



SECTION 613

PAVEMENT REPAIR

613.1 Description.

613.1.1 Full depth pavement repair shall consist of removing specified areas of existing variable thickness portland cement concrete pavement and replacing the pavement with reinforced portland cement concrete as shown on the plans.

613.1.2 Partial depth pavement repair shall consist of removal of areas of unsound concrete, not to exceed 4 inches (100 mm) deep, and replacing with a bituminous mixture.

613.2 Construction Requirements.

613.2.1 Approximate locations and areas of pavement sections to be removed will be shown on the plans. Specific locations, areas and type of pavement repair shall be as shown on the plans or designated by the engineer. All pavement repair subsequent to sawing of pavement shall be accomplished in the same day.

613.2.2 Specified areas of full depth pavement repair shall be removed in accordance with the applicable requirements of [Sec 202.20](#) except that the saw cut shall be full depth, a diamond saw shall be used for perimeter cuts and a rock saw may be used to make a cut through the middle portion of the area to be removed for stress relief. The full depth of the pavement shall be removed without mechanically breaking in place and with a minimum disturbance of sound base. Any aggregate base disturbed by the contractor shall be recompacted or removed and backfilled with portland cement concrete as an integral part of the repair. Unstable base aggregate shall be removed and replaced in accordance with [Sec 304](#), as directed by the engineer. Subgrade compaction in accordance with [Sec 210](#) shall be performed if directed by the engineer in areas of unstable subgrade, or the unstable subgrade may be removed and replaced with aggregate base material in accordance with [Sec 304](#) at the contractor's option. If subgrade compaction is performed, the aggregate base shall be replaced. Compaction shall be to the satisfaction of the engineer and inspection shall be made visually.

613.2.3 Areas of full depth repair shall be filled with reinforced portland cement concrete as specified in the plans. All pavement repairs exceeding 10 feet (3.0 m) in length shall be constructed with tie bars along the longitudinal centerline joint in accordance with [Sec 502](#). Dowel bars, tie bars and holes shall be as shown on the plans. Dowel bars shall be 1 1/4 by 18 inches (32 x 450 mm) and epoxy coated. Tie bars shall be No. 6 bars, 18 inches (450 mm) long and epoxy coated. Bar holes shall be drilled to the specified diameter and to the depth shown on the plans. Equipment designed to drill multiple holes simultaneously will only be allowed provided such equipment causes no damage to existing pavement. The holes shall be blown clean and allowed to dry. The holes shall be injected with an epoxy or polyester bonding agent meeting the requirements of [Sec 1039.3](#) to fill the void around the bar. If the bonding agent is either in bulk or cartridge form, it shall be thoroughly mixed in the proper ratio by an automatic mixing unit prior to injection into the holes. The automatic mixing unit shall be an integral part of the injection device. The bonding agent shall be injected into the hole by inserting the injection device to the back of the hole and slowly withdrawing the device while dispensing sufficient material to completely fill the void around the bar when

inserted. Prior to inserting the bar into the hole, a thin plastic disk, manufactured to slip tightly over the bar, shall be placed over the bar at approximately midpoint to prevent the bonding agent from flowing from the hole during placement of the bar and to create an effective face at the entrance of the hole. The bar shall be inserted into the hole with a twisting motion so the material in the back of the hole is forced up and around the bar. The bars shall be placed parallel to the surface and the centerline of the traveled way and shall not vary more than 1/4 inch (6 mm) in alignment. Bars shall be firmly seated prior to placing concrete. Welded wire fabric shall be used and placed 3 inches (75 mm) plus or minus 1/2 inch (13 mm) below the surface of the concrete patch.

613.2.4 Areas of partial depth concrete repair shall be sawed around the perimeter of the deteriorated area 2 inches (50 mm) deep, squaring up the area. The area shall be cleaned to remove loose material, provide a relatively uniform depth, and to provide a relatively vertical edge. Loose material shall be removed with minimal use of a maximum 15 pound (7 kg) chipping hammer or other light chipping tools and a light air blast, leaving tightly bound material in place to the satisfaction of the engineer. The area shall be a minimum of 2 inches (50 mm) in depth. Areas of less than 1 square foot (0.1 m²) are not required to be sawed, provided they can be prepared to the satisfaction of the engineer. Areas deeper than 4 inches (100 mm) or areas which indicate pumping or other movement of the subbase or structural pavement failure shall be completely removed, repaired and paid for as required for full depth concrete repairs.

613.2.4.1 The repair area shall be suitably primed on the sides and bottom to ensure bonding of any remaining loose material as well as bonding of the repair material, however there shall not be any ponding of prime liquid at the time the area is filled. The repair area shall be filled with an approved [Sec 403](#) surface mixture meeting temperature placement requirements and thoroughly compacted over the entire repair area to density as approved by the engineer. Areas greater than 2 inches (50 mm) in depth shall be filled in two lifts, each thoroughly compacted. Re-establishing of joints by sawing is not required.

613.2.5 Repairs shall be made to only one lane at a time. The removed concrete and any excavated subgrade material shall be disposed of at a location furnished by the contractor or at locations on the right of way approved by the engineer. If the material is disposed of outside the right of way, an acceptable written agreement with the property owner on whose property the material is placed shall be submitted by the contractor.

613.2.6 If the repaired area is not to be resurfaced, the overcut from the sawing operation shall be filled with an expansive mortar, epoxy, polyester or joint material as directed by the engineer.

613.2.7 All material, proportioning, air-entraining, mixing, slump and transporting of concrete shall be in accordance with [Sec 501](#) as applicable to pavement concrete, except the minimum cement requirement shall be 8 1/2 sacks per cubic yard (475 kg/m³) regardless of aggregate gradation and the maximum slump shall be 3 1/2 inches (90 mm). When Gradation F is specified, Gradation D or E may be used. All repaired areas shall be finished to provide a smooth ride and to the satisfaction of the engineer. Repaired areas shall be checked by stringline if required by the engineer. When stringlined, the surface of the repaired area shall not vary more than 1/8 inch (3 mm) per 10 feet (3 m) regardless of whether the repair is to be resurfaced or not, from a straight line between the surface of the existing pavement on each side of the repaired area. Immediately after finishing and as soon as marring of the concrete will not occur, the entire surface of the newly placed concrete shall be cured in accordance with one of the following methods. If the existing pavement has been or is to be resurfaced, an asphalt emulsion shall be applied at a rate of 0.1 gallon per square yard (0.50 L/m²), or as directed by the engineer. If the existing pavement surface is concrete and is not to be resurfaced, the curing shall be in accordance with [Sec 502](#). The area shall not be opened to

traffic until the concrete has attained a minimum compressive strength of 3500 pounds per square inch (24 MPa) determined by tests made in accordance with MoDOT methods.

613.2.7.1 When the repair is to be made and opened to traffic the same day, the concrete shall contain Type III cement and calcium chloride or an approved accelerator. The aggregates or water or both shall be heated during the season when the ambient temperature may drop below 60 F (15 C). Aggregates shall not be heated higher than 150 F (65 C). The temperature of the water and aggregates combined shall not be higher than 110 F (45 C) when the cement is added. The temperature of the concrete at the time of placement shall not be lower than 80 F (25 C). Insulating curing mats, approved by the engineer, shall be used throughout the curing period. A minimum of 4 hours curing time and no minimum compressive strength will be required for opening to traffic. However, at the engineer's option, cylinders may be made and tested at a later date for compressive strength, and that concrete represented by cylinders or other MoDOT approved test methods not exceeding a compressive strength of 3500 pounds per square inch (24 MPa) by 28 days shall be replaced by the contractor with no additional payment. At the option of the contractor, in lieu of Type III cement, an approved mix containing a minimum of 8 1/2 sacks per cubic yard (475 kg/m³) of Type I cement may be used with an accelerator and/or other admixtures approved by the engineer. If this option is selected, the contractor shall provide a trial mix to determine the approximate cure time needed to achieve a compressive strength of 3500 pounds per square inch (24 MPa). Compressive specimens shall be prepared in accordance with current MoDOT methods and cured to simulate actual field conditions. Testing of compressive specimens shall be performed by methods and at facilities acceptable to the engineer. The repaired pavement shall not be opened to traffic until the cure time has elapsed. A new trial mix may be required if the engineer determines the field conditions vary substantially from trial mix conditions.

613.2.7.2 If the pavement has been resurfaced, the repaired area shall be filled to the surface of the existing asphalt with portland cement concrete.

613.2.8 Where subsequent resurfacing operations are not specified, both transverse ends of all new portland cement concrete repairs shall be sawed 2 inches (50 mm) deep and 3/8 inch (9.5 mm) wide, and sealed in accordance with [Sec 1057](#).

613.2.9 Weather limitations shall be in accordance with [Sec 502.4](#).

613.3 Methods of Measurement.

613.3.1 Measurement for full or partial depth sawing will be made to the nearest linear foot (0.5 m) of perimeter diamond saw cut.

613.3.2 Measurement for drilling dowel or tie bar holes and furnishing and installing dowels or tie bars will be made per dowel or tie bar.

613.3.3 Measurement for furnishing and placing portland cement concrete and wire fabric, if applicable, or bituminous mixture, if applicable, will be made to the nearest 1/10 square yard (0.1 m²).

613.3.4 Measurement for partial depth repairs for removing, furnishing and placing material as specified will be made to the nearest 1/10 square yard (0.1 m²).

613.4 Basis of Payment. The accepted quantities for full depth pavement repair will be paid for at the contract unit price for each of the pay items included in the contract. The accepted quantities for partial depth pavement repair will be paid for at the contract unit price of area repaired. In addition, subgrade compaction and aggregate base will be paid for as follows.

613.4.1 Subgrade compaction will be paid for in accordance with [Sec 210](#) except measurement will be made to the nearest square yard (square meter).

613.4.2 Aggregate base will be paid for in accordance with [Sec 304](#). However, no direct payment will be made for aggregate base material used to replace unstable subgrade.