Florida Department of Transportation

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SECRETARY

September 16, 2022

MATERIALS BULLETIN NO. 22-04
DCE MEMORANDUM NO. 22-13
(FHWA Approved: 9/14/22)

TO: **DISTRICT CONSTRUCTION ENGINEERS**
DISTRICT MATERIALS AND RESEARCH ENGINEERS

FROM: Rudy Powell, P.E., Interim Director, Office of Materials
Tim Lattner, P.E., Director, Office of Construction

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COPIES: Will Watts, Dan Hurtado, Ananth Prasad (FTBA), Mark Musselman (ACAF), Jose Ortiz (FHWA)

SUBJECT: **RETROACTIVE IMPLEMENTATION OF JULY 2021 STANDARD SPECIFICATION 334**

The Department has implemented revisions to the July 2021 Standard Specifications, as listed below:

Section 334 – SUPERPAVE ASPHALT CONCRETE

Changes were made in MAC to address the July 2021 specification updates for density tolerances to promote higher pavement density, but MAC is unable to apply them only to projects let after July 2021.

This Memo allows the incorporation of the July 2021 specification tolerances for density on projects let before July 2021.

Revisions to Specification Section 334 are attached.

If there are any questions, contact Richard Hewitt at (386) 943-5305 or Howie Moseley at (352) 955-2905.

This memorandum serves as blanket approval to process a $0.00 contract change to incorporate any of the above referenced revisions and should be attached to the Work Order or Supplemental Agreement.

TL/RP/RH

SUPERPAVE ASPHALT CONCRETE
(REV 10-28-20)

SUBARTICLE 334-5.1.2 is deleted and the following substituted:

334-5.1.2 Acceptance Testing Exceptions: When the total combined quantity of hot mix asphalt for the project, as indicated in the Plans for Type B-12.5, Type SP and Type FC mixtures only, is less than 2000 tons, the Engineer will accept the mix on the basis of visual inspection. The Engineer may require the Contractor to run process control tests for informational purposes, as defined in 334-4, or may run independent verification tests to determine the acceptability of the material.

Density testing for acceptance will not be performed on widening strips or shoulders with a width of 5 feet or less, open-graded friction courses, variable thickness overbuild courses, leveling courses, any SP-9.5 or SP-12.5 asphalt layer placed on subgrade with a layer thickness less than or equal to 3 inches, miscellaneous asphalt pavement, shared use paths, crossovers, gore areas, raised crosswalks, speed tables, or any course with a specified thickness less than 1 inch or a specified spread rate that converts to less than 1 inch as described in 334-1.4. Density testing for acceptance will not be performed on asphalt courses placed on bridge decks or approach slabs; compact these courses in static mode only per the requirements of 330-7.7. In addition, density testing for acceptance will not be performed on the following areas when they are less than 500 feet (continuous) in length: turning lanes, acceleration lanes, deceleration lanes, shoulders, parallel parking lanes, ramps, or unsignalized side streets with less than four travel lanes and speed limits less than 35 mph. Do not perform density testing for acceptance in situations where the areas requiring density testing is less than 50 tons within a sublot.

Density testing for acceptance will not be performed in intersections. The limits of the intersection will be from stop bar to stop bar for both the mainline and side streets. A random core location that occurs within the intersection shall be moved forward or backward from the intersection at the direction of the Engineer.

Where density testing for acceptance is not required, compact these courses (with the exception of open-graded friction courses) in accordance with the rolling procedure (equipment and pattern) as approved by the Engineer or with Standard Rolling Procedure as specified in 330-7.2. In the event that the rolling procedure deviates from the procedure approved by the Engineer, or the Standard Rolling Procedure, placement of the mix shall be stopped.

The density pay factor (as defined in 334-8.2) for areas not requiring density testing for acceptance will be paid at the same density pay factor as for the areas requiring density testing within the same LOT. If the entire LOT does not require density testing for acceptance, the LOT will be paid at a density pay factor of 1.00.

