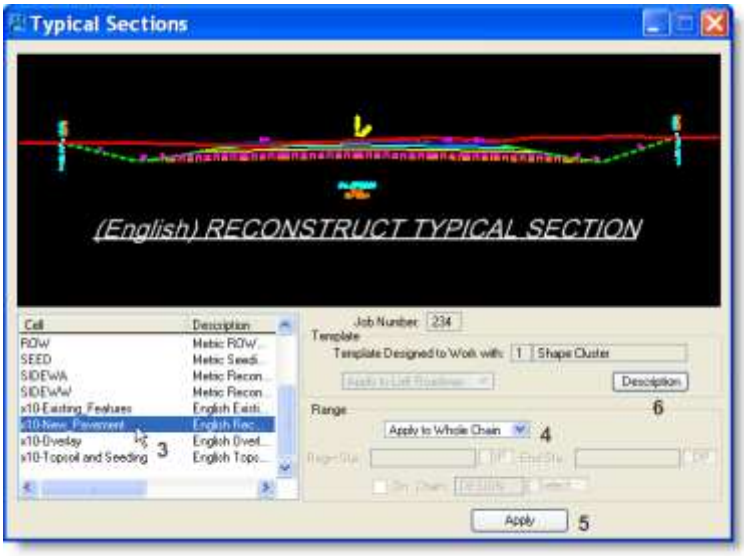
3) Select **Add** and the shape cluster will be added to the list to the left.

4) **Close** The **List of Clusters** Dialog.

Repeat for each Cluster until all clusters have been added.

Shape Cluster Step 2

1) Select one of the Clusters from the list
2) Select **Typical** Button
3) Within the **Typical Section** Dialog Select the Cell name of the Typical that best fits your typical section. (next page)
4) Select range of application
5) Select the **Apply** button
6) For HELP click Description



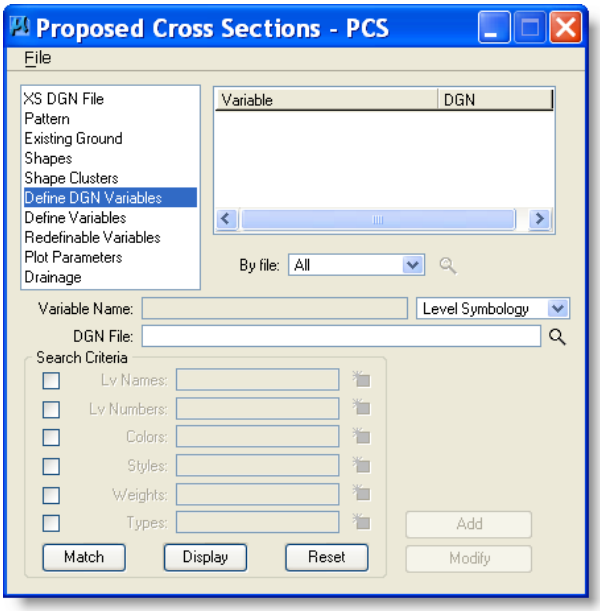
7) Repeat for each Cluster

Note: Thick button is no longer used.

This fills in the Side Slope Condition for this Cluster and also Criteria Files for both the Left and Right Side Slope Condition

NOTE: With criteria there are only 4 typicals that may be used for English projects - x10's – existing features, new pavement, overlay and topsoil & seeding.

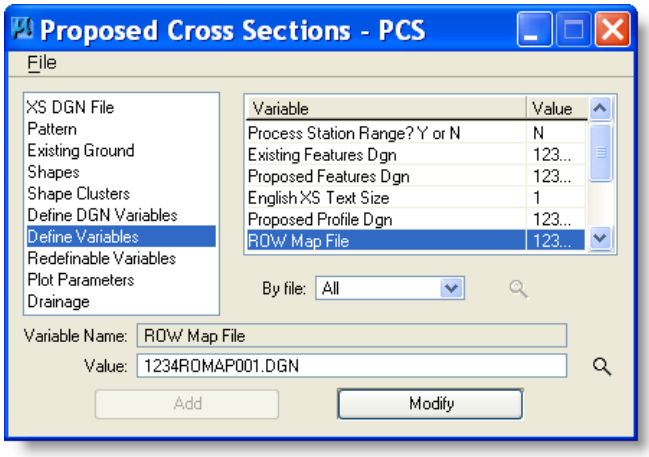
ANY OTHER SELECTION MAY CAUSE UNPREDICTABLE RESULTS!



DEFINE DGN VARIABLES:

Bypass Define DGN Variables.

Note: Using the new Criteria files the widening area can be done with graphical elements in the Microstation map file. There is no need to define them.



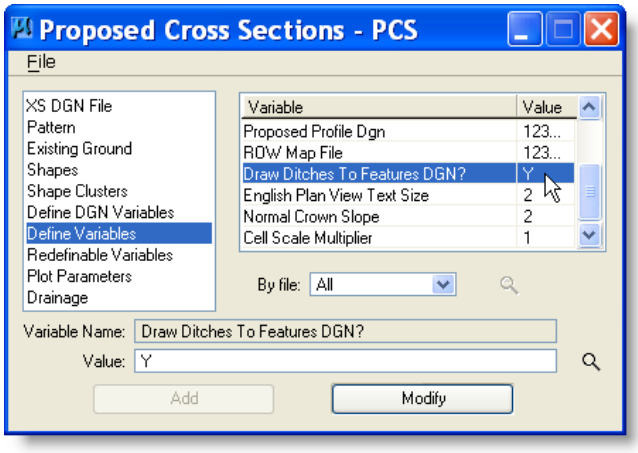
1) Select the variable to change.

2) Type the new **Value**.

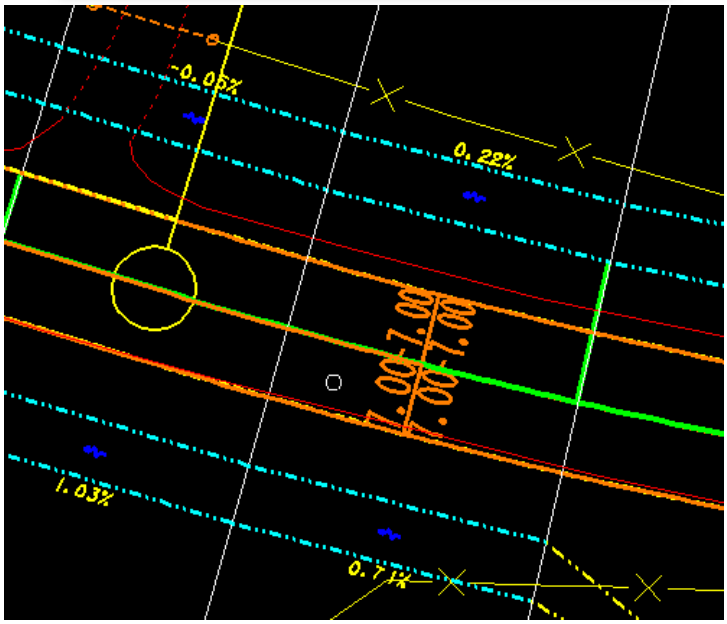
3) Select **Modify** to change **Value**

4) Enter all dgn files you have available for the project.

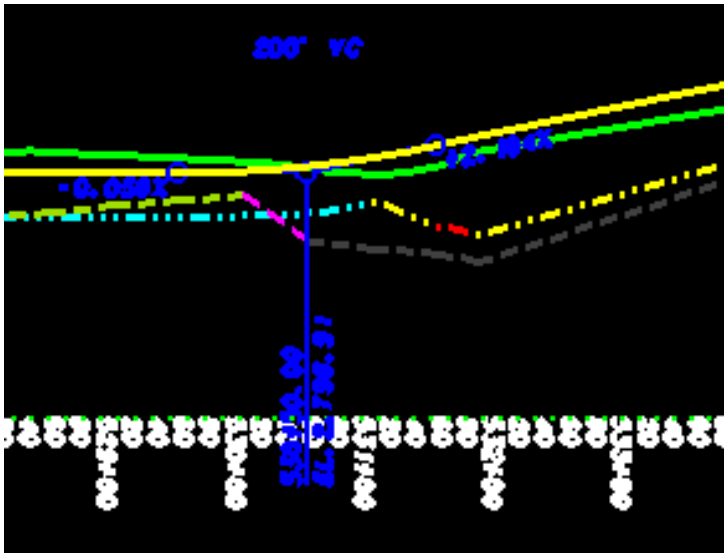
5) Change English XS Text Size to 1.0 or something that looks good with all of the text generated. An example of all the text generated is on page 16-7.



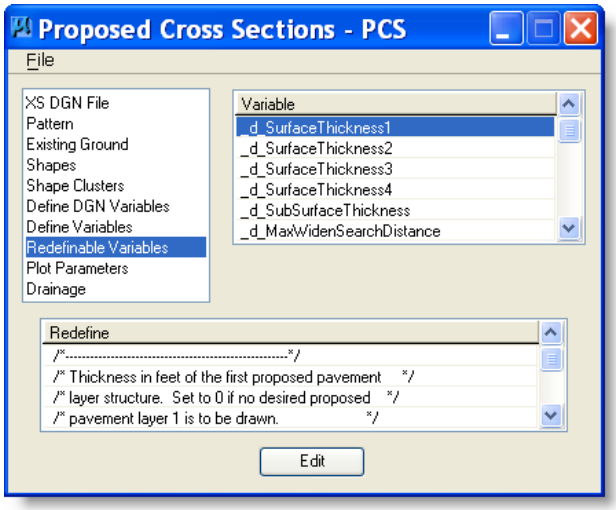
Setting the Draw Ditches to Feature DGN to 'Y' will result in drainage showing on the map and profile.

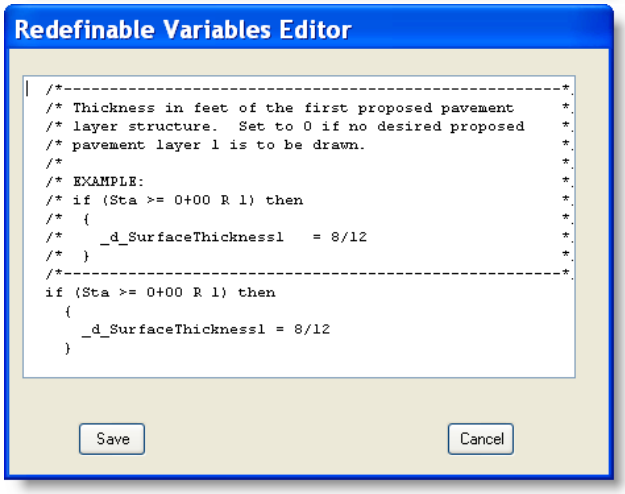


Results shown in the map file



Results shown on the profile.





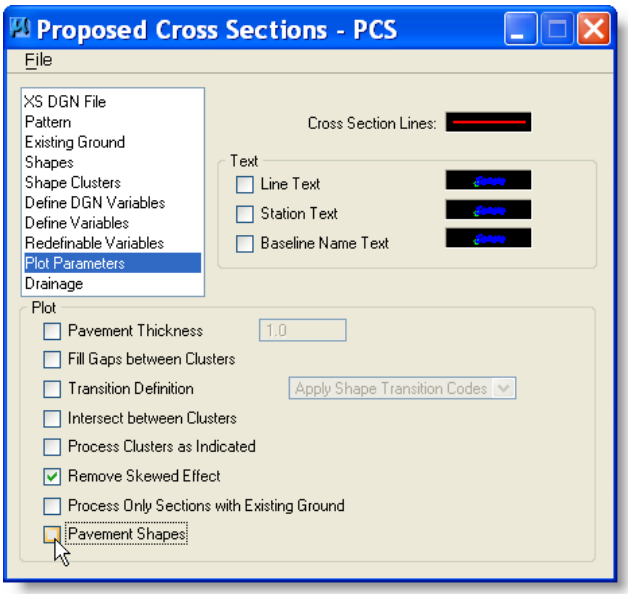
1) Select the variable to change.

2) Select **Edit**.

3) Change the Value

4) Select **Save** to update

NOTE: The top surfacing layer can be either dirt or plant mix it does not matter to Geopak except in the way the criteria is set up. If you only have one layer you must use the first layer otherwise it will not place the correct line at the bottom of the surfacing layer for Geopak to calculate it correctly in Earthwork.



1) Set the XS Lines symbology to LV= Default

2) Remove all the checks from the Plot area.

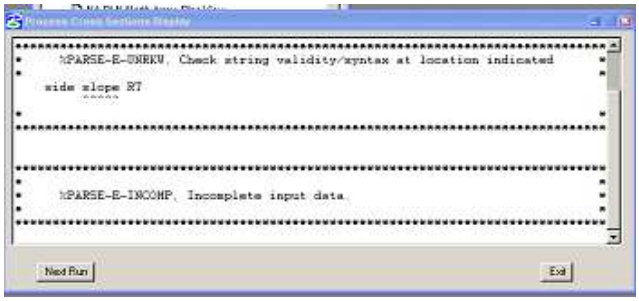
3) CHECK Remove Skewed Effect*

4) File > Save Settings

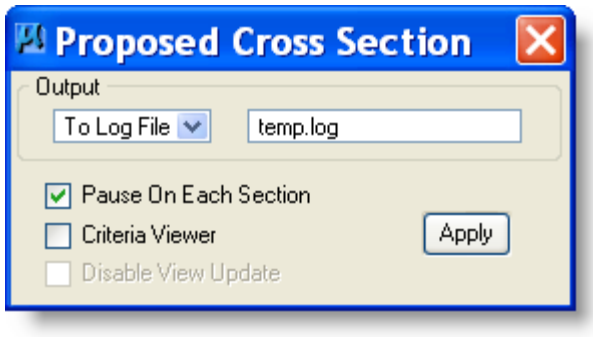
5) File > Run

A new entry is available – pavement shapes – this plots the proposed pavement lines – before these were *always* plotted, now you have the option to turn the pavement lines off.

* You may not want to check remove skewed effect if you need actual calculated slopes to show. Not checking it may also cause an error – see next page - one of Geopak's quirks.



*This is the error received when Remove Skewed Effect is causing the problem. If checked, uncheck it…If not checked, check it…Then run again.

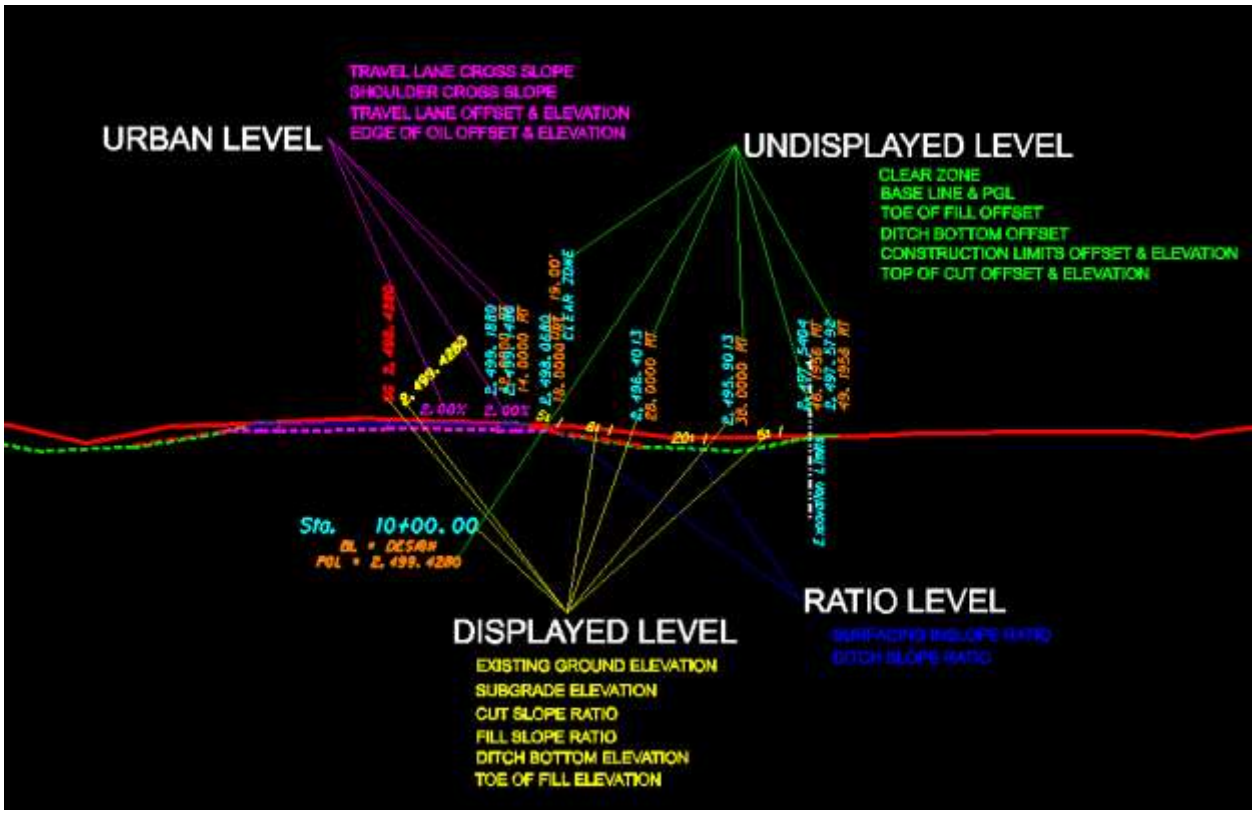


Click File > Save Settings then RUN

Output to log file and Pause on each section.

Check the first station and, if OK, remove pause check and continue.

Completed Process Example:

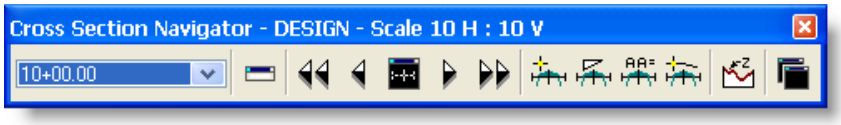


Text here is set to 1 via English XS Text Size in Definable Variables.

17.1 Review or Label Cross Sections

17.1.1 Review Cross Sections

Open **Cross Section Navigator**



Use this dialog to move around within the working cross section file and find a specific cross section.

When this dialog is opened it will automatically search for all the cross sections in the design file.

The double arrows take you to the beginning and end stations

The single arrows will take you forward or backward one cross section at a time.

The small window Button will reset the navigator and returns the user to the first section.

17.1.2 Cross Section Labeler

Open the **Cross Section Labeler**

1) Select Identify Element or DP

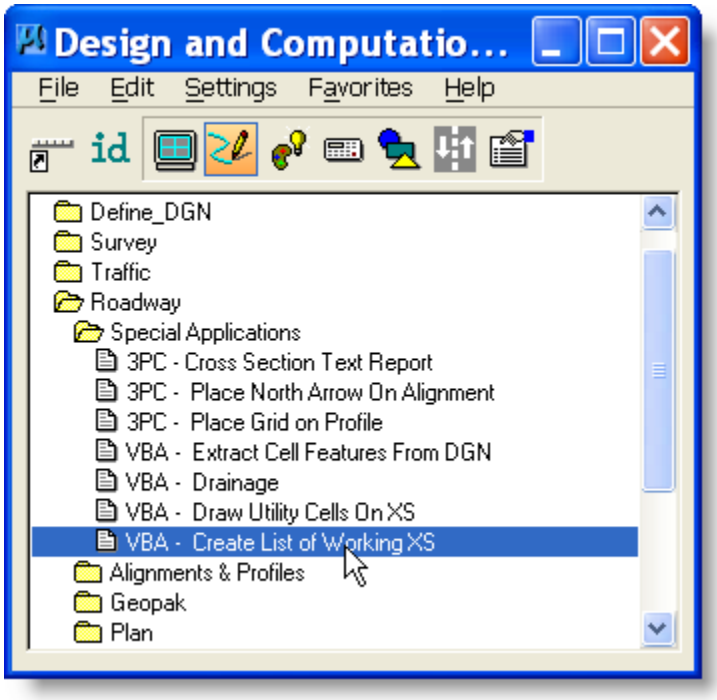
2) Set the Parameters to place the Label or Open and select an existing Style.

3) Place the Label

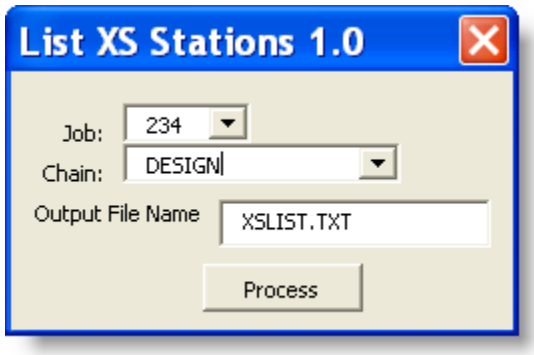
Note: See the Geopak Help Online – Command Reference > Cross Sections

17.2 List all Stations with Working Cross Sections

Open the cross section file for your project: XXXXRDXSF001.DGN
Open D&C Manager and click the Design icon.

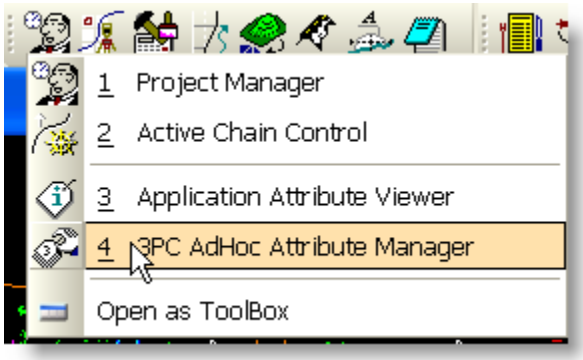


Double click on Roadway > Special Applications > VBA-Create List of Working XS
Brings up this dialog window so you can enter the job, chain and the output file you wish to create.

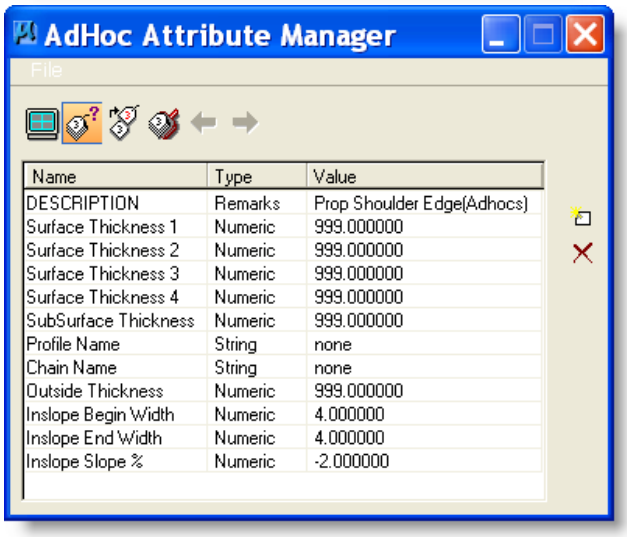


Click Process and this window shows what results were found and the file created in c:\dgn.

18 Adhoc Attribute Manager



Open Adhoc Attribute Manager From Application Menu.
Note: It's a good idea to close the D&C Manager while using the Adhoc Manager. Otherwise, your symbology may not be what you are expecting.



Use the Adhoc Attribute Manager to change the "smart" lines.

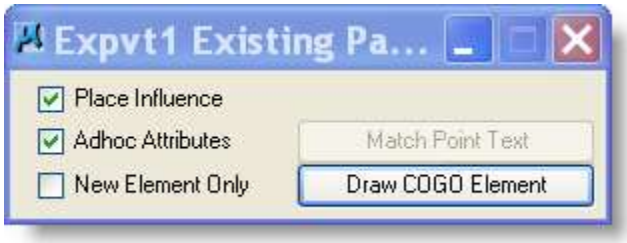
1) Make sure preferences are set to **replace**.

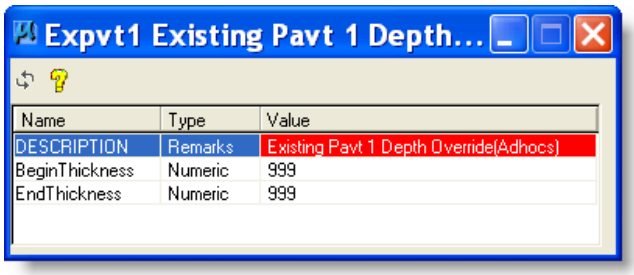
2) Click Identify Element and select the line to be changed.

3) Make changes as needed to the attributes

4) Click Set Attributes

18.1 Editing Adhoc Attributes



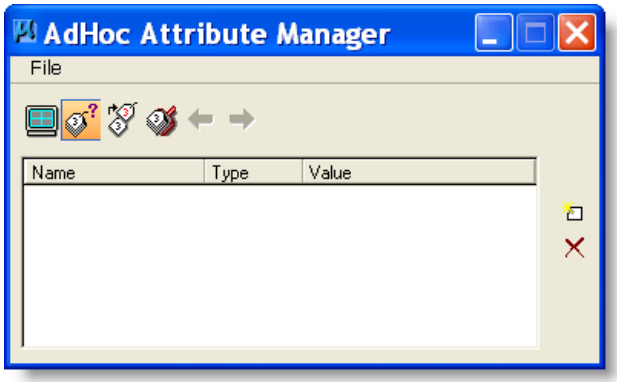


On certain Design and Computation elements used by the criteria the user has the option of assigning AdHoc Attributes to the element in order to directly control the criteria. The Adhoc Attribute's options will become visible to the user when the Adhoc Attributes option is selected when drawing with D&C and using the D&C Tool Settings:

NOTE: Entered attributes override any Redefinable Variables entered when doing proposed cross-sections.

18.2 Changing Adhoc Attributes

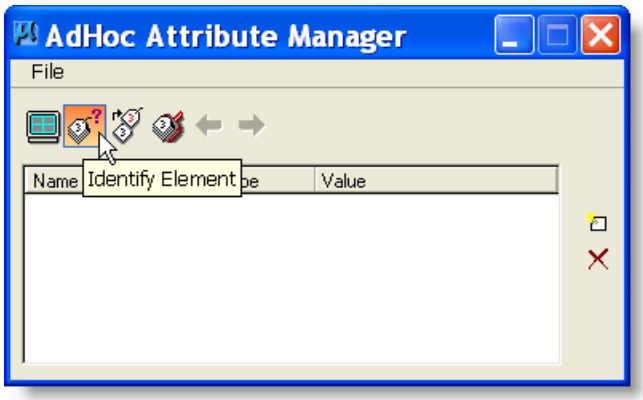
Once an element has been drawn to the plan view using Design and Computation manager, it may be desirable to revise certain adhoc values. The following steps should be followed to change the attributes of an element already placed in the design file.



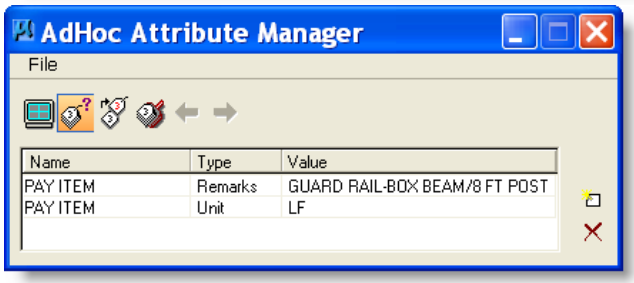
1. On the MicroStation top menu, open **APPLICATIONS > GEOPAK ROAD > GEOPAK 3PC ADHOC ATTRIBUTE MANAGER**.

This dialog will appear:

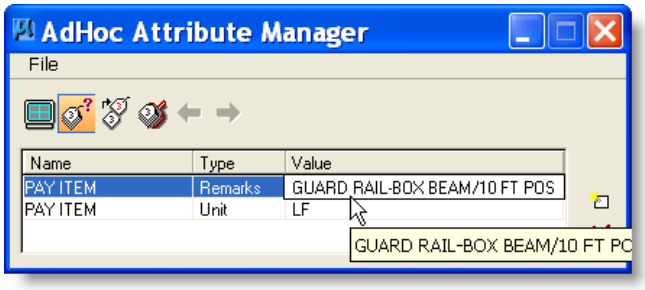
2. From the File pull down menu select Preferences and change the Set Mode to Replace as shown in this dialog.



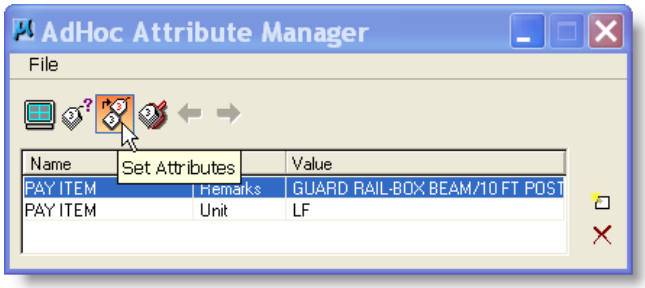
3. Select the icon to identify the plan element that contains the AdHoc Attribute(s) to be revised.



4. Select the plan element with a left mouse click and accept with a second mouse click to populate the dialog with the current adhoc attributes of the element. The dialog will now look something like this:



5. Revise the value of the adhoc(s) in the dialog to the new desired value by clicking on the current adhoc setting and type in a new value and press enter or tab to accept the change.



6. Select the icon entitled "Set Attributes" and then left mouse click on the plan element(s) that require the change and left click a second time to accept the change. The attributes should now be changed.

IMPORTANT: Design and Computation Manager's "Place Influence" MUST be turned OFF to be able to change adhoc attributes.

19 Earthwork

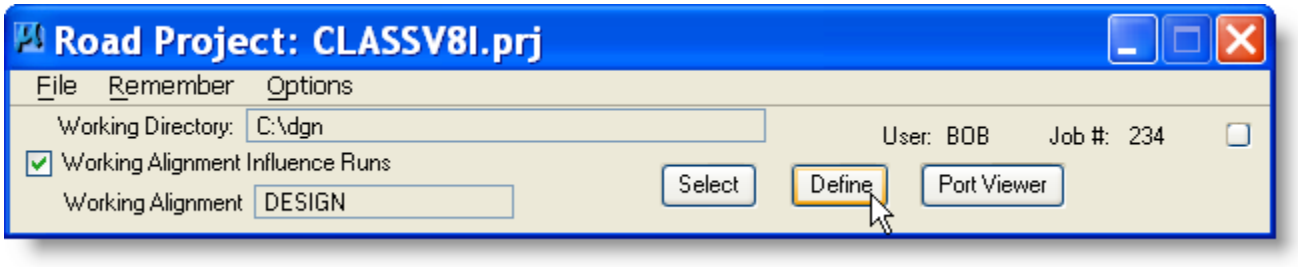
19.1 Earthworks Dialog

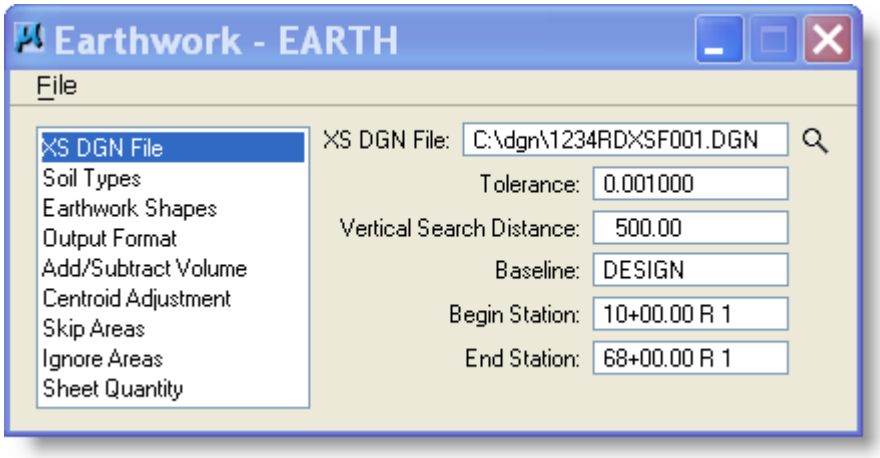
This Method will require that the Geopak Project Manager be used.

In Project manager Select **Earthwork**

After the Select Run Dialog opens **copy** the DEFAULT project and DEFAULT user to create a new run.
For more information see page 6-2

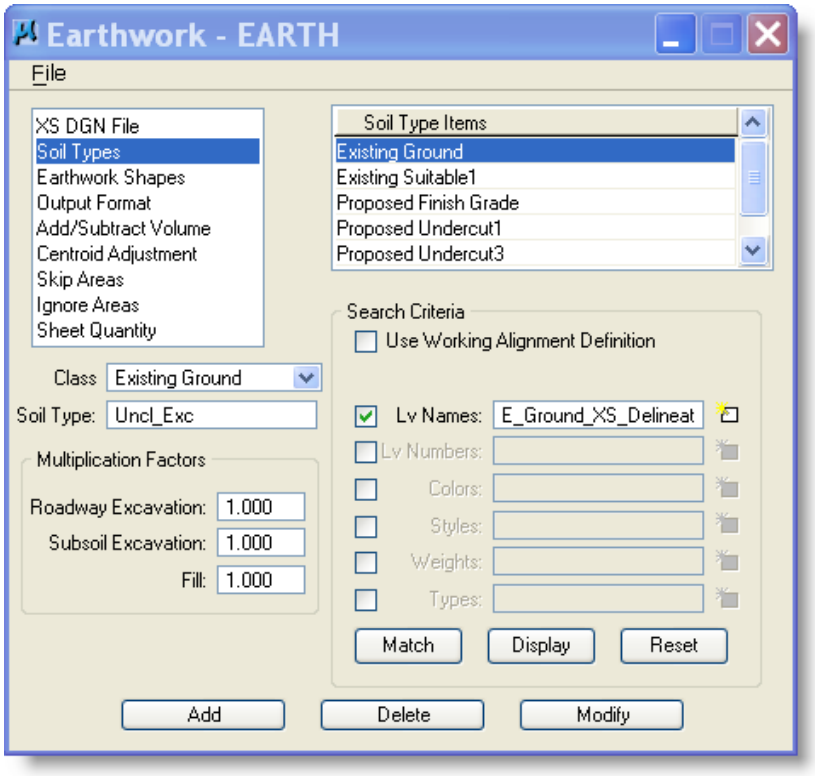
HINT: Because most of the information within these dialogs is standard it is much easier to **copy the information from the DEFAULT Project and DEFAULT User within Project Manager.** Doing this requires the Project Working Alignment Definition be up-to-date. (section 5).



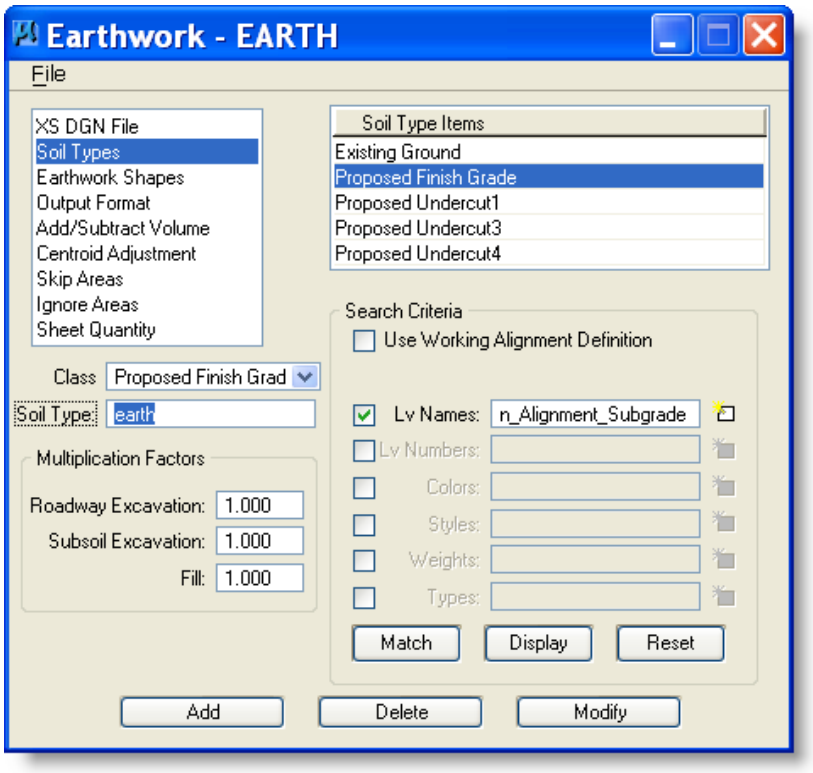


If you are using the Define Alignment this will fill-in the XS DGN File Baseline and the Begin and End Station.

If you copied this run from the Default project all of the Dialog will be filled in.



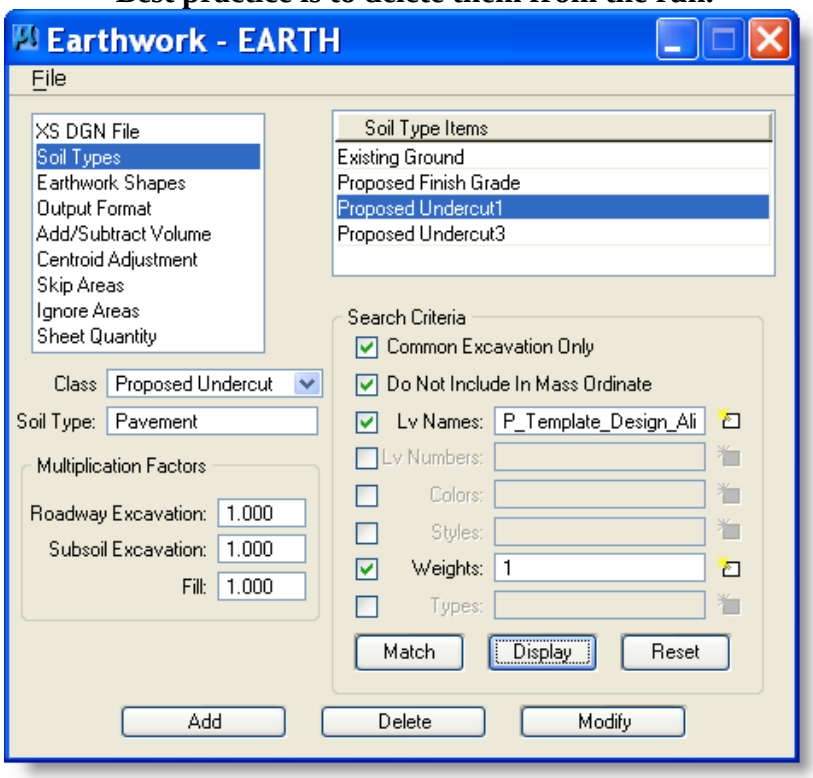
1) Select Existing Ground
2) Soil type is "Earth"
3) Multi-Factors are all 1.
4) Uncheck "Use Working Alignment Definition"
5) Select level name E_Ground_XS_Delineation
6) Click Modify to update.



1) Select Proposed Finish Grade.
2) Soil type is "Earth"
3) Multi-Factor is 1.2 for Fill.
4) Uncheck "Use Working Alignment Definition"
5) Select level names P_Template_Design_Alignment_FinishedGrade & P_Template_Design_Alignment_SubGrade.
6) Select Styles 2.
7) Click Modify to update.

Using Proposed Undercuts may produce unpredictable results with the Cut/Fill of the Existing Ground and/or Proposed Finished Grade.

Best practice is to delete them from the run.



1) Select Proposed Undercut1.

2) Soil type is “Pavement”

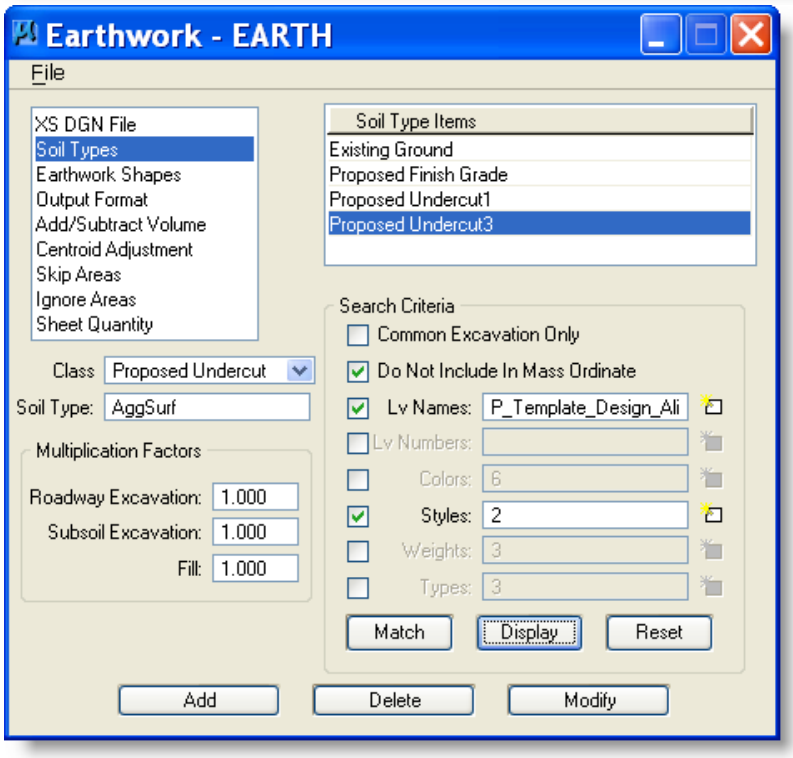
3) Muli-Factors are all 1.

4) Check “Do Not Include in Mass Ordinate”.

5) Set Search Criteria as shown, set level to P_Template_Design_Alignment_Subgrade.

6) Set weight to 1

7) Select Add for new or Modify to update



8) Select Proposed Undercut2.

9) Soil type is “AggSurf”

10) Multi-Factors are all 1.

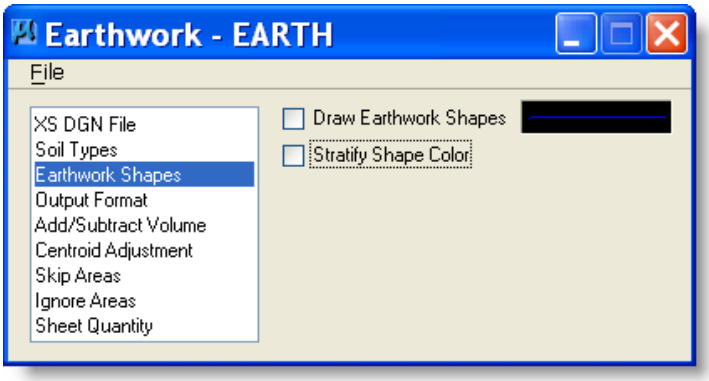
11) Check “Do Not Include in Mass Ordinate”.

12) Set Search Criteria as shown, set level to P_Template_Design_Alignment_Subgrade.

13) Set Style to 2

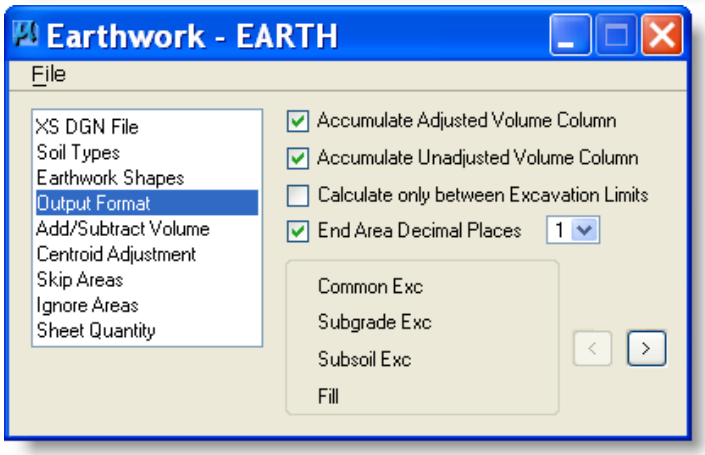
14) Select Add for new or Modify to update

You can do pavement and aggregate manually. (See road manual) But, if you must, the above shows how to use Undercuts.

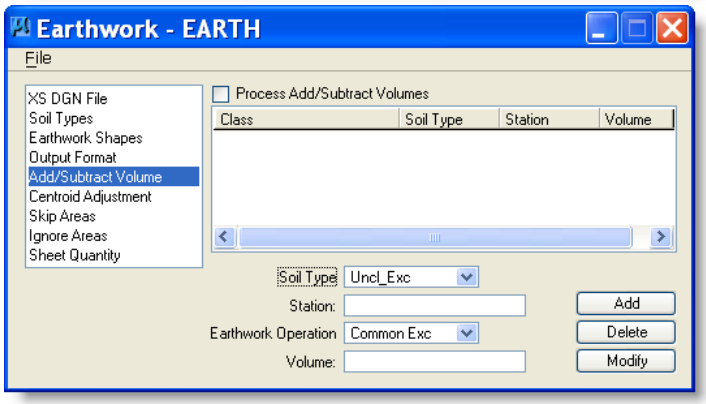


If you copied this run from the Default project all of the Dialog will be Filled in.

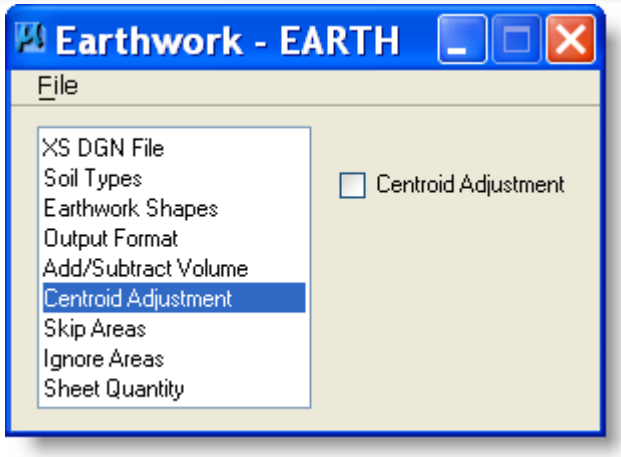
If you want the shapes to show then check Draw Earthwork Shapes.



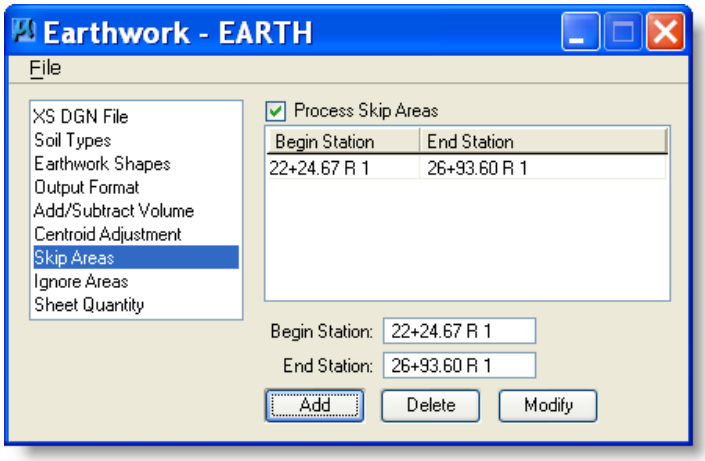
If you copied this run from the Default project all of the Dialog will be Filled in.



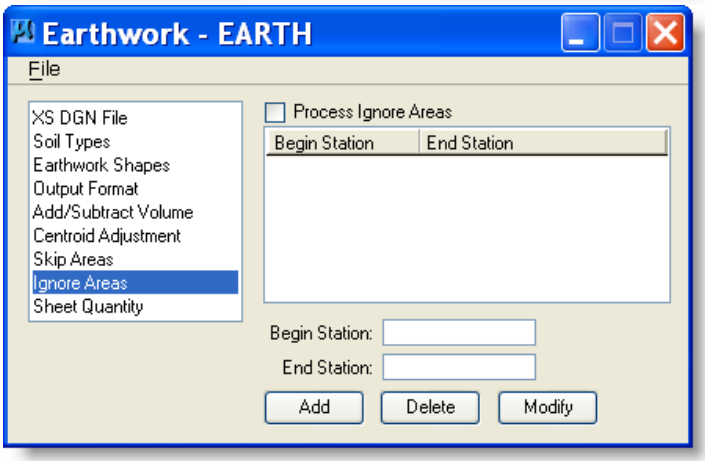
This dialog can be used to add additional quantities to the earthwork run.
Select Process Add/Subtract Volumes for Topsoil, Digouts and/or Approaches. Make sure you add the stations where volumes are to be adjusted.



If you copied this run from the Default project all of the Dialog will be Filled in.

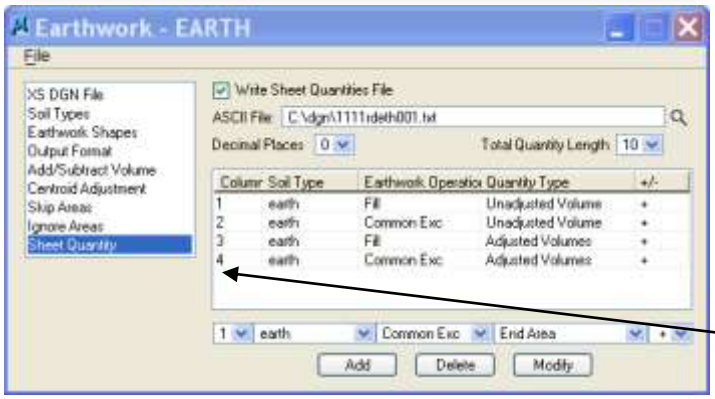


If you copied this run from the Default project all of the Dialog will be Filled in.
Skip Areas to be defined for the class project – this is the bridge area.
Enter begin and end stations and click on Add.
Click in the Process Skip Areas check box.

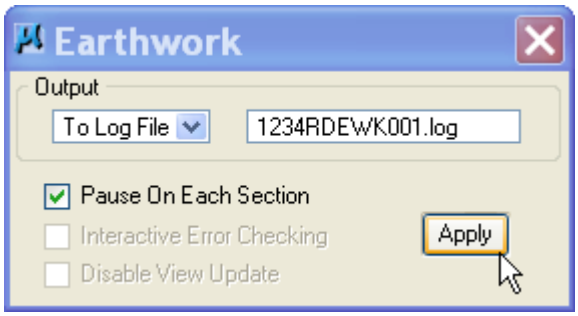


If you copied this run from the Default project all of the Dialog will be Filled in.
To be used for areas earthwork is to be ignored.

Skip or Ignore – either works



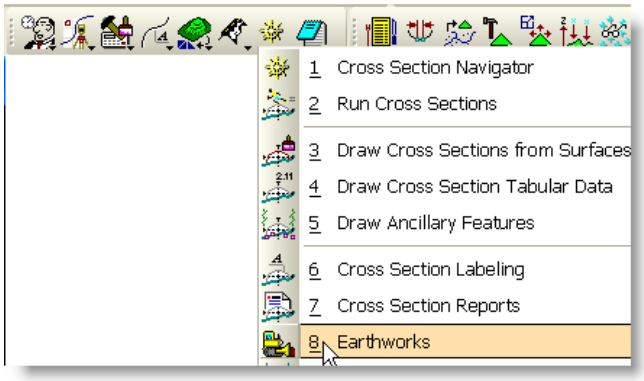
If you copied this run from the Default project all of the Dialog will be Filled in.
Click the spy glass to find the correct earthwork text file.
To combine quantities change the column #.



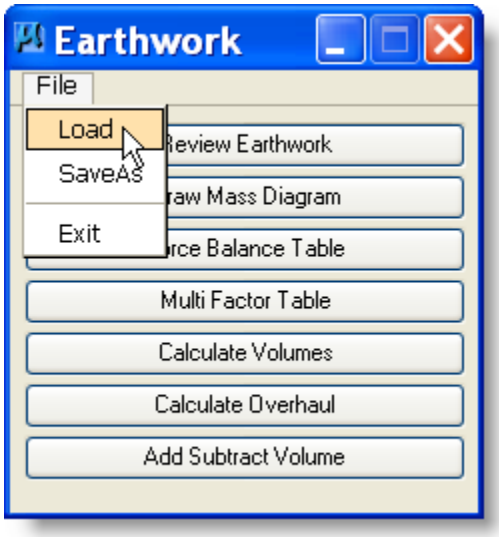
From the **Earthwork** Dialog select Files > Run to process the earthwork run.
Be sure to save a Log File.
Pause on each section allows you to look at the earthwork on each cross section. If you do not wish to pause, turn the switch off.

After the earthwork has run to completion, go to **EARTHWORKS**.
Applications > Geopak Road > Cross Sections > Earthworks

19.2 EarthWork Volumes



Open **Earthworks**



This dialog box will open empty.
Go to **FILE-LOAD** and load the log file that was created from the Earthwork Run.

This will bring up the buttons.

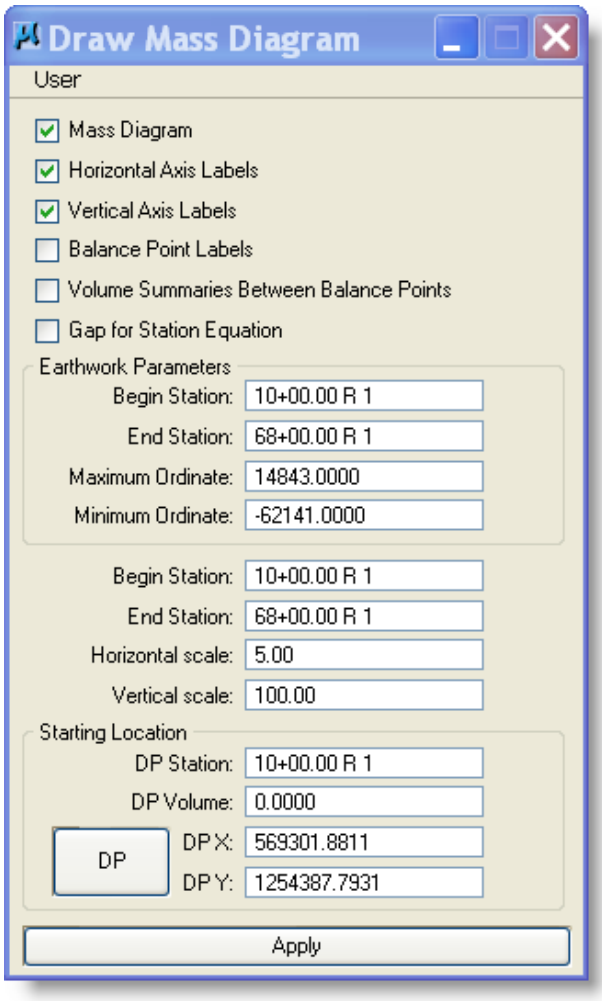
The log file will let you draw the mass diagram. This can also be edited using the EARTHWORKS program.

You can draw the Mass Diagram to find out what the unadjusted volumes look like.

You can add & subtract volumes, vary multiplication factors, and force balances.

Calculating volumes will create a new .log file.

19.3 Drawing Mass Diagram



Click on **DRAW MASS DIAGRAM** button

Because to date we have no standards for how Mass Diagrams should be set up and Mass Diagrams are very individual by project, settings will be up to your discretion.

User - opens dialog boxes for the settings of the elements on the mass diagram.

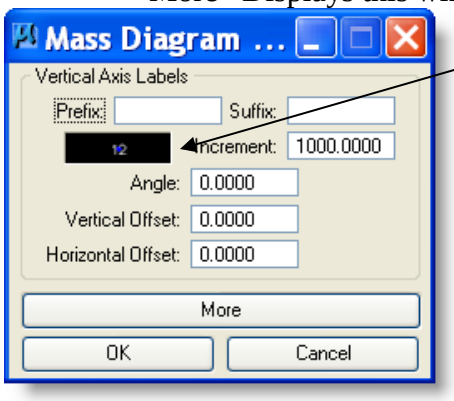
The switches turn different elements on and off.

Parameters - lists information about the earthwork.

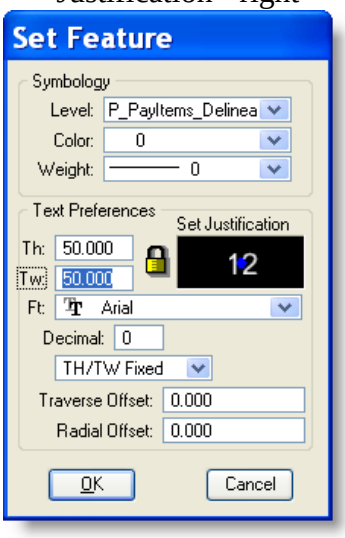
Stations and scale allows you to set the length and size of the diagram.

DP - allows you to set beginning station, volume, and coordinate.

USER > Preferences > Mass Diagram Preferences > More Displays this window.



Double-click black box
Symbology Text size = 50
Set Increment = 1000.00
Justification - right



19.4 Add & Subtract Volume

This dialog box allows you to add positive or negative volumes.

If you make a mistake highlight the line and select delete.

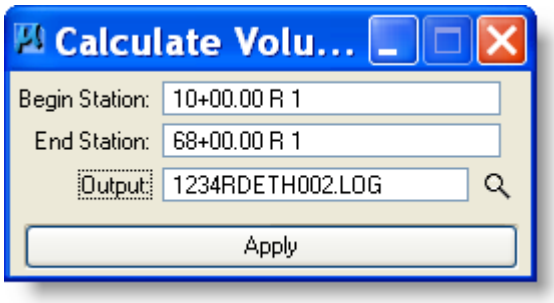
When you are done close the window using X..

19.5 Multifactor Table

This dialog box will allow you to adjust multiplication factors by station.

Simply highlight a line, type in the new station range and multiplication factor and hit Add. This automatically adjusts the stations. Now exit by selecting the X.
When you are done adjusting the earthwork, click on **CALCULATING VOLUMES.**

19.6 Calculating Volumes



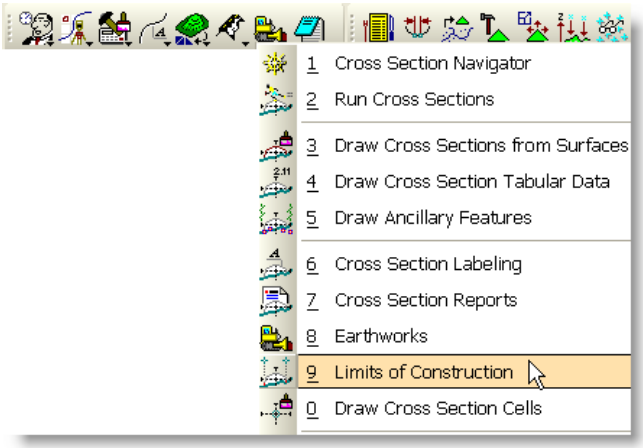
Make sure the output file name is different from the original .log file name.

Click on calculate. Make sure you check the calculations from this process, as Bentley has logged a defect associated with this 10/29/10.

When this is finished running, go back to **FILE-LOAD** and load this new file.

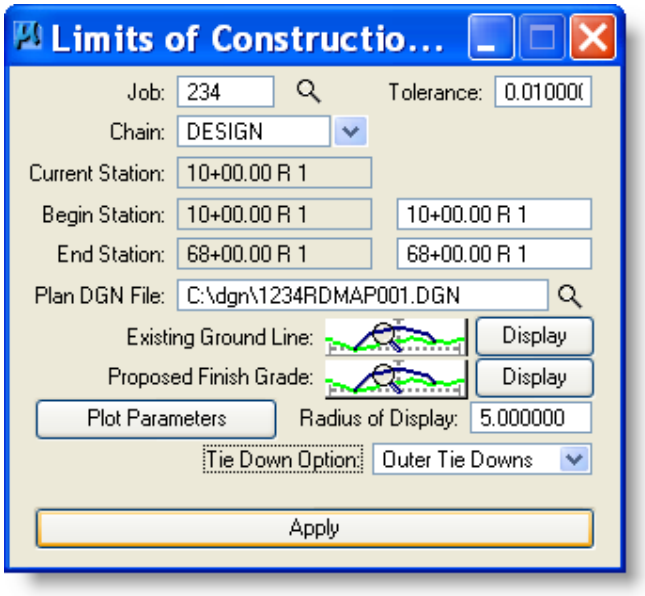
Go back to previous step desired such as drawing Mass Diagram.

20 Limits of Construction



The cross section (XSF) file must be open.
In Project manager Select **Limits of**

Construction.
OR
Select Limits of Construction from the menu.
Rename or create a new run (see page 6-1).

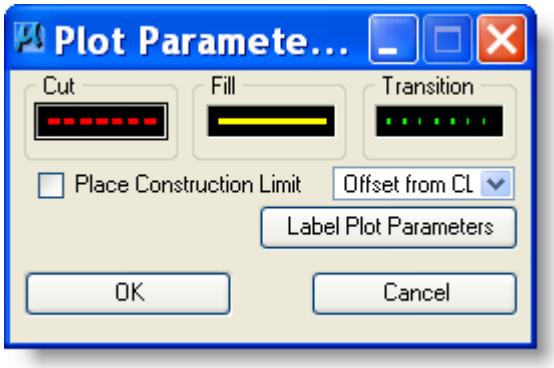


If you are using the Define Alignment this will fill-in all of this dialog.
See Define Cross Section View page 5-3
Set Tolerance to .01
Set Symbology:

Existing Ground Line :
E_Ground_XS_Delineation,

Proposed Finish Grade:
P_Template_Design_Alignment_FinishedGrade,
P_Template_Design_Alignment_BackSlopeRounding

Note: You will need to set the Beg. And End Station to the limits of your proposed surfacing.
Check Plot Parameters are set as needed below.
Click Apply to process construction limits.
The Limits of Construction will be drawn on the plan map file and MicroStation shows that.



Set the following:
Cut Symbology
a) Level = see below
b) Style = 2
c) Weight = 2
Fill Symbology
a) Level = see below
b) Style = 0
c) Weight = 2
Transition Symbology
a) Level = see below
b) Style = 1
c) Weight = 2

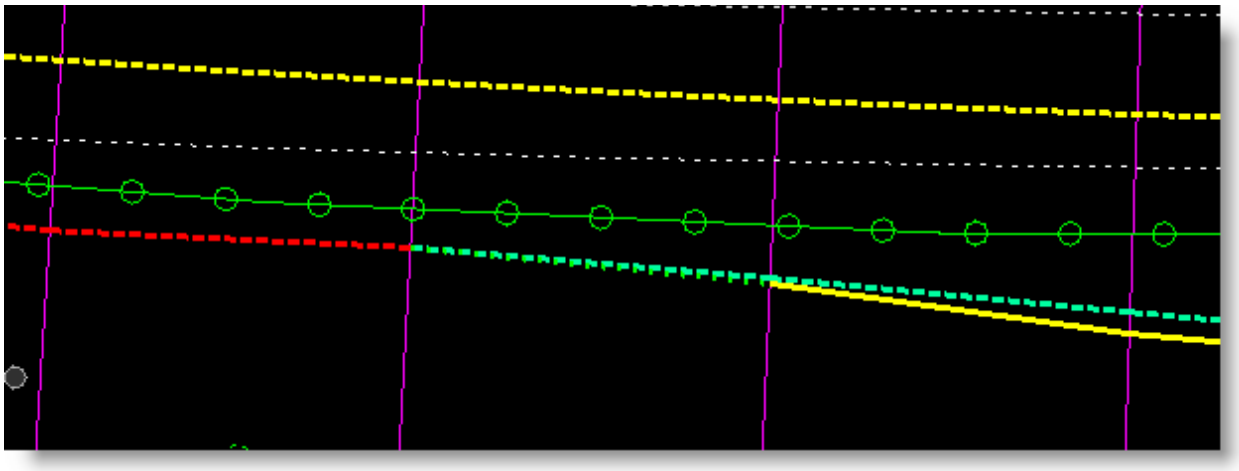
US Customary - LV=P_Construction_Limits_Approach
and/or LV=P_Construction_Limits_Design (normal alignment)

and/or LV=P_Construction_Limits_Detour
and/or LV=P_Construction_Limits_FrontRd
and/or LV=P_Construction_Limits_Ramp
and/or LV=P_Template_Approach_Alignment_BackSlopeRounding

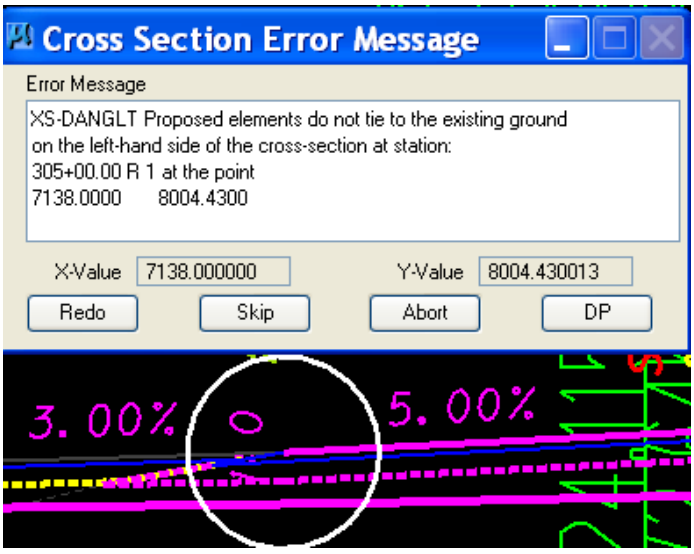
Color is at your discretion.

Tie Down Option = Outer Tie Downs

Click Apply – Geopak scans the cross section file to find the construction limits and draws them, according to the symbology defined, into the map design file. The map file is then opened.
An example appears below:



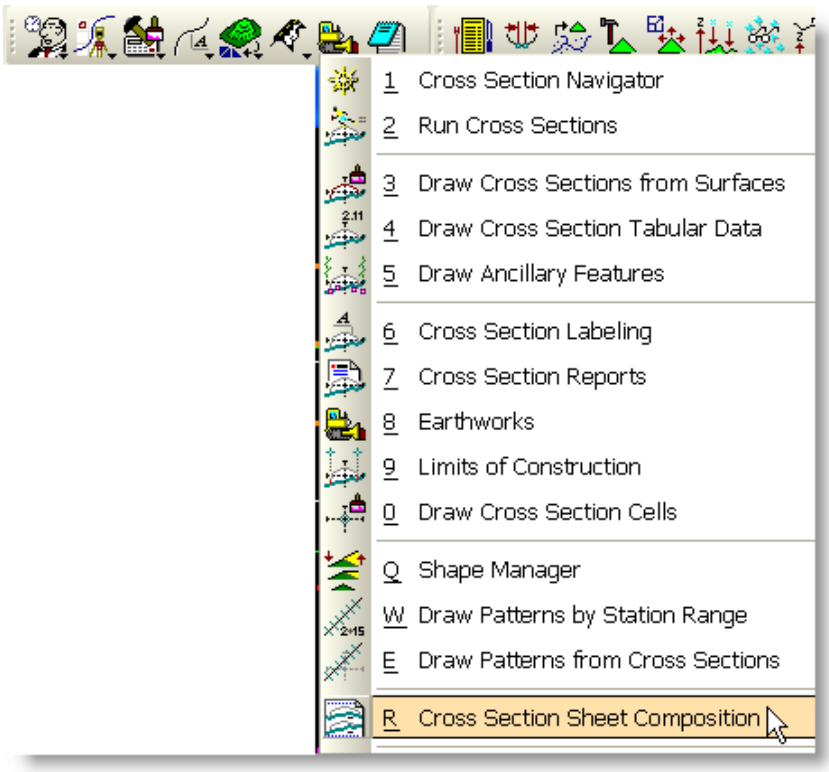
Cut Transition Fill



Skip over approaches is standard operating procedure.

NOTE: Double check the symbology drawn as a defect has been found that shows Fill wherever backslope rounding occurs – these should show as Cut.
This problem existed 5/23/2011-10/14/2011.

21 Cross Sections Sheets



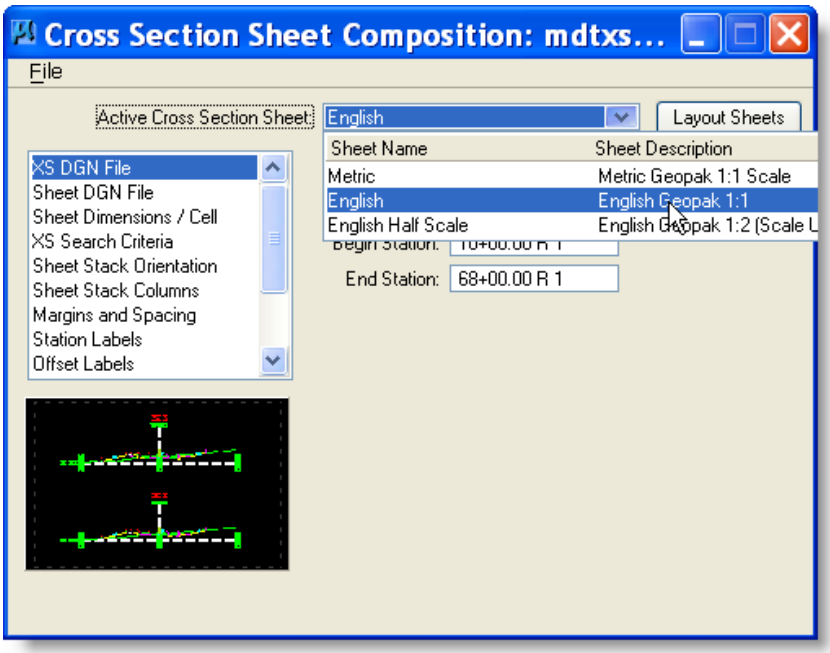
This Method will require that the Geopak Project Manager be used.

In Project manager Select **Cross Section Sheets**.

OR
Select Cross Section Sheet Composition from the menu.

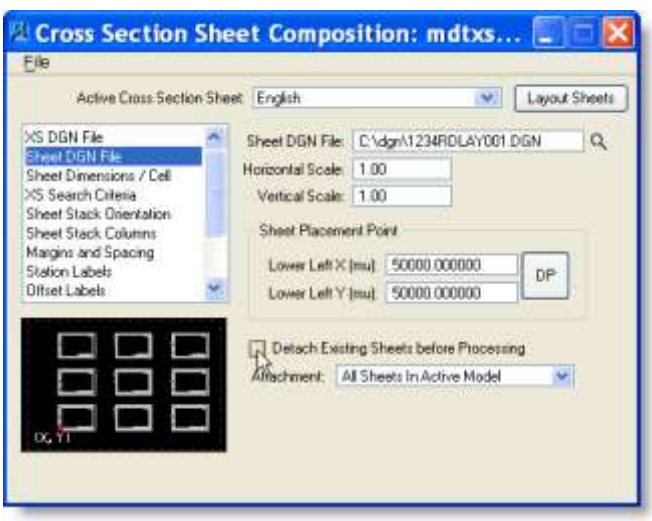
HINT: Because most of the information within these dialogs is standard, Select File > Sheet Library > Attach and Select W:\GEOPAK\MDTXSEC.XSSL.

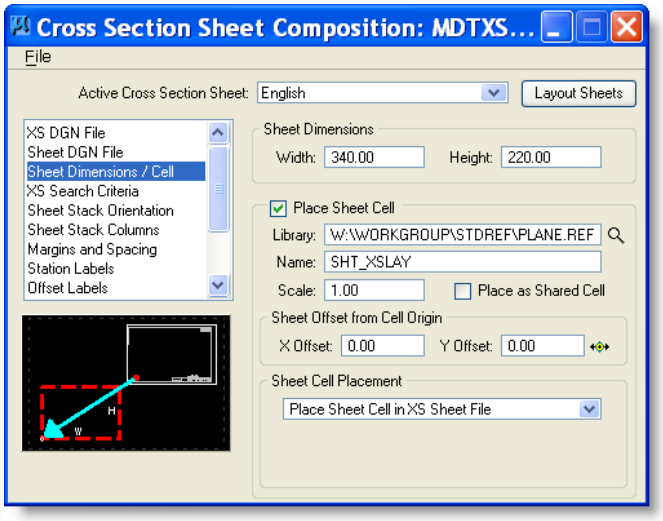
Create a .dgn file name 1234RDLAY001.DGN - use the Macro > ROAD DESIGN > Create DGN(S) > click Layout X-sections and English > Create DGN (See *CADD Standards Manual)*



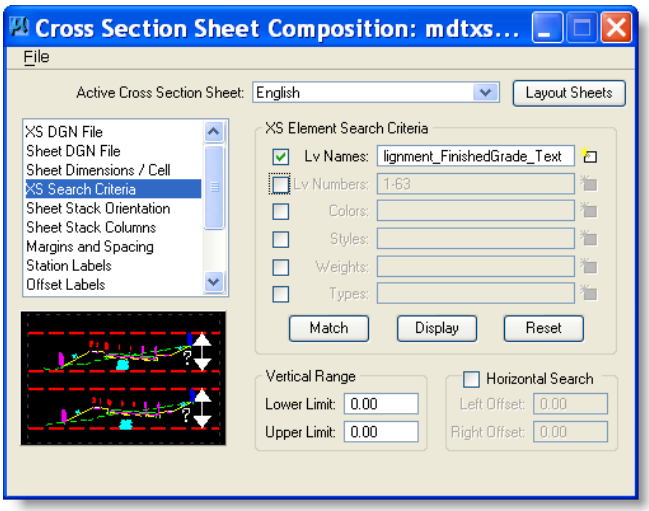
Select English and appropriate scale. You may need to set the Begin and End Station to the limits of your proposed surfacing.

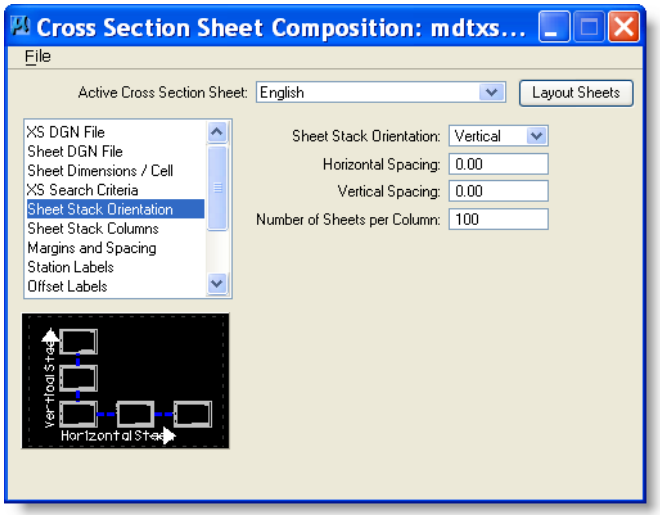
If you select MDTXSEC.XSSL, all of the Dialog will be Filled in.



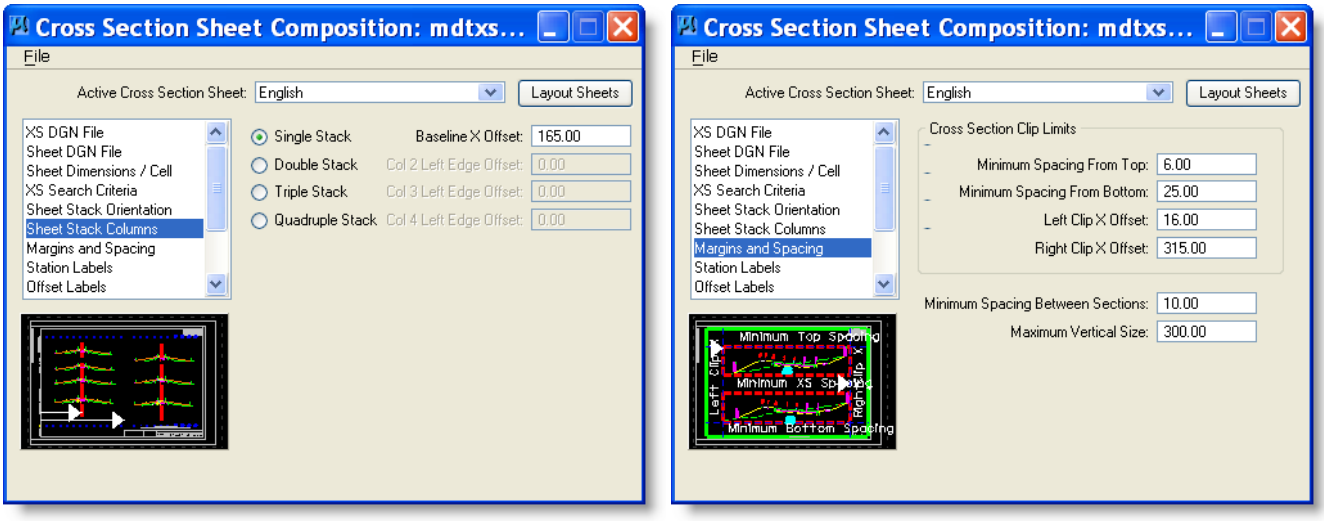


Option: Select Detach Existing if you are replacing all the existing sheets.

