

Analyzing Elevations and Profile Information from Terrains

This document has been produced for non-Roadway users of OpenSite Designer who typically use few alignments and require existing elevation data to perform their analysis and design. The functionality is the same in OpenRoads Designer.

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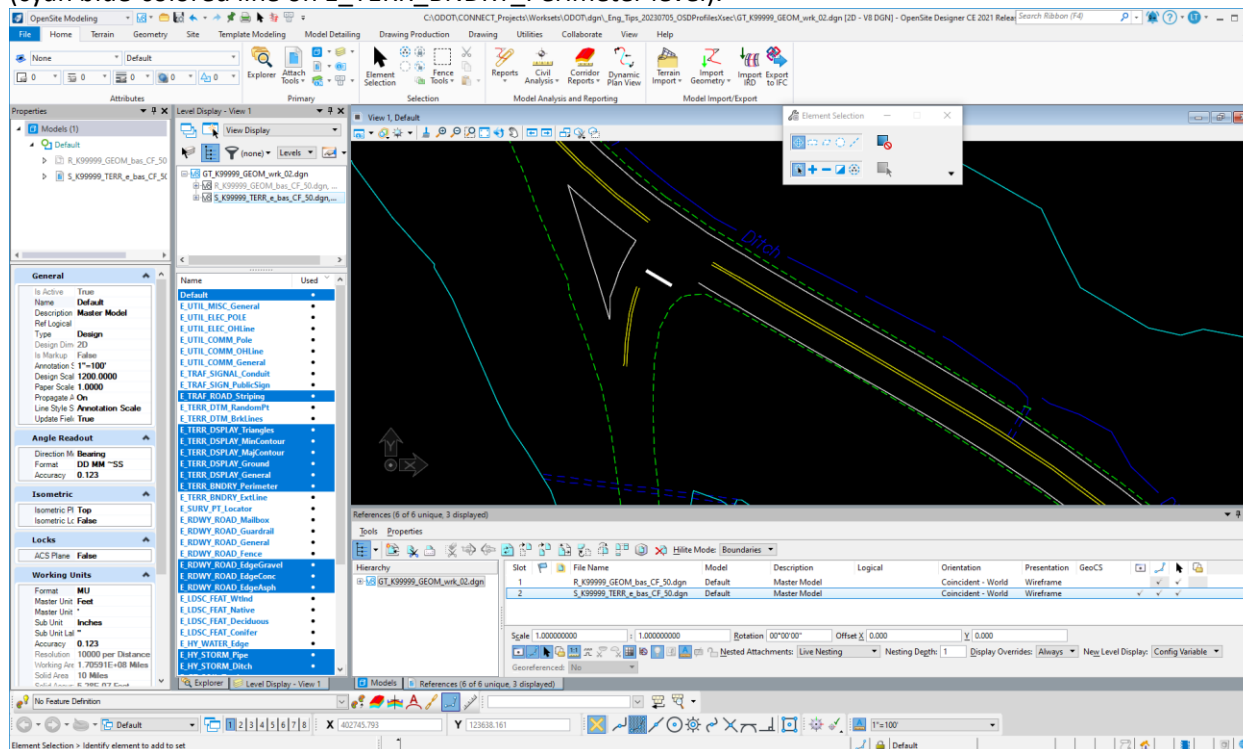
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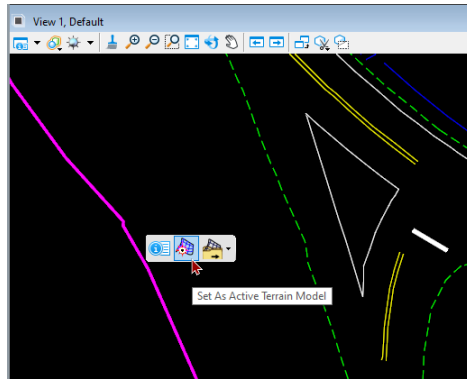
Set Up

Work in a discipline folder in a newly created file from a 2D seed – this file could be named as a working geometry file. Attach the Survey terrain container file as a reference from the 6_Civil_Data folder, using Live Nesting (depth=1) and adjust the level display to toggle off the display of E_TERR_BNDRY_ExtLine (magenta-colored exterior line). The picture below shows an existing intersection (striping, edge of pavement, ditch lines and pipes) as well as the terrain boundary (cyan blue-colored line on E_TERR_BNDRY_Perimeter level).



Set As Active Terrain Model

A necessary step is to select the terrain boundary, then from the cursor hover menu choose “Set As Active Terrain Model”.

