23. Side Roads

In this exercise we will use Graphical COGO & the Draw Profile tool to begin the design of a side road. All of the functions we have worked with to design our mainline roadway S.R. 95 can be used to develop side roads as well. The tools in this chapter are presented as an alternative to some of the functions we used previously for S.R. 95.

Private Drives:
Any private drives, businesses and field entrances with possible slope encroachments, in extreme cuts or fills or any that need more complex vertical alignments will need to be designed using regular roadway design functions presented in this manual.

We do have a batch process developed for automatic production of private drive profiles which can be used on drives that do not involve any of the design situations listed above that would require more in depth study. For complete documentation on batch processing of private drive profiles, refer to standard documentation file PvtDrProfiles.pdf which can be found under Documentation at the T.D.O.T. Roadway Design Division web page address:

http://intranet.tdot.tn.gov/asstchiefengrdesign/Design/v8design/default.htm#Documentation

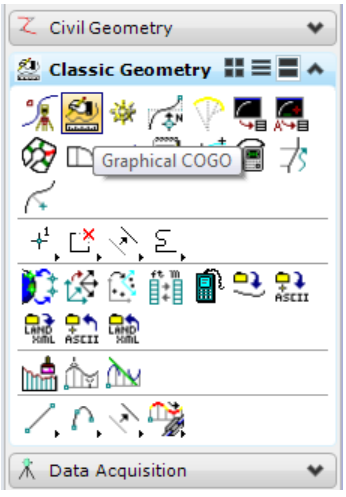
I.) Initial Set Up

1) Open the MicroStation file

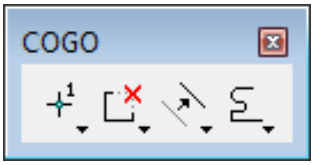
C:\Projects\Roane\SR95PoplarCr\ROSR95Alignments.dgn

Access Project Manager.

2) From the Classic Geometry task group, select the Graphical COGO icon.



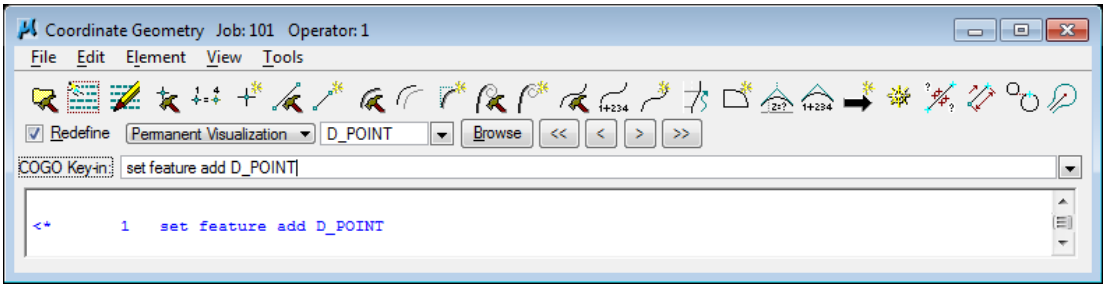
The COGO dialog opens and the Graphical COGO toolbox appears.



3) Before we store proposed centerline points, we need to set the feature D_POINT in COGO. Turn on Permanent Visualization and click the Browse button to set the feature.

Feature D_POINT is found under Design→D_POINT.

4) Back in the main COGO dialog we can see our feature has been set. Minimize the COGO dialog to clear your screen area.



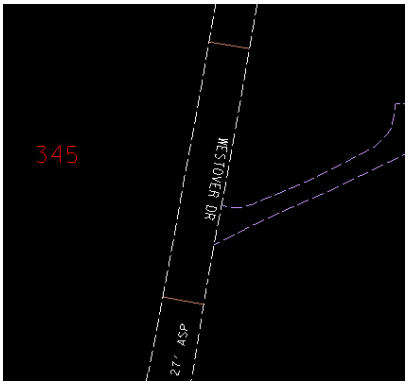
II.) Graphical COGO Centerline

In this section we are going to use Graphical COGO to store 2 points to define a centerline chain for Westover Dr. We will use this chain later to illustrate the use of the Draw Profile tool.

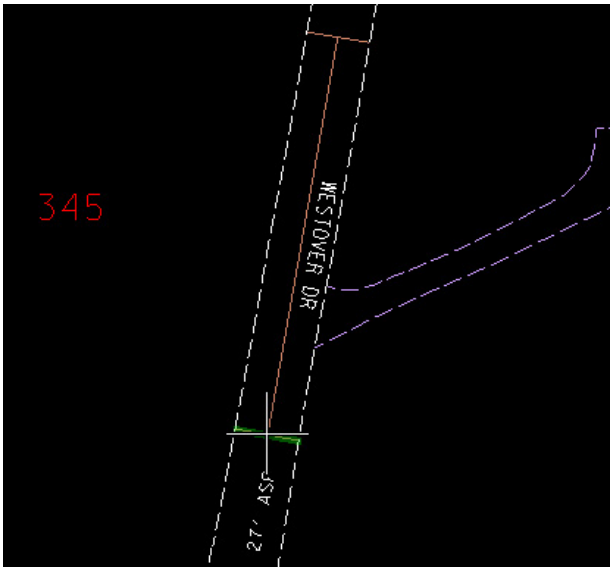
NOTE:
In the normal workflow existing centerlines for side roads are set up and provided by Survey. If realignment for the side road is indicated in the APR for the project, Survey will develop a preliminary proposed centerline as well. Design personnel would then determine whether those centerlines can be used in the final design.

1) Zoom in on Westover Drive near the end of our SR95 chain.

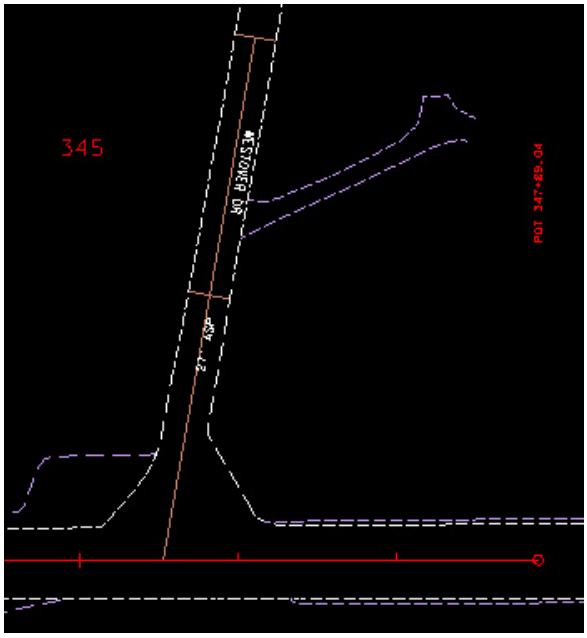
Using MicroStation, draw 2 perpendicular lines across Westover Drive between the existing edge of pavement lines. It may be necessary to turn on the Survey reference file RO095-01Survey.dgn and level SURVEY - TRANSPORTATION – Roads.



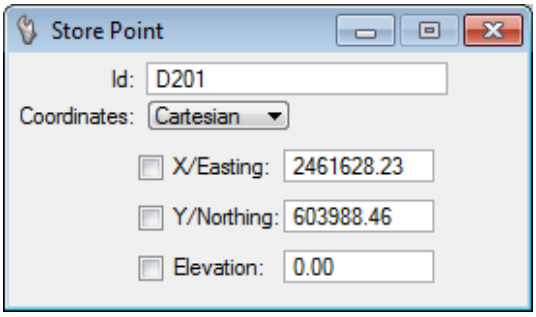
Using Midpoint snap, draw a line from the middle of the first line to the middle of the second.



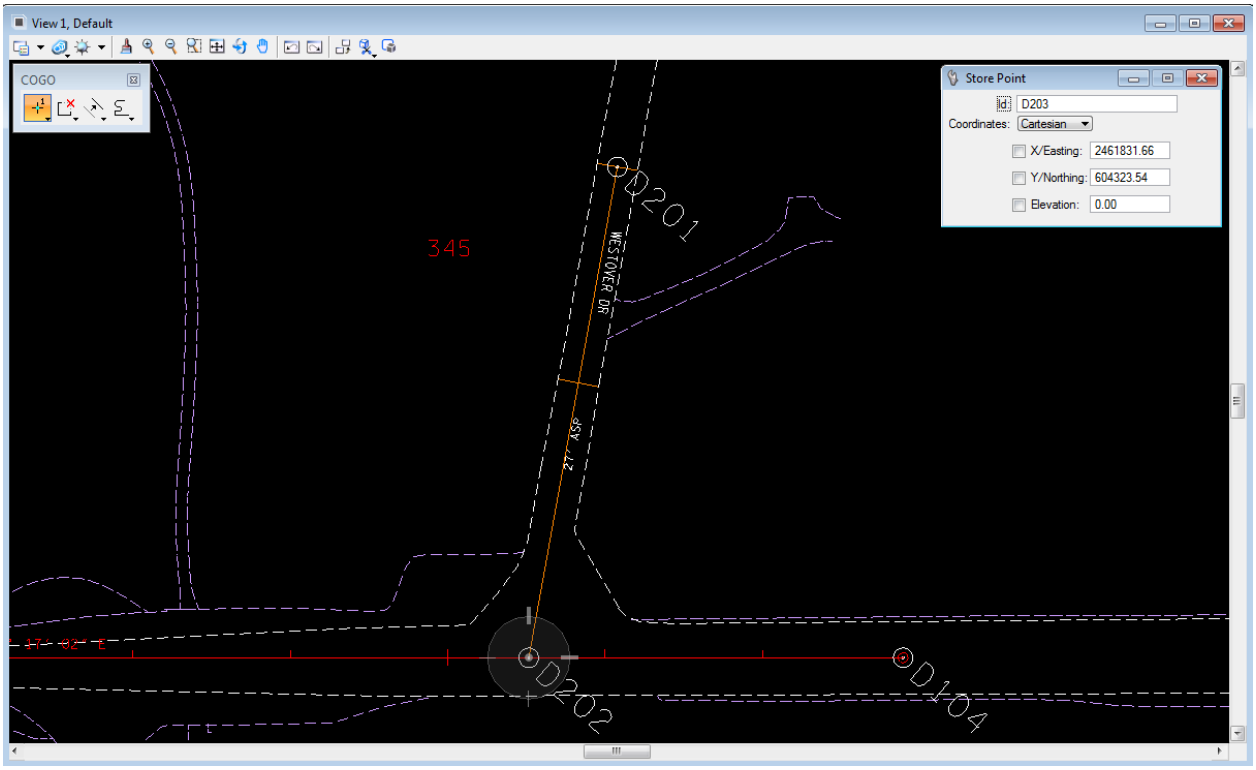
Use MicroStation's Extend to Intersection tool to extend the line to the SR95 centerline chain.



2) Access the Graphical COGO Store Point command. Set the point name to D201 and switch the Coordinates option to Cartesian.

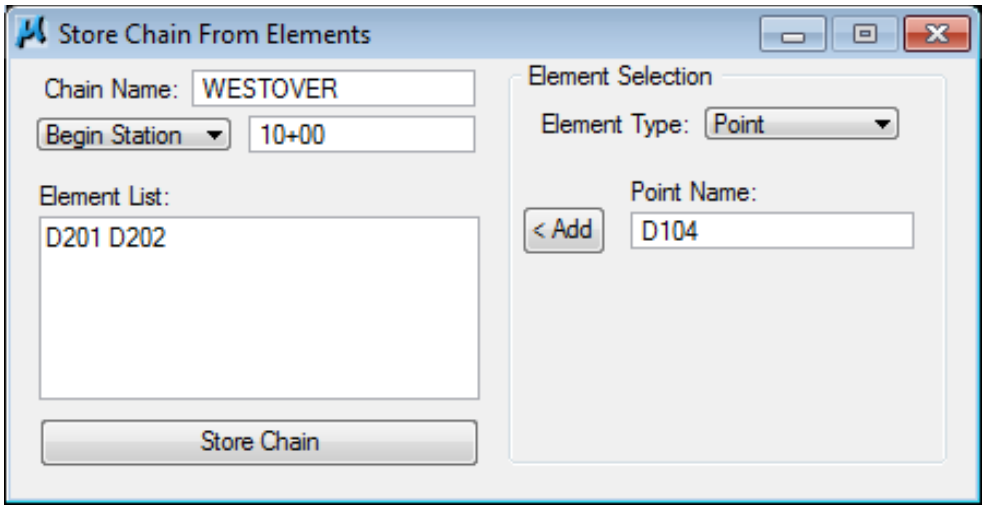


3) Keypoint snap and data point at the ends of our constructed centerline to store points D201 and D202.



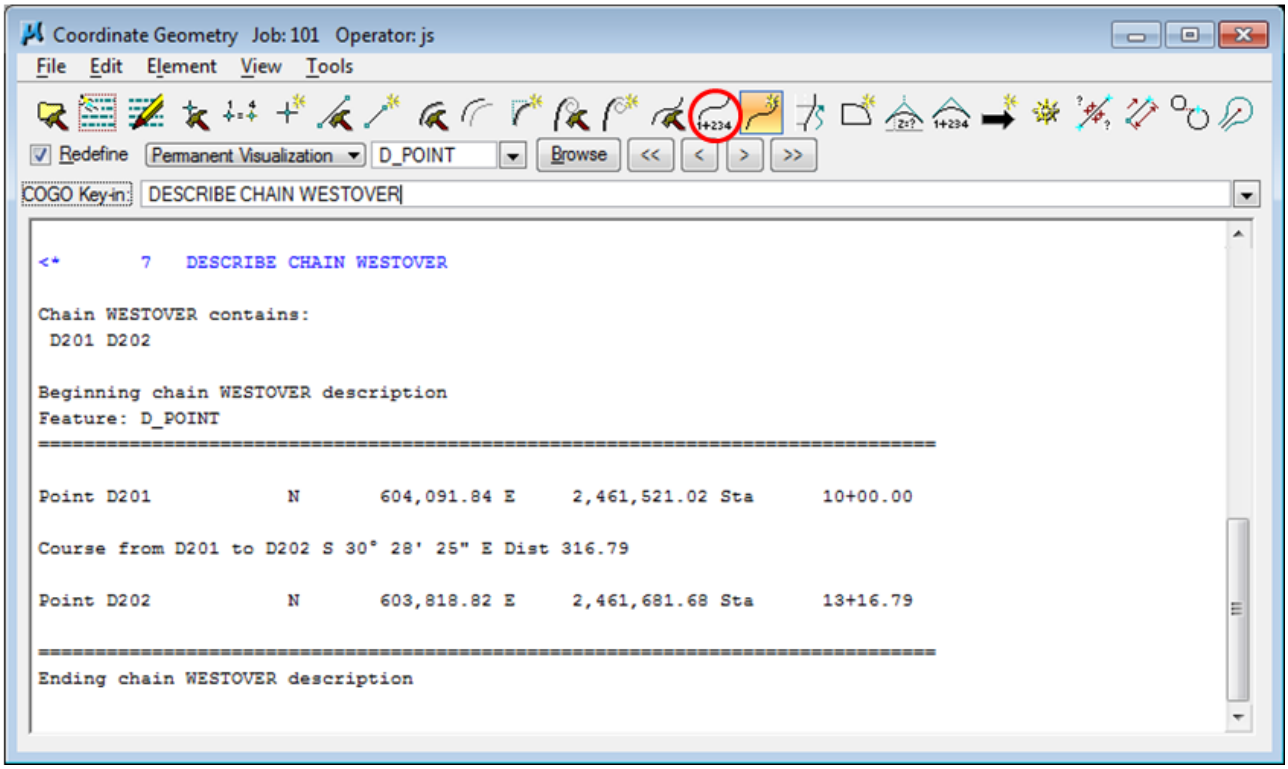
4) Now that our points are stored, we can build a chain from them. Click on the Chain from Elements icon in the main COGO dialog.

Key in chain name WESTOVER and for now set the begin station as 10+00. Double click on our visualized points in MicroStation to build the chain element list.



Click the Store Chain button.

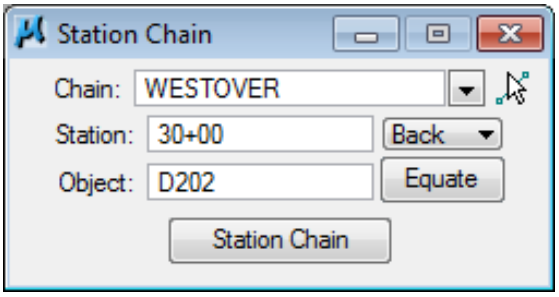
5) Go to COGO Navigator and describe the chain WESTOVER.



We can see that our chain ends at SR95 with an odd station. This station value will vary depending on where point D201 was stored.

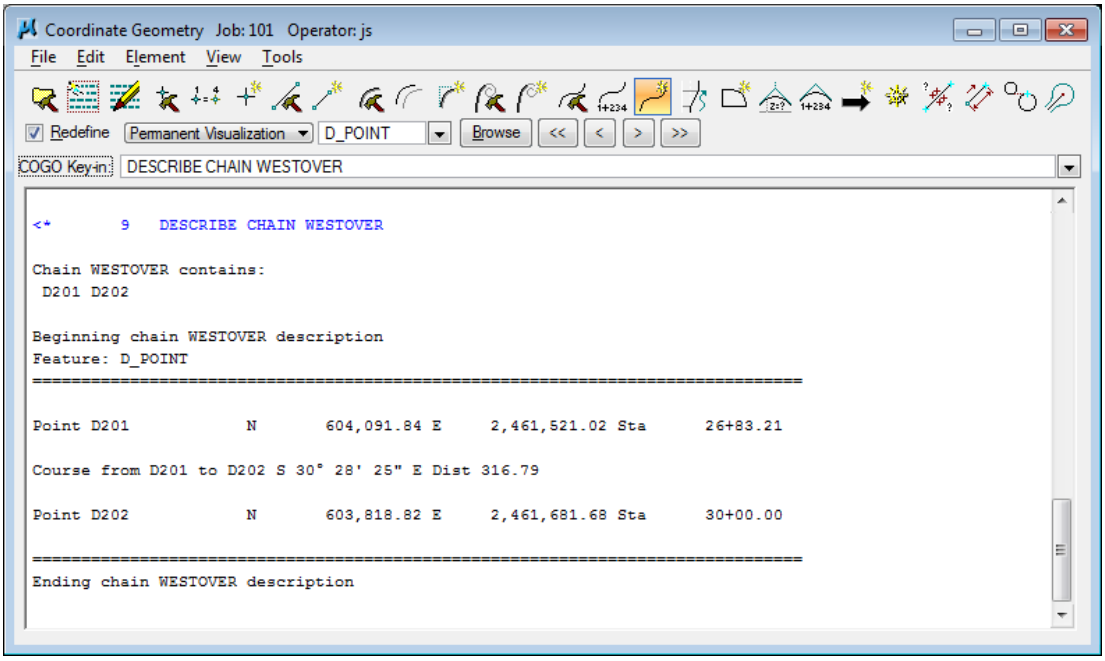
6) Click on the Station Chain icon on the main COGO dialog.

7) In the Station Chain dialog set chain WESTOVER, station 30+00 Back and object point D202. This will back our stationing in from the end giving an even station at the SR95 intersection. When re-stationing a chain, the object stationed from must be a part of the chain.



Turn on Redefine in the main COGO dialog and click the Station Chain button.

8) Go to the Navigator and describe the chain again. It should now end at 30+00.



9) Close COGO and save an input file if you wish.

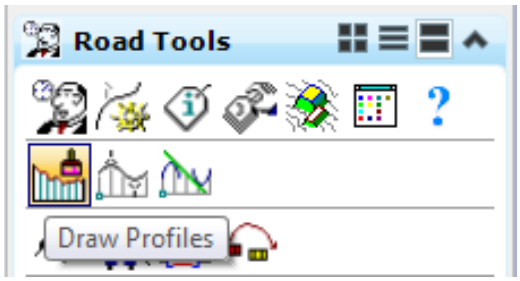
III.) Draw Profile

The proposed tin created for the mainline roadway can be used to help develop side road tie-ins. In this section, we will use the proposed tin which we developed for S.R. 95 with the Draw Profile tool to illustrate cutting a profile across multiple surfaces at one time.

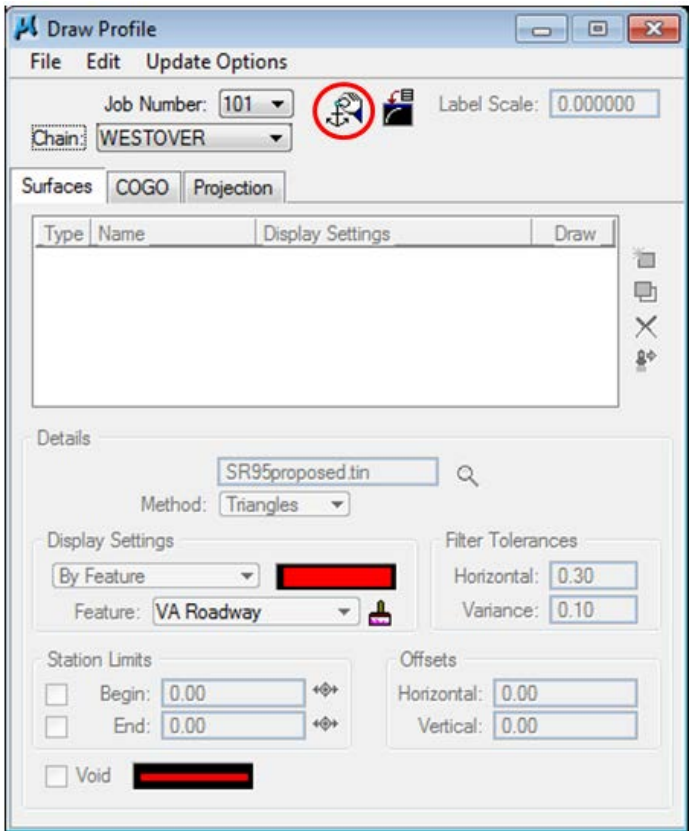
1) Open the Draw Profile dialog. It can be accessed from the MicroStation menu bar drop down location.

Applications → GEOPAK → Road → Plans Preparations → Draw Profiles

or from the Road Tools task group, select the Draw Profiles icon.



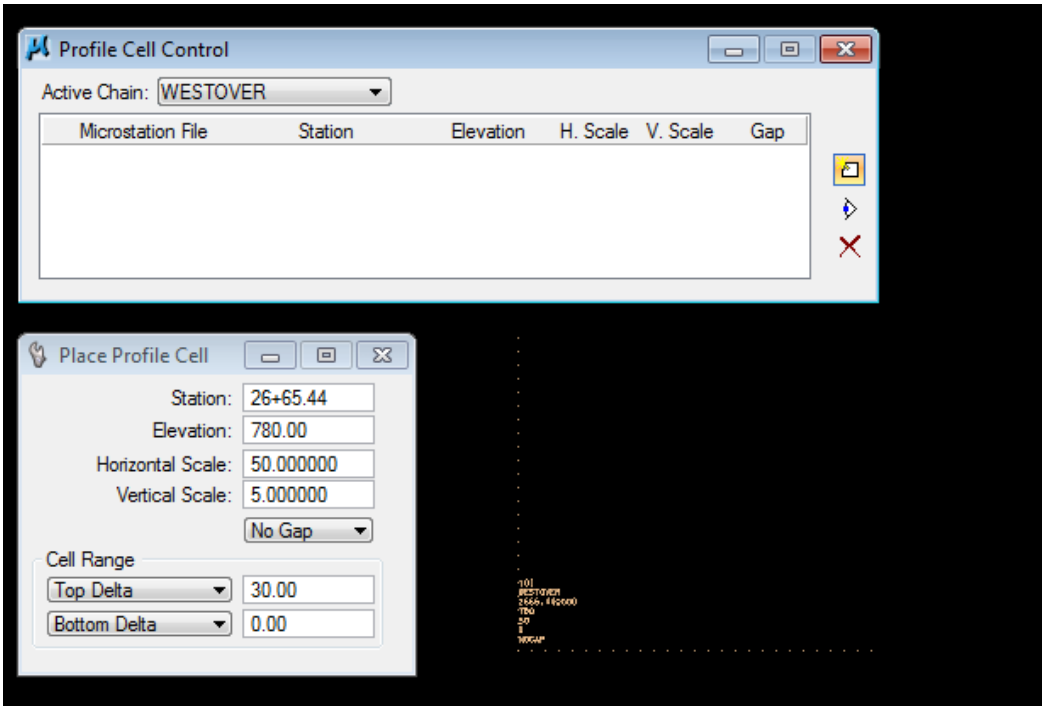
2) The Draw Profiles dialog is opened. You may notice that it is similar in layout to the Draw Cross Sections tool. Set the Job Number to 101 and the chain to our new side road chain, WESTOVER. Many items on the dialog will be dimmed out since we have not created a GEOPAK profile cell or configured a working alignment for this roadway.



3) Zoom out and find a location somewhere below the SR95 profile to place our new profile for WESTOVER. If your view is rotated, you will need to un-rotate it.

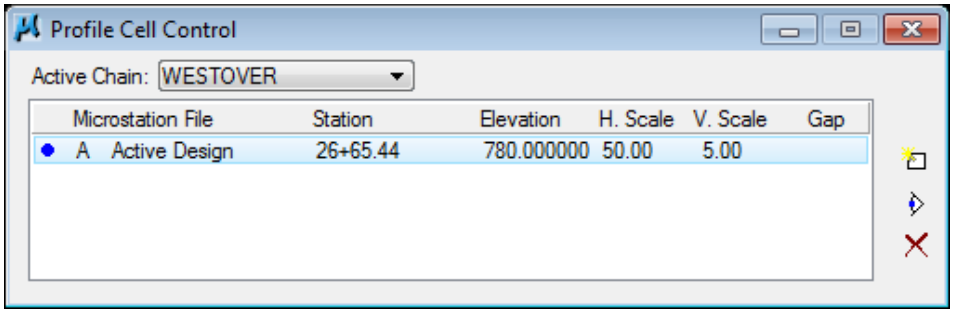
Click on the Dialog Profile Cell Control icon near the top of the Draw Profiles dialog.

Now we can place a GEOPAK profile cell for our side road. Make settings as shown after clicking on the Place Profile Cell icon to the right of the Profile Cell Control dialog. The beginning station is filled in automatically. The value of that station depends on where point D201 was located and may vary from what is shown.



Once settings are made move your cursor into the view, the profile cell is on your cursor waiting for a data point for placement. Data point somewhere below the limits of the SR95 profile cell.

4) Our profile cell data now appears in the Profile Cell Control dialog. We can dismiss this dialog now.

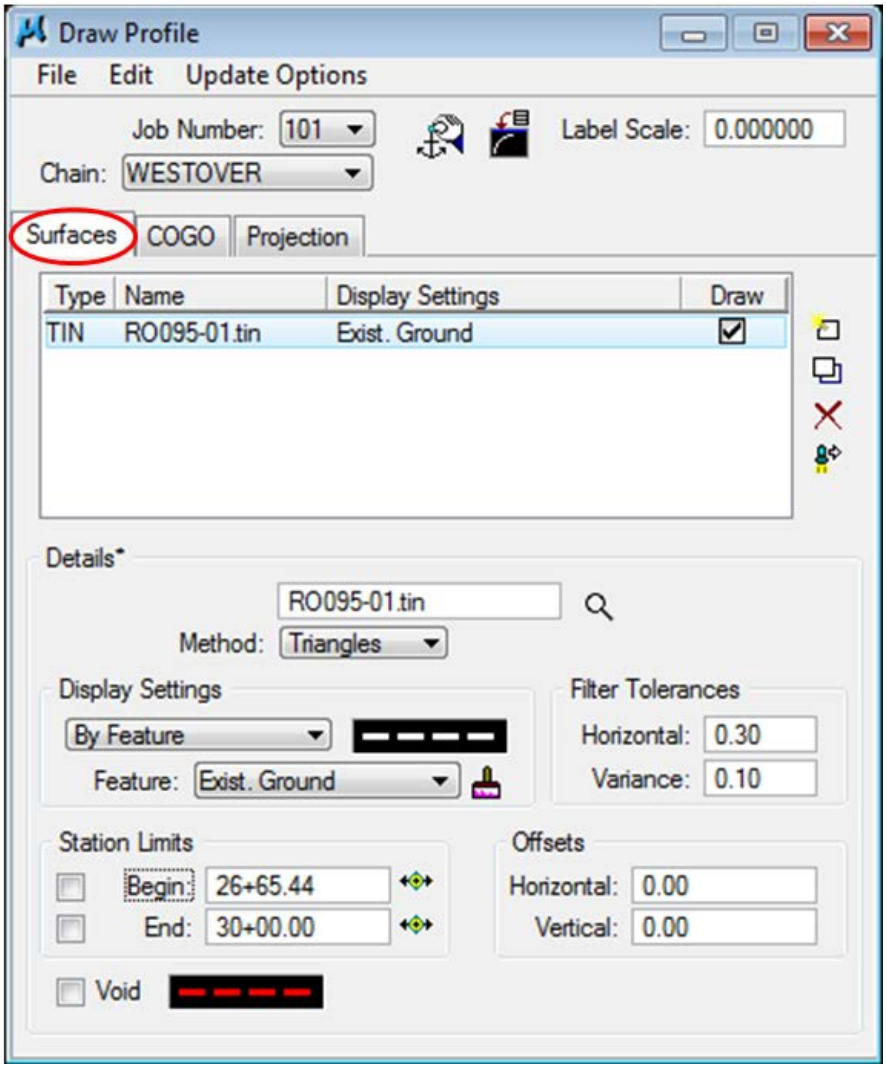


5) In the Draw Profile dialog, we can now set up our surfaces. First, set up the existing as shown.

Use the browse button to set our existing TIN File RO095-01.tin.

Set Display Settings to By Feature and use the D&C Manager item Exist. Ground (found under Existing Profiles in D&C). Click on the paint brush icon to browse the D&C Manager items.

When settings are made, click the Add button to the right of the surface list area.



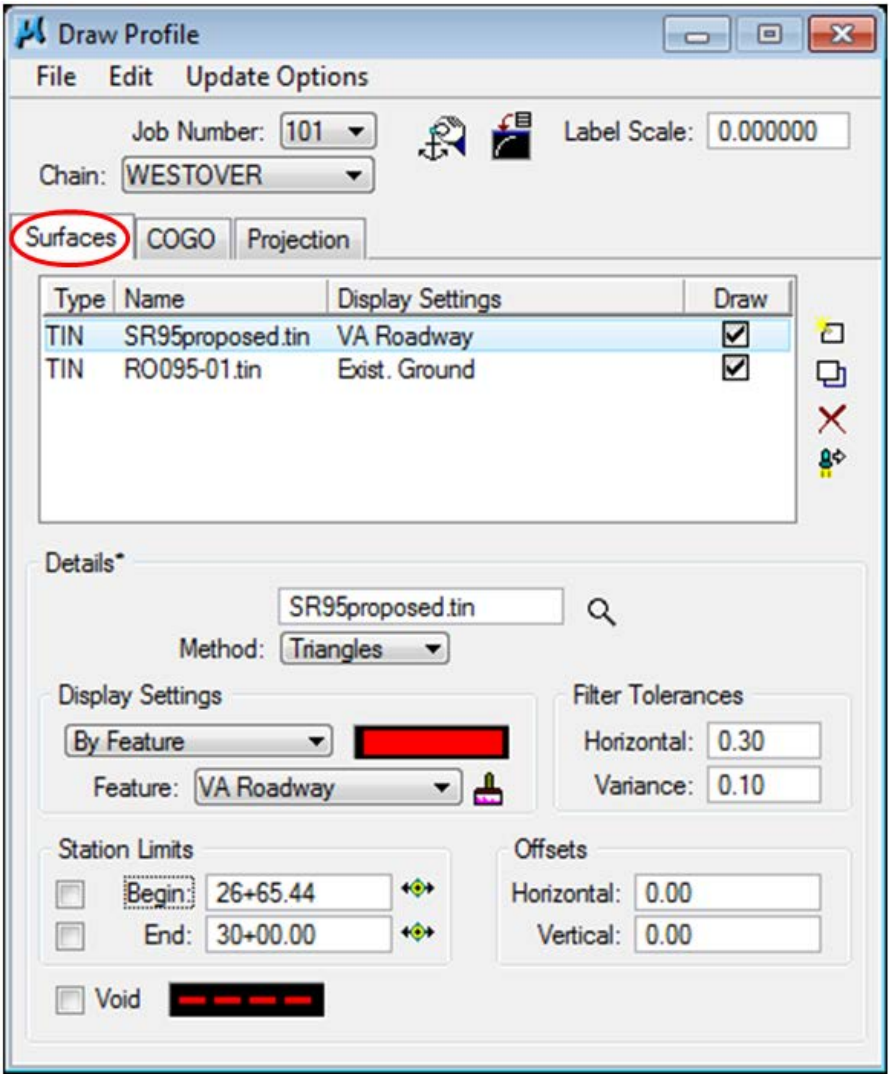
NOTE:
In most cases, Void areas are not encountered along profiles but if needed set the level and symbology to SURVEY - PROFILE - Ground Line with Text, color 6, line code 3 and weight 2.

6) Now set up the proposed surface for SR95 as shown.

Use the browse button to set our proposed TIN File SR95proposed.tin.

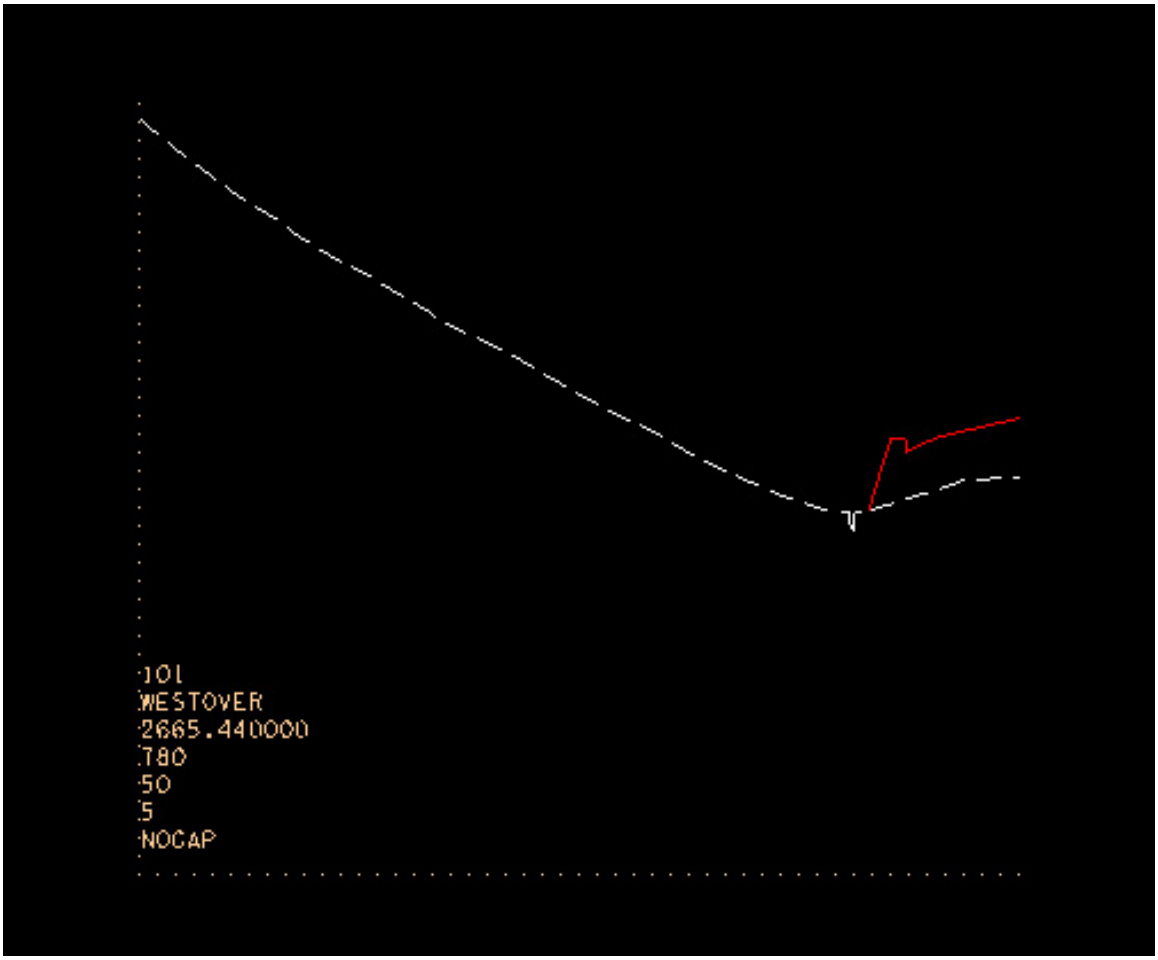
Use the D&C Manager item VA Roadway (found under Roadway Vertical Alignments in D&C).

When settings are made, click the Add button.



7) You may have noticed that as we added the surfaces they are automatically displayed in graphics. Now the Profile Generator tool could be used to develop a proposed vertical alignment profile for Westover Drive.

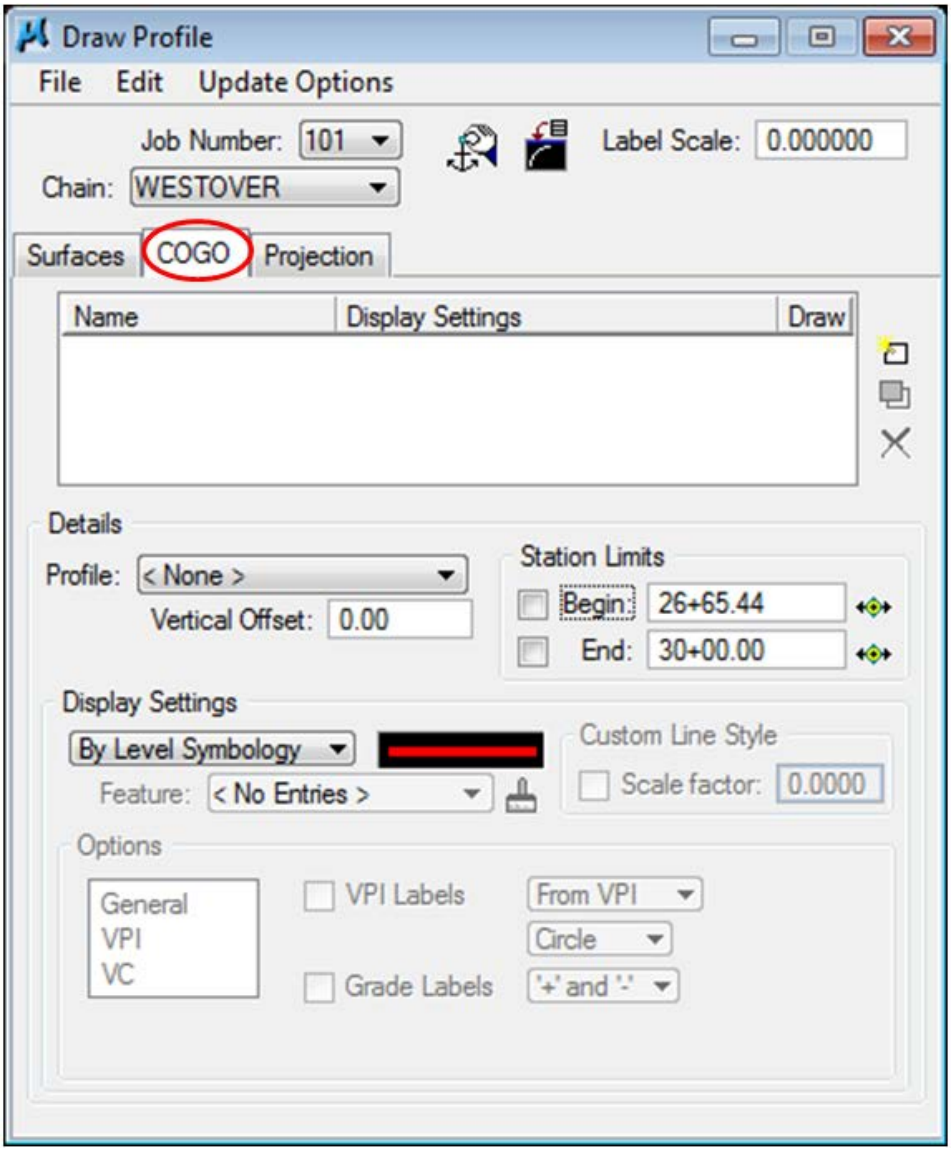
We did not take the time to set up intersection EOP lines across the side road intersection so we can see that the shoulder, curb & sidewalk were included on the proposed TIN surface in that area. The Westover Drive proposed vertical alignment would need to tie in to the outside edge of the SR95 travel lanes.



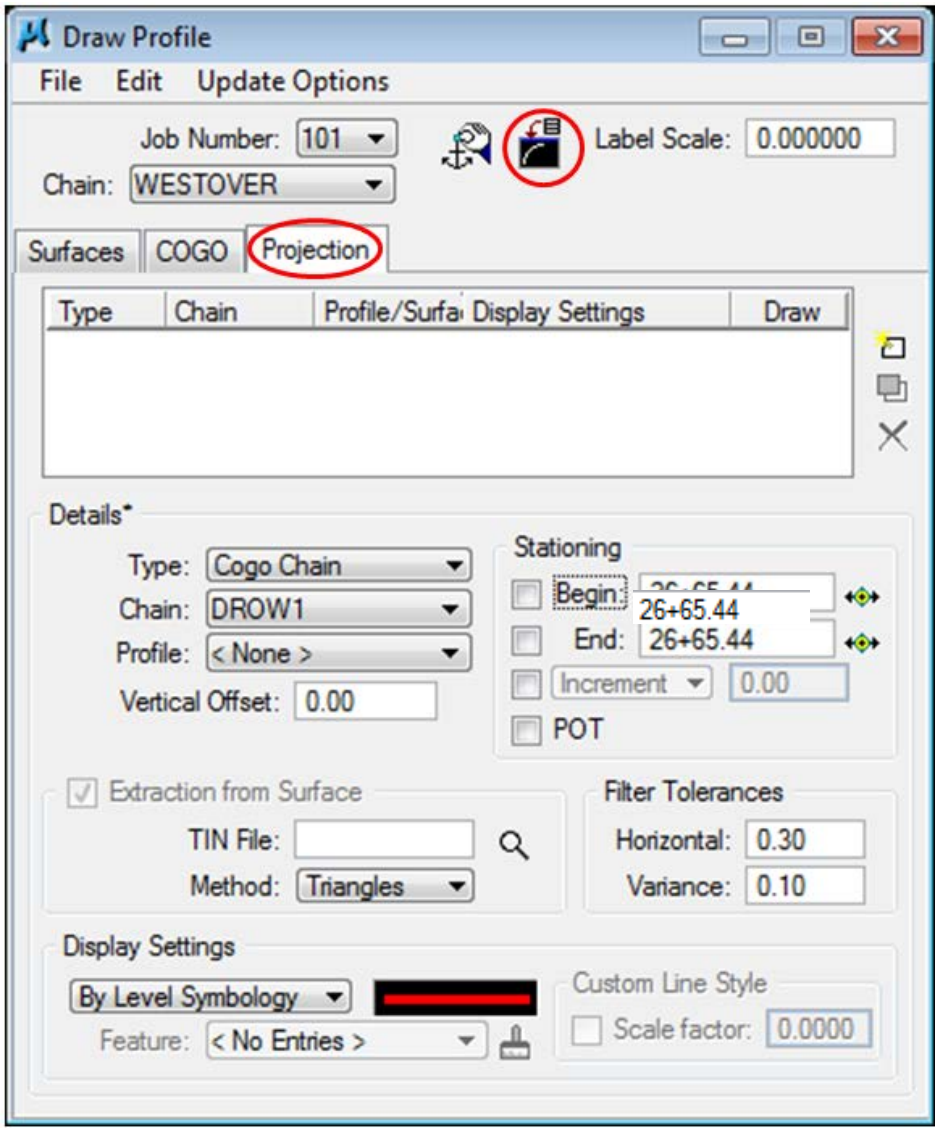
NOTE:
It is not necessary to develop a proposed tin for the mainline to develop side road profile tie-ins. We simply used this as an example to demonstrate the Draw Profile tool.

The information needed to tie in to a mainline road: finished grade elevation, cross slope and grade on the mainline can all be found using the Shape Analyst tools for roadways with superelevation. If the mainline doesn't have superelevation, then the Profile Elevation tool in COGO will provide the information required.

8) We will not do anything with the other tabs in the Draw Profile dialog but take a moment to look at them. The COGO tab can be used to display profiles for this chain which have been developed and stored in the GPK file.



9) The Projection tab can be used to project profiles from other chains as well as survey chains onto this profile. This portion of the tool is used on bridge replacement projects to project existing centerline profiles onto the proposed profile.



10) Anytime data is changed and profiles need to be updated simply open the Draw Profile tool and click the Update Profile icon near the top of the dialog.

11) Close the Draw Profile dialog.