

# Aggregate Optimization Chart

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

Production Gradation Report

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

Sample Date: 11/26/18

Concrete Grade: **P1M**

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

Dates Test Represents: 11/27/2018 through 12/3/2018

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"	100.0	100.0	100.0	100.0	0.0	0.0
1"	47.6	100.0	100.0	85.1	14.9	14.9
3/4"	13.4	100.0	100.0	75.4	9.7	24.6
1/2"	3.6	85.5	100.0	68.1	7.3	31.9
3/8"	2.2	59.8	100.0	59.8	8.3	40.2
#4	1.6	15.8	98.8	45.5	14.3	54.5
#8	1.4	4.7	83.9	36.0	9.5	64.0
#16	1.2	2.4	66.9	28.3	7.7	71.7
#30	1.1	2.0	46.9	20.0	8.3	80.0
#50	1.1	1.8	18.2	8.3	11.7	91.7
#100	1.1	1.6	3.3	2.1	6.1	97.9
LBW	0.9	1.3	0.6	0.9	1.2	99.1



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 Suite 500  
 Farmington Hills, MI 48336

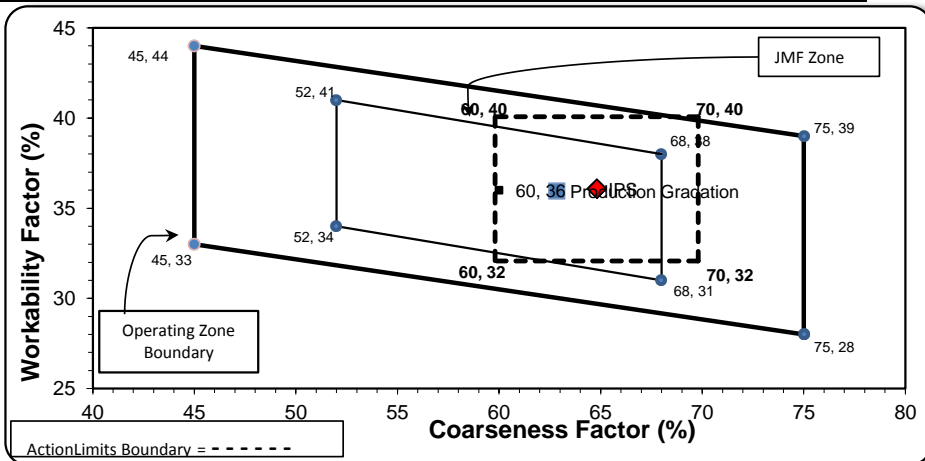
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when a 2"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

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

**Coarseness Factor: 63**      **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-102**

Sample Date: 11/26/18

Concrete Grade: **P1M**

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

Dates Test Represents: 11/27/2018 through 12/3/2018

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"	64.6	100.0	100.0	84.5	15.5	15.5
3/4"	39.6	100.0	100.0	73.5	11.0	26.5
1/2"	16.4	93.7	100.0	62.2	11.3	37.8
3/8"	6.7	83.2	100.0	56.1	6.1	43.9
#4	2.5	24.3	100.0	43.8	12.2	56.2
#8	1.9	6.8	86.0	35.1	8.7	64.9
#16	1.6	3.1	64.0	25.9	9.2	74.1
#30	1.4	2.3	43.0	17.6	8.3	82.4
#50	1.4	2.1	23.0	9.8	7.7	90.2
#100	1.3	2.0	4.0	2.5	7.4	97.5
LBW	1.2	1.7	0.9	1.2	1.3	98.8

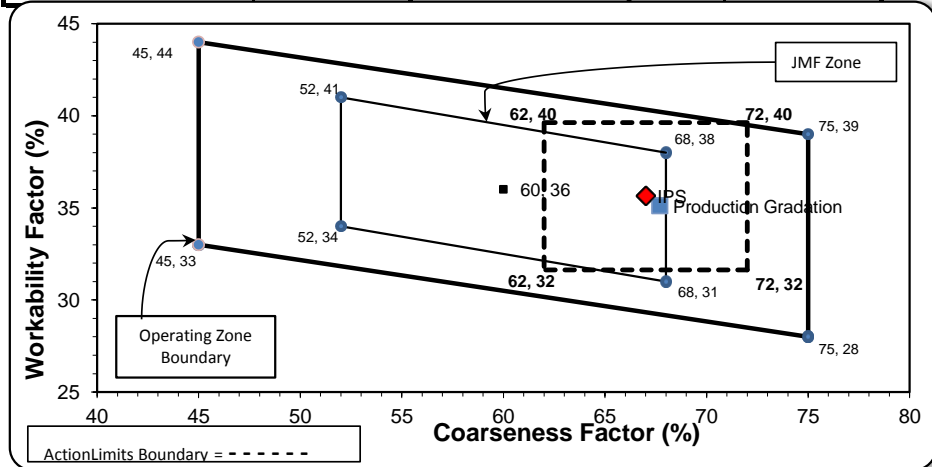


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\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained 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: **68**      Workability Factor: **35**



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: 11/26/18

Concrete Grade: **P1M**

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

Dates Test Represents: 11/27/2018 through 12/3/2018

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"	100.0	100.0	100.0	100.0	0.0	0.0
1"	47.6	100.0	100.0	84.6	15.4	15.4
3/4"	13.4	100.0	100.0	74.6	10.0	25.4
1/2"	3.6	85.5	100.0	67.4	7.2	32.6
3/8"	2.2	59.8	100.0	59.3	8.1	40.7
#4	1.6	15.8	97.4	44.9	14.4	55.1
#8	1.4	4.7	84.0	36.0	8.8	64.0
#16	1.2	2.4	68.0	28.8	7.3	71.2
#30	1.1	2.0	47.5	20.3	8.5	79.7
#50	1.1	1.8	18.3	8.3	11.9	91.7
#100	1.1	1.6	2.4	1.8	6.5	98.2
LBW	0.9	1.3	0.3	0.8	1.0	99.2

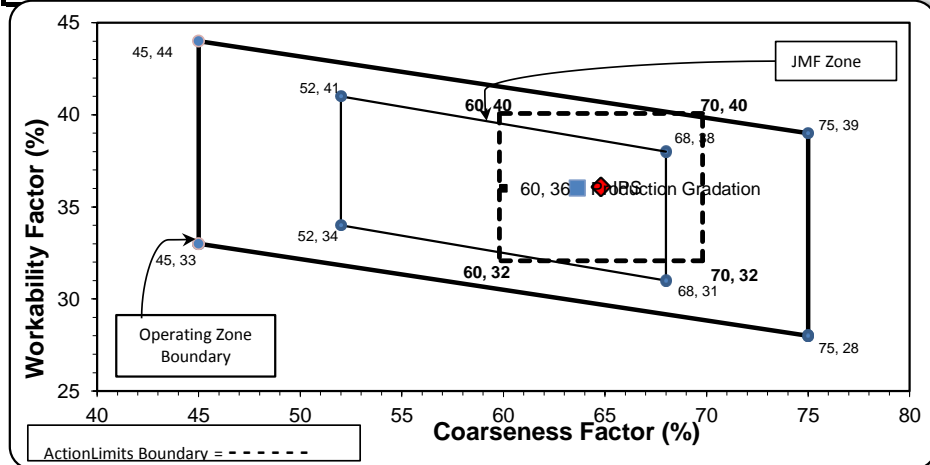


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\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained 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: 64**      **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: 11/26/18

Concrete Grade: **P1M**

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

Dates Test Represents: 11/27/2018 through 12/3/2018

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"	96.6	100.0	100.0	99.0	1.0	1.0
1"	36.3	100.0	100.0	81.3	17.7	18.7
3/4"	8.6	97.9	100.0	72.6	8.7	27.4
1/2"	2.1	75.6	100.0	64.0	8.6	36.0
3/8"	1.8	46.9	100.0	55.3	8.7	44.7
#4	1.6	7.8	97.7	42.6	12.7	57.4
#8	1.5	2.8	85.1	35.9	6.7	64.1
#16	1.4	2.0	68.6	28.9	7.0	71.1
#30	1.4	1.9	48.4	20.7	8.3	79.3
#50	1.3	1.8	20.5	9.3	11.4	90.7
#100	1.2	1.7	4.3	2.6	6.7	97.4
LBW	1.0	0.4	0.9	0.8	1.8	99.2

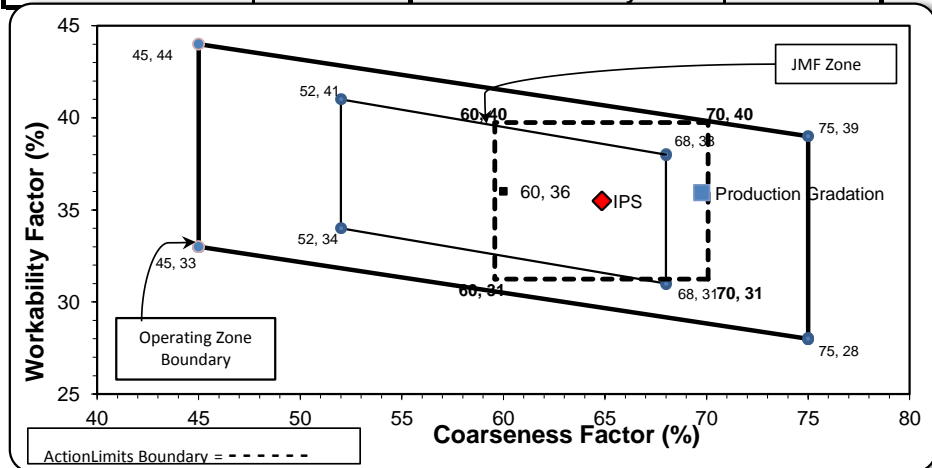


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\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained 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: **70**      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: 11/26/18

Concrete Grade: **P1M**

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

Dates Test Represents: 11/27/2018 through 12/3/2018

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"	96.6	100.0	100.0	99.1	0.9	0.9
1"	36.3	100.0	100.0	82.4	16.7	17.6
3/4"	8.6	97.9	100.0	74.0	8.3	26.0
1/2"	2.1	75.6	100.0	65.2	8.8	34.8
3/8"	1.8	46.9	100.0	56.0	9.2	44.0
#4	1.6	7.8	97.4	42.6	13.5	57.4
#8	1.5	2.8	84.0	35.5	7.1	64.5
#16	1.4	2.0	68.0	28.7	6.8	71.3
#30	1.4	1.9	47.5	20.3	8.4	79.7
#50	1.3	1.8	18.3	8.4	11.9	91.6
#100	1.2	1.7	2.4	1.8	6.5	98.2
LBW	1.0	0.4	0.3	0.5	1.3	99.5

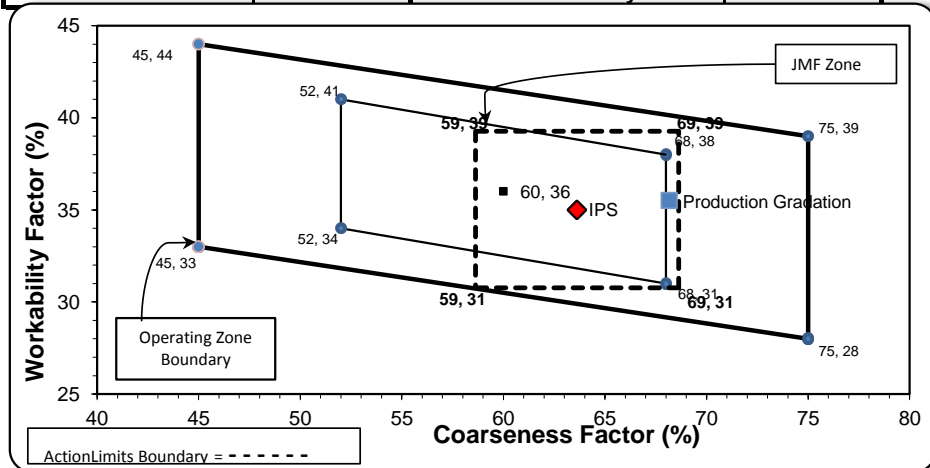


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\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained 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: **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: 11/26/18

Concrete Grade: **P1M**

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

Dates Test Represents: 11/27/2018 through 12/3/2018

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"	100.0	100.0	100.0	100.0	0.0	0.0
1"	47.6	100.0	100.0	84.6	15.4	15.4
3/4"	13.4	100.0	100.0	74.6	10.0	25.4
1/2"	3.6	85.5	100.0	67.7	6.9	32.3
3/8"	2.2	59.8	100.0	60.2	7.5	39.8
#4	1.6	15.8	96.5	46.3	13.9	53.7
#8	1.4	4.7	79.9	36.1	10.3	63.9
#16	1.2	2.4	63.6	28.4	7.7	71.6
#30	1.1	2.0	47.5	21.3	7.1	78.7
#50	1.1	1.8	24.6	11.4	9.9	88.6
#100	1.1	1.6	5.2	3.0	8.4	97.0
LBW	0.9	1.3	0.4	0.8	2.2	99.2

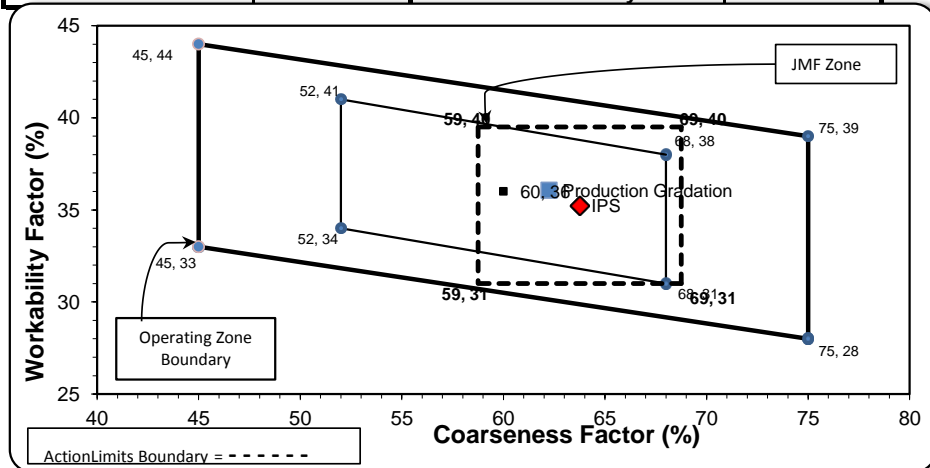
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when a 2"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



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Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Coarseness Factor: **62**      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"	84.3	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: 11/26/18

Concrete Grade: **P1M**

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

Dates Test Represents: 11/27/2018 through 12/3/2018

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"	96.6	100.0	100.0	99.1	0.9	0.9
1"	36.3	100.0	100.0	82.4	16.7	17.6
3/4"	8.6	97.9	100.0	74.0	8.3	26.0
1/2"	2.1	75.6	100.0	65.2	8.8	34.8
3/8"	1.8	46.9	100.0	56.0	9.2	44.0
#4	1.6	7.8	97.4	42.6	13.5	57.4
#8	1.5	2.8	84.0	35.5	7.1	64.5
#16	1.4	2.0	68.0	28.7	6.8	71.3
#30	1.4	1.9	47.5	20.3	8.4	79.7
#50	1.3	1.8	18.3	8.4	11.9	91.6
#100	1.2	1.7	2.4	1.8	6.5	98.2
LBW	1.0	0.4	0.3	0.5	1.3	99.5

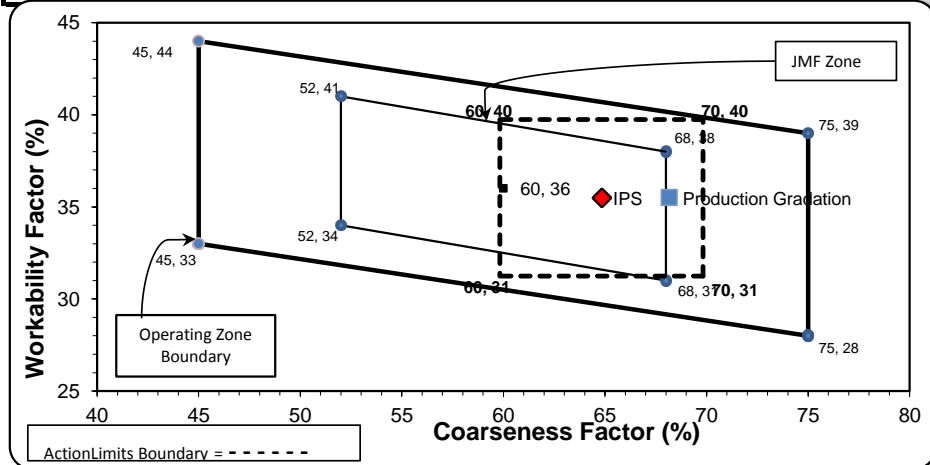


**Superior Materials, LLC**  
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\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 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: **68**      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: