

Geog 254
Fall 2017
Lab 2 – Groundwater
Due: Oct 24, 2017

Data collection:

Bail/Slug tests

I have installed the piezometers/wells for you to ensure they were equilibrated (static hydraulic head) prior to the test.

In the field your task will be to remove a quantity of water quickly from the pipe, and then measure the rate of return of the water to the pipe. The rate of return is proportional the hydraulic conductivity and the pipe dimensions.

It is important that you record your pipe length, length of slotted intake, inside diameter, outside diameter, stickup, and static water level.

Well/piezometer heights

In order to get the gravitational component of hydraulic head, we must know the well top heights. You will survey these using the level and/or “survey equipment” provided.

Question 1: [28 total marks]

Using the Hvorslev (1951) method, calculate the hydraulic conductivity of your piezometer:

- Provide a properly formatted table showing the raw data and calculated values required to create the plot (10 marks)
- Provide a properly formatted plot of the head recovery (5 marks)
- Show your calculations that you completed to obtain:
 - One of the $\frac{H - h}{H - H_o}$ values (2 marks)
 - How you obtained the T_o value (5 marks)
 - Your final K calculation (3 marks)
- How does this value of K compare to the literature for similar soil types (3 marks)

Question 2: [22 total marks]

Using your K value from question 1, and the pipe top data you collected, calculate the vertical flux of water between your piezometer and the water table (or other piezometer, depending on the setup) using the specific discharge version of Darcy’s Law:

- Create a (roughly) to scale diagram showing the two components of hydraulic head as well as the hydraulic head for both the well and piezometer. Include in the diagram the surface, water table, well and piezometer, location of slotted intakes, and datum (10 marks) [You can use Figure 3.4, 3.5 and 3.7 from Hendricks as a rough guide.]
- Calculate the hydraulic gradient (the dh/dl term in Darcy’s Law) (2 marks) and include these distances on the diagram as well (2 marks)
- What is the vertical flux (mm/day) between the water table and the piezometers (include the direction)? (3 marks)
- Does this value make sense in terms of the annual water balance (5 marks, letter grade)

Total marks for assignment: 50