# The CEDRA Corporation's

# COMMAND OF THE MONTH

**A monthly information bulletin**          **February 2007**
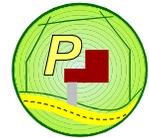
## Application Description

Suggested to us a short time ago, from a user, was the idea of developing a tool which would provide the capability to create a polygon given three sides and a desired polygon area. Trying to be as receptive to our user's requests as possible, we decided to develop such a tool.

The application was described to us as beginning with a baseline and two bounding sides, create a string offset to the baseline, intersecting the offset string with the bounding sides to form a closed figure (polygon). The newly created polygon would then have to satisfy a user-specified area. The three sides, baseline and the two bounding sides, could be comprised of multiple individual features (two-point lines, polylines and curves).

## The CEDRA Solution

To address the application of creating a polygon given three sides and an area, the [Area Calculation] command, $\boxed{\text{A/}}$ , was developed. At this time, this command is available only for ArcGIS® users and appears in the CEDRA-AVparcel-Tools toolbar, shown in Figure 1.

## Area Calculation - Overview

The intent of the [Area Calculation] command is to provide the user the ability to define three sides for processing, after which, a multi-input dialog box is presented, from which, the user specifies certain parameters.
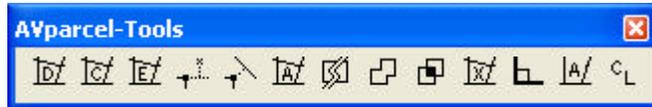


**Figure 1**
**CEDRA-AVparcel-Tools Toolbar for ArcGIS Users**

In defining the three sides, the command refers to each side as the *baseline*, *start side* and *end side*, respectively. The baseline is defined first, followed by the start side and finally, the end side. Each side may be comprised of multiple individual features (two-point lines, polylines and curves). A side is defined by the user: (a) by making a "pick" to select the appropriate feature(s), or (b) by defining a rectangle which touches a portion of the desired feature(s).

> ### Command Of The Month bulletin
>
> *This month's issue discusses the Area Calculation tool for creating a polygon given three sides and a desired polygon area.*

Once the sides have been defined a multi-input dialog box is displayed, from which, the user enters the desired area calculation parameters. Given this information, the command begins an iterative process.

Step one is to create an offset baseline. Shown in Figure 2 are the three sides, (baseline, start side and end side). In addition, the offset baseline is shown using a dashed line pattern. An initial guess is used to calculate the offset at which the offset baseline is created.



**Figure 2**
**Offset Baseline String**
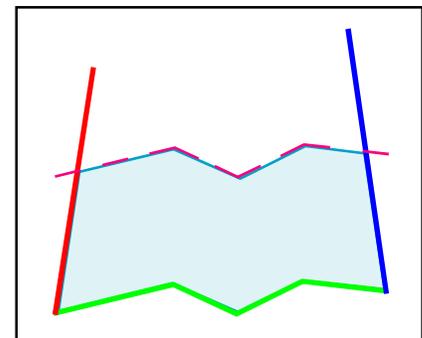


**Figure 3**
**Newly Created Polygon**

The second step is to intersect the offset baseline with the start and end sides to create a new polygon, see Figure 3.

The third step is to compute the area of the new polygon and compare this value with the user-specified area value. If
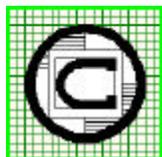
the difference between the two values is within a user-specified area tolerance, the command terminates creating the polygon. If not, the process is repeated by either increasing or decreasing the offset value, which is used to create the offset baseline, until the difference in area values is within the user-specified area tolerance.

**Area Calculation - Operation**

Once the command has been activated, perform the following:

1.   Make either a pick or define a rect-angle in the map area to select the feature(s) to be processed. The feature(s) selected here will com-prise the *baseline*.

2.   As shown in Figure 4, click at the:



**Figure 4**
**Feature Selection Confirmation Query**

●  *Cancel* button to terminate the command, the
●  *No* button to reject the feature selection and indicate that Step 1 is to be repeated to select a different set of features, or the
●  *Yes* button to confirm the feature selection and continue with the pro-cessing.

3.   Make either a pick or define a rect-angle in the map area to select the feature(s) to be processed. The feature(s) selected here will com-prise the *start side*.

4.   As shown in Figure 4, click at the:
●  *Cancel* button to reject the fea-ture selection and indicate that Step 3 is to be repeated to select a differ-ent set of features, the
●  *No* button to reject the feature selection and indicate that Step 3 is to be repeated to select a different set of features, or the

●  *Yes* button to confirm the feature selection and continue with the pro-cessing.

5.   Make either a pick or define a rect-angle in the map area to select the feature(s) to be processed. The feature(s) selected here will com-prise the *end side*.

6.   As shown in Figure 4, click at the:
●  *Cancel* button to reject the fea-ture selection and indicate that Step 5 is to be repeated to select a differ-ent set of features, the
●  *No* button to reject the feature selection and indicate that Step 5 is to be repeated to select a different set of features, or the
●  *Yes* button to confirm the feature selection and continue with the pro-cessing.

7.   Upon confirmation of the *end side* selection, a multi-input dialog box similar to that of Figure 5 will ap-pear.
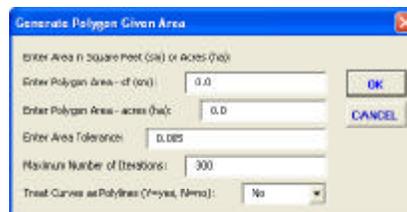


**Figure 5**
**Feature Selection Confirmation Query**

As can be seen from Figure 5, the user has a great deal of control over how the area calculations are per-formed. Beginning at the top of the dialog box, the user is able to con-trol the following:

Data Line 1 - Polygon Area -sf (sm)

The desired polygon area can be expressed in terms of square feet (sm) or acres (ha). Data lines 1 and 2 are used for entering the desired area in the appropriate units. A nonzero area value must be entered in either data line 1 or 2, but not both. Note that if a negative area value is specified the polygon will be cre-

ated on the opposite side of the baseline direction.

Data Line 2 - Polygon Area - acres (ha)

A nonzero entry in this data field denotes that the desired polygon area value is being expressed in terms of acres (ha).

Data Line 3 - Area Tolerance

The area tolerance value must be a value greater than zero and denotes the maximum allowable difference between the computed area of the new polygon and the desired poly-gon area as specified in data line 1 or 2.

Data Line 4 - Max. Number of Iterations

The maximum number of iterations must be a value greater than zero and denotes the maximum number of iterations that are to be performed. This parameter prevents the com-mand from entering an infinite loop (processing without termination).

Data Line 5 - Curve Treatment

This parameter denotes how curve features are to be treated, either as circular arcs or as polyline features.

The user simply selects Yes or No from the choice list.

Once the desired values have been entered in Figure 5, click at the:
●  *Cancel* button to terminate the command, or the
●  *Yes* button to begin the area cal-culation process.

If the maximum number of iterations is exceeded, a warning message



**Figure 6**
**Warning Message Box**

box similar to that shown in Figure 6 will be displayed.

At this point, the command can be repeated, increasing the maximum number of iterations, or the specified area value can be checked for validity. That is, a polygon of the specified area can actually be created within the sides that have been selected.

If the command is unable to create a polygon, a warning message box similar to that shown in Figure 7 will be displayed. In this situation, the user can try reversing the order of the start and end sides.



**Figure 7**
**Warning Message Box**

If the command is able to create a polygon, the new polygon will be placed in the current active layer. In addition a message, similar to that shown in Figure 8, will appear.



**Figure 8**
**Successful Polygon Creation Message**

Upon completion of its processing the command remains active so that another polygon can be created. At this point, the command is in the baseline definition mode of operation.

If the user wishes to undo the creation of the polygon, the {Edit} [Undo Create Polygon] command can be selected.

**Summary**

The [Area Calculation] command is a direct result of user feedback. If users have other requests for specific functionality they should feel free to forward them on.

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