

Understanding the Basics

Back To Basics Seminar
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Virginia Asphalt Association

Jointly sponsored By VAA, VTRC and VDOT



Mix Design

Sample Extra Material for Mix Design

- Typical Volumetric Mix Design
 - 12 gyratory specimens
 - 5 permeability specimens
 - Plus, rice and furnace correction factor
 - Part B (*during 1st lot*) 6 TSR specimens
- BMD Mix Design (additional)
 - 20 IDT-CT specimens
 - 6 IDT-HT specimens
 - 8 APA specimens

Total 51



Aggregate Properties

- Get to know your materials
 - Test frequently
- ALWAYS split sample with aggregate supplier
 - Confirm results
 - Compare to historical data
 - Include RAP
- Test both individual materials and JMF blend



Gradation Example

➤ Know your equipment



| Sieve Size | Weight Retained (g) | Retained (%) | Total Passing (%) |
|------------|---------------------|--------------|-------------------|
| 1/2 in | 0 | | |
| 3/8 in | 52.5 | | |
| No. 4 | 507.6 | | |
| No. 8 | 263.3 | | |
| No. 16 | 168.8 | | |
| No. 30 | 174.8 | | |
| No. 50 | 136.6 | | |
| No. 100 | 49.4 | | |
| No. 200 | 38.8 | | |
| Total | 1391.8 | | |

*To much weight
for 8-inch sieves,
maximum 330 g*

Sample Weight Before Washing = 1485.3g

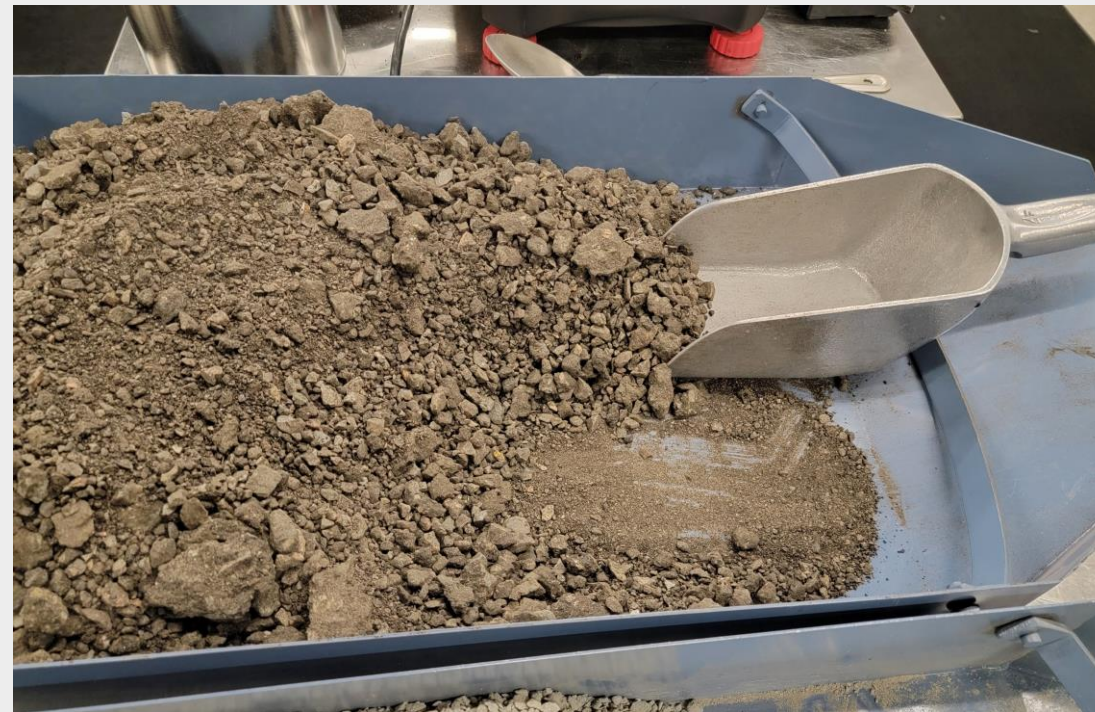
Batching Lab Specimens

- Mimic in the lab what happens during plant production
- Material in pan is like a stockpile

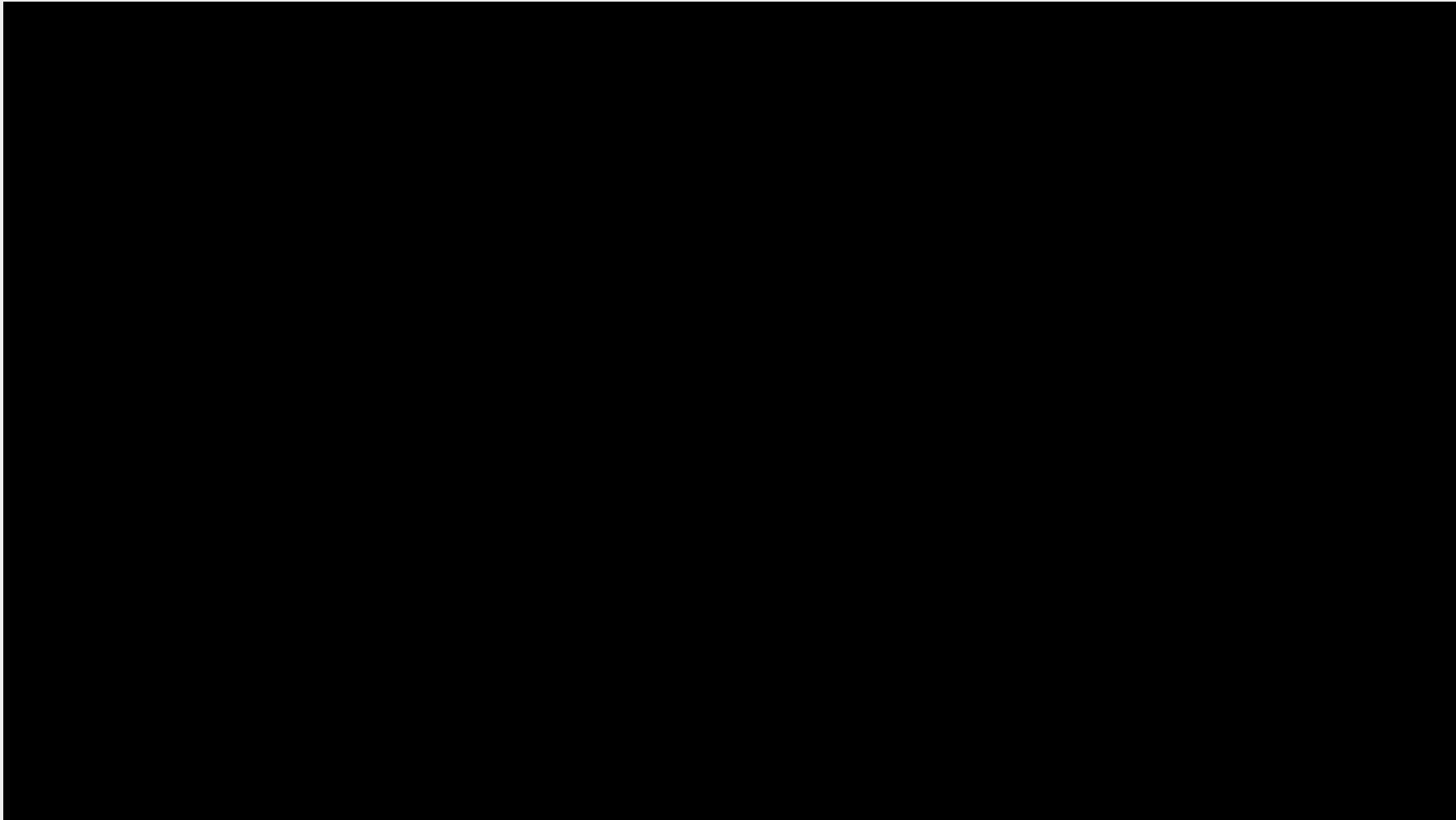


Batching Lab Specimens

Have you seen this in your lab?



Segregation – John Hellyer



RAP Segregation Demo - Gradations

| Sieve Size | First Sample | Second Sample | Average |
|------------|--------------|---------------|---------|
| 3/4" | 100 | 100 | 100 |
| 1/2" | 98 | 99 | 99 |
| 3/8" | 87 | 94 | 91 |
| No. 4 | 52 | 72 | 62 |
| No. 8 | 36 | 57 | 47 |
| No. 16 | 28 | 46 | 37 |
| No. 30 | 20 | 35 | 28 |
| No. 50 | 14 | 24 | 19 |
| No. 100 | 9 | 15 | 12 |
| No. 200 | 5.8 | 8.7 | 7.3 |
| AC | 3.72 % | 4.78 % | 4.25 % |

Batching Lab Specimens

Use caution when scooping -
Don't segregate material or miss fines



Gyratory vs. IDT

Different size specimens with same percentages of materials

- Note: Bag House fines in both specimens



Mix Additives

Include all additives for BMD testing

- Anti-strip
- WMA
- Rejuvenator, etc.



Condition Lab Mixed Specimens

Each specimen (Volumetric and BMD) must be conditioned/aged before compacting.

- Stir mixture at 60 ± 5 minute intervals during STOA
- Condition each specimen individually



Furnace Specimens

Ignition Furnace

- Manufacturer and AASHTO do not recommend sharing correction factors
- Things that affect the correction factor
 - Two different models that look the same
 - Different afterburner design
 - Length of exhaust
 - *Ongoing research to burn at cooler temp*
- Establish one furnace for each JMF



Ignition Furnace

- Always use the same number of baskets
- Always check moisture on sample
 - WMA saves \$\$ (fuel) but may not dry mix
- FAA ?



Production Samples

Proper Sampling is Key

- Obtain representative sample according to VTM-48
- Sample from multiple locations
 - Follow proper sampling techniques to prevent segregating sample



How do you Get Specimen Weight?



AASHTO R 47

Scope:

“This standard practice outlines methods for the reduction of large samples of asphalt mixture to the appropriate size for testing, employing techniques that are intended to minimize variations in the measured characteristics between the test samples so selected and the large sample.”

AASHTO R 47

Selection of Method:

“The selection of a particular method to reduce the large sample to test size depends on the amount of material comprising the large sample. It is recommended that for a large amount of material, a mechanical splitter be employed whenever possible, thus lessening the time needed for reduction and minimizing the loss of temperature. To further reduce the sample size, a quartering method can be used.”

VTM-48, Section 4.2

“Samples of asphalt mixtures (including gyratory volumetric samples) shall be obtained from two or more locations in the truck and combined to form a representative sample.”



Front View



Top View

Quarter to Specimen Weight



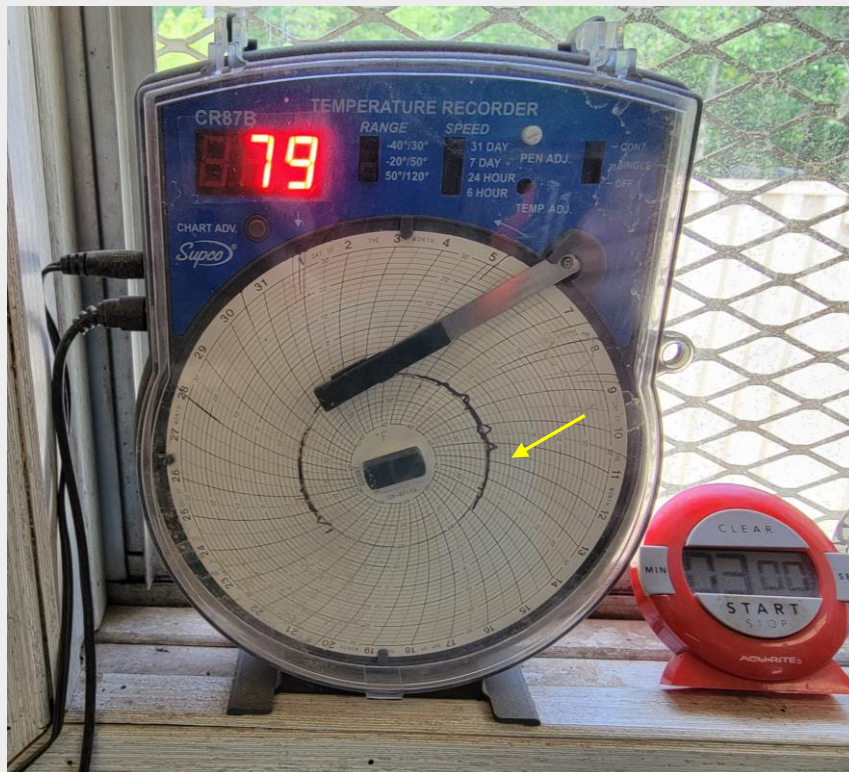
Rice Test

- Rice (G_{mm}) specimen split from the gyratory sample
- AutoRice™ Controller will improve consistency



Weigh Bath

Monitor water level and temperature



Measuring Air Voids

Recommend weighing pill on its side in water to reduce change of trapping air on bottom



The Unbreakable Laws of Bulking

- ⊛ Water shall be $25 \pm 0.5^{\circ}\text{C}$ - checked with Thermometer
- ⊛ Towels shall Not be so wet that you can wring water out of them.

→ Soaked Towels =
Gummy Engineers

Don't Overlook the Simple Things

- Quickest indicator of how the mix is running is specimen height
 - Same pill weight = consistent height
- BMD specimens - possible indicator of differences in equipment when it takes different weights &/or gyrations to achieve same air voids for same size specimen

David,
should I
remove
this?



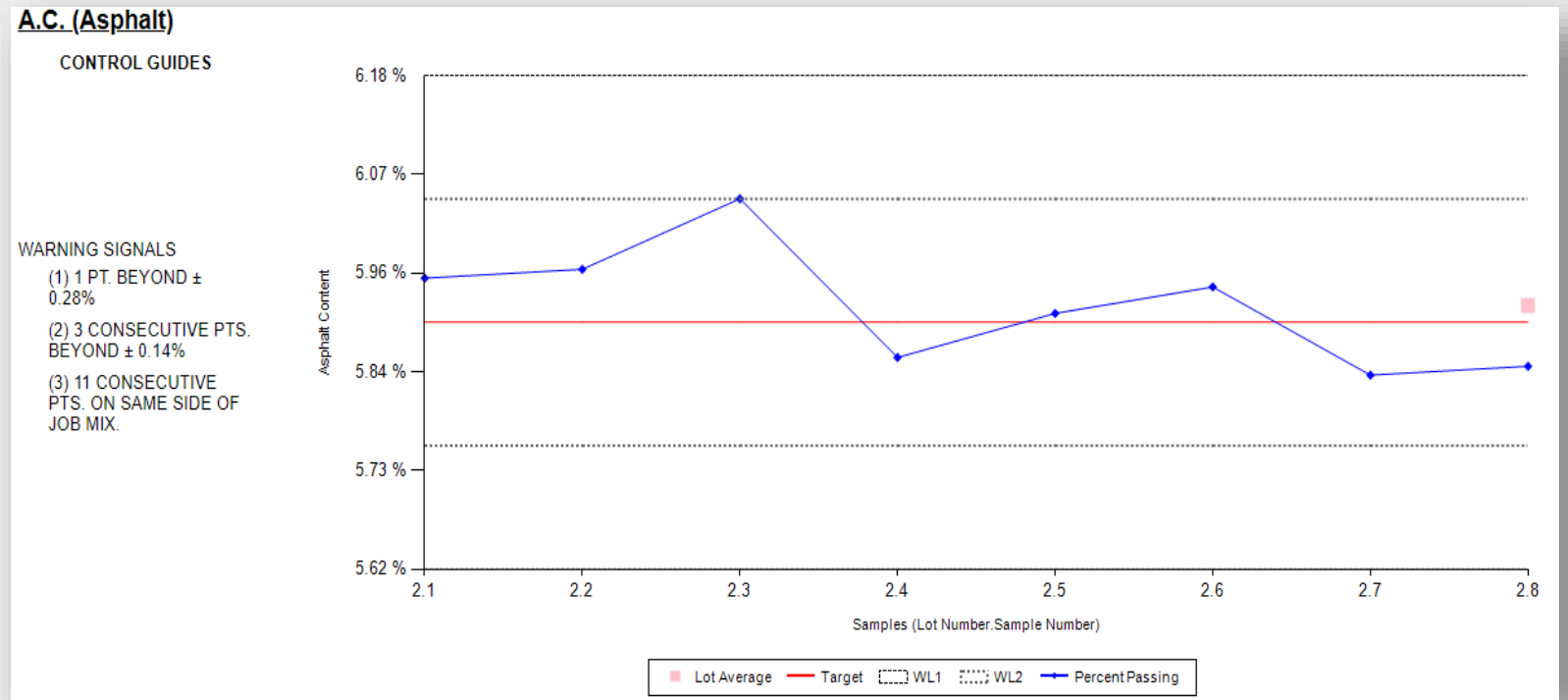
SMA - VCA_{DRC}

- Measured on materials retained on Break Point sieve
 - SMA-9.5 - No. 8
 - SMA-12.5 - No. 4
 - SMA-19.0 - No. 4
- Include RAP
- Recommend measuring specific gravity on test sample



Control Charts are your Friend

- Best chance of seeing a problem early
- Focus on actual test
 - Rice, G_{mm}
 - Bulk, G_{mb}
 - AC
 - Primary sieves
 - VCA_{MIX} for SMA





GENERAL CONVERSATION