Lecture 5

SUBSURFACE DRAINAGE

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GE 441 Geotechnical Construction Practice
Part 1

FUNDAMENTAL CONCEPTS OF SHALLOW SUBSURFACE FLOW
Groundwater Terminology
Theoretical movement of groundwater through uniformly permeable material
Gaining and losing streams
Hydraulic gradient – linear approximation

\[ \text{Hydraulic gradient} = \frac{h_1 - h_2}{d} \]
Darcy’s Law is useful for providing approximations of groundwater flow.

\[ Q = K A \frac{h_1 - h_2}{L} \]

- Where \( \frac{h_1 - h_2}{L} \) is the **hydraulic gradient**
**Interflow**

- **Springs**
  - Springs occur where the ground water table intersects the Earth’s surface
  - Natural outflow of groundwater
  - Can be caused by an aquitard, creating a localized zone of saturation, which is called a **perched water table**
  - Ephemeral springs present the greatest engineering challenge, because they can be very difficult to detect
Springs resulting from a perched water table

Perched water tables are common to the Ozarks, much of the Midwest, and the Appalachian Mountains/Piedmont areas
The slope of the groundwater table in karst is typically about $\frac{1}{2}$ degree!