

Aggregate Optimization Chart

PLANT #: **P-101**

Sample Date: 3/14/22

Concrete Grade: **P1M, 3500HP**

Dates Test Represents: 3/15/2022 through 3/21/2022

Contractor: _____

MDOT No.: _____

Agg. Class	Pit #	Source	Weight (SSD)	ft ³	Specific Gravity	% Contribution
CA	71-47	Presque Isle	1070	6.54	2.62	34.9
IA	71-47	Presque Isle	800	4.89	2.62	26.1
2NS	75-051	Mid-Michigan	1200	7.23	2.66	39.1
Total Wt			3070	18.67		100.0

<---- 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"	97.5	100.0	100.0	99.1	0.9	0.9
1"	49.9	100.0	100.0	82.5	16.6	17.5
3/4"	12.7	99.2	100.0	69.4	13.2	30.6
1/2"	3.0	80.1	100.0	61.0	8.4	39.0
3/8"	2.2	55.7	100.0	54.4	6.6	45.6
#4	1.6	9.9	98.5	41.6	12.7	58.4
#8	1.4	3.1	83.3	33.9	7.8	66.1
#16	1.3	2.0	68.3	27.7	6.2	72.3
#30	1.3	1.9	53.3	21.8	5.9	78.2
#50	1.2	1.8	29.2	12.3	9.5	87.7
#100	1.1	1.6	7.3	3.7	8.6	96.3
LBW	0.9	1.5	0.6	0.9	2.7	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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 30701 W. 10 Mile Rd.
 Suite 500
 Farmington Hills, MI 48336

Production Gradation Batch Plant Gradations Aggregate Supplier Gradations

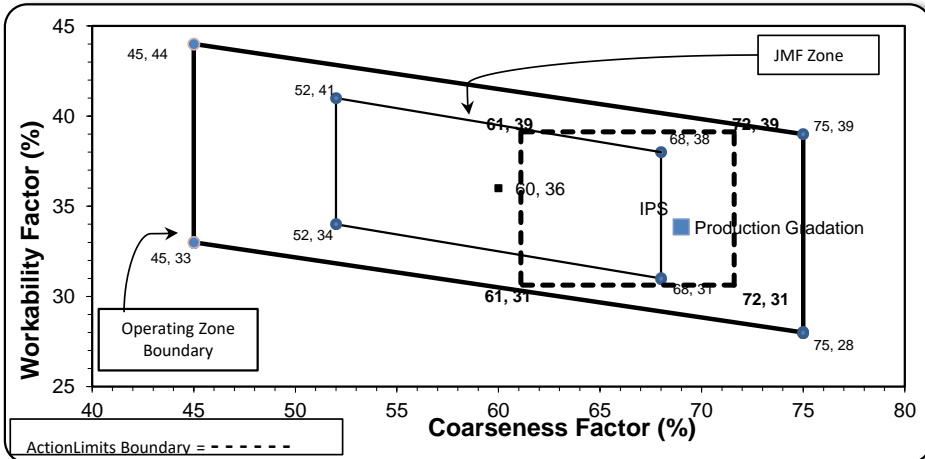
Coarseness Factor: **69** **Workability Factor:** **34**

Initial Production Sample (IPS)

Coarseness Factor: **66**

Workability Factor: **35**

Sieve	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	0.0	0.0
1.5"	99.6	0.4	0.4
1"	84.3	15.3	15.7
3/4"	74.8	9.6	25.2
1/2"	64.3	10.4	35.7
3/8"	56.8	7.5	43.2
#4	43.0	13.8	57.0
#8	34.9	8.1	65.1
#16	26.4	8.5	73.6
#30	19.9	6.5	80.1
#50	10.4	9.5	89.6
#100	3.4	7.0	96.6
LBW	1.2	2.2	98.8



PREPARED BY:
 SM, LLC Technical Service

Approved By:

Aggregate Optimization Chart

PLANT #: **P-102**

Sample Date: 3/14/22

Concrete Grade: **P1M, 3500HP**

Dates Test Represents: 3/15/2022 through 3/21/2022

Contractor: _____

MDOT No.: _____

Agg. Class	Pit #	Source	Weight (SSD)	ft ³	Specific Gravity	% Contribution
CA	58-003	Stoneco	1350	8.04	2.69	43.3
IA	58-003	Stoneco	620	3.69	2.69	19.9
2NS	63-114	Highland	1150	6.95	2.65	36.9
Total Wt			3120	18.69		100.0

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



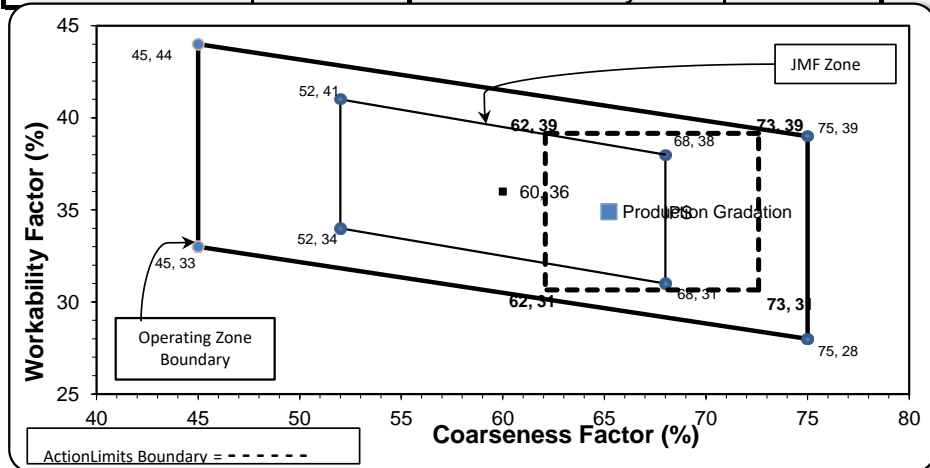
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Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	100.0	100.0	100.0	100.0	0.0	0.0
1"	65.1	100.0	100.0	84.9	15.1	15.1
3/4"	44.3	100.0	100.0	75.9	9.0	24.1
1/2"	19.2	94.1	100.0	63.9	12.0	36.1
3/8"	14.0	73.6	100.0	57.5	6.3	42.5
#4	4.7	21.1	99.7	43.0	14.6	57.0
#8	2.9	6.5	87.8	34.9	8.1	65.1
#16	2.5	3.4	67.8	26.7	8.2	73.3
#30	2.0	2.5	47.0	18.7	8.1	81.3
#50	1.8	2.3	19.5	8.4	10.3	91.6
#100	1.7	2.2	3.3	2.4	6.0	97.6
LBW	1.4	1.8	1.0	1.3	1.1	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

Coarseness Factor:	65	Workability Factor:	35
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Initial Production Sample (IPS)

Coarseness Factor:	67		
Workability Factor:	35		
Sieve	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	0.0	0.0
1.5"	100.0	0.0	0.0
1"	85.5	14.5	14.5
3/4"	73.4	12.1	26.6
1/2"	61.0	12.4	39.0
3/8"	56.2	4.8	43.8
#4	43.1	13.1	56.9
#8	34.9	8.2	65.1
#16	29.4	5.5	70.6
#30	21.6	7.8	78.4
#50	8.1	13.4	91.9
#100	2.2	5.9	97.8
LBW	1.4	0.8	98.6

PREPARED BY:
 SM, LLC Technical Service

Approved By:

Aggregate Optimization Chart

PLANT #: **P-12**

Sample Date: 3/14/22

Concrete Grade: **P1M, 3500HP**

Dates Test Represents: 3/15/2022 through 3/21/2022

Contractor: _____

MDOT No.: _____

Agg. Class	Pit #	Source	Weight (SSD)	ft ³	Specific Gravity	% Contribution
CA	71-47	Presque Isle	1020	6.24	2.62	33.2
IA	71-47	Presque Isle	800	4.89	2.62	26.1
2NS	63-115	Ray Rd	1250	7.56	2.65	40.7
Total Wt			3070	18.69		100.0

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



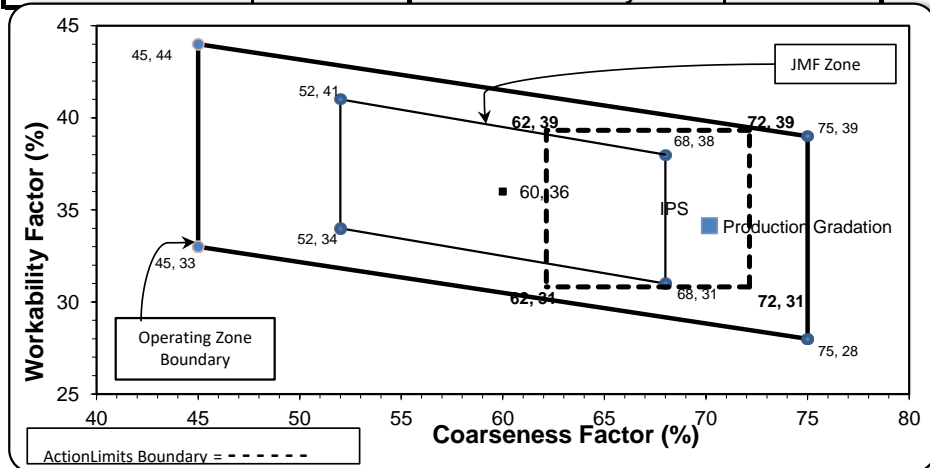
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Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	98.3	100.0	100.0	99.4	0.6	0.6
1"	35.3	100.0	100.0	78.5	20.9	21.5
3/4"	9.0	98.8	100.0	69.5	9.1	30.5
1/2"	1.8	73.2	100.0	60.4	9.1	39.6
3/8"	1.6	48.1	100.0	53.8	6.6	46.2
#4	1.5	9.9	96.9	42.5	11.2	57.5
#8	1.4	3.9	80.2	34.1	8.4	65.9
#16	1.3	2.5	64.4	27.3	6.8	72.7
#30	1.3	2.1	48.0	20.5	6.8	79.5
#50	1.2	1.9	25.8	11.4	9.1	88.6
#100	1.1	1.7	4.5	2.6	8.8	97.4
LBW	0.9	1.3	1.0	1.0	1.6	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

Coarseness Factor: **70** **Workability Factor:** **34**



Initial Production Sample (IPS)

Coarseness Factor: **67**
Workability Factor: **35**

Sieve	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	0.0	0.0
1.5"	99.6	0.4	0.4
1"	83.9	15.7	16.1
3/4"	74.0	9.8	26.0
1/2"	63.7	10.3	36.3
3/8"	56.4	7.3	43.6
#4	43.0	13.4	57.0
#8	35.1	7.9	64.9
#16	29.0	6.1	71.0
#30	20.9	8.0	79.1
#50	8.1	12.8	91.9
#100	1.6	6.5	98.4
LBW	0.9	0.8	99.1

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Aggregate Optimization Chart

PLANT #: **P-32**

Sample Date: 3/14/22

Concrete Grade: **P1M, 3500HP**

Dates Test Represents: 3/15/2022 through 3/21/2022

Contractor: _____

MDOT No.: _____

Agg. Class	Pit #	Source	Weight (SSD)	ft ³	Specific Gravity	% Contribution
CA	71-47	Presque Isle	920	5.63	2.62	30.0
IA	71-47	Presque Isle	900	5.50	2.62	29.3
2NS	95-013	Smelter Bay	1250	7.56	2.65	40.7
Total Wt			3070	18.69		100.0

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



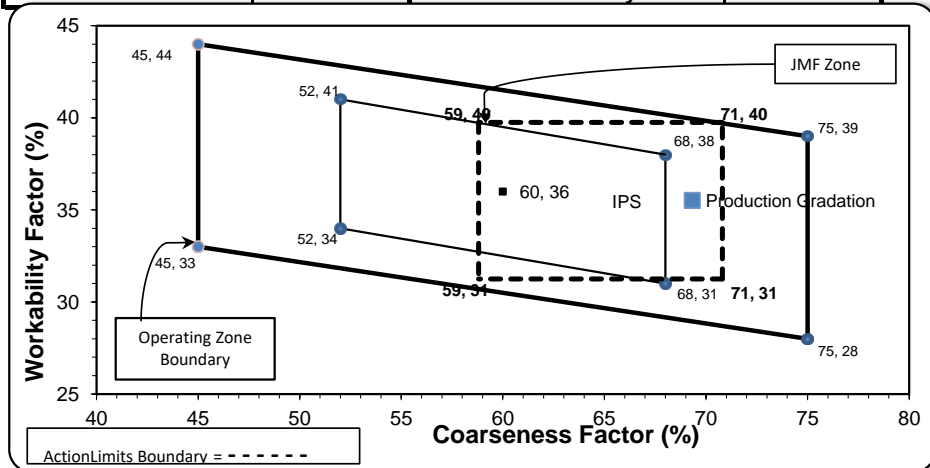
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Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	98.3	100.0	100.0	99.5	0.5	0.5
1"	35.3	100.0	100.0	80.6	18.9	19.4
3/4"	9.0	98.8	100.0	72.4	8.2	27.6
1/2"	1.8	73.2	100.0	62.7	9.7	37.3
3/8"	1.6	48.1	100.0	55.3	7.4	44.7
#4	1.5	9.9	96.0	42.4	12.9	57.6
#8	1.4	3.9	83.4	35.5	6.9	64.5
#16	1.3	2.5	68.0	28.8	6.7	71.2
#30	1.3	2.1	48.3	20.7	8.1	79.3
#50	1.2	1.9	24.0	10.7	10.0	89.3
#100	1.1	1.7	7.4	3.8	6.8	96.2
LBW	0.9	1.3	1.6	1.3	2.5	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

Coarseness Factor: **69** **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"	99.0	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

PLANT #: **P-35**

Sample Date: 3/14/22

Concrete Grade: **P1M, 3500HP**

Dates Test Represents: 3/15/2022 through 3/21/2022

Contractor: _____

MDOT No.: _____



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Agg. Class	Pit #	Source	Weight (SSD)	ft ³	Specific Gravity	% Contribution
CA	58-003	Stoneco	1380	8.22	2.69	44.2
IA	58-003	Stoneco	620	3.69	2.69	19.9
2NS	81-019	Pleasant Lake	1120	6.77	2.65	35.9
Total Wt			3120	18.69		100.0

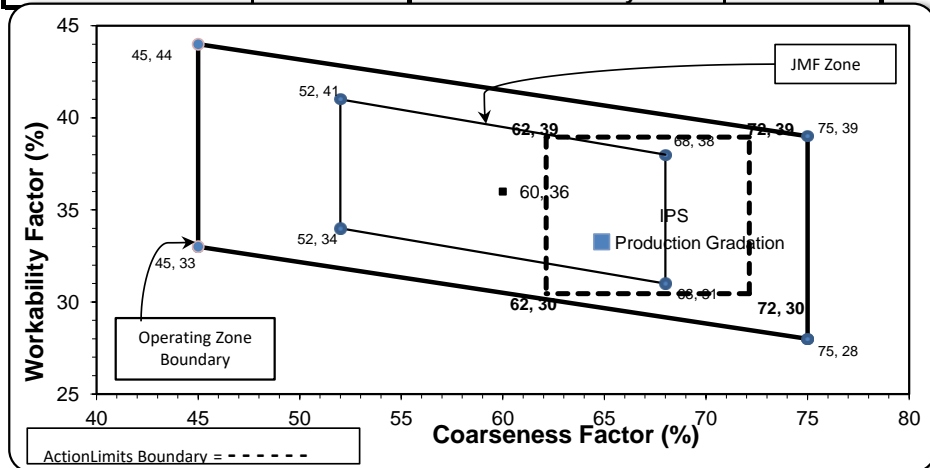
<----- Verify this number is 100%

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"	65.1	100.0	100.0	84.6	15.4	15.4
3/4"	44.3	100.0	100.0	75.4	9.2	24.6
1/2"	19.2	94.1	100.0	63.1	12.3	36.9
3/8"	14.0	73.6	100.0	56.7	6.4	43.3
#4	4.7	21.1	99.4	42.0	14.8	58.0
#8	2.9	6.5	85.5	33.3	8.7	66.7
#16	2.5	3.4	67.7	26.1	7.2	73.9
#30	2.0	2.5	48.8	18.9	7.2	81.1
#50	1.8	2.3	23.8	9.8	9.1	90.2
#100	1.7	2.2	6.5	3.5	6.3	96.5
LBW	1.4	1.8	2.0	1.7	1.8	98.3

*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:	65	Workability Factor:	33
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Initial Production Sample (IPS)

Coarseness Factor:	67
Workability Factor:	35

Sieve	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	0.0	0.0
1.5"	100.0	0.0	0.0
1"	86.9	13.1	13.1
3/4"	76.1	10.8	23.9
1/2"	63.7	12.4	36.3
3/8"	56.2	7.5	43.8
#4	43.2	13.0	56.8
#8	34.7	8.5	65.3
#16	27.5	7.2	72.5
#30	20.6	7.0	79.4
#50	9.0	11.6	91.0
#100	2.1	6.9	97.9
LBW	1.0	1.1	99.0

PREPARED BY:
 SM, LLC Technical Service

Approved By:

Aggregate Optimization Chart

PLANT #: **P-39**

Sample Date: 3/14/22

Concrete Grade: **P1M, 3500HP**

Dates Test Represents: 3/15/2022 through 3/21/2022

Contractor: _____

MDOT No.: _____

Agg. Class	Pit #	Source	Weight (SSD)	ft ³	Specific Gravity	% Contribution
CA	71-47	Presque Isle	1020	6.24	2.62	33.2
IA	71-47	Presque Isle	800	4.89	2.62	26.1
2NS	63-92	Grange Hall	1250	7.56	2.65	40.7
Total Wt			3070	18.69		100.0

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



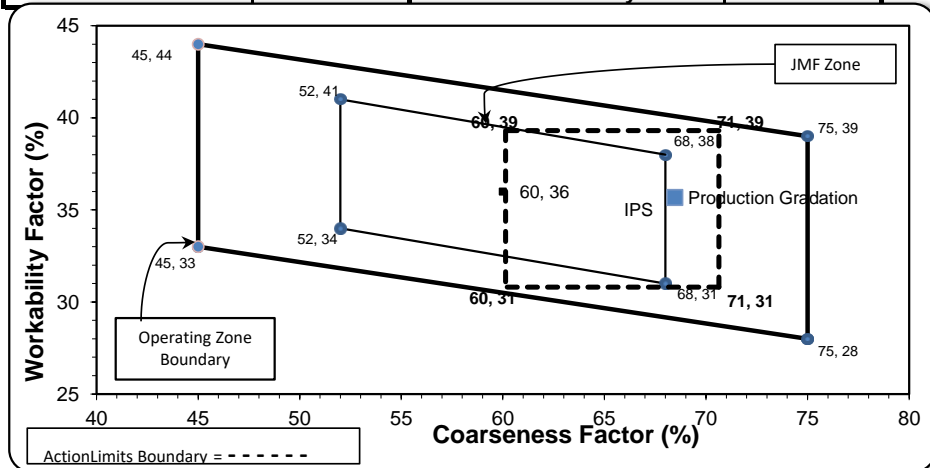
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 Suite 500
 Farmington Hills, MI 48336

Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	97.5	100.0	100.0	99.2	0.8	0.8
1"	49.9	100.0	100.0	83.4	15.8	16.6
3/4"	12.7	99.2	100.0	70.8	12.6	29.2
1/2"	3.0	80.1	100.0	62.6	8.2	37.4
3/8"	2.2	55.7	100.0	56.0	6.6	44.0
#4	1.6	9.9	97.8	42.9	13.0	57.1
#8	1.4	3.1	84.5	35.7	7.3	64.3
#16	1.3	2.0	68.0	28.6	7.0	71.4
#30	1.3	1.9	48.7	20.8	7.9	79.2
#50	1.2	1.8	20.9	9.4	11.4	90.6
#100	1.1	1.6	3.8	2.3	7.0	97.7
LBW	0.9	1.5	0.6	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.

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"	99.6	0.4	0.4
1"	83.9	15.7	16.1
3/4"	74.1	9.8	25.9
1/2"	64.3	9.7	35.7
3/8"	57.5	6.8	42.5
#4	44.5	13.1	55.5
#8	35.1	9.4	64.9
#16	27.9	7.2	72.1
#30	21.7	6.2	78.3
#50	12.6	9.1	87.4
#100	3.5	9.1	96.5
LBW	1.2	2.4	98.8

PREPARED BY:
 SM, LLC Technical Service

Approved By:

Aggregate Optimization Chart

PLANT #: **P-02**

Sample Date: 3/14/22

Concrete Grade: **P1M, 3500HP**

Dates Test Represents: 3/15/2022 through 3/21/2022

Contractor: _____

MDOT No.: _____

Agg. Class	Pit #	Source	Weight (SSD)	ft ³	Specific Gravity	% Contribution
CA	71-47	Presque Isle	970	5.93	2.62	31.6
IA	71-47	Presque Isle	850	5.20	2.62	27.7
2NS	63-115	Ray Rd	1250	7.56	2.65	40.7
Total Wt			3070	18.69		100.0

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



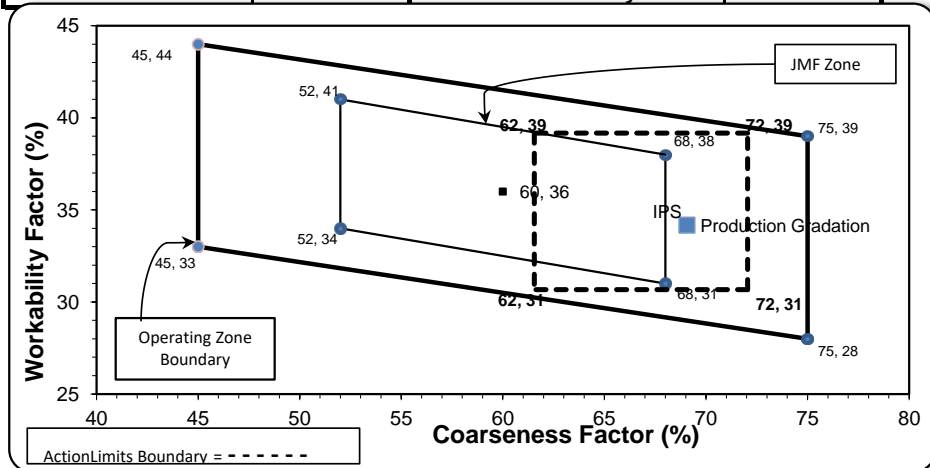
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 Suite 500
 Farmington Hills, MI 48336

Sieve	CA	IA	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.0	100.0	100.0	0.0	0.0
1.5"	98.3	100.0	100.0	99.5	0.5	0.5
1"	35.3	100.0	100.0	79.6	19.9	20.4
3/4"	9.0	98.8	100.0	70.9	8.6	29.1
1/2"	1.8	73.2	100.0	61.6	9.4	38.4
3/8"	1.6	48.1	100.0	54.5	7.0	45.5
#4	1.5	9.9	96.9	42.7	11.9	57.3
#8	1.4	3.9	80.2	34.2	8.5	65.8
#16	1.3	2.5	64.4	27.3	6.9	72.7
#30	1.3	2.1	48.0	20.5	6.8	79.5
#50	1.2	1.9	25.8	11.4	9.1	88.6
#100	1.1	1.7	4.5	2.7	8.8	97.3
LBW	0.9	1.3	1.0	1.1	1.6	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

Coarseness Factor: **69** **Workability Factor:** **34**



Initial Production Sample (IPS)

Coarseness Factor: **67**
Workability Factor: **35**

Sieve	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	0.0	0.0
1.5"	100.0	0.0	0.0
1"	85.0	15.0	15.0
3/4"	72.3	12.7	27.7
1/2"	64.5	7.8	35.5
3/8"	56.5	8.0	43.5
#4	42.7	13.8	57.3
#8	34.9	7.8	65.1
#16	29.0	5.9	71.0
#30	21.0	8.0	79.0
#50	8.2	12.8	91.8
#100	1.6	6.5	98.4
LBW	0.7	0.9	99.3

PREPARED BY:
 SM, LLC Technical Service

Approved By: