

# Aggregate Optimization Chart

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

Sample Date: 3/30/20

Concrete Grade: **P1M**

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

Dates Test Represents: 3/31/2020 through 4/6/2020

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	71-47	Presque Isle	500	3.06	2.62	16.3
IA	71-47	Presque Isle	1300	7.95	2.62	42.3
2NS	63-115	Ray Rd	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%



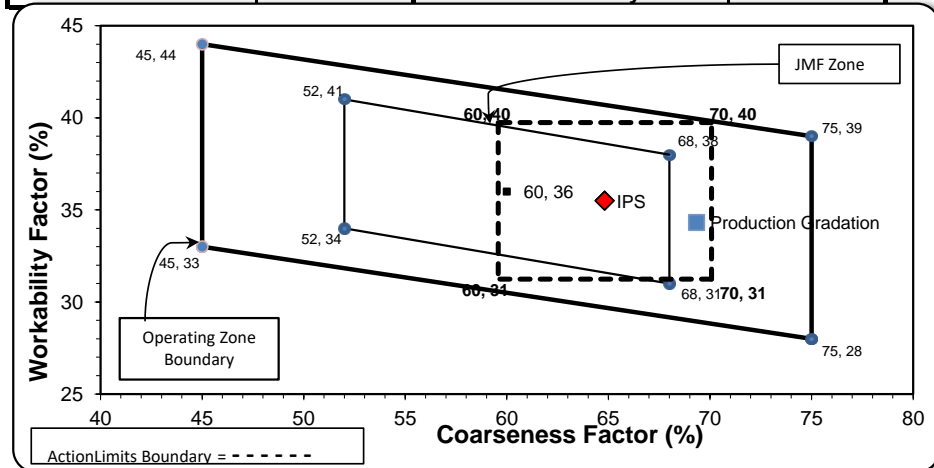
**Superior Materials, LLC**  
 30701 W. 10 Mile Rd.  
 Suite 500  
 Farmington Hills, MI 48336

Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	97.4	100.0	100.0	99.6	0.4	0.4
1"	39.8	100.0	100.0	90.2	9.4	9.8
3/4"	9.4	93.8	100.0	82.6	7.6	17.4
1/2"	2.7	59.9	100.0	67.2	15.4	32.8
3/8"	2.1	30.1	100.0	54.5	12.7	45.5
#4	2.1	5.8	96.6	42.8	11.7	57.2
#8	2.0	3.1	79.0	34.3	8.4	65.7
#16	1.9	2.5	61.9	27.0	7.3	73.0
#30	1.9	2.4	45.6	20.2	6.8	79.8
#50	1.8	2.3	22.5	10.6	9.6	89.4
#100	1.7	2.1	4.3	2.9	7.6	97.1
LBW	1.3	1.7	0.6	1.2	1.8	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>69</b>	<b>Workability Factor:</b>	<b>34</b>
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Initial Production Sample (IPS)

<b>Coarseness Factor:</b>	<b>65</b>		
<b>Workability Factor:</b>	<b>35</b>		
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: 3/30/20

Concrete Grade: **P1M**

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

Dates Test Represents: 3/31/2020 through 4/6/2020

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	71-47	Presque Isle	450	2.75	2.62	14.7
IA	71-47	Presque Isle	1420	8.69	2.62	46.3
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%



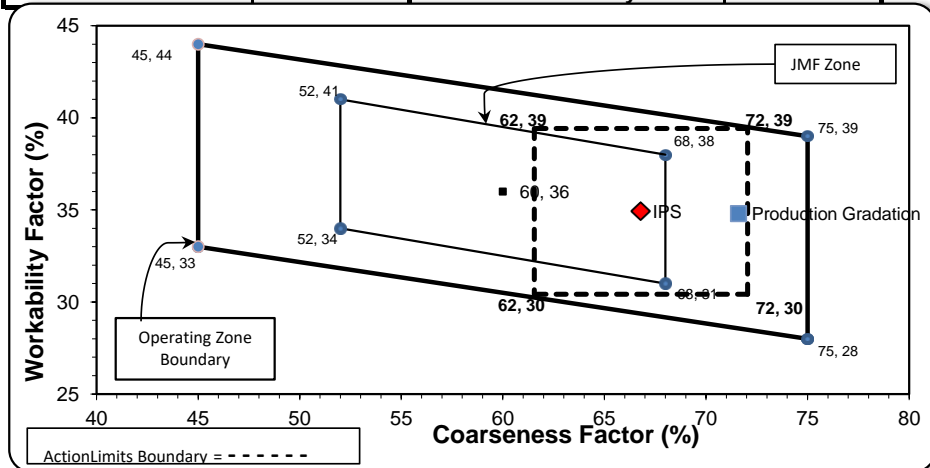
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Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	97.4	100.0	100.0	99.6	0.4	0.4
1"	39.8	100.0	100.0	91.2	8.4	8.8
3/4"	9.4	93.8	100.0	83.9	7.3	16.1
1/2"	2.7	59.9	100.0	67.2	16.7	32.8
3/8"	2.1	30.1	100.0	53.3	13.9	46.7
#4	2.1	5.8	97.4	41.1	12.3	58.9
#8	2.0	3.1	84.6	34.8	6.3	65.2
#16	1.9	2.5	69.7	28.7	6.1	71.3
#30	1.9	2.4	51.1	21.4	7.3	78.6
#50	1.8	2.3	22.2	10.0	11.4	90.0
#100	1.7	2.1	3.3	2.5	7.5	97.5
LBW	1.3	1.7	0.8	1.3	1.2	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:** **72**      **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: 3/30/20

