

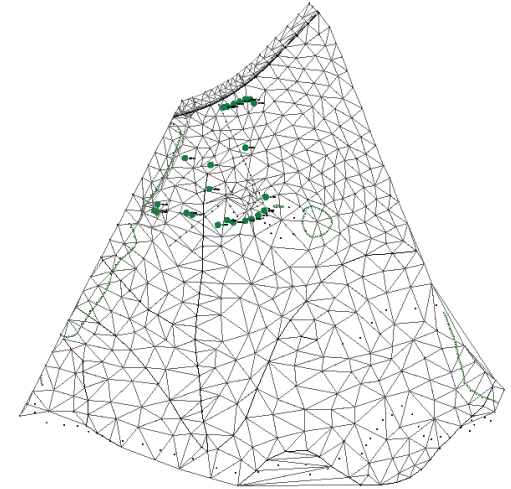


Chapter 4

- Modeling the Existing Terrain Using Surfaces
 - Topics
 - Understanding surfaces
 - Creating a surface from survey data
 - Using breaklines to improve surface accuracy
 - Editing surfaces
 - Displaying and analyzing surfaces
 - Annotating surfaces

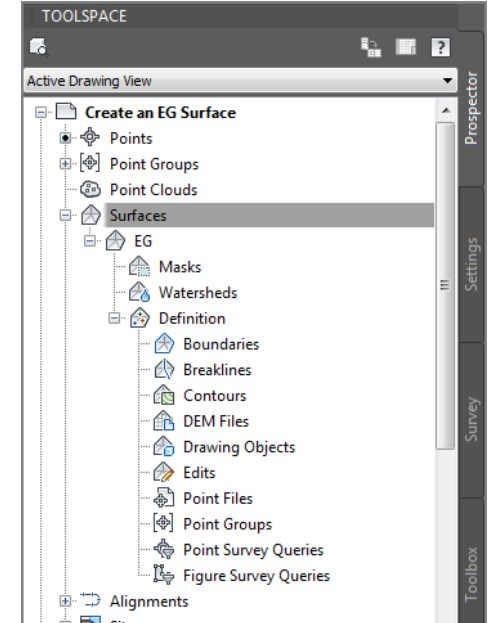
Understanding Surfaces

- A surface is made using a TIN (Triangular Irregular Network) algorithm.
- You provide point data; in this chapter, this is survey data.
- The TIN algorithm fills in the spaces between the points.
- This enables an elevation to be approximated anywhere within the surface.
- Surfaces are key components of nearly every land development project.



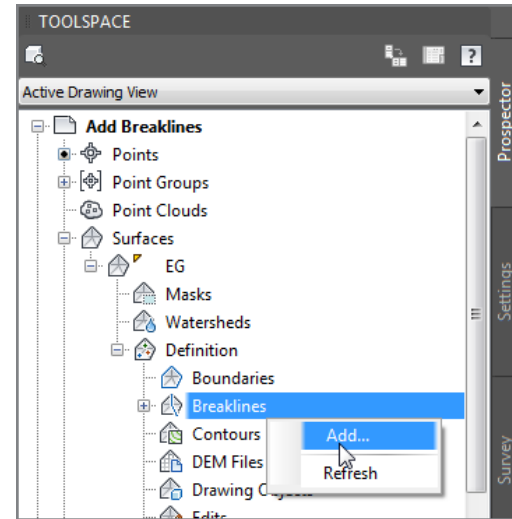
Components of a Surface

- Boundaries: Control where the surface *is*
- Breaklines: Control the alignment of TIN lines
- Contours
- DEM files: Large-scale Digital Elevation Models
- Drawing objects: Lines, arcs, circles, and so on
- Point files (text files)
- Point groups



Surface from Survey Data

- There are many ways to create surfaces, and many different types of data can contribute to them.

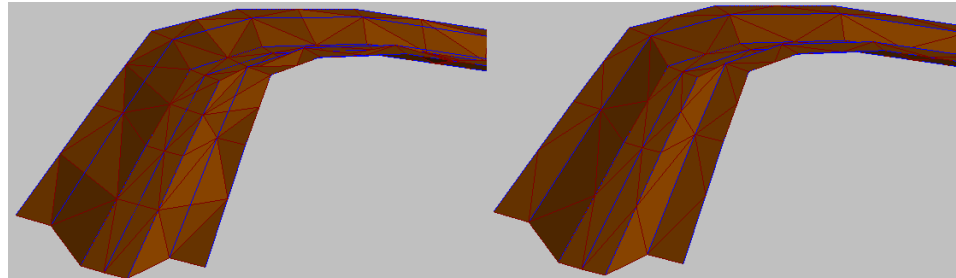


- In this chapter, you will create a surface from survey data. Later you will use other methods/sources of data.
- You will begin by creating a new surface and then adding a point group to it.



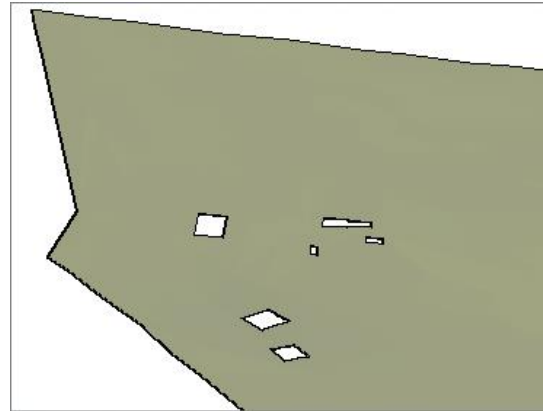
Breaklines

- Points alone do not make an accurate surface.
- You must control how the lines are drawn between those points to make a truly accurate representation of the ground.
- Breaklines establish “hard edges” within the surface along curb lines, edges of pavement, embankment edges, and so on.



Adding Boundaries

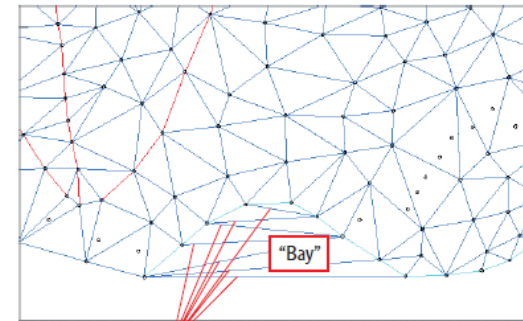
- Adding Boundaries
 - Boundaries: Control where the surface *is*
 - Outer boundaries: *Contain* the surface
 - Hide boundaries: Make a hole in the surface
 - Show boundaries: Make an island within the hole





Editing Surfaces

- Deleting lines
 - » The TIN algorithm can place lines where they don't belong.
 - » Contour will appear where there are TIN lines, even if they are wrong.
 - » Deleting TIN lines is an important part of cleaning up a surface.

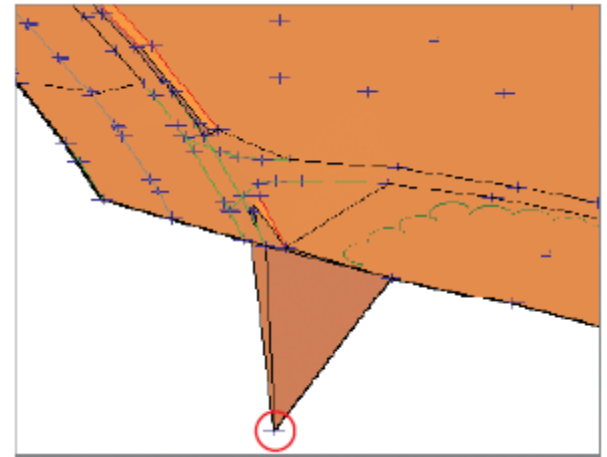


Erroneous TIN Lines



Editing Surfaces

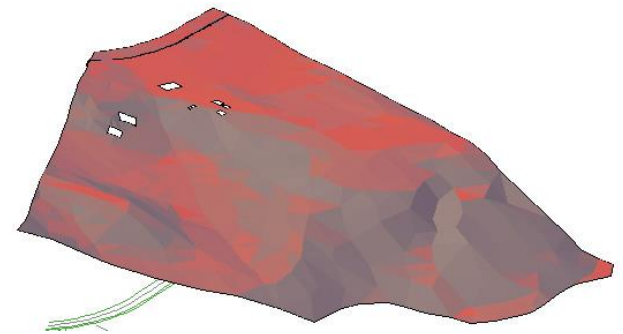
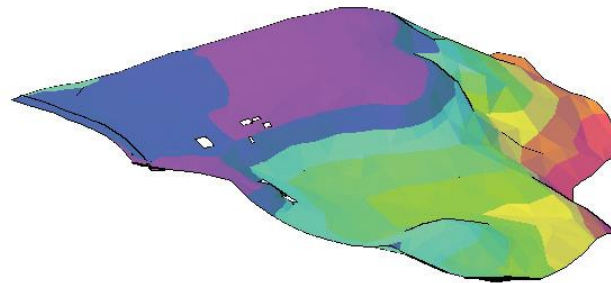
- Editing points
 - » Field errors can cause a point to have an incorrect elevation.
 - » Individual points can be edited within the surface to correct them.





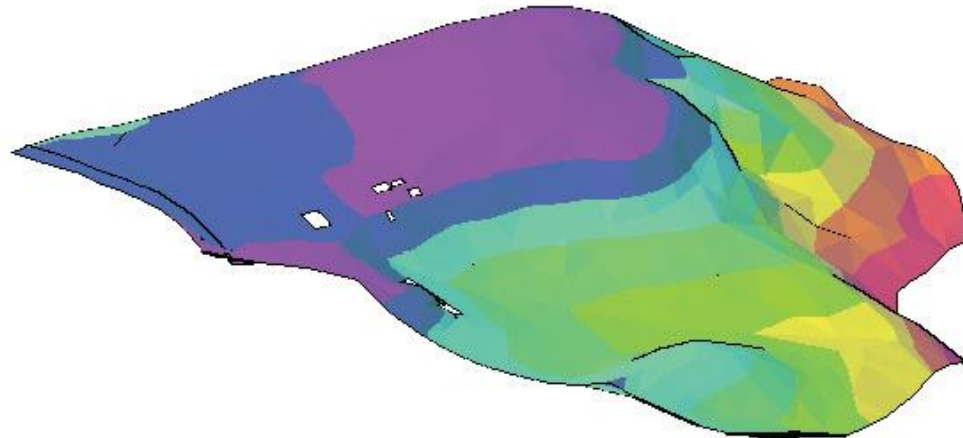
Display and Analyze a Surface

- One way to leverage the dynamic surface model is through display and analysis.
- The surface can “tell its story” in ways other than contours.



Elevation Analysis

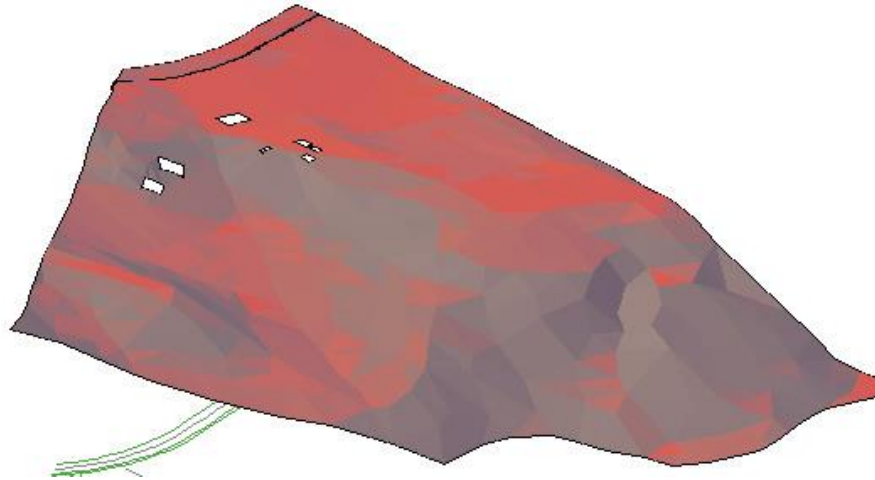
- Divides the surface into ranges of elevation
- Displays each range as a different color
- Great for helping someone visualize terrain who doesn't know how to read topo maps





Slope Analysis

- Divides the surface into ranges of slope
- Displays each range as a different color
- Great for identifying areas with excessively steep or flat slopes





Other Types of Analysis

- Contours
 - Contours are color-coded based on elevation.
 - A legend shows the area/volume of each contour.
- Directions
 - These are visual representations of surface slopes.
 - For example, which parts of your surface flow to the south, and which flow to the north?
- User-Defined Contours
 - These are used for “odd” contours between regular intervals.
- Watersheds
 - These are areas within the surface where rainfall runoff flows to a certain point or in a certain direction.

Annotating Surfaces

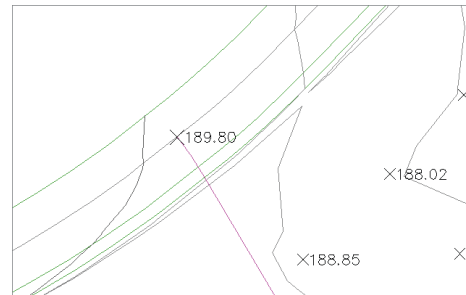


- Surface annotation is as important as the surface itself.
- In this section, you will study three types of surface labels:
 - Spot Elevation Labels
 - Slope Labels
 - Contour Labels

Spot Elevation Labels



- Used to label key elevations or flat areas where contours are sparse
- Update automatically when they are moved or copied
- Update automatically when the surface changes





Slope Labels

- Used to label areas where slope is important such as
 - Steep embankments
 - Travel-ways like roads and driveways
 - Many others
- Come in one-point and two-point versions
 - One-point labels: These always point in the steepest downhill direction.
 - Two-point labels: You control the direction.



Contour Labels

- Created by drawing a line across one or more contours
 - Labels appear wherever the line crosses a contour.
 - Labels move as line moves.
 - Lines can be made invisible so that only labels can be seen and plotted.
- Major and minor labels stylized separately

