QA/QC-1 Rev

# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

## HOT MIX ASPHALT QUALITY CONTROL TEST WORKSHEET

9/23/2009

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Type Mix: | [ 1 ] | QC Sample Date: | [ 4 ] | JMF Pba: | [ 7 ] | MD Gb: | [ 10 ] |
| Plant Location: | [ 2 ] | QC Sample No.: | [ 5 ] | JMF Gse: | [ 8 ] | Calculated Gse: | [ 11 ] |
| Plant Cert No: | [ 3 ] | JMF No.: | [ 6 ] | JMF Gsb: | [ 9 ] | Corrected Gsb: | [ 12 ] |

| Dry & Pan Weights | | Pan Wt. |
|---|---|---|
| Agg Wt after Ignition | [ 13 ] | <0.2% of |
| Dry Wt after Wash | [ 14 ] | Dry Wt. |
| Pan Weight | [ 15 ] | After Sieving? |
| % Loss from Sieving | [ 16 ] | [ 17 ] |

| Furnace Weights | | Furnace |
|---|---|---|
| Basket + Mix | [ 18 ] | Scale |
| Basket Wt. | [ 19 ] | Within |
| Total Mix Wt. | [ 20 ] | 5.0 grams? |
| Furnace Readout | [ 21 ] | [ 22 ] |

| % Binder (Pb) | |
|---|---|
| JMF %Binder | [ 23 ] |
| % Binder from Burn | [ 24 ] |

| Moisture Content | |
|---|---|
| Mix Sample Weight | [ 25 ] |
| Mix Dry Weight | [ 26 ] |
| Mix % Moisture | [ 27 ] |

| | |
|---|---|
| VMA | [ 51 ] |
| VFA | [ 52 ] |
| %Gmm@Nini | [ 53 ] |
| Po.075 / Pbe Ratio | [ 54 ] |

### Gradation Data (all weights are after burn weights)

| SIEVE | Accumulated Weight | Percent Retained | TOTAL % PASSING | | | JMF |
|---|---|---|---|---|---|---|
| 37.5 mm | [ 28 ] | [ 29 ] | [ 30 ] | | | [ 33 ] |
| 25.0 mm | | | | | | |
| 19.0 mm | | | | | | |
| 12.5 mm | | | | | | |
| 9.5 mm | | | | | | |
| 4.75 mm | | | | | | |
| 2.36 mm | | | | | | |
| 1.18 mm | | | | | | |
| .600 mm | | | | | | |
| .300 mm | | | | | | |
| .150.mm | | | | | | |
| .075 mm | | | | | | |
| PAN | | | | Constant = | | [ 34 ] |

| Hot Bin Weights | #1 | #2 | #3 | #4 | #5 |
|---|---|---|---|---|---|
| ( Batch Plant ) | [ 35 ] | | | | |
| Cold Feed(materials) | [ 36 ] | | | | |
| Percentages | [ 37 ] | | | | |

### Gmm (Rice) Test Data

| | |
|---|---|
| A. Weight of Container | [ 38 ] |
| B. Weight of Container + Mix | [ 39 ] |
| C. Weight of Container + Mix In Water | [ 40 ] |
| D. Weight of Container (hanging in water) | [ 41 ] |
| E. Uncorrected Maximum Specific Gravity $\frac{B-A}{(B-A)-(C-D)}$ | [ 42 ] |
| Weighing Interval | [ 43 ] |
| 0 Min | |
| 15 Min | |
| 30 Min | |
| 45 Min | |
| 60 Min | |
| 75 Min | |
| F. Weight of Pan + Final Sample Weight | [ 44 ] |
| G. Weight of Pan | [ 45 ] |
| H. Max Specific Grav $\frac{B-A}{(F-G)-(C-D)}$ | [ 46 ] |
| I. Dry Back Correction Factor | [ 47 ] |
| J. ( G ) - ( H ) = Corrected Value | [ 48 ] |
| K. Reheat Correction Factor | [ 49 ] |
| L. ( G ) x ( J )Corrected Max Specific Gravity | [ 50 ] |

### Gyratory Compacted Specimen Test Data

| Specimen No. | A) Height @ Nini | B) Height @ Ndes | C) Dry In Air | D) SSD In Air | E) Weight In Water | F) Gmb @ Ndes' Measured | G). Gmb @ Ndes' Estimated | SAMPLE VOLUME H) '@' Nini | SAMPLE VOLUME I) '@ Ndes | J) Correction Factor | K) Gmb @Nini Estimated | L) Gmb @Nini Corrected | M) Gmm Rice Grav | N) VTM @' Ndes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Measured | Measured | Measured | Measured | Measured | C / (D-E) | C / I | Ax17.6715 | Bx17.6715 | F / G | C / H | J x K | Measured | (M-F) / M x 100 |
| 1 | [ 55 ] | [ 56 ] | [ 57 ] | [ 58 ] | [ 59 ] | [ 60 ] | [ 61 ] | [ 62 ] | [ 63 ] | [ 64 ] | [ 65 ] | [ 66 ] | [ 67 ] | [ 68 ] |
| 2 | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | |
| AVERAGES | | | | | | [ 69 ] | | | | | | [ 70 ] | | [ 71 ] |

*NOTE: BY PROVIDING THIS DATA UNDER MY SIGNATURE AND/OR HICAMS CERTIFICATION NUMBER, I ATTEST TO THE ACCURACY AND VALIDITY OF THE TEST DATA CONTAINED ON THIS FORM AND CERTIFY THAT NO DELIBERATE MISREPRESENTATION OF TEST RESULTS, IN ANY MANNER, HAS OCCURRED

[ 72 ]

* PRINT NAME LEGIBLY w/ HICAMS #

[ 73 ]

QA/QC TECHNICIANS SIGNATURE

# ***QA/QC-1***

**HOT MIX ASPHALT QA/QC TESTS WORKSHEET**

**($G_{mm}$ by Rice Test Method)**

**GENERAL NOTE:** This form may be used by either QA or QC personnel when determining binder content, recovered aggregate gradations, maximum specific gravity by Rice Test Method, and Gyratory test data for mix samples compacted to $N_{des}$ gyrations. QC is required to attach the following to this QA/QC Form:

1) a copy of the weigh ticket for the mix sample load; and
2) the ignition furnace printout for the binder content test.

This form, with these attachments, shall be maintained in the appropriate QC files for a period of (3) years after completion of the form. QA shall maintain their QA/QC-1 forms indefinitely unless permission is given otherwise.

1. Type mix being produced and tested; i.e, SF9.5A, I19.0C, etc.
2. Actual location of plant site (Site shown on JMF)
3. Current asphalt plant HiCAMS certification number.
4. Date mix is tested by QA/QC personnel
5. Consecutive QC sample number, i.e., 09-1, 09-2, 09-3, etc.
6. Actual Job Mix Formula Number of mix tested.
7. Percent Absorption ($P_{ba}$) value from the Job Mix Formula.
8. Effective Specific Gravity ($G_{se}$) value from the Job Mix Formula
9. Bulk Specific Gravity ($G_{sb}$) value from the Job Mix Formula.
10. Binder specific gravity from actual mix design being used.
11. Calculated effective specific gravity from the Rice Test from this mix sample. (See Section 7.16.3 of this manual for formula).
12. Corrected bulk specific gravity. See Section 7.16 Step 1 for formula.
13. Weight of recovered aggregate after ignition furnace burn.
14. Weight of dry recovered aggregate after washing aggregate sample.
15. Weight of material in pan after sieving (See PAN weight under Block 28).
16. Percent loss after sieving. See Section 7.9 for formula
17. YES if No. 16 above is 0.2% or less. NO if it exceeds 0.2%.
18. Weight of ignition furnace basket + mix.
19. Weight of ignition furnace basket.
20. No. 18 minus No. 19 = Total weight of mix.
21. Combined weight of mix sample and ignition furnace basket shown on ignition furnace readout.
22. YES if weight difference between Nos. 18 and 21 is within 5.0 grams. No if the difference is not w/in 5.0 grams.
23. Percent binder from Job Mix Formula being produced.
24. Percent binder from ignition furnace burn ticket.

**NOTE**: Nos. 25, 26, and 27, to be used when checking moisture in the completed mix when required.

25. Mix sample weight before drying.
26. Mix sample weight after drying. (Mix should be dried at 325ºF ±25ºF to a constant weight in oven.)
27. % Moisture in Mix:
    *(Original mix sample weight (25) – Dry mix sample weight (26)) ÷ Original mix sample weight (25) x 100)*
28. Accumulated weight of aggregate retained on each sieve/pan.
29. Percent retained. Cumulative Wt. Retained ÷ (Pan Wt. + Wt. Loss from Washing) x 100. See Section 7.9 for formula and example calculation of constant.
30. Total Percent passing [100 – % Retained (#29)].
31. [ITEM DELETED]
32. [ITEM DELETED]
33. Target values for each sieve from JMF.
34. Constant for computing percent retained (See Section 7.9 for formula and example calculation of constant).
35. Actual aggregate weights pulled from each hot bin being used (Batch Plant Only).
36. Type aggregate in each cold feed bin being used in mix; i.e., 78M, screenings, sand, etc.

## *QA/QC-1*

**HOT MIX ASPHALT QA/QC TESTS WORKSHEET**
**($G_{mm}$ by Rice Test Method)**
**(continued)**

37. Actual percent aggregate from each cold feed bin being used for in mix.
38. Weight of container (Rice Pot).
39. Weight of container + mix.
40. Weight of container + mix w/ both suspended under water.
41. Weight of empty container suspended under water.
42. Uncorrected Maximum Specific Gravity (Rice Gravity). Use formula on form.
43. Weighing interval, only if dry back test is required.
    (Dry back required if any aggregate in mix has absorption of 1.5% or greater.)
44. Final weight of pan and mix sample.
45. Weight of Pan.
46. Maximum Specific Gravity calculation (Nos. 43 thru 46 completed only if dry back is performed).
47. Dry back correction factor, if applicable. Difference in blank (42) and blank (46).
48. Corrected $G_{mm}$ value, only if dryback correction factor is used. [Blank (42) minus blank (47)]
49. Reheat correction factor, if applicable.
50. Corrected Maximum specific gravity (if reheat correction factor used). Blank (46) minus (48).
51. Calculated VMA from test data (See calculation formula in Section 7.16.4)
52. Calculated VFA from test data (See calculation formula in Section 7.16.5)
53. Calculated % $G_{mm}$@ $N_{ini}$ from test data (See calculation formula in Section 7.16.7)
54. Calculated $P_{0.075}/P_{be}$ Ratio from test data (See calculation formula in Section 7.16.6)
55. Height (mm) of Gyratory specimens at $N_{ini}$ taken from computer printout.
56. Height (mm) of Gyratory specimens at $N_{des}$ taken from computer printout.
57. Unsuspended dry weight of each Gyratory specimen to nearest 0.1 gram (x.x).
58. Unsuspended saturated surface dry weight of each Gyratory specimen to nearest 0.1 gram (x.x).
59. Suspended weight in 77°F water for 3-5 minutes for each Gyratory specimen to nearest 0.1 gram (x.x).
60. Bulk specific gravity of each specimen ($G_{mb}$@$N_{des}$, measured to nearest 0.001 (x.xxx).
61. Bulk Specific Gravity of each specimen ($G_{mb}$ @$N_{des}$, estimated)
62. Sample volume @ $N_{ini}$ expressed in $cm^3$.
63. Sample volume @ $N_{des}$ expressed in $cm^3$.
64. Correction factor determined by dividing $G_{mb}$@$N_{des}$ (measured) by $G_{mb}$ @$N_{des}$ (estimated). (Calculated to 0.001)
65. Bulk Specific Gravity ($G_{mb}$ @$N_{ini}$ Estimated).
66. Bulk Specific Gravity ($G_{mb}$ @$N_{ini}$ Corrected) Correction Factor x $G_{mb}$ @$N_{ini}$ (estimated).
67. $G_{mm}$ (Rice Test specific gravity) from blank 42, or blank 46 if dry back is required.
68. Percent voids in total mix (VTM) from test data (see calculation formula in Section 7.16).
69. Average $G_{mb}$ @ $N_{des}$. [Total of specimen $G_{mb}$ ÷ 3 (nearest 0.001)]
70. Average $G_{mb}$ @ $N_{ini}$ [Total of $G_{mb}$ @ $N_{ini}$ ÷3 (nearest 0.001)]
71. Average VTM @ $N_{des}$ [Total of VTMs ÷3 (nearest 0.1%)]
72. Printed name and HiCAMS certification number of QA/QC technician performing test
73. Signature of QA/ QC technician performing test

**NOTE :** All volumetric properties (VMA, VTM, VFA) are calculated using $G_{mb}$ @ $N_{des}$(measured).