Underground Utilities with SUE

Contents

This document will discuss how to use the Subsurface Utility Engineering (SUE) application inside of Power GEOPAK SS4 to display utilities such as, Gas Lines, CATV, Electrical Lines, Storm Pipes, Sewer Pipes, water lines and more in the 3D view and plotted in Cross Section Models (sheets).

Prerequisites:

1. Horizontal Civil Geometry representing the utility.
2. Vertical profile for invert of utility line.
3. Active Terrain Model (typically existing ground TIN)
4. Corridor of mainline Alignment with Template Drops.
5. Terrain Model of Proposed Finished Grade.

What is SUE?

SUE is the application used in Power GEOPAK to make 3D utility information available in 2D, 3D, Profile and Cross Section views. Cross Sections will display geometry where utilities drawing with SUE lie in 3D space in comparison to the selected alignment. This can be used to replace the Draw Ancillary Features in the old Cross Section tools prior to SS3. A GEOPAK Cross Section cell is not necessary, nor is a GPK. However, a GEOPAK Drainage file can be imported and utilized to display a 3D model of the GDF.

How to Create 3D Utilities

This step by step process will show how to create 3D utility lines for display in the 2D model, the 3D model and on a Cross Section **Model** (sheets). (Any element with a profile will display in the Cross Section **Dynamic View**, which is different than the Cross Section Model.)

Activating Subsurface Utility Engineering Application (SUE)

1. In Power GEOPAK click the **Tools** menu
2. Click on **Product Add-Ins**
3. Select **Activate Subsurface Utility Engineering**
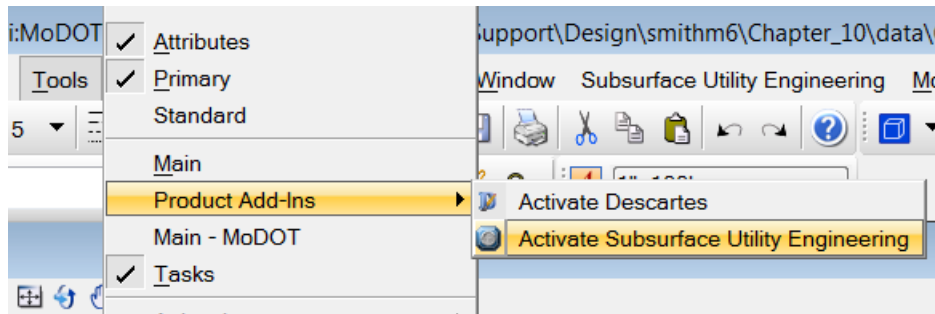
4. If an Alert box pops up, click **Yes**. Our subscription allows for the basic use of this application by all users.
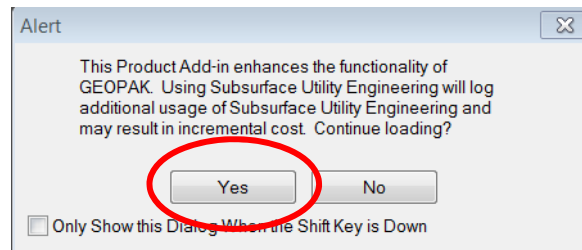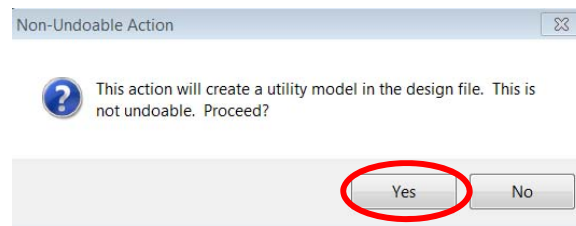

The application is now activated for this session of Power GEOPAK.

Creating the 3D Utility

5. Click the **Subsurface Utility Engineering** menu pull-down
6. Open the **Tools** Submenu
7. Click **Extract Utilities From Graphics**
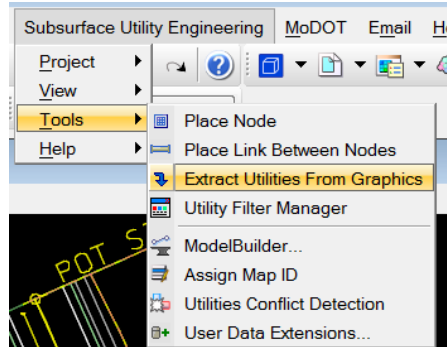
8. The Non-Undoable Action dialog will appear if this is the first time SUE has been used in this file. Click **Yes** to this dialog.


9. Setup the *Extract Utilities From Graphics* dialog Feature area with the type of Feature desired. In this example a 4" Water Line is being extracted. This Water Line has Horizontal and Vertical geometry.
    a. Method: Selection
    b. Vertical Offset: 0
    c. **Design Stage: 3 – Final-x5 (Very Important – Most Accurate in Cross Sections)**
    d. Feature Definition: Water Line Solid Wall PVC
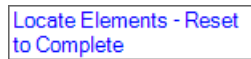   e. Name Prefix: WL-
    f. Description: 4"
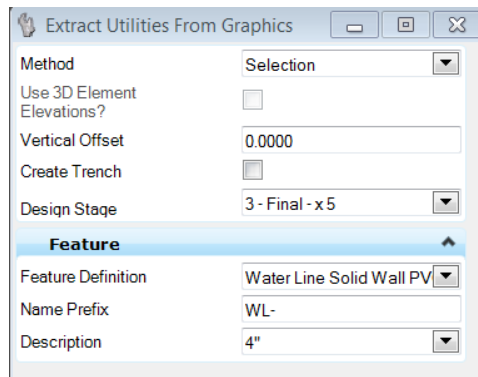
10. On the Heads Up prompt, **LEFT click** the mouse to accept the *Select Method* of Selection.
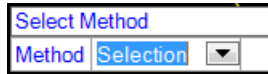
11. On the Heads Up prompt, *Locate Elements- Reset to Exit*, **LEFT click the Geometry** that represents the utility.
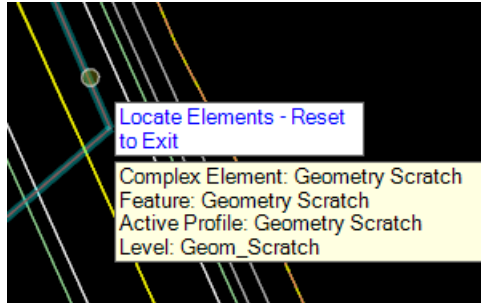
12. On the Heads Up prompt*, Locate Elements – Reset to Complete*, **RIGHT click** the mouse.

13. On the Heads Up prompt, *Select Surface or Reset to use Active Terrain Model*, **LEFT Click on the Proposed Finished Grade Terrain Model**. This will help the program determine elevations. If this is an Existing Utility, you may wish to use the **Existing Ground Terrain**.
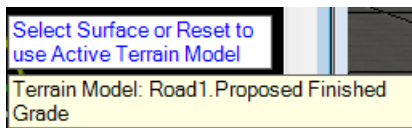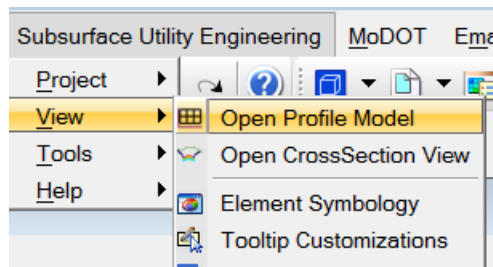
 or **EXISTING GROUND TERRAIN**

14. If you filled out the dialog in **Step 9**, Simply **LEFT click** the mouse through the remaining prompts for Vertical Offset and Create Trench.


View/Change the Active Profile

15. Open the Profile Model for the new pipe, select **Subsurface Utility Engineering** menu pull-down.
16. Click **View** Submenu
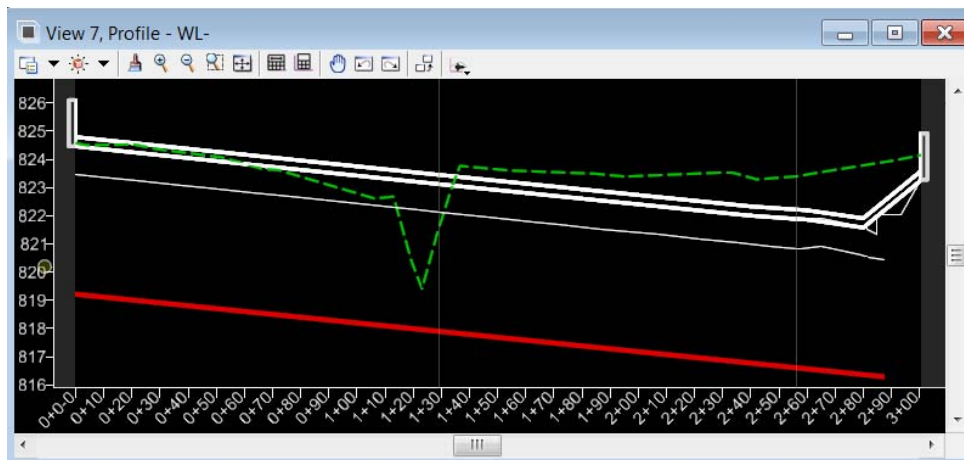17. Click **Open Profile Model**

Creating the Utility also creates a new profile for the utility. We need to change the active profile to the profile we wish to use for the pipe.

18. On the Heads Up prompt, *Locate Plan Element*, **LEFT click** on the new Utility Line created by the Extracting Graphics tools used earlier.
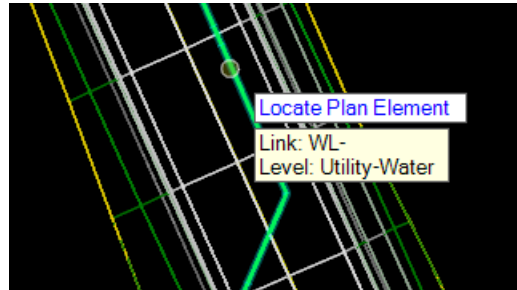

19. On the Heads Up prompt, Select or Open View, **Open View 8** and **LEFT click** in the window.
20. Hit the **F4 key** to clear out any tool.

The Profile Model will display for the Water Line. In this example, the Bottom (Red) Line in the profile window is the profile that needs to be active for the Water Line.

21. With the Element Selection tool**, LEFT click** on the bottom profile line
22. In the context sensitive menu, **LEFT click** on *Set As Active Profile*
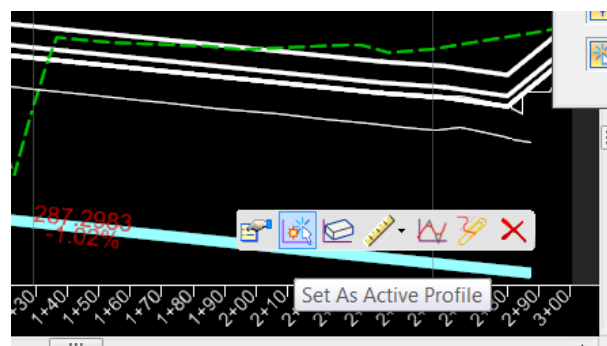
Once the lower profile has been set active, the pipe will move down to the correct location.
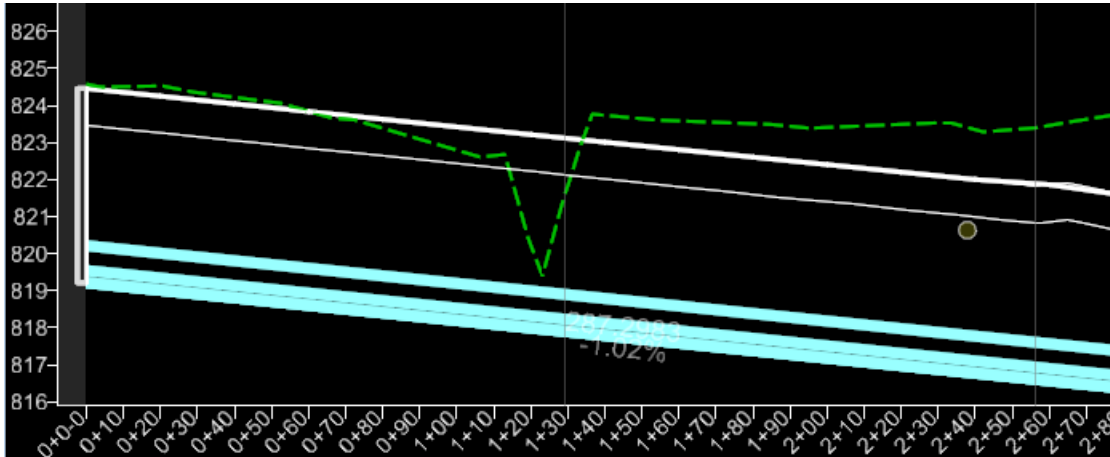
The 3D Model

The 3D Model is automatically updated to show the new 4" Water Line.

1. Hit the **F6 key** to create the split window view of the 2D and 3D Model.
2. In View 2, **LEFT click** on the banner to make it the Active Model.
3. **LEFT click** on the **Fit View** tool to see the entire 3D Model.
4. Zoom in to the location of the Water Line previously drawn.
5. **LEFT click** on the **Rotate View** in View 2 and Rotate to see the Water Line pipe drawn under the proposed pavement.
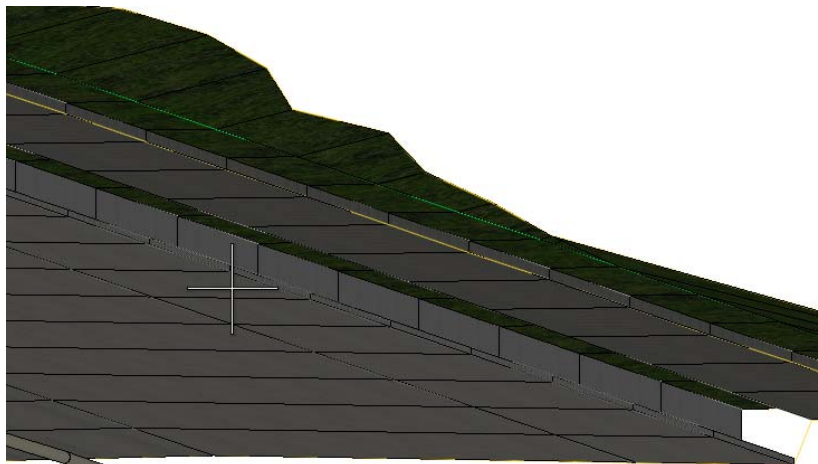
Water Line

The Water Line now displays in the 3D view in the proper location under the pavement.

Adding Utilities to the Cross Section Model

Adding utilities to cross sections is easy using SUE. If the SUE object lies within the parameters of the Cross Section, it will plot that utility in its proper location on the Cross Section, Vertically and Horizontally. One thing to keep in mind is the Design Stage of the Cross Section sheets. If this is for production, you will want to plot your Cross Sections in the 3-Final-x5 Design Stage. This Design Stage will also more accurately place the utilities vertical and horizontal location. As with any Cross Section, the Design Stage will determine the interpolation between cross sections. The Final Design Stage will be the most accurate depiction of these utilities.

Preliminary Design Stage = Less accurate location of utilities as it will have a longer distance at which to interpolate across.

Final-x5 Design Stage = Most accurate location of utilities when running cross sections.
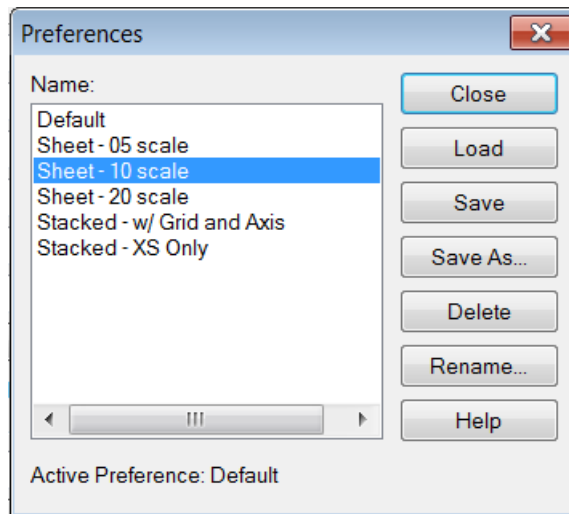
1. From the **Task** menu, Open **Corridor Modeling**
2. **LEFT Click** on **Create Cross Sections** tool
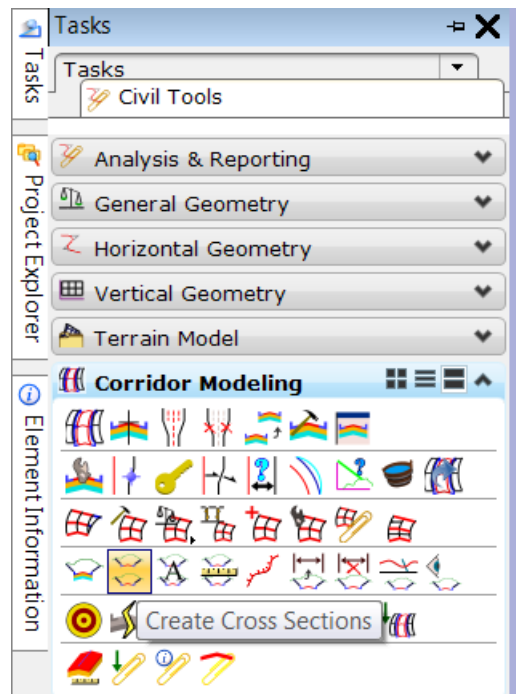
3. On the Heads Up Menu, *Locate Alignment*, **LEFT click** on the Mainline Alignment you wish to run Cross Sections on.
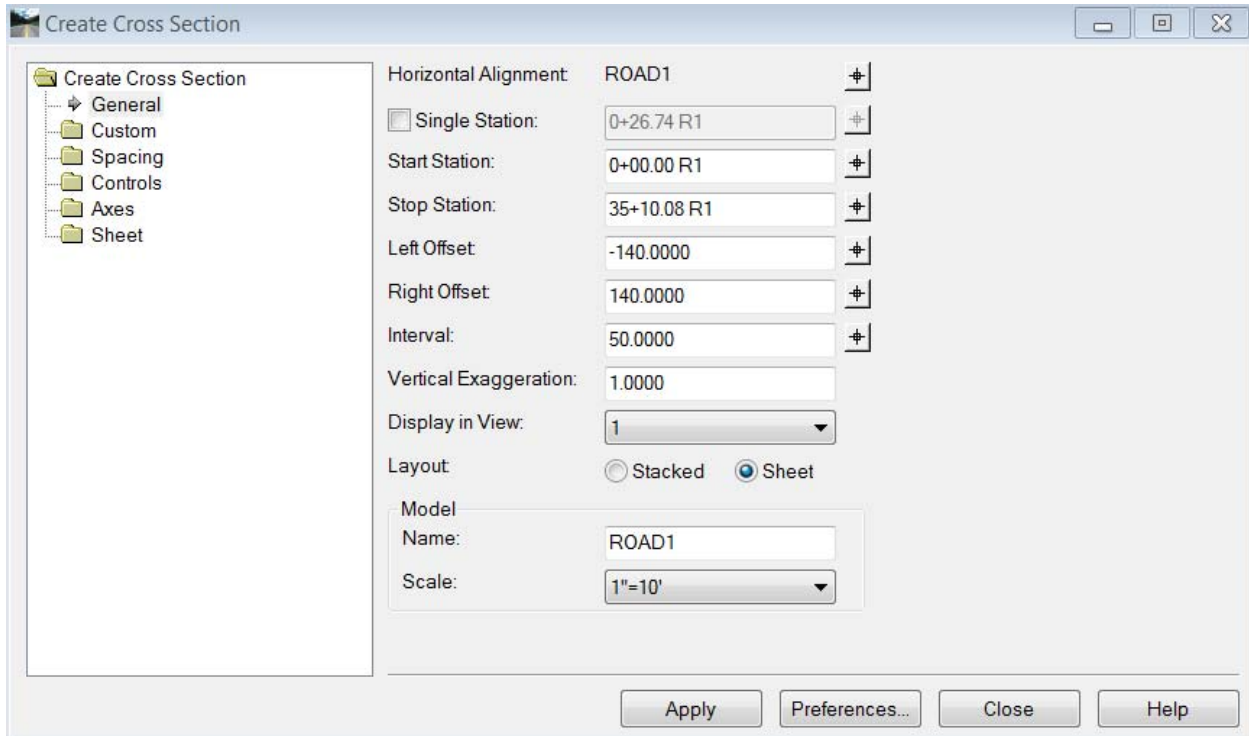
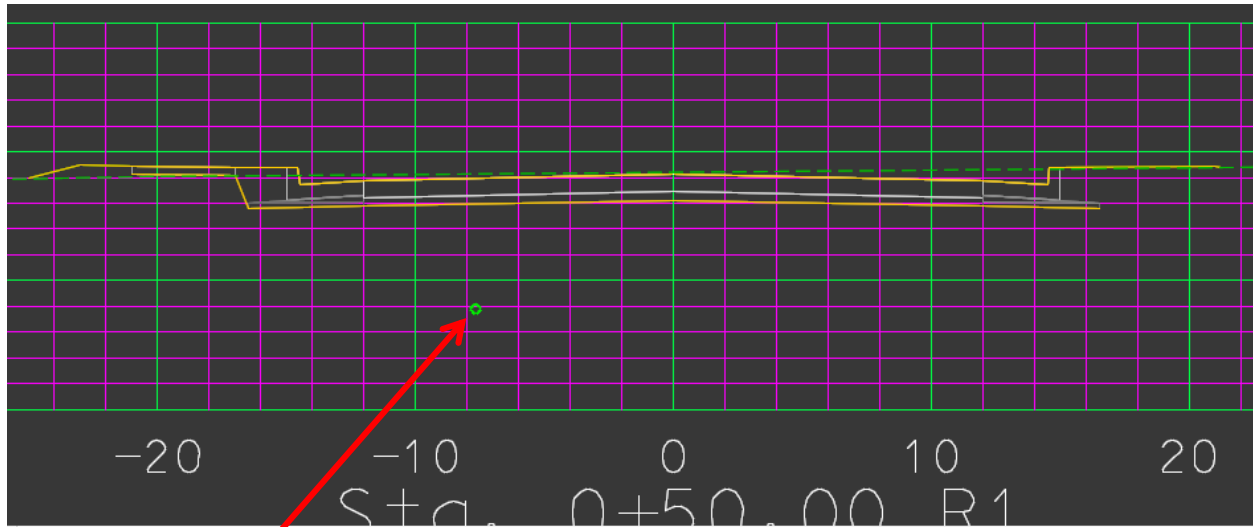4. In the Create Cross Section dialog, **LEFT click** on **Preferences…**

5. **LEFT click** the Name of the Cross Section preference you wish to use and click **Load**.
6. **LEFT click Close**.
7. Make any necessary changes to the main screen of the dialog, typically these are already set to work properly, but you may wish to change the station range or the intervals of the Cross Sections. **LEFT click Apply**.

The Cross Sections will now create a new Model and add sections to that Model as sheets or stacked depending on your preferences selection. You should now notice that your sections where the Water Line intersected a Cross Section, the program draws the 4" Water Line.

8. Close the Dialog and use the Zoom tools to zoom to a section you know should cross the Water Line.

Water Line