

# Aggregate Optimization Chart

# Production Gradation Report

PLANT #: **P-20**

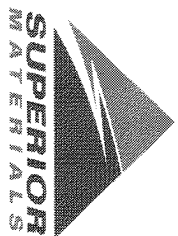
Sample Date: **9/14/20**

Dates Test Represents: **9/15/2020 through 9/21/2020**

Concrete Grade: **P1M**

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

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



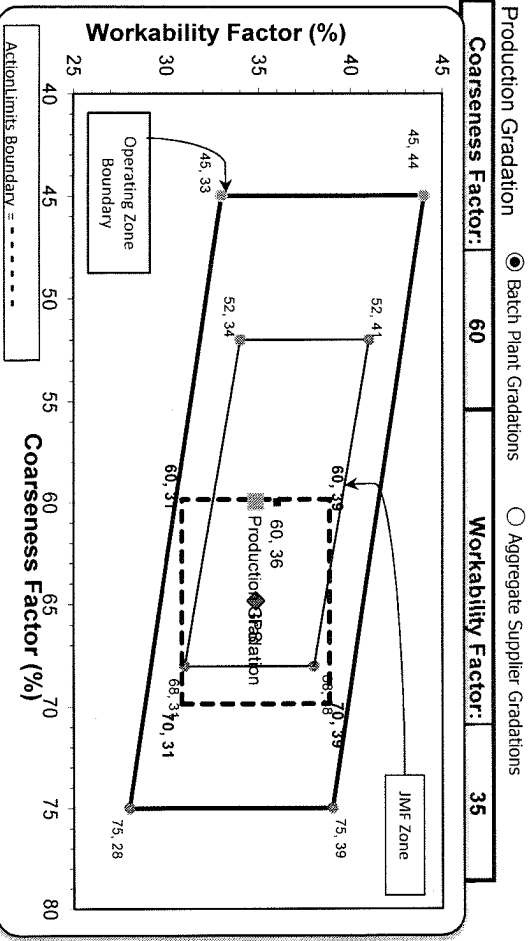
**Superior Materials, LLC**  
30701 W. 10 Mile Rd.  
Suite 500  
Farmington Hills, MI 48336

Agg. Class	Pit #	Source	Weight (ss)	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
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>

Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	97.1	100.0	100.0	99.2	0.8	0.8
1"	50.0	100.0	100.0	85.8	13.3	14.2
3/4"	9.5	99.0	100.0	74.0	11.8	26.0
1/2"	2.4	86.1	100.0	67.8	6.2	32.2
3/8"	2.0	65.3	100.0	60.9	6.9	39.1
#4	1.8	17.0	97.4	44.1	16.8	55.9
#8	1.7	3.8	84.7	34.8	9.3	65.2
#16	1.6	1.8	70.5	28.6	6.2	71.4
#30	1.5	1.6	50.0	20.5	8.1	79.5
#50	1.5	1.5	21.2	9.2	11.3	90.8
#100	1.2	1.3	2.9	1.9	7.3	98.1
LBW	0.9	0.9	0.4	0.7	1.2	99.3

\*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.



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 7919-COARSE AGG P1M LS  
 Period: 09/13/2020 - 09/19/2020

Name/Title Doug Storey / QC Technician  
 Report Date 09/18/2020

Procedure	Sieve/Test	Result	Unit	Coarse Agg P1M LS Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	97.1	%	
	1" (25mm)	50.0	%	
	3/4" (19mm)	9.5	%	
	1/2" (12.5mm)	2.4	%	
	3/8" (9.5mm)	2.0	%	
	#4 (4.75mm)	1.8	%	
	#8 (2.36mm)	1.7	%	
	#16 (1.18mm)	1.6	%	
	#30 (.6mm)	1.5	%	
	#50 (.3mm)	1.5	%	
	#100 (.15mm)	1.2	%	
	#200 (75µm)	1.0	%	
	Wash Loss (#200/75um)	0.9	%	0-2
	Total Moisture	1.15	%	



Plant S20-Superior Flint  
 Product 7920-INTERMED AGG P1M LS  
 Period: 09/13/2020 - 09/19/2020

Name/Title Doug Storey / QC Technician  
 Report Date 09/18/2020

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)	99.0	%	
	1/2" (12.5mm)	86.1	%	
	3/8" (9.5mm)	65.3	%	
	#4 (4.75mm)	17.0	%	
	#8 (2.36mm)	3.8	%	
	#16 (1.18mm)	1.8	%	
	#30 (.6mm)	1.6	%	
	#50 (.3mm)	1.5	%	
	#100 (.15mm)	1.3	%	
	#200 (75µm)	1.1	%	
	Wash Loss (#200/75um)	0.9	%	0-3
	Total Moisture	4.46	%	



**Plant** S20-Superior Flint  
**Product** 1022-2NS GR  
**Period:** 09/13/2020 - 09/19/2020

**Name/Title** Doug Storey / QC Technician  
**Report Date** 09/18/2020

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)	84.7	%	65-95
	#16 (1.18mm)	70.5	%	35-75
	#30 (.6mm)	50.0	%	20-55
	#50 (.3mm)	21.2	%	10-30
	#100 (.15mm)	2.9	%	0-10
	#200 (75µm)	0.4	%	
	FM	2.73		2.6-3
	Wash Loss (#200/75um)	0.4	%	0-3
	Total Moisture	3.34	%	

# Aggregate Optimization Chart

# Production Gradation Report

PLANT #: **P-36**

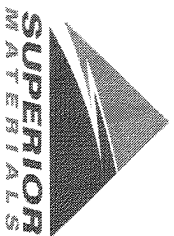
Sample Date: 9/14/20

Dates Test Represents: 9/15/2020 through 9/21/2020

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	900	5.50	2.62	29.3
IA	71-47	Presque Isle	970	5.93	2.62	31.6
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>

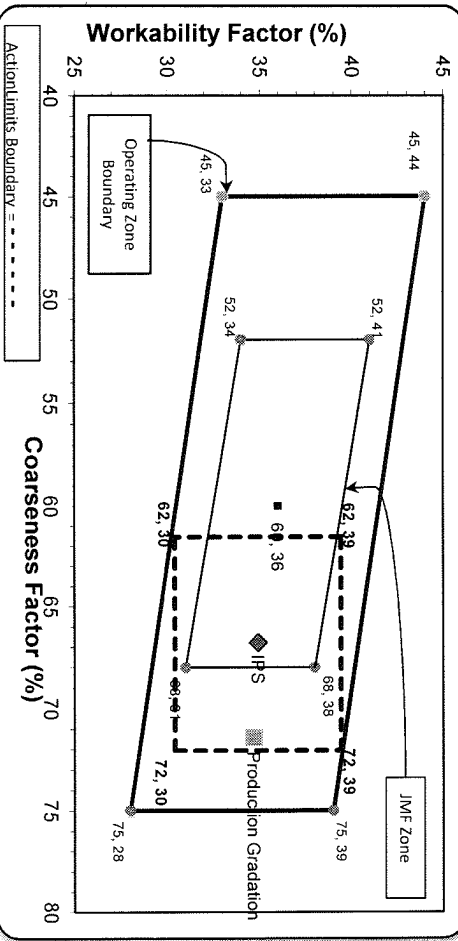
  

Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	100.0	100.0	100.0	100.0	0.0	0.0
1"	37.8	100.0	100.0	81.8	18.2	18.2
3/4"	9.2	96.5	100.0	72.3	9.5	27.7
1/2"	2.8	67.1	100.0	61.1	11.2	38.9
3/8"	2.4	42.9	100.0	53.3	7.8	46.7
#4	2.4	8.1	97.6	41.4	11.9	58.6
#8	2.3	3.7	84.0	34.7	6.7	65.3
#16	2.3	2.9	69.1	28.6	6.1	71.4
#30	2.2	2.6	49.9	21.0	7.6	79.0
#50	2.1	2.5	20.5	9.4	11.6	90.6
#100	2.0	2.4	3.5	2.7	6.7	97.3
LBW	1.8	1.8	1.1	1.5	1.2	98.5

\*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: **71** Workability Factor: **35**



Initial Production Sample (IPS)

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: \_\_\_\_\_



2470 Auburn Road  
Auburn Hills, MI 48432

Plant S36-Superior Auburn Hills  
Product 7919-COARSE AGG P1M LS  
Period: 09/13/2020 - 09/19/2020

Name/Title Doug Storey / QC Technician  
Report Date 09/18/2020

Procedure	Sieve/Test	Result	Unit	Coarse Agg P1M LS Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	
	1" (25mm)	37.8	%	
	3/4" (19mm)	9.2	%	
	1/2" (12.5mm)	2.8	%	
	3/8" (9.5mm)	2.4	%	
	#4 (4.75mm)	2.4	%	
	#8 (2.36mm)	2.3	%	
	#16 (1.18mm)	2.3	%	
	#30 (.6mm)	2.2	%	
	#50 (.3mm)	2.1	%	
	#100 (.15mm)	2.0	%	
	#200 (75µm)	1.8	%	
	Wash Loss (#200/75um)	1.6	%	0-2
	Total Moisture	2.25	%	



2470 Auburn Road  
Auburn Hills, MI 48432

Plant S36-Superior Auburn Hills  
Product 7920-INTERMED AGG P1M LS  
Period: 09/13/2020 - 09/19/2020

Name/Title Doug Storey / QC Technician  
Report Date 09/18/2020

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)	96.5	%	
	1/2" (12.5mm)	67.1	%	
	3/8" (9.5mm)	42.9	%	
	#4 (4.75mm)	8.1	%	
	#8 (2.36mm)	3.7	%	
	#16 (1.18mm)	2.9	%	
	#30 (.6mm)	2.6	%	
	#50 (.3mm)	2.5	%	
	#100 (.15mm)	2.4	%	
	#200 (75µm)	2.1	%	
	Wash Loss (#200/75um)	1.8	%	0-3
	Total Moisture	3.01	%	



2470 Auburn Road  
Auburn Hills, MI 48432

**Plant** S36-Superior Auburn Hills

**Product** 1022-2NS GR

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

**Period:** 09/13/2020 - 09/19/2020

**Report Date** 09/18/2020

Procedure	Sieve/Test	Result	Unit	2NS GR Spec
	3/8" (9.5mm)	100.0	%	100-100
	#4 (4.75mm)	97.6	%	95-100
	#8 (2.36mm)	84.0	%	65-95
	#16 (1.18mm)	69.1	%	35-75
	#30 (.6mm)	49.9	%	20-55
	#50 (.3mm)	20.5	%	10-30
	#100 (.15mm)	3.5	%	0-10
	#200 (75µm)	1.1	%	
	FM	2.75		2.6-3
	Wash Loss (#200/75um)	1.1	%	0-3
	Total Moisture	3.77	%	



# Aggregate Optimization Chart

# Production Gradation Report

PLANT #: **P-39**

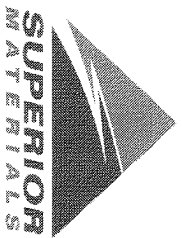
Sample Date: 9/14/20

Dates Test Represents: 9/15/2020 through 9/21/2020

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	900	5.50	2.62	29.3
IA	71-47	Presque Isle	950	5.81	2.62	30.9
ZNS	44-051	Krake Willis Rd	1220	7.38	2.65	39.7
		<b>Total Wt</b>	<b>3070</b>	<b>18.69</b>		<b>100.0</b>

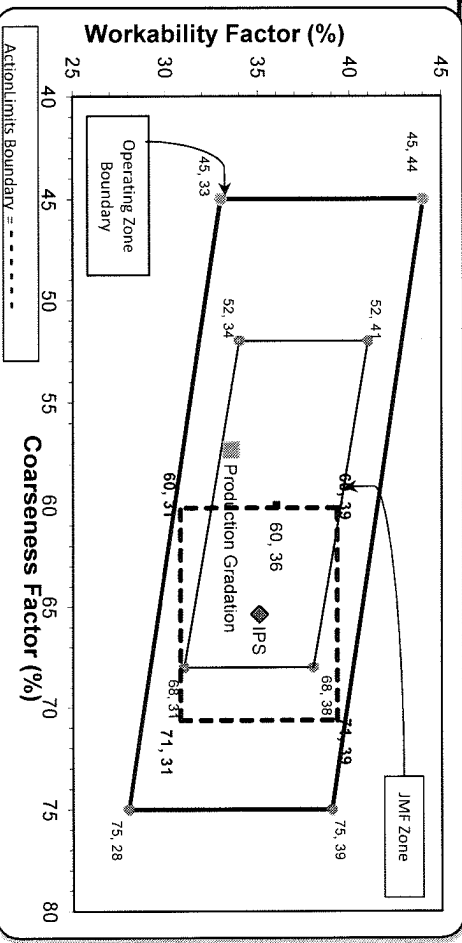
  

Sieve	CA	IA	ZNS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	100.0	100.0	100.0	100.0	0.0	0.0
1"	59.5	100.0	100.0	88.1	11.9	11.9
3/4"	24.1	100.0	100.0	77.7	22.3	22.3
1/2"	8.2	86.4	100.0	68.9	31.1	31.1
3/8"	6.0	66.0	100.0	61.9	38.1	38.1
#4	3.5	16.9	95.2	44.1	55.9	55.9
#8	2.6	5.5	78.2	33.5	66.5	66.5
#16	2.4	3.6	65.0	27.6	72.4	72.4
#30	2.4	3.2	50.4	21.7	78.3	78.3
#50	2.3	3.0	24.1	11.2	88.8	88.8
#100	2.1	2.8	6.5	4.1	95.9	95.9
LBW	1.8	2.3	1.4	1.8	98.2	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. 1.5") aggregate is used.

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Coarseness Factor: **57** 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"	83.9	15.7	16.1
3/4"	74.1	9.8	25.9
1/2"	64.3	9.7	35.7
3/8"	57.5	6.8	42.5
#4	44.5	13.1	55.5
#8	35.1	9.4	64.9
#16	27.9	7.2	72.1
#30	21.7	6.2	78.3
#50	12.6	9.1	87.4
#100	3.5	9.1	96.5
LBW	1.2	2.4	98.8

Coarseness Factor: **65** Workability Factor: **35**

PREPARED BY:  
SM, LLC Technical Service

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



Plant S39-Superior Sterling Heights  
 Product 7919-COARSE AGG P1M LS  
 Period: 09/13/2020 - 09/19/2020

Name/Title Doug Storey / QC Technician  
 Report Date 09/18/2020

Procedure	Sieve/Test	Result	Unit	Coarse Agg P1M LS Target
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	
	1" (25mm)	59.5	%	
	3/4" (19mm)	24.1	%	
	1/2" (12.5mm)	8.2	%	
	3/8" (9.5mm)	6.0	%	
	#4 (4.75mm)	3.5	%	
	#8 (2.36mm)	2.6	%	
	#16 (1.18mm)	2.4	%	
	#30 (.6mm)	2.4	%	
	#50 (.3mm)	2.3	%	
	#100 (.15mm)	2.1	%	
	#200 (75µm)	1.9	%	
	Wash Loss (#200/75um)	1.8	%	0-2
	Total Moisture	1.95	%	



Plant S39-Superior Sterling Heights  
 Product 7920-INTERMED AGG P1M LS  
 Period: 09/13/2020 - 09/19/2020

Name/Title Doug Storey / QC Technician  
 Report Date 09/18/2020

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)	100.0	%	
	1/2" (12.5mm)	86.4	%	
	3/8" (9.5mm)	66.0	%	
	#4 (4.75mm)	16.9	%	
	#8 (2.36mm)	5.5	%	
	#16 (1.18mm)	3.6	%	
	#30 (.6mm)	3.2	%	
	#50 (.3mm)	3.0	%	
	#100 (.15mm)	2.8	%	
	#200 (75µm)	2.5	%	
	Wash Loss (#200/75um)	2.3	%	0-3
	Total Moisture	2.87	%	



**Plant** S39-Superior Sterling Heights

**Product** 1022-2NS GR

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

**Period:** 09/13/2020 - 09/19/2020

**Report Date** 09/18/2020

Procedure	Sieve/Test	Result	Unit	2NS GR Spec
	3/8" (9.5mm)	100.0	%	100-100
	#4 (4.75mm)	95.2	%	95-100
	#8 (2.36mm)	78.2	%	65-95
	#16 (1.18mm)	65.0	%	35-75
	#30 (.6mm)	50.4	%	20-55
	#50 (.3mm)	24.1	%	10-30
	#100 (.15mm)	6.5	%	0-10
	#200 (75µm)	1.5	%	
	FM	2.81		2.6-3
	Wash Loss (#200/75um)	1.4	%	0-3
	Total Moisture	2.76	%	