

# Aggregate Optimization Chart

## Production Gradation Report

PLANT #: **P-35**

Sample Date: **10/3/22**

Dates Test Represents: **10/4/2022** through **10/10/2022**

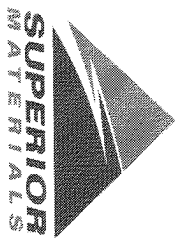
Concrete Grade: **P1M, 3500HP**

Contractor: \_\_\_\_\_

MDOT No.: \_\_\_\_\_

| Agg. Class      | Pit #  | Source        | Weight (ssd) | ft <sup>3</sup> | Specific Gravity | Contribution % |
|-----------------|--------|---------------|--------------|-----------------|------------------|----------------|
| CA              | 58-003 | Stonoco       | 1370         | 8.16            | 2.69             | 43.9           |
| IA              | 58-003 | Stonoco       | 560          | 3.28            | 2.69             | 17.6           |
| 2NS             | 81-019 | Pleasant Lake | 1200         | 7.26            | 2.65             | 38.5           |
| <b>Total Wt</b> |        |               | <b>3120</b>  | <b>18.70</b>    |                  | <b>100.0</b>   |

| Sieve | CA    | IA    | 2NS   | Cumulative % Passing | % Retained | Cumulative % Retained |
|-------|-------|-------|-------|----------------------|------------|-----------------------|
| 2"    | 100.0 | 100.0 | 100.0 | 100.0                | 0.0        | 0.0                   |
| 1.5"  | 100.0 | 100.0 | 100.0 | 100.0                | 0.0        | 0.0                   |
| 1"    | 61.5  | 100.0 | 100.0 | 83.1                 | 16.9       | 16.9                  |
| 3/4"  | 21.0  | 100.0 | 100.0 | 65.3                 | 17.8       | 34.7                  |
| 1/2"  | 10.6  | 95.3  | 100.0 | 59.9                 | 5.4        | 40.1                  |
| 3/8"  | 8.6   | 82.7  | 100.0 | 56.8                 | 3.1        | 43.2                  |
| #4    | 3.4   | 28.3  | 98.5  | 44.4                 | 12.5       | 55.6                  |
| #8    | 2.4   | 9.0   | 83.1  | 34.6                 | 9.8        | 65.4                  |
| #16   | 1.9   | 4.1   | 66.7  | 27.2                 | 7.4        | 72.8                  |
| #30   | 1.7   | 2.7   | 49.3  | 20.2                 | 7.0        | 79.8                  |
| #50   | 1.5   | 2.2   | 24.8  | 10.6                 | 9.6        | 89.4                  |
| #100  | 1.3   | 2.0   | 7.8   | 3.9                  | 6.7        | 96.1                  |
| LBW   | 1.0   | 1.9   | 1.8   | 1.5                  | 2.5        | 98.5                  |

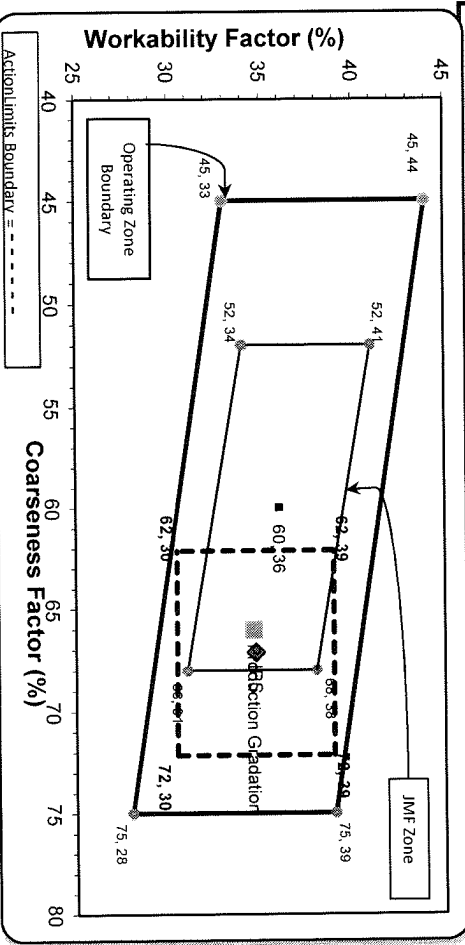


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\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max.  
 nom. max. #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max.  
 nom. max. #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when  
 a 2" max. size (nom. Max. 1.5") aggregate is used.

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Coarseness Factor: **66** Workability Factor: **35**



| Sieve | Coarseness Factor: | Workability Factor: | % Retained | Cumulative % Retained |
|-------|--------------------|---------------------|------------|-----------------------|
| 2"    | 67                 | 35                  | 0.0        | 0.0                   |
| 1.5"  |                    |                     | 0.0        | 0.0                   |
| 1"    |                    |                     | 13.1       | 13.1                  |
| 3/4"  |                    |                     | 10.8       | 23.9                  |
| 1/2"  |                    |                     | 12.4       | 36.3                  |
| 3/8"  |                    |                     | 7.5        | 43.8                  |
| #4    |                    |                     | 13.0       | 56.8                  |
| #8    |                    |                     | 8.5        | 65.3                  |
| #16   |                    |                     | 7.2        | 72.5                  |
| #30   |                    |                     | 7.0        | 79.4                  |
| #50   |                    |                     | 11.6       | 91.0                  |
| #100  |                    |                     | 6.9        | 97.9                  |
| LBW   |                    |                     | 1.1        | 99.0                  |

PREPARED BY:  
 SM, LLC Technical Service

Approved By: \_\_\_\_\_



Plant S35-Superior Romulus  
 Product 1022-2NS GR  
 Period: 10/02/2022 - 10/08/2022

Name/Title Doug Storey / QC Technician  
 Report Date 10/07/2022

| Procedure  | Sieve/Test            | Result | Unit | 2NS GR Spec |
|------------|-----------------------|--------|------|-------------|
|            | 3/8" (9.5mm)          | 100.0  | %    | 100-100     |
|            | #4 (4.75mm)           | 98.5   | %    | 95-100      |
|            | #8 (2.36mm)           | 83.1   | %    | 65-95       |
|            | #16 (1.18mm)          | 66.7   | %    | 35-75       |
|            | #30 (.6mm)            | 49.3   | %    | 20-55       |
|            | #50 (.3mm)            | 24.8   | %    | 10-30       |
|            | #100 (.15mm)          | 7.8    | %    | 0-10        |
|            | #200 (75µm)           | 2.2    | %    |             |
|            | FM                    | 2.70   |      | 2.6-3       |
| AASHTO T11 | #200 (75um)           | 2.24   | %    |             |
|            | Wash Loss (#200/75um) | 1.8    | %    | 0-3         |
| ASTM C566  | Total Moisture        | 3.13   | %    |             |



Plant S35-Superior Romulus  
 Product 7920-INTERMED AGG P1M LS  
 Period: 10/02/2022 - 10/08/2022

Name/Title Doug Storey / QC Technician  
 Report Date 10/07/2022

| Procedure | Sieve/Test            | Result | Unit | Intermed Agg P1M LS Target |
|-----------|-----------------------|--------|------|----------------------------|
|           | 2" (50mm)             | 100.0  | %    |                            |
|           | 1 1/2" (37.5mm)       | 100.0  | %    |                            |
|           | 1" (25mm)             | 100.0  | %    |                            |
|           | 3/4" (19mm)           | 100.0  | %    |                            |
|           | 1/2" (12.5mm)         | 95.3   | %    |                            |
|           | 3/8" (9.5mm)          | 82.7   | %    |                            |
|           | #4 (4.75mm)           | 28.3   | %    |                            |
|           | #8 (2.36mm)           | 9.0    | %    |                            |
|           | #16 (1.18mm)          | 4.1    | %    |                            |
|           | #30 (.6mm)            | 2.7    | %    |                            |
|           | #50 (.3mm)            | 2.2    | %    |                            |
|           | #100 (.15mm)          | 2.0    | %    |                            |
|           | #200 (75µm)           | 1.9    | %    |                            |
|           | Wash Loss (#200/75um) | 1.9    | %    | 0-3                        |
| ASTM C566 | Total Moisture        | 2.49   | %    |                            |



**Plant** S35-Superior Romulus  
**Product** 7919-COARSE AGG P1M LS  
**Period:** 10/02/2022 - 10/08/2022

**Name/Title** Doug Storey / QC Technician  
**Report Date** 10/07/2022

| Procedure | Sieve/Test            | Result | Unit | Coarse Agg P1M LS Target |
|-----------|-----------------------|--------|------|--------------------------|
|           | 2" (50mm)             | 100.0  | %    |                          |
|           | 1 1/2" (37.5mm)       | 100.0  | %    |                          |
|           | 1" (25mm)             | 61.5   | %    |                          |
|           | 3/4" (19mm)           | 21.0   | %    |                          |
|           | 1/2" (12.5mm)         | 10.6   | %    |                          |
|           | 3/8" (9.5mm)          | 8.6    | %    |                          |
|           | #4 (4.75mm)           | 3.4    | %    |                          |
|           | #8 (2.36mm)           | 2.4    | %    |                          |
|           | #16 (1.18mm)          | 1.9    | %    |                          |
|           | #30 (.6mm)            | 1.7    | %    |                          |
|           | #50 (.3mm)            | 1.5    | %    |                          |
|           | #100 (.15mm)          | 1.3    | %    |                          |
|           | #200 (75µm)           | 1.1    | %    |                          |
|           | Wash Loss (#200/75um) | 1.0    | %    | 0-2                      |
| ASTM C566 | Total Moisture        | 1.59   | %    |                          |

# Aggregate Optimization Chart

**PLANT #:** P-36

Sample Date: 10/3/22

Dates Test Represents: 10/4/2022 through 10/10/2022

Concrete Grade: P1M, 3500HP

Contractor: \_\_\_\_\_

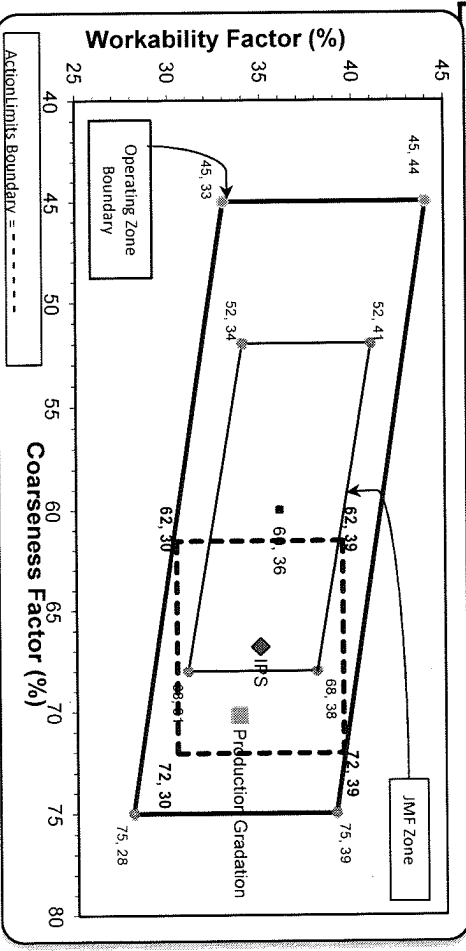
MDOT No.: \_\_\_\_\_

| Agg. Class      | Pit # | Source       | Weight (ssd) | ft <sup>3</sup> | Specific Gravity | Contribution % |
|-----------------|-------|--------------|--------------|-----------------|------------------|----------------|
| CA              | 71-47 | Presque Isle | 1050         | 6.42            | 2.62             | 34.2           |
| IA              | 71-47 | Presque Isle | 820          | 5.02            | 2.62             | 26.7           |
| 2NS             | 63-92 | Grange Hall  | 1200         | 7.26            | 2.65             | 39.1           |
| <b>Total Wt</b> |       |              |              |                 |                  | <b>100.0</b>   |
| <b>Total Wt</b> |       |              |              |                 |                  | <b>3070</b>    |
| <b>Total Wt</b> |       |              |              |                 |                  | <b>18.70</b>   |

| Sieve | CA    | IA    | 2NS   | Cumulative % Passing | % Retained | Cumulative % Retained |
|-------|-------|-------|-------|----------------------|------------|-----------------------|
| 2"    | 100.0 | 100.0 | 100.0 | 100.0                | 0.0        | 0.0                   |
| 1.5"  | 96.9  | 100.0 | 100.0 | 98.9                 | 1.1        | 1.1                   |
| 1"    | 43.3  | 100.0 | 100.0 | 80.6                 | 18.3       | 19.4                  |
| 3/4"  | 12.2  | 97.5  | 100.0 | 69.3                 | 11.3       | 30.7                  |
| 1/2"  | 4.1   | 75.8  | 100.0 | 60.7                 | 8.6        | 39.3                  |
| 3/8"  | 3.2   | 49.9  | 100.0 | 53.5                 | 7.2        | 46.5                  |
| #4    | 2.3   | 7.6   | 97.2  | 40.8                 | 12.7       | 59.2                  |
| #8    | 2.2   | 2.4   | 82.8  | 33.8                 | 7.1        | 66.2                  |
| #16   | 2.1   | 1.9   | 67.4  | 27.6                 | 6.2        | 72.4                  |
| #30   | 2.1   | 1.7   | 48.1  | 20.0                 | 7.6        | 80.0                  |
| #50   | 2.0   | 1.7   | 18.9  | 8.5                  | 11.4       | 91.5                  |
| #100  | 1.9   | 1.6   | 3.4   | 2.4                  | 6.1        | 97.6                  |
| LBW   | 1.6   | 1.4   | 0.6   | 1.2                  | 1.3        | 98.8                  |

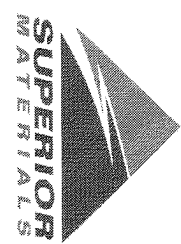
Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Coarseness Factor: 70 Workability Factor: 34



| Sieve | Coarseness Factor: | Workability Factor: | % Retained | Cumulative % Retained |
|-------|--------------------|---------------------|------------|-----------------------|
| 2"    | 67                 | 35                  | 0.0        | 0.0                   |
| 1.5"  | 67                 | 35                  | 0.0        | 0.0                   |
| 1"    | 67                 | 35                  | 15.0       | 15.0                  |
| 3/4"  | 67                 | 35                  | 12.9       | 27.9                  |
| 1/2"  | 67                 | 35                  | 7.6        | 35.5                  |
| 3/8"  | 67                 | 35                  | 8.0        | 43.5                  |
| #4    | 67                 | 35                  | 13.8       | 57.3                  |
| #8    | 67                 | 35                  | 7.8        | 65.1                  |
| #16   | 67                 | 35                  | 5.9        | 71.0                  |
| #30   | 67                 | 35                  | 8.0        | 79.0                  |
| #50   | 67                 | 35                  | 12.8       | 91.8                  |
| #100  | 67                 | 35                  | 6.5        | 98.4                  |
| LBW   | 67                 | 35                  | 0.9        | 99.3                  |

Initial Production Sample (IPS)



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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.

PREPARED BY:  
 SM, LLC Technical Service

Approved By: \_\_\_\_\_



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Auburn Hills, MI 48432

Plant S36-Superior Auburn Hills

Product 1022-2NS GR

Name/Title Doug Storey / QC Technician

Period: 10/02/2022 - 10/08/2022

Report Date 10/07/2022

| Procedure | Sieve/Test            | Result | Unit | 2NS GR Spec |
|-----------|-----------------------|--------|------|-------------|
|           | 3/8" (9.5mm)          | 100.0  | %    | 100-100     |
|           | #4 (4.75mm)           | 97.2   | %    | 95-100      |
|           | #8 (2.36mm)           | 82.8   | %    | 65-95       |
|           | #16 (1.18mm)          | 67.4   | %    | 35-75       |
|           | #30 (.6mm)            | 48.1   | %    | 20-55       |
|           | #50 (.3mm)            | 18.9   | %    | 10-30       |
|           | #100 (.15mm)          | 3.4    | %    | 0-10        |
|           | #200 (75µm)           | 0.7    | %    |             |
|           | FM                    | 2.82   |      | 2.6-3       |
|           | Wash Loss (#200/75um) | 0.6    | %    | 0-3         |
|           | Total Moisture        | 3.08   | %    |             |



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Plant S36-Superior Auburn Hills

Product 7920-INTERMED AGG P1M LS

Name/Title Doug Storey / QC Technician

Period: 10/02/2022 - 10/08/2022

Report Date 10/07/2022

| Procedure | Sieve/Test            | Result | Unit | Intermed Agg P1M LS Target |
|-----------|-----------------------|--------|------|----------------------------|
|           | 2" (50mm)             | 100.0  | %    |                            |
|           | 1 1/2" (37.5mm)       | 100.0  | %    |                            |
|           | 1" (25mm)             | 100.0  | %    |                            |
|           | 3/4" (19mm)           | 97.5   | %    |                            |
|           | 1/2" (12.5mm)         | 75.8   | %    |                            |
|           | 3/8" (9.5mm)          | 49.9   | %    |                            |
|           | #4 (4.75mm)           | 7.6    | %    |                            |
|           | #8 (2.36mm)           | 2.4    | %    |                            |
|           | #16 (1.18mm)          | 1.9    | %    |                            |
|           | #30 (.6mm)            | 1.7    | %    |                            |
|           | #50 (.3mm)            | 1.7    | %    |                            |
|           | #100 (.15mm)          | 1.6    | %    |                            |
|           | #200 (75µm)           | 1.5    | %    |                            |
|           | Wash Loss (#200/75um) | 1.4    | %    | 0-3                        |
|           | Total Moisture        | 3.53   | %    |                            |



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Plant S36-Superior Auburn Hills

Product 7919-COARSE AGG P1M LS

Name/Title Doug Storey / QC Technician

Period: 10/02/2022 - 10/08/2022

Report Date 10/07/2022

| Procedure | Sieve/Test            | Result | Unit | Coarse Agg P1M LS Target |
|-----------|-----------------------|--------|------|--------------------------|
|           | 2" (50mm)             | 100.0  | %    |                          |
|           | 1 1/2" (37.5mm)       | 96.9   | %    |                          |
|           | 1" (25mm)             | 43.3   | %    |                          |
|           | 3/4" (19mm)           | 12.2   | %    |                          |
|           | 1/2" (12.5mm)         | 4.1    | %    |                          |
|           | 3/8" (9.5mm)          | 3.2    | %    |                          |
|           | #4 (4.75mm)           | 2.3    | %    |                          |
|           | #8 (2.36mm)           | 2.2    | %    |                          |
|           | #16 (1.18mm)          | 2.1    | %    |                          |
|           | #30 (.6mm)            | 2.1    | %    |                          |
|           | #50 (.3mm)            | 2.0    | %    |                          |
|           | #100 (.15mm)          | 1.9    | %    |                          |
|           | #200 (75µm)           | 1.7    | %    |                          |
|           | Wash Loss (#200/75um) | 1.6    | %    | 0-2                      |
|           | Total Moisture        | 1.41   | %    |                          |