



## **NORTH CAROLINA** Department of Transportation

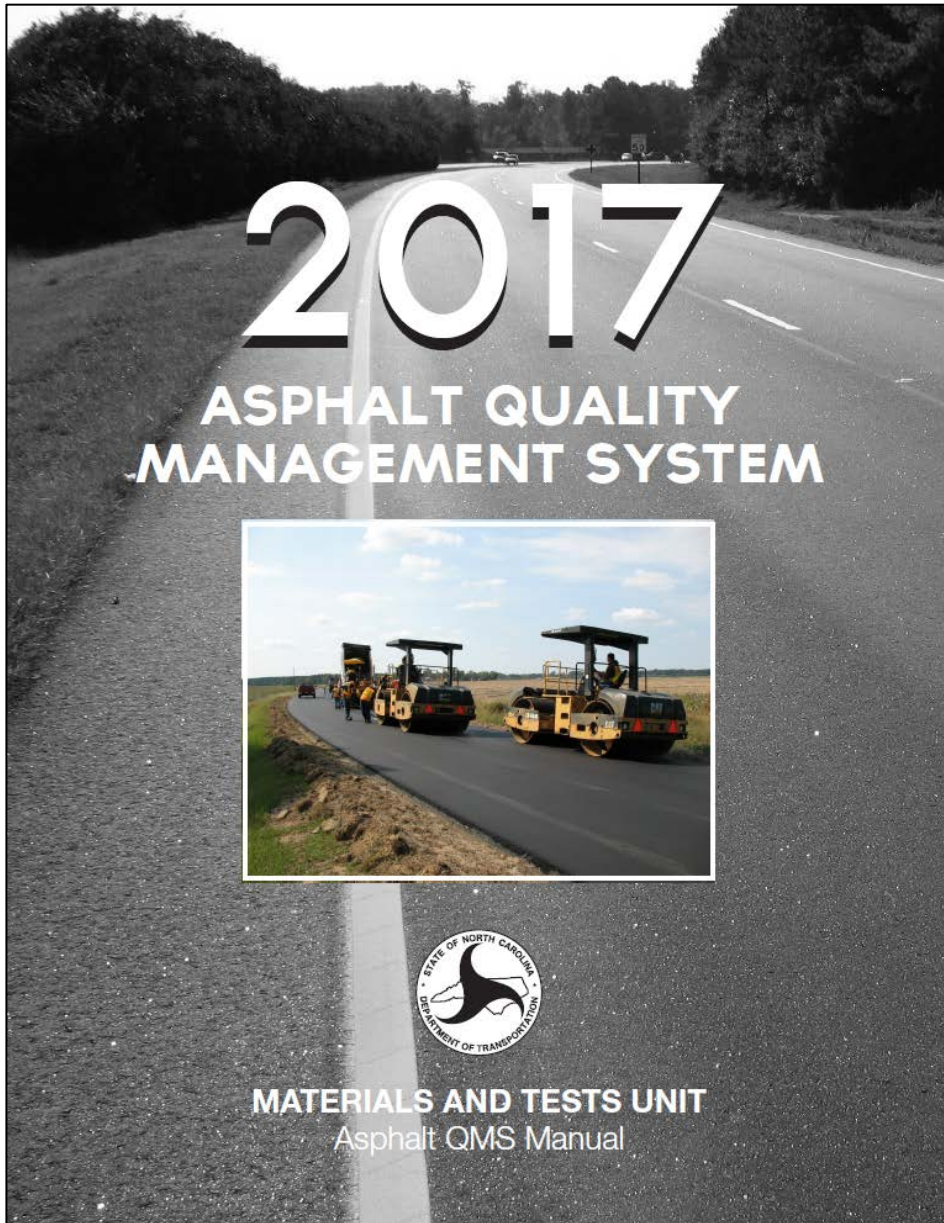


# Materials & Tests Updates

2017 Contract Administration Workshops

QMS Manual Updates

Todd W. Whittington, PE – State Field Operations Manager



## Find in the Table of Contents...

Asphalt QMS - 2017		Table of Contents
<b>MAJOR CHANGES FOR QMS MANUAL</b>		
<b>Section 1: Quality Management System (QMS) for Asphalt Pavements</b>		
<i>Page No.</i>	<i>Subsection</i>	<i>Change</i>
1-5	1.3.7	Fixed error to show effective period for all certifications is Five (5) years.
Various	Various	Changed several citations to the Standard Specifications to instead cite the applicable Sections of the QMS Manual.
<b>Section 2: Materials Used In Asphalt Paving</b>		
<i>Page No.</i>	<i>Subsection</i>	<i>Change</i>
2-11	Table 1005-1	Widened gradation tolerances Coarse Aggregate sizes #14M & #9M to encourage wider availability of these materials for Surface Treatment work.
<b>Section 3: Asphalt Pavement Design</b>		
		No Major Changes
<b>Section 4: Asphalt Mix Design and Job Mix Formulas</b>		
<i>Page No.</i>	<i>Subsection</i>	<i>Change</i>
4-4	4.4.1	Removed reference to an example 0.45 power chart that is no longer in the manual.
<b>Section 5: Asphalt Plant Equipment</b>		
		No Major Changes
<b>Section 6: Asphalt Plant Operations</b>		
<i>Page No.</i>	<i>Subsection</i>	<i>Change</i>
6-6	6.4	Added Table 6-1 "Plant Calibration Frequencies".
6-10	6.5.7	Removed duplicate paragraph on malfunctions – can be found in Section 6.12.
6-22	6.9	Clarified requirements for truck covers/tarps.
Various	Various	Removed any reference to frequency for Plant Calibrations – all frequencies can be maintained and referenced via Table 6-1.
<b>Section 7: Asphalt Mixture Sampling and Testing</b>		
<i>Page No.</i>	<i>Subsection</i>	<i>Change</i>
7-4	7.2.2	Added sentence to clarify that if a gyratory compactor is moved, it must be recalibrated BEFORE it can be used for testing.
7-12	7.3.2	Fixed error to show samples to be reported on QC-1 Form within 3 calendar days.
7-12	7.3.3	Added new Subsection 7.3.3 giving specific instructions on the use of Random Number tables for mix testing.
7-13	7.3.3	Updated Random Number tables for use in CY2017.
7-19	7.4.4	Added row to Table 609-1 for 1.18mm Sieve Control Points for use with S4.75A only – matches what is already required by the S4.75A specification.