Concrete Grade: **P1M**

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

Dates Test Represents: 3/31/2020 through 4/6/2020

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%



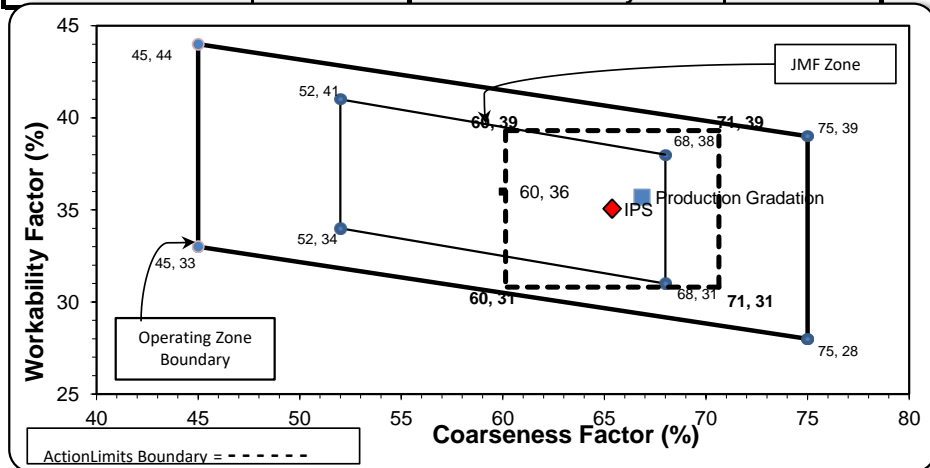
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Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	100.0	100.0	100.0	100.0	0.0	0.0
1"	39.6	100.0	100.0	80.3	19.7	19.7
3/4"	10.2	98.9	100.0	70.4	9.9	29.6
1/2"	3.0	82.6	100.0	63.6	6.9	36.4
3/8"	2.7	59.2	100.0	57.0	6.6	43.0
#4	2.4	13.7	97.4	43.3	13.7	56.7
#8	2.2	4.9	84.6	35.7	7.6	64.3
#16	2.1	2.8	69.7	29.2	6.5	70.8
#30	2.1	2.2	51.1	21.6	7.6	78.4
#50	2.0	2.0	22.2	10.0	11.6	90.0
#100	1.9	1.8	3.3	2.4	7.6	97.6
LBW	1.7	1.5	0.8	1.3	1.1	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. Max. 1.5") aggregate is used.

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

**Coarseness Factor:** **67**      **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: 3/30/20

Concrete Grade: **P1M**

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

Dates Test Represents: 3/31/2020 through 4/6/2020

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	71-47	Presque Isle	650	3.98	2.62	21.2
IA	71-47	Presque Isle	1170	7.16	2.62	38.1
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%



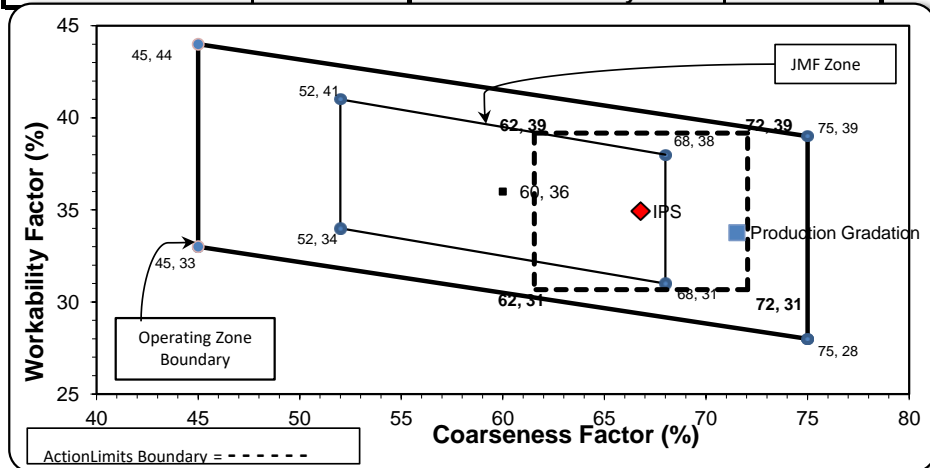
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Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	97.4	100.0	100.0	99.4	0.6	0.6
1"	39.8	100.0	100.0	87.3	12.2	12.7
3/4"	9.4	93.8	100.0	78.5	8.8	21.5
1/2"	2.7	59.9	100.0	64.1	14.3	35.9
3/8"	2.1	30.1	100.0	52.6	11.5	47.4
#4	2.1	5.8	96.6	42.0	10.6	58.0
#8	2.0	3.1	79.0	33.8	8.2	66.2
#16	1.9	2.5	61.9	26.6	7.2	73.4
#30	1.9	2.4	45.6	19.9	6.7	80.1
#50	1.8	2.3	22.5	10.4	9.5	89.6
#100	1.7	2.1	4.3	2.9	7.5	97.1
LBW	1.3	1.7	0.6	1.2	1.7	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>72</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"	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: