

Improving Design Phase Evaluations of High Pile Rebound Soils with an Emphasis on SPT Testing

*Task Work Order BDV28 Two 977-05
15 month study*

PI: Paul J Cosentino Ph.D., P.E.,
Florida Institute of Technology
Melbourne Fl 32901-6975
321-674-7555 Direct

PM: David Horhota, Ph.D., P.E






Outline

- 🖱 Introduction and Background
- 🖱 Objective
- 🖱 Approach
 - 🖱 Task 1 Additional Sites
 - 🖱 Task 2 HPR Trends
 - 🖱 Task 3 Draft Final Report and Closeout Teleconference
 - 🖱 Task 4 Final Report
- 🖱 Schedule of Tasks
- 🖱 Implementation Items or Issues
- 🖱 Project Benefits
- 🖱 Closing



FDOT Sites Tested to Date

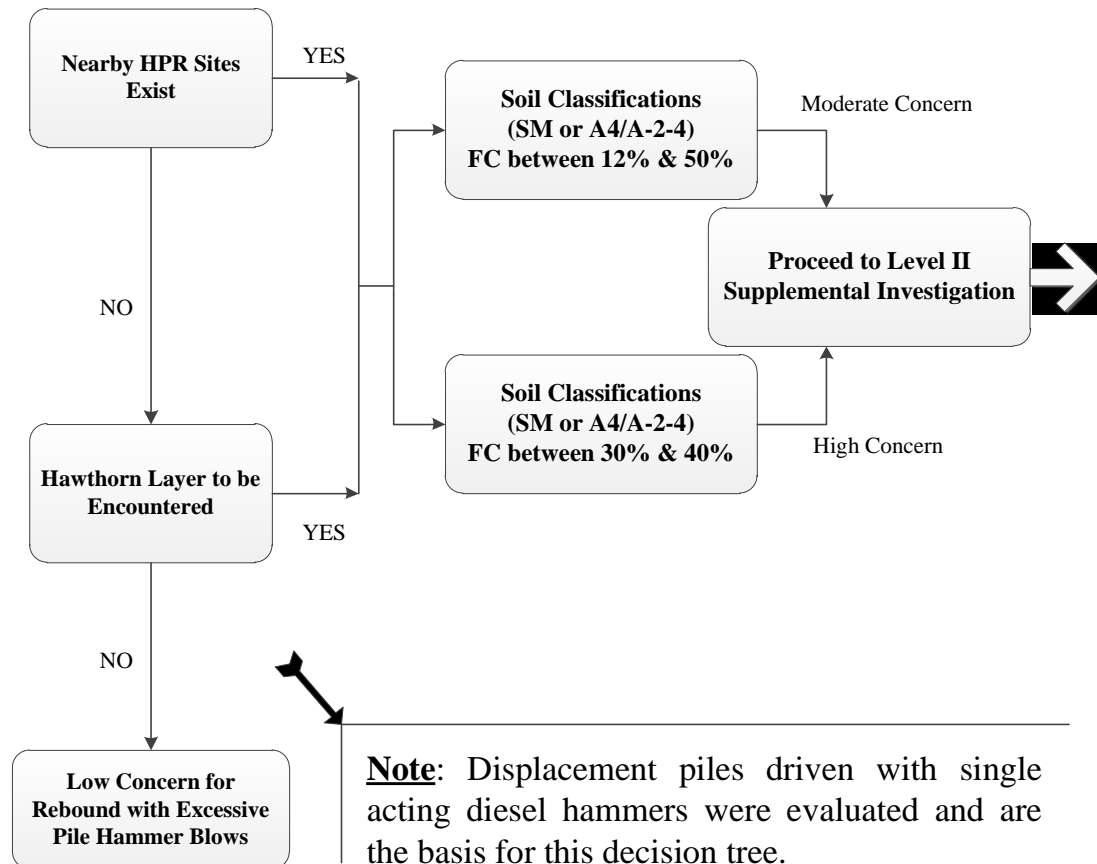
-  SPT on 11 of 12
-  CPTu on 8 of 12
-  Shelby on 6 of 12

Number	Description	Testing		
		SPT	CPTu	Undisturbed
1	I-4 / US-192 Interchange / Osceola County / Florida.	✓	✓	✓
2	State Road 417 International Parkway / Osceola County / Florida.	✓	✓	✓
3	I-4 / Osceola Parkway / Osceola County / Florida.			✓
4	State Road 50 and State Road 436 / Orange County / Florida.	✓	✓	
5	I-4 / State Road 408 Ramp B / Orange County / Florida.	✓	✓	
6	Anderson Street Overpass at I-4/SR-408 / Orange County / Florida.	✓	✓	
7	I-4 John Young Parkway/ Orange County / Florida	✓		
8	I-4 Widening Daytona / Volusia County / Florida.	✓	✓	
9	SR 528 over Indian River, Brevard County / Florida	✓		
10	Saint Johns Heritage Parkway, Brevard County / Florida	✓	✓	✓
11	I-10 Chaffee Road, Duval County / Florida	✓		✓
12	State Road 83 over Ramsey Branch Bridge / Walton County / Florida.	✓	✓	✓



High Pile Rebound Decision Tree

Level I: Basic Design Phase Information



Note: Displacement piles driven with single acting diesel hammers were evaluated and are the basis for this decision tree.

HPR Decision Tree

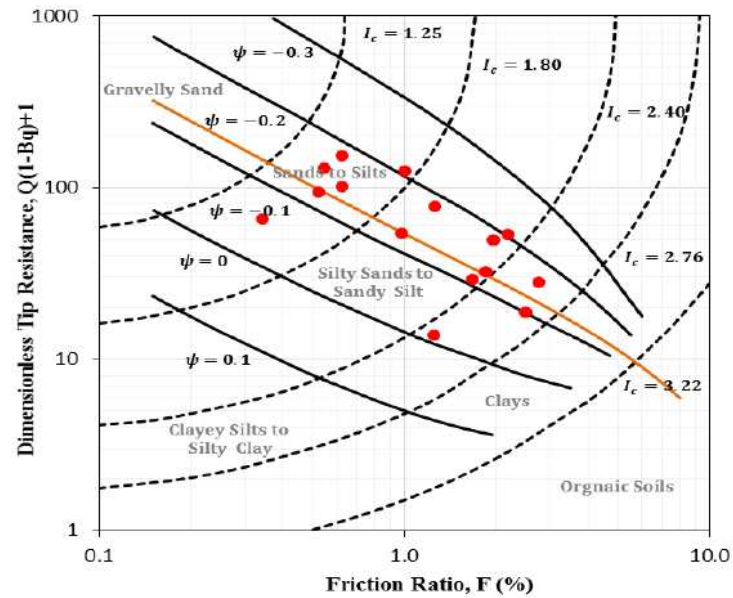
- 👉 Three Levels
 - 👉 Only Level 1 shown
 - 👉 Level 1 should be refined
- 👉 Based on limited data
- 👉 Based on 1/2 " rebound
 - 👉 1/4 " produced poor results
 - 👉 Other rebound levels may help clarify

Trends from CPTu Charts

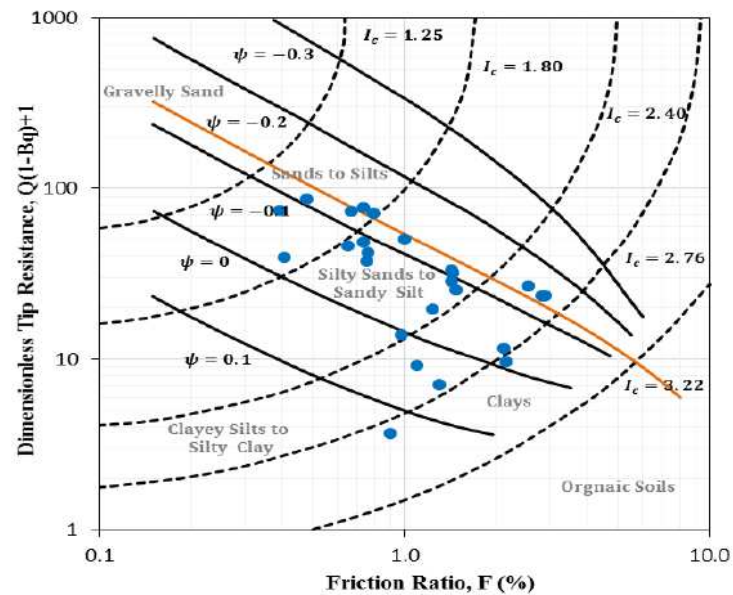
- Based on Layers 4B thick
- Layer Thickness is critical
- Similar Trends maybe available using SPT data



Rebound CPTu Data



Nonrebound CPTu Data





Objective

 Refine the BDV28 977-01 Decision Matrix Level I soil classification criteria based on rebound level with N values and FC.



