NORTH CAROLINA
Department of Transportation

2017 QMS Manual Updates

CAPA/NCDOT Asphalt Pavement Workshop

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From the Table of Contents…

Asphalt QMS - 2017 — Table of Contents

MAJOR CHANGES FOR QMS MANUAL

Section 1:	**Quality Management System (QMS) for Asphalt Pavements**	
Page No.	*Subsection*	*Change*
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.
Section 2:	**Materials Used In Asphalt Paving**	
Page No.	*Subsection*	*Change*
2-11	Table 1005-1	Widened gradation tolerances Coarse Aggregate sizes #14M & #9M to encourage wider availability of these materials for Surface Treatment work.
Section 3:	**Asphalt Pavement Design**	
		No Major Changes
Section 4:	**Asphalt Mix Design and Job Mix Formulas**	
Page No.	*Subsection*	*Change*
4-4	4.4.1	Removed reference to an example 0.45 power chart that is no longer in the manual.
Section 5:	**Asphalt Plant Equipment**	
		No Major Changes
Section 6:	**Asphalt Plant Operations**	
Page No.	*Subsection*	*Change*
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.
Section 7:	**Asphalt Mixture Sampling and Testing**	
Page No.	*Subsection*	*Change*
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.

Plant Calibrations

- Section 6, Table 6-1, page 6-6:

Table 6-1
Plant Calibration Frequencies

Device/Control	***Minimum Frequency****
Cold Feeder Aggregate Blend Ratio	12 months
Aggregate Scales/Weigh Bridges	12 months
Asphalt Binder Scales	12 months
Asphalt Binder Meters	12 months
Anti-Strip Meter System	12 months

*NOTES:

1) Perform Calibrations at the minimum frequency above and anytime the Plant has been idle for **90** days or more.

2) A new calibration of all proportioning devices or plant controls shall be performed after any malfunction and all necessary repairs of the equipment have been completed OR after any device/control is moved or exchanged.

3) All original calibration records shall be kept on site at the plant for audit by the Engineer.

Random Number Tables

- Both Tables Updated for 2017:

Section 7

Asphalt Mixture Sampling & Testing - 2017

Table 7-1
[Page 1]

	Mix Type	0	Mix Type	1	Mix Type	2	Mix Type	3	Mix Type	4	Mix Type	5
1		0.569		0.739		0.628		0.857		0.547		0.241
2		0.599		0.320		0.633		0.561		0.016		0.035
3		0.230		0.827		0.309		0.605		0.544		0.127
4		0.857		0.576		0.162		0.161		0.691		0.745
5		0.780		0.840		0.346		0.909		0.789		0.785
6		0.687		0.471		0.406		0.081		0.496		0.698
7		0.535		0.929		0.312		0.017		0.455		0.130
8		0.074		0.423		0.577		0.576		0.208		0.972
9		0.361		0.199		0.354		0.639		0.598		0.063
10		0.448		0.983		0.138		0.261		0.883		0.950
11		0.293		0.800		0.169		0.805		0.795		0.975
12		0.758		0.619		0.226		0.085		0.797		0.246
13		0.486		0.527		0.088		0.403		0.371		0.846
14		0.737		0.704		0.027		0.207		0.255		0.096
15		0.064		0.284		0.205		0.388		0.703		0.090

Roadway Inspection & Testing - 2017

Section 10

Table 10-2

	4	5	6	7	8	9
84	8110	1488	5712	0483	0340	0296
26	4132	0413	0429	4026	5563	4570
17	3592	5347	1661	4091	4791	9819
91	1878	9197	9528	3060	2547	1356
02	1007	8245	9346	5573	0579	2628
32	9633	2630	7529	6106	2436	2404
97	0005	3939	3251	7476	9842	1113
38	7131	0590	5449	6741	4670	2182
88	7365	8297	2038	5917	5759	6306
63	7017	4251	0487	2234	0583	6141
11	2262	6068	5404	2037	2897	0438
53	5660	1850	3544	3739	9890	4604
47	4368	3967	0078	4891	3747	8454
69	7070	0722	8953	2591	1222	2767
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:

TABLE 605-2 APPLICATION TEMPERATURE FOR TACK COAT	
Asphalt Material	**Temperature Range**
Asphalt Binder, Grade PG 58-28 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

Truck Tarps

- Clarified Language – Section 9.5.1(C), page 9-11:
  - *Cover each load of mixture with a solid, waterproof tarp constructed of canvas, vinyl, or other suitable material. Tarps should be free of rips or holes and at least as wide as the dump box to prevent the entrance of moisture and the rapid loss of temperature.*

Truck Tarps

Truck Tarps

Truck Tarps

Mix Temperatures

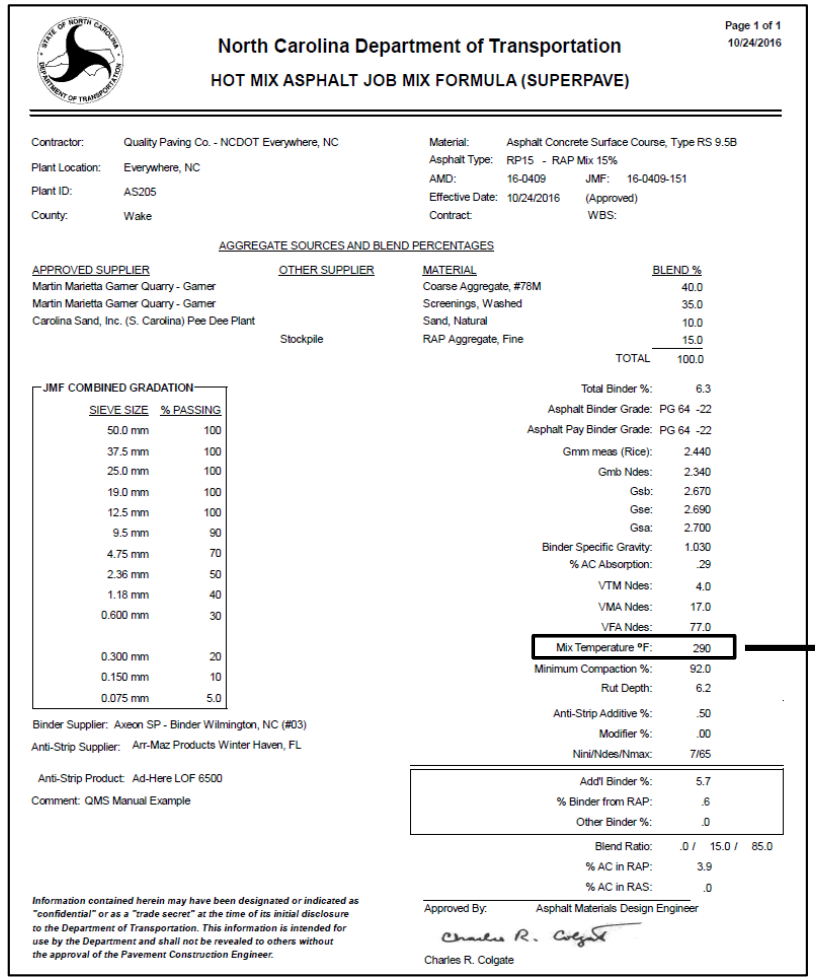
- Table 610-1 (New in 2016)

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 ± 25° F of the temperature specified on the JMF."

Mix Temperatures

Example on Page 10-6:



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10/24/2016

North Carolina Department of Transportation

HOT MIX ASPHALT JOB MIX FORMULA (SUPERPAVE)

Contractor: Quality Paving Co. - NCDOT Everywhere, NC
Plant Location: Everywhere, NC
Plant ID: AS205
County: Wake

Material: Asphalt Concrete Surface Course, Type RS 9.5B
Asphalt Type: RP15 - RAP Mix 15%
AMD: 16-0409 JMF: 16-0409-151
Effective Date: 10/24/2016 (Approved)
Contract: WBS:

AGGREGATE SOURCES AND BLEND PERCENTAGES

APPROVED SUPPLIER	OTHER SUPPLIER	MATERIAL	BLEND %
Martin Marietta Gamer Quarry - Gamer		Coarse Aggregate, #78M	40.0
Martin Marietta Gamer Quarry - Gamer		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

JMF COMBINED GRADATION

SIEVE SIZE	% PASSING
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

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
Nini/Ndes/Nmax:	7/65
Add'l 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

Binder Supplier: Axeon 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

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.

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

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 **± 25° F** for checking the mix temperature in the truck.

