Field Investigation of Down Drag on Concrete Piles in Sandy Soil

Project Pending

GRIP 2019

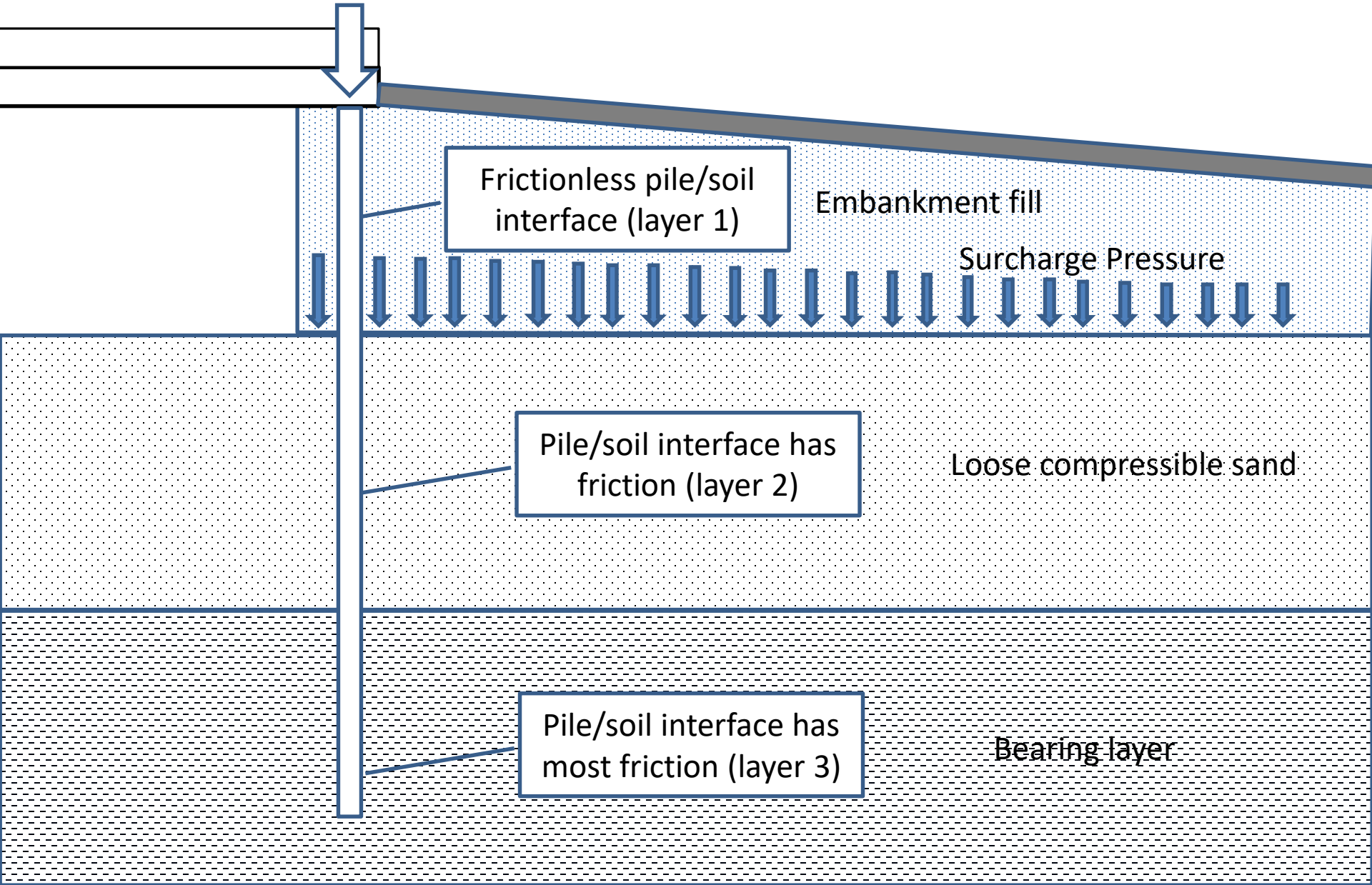
USF UNIVERSITY OF SOUTH FLORIDA

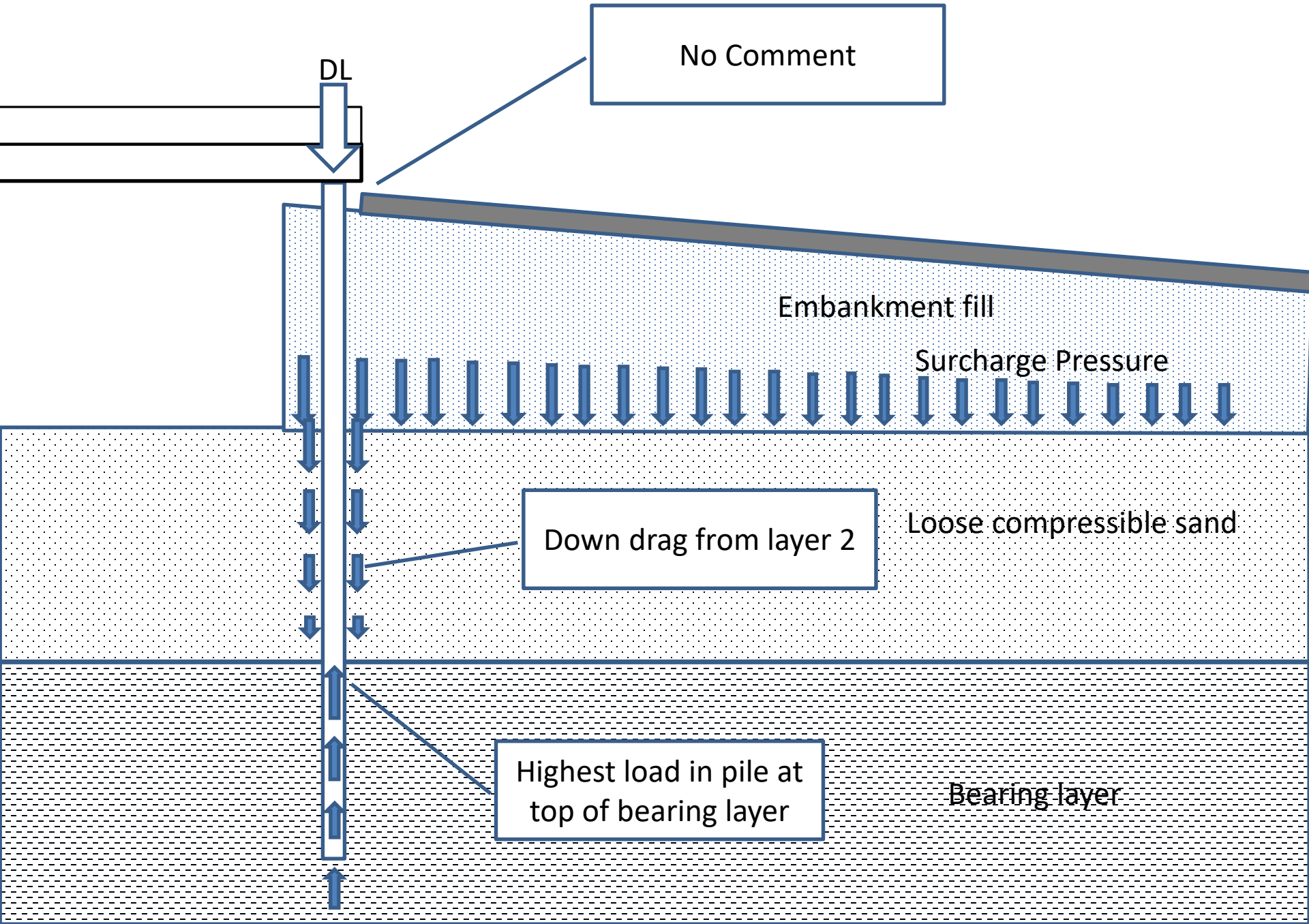
Civil & Environmental Engineering

Problem Statement

- Piles in end bents are often subjected to settlement induced surcharge loads in addition to structural bridge loads.
- Depending on the site-specific conditions it is conceivable that the additional loads may exceed the structural and/or geotechnical pile capacity.
- This study will investigate these conditions.

Simple Embankment Model




No Comment
DL
Embankment fill
Surcharge Pressure
Down drag from layer 2
Loose compressible sand
Highest load in pile at top of bearing layer
Bearing layer

Questions to be Investigated

- Under what conditions (if any) does the pile exceed structural capacity?
- How much additional pile settlement is expected for various site conditions?
- Does the densified soil around pile in compressible layer isolate pile from down drag or exacerbate it?
- What role does live load induced elastic shortening play in down drag reduction from strain reversal?

Approach

- Field Monitoring
  - Instrumented piles in end bents to show dead load and live load effects
  - Instrumented out of position piles behind end bents but in embankment to show only down drag
  - High speed short term and low speed long term monitoring (i.e. vibrating wire and resistive strain gages)
  - Fully loaded and weighed trucks
- Numerical Modeling (concurrent)

Project Support

- District Engineers
- Need sites going to construction within the next year
- Need case studies and past experiences

Questions