GW Engineering EXAM I FALL 2010

PROBLEM #3 – 25 points USE UNITS of METERS SECONDS and GRAMS

A 40 meter long by 36 meter wide man-made pond has impermeable steel walls to the bottom of the silt and clay lining as illustrated in the cross-sectional view below.

NAME

The system is at a steady state.

The regional water table is 23 meters below the pond surface.

ANSWER THE QUESTIONS ON THE FOLLOWING PAGE, SHOW YOUR WORK

1305,5m elev Pond water level is 1308 meters above sea level Pond Water Pond bottom is silt K=2.7x105m/s SY=3x102 1.2 meters of silt 1305.5 meters clay K=1.8x10*m/s SY=1x102. above sea level 0.3 meters of clav -1304 melev Regional aquifer is gravel K=1x10+2m/s SY=3.5x10-1 「「「「「「「」」」」」 Regional water table is 1285 meters above sea level

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PROVIDE CALCULATIONS AND ANSWERS TO PROBLEM 3 HERE

USE UNITS of METERS SECONDS and GRAMS

3a) What is the volumetric discharge from the base of the pond?

$$Q = K_{i} A = 7.1 \times 10^{-6} M_{3}^{2} 2.67 (14.40 m^{2}) = (2.7 \times 10^{-2} M_{3}^{2} M_{3}^{2})$$

$$K = \frac{1.5 m}{44} = 7.1 \times 10^{-6} M_{3}^{2} = 7.1 \times 10^{-6} M_{3}^{2} = 1.5 M_{1.5}^{2} = 2.67$$

$$K = \frac{1.5 m}{2.7 \times 10^{-5}} + \frac{0.3 m}{1.8 \times 10^{-6}} = 7.1 \times 10^{-6} M_{3}^{2} = 1.5 M_{1.5}^{2} = 2.67$$

$$A = 40 m \times 36 m = 1440 m^{2}$$

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NAME

3b) What percentage of the pond volume is seeping through the bottom each day?

3c) Using sea level as your datum, what is the head at the contact between the silt and clay?

$$V = Keq i = 7.1 \times 10^{-6} \text{ m} 2.67 = 1.89 \times 10^{-5} \text{ m}$$

$$Ah = \frac{Vl}{K} = \frac{1.89 \times 10^{-5} \text{ m} 1.2m}{2.7 \times 10^{-5} \text{ m/s}} = 0.842m$$

$$1308m = 0.842m = 1307.16m$$

3d) What is the pressure at the same location that you calculated head for in sabove?

hp=hT-he= 1307.16m-(1305.5-12)=(2.86m)

3e) If we pumped the pond out and then allowed the silt and clay to drain completely, how much water would drain from the silt and clay?

$$(1.2m \pm 0.03 \pm 0.3m \pm 0.01) 36m 40m = 56m^3$$