

# Aggregate Optimization Chart

## Production Gradation Report

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

Sample Date: 11/15/21

Concrete Grade: **DM**

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

Dates Test Represents: 11/16/2021 through 11/22/2021

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	71-47	Presque Isle	1560	9.54	2.62	53.6
26A	71-47	Presque Isle	200	1.22	2.62	6.9
2NS	75-051	Mid-Michigan	1150	6.93	2.66	39.5
<b>Total Wt</b>			<b>2910</b>	<b>17.69</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	6AA	26A	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"	99.6	100.0	100.0	99.8	0.2	0.2
3/4"	89.9	100.0	100.0	94.6	5.2	5.4
1/2"	50.2	98.0	100.0	73.2	21.4	26.8
3/8"	30.2	84.0	100.0	61.5	11.7	38.5
#4	4.3	18.7	98.9	42.7	18.8	57.3
#8	2.0	4.1	81.1	33.4	9.3	66.6
#16	1.7	2.3	63.8	26.3	7.1	73.7
#30	1.6	2.1	47.7	19.9	6.4	80.1
#50	1.5	1.9	24.8	10.7	9.1	89.3
#100	1.5	1.8	6.8	3.6	7.1	96.4
LBW	1.4	1.5	0.8	1.2	2.4	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.

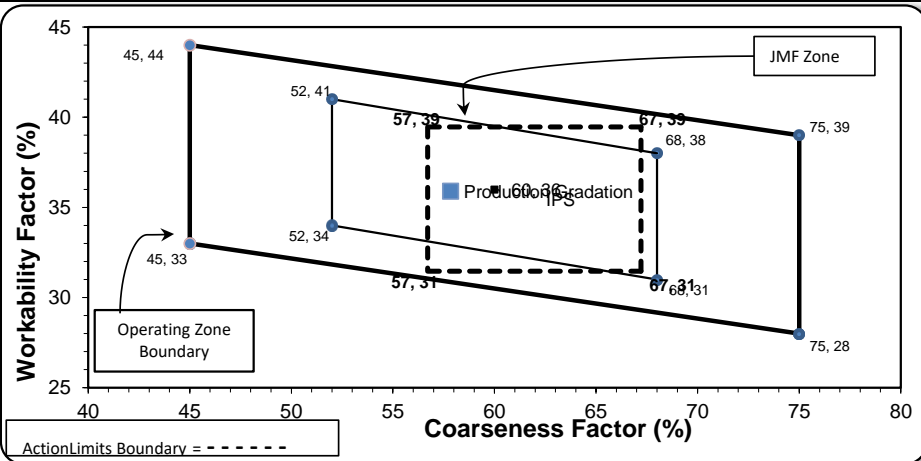
Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Adjusted WF Initial Production Sample (IPS)

<b>Coarseness Factor:</b>	<b>58</b>	<b>Workability Factor:</b>	<b>33</b>	<b>Adjusted WF</b>	<b>35.9</b>
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<b>Coarseness Factor:</b>	<b>62</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"	100.0	0.0	0.0
3/4"	95.0	5.0	5.0
1/2"	70.5	24.5	29.5
3/8"	60.0	10.5	40.0
#4	44.4	15.6	55.6
#8	35.5	9.0	64.5
#16	28.5	7.0	71.5
#30	21.5	7.0	78.5
#50	10.2	11.3	89.8
#100	3.1	7.1	96.9
LBW	1.3	1.8	98.7



PREPARED BY:  
 SM, LLC Technical Service

Approved By:

# Aggregate Optimization Chart

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

Sample Date: 11/15/21

Concrete Grade: **DM**

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

Dates Test Represents: 11/16/2021 through 11/22/2021

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	58-003	Stoneco	1500	8.94	2.69	50.8
26A	58-003	Stoneco	305	1.82	2.69	10.3
2NS	63-114	Highland	1150	6.95	2.65	38.9
<b>Total Wt</b>			<b>2955</b>	<b>17.71</b>		<b>100.0</b>

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



**Superior Materials, LLC**  
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 Suite 500  
 Farmington Hills, MI 48336

