CVEN 3698 Engineering Geology Attitude of Geological Planes

Before proceeding with this assignment, you are asked to read pp. 228-231 in the *Laboratory Manual in Physical Geology* (9th Edition). **Distributed in class**.

1) For the geometry of the plane shown in Figs. 1(a) and 1(b), derive the following two equations:

 $\tan\psi_a = \tan\psi \cdot \cos\beta$

 $\tan \psi_a = \tan \psi \cdot \sin \alpha$

where ψ is the true dip of the plane and ψ_a is its apparent dip in a direction making a horizontal angle α with the strike direction (or β with the dip direction).

2) If the attitude of a plane is N 75W 22 NE, what is its apparent dip in the direction N 50°?

3) Two lines define a plane. The following two apparent dips have been measured.

 $\psi_{a1} = 10^{\circ}$ in the N 72W direction $\psi_{a2} = 25^{\circ}$ in the N 35° direction

Determine the strike and true dip angles of the plane.

4) A certain E-W bed dips 40 degrees due North. In what direction(s) will its apparent dip be exactly half as great? There are two answers to that question.



STRIKE-is the direction (bearing) of a line formed by the intersection of the surface (dip slope) of an inclined rock layer and a horizontal plane. (In this case: quadrant N25°E or

DIP-is the maximum angle of inclination of the rock layer, always measured perpendicular to strike. Water poured on a dip slope always runs along the dip and in the direction of dip (in this case 30°SE or azimuth 30° @ compass 115°).



azimuth 025°)

MAP SYMBOL FOR THIS STRIKE AND DIP-The long top line of the "T" represents the line of strike and the short line represents the dip direction. Degrees of dip are indicated beside the symbol. If the rock layer is horizontal, then a plus sign inside of a circle is used (or just a plus sign).

MAP

(a)



Figure 1. (a) Block diagram showing the strike, dip and dip direction angles of a geologic plane (after Bush, 2011) (b) Definition of the apparent dip ψ_a in a direction α with respect to the strike line (after Goodman, 1993).