SUBARTICLE 334-8.2.2 is deleted and the following substituted:

334-8.2.2 Two or Less Sublot Test Results: In the event that two or less sublot test results are available for a LOT, Pay Factors will be determined based on Table 334-8, using the average of the accumulated deviations from the target value. (Except for density, deviations are absolute values with no plus or minus signs.) Use the 1-Test column when there is only one sublot test result and use the 2-Tests column when there are two sublots.

Table 334-8 Small Quantity Pay Table		
Pay Factor	1 Sublot Test Deviation	2 Sublot Test Average Deviation
Asphalt Binder Content		
1.05	0.00-0.23	0.00-0.16
1.00	0.24-0.45	0.17-0.32
0.90	0.46-0.55	0.33-0.39
0.80	>0.55	>0.39
No. 8 Sieve		
1.05	0.00-2.25	0.00-1.59
1.00	2.26-4.50	1.60-3.18
0.90	4.51-5.50	3.19-3.89
0.80	>5.50	>3.89
No. 200 Sieve		
1.05	0.00-0.55	0.00-0.39
1.00	0.56-1.10	0.40-0.78
0.90	1.11-1.50	0.79-1.06
0.80	>1.50	>1.06
Air Voids		
1.05	0.00-0.50	0.00-0.35
1.00	0.51-1.00	0.36-0.71
0.90	1.01-1.70	0.72-1.20
0.80	1.71-2.00	1.21-1.41
0.70	2.01-2.50	1.42-1.77
0.55	>2.50	>1.77
Density [1] Target = 93.00 percent of G_{mm}		
1.05	+ (0.00-3.50), - (0.00-0.50)	+ (0.00-3.25), - (0.00-0.35)
1.00	+ (3.51-4.50), - (0.51-1.00)	+ (3.26-4.25), - (0.36-0.71)
0.95	+ (4.51-5.00), - (1.01-2.00)	+ (4.26-4.75), - (0.72-1.41)
0.90	+ (5.01-5.50), - (2.01-3.00)	+ (4.76-5.25) – (1.42-2.12)
0.80	+ (>5.50), - (>3.00)	+ (>5.25), - (>2.12)
Density [1] Target = 92.00 percent of G_{mm}		
1.05	+ (0.00-4.50), - (0.00-0.50)	+ (0.00-4.25), - (0.00-0.35)
1.00	+ (4.51-5.50), - (0.51-1.00)	+ (4.26-5.25), - (0.36-0.71)
0.95	+ (5.51-6.00), - (1.01-1.50)	+ (5.26-5.75), - (0.72-1.41)
0.90	+ (6.01-6.50), - (1.51-2.00)	+ (5.76-6.25) – (1.42-2.12)
0.80	+ (>6.50), - (>2.00)	+ (>6.25), - (>2.12)

(1). Each density test result is the average of three to five randomly located cores. The target density is 93.00 percent of G_{mm} (92.00 percent when compaction is limited to the static mode or for layers specified to be one inch thick). When compaction is limited to the static mode, no vibratory mode in the vertical direction will be allowed. Other vibratory modes will be allowed, if approved by the Engineer. In this case, the target density is 92.00 percent of G_{mm}.

SUBARTICLE 334-8.2.3.1 is deleted and the following substituted:

334-8.2.3.1 Percent Within Limits: The percent within limits (PWL) and Pay Factors for the LOT will be calculated as described below. Variables used in the calculations are as follows:

x = individual test value (sublot)
n = number of tests (sublots)
s = sample standard deviation
$\Sigma(x^2)$ = summation of squares of individual test values
$(\Sigma x)^2$ = summation of individual test values squared
Q_U = upper quality index
USL = upper specification limit (target value plus upper specification limit from Table 334-9)
Q_L = lower quality index
LSL = lower specification limit (target value minus lower specification limit from Table 334-9)
P_U = estimated percentage below the USL
P_L = estimated percentage above the LSL

1. Calculate the arithmetic mean $(\overline{X})$ of the test values:

$$\overline{X} = \frac{\sum x}{n}$$

2. Calculate the sample standard deviation (s):

$$s = \sqrt{\frac{n\sum\left(x^2\right) - \left(\sum x\right)^2}{n(n-1)}}$$

3. Calculate the upper quality index (Q_U):

$$Q_U = \frac{\text{USL} - \overline{\text{X}}}{\text{s}}$$

4. Calculate the lower quality index (Q_L):

$$Q_L = \frac{\overline{X} - LSL}{s}$$

5. From Table 334-10, determine the percentage of work below the USL (P_U).

6. From Table 334-10, determine percentage of work above the LSL (P_L) Note: If USL or LSL is not specified; percentages within (USL or LSL) will be 100.

7. If Q_U or Q_L is a negative number, then calculate the percent within limits for Q_U or Q_L as follows: enter Table 334-10 with the positive value of Q_U or Q_L and obtain the corresponding percent within limits for the proper sample size. Subtract this number from 100.00. The resulting number is the value to be used in the next step (Step 8) for the calculation of quality level.

8. Calculate the percent within limits (PWL) = (P_U + P_L) - 100

9. Calculate the Pay Factor (PF) for each quality characteristic using the equation given in 334-8.2.3.2.

Table 334-9
Specification Limits

Quality Characteristic	Specification Limits
Passing No. 8 sieve (percent)	Target ± 3.1
Passing No. 200 sieve (percent)	Target ± 1.0
Asphalt Content (percent)	Target ± 0.40
Air Voids (percent)	4.00 ± 1.20
Density, vibratory mode (percent of G_{mm}):	93.00 + 4.00, - 1.20
Density, static mode (percent of G_{mm}):	92.00 + 5.00, - 1.50 (1)

(1): No vibratory mode in the vertical direction will be allowed. Other vibratory modes will be allowed, if approved by the Engineer.

Table 334-10
Percent Within Limits

Quality Index	Percent within Limits for Selected Sample Size			
	n = 3	n = 4		
0.00	50.00	50.00		
0.05	51.38	51.67		
0.10	52.76	53.33		
0.15	54.15	55.00		
0.20	55.54	56.67		
0.25	56.95	58.33		
0.30	58.37	60.00		
0.35	59.80	61.67		
0.40	61.26	63.33		
0.45	62.74	65.00		
0.50	64.25	66.67		
0.55	65.80	68.33		
0.60	67.39	70.00		
0.65	69.03	71.67		
0.70	70.73	73.33		

Table 334-10 Percent Within Limits				
Quality Index	Percent within Limits for Selected Sample Size			
	n = 3	n = 4		
0.75	72.50	75.00		
0.80	74.36	76.67		
0.85	76.33	78.33		
0.90	78.45	80.00		
0.95	80.75	81.67		
1.00	83.33	83.33		
1.05	86.34	85.00		
1.10	90.16	86.67		
1.15	97.13	88.33		
1.20	100.00	90.00		
1.25	100.00	91.67		
1.30	100.00	93.33		
1.35	100.00	95.00		
1.40	100.00	96.67		
1.45	100.00	98.33		
1.50	100.00	100.00		
1.55	100.00	100.00		
1.60	100.00	100.00		
1.65	100.00	100.00		
1.70	100.00	100.00		
1.75	100.00	100.00		
1.80	100.00	100.00		
1.85	100.00	100.00		
1.90	100.00	100.00		
1.95	100.00	100.00		
2.00	100.00	100.00		
2.05	100.00	100.00		
2.10	100.00	100.00		
2.15	100.00	100.00		
2.20	100.00	100.00		
2.25	100.00	100.00		
2.30	100.00	100.00		
2.35	100.00	100.00		
2.40	100.00	100.00		

Table 334-10 Percent Within Limits				
Quality Index	Percent within Limits for Selected Sample Size			
	n = 3	n = 4		
2.45	100.00	100.00		
2.50	100.00	100.00		
2.55	100.00	100.00		
2.60	100.00	100.00		
2.65	100.00	100.00		