Sieve	6AA	26A	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"	99.7	100.0	100.0	99.8	0.2	0.2
3/4"	83.4	100.0	100.0	91.6	8.3	8.4
1/2"	43.9	99.6	100.0	71.5	20.1	28.5
3/8"	20.7	84.8	100.0	58.2	13.3	41.8
#4	2.8	11.5	99.6	41.4	16.8	58.6
#8	1.0	2.0	87.2	34.6	6.7	65.4
#16	1.3	1.0	67.9	27.2	7.5	72.8
#30	1.2	0.8	47.6	19.2	8.0	80.8
#50	1.1	0.7	19.7	8.3	10.9	91.7
#100	0.9	0.6	3.2	1.8	6.5	98.2
LBW	0.5	0.4	0.7	0.6	1.2	99.4

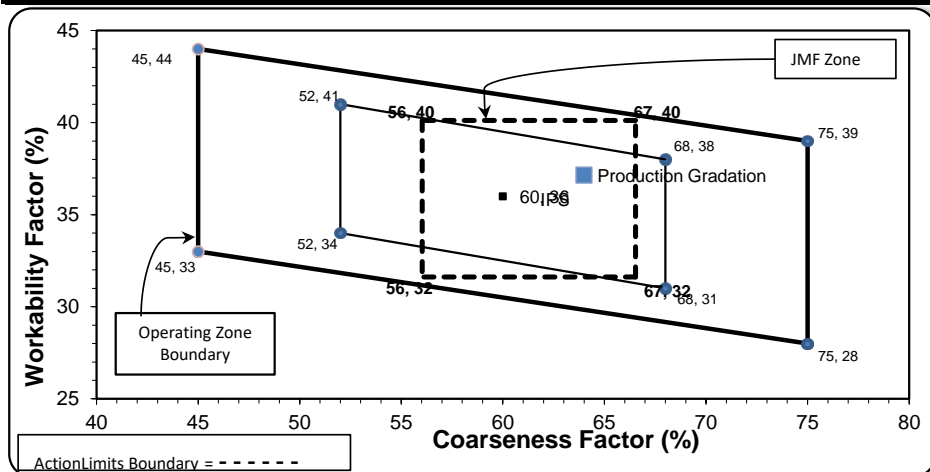
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when a 2"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

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Adjusted WF Initial Production Sample (IPS)

<b>Coarseness Factor:</b>	<b>64</b>	<b>Workability Factor:</b>	<b>35</b>	<b>37.1</b>	<b>Coarseness Factor:</b>	<b>61</b>
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<b>Workability Factor:</b>	<b>36</b>
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Sieve	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	0.0	0.0
1.5"	100.0	0.0	0.0
1"	99.3	0.7	0.7
3/4"	89.2	10.1	10.8
1/2"	70.7	18.5	29.3
3/8"	60.7	10.0	39.3
#4	44.4	16.3	55.6
#8	35.9	8.5	64.1
#16	27.3	8.6	72.7
#30	19.1	8.2	80.9
#50	7.4	11.7	92.6
#100	1.9	5.6	98.1
LBW	0.7	1.2	99.3

PREPARED BY:  
 SM, LLC Technical Service

Approved By:

# Aggregate Optimization Chart

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

Sample Date: 11/15/21

Concrete Grade: **DM**

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

Dates Test Represents: 11/16/2021 through 11/22/2021

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	71-47	Presque Isle	1455	8.90	2.62	50.1
26A	71-47	Presque Isle	300	1.83	2.62	10.3
2NS	95-013	Smelter Bay	1150	6.95	2.65	39.6
<b>Total Wt</b>			<b>2905</b>	<b>17.69</b>		<b>100.0</b>

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



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Sieve	6AA	26A	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"	97.8	100.0	100.0	98.9	1.1	1.1
3/4"	78.3	100.0	100.0	89.1	9.8	10.9
1/2"	41.5	95.3	100.0	70.2	18.9	29.8
3/8"	25.7	76.0	100.0	60.3	9.9	39.7
#4	5.0	11.4	95.7	41.6	18.7	58.4
#8	2.6	3.6	82.4	34.3	7.3	65.7
#16	2.2	2.0	66.9	27.8	6.5	72.2
#30	2.0	1.6	48.0	20.2	7.6	79.8
#50	1.9	1.4	24.9	11.0	9.2	89.0
#100	1.8	1.3	7.7	4.1	6.9	95.9
LBW	1.2	0.9	2.0	1.5	2.6	98.5

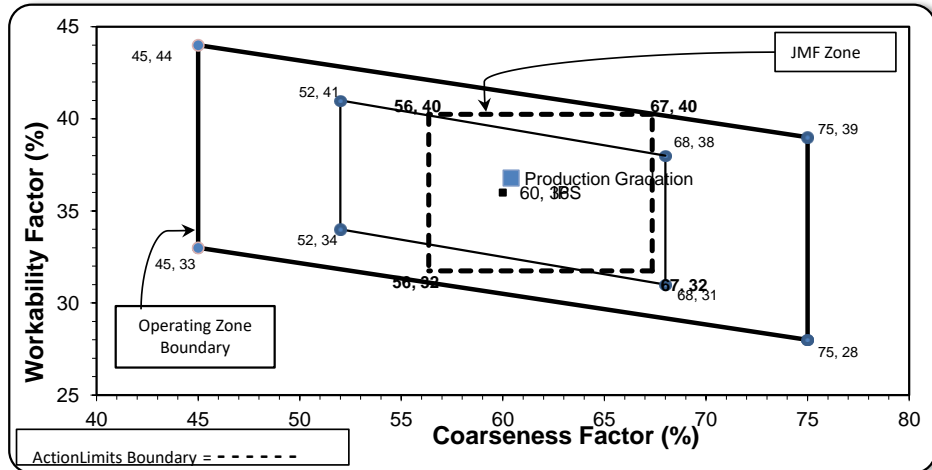
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when a 2"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

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Adjusted WF Initial Production Sample (IPS)

<b>Coarseness Factor:</b>	<b>60</b>	<b>Workability Factor:</b>	<b>34</b>	<b>36.8</b>
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<b>Coarseness Factor:</b>	<b>62</b>
<b>Workability Factor:</b>	<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"	100.0	0.0	0.0
3/4"	95.0	5.0	5.0
1/2"	72.3	22.8	27.7
3/8"	60.4	11.8	39.6
#4	42.6	17.8	57.4
#8	36.0	6.6	64.0
#16	29.5	6.5	70.5
#30	20.3	9.2	79.7
#50	9.5	10.8	90.5
#100	3.4	6.1	96.6
LBW	1.3	2.1	98.7

PREPARED BY:  
 SM, LLC Technical Service

Approved By:

# Aggregate Optimization Chart

**PLANT #:** **P-35**

Sample Date: 11/15/21

Concrete Grade: **DM**

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

Dates Test Represents: 11/16/2021 through 11/22/2021

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	58-003	Stoneco	1555	9.26	2.69	52.6
26A	58-003	Stoneco	300	1.79	2.69	10.2
2NS	81-093	Burmeister	1100	6.65	2.65	37.2
<b>Total Wt</b>			<b>2955</b>	<b>17.70</b>		<b>100.0</b>

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



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Sieve	6AA	26A	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"	99.7	100.0	100.0	99.8	0.2	0.2
3/4"	83.4	100.0	100.0	91.3	8.6	8.7
1/2"	43.9	99.6	100.0	70.4	20.8	29.6
3/8"	20.7	84.8	100.0	56.7	13.7	43.3
#4	2.8	11.5	98.9	39.5	17.3	60.5
#8	1.0	2.0	86.4	32.9	6.6	67.1
#16	1.3	1.0	71.8	27.5	5.4	72.5
#30	1.2	0.8	53.9	20.8	6.7	79.2
#50	1.1	0.7	21.2	8.5	12.2	91.5
#100	0.9	0.6	3.5	1.8	6.7	98.2
LBW	0.5	0.4	1.2	0.8	1.1	99.2

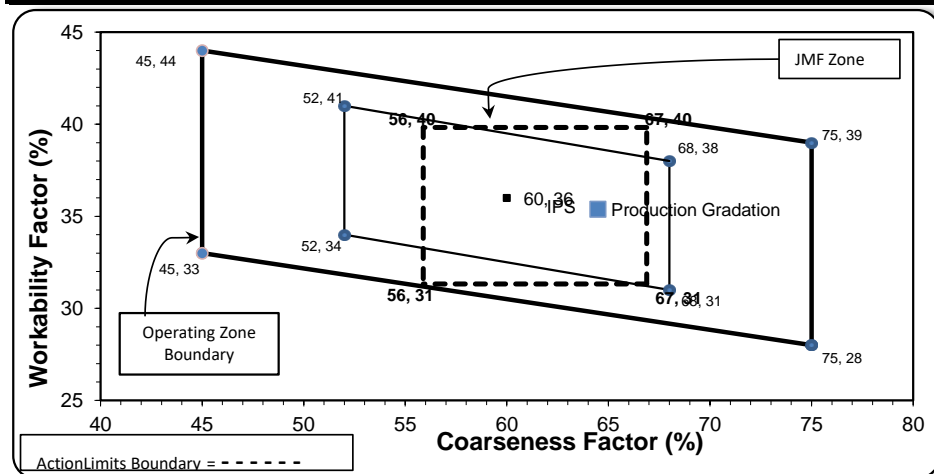
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when a 2"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

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Adjusted WF Initial Production Sample (IPS)

<b>Coarseness Factor:</b>	<b>64</b>	<b>Workability Factor:</b>	<b>33</b>	<b>Adjusted WF</b>	<b>35.4</b>
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<b>Coarseness Factor:</b>	<b>61</b>
<b>Workability Factor:</b>	<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"	99.3	0.7	0.7
3/4"	89.1	10.2	10.9
1/2"	70.5	18.6	29.5
3/8"	60.5	10.0	39.5
#4	44.1	16.4	55.9
#8	35.6	8.5	64.4
#16	27.7	7.9	72.3
#30	20.6	7.1	79.4
#50	8.7	11.8	91.3
#100	1.6	7.1	98.4
LBW	1.1	0.6	98.9

PREPARED BY:  
 SM, LLC Technical Service

Approved By:

# Aggregate Optimization Chart

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

Sample Date: 11/15/21

Concrete Grade: **DM**

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

Dates Test Represents: 11/16/2021 through 11/22/2021

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	71-47	Presque Isle	1705	10.43	2.62	58.7
26A	71-47	Presque Isle	100	0.61	2.62	3.4
2NS	44-051	Krake Willis Rd	1100	6.65	2.65	37.9
<b>Total Wt</b>			<b>2905</b>	<b>17.69</b>		<b>100.0</b>

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



**Superior Materials, LLC**  
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 Farmington Hills, MI 48336

Sieve	6AA	26A	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"	99.6	100.0	100.0	99.8	0.2	0.2
3/4"	89.9	100.0	100.0	94.1	5.7	5.9
1/2"	50.2	98.0	100.0	70.7	23.4	29.3
3/8"	30.2	84.0	100.0	58.5	12.2	41.5
#4	4.3	18.7	96.6	39.7	18.7	60.3
#8	2.0	4.1	79.0	31.2	8.5	68.8
#16	1.7	2.3	64.0	25.3	5.9	74.7
#30	1.6	2.1	49.1	19.6	5.7	80.4
#50	1.5	1.9	28.0	11.5	8.1	88.5
#100	1.5	1.8	9.8	4.7	6.9	95.3
LBW	1.4	1.5	1.0	1.3	3.4	98.7

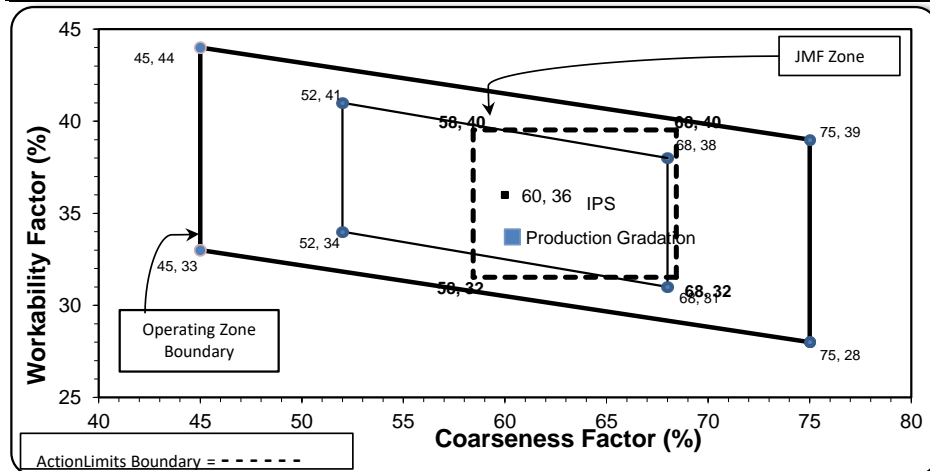
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when a 2"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

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Adjusted WF Initial Production Sample (IPS)

<b>Coarseness Factor:</b>	<b>60</b>	<b>Workability Factor:</b>	<b>31</b>	<b>Adjusted WF</b>	<b>33.7</b>
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<b>Coarseness Factor:</b>	<b>63</b>
<b>Workability Factor:</b>	<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"	100.0	0.0	0.0
3/4"	89.7	10.3	10.3
1/2"	70.3	19.4	29.7
3/8"	59.1	11.2	40.9
#4	42.8	16.3	57.2
#8	35.5	7.3	64.5
#16	29.0	6.5	71.0
#30	21.2	7.7	78.8
#50	9.8	11.5	90.2
#100	3.7	6.1	96.3
LBW	1.2	2.5	98.8

PREPARED BY:  
 SM, LLC Technical Service

Approved By:

# Aggregate Optimization Chart

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

Sample Date: 11/15/21

Concrete Grade: **DM**

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

Dates Test Represents: 11/16/2021 through 11/22/2021

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	71-47	Presque Isle	1505	9.21	2.62	51.8
26A	71-47	Presque Isle	300	1.83	2.62	10.3
2NS	63-115	Ray Rd	1100	6.65	2.65	37.9
<b>Total Wt</b>			<b>2905</b>	<b>17.69</b>		<b>100.0</b>

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



**Superior Materials, LLC**  
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Sieve	6AA	26A	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"	95.8	100.0	100.0	97.8	2.2	2.2
3/4"	67.0	100.0	100.0	82.9	14.9	17.1
1/2"	31.6	95.3	100.0	64.1	18.8	35.9
3/8"	20.1	76.0	100.0	56.1	8.0	43.9
#4	3.1	11.4	96.3	39.2	16.9	60.8
#8	2.3	3.6	78.6	31.3	7.9	68.7
#16	2.1	2.0	62.3	24.9	6.4	75.1
#30	2.0	1.6	47.2	19.1	5.8	80.9
#50	1.9	1.4	28.8	12.0	7.0	88.0
#100	1.8	1.3	6.3	3.5	8.6	96.5
LBW	1.3	0.9	0.8	1.1	2.4	98.9

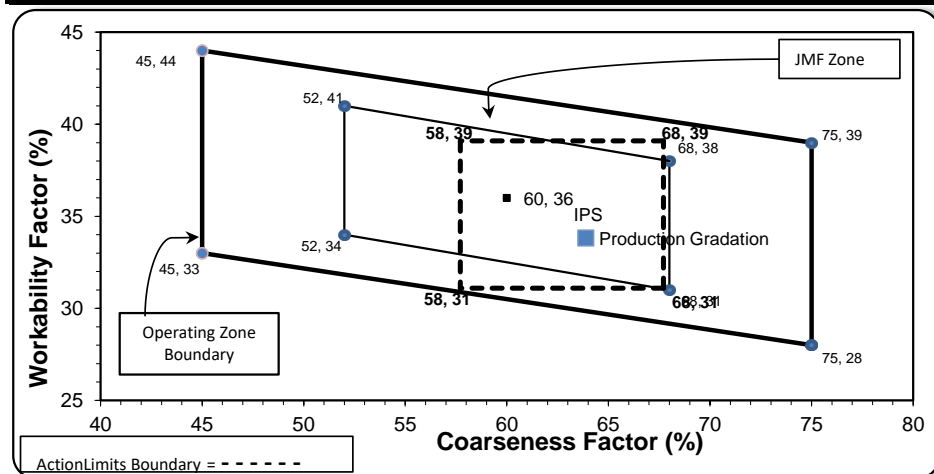
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when a 2"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

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Adjusted WF Initial Production Sample (IPS)

<b>Coarseness Factor:</b>	<b>64</b>	<b>Workability Factor:</b>	<b>31</b>	<b>33.8</b>
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<b>Coarseness Factor:</b>	<b>63</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"	100.0	0.0	0.0
3/4"	95.1	4.9	4.9
1/2"	74.6	20.5	25.4
3/8"	59.3	15.3	40.7
#4	42.1	17.2	57.9
#8	35.1	7.1	64.9
#16	29.2	5.9	70.8
#30	21.9	7.3	78.1
#50	9.6	12.4	90.4
#100	2.4	7.2	97.6
LBW	0.9	1.5	99.1

PREPARED BY:  
 SM, LLC Technical Service

Approved By: