Creating profile graphs

About profiles

Profiles show the change in elevation of a surface (raster, TIN, or terrain) along a line. They can help you assess the difficulty of a trail or evaluate the feasibility of placing a rail line along a given route.

The Create Profile Graph tool on the 3D Analyst interactive toolbar is used to derive a graphical representation of one or many profiles. Profiles can be generated from any 3D line feature.

Once a profile graph has been created, it will appear as a floating window in ArcMap. You can then modify the titles, symbology, and even save or export the profile graph to use with other applications. To access further analysis capabilities for a profile graph, right-click in the profile graph window to open the context menu. For more information on the options in the context menu see Graph options.

The following four examples provide general steps for generating profile graphs from various analysis results:

- Digitizing a 3D line from a surface using the Interpolate Line tool.
- 3D line features from a line feature class.
- Line of sight visibility analysis results from using the Line of Sight tool.
- Steepest path surface analysis results from the Steepest path tool.

NOTE: The Create Profile Graph tool will generate a profile for a 3D line feature only. If you wish to generate a profile of a 2D line feature, such as 2D roadways or waterlines data, convert them to 3D features. You can convert features from 2D to 3D based on an underlying surface by either digitizing them with the Interpolate Line tool or by using the Interpolate Shape Geoprocessing tool.

NOTE: For information about enabling the interactive tools with terrain datasets see the following link: Interactive tools for terrain datasets.

Using the profile graph tool

How to create a profile graph from digitized features of a surface

1. In ArcMap, click the Layer drop-down arrow on the 3D Analyst toolbar and click the surface that you want to profile.
2. Click the Interpolate Line button.
3. Click the surface and digitize a line you want to profile. When you are finished added vertices to the line, double-click to stop digitizing.
4. Click the Create Profile Graph button.
5. Optionally, you can change the layout of the profile graph, right-click the title bar of the profile graph and click Properties. Change the basic layout options and click OK, or click Advanced Options to make more complex changes to the layout.

How to create a profile graph from 3D line features

1. In ArcMap, ensure that the layer containing the 3D line features you wish to profile are checked as visible in the table of contents.
2. Click the Select Features tool from the Tools toolbar.
3. Click the 3D line feature or features you wish to profile. 
   
   NOTE: Use the shift key to select more than one graphic.
4. Click the Create Profile Graph button from the 3D interactive toolbar. The profile graph appears as a floating window on your map.

The analysis shown in the image below depicts the elevation change along a roadway.
How to create a profile graph from line of sight results

1. In ArcMap, click the Layer drop-down arrow on the 3D Analyst toolbar and click the surface that you want to analyze.
2. In ArcMap, click the Create Line Of Sight button on the 3D Analyst toolbar.
3. Optionally, type an observer and target offset.
4. Optionally, check the box to model curvature and refraction.
5. First, click on the surface at the observer location, then click the surface at the target location. A colored line will appear indicating what is and what is not visible along the identified path from the observer location. For more information on the Line of Sight tool see Creating a line of sight.
6. With the graphic or graphics selected, click the Create Profile Graph button. The profile graph appears as a floating window on your map.

NOTE: Use the shift key to select more than one graphic.

A visibility analysis along a roadway to a mountain top is displayed below. The results indicate that the two locations along the roadway would see a tower located on a mountain top. The two green dots at the target location indicates the roadway does have a clear line of sight to a tower, standing 10 meters high. The 3D Line is symbolized with red areas as obstructed areas from the observer point, and green areas that are visible areas from the observer point. The profile graph displays the elevation change between the observer and target locations, as well as the visibility that exist from the roadway locations.

How to create a profile graph from steepest path results

1. In ArcMap, click the Layer drop-down arrow on the 3D Analyst toolbar and click the surface that you want to analyze.
2. Click the Create Steepest Path button.
3. Click the surface at the location where you want the path to begin. The steepest path is then automatically drawn on the map.

4. With the graphic or graphics selected, click the Create Profile Graph button. The profile graph appears as a floating window on your map.

**NOTE: Use the shift key to select more than one graphic.**

The analysis shown in the image below depicts a steepest path from two locations on a mountain top. The profile graph displays the elevation and distance difference between the two steepest path results. This example depicts possible drainage patterns.