

SECTION 516—CONCRETE PAVEMENT PATCHING

516.1 DESCRIPTION—This work is the construction of one course, full depth, normal strength and accelerated strength, cement concrete pavement patches. Do not patch less than one lane width. If diamond grinding is to be performed, test the pavement surface in the longitudinal direction as specified in [Section 514.3\(d\)2](#).

(a) **Patching Joint.** Provide full depth saw-cuts at the existing pavement/patch interface, install load transfer dowels in the transverse faces of the existing pavement, construct a sealant reservoir, and seal the joint.

(b) **New Pavement Joint.** Provide load transfer unit, construct sealant reservoir, and seal the joint.

(c) **Normal and Accelerated Concrete Pavement Patching, Type A.** Construct patches between 1.80 m and 6.00 m (6 feet and 20 feet) long.

(d) **Normal and Accelerated Concrete Pavement Patching, Type B.** Construct patches between 6.01 m and 20.00 m (20.1 feet and 65 feet) long.

(e) **Normal and Accelerated Concrete Pavement Patching, Type C.** Construct patches between 20.01 m and 150.00 m (65.1 feet and 500 feet) long.

516.2 MATERIAL—

(a) **Cement Concrete—Class AA.** For normal strength, use [Section 704](#).

For accelerated strength, use Section 704, except delete Table A. Provide concrete for acceptance having a 28-day minimum compressive strength of 26 MPa (3,750 pounds per square inch) when tested according to [PTM No. 604](#). Submit mix design, as specified in [Section 704.1\(c\)](#), having a minimum target value compressive strength of 10 MPa (1,500 pounds per square inch) at 7 hours when tested according to [PTM No. 604](#).

(b) **Reinforcement.** [Sections 709.2](#), [709.3](#), and [709.4](#)

(c) **Expansion Joint Filler.** [Section 705.1](#)

(d) **Dowels and Load Transfer Units.** [Section 705.3](#)

(e) **Joint Sealing Material.** [Section 705.4\(b\)](#) or [\(c\)](#)

(f) **Graphite Lubricant.** [Section 705.6](#)

(g) **Concrete Curing Materials.** For normal strength, use [Section 711.1\(a\)](#), [\(b\)](#), [\(c\)](#), [\(d\)](#), and [\(e\)](#); or [Section 711.2\(a\)](#), Type 2.

For accelerated strength, use [Section 711.1\(b\)](#) and [Section 711.2\(a\)](#), Type 2, or [711.2\(b\)](#).

(h) **Concrete Admixtures.** [Section 711.3](#)

If accelerating admixtures are used, provide only accelerating admixtures that contain no chlorides.

(i) **Subbase.** [Section 350.2](#)

(j) **Tape Bond Breaker.** An approved self-adhesive tape the width of the sealant reservoir.

(k) **Anchor Material.** An approved adhesive anchoring material as listed in [Bulletin 15](#).

(m) **Preformed Cellular Polystyrene.** [ASTM C 578](#)

(n) **Intermediate Curing Compound.** [Section 711.2\(c\)](#)

516.3 CONSTRUCTION—As shown on Standard Drawing RC 26M, and as follows:

(a) General. Prepare a QC Plan as specified in [Section 106.03\(a\)2.a](#) and submit it for review. Detail appropriate action points for all phases of construction, including concrete mixing and curing, joint sawing and sealing, and sampling and testing for opening to traffic. For normal strength patches, do not place concrete if the air temperature falls below 4 °C (40F). For accelerated strength patches, do not place concrete if the air temperature falls below 7 °C (45F). Before placing concrete, ensure adequate equipment and trained personnel are available, and sufficient hauling units scheduled, to maintain continuity in placement.

If patching both lanes, construct concrete pavement patches in one-lane or two-lane widths, except where two-lane width construction would interfere with traffic. The Representative will surface mark patch areas in advance of the sawing operations.

Do not allow excavated patch areas to remain unpatched for more than 2 calendar days or over weekends or holidays. When excavated patch areas are adjacent to open traffic lanes, use temporary fill or other approved methods to protect traffic at all times.

If it rains while the patch area is open, excavate an outlet through the shoulder at the lowest point of the patch as directed.

Repair any damage to the existing shoulders as a result of this work, at no expense to the Department.

After saw cutting the existing pavement, allow traffic on patch areas of existing pavement for a maximum of 72 hours.

Do not wheel saw cut and open to traffic.

(b) Saw Cutting. Where one lane only is being patched, make a full depth saw-cut in the existing longitudinal joint for the full length of the patch. Where two lanes are being patched one lane at a time, perform one of the following:

- Make a full depth saw-cut parallel to the existing longitudinal joint and not more than 300 mm (1 foot) within the second lane to be patched. Form the patch and backfill behind the forms with aggregate at no additional cost to the Department.
- Make a full depth saw-cut in the existing longitudinal joint for the length of the patch and insert a temporary rigid separator between the second lane and the patch area. Do not use a temporary rigid separator greater than 3 mm (1/8 inch) thick.

Make full depth transverse saw-cuts as indicated. Do not break back the underside of the existing pavement. If break back occurs, make a new full depth transverse saw-cut beyond the area of break back. Place the additional length of patch at no expense to the Department.

(c) Removal of Existing Pavement. Remove concrete between narrowly spaced saw-cuts at the end of a proposed patch area with air hammers and hand tools.

As an alternate, a wheel saw having carbide steel tips may be used before making the full depth transverse saw-cuts necessary for the patching joint. Limit penetration of wheel into the subbase to a maximum of 13 mm (1/2 inch). Do not allow the wheel to cut into pavement that is remaining in place. Discontinue using a wheel saw if unsatisfactory results are obtained as determined by the Representative.

Install lifting devices and lift the concrete in the patch area out in one or more pieces without disturbing the subbase and subgrade. Do not use drop hammers or hydro-hammers.

If the surface of the subbase is disturbed by the removal technique, recompact the surface using small vibratory compactors. If the disturbed material is deeper than 25 mm (1 inch), remove the disturbed material with hand tools and replace with concrete during paving at no expense to the Department.

Correct all subbase surface irregularities exceeding 25 mm (1 inch) in depth by loosening the surface and removing or adding material as required. Compact the corrected area and surrounding surface by rolling to proper grade and slope.

(d) Removal of Existing Subbase. Remove unsuitable subbase material, as directed. Replace as specified in [Section 350.3](#).

(e) Transverse Joints.

1. General. If any patch is replacing an existing expansion joint, and the existing expansion joint in the adjacent lane is remaining in place, install 19 mm (3/4-inch) expansion joint material in the joint nearest to the remaining expansion joint. Provide a tube with a minimum 25 mm (1-inch) clearance packet, over the lubricated end of all coated dowel bars.

2. Patching Joint. Drill holes into the face of the existing pavement that has been saw cut full depth. Provide holes a maximum of 3 mm (1/8 inch) larger in diameter than the coated dowel bars. Mount drilling machines in a frame that maintains the proper horizontal and vertical alignment during drilling.

Do not use hand held drills or drills that rest upon the subbase or subgrade. Drill holes to the alignment tolerances shown on the [Standard Drawings](#). Change location of drill holes ± 25 mm (± 1 inch) to avoid existing reinforcing steel.

Securely embed the coated dowel bars into place with an approved anchoring material. Inject all the mixed anchoring material into the rear of the hole before inserting the dowel bar. Rotate the dowel three to five complete rotations while inserting the dowel to purge air voids as completely as possible. Immediately trowel all excess anchoring material flush with the vertical face of the patch until the anchoring material reaches its initial set. Do not leave voids in the anchoring material. Use a plastic retainer washer to hold anchoring material in place, if directed, and remove before placement of concrete in the patch. Provide anchoring material formulated to reach an initial set within 5 minutes of application. Provide a material specification data sheet for the anchoring material used.

Render exposed portion of each coated dowel bar bondless as specified in [Section 501.3\(i\)](#).

3. New Pavement Joint. As indicated and when directed, provide load transfer units adjacent to existing joints and at the same joint spacing as the existing pavement. When patching all adjacent lanes, make the joint spacing correspond to Standard Drawing RC-21M or RC-27M as applicable. Make all joints normal to the centerline of the roadway. Place coated dowel bars parallel to the centerline and surface of the pavement.

Install load transfer units as specified in [Section 501.3\(i\)](#).

(f) Forms. Form all patch sides not in contact with pavement remaining in place. Use steel or wood forms with adequate bracing to maintain proper position. Extend all forms to the full depth of the existing pavement. Furnish forms plumb, clean, and free of any warping or surface defects. Make all formed joints vertical.

(g) Concrete. Design, mix, and place as specified in [Section 501.3\(a\)](#) through (h). Concrete will be accepted by lot as specified in [Section 704.1\(d\)4](#).

(h) Final Strike-Off and Consolidation. As specified in [Section 501.3\(k\)](#).

(i) Final Finish for Pavements Not Being Overlaid. For Type A and B patches, finish the surface of the patch to match the existing pavement cross section. Include any existing wheel ruts. For Type C patches, taper the wheel ruts at both ends of the patch to a straight pavement cross slope, within the patch, with a minimum transition length of 6 m (20 feet).

Texture Type A and B patches to correspond with the texture of the surrounding pavement. Texture Type C patches as specified in [Section 501.3\(k\)4](#).

Following the final finishing and before application of curing materials, scribe the date of the patch placement in the surface of the fresh concrete along the shoulder edge of the patch.

If the contract includes grinding of the pavement surface, then the matching of wheel ruts and the texturing of the patch surface is not necessary. Make the scribing of the patch dates deep enough that the grinding will not eliminate them.

(j) Curing of Concrete. For normal strength patches, immediately after finishing operations have been completed, cover and cure the patch surface as specified in [Section 501.3\(l\)](#).

For accelerated patches, cure concrete as specified in [Section 501.3\(l\)1.b](#) or using approved curing insulation materials. Apply white membrane-forming curing compound as specified in [Section 501.3\(l\)1.c](#). The Contractor may use black membrane-forming curing compound provided the patch area will not be accessible to traffic before placement of a surface course. Discontinue use of black membrane-forming curing compound if it performs unsatisfactorily as a curing agent, and resume curing by other methods as specified. Cure test cylinders under the same conditions as the concrete pavement patch. Provide insulation or heating of patches if the ambient temperature drops below 27 °C (80F) during the curing operation. Control the curing temperature and monitor at least hourly to ensure that the concrete pavement patch does not experience a temperature change in excess of 22 °C (40F) within any 1-hour period during the curing operation. If a temperature change in excess of 22 °C (40F) occurs in the concrete pavement patch within any 1-hour period, considered the work defective.

(k) Stabilizing Around Patches. After curing and before opening to traffic, grout around the patches. Use the hole pattern shown on the [Standard Drawings](#). If directed, stabilize as specified in [Section 679](#).

(m) Longitudinal Joints. In two-lane width patching being performed at the same time, construct a Type L joint as shown on the [Standard Drawings](#).

In two-lane patching being performed one lane at-a-time, or one-lane patching, provide a 6 mm (1/4-inch), full depth, polystyrene board bond breaker in the longitudinal joint of Type A and B patches. Do not provide a bond breaker in the longitudinal joint of Type C patches. For all patch types, saw cut the longitudinal joint 6 mm (1/4 inch) wide and 25 mm (1 inch) deep. Center the saw-cut over the board bond breaker. Do not provide tie bolts unless directed. If the pavement is to be overlaid, the saw-cut is not necessary.

(n) Sealing. Seal all longitudinal and transverse joints constructed as part of this work, except if the pavement is to be overlaid, then only expansion joint sealing is necessary. Seal joints as specified in [Section 501.3\(n\)](#).

Seal all saw-cuts extending beyond the patch limits.

When the pavement will not be overlaid during the same construction season, construct a sealant reservoir and seal joints as specified in [Section 501.3\(n\)](#).

(p) Ride Acceptance. Test the surface of the patch area, in the longitudinal direction, and across patch joints using a 3 m (10-foot) straightedge. Correct, by grinding, any high points or depressions in excess of 3 mm (1/8 inch) at no expense to the Department. After grinding, retest the area with the 3 m (10-foot) straightedge. If the surface still exceeds the above limits, then the area is defective. Remove and replace the defective area at no expense to the Department.

(q) Opening to Traffic. For normal strength patches, do not open the repaired area to traffic until the concrete has obtained a minimum compressive strength of 21 MPa (3,000 pounds per square inch), when tested according to [PTM No. 604](#).

For accelerated strength patches, obtain samples of plastic concrete, for compressive strength testing for opening to traffic, from each 76 m³ (100 cubic yards) or fraction thereof of the day's placement, and, unless otherwise required, from the last mixer load of the day, according to the approved QC Plan. Sample locations will be selected according to [PTM No. 1](#). Test concrete for compressive strength according to [PTM No. 604](#), at the time of opening to traffic. Concrete lots that have not attained a minimum compressive strength of 8.3 MPa (1,200 pounds per square inch) at the time of opening to traffic will be considered defective work.

(r) Defective Work. Remove and replace concrete pavement patches that are considered defective, at no cost to the Department. The 28-day minimum compressive strength testing for acceptance will not be conducted for any work that is considered defective.

516.4 MEASUREMENT AND PAYMENT—

(a) Patching Joint. Meter (Linear Foot)

(b) New Pavement Joint. Meter (Linear Foot)

(c) Concrete Pavement Patching. Square Meter (Square Yard)

For the type indicated. When longitudinal joint cleaning and sealing is part of the contract, the sealing of longitudinal joints is incidental to that item, not to concrete pavement patching.

The unit price includes removal of the existing pavement and all repairs or corrections specified in [Section 516.3](#) that are needed as a result of patching operations.

(d) Subbase Material. Cubic Meter (Cubic Yard)
The unit price includes excavation.

(e) Slab Stabilization. [Section 679.4\(b\)](#) and [\(c\)](#)