



FIELD TESTING AND CALIBRATION OF THE VERTICAL INSITU PERMEAMETER (VIP)

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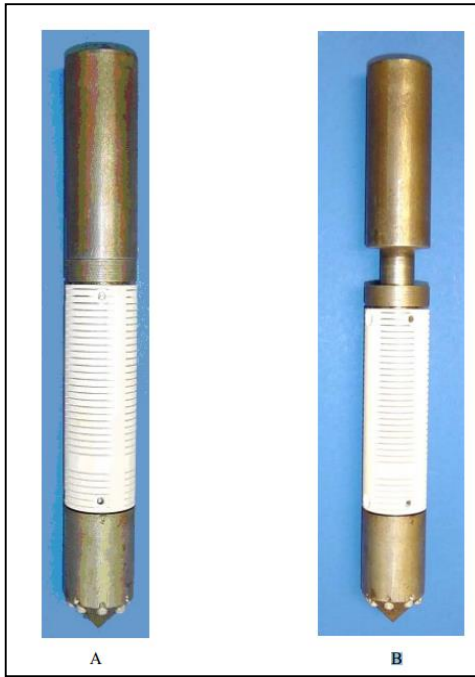
OVERVIEW

- ❑ Background
 - VAHIP
 - VIP
- ❑ Project Objective
- ❑ Literature Review
 - Direct-Push Permeameter
- ❑ Site Identification
 - Lake City
 - Jacksonville
- ❑ VIP Testing

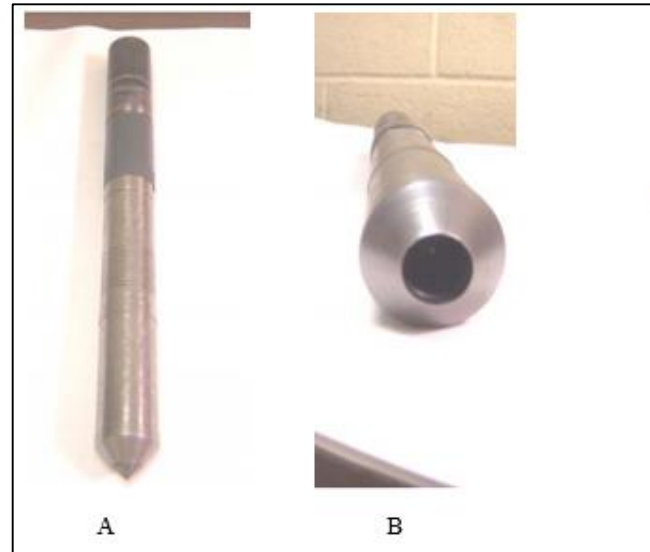
BACKGROUND

- VAHIP – Vertical and Horizontal Insitu Permeameter
 - Sponsored research by FDOT
 - Insitu hydraulic permeability device
 - Measure permeability in more time-efficient manner than current borehole methods
 - Developed to measure horizontal and vertical permeability
 - 2004 – preliminary probe
 - 2005 to 2007 – updates on the probe
 - 2012 – “smear proof” probe

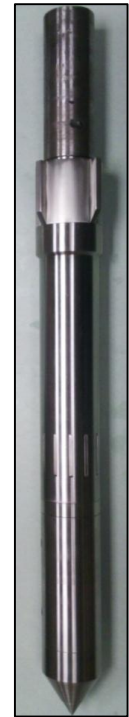
BACKGROUND



Original (2004) VAHIP showing:
(A) vertical testing position
(B) horizontal testing position



Evolution of the VAHIP showing the
2005-2007 second generation model:
(A) the horizontal flow position
(B) the vertical flow position



Third generation:
“smear-proof” VAHIP

BACKGROUND

□ VAHIP

- Difficult operation
- Development of VIP

□ VIP – Vertical Insitu Permeameter

- Measures only vertical permeability
- Improvement compared to existing insitu techniques for permeability measurement
 - Allows testing at several depths using SPT rig

VAHIP & VIP

VAHIP



VIP



BACKGROUND

- Preliminary field trial tests with VAHIP and VIP
 - Already performed
 - Not yet performed
 - Systematic field testing
 - Validation / Calibration at multiple sites
 - Existing independent permeability estimates from current FDOT borehole methods

PROJECT OBJECTIVE

- ❑ Implement simple procedure to execute the test insitu
- ❑ Develop simple and theoretically consistent equations for VIP data interpretation
 - Empirical data analyses comparing VIP data with FDOT borehole data
- ❑ Provide user friendly spreadsheet implementation
- ❑ Tasks:
 - Literature review
 - Site identification
 - VIP testing
 - Data analyses and empirical equations development
 - Draft and final reports

LITERATURE REVIEW

□ Current methods

■ Laboratory

- Soil disturbance
- Sample size

■ Empirical

- Assumptions

■ Field

- Insitu measurement
- Larger sample size
- Limitations
 - Time
 - Complex procedures

LITERATURE REVIEW

- Development of direct-push permeameter
 - Faster setup and testing times
 - Simplified procedure
 - Less soil disturbance
 - More detailed hydraulic permeability measurement
 - Multiple depths
 - More accurate
 - Vertical and horizontal permeability

SITE IDENTIFICATION

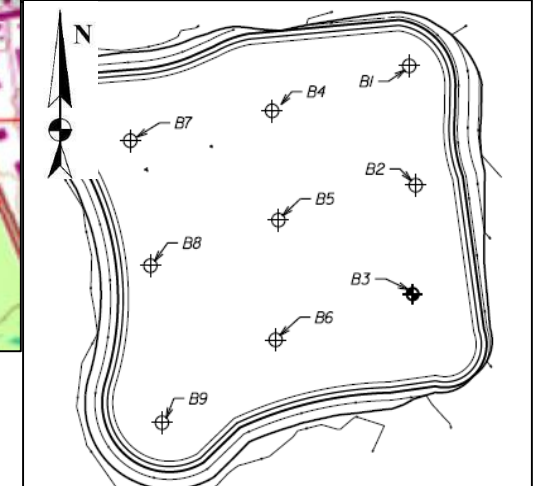
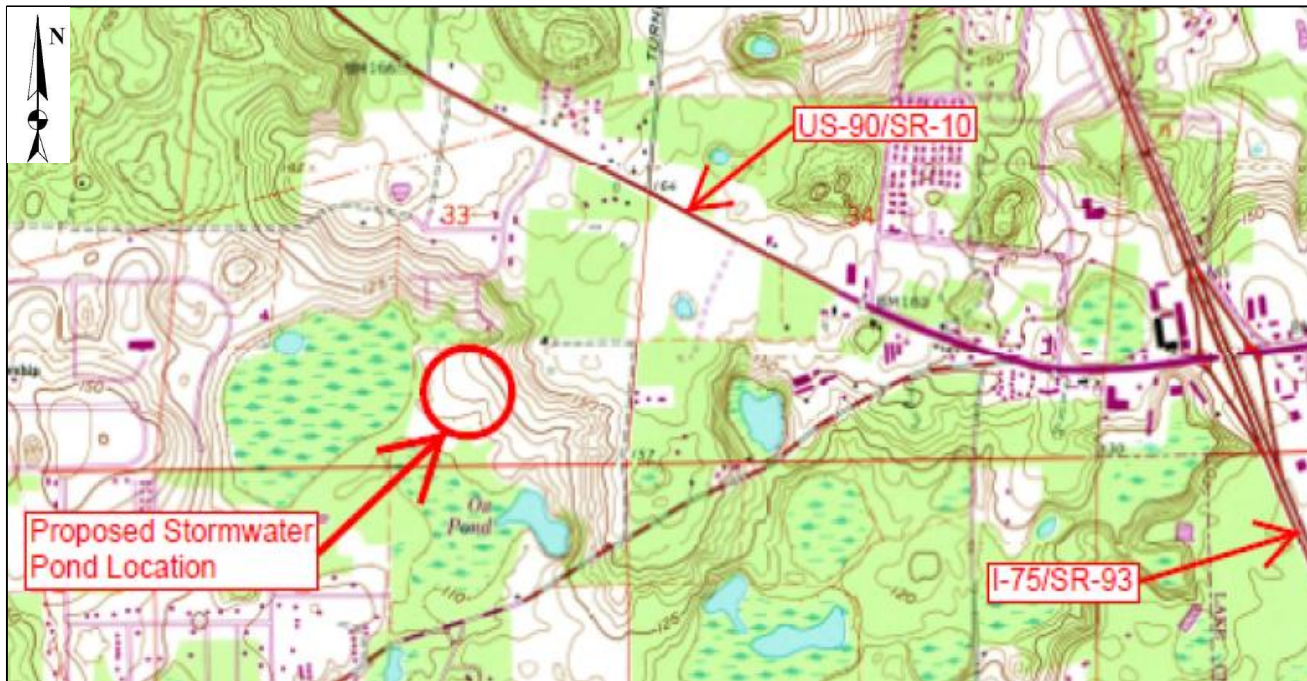
□ Lake City

- 9 auger borings
 - 5, 10, 15 feet depths
- Cased constant head permeability tests
 - Range: 0.0 – 0.19 in/hr

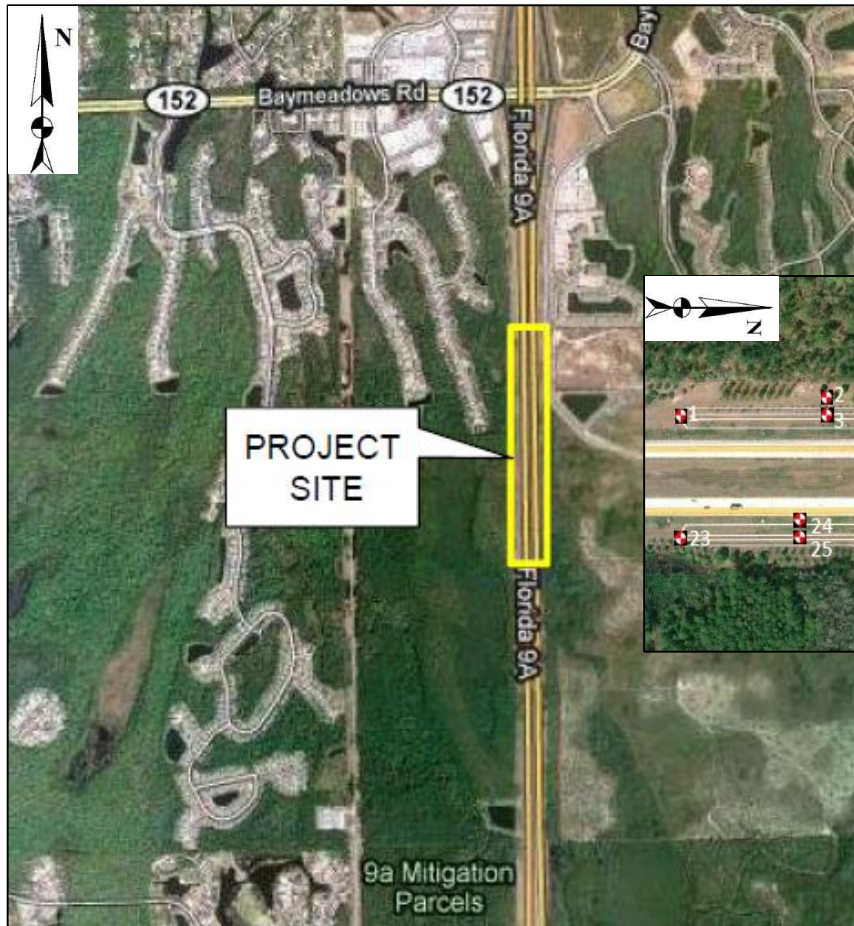
□ Jacksonville

- 44 auger borings
 - 4 – 8.4 feet depths
- Cased & Uncased constant head permeability tests
 - Range: 0.02 – 9.5 in/hr cased
 - Range: 0.2 – 18.0 in/hr uncased

LAKE CITY



JACKSONVILLE



VIP TESTING

- Schedule
 - August – September
- Boring locations
 - Multiple testing depths per location
 - Saturated and unsaturated
- SPT rig
 - Direct-push technique
 - Pre-drilling
 - Larger depths
 - Stiff soil

VIP TESTING

- General testing procedure
 - Setup water tank
 - Attach probe to SPT rig
 - Advance probe to testing depth
 - Open probe
 - Saturate soil for 15 minutes
 - Begin test
 - Flush and close probe
 - Advance probe to next testing depth



VIP TESTING

- Preliminary DOT testing
 - Tapered friction sleeve and AWJ connection adapter
 - Keep soil from building up between connections
 - Enlarged set-screw on friction sleeve
 - More resistance to torque
 - Removed internal pin
 - Locking mechanism
 - Added O-ring to inner rod
 - Internal resistance keeps outer casing in place during probe advancement





QUESTIONS?

