

## SECTION 451—PATCHING PORTLAND CEMENT CONCRETE PAVEMENT (SPALL REPAIR)

**451.01 DESCRIPTION:** This Work shall consist of the partial depth patching of spalls and potholes in Portland Cement concrete pavement by removing the broken, damaged, or disintegrated concrete pavement, including any asphaltic concrete patches, from spalled or damaged areas of the pavement surfaces and patching the damaged and spalled areas with approved patching materials in accordance with this Specification and in reasonable close conformity with the existing pavement cross sections.

**451.02 MATERIALS:** Materials for repairing and patching Portland Cement concrete pavement shall conform to the following requirements:

Twenty-Four Hour Accelerated Strength Concrete* .....	Section 504
Epoxy Adhesive, Type II .....	Section 886
Silicone Sealant .....	Sub-Section 833.06
Fine Aggregate .....	Sub-Section 801.02
Coarse Aggregate .....	Sub-Section 800.01
Closed-Cell Polyethylene Foam .....	Sub-Section 833.10

Rapid Setting Patching Material\*\*

Approved Products List No. 27 and Section 934

\*This Section is modified to permit the use of a portable concrete mixer of adequate capacity. Slump requirements shall be from 1 to 3 inches inclusive.

\*\*If approved for use, setting time requirements may be waived by the laboratory provided minimum compressive strength development is unaffected.

**451.03 CONSTRUCTION:** Concrete patching operations shall be conducted in one lane at a time and in a safe and expeditious manner that offers minimum inconvenience to the traveling public. The Work shall be accomplished with other operations in progress within an area whenever practical. Work shall be completed before the grinding operation, if specified, begins.

Any concrete patches that are completed and found to contain cracks, shrinkage, compression failures, or become damaged during construction or by traffic prior to final acceptance shall be removed and replaced at no additional cost to the Department.

### A. REMOVAL AND PREPARATION OF REPAIR AREA:

1. **PARTIAL DEPTH PATCHING OF SPALLED JOINTS:** Each transverse joint and longitudinal joint, with a visual defect shall be "sounded" to determine the limits of the damaged or defective areas by striking the pavement surface along each side of each joint with a hammer, chain drag, or other similar tools to detect unsound concrete having a "flat" or "hollow" sound. The limits of the defective areas shall be marked on the pavement by making a rectangular area two inches beyond the outer limits of the unsound concrete area to serve as a guide for sawing. Spalled areas within less than 2 feet of each other along a joint shall be

marked as one spall area. If separated 2 feet or more, mark as separate spall areas. Defective (spalled) joint areas less than six inches in length and 1½ inches in width shall not be repaired under this Specification, but shall be thoroughly cleaned and sealed with silicone sealant as part of the joint sealing operation following procedures specified in Section 461, Resealing Roadway and Bridge Joints and Cracks.

The rectangular marked areas shall be sawn with near vertical faces not less than 2 inches nor more than 3 inches in depth. All "unsound" material within the sawed area is to be removed with a 30 pound chipping hammer. Utmost care shall be exercised not to damage or fracture the "sound" concrete substrate to be left on the bottom of the spall area. Use of sharp pointed bits is prohibited.

If the depth of removal of unsound material exceeds 4 inches, the Engineer may direct that the repairs will be accomplished by placing a six-foot slab replacement which is classified and paid for as Section 610, Slab Removal and Section 452, Slab Replacement.

Prior to placing the patching material, the face of the existing transverse and/or longitudinal joints bordering the repair area(s) shall be sawed a minimum of 5 inches deep and ¼ inch wide with the full depth of the saw cut extending at least one inch beyond the limits of the repair area(s) in each direction. Just prior to placing the patching material, the surfaces within the repair areas shall be thoroughly cleaned by sandblasting and air blasting to remove any oil, dust, dirt, traces of asphaltic concrete, slurry from saw operation, and other contaminants. Following this, a ¼ inch wide piece of closed cell polyethylene foam shaped to fit the saw cut shall be placed in the joints bordering the repair areas. In the event of "back to back" repair areas at a joint, the ¼ inch closed-cell polyethylene foam shall be supported during the placing operation so as to maintain a true, straight joint line. The method used shall be approved by the Engineer. If a straight line is not maintained, the repair shall be re-done, if so directed by the Engineer, at no cost to the Department.

2. PARTIAL DEPTH PATCHING OF PAVEMENT POTHoles: The Engineer shall determine which pavement potholes are to be repaired.

The procedures previously specified for repairing spalled joints shall be used for repairing "potholes" within the pavement surface except the requirements regarding the use of ¼ inch closed-cell polyethylene foam do not apply.

#### B. PLACEMENT OF PATCHING MATERIAL:

The Contractor shall use Repair Method No. 1 unless specific written approval is given by the State Materials and Research Engineer to use Repair Method No. 2. Repair Method No. 1 is limited to use when the average daily temperature is 50 degrees F. or above. Repair Method No. 2, if approved, shall be limited to the manufacturer's written recommendations.

For the following repair methods, the surface within the repair areas shall be dry and thoroughly cleaned of all contaminants immediately before the placement is begun. The finished surface including joints shall meet a surface tolerance of  $\frac{1}{8}$  inch in 10 feet. The Contractor shall at all times utilize such approved measures as are necessary to keep all pavement surfaces adjacent to this operation reasonably clean of excess grout and other materials. Unless otherwise specified, all patching operations shall be completed and all lanes opened to traffic before sunset each day.

### REPAIR METHOD 1

**TWENTY-FOUR HOUR ACCELERATED STRENGTH CONCRETE:** After following the requirements previously specified, all concrete surface areas within the repair area shall be completely coated with a film of Type II Epoxy approximately 10 to 20 mils thick.

The concrete must be mixed on site. The mix design and mixing method must be approved by the Laboratory.

Concrete shall be deposited in the repair area while the epoxy is still tacky and shall be sufficiently vibrated to form a dense, homogeneous mass of concrete, completely filling the area of the patch. The concrete shall be screeded to the proper grade and allowed to remain undisturbed until the water-sheen disappears from the surface. The concrete shall then be covered with wet burlap or membrane curing compound. Curing shall continue for a minimum of 3 hours. A longer curing time may be required by the Engineer to ensure sufficient strength development of the concrete prior to opening to traffic.

### REPAIR METHOD NO. 2

**RAPID SETTING PATCHING MATERIAL FOR PORTLAND CEMENT CONCRETE PAVEMENT:** In addition to the requirements outlined previously, the surfaces in the repair areas shall be further prepared in accordance with the manufacturer's written recommendations. Handling, mixing, placement, consolidation, screeding, and curing of the patching material shall be in accordance with the manufacturer's written instructions as approved by the Laboratory. Curing shall continue for at least one hour and until the section is opened to traffic.

- C. **SPECIAL REQUIREMENTS:** The following special requirements apply to this work:
1. Air compressors used for cleaning repair areas shall be equipped with suitable traps capable of removing all surplus water and oil in the compressed air. The compressed air will be checked daily by the Engineer for contamination. No contaminated air shall be used. The compressor shall be capable of delivering compressed air at a continuous pressure of at least 90 psi.

2. After any sandblasting operation, thoroughly clean with compressed air. Also remove sand from sandblasting operation from roadway and shoulders. During sandblasting, protect traffic in adjacent lane(s).
3. "Over-cutting" of the pavement beyond marked areas shall be held to the minimum amount possible. All "over-cutting" shall be thoroughly cleaned of "saw slurry" and other contaminates and then repaired by filling full-depth with an approved low-viscosity epoxy compound using a Type II epoxy adhesive as specified in Section 886. Such repairs are to be made as soon as possible, but in any event, not later than when the joint is resealed.
4. In the event of repairs adjacent to an unstable shoulder, a form shall be placed full depth of the repair area to maintain a true, straight shoulder joint and prevent intrusion of the patching material onto the shoulder area. After curing of the patching material, the form shall be removed and the shoulder repaired at the Contractor's expense.
5. Any original transverse and longitudinal joints shall be re-established by sawing and sealing with silicone meeting the requirements of Sub-Section 833.06 and in accordance with plan details and Section 461. All joints must be re-established within 60 days after placement of the patch. The width of the re-established joints shall be 3/8 inch minimum.

**451.04 MEASUREMENT:** The area measured for payment will be the number of square feet of patching complete in place and accepted.

**451.05 PAYMENT:** The area measured as provided above will be paid for at the Contract Unit Price per square foot. Such payment shall be full compensation for any required sawing: removing any existing asphaltic concrete patching material or the spalled, broken, or damaged Portland Cement concrete; cleaning the open area by sandblasting; furnishing, placing, finishing, and curing the patching material, and sawing and sealing new transverse and longitudinal joints, including all equipment, tools, labor, and incidentals necessary to complete the Work.

Payment will be made under:

Item No. 451. Patching Portland Cement Concrete  
 Pavement .....per Square Foot