Air Diffusion Tests under Upward Hydraulic Gradient

NSF Project: Liquefaction Mitigation Using Entrapped Air
(Award #:CMS-0509894)
Test Setup

Diagram:
- Constant Heads
- 2" NPT
- Inflow water
- Excess Water out
- Outflow Water
- 7.62 cm (3"
  Plexiglass Tube
- Partially Saturated Ottawa Sand Column
- Reinforced Concrete
- Drainage Beaker

Images:
- Drainage Beaker
- Reinforced Concrete
- Plexiglass Tube
- Inflow water
- Excess Water out
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Text:
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- Water
Typical Test Results

Variation of Degree of Saturation for Air Entrapped Ottawa Sand Specimen under Vertical Hydraulic Gradient

- Initial: $e_{initial} = 0.72$
- Final: $e_{final} = 0.73$
- Initial Saturation: $S_{initial} = 82.6\%$
- Final Saturation: $S_{final} = 83.6\%$

Graph with Degree of Saturation on the y-axis and Gradient, $i$, on the x-axis.
Typical Test Results

Flow Rates under $i = 0.3$ for Air Entrapped and Fully Saturated Specimens

- Fully Saturated Sand Specimen, $S = 99.6\%$, $e = 0.73$
- Partially Saturated Sand Specimen, $S = 82.6\%$, $e = 0.72$
Typical Test Results

Coefficient of Permeability for Air Entrapped and Fully Saturated Specimens

- Fully Saturated Sand Specimen \(S=99.6\%, e=0.73\)  
  \[Q/A = 0.109^*i\]  
  \[k=0.11 \text{ cm/sec}\]

- Partially Saturated Sand Specimen \(S=82.6\%, e=0.72\)  
  \[Q/A = 0.058^*i\]  
  \[k=0.06 \text{ cm/sec}\]