

CIE-365 Spring 2022: Homework assignment 4

Due date: 03/11/2022 at 10:00 AM

Possible points: 30

Answer the following questions based on the contents of Module 4- part 3.

- [O2] (5 points) Watch the YouTube video provided in this [link](#) and answer the following questions.
 - According to the video, what is the primary cause of dam failures in the U.S.?
 - Why is it so important for engineers to anticipate and monitor internal erosion?
- [O2] (10 points) For the given sheet pile driven into a permeable soil layer underlain by an impermeable clay layer (Figure 1):
 - Draw the flow net by using $N_f = 3$.
 - Compute the flow rate q around the sheet pile.
 - If the soils has $G_s = 2.65$ and $w = 25\%$ can piping occur?
 - What is the effect of dewatering the right side of the sheet pile on the factor of safety against piping?

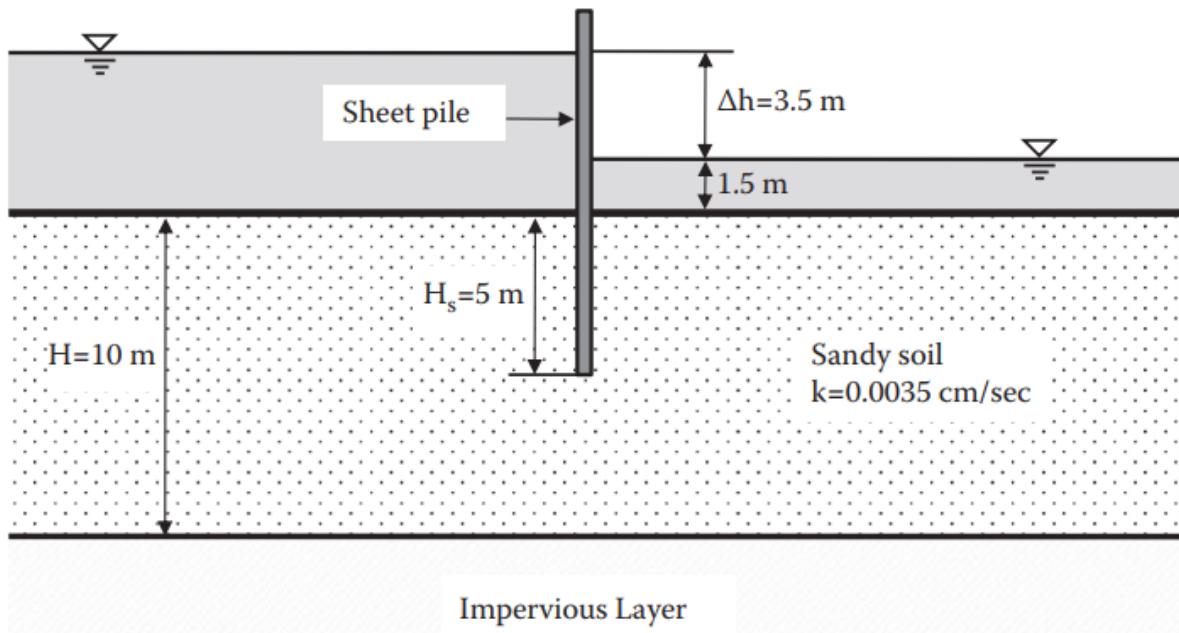


Figure 1: Figure needed for question 2.

- [O2] (10 points) For the flownet shown in Figure 2 determine:
 - The seepage flow below the dam.
 - If two piezometers are installed, as shown in Figure 2, what is the difference between their recorded pore pressures?.

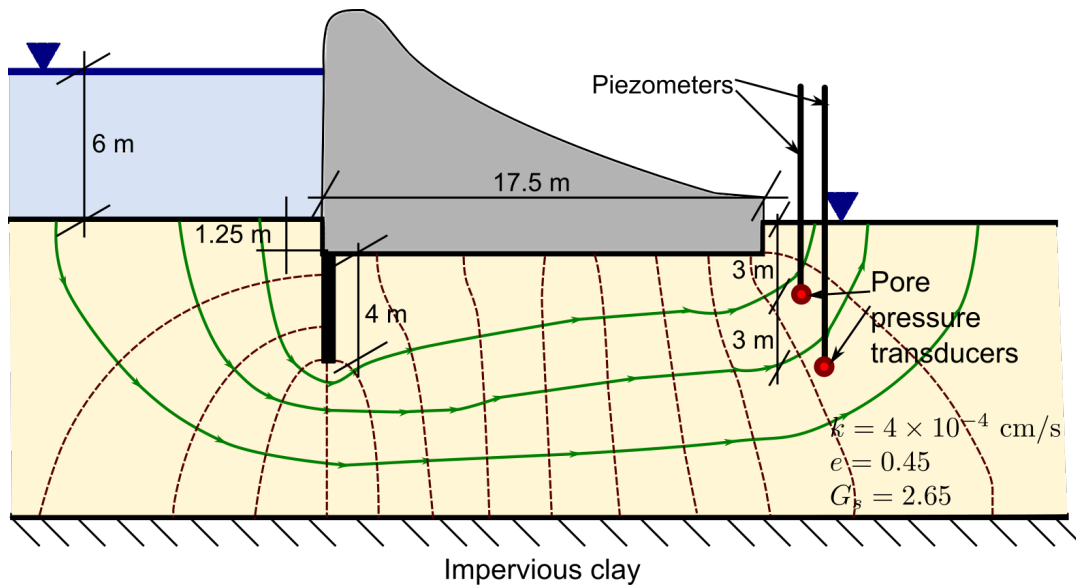


Figure 2: Cross-section for question 3.

- (c) Determine the pore pressure distribution below the dam and calculate the resultant uplift pressure.
 - (d) Calculate the dam weight to prevent uplift with a factor of safety of 1.2.
 - (e) What is the maximum hydraulic gradient at the exit?
 - (f) What is the factor of safety against piping?
4. [O2] (5 points) For the problem illustrated in Figure 3, draw the flow net and calculate the flow that each drain will collect per unit of length. The pipe flow is only due to gravity (i.e., the pressure head is 0 in the pipe).

Note: [O#] indicates the course objective that is partially covered by this assignment.

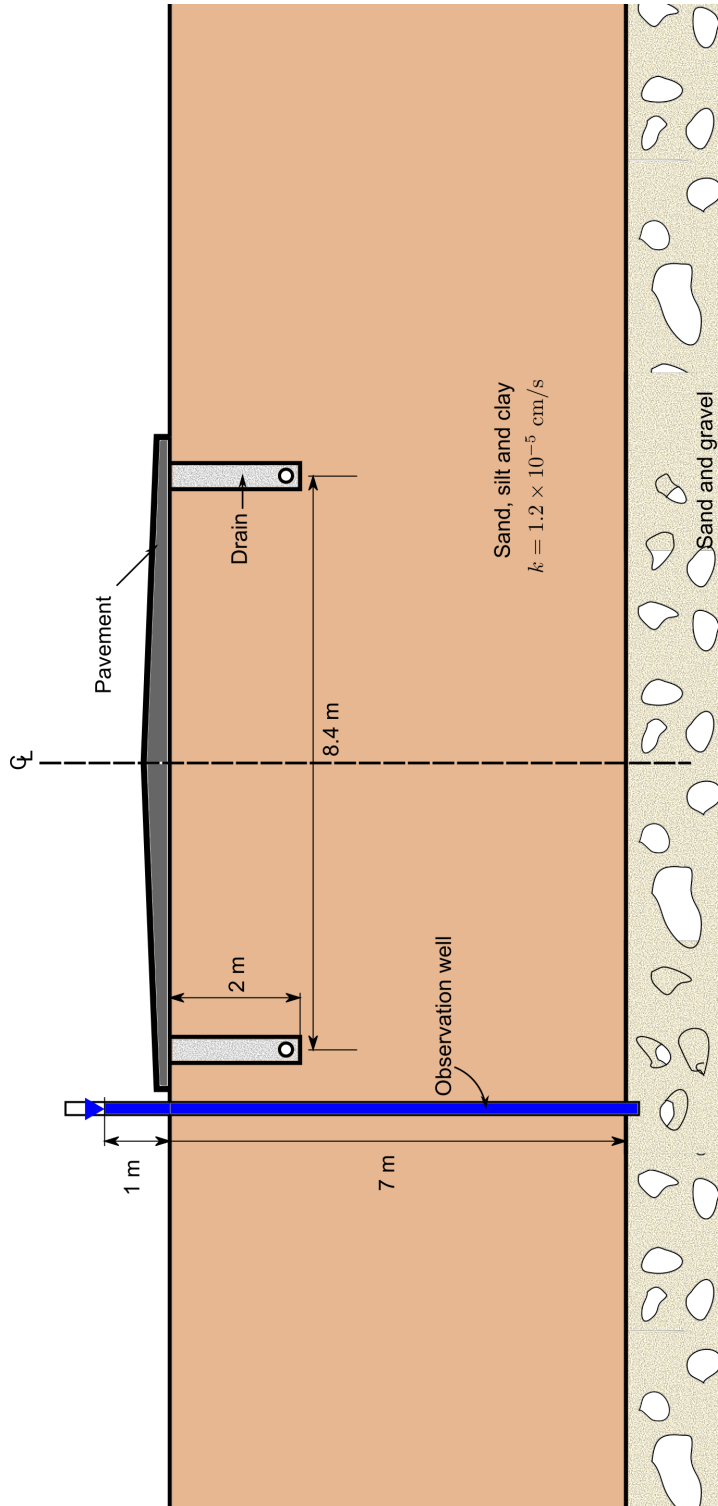


Figure 3: Cross-section profile for problem 4.