# Aggregate Optimization Chart

# **Production Gradation Report**

PLANT #: P-101 Contractor:

Concrete Grade: DM, 4500HP Sample Date: 7/17/23 Dates Test Represents: 7/18/2023 7/24/2023 through MDOT No.:

Agg. Class	Pit#	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	71-47	Presque Isle	1500	9.17	2.62	51.7
26A	71-47	Presque Isle	250	1.53	2.62	8.6
2NS	75-051	Mid Michigan	1150	6.93	2.66	39.7
		Total Wt	2900	17.63		100.0

-- Verify this number is 100%

SUPER	RIOR

# **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"	100.0	100.0	100.0	100.0	0.0	0.0
3/4"	82.4	100.0	100.0	90.9	9.1	9.1
1/2"	40.7	95.8	100.0	69.0	21.9	31.0
3/8"	25.6	86.4	100.0	60.3	8.6	39.7
#4	4.5	21.7	96.7	42.5	17.8	57.5
#8	1.9	6.0	82.2	34.1	8.4	65.9
#16	1.6	3.2	67.7	28.0	6.1	72.1
#30	1.6	2.6	52.1	21.7	6.2	78.3
#50	1.5	2.3	26.7	11.6	10.2	88.4
#100	1.5	2.2	7.3	3.9	7.7	96.1
LBW	1.2	2.0	1.3	1.3	2.6	98.7
Production Gradation	Batch Plant Gradations	Aggregate Supplier Grad	dations	Adjusted WF	Initial Producti	on Sample (IPS

\*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 Gra	dations    Aggregate Supplier Gradat	ions	Adjusted WF	Initial Produc	tion Sample (IPS	3)
Coarseness Factor: 60		Workability Factor:	Workability Factor: 34		Coarseness Factor:		
45					Worl	kability Factor:	
45, 44			JMF Zone	$\neg \mid \blacksquare$	Sieve	Cumulative	Γ
1   <b> </b>	50.44			<b>-</b>	Sieve	% Passing	F
10	52, 41			- 11	2"	100.0	
<b>○</b> 40 1		57, 39 68, 38	75, 39	- 11	1.5"	100.0	
				- 11	1"	100.0	
Lactor 1 35 d		Production Gradation		- 11	3/4"	95.0	
<b>교</b> 35 -		i i i i i i i i i i i i i i i i i i i		- 11	1/2"	70.5	
	52, 34	<del>-!</del>		- 11	3/8"	60.0	
At, 33 Operating Zon Boundary				- 11	#4	44.4	
<b>5</b> 30		<b>67</b> <sub>6</sub> <b>3</b> ,1 <sub>31</sub>		- 11	#8	35.5	Г
Operating Zon	e			- 11	#16	28.5	
Boundary	·		75, 28	- 11	#30	21.5	
<b>≥</b> 25					#50	10.2	
40 45	50	55 60 6570	75	80	#100	3.1	
		Coarseness Factor (%)	7.0		LBW	1.3	
ActionLimits Boundary = -							

Work	ability Factor:	35	
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

Sample Date:

**Production Gradation** 

7/17/23 Concrete Grade: DM, 4500HP

7/18/2023	through	7/24/2023		
Source	Weight (SSD)	ft <sup>3</sup>	Specific	%
Source	weight (SSD)	It	Gravity	Contribution
Stoneco	1575	9.38	2.69	53.4
•				

Adjusted WF Intial Production Sample (IPS)

36.6

**Coarseness Factor:** 

Contractor:

MDOT No.:



-- Verify this number is 100%

**Superior Materials, LLC** 30701 W. 10 Mile Rd. Suite 500 Farmington Hills, MI 48336

	i otai wt	2930	17.00		100.0	< verify this n	umber is 100%
Sieve	6AA	26/	A.	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"	87.0	100	.0	100.0	93.1	6.9	6.9
1/2"	48.9	100	.0	100.0	72.7	20.3	27.3
3/8"	28.9	90.	2	100.0	61.3	11.4	38.7
#4	5.0	9.9	)	98.3	41.7	19.5	58.3
#8	2.6	3.2	<u> </u>	83.4	34.1	7.6	65.9
#16	2.1	2.4		65.9	27.0	7.2	73.0
#30	1.8	2.0	)	46.7	19.3	7.7	80.7
#50	1.6	1.9	)	23.0	10.0	9.4	90.0
#100	1.6	1.8	3	6.6	3.6	6.4	96.4
LBW	1.3	1.6	3	1.3	1.3	2.2	98.7

Aggregate Supplier Gradations

\*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.

