

# Aggregate Optimization Chart

# Production Gradation Report

PLANT #: **P-12**

Sample Date: **6/7/21**

Dates Test Represents: **6/8/2021** through **6/14/2021**

Concrete Grade: **P1M**

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

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	Contribution %
CA	71-47	Presque Isle	1020	6.24	2.62	33.2
IA	71-47	Presque Isle	800	4.89	2.62	26.1
NNS	63-115	Ray Rd	1250	7.56	2.65	40.7
Total Wt.						100.0

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"	100.0	100.0	100.0	100.0	0.0	0.0
1"	51.8	100.0	100.0	84.0	16.0	16.0
3/4"	18.5	96.3	100.0	72.0	28.0	44.0
1/2"	4.9	77.8	100.0	62.6	37.4	81.4
3/8"	3.6	61.1	100.0	57.8	42.2	93.6
#4	2.6	20.9	97.8	46.1	53.9	97.5
#8	2.4	8.6	82.8	36.8	63.2	99.9
#16	2.2	5.2	68.3	29.9	70.1	100.0
#30	2.2	4.2	53.6	23.6	76.4	100.0
#50	2.1	3.5	27.2	12.7	87.3	100.0
#100	1.9	2.9	5.3	3.5	96.5	100.0
LBW	1.6	2.4	0.5	1.4	98.6	100.0

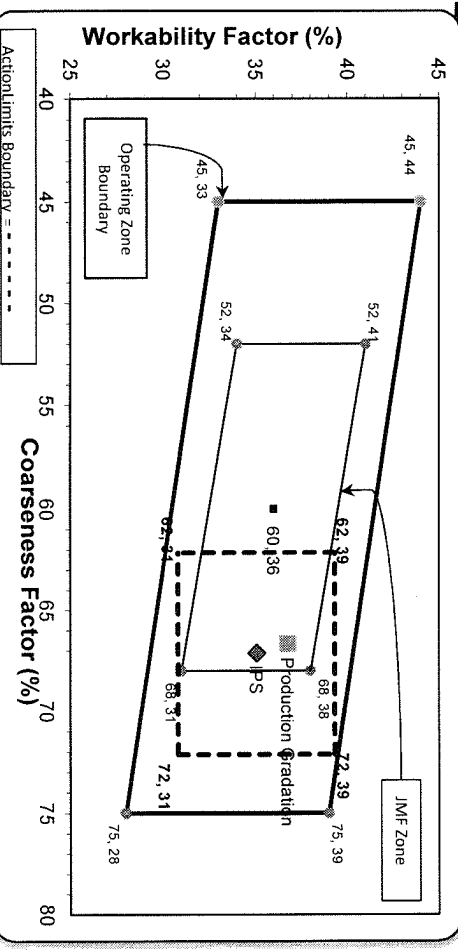
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max.  
 nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max.  
 nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when 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

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Initial Production Sample (PS)

Coarseness Factor: **67** Workability Factor: **37**

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



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

PREPARED BY:  
 SM, LLC Technical Service

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



Plant S12-Superior Onsite

Product 1022-2NS GR

Name/Title Doug Storey / QC Technician

Period: 06/06/2021 - 06/12/2021

Report Date 06/12/2021

Procedure	Sieve/Test	Result	Unit	2NS GR Spec
	3/8" (9.5mm)	100.0	%	100-100
	#4 (4.75mm)	97.8	%	95-100
	#8 (2.36mm)	82.8	%	65-95
	#16 (1.18mm)	68.3	%	35-75
	#30 (.6mm)	53.6	%	20-55
	#50 (.3mm)	27.2	%	10-30
	#100 (.15mm)	5.3	%	0-10
	#200 (75µm)	0.8	%	
	FM	2.65		2.6-3
	Wash Loss (#200/75µm)	0.5	%	0-3
	Total Moisture	3.15	%	



Plant S12-Superior Onsite

Product 7920-INTERMED AGG P1M LS

Name/Title Doug Storey / QC Technician

Period: 06/06/2021 - 06/12/2021

Report Date 06/12/2021

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)	96.3	%	
	1/2" (12.5mm)	77.8	%	
	3/8" (9.5mm)	61.1	%	
	#4 (4.75mm)	20.9	%	
	#8 (2.36mm)	8.6	%	
	#16 (1.18mm)	5.2	%	
	#30 (.6mm)	4.2	%	
	#50 (.3mm)	3.5	%	
	#100 (.15mm)	2.9	%	
	#200 (75µm)	2.5	%	
	Wash Loss (#200/75um)	2.4	%	0-3
	Total Moisture	2.52	%	



**Plant** S12-Superior Onsite

**Product** 7919-COARSE AGG P1M LS

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

**Period:** 06/06/2021 - 06/12/2021

**Report Date** 06/12/2021

Procedure	Sieve/Test	Result	Unit	Coarse Agg P1M LS Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	
	1" (25mm)	51.8	%	
	3/4" (19mm)	18.5	%	
	1/2" (12.5mm)	4.9	%	
	3/8" (9.5mm)	3.6	%	
	#4 (4.75mm)	2.6	%	
	#8 (2.36mm)	2.4	%	
	#16 (1.18mm)	2.2	%	
	#30 (.6mm)	2.2	%	
	#50 (.3mm)	2.1	%	
	#100 (.15mm)	1.9	%	
	#200 (75µm)	1.6	%	
	Wash Loss (#200/75um)	1.6	%	0-2
	Total Moisture	1.12	%	

# Aggregate Optimization Chart

# Production Gradation Report

PLANT #: **P-20**

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

Sample Date: **6/7/21**

Concrete Grade: **P1M**

Dates Test Represents: **6/8/2021** through **6/14/2021**

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	Contribution %
CA	71-47	Presque Isle	950	5.81	2.62	30.9
IA	71-47	Presque Isle	920	5.63	2.62	30.0
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"	100.0	100.0	100.0	100.0	0.0	0.0
1"	31.4	100.0	100.0	78.8	21.2	21.2
3/4"	11.6	97.7	100.0	72.0	6.8	28.0
1/2"	3.7	74.1	100.0	62.4	9.5	37.6
3/8"	2.6	50.4	100.0	55.0	7.4	45.0
#4	2.0	12.3	98.8	42.9	12.1	57.1
#8	1.8	6.1	87.3	36.5	6.4	63.5
#16	1.6	4.8	71.2	29.8	6.7	70.2
#30	1.5	4.3	51.1	21.7	8.0	78.3
#50	1.4	3.9	23.9	10.9	10.8	89.1
#100	1.2	3.4	3.9	2.9	8.0	97.1
LBW	0.8	2.8	0.7	1.4	1.6	98.6

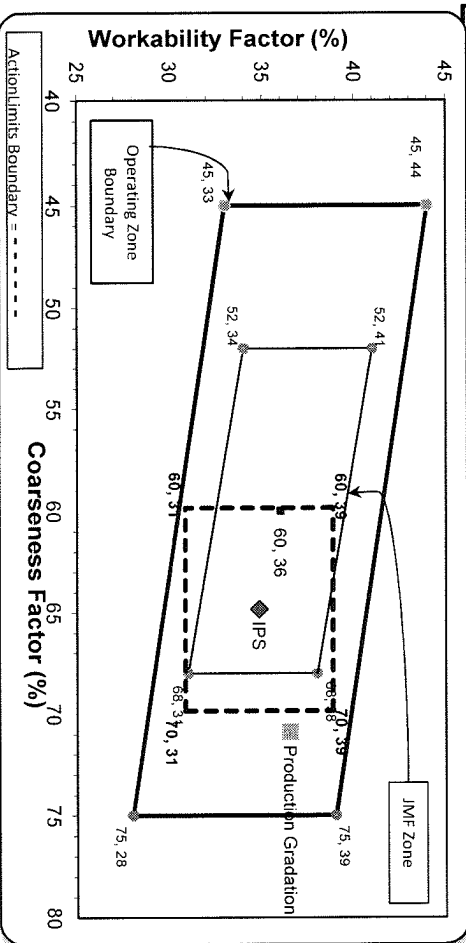
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max.  
 nom. max. #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max.  
 nom. max. #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when  
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

**Superior Materials, LLC**  
 30701 W. 10 Mile Rd.  
 Suite 500  
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Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations  
 Coarseness Factor: **71** Workability Factor: **37**

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

PREPARED BY:  
 SM, LLC Technical Service

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



Plant S20-Superior Flint

Product 1022-2NS GR

Name/Title Doug Storey / QC Technician

Period: 06/06/2021 - 06/12/2021

Report Date 06/12/2021

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)	87.3	%	65-95
	#16 (1.18mm)	71.2	%	35-75
	#30 (.6mm)	51.1	%	20-55
	#50 (.3mm)	23.9	%	10-30
	#100 (.15mm)	3.9	%	0-10
	#200 (75µm)	0.9	%	
	FM	2.64		2.6-3
	Wash Loss (#200/75um)	0.7	%	0-3
	Total Moisture	3.51	%	



Plant S20-Superior Flint

Product 7920-INTERMED AGG P1M LS

Name/Title Doug Storey / QC Technician

Period: 06/06/2021 - 06/12/2021

Report Date 06/12/2021

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)	97.7	%	
	1/2" (12.5mm)	74.1	%	
	3/8" (9.5mm)	50.4	%	
	#4 (4.75mm)	12.3	%	
	#8 (2.36mm)	6.1	%	
	#16 (1.18mm)	4.8	%	
	#30 (.6mm)	4.3	%	
	#50 (.3mm)	3.9	%	
	#100 (.15mm)	3.4	%	
	#200 (75µm)	3.0	%	
	Wash Loss (#200/75um)	2.8	%	0-3
	Total Moisture	3.75	%	



**Plant** S20-Superior Flint

**Product** 7919-COARSE AGG P1M LS

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

**Period:** 06/06/2021 - 06/12/2021

**Report Date** 06/12/2021

Procedure	Sieve/Test	Result	Unit	Coarse Agg P1M LS Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	
	1" (25mm)	31.4	%	
	3/4" (19mm)	11.6	%	
	1/2" (12.5mm)	3.7	%	
	3/8" (9.5mm)	2.6	%	
	#4 (4.75mm)	2.0	%	
	#8 (2.36mm)	1.8	%	
	#16 (1.18mm)	1.6	%	
	#30 (.6mm)	1.5	%	
	#50 (.3mm)	1.4	%	
	#100 (.15mm)	1.2	%	
	#200 (75µm)	1.0	%	
	Wash Loss (#200/75um)	0.8	%	0-2
	Total Moisture	0.12	%	



# Aggregate Optimization Chart

# Production Gradation Report

PLANT #: **P-36**

Sample Date: **6/7/21**

Dates Test Represents: **6/8/2021** through **6/14/2021**

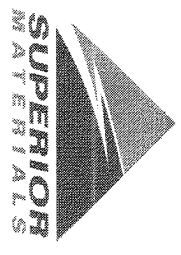
Concrete Grade: **P1M**

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

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	Contribution %
CA	71-47	Presque Isle	1050	6.42	2.62	34.2
IA	71-47	Presque Isle	820	5.02	2.62	26.7
ZNS	63-92	Grange Hall	1200	7.26	2.65	39.1
Total Wt			3070	18.70		100.0

Sieve	CA	IA	ZNS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	97.3	100.0	100.0	99.1	0.9	0.9
1"	55.8	100.0	100.0	84.9	14.2	15.1
3/4"	20.8	98.1	100.0	72.4	12.5	27.6
1/2"	5.9	78.4	100.0	62.0	10.4	38.0
3/8"	4.5	57.2	100.0	55.9	6.1	44.1
#4	3.5	13.2	98.0	43.0	12.9	57.0
#8	3.1	4.7	86.4	36.1	6.9	63.9
#16	2.9	3.1	71.2	29.7	6.4	70.3
#30	2.7	2.8	52.4	22.2	7.5	77.8
#50	2.6	2.6	24.2	11.0	11.1	89.0
#100	2.3	2.4	3.6	2.8	8.2	97.2
LBW	1.7	1.8	0.6	1.3	1.5	98.7



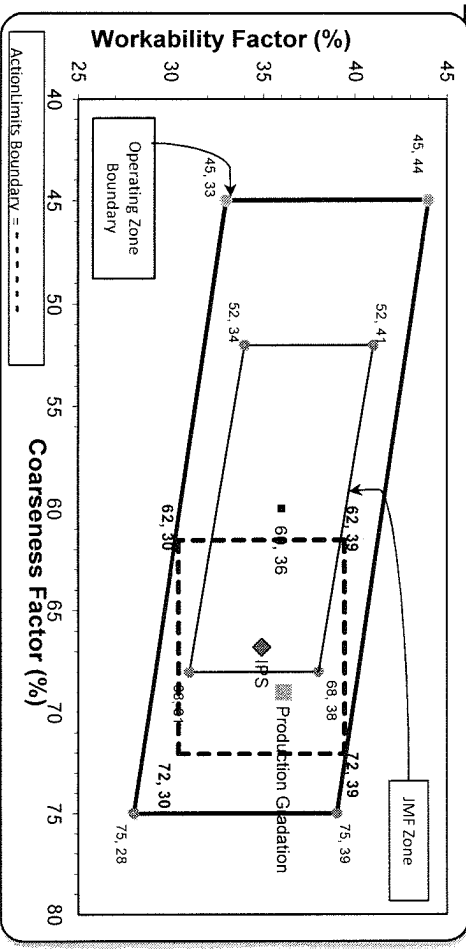
Superior Materials, LLC  
30701 W. 10 Mile Rd.  
Suite 500  
Farmington Hills, MI 48336

Sieve	CA	IA	ZNS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	97.3	100.0	100.0	99.1	0.9	0.9
1"	55.8	100.0	100.0	84.9	14.2	15.1
3/4"	20.8	98.1	100.0	72.4	12.5	27.6
1/2"	5.9	78.4	100.0	62.0	10.4	38.0
3/8"	4.5	57.2	100.0	55.9	6.1	44.1
#4	3.5	13.2	98.0	43.0	12.9	57.0
#8	3.1	4.7	86.4	36.1	6.9	63.9
#16	2.9	3.1	71.2	29.7	6.4	70.3
#30	2.7	2.8	52.4	22.2	7.5	77.8
#50	2.6	2.6	24.2	11.0	11.1	89.0
#100	2.3	2.4	3.6	2.8	8.2	97.2
LBW	1.7	1.8	0.6	1.3	1.5	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

Coarseness Factor: **69** Workability Factor: **36**



Initial Production Sample (IPS)

Sieve	Coarseness Factor:	Workability Factor:	% Retained	Cumulative % Retained
2"	67	35	0.0	0.0
1.5"			0.0	0.0
1"			15.0	15.0
3/4"			12.9	27.9
1/2"			7.6	35.5
3/8"			8.0	43.5
#4			13.8	57.3
#8			7.8	65.1
#16			5.9	71.0
#30			8.0	79.0
#50			12.8	91.8
#100			6.5	98.4
LBW			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 1022-2NS GR

Name/Title Doug Storey / QC Technician

Period: 06/06/2021 - 06/12/2021

Report Date 06/12/2021

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)	86.4	%	65-95
	#16 (1.18mm)	71.2	%	35-75
	#30 (.6mm)	52.4	%	20-55
	#50 (.3mm)	24.2	%	10-30
	#100 (.15mm)	3.6	%	0-10
	#200 (75µm)	0.8	%	
	FM	2.64		2.6-3
	Wash Loss (#200/75um)	0.6	%	.0-3
	Total Moisture	3.48	%	



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: 06/06/2021 - 06/12/2021

Report Date 06/12/2021

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)	98.1	%	
	1/2" (12.5mm)	78.4	%	
	3/8" (9.5mm)	57.2	%	
	#4 (4.75mm)	13.2	%	
	#8 (2.36mm)	4.7	%	
	#16 (1.18mm)	3.1	%	
	#30 (.6mm)	2.8	%	
	#50 (.3mm)	2.6	%	
	#100 (.15mm)	2.4	%	
	#200 (75µm)	2.0	%	
	Wash Loss (#200/75um)	1.8	%	0-3
	Total Moisture	2.73	%	



Superior Auburn Hills  
 2470 Auburn Road  
 Auburn Hills, MI 48432

**Plant** S36-Superior Auburn Hills

**Product** 7919-COARSE AGG P1M LS

**Period:** 06/06/2021 - 06/12/2021

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

**Report Date** 06/12/2021

Procedure	Sieve/Test	Result	Unit	Coarse Agg P1M LS Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	97.3	%	
	1" (25mm)	55.8	%	
	3/4" (19mm)	20.8	%	
	1/2" (12.5mm)	5.9	%	
	3/8" (9.5mm)	4.5	%	
	#4 (4.75mm)	3.5	%	
	#8 (2.36mm)	3.1	%	
	#16 (1.18mm)	2.9	%	
	#30 (.6mm)	2.7	%	
	#50 (.3mm)	2.6	%	
	#100 (.15mm)	2.3	%	
	#200 (75µm)	1.8	%	
	Wash Loss (#200/75um)	1.7	%	0-2
	Total Moisture	1.41	%	