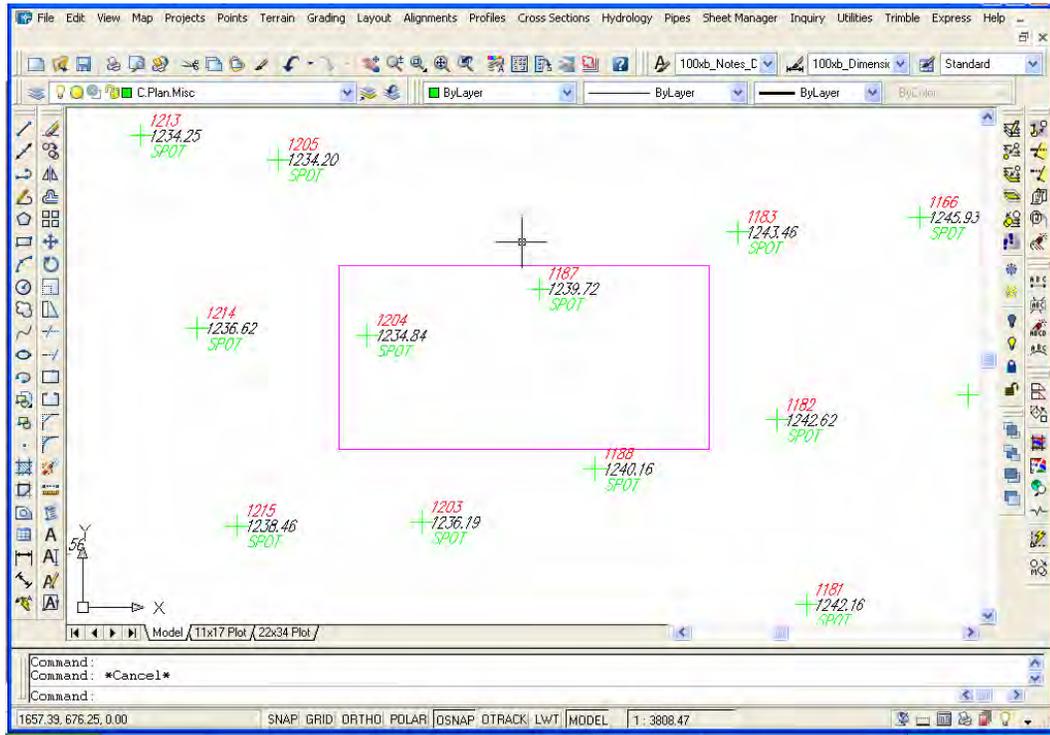


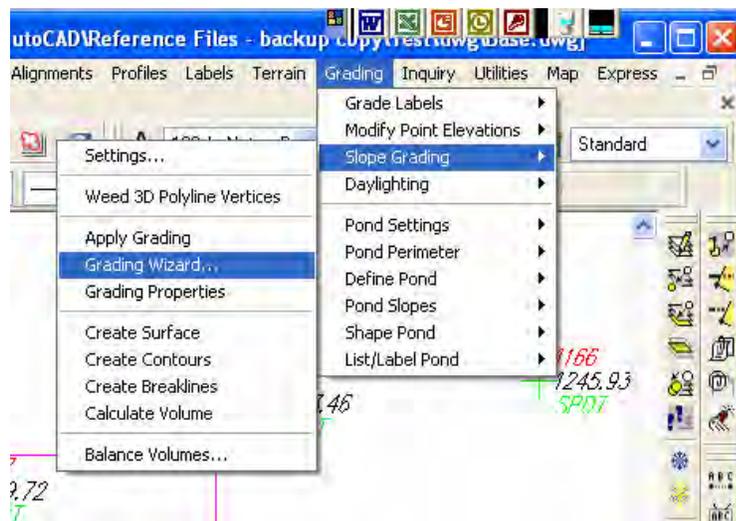
## CREATING COMPOSITE GRADING OBJECTS

The following example illustrates how to create a composite grading object for a pit which slopes up from a bottom elevation of 1230 at a 4:1 slope to a 10-foot wide berm with a top elevation of 1245 and then down from the top of berm elevation to existing ground at a 3:1 slope. You will need to have an original ground surface created before starting this procedure.

1. Create a polyline (for example, a rectangle) with an assigned elevation of 1230 to represent the floor of the pit. In this example, the pit footprint measures 100 feet by 50 feet.

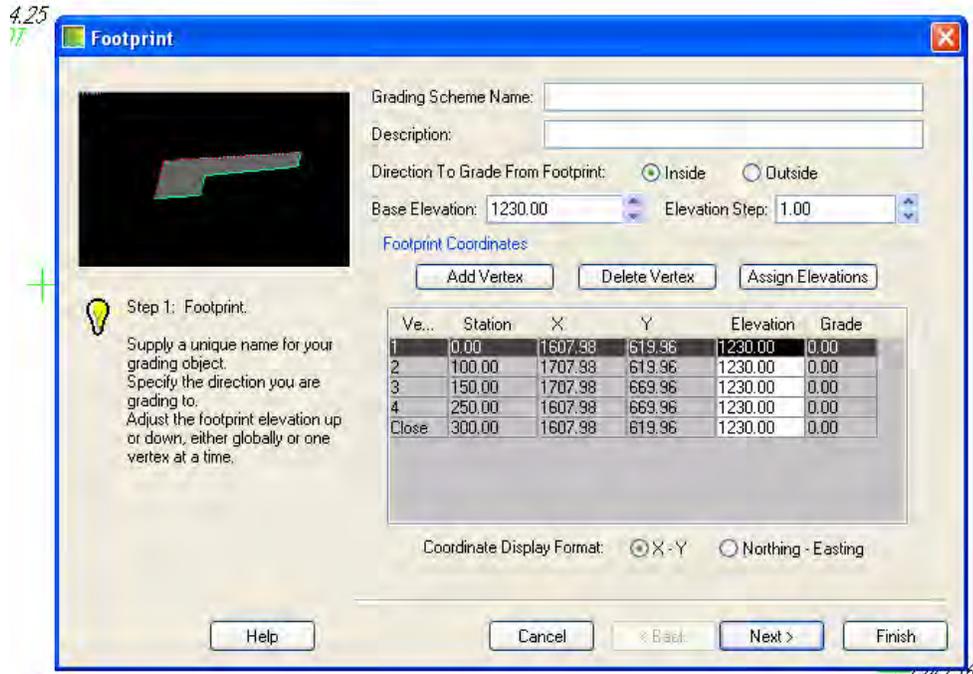


2. Create your first grading object using the Grading Wizard. This object will represent the grading from the bottom of the pit using the footprint you created in Step 1 up to the top of dike elevation.
  - a. Begin by starting the Grading Wizard.



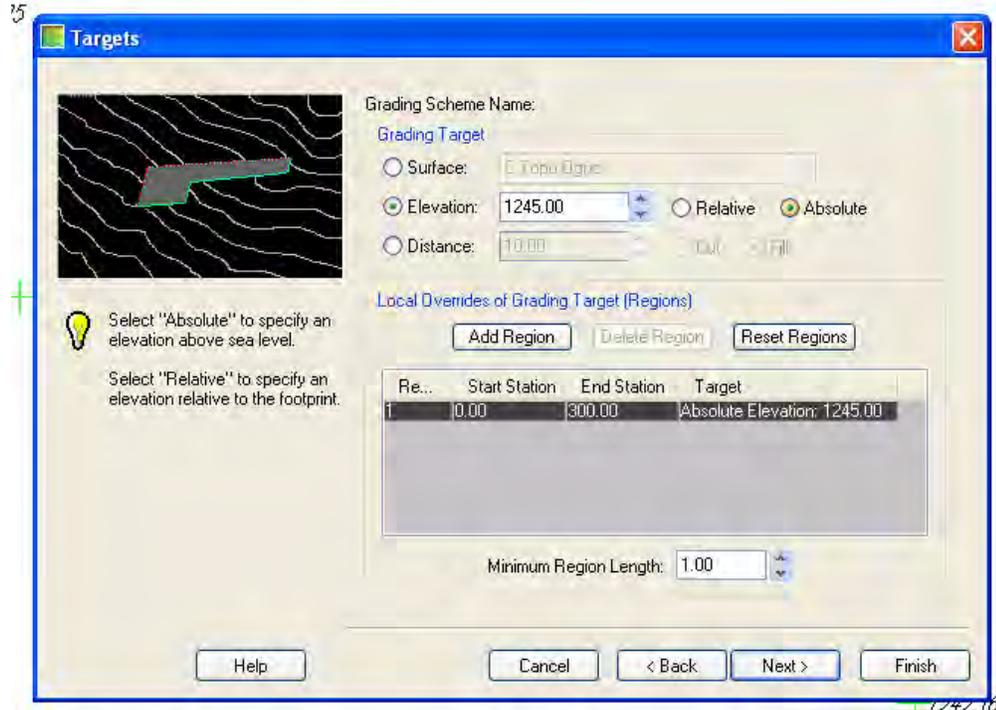
## CREATING COMPOSITE GRADING OBJECTS

- b. You will be prompted at the command line to select a polyline, line, arc, or grading object. Select the footprint polyline you created in Step 1.
- c. Once you select the footprint object, you will be prompted to pick a side. In this example, we are grading up from a polyline which represents the bottom of a pit so you need to click outside of the footprint polyline.
- d. Once you pick a side, the Footprint window of the grading wizard will appear. In this window, you can assign a name and description to the grading scheme if you wish (these fields are optional). Since we assigned an elevation to the footprint object in Step 1, the grading wizard has automatically inserted the object's vertex elevations into the table. The elevations in this table can be manually edited here if you want to change all or some of the vertex elevations. Click on the Next> button after you verify that the information in this window is correct.



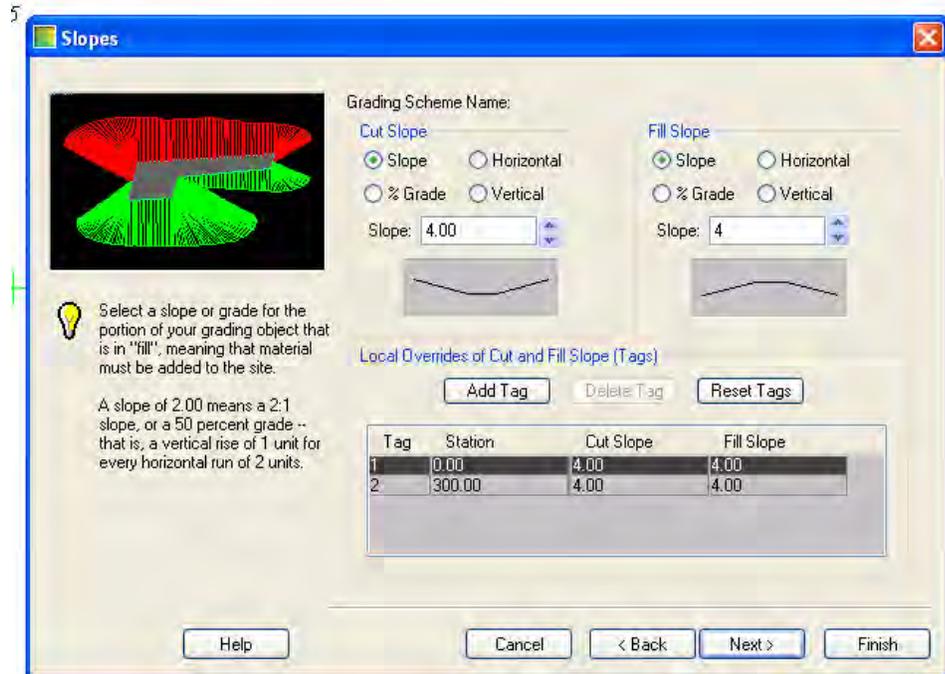
## CREATING COMPOSITE GRADING OBJECTS

- e. The next window to appear will be the Targets window. To grade up to a top of berm elevation of 1245, select "Elevation" under the Grading Target selection area, type in the elevation, and be sure the "Absolute" selection is picked. You could also achieve the same result using the "Relative" option. "Relative" allows you to grade up or down a given distance from the base elevation of your grading footprint. For example, you could grade to a relative elevation of +15 to reach a top of berm elevation of 1245 from the pit floor elevation of 1230. Click on the Next> button when you are finished selecting your grading target.

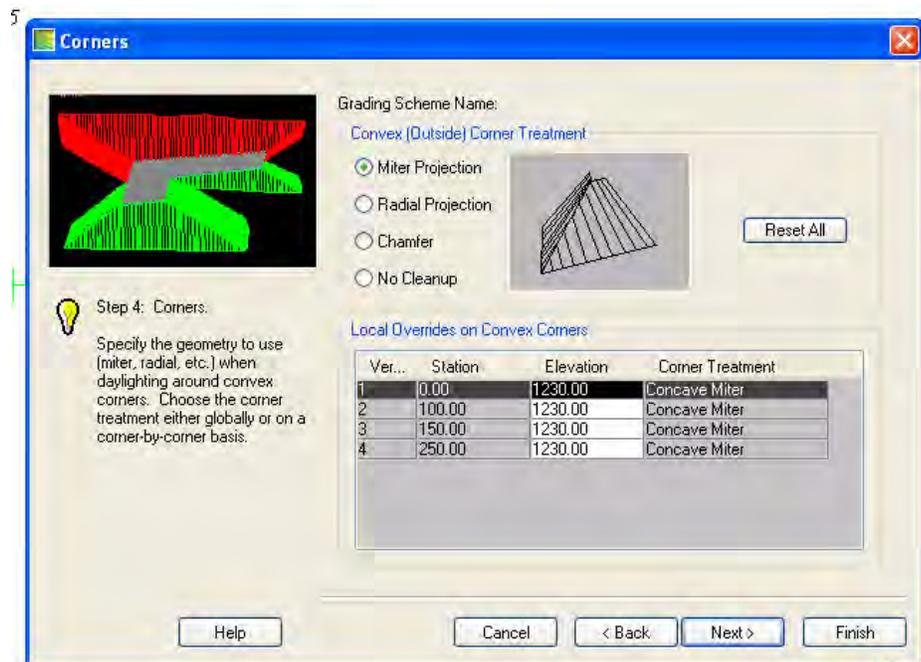


## CREATING COMPOSITE GRADING OBJECTS

- f. The Slopes window will appear next. In this window, you set the cut and fill slopes for the grading object that you are creating. In this example, we are grading up from the bottom footprint to the top of berm elevation at a 4:1 slope so make sure the Slope option is selected in the Cut Slope and Fill Slope sections and type a value of 4 in the Slope windows. Click on the Next> button when finished.

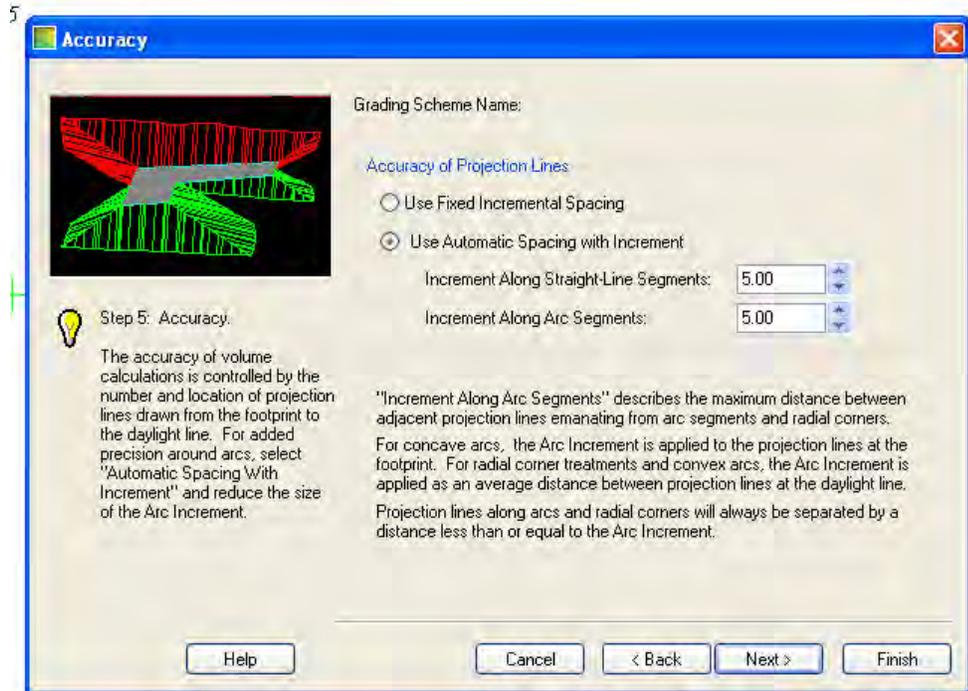


- g. Next, you will choose a corner treatment in the Corners window. “Miter” is usually used for pits and dikes in order to provide a clean breakline where the edges of the grading object join. Click on the Next> button after you have selected a corner treatment.

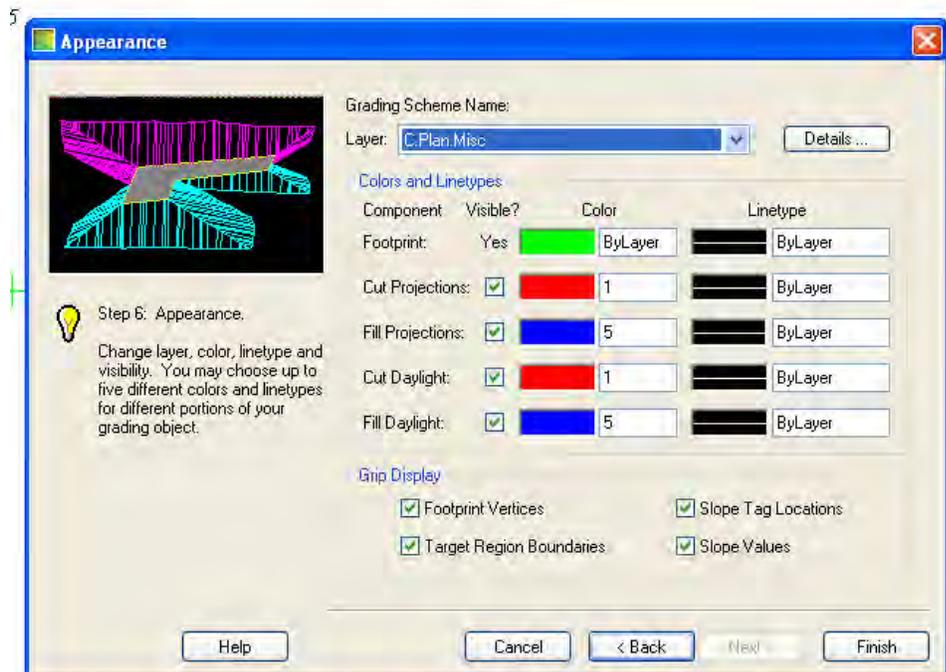


## CREATING COMPOSITE GRADING OBJECTS

- h. Click on the Next> button to accept the default Accuracy settings.



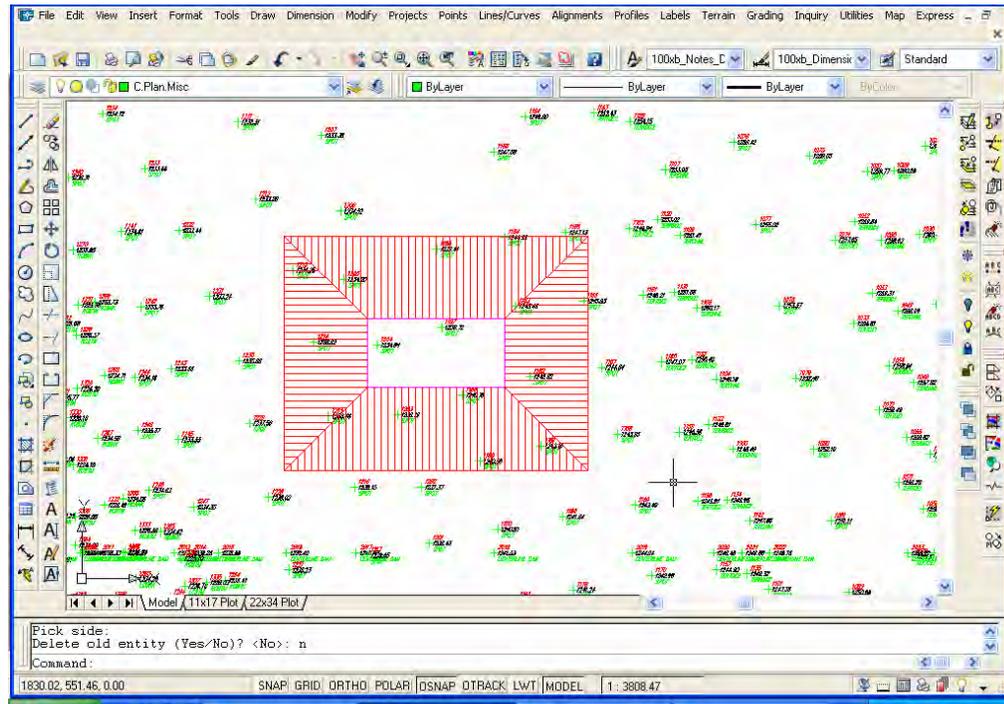
- i. In the Appearance window, you can choose a layer to create the grading object on and modify the display settings if desired. Click on the Finish button when you are finished.



## CREATING COMPOSITE GRADING OBJECTS

- j. As a final step, you will be asked at the command line whether you want to delete the old entity (the object that you used for the bottom of pit footprint). If you say yes at this point, the polyline that you created in Step 1 to use as a pit footprint will be erased when the new grading object is created. If you say no, the original footprint polyline will be left in the drawing.

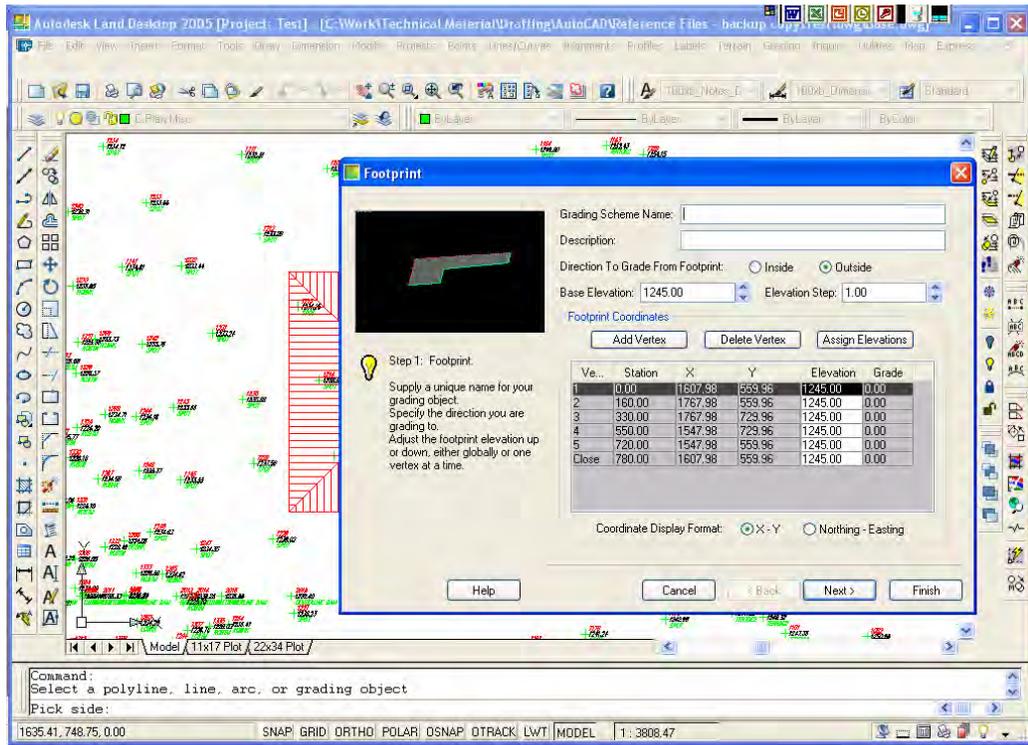
You should wind up with a grading object in your drawing similar to the one below. This object represents the grading from the bottom footprint of the pit up to the top of berm elevation at a 4:1 slope.



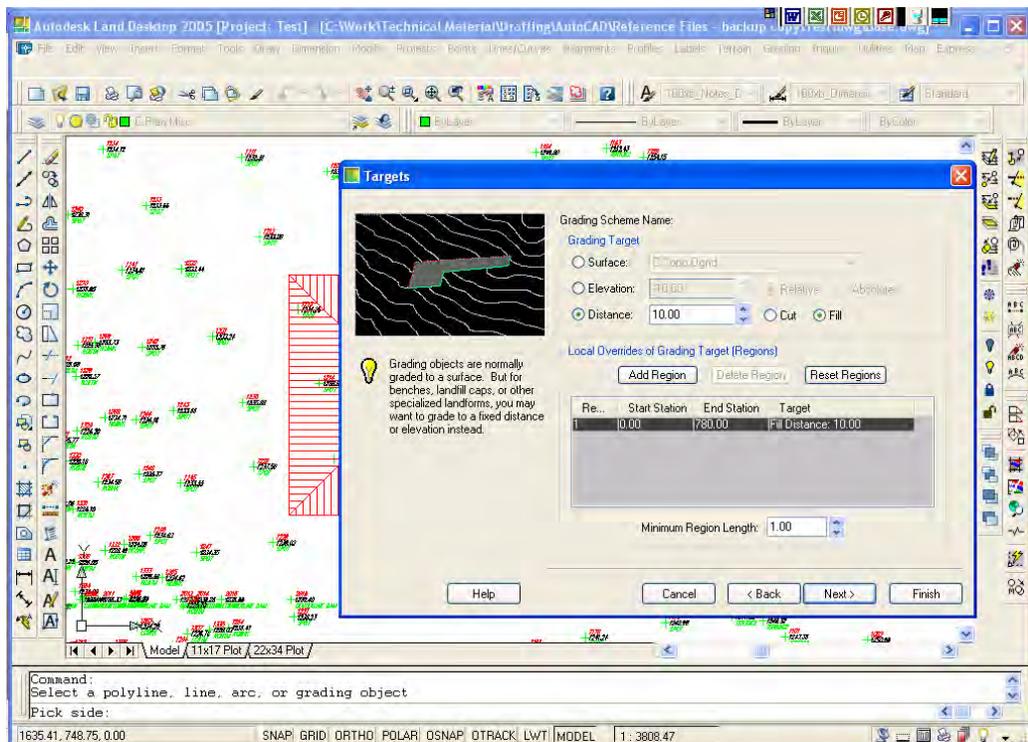
3. Now, create a second grading object to represent the top of the berm. In this step, we will be using the first grading object as a starting point. The second grading object will extend horizontally for a distance of 10 feet from the top of the 4:1 pit slope.
- a. Start the Grading Wizard. At the command prompt, you will be asked to select a polyline, line, arc, or grading object. Select the grading object you just created in Step 2 and pick a point outside of the grading object when you are asked to pick a side.

## CREATING COMPOSITE GRADING OBJECTS

- b. Notice in the Footprint window that the vertex elevation is now 1245.00. This is because that was the elevation that we graded the first grading object to in Step 2 above. Click on the Next> button.

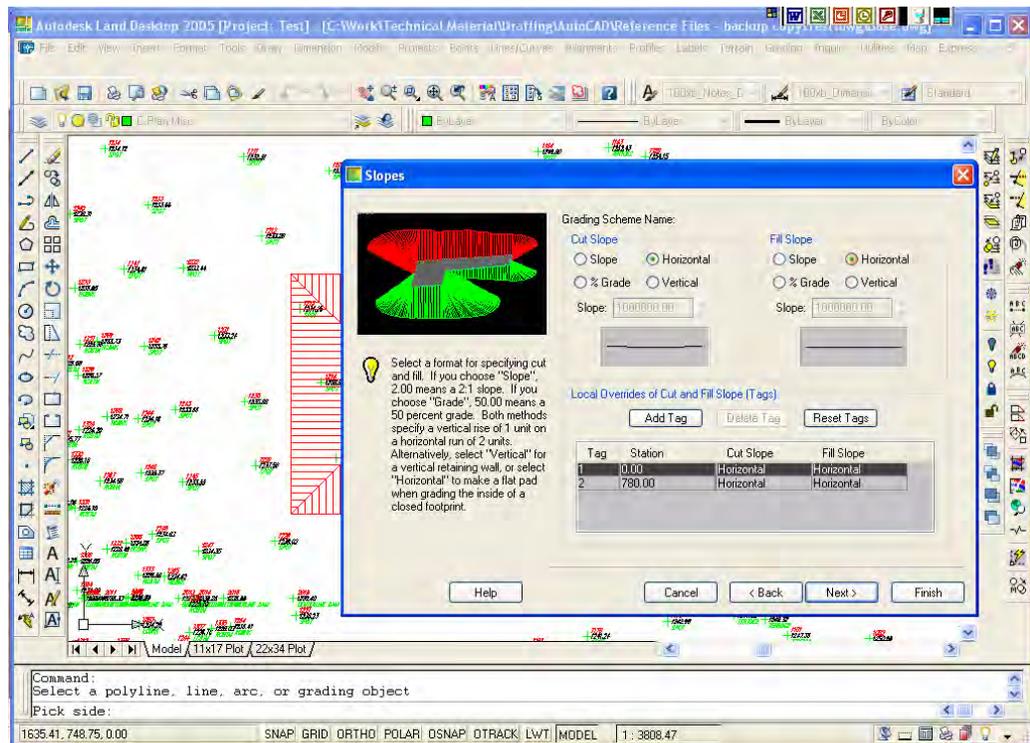


- c. At the Targets window, select the Distance option under Grading Target and enter a value of 10. This is the top width of the berm. At this point, it does not matter if either the Cut or Fill button next to the distance value window is selected because we will be grading horizontally. Click on the Next> button when finished with this step.



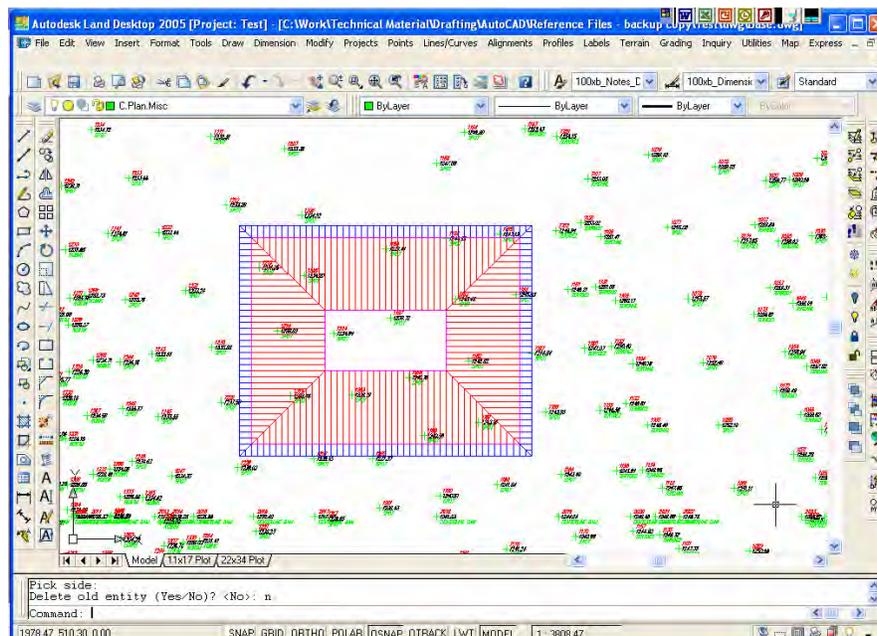
## CREATING COMPOSITE GRADING OBJECTS

- d. At the Slopes window, select Horizontal for the Cut Slope and Fill Slope, and click on the Next> button.



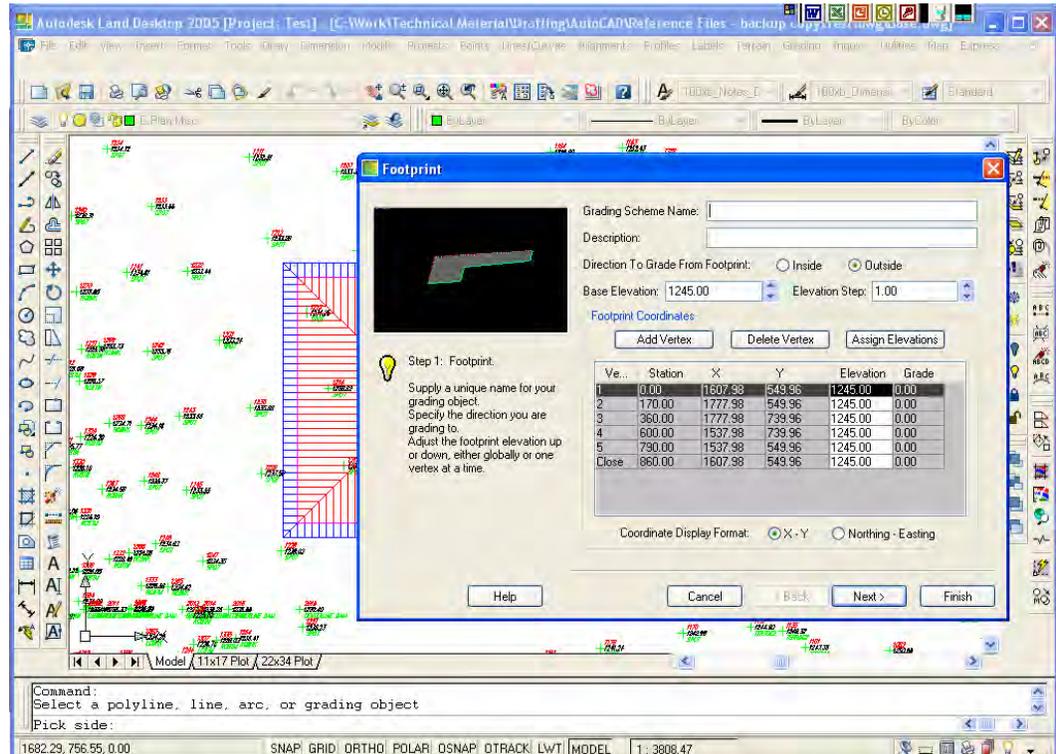
- e. Go through the Corners and Accuracy windows as you did in Step 2. Click on the Finish button when you are done making your selections in the Appearance window.
- f. You will be asked again at the command line whether you want to delete the old entity. At this point you want to say No. If you say Yes at this point, the grading object that you created to model the inside portion of the pit will be erased.

A second grading object should appear on the outside of the first object that you created to represent the inside of the pit similar to the one shown below.



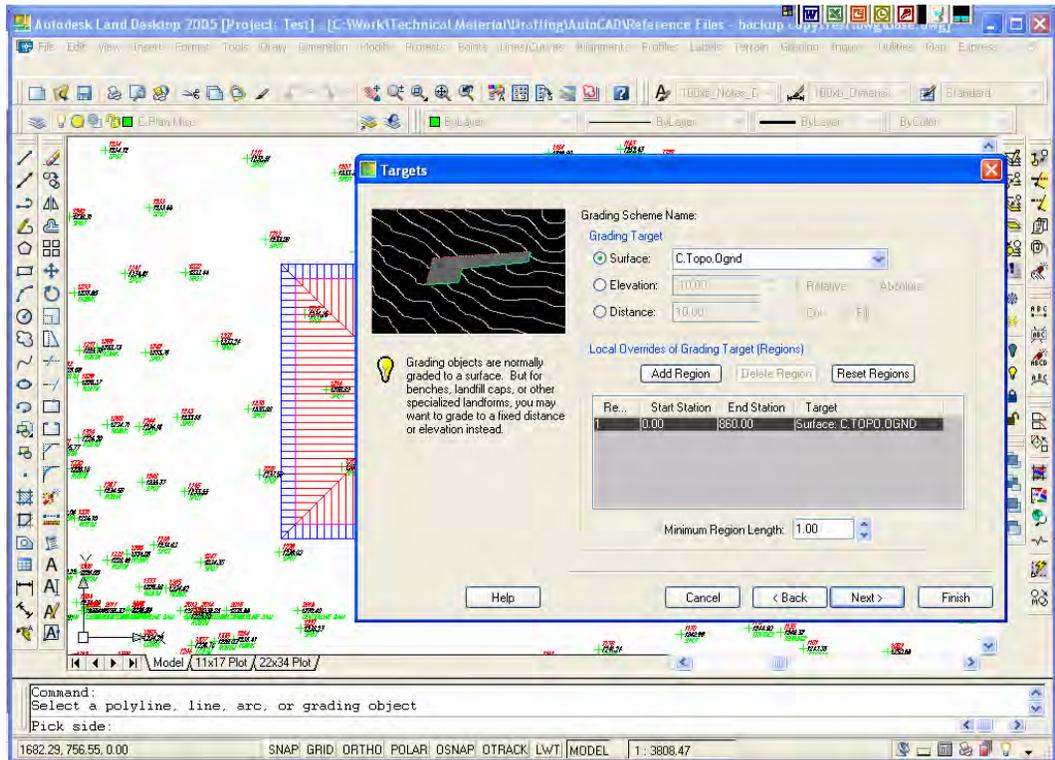
## CREATING COMPOSITE GRADING OBJECTS

4. To complete the model of the pit, you will now create a third grading object to represent the grading from the top of dike elevation down to existing ground.
  - a. Start the Grading Wizard again and choose the grading object that you just created in Step 3 that represents the 10-foot top of dike. Click to the outside of the grading objects that you have already created.
  - b. Notice at the Footprint window that the vertex elevation is still set at 1245.00. This is because we graded out horizontally in the previous step to create the 10-foot top of the dike.

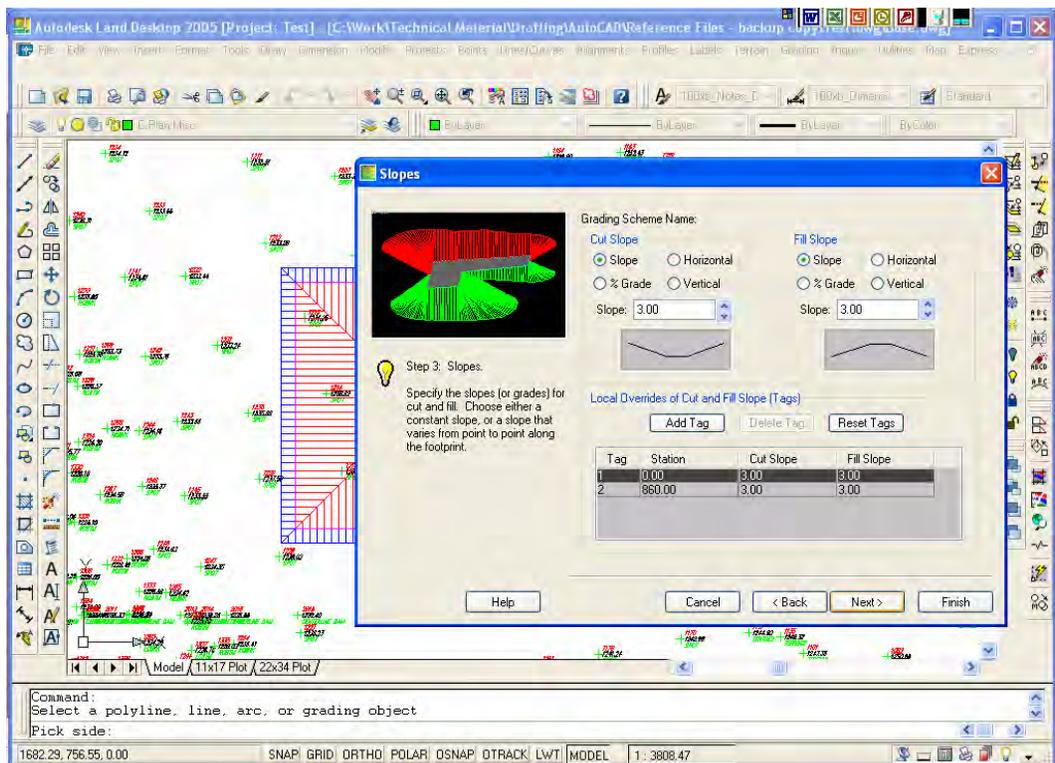


## CREATING COMPOSITE GRADING OBJECTS

- c. At the Targets window, you will choose the Surface option under Grading Target and select your original ground terrain surface model.

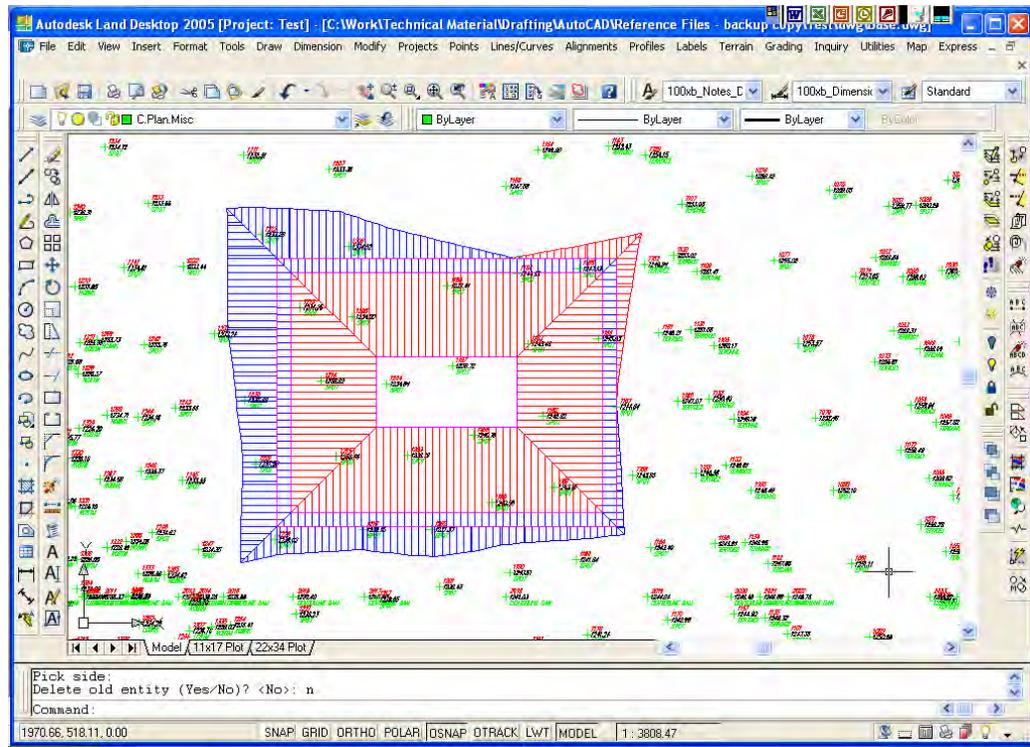


- d. At the Slopes window, select the Slope option for the Cut Slope and Fill Slope, and enter a value of 3 for the slope value.



## CREATING COMPOSITE GRADING OBJECTS

- d. Once again, go through the Corners, Accuracy, and Appearance windows, and do not erase the old entity. A third grading object will appear which represents the outer 3:1 slope of the pit which ties in to your existing ground surface. The final product will be three separate grading objects which together represent the composite grading object for the pit.



One primary limitation to composite grading objects is that the individual objects are not linked together so changes made to one of the objects will not be automatically made to adjacent grading objects. For example, if the side slopes or elevations of one of the objects are modified, the adjacent objects will also need to be individually changed or recreated. Clicking on a grading object will display grips which can be used to modify the geometry of the grading object, but again, the changes will only affect the grading object selected.

The set of grading objects can also be moved if all three objects are selected and moved together. Doing this will cause the outer grading object that ties in to the existing ground terrain model to update to display a new daylight line where the slopes for the pit tie in to the existing ground surface.