

# Aggregate Optimization Chart

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

# Production Gradation Report

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

Sample Date: 11/19/18

Concrete Grade: **P1M**

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

Dates Test Represents: 11/20/2018 through 11/26/2018

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	71-47	Presque Isle	875	5.35	2.62	28.5
IA	71-47	Presque Isle	950	5.81	2.62	30.9
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%

Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	96.6	100.0	100.0	99.0	1.0	1.0
1"	48.5	100.0	100.0	85.3	13.7	14.7
3/4"	13.9	99.3	100.0	75.3	10.1	24.7
1/2"	2.5	77.7	100.0	65.4	9.9	34.6
3/8"	2.1	51.2	100.0	57.1	8.3	42.9
#4	1.9	10.9	98.1	43.8	13.3	56.2
#8	1.7	4.3	81.6	35.0	8.8	65.0
#16	1.7	3.1	64.0	27.5	7.5	72.5
#30	1.6	2.8	44.3	19.3	8.1	80.7
#50	1.6	2.5	18.0	8.5	10.8	91.5
#100	1.5	2.4	3.6	2.6	5.9	97.4
LBW	1.4	2.1	0.6	1.3	1.3	98.7



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

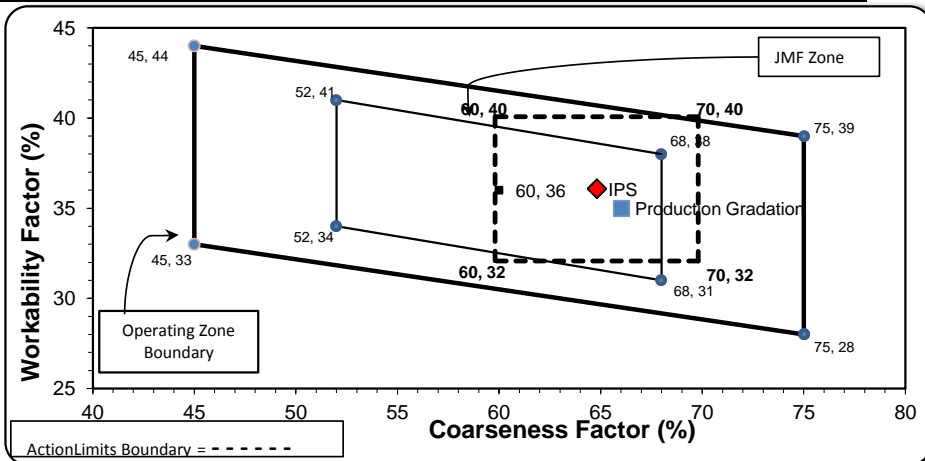
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when a 2"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

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

<b>Coarseness Factor:</b>	<b>66</b>	<b>Workability Factor:</b>	<b>35</b>
---------------------------	-----------	----------------------------	-----------

Initial Production Sample (IPS)

<b>Coarseness Factor:</b>	<b>65</b>		
<b>Workability Factor:</b>	<b>36</b>		
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: 11/19/18

Concrete Grade: **P1M**

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

Dates Test Represents: 11/20/2018 through 11/26/2018

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%

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"	64.7	100.0	100.0	84.5	15.5	15.5
3/4"	38.3	100.0	100.0	72.9	11.6	27.1
1/2"	14.4	93.8	100.0	61.3	11.6	38.7
3/8"	6.0	82.9	100.0	55.7	5.6	44.3
#4	2.4	25.0	100.0	43.9	11.8	56.1
#8	1.7	6.7	88.0	35.8	8.1	64.2
#16	1.5	2.8	64.0	25.8	10.0	74.2
#30	1.4	2.1	43.0	17.5	8.2	82.5
#50	1.3	1.8	23.0	9.7	7.8	90.3
#100	1.2	1.7	4.0	2.4	7.4	97.6
LBW	1.1	1.5	0.7	1.0	1.3	99.0

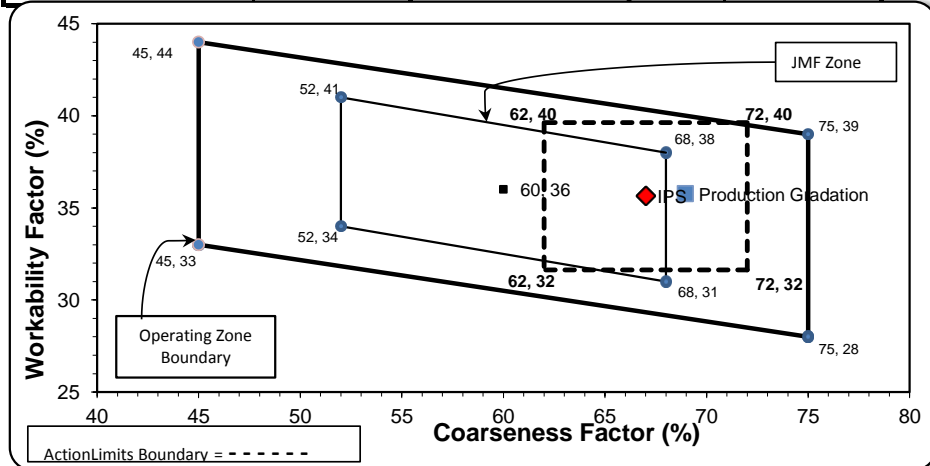


**Superior Materials, LLC**  
 30701 W. 10 Mile Rd.  
 Suite 500  
 Farmington Hills, MI 48336

\*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.

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Coarseness Factor: **69**      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-12

Sample Date: 11/19/18

Concrete Grade: P1M

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

Dates Test Represents: 11/20/2018 through 11/26/2018

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	920	5.63	2.62	30.0
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"	96.6	100.0	100.0	99.0	1.0	1.0
1"	48.5	100.0	100.0	84.9	14.1	15.1
3/4"	13.9	99.3	100.0	74.5	10.4	25.5
1/2"	2.5	77.7	100.0	64.7	9.8	35.3
3/8"	2.1	51.2	100.0	56.7	8.1	43.3
#4	1.9	10.9	97.4	43.5	13.2	56.5
#8	1.7	4.3	84.2	36.1	7.4	63.9
#16	1.7	3.1	68.1	29.2	6.9	70.8
#30	1.6	2.8	48.2	20.9	8.2	79.1
#50	1.6	2.5	19.7	9.2	11.7	90.8
#100	1.5	2.4	2.8	2.3	6.9	97.7
LBW	1.4	2.1	0.3	1.2	1.1	98.8

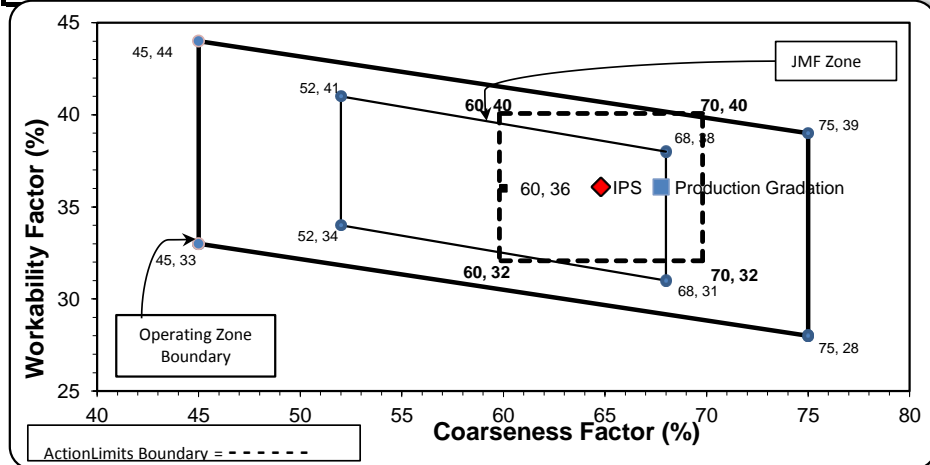


**Superior Materials, LLC**  
 30701 W. 10 Mile Rd.  
 Suite 500  
 Farmington Hills, MI 48336

\*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.

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Coarseness Factor: 68      Workability Factor: 36



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-32**

Sample Date: 11/19/18

Concrete Grade: **P1M**

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

Dates Test Represents: 11/20/2018 through 11/26/2018

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	920	5.63	2.62	30.0
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"	95.5	100.0	100.0	98.7	1.3	1.3
1"	43.7	100.0	100.0	83.5	15.2	16.5
3/4"	7.8	99.3	100.0	72.8	10.7	27.2
1/2"	2.6	74.0	100.0	63.7	9.1	36.3
3/8"	2.1	48.0	100.0	55.7	7.9	44.3
#4	1.7	7.8	98.0	42.7	13.0	57.3
#8	1.6	3.0	85.0	36.0	6.8	64.0
#16	1.6	2.2	68.5	29.0	7.0	71.0
#30	1.5	2.1	47.7	20.5	8.5	79.5
#50	1.5	1.9	20.2	9.2	11.3	90.8
#100	1.4	1.8	3.7	2.5	6.8	97.5
LBW	1.1	1.2	0.5	0.9	1.6	99.1

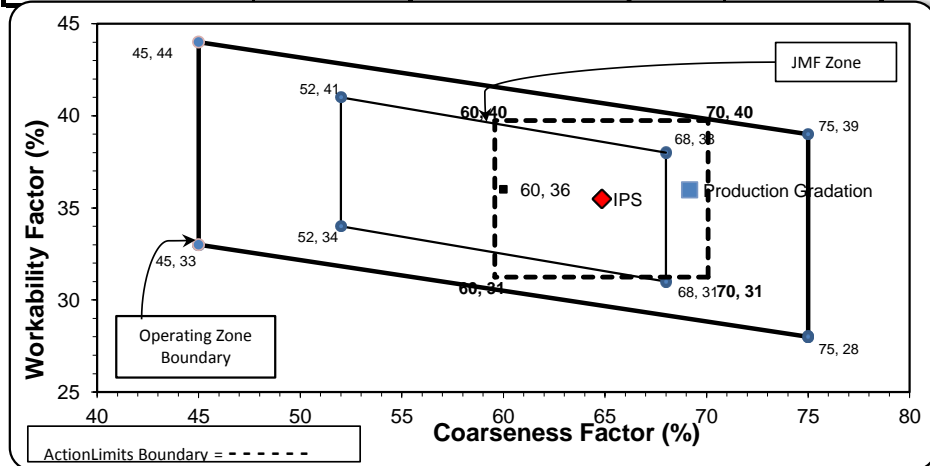


**Superior Materials, LLC**  
 30701 W. 10 Mile Rd.  
 Suite 500  
 Farmington Hills, MI 48336

\*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.

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Coarseness Factor: **69**      Workability Factor: **36**



Initial Production Sample (IPS)

Coarseness Factor: <b>65</b>		Workability Factor: <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: 11/19/18

Concrete Grade: **P1M**

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

Dates Test Represents: 11/20/2018 through 11/26/2018

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	71-47	Presque Isle	850	5.20	2.62	27.7
IA	71-47	Presque Isle	970	5.93	2.62	31.6
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"	95.5	100.0	100.0	98.8	1.2	1.2
1"	43.7	100.0	100.0	84.4	14.3	15.6
3/4"	7.8	99.3	100.0	74.3	10.2	25.7
1/2"	2.6	74.0	100.0	64.8	9.4	35.2
3/8"	2.1	48.0	100.0	56.5	8.4	43.5
#4	1.7	7.8	97.4	42.6	13.9	57.4
#8	1.6	3.0	84.2	35.7	6.9	64.3
#16	1.6	2.2	68.1	28.9	6.8	71.1
#30	1.5	2.1	48.2	20.7	8.2	79.3
#50	1.5	1.9	19.7	9.0	11.7	91.0
#100	1.4	1.8	2.8	2.1	6.9	97.9
LBW	1.1	1.2	0.3	0.8	1.3	99.2

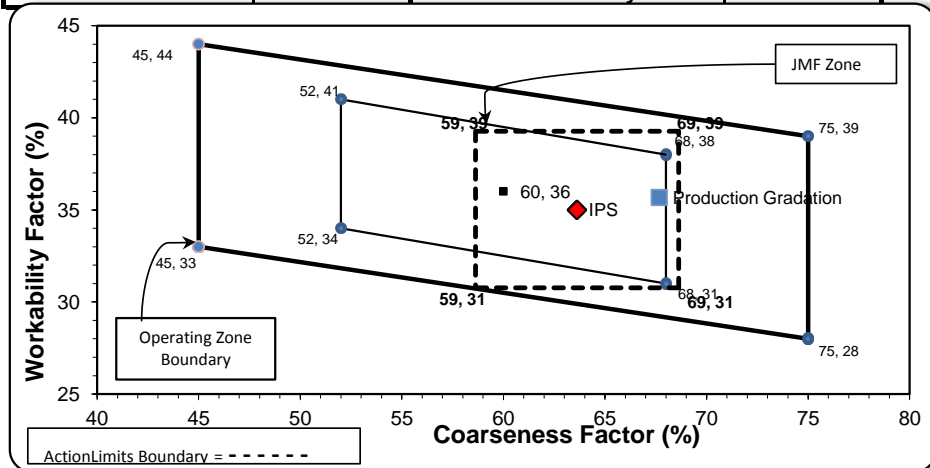


**Superior Materials, LLC**  
 30701 W. 10 Mile Rd.  
 Suite 500  
 Farmington Hills, MI 48336

\*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.

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Coarseness Factor: **68**      Workability Factor: **36**



Initial Production Sample (IPS)

Coarseness Factor: <b>64</b>		Workability Factor: <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"	84.6	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**

Sample Date: 11/19/18

Concrete Grade: **P1M**

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

Dates Test Represents: 11/20/2018 through 11/26/2018

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	850	5.20	2.62	27.7
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%

Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	96.6	100.0	100.0	99.0	1.0	1.0
1"	48.5	100.0	100.0	84.9	14.1	15.1
3/4"	13.9	99.3	100.0	74.6	10.3	25.4
1/2"	2.5	77.7	100.0	65.2	9.3	34.8
3/8"	2.1	51.2	100.0	57.8	7.5	42.2
#4	1.9	10.9	96.7	45.2	12.6	54.8
#8	1.7	4.3	79.3	35.8	9.4	64.2
#16	1.7	3.1	62.2	28.1	7.7	71.9
#30	1.6	2.8	45.9	21.0	7.1	79.0
#50	1.6	2.5	23.3	11.2	9.8	88.8
#100	1.5	2.4	4.9	3.2	8.0	96.8
LBW	1.4	2.1	0.6	1.2	2.0	98.8

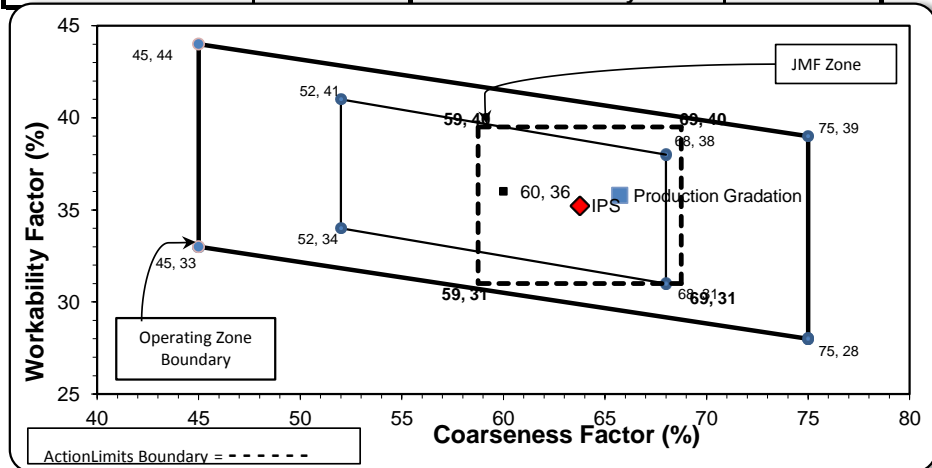


**Superior Materials, LLC**  
 30701 W. 10 Mile Rd.  
 Suite 500  
 Farmington Hills, MI 48336

\*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.

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

<b>Coarseness Factor:</b>	<b>66</b>	<b>Workability Factor:</b>	<b>36</b>
---------------------------	-----------	----------------------------	-----------



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

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

Sample Date: 11/19/18

Concrete Grade: P1M

Dates Test Represents: 11/20/2018 through 11/26/2018

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
CA	71-47	Presque Isle	850	5.20	2.62	27.7
IA	71-47	Presque Isle	970	5.93	2.62	31.6
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"	95.5	100.0	100.0	98.8	1.2	1.2
1"	43.7	100.0	100.0	84.4	14.3	15.6
3/4"	7.8	99.3	100.0	74.3	10.2	25.7
1/2"	2.6	74.0	100.0	64.8	9.4	35.2
3/8"	2.1	48.0	100.0	56.5	8.4	43.5
#4	1.7	7.8	97.4	42.6	13.9	57.4
#8	1.6	3.0	84.2	35.7	6.9	64.3
#16	1.6	2.2	68.1	28.9	6.8	71.1
#30	1.5	2.1	48.2	20.7	8.2	79.3
#50	1.5	1.9	19.7	9.0	11.7	91.0
#100	1.4	1.8	2.8	2.1	6.9	97.9
LBW	1.1	1.2	0.3	0.8	1.3	99.2

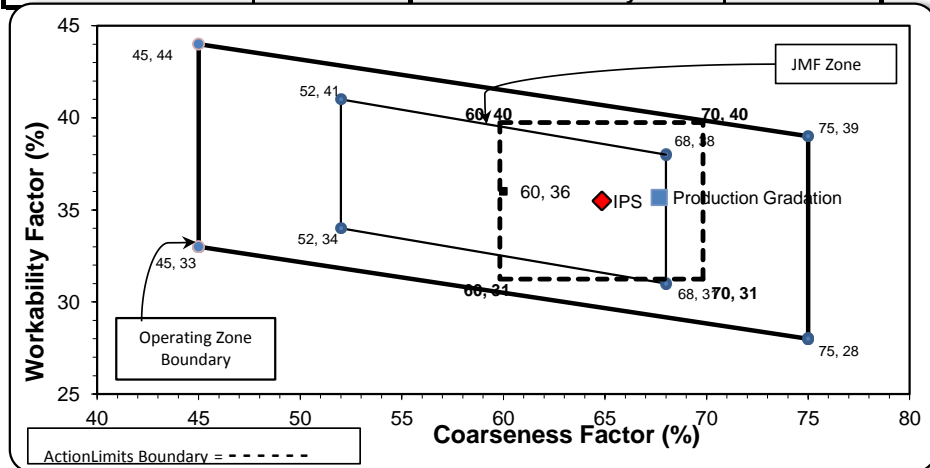


**Superior Materials, LLC**  
 30701 W. 10 Mile Rd.  
 Suite 500  
 Farmington Hills, MI 48336

\*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.

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"	99.4	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: