Existing Ground Cross Sections

4.1 Introduction

Objectives	To generate existing ground cross sections based on a horizontal alignment and the surface model beneath the alignment, and to review the sections utilizing the Cross Section Navigator tool.
Tools	
Menu Bar Application	GEOPAK Road > Cross Sections > Draw Pattern by Station Range GEOPAK Road > Cross Sections > Ground Cross Sections from DTM GEOPAK Road > Cross Sections > Navigator

The prerequisites to generate existing cross-sections utilizing digital terrain modeling are:

- ·GEOPAK coordinate geometry database wherein the horizontal alignment is stored.
- ·GEOPAK binary TIN file, Site Model or Site Object. If you have not already created your binary TIN file, see the DTM online documentation for a detailed discussion of the Digital Terrain Modeling features. The Site Model or Object are created utilizing GEOPAK Site Modeler software and are stored within the GEOPAK Site project (gsf) file.
- Pattern lines if pattern by design is to be utilized.

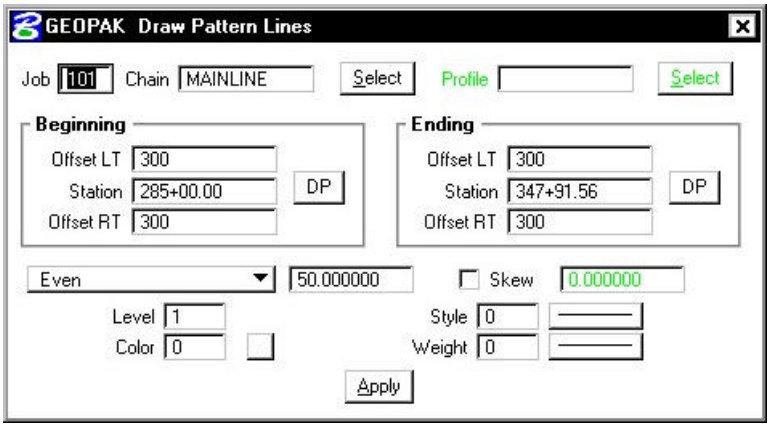
The generation of existing ground cross sections must be invoked from within the 2D MicroStation design file wherein the sections are to be drawn. GEOPAK does not create this MicroStation design file. The user creates the blank design file utilizing the desired seed file, and then GEOPAK draws into it.

4.2 Pattern Lines

Project Manager	Draw Pattern
Tools	
Menu Bar Application	GEOPAK Road > Cross Sections > Draw Patterns By Station Range

Pattern lines are graphical lines and/or line strings in a MicroStation design file that define locations at which the cross sections will be cut.

From the **Project Manager** you will select **Draw Pattern**, and create or select an existing run. When completed, the following Draw Pattern Lines dialog appears.



Once all of the fields have been completed, and the application is initiated, graphic lines (on the specified level, color and style) are drawn along the chain. This is a visual representation of the location of the cross sections to be generated.

Six methods are supported for drawing the pattern lines:

- Increment – starts at the beginning station, and draws a pattern line at the given increment.
- Even – draws pattern lines at stations divisible by the given value.
- Once – draws a pattern line at a given station.
- Critical Points Horizontal – draws a pattern line at each of the critical point (i.e. POT, PC, PT, etc.) within a chain.
- Critical Points Vertical – Draws a pattern line at each VPC and VPT in addition to the sag and crest station of vertical curves based on the profile defined in the dialog.
- Superelevation Transitions - The current design file is scanned for Superelevation shapes created with the specified chain. A pattern line is drawn at the beginning and end of each Superelevation shape, ignoring the beginning and ending station fields in the dialog. Note the Superelevation shapes cannot be in a reference file.

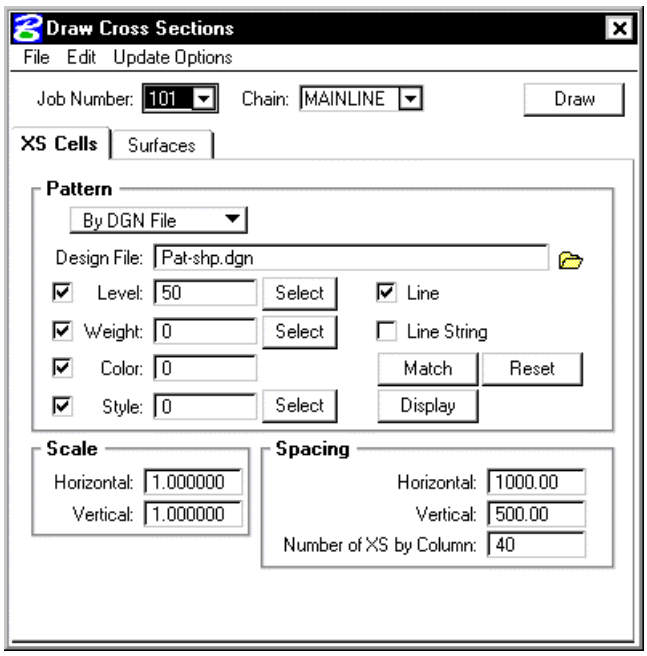
The pattern lines are drawn into the current MicroStation design file. The user can use the MicroStation **Place Smartline** or **Place Line** command to draw additional pattern lines at any user defined location. In addition, MicroStation commands can be utilized to modify pattern lines drawn via the dialog to lengthen, shorten, delete, copy, move, etc.

NOTE: This should be completed before the existing ground cross sections are generated.

4.3 Generating Cross Sections

Tools	
Menu Bar Application	GEOPAK Road > Cross Sections > Draw Cross Sections from Surfaces

Once the pattern lines have been drawn, the cross sections can be generated. Note the Job Number must be defined in order to populate the Chain list. Once the Chain is defined, the dialog unghosts as depicted below.



The rest of the dialog consists of a menu bar with three listings:

File — Standard file utilities to load, or save settings, plus a dialog exit option.

Edit — Options to Cut, Copy and Paste rows in the surfaces list box. Also, save and restore settings in the RSC file or clear list of all surfaces.

Update Options: — User-defined options on how the software handles the redrawing of cross sections.

Delete Existing Elements and Redraw — When this option is activated, any existing ground lines previously drawn with this tool are deleted and new ground lines are drawn.

Delete Non-modified Elements and Redraw — When this option is activated, any existing ground lines previously drawn with this tool are deleted and new ground lines are drawn.

Draw on Top of Existing — When this option is activated, any previously drawn ground lines are ignored and a new set is drawn, resulting in two sets of ground lines.

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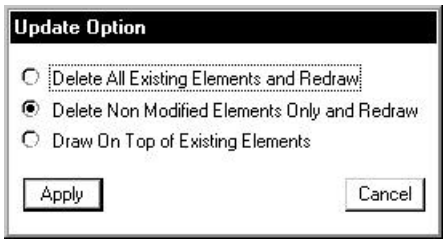
Query When activated, the user is prompted each time the Draw button is pressed.



Two tabs on the dialog support the input data required to draw cross sections:

XS Cells Defines the location of cross sections utilizing either pattern by station or pattern by design. In addition, the scale and spacing are defined on within this tab.

Surfaces Define the surfaces utilized for drawing cross sections. Note multiple surfaces may be drawn in a single processing. Source data includes GEOPAK TIN files, Site Models, or Site Objects.

On the **XS Cells tab**, the **Pattern** group box has three choices:

Pattern by Station Utilizes Begin and End Station values in addition to an Increment/Even option and Left and Right Offset fields to determine cross section location. This works well when no sections are needed that are at odd stations, skewed or kinked relative to the Chain.

Pattern by DGN This method utilizes graphical representation and draws one cross section for each line or line string of the specified parameters. Those parameters include Design File which is the name of the file that contains the lines and line strings in addition to their associated symbology.

In Existing Only No user input is required, as this option draws ground lines only for cross section cells which were previously drawn. Therefore, no other pattern requirements are needed.

4.4 Cross Section Navigator

Project Manager	Not accessible from within Project Manager
Tools	
Menu Bar Application	GEOPAK Road > Cross Sections > Navigator

The Cross Section Navigator tool is used to view and traverse between cross sections. It can also be used to draw cross section information.

When the Navigator is invoked, the following dialog appears.

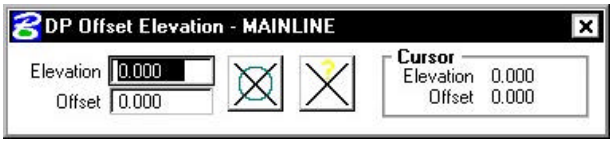
The user can scan through the cross sections by either choosing the station from the drop down list, or by using the First Section, Previous Section, Next Section, or Last Section icons (arrowheads). The Reset Navigator icon window centers the current station to the view.

The **Open View Control Dialog** enables the user to open several windows to view different portions of the cross section at the same time. The user can view the whole cross section in view 1, the left side in view 2, and the right side in view 3, etc.

Cross section elements can be added or modified using MicroStation tools or GEOPAK cross section drawing tools, as detailed in the table below.

DP Offset Elevation

Data points at a given offset/elevation, or find the offset/elevation of the cursor location.



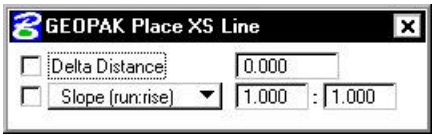
DP Delta Distance Slope

Draws a line at a given horizontal distance and slope.

XS Active Angle Tool

Sets the active angle to the given value. If a MicroStation tool is used with the active angle option, this value is used.

Draw XS Line Draws a cross section line. The length and/or slope can be specified.



4.5 Summary - Basic Steps to Creating Existing Ground Cross Sections from a DTM

Step 1. Requires a horizontal alignment stored in *.GPK file.

Step 2. Requires an existing triangle file (TIN) from a DTM.

Step 3. Draw pattern lines.

Step 4. Process cross sections through GEOPAK.

Step 5. Review and modify (if necessary).