

Aggregate Optimization Chart

Production Gradation Report

PLANT #: P11

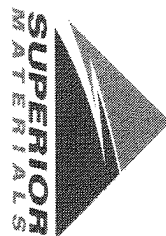
Sample Date: 10/30/23

Dates Test Represents: 10/31/2023 through 11/6/2023

Concrete Grade: S2M 3500HP

Contractor: _____

MDOT No.: _____



Superior Materials, LLC
30701 W. 10 Mile Rd.
Suite 500
Farmington Hills, MI 48336

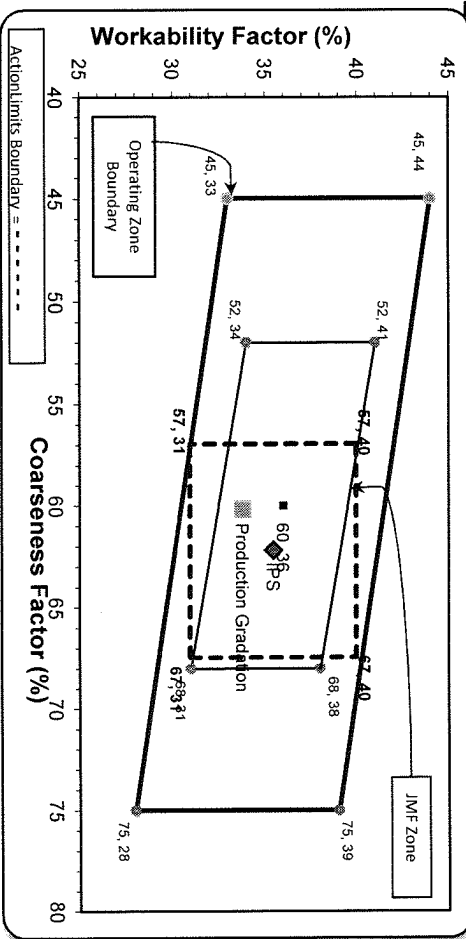
Agg. Class	Pit #	Source	Weight (SSD)	ft ³	Specific Gravity	Contribution %
6AA	71-47	Presque Isle	1400	8.56	2.62	45.9
26A	71-47	Presque Isle	420	2.57	2.62	13.8
2NS	95-013	Smelter Bay	1230	7.44	2.65	40.3
Total Wt			3050	18.57		100.0

Sieve	6AA	26A	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	100.0	100.0	100.0	100.0	0.0	0.0
1"	98.9	100.0	100.0	99.5	0.5	0.5
3/4"	74.9	100.0	100.0	88.5	11.0	11.5
1/2"	32.1	94.4	100.0	68.1	20.4	31.9
3/8"	18.2	83.4	100.0	60.2	7.9	39.8
#4	3.4	19.8	96.8	43.3	16.8	56.7
#8	1.9	6.0	79.6	33.8	9.5	66.2
#16	1.8	3.7	63.1	26.8	7.0	73.2
#30	1.7	3.0	47.0	20.1	6.6	79.9
#50	1.6	2.8	23.0	10.4	9.7	89.6
#100	1.5	2.6	5.2	3.2	7.2	96.8
LBW	1.1	2.5	0.7	1.1	2.0	98.9

Production Gradation

Batch Plant Gradations Aggregate Supplier Gradations

Coarseness Factor: 60 Workability Factor: 34



Initial Production Sample (IPS)

Sieve	Coarseness Factor:	Workability Factor:	Cumulative % Passing	% Retained	Cumulative % Retained
2"	62	35	100.0	0.0	0.0
1.5"			100.0	0.0	0.0
1"			100.0	0.0	0.0
3/4"			94.0	6.0	6.0
1/2"			70.2	23.7	29.8
3/8"			59.9	10.4	40.1
#4			42.7	17.2	57.3
#8			35.5	7.2	64.5
#16			28.4	7.0	71.6
#30			19.2	9.2	80.8
#50			8.9	10.3	91.1
#100			3.1	5.9	96.9
LBW			1.4	1.7	98.6

*Maximum % Retained must be above the 3/8" sieve.
 *Any two adjacent sieves must equal 10% except max.
 nom. max., #100 and #200 sieves.
 **% Retained must be at least 4% for each sieve except max.
 nom. max., #100 and #200 sieves.
 ***% Retained must be at least 4% for the 3/4" sieve when
 a 1.5" max. size (nom. Max. 1.0") aggregate is used.

PREPARED BY:
SM, LLC Technical Service

Approved By:

Mechanical Analysis Report

Material	Location	Sample Type	Sample Method	Sampled by	Sample Date	Time
6AA	Onsite Jefferson	QA	Bucket Blend	Douglas Storey	11/3/23	12:00 PM
Sample Weights						
Sieve	Retained Fractional	Percent Retained	Percentages Cumulative	Specification		
	Weight	Percent	Passing	Low Limit	High Limit	
2"	0	0.00	100.00			
1 1/2"	0	0.00	100.00			
1"	44	1.10	98.90			
3/4"	959	24.04	74.86			
x 5/8"		0.00	25.14			
1/2"	1705	42.73	32.13			
3/8"	556	13.93	18.20			
x 1/4"		0.00	81.80			
No. 4	590	14.79	3.41			
No. 8	60	1.50	1.90			
No. 16	6	0.15	1.75			
No. 30	3	0.08	1.68			
No. 50	3	0.08	1.60			
No. 100	4	0.10	1.50			
No. 200	9	0.23	1.28			
Pan	7	0.18	0.00			
LBW	44	1.10		Max Sieve	1/2"	
Total	3990	100.00				
Remarks:						
Sample Weights						
Initial Weight:			4148 gm			
Dry Weight:			3990 gm			
Washed Weight:			3946 gm			
Crushed Material						
Retained Sieve:			No. 4	Weight:	3854 gm	
Crushed Material:			gm %			
Deleterious Pick						
Retained Sieve:			No. 4	Weight:	3854 gm	
Soft Particles:			gm %			
Clay-Ironstone:			gm %			
Chert:			gm %			
Soft + Clay-Iron:			0 gm 0.0 %			
Total Deleterious:			0 gm 0.0 %			
Other Test Results						
Fineness Modulus:			6.95			
Moisture Content:			158 gm 4.0 %			
Loss by Wash:			44 gm 1.1 %			
Tested by: Douglas Storey						
Date:		11/4/23		Time:		12:00 PM

Mechanical Analysis Report

Material	Location	Sample Type	Sample Method	Sampled by	Sample Date	Time
26A	Onsite Jefferson	QA	Bin	Douglas Storey	10/31/23	12:00 PM
Sample Weights						
Sieve			Retained Fractional	Percent Retained	Percentages Cumulative	Specification
	Weight	Percent	Retained	Passing	Low Limit	High Limit
2"	0	0.00	0.00	100.00		
1 1/2"	0	0.00	0.00	100.00		
1"	0	0.00	0.00	100.00		
3/4"	0	0.00	0.00	100.00		
5/8"		0.00	0.00			
1/2"	131	5.57	5.57	94.43		
3/8"	259	11.02	16.60	83.40		
1/4"		0.00	16.60			
No. 4	1494	63.57	80.17	19.83		
No. 8	324	13.79	93.96	6.04		
No. 16	56	2.38	96.34	3.66		
No. 30	15	0.64	96.98	3.02		
No. 50	6	0.26	97.23	2.77		
No. 100	3	0.13	97.36	2.64		
No. 200	3	0.13	97.49	2.51		
Pan	1	0.04	97.53	0.00		
LBW	58	2.47			Max Sieve	No. 4
Total	2350	100.00				
Other Test Results						
Fineness Modulus:			5.79			
Moisture Content:			76 gm		3.2 %	
Loss by Wash:			58 gm		2.5 %	
Tested by:			Douglas Storey			
Date:		11/1/23		Time:		12:00 PM
Deleterious Pick						
Retained Sieve:			No. 4	Weight:	1884 gm	
Soft Particles:			gm		%	
Clay-Ironstone:			gm		%	
Chert:			gm		%	
Soft + Clay-Iron:			0 gm		0.0 %	
Total Deleterious:			0 gm		0.0 %	
Crushed Material						
Retained Sieve:			No. 4	Weight:	1884 gm	
Crushed Material:			gm		%	
Initial Weight:			2426 gm			
Dry Weight:			2350 gm			
Washed Weight:			2292 gm			

Remarks:

Mechanical Analysis Report

Material	Location	Sample Type	Sample Method	Sampled by	Sample Date	Time
2NS	Onsite Jefferson	QA	Bin	Douglas Storey	10/31/23	12:00 PM
Sample Weights						
Sieve	Retained Fractional	Percents Retained	Percents Cumulative	Low Limit	High Limit	
	Weight	Percent	Passing			
2"		0.00	0.00			
1 1/2"		0.00	0.00			
1"		0.00	0.00			
3/4"		0.00	0.00			
5/8"		0.00	0.00			
1/2"		0.00	0.00			
3/8"	0	0.00	0.00	100.00		
1/4"		0.00	0.00			
No. 4	17	3.18	3.18	96.82		
No. 8	92	17.23	20.41	79.59		
No. 16	88	16.48	36.89	63.11		
No. 30	86	16.10	53.00	47.00		
No. 50	128	23.97	76.97	23.03		
No. 100	95	17.79	94.76	5.24		
No. 200	23	4.31	99.06	0.94		
Pan	1	0.19	99.25	0.00		
LBW	4	0.75			Max Sieve	No. 50
Total	534	100.00				
Remarks:						
Sample Weights						
Initial Weight:		556 gm				
Dry Weight:		534 gm				
Washed Weight:		530 gm				
Crushed Material						
Retained Sieve:		No. 4	Weight:	17 gm		
Crushed Material:				gm %		
Deleterious Pick						
Retained Sieve:		No. 4	Weight:	17 gm		
Soft Particles:		gm		%		
Clay-Ironstone:		gm		%		
Chert:		gm		%		
Soft + Clay-Iron:		0 gm		0.0 %		
Total Deleterious:		0 gm		0.0 %		
Other Test Results						
Fineness Modulus:		2.85				
Moisture Content:		22 gm		4.1 %		
Loss by Wash:		4 gm		0.7 %		
Tested by: Douglas Storey						
Date:		11/1/23		Time:		12:00 PM

Aggregate Optimization Chart

Production Gradation Report

PLANT #: **P-32**

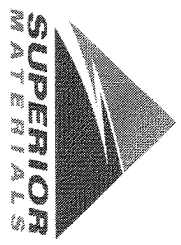
Sample Date: **10/30/23**

Dates Test Represents: **10/31/2023** through **11/6/2023**

Concrete Grade: **S2M, 3500HP**

Contractor: _____

MDOT No.: _____



Superior Materials, LLC
 30701 W. 10 Mile Rd.
 Suite 500
 Farmington Hills, MI 48336

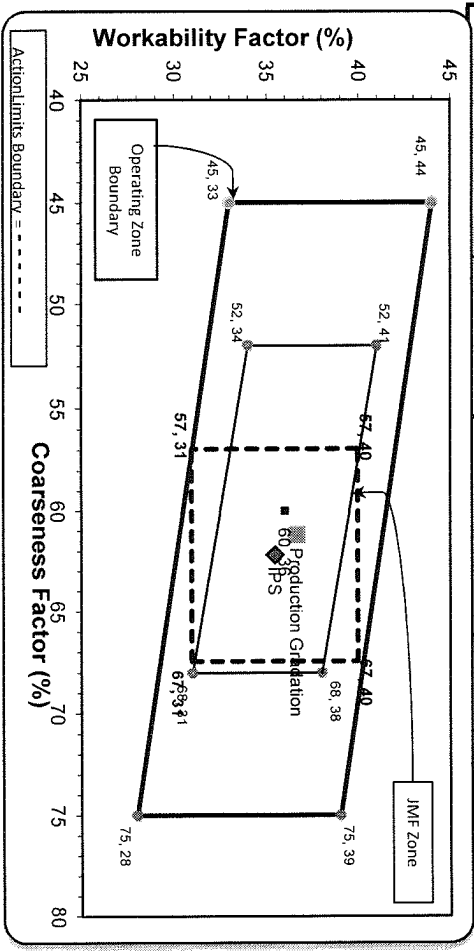
Agg. Class	Pit #	Source	Weight (ssd)	ft ³	Specific Gravity	% Contribution
6AA	71-47	Presque Isle	1400	8.56	2.62	45.9
26A	71-47	Presque Isle	420	2.57	2.62	13.8
2NS	95-013	Smelter Bay	1230	7.44	2.65	40.3
		Total Wt	3050			100.0

Sieve	6AA	26A	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	100.0	100.0	100.0	100.0	0.0	0.0
1"	97.5	100.0	100.0	98.8	1.2	1.2
3/4"	76.0	100.0	100.0	89.0	9.9	11.0
1/2"	35.4	96.7	100.0	69.9	19.1	30.1
3/8"	19.7	86.2	100.0	61.2	8.6	38.8
#4	3.1	24.0	96.9	43.8	17.4	56.2
#8	2.0	6.0	86.5	36.6	7.2	63.4
#16	1.8	3.0	71.9	30.2	6.4	69.8
#30	1.8	2.3	52.1	22.2	8.1	77.8
#50	1.7	2.1	25.7	11.4	10.7	88.6
#100	1.6	2.0	8.2	4.3	7.1	95.7
LBW	1.3	1.8	2.0	1.7	2.7	98.3

*Maximum % Retained must be above the 3/8" sieve.
 *Any two adjacent sieves must equal 10% except max.
 nom. max. #100 and #200 sieves.
 *% Retained must be at least 4% for each sieve except max.
 nom. max. #100 and #200 sieves.
 *% Retained must be at least 4% for the 3/4" sieve when
 a 1.5" max. size (nom. Max. 1.0") aggregate is used.

Production Gradation Batch Plant Gradations Aggregate Supplier Gradations

Coarseness Factor: **61** Workability Factor: **37**



Initial Production Sample (IPS)

Sieve	Coarseness Factor:	Workability Factor:	Cumulative % Passing	% Retained	Cumulative % Retained
2"	62	35	100.0	0.0	0.0
1.5"			100.0	0.0	0.0
1"			100.0	0.0	0.0
3/4"			94.0	6.0	6.0
1/2"			70.2	23.7	29.8
3/8"			59.9	10.4	40.1
#4			42.7	17.2	57.3
#8			35.5	7.2	64.5
#16			28.4	7.0	71.6
#30			19.2	9.2	80.8
#50			8.9	10.3	91.1
#100			3.1	5.9	96.9
LBW			1.4	1.7	98.6

PREPARED BY:
 SM, LLC Technical Service

Approved By: _____

Mechanical Analysis Report

Material	Location	Sample Type	Sample Method	Sampled by	Sample Date	Time
6AA	JMT	QA	Bucket Blend	Douglas Storey	10/31/23	12:00 PM
Sample Weights						
Sieve			Initial Weight:		3785 gm	
Retained Fractional			Dry Weight:		3658 gm	
Percent			Washed Weight:		3609 gm	
Retained			Crushed Material			
Passing			Retained Sieve:		No. 4 ▾ Weight: 3546 gm	
Low Limit			Crushed Material:		gm %	
High Limit			Deleterious Pick			
Specification			Retained Sieve:		No. 4 ▾ Weight: 3546 gm	
2"			Soft Particles:		gm %	
1 1/2"			Clay-Ironstone:		gm %	
1"			Chert:		gm %	
3/4"			Soft + Clay-Iron:		0 gm 0.0 %	
x 5/8"			Total Deleterious:		0 gm 0.0 %	
1/2"			Other Test Results			
3/8"			Fineness Modulus:		6.92	
x 1/4"			Moisture Content:		127 gm 3.5 %	
No. 4			Loss by Wash:		49 gm 1.3 %	
No. 8			Tested by: Douglas Storey			
No. 16			Date:		11/2/23	
No. 30			Time:		12:00 PM	
No. 50			Remarks: 			
No. 100						
No. 200						
Pan						
LBW						
Total						

Mechanical Analysis Report

Material	Location	Sample Type	Sample Method	Sampled by	Sample Date	Time
26A	JMT	QA	Bucket Blend	Douglas Storey	10/31/23	12:00 PM
Sample Weights						
Sieve			Retained Fractional	Percents Cumulative		Specification
	Weight	Percent	Retained	Passing	Low Limit	High Limit
2"	0	0.00	0.00	100.00		
1 1/2"	0	0.00	0.00	100.00		
1"	0	0.00	0.00	100.00		
3/4"	0	0.00	0.00	100.00		
x 5/8"		0.00	0.00			
1/2"	69	3.30	3.30	96.70		
3/8"	220	10.52	13.81	86.19		
x 1/4"		0.00	13.81			
No. 4	1300	62.14	75.96	24.04		
No. 8	377	18.02	93.98	6.02		
No. 16	64	3.06	97.04	2.96		
No. 30	13	0.62	97.66	2.34		
No. 50	5	0.24	97.90	2.10		
No. 100	3	0.14	98.04	1.96		
No. 200	3	0.14	98.18	1.82		
Pan	1	0.05	98.23	0.00		
LBW	37	1.77			Max Sieve	No. 4
Total	2092	100.00				
Remarks:						
Sample Weights						
Initial Weight:			2157 gm			
Dry Weight:			2092 gm			
Washed Weight:			2055 gm			
Crushed Material						
Retained Sieve:			No. 4	Weight:	1589 gm	
Crushed Material:					gm %	
Deleterious Pick						
Retained Sieve:			No. 4	Weight:	1589 gm	
Soft Particles:					gm %	
Clay-Ironstone:					gm %	
Chert:					gm %	
Soft + Clay-Iron:					0 gm 0.0 %	
Total Deleterious:					0 gm 0.0 %	
Other Test Results						
Fineness Modulus:			5.74			
Moisture Content:			65 gm		3.1 %	
Loss by Wash:			37 gm		1.8 %	
Tested by: Douglas Storey						
Date:		11/2/23		Time:		12:00 PM

Mechanical Analysis Report

Material	Location	Sample Type	Sample Method	Sampled by	Sample Date	Time
2NS Smelter Bay	JMT	QA	Bucket Blend	Douglas Storey	10/31/23	12:00 PM
Sample Weights						
Sieve	Retained Fractional	Percents Cumulative	Specification			
	Weight	Percent	Retained	Passing	Low Limit	High Limit
2"	0	0.00	0.00	100.00		
1 1/2"	0	0.00	0.00	100.00		
1"	0	0.00	0.00	100.00		
3/4"	0	0.00	0.00	100.00		
x 5/8"		0.00	0.00			
1/2"	0	0.00	0.00	100.00		
3/8"	0	0.00	0.00	100.00		
x 1/4"		0.00	0.00			
No. 4	19	3.13	3.13	96.88		
No. 8	63	10.36	13.49	86.51		
No. 16	89	14.64	28.13	71.88		
No. 30	120	19.74	47.86	52.14		
No. 50	161	26.48	74.34	25.66		
No. 100	106	17.43	91.78	8.22		
No. 200	36	5.92	97.70	2.30		
Pan	2	0.33	98.03	0.00		
LBW	12	1.97			Max Sieve	No. 50
Total	608	100.00				
Remarks:						
Sample Weights						
			Initial Weight:			635 gm
			Dry Weight:			608 gm
			Washed Weight:			596 gm
			Crushed Material			
			Retained Sieve:	No. 4	Weight:	19 gm
			Crushed Material:			gm %
			Deleterious Pick			
			Retained Sieve:	No. 4	Weight:	19 gm
			Soft Particles:			gm %
			Clay-Ironstone:			gm %
			Chert:			gm %
			Soft + Clay-Iron:			0 gm 0.0 %
			Total Deleterious:			0 gm 0.0 %
Other Test Results						
			Fineness Modulus:			2.59
			Moisture Content:			27 gm 4.4 %
			Loss by Wash:			12 gm 2.0 %
			Tested by: Douglas Storey			
			Date:	11/2/23	Time:	12:00 PM