**CONCRETE WORK FOR JOINT REPLACEMENT** **(2-11-19)**

Description

This special provision addresses the removal, placement and finishing of concrete required for reconstructing the deck slab and, if necessary, bent diaphragms at bridge joint locations as noted in the plans.

Materials

Furnish Department approved pre-packaged concrete or bulk concrete materials in a mix proportioned to satisfy provisions for Class AA Concrete detailed in Article 1000-5 of the *Standard Specifications* or as otherwise noted in the Concrete for Deck Repair special provision.

Removal and Preparation

Remove existing deck slab concrete to the limits shown in the plans. Existing concrete that is deteriorated, cracked or spalled shall be removed to sound material. Do not cut or remove the existing reinforcing steel unless otherwise noted in the plans.

Prior to concrete removal, introduce a shallow saw cut, ½” in depth, around the repair area at right angles to the concrete surface. Remove all concrete within the limits called out in the plans. If concrete removal exposes reinforcing steel beyond the limits shown in the plans, remove concrete 1” below the reinforcing steel with a 17 lb (maximum) pneumatic hammer, with points that do not exceed the width of the shank, or with hand picks or chisels, as directed by the Engineer.

Abrasive blast all exposed concrete surfaces and existing non-epoxy coated reinforcing steel in repair areas to remove all debris, loose concrete, loose mortar, rust, scale, etc. After blasting, examine the reinforcing steel to ensure at least 90% of the original diameter remains. If there is more than 10% reduction in the rebar diameter, splice in and securely tie supplemental reinforcing bars as directed by the Engineer. This might require additional removal of concrete, in order to achieve an appropriate splice length of the reinforcing steel. Touch-up epoxy coatings of exposed epoxy reinforcing steel, as directed by the Engineer.

Follow all abrasive blasting with vacuum cleaning.

Prior to placing concrete at joint repair locations, install a rigid bulkhead at the required grade and profile.

For joint repairs utilizing elastomeric concrete, attach a 5 ½” x 2 ¼” minimum block out to the rigid bulkhead. The block out shall have 1” diameter air bleed holes spaced at 3’ centers along the block out to relieve air pockets and facilitate concrete consolidation. Once the concrete has cured properly, remove the block out and install elastomeric concrete as described in the Elastomeric Concrete special provision.

For joint repairs utilizing strip seals, secure the strip seal retainer rails in final position to match existing grade and cross slope. Furnish falsework to support retainer rails during installation as described in the Strip Seal special provision.

Secure screed rail guides in position to ensure finishing the surface to the required profile and cross slope. Do not treat screed rails with parting compound to facilitate their removal.

Completely clean all surfaces of grease, oil, curing compounds, acids, dirt, or loose debris within 24 hours of placing concrete. Thoroughly soak and cover existing concrete surfaces for a minimum of two (2) hours prior to placing concrete. Remove any standing water from the repair area surface prior to placing concrete

Placing and Finishing

Construction joints other than those shown on the plans will not be permitted unless approved by the Engineer.

Prior to placement, the air temperature, wind speed, and evaporation rate shall be determined by the Contractor and verified by the Engineer. Do not place concrete if the ambient air temperature is below 45°F or above 85°F, or if the wind velocity is in excess of 10 mph.

If the rate of evaporation of surface moisture exceeds 0.10 pounds per square foot per hour during placement, measures shall be taken to reduce the rate of evaporation. The evaporation rate is calculated using the following formula:

 E = (Tc2.5-r\*Ta2.5)\*(1+0.4V)\*(10-6)

 where,

 E = Evaporation Rate,

 Tc = Concrete Temp (°F),

 r = Relative Humidity (%/100)

Ta = Air Temp (°F),

 V=Wind Velocity (mph)

Do not place concrete if the predicted air temperature at the site will be less than 35°F within 72 hours after placement. For a predicted air temperature above 35°F but below 50°F, use insulation to protect the concrete for a period of at least 48 hours. Use insulation that meets the requirements of Subarticle 420-7(C) of the *Standard Specifications* and place on fresh concrete surfaces as soon as initial set permits. Do not remove the insulation during the wet curing period unless the ambient air temperature is at least 40°F and rising.

Place the concrete monolithically in one operation. Concrete shall not be placed in layers. Sections to be reconstructed are to be filled full depth and shall progress horizontally. Deviation from this procedure shall be cause for rejection.

Stop all placement operations during periods of precipitation. Keep an adequate quantity of protective coverings at the worksite and take adequate precautions to protect the freshly placed concrete from precipitation.

When a tight, uniform surface is achieved and before the concrete becomes non-plastic, finish the top surface of the deck repair by burlap dragging or other approved method that produces an acceptable uniform surface texture.

As soon as the surface supports burlap without deformations, cover the surface with two layers of clean, wet burlap. Drain excess water from the burlap before placement. Other wet cure methods are permitted but must be approved by the Engineer prior to start of placement.

Wet cure the concrete a minimum of three (3) hours or until 4,500 psi compressive strength is obtained.

After the concrete has hardened sufficiently, test the finished surface with a straightedge that is designed, constructed, and adjusted such that it will accurately indicate or mark all floor areas which deviate from a plane surface by more than ⅛” in 10 feet. Remove all high areas in excess of ⅛” in 10 feet with an approved grinding or cutting machine. Where variations are such that the corrections extend below the limits of the top layer of grout, seal the repaired surface with an approved sealing agent. Methods for correcting low areas shall be approved by the Engineer.

Groove finished concrete surfaces unless otherwise shown in the plans.

Limitations of Operations

Submit volumetric mixer size and weight data to the Engineer for review. The volumetric mixer may be allowed on the bridge deck with approval from the Engineer.

No vehicular or construction traffic is permitted on finished concrete prior to achieving a compressive strength of 4,500 psi.

If working at night, provide approved lighting

**Measurement and Payment**

*Concrete Work for Joint Replacement* will be measured and paid for at the contract unit price bid per square feet and will be full compensation for removal, containment and disposal off‑site of unsound concrete, placement and finishing of repair concrete, and shall include the cost of labor, tools, equipment (excluding the volumetric mixer) and incidentals necessary to complete the repair work.

**Pay Item Pay Unit**

Concrete Work for Joint Replacement Square Feet