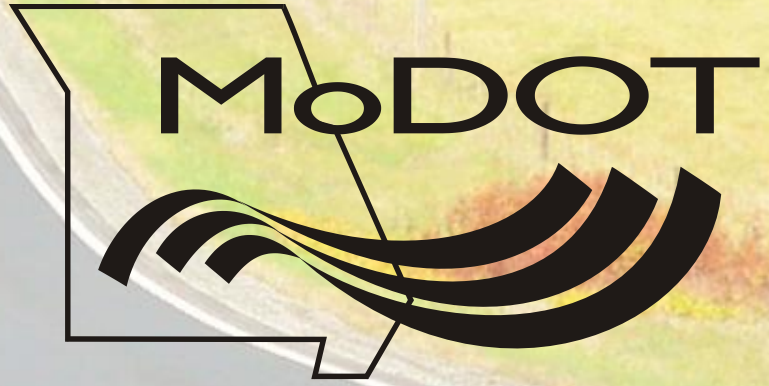
Asphalt Permeability As A Measure of Density



Joe Schroer, PE

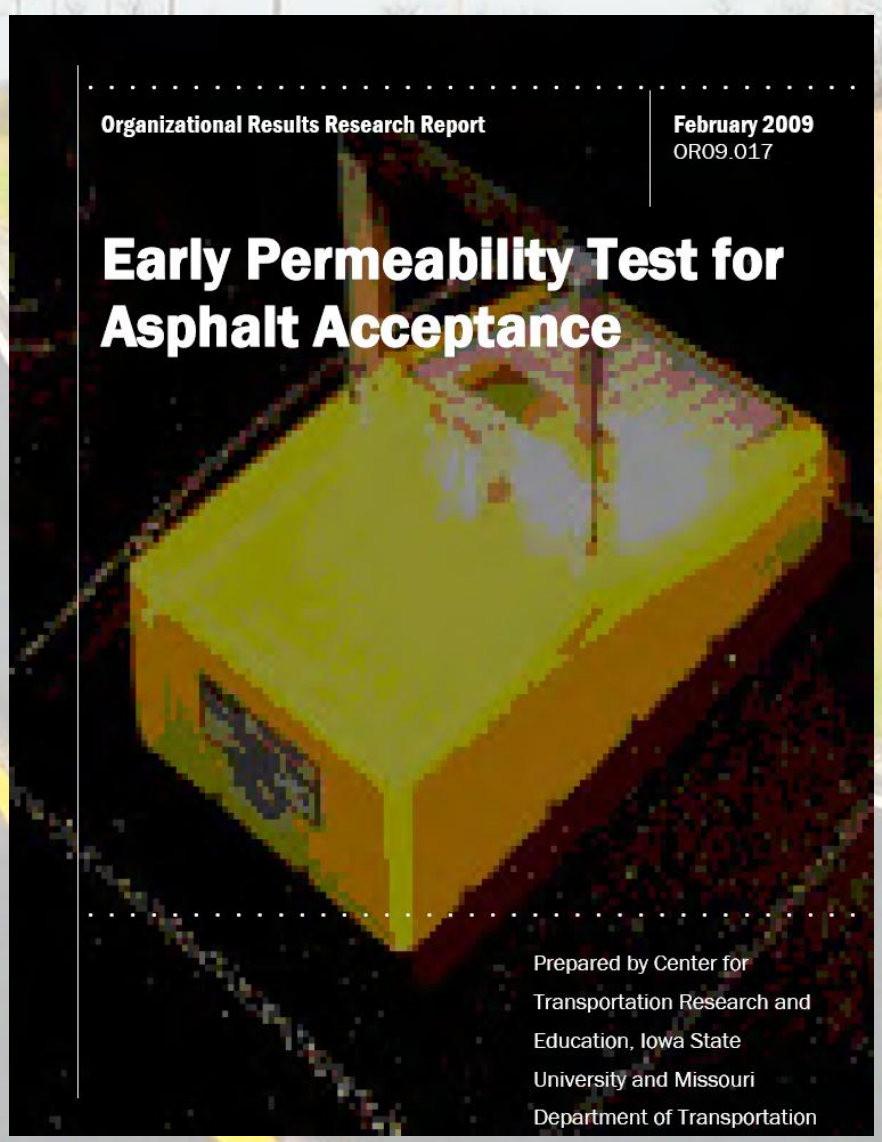
North Central HMA Conference

February 3, 2009

Why The Interest In Permeability?

- Non-destructive Test
- Test Results – Quicker, Can Be Performed Multiple Times
- Most Pavement Designs Assume An Impermeable Surface

http://library.modot.mo.gov/RDT/reports/Ri07053/or09017.pdf



Project Questions

Permeability testing to replace or supplement AASHTO T166?

Which permeability test?

Integration of permeability testing into PWL?

Density Tests

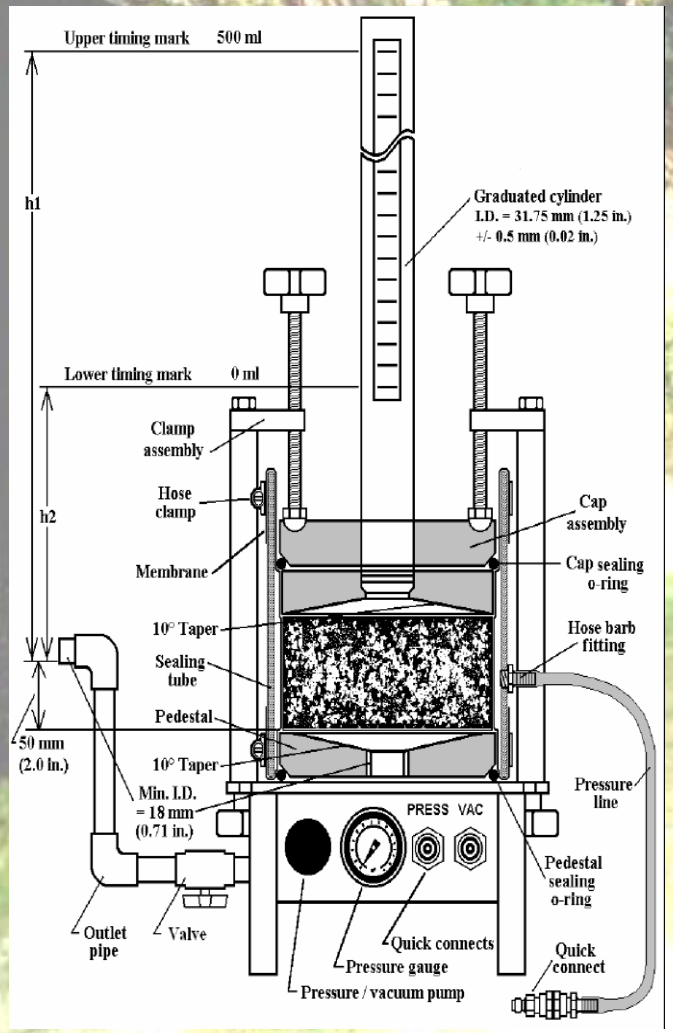
Field Tests

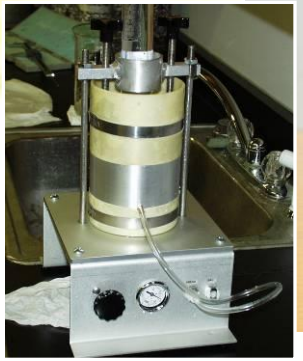

NCAT
FIELD
PERMEAMETER
sta put


KENTUCKY
AIR
PERMEAMETER

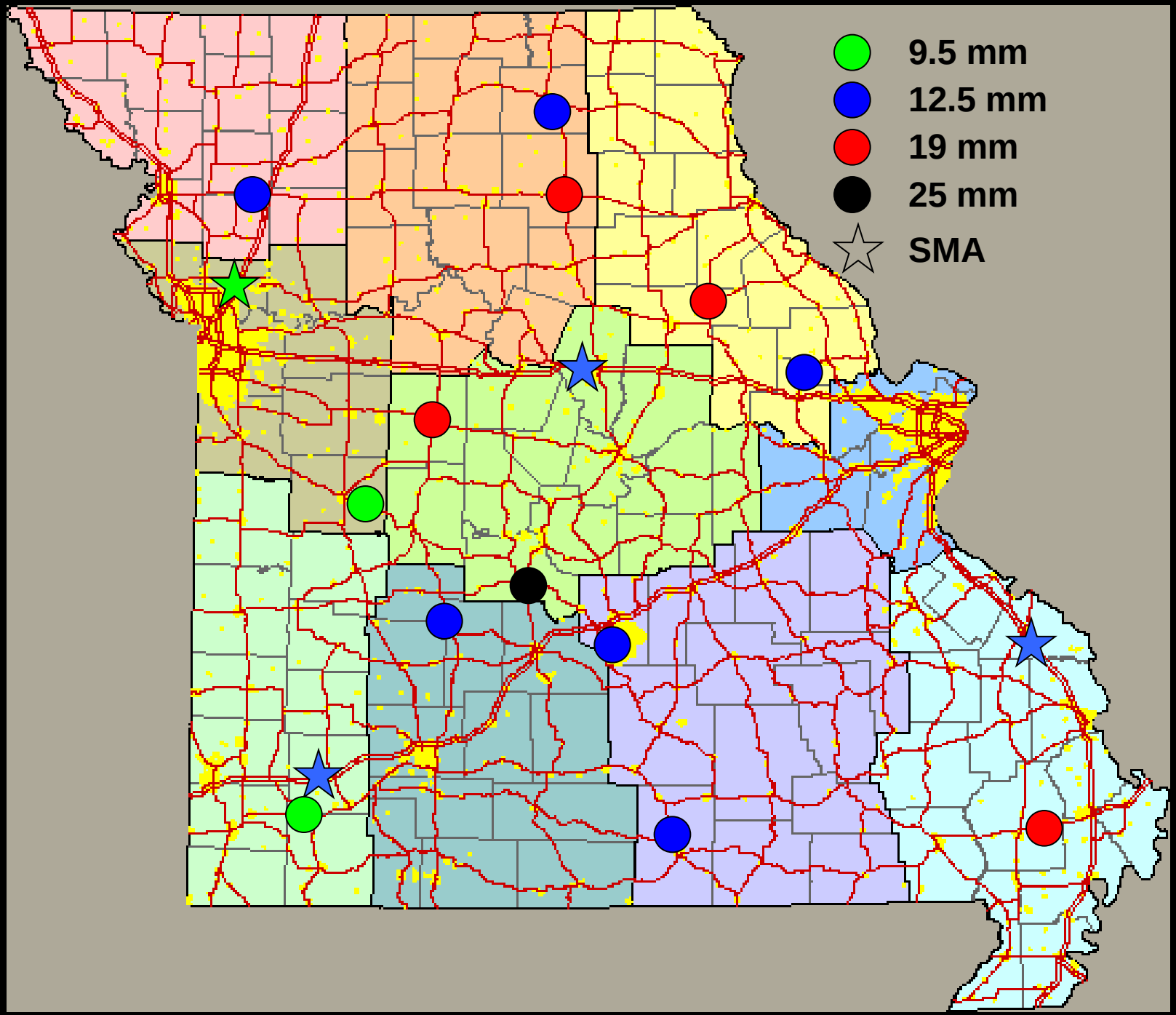

ROMUS
AIR
PERMEAMETER

Lab Test

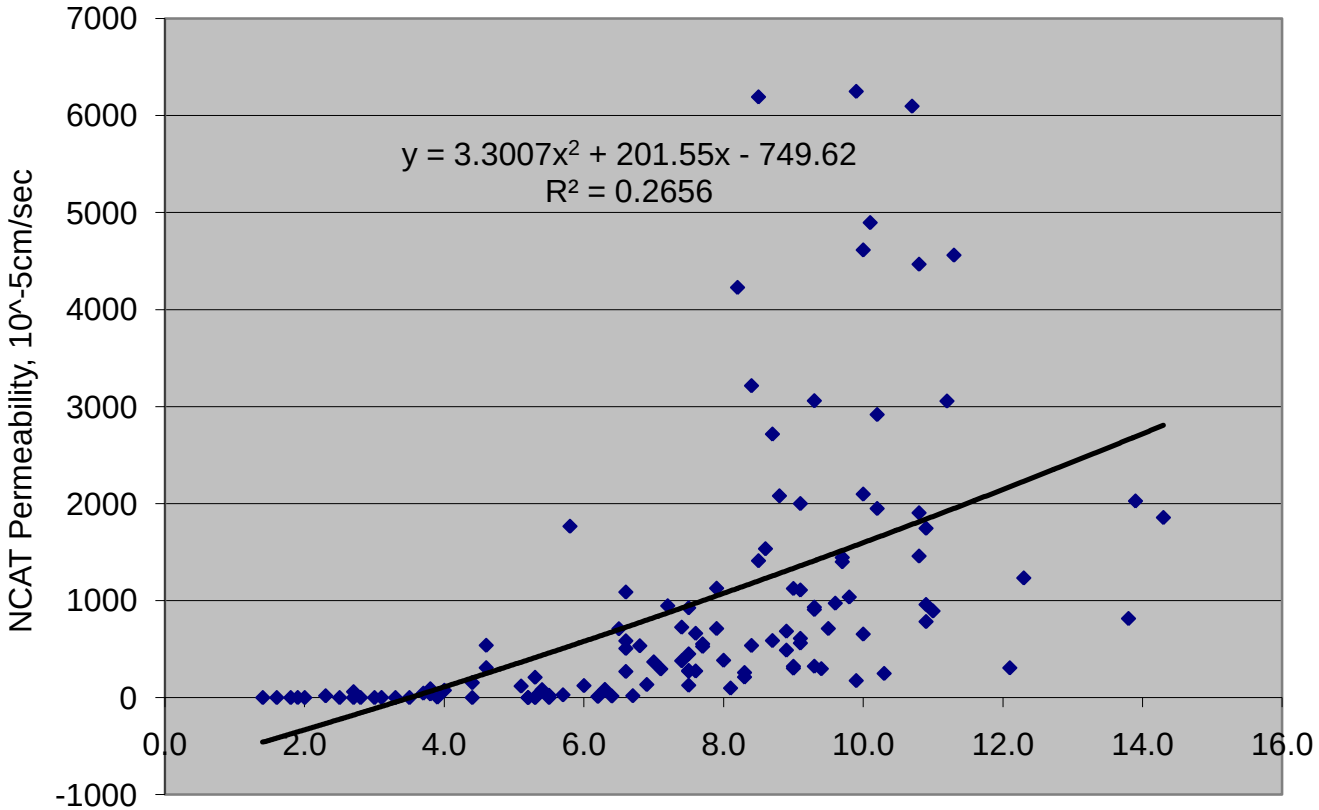

Upper timing mark
500 ml
h1
Graduated cylinder
I.D. = 31.75 mm (1.25 in.)
+/- 0.5 mm (0.02 in.)
Lower timing mark
0 ml
Clamp assembly
Hose clamp
h2
Membrane
Cap assembly
Cap sealing o-ring
10° Taper
Hose barb fitting
Sealing tube
Pedestal
50 mm (2.0 in.)
10° Taper
Min. I.D. = 18 mm (0.71 in.)
PRESS VAC
Pressure line
Pedestal sealing o-ring
Outlet pipe
Valve
Quick connects
Pressure gauge
Quick connect
Pressure / vacuum pump



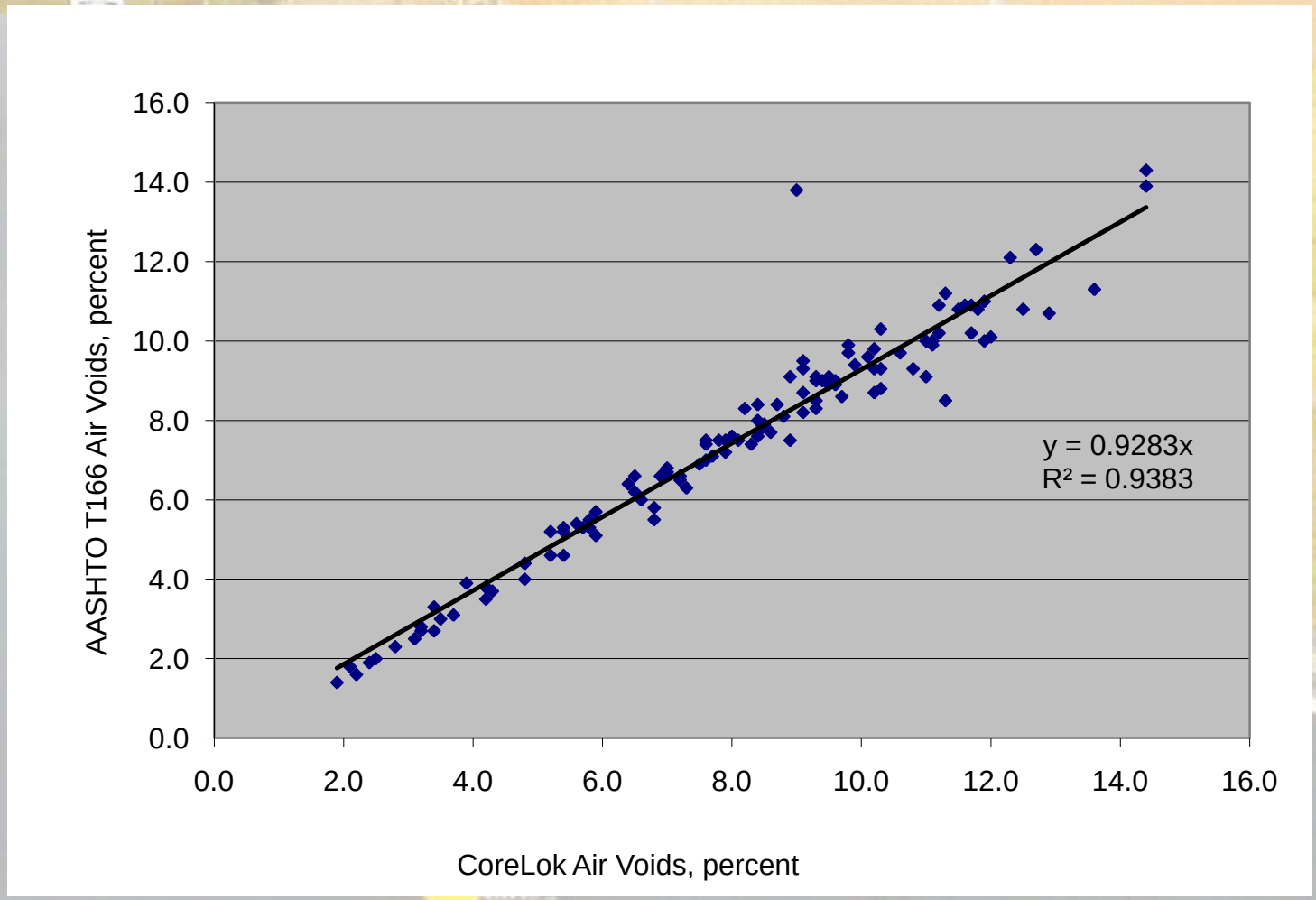

KAROL
WARNER
ASPHALT
WATER
PERMEAMETER


9.5 mm
12.5 mm
19 mm
25 mm
SMA

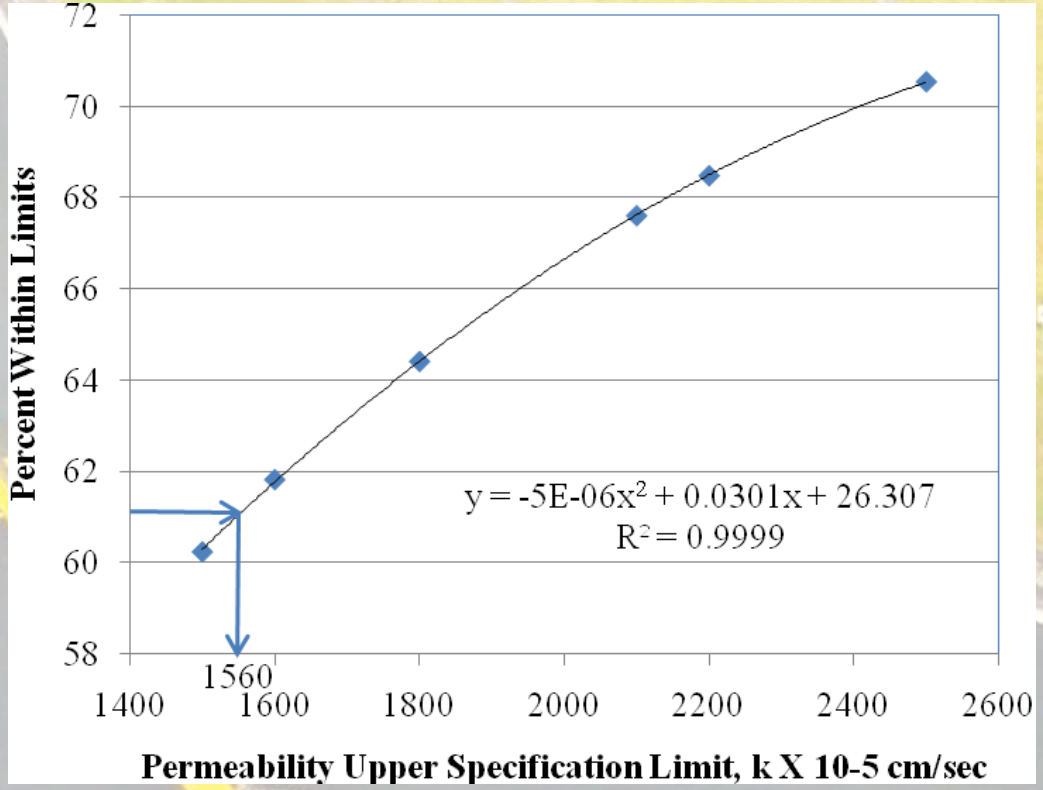
AASHTO T166 vs. NCAT



CoreLok vs. AASHTO T166



Sensitivity of PWL to USL for the NCAT Permeameter



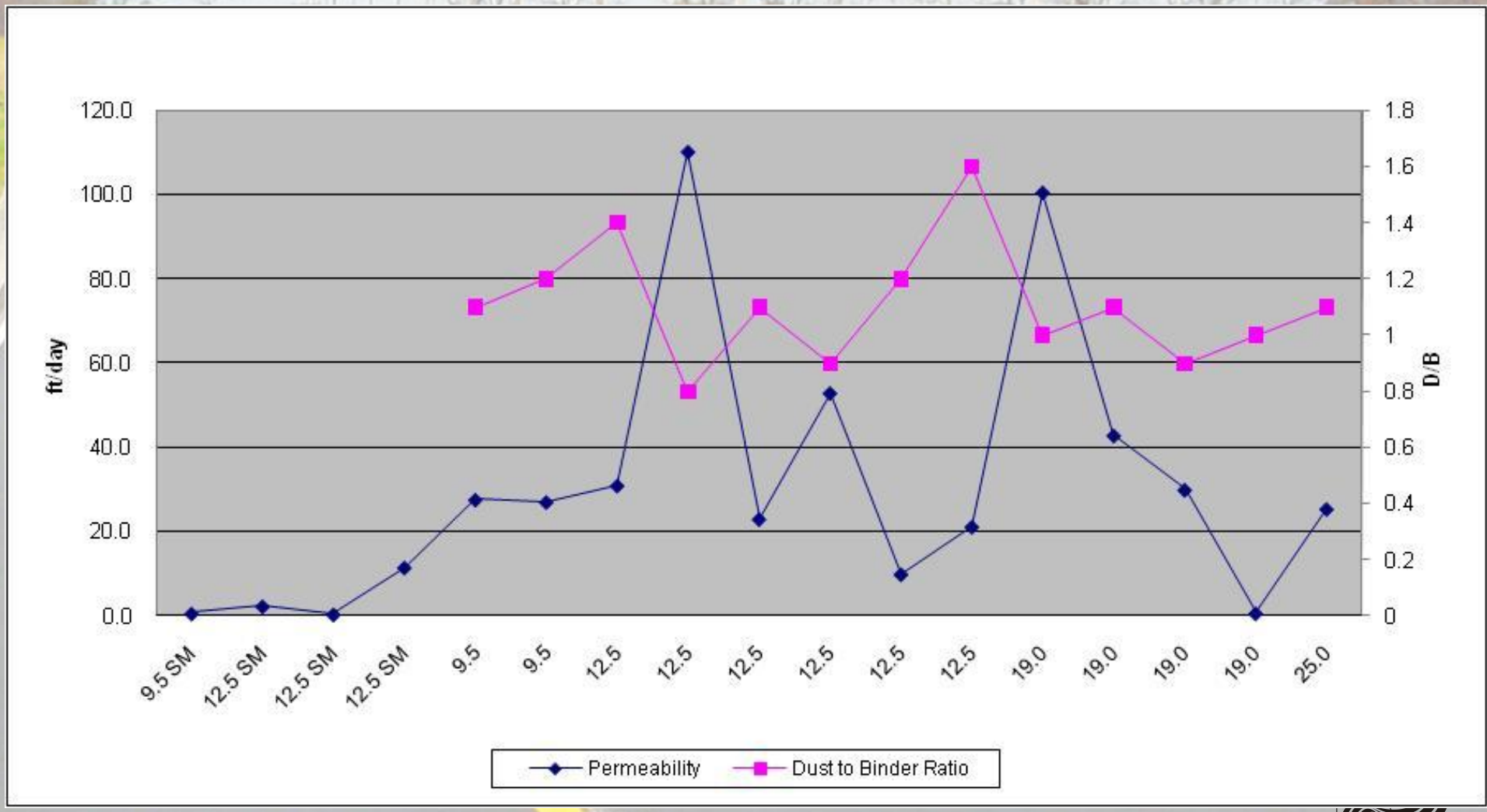
Findings

- Reasonable criteria for implementing permeability testing as part of PWL specifications has been established
  - NCAT: 0, 1560 X 10^{-5} cm/sec (44.2 ft/day)
  - KY: 0, 325 X 10^{-5} cm/sec (9.2 ft/day)
  - K-W: 0, 530 X 10^{-5} cm/sec (15.0 ft/day)

Recommendations

- NCAT and KY Preferred Over Karol-Warner
  - In-situ testing
  - Quicker test results for use in decision making
  - Non-destructive
- NCAT Preferred Over KY - Commercially Availability (Cool down not required either)

Mix Type vs. Permeability & D/B



Proposed MoDOT Specifications

403.5.2 Density. The final, in-place permeability of the mixture shall be a maximum rate of 42.0 feet per day for all mixtures except SMA. SMA mixtures shall have a maximum rate of 3.5 feet per day. Tests shall be taken not later than the day following placement of the mixture. The engineer will randomly determine test locations.

*Tests shall be performed at random locations within each half-sublot.

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