Asphalt Quality Assurance Program
&
Construction Inspection

2015 Asphalt Regional Seminars

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QUALITY CONTROL

ALWAYS

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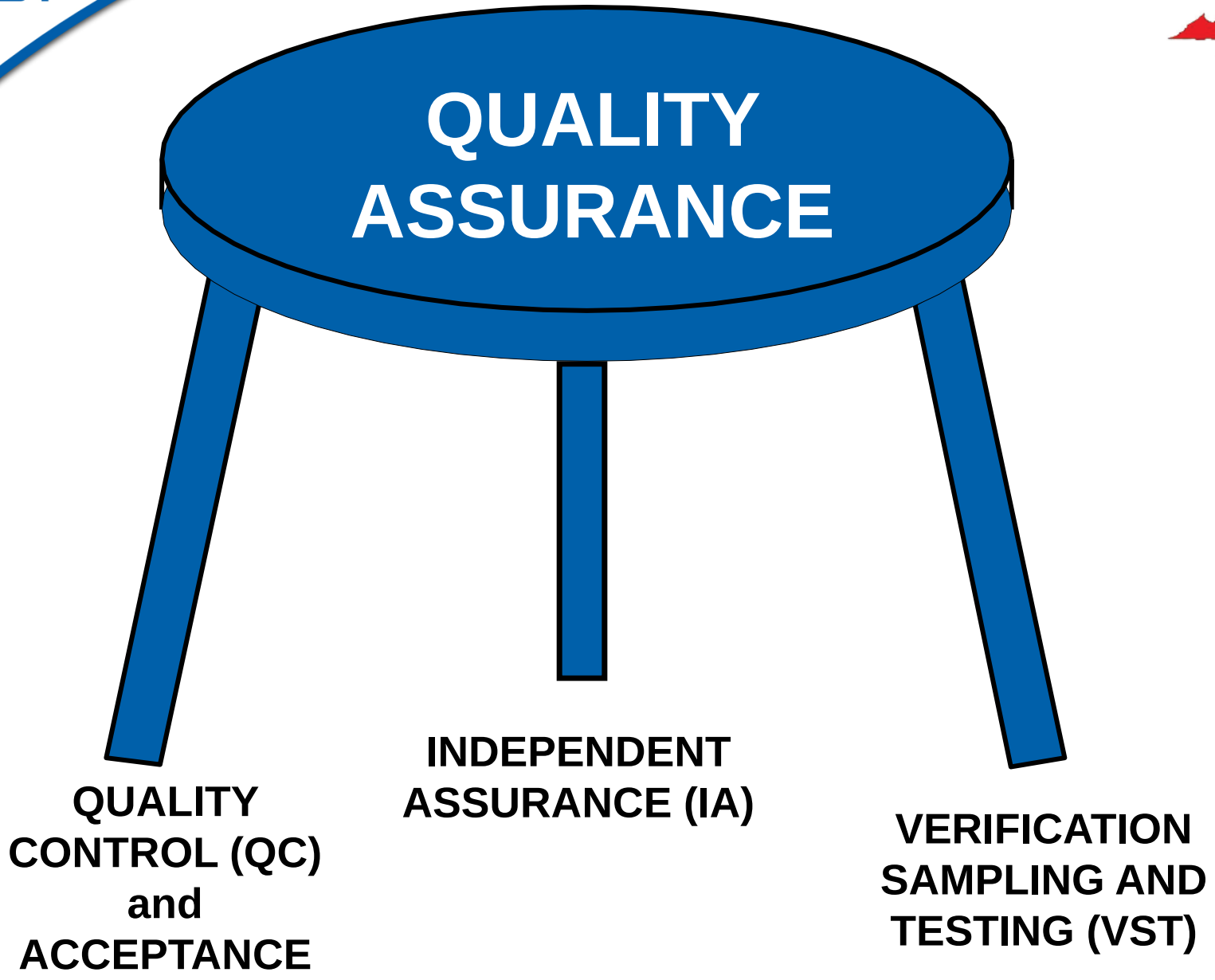

QUALITY ASSURANCE
QUALITY CONTROL (QC) and ACCEPTANCE
INDEPENDENT ASSURANCE (IA)
VERIFICATION SAMPLING AND TESTING (VST)

Are these Actually Different?

QA or Quality Assurance is the *overall program* required by the owner.

1. **QC or Quality Control** is the processes*/procedures used by the contractor.

   * *These processes are beyond the minimum requirements of acceptance testing - such as additional sampling*

Acceptance is the procedure for which a product is measured for adherence to specification such as mat density. In Virginia, this procedure is performed by the contractor for asphalt

Are these Actually Different?

2. Independent Assurance is a procedure/process used by the owner.

   The purpose is to ensure the people, equipment, and procedures used by the Contractor are compliant to specification

3. Verification, Sampling and Testing is a procedure / process used by the owner.

   The purpose is to check the acceptance decision by the Contractor such as verification cores

VDOT Uses System & Project Approach to QA

System Approach at the Plant (Contractor)

- Certified technicians
- QC on mixes during production
- Sampling for acceptance on AC Content and Gradation; Pass/Fail on Volumetrics
- All mixes going to VDOT projects tested, but not specific to a project
- Test data entered into PLAID

VDOT Uses System & Project Approach to QA

System Approach at the Plant (VDOT)

- Certified technicians
- Mix samples collected for statistical comparisons on AC Content and Gradation
- Mix samples collected with contractor acceptance samples for IA (matched samples)
- VDOT samples compared to other contractor acceptance samples for VST (unmatched samples)
- VDOT volumetric samples collected for Pass/Fail only and compared to contractor results

Asphalt Plant Quality Control


DURABILT MFG
412
DANGER
Lock out power for maintenance or adjustments.


WARNING
STAY BACK


GIANT EAGLE
WPXI
CASIO

VDOT Uses System & Project Approach to QA

Project Approach in the Field (Contractor)

- Asphalt Field Level 2 Technician
- Certified density technicians
- Establish roller pattern and control strip
- QC on density during compaction of Lots
- Acceptance on Lot mat density
- Monitoring of longitudinal joint density
- All data recorded on TL forms and provided to VDOT

VDOT Uses System & Project Approach to QA

Project Approach in the Field (VDOT)

- Asphalt Field Level 2 technicians
- Monitor construction of roller pattern
- Monitor compacting, nuclear density testing, coring/plug and calculation of average control strip density
- Randomly tests cores from control strip (IA)
- Provides random numbers to contractor
- Monitors nuclear density testing in Lot
- Identifies and retrieves cores for VDOT acceptance testing (VST)


CAT
CAT

TROXLER
4640-B
THIN LAYER DENSITY GAUGE

VDOT Project Staff Responsibilities IA

- Verifies paving equipment meets specifications
- Verifies materials being used are from approved sources
- Take temperature measurements of AC at least every hour
- Verifies that contractor personnel are performing QC operations correctly
- Verifies density testing being performed
  - Joint Density


218.0
°F
MAX 219

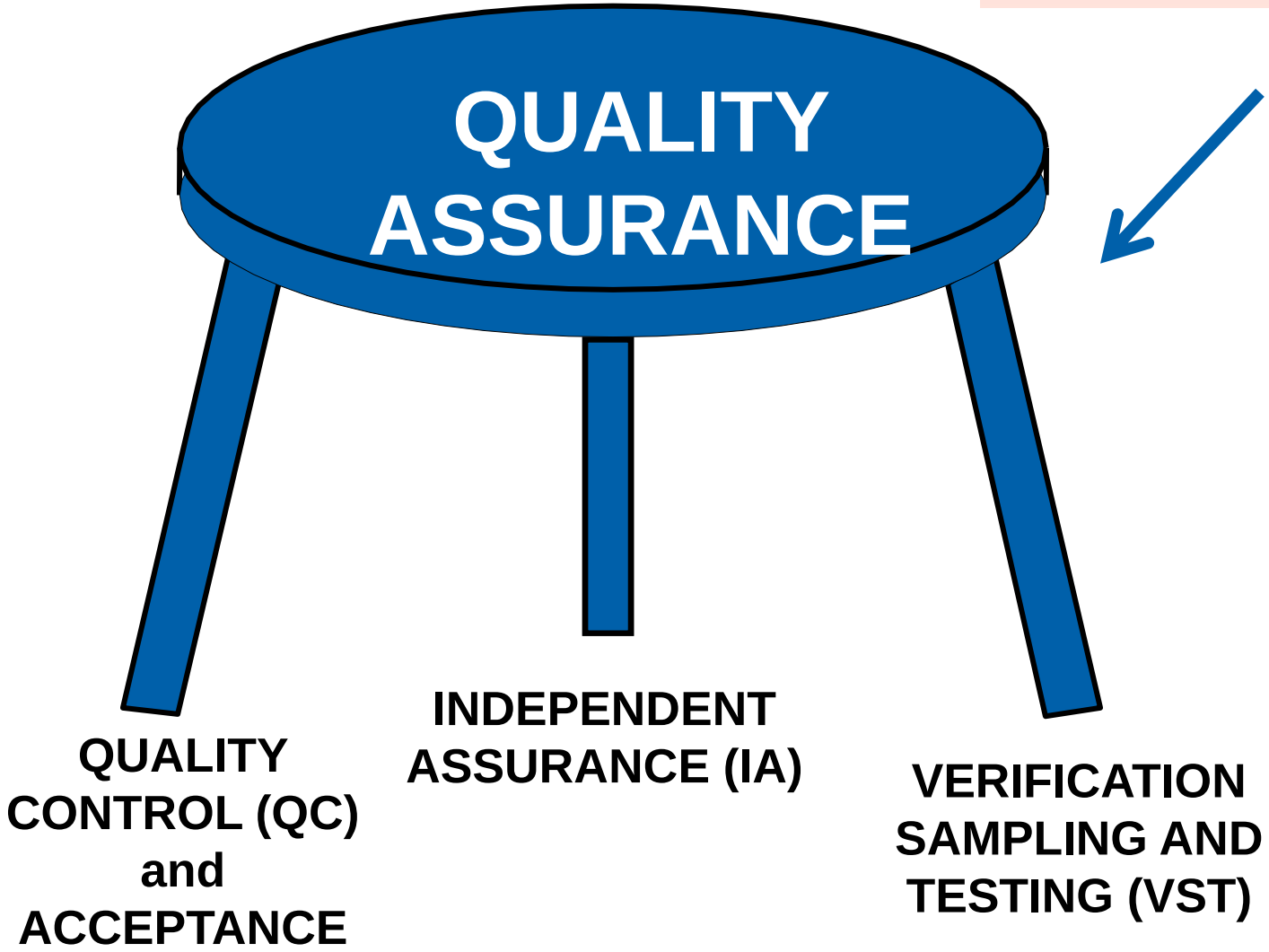
VDOT/Materials VST and IA

- Perform VST testing on plugs

- IA testing
  - Verify method of random selection
  - Marking of test locations
  - Observe QC testing at control strip
  - Observe test sections.
  - Obtain samples of cores from control strip to reweigh in laboratory.

- Depth Control tests

So where does *construction inspection* fit into VDOT's QA Program ?

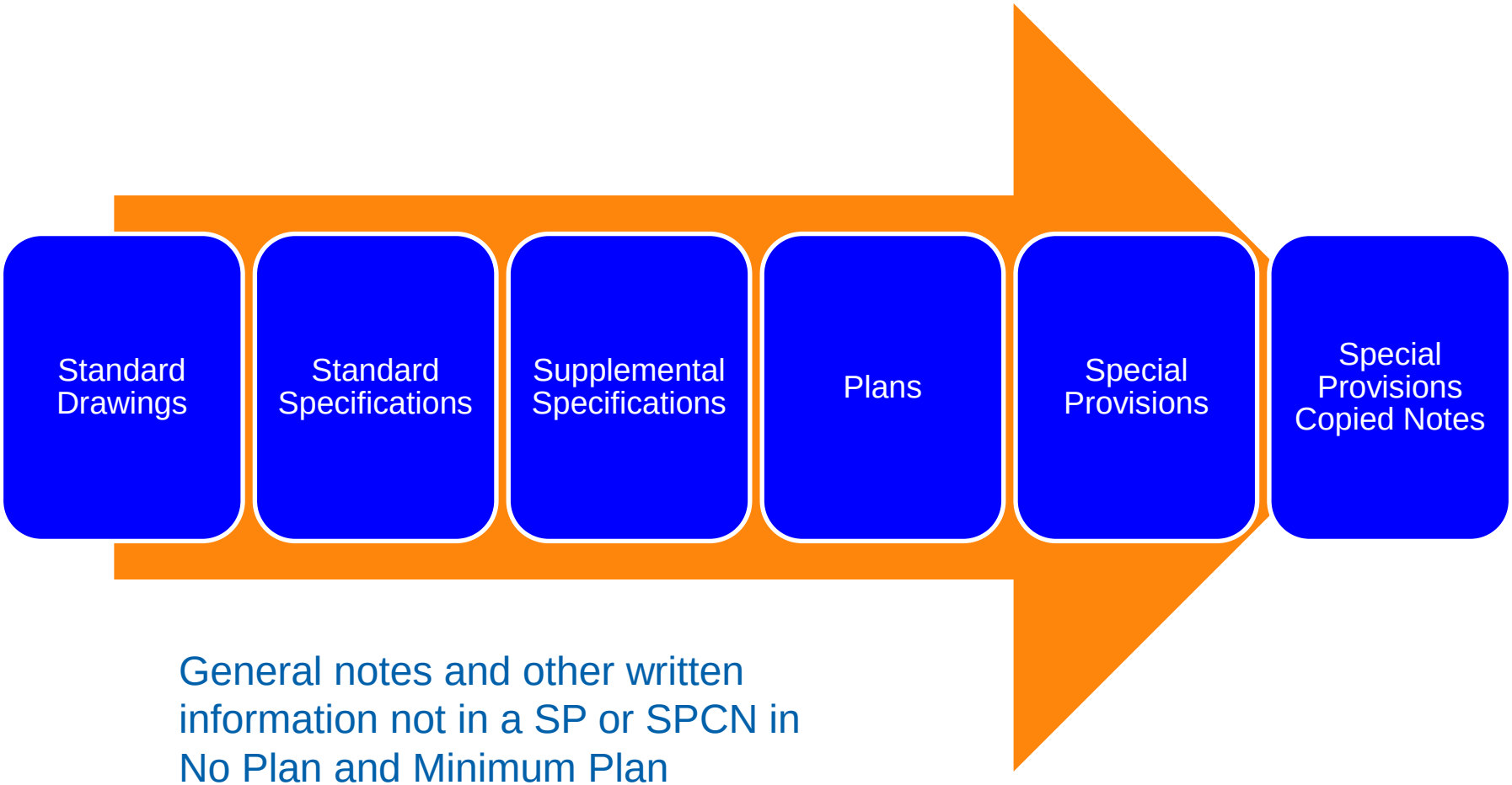


Construction Inspection

VDOT Representatives (consultant or VDOT employee) provides the construction oversight & inspection

Representatives must be familiar with the VDOT Road and Bridge Specifications as well as Special Provisions that are found in the contract.

Document Hierarchy
Section 105.12



General notes and other written information not in a SP or SPCN in No Plan and Minimum Plan Concept contracts carry the same weight as plans

Key Inspection Points

Prior to Density Acceptance

- Site preparation
- Milling
- Tacking
- Equipment
- Placement
- Compaction

Density Acceptance

- General requirements
- Small quantity applications
- VTM-76
- QC test sections
- Independent assurance
- Verification testing and sampling
- Referee procedure

Site Preparation

Areas of particular concern/focus:

- **Repairing failed areas**
- **Cleaning the surface**
- **Tack-achieve bonding of layers**

Site Preparation – Failed areas

Not addressing failed areas leads to premature failure of our overlays & resurfacing

<u>Approaches to correct failures can include</u>:

- **Milling**
- **Patching prior to the contract for resurfacing**
- **Specify patching type, material and locations in the contract**
  - Use Special Provision (SP) for Surface Preparation and Restoration Prior to Plant Mix Overlay (Volume 2)

Milling

Why mill a road?

- Remove material distress
- Maintain surface elevation
- Improve cross-section

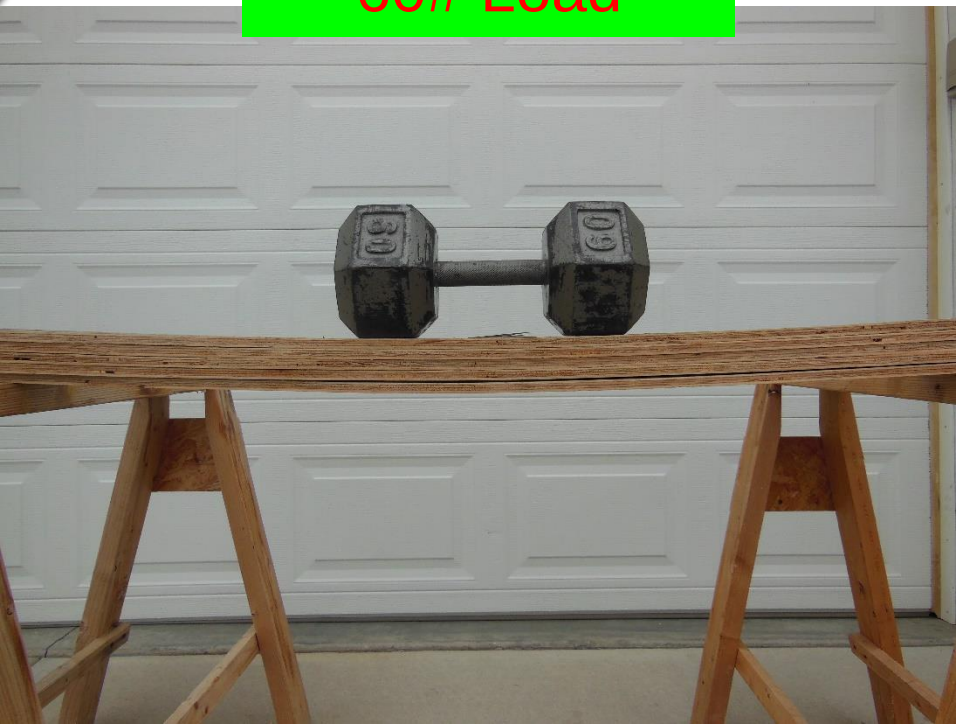
What things must be inspected?

- Presence of scabbing
- Positive drainage
- Cleanliness
- Performance milling
- Time frames
- Run-on conditions

What Happens with No Bonding

Bonded Demonstration

½” Deflection,
60# Load



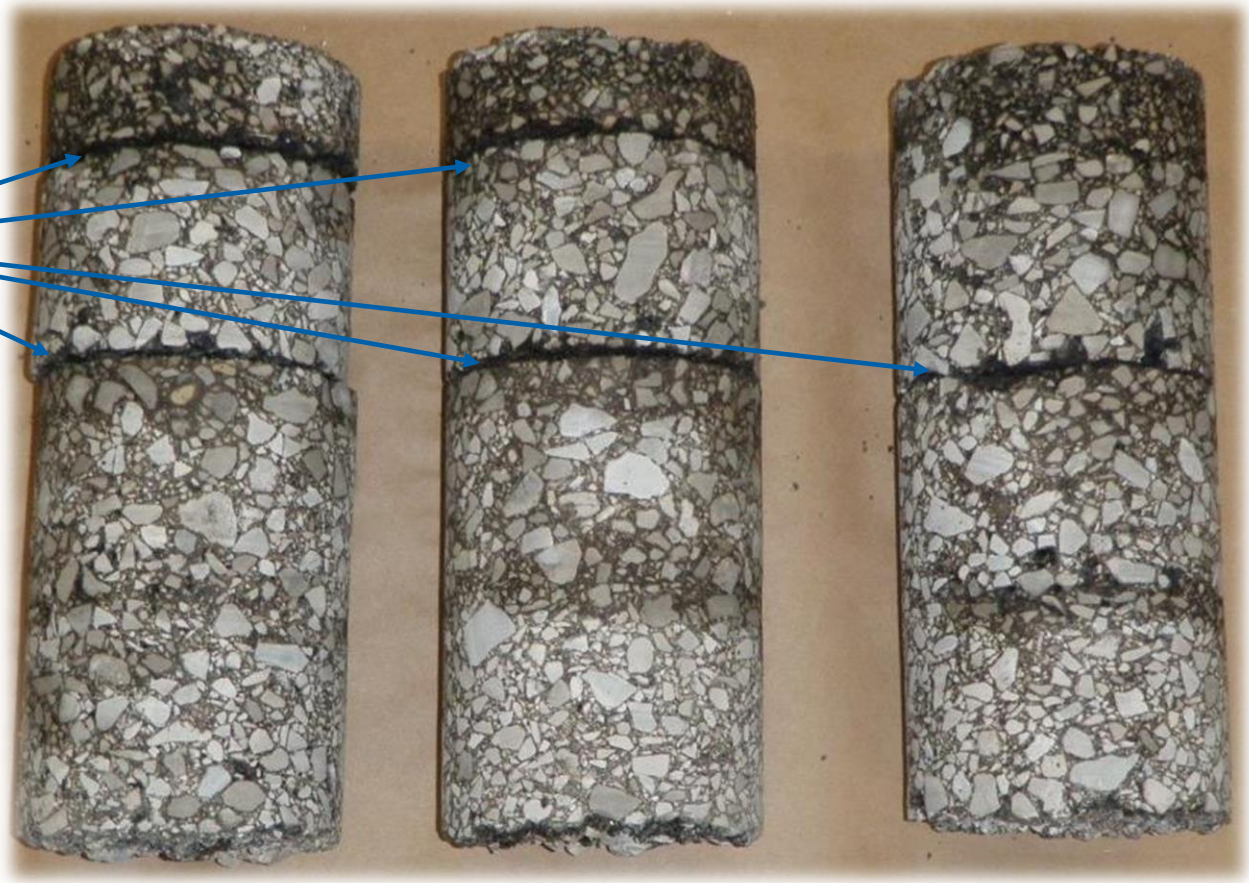
¼” Deflection,
160# Load

Unbonded

Fully Bonded

Cores Showing Debonding

Bonding Failures



Days later!

Courtesy of Road Science

Tacking – Proper Mainline

Tacking – Mainline and Joints

What two categories of tack coat materials are approved by VDOT?

- **Conventional Tack – Section 310**
- **Non-Tracking Tack Coat –Volume 2**

Tacking – Mainline and Joints

What is the specified application rate for conventional tack on mainline? Where is it found?

- **0.05 – 0.10 gal/sy for undiluted**

  Section 310.03

What is the specified application rate for non-tracking tack coat on mainline?

- **Rate recommended by the manufacturer**

Tacking – Longitudinal Joints

Proper application to result in joint density

Width of application for first paving pass?

- **2 feet – 18 to 20 inches under first pass, 4 to 6 inches protruding beyond first pass**

- **For second pass, vertical face of first pass and approximately 1 foot into lane to be paved**

Equipment

Material Transfer Vehicle

- Required for interstate surface paving in 2015
- Required for SMA and other specialty mixes
- Minimum 15 ton combined capacity between device and paver

Placement

Temperatures

Base

- WMA: 40F minimum
- HMA: 40F for “A” mixes and less 25% RAP; 50F for “A” mixes and 25% or more RAP, “D” and “E”

Mix

- Maximum is 350F or specified by liquid supplier
- New for 2015: WMA minimum is 200F

Placement

Paver Items

Longitudinal joints must be offset 6” from underlying joint

Surface longitudinal joint must be 6” – 12” from centerline marking; 6” offset from between lane markings

Continuous line for steering the paver

Grade control with ski, joint shoe

Density (Compaction)

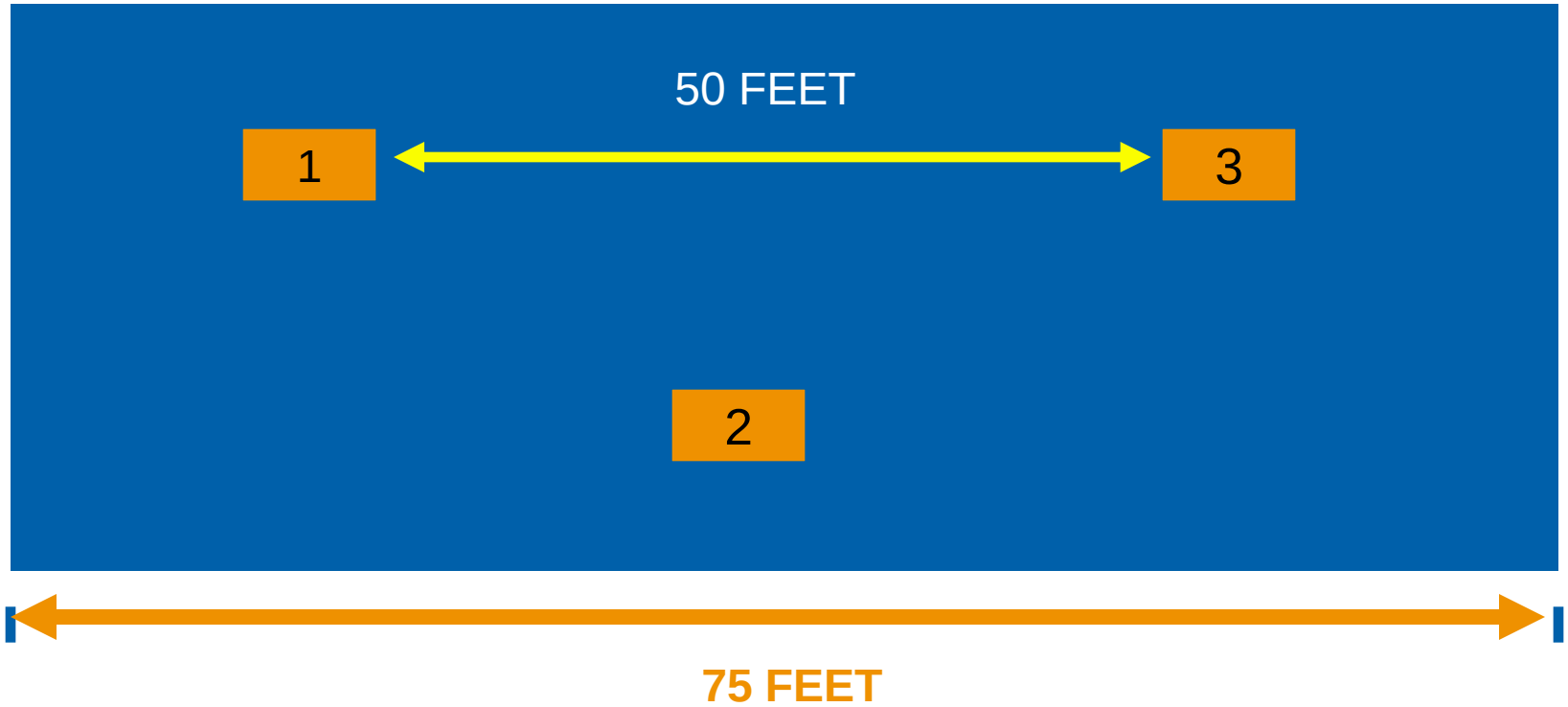
CRITICAL to pavement durability & performance !

No significant changes to procedures from 2014

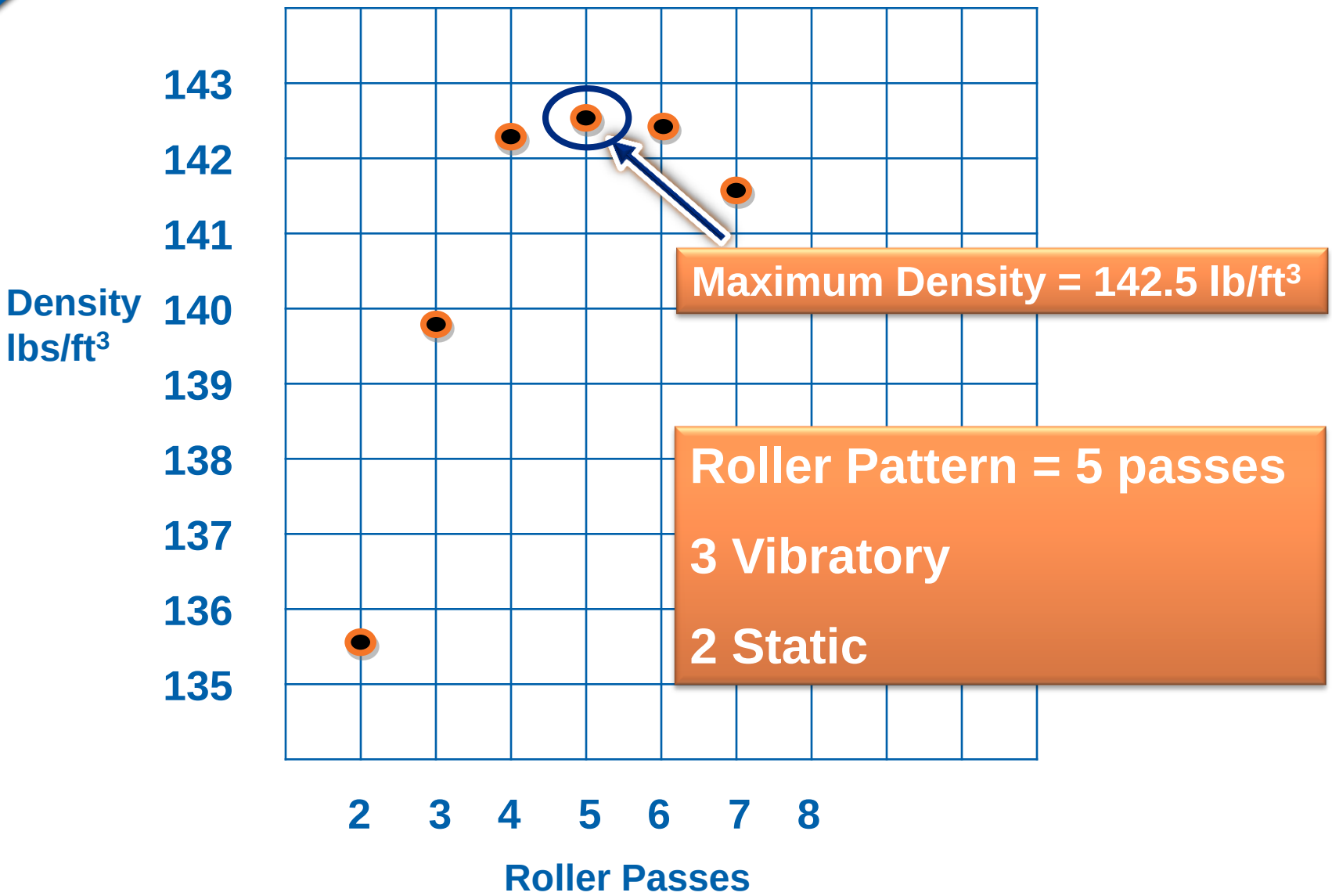
SMA changes:

- **Allow more than 3 vibratory passes, caution not to crush the stone**

Roller pattern



Thin Lift Roller Pattern Graph TL-57



Control Strip Construction

- Establishes an average nuclear density reading (10 locations)
- Verifies nuclear density reading using asphalt cores
- Determines the Target Density Value for subsequent acceptance testing

Control Strip Construction

When do you have to construct a Control Strip?

VDOT specifications require that one control strip be constructed at the beginning of work on each roadway and shoulder course and on each lift of each course.

Locations of nuclear readings are marked by contractor.

Core locations are marked for cutting.


VIRGINIA
44-483S


igloo

Verification of Target Density

Table III-3

Mix Type	Min.Control Strip Density%
SM-9.5A, SM-12.5A	92.5
SM-9.5D SM-12.5D	92.2
SM-9.5E, SM-12.5E	92.2
IM-19.0A, IM-19.0D, IM-19.0E	92.2
BM-25.0A, BM-25.0D	92.2

Control Strip Construction

An additional control strip is required when:

- **There is a change in type or source of materials.**
- **There is a significant change in the composition of the material being placed from the same source.**
- **There is a control strip failure (consecutive failures?)**

Construction must cease if new control strip is required

Test Sections

Table III-4 Payment Schedule for Lot Densities	
% of Target Control Strip Density	Percent of Payment
Greater than 102.0%	95
98.0 to 102%	100
97.0 to less than 98.0%	95
96.0 to less than 97.0	90
Less than 96.0%	75

SM-4.75 is Slightly Different

Mix monitored at plant through permeability testing as well as standard tests

In the field:

- **Roller pattern established (same as other dense graded mixes)**
- **Control strip constructed**
  - **BUT NO CORES**
  - **Average nuclear density from 10 readings is target**
- **Lot testing and payment follows Table III-4**

SUCCESS COMES

IN A

CAN

NOT A CAN'T

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