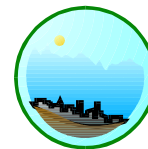


The CEDRA Corporation's COMMAND OF THE MONTH

A monthly information bulletin

May 2010

FEATURED COMMAND
Cross-Section and
Profile Stripping



Application Description

As stated at the bottom of this publication, CEDRA software “bridges engineering and GIS”. An example of a typical engineering application is the extraction or stripping of cross-sections and profiles from a surface.

Previous issues of Command of the Month have discussed how to:

- ◆ establish a horizontal alignment (March 2007),
- ◆ plot profiles (December 2005 and April 2010),
- ◆ plot cross-sections (April 2007), and
- ◆ produce plan and profile drawings (November 2005).

All of the above are either directly or indirectly related to the process of extracting or stripping cross-sections and profiles.

The CEDRA Solution

To address the application of extracting cross-sections and profiles, the following four commands within the CEDRA-AVland Cross-Section/Profile-Commands combo-box (Figure 1):

[Sections from Contours]
[Sections from Polygons]
[Sections from TIN]
[Profile from Sections]

as well as the:

[Profile from TIN]

command, within the CEDRA-Polygon-Tools toolbar (Figure 2), all provide the ability to extract cross-sections and/or profiles. Depending upon the data

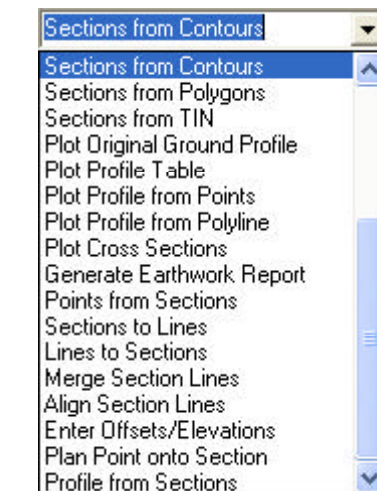


Figure 1
Cross-Section/Profile Commands
ComboBox

Command Of The Month bulletin

This month's issue discusses the various commands that are available to the user for extracting or stripping cross-sections and profiles.

source, the user selects the appropriate command. The result of executing any of the above mentioned commands is the creation of one or two dBase tables. These tables will contain information describing the cross-sections and profile and are referred to as the CrossSection Data Table and Profile Data Table, respectively. Note, no features (points, lines, etc.) are created by these commands.

The [Sections from Contours], [Sections from Polygons] and [Sections from TIN] commands require the definition of a hori-

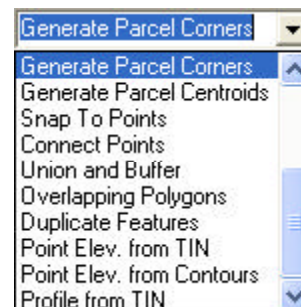


Figure 2
CEDRA-Polygon-Tools toolbar
ComboBox

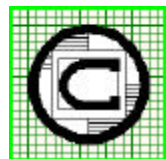
zontal alignment and will result in the creation of two dBase tables (one containing the cross-sections, CrossSection Data Table, and the other the profile, Profile Data Table).

The [Profile from TIN] command requires the presence of a selected polyline feature and an ArcGIS TIN Dataset. The result of executing this command is the creation of a single dBase table containing the profile, the Profile Data Table.

The [Profile from Sections] command requires the presence of line features that represent cross-sections, from which, a profile is extracted given a specified offset. The result of executing this command is the creation of a single dBase table containing the profile, the Profile Data Table.

Sections from Contours Overview

The [Sections from Contours] command extracts cross-sections and a profile from a series of line features. The line features may be two-point lines or polylines (lines comprised of more than



The CEDRA Corporation

**Total CADD for Engineers™
Bridging Engineering and GIS™**

Copyright © 2010 The CEDRA Corporation. The CEDRA logos, CEDRA-AVseries, CEDRA-AVcad, CEDRA-AVcogo, CEDRA-AVparcel, CEDRA-AVland, CEDRA-AVsand, CEDRA-AVwater, CEDRA-DataEditor and CEDRA-DxfExport are trademarks of The CEDRA Corporation.
ArcView® GIS, 3D Analyst, and ArcGIS are registered trademarks of Environmental Systems Research Institute, Inc. All World Rights Reserved.

Phone: 585-232-6998
Fax: 585-262-2042

151 Sully's Trail - Suite 6
Pittsford, New York 14534

E-mail: cedra@cedra.com
URL: <http://www.cedra.com>

2 vertices). Additionally, the line features which are processed by this command can reside in multiple layers.


As stated previously, this command requires the definition of a horizontal alignment in order to operate. As such, the user must first create the horizontal alignment. Reference is made to the March 2007 issue of Command of the Month for information describing this process.

After the horizontal alignment has been defined, the user selects or activates the line layer(s) to be processed in the Table of Contents (TOC). Note, there must be at least one active line layer in order for this command to function. Furthermore, the command will process the selected features in the active layer(s). If an active layer does not contain any selected features, then all features in the layer will be processed.

Following the selection of the line layer(s), and features if appropriate, the command is activated. A multi-input dialog box will appear prompting the user for the various cross-section and profile extraction parameters.

Once the values for the various parameters have been specified, the OK button is selected and the extraction process begins. Upon completion, two dBase tables will be created (one containing the cross-sections, CrossSection Data Table, and the other the profile, Profile Data Table).

Sections from Contours Operation

- 1 Scroll down in the **table of contents area**, and **select** the **line layer(s)** that contain the line features to be processed. If all features within the layer(s) are to be processed skip to Step 3. If not, the user will need to select the features that are to be processed.
- 2 Select with the  *Select Features from Active Layers* tool the **line features** to be processed.

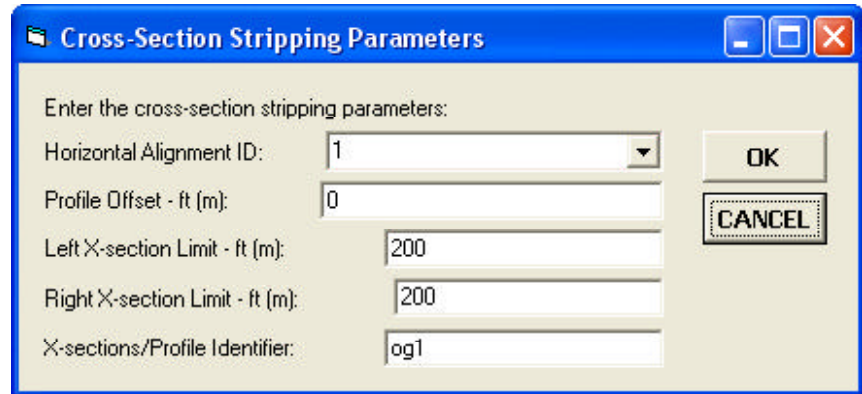


Figure 3
[Sections from Contours] Multi-Input Dialog Box

- 3 Scroll down in the {Cross-Section/Profile Commands} menu combo box, and **select** the [Sections from Contours] menu command. If the prerequisites, as outlined above, for using this command are not met, an appropriate error message will appear. If the requisites are satisfied, the multi-input dialog box of Figure 3 will be displayed.
- 4 Scroll down in the *Horizontal Alignment ID:* data field, and **select** from the displayed data list the identification number pertaining to the alignment along which the cross sections and the profile are to be stripped. If erroneously the blank line option is selected, or if an alignment identification number is entered in this data field for an alignment that does not exist, a warning message is displayed to that effect. In this case, click at the OK button to acknowledge, and repeat the command process from the beginning.
- 5 Enter in the *Profile Offset - ft (m):* data field the offset distance from the baseline along which the profile are to be stripped. A negative offset strips the profile to the left of the alignment, and a positive offset to the right. The zero offset of the cross sections is always at the alignment.
- 6 Enter in the *Left X-section Limit - ft (m):* data field the maximum left offset limit from the alignment up to which the cross sections are to be stripped.
- 7 Enter in the *Right X-section Limit - ft (m):* data field the maximum right offset limit from the alignment up to which the cross sections are to be stripped.
- 8 Enter in the *X-sections/Profile Identifier:* data field the root name of the tables to be created. The execution of this command results in the creation of two tables, one containing the cross section data, and the other the profile data. Thus the root name specified should be symbolically *ogX*, where *og* denotes the cross section and profile identifier, and *X* the alignment identification number. The program will then append the file extension *.xsc* for the cross sections table, and the file extension *.pro* for the profile table. Thus, *og3.xsc* and *og3.pro* could denote the original ground cross sections and profile, respectively, along alignment 3.
- 9 Click at the **OK** button to execute the command, or Click at the **Cancel** button to abort the command.

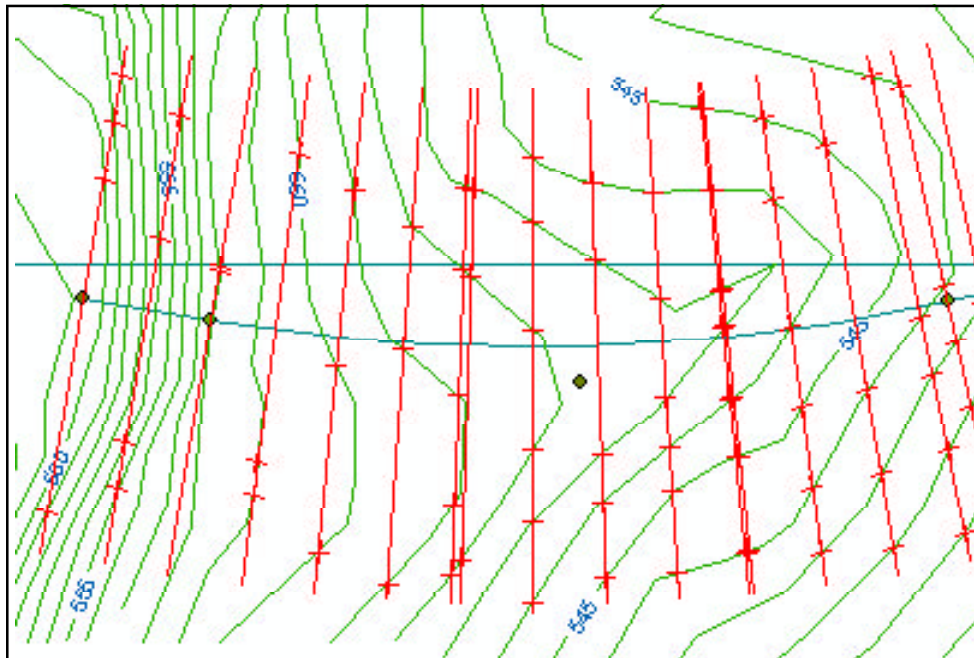


Figure 4 - Cross Section/Profile from Contours

played at the intersection of a cross section line with a contour line. This is referred to as a cross-section point.

The profile elevation at a cross-section is interpolated, at the specified offset, using the cross-section points. That is, the points where a plus sign is displayed.

The station interval at which the cross sections are to be stripped is that specified with the [Horizontal Alignment Data] command.

To view the contents of the two dBase tables:

OID	ID	STATION	STATION2	POINTS	OFF1	ELV1	OFF2	ELV2	OFF3
4	0	1150	1150	4	-136.166307	550	0	550.568707	100.201746
5	0	1200	1300	4	-113.822857	548	0	548.832932	20.852660
6	0	1250	1250	4	-88.408813	548	0	548.939567	5.758178
7	0	1293.65	1293.65	6	-122.507309	547	-50.201146	540	0
8	0	1293.65	1293.65	6	178.256008	548	0	0	0
9	0	1300	1300	4	-120.651174	547	-53.480196	548	0
10	0	1350	1350	7	-147.277170	546	-98.462000	547	-12.902600
11	0	1350	1350	7	136.748436	547	198.699956	546	0
12	0	1400	1400	8	-125.156040	546	-88.708267	547	0

Figure 5 - CrossSection Data Table (ogX.xsc)

OID	ID	STATION	ELEVATION
3	0	1100	552
4	0	1150	550.568707
5	0	1200	549.832932
6	0	1250	548.939567
7	0	1293.65	548.603090
8	0	1300	548

Figure 6 - Profile Data Table (ogX.pro)

- ▶ 10 Click on top of the **Source** tab in the TOC area, **scroll** down to the **ogX.xsc**, or **ogX.pro** table, **right-click** on top of the name of the table, and then **click** at the **Open** menu item to display the *ogX.xsc* table, see Figure 5, or the *ogX.pro* table, see Figure 6.

In the displayed table of Figure 5 for *ogX.xsc* there will be one, or more records per station, with each record in the table containing a maximum of five offset points and their elevations. If a cross section contains more than five offset points, the station will be repeated in subsequent table records until all offset points have been exhausted.

Having clicked at the OK button, the program creates the above said two tables and displays in the ArcMap map area the cross section lines, see Figure 4. A cross section line is displayed in red at the specified station interval. A cross sec-

tion line is also displayed at any alignment control point, random point and odd station, if there are any, as seen by the cross section lines which appear in Figure 4 as being very close together. Furthermore, a small plus sign is dis-

The table column labeled STATION2 is reserved for those alignments in which an alignment is referenced to another alignment as in the case in which the design alignment is referenced to a survey base line. If such referencing does not exist, the contents of the columns labeled STATION1 and STATION2 are the same.

In the displayed table of Figure 6 for *ogX.pro* there will be one record per station containing the profile station and its elevation.

- **11** Close the table, and then **click** on top of the **Display** tab in the TOC area.

The cross section lines, shown in Figure 4, are stored in an annotation group layer labeled *ogX_pln*.

To remove the display of the cross-section lines and points:

- **12** Click at the **View** menu item, select the **Data Frame Properties** command, and activate the **Annotation Groups** tag to display the dialog box of Figure 7.
- **13** Click at the *ogX_pln* name, click at the **Remove Group** command, and then **click** at the **OK** button to close the dialog box and remove the group layer.

Sections from Polygons Overview

The [Sections from Polygons] command provides the user the ability to extract (strip) cross sections at a specified station interval along an alignment from a set of polygons comprising the TIN of a surface.

Note that this TIN is not an ArcGIS TIN dataset. It is a set of congruent 3D polygons, either triangles or quadrilaterals, with each vertex containing an elevation. That is, the shape data field of the polygons must be *Polygon Z*, or *Polygon ZM*.

In addition to extracting cross sections, a profile is also stripped along the alignment. The ability is available for the user to strip said profile along a left or right offset from the alignment.

In order to use this command the following information must be present:

- a. a surface TIN must be available, with each polygon vertex having an elevation,
- b. the layer(s) in which these polygons are stored must be made active by clicking on it in the table of contents (TOC) of ArcMap, and
- c. a horizontal alignment must be defined.

The station interval at which the cross sections are to be stripped is that specified with the [Horizontal Alignment Data] command.

If this command is invoked without having activated the layer that contains the TIN polygons, or if a non-polygon layer type has been activated, a warning message box to that effect is displayed. Similarly, if a horizontal alignment does not exist, an appropriate warning message is displayed. In either case, the user should click at the OK button to acknowledge, click at said layer, and/or create an alignment, and then invoke the command again.

Thus having: (a) activated the layer in the TOC, (b) introduced the proper horizontal alignment, and (c) activated the [Sections from Polygons] command, the multi-input dialog box of Figure 3 is displayed. From this point on, the operation of the command is the same as that of the [Sections from Contours] command, described previously.

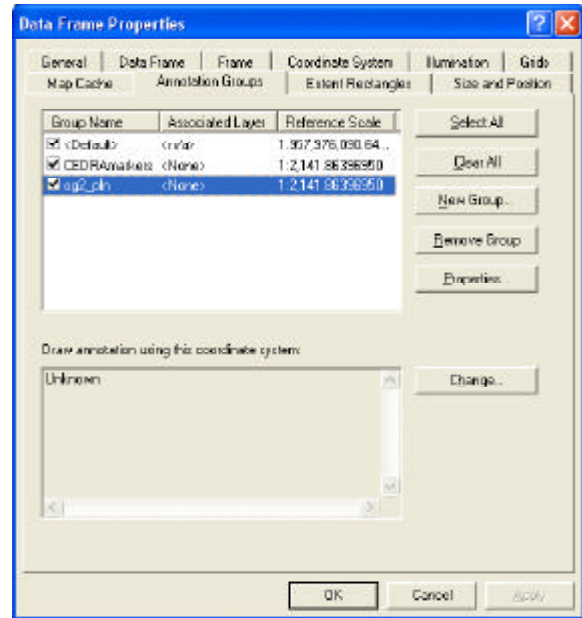


Figure 7 - Annotation Group Layers

Sections from TIN Overview

The [Sections from TIN] command provides the user the ability to extract (strip) cross sections at a specified station interval along an alignment from an ArcGIS TIN dataset.

Note that this TIN is not the TIN addressed under the [Sections from Polygons] command overview. This TIN dataset is created by the 3D Analyst extension.

In addition to extracting cross sections, a profile is also stripped along the alignment. The ability is available for the user to strip said profile along a left or right offset from the alignment.

In order to use this command:

- a. a surface TIN dataset must be available,
- b. the layer in which this TIN dataset is stored must be made active by clicking on it in the table of contents (TOC) of ArcMap, and
- c. a horizontal alignment must be defined.

The station interval at which the cross sections are to be stripped is that speci-

fied with the [Horizontal Alignment Data] command.

If the subject command is invoked without having activated the layer that contains the TIN polygons, or if another layer has been activated, a warning message box to that effect is displayed. Similarly, if a horizontal alignment does not exist, an appropriate warning message is displayed. In either case, the user should click at the OK button to acknowledge, click at said layer, and/or create an alignment, and then invoke the command again.


Thus having: (a) activated the layer in the TOC, (b) introduced the proper horizontal alignment, and (c) activated the [Sections from TIN] command, the multi-input dialog box of Figure 3 is displayed. From this point on, the operation of the command is the same as that of the [Sections from Contours] command, described previously.

Profile from TIN Overview

The [Profile from TIN] command enables the user to process a selected polyline, which has been superimposed upon an ArcGIS TIN dataset, and extract (strip) a profile along said polyline. This polyline could represent the skeleton of a roadway, canal, swale, levee, or other similar project.

The profile that is extracted along the selected polyline is stored in a dBase table, the name of which is specified by the user. Once this table has been created, it may be used by the CEDRA-AVland, CEDRA-AVsand or CEDRA-AVwater software in the design of a roadway, wastewater or storm water sewer and/or water distribution system.

Profile from TIN Operation

- 1 Scroll down in the **table of contents area**, and **select the layer** that contains the polyline along which the profile is to be extracted.
- 2 Select with the  *Select Features from Active Layers* tool the

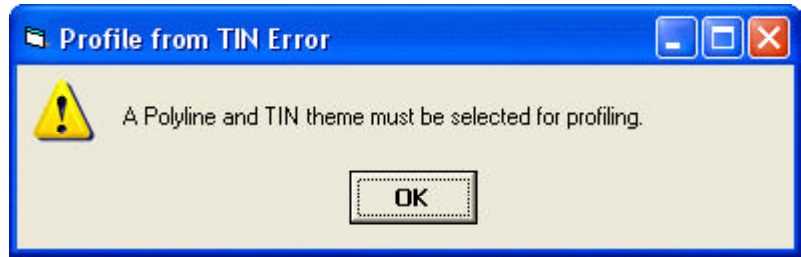


Figure 8 - Annotation Group Layers



Figure 9
Extract Profile from Contours



Figure 10
Extract Profile from Contours

polyline along which the profile is to be extracted.

- 3 **Hold down** the control (Ctrl) keyboard key, **scroll** down in the **table of contents area**, and **select the layer** that contains the ArcGIS TIN dataset from which the profile is to be stripped.
- 4 **Scroll** down in the {CEDRA-Polygon-Tools} menu combo box, and **select** the [Profile from TIN] menu command (see Figure 2) to display the multi-input dialog box of Figure 11.

Note that both, the polyline and the TIN layers must have been selected above, as well as a polyline. If any, or all of these three are not selected, an appropriate

warning message, see Figures 8 through 10, is displayed, in which case the user should click at the *OK* button to acknowledge the message to close the message window, and then repeat the command from its very beginning.

- 5 **Enter** in the *Starting Station Value - ft (m):* data field the **starting station** value of the profile to be created. This value should be entered without the plus (+) sign. For example the entry of 1029.34 denotes a station of 10+29.34.
- 6 **Enter** in the *Station Increment Value - ft (m):* data field the **station increment** value of the profile to be created. This value indicates how often elevations

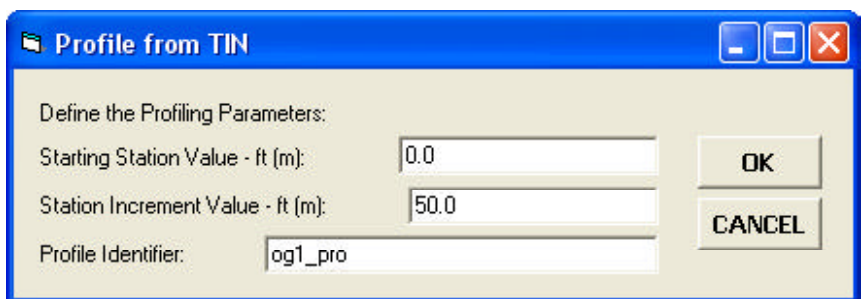


Figure 11
[Profile from TIN] Multi-Input Dialog Box

are to be interpolated along the polyline alignment.

