

# Aggregate Optimization Chart

**PLANT #:** **P-32**

Sample Date: 3/30/20

Concrete Grade: **S2M**

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

Dates Test Represents: 3/31/2020 through 4/6/2020

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

| Agg. Class      | Pit #  | Source       | Weight (SSD) | ft <sup>3</sup> | Specific Gravity | % Contribution |
|-----------------|--------|--------------|--------------|-----------------|------------------|----------------|
| 6AA             | 71-47  | Presque Isle | 1470         | 8.99            | 2.62             | 48.2           |
| 26A             | 71-47  | Presque Isle | 300          | 1.83            | 2.62             | 9.8            |
| 2NS             | 63-115 | Ray Rd       | 1280         | 7.74            | 2.65             | 42.0           |
| <b>Total Wt</b> |        |              | <b>3050</b>  | <b>18.57</b>    |                  | <b>100.0</b>   |

<----- Verify this number is 100%



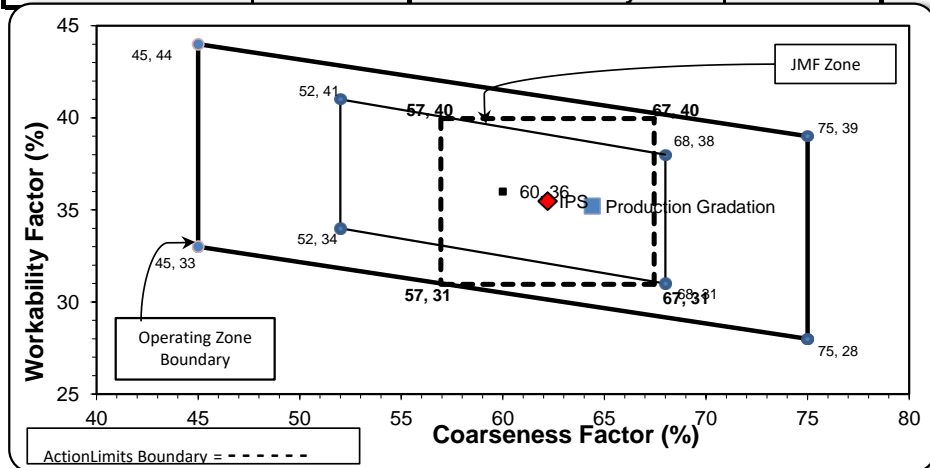
**Superior Materials, LLC**  
 30701 W. 10 Mile Rd.  
 Suite 500  
 Farmington Hills, MI 48336

| Sieve | 6AA   | 26A   | 2NS   | Cumulative % Passing | % Retained | Cumulative % Retained |
|-------|-------|-------|-------|----------------------|------------|-----------------------|
| 2"    | 100.0 | 100.0 | 100.0 | 100.0                | 0.0        | 0.0                   |
| 1.5"  | 100.0 | 100.0 | 100.0 | 100.0                | 0.0        | 0.0                   |
| 1"    | 100.0 | 100.0 | 100.0 | 100.0                | 0.0        | 0.0                   |
| 3/4"  | 78.1  | 100.0 | 100.0 | 89.4                 | 10.6       | 10.6                  |
| 1/2"  | 33.1  | 100.0 | 100.0 | 67.8                 | 21.7       | 32.2                  |
| 3/8"  | 15.8  | 88.4  | 100.0 | 58.3                 | 9.5        | 41.7                  |
| #4    | 3.8   | 23.9  | 96.6  | 44.7                 | 13.6       | 55.3                  |
| #8    | 2.8   | 7.2   | 79.0  | 35.2                 | 9.5        | 64.8                  |
| #16   | 2.5   | 3.7   | 61.9  | 27.5                 | 7.7        | 72.5                  |
| #30   | 2.3   | 3.1   | 45.6  | 20.6                 | 7.0        | 79.4                  |
| #50   | 2.2   | 2.8   | 22.5  | 10.8                 | 9.8        | 89.2                  |
| #100  | 2.0   | 2.6   | 4.3   | 3.0                  | 7.8        | 97.0                  |
| LBW   | 1.5   | 2.3   | 0.6   | 1.2                  | 1.8        | 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.

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

|                           |           |                            |           |
|---------------------------|-----------|----------------------------|-----------|
| <b>Coarseness Factor:</b> | <b>64</b> | <b>Workability Factor:</b> | <b>35</b> |
|---------------------------|-----------|----------------------------|-----------|



Initial Production Sample (IPS)

| 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"  | 94.0                 | 6.0        | 6.0                   |
| 1/2"  | 70.2                 | 23.7       | 29.8                  |
| 3/8"  | 59.9                 | 10.4       | 40.1                  |
| #4    | 42.7                 | 17.2       | 57.3                  |
| #8    | 35.5                 | 7.2        | 64.5                  |
| #16   | 28.4                 | 7.0        | 71.6                  |
| #30   | 19.2                 | 9.2        | 80.8                  |
| #50   | 8.9                  | 10.3       | 91.1                  |
| #100  | 3.1                  | 5.9        | 96.9                  |
| LBW   | 1.4                  | 1.7        | 98.6                  |

PREPARED BY:  
 SM, LLC Technical Service

Approved By:

# Aggregate Optimization Chart

**PLANT #:** **P-36**

Sample Date: 3/30/20

Concrete Grade: **S2M**

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

Dates Test Represents: 3/31/2020 through 4/6/2020

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

| Agg. Class      | Pit # | Source       | Weight (SSD) | ft <sup>3</sup> | Specific Gravity | % Contribution |
|-----------------|-------|--------------|--------------|-----------------|------------------|----------------|
| 6AA             | 71-47 | Presque Isle | 1450         | 8.87            | 2.62             | 47.5           |
| 26A             | 71-47 | Presque Isle | 400          | 2.45            | 2.62             | 13.1           |
| 2NS             | 63-92 | Grange Hall  | 1200         | 7.26            | 2.65             | 39.3           |
| <b>Total Wt</b> |       |              | <b>3050</b>  | <b>18.57</b>    |                  | <b>100.0</b>   |

<----- Verify this number is 100%



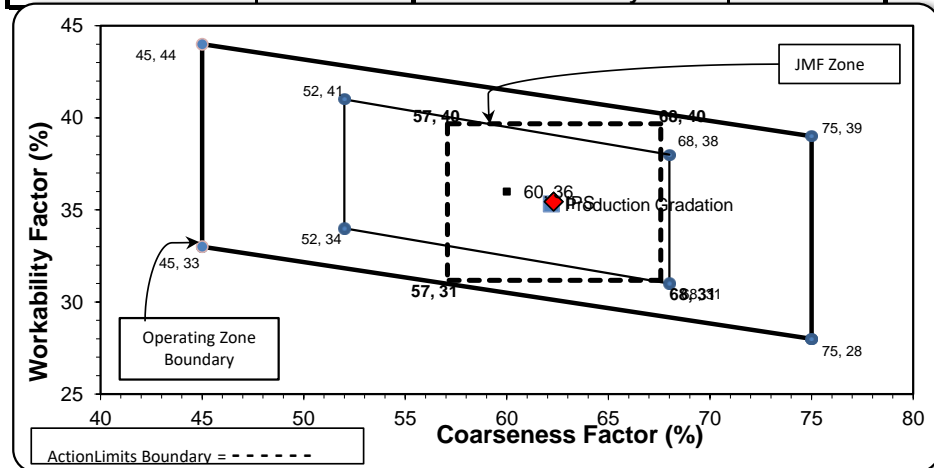
**Superior Materials, LLC**  
 30701 W. 10 Mile Rd.  
 Suite 500  
 Farmington Hills, MI 48336

| 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"    | 98.3  | 100.0 | 100.0 | 99.2                 | 0.8        | 0.8                   |
| 3/4"  | 77.6  | 100.0 | 100.0 | 89.4                 | 9.8        | 10.6                  |
| 1/2"  | 37.6  | 100.0 | 100.0 | 70.3                 | 19.0       | 29.7                  |
| 3/8"  | 18.6  | 88.4  | 100.0 | 59.8                 | 10.6       | 40.2                  |
| #4    | 3.5   | 23.9  | 97.4  | 43.1                 | 16.7       | 56.9                  |
| #8    | 2.3   | 7.2   | 84.6  | 35.3                 | 7.8        | 64.7                  |
| #16   | 2.0   | 3.7   | 69.7  | 28.9                 | 6.5        | 71.1                  |
| #30   | 1.9   | 3.1   | 51.1  | 21.4                 | 7.4        | 78.6                  |
| #50   | 1.8   | 2.8   | 22.2  | 10.0                 | 11.5       | 90.0                  |
| #100  | 1.6   | 2.6   | 3.3   | 2.4                  | 7.6        | 97.6                  |
| LBW   | 1.3   | 2.3   | 0.8   | 1.2                  | 1.2        | 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.

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

|                           |           |                            |           |
|---------------------------|-----------|----------------------------|-----------|
| <b>Coarseness Factor:</b> | <b>62</b> | <b>Workability Factor:</b> | <b>35</b> |
|---------------------------|-----------|----------------------------|-----------|



Initial Production Sample (IPS)

| <b>Coarseness Factor:</b>  | <b>62</b>            |            |                       |
|----------------------------|----------------------|------------|-----------------------|
| <b>Workability Factor:</b> | <b>35</b>            |            |                       |
| 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"                       | 90.5                 | 8.6        | 9.5                   |
| 1/2"                       | 69.8                 | 20.7       | 30.2                  |
| 3/8"                       | 59.8                 | 10.0       | 40.2                  |
| #4                         | 42.2                 | 17.6       | 57.8                  |
| #8                         | 35.4                 | 6.7        | 64.6                  |
| #16                        | 28.8                 | 6.7        | 71.2                  |
| #30                        | 21.4                 | 7.4        | 78.6                  |
| #50                        | 8.8                  | 12.6       | 91.2                  |
| #100                       | 1.8                  | 7.0        | 98.2                  |
| LBW                        | 0.7                  | 1.0        | 99.3                  |

PREPARED BY:  
 SM, LLC Technical Service

Approved By:

# Aggregate Optimization Chart

**PLANT #:** **P-39**

Sample Date: 3/30/20

Concrete Grade: **S2M**

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

Dates Test Represents: 3/31/2020 through 4/6/2020

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

| Agg. Class      | Pit # | Source       | Weight (SSD) | ft <sup>3</sup> | Specific Gravity | % Contribution |
|-----------------|-------|--------------|--------------|-----------------|------------------|----------------|
| 6AA             | 71-47 | Presque Isle | 1600         | 9.79            | 2.62             | 52.5           |
| 26A             | 71-47 | Presque Isle | 250          | 1.53            | 2.62             | 8.2            |
| 2NS             | 63-92 | Grange Hall  | 1200         | 7.26            | 2.65             | 39.3           |
| <b>Total Wt</b> |       |              | <b>3050</b>  | <b>18.57</b>    |                  | <b>100.0</b>   |

<----- Verify this number is 100%



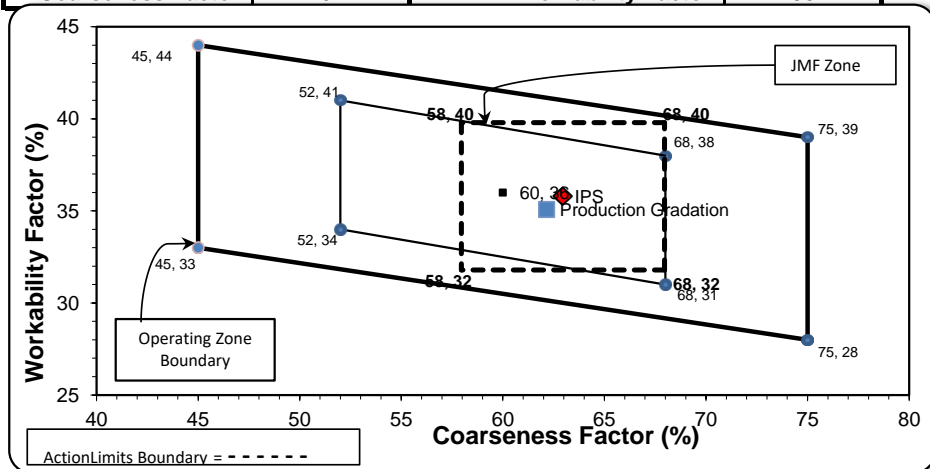
**Superior Materials, LLC**  
 30701 W. 10 Mile Rd.  
 Suite 500  
 Farmington Hills, MI 48336

| 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"    | 98.1  | 100.0 | 100.0 | 99.0                 | 1.0        | 1.0                   |
| 3/4"  | 86.5  | 100.0 | 100.0 | 92.9                 | 6.1        | 7.1                   |
| 1/2"  | 44.0  | 100.0 | 100.0 | 70.6                 | 22.3       | 29.4                  |
| 3/8"  | 24.9  | 88.4  | 100.0 | 59.7                 | 11.0       | 40.3                  |
| #4    | 4.6   | 23.9  | 97.4  | 42.7                 | 17.0       | 57.3                  |
| #8    | 2.3   | 7.2   | 84.6  | 35.1                 | 7.6        | 64.9                  |
| #16   | 2.0   | 3.7   | 69.7  | 28.8                 | 6.3        | 71.2                  |
| #30   | 1.9   | 3.1   | 51.1  | 21.4                 | 7.4        | 78.6                  |
| #50   | 1.8   | 2.8   | 22.2  | 9.9                  | 11.4       | 90.1                  |
| #100  | 1.7   | 2.6   | 3.3   | 2.4                  | 7.5        | 97.6                  |
| LBW   | 1.5   | 2.3   | 0.8   | 1.3                  | 1.1        | 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 Gradations  Aggregate Supplier Gradations

|                           |           |                            |           |
|---------------------------|-----------|----------------------------|-----------|
| <b>Coarseness Factor:</b> | <b>62</b> | <b>Workability Factor:</b> | <b>35</b> |
|---------------------------|-----------|----------------------------|-----------|



Initial Production Sample (IPS)

|                            |           |
|----------------------------|-----------|
| <b>Coarseness Factor:</b>  | <b>63</b> |
| <b>Workability Factor:</b> | <b>36</b> |

| 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"  | 89.8                 | 10.2       | 10.2                  |
| 1/2"  | 70.7                 | 19.1       | 29.3                  |
| 3/8"  | 59.6                 | 11.1       | 40.4                  |
| #4    | 43.2                 | 16.4       | 56.8                  |
| #8    | 35.8                 | 7.4        | 64.2                  |
| #16   | 29.2                 | 6.6        | 70.8                  |
| #30   | 21.4                 | 7.8        | 78.6                  |
| #50   | 9.8                  | 11.6       | 90.2                  |
| #100  | 3.7                  | 6.1        | 96.3                  |
| LBW   | 1.2                  | 2.5        | 98.8                  |

PREPARED BY:  
 SM, LLC Technical Service

Approved By:

# Aggregate Optimization Chart

**PLANT #:** **P-02**

Sample Date: 3/30/20

Concrete Grade: **S2M**

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

Dates Test Represents: 3/31/2020 through 4/6/2020

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

| Agg. Class      | Pit #  | Source       | Weight (SSD) | ft <sup>3</sup> | Specific Gravity | % Contribution |
|-----------------|--------|--------------|--------------|-----------------|------------------|----------------|
| 6AA             | 71-47  | Presque Isle | 1450         | 8.87            | 2.62             | 47.5           |
| 26A             | 71-47  | Presque Isle | 300          | 1.83            | 2.62             | 9.8            |
| 2NS             | 63-115 | Ray Rd       | 1300         | 7.86            | 2.65             | 42.6           |
| <b>Total Wt</b> |        |              | <b>3050</b>  | <b>18.57</b>    |                  | <b>100.0</b>   |

<----- Verify this number is 100%



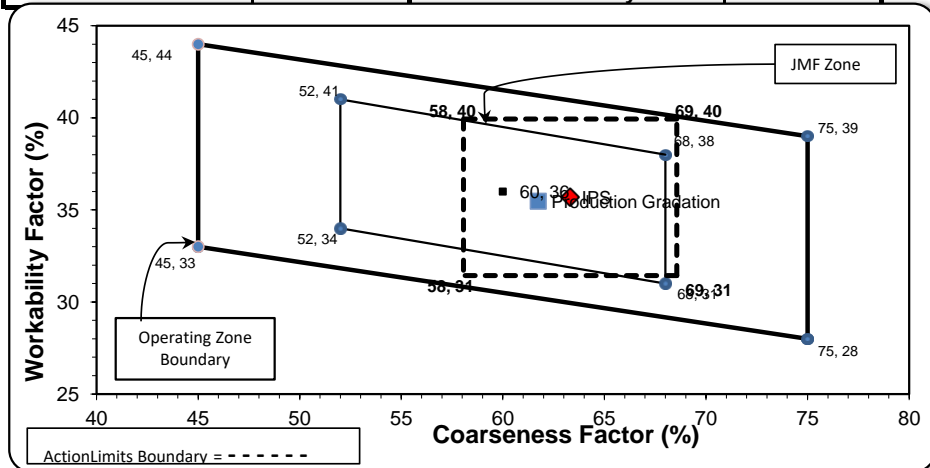
**Superior Materials, LLC**  
 30701 W. 10 Mile Rd.  
 Suite 500  
 Farmington Hills, MI 48336

| 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"    | 98.3  | 100.0 | 100.0 | 99.2                 | 0.8        | 0.8                   |
| 3/4"  | 77.6  | 100.0 | 100.0 | 89.4                 | 9.8        | 10.6                  |
| 1/2"  | 37.6  | 100.0 | 100.0 | 70.3                 | 19.0       | 29.7                  |
| 3/8"  | 18.6  | 88.4  | 100.0 | 60.2                 | 10.2       | 39.8                  |
| #4    | 3.5   | 23.9  | 96.6  | 45.2                 | 15.0       | 54.8                  |
| #8    | 2.3   | 7.2   | 79.0  | 35.5                 | 9.7        | 64.5                  |
| #16   | 2.0   | 3.7   | 61.9  | 27.7                 | 7.8        | 72.3                  |
| #30   | 1.9   | 3.1   | 45.6  | 20.6                 | 7.1        | 79.4                  |
| #50   | 1.8   | 2.8   | 22.5  | 10.7                 | 9.9        | 89.3                  |
| #100  | 1.6   | 2.6   | 4.3   | 2.8                  | 7.9        | 97.2                  |
| LBW   | 1.3   | 2.3   | 0.6   | 1.1                  | 1.7        | 98.9                  |

\*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:** **62**      **Workability Factor:** **35**



Initial Production Sample (IPS)

**Coarseness Factor:** **63**  
**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"  | 95.6                 | 4.4        | 4.4                   |
| 1/2"  | 73.1                 | 22.6       | 26.9                  |
| 3/8"  | 59.3                 | 13.8       | 40.7                  |
| #4    | 42.8                 | 16.5       | 57.2                  |
| #8    | 35.7                 | 7.1        | 64.3                  |
| #16   | 28.9                 | 6.8        | 71.1                  |
| #30   | 20.7                 | 8.2        | 79.3                  |
| #50   | 9.9                  | 10.8       | 90.1                  |
| #100  | 2.1                  | 7.8        | 97.9                  |
| LBW   | 0.9                  | 1.2        | 99.1                  |

PREPARED BY:  
 SM, LLC Technical Service

Approved By: