# Aggregate Optimization Chart

## **Production Gradation Report**

PLANT #: P-101 Contractor:

Concrete Grade: DM, 4500HP Sample Date: 12/19/22 Dates Test Represents: 12/20/2022 12/26/2022 through

	10   10 0 0 11101					
Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	71-47	Presque Isle	1360	8.32	2.62	46.7
26A	71-47	Presque Isle	400	2.45	2.62	13.7
2NS	75-051	Mid Michigan	1150	6.93	2.66	39.5
		Total Wt	2910	17.69		100.0

MDOT No.:

-- Verify this number is 100%

SUPERIOR	

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

	TOTAL WIT	2910 17.09		100.0	< venly this n	uniber 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"	95.8	100.0	100.0	98.0	2.0	2.0
3/4"	76.2	100.0	100.0	88.9	9.2	11.1
1/2"	34.2	97.4	100.0	68.9	20.0	31.1
3/8"	16.6	87.4	100.0	59.3	9.6	40.7
#4	2.6	18.8	97.7	42.4	16.9	57.6
#8	1.7	3.9	81.3	33.5	8.9	66.5
#16	1.5	2.0	65.7	26.9	6.5	73.1
#30	1.5	1.7	49.4	20.5	6.5	79.5
#50	1.5	1.6	26.5	11.4	9.1	88.6
#100	1.4	1.5	8.2	4.1	7.3	95.9
LBW	1.3	1.4	1.5	1.4	2.7	98.6
Production Gradation	Batch Plant Grada	tions    Aggregate Supplier 0	Gradations	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:	61	Workability Factor:	33	36.0	Coars	seness Factor:	
45					Worl	kability Factor:	
45, 44			JMF Zone	7 I I	Sieve	Cumulative	
	50.44			_	Oicvc	% Passing	F
40	52, 41				2"	100.0	
(a) 40 f		57, 39 68, 38	75, 39		1.5"	100.0	
		00,30			1"	100.0	
5		■ 60P%Guction Gladation			3/4"	95.0	
35   A		T, IPSoulon ordinant			1/2"	70.5	
	52, 34	<del>-!</del>			3/8"	60.0	
Operating Zone Boundary					#4	44.4	
30 →		<b>67</b> <sub>6</sub> <b>3</b> ,1 <sub>31</sub>			#8	35.5	
Operating Zone	$\Box$				#16	28.5	
Boundary	·		75, 28		#30	21.5	
<b>≥</b> 25					#50	10.2	
40 45	50 5	55 _ 60 _65 _ 70	75	80	#100	3.1	
		Coarseness Factor (%)	75	00	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

PREPARED BY: SM, LLC Technical Service through

Weight (SSD)

1500

300

1150

12/20/2022

Source

Stoneco

Stoneco

Pleasant Lake

Batch Plant Gradations

PLANT #: P-102

Pit#

58-003

58-003

81-019

Sample Date:

Agg. Class

6AA

26A

2NS

Dates Test Represents:

**Production Gradation** 

12/19/22

6.95

Concrete Grade: DM, 4500HP

2.65

12/26/2022		
ft <sup>3</sup>	Specific Gravity	% Contribution
8.94	2.69	50.8
1.79	2.69	10.2

39.0

36.7

MDOT No.:

Adjusted WF Intial Production Sample (IPS)

**Coarseness Factor:** 

Contractor:

**Superior Materials, LLC** 

30701 W. 10 Mile Rd. Suite 500

Farmington Hills, MI 48336

	Total Wt	2950 17.68		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"	99.8	100.0	100.0	99.9	0.1	0.1
3/4"	85.7	100.0	100.0	92.7	7.2	7.3
1/2"	49.5	99.3	100.0	74.3	18.5	25.7
3/8"	21.7	89.9	100.0	59.2	15.1	40.8
#4	5.4	6.9	97.4	41.4	17.7	58.6
#8	2.9	2.0	83.5	34.2	7.2	65.8
#16	2.3	1.7	67.0	27.5	6.8	72.5
#30	2.6	1.5	49.7	20.8	6.6	79.2
#50	2.3	1.4	24.2	10.7	10.1	89.3
#100	2.1	1.3	6.9	3.9	6.9	96.1
LBW	1.5	1.2	1.8	1.6	2.3	98.4

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:	arseness Factor: 62 Workability Factor:			
45 45, 44 45, 44 45, 44 45, 33 Operating Zone Boundary	52, 34	6, 40 68, 38 60, 38 Production Gradation 60, 32 61, 32 61, 32	75, 39	
25 40 45  ActionLimits Boundary =	50 5	Coarseness Factor (%)	75	80

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

Sample Date:

**Production Gradation** 

12/19/22 Concrete Grade: DM, 4500HP

12/20/2022 12/26/2022 through

Dates Test F	Represents:	12/20/2022	through	12/26/2022		
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	300	1.79	2.69	10.2
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:** 

36.7



**Superior Materials, LLC** 

30701 W. 10 Mile Rd. Suite 500

Farmington Hills, MI 48336

	I otal Wt	2950	17.68		100.0	< Verify this n	umber is 100%	
Sieve	6AA	26	A	2NS	Cumulative % Passing	% Retained	Cumulative % Retained	
2"	100.0	100	0.0	100.0	100.0	0.0	0.0	]
1.5"	100.0	100	0.0	100.0	100.0	0.0	0.0	
1"	99.8	100	0.0	100.0	99.9	0.1	0.1	1
3/4"	85.7	100	0.0	100.0	92.7	7.2	7.3	1
1/2"	49.5	99	.3	100.0	74.3	18.5	25.7	1
3/8"	21.7	89	.9	100.0	59.2	15.1	40.8	*
#4	5.4	6.	9	97.4	41.4	17.7	58.6	*
#8	2.9	2.	0	83.5	34.2	7.2	65.8	nc
#16	2.3	1.	7	67.0	27.5	6.8	72.5	*
#30	2.6	1.	5	49.7	20.8	6.6	79.2	nc
#50	2.3	1.	4	24.2	10.7	10.1	89.3	*
#100	2.1	1.	3	6.9	3.9	6.9	96.1	a :
LBW	1.5	1.	2	1.8	1.6	2.3	98.4	Ī

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:	62	Workability Factor:	34	
45 45, 44 45, 44 45, 33 Operating Zone Boundary	52, 34	68, 38 Production Gradation 60128	75, 39	
25	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"	89.2	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:

Schlegel

Batch Plant Gradations

1100

PLANT #: P-14

Pit#

58-003

58-003

19-55

Sample Date:

Agg. Class

6AA

26A

2NS

Dates Test Represents:

**Production Gradation** 

12/19/22 Concrete Grade: DM, 4500HP

12/20/2022 12/26/2022 through Specific % ft<sup>3</sup> Source Weight (SSD) Gravity Contribution Stoneco 1530 9.11 2.69 51.7 330 1.97 2.69 Stoneco 11.1

6.60

2.67

37.2

37.7

Adjusted WF Intial Production Sample (IPS)

**Coarseness Factor:** 

Contractor:

MDOT No.:



### **Builders Redi-Mix**

30701 W. 10 Mile Rd. Suite 500

Farmington Hills, MI 48336

					· · · · · · · · · · · · · · · · · · ·		
	Total Wt	2960	17.68		100.0	< Verify this n	umber is 100%
Sieve	6AA	26	<b>SA</b>	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100	0.0	100.0	100.0	0.0	0.0
1.5"	100.0	100	0.0	100.0	100.0	0.0	0.0
1"	99.8	100	0.0	100.0	99.9	0.1	0.1
3/4"	85.7	100	0.0	100.0	92.6	7.3	7.4
1/2"	49.5	99	).3	100.0	73.8	18.8	26.2
3/8"	21.7	89	).9	100.0	58.4	15.4	41.6
#4	5.4	6.	.9	99.9	40.7	17.7	59.3
#8	2.9	2.	.0	90.1	35.2	5.5	64.8 r
#16	2.3	1.	.7	69.4	27.2	8.0	72.8
#30	2.6	1.	.5	44.5	18.0	9.1	82.0 r
#50	2.3	1.	4	14.3	6.7	11.4	93.3
#100	2.1	1.	.3	2.7	2.2	4.4	97.8
LBW	1.5	1.	.2	0.2	1.0	1.3	99.0

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.

63

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

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

Coarseness Factor:	64	Workability Factor:	35	
45 45, 44 45, 44 45, 33 Operating Zone Boundary	52, 41	57, 40 68, 40 68, 38 Product on Grad	JMF Zone 75, 39	
Boundary  25  40  45  ActionLimits Boundary =	50 5	5 Coarseness Factor (%)	75, 28 75	80

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

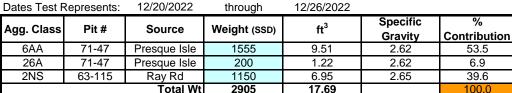
Sample Date:

Concrete Grade: DM, 4500HP 12/19/22

12/20/2022 12/26/2022 through Specific ft<sup>3</sup> Weight (SSD) Source Gravity

	MDOT	No.:
1		

Contractor:



SUPERIOR

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

	l otal Wt	2905	17.69		100.0	< Verify this n	umber is 100%
Sieve	6AA	26	A	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100	0.0	100.0	100.0	0.0	0.0
1.5"	100.0	100	0.0	100.0	100.0	0.0	0.0
1"	98.5	100	0.0	100.0	99.2	0.8	0.8
3/4"	89.2	100	0.0	100.0	94.2	5.0	5.8
1/2"	46.9	97	.2	100.0	71.4	22.8	28.6
3/8"	29.9	82	.0	100.0	61.2	10.1	38.8
#4	6.0	10	.3	96.3	42.0	19.2	58.0
#8	2.2	2.	7	80.3	33.2	8.9	66.8
#16	1.8	1.	4	64.9	26.8	6.4	73.2
#30	1.7	1.	1	49.6	20.6	6.1	79.4
#50	1.6	1.	0	25.9	11.2	9.4	88.8
#100	1.6	0.	9	4.3	2.6	8.6	97.4
LBW	1.3	0.	7	0.6	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 Gradation	ons	ons	Adjusted WF	Intial Producti	on Sample (IPS)	)
Coarseness Factor:	58	Workability Factor:	33	35.7	Coars	eness Factor:	
7 45				$\neg \top$	Work	ability Factor:	
45, 44			JMF Zone	7 I I	Sieve	Cumulative	
1 1	52, 41			<b>-</b>	Sieve	% Passing	F
_ 40 ]	57,	40 68, 40			2"	100.0	
😭		68, 38	75, 39		1.5"	100.0	
-		!			1"	99.3	
Factor (%)		Production Gradation		- 11	3/4"	89.0	
35 ]					1/2"	70.3	
	52, 34	<del>!</del>		- 11	3/8"	59.9	
Operating Zone Boundary	57.	68, 32 68, 31			#4	41.9	
<del>2</del> 30		68, 31			#8	35.9	
Operating Zone			<b>⊸</b>		#16	27.8	
Boundary			75, 28		#30	18.9	
> <sub>25</sub>	J				#50	6.3	
40 45	50 55	60 65 70	75	80	#100	1.7	
		Coarseness Factor (%) <sup>70</sup>			LBW	1.0	
ActionLimits Boundary =							

Work	ability 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

63

## **Aggregate Optimization Chart**

through

Weight (SSD)

1505

250

1150

12/20/2022

Source

Presque Isle

Presque Isle

Smelter Bay

PLANT #: 11

Pit#

71-47

71-47

95-013

PREPARED BY:

Sample Date:

Agg. Class

6AA

26A

2NS

Dates Test Represents:

12/19/22 Concrete Grade: DM, 4500HP 12/26/2022

ft<sup>3</sup>

9.21

1.53

6.95

Specific

Gravity

2.62

2.62

2.65

	M
%	
ontribution	
51.8	
8.6	

39.6

Contractor:

IDOT No.:



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

į	oo o lo ollionol Bay	1100	0.00	2.00	00.0		
	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"	99.2	10	0.0	100.0	99.6	0.4	0.4
3/4"	86.3	10	0.0	100.0	92.9	6.7	7.1
1/2"	47.8	97	7.2	100.0	72.7	20.2	27.3
3/8"	26.7	82	2.0	100.0	60.5	12.2	39.5
#4	3.5	1(	).3	95.2	40.4	20.1	59.6
#8	1.5	2	.7	83.2	33.9	6.4	66.1
#16	1.3	1	.4	68.0	27.7	6.2	72.3
#30	1.2	1	.1	49.2	20.2	7.5	79.8
#50	1.2	1	.0	23.7	10.1	10.1	89.9
#100	1.2	0	.9	6.4	3.2	6.9	96.8
LBW	0.9	0	.7	1.1	1.0	2.3	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	O Batch Plant Grad	ations	ons	Adjusted WF	Intial Producti	ion Sample (IPS)
Coarseness Factors	60	Workability Factor:	34	36.4	Coars	seness Factor:
7 45				$\neg  \top$	Work	cability Factor:
45, 44			JMF Zone	711	Sieve	Cumulative
40	52, 41	40 67, 40		<b>-</b>	2"	% Passing 100.0
(%)		68, 38	75, 39	- 11	1.5"	100.0
		1		- 11	1"	100.0
Factor 35		Production Gradation		- 11	3/4"	95.0
35		i il		- 11	1/2"	72.3
	52, 34	<del>!</del> !		- 11	3/8"	60.4
Norway 45, 33  Operating Zon Boundary	56.	92 07 <sub>68,31</sub>		- 11	#4	42.6
<del>g</del> 30	,	68, 31		- 11	#8	36.0
Operating Zon	e		<b>⊸</b> l		#16	29.5
Boundary	·		75, 28		#30	20.3
25					#50	9.5
40 45	50 55	60 65 70	75	80	#100	3.4
		Coarseness Factor (%) <sup>70</sup>	-		LBW	1.3
ActionLimits Boundary = -						

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"	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

SM, LLC Technical Service

Sample Date:

**Production Gradation** 

Concrete Grade: DM, 4500HP 12/19/22

Contractor:

MDOT No.:

Adjusted WF Intial Production Sample (IPS)

**Coarseness Factor:** 

36.4

Dates Test F	Represents:	12/20/2022	through	12/26/2022		
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	250	1.53	2.62	8.6
2NS	95-013	Smelter Bay	1150	6.95	2.65	39.6
		Total Wt	2905	17.69		100.0

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	250	1.53	2.62	8.6
2NS	95-013	Smelter Bay	1150	6.95	2.65	39.6
	•	Total Wt	2905	17.69		100.0
		·				

SUPE	RIOR

**Superior Materials, LLC** 

30701 W. 10 Mile Rd.

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"	99.2	100.0	)	100.0	99.6	0.4	0.4
3/4"	86.3	100.0	)	100.0	92.9	6.7	7.1
1/2"	47.8	97.2		100.0	72.7	20.2	27.3
3/8"	26.7	82.0		100.0	60.5	12.2	39.5
#4	3.5	10.3		95.2	40.4	20.1	59.6
#8	1.5	2.7		83.2	33.9	6.4	66.1
#16	1.3	1.4		68.0	27.7	6.2	72.3
#30	1.2	1.1		49.2	20.2	7.5	79.8
#50	1.2	1.0		23.7	10.1	10.1	89.9
#100	1.2	0.9	_	6.4	3.2	6.9	96.8
LBW	0.9	0.7		1.1	1.0	2.3	99.0

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:	34	
45 45, 44 45, 33 Operating Zone Boundary	52, 34	6, 40 67, 40 68, 38 68, 38 Fig. 1, 92 768, 31	JMF Zone 75, 39 75, 28	
25 40 45  ActionLimits Boundary =	50 55	Coarseness Factor (%) <sup>70</sup>	75	80

Batch Plant Gradations

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"	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

62

Total Wt

Batch Plant Gradations

2950

Pleasant

PLANT #: P-35

Pit#

58-003

58-003

81-019

Sample Date:

Agg. Class

6AA

26A

2NS

LBW

**Production Gradation** 

Dates Test Represents:

Concrete Grade: DM, 4500HP 12/19/22

17.68

100.0

1.6

36.7

12/20/2022	through	12/26/2022		
Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
Stoneco	1500	8.94	2.69	50.8
Stoneco	300	1.79	2.69	10.2
Pleasant Lake	1150	6.95	2.65	39.0

Contractor:

MDOT No.:

2.3

Adjusted WF Intial Production Sample (IPS)

Coarseness Factor:



----- Verify this number is 100%

ned	Cumulative % Retained	<u>Superior Materials, LLC</u> 30701 W. 10 Mile Rd.
	0.0	Suite 500
	0.0	Farmington Hills, MI 48336

Cumulative 6AA 26A % Retain Sieve 2NS % Passing 2" 100.0 100.0 100.0 100.0 0.0 1.5" 100.0 100.0 100.0 100.0 0.0 99.9 99.8 100.0 100.0 0.1 0.1 3/4" 85.7 100.0 100.0 92.7 7.2 7.3 1/2' 49.5 99.3 100.0 74.3 18.5 25.7 3/8' 89.9 100.0 59.2 15.1 40.8 21.7 #4 5.4 6.9 97.4 41.4 17.7 58.6 #8 2.9 2.0 83.5 34.2 7.2 65.8 #16 2.3 1.7 67.0 27.5 6.8 72.5 #30 2.6 49.7 20.8 79.2 1.5 6.6 #50 2.3 1.4 24.2 10.7 10.1 89.3 #100 3.9 2.1 1.3 6.9 6.9 96.1

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:	62	Workability Factor:	34	
45 45, 44 45, 44 45, 33 Operating Zone Boundary	52, 34	68, 38 Production Gradation 60,19 67, 60, 31	75, 39	
40 45  ActionLimits Boundary =	50	55 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

Sample Date:

LBW

**Production Gradation** 

Dates Test Represents:

12/19/22 Concrete Grade: **DM**, **4500HP** 

		Control Ciado: ,	
12/20/2022	through	12/26/2022	

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	255	1.56	2.62	8.8
2NS	63-92	Grange Hall	1100	6.65	2.65	37.9
		Total Wt	2905	17.69		100.0

Contractor:

MDOT No.:

<---- Verify this number is 100%

Adjusted WF Intial Production Sample (IPS)

**Coarseness Factor:** 

1.1

35.9

SUPER	IOR
MATERI	ALS

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	l
1.5"	100.0	100.0	100.0	100.0	0.0	0.0	l
1"	98.5	100.0	100.0	99.2	0.8	0.8	l
3/4"	89.2	100.0	100.0	94.2	5.0	5.8	l
1/2"	46.9	97.2	100.0	71.4	22.8	28.6	l
3/8"	29.9	82.0	100.0	61.0	10.4	39.0	,
#4	6.0	10.3	97.6	41.1	20.0	58.9	,
#8	2.2	2.7	84.4	33.4	7.7	66.6	no
#16	1.8	1.4	70.5	27.8	5.6	72.2	,
#30	1.7	1.1	53.4	21.2	6.6	78.8	no
#50	1.6	1.0	24.4	10.2	11.0	89.8	,
#100	1.6	0.9	4.1	2.5	7.7	97.5	а

Aggregate Supplier Gradations

0.7

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

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

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

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

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

63

\*% 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:	33	
45 45, 44 45, 44 45, 33 Operating Zone Boundary	52, 41	58, 39   58, 39   68, 38   68, 38   68, 38   68, 31   68, 31	75, 39	
40 45  ActionLimits Boundary =	50	Coarseness Factor (%)	75	80

Batch Plant Gradations

Work	ability Factor:	35	
Sieve	eve Cumulative % Passing		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

PREPARED BY: SM, LLC Technical Service Approved By

Sample Date:

Concrete Grade: DM, 4500HP 12/19/22 12/26/2022

Dates Test F	Represents:	12/20/2022	through	12/26/2022		
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	44-051	Krake Willis Rd	1100	6.65	2.65	37.9
		Total Wt	2905	17 69		100.0

MDOT No.:

**Coarseness Factor:** 

Contractor:

SUPE	RIOR

### **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.

63

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

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

•	Total Wt	2905	17.69		100.0	< Verify this n	umber is 100%
Sieve	6AA	26	SA.	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"	95.8	10	0.0	100.0	97.8	2.2	2.2
3/4"	76.2	100.0		100.0	87.7	10.2	12.3
1/2"	34.2	97.4		100.0	65.6	22.0	34.4
3/8"	16.6	87	<b>7.4</b>	100.0	55.5	10.2	44.5
#4	2.6	18	3.8	96.2	39.7	15.8	60.3
#8	1.7	3	.9	80.4	31.7	8.0	68.3
#16	1.5	2	.0	65.2	25.7	6.1	74.3
#30	1.5	1	.7	49.4	19.7	6.0	80.3
#50	1.5	1.6		24.3	10.1	9.5	89.9
#100	1.4	1	.5	9.0	4.3	5.9	95.7
LBW	1.3	1	.4	0.8	1.1	3.2	98.9

O Batch Plant Gradations Aggregate Supplier Gradations **Production Gradation** Adjusted WF Intial Production Sample (IPS) Coarseness Factor: 65 **Workability Factor:** 32 34.2

Work	ability Factor:	36	
Sieve	Sieve Cumulative % Passing		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

	<sup>45</sup> ]	45, 44 JMF Zone
Workability Factor (%)	35 -	52, 41  58, 40  68, 38  60, 36 IPS  Production Gradation  52, 34  Operating Zone
Wor	25	Boundary 75, 28
Ac	4	0 45 50 55 60 65 70 75 80  Coarseness Factor (%)

Sample Date:

**Production Gradation** 

12/19/22 Concrete Grade: DM, 4500HP

Dates Test Represents:		12/20/2022	through	12/26/2022		
∖gg. 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	200	1.22	2.62	6.9
2NS	63-115	Ray Rd	1150	6.95	2.65	39.6

Contractor:

MDOT No.:

Adjusted WF Intial Production Sample (IPS)

Coarseness Factor:

35.7

	IVII
%	
ntribution	
53.5	
6.9	
39.6	

SUPE	RIOR

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Ťotal 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"	98.5	10	0.0	100.0	99.2	0.8	0.8
3/4"	89.2	10	0.0	100.0	94.2	5.0	5.8
1/2"	46.9	97	7.2	100.0	71.4	22.8	28.6
3/8"	29.9	82	2.0	100.0	61.2	10.1	38.8
#4	6.0	10	).3	96.3	42.0	19.2	58.0
#8	2.2	2	.7	80.3	33.2	8.9	66.8 r
#16	1.8	1	.4	64.9	26.8	6.4	73.2
#30	1.7	1	.1	49.6	20.6	6.1	79.4 r
#50	1.6	1	.0	25.9	11.2	9.4	88.8
#100	1.6	0	.9	4.3	2.6	8.6	97.4 a
LBW	1.3	0	.7	0.6	1.0	1.6	99.0

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, 38 68, 38 68, 38 68, 38	75, 39	
25 40 45  ActionLimits Boundary =	50 55	Coarseness Factor (%)	75	80

Batch Plant Gradations

Work	ability Factor:	35	
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"	95.1	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