CIVE 353 - Geotechnical Engineering I
ASSIGNMENT 5

University of Waterloo
Department of Civil Engineering

Posted Date: Wednesday February 15, 2006
Due Date: Wednesday February 22, 2006 @ 4pm in soil lab

1. Draw a flow net for the dam cross-section shown in Figure 1.

a) Determine the quantity of seepage under the dam if the foundation soil has an intrinsic permeability of 1.0×10^{-13} cm^2.

b) The water impounded behind the dam is contaminated and requires treatment before it can be discharged. A down stream water treatment facility is required to treat the contaminated groundwater that seeps under the dam. If the dam has a longitudinal length of 50 metres, how much groundwater would require treatment in a year?

c) Determine the magnitude of porewater pressure at points A, B and C.

d) If a pressure gage were connected to a piezometer at point C, as shown in Figure 1, what would it read?

e) Determine the maximum Darcy and seepage velocity at the down stream end of the dam. Assume an effective porosity of 32 percent.

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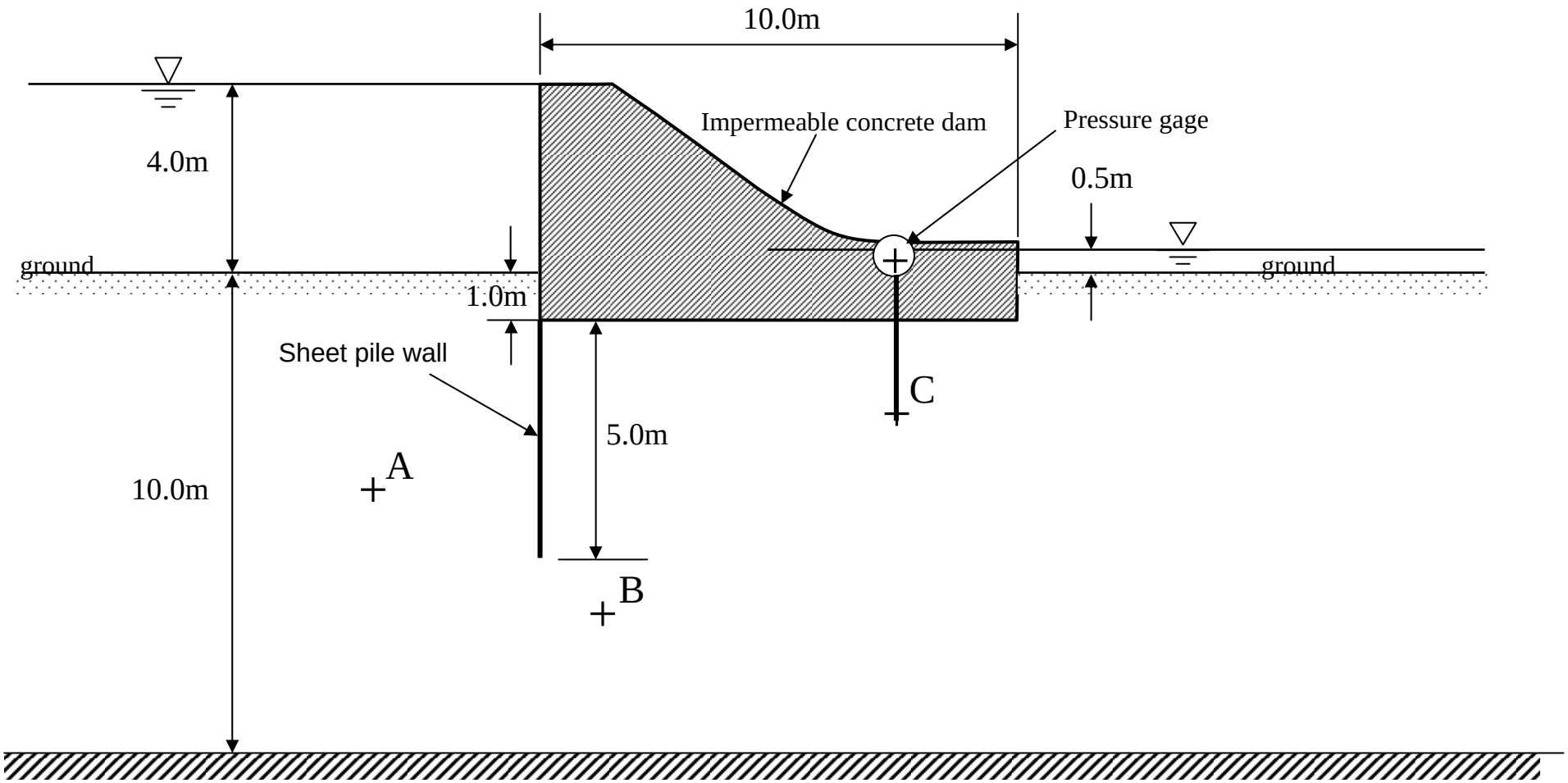

Figure 1

2. Show how the porewater pressure, total and effective stress changes with depth for the following soil profile. Assume that the water table is static.

    a. 0 to 10m is sand with bulk unit weight of 18 kN/m^3
    b. 10 to 20m is a firm to stiff grey clay with an unit weight of 20 kN/m^3
    c. groundwater table is located 10m below the ground surface