

# Aggregate Optimization Chart

MIX ID'S: DDD0K7E7, DDD0K7E8 and DDD0K7E9

Production Gradation Report

**PLANT #:** **P-102**

Sample Date: 9/24/18

Concrete Grade: **DM**

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

Dates Test Represents: 9/25/2018 through 10/1/2018

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

| Agg. Class      | Pit #  | Source  | Weight (SSD) | ft <sup>3</sup> | Specific Gravity | % Contribution |
|-----------------|--------|---------|--------------|-----------------|------------------|----------------|
| 6AA             | 58-003 | Stoneco | 1520         | 9.06            | 2.69             | 50.8           |
| 26A             | 58-003 | Stoneco | 325          | 1.94            | 2.69             | 10.9           |
| 2NS             | 38-046 | Chelsea | 1150         | 6.95            | 2.65             | 38.4           |
| <b>Total Wt</b> |        |         | <b>2995</b>  | <b>17.95</b>    |                  | <b>100.0</b>   |

<----- 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"    | 99.5  | 100.0 | 100.0 | 99.7                 | 0.3        | 0.3                   |
| 3/4"  | 82.1  | 100.0 | 100.0 | 90.9                 | 8.8        | 9.1                   |
| 1/2"  | 41.4  | 99.8  | 100.0 | 70.2                 | 20.7       | 29.8                  |
| 3/8"  | 17.2  | 89.7  | 100.0 | 56.9                 | 13.4       | 43.1                  |
| #4    | 2.0   | 20.9  | 100.0 | 41.7                 | 15.2       | 58.3                  |
| #8    | 1.0   | 4.3   | 88.0  | 34.8                 | 6.9        | 65.2                  |
| #16   | 0.8   | 1.4   | 65.0  | 25.5                 | 9.2        | 74.5                  |
| #30   | 0.7   | 0.9   | 46.0  | 18.1                 | 7.4        | 81.9                  |
| #50   | 0.7   | 0.8   | 25.0  | 10.0                 | 8.1        | 90.0                  |
| #100  | 0.5   | 0.7   | 6.0   | 2.6                  | 7.4        | 97.4                  |
| LBW   | 0.5   | 0.5   | 1.0   | 0.7                  | 1.9        | 99.3                  |



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

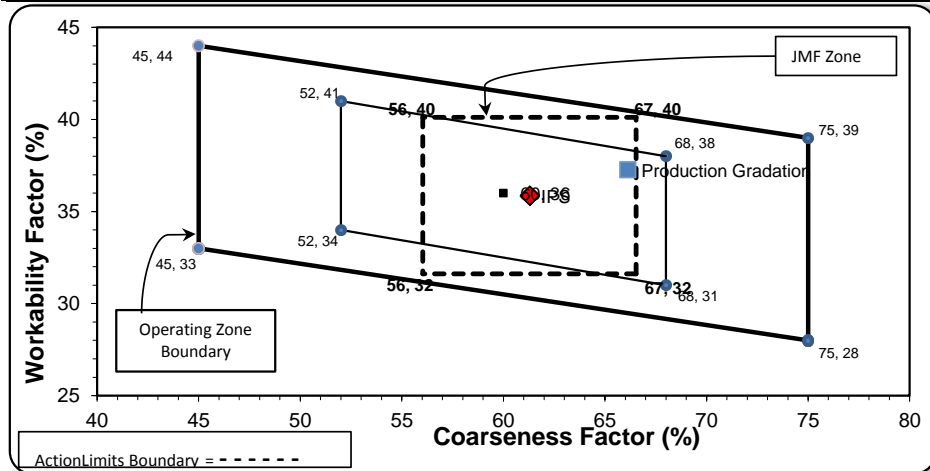
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when a 2"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

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Adjusted WF Initial Production Sample (IPS)

|                           |           |                            |           |
|---------------------------|-----------|----------------------------|-----------|
| <b>Coarseness Factor:</b> | <b>66</b> | <b>Workability Factor:</b> | <b>35</b> |
|---------------------------|-----------|----------------------------|-----------|

|                            |           |
|----------------------------|-----------|
| <b>Coarseness Factor:</b>  | <b>61</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"    | 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:

# Aggregate Optimization Chart

MIX ID'S: DDD0K7E7, DDD0K7E8 and DDD0K7E9

Production Gradation Report

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

Sample Date: 9/24/18

Concrete Grade: **DM**

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

Dates Test Represents: 9/25/2018 through 10/1/2018

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

| Agg. Class      | Pit # | Source       | Weight (SSD) | ft <sup>3</sup> | Specific Gravity | % Contribution |
|-----------------|-------|--------------|--------------|-----------------|------------------|----------------|
| 6AA             | 71-47 | Presque Isle | 1500         | 9.17            | 2.62             | 50.8           |
| 26A             | 71-47 | Presque Isle | 300          | 1.83            | 2.62             | 10.2           |
| 2NS             | 95-13 | Smelter Bay  | 1150         | 6.95            | 2.65             | 39.0           |
| <b>Total Wt</b> |       |              | <b>2950</b>  | <b>17.96</b>    |                  | <b>100.0</b>   |

<----- 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"    | 98.0  | 100.0 | 100.0 | 99.0                 | 1.0        | 1.0                   |
| 3/4"  | 77.4  | 100.0 | 100.0 | 88.5                 | 10.5       | 11.5                  |
| 1/2"  | 42.9  | 95.8  | 100.0 | 70.5                 | 18.0       | 29.5                  |
| 3/8"  | 21.1  | 81.7  | 100.0 | 58.0                 | 12.5       | 42.0                  |
| #4    | 3.1   | 21.3  | 97.7  | 41.8                 | 16.2       | 58.2                  |
| #8    | 1.8   | 7.2   | 86.1  | 35.2                 | 6.6        | 64.8                  |
| #16   | 1.6   | 4.0   | 68.8  | 28.0                 | 7.2        | 72.0                  |
| #30   | 1.5   | 3.2   | 46.6  | 19.3                 | 8.8        | 80.7                  |
| #50   | 1.5   | 2.9   | 19.4  | 8.6                  | 10.6       | 91.4                  |
| #100  | 1.4   | 2.6   | 4.2   | 2.6                  | 6.0        | 97.4                  |
| LBW   | 1.1   | 2.0   | 1.0   | 1.2                  | 1.5        | 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.



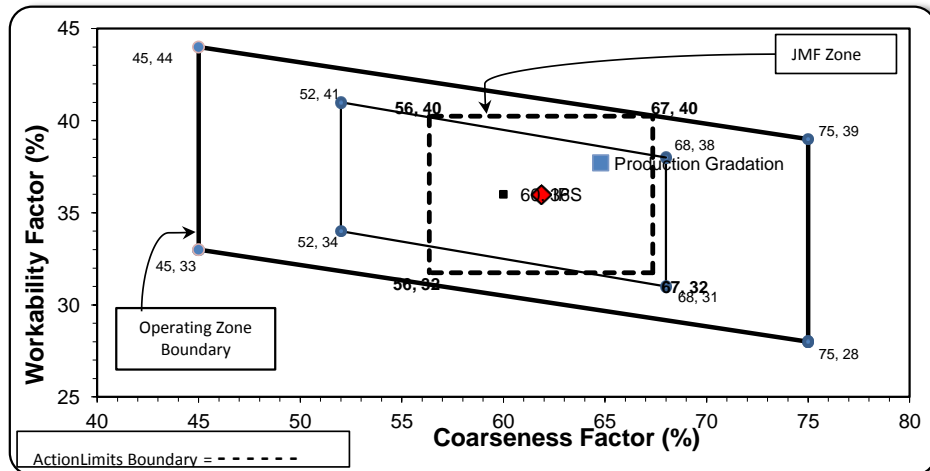
**Superior Materials, LLC**  
 30701 W. 10 Mile Rd.  
 Suite 500  
 Farmington Hills, MI 48336

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Adjusted WF Initial Production Sample (IPS)

|                           |           |                            |           |             |
|---------------------------|-----------|----------------------------|-----------|-------------|
| <b>Coarseness Factor:</b> | <b>65</b> | <b>Workability Factor:</b> | <b>35</b> | <b>37.7</b> |
|---------------------------|-----------|----------------------------|-----------|-------------|

|                            |           |
|----------------------------|-----------|
| <b>Coarseness Factor:</b>  | <b>62</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"  | 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                  |

PREPARED BY:  
 SM, LLC Technical Service

Approved By:

