

# Aggregate Optimization Chart

# Production Gradation Report

**PLANT #:** P-32

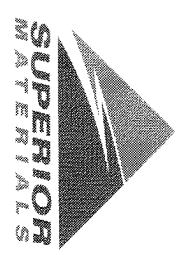
**Sample Date:** 5/1/23

**Dates Test Represents:** 5/2/2023 through 5/8/2023

**Concrete Grade:** DM 4500HP

**Contractor:** \_\_\_\_\_

**MDOT No.:** \_\_\_\_\_



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

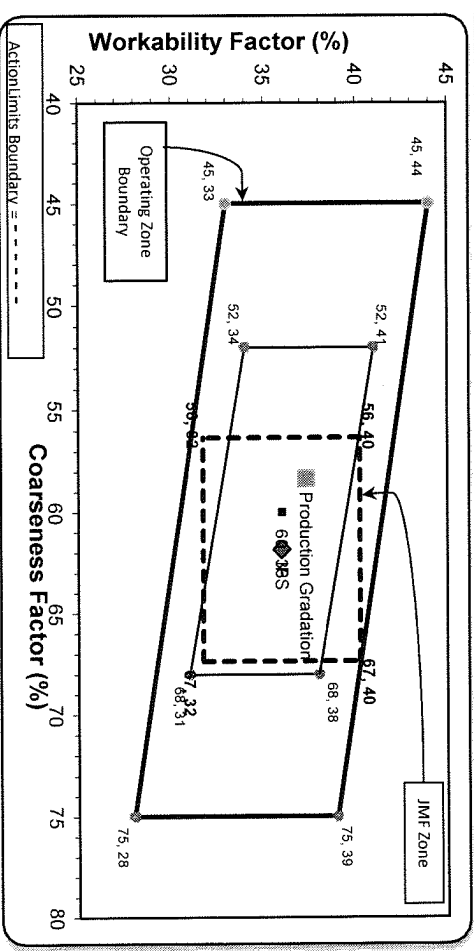
Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	Contribution %	
6AA	71-47	Presque Isle	1405	8.59	2.62	48.4	
26A	71-47	Presque Isle	350	2.14	2.62	12.0	
2NS	95-013	Smetler Bay	1150	6.95	2.65	39.6	
<b>Total Wt:</b>						<b>2905</b>	<b>100.0</b>

Sieve	% Retained	Cumulative % Retained
2"	0.0	0.0
1.5"	0.0	0.0
1"	1.3	1.3
3/4"	7.3	8.5
1/2"	19.1	27.6
3/8"	10.4	38.0
#4	19.5	57.5
#8	7.7	65.2
#16	6.7	71.9
#30	8.0	79.9
#50	10.2	90.2
#100	6.5	96.7
LBW	2.1	98.8

\*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 8% for the 1" sieve when a 2" max. size (nom. Max. 1.5") aggregate is used.

Production Gradation	Batch Plant Gradations	Aggregate Supplier Gradations	Adjusted WF
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	
<b>Coarseness Factor:</b> 58	<b>Workability Factor:</b> 35		<b>37.3</b>

Initial Production Sample (IPS)	Coarseness Factor:	Workability Factor:
	<b>62</b>	<b>36</b>



Sieve	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	0.0	0.0
1.5"	100.0	0.0	0.0
1"	100.0	0.0	0.0
3/4"	95.0	5.0	5.0
1/2"	72.3	22.8	27.7
3/8"	60.4	11.8	39.6
#4	42.6	17.8	57.4
#8	36.0	6.6	64.0
#16	29.5	6.5	70.5
#30	20.3	9.2	79.7
#50	9.5	10.8	90.5
#100	3.4	6.1	96.6
LBW	1.3	2.1	98.7

PREPARED BY:  
 SM, LLC Technical Service

Approved By: \_\_\_\_\_

Plant 958-JMT

Product 1054-6AA LS PI

Name/Title Doug Storey / QC Technician

Period: 04/30/2023 - 05/06/2023

Report Date 05/06/2023

Procedure	Sieve/Test	Result	Unit	6AA LS PI Spec
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	100-100
	1" (25mm)	97.4	%	95-100
	3/4" (19mm)	82.4	%	
	1/2" (12.5mm)	43.6	%	30-60
	3/8" (9.5mm)	24.3	%	
	#4 (4.75mm)	3.2	%	0-8
	#8 (2.36mm)	1.4	%	
	#16 (1.18mm)	1.1	%	
	#30 (.6mm)	1.0	%	
	#50 (.3mm)	1.0	%	
	#100 (.15mm)	0.9	%	
	#200 (75µm)	0.8	%	
	Wash Loss (#200/75um)	0.8	%	0-2
	Total Moisture	2.2	%	

Plant 958-JMT

Product 1067-26A Mod LS

Name/Title Doug Storey / QC Technician

Period: 04/30/2023 - 05/06/2023

Report Date 05/06/2023

Procedure	Sieve/Test	Result	Unit	26A Mod LS Spec
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	
	1" (25mm)	100.0	%	
	3/4" (19mm)	100.0	%	100-100
	1/2" (12.5mm)	97.1	%	95-100
	3/8" (9.5mm)	88.3	%	60-95
	#4 (4.75mm)	22.7	%	5-30
	#8 (2.36mm)	5.8	%	0-12
	#16 (1.18mm)	3.5	%	
	#30 (.6mm)	3.0	%	
	#50 (.3mm)	2.7	%	
	#100 (.15mm)	2.5	%	
	#200 (75µm)	2.3	%	
	Wash Loss (#200/75um)	2.1	%	0-3
	Total Moisture	3.4	%	

Plant 958-JMT

Product 1022-2NS GR - Smelter Bay

Name/Title Doug Storey / QC Technician

Period: 04/30/2023 - 05/06/2023

Report Date 05/06/2023

Procedure	Sieve/Test	Result	Unit	2NS GR Spec
	3/8" (9.5mm)	100.0	%	100-100
	#4 (4.75mm)	96.6	%	95-100
	#8 (2.36mm)	84.1	%	65-95
	#16 (1.18mm)	68.6	%	35-75
	#30 (.6mm)	48.6	%	20-55
	#50 (.3mm)	22.8	%	10-30
	#100 (.15mm)	6.5	%	0-10
	#200 (75µm)	1.6	%	
	FM	2.73		2.6-3
	Wash Loss (#200/75um)	1.5	%	0-3
	Total Moisture	4.6	%	

# Aggregate Optimization Chart

# Production Gradation Report

PLANT #: **P-38**

Sample Date: **5/1/23**

Dates Test Represents: **5/2/2023** through **5/8/2023**

Concrete Grade: **DM 4500HP**

Contractor: \_\_\_\_\_

MDOT No.: \_\_\_\_\_

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	Contribution %
6AA	58-003	Stoneco	1550	9.23	2.69	52.5
26A	58-003	Stoneco	250	1.49	2.69	8.5
2NS	81-019	Pleasant Lake	1150	6.95	2.65	39.0
<b>Total Wt:</b>						<b>2950</b>
						<b>17.68</b>
						<b>100.0</b>

Verify this number is 100%

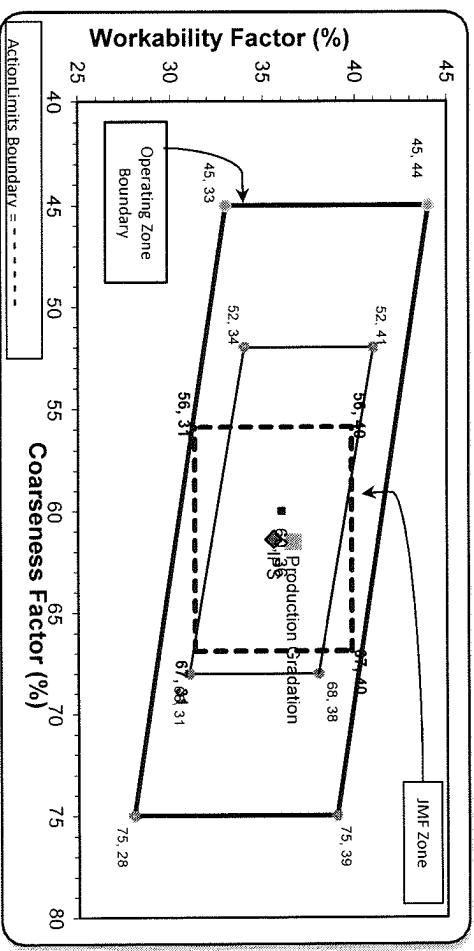
Sieve	6AA	26A	2NS	Cumulative % Passing
2"	100.0	100.0	100.0	100.0
1.5"	100.0	100.0	100.0	100.0
1"	98.1	100.0	100.0	99.0
3/4"	82.7	100.0	100.0	90.9
1/2"	47.9	99.7	100.0	72.6
3/8"	24.6	89.2	100.0	59.5
#4	4.6	13.6	98.1	41.8
#8	1.8	4.1	84.2	34.1
#16	1.4	2.7	68.3	27.6
#30	1.3	2.3	50.8	20.7
#50	1.2	2.1	25.9	10.9
#100	1.1	1.9	7.8	3.8
LBW	0.9	1.8	1.7	1.3

Sieve	% Retained	Cumulative % Retained
2"	0.0	0.0
1.5"	0.0	0.0
1"	1.0	1.0
3/4"	8.1	9.1
1/2"	18.3	27.4
3/8"	13.1	40.5
#4	17.7	58.2
#8	7.7	65.9
#16	6.5	72.4
#30	6.9	79.3
#50	9.8	89.1
#100	7.1	96.2
LBW	2.5	98.7

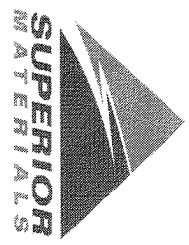
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max.  
 nom. max., #100 and #200 sieves.  
 \*\*Retained must be at least 4% for each sieve except max.  
 nom. max., #100 and #200 sieves.  
 \*\*\*Retained must be at least 8% for the 1" sieve when  
 a 2" max. size (nom. Max. 1.5") aggregate is used.

Production Gradation	Batch Plant Gradations	Aggregate Supplier Gradations
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coarseness Factor: <b>62</b>	Workability Factor: <b>34</b>	Adjusted WF: <b>36.6</b>

Initial Production Sample (IPS)	Coarseness Factor:	Workability Factor:
	<b>61</b>	<b>36</b>



Sieve	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	0.0	0.0
1.5"	100.0	0.0	0.0
1"	99.3	0.7	0.7
3/4"	89.1	10.2	10.9
1/2"	70.5	18.6	29.5
3/8"	60.5	10.0	39.5
#4	44.1	16.4	55.9
#8	35.6	8.5	64.4
#16	27.7	7.9	72.3
#30	20.6	7.1	79.4
#50	8.7	11.8	91.3
#100	1.6	7.1	98.4
LBW	1.1	0.6	98.9



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 Farmington Hills, MI 48336

PREPARED BY:  
 SM, LLC Technical Service

Approved By: \_\_\_\_\_



**Plant** S38-Superior Ann Arbor

**Product** 1051-6AA LS

**Period:** 04/30/2023 - 05/06/2023

**Name/Title** Doug Storey / QC Technician

**Report Date** 05/05/2023

Procedure	Sieve/Test	Result	Unit	6AA LS
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	100-100
	1" (25mm)	98.1	%	95-100
	3/4" (19mm)	82.7	%	
	1/2" (12.5mm)	47.9	%	30-60
	3/8" (9.5mm)	24.6	%	
	#4 (4.75mm)	4.6	%	0-8
	#8 (2.36mm)	1.8	%	
	#16 (1.18mm)	1.4	%	
	#30 (.6mm)	1.3	%	
	#50 (.3mm)	1.2	%	
	#100 (.15mm)	1.1	%	
	#200 (75µm)	0.96	%	
	Wash Loss (#200/75um)	0.9	%	0-2
	Total Moisture	3.99	%	



Plant S38-Superior Ann Arbor

Product 1067-26A Mod LS

Name/Title Doug Storey / QC Technician

Period: 04/30/2023 - 05/06/2023

Report Date 05/05/2023

Procedure	Sieve/Test	Result	Unit	26A Mod LS Spec
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	
	1" (25mm)	100.0	%	
	3/4" (19mm)	100.0	%	100-100
	1/2" (12.5mm)	99.7	%	95-100
	3/8" (9.5mm)	89.2	%	60-95
	#4 (4.75mm)	13.6	%	5-30
	#8 (2.36mm)	4.1	%	0-12
	#16 (1.18mm)	2.7	%	
	#30 (.6mm)	2.3	%	
	#50 (.3mm)	2.1	%	
	#100 (.15mm)	1.9	%	
	#200 (75µm)	1.8	%	
	Wash Loss (#200/75um)	1.8	%	0-3
	Total Moisture	6.40	%	



Plant S38-Superior Ann Arbor

Product 1022-2NS GR

Name/Title Doug Storey / QC Technician

Period: 04/30/2023 - 05/06/2023

Report Date 05/05/2023

Procedure	Sieve/Test	Result	Unit	2NS GR Spec
	3/8" (9.5mm)	100.0	%	100-100
	#4 (4.75mm)	98.1	%	95-100
	#8 (2.36mm)	84.2	%	65-95
	#16 (1.18mm)	68.3	%	35-75
	#30 (.6mm)	50.8	%	20-55
	#50 (.3mm)	25.9	%	10-30
	#100 (.15mm)	7.8	%	0-10
	#200 (75µm)	2.0	%	
	FM	2.65		2.6-3
	Wash Loss (#200/75um)	1.7	%	0-3
	Total Moisture	4.84	%	



# Aggregate Optimization Chart

## Production Gradation Report

PLANT #: **P-102**

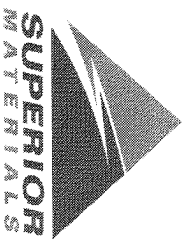
Sample Date: **5/11/23**

Dates Test Represents: **5/2/2023** through **5/8/2023**

Concrete Grade: **DM, 4500HP**

Contractor: \_\_\_\_\_

MDOT No.: \_\_\_\_\_



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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	Contribution %
6AA	58-003	Stoneco	1550	9.23	2.69	52.5
26A	58-003	Stoneco	250	1.49	2.69	8.5
2NS	81-019	Pleasant Lake	1150	6.95	2.65	39.0
			<b>Total Wt</b>	<b>2950</b>	<b>17.68</b>	<b>100.0</b>

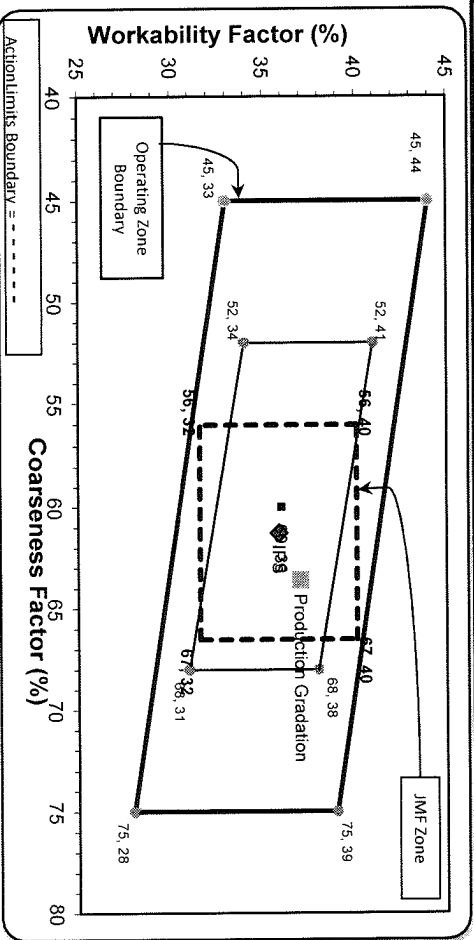
  

Sieve	6AA	26A	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	100.0	100.0	100.0	100.0	0.0	0.0
1"	100.0	100.0	100.0	100.0	0.0	0.0
3/4"	79.8	100.0	100.0	89.4	10.6	10.6
1/2"	43.1	99.1	100.0	70.0	19.4	30.0
3/8"	22.9	86.6	100.0	58.4	11.7	41.6
#4	4.0	11.7	98.7	41.6	16.8	58.4
#8	1.8	3.9	85.3	34.5	7.0	65.5
#16	1.5	3.0	68.6	27.8	6.7	72.2
#30	1.5	2.6	50.4	20.7	7.1	79.3
#50	1.4	2.4	24.9	10.6	10.0	89.4
#100	1.4	2.3	7.5	3.9	6.8	96.1
LBW	1.1	2.1	1.8	1.5	2.4	98.5

\*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 8% for the 1" sieve when  
 a 2" max. size (nom. 1.5") aggregate is used.

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Coarseness Factor: **64** Workability Factor: **35** Adjusted WF: **37.0**



Sieve	Initial Production Sample (IPS)	Coarseness Factor:	Workability Factor:	Adjusted WF
2"	0.0	<b>61</b>	<b>36</b>	<b>37.0</b>
1.5"	0.0			
1"	0.7			
3/4"	10.1			
1/2"	18.5			
3/8"	10.0			
#4	16.3			
#8	8.5			
#16	8.6			
#30	8.2			
#50	11.7			
#100	5.6			
LBW	1.2			

PREPARED BY:  
SM, LLC Technical Service

Approved By: \_\_\_\_\_



Plant S102-Superior Novi

Product 1051-6AA LS

Period: 04/30/2023 - 05/06/2023

Name/Title Doug Storey / QC Technician

Report Date 05/05/2023

Procedure	Sieve/Test	Result	Unit	6AA LS
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	100-100
	1" (25mm)	100.0	%	95-100
	3/4" (19mm)	79.8	%	
	1/2" (12.5mm)	43.1	%	30-60
	3/8" (9.5mm)	22.9	%	
	#4 (4.75mm)	4.0	%	0-8
	#8 (2.36mm)	1.8	%	
	#16 (1.18mm)	1.5	%	
	#30 (.6mm)	1.5	%	
	#50 (.3mm)	1.4	%	
	#100 (.15mm)	1.4	%	
	#200 (75µm)	1.24	%	
	Wash Loss (#200/75µm)	1.1	%	0-2
	Total Moisture	3.43	%	



Plant S102-Superior Novi  
 Product 1067-26A Mod LS  
 Period: 04/30/2023 - 05/06/2023

Name/Title Doug Storey / QC Technician  
 Report Date 05/05/2023

Procedure	Sieve/Test	Result	Unit	26A Mod LS Spec
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	
	1" (25mm)	100.0	%	
	3/4" (19mm)	100.0	%	100-100
	1/2" (12.5mm)	99.1	%	95-100
	3/8" (9.5mm)	86.6	%	60-95
	#4 (4.75mm)	11.7	%	5-30
	#8 (2.36mm)	3.9	%	0-12
	#16 (1.18mm)	3.0	%	
	#30 (.6mm)	2.6	%	
	#50 (.3mm)	2.4	%	
	#100 (.15mm)	2.3	%	
	#200 (75µm)	2.2	%	
	Wash Loss (#200/75um)	2.1	%	0-3
	Total Moisture	4.45	%	



Plant S102-Superior Novi

Product 1022-2NS GR

Period: 04/30/2023 - 05/06/2023

Name/Title Doug Storey / QC Technician

Report Date 05/05/2023

Procedure	Sieve/Test	Result	Unit	2NS GR Spec
	3/8" (9.5mm)	100.0	%	100-100
	#4 (4.75mm)	98.7	%	95-100
	#8 (2.36mm)	85.3	%	65-95
	#16 (1.18mm)	68.6	%	35-75
	#30 (.6mm)	50.4	%	20-55
	#50 (.3mm)	24.9	%	10-30
	#100 (.15mm)	7.5	%	0-10
	#200 (75µm)	2.1	%	
	FM	2.65		2.6-3
	Wash Loss (#200/75um)	1.8	%	0-3
	Total Moisture	5.56	%	