## **Aggregate Optimization Chart**

## **Production Gradation Report**

PLANT #: P-101

Sample Date:

**Production Gradation** 

11/21/22 Concrete Grade: DM, 4500HP

MDOT	No.:	
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Contractor:

Adjusted WF Initial Production Sample (IPS)

**Coarseness Factor:** 

Dates Test Represents: 11/22/2022 11/28/2022 through Specific ft<sup>3</sup> Agg. Class Pit# Weight (SSD) Source Gravity Contribution 6AA 71-47 Presque Isle 1460 8.93 2.62 50.2 26A 71-47 Presque Isle 300 1.83 2.62 10.3 2NS 75-051 Mid Michigan 1150 6.93 2.66 39.5

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

	Total Wt	2910 17.69		100.0	< Verify this no	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"	98.3	100.0	100.0	99.1	0.9	0.9
3/4"	87.6	100.0	100.0	93.8	5.4	6.2
1/2"	49.5	94.9	100.0	74.1	19.6	25.9
3/8"	28.5	80.4	100.0	62.1	12.0	37.9
#4	4.8	20.8	98.8	43.6	18.5	56.4
#8	2.1	7.6	84.8	35.3	8.2	64.7 r
#16	1.8	4.2	69.3	28.7	6.6	71.3
#30	1.8	3.2	51.6	21.6	7.1	<b>78.4</b> r
#50	1.7	2.8	23.2	10.3	11.3	89.7
#100	1.7	2.6	4.7	3.0	7.3	97.0 a
LBW	1.5	2.4	0.8	1.3	1.7	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.

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:	35	37.8
45 45, 44 45, 44 45, 33 Operating Zone Boundary	52, 41	57, 39  Production Gradation  68, 38  60, 36s  57, 31  67,68,131	75, 28	
40 45  ActionLimits Boundary =	50	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"	95.0	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** 

Concrete Grade: DM, 4500HP

Dates Test F	Represents:	11/22/2022	through	11/28/2022		
Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	58-003	Stoneco	1400	8.34	2.69	47.5
00.4	F0 000	Ot	400	0.00	0.00	40.0

Adjusted WF Intial Production Sample (IPS)

**Coarseness Factor:** 

36.0

Contractor:

MDOT No.:

Agg. Class	Pit#	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	58-003	Stoneco	1400	8.34	2.69	47.5
26A	58-003	Stoneco	400	2.38	2.69	13.6
2NS	81-019	Pleasant Lake	1150	6.95	2.65	39.0
		Total Wt	2950	17.68		100.0

SUPE	RIOF	2

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

	10tal Wt 2950 17.08			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"	77.7	10	0.0	100.0	89.4	10.2	10.6
1/2"	35.7	10	0.0	100.0	69.5	19.9	30.5
3/8"	12.3	88	3.7	100.0	56.8	12.6	43.2
#4	3.2	6	.2	97.6	40.4	16.4	59.6
#8	1.8	1	.0	83.5	33.5	6.9	66.5
#16	1.4	0	.7	68.5	27.5	6.1	72.5
#30	1.4	0	.6	51.2	20.7	6.8	79.3 ı
#50	1.1	0	.6	26.6	11.0	9.7	89.0
#100	1.3	0	.6	7.3	3.5	7.4	96.5
LBW	1.1	0	.5	1.3	1.1	2.4	98.9

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:	65	Workability Factor:	34	
45 45, 44 45, 44 45, 33 Operating Zone Boundary	52, 34	60,136 Production Gradation	JMF Zone 75, 39 75, 28	
25 + 40 45  ActionLimits Boundary =	50	Coarseness Factor (%)	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"	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** 

11/21/22 Concrete Grade: **DM**, **4500HP** 

Dates Test F	represents:	11/22/2022	tnrougn	11/28/2022		
Agg. Class	Pit#	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	58-003	Stoneco	1400	8.34	2.69	47.5
26A	58-003	Stoneco	400	2.38	2.69	13.6
2NS	81-019	Pleasant Lake	1150	6.95	2.65	39.0

MDOT No.:

Adjusted WF Intial Production Sample (IPS)

