

Effects of Construction on Shaft Performance

Part II: Temporary Casing in Rock Sockets



GRIP 2015

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Part II: Problem Statement

- ◆ Construction methods affect drilled shaft side shear resistance which is not fully addressed by design.
- ◆ The effects from full length or partial length temporary casing can present the same concern.
- ◆ The primary objective of this study is to **quantify the effects of temporary casing** installation and extraction on the resulting side shear in the portions of the rock sockets used to embed and seal the casing.

Study Motivation

455-15.7 Casings. Ensure casings are metal . . .

. . . . *If temporary casing is advanced deeper* than the minimum top of rock socket elevation shown in the Plans or actual top of rock elevation if deeper, withdraw the casing from the rock socket and overream the shaft. If the temporary casing cannot be withdrawn from the rock socket before final cleaning, *extend the length of rock socket* below the authorized tip elevation one-half of the distance between the minimum top of rock socket elevation or actual elevation if deeper, and the temporary casing tip elevation.

Research Approach

- ◆ Task 1 Literature Review
- ◆ Task 2 Small Scale Side Shear Test Setup
- ◆ Task 3 Small Scale Side Shear Testing and Analysis
- ◆ Task 4 Full Scale Field Testing
- ◆ Task 5 Draft Final and Final Report

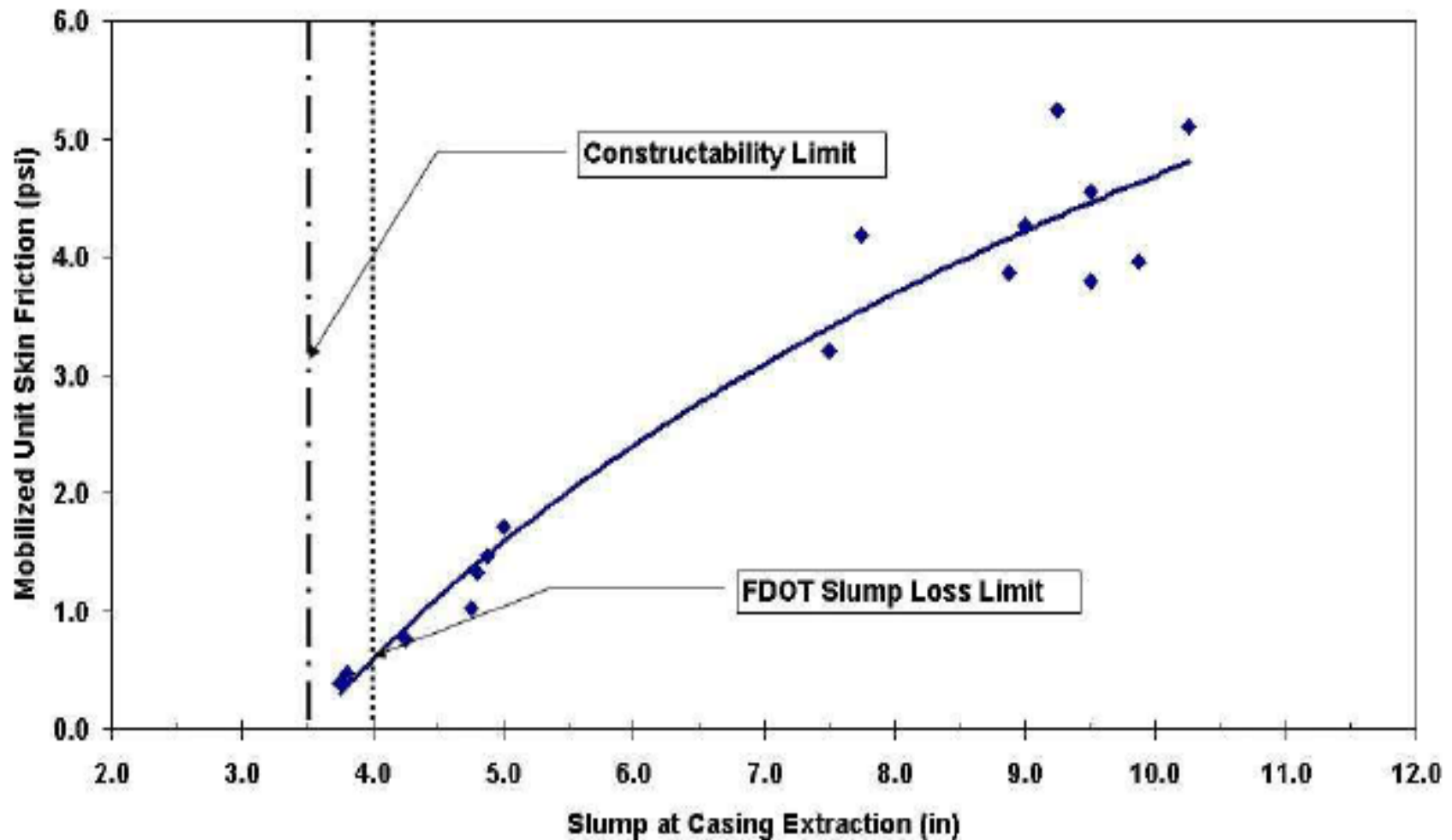
Casing Conditions

- ◆ Permanent
 - Full length
 - Partial length
- ◆ Temporary
 - Full length
 - Partial length
- ◆ Telescoping / Combination

Misconceptions

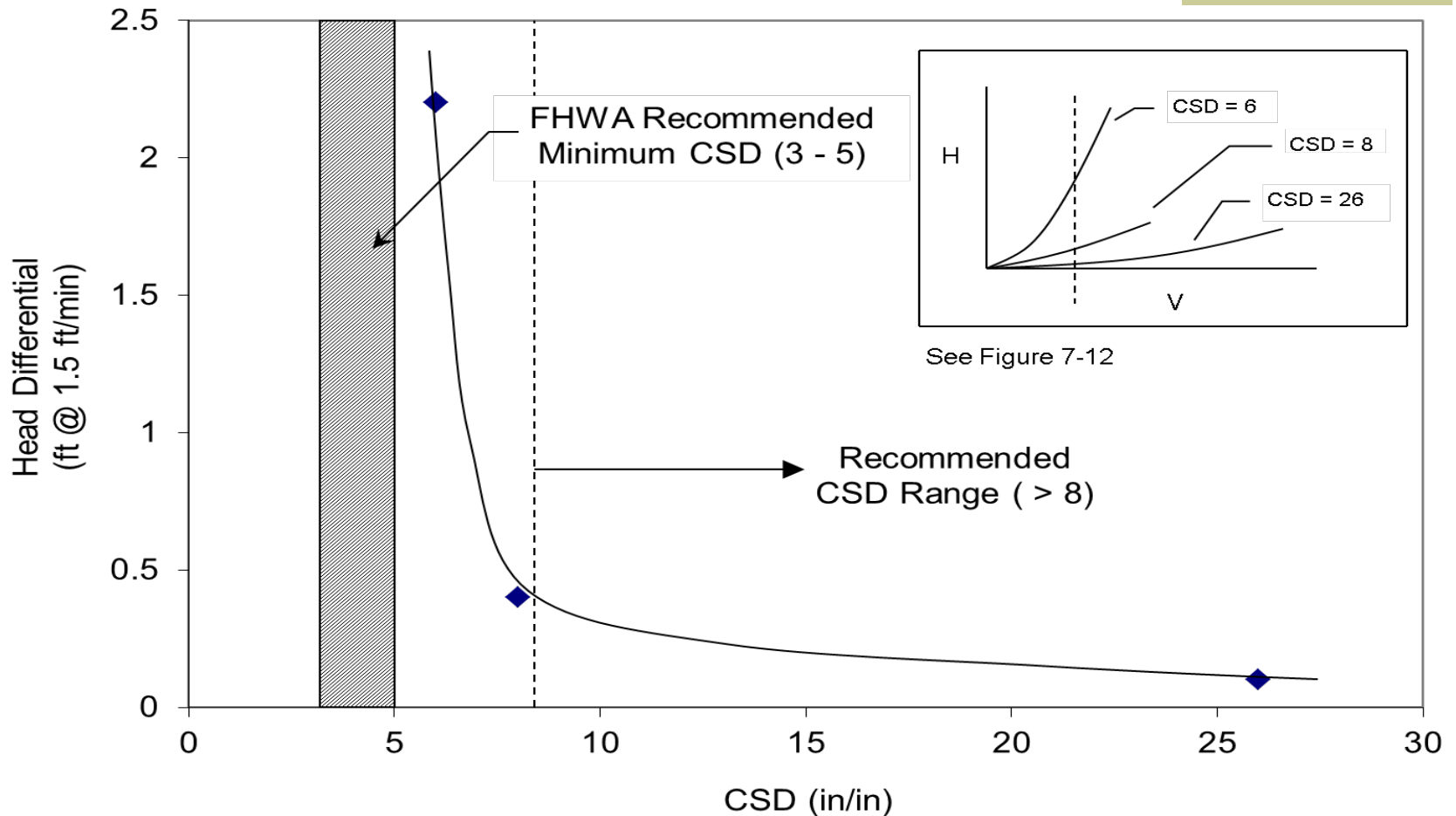
- ◆ Use of casing makes more predicable shaft
- ◆ No anomalies occur within permanent cased regions
- ◆ Temporary cased sections have more reliable cross sections

Slump Loss in Temporary Casing

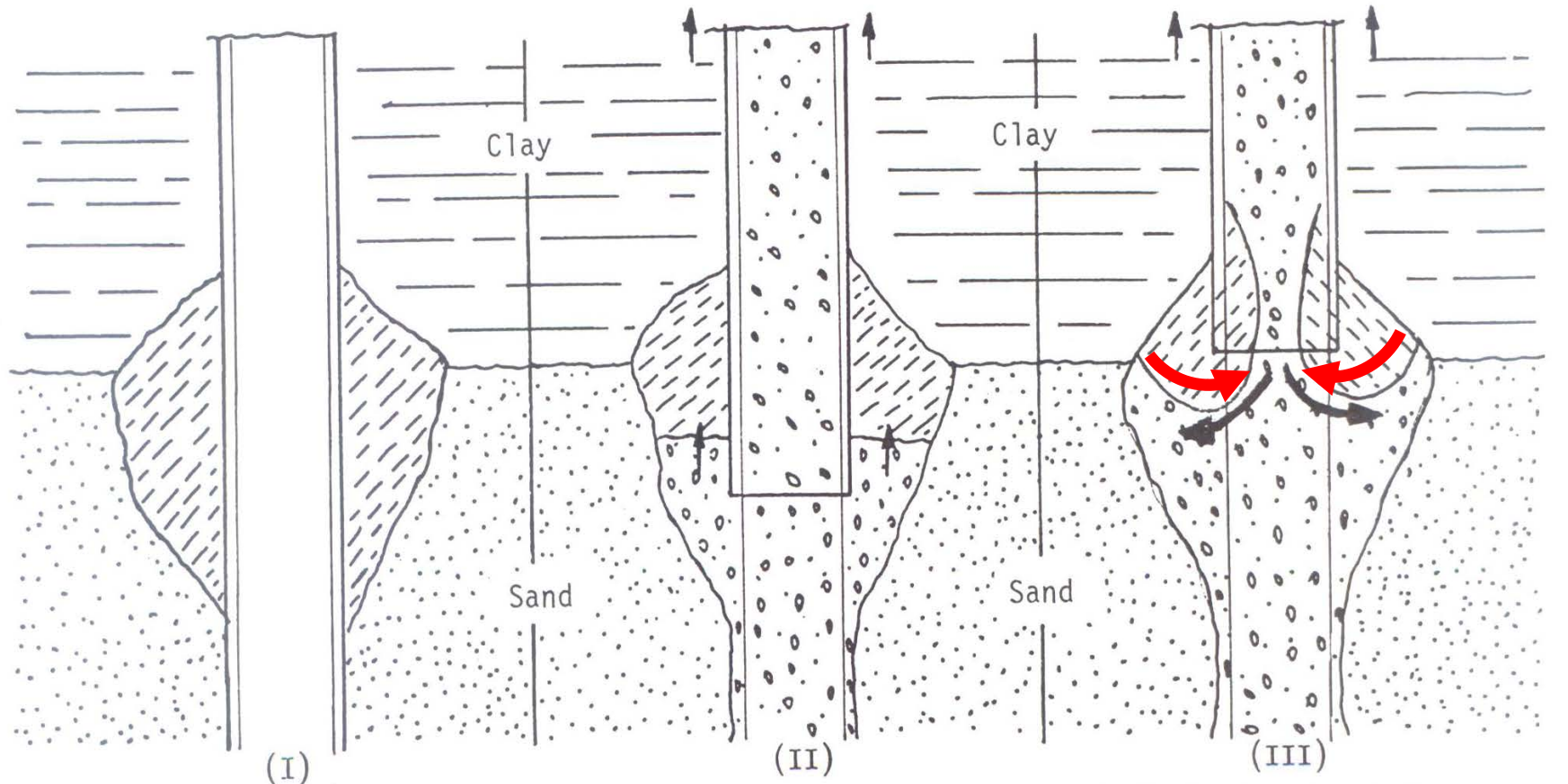




Spacing vs Aggregate Size



Temporary Casing Removal



SLURRY FILLED CAVITY FORMED
OUTSIDE THE CASING

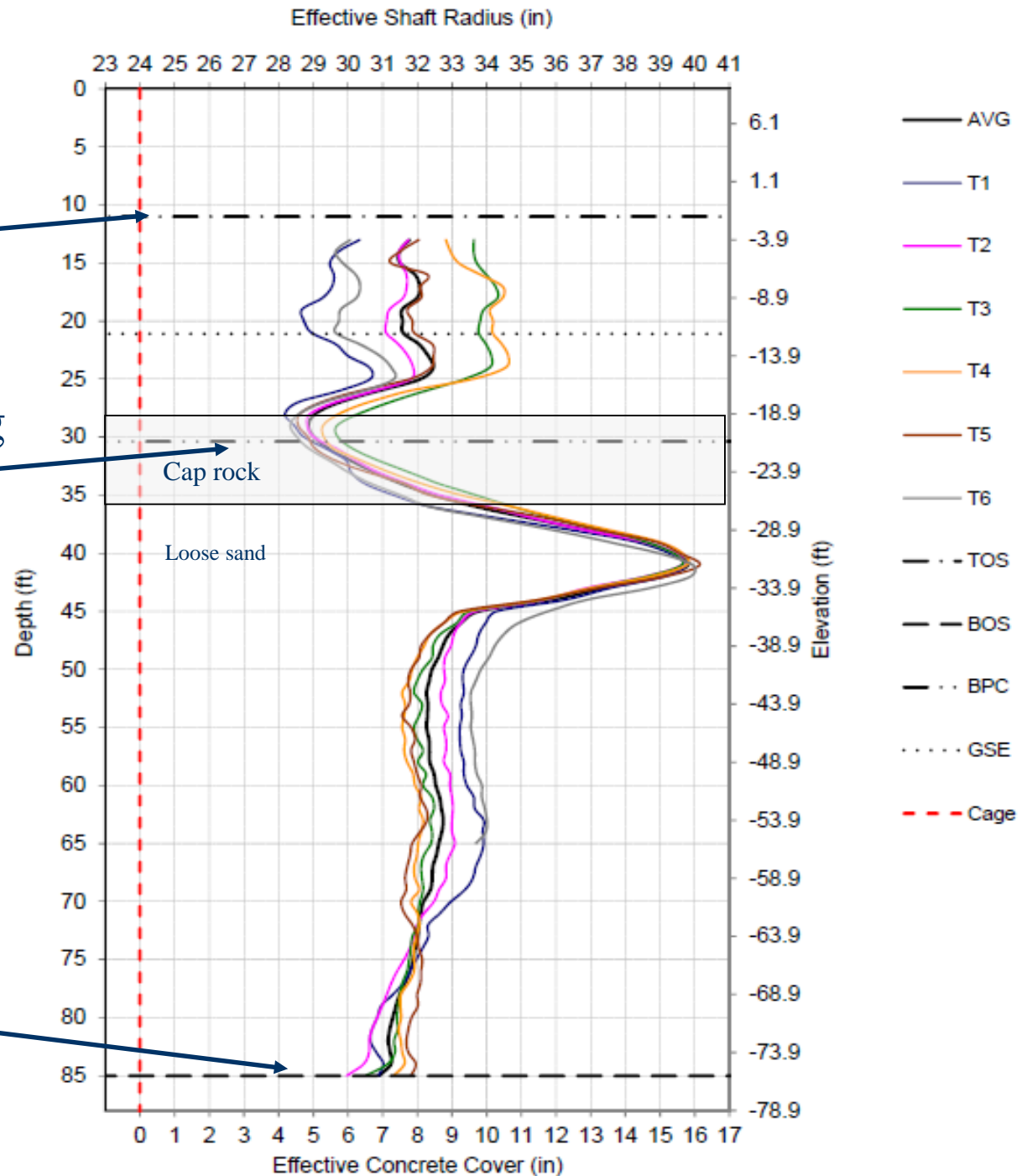
PILE CONCRETED, CASING
LIFTED IN CAVITY UNDER
PRESSURE

CASING IS LIFTED HIGHER
CONCRETE SLUMPS INTO THE VOID
CONTAMINATED SLURRY FLOWS INTO
PILE

Permanent casing
(top)

Permanent casing
(bottom)

Temporary full
length casing



Quantifying the Effects

- ◆ How does temporary casing affect the resulting side shear?
- ◆ Does concrete flow out and form intimate bond with surrounding rock?

or

- ◆ Do residual fragments of crushed rock remain and get squeezed/trapped between outward flowing concrete?

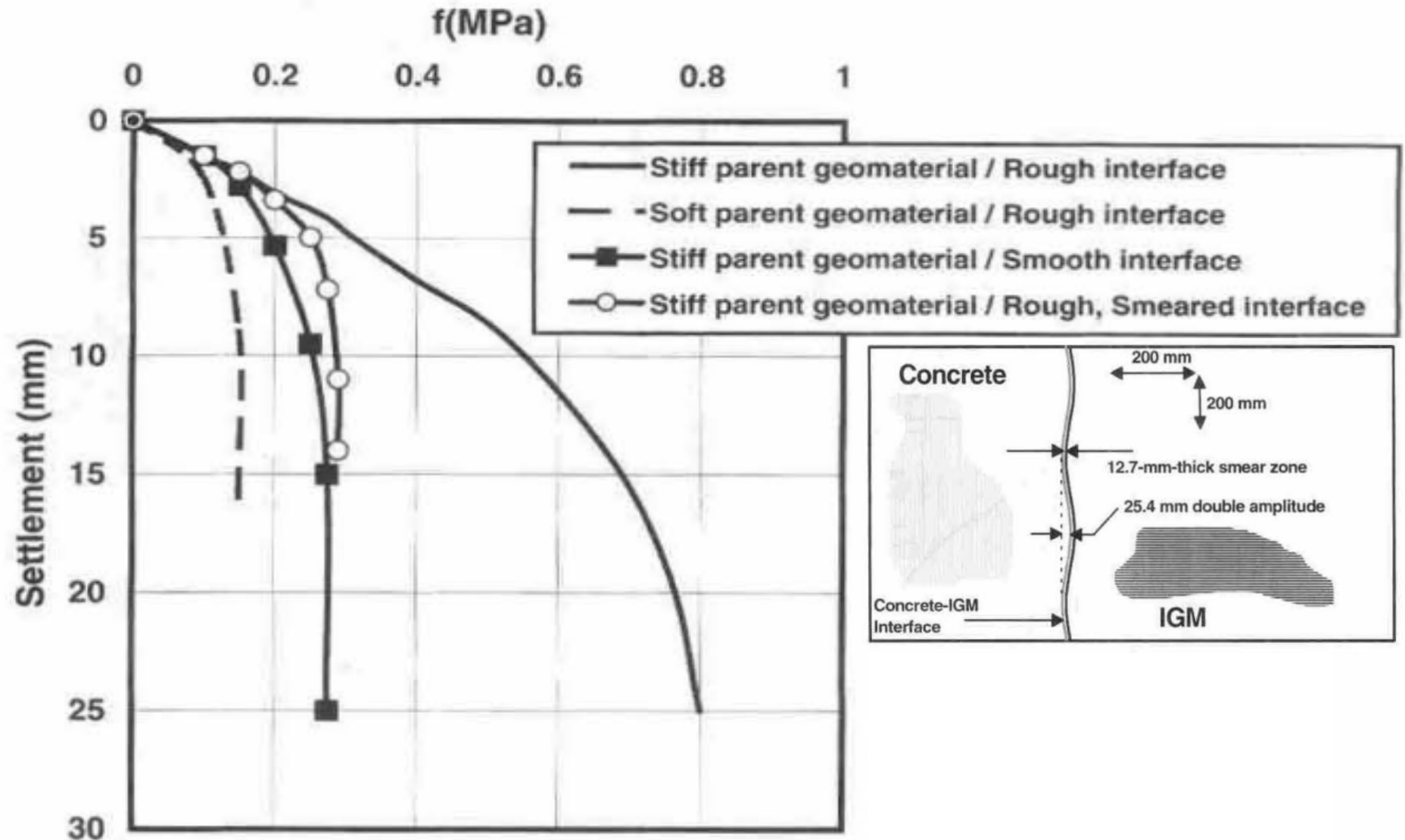
Construction with temporary casing

Effects of casing extraction

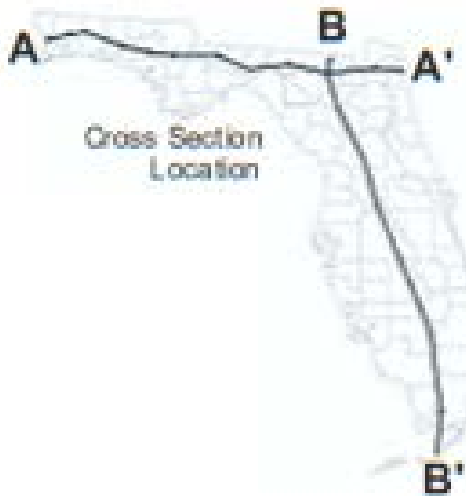
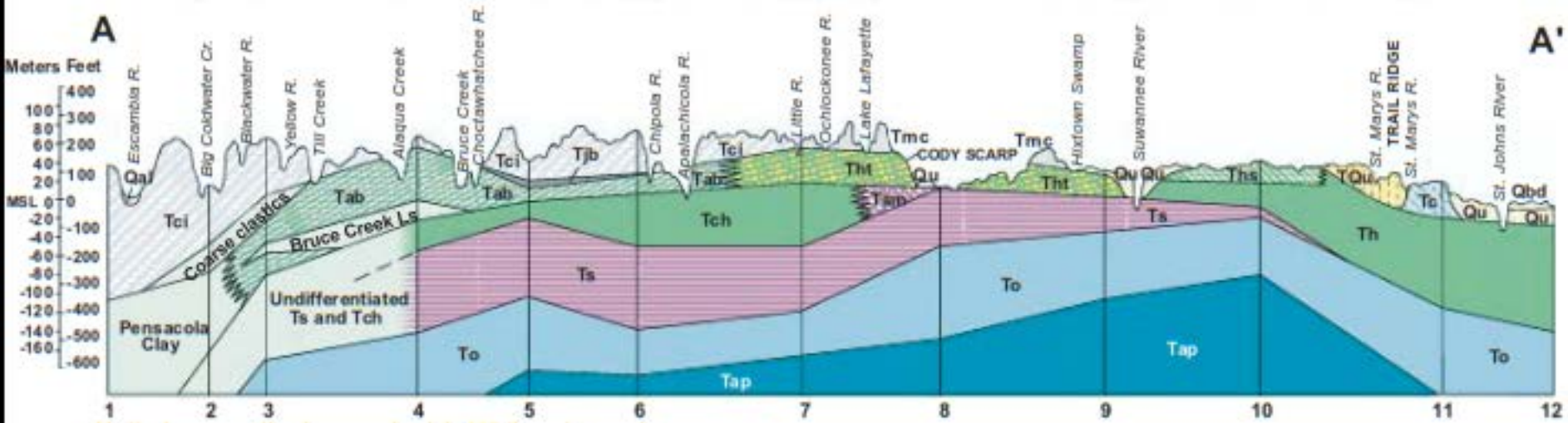


Construction of rock sockets

Effects on the side resistance (O'Neill and Hassan, 1994)

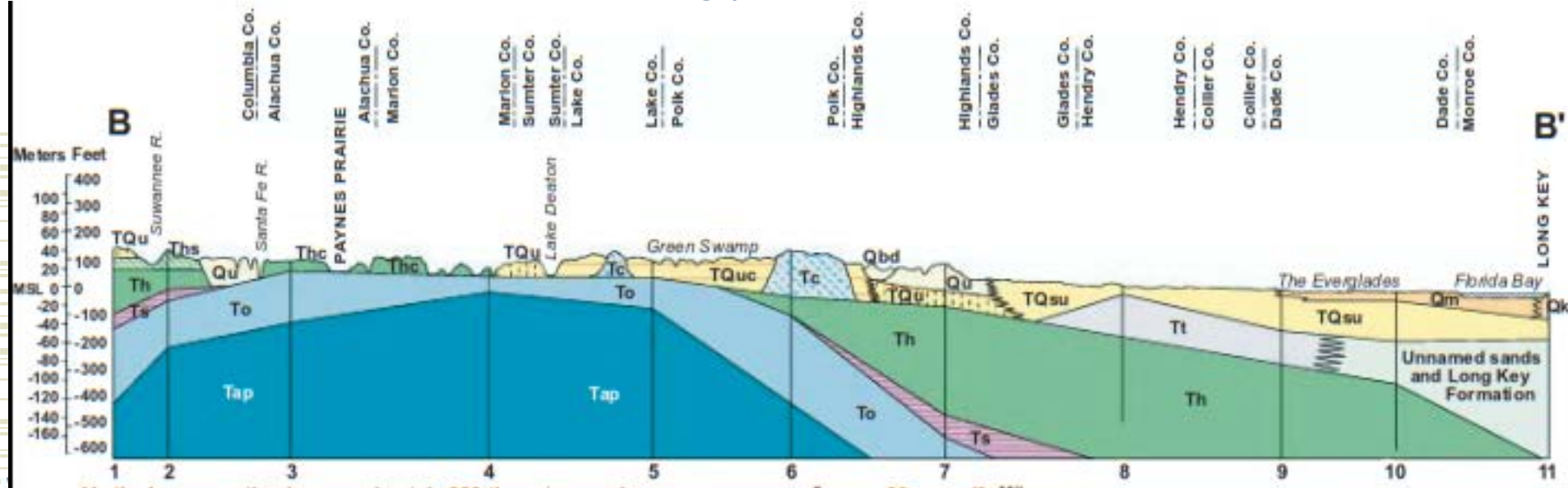


Geology of Florida



- Tch Silty to finely sandy dolostone
- Th Clayey sands to silty clays
- Ts Suwannee Limestone
- To Ocala Limestone
- Tap Avon Park Formation (limestones interbedded with dolostones)

Geology of Florida



- Th Clayey sands to silty clays
- Ts Suwannee Limestone
- To Ocala Limestone
- TQsu Sands and limestones, mainly
- Qm Miami Limestone
- Tt Sands and limestones, mainly
- Tap Avon Park Formation (limestones interbedded with dolostones)

Need for Data Sets

- ◆ **Unpublished load test results**
- ◆ **FDOT load test database??**
- ◆ **District Engineers**
- ◆ **Consultants**

Questions for Part II?

