SP- 150395
(New)

SPECIAL PROVISIONS
FOR
STRUCTURAL CONCRETE (LINK SLAB)

Polk County
IMX-080-3(209)133--02-77

Effective Date
May 21, 2019

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

150395.01 DESCRIPTION.

A. Structural concrete for link slab shall be contractor designed mix high performance concrete (CDM-HPC) including fiber reinforcement as specified herein.

B. Use a combination of micro and macro non-metallic synthetic fibers to provide crack control and improve the long-term performance of the bridge decks. Incorporate the fibers into the mix design in accordance with this Special Provision and the applicable requirements of Sections 2406, 2403, and 2412 of the Standard Specifications.

150395.02 MATERIALS.

A. Supply a fiber blend of high-performance macro-monofilaments with sinusoidal deformations and collated-fibrillated polypropylene. The stated manufacturer purpose of the synthetic fibers is for controlling plastic shrinkage cracks in concrete (micro fibers) and to provide increased residual flexural strength in the concrete (macro fibers). Supply Type III fibers in accordance with ASTM C1116.

B. Polypropylene Micro Fibers.
Provide synthetic fibers that meet the following:

1. Absorption – Nil;

2. Specific Gravity - 0.91;

3. Fiber Length – Multi-Design Gradation;

4. Electrical Conductivity – Low;

5. Tensile Strength – 70 ksi minimum; and

6. Melt Point – 320° F minimum.

C. Polypropylene Macro Fibers.
Provide synthetic fibers that meet the following:

1. Absorption – Nil;

2. Specific Gravity - 0.91;

3. Nominal Filament Diameter - 0.033 inches;

4. Fiber Length – 1.8 inches minimum;

5. Electrical Conductivity – Low;

6. Tensile Strength – 85 ksi minimum; and

7. Melt Point – 320° F minimum.

D. Acceptance.

1. Based on previous history, the following manufacturers and dosage rates are preapproved for use:
   a. Propex Novomesh 950 at a dosage rate of 5 pounds per cubic yard;
   b. BASF MasterFiber MAC Matrix at a dosage rate of 4 pounds per cubic yard with BASF MasterFiber M100 at a dosage rate of 0.5 pounds per cubic yard; or
   c. Forta Ferro at a dosage rate of 5 pounds per cubic yard.

2. Alternate polypropylene fiber manufacturers may be submitted, for approval by the Engineer, that conform to the listed requirements at a minimum dosage rate of 4 pounds per cubic yard. In all cases the trial placement with the contractor-designed mix will be required to demonstrate slump, air loss, and workability with the Contractor's mix design.

E. Dosage, Documentation and Testing.

1. Supply a written statement from the manufacturer of the fibers verifying the compatibility of the combination of materials and the sequence in which they are combined, to the Engineer prior to using it in this project.

2. Assure fibrous concrete conforms to ASTM C1116, "Standard Specification for Fiber-Reinforced Concrete". Incorporate at a minimum rate of 4 pounds per cubic yard or the manufacturer's recommended dosage. Furnish fiber manufacturer's documentary evidence of satisfactory performance history and compliance with ASTM C1116 Type III.

F. Mix Design.

1. The contractor designed mix high performance concrete (CDM-HPC) mix design shall be designed to meet the desired placement, finishing, and curing characteristics for the link slab placement. A trial batch will be conducted to ensure these qualities are met prior to production.

2. For CDM-HPC mix with fibers, apply the following:
   a. Use coarse aggregate meeting Class 3i durability.
   b. Use a mid-range water reducer or high range water reducer.

c. If a high range water reducer is used, apply the following:
  1) Slump range 1 to 7 inches, with a maximum of 8 inches.
  2) Target air content of 7.5% ±2%.
d. Absolute volume of cement is 0.118. If needed, the absolute volume may be increased to 0.128 maximum
e. Use a minimum replacement of 20% ggbfs and 20% fly ash.
f. Water cement ratio 0.45 maximum.

3. Place two layers of prewetted burlap on floor immediately after finishing with a maximum time limit of 10 minutes after final finishing. Apply water to burlap covering for entire curing period by means of a continuous wet sprinkling system, or other approved method that is effective in keeping burlap continuously wet during moist curing period.

150395.03 CONSTRUCTION.

A. Application Requirements.

1. Identify dedicated personnel involved in introduction of fibers to mix to the Engineer. Do not toss a fiber reinforcement bag into the mixer. Add synthetic fiber reinforcement into concrete mixer using one of the following methods:
  a. Open bag and distribute fibers on aggregate belt at ready-mix concrete plant.
  b. Open bag and break apart any fiber clumps, and introduce fibers into ready-mix concrete truck in a well-distributed manner.

2. Mix synthetic fiber reinforcement in concrete mixer in accordance with mixing time and speed of ASTM C94, "Standard Specification for Ready-Mixed Concrete" to ensure uniform distribution and random orientation of fibers throughout concrete.

3. Other methods to add fibers to the concrete mix may be submitted for approval by the Engineer following demonstration of the method by a successful trial placement. Ensure the manufacturer’s technical representative is available by phone or in person to troubleshoot fiber inclusion into the mix during the trial placement and bridge deck placement.

4. Magnesium bull floats are required. Do not use wood or steel floats.

5. Do not use tined rakes.

B. Trial Batch and Test Placement.

1. In addition to a flexural strength test in accordance with Article 2403.03, N, 2 of the Standard Specifications, the Contractor is required to produce a test batch and test placement.

2. Allow District Materials Engineer ample opportunity to witness trial batching. Provide District Materials Engineer notice and mix proportions 7 calendar days prior to this event.

3. Mix trial batch (a minimum of 3 cubic yards in size) at least 180 calendar days prior to planned placement. Establish batching sequence of materials during trial batch.

4. The test batch shall be 8 inches in thickness and 100 square feet minimum in plan dimensions. Two layers of epoxy coated reinforcement shall be placed in a test batch with a similar bar size, spacing and minimum clearance to those for the production link slabs as shown in the contract plans. Place and consolidate using methods typical for bridge deck pours. Finish concrete by hand and evaluate mix workability and finishability for intended application and method of placement. The test placement may be directly poured on grade. Contractor is required to demonstrate the proposed placement and finishing processes.

5. In the presence of the Engineer, demonstrate that the trial batch can be successfully finished before placing production concrete.

150395.04 METHOD OF MEASUREMENT.

A. The quantity of Structural Concrete (Link Slab), in cubic yard, will be the quantity shown in the contract documents.

B. The quantity for Trial Batch and Test Placement includes one trial. Payment will be based on number of trials completed, with a maximum of three allowed if required.

150395.05 BASIS OF PAYMENT.

A. The Contractor will be paid the contract unit price for bid item Structural Concrete (Link Slab), per cubic yard.

B. The Contractor will be paid the contract unit price for each separate Trial Batch and Test Placement performed.