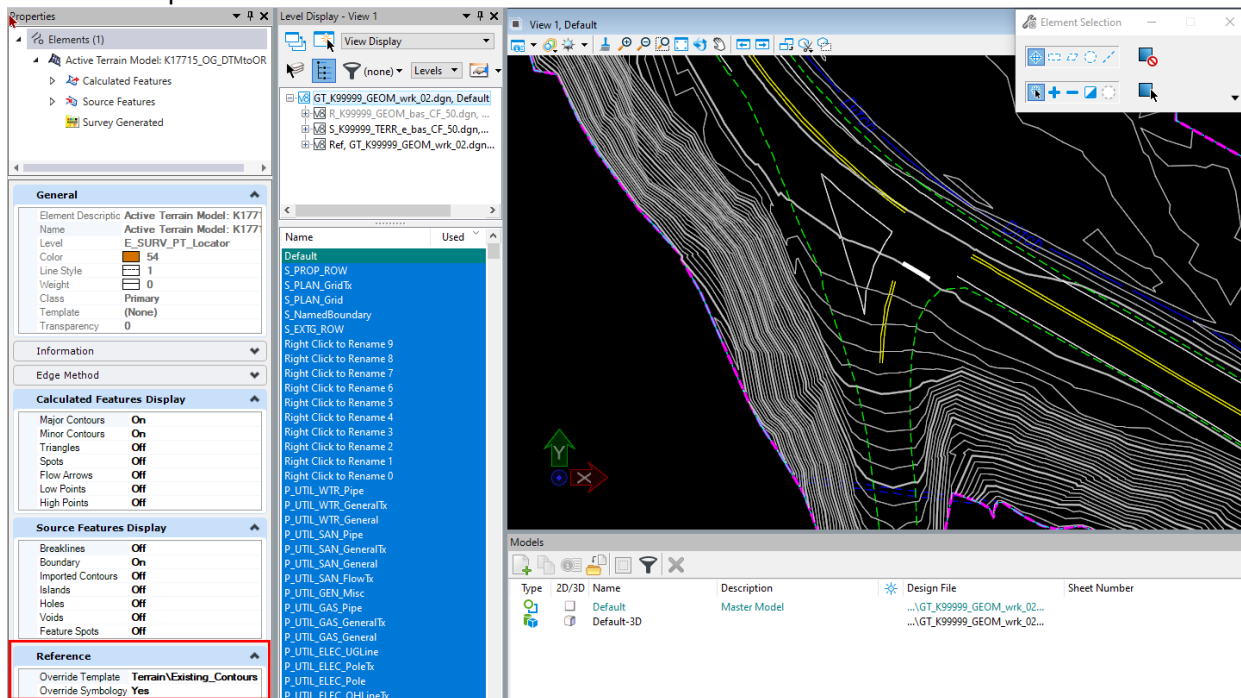


This command creates a managed Default-3D model, attaches all 3D models currently attached to the Default model to Default-3D, and makes a self-reference of Default-3D to Default. The result is that as 3D elements are created in, or attached as references to the file, you will see them appear in the 2D “Default” model.

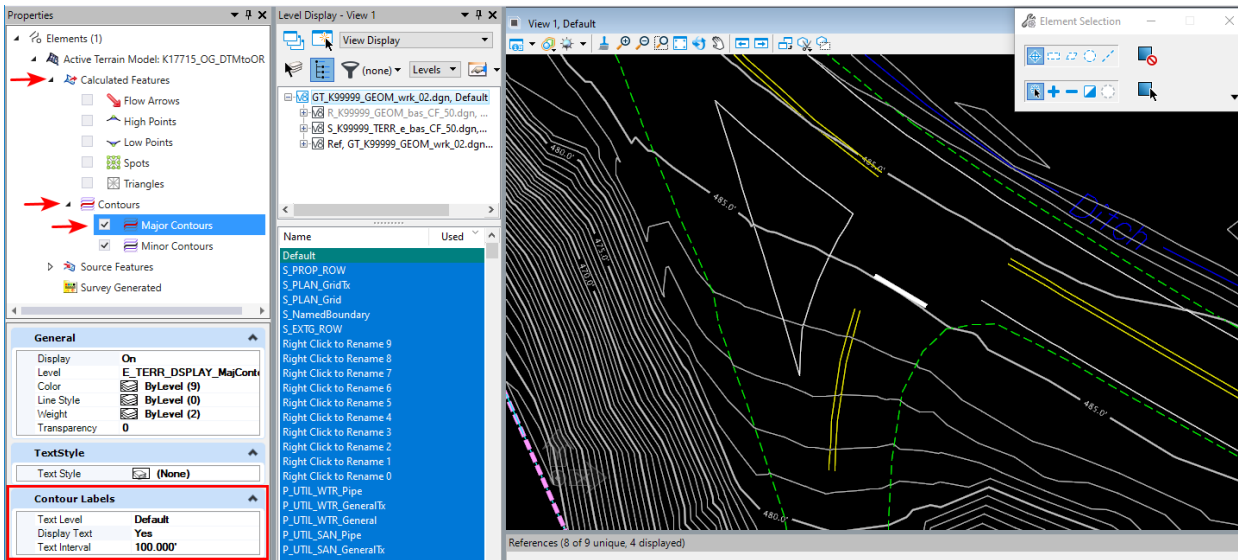
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Display Contours

The existing terrain from Survey should be delivered with a feature definition assigned named Existing_Boundary. This assignment will display only the terrain boundary, but no other calculated features. The other linework that you see depicting pavement edges, utilities and striping all comes from the survey features in the fieldbook. Contours can give you some quick visual elevation information. Override the assigned feature definition by selecting the terrain and modifying the “Reference” property group and changing the “Override Symbology” value from No to Yes. When the “Override Template” property appears, expand the value of (None) and select Terrain\Existing_Contours, as shown in the picture below.



Contour Labels can be displayed using the Element Properties of the terrain – expand the Calculated Features and expand the sub-group Contours, then select “Major Contours”. In the Contour Labels group, change the value of “Display Text” from No to Yes. The results are shown below.



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Analyze Point

Use **Home>Model Analysis and Reporting>Civil Analysis>Analyze Point** to *dynamically* review information about a selected 2D or 3D design element (linear), terrain model or mesh. You are prompted to “Select Element to Analyze Point”.

- you cannot analyze a Point element - just use the Element Properties.
- you *can* analyze a non-civil linear graphical element and get information about a terrain beneath it.

