The CEDRA Corporation's
COMMAND OF THE MONTH

A monthly information bulletin   **May 2013**

Application Description

Civil Engineers and utility mappers often are involved with generating cross-section drawings. For those who are unfamiliar with these types of drawings, a cross-section is a view taken along a line that is perpendicular to an alignment. A series of cross-sections are typically generated along an alignment.

On a cross-section drawing, not only is the existing ground surface shown, but additional layers of information can be displayed. For example, a proposed roadway surface, the roadway subbase and so forth. Additionally, crossings are also shown on the cross-section drawings. A crossing can represent the location of a water or sewer line in relationship to the existing ground surface.

As such, a cross-section drawing contains a wealth of information which is valuable in determining earthwork quantities as well as in the construction phase of a project.

Recently we were asked if there was a way to automate the plotting of the crossings on a cross-section. The [Plot Cross Sections] command will generate fully annotated cross-section drawings but had no provision for annotating crossings, until recently.

The CEDRA Solution

To accommodate the application described above, the [Intersect with Sections] command located within the CEDRA-AVland-CrossSection Toolbar, see Figure 1, was created.

Intersect with Sections Overview

The [Intersect with Sections] menu command enables the user to intersect cross-sections associated with a horizontal alignment with polyline and/or polygon layers. The result of which will be: (a) a dBase table containing the intersection points and/or (b) point features which are stored in the current active layer. The dBase table that is created is referred to as a **Cross-Section Points Table**. This

> ### Command Of The Month bulletin
>
> *This month's issue discusses how to create a Cross-Section Points Table which contains the intersections of features with cross-section lines.*

table can be added to the data frame where cross-section drawings are to be created. In so doing, the user is able to superimpose individual points upon the cross-sections. For example, sewer and/or water line crossings.

For this command to operate the user must activate the polyline and/or polygon layer(s) prior to activating the command. If no layer is active or if an unsupported layer type is active, an appropriate error message will be displayed.

Shown in Figure 2 is a horizontal alignment with 6 cross-section lines. In this example, two layers are intersected with the
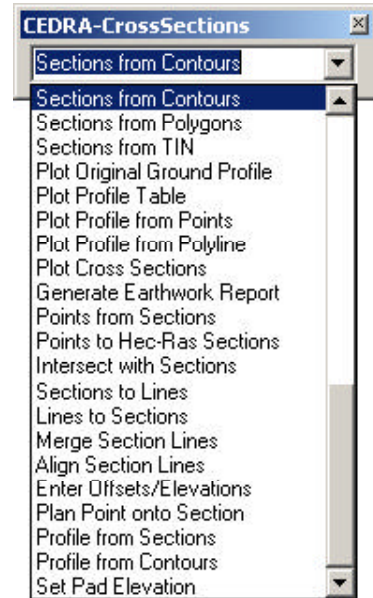

Figure 1
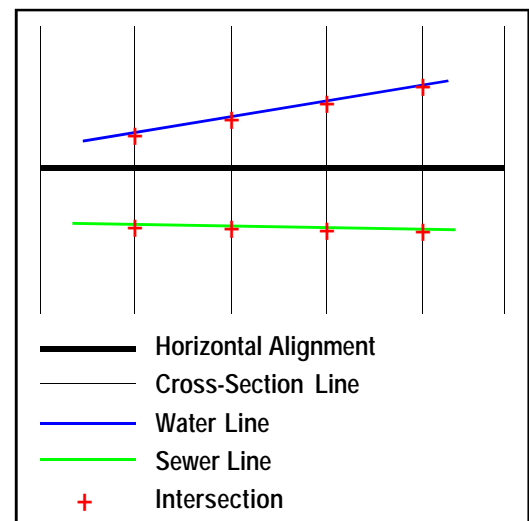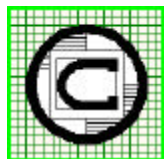**CEDRA-AVland-CrossSection Toolbar**

Figure 2 Red Plus Signs
denote the intersections which would
be computed by this command

---

horizontal alignment. A water line layer and a sewer line layer. The result of executing this command would be 8 intersections, 4 for the sewer line and 4 for the water line. Even though this sample illustrates only line layers, the command will also process polygon layers.

The Cross-Section Points Table that is created will contain the following fields:

STATION: station value
OFFSET: offset value
ELEVATION: elevation value
COMMENT: comment or label
PT_TYPE: point marker type

The STATION and OFFSET values are computed based upon the intersection with the cross-section line. Positive offsets are to the right of the horizontal alignment direction, while negative offsets are to the left. Station values increase in the direction of the horizontal alignment.

The ELEVATION value can be determined in one of 3 fashions. The **first** option is to extract the elevation from a field associated with the feature. The **second** is to interpolate an elevation based upon a reference cross-section surface in conjunction with the computed offset of the intersection. The **third** option is similar to the second with the exception that COVER and/or DIAMETER values can be included in the elevation computation. The COVER and DIAMETER values must be inches/millimeters. Specifically, the elevation value computation for this option is as follows:

US units
$ELV = Exsc - (COVER/12) - (DIAM/12)$

Metric units
$ELV = Exsc - (COVER/1000) - (DIAM/1000)$

where Exsc denotes the interpolated elevation on the reference cross-section surface at the intersection's computed offset location.

The COMMENT value can be extracted from a field associated with the feature or can be explicitly entered by the user

during execution of the command. This value will appear on the cross-section as a note above the position of the cross-section point. For example, 8" Water Line could be a comment, or Prop R/W. The comment can be comprised of a maximum of 80 characters.

The PT_TYPE value denotes the marker that is used when the cross-section point is plotted on a cross-section. Available options include the following:

POINT   POINT W/ LINE
CIRCLE   CIRCLE W/ LINE
OCTOGON   OCTOGON W/ LINE
SQUARE   SQUARE W/ LINE
TRIANGLE   TRIANGLE W/ LINE
LINE

The options above which include the W/ LINE text denote that a vertical line will be included in the plotting of the cross-section point.

When a cross-section point is plotted, a point feature is created and the MRK field is assigned a value which the user can classify upon to assign a specific marker for that value. The following MRK values are stored based upon the PT_TYPE value:

POINT   1   CIRCLE   2
OCTOGON   3   SQUARE   4
TRIANGLE   5

Intersect with Sections Operation

To use this menu command, the user should:

➤ 1   **Scroll** down in the **table of contents area**, and **select** the **layers** that contain the polyline and/or polygon features to be processed.

➤ 2   If all features within the active layer are to be processed, proceed to the next step, otherwise, **select** with the ⬚ *Select Features from Active*

Layers tool the **features** to be processed.

➤ 3   **Scroll** down in the {CEDRA-AVland-CrossSections} menu combo box, and **select** the [Intersect with Sections] menu command, see Figure 1. If the prerequisite conditions are not met, a warning message such as that shown in Figures 3 or 4 will be displayed. At this point click the OK button and make the appropriate adjustments. If the prerequisites are met, the dialog box of Figure 5 is 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 lines are to be developed. 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 acknowl-

Figure 3
No Layer Selected
Warning Message

Figure 4
Polyline and Polygon Layer
must be selected Warning Message

edge, 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 for which intersections are to be computed.

➤ **7**   **Enter** in the *Right X-section Limit - ft (m):* data field the maximum right offset limit from the alignment for which intersections are to be computed.

➤ **8**   **Enter** in the *X-sections/Profile Identifier:* data field the root name of the tables to be created. The format of the Cross-Section Points Table will be xscX_pts, where X denotes the horizontal alignment identification. It is suggested that the default, xsc, is entered for this parameter.

➤ **9**   **Scroll** down in the *Reference Cross-Section Surface:* data field, and **select** from the displayed choice list the name of the **Cross Section Data Table** which is to be used for computing elevation values. If the elevation values are to be extracted from a field, select the <none> option.

➤ **10**   **Scroll** down in the *Elevation from:* data field, and **select** the:
- **Elevation Field** option to indicate that the elevation value is to be extracted from a field that is associated with the feature being processed.

Figure 5 Intersect with Sections Specification Multi-Input Dialog Box

- **Cross-Section Surface** option to indicate that the elevation value is to be interpolated using the computed offset value and reference cross-section surface.
- **Cross-Section Surface w/ Cover, Diameter** option to indicate that the elevation value is to be interpolated using the computed offset value and reference cross-section surface along with the Cover and Diameter values.

➤ **11**   **Scroll** down in the *Elevation Field:* data field, and **select** the field that contains the elevation values. If there is no corresponding field, select the <none> option.

➤ **12**   **Scroll** down in the *Cover Field:* data field, and **select** the field that contains the elevation

values. If there is no corresponding field, select the <none> option.

➤ **13**   **Scroll** down in the *Diameter Field:* data field, and **select** the field that contains the elevation values. If there is no corresponding field, select the <none> option.

➤ **14**   **Scroll** down in the *Comment Field or "Comment":* data field, and **select** the field that contains the elevation values. If there is no corresponding field, select the <none> option. Alternatively, the user is able to explicitly enter the comment value. This is accomplished by entering the comment, enclosed in double-quotes. For example, "Sample Comment". In this case, the text Sample Comment would be assigned to all intersection points that are computed. As such, this

capability should only be used when it is desired to apply the same comment to all computed intersection points.

➤ **15** **Scroll** down in the *Point Marker Type:* data field, and **select** the desired type of point marker to be displayed when plotting cross-section points.

➤ **16** **Scroll** down in the *Delete Current Data:* data field, and **select** the:
- **Yes** option to indicate that the dBase table created by this command is to be overwritten. Any data contained in this table will be deleted and as such lost.
- **No** option to indicate that the existing contents of the table are to be left as is. Any new data will be appended to the table.

➤ **17** **Scroll** down in the *Create Point Features:* data field, and **select** the:
- **Yes** option to indicate that the command is to create point features at each of the computed cross-section intersection locations. The point features created will be stored in the current active layer.
- **No** option to indicate that point features are not to be created.

