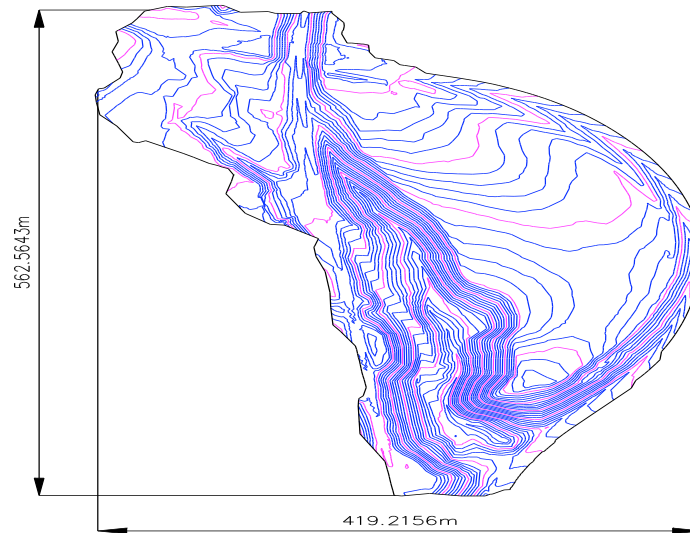


Laboratory Exercise / Homework #3

Due 19 May 2005

Objectives: This lab exercise / homework is intended to help you learn how to create and visualize surfaces in Autodesk Land Desktop. You will be creating the following 3D surface from surveying data, creating a contour map and creating three sections through the surface



Download from the class website: surveyingData.zip.

1. Creating a new project using Land Desktop

- a. This topic is discussed in AutoDesk Land Desktop Tutorial: Lesson #1
- b. Using the Project Management window that is accessed from **Project->Manager** or **Project Manager** on the Autodesk Land Desktop Today window, create a new project by specifying the path for the project directory and the name of the project. When you do this, you will need to choose a project prototype; the drawing that we will be creating will be defined using SI units, so choose **Default (meters)** for the project prototype.
- c. We will be printing using a page size of approximately 8.5 x 11 in. (216 mm x 280 mm), so create a new file and choose the following as you go through the menus to create the new file:
 - i) aec_m.dwt as the template for the drawing file
 - ii) Drawing Setup Profile: m1000.set (Metric 1:2000) – note that for metric pages in Land Desktop, the assumption is made that paperspace units are meters while paperspace units are mm, thus, printing at a scale of 1:1 is really 1 m (model space) = 1 mm (paper space). Thus, this scale is a bit too large, but approximately correct.
 - iii) Drawing Scale: Horizontal: 1:2000, Vertical 1:10, Sheet Size: 210 x 297
 - iv) Coordinate System: USA, Washington, NAD83 Washington State Planes, North Zone, Meter
- d. Use the default values for everything else

2. Import the surveying data into the project and drawing
 - a. This topic is discussed in AutoDesk Land Desktop Tutorial: Lessons #2 - #8
 - b. Unzip the surveyingData.zip and place all of the files in the **survey** directory under the new project directory that you created. Note that some of the files have the extension *.PNEZD and one has the extension *.txt. These files require different formats for importing into the current project and drawing.
 - c. Create a series of new layers within your drawing, one for each of the pnt files that you will be importing. You may call the layers anything that you like. Though PNT_* is probably the preferred naming strategy. You may want them to have different colors so that you can id points easily.
 - d. Go to Point->Point Settings to modify the point settings before you import the points into your drawing.
 - i) Make sure the "insert into drawing as created", "sequential numbering" are checked and that current number is set to 1.
 - ii) Set the Marker and the Text size the 2 absolute units; this is 2 meters in the absolute coordinates and is reasonably easy to read in the drawing window.
 - iii) Modify the point marker as you see fit
 - e. The *.PNEZD points are in a standard format that AutoCAD recognized (point number, northing, easting, elevation, and description). Look at one of these files using Notepad.exe. However, we need to set up an import format for the *.txt files. Open the *.txt file, compare the numbers with the numbers in the *.PNEZD file and figure out what information is in each column of the *.txt file. Then create a new import format using the **Points->Import/Export Points -> Format Manager**. From the Format Manager menu
 - i) Add a new **User Point File** format.
 - ii) Load the *.txt file.
 - iii) Look at the data in the *.txt file, and confirm that this data is delimited by spaces only. Specify this in the menu.
 - iv) Then, go through the column headers in the bottom window, double click on the "unused" data titles and replace "unused" with the correct title from the list.
 - v) When you think that you have everything set up correctly, click the parse button. You should see the parsed data in the top window. If the data looks okay exit the window by clicking ok.
 - f. Import the surveying data included in each of the files in the surveying folder of the project using the following approach:
 - i) Set the current layer to be the layer corresponding to the data that you will import.
 - ii) Import the data by going to Points -> Import/Export Points -> Import Points
 - (1) Choose the correct format from the format list (either PNEZD for the *.PNEZD files or the "new format" for the *.txt file)
 - (2) Choose the source file that you want (either the *.PNEZD files or the *.txt file)

- (3) Check Add points to a point group and click on the green icon to create a new point group with the same name as the point data file.
 - iii) Verify that new points have been added to your drawing. If you don't see any points try zoom to extents to make sure that you are seeing the entire project area.
3. Create a boundary for the project.
 - a. Create a new layer in the drawing named PROJECT_BOUNDARY
 - b. Using OSNAP with snap mode set to Node, draw a **rough** boundary for the project using polyline. The important thing is that the boundary be inside the scatter of points so that you don't have an inaccurate surface mesh at the edges of the project where you have very little surface data.
 - c. Use the Modify -> Object -> Polyline to create a spline so that the boundary has smooth edges.
4. Create a surface using the point data that you have imported, the boundary that you just drew and a breakline that you will create.
 - a. This topic is discussed in AutoDesk Land Desktop Tutorial: Lesson #12
 - b. Open Terrain Model Explorer
 - c. Create a new surface
 - d. Right click on the Point Groups under the new surface and add all of the point groups that you added
 - e. Right click on Boundary under the new surface and add the boundary that you created above. Use the option of making this an outer boundary and don't create a breakline at the boundary.
 - f. Right click on breaklines and a breakline at the bottom of the stream bed (you may want to isolate the pnt_streambed layer using LAI command at the command line to choose a point on the pnt_streambed layer and thereby turn off all layers except the pnt_streambed layer).
 - g. Right click on the surface and go to Build to create the surface
5. Evaluate the surface
 - a. This topic is discussed in AutoDesk Land Desktop Tutorial: Lesson #13
 - b. First turn off the point layer.
 - c. Second, use Terrain -> Display Surfaces -> Quick View to give yourself a look at the mesh. How does the surface look? Are there any anomalies?
 - d. Third, to get a color coded view of the surface elevation use Terrain -> Display Surfaces -> Banding 3D Faces
 - i) Set the layer prefix and *
 - ii) Check create skirts

- iii) Change the vertical factor to 2.0
 - iv) Click Auto-Range and then OK when the color ranges pop-up
 - v) Click OK
 - vi) How does the color banding look? Are there any anomalies?
- e. Fourth, use Utilities -> Object Viewer to get a 3D rendering of the surface. Click on the global icon and use the mouse to move the 3D rendering around. How does the surface look? Are there any anomalies?
6. If there are points that seem to be incorrect, you will need to find them and either edit them or remove them.
- a. This topic is discussed in AutoDesk Land Desktop Tutorial: Lesson #5
 - b. Split the window using viewports to give yourself both a isometry view (you can set the view in the object viewer to be the current view) and the top view.
 - c. Use Inquiry -> Surface Elevation to help identify points that may have incorrect elevations.
 - d. Use Inquiry -> Track Elevation to help identify points that may be incorrect elevations.
 - e. Once you know the point number of incorrect points, edit or remove them using the Points menu.
7. Create contour lines
- a. This topic is discussed in AutoDesk Land Desktop Tutorial: Lesson #14
 - b. Use Terrain -> Contour Manager to set up the style of your contour lines: choose the level of smoothness, , whether contours are labeled, etc.
 - c. Use Terrain -> Create Contour to create the contour lines. Choose a reasonable spacing for major and minor contours: what's the max / min elevation? And how many contour lines do you want?
8. Creating Sections
- a. This topic is discussed in AutoDesk Land Desktop Tutorial: Lesson #15
 - b. Create a two new layers named SectionLines and Sections
 - c. On the Section Lines layer, draw three section lines in the EW direction and label them A-A, B-B and C-C and draw one section line in the NS direction and label it D-D. You'll need to include additional information on your section labels indicating that the sections will be shown on page 2 of the drawing package (see part 9).
 - d. On the Sections layer, create four sections, using the following commands:
 - i) Terrain -> Section -> Create Section is used to define the sections. You will want to have a group name such as section1 and then individual section labels "A-A", "B-B", etc. Define each section using the end points of the section lines you drew above. Hitting "enter" twice gets you out of the create surface command

- ii) Terrain -> Section -> Process Section processes the section information and gets the elevations of the sections from the surface
- iii) Terrain -> Section -> Import Section inserts the sections into the drawing (make sure you do this on the correct layer). Use the default datum and change the vertical elevation scale factor to get a section scale that you like.

9. To turn in by **5:00 pm on 26 November 2003**

- a. A multi-page drawing set with title block on each page.
- b. Page one should have be the contour map of the site with section lines shown and the scale of the drawing shown. On the page set up, set the printable area of the page to be defined in mm and define the scale of the drawing in terms of 1 m (modelspace) = ** mm (paperspace). Note that 1/1 xp gives you a scale of 1 m (modelspace) = 1 mm (paperspace).
- c. Page two or page two and three should show the sections. Again, the scale of the drawing should be specified.