

## ODOT CONTRACTOR MIX DESIGN SUMMARY

PROJECT	Pave MP 0 - 25
CONTRACT NO.	C99999
MIX PRODUCER	Pavin' Black Stuff, Inc.
CMDT (print)	John Doe

MIX CLASS	1/2" Dense
LEVEL (2,3,4)	4
PROJECT MANAGER	Dean Chess
CMDT JMF MIX ID NO.	2010AB-1
BID ITEM #	127

### AGGREGATE & OTHER CONSTITUENTS (RAP, BL. SAND, LIME, ETC.)

STOCKPILE SIZES	1/2" - #4	#4 - #8	#8 - 0	RAP			
SOURCE NUMBER	99-999-02	99-999-02	99-999-02	Project			
STOCKPILE PERCENTAGE (P <sub>sp</sub> )	20	20	30	30			
Bulk Specific Gravity (G <sub>sb</sub> )	2.729	2.713	2.667	2.638			
Apparent Specific Gravity (G <sub>sa</sub> )	2.854	2.858	2.849	2.801			

Design developed with "dryback" Gmm (Y/N)?

NO

### MIXTURE AT DESIGN ASPHALT CONTENT

Maximum Specific Gravity (G <sub>mm</sub> )	2.502
Gyratory Bulk Gravity (G <sub>mb</sub> )	2.403
Combined Aggregate (G <sub>sb</sub> )	2.681
Effective Specific Gravity (G <sub>se</sub> )	2.755
Combined Apparent Gravity (G <sub>sa</sub> )	2.837
Absorbed Asphalt, % (P <sub>ba</sub> )	1.03
Effective Asphalt Content, % (P <sub>be</sub> )	5.03
P <sub>200</sub> / P <sub>be</sub> Ratio	1.2
Air Voids, % (V <sub>a</sub> )	4.0
VMA, %	15.7
VFA, %	75
Tensile Strength Ratio (TSR)	94.3
TSR Compaction Blows	30
VIR	14
APA Rut depth - mm	3.0
Gmb Sample Weight @ JMF	4740
Number of Gyration	100
Draindown % (open graded)	-
Date	1/1/2011
CMDT Signature	
CMDT Card #	49999

Aggregate Gradation Sieve	Blend	CA & FA Ratios
3/4" (19 mm)	100	
1/2" (12.5 mm)	96	CA
3/8" (9.5 mm)	86.5	0.876
1/4" (6.3 mm)	66.2	
No. 4 (4.75 mm)	55.8	FA
No. 8 (2.36 mm)	36.6	0.423
No. 16 (1.18 mm)	24	0.430
No. 30 (0.60 mm)	16.5	0.451
No. 50 (0.30 mm)	11.7	0.488
No. 100 (0.150 mm)	8.7	0.527
No. 200 (0.075 mm)	6.1	0.521
	FA Average	0.473
	FA Std Dev.	0.045
Asphalt content, % (P <sub>b</sub> )	6.0	
RAP AC, % (P <sub>br</sub> )	6.09	
Virgin Binder Repl., %	30.5	
Antistrip, %	N/A	
Agg. Treatment, %	N/A	
Asphalt Brand	BP	
Asphalt Grade	PG64-22	
Mixing temp. range	302-310 F	
Placement temp. range	280-289 F	
Asphalt SpGr (Gb) 77 °F	1.027	
Asphalt SpGr (Gb) 60 °F	1.031	

### COMMENTS:

BLEND CHOSEN?

Fine

REASON? :

Disclaimer - This example mix design was chosen to show the use of the forms only, not to show best design practices.  
Best trial blend for not the best VMA situation, may need to look at closing up the VMA. VIR higher than expected??

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**AASHTO T-85: Specific Gravity and Absorption of Coarse Aggregate**

Size	1/2" - #4 (+#8)		Average	#4 - #8 (+#8)		Average			Average			Average
Source	99-999-02			99-999-02								
A) Mass of Dry Sample	3027.5	3041.0		2280.3	2441.1							
B) Mass of SSD Sample	3077.2	3089.0		2321.5	2485.9							
C) Mass of Sample Immersed	1966.5	1975.8		1482.4	1586.9							
Bulk Specific Gravity ( $G_{sb}$ )	2.726	2.732	2.729	22.718	2.715	2.716						
Bulk Specific Gravity (SSD)	2.771	2.775	2.773	2.767	2.765	2.766						
Apparent Specific Gravity ( $G_{sa}$ )	2.853	2.855	2.854	2.858	2.858	2.858						
Absorption (%)	1.64	1.58	1.61	1.81	1.84	1.82						

**AASHTO T-84: Specific Gravity and Absorption of Fine Aggregate**

Size			Average	#4 - #8 (+#8)		Average	#8 - 0 (-#4)		Average			Average
Source				99-999-02			99-999-02					
S) Mass of SSD Sample				500.2	500.2		500.0	500.0				
B) Mass of Pyc. + Water				674.8	675.0		674.8	675.0				
C) Mass of Pyc.+H2O+Sample				992.2	991.9		991.5	992.1				
Mass of Dry Sample + Pan				803.0	802.5		802.2	804.8				
Mass of Pan				314.3	315.1		314.5	316.0				
A) Mass of Dry Sample				488.7	487.4		487.7	488.8				
Bulk Specific Gravity ( $G_{sb}$ )				2.673	2.659	2.666	2.661	0.672	2.667			
Bulk Specific Gravity (SSD)				2.736	2.729	2.733	2.728	2.734	2.731			
Apparent Specific Gravity ( $G_{sa}$ )				2.853	2.859	2.856	2.852	2.847	2.849			
Absorption (%)				2.35	2.63	2.49	2.52	2.29	2.41			

**Combined Specific Gravity**

Size	1/2" - #4	#4 - #8	#8 - 0						
Split Sieve	#8	#8	#4						
Percent Passing Split Sieve	2.0%	5.0%	100.0%						
Bulk Specific Gravity ( $G_{sb}$ )	2.729	2.713	2.667						
Bulk Specific Gravity (SSD)	2.773	2.764	2.731						
Apparent Specific Gravity ( $G_{sa}$ )	2.854	2.858	2.849						
Absorption (%)	1.6	1.8	2.4						

Comments: T 84 was not required on the #4 - #8, but ran it anyway, so the results were used.

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**RAP WORKSHEET**

Separated Size	1/2" - 0	$G_{b@77^{\circ}F}$	1.027
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**AASHTO T-209: Theoretical Maximum Specific Gravity**

Sample	1	2	3
Mass of Dry RAP ( $R_{hot}$ )	1772.4	1902.2	1867.4
Mass of Added Binder ( $Binder_{new}$ )	53.2	57.1	56.0
$P_{b-new}$ , %	2.914	2.914	2.912
Mass of Coated Sample (C)	1822.4	1958.6	1922.5
Actual Dry Mass Uncoated Sample (A)	1769.3	1901.5	1866.5
Actual Mass of Added Binder (C-A)	53.1	57.1	56.0
Mass @ SSD	1825.3	1961.1	1925.1
Pycnometer + Water	7428.6	7428.6	7428.6
Pycnometer + Water + Mix	8486.2	8571.7	8550.9
RAP $G_{mm}$ SSD	2.471	2.492	2.494

**Asphalt Content of RAP**

Sample	1	2	3	4	5	
Basket Tare	1000.0	1000.0	1000.0	1000.0	1000.0	
Mass of Coated RAP + Basket	2769.3	2901.5	2866.5	2670.8	2836.8	
Mass of Agg and Basket	2643.9	2778.4	2747.3	2568.1	2718.3	
Mass Initial, $M_i$	1769.3	1901.5	1866.5	1670.8	1836.8	
Mass Final, $M_f$	1643.9	1778.4	1747.3	1568.1	1718.3	
%I = $[(M_i - M_f)/M_i] \times 100$	7.09	6.47	6.39	6.15	6.45	Average
Corrected $P_b$ , $C_f = 0.50$	6.59	5.97	5.89	5.65	5.95	6.01
						RAP $G_{se}$
						2.733

**AASHTO T-85: Specific Gravity and Absorption of Coarse Aggregate**

Size	RAP (+#4)		Average
Source	Project		
A) Mass of Dry Sample	2419.7	2593.1	
B) Mass of SSD Sample	2460.3	2635.6	
C) Mass of Sample Immersed	1554.6	1662.9	
Bulk Specific Gravity ( $G_{sb}$ )	2.672	2.666	2.669
Bulk Specific Gravity (SSD)	2.716	2.710	2.713
Apparent Specific Gravity ( $G_{sa}$ )	2.797	2.788	2.792
Absorption (%)	1.68	1.64	1.66

**Combined Specific Gravity  
T-84 & T-85**

Size	1/2" - 0
Split Sieve	4
Percent Passing Split Sieve	56.9
Burnt Bulk Specific Gravity ( $G_{sb}$ )	2.606
Burnt Bulk Specific Gravity (SSD)	2.671
Burnt Apparent Specific Gravity	2.785
Absorption (%)	2.2

**AASHTO T-84: Specific Gravity and Absorption of Fine Aggregate**

Size	RAP (-#4)		Average
Source	Project		
S) Mass of SSD Sample	500.0	500.1	
B) Mass of Pyc. + Water	674.8	675.0	
C) Mass of Pyc.+H2O+Sample	985.0	986.0	
Mass of Dry Sample + Pan	800.0	796.0	
Mass of Pan	315.0	310.5	
A) Mass of Dry Sample	485.0	485.5	
Bulk Specific Gravity ( $G_{sb}$ )	2.555	2.567	2.561
Bulk Specific Gravity (SSD)	2.634	2.645	2.639
Apparent Specific Gravity ( $G_{sa}$ )	2.775	2.782	2.778
Absorption (%)	3.09	3.01	3.05

**Combined RAP Specific Gravity  
ODOT TM-319**

RAP $G_{sb}$	2.638
RAP $G_{sa}$	2.801

**RAP Gradation**

SAMPLE 1				SAMPLE 2							
Sieve Size	Mass Retained	% Retained	% Pass	Initial Dry Mass	1643.9	Sieve Size	Mass Retained	% Retained	% Pass	Initial Dry Mass	1778.4
1"	0.0	0.0	100.0	Dry Washed Mass	1498.0	1"	0.0	0.0	100.0	Dry Washed Mass	1642.9
3/4"	0.0	0.0	100.0	Mass After Sieve	1497.3	3/4"	0.0	0.0	100.0	Mass After Sieve	1642.3
1/2"	56.2	3.4	96.6	Sieve Loss	0.0	1/2"	56.3	3.2	96.8	Sieve Loss	0.0
3/8"	106.4	6.5	90.1			3/8"	150.7	8.5	88.3		
1/4"	298.3	18.1	72.0			1/4"	356.7	20.1	68.2		
#4	175.5	10.7	61.3			#4	197.0	11.1	57.1		
#8	298.0	18.1	43.2			#8	327.9	18.4	38.7		
#16	197.3	12.0	31.2			#16	201.6	11.3	27.4		
#30	129.9	7.9	23.3			#30	127.7	7.2	20.2		
#50	108.7	6.6	16.7			#50	104.5	5.9	14.3		
#100	68.6	4.2	12.5			#100	64.0	3.6	10.7		
#200	53.2	3.2	9.3			#200	49.4	2.8	7.9		
Pan	5.2					Pan	6.5				

SAMPLE 3				SAMPLE 4							
Sieve Size	Mass Retained	% Retained	% Pass	Initial Dry Mass	1747.3	Sieve Size	Mass Retained	% Retained	% Pass	Initial Dry Mass	1568.1
1"	0.0	0.0	100.0	Dry Washed Mass	1604.9	1"	0.0	0.0	100.0	Dry Washed Mass	1458.8
3/4"	0.0	0.0	100.0	Mass After Sieve	1604.9	3/4"	0.0	0.0	100.0	Mass After Sieve	1458.6
1/2"	84.8	4.9	95.1	Sieve Loss	0.0	1/2"	125.3	8.0	92.0	Sieve Loss	0.0
3/8"	138.5	7.9	87.2			3/8"	127.6	8.1	83.9		
1/4"	323.7	18.5	68.7			1/4"	316.2	50.2	63.7		
#4	202.5	11.6	57.1			#4	163.4	10.4	53.3		
#8	337.0	19.3	37.8			#8	287.8	18.4	34.9		
#16	197.1	11.3	26.5			#16	161.9	10.3	24.6		
#30	118.6	6.8	19.7			#30	99.2	6.3	18.3		
#50	95.4	5.5	14.2			#50	80.4	5.1	13.2		
#100	58.3	3.3	10.9			#100	49.7	3.2	10.0		
#200	45.1	2.6	8.3			#200	39.1	2.5	7.5		
Pan	3.9					Pan	8.0				

SAMPLE 5				Average			
Sieve Size	Mass Retained	% Retained	% Pass	Initial Dry Mass	1718.3	Sieve Size	% Pass
1"	0.0	0.0	100.0	Dry Washed Mass	1581.5	1"	100.0
3/4"	0.0	0.0	100.0	Mass After Sieve	1580.5	3/4"	100.0
1/2"	133.1	7.7	92.3	Sieve Loss	0.1	1/2"	94.6
3/8"	137.0	8.0	84.3			3/8"	86.8
1/4"	298.4	17.4	66.9			1/4"	67.9
#4	189.6	11.0	55.9			#4	56.9
#8	299.5	17.4	38.5			#8	38.6
#16	192.3	11.2	27.3			#16	27.4
#30	119.4	6.9	20.4			#30	20.4
#50	97.8	5.7	14.7			#50	14.6
#100	60.8	3.5	11.2			#100	11.1
#200	47.0	2.7	8.5			#200 - 1%	7.3
Pan	5.6					Pan	

### AGGREGATE STOCKPILE QLs

Aggregate		1/2" - #4	#4 - #8	#8 - 0	RAP						Lower Control Point	Upper Control Point
Source		99-999-2	99-999-3	99-999-4	Project							
G <sub>sb</sub>		2.729	2.714	2.667	2.641							
Sieve Size												
25.0	1"	100.0	100.0	100.0	100.0							
19.0	3/4"	100.0	100.0	100.0	100.0							
12.5	1/2"	87.9	100.0	100.0	94.6							
9.5	3/8"	52.5	100.0	100.0	86.8							
6.35	1/4"	3.8	75.2	100.0	68.0							
4.75	#4	2.3	40.9	100.0	57.1							
2.36	#8	1.3	5.2	78.9	38.8							
1.18	#16	1.3	2.1	50.2	27.6							
0.600	#30	1.3	1.4	32.7	20.6							
0.300	#50	1.2	1.3	22.3	14.9							
0.150	#100	1.2	1.3	16.0	11.3							
0.075	#200	0.8	0.9	11.7	7.6							

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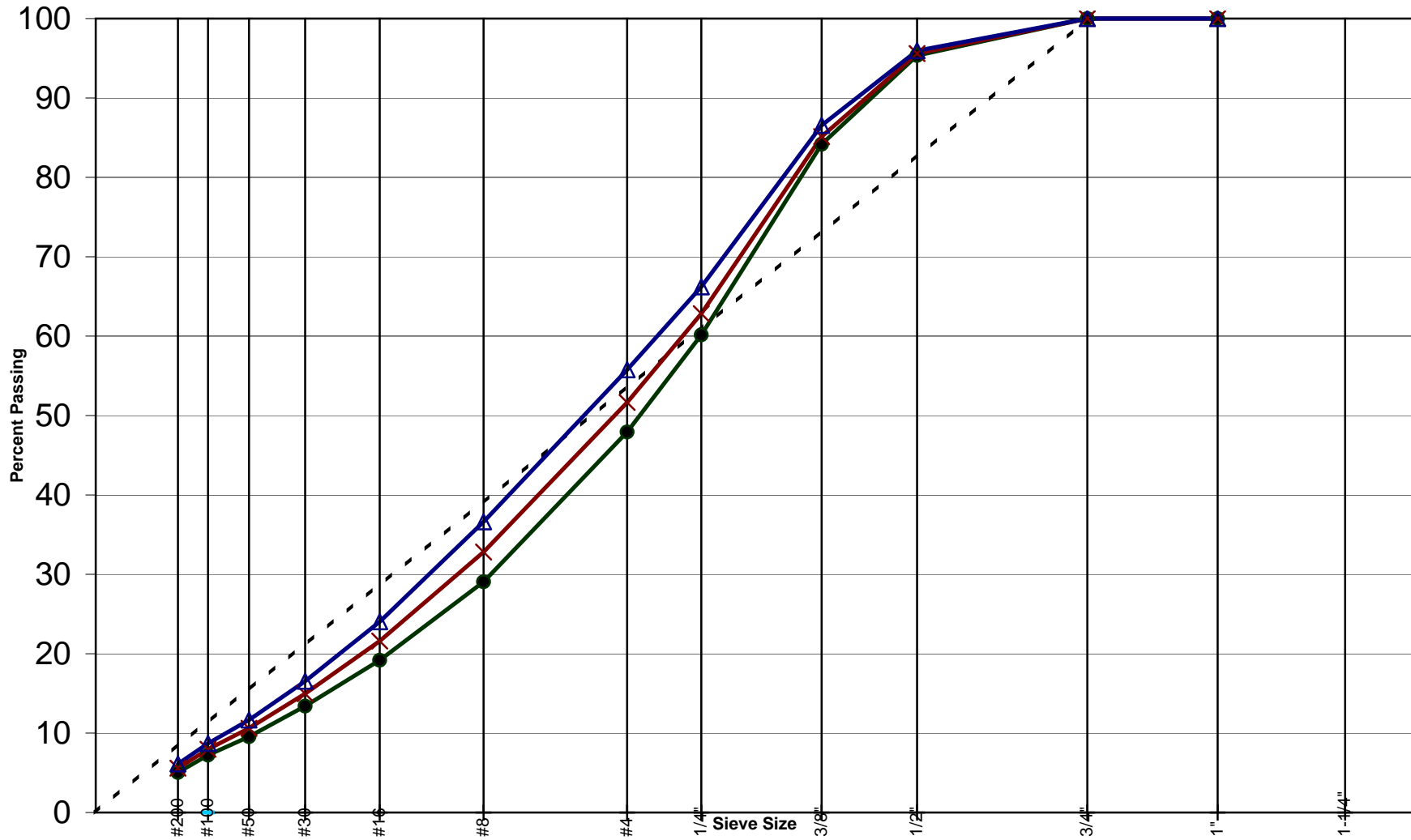
Stage 1 Trial Blends

							Dust Pull		0.0		
Stockpile	1/2" - #4	#4 - #8	#8 - 0	RAP			Coarse Blend	Dust Adjusted	CA & FA Ratios		
Percent	25.0	25.0	20.0	30.0							
Sieve Size											
25.0	1"	100.0	100.0	100.0	100.0		100.0	100.0			
19.0	3/4"	100.0	100.0	100.0	100.0		100.0	100.0			
12.5	1/2"	87.9	100.0	100.0	94.6		95.3	95.3	CA		
9.5	3/8"	52.5	100.0	100.0	86.8		84.2	84.2	0.781		
6.35	1/4"	3.8	75.2	100.0	68.0		60.2	60.2			
4.75	#4	2.3	40.9	100.0	57.1		47.9	47.9	FA		
2.36	#8	1.3	5.2	78.9	38.8		29.1	29.1	0.346		
1.18	#16	1.3	2.1	50.2	27.6		19.2	19.2	0.401		
0.600	#30	1.3	1.4	32.7	20.6		13.4	13.4	0.460		
0.300	#50	1.2	1.3	22.3	14.9		9.6	9.6	0.500		
0.150	#100	1.2	1.3	16.0	11.3		7.2	7.2	0.537		
0.075	#200	0.8	0.9	11.7	7.6		5.0	5.0	0.521		
G <sub>sb</sub>	2.686	G <sub>sa</sub>	2.838						FA Average		0.461
							FA Std. Dev.		0.075		

							Dust Pull		0.0		
Stockpile	1/2" - #4	#4 - #8	#8 - 0	RAP			Medium Blend	Dust Adjusted	CA & FA Ratios		
Percent	23.0	22.0	25.0	30.0							
Sieve Size											
25.0	1"	100.0	100.0	100.0	100.0		100.0	100.0			
19.0	3/4"	100.0	100.0	100.0	100.0		100.0	100.0			
12.5	1/2"	87.9	100.0	100.0	94.6		95.6	95.6	CA		
9.5	3/8"	52.5	100.0	100.0	86.8		85.1	85.1	0.806		
6.35	1/4"	3.8	75.2	100.0	68.0		62.8	62.8			
4.75	#4	2.3	40.9	100.0	57.1		51.7	51.7	FA		
2.36	#8	1.3	5.2	78.9	38.8		32.8	32.8	0.385		
1.18	#16	1.3	2.1	50.2	27.6		21.6	21.6	0.418		
0.600	#30	1.3	1.4	32.7	20.6		15.0	15.0	0.457		
0.300	#50	1.2	1.3	22.3	14.9		10.6	10.6	0.491		
0.150	#100	1.2	1.3	16.0	11.3		8.0	8.0	0.533		
0.075	#200	0.8	0.9	11.7	7.6		5.6	5.6	0.528		
G <sub>sb</sub>	2.683	G <sub>sa</sub>	2.838						FA Average		0.469
							FA Std. Dev.		0.060		

							Dust Pull		0.0		
Stockpile	1/2" - #4	#4 - #8	#8 - 0	RAP			Fine Blend	Dust Adjusted	CA & FA Ratios		
Percent	20.0	20.0	30.0	30.0							
Sieve Size											
25.0	1"	100.0	100.0	100.0	100.0		100.0	100.0			
19.0	3/4"	100.0	100.0	100.0	100.0		100.0	100.0			
12.5	1/2"	87.9	100.0	100.0	94.6		96.0	96.0	CA		
9.5	3/8"	52.5	100.0	100.0	86.8		86.5	86.5	0.876		
6.35	1/4"	3.8	75.2	100.0	68.0		66.2	66.2			
4.75	#4	2.3	40.9	100.0	57.1		55.8	55.8	FA		
2.36	#8	1.3	5.2	78.9	38.8		36.6	36.6	0.423		
1.18	#16	1.3	2.1	50.2	27.6		24.0	24.0	0.430		
0.600	#30	1.3	1.4	32.7	20.6		16.5	16.5	0.451		
0.300	#50	1.2	1.3	22.3	14.9		11.7	11.7	0.488		
0.150	#100	1.2	1.3	16.0	11.3		8.7	8.7	0.527		
0.075	#200	0.8	0.9	11.7	7.6		6.1	6.1	0.521		
G <sub>sb</sub>	2.681	G <sub>sa</sub>	2.837						FA Average		0.473
							FA Std. Dev.		0.045		

# 0.45 Power Chart



**STAGE 1: Analysis of Compacted Paving Mixture (Preliminary Trial)**

Mixing Temp, °F	302 - 310 F	Stockpile	Specific Gravity	Coarse	Medium	Fine	
Compaction Temp, °F	280 - 289 F	1/2" - #4	2.729	25%	23%	20%	
Design Gyration	80	#4 - #8	2.583	25%	22%	20%	
		#8 - 0	2.542	20%	25%	30%	
		RAP	2.641	30%	30%	50%	
Percent AC in RAP	6.09	Asphalt	1.027	6.00	6.00	6.00	
1. SSD Maximum Specific Gravity (G <sub>mm</sub> ) Total Mixture				2.497	2.496	2.496	
2. Bulk Specific Gravity (G <sub>mb</sub> ), Compacted Mix				2.393	2.400	2.404	
3. Bulk Specific Gravity (G <sub>sb</sub> ), Total Aggregate				2.686	2.683	2.681	
4. Effective Specific Gravity (G <sub>se</sub> ), Total Aggregate				2.748	2.747	2.747	
5. Apparent Specific Gravity (G <sub>sa</sub> ), Total Aggregate				2.838	2.838	2.837	
6. Air Voids (V <sub>a</sub> ), %				4.2	3.8	3.7	
7. Voids in Mineral Aggregate (VMA)				16.3	15.9	15.7	
8. Voids Filled with Asphalt (VFA), %				74	1	76	
9. Absorbed Asphalt (P <sub>ba</sub> ) % By Weight, Total Aggregate				0.86	0.89	0.92	
10. Effective Asphalt Content (P <sub>be</sub> ), %				5.19	5.16	5.14	
11. Virgin Binder Replacement, % By Weight, Total Binder				30.5	30.5	30.5	
12. P200 (Actual)				5.0	5.6	6.1	
13. P200/P <sub>be</sub> Ratio				1.0	1.1	1.2	

**Compacted Bulk Specific Gravity (G<sub>mb</sub>)**

Specimen	Coarse		Medium		Fine	
	1	2	1	2	1	2
Final Height	116.2	116.5	115.0	114.9	115.4	115.7
A. Mass in Air	4788.5	4722.5	4735.8	4738.8	4737.5	4737.9
C. Weight in Water	2802.2	2762.5	2772.9	2768.0	2769.8	2774.5
B. Mass SSD	4802.0	4736.8	4743.7	4745.8	4743.0	4742.2
D. Immersed Volume	1999.8	1974.3	1970.8	1977.8	1973.2	1967.7
E. Geometric Volume	2101.8	2066.5	2031.2	2029.4	2038.3	2043.6
F. Imm/Geom. Ratio	0.951	0.955	0.970	0.975	0.968	0.963
G <sub>ma</sub> - G <sub>mb</sub>	0.016	0.017	0.010	0.010	0.009	0.007
G <sub>ma</sub> (A/A-C)	2.411	2.409	2.413	2.405	2.408	2.415
G <sub>mb</sub> [(A/B)-C]	2.394	2.392	2.403	2.396	2.401	2.407
G <sub>mb</sub> Average	2.393		2.400		2.404	

**Volumetrics Normalized to 4.0% Air Voids (SSD G<sub>mm</sub>)**

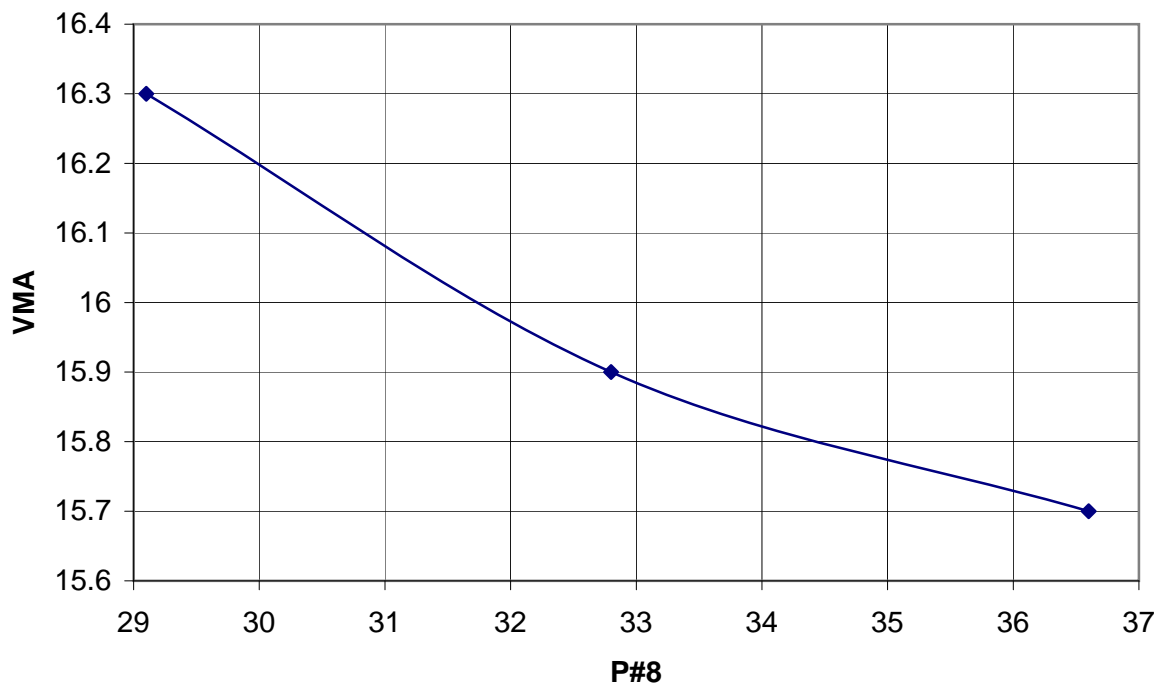
Blend	Coarse	Medium	Fine	JMF Criteria
P <sub>b</sub>	6.1	5.9	5.9	
V <sub>a</sub>	4.0	4.0	4.0	4
VMA	16.3	15.9	15.7	14 - 16
VFA	75	75	75	65 - 75
P <sub>be</sub>	5.29	5.11	4.98	
Virgin Repl %	30.0	31.0	31.0	
P200/P <sub>be</sub>	1.0	1.1	1.2	0.8 - 1.6

**Maximum Specific Gravity (G<sub>mm</sub>)**

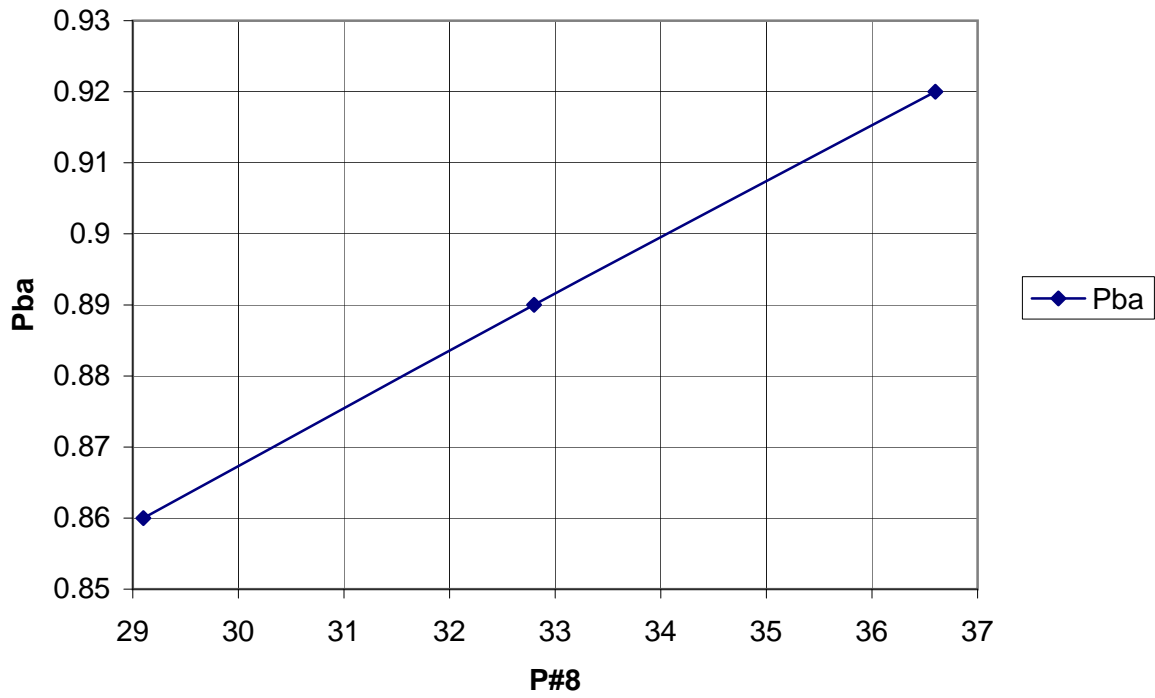
Blend	Coarse	Medium	Fine
Pycnometer+Lid+Mix	4598.9	4597.7	4594.8
Pycnometer+Lid	3047.3	3047.3	347.3
Mass of Dry Sample	1551.6	1550.4	1547.4
Mass of SSD Sample	1553.1	1551.5	1549.1
Pycnometer+Lid+Water	7428.6	7428.6	7428.6
Pycnometer+Lid+Water+Mix	8360.4	8359.0	8357.8
<b>G<sub>mm</sub></b>	<b>2.503</b>	<b>2.501</b>	<b>2.503</b>
<b>SSD G<sub>mm</sub></b>	<b>2.497</b>	<b>2.496</b>	<b>2.496</b>

Certified Technician and Card Number: John Doe 49999

Stage 1 - VMA vs P#8



Stage 1 - Pba vs. P#8



**JMF - BATCH VERIFICATION**

SIEVE SIZE	MASS 1	MASS 2	TOTAL MASS	Virgin %		RAP %		TARGET	TOLERANCE	SIEVE SIZE
				% RET	% PASS	RAP % PASS	COMBINED % PASS			
3/4"	0.0		0.0	0.0	100.0	100.0	100.0	100.0	98.5 - 100.0	3/4"
1/2"	81.1		81.1	4.0	96.0	94.6	95.5	96.0	94.5 - 97.5	1/2"
3/8"	168.4		168.4	8.4	87.6	86.8	87.3	86.5	85.0 - 88.0	3/8"
1/4"	409.6		409.6	20.4	67.1	68.0	67.4	66.2	64.7 - 67.7	1/4"
#4	203.5		203.5	10.1	57.0	57.1	57.0	55.8	54.3 - 57.3	#4
#8	403.2		403.2	20.1	36.9	38.8	37.5	36.6	35.6 - 37.6	#8
#16	276.5		276.5	13.8	23.1	27.6	24.4	24.0	23.0 - 25.0	#16
#30	183.2		183.2	9.1	13.9	20.6	16.0	16.5	15.5 - 17.5	#30
#50	98.7		98.7	4.9	9.0	14.9	10.8	11.7	10.7 - 12.7	#50
#100	25.2		25.2	1.3	7.8	11.3	8.8	8.7	8.2 - 9.2	#100
#200	36.9		36.9	1.8	5.9	7.6	6.4	6.1	5.6 - 6.6	#200
PAN			5							

TOTAL MASS (g) 1891.3

INIT. DRY MASS (g) 2005.0

DRY WASHED MASS (g) 1888.5

SIEVE LOSS % -0.15%

**STAGE 2 TESTING**

**AASHTO T-209: Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures**

Percent Asphalt Content ( $P_b$ )	5.5	6.0	
Pycnometer + Lid + Mix	4588.3	4598.6	
Pycnometer + Lid	3047.4	3047.3	
Mass of Dry Sample	1540.9	1551.3	
Mass of SSD Sample	1543.1	1552.7	
Pycnometer + Lid + Water	7428.6	7428.6	
Pycnometer + Lid + Water + Mix	8359.4	8359.0	
Non-Dryback Maximum Specific Gravity ( $G_{mm}$ )	2.526	2.498	
Non-Dryback Effective Specific Gravity ( $G_{se}$ )	2.761	2.749	
SSD Maximum Specific Gravity (SSD $G_{mm}$ )	2.517	2.493	
SSD Effective Specific Gravity ( $G_{se}$ )	2.749	2.743	
Gse Difference	0.012		
Average $G_{se}$ Non-Dryback	2.755		

**Back-Calculated Design Maximum Specific Gravity Determination**

$P_b$	$P_s$	$G_{se}$	$G_b$	$G_{mm}$
5.0	95.0	2.755	1.027	2.541
5.5	94.5	2.755	1.027	2.522
6.0	94.0	2.755	1.027	2.502
6.5	93.5	2.755	1.027	2.483
6.0	94.0	2.755	1.027	2.502

**AASHTO T 166/275: Bulk Specific Gravity of Compacted Hot Mix Asphalt (HMA)**

Mixing Temp, °F		319 - 327 F			Gyrations				
Compaction Temp, °F		295 - 304 F			80				
% AC	Height	Dry Mass	Wt. in H <sub>2</sub> O	SSD Mass	$G_{mb}$	Voids	Immersed to Geom. Ratio	$G_{ma}$	$G_{ma} - G_{mb}$
5.0	116.1	4702.7	2725.3	4729.0	2.347	7.6	0.977	2.378	0.031
5.0	115.9	4698.2	2717.9	2719.9	2.347	7.6	0.977	2.372	0.025
<b>Average</b>					<b>2.347</b>	7.6			
5.5	116.2	4721.1	2750.0	4731.8	2.382	5.6	0.965	2.395	0.013
5.5	116.7	4723.4	2745.6	4737.0	2.372	5.9	0.966	2.388	0.016
<b>Average</b>					<b>2.377</b>	5.7			
6.0	115.6	4732.0	2773.8	4742.9	2.403	4.0	0.964	2.417	0.014
6.0	115.6	4735.2	2773.6	4744.2	2.403	4.0	0.965	2.414	0.011
<b>Average</b>					<b>2.403</b>	4.0			
6.5	114.5	4755.9	2791.7	4764.1	2.411	2.9	0.975	2.421	0.010
6.5	114.6	4750.9	2793.0	4755.5	2.421	2.5	0.969	2.427	0.006
<b>Average</b>					<b>2.416</b>	2.7			

**STAGE 2: Analysis of Compacted Paving Mixture (Superpave Method)**

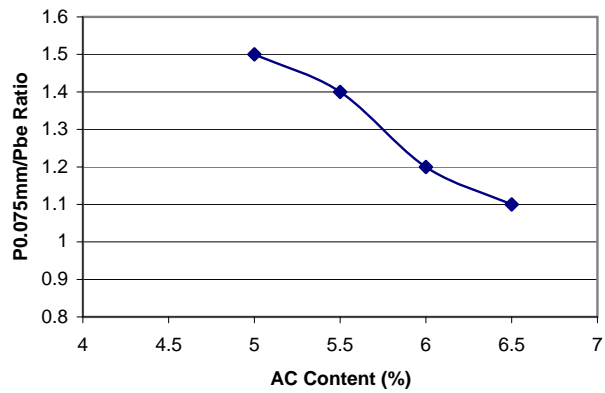
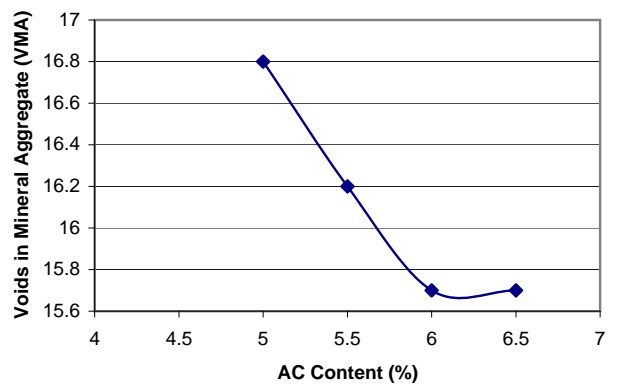
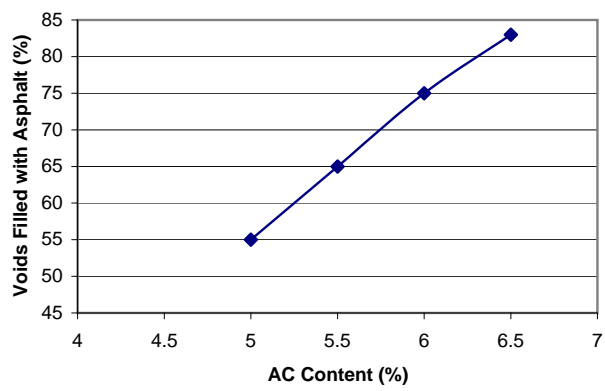
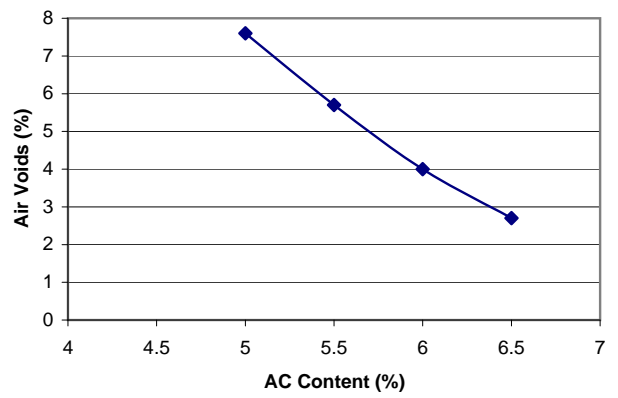
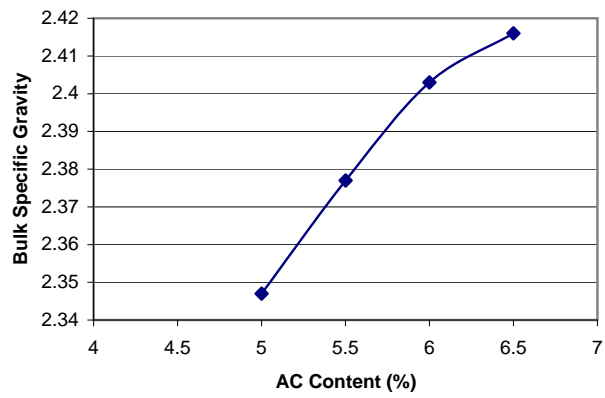
Stockpile	Blend %	Specific Gravity	Mixing Temp, °F	302 - 310 F	
1/2" - #4	20	2.729	Compaction Temp, °F	279 - 288 F	
#4 - #8	20	2.714	Design Gyration	80	
#8 - 0	30	2.667	Air Voids Designed to, %	4.0	
RAP	30	2.641	Dryback Rices / G <sub>mm</sub> (YES / NO)		
Asphalt Cement, G <sub>b</sub>		1.027			
Percent AC in RAP	6.09		Mix Composition, % By Weight of Total Mix, P <sub>b</sub>		
P <sub>b</sub> Contributed by RAP	1.83		5.0	5.5	6.0
			6.5	6.0	6.0
1. Bulk Specific Gravity (G <sub>mb</sub> ), Compacted Mix			2.347	2.377	2.403
2. Maximum Specific Gravity (G <sub>mm</sub> ) Total Mixture			2.541	2.522	2.502
3. Bulk Specific Gravity (G <sub>sb</sub> ), Total Aggregate			2.681	2.681	2.681
4. Effective Specific Gravity (G <sub>se</sub> ), Total Aggregate			2.755	2.755	2.755
5. Apparent Specific Gravity (G <sub>sa</sub> ), Total Aggregate			2.838	2.838	2.838
6. Air Voids (V <sub>a</sub> ), %			7.6	5.7	4.0
7. Voids in Mineral Aggregate (VMA)			16.8	16.2	15.7
8. Voids Filled with Asphalt (VFA), %			55	65	75
9. Absorbed Asphalt (P <sub>ba</sub> ) % By Weight, Total Aggregate			1.03	1.03	1.03
10. Effective Asphalt Content (P <sub>be</sub> ) % By Weight			4.0	4.5	5.0
11. Virgin Binder Replacement, % By Weight, Total Binder			36.5	33.2	30.5
12. P200 (Actual)			6.1	6.1	6.1
13. P200/P <sub>be</sub> Ratio			1.5	1.4	1.2

Optimum Asphalt Content

**Aggregate Blend**

					Dust Pull	0.0	
Sieve Size	1/2" - #4	#4 - #8	#8 - 0	RAP	Blend	Dust Adjusted	Bailey Ratios
25.0mm ( 1" )	100.0	100.0	100.0	100.0	100.0	100	
19.0mm ( 3/4" )	100.0	100.0	100.0	100.0	100.0	100	
12.5mm ( 1/2" )	87.9	100.0	100.0	94.6	96.0	96	<b>CA</b>
9.5mm ( 3/8" )	52.5	100.0	100.0	86.8	86.5	86.5	0.876
6.35mm ( 1/4" )	3.8	75.2	100.0	68.0	66.2	66.2	
4.75mm ( #4 )	2.3	40.9	100.0	57.1	55.8	55.8	<b>FA</b>
2.36mm ( #8 )	1.3	5.2	78.9	38.8	36.6	36.6	0.423
1.18mm ( #16 )	1.3	2.1	50.2	27.6	24.0	24	0.430
0.600mm ( #30 )	1.3	1.4	32.7	20.6	16.5	16.5	0.451
0.300mm ( #50 )	1.2	1.3	22.3	14.9	11.7	11.7	0.488
0.150mm ( #100 )	1.2	1.3	16.0	11.3	8.7	8.7	0.527
0.075mm ( #200 )	0.8	0.9	11.7	7.6	6.1	6.1	0.521
					<b>FA Average</b>		0.473
					<b>FA Std Dev.</b>		0.045

Certified Technician and Card Number: John Doe 49999



**STAGE 3 - TSR's**

**AASHTO T-283: Resistance of Compacted Bituminous Mixture to Moisture Induced Damage**

Compaction Temp: 302 - 310 F

Sample:

%AC: 6.0

Blows / Gyration: 30 Blows Average

G<sub>mm</sub>: 2.502

Sample Number	1	2	3	4	5	6	7	8
Diameter, in	4.000	3.999	3.999	3.998	3.999	4.000		
Height, in	2.587	2.562	2.570	2.590	2.560	2.563		
Weight in Air, g	1194.5	1194.9	1193.4	1193.3	1197.1	1194.8		
SSD Weight, g	1199.3	1197.6	1197.3	1196.8	1201.6	1198.1		
Weight in Water, g	686.6	684.7	684.4	681.9	686.9	685.4		
Volume, cm <sup>3</sup>	512.7	512.9	512.9	514.9	514.7	512.7		
Bulk Specific Gravity, G <sub>mb</sub>	2.330	2.330	2.327	2.318	2.326	2.330		
% Voids (7.0% +/- 0.5%)	6.90	6.90	7.00	7.40	7.00	6.90		
Volume of Air Voids	35.4	35.4	35.9	38.1	36.0	35.4		
Test Condition Wet (W) or Dry (D)	W	D	D	W	D	W		

Average

7.00

Wet Condition Average Voids:

Dry Condition Average Voids:

Desired Wt. Gain	26.5			28.6		26.5		
Target Saturation Weight	1221.0			1221.9		1221.3		

Weight After Saturation	1220.9			1222.1		1221.1		
Volume of Absorbed Water	26.4			28.8		26.3		
% Saturation (70% - 80%)	74.6			75.6		74.3		

Average

74.8

P, Load for Dry Sample, lbs		2725	2686		2743			
S <sub>dry</sub> = 2P / (t x D x π)		169.4	166.5		170.7			

Average

168.9

P', Load for Wet Sample, lbs	2621			2479		2640		
S <sub>wet</sub> = 2'P / (t x D x π)	161.3			152.5		164.0		

Average

159.3

Tensile Strength Ratio, % = (S<sub>wet</sub>/S<sub>dry</sub>) x 100: 94.3

Visual Stripping Rating 0-5: 1

0 = No Stripping

5 = Significant Stripping

Comments: