Applied Geomorphology
Alidade Lab Project

Introduction

In this lab you will learn how to use the Alidade and plane table to construct a topographic map and plot the location of station points accurately on a map at a scale of 1 inch = 100 feet. The project will require some data reduction calculations that you will probably want to use Excel to calculate, however, a calculator can be programmed to do the same task.

Mapping Task

For this project you will be assigned groups of 4 or more to work at one of the 4 established benchmarks on campus. Each benchmark is an aluminum plate set in concrete. Each group will setup the plane table directly over one of the benchmarks and collect data initially from that point. Later it will be necessary to traverse (move) the instrument to another benchmark to fully cover the mapping area. The mapping area consists of the terrain between the Life Sciences, Art, Medical School, Administration, and Swimming Pool buildings. In addition to contouring the topography of this area you will also survey the positions of the 9 stations (white paint) used on the pace and compass lab. The scale of the map should be 1 inch = 100 feet, and the contour interval 1 foot. Make every 5^{th} contour an index contour. Mark the pace and compass stations with a cross marker with “S-1", “S-2", etc. Rays that are shot with the alidade for topographic control should be labeled with a cross marker and “R1", “R2", etc. The labels on the map must correspond to your data sheet notes. Connect the tree stations with a line to display the pace and compass course. You can use the software application Surfer to complete the project. We will discuss Surfer in lecture after this lab is assigned.

Mapping Strategy

To complete the project you will need the alidade, plane table, stadia rod, tripod, ruler, calculator and data sheets. You will operate as a team so a person or persons should be assigned to the instrument, stadia rod, note taking, and calculation tasks. Whenever you set up the tripod your instrument height will vary so make sure you record it on the data sheet. You must switch to a new data sheet every time the plane table is setup (or at least make a note that the instrument height changed) even if it is in the same spot. When you set up the plane table and tripod for the first time make sure that you record the magnetic north direction, scale, and contour interval on the map paper. Also write your group number on the data sheet and map sheet. Record the benchmark elevation on the map and in the data sheet. Label a starting station point on the map as a dot, and label this “S-1" for station 1. Rays shot from this point will be labeled “R1", “R2", etc. The position of the starting dot on the plane table should be roughly proportional to the geographic position of the benchmark relative to the map area. Each time a measurement is made from the initial station remember to record the stadia intercept, crosshair reading, and vertical

angle on the data sheet. For now you can assume that the stadia distance (SD) is the same as the horizontal map distance so plot the ray length distance on the map based on the SD and scale. Later, if there is significant difference in map distance versus SD you can correct it (use pencil lines!).

Proceed to collect data with these steps:

1. Survey the position of the tree stations in your vicinity. It will not be possible to survey all of the stations from one benchmark. In your data sheet notes make sure that you clearly indicate which ray corresponds to which tree station.

2. After surveying the tree stations proceed to collect randomly spaced topographic control points so as to have good coverage for contouring a topographic map.

3. After you have surveyed the vicinity adjacent to the benchmark you need to traverse (move) the instrument to another benchmark. Shoot a ray to this benchmark and calculate and plot the position and elevation of this new benchmark on the map. When you take down and setup the instrument on the new benchmark the new rays will radiate from this new point. Label this point "S2". Repeat steps 1 and 2 for the new station position until all tree stations are surveyed, and you have enough topographic control.

Products to Turn In (2 week project)

Product 1: Data sheets. They should be legible- if not re-copy the data to new sheets. I will be grading these with an eye for organization. For example, I should be able to easily track down the raw data (SD, CH, VA, etc.) For any particular ray based on the map label. You can turn in Excel hard copy for this if you wish.

Product 2: Map. This should be drafted/plotted on 8.5 x 11 inch white unlined paper. A north arrow should be in the upper right corner, the scale bar should be centered at the bottom of the page. The contour interval may be placed directly below the scale bar. The group member names and due date should be placed in the lower right corner of the map. The map itself will fill up the center of the page- it's a tight fit so use the page space efficiently. Place the title "GY325 Alidade Project: Group 1" at the upper center of the page.

Product 3: If your group uses surfer to plot the map I will need a copy of the data files used. You can simply specify a workstation and folder in the basement computer lab.

Benchmark data:

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ID	Easting (ft)	Northing (ft)	Elev(ft)	Notes
st1	5000.00	5000.00	161.10	Benchmark 1
st2	4984.41	4744.05	171.57	Benchmark 2
st3	5046.73	5063.34	159.60	Benchmark 3
st4	4958.70	4750.18	171.13	Benchmark 4