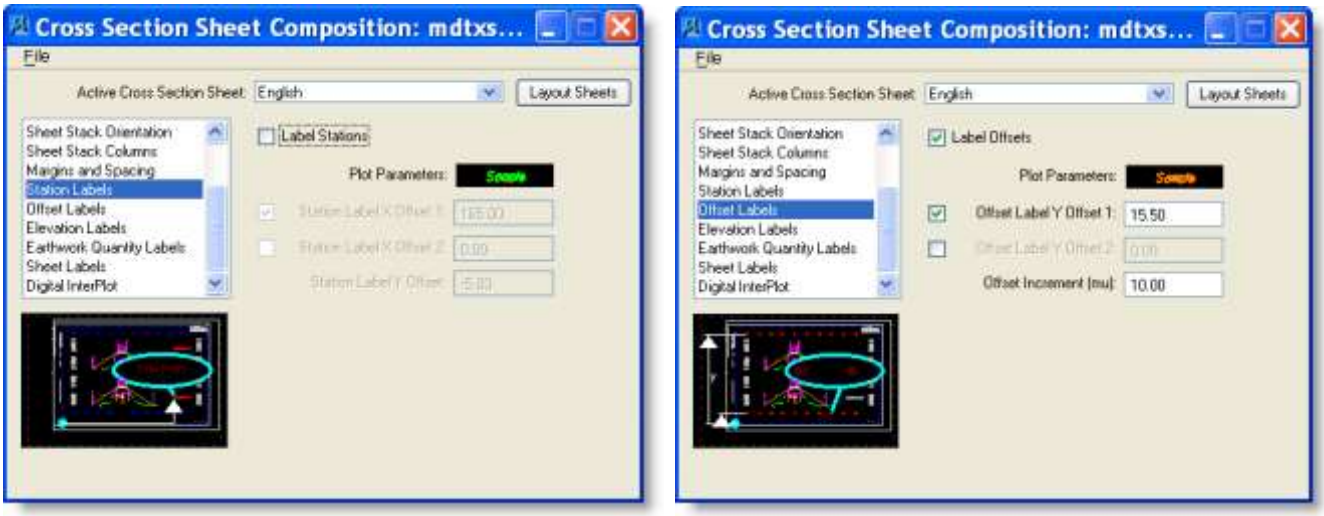




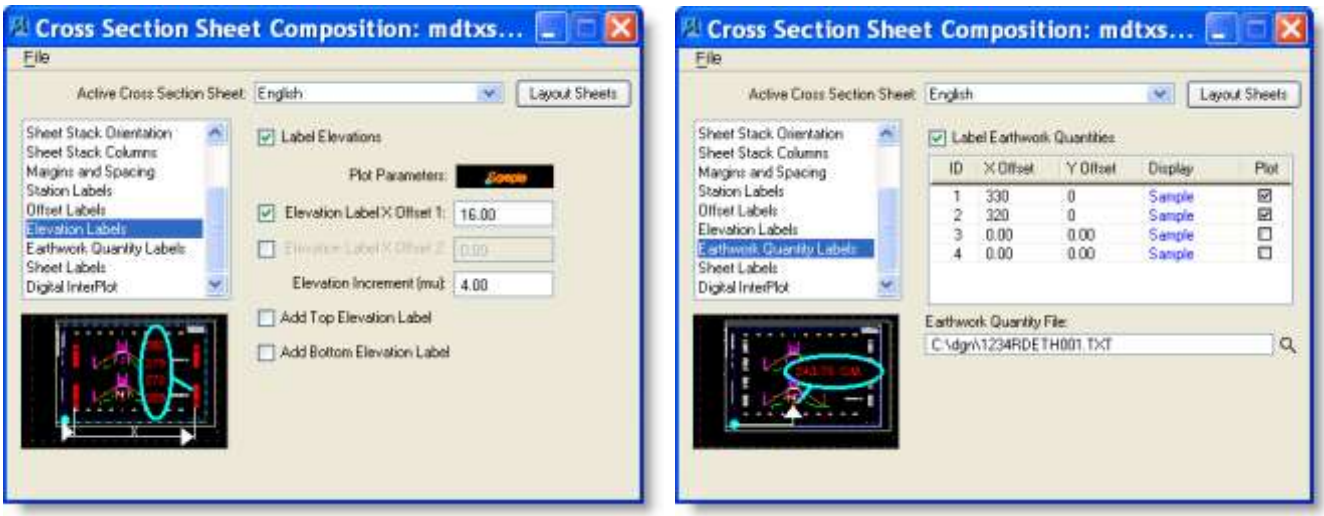
Include existing ground, finish & sub grade, backslope rounding and alignment annotation displayed.
Note: This information is used to define the limits of the Reference File clip bounds, so you may need to select other levels as well in order to get what is needed in each cross section.
Setting these levels off (cell, seeding, and alignment annotation undisplayed) in the working cross section file makes the others easier to select.



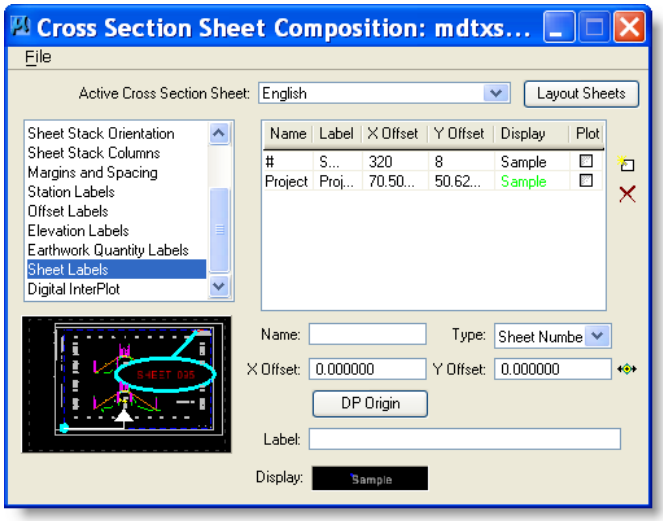
With Sheet Stack Columns you can offset the cross sections within the sheet cell.
If you select MDTXSEC.XSSL, all of the Dialog will be Filled in.

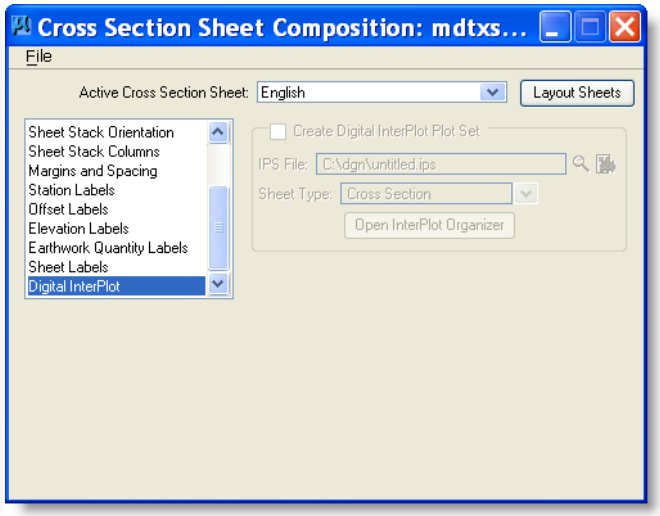


If you select MDTXSEC.XSSL, all of the Dialog will be Filled in.

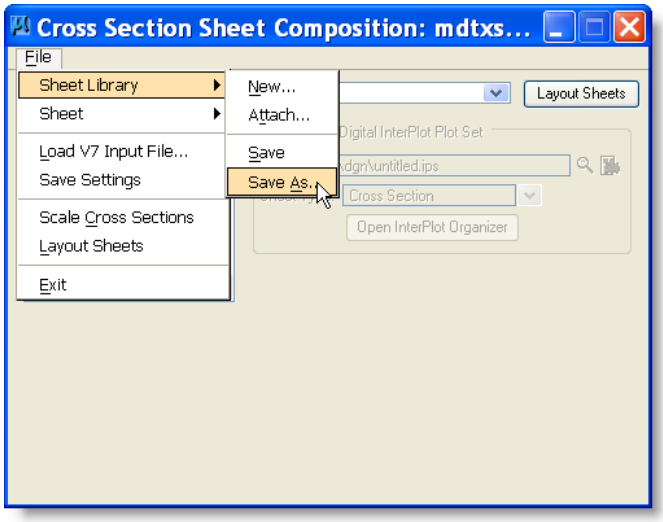


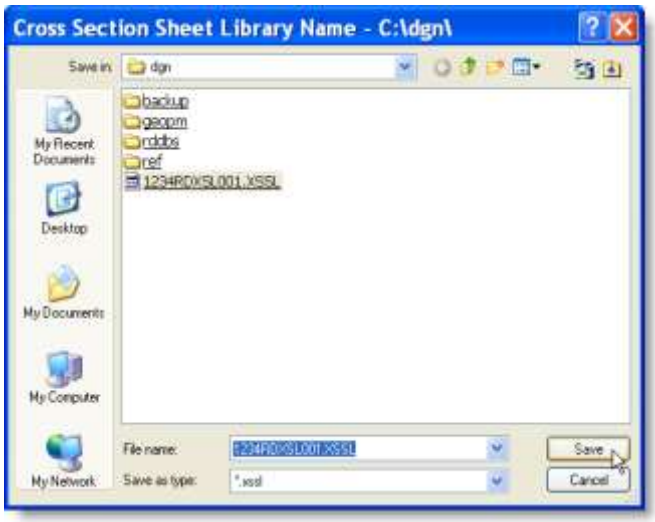
If you select MDTXSEC.XSSL, all of the Dialog will be Filled in. Reference in earthwork file.





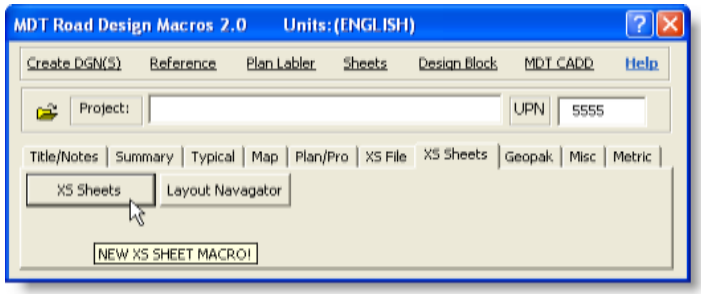
If you select MDTXSEC.XSSL, all of the Dialog will be Filled in.



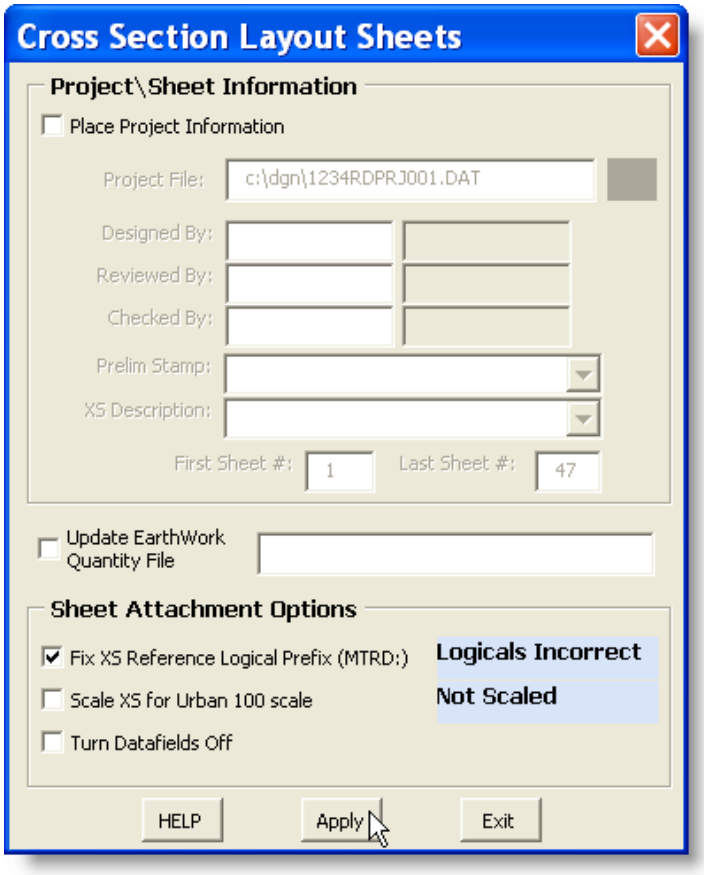


To save the input data you must create a xssl file for your project. File > Sheet Library > Save As > Name the file what you want and insure it is saved to C:\dgn with file type of xssl. You can then reference it in next time you initiate this dialog box.

Open XXXXRDLAY001.dgn then click Layout Sheets on the dialog box.



Run MACRO to rename all XS references: Road Design > XS Sheets > XS Sheets > Fix XS Reference Attachments

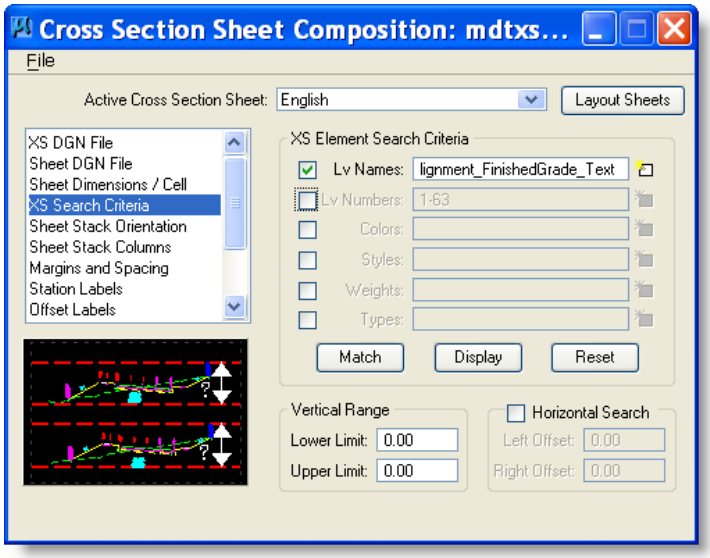


Check Fix XS Ref Logical Prefix

Click Apply.

This will update all of the attachments to insure they are associated with MTRD.

If you need to do the other functions on this dialog box, **run each function separately;** otherwise, unpredictable results may occur.



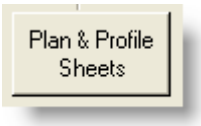
What if items are missing from your cross sections?

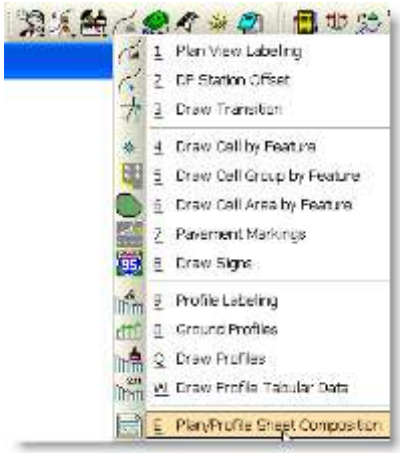
1. Insure the levels are turned on in the cross section file for ALL elements you want shown.

2. Insure XS Element Search Criteria will cover all elements you want shown - this determines height of each cross section drawn too.

22 Plan & Profile Sheets

22.1 Setting up Plan & Profile sheets

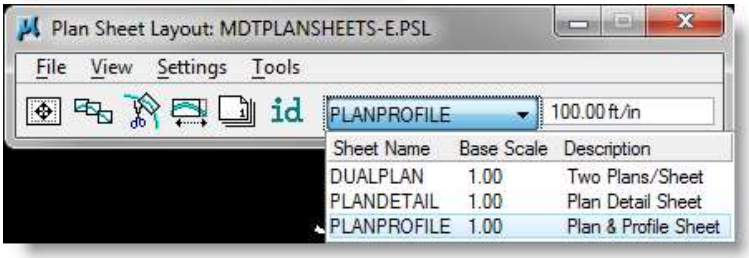




In Project manager Select **Plan & Profile Sheets**.
OR Select Plan\Profile Sheet Composition from menu

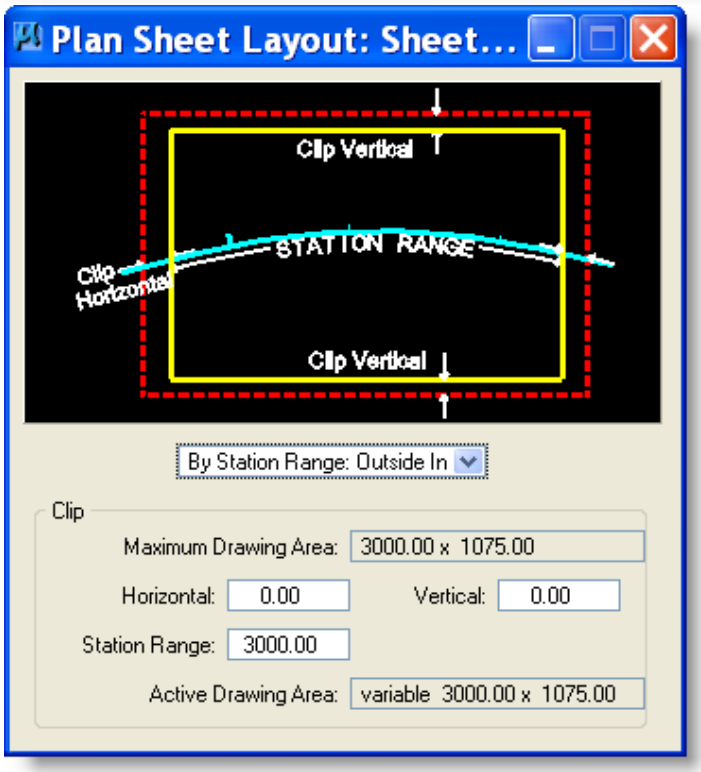
After the Select Run Dialog opens rename or create a run. For more information see page 6-1. Open RDMAP file.

Below settings are for ENG Plan and Profile Sheets 100 ft./in. only. Other selections will have different settings…



1) Select File > Sheet Library and attach MDTPLANSHEETS-E.PSL. (*w:\geopak\mdtplansheets-e.psl*)

2) Select the type of sheets and enter the Scale for your plan – Full-size enter 100 ft/in.



1) Select Sheet Composition (1st Icon)

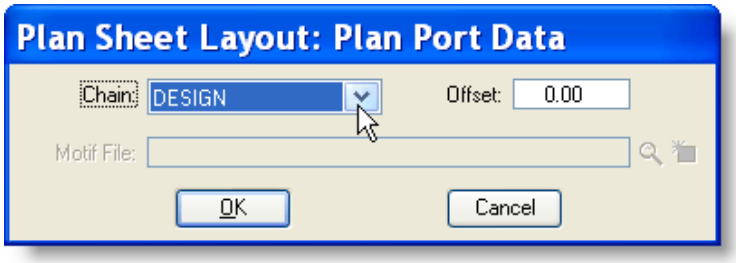
2) Set "By Station Range: Outside In"

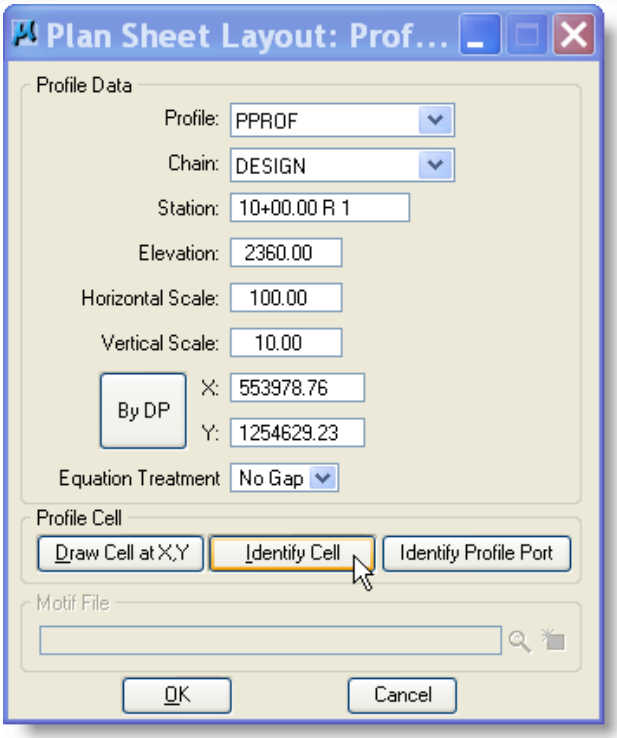
3) Set Horizontal to 0

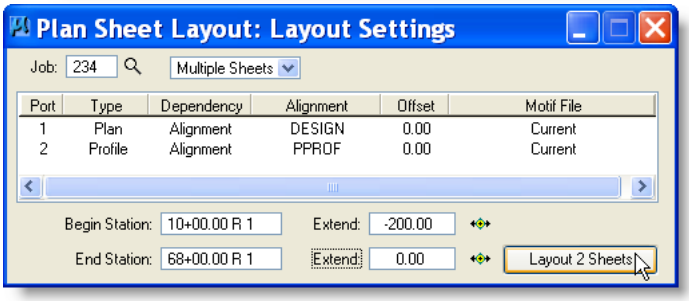
4) Set Vertical to 0

5) Station Range should read 3000 for 100ft./in.

6) Close the window







1) Select Plan Sheet Layout: Layout Settings (second icon from the left).

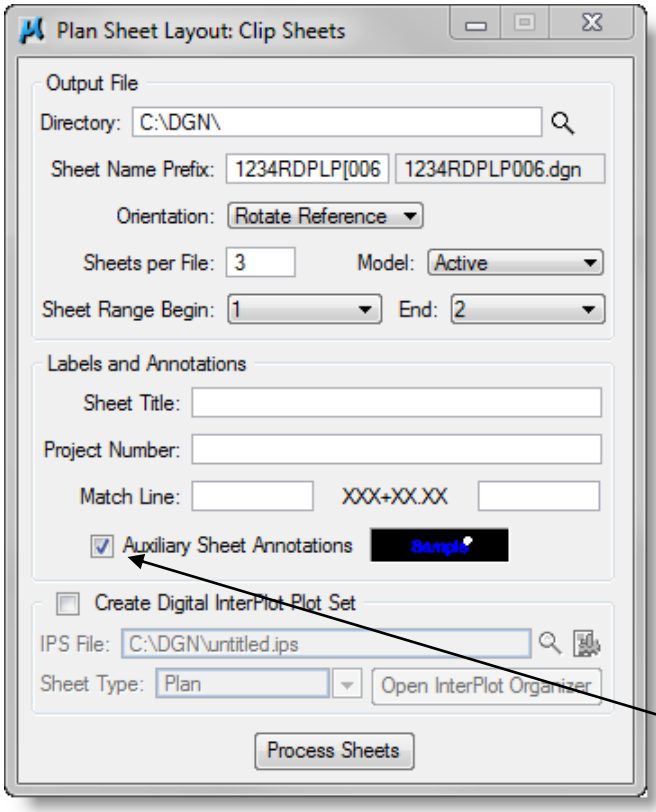
2) The appropriate ports will be filled in. Double-click Alignment and fill in the appropriate chain or profile.

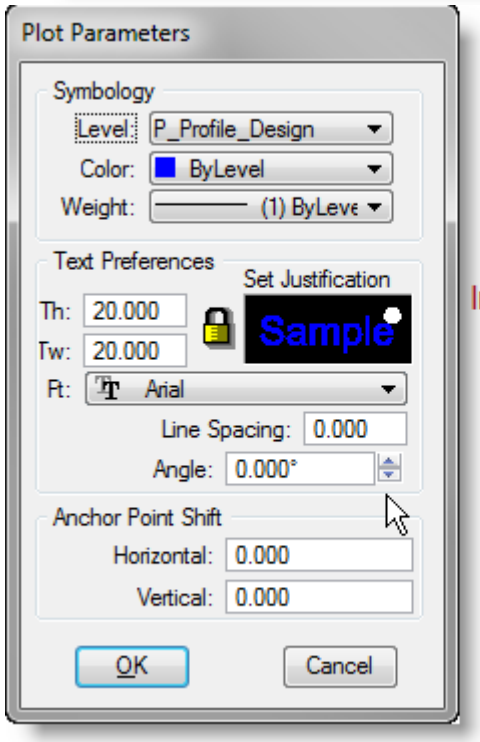
3) When selecting Profile:
- Either select the profile name from the drop-down box OR
- Click Identify Cell button then select the required profile cell on the design file.
- Click OK

4) The Begin and End Stations will fill in. You can use the Extend boxes to add length to the project for notes.

5) Select Layout # Sheets. This will place the sheet boxes in the map file. Drawn on P_Geopak_SheetClips..

6) Close the window.





Insure justification is set to upper right

1) Select Plan Sheet Layout: Clip Sheets (third icon from the left).

2) Set c:\dgn\ for the Directory.

3) Set Sheet Name Prefix to proj. # ____RD**PLP**[001]. Brackets cause incremental files to be created. **NOTE: Use PLP for PlanProfile. PLN for PlanDetail or DualPlan.**

4) Set Orientation to Rotate Reference.

5) Set Sheets per File to 3.

6) Set Model to Active.

7) Sheet Range Begin and End should fill in automatically.

8) Check Auxiliary Sheet Annotations

9) Double-click symbology

10) Set Justification to upper Right.

11) Set Th. & Tw. To 20.00.

12) Set Ft to Arial.

13) Check Vertical to insure it has 0.000.

14) Select OK on the Plot Parameters dialog.

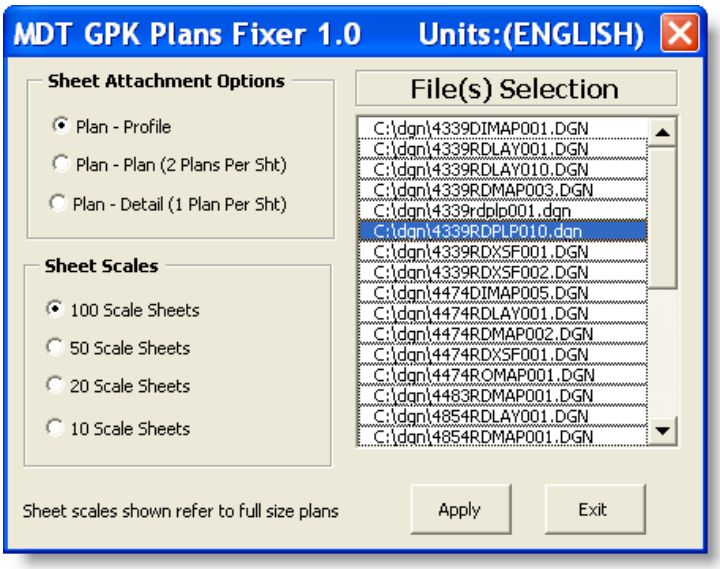
15) Select Process Sheets on the Clip Sheets dialog box. This will make the plan sheets and plan sheet files.

16) Close the dialog windows.

NOTE: If referenced files do not appear in the PLP area as expected then:

1. Detach the reference file and reattach using the Reference macro, OR
2. Copy a reference and change the properties to the reference that needs to be reattached.

Use the MDT Macro to attach the sheet borders.



NOTE: If the references do not show for the plan area as expected, then open the reference window, detach the references not showing and then use the REFERENCE macro to reattach those references. They should show as expected.

If the grid comes in grey scaled then do the following for each referenced file:

- Settings > Level Manager > Highlight all the levels
- Click on one of the colors
- Click override OFF

1. File > Open > Select the new file(s) just created. Remember s/b PLN for plans only, PLP for plan/profile.

2. Turn off the following levels:
   - Geopak profile cell
   - Pattern Lines
   - Super Shapes
   - P_Geopak_SheetClips – sheet border
   - Profile cell text
   - Any other levels you do not want to show in the plan & profile

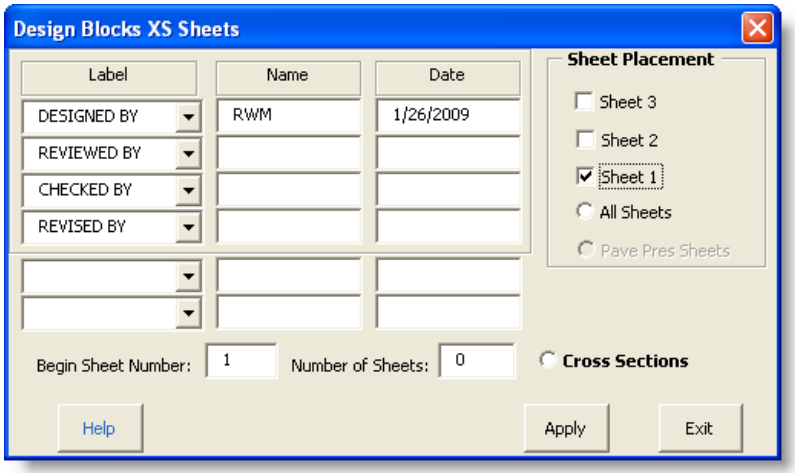
3. MDT > Road Design > Plan/Pro > GPK Attach Sheet.

4. Sheet Options and Scale should be set according to your project.

5. Select current Plan and Profile .dgn file and click on Apply. The sheet borders will be drawn onto the plan.

WARNING: IF THIS MACRO DOES NOT WORK, THERE IS SOMETHING WRONG WITH THE DGN FILE AND/OR YOUR DGN FOLDER. PLEASE CHECK THE CADD INTRANET TROUBLESHOOTING PAGE.

22.2 Sheet Clips Labeling



Use the MDT Macros to label Cross Section Sheets or Plan and Profile Sheets.

1. MDT > Road Design > Design Block.

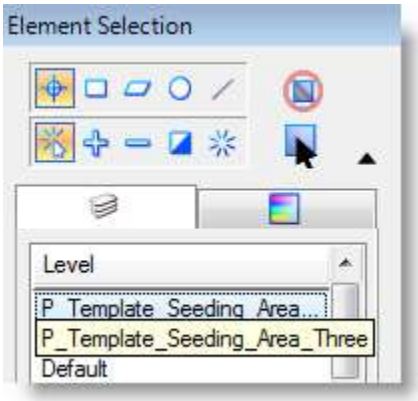
2. Enter Name or Initials.

3. Select Sheets to label.

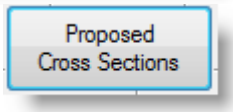
4. Click on Apply.

23 Topsoil & Seeding

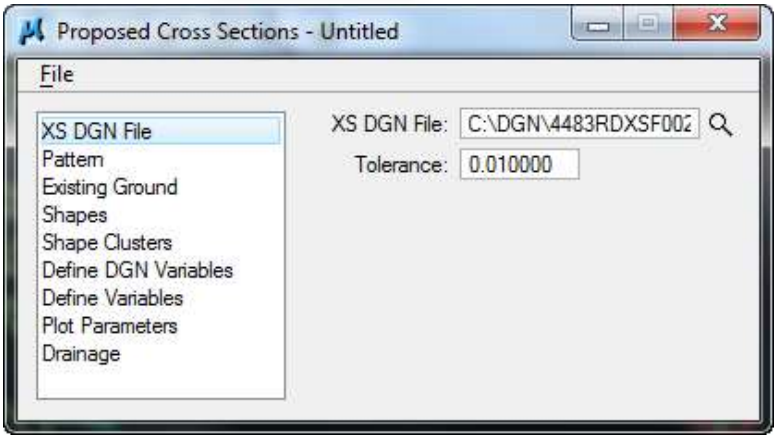
23.1 Drawing Topsoil and Seeding onto Cross Sections



First thing to do is delete the original seeding generated via the proposed cross section process.
Select the two seeding levels in the element selection dialog and hit Delete.
P_Template_Seeding_Area_One_Two
P_Template_Seeding_Area_Three

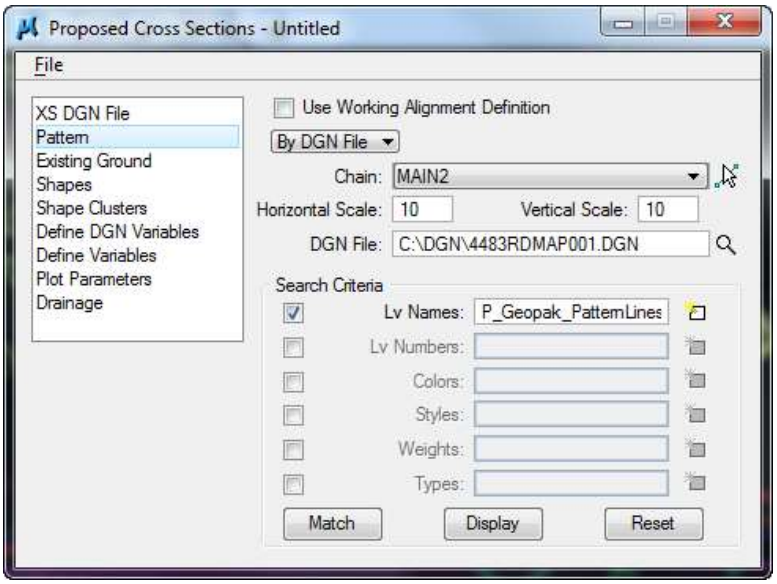


In Project Manager Select **Proposed Cross Sections**



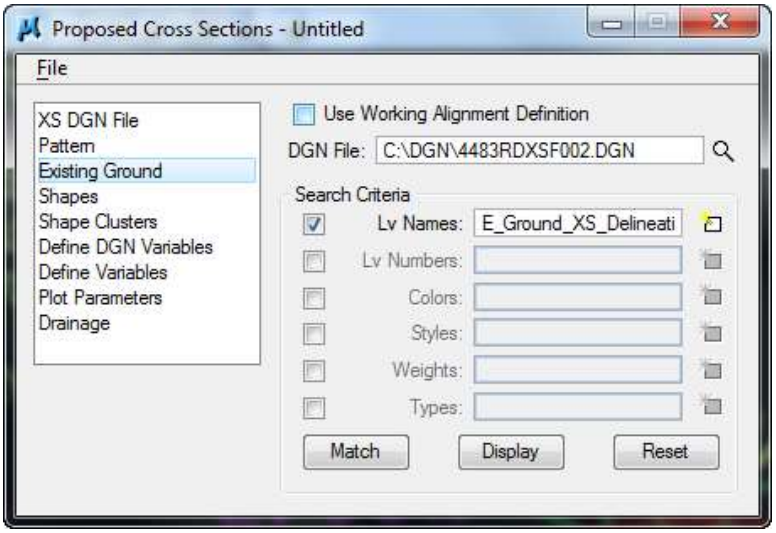
XS DGN FILE:

If you are using the Define Alignment this will fill-in the XS DGN File. This is file created for the existing cross sections. The tolerance defaults to .1, but should be changed to .01.



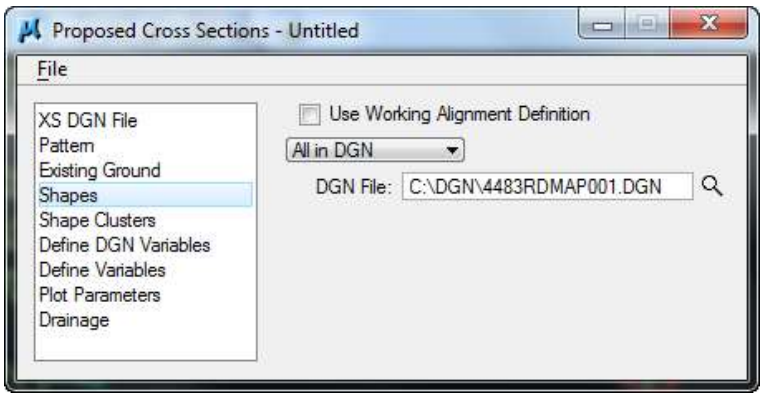
PATTERN:

Check "Use Working Alignment Definition" if you have defined this information.
Or
Fill-in The Chain, Scale & Design File.
Lv=P_Geopak_PatternLines_Design



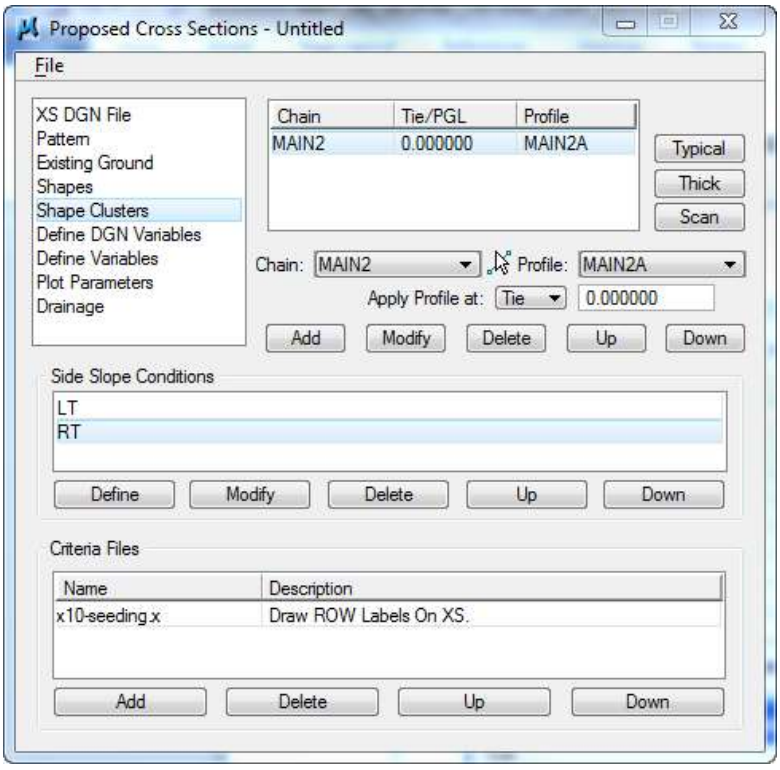
EXISTING GROUND:

Check "Use Working Alignment Definition" if you have defined this information.
Or
Fill-in the Design File where cross sections are located.
LV=E_Ground_XS_Delineation



SHAPES:

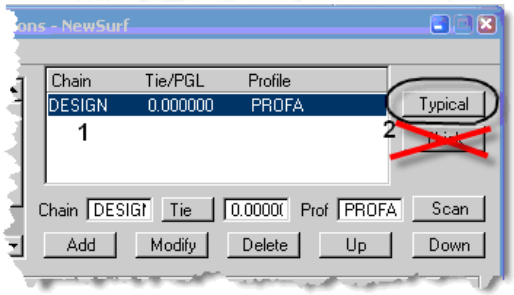
Check "Use Working Alignment Definition" if you have defined this information.
Or
Fill-in Design File where the Super Elevation shapes were drawn.



SHAPE CLUSTERS:

See Following Pages for 2 steps on filling out this dialog.

Note: Steps 1 & 2 can be done manually without the help of the Dialogs.



Shape Clusters Step 1

1) Select the **Scan** button and the **List of Clusters** dialog box will open.

2) Then select a shape cluster from the **List of Cluster** dialog.

3) Select **Add** and the shape cluster will be added to the list to the left.

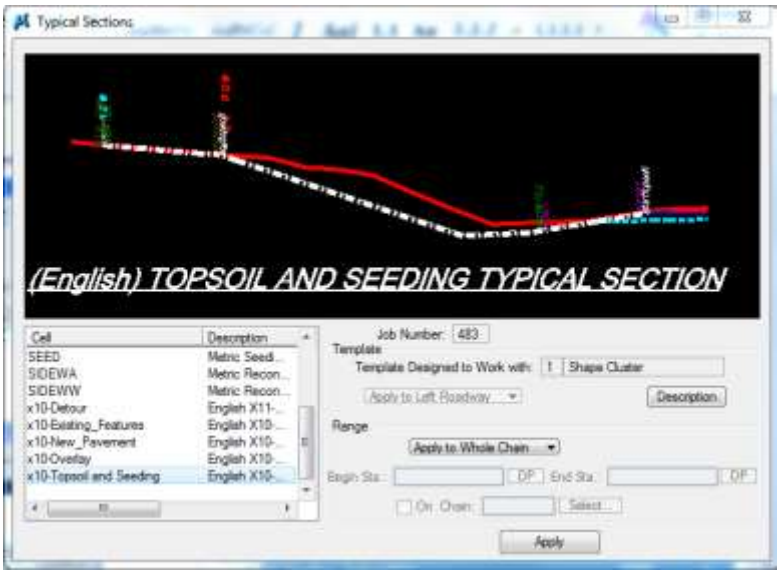
4) **Close** The **List of Clusters** Dialog.

Repeat for each Cluster until all clusters have been added.

Shape Cluster Step 2

1) Select one of the Clusters from the list

2) Select **Typical** Button

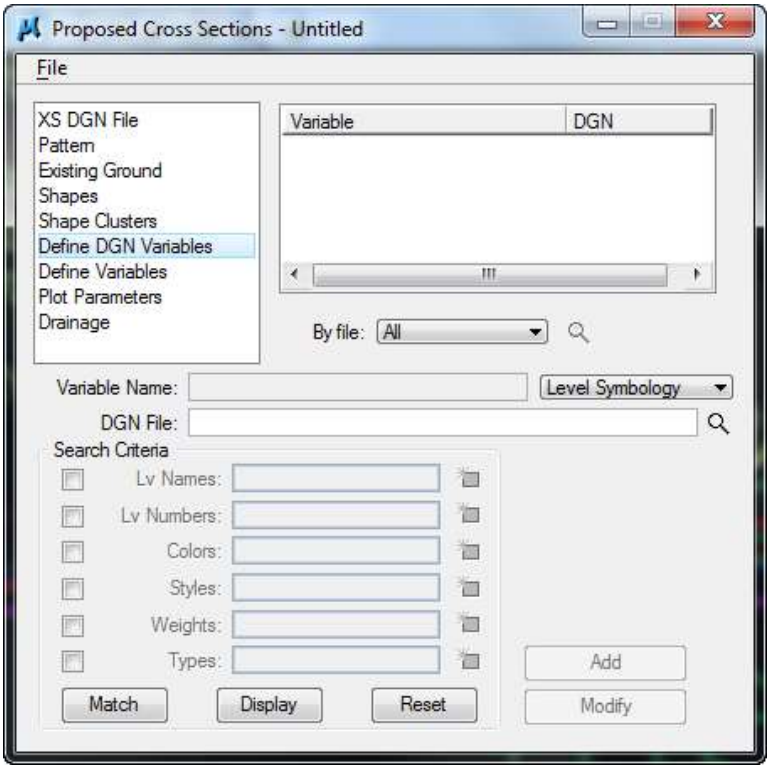


3) Within the **Typical Section** Dialog Select **x10-Topsoil and Seeding**

4) Select range of application

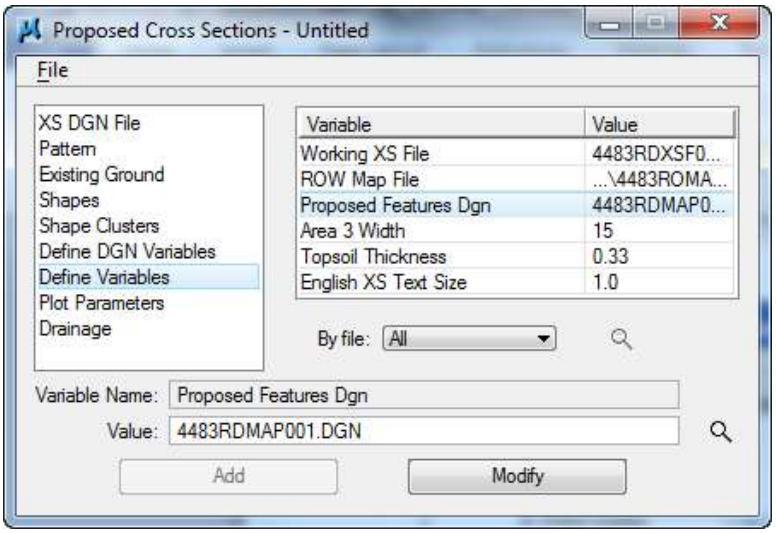
5) Select the **Apply** button

6) For HELP click Description



DEFINE DGN VARIABLES:

Bypass Define DGN Variables.



DEFINE VARIABLES:

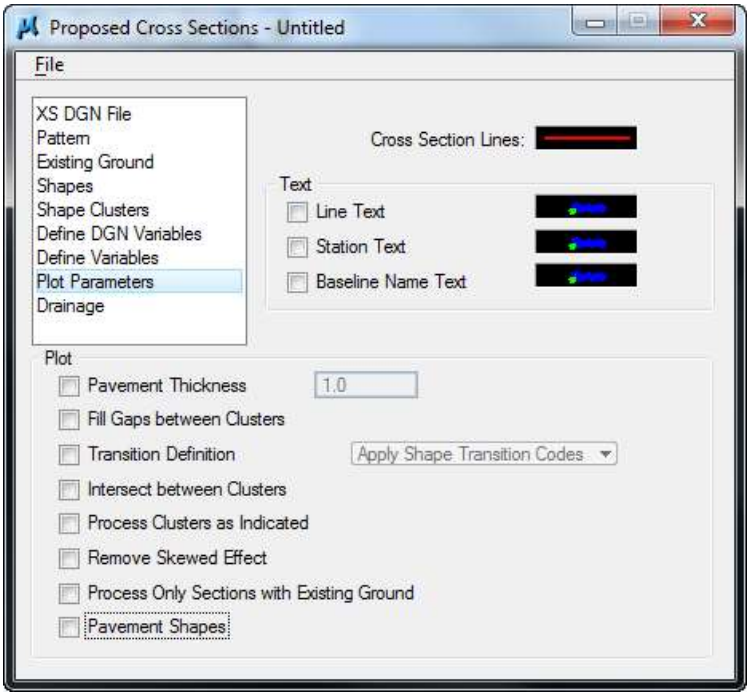
1) Select the variable to change.

2) Type the new **Value**.

3) Select **Modify** to change **Value**

4) Enter all dgn files you have available for the project.

5) Change English XS Text Size to 1.0 or something that looks good with all of the text generated. An example of all the text generated is on page 16-7.

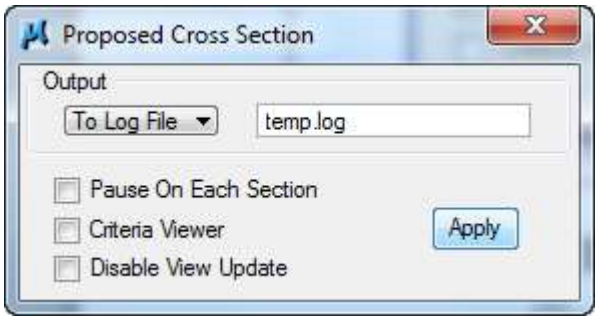


PLOT PARAMETERS:

1) Remove all the checks from the Plot area.

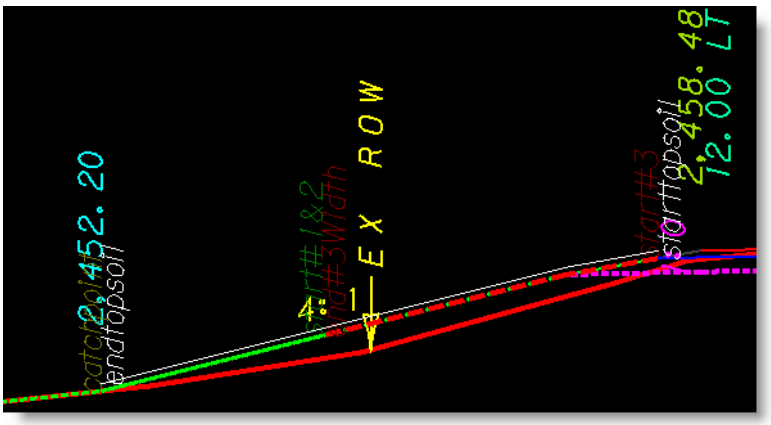
2) File > Save Settings

3) File > Run



Output to log file and Pause on each section.

Check the first station and, if OK, remove pause check and continue.



Completed Process Example:
This shows the seeding and topsoil elements drawn into the design file.

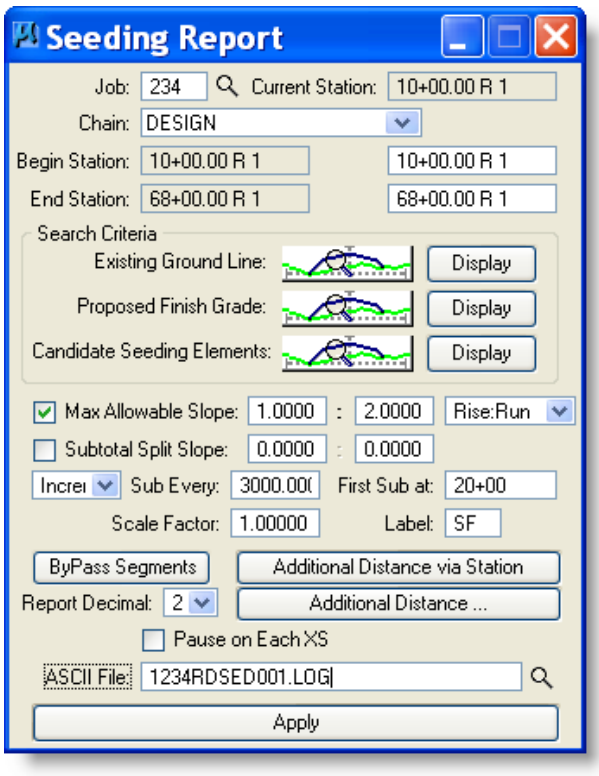
P_Template_Seeding_Area_One_Two
P_Template_Seeding_Area_Three
P_Template_Topsoil

23.2 Calculating Topsoil from Proposed Surfacing

Within the Project manager dialog select **Reports & XS Quantities**.

Must be in the cross section file (XSF) to use cross section reports.

Select **Seeding**.



1) If you are using Project Manager the following will be filled-in
   a) Job Number
   b) Chain
   c) Begin & End Station
   d) Existing Ground Line Symbology
      Level = E_Ground_XS_Delineation
   e) Proposed Finish Grade Symbology
      Level = P_Template_Design_Alignment_FinishedGrade

2) Set Candidate Seeding Elements:
   a) Level = P_Template_Design_Alignment_FinishedGrade
   b) Color = 2,3, 10-253

This will pick up the Proposed Surfacing with the exception of the elements under the finish surfacing.

3) Check Max. Allowable slope and set it to **1:2** for topsoil reports

3) Set Sub Every to **3000.**

4) **S**et First Sub At to a station of your preference. This is where the 1st subtotal is to appear.

5) Enter a ASCII file name.

6) Select Apply.

See Geopak Help Online – Command Reference > Plans Preparations
Optional direct link to Help press F1 when dialog is active

23.3 Calculating Seeding to Right of Way

The new way of calculating Seeding areas according to the memo from Carl S. Peil dated December 2, 1998 is to figure the total area within the NEW right-of-way limits and the total area within the construction permits and applicable easements. In order to allow Geopak to calculate the Area 1, 2 and 3 an element will need to be placed on the cross section then use the seeding report to calculate the quantities.

What is needed to accomplish this are:

1) Right of Way Strip map file with the New right-of-way drawn in it. Make note of the symbology where the right-of-way is drawn in this file.

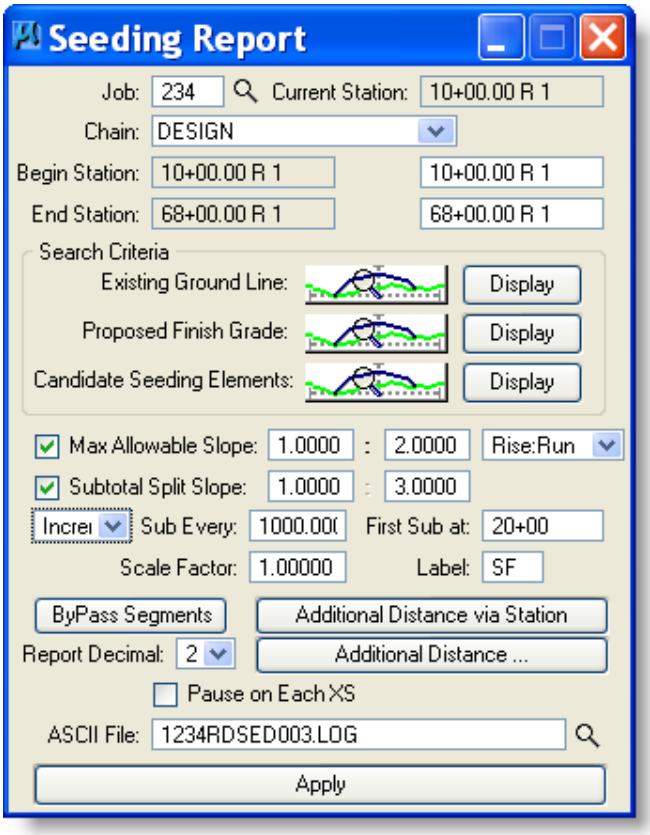
2) The working cross section files with the existing and proposed surface and subgrade draw on the cross sections. Make note of the symbology of the existing ground, proposed surface and subgrade surface.

3) Geopak Project Manager.

The seeding criteria file will start at the centerline at the finish grade elevation. Then trace down to the Proposed Finish Grade to the end of the top lift. At this point it will trace down the surfacing inslope to the bottom of the Bituminous Material. Then it will go down another 2 feet according to the Seeding Standards. At this point it will start drawing a line that represents the Area 3 Seeding. It will draw this line until the Horizontal distance is equal to 15 feet. Then it will end the area 3 Seeding and start Area 1 & 2 seeding. It will trace the Proposed Surface to the Proposed Subgrade then trace this line to the Construction Limit. At this point it will trace the Existing Ground until it intercepts the New or Existing Right of Way.

23.4 Seeding Report

Run this process from Project Manager > Reports & XS Quantities > Seeding to calculate the quantities you need.



1) Proposed Finish Grade = P_Template_Design_Alignment_FinishedGrade AND E_Ground_XS_Delineation. This causes the process to search the entire XS width. See NOTE below.

2) Set Candidate Seeding Elements Level = P_Template_Seeding_Area_One_Two use only level name.

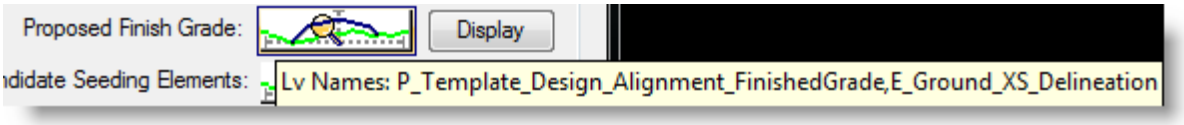
3) Change the ASCII File name

4) Select Apply

5) Repeat above steps: Set Candidate Seeding Elements Level = P_Template_Seeding_Area_Three.

You can also calculate the Area 3 using the following formula. Length of the job X 30' = area 3 seeding (e.g. 2800 X 30 = 84000) either number will be close enough for the plans.

NOTE: The Proposed Finish Grade search needs to include E_Ground_XS_Delineation for Seeding report in order to search the entire XS width.



You can edit the file created in the previous step, changing "topsoil" to "seeding", if desired.

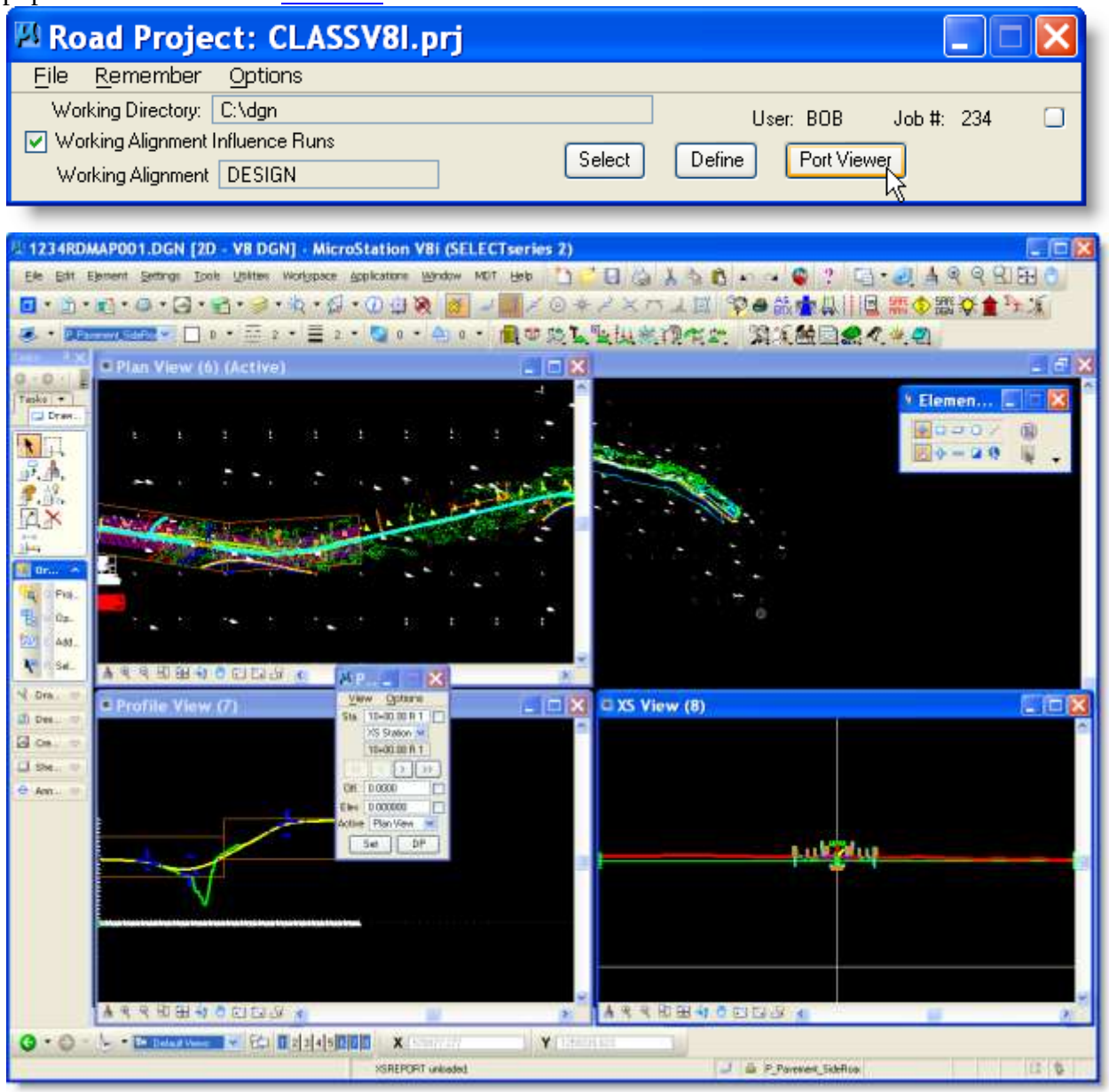
NOTE: If attempting to use Additional Distance and Subtotal Split Slope on the same run – the **additional distance** shows on each station but the **calculated area does not include it** because Geopak cannot determine if it is within the split slope criteria or not. The additional calculated area does show in the subtotals and final total.

24 Port Viewer

The Port Viewer is a tool which enables the user to view all three major aspects of a road design simultaneously, even though they are located in different files. In addition, the user can draw into any of the views, by a simple data point to identify the active field, therefore the active file. The three views include:

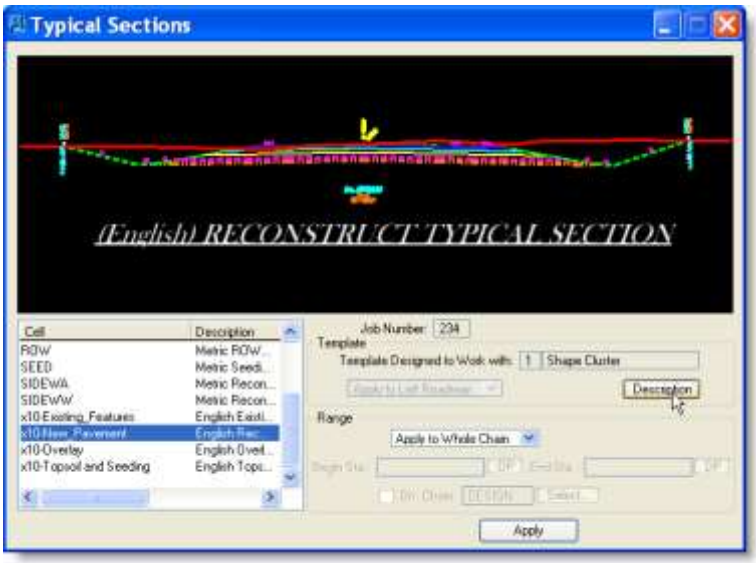
plan view layout
profile
cross sections

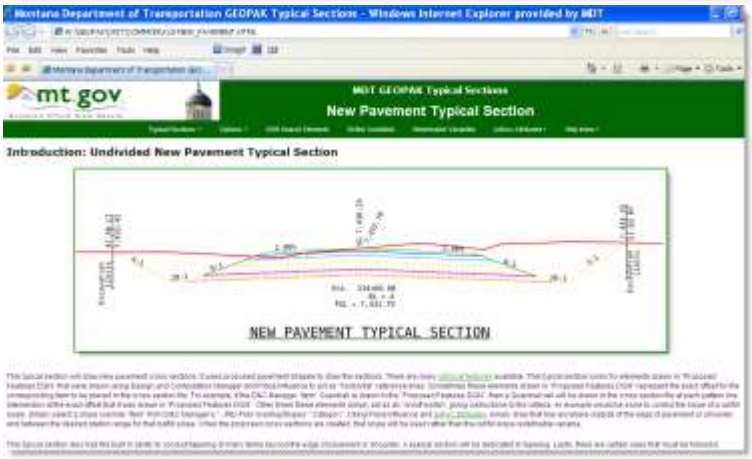
As a prerequisite to invoking the Port Viewer, a working alignment must be defined and populated as outlined in section 5.



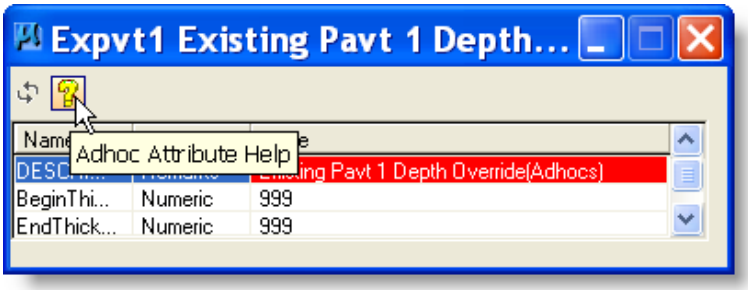
The Port Viewer Navigator is the tool used to keep all views in sync. And show current positions.

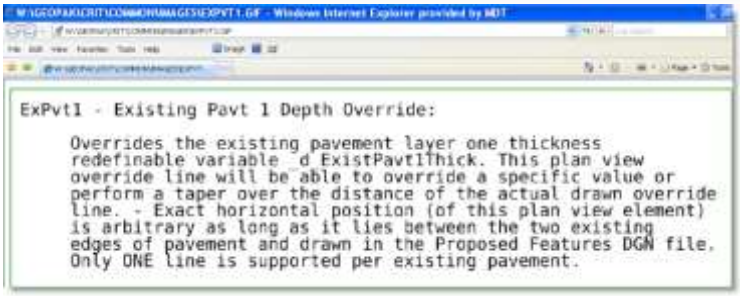
25 Help Description Files





From Typical Sections, in the Proposed Cross Sections Process, - Click DESCRIPTION button to access NEW TYPICAL CRITERIA INFORMATION on the Intranet.



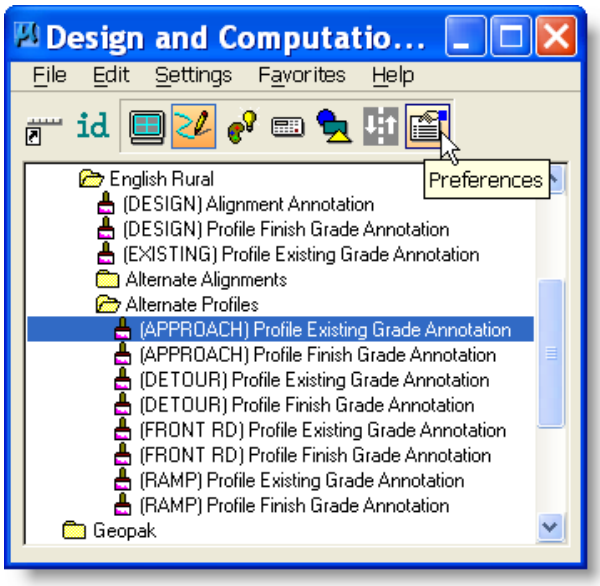


From the Adhoc Attribute Dialog Box, used with the D&C Manager, - Click question mark to access adhoc descriptions and graphics pertaining to that specific adhoc item.

Link to GEOPAK Help files in CADDSTD \GEOPAK\CRIT\COMMON\HTML
Link to GEOPAK instruction videos in CADDTESTV8 \DOCUMENTATION\GEOPAKCRITERIA

26 Modifying Design and Computation Drawing Standards

Important: If you are using the Project manager the location of the profile can be defined first so that when this dialog is opened the location information is already filled in. It is a good idea to have this information defined in project manager so that it will always be the same for all profiles and will make it easier to draw your plan and profile sheets

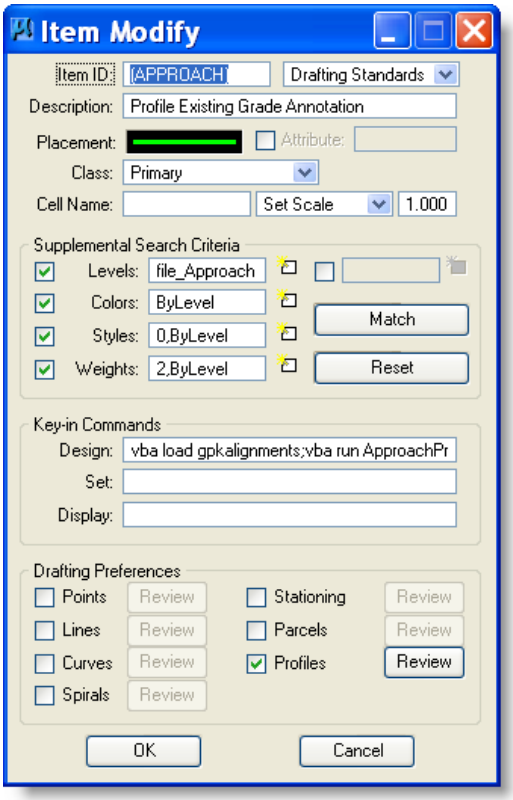


If you have exceptions to the standards layout you can set them by using *Preferences* (Box on upper right under Help, that says *Design*, click and drag to *Preference*).

You can use this box to create a new category, create an item, modify an item or review settings on an item.

In order to modify an item you will have to type in a password, **MDT1**. The password is case sensitive and must be typed in all caps.

The reason for the password is so you will realize that you are changing the standards. ***Do not save on exit when modifying an item!***



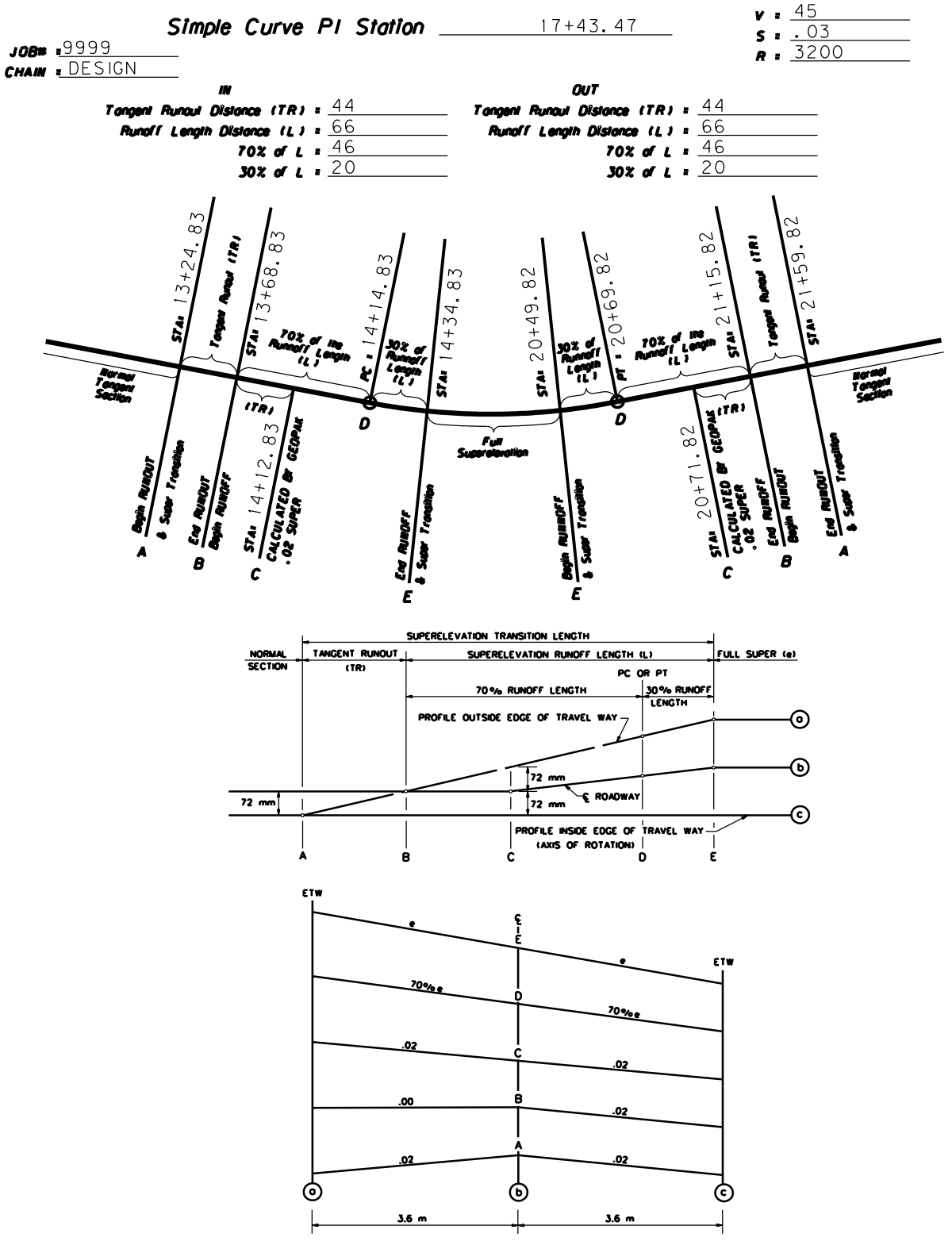
If you create new categories or items please send a copy to MDT CADD Administration so that it can be included in the standards for use by everyone.

When you select Modify Item this dialog box opens. Click on review of the item you wish to modify.

This will open dialog boxes containing the settings of each element item.

To return to Drawing change *Preference* back to *Design*

27 Super Elevation Simple Curve Diagram



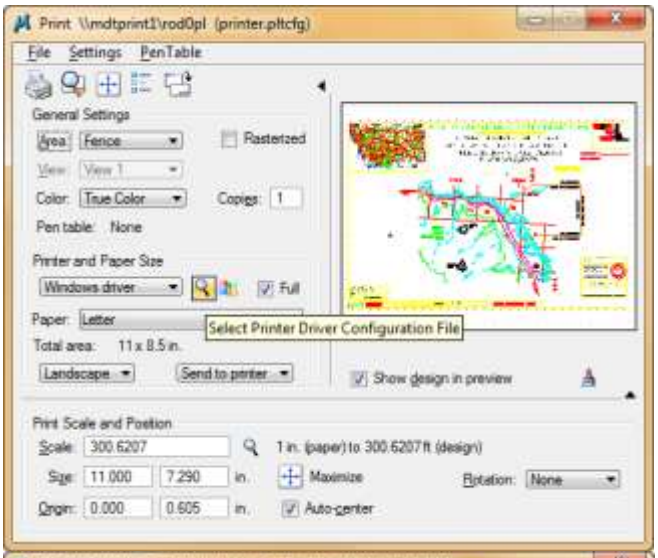
A diagram is also available for a spiral curve.

28 GEOPAK Level Setup

English

	LV	*CO*	*WT*	*LC*	*FT*	*TX*
Levels to be used by the user - working plan file						
Pattern lines	P_Geopak_PatternLines_Approach P_Geopak_PatternLines_Design P_Geopak_PatternLines_Detour P_Geopak_PatternLines_FrontRD P_Geopak_PatternLines_Ramp		0	0		
Super Shapes	P_Geopak_SuperShapes_Approach P_Geopak_SuperShapes_Design P_Geopak_SuperShapes_Detour P_Geopak_SuperShapes_Frontage P_Geopak_SuperShapes_Ramp					
Geopak Defaults – Working cross section file						
Existing Ground	E_Ground_XS_Delineation		3	0		
Sub-grade elevation text	P_Template_Design_Alignment_Annotation_Displayed	5 *	2		16	1
Exist ground elevation text	P_Template_Design_Alignment_Annotation_Displayed	2 *	1		16	1
Cut, fill slope & ditch elev. text	P_Template_Design_Alignment_Annotation_Displayed	13 *	0		16	1
Ditch elevation text	P_Template_Design_Alignment_Annotation_Displayed	14 *	0		16	1
Catch point elevation text	P_Template_Design_Alignment_FinishedGrade_Text	14 *	0		16	1
Proposed Top Lifts lines	P_Template_Design_Alignment_FinishedGrade	#	0	0		
Proposed Sub-grade lines	P_Template_Design_Alignment_Subgrade	0-9	3	2		
Sub-grade line outside hinge point	P_Template_Design_Alignment_Subgrade	10	3	2		
Sub-grade cut slopes	P_Template_Design_Alignment_Subgrade	11-19	3	2		
Sub-grade fill slopes	P_Template_Design_Alignment_Subgrade	21-29	3	2		
Default, error & marked point text	P_Template_Design_Alignment_Annotation_UnDisplayed	12 *	0*		16	2
Cross slope text	P_Template_Design_Alignment_Annotation_UnDisplayed	30 *	0*		16	.25
Levels to be used by the users – Working cross section file						
Back slope rounding	P_Template_Design_Alignment_BackslopeRounding		3	2		
Back slope rounding Text	P_Template_Design_Alignment_BackslopeRounding_Text					
Drainage & grading items & notes	E_DRAINAGE_Delineation		1		16	1
Row, Permits, & easement cells	E_ROW_Delineation				16	1
Utilities cells	P_UTILITES_*				16	1
Optional surfacing: ** Approach Detour FrontRD Ramp	P_Template_**_Alignment_Annotation_Displayed P_Template_**_Alignment_Annotation_Undisplayed P_Template_**_Alignment_BackSlopeRounding P_Template_**_Alignment_BackSlopeRounding_Text P_Template_**_Alignment_FinishedGrade P_Template_**_Alignment_FinishedGrade_Text P_Template_*_Alignment_Subgrade					
Geopak Defaults – Cross section layout file						
Offset labels	P_XSection_Layout_Text	4 *	3		16	3
Elevation labels	P_XSection_Layout_Text	5 *	3		16	2
Station labels	P_XSection_Layout_Text	3 *	3		16	2
Earthwork Quantities	P_XSection_Layout_Text	4	0		16	1.5
** Set as default in Geopak input files but can be changed*						
# The color varies for each lift line. For sub-grade lines under the surfacing, the color is less than 10. Colors 10 and greater are for sub-grade line outside surfacing (used to calculate seeding and topsoil).						

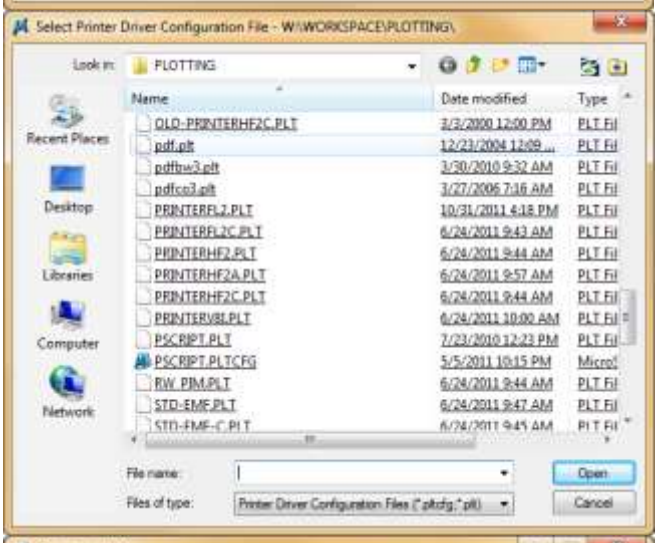
29 PDF from MICROSTATION



There are actually multiple ways to go about it. Defined here is the easiest method.

Built in to basic MicroStation is a PDF plot driver that lets you create a PDF file from the standard File > Print option. You just need to select the Bentley PDF.PLT plot driver and you will create a PDF document instead of printing to paper.

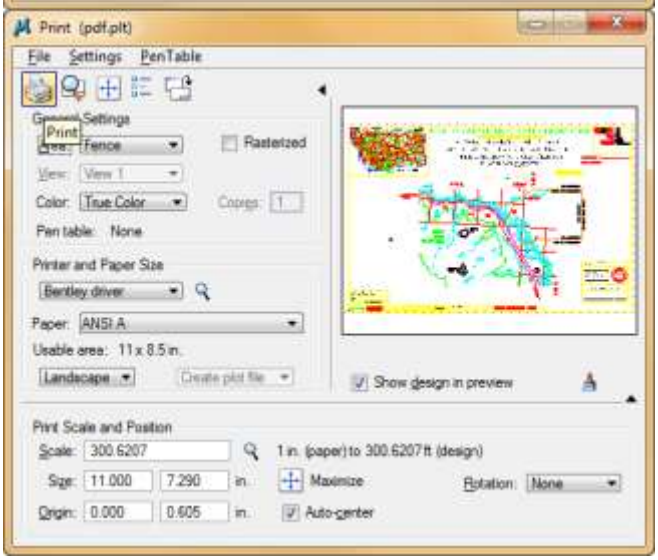
Select File > Print which brings up this dialog box.



Click the spy glass on the Printer and Paper Size entry.

Select the PDF plot driver from the directory:
W:\workspace\plotting\

There is one for black & white and one for color also.



The Bentley driver is selected which changes the Dialog Box Heading and the Printer and Paper Size entries

Fill out dialog box as needed.
Click on Print icon or
Click File > Print

A PDF file will be generated.

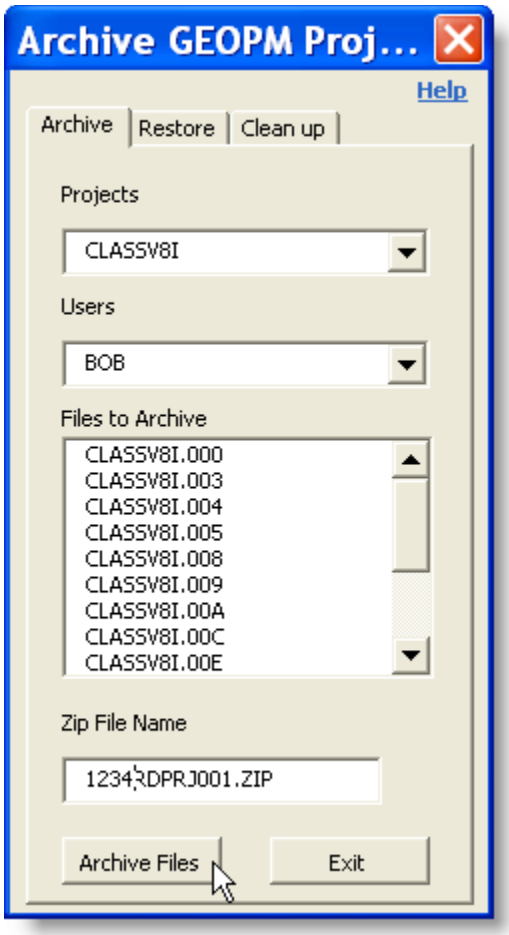
30 Geopak Project Manager

This is a process used to save, restore and/or delete a project's Geopm files. The archive process should be used on a monthly basis and at the end of a project. The others will be used as needed.

30.1 Archive the Geopak Project Manager Files located in the GEOPM directory

1) Select MDT > Road Design

2) Select Geopak > Archive GPK Proj



1) Select the Project to archive

This program will search the *GEOPM* directory to find the **Projects**. *

2) Select the user associated with the project

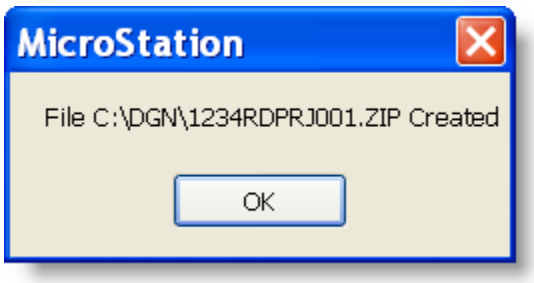
This program will search the *GEOPM\PROJDBS* directory for the folders to find the **Users**.

This will archive all the files shown in the "Files to Archive" list.

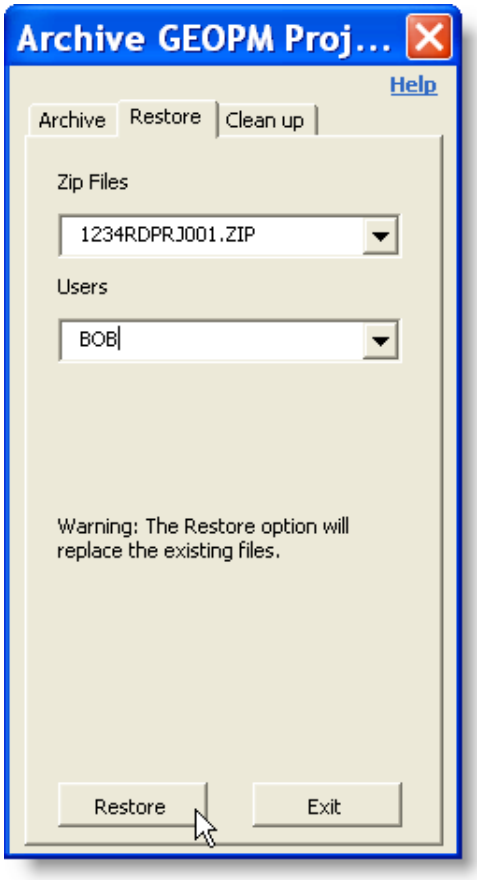
3) Change the "Zip File Name" to correspond to your project.

4) Select Archive Files.

* This directory is defined by the System Configuration Variable "GPK_PROJMGR_PROJECTDIR"



Successful completion creates the Zip file in the same directory as your DGN file.
Check-in this file to DMS.
This completes the archive process.



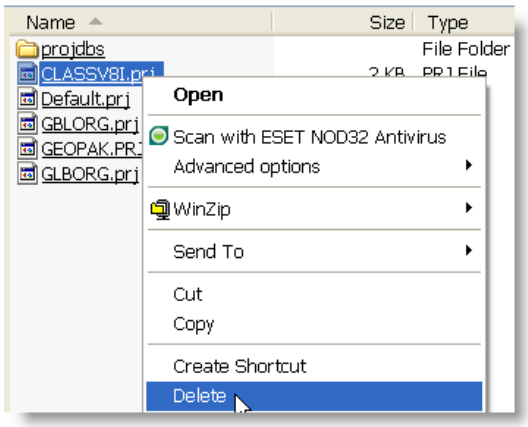
30.2 Restore the Project manager files to GEOPM Directory.

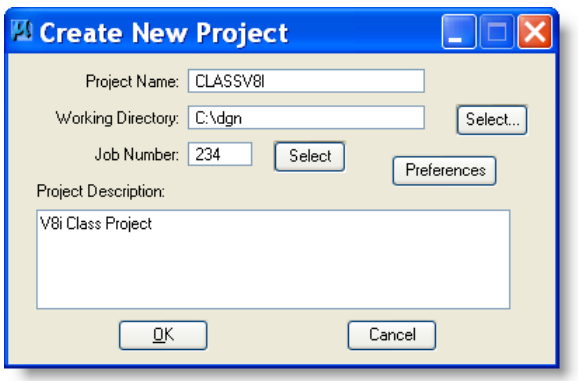
1) Select existing **Zip file**

2) Select the **User** to copy

3) Select **Restore**

This process will copy the files to the correct directory based on the System Configuration Variable "GPK_PROJMGR_PROJECTDIR"





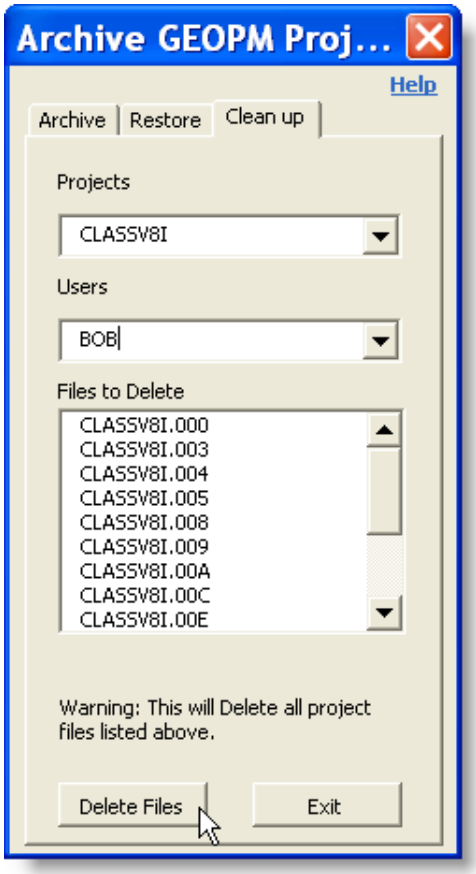
1. Locate the .prj file you just restored in C:\dgn\geopm.

2. Remember the exact name, then delete the file.

3. Create a new project using the **exact same name** as the one you just deleted.

4. You should now be able to access the project's Geopak information.

This completes the restore process.



30.3 Delete the Project manager files from GEOPM Directory.

1) Select the Project to archive.
   This program will search the *GEOPM* directory to find the **Projects**. *

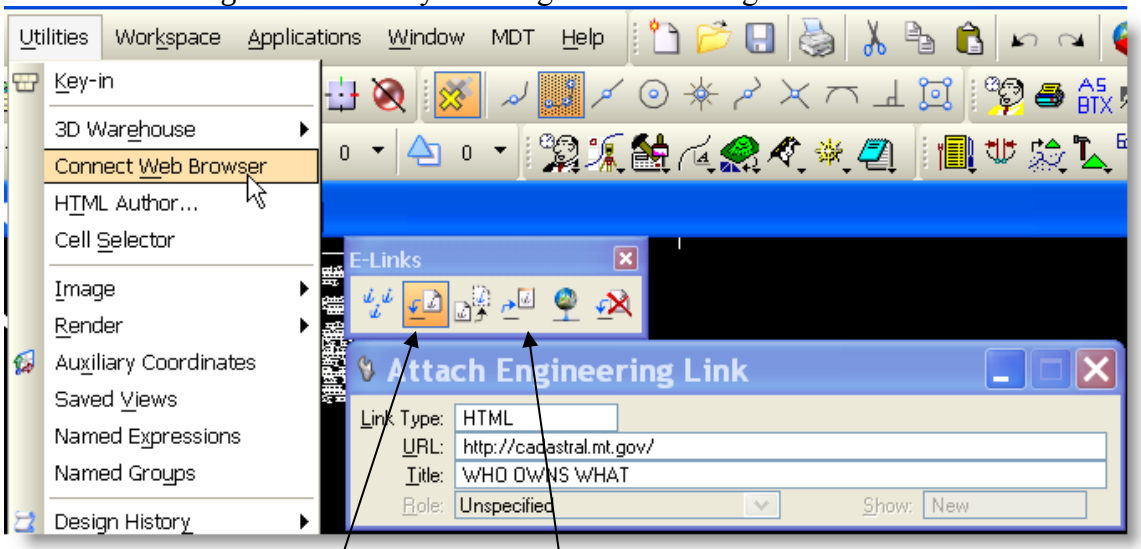
2) Select the user associated with the project.
   This program will search the *GEOPM\PROJDBS* directory for the folders to find the **Users**.

3) Select Delete Files.
   This process will Delete the files from the directory based on the System Configuration Variable "GPK_PROJMGR_PROJECTDIR"
   The files are no longer available.

This completes the delete process.

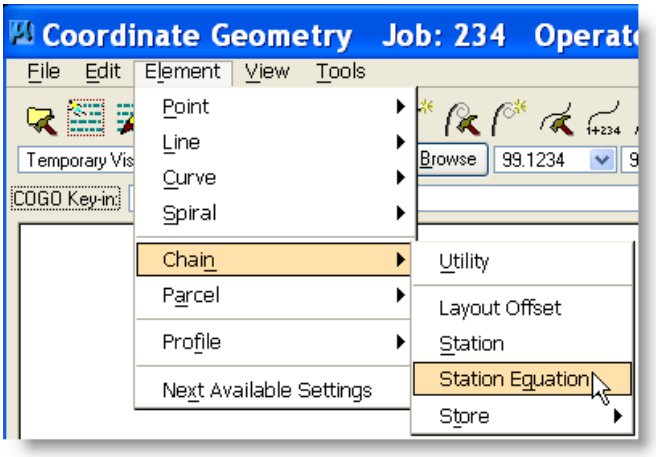
30.4 Attach a link to your design file:

How about adding a web link to your design file? That might be cool…



1. Draw an element or attach a link to an existing element.
2. Utilities > Connect Web Browser – this opens the browser and E-Links dialog box.
3. Click on the 2nd icon in the E-Links – Attach Engineering Link dialog box opens.
4. In the browser find the web page, file or whatever it is you wish to show in the browser.
5. Copy the URL (address line) from the browser and paste into the URL of Attach Engineering Link. Tentative and select the element this link is to relate to.
6. Click Follow an Engineering Link 4th icon on the E-Links dialog box and close all boxes.
7. Whenever you select the related element the browser will open and display what was defined at that time.

31 Storing Equations on a Chain

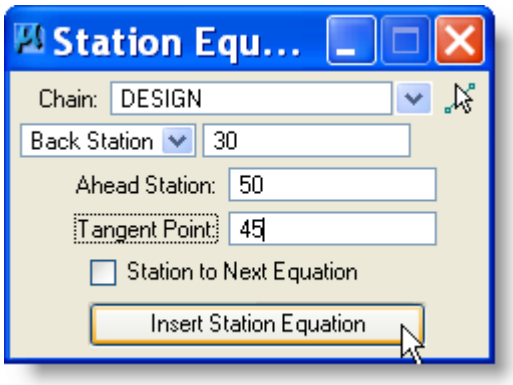


Open Coordinate Geometry (COGO)

Go to ELEMENT-CHAIN-STATION EQUATION

This opens the Chain > Station Equation dialog box.

The first box can be set to either Label Point or Back Station.



1. Label Point or Back Station
For Label Point you can type in the point you wish to equate with the ahead station or you can hit equate and choose the point (i.e. st c4a).
For Back Station simply type in the back station you wish the equation at.

2. Ahead Station
Type in the ahead station in the equation.

3. Tangent Point
It is required that you name the point with a number. ***Make sure the number has not already been used or you may change your chain.***

If you wish to have the rest of the chain restationed to the next equation turn the switch on.

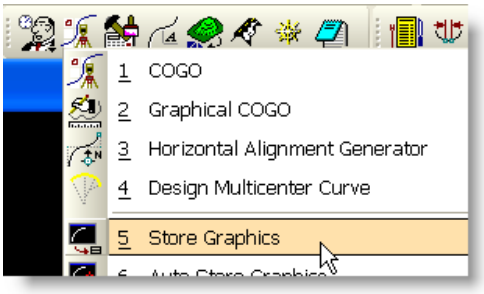
If there is no other equation present leave the switch off and the rest of the chain will be restationed.

4. Choose the chain you wish to put the equation on.

5. Click on Insert Station Equation.

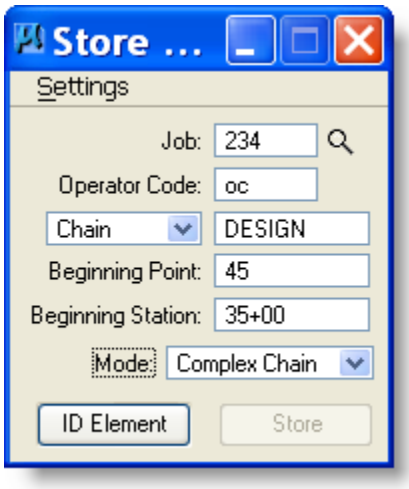
Note: Remember that for spirals the ST is always on 'curvename'A and the TS is always on 'curvename'B.

32 Store Existing Alignment from Graphics



Open **Store Graphics** dialog box

Important: When using this option be sure the Bearing's are rounded to the nearest Second (00^00'00") and the Length's are rounded to the nearest tenth (0.01). **You may need to modify the alignment in Coordinate Geometry.** This dialog box will allow you to store points, curves, chains or parcels.



1. Fill in the Job Number (limit 3 characters)
   Operator Code (limit 2 characters)
   Chain Name
   Beginning Point
   Beginning Station
2. Click on **ID Element**

3. Tentative to the end of the alignment you wish to store and accept.

This may be easier if you turn off all the levels except for the one with the alignment.

4. Continue to accept the pieces of the alignment until the whole chain is highlighted and the **STORE** button is highlighted in dialog box.

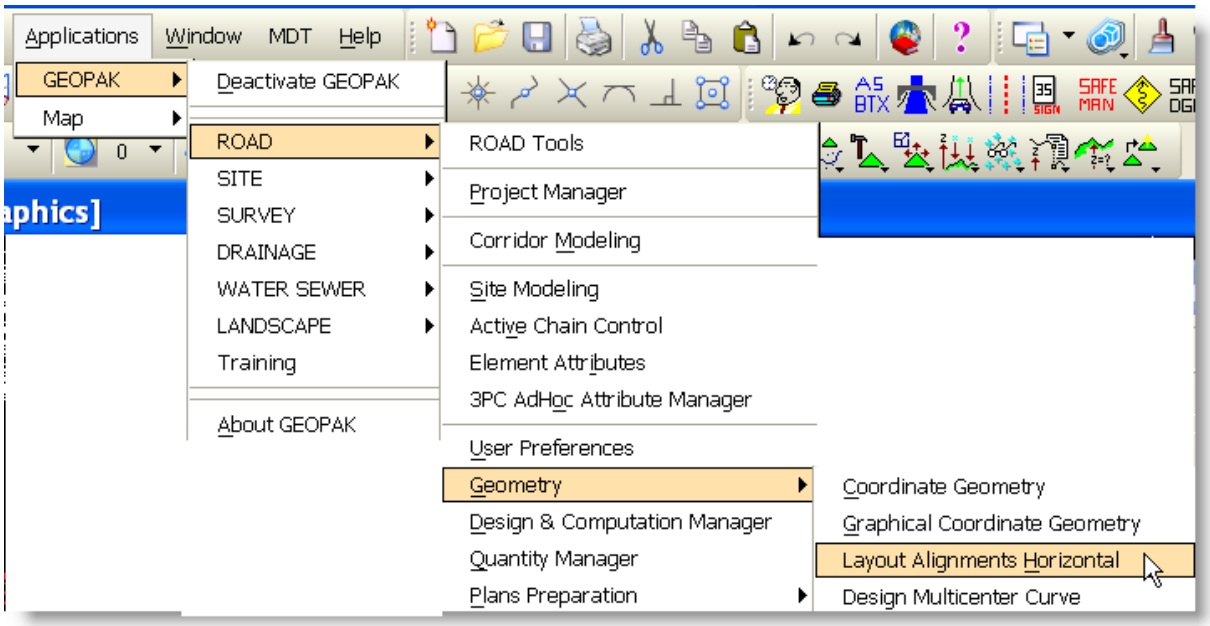
5. Click on **STORE** to store the alignment in the .gpk file.
Note: This will give you a message telling you the chain was stored in the .gpk file and the commands were saved in an .inp file. Keep this .inp file so that you can recreate the .gpk file if it becomes corrupt or lost.

If you need to store equations on your alignment go to section 30.

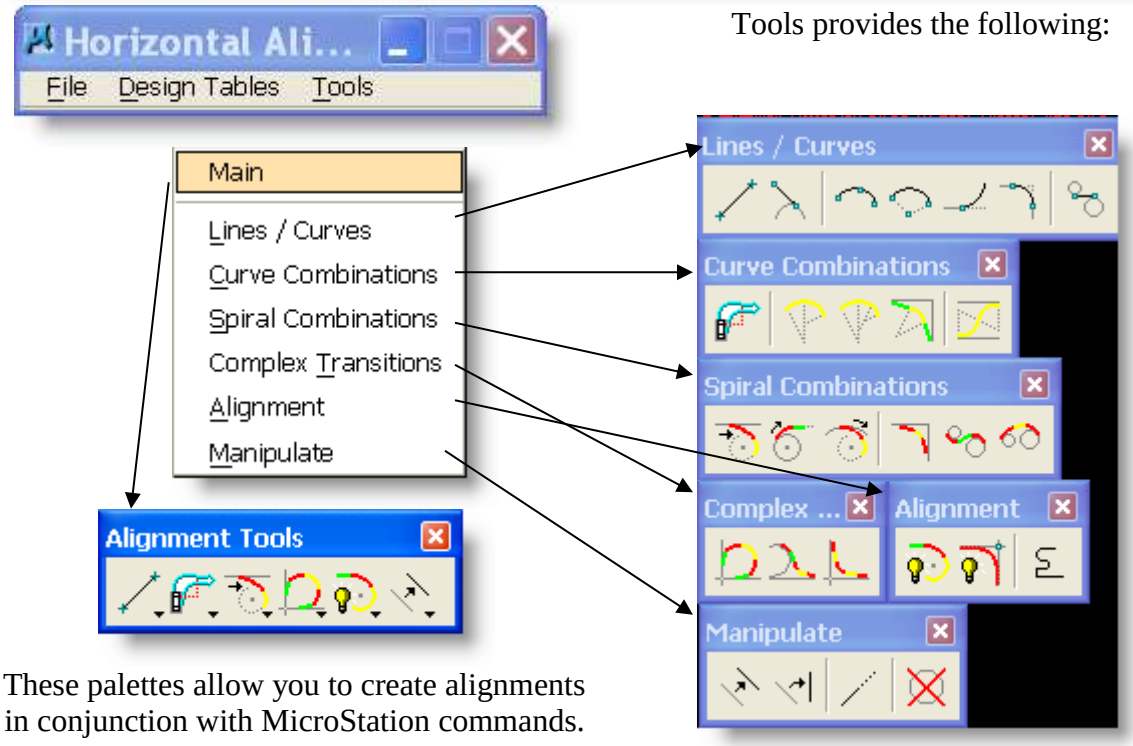
6. Once your alignment is stored in a .gpk file go to the **SURVEY** section of this manual to put your ground line into Geopak.

33 Drawing and Storing an Alignment

Open **LAYOUT ALIGNMENTS HORIZONTAL** dialog box



Tools provides the following:



These palettes allow you to create alignments in conjunction with MicroStation commands.

Important: When using this option be sure the Bearing's are rounded to the nearest Second (00^00'00") and the Length's are rounded to the nearest tenth (0.01). **You may need to modify the alignment in Coordinate Geometry.**

To create the alignment:

1. Draw tangents using MicroStation Place Line command.

2. Curves can then be placed by choosing the command from the right on the bottom of the Lines/Curves palette or the first icon on the Spiral Combinations palette.

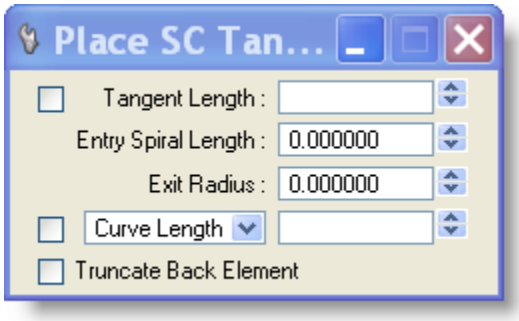
Choosing the third command opens this dialog box.

You can create simple curves by radius or degree.

a. Key-in radius or degree of curve and/or Length.
b. Data point on first tangent.
c. Data point on second tangent.
d. Accept if the curve is correct or reject if you need to try another curve.

Repeat this process until all the simple curves have been created.

Note: Always choose tangents in increasing station order or you will have to transpose your curves when you create your chain.



Choosing the first icon opens this dialog box to create curves with spirals by radius or degree.

The various combinations available are SC, SCS, CS, SCSCS, and CSC.

a. Key-in length of spiral
b. Key-in radius or degree of simple curve portion
c. Data point on first tangent.
d. Data point on second tangent.
e. Accept if the curve is correct or reject if you need to try another curve.

Repeat this process until all the spiral curves combinations have been created.

Note: Always choose tangents in increasing station order or you will have to transpose your curves when you create your chain.

3. When the alignment has been completely drawn go to section 31 for storing an alignment graphically.

If you need to store equations on your alignment go to section 30.

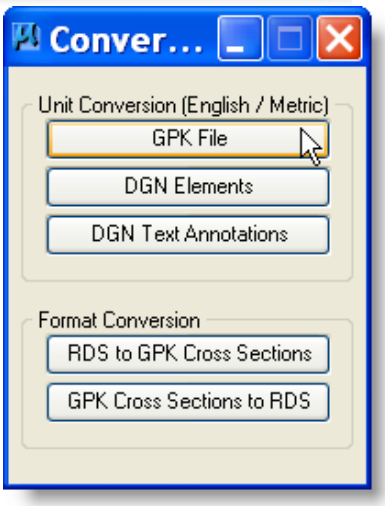
See Horizontal Alignment Generator Document in CADD Help Information

34 Convert English GPK to Metric GPK

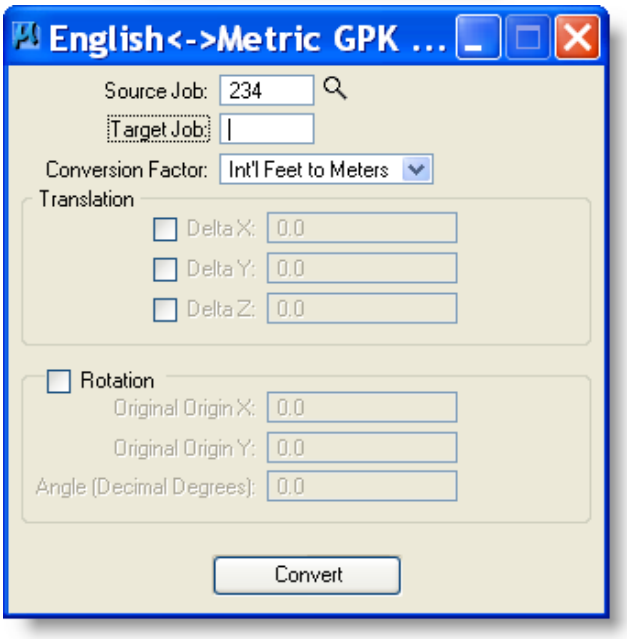
The information about this process is contained in Geopak Help Online- Command Reference > DTM Tools.

This method will only be used to soft convert points such as PI's. It will not be used by MDT to convert a surveyed alignment. Surveyed ground line points can be put into the .gpk file and converted by this method, also, to obtain a digital terrain model.

Open **English/Metric Conversion (GPK Database)**



Select GPK File



1) Set the Source Job Number to the English GPK file

2) Set the Target Job Number to a new GPK file.

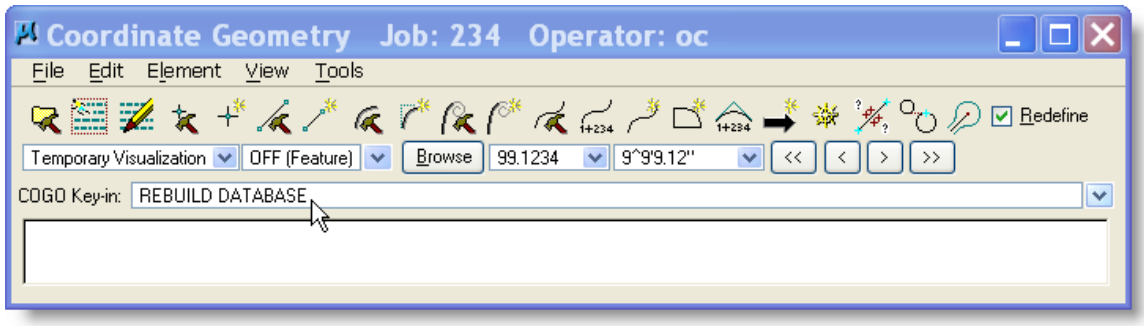
3) Select Convert

Metric to English:
This uses 0.3048 as a conversion factor. You can set Conversion Factor to Custom and Enter 0.3048 if needed. You will now have a new GPK file converted to metric.

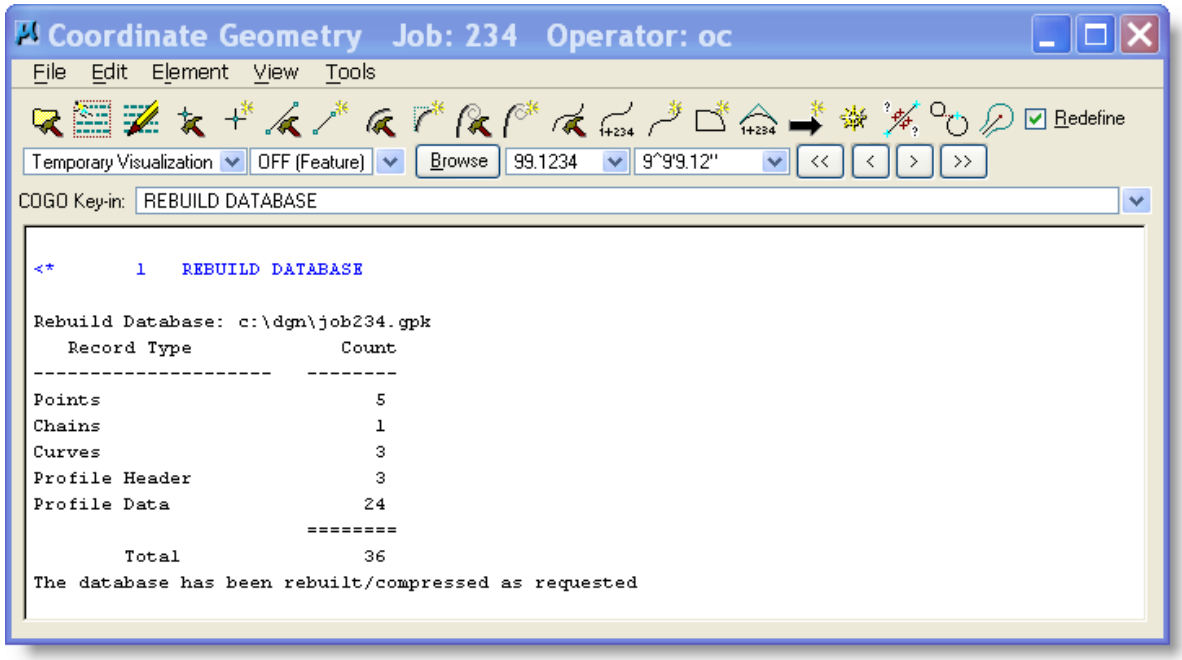
English to Metric: Use a factor of 3.28

35 Fix Corrupt GPK

Dealing with corrupt GPK or basic maintenance - From the Coordinate Geometry dialogue at the COGO key-in enter REBUILD DATABASE.



Press Enter
It may take several minutes to process the GPK.
When complete the rebuilt statistics will be displayed.



This should be done occasionally and definitely before zipping for the archive or posting to DMS.

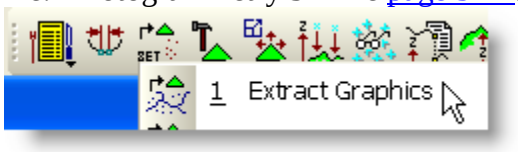
36 Existing Ground - DTM

Go to **Applications-GEOPAK ROAD > DTM Tools**, or **DTM on the Road Tools Dialog** or Click on **Existing Ground** button in *Road Project* dialog box.

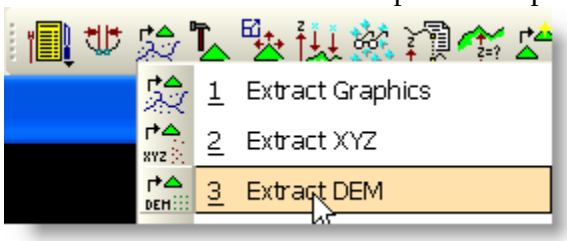
Normally this process will not need to be done, as Photogrammetry will have already generated a TIN file for the project.
This will open the following the DTM main menu. Then you will need to select Extract Graphics from one of the following menus.

There are three options under the Extract option.

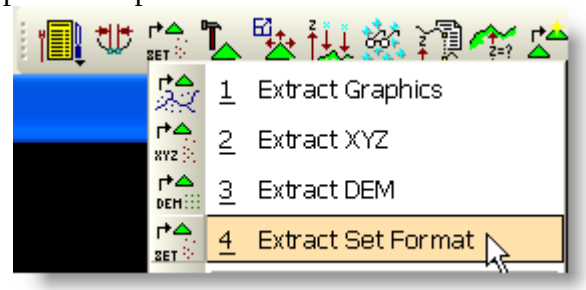
1. **Extract Graphics** - this option will extract XYZ points to create a DTM from a design file. Photogrammetry 3D file page 34-2. Survey 2D file page 34-9.



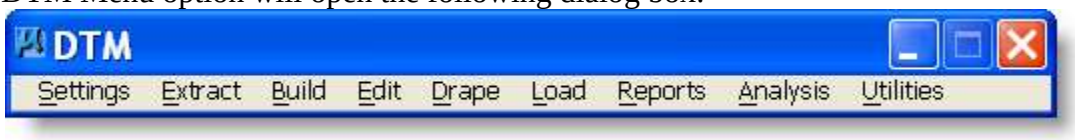
2. **Extract DEM Data** – this option use specialized Digital Elevation Models.



3. **Extract ASCII** - this option will process and XYZ ASCII files into GEOPAK DTM Format. (See page 34-13)



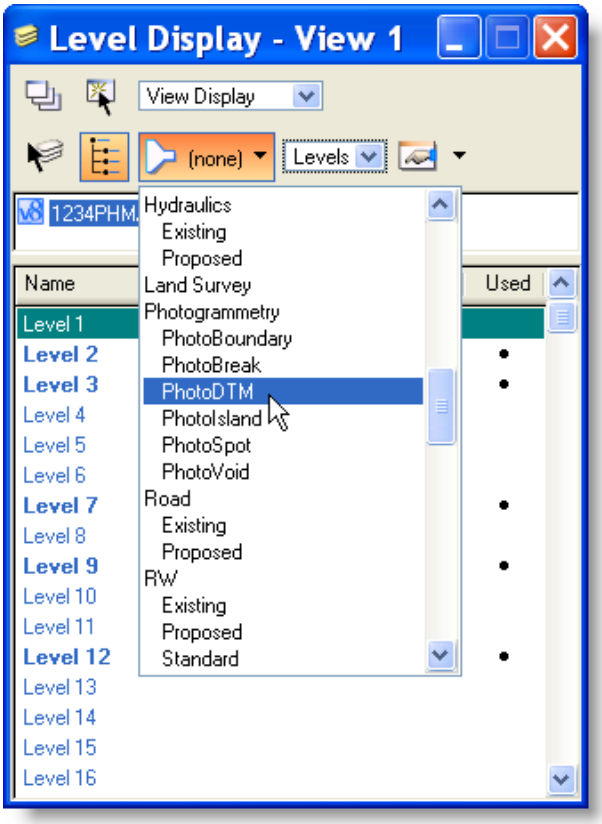
DTM Menu option will open the following dialog box.



Set Curve Stroke Tolerance to 0.3 and Minimum Linear Distance to 5.0

36.1 Photogrammetry 3D file

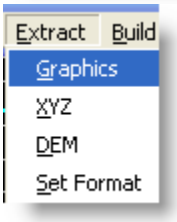
Start by opening a 3D Photogrammetry file.
####PHDTPF01.DGN



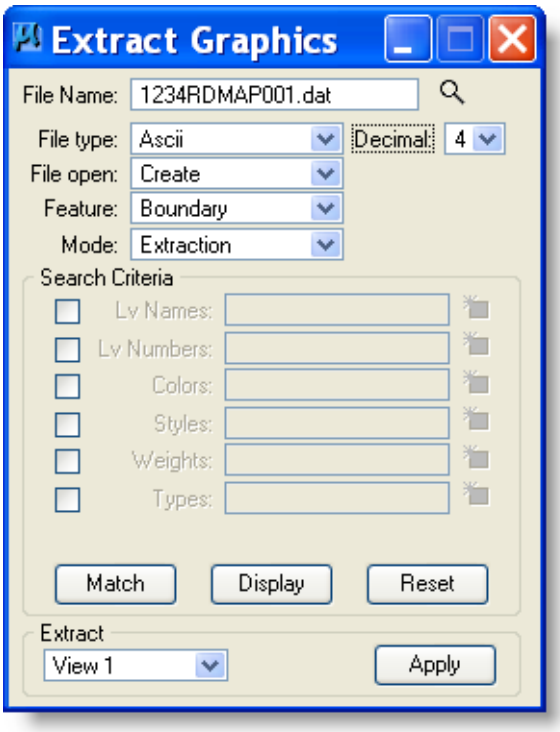
Make sure the file is 3D for this process. Otherwise, go to page 34-9 for 2D files.

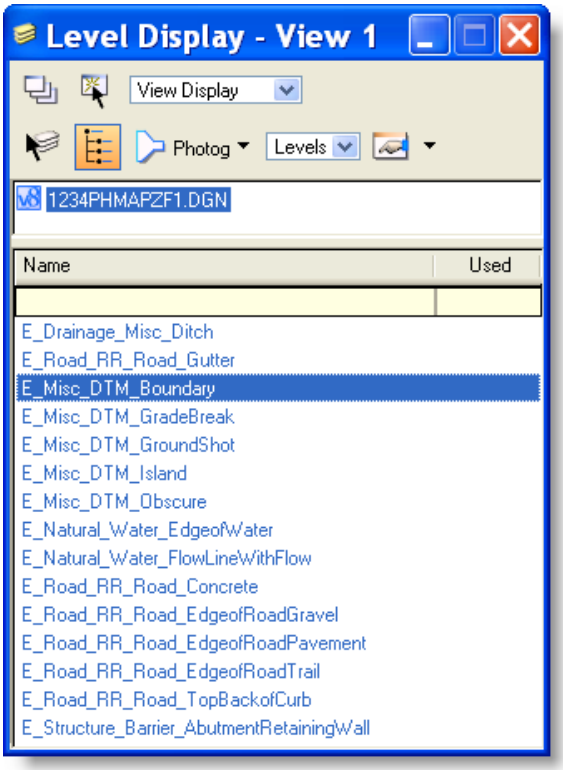
Step 1
Open level display and set filter to PhotoDTM. Leave the Level Display open for use during the extract process.

Hints: be sure that the **whole map** can be seen in the MicroStation Window (View 1) and after setting the **Select Criteria** be sure to select the apply button.



Step 2
Open Extract Graphics dialog





Step 3

1) Choose from Files or type in ####RDDTN001.DAT for file name. This will create a file you can use to create a DTM.

2) Set Decimal to 4 or greater

3) File Type can be either *ASCII* or *Binary*.

4) Set File Open to Create. The first extract should have *Create* set. Additional points will be Added to this file by changing from *Create* to *Append*.

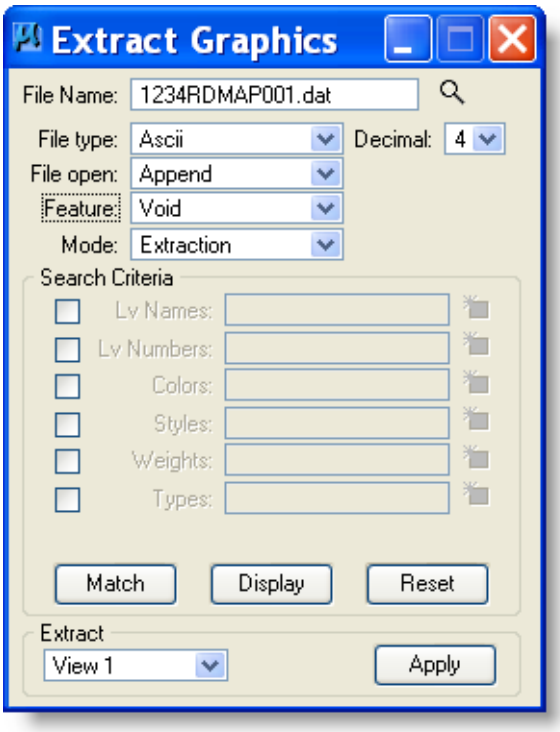
5) Set Feature Type to *Boundary*. This is the line that is around the outside of all the information.

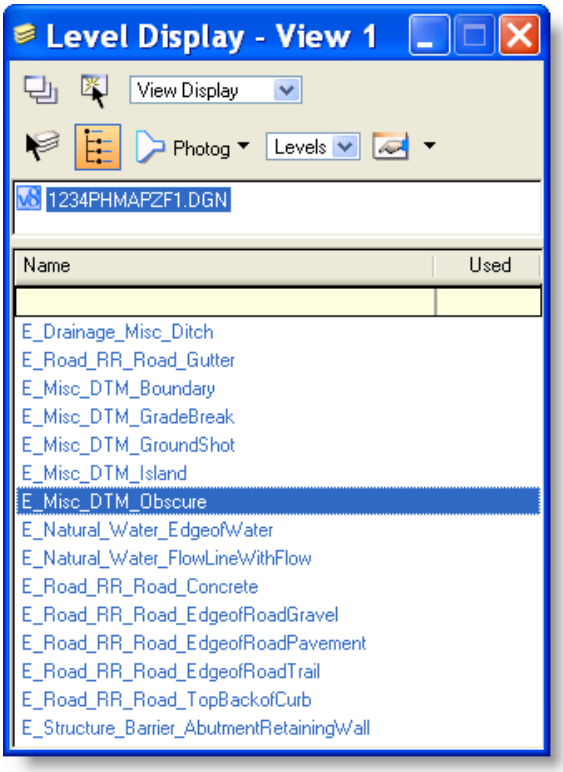
6) Set Mode to Extraction

7) In Level Display set all levels OFF except for E_Misc_DTM_Boundary

8) Set Extract – View 1. Be sure you can see the whole drawing in view 1

9) Click on Apply.





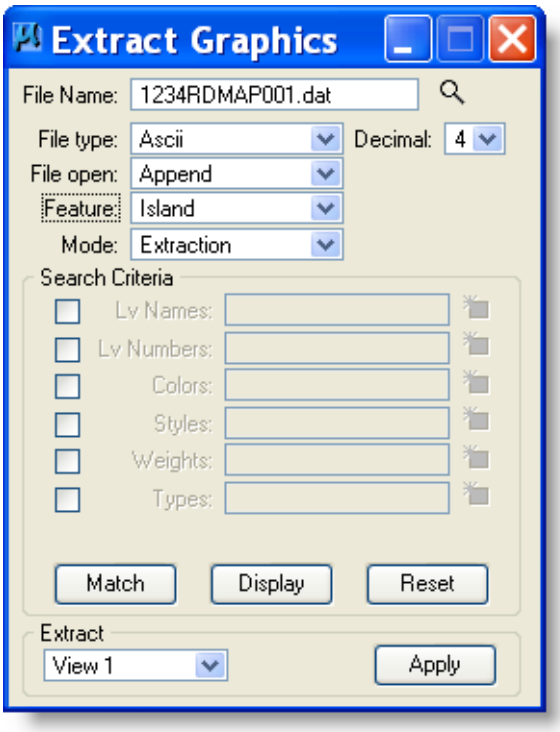
Step 4

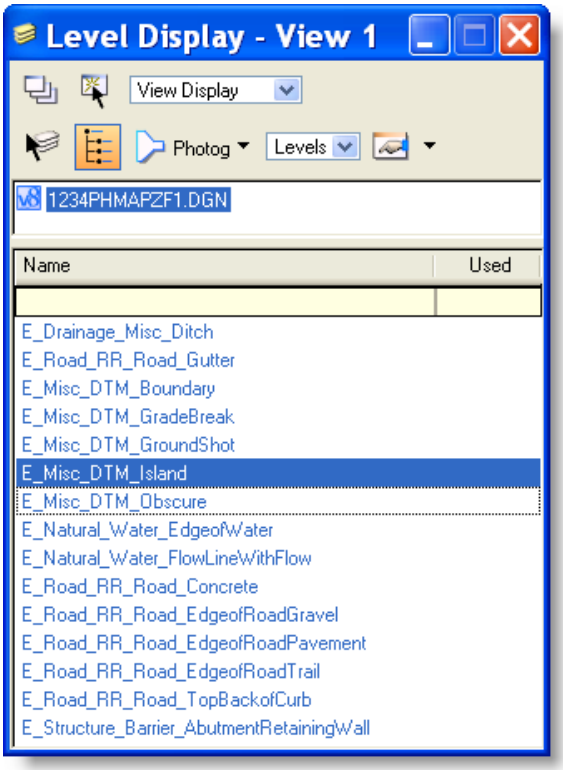
1) Change File Open to Append. This will add the voids to the existing .dat file that was created in the previous step.

2) Change Feature Type to Voids. These are the lines around the outside of buildings and areas that have heavy trees or brush where the ground information cannot be seen by the Photogrammetry unit.

3) In Level Display turn all levels off except E_Misc_DTM_Obscure.

4) Select Apply. This will add the void information to the existing dat file.





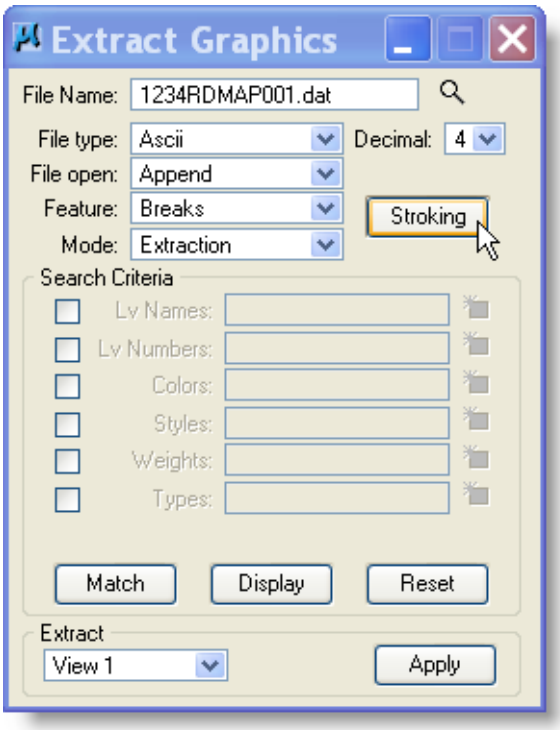
Step 5 (Optional)

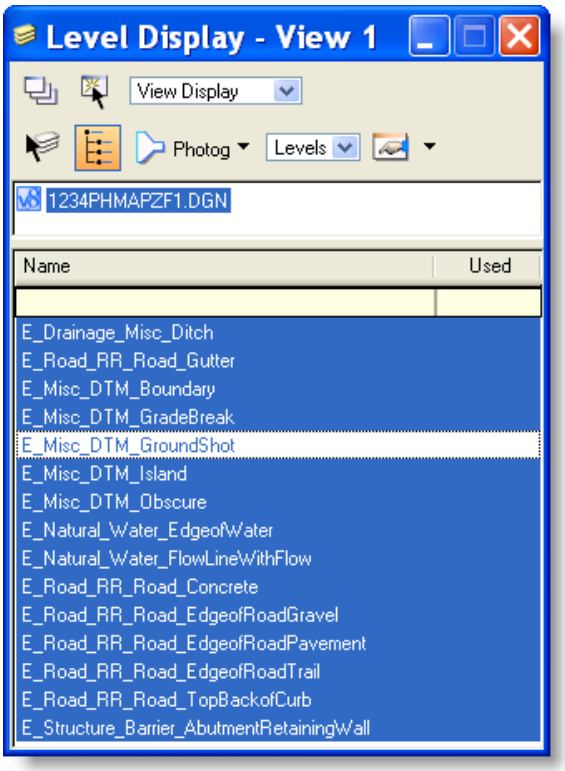
1) Perform this step only if elements exist on E_Misc_DTM_Island level.

2) Change Feature Type to Island. These are actual islands in the middle of rivers and/or meadow areas in heavy timber as seen by the Photogrammetry unit.

3) In Level Display turn all levels off except E_Misc_DTM_Island.

4) Select Apply. This will add the void information to the existing dat file.





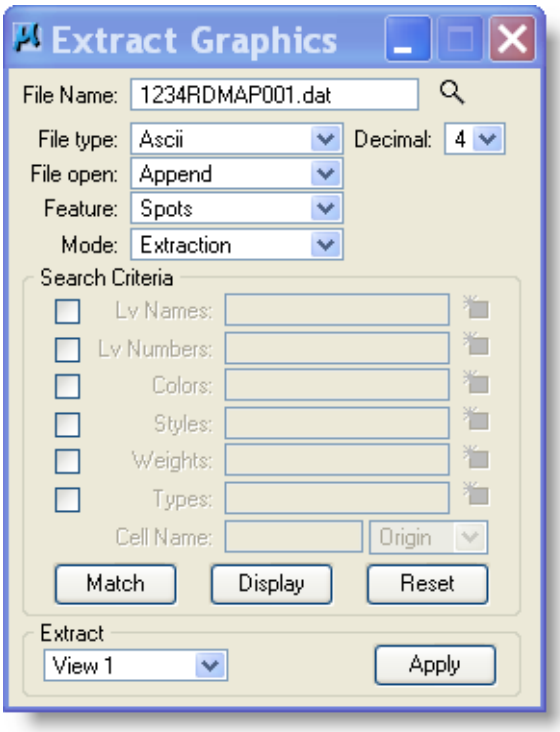
Step 6

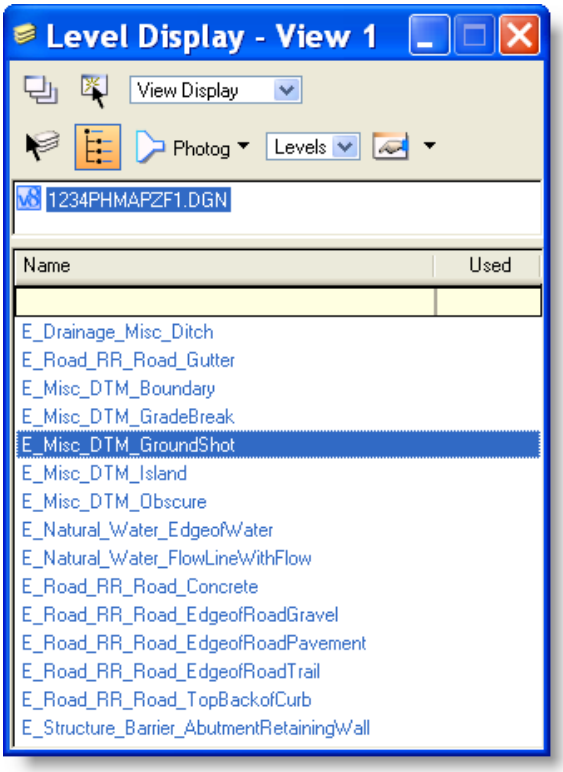
1) Change Feature Type to Breaks. These are the lines that show the edge of roads and ditches. These are needed to get a better tin of what the ground really looks like.

2) Check stroking are Curve Stroke Tolerance to 0.3 and Minimum Linear Distance to 5.0.

3) In Level Display turn ALL levels ON except E_Misc_DTM_GroundShot.

4) Select Apply. This will add the break information to the existing dat file.





Step 7

1) Change Feature Type to Spots. These are the mass points defined by the Photogrammetry unit.

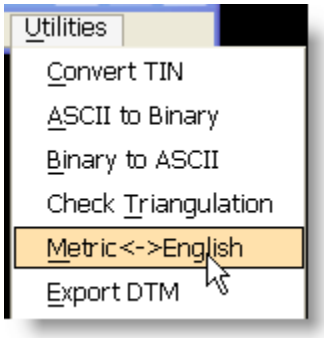
2) In Level Display turn ALL levels OFF except E_Misc_DTM_GroundShot.

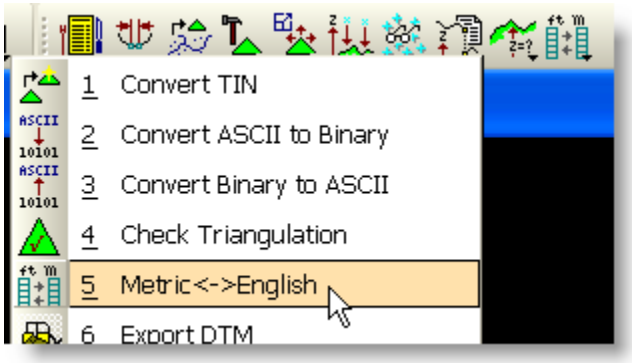
3) Select Apply. This will add the spot information to the existing dat file.

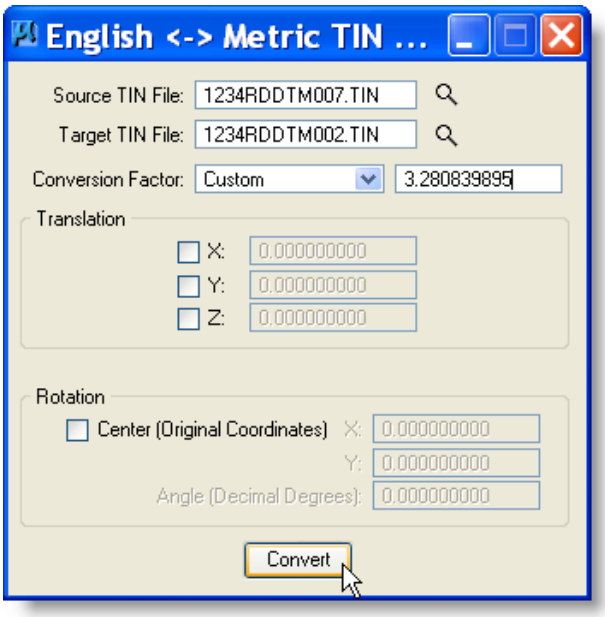
You have now created an XYZ file you can create a .tin file with.

36.2 Convert DTM to English

For information only. Be sure to follow conversion procedures if converting your own DTM.







1) Select Metric<->English from the DTM menu or the Icon from the Menus

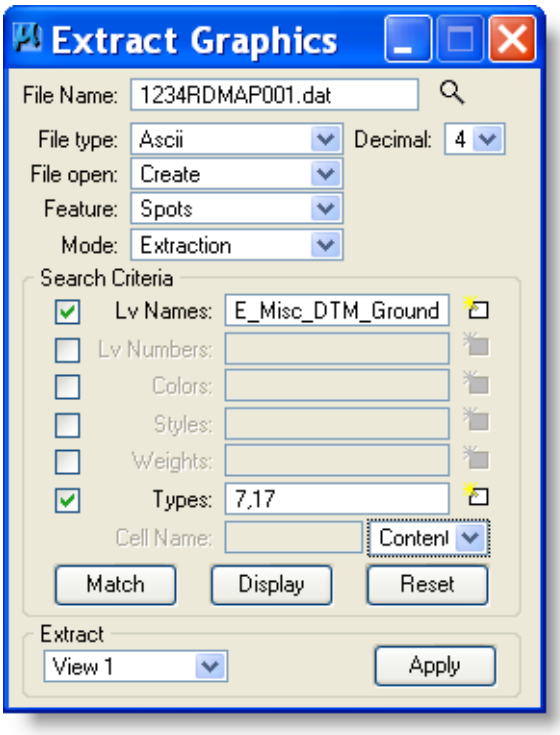
2) Set Source to existing DTM

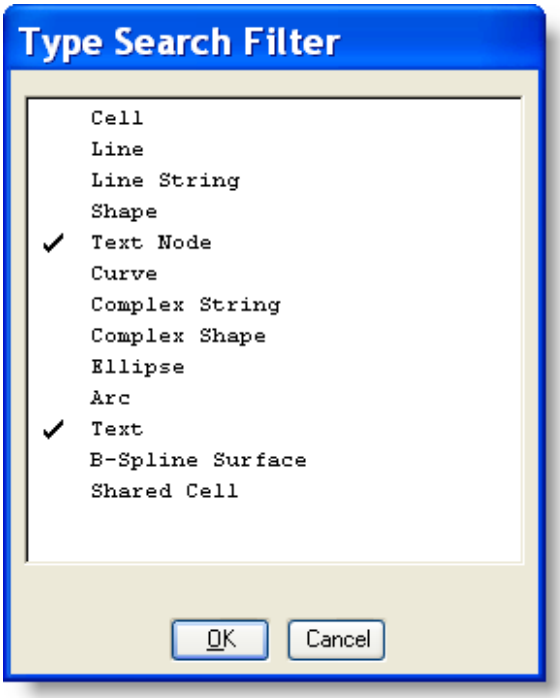
3) Set Target to new DTM

4) Set Conversion Factor to Custom and 3.280839895

5) Press Convert

36.3 Survey file 2D





Step 1

1) Choose from Files or type in 1234RDDTM001.dat for file name. This will create a file you can use to create a DTM.

2) Set Decimal to 4 or greater

3) File Type can be either *ASCII* or *Binary*.

4) Set File Open to Create. The first extract should have *Create* set. Additional points can be Added to this file by changing from *Create* to *Append*.

5) Set Feature to *Spots*. This will extract the mass point from the design file. In most cases they look like green dots.

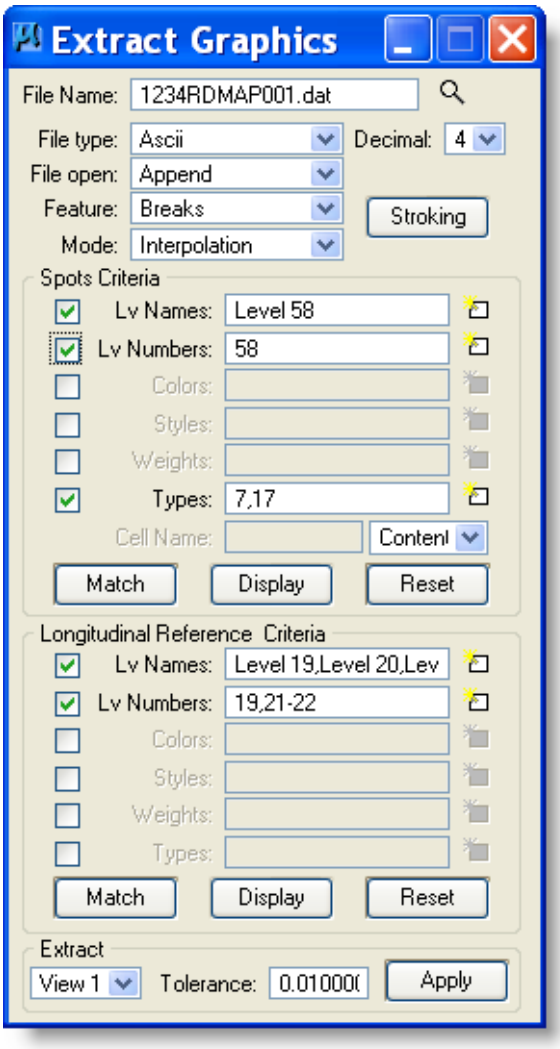
6) Set Mode to *Extraction*

7) Select Criteria to match your elements to be extracted. A quick method of matching is to use the match button and select your element. E_MISC_DTM_GROUNDSHOT

8) Select Types to Text and Text Nodes and Set toggle to Content. This will read the Elevation text to get the Z information. Select OK

9) Set Extract – View 1. Be sure you can see the whole drawing in view 1

10) Click on Apply. This will create the text file containing Spot elevation information.



Step 2

1) Change the **File Open** to **Append**

2) Change **Feature** to **Breaks.** Make sure stroking values have been set.

3) Change **Mode** to **Interpolation**

4) Select Criteria to match your elements to be extracted. English levels below.

5) Set Spot Criteria Type to **Text** and **Text Node**, Set Toggle to **Content.** In order to get the elevation of break line from a 2d file Geopak must read the Content of the elevation text. Geopak will only read the elevation text that is near the break lines

6) Set Longitudinal Reference Criteria Level Mask to match your elements.

7) Set tolerance to 0.01

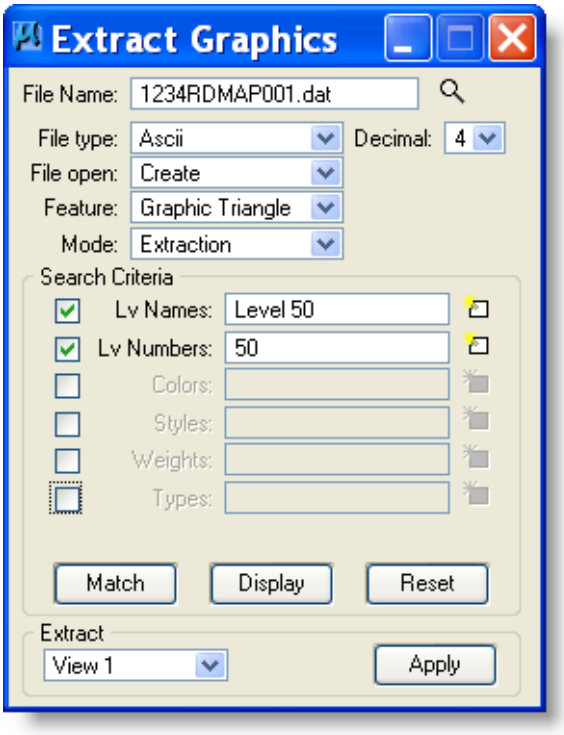
8) Select Apply. At this point Geopak will add the Break lines to the existing dat file.

<u>Be sure all criteria are set before you apply.</u> Levels to be used for English:
E_MISC_DTM_GROUNDSHOT, E_MISC_DTM_BOUNDRY,
E_MISC_DTM_GRADEBREAK, E_MISC_DTM_ISLAND, E_MISC_DTM_OBSCURE

You have now created an XYZ file you can create a .tin file with.

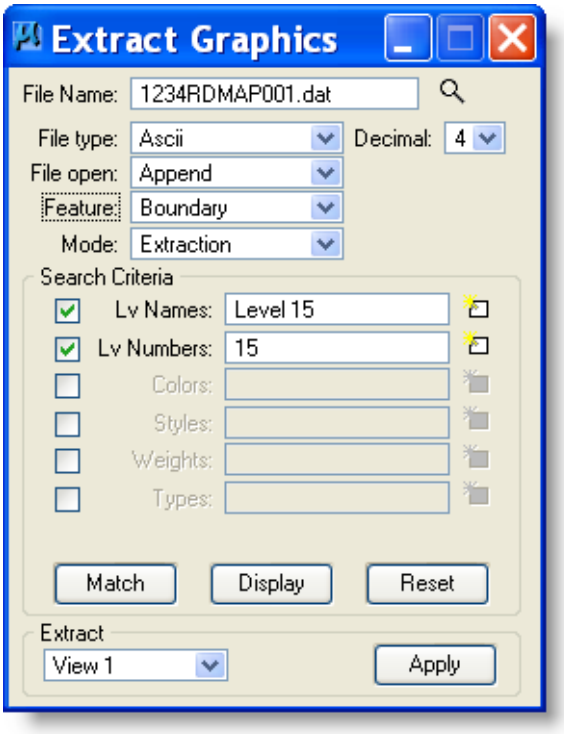
36.4 3D Survey file from CAICE

File name will be similar to this naming convention 1234DIDTM001.dgn



Step 1

1) Choose from Files or type in 1234RDDTM001.dat for file name. This will create a file you can use to create a DTM.
2) File Type can be either *ASCII* or *Binary*. For *ASCII* set Decimal to 4 or greater.
3) Set File Open to Create. The first extract should have *Create* set. Additional points can be Added to this file by changing from *Create* to *Append*.
4) Set Feature to *Graphic Triangles*. This will extract the triangles from the design file. In most cases they look like existing TIN.
5) Set Mode to *Extraction*
6) Set **Levels** for CASIE 3D file. Select Criteria to match your elements to be extracted. A quick method of matching is to use the match button and select your element. Select OK
7) Set Extract – View 1. Be sure you can see the whole drawing in view 1.
8) Click on Apply. This will create the text file with the graphic triangle information.



Step 2

1) Change the **File Open** to **Append**

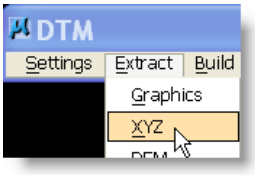
2) Change **Feature** to **Boundary**

3) Set **Levels** to match your elements to be extracted. A quick method of matching is to use the match button and select your element.

4) Select Apply. At this point Geopak will add the boundaries to the existing dat file.

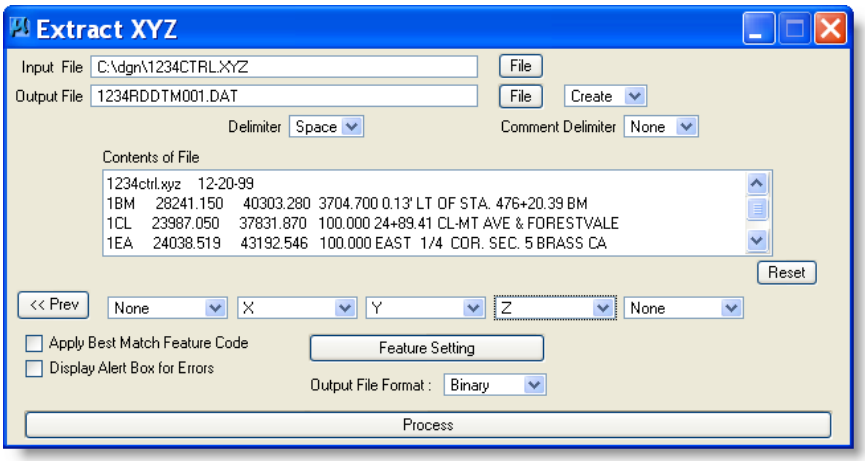
You have now created an XYZ file you can create a .tin file with.

36.5 Extract XYZ ASCII



Extract ASCII Format option will open the following dialog box.

This dialog will reformat the existing XYZ data file to a format that Geopak can create a DTM from. GEOPAK requires the following information for each data point: **Point Code, X-coordinate, Y-coordinate and Z-coordinate**. Other informational items include **Point Number, Linking Code, Chain, DTM, Zone**, and combination **Linking Code Point Code.** For more information see the Geopak Help Online – Command Reference > DTM Tools



1) Set the Input file name to the file that contains the XYZ data. An example of the first few lines of the data file will show in the **Contents of File.**

2) Set the Output file to the file you wish to create. Use this format 1234GRND.dat

3) Set the Delimiter to space. If you have commas or some other delimiter you will need to set it to that.

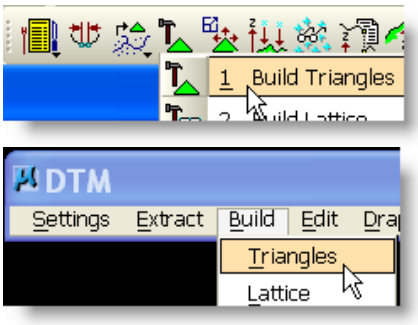
4) Select one line of data within the Contents of File area and the information from that line will appear below.

5) At this point you will need to set the button below each number or text to the correct setting as shown in the example. In some cases you will not have a column for PCODE, this is ok but you will get a message that you have not defined the PCODE. Just Select OK if you get this message and Geopak will create the DTM input file.

6) Select Process. This will convert the data file to a DTM input file that Geopak can create a DTM from.

You have now created an XYZ file you can create a .tin file with.

36.6 Create Digital Terrain Model



To create the .tin file go to **BUILD-TRIANGLES**.

1) Choose or Type in the name of the xyz data file created above.

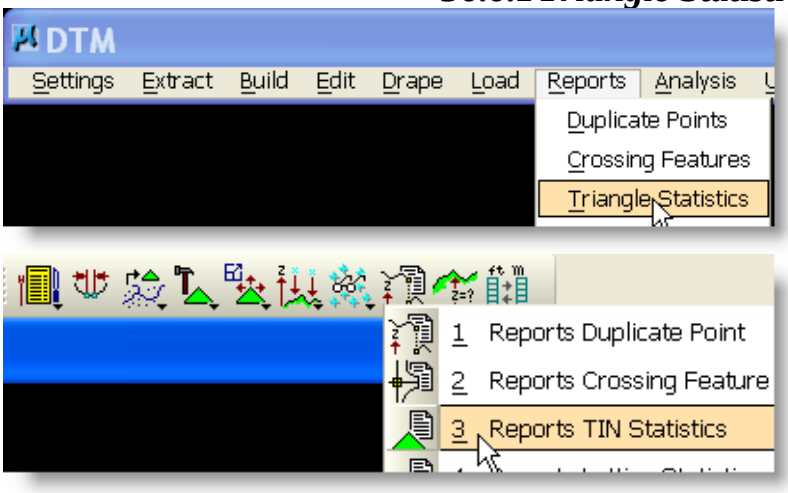
2) Choose or Type in the name of the tin file (triangle file). You are building or replacing this file.

3) Choose None for Dissolve Option.
   Note: For RDS cross sections set Dissolve Option to Side and set distance slightly larger than your surveyed distance between cross sections or you will get improper triangles.

4) Select on Process.

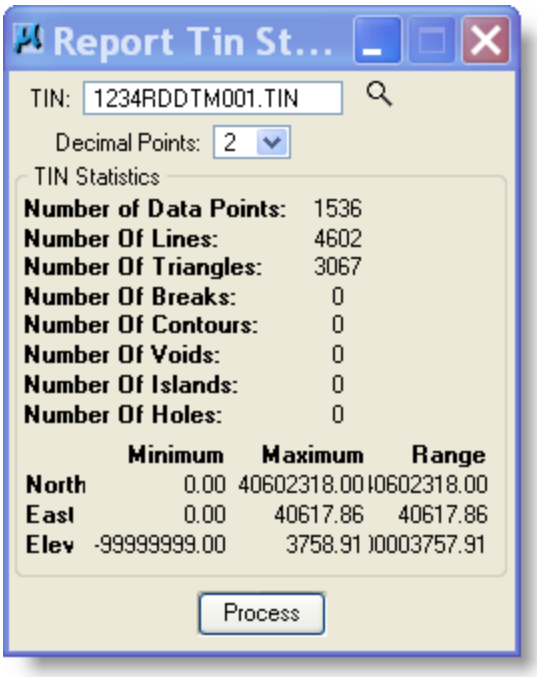
You have now created the file necessary to create your cross-sections. To check this file you can do the following two steps.

36.6.1 Triangle Statistics



Go to Reports > Triangle Statistics

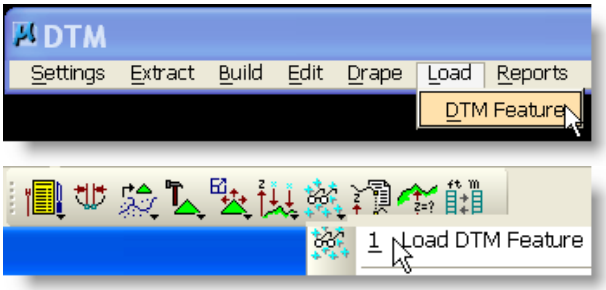
This will open a dialog box that gives information about triangulated file.



This allows you to check and make sure that all your points are not at the same spot or any other mistakes that are obvious such as 1000-foot difference in elevations when you only have a max. 100 foot difference.

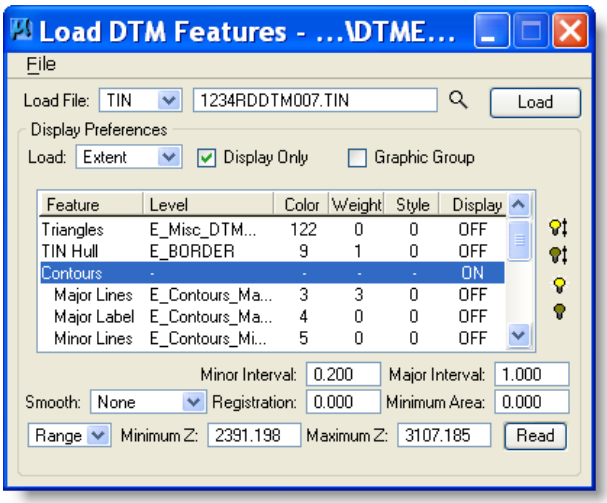
I believe the report at left shows a file built in error. A rerun is required.

36.6.2 Display DTM Features



Go to LOAD > DTM Feature
This will open the Load DTM Feature dialog.

Select File > Open and select DTMEXISTING or DTMPROPOSED file that sets symbology for loaded features.



1) Set Load File to TIN and use Files button to select the Tin file.

2) Set the Feature to the feature you wish to display.

3) Select Load button

Hint: To set up the feature setting for Erosion control contours use the FILE menu from this dialog and OPEN the file w:\geopak\erosion.lpf. This will set the features as shown to the left.

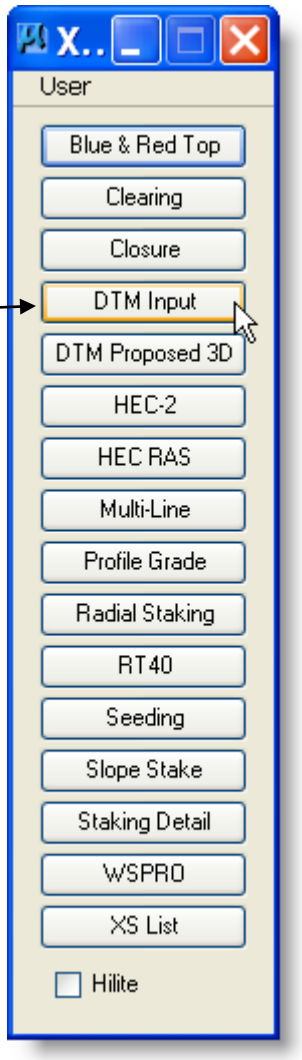
The triangles should now be displayed on the screen laid over your alignment. Now you can visually inspect the triangle file for any gaps that should not exist or if there are extra triangles that should not be there. If there are go back to Build-Triangles and adjust the side length until it looks right. A contour map may be created by using the **macro**: RD > Create DGNs > select Contour Map File, English and use the PH file as the Base Map > Create DGN'S - creates 1234RDCMA001.dgn.

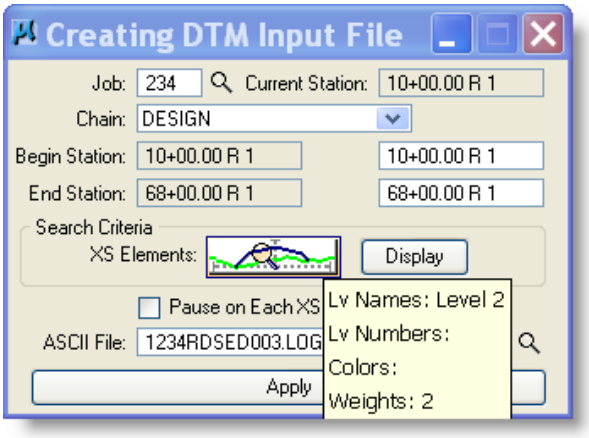
36.7 Creating DTM input from existing cross section file

Within the Project manager dialog select **Reports & XS Quantities.**

Must be in the cross section file to use cross section reports.

Select **DTM Input**.

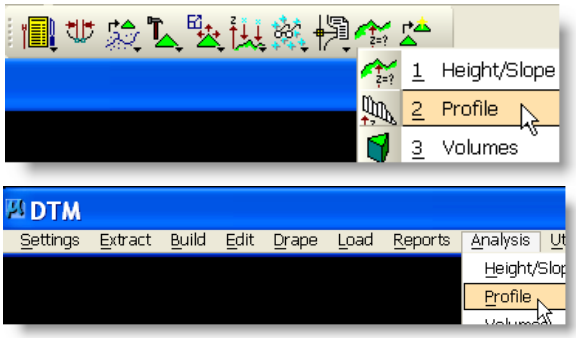




1) If you are using Project Manager the following will be filled-in
   a) Job Number
   b) Chain
   c) Begin & End Station
   d) XS Element Symbology
2) or Set the Following for XS Elements
   a) Level = 2
   b) Weight = 2
   c) Style = 0
3) Enter a ASCII file name
4) Select Apply

You have now created an XYZ file you can create a .tin file with. Go to section 5.6.
See Geopak Help Online – Command Reference > Cross Sections *Optional direct link to Help press F1 when dialog is active.*

36.7.1 View X-Sections profile from DTM



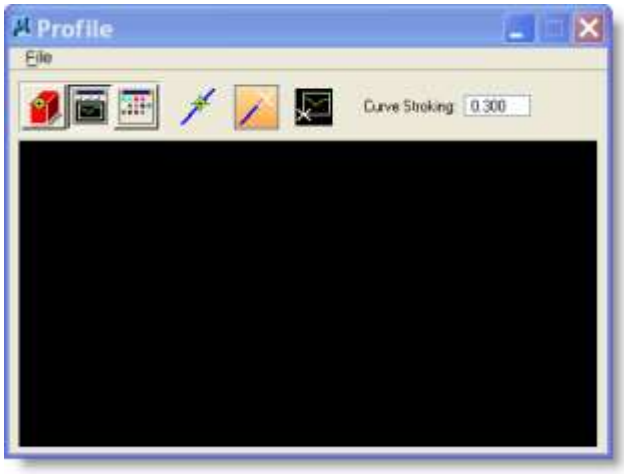
Select **Analysis > Profile** from either the menu or icon ribbon.

Selection
1) Select TIN file

2) You can set the symbology for the element
   Right click on the line symbol

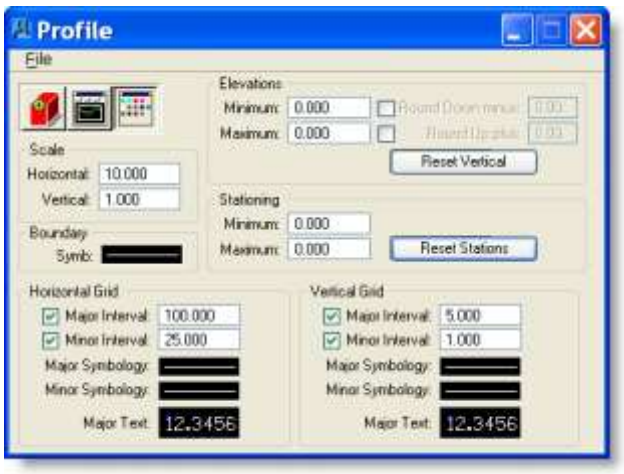
3) Select Add

4) Go to Profile tab



Profile

1) Select the Select Element or Place Element button.
2) Select the Element or place the line on the screen.
3) The profile will appear in the dialog
4) You can place this image on the design file if you wish. You may wish to set the preferences before placing this on the design file.



Preference

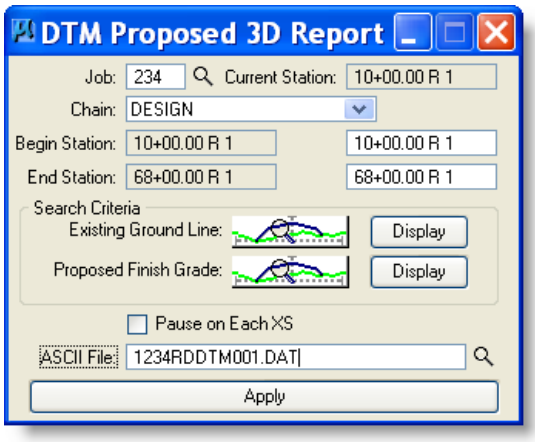
At this time there is not a standard.

36.8 Creating DTM input from Existing & Proposed Cross section file

Select **Reports & XS Quantities** or From **Road Tools Menu > XS Reports**

Must be in the cross section file to use cross section reports

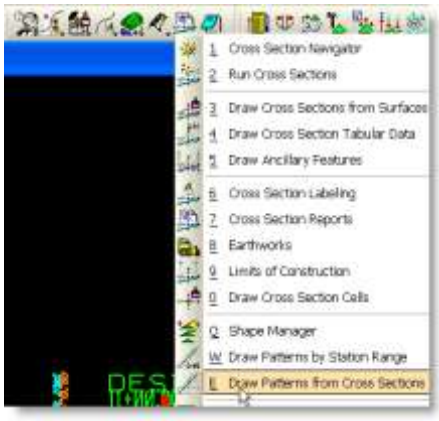
Select **DTM Prop. 3D**.



1) If you are using Project Manager the following will be filled-in
   a) Job Number
   b) Chain
   c) Begin & End Station
   d) Existing Ground Line
   e) Proposed Finish Grade
2) Set Search Criteria:
   Existing Ground Line
   Level = E_Ground_XS_Delineation
   Proposed Finish Grade
   Level = P_Template_Design_Alignment_Finished_Grade
3) Enter a ASCII file name
4) Select Apply

You have now created a DTM file to be used to create a .tin file.
See Geopak Help Online – Command Reference > Cross Sections *Optional direct link to Help press F1 when dialog is active*

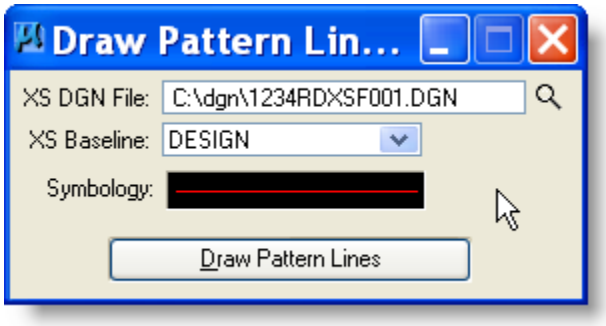
37 Create Patterns from Existing Ground Cross Sections



In Project manager Select **Existing Ground Cross-Sections**. You will need to Create or Rename a run.

Or

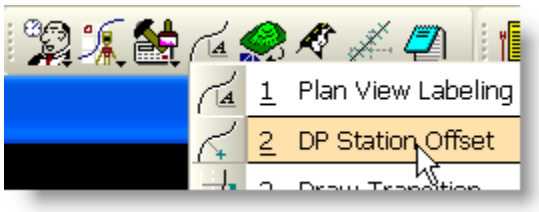
Select Ground Cross Sections From DTM from the Geopak Road Tools Menu



1) Select the cross section file needed
2) Select the chain (baseline).
3) Set the symbology of the pattern lines.
4) Make sure the map file is open.
5) Click Draw Pattern Lines. The new pattern lines will be drawn according to the cross sections.

38 Topography or Signing

Placing Point Data



Open **DP Station/Offset** dialog

If you are using Project manager the Job # and Chain will be filled-in.
Topo & Signing is done on the strip map file.

1. Type in station location of point data.

2. Type in offset from centerline.
   A minus (-) sign represents offset left.
   A plus (+) or no sign represents offset right.

3. Choose MicroStation command for placing your specific type of point data. (For most topography and signs, this will be PLACE ACTIVE CELL. Make sure to attach Cell Library before trying to place cells.)

4. Click on **DP**.

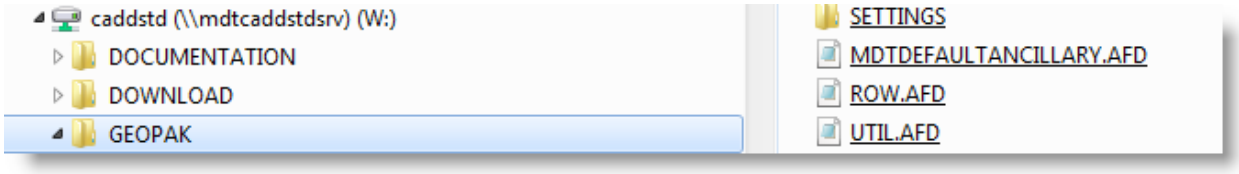
The point data you were placing should appear on your screen at the correct location. (You must have this part of your alignment on the screen to see the element.)

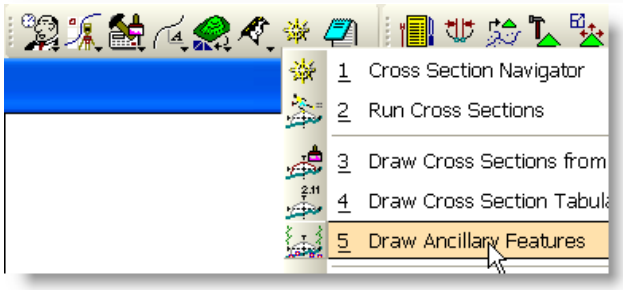
5. Repeat steps 1- 4 to continue placing point data.

39 Ancillary

39.1 GEOPAK Ancillary Process (LINES)

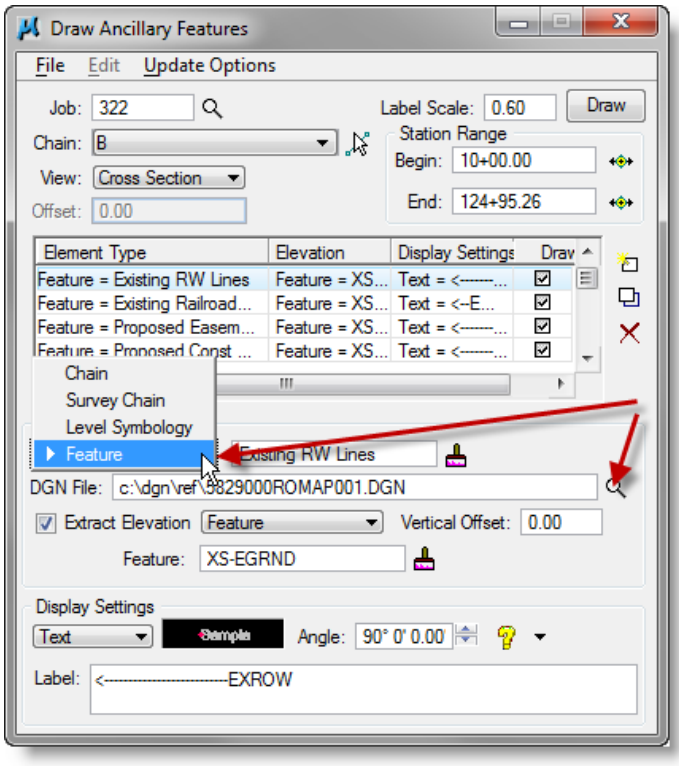
This process handles the lines from the design file – to process cells go to section 39.2.
NOTE: There are standard files defined in CADDSTD\GEOPAK*.afd. In order to use these copy and paste the required file into C:\dgn and rename to your project - nnnnRDADF001.afd



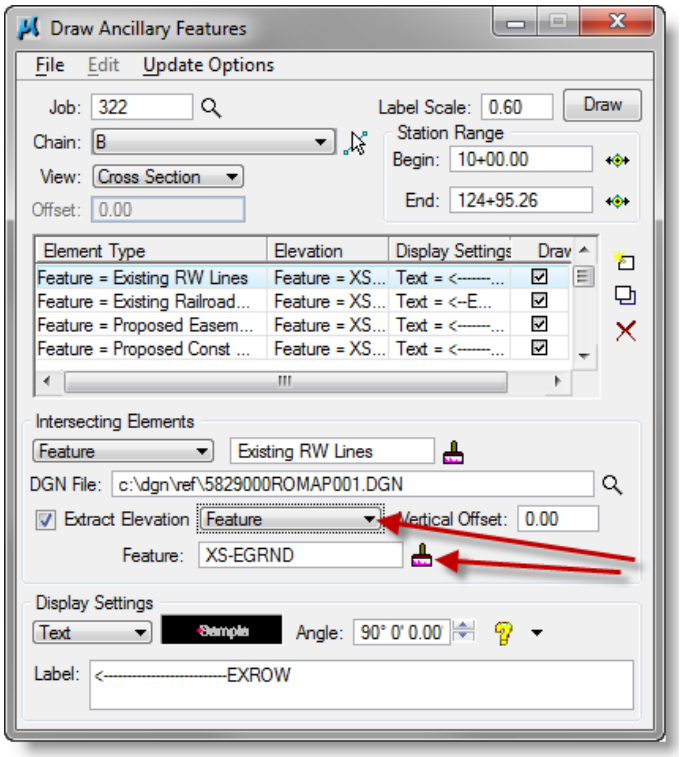


Open the **Draw Ancillary Features**
OR
GEOPAK ROAD > Cross Sections > Draw Ancillary Features get the window.

This is used to draw features such as underground utilities and Row on the working cross sections.

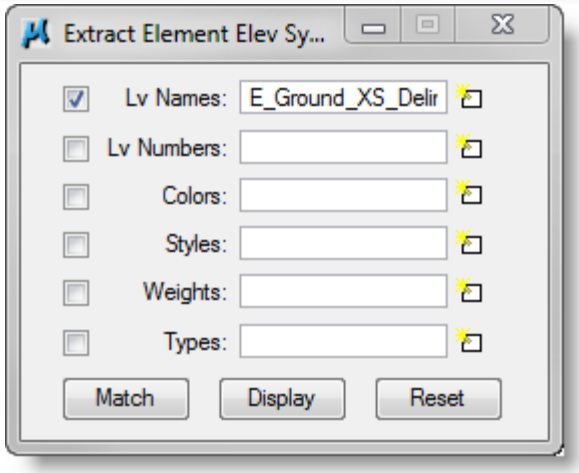


1) If you copied a .afd file from CADDSTD, then File > Load > Select the file you copied.
2) Select Job
3) Select Chain
4) Set View to Cross Section
5) Select Intersecting Element **Level Symbology or Feature. Match symbology from the actual file.**
6) **Select the SPECIFIC file that contains the level symbology or feature you wish to look for.**



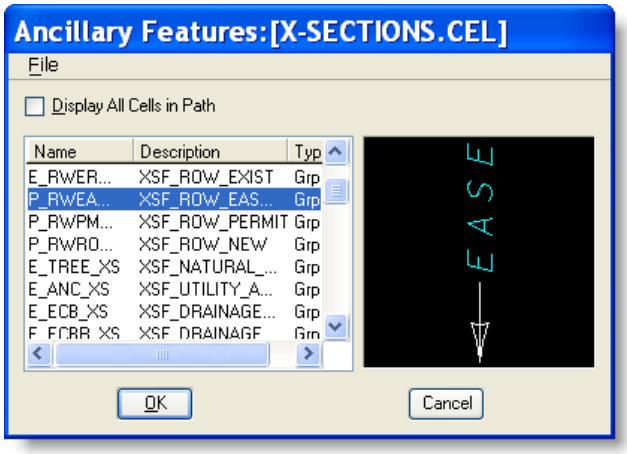
7) Check on Extract Elevation. Use the existing Ground Cross sections.

8) Set to **Level Symbology or Feature. If looking at the cross section file with standard settings then Feature & XS-EGRND can be used as shown. Otherwise, use symbology and match as below.**



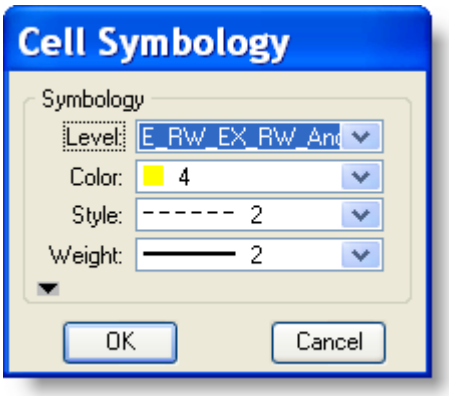
9) Set Search criteria to existing ground line on cross sections.

10) Reset & Match element symbology.

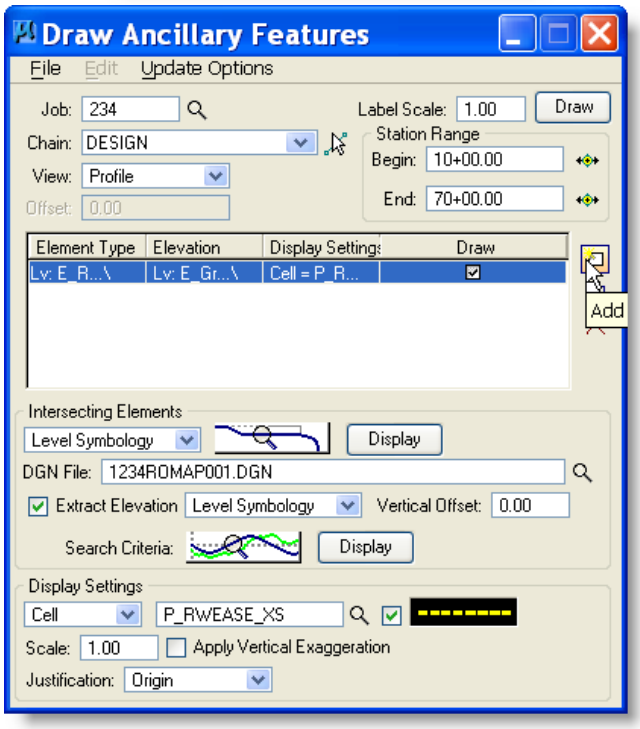


11) Change Display Settings to Cell

12) Click spyglass and select cell from ancillary features list. You may have to File > Open to find the correct cell library W:\workgroup\RDSTD\cell\X-SECTIONS.cell



13) Check drawing setting and set the Level, Color, and Weight you wish to place the cell on.



14) Set Justification to Origin.

15) ADD into dialog box. If changing an existing entry make sure to Modify that entry.

16) You may do a File > Save As if you desire to save all this work.

17) Click Draw button.

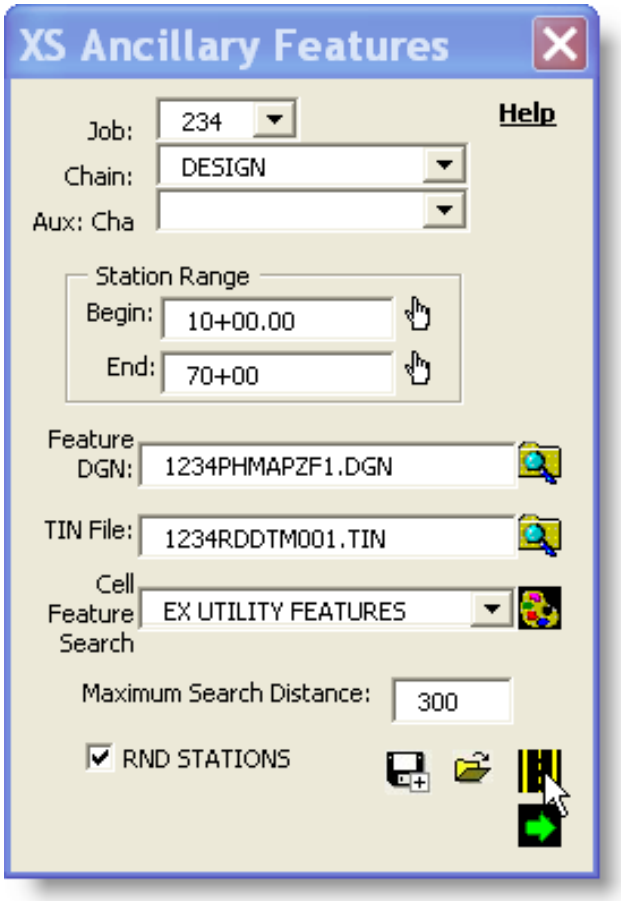
The process should draw the selected cell into the designated file everywhere it finds matching intersecting elements in the designated design file.

You may do one element at a time or add multiple elements into the dialog and draw them all at the same run.

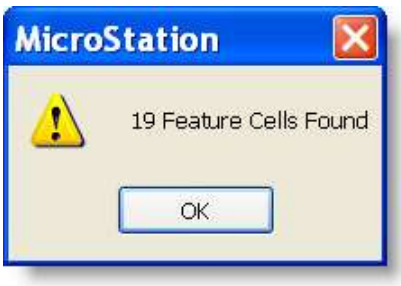
39.2 MDT GPK Ancillary (CELLS)

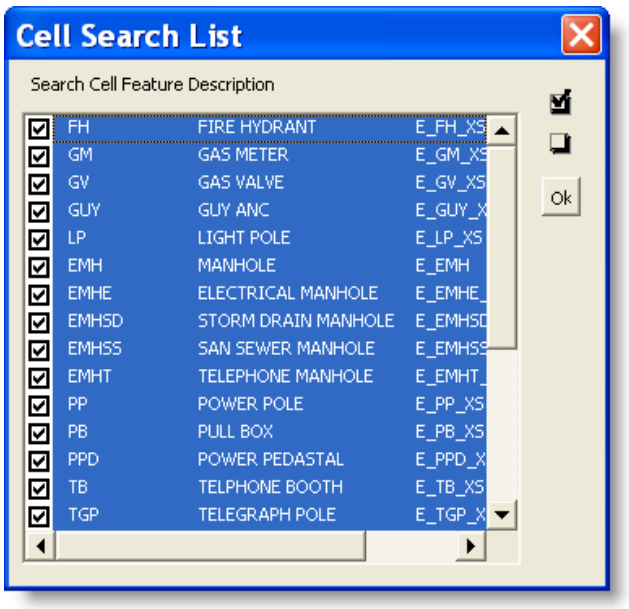
This process handles cells from the design file – to process lines go to section 38.1.

Open the **Road Design > XS File tab > GPK Ancillary**



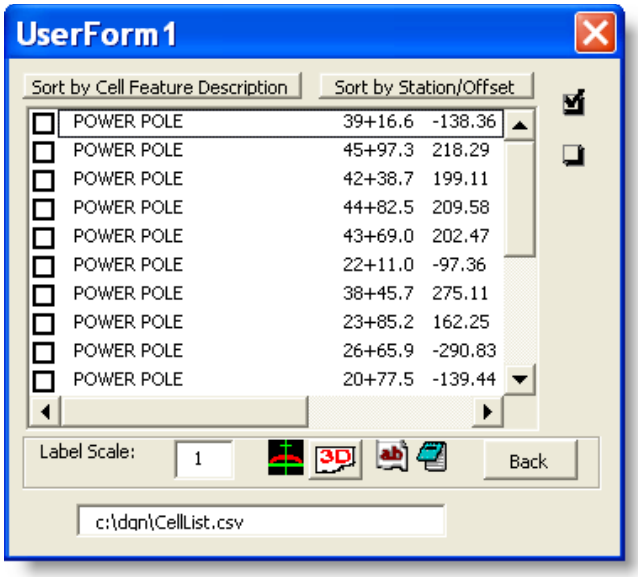
1. Enter Job and Chain
2. Select feature file
3. Select TIN file
4. Select cell feature from drop-down list
5. The following dialog box appears – do step 7 & 8
6. After performing the selection below, click on the road icon to perform the actual search.
   Go to step 9.





7. Select all or some features to search for. Use shift+click for a range or ctrl+click to select individual features.
   List of search selections for each feature shown below.

8. Click OK to lock in the search selection.



9. This dialog box shows all features selected.

10. You can do many things using this box:
    a. Sort features
    b. Select features and draw cells onto the XS view
    c. Create a text table of the selected features
    d. Save a text file of the feature information

11. Clicking the BACK button returns to the original dialog box.

NOTE: Shared cells will NOT be found with this process. Select shared cells to be dropped. Convert the cells- Drop Elements > check Complex, Shared Cells [to Normal Cell]
Select in the design area – all selected shared cells should be converted to normal and should now be found when performing the search above.

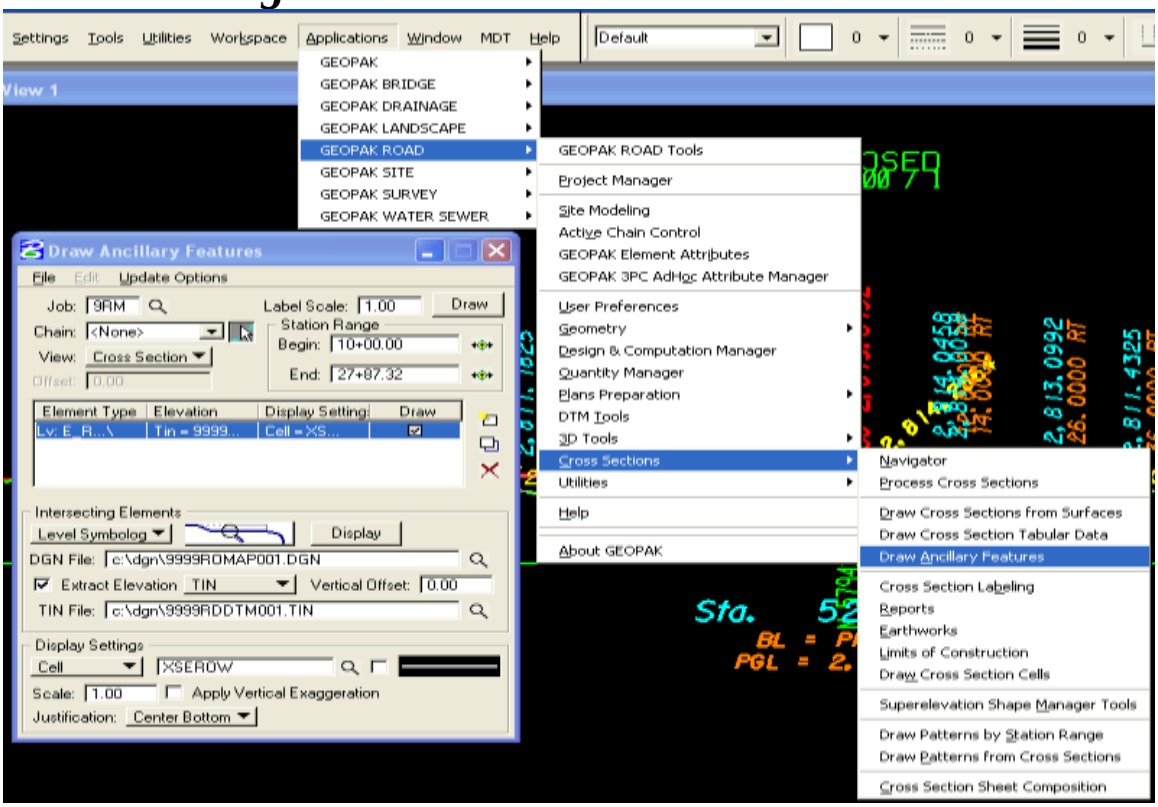
MDT GPK Ancillary Features

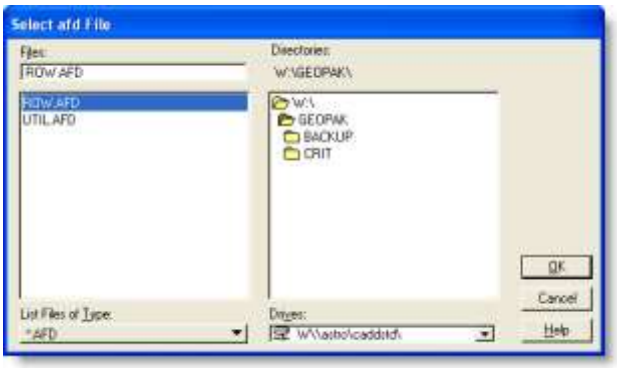
ANCILLARY FEATURES ENTRIES

TYPE	CODE	DESCRIPTION	LEVEL	CELL
EX_UTILITY_FEATURES				
	FH	FIRE HYDRANT	E_FH_XS	E_FH_XS
	GM	GAS METER	E_GM_XS	E_GM_XS
	GV	GAS VALVE	E_GV_XS	E_GV_XS
	GUY	GUY ANCHOR	E_GUY_XS	E_GUY_XS
	LP	LIGHT POLE	E_LP_XS	E_LP_3D
	EMH	MANHOLE	E_EMH	E_EMH_XS
	EMHE	ELECTRICAL MANHOLE	E_EMHE_XS	E_EMHE_XS
	EMHSD	STORM DRAIN MANHOLE	E_EMHSD_XS	E_EMHSD_XS
	EMHSS	SAN SEWER MANHOLE	E_EMHSS_XS	E_EMHSS_XS
	EMHT	TELEPHONE MANHOLE	E_EMHT_XS	E_EMHT_XS
	PP	POWER POLE	E_PP_XS	E_PP_3D
	PB	PULL BOX	E_PB_XS	E_PB_XS
	PPD	POWER PEDASTAL	E_PPD_XS	E_PPD_XS
	TB	TELEPHONE BOOTH	E_TB_XS	E_TB_XS
	TCP	TELEGRAPH POLE	E_TGP_XS	E_TGP_XS
	TP	TELEPHONE POLE	E_TP_XS	E_TP_XS
	TPD	TELEPHONE PEDASTAL	E_TPD_XS	E_TPD_3D
	TOWER	TOWER	E_TOWER_XS	E_TOWER_XS
	TL	TRAFFIC SIGNAL	E_TL_XS	E_TL_XS
	CNTR	SIGNAL CONTROLLER	E_CNTR_XS	E_CNTR_XS
	TT	TRANSMISSION TOWER	E_TT_XS	E_TT_XS
	VALVE	VALVE	E_VALVE_XS	E_VALVE_XS
	WH	WATER HYDRANT	E_WH_XS	E_WH_XS
	WM	WATER METER	E_WM_XS	E_WM_XS
	WV	WATER VALVE	E_WV_XS	E_WV_XS
	WELL	WELL	E_WELL_XS	E_WELL_XS
EX_UTILITY_X-INGS				
	UTXING	UTILITY CROSSINGS	E_UTXING_XS	E_UTXING_3D
EX_ROADWAY_FEATURES				
	MAIL	MAIL BOX	E_MAIL_XS	E_MAIL_3D
	MILE	MILE POST	E_MILE_XS	E_MILE_3D
EX_NATURAL_FEATURES				
	TREE	TREE	E_TREE_XS	E_TREE_3D
	SHRUB	SHRUB	E_SHRUB_XS	E_SHRUB_3D
EX_DRAINAGE_FEATURES				
	EDI	DROP INLET	E_EDI_XS	E_EDI_3D

EDIR	DROP INLET ROUND	E_EDIR_XS	E_EDIR_3D
PR_PAYITEM_FEATURES			
P_REMIEMH	REMOVE MANHOLE	XS_DEFAULT	XS_DEFAULT
P_REMWVB	REMOVE WATER VALVE BOXE	XS_DEFAULT	XS_DEFAULT
P_REMIRR	REMOVE IRRIGATION STRUCTURE	XS_DEFAULT	XS_DEFAULT
P_REMCONCWALL	REMOVE CONCRETE HEADWALL	XS_DEFAULT	XS_DEFAULT
P_REMFH	REMOVE FIRE HYDRANT	XS_DEFAULT	XS_DEFAULT
P_REMINLET	REMOVE INLET	XS_DEFAULT	XS_DEFAULT
P_REMDI	REMOVE DROP INLET	XS_DEFAULT	XS_DEFAULT
P_REMCI	REMOVE CURB INLET	XS_DEFAULT	XS_DEFAULT
P_ABNEMH	ABANDON MANHOLE	XS_DEFAULT	XS_DEFAULT
P_ABNSUMP	ABANDON SUMP	XS_DEFAULT	XS_DEFAULT
P_ABNSEPTIC	ABANDON SEPTIC TANK	XS_DEFAULT	XS_DEFAULT
P_ADJMON	ADJUST MONUMENT BOX	XS_DEFAULT	XS_DEFAULT
P_ADJFH	ADJUST FIRE HYDRANT	XS_DEFAULT	XS_DEFAULT
P_ADJEMH	ADJUST MANHOLES	XS_DEFAULT	XS_DEFAULT
P_ADJDI	ADJUST DROP INLET	XS_DEFAULT	XS_DEFAULT
P_ADJMEDINLET	ADJUST MEDIAN INLET	XS_DEFAULT	XS_DEFAULT
P_ADJVALVE	ADJUST VALVE	XS_DEFAULT	XS_DEFAULT
P_ADJAIR	ADJUST AIR RELIEF	XS_DEFAULT	XS_DEFAULT
P_ADJCRBBOX	ADJUST CURB STOP & BOX	XS_DEFAULT	XS_DEFAULT
P_ADJSUMP	ADJUST SUMP	XS_DEFAULT	XS_DEFAULT
STREET	STREET LIGHT	P_STREET_XS	P_STREET_3D
P_TREE	PROPOSED TREE	P_TREE_XS	P_TREE_3D
P_SHRUB	PROPOSED SHRUB	P_SHRUB_XS	P_SHRUB_3D
P_MH	PROPOSED SEWER NODE	P_MH_XS	P_MH_XS
LAYDOWN_CURB_FEATURE			
LAYDOWN CURB	LAYDOWN CURB	LAYDOWN_CURB	
GPK_LABELS			
GPKLBL	GPK LABELS	GPKLBL	
CORE_HOLE_FEATURES			
CORE	CORE HOLE	CORE	
CURB_RETURN_LOCATORS			
P_CURBRTNLOC	CURB RETURN LOCATOR	P_CURBRTNLOC	

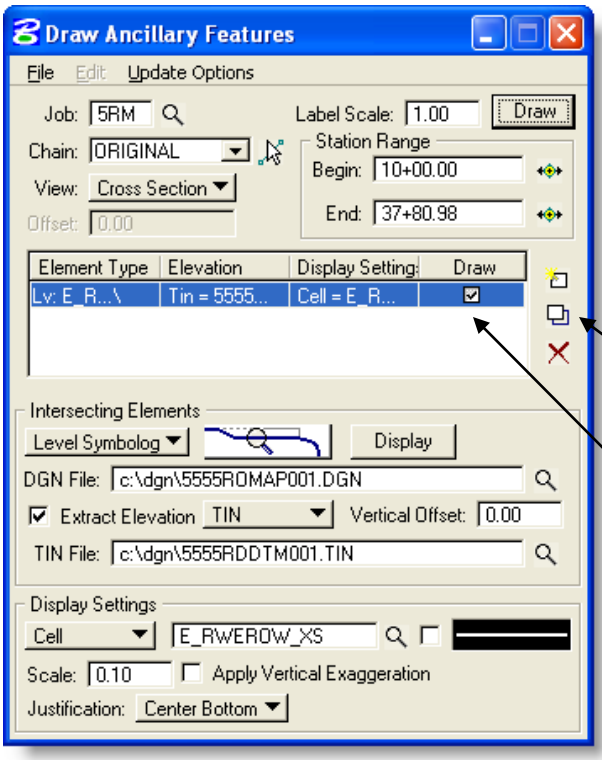
40 Draw Existing ROW on Cross Sections



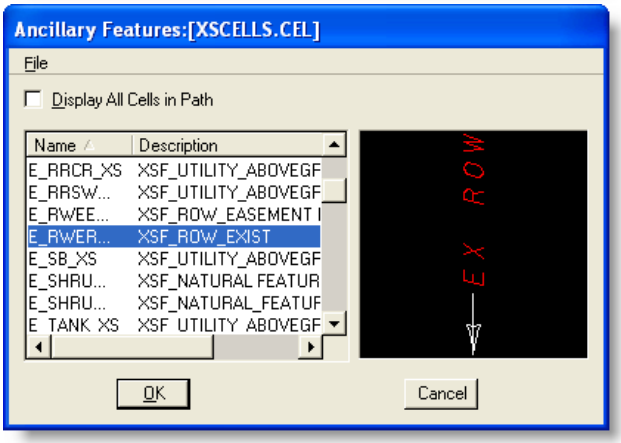


Pick the Job & Chain.
Click View: Cross Section

Click File > Load and select ROW.AFD file from the W:\GEOPAK folder. This will load the level symbology used to search the ROW file.

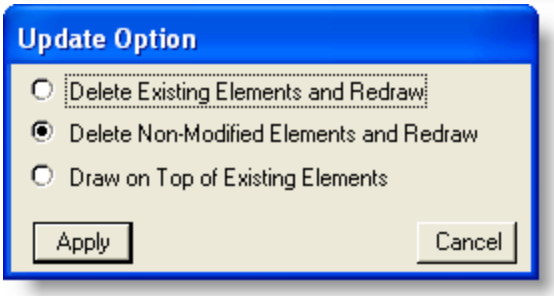


1. Use the DGN File spy glass icon to select the ROW map file.
2. Check Extract Elevation and select TIN and TIN file using spy glass.
3. In Display Settings select Cell drop-down box.
4. Click on spyglass icon to get cell (see entry below).
5. Set Scale to .1 and Justification to Center Bottom.
6. After all entries are as required, click the Add or Modify Element Set to place in the dialog box window.
7. Make sure a check is in the element type you wish to draw & click Draw



CELL SELECTION

Click File > Open
Locate the XSCELLS.CEL file in W:\RDSTD\CELL.
Select the cell you wish to place on the cross sections – Here E_RWEROW_XS cell is selected and it populates the display settings cell entry.



This dialog provides options of what to do with previously drawn elements.

Chose one and click Apply.

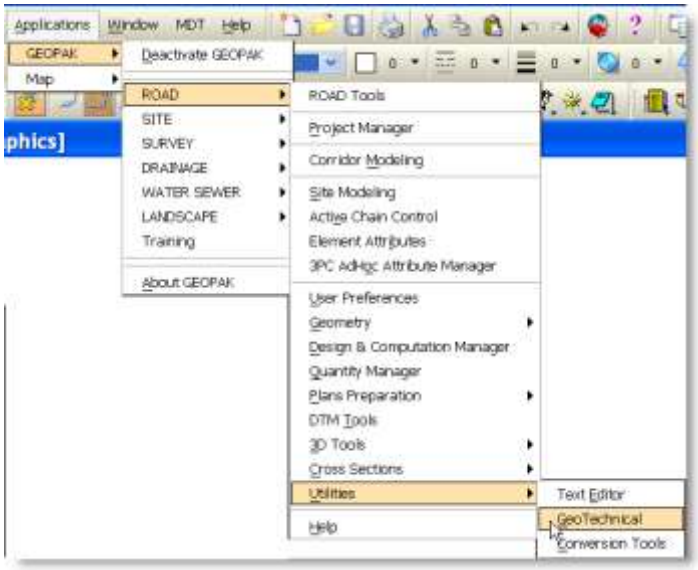
The selected elements will be drawn onto the cross sections.

Use the Navigator to insure the requested elements are drawn on the cross sections.

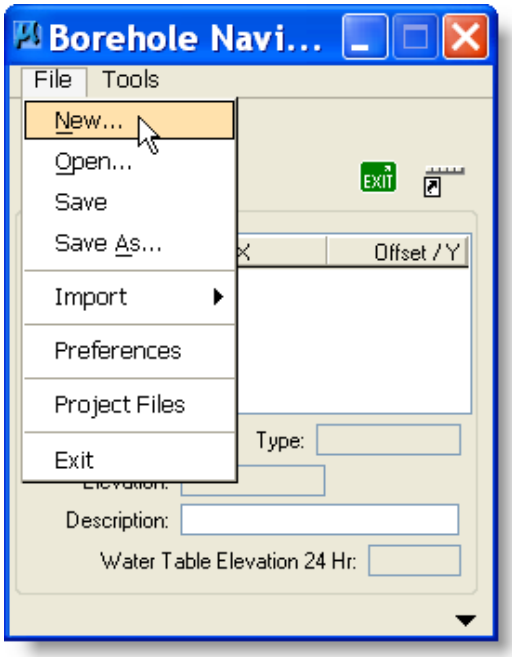
41 Boring Logs Process

This process is used to insert boring logs into design and cross section files.
Files needed:

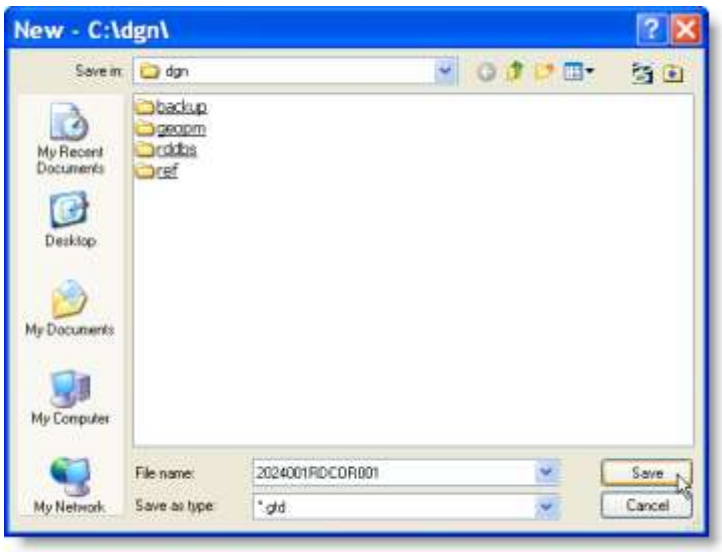
- Borehole location file (BHL), located on DMS in the GT directory, CSV format.
- Borehole material file (BHM), located on DMS in the GT directory, CSV format.
- GPK file
- MAP file
- XSF file



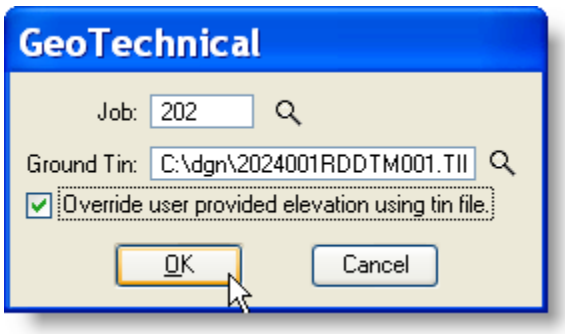
1. Open the map file
2. Start GEOPAK
3. Load Project Manager
4. Applications > GEOPAK ROAD > Utilities > Geotechnical
5. The borehole navigator opens



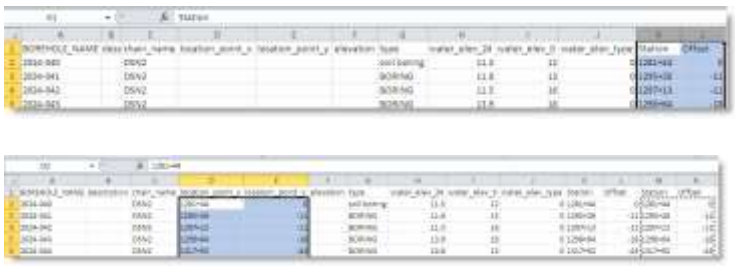
1. Click File > New



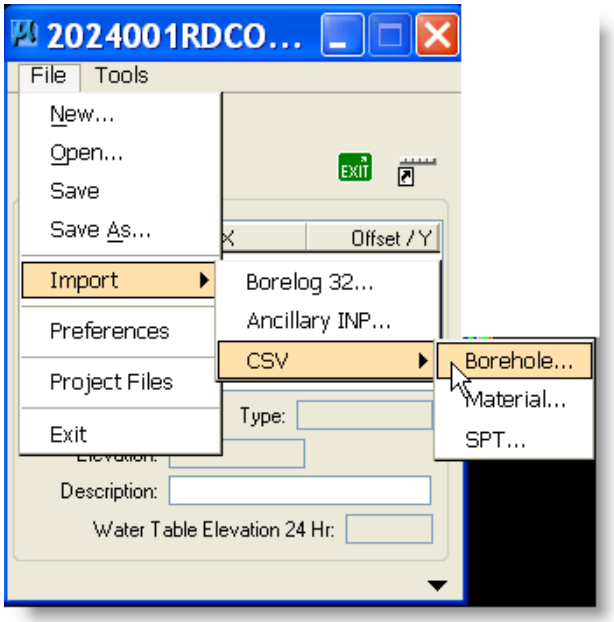
1. Name a new .GTD file according to standards. Example: 4321RDCOR001
2. OR highlight existing file if available.
3. Click SAVE or OK

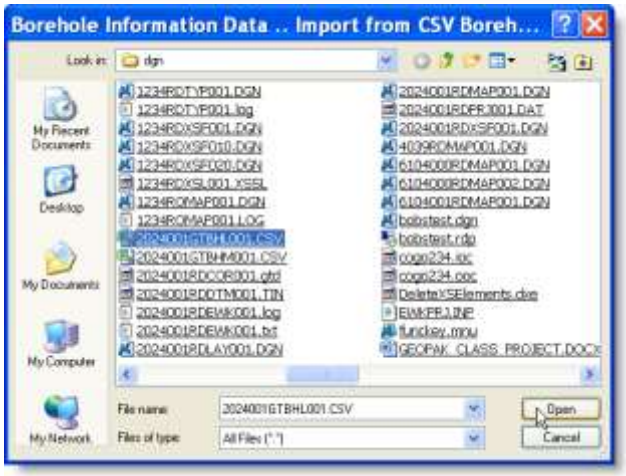


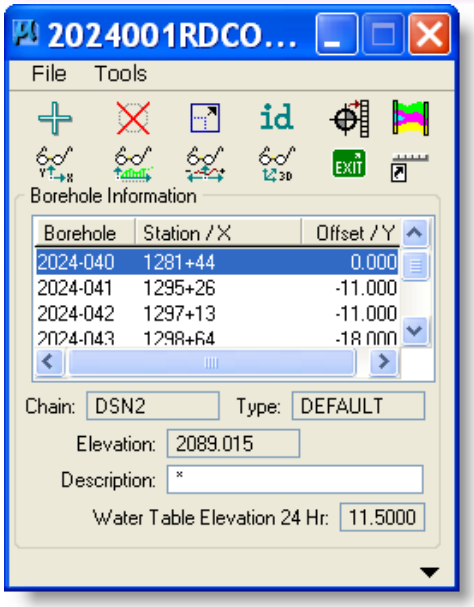
1. Select and find GPK file for project.
2. Click spyglass and select TIN file.
3. Check Override user provided elevation.
4. Click OK



1. Open the boring log location .csv file in Excel.
2. If x and y coordinates are provided – delete the station and offset columns completely.
3. If x and y coordinates are NOT provided – Cut/Paste station and offset data into the x & y columns, leaving the headers.
4. Save & close the location .csv file.





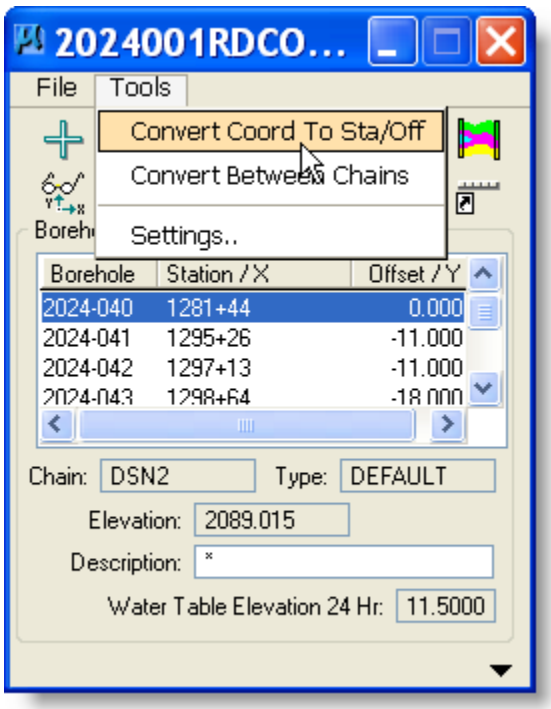


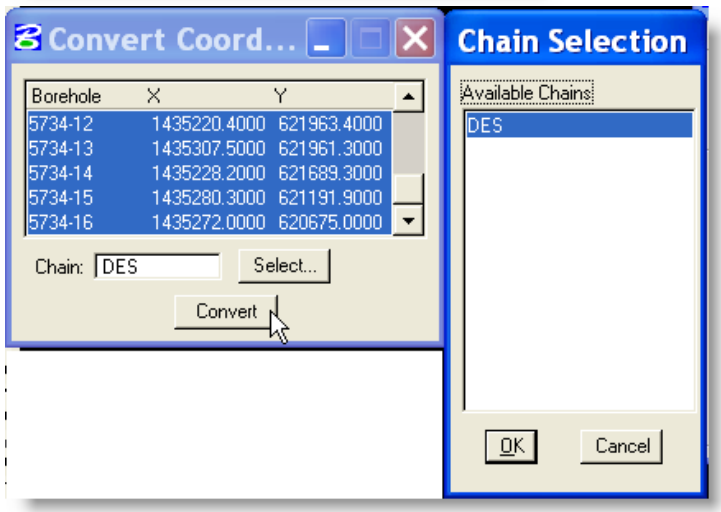
Import Location & Material CSV Information:

1. Insure the .csv files are closed.
2. File > Import > CSV > Borehole
3. Change file type list to All Files (*.*)
4. Select borehole (BHL) location .csv file > OK
5. Select borehole (BHM) material .csv file > OK

   All borehole information is now loaded into the Geotechnical Process.

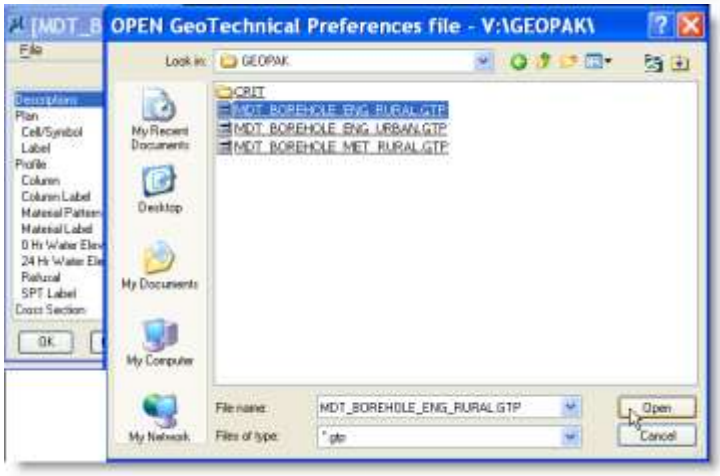
If the location file was imported using x and y coordinates the following is how you convert the x and y to station and offset. If alignments change just re-import the original location and material files, and convert to the new alignment. If station and offsets were provided skip the next frame.





Convert Coordinates to Station & Offset.

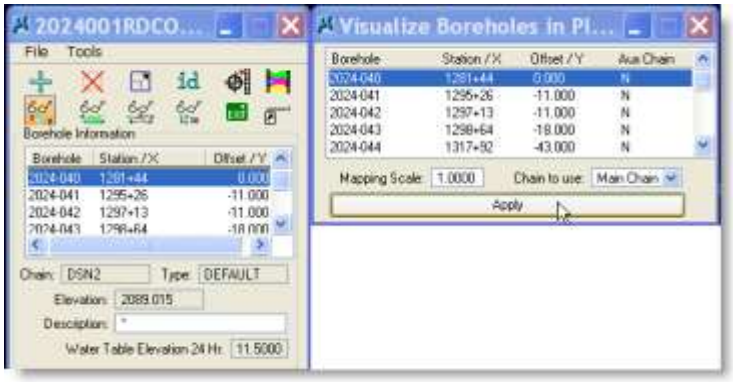
1. Select Tools > Convert Coord to Sta/Off
2. Convert Coord Dialog Box is Displayed.
3. Highlight all boring entries, within the dialog box window, to be converted.
4. Click Select button and select the correct chain from the Chain Selection Dialog Box.
5. Click OK
6. Click Convert
7. The station and offset data should now be in the borehole navigator.



Set Preferences File.

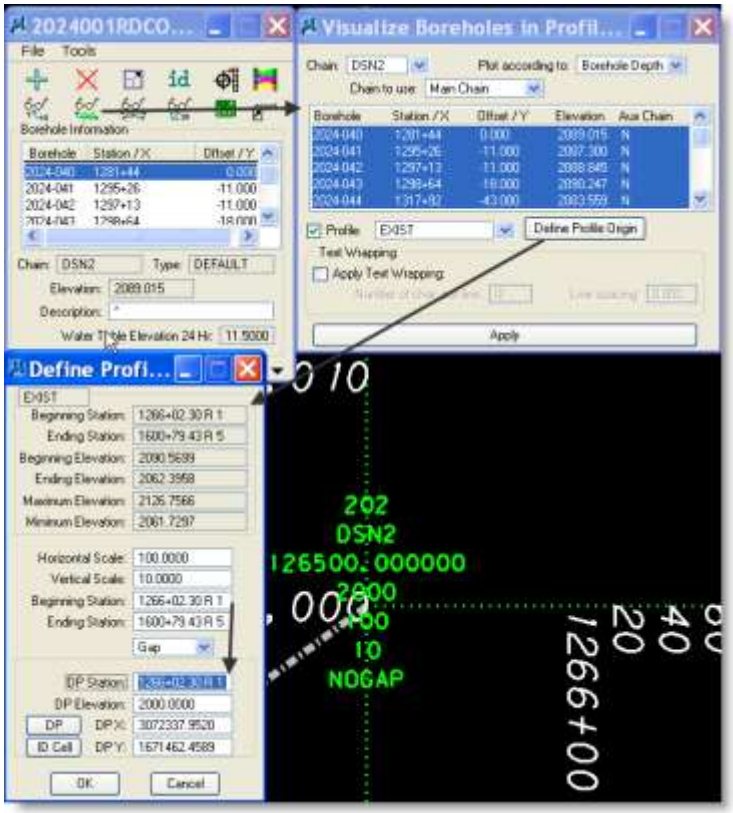
1. Click File > Preferences – Displays Preferences Dialog.
2. Click File and Select the preference file from W:\GEOPAK depending on the scale for the alignment and profile.
3. Click OK twice.

Place Soil Boring Data on Plan View.



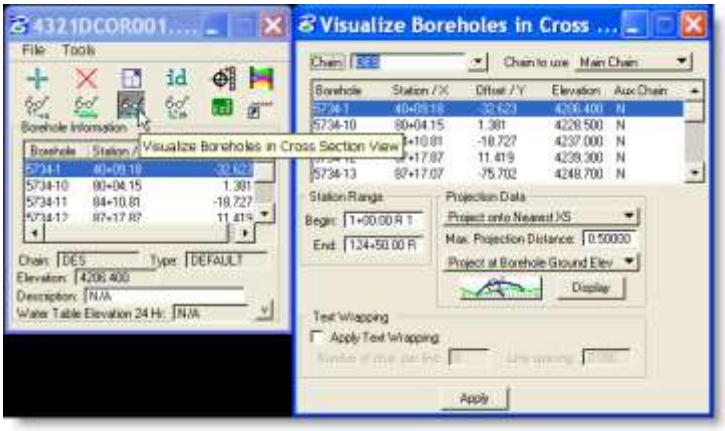
1. Click Visualize Boreholes in Plan View – 1st icon.
2. Insure Mapping Scale is set to 1.00.
3. Highlight all logs to be plotted onto the design file.
4. Click Apply.
5. All logs should be found on these levels:
   E_SoilData_Borehole
   E_SoilData_Borehole_Text

Plotting stick logs in Profile view.

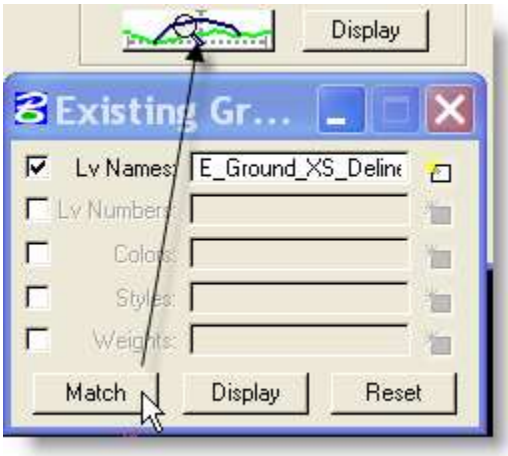


1. Click Visualize Boreholes in Profile View – 2nd icon.
2. Select the appropriate chain in the drop-down box.
3. Plot according to: Borehole Depth
4. Always use Main Chain.
5. Highlight all logs to be plotted onto profile.
6. Select appropriate Profile from drop-down box.
7. Click Define Profile Origin – displays dialog to left.
8. Click ID Cell > Tentative > Accept profile cell on design file.
9. Insure DP Station matches Beginning Station.
10. Click OK.
11. Click Apply - All stick logs that were highlighted should populate in the specified profile on the same levels as described above.
12. Close the windows.

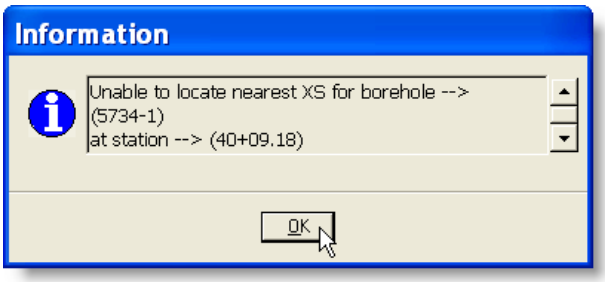
Plotting stick logs in Cross Section view.



1. Open the XSF file, keeping geopak running, and the Borehole navigator open.
2. Click Visualize Boreholes in Cross Section View – 3rd icon.
3. Select appropriate Chain from drop-down box.
4. Always use Main Chain.
5. Highlight all bore logs to be plotted in XS.
6. Station Range should be populated already.
7. Project onto Nearest XS.
8. Max projection distance is 200.00.
9. Always Project at Borehole Ground Elev.



10. Click Symbology button.
11. Match Lv Names only - existing ground cross section line.
12. Close box.
13. Click Apply.

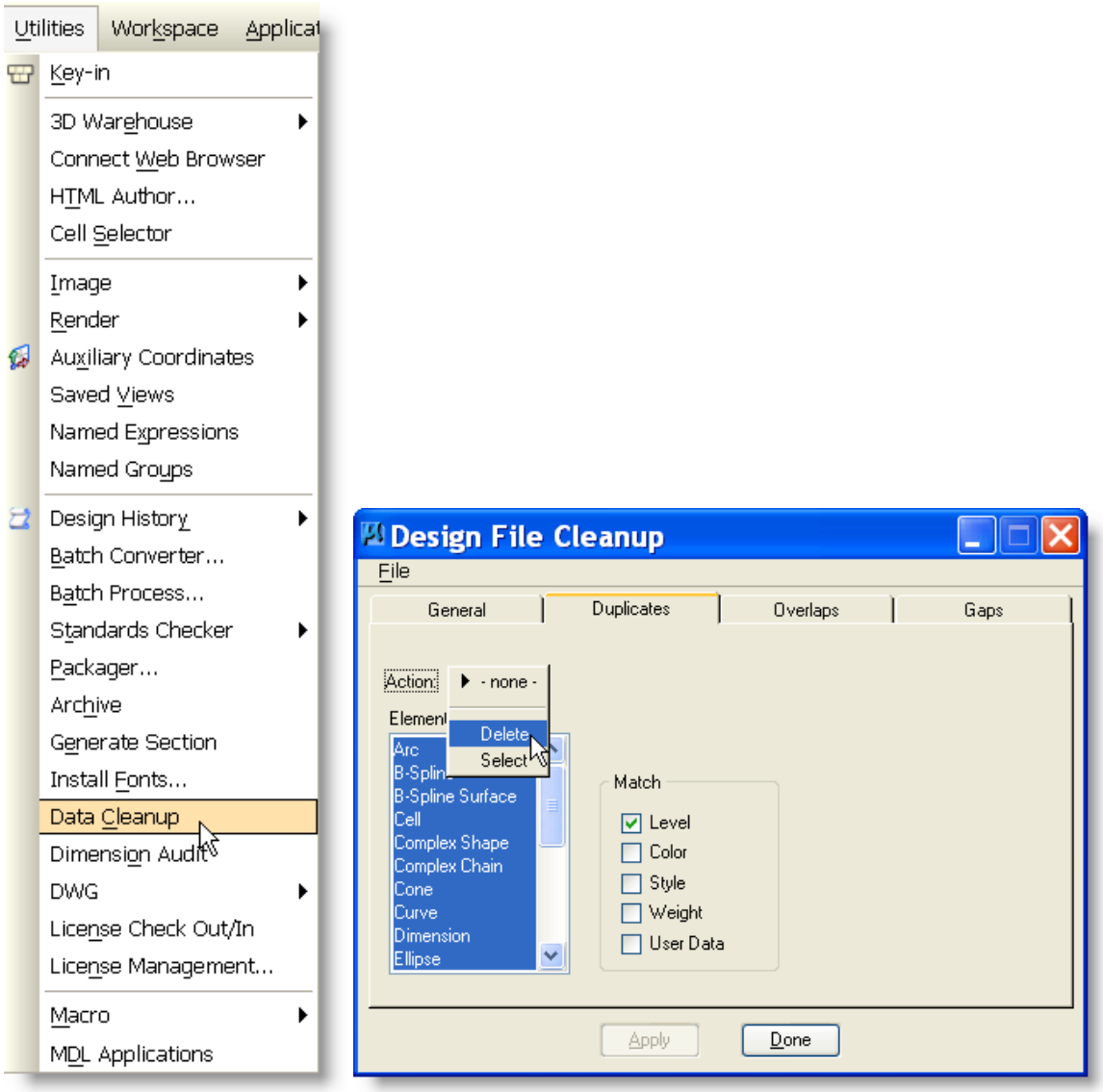


You may need to check out the information messages. These borings will not show on the design file.

All logs should be found on these levels:
E_SoilData_Borehole
E_SoilData_Borehole_Text

42 Delete Duplicate Elements

If you have duplicate elements in a design file and want to select or delete them you can do it by using the Utilities > Data Cleanup tool. You can Select or Delete elements and use Element Type criteria or Match Criteria to select specific element types. Apply it and it will process your choices. If you use select, it will tell you at the bottom of the screen how many duplicate elements it located.



43 GEOPAK Problem Resolution Steps

The following suggestions are steps that may help when encountering a problem in Microstation or Geopak. These steps have proven helpful, in prior situations, for getting the software operational again and/or overcoming a non-responsive operation.

1. When the initial problem is encountered the following steps should be done in the order described.
    a. Double check all dialog box entries to insure they are as expected.
    b. Double check all symbology selected to insure it is exactly what you need for the function you are attempting.

2. If an error message is encountered:
    a. If an error is displayed, read it before continuing. If you understand it and can fix the problem, then fix the problem and restart the attempted function.
    b. If you do not understand the error or don't know how to fix it, seek out help from your fellow team mates – one of them may have seen and/or resolved that error before.

3. Initialize Geopak/Microstation:
    a. Run KILLTASK.BAT enter 'Y' and hit Enter when prompted. KILLTASK.bat should reside on your desktop. It is located on CADDSTD for copying.
    b. Restart Microstation/Geopak
    c. Reattempt the function that you were having problems with.

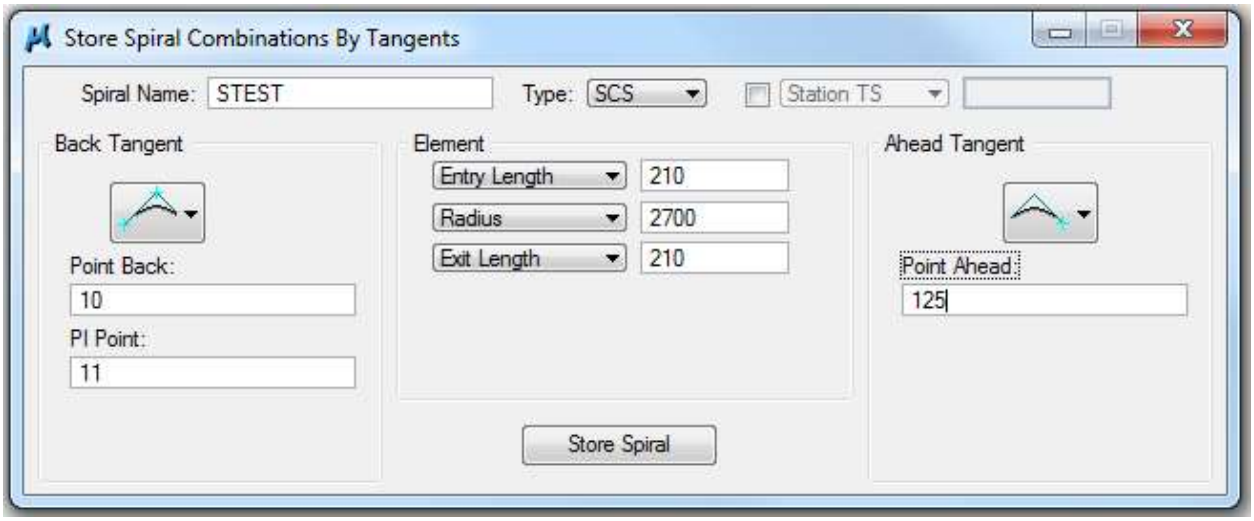
4. Recreate .upf file
    a. Exit Microstation
    b. Go to C:\mdoh folder
    c. Highlight file U####V8i.upf (where # is your employee number) and rename it to SAVEU####V8i.upf. This file contains your preferences for Microstation.
    d. Restart Microstation/Geopak – this will recreate the U####V8i.upf file. You will notice that toolbars & menus may have changed from your preferred settings.
    e. Reattempt the function that you were having problems with. If this works you should delete the saved .upf file.

5. Still no resolution send an email to **MDT CADD Support** that contains the following:
    - Computer Number Eg. MDTHLNRODC164
    - Project Number
    - GPK File
    - Pxsprj.inp (Proposed Cross Section Input File)
    - Proposed DGN file containing Patterns, Shapes and Profiles
    - Cross Section Drawing where sections are processed and you give me a reference to the problem cross section, if applicable.
    - Existing topo drawing – TIN file
    - A **DETAILED** description of the problem or situation that needs to be fixed.

Appendix A: Storing a Spiral with Master PI

STORING A CHAIN WITH A SPIRAL TO INCLUDE MASTER PI

First, store the spiral using the simple curve PI and Radius as shown below:



<* 1 Store SCS STEST PB 10 PI 11 LS1 210 LS2 210 Radius 2700 PA 125

SCS STEST
PISCS STEST N 1,004,194.433 E 1,875,766.406 STA 23+16.22
Total Tangent = 2,316.215
Total Length = 3,914.823
Total Delta = 78° 37' 07.62" (LT)
Back Tangent = S 1° 35' 31.11" E
Ahead Tangent = S 80° 12' 38.73" E
Spiral Back
Spiral STESTB Type 1 Spiral Element

Angle 2° 13' 41.41" (LT) P 0.681 BK S 1° 35' 31.11" E
LS 210.000 K 104.995 AH S 3° 49' 12.52" E
R 2,700.000 LT 140.011 CB S 2° 20' 04.88" E
YS 2.722 ST 70.010 Defl 0° 44' 33.77"
XS 209.968 LC 209.986 Deg 2° 07' 19.44"

Spiral Coordinates

Point	North	East	Station
TS	1,006,509.755	1,875,702.058	0+00.00
PI	1,006,369.798	1,875,705.948	1+40.01
SC	1,006,299.943	1,875,710.612	2+10.00
CC	1,006,479.830	1,878,404.613	

Circular Section
Curve Data

Curve STEST

P.I. Station 20+40.60 N 1,004,263.874 E 1,875,846.567
Delta = 74° 09' 44.80" (LT)
Degree = 2° 07' 19.44"
Tangent = 2,040.603
Length = 3,494.823
Radius = 2,700.000
External = 684.385
Long Chord = 3,255.911
Mid. Ord. = 545.990
P.C. Station 0+00.00 N 1,006,299.943 E 1,875,710.612
P.T. Station 34+94.82 N 1,003,839.002 E 1,877,842.449
C.C. N 1,006,479.830 E 1,878,404.613
Back = S 3° 49' 12.52" E
Ahead = S 77° 58' 57.32" E
Chord Bear = S 40° 54' 04.92" E
Spiral Ahead
Spiral STESTA Type 2 Spiral Element

Angle 2° 13' 41.41" (LT) P 0.681 BK S 77° 58' 57.32" E
LS 210.000 K 104.995 AH S 80° 12' 38.73" E
R 2,700.000 LT 140.011 CB S 79° 28' 04.96" E
YS 2.722 ST 70.010 Defl 0° 44' 33.77"
XS 209.968 LC 209.986 Deg 2° 07' 19.44"

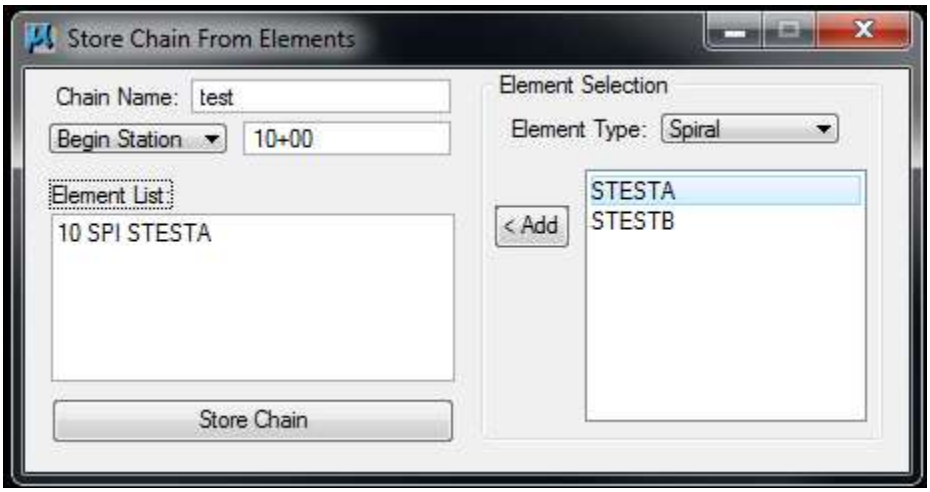
Spiral Coordinates

Point	North	East	Station
CS	1,003,839.002	1,877,842.449	0+00.00
PI	1,003,824.425	1,877,910.925	0+70.01
ST	1,003,800.620	1,878,048.897	2+10.00
CC	1,006,479.830	1,878,404.613	

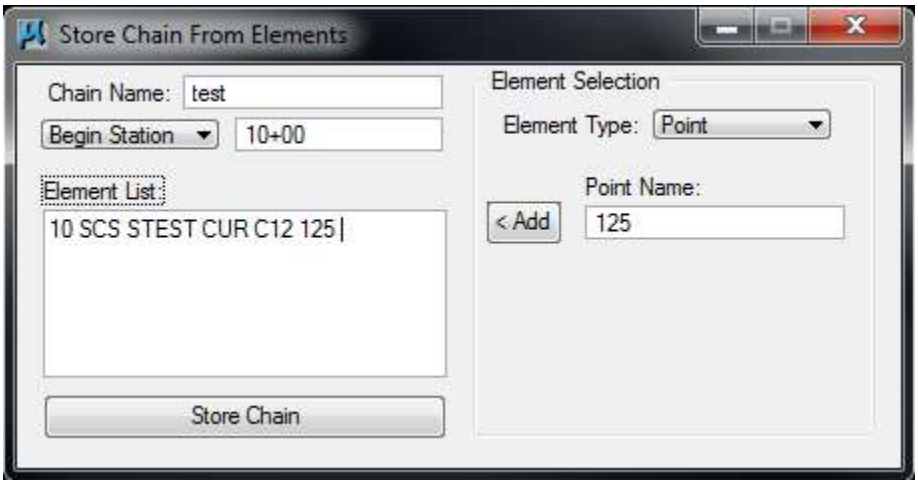
SCS STEST stored

When storing the chain with the spiral, the dialog box will show the spiral as STESTA &STESTB.

…..and if you clicked on Add, it would display like below.



Edit out the SPI and replace with SCS. Also, edit out the A so it looks like below:



<* 2 Store Chain test 10 SCS STEST CUR C12 125 Station 10+00

Chain TEST redefined

Check to make sure the print out shows the Master PI for the chain, as show in bold below:

<* 3 Describe Chain TEST

Chain TEST contains:
10 SCS STEST CUR C12 125

Beginning chain TEST description
==========

Point 10 N 1,008,886.911 E 1,875,635.991 Sta 10+00.00

Course from 10 to TS STESTB S 1° 35' 31.11" E Dist 2,378.074

SCS STEST found within chain TEST, contains:
SPI STESTB CUR STEST SPI STESTA

PISCS STEST N 1,004,194.433 E 1,875,766.406 STA 56+94.29
Total Tangent = 2,316.215
Total Length = 3,914.823
Total Delta = 78° 37' 07.62" (LT)
Back Tangent = S 1° 35' 31.11" E
Ahead Tangent = S 80° 12' 38.73" E

Beginning SCS STEST description

Spiral Back
Spiral STESTB Type 1 Spiral Element

Angle 2° 13' 41.41" (LT) P 0.681 BK S 1° 35' 31.11" E
LS 210.000 K 104.995 AH S 3° 49' 12.52" E
R 2,700.000 LT 140.011 CB S 2° 20' 04.88" E
YS 2.722 ST 70.010 Defl 0° 44' 33.77"
XS 209.968 LC 209.986 Deg 2° 07' 19.44"

Spiral Coordinates

Point	North	East	Station
TS	1,006,509.755	1,875,702.058	33+78.07
PI	1,006,369.798	1,875,705.948	35+18.09
SC	1,006,299.943	1,875,710.612	35+88.07
CC	1,006,479.830	1,878,404.613	

Circular Section

Curve Data

Curve STEST

P.I. Station 56+28.68 N 1,004,263.874 E 1,875,846.567

Delta = 74° 09' 44.80" (LT)

Degree = 2° 07' 19.44"

Tangent = 2,040.603

Length = 3,494.823

Radius = 2,700.000

External = 684.385

Long Chord = 3,255.911

Mid. Ord. = 545.990

P.C. Station 35+88.07 N 1,006,299.943 E 1,875,710.612

P.T. Station 70+82.90 N 1,003,839.002 E 1,877,842.449

C.C. N 1,006,479.830 E 1,878,404.613

Back = S 3° 49' 12.52" E

Ahead = S 77° 58' 57.32" E

Chord Bear = S 40° 54' 04.92" E

Spiral Ahead

Spiral STESTA Type 2 Spiral Element

Angle 2° 13' 41.41" (LT) P 0.681 BK S 77° 58' 57.32" E

LS 210.000 K 104.995 AH S 80° 12' 38.73" E

R 2,700.000 LT 140.011 CB S 79° 28' 04.96" E

YS 2.722 ST 70.010 Defl 0° 44' 33.77"

XS 209.968 LC 209.986 Deg 2° 07' 19.44"

Spiral Coordinates

Point	North	East	Station
CS	1,003,839.002	1,877,842.449	70+82.90
PI	1,003,824.425	1,877,910.925	71+52.91
ST	1,003,800.620	1,878,048.897	72+92.90
CC	1,006,479.830	1,878,404.613	

Ending SCS STEST description

Course from ST STESTA to PC C12 S 82° 22' 47.85" E Dist 15,399.251

Curve Data

Curve C12

P.I. Station 234+66.05 N 1,001,652.214 E 1,894,078.715
Delta = 15° 23' 02.00" (RT)
Degree = 0° 59' 59.73"
Tangent = 773.906
Length = 1,538.502
Radius = 5,730.000
External = 52.027
Long Chord = 1,533.885
Mid. Ord. = 51.558
S. E. = 0.040
P.C. Station 226+92.15 N 1,001,758.631 E 1,893,312.161
P.T. Station 242+30.65 N 1,001,346.254 E 1,894,789.573
C.C. N 996,083.062 E 1,892,524.246
Back = S 82° 05' 47.00" E
Ahead = S 66° 42' 45.00" E
Chord Bear = S 74° 24' 16.00" E

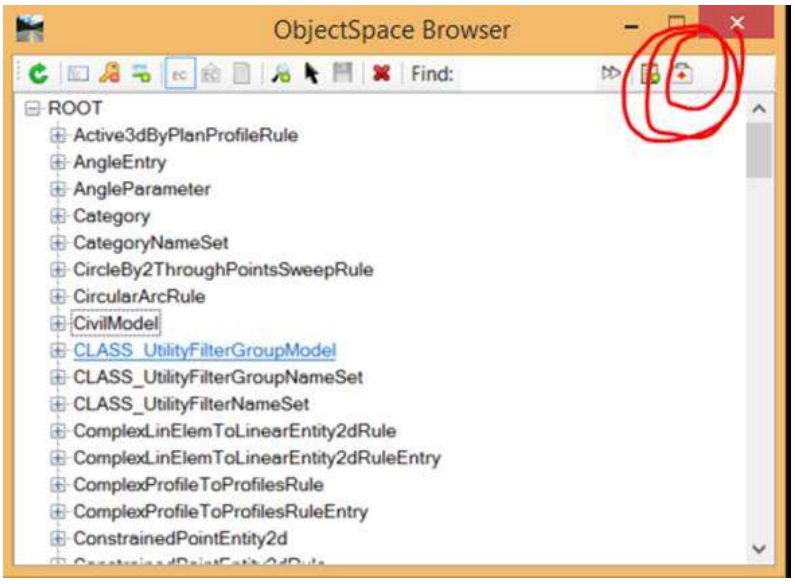
Course from PT C12 to 125 S 66° 42' 45.00" E Dist 1,832.329

Point 125 N 1,000,621.852 E 1,896,472.627 Sta 260+62.98

==========
Ending chain TEST description

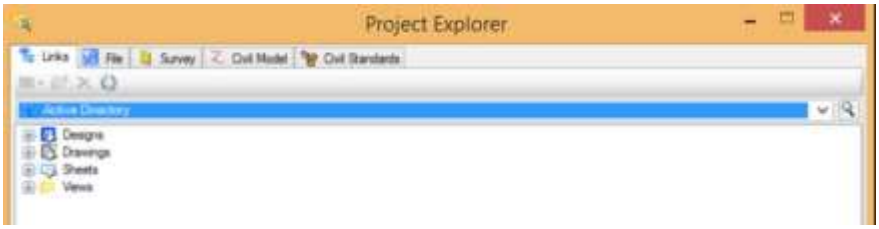
Appendix B: Civil Alignment Fix

There are two things you can do that sometimes helps …



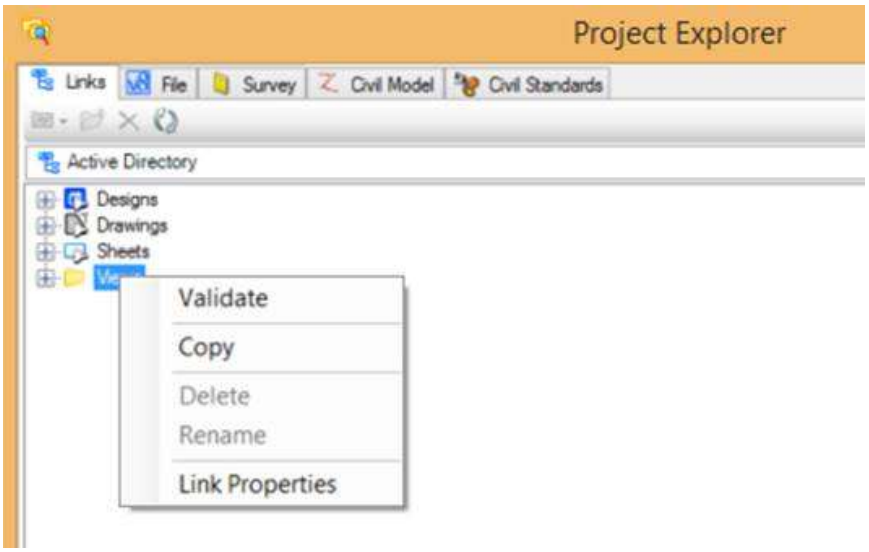
In the Key In Browser, you can keyin "Civil Display Browser". It will take a few minutes to come up since it has to do some checking … but eventually a dialog comes up that looks like this:

Click on the icon with the red cross … this will try to clean up any issues.



Open the MicroStation Project Explorer dialog (File > Project Explorer)

Select the LINKS tab, and set the option to Active Directory



Right-click on Views and select Validate.