

Lab Homework Assignment 1

Topographic Maps

Due Friday January 30, 2009

Group Project

Exercise 1: (Question 18 in *Laboratory Manual in Physical Geology*, R.M Busch and D. Tasa (Editor), AGI, pp. 186, 7th Edition, 2005).

Study the map shown in Figure 9.20, pp. 188.

- a) The contour lines on this map are labeled in meters. What is the contour interval of this map?
- b) What is the total relief of the land represented in this map?
- c) How could you find the areas of this map that have a gradient of 20 meters per kilometer or greater?
- d) Imagine that you need to drive a truck from point A to point B in this map, and that your truck cannot travel up any slopes having a gradient over 20 meters per kilometer (gradient of 2%). Trace the route that you would drive to get from point A to point B.

Exercise 2

Consider the SW corner of the 7 ½-minute Golden quadrangle distributed during the lab. The horizontal scale of the map is 1:24,000 (1 in. for 2,000 ft).

- a) Construct the topographic cross-section from A to A' to A'' by the method described during the lab. The crooked path AA'A'' can be represented as a straight line on your cross-section.
- b) A water tunnel is to be excavated along the AA'A'' alignment. The tunnel intersects the ground (SW portal) at point P (Elev. 5850 ft). Starting from P, the tunnel is excavated with an upward gradient of 1% from P to A' and an upward gradient of 1.5% from A' to A''. Draw the trace of the tunnel on your cross-section and note where the tunnel intersects the ground on the NE side of North Table Mountain? Give the location and elevation of that intersection.
- c) Using a different graph, show the variation of the height, h , of overburden above the tunnel versus the tunnel length. The rock has a unit weight, γ , of 25 kN/m³. Knowing that $\sigma = \gamma h$ can be taken as a measure of the rock pressure acting on the lining of the tunnel, what is the maximum value of σ along the tunnel length?