In search of “True” density

• Accurate bulk specific gravity measurement is the basis for optimum volumetric mix design
Increase in the use of open graded, OGFC and SMA mixes has generated a concern over the accuracy of the SSD method.
Open Graded Mix Definition

• AASHTO T269 specifies:

Section 3.2.3, “open bituminous paving mixture - Bituminous paving mixtures in which the air voids are 10 percent or more when compacted”
T166 Requirements

- Under scope of this test method:
  Section 1.2- "This method should not be used with samples that contain open or interconnecting voids and/or absorb more than 2% water by volume,….."
Problem with SSD (T166) Bulk Density

- Cores with large void volume (Coarse SuperPave Mix, SMA, etc.)
  - Water penetrates into the samples quickly
  - Drains out of the sample quickly
SSD measurements will result in:

- low sample volume estimation
- high bulk density
- low air voids.
Advantages of Corelok Method

• Specified by ASTM, D6752-02.
• AASHTO is due to be balloted this year
• Little to no operator involvement in the sealing process
• Excellent repeatability and accuracy
• Samples do not get wet. Same sample can be re-tested many times.
Verification of the Unit

- NCAT and Texas DOT were instrumental during development of CoreLok
- Shane Buchanan of NCAT presented at AAPT indicating that CoreLok appeared to give the most accurate results regardless of mix type and air void content.
- More than 21 studies have been conducted on CoreLok
NCAT Recommendation

• CoreLok should be utilized for mixes passing below the restricted zone with water absorption of above 0.4
• SSD should only be used for gradation passing more than 5% above the max density line (i.e. fine graded)
• For all other mixes agencies should use the CoreLok
State Specifications

- Texas DOT
- Indiana DOT
- Alabama DOT
- Oklahoma DOT
- Kansas DOT
- Minnesota DOT
- North Carolina DOT

NY, NM, CO, NJ, CT, ME, AK, MI, MO, WI are in process of specification/evaluation
Pneumatic Tire Steel Wheel

Percent Air Voids

- Voids, T166
- Voids, Corelok
- Nuclear Density

Legend:
- Voids, T166
- Voids, Corelok
- Nuclear Density