Note that if the starting station is not a multiple of the specified increment, the first station after the starting point is assigned a station which is a multiple of the specified increment. Thereafter, elevations are extracted at the specified increment. For example, if the starting station value is 1029.34 and the station increment value is 50, the next station would be 1050, and thereafter 1100, 1150 and so on.

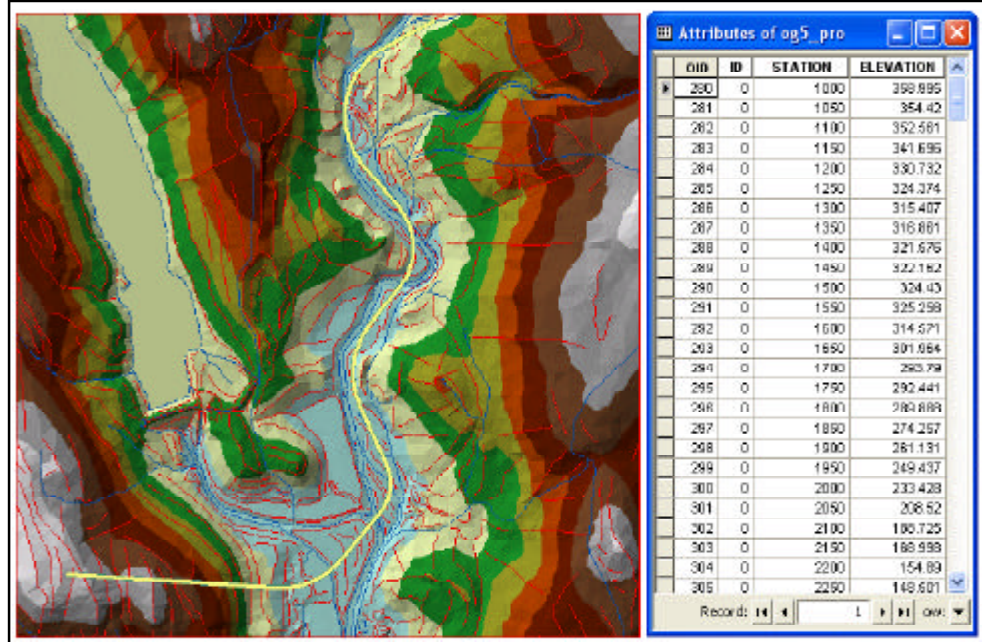


Figure 12
Profile Data Table Extracted from a TIN Dataset Along a Polyline

- **7** Enter in the *Profile Identifier*: data field the **name of the Profile Data Table** to be created.
- **8** Click at either the **OK** button to execute the command, and then terminate it, or click at the **Cancel** button to abort the command.

Note that having clicked at the *OK* button:

- If an illegal entry has been made, an error message is displayed identifying the illegal entry. In this case, click at the *OK* button to acknowledge the message and display again the dialog box of Figure 11, make the correction and continue with the work.
- If the specified table name exists, a query message is displayed asking the user whether the existing table should be replaced with the new table, or not. A positive response continues with the work replacing the existing table, while a neg-

ative response aborts the command.

- Upon completion of the work, a message is displayed informing the user of the number of profile points that have been extracted.
- **9** Click at either the **OK** button to acknowledge the message, and terminate the command.

To view the contents of the newly created Profile Data Table:

- **10** Click on top of the **Source** tab in the TOC area to display the various layers and tables therein, scroll down in the table of contents list, **right-click** at the label of the **name** of the table that was entered in the *Profile Identifier*: data field of Figure 11, and select the **Open** command to display the contents of the table.
- **11** Peruse the table and when done close its window.

Note that the polyline and the two layers in the table of contents

remain highlighted. If the command is reactivated, the previously entered data are shown as the default values. Shown on the left side of Figure 12 is an ArcGIS TIN with a polyline highlighted in yellow along which a profile has been stripped. On the right side of said figure is the display of the resultant Profile Data Table.

Summary

As can be seen, the user has a variety of methods in extracting cross-sections and profiles. Once extracted, the plotting commands can be employed to create a fully annotated drawing.

As always, users who have a need for functionality that is not presently available in CEDRA software should feel free to forward these requests to CEDRA, as well as, any other comments or suggestion you may have.

If you have a request for Command Of The Month, feel free to phone, fax or e-mail your request to The CEDRA Corporation.