

# Aggregate Optimization Chart

**PLANT #:** **P-102**

Sample Date: 5/4/20

Concrete Grade: **P1M**

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

Dates Test Represents: 5/5/2020 through 5/11/2020

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	58-003	Stoneco	1420	8.46	2.69	45.5
IA	58-003	Stoneco	500	2.98	2.69	16.0
2NS	63-114	Highland	1200	7.26	2.65	38.5
<b>Total Wt</b>			<b>3120</b>	<b>18.70</b>		<b>100.0</b>

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



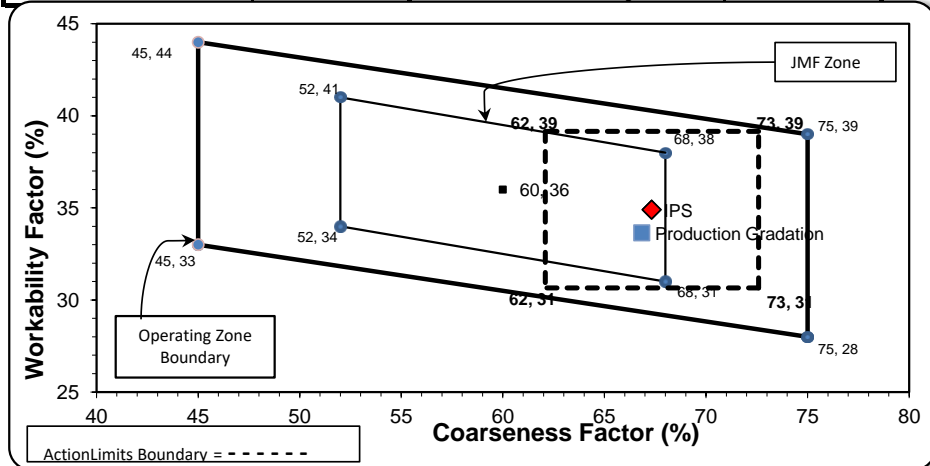
**Superior Materials, LLC**  
 30701 W. 10 Mile Rd.  
 Suite 500  
 Farmington Hills, MI 48336

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"	65.8	100.0	100.0	84.4	15.6	15.6
3/4"	37.0	100.0	100.0	71.3	13.1	28.7
1/2"	19.1	89.0	100.0	61.4	9.9	38.6
3/8"	10.7	76.9	100.0	55.7	5.8	44.3
#4	3.6	27.5	98.9	44.1	11.6	55.9
#8	2.5	6.8	81.7	33.7	10.4	66.3
#16	2.0	2.5	62.6	25.4	8.3	74.6
#30	1.8	1.8	43.9	18.0	7.4	82.0
#50	1.7	1.6	18.0	8.0	10.0	92.0
#100	1.6	1.5	3.6	2.4	5.6	97.6
LBW	1.5	1.2	0.4	1.0	1.3	99.0

\*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

Coarseness Factor: **67**      Workability Factor: **34**



Initial Production Sample (IPS)

Coarseness Factor: **67**  
 Workability Factor: **35**

Sieve	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	0.0	0.0
1.5"	100.0	0.0	0.0
1"	85.5	14.5	14.5
3/4"	73.4	12.1	26.6
1/2"	61.0	12.4	39.0
3/8"	56.2	4.8	43.8
#4	43.1	13.1	56.9
#8	34.9	8.2	65.1
#16	29.4	5.5	70.6
#30	21.6	7.8	78.4
#50	8.1	13.4	91.9
#100	2.2	5.9	97.8
LBW	1.4	0.8	98.6

PREPARED BY:  
 SM, LLC Technical Service

Approved By:

# Aggregate Optimization Chart

**PLANT #:** **P-12**

Sample Date: 5/4/20

Concrete Grade: **P1M**

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

Dates Test Represents: 5/5/2020 through 5/11/2020

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	850	5.20	2.62	27.7
2NS	63-115	Ray Rd	1250	7.56	2.65	40.7
<b>Total Wt</b>			<b>3070</b>	<b>18.69</b>		<b>100.0</b>

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



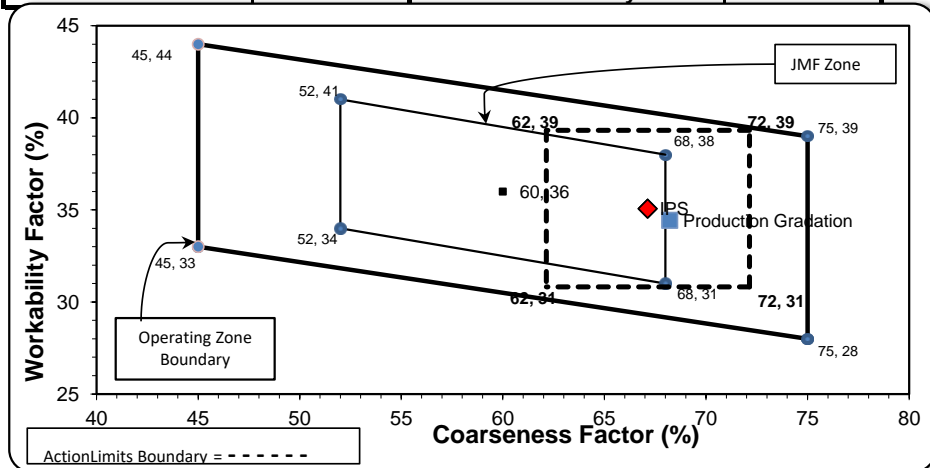
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 Suite 500  
 Farmington Hills, MI 48336

Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	97.0	100.0	100.0	99.1	0.9	0.9
1"	35.8	100.0	100.0	79.7	19.3	20.3
3/4"	9.1	96.6	100.0	70.3	9.4	29.7
1/2"	3.2	72.9	100.0	61.9	8.4	38.1
3/8"	2.8	49.4	100.0	55.3	6.6	44.7
#4	2.4	14.6	98.3	44.8	10.5	55.2
#8	2.2	5.7	79.0	34.4	10.4	65.6
#16	2.0	3.5	60.7	26.3	8.1	73.7
#30	1.8	3.0	45.0	19.7	6.6	80.3
#50	1.8	2.6	23.3	10.8	8.9	89.2
#100	1.6	2.2	4.9	3.1	7.7	96.9
LBW	1.4	1.6	0.8	1.2	1.9	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.

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

<b>Coarseness Factor:</b>	<b>68</b>	<b>Workability Factor:</b>	<b>34</b>
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Initial Production Sample (IPS)

<b>Coarseness Factor:</b>	<b>67</b>
<b>Workability Factor:</b>	<b>35</b>

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

PREPARED BY:  
 SM, LLC Technical Service

Approved By:

# Aggregate Optimization Chart

**PLANT #:** **P-32**

Sample Date: 5/4/20

Concrete Grade: **P1M**

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

Dates Test Represents: 5/5/2020 through 5/11/2020

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

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	900	5.50	2.62	29.3
2NS	95-013	Smelter Bay	1270	7.68	2.65	41.4
<b>Total Wt</b>			<b>3070</b>	<b>18.69</b>		<b>100.0</b>

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



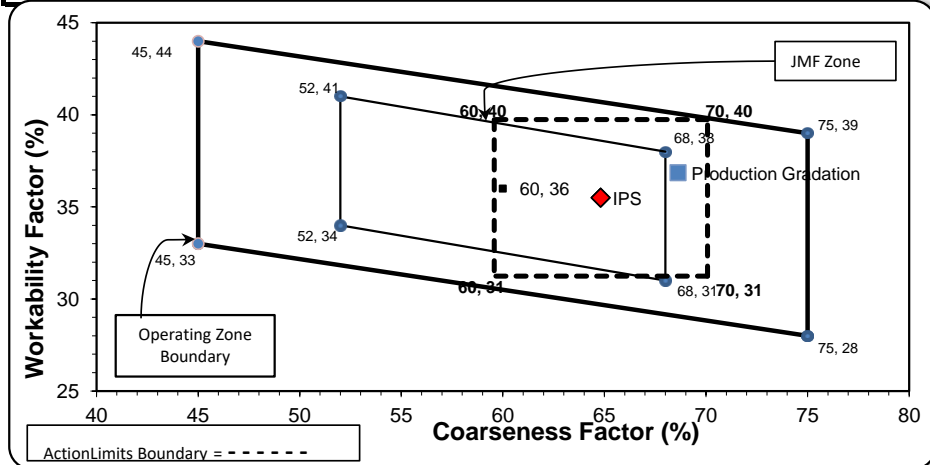
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Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	97.0	100.0	100.0	99.1	0.9	0.9
1"	35.8	100.0	100.0	81.2	17.9	18.8
3/4"	9.1	96.6	100.0	72.4	8.8	27.6
1/2"	3.2	72.9	100.0	63.7	8.7	36.3
3/8"	2.8	49.4	100.0	56.7	7.0	43.3
#4	2.4	14.6	95.1	44.3	12.3	55.7
#8	2.2	5.7	83.5	36.9	7.5	63.1
#16	2.0	3.5	70.7	30.9	6.0	69.1
#30	1.8	3.0	52.7	23.2	7.7	76.8
#50	1.8	2.6	24.4	11.4	11.8	88.6
#100	1.6	2.2	7.1	4.1	7.3	95.9
LBW	1.4	1.6	1.5	1.5	2.6	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:** **69**      **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"	99.4	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:

