

PN 512 - 07/20/2007 - ITEM SPECIAL - PATCHING CONCRETE BRIDGE DECKS

A. Description. This item shall consist of furnishing the necessary labor, materials and equipment to repair concrete bridge decks, including the removal of all loose and unsound concrete, bituminous patches, surface preparation, bonding coat and the mixing, placing, finishing and curing of the mortar or concrete patches.

B. Materials. Materials shall conform to the following requirements:

Fine aggregate (natural sand).....	703.02
Coarse aggregate (No.8)	703.02
Portland cement	701.05
Quick Setting Concrete Mortar, Type 1 or 2	705.21
Air-entraining admixture	705.10
Curing materials - Type A or B Patches	705.07
Curing materials - Type C Patches	Mfgr's recommendations

C. Removal of Unsound Concrete. The Engineer shall sound the entire deck and outline the areas to be removed. Sounding may have to be delayed until the deck is sufficiently dry to permit detection of all areas of delamination. The perimeter of all removal areas shall be sawed to a depth of 1 inch (25 mm) to produce a vertical or slightly undercut face. Additional saw cuts may be required to facilitate removal. All unsound concrete including all patches other than sound Portland cement concrete, and all loose and disintegrated concrete shall be removed. The unsound concrete may be removed by chipping or hand dressing. Chipping hammers shall not be heavier than the nominal 35 pound (16 kg) class and shall be operated at an angle of less than 45 degrees measured from the surface of the deck. Concrete shall be removed in a manner that prevents cutting, elongating or damaging reinforcing steel. Where the bond between the concrete and a primary reinforcing bar has been destroyed, or where more than one half of the periphery of such a bar has been exposed, the adjacent concrete shall be removed to a depth that will provide a minimum 3/4 inch (19 mm) clearance around the bar except where other reinforcing bars make this impracticable. Reinforcement which has become loose shall be adequately supported and tied back into place. After completion of the secondary removal operations, the Engineer will re-sound the deck to ensure that only sound concrete remains.

D. Surface Preparation. Cleaning shall closely precede application of the bonding grout and/or the patching material. The surface to be patched and the exposed reinforcing steel shall be thoroughly cleaned by sandblasting followed by an air blast. It may be necessary to use hand tools to remove scale from the reinforcing steel. For Type A and Type B patches and Type C patches which do not use water as the activator, the prepared surface shall be surface dry. For Type C patches which require water as the activator the prepared surface shall be left in the condition as recommended by the manufacturer. Any additional surface preparation shall be in accordance with the manufacturer's recommendations for the patching material which is used.

E. Bonding Grout. The grout for bonding Type A patches shall consist of equal parts by volume of Portland cement and sand, mixed with sufficient water to form a stiff slurry. The consistency of this slurry shall be such that it can be applied with a stiff brush or broom to the existing surface in a thin, uniform coating. The coating of grout shall be scrubbed onto the dry surface immediately before placing the concrete. Care shall be exercised to ensure that no excess grout is permitted to collect in low spots. In no case shall the grout be permitted to dry before placing the new concrete. Thinned grout shall be painted over all joints between the new existing concrete immediately after the finishing has been completed. Type B and Type C patches shall be bonded according to the manufacturers recommendations.

F. Patching. The mortar or concrete shall be placed as Type A, B, or C.

1. Type A. The mixture shall consist of 1 part high-early-strength Portland cement, 1-1/2 parts fine aggregate and 1-1/2 parts coarse aggregate by volume. Sufficient air-entraining agent shall be added to maintain an air content of 8 plus or minus 2 percent. The slump shall be the minimum practical for placing and in no case shall it exceed 2 inches (50 mm). The materials shall be mixed at the site. Ready-mixed concrete shall not be permitted. The mix shall be placed in the area to be patched while the bonding grout is still wet, a slightly overfilled and struck off with a vibrating screed drawn slowly across the area. Hand finishing with a wood float may be required to product a tight, uniform surface.

2. Type B. Patching material shall be made using Quick Setting Concrete Mortar, Type 1 or 2, 705.21. The mortar shall be mixed and placed as per manufacturer's recommendations. Coarse aggregate may be added in accordance with the manufacturer's instructions when the depth of the patch exceeds 1 inch (25 mm).

3. Type C. Patching material shall be made using a blend of 705.21 Type 2 material and selected aggregates with an activator. These materials shall be mixed and placed as per manufacturer's recommendations. Coarse aggregate may be added in accordance with the manufacturer's instructions when the depth of the patch exceeds 1 inch (25 mm).

G. Curing. Type A patches shall be cured in accordance with 511.17, Method (A), for not less than 24 hours if membrane waterproofing is to be applied immediately. If not, Method (A) shall be used for 48 hours, after which membrane curing material shall be applied at a rate not less than one gallon per 200 square foot (1 L per 5 m²). Membrane curing material shall be removed prior to placing waterproofing. Type B and Type C patches shall be cured in accordance with the manufacturer's recommendations.

H. Method of Measurement. The quantity shall be the actual area in square yards (square meters) of the exposed surface of all patches, irrespective of the depth of the patch, complete, in place and accepted.

I. Basis of Payment. Payment shall be made at the contract price bid for:

ITEM	UNIT	DESCRIPTION
Special	Square Yard (Square Meter)	Patching concrete bridge decks, Type A.
Special	Square Yard (Square Meter)	Patching concrete bridge decks, Type B.
Special	Square Yard (Square Meter)	Patching concrete bridge decks, Type C.

Designer notes:

This proposal note should be used in lieu of Item 519 when the work dictates that faster setting materials be required to complete the repairs within an acceptable time frame.