

# Aggregate Optimization Chart

**PLANT #:** **P-101**

Sample Date: 4/12/21 Concrete Grade: **P1M**  
 Dates Test Represents: 4/13/2021 through 4/19/2021

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

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	71-47	Presque Isle	1070	6.54	2.62	34.9
IA	71-47	Presque Isle	800	4.89	2.62	26.1
2NS	75-051	Mid-Michigan	1200	7.23	2.66	39.1
<b>Total Wt</b>			<b>3070</b>	<b>18.67</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"	94.7	100.0	100.0	98.2	1.8	1.8
1"	45.0	100.0	100.0	80.8	17.3	19.2
3/4"	12.5	98.4	100.0	69.1	11.7	30.9
1/2"	2.6	80.1	100.0	60.9	8.2	39.1
3/8"	1.8	58.9	100.0	55.1	5.8	44.9
#4	1.4	13.6	98.3	42.5	12.6	57.5
#8	1.3	4.0	83.6	34.2	8.3	65.8
#16	1.2	2.4	68.5	27.8	6.4	72.2
#30	1.2	2.2	50.8	20.8	7.0	79.2
#50	1.1	2.1	23.8	10.2	10.6	89.8
#100	1.1	2.0	3.6	2.3	7.9	97.7
LBW	0.9	1.9	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

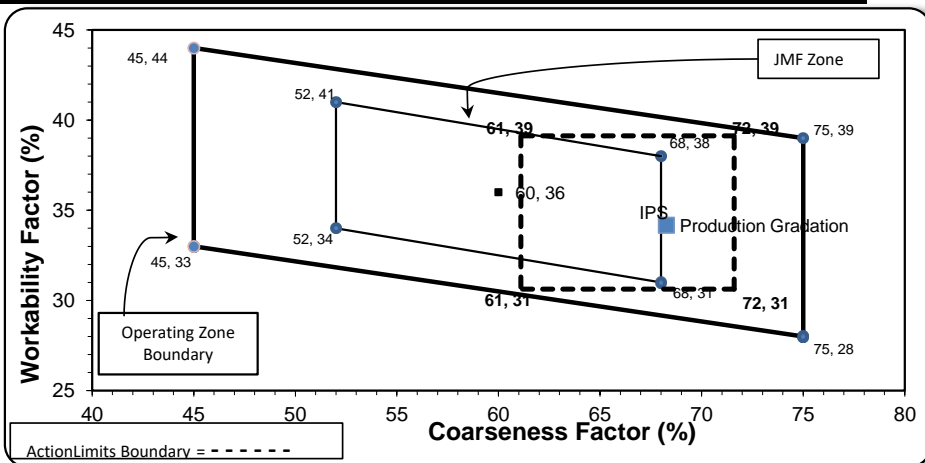
**Coarseness Factor:** **68**      **Workability Factor:** **34**

Initial Production Sample (IPS)

**Coarseness Factor:** **66**

**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"	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



PREPARED BY:  
 SM, LLC Technical Service

Approved By:

# Aggregate Optimization Chart

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

Sample Date: 4/12/21

Concrete Grade: **P1M**

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

Dates Test Represents: 4/13/2021 through 4/19/2021

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%



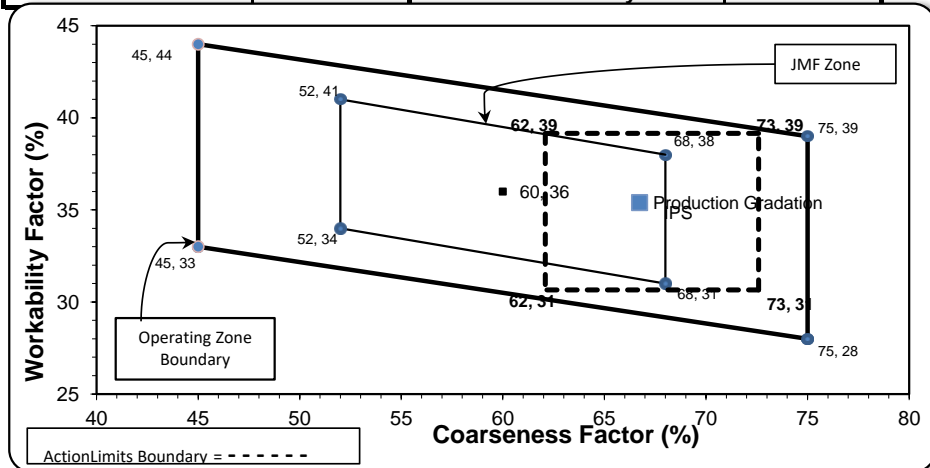
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Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	100.0	100.0	100.0	100.0	0.0	0.0
1"	68.5	100.0	100.0	85.7	14.3	14.3
3/4"	43.7	100.0	100.0	74.4	11.3	25.6
1/2"	19.9	93.3	100.0	62.5	11.9	37.5
3/8"	11.3	82.9	100.0	56.9	5.6	43.1
#4	3.4	28.0	99.6	44.3	12.5	55.7
#8	2.2	8.0	86.1	35.4	8.9	64.6
#16	1.9	3.5	67.3	27.3	8.1	72.7
#30	1.7	2.4	46.7	19.1	8.2	80.9
#50	1.4	2.1	17.3	7.6	11.5	92.4
#100	1.4	2.1	3.0	2.1	5.5	97.9
LBW	1.3	1.7	0.8	1.2	1.0	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:** **35**



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: 4/12/21 Concrete Grade: **P1M**  
 Dates Test Represents: 4/13/2021 through 4/19/2021

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

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	71-47	Presque Isle	1070	6.54	2.62	34.9
IA	71-47	Presque Isle	750	4.59	2.62	24.4
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%



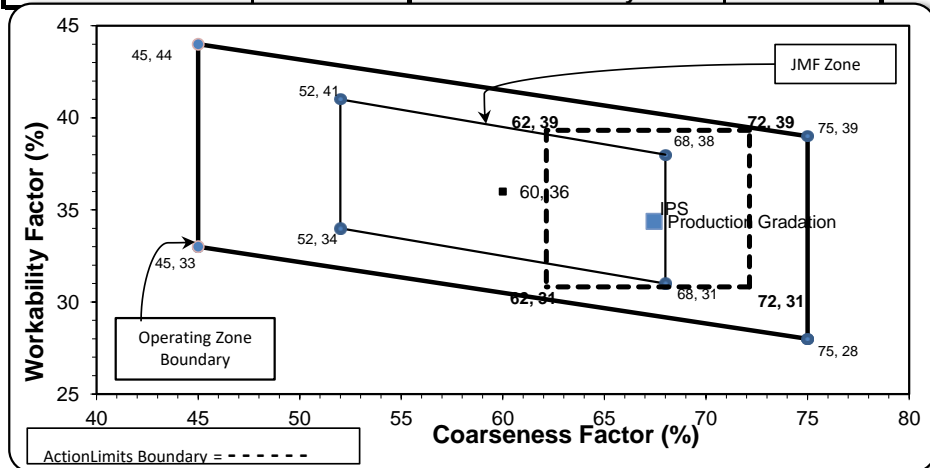
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Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	94.7	100.0	100.0	98.2	1.8	1.8
1"	45.0	100.0	100.0	80.8	17.3	19.2
3/4"	12.5	98.4	100.0	69.1	11.7	30.9
1/2"	2.6	80.1	100.0	61.2	7.9	38.8
3/8"	1.8	58.9	100.0	55.7	5.5	44.3
#4	1.4	13.6	96.5	43.1	12.6	56.9
#8	1.3	4.0	80.9	34.4	8.7	65.6
#16	1.2	2.4	67.1	28.3	6.0	71.7
#30	1.2	2.2	51.9	22.1	6.2	77.9
#50	1.1	2.1	27.0	11.9	10.2	88.1
#100	1.1	2.0	4.5	2.7	9.2	97.3
LBW	0.9	1.9	0.5	1.0	1.7	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"	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

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 SM, LLC Technical Service

Approved By:

# Aggregate Optimization Chart

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

Sample Date: 4/12/21

Concrete Grade: **P1M**

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

Dates Test Represents: 4/13/2021 through 4/19/2021

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	71-47	Presque Isle	1070	6.54	2.62	34.9
IA	71-47	Presque Isle	750	4.59	2.62	24.4
2NS	95-013	Smelter Bay	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%



