Created By: Christopher Dry
Date: February 14, 2008
Email: christopher.dry@uma.aecom.com

Process for Calculating Elevation Difference Between Existing and Proposed Grades at Utilities

The intent of this exercise is to be able to generate an accurate and complete list of all utility poles, anchors, etc. that fall within the proposed grading limits of your project.

You will generate reports showing both the existing ground elevation and proposed ground elevation at each utility pole. The grade change can then be calculated and the list delivered to each utility company for determination of whether the pole needs to be relocated or replaced.

Keep in mind that a *visual evaluation and good engineering judgment* must be used when evaluating the list. For example, your proposed dtm may not be exhaustive of every finished grade condition, especially say near an entrance. So if a utility pole exists near an entrance, the report may show a 2m cut at that pole, when in reality there may be no excavation at all.

In addition, there may be poles that exist just outside of the grading limit, but may be impacted by a culvert or other conditions. Or a pole may exist within the grading limits of a short sideroad where no proposed dtm or cross sections were necessary.

A thorough QC of the list must be made prior to delivering to the utility company.

1. Before you begin, you must have an existing ground dtm and a proposed finished ground dtm created.

2. Copy the Topographic base file to a new 3d file called utilities.dgn (.dwg in AutoCad)

3. Isolate all layers with utility poles, anchors, etc.
    i.e.   PH-E-UTL-AN – Photogrammetry Anchors
    PH-E-UTL-BH – Photogrammetry Bell/Hydro Poles
    PH-E-UTL-HP – Photogrammetry Hydro Poles
    PH-E-UTL-BP – Photogrammetry Bell Poles
    PH-E-UTL-LS – Photogrammetry Light Standards
    SP-E-UTL-AN – Survey Anchors
    SP-E-UTL-BH – Survey Bell/Hydro Poles
    SP-E-UTL-HP – Survey Hydro Poles
    SP-E-UTL-BP – Survey Bell Poles
    SP-E-UTL-LS – Survey Light Standards

    Verify that these layers contain all of the utility facilities that you wish to report. Ensure that no miscellaneous information is included, i.e. aerial lines, clearance text, etc.
    This process will still work even if the graphic symbols are shared cells with tags.
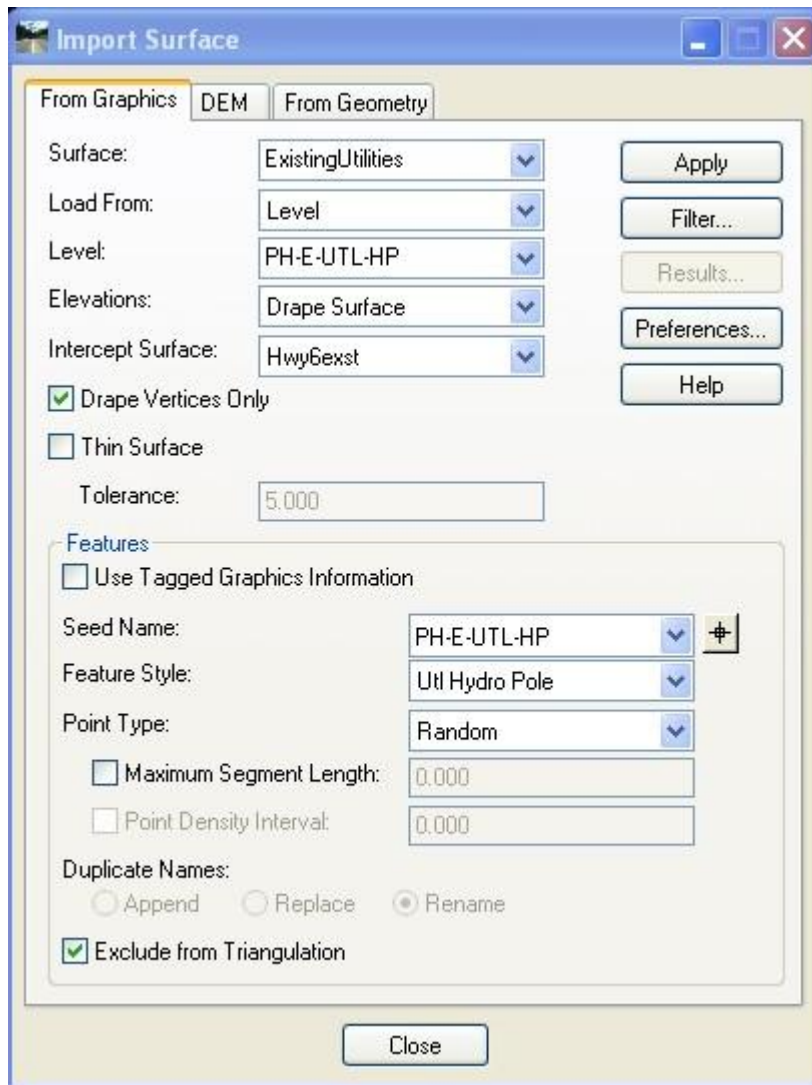
4. FILE >NEW. Create a new dtm called ExistingUtilities.dtm
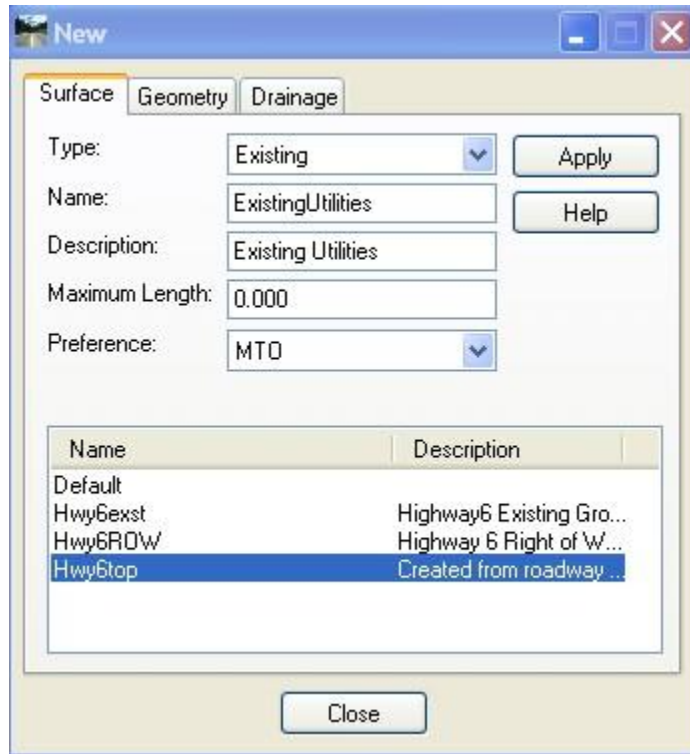
This new dtm will be used as a "container" to store the horizontal and vertical locations of all the existing utility poles, anchors, etc.

5. FILE >IMPORT SURFACE

Select the From Graphics Tab. Select your Existing Utilities surface and load from Level (Layer).
Select your first layer that contains utilities, i.e. Hydro Poles.

Set the elevations to Drape Surface and select your existing ground surface as the intercept surface. Toggle on Drape Vertices only.

For the seed name, type in the same name as the Level (Layer) you are importing from. Select the appropriate feature style and set Point Type to Random.

You do not need to triangulate anything in this surface, so check on Exclude from Triangulation.

6. Repeat the above step for each and every level (layer) you wish to include. Be sure to match the seed name to the level (layer) and select the appropriate feature style.

7. Verify that all of your features have been imported correctly.
   SURFACE >FEATURE > FEATURE PROPERTIES
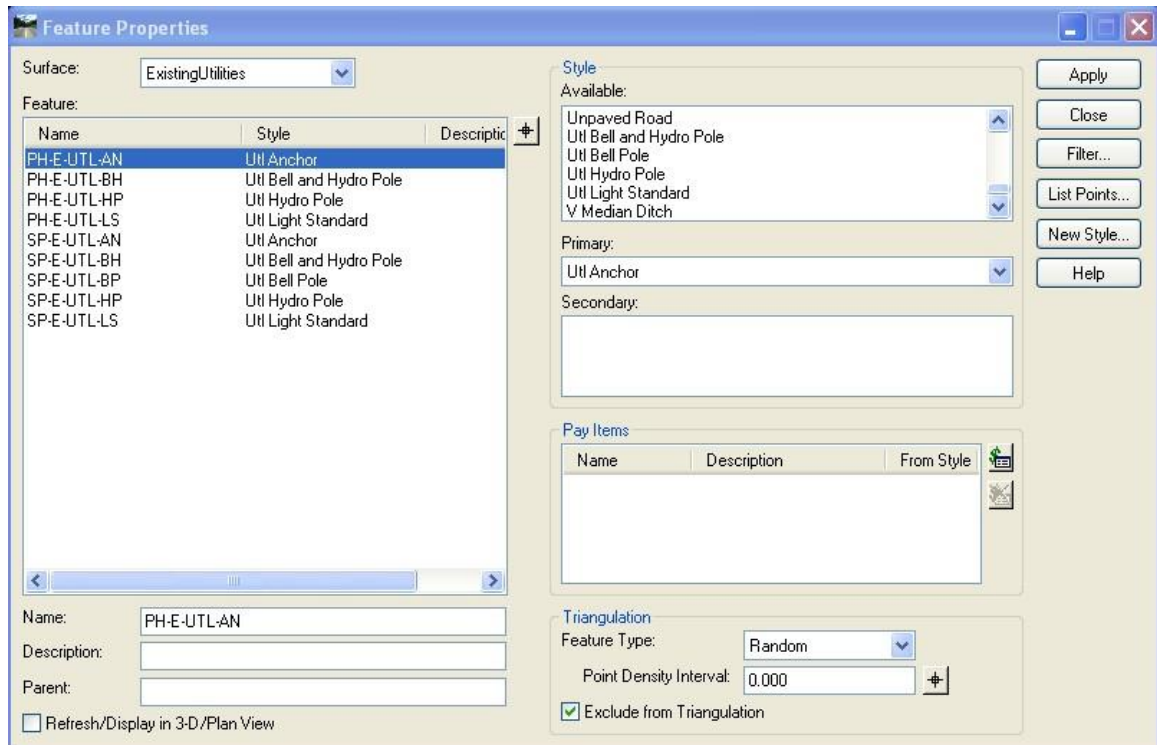
Select each feature in the left window and press List Points:

Created By: Christopher Dry
Date: February 14, 2008
Email: christopher.dry@uma.aecom.com
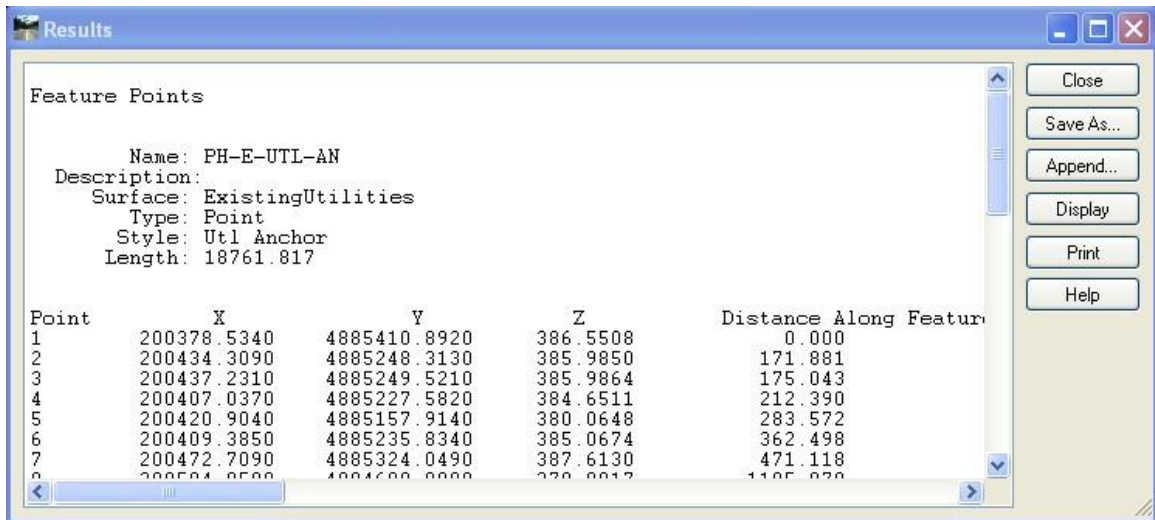
Look through the point list to verify that all of the desired features were imported. Also, verify that a Z elevation appears for each point. If any points have been duplicated or are missing elevations, verify the dtm and the cells (blocks) at these locations and repeat Step 5 above.

Note, if you repeat step 5, be sure to Empty the surface first.

Save your ExistingUtilities.dtm surface.

8. The next steps are to isolate only the utilities that fall within the proposed grading limits.

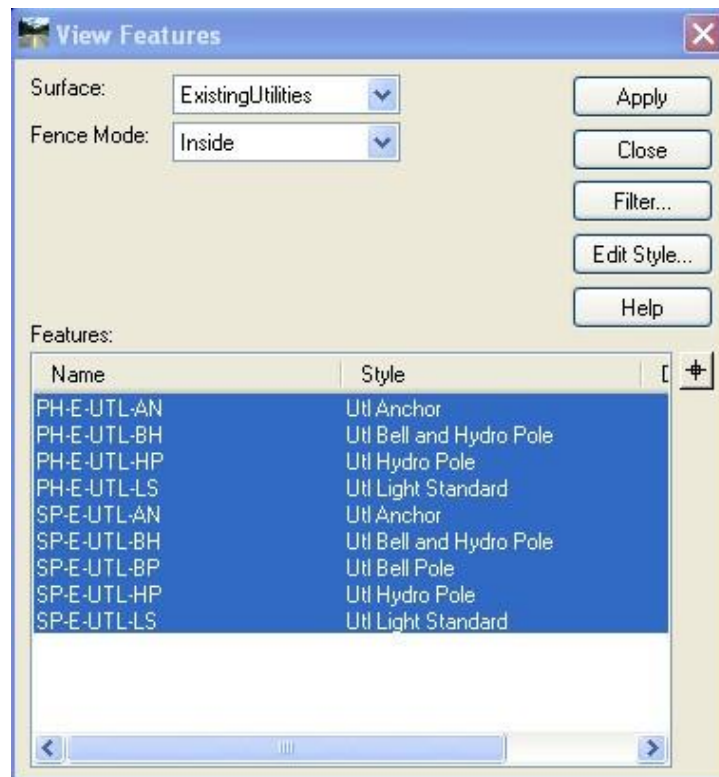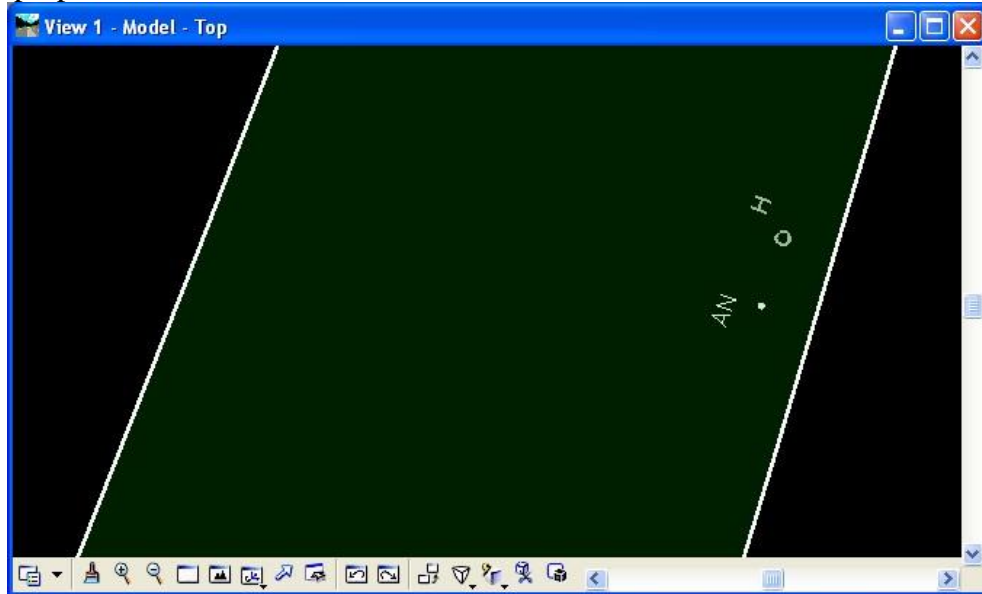Open a new empty drawing file or delete all of the graphics in your current working file.

SURFACE >VIEW SURFACE >PERIMETER

View the perimeter of your proposed ground dtm.

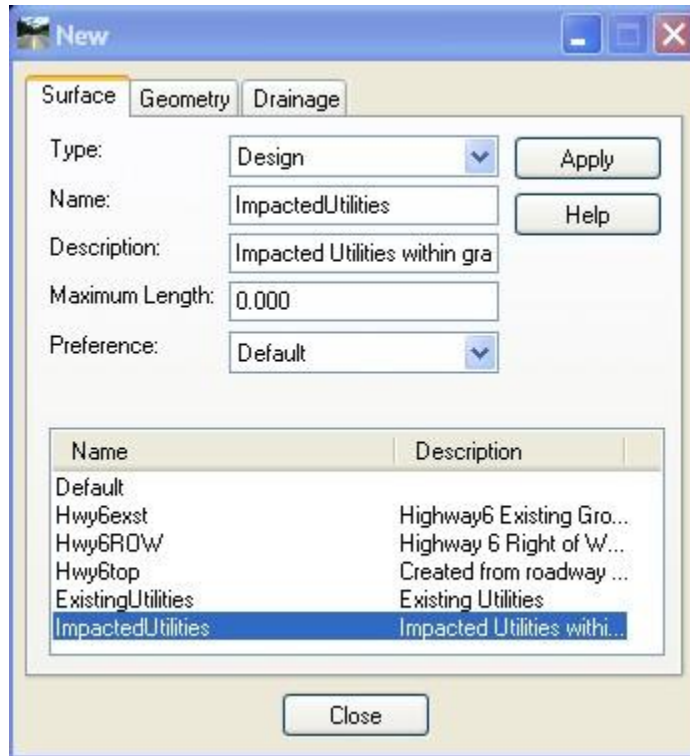9. **SURFACE >VIEW SURFACE >FEATURES**

Set Fence (Region) Type to Element and place a fence (Region) on the perimeter of the proposed dtm.

Only the features within your proposed grading limits should be displayed. Verify that the displayed features have been displayed on the correct levels (layers).
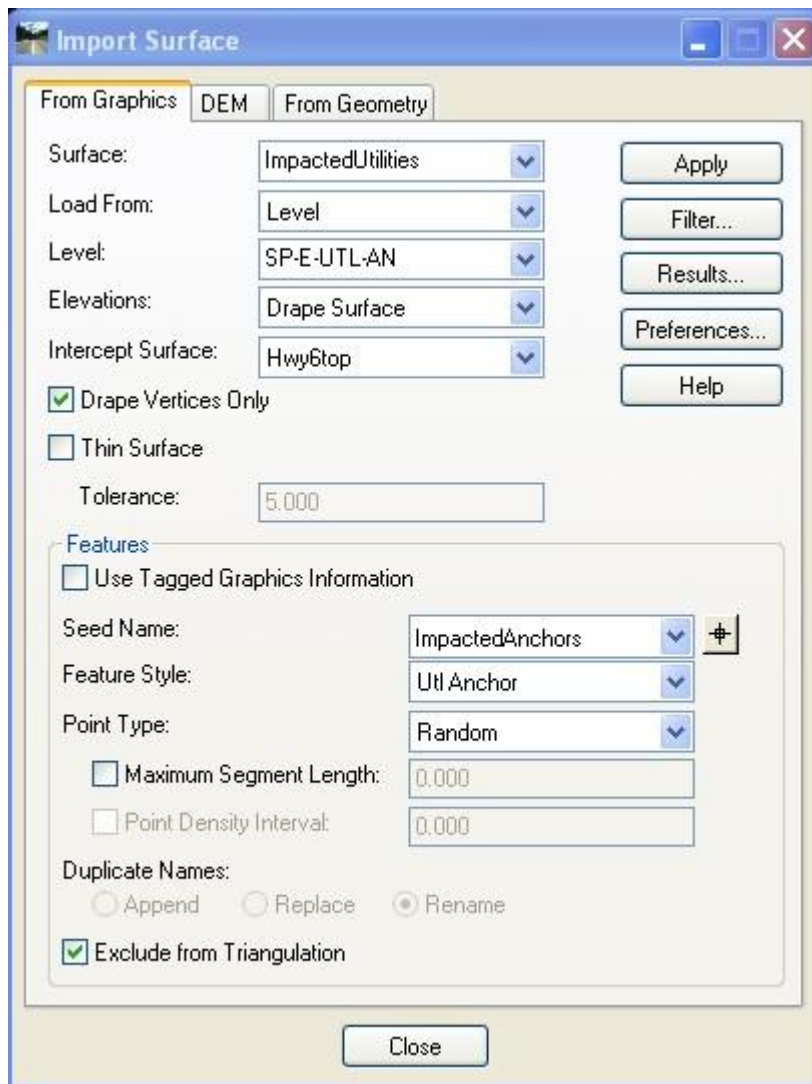
10. FILE >NEW. Create a new dtm called ImpactedUtilities.dtm

This new dtm will be used as a "container" to store the horizontal and proposed ground vertical locations of all the utility poles, anchors, etc. in the impacted areas of new grading.

Created By: Christopher Dry
Date: February 14, 2008
Email: christopher.dry@uma.aecom.com

11. FILE >IMPORT SURFACE

Select the From Graphics Tab. Select your Impacted Utilities surface and load from Level (Layer).
Select your first layer that contains utilities, i.e. Hydro Poles.

Set the elevations to Drape Surface and select your proposed ground surface as the intercept surface. Toggle on Drape Vertices only.

For the seed name, type in a name such as ImpactedAnchors. Select the appropriate feature style and set Point Type to Random.

You do not need to triangulate anything in this surface, so check on Exclude from Triangulation.

Created By: Christopher Dry
Date: February 14, 2008
Email: christopher.dry@uma.aecom.com

12. Repeat the above step for each and every level (layer) you wish to include. Be sure to select the appropriate feature style.
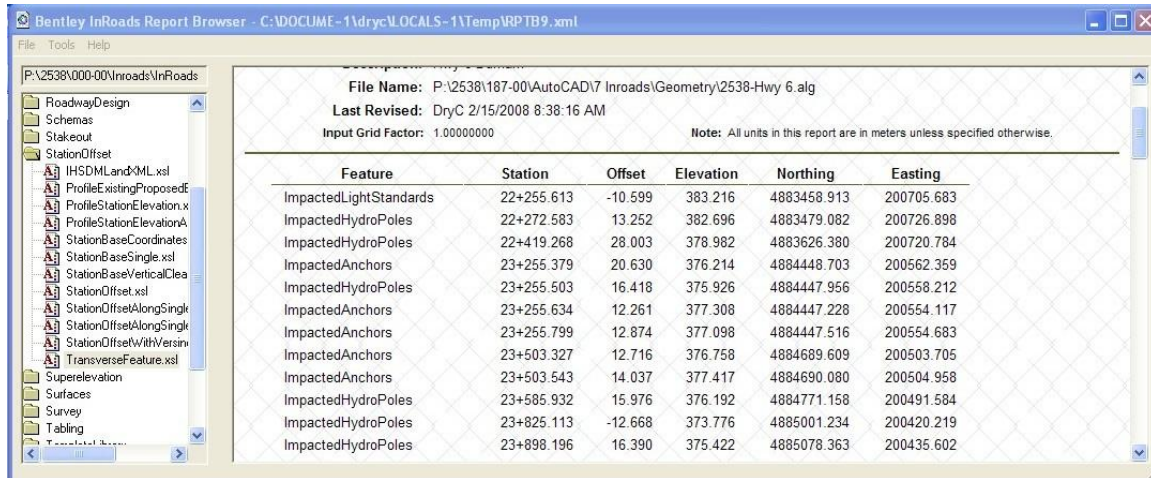
13. TOOLS >XML REPORTS >STATION OFFSET
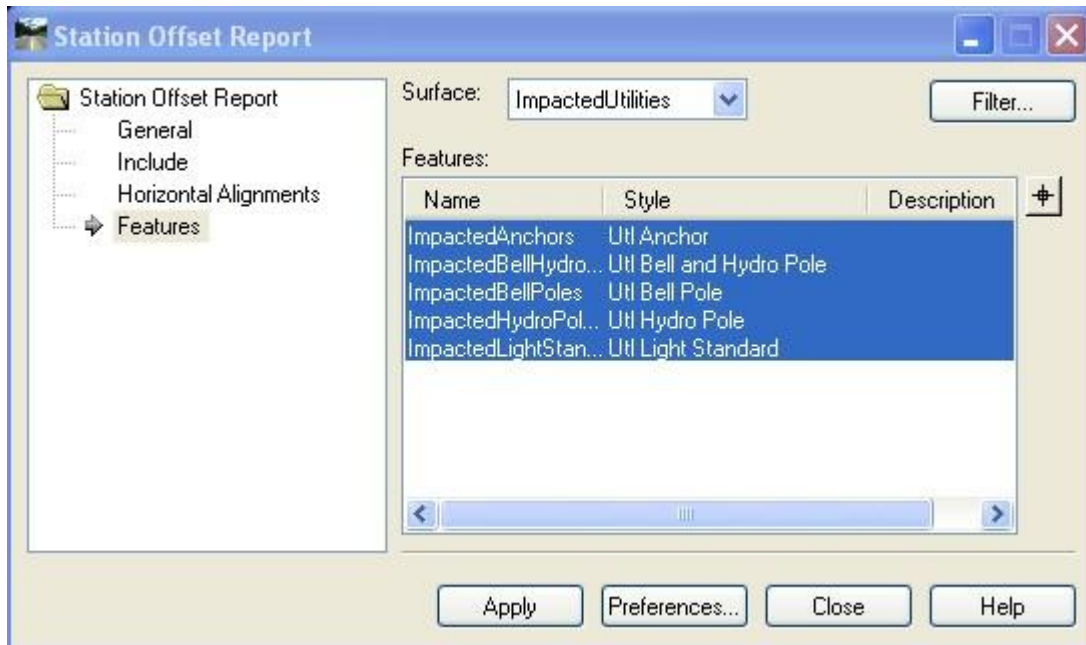
On the General window, set active your centerline alignment. On the Include window, toggle on the On-Alignment horizontal points. On the Features window, select all of your features.
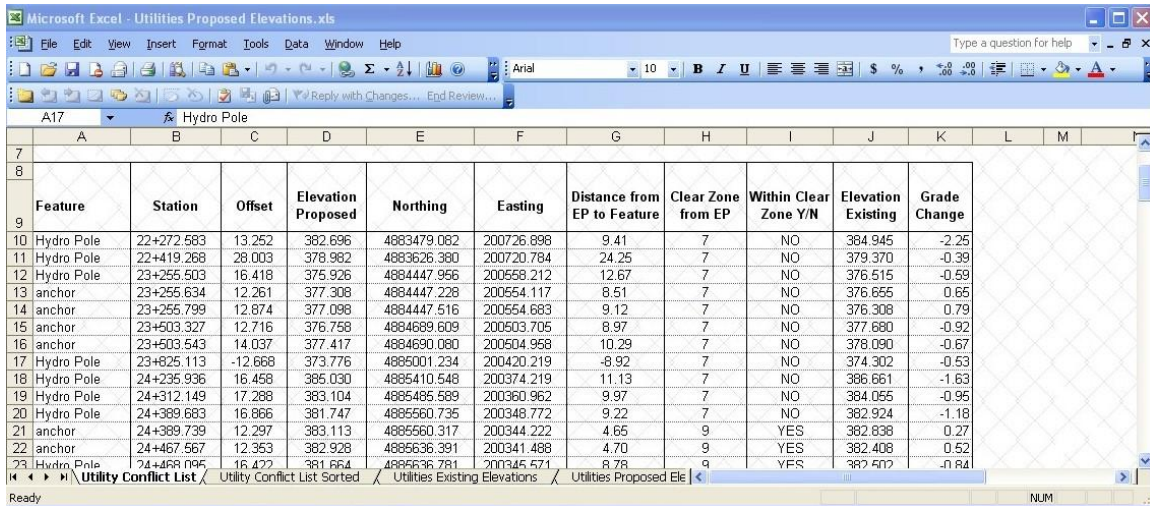
The station and offset report will display from your centerline alignment to the impacted utilities showing the Proposed Ground Elevation.

Repeat this step with another report showing the Existing Ground Elevations.

14. Once you have created the proposed and existing ground elevation report, create an excel spreadsheet to organize your results.

You could identify which features fall within the clear zone within your spreadsheet, however you could also use the same process above to do the same. i.e. Draw your proposed clear zone lines and create a closed shape. Then display only the features within this shape.

Created By: Christopher Dry
Date: February 14, 2008
Email: christopher.dry@uma.aecom.com

Your utilities can now easily be displayed in your cross sections if needed.