Mix Temperature °F: 290

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

290 ± 25° F = 265 to 315 ° F
acceptable range of temperatures when checked in the **Truck** at the **Roadway**.

Small Quantities Cores

- For individual structure replacements and projects having 1,500 linear feet or less of roadway pavement.
- No Verification or Dispute Resolution cores are required for Small Quantities
- A minimum of **2** core samples per pavement layer **PER DAY** (gives a minimum of 2/day for Average)
- From Section 10.8.2, page 10-53:
  - *The Contractor shall be responsible for cutting cores for testing by the Department.*
  - *These Small Quantity ("SQ") core samples will be taken in the presence of a DOT technician, and uniquely numbered (SQ-1, SQ-2, etc.).*
  - *The SQ cores shall be delivered directly to the appropriate QA Lab by either a DOT technician or a Contractor's technician.*

Small Quantities Cores - HiCAMS

- Input to the "Review Density Asphalt Cores QC" module
  - Identify Cores as "1S", "2S", etc.
  - Label the Core Type as "QC"
  - Add Comment:

    "SMALL QUANTITY CORES - No Verification or Comparison cores required. (10.8.2 - QMS Manual)"
- Should Still Be an M&T 605 Form with SQ Work
  - Be sure to add Comment about "SQ Cores" to M&T 605

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.

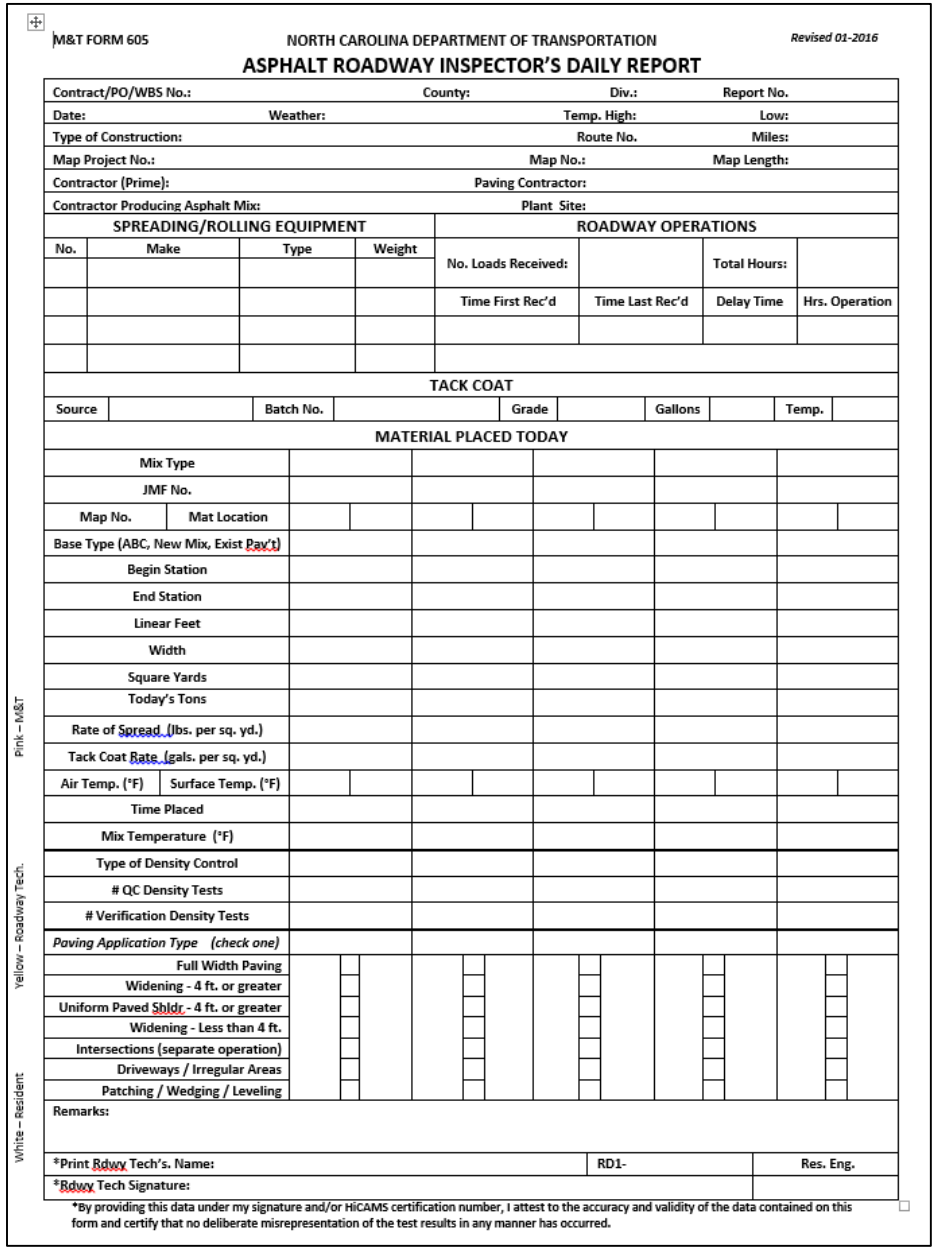
Roadway Density

- 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.

M&T 605 Form

- Required:
  - *This report is to be completed in entirety each day that any pavement is placed on a project.*



M&T FORM 605 — NORTH CAROLINA DEPARTMENT OF TRANSPORTATION — Revised 01-2016

ASPHALT ROADWAY INSPECTOR'S DAILY REPORT

Contract/PO/WBS No.:	County:	Div.:	Report No.
Date:	Weather:	Temp. High:	Low:
Type of Construction:		Route No.	Miles:
Map Project No.:		Map No.:	Map Length:
Contractor (Prime):		Paving Contractor:	
Contractor Producing Asphalt Mix:		Plant Site:	

SPREADING/ROLLING EQUIPMENT

No.	Make	Type	Weight

ROADWAY OPERATIONS

No. Loads Received:		Total Hours:	
Time First Rec'd	Time Last Rec'd	Delay Time	Hrs. Operation

TACK COAT

Source		Batch No.		Grade		Gallons		Temp.	

MATERIAL PLACED TODAY

Mix Type					
JMF No.					
Map No. / Mat Location					
Base Type (ABC, New Mix, Exist Pav't)					
Begin Station					
End Station					
Linear Feet					
Width					
Square Yards					
Today's Tons					
Rate of Spread (lbs. per sq. yd.)					
Tack Coat Rate (gals. per sq. yd.)					
Air Temp. (°F) / Surface Temp. (°F)					
Time Placed					
Mix Temperature (°F)					
Type of Density Control					
# QC Density Tests					
# Verification Density Tests					
Paving Application Type (check one)					
Full Width Paving					
Widening - 4 ft. or greater					
Uniform Paved Shldr - 4 ft. or greater					
Widening - Less than 4 ft.					
Intersections (separate operation)					
Driveways / Irregular Areas					
Patching / Wedging / Leveling					

Remarks:

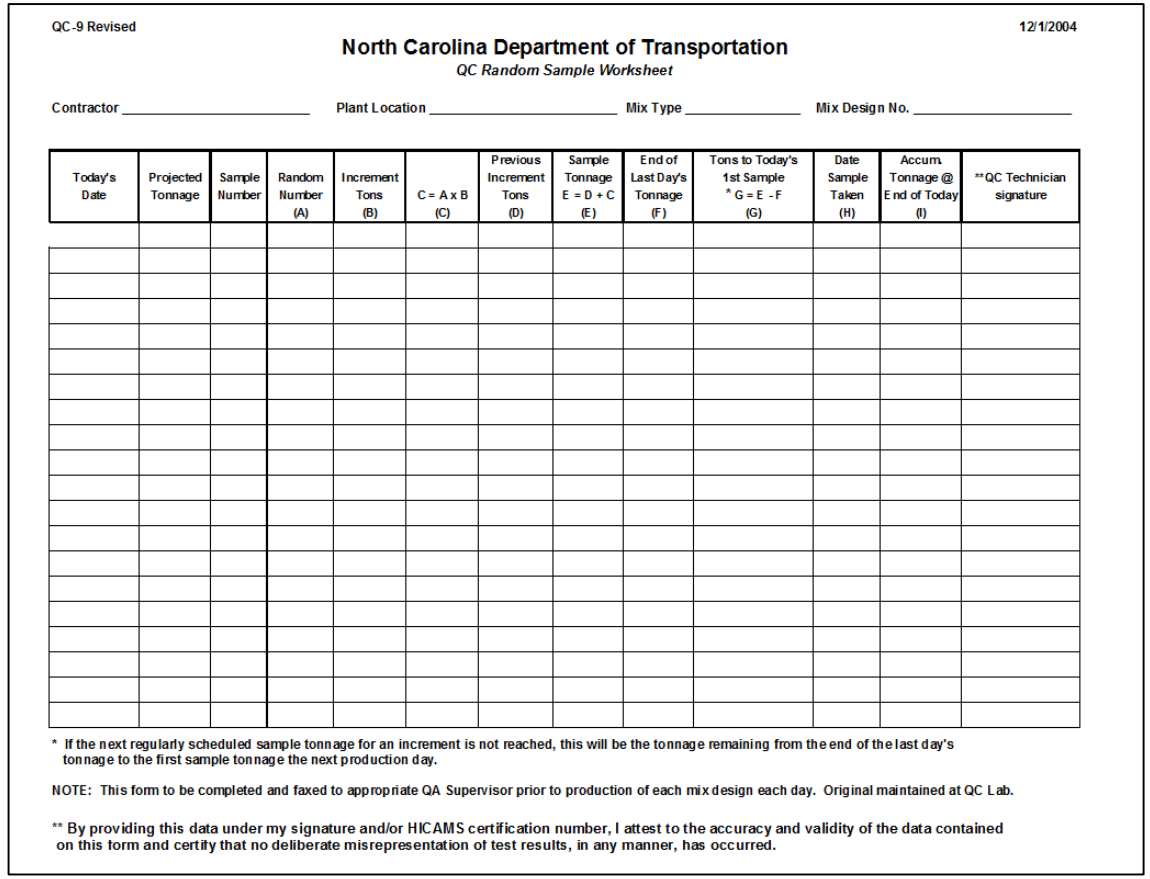
*Print Rdwy Tech's. Name:	RD1-	Res. Eng.
*Rdwy Tech Signature:		

*By providing this data under my signature and/or HiCAMS certification number, I attest to the accuracy and validity of the data contained on this form and certify that no deliberate misrepresentation of the test results in any manner has occurred.

Pink – M&T
Yellow – Roadway Tech.
White – Resident

QC-9 Form

- Required:
  - *This form should also be sent to the appropriate QA Supervisor prior to production each day or at the beginning of producing a different mix during the day.*
  - *In the event of production over a night shift, weekend, or holiday, the Contractor shall contact the QA Supervisor via a telephone call, text, etc. so that he can make any needed arrangements for obtaining possible samples during this time.*



QC-9 Revised 12/1/2004

North Carolina Department of Transportation

QC Random Sample Worksheet

Contractor _____ Plant Location _____ Mix Type _____ Mix Design No. _____

Today's Date	Projected Tonnage	Sample Number	Random Number (A)	Increment Tons (B)	C = A x B (C)	Previous Increment Tons (D)	Sample Tonnage E = D + C (E)	End of Last Day's Tonnage (F)	Tons to Today's 1st Sample * G = E - F (G)	Date Sample Taken (H)	Accum. Tonnage @ End of Today (I)	**QC Technician signature

* If the next regularly scheduled sample tonnage for an increment is not reached, this will be the tonnage remaining from the end of the last day's tonnage to the first sample tonnage the next production day.

NOTE: This form to be completed and faxed to appropriate QA Supervisor prior to production of each mix design each day. Original maintained at QC Lab.

** By providing this data under my signature and/or HICAMS certification number, I attest to the accuracy and validity of the data contained on this form and certify that no deliberate misrepresentation of test results, in any manner, has occurred.

M&T Personnel Updates

Division(s)	Contact Person	Office Location
1, 2, & 4	Donnie Best	Kinston
3	Junior Thornton	Burgaw
5	*Jan Womble*	*Youngsville*
6	*Tommy Bowen*	*Fayetteville*
7	Norman Abrams	McLeansville
8	Bradley Comer	Aberdeen
9	Randall Ashmore	Lexington
10	*Ryan Richardson*	*Matthews*
11	Jeff Canter	Wilkesboro
12	Joel Hamrick	Lincolnton
13	Cathy McAbee	Asheville
14	Dale Buchanan	Whittier
Statewide	Dan Hunter & Charles Colgate	