

# Aggregate Optimization Chart

# Production Gradation Report

**PLANT #:** P-32

**Sample Date:** 7/12/21

**Dates Test Represents:** 7/13/2021 through 7/19/2021

**Concrete Grade:** P1M

**Contractor:**

**MDOT No.:**



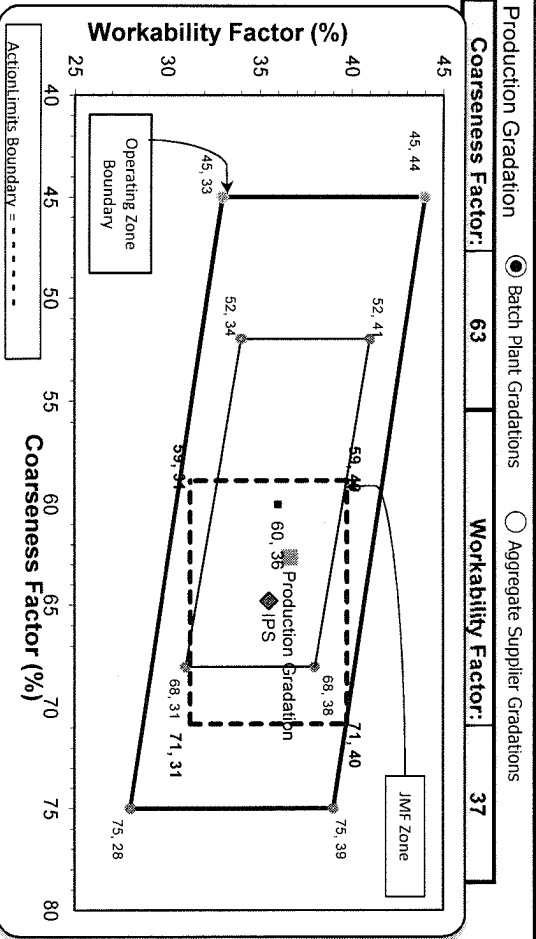
**Superior Materials, LLC**  
30701 W. 10 Mile Rd.  
Suite 500  
Farmington Hills, MI 48336

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	71-47	Presque Isle	700	4.28	2.62	22.8
IA	71-47	Presque Isle	1120	6.85	2.62	36.5
N2S	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	N2S	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	95.1	100.0	100.0	98.9	1.1	1.1
1"	39.0	100.0	100.0	86.1	12.8	13.9
3/4"	9.9	98.1	100.0	78.8	7.3	21.2
1/2"	4.9	74.4	100.0	69.0	9.8	31.0
3/8"	3.8	51.3	100.0	60.3	8.7	39.7
#4	3.2	14.2	96.2	45.1	15.2	54.9
#8	2.8	5.0	83.9	36.6	8.5	63.4
#16	2.5	3.1	71.2	30.7	5.9	69.3
#30	2.4	2.6	47.9	21.0	9.7	79.0
#50	2.2	2.4	21.0	9.9	11.1	90.1
#100	2.0	2.2	5.2	3.4	6.6	96.6
LBW	1.6	1.9	1.7	1.8	1.6	98.2

\*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:** 63 **Workability Factor:** 37

Sieve	Coarseness Factor:	Workability Factor:	% Cumulative Passing	% Retained	% Cumulative Retained
2"	65	36	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 1022-2NS GR - Smelter Bay  
 Period: 07/11/2021 - 07/17/2021

Name/Title Doug Storey / QC Technician  
 Report Date 07/17/2021

Procedure	Sieve/Test	Result	Unit	2NS GR Spec
	3/8" (9.5mm)	100.0	%	100-100
	#4 (4.75mm)	96.2	%	95-100
	#8 (2.36mm)	83.9	%	65-95
	#16 (1.18mm)	71.2	%	35-75
	#30 (.6mm)	47.9	%	20-55
	#50 (.3mm)	21.0	%	10-30
	#100 (.15mm)	5.2	%	0-10
	#200 (75µm)	1.8	%	
	FM	2.75		2.6-3
	Wash Loss (#200/75µm)	1.7	%	0-3
	Total Moisture	8.5	%	

Plant 958-JMT  
 Product 7920-INTERMED AGG P1M LS PI  
 Period: 07/11/2021 - 07/17/2021

Name/Title Doug Storey / QC Technician  
 Report Date 07/17/2021

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)	98.1	%	
	1/2" (12.5mm)	74.4	%	
	3/8" (9.5mm)	51.3	%	
	#4 (4.75mm)	14.2	%	
	#8 (2.36mm)	5.0	%	
	#16 (1.18mm)	3.1	%	
	#30 (.6mm)	2.6	%	
	#50 (.3mm)	2.4	%	
	#100 (.15mm)	2.2	%	
	#200 (75µm)	2.0	%	
	Wash Loss (#200/75um)	1.9	%	0-3
	Total Moisture	5.5	%	

# Edw. C. Levy Co.

JMT  
8911 W. Jefferson  
Detroit, 48209  
(313) 429-2429

Plant 958-JMT

Product 7919-COARSE AGG P1M LS PI

Name/Title Doug Storey / QC Technician

Period: 07/11/2021 - 07/17/2021

Report Date 07/17/2021

Procedure	Sieve/Test	Result	Unit	Coarse Agg P1M LS PI Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	95.1	%	
	1" (25mm)	39.0	%	
	3/4" (19mm)	9.9	%	
	1/2" (12.5mm)	4.9	%	
	3/8" (9.5mm)	3.8	%	
	#4 (4.75mm)	3.2	%	
	#8 (2.36mm)	2.8	%	
	#16 (1.18mm)	2.5	%	
	#30 (.6mm)	2.4	%	
	#50 (.3mm)	2.2	%	
	#100 (.15mm)	2.0	%	
	#200 (75µm)	1.7	%	
	Wash Loss (#200/75um)	1.6	%	0-2
	Total Moisture	3.5	%	

# Aggregate Optimization Chart

## Production Gradation Report

PLANT #: **P-35**

Sample Date: 7/12/21

Dates Test Represents: 7/13/2021 through 7/19/2021

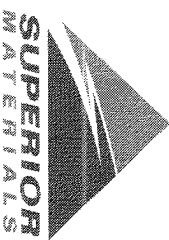
Concrete Grade: **P1M**

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

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	Contribution %
CA	58-003	Stoneco	1370	8.16	2.69	43.9
IA	58-003	Stoneco	550	3.28	2.69	17.6
NNS	81-093	Burnmeister	1200	7.26	2.65	38.5
Total Wt						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"	64.1	100.0	100.0	84.2	15.8	15.8
3/4"	30.2	100.0	100.0	69.4	30.6	30.6
1/2"	11.3	94.6	100.0	60.1	39.9	39.9
3/8"	7.0	78.2	100.0	55.3	44.7	44.7
#4	3.0	25.5	98.8	43.8	56.2	56.2
#8	2.3	6.6	85.0	34.9	65.1	65.1
#16	2.1	3.3	67.0	27.3	72.7	72.7
#30	1.9	2.5	44.3	18.3	81.7	81.7
#50	1.8	2.2	15.5	7.1	92.9	92.9
#100	1.7	2.1	3.9	2.6	97.4	97.4
LBW	1.3	1.9	1.8	1.6	98.4	98.4



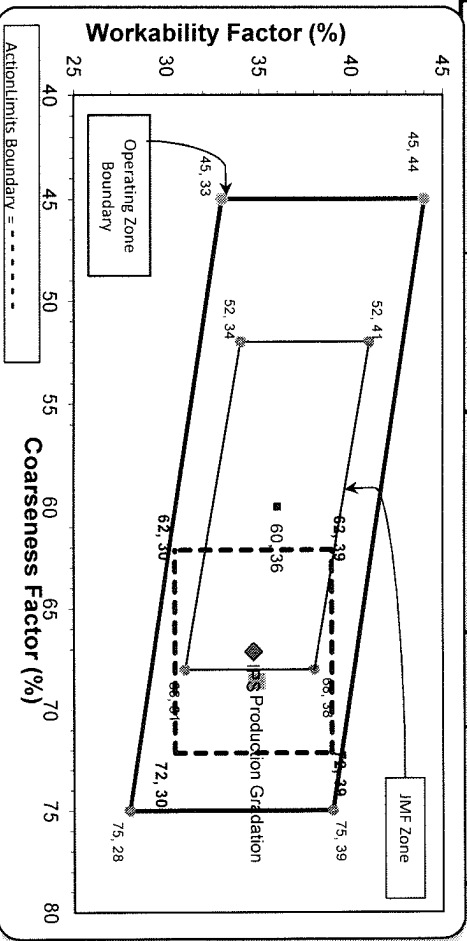
Superior Materials, LLC  
30701 W. 10 Mile Rd.  
Suite 500  
Farmington Hills, MI 48336

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"	64.1	100.0	100.0	84.2	15.8	15.8
3/4"	30.2	100.0	100.0	69.4	30.6	30.6
1/2"	11.3	94.6	100.0	60.1	39.9	39.9
3/8"	7.0	78.2	100.0	55.3	44.7	44.7
#4	3.0	25.5	98.8	43.8	56.2	56.2
#8	2.3	6.6	85.0	34.9	65.1	65.1
#16	2.1	3.3	67.0	27.3	72.7	72.7
#30	1.9	2.5	44.3	18.3	81.7	81.7
#50	1.8	2.2	15.5	7.1	92.9	92.9
#100	1.7	2.1	3.9	2.6	97.4	97.4
LBW	1.3	1.9	1.8	1.6	98.4	98.4

\*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

Initial Production Sample (IPS)



Sieve	Coarseness Factor:	Workability Factor:	% Retained	Cumulative % Retained
2"	69	35	0.0	0.0
1.5"	69	35	0.0	0.0
1"	69	35	13.1	13.1
3/4"	69	35	23.9	23.9
1/2"	69	35	36.3	36.3
3/8"	69	35	43.8	43.8
#4	69	35	56.8	56.8
#8	69	35	65.3	65.3
#16	69	35	72.5	72.5
#30	69	35	79.4	79.4
#50	69	35	91.0	91.0
#100	69	35	97.9	97.9
LBW	69	35	99.0	99.0

PREPARED BY:  
SM, LLC Technical Service

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



Plant S35-Superior Romulus  
 Product 1022-2NS GR  
 Period: 07/11/2021 - 07/17/2021

Name/Title Doug Storey / QC Technician  
 Report Date 07/17/2021

Procedure	Sieve/Test	Result	Unit	2NS GR Spec
	3/8" (9.5mm)	100.0	%	100-100
	#4 (4.75mm)	98.8	%	95-100
	#8 (2.36mm)	85.0	%	65-95
	#16 (1.18mm)	67.0	%	35-75
	#30 (.6mm)	44.3	%	20-55
	#50 (.3mm)	15.5	%	10-30
	#100 (.15mm)	3.9	%	0-10
	#200 (75µm)	2.0	%	
	FM	2.86		2.6-3
AASHTO T11	#200 (75um)	1.96	%	
	Wash Loss (#200/75um)	1.8	%	0-3
ASTM C566	Total Moisture	7.32	%	



Plant S35-Superior Romulus

Product 7920-INTERMED AGG P1M LS

Name/Title Doug Storey / QC Technician

Period: 07/11/2021 - 07/17/2021

Report Date 07/17/2021

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)	94.6	%	
	3/8" (9.5mm)	78.2	%	
	#4 (4.75mm)	25.5	%	
	#8 (2.36mm)	6.6	%	
	#16 (1.18mm)	3.3	%	
	#30 (.6mm)	2.5	%	
	#50 (.3mm)	2.2	%	
	#100 (.15mm)	2.1	%	
	#200 (75µm)	2.0	%	
	Wash Loss (#200/75um)	1.9	%	0-3
ASTM C566	Total Moisture	2.71	%	



**Plant** S35-Superior Romulus

**Product** 7919-COARSE AGG P1M LS

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

**Period:** 07/11/2021 - 07/17/2021

**Report Date** 07/17/2021

Procedure	Sieve/Test	Result	Unit	Coarse Agg P1M LS Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	
	1" (25mm)	64.1	%	
	3/4" (19mm)	30.2	%	
	1/2" (12.5mm)	11.3	%	
	3/8" (9.5mm)	7.0	%	
	#4 (4.75mm)	3.0	%	
	#8 (2.36mm)	2.3	%	
	#16 (1.18mm)	2.1	%	
	#30 (.6mm)	1.9	%	
	#50 (.3mm)	1.8	%	
	#100 (.15mm)	1.7	%	
	#200 (75µm)	1.4	%	
	Wash Loss (#200/75um)	1.3	%	0-2
ASTM C566	Total Moisture	0.00	%	



# Aggregate Optimization Chart

PLANT #: **P-36**

Sample Date: 7/12/21

Dates Test Represents: 7/13/2021 through 7/19/2021

Concrete Grade: **P1M**

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

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	Contribution %
CA	71-47	Presque Isle	720	4.40	2.62	23.5
IA	71-47	Presque Isle	1150	7.03	2.62	37.5
2NS	63-92	Grange Hall	1200	7.26	2.65	39.1
<b>Total Wt</b>			<b>3070</b>	<b>18.70</b>		<b>100.0</b>

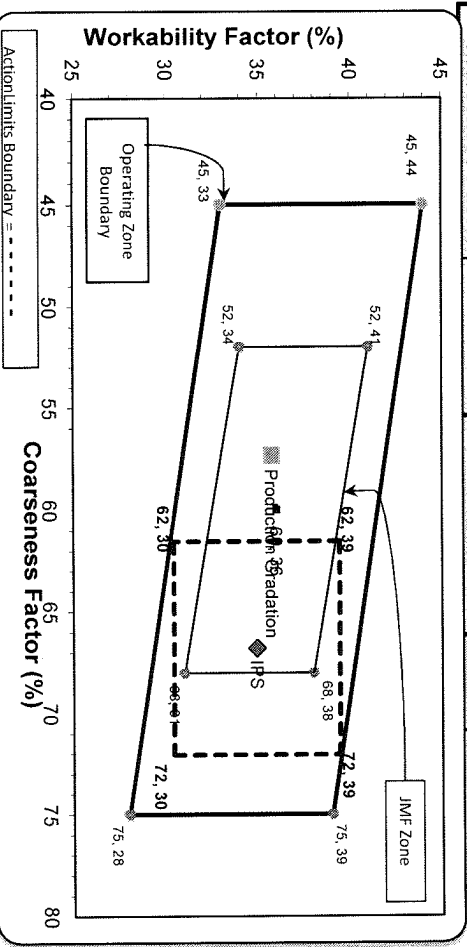
<----- Verify this number is 100%

Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	98.1	100.0	100.0	99.6	0.4	0.4
1"	54.3	100.0	100.0	89.3	10.3	10.7
3/4"	19.3	99.0	100.0	80.7	8.6	19.3
1/2"	11.2	81.0	100.0	72.1	8.6	27.9
3/8"	9.4	58.4	100.0	63.2	8.9	36.8
#4	3.9	12.2	98.7	44.1	19.1	55.9
#8	2.7	4.3	85.7	35.7	8.3	64.3
#16	2.5	2.9	70.6	29.3	6.5	70.7
#30	2.4	2.6	49.9	21.0	8.2	79.0
#50	2.4	2.4	19.8	9.2	11.8	90.8
#100	2.3	2.3	3.0	2.6	6.6	97.4
LBW	1.8	2.0	0.5	1.4	1.2	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 8% for the 1" sieve when  
 a 2" max. size (nom. Max. 1.5") aggregate is used.

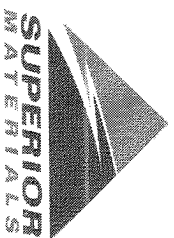
Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Coarseness Factor: **57** Workability Factor: **36**



Initial Production Sample (IPS)

Sieve	Coarseness Factor:	Workability Factor:	Cumulative % Passing	% Retained	Cumulative % Retained
2"	67	35	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



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

PREPARED BY:  
 SM, LLC Technical Service

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



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: 07/11/2021 - 07/17/2021

Report Date 07/17/2021

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)	85.7	%	65-95
	#16 (1.18mm)	70.6	%	35-75
	#30 (.6mm)	49.9	%	20-55
	#50 (.3mm)	19.8	%	10-30
	#100 (.15mm)	3.0	%	0-10
	#200 (75µm)	0.6	%	
	FM	2.72		2.6-3
	Wash Loss (#200/75um)	0.5	%	0-3
	Total Moisture	5.45	%	



Superior Auburn Hills  
 2470 Auburn Road  
 Auburn Hills, MI 48432

Plant S36-Superior Auburn Hills  
 Product 7920-INTERMED AGG P1M LS  
 Period: 07/11/2021 - 07/17/2021

Name/Title Doug Storey / QC Technician  
 Report Date 07/17/2021

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)	99.0	%	
	1/2" (12.5mm)	81.0	%	
	3/8" (9.5mm)	58.4	%	
	#4 (4.75mm)	12.2	%	
	#8 (2.36mm)	4.3	%	
	#16 (1.18mm)	2.9	%	
	#30 (.6mm)	2.6	%	
	#50 (.3mm)	2.4	%	
	#100 (.15mm)	2.3	%	
	#200 (75µm)	2.1	%	
	Wash Loss (#200/75um)	2.0	%	0-3
	Total Moisture	5.63	%	



Superior Auburn Hills  
 2470 Auburn Road  
 Auburn Hills, MI 48432

**Plant** S36-Superior Auburn Hills  
**Product** 7919-COARSE AGG P1M LS  
**Period:** 07/11/2021 - 07/17/2021

**Name/Title** Doug Storey / QC Technician  
**Report Date** 07/17/2021

Procedure	Sieve/Test	Result	Unit	Coarse Agg P1M LS Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	98.1	%	
	1" (25mm)	54.3	%	
	3/4" (19mm)	19.3	%	
	1/2" (12.5mm)	11.2	%	
	3/8" (9.5mm)	9.4	%	
	#4 (4.75mm)	3.9	%	
	#8 (2.36mm)	2.7	%	
	#16 (1.18mm)	2.5	%	
	#30 (.6mm)	2.4	%	
	#50 (.3mm)	2.4	%	
	#100 (.15mm)	2.3	%	
	#200 (75µm)	2.0	%	
	Wash Loss (#200/75um)	1.8	%	0-2
	Total Moisture	3.36	%	