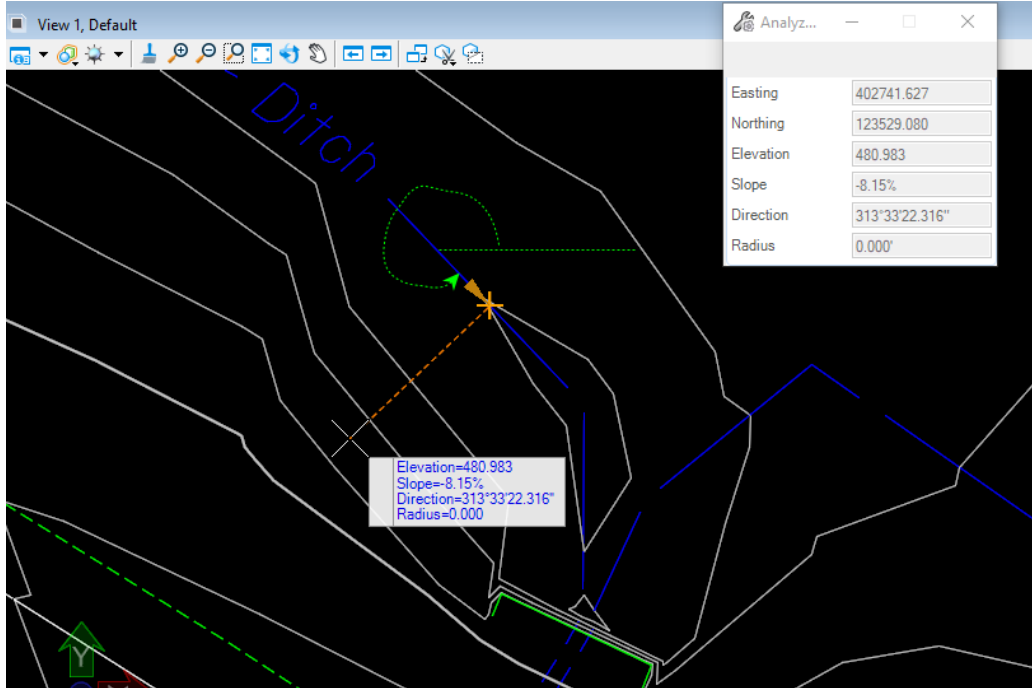
Terrain

When the element you select is a Terrain - a heads up dialog shows Elevation, Slope, and Aspect. The tool settings dialog allows for control of the display of contour line, filled triangle, slope arrow and a slope label (X.XX%). **When a datapoint is entered, graphics that are displayed are drawn to the file.** The "Aspect" or angle of the slope vector is measured Clockwise from the North. The picture below shows only the slope displayed. Green dashed line graphics have been added to indicate how the “Aspect” angle is measured.



Linear Element (civil or non-civil)

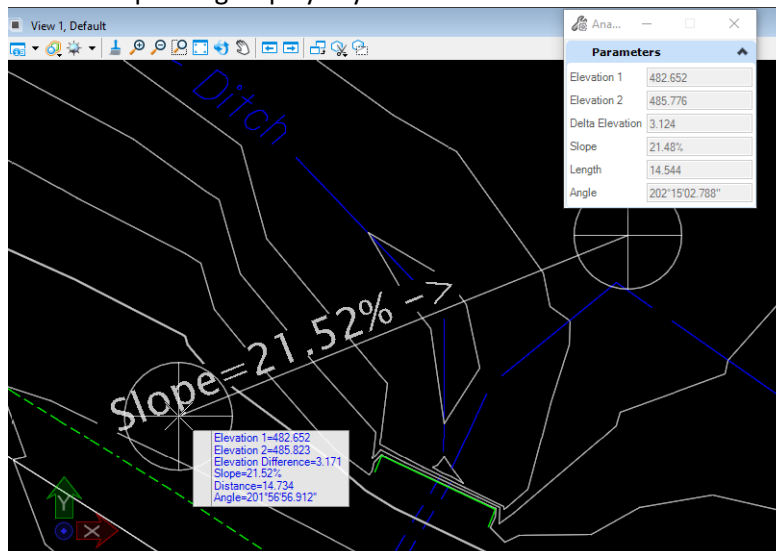
When the element you select is a linear element - a heads up dialog displays showing Elevation, Slope, Direction, and Radius (of any circular curve segments). Station & Offset is displayed if the element is an alignment or corridor feature. The Direction angle is not a slope direction, it is the direction vector of the linear element measured Counter Clockwise from an East-based Azimuth (the way MicroStation has always been set to measure angles). The picture below shows the Analyze Point command with a ditch line selected (at a low spot) near a culvert crossing. Green dashed line graphics have been added to indicate how the "Direction" angle is measured – Counter Clockwise from the East.



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Analyze Between Points

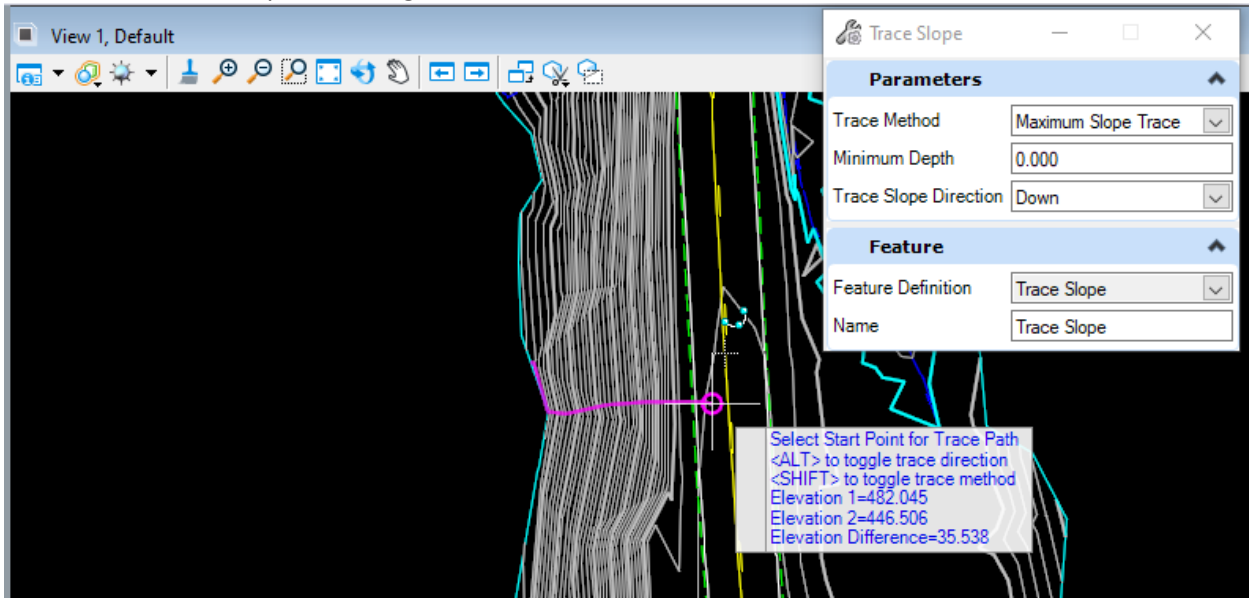
Use **Home>Model Analysis and Reporting>Civil Analysis>Analyze Between Points** to label elevation, slope, distance and delta information between two selected points of a terrain model or mesh. **When two datapoints are entered, graphics are drawn to the file with the direction of the line between points and slope labeled.** The arrow points in the direction of the lower elevation. This is not a flow arrow because it is only looking at the elevations of the two distinct points, not at the terrain in between. The heads up dialog displays dynamic information until the second datapoint is entered.



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Analyze Trace Slope

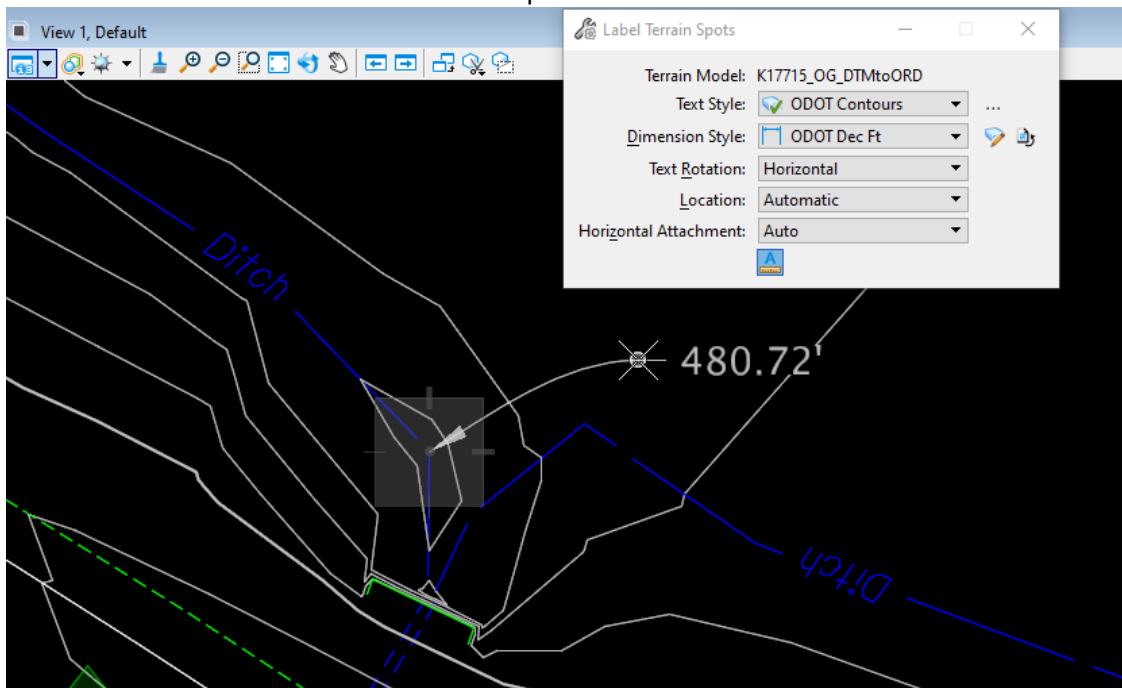
Use **Home>Model Analysis and Reporting>Civil Analysis>Analyze Trace Slope** to draw the path of a drop of water down a selected terrain model (or mesh surface) or up the surface to the water source. Inputs include a data point for the origin of the path. The first datapoint will write the element template to the file, after that a dynamic line will follow the mouse cursor; a datapoint draws the trace line to the file. Set the Minimum Depth value to 0 to disable it. Set the Feature Definition to Trace Slope for a magenta-colored line.



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Label Terrain Spots

Use **Terrain>Labeling>Label Terrain Spots** to *dynamically* review elevation information from the selected terrain directly beneath your mouse cursor. Once you select the terrain, the text favorite displaying the elevation follows your cursor. The next two mouse clicks will locate the arrowhead and place the elevation label in the file.



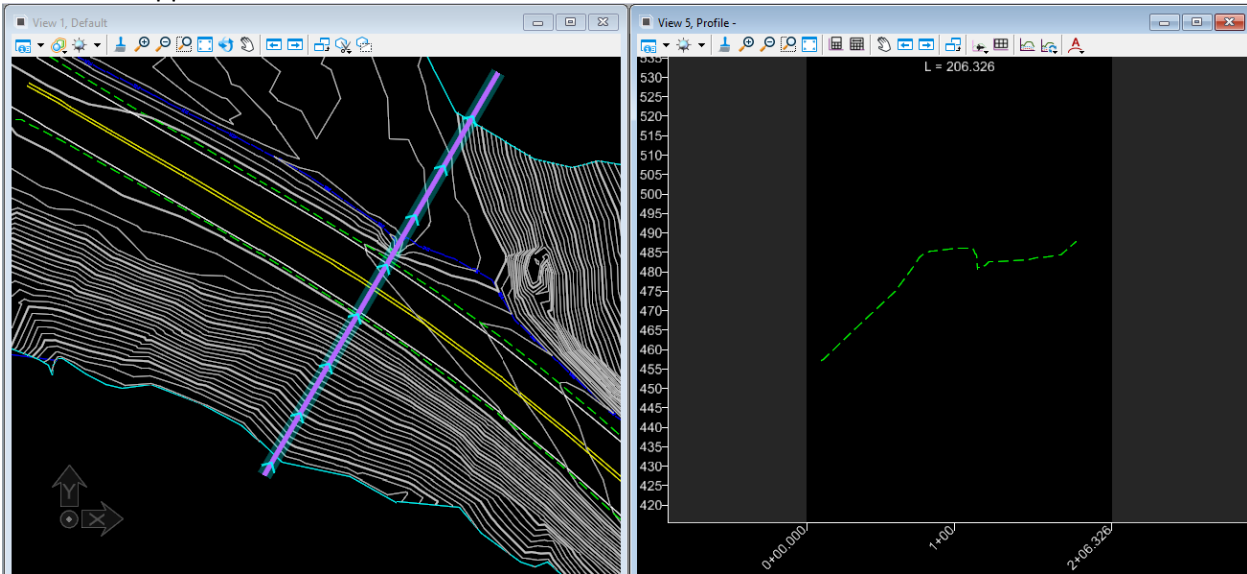
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Two-Point Profile (temporary & dynamic)

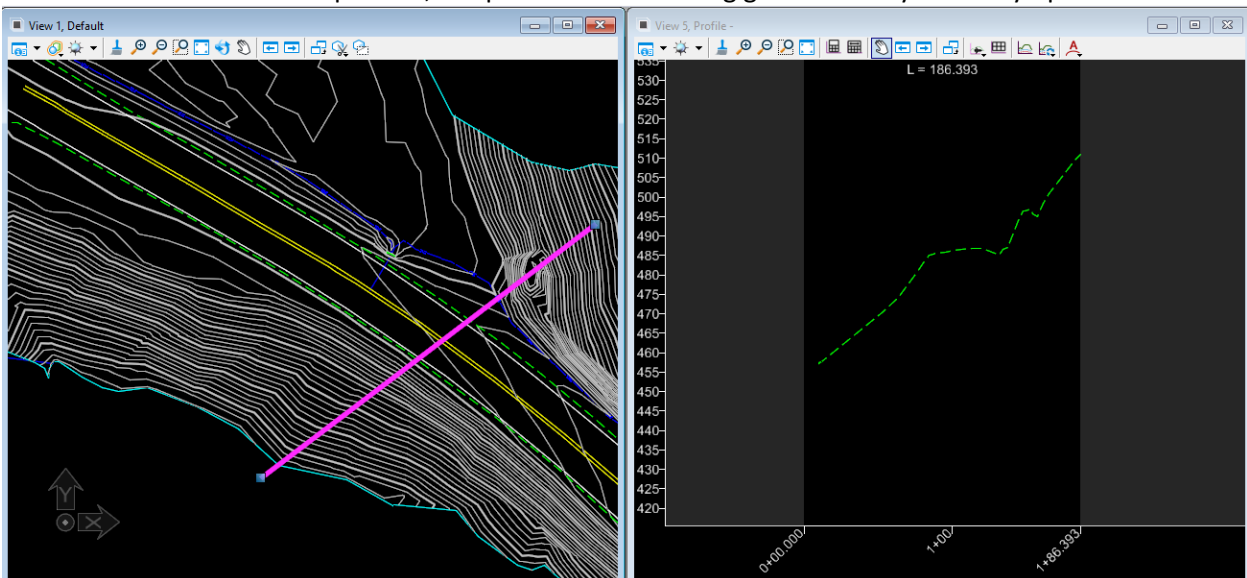
To see what is happening with elevations along a line, draw a line across the referenced terrain, then view its profile model. The Profile view window will display the active surface's profile.

1. Draw a line across the terrain.
2. Use the command **Geometry>Vertical>Open Profile Model**.
3. When prompted to "Locate Plan element", select the line that you drew from View 1, Default.
4. When prompted to "Select or Open View", select a numbered view window from the View Toggles.
5. Left-click in the new view window to display the existing ground line in an unnamed dynamic Profile.

The profile is a dynamic display of the terrain from the beginning point of the line to the ending (left to right). When the mouse focus is in the Profile view – arrows are displayed over the top of the line in Default (2D view), indicating the direction that the line was drawn. Colored bands and vertical lines in the Profile view give you information about the parent line and will appear at vertices.



The profile is temporary and dynamic. If the file is exited, the profile should be redisplayed using "Open Profile Model". If the line is moved or otherwise manipulated, the profile of the existing ground will dynamically update.



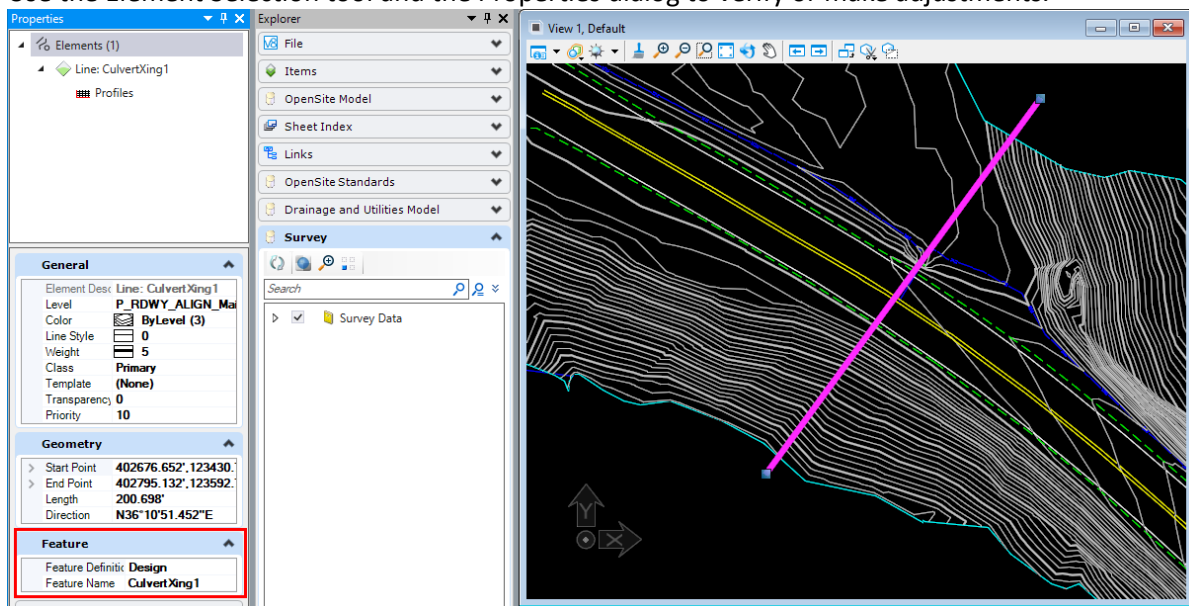
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Permanent Profile for Labeling

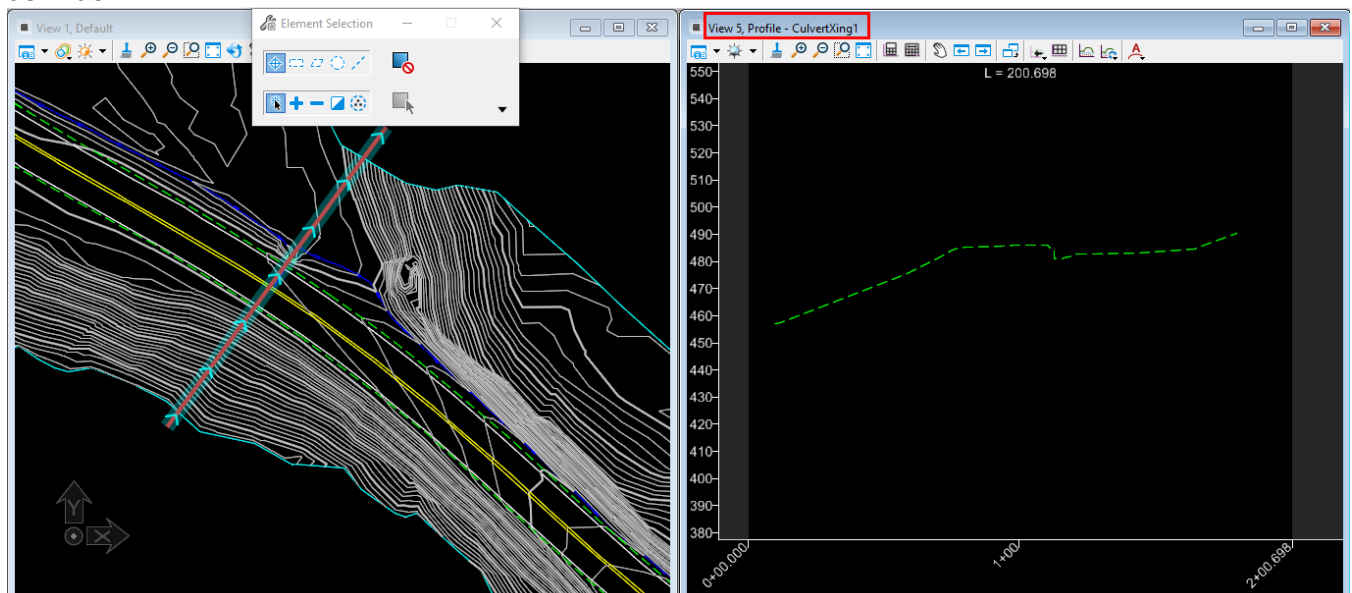
These steps will work really well to create a drawing model of a very long or short profile for design and analysis purposes, and can also be used to create PDFs of any profile by choosing a drawing boundary seed that limits a sheet to 11x17.

You can use civil labels and text favorites to annotate a permanent profile and you can also print a permanent profile. A permanent profile is not just a display of the existing ground, it can also display the vertical alignment that is attached to a civil element (horizontal alignment or linear feature). The Create Drawing command will create drawing and sheet models with permanent reference attachments to the profile of a civil element. These models can be updated and annotated as long as the original civil element still exists.

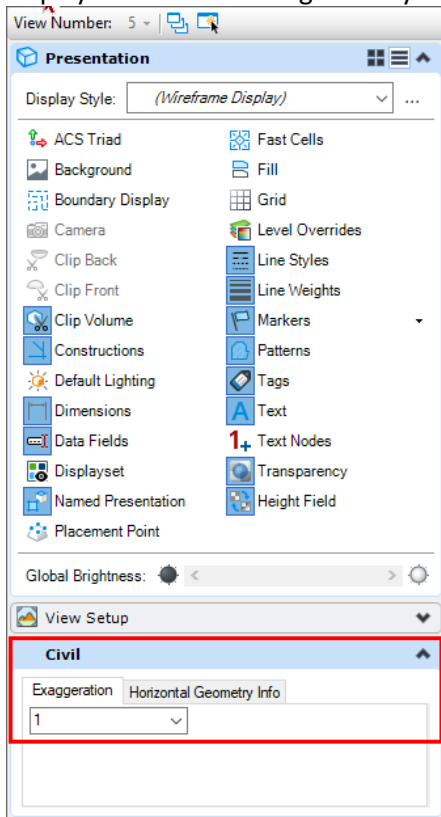
1. Draw a line across the terrain.
2. Use the command **Geometry>General Tools>Standards>Set Feature Definition**.
3. Assign a Feature Type, Feature Definition and Name in the tool settings dialog and select the line (Locate Elements). After the line is highlighted, right-click to complete the command.
4. Use the Element Selection tool and the Properties dialog to verify or make adjustments.



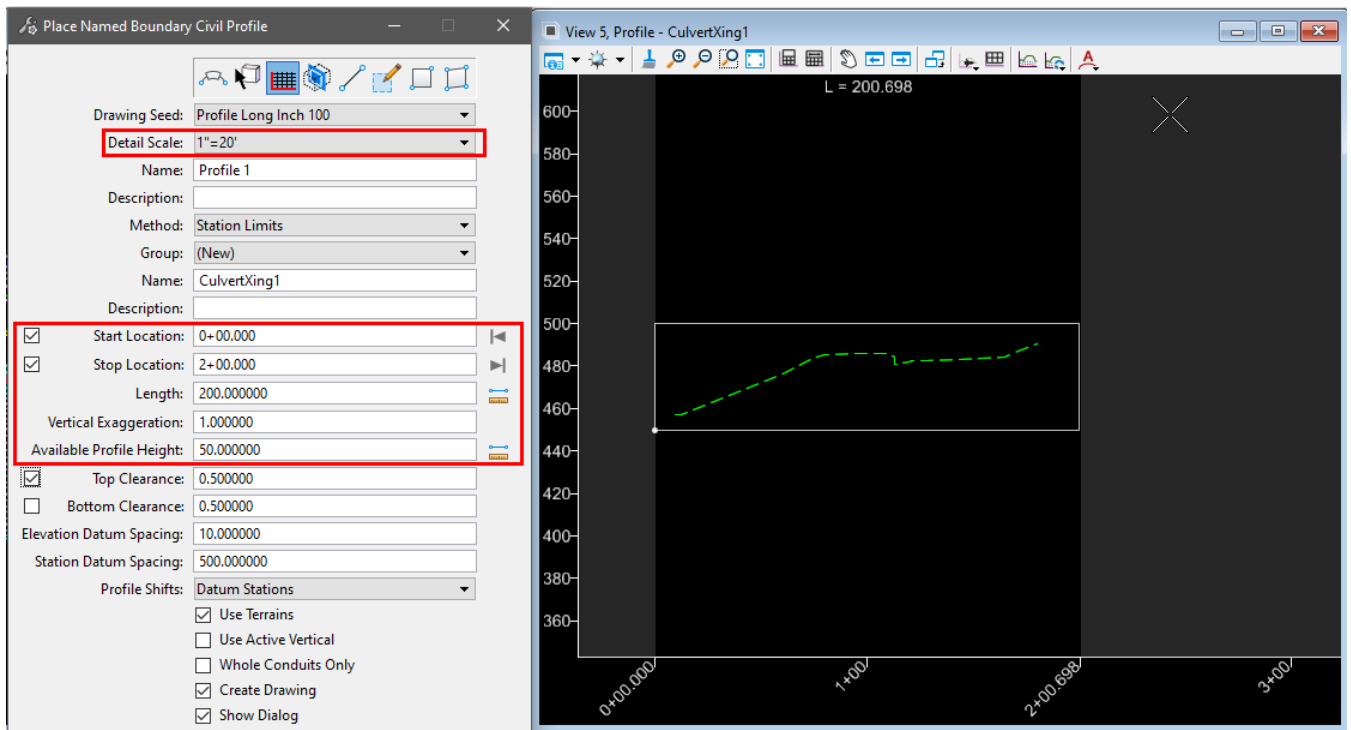
5. Now, use the command **Geometry>Vertical>Open Profile Model**.
6. When prompted to "Locate Plan element", select the line that you drew from View 1, Default.
7. When prompted to "Select or Open View", select a numbered view window from the View Toggles or left-click in an open view window to display the existing ground line in the dynamic Profile belonging to your feature definition.



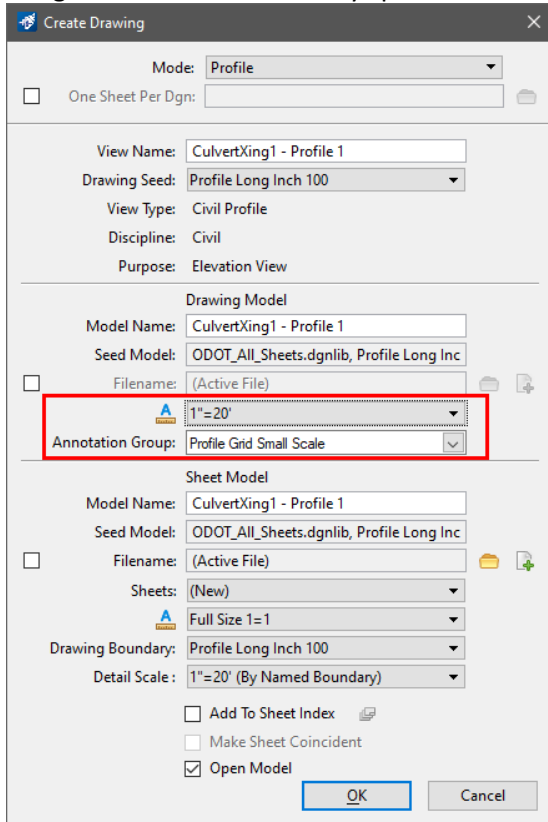
- Adjust the Exaggeration in the **View Attributes>Civil** group to display no vertical exaggeration. Note that the display of the horizontal geometry information in the profile window can be controlled here, too.



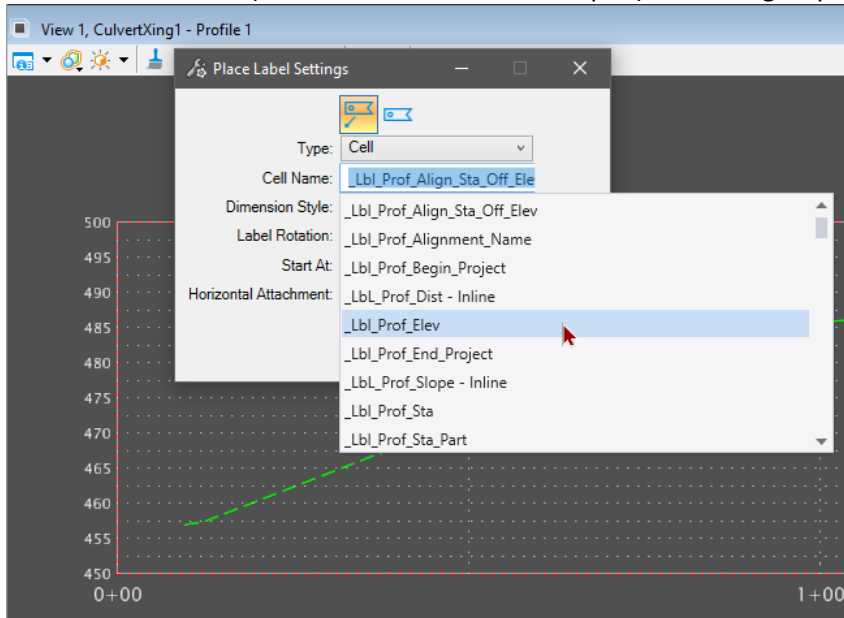
- Use the **Drawing Production>Named Boundaries>Place Named Boundary** command to place a **Civil Profile** using an appropriate Drawing Seed, like Profile Long Inch 100, to Create Drawing. Adjust the Detail Scale to something like 1"=20' (this will affect the default values below). Adjust the Start and Stop location to provide a little space at the beginning and end. Also adjust the vertical exaggeration, overall length and profile height to just what is needed. The white outline of the drawing boundary will be sized and placed based upon your entries.



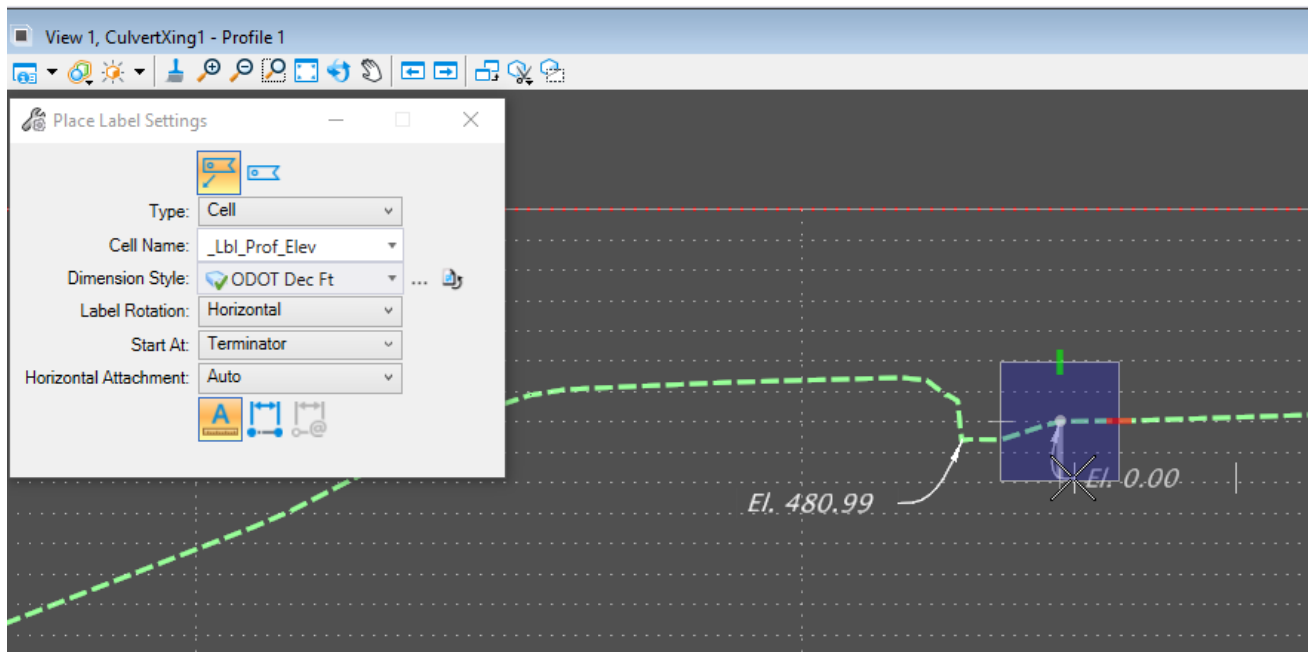
10. After clicking enough times to accept all entries, the Create Drawing dialog will appear. Adjust the Drawing Model annotation scale and Annotation Group to 1"=20' and "Profile Grid Small Scale", as shown below, so that the grid lines are more closely spaced. Then click [OK] to create the models.



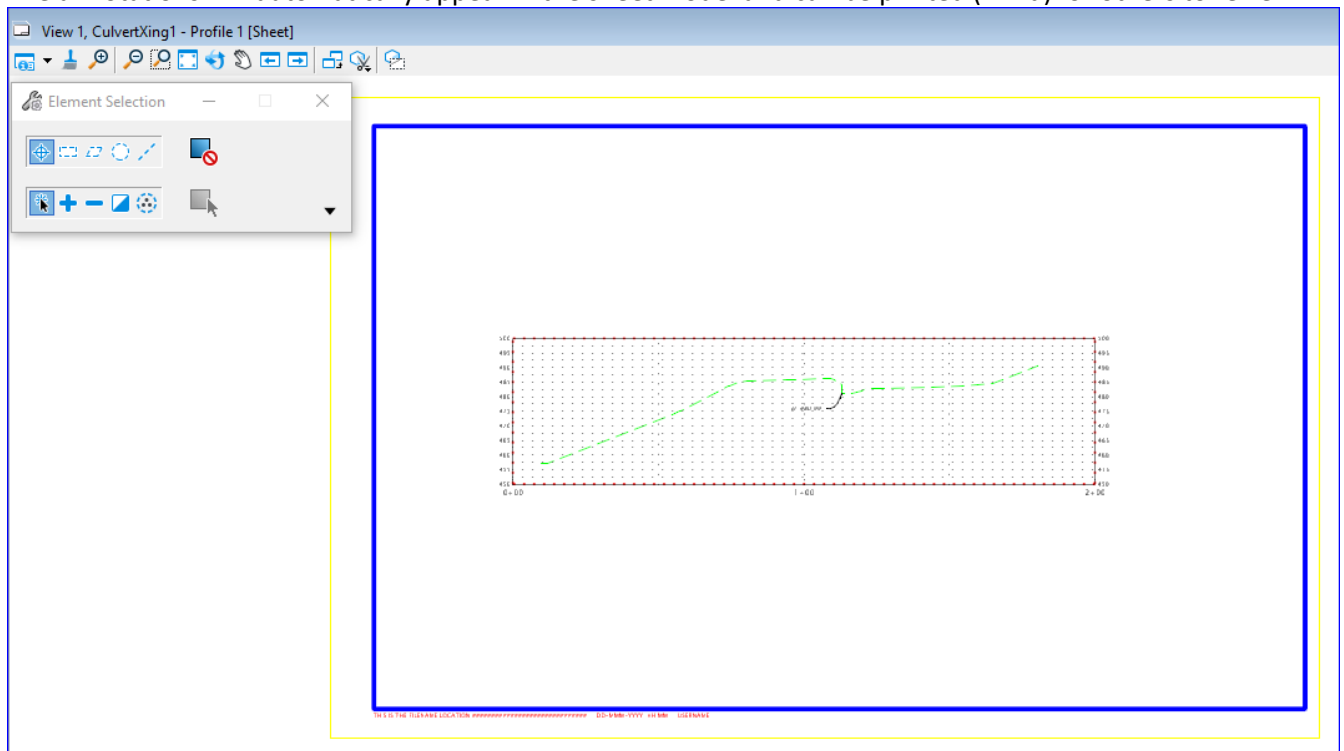
11. Place annotations in the drawing model. Use Drawing Production>Notes>Place Label with Type set to Cell. Pick a cell from the full list (it takes several seconds to open) from the groups at the top that begin with _LBL_Prof_.



12. Follow the prompts to annotate the profile for your design and analysis.



13. The annotations will automatically appear in the sheet model and can be printed (PDFd) for others to review.



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