➤ **18** **Click** at the **OK** button to execute the command,
or
Click at the **Cancel** button to abort the command.

Having clicked at the OK button, the program begins its computations and once done, displays in the ArcMap view the cross section lines. A cross section line is displayed in red at the specified station interval. A cross section line is also displayed at any alignment control point, random point and odd station, if there are any. A small plus sign is also displayed at the intersection, if any, of a cross section line with a feature that was processed.

The cross section lines and red plus signs are stored in an annotation group layer labeled *xscX_pts*. If the user wishes to delete this annotation group layer:

➤ **19** **Click** at the **View** menu, **select** the **Data Frame Properties** command, and activate the **Annotation Groups** tag.

➤ **20** **Click** at the **xscX_pts** name, **click** at the **Remove Group** command, and then **click** at the **OK** button to close the dialog box and remove the group layer.

Shown in Figure 6 is a sample Cross-Section Points Table. There is no limit to the number of records this table can contain. Additionally, the records do not have to appear in station ascending

order. Figure 7 contains a cross-section plot with 4 superimposed cross-section points.

Notes

a. In order to have the [Plot Cross Sections] command plot crossings on the individual cross-sections, the user must add a Cross-Section Points Table to the Data Frame where the cross-sections are being plotted. In order for the [Plot Cross Sections] command to process the table, the name of the table must be of the form xscX_pts, where X denotes the current horizontal alignment identification.

b. The point features that are created by this command are stored in the current active layer, as specified with the [Set Active Layer] command.

Summary

Those users who have a requirement to produce cross-section drawings will find the [Intersect with Sections] especially useful in plotting crossings. Additionally, this command can also be used to simply identify the intersections of polyline and polygon features with cross-section lines. This information can be used in stakeout applications.

As mentioned at the outset of this publication, the implementation of this command was the direct result of a suggestion we received. So that, we encour-

OID	STATION	OFFSET	ELEVATION	COMMENT	PT_TYPE
0	1050	-75	555	PROP R/W	CIRCLE W/ LINE
1	1050	75	556	PROP R/W	CIRCLE W/ LINE
2	1075	-50	553	8" W/L	POINT W/ LINE
3	1075	50	554	8" W/L	POINT W/ LINE
4	1075	-75	555	PROP R/W	SQUARE W/ LINE
5	1075	75	556	PROP R/W	SQUARE W/ LINE

Attributes of xsc1_pts

Record: 1 of | Show: All | Selected | Records (0 out of 154 Selected.) | Options

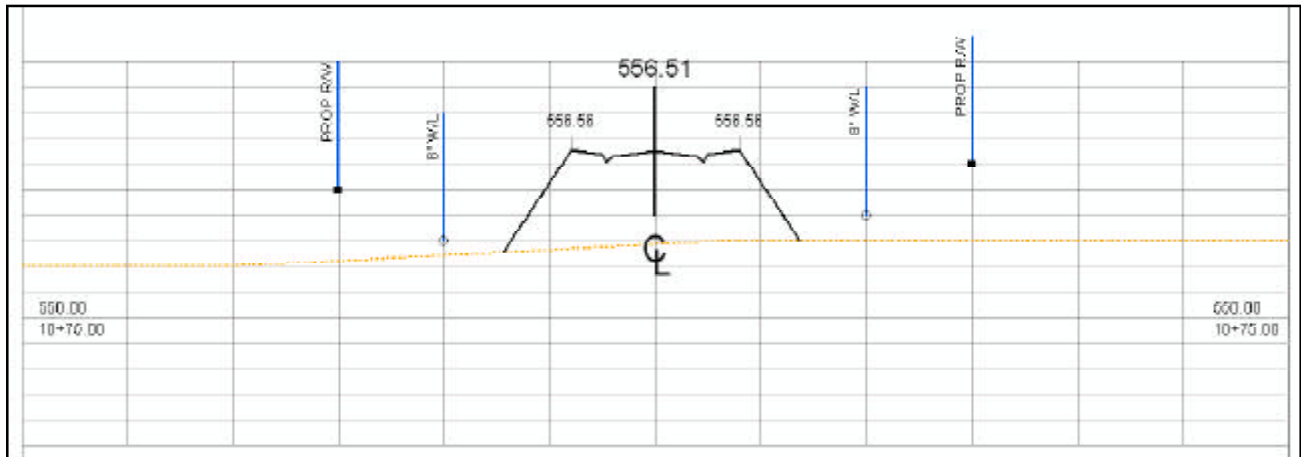Figure 6 Sample Cross-Section Points Table

Figure 8-13(f) Sample Cross-Section with Cross-Section Points Superimposed

age our users and those interested in our software to feel free to pass along their suggestions.

After all, if the software does not address the application being worked on, then there's no need for the software. As such, The CEDRA Corporation tries its best to deliver application solution products.

The implementation of the [Intersect with Sections] command is a recent enhancement to the CEDRA-AVland-CrossSection toolbar. Users with a software support agreement should check with The CEDRA Corporation on how to obtain a software update so as to be able to utilize this new functionality.

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 suggestions 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.