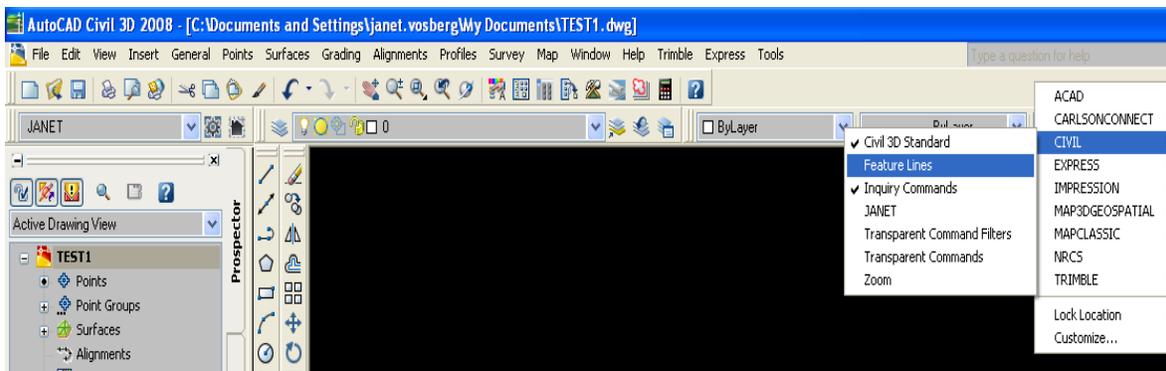


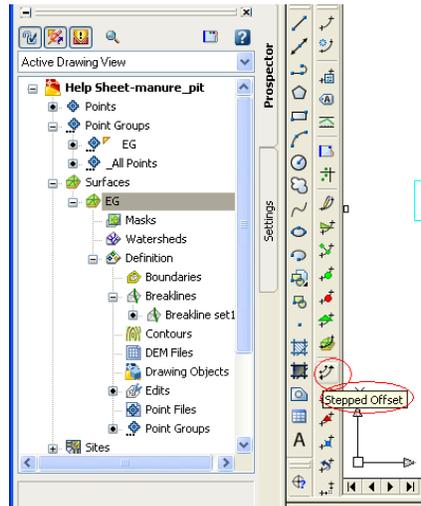
Proceed to this section after you have created the existing ground contours described in other help sheets.

I DRAWING THE PIT

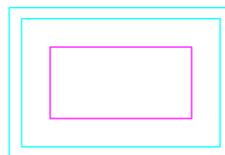
Now we are going to work with Feature Lines. A feature line is a 3d line, meaning it has an x, y, z dimension and is a special line type that grading commands recognize and use as a footprint and surfaces can use as a breakline. You can draw feature lines, create them by converting existing objects, or export feature lines from corridors. A feature line represents an object in the drawing from which you want to grade, such as a swale or a pit footprint. In order to obtain volumes, we need to create a grading group and for that we need Feature Lines.

1. Using either a polyline or rectangle from the Draw toolbar, create a rectangle representing the bottom of the pit, (i.e. 100'x 50').
2. Since you no longer have the option of copying contours by slope, you'll have to create the top of the bank another way. Bring up the Feature Lines toolbar by right clicking in the gray area by the other toolbars
3. Select CIVIL, then FEATURE LINES



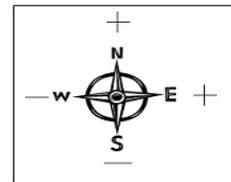
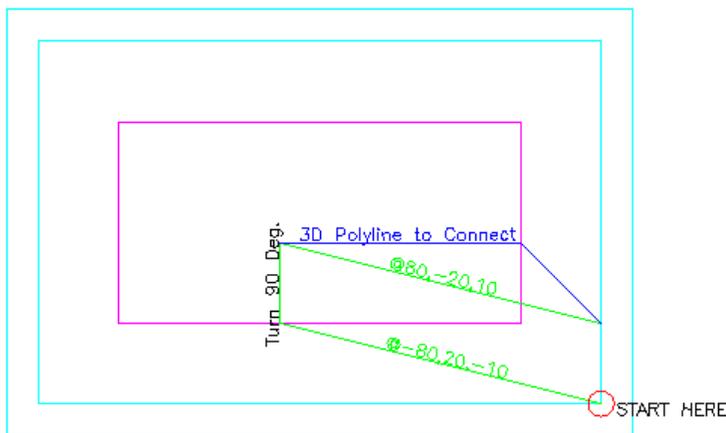
4. Choose the “Stepped Offset” icon

- a. Doing it this way requires you to do a little math. The first question is: Offset Distance or Through/layer. You have to type in the horizontal distance the top of the pit is going to be from the bottom.
- b. For Example: If the pit is going to be 10 ft. deep and the sideslopes are 2:1, the top will be offset 20' horizontal from the bottom.
- c. Let's use 20 ft. Type in “20” and “Enter”.
- d. The computer will prompt you to tell it which line you want to work with. Pick the line representing the bottom of your pit, then pick a point outside the polygon boundary.
 - i. The computer prompts you for: “Elevation Difference or (Grade/Slope)”.
 - ii. At this point you can either type in “10” or type “S” to indicate “slope” and then “2” to indicate 2:1. Then, “Enter”.
 - iii. The outcome is the same. The line representing the top of the pit will appear and be 10 feet higher than the bottom.
- e. You can now offset this line to create the outside of the berm using the offset command.
- f. You should end up with a drawing similar to:

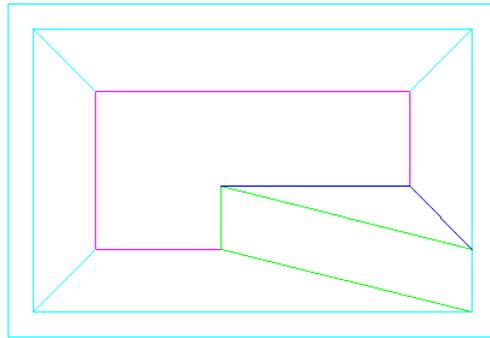


5. Adding a Ramp

- a. Our ramp will be 20' wide with an 8:1 slope. *Our pit is 10' deep, so the ramp will be 80' long*
- b. Go to the 3d-polyline draw tool in your “Draw” toolbar or type “3DPOLY” at the “Command” line.
- c. Start by picking the SE corner of the pit.
 - i. Use the “@x,y,z” command to draw the side of the ramp to the bottom of the pit. Type “@-80, 20,-10” and “Enter”. *The other end of your line will snap itself to the edge of the bottom 80' west of, 20' north of, and 10' lower than where you started.*
 - ii. Turn 90 deg to the bottom with your Polar button engaged and type in the desired width of the ramp (in our example 20').
 - iii. Then use the “@x,y,z” command again to run the other edge of the ramp back up to the top of the pit using the “@x,y,z” command: “@80,-20,10”.
 - iv. Use a 3D polyline to connect the vertices and form the backslope of the ramp.

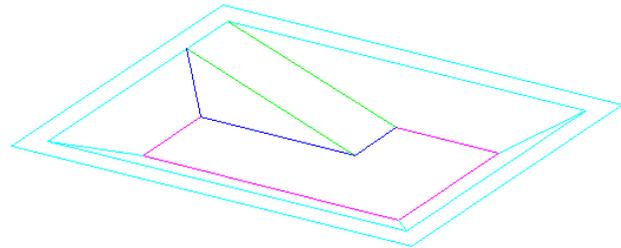
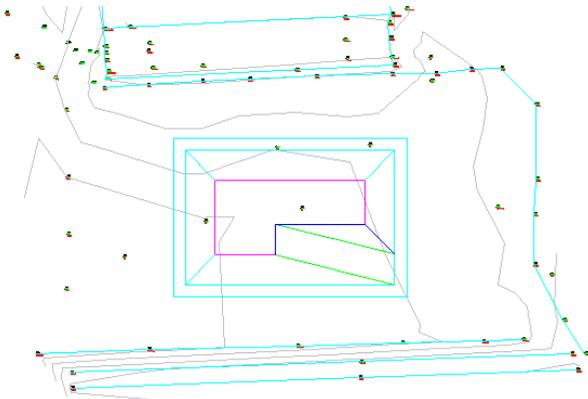


