

Special Specification 4168

Bridge Deck Overlay with Steel Fiber Reinforced Concrete



1. DESCRIPTION

Furnish and place steel fiber reinforced concrete (FRC) as bridge deck overlay where shown on the plans.

2. MATERIALS

- 2.1. **Concrete Class.** The mix design must follow the requirements of Class CO concrete as specified in Item 421, "Hydraulic Cement Concrete," except for the following requirements.
- 2.2. **Steel Fibers.** Steel fibers will be made from stainless steel and meet the physical property requirements prescribed in ASTM A820. For overlay thinner than 2.5 in., the nominal length must be 1.5 in. (37.5 mm) long. For thicker overlay, the nominal length must be 2.0 in. (50 mm) long. 1 in. Helix Fibers are also allowed. Steel fibers must have a quantity of at least 2,000 fibers per pound and a fiber aspect ratio of 40 to 60. The steel fibers must not have any hooks or 90° bends. The steel fibers must be free from rust, oil and other deleterious materials. Steel fibers must be transported, stored and applied to the concrete mixture in accordance with the manufacturer's recommendations.
- 2.3. **Mix Design.** Mix design with trial batches must be pre-approved by TxDOT
- **Fiber Dosage.** The steel fiber dosage rate must be 70 to 80 lb. per cubic yard of concrete.
 - **Shrinkage Reducing Admixture (SRA) Dosage.** The SRA will be added at a dosage rate of 1.0 gal./yd³.
 - **Silica Fume.** The use of Silica Fume is not allowed.

3. EQUIPMENT

3.1. Surface Preparation Equipment

Provide equipment to remove overlay, deck top concrete and prepare deck surface meeting the requirement of Item 483, "Concrete Bridge Deck Surfacing," Section 3.2, "Hydro-Demolition."

3.2. Proportioning and Mixing Equipment

Provide batching equipment meeting the requirement of Item 439.3 "Equipment." Provide adequate mixing, placing, consolidation, and finishing equipment to properly place deck overlay with steel fiber reinforced concrete. Provide equipment necessary to test fresh and hardened FRC properties.

4. CONSTRUCTION OF STEEL FIBER CONCRETE OVERLAY

- 4.1. **General.** Follow the requirement of Item 439, "Bridge Deck Overlays," Section 4.1, "General."

Before the initial placement of the FRC overlay, arrange for a pre-construction meeting with the material representatives, contractor, the engineer, and the area office. The objective of the meeting will be to clearly outline the procedures of material production and transportation, overlay placement and curing, quality control testing, and final surface texture preparation.

- 4.2. **Mix Design.** Provide a mix design with an entrained air content of the fresh concrete of 6% with a tolerance of ± 1 % when tested in accordance with Tex-414-A or Tex-416-A.
- Measure fibers by weight within the tolerance of -3% to +5%.
- Furnish FRC free of fiber balls.
- 4.3. **Trial Placement.** A trial placement of FRC overlay over a concrete slab must be made. The trial placement must use the same delivery and placing equipment as will be used in the actual work and must use the mix design as approved by the engineer. As a minimum, the trial placement must be a 10-ft by 10-ft by 2.5-in. thick slab. TxDOT will pay for one cubic yard of concrete used in the acceptance testing. TxDOT will only pay for the passing test results, failing test results will be at the contractor's expense.
- 4.4. **Surface Preparation.** Follow Item 483 "Concrete Bridge Deck Surfacing" for existing surface removal. Upon the completion of the hydro-demolition process, prepare and maintain the bridge surface in accordance with Item 439, "Bridge Deck Overlays." Maintain SSD condition for a minimum of 8 hr. before overlay placement.
- 4.5. **439, "Bridge Deck Overlays," Curing:** Follow the requirement of Item 439, "Bridge Deck Overlays," Section 4.5, "Curing."
- 4.6. **Final Surface Finish.** Provide a saw cut final surface texture to the bridge in accordance with Item 422.

5. MEASUREMENT

Steel Fiber Reinforced Concrete Overlay will be measured by the square yard of surface overlaid using the dimensions shown on the plans.

6. PAYMENT

The work performed and materials furnished in accordance with this item and measured as provided under "Measurement" will be paid for at the unit price bid for "Steel Fiber Reinforced Concrete Overlay."

Payment for "Steel Fiber Reinforced Concrete Overlay" is full compensation for final cleaning surface and preparing surface for overlay, cleaning and restoration of reinforced steel; furnishing and placing reinforcing steel; furnishing, placing, finishing and curing the steel fiber concrete overlay; and final surface finish.

These prices are full compensation for materials, tools, equipment, labor, and incidentals.

Repair of deteriorated concrete below the level of scarification will be paid for in accordance with Item 429, "Concrete Structure Repair."

Concrete removal and surface preparation utilizing hydro-demolition will be paid for in accordance with item 483, "Concrete Bridge Deck Surfacing."