

# Aggregate Optimization Chart

# Production Gradation Report

**PLANT #:** P-32

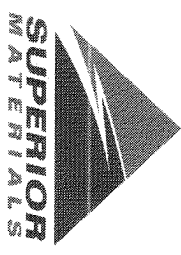
**Sample Date:** 11/30/20

**Dates Test Represents:** 12/1/2020 through 12/7/2020

**Concrete Grade:** P1M

**Contractor:**

**MDOT No.:**



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

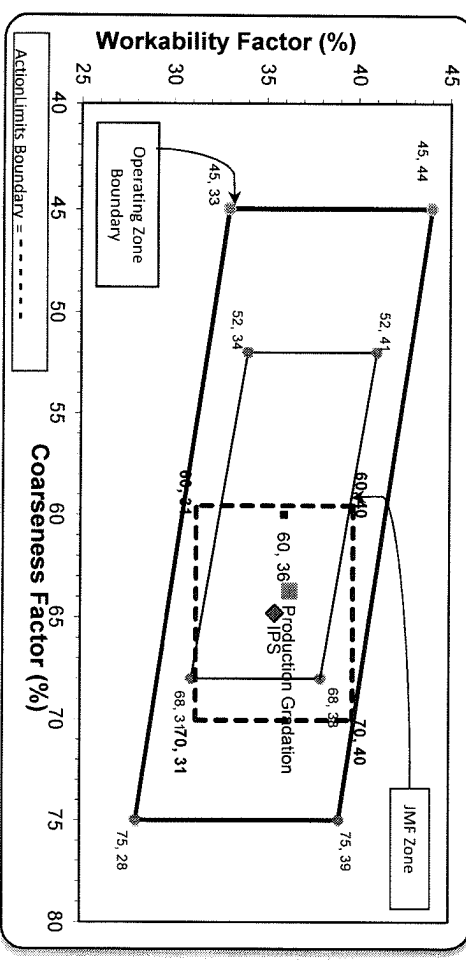
Agg. Class	Pit #	Source	Weight (ssd)	ft <sup>3</sup>	Specific Gravity	Contribution %
CA	71-47	Presque Isle	920	5.63	2.62	30.0
IA	71-47	Presque Isle	900	5.50	2.62	29.3
2NS	95-013	Smelter Bay	1250	7.56	2.65	40.7
		<b>Total Wt</b>	<b>3070</b>			<b>100.0</b>

Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	98.5	100.0	100.0	99.6	0.4	0.4
1"	43.2	100.0	100.0	83.0	16.6	17.0
3/4"	11.5	99.4	100.0	73.3	9.7	26.7
1/2"	3.4	91.2	100.0	68.5	4.8	31.5
3/8"	3.1	60.6	100.0	59.4	9.1	40.6
#4	2.6	20.9	96.7	46.3	13.1	53.7
#8	2.4	7.5	82.0	36.3	10.0	63.7
#16	2.2	4.5	65.7	28.7	7.6	71.3
#30	2.1	3.7	44.6	19.9	8.9	80.1
#50	1.9	3.1	21.0	10.0	9.8	90.0
#100	1.8	2.4	5.7	3.6	6.5	96.4
LBW	1.1	1.9	1.5	1.5	2.1	98.5

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

**Coarseness Factor:** 64 **Workability Factor:** 36



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

**Coarseness Factor:** 65 **Workability Factor:** 36

\*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:

# Edw. C. Levy Co.

Plant 958-JMT

Product 7919-COARSE AGG P1M LS PI

Name/Title Doug Storey / QC Technician

Period: 11/29/2020 - 12/05/2020

Report Date 12/04/2020

Procedure	Sieve/Test	Result	Unit	Coarse Agg P1M LS PI Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	98.5	%	
	1" (25mm)	43.2	%	
	3/4" (19mm)	11.5	%	
	1/2" (12.5mm)	3.4	%	
	3/8" (9.5mm)	3.1	%	
	#4 (4.75mm)	2.6	%	
	#8 (2.36mm)	2.4	%	
	#16 (1.18mm)	2.2	%	
	#30 (.6mm)	2.1	%	
	#50 (.3mm)	1.9	%	
	#100 (.15mm)	1.8	%	
	#200 (75µm)	1.3	%	
	Wash Loss (#200/75um)	1.1	%	0-2
	Total Moisture	2.4	%	

# Edw. C. Levy Co.

Plant 958-JMT

Product 7920-INTERMED AGG P1M LS PI

Name/Title Doug Storey / QC Technician

Period: 11/29/2020 - 12/05/2020

Report Date 12/04/2020

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)	91.2	%	
	3/8" (9.5mm)	60.6	%	
	#4 (4.75mm)	20.9	%	
	#8 (2.36mm)	7.5	%	
	#16 (1.18mm)	4.5	%	
	#30 (.6mm)	3.7	%	
	#50 (.3mm)	3.1	%	
	#100 (.15mm)	2.4	%	
	#200 (75µm)	2.2	%	
	Wash Loss (#200/75um)	1.9	%	0-3
	Total Moisture	4.4	%	

# Edw. C. Levy Co.

Plant 958-JMT

Product 1022-2NS GR - Smelter Bay

Name/Title Doug Storey / QC Technician

Period: 11/29/2020 - 12/05/2020

Report Date 12/04/2020

Procedure	Sieve/Test	Result	Unit	2NS GR Spec
	3/8" (9.5mm)	100.0	%	100-100
	#4 (4.75mm)	96.7	%	95-100
	#8 (2.36mm)	82.0	%	65-95
	#16 (1.18mm)	65.7	%	35-75
	#30 (.6mm)	44.6	%	20-55
	#50 (.3mm)	21.0	%	10-30
	#100 (.15mm)	5.7	%	0-10
	#200 (75µm)	2.0	%	
	FM	2.84		2.6-3
	Wash Loss (#200/75um)	1.5	%	0-3
	Total Moisture	5.1	%	

# Aggregate Optimization Chart

# Production Gradation Report

PLANT #: **P-39**

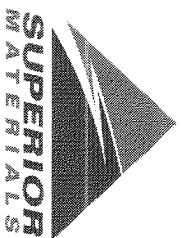
Sample Date: 11/30/20

Dates Test Represents: 12/1/2020 through 12/7/2020

Concrete Grade: **P1M**

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

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



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

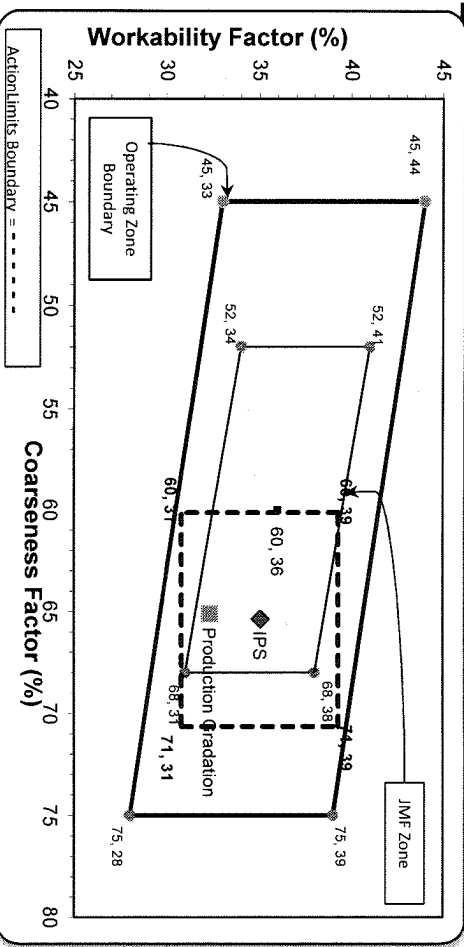
Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	71-47	Presque Isle	970	5.93	2.62	31.6
IA	71-47	Presque Isle	900	5.50	2.62	29.3
2NS	44-051	Krake Willis Rd	1200	7.26	2.65	39.1
		<b>Total Wt</b>	<b>3070</b>	<b>18.70</b>		<b>100.0</b>

Sieve	CA	IA	2NS	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	98.8	1.2	1.2
1"	26.2	100.0	100.0	76.7	22.1	23.3
3/4"	4.1	98.6	100.0	69.3	7.4	30.7
1/2"	2.6	76.4	100.0	62.3	7.0	37.7
3/8"	2.4	54.9	100.0	55.9	6.4	44.1
#4	1.9	15.1	94.8	42.1	13.9	57.9
#8	1.8	5.3	77.3	32.3	9.7	67.7
#16	1.7	3.1	62.8	26.0	6.3	74.0
#30	1.7	2.6	48.7	20.3	5.7	79.7
#50	1.6	2.4	26.7	11.6	8.7	88.4
#100	1.5	2.2	7.9	4.2	7.4	95.8
LBW	1.1	1.8	1.9	1.6	2.6	98.4

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Coarseness Factor: **65** Workability Factor: **32**



Initial Production Sample (IPS)

Sieve	Coarseness Factor:	Workability Factor:	% Retained	Cumulative % Retained
2"	65	35	0.0	0.0
1.5"			0.4	0.4
1"			15.7	16.1
3/4"			9.8	25.9
1/2"			9.7	35.7
3/8"			6.8	42.5
#4			13.1	55.5
#8			9.4	64.9
#16			7.2	72.1
#30			6.2	78.3
#50			9.1	87.4
#100			9.1	96.5
LBW			2.4	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 S39-Superior Sterling Heights

Product 7919-COARSE AGG P1M LS

Period: 11/29/2020 - 12/05/2020

Name/Title Doug Storey / QC Technician

Report Date 12/04/2020

Procedure	Sieve/Test	Result	Unit	Coarse Agg P1M LS Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	96.2	%	
	1" (25mm)	26.2	%	
	3/4" (19mm)	4.1	%	
	1/2" (12.5mm)	2.6	%	
	3/8" (9.5mm)	2.4	%	
	#4 (4.75mm)	1.9	%	
	#8 (2.36mm)	1.8	%	
	#16 (1.18mm)	1.7	%	
	#30 (.6mm)	1.7	%	
	#50 (.3mm)	1.6	%	
	#100 (.15mm)	1.5	%	
	#200 (75µm)	1.3	%	
	Wash Loss (#200/75um)	1.1	%	0-2
	Total Moisture	1.98	%	



Plant S39-Superior Sterling Heights  
 Product 7920-INTERMED AGG P1M LS  
 Period: 11/29/2020 - 12/05/2020

Name/Title Doug Storey / QC Technician  
 Report Date 12/04/2020

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)	98.6	%	
	1/2" (12.5mm)	76.4	%	
	3/8" (9.5mm)	54.9	%	
	#4 (4.75mm)	15.1	%	
	#8 (2.36mm)	5.3	%	
	#16 (1.18mm)	3.1	%	
	#30 (.6mm)	2.6	%	
	#50 (.3mm)	2.4	%	
	#100 (.15mm)	2.2	%	
	#200 (75µm)	1.9	%	
	Wash Loss (#200/75um)	1.8	%	0-3
	Total Moisture	4.41	%	



**Plant** S39-Superior Sterling Heights

**Product** 1022-2NS GR

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

**Period:** 11/29/2020 - 12/05/2020

**Report Date** 12/04/2020

Procedure	Sieve/Test	Result	Unit	2NS GR Spec
	3/8" (9.5mm)	100.0	%	100-100
	#4 (4.75mm)	94.8	%	95-100
	#8 (2.36mm)	77.3	%	65-95
	#16 (1.18mm)	62.8	%	35-75
	#30 (.6mm)	48.7	%	20-55
	#50 (.3mm)	26.7	%	10-30
	#100 (.15mm)	7.9	%	0-10
	#200 (75µm)	2.3	%	
	FM	2.82		2.6-3
	Wash Loss (#200/75um)	1.9	%	0-3
	Total Moisture	4.73	%	



# Aggregate Optimization Chart

# Production Gradation Report

**PLANT #:** P-101

Sample Date: 11/30/20

Dates Test Represents: 12/1/2020 through 12/7/2020

Concrete Grade: P1M

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

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

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
ZNS	75-051	Mid-Michigan	1200	7.23	2.66	39.1
Total Wt.			3070	18.67		100.0

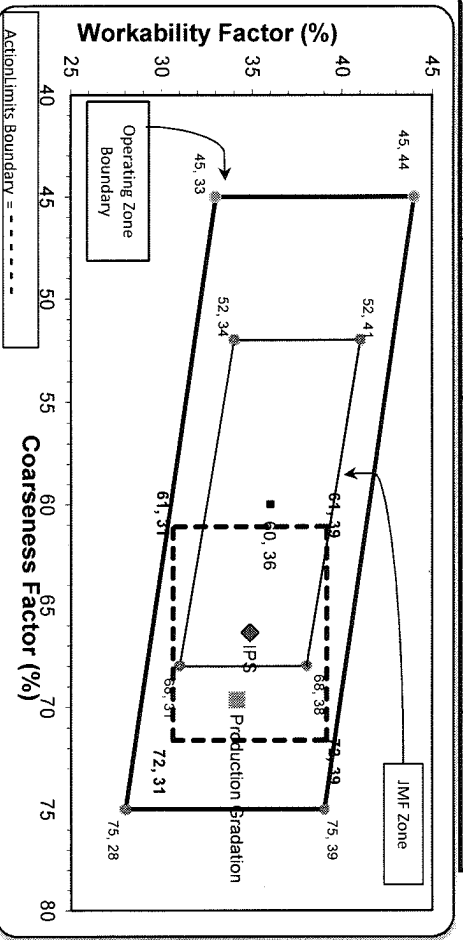
Verify this number is 100%

Sieve	CA	IA	ZNS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	98.1	100.0	100.0	99.4	0.6	0.6
1"	40.1	100.0	100.0	81.1	18.3	18.9
3/4"	7.3	94.7	100.0	69.2	11.9	30.8
1/2"	2.6	71.8	100.0	61.0	8.2	39.0
3/8"	2.3	48.9	100.0	54.2	6.8	45.8
#4	2.2	14.0	98.4	43.3	10.9	56.7
#8	2.1	6.3	81.0	34.2	9.1	65.8
#16	2.0	4.5	62.6	26.4	7.8	73.6
#30	2.0	4.1	46.2	19.9	6.5	80.1
#50	1.9	3.7	21.5	10.1	9.8	89.9
#100	1.7	3.3	4.7	3.3	6.7	96.7
LBW	1.4	2.6	0.9	1.6	1.8	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. 1.5") aggregate is used.

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Coarseness Factor: 70 Workability Factor: 34



Initial Production Sample (IPS)

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



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

PREPARED BY:  
 SM, LLC Technical Service

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



Plant S101-Superior Mount Clemens

Product 7919-COARSE AGG P1M LS

Period: 11/29/2020 - 12/05/2020

Name/Title Doug Storey / QC Technician

Report Date 12/04/2020

Procedure	Sieve/Test	Result	Unit	Coarse Agg P1M LS Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	98.1	%	
	1" (25mm)	40.1	%	
	3/4" (19mm)	7.3	%	
	1/2" (12.5mm)	2.6	%	
	3/8" (9.5mm)	2.3	%	
	#4 (4.75mm)	2.2	%	
	#8 (2.36mm)	2.1	%	
	#16 (1.18mm)	2.0	%	
	#30 (.6mm)	2.0	%	
	#50 (.3mm)	1.9	%	
	#100 (.15mm)	1.7	%	
	#200 (75µm)	1.5	%	
	Wash Loss (#200/75um)	1.4	%	0-2
	Total Moisture	2.45	%	



Plant S101-Superior Mount Clemens

Product 7920-INTERMED AGG P1M LS

Period: 11/29/2020 - 12/05/2020

Name/Title Doug Storey / QC Technician

Report Date 12/04/2020

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)	94.7	%	
	1/2" (12.5mm)	71.8	%	
	3/8" (9.5mm)	48.9	%	
	#4 (4.75mm)	14.0	%	
	#8 (2.36mm)	6.3	%	
	#16 (1.18mm)	4.5	%	
	#30 (.6mm)	4.1	%	
	#50 (.3mm)	3.7	%	
	#100 (.15mm)	3.3	%	
	#200 (75µm)	2.8	%	
	Wash Loss (#200/75um)	2.6	%	0-3
	Total Moisture	3.10	%	



**Plant** S101-Superior Mount Clemens

**Product** 1022-2NS GR

**Period:** 11/29/2020 - 12/05/2020

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

**Report Date** 12/04/2020

Procedure	Sieve/Test	Result	Unit	2NS GR Spec
	3/8" (9.5mm)	100.0	%	100-100
	#4 (4.75mm)	98.4	%	95-100
	#8 (2.36mm)	81.0	%	65-95
	#16 (1.18mm)	62.6	%	35-75
	#30 (.6mm)	46.2	%	20-55
	#50 (.3mm)	21.5	%	10-30
	#100 (.15mm)	4.7	%	0-10
	#200 (75µm)	1.1	%	
	FM	2.86		2.6-3
	Wash Loss (#200/75um)	0.9	%	0-3
	Total Moisture	3.83	%	