Field Evaluation of Foamed Asphalt Stabilized Base Layers

Charles Schwartz,
Sadaf Khosravifar, and Dimitrios Goulias
University of Maryland

Pavement Evaluation 2010
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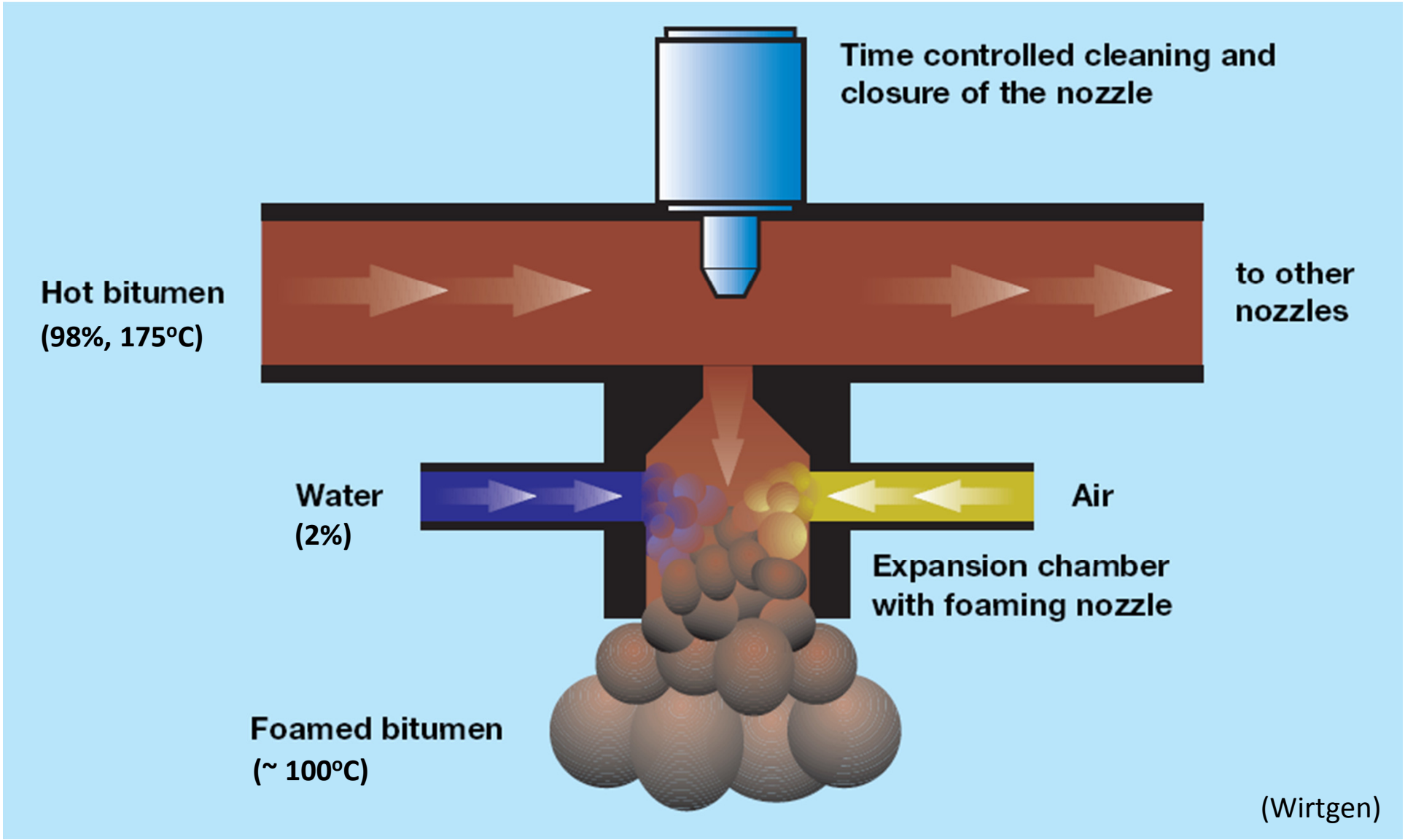
Overall Study Questions

- What are appropriate plant-produced FASB mix designs for MD materials?
- What are typical engineering/design properties?
- What are appropriate production and placement guidelines?
- What are best QC/QA practices, especially for field testing?
- What are the economic advantages of FAB?

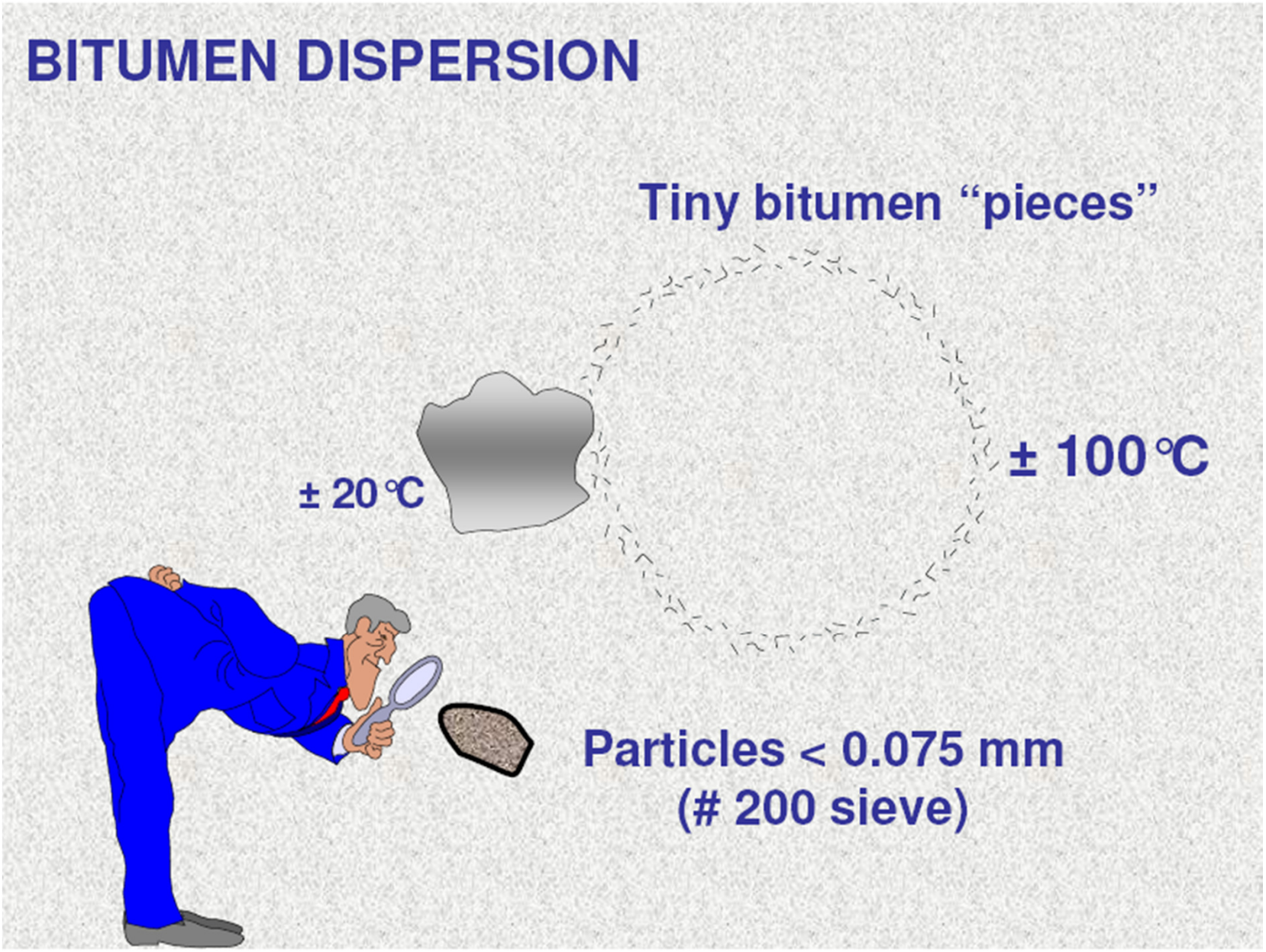
Study Collaborators

- University of Maryland
  - Charles Schwartz, PI
  - Dimitrios Goulias, Co-PI
  - Sadaf Khosravifar, GRA (+others)
- Maryland State Highway Administration
  - Soils and Aggregates Division (Dan Sajedi, George Hall)
  - Pavement and Geotechnical Division (Nate Moore)
- Maryland Producers
  - Chamberlain Contractors (Harold Green)
  - P. Flanigan and Sons (Tom Norris)
- Others
  - Mike Heitzman (NCAT)
  - Mike Marshall (Wirtgen America)
  - Brian Diefenderfer (VTRC), Trenton Clark (VDOT)

Asphalt Foaming Process



(Wirtgen)



(Collings, 2009)

Portable Production Plant

(Wirtgen)

Field Test Sites

- Lane Widening
  - York Road (Timonium, MD)
- Lane Addition
  - MD 295 (Baltimore, MD)
- Full-Depth Patching
  - Glenn Dale Maintenance Facility (Prince George's Co, MD)
  - Oxon Hill Fire Station (Oxon Hill, MD)
- Reconstruction
  - Truman Parking Lot (Annapolis, MD) (??)
  - I-81 (Staunton, VA)


10” HMA/6” FASB/6”GAB
York Road

York Road

York Road

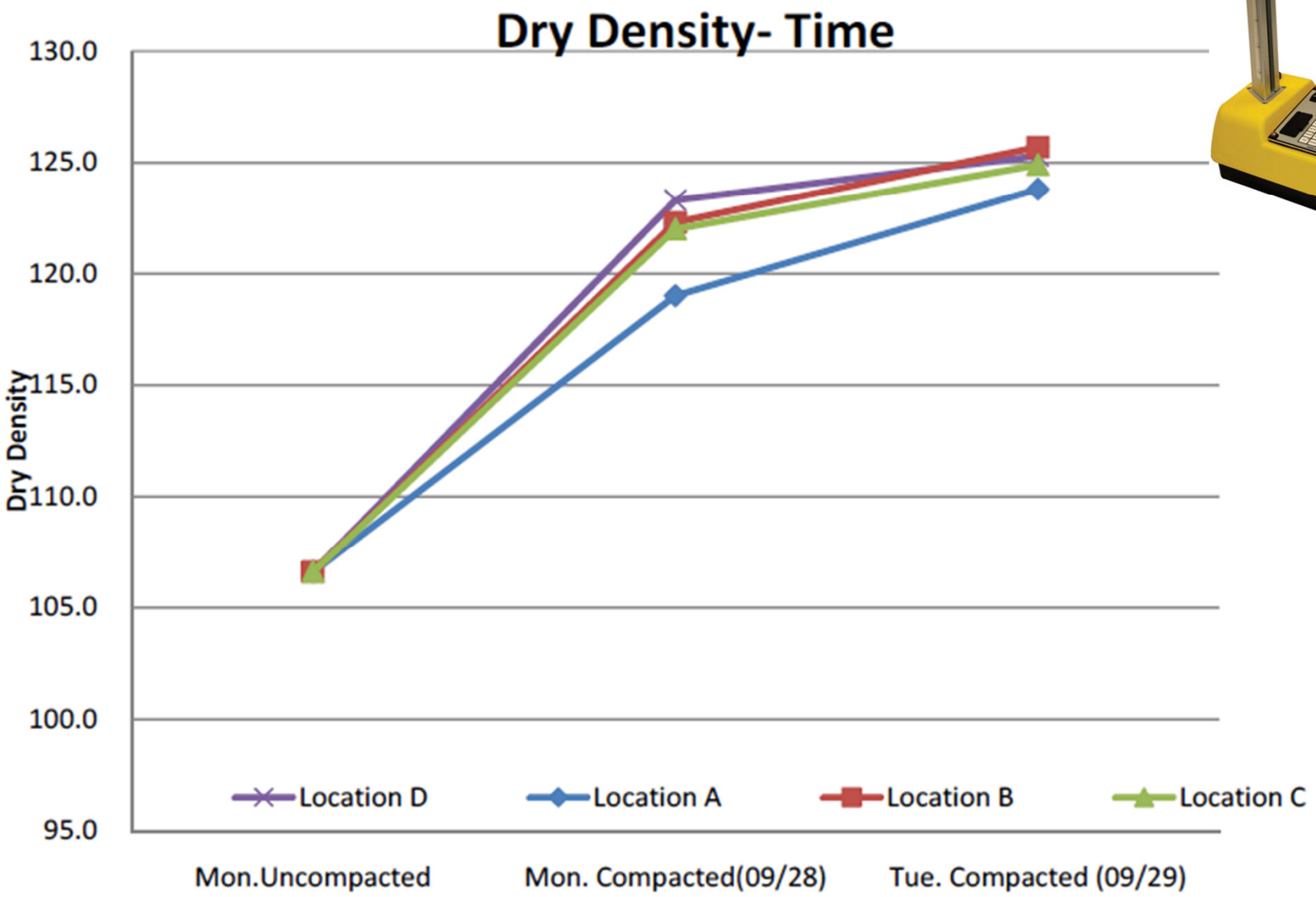
Nuclear Density Gauge

GeoGauge

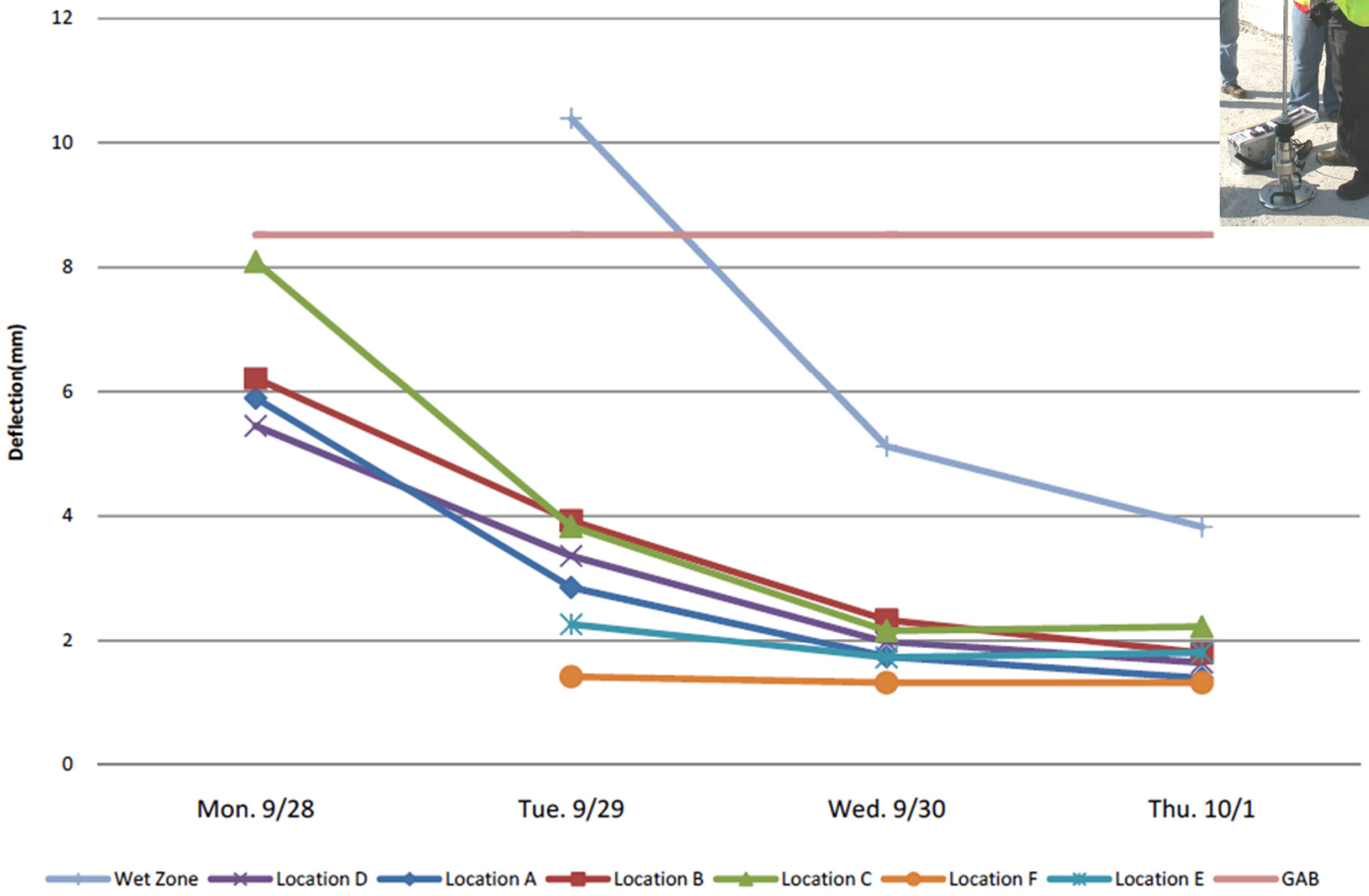
Zorn ZFG2000A LWD

FWD

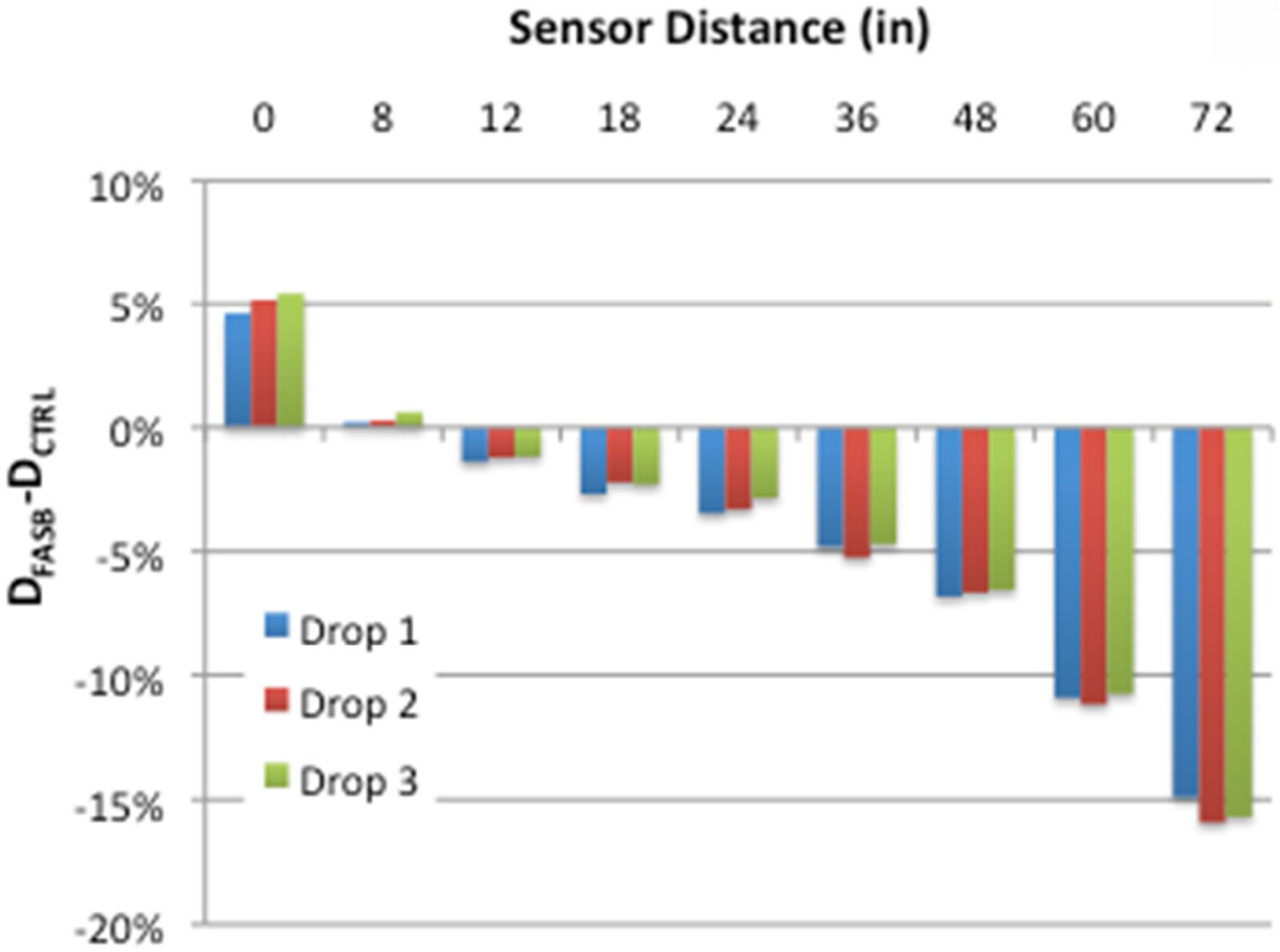
York Road: Density



York Road: LWD Deflections



York Road: FWD Deflections



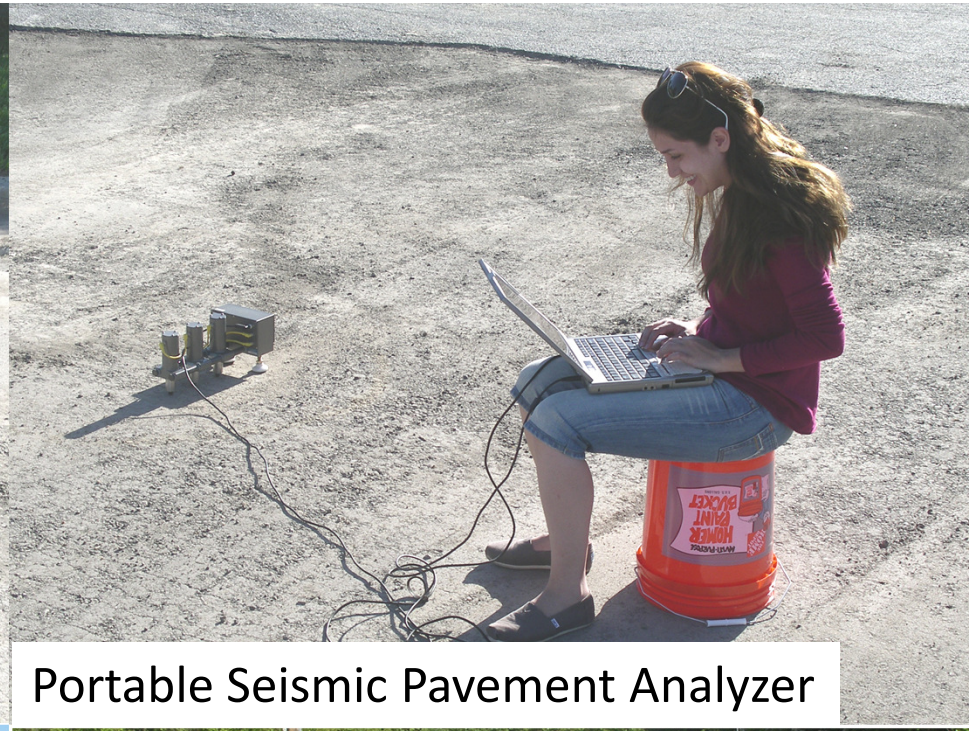
4 FASB Locations, 4 Control Locations

Glenn Dale Maintenance Facility

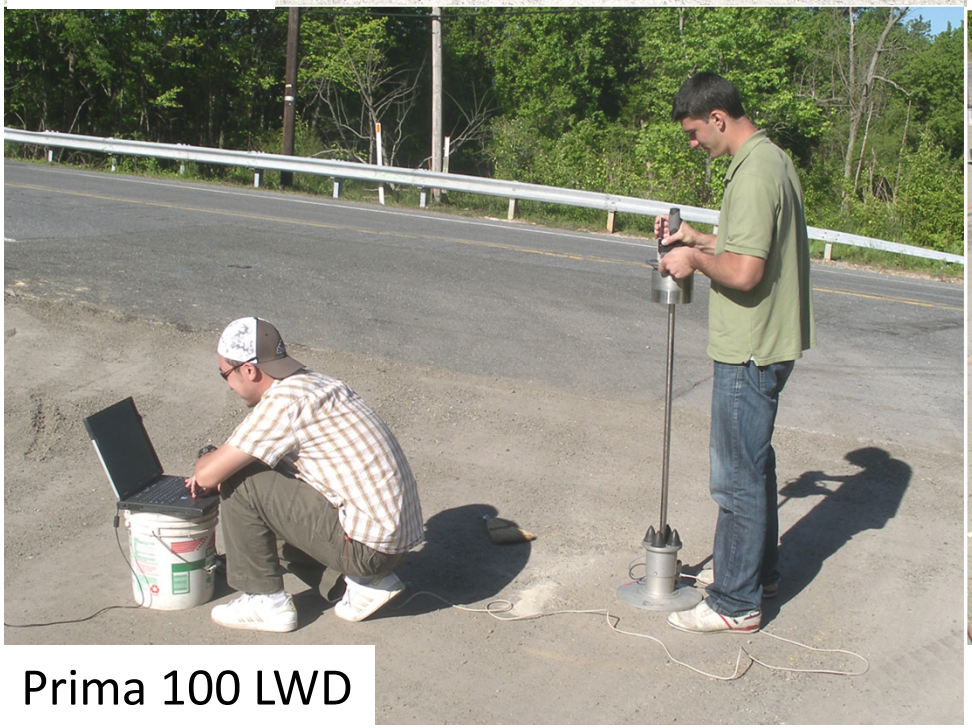
Glenn Dale
Maintenance Facility

Glenn Dale Maintenance Facility

GeoGauge



Portable Seismic Pavement Analyzer



Prima 100 LWD

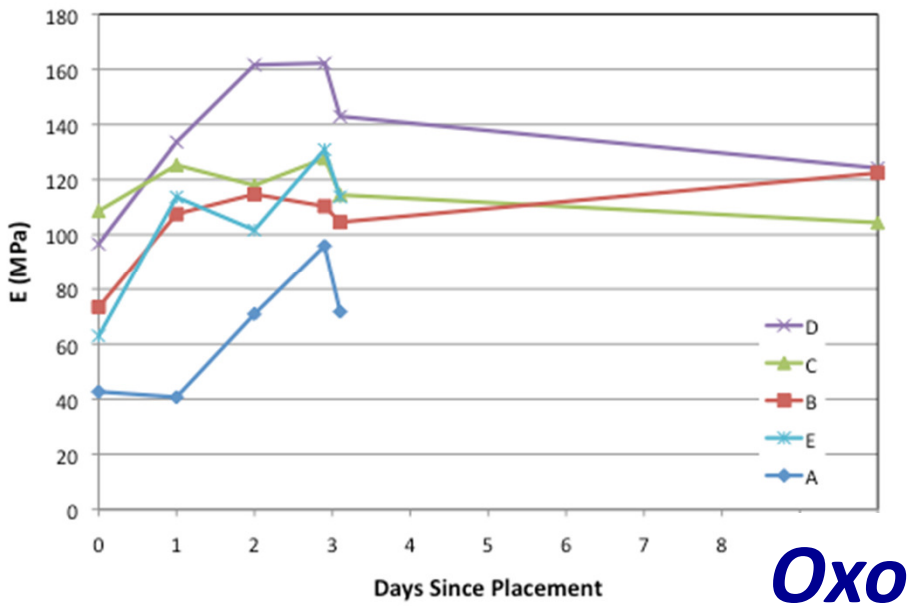
Zorn ZFG2000 LWD

Oxon Hill Fire Station

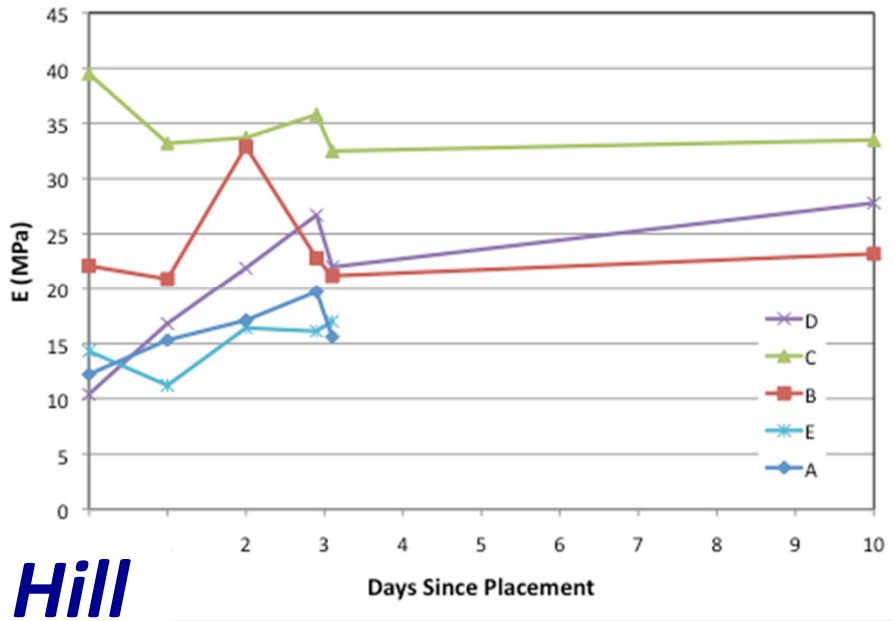

Oxon Hill Fire Station

Oxon Hill

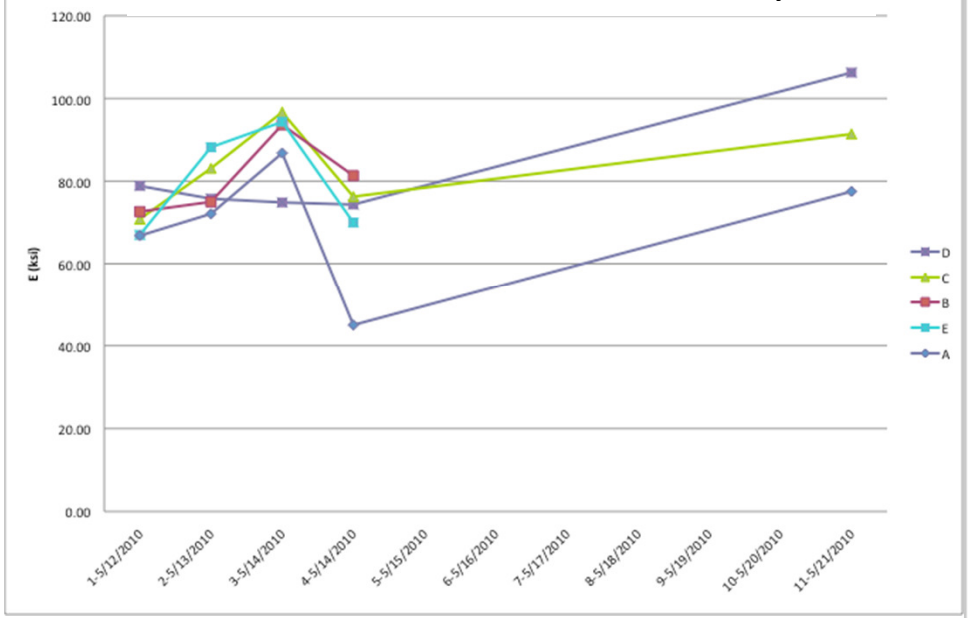
GeoGauge



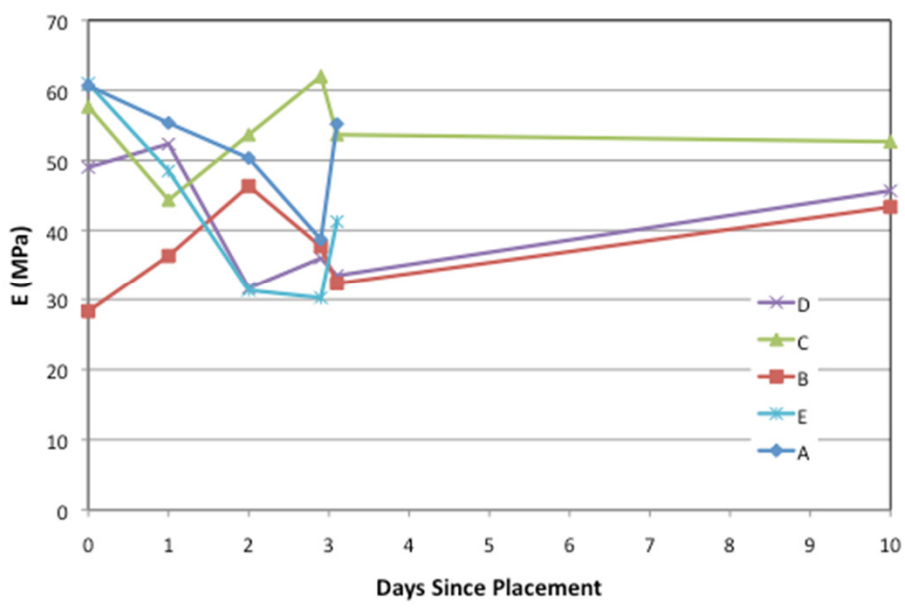
Zorn LWD



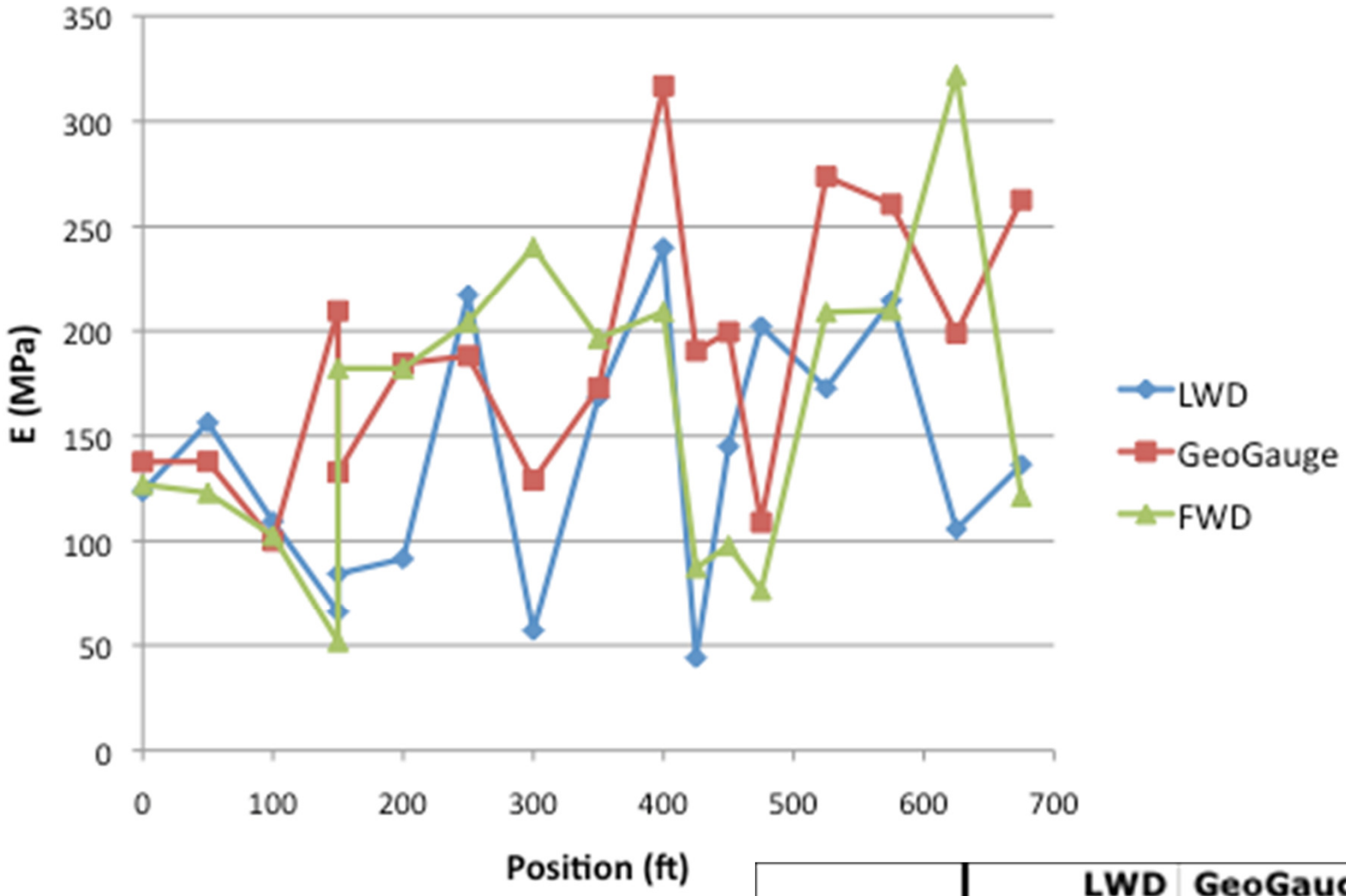
Portable Seismic Pavement Analyzer



Prima 100 (4 buffers)



MD 295: Subgrade Stiffness



	LWD	GeoGauge	FWD
Mean	164.6	188.4	161.3
Std Dev	59.6	61.9	70.4
COV	0.43	0.33	0.44

Laboratory Study

Laboratory Study

- Materials
  - 100% RAP (1+2)
  - RAP-Recycled PCC Blend (3)
  - RAP-Granular Base Blend (3)
  - I-81 Processed RAP
- Tests
  - Binder (Expansion Ratio, Half-Life
  - Mix Design (Proctor, IDT)
  - Dynamic Modulus
  - Repeated Load Permanent Deformation

Interim Conclusions: Field Evaluation
(based on limited/poor sites to date)

- Nuclear density gauges not ideal for FASB
  - Need moisture content correction for asphalt
  - Cannot capture stiffness increase with curing
- Inconsistent stiffness values from different devices
  - No “gold standard”
- High spatial variability, even over short distances

Contact Info:

Dr. Charles W. Schwartz
University of Maryland
schwartz@umd.edu
+1.301.405.1962

A. JAMES CLARK
SCHOOL OF ENGINEERING