INDIANA DEPARTMENT OF TRANSPORTATION

Driving Indiana's Economic Growth

Design Memorandum No. 07-06
Technical Advisory

March 22, 2007

TO: **All Design, Operations, and District Personnel, and Consultants**

FROM: ***/s/ Anthony L. Uremovich***
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Production Management Division

SUBJECT: **Patching Concrete Structures**

REVISES: ***Indiana Design Manual*** **Section 72-3.04(03)**
Rehabilitation Technique SF-1

EFFECTIVE: **September 6, 2007, Letting**

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The pay item for patching piers, end bents, abutments, wingwalls, beams, or girders is 710-09158, Patching Concrete Structures, pay unit square foot (square meter). The pay item for repointing masonry in structures should no longer be used for this work.

Recurring Special Provision 710-B-176, attached hereto, should be called for beginning with the September 6, 2007, letting, and through the last letting of August 2008. Beginning with the first letting of September 2008, the recurring special provision will be incorporated into the INDOT *Standard Specifications*. The provision will then no longer be required to be called for in specific contracts.

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Attachment

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PATCHING CONCRETE STRUCTURES AND REPOINTING MASONRY IN STRUCTURES

The Standard Specifications are revised as follows:

SECTION 710, BEGIN LINE 1, DELETE AND INSERT AS FOLLOWS:

SECTION 710 – *PATCHING CONCRETE STRUCTURES AND* REPOINTING MASONRY IN STRUCTURES

710.01 Description

This work ~~shall~~ consists of *patching concrete piers, endbents, abutments, wingwalls, retaining walls, concrete structure surfaces other than bridge decks, patching concrete drainage structures and* repointing ~~concrete~~, rubble, dressed stone, or brick masonry structures ~~with mortar~~ in accordance with 105.03.

Bridge deck patching shall be in accordance with 722.

710.02 Materials

Materials shall be in accordance with the following:

Coarse Aggregate, Class A or Higher, Size No. 11 ..... *904*
Concrete, Class A *701.02*
Curing Compound *912.01*
Epoxy Resin Adhesive *909.11*
Fine Aggregate 904.01
Hydrated Lime 913.04
Masonry Cement ..... 901.01(c)
Portland Cement ..... 901.01(b)
Reinforcing Steel *910.01*

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CONSTRUCTION REQUIREMENTS

710.03 ~~Repointing Concrete Masonry~~ *Patching Concrete Structures*

~~All honeycombed, weathered, or disintegrated areas in the concrete shall be cut out and thoroughly cleaned of all loose concrete, dirt, or other foreign material to a depth and over the area necessary to produce a firm and solid connecting surface for the adherence of the new mortar. This prepared surface shall be coated with epoxy resin adhesive in accordance with AASHTO M 235, class I, filled with mortar well driven in, and finished to meet approval. Where the surface is to be cleaned out to such depth and area that the new mortar does not stay in place without support, a form shall be placed over the area and the space so enclosed filled with well-consolidated mortar. After the forms are removed the mortar shall be protected in accordance with 708.07.~~

(a) Concrete Removal

Areas of unsound concrete to be removed will be marked by the Engineer.

A saw cut shall be made perpendicular to the existing concrete surface a minimum of 1 in. (25 mm) outside marked areas. The cut shall be a minimum 1 in. (25 mm) deep or to the top of reinforcing steel, whichever is less.

Removal of unsound concrete shall not exceed 6 in. (150 mm) in depth and shall be performed by handchipping. Handchipping tools may be hand or mechanically driven. Jack hammers shall not be heavier than nominal 45 lb (20.5 kg) class and chipping hammers shall not be heavier than nominal 15 lb (6.8 kg) class. Only chipping hammers shall be used when removing concrete within 1 in. (25 mm) of reinforcing steel. Mechanically driven tools shall be operated at a maximum angle of 45 degrees to concrete surfaces.

Where reinforcing steel has been exposed, concrete adjacent to the steel shall be removed to a minimum clearance of 1 in. (25 mm) around the entire periphery of the exposed steel. Exposed reinforcing steel shall not be damaged by removal operations. Reinforcing steel damaged by the Contractor shall be replaced.

Regardless of the method of removal, removal operations shall cease if sound concrete is being removed beyond the limits approved by the Engineer. Removal methods shall be adjusted to prevent unnecessary removal of sound concrete prior to resuming removal operations.

(b) Replacement of Reinforcing Steel

Existing reinforcing steel that has lost 50% or more of its original cross sectional area shall be removed and replaced with new reinforcing steel of the diameter of the original steel. Replacement reinforcing steel shall be lapped a minimum of 3 in. (75 mm) along existing reinforcing steel.

(c) Patching

After concrete removal operations are completed and just prior to placing patches, all patch areas shall be sandblasted to expose aggregates in concrete surfaces and to remove rust, residual concrete and laitance layers from reinforcing steel surfaces. All surfaces shall be free of dust, chips, water and foreign material to produce a firm, solid surface for adherence of patching concrete. Air lines for sandblasting and air cleaning shall be equipped with oil and water traps.

Surfaces of prepared cavities and all exposed reinforcing steel within the cavities shall be coated with epoxy resin adhesive in accordance with 722.06(a)1.

For patched areas that require forms, forms may be removed after 24 hr and surfaces cured in accordance with 702.22 or the forms may be left in place for 72 hr and no additional curing will be required. Patched areas that do not require forms shall be cured in accordance with 702.22.

Concrete patches shall be finished to match the texture and finish of abutting existing concrete.

710.04 Repointing Rubble Masonry

Joints in rubble masonry shall be cleaned of all loose mortar and foreign material. All spaces around the rubble aggregate, after being cleaned, shall be ~~well~~ filled with mortar *and trowel finished*. ~~If any of the~~ *All loose* rubble ~~is loose, it~~ shall be settled into place before the mortar has set.

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710.05 Repointing Dressed Stone and Brick Masonry

~~The joints~~ *Joints* in ~~the~~ masonry shall be cleaned of all loose mortar and foreign material for a depth of at least twice the width of the joint. ~~The joints~~ *Joints* shall ~~then~~ be filled with mortar ~~well driven in~~ and ~~neatly~~ *trowel* finished.

710.06 Method of Measurement

~~Repointing~~ *Patching concrete structures and repointing rubble, dressed stone and brick* masonry in structures will be measured by the square foot (square meter) of actual surface area of ~~masonry repointed~~ *patching or repointing*. Individual ~~patches~~ *areas* of less than 1 ~~sq~~ ft^2 (0.1 m^2) in area will be considered as 1 ~~sq~~ ft^2 (0.1 m^2). *Areas greater than 1 ft^2 (0.1 m^2) will be recorded as the actual measurement of the repaired area to the nearest 0.1 ft^2 (0.01 m^2).*

710.07 Basis of Payment

The accepted quantities of ~~repointing~~ *patching concrete structures will be paid for at the contract unit price per square foot (square meter) complete in place. Repointing rubble, dressed stone, and brick* masonry in structures will be paid for at the contract unit price per square foot (square meter) of ~~repointed~~ *repointing* masonry complete in place.

Payment will be made under:

Pay Item	**Pay Unit Symbol**
Patching Concrete Structures	*SFT (m2)*
Repointing Masonry in Structures	SFT (m2)

Areas where *patching concrete structures or* repointing *rubble, dressed stone, or brick* masonry in structures exceeds an average of 4 in. (100 mm) in depth~~, the work shall be completed as extra work~~ *will be paid for at a price calculated by multiplying the contract unit price by 1.25*. ~~Payment will be made in accordance with 104.03.~~

The cost of removing the existing concrete or masonry cement, furnishing, hauling, and placing all materials, preparing the surface, and all necessary incidentals shall be included in the pay items in this section.

The cost of replacing damaged reinforcing steel shall be included in the cost of patching concrete structures.

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