Approach

- 🔍 Identify & Organize Additional HPR and NonHPR sites Based on Rebound Level
 - 🔍 Acceptable [rebound but pile driven]
 - 🔍 No Rebound [$< 1/4^{\text{th}}$ inch rebound]
 - 🔍 Unacceptable [Rebound Greater than $1/4$ $1/2$ or 1"]
- 🔍 Evaluation of HPR Rebound Trends
- 🔍 Draft Final Report and Closeout Teleconference
- 🔍 Final Report



Schedule of Tasks

FLORIDA DEPARTMENT OF TRANSPORTATION RESEARCH CENTER																			
PROJECT SCHEDULE																			
Project Title	Improving Design Phase Evaluations of High Pile Rebound Soils with an Emphasis on SPT Testing																		
FDOT Project No.																FY	2017	Month	April
Research Agency	Florida Institute of Technology																		
Principal Investigator	Paul J. Cosentino, Ph.D. P.E.																		
RESEARCH TASK	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Comments			
Project Kickoff Meeting	1																		
Task 1 Identification and Organization of Additional HPR and NonHPR sites Based on Rebound Level	1	2	3	4	5	6													
Task Evaluation of HPR Rebound Trends			1	2	3	4	5	6	7	8	9								
Task 3 Draft Final Report and Closeout Conference									1	2	3	4		1					
Task 4 Final Report													1	2	3				



Task 1 Identification and Organization of Additional HPR and NonHPR sites Based on Rebound Level

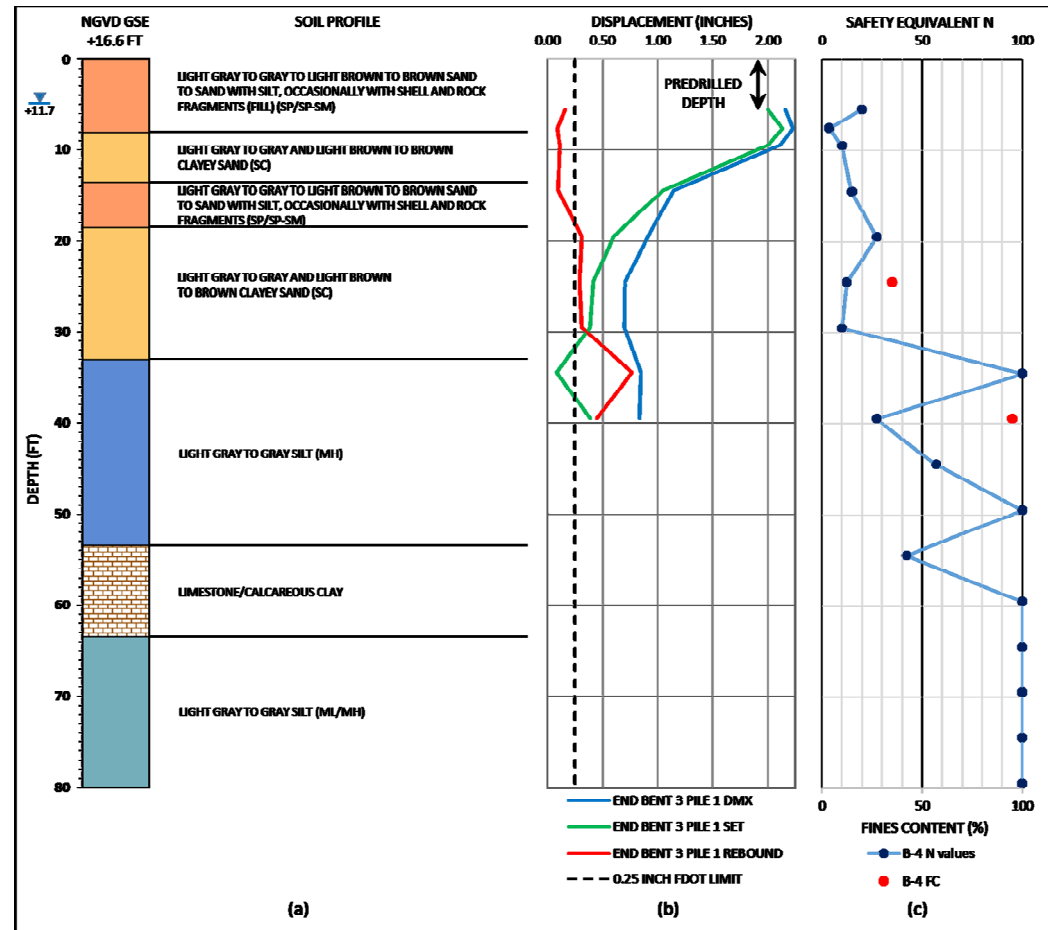
- 👉 Up to SIX new HPR sites will be identified- 4 identified to date
- 👉 Soil profiles with SPT plus PDA data from these sites will be organized so that the rebound can be categorized as follows:
 - 👉 acceptable (rebound with acceptable set i.e. the pile driven),
 - 👉 no rebound (less than 0.25 inches of rebound)
 - 👉 unacceptable (rebound greater than one of the three proposed rebound levels $\frac{1}{4}$ -inch, $\frac{1}{2}$ -inch and 1-inch).



Task 1: FDOT New Sites

 I-75 and SR 64

 Pier 3 Pile 1

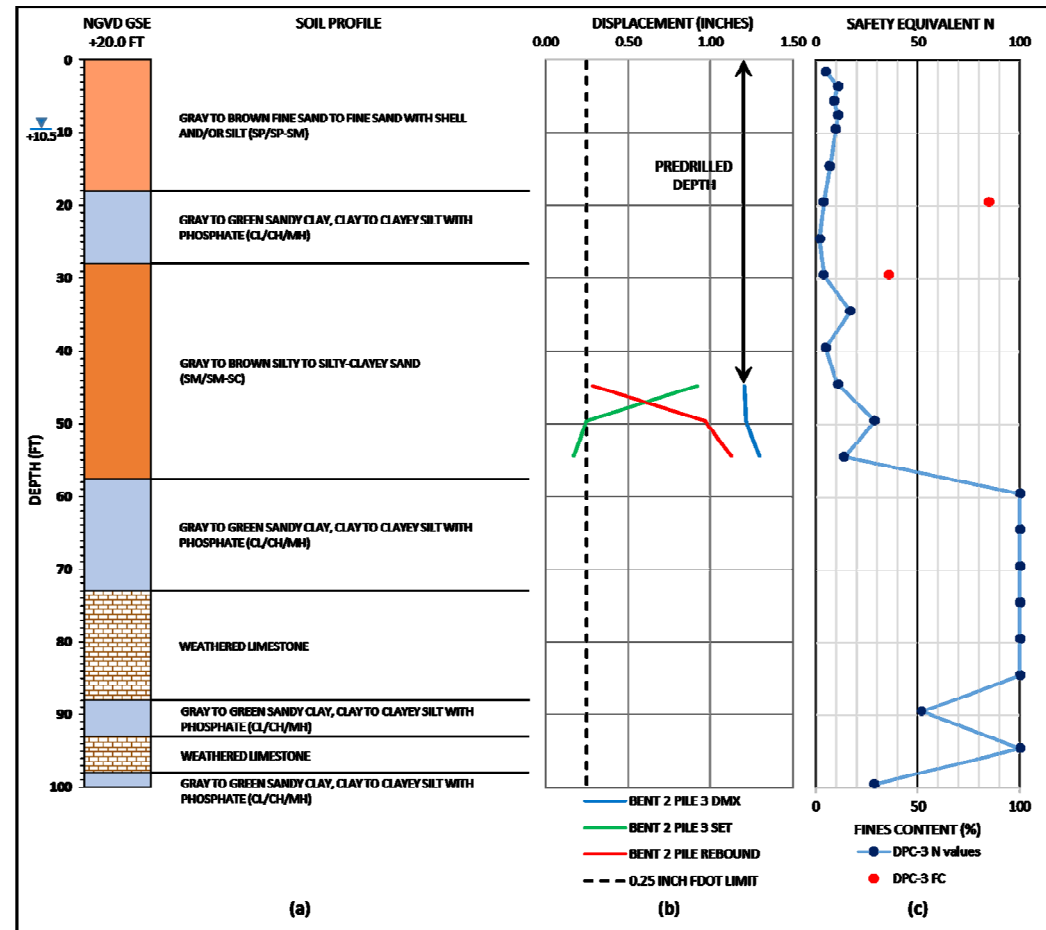




Task 1: FDOT New Sites

 Toledo Blade

 Pier 2 Pile 3

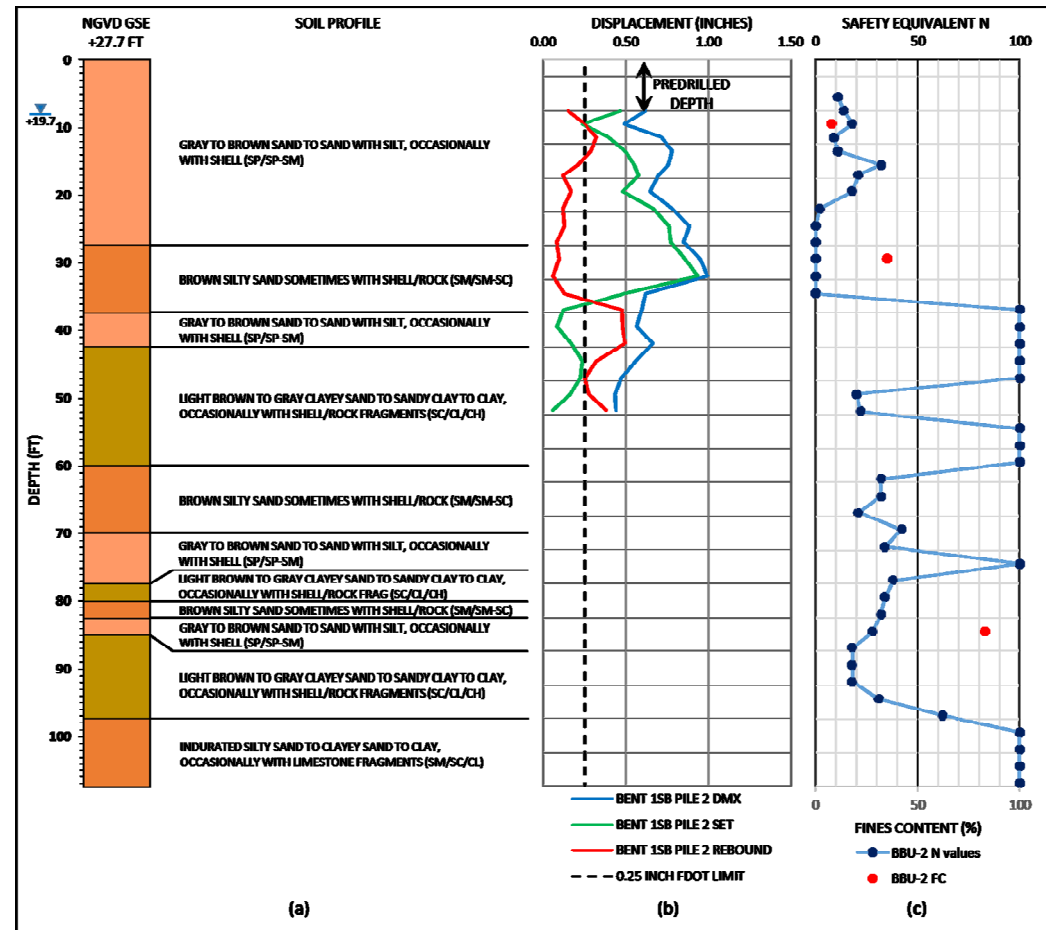




Task 1: FDOT New Sites

University Parkway:

Bent 1 (SB) Pile 2

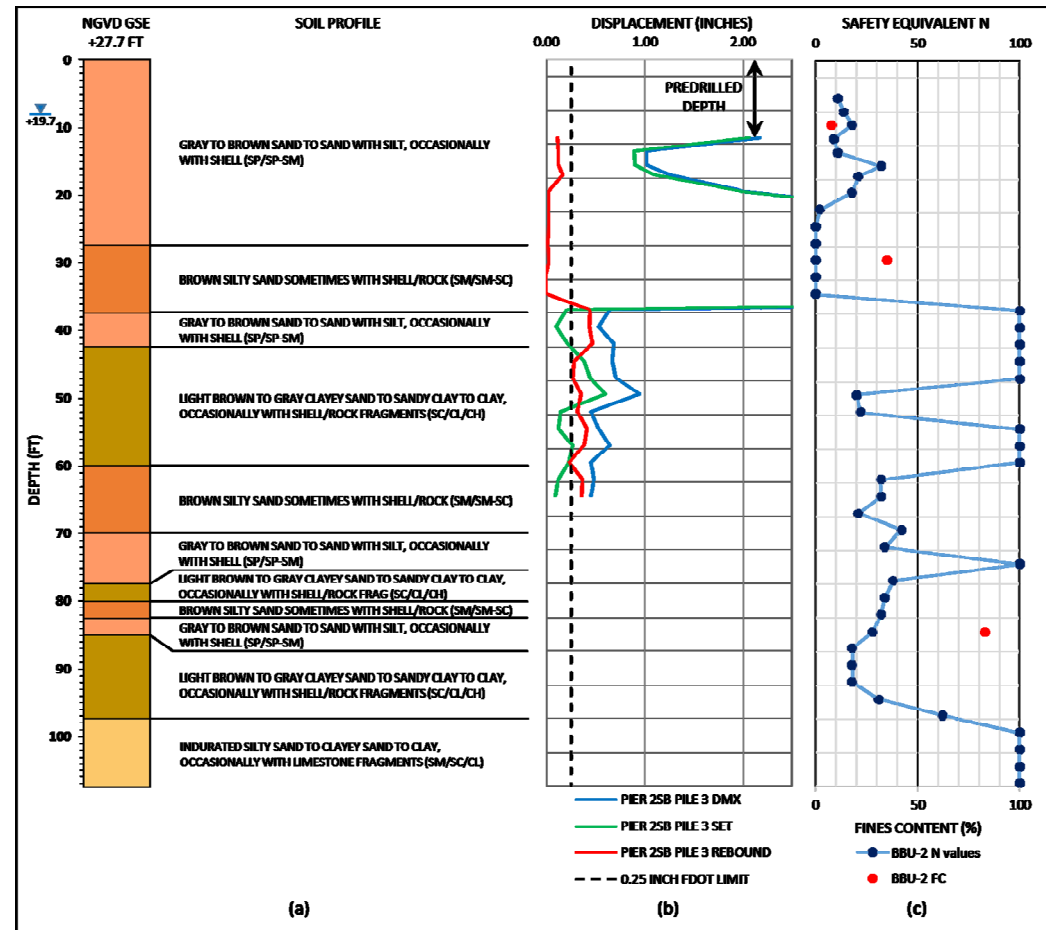




Task 1: FDOT New Sites

University Parkway:

Bent 2 (SB) Pile 3

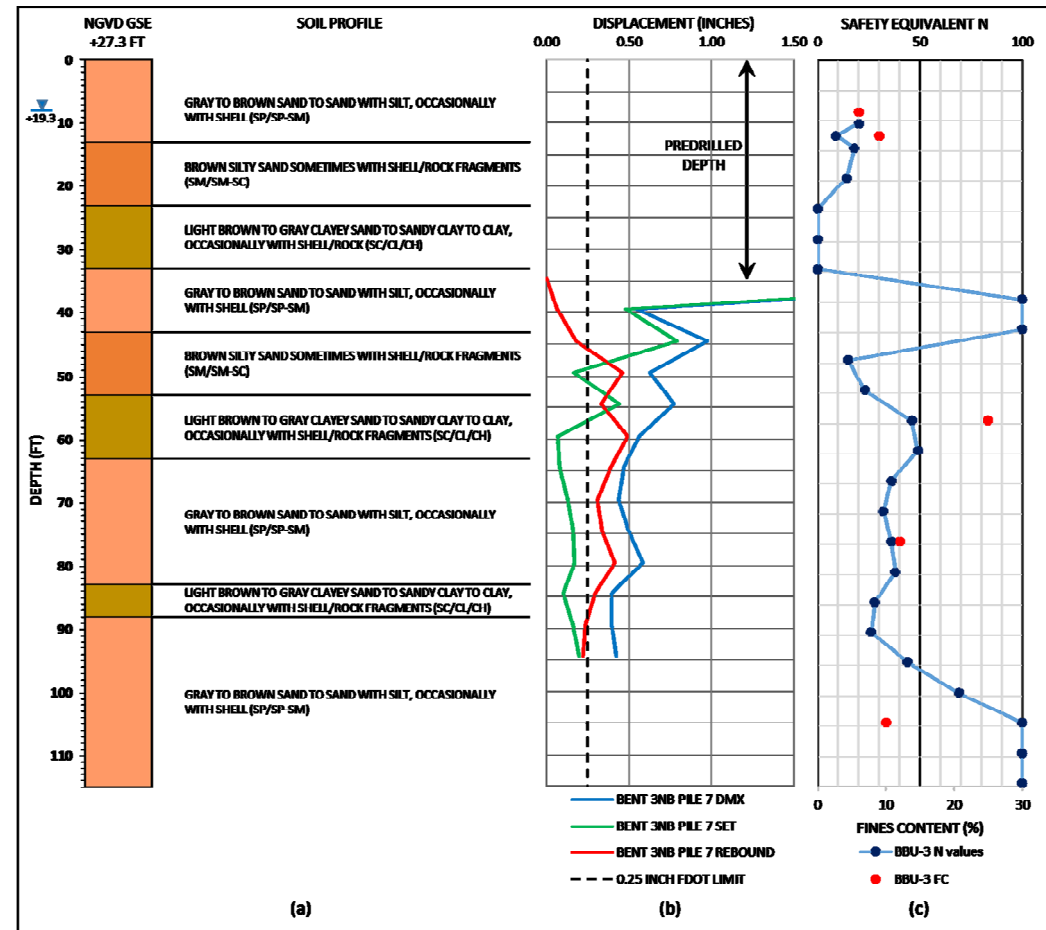




Task 1: FDOT New Sites

University Parkway:

Bent 3 (NB) Pile 7

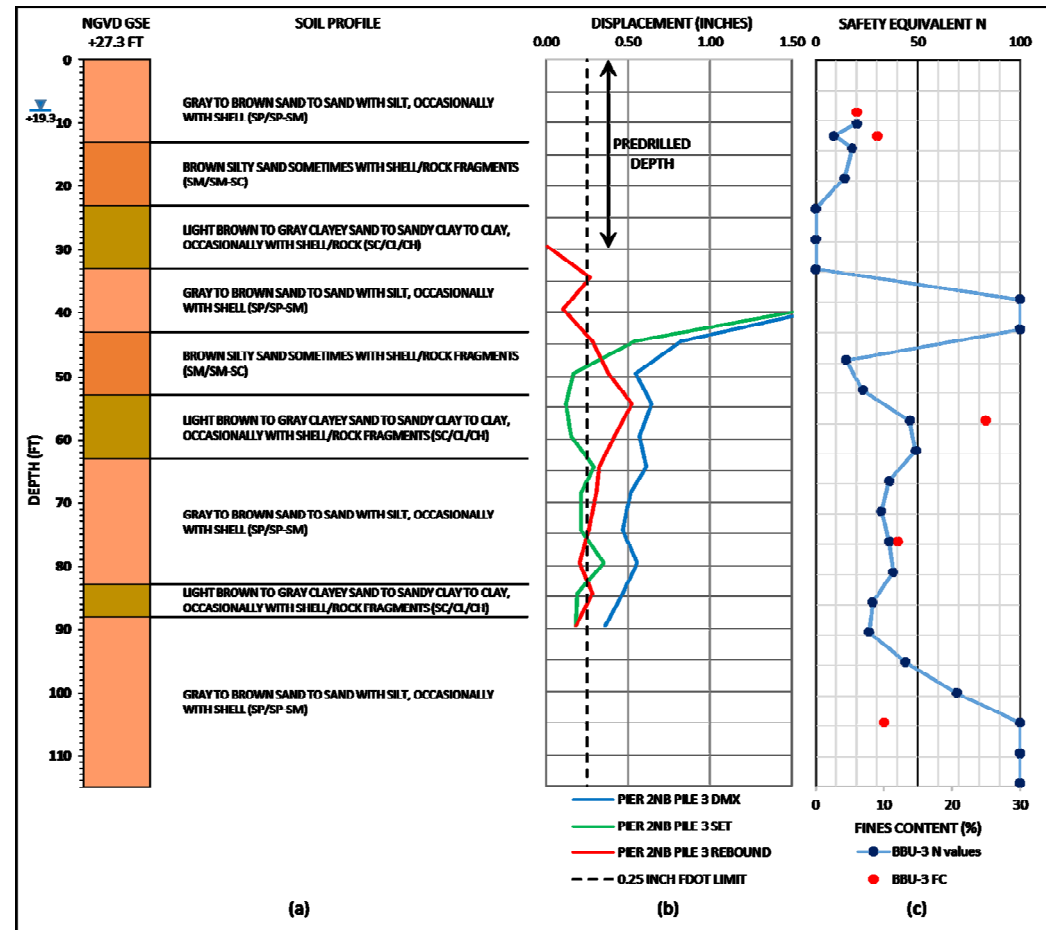




Task 1: FDOT New Sites


University Parkway:

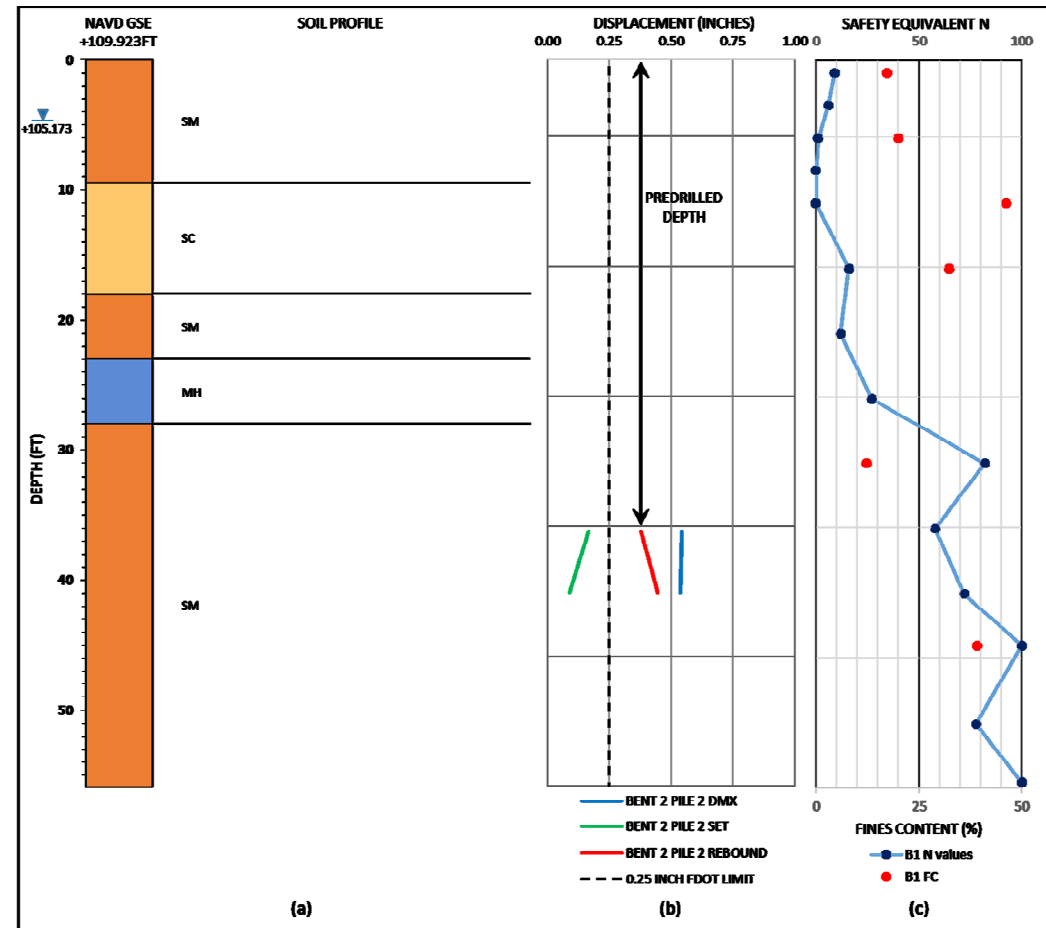
Bent 2 (NB) Pile 3



Task 1: FDOT New Sites

 Saddle Creek:

 Pier 2 Pile 2





Task 2 Evaluation of HPR Rebound Trends

👁 Existing and New Data to be used

👁 Divided into 4 subtasks

👁 CPTu Soil Behavior Type Charts will be used to determine CPTu rebound trends and correlations

- Based on pile penetration into the rebound layers of 2B, 4B and 8B

👁 Correlations will be developed between the CPTu N equivalent values and the measured N values




👁 SPT N and FC versus rebound correlations will be investigated using the 2B, 4B and 8B layer thicknesses

👁 Conclusions will be developed and the Level I Decision Tree will be updated to reflect the new findings





Final Two Tasks

Task 3 Draft Final Report and Closeout Teleconference

-  Contains two deliverables
-  Identified as 1 item in budget
-  A well Written document will be submitted and reviewed for approval

Task 4 Final Report

-  After revisions Final Report will be submitted on 2 Professionally labeled CD's
-  Each CD will contain the report in both a word and pdf format

Questions

