

SECTION 522 — PORTLAND CEMENT CONCRETE PAVEMENT REPAIRS

522.01 DESCRIPTION. This work shall consist of repairing plain, conventionally reinforced, or continuously reinforced portland cement concrete pavement as specified in the Contract Documents or as directed by the Engineer. Repairs are either Type I, 6 ft to less than 15 ft in length or Type II, 15 ft and greater in length. The minimum repair length shall be 6 ft.

522.02 MATERIALS. Refer to 520.02 except as follows:

Graded Aggregate for Base Course	901.01
Crusher Run Aggregate CR-6	901.01
High Range Water Reducing Admixture	902.06.03
Nonshrink Grout	902.11(c)
Epoxy Grout	902.11(d)
Epoxy Adhesive	921.04

522.02.01 Concrete Mix Design (Modified Mix No. 6). Concrete shall be Mix No. 6 as specified in 902.10.03 except that the minimum cement factor shall be 800 lb/yd³, contain a high range water reducing admixture and have a minimum compressive strength of 2500 psi in 12 hours. Testing shall conform to 902.10.08 except that cylinders shall remain in the molds until tests are conducted.

522.02.02 Field Control. Field control will be by compressive strength, cement content, slump, water/cement ratio and air entrainment. Acceptance will be based on a minimum compressive strength of 3000 psi in 24 hours. If test results fall below the specified value, a new mix design shall be prepared by the Contractor as directed by the Engineer.

522.02.03 Polyester Grout. The Contractor may substitute polyester grout in lieu of epoxy grout providing the grout conforms to 902.11(d). Cartridge type systems shall be identified with a batch or lot number.

522.02.04 Epoxy Adhesives. Epoxy adhesives shall conform to 921.04 and shall be Type IV, Grade 3, Class B and C, and shall be water insensitive.

522.02.05 Reinforcement. Reinforcement, including load transfer assemblies, tie bars, deformed steel bars and longitudinal tie devices shall conform to Section 908 and shall be epoxy coated.

522.03 CONSTRUCTION. Areas to be repaired and type of repair will be determined by the Engineer. Prior to the start of repairs, the

Contractor shall submit for approval, a proposed repair plan, including equipment, methods and procedures. The Contractor shall protect the repair area against damage from all causes. If any part of the repaired pavement is damaged, it shall be repaired or replaced by the Contractor at no additional cost to the Administration. Repairs shall be made in only one lane at a time for each roadway.

522.03.01 Equipment. Refer to 520.03.01.

522.03.02 Weather Restrictions. Weather restrictions shall be as specified in 520.03.02 except that the work shall be performed during the months of April through October, unless otherwise permitted in writing by the Engineer. When the range in daily temperature is expected to exceed 15 F, concrete placement will be permitted in the late afternoon after the existing pavement has achieved its maximum expansion, unless otherwise directed by the Engineer.

Cold weather protection shall conform to 520.03.12 except that insulated blankets shall be used when the ambient air temperature is less than 70 F.

522.03.03 Saw Cuts and Removal of Existing Pavement. Concrete slabs shall be removed by the lift out method in large sections. No other method of slab removal shall be used unless permitted by the Engineer. All areas where the pavement has been removed shall be repaired in the same working day.

If any portion of adjacent slabs are damaged due to the Contractor's operations, the damaged portions shall be repaired by the Contractor at no additional cost to the Administration.

