Chapter-4 Model Set Up

RAB Model Overview

In this chapter the user will gain insight into what needs to be completed prior to creating the finished model of the Roundabout. Prior to activating the corridor design tools the vertical geometry (Profiles) of the roadways need to be established. To begin the designer will focus on:

- Establish preliminary grading using DTM tools, Roadway designer tools or GEOPAK Site Modeler
- Establish the profile of the connecting roadways in the area of the RAB
- Create the Circulatory Area Chain (Alignment) and Profile

It is important to first understand the requirements of the project prior to modeling the RAB; in some instances the designer may opt to use GEOPAK Site Modeler. While Site Modeler alone allows for quick modeling of the final surface it does not interact on the same level as the Corridor Modeler. The Model referred to in this workshop will guide the user through the process using the Corridor Modeling tools.

Establish the RAB Rough Grade

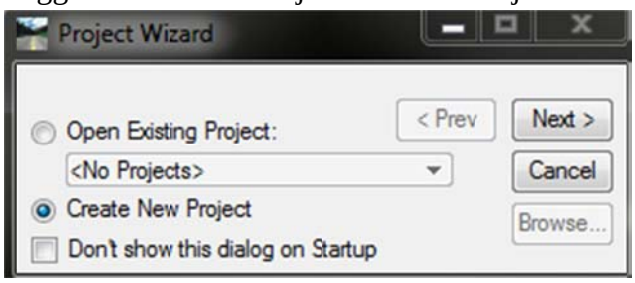
Bentleys Site Modeler is an excellent tool for developing quick, highly adjustable surfaces. In short Site Modeler simply builds TINs. The designer could also opt to create these rough construction surfaces by using other tools such as the DTM tools or roadway designer. For the purpose of the workshop we have opted to use the Site modeler application for the following reason:

- Quickly generates surfaces
- Surfaces can be profiled using the same process as used in GEOPAK Road
- Can be used downstream to complete a finished 3D model of the entire site that is easily updated.

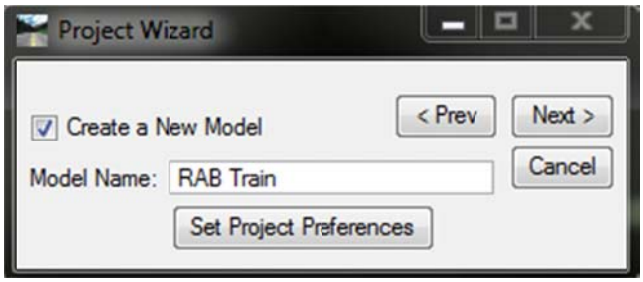
Creating the Modeler Project

With the Horizontal (Chains) in place for Rte 63 and The ramps (1-4)and the profile for the Rte 63 having been established the user can now design a rough grade plane using the PGL as the starting point of the RAB surface.

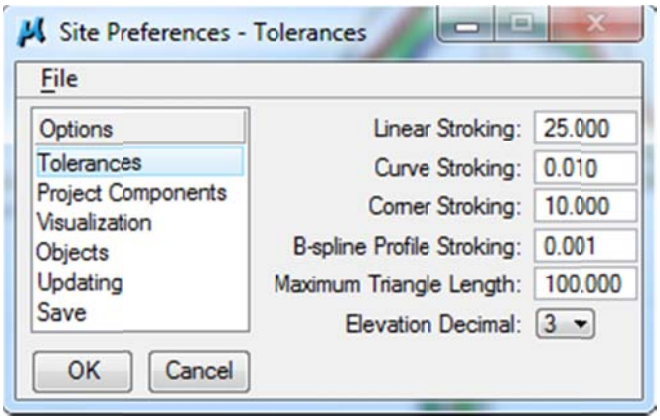
1. Open RAB_Training_Chapter4.dgn from CH4 Folder
2. Open GEOPAK Site *GEOPAK > Site> Site Modeler>Site Modeling*
3. Toggle create New Project from the Project Wizard dialog > Click Next



4. Place in folder C:\Data\J9I2184\ name it "RAB_Training_Chapter4.gsf" > Click next
5. Toggle create a new Model > Enter name RAB Train
6. Click "set Project preferences"



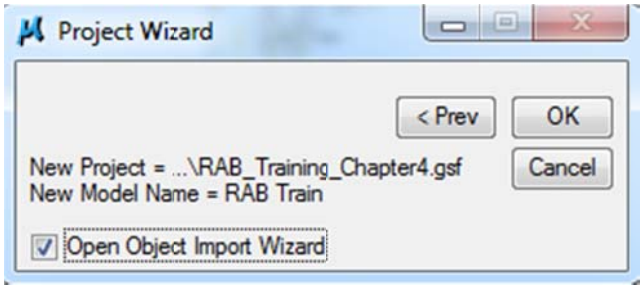
7. Click File> Open> select from the "Standards folder MoDOT_Site.spf



8. Click OK

9. Click Next on the project wizard dialog

10. Toggle "Open Object Import Wizard"

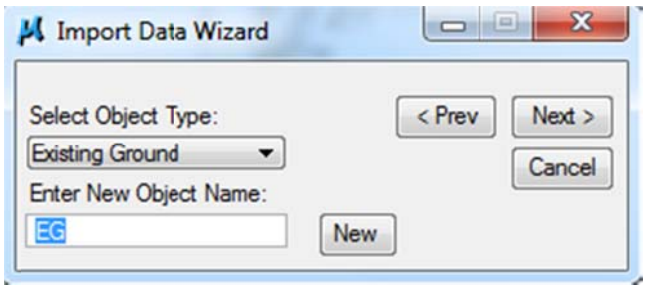


11. Click OK

12. Set the dialog to:

File Type: TIN File
File Name (Browse): C:\Data\J9I2184\J9I2184.tin

13. Click Next- set the dialog as shown below

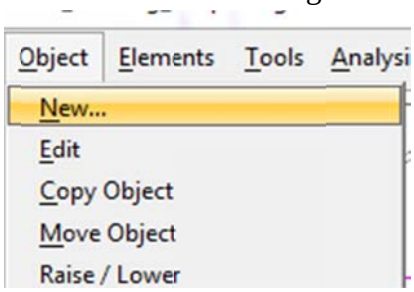


14. Click Next > Toggle ON "Use as Base Object For: Model : RAB Train"

15. Click OK

Create the Construction Object Surface

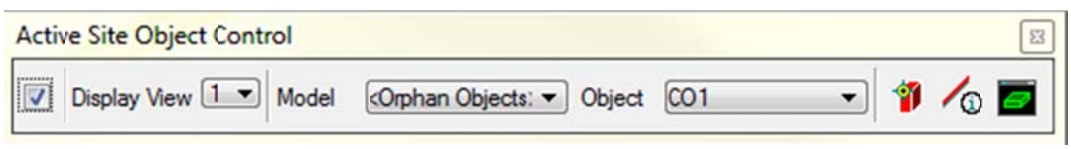
1. From the modeler dialog Create a new Object *modeler Object > New*



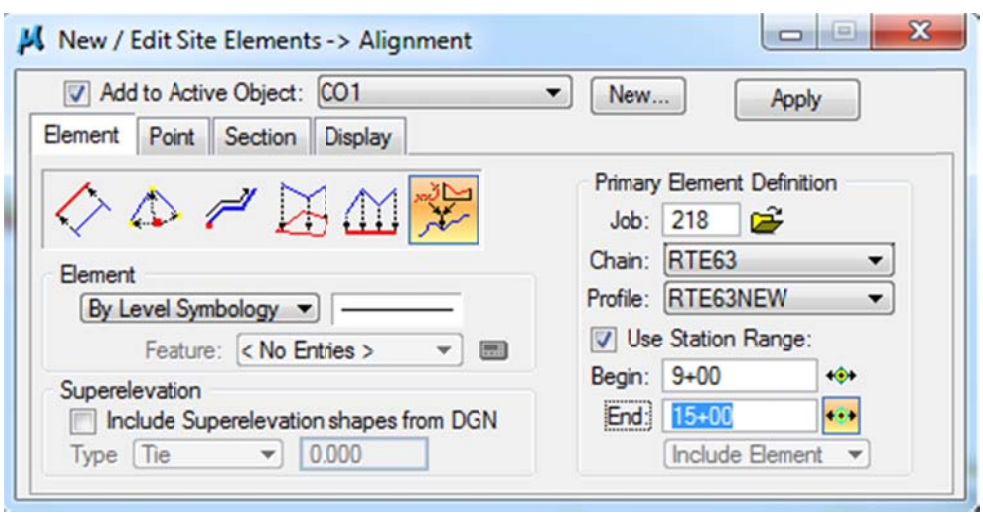
2. Set the dialog
   a. **Type:** Construction
   b. **Object name**: CO1

> ***Note*** *Do not toggle add to active Model- This creates an "Orphan Object" this means the object (an object is simply a surface) will not merge into the Base Object*

3. Click OK... The object should now appear in the Active Site Object Control

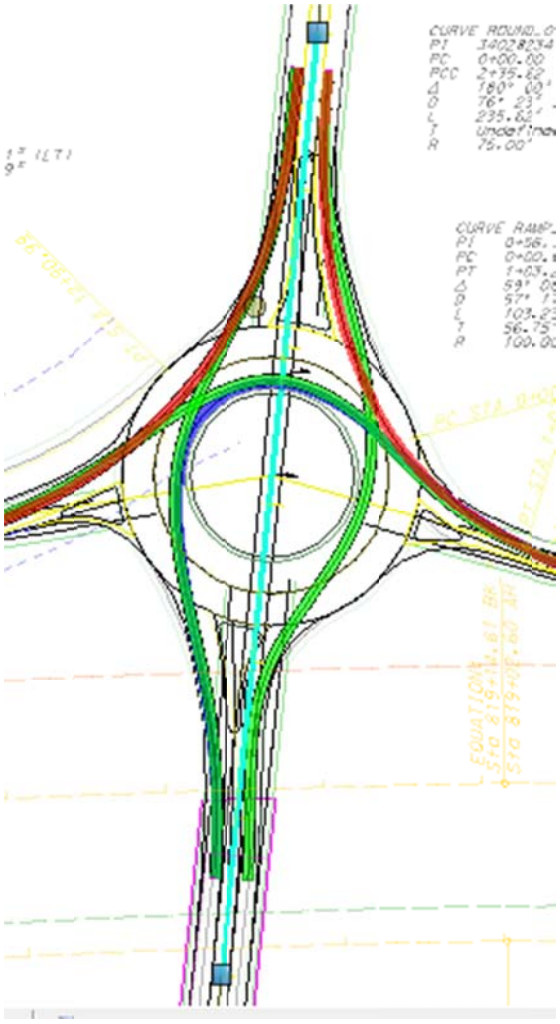


4. Open the Elements New Edit dialog – *Modeler > elements > New/edit*
5. Set the dialog as shown below

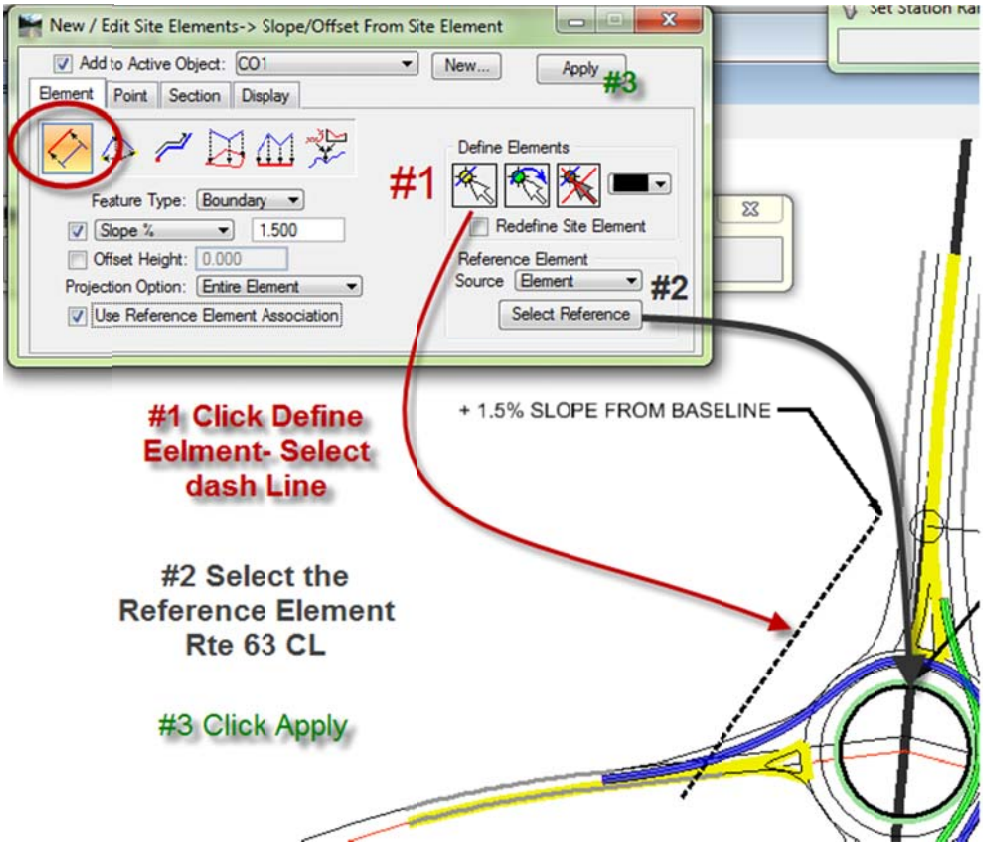


6. Click "Apply"

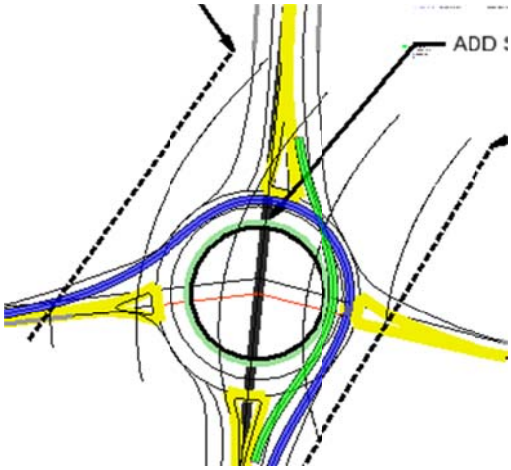
Note	*Once Applied- an element will be created between the station range using the level or feature symbology active on the dialog*



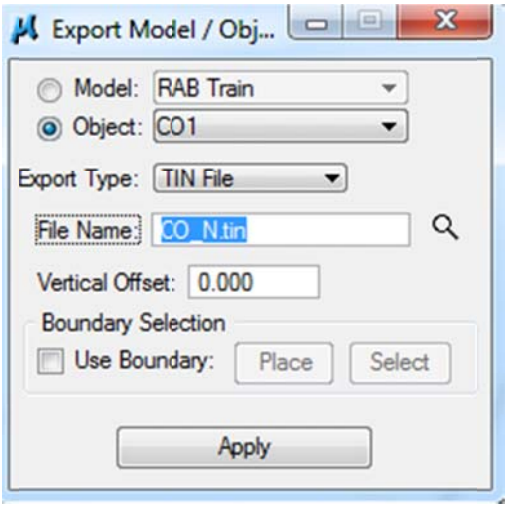
7. Change the command mode on the New / Edit Site Elements Dialog to Slope/ Offset
8. Follow the Diagram below to select the element-select the reference and apply



9. Repeat the process to add the dashed line to the east of Rte 63 at a -1.5% slope



10. Export the newly created CO1 *Modeler > Project > Export> Model/Object*
11. Set the dialog as shown below and click Apply



Creating the Circulatory Alignment

At this point various geometry has been created by placing the RAB the geometry should include:

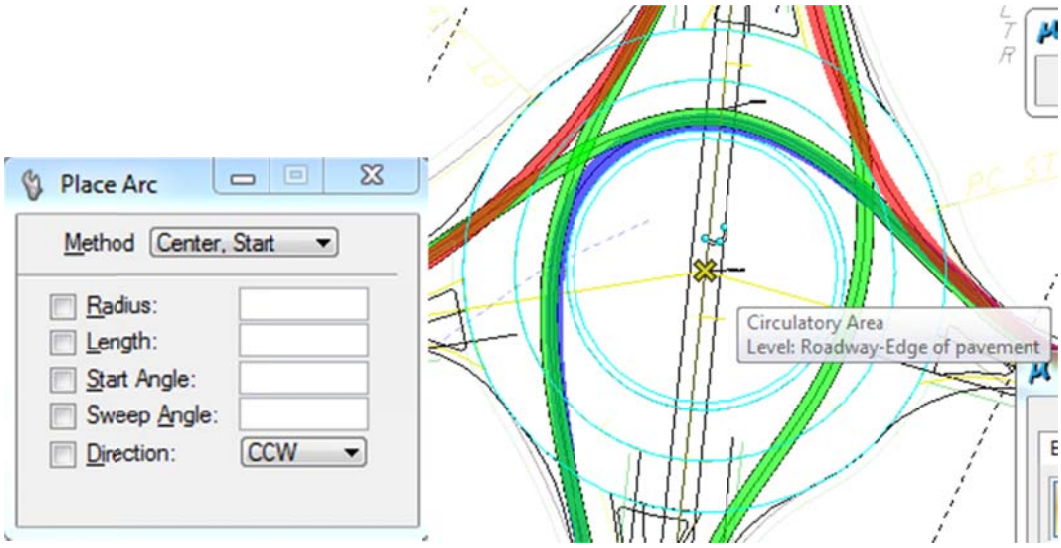
- Circulatory Curves (These will have to be constructed into a Chain)
- 4 Flares- NW, NE, SW, SE

Using the CO1 construction surface as a guide the user can now set the RAB Circulatory Profile

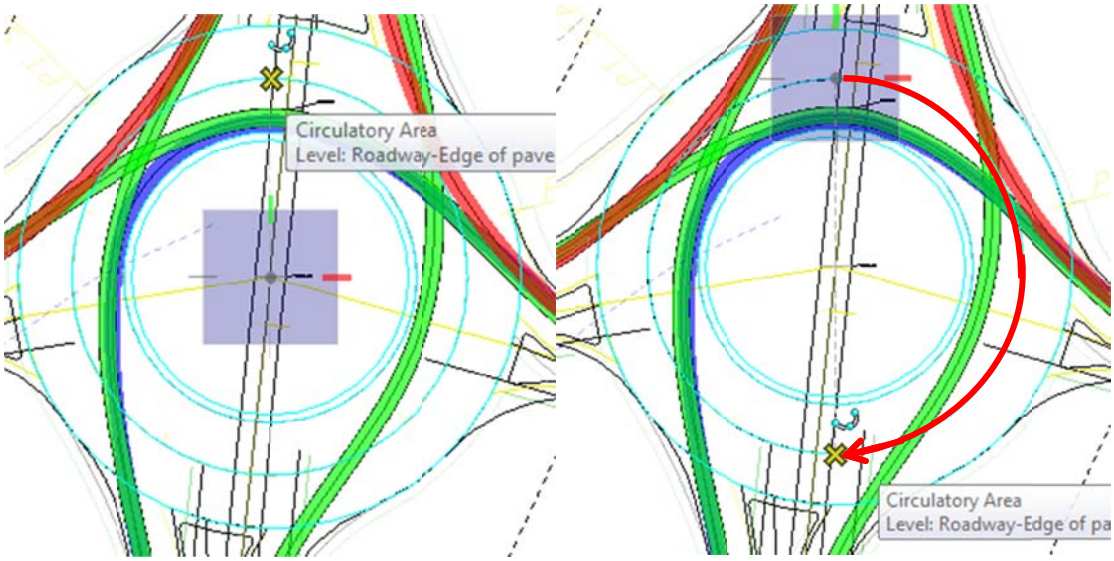
Create the Circulatory Chain / Profile

Currently a chain using a circle does not produce desired results in GEOPAK. So for a chain to work properly, we will create 2 arcs along the Circulatory area of the Roundabout and Store Graphics for the alignment (chain) of the roundabout.

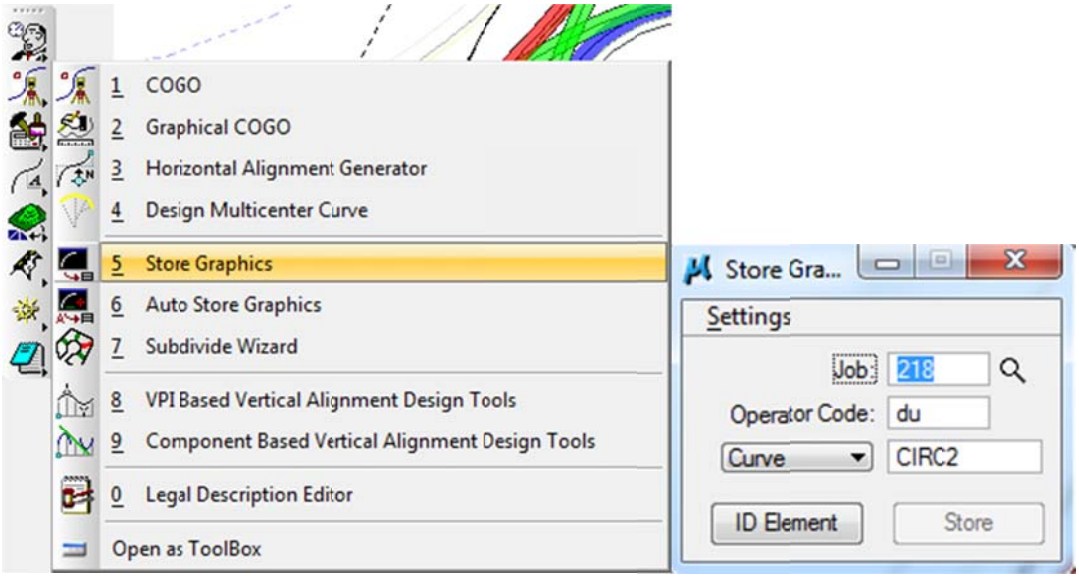
1. Select the Place Arc tool
2. Set Method to Center, Start



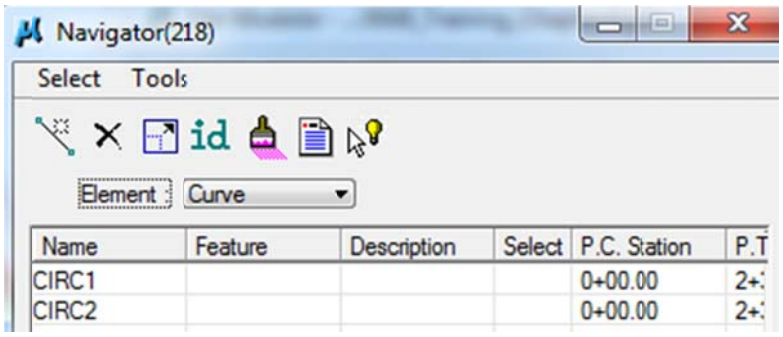
3. Place 2 arcs, using the center of the roundabout and snap points.



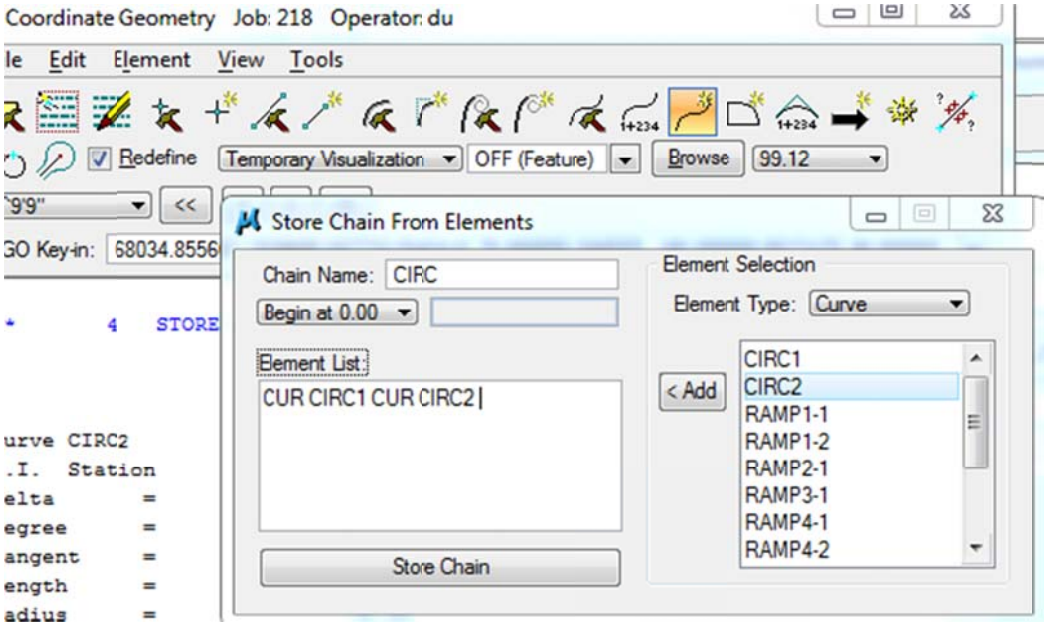
4. Store Graphics of the Arcs created to store curves “CIRC1” and “CIRC2”



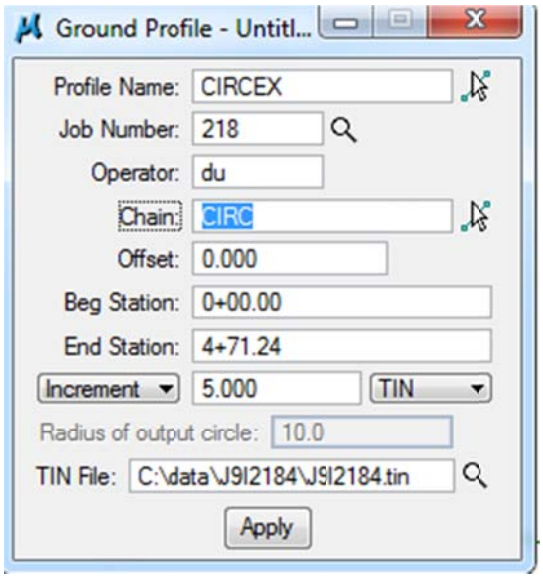
5. ID Element, Select the first arc created and Store the Curve
6. ID Element, Select the second arc created and Store the Curve



7. Open Coordinate Geometry
8. Click Store Chain From Elements
9. Add the two Curves created



10. Click Store Chain "CIRC"
11. Close COGO
12. Open the "Ground Profile" tool- *GEOPAK > Road > Plans Preparation > Ground Profile*
13. Set the Dialog as shown below



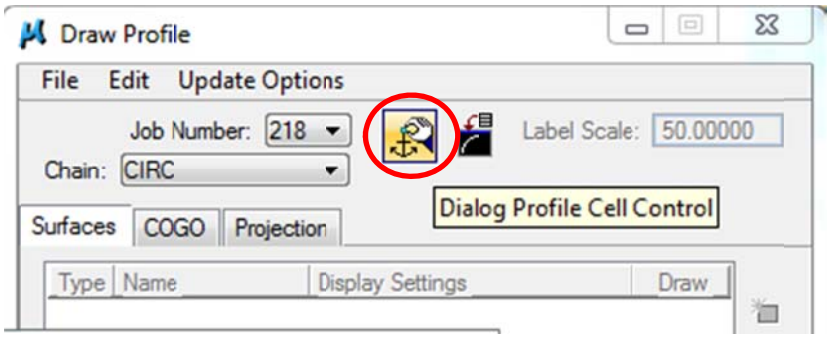
14. Click Apply > Click "OK" to store inp > Click YES to store Profile > Click YES to "Delete Profile String"

15. Close the dialog

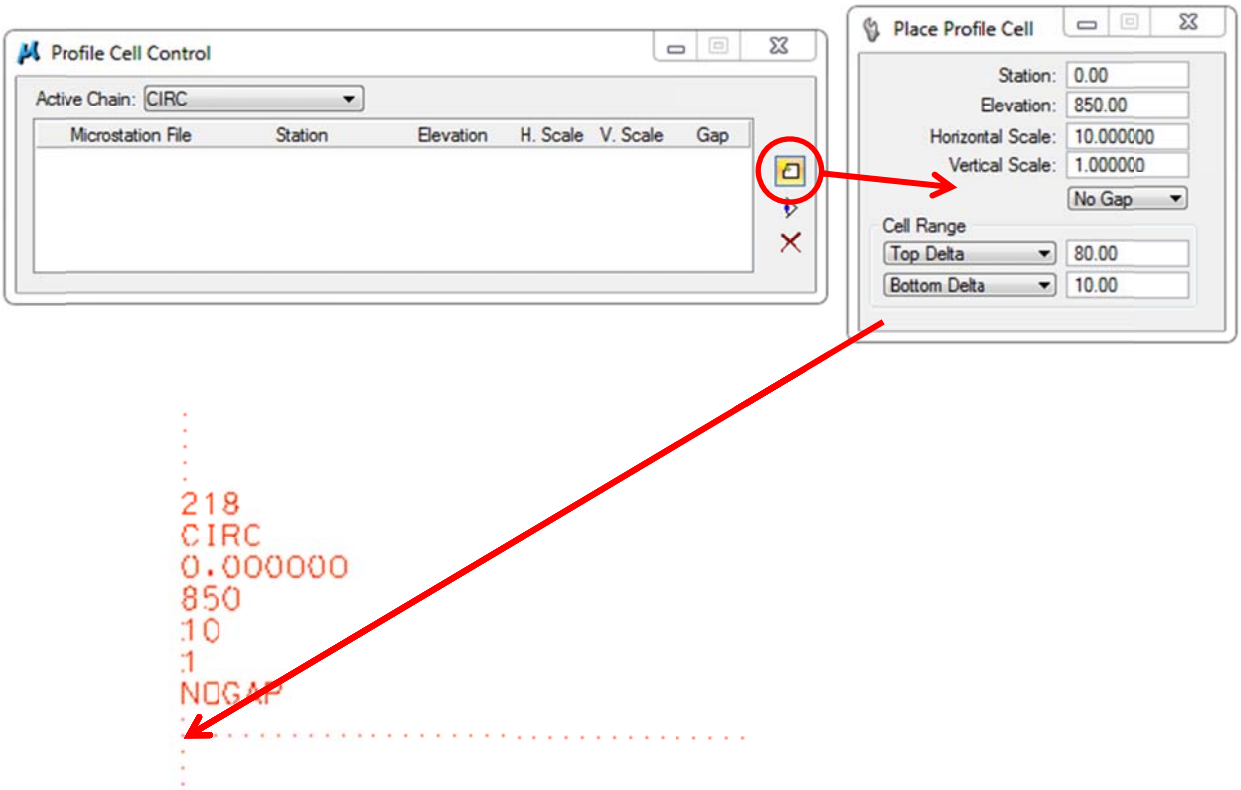
Creating Existing Profile View using GEOPAK Site

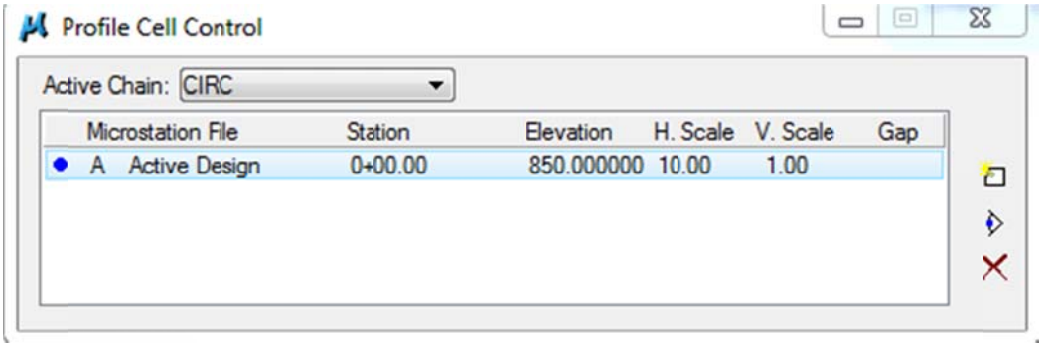
16. Create a profile- modeler > Object > draw profile

17. Place profile Cell- Click the Dialog Place profile Cell



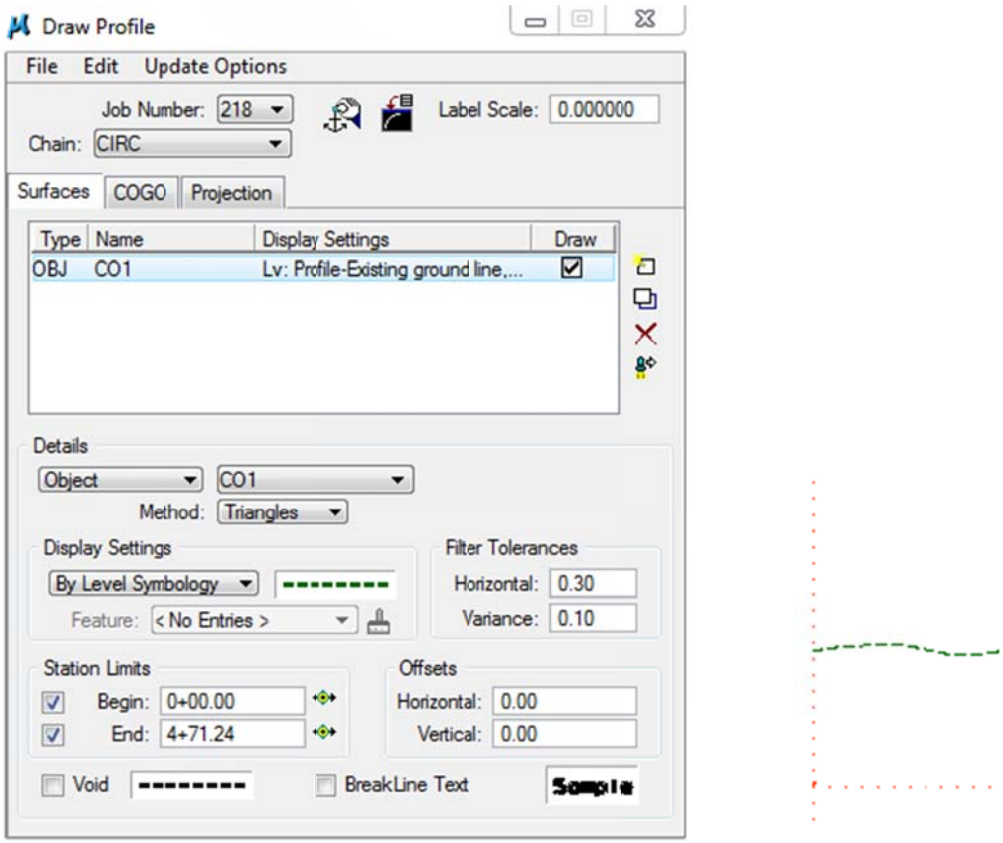
18. From the Profile cell Control dialog follow the steps in the diagram below





19. From the "Draw profile" dialog select the "Surface tab"

20. Set The dialog as shown below – Click "Add" to display the CO1 surface

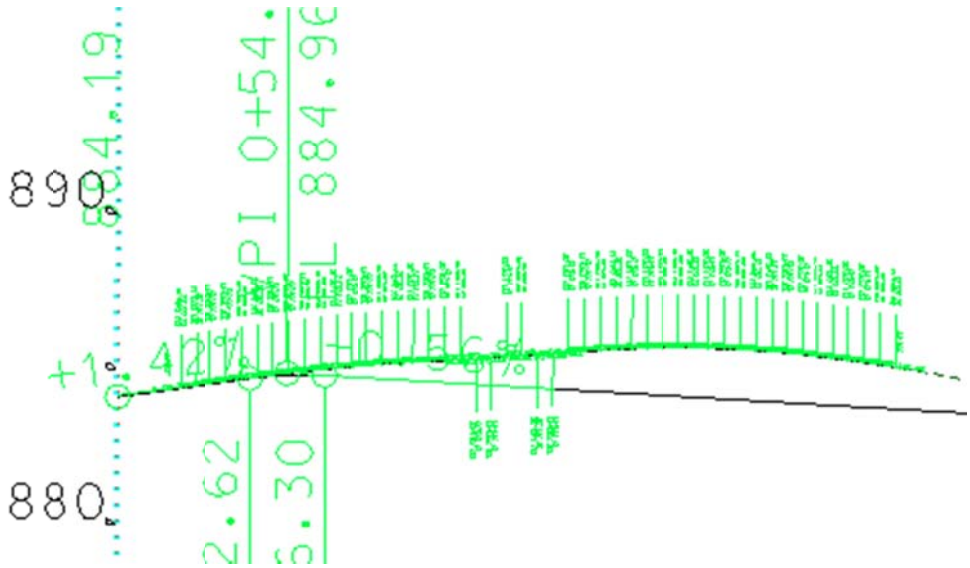


Creating Proposed Profile

21. Repeat the process to create existing ground, This time use the CO_N surface as the Existing ground. This will place the profile for the circle on the desired plane.

Note	Identifying the cell will update the X, Y reference information

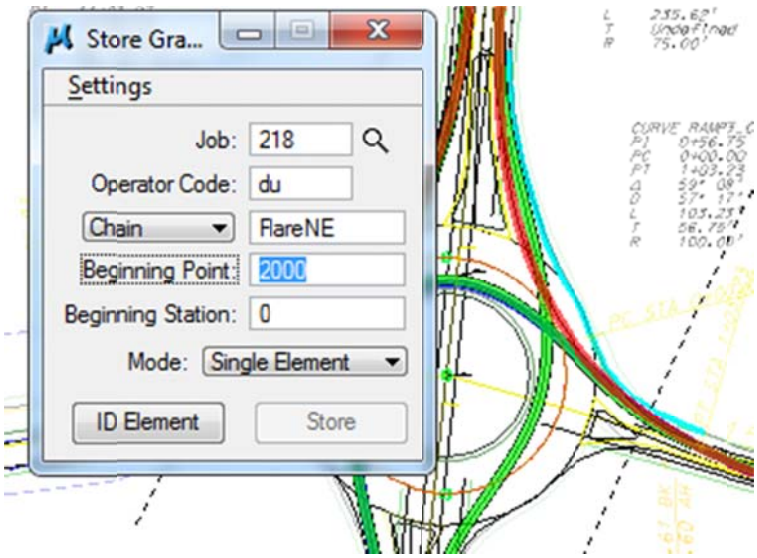
22. Save your profile as CIRCEX2.



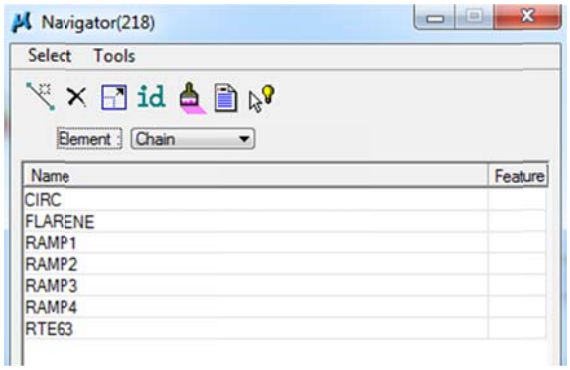
Create the Flare Alignments and Ramp Profiles

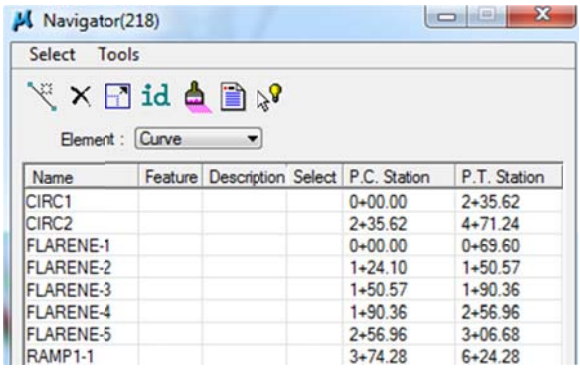
Creating the Flare Alignments

1. Use the MicroStation Create Complex Chain tool
2. Change the method to Manual
3. Select the elements that make up the Flare (leave out any bsplines)
4. Click the Store Graphics tool
5. Set the Dialog box as shown below and ID Element >select the Complex chain created from the North East Flare. This will require you to reset (right click) several times to select the complex chain. Watch the Status bar at the bottom of the screen to make sure you select the Complex Chain and not the Flare. Selecting the Flare will not store the chain.



6. Click the Store button.
7. Repeat this for each Flare on the Roundabout.





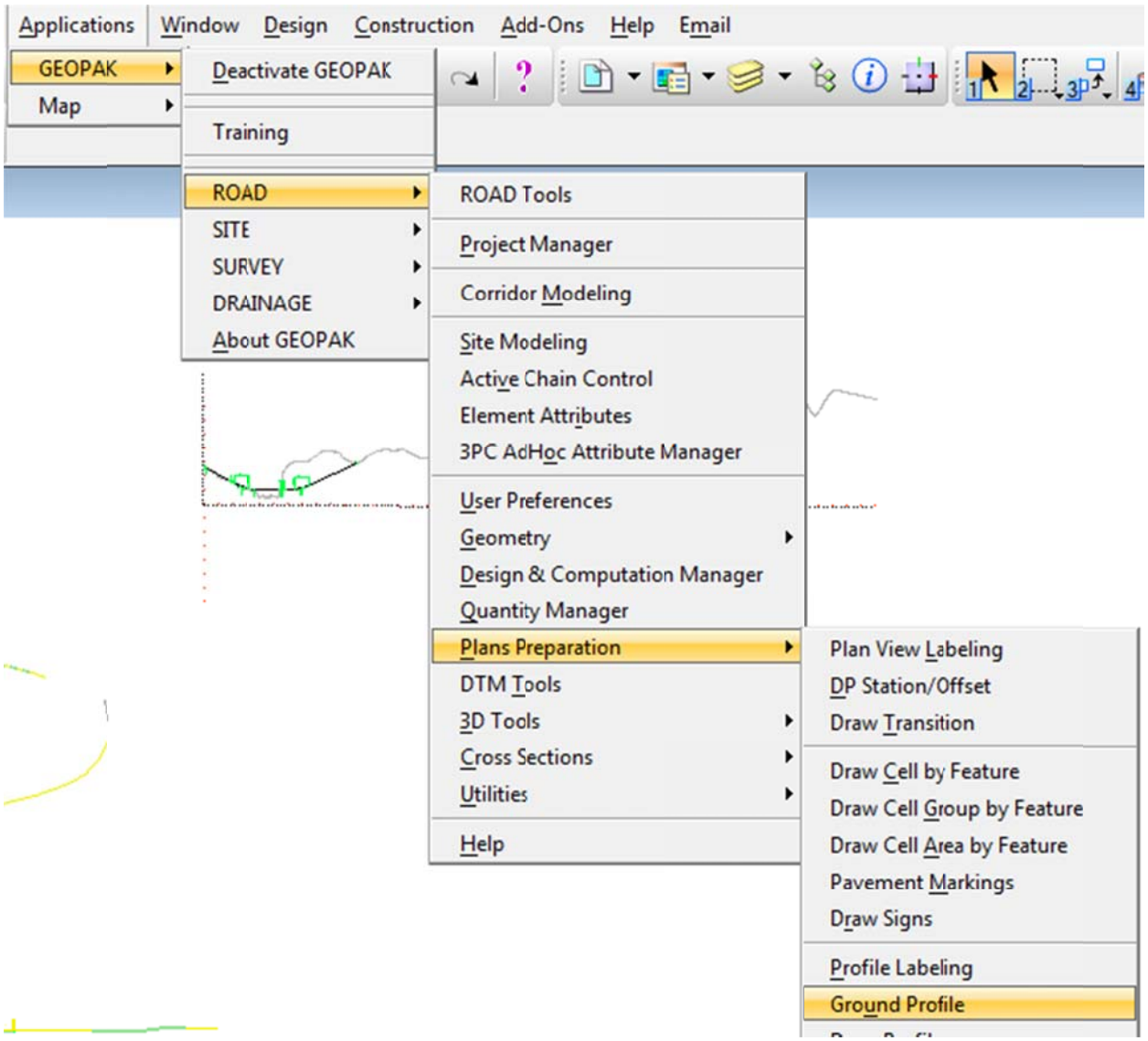
The chain is now stored for FLARENE along with the curves that make up the flare.

Note:
Flares are often made up of bsplines, which GEOPAK may have trouble with. If you continually crash trying to create a flare in this manner, try dropping the complex chain and replacing the bspline with a smartline, then recreating the complex chain. Or when creating the complex chain from the flare, skip the bspline.

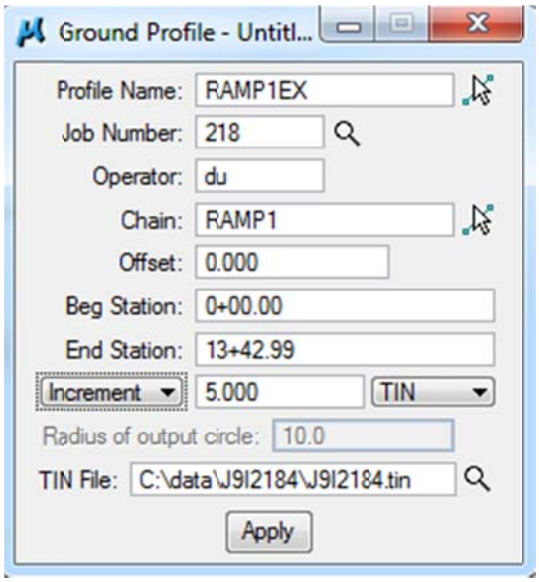
Create Ramp 1 Profiles

Ramp1EX
Ramp1New

1. Open the Ground Profile tool



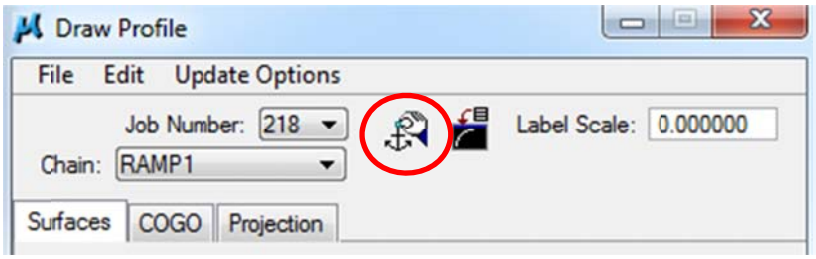
2. Setup the Existing Ground Profile RAMP1EX



3. Click Apply
4. Click OK to store the inp file
5. Click Yes to Store the Profile
6. Click Yes to deleting the 3D string
7. Close the dialog

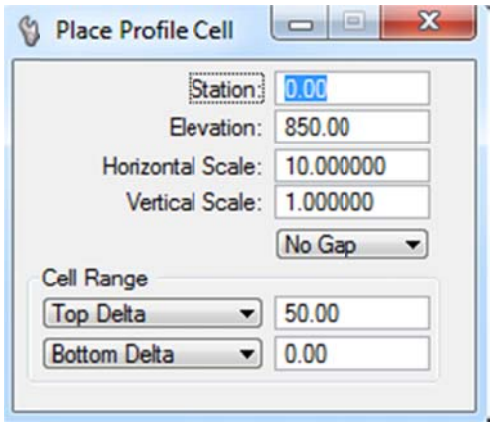
Draw the Profile in to the Drawing

1. Applications> GEOPAK> Road> Plans Preparation> Draw Profile
2. Change the active chain to RAMP1 and click the Dialog Profile Cell Control tool



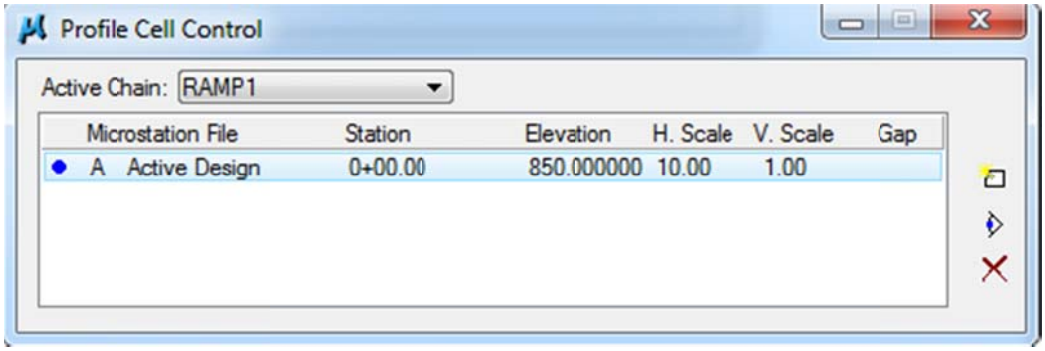
3. In the Profile Cell Control Dialog, choose the add button

4. Set the Place Profile Cell dialog as shown below:

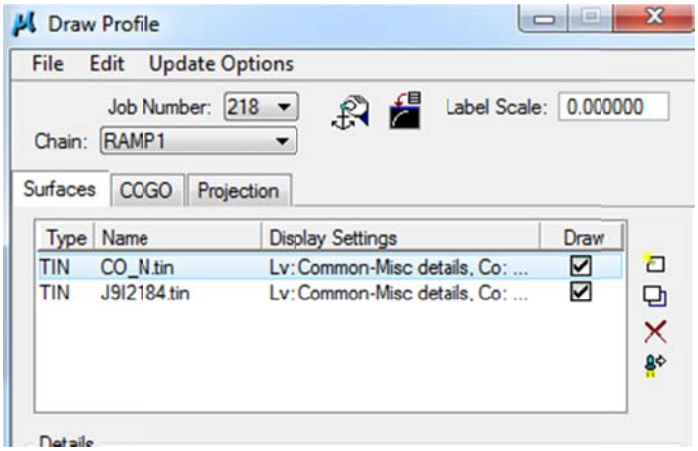


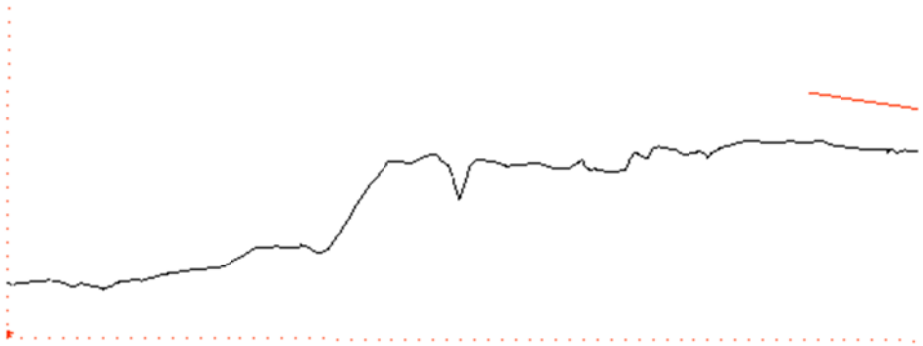
5. Place the profile Cell.

The Cell will show on the screen and in the Profile Cell Control dialog.



6. In the Draw Profile box, add the CO_N.tin and J9I2184.tin on the Surfaces Tab.

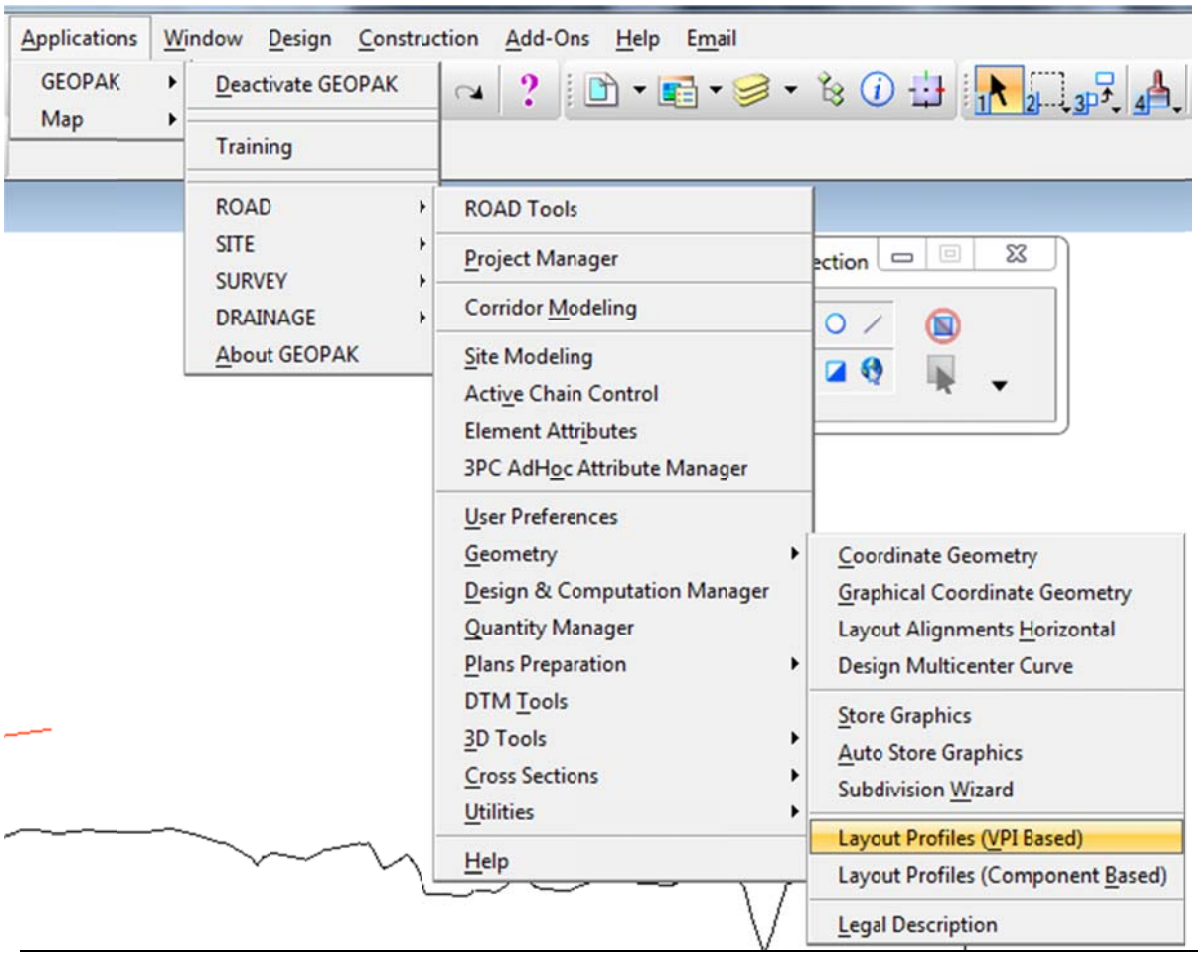




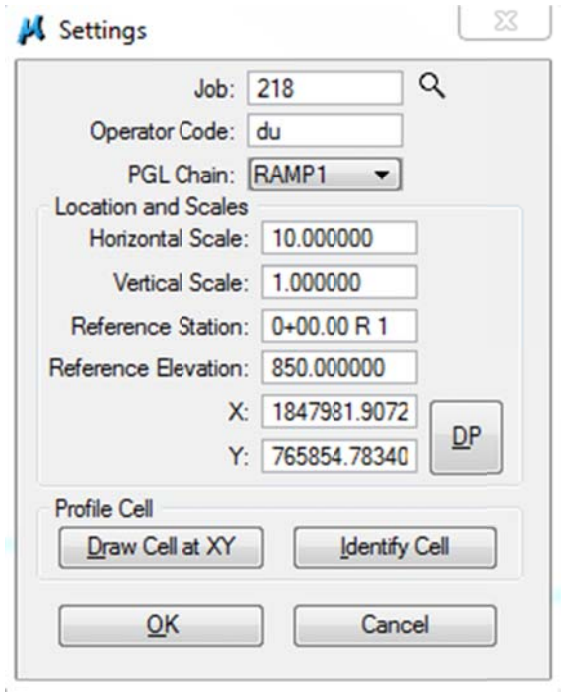
The top line is the Roundabout Surface created by GEOPAK Site. The lower line is RAMP1EX. This could have been drawn in using D&C Manager as well.

Create a New Profile Matching the Roundabout and Existing Elevation

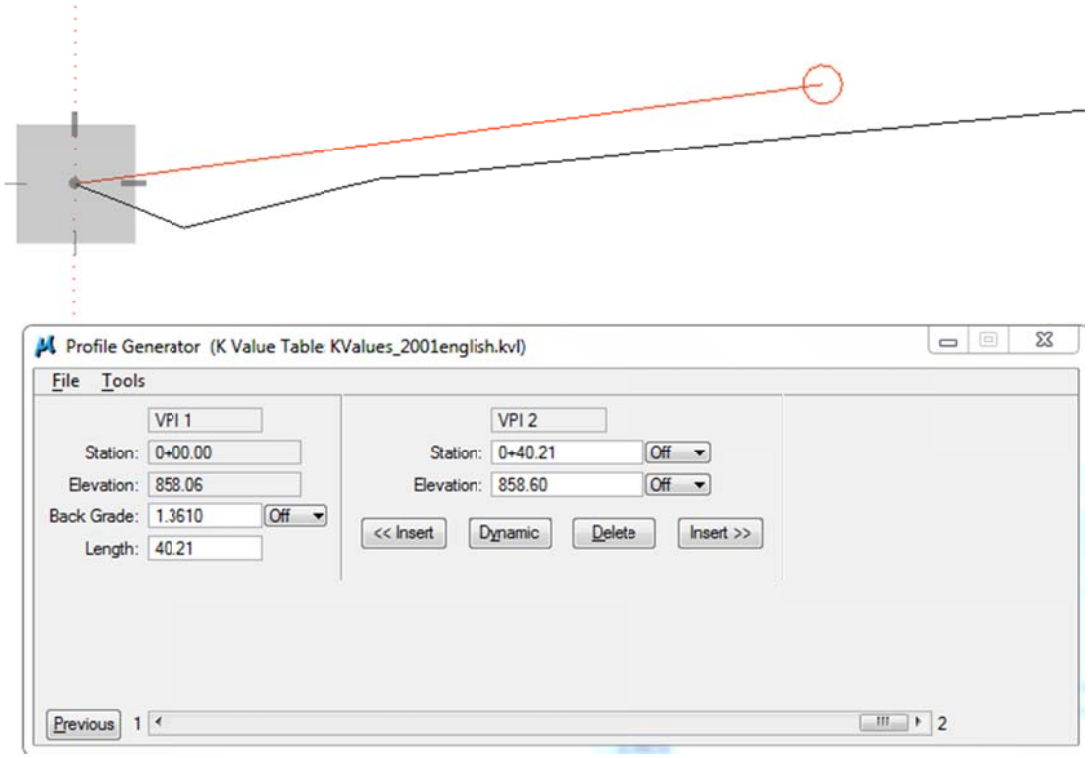
1. Open the Layout Profiles (VPI Based) tool



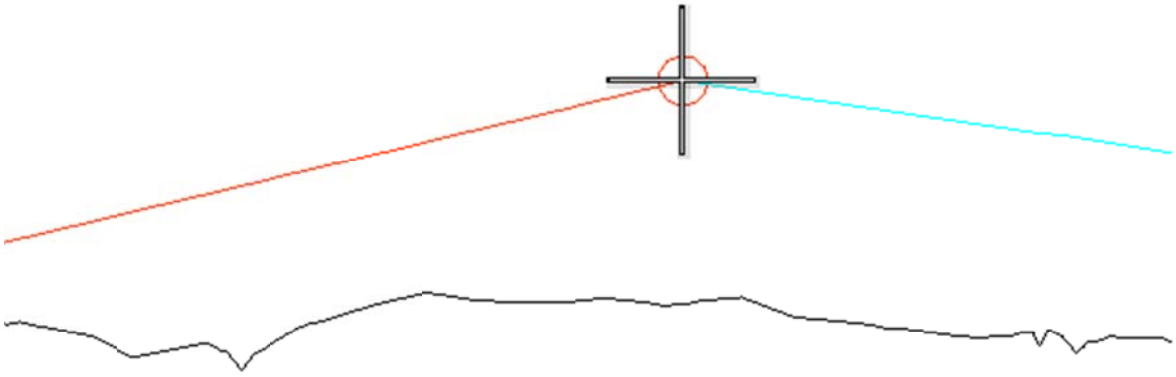
2. Set up the Settings Dialog box, be sure to Identify Cell and select the RAMP1 Cell created earlier.



3. Start the first Station at the beginning of the existing profile (RAMP1EX) line

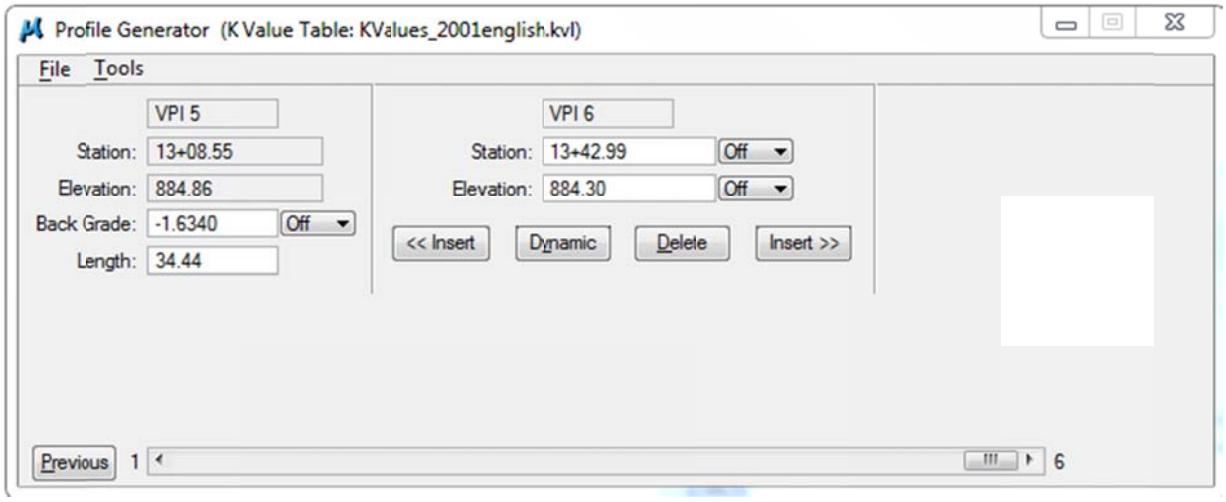


4. Insert the next VPI at the end of the Roundabout Line.



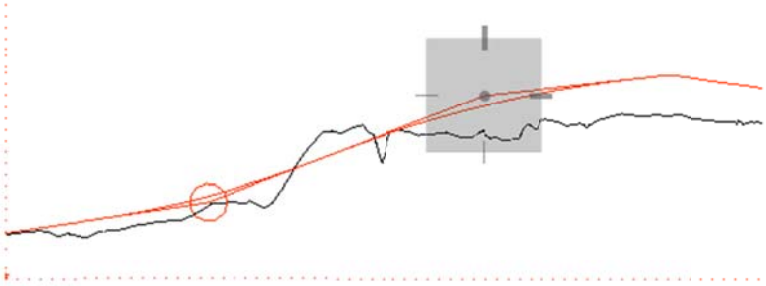
5. Insert more VPI's at the points along the Roundabout Profile line

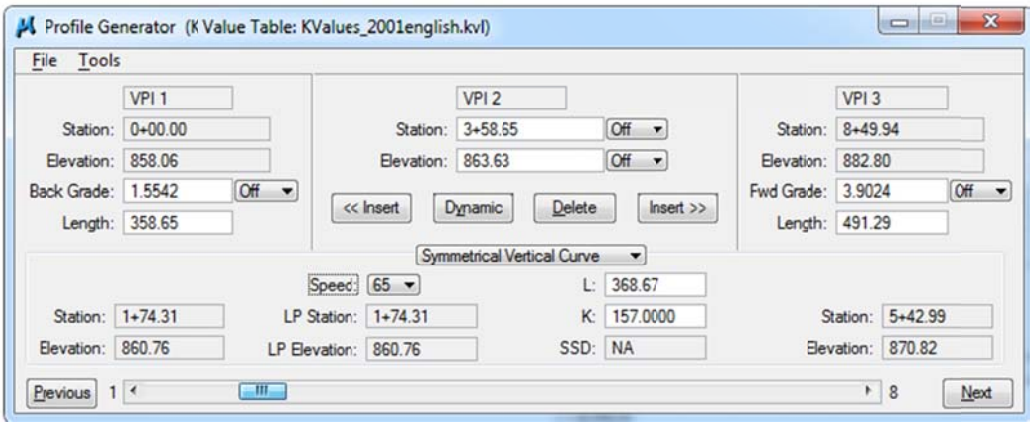
6. The final VPI should be snapped to the far end of the Roundabout Profile Line



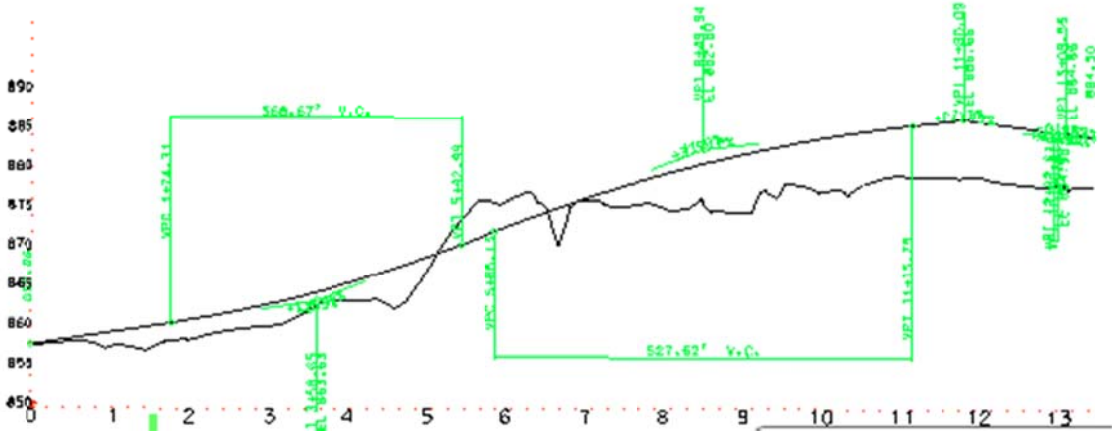
The profile should look similar to the one above.

7. You may now go back and insert any other VPI's you feel necessary.

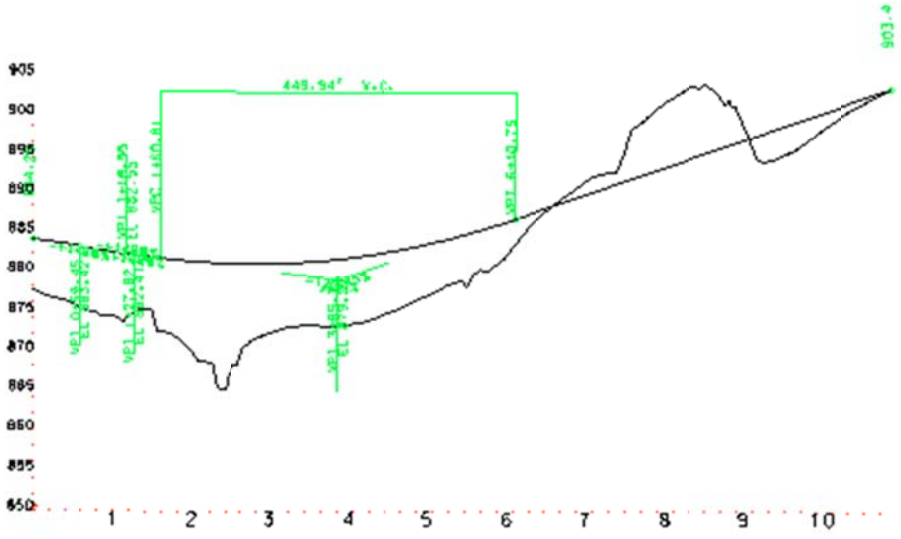




8. Store the profile as RAMP1NEW
9. You may use D&C Manager to place the profile for viewing if you wish



Use this same technique to create RAMP3EX and RAMP3NEW profiles.



Possible RAMP3NEW solution