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OKLAHOMA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION
FOR
RICH INTERMEDIATE LAYER (RIL)

These Special Provisions revise, amend, and where in conflict, supersede applicable sections of the 2009 Standard Specifications for Highway Construction, English and Metric.

411.02 MATERIALS *(Add the following:)*

The Department will not allow the use of RAP in Stone Matrix Asphalt (SMA), Permeable Friction Course (PFC), Rich Bottom Layer (RBL),Open Graded Friction Surface Course (OGFSC), Open Graded Bituminous Base (OGBB), or Rich Intermediate Layer (RIL) mixes.

PLANT MIX BITUMINOUS BASES AND SURFACES
Table 411:5
Physical Properties of Aggregates

Test	Aggregates to be used in: RIL	
L.A. Abrasion [a], % wear	≤40	
Micro-Deval [a], % wear	≤25[1]	
Sand equivalent [b], per traffic ESALs [k]		
<3 M	≥40	
3 M – <30 M	≥45	
≥30 M	≥50	
Mechanically fractured faces [b,c,i] per traffic ESALs [k], %		
Depth from surface [j], in [mm]	—	—
<3 M	≥75/75	—
3 M – <10 M	≥85/80	—
10 M – <30 M	≥95/90	—
30 M – <100 M	≥98/95	—
≥100 M	≥98/95	—
Aggregate durability index [a]	≥40	
Insoluble residue [d,e], %, per traffic ESALs [k]		
<3 M	≥30	
≥3 M	≥40	
Flat and elongated pieces [b,c,f], %	≤10	
Natural sand and gravel [b], %, per traffic ESALs [k]		
<0.3 M	≤25	
≥0.3 M	≤15	
Clay balls and friable particles [g], %	≤1.0	

PLANT MIX BITUMINOUS BASES AND SURFACES
Table 411:5
Physical Properties of Aggregates

Test	Aggregates to be used in: RIL	
Soft particles [a], %	≤5	
Sticks or roots [a], %	≤0.5	
Uncompacted void content of fine aggregate [b,h], %, per traffic ESALs [k]		
Depth from surface, [j] in [mm]	—	—
<0.3 M	—	—
0.3 M – <3 M	≥40	—
3 M – <30 M	≥45	—
≥30 M	≥45	—

Note: For the purpose of this table, "million" is abbreviated as "M".

[a] Applies to each source.

[b] Applies to the combined aggregate.

[c] Applies to the aggregate retained on the No. 4 [4.75 mm] sieve.

[d] Applies to the combined coarse aggregate.

[e] Applies to the coarse aggregate in the surface course. Does not apply to shoulders, driveways, and temporary detours.

[f] A flat and elongated piece has a length greater than five times the thickness.

[g] Applies to combined aggregate. If the maximum for the combined aggregate is not exceeded, the Department will allow 1.5% for one source.

[h] Applies to the aggregate passing the No.8 [2.36 mm] sieve.

[i] In the mechanically fractured faces requirement format “xx/yy,” “xx” is the minimum percentage of coarse aggregate requiring one fractured face, and “yy” is the percentage requiring two fractured faces.

[j] If less than 25% of a layer is within 4 in [100 mm] of the surface, the layer may be considered to be below 4 in [100 mm] for mixture design purposes.

[k] Regardless of the actual design life of the roadway, the design ESALs are based on 20 years.

[l] Applies to projects with 30 million or more design ESALs.

Table 411:6 Mixture for Hot Mix – Hot Lay, Non-Superpave	
Sieve Size [a]	RIL
1 ½ in [37.5 mm]	—
1 in [25.0 mm]	—
¾ in [19.0 mm]	—
½ in [12.5 mm]	100
⅜ in [9.5 mm]	90 – 100
No. 4 [4.75 mm]	≤ 90
No. 8 [2.36 mm]	37 – 67
No. 16 [1.18 mm]	—
No. 30 [0.600 mm]	—
No. 50 [0.300 mm]	—
No. 100 [0.150 mm]	—
No. 200 [0.075 mm][b]	2.0 – 10.0
Other Mixture Requirements	
NMS [d]	3/8 in [9.5 mm]
Cellulose Fiber, % of mix mass	—
Asphalt Cement [e], % of mix mass	≥ 5.4[g]
Performance grade asphalt cement	[h]

[a] Table 411:6 reflects the sieve size boundaries for design and JMF purposes. After the design is established, the JMF will designate the combined aggregate sieve requirements with tolerances set in Table 708:12 of the Standard Specifications.

[b] Ensure the ratio of the percent passing the No. 200 [75 µm] sieve to the percent effective asphalt cement is from 0.4 to 1.9.

[c] Retain at least 55 percent of the aggregate between the ⅜ in [9.5 mm] and the No. 4 [4.75 mm].

[d] Nominal Maximum Size (NMS) is defined as one size larger than the first sieve to retain more than 10 percent.

[e] The Department's Materials Engineer may allow the lower limit to be adjusted if the effective specific gravity of the combined aggregates is greater than 2.65. The Department's Materials Engineer may allow adjustments if a theoretical lab molded specimen at the JMF asphalt content meets the VMA requirement at 4 percent air voids.

[f] Calculate the JMF for percent AC in the open graded friction course with the following equation:

$$\% \text{ AC} = (16.5) / (\text{Effective Specific Gravity } (G_{se}) + 0.165).$$

[g] The Department's Material Engineer may allow the amount of asphalt binder to be adjusted if the effective specific gravity of the combined aggregate is greater than 2.833 or less than 2.495.

[h] The Contractor may substitute a higher grade of asphalt than that shown on the Plans, at no additional cost to the Department.

Table 411:7 Mix Design Properties of Laboratory Molded Non-Superpave Specimens	
Property	RIL
Number of SGC Gyrations	50
Required Density, *% of G_{mm}*	97.0
VMA [a], *%*	≥15.0
TSR minimum	0.80
Draindown, *%*	—
Permeability, *cm/s × 10^{-5}*	≤12.5
Hamburg rut depth, *mm*	≤12.5[b]
[a] VMA is based on the bulk specific gravity of the aggregates. [b] Based on PG binder type.	

Table 411:8 Field Sample Properties of Laboratory Molded Non-Superpave Specimens	
Property	RIL
Number of SGC Gyrations	50
Required Density, *% of G_{mm}*	95.5 – 98.4
VMA [a], *%*	≥14.5
TSR	≥0.75
Draindown, *%*	—
Permeability, *cm/s × 10^{-5}*	—
APA rut depth, *mm*	—
[a] VMA is based on the bulk specific gravity of the aggregates. Compute a new bulk specific gravity from each AASHTO T 209 test. Calculate the value by multiplying the aggregate Effective Specific Gravity (G_{se}) calculated from the latest AASHTO T 209 test by the aggregate Bulk Specific Gravity (G_{sb}) from the design. Afterwards, divide the product by the aggregate G_{se} from the design.	

Table 411:9 Sampling and Testing of Bituminous Mixtures	
Materials	Testing Method
Rutting susceptibility using the Hamburg Rut Tester	OHD L-55

411.04 CONSTRUCTION METHODS

K. Compaction

(2) Acceptance

(a) ***Layers At Least 1½ in [38 mm] Thick*** *(Replace Table 411:2 with the following:)*

Table 411:2 Pay Adjustments for Lot Density	
Pay Adjustment Factor (PAF) [a] % of Maximum Theoretical Density *(Calculated at the JMF AC Content)*	Average Lot Density (ALD)
>97.0 [c]	Unacceptable [b]
92.0 – 97.0 [c]	1.00
91.0 – 91.9	1.00 – (0.07)(92.0 – ALD)
88.1 – 90.9	0.93 – (0.15)(91.0 – ALD)
<88.1	Unacceptable [b]
[a] Use PAF for Roadway Density in the Combined Pay Factor equation in accordance with Subsection 411.04.N(2)(a), "Basis of Acceptance and Payment." [b] Unless otherwise directed by the Resident Engineer, remove and replace unacceptable lots at no additional cost to the Department [c] For RIL only, replace 97.0 with 98.0 .	

N. Mix Properties

(2) Acceptance

(b) ***Resident Engineer's Acceptance Procedures*** *(Add the following to Table 411:4:)*

Table 411:4 Acceptance Schedule		
Characteristics	1 Test	Pay Factor
Average of Deviations from Target (Without Regard to Sign)		
Air Void (Lab Molded Samples) [a]	0.00 – 1.50	1
Target (Superpave, SMA) = 4%	1.51 – 2.50	$-0.16x^2 + 0.24x + 1.00$
Target (RBL) = 2% Target (RIL) = 3%	>2.50	Unacceptable [b]

411.06 BASIS OF PAYMENT *(Add the following:)*

Pay Item:	***Pay Unit:***
(J) RICH INTERMEDIATE LAYER	Ton [Metric Ton]