- v. You can connect the berm to the pit floor at the corners and trim the bottom of the pit in the ramp to accurately reflect how the pit will look. The result should look like:



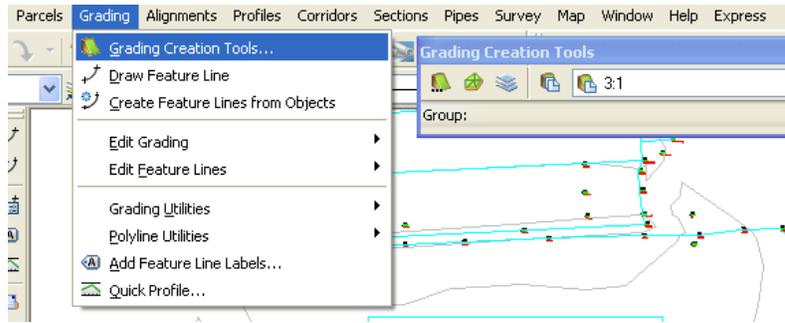
vi. Move your pit to the location on your survey

- Then use the “Move” button and the “@ 0,0,Z” command to set the correct elevation.
- Make sure elevations are correct by using the Properties button and checking out the project in 3D.

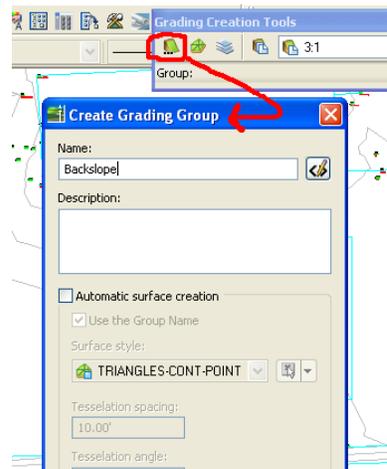


II GRADING THE PIT

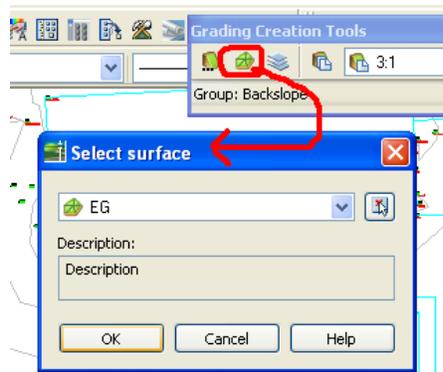
- 1 Now that you’ve got your pit built, you can start building the backslope. In land Desktop we would have done this by “Daylighting” or using the “Grading Wizard”. Civil 3d has done away with those tools. You now have to use “Grading Creation Tools”.
- 2 From the screen menu, Pick: “Grading” → “Grading Creation Tools”



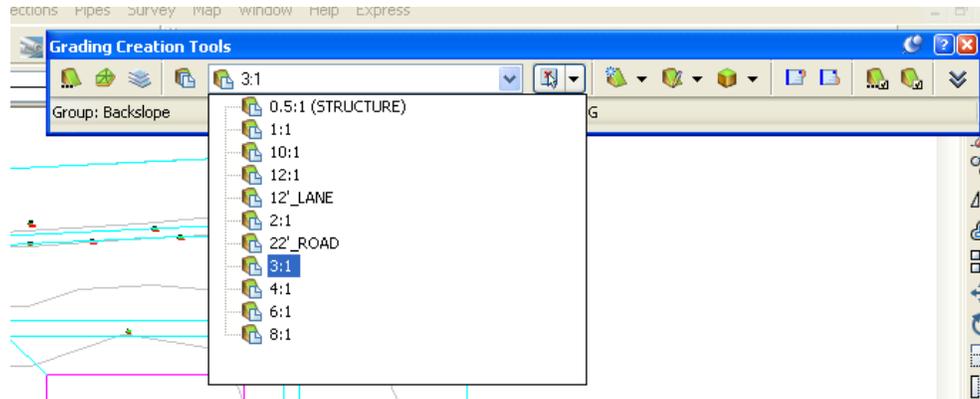
- 3 You'll see a toolbar called: "Grading Creation Tools". Select the icon "Set the Grading Group".



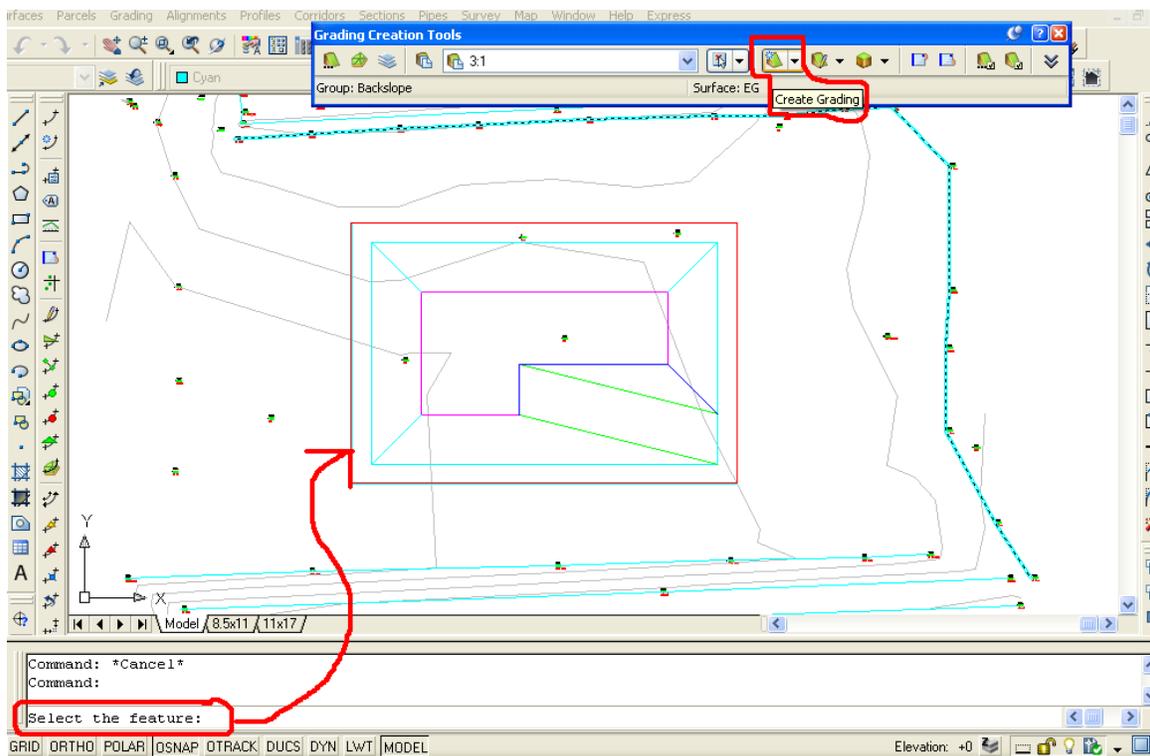
- 4 A window pops up titled,"Select Grading Group".
- 5 Change the name to "Berm" or "Backslope", or something appropriate for your project. Pick "OK".
- 6 Select the icon that looks like a spider web filled in green titled "Set the Target surface". This is the surface you'll be daylighting to; most likely EG. Pick it. Pick "OK".



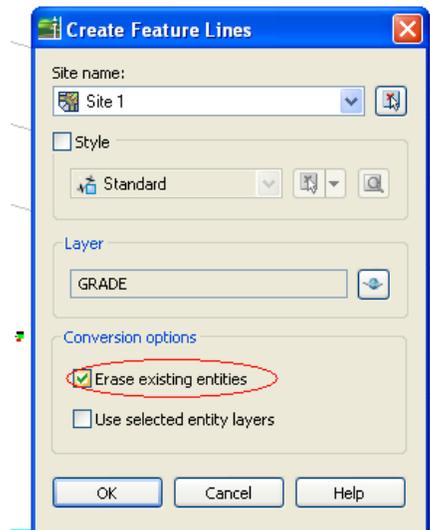
- 7 If you've set up a bunch of "Creation Criteria" ahead of time, pick "3:1" in the window. (*The template has the "Creation Criteria" already set up.*)
- If you do not have any grading criteria, you'll need to create grading criteria to continue.
 - There is a symbol that looks like a paper and pencil to the right of the "Grading Criteria" window. Use that button to create various grading schemes.



- Let's assume you've got the grading criteria already set. To the right of the "grading criteria creation" button is another button that looks like a piece of green cheesecake with a star on it. It's titled "Create Grading". Pick that button.
- The command line prompts you to "Select the feature". Pick the outside of the pit berm.

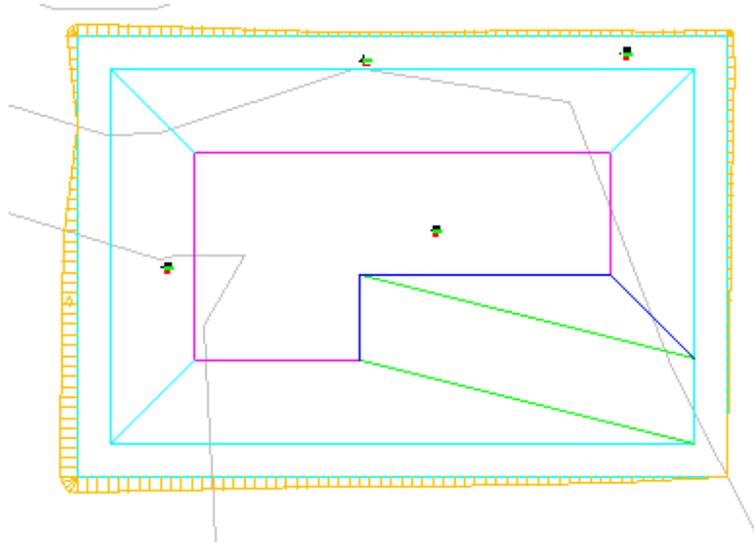
GRADING - MANURE STORAGE FACILITY EXAMPLE

- d You'll get a dialog box allowing you to pick the layer the grading will be placed on and other things. Make any changes you want (such as if you want the lines to be erased). Hit "OK".



- e At the Command Line:
- i It asks which side you want to grade to. Choose the proper side.
 - ii It asks if you want to apply the grading criteria to the entire length of the line. "Yes".

- iii It asks how you want your cut slopes formatted, Grade or slope? Grade will give you percent grade, “Slope” will be expressed as run/rise (2:1).
- iv Pick “S” for slope and then type “3” for 3:1.
- v Then do the same for fill slopes.
- vi The toe of the berm appears.

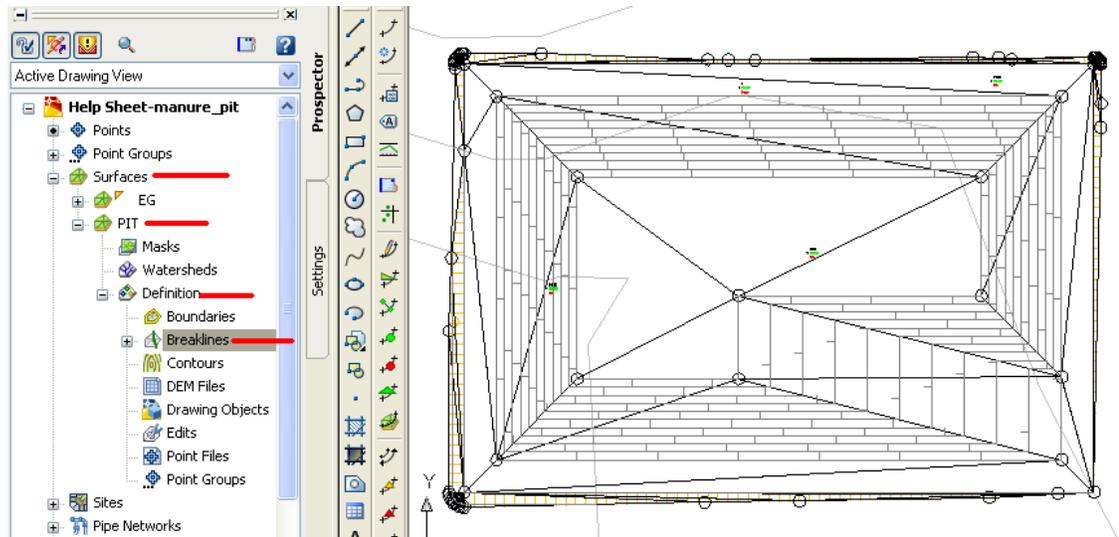


III CREATING THE PIT SURFACE

- 1 From the “Toolspace” toolbar → “Surfaces” directory → right-click → “New”
- 2 You’ll get a “Create Surface” dialog box.
 - a Under “Information”, to the right of where it says “Name”, replace the value with the name of your surface (PIT).
 - b Pick “OK”
- 3 A “plus” (+) box appears next to the “Surfaces” subdirectory.
 - a When you pick the (+) box, your surface name should appear under “Surfaces”.
 - b Pick the (+) box next to your surface name.
 - c Pick the (+) box next to “Definition”
 - d Right click on Breaklines
 - i Click on “Add”
 - ii Click “OK” on the Dialog box

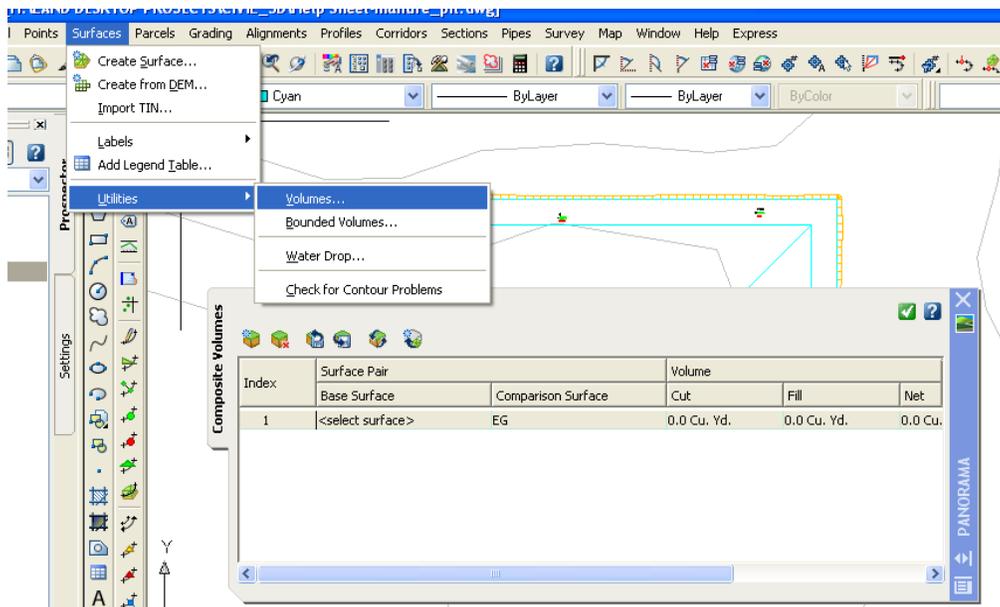
GRADING - MANURE STORAGE FACILITY EXAMPLE

- iii Command Line tells you to select the objects: Select all the polylines that make up the pit as breaklines.
- iv When you pick them all and hit enter, a surface is created.
- e You can edit the surface, or leave as is.



IV CALCULATING PIT VOLUMES

- 1 From the screen menu, Pick: “Surfaces” → “Utilities” → “Volumes...”



- 2 You get a toolbar with a half dozen little box-shaped icons on top and two main columns identified as “Surface Pair” and “Volume”
 - a The first of the top icons on the left is a box with a green top with a little star above it. It should say “Create a new volume entry” when you hover your cursor over it. Pick that icon.
 - b A new indexed column appears under the headings. Two lines say select “<select surface>”.
 - i Select your original surface (EG) as the “Base Surface” on the left and your constructed surface (PIT) as the “Comparison Surface” on the right.
 - ii The program calculates excavation and fills and shows you in the appropriate column.
 - iii There is no adjustment for compaction and /or losses. You will have to do that manually.

