

Creating Exclusion/Inclusion Areas and Breaklines

The following instructions will guide you through the process of creating exclusion, inclusion areas and break lines to generate the surface and contours. Exclusion areas are needed for objects such as buildings where the surface and contour lines do not need to be generated. Inclusion lines need to be drawn around the surveyed area especially if it is an irregular shape. This prevents the surface lines and contour lines from being generated in the wrong direction. Having seen the land you know how it should look however the computer does not. These instructions assume that the point data has already been downloaded and drawn in Carlson Software. Carlson modules are displayed as {**Civil Design**}, main menus are displayed as [**3D Data**], and submenus and menu commands are displayed as < **Hard Breaklines** >.

Inclusion Areas Manually Entering Boundary:

- 1) Use the 3D Polyline command to draw a line around the outside of the points: {**any Carlson Module**} → [**Draw**] → <**3D Polyline**>
 - a) Confirm “**Show options on startup**” is checked
 - b) To use the current layer, make sure the “**Use current drawing layer**” is checked. To specify a different layer, uncheck this box and **type in a layer name** or use the “**Select**” button to pick the desired layer.
 - c) Click “**OK**” when done
- 2) Use the osnap node or type in the point numbers to connect to the points. Always use 3D polylines since a 2D polyline or a line does not allow for entering point numbers and gives better accuracy.
- 3) Continue to draw the 3D polyline around the outside perimeter connecting to points.
- 4) When all but the last segment is complete use the close option with the 3D polyline command: “**C**”

Inclusion Areas Using Shrink-Wrap Entities for Boundary:

- 5) Use the Shrink-Wrap Entities command to automatically draw a line around the outside of all the points: {**any Carlson Module**} → [**Draw**] → <**Shrink-Wrap Entities**>
 - a) Use the Gap methodology by pressing “**Enter**”
 - b) Enter the layer for the inclusion line: **COGO – Include**

- c) **Select the objects** to draw a line around or type “all”
- d) Press “**Enter**” when done selecting objects
- e) The perimeter reduction variable dictates how loosely the program follows the point outline. Use the standard “2” unless the results need to be tighter/looser to the points during a previous attempt: “2” followed by an “**Enter**”
- f) Create the line work as a 3D Polyline: “3D” followed by an “**Enter**”

Carlson Software creates a boundary 3D Polyline around the selected points. If the line is too “tight” on the points or too “loose”, hit “Undo” and restart the command and use a different perimeter reduction variable. Use a lower number to more loosely fit the points and a higher number to conform to the points.

Exclusion Areas:

On any buildings or man made non-topographic areas in which the interiors do not need to be surfaced or contoured draw a 3d polyline around which will be used by Carlson as an exclusion boundary.

- 6) Use the procedure above in “**Inclusion Areas - Manually Entering Boundary**” to draw a 3D Polyline around the area
- 7) If you only have 2 sides to a building the “4 Sided Building” command can be used to quickly draw the rest of it: **{Survey} → [Survey] → <4 Sided Building>**.
- 8) **Select the 2 sides** of the building you have drawn.
- 9) Press “**Enter**”. The command draws the other sides of the building.

Breaklines:

Breaklines are polylines that are used in surface modeling to represent a break line such as a ridge, stream, curb or similar features that need to be connected (ex. top of bank). Breaklines force triangulation between the two endpoints of the breakline which prevents any other triangulation line from crossing the breakline. This forces interpolation along the breakline.

- 10) Connect all similar features that require breaklines with a 3D Polyline. Use the procedure above in “**Inclusion Areas - Manually Entering Boundary**”.
 - a) Breaklines do not have to be closed
- 11) Use the “Tag Hard Breakline Polylines” to reduce smoothing at vertical surfaces (if the contours are rounding excessively at a wall): **{Civil Design} → [3D Data] → <Hard Breaklines> → <Tag Hard Breakline Polylines>**