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CHAPTER 9 ASPHALTIC CONCRETE PRODUCTION AND PLACEMENT RECORD

9.1 PURPOSE

To establish uniform and decisive instructions for keeping accurate final pay records for asphalt pay items with liquid included.

9.2 SCOPE

This procedure provides the explanations of forms used to document the quantities of bituminous material in the daily production of Asphaltic Concrete Mixes for FDOT construction. It also establishes guidelines to control those Asphalt Plant Operations that relate to the daily measurement and documentation of bituminous quantities. Also included are instructions for assessing Quality Assurance penalties.

9.3 PLANT RECORDS

The asphalt plant inspector is charged with the responsibility of keeping a daily running account of all mixes that are to be used by the Department.

The following forms are used to document the source data used in determining the quantities of asphaltic concrete and bituminous material:

- 1 **9.3.1 Daily Report of Asphalt Plant Inspector** - The purpose of this form (**See Form**
- 2 **675-030-06**) is to record daily plant operations for each type of asphalt concrete mix
- 3 placed. Daily Report of Asphalt Plant Inspector form Number 675-030-06 and the
- 4 instructions are as follows:
- 5

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION DAILY REPORT OF ASPHALT PLANT INSPECTOR										FORM 675-030-06 MATERIALS 07/98
Fin. Project ID	1	Material No.	2	Sample No.	3	Date Sampled	4			
Station From	5	Reference Line	6	Source	7	Plant No.	8	Quantity	9	tons / MT
Date Tested	10	Tested By Code	11	Status	12	Mix Design No.	13			
PAY ITEMS					PAY ITEM TONNAGE					
					PREVIOUS	THIS QUANTITY	ITEM TOTAL	REJECTED/WASTE		
1	14				15	16	17	18		
2										
3										
Standard Sieve Size	Super Pave Sieve Size	TARGET VALUE (JMF)	LOT Number		22 TONS / MT THIS LOT		LIQUID A.C.			
			SUB	SUB	PAY FACTOR COMPLETE BELOW WHEN LOT IS CLOSED OUT LOT SIZE		PAY ITEM	BID PRICE		
19	1" (25.5 mm)	20	0-0- 21 -0-0		24 ↓		26 ↓			
					average deviation	pay factor %	Design % Bitumen	1.	2.	3.
1 1/2" (31.5 mm)	3/4" (19.0 mm)						27			
1" (25.0 mm)	3/8" (12.5 mm)						Theoretical % Bitumen added			
3/4" (19.0 mm)	#8 (2.5 mm)						28			
3/8" (12.5 mm)	#4 (4.75 mm)						Theoretical gal. / liters used	29		
#4 (4.75 mm)	#16 (1.18 mm)		0-0- 23 -0-0			25	#5 FUEL OIL <input checked="" type="checkbox"/> 30 -0- DIESEL FUEL USED FOR DRYING AGGR. NAT. GAS OTHER			
#10 (2.00 mm)	#30 (900 µm)									
#40 (425 µm)	#50 (300 µm)									
#80 (180 µm)	#100 (150 µm)									
#200 (75 µm)	#200 (75 µm)									
AC Content %		AC Determination Method		Solvent	Ignition Oven	Printout				
TEMPERATURES					MATERIAL NUMBER TONNAGE					
ESTABLISHED		31			PREVIOUS QUANTITY		43			
AVERAGE		32			THIS QUANTITY		44			
MAXIMUM		33			TOTAL QUANTITY		45			
MINIMUM		34			RESIDENT ASPHALT ENGINEER: _____ 46 INITIAL / DATE _____ TECHNICIAN: _____ 47 TECHNICIAN'S HOURS: From _____ To _____ Total 48 PROJECT ENGINEER: _____ 49 INITIAL / DATE _____					
AVERAGE of FIRST 5 LOADS		35								
ROTATIONAL VISCOSITY										
BLEND = TYPES =		MATL. #453B		MATL. #452B						
CHECK ONE <input checked="" type="checkbox"/>		SITE	36	TERMINAL	37					
Asphalt Rubber Grade		38								
Test Temperature		40								
MINIMUM VISCOSITY		39	41	AM	42	PM				
			Pa.s		Pa.s					
REMARKS: 50										

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**INSTRUCTIONS FOR COMPLETION OF THE DAILY REPORT
 OF ASPHALT PLANT INSPECTOR**
No erasures accepted, strikeout mistakes only

CQR INFORMATION SECTION

1. Fin. Project ID - Refers to the Financial Project ID. For a job with multiple Project IDs, show all Project IDs where sampled material was placed. Make sure all applicable Project IDs are recorded together on the form. This will enable CQR input personnel to credit the sample and test data to all applicable projects.
2. Material No. - A four-character code obtained from the JOB GUIDE SCHEDULE that identifies each material/test. Material numbers for extraction tests on various types of mixes are as follows:

Type S - 120A	FC - 110A	Type II - 125A	SAHM - 140A
ABC - 076A	MISC. - 143A	Type III - 130A	Type SP - 123A

3. Sample No. - Each report generated will have one sample number per day, per mix (e.g., S1001, S1002, etc.). A new sample number and report will also be required at the beginning of each LOT, per mix. For a project with two or more plants producing asphalt, a new report must be written for mix produced at another plant.

NOTE: Sample numbers cannot be duplicated when using the same material number on the same project. To prevent duplication, samples should be numbered sequentially, according to mix type and use. Sample numbers should be kept sequentially despite changes in an approved mix design or pay-item. Once a sample number is used for a material number on a project that number cannot be reused. A suggested numbering sequence is as follows:

EXAMPLES OF SAMPLE NUMBERS	
TYPE of MIX	CORRECT NUMBERING SEQUENCES
ABC-1	B1001, B1002, B1003, ↔ B1999
ABC-2	B2001, B2002, B2003, ↔ B2999
ABC-3	B3001, B3002, B3003, ↔ B3999
FC-2	F2001, F2002, F2003, ↔ F2999
FC-3	F3001, F3002, F3003, ↔ F3999
FC-5	F5001, F5002, F5003, ↔ F5999
FC-6	F6001, F6002, F6003, ↔ F6999
S-I	S1001, S1002, S1003, ↔ S1999
S-II	S2001, S2002, S2003, ↔ S2999
S-III	S3001, S3002, S3003, ↔ S3999
SP-9.5	P1001, P1002, P1003, ↔ P1999
SP-12.5	P2001, P2002, P2003, ↔ P2999
SP-19.0	P3001, P3002, P3003, ↔ P3999
SAHM	L1001, L1002, L1003, ↔ L1999
TYPE II	L2001, L2002, L2003, ↔ L2999
TYPE III	L3001, L3002, L3003, ↔ L3999
MISCELLANEOUS	M0001, M0002, M0003, ↔ M0999

4. Date Sampled - Date sample was taken, if no sample was taken, date material was produced.
5. Station From - N/A.
6. Reference Line - N/A.

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7. Source - 05.
8. Plant No. - Identification number assigned to each approved asphalt plant producing asphalt for the Department. This number should be on the asphalt concrete delivery ticket and can be verified by the District Bituminous Engineer.
9. Quantity - This represents the TOTAL LOT quantity and should be filled in ONLY when the LOT is completed. Leave this item blank if the LOT is NOT completed.
10. Date Tested - Date sample was tested.
11. Tested By Code - A two digit code used to identify which resident construction office tested the sample (e.g. 2G = Gainesville Construction).
12. Status - Record **NA** (Not Applicable) if the LOT is NOT completed. Record **P** (Passed) if the LOT is completed with full pay; **FA** (Failed, penalty Assessed) if the LOT is completed with partial pay (penalty has been assessed according to specification).
13. Mix Design No. - Example: QA 95-6899A, SP 97-0008.

PAY - ITEMS

14. Pay Item No. - Record all pay item numbers represented by the sample. Pay item numbers must be written EXACTLY as they appear on the project JOB GUIDE SCHEDULE.

PAY ITEM TONNAGE BOX

15. Previous Quantity - Quantity of mix (corresponding to the appropriate pay item) placed before this report, in tons or metric tons (MT).
16. This Quantity - Quantity of mix (corresponding to the appropriate pay item) placed that is represented by this report, in tons or metric tons (MT). This does not include rejected / waste mix (see item #18).
17. Item Total - Add items 15 and 16.
18. Rejected / Waste - Record tonnage amounts given to you from the road inspector that were NOT placed on the project. (i.e. Private, MOT, Other.)

EXTRACTION / GRADATION SECTION

19. Sieve Size - Mark thru inapplicable column(s).
20. Target Value - Record data from the Job Mix Formula (JMF) on the approved Mix Design.
21. LOT / Sublot - Record appropriate LOT number and Sublot number on all reports (even if no test is run). Number the LOTs sequentially according to material number, even if there is a change in the mix design. Note: Do not record extraction results from previous reports.
22. Tons / Metric Tons (MT) this LOT - Record running total tonnage for this LOT. This entry is not required when Item 24 is recorded. Circle applicable units.
23. Extraction Results - List extraction gradation and AC content results in appropriate blanks for each Sublot. Results from previous Sublot's samples should not be recorded again. (Record all results to two decimal places). Identify AC content determination method. (Use calibrated AC content for the ignition method). Circle applicable method.
24. LOT Size - After the LOT is complete, record tonnage of the completed LOT. Circle applicable units.
25. Pay Factor - Based on average of deviations from the Job Mix Formula (JMF) on the approved Mix Design and Table 331-6 of the Standard Specifications. Pay Factor % is determined after the LOT is completed.

LIQUID A.C. SECTION

26. Pay-item / bid price - Record bid price from the project's contract for each pay-item sampled.
27. Design % Bitumen - Get from page two of the approved Mix Design. This will be the "Optimum Asphalt" for structural/base mixes and "Total Asphalt Rubber" for friction courses. e.g., 6.7 or 7.0, for each pay-item sampled.

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28. Theoretical % Bitumen Added - Get from page two of the approved Mix Design. This will be the "Recycling Agent to be added" for recycled mixes; "Optimum Asphalt" for virgin mixes; and "Optimum AC Content" for asphalt rubber friction courses.
29. Theoretical Gallons or Liters used - Calculate and record.

Example: English

Theoretical Gallons =

Tons x Theoretical % Bitumen added x 2000 lbs /ton + unit weight of liquid lbs/gal.

where:

Tons = The quantity of mix placed for this item (see #16)
Theoretical % Bitumen added = See #28 (i.e. 5.9% = 0.059)
Unit weight of liquid = 8.58 lb/gal for structural/base
8.60 lb/gal for FC-3 / FC-6 with rubber
8.70 lb/gal for FC-2 / FC-5 with rubber

Example: Metric

Theoretical Liters =

Metric Tons x Theoretical % Bitumen added x 1000 kg/MT + unit weight of liquid kg/L.

where:

Metric tons = The quantity of mix placed for this item (see #16)
Theoretical % Bitumen added = See #28 (i.e. 5.9% = 0.059)
Unit weight of liquid = 1.03 kg/L for structural/base
1.03 kg/L for FC-3 / FC-6 with rubber
1.04 kg/L for FC-2 / FC-5 with rubber

30. Fuel Used for Drying Aggregate - Place a check mark in the box beside the type fuel used or write in the 'other' box fuel types not listed above.

TEMPERATURE BOX

31. Established - Mix temperature established on the approved Mix Design. Circle applicable units.
32. Average - Average mix temperature for the date the mix was sampled. Circle applicable units.
33. Maximum - Maximum mix temperature for the date the mix was sampled. Circle applicable units.
34. Minimum - Minimum mix temperature for the date the mix was sampled. Circle applicable units.
35. Average of First Five Loads - Record the average temperature of the first five truckloads here. Record the temperature of the first five loads and at least one load out of every five loads thereafter on the *asphalt delivery tickets*. Circle applicable units.

ROTATIONAL VISCOSITY BOX (ASPHALT RUBBER ONLY)

- 36 & 37. Blend Type - Place a check mark in the box for the type blend you are sampling. Note: this information needs to be reported under a separate CQR sample and test result screen under material number 453B or 452B. (The COPY command can be used for most sample data in CQR)
38. Asphalt Rubber Grade - Record the applicable type of Asphalt Rubber Grade, e.g., ARB-5, ARB-12, ARB-20, etc.
39. Min. Viscosity - Record the minimum viscosity (poises or pascal seconds) allowed, e.g., 3, 6, 15, etc.
- 40, 41 & 42. Test Results - Record the temperature, time of day when test was made, and poises or pascal seconds reading for each test. Circle applicable units. Note: Record additional test results in the Remarks section.

MATERIAL NUMBER TONNAGE BOX

43. Previous Quantity - Quantity of mix placed before this report, for this material number, in tons or metric tons (MT).

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44.	<u>This Quantity</u> - Quantity of mix placed that is represented by this report, for this material number, in tons or metric tons (MT). This does not include rejected / waste mix.			
45.	<u>Total Quantity</u> - Add items 43 and 44.			
<u>MISCELLANEOUS</u>				
46.	<u>Resident Asphalt Engineer</u> - Record Resident Asphalt Engineer's name. Resident Asphalt Engineer will initial and date this after checking the report for correctness. Disregard this line if no Resident Asphalt Engineer is assigned to this project.			
47.	<u>Technician</u> - Record name of Qualified Asphalt Plant Technician doing these tests.			
48.	<u>Technician's Hours</u> - Record from, to and total hours the Qualified Asphalt Plant Technician was at the plant.			
49.	<u>Project Engineer</u> - Record Project Engineer's name here. Project Engineer will initial and date here after checking the report for correctness.			
50.	<u>Remarks</u> - Comments pertinent to the production of the asphalt mix which are not shown elsewhere on the worksheet, e.g., 'Lot 6 closed due to mix change', 'baghouse caught fire', Breakdown of waste tonnage (#18): i.e., <table style="margin-left: 100px;"><tr><td>50.2 Ton to MOT detour</td></tr><tr><td>+25.8 Waste</td></tr><tr><td><u>76.0 Total</u></td></tr></table>	50.2 Ton to MOT detour	+25.8 Waste	<u>76.0 Total</u>
50.2 Ton to MOT detour				
+25.8 Waste				
<u>76.0 Total</u>				
NOTE: It is <u>very</u> important to have <u>good</u> communication between the Asphalt Plant Inspector and the Asphalt Roadway Inspector.				

DAILY REPORT OF ASPHALT PAVING INSPECTOR
No erasures accepted, strikeout mistakes only

CQR INFORMATION SECTION

- Fin. Project ID** - Refers to the Financial Project ID. For a job with multiple Project IDs, show the Project ID on which the material was placed. A separate report will need to be issued for each project, and for each pay item.
- Material No.** - A four character code obtained from the project JOB GUIDE SCHEDULE which identifies each material/test. Material numbers for density tests on the various types of mixes are as follows:

Type S - 120C	FC - 110C	Type II - 125C	SAHM - 140C
ABC - 076C	MISC. - 143	Type III - 130C	Type SP - 123D

- Sample No.** - Each LOT of paving will require its own report, and each report generated will have one sample number per LOT (e.g. S1001, S1002, etc.). A new sample number and report will also be required at the beginning of each LOT, per mix.

NOTE: Sample numbers cannot be duplicated when using the same material number on the same project. In order to prevent duplication, sample numbers should be numbered sequentially, according to the mix type. A suggested numbering sequence is as follows:

EXAMPLES OF SAMPLE NUMBERS	
TYPE of MIX	CORRECT NUMBERING SEQUENCES
ABC-1	B1001, B1002, B1003, ↔ B1999
ABC-2	B2001, B2002, B2003, ↔ B2999
ABC-3	B3001, B3002, B3003, ↔ B3999
FC-2	F2001, F2002, F2003, ↔ F2999
FC-3	F3001, F3002, F3003, ↔ F3999
FC-5	F5001, F5002, F5003, ↔ F5999
FC-6	F6001, F6002, F6003, ↔ F6999
S-I	S1001, S1002, S1003, ↔ S1999
S-II	S2001, S2002, S2003, ↔ S2999
S-III	S3001, S3002, S3003, ↔ S3999
SP-9.5	P1001, P1002, P1003, ↔ P1999
SP-12.5	P2001, P2002, P2003, ↔ P2999
SP-19.0	P3001, P3002, P3003, ↔ P3999
SAHM	L1001, L1002, L1003, ↔ L1999
TYPE II	L2001, L2002, L2003, ↔ L2999
TYPE III	L3001, L3002, L3003, ↔ L3999
MISCELLANEOUS	M0001, M0002, M0003, ↔ M0999

Sample numbers should always be sequential, regardless of whether or not a different mix design or pay item is used. Once a sample number is used on a project, it should not be reused on that project.

NOTE: When density is not required, LOT numbers are not assigned. In these situations it will still be necessary to assign a sample number as shown above.

- Date Sampled** - Date density was tested, or date mix was placed if density is not required.
- Station From** - Beginning Station of the construction represented by this report.
- Station To** - Ending Station of the construction represented by this report.

NOTE: In situations where the location of the construction jumps from place to place, try to identify the outer limits of the construction in Items 5 & 6, and put more specific comments in the REMARKS section.

7. Rdwy. Side - Roadway side. If the construction is on a divided highway, enter R for right roadway or L for left roadway. Enter C for composite roadway if the construction is on an undivided highway.
8. Mainline - Enter Y if the sample is referenced to the mainline roadway, and N if not.
9. Reference Line - Enter the line on the plans used as the reference for determining the material location. Examples include Survey BL, Const CL, NE 50th St Const CL, Ramp B1 Survey BL, etc.
10. Source - 05.
11. Plant No. - Identification number assigned to each approved asphalt plant producing asphalt for the Department. This number should be on the asphalt concrete delivery ticket and can be verified by the District Bituminous Engineer.
12. Quantity - If the density of the material has been tested, enter the quantity of material represented by this report. If the density was not tested, (leveling, overbuild less than 1 inch, FC-2, FC-5, etc.) enter zero. Circle applicable units.
13. Intended Use - Defines how the material represented by the sample is used. Examples: shoulder, leveling, overbuild, first 2 inches of structural, friction course.
14. Date Tested - Date sample was tested.
15. Tested By Code - A two digit code used to identify which resident construction office tested the sample (e.g. 2G = Gainesville Construction).
16. Pay Item No. - Record the pay item number represented by the report. Only one Pay Item Number per report. The Pay Item Number must be written exactly as it appears on the project JOB GUIDE SCHEDULE.
17. Status - Circle **NA** (Not Applicable) if densities are not required or are not taken. Circle **Passed** if the density of the LOT passes with full pay, or **FA** (Failed, penalty Assessed) if the LOT is completed with partial pay (penalty has been assessed according to specification). If **NA** is used, an explanation **must** be included in the Remarks section of the report.

ROADWAY INFORMATION SECTION

18. Nuclear Gauge No. - The number of the nuclear gauge used to determine density of the LOT. The nuclear gauge used in determining the LOT density must be the same gauge used for the control strip indicated in item 25. Leave blank if not applicable.
19. Standard Count - Standard count of the nuclear gauge obtained on the date of use. (See FM 1-T 238). Leave blank if not applicable.
20. LOT No. - The LOT number should be numbered sequentially according to Pay Item Number. Do **not** start with LOT 1 each day. LOTS are not needed for acceleration/deceleration lanes (tapered areas only), crossovers, intersections, leveling/overbuild courses or other areas where densities are not required. Densities are required for acceleration/deceleration lanes when tapers become a constant lane width. NOTE: Do not assign LOT numbers when density is not required.
21. Type of Mix - Example: FC-2, S-1, ABC-3, SP-9.5.
22. Underlying Course - The underlying layer such as new 12" limerock, existing pavement, milled surface, asphalt base course or embankment, 1st lift (3") of asphalt base, 1st lift (2") of structural, 2nd lift (4") of structural, etc.
23. Mix Design No. - Example: QA 89-3557, SP 97-0008.
24. Lab Density/Gmm - Record the lab density of the mix being placed from the approved mix design.
On *Superpave* projects where cores are required, record the daily target maximum specific gravity (Gmm).
25. Control Strip No. - The number of the control strip used to evaluate the density of the LOT. The numbers should be sequential and should not be duplicated. Leave blank if not applicable.
26. Control Strip Density - The density of the valid control strip (the average of the ten nuclear gauge readings) in pounds per cubic foot or kilograms per cubic meter. For English units, round to the nearest tenth of a lb/ft³, for example: 135.56 lb/ft³ rounds to 135.6 lb/ft³. For metric units, round to the nearest kg/m³, for example: 2176.3 kg/m³ rounds to 2176 kg/m³. Leave blank if not applicable.
27. Lift No. - The lift number of the pay item being placed. Example: Lift 1 of 3, Lift 2 of 2, Lift 1 of 1.
28. Control Strip Correction Factor - The correction factor applied to the control strip which is used to determine if the control strip meets minimum requirements. Report to the nearest hundredth. Example: +3.50, +2.82, -3.49. Leave blank if not applicable.
Note: This correction factor is only used to determine if the control strip density meets the minimum requirement of 96% of lab density. It is recorded for historical purposes only and is not used in the acceptance of the LOT.

29. Lane - The lane where the mix is placed. Right or left lane should be determined by standing on the centerline of the median, facing the direction of increasing stations, and number the lanes L1, L2, L3, etc. or R1, R2, R3, etc. This indicates that lane L1 is the first lane to the left of the centerline. Center lanes should be identified with the letter C. Shoulders can be identified as IL (inside left), OL (outside left), IR (inside right), and OR (outside right).
30. Station to Station - The beginning and ending stations of the report's construction. With multiple lanes being placed, this may vary and more than one line may be used. Remember to show the overall beginning and ending stations in items 5 & 6.
31. Loads - The load number(s) from the delivery tickets of the mix placed in this area.
32. Lin. Ft. / M. - The number of linear feet / meters in each area. The standard size LOT (consisting of 5 sublots) shall consist of 5000 linear feet / 1500 linear meters of any pass made by the paving train regardless of the width of the pass or the thickness of the course. If a LOT size is determined to be less than 5000 feet / 1500 meters, it is considered a partial LOT. If the length of the partial LOT is 2000 feet / 600 meters or less, then the previous full-size LOT will be redefined to include this partial LOT. The following table indicates the number of density tests required.

LOT Size		Number Of Density Tests
Feet	Meters	
Less than 3000	Less than 900	3
3001 - 4000	901 - 1200	4
4001 - 5000	1201 - 1500	5
5001 - 6000	1501 - 1800	6
6001 - 7000	1801 - 2100	7
Greater than 7000	Greater than 2100	Two LOTs

33. Ln. Width - The width of the lane being placed, in feet or meters. If the width is not constant a drawing or diagram must be included on the back of the report or attached so that the area can be verified.
34. SY / SM - The number of square yards or square meters in the LOT. Record to the hundredth.
35. Tons / MT - The number of tons or metric tons in the LOT. Record to nearest hundredth.
36. Spread - The average spread of the LOT must be calculated in case of penalty. Record to the tenth. If density is not required, record average spread for mix being placed. Units: lb/yd², kg/m².

ROADWAY DENSITY SECTION

37. Nuclear Reading & Cores - When using a *Nuclear Density Gauge*: list station & lane where nuclear reading was taken on top road and nuclear density reading directly below the station. (Note: For *non-valid control strip procedure*: report core number and core density below the station & lane where the core was cut.)
 On *Superpave projects*, report core number and core specific gravity (Gmb) below the station & lane where the core was cut.
38. LOT Density / LOT Gmb - When using a *Nuclear Density Gauge* report the average density of the LOT in pounds per cubic foot / kilograms per cubic meter. This is the average of all the densities taken in the LOT (from item 37). For English units, round to the nearest tenth of a lb/ft³. For metric units, round to the nearest kg/m³. Examples: 135.56 lb/ft³ rounds to 135.6 lb/ft³, 2176.3 kg/m³ rounds to 2176 kg/m³.
 On *Superpave projects*, report the average specific gravity (Gmb) of the LOT. This is the average of all the core specific gravities (Gmb) reported in the LOT (from item 37). Round to the nearest three decimal places (Example: 2.5867 rounds to 2.587).
39. % Ctrl Strip / %Gmm - The percent of control strip density is determined by dividing the LOT Density (item 38) by the Control Strip Density (item 26). This is reported to one decimal place without rounding (97.98% is reported as 97.9%). If two consecutive LOTS are over 102%, the District Bituminous Engineer must be notified. The Contractor should be told the density results as each LOT is completed.
 On *Superpave projects*, report the percent maximum specific gravity (%Gmm). This is determined by dividing the LOT specific gravity (Gmb) (item 38) by the maximum specific gravity (Gmm) (item 24). This is reported to one decimal place without rounding (94.98% is reported as 94.9%).

40. % Pay - The percent pay of the completed LOT based on the percent of control strip density obtained or percent maximum specific gravity (% Gmm). Use Table 330-3, or 334-14, 334-15 of the Standard Specifications.
41. Length of LOT - The total length of the completed LOT. Add all lengths in item 32 to obtain the total length. Leave blank if density is not required.
42. Spread Rate - The average spread of the LOT (See item 36). If density is not required, record average spread for mix being placed. Units: lb/yd², kg/m².

