

Control Section: PW-7017 Puritan & Grand River						Job Number: PW-7017 Puritan & Grand River						
Contractor: Cadillac Asphalt, LLC						Route & Location: PW-7017 Puritan & Grand River						
Plant Number: 40-03						Plant Location: Dix						
Bituminous Mixture: 4E3 - 53139												
PIT NAME		Burmeister	Drake	Newport	Drake			Plt	Plt	CONTROL POINTS	COMBINED GRADATION	
PIT NUMBER		81-93	81-92	58-11	81-92			40-03	40-03			
AGGREGATE TYPE		2NS	M.Sand	L.Sand	5/8 x 3/8			BHF	RAP			
BLEND % (10% Minimum)		25.0	18.2	16.0	18.0			0.8	22.0			
		25.0	19.0	16.0	18.0				22.0			
AVERAGE GRADATION	P 1 1/2 (37.5 mm)	100.0	100.0	100.0	100.0			100.0	100.0		100.0	
	P 1 in. (25.0 mm)	100.0	100.0	100.0	100.0			100.0	100.0		100.0	
	P 3/4 in. (19.0 mm)	100.0	100.0	100.0	99.7			100.0	100.0	100.0	99.9	
	P 1/2 in. (12.5 mm)	100.0	100.0	100.0	51.0			100.0	98.0	90-100	90.7	
	P 3/8 in. (9.5 mm)	100.0	100.0	94.1	10.0			100.0	92.8	90 Max	81.3	
	P NO. 4 (4.75 mm)	96.0	91.3	59.7	1.4			100.0	76.1		68.0	
	P NO. 8 (2.36 mm)	75.9	55.0	33.6	1.2			100.0	60.7	39-58	48.7	
	P NO. 16 (1.18 mm)	51.7	30.6	17.9	1.1			100.0	47.6		32.8	
	P NO. 30 (600 um)	30.2	17.2	8.9	1.0			100.0	36.6		21.1	
	P NO. 50 (300 um)	13.2	9.1	6.1	0.9			99.0	24.8		12.3	
	P NO. 100 (150 um)	5.3	4.5	5.7	0.8			95.0	14.8		7.2	
	TOTAL P NO. 200 (75 um)	2.6	3.1	5.0	0.7			90.0	10.0	2 - 10	5.1	
Crush Count 1 / 2 Face		24	94.9/92.7	100	97				92.9	75 Min	95.6	
L.A. Abrasion Year / Value		20 16	18 15	29 19	18 15			N A	N A	35 Max	< 35	
NAA ANGULARITY INDEX (METHOD A)		41	46.2	47					46.3	43 Min	43.0	
AWI Nomograph & Quarries		235	301	243	302				240	260 Min	274	
COARSE AGGREGATE BULK SPECIFIC GRAVITY #4 UP					2.675				2.723		2.660	
COARSE AGGREGATE BULK SPECIFIC GRAVITY #8			2.647						Combined Gsb		2.668	
FINE AGGREGATE BULK SPECIFIC GRAVITY		2.65	2.647	2.577					2.723		2.644	
FLAT & ELONGATED %					0.9					10 Max		
SOFTSTONE %			0.3		0.6					5 Max		
ASPHALT CEMENT SUPPLIER			MPM Oil Monroe, MI ABS 6505					GRADE		64-28	SPECIFIC GRAVITY	1.029
SUBMITT ED BY:	NAME (Print or Type) Shelly Moultrup							DATE March 3, 2021		PHONE NUMBER 248-640-1960		
	SIGNATURE							LAB NO.		FAX NUMBER		
AC Content		Gmm						Gmb				
5.95		2.472						2.398				
VMA		Air Voids						VFA				
15.46		3.00						80.6				

RAP STOCKPILE SUMMARY DATA SHEET

Cumulative Tonnage	<u>31000</u>
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Comments	
Gsb - 2.723	

Tested by: D, Arnold / S. Moses

SUBMITTED SUPERPAVE MIX DESIGN SUMMARY SHEET

Contractor:		Consultant:	
Cadillac Asphalt, LLC			
Control Section:	Job Number:	Mix Type:	
PW-7017 Puritan & Grand River	PW-7017 Puritan & Grand River	4E3 - 53139	
N_{INT}	N_{DES}	N_{MAX}	
7	86	134	
Mixing Temp (F)			Compaction Temp (F)
295 - 305			270 - 280

SUPERPAVE MIX PROPERTIES AT TESTED & OPTIMUM ASPHALT CONTENT

ITEM	TEST POINTS				RECOMMENDED OPTIMUM Regression Value at Optimum Asphalt Content	VERIFICATION TEST RESULTS @ N _{MAX}
	4 POINT DESIGN					
	FINAL		BLEND			
ASPHALT CONTENT (%)	4.5	5.0	5.5	6.0	5.50	5.50
BULK SPECIFIC GRAVITY @ N _{DES}	2.347	2.365	2.389	2.397	2.388	2.389
BULK SPECIFIC GRAVITY @ N _{MAX}						2.418
THEORETICAL MAXIMUM (S.G.)	2.523	2.508	2.486	2.474	2.488	2.488
AIR VOIDS (%) @ N _{DES}	7.00	5.71	3.90	3.12	4.00	3.98
VOIDS IN MINERAL AGGREGATE % (VMA) @ N _{DES}	16.04	15.65	15.48	15.52	15.39	15.37
VOIDS FILLED WITH ASPHALT % (VFA) @ N _{DES}	55.4	64.7	73.4	81.2	74.01	
% G _{mm} @ N _{INT}	86.5	87.6	89.3	89.9		88.7
% G _{mm} @ N _{DES}	93.0	94.3	96.1	96.9	96.0	96.0
% G _{mm} @ N _{MAX}						97.2
FINES/EFF ASPHALT RATIO	1.30	1.15	1.03	0.94	1.03	

The submitted superpave mix design final blend shall have a minimum of 4 test points at 0.5 percent asphalt content increments. At least one full asphalt content (0.5%) above and below optimum asphalt content is required.

ASPHALT CONTENT OF SUBMITTED SUPERPAVE MIX DESIGN

5.50

ASPHALT SPECIFIC GRAVITY

1.029

SPECIFIC GRAVITY OF COMBINED AGGREGATE G_{sb}

2.668

THEORETICAL MAXIMUM SPECIFIC GRAVITY OF BITUMINOUS PAVING MIXTURES ASTM D2041 (RICE METHOD)

PROJECT NUMBER PW-7017 Purita-7017 Puritan & Grand River	MIX DESIGN NUMBER
CONTRACTOR Cadillac Asphalt, LLC	4E3 - 53139

% ASPHALT BINDER		4.5	5.0
ASPHALT SPECIFIC GRAVITY		1.029	1.029
SAMPLE and BOWL WEIGHT in AIR, g	A	2100.0	2100.0
BOWL WEIGHT in AIR, g	B		
SAMPLE WEIGHT in AIR, g	C=A-B	2100.0	2100.0
SAMPLE and BOWL in WATER,g	D	2652.5	2719.7
BOWL in WATER,g	E	1384.8	1456.9
SAMPLE in WATER,g	F=D-E	1267.7	1262.8
VOLUME, cc	G=C-F	832.3	837.2
Gmm	C/G	2.523	2.508
Gse		2.708	2.714

% ASPHALT BINDER		5.5	6.0
ASPHALT SPECIFIC GRAVITY		1.029	1.029
SAMPLE and BOWL WEIGHT in AIR, g	A	2251.4	2100.0
BOWL WEIGHT in AIR, g	B		
SAMPLE WEIGHT in AIR, g	C=A-B	2251.4	2100.0
SAMPLE and BOWL in WATER,g	D	2730.6	2635.9
BOWL in WATER,g	E	1384.8	1384.8
SAMPLE in WATER,g	F=D-E	1345.8	1251.1
VOLUME, cc	G=C-F	905.6	848.9
Gmm	C/G	2.486	2.474
Gse		2.709	2.717
AVERAGE Gse		2.712	

Source Of Asphalt Cement: MPM Oil Monroe MI ABS 6505	Date Tested: March 3, 2021
Tester: B.Jajou	Checked By: Shelly Moultrup

GYRATORY COMPACTED BULK SPECIFIC GRAVITY WORKSHEET

Job Number:	Date:	Mix Design Number:
PW-7017 Puritan & Grand River	03/03/21	
Contractor:		Mix Type:
Cadillac Asphalt, LLC		4E3 - 53139

	SAMPLE	A	B	C	D	E
		WEIGHT IN AIR	SSD WEIGHT	WEIGHT IN WATER	VOLUME OF SAMPLE (B-C)	ACTUAL SPEC. GRAVITY (A/D)

 ASPHALT
%

 FOUR POINT DESIGN COMPACTED TO N_{DES}

4.5	A	4722.2	4737.3	2726.1	2011.2	2.348
	B	4712.4	4729.8	2720.3	2009.5	2.345
					AVERAGE	2.347

 ASPHALT
%

5	A	4743.5	4753.1	2746.2	2006.9	2.364
	B	4741.4	4753.7	2750.4	2003.3	2.367
					AVERAGE	2.365

 ASPHALT
%

5.5	A	4759.6	4762.4	2766.9	1995.5	2.385
	B	4762.2	4765.9	2776.0	1989.9	2.393
					AVERAGE	2.389

 ASPHALT
%

6.0	A	4779.8	4783.3	2789.7	1993.6	2.398
	B	4778.4	4783.1	2788.3	1994.8	2.395
					AVERAGE	2.397

 ASPHALT
%

 VERIFICATION SPECIMEN COMPACTED AT OPTIMUM ASPHALT CONTENT TO N_{MAX}

5.5	1	4798.4	4799.2	2815	1984.2	2.418
					AVERAGE	2.418

Tester:	Checked By:
B.Jajou	Shelly Moultrup

COARSE AGGREGATE GRAVITY

Control Section:	Job Number:	Mix Design Number:
PW-7017 Puritan & Grand River	PW-7017 Puritan & Grand River	40-03
Contractor:		Mix Type:
Cadillac Asphalt LLC		4E3 - 53139

TEST NUMBER	1			
BUCKET ID	1			
PAN ID	A			
A. SSD Agg. + Bucket	4376.2			
B. Weight of Bucket	2314.1			
C. = Weight of SSD Agregate (A - B)	2062.1			
D. Weight of SSD Agg. + Bucket in H ₂ O	2752.4			
E. Weight of Bucket in H ₂ O	1456.9			
F. = Weight of SSD Agg. In H ₂ O (D - E)	1295.5			
G. Weight of Pan + Oven Dry Aggregate	2652.8			
H. Weight of Pan	614.0			
J. = Weight of Oven Dry Aggregate (G-H)	2038.8			
C - F (SSD Volume)	766.6			
J - F (Dry Agg. - Dry Weight)	743.3			
C - J (SSD - Dry Weight)	23.3			
				AVERAGE
Bulk Dry S.G. = J/(C - F)	2.660			2.660
Bulk SSD S.G. = C/(C - F)	2.690			2.690
Apparent S.G. = J/(J - F)	2.743			2.743
Absorption, % = [(C - J) / J] x 100	1.14			1.14

REMARKS:

TEST PERFORMED BY: B.Jajou

FINE AGGREGATE GRAVITY

CONTROL SECTION I.D.		JOB NO.		MIX DESIGN #	
PW-7017 Puritan & Grand River		PW-7017 Puritan & Grand River		40-03	
CONTRACTOR			MIXTURE TYPE		
Cadillac Asphalt LLC			4E3 - 53139		
TEST NUMBER	1				
FLASK NUMBER	A				
PAN NUMBER	1				
A. Weight of Flask + SSD Agg.	752.7				
B. Weight of Flask	248.6				
C. = Weight of SSD Aggregate (A - B)	504.1				
D. Weight of Flask + SSD Agg. + H ₂ O	1560.9				
E. Weight of Flask + H ₂ O	1244.6				
F. = Weight of SSD Agg. In H ₂ O (D - E)	316.3				
G. Weight of Pan + Oven Dry Aggregate	1362.8				
H. Weight of Pan	866.2				
J. = Weight of Oven Dry Aggregate (G-H)	496.6				
C - F (SSD Volume)	187.8				
J - F (Dry Agg. - Dry Weight)	180.3				
C - J (SSD - Dry Weight)	7.5				AVERAGE
Bulk Dry S.G. = J/(C - F)	2.644	#DIV/0!			2.644
Bulk SSD S.G. = C/(C - F)	2.684	#DIV/0!			2.684
Apparent S.G. = J/(J - F)	2.754	#DIV/0!			2.754
Absorption, % = [(C - J) / J] x 100	1.5	#DIV/0!			1.510

REMARKS:

TEST PERFORMED BY: B.Jajou

Cadillac Asphalt LLC

Contractor Furnished Mix Design

Asphalt Cement, %	Actual Bulk Pt.	Actual TMD	Bulk S.P. Gravity	Max. SP. Gravity	Air Voids , %	V.F.A.	Gsb V.M.A.	Effective A/C	F/eff A
4.2			2.329	2.538	8.24	49.68	16.37	3.6	1.41
4.3			2.335	2.534	7.87	51.58	16.25	3.7	1.37
4.4			2.340	2.530	7.51	53.47	16.14	3.8	1.33
4.5	2.347	2.523	2.345	2.526	7.16	55.36	16.04	3.9	1.30
4.6			2.350	2.522	6.82	57.25	15.94	4.0	1.27
4.7			2.355	2.519	6.48	59.13	15.86	4.1	1.23
4.8			2.360	2.515	6.16	60.99	15.78	4.2	1.20
4.9			2.364	2.511	5.84	62.84	15.71	4.3	1.18
5.0	2.365	2.508	2.368	2.507	5.53	64.67	15.65	4.4	1.15
5.1			2.372	2.503	5.23	66.48	15.60	4.5	1.12
5.2			2.376	2.500	4.94	68.26	15.56	4.6	1.10
5.3			2.380	2.496	4.66	70.01	15.53	4.7	1.08
5.4			2.383	2.492	4.38	71.73	15.50	4.8	1.05
5.5	2.389	2.486	2.386	2.488	4.12	73.41	15.48	4.9	1.03
5.6			2.389	2.485	3.86	75.05	15.47	5.0	1.01
5.7			2.391	2.481	3.61	76.65	15.47	5.1	0.99
5.8			2.394	2.477	3.37	78.20	15.48	5.2	0.97
5.9			2.396	2.473	3.14	79.70	15.49	5.3	0.95
6.0	2.397	2.474	2.398	2.470	2.92	81.16	15.52	5.4	0.94
6.1			2.399	2.466	2.71	82.56	15.55	5.5	0.92
6.2			2.401	2.462	2.51	83.91	15.59	5.6	0.90
Gb	1.029		FAC RATIO	0.92					
Gse	2.712		Pba	0.63325					
Gsb	2.668								