



Maura Healey, Governor  
Kimberley Driscoll, Lieutenant Governor  
Gina Fiandaca, Secretary & CEO  
Jonathan L. Gulliver, Highway Administrator



March 28, 2023

Mr. Chris Dauphinais  
President  
Dauphinais Concrete  
P.O. Box 461  
Sutton, MA 01590

Dear Mr. Dauphinais,

Your proposed cement concrete mix design formulations have been reviewed by the MassDOT Research and Materials Section (RMS) and are approved as identified on the enclosed RMS 043 Cement Concrete Mix Design Sheet, for the duration of the annual approval cycle, and will **expire on April 1, 2024**.

Approved Plant: DAUPHINAIS CONCRETE  
Approved Plant Location: BELLINGHAM, MA  
Mix Design Sheet Identification No.: 22-03-21-15-36-48

Modifications to the approved mix design formulations, including source of constituent materials, design proportions, mix type, combined aggregate system targets, paste system targets, slump targets, air content targets, and compressive strength targets are prohibited. At no point shall the water-cementitious (w/cm) ratio exceed the design target. Approval is subject to performance at the plant and project site, as well as conformance to MassDOT protocols and specifications.

Sincerely,

Mary A. Grieco, P.E.  
Director of Research and Materials

MAG/gg/rfm  
Enclosures  
CC: District Materials Engineer

# 2023 CEMENT CONCRETE MIX DESIGN SHEET RMS 043

| PLANT INFORMATION   |  |                |  | MAILING ADDRESS      |  |                  |  | MIX SHEET IDENTIFICATION     |  |          |                          |  |
|---------------------|--|----------------|--|----------------------|--|------------------|--|------------------------------|--|----------|--------------------------|--|
| PLANT NAME          |  | LOCATION       |  | STREET NO. & ADDRESS |  | CITY/TOWN        |  | EMAIL ADDRESS                |  | CONTRACT | SHEET IDENTIFICATION NO. |  |
| DAUPHINAIS CONCRETE |  | BELLINGHAM, MA |  | P.O. Box 461         |  | Sutton, MA 01590 |  | chris@dauphinaisconcrete.com |  |          | 22-03-21-15-36-48        |  |

| CONSTITUENT MATERIALS |                      |               |           |                   |       |      |          |        |                             |           |       |         |         |         |       |      |      |      |      |      |      |     |      |
|-----------------------|----------------------|---------------|-----------|-------------------|-------|------|----------|--------|-----------------------------|-----------|-------|---------|---------|---------|-------|------|------|------|------|------|------|-----|------|
| ID                    | MANUFACTURER         | LOCATION      | NMAS      | DESCRIPTION       | SPEC. | SG   | UW (PCF) | VC (%) | PERCENT PASSING BY MASS (%) |           |       |         |         |         |       |      |      |      |      |      |      |     | FM   |
|                       |                      |               |           |                   |       |      |          |        | 2 IN.                       | 1 1/2 IN. | 1 IN. | 3/4 IN. | 1/2 IN. | 3/8 IN. | #4    | #8   | #16  | #30  | #50  | #100 | #200 |     |      |
| FINE                  | PYNE SAND AND GRAVEL | DOUGLAS, MA   | FINE      | NORMAL WEIGHT     | M 6   | 2.65 | 96.3     | 41.7   | 100.0                       | 100.0     | 100.0 | 100.0   | 100.0   | 100.0   | 100.0 | 97.8 | 87.0 | 66.8 | 46.2 | 21.8 | 6.2  | 1.8 | 2.74 |
| CA1                   | P J KEATING          | LUNENBURG, MA | 3/4 IN.   | NORMAL WEIGHT - 6 | M 80  | 2.74 | 105.7    | 38.1   | 100.0                       | 100.0     | 100.0 | 90.2    | 38.4    | 3.1     | 1.8   | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  | 1.0 | 7.00 |
| CA2                   | P J KEATING          | LUNENBURG, MA | 1/2 IN.   | NORMAL WEIGHT - 8 | M 80  | 2.74 | 107.6    | 37.0   | 100.0                       | 100.0     | 100.0 | 100.0   | 100.0   | 86.1    | 10.5  | 2.8  | 2.2  | 1.7  | 1.5  | 1.0  | 1.0  | 1.0 | 5.94 |
| CA3                   | P J KEATING          | LUNENBURG, MA | 1 1/2 IN. | NORMAL WEIGHT - 4 | M 80  | 2.80 | 101.3    | 41.9   | 100.0                       | 100.0     | 54.1  | 14.8    | 3.9     | 1.1     | 1.0   | 1.0  | 1.0  | 1.0  | 1.0  | 0.9  | 0.8  | 0.8 | 7.78 |

| HYDRAULIC CEMENT, SUPPLEMENTARY CEMENTITIOUS MATERIALS, MORTAR, AND FIBER SOURCES |                          |                          |      |                        |       |      |     |                          |              | CHEMICAL ADMIXTURE SOURCES |                             |       |      |  |  |  |  |  |  |
|---|--------------------------|--------------------------|------|------------------------|-------|------|-----|--------------------------|--------------|----------------------------|-----------------------------|-------|------|--|--|--|--|--|--|
| ID  | MANUFACTURER             | PRODUCT / LOCATION       | TYPE | DESCRIPTION            | SPEC. | SG   | ID  | MANUFACTURER             | PRODUCT      | TYPE                       | DESCRIPTION                 | SPEC. | SG   |  |  |  |  |  |  |
| CEM   | HEIDELBERG MATERIALS     | CANAKKALE, TURKEY (I/II) | I/II | GENERAL / MOD. SULFATE | M 85  | 3.15 | AD1 | GCP APPLIED TECHNOLOGIES | ADVA 140M    | F                          | HIGH RANGE WATER REDUCING   | M 194 | 1.10 |  |  |  |  |  |  |
| SCM1  | HEIDELBERG MATERIALS     | CAMDEN, NJ               | SLAG | HIGH ACTIVITY (120)    | M 302 | 2.82 | AD2 | GCP APPLIED TECHNOLOGIES | DAREX II AEA | AEA                        | AIR ENTRAINING              | M 154 | 1.04 |  |  |  |  |  |  |
| SCM2  |                          |                          |      |                        |       |      | AD3 | GCP APPLIED TECHNOLOGIES | EXP 950      | F                          | HIGH RANGE WATER REDUCING   | M 194 | 1.10 |  |  |  |  |  |  |
| SCM3  | GCP APPLIED TECHNOLOGIES | FORCE 10,000 D           | SF   | SILICA FUME            | M 307 | 2.49 | AD4 | GCP APPLIED TECHNOLOGIES | DCI-S        | CIA                        | CORROSION INHIBITING        | C1582 | 1.28 |  |  |  |  |  |  |
| PKG   |                          |                          |      |                        |       |      | AD5 | GCP APPLIED TECHNOLOGIES | RECOVER      | D                          | ATER REDUCING AND RETARDING | M 194 | 1.15 |  |  |  |  |  |  |
| FIBER   |                          |                          |      |                        |       |      | AD6 | GCP APPLIED TECHNOLOGIES | DARAFIL CLSM | CLSM                       | CLSM ENHANCING              | TDS   | cd   |  |  |  |  |  |  |

| MIX DESIGN FORMULATION |            |            |            |             |        |            |        |                  |        |        |        |   |       |       |      |     |       |   |     |     |     |     |      |            |     |      |       |      |      |
|------------------------|------------|------------|------------|-------------|--------|------------|--------|------------------|--------|--------|--------|---|-------|-------|------|-----|-------|---|-----|-----|-----|-----|------|------------|-----|------|-------|------|------|
| MIX IDENTIFICATION NO. |            | T 22 (PSI) | NMAS (IN.) | SLUMP (IN.) | AC (%) | W/CM RATIO | PC (%) | AGGREGATE (LBS.) |        |        |        | CEMENT, SCM, PACKAGED, AND FIBER (LBS.) |       |       |      |     |       | TOTAL WATER (GAL.) AND CHEMICAL ADMIXTURES (OZ) |     |     |     |     |      | YIELD (CF) |     |      |       |      |      |
| MASSDOT                | PRODUCER   |            |            |             |        |            |        | MIX DESIGN TYPE  | CA1    | CA2    | CA3    | CEM                                     | SCM1  | SCM2  | SCM3 | PKG | FIBER | W1  | AD1 | AD2 | AD3 | AD4 | AD5  |            | AD6 |      |       |      |      |
| 22-03-21-15-36-48-01   | MHDCDFEX   |            | 70         | 10.00       | 25.0   | 3.65       | 18.9   | 2500.0           |        |        |        |   | 80.0  |       |      |     |       |   |     |     |     |     | 35.0 |            |     |      |       | 1.0  | 27.0 |
| 22-03-21-15-36-48-02   | MHDCDFNONE | CDF TYPE 2 | 200        | 10.00       | 20.0   | 1.46       | 21.1   | 2630.0           |        |        |        |   | 200.0 |       |      |     |       |   |     |     |     |     | 35.0 |            |     |      |       | 1.0  | 27.0 |
| 22-03-21-15-36-48-03   | 3034SMHD   |            | 3000       | 3/4         | 5.00   | 6.0        | 0.50   | 25.4             | 1320.0 | 1030.0 | 770.0  |   | 388.0 | 130.0 |      |     |       |   |     |     |     |     | 31.0 | 35.0       | 1.0 |      |       |      | 27.0 |
| 22-03-21-15-36-48-04   | 3515SMHD   |            | 3500       | 1 1/2       | 5.00   | 5.0        | 0.47   | 25.1             | 1300.0 | 500.0  | 500.0  | 900.0                                   | 399.0 | 133.0 |      |     |       |   |     |     |     |     | 30.0 | 37.2       | 2.0 |      |       |      | 27.0 |
| 22-03-21-15-36-48-05   | 4038SMHD   |            | 4000       | 3/8         | 5.00   | 7.0        | 0.45   | 30.7             | 1185.0 |        | 1650.0 |   | 496.0 | 166.0 |      |     |       |   |     |     |     |     | 36.0 | 46.0       | 5.0 |      |       |      | 27.0 |
| 22-03-21-15-36-48-06   | 4034SMHD   |            | 4000       | 3/4         | 5.00   | 6.0        | 0.44   | 30.1             | 1140.0 | 1030.0 | 740.0  |   | 493.0 | 165.0 |      |     |       |   |     |     |     |     | 35.0 | 46.0       | 3.5 |      |       |      | 27.0 |
| 22-03-21-15-36-48-07   | 4015SMHD   |            | 4000       | 1 1/2       | 5.00   | 5.0        | 0.45   | 28.1             | 1168.0 | 500.0  | 500.0  | 900.0                                   | 454.0 | 152.0 |      |     |       |   |     |     |     |     | 33.0 | 42.0       | 4.0 |      |       |      | 27.0 |
| 22-03-21-15-36-48-08   | 5034SMHD   |            | 5000       | 3/4         | 5.00   | 6.0        | 0.40   | 30.5             | 1190.0 | 1079.0 | 615.0  |   | 529.0 | 177.0 |      |     |       |   |     |     |     |     | 34.0 | 49.4       | 5.5 |      |       |      | 27.0 |
| 22-03-21-15-36-48-09   | 5034SHPMHD | HP         | 5000       | 3/4         | 6.00   | 6.5        | 0.40   | 29.9             | 1195.0 | 1079.0 | 615.0  |   | 483.0 | 161.0 |      |     | 43.0  |   |     |     |     |     | 33.0 |            | 3.5 | 29.0 | 384.0 | 13.0 | 27.0 |
| 22-03-21-15-36-48-10   | 5038SHPMHD | HP         | 5000       | 3/8         | 6.00   | 6.5        | 0.40   | 30.9             | 1185.0 |        | 1650.0 |   | 501.0 | 166.0 |      |     | 43.0  |   |     |     |     |     | 34.0 |            | 6.0 | 29.0 | 384.0 | 13.0 | 26.9 |
| 22-03-21-15-36-48-11   | 4034SWMHD  | SIDEWALK   | 4000       | 3/4         | 5.00   | 7.0        | 0.45   | 29.9             | 1140.0 | 1030.0 | 700.0  |   | 484.0 | 161.0 |      |     |       |   |     |     |     |     | 35.0 | 43.4       | 3.0 |      |       |      | 27.0 |
| 22-03-21-15-36-48-12   | 4034SHPMHD | HP         | 4000       | 3/4         | 6.00   | 6.5        | 0.40   | 25.4             | 1305.0 | 1100.0 | 680.0  |   | 412.0 | 138.0 |      |     | 35.0  |   |     |     |     |     | 28.0 |            | 5.5 | 25.0 | 384.0 | 11.0 | 26.9 |

| COMBINED AGGREGATE SYSTEM, PASTE SYSTEM, AND UNIT WEIGHT |            |                             |           |       |         |         |         |      |      |      |      |      |      |      |                |                                |      |                      |     |          |          |          |         |        |             |          |  |
|--|------------|-----------------------------|-----------|-------|---------|---------|---------|------|------|------|------|------|------|------|----------------|--------------------------------|------|----------------------|-----|----------|----------|----------|---------|--------|-------------|----------|--|
| MIX IDENTIFICATION NUMBERS                               |            | PERCENT BY MASS PASSING (%) |           |       |         |         |         |      |      |      |      |      |      |      |                | TARANTULA CURVE                |      | SHILSTONE WF-CF ZONE |     | SCM1 (%) | SCM2 (%) | SCM3 (%) | EPC (%) | VC (%) | PC/VC RATIO | UW (PCF) |  |
| MASSDOT  | PRODUCER   | 2 IN.                       | 1 1/2 IN. | 1 IN. | 3/4 IN. | 1/2 IN. | 3/8 IN. | #4   | #8   | #16  | #30  | #50  | #100 | #200 |                |                                |      |                      |     |          |          |          |         |        |             |          |  |
| 22-03-21-15-36-48-01                                     | MHDCDFEX   | 100.0                       | 100.0     | 100.0 | 100.0   | 100.0   | 100.0   | 97.8 | 87.0 | 66.8 | 46.2 | 21.8 | 6.2  | 1.8  | OUTSIDE LIMITS | IV: EXCESSIVE FINES            | 0.0  | 0.0                  | 0.0 | 20.5     | 23.4     | 0.81     | 106.5   |        |             |          |  |
| 22-03-21-15-36-48-02                                     | MHDCDFNONE | 100.0                       | 100.0     | 100.0 | 100.0   | 100.0   | 100.0   | 97.8 | 87.0 | 66.8 | 46.2 | 21.8 | 6.2  | 1.8  | OUTSIDE LIMITS | IV: EXCESSIVE FINES            | 0.0  | 0.0                  | 0.0 | 16.5     | 24.6     | 0.86     | 115.5   |        |             |          |  |
| 22-03-21-15-36-48-03                                     | 3034SMHD   | 100.0                       | 100.0     | 100.0 | 96.8    | 79.7    | 64.6    | 44.6 | 37.8 | 29.1 | 20.3 | 9.9  | 3.2  | 1.3  | OUTSIDE LIMITS | II: OPTIMUM (3/4 - 2 IN. NMAS) | 25.1 | 0.0                  | 0.0 | 4.4      | 27.0     | 0.94     | 144.2   |        |             |          |  |
| 22-03-21-15-36-48-04                                     | 3515SMHD   | 100.0                       | 100.0     | 87.1  | 74.5    | 63.3    | 54.9    | 41.9 | 36.2 | 27.9 | 19.5 | 9.5  | 3.1  | 1.3  | WITHIN LIMITS  | II: OPTIMUM (3/4 - 2 IN. NMAS) | 25.0 | 0.0                  | 0.0 | 1.8      | 28.3     | 0.89     | 147.3   |        |             |          |  |
| 22-03-21-15-36-48-05                                     | 4038SMHD   | 100.0                       | 100.0     | 100.0 | 100.0   | 100.0   | 91.9    | 47.0 | 38.0 | 29.2 | 20.3 | 10.0 | 3.2  | 1.3  | OUTSIDE LIMITS | III: OPTIMUM (< 3/4 IN. NMAS)  | 25.1 | 0.0                  | 0.0 | 13.4     | 24.3     | 1.26     | 140.5   |        |             |          |  |
| 22-03-21-15-36-48-06                                     | 4034SMHD   | 100.0                       | 100.0     | 100.0 | 96.5    | 78.2    | 62.2    | 41.6 | 35.1 | 27.1 | 18.9 | 9.3  | 3.0  | 1.3  | OUTSIDE LIMITS | II: OPTIMUM (3/4 - 2 IN. NMAS) | 25.1 | 0.0                  | 0.0 | 11.0     | 25.1     | 1.20     | 142.8   |        |             |          |  |
| 22-03-21-15-36-48-07                                     | 4015SMHD   | 100.0                       | 100.0     | 86.5  | 73.4    | 61.8    | 52.9    | 39.5 | 34.0 | 26.2 | 18.3 | 9.0  | 2.9  | 1.2  | WITHIN LIMITS  | II: OPTIMUM (3/4 - 2 IN. NMAS) | 25.1 | 0.0                  | 0.0 | 6.1      | 27.0     | 1.04     | 146.1   |        |             |          |  |
| 22-03-21-15-36-48-08                                     | 5034SMHD   | 100.0                       | 100.0     | 100.0 | 96.3    | 77.0    | 60.8    | 43.3 | 36.9 | 28.4 | 19.8 | 9.7  | 3.1  | 1.3  | WITHIN LIMITS  | II: OPTIMUM (3/4 - 2 IN. NMAS) | 25.1 | 0.0                  | 0.0 | 11.5     | 25.0     | 1.22     | 143.5   |        |             |          |  |
| 22-03-21-15-36-48-09                                     | 5034SHPMHD | 100.0                       | 100.0     | 100.0 | 96.3    | 77.0    | 60.9    | 43.4 | 37.0 | 28.5 | 19.8 | 9.7  | 3.2  | 1.3  | WITHIN LIMITS  | II: OPTIMUM (3/4 - 2 IN. NMAS) | 23.4 | 0.0                  | 6.3 | 11.3     | 25.1     | 1.19     | 142.7   |        |             |          |  |
| 22-03-21-15-36-48-10                                     | 5038SHPMHD | 100.0                       | 100.0     | 100.0 | 100.0   | 100.0   | 91.9    | 47.0 | 38.0 | 29.2 | 20.3 | 10.0 | 3.2  | 1.3  | OUTSIDE LIMITS | III: OPTIMUM (< 3/4 IN. NMAS)  | 23.4 | 0.0                  | 6.1 | 13.0     | 24.4     | 1.27     | 142.2   |        |             |          |  |
| 22-03-21-15-36-48-11                                     | 4034SWMHD  | 100.0                       | 100.0     | 100.0 | 96.5    | 77.9    | 61.8    | 42.1 | 35.6 | 27.4 | 19.1 | 9.4  | 3.1  | 1.3  | WITHIN LIMITS  | II: OPTIMUM (3/4 - 2 IN. NMAS) | 25.0 | 0.0                  | 0.0 | 12.1     | 24.8     | 1.21     | 141.0   |        |             |          |  |
| 22-03-21-15-36-48-12                                     | 4034SHPMHD | 100.0                       | 100.0     | 100.0 | 96.5    | 78.0    | 62.4    | 44.3 | 37.8 | 29.1 | 20.3 | 9.9  | 3.2  | 1.3  | WITHIN LIMITS  | II: OPTIMUM (3/4 - 2 IN. NMAS) | 23.6 | 0.0                  | 6.0 | 5.1      | 26.8     | 0.95     | 144.9   |        |             |          |  |

We agree to produce cement concrete mix designs per the precise proportions, quantities, types, and sources of constituent materials identified on the approved RMS 043 Cement Concrete Mix Design Sheet for MassDOT construction contracts.

Mr. Chris Dauphinais  
NAME

President  
TITLE

SIGNATURE ON FILE  
AUTHORIZED SIGNATURE

3/28/2023  
DATE