3. Digital Terrain Models

In the normal project flow, the existing ground digital terrain model (*.TIN) file is created by Survey personnel.

In this exercise, we will demonstrate some of the tools which are available to pull information from those surfaces.

I.) Accessing DTM Tools

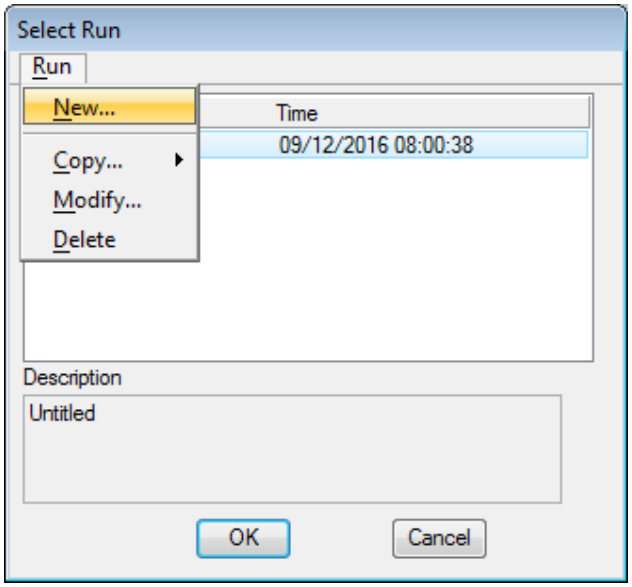
1) Open the MicroStation file

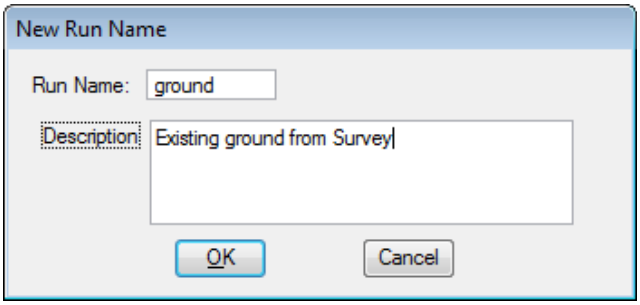
C:\Projects\Roane\SR95PoplarCr\ROSR95Contours.dgn

Access Project Manager. It should automatically access the Road workflow dialog since we "remembered" the options in Exercise 2.

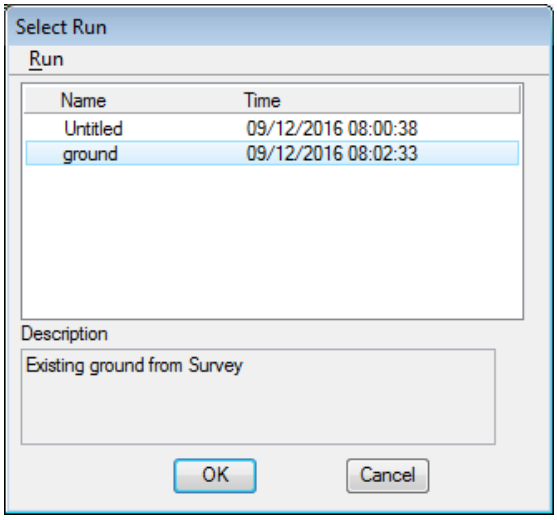
2) Select the icon Existing Ground from the Project Manager workflow dialog.

3) Create a new run named ground.

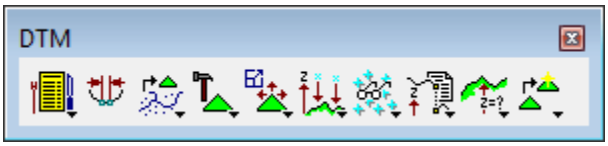




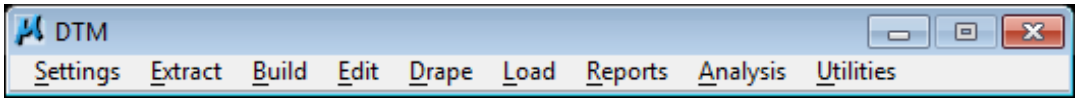
4) After creating the run, select the run by highlighting the name of the run in the dialog list box and press OK.



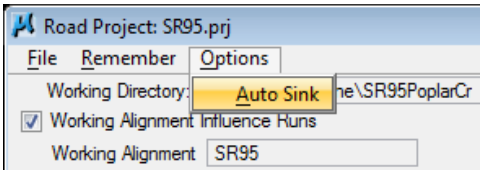
This will invoke the DTM tool frame.



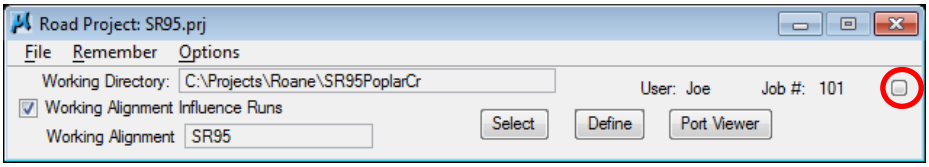
If you prefer a drop down menu click on the menu icon at far left of the tool frame.



5) You can set the Project Manager workflow dialog to automatically sink when a tool is chosen by setting the drop down option Options → Auto Sink.



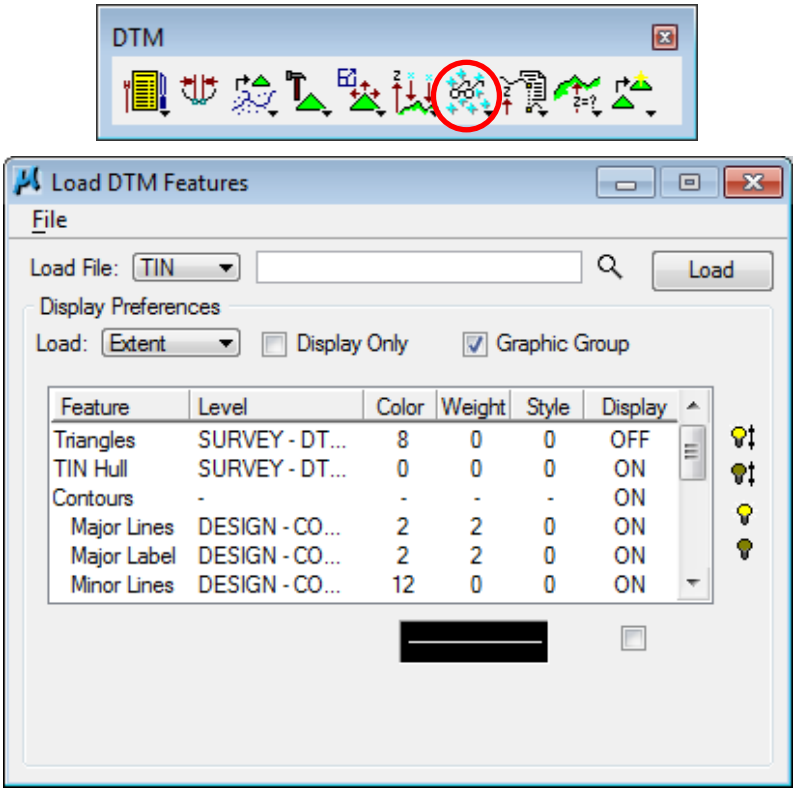
The small button on the upper right of the Project Manager workflow dialog will minimize it to a bar



Use one of these options to help keep your workspace clear.

II.) Display DTM Features

1) Select the Load Features icon from the tool frame to invoke the following dialog.



2) Use the File → Open drop down to open the preference file tdotEXIST.lpf from the C:\Users\Public\Geopak Standards directory. This will set the symbologies to TDOT standards for existing digital terrain models.

NOTE:
When working with proposed surfaces use tdotPROP.lpf for graphic displays.

3) Set the Load File option to TIN.

4) Select the TIN file 'RO095-01.tin' by clicking the navigator  button and going to the project directory C:\Projects\Roane\SR95PoplarCr.

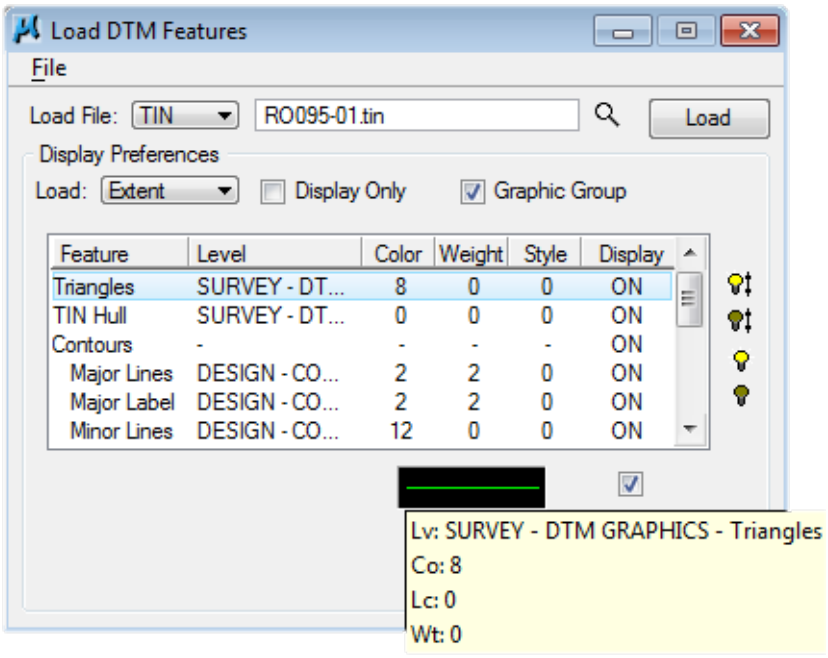
5) Select the Triangles Feature by highlighting in the list box at the bottom. Notice that initially the display is set to OFF. You can control the display of an item three ways:

- Use the "light bulb" icons to the right of the dialog 
- Double-click on an item

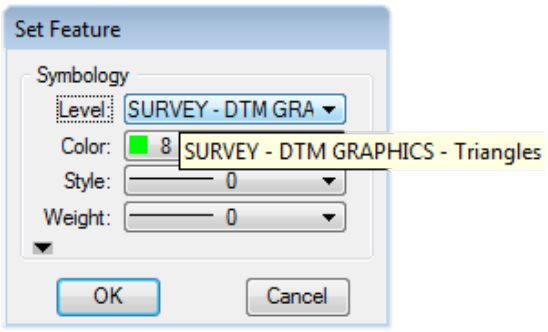
- Use the "display" toggle in the lower right corner of the dialog

Set the Triangles display to ON.

6) Note the display symbology for the Triangles as indicated in the symbology review box in the lower portion of the dialog. Due to the length of the level name, it will usually not appear completely in the main item list. If you float your cursor over the symbology review box, you can see the settings in the pop up info.



If you wish to change the symbology for an item, simply double click in the symbology review box to open the Set Feature dialog



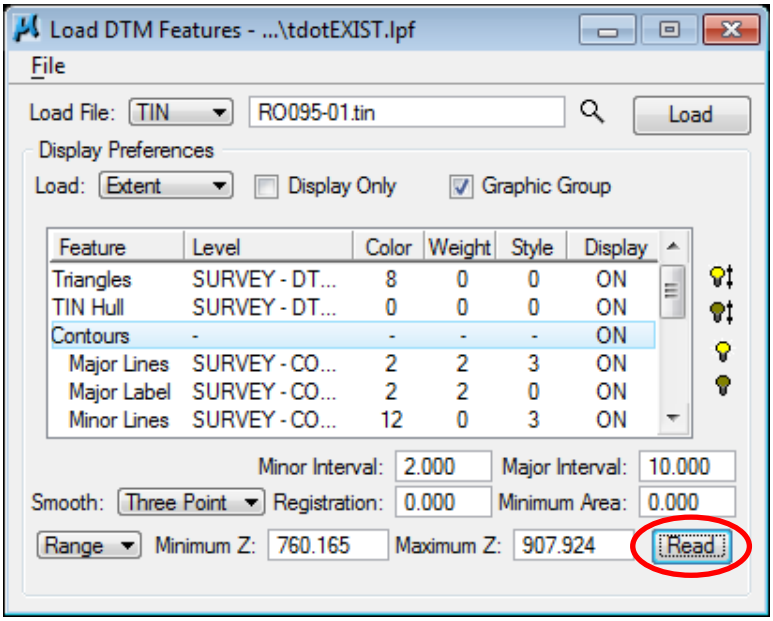
Click Cancel to close this dialog without making any changes.

7) Make sure the display of the Tin Hull (the boundary of the surface model) is ON.

8) Select the Contours feature and make sure the display is ON.

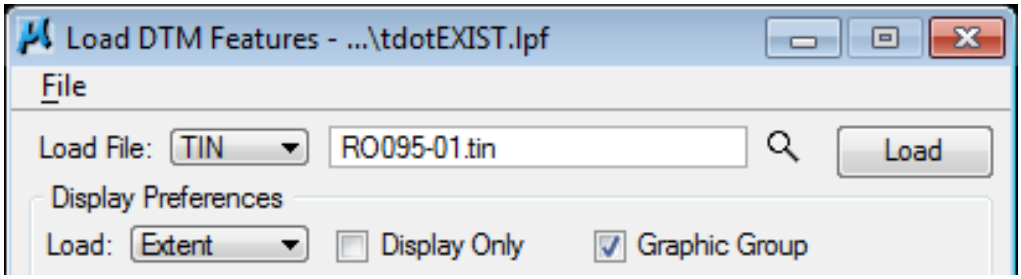
9) Complete the bottom of the dialog as indicated below. To complete the Minimum and Maximum Z, Press the Read button, which will review the active TIN file and determine these values.

Once you read the limits of any surface, you can determine what minor and major intervals might work best. For flatter surfaces smaller intervals might be required or in the case of larger differences between the minimum and maximum Z elevations larger intervals might be needed.



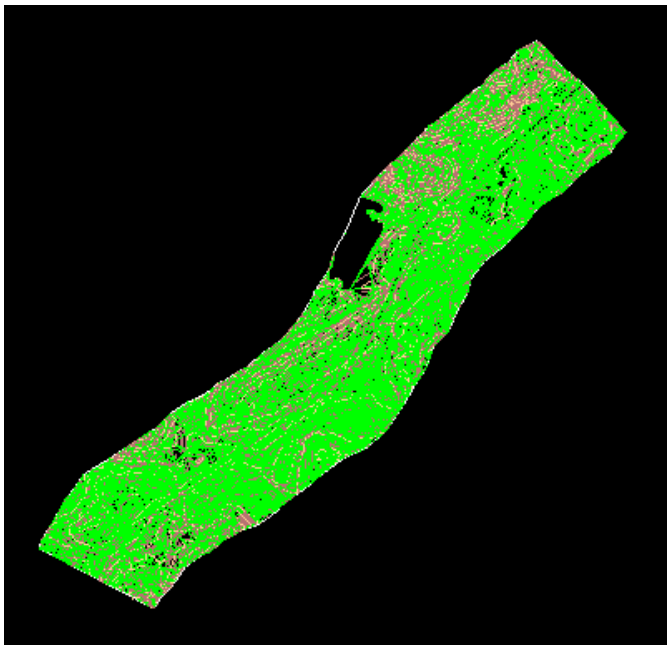
Notice that Major and Minor contour lines and text are controlled separately. Check to make sure all are ON except for Minor Label.

10) Set the Load option to Extent, deactivate the Display Only toggle and activate the Graphic Group toggle to write the graphics to this file as a graphic group.



11) Press the Load button to initiate the process. Fit the view and check out the resulting graphics. Use MicroStation's Level Display dialog to turn levels on and off in order to see the different features.

Triangles	SURVEY - DTM GRAPHICS - Triangles
TIN Hull	SURVEY - DTM GRAPHICS - Boundary Line
Major Contours	SURVEY - CONTOURS - Index with Text
Minor Contours	SURVEY - CONTOURS - Intermediate with optional Text



12) Turn off the level display for the triangles so you will be ready for the next exercise.

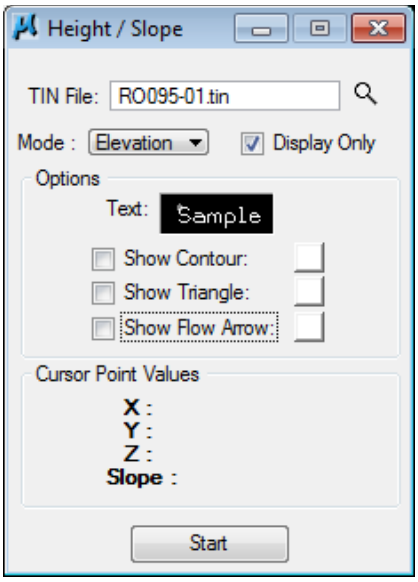
13) Close the Load DTM Features dialog and click Yes to Save Settings when prompted.

III.) Analysis Tools

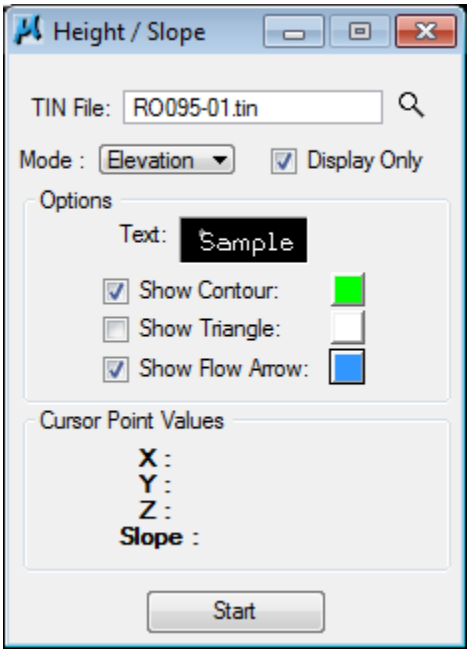
We will review several analysis tools in the following exercises. These include the height/slope tool, drainage tools and the profile tool.

a) Height/Slope Tool

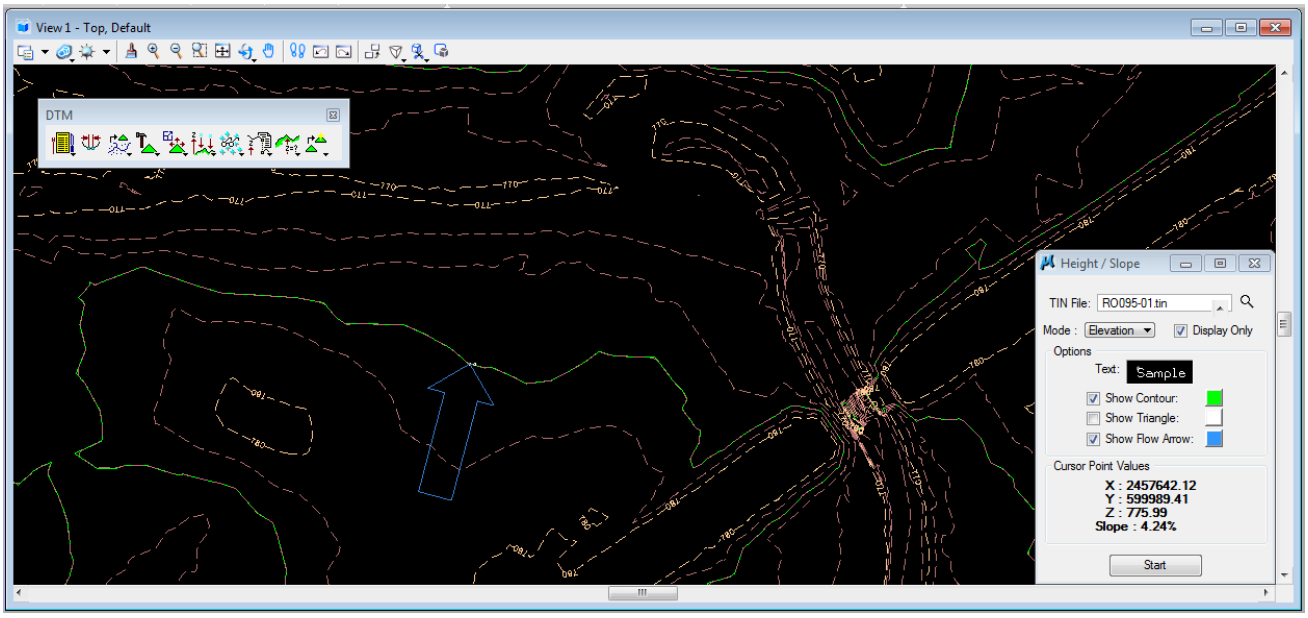
1) Select the Height/Slope icon from the DTM tool frame to invoke the following dialog.



2) Make sure Mode is set to Elevation and Display Only is clicked on. Under Options, activate the Show Contour and Show Flow Arrow toggles. The color may be altered to your choice of colors from the color picker buttons to the right of the Options on the Height dialog. The level, weight and style of the contour line and arrow are controlled by the active MicroStation settings.



3) Click the Start button and scan the surface model with the cursor to display the values for xyz and the slope on the model at the cursor point.

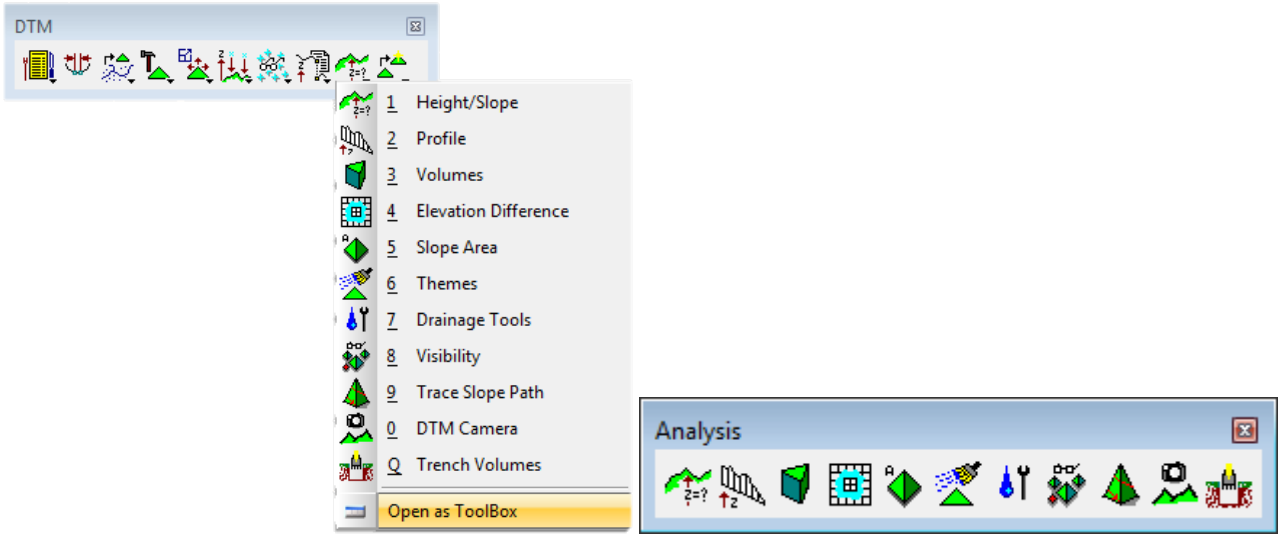


4) To actually display these graphics in the file, click off the Display Only option and data point any place you want graphics placed.

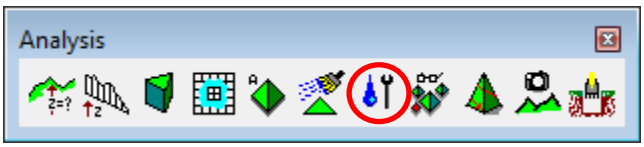
5) Close the Height/Slope dialog.

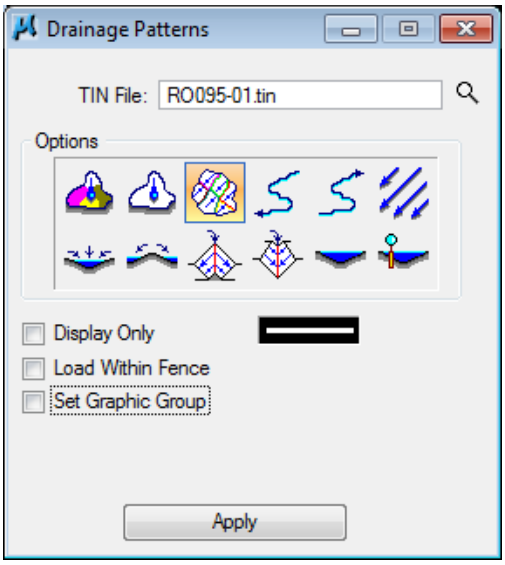
b) Drainage Tools

1) Click on the Height/Slope tool holding the mouse button down and drag the pointer away to pop up all of the Analysis tools. Select the Open as Toolbox option at the bottom to access the Analysis toolbox.



2) Select the Drainage Tools icon from the Analysis tool box to invoke the dialog depicted below.

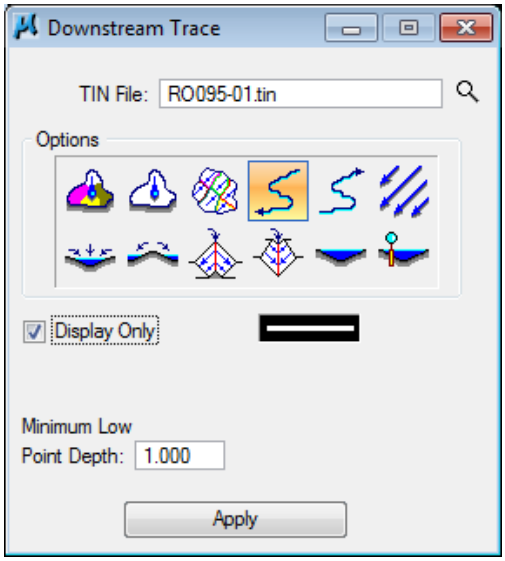




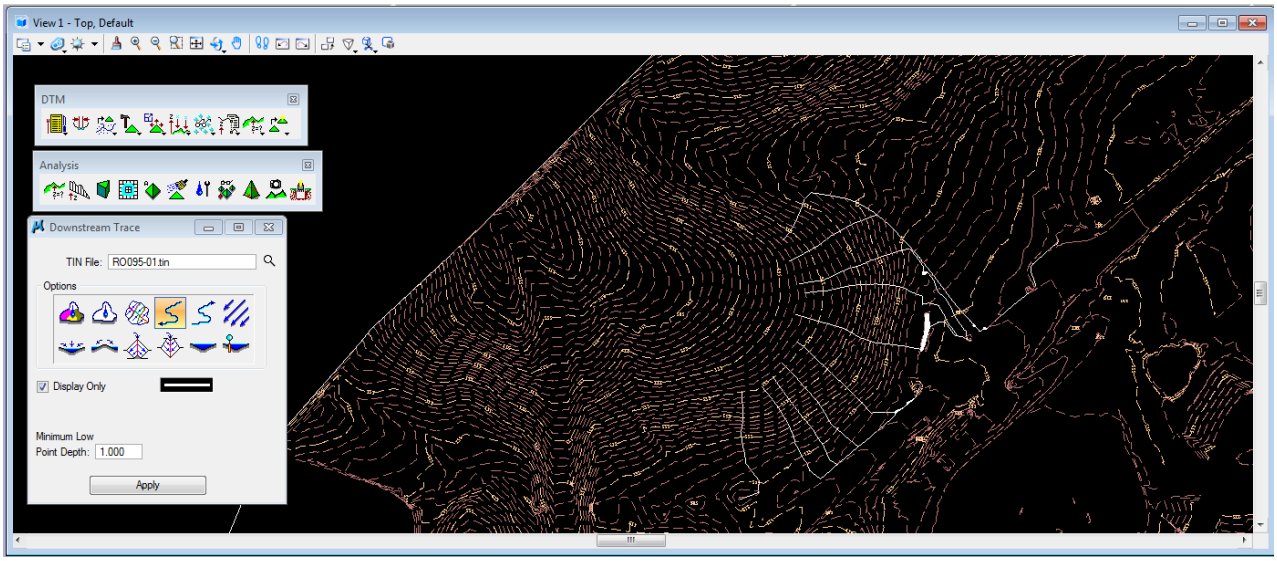
3) Ensure that all graphic elements are Fit into View 1 and turn off contour levels.

4) From the Drainage Tools dialog, select the Downstream Trace tool as shown. The Downstream Trace Tool delineates the flow path downstream from any given point in the TIN.

Set the Display Only toggle to ON and the Minimum Low Point Depth to 1.



5) Press Apply and then data point somewhere on the dtm. The flow path downstream should be displayed in the design file. You may enter several data points consecutively, then reset to exit. You may wish to turn on the contours to get a feel for the results you are getting.



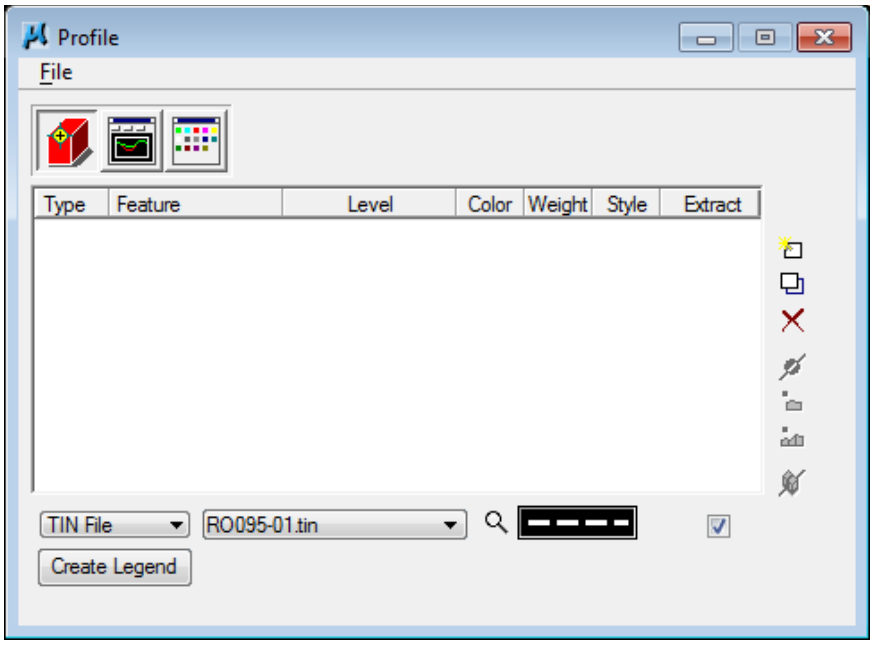
6) Take some time to try some of the other Drainage Tools.

7) Dismiss the Drainage Tools dialog.

c) Profile Tool

This tool is useful for quick checks of profiles across surfaces but for permanent displays we recommend use of the Draw Profile or Existing Ground Profile tools. They will be shown in later exercises.

1) Select the Profile icon from the Analysis tool box to invoke the following dialog.

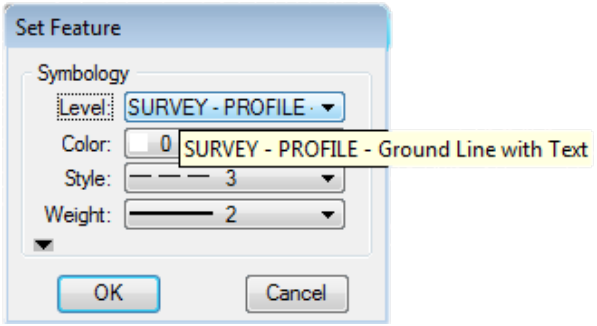


2) Under the Object Selection  icon on the left identify your surface model (TIN File) which will be used to generate a profile, and identify the symbology for your profile.

Select the TIN file 'RO095-01.tin' by clicking the "browser" button and going to the project directory C:\Projects\Roane\SR95PoplarCr

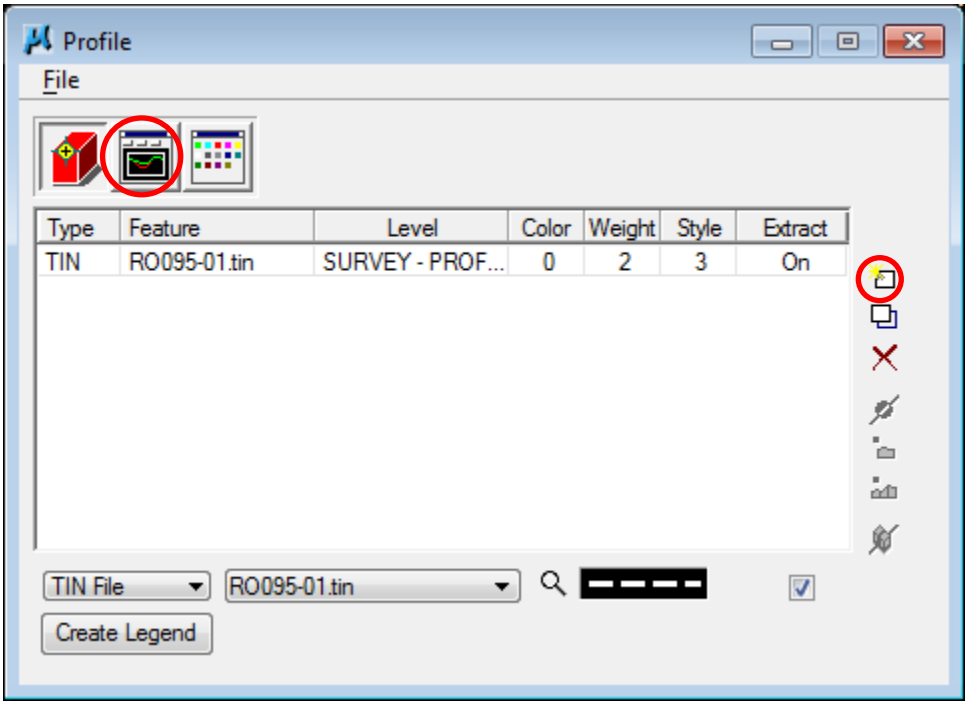
NOTE**:**
This tool will process multiple surfaces at one time so if proposed surfaces have been created they could be cut at the same time.

3) Double-click on the symbology review box on the right of the "browser" (button at the bottom of the dialog) to open the Set Feature dialog. Set the symbology representing the ground surface profile. Make settings as shown and press OK.



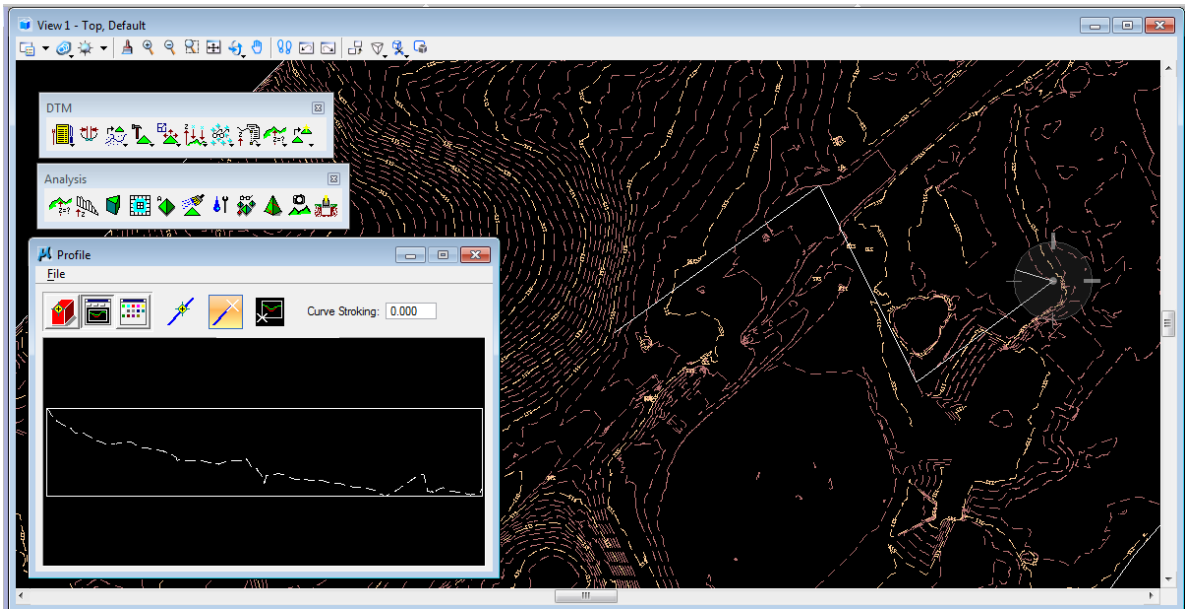
The level name is SURVEY - PROFILE - Ground Line with Text.

4) Press the Add icon  to add the feature to the collection box.

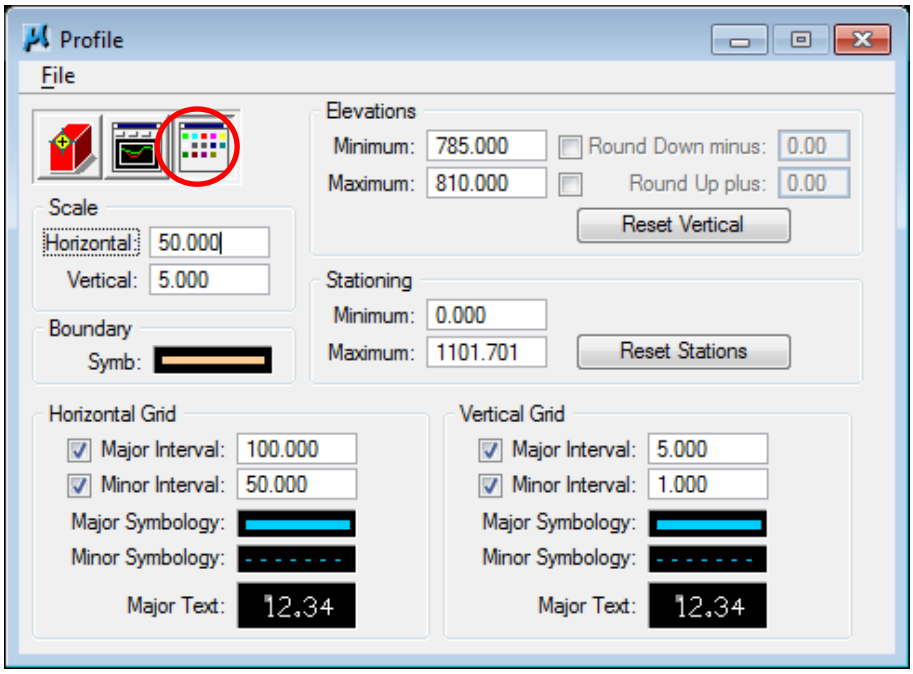


5) Select the Create Profile icon circled above.

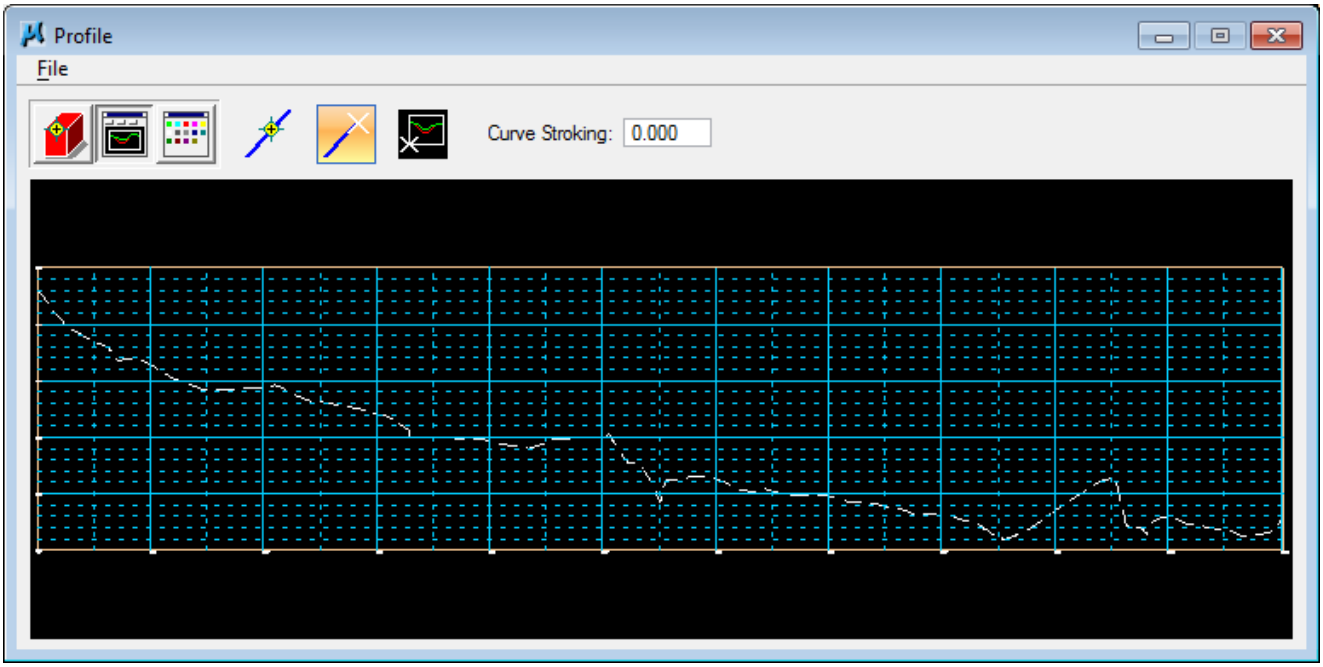
6) Press the Place Element button to cut your actual profile at any desired area by just placing two data points (i.e. a line) or a series of data points (i.e. a line-string) across your surface model at any location.



7) You can use the Preferences icon to set up a grid for your profile if desired.

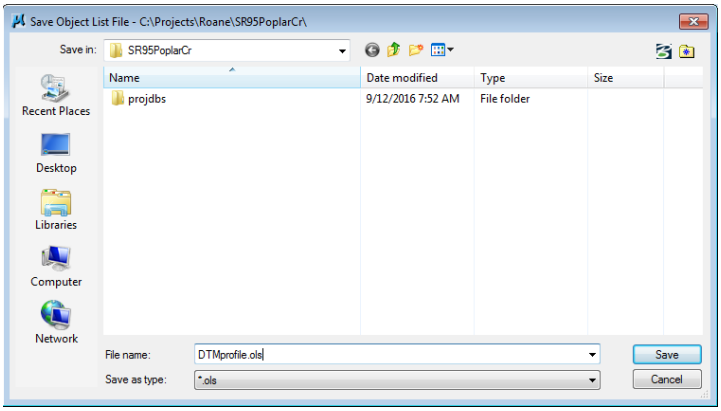


Click on the Profile icon and see your profile with the grid parameters that have been set.



If not happy with your grid settings, go back to Preferences to adjust. You can use the Place Profile icon at the far right to place your profile graphics in MicroStation

8) If you think you might use this set up again later you can save all of your settings by going to the drop down option Files → Save.



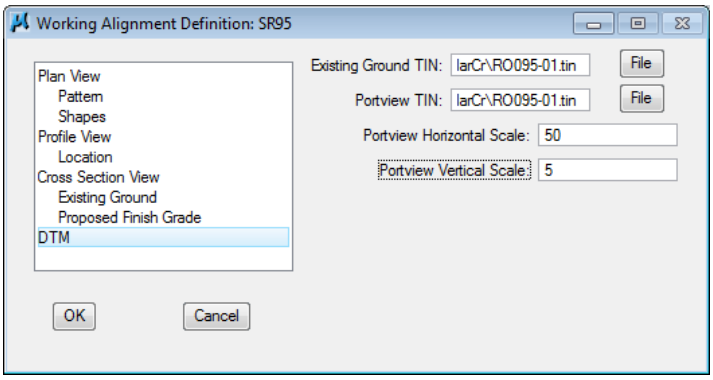
9) Close the Profile dialog and the DTM and Analysis tool frames.

IV.) Working Alignment – Define DTM

We now have more information to set in the Working Alignment. To do this, we'll need to use the working alignment Define button on the Project Manager workflow dialog. The Project Manager workflow dialog should still be active. Re-access the dialog by clicking on the Project Manager icon.

1) Press the Define button to access the Working Alignment Definition dialog.

2) Select the DTM item in the list box and complete the DTM definitions as shown below:



We will discuss the use of the Port Viewer tool in a later exercise.

3) Press OK to exit the Working Alignment Definition dialog and to save our new settings.

4) Exit Project Manager using the File → Exit drop-down option.