7-23	7.5.5	Added language to insure that Mix Temperature taken at the plant is actually taken from the truck during the sampling process.
7-59	7.19	Added reference to Table 609-2 for 1.18mm Retest Limits for use with S4.75A only – matches what is already required by the S4.75A specification.
7-60	7.20	Added clarifications to when Verification & QA-split mix samples are required.
Various	Various	Changed several citations to the Standard Specifications to instead cite the applicable Sections of the QMS Manual.

# Random Number Tables

- Both Tables Updated for 2017:

Roadway Inspection & Testing - 2017						Section 10																		
Section 7						Section 10																		
Asphalt Mixture Sampling & Testing - 2017						Table 10-2																		
Table 7-1 [Page 1]																								
	Mix Type	0	Mix Type	1	Mix Type	2	Mix Type	3	Mix Type	4	Mix Type	5		4	5	6	7	8	9					
1		0.569		0.739		0.628		0.857		0.547		0.241		84	8110	1488	5712	0483	0340	0296				
2		0.599		0.320		0.633		0.561		0.016		0.035		26	4132	0413	0429	4026	5563	4570				
3		0.230		0.827		0.309		0.605		0.544		0.127		17	3592	5347	1661	4091	4791	9819				
4		0.857		0.576		0.162		0.161		0.691		0.745		91	1878	9197	9528	3060	2547	1356				
5		0.780		0.840		0.346		0.909		0.789		0.785		02	1007	8245	9346	5573	0579	2628				
6		0.687		0.471		0.406		0.081		0.496		0.698		32	9633	2630	7529	6106	2436	2404				
7		0.535		0.929		0.312		0.017		0.455		0.130		97	0005	3939	3251	7476	9842	1113				
8		0.074		0.423		0.577		0.576		0.208		0.972		38	7131	0590	5449	6741	4670	2182				
9		0.361		0.199		0.354		0.639		0.598		0.063		88	7365	8297	2038	5917	5759	6306				
10		0.448		0.983		0.138		0.261		0.883		0.950		63	7017	4251	0487	2234	0583	6141				
11		0.293		0.800		0.169		0.805		0.795		0.975		11	2262	6068	5404	2037	2897	0438				
12		0.758		0.619		0.226		0.085		0.797		0.246		53	5660	1850	3544	3739	9890	4604				
13		0.486		0.527		0.088		0.403		0.371		0.846		47	4368	3967	0078	4891	3747	8454				
14		0.737		0.704		0.027		0.207		0.255		0.096		69	7070	0722	8953	2591	1222	2767				
15		0.064		0.284		0.205		0.388		0.703		0.090		65	2580	8167	9346	4687	5016	1014				
														89	2122	9251	1184	8893	1072	6292				
														08	8402	9878	6999	7649	7189	5137				
														02	5554	1468	2915	0948	4379	9580				
														19	5283	5820	2870	1729	2482	5452	6931	7738	4006	6959
														20	6719	4429	4081	9838	0025	4735	7484	7024	2918	4498

# Tack Coat Materials

- **PG 58-28** is a Recognized Binder Grade for Tack Coat:

<b>TABLE 605-2 APPLICATION TEMPERATURE FOR TACK COAT</b>	
<b>Asphalt Material</b>	<b>Temperature Range</b>
Asphalt Binder, Grade <b>PG 58-28</b> or PG 64-22	350 - 400°F
Emulsified Asphalt, Grade RS-1H	130 - 160°F
Emulsified Asphalt, Grade CRS-1	130 - 160°F
Emulsified Asphalt, Grade CRS-1H	130 - 160°F
Emulsified Asphalt, Grade HFMS-1	130 - 160°F
Emulsified Asphalt, Grade CRS-2	130 - 160°F



















# Mix Temperatures

- Table 610-1 (New in 2016)

TABLE 610-1 MIXING TEMPERATURE AT THE ASPHALT PLANT	
Binder Grade	JMF Mix Temperature
PG 58-28; PG 64-22	250 - 290° F
PG 70-22	275 - 305° F
PG 76-22	300 - 325° F

- JMF Mix Temperature is chosen by the contractor and set when the JMF is approved.
- “When checked in the truck at the roadway, mix temperature must be within  $\pm 25^{\circ}$  F of the temperature **specified on the JMF.**”

# Mix Temperatures

Example on Page 10-6:

Page 1 of 1  
10/24/2016

**North Carolina Department of Transportation**  
**HOT MIX ASPHALT JOB MIX FORMULA (SUPERPAVE)**

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Contractor: Quality Paving Co. - NCDOT Everywhere, NC	Material: Asphalt Concrete Surface Course, Type RS 9.5B	
Plant Location: Everywhere, NC	Asphalt Type: RP15 - RAP Mix 15%	
Plant ID: AS205	AMD: 16-0409 JMF: 16-0409-151	
County: Wake	Effective Date: 10/24/2016 (Approved)	Contract: WBS:

AGGREGATE SOURCES AND BLEND PERCENTAGES

<u>APPROVED SUPPLIER</u>	<u>OTHER SUPPLIER</u>	<u>MATERIAL</u>	<u>BLEND %</u>
Martin Marietta Gomer Quarry - Gomer		Coarse Aggregate, #78M	40.0
Martin Marietta Gomer Quarry - Gomer		Screenings, Washed	35.0
Carolina Sand, Inc. (S. Carolina) Pee Dee Plant		Sand, Natural	10.0
	Stockpile	RAP Aggregate, Fine	15.0
TOTAL			100.0

<p><u>JMF COMBINED GRADATION</u></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><u>SIEVE SIZE</u></th> <th style="text-align: right;"><u>% PASSING</u></th> </tr> </thead> <tbody> <tr><td>50.0 mm</td><td style="text-align: right;">100</td></tr> <tr><td>37.5 mm</td><td style="text-align: right;">100</td></tr> <tr><td>25.0 mm</td><td style="text-align: right;">100</td></tr> <tr><td>19.0 mm</td><td style="text-align: right;">100</td></tr> <tr><td>12.5 mm</td><td style="text-align: right;">100</td></tr> <tr><td>9.5 mm</td><td style="text-align: right;">90</td></tr> <tr><td>4.75 mm</td><td style="text-align: right;">70</td></tr> <tr><td>2.36 mm</td><td style="text-align: right;">50</td></tr> <tr><td>1.18 mm</td><td style="text-align: right;">40</td></tr> <tr><td>0.600 mm</td><td style="text-align: right;">30</td></tr> <tr><td>0.300 mm</td><td style="text-align: right;">20</td></tr> <tr><td>0.150 mm</td><td style="text-align: right;">10</td></tr> <tr><td>0.075 mm</td><td style="text-align: right;">5.0</td></tr> </tbody> </table>	<u>SIEVE SIZE</u>	<u>% PASSING</u>	50.0 mm	100	37.5 mm	100	25.0 mm	100	19.0 mm	100	12.5 mm	100	9.5 mm	90	4.75 mm	70	2.36 mm	50	1.18 mm	40	0.600 mm	30	0.300 mm	20	0.150 mm	10	0.075 mm	5.0	<table border="0" style="width: 100%;"> <tr><td>Total Binder %:</td><td style="text-align: right;">6.3</td></tr> <tr><td>Asphalt Binder Grade:</td><td style="text-align: right;">PG 64 -22</td></tr> <tr><td>Asphalt Pay Binder Grade:</td><td style="text-align: right;">PG 64 -22</td></tr> <tr><td>Gmm meas (Rice):</td><td style="text-align: right;">2.440</td></tr> <tr><td>Gmb Ndes:</td><td style="text-align: right;">2.340</td></tr> <tr><td>Gsb:</td><td style="text-align: right;">2.670</td></tr> <tr><td>Gse:</td><td style="text-align: right;">2.690</td></tr> <tr><td>Gsa:</td><td style="text-align: right;">2.700</td></tr> <tr><td>Binder Specific Gravity:</td><td style="text-align: right;">1.030</td></tr> <tr><td>% AC Absorption:</td><td style="text-align: right;">.29</td></tr> <tr><td>VTM Ndes:</td><td style="text-align: right;">4.0</td></tr> <tr><td>VMA Ndes:</td><td style="text-align: right;">17.0</td></tr> <tr><td>VFA Ndes:</td><td style="text-align: right;">77.0</td></tr> <tr><td>Mix Temperature °F:</td><td style="text-align: right; border: 1px solid black;">290</td></tr> <tr><td>Minimum Compaction %:</td><td style="text-align: right;">92.0</td></tr> <tr><td>Rut Depth:</td><td style="text-align: right;">6.2</td></tr> <tr><td>Anti-Strip Additive %:</td><td style="text-align: right;">.50</td></tr> <tr><td>Modifier %:</td><td style="text-align: right;">.00</td></tr> <tr><td>NiniNdes/nmax:</td><td style="text-align: right;">7/65</td></tr> <tr><td>Add Binder %:</td><td style="text-align: right;">5.7</td></tr> <tr><td>% Binder from RAP:</td><td style="text-align: right;">.6</td></tr> <tr><td>Other Binder %:</td><td style="text-align: right;">.0</td></tr> <tr><td>Blend Ratio:</td><td style="text-align: right;">.0 / 15.0 / 85.0</td></tr> <tr><td>% AC in RAP:</td><td style="text-align: right;">3.9</td></tr> <tr><td>% AC in RAS:</td><td style="text-align: right;">.0</td></tr> </table>	Total Binder %:	6.3	Asphalt Binder Grade:	PG 64 -22	Asphalt Pay Binder Grade:	PG 64 -22	Gmm meas (Rice):	2.440	Gmb Ndes:	2.340	Gsb:	2.670	Gse:	2.690	Gsa:	2.700	Binder Specific Gravity:	1.030	% AC Absorption:	.29	VTM Ndes:	4.0	VMA Ndes:	17.0	VFA Ndes:	77.0	Mix Temperature °F:	290	Minimum Compaction %:	92.0	Rut Depth:	6.2	Anti-Strip Additive %:	.50	Modifier %:	.00	NiniNdes/nmax:	7/65	Add Binder %:	5.7	% Binder from RAP:	.6	Other Binder %:	.0	Blend Ratio:	.0 / 15.0 / 85.0	% AC in RAP:	3.9	% AC in RAS:	.0
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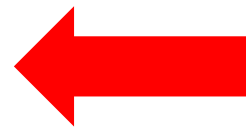
Binder Supplier: Axxon SP - Binder Wilmington, NC (#03)  
 Anti-Strip Supplier: Arr-Maz Products Winter Haven, FL  
 Anti-Strip Product: Ad-Here LOF 6500  
 Comment: QMS Manual Example

Approved By: Asphalt Materials Design Engineer  
*Charles R. Colgate*  
 Charles R. Colgate

Information contained herein may have been designated or indicated as "confidential" or as a "trade secret" at the time of its initial disclosure to the Department of Transportation. This information is intended for use by the Department and shall not be revealed to others without the approval of the Pavement Construction Engineer.

- 1) The Mix Temperature is set based on the ranges shown in Table 610-1.
- 2) The Mix Temperature is found on each JMF.
- 3) The Roadway Technician should use the temperature shown on the JMF and then apply the  $\pm 25^\circ \text{F}$  for checking the mix temperature in the truck.

Mix Temperature °F: 290



**Example:**  
**Mix Temperature (from JMF) = 290 ° F**

**$290 \pm 25^\circ \text{F} = 265 \text{ to } 315^\circ \text{F}$**   
 acceptable range of temperatures when checked in the **Truck** at the **Roadway**.

# Small Quantities Cores

- Where?
  - 1,500 linear feet or less of roadway pavement.
- Who Cuts the Cores??
- *Who Tests the Cores??*
- How Many?
  - Minimum **2** core samples per layer **PER DAY**
  - No Verification or Dispute Resolution cores are required for Small Quantities

# Small Quantities Cores - HiCAMS

Review Density Asphalt Cores QC (C203410)

Contract: C203410 Contractor: R.E. BURNS & SONS CO., INC. WBS: 38433.3.FD1 Status: Accepted

Placed Date: 04/30/2015 JMF: 04-0187-224 Material: Asphalt Concrete Surface Course, Type RSF 9.5A - Tons Retrieve

Lot Results History

Include In Avg	Core	Core Type	Station	Station Fraction	Location	% Comp
<input checked="" type="checkbox"/>	1S	QC	14 +	81.000	2 ft. Lt.	93.5
<input checked="" type="checkbox"/>	2S	QC	18 +	43.000	7 ft. Rt.	94.2

Check QC  
 Control Strip QC  
 QC  
 Substitution QC

JMF Min % Comp: 90.00      Lot Construction:  Other     New      Lot Average: 93.9  
 Lot: 3      Lot Completed:  Open     Complete      Lot Status: Meets Specs

Comment: SMALL QUANTITY CORES - No Verification or Comparison cores required. (10.8.2 - QMS Manual)



# Roadway Density

- Situations when Density is **REQUIRED**:
  1. All full width travel lane pavements, including:
    - a. Normal mainline and -Y- line travel lane pavements
    - b. Turn lanes
    - c. Collector lanes
    - d. Ramps and Loops
    - e. Temporary pavements
  2. Pavement widening 4.0 feet or greater
  3. Uniform width paved shoulders paved in the same operation as the travel lane. Uniform width paved shoulders greater than 4.0 feet paved as a separate operation from the travel lane.

# Roadway Density

- Situations when Density is **NOT** Required:
  1. Pavement widening less than 4.0 feet.
  2. Intersections and driveways paved as a separate operation and less than 100 feet.
  3. Paving in irregular areas. Irregular areas are shapes such as tapers or bulb outs that may make them difficult to compact.
  4. Paving for patching, wedging, or leveling.

# Roadway Density


- Section 10.3.5, page 10-14:
  - *Marking the core locations on the pavement **shall not** be done prior to completion of the compaction process.*
- Section 10.7, page 10-51:
  - QA Cores Removed in 2016
  - Department Roadway Technician only has to obtain V-cores and the corresponding DR-cores.


# Audit Findings


- Latest Federal Compliance Audit (FY 7/1/15 – 6/30/16)
- Looked at:
  - Asphalt: Mix and Density Testing
    - 5 Findings for Mix Testing
      - 14 Findings on last audit
    - ZERO Findings for Asphalt Density
      - 9 Findings on last audit
  - ABC: Roadway Assurance and Density Testing
    - 3 Findings


Select A Report


- Report Name**
- Approved Producer/Suppliers
  - Class Roster Report
  - Concrete School Class Roster
  - Course Test Results by Class
  - Course Test Results by Instructor
  - DBE Certification Renewal
  - DBE Directory
  - Former Names of Transferred Facilities
  - Highway Contractors
  - M&T Assessment Programs
  - Other Types
  - Prequalified Contractors
  - Prequalified Contractors Expiration
  - Product Report
  - Registration By Office Location Report
  - Technician Certifications
  - Welder Certification Report


Technician:  


Producer/Supplier:  

Division/Unit:  


Office Location:  

Certification Type:  

Certification Status:  

Staff Status:  

Certificate Expiration Date Range

From:   To:  