RECORD OF BITUMINOUS MATERIALS BOX

43. Contract No. - Record the Contract Number of the contract that governs the project.
44. Table No. - Record the emulsified asphalt table number.
45. Invoice No. - Record the invoice number from the tickets provided by the contractor.
46. Pay Item No. - Record the pay item number for this shot of liquid asphalt.
47. Grade of Asphalt - Type liquid being used i.e.; RS, AEP, AC, etc.
48. Tank Number - Obtain from frame or tank of distributor.
49. Beginning Measurement - Distributor tank measurement to the nearest 1/16 inch or nearest millimeter at beginning of production or every time tank is refilled.
50. Gallons / Liters - Record the amount of liquid in the tank at the beginning of production by using the approved calibration chart.
51. End Measurement - Distributor tank measurement at end of production to the nearest 1/16 inch or nearest millimeter.
52. Gallons / Liters - Record amount of liquid in tank at the end of production by using the approved calibration chart.
53. Time of Day - Record the time when ending readings were taken. Circle AM or PM.
54. Temperature - Record the temperature of the liquid asphalt in the distributor. Circle °C or °F.
55. Net Hot Gallons / Liters - Record the measured amount of liquid asphalt used. Net Hot Gallons (or Liters) equals Item 50 minus Item 52.
56. Correction Factor - Obtain this from the appropriate chart for this liquid asphalt. (See Asphalt Paving Technician Manual (1996 Edition) Appendix - Charts and Tables)
57. Gallons / Liters @ 60° F / 15° C - Calculate and record, Item 55 x Item 56 = Item 57. Record to the hundredth. Circle either Gallons or Liters.
58. SY/SM Covered - Compute and enter the area covered by the liquid asphalt. Circle either SY or SM.
59. Spread Rate - Item 59 = Item 57 / Item 58. Circle either GAL/SY or L/SM

RECORD OF BITUMINOUS MATERIALS BOX

60. Est. Mix Temp. - Established mix temperature as shown on the approved mix design. Circle applicable units.
61. Avg. Temp. Today - Average mix temperature taken at the roadway for the date the mix was placed. Circle applicable units.
62. Max. Temp. Today - Maximum mix temperature for the date the mix was placed. Circle applicable units.
63. Min. Temp. Today - Minimum mix temperature for the date the mix was placed. Circle applicable units.
64. Average of First Five Loads - Record the average temperature of the first five truckloads here. Record the temperature of the first five loads and at least one load out of every five loads thereafter on the *asphalt delivery tickets*. Circle applicable units.

PAVING COMPLETED BOX

65. Previous Quantity - Quantity of mix placed prior to this report, in tons / metric tons and square yards / square meters, for this pay item only. Record to the hundredth.

66. This Quantity - Quantity of mix placed (rejected/waste - item #68 not included) that is represented by this report, in tons / metric tons and square yards / square meters. Record to the hundredth. NOTE: if the area to be placed requires more than one lift, the square yards / square meters reported must be prorated as follows:

- Example: first lift (1.25") of a two inch (2") item:
 $41,438.62 \text{ sy} \times (1.25"/2.00") = 25,899.14 \text{ sy}$
- Example: the second lift would then be 0.75" of the total 2" item:
 $41,438.62 \text{ sy} \times (0.75"/2.00") = 15,539.48 \text{ sy}$

67. Total Quantity - Add items 65 and 66. Record to the hundredth.

68. Rejected / Waste - The amount of material delivered but not placed for pay on the project for the day recorded as tons / metric tons and square yards / square meters. (i.e. Private, MOT, Other.)

69. Project Engineer - Record Project Engineer's name. Project Engineer will initial and date this after checking the report for correctness.

70. Resident Asphalt Engineer - Record Resident Asphalt Engineer's name. Resident Asphalt Engineer will initial and date this after checking the report for correctness. Disregard this line if no Resident Asphalt Engineer is assigned to this project.

71. Inspector - Record certified paving inspectors name here who actually performed these tests.

72. Remarks - Examples of remarks - "Time Began:", "Time Completed:" (Note time and causes of interruptions), "Unable to establish a valid control strip, cored for pay using procedure FM 5-543", "No density required, initial layer of asphalt base over soil subgrade, see Standard Specification 280-8.6, item 2", "No density required, overbuild course with variable thicknesses less than one inch, see Standard Specification 330-10.1.1", "No density required, intermediate course less than one inch, see Standard Specification 330-10.1.1" "No density required, limits of project is less than 1000 feet, see Standard Specification 330-10.3.5", "No density required, bridge project with approaches less than 1000 feet, see Standard Specification 330-10.3.5".

More specific descriptions of where the material was placed can also be shown here - Example: L2 126 + 43 to 128 + 57, R4 1288 + 32 to 1333 + 00, C 132 + 25 to 139 + 45, etc.

NOTE: It is very important to have good communication between the Asphalt Plant Inspector and the Asphalt Roadway Inspector.

9.4 ASPHALT PLANT OPERATIONS

1 The specifications include the requirements for the asphalt plant operation. This
2 procedure will reiterate and expand on some of these, especially those that have a
3 bearing on the measurement and recording of final pay quantities.

4 All asphalt plants shall have Electronic Weight Systems with Automatic Ticket Printouts.

5 All asphalt plants must be equipped with one of the following three electronic weigh
6 systems capable of automatically printing a delivery ticket.

7 ([See Figure 9-1](#)):

8 **9.4.1 Automatic batch plant with printout** (according to ***Subarticle 320-2.4 of the***
9 ***Standard Specifications***).

10 **9.4.2 Electronic weight system on hopper beneath a surge or storage bin**

11 **9.4.3 Electronic weigh system on the truck scales**

12 Include as a minimum, the following information on the printed delivery tickets:

- 13 • Sequential load number
- 14 • Financial Project ID Number
- 15 • Date
- 16 • Name and location of plant
- 17 • Type of mix
- 18 • Place for hand-recording mix temperature
- 19 • Truck number
- 20 • Gross, tare, and net weights (as applicable)
- 21 • Accumulated total of mix*

22 Tons [Metric Tons] or Square Yards [Square meters]*

23 *(May be hand-recorded)

1 In the event of a malfunction of the automatic printer and the plant is equipped
2 with an electronic display a contractor blank automatic ticket may be written (by a
3 Department representative) from the electronic display until the printer can be
4 repaired, for a period not to exceed 48 hours.

5 **9.5 AUTOMATED PLANTS WITH BATCH WEIGHT PRINTER SYSTEM**

6 Plants of this type are set up to automatically control the batching operations and have
7 an automatic printer system which will print the individual or accumulative weights of
8 aggregate and liquid asphalt delivered to the pugmill and the total weight of the batches
9 contained in a truck load.

10 **9.5.1 Operating Without Storage Bins:** There are two methods of maintaining proper
11 pay records for this type plant:

12 (A) Accept the weight of asphalt shown on the automatically printed tickets for
13 the material used on the project.

14 **NOTE:** These automatically printed tickets are acceptable and the total
15 weight of mix shown may be used as the tonnage, if the following
16 conditions are fulfilled:

17 (1) The printer tickets weights must be checked across certified truck
18 scales and be within the 0.4% tolerance allowed by the
19 specifications.

20 (2) Consists of an original and at least three clear copies, original
21 retained by the plant inspector, one copy retained by the producer
22 at the plant, one copy to the road inspector, and one copy to the
23 paving contractor.

24 (3) Since preprinted ticket numbers do not normally occur without
25 breaks in order, they cause excessive "page order" messages on
26 the computer output listing. To avoid this problem the plant
27 assigned numbers shall be in sequence regardless of the numerical
28 order of the preprinted number on the ticket.

29 (4) Regardless of the method of documentation, the original weight
30 tickets, tapes or digital records shall become the property of the
31 Department, including the records of all of project mixes furnished
32 during production runs for the Department.

33 (5) Preprinted tickets shall be bound in sets for each days run. A cover

1 shall be made for each set showing the financial project ID number,
2 pay item numbers, date, book number, design mix number, type of
3 material, ticket numbers included, and total quantity, ([See Figure 9-
4 2](#)). The format may vary depending on the size of the preprinted
5 tickets but shall be similar to the regular truck miscellaneous
6 tabulation form. Material of different types, pay items waste, or
7 private work for each days run shall be identified.

8 (6) Unless the number of weight tickets justifies the use of the
9 computer to summarize the material, a manual summary shall be
10 made by weight tickets totals in the final estimates computation
11 book.

12 (7) When the computer is used, the output shall be included as part of
13 the estimate computations and shall be cross-referenced in the
14 computation book.

15 (8) A complete tabulation, as packing list, of all weight tickets for each
16 type of material or each different pay item shall be shown in the
17 transmittal data when the final estimates package is submitted.

18 (B) For those plants with the automatic printer system, if all Department
19 tickets used are properly numbered in sequence by the plant inspector
20 including all void and waste tickets, it will be necessary for the contractor
21 to furnish the Department only those tickets showing Department
22 production when printed weights are accepted and converted to volume
23 for pay purposes.

24 **9.5.2. Operation with storage bins:** The record keeping procedures for this type of
25 plant are similar to an automated plant without a printer system and using
26 storage bins:

27 (A) Record the exact weight of all material placed in storage bins.

28 (B) Record the exact weight of all material used out of the storage bins and at
29 the end of the day or run. Calculate the amount of mix remaining in the
30 bins.

31 (1) If the producer elects to use any of the mix remaining in the storage
32 bin after the Department completes its work for this date, the
33 tonnage used must be recorded under Department supervision and
34 deducted in order to establish the tonnage in storage at the
35 beginning of the next day's work.

1 **9.6 REQUIREMENTS FOR ACCURACY CONDITIONS AND**
2 **TOLERANCE**

3 The specifications state the following requirements that relate to asphalt plant
4 operations:

- 5 (A) Truck scales shall be recertified every six months.
- 6 (B) Batch scales and the accuracy of the automatic printer shall be certified at
7 least once every six months.
- 8 (C) The accuracy of the batch scales and the printer system shall be checked
9 at the commencement of production and thereafter at least once a week
10 during production for the Department.
- 11 (D) The maximum permissible deviation is 8 pounds per ton [4 kg per metric
12 ton] of load. (*per Subarticle 320-2.3*)

13 **9.7 METHOD OF MEASUREMENT**

14 **9.7.1. Tonnage [Metric Tonnage] Items (Bit Included)** - Automatic printer tickets
15 showing weights and forms **675-030-06** and **675-030-07** shall be submitted with
16 the final estimate for each job on the contract.

17 **9.7.2. Square Yard [Square Meter] Items (Bit Included) (Optional Base Only)** -
18 When the pavement is to be paid for on an area basis, the area to be paid for
19 shall be Plan Quantity subject to the provisions of **Subarticle 9-3.2 of the**
20 **Standard Specifications**, omitting any areas not allowed for payment under the
21 provisions of **Subarticle 330-15.2.2 of the Standard Specifications** and
22 adjusted as follows:

- (A) The volume of pavement represented by the difference between the
average thickness (determined as specified in **Article 330-16 of the**
Standard Specifications), and specified thickness shall be converted into
equivalent square yards [square meters] of pavement of specified
thickness and the quantity thereby obtained shall be added to, or
deducted, from the pay areas as appropriate.
- 23 (B) The pay area shall not exceed 105% of the surface area.
- 24 (C) There will be no adjustment of the pay area on the basis of thickness for
25 base courses constructed utilizing mixed-in-place operations.

1 (D) Automatic printer tickets showing weights, field records and
2 (measurements) if plan quantity is changed, Forms **675-030-06** and **675-**
3 **030-07** shall be submitted with the final estimate for each job on the
4 contract.

5 **NOTE:** If a plan quantity error exceeds the limitations established in
6 **Article 9-3 of the Standard Specifications**, record documentation in field
7 books, computer forms, or computation book forms.

8 **9.8 QUALITY ASSURANCE PENALTY RECORDS**

9 General Note: As a part of final pay records, computations are required for
10 exceptions only, i.e., where subplot values fall outside the job mix tolerance and a
11 penalty is assessed. Note however, the penalty is assessed against the entire lot
12 which has subplot failures. Standard lot size is four thousand (4,000) tons (4
13 sublots).

14 **9.8.1. Production Failures (Plant) - Lots Defined in Tons**

15 (A) Asphalt content and/or gradation (Percent Passing No. 4, 10, 40 and 200
16 sieve).
17 Asphalt content and/or gradation (Percent Passing No. 8 and 200 sieve)*
18 ***Superpave Only.**

19 (B) Submit "Extraction Worksheet" showing design percent of job mix.
20 ([See Figure 9-3](#)).

21 (C) Submit the "Daily Report of Asphalt Plant Inspector" and "Daily Report of
22 Asphalt Paving Inspector" representing each failing lot.

(D) When the pay item is by square yard [square meter], the lot at the
production point (which is defined in tons) [metric tons] can be converted
to equivalent square yards [square meters] at the design thickness by
using the formula for "Case No. 1" at the bottom of the "Pay Reduction
Summary Sheet". ([See Figure 9-4](#)).

23 (E) Record results and show calculations on the "Pay Reduction Summary
24 Sheet" and attach to the appropriate pay item computation sheet in the
25 final estimate computation book.

26 (F) Penalties will not apply to total original plan quantities of less than five
27 hundred (500) tons [450 metric tons], even though there is an overrun and
28 final pay exceeds this amount. (Acceptance is made on visual inspection.)

- 1 (G) Penalties will apply to original plan quantities of more than five hundred
2 (500) tons [450 metric tons], even though an underrun causes final pay to
3 be less than this amount. In the case of multi-job contracts, the original
4 plan quantity means total contract plan quantity.
- 5 (H) Acceptance tests will be run in accordance with **Article 331-5 of the**
6 **Standard Specifications** for asphalt content and gradation for contract
7 tonnages for more than five hundred (500) tons [450 metric tons].
- 8 (I) When there are two or more failures in gradation, only the greatest penalty
9 will be applied. When any gradation pay reduction penalty is twenty
10 percent (20%) or larger, the plant personnel shall promptly notify the
11 Project Engineer (PE) so he/she can make a determination as to whether
12 the material must be removed or remain in place at reduced pay (see
13 **Subarticle 331-5.2 of the Standard Specifications**).
- 14 (J) Referee Analysis: A referee system has been established to verify the
15 validity of the acceptance test results on lots at the asphalt plant. Data
16 from split samples run by the Department's District and Central labs will be
17 used to evaluate the acceptance test results. Final determination of the
18 acceptance test result will be made by the State Bituminous Engineer. An
19 acceptance test result determined to be non-representative will not be
20 used in the evaluation of the quality of the lot.

21 **9.8.2. Roadway Failures Lots defined in Linear Feet [meters] Project over 100 LF**
22 **[40m] in length**

- 23 (A) **Density:** For lots with an average density less than ninety-eight percent
24 (98%) of control strip density, submit "Daily Report of Asphalt Paving
25 Inspector". The "average spread" as recorded on the inspector's report
26 will be calculated using areas subject to density test and "Tons [metric
27 tons] Laid" within these areas. Determine the tonnage [metric tonnage] of
28 material in the failing lot. For penalty purposes, this quantity generally
29 represents the main roadway proper. As a general rule, tonnages [metric
30 tonnages] used in areas not represented by the random sampling
31 procedures for density, e.g., irregular areas, extra areas at intersections,
32 turnouts, etc., will not be penalized. **Table 330-5 of the Standard**
33 **Specifications** shows the payment schedule for density. Conversion
34 shall be as follows:

- 35 (1) When the pay quantity is by the square yard [square meter], the lot
36 representing a particular course thickness can be converted to
37 equivalent square yards [square meters] at plan thickness (pay

1 item) by using "Case No. 2" ([See Figure 9-4](#)) at the bottom of the
2 "Pay Reduction Summary Sheet". The weight of the material used
3 will be either: (a) the recorded tons [metric tons] placed in the lot or
4 (b) the area times the average calculated spread (taken from the
5 "Daily Report of Asphalt Paving Inspector").

6 (2) When the pay quantity is by the ton [metric ton] and tonnage [metric
7 tonnage] used is not directly available, the lot can be converted to
8 equivalent tons [metric tons] by using "Case No. 3" ([See Figure 9-
9 4](#)) at the bottom of the "Pay Reduction Summary Sheet". The
10 average calculated spread is taken from the "Daily Report of
11 Asphalt Paving Inspector".

12 (B) Record results and show calculations on the "Pay Reduction Summary
13 Sheet" and attach to the appropriate pay item computation sheet in the
14 final estimates computation book.

15 (C) When the pay quantity is by the square yard [square meter] and: (1) the
16 total plan thickness adjustment is placed in one course (such as friction
17 course), and (2) thickness adjustment is not paid for, use the neat
18 calculated area of the failing lot rather than using the conversion formula
19 for spread.

20 **9.8.3. Surface Deficiencies** - Deficiencies are determined by the Engineer with a 15-
21 foot rolling straightedge. Deviations from the straightedge in excess of 3/16 of an
22 inch shall be corrected in accordance with **Subarticle 330-13.3.4 of the**
23 **Standard Specifications** unless such corrections are waived by the DCE.
24 Deficient areas where the Engineer has waived corrections will be deducted as
25 follows:

26 (A) **Friction Course:**

27 (1) Square Yard [square meter] Item: The distance used will be the
28 length of 50 feet [15 meters] either side of the deficiency times the
29 lane width. This area will be considered as 100% pay reduction
30 and should be reflected on the estimate as minus s.y. [s.m.] at full
31 unit price.

32 (2) Tonnage [metric tonnage] Item: The Department will base the
33 reduction on the volume that would have removed (100 feet by lane
34 width by layer thickness) [30 meters by lane width by layer
35 thickness] multiplied by the laboratory density for the mix.

(B) **Other Than Friction Course:**

1 (1) Where the Engineer elects to waive a correction and the finished
2 pavement surface is other than friction course, the appropriate pay
3 quantity for Asphaltic Concrete shall be reduced by the equivalent
4 quantity of materials, which would have been removed and
5 replaced if the correction had been made.

6 (2) Where the pay quantity is in square yards [square meters], the
7 reduction is based on the area, which would have been removed
8 (100 feet X lane width) [30 meters X lane width] multiplied by the
9 ratio of the layer thickness to the total thickness of the type of mix
10 specified.

11 (3) Where the pay quantity is in tons [metric tons], the reduction is
12 based on the volume, which would have been removed (100 feet X
13 lane width X layer thickness) [30 meters X lane width X layer
14 thickness] multiplied by the laboratory density for the mix.

15 **9.8.4. Rejected Surface** - Defective surface will be replaced with a satisfactory surface
16 at no compensation for the replaced area in accordance with **Article 330-13.4 of**
17 **the Standard Specifications.**

18 Should the rejected surface area not be corrected to the satisfaction of the PE,
19 no pay for the rejected area should be made in accordance with **Subarticle 9-6.3**
20 **Standard Specifications.**

21 **9.8.5 Surface Requirements (Pavement Smoothness) Supplemental**
22 **Specifications Article 330-13.5**

23 Unit price adjustments for friction course smoothness will be based on the Ride
24 Number (RN) as established by a Laser Profiler. The RN will be derived from a
25 mathematical processing of the longitudinal profile measurements to produce a
26 ride quality or smoothness on a scale of zero to five.

27 Only those LOTS actually tested in accordance with this article will be eligible for
28 unit price adjustments. Excluded from testing are acceleration and deceleration
29 lanes, storage lanes for turns, cross-overs, shoulders, signalized intersections,
30 and ramps. Additionally, 1000 feet [300 meters] of roadway before and 500 feet
31 [150 meters] after the sections to be tested are excluded from unit price
32 adjustment under this Article. These excluded distances are to provide sufficient
33 acceleration and deceleration length for the equipment. Excluded areas will be
34 accepted in accordance with 330-13.3.4.

35

1 **9.8.6 Unit Price Adjustment Criteria *Supplemental Specifications Article 330-***
2 ***13.5.3***

3 For the purpose of unit price adjustment, each lane will be divided into 0.1 mile
4 [0.1 km] LOTS. Payment for smoothness will be determined in accordance with
5 the following:

Ride Number (RN)	Unit Price Adj. per 0.1 mile	Unit Price adj. per 0.1 km
4.47 = RN	\$600 per LOT	\$380 per LOT
4.45 = RN < 4.47	\$300 per LOT	\$180 per LOT
4.43 = RN < 4.45	\$100 per LOT	\$60 per LOT

10 In no case will the pavement be re-tested once the smoothness of the LOT is
11 determined. Total unit price adjustment will be limited to 2% of the original total
12 Contract amount.

EXAMPLE OF COMPUTER PRINTOUT FOR SMOOTHNESS BY A LASER PROFILER
AND A UNIT PRICE ADJUSTMENT: [\(See Figure 9-6\).](#)

13 **9.9 GENERAL**

14 The "Pay Reduction Summary Sheet" [\(See Figure 9-4\)](#) is designed to tabulate lot
15 failures (plant and roadway) per pay item. The accumulated penalty quantities will be
16 reflected on pay estimates as negative quantities as provided for under an adjustment
17 letter in the Contract Reporting System (CRS). To code a negative quantity, overpunch
18 the right most digit in the quantity column. All quantities will appear on the first quantity
19 line for full payment (before penalties) to reflect actual initial quantities (such as surface
20 areas and tonnage produced). An explanation as to the type and amount of each
21 penalty will be made under comments at the bottom of the estimate or immediately
22 following the applicable item.

23 **9.10 CORE OUT ADJUSTMENT (OPTIONAL BASE ONLY)**

24 Adjustment according to Specifications and Special Provisions.

25 **NOTE:** Percentage adjustments such as density, gradation failures, asphalt cement
26 content and surface tolerance when asphalt other than friction course is used as final
27 course will be deducted after the thickness adjustment is applied. Penalties with 100%
28 deduct such as shy areas will be deducted before the thickness adjustment is applied.

29 **9.10.1 Square Yard [Square Meter] Items (Bit Included)** - When the pavement is to
30 be paid for on an area basis, the area to be paid for shall be Plan Quantity
31 subject to the provisions of ***Subarticle 9-3.2 of the Standard Specifications,***

1 omitting any areas not allowed for payment under the provisions of **Subarticle**
2 **330-15 of the Standard Specifications** and adjusted as follows:

3 (A) The volume of pavement represented by the difference between the
4 average thickness (determined as specified in **Article 330-16 of the**
5 **Standard Specifications**), and specified thickness shall be converted into
6 equivalent square yards [square meters] of pavement of specified
7 thickness and the quantity thereby obtained shall be added to, or
8 deducted, from the pay areas as appropriate.

9 **The maximum average thickness of pavement upon which payment will be made**
10 **shall be limited as follows**

11 Example Core Out Adjustment

12 Type ABC-3 7.00?

13 Specifications allow 1/2? per Subarticle 285-7

14 Actual core out = 7.50?

15 Therefore = $\frac{7.50? - 7.00?}{7.00?} \times 100 = 7.1428571 \%*$
16

17 *Optional Base shall not exceed 105% of the surface area per **Article 285-8 of**
18 **the Standard Specifications**

So: .05 X 8,000 S.Y.s = 400 S.Y.s Thickness Adjustment

19 **9.11 BITUMINOUS MATERIAL FAILURES**

20 The contract unit prices for Bituminous Material will be subject to the pay reduction
21 tables contained in **Section 916 of the Standard Specifications**.

22 Where the cost of bituminous material is included in the contract unit price for another
23 item, any pay reductions will be applied by reducing the pay quantity for such item by a
24 quantity equivalent in cost to the amount determined below. The amount of the
25 payment reduction will be determined by multiplying the quantity of material having a
26 viscosity outside of the specifications range, times the Department Asphalt Price Index
27 (API) for the month the material was placed, times the appropriate percentage of
28 original payment (per payment reduction table). This adjustment will be made upon
29 submittal of the tentative final estimate and the final estimate package.

EXAMPLE

1 Failing sample for viscosity represented 45,000 gallons. The viscosity in poises was
2 2200 for A.C. 30 which is a 6 % penalty from Table 2 in **Section 916-1 of the Standard**
3 **Specifications**. The type mix being placed was F.C. III, the unit price was \$52.50 per
4 ton and the A.P.I. for the month the material was being placed was 0.5805.

5 So: 45,000 gals. X 0.5805 (A.P.I.) X .06 = \$1,567.35*

6 \$1,567.35 ÷ \$52.50 = 29.85 Tons**

7 29.9 Tons will be deducted at a unit price of \$52.50

8 Monetary amount: 29.9 X \$52.50 = \$1,569.75*

9 ***Note:** Due to the rounding of the unit of measure the monetary amount will not
10 always be the same.

11 ****Note:** This example can be used for square yard items also.

12 9.12 ACCURACY OF COMPUTATIONS

13 **The decimal place accuracy is very critical in the computation of percent penalty.**
14 **In order to avoid differences, computations are shown to two decimal places**
15 **(hundredths) for acceptance test results for bitumen content and gradation.**
16 **Arithmetic averages shall be shown to thousandths and rounded to hundredths.**
17

18 9.13 SALVAGE OF MATERIALS

19 When material is salvaged from the project and delivered to a Maintenance Yard, a
20 signed "Receipt of Goods from Vendor" must be submitted with the final estimate. The
21 "vendor" is actually the Construction Office from which the materials were received and
22 the vendor number is the Financial Project ID Number. ([See Figure 9-5](#)).

23 9.14 SUPERIOR PERFORMING ASPHALT PAVEMENT (Superpave)

24 Description (**Section 334 of the Standard Specifications 2000 Edition**) (Each
25 contract shall be reviewed for governing Specification's)

26 Superpave Asphalt Concrete shall be constructed using the type of mixture specified in
27 the contract, or when offered as alternates, as selected. Superpave mixes are identified
28 as Type SP-9.5, Type SP-12.5, or Type SP-19.0.

1 They shall meet the requirements of **Section 320** for plant and equipment and the
2 general construction requirements of **Section 330 of the Standard Specifications**,
3 with the exception that the density requirements of **Subarticle 334-5.4 of the Standard**
4 **Specifications** shall be met.

5 The Superpave mixes are categorized as either “coarse” or “fine”, depending on the
6 overall gradation of the mixture. Coarse mixes are defined as having a gradation that
7 passes below the restricted zone, as defined in **Subarticle 334-2.3 of the Standard**
8 **Specifications**. Fine mixes are defined as having a gradation that passes above the
9 restricted zone.

10 **9.15 ACCEPTANCE OF THE MIXTURE (Article 334-5 of the Standard** 11 **Specifications)**

12 **9.15.1 Plant Acceptance** - the asphalt mixture will be accepted at the plant, with
13 respect to gradation and asphalt binder content, on a LOT to LOT basis. The
14 material will be tested for acceptance in accordance with the provisions of
15 **Subarticle 330-2 of the Standard Specifications** and the following
16 requirements. However, any load or loads of mixture which, in the opinion of the
17 Engineer, are unacceptable for reasons of excessive segregation, aggregates
18 improperly coated, or of excessively high or low temperature will be rejected for
19 use in the work.

20 (A) A standard size LOT at the plant will consist of 4,000 tons [3,600 metric
21 tons] with four equal subplot of 1,000 tons [900 metric tons] each.

22 (B) A partial LOT may occur due to the following:

23 (1) the completion of a given mix type on a project.

24 (2) an approved LOT termination by the Engineer due to a change in
25 process, extended delay in production or change in mix design.

26 (C) If the partial LOT contains one or two sublots with their appropriate test
27 results, then the previous full-size LOT will be redefined to include this
28 partial LOT and the evaluation of the LOT will be based on either five or
29 six subplot determinations. If the partial LOT contains three sublots with
30 their appropriate test results, this partial LOT will be redefined to be a
31 whole LOT and the evaluation of it will be based on three subplot
32 determinations.

(D) When the total quantity of any mix is less than 3,000 tons [2,700 metric tons], the partial LOT will be evaluated for the appropriate number of sublots from n=1 to n=3. When the total quantity of any mix type is less than 500 tons [450 metric tons], the Engineer will accept the mix on the basis of visual inspection. On multiple projects contracts the LOT(s) at the asphalt plant will carry over from project to project.

1 (E) Acceptance of the mixture will be on the basis of test results on
2 consecutive random samples from each LOT. The Engineer will take one
3 random sample from each subplot. Payment will be made on the basis of
4 **Table 334-13 (Acceptance Schedule of Payment)**. When possible, the
5 Engineer will complete all acceptance tests on the same day the sample
6 was taken and on no occasion will they be completed later than the
7 following work day.

8 **9.15.2 Roadway Acceptance** - the standard size of a LOT will consist of 5,000 Lin. Ft.
9 [1,500 meters] of any pass made by the paving train regardless of the width of
10 the pass. Changes in thickness, mix design, or underlying layer shall constitute a
11 separate LOT. Mix placed on the shoulder shall be considered a separate LOT.
12 Pavers traveling in echelon will be considered as two separate passes. When at
13 the end of a days production (production day) or the completion of a given
14 course, layer, or mix or at the completion of the project, a LOT size is determined
15 to be less than 5,000 LF [1,500 meters], it is considered a partial LOT. Partial
16 LOT's are to be handled as follows:

17 (A) If the length of the partial LOT is 2,000 LF [600 meters] or less, then the
18 previous full-size LOT will be redefined to include this partial LOT and the
19 number of tests required for the combined LOT will be as shown in **Table**
20 **334-14. (Density Testing Requirements for Partial LOT'S)**.

21 (B) If the partial LOT is 2,000 LF [600 meters] or less, and a previous full-size
22 LOT from the same day, mix, layer, and project is not available, then the
23 partial LOT will be evaluated separately and the number of tests required
24 for the partial LOT will be as shown in **Table 334-14**.

25 (C) If the partial LOT is greater than 2,000 LF [600 meters], it will be evaluated
26 separately with the number of tests required as shown in **Table 334-14**.

27 **9.15.3 Density Requirements** - the density of the cores will be determined in
28 accordance with FM 1-T166, and will be averaged for each LOT. To receive full
29 payment for density the average density of a LOT shall be a minimum of 93.5%
30 of **Maximum Specific Gravity** (Gmm) for coarse mixes, and 92% of Gmm for
31 fine mixes. Partial payment will be made for those LOT's that have an average

1 density less than 93.5% of Gmm based on **Table 334-15** (for coarse mixes) and
2 less than 92% of Gmm based on **Table 334-16** (for fine mixes).

3 **9.15.4 Surface Tolerance** - the asphalt mixture will be accepted on the roadway with
4 respect to surface tolerance in accordance with the applicable requirements of
5 **Article 330-13 of the Standard Specifications**.

6 **9.15.5 Thickness Adjustment** - the maximum average thickness of payment will be as
7 specified in **Subarticle 334-6.2 of the Standard Specifications**.

8
9 **9.15.6 Compensation**

10 (A) Tonnage [metric tonnage] Item: Automatic printer tickets showing weights,
11 **Form Number 675-030-06 and 675-030-07** shall be submitted with the
12 Final Estimate for each job on the contract.

13 (B) Square Yard [square meter] Items: When the pavement is to be paid for
14 on an area basis, the area to be paid for shall be Plan Quantity subject to
15 the provisions of **Subarticle 9-3.2 of the Standard Specifications**,
16 omitting any areas not allowed for payment under the provisions of
17 **Subarticle 330-14.2 of the Supplemental Specifications**.

Example Problems

19 (A) **Asphalt Content (Coarse Mix) - Item No. 334-23-30**

20 Per Specifications Subarticle 334-5.2
21 Gmm = 2.312 Target AC = 5.0%
22 LOT No. 3 = 4,000 tons

Step 1	Test Results			
	# 1	# 2	# 3	# 4
AC Test	4.8	4.5	4.7	5.5
Deviation	0.2	0.5	0.3	0.5

26 $(0.2 + 0.5 + 0.3 + 0.5) \div 4 = 0.38$ [Absolute Average Deviation]*

27 *Absolute Average Deviation equals the Target A.C. minus the Actual A.C. test
28 with no plus or minus sign.

1	Example:	Target A.C.	= 5.0
2		Test A.C.	= <u>5.5</u>
3		Absolute Deviation	= <u>0.5</u>

4 Per **Table 334-13** a deviation of 0.38 for 4 tests has a pay factor of 95 %.

5 **Step 2** The referee analysis test reports shows the plant tests are
6 acceptable. Therefore, a penalty of 5% will be assessed for the
7 4,000 tons produced in Lot #3.

8 4,000 tons x 0.05 = 200 tons

9 But the pay item is measured in square yards.

10 **Step 3** Therefore, use the case #1 formula shown at the bottom of the Pay
11 Reduction Summary Sheet to convert tons to area.

$$\frac{200 \text{ tons} \times 2,000 \text{ lbs/ton}}{\text{Lab Density} \times 0.75 \times \text{Plan Thickness}}$$

14 But what is the Lab Density?

15 **Step 4** Multiply Gmm (2.312) x **62.4** lb/cf (Weight of a cubic foot of water).
16 The Lab Density is 2.312 x 62.4 = 144.3 lb/cf

17 **Step 5** $\frac{200 \text{ tons} \times 2,000 \text{ lbs/ton}}{144.3 \times 0.75 \times 3 \text{ inches}} = 1,232.00 \text{ S.Y.'s}$

19 **(B) Density (Coarse Mix) - Item No. 334-23-30**

20 Roadway Lot #12
21 5,000 ft. in length by 12 ft. wide
22 Gmm produced = 2.312.

23 **Step 1** Gmm Produced = 2.312

24	Gmm Core	#1 = 2.164
25		#2 = 2.127
26		#3 = 2.140
27		#4 = 2.142
28		#5 = 2.113
29		Average = 2.137

1 $2.137 \div 2.312 \times 100 = 92.4\%$ of Gmm per note at bottom of **Table 334-15**.
2 If density is < 93% of Gmm you have to do a permeability test. If the
3 coefficient of permeability is < or = 125×10^{-5} cm/s, the payment will be
4 accepted but, at 90% pay (10% penalty).

5 If the coefficient of permeability is > 125×10^{-5} cm/s, the Engineer may
6 require removal and replacement at no cost or may accept at 90% pay
7 (10% penalty).

Step 2 Test Results

8 Test results showed coefficient of permeability # 125×10^{-5} cm/s and the
9 Engineer accepted at 90% pay, therefore, density penalty = 5,000 lin. ft. x
10 12 ft. width $\div 9 = 6,667$ S.Y.s
11 Spread rate was 311 LBS./S.Y.

12 **Step 3** So use Case #2 on Pay Reduction Summary Sheet

13
$$\frac{311 \text{ lb} \times 6,667 \text{ sy}}{144.3 \times 0.75^{**} \times 3 \text{ inches}} = 6,386 \text{ S.Y.s}$$

15 $6,386 \text{ S.Y.s} \times .10 = 639 \text{ S.Y.}$ penalty for Lot #12

16 ****Note:** 0.75 is a constant conversion factor used for converting cubic feet
17 per inch to equivalent square yards.

18 **(C) Sieve Failures (Coarse Mix) - Item No. 334-23-30**

19 Lot #3 = 4,000 tons
20 Gmm = 2.312 Target # 8 Sieve = 32
21 **Standard Specification Subarticle 334-5.2** (Acceptance test for
22 gradation involves the No.s. 8 & 200 sieves)

23 Payment will be made on the basis of **Table 334 -13**.

Step 1 Test Results

24 Plant tests showed deviations for the No. 8 sieve as:

	#1	#2	#3	#4
Test	36.25	27.25	36.75	36.80
Deviation	4.25	4.75	4.75	4.80

1 (4.25 + 4.75 + 4.75 + 4.80) ÷ 4 = 4.64 [Absolute Average Deviation]*

2 *Absolute Average Deviation equals the Gradation Target minus the
3 Actual Gradation test with no plus or minus sign.

4	Example:	Target	= 32.0
5		Test	= <u>36.8</u>
6		Absolute Deviation	= <u>04.8</u>

7 The average deviation from the target is 4.64 which falls in the 90% pay
8 (10% penalty) factor shown in **Table 334-13**.

9 The referee analysis tests show that the plant results are representative
10 and are to be used for acceptance purposes.

11 If any individual test results fall in the 80% pay factor the lot will be
12 automatically terminated.

13 **Step 2** This pay item is paid by the square yard, so you must use the
14 equivalent sy formula shown at the bottom of the pay reduction
15 summary sheet to calculate the penalty.

16
17 Equiv. S.Y.s = $\frac{\text{Tons} \times 2,000 \text{ lbs./ton}}{\text{Lab Density} \times 0.75 \times \text{thickness}}$
18

19 Therefore:
20 $\frac{4,000 \times 2,000}{144.3 \times 0.75 \times 3 \text{ inches}} = 24,640 \text{ S.Y.s}$
21

22 $24,640 \times 10\% = 2,464 \text{ S.Y.s deduction}$

23 **9.16 ASPHALTIC CONCRETE FRICTION COURSE** 24 **(105% ADJUSTMENT)**

25 **9.16.1 Thickness of Friction Courses (Article 337-8)**

26 The thickness of the friction courses will be based on the spread rate. It is
27 recommended that the spread rate be set by the Engineer (Bituminous Engineer,
28 Resident Engineer, or Project Engineer) at the Preconstruction or the Prepaving
29 meeting. This needs to be documented in writing. Original quantities are based

1 on the maximum spread rate within the ranges shown below. Pay quantities may
2 be less, based on the spread rate set by the Engineer.

3 **9.16.2 Spread Rate for FC-2 (Article 337-8.1)**

4 For FC-2 with granite, oolitic limestone, or other conventional aggregate, the
5 Engineer will set the spread rate within the range of 50 – 60 lb/yd² [27 – 34
6 kg/m²]. For FC-2 with lightweight aggregate, the Engineer will set the spread rate
7 within the range of 28 – 35 lb/yd² [15 – 19 kg/m²].

8 **9.16.3 Spread Rate for FC-3 (Article 337-8.2)**

9 The Engineer will set the spread rate within the range of 100 – 110 lb/yd² [54 –
10 60 kg/m²].

11 **9.16.4 Spread Rate for FC-5 (Article 337-8.3)**

12 The Engineer will set the spread rate within the range of 70 - 80 lb/yd² [38 - 44
13 kg/m²].

14 **9.16.5 Spread Rate for FC-6 (Article 337-8.4)**

15 The Engineer will set the spread rate within the range of 150 - 160 lb/yd² [80 - 88
16 kg/m²].

17 **9.16.6 Method of Measurement (Article 337-10)**

18 The quantity to be paid for will be the weight, in tons [metric tons], as determined
19 in accordance with 320-2 (including provisions for the automatic recordation
20 system). The pay quantity will be based on the average spread rate for the
21 project, limited to a maximum of 105% of the spread rate set by the Engineer in
22 accordance with 337-8.

23 **9.17 MISCELLANEOUS ASPHALT**

24 **9.17.1 Method of Measurement (Article 339-7)**

25 The quantity to be paid for will be the weight in tons [metric tons], determined by
26 weighing in trucks on scales meeting the requirements of 320-2.2 or from the
27 total weight of batches placed in trucks as determined by an automatic printer
28 system meeting the requirements of 320-4. The pay quantity will be based on the

1 average spread rate or dimensions for the project, limited to a maximum of
2 105%. For calculation, a weight of 100 lbs/yd² per inch [22kg/m² per 10 mm]
3 thickness of asphalt will be used.

4 **9.17.2 Basis of Payment (*Article 339-8*)**

5 Price and payment will be full compensation for all work specified in this Section,
6 including shaping and compacting the foundation, soil sterilization treatment,
7 furnishing of the bituminous material used in the mixture, and shaping of the
8 adjacent earth surfaces.

9 **EXAMPLE**

10 Original Square Yards = 800
11 Original Tons = 80.00
12 Final Square Yards = 800
13 Final Tons = 90.50
14 $90.50 \times 2,000 = 181,000 \text{ LBS.}$
15 $181,000 \text{ LBS.} \div 800 \text{ S.Y.} = 226.25 \text{ LBS./S.Y.}$
16 $226.25 \text{ LBS.} \div 200 \text{ LBS.} \times 100 = 113 \%$
17 $113 \% > 105 \%$
18 $200 \text{ LBS./S.Y.} \times 1.05 = 210 \text{ LBS./S.Y. maximum lbs. Per S.Y. payable}$
19 $210 \text{ LBS.} \times 800 \text{ S.Y.'s} \div 2,000 = 84 \text{ Tons Final Pay Quantity}$

20 **9.18 CONTRACTOR'S QUALITY CONTROL (CQC) (AKA QC2000)**

21 **9.18.1 Responsibility**

22 The Contractor or Sub-Contractor is now responsible for quality control at the
23 plant and on the roadway. The Contractor will run asphalt content and gradation
24 tests at the plant and density tests on the roadway. The contractor is responsible
25 for determining quantities of asphalt produced and recording tack measurements
26 placed on the roadway.

27 **9.18.2 Quality Control Documentation Verification**

28 The Engineer or designee is responsible for verifying the quantities submitted by
29 the CQC Technician. The Engineer shall collect a copy of the Quality Control
30 Technician's Report for both the asphalt plant and the asphalt road. In addition
31 the Engineer shall collect all asphalt ticket packets associated with these reports.
32 The Engineer is to ensure that the ticket packets for each day's production match
33 these reports.

9.18.3 Resolution Reports for A.C. content, Gradation and Density Cores

In some instances when the CQC Technician's results and the Verification Technician's results do not compare for a specified test, then a Resolution report must be accomplished. The tests results of the Resolution Technician will be compared to the results of the Quality Control Technician and the Verification Technician.

If the Resolution results favor the CQC Technician's results, then use the CQC Technician's results.

If the Resolution Technician's results favor the Verification Technician's results, then use the Resolution Technician's results.

9.18.4 Composite Pay Factor - Excel Spreadsheet

The Verification Technician is responsible for entering the CQC Technician's test results in the Composite Pay Factor spreadsheet to calculate the pay adjustments. These entries shall be done at the closing of a Lot during the life of the contract. It is the responsibility of the Project Engineer or designee to verify that the test results entered by the Verification Technician is correct. Also, all reports shall be affixed to the Composite Pay Factor spreadsheet representing that Lot. See example of Lot Submittal Package (See Figure No. 9-7 and 9-7a thru 9-7k). These reports along with the asphalt ticket packets shall be collected two working days after the closing of a Lot. The Lot Submittal Package shall be submitted with the Final Estimates Package.

9.18.4 Composite Pay Factor Adjustments

All Contracts shall have a unit price adjustment calculated as directed by **Construction Memorandum No. 28-02** (See Figure No. 9-8). The Engineer or designee shall calculate the unit price adjustment and enter the revised unit price adjustment on the monthly/progress estimate along with the tons (metric tons) represented by each lot produced.

These revised unit price adjustments range from 75 per cent to 105 per cent. All lots shall be grouped together for each unit price adjustment.

Example: Lots 2, 3 and 5 were at 101 percent, show the tons (metric tons) represented by these lots on the monthly/progress at the revised unit price for a 101 per cent adjustment using a Card Type "5" (See Figure No. 9-10) and place

1 a brief summary on a Card Type "Z" (See Figure No. 9-11) explaining which lots
2 received the adjustment(s). Also place a new Computation Sheet in the
3 Computation Booklet or break out the percentage adjustments on the original
4 Computation Sheet for the adjusted item(s) (See Figure No. 9-9).

5 **Note:** Always carry the revised unit price adjustment calculations to four (4)
6 decimal places.

7 LIST OF FIGURES FOLLOWING THIS CHAPTER

8	Figure No. 9-1	Automatic Printer Ticket
9	Figure No. 9-2	Sample Cover For Preprinted Tickets
10	Figure No. 9-3	Extraction Worksheet
11	Figure No. 9-4	Pay Reduction Summary Sheet
12	Figure No. 9-5	Receipt/Invoice For Excess Materials Delivered to
13		Warehouse
14	Figure No. 9-6	Example of Computer Printout for Smoothness by a
15		Laser Profiler and Unit Price Adjustment
16	Figure No. 9-7 &	
17	9-7a thru 9-7k	Lot Submittal Package (QC2000)
18	Figure No. 9-8	Construction Memorandum No.28-02
19	Figure No. 9-9	Computation Sheet for Superpave (Level B)
20	Figure No. 9-10	Card Type "5"
21	Figure No. 9-11	Card Type "Z"