

# Aggregate Optimization Chart

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

## Production Gradation Report

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

Sample Date: 11/12/18

Concrete Grade: **P1M**

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

Dates Test Represents: 11/13/2018 through 11/19/2018

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	27.6
IA	71-47	Presque Isle	975	5.96	2.62	31.7
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"	49.1	100.0	100.0	85.9	14.1	14.1
3/4"	15.7	98.4	100.0	76.2	9.7	23.8
1/2"	4.5	73.1	100.0	65.1	11.1	34.9
3/8"	3.1	43.9	100.0	55.4	9.6	44.6
#4	2.2	6.3	98.8	42.8	12.7	57.2
#8	1.7	2.8	82.7	35.0	7.8	65.0
#16	1.6	2.1	64.8	27.4	7.5	72.6
#30	1.6	1.9	45.7	19.6	7.8	80.4
#50	1.5	1.8	19.7	9.0	10.6	91.0
#100	1.5	1.7	4.0	2.6	6.4	97.4
LBW	1.3	1.5	0.7	1.1	1.5	98.9



**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.

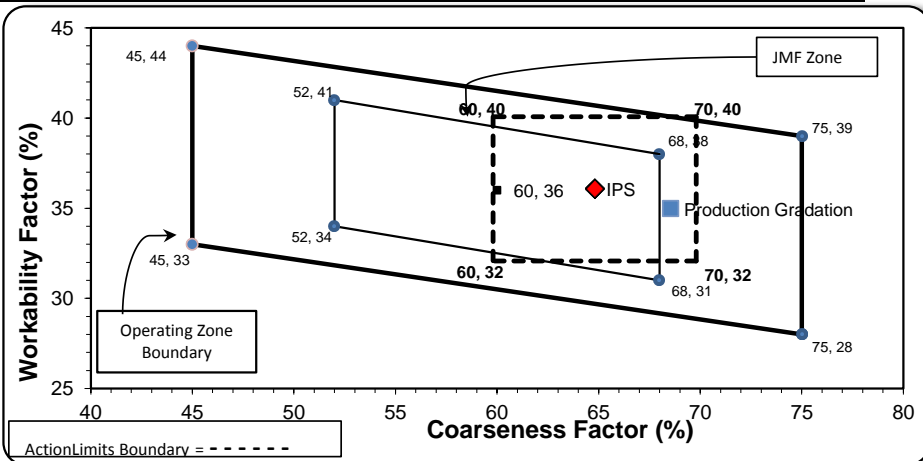
Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

**Coarseness Factor:** 69      **Workability Factor:** 35

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-12**

Sample Date: 11/12/18

Concrete Grade: **P1M**

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

Dates Test Represents: 11/13/2018 through 11/19/2018

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"	100.0	100.0	100.0	100.0	0.0	0.0
1"	49.1	100.0	100.0	85.9	14.1	14.1
3/4"	15.7	98.4	100.0	76.2	9.8	23.8
1/2"	4.5	73.1	100.0	65.1	11.1	34.9
3/8"	3.1	43.9	100.0	55.4	9.6	44.6
#4	2.2	6.3	97.2	42.2	13.3	57.8
#8	1.7	2.8	84.1	35.6	6.6	64.4
#16	1.6	2.1	68.1	28.8	6.8	71.2
#30	1.6	1.9	48.9	21.0	7.9	79.0
#50	1.5	1.8	21.2	9.6	11.3	90.4
#100	1.5	1.7	3.2	2.3	7.4	97.7
LBW	1.3	1.5	0.3	1.0	1.3	99.0

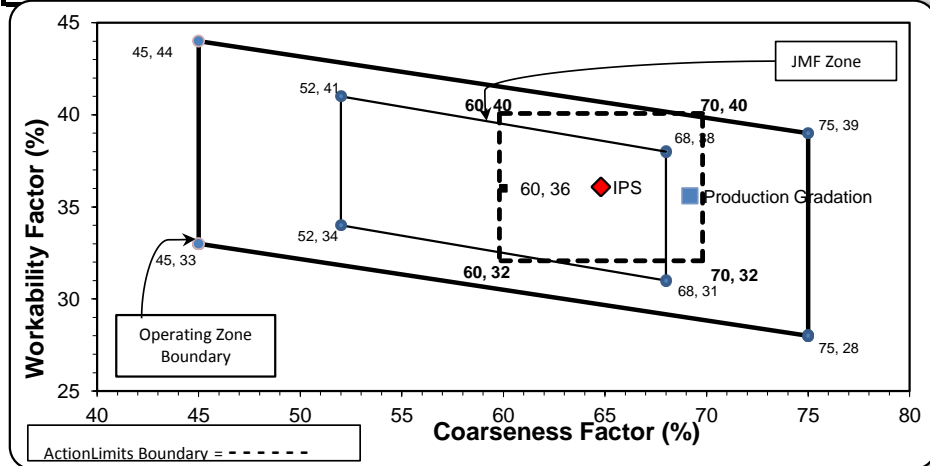


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\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained 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: **69**      Workability Factor: **36**



Initial Production Sample (IPS)

Coarseness Factor: <b>65</b>		Workability Factor: <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

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 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: 11/12/18

Concrete Grade: **P1M**

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

Dates Test Represents: 11/13/2018 through 11/19/2018

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	820	5.02	2.62	26.7
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"	56.6	100.0	100.0	85.9	14.1	14.1
3/4"	14.7	99.0	100.0	71.9	13.9	28.1
1/2"	3.5	82.8	100.0	64.0	8.0	36.0
3/8"	3.1	53.7	100.0	56.1	7.9	43.9
#4	2.7	7.9	97.5	42.7	13.4	57.3
#8	2.4	2.7	85.6	36.4	6.3	63.6
#16	2.2	2.1	68.8	29.3	7.1	70.7
#30	2.1	1.9	48.4	20.9	8.4	79.1
#50	2.0	1.6	20.6	9.5	11.4	90.5
#100	1.9	1.5	4.1	2.7	6.8	97.3
LBW	1.4	1.2	0.9	1.1	1.5	98.9

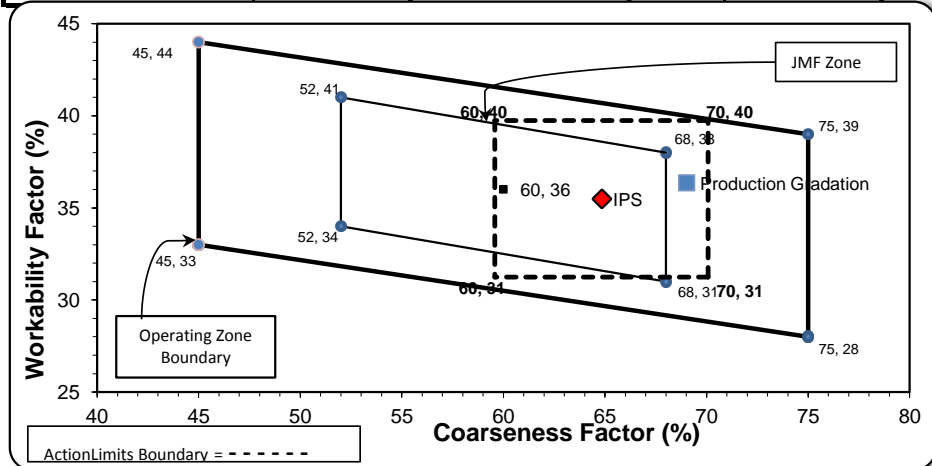


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\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained 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: 69**      **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:  
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Approved By:

# Aggregate Optimization Chart

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

# Production Gradation Report

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

Sample Date: 11/12/18

Concrete Grade: **P1M**

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

Dates Test Represents: 11/13/2018 through 11/19/2018

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	820	5.02	2.62	26.7
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"	56.6	100.0	100.0	85.9	14.1	14.1
3/4"	14.7	99.0	100.0	71.9	13.9	28.1
1/2"	3.5	82.8	100.0	64.0	8.0	36.0
3/8"	3.1	53.7	100.0	56.1	7.9	43.9
#4	2.7	7.9	97.2	42.6	13.5	57.4
#8	2.4	2.7	84.1	35.7	6.8	64.3
#16	2.2	2.1	68.1	29.0	6.7	71.0
#30	2.1	1.9	48.9	21.1	7.9	78.9
#50	2.0	1.6	21.2	9.7	11.4	90.3
#100	1.9	1.5	3.2	2.3	7.4	97.7
LBW	1.4	1.2	0.3	0.9	1.4	99.1

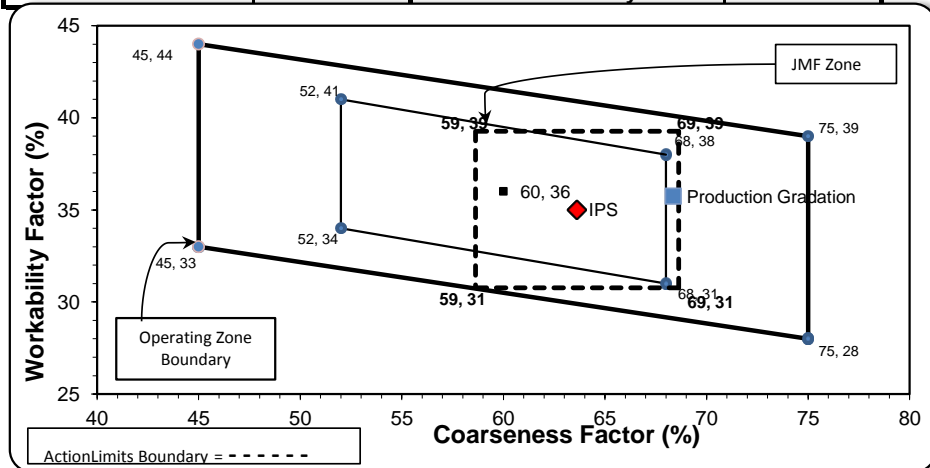


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\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained 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: 68**      **Workability Factor: 36**



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**

Sample Date: 11/12/18

Concrete Grade: **P1M**

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

Dates Test Represents: 11/13/2018 through 11/19/2018

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"	49.1	100.0	100.0	85.1	14.9	14.9
3/4"	15.7	98.4	100.0	74.8	10.2	25.2
1/2"	4.5	73.1	100.0	64.6	10.3	35.4
3/8"	3.1	43.9	100.0	56.1	8.5	43.9
#4	2.2	6.3	96.6	43.9	12.1	56.1
#8	1.7	2.8	79.3	35.4	8.6	64.6
#16	1.6	2.1	62.5	27.9	7.4	72.1
#30	1.6	1.9	46.6	21.0	6.9	79.0
#50	1.5	1.8	23.1	10.9	10.2	89.1
#100	1.5	1.7	4.3	2.8	8.1	97.2
LBW	1.3	1.5	0.5	1.0	1.7	99.0

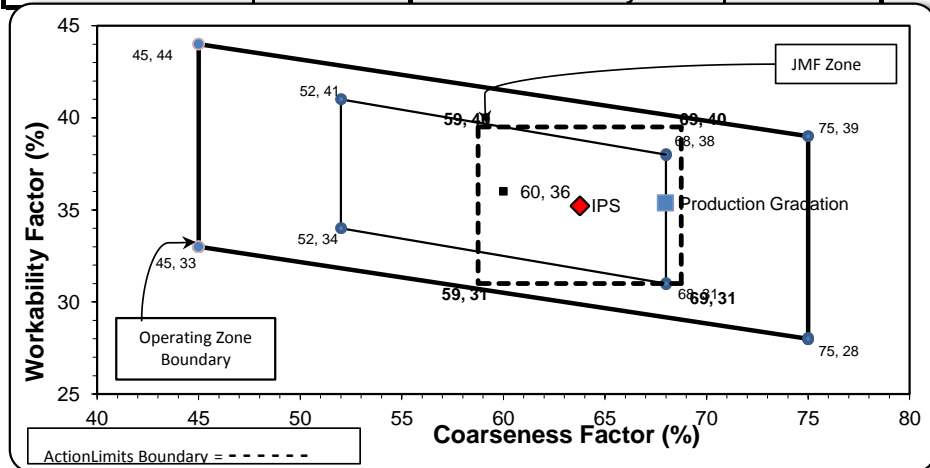
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when a 2"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



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Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Coarseness Factor: **68**      Workability Factor: **35**



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: 11/12/18

Concrete Grade: **P1M**

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

Dates Test Represents: 11/13/2018 through 11/19/2018

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	820	5.02	2.62	26.7
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"	56.6	100.0	100.0	85.9	14.1	14.1
3/4"	14.7	99.0	100.0	71.9	13.9	28.1
1/2"	3.5	82.8	100.0	64.0	8.0	36.0
3/8"	3.1	53.7	100.0	56.1	7.9	43.9
#4	2.7	7.9	97.2	42.6	13.5	57.4
#8	2.4	2.7	84.1	35.7	6.8	64.3
#16	2.2	2.1	68.1	29.0	6.7	71.0
#30	2.1	1.9	48.9	21.1	7.9	78.9
#50	2.0	1.6	21.2	9.7	11.4	90.3
#100	1.9	1.5	3.2	2.3	7.4	97.7
LBW	1.4	1.2	0.3	0.9	1.4	99.1

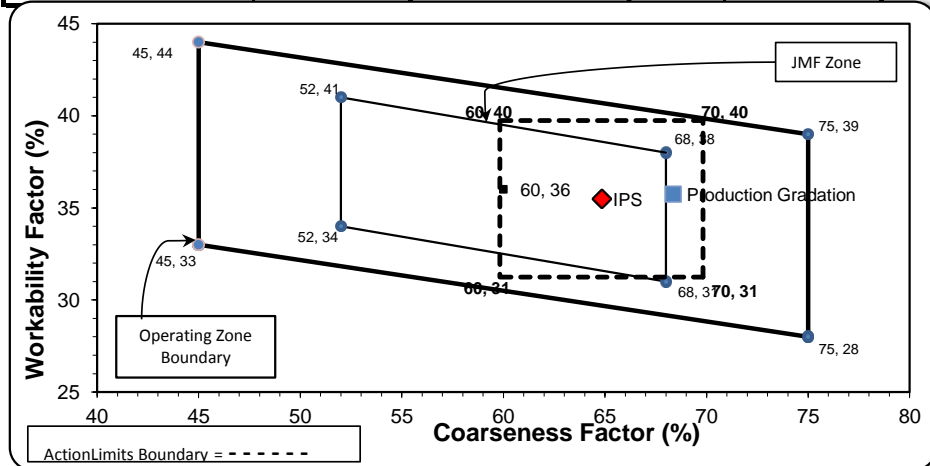
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when a 2"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



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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: