

ORDER NO.: N25
CONTRACT ID. NO.: CM518PML110635

[SP316-000100-00](#)

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISIONS FOR
PATCHING HYDRAULIC CEMENT CONCRETE PAVEMENT

August 31, 2007; Reissued July 12, 2016

I. DESCRIPTION

This work shall consist of removing designated areas of defective concrete pavement, replacing subbase material where required, and placing concrete pavement with or without reinforcement according to these provisions and in reasonably close conformity with the original lines and grades as shown on the plans or as established by the Engineer.

The following is a description of each patch type:

Jointed Concrete Pavement Patch, Type I patching shall consist of full depth, full lane width concrete pavement repairs equal to 6 feet in length and less than 15 feet in length. The patch is non-reinforced, with dowels at the transverse joints.

Jointed Concrete Pavement Patch, Type II patching shall consist of full depth, full lane width concrete pavement repairs 15 feet or greater in length. The patch is reinforced with steel wire fabric and has dowels at the transverse joints and longitudinal tie bars as shown in Figures 1 & 2 (Attached).

Jointed Concrete Pavement Patch, Type III patching shall consist of partial depth concrete pavement repairs that extend no deeper than one-third the slab thickness and extend no more than one-half the lane width. Type III patches shall not be used at existing joints or cracks.

Continuously Reinforced Concrete Pavement Type IV shall consist of full depth repairs. Patches shall be of the following types:

Type IV-A patches shall be full lane width and not less than 6 feet long.

Type IV-B patches shall be partial lane width and not less than 6 x 6 feet.

No tie bars will be required for Type IV-A patches or Type IV-B patches less than 15 feet in length.

II. MATERIALS AND EQUIPMENT

A. Materials

The Contractor shall prepare sufficient trial batches of the hydraulic cement concrete mix in the presence of the Engineer to verify the strength and workability of the mix design. The mix shall be shown to be capable of achieving a target opening to traffic strength of 2000 psi when tested according to AASHTO T-23 and T-24.

Subbase material shall conform to Section 208 of the Specifications.

Reinforcing steel, dowels, tie bars, hook bolts, and welded wire fabric shall conform to Section 223 of the Specifications.

Joint sealer and filler shall conform to Section 212 of the Specifications.

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Load transfer devices shall be fabricated of steel and shall be of an approved type and design.

Curing materials shall conform to Section 220 of the Specifications or be used according to the manufacturer's recommendation.

Epoxy compounds shall conform to Section 243 of the Specifications.

Asphalt concrete shall conform to Section 211 of the Specifications, except that material may be accepted by certification and visually inspected at the job site by the Engineer.

B. Equipment

Saw cutting equipment shall be capable of sawing neat vertical faces along the patch boundaries. The use of a carbide-toothed wheel saw shall not be permitted for sawing the patch boundaries. A carbide-tipped wheel saw may be used for additional saw cuts provided that a minimum 3-inch clearance from the sawed boundary is maintained.

III. CONSTRUCTION METHODS

Designated defective pavement shall be removed full depth and undisturbed portions of the existing pavement adjacent to the area to be patched shall be left with straight vertical sides.

The existing pavement to be removed shall be sawed full depth along the transverse and longitudinal boundaries, including the lane and shoulder/lane joints as shown on the plans or as directed by the Engineer. Additional saw cuts inside the patch boundaries will be permitted to facilitate the concrete removal operation.

Concrete sawn full depth to be removed shall be lifted out by means of chains, lift-pins, or other approved devices. Concrete breaking in-place shall not be permitted. During the removal operations, utmost care shall be exercised to minimize disturbance and damage to the base material, and the adjacent pavement and shoulder.

Unsuitable subbase material, concrete and reinforcing steel shall be removed and disposed of off the project according to Section 106.04 of the Specifications. After the old concrete has been removed from the patch area, the subbase shall be dressed to the satisfaction of the Engineer. When unsuitable subbase or subgrade material is encountered, it shall be removed, and if replaced brought to grade with specified material, and compacted to the satisfaction of the Engineer.

Where cement-stabilized material is present and is found to be sound, excavation below the top of the cement stabilized material will not be required.

All excavated areas shall be patched the same day. In the event the excavated area has not been patched and cured within the lane closure time restriction, it shall be temporarily filled with asphalt concrete as approved by the Engineer.

The excavated area shall be thoroughly cleaned of loose material and debris and moistened prior to the placement of hydraulic cement concrete.

Existing pavements shall not be removed if such removal will result in hydraulic cement concrete being placed when the ambient air temperature is below 32° F, unless approved by the Engineer. The hydraulic cement concrete temperature at the time of placement shall not be less than 70° F and not more than 95° F, unless approved by the Engineer.

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Hydraulic cement concrete shall be deposited on the sublayer, spaded, tamped, and internally vibrated so that it completely fills the area of the patch. Finishing of the plastic hydraulic cement concrete shall conform to Section 316 of the Specifications, except that the final surface shall be textured similar to that of the adjoining pavement. The patch and the existing pavement shall be tested for smoothness by means of a 10-foot straightedge laid parallel to the centerline of the road surface, and irregularities in the patch in excess of $\frac{1}{4}$ inch shall be corrected.

Immediately after straight edging and texturing, the hydraulic cement concrete shall be moist-cured with wet burlap and insulating blankets.

When patching 2 lanes simultaneously, the longitudinal joint shall be reestablished by sawing. Joints shall be sealed with silicone unless otherwise permitted by the Engineer.

Within 24 hours after completion of a patch area, any bituminous concrete shoulders damaged during pavement repair operations shall be reconstructed according to Section 315 of the Specifications with full depth Type SM-9.5A asphalt concrete to match the finished shoulder grade. In the event traffic is to be permitted on the patch area prior to reconstruction of the shoulder, the Contractor shall first make such temporary repair to the shoulder as is necessary to avoid any hazardous condition.

The Department will stencil all patches with the date and project identification.

Additional construction methods specific to partial depth repairs are noted under the section headed Type III.

TYPES I AND II

Where the existing joint dowel assembly is to be removed, the existing concrete shall be saw cut full depth and removed a minimum of 1 foot on either side of existing transverse joints. Minimum length of removal shall be 6 feet according to that shown in Figure 1. (Attached)

Oversawing into the adjacent slabs or shoulder shall be kept to the minimum amount necessary to ensure that full depth cuts in the corners have been achieved. All oversawing shall be cleaned and filled with joint sealant.

Any areas damaged during concrete sawing and removal operations shall be repaired to the satisfaction of the Engineer by extending the patch boundary or repairing spalls at the Contractor's expense. Spalls greater than $\frac{1}{4}$ inch wide and 2 inches long and over $\frac{1}{2}$ inch in depth below the pavement surface shall be repaired using an approved epoxy mortar.

Bond breaking material approved by the Engineer shall be placed at the longitudinal joint for Type I patches as shown in Figure 2 (Attached).

Type I and Type II patches shall be installed according to Standard PR-2 unless otherwise noted herein.

Where dowels are required, holes slightly larger than the diameter of the dowels shall be drilled 9 inches into the face of the existing slab starting 6 - 12 inches from either edge and then on 12 inch centers. There shall be four dowels placed in from each pavement edge for a total of eight per joint. The holes shall be located at a depth as shown in Figure 1. The dowels shall be carefully aligned (within $\frac{1}{4}$ inch) with the direction of the pavement and parallel to the plane of the surface. A quick setting, non-shrinking mortar or a high viscosity epoxy shall be used to anchor the dowels in the holes. The holes shall be completely filled around the dowels so as to minimize vertical movement of the dowels and ensure that the dowels are permanently fastened to the existing concrete. The epoxy or grout is to be put into the hole in sufficient quantity so that when the bar is inserted, the material completely fills the annular space around the bar. A grout retention ring shall be used as shown in Figure 1.

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The surface edges of all patches shall be tooled, formed and/or sawed, and cleaned to result in a properly dimensioned reservoir for sealant. All transverse and longitudinal joints at pavement repair locations shall be filled with silicone according to manufacturer's recommendations unless otherwise permitted by the Engineer. Joints at pavement repair locations shall be cleaned and sealed prior to the winter shutdown unless otherwise directed by the Engineer.

TYPE III

Partial depth patches shall be sawed a minimum depth of 2 inches around the perimeter of the patch area to provide a vertical face at the edges. Concrete within the patching area shall be broken out with a pneumatic hammer not heavier than a 35-pound class or by other methods approved by the Engineer. Edge spalls greater than ¼ inch wide and 2 inches long and over ½ in depth below the pavement surface shall be repaired using an approved epoxy mortar. The area of failure shall be removed by equipment that will not damage the adjacent sound pavement. The exposed faces of the concrete shall be free of loose particles, oil, dust, and other contaminants before placement of patch material. All residues shall be removed just prior to placement of the concrete bonding agent. Bonding agent shall be an approved cement mortar mixture or any other approved agent.

TYPE IV-A&B

Care shall be taken to minimize damage to the adjacent concrete during concrete removal. Should excessive edge chipping occur during removal, it shall be the Contractor's responsibility to resaw, remove, and replace the damaged pavement at the Contractor's expense. Chipping or spalling that exceeds 2 inches wide and 3 inches long or chipping or spalling less than 2 inches wide and 3 inches long that affects more than 10 percent of the joint will be considered excessive.

Replacement will be according to special provisions and standards for placing PR-3, PR-4, and PR-5 continuously reinforced (steel bar) concrete pavement. Transverse faces of all pavements shall be thoroughly cleaned and moistened prior to placement of new concrete.

Existing pavement shall be removed by sawing the exterior transverse patching limits to a depth of 2 to 3 inches. Care shall be taken to avoid saw cutting the steel reinforcement. Longitudinal limits shall be cut full depth. When necessary, the shoulders shall be cut a sufficient depth and width to facilitate forming paving edge. The concrete in the end sections shall be removed full depth by methods that will not bend nor gouge the reinforcing steel nor damage the adjacent concrete that is to remain in place as approved by the Engineer. Full depth interior saw cuts shall be used to cut the existing reinforcing steel and to define the limits of the end sections. The existing reinforcing steel shall be cut leaving at least 16 inches for steel overlap plus 2 inches for clearance between the lap and the existing pavement. The end sections shall be at least 18 inches long. The center section of concrete shall be removed full depth as shown elsewhere in this provision.

The reinforcement in the end sections shall be carefully straightened after the breakout of the concrete and cleaned of all concrete and rust scale prior to placement of the concrete. If 3 adjacent bars or more than 3 bars total are corroded or damaged, either a new exterior transverse saw cut extending the end sections to establish the appropriate end section lengths of undamaged steel or some other corrective method as approved by the Engineer shall be required. If damage to the reinforcement occurs due to the Contractor's operation, the corrective measures shall be performed at no cost to the Department.

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IV. WARRANTY

The Contractor shall provide a one-year warranty from the date of final acceptance on all hydraulic cement concrete patches. The Department will stencil all patches with the installation date and project identification. The Department will monitor patches installed throughout the warranty period for compliance and acceptability. The Contractor shall remove and replace any patch that fails due to materials or workmanship before the end of the warranty period and shall do so within 14 days after Department notification unless otherwise directed by the Department. Failure of a patch is defined by the medium or high severity occurrence of longitudinal cracking, transverse cracking, transverse joint spalling, longitudinal joint spalling, corner breaks, joint faulting or other undesirable distress as described and measured in the 2003 Distress Identification Manual for the Long-Term Pavement Performance Program. The Engineer shall notify the Contractor of the date for the warranty inspection and the Contractor shall be present at the inspection.

If notified regarding a failed patch, the Contractor may request a review by the Department. This review will be conducted to determine if the patch failure is a result of materials or workmanship based on a visual inspection. Further inspection may be required as directed by the Department. Failures not related to materials or workmanship are excluded from this warranty.

V. MEASUREMENT AND PAYMENT

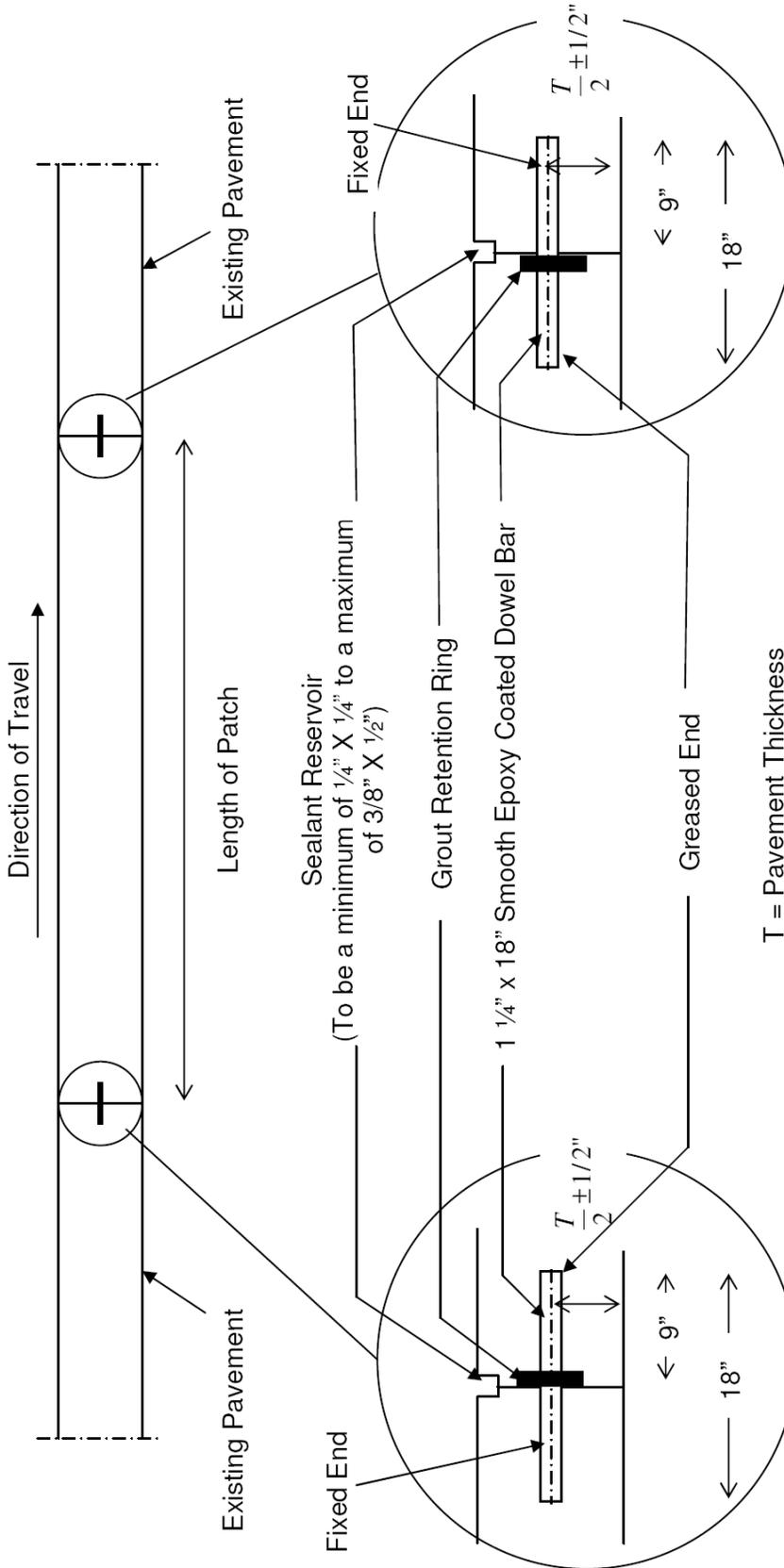
Patching hydraulic cement concrete pavement will be measured in square yards of pavement surface area, complete-in-place, and will be paid for at the contract unit price per square yard for the type and depth specified, which price shall be full compensation for saw cutting pavement to the required depth, removing and disposing of existing concrete, preparing of sublayer, furnishing and installing preformed expansion material, furnishing and installing steel dowels, furnishing and installing reinforcing steel as specified, furnishing, placing, finishing, and curing special design concrete, cleaning and sealing joints, patch area protection, and for all materials, labor, tools, equipment, and incidentals necessary to complete the work

Payment will be made under:

Pay Item	Pay Unit
Patching Hydraulic Cement Concrete Pavement (Type and Original Design Depth)	Square Yard

In areas where the Engineer deems the sublayer insufficient to support the patch, the sublayer shall be excavated to sound material and replaced with Aggregate 21A OR B at cost of per bid item per ton. This shall be full compensation for excavation and disposal of unsuitable sublayer, and for furnishing, placing, and compacting aggregate material.

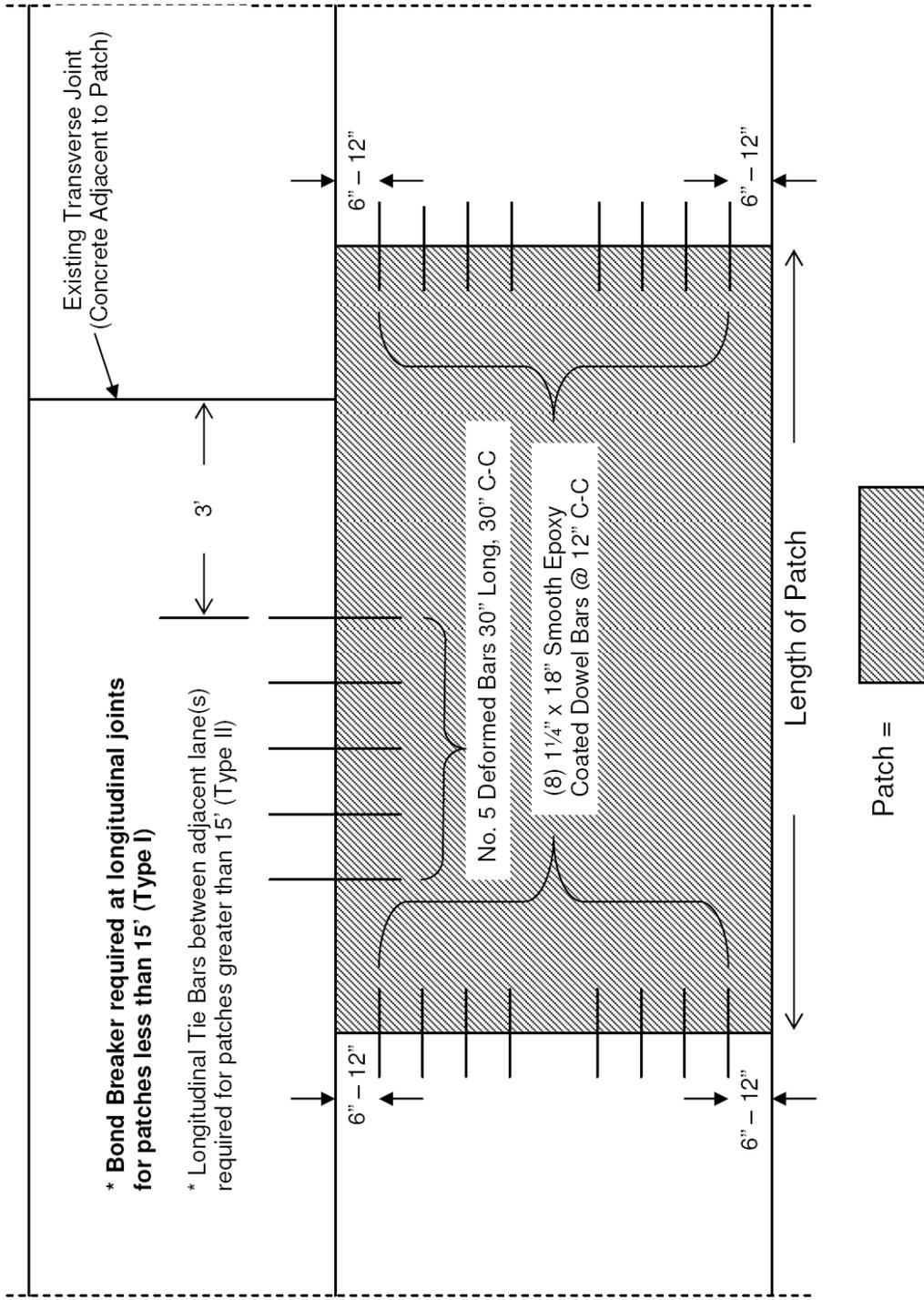
TYPE I AND TYPE II JOINTED CONCRETE PATCHES



NOTE: If the length of patch is greater than 15 feet, re-establish joint in center of patch with the standard dowel basket and if the distance between remaining joints is greater than 15 feet, steel wire mesh shall be placed in a manner which will provide for a final location in the middle third of the slab thickness, maintaining a minimum of 2 inches of concrete cover.

FIGURE 1

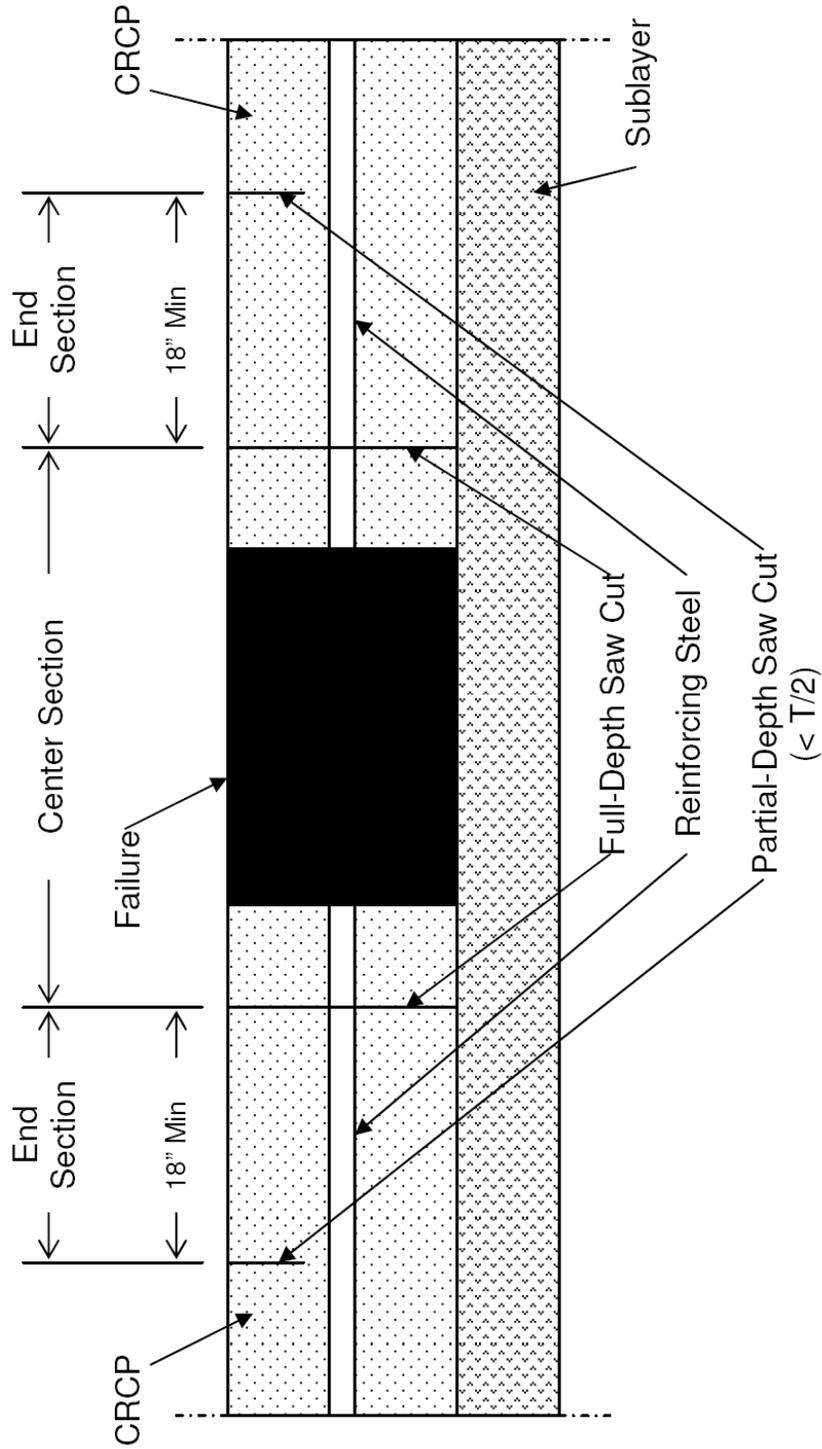
TYPICAL TYPE I AND TYPE II PATCHES



Typical Load Transfer Steel Layout for Patching Jointed Concrete Pavement

FIGURE 2

TYPICAL SECTION ELEVATION VIEW OF TYPE IV-A&B PATCHES



NOTE: Longitudinal Tie Bars Necessary for Patches Greater Than 15'.
 T = Pavement Thickness

FIGURE 3