

# Aggregate Optimization Chart

# Production Gradation Report

PLANT #: 12

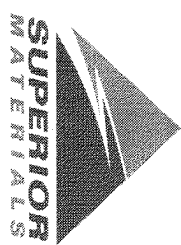
Sample Date: 9/4/23

Dates Test Represents: 9/5/2023 through 9/11/2023

Concrete Grade: P1M, 3500HP

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

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



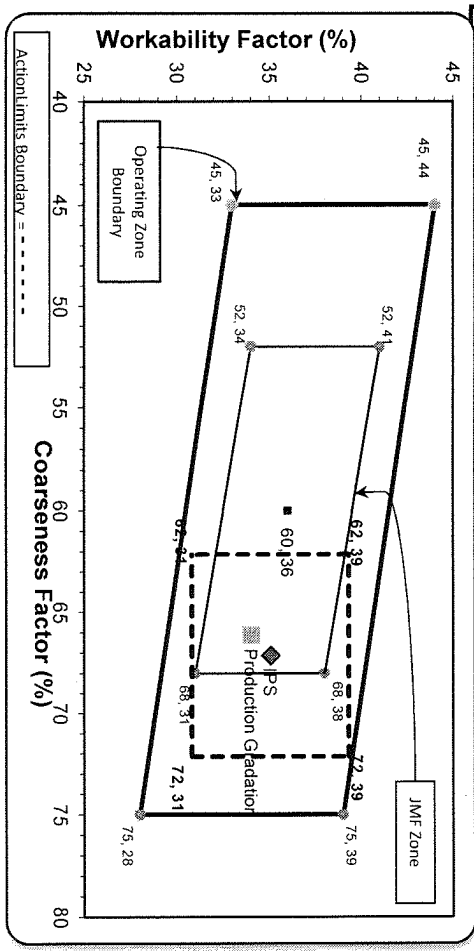
**Superior Materials, LLC**  
30701 W. 10 Mile Rd.  
Suite 500  
Farmington Hills, MI 48336

Aggr. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	Contribution %
CA	71-47	Presque Isle	870	5.32	2.62	28.3
IA	71-47	Presque Isle	1000	6.12	2.62	32.6
N2S	63-115	Ray Rd	1200	7.26	2.65	39.1
Total Wt			3070	18.70		100.0

Sieve	CA	IA	N2S	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	94.8	100.0	100.0	98.5	1.5	1.5
1"	36.1	100.0	100.0	81.9	16.6	18.1
3/4"	8.9	97.7	100.0	73.4	8.5	26.6
1/2"	3.1	75.6	100.0	64.6	8.8	35.4
3/8"	2.6	50.8	100.0	56.4	8.2	43.6
#4	2.4	11.3	96.5	42.1	14.3	57.9
#8	2.3	4.4	81.7	34.0	8.1	66.0
#16	2.1	3.5	72.0	28.0	6.1	72.0
#30	2.1	3.2	50.9	21.5	6.4	78.5
#50	2.0	3.1	25.5	11.5	10.0	88.5
#100	1.8	2.9	5.3	3.5	8.0	96.5
LBW	1.3	2.4	1.0	1.5	2.0	98.5

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Coarseness Factor: 66 Workability Factor: 34



Initial Production Sample (IPS)

Coarseness Factor: 67 Workability Factor: 35

Sieve	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	0.0	0.0
1.5"	99.6	0.4	0.4
1"	83.9	15.7	16.1
3/4"	74.0	9.8	26.0
1/2"	63.7	10.3	36.3
3/8"	56.4	7.3	43.6
#4	43.0	13.4	57.0
#8	35.1	7.9	64.9
#16	29.0	6.1	71.0
#30	20.9	8.0	79.1
#50	8.1	12.8	91.9
#100	1.6	6.5	98.4
LBW	0.9	0.8	99.1

Verify this number is 100%

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

PREPARED BY:  
SM, LLC Technical Service

Approved By:



**Plant** S12-Onsite Southfield

**Product** 7919-COARSE AGG P1M LS

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

**Period:** 09/03/2023 - 09/09/2023

**Report Date** 09/09/2023

Procedure	Sieve/Test	Result	Unit	Coarse Agg P1M LS Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	94.8	%	
	1" (25mm)	36.1	%	
	3/4" (19mm)	8.9	%	
	1/2" (12.5mm)	3.1	%	
	3/8" (9.5mm)	2.6	%	
	#4 (4.75mm)	2.4	%	
	#8 (2.36mm)	2.3	%	
	#16 (1.18mm)	2.1	%	
	#30 (.6mm)	2.1	%	
	#50 (.3mm)	2.0	%	
	#100 (.15mm)	1.8	%	
	#200 (75µm)	1.5	%	
	Wash Loss (#200/75um)	1.3	%	0-2
	Total Moisture	0.13	%	



Plant S12-Onsite Southfield

Product 7920-INTERMED AGG P1M LS

Name/Title Doug Storey / QC Technician

Period: 09/03/2023 - 09/09/2023

Report Date 09/09/2023

Procedure	Sieve/Test	Result	Unit	Intermed Agg P1M LS Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	
	1" (25mm)	100.0	%	
	3/4" (19mm)	97.7	%	
	1/2" (12.5mm)	75.6	%	
	3/8" (9.5mm)	50.8	%	
	#4 (4.75mm)	11.3	%	
	#8 (2.36mm)	4.4	%	
	#16 (1.18mm)	3.5	%	
	#30 (.6mm)	3.2	%	
	#50 (.3mm)	3.1	%	
	#100 (.15mm)	2.9	%	
	#200 (75µm)	2.5	%	
	Wash Loss (#200/75um)	2.4	%	0-3
	Total Moisture	1.03	%	



Plant S12-Onsite Southfield

Product 1022-2NS GR

Name/Title Doug Storey / QC Technician

Period: 09/03/2023 - 09/09/2023

Report Date 09/09/2023

Procedure	Sieve/Test	Result	Unit	2NS GR Spec
	3/8" (9.5mm)	100.0	%	100-100
	#4 (4.75mm)	96.5	%	95-100
	#8 (2.36mm)	81.7	%	65-95
	#16 (1.18mm)	67.1	%	35-75
	#30 (.6mm)	50.9	%	20-55
	#50 (.3mm)	25.5	%	10-30
	#100 (.15mm)	5.3	%	0-10
	#200 (75µm)	1.3	%	
	FM	2.73		2.6-3
	Wash Loss (#200/75um)	1.0	%	0-3
	Total Moisture	3.31	%	

# Aggregate Optimization Chart

# Production Gradation Report

PLANT #: 20

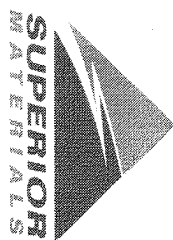
Sample Date: 9/4/23

Dates Test Represents: 9/5/2023 through 9/11/2023

Concrete Grade: P1M 3500HP

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

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



Superior Materials, LLC  
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Suite 500  
Farmington Hills, MI 48336

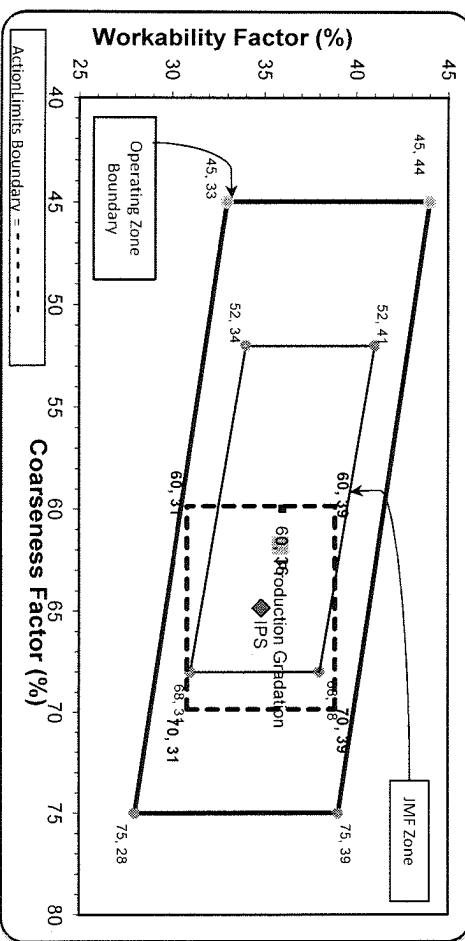
Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	Contribution %	
CA	71-47	Presque Isle	970	5.93	2.62	31.6	
IA	71-47	Presque Isle	900	5.50	2.62	29.3	
NNS	63-92	Grange Hill	1200	7.26	2.65	39.1	
Total Wt						3070	100.0

Sieve	CA	IA	NNS	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"	54.3	100.0	100.0	85.6	14.4	14.4
3/4"	15.9	99.5	100.0	73.3	26.7	41.1
1/2"	3.9	88.5	100.0	66.3	33.7	74.8
3/8"	2.1	70.4	100.0	60.4	39.6	84.4
#4	0.8	20.6	98.2	44.7	55.3	89.7
#8	0.7	6.9	86.1	35.9	64.1	93.8
#16	0.7	3.8	72.5	29.7	70.3	96.1
#30	0.7	3.1	53.8	22.2	77.8	97.9
#50	0.6	2.7	22.4	9.7	90.3	98.4
#100	0.6	2.4	3.2	2.1	97.9	99.1
LBW	0.4	2.0	0.5	0.9	1.2	99.1

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Coarseness Factor: 62 Workability Factor: 36



Initial Production Sample (IPS)

Coarseness Factor: 65 Workability Factor: 35

Sieve	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	0.0	0.0
1.5"	99.1	0.9	0.9
1"	80.8	18.2	19.2
3/4"	71.3	9.6	28.7
1/2"	64.0	7.3	36.0
3/8"	57.7	6.2	42.3
#4	42.8	15.0	57.2
#8	34.8	7.9	65.2
#16	28.4	6.4	71.6
#30	20.2	8.2	79.8
#50	7.6	12.6	92.4
#100	1.6	6.0	98.4
LBW	1.0	0.6	99.0

\*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.

PREPARED BY:  
SM, LLC Technical Service

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



Plant S20-Superior Flint

Product 7919-COARSE AGG P1M LS

Name/Title Doug Storey / QC Technician

Period: 09/03/2023 - 09/09/2023

Report Date 09/09/2023

Procedure	Sieve/Test	Result	Unit	Coarse Agg P1M LS Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	
	1" (25mm)	54.3	%	
	3/4" (19mm)	15.9	%	
	1/2" (12.5mm)	3.9	%	
	3/8" (9.5mm)	2.1	%	
	#4 (4.75mm)	0.8	%	
	#8 (2.36mm)	0.7	%	
	#16 (1.18mm)	0.7	%	
	#30 (.6mm)	0.7	%	
	#50 (.3mm)	0.6	%	
	#100 (.15mm)	0.6	%	
	#200 (75µm)	0.4	%	
	Wash Loss (#200/75um)	0.4	%	0-2



Plant S20-Superior Flint

Product 7920-INTERMED AGG P1M LS

Name/Title Doug Storey / QC Technician

Period: 09/03/2023 - 09/09/2023

Report Date 09/09/2023

Procedure	Sieve/Test	Result	Unit	Intermed Agg P1M LS Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	
	1" (25mm)	100.0	%	
	3/4" (19mm)	99.5	%	
	1/2" (12.5mm)	88.5	%	
	3/8" (9.5mm)	70.4	%	
	#4 (4.75mm)	20.6	%	
	#8 (2.36mm)	6.9	%	
	#16 (1.18mm)	3.8	%	
	#30 (.6mm)	3.1	%	
	#50 (.3mm)	2.7	%	
	#100 (.15mm)	2.4	%	
	#200 (75µm)	2.1	%	
	Wash Loss (#200/75um)	2.0	%	0-3



Plant S20-Superior Flint

Product 1022-2NS GR

Name/Title Doug Storey / QC Technician

Period: 09/03/2023 - 09/09/2023

Report Date 09/09/2023

Procedure	Sieve/Test	Result	Unit	2NS GR Spec
	3/8" (9.5mm)	100.0	%	100-100
	#4 (4.75mm)	98.2	%	95-100
	#8 (2.36mm)	86.1	%	65-95
	#16 (1.18mm)	72.5	%	35-75
	#30 (.6mm)	53.8	%	20-55
	#50 (.3mm)	22.4	%	10-30
	#100 (.15mm)	3.2	%	0-10
	#200 (75µm)	0.5	%	
	FM	2.64		2.6-3
	Wash Loss (#200/75um)	0.4	%	0-3



# Aggregate Optimization Chart

# Production Gradation Report

PLANT #: **P-36**

Sample Date: **9/4/23**

Dates Test Represents: **9/5/2023** through **9/11/2023**

Concrete Grade: **P1M, 3500HP**

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

MIDOT No.: \_\_\_\_\_

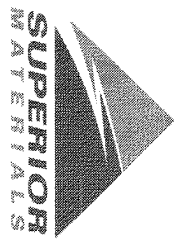
Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	Contribution %
CA	71-47	Presque Isle	870	5.32	2.62	28.3
IA	71-47	Presque Isle	1000	6.12	2.62	32.6
ZNS	63-92	Grange Hall	1200	7.26	2.65	39.1
<b>Total Wt</b>						<b>3070</b>
						<b>100.0</b>

<----- Verify this number is 100%

Sieve	CA	IA	ZNS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	91.7	100.0	100.0	97.6	2.4	2.4
1"	29.7	100.0	100.0	80.1	17.6	19.9
3/4"	10.5	97.6	100.0	73.9	6.2	26.1
1/2"	4.6	72.1	100.0	63.9	10.0	36.1
3/8"	3.7	49.1	100.0	56.1	7.7	43.9
#4	2.8	11.5	97.4	42.6	13.5	57.4
#8	2.4	4.1	83.7	34.7	7.9	65.3
#16	2.3	3.0	68.7	28.5	6.2	71.5
#30	2.2	2.7	49.8	21.0	7.5	79.0
#50	2.1	2.5	19.8	9.1	11.8	90.9
#100	1.9	2.3	2.9	2.4	6.7	97.6
LBW	1.4	1.7	0.5	1.1	1.3	98.9

\*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.

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

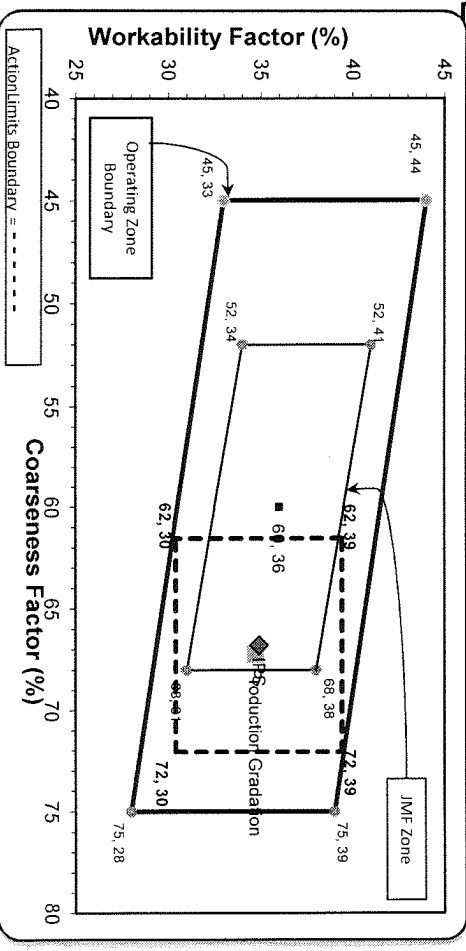


Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Initial Production Sample (IPS)

Coarseness Factor: **67** Workability Factor: **35**

Coarseness Factor: **67** Workability Factor: **35**



Sieve	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	0.0	0.0
1.5"	100.0	0.0	0.0
1"	85.0	15.0	15.0
3/4"	72.1	12.9	27.9
1/2"	64.5	7.6	35.5
3/8"	56.5	8.0	43.5
#4	42.7	13.8	57.3
#8	34.9	7.8	65.1
#16	29.0	5.9	71.0
#30	21.0	8.0	79.0
#50	8.2	12.8	91.8
#100	1.6	6.5	98.4
LBW	0.7	0.9	99.3

PREPARED BY:  
 SM, LLC Technical Service

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



Superior Auburn Hills  
 2470 Auburn Road  
 Auburn Hills, MI 48432

**Plant** S36-Superior Auburn Hills  
**Product** 7919-COARSE AGG P1M LS  
**Period:** 09/03/2023 - 09/09/2023

**Name/Title** Doug Storey / QC Technician  
**Report Date** 09/09/2023

Procedure	Sieve/Test	Result	Unit	Coarse Agg P1M LS Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	91.7	%	
	1" (25mm)	29.7	%	
	3/4" (19mm)	10.5	%	
	1/2" (12.5mm)	4.6	%	
	3/8" (9.5mm)	3.7	%	
	#4 (4.75mm)	2.8	%	
	#8 (2.36mm)	2.4	%	
	#16 (1.18mm)	2.3	%	
	#30 (.6mm)	2.2	%	
	#50 (.3mm)	2.1	%	
	#100 (.15mm)	1.9	%	
	#200 (75µm)	1.6	%	
	Wash Loss (#200/75um)	1.4	%	0-2
	Total Moisture	1.91	%	



Superior Auburn Hills  
 2470 Auburn Road  
 Auburn Hills, MI 48432

Plant S36-Superior Auburn Hills

Product 7920-INTERMED AGG P1M LS

Name/Title Doug Storey / QC Technician

Period: 09/03/2023 - 09/09/2023

Report Date 09/09/2023

Procedure	Sieve/Test	Result	Unit	Intermed Agg P1M LS Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	
	1" (25mm)	100.0	%	
	3/4" (19mm)	97.6	%	
	1/2" (12.5mm)	72.1	%	
	3/8" (9.5mm)	49.1	%	
	#4 (4.75mm)	11.5	%	
	#8 (2.36mm)	4.1	%	
	#16 (1.18mm)	3.0	%	
	#30 (.6mm)	2.7	%	
	#50 (.3mm)	2.5	%	
	#100 (.15mm)	2.3	%	
	#200 (75µm)	1.9	%	
	Wash Loss (#200/75µm)	1.7	%	0-3
	Total Moisture	2.69	%	



Superior Auburn Hills  
 2470 Auburn Road  
 Auburn Hills, MI 48432

Plant S36-Superior Auburn Hills

Product 1022-2NS GR

Name/Title Doug Storey / QC Technician

Period: 09/03/2023 - 09/09/2023

Report Date 09/09/2023

Procedure	Sieve/Test	Result	Unit	2NS GR Spec
	3/8" (9.5mm)	100.0	%	100-100
	#4 (4.75mm)	97.4	%	95-100
	#8 (2.36mm)	83.7	%	65-95
	#16 (1.18mm)	68.7	%	35-75
	#30 (.6mm)	49.8	%	20-55
	#50 (.3mm)	19.8	%	10-30
	#100 (.15mm)	2.9	%	0-10
	#200 (75µm)	0.6	%	
	FM	2.78		2.6-3
	Wash Loss (#200/75um)	0.5	%	0-3
	Total Moisture	3.41	%	

# Aggregate Optimization Chart

# Production Gradation Report

PLANT #: **P-102**

Sample Date: **9/4/23**

Dates Test Represents: **9/5/2023** through **9/11/2023**

Concrete Grade: **P1M, 3500HP**

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

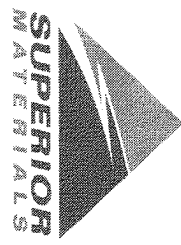
MDOT No.: \_\_\_\_\_

Aggr. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	Contribution %
CA	58-003	Stonoco	1370	8.16	2.69	43.9
IA	58-003	Stonoco	550	3.28	2.69	17.6
ZNS	81-019	Pleasant Lake	1200	7.26	2.65	38.5
<b>Total Wt</b>						<b>3120</b>
						<b>18.70</b>
						<b>100.0</b>

<----- Verify this number is 100%

Sieve	CA	IA	ZNS	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"	68.5	100.0	100.0	86.2	13.8	13.8
3/4"	39.2	100.0	100.0	73.3	26.7	40.5
1/2"	19.5	87.4	100.0	62.4	37.6	78.1
3/8"	11.7	62.4	100.0	54.6	45.4	93.5
#4	4.5	13.6	98.0	42.1	57.9	98.7
#8	3.1	4.8	83.8	34.4	65.6	98.7
#16	2.7	2.8	67.4	27.6	72.4	98.7
#30	2.5	2.2	48.9	20.3	79.7	98.7
#50	2.3	2.1	23.7	10.5	89.5	98.7
#100	2.1	1.9	5.0	3.2	96.8	98.7
LBW	1.8	1.8	0.5	1.3	98.7	98.7

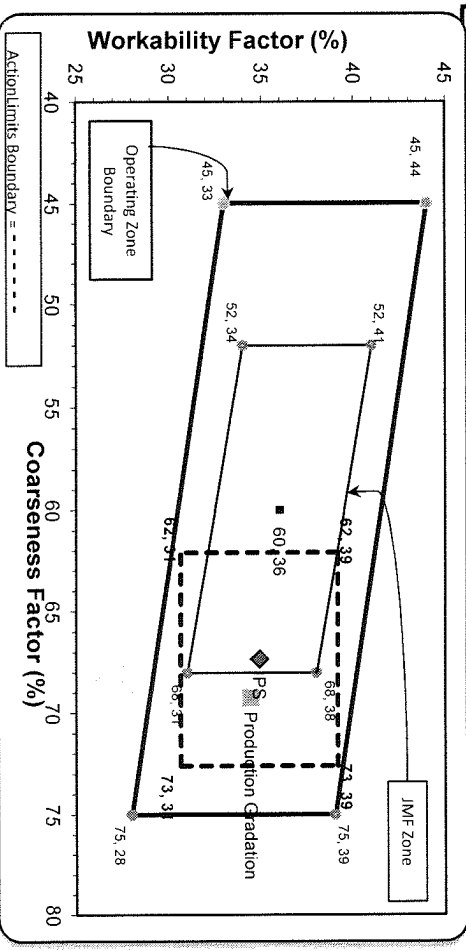
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max.  
 nom. max. #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max.  
 nom. max. #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when  
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



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

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Coarseness Factor: **69** Workability Factor: **34**



Initial Production Sample (IPS)

Sieve	Coarseness Factor:	Workability Factor:	% Retained	Cumulative % Retained
2"	67	35	0.0	0.0
1.5"	67	35	0.0	0.0
1"	67	35	14.5	14.5
3/4"	67	35	12.1	26.6
1/2"	67	35	12.4	39.0
3/8"	67	35	4.8	43.8
#4	67	35	13.1	56.9
#8	67	35	8.2	65.1
#16	67	35	5.5	70.6
#30	67	35	7.8	78.4
#50	67	35	13.4	91.9
#100	67	35	5.9	97.8
LBW	67	35	0.8	98.6

PREPARED BY:  
 SM, LLC Technical Service

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



Plant S102-Superior Novi

Product 7919-COARSE AGG P1M LS

Name/Title Doug Storey / QC Technician

Period: 09/03/2023 - 09/09/2023

Report Date 09/09/2023

Procedure	Sieve/Test	Result	Unit	Coarse Agg P1M LS Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	
	1" (25mm)	68.5	%	
	3/4" (19mm)	39.2	%	
	1/2" (12.5mm)	19.5	%	
	3/8" (9.5mm)	11.7	%	
	#4 (4.75mm)	4.5	%	
	#8 (2.36mm)	3.1	%	
	#16 (1.18mm)	2.7	%	
	#30 (.6mm)	2.5	%	
	#50 (.3mm)	2.3	%	
	#100 (.15mm)	2.1	%	
	#200 (75µm)	1.9	%	
	Wash Loss (#200/75um)	1.8	%	0-2
	Total Moisture	0.86	%	



Plant S102-Superior Novi  
Product 7920-INTERMED AGG P1M LS  
Period: 09/03/2023 - 09/09/2023

Name/Title Doug Storey / QC Technician  
Report Date 09/09/2023

Procedure	Sieve/Test	Result	Unit	Intermed Agg P1M LS Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	
	1" (25mm)	100.0	%	
	3/4" (19mm)	100.0	%	
	1/2" (12.5mm)	87.4	%	
	3/8" (9.5mm)	62.4	%	
	#4 (4.75mm)	13.6	%	
	#8 (2.36mm)	4.8	%	
	#16 (1.18mm)	2.8	%	
	#30 (.6mm)	2.2	%	
	#50 (.3mm)	2.1	%	
	#100 (.15mm)	1.9	%	
	#200 (75µm)	1.8	%	
	Wash Loss (#200/75um)	1.8	%	0-3
	Total Moisture	3.31	%	



Plant S102-Superior Novi

Product 1022-2NS GR

Name/Title Doug Storey / QC Technician

Period: 09/03/2023 - 09/09/2023

Report Date 09/09/2023

Procedure	Sieve/Test	Result	Unit	2NS GR Spec
	3/8" (9.5mm)	100.0	%	100-100
	#4 (4.75mm)	98.0	%	95-100
	#8 (2.36mm)	83.8	%	65-95
	#16 (1.18mm)	67.4	%	35-75
	#30 (.6mm)	48.9	%	20-55
	#50 (.3mm)	23.7	%	10-30
	#100 (.15mm)	5.0	%	0-10
	#200 (75µm)	0.8	%	
	FM	2.73		2.6-3
	Wash Loss (#200/75um)	0.5	%	0-3
	Total Moisture	2.34	%	