Coarseness Factor:	59	Workability Factor:	34	
45 45, 44 45, 44 45, 33 Operating Zone Boundary	52, 34	Production Gradation 68, 38	JMF Zone 75, 39	
Boundary  25  40  45  ActionLimits Boundary =	50 55	Coarseness Factor (%)	75, 28	80

Batch Plant Gradations

Work	ability Factor:	36	
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

61

Sample Date:

Dates Test Represents:

**Production Gradation** 

7/17/23 Concrete Grade: DM, 4500HP

7/18/2023 7/24/2023 through

Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	58-003	Stoneco	1575	9.38	2.69	53.4
26A	58-003	Stoneco	225	1.34	2.69	7.6
2NS	81-019	Pleasant Lake	1150	6.95	2.65	39.0
	•	Total Wt	2950	17.68	·	100.0

Contractor:

MDOT No.:

Adjusted WF Intial Production Sample (IPS)

**Coarseness Factor:** 

36.6

---- Verify this number is 100%

Superior Materials, LLC
30701 W. 10 Mile Rd.
Suite 500
Farmington Hills, MI 48336

	10000 110					· · · · · · · · · · · · · · · · · · ·	abo. 10 10070
Sieve	6AA	26	6A	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	10	0.0	100.0	100.0	0.0	0.0
1.5"	100.0	10	0.0	100.0	100.0	0.0	0.0
1"	100.0	10	0.0	100.0	100.0	0.0	0.0
3/4"	87.0	10	0.0	100.0	93.1	6.9	6.9
1/2"	48.9	10	0.0	100.0	72.7	20.3	27.3
3/8"	28.9	90	).2	100.0	61.3	11.4	38.7
#4	5.0	9	.9	98.3	41.7	19.5	58.3
#8	2.6	3	.2	83.4	34.1	7.6	65.9
#16	2.1	2	.4	65.9	27.0	7.2	73.0
#30	1.8	2	.0	46.7	19.3	7.7	80.7
#50	1.6	1	.9	23.0	10.0	9.4	90.0
#100	1.6	1	.8	6.6	3.6	6.4	96.4
LBW	1.3	1	.6	1.3	1.3	2.2	98.7

Aggregate Supplier Gradations

\*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.

Coarseness Factor:	59	Workability Factor:	34	
45 45, 44 45, 44 45, 33 Operating Zone Boundary	52, 34	Production Gradation 68, 38	75, 39 75, 28	
25 40 45  ActionLimits Boundary =	50 55	Coarseness Factor (%)	75	80

O Batch Plant Gradations

Work	ability Factor:	36	
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:

6AA

1.6

Batch Plant Gradations

Sieve

#100

LBW

**Production Gradation** 

PLANT #: 14 Contractor:

2NS

2.7

Sample Date: 7/17/23 Concrete Grade: DM, 4500HP

Dates Test Represents: 7/18/2023 through 7/24/2023 MDOT No.:

Agg. Class	Pit#	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	58-003	Stoneco	1600	9.53	2.69	54.1
26A	58-003	Stoneco	260	1.55	2.69	8.8
2NS	19-04	Schlegel	1100	6.60	2.67	37.2
		Total Wt	2060	17 69		100.0

26A

1.8

1.6

MDOT No.:

Cumulative

98.0

99.1

Coarseness Factor:

----- Verify this number is 100%

% Retained

4.3

Adjusted WF Intial Production Sample (IPS)

Cumulative

2.0

0.9

Builders'
Finish First With Builders'

#### **Builders Redi-Mix**

30701 W. 10 Mile Rd. Suite 500

Farmington Hills, MI 48336

				% Passing		% 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"	87.0	100.0	100.0	93.0	7.0	7.0
1/2"	48.9	100.0	100.0	72.4	20.6	27.6
3/8"	28.9	90.2	100.0	60.7	11.7	39.3
#4	5.0	9.9	99.9	40.7	20.0	59.3
#8	2.6	3.2	90.1	35.2	5.5	64.8
#16	2.1	2.4	69.4	27.1	8.0	72.9
#30	1.8	2.0	44.5	17.7	9.5	82.3
#50	1.6	1.9	14.3	6.3	11.3	93.7

Aggregate Supplier Gradations

\*Maximum % Retained must be above the 3/8" sieve.

\*Any two adjacent sieves must equal 10% except max.,

nom. max., #100 and #200 sieves.

 $\ensuremath{^{*}\%}$  Retained must be at least 4% for each sieve except max.,

nom. max., #100 and #200 sieves.

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\*% Retained must be at least 8% for the 1" sieve when

a 2" max. size (nom. Max. 1.5") aggregate is used.

Coarseness Factor:	61	Workability Factor:	35	37.
45 45, 44 45, 44 45, 33 Operating Zone Boundary	52, 41	57, 40 68, 40 68, 38 Production Gradition 60, 36PS  57, 32 68, 32	75, 39 75, 28	
25	50 55	Coarseness Factor (%)	75	80

Workability Factor:		36	
Sieve	Cumulative	%	Cumulative
Sieve	% Passing	Retained	% 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"	89.0	10.3	11.0
1/2"	70.3	18.7	29.7
3/8"	59.9	10.4	40.1
#4	41.9	18.0	58.1
#8	35.9	6.0	64.1
#16	27.8	8.2	72.2
#30	18.9	8.8	81.1
#50	6.3	12.6	93.7
#100	1.7	4.6	98.3
LBW	1.0	0.7	99.0

PREPARED BY: SM, LLC Technical Service Approved By

**PLANT #:** 12 Contractor:

Sample Date: 7/17/23 Concrete Grade: DM, 4500HP Dates Test Represents: 7/18/2023 7/24/2023 through

Agg. Class	Pit#	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	71-47	Presque Isle	1550	9.48	2.62	53.4
26A	71-47	Presque Isle	205	1.25	2.62	7.1
2NS	63-115	Ray Rd	1150	6.95	2.65	39.6
		Total Wt	2905	17.69		100.0

MDOT No.:

--- Verify this number is 100%

**Coarseness Factor:** 

SUPERIOR MATERIALS	

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.

	i otai vvt	2905 17.69		100.0	< verify this n	umber is 100%
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	98.8	1.2	1.2
3/4"	79.0	100.0	100.0	88.8	10.0	11.2
1/2"	43.6	95.5	100.0	69.6	19.2	30.4
3/8"	28.2	88.5	100.0	60.9	8.7	39.1
#4	6.0	20.6	96.0	42.7	18.2	57.3
#8	2.8	4.8	78.9	33.1	9.6	66.9
#16	2.4	2.6	62.9	26.4	6.7	73.6
#30	2.3	2.0	47.7	20.3	6.1	79.7
#50	2.2	1.8	25.8	11.5	8.7	88.5
#100	2.1	1.8	6.0	3.6	7.9	96.4
LBW	1.8	1.5	0.7	1.3	2.3	98.7
Production Gra	adation O Batch Plant Grada	tions    Aggregate Supplier G	radations	Adjusted WF	Intial Production	on Sample (IPS)

**Production Gradation**  Batch Plant Gradations Aggregate Supplier Gradations **Coarseness Factor:** 58 Workability Factor: 33 35.6 JMF Zone 75. 39 Workability Factor (%) Production Gradation 52, 34 Operating Zone 75, 28 Boundary 45 50 Coarseness Factor (%) $^{70}$ 75 80 ActionLimits Boundary = - - - - -

Work	ability Factor:	36	
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"	89.0	10.3	11.0
1/2"	70.3	18.7	29.7
3/8"	59.9	10.4	40.1
#4	41.9	18.0	58.1
#8	35.9	6.0	64.1
#16	27.8	8.2	72.2
#30	18.9	8.8	81.1
#50	6.3	12.6	93.7
#100	1.7	4.6	98.3
LBW	1.0	0.7	99.0

63

**PLANT #:** p11 Contractor:

Sample Date: Concrete Grade: DM, 4500HP 7/17/23 Dates Test Represents: 7/18/2023 7/24/2023 MDOT No.: through

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	150	0.92	2.62	5.2
2NS	95-013	Smelter Bay	1150	6.95	2.65	39.6
		Total Wt	2905	17.69		100.0

---- Verify this number is 100%

SUPER	

# **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"	99.2	100.0	100.0	99.6	0.4	0.4	
3/4"	86.2	100.0	100.0	92.4	7.2	7.6	
1/2"	50.4	95.5	100.0	72.4	20.0	27.6	
3/8"	31.8	88.5	100.0	61.7	10.6	38.3	
#4	5.7	20.6	96.7	42.5	19.2	57.5	
#8	3.0	4.8	85.1	35.6	6.9	64.4	
#16	2.5	2.6	70.2	29.3	6.3	70.7	
#30	2.4	2.0	50.6	21.5	7.8	78.5	
#50	2.3	1.8	25.0	11.3	10.2	88.7	
#100	2.2	1.8	7.6	4.3	6.9	95.7	
LBW	1.8	1.5	1.3	1.6	2.7	98.4	

\*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.

62

\*% Retained must be at least 8% for the 1" sieve when

a 2" max. size (nom. Max. 1.5") aggregate is used.

Coarseness Factor:	59	Workability Factor:	36	38.1	Coars	seness Factor
45 —				$\neg \top$	Worl	kability Factor
45, 44	52, 41		JMF Zone	]	Sieve	Cumulative % Passing
_ 40 -	52, 4	67, 40			2"	100.0
35 -		68, 38	75, 39		1.5"	100.0
: 1		Production Gradation			1"	100.0
		■ 60,3MBS			3/4"	95.0
35 -		i il			1/2"	72.3
	52, 34	<u> </u>			3/8"	60.4
45, 33	50.	7 32			#4	42.6
30 -	55,5	<b>67 32 68</b> , 31			#8	36.0
Operating Zone	7				#16	29.5
30 - 45, 33 Operating Zone Boundary			75, 28		#30	20.3
25					#50	9.5
40 45	50 55	60 65 70	75	80	#100	3.4
10 10		Coarseness Factor (%) <sup>70</sup>	, 0	00	LBW	1.3

Work	ability Factor:	36	
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

Sample Date:

**Production Gradation** 

7/17/23 Concrete Grade: DM, 4500HP

Contractor:

Adjusted WF Intial Production Sample (IPS)

**Coarseness Factor:** 

38.1

Dates Test F	Represents:	7/18/2023	through	7/24/2023		
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	150	0.92	2.62	5.2
2NS	95-013	Smelter Bay	1150	6.95	2.65	39.6

MDOT No.:

SUPERIOR MATERIALS

### **Superior Materials, LLC** 30701 W. 10 Mile Rd. Suite 500 Farmington Hills, MI 48336

Total Wt		2905	2905 17.69		100.0	< Verify this number is 100%		
Sieve	6AA	26	6 <b>A</b>	2NS	Cumulative % Passing	% Retained	Cumulative % Retained	
2"	100.0	10	0.0	100.0	100.0	0.0	0.0	
1.5"	100.0	10	0.0	100.0	100.0	0.0	0.0	
1"	99.2	10	0.0	100.0	99.6	0.4	0.4	
3/4"	86.2	10	0.0	100.0	92.4	7.2	7.6	
1/2"	50.4	95.5		100.0	72.4	20.0	27.6	
3/8"	31.8	88	3.5	100.0	61.7	10.6	38.3	
#4	5.7	20	).6	96.7	42.5	19.2	57.5	
#8	3.0	4	.8	85.1	35.6	6.9	64.4	
#16	2.5	2	.6	70.2	29.3	6.3	70.7	
#30	2.4	2.0		50.6	21.5	7.8	78.5	
#50	2.3	1.8		25.0	11.3	10.2	88.7	
#100	2.2	1.8		7.6	4.3	6.9	95.7	
LBW	1.8	1.5		1.3	1.6	2.7	98.4	
Production Gradation	n Batch Plant Grada	ations	regate Supplier Gr	radations	Adjusted WF	Intial Production	on Sample (IPS	

\*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.

Coarseness Factor: 59		Workability Factor:	36	
45 45, 44 45, 44 45, 33 Operating Zone Boundary	52, 41	56, 40 67, 40  Production Gradator  68, 38  60, 38S  7, 32	75, 39 75, 28	
25 40 45  ActionLimits Boundary =	50	55 Coarseness Factor (%) <sup>70</sup>	75	80

Worl	kability Factor:	36	
Sieve	Cumulative	%	Cumulative
Sieve	% Passing	Retained	% 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

Sample Date:

**Production Gradation** 

Concrete Grade: DM, 4500HP

7/17/23 7/18/2023 7/24/2023 through

Dates Test F	Represents:	7/18/2023	through	7/24/2023		
Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	58-003	Stoneco	1575	9.38	2.69	53.4
26A	58-003	Stoneco	225	1.34	2.69	7.6
2NS	81-019	Pleasant Lake	1150	6.95	2.65	39.0
		Total Wt	2950	17.68		100.0

MDOT No.:

Contractor:

Adjusted WF Intial Production Sample (IPS)

**Coarseness Factor:** 

4		
		OR LS

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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.

Total Wt		2950	17.68		100.0	< Verify this number is 100%	
Sieve	6AA	26A		2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	10	0.0	100.0	100.0	0.0	0.0
1.5"	100.0	10	0.0	100.0	100.0	0.0	0.0
1"	100.0	10	0.0	100.0	100.0	0.0	0.0
3/4"	87.0	100.0		100.0	93.1	6.9	6.9
1/2"	48.9	100.0		100.0	72.7	20.3	27.3
3/8"	28.9	90	).2	100.0	61.3	11.4	38.7
#4	5.0	9	.9	98.3	41.7	19.5	58.3
#8	2.6	3	.2	83.4	34.1	7.6	65.9
#16	2.1	2	.4	65.9	27.0	7.2	73.0
#30	1.8	2.0		46.7	19.3	7.7	80.7
#50	1.6	1.9		23.0	10.0	9.4	90.0
#100	1.6	1.8		6.6	3.6	6.4	96.4
LBW	1.3	1	.6	1.3	1.3	2.2	98.7

Aggregate Supplier Gradations

Coarseness Factor:	59	Workability Factor:	34	36.6
45 45, 44 45, 44 45, 33 Operating Zone Boundary	52, 41 <b>56</b> ; 52, 34 <b>56</b> ,	Production Gradation	75, 39 75, 28	
40 45  ActionLimits Boundary =	50 55	Coarseness Factor (%)	75	80

Batch Plant Gradations

Work	ability Factor:	36	
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

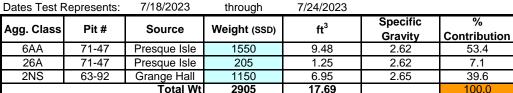
Sample Date:

**Production Gradation** 

7/17/23

Concrete Grade: DM, 4500HP

MDOT No.:	



Contractor:

Adjusted WF Intial Production Sample (IPS)

**Coarseness Factor:** 

37.5

SUPERIOR MATERIALS

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Farmington Hills, MI 48336

	Total Wt	2905	17.69		100.0	< Verify this n	umber is 100%
Sieve	6AA	26	6 <b>A</b>	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	10	0.0	100.0	100.0	0.0	0.0
1.5"	100.0	10	0.0	100.0	100.0	0.0	0.0
1"	97.8	10	0.0	100.0	98.8	1.2	1.2
3/4"	79.0	10	0.0	100.0	88.8	10.0	11.2
1/2"	43.6	95	5.5	100.0	69.6	19.2	30.4
3/8"	28.2	88	3.5	100.0	60.9	8.7	39.1
#4	6.0	20	).6	97.3	43.2	17.7	56.8
#8	2.8	4	.8	83.7	35.0	8.2	65.0
#16	2.4	2	.6	68.5	28.6	6.4	71.4
#30	2.3	2	.0	48.8	20.7	7.9	79.3
#50	2.2	1	.8	22.2	10.1	10.6	89.9
#100	2.1	1	.8	4.3	2.9	7.1	97.1
LBW	1.8	1	.5	0.7	1.3	1.6	98.7

Aggregate Supplier Gradations

\*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.

Coarseness Factor:	60	Workability Factor:	35	
45 45, 44 45, 44 45, 33 Operating Zone Boundary	52, 41	58, 39 68, 38 Production Gradation 60, 36 IPS 68, 31	75, 39	
25   40   45   ActionLimits Boundary =	50 5	Coarseness Factor (%)	75	80

Batch Plant Gradations

Work	ability Factor:	35	
Sieve	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	0.0	0.0
1.5"	100.0	0.0	0.0
1"	99.1	0.9	0.9
3/4"	90.3	8.8	9.7
1/2"	69.2	21.1	30.8
3/8"	59.1	10.1	40.9
#4	41.8	17.3	58.2
#8	35.1	6.6	64.9
#16	28.5	6.6	71.5
#30	21.2	7.3	78.8
#50	8.7	12.5	91.3
#100	1.8	7.0	98.2
LBW	0.7	1.0	99.3

63

Sample Date:

Dates Test Represents:

7/17/23 Concrete Grade: DM, 4500HP

•				
Jource	Weight (SSD)	11	Gravity	Contribution
Source	Weight (SSD)	ft <sup>3</sup>	Specific	%
7/18/2023	through	7/24/2023		

Agg. Class	ass Pit # Source Weight (SSD) ft <sup>3</sup>		Weight (SSD) ft <sup>3</sup>		Specific	%
Ayy. Class	FIL#	Source	weight (SSD) IT		Gravity	Contribution
6AA	58-003	Stoneco	1575	9.38	2.69	53.4
26A	58-003	Stoneco	225	1.34	2.69	7.6
2NS	81-019	Pleasant Lake	1150	6.95	2.65	39.0
		Total Wt	2950	17.68		100.0

Contractor:

MDOT No.:

--- Verify this number is 100%

SUPERIOR MATERIALS

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	i Otai Wt	2330 17.00		100.0	C Verily this ii	umber 16 10076
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"	87.0	100.0	100.0	93.1	6.9	6.9
1/2"	48.9	100.0	100.0	72.7	20.3	27.3
3/8"	28.9	90.2	100.0	61.3	11.4	38.7
#4	5.0	9.9	98.3	41.7	19.5	58.3
#8	2.6	3.2	83.4	34.1	7.6	65.9
#16	2.1	2.4	65.9	27.0	7.2	73.0
#30	1.8	2.0	46.7	19.3	7.7	80.7
#50	1.6	1.9	23.0	10.0	9.4	90.0
#100	1.6	1.8	6.6	3.6	6.4	96.4
LBW	1.3	1.6	1.3	1.3	2.2	98.7
•	_	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 Grad	dations	ions	Adjusted WF	Intial Producti	on Sample (IPS	()
Coarseness Facto	r: 59	Workability Factor:	34	36.6	Coars	seness Factor:	
45					Work	ability Factor:	
45, 44			JMF Zone		Sieve	Cumulative % Passing	
	52, 41	10		- 11	2"	100.0	
් ල <sup>40</sup> ]	56,		75, 39	- 11	1.5"	100.0	
		68, 38	Ĭ		1"	99.3	
5		Production Gradation			3/4"	89.1	
Factor 35		- 60, <sub> P</sub> S			1/2"	70.5	
122	52, 34	<u> </u>			3/8"	60.5	Г
45, 33					#4	44.1	Г
<b>=</b>	56,	<b>67</b> , <b>89</b> , 31		- 11	#8	35.6	
Operating Zo	ne				#16	27.7	
Morkability  At 1, 33  Operating Zo Boundary			75, 28	- 11	#30	20.6	
Š   L			70, 20		#50	8.7	

Coarseness Factor (%) $^{70}$ 

75

80

Workability Factor:		36	
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

61

PREPARED BY: SM, LLC Technical Service

50

45

ActionLimits Boundary = - - - - -

25

7/17/23

**PLANT #:** P-39

Sample Date:

Dates Test Represents:

**Production Gradation** 

Concrete Grade: DM, 4500HP

Contractor:

7/18/2023 7/24/2023 through

M	DOT	No.	

Adjusted WF Intial Production Sample (IPS)

**Coarseness Factor:** 

35.2

Agg. Class	Pit#	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	71-47	Presque Isle	1555	9.51	2.62	53.5
26A	71-47	Presque Isle	250	1.53	2.62	8.6
2NS	44-051	Krake Willis Rd	1100	6.65	2.65	37.9
		Total Wt	2905	17.69		100.0

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Suite 500
Farmington Hills, MI 48336

	Total Wt	2905	17.69	100.0	< Verify this n	umber is 100%
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"	82.4	100.0	100.0	90.6	9.4	9.4
1/2"	40.7	95.8	100.0	67.9	22.7	32.1
3/8"	25.6	86.4	100.0	59.0	8.9	41.0
#4	4.5	21.7	95.9	40.6	18.4	59.4
#8	1.9	6.0	82.4	32.7	7.9	67.3 r
#16	1.6	3.2	68.2	27.0	5.8	73.0
#30	1.6	2.6	51.0	20.4	6.6	79.6 r
#50	1.5	2.3	23.0	9.7	10.7	90.3
#100	1.5	2.2	5.6	3.1	6.6	96.9
LBW	1.2	2.0	1.1	1.2	1.9	98.8
Production Grada	ation O Batch Plant Grada	tions	Supplier Gradations	Adjusted WF	Intial Production	on Sample (IPS)

\*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.

Coarseness Factor:	61	Workability Factor:	33	
45 45, 44 45, 44 45, 33 Operating Zone Boundary	52, 41	58, 40 60, 36 LPS Gradation Production Gradation	75, 39 75, 28	
40 45  ActionLimits Boundary =	50 55 	Coarseness Factor (%) <sup>70</sup>	75	80

Workability Factor:		36	
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

63

Sample Date:

**Production Gradation** 

7/17/23 Concrete Grade: DM, 4500HP

Dates Test I	Represents:	7/18/2023	through	7/24/2023		
Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	71-47	Presque Isle	1550	9.48	2.62	53.4
26A	71-47	Presque Isle	205	1.25	2.62	7.1
2NS	63-115	Ray Rd	1150	6.95	2.65	39.6

MDOT No.:

Contractor:

Adjusted WF Intial Production Sample (IPS)

**Coarseness Factor:** 

35.6

Superior Materials, LLC	:
30701 W. 10 Mile Rd.	
Suite 500	
Farmington Hills, MI 4833	6

	Ťotal Wt	2905	17.69		100.0	< Verify this n	umber is 100%
Sieve	6AA	26	5A	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	10	0.0	100.0	100.0	0.0	0.0
1.5"	100.0	10	0.0	100.0	100.0	0.0	0.0
1"	97.8	10	0.0	100.0	98.8	1.2	1.2
3/4"	79.0	10	0.0	100.0	88.8	10.0	11.2
1/2"	43.6	95	5.5	100.0	69.6	19.2	30.4
3/8"	28.2	88	3.5	100.0	60.9	8.7	39.1
#4	6.0	20	).6	96.0	42.7	18.2	57.3
#8	2.8	4	.8	78.9	33.1	9.6	66.9
#16	2.4	2	.6	62.9	26.4	6.7	73.6
#30	2.3	2	.0	47.7	20.3	6.1	79.7
#50	2.2	1	.8	25.8	11.5	8.7	88.5
#100	2.1		.8	6.0	3.6	7.9	96.4
LBW	1.8	1	.5	0.7	1.3	2.3	98.7

Aggregate SupplierGradations

\*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.

Coarseness Factor:	58	Workability Factor:	33	
45 45, 44 45, 44 45, 33 Operating Zone Boundary	52, 41	58, 39 68, 39 68, 38 Production	75, 28	
25 40 45  ActionLimits Boundary =	50 5	5 Coarseness Factor (%)	75	80

Batch Plant Gradations

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"	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

63