

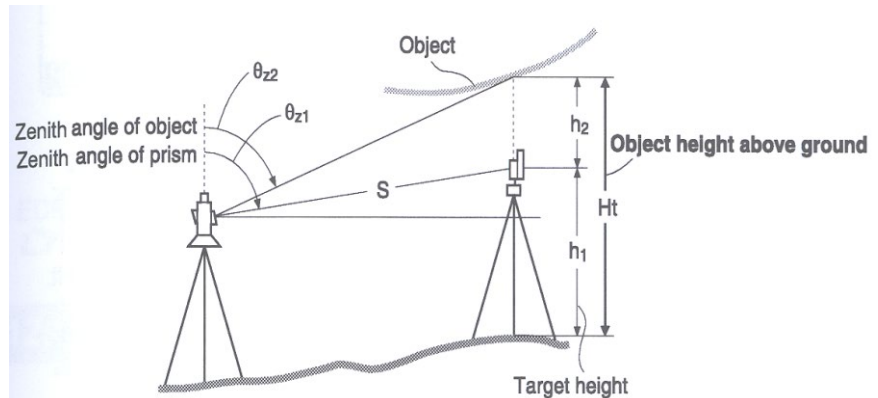
GY301 Geomorphology

Laboratory 3: Using the Total Station to Measure Elevation Difference

Introduction

The Total Station contains a very accurate clinometer; therefore it may be used to calculate elevation differences (i.e. heights) with an accuracy of several cm.s. Consider

Figure 1 - All that is needed to calculate the height of an object is 1) the slope distance between the instrument and the target, and 2) the angular



difference between the mirror target and the target object. **Figure 1: Geometry of REM height measurement.**

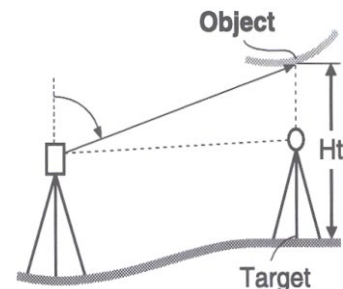
The mirror target must be set directly under the target object, and the height of the mirror target must be known. Note that the height of the instrument does not need to be measured for this procedure. Also, the ground between the instrument and target mirror may have a significant slope.

For this lab you will be divided into groups and assigned a Total Station instrument. Your assignment is to measure the heights of the 4 corners of the LSCB (i.e. the same corners measured with the pocket transit) with the Total Station REM procedure. Each person should make their own measurements after the instrument is level and report the results in the below table. Report the answer in meters and feet. The instrument will be set to report the height in meters.

The general procedure for the measurement will be as follows:

1. Level the instrument (Details in lecture). The instrument should be approximately 50-100 feet away from corner so that you have a reasonable clinometer angle (<45) to measure.
2. Place the mirror target on the ground at the corner of the

REM	
Ht .	6.255m
S	13.120m
ZA	89°59'50"
HAR	117°32'20"
STOP	



REM	
Ht .	6.255m
S	13.120m
ZA	89°59'50"
HAR	117°32'20"
REM OBS	

Figure 2: REM measurement screen.

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building and record the mirror target height in meters from the range pole scale.

3. From the “MEAS” menu select “Menu” > “Coordinate” > “Station Orientation” and set the target height. For a REM measurement you can skip the XY coordinates and height of instrument settings

4. Sight the mirror target with the telescope and lock the position with the horizontal and vertical clamps. From the “MEAS” menu select “Menu” > “REM” and then [OBS] (**Figure 2**) to measure the slope distance (S in **Figure 1**). Then unlock the vertical clamp and sight in the top of the building corner and re-lock the vertical clamp. Select [REM] (**Figure 2**) from the function key menu and write down the calculated height (meters).

5. With your group move to another corner and use the instrument there to measure the height. If the instrument is not set to a comfortable height, lower it and re-level. Check the instrument settings to make sure the target height is correct before making the measurement. Repeat until all four corners are measured.

Problem 1: Measure the height of the Life Sciences Building from the ground to the top of the building at all 4 corners. Enter the height of the building calculated from the previous lab for comparison.

Group: _____

Group Members: _____

Pocket Transit Measurement

Northeast corner:

Height of corner = _____ meters = _____ feet. _____ feet.

Southeast corner:

Height of corner = _____ meters = _____ feet. _____ feet.

Southwest corner:

Height of corner = _____ meters = _____ feet _____ feet.

Northwest corner:

Height of corner = _____ meters = _____ feet _____ feet.