**Coarseness Factor:** 

36.0

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"	99.2	100.0	100.0	99.6	0.4	0.4
3/4"	77.7	100.0	100.0	89.4	10.2	10.6
1/2"	35.7	100.0	100.0	69.5	19.9	30.5
3/8"	12.3	88.7	100.0	56.8	12.6	43.2
#4	3.2	6.2	97.6	40.4	16.4	59.6
#8	1.8	1.0	83.5	33.5	6.9	66.5
#16	1.4	0.7	68.5	27.5	6.1	72.5
#30	1.4	0.6	51.2	20.7	6.8	79.3
#50	1.1	0.6	26.6	11.0	9.7	89.0
#100	1.3	0.6	7.3	3.5	7.4	96.5
LBW	1.1	0.5	1.3	1.1	2.4	98.9
	•	^				

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.

61

\*% 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:	34	
45, 44 45, 33 Operating Zone Boundary	52, 41 <b>56</b> , 52, 34 <b>56</b> ,	68, 38 60] 38 Production Gradati	JMF Zone 75, 39 on 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"	89.2	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:

Sample Date:

**Production Gradation** 

11/21/22 Concrete Grade: DM, 4500HP

11/22/2022 11/28/2022 through

Dates Test F	Represents:	11/22/2022	through	11/28/2022		
Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	58-003	Stoneco	1410	8.40	2.69	47.6
26A	58-003	Stoneco	450	2.68	2.69	15.2
2NS	19-55	Schlegel	1100	6.60	2.67	37.2
		Total Wt	2060	17.60		100.0

MDOT No.:

Contractor:

Adjusted WF Intial Production Sample (IPS)

**Coarseness Factor:** 

37.3



**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	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	ĺ
1"	99.2	100	0.0	100.0	99.6	0.4	0.4	
3/4"	77.7	100	0.0	100.0	89.4	10.2	10.6	
1/2"	35.7	100	0.0	100.0	69.4	20.0	30.6	ĺ
3/8"	12.3	88	.7	100.0	56.5	12.9	43.5	*
#4	3.2	6.	2	100.0	39.6	16.9	60.4	*
#8	1.8	1.	0	90.8	34.8	4.9	65.2	nc
#16	1.4	0.	7	71.2	27.2	7.5	72.8	*
#30	1.4	0.	6	48.1	18.6	8.6	81.4	nc
#50	1.1	0.	6	16.9	6.9	11.7	93.1	*
#100	1.3	0.	6	3.2	1.9	5.0	98.1	a :
LBW	1.1	0.	5	0.3	0.7	1.2	99.3	ı

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:	67	Workability Factor: 35
45 45, 44 45, 44 45, 44 45, 33 Operating Zone Boundary	52, 41	57, 40 68, 40 75, 39 68, 38 Production Gradation 60, 3GPS 68, 32 75, 28
40 45	50	55 60 65 70 75 80 <b>Coarseness Factor (%)</b>
ActionLimits Boundary =		30ar36ri633 r a0tor (70)

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"	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:

11/21/22 Concrete Grade: DM, 4500HP

MDOT No.		

Dates Test F	Represents:	11/22/2022	through	11/28/2022		
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	63-115	Ray Rd	1150	6.95	2.65	39.6
		Total Wt	2905	17.69		100.0

MDOT No.:

Contractor:

--- Verify this number is 100%

SUPERIOR	
MATERIALS	

**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"	96.4	100.0	100.0	98.1	1.9	1.9
3/4"	75.1	100.0	100.0	87.1	11.0	12.9
1/2"	33.8	98.1	100.0	65.5	21.6	34.5
3/8"	16.3	89.3	100.0	55.7	9.8	44.3
#4	2.9	26.5	97.4	42.3	13.4	57.7
#8	2.0	7.0	81.4	33.9	8.5	66.1
#16	1.8	2.7	66.4	27.5	6.4	72.5
#30	1.7	2.0	50.5	21.0	6.4	79.0
#50	1.6	1.8	27.9	12.0	9.0	88.0
#100	1.5	1.7	5.5	3.1	8.9	96.9
LBW	1.2	1.5	0.6	1.0	2.1	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 Gra	dations	ons	Adjusted WF	Intial Producti	on Sample (IPS	)
Coarse	ness Factor:	67	Workability Factor:	34	36.4	Coars	eness Factor:	Ī
7 45 —					$\neg \top$	Work	ability Factor:	
	45, 44			JMF Zone	7 I I	Sieve	Cumulative	_
1 1		52, 41		31111 20110	<b>-</b>	Sieve	% Passing	
40 1			57, 40 68, 40			2"	100.0	ı
જે ૈ			68, 38	75, 39		1.5"	100.0	
-			!			1"	99.3	
유			■ 60, 36PS ■ roduction (	Gradation		3/4"	89.0	
Factor (%)			i		- 11	1/2"	70.3	Ī
	<b>—</b>	52, 34	<del>-</del> !		- 11	3/8"	59.9	Ī
Workability	45, 33		37-22 68-32			#4	41.9	
30 -			<b>37, 32 68, 32</b> 68, 31		- 11	#8	35.9	Ī
١ ١ ١	Operating Zone					#16	27.8	
∣Ş ∣∣	Boundary			75, 28	- 11	#30	18.9	Ī
<b>&gt;</b> 25   1						#50	6.3	
40	45	50 55	60 65 70	75	80	#100	1.7	
	_		Coarseness Factor (%) <sup>70</sup>	. •		LBW	1.0	
L ActionLim	its 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

## Aggregate Optimization Chart

PLANT #:

Sample Date:

Concrete Grade: DM, 4500HP 11/21/22

MDOT No.:

Contractor:

Dates Test F	Represents:	11/22/2022	through	11/28/2022		
Agg. Class	Pit#	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	71-47	Presque Isle	1405	8.59	2.62	48.4
26A	71-47	Presque Isle	350	2.14	2.62	12.0
2NS	95-013	Smelter Bay	1150	6.95	2.65	39.6
		Total Wt	2905	17.69		100.0

	IVIL
%	
tribution	
48.4	
12.0	
20.0	



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

	Total 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"	98.8	100	0.0	100.0	99.4	0.6	0.6
3/4"	89.9	100	0.0	100.0	95.1	4.3	4.9
1/2"	44.5	98	.1	100.0	72.9	22.2	27.1
3/8"	21.7	89	.3	100.0	60.8	12.1	39.2
#4	3.1	26	.5	96.4	42.9	18.0	57.1
#8	1.9	7.	0	84.2	35.1	7.8	64.9
#16	1.7	2.	7	69.0	28.5	6.6	71.5
#30	1.6	2.	0	50.4	21.0	7.5	79.0
#50	1.5	1.	8	24.6	10.7	10.3	89.3
#100	1.4	1.	7	7.1	3.7	7.0	96.3
LBW	1.2	1.	5	1.2	1.2	2.5	98.8

\*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	Adjusted WF 37.6		seness Factor:	÷
45	00	Workdomity I dotor:	- 55	57.0		kability Factor:	٠
45, 44	52, 41		JMF Zone	]	Sieve	Cumulative % Passing	
_ 40 -	52, 41	67, 40		- 11	2"	100.0	T
<b>3 3 4 3 4 4 5 1 4 5 1 1 1 1 1 1 1 1 1 1</b>	i	68, 38	75, 39	- 11	1.5"	100.0	
	!	Production Gradation		- 11	1"	100.0	
Factor 35		■ 60, 3MBS			3/4"	95.0	
<u>ig</u> 35 -	į į	il			1/2"	72.3	
	52, 34	<u> </u>			3/8"	60.4	
<b>≦</b> /45, 33	50.92	M7 32			#4	42.6	
Operating Zone Boundary	,	<b>67</b> , <b>32</b> , 31			#8	36.0	Г
Operating Zone	1		<b>_</b>		#16	29.5	
Boundary			75, 28		#30	20.3	Г
<b>&gt;</b> 25 <b>                   </b>	J				#50	9.5	Г
40 45	50 55	60 65 70	75	80	#100	3.4	
ActionLimits Boundary =	<u> </u>	Coarseness Factor (%) <sup>70</sup>	. 5	"	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

11/22/2022

PLANT #: P-32

Sample Date:

Dates Test Represents:

Concrete Grade: DM, 4500HP 11/21/22

11/28/2022

Contractor:

MDOT No.:

Agg. Class	Pit#	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	71-47	Presque Isle	1405	8.59	2.62	48.4
26A	71-47	Presque Isle	350	2.14	2.62	12.0
2NS	95-013	Smelter Bay	1150	6.95	2.65	39.6
Total Wt			2905	17.69		100.0

through

- Verify this number is 100%

37.6

**Coarseness Factor:** 

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

	i otai wt	2905 17.08		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"	98.8	100.0	100.0	99.4	0.6	0.6
3/4"	89.9	100.0	100.0	95.1	4.3	4.9
1/2"	44.5	98.1	100.0	72.9	22.2	27.1
3/8"	21.7	89.3	100.0	60.8	12.1	39.2
#4	3.1	26.5	96.4	42.9	18.0	57.1
#8	1.9	7.0	84.2	35.1	7.8	64.9
#16	1.7	2.7	69.0	28.5	6.6	71.5
#30	1.6	2.0	50.4	21.0	7.5	79.0
#50	1.5	1.8	24.6	10.7	10.3	89.3
#100	1.4	1.7	7.1	3.7	7.0	96.3
LBW	1.2	1.5	1.2	1.2	2.5	98.8
Production Grad	lation	ions     Aggregate Suppli	ier 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:	60	Workability Factor:	35	
45 45, 44 45, 44 45, 33 Operating Zone Boundary	52, 34	68, 38 Production Gradation 68, 38 68, 38	75, 28	
40 45  ActionLimits Boundary =	50 55	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"	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

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Pleasant Lake

Batch Plant Gradations

PLANT #:

81-019

Sample Date:

2NS

**Production Gradation** 

Concrete Grade: DM, 4500HP

6.95

Dates Test Represents:		11/22/2022	through	11/28/2022			
	Agg. Class	Pit #	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
	6AA	58-003	Stoneco	1400	8.34	2.69	47.5
	26A	58-003	Stoneco	400	2.38	2.69	13.6

1150

2.69 13.6 2.65 39.0

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 number 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"	99.2	10	0.0	100.0	99.6	0.4	0.4	
3/4"	77.7	10	100.0		89.4	10.2	10.6	
1/2"	35.7	10	100.0		69.5	19.9	30.5	
3/8"	12.3	88	3.7	100.0	56.8	12.6	43.2	
#4	3.2	6	.2	97.6	40.4	16.4	59.6	
#8	1.8	1	.0	83.5	33.5	6.9	66.5	
#16	1.4	0	.7	68.5	27.5	6.1	72.5	
#30	1.4	0	.6	51.2	20.7	6.8	79.3 ı	
#50	1.1	0	.6	26.6	11.0	9.7	89.0	
#100	1.3	0	.6	7.3	3.5	7.4	96.5	
LBW	1.1	0	.5	1.3	1.1	2.4	98.9	

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:	65	Workability Factor:	34	36.0
45 45, 44 45, 44 45, 33 Operating Zone Boundary	52, 41 <b>56</b> ; 52, 34 <b>56</b> ,	68, 38  ■ 60 Production Grace	75, 39 dation 75, 28	
40 45 ActionLimits Boundary =	<u>50</u> 55	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"	89.1	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

Sample Date:

Dates Test Represents:

**Production Gradation** 

11/21/22 Concrete Grade: **DM**, **4500HP** 

HP

11/22/2022 through 11/28/2022

Agg. Class	Pit#	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	71-47	Presque Isle	1500	9.17	2.62	51.6
26A	71-47	Presque Isle	305	1.87	2.62	10.5
2NS	63-92	Grange Hall	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:** 

35.7

<---- Verify this number is 100%

SUPERIOR MATERIALS

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
1.5"	100.0	100.0	100.0	100.0	0.0	0.0	
1"	96.4	100.0	100.0	98.1	1.9	1.9	
3/4"	75.1	100.0	100.0	87.1	11.0	12.9	
1/2"	33.8	98.1	100.0	65.6	21.5	34.4	]
3/8"	16.3	89.3	100.0	55.7	10.0	44.3	*
#4	2.9	26.5	97.3	41.1	14.5	58.9	*
#8	2.0	7.0	83.1	33.2	7.9	66.8	no
#16	1.8	2.7	68.3	27.1	6.2	72.9	*
#30	1.7	2.0	50.4	20.2	6.9	79.8	no
#50	1.6	1.8	23.1	9.8	10.4	90.2	*
#100	1.5	1.7	3.2	2.2	7.6	97.8	a 2
LBW	1.2	1.5	0.4	0.9	1.2	99.1	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.

 $^{\star}\%$  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 45, 44 45, 33 45, 33	52, 41	58, 39 68, 38 68, 38 Production Gr. 58, 31	JMF Zone 75, 39	
25 +			75, 28	
40 45  ActionLimits Boundary =	50	Coarseness Factor (%) <sup>70</sup>	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"	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:

**Production Gradation** 

11/21/22 Concrete Grade: DM, 4500HP

Dates Test F	Represents:	11/22/2022	through	11/28/2022		
Agg. Class	Pit#	Source	Weight (SSD)	ft <sup>3</sup>	Specific Gravity	% Contribution
6AA	71-47	Presque Isle	1605	9.82	2.62	55.2
26A	71-47	Presque Isle	200	1.22	2.62	6.9
2NS	44-051	Krake Willis Rd	1100	6.65	2.65	37.9
				4 = 00		4000

MDOT No.:

Adjusted WF Intial Production Sample (IPS)

**Coarseness Factor:** 

34.7

Contractor:



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

	i otai 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"	98.3	100	0.0	100.0	99.1	0.9	0.9
3/4"	87.6	100	0.0	100.0	93.1	5.9	6.9
1/2"	49.5	94	.9	100.0	71.7	21.4	28.3
3/8"	28.5	80	.4	100.0	59.1	12.6	40.9
#4	4.8	20	.8	96.4	40.6	18.6	59.4
#8	2.1	7.	6	80.6	32.2	8.4	67.8
#16	1.8	4.	2	65.7	26.2	6.0	73.8
#30	1.8	3.	2	48.1	19.4	6.7	80.6
#50	1.7	2.	8	23.7	10.1	9.3	89.9
#100	1.7	2.	6	7.2	3.8	6.3	96.2
LBW	1.5	2.	4	0.9	1.3	2.5	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.

Coars	eness Factor:	60	Workability Factor:	32	
45 T	45, 44	52, 41	58, 40 68, 38 68, 38	JMF Zone 75, 39	
Workability Factor (%)	Operating Zone Boundary	52, 34	Production Gradation  59, 22	75, 28	
25 +	45 hits 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"	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

Sample Date:

**Production Gradation** 

Concrete Grade: DM, 4500HP

	Dates Test Represents:		11/22/2022	through	11/28/2022		
	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
Ī	26A	71-47	Presque Isle	250	1.53	2.62	8.6

Contractor:

MDOT No.:

Adjusted WF Intial Production Sample (IPS)

**Coarseness Factor:** 

36.4

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	63-115	Ray Rd	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	17.69		100.0	< Verify this n	umber is 100%
Sieve	6AA	26 <i>A</i>	1	2NS	Cumulative % Passing	% Retained	Cumulative % Retained
2"	100.0	100.	0	100.0	100.0	0.0	0.0
1.5"	100.0	100.	0	100.0	100.0	0.0	0.0
1"	96.4	100.	0	100.0	98.1	1.9	1.9
3/4"	75.1	100.	0	100.0	87.1	11.0	12.9
1/2"	33.8	98.1	1	100.0	65.5	21.6	34.5
3/8"	16.3	89.3	3	100.0	55.7	9.8	44.3
#4	2.9	26.5	5	97.4	42.3	13.4	57.7
#8	2.0	7.0		81.4	33.9	8.5	66.1
#16	1.8	2.7		66.4	27.5	6.4	72.5
#30	1.7	2.0		50.5	21.0	6.4	79.0
#50	1.6	1.8		27.9	12.0	9.0	88.0
#100	1.5	1.7		5.5	3.1	8.9	96.9
LBW	1.2	1.5		0.6	1.0	2.1	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.

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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:	67	Workability Factor:	34	
45 45, 44 45, 44 45, 33 45, 33 Operating Zone Boundary	52, 41	58, 39 68, 39 68, 38 Productio	JMF Zone 75, 39 In Gradation 75, 28	
40 45  ActionLimits Boundary =	50	55 Coarseness Factor (%)	75	80

O 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