# Aggregate Optimization Chart

**PLANT #:** **P-36**

Sample Date: 5/4/20

Concrete Grade: **P1M**

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

Dates Test Represents: 5/5/2020 through 5/11/2020

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

Agg. Class	Pit #	Source	Weight (SSD)	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>

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



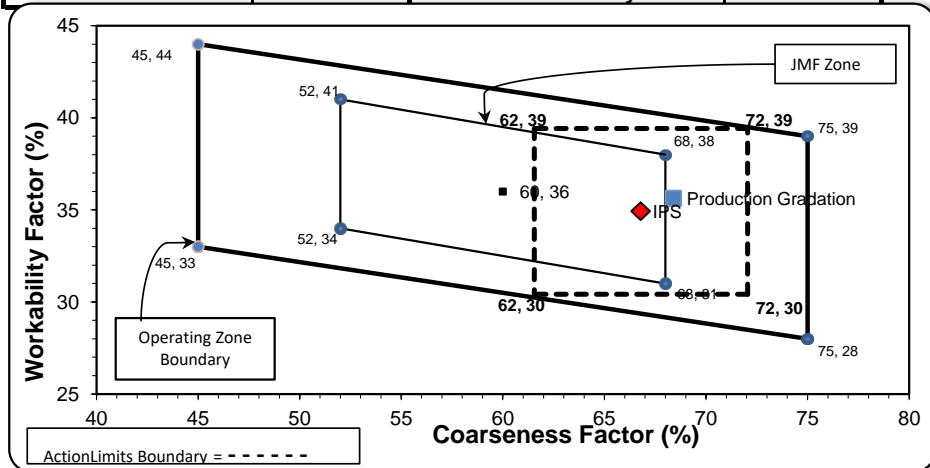
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Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	97.0	100.0	100.0	99.1	0.9	0.9
1"	35.8	100.0	100.0	81.8	17.3	18.2
3/4"	9.1	96.6	100.0	73.1	8.7	26.9
1/2"	3.2	72.9	100.0	63.7	9.4	36.3
3/8"	2.8	49.4	100.0	56.0	7.8	44.0
#4	2.4	14.6	97.6	43.6	12.4	56.4
#8	2.2	5.7	84.8	35.6	8.0	64.4
#16	2.0	3.5	70.0	29.1	6.6	70.9
#30	1.8	3.0	51.0	21.4	7.6	78.6
#50	1.8	2.6	23.4	10.5	10.9	89.5
#100	1.6	2.2	3.8	2.7	7.8	97.3
LBW	1.4	1.6	0.7	1.2	1.5	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.

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

<b>Coarseness Factor:</b>	<b>68</b>	<b>Workability Factor:</b>	<b>36</b>
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Initial Production Sample (IPS)

<b>Coarseness Factor:</b>	<b>67</b>
<b>Workability Factor:</b>	<b>35</b>

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:

# Aggregate Optimization Chart

**PLANT #:** **P-39**

Sample Date: 5/4/20

Concrete Grade: **P1M**

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

Dates Test Represents: 5/5/2020 through 5/11/2020

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	71-47	Presque Isle	1000	6.12	2.62	32.6
IA	71-47	Presque Isle	850	5.20	2.62	27.7
2NS	63-92	Grange Hall	1220	7.38	2.65	39.7
<b>Total Wt</b>			<b>3070</b>	<b>18.69</b>		<b>100.0</b>

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



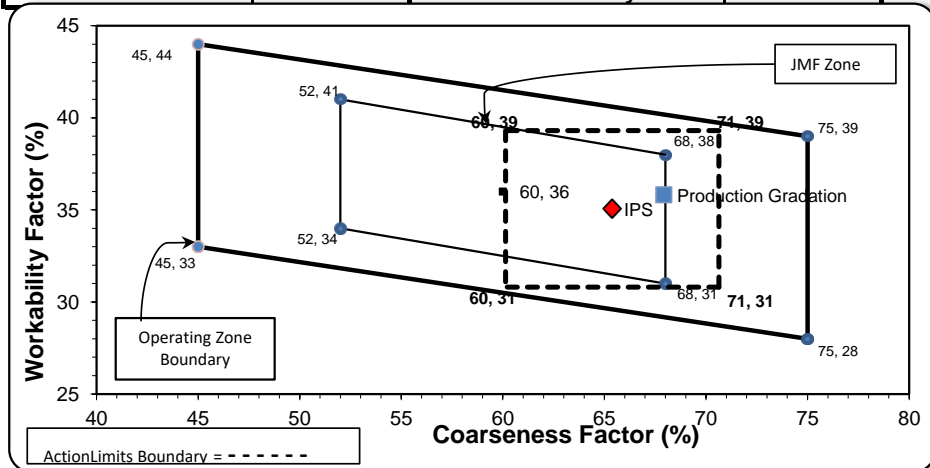
**Superior Materials, LLC**  
 30701 W. 10 Mile Rd.  
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Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	100.0	100.0	100.0	100.0	0.0	0.0
1"	49.0	100.0	100.0	83.4	16.6	16.6
3/4"	17.4	98.2	100.0	72.6	10.8	27.4
1/2"	3.9	81.0	100.0	63.4	9.2	36.6
3/8"	2.8	56.9	100.0	56.4	7.0	43.6
#4	2.2	13.2	97.6	43.2	13.2	56.8
#8	2.0	5.3	84.8	35.8	7.3	64.2
#16	0.2	2.9	70.0	28.7	7.1	71.3
#30	1.8	2.4	51.0	21.5	7.2	78.5
#50	1.8	2.2	23.4	10.5	11.0	89.5
#100	1.7	2.0	3.8	2.6	7.9	97.4
LBW	1.5	1.8	0.7	1.3	1.4	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:** **68**      **Workability Factor:** **36**



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"	99.6	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

PREPARED BY:  
 SM, LLC Technical Service

Approved By:

# Aggregate Optimization Chart

**PLANT #:** **P-02**

Sample Date: 5/4/20 Concrete Grade: **P1M**  
 Dates Test Represents: 5/5/2020 through 5/11/2020

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

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

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	63-115	Ray Rd	1250	7.56	2.65	40.7
<b>Total Wt</b>			<b>3070</b>	<b>18.69</b>		<b>100.0</b>

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



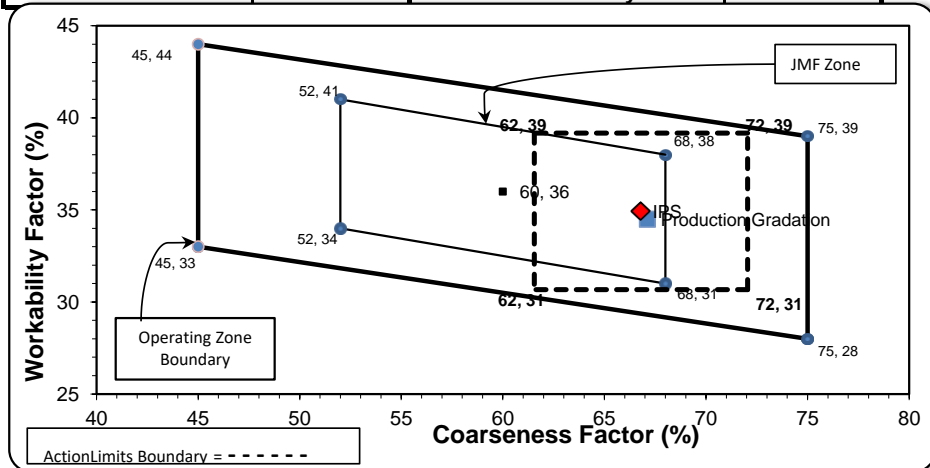
**Superior Materials, LLC**  
 30701 W. 10 Mile Rd.  
 Suite 500  
 Farmington Hills, MI 48336

Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	97.0	100.0	100.0	99.1	0.9	0.9
1"	35.8	100.0	100.0	80.8	18.3	19.2
3/4"	9.1	96.6	100.0	71.8	9.0	28.2
1/2"	3.2	72.9	100.0	63.0	8.7	37.0
3/8"	2.8	49.4	100.0	56.0	7.0	44.0
#4	2.4	14.6	98.3	45.0	11.0	55.0
#8	2.2	5.7	79.0	34.5	10.5	65.5
#16	2.0	3.5	60.7	26.3	8.2	73.7
#30	1.8	3.0	45.0	19.7	6.6	80.3
#50	1.8	2.6	23.3	10.8	9.0	89.2
#100	1.6	2.2	4.9	3.1	7.7	96.9
LBW	1.4	1.6	0.8	1.2	1.9	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.

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

**Coarseness Factor:** **67** **Workability Factor:** **34**



Initial Production Sample (IPS)

**Coarseness Factor:** **67**  
**Workability Factor:** **35**

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"	72.3	12.7	27.7
1/2"	64.5	7.8	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: