

FERRIS STATE UNIVERSITY

SURVEYING ENGINEERING

SURE 110 – FUNDAMENTALS OF SURVEYING
PROJECT

SPRING 2006/07

PURPOSE: The purpose of this project is to have each student group develop a topographic map of an assigned area around a building on campus.

- PROCEDURE:**
1. Locate the traverse points around the building assigned by the professor. A minimum of 4 points are needed to define the traverse. Set nails at the traverse points with ribbons. Create at least 3 witness ties to each traverse point.
 2. Measure the horizontal distances between the traverse points by taping. The distances are to be measured forward and reverse, then compute the average distance. The two individual lengths shall not vary from the average by more than 0.02'.
 3. Measure the interior angles of the traverse using an optical theodolite, like the Nikon. Use double centering techniques and accumulate the horizontal angle on the circle. As a minimum, measure 2 D/R with a criteria that the final angle be within 1' of the first angle reading.
 4. Measure the elevations of the traverse points. Use the elevations from the campus control information. At least 2 control points will be used and the leveling performed between control and traverse points in a loop. There will be no intermediate sights.
 5. Tie the traverse to 2 of the campus control points. Occupy one control point and backsight on a second. Then turn the angle to a traverse point. Four repetitions, using double centering, are to be used. For this part of the lab, use the electronic theodolites. Record the backsight readings and foresight readings and then the difference to obtain the angle. This instrument does not allow for accumulation of the horizontal angle on horizontal circle. Close the

horizon. Do this same procedure for a second traverse point as well. Measure the distances with a steel tape from the campus control to the traverse points, again in the forward and reverse directions with the average being used and the spread not to exceed 0.02'.

6. Compute the angular error and the correction per angle (cpa) and apply to all the measured angles. For the angle measurements from the control, closing the horizon should result in a sum of the averaged angles of 360° . The sum of the angles shall be within 1' of these criteria. Compute the cpa and apply it to the angles. For the interior angles of the traverse, the sum of the angles shall be within 2' of the criteria of $(n-2) \cdot 180^\circ$. Compute the azimuths/bearing of all lines.
7. Adjust the traverse using the Compass Rule (Bowditch Method). Compute the adjusted Northings and Eastings, directions, and distances.
8. Perform a topographic survey locating all features within the area. Use stadia to measure the distance. Record the point number, horizontal angle, vertical angle, top cross-wire reading on the level rod and bottom cross-wire reading.
9. Create a spreadsheet that computes the coordinates of the topographic points measured from the survey and their elevations.
10. Plot the topographic survey on a 24' x 36' piece of velum. The map shall include a 1" border around the sheet, a title, north arrow, title block and the topographic survey.
11. Draw the contours on the topographic map.