

# Aggregate Optimization Chart

## Production Gradation Report

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

Sample Date: 12/20/21

Concrete Grade: **DM**

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

Dates Test Represents: 12/21/2021 through 12/27/2021

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"	98.7	100.0	100.0	99.3	0.7	0.7
3/4"	84.7	100.0	100.0	91.8	7.5	8.2
1/2"	44.8	97.6	100.0	70.2	21.6	29.8
3/8"	24.4	84.4	100.0	58.4	11.8	41.6
#4	3.1	14.0	98.5	41.6	16.8	58.4
#8	1.9	3.5	83.3	34.2	7.4	65.8
#16	1.7	1.6	68.3	28.0	6.2	72.0
#30	1.5	1.4	53.3	22.0	6.0	78.0
#50	1.5	1.2	29.2	12.4	9.5	87.6
#100	1.4	1.2	7.3	3.7	8.7	96.3
LBW	1.3	1.0	0.6	1.0	2.7	99.0

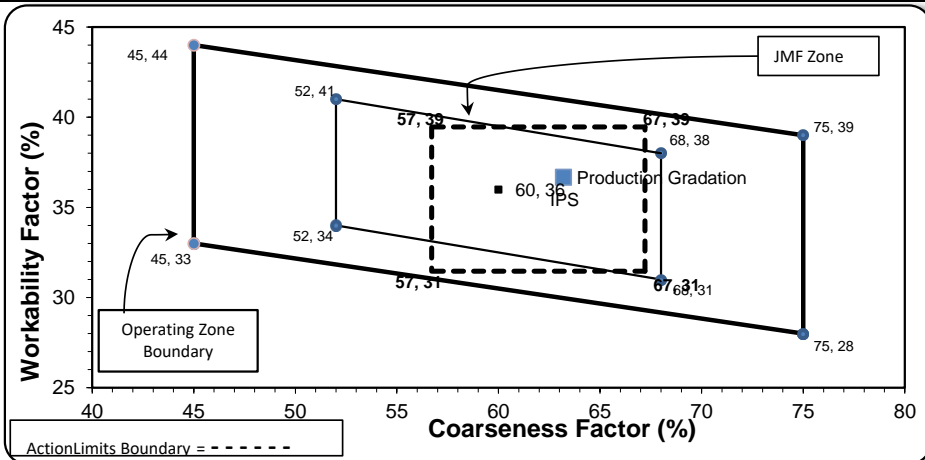
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when a 2"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

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Adjusted WF Initial Production Sample (IPS)

<b>Coarseness Factor:</b>	<b>63</b>	<b>Workability Factor:</b>	<b>34</b>	<b>Adjusted WF</b>	<b>36.7</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: 12/20/21

Concrete Grade: **DM**

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

Dates Test Represents: 12/21/2021 through 12/27/2021

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%



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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"	100.0	100.0	100.0	100.0	0.0	0.0
3/4"	84.0	100.0	100.0	91.9	8.1	8.1
1/2"	40.3	98.4	100.0	69.5	22.3	30.5
3/8"	20.6	81.9	100.0	57.8	11.7	42.2
#4	4.1	5.6	99.5	41.4	16.4	58.6
#8	1.9	3.7	87.3	35.3	6.1	64.7
#16	2.1	3.4	70.9	29.0	6.3	71.0
#30	1.9	3.3	50.3	20.9	8.1	79.1
#50	1.7	3.1	19.4	8.7	12.1	91.3
#100	1.7	3.0	2.5	2.1	6.6	97.9
LBW	1.2	2.6	0.5	1.1	1.1	98.9

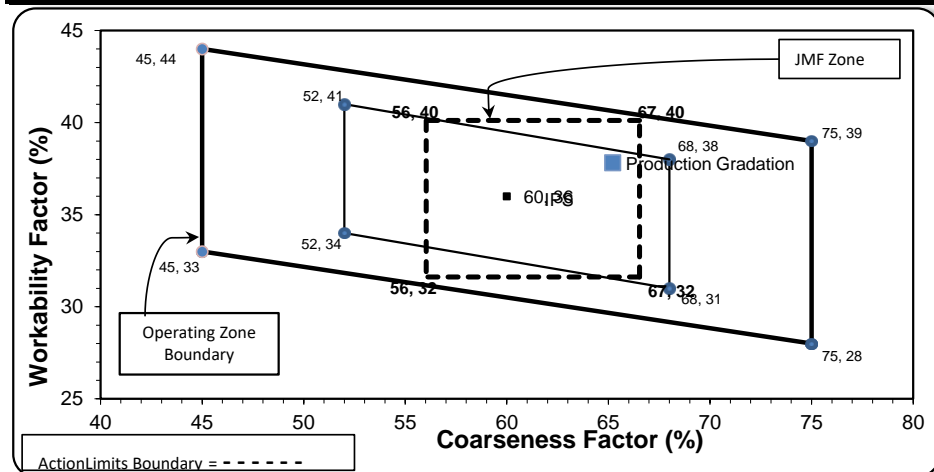
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when a 2"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

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Adjusted WF Initial Production Sample (IPS)

<b>Coarseness Factor:</b>	<b>65</b>	<b>Workability Factor:</b>	<b>35</b>	<b>37.8</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"	89.2	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: 12/20/21

Concrete Grade: **DM**

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

Dates Test Represents: 12/21/2021 through 12/27/2021

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	71-47	Presque Isle	1355	8.29	2.62	46.6
26A	71-47	Presque Isle	400	2.45	2.62	13.8
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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 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"	96.2	100.0	100.0	98.2	1.8	1.8
3/4"	73.0	100.0	100.0	87.4	10.8	12.6
1/2"	30.7	97.9	100.0	67.4	20.0	32.6
3/8"	14.5	88.4	100.0	58.5	8.9	41.5
#4	4.6	21.2	96.4	43.2	15.3	56.8
#8	3.1	4.8	84.4	35.5	7.7	64.5
#16	2.7	2.2	69.2	29.0	6.6	71.0
#30	2.6	1.7	49.0	20.8	8.1	79.2
#50	2.4	1.6	23.6	10.7	10.2	89.3
#100	2.2	1.5	6.2	3.7	7.0	96.3
LBW	1.7	1.4	1.0	1.4	2.3	98.6

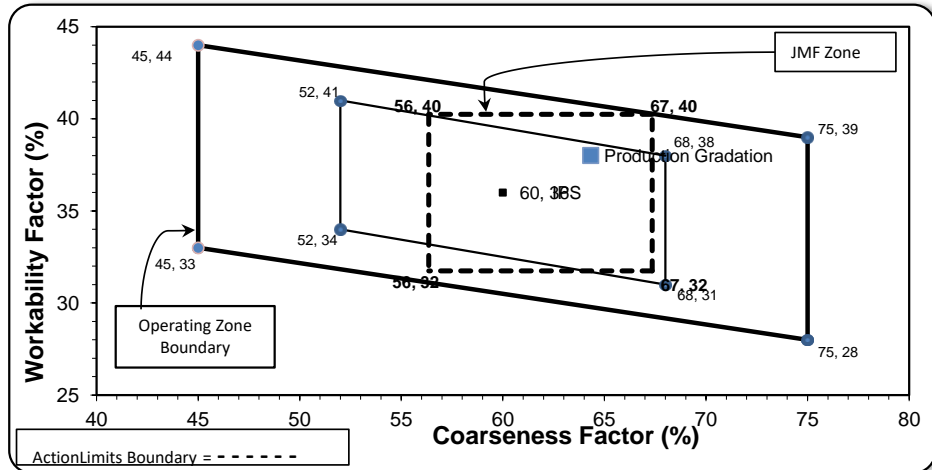
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when a 2" 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>36</b>	<b>38.0</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: 12/20/21

Concrete Grade: **DM**

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

Dates Test Represents: 12/21/2021 through 12/27/2021

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	58-003	Stoneco	1550	9.23	2.69	52.5
26A	58-003	Stoneco	300	1.79	2.69	10.2
2NS	81-093	Burmeister	1100	6.65	2.65	37.3
<b>Total Wt</b>			<b>2950</b>	<b>17.67</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	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"	100.0	100.0	100.0	100.0	0.0	0.0
3/4"	84.0	100.0	100.0	91.6	8.4	8.4
1/2"	40.3	98.4	100.0	68.5	23.1	31.5
3/8"	20.6	81.9	100.0	56.4	12.0	43.6
#4	4.1	5.6	97.9	39.2	17.2	60.8
#8	1.9	3.7	86.6	33.7	5.6	66.3
#16	2.1	3.4	71.7	28.2	5.5	71.8
#30	1.9	3.3	54.4	21.6	6.6	78.4
#50	1.7	3.1	21.4	9.2	12.4	90.8
#100	1.7	3.0	5.1	3.1	6.1	96.9
LBW	1.2	2.6	1.7	1.5	1.6	98.5

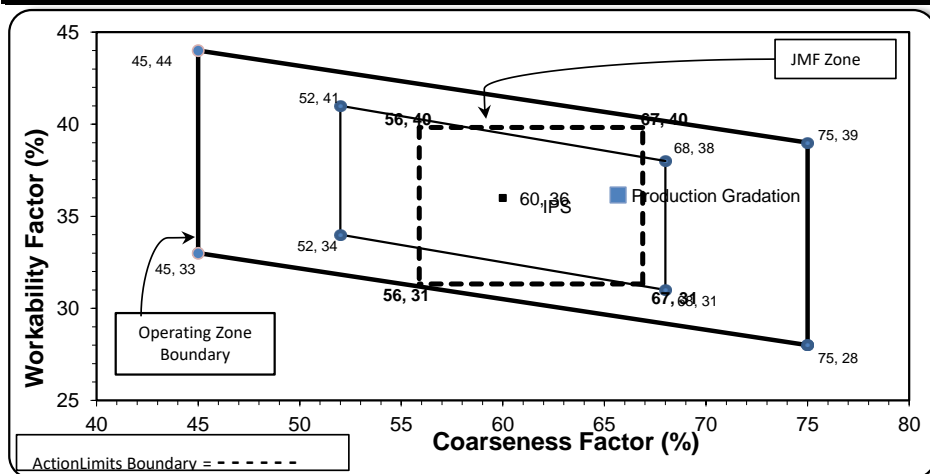
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when a 2" 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>66</b>	<b>Workability Factor:</b>	<b>34</b>	<b>36.2</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: 12/20/21

Concrete Grade: **DM**

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

Dates Test Represents: 12/21/2021 through 12/27/2021

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

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	71-47	Presque Isle	1605	9.82	2.62	55.2
26A	71-47	Presque Isle	200	1.22	2.62	6.9
2NS	63-92	Grange Hall	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**  
 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"	98.7	100.0	100.0	99.3	0.7	0.7
3/4"	84.7	100.0	100.0	91.5	7.7	8.5
1/2"	44.8	97.6	100.0	69.3	22.2	30.7
3/8"	24.4	84.4	100.0	57.2	12.2	42.8
#4	3.1	14.0	97.8	39.7	17.4	60.3
#8	1.9	3.5	84.2	33.2	6.5	66.8
#16	1.7	1.6	69.1	27.2	6.0	72.8
#30	1.5	1.4	50.2	19.9	7.3	80.1
#50	1.5	1.2	23.4	9.8	10.2	90.2
#100	1.4	1.2	3.1	2.0	7.7	98.0
LBW	1.3	1.0	0.4	0.9	1.1	99.1

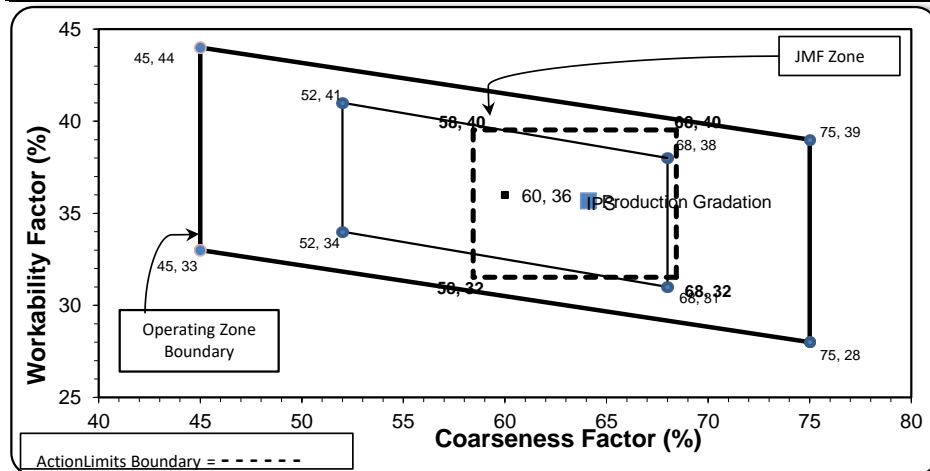
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when a 2"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

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

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>35.7</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: 12/20/21

Concrete Grade: **DM**

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

Dates Test Represents: 12/21/2021 through 12/27/2021

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**  
 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"	95.6	100.0	100.0	97.7	2.3	2.3
3/4"	78.3	100.0	100.0	88.8	9.0	11.2
1/2"	36.4	97.9	100.0	66.8	21.9	33.2
3/8"	17.4	88.4	100.0	56.0	10.8	44.0
#4	3.1	21.2	97.0	40.5	15.5	59.5
#8	2.2	4.8	79.9	31.9	8.6	68.1
#16	2.0	2.2	63.1	25.2	6.7	74.8
#30	1.9	1.7	46.0	18.6	6.6	81.4
#50	1.8	1.6	22.9	9.8	8.8	90.2
#100	1.7	1.5	5.0	2.9	6.8	97.1
LBW	1.4	1.4	1.2	1.3	1.6	98.7

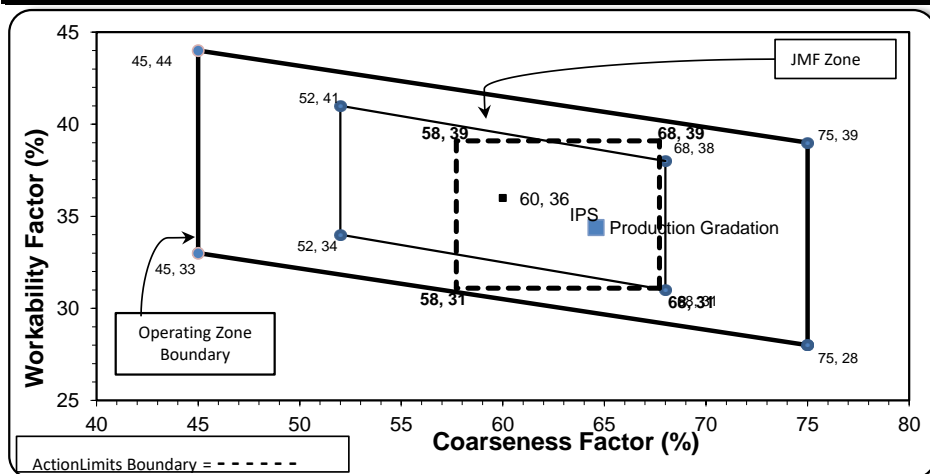
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when a 2" 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>65</b>	<b>Workability Factor:</b>	<b>32</b>	<b>34.4</b>	<b>Coarseness Factor:</b>	<b>63</b>
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<b>Workability Factor:</b>	<b>35</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"	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: