

# Aggregate Optimization Chart

# Production Gradation Report

PLANT #: **P11**

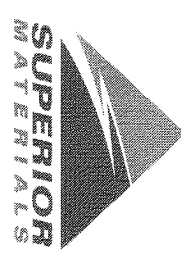
Sample Date: **6/26/23**

Dates Test Represents: **6/27/2023** through **7/3/2023**

Concrete Grade: **P1M, 3500HP**

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

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



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

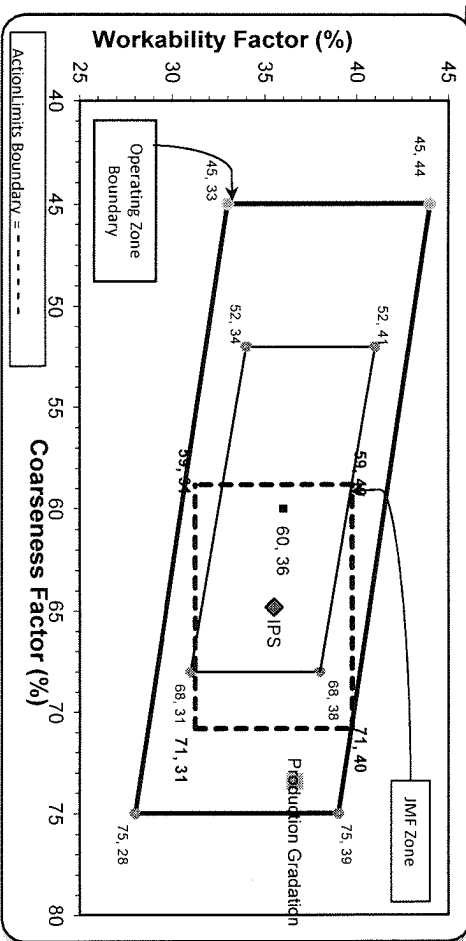
Aggr. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	Contribution %
CA	71-47	Presque Isle	1070	6.54	2.62	34.9
IA	71-47	Presque Isle	750	4.59	2.62	24.4
ZNS	95-013	Smelter Bay	1250	7.56	2.65	40.7
		<b>Total Wt</b>	<b>3070</b>	<b>18.69</b>		<b>100.0</b>

Sieve	CA	IA	ZNS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	97.0	100.0	100.0	99.0	1.0	1.0
1"	37.2	100.0	100.0	78.1	20.8	21.9
3/4"	10.9	97.6	100.0	68.4	9.8	31.6
1/2"	3.5	71.6	100.0	59.4	8.9	40.6
3/8"	2.9	48.1	100.0	53.5	6.0	46.5
#4	2.3	10.9	97.2	43.0	10.4	57.0
#8	2.1	4.3	85.6	36.6	6.4	63.4
#16	2.1	3.4	70.9	30.4	6.2	69.6
#30	2.0	3.1	51.5	22.4	8.0	77.6
#50	2.0	3.0	25.5	11.8	10.6	88.2
#100	1.8	2.8	8.0	4.6	7.2	95.4
LBW	1.3	2.3	1.6	1.7	2.9	98.3

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Coarseness Factor: **73** Workability Factor: **37**



Initial Production Sample (IPS)

Sieve	Coarseness Factor:	Workability Factor:	% Retained	Cumulative % Retained
2"	73	37	0.0	0.0
1.5"	73	37	0.6	0.6
1"	73	37	15.3	16.0
3/4"	73	37	10.5	26.5
1/2"	73	37	8.2	34.8
3/8"	73	37	7.1	41.8
#4	73	37	14.1	55.9
#8	73	37	8.6	64.5
#16	73	37	6.4	70.9
#30	73	37	7.3	78.1
#50	73	37	12.2	90.4
#100	73	37	7.1	97.4
LBW	73	37	1.6	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 S11-Onsite Jefferson

Product 7919-COARSE AGG P1M LS

Name/Title Doug Storey / QC Technician

Period: 06/25/2023 - 07/01/2023

Report Date 06/30/2023

Procedure	Sieve/Test	Result	Unit	Coarse Agg P1M LS Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	97.0	%	
	1" (25mm)	37.2	%	
	3/4" (19mm)	10.9	%	
	1/2" (12.5mm)	3.5	%	
	3/8" (9.5mm)	2.9	%	
	#4 (4.75mm)	2.3	%	
	#8 (2.36mm)	2.1	%	
	#16 (1.18mm)	2.1	%	
	#30 (.6mm)	2.0	%	
	#50 (.3mm)	2.0	%	
	#100 (.15mm)	1.8	%	
	#200 (75µm)	1.5	%	
	Wash Loss (#200/75um)	1.3	%	0-2
	Total Moisture	1.37	%	



Plant S11-Onsite Jefferson

Product 7920-INTERMED AGG P1M LS

Name/Title Doug Storey / QC Technician

Period: 06/25/2023 - 07/01/2023

Report Date 06/30/2023

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)	71.6	%	
	3/8" (9.5mm)	48.1	%	
	#4 (4.75mm)	10.9	%	
	#8 (2.36mm)	4.3	%	
	#16 (1.18mm)	3.4	%	
	#30 (.6mm)	3.1	%	
	#50 (.3mm)	3.0	%	
	#100 (.15mm)	2.8	%	
	#200 (75µm)	2.5	%	
	Wash Loss (#200/75um)	2.3	%	0-3
	Total Moisture	3.10	%	



Plant S11-Onsite Jefferson

Product 1022-2NS GR

Name/Title Doug Storey / QC Technician

Period: 06/25/2023 - 07/01/2023

Report Date 06/30/2023

Procedure	Sieve/Test	Result	Unit	2NS GR Spec
	3/8" (9.5mm)	100.0	%	100-100
	#4 (4.75mm)	97.2	%	95-100
	#8 (2.36mm)	85.6	%	65-95
	#16 (1.18mm)	70.9	%	35-75
	#30 (.6mm)	51.5	%	20-55
	#50 (.3mm)	25.5	%	10-30
	#100 (.15mm)	8.0	%	0-10
	#200 (75µm)	2.1	%	
	FM	2.61		2.6-3
	Wash Loss (#200/75um)	1.6	%	0-3
	Total Moisture	6.70	%	

# Aggregate Optimization Chart

# Production Gradation Report

PLANT #: **P-32**

Sample Date: **6/26/23**

Dates Test Represents: **6/27/2023** through **7/3/2023**

Concrete Grade: **P1M, 3500HP**

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

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	Contribution %
CA	71-47	Presque Isle	1070	6.54	2.62	34.9
IA	71-47	Presque Isle	750	4.59	2.62	24.4
NNS	95-013	Smetler Bay	1250	7.56	2.65	40.7
<b>Total Wt:</b>			<b>3070</b>	<b>18.69</b>		<b>100.0</b>

Verify this number is 100%

Sieve	CA	IA	NNS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	96.2	100.0	100.0	98.7	1.3	1.3
1"	50.6	100.0	100.0	82.8	15.9	17.2
3/4"	20.8	100.0	100.0	72.2	10.5	27.8
1/2"	9.0	100.0	100.0	62.6	9.7	37.4
3/8"	6.9	50.9	100.0	55.6	7.0	44.4
#4	3.9	11.8	96.6	43.6	12.0	56.4
#8	2.8	4.9	85.3	36.9	6.7	63.1
#16	2.6	3.8	70.4	30.5	6.4	69.5
#30	2.5	3.5	50.3	22.2	8.3	77.8
#50	2.4	3.3	24.9	11.8	10.4	88.2
#100	2.2	3.1	7.5	4.6	7.2	95.4
LBW	1.9	2.7	1.3	1.9	2.7	98.1

\*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.

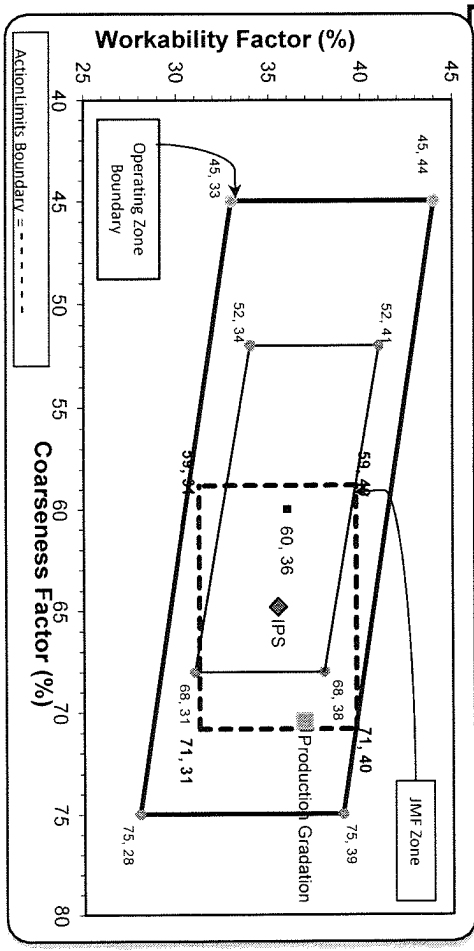
**SUPERIOR MATERIALS**  
 Superior Materials, LLC  
 30701 W. 10 Mile Rd.  
 Suite 500  
 Farmington Hills, MI 48336

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Coarseness Factor: **70** Workability Factor: **37**

Initial Production Sample (IPS)

Sieve	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	0.0	0.0
1.5"	99.0	0.6	0.6
1"	84.0	15.3	16.0
3/4"	73.5	10.5	26.5
1/2"	65.2	8.2	34.8
3/8"	58.2	7.1	41.8
#4	44.1	14.1	55.9
#8	35.5	8.6	64.5
#16	29.1	6.4	70.9
#30	21.9	7.3	78.1
#50	9.6	12.2	90.4
#100	2.6	7.1	97.4
LBW	1.0	1.6	99.0



PREPARED BY:  
 SM, LLC Technical Service

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

Plant 958-JMT

Product 7919-COARSE AGG P1M LS PI

Name/Title Doug Storey / QC Technician

Period: 06/25/2023 - 07/01/2023

Report Date 06/30/2023

Procedure	Sieve/Test	Result	Unit	Coarse Agg P1M LS PI Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	96.2	%	
	1" (25mm)	50.6	%	
	3/4" (19mm)	20.8	%	
	1/2" (12.5mm)	9.0	%	
	3/8" (9.5mm)	6.9	%	
	#4 (4.75mm)	3.9	%	
	#8 (2.36mm)	2.8	%	
	#16 (1.18mm)	2.6	%	
	#30 (.6mm)	2.5	%	
	#50 (.3mm)	2.4	%	
	#100 (.15mm)	2.2	%	
	#200 (75µm)	1.9	%	
	Wash Loss (#200/75um)	1.9	%	0-2
	Total Moisture	0.5	%	

Plant 958-JMT

Product 7920-INTERMED AGG P1M LS PI

Name/Title Doug Storey / QC Technician

Period: 06/25/2023 - 07/01/2023

Report Date 06/30/2023

Procedure	Sieve/Test	Result	Unit	Intermed Agg P1M LS PI Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	
	1" (25mm)	100.0	%	
	3/4" (19mm)	99.4	%	
	1/2" (12.5mm)	76.6	%	
	3/8" (9.5mm)	50.9	%	
	#4 (4.75mm)	11.8	%	
	#8 (2.36mm)	4.9	%	
	#16 (1.18mm)	3.8	%	
	#30 (.6mm)	3.5	%	
	#50 (.3mm)	3.3	%	
	#100 (.15mm)	3.1	%	
	#200 (75µm)	2.8	%	
	Wash Loss (#200/75um)	2.7	%	0-3
	Total Moisture	1.4	%	

Plant 958-JMT

Product 1022-2NS GR - Smelter Bay

Name/Title Doug Storey / QC Technician

Period: 06/25/2023 - 07/01/2023

Report Date 06/30/2023

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)	85.3	%	65-95
	#16 (1.18mm)	70.4	%	35-75
	#30 (.6mm)	50.3	%	20-55
	#50 (.3mm)	24.9	%	10-30
	#100 (.15mm)	7.5	%	0-10
	#200 (75µm)	1.8	%	
	FM	2.65		2.6-3
	Wash Loss (#200/75um)	1.3	%	0-3
	Total Moisture	5.0	%	



# Aggregate Optimization Chart

# Production Gradation Report

**PLANT #:** P-36

**Sample Date:** 6/26/23

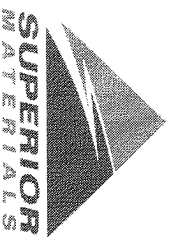
**Dates Test Represents:** 6/27/2023 through 7/3/2023

**Concrete Grade:** P1M, 3500HP

**Contractor:**

**MDOT No.:**

Agg. Class	Pit #	Source	Weight (ssd)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	71-47	Presque Isle	1070	6.54	2.62	34.9
IA	71-47	Presque Isle	800	4.89	2.62	26.1
2NS	63-92	Grange Hill	1200	7.26	2.65	39.1
<b>Total Wt</b>			<b>3070</b>	<b>18.70</b>		<b>100.0</b>



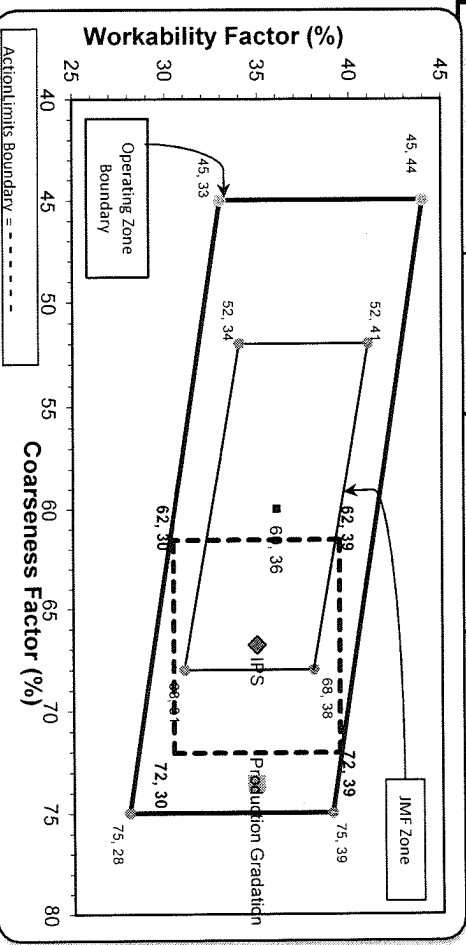
**Superior Materials, LLC**  
30701 W. 10 Mile Rd.  
Suite 500  
Farmington Hills, MI 48336

Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	98.4	100.0	100.0	99.4	0.6	0.6
1"	41.0	100.0	100.0	79.4	20.6	20.6
3/4"	11.3	96.2	100.0	68.1	31.9	31.9
1/2"	2.9	72.5	100.0	59.0	41.0	41.0
3/8"	2.3	46.8	100.0	52.1	47.9	47.9
#4	2.0	10.3	97.9	41.6	58.4	58.4
#8	1.9	3.9	84.9	34.9	65.1	65.1
#16	1.9	2.9	69.8	28.7	71.3	71.3
#30	1.8	2.6	51.0	21.2	78.8	78.8
#50	1.8	2.2	19.8	8.9	91.1	91.1
#100	1.7	1.3	3.5	2.5	97.5	97.5
LBW	1.3	0.3	0.3	0.9	99.1	99.1

\*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

**Coarseness Factor:** 74 **Workability Factor:** 35



**Initial Production Sample (IPS)**

Coarseness Factor:	Workability Factor:	% Retained	Cumulative % Retained
67	35	0.0	0.0
		0.0	0.0
		15.0	15.0
		12.9	27.9
		7.6	35.5
		8.0	43.5
		13.8	57.3
		7.8	65.1
		5.9	71.0
		8.0	79.0
		12.8	91.8
		6.5	98.4
		0.9	99.3

PREPARED BY:  
SM, LLC Technical Service

Approved By:



**Plant** S36-Superior Auburn Hills

**Product** 7919-COARSE AGG P1M LS

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

**Period:** 06/25/2023 - 07/01/2023

**Report Date** 06/30/2023

Procedure	Sieve/Test	Result	Unit	Coarse Agg P1M LS Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	98.4	%	
	1" (25mm)	41.0	%	
	3/4" (19mm)	11.3	%	
	1/2" (12.5mm)	2.9	%	
	3/8" (9.5mm)	2.3	%	
	#4 (4.75mm)	2.0	%	
	#8 (2.36mm)	1.9	%	
	#16 (1.18mm)	1.9	%	
	#30 (.6mm)	1.8	%	
	#50 (.3mm)	1.8	%	
	#100 (.15mm)	1.7	%	
	#200 (75µm)	1.5	%	
	Wash Loss (#200/75um)	1.3	%	0-2
	Total Moisture	1.36	%	



Plant S36-Superior Auburn Hills

Product 7920-INTERMED AGG P1M LS

Period: 06/25/2023 - 07/01/2023

Name/Title Doug Storey / QC Technician

Report Date 06/30/2023

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)	96.2	%	
	1/2" (12.5mm)	72.5	%	
	3/8" (9.5mm)	46.8	%	
	#4 (4.75mm)	10.3	%	
	#8 (2.36mm)	3.9	%	
	#16 (1.18mm)	2.9	%	
	#30 (.6mm)	2.6	%	
	#50 (.3mm)	2.2	%	
	#100 (.15mm)	1.9	%	
	#200 (75µm)	1.5	%	
	Wash Loss (#200/75um)	1.3	%	0-3
	Total Moisture	2.97	%	



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: 06/25/2023 - 07/01/2023

Report Date 06/30/2023

Procedure	Sieve/Test	Result	Unit	2NS GR Spec
	3/8" (9.5mm)	100.0	%	100-100
	#4 (4.75mm)	97.9	%	95-100
	#8 (2.36mm)	84.9	%	65-95
	#16 (1.18mm)	69.8	%	35-75
	#30 (.6mm)	51.0	%	20-55
	#50 (.3mm)	19.8	%	10-30
	#100 (.15mm)	3.5	%	0-10
	#200 (75µm)	0.5	%	
	FM	2.73		2.6-3
	Wash Loss (#200/75um)	0.3	%	0-3
	Total Moisture	3.64	%	

# Aggregate Optimization Chart

## Production Gradation Report

PLANT #: **P-101**

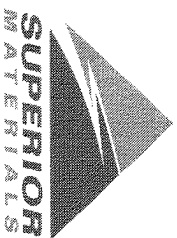
Sample Date: **6/26/23**

Dates Test Represents: **6/27/2023** through **7/3/2023**

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	1070	6.54	2.62	34.9
IA	71-47	Presque Isle	800	4.89	2.62	26.1
N2S	75-051	Mid Michigan	1200	7.23	2.66	39.1
			<b>Total Wt</b>	<b>3070</b>	<b>18.67</b>	<b>100.0</b>

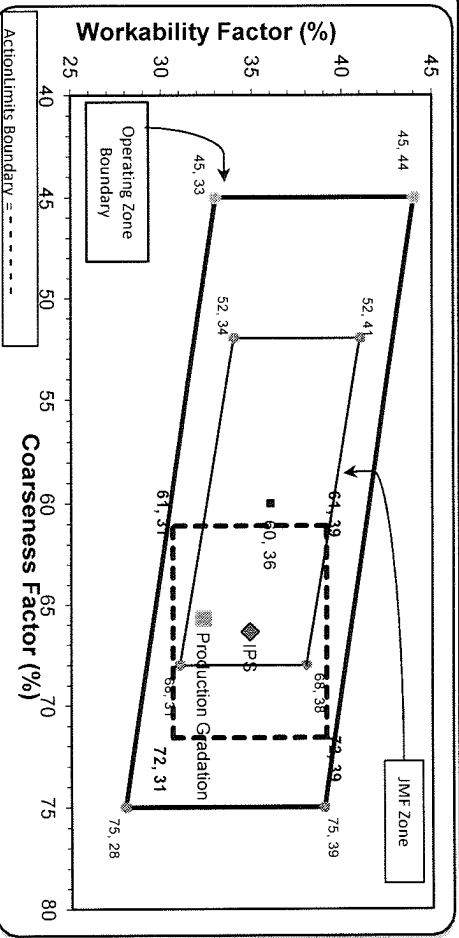
  

Sieve	CA	IA	N2S	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	97.4	100.0	100.0	99.1	0.9	0.9
1"	47.3	100.0	100.0	81.6	17.5	18.4
3/4"	14.4	100.0	100.0	70.2	11.5	29.8
1/2"	6.0	80.6	100.0	62.2	8.0	37.8
3/8"	4.8	56.7	100.0	55.5	6.6	44.5
#4	3.8	13.9	95.4	42.2	13.3	57.8
#8	3.2	4.2	77.0	32.3	9.9	67.7
#16	3.0	2.9	60.8	25.6	6.7	74.4
#30	2.7	2.7	46.7	20.0	5.6	80.0
#50	2.7	2.5	25.1	11.4	8.6	88.6
#100	2.4	2.4	6.5	4.0	7.4	96.0
LBW	1.9	2.0	0.7	1.5	2.5	98.5

Production Gradation

Batch Plant Gradations  Aggregate Supplier Gradations

Coarseness Factor: **66** Workability Factor: **32**



Initial Production Sample (IPS)

Coarseness Factor: **66** 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"	84.3	15.3	15.7
3/4"	74.8	9.6	25.2
1/2"	64.3	10.4	35.7
3/8"	56.8	7.5	43.2
#4	43.0	13.8	57.0
#8	34.9	8.1	65.1
#16	26.4	8.5	73.6
#30	19.9	6.5	80.1
#50	10.4	9.5	89.6
#100	3.4	7.0	96.6
LBW	1.2	2.2	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.

PREPARED BY:  
SM, LLC Technical Service

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



Plant S101-Superior Mount Clemens

Product 7919-COARSE AGG P1M LS

Period: 06/25/2023 - 07/01/2023

Name/Title Doug Storey / QC Technician

Report Date 06/30/2023

Procedure	Sieve/Test	Result	Unit	Coarse Agg P1M LS Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	97.4	%	
	1" (25mm)	47.3	%	
	3/4" (19mm)	14.4	%	
	1/2" (12.5mm)	6.0	%	
	3/8" (9.5mm)	4.8	%	
	#4 (4.75mm)	3.8	%	
	#8 (2.36mm)	3.2	%	
	#16 (1.18mm)	3.0	%	
	#30 (.6mm)	2.9	%	
	#50 (.3mm)	2.7	%	
	#100 (.15mm)	2.4	%	
	#200 (75µm)	2.0	%	
	Wash Loss (#200/75um)	1.9	%	0-2
	Total Moisture	1.96	%	



Plant S101-Superior Mount Clemens

Product 7920-INTERMED AGG P1M LS

Name/Title Doug Storey / QC Technician

Period: 06/25/2023 - 07/01/2023

Report Date 06/30/2023

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)	80.6	%	
	3/8" (9.5mm)	56.7	%	
	#4 (4.75mm)	13.9	%	
	#8 (2.36mm)	4.2	%	
	#16 (1.18mm)	2.9	%	
	#30 (.6mm)	2.7	%	
	#50 (.3mm)	2.5	%	
	#100 (.15mm)	2.4	%	
	#200 (75µm)	2.1	%	
	Wash Loss (#200/75um)	2.0	%	0-3
	Total Moisture	3.99	%	



Plant S101-Superior Mount Clemens

Product 1022-2NS GR

Name/Title Doug Storey / QC Technician

Period: 06/25/2023 - 07/01/2023

Report Date 06/30/2023

Procedure	Sieve/Test	Result	Unit	2NS GR Spec
	3/8" (9.5mm)	100.0	%	100-100
	#4 (4.75mm)	95.4	%	95-100
	#8 (2.36mm)	77.0	%	65-95
	#16 (1.18mm)	60.8	%	35-75
	#30 (.6mm)	46.7	%	20-55
	#50 (.3mm)	25.1	%	10-30
	#100 (.15mm)	6.5	%	0-10
	#200 (75µm)	1.1	%	
	FM	2.88		2.6-3
	Wash Loss (#200/75um)	0.7	%	0-3
	Total Moisture	4.39	%	