

# Aggregate Optimization Chart

MIX ID'S: DDP154E7, DDP154E8, DDP154ER, DDP164E7 and DDP164E8

Production Gradation Report

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

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

Sample Date: 9/17/18

Concrete Grade: **P1M**

Dates Test Represents: 9/18/2018 through 9/24/2018

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	71-47	Presque Isle	950	5.81	2.62	30.9
IA	71-47	Presque Isle	875	5.35	2.62	28.5
2NS	75-051	Mid-Michigan	1250	7.53	2.66	40.7
<b>Total Wt</b>			<b>3075</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"	98.2	100.0	100.0	99.4	0.6	0.6
1"	45.1	100.0	100.0	83.0	16.4	17.0
3/4"	10.8	98.2	100.0	71.9	11.1	28.1
1/2"	2.8	75.9	100.0	63.1	8.8	36.9
3/8"	2.2	47.5	100.0	54.8	8.3	45.2
#4	1.8	4.5	98.8	42.0	12.8	58.0
#8	1.6	1.9	78.6	33.0	9.0	67.0
#16	1.6	1.6	60.5	25.5	7.4	74.5
#30	1.6	1.4	44.8	19.1	6.4	80.9
#50	1.5	1.4	23.3	10.3	8.8	89.7
#100	1.4	1.3	6.6	3.5	6.8	96.5
LBW	1.2	1.1	0.9	1.0	2.4	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

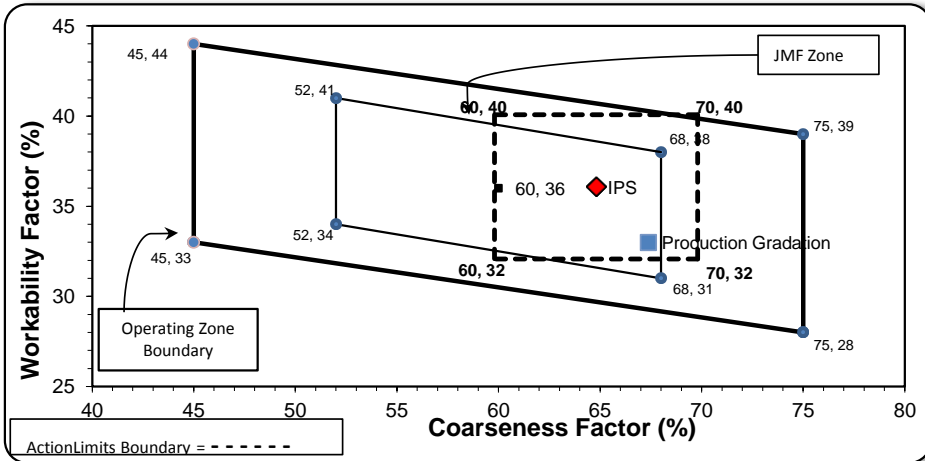
**Coarseness Factor:** **67**      **Workability Factor:** **33**

Initial Production Sample (IPS)

**Coarseness Factor:** **65**

**Workability Factor:** **36**

Sieve	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	0.0	0.0
1.5"	99.3	0.7	0.7
1"	83.6	15.7	16.4
3/4"	73.0	10.6	27.0
1/2"	65.1	7.9	34.9
3/8"	58.6	6.5	41.4
#4	45.8	12.8	54.2
#8	36.1	9.7	63.9
#16	28.8	7.3	71.2
#30	21.7	7.1	78.3
#50	10.3	11.4	89.7
#100	3.1	7.2	96.9
LBW	1.3	1.8	98.7



PREPARED BY:  
 SM, LLC Technical Service

Approved By:

# Aggregate Optimization Chart

MIX ID'S: DDP154E7, DDP154E8, DDP154ER, DDP164E7 and DDP164E8

## Production Gradation Report

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

Sample Date: 9/17/18

Concrete Grade: **P1M**

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

Dates Test Represents: 9/18/2018 through 9/24/2018

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	58-003	Stoneco	1370	8.16	2.69	43.9
IA	58-003	Stoneco	550	3.28	2.69	17.6
2NS	38-046	Chelsea	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%



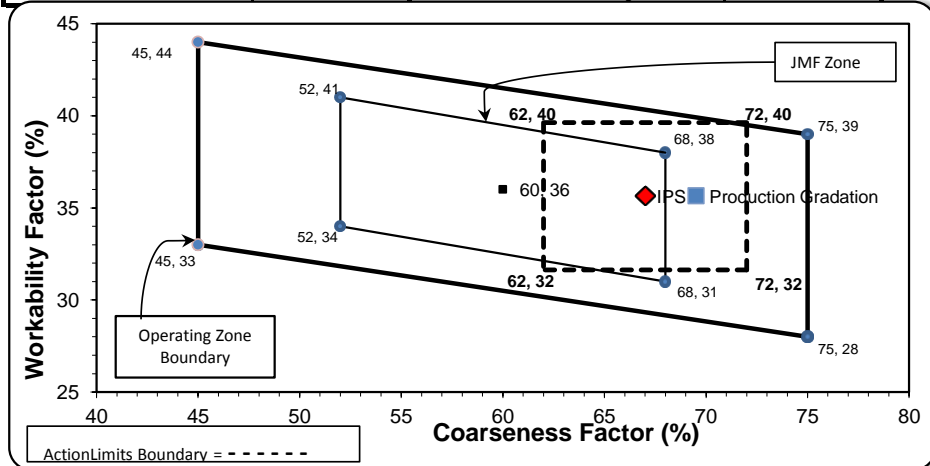
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 30701 W. 10 Mile Rd.  
 Suite 500  
 Farmington Hills, MI 48336

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"	65.6	100.0	100.0	84.9	15.1	15.1
3/4"	42.2	100.0	100.0	74.6	10.3	25.4
1/2"	19.0	93.8	100.0	63.3	11.3	36.7
3/8"	4.4	84.4	100.0	55.3	8.1	44.7
#4	1.8	24.3	100.0	43.5	11.7	56.5
#8	1.4	6.8	88.0	35.7	7.9	64.3
#16	1.2	3.2	65.0	26.1	9.6	73.9
#30	1.1	2.4	46.0	18.6	7.5	81.4
#50	1.0	2.2	25.0	10.4	8.2	89.6
#100	1.0	2.1	6.0	3.1	7.3	96.9
LBW	0.8	1.8	1.0	1.1	2.1	98.9

\*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: **70**      Workability Factor: **36**



Initial Production Sample (IPS)

Coarseness Factor: <b>67</b>		Workability Factor: <b>36</b>	
Sieve	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	0.0	0.0
1.5"	100.0	0.0	0.0
1"	87.2	12.8	12.8
3/4"	76.6	10.6	23.4
1/2"	64.4	12.2	35.6
3/8"	56.9	7.6	43.1
#4	44.1	12.7	55.9
#8	35.6	8.5	64.4
#16	27.7	8.0	72.3
#30	19.5	8.2	80.5
#50	7.8	11.6	92.2
#100	2.3	5.6	97.7
LBW	0.6	1.6	99.4

PREPARED BY:  
 SM, LLC Technical Service

Approved By:

# Aggregate Optimization Chart

MIX ID'S: DDP154E7, DDP154E8, DDP154ER, DDP164E7 and DDP164E8

## Production Gradation Report

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

Sample Date: 9/17/18

Concrete Grade: **P1M**

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

Dates Test Represents: 9/18/2018 through 9/24/2018

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	71-47	Presque Isle	820	5.02	2.62	26.7
IA	71-47	Presque Isle	1000	6.12	2.62	32.6
2NS	95-13	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%

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"	42.5	100.0	100.0	84.6	15.4	15.4
3/4"	11.1	98.6	100.0	75.8	8.8	24.2
1/2"	2.9	75.8	100.0	66.2	9.6	33.8
3/8"	2.1	49.1	100.0	57.3	8.9	42.7
#4	1.7	8.8	96.4	42.6	14.7	57.4
#8	1.6	2.6	84.7	35.8	6.8	64.2
#16	1.5	2.0	68.0	28.7	7.0	71.3
#30	1.5	1.9	47.1	20.2	8.5	79.8
#50	1.4	1.9	19.2	8.8	11.4	91.2
#100	1.4	1.7	3.9	2.5	6.3	97.5
LBW	1.2	1.4	1.1	1.2	1.3	98.8

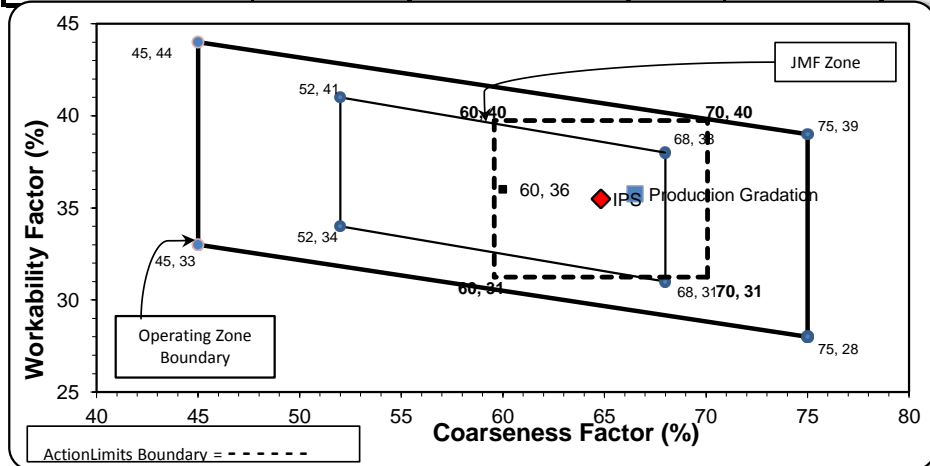
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when a 2"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



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Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

**Coarseness Factor:** **67**      **Workability Factor:** **36**



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

MIX ID'S: DDP154E7, DDP154E8, DDP154ER, DDP164E7 and DDP164E8

## Production Gradation Report

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

Sample Date: 9/17/18

Concrete Grade: **P1M**

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

Dates Test Represents: 9/18/2018 through 9/24/2018

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	71-47	Presque Isle	820	5.02	2.62	26.7
IA	71-47	Presque Isle	1000	6.12	2.62	32.6
2NS	63-92	AA Grange Hall	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%

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"	42.5	100.0	100.0	84.6	15.4	15.4
3/4"	11.1	98.6	100.0	75.8	8.8	24.2
1/2"	2.9	75.8	100.0	66.2	9.6	33.8
3/8"	2.1	49.1	100.0	57.3	8.9	42.7
#4	1.7	8.8	97.0	42.8	14.5	57.2
#8	1.6	2.6	82.9	35.0	7.8	65.0
#16	1.5	2.0	67.2	28.4	6.6	71.6
#30	1.5	1.9	51.3	21.9	6.5	78.1
#50	1.4	1.9	26.7	11.9	10.0	88.1
#100	1.4	1.7	5.0	3.0	8.9	97.0
LBW	1.2	1.4	0.4	0.9	2.0	99.1

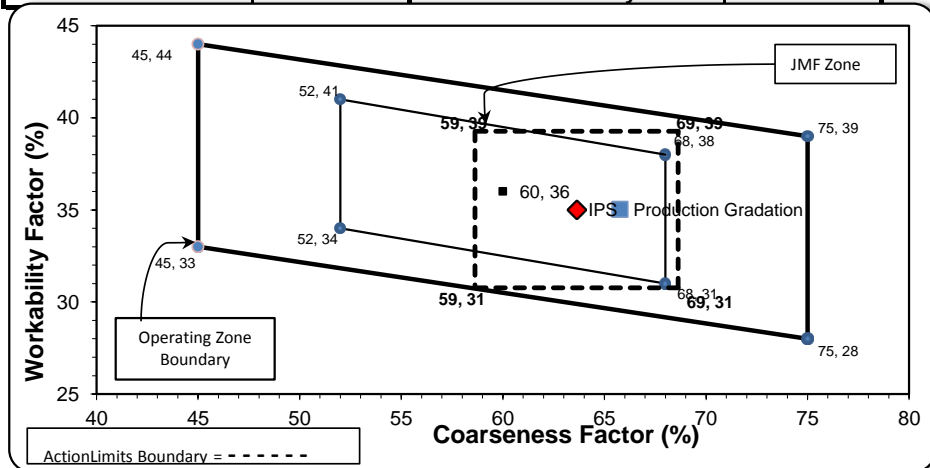


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\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained 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: 66**      **Workability Factor: 35**



Initial Production Sample (IPS)

**Coarseness Factor: 64**  
**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"	84.6	14.7	15.4
3/4"	74.4	10.3	25.6
1/2"	66.0	8.4	34.0
3/8"	58.7	7.4	41.3
#4	44.6	14.0	55.4
#8	35.0	9.6	65.0
#16	27.6	7.4	72.4
#30	19.5	8.1	80.5
#50	8.6	11.0	91.4
#100	2.0	6.6	98.0
LBW	0.9	1.1	99.1

PREPARED BY:  
 SM, LLC Technical Service

Approved By:

# Aggregate Optimization Chart

MIX ID'S: DDP154E7, DDP154E8, DDP154ER, DDP164E7 and DDP164E8

## Production Gradation Report

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

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

Sample Date: 9/17/18

Concrete Grade: **P1M**

Dates Test Represents: 9/18/2018 through 9/24/2018

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	750	4.59	2.62	24.4
2NS	63-115	Ray Road	1320	7.98	2.65	43.0
<b>Total Wt</b>			<b>3070</b>	<b>18.69</b>		<b>100.0</b>

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



**Superior Materials, LLC**

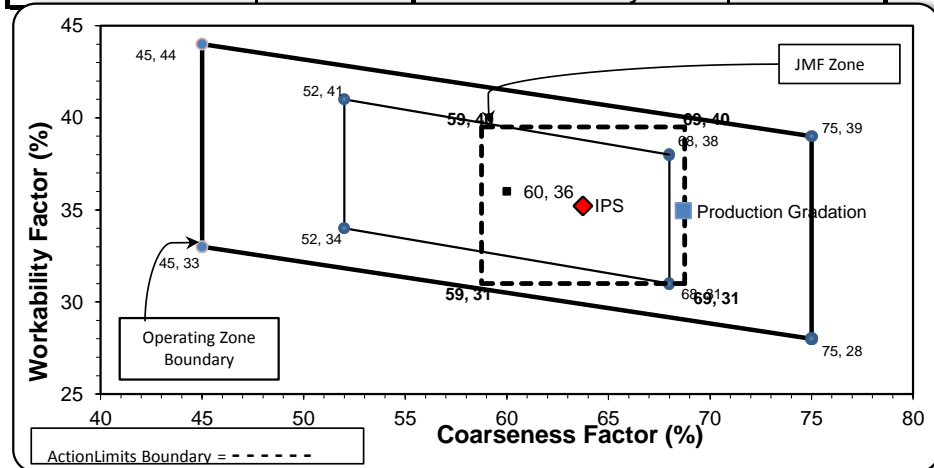
30701 W. 10 Mile Rd.  
Suite 500  
Farmington Hills, MI 48336

Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	98.2	100.0	100.0	99.4	0.6	0.6
1"	45.1	100.0	100.0	82.1	17.3	17.9
3/4"	10.8	98.2	100.0	70.5	11.6	29.5
1/2"	2.8	75.9	100.0	62.5	8.1	37.5
3/8"	2.2	47.5	100.0	55.3	7.1	44.7
#4	1.8	4.5	96.4	43.1	12.2	56.9
#8	1.6	1.9	79.0	35.0	8.2	65.0
#16	1.6	1.6	62.0	27.6	7.4	72.4
#30	1.6	1.4	46.3	20.8	6.8	79.2
#50	1.5	1.4	24.7	11.5	9.3	88.5
#100	1.4	1.3	5.8	3.3	8.2	96.7
LBW	1.2	1.1	0.6	0.9	2.3	99.1

\*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>35</b>
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Initial Production Sample (IPS)

Sieve	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	0.0	0.0
1.5"	99.4	0.6	0.6
1"	84.3	15.1	15.7
3/4"	73.9	10.4	26.1
1/2"	65.7	8.2	34.3
3/8"	58.7	7.0	41.3
#4	45.1	13.6	54.9
#8	35.3	9.8	64.7
#16	28.1	7.2	71.9
#30	21.2	6.9	78.8
#50	10.1	11.1	89.9
#100	3.1	7.0	96.9
LBW	1.4	1.7	98.6

PREPARED BY:  
SM, LLC Technical Service

Approved By:

# Aggregate Optimization Chart

MIX ID'S: DDP154E7, DDP154E8, DDP154ER, DDP164E7 and DDP164E8

## Production Gradation Report

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

Sample Date: 9/17/18

Concrete Grade: **P1M**

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

Dates Test Represents: 9/18/2018 through 9/24/2018

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	71-47	Presque Isle	820	5.02	2.62	26.7
IA	71-47	Presque Isle	1000	6.12	2.62	32.6
2NS	63-92	AA Grange Hall	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%



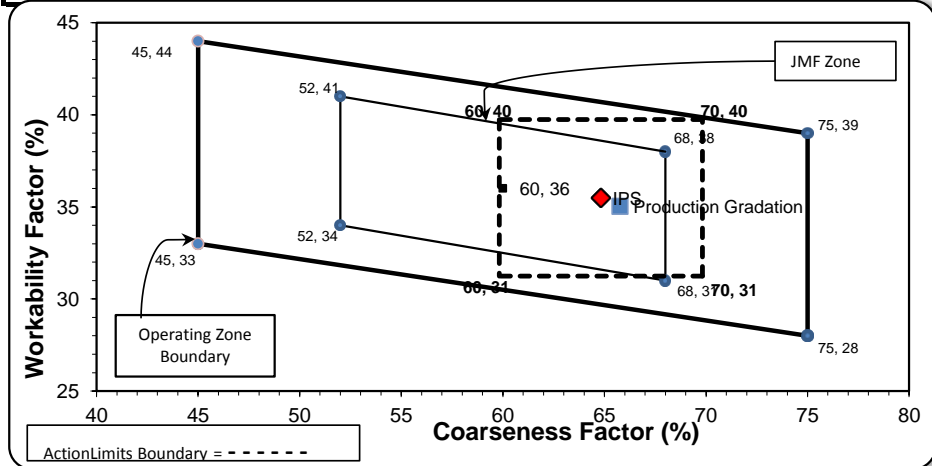
**Superior Materials, LLC**  
 30701 W. 10 Mile Rd.  
 Suite 500  
 Farmington Hills, MI 48336

Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	100.0	100.0	100.0	100.0	0.0	0.0
1"	42.5	100.0	100.0	84.6	15.4	15.4
3/4"	11.1	98.6	100.0	75.8	8.8	24.2
1/2"	2.9	75.8	100.0	66.2	9.6	33.8
3/8"	2.1	49.1	100.0	57.3	8.9	42.7
#4	1.7	8.8	97.0	42.8	14.5	57.2
#8	1.6	2.6	82.9	35.0	7.8	65.0
#16	1.5	2.0	67.2	28.4	6.6	71.6
#30	1.5	1.9	51.3	21.9	6.5	78.1
#50	1.4	1.9	26.7	11.9	10.0	88.1
#100	1.4	1.7	5.0	3.0	8.9	97.0
LBW	1.2	1.4	0.4	0.9	2.0	99.1

\*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:** **66**      **Workability Factor:** **35**



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: