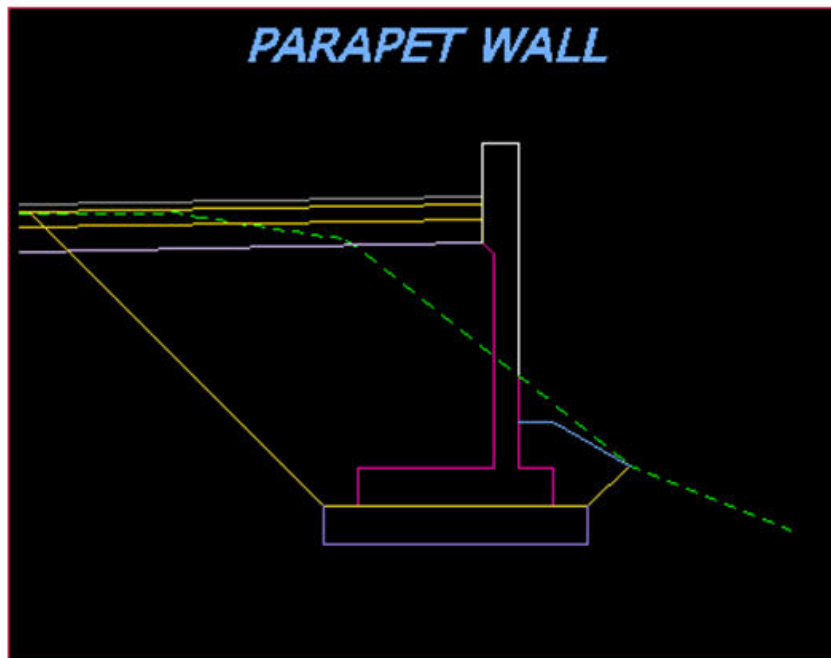


**CFLHD Retaining Layout Procedure Manual**  
**Parapet Walls**

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**CFLHD Retaining Layout Procedure Manual**  
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# CFLHD Retaining Wall Layout Procedure Manual

## Parapet Walls

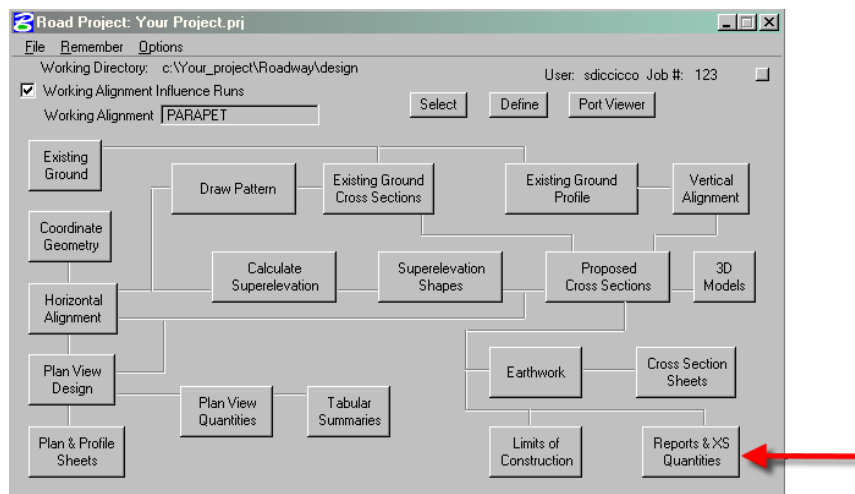
### **About Retaining Wall Layout Procedures (For CFLHD employees)**

The FLH criteria library supports nine wall types; Parapet, MSE, Soil Nail, SMSE, Cut, Fill, Gabion, Guardwall and Rockery. Creating a constructible wall layout is an iterative process, which requires the involvement of the Highway Engineer as well as the Structural and/or Geotechnical Engineer. The process requires two or three phases, depending upon the wall type. The first phase is to create the initial proposed cross sections, using the CFLHD default AdHoc attributes. From these cross sections, several chains and profiles are stored. This information is then given to the Structural/Geotechnical Engineer, to assist in the determination of the appropriate project specific design criteria that will be required. The second phase is to produce proposed cross sections that reflect a constructible wall profile and appropriate site specific design requirements.

### **Workflow: Parapet Wall Layout**

#### **Phase 1**

1. **Draw pattern lines** *every five feet through the wall site in the mainline pattern file. Use a different level for the pattern lines than the mainline cross section pattern lines. If the wall is located on a tight switchback curve, three-foot pattern lines will be needed to provide a smooth wall face. Additional cross sections may be required at the beginning and end to determine where the wall should begin and end.*
2. **Cut existing ground cross sections** *based on the pattern lines created in step 1.*
3. **Run the proposed cross sections.** *Use the default AdHoc attributes for the parapet wall dimensions, with the exception of the Parapet Thickness. Obtain this dimension from the Structural Engineer, as it will vary depending upon the type of wall facing and rail selected.*
4. **To create the Parapet Wall profiles,** *click on Reports & XS Quantities from the Road Project Manager dialog box as shown in the figure below.*



**Figure 1-1: Reports & XS Quantities**

## CFLHD Retaining Wall Layout Procedure Manual Parapet Walls

5. Click on the Profile Grade button in the XS Report dialog box. This will open the Profile Grade Report dialog box. Fill in the Begin and End Station of the parapet wall station range as shown below. Do not include cross sections that do not require a parapet retaining wall.

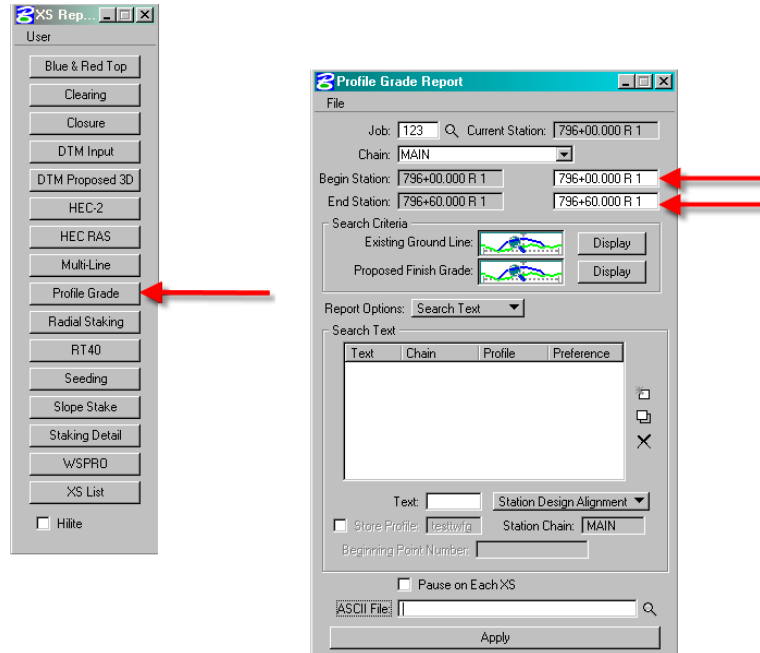


Figure 1-2: Profile Grade and Profile Grade Report

6. Under Search Criteria, click on the button next to Existing Ground Line. Add the Lv Names to the Existing Ground Line dialog as shown in the figure below. The Existing Ground Line dialog box should only have the existing ground level (X\_E\_Ground\_XS) in the Lv Names. Close the dialog box.

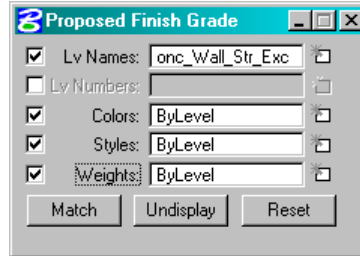


Figure 1-3: Existing Ground Line Dialog

7. Under Search Criteria, click on the button next to Proposed Finish Grade. Add the Lv Names to the Proposed Finish Grade dialog. The Proposed Finish Grade must travel from

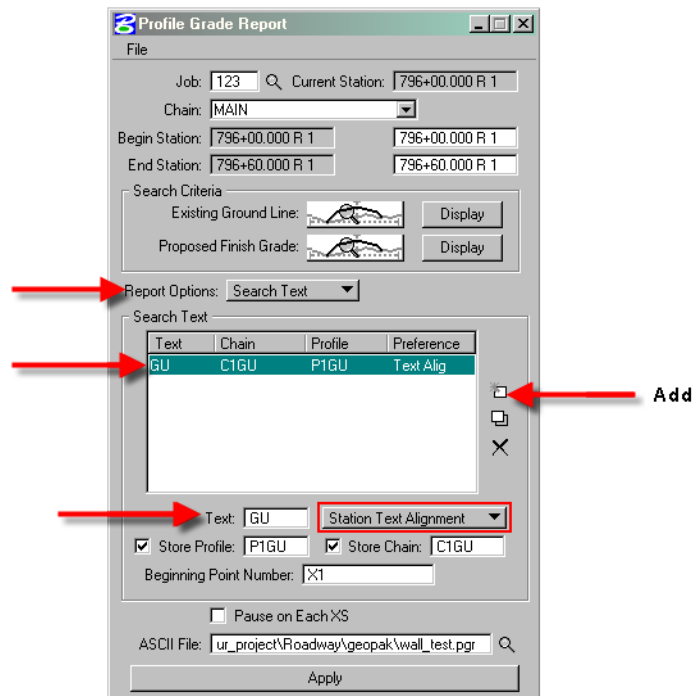
## CFLHD Retaining Wall Layout Procedure Manual Parapet Walls

catch point to catch point, and it must pass through the text points GU and BWFB (See Figure 1-7 for text locations). The following levels must be specified for a parapet retaining wall: X\_P\_Conc\_Wall\_Above; X\_P\_Conc\_Wall\_Below and X\_P\_Conc\_Wall\_Str\_Exc. The existing ground level (X\_E\_Ground\_XS) must also be included, to locate the TWFG text. Close the dialog box.



**Figure 1-4: Proposed Finish Grade Dialog**

8. Pull down the Search Text menu and fill in the text dialog box as shown below. Select Station Text Alignment from the pull down menu. The Beginning Point Number should not be a point used in any other chain. Click on the Add tab to populate the search text field.

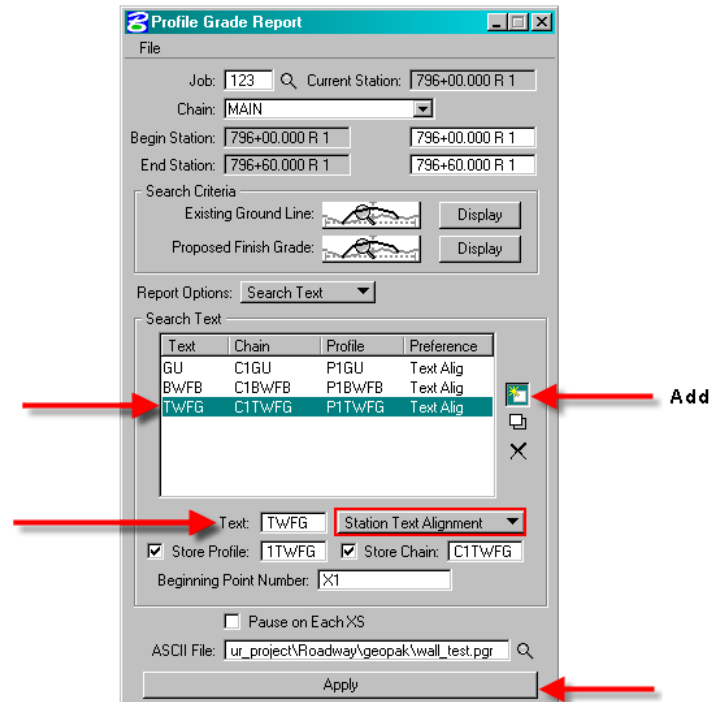


**Figure 1-5: Add Profile & Chain at Gutterline (GU)**

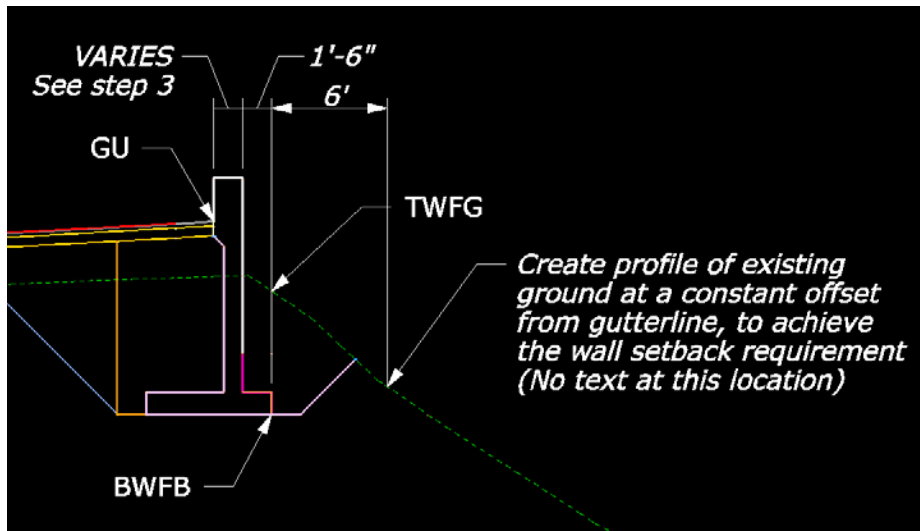
9. Add the search text for the Bottom of Wall Footing Back (BWFB) as shown below. Click on the Add tab to add the text to the search text box. Add the search text for the existing

## CFLHD Retaining Wall Layout Procedure Manual Parapet Walls

*ground at the wall footing (TWFG). Click on the Apply button to generate the chains and profiles based on the locations of the GU, BWFB and TWFG text (See Figure 1-7).*



**Figure 1-6: Add Profile & Chain at Bottom of Wall at Footing Back (BWFB) and at Existing Ground at Footing of Wall (TWFG)**



**Figure 1-7: Search Text Locations**

**Note: All chains will begin at station 0+00**

## CFLHD Retaining Wall Layout Procedure Manual

### Parapet Walls

10. Create a new design file for the wall profiles (See CADD Standards Manual for naming conventions). Open the Draw Profile from the Geopak Road Tools dialog as shown in the figure below.

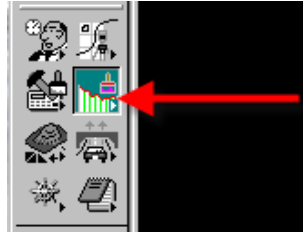


Figure 1-8: Geopak Tool Draw Profile

11. Select the gutterline chain (C1GU) in the Draw Profile Dialog box. Click on the dialog for Profile Cell Control as shown below.

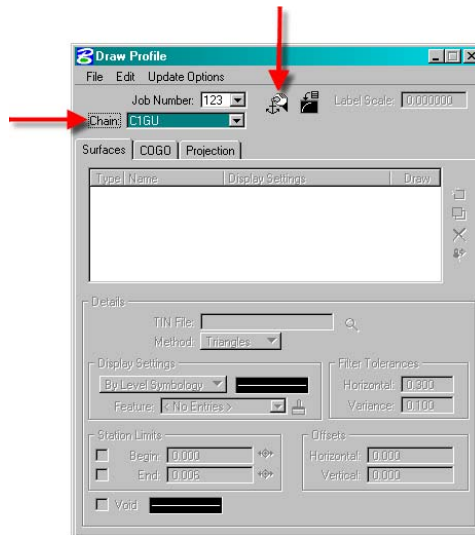


Figure 1-9: Geopak Tool Draw Profile

12. Select the Active chain. Click on the Place Profile Cell in the Profile Cell Control dialog box as shown in the figure below.

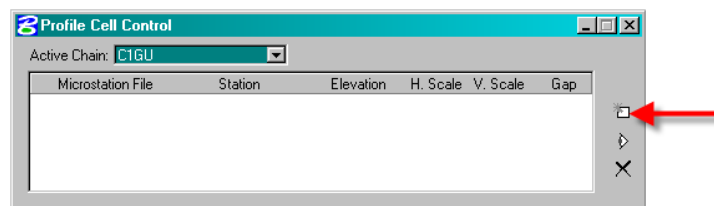
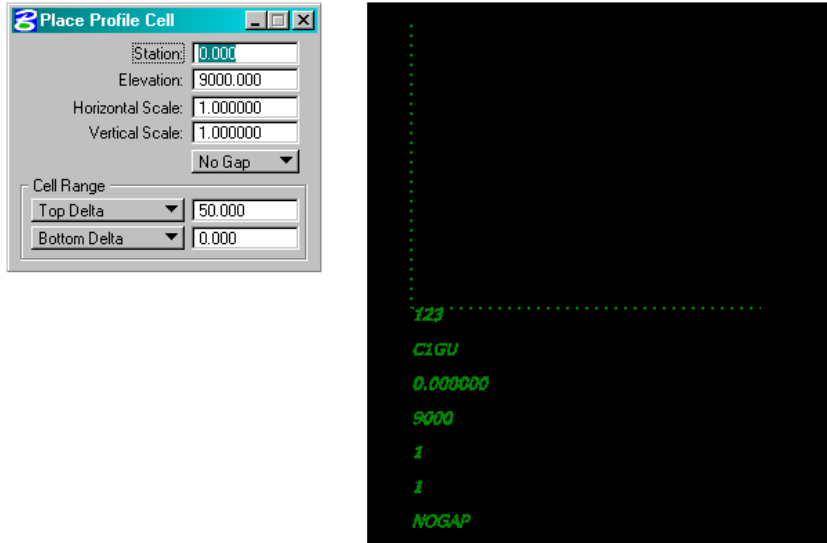


Figure 1-10: Profile Cell Control

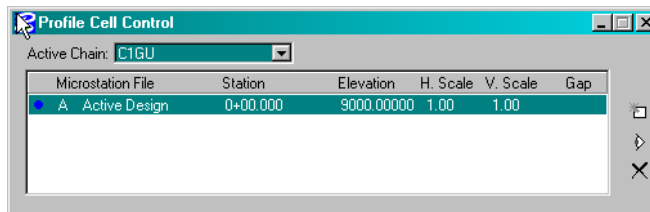
13. Enter the beginning station, elevation (lower than proposed cross sections) and 1:1 scale in the Place Profile Cell dialog box. Then place the cursor in the View 1 window and click to place the profile cell location as shown in below.

## CFLHD Retaining Wall Layout Procedure Manual Parapet Walls



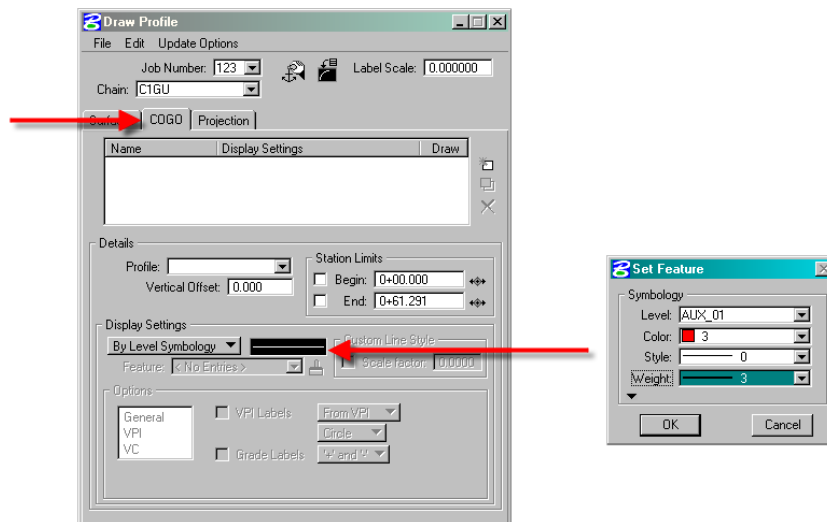
**Figure 1-11: Place Profile Cell**

14. The Profile Cell Control will appear with the Active Chain information as shown in the figure below. Close the Profile Cell Control box.



**Figure 1-12: Active Profile Cell Information**

15. Click on the COGO tab in the Draw Profile dialog box. Double click on the By Level Symbology field. Change the level symbology as shown below.

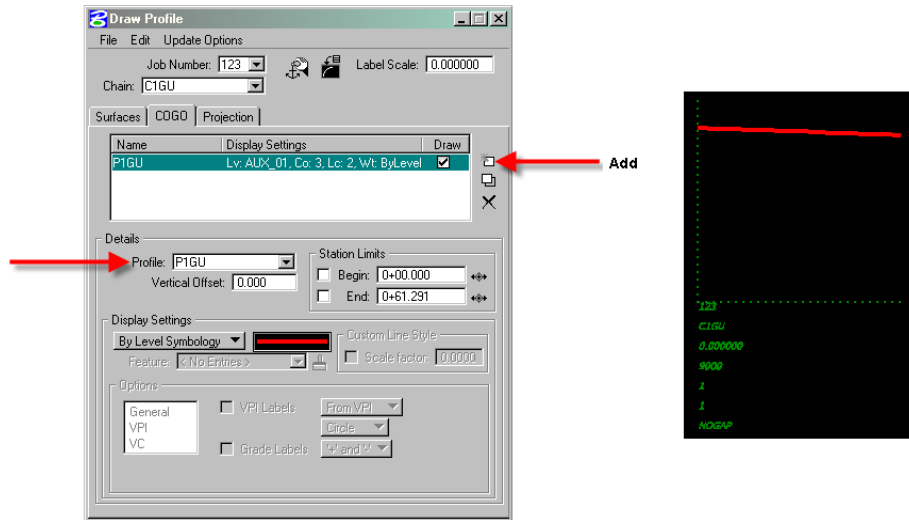


**Figure 1-13: Draw Profile COGO Tab**



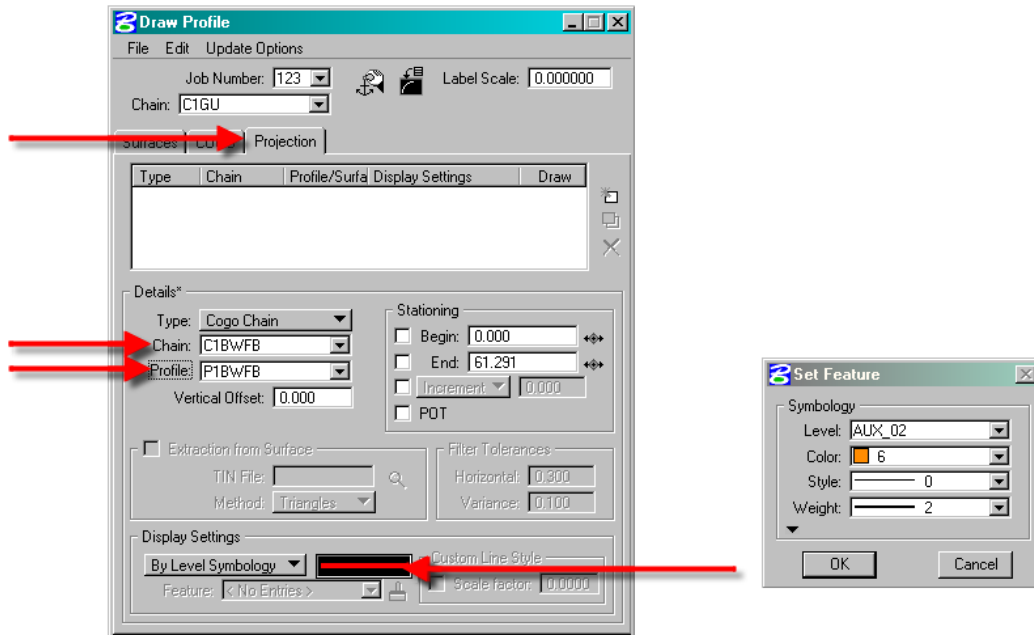
## CFLHD Retaining Wall Layout Procedure Manual Parapet Walls

16. Select the gutterline profile (P1GU) and click on the Add COGO Profile Settings as shown below. The gutterline profile will display in the design file.



**Figure 1-14: Draw Gutterline Profile**

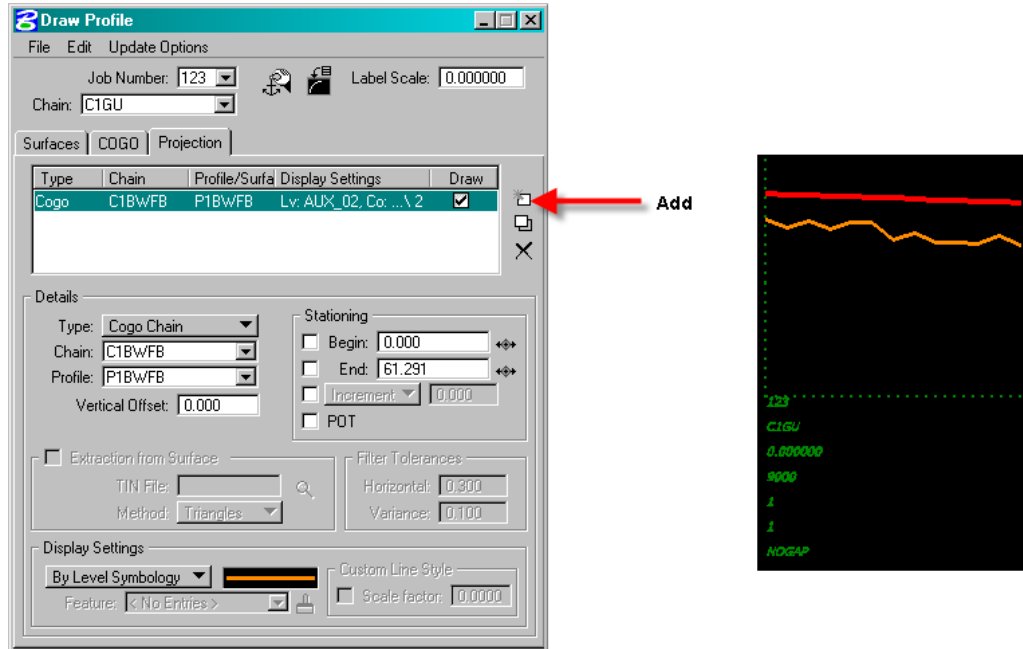
17. Click on the Projection tab in the Draw Profile dialog box. Select the chain and profile for the BWFB text. Double click on the By Level Symbology field and select the symbology as shown in the figure below and click on OK.



**Figure 1-15: Project Profile for BWFB**

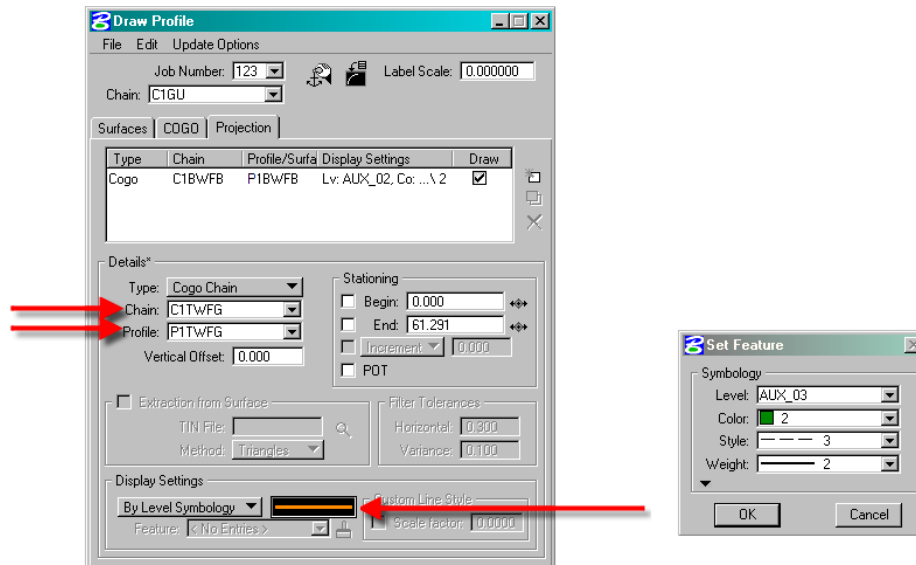
## CFLHD Retaining Wall Layout Procedure Manual Parapet Walls

18. Click on the Add COGO Profile Settings as shown in the figure below. The bottom of wall profile will be displayed in the design file.



**Figure 1-16: Draw Bottom of Wall Profile**

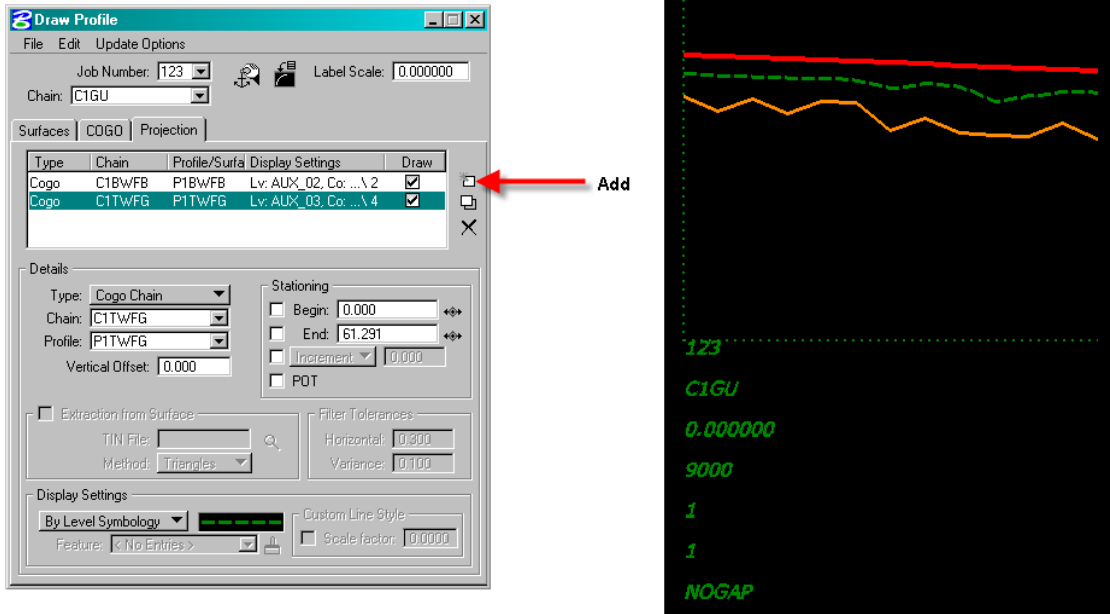
19. Change the Details in the Draw Profile dialog box to the TWFG profile. Double click on the By Level Symbology field and select the symbology as shown below and click on OK.



**Figure 1-17: Project Profile for TWFG**

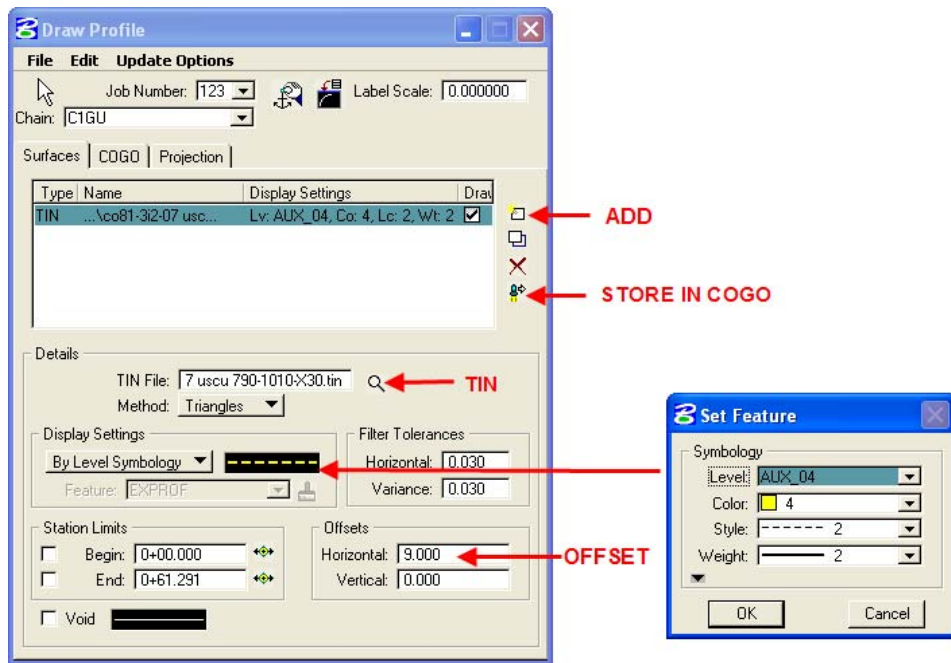
## CFLHD Retaining Wall Layout Procedure Manual Parapet Walls

20. Click on the Add COGO Profile Settings as shown below. The existing ground profile at the wall footing will display in the design file.



**Figure 1-18: Draw Profile of Existing Ground at Footing Back**

21. Create a profile of the existing ground at a constant offset (9-ft) from the gutterline chain (C1GU), (See Figure 1-7 for location). Select the Surfaces tab on the Draw Profile dialog, select the project TIN File, set the Display Settings as shown, add in a horizontal offset and select add to display the profile. To store the profile, select the "store in COGO" icon.



**Figure 1-19: Draw Profile at Existing Ground at Offset from Gutterline**

**Note: Offsets to the left are negative values and offsets to the right are positive.**

## CFLHD Retaining Wall Layout Procedure Manual Parapet Walls

22. Label the profiles as shown below.

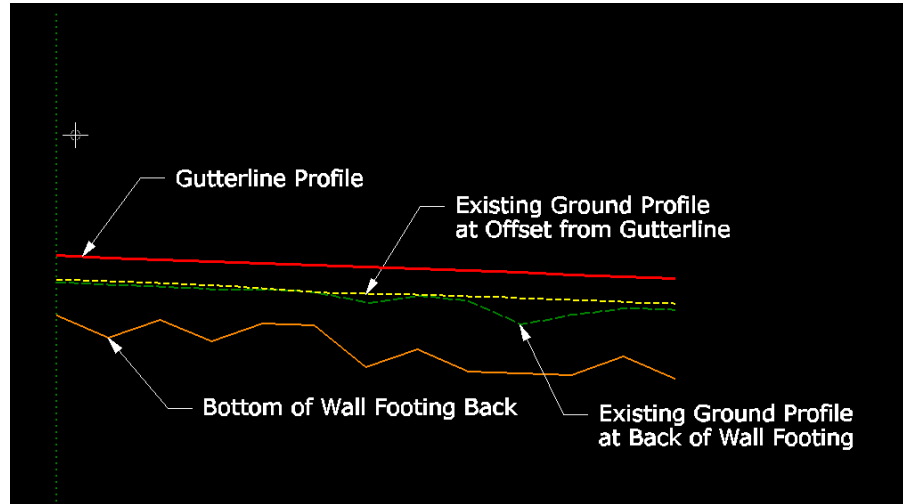


Figure 1-20: Labeled Wall Profiles

23. Send the dgn files with the plan view, profiles and cross sections to the Structural Engineer for the final wall layout design. Provide the Chain and Profile names for the four profiles. Include a print out of the AdHoc attributes used for the parapet wall as shown below.

Name	Type	Value
Parapet Thickness	Numeric	1.500000
Parapet Height	Numeric	2.250000
Embedment Depth	Numeric	2.000000
Structure Exc Width	Numeric	1.500000
Wall Exc Slope Back	String	1:1
Wall Exc Slope Front	String	1:1
Wall Backfill Depth	Numeric	2.000000
BottomFootingProfName	String	none
GutterlineChainName	String	none
Foundation Depth	Numeric	0.000000

Figure 1-21: Printout of AdHoc Attributes used for Phase 1 Parapet Wall Layout

# CFLHD Retaining Wall Layout Procedure Manual

## Parapet Walls

### Phase 2

1. The Structural Engineer will provide a dgn file containing the designed profile for the bottom of the parapet wall footing. Store the profile supplied by the Structural Engineer as P1BFFP, based on the gutterline chain created in Phase 1 (C1GU). Click on Vertical Alignment from the Road Project Manager dialog box as shown below.

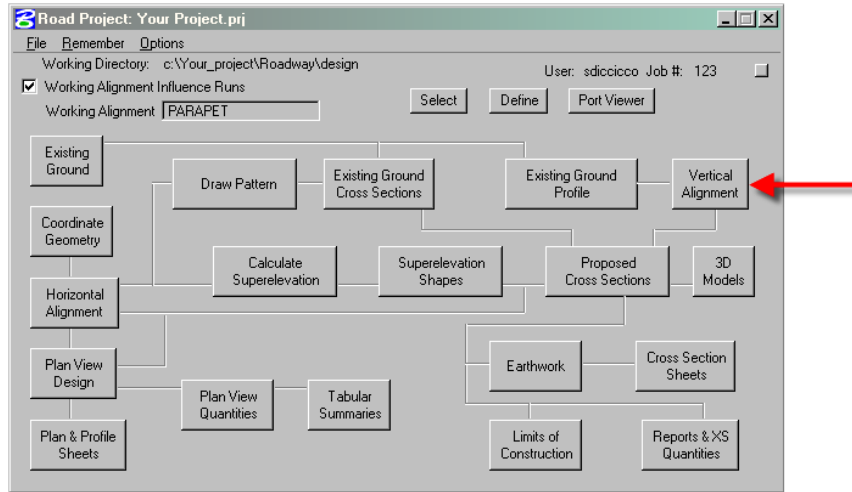


Figure 2-1: Vertical Alignment

2. From the Settings dialog box, click on Identify Cell or select PGL Chain C1GU. Enter a Horizontal and Vertical Scale of 1. Click on the DP button and tentative snap to the origin of the Profile Cell and accept the data point. Click on OK.

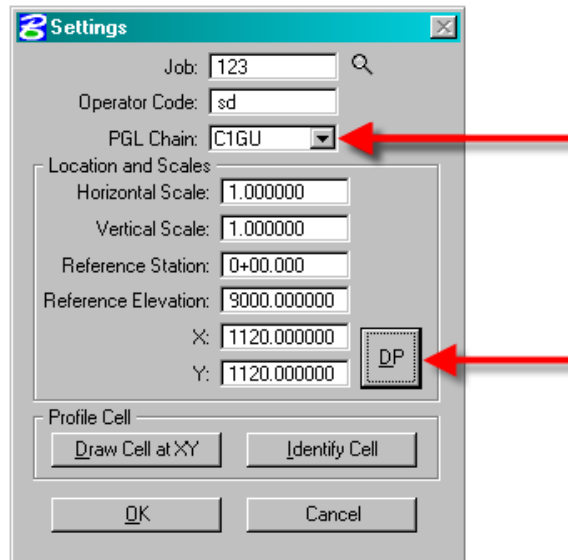


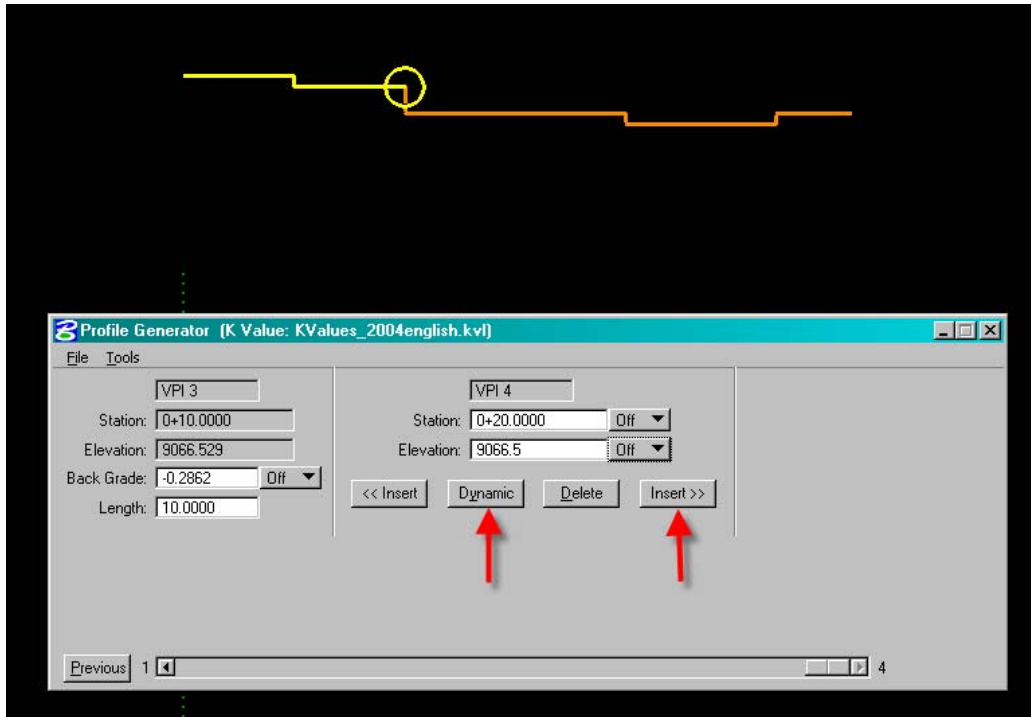
Figure 2-2: Vertical Alignment Settings Dialog

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### Parapet Walls

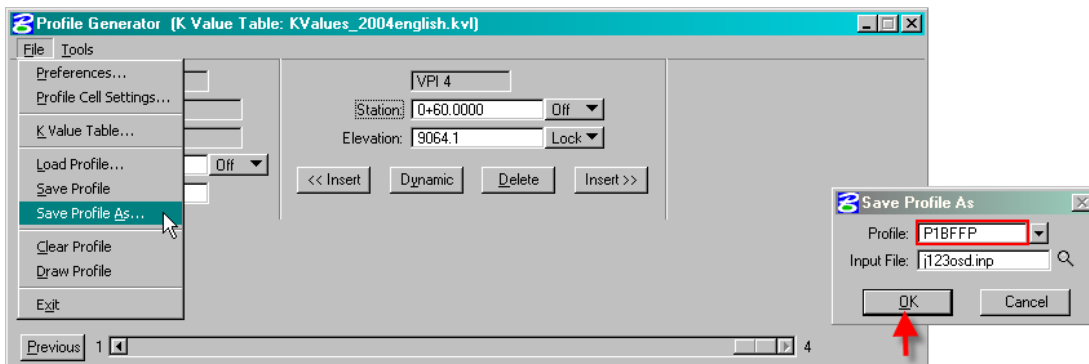
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3. Click on the Dynamic button on the Profile Generator dialog box. Tentative Snap to the first VPI of the Parapet Wall Footing Profile and accept it. Click on the Insert button and then the Dynamic button. Tentative Snap to the second VPI and accept it. Continue the process until the entire profile has been input.



**Figure 2-3: Generate Phase 2 Profile for Bottom of Parapet Wall Footing Using Profile Generator**

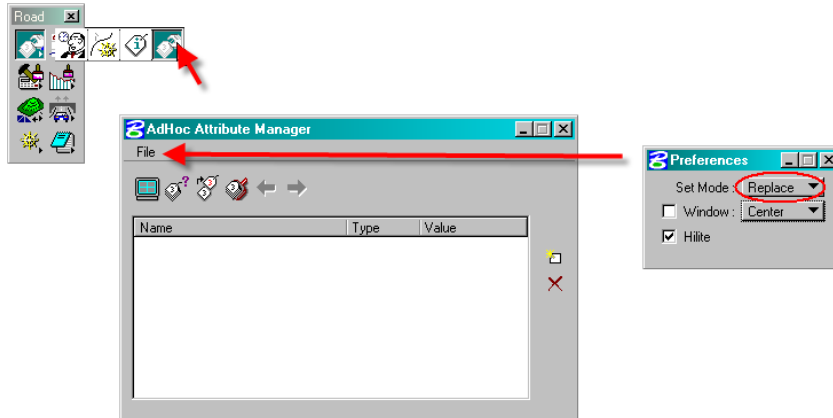
4. Click on File and select Save Profile As. Save the profile as P1BFFP (Profile 1 Bottom of Footing Final Profile). Click on OK.



**Figure 2-4: Save Phase 2 Profile for Bottom of Parapet Wall Footing**

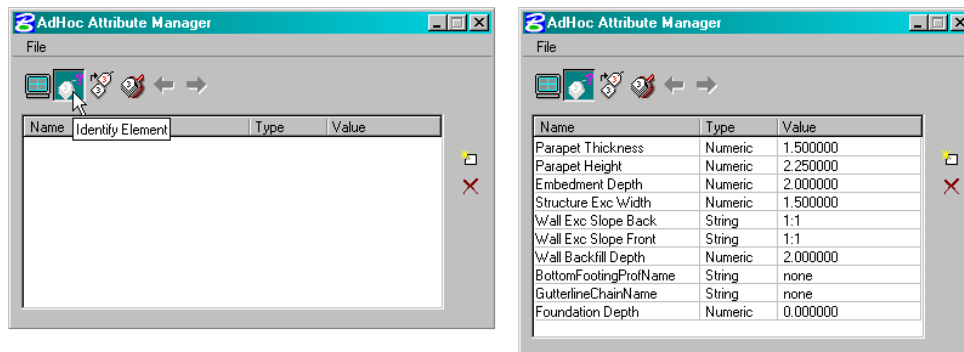
## CFLHD Retaining Wall Layout Procedure Manual Parapet Walls

- Open the proposed plan dgn file *containing the parapet wall AdHoc line*. Open the AdHoc Attribute Manager as shown below. Click on File then Preferences. The Set Mode should be set to Replace. Close the Preferences dialog box.



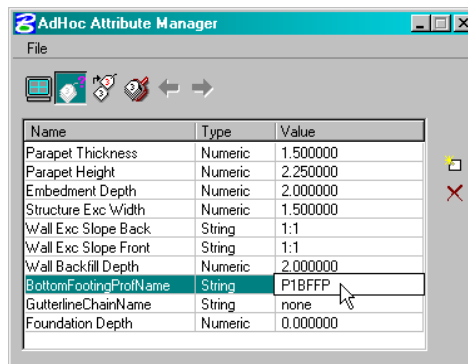
**Figure 2-5: AdHoc Attribute Manager**

- Click on the Identify Element button as shown below. Double click on the plan view parapet wall line. The AdHoc Attributes of the line will then be displayed in the field.



**Figure 2-6: Identify Element**

- To change any of the values, click on the value and type in the desired change as shown below. Include the bottom of wall footing profile, the gutterline chain and all other design parameters supplied by the Structural Engineer.



**Figure 2-7: Adjust the AdHoc Values**

## CFLHD Retaining Wall Layout Procedure Manual Parapet Walls

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8. If the Design and Computation Manager is open, make sure that the 'Place Influence' and 'AdHoc Attributes' are toggled off as shown below.

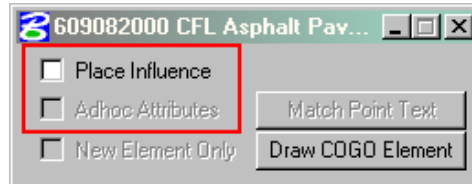


Figure 2-8: Toggle Place Influence Off

9. Click on the Set Attributes button as shown below. Click on the Parapet wall line to identify it, and click again to accept the changes. To check if the changes have been stored, use the Identify Element button as described in step 6.

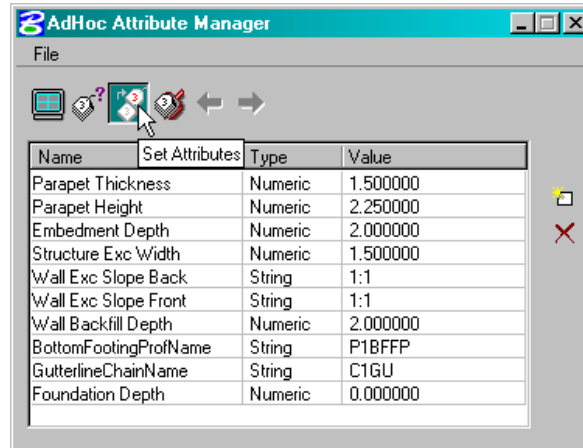


Figure 2-9: Change Parapet Wall AdHoc Attributes

10. Re-run the proposed cross sections *with the new AdHoc attributes*.
11. Re-draw the profiles *as described in the Phase 1 procedures*.
12. Send the *dgn files with the plan view, cross sections and profiles to the Structural Engineer for review. Include a print out of the Adhoc attributes as shown in the figure above. Additional iterations of phase 2 procedures may be required.*