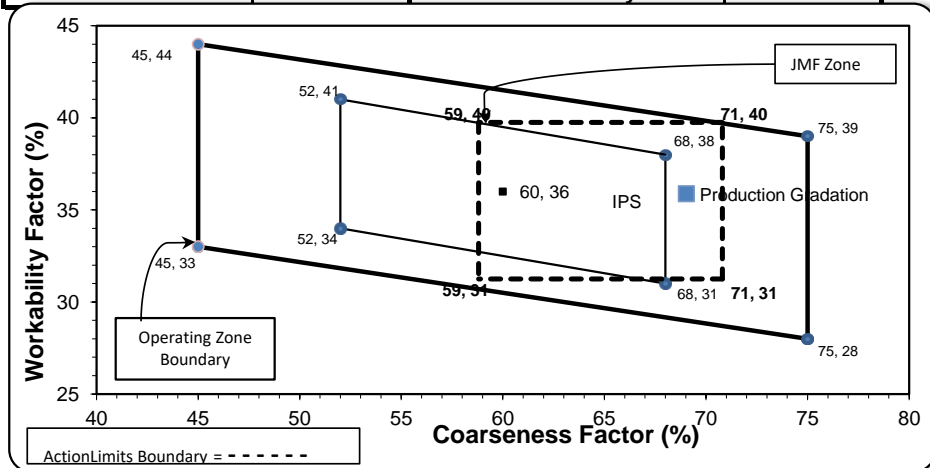
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Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	94.7	100.0	100.0	98.2	1.8	1.8
1"	45.0	100.0	100.0	80.8	17.3	19.2
3/4"	12.5	98.4	100.0	69.1	11.7	30.9
1/2"	2.6	80.1	100.0	61.2	7.9	38.8
3/8"	1.8	58.9	100.0	55.7	5.5	44.3
#4	1.4	13.6	96.6	43.1	12.6	56.9
#8	1.3	4.0	84.6	35.9	7.3	64.1
#16	1.2	2.4	69.7	29.4	6.5	70.6
#30	1.2	2.2	48.5	20.7	8.7	79.3
#50	1.1	2.1	22.7	10.1	10.6	89.9
#100	1.1	2.0	5.2	3.0	7.1	97.0
LBW	0.9	1.9	1.4	1.3	1.6	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

<b>Coarseness Factor:</b>	<b>69</b>	<b>Workability Factor:</b>	<b>36</b>
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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

PREPARED BY:  
 SM, LLC Technical Service

Approved By:

# Aggregate Optimization Chart

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

Sample Date: 4/12/21

Concrete Grade: **P1M**

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

Dates Test Represents: 4/13/2021 through 4/19/2021

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	71-47	Presque Isle	1070	6.54	2.62	34.9
IA	71-47	Presque Isle	800	4.89	2.62	26.1
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%



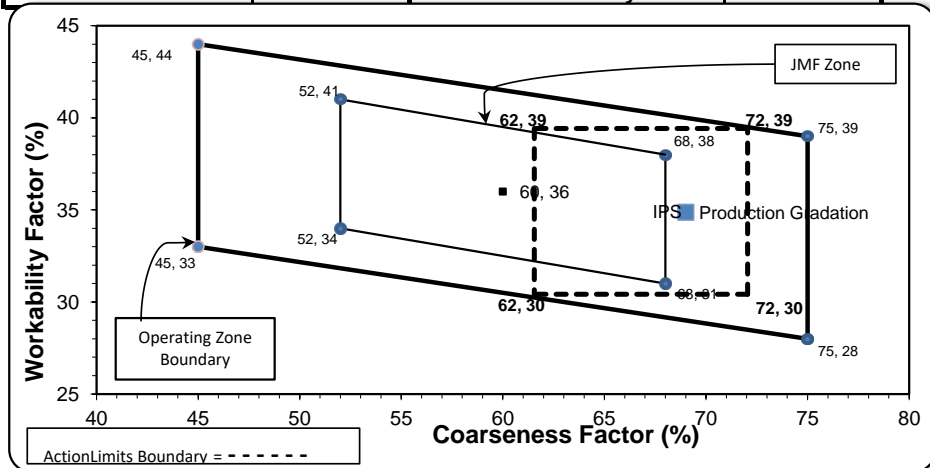
**Superior Materials, LLC**  
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Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	94.7	100.0	100.0	98.2	1.8	1.8
1"	45.0	100.0	100.0	80.8	17.3	19.2
3/4"	12.5	98.4	100.0	69.1	11.7	30.9
1/2"	2.6	80.1	100.0	60.9	8.2	39.1
3/8"	1.8	58.9	100.0	55.1	5.8	44.9
#4	1.4	13.6	97.7	42.2	12.8	57.8
#8	1.3	4.0	85.4	34.9	7.3	65.1
#16	1.2	2.4	70.6	28.6	6.2	71.4
#30	1.2	2.2	50.9	20.9	7.8	79.1
#50	1.1	2.1	21.5	9.3	11.6	90.7
#100	1.1	2.0	2.7	2.0	7.4	98.0
LBW	0.9	1.9	0.5	1.0	1.0	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:** **69**      **Workability Factor:** **35**



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"	72.1	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: 4/12/21

Concrete Grade: **P1M**

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

Dates Test Represents: 4/13/2021 through 4/19/2021

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	71-47	Presque Isle	1070	6.54	2.62	34.9
IA	71-47	Presque Isle	800	4.89	2.62	26.1
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>

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



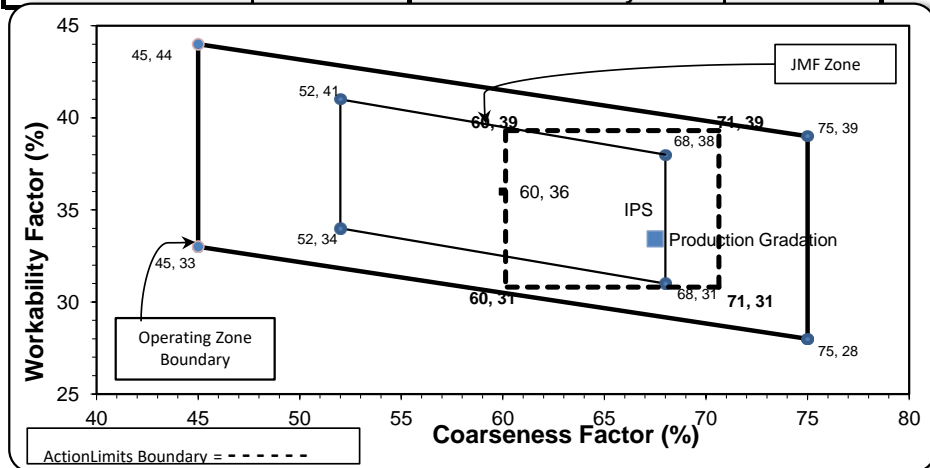
**Superior Materials, LLC**  
 30701 W. 10 Mile Rd.  
 Suite 500  
 Farmington Hills, MI 48336

Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	94.7	100.0	100.0	98.2	1.8	1.8
1"	45.0	100.0	100.0	80.8	17.3	19.2
3/4"	12.5	98.4	100.0	69.1	11.7	30.9
1/2"	2.6	80.1	100.0	60.9	8.2	39.1
3/8"	1.8	58.9	100.0	55.1	5.8	44.9
#4	1.4	13.6	95.6	41.4	13.7	58.6
#8	1.3	4.0	81.7	33.4	8.0	66.6
#16	1.2	2.4	69.5	28.2	5.2	71.8
#30	1.2	2.2	54.4	22.3	6.0	77.7
#50	1.1	2.1	27.8	11.8	10.5	88.2
#100	1.1	2.0	8.1	4.1	7.7	95.9
LBW	0.9	1.9	1.0	1.2	2.9	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:** **68**      **Workability Factor:** **33**



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: 4/12/21 Concrete Grade: **P1M**  
 Dates Test Represents: 4/13/2021 through 4/19/2021

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

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	71-47	Presque Isle	1070	6.54	2.62	34.9
IA	71-47	Presque Isle	750	4.59	2.62	24.4
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%



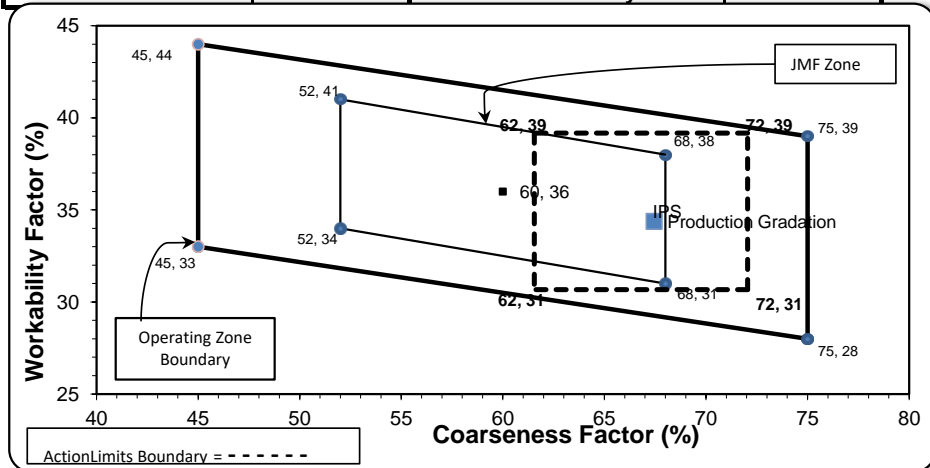
**Superior Materials, LLC**  
 30701 W. 10 Mile Rd.  
 Suite 500  
 Farmington Hills, MI 48336

Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	94.7	100.0	100.0	98.2	1.8	1.8
1"	45.0	100.0	100.0	80.8	17.3	19.2
3/4"	12.5	98.4	100.0	69.1	11.7	30.9
1/2"	2.6	80.1	100.0	61.2	7.9	38.8
3/8"	1.8	58.9	100.0	55.7	5.5	44.3
#4	1.4	13.6	96.5	43.1	12.6	56.9
#8	1.3	4.0	80.9	34.4	8.7	65.6
#16	1.2	2.4	67.1	28.3	6.0	71.7
#30	1.2	2.2	51.9	22.1	6.2	77.9
#50	1.1	2.1	27.0	11.9	10.2	88.1
#100	1.1	2.0	4.5	2.7	9.2	97.3
LBW	0.9	1.9	0.5	1.0	1.7	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"	85.0	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:  
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Approved By: