STEEL FIBER REINFORCED CONCRETE OVERLAY 8/15/18

**1.0 Description.** This work shall consist of constructing a steel fiber reinforced concrete slab overlay with Class B-1 or B-2 concrete (as noted on the plans) and steel fiber reinforcement and in accordance with Sec 501, Sec 703 and the Job Special Provisions.

**2.0 Materials.**

**2.1** Steel fibers shall be made from stainless steel and nominally be 2.0 inches (50 mm) long and meet the physical property requirements prescribed in ASTM A820. 1 inch Helix Fibers are also allowed. Steel fibers shall have a quantity of at least 2,000 fibers per pound and a fiber aspect ratio of 40 to 60. The steel fibers shall not have any hooks or 90° bends. The steel fibers shall be free from rust, oil and other deleterious materials. Steel fibers shall be transported, stored and applied to the concrete mixture in accordance with the manufacturer’s recommendations.

**2.1.1** The contractor shall provide initial on-site technical assistance from the supplier of the steel fiber reinforcement. Further technical assistance shall be available at the request of the engineer.

**2.2 Mix Design.** The steel fiber dosage rate shall be 80 pounds per cubic yard of concrete.

**3.0 Removal of Unsound Concrete for Monolithic Deck Repairs.**

**3.1** Following scarification of the deck, completion of all special zone repairs and prior to placement of overlay, the engineer will visually inspect and perform a sounding test on the bridge deck. Any areas of the deck that are loose, partially delaminated, or otherwise unsound, will be measured by the engineer and marked for removal. The contractor shall remove the unsound concrete per Sec 704.4.1.3. Payment for removal of any unsound concrete will be made per Section 6.1.

**3.2** Following removal of all unsound concrete, all debris shall be removed from the deck prior to placement of overlay, at no additional cost.

**4.0 Construction Requirements.**

**4.1 Surface Preparation.**

**4.1.1** On new concrete decks, the surface shall be given a very rough texture while still plastic by use of a wire comb or other approved texturing device which will produce a bondable surface acceptable to the engineer.

**4.1.2** On old existing concrete decks with existing wearing surfaces, the wearing surface shall be removed in accordance with Sec 216. On existing concrete decks without existing wearing surfaces, the surface shall be scarified in accordance with Sec 216.

**4.1.3** The textured or scarified deck shall be abrasive blasted followed by an air blast. The abrasive blast shall remove all dirt, oil and other foreign material, as well as any unsound concrete or laitance from the surface and edges against which new concrete is to be placed. The compressor shall be equipped to prevent oil in the air supply. That portion of the curb and previously placed overlays against which new concrete is to be placed shall be abrasive blasted. Any loose or foreign material detected on the concrete surface prior to placement of the overlay shall be removed by abrasive or air blasting. The concrete surface may require retexturing where penetration of foreign material is evident. No contamination of the retextured or scarified concrete surface will be permitted.

**4.1.4** To assure that the thickness of the concrete overlay above the prepared surface will be as specified on the plans, the clearance shall be checked in the following manner before concrete is placed. A filler block having a thickness 1/8 inch less than the overlay thickness shall be attached to the bottom of the screed. With screed guides in place, the screed shall be passed over the area to be concreted. Where the intended clearance does not allow use of this method, a stringline or other means shall be used, subject to approval from the engineer. All old concrete that does not have sufficient clearance shall be removed.

**4.2 Pumping.** Pumping shall generally be in accordance with Sec 703. Unless otherwise approved by the engineer, the following practices shall be observed:

(a) Avoid rapid reduction in line size from the pump to the lines.

(b) Operating pressure inside the line should be kept as low as functionally possible.

(c) Use 5 inch (minimum) diameter clean, steel lines.

**4.3 Placement Plan.**

**4.3.1** At least six weeks prior to the first placement of the steel fiber reinforced concrete slab overlay on the project, a pre-placement conference shall be held with the contractor, the steel fiber supplier, the engineer and other parties involved with the steel fiber reinforced concrete slab overlay on the project. The contractor shall present the plan for furnishing, placing, sampling and testing of the steel fiber reinforced concrete slab overlay in accordance with the requirements of this Special Provision.

**4.3.2** As part of the pre-placement conference a trial placement of steel fiber reinforced concrete slab overlay shall be made. The trial placement shall use the same delivery and placing equipment as shall be used in the actual work and shall use the mix design as approved by the engineer. For pumped concrete, simulate as closely as possible the distance and height that the concrete is to be pumped. As a minimum, the trial placement shall be a 10-ft by 10-ft by 4 inch thick slab.

**4.3.3** Placement of steel fiber reinforced concrete slab overlay for the project shall not be allowed until the engineer approves the contractor’s plan, including the results of the trial placements. Mixing, pumping, placing and finishing techniques should ensure uniform fiber distribution throughout the mixture without fiber balling or segregation. After approval, the placement plan shall not be changed unless approved in writing by the engineer.

**4.3.4** The trial slab shall become the property of the contractor after the placement plan has been approved by the engineer and shall be removed and disposed of in accordance with Sec 202.

**4.3.5** The curing and sealing of the concrete overlay on the existing bridge slab shall be in accordance with Sec 703.3.6.

**4.3.6** The curing of the concrete overlay on the bottom slab of the existing box culvert shall be in accordance with Sec 703.3.6. Concrete sealer will not be required.

**4.4 Monolithic Deck Repair.**

**4.4.1** Monolithic deck repair is defined as providing and placing the deck overlay material necessary to fill all depressions in the deck below the bottom of the planned deck overlay thickness. This material is placed monolithic during the deck overlay process.

**4.4.2** Shallow and deep areas, including approved half soled repair areas, shall be filled monolithically with the deck overlay. Deep areas shall be filled in advance during the wearing surface pour so that material stiffens enough that it will not roll back under the paving screed. Any standing water on the deck or in the depressed areas shall be removed prior to placement of concrete overlay material. Hand vibrators shall be used in areas where concrete is being placed around reinforcement, deeper areas within the pour, and along curb lines and construction joints.

**4.4.3** The volume of material necessary to fill areas removed by the contractor’s negligence, including milling too deep during scarification will be deducted from the total quantity of monolithic deck repair.

**5.0 Method of Measurement.**

**5.1** Measurement for Removal of Unsound Concrete for Monolithic Deck Repairs will be made to the nearest square foot. Measurement will include removal of unsound concrete following scarification of bridge deck.

**5.2** The overlay area will be measured to the nearest square yard based on measurement longitudinally from end of overlay to end of overlay and transversely from edge of overlay to edge of overlay.

**5.3** Measurement for Monolithic Deck Repair will be made to the nearest cubic yard. The quantity of monolithic deck repair will be determined by deducting the theoretical volume of material necessary to construct the deck overlay at plan thickness from the total volume of deck overlay material placed on the deck surface. Any volume of material wasted or used to fill depressed areas caused by the contractor’s negligence in scarification or concrete removal will not be included in this quantity.

**6.0 Basis of Payment.** Payment for furnishing and installing the above described work, including all testing, the preparation of a placement plan and the trial placement of an overlay section, will be considered completely covered by the contract unit price for steel fiber reinforced concrete overlay as specified in the plans.

**6.1** Payment for Removal of Unsound Concrete for Monolithic Deck Repairs will be made at the contract unit price.

**6.2** Payment for Monolithic Deck Repair will be made at the fixed unit price for the type of overlay material specified in the plans. Fixed unit prices shall be: $500 per cubic yard for Steel Fiber Reinforced Concrete. Payment for Monolithic Deck Repair includes all material, labor and equipment, and any other incidental items necessary to complete the work. Labor and equipment costs for placing the wearing surface concrete monolithically with the deck repair will be considered completely covered by the contract unit price for the concrete wearing surface.