Saw cuts and pavement removal procedures are as follows:

- (a) **Plain and Conventionally Reinforced Portland Cement Concrete Pavement.** Existing pavement shall be removed by making a perpendicular saw cut, full depth, for the full slab width using a diamond saw blade. Full depth saw cuts shall be spaced a minimum of 2 in. from and parallel to, longitudinal joints between pavement slabs. When repairs are to be made on only one side of an existing transverse joint, the removal shall extend into the adjacent slab a sufficient distance to ensure that existing dowels are removed. The concrete slab shall be removed within one week after the saw cuts have been made. Repairs shall be completed in a continuous operation.
- (b) **Continuously Reinforced Portland Cement Concrete Pavement.** Existing pavement shall be removed by making a

perpendicular saw cut for the full slab width using a diamond saw blade. The concrete slab shall be removed within 72 hours after the saw cuts have been made. This saw cut shall be 2 in. minimum depth, for the full width of the lane at the boundaries of the repair without cutting the steel reinforcement. The boundaries shall be a minimum of 18 in. from the nearest transverse tight crack for normally spaced tight cracks and at least 6 in. from the nearest transverse crack when they are closely spaced. The Contractor shall saw cut, full depth, across the full width of the slab a minimum of 22 in. inside each boundary saw cut. Additional full depth saw cuts shall be made along all longitudinal edges not bounded by construction joints. Concrete shall be removed to its full depth within the boundaries of the repair area. Bending existing reinforcement bars is prohibited.

The equipment used to remove concrete in the areas between each 2 in. and full depth saw cut shall be restricted to a maximum jackhammer size of 60 lb and hand tools only. The existing pavement edge shall be neatly trimmed and vertical. A minimum of 22 in. of reinforcement shall remain exposed on each side of the repair. The Engineer will require the removal of any pavement breaking equipment from the project that could damage the adjacent concrete pavement.

When the saw cuts close due to temperature prior to removal of the existing slab, narrowly spaced, full depth, full width saw cuts shall be made to relieve pressure. The material between the narrowly spaced saw cuts or the longitudinal joint and the 2 in. minimum offset longitudinal cut shall be removed. Removal equipment shall be as specified above. Tie bars protruding from the longitudinal offset cut shall be cut flush with the existing concrete. All waste material shall be immediately removed from the repair site.

Any saw cuts that extend into adjacent slabs, curbs or gutter shall be sealed as specified in Section 523.

522.03.04 Base and Subgrade Preparation. Refer to 505.03.03 except that the subgrade for all types of repairs shall be moistened with water.

522.03.05 Subgrade Drains. The Engineer may direct that subgrade drains be constructed. The work shall conform to Section 306. Additional work shall be as directed by the Engineer.

522.03.06 Forms. The forms used shall conform to 520.03.04, or shall be as directed by the Engineer. Forms shall overlap the existing pavement on each side of the patch a minimum of 1 ft and be securely

fastened to prevent movement when concrete is placed. The Contractor shall excavate the adjacent shoulder the width of the form plus 6 in. to provide space for the forms. After removal of the form, the excavated shoulder area shall be repaired using the same type of material as used in the original shoulder.

522.03.07 Reinforcement. Reinforcement shall conform to the Contract Documents and 520.03.06. Doweled joints shall be located at the slab face closest to the original doweled joint location.

Holes having a diameter 1/4 in. larger than the dowels, load transfer tie bars and longitudinal tie devices shall be drilled into the face of the existing slab at mid depth. After drilling, the hole shall be blown out and allowed to dry. The dowels, load transfer tie bars and longitudinal tie devices shall be grouted or epoxied into place. The alignment of the reinforcement shall be in the direction of the pavement and parallel to the plane of the surface.

A plastic grout retention disk conforming to the Contract Documents shall be placed on each dowel to prevent loss of the bonding material.

Reinforcement steel bars for continuously reinforced portland cement concrete pavement shall be the same size and spacing as the existing steel and shall be spliced to the exposed steel of the existing pavement by lapping, welding or using a mechanical device that is approved by the Engineer. For lap splices, the steel reinforcement shall be lapped a minimum of 22 in. and secured with tie wires. Longitudinal steel reinforcement bars shall be continuous for the full length of the repair and the amount of steel in the repair area shall be at least equal to the amount of steel in the existing pavement. The reinforcement steel bars shall be supported by chairs or as approved by the Engineer.

For plain and conventionally reinforced pavement, the protruding ends of the dowel bars shall be coated with a water insoluble lubricant approved by the Engineer.

522.03.08 Joints. Joints shall conform to 520.03.14 and the Contract Documents.

All joints shall be sealed as specified in Section 523.

522.03.09 Concrete Placement. Concrete placement shall conform to 520.03.07. Prior to placing concrete, the exposed vertical surfaces of all adjacent concrete shall be cleaned.

Refer to 520.03.02 for weather requirements. The temperature of the concrete at placement shall be 50 to 90 F.

Concrete for continuously reinforced portland cement concrete pavement shall be placed when the air temperature is a minimum 40 F and rising. When the range in daily temperature is expected to exceed 15 F, placement of concrete will be permitted in the late afternoon after the existing pavement has achieved maximum expansion unless otherwise directed by the Engineer.

Plain and continuously reinforced concrete pavement repairs shall be cast in one full depth operation. Conventionally reinforced concrete pavement repairs shall be placed in two equal lifts with the wire mesh laid on the surface of the first lift.

All concrete shall be vibrated.

522.03.10 Finishing. Following the concrete placement, the surface shall be struck off to the finished grade by means of an adjustable steel or wooden template and floated to a smooth finish. The repair shall be screeded longitudinally to provide uniformity of ride to adjacent pavement. The final surface shall match the contour of the existing roadway. The Contractor shall provide a metal straightedge and perform surface checks as specified in 520.03.10.

522.03.11 Curing. The concrete shall be cured as specified in 520.03.12 except that the curing shall continue for 12 hours after placement of the concrete or until the repair is put into service.

522.03.12 Emergency Filler. The Contractor shall have readily available sufficient crusher run aggregate CR-6 to completely fill the void of the repair area. The material shall be placed and compacted in the void and covered with a steel plate when directed by the Engineer. At the beginning of the next day's work, this material shall be completely removed using procedures which shall not disturb the subgrade, dowels, load transfer tie bars, load transfer assemblies or reinforcement that has been previously placed.

522.03.13 Steel Plates. The Contractor shall have an ample supply of 12 x 14 ft by 1 in. thick steel plates available on the project to cover emergency filler or be placed over the patch area until the concrete has developed sufficient strength to carry traffic.

522.03.14 Unacceptable Repairs. Pavement repairs that have been damaged by traffic or other causes or are not in conformance with the Contract Documents shall be removed and replaced by the Contractor at no additional cost to the Administration.

522.04 MEASUREMENT AND PAYMENT. Portland Cement Concrete Pavement Repairs will be measured in place and paid for at the

Contract unit price for one or more of the items listed below as specified in the Contract Documents. The payment will be full compensation for saw cuts, furnishing, hauling, placing of all materials, removal and disposal of old concrete, grout, drilled holes, chairs, all tie devices, reinforcement, epoxy coating, steel plates, emergency filler, joint sealing, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

Steel plates and emergency filler shall remain the property of the Contractor at the completion of the project.

522.04.01 Plain Portland Cement Concrete Pavement Type I Repairs per square yard.

522.04.02 Plain Portland Cement Concrete Pavement Type II Repairs per square yard.

522.04.03 Conventionally Reinforced Portland Cement Concrete Pavement Type I Repairs per square yard.

522.04.04 Conventionally Reinforced Portland Cement Concrete Pavement Type II Repairs per square yard.

522.04.05 Continuously Reinforced Portland Cement Concrete Pavement Type I Repairs per square yard.

522.04.06 Continuously Reinforced Portland Cement Concrete Pavement Type II Repairs per square yard.

522.04.07 Removal of Unsuitable Material and Refill per cubic yard. The payment will also include excavation and disposal of unsuitable material, backfilling with aggregate, and compaction.

522.04.08 Subgrade Drains will be measured and paid for as specified in the applicable portions of Section 306.

522.04.09 Shoulder Repairs per square yard. Repairs to existing shoulders necessitated by the placement of forms are also included.