Aggregate Optimization Chart

Production Gradation Report

PLANT #: P-101 Contractor:

Concrete Grade: DM, 4500HP Sample Date: 5/15/23 Dates Test Represents: 5/16/2023 5/22/2023 through

Agg. Class	Pit#	Source	Weight (SSD)	ft ³	Specific Gravity	% Contribution
6AA	71-47	Presque Isle	1450	8.87	2.62	50.0
26A	71-47	Presque Isle	300	1.83	2.62	10.3
2NS	75-051	Mid Michigan	1150	6.93	2.66	39.7
		Total Wt	2900	17.63		100.0

MDOT No.:



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

	Total Wt	2900 17.63		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"	98.1	100.0	100.0	99.1	1.0	1.0
3/4"	79.2	100.0	100.0	89.6	9.5	10.4
1/2"	37.7	96.1	100.0	68.4	21.2	31.6
3/8"	20.4	87.7	100.0	58.9	9.5	41.1
#4	2.6	23.2	97.3	42.3	16.6	57.7
#8	1.4	6.2	82.1	33.9	8.4	66.1 r
#16	1.2	3.4	66.8	27.4	6.5	72.6
#30	1.2	2.9	50.7	21.0	6.4	79.0 r
#50	1.2	2.7	23.2	10.1	10.9	89.9
#100	1.1	2.5	6.7	3.5	6.6	96.5 a
LBW	1.0	2.3	1.3	1.3	2.2	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 Gra	dations	ns	Adjusted WF	Initial Product	ion Sample (IPS	3)
Coarseness Factor	: 62	62 Workability Factor: 3		34 36.4		Coarseness Factor:	
45					Worl	ability Factor:	
45, 44			JMF Zone]	Sieve	Cumulative % Passing	R
40 -	52, 41	\downarrow		- 11	2"	100.0	Π
3 40 1		57 , 39 67 , 39 68 , 38	75, 39	- 11	1.5"	100.0	_
		08, 38	I	- 11	1"	100.0	Π
35 d		■ 60, Sproduction Gradation		- 11	3/4"	95.0	
2 35 -		i ips		- 11	1/2"	70.5	
<u> </u>	52, 34	-!		- 11	3/8"	60.0	
As, 33 Operating Zon Boundary				- 11	#4	44.4	Π
5 30 		67 ₆ 8 ,1 ₃₁		- 11	#8	35.5	_
Operating Zon	e			- 11	#16	28.5	Π
b Boundary			75, 28	- 11	#30	21.5	_
≥ ₂₅ □					#50	10.2	
40 45	50 5	55 60 65 70	75	80	#100	3.1	
		Coarseness Factor (%)	. 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

5/15/23 Concrete Grade: DM, 4500HP

Dates Test Represents:		5/16/2023	through	5/22/2023		
Agg. Class	Pit#	Source	Weight (SSD)	ft ³	Specific Gravity	% Contribution
6AA	58-003	Stoneco	1650	9.83	2.69	55.9
26A	58-003	Stoneco	150	0.89	2.69	5.1
2NS	81-019	Pleasant Lake	1150	6.95	2.65	39.0
		Total Wt	2050	17 69		100.0

Contractor:

MDOT No.:

Adjusted WF Intial Production Sample (IPS)

Coarseness Factor:

36.6



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

	i otai 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	1	100.0	100.0	0.0	0.0
1.5"	100.0	100.0	1	100.0	100.0	0.0	0.0
1"	99.0	100.0	1	100.0	99.4	0.6	0.6
3/4"	89.7	100.0	1	100.0	94.2	5.2	5.8
1/2"	52.5	98.5		100.0	73.4	20.9	26.6
3/8"	32.4	79.0		100.0	61.1	12.2	38.9
#4	4.3	6.2		98.8	41.2	19.9	58.8
#8	1.3	2.1		85.3	34.1	7.1	65.9
#16	1.1	1.6		67.4	27.0	7.1	73.0
#30	0.9	1.5		46.5	18.7	8.3	81.3
#50	0.8	1.4		21.7	9.0	9.7	91.0
#100	0.8	1.3	_	5.8	2.8	6.2	97.2
LBW	0.7	1.1		1.1	0.9	1.9	99.1

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

Total Wt

O Batch Plant Gradations

PLANT #: P-103

Sample Date:

#100

LBW

Production Gradation

5/15/23 Concrete Grade: DM, 4500HP

17.68

Dates Test Represents:		5/16/2023	tnrougn	5/22/2023		
Agg. Class	Pit#	Source	Weight (SSD)	ft ³	Specific Gravity	% Contribution
6AA	58-003	Stoneco	1650	9.83	2.69	55.9
26A	58-003	Stoneco	150	0.89	2.69	5.1
2NS	81-019	Pleasant Lake	1150	6.95	2.65	39.0

2950

Contractor:

Cumulative

97.2

99.1

Coarseness Factor:

MDOT No.:

6.2

1.9

Adjusted WF Intial Production Sample (IPS)

Cumulative

2.8

0.9

36.6

5.8

<---- Verify this number is 100%

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Suite 500
F

Farmington Hills, MI 48336

Sieve	6AA	26A	2NS	% Passing	% Retained	% 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	1
1"	99.0	100.0	100.0	99.4	0.6	0.6	1
3/4"	89.7	100.0	100.0	94.2	5.2	5.8	1
1/2"	52.5	98.5	100.0	73.4	20.9	26.6	1
3/8"	32.4	79.0	100.0	61.1	12.2	38.9	,
#4	4.3	6.2	98.8	41.2	19.9	58.8	*
#8	1.3	2.1	85.3	34.1	7.1	65.9	nc
#16	1.1	1.6	67.4	27.0	7.1	73.0	*
#30	0.9	1.5	46.5	18.7	8.3	81.3	nc
#50	0.8	1.4	21.7	9.0	9.7	91.0	,

Aggregate Supplier Gradations

1.3

1.1

*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.

Coarseness Factor:	59	Workability Factor:	34	
45 45, 44 45, 44 45, 33 Operating Zone Boundary	52, 34	40 67 40 68, 38 Production Gradation 60) 88	75, 39	
25 40 45 ActionLimits Boundary =	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"	89.2	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

0.8

0.7

Approved BY:

Schlegel

Batch Plant Gradations

Dates Test Represents:

Production Gradation

Pit#

58-003

58-003

19-04

Agg. Class

6AA

26A

2NS

PLANT #: 14 Contractor:

2.67

37.2

36.9

Sample Date: 5/15/23 Concrete Grade: **DM, 4500HP**

1100

5/16/2023	tnrougn	5/22/2023		
Source	Weight (SSD)	ft ³	Specific	%
Oource	Weight (33b)	- 10	Gravity	Contribution
Stoneco	1660	9.89	2.69	56.1
Stoneco	200	1.19	2.69	6.8

6.60

MDOT No.:

Adjusted WF Intial Production Sample (IPS)

Coarseness Factor:



Builders Redi-Mix

30701 W. 10 Mile Rd. Suite 500

Farmington Hills, MI 48336

	Total Wt	2960	17.68		100.0	< Verify this number is 100%	
Sieve	6AA	26	6 A	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"	99.0	10	0.0	100.0	99.4	0.6	0.6
3/4"	89.7	10	0.0	100.0	94.2	5.2	5.8
1/2"	52.5	98	3.5	100.0	73.3	21.0	26.7
3/8"	32.4	79	0.0	100.0	60.7	12.6	39.3
#4	4.3	6	.2	99.9	40.0	20.7	60.0
#8	1.3	2	.1	90.1	34.4	5.6	65.6 r
#16	1.1	1.	.6	69.4	26.5	7.8	73.5
#30	0.9	1.	.5	44.5	17.1	9.4	82.9 r
#50	0.8	1.	.4	14.3	5.9	11.3	94.1
#100	0.8	1.	.3	2.7	1.5	4.3	98.5
LBW	0.7	1.	.1	0.2	0.5	1.0	99.5

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.

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

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

Coars	seness Factor:	60	Workability Factor:	34	
45	45, 44			JMF Zone	
(%) Ju		52, 41	57, 40 68, 40 68, 38 Production Gradation	75, 39	
Workability Factor (%)	45, 33	52, 34	60, 36PS		
	Operating Zone Boundary		57, 22 6 <u>8, 37</u>	75, 28	
	0 45 mits Boundary =	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

Aggregate Optimization Chart

5/15/23

PLANT #: 12

Sample Date:

Dates Test Represents:

Concrete Grade: DM, 4500HP

Contractor:

5/16/2023 5/22/2023 through

MDOT No.:

1.5

Agg. Class	Pit #	Source	Weight (SSD)	ft ³	Specific Gravity	% Contribution
6AA	71-47	Presque Isle	1655	10.12	2.62	57.0
26A	71-47	Presque Isle	100	0.61	2.62	3.4
2NS	63-115	Ray Rd	1150	6.95	2.65	39.6
		Total Wt	2905	17.69		100.0

---- Verify this number is 100%

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

Cumulative Cumulative 6AA 26A % Retained 2NS Sieve % 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 0.0 100.0 99.0 98.2 100.0 1.0 1.0 3/4" 86.1 100.0 100.0 92.1 6.9 7.9 33.4 1/2' 41.5 97.0 100.0 66.6 25.5 3/8' 22.1 87.6 100.0 55.2 11.4 44.8 40.5 14.7 59.5 #4 2.9 17.6 96.6 #8 1.3 4.2 80.0 32.6 7.9 67.4 #16 1.1 2.1 64.0 26.0 6.5 74.0 #30 48.2 19.8 6.3 80.2 1.1 1.6 #50 1.1 1.5 25.1 10.6 9.1 89.4 #100 2.2 1.0 1.4 3.9 8.5 97.8 LBW

*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	gate Supplier Gradations	Adjusted WF	Intial Production	on Sample (IPS)
Coarseness Factor: 66 Worka	bility Factor: 33	35.1	Coars	eness Factor:	
7 45		$\neg \top$	Work	ability Factor:	
45, 44	JMF Zor	ne	Sieve	Cumulative	
52, 41			Sieve	% Passing	I
40	68, 40		2"	100.0	
	68, 38	39	1.5"	100.0	
	7		1"	99.3	
9 60, 36Ps			3/4"	89.0	
■ 60, 30Ps	Production Gradation		1/2"	70.3	
	i I		3/8"	59.9	
At 5, 33 Operating Zone Boundary	68 32		#4	41.9	
30 -	68, 32		#8	35.9	
Operating Zone			#16	27.8	
Boundary	75, 2	28	#30	18.9	
25			#50	6.3	
	_6570 75	80	#100	1.7	
Coarseness F	actor (%)	[LBW	1.0	
ActionLimits Boundary =					

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

0.8

PLANT #: p11 Contractor:

Concrete Grade: DM, 4500HP Sample Date: 5/15/23 Dates Test Represents: 5/16/2023 5/22/2023 MDOT No.: through

	10 10 0 0 11101			0,,		
Agg. Class	Pit #	Source	Weight (SSD)	ft ³	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

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	A	2NS	Cumulative % Passing	% Retained	Cumulative % Retained	
2"	100.0	100	0.0	100.0	100.0	0.0	0.0	1
1.5"	100.0	100	0.0	100.0	100.0	0.0	0.0	1
1"	99.1	100	0.0	100.0	99.5	0.5	0.5	1
3/4"	86.8	100	0.0	100.0	92.7	6.8	7.3	1
1/2"	51.4	97	.0	100.0	73.0	19.7	27.0	1
3/8"	32.3	87	.6	100.0	62.0	11.0	38.0	1
#4	7.0	17	.6	96.9	43.1	18.8	56.9	1
#8	2.0	4.	2	84.3	34.7	8.4	65.3	n
#16	1.6	2.	1	68.7	28.2	6.5	71.8	1
#30	1.5	1.	6	48.6	20.2	8.0	79.8	n
#50	1.5	1.	5	23.1	10.1	10.1	89.9	1
#100	1.4	1.	4	6.7	3.5	6.6	96.5	а
LBW	1.2	1.	2	1.1	1.2	2.3	98.8	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 Grad	dation	Batch Plant Gra	dations	tions	Adjusted WF	Intial Production	on Sample (IPS))
Coarseness	Factor:	58	Workability Factor:	35	37.2	Coars	eness Factor:	_
7 45					$\neg \top$	Work	ability Factor:	
45, 4	4			JMF Zone	7 I I	Sieve	Cumulative	
1 1		52, 41				Sieve	% Passing	
40 1		-56	67, 40			2"	100.0	
 %		i	68, 38	68, 38		1.5"	100.0	
			Production Gradation			1"	100.0	
Factor 35	유 _ · · ·		■ 60,3MBS			3/4"	95.0	
25 35			i il			1/2"	72.3	
	—	52, 34	<u> </u>			3/8"	60.4	
Workability 000 000 000 000 000 000 000 000 000 0	5, 33	36	92 32			#4	42.6	
= 30			67 , 32			#8	36.0	
\frac{2}{2}	erating Zone			⊸ .		#16	29.5	
	Boundary			75, 28		#30	20.3	
> ₂₅ <u> </u>						#50	9.5	
40	45	50 55	60 65 70	75	80	#100	3.4	
			Coarseness Factor (%) ⁷⁰	-		LBW	1.3	
ActionLimits Bou	ndary =							

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

62

through

Weight (SSD)

1605

150

1150

5/16/2023

Source

Presque Isle

Presque Isle

Smelter Bay

PLANT #: P-32

Pit#

71-47

71-47

95-013

Sample Date:

Agg. Class

6AA

26A

2NS

Dates Test Represents:

5/15/23 Concrete Grade: DM, 4500HP 5/22/2023

ft³

9.82

0.92

6.95

Specific

Gravity

2.62

2.62

2.65

	MDOT No.:
%	
Contribution	

55.2

5.2

39.6

37.2

Contractor:

Coarseness Factor:

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

	Total Wt	2905 17.69		100.0	< Verify this number 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"	99.1	100.0	100.0	99.5	0.5	0.5	
3/4"	86.8	100.0	100.0	92.7	6.8	7.3	
1/2"	51.4	97.0	100.0	73.0	19.7	27.0	
3/8"	32.3	87.6	100.0	62.0	11.0	38.0	
#4	7.0	17.6	96.9	43.1	18.8	56.9	
#8	2.0	4.2	84.3	34.7	8.4	65.3 r	
#16	1.6	2.1	68.7	28.2	6.5	71.8	
#30	1.5	1.6	48.6	20.2	8.0	7 9.8 r	
#50	1.5	1.5	23.1	10.1	10.1	89.9	
#100	1.4	1.4	6.7	3.5	6.6	96.5	
LBW	1.2	1.2	1.1	1.2	2.3	98.8	
Production Gr	adation O Batch Plant Grada	tions Aggregate 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	: 58	Workability Factor:	35	
45 45, 44 45, 44 45, 33 Operating Zo Boundary	52, 34	6, 40 67, 40 68, 38 68, 38 68, 38 68, 38 68, 38 68, 38 68, 38	75, 28	
40 45 ActionLimits Boundary = -	50 55	Coarseness Factor (%)	75	80

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"	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

5/16/2023

PLANT #: P-35

Sample Date:

#50

#100

LBW

Production Gradation

Dates Test Represents:

5/15/23 Concrete Grade: DM, 4500HP 5/22/2023

Contractor:	

91.0

97.2

Coarseness Factor:

MDOT No.:

24100 10011101101		0, 10, 2020	o a g	0,22,2020		
Agg. Class	Pit #	Source	Weight (SSD)	ft ³	Specific Gravity	% Contribution
6AA	58-003	Stoneco	1650	9.83	2.69	55.9
26A	58-003	Stoneco	150	0.89	2.69	5.1
2NS	81-019	Pleasant Lake	1150	6.95	2.65	39.0
Total Wt			2950	17.68		100.0

through

---- Verify this number is 100%

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Cumulative Cumulative 6AA 26A 2NS % Retained Sieve % 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 99.0 100.0 100.0 99.4 0.6 0.6 3/4" 89.7 100.0 100.0 94.2 5.2 5.8 1/2' 52.5 98.5 100.0 73.4 20.9 26.6 3/8' 79.0 100.0 61.1 12.2 38.9 32.4 #4 4.3 6.2 98.8 41.2 19.9 58.8 #8 1.3 2.1 85.3 34.1 7.1 65.9 #16 1.1 1.6 67.4 27.0 7.1 73.0 #30 0.9 1.5 46.5 18.7 8.3 81.3

21.7

5.8

9.0

2.8

0.9

36.6

9.7

6.2

1.9

Adjusted WF Intial Production Sample (IPS)

1.4

1.3

1.1

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:	59	Workability Factor:	34	,
45 45, 44 45, 44 45, 33 Operating Zone Boundary	52, 41 56, 52, 34 56,	Production Gradation 68, 38	75, 39	
25	50 55	Coarseness Factor (%) ⁷⁰	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"	89.1	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

0.8

0.8

0.7

Batch Plant Gradations

Sample Date:

Production Gradation

5/15/23 Concrete Grade: DM, 4500HP

	Dates Test Represents:		5/16/2023	through	5/22/2023		
	Agg. Class	Pit #	Source	Weight (SSD)	ft ³	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	63-92	Grange Hall	1150	6.95	2.65	39.6
			T-4-1 \A/4	2005	47.00		1000

Contractor:

MDOT No.:

Adjusted WF Intial Production Sample (IPS)

Coarseness Factor:

37.5

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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"	98.2	100	0.0	100.0	99.0	1.0	1.0
3/4"	86.1	100	0.0	100.0	92.3	6.7	7.7
1/2"	41.5	97	.0	100.0	67.5	24.8	32.5
3/8"	22.1	87	.6	100.0	56.3	11.2	43.7
#4	2.9	17.6		97.7	41.2	15.1	58.8
#8	1.3	4.	2	86.0	35.0	6.2	65.0
#16	1.1	2.	1	71.7	29.1	5.9	70.9
#30	1.1	1.	6	50.7	20.8	8.3	79.2
#50	1.1	1.	5	22.2	9.5	11.3	90.5
#100	1.0	1.	4	3.8	2.1	7.3	97.9
LBW	0.8	1.	2	0.7	0.8	1.3	99.2

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:	67	Workability Factor:	35	
45 45, 44			JMF Zone	$\overline{\mathbb{n}}$
10	52, 41	58, 39 68, 38 roduction 0	75, 39 Gradat on	
Morkability Factor (%) 30 Operating Zone Boundary	52, 34	■ 60, 36 IPS		
		58, 31 688, 31	75, 28	
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

Sample Date:

Concrete Grade: DM, 4500HP 5/15/23

Dates Test F	Represents:	5/16/2023	through	5/22/2023		
Agg. Class	Pit#	Source	Weight (SSD)	ft ³	Specific Gravity	% Contribution
6AA	58-003	Stoneco	1650	9.83	2.69	55.9
26A	58-003	Stoneco	150	0.89	2.69	5.1
2NS	81-019	Pleasant Lake		6.95	2.65	39.0
		. T.	5	1		400

Contractor:

MDOT No.:

Coarseness Factor:

SUPERIOR MATERIALS

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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 n	umber is 100%
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"	99.0	10	0.0	100.0	99.4	0.6	0.6
3/4"	89.7	10	100.0		94.2	5.2	5.8
1/2"	52.5	98	3.5	100.0	73.4	20.9	26.6
3/8"	32.4	79	9.0	100.0	61.1	12.2	38.9
#4	4.3	6	.2	98.8	41.2	19.9	58.8
#8	1.3	2	.1	85.3	34.1	7.1	65.9
#16	1.1	1.6		67.4	27.0	7.1	73.0
#30	0.9	1.5		46.5	18.7	8.3	81.3
#50	0.8	1.4		21.7	9.0	9.7	91.0
#100	0.8	1.3		5.8	2.8	6.2	97.2
LBW	0.7	1	.1	1.1	0.9	1.9	99.1

Aggregate Supplier Gradations Batch Plant Gradations **Production Gradation** Adjusted WF Intial Production Sample (IPS) Coarseness Factor: 59 **Workability Factor:** 34 36.6

45 -	45, 44 JMF Zone	
Workability Factor (%)	52, 41 56, 49 Production Gradation 68, 38 52, 34 56, 31 67, 64 31	
25 -	Operating Zone Boundary 75, 28	
	0 45 50 55 Coarseness Factor (%) 70 75 8	30

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

Concrete Grade: DM, 4500HP 5/15/23

Dates Test F	Represents:	5/16/2023	through	5/22/2023		
Agg. Class	Pit#	Source	Weight (SSD)	ft ³	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

MDOT No.:

Contractor:

Adjusted WF Intial Production Sample (IPS)

Coarseness Factor:

35.5

---- Verify this number is 100%

SUPE	RIOR

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

					· voing and in	arribor 10 10070
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"	98.1	100.0	100.0	99.0	1.0	1.0
3/4"	79.2	100.0	100.0	88.9	10.1	11.1
1/2"	37.7	96.1	100.0	66.3	22.5	33.7
3/8"	20.4	87.7	100.0	56.3	10.0	43.7
#4	2.6	23.2	97.0	40.1	16.2	59.9
#8	1.4	6.2	83.8	33.0	7.1	67.0 r
#16	1.2	3.4	68.6	26.9	6.1	73.1
#30	1.2	2.9	50.2	19.9	7.0	80.1 r
#50	1.2	2.7	22.4	9.4	10.5	90.6
#100	1.1	2.5	5.4	2.8	6.5	97.2 a
LBW	1.0	2.3	1.0	1.1	1.7	98.9
Production Gr	adation O Batch Plant Grada	ations Aggregate Supplier Gra	adations	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:	65	Workability Factor:	33	
45 45, 44 45, 44 45, 33 Operating Zone Boundary	52, 41	58, 40 60, 36 IPS Production Gi		
40 45 ActionLimits Boundary =	50 55	Coarseness Factor (%) ⁷⁰	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"	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

5/15/23

PLANT #: P-O2

Sample Date:

Concrete Grade: DM, 4500HP

OHP_

Cumulative

35.1

Dates Test F	Represents:	5/16/2023	through	5/22/2023		
Agg. Class	Pit #	Source	Weight (SSD)	ft ³	Specific Gravity	% Contribution
6AA	71-47	Presque Isle	1655	10.12	2.62	57.0
26A	71-47	Presque Isle	100	0.61	2.62	3.4
2NS	63-115	Ray Rd	1150	6.95	2.65	39.6
		Total Wt	2905	17.69		100.0

MDOT No.:

Contractor:

Adjusted WF Intial Production Sample (IPS)

Coarseness Factor:

<---- Verify this number is 100%

Cumulative

SUPERIOR	

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Sieve	6AA	26A	2NS	% Passing	% Retained	% Retained	
2"	100.0	100.0	100.0	100.0	0.0	0.0	ĺ
1.5"	100.0	100.0	100.0	100.0	0.0	0.0	ĺ
1"	98.2	100.0	100.0	99.0	1.0	1.0	ĺ
3/4"	86.1	100.0	100.0	92.1	6.9	7.9	ĺ
1/2"	41.5	97.0	100.0	66.6	25.5	33.4	ĺ
3/8"	22.1	87.6	100.0	55.2	11.4	44.8	ĺ
#4	2.9	17.6	96.6	40.5	14.7	59.5	ĺ
#8	1.3	4.2	80.0	32.6	7.9	67.4	n
#16	1.1	2.1	64.0	26.0	6.5	74.0	ĺ
#30	1.1	1.6	48.2	19.8	6.3	80.2	n
#50	1.1	1.5	25.1	10.6	9.1	89.4	ĺ
#100	1.0	1.4	3.9	2.2	8.5	97.8	а

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

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"	95.1	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

0.8

Production Gradation

O Batch Plant Gradations

Approved By