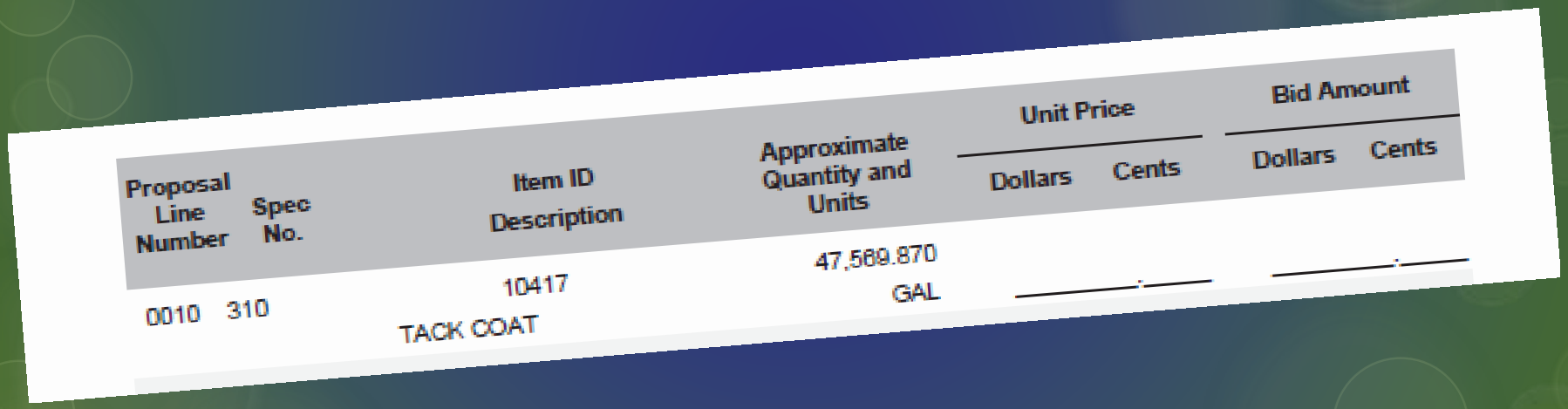
Supplemental Section 310 - Tack Coat

Tack Coat Inspection and Verification Process

Ron Hobson, P.E. - Area Construction Engineer
Richmond District - Southern Region

Harry King - Vice President
Colony Construction

VDOT will begin paying for Asphalt Tack Coat per gallon.



Proposal Line Number	Spec No.	Item ID / Description	Approximate Quantity and Units	Unit Price Dollars	Unit Price Cents	Bid Amount Dollars	Bid Amount Cents
0010	310	10417 TACK COAT	47,569.870 GAL	_____	. _____	_____	. _____

It is no longer included in the price of other pay items.

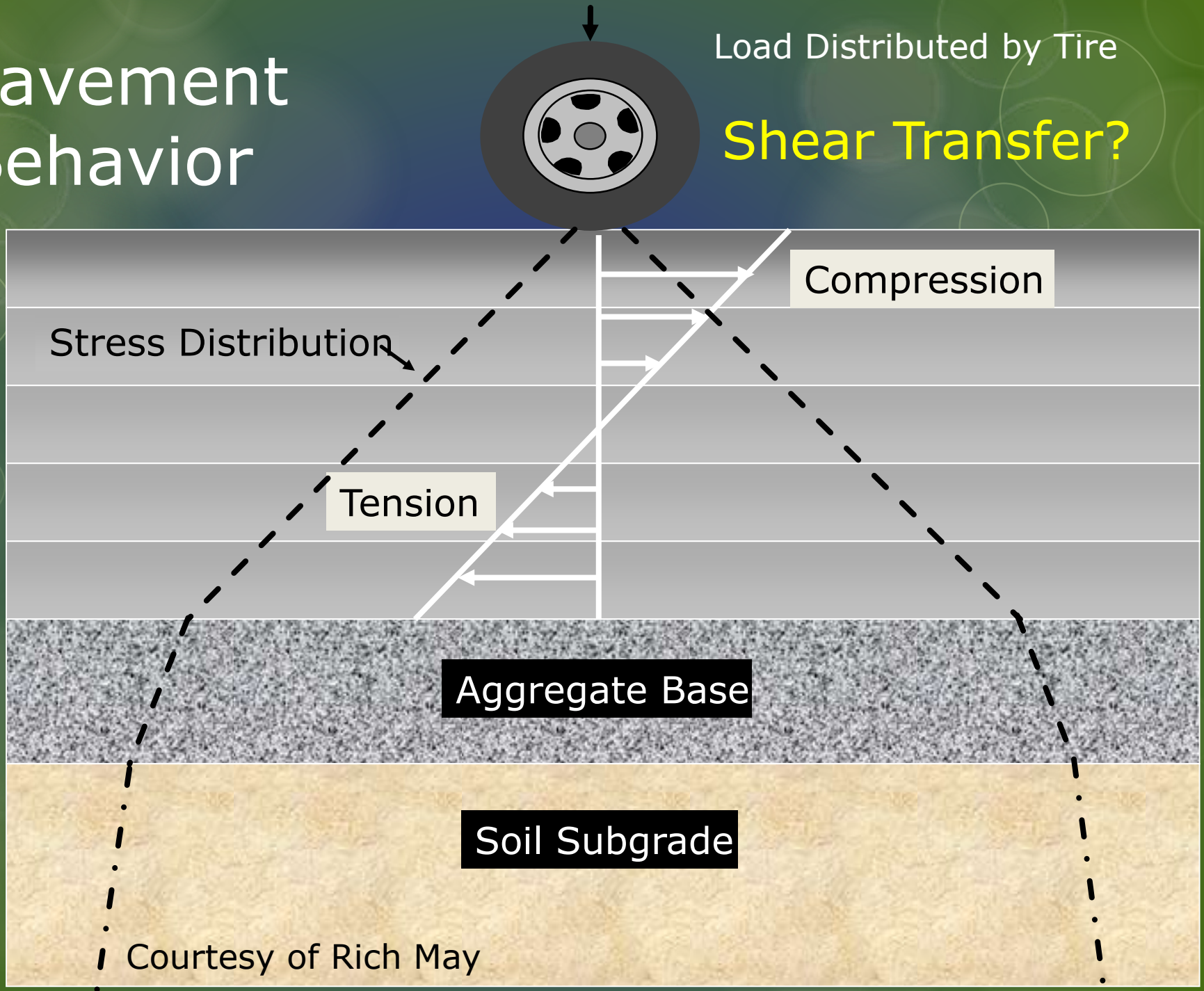
Opening Remarks ……..

- Consider this specification change as a concerted effort to address a paving quality concern. It is NOT perfect.
- Rob Crandol and others would appreciate your feedback at the end of the 2016 Paving Season.
- This presentation is one ACE's and one Contractor's opinion of a specification interpretation. You may agree or disagree.
- We are both hopeful that the presentation will get you thinking about how you will approach the change.
- Some slides came from Dave Johnson (Asphalt Institute).

Revised Specification 310

Why are things changing?

Pavement Behavior



Bonded Demonstration

½” Deflection,
60# Load

Unbonded

¼” Deflection,
160# Load

Fully Bonded

Cores Showing De-bonding

Consequences of Poor Bonding

- Layer independence
  - Reduced fatigue life
  - Increased rutting
  - Slippage
  - Shoving

- Compaction difficulty

  Direction of Traffic

What happens without sufficient Tack?

Delamination Pothole

Revised Specification 310

What stays the same?

Surface Preparation

- The existing surface shall be patched, cleaned, and rendered free from irregularities to the extent necessary to provide a reasonably smooth and uniform surface. The Contractor shall remove unstable corrugated areas, and replace with suitable patching materials when required by the contract specifications.
- Section 310.03

Longitudinal Joints

- The Contractor shall clean the edges of existing pavements that are to be adjacent to new pavement to permit adhesion of asphalt.

Section 310.03

The Contractor shall apply tack coat and non-tracking tack coat in accordance with the weather limitations that apply to the course being placed……

WEATHER RESTRICTIONS

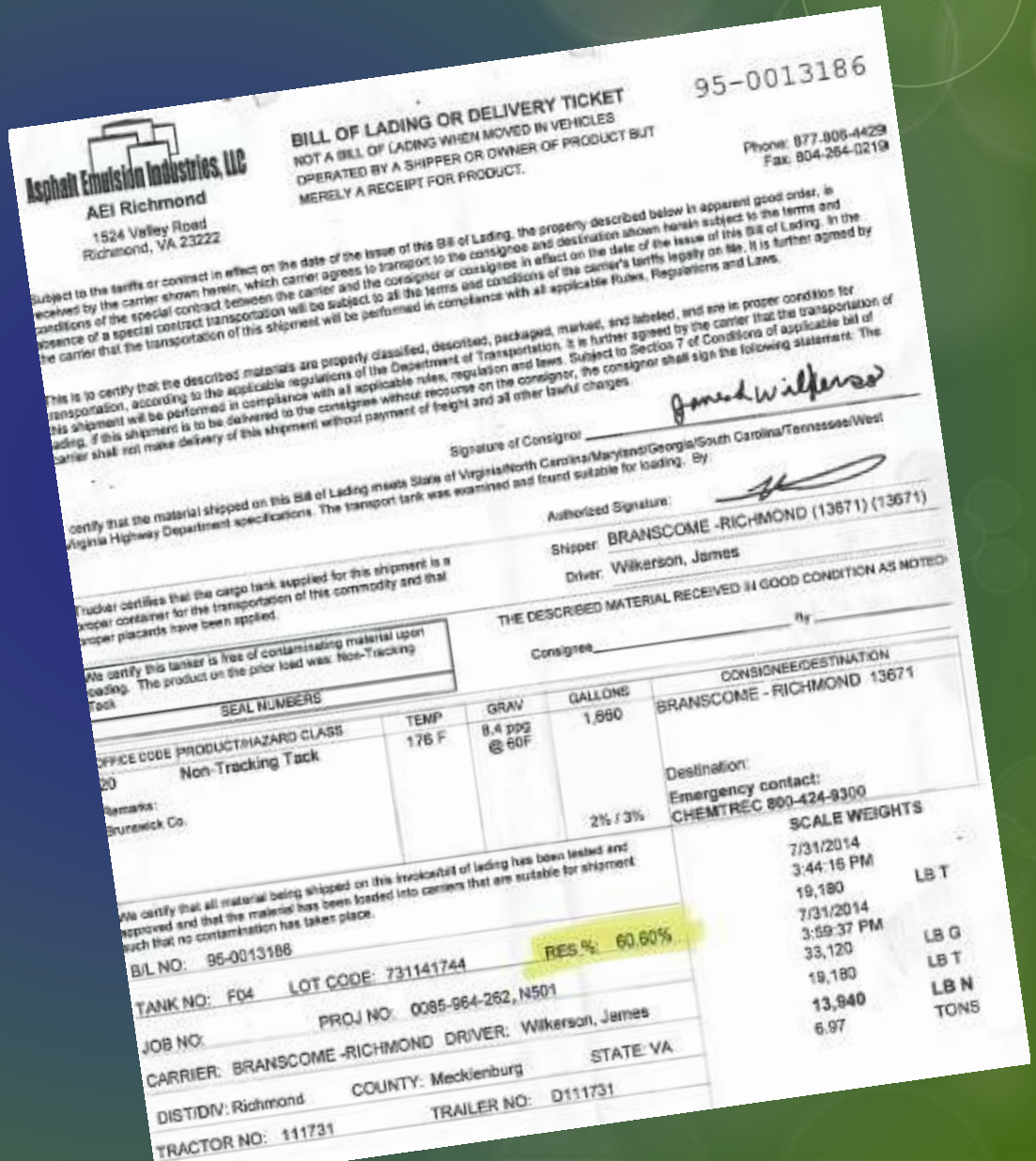
Appearance

The contractor shall uniformly apply tack coat or non-tracking coat…..

Tack Material

No longer using CRS-2

- Bill of Lading
- ALL TACK MATERIALS STORED LONGER THAN 30 DAYS SHALL BE RETESTED



Asphalt Emulsion Industries, LLC
AEI Richmond
1524 Valley Road
Richmond, VA 23222

BILL OF LADING OR DELIVERY TICKET
NOT A BILL OF LADING WHEN MOVED IN VEHICLES OPERATED BY A SHIPPER OR OWNER OF PRODUCT BUT MERELY A RECEIPT FOR PRODUCT.

95-0013186

Phone: 877-806-4429
Fax: 804-264-0219

Subject to the tariffs or contract in effect on the date of the issue of this Bill of Lading, the property described below in apparent good order, is received by the carrier shown herein, which carrier agrees to transport to the consignee and destination shown herein subject to the terms and conditions of the special contract between the carrier and the consignor or consignee in effect on the date of the issue of this Bill of Lading. In the absence of a special contract transportation will be subject to all the terms and conditions of the carrier's tariffs legally on file. It is further agreed by the carrier that the transportation of this shipment will be performed in compliance with all applicable Rules, Regulations and Laws.

This is to certify that the described materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportation. It is further agreed by the carrier that the transportation of this shipment will be performed in compliance with all applicable rules, regulation and laws. Subject to Section 7 of Conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

Signature of Consignor: James Wilkerson

I certify that the material shipped on this Bill of Lading meets State of Virginia/North Carolina/Maryland/Georgia/South Carolina/Tennessee/West Virginia Highway Department specifications. The transport tank was examined and found suitable for loading. By

Authorized Signature:

Trucker certifies that the cargo tank supplied for this shipment is a proper container for the transportation of this commodity and that proper placards have been applied.

Shipper: BRANSCOME -RICHMOND (13671) (13671)

Driver: Wilkerson, James

We certify this tanker is free of contaminating material upon loading. The product on the prior load was: Non-Tracking Tack

THE DESCRIBED MATERIAL RECEIVED IN GOOD CONDITION AS NOTED

By

Consignee

SEAL NUMBERS

OFFICE CODE	PRODUCT/HAZARD CLASS	TEMP	GRAV	GALLONS	CONSIGNEE/DESTINATION
20	Non-Tracking Tack	176 F	8.4 ppg @ 60F	1,660	BRANSCOME - RICHMOND 13671

Remarks:
Brunswick Co.

2% / 3%

Destination:

Emergency contact:
CHEMTREC 800-424-9300

We certify that all material being shipped on this invoice/bill of lading has been tested and approved and that the material has been loaded into carriers that are suitable for shipment such that no contamination has taken place.

SCALE WEIGHTS

7/31/2014 3:44:16 PM	19,180	LB T
7/31/2014 3:59:37 PM	33,120	LB G
	19,180	LB T
	13,940	LB N
	6.97	TONS

B/L NO: 95-0013186

RES %: 60.60%

TANK NO: F04 LOT CODE: 731141744

JOB NO: PROJ NO: 0085-964-262, N501

CARRIER: BRANSCOME -RICHMOND DRIVER: Wilkerson, James

DIST/DIV: Richmond COUNTY: Mecklenburg STATE: VA

TRACTOR NO: 111731 TRAILER NO: D111731

Revised Specification 310

What changes for VDOT personnel?

SET CLEAR EXPECTATIONS AND COMMUNICATE THE SAME

> Begin at the Pre-Construction Meeting

Suddenly, a heated exchange took place between the King and the Moat Contractor.

Safety

Contractor & VDOT Representatives will be handling plates with hot Tack

(Application Rate – NOT Residual Rate).

Train & Equip your personnel

Insulated & Petrochemical resistant GLOVES

What is your plan to pick up the plates?

Asphalt Institute Burn Information

KEEP COOL

DO NOT PANIC OR DELAY

ON-SCENE FIRST AID FOR ASPHALT BURNS

- Immediately address any Airway, Breathing or Circulation concerns and START COOLING with water
- Do NOT try to remove asphalt from skin
- Quickly place affected area under running/flowing water (ice or cold packs may be used in the event water is unavailable)
- Leave the asphalt burn area uncovered
- Notify others
- CALL FOR HELP!

1. VDOT to observe & document Distributor Calibration Test. Contractor to conduct test.

2. VDOT Representatives to conduct plate tests within first 500 tons (300 ft.) of paving. VDOT to use TL-143 **Method A** sheet to document appropriate Tack Application Rate.

VDOT must ACTIVELY inspect this operation.

3. Contractor to provide daily Tack usage. Contractor to use TL-143 **Method B** sheet to agree on volume EACH DAY.

>VDOT & Contractor to sign.

1

OBSERVE CONTRACTOR APPLICATION RATE CALIBRATION TEST

VERIFY THE CALIBRATION

WHERE ARE YOU GOING TO DO THIS?

The Distributor shall be calibrated by the Contractor in the presence of the Engineer prior to initial asphalt plant mix placement to demonstrate an even and accurate spray application.

CONTACT DISTRICT MATERIALS TO OBSERVE AND DOCUMENT THE TEST

Test conducted off-site PRIOR to C-5

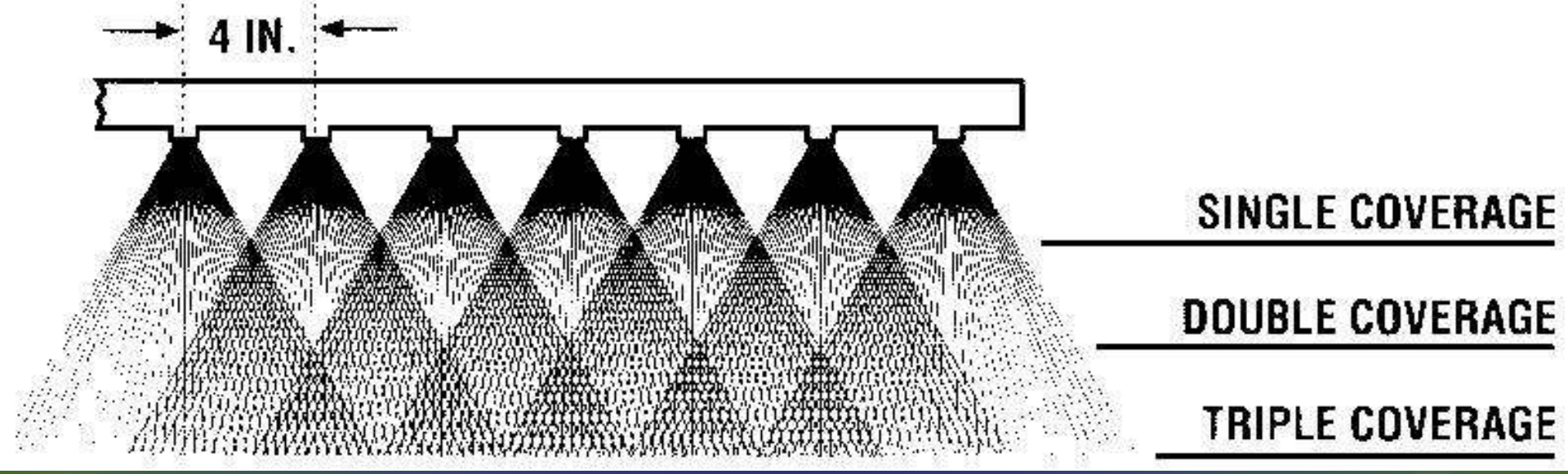
I will accept another VDOT representatives observation assuming I get a statement from the contractor that the Distributor Truck is in the same working condition (*no damage / repairs or modifications*) since the Calibration Test

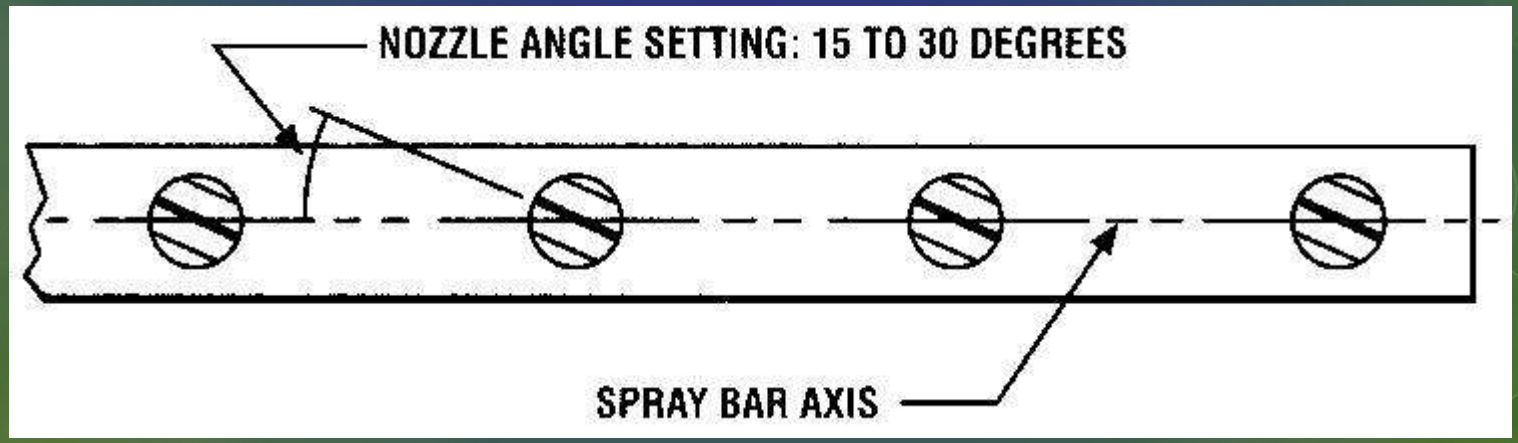
Distributor Truck Setup

Distributor Truck Setup

- Liquid temperature
  - Monitor and Match to material
- Calibrate distributor truck
  - Spray bar height
  - Spray bar pressure
  - Nozzle angle
  - Nozzle selection
  - Thermometers
  - Volumeter

Spray Bar/Nozzles

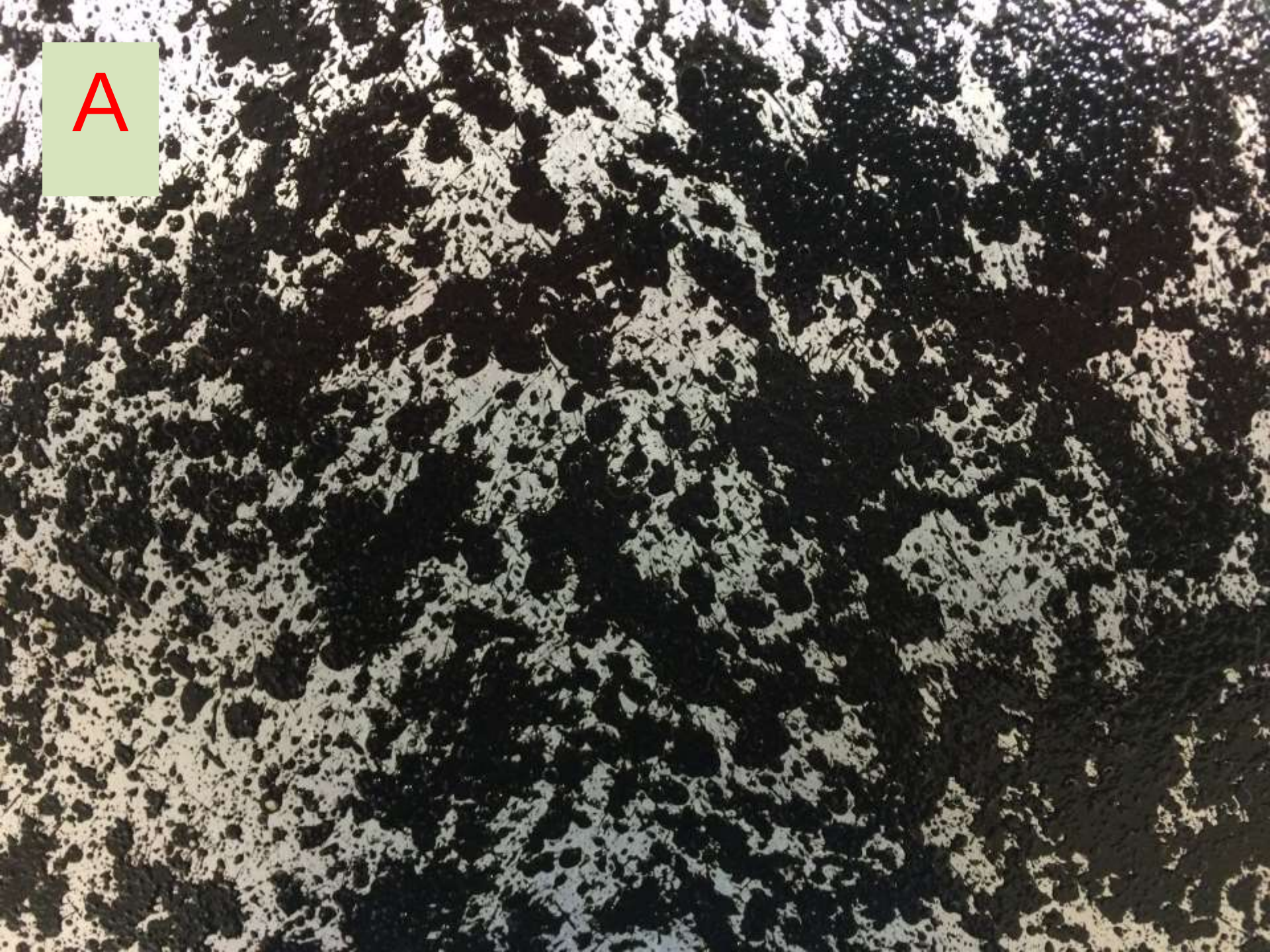




Effect of Nozzle Orientation

Tack Plates

What are they supposed to look like?


A


B


C

Answer: C

NOTE THAT PLATE C HAS THE ***MINIMUM*** RESIDUAL AMOUNT.

TL 143

Virginia Department of Transportation
Tack Application Rate Report

Materials Division

METHOD A: Tack Plate Method, VTM 137

District: RICHMOND
UPC: 107849
Project Number: PM-4D-16
Asphalt Producer: CONTRACTOR-X

Tack Manufacturer: BLACKLIDGE
Material Type: NTSS-1HM
Target Application Rate: 0.07

COMPARE

Test No./ Plate Number	Date	County	Route	Dir.	Weather Conditions: Air Temp. F	Weather Conditions: Surface Temp. F	Area, ft²	Weight, lbs			
							Plate Area (a)	Tare Wt. of Plate (b)	Wt. of Plate + Asphalt (c)	Wt. of Asphalt (d) = (c) - (b)	Application Rate* (gal/sq. yd)
1	3/15/16	—	—	—	65°	80°	0.992	1.32	1.38		

*Application Rate = ((d)x 9 / (a)) / 8.41

Project Inspector: E. BAILEY VDOT Reviewer: Ron Hobson

OBSERVE / VERIFY CONTRACTOR CALIBRATION TEST

Aim @ 0.07 g/SY

ns	Area, ft^2	Weight, lbs			
mp, F	Plate Area (a)	Tare Wt. of Plate (b)	Wt. of Plate + Asphalt (c)	Wt. of Asphalt (d) = (c) - (b)	Application Rate* (gal/sq. yd)

Calibration must be within 0.02 gallons per SY of the design application rate

2 Section 310.03

The Engineer shall verify the desired tack application rate is achieved using VTM-137 Method A (Tack Plate Method).

This test shall be performed at a minimum frequency of once per each roadway, within the first 500 tons of asphalt mix placed, unless other wise approved by the Engineer.


Scout Pro
0.00 g
ON/ZERO
Off
PRINT
Unit
OHAUS

TL-143

Virginia Department of Transportation
Tack Application Rate Report

Materials Division

METHOD A: Tack Plate Method, VTM 137

District: RICHMOND
UPC: 107844
Project Number: PM-4D-16
Asphalt Producer: CONTRACTOR X

Tack Manufacturer: BLACKLIDGE
Material Type: NTSS-1HM
Target Application Rate:

					Weather Conditions		Area, ft²	Weight, lbs			
Test No./ Plate Number	Date	County	Route	Dir.	Air Temp, F	Surface Temp, F	Plate Area (a)	Tare Wt. of Plate (b)	Wt. of Plate + Asphalt (c)	Wt. of Asphalt (d) = (c) - (b)	Application Rate* (gal/sq. yd)
1	5/2/16	026	712	-	75°	80°	0.992	1.31	1.39		
2	"	"	"	-	"	"	0.992	1.33	1.40		

*Application Rate = ((d)x 9 / (a)) / 8.41

COMPARE

MANUFACTER RECOMMENDED APPLICATION RATE

0.05 – 0.10 GAL/SY

Project Inspector: E. BAILEY VDOT Reviewer:

3

Track Tack Usage for Payment

Contractor to provide daily Tack usage.

Contractor to use TL-143 **Method B** sheet to agree on volume EACH DAY.

Section 310.04

Measurement and Payment

On a daily basis, the Contractor shall provide the Engineer readings taken from the calibrated distributors

Round to the nearest gallon

Insufficient or excessive amounts of Tack is a problem!

The inspection staff needs to stop the work.

Section 310.03

The Engineer reserves the right to perform the tack plate method testing at a higher frequency, as determined necessary, to ensure adherence to specifications.

I recommend that you “discuss and plan” for Distributor Breakdowns & RE-tacking

How do we handle quantities for hand spraying the vertical joints?

Referee System

"If the Engineer suspects the Contractor is failing to apply good bond promoting procedures or adequately tacking the existing surface per the manufacturer's recommendation, the Engineer may core a minimum of 10 locations to determine the shear & tensile strength at the interface."

TL-143

Virginia Department of Transportation
Tack Application Rate Report

Materials Division

METHOD B: Tack Yield Calculation Method, VTM 137

District: RICHMOND
UPC: 107844
Project Number: PM-4D-16
Asphalt Producer: CONTRACTOR X

Tack Manufacturer: BLACKLIDGE
Material Type: NTSS-1HM
Target Application Rate: _____

					Temp, F			Area, ft²	Volume, gal			
Test No.	Date	County	Route	Dir.	Temp. of Tack (t)	Length, ft. (a)	Width, ft. (b)	Applied Area (c) = (a) X (b)	Gauge reading @ beginning (d)	Gauge reading @ end (e)	Gallons used* (f)	Inspector Signature
–	5/2/16		720	–	160	2762	12		1950	1504		
1	5/3/16	SOUTHAMPTON	656	–	165	1510	11		1340	1170		
2			656	–	168	1010	11		905	717		
–	5/4/16		656		162	3050	11		1625	1170		

* (f) = {(d)-(e)} x {0.00025 x (60- (t)) +1}

**Application Rate = (f)x9 / (c)

R. HOBSON

Summary

Safety – PPE / Gloves

1. Calibration Test
   Materials and P.I. should observe

2. Tack Plate Test
   Tack Test Plates must be available
   Scales to weigh the plates

3. Tack Usage
   Agree daily on the quantity placed

4. Consider context.

ACTIVE INSPECTION IS A MUST!

Revised Specification 310

What changes for the Contractor?

Harry King
Vice President
Colony Construction

New to 2016 Paving Season

- Tack as a Pay Item
- Calibration of the Distributor Trucks
- Quantity Tracking of Material Used
- More Oversight of Tacking Operations

TACK AS A PAY ITEM

"Tack coat, including Tack Coat and Non-Tracking Tack Coat materials, when a pay item, will be measured in gallons and will be paid for at the contract unit price per gallon."

"When not a pay item the Contractor shall include the cost in the contract unit price for other appropriate items."

Sect. 310.04 – Measurement and Payment

Calibration of Distributor

"The distributor shall be calibrated by the Contractor in the presence of the Engineer prior to initial asphalt plant mix placement to demonstrate an even and accurate spray application. Calibration will be considered acceptable when the spray rate is uniform and within 0.02 gallon per square yard of the design application rate." Sect. 310.03

Quantity Tracking

What will we need?

- Daily quantities of tack material used
- Daily temperature of applied material
- Area sprayed (sq. yd.)
- TL-143 form completed on a daily basis

Quantity Tracking

- Quantities to be taken at the beginning and end of each day's operation

- Quantities can be taken from the computer screen or swing gauge on the tank

Good communication between the project superintendent and the inspection staff will be essential in gathering necessary information.

Temperature Requirements

- The documented temperature shall be taken of the heated material within the tank prior to application.

- It is suggested to use an average daily temperature, preferably sprayed at the manufacturers recommended temp.

TL- 143

- Emulsion will be adjusted according to 60° correction factor (0.00025)

- Ref. Sec. 109 of Road and Bridge Specifications

Link to TL-143

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Virginia Calibration Methods (VCMs):

Virginia Calibration Methods (.pdf 440kb) 8/25/15

Virginia Test Methods (VTMs):

Virginia Test Methods (pdf 9mb) 10/16/15

VDOT Forms including Materials TL (Test Log) Forms

VDOT Forms (Link)

TL-131 (160 KB) 1/24/14

TL-143

Virginia Department of Transportation
Tack Application Rate Report

Materials Division

METHOD B: Tack Yield Calculation Method, VTM 137

District _____
UPC _____
Project Number _____
Asphalt Producer _____

Tack Manufacturer _____
Material Type _____
Target Application Rate _____

					Temp, F			Area, ft^2	Volume, gal			
Test No.	Date	County	Route	Dir.	Temp. of Tack (t)	Length, ft. (a)	Width, ft. (b)	Applied Area (c) = (a) X (b)	Gauge reading @ beginning (d)	Gauge reading @ end (e)	Gallons used* (f)	Inspector Signature

* (f) = {(d)-(e)} x {0.00025 x (60- (t)) +1}

**Application Rate = (f)x9 / (c)

CORRECTION EQUATION

CORRECTED GAL.=

(GAL USED) X **(**0.00025 X (60 –TEMP) +1**)**

TACK YIELD CALCULATION METHOD, VTM-137

SAMPLE PROBLEM

KNOWN FACTORS

Length of roadway:	5,280 lf
Width of roadway:	12'
Material type:	Non-tracking
Temp. of tack:	165 degrees (F)
Gauge reading (beginning):	1000 gal.
Gauge reading (end of day):	296 gal.

EQUATION

((Gauge reading (beg) – (Gauge reading (end))) X (0.00025 x (60 – temp of tack) + 1) = Gals. Used

(1,000 - 296) X (0.00025 x (60 – 165) + 1) = Gals. Used

(704) X (0.00025 x (- 105) + 1) = Gals. Used

(704) X (0.97375) = Gals. Used

685.52 = Corrected Gallons Used

TL-143

Virginia Department of Transportation
Tack Application Rate Report

Materials Divisio

METHOD B: Tack Yield Calculation Method, VTM 137

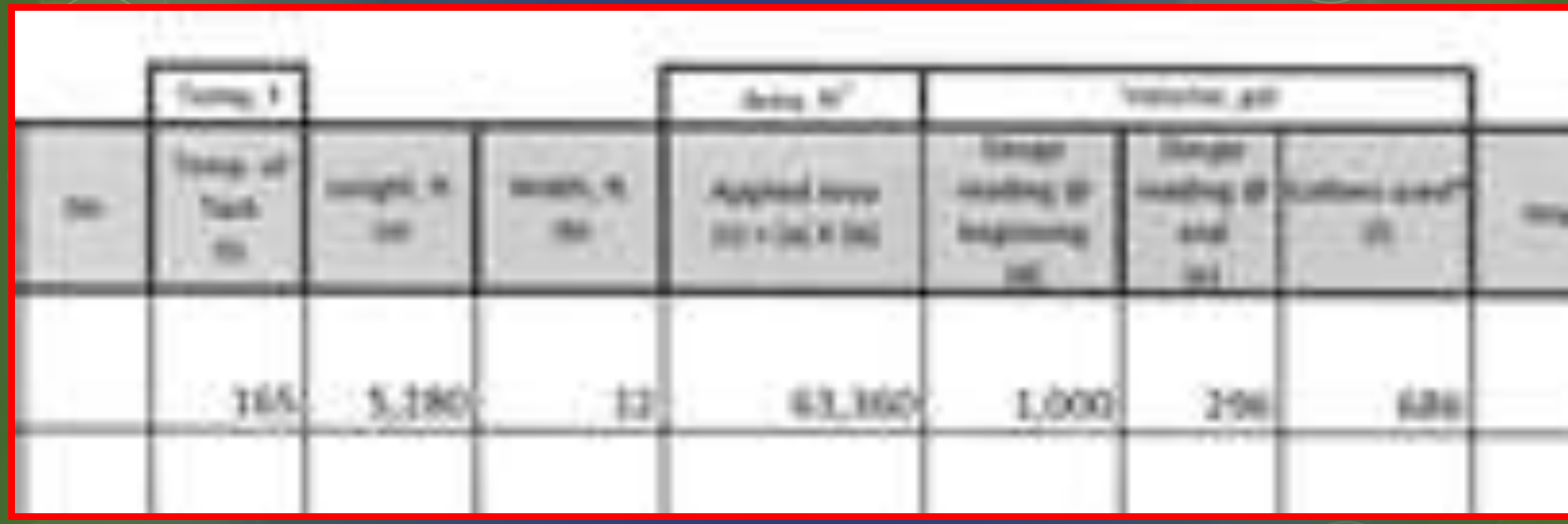
District _____
UPC _____
Project Number _____
Asphalt Producer _____

Tack Manufacturer _____
Material Type _____
Target Application Rate _____

					Temp, F			Area, ft²	Volume, gal			
Test No.	Date	County	Route	Dir.	Temp. of Tack (t)	Length, ft. (a)	Width, ft. (b)	Applied Area (c) = (a) X (b)	Gauge reading @ beginning (d)	Gauge reading @ end (e)	Gallons used* (f)	Inspector Signature
					165	5,280	12	63,360	1,000	296	686	

* (f) = {(d)-(e)} x {0.00025 x (60- (t)) +1}

**Application Rate = (f)x9 / (c)



More Oversight of Tacking Operations

- VDOT is now able to confirm application rates and make adjustments according to actual data

- (c) Referee System

- When a new asphalt course is placed on a milled or non-milled surface, the Contractor shall take steps to ensure an adequate bond is made between the new material and the existing surface. If the Engineer suspects the Contractor is failing to apply good bond promoting procedures or adequately tacking the existing surface per the manufacturer's recommendations, the Engineer may core a minimum of 10 locations to determine the shear and tensile strength at the interface.

Referee System Cont'd

- The Engineer will determine these locations by using a stratified random selection process. The Department will test cores in the Department's laboratory in accordance with VTM-128. For the surface to be acceptable, the average results for shear and tensile strength specified herein must be met. The Department will test a minimum of 5 cores for shear strength and at least 5 cores for tensile strength.
- 1. **Milled surfaces**: The average shear strength must meet or exceed 100 psi with no single core having a shear strength less than 50 psi. The average tensile strength of the remaining cores must meet or exceed 40 psi with no single core having a tensile strength less than 20 psi.
- 2. **Un-milled surfaces**: The average shear strength must meet or exceed 50 psi with no single core having a shear strength less than 30 psi. The average tensile strength of the remaining cores must meet or exceed 30 psi with no single core having a tensile strength less than 20 psi.

The Engineer will reduce the payment for the asphalt concrete tonnage placed in the area of dispute by 10% if the minimum shear or tensile strength requirements in that area are not met.

Take-Aways

A good working relationship with the inspection staff will be a necessity in making this revised specification a success

Plate Test (Method A): It is suggested to be done within the first 300 feet of the paving operation for that day

Distribution of the TL-143 will be needed. If using the digital form in the field, make sure the cells do not get unlocked.

Training will be needed for our Superintendents and Distributor drivers.

KEEP

CALM

AND

TACK

ON

Questions