# Aggregate Optimization Chart

MIX ID'S: DDD0K7E7, DDD0K7E8 and DDD0K7E9

Production Gradation Report

**PLANT #:** **P-35**

Sample Date: 9/24/18

Concrete Grade: **DM**

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

Dates Test Represents: 9/25/2018 through 10/1/2018

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

| Agg. Class      | Pit #  | Source     | Weight (SSD) | ft <sup>3</sup> | Specific Gravity | % Contribution |
|-----------------|--------|------------|--------------|-----------------|------------------|----------------|
| 6AA             | 58-003 | Stoneco    | 1390         | 8.28            | 2.69             | 46.5           |
| 26A             | 58-003 | Stoneco    | 350          | 2.09            | 2.69             | 11.7           |
| 2NS             | 81-93  | Burmeister | 1250         | 7.59            | 2.64             | 41.8           |
| <b>Total Wt</b> |        |            | <b>2990</b>  | <b>17.95</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"    | 99.5  | 100.0 | 100.0 | 99.8                 | 0.2        | 0.2                   |
| 3/4"  | 82.1  | 100.0 | 100.0 | 91.7                 | 8.1        | 8.3                   |
| 1/2"  | 41.4  | 99.8  | 100.0 | 72.7                 | 18.9       | 27.3                  |
| 3/8"  | 17.2  | 89.7  | 100.0 | 60.3                 | 12.4       | 39.7                  |
| #4    | 2.0   | 20.9  | 99.3  | 44.9                 | 15.4       | 55.1                  |
| #8    | 1.0   | 4.3   | 85.7  | 36.8                 | 8.1        | 63.2                  |
| #16   | 0.8   | 1.4   | 68.1  | 29.0                 | 7.8        | 71.0                  |
| #30   | 0.7   | 0.9   | 47.8  | 20.4                 | 8.6        | 79.6                  |
| #50   | 0.7   | 0.8   | 20.0  | 8.8                  | 11.6       | 91.2                  |
| #100  | 0.5   | 0.7   | 3.4   | 1.7                  | 7.0        | 98.3                  |
| LBW   | 0.5   | 0.5   | 0.9   | 0.7                  | 1.1        | 99.3                  |

\*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.

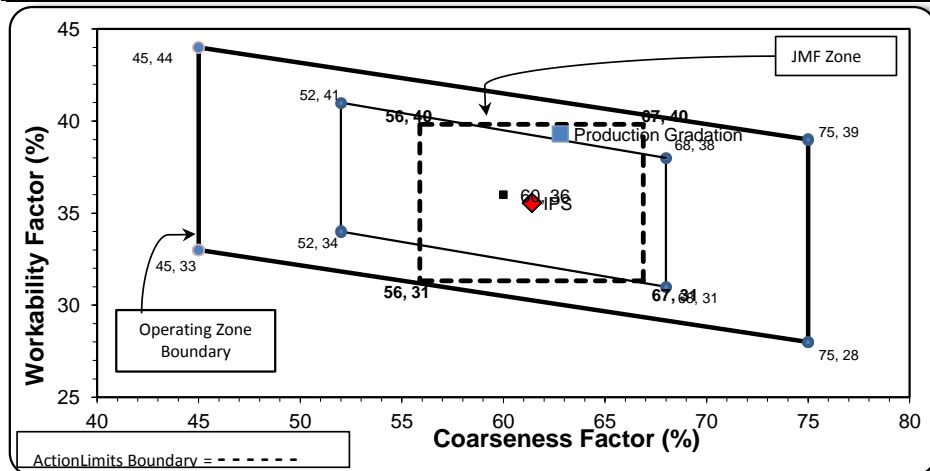
Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Adjusted WF Initial Production Sample (IPS)

|                           |           |                            |           |
|---------------------------|-----------|----------------------------|-----------|
| <b>Coarseness Factor:</b> | <b>63</b> | <b>Workability Factor:</b> | <b>37</b> |
|---------------------------|-----------|----------------------------|-----------|

|                            |           |
|----------------------------|-----------|
| <b>Coarseness Factor:</b>  | <b>61</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"    | 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

Approved By:

# Aggregate Optimization Chart

MIX ID'S: DDD0K7E7, DDD0K7E8 and DDD0K7E9

Production Gradation Report

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

Sample Date: 9/24/18

Concrete Grade: DM

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

Dates Test Represents: 9/25/2018 through 10/1/2018

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             | 54.2           |
| 26A             | 71-47 | Presque Isle   | 200          | 1.22            | 2.62             | 6.8            |
| 2NS             | 63-92 | AA Grange Hall | 1150         | 6.95            | 2.65             | 39.0           |
| <b>Total Wt</b> |       |                | <b>2950</b>  | <b>17.96</b>    |                  | <b>100.0</b>   |

<----- 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"    | 100.0 | 100.0 | 100.0 | 100.0                | 0.0        | 0.0                   |
| 3/4"  | 83.9  | 100.0 | 100.0 | 91.3                 | 8.7        | 8.7                   |
| 1/2"  | 41.8  | 95.8  | 100.0 | 68.1                 | 23.1       | 31.9                  |
| 3/8"  | 23.1  | 81.7  | 100.0 | 57.1                 | 11.1       | 42.9                  |
| #4    | 4.7   | 21.3  | 97.4  | 42.0                 | 15.1       | 58.0                  |
| #8    | 2.5   | 7.2   | 83.7  | 34.5                 | 7.5        | 65.5                  |
| #16   | 2.2   | 4.0   | 68.0  | 28.0                 | 6.5        | 72.0                  |
| #30   | 2.1   | 3.2   | 50.8  | 21.2                 | 6.8        | 78.8                  |
| #50   | 2.0   | 2.9   | 24.1  | 10.7                 | 10.5       | 89.3                  |
| #100  | 1.9   | 2.6   | 4.1   | 2.8                  | 7.9        | 97.2                  |
| LBW   | 1.5   | 2.0   | 0.3   | 1.1                  | 1.7        | 98.9                  |



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

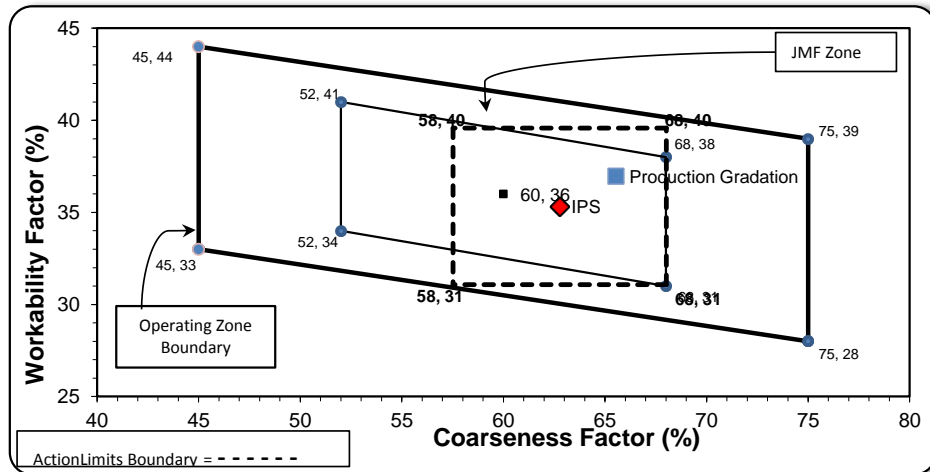
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when a 2"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

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Adjusted WF Initial Production Sample (IPS)

|                           |           |                            |           |                    |             |
|---------------------------|-----------|----------------------------|-----------|--------------------|-------------|
| <b>Coarseness Factor:</b> | <b>66</b> | <b>Workability Factor:</b> | <b>34</b> | <b>Adjusted WF</b> | <b>37.0</b> |
|---------------------------|-----------|----------------------------|-----------|--------------------|-------------|

|                            |           |
|----------------------------|-----------|
| <b>Coarseness Factor:</b>  | <b>63</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"    | 99.9                 | 0.1        | 0.1                   |
| 3/4"  | 89.1                 | 10.8       | 10.9                  |
| 1/2"  | 71.3                 | 17.8       | 28.7                  |
| 3/8"  | 59.4                 | 11.9       | 40.6                  |
| #4    | 42.6                 | 16.8       | 57.4                  |
| #8    | 35.3                 | 7.3        | 64.7                  |
| #16   | 28.5                 | 6.8        | 71.5                  |
| #30   | 20.9                 | 7.6        | 79.1                  |
| #50   | 9.0                  | 12.0       | 91.0                  |
| #100  | 1.7                  | 7.3        | 98.3                  |
| LBW   | 0.7                  | 1.0        | 99.3                  |

PREPARED BY:  
 SM, LLC Technical Service

Approved By:

# Aggregate Optimization Chart

MIX ID'S: DDD0K7E7, DDD0K7E8 and DDD0K7E9

Production Gradation Report

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

Sample Date: 9/24/18

Concrete Grade: **DM**

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

Dates Test Represents: 9/25/2018 through 10/1/2018

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             | 54.2           |
| 26A             | 71-47 | Presque Isle   | 200          | 1.22            | 2.62             | 6.8            |
| 2NS             | 63-92 | AA Grange Hall | 1150         | 6.95            | 2.65             | 39.0           |
| <b>Total Wt</b> |       |                | <b>2950</b>  | <b>17.96</b>    |                  | <b>100.0</b>   |

<----- 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"    | 100.0 | 100.0 | 100.0 | 100.0                | 0.0        | 0.0                   |
| 3/4"  | 83.9  | 100.0 | 100.0 | 91.3                 | 8.7        | 8.7                   |
| 1/2"  | 41.8  | 95.8  | 100.0 | 68.1                 | 23.1       | 31.9                  |
| 3/8"  | 23.1  | 81.7  | 100.0 | 57.1                 | 11.1       | 42.9                  |
| #4    | 4.7   | 21.3  | 97.4  | 42.0                 | 15.1       | 58.0                  |
| #8    | 2.5   | 7.2   | 83.7  | 34.5                 | 7.5        | 65.5                  |
| #16   | 2.2   | 4.0   | 68.0  | 28.0                 | 6.5        | 72.0                  |
| #30   | 2.1   | 3.2   | 50.8  | 21.2                 | 6.8        | 78.8                  |
| #50   | 2.0   | 2.9   | 24.1  | 10.7                 | 10.5       | 89.3                  |
| #100  | 1.9   | 2.6   | 4.1   | 2.8                  | 7.9        | 97.2                  |
| LBW   | 1.5   | 2.0   | 0.3   | 1.1                  | 1.7        | 98.9                  |



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

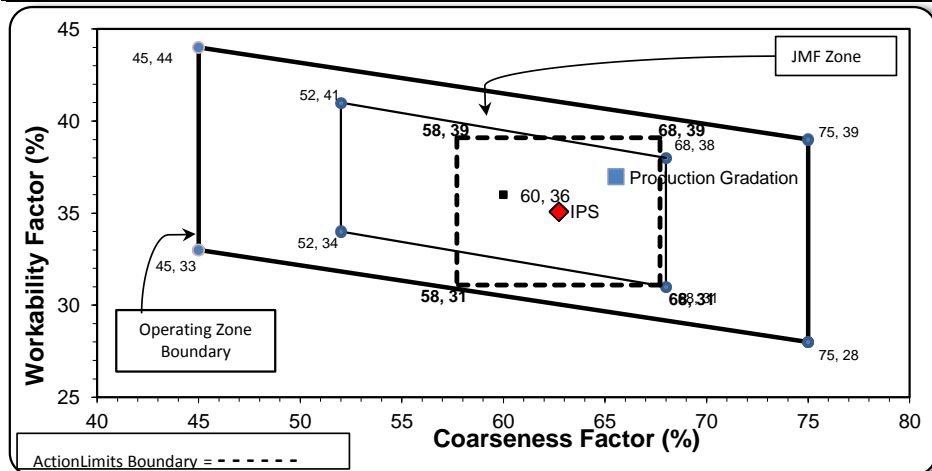
\*Maximum % Retained must be above the 3/8" sieve.  
 \*Any two adjacent sieves must equal 10% except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 4% for each sieve except max., nom. max., #100 and #200 sieves.  
 \*% Retained must be at least 8% for the 1" sieve when a 2"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

Production Gradation  Batch Plant Gradations  Aggregate Supplier Gradations

Adjusted WF Initial Production Sample (IPS)

|                           |           |                            |           |                    |             |
|---------------------------|-----------|----------------------------|-----------|--------------------|-------------|
| <b>Coarseness Factor:</b> | <b>66</b> | <b>Workability Factor:</b> | <b>34</b> | <b>Adjusted WF</b> | <b>37.0</b> |
|---------------------------|-----------|----------------------------|-----------|--------------------|-------------|

|                            |           |
|----------------------------|-----------|
| <b>Coarseness Factor:</b>  | <b>63</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"    | 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

Approved By: