

# Aggregate Optimization Chart

# Production Gradation Report

**PLANT #:** P-32

**Sample Date:** 10/14/19

**Dates Test Represents:** 10/15/2019 through 10/21/2019

**Concrete Grade:** DM

**Contractor:**

**MDOT No.:**

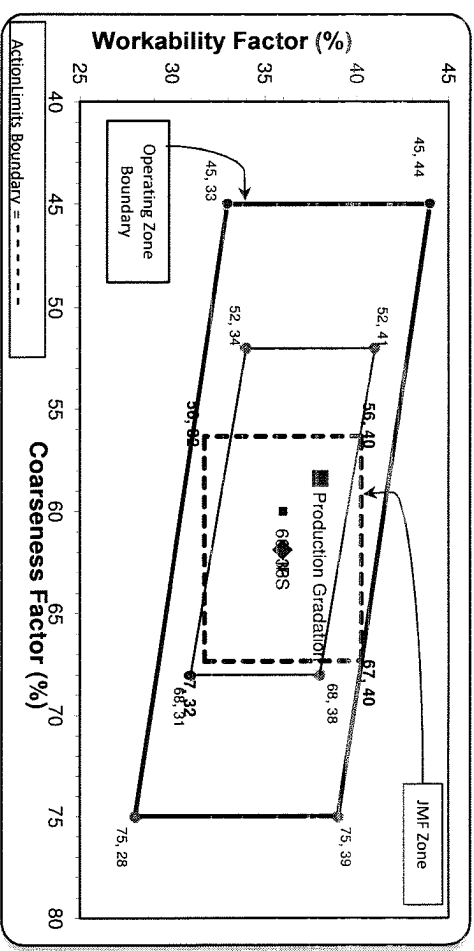
Agg. Class	Pit #	Source	Weight (ssd)	$r^3$	Specific Gravity	Contribution %
6AA	71-47	Presque Isle	1450	8.87	2.62	49.9
26A	71-47	Presque Isle	305	1.87	2.62	10.5
2NS	95-013	Smelter Bay	1150	6.95	2.65	39.6
<b>Total Wt</b>			<b>2905</b>	<b>17.69</b>		<b>100.0</b>

<--- Verify this number is 100%

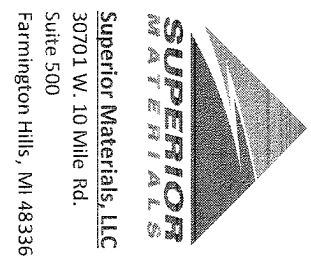
Sieve	6AA	26A	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	100.0	100.0	100.0	100.0	0.0	0.0
1"	98.7	100.0	100.0	99.4	0.6	0.6
3/4"	89.0	100.0	100.0	94.5	4.8	5.5
1/2"	52.4	95.2	100.0	75.7	18.8	24.3
3/8"	28.3	82.4	100.0	62.4	13.4	37.6
#4	5.4	27.1	95.9	43.5	18.9	56.5
#8	2.8	9.2	83.8	35.5	8.0	64.5
#16	2.3	5.0	69.7	29.3	6.3	70.7
#30	2.2	4.2	52.0	22.1	7.1	77.9
#50	2.0	3.7	25.4	11.4	10.7	88.6
#100	1.9	3.3	7.3	4.2	7.3	95.8
LBW	1.5	2.8	1.8	1.8	2.4	98.2

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

**Coarseness Factor:** 58 **Workability Factor:** 36 **Adjusted WF:** 38.0



Sieve	Initial Production Sample (IPS)	Coarseness Factor:	Workability Factor:	Adjusted WF
2"	100.0	62	36	38.0
1.5"	100.0	0.0	0.0	
1"	100.0	0.0	0.0	
3/4"	95.0	5.0	5.0	
1/2"	72.3	22.8	27.7	
3/8"	60.4	11.8	39.6	
#4	42.6	17.8	57.4	
#8	36.0	6.6	64.0	
#16	29.5	6.5	70.5	
#30	20.3	9.2	79.7	
#50	9.5	10.8	90.5	
#100	3.4	6.1	96.6	
LBW	1.3	2.1	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. 1.5") aggregate is used.

PREPARED BY:  
SM, LLC Technical Service

Approved By:

Plant 958-JMT

Product 1054-6AA LS PI

Name/Title Doug Storey / QC Technician

Period: 10/13/2019 - 10/19/2019

Report Date 10/17/2019

Procedure	Sieve/Test	Result	Unit	6AA LS PI Spec
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	100-100
	1" (25mm)	98.7	%	95-100
	3/4" (19mm)	89.0	%	
	1/2" (12.5mm)	52.4	%	30-60
	3/8" (9.5mm)	28.3	%	
	#4 (4.75mm)	5.4	%	0-8
	#8 (2.36mm)	2.8	%	
	#16 (1.18mm)	2.3	%	
	#30 (0.6mm)	2.2	%	
	#50 (0.3mm)	2.0	%	
	#100 (0.15mm)	1.9	%	
	#200 (75µm)	1.7	%	
	Wash Loss (#200/75µm)	1.5	%	0-2
	Total Moisture	3.6	%	

Plant 958-JMT

Product 1067-26A Mod LS

Name/Title Doug Storey / QC Technician

Period: 10/13/2019 - 10/19/2019

Report Date 10/17/2019

Procedure	Sieve/Test	Result	Unit	26A Mod LS Spec
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	
	1" (25mm)	100.0	%	
	3/4" (19mm)	100.0	%	100-100
	1/2" (12.5mm)	95.2	%	95-100
	3/8" (9.5mm)	82.4	%	60-95
	#4 (4.75mm)	27.1	%	5-30
	#8 (2.36mm)	9.2	%	0-12
	#16 (1.18mm)	5.0	%	
	#30 (0.6mm)	4.2	%	
	#50 (0.3mm)	3.7	%	
	#100 (0.15mm)	3.3	%	
	#200 (75µm)	2.9	%	
	Wash Loss (#200/75um)	2.8	%	0-3
	Total Moisture	4.3	%	

Plant 958-JMT

Product 1022-2NS GR - Smelter Bay

Name/Title Doug Storey / QC Technician

Period: 10/13/2019 - 10/19/2019

Report Date 10/17/2019

Procedure	Sieve/Test	Result	Unit	2NS GR Spec
	3/8" (9.5mm)	100.0	%	100-100
	#4 (4.75mm)	95.9	%	95-100
	#8 (2.36mm)	83.8	%	65-95
	#16 (1.18mm)	69.7	%	35-75
	#30 (0.6mm)	52.0	%	20-55
	#50 (0.3mm)	25.4	%	10-30
	#100 (0.15mm)	7.3	%	0-10
	#200 (75µm)	2.0	%	
	FM	2.66		2.6-3
	Wash Loss (#200/75um)	1.8	%	0-3
	Total Moisture	4.4	%	

# Aggregate Optimization Chart

# Production Gradation Report

**PLANT #:** P-36

**Sample Date:** 10/14/19

**Dates Test Represents:** 10/15/2019 through 10/21/2019

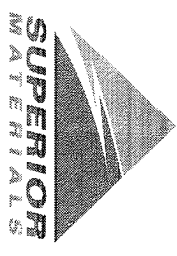
**Concrete Grade:** DM

**Contractor:**

**MDOT No.:**

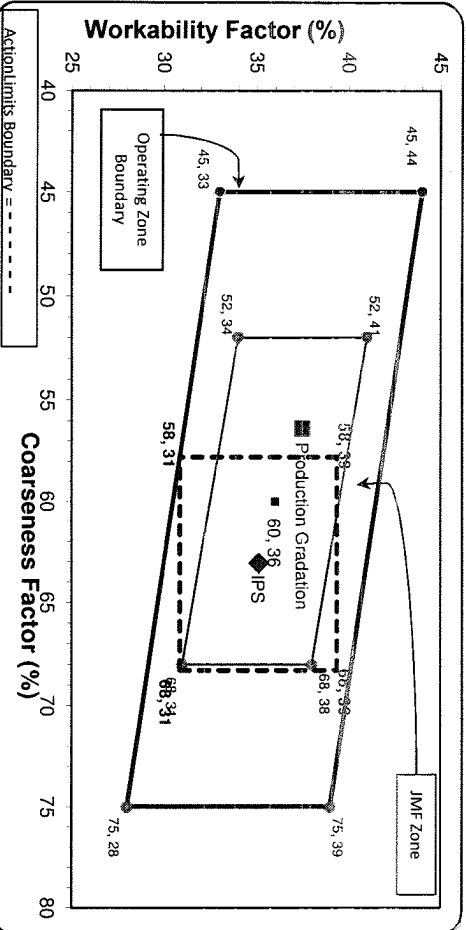
Aggr. Class	Pit #	Source	Weight (ssd)	ft <sup>3</sup>	Specific Gravity	Contribution %
GAA	71-47	Presque Isle	1450	8.87	2.62	49.9
26A	71-47	Presque Isle	355	2.17	2.62	12.2
2NS	63-92	Grange Hall	1100	6.65	2.65	37.9
<b>Total Wt</b>			<b>2905</b>	<b>17.69</b>		<b>100.0</b>

Sieve	Batch Plant Gradations	Aggregate Supplier Gradations	Adjusted WF	Initial Production Sample (IPS)
2"	100.0	100.0	100.0	100.0
1.5"	100.0	100.0	100.0	100.0
1"	98.8	100.0	99.4	100.0
3/4"	87.0	100.0	93.5	100.0
1/2"	50.4	95.0	74.6	100.0
3/8"	30.3	84.8	63.4	100.0
#4	5.6	29.7	43.2	100.0
#8	2.9	11.2	35.0	100.0
#16	2.4	5.8	28.8	100.0
#30	2.3	4.5	21.8	100.0
#50	2.2	4.0	9.2	100.0
#100	2.0	3.6	2.5	100.0
LBW	1.7	3.0	1.3	100.0



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

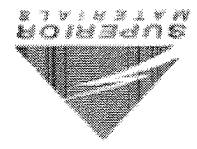
Maximum % Retained must be above the 3/8" sieve.  
 \* Any two adjacent sieves must equal 10% except max.  
 nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max.  
 nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when  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



Sieve	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	0.0	0.0
1.5"	100.0	0.0	0.0
1"	99.1	0.9	0.9
3/4"	90.3	8.8	9.7
1/2"	69.2	21.1	30.8
3/8"	59.1	10.1	40.9
#4	41.8	17.3	58.2
#8	35.1	6.6	64.9
#16	28.5	6.6	71.5
#30	21.2	7.3	78.8
#50	8.7	12.5	91.3
#100	1.8	7.0	98.2
LBW	0.7	1.0	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 1051-6AA LS

Period: 10/13/2019 - 10/19/2019

Report Date 10/17/2019

Name/Title Doug Storey / QC Technician

Procedure Sieve/Test Result Unit

Procedure	Sieve/Test	Result	Unit
	2" (50mm)	100.0	%
	1 1/2" (37.5mm)	100.0	%
	1" (25mm)	98.8	%
	3/4" (19mm)	87.0	%
	1/2" (12.5mm)	50.4	%
	3/8" (9.5mm)	30.3	%
	#4 (4.75mm)	5.6	%
	#8 (2.36mm)	2.9	%
	#16 (1.18mm)	2.4	%
	#30 (0.6mm)	2.3	%
	#50 (0.3mm)	2.2	%
	#100 (0.15mm)	2.0	%
	#200 (75µm)	1.84	%
	Wash Loss (#200/75µm)	1.7	%
	Total Moisture	3.28	%

100-100  
 95-100  
 30-60  
 0-8

0-2

6AA LS



Superior Auburn Hills  
 2470 Auburn Road  
 Auburn Hills, MI 48432

Plant S36-Superior Auburn Hills

Product 1067-26A Mod LS

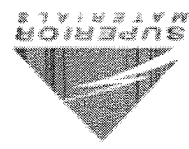
Period: 10/13/2019 - 10/19/2019

Name/Title Doug Storey / QC Technician

Report Date 10/17/2019

Procedure	Sieve/Test	Result	Unit	26A LS Spec
-----------	------------	--------	------	-------------

	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	
	1" (25mm)	100.0	%	
	3/4" (19mm)	100.0	%	100-100
	1/2" (12.5mm)	95.0	%	95-100
	3/8" (9.5mm)	84.8	%	60-95
	#4 (4.75mm)	29.7	%	5-30
	#8 (2.36mm)	11.2	%	0-12
	#16 (1.18mm)	5.8	%	
	#30 (0.6mm)	4.5	%	
	#50 (0.3mm)	4.0	%	
	#100 (0.15mm)	3.6	%	
	#200 (75µm)	3.2	%	
	Wash Loss (#200/75µm)	3.0	%	0-3
	Total Moisture	4.05	%	



Superior Auburn Hills  
 2470 Auburn Road  
 Auburn Hills, MI 48432

Plant S36-Superior Auburn Hills

Product 1022-2NS GR

Period: 10/13/2019 - 10/19/2019

Report Date 10/17/2019

Name/Title Doug Storey / QC Technician

Procedure	Sieve/Test	Result	Unit	ZNS GR Spec
	3/8" (9.5mm)	100.0	%	100-100
	#4 (4.75mm)	97.0	%	95-100
	#8 (2.36mm)	85.0	%	65-95
	#16 (1.18mm)	71.1	%	35-75
	#30 (0.6mm)	53.0	%	20-55
	#50 (0.3mm)	20.1	%	10-30
	#100 (0.15mm)	2.7	%	0-10
	#200 (75µm)	0.5	%	
FM		2.71		2.6-3
Wash Loss (#200/75µm)		0.3	%	0-3
Total Moisture		4.39	%	



# Aggregate Optimization Chart

# Production Gradation Report

**PLANT #:** P-39

Sample Date: 10/14/19

Dates Test Represents: 10/15/2019 through 10/21/2019

Concrete Grade: DM

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

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

Aggr. Class	Pit #	Source	Weight (ssd)	ft <sup>3</sup>	Specific Gravity	Contribution %
6AA	71-47	Presque Isle	1550	9.48	2.62	53.4
26A	71-47	Presque Isle	205	1.25	2.62	7.1
2NS	44-051	Krake Willis Rd	1150	6.95	2.65	39.6
Total Wt			2905	17.69		100.0

<--- Verify this number is 100%

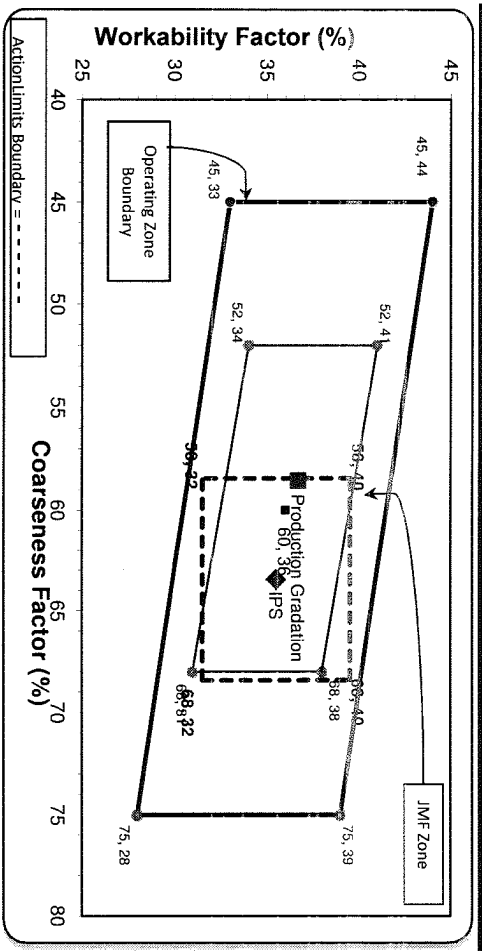
Sieve	6AA	26A	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	100.0	100.0	100.0	100.0	0.0	0.0
1"	98.3	100.0	100.0	99.1	0.9	0.9
3/4"	87.9	100.0	100.0	93.5	5.5	6.5
1/2"	50.2	96.8	100.0	73.2	20.3	26.8
3/8"	29.6	86.5	100.0	61.5	11.7	38.5
#4	6.4	23.8	96.6	43.3	18.1	56.7
#8	3.2	6.7	80.9	34.2	9.1	65.8
#16	2.7	3.3	67.6	28.4	5.8	71.6
#30	2.5	2.7	49.6	21.2	7.3	78.8
#50	2.4	2.4	23.3	10.7	10.5	89.3
#100	2.3	2.2	6.8	4.1	6.6	95.9
LBW	2.0	1.9	1.6	1.8	2.2	98.2

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

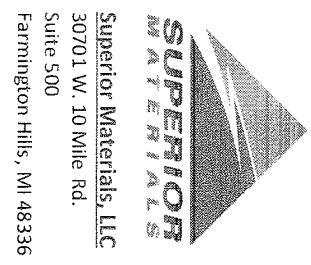
Coarseness Factor: 59 Workability Factor: 34 Adjusted WF: 36.7

Initial Production Sample (IPS)

Coarseness Factor: 63 Workability Factor: 36



Sieve	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	0.0	0.0
1.5"	100.0	0.0	0.0
1"	100.0	0.0	0.0
3/4"	89.7	10.3	10.3
1/2"	70.3	19.4	29.7
3/8"	59.1	11.2	40.9
#4	42.8	16.3	57.2
#8	35.5	7.3	64.5
#16	29.0	6.5	71.0
#30	21.2	7.7	78.8
#50	9.8	11.5	90.2
#100	3.7	6.1	96.3
LBW	1.2	2.5	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 1051-6AA LS

Name/Title Doug Storey / QC Technician

Period: 10/13/2019 - 10/19/2019

Report Date 10/17/2019

Procedure	Sieve/Test	Result	Unit	6AA LS
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	100-100
	1" (25mm)	98.3	%	95-100
	3/4" (19mm)	87.9	%	
	1/2" (12.5mm)	50.2	%	30-60
	3/8" (9.5mm)	29.6	%	
	#4 (4.75mm)	6.4	%	0-8
	#8 (2.36mm)	3.2	%	
	#16 (1.18mm)	2.7	%	
	#30 (0.6mm)	2.5	%	
	#50 (0.3mm)	2.4	%	
	#100 (0.15mm)	2.3	%	
	#200 (75µm)	2.11	%	
	Wash Loss (#200/75um)	2.0	%	0-2
	Total Moisture	3.29	%	



Plant S39-Superior Sterling Heights

Product 1067-26A Mod LS

Name/Title Doug Storey / QC Technician

Period: 10/13/2019 - 10/19/2019

Report Date 10/17/2019

Procedure	Sieve/Test	Result	Unit	26A LS Spec
	2" (50mm)	100.0	%	
	1 1/2" (37.5mm)	100.0	%	
	1" (25mm)	100.0	%	
	3/4" (19mm)	100.0	%	100-100
	1/2" (12.5mm)	96.8	%	95-100
	3/8" (9.5mm)	86.5	%	60-95
	#4 (4.75mm)	23.8	%	5-30
	#8 (2.36mm)	6.7	%	0-12
	#16 (1.18mm)	3.3	%	
	#30 (0.6mm)	2.7	%	
	#50 (0.3mm)	2.4	%	
	#100 (0.15mm)	2.2	%	
	#200 (75µm)	2.0	%	
	Wash Loss (#200/75um)	1.9	%	0-3
	Total Moisture	2.73	%	



Plant S39-Superior Sterling Heights

Product 1022-2NS GR

Name/Title Doug Storey / QC Technician

Period: 10/13/2019 - 10/19/2019

Report Date 10/17/2019

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)	80.9	%	65-95
	#16 (1.18mm)	67.6	%	35-75
	#30 (0.6mm)	49.6	%	20-55
	#50 (0.3mm)	23.3	%	10-30
	#100 (0.15mm)	6.8	%	0-10
	#200 (75µm)	1.9	%	
	FM	2.75		2.6-3
	Wash Loss (#200/75um)	1.6	%	0-3
	Total Moisture	5.35	%	