



SECTION 506

CONCRETE OVERLAYS FOR PAVEMENTS

SECTION 506.10 ULTRATHIN CONCRETE WHITETOPPING

506.10.1 Description. This work shall consist of producing and placing an ultrathin concrete whitetopping (UTW) pavement as shown on the plans or as directed by the engineer. The UTW pavement shall be in accordance with [Sec 502](#), except as modified herein. The UTW pavement shall consist of a fiber reinforced concrete pavement placed over a prepared asphalt surface. Unless otherwise specified on the plans, the minimum UTW pavement thickness shall be 4 inches (100 mm). The prepared base asphalt shall have a minimum thickness of 3 inches (75 mm).

506.10.2 Material. All material shall be in accordance with Division 1000, Material Details, unless otherwise noted.

506.10.2.1 Fibers. Fibrillated polypropylene fibers shall be added at a rate of 3.0 pounds per cubic yard (1.8 kg/m³). All fibers shall be measurable by weight (mass). Fibers may be measured in bags, boxes or like containers with approval from the engineer. The containers shall be sealed by the fiber manufacturer, and shall have the weight (mass) contained therein clearly marked by the manufacturer. No fraction of container delivered unsealed or left over from previous work shall be used unless weighed. Fibers shall be added to the concrete mix and mixed according to the fiber manufacturer's recommendations.

506.10.2.2 Water-Reducers. An approved high range water-reducer admixture may be used. No re-dosing of high range water-reducing admixture will be permitted.

506.10.3 Mix Design.

506.10.3.1 Mix Approval. The contractor shall submit a mix design to Construction and Materials for approval in accordance with [Sec 501](#). The mixture shall be designed to develop a minimum compressive strength of 4600 psi (24 MPa). The maximum aggregate size shall be no more than one-third the thickness of the UTW pavement.

506.10.3.2 Admixtures. Any admixtures used shall be certified by the fiber manufacturer for compatibility with the fibers used in the concrete.

506.10.3.3 Mix Adjustments. The contractor shall not make any mix design changes during placement of the UTW pavement without prior approval from the engineer.

506.10.4 Construction Requirements. The QC/QA provisions of [Sec 502](#) will not apply.

506.10.4.1 Surface Preparation. The existing bituminous surface shall be coldmilled in accordance with [Sec 622.10](#) and as indicated elsewhere in the contract.

506.10.4.1.1 Prior to placing the UTW pavement, the surface shall be thoroughly cleaned of all vegetation, dirt, mud and other objectionable material. All dust and loose particles shall be completely removed.

506.10.4.1.2 The asphalt surface temperature shall be less than 100 F (38 C) at the time of UTW pavement placement. This may require night placement, water fogging or other suitable means of obtaining a cooler surface. At the time of placement of the UTW pavement, there shall be no puddled water or other contamination to prevent bonding of the UTW to the asphalt surface.

506.10.4.2 Placement.

506.10.4.2.1 Provided no loose, foreign material is tracked onto the surface, trucks used for transporting concrete may drive on the pavement being overlaid and concrete may be deposited directly in front of the concrete spreader.

506.10.4.2.2 The UTW pavement shall be free of fiber balls when placed.

506.10.4.2.3 The concrete temperature shall not exceed 90 F (32 C) when delivered to the site.

506.10.4.2.4 The UTW pavement shall be placed in a uniform thickness on a final grade that has been established by other means, such as cold milling.

506.10.4.3 Surface Finish. The surface finish of the UTW pavement shall be in accordance with [Sec 502](#).

506.10.4.4 Joints. Sawing of the joints shall not cause excessive raveling. The joints shall be spaced equidistant longitudinally and transversely and at a distance approximately equal to twelve times the specified UTW pavement thickness, with the following exceptions. Slight adjustments may be made in the joint spacing to equalize the longitudinal joints between pavement cast edges. All sawed UTW pavement units shall be square, except as necessary in pavement width transitions. In such cases, slight field adjustments may be made to maintain relatively square units. Joint spacing for any adjustments shall not exceed one foot (300 mm) more than 12 times the specified UTW pavement thickness. Transverse joints on adjoining lanes shall match. The minimum depth of the joints shall be the UTW pavement thickness divided by four and the width of the joint shall be 1/8 inch (3 mm) maximum. The joints shall not be sealed but shall be cleaned of all deleterious material after sawing. The engineer may require the contractor to replace UTW pavement where cracking occurs due to late sawing at the contractor's expense.

506.10.4.5 Curing. Curing compound shall be applied at 1.5 times the normal application rate. If blankets are used for fast tracking, the blankets shall be light in color and shall not take the place of a curing compound. The temperature under the blanket shall not exceed 160 F (71 C). Blankets shall not be removed until the temperature under the blanket is within 40 F (20 C) of the ambient temperature.

506.10.4.6 Opening to Traffic. UTW pavement shall not be opened to all types of traffic until the concrete has attained a minimum compressive strength of 3500 psi (24 MPa). Compressive strength will be determined by tests conducted in accordance with MoDOT Test Methods.

506.10.5 Method of Measurement.

506.10.5.1 Material Furnished. Measurement for furnishing UTW concrete will be made to the nearest 0.1 cubic yard (m³) for material incorporated into the UTW pavement.

506.10.5.2 Material Placed. Measurement for placing UTW pavement will be computed to the nearest 0.1 square yard (m²).

506.10.5.3 Pavement Thickness Determination. The thickness of the pavement will be determined by the average caliper measurement of cores in accordance with AASHTO T 148.

506.10.5.3.1 For the purpose of determining the constructed thickness of the pavement, cores will be taken at random intervals in each traffic lane at the rate of one core per 1000 feet (300 m), or increment thereof. In addition, cores will be taken at all locations where thickness measurements taken during construction indicate a thickness deficiency sufficient to justify a deduction from the contract unit price or at any other locations as may be determined by the engineer. If the measurement of any core is deficient in excess of 3/10 inch (8 mm) from the plan thickness, additional cores will be taken at 30-foot (10 m) intervals parallel to the centerline ahead and behind the affected location until the extent of the deficiency has been determined.

506.10.5.3.2 Each core will represent the pavement thickness for a distance extending one-half the distance to the next core, measured along the centerline. In the case of a beginning or ending core, the distance shall extend to the end of the pavement section.

506.10.5.4 Final Measurement. Final measurement of the complete UTW pavement will not be made except for authorized changes during construction or where appreciable errors are found in the contract quantity. The revision or correction will be computed and added to or deducted from the contract quantity.

506.10.5.5 Quantity of Cold milling. Measurement for cold milling bituminous pavement for removal of surface will be made in accordance with [Sec 622.10.4](#).

506.10.6 Basis of Payment.

506.10.6.1 Material Furnished. The plan quantity of UTW concrete will be paid for at the contract unit price for UTW concrete, per cubic yard (m³). Reimbursement for any additional concrete incorporated into the UTW pavement will be in accordance with [Sec 109.5.3](#) and shall not exceed the unit contract price.

506.10.6.2 Material Placed. Payment for the placement of UTW pavement will be made at the contract unit price for UTW pavement, per square yard (m²), to include all surface preparation following cold milling of the bituminous surface. No direct payment will be made for furnishing labor, equipment, reinforcement and other materials to place, finish, texture and cure the UTW pavement, including sawing the joints in accordance with the plans and specifications.

506.10.6.3 Pavement Thickness. Pavement thickness determination will be made after all smoothness correction has been completed. If any core measurement of thickness is deficient, the contractor may remove and replace the pavement at the contractor's expense or leave the pavement in place, and receive the following deductions in payment:

Deficiency in Thickness	Deductions, Percent of Contract Unit Price
0 to 3/10 inch (8 mm)	None
Over 3/10 inch (8 mm)	100

506.10.6.3.1 The above deductions will be applied to a section of pavement 30 feet (9 m) long and will include the entire paved width for a specific pass. Deductions for deficient thickness or damaged pavement may be entered on any estimate after the information becomes available.

506.10.6.3.2 If any pavement is deficient in thickness in excess of 3/10 inch (8 mm), the contractor shall remove the pavement and replace the pavement with one of a satisfactory quality and thickness that, when accepted by the engineer, will be included in the pay quantity. No payment will be made for any costs incurred in the removal of the deficient pavement.

506.10.6.3.3 Removal of pavement shall be from the edge to a longitudinal joint or between longitudinal joints and on each side of the deficient measurement until no portion of the exposed cross sections is more than 3/10 inch (8 mm) deficient, except that there shall be no less than 15 linear feet (4.5 m) of pavement removed. If there remains less than 15 feet (4.5 m) of acceptable pavement between the section that has been removed and a transverse contraction, expansion or construction joint, the contractor shall remove the pavement to the joint, at the contractor's expense.

506.10.6.4 Adjustments. Any adjustments in payment as a result of the profilograph index or pavement thickness deficiency of the UTW pavement will be made to the unit contract prices for UTW pavement, per square yard (m^2) and UTW pavement placed, per cubic yard (m^3). For this purpose, the volume of UTW pavement placed per cubic yard (m^3) price will be adjusted to a square yard (m^2) price based on the plan UTW pavement thickness.

506.10.6.5 Cold Milling. Payment for cold milling bituminous pavement for removal of surface will be made in accordance with [Sec 622.10.5](#).

SECTION 506.20 PORTLAND CEMENT CONCRETE UNBONDED OVERLAY

506.20.1 Description. This work shall consist of applying a debonding material and constructing a Portland cement concrete unbonded overlay in accordance with the details and locations shown on the plans. Work shall also include minor surface pavement repair, joint filling and other associated operations. The contractor shall establish the existing roadway profile and set the final overlay profile. The engineer may adjust the final profile as needed. The cubic yards (m^3) of concrete required will be determined by the engineer from the set or adjusted profile. This quantity will be the field established plan quantity.

506.20.1.1 The concrete unbonded overlay shall be placed on a minimum one-inch (25 mm) thick new bituminous interlayer or a coldmilled bituminous surface.

506.20.1.2 All procedures and material for the concrete unbonded overlay shall be in accordance with [Sec 502](#), including QC/QA and PWL provisions for non-reinforced concrete pavement, except the strength pay factor will account for 100 percent of the total pay factor. The pay factor for thickness will not apply.

506.20.2 Material. All material shall be in accordance with Division 1000, Material Details, unless specified otherwise.

506.20.2.1 Debonding Material. The debonding material between the existing pavement or shoulder surface and the new concrete pavement overlay shall be one of the following.

506.20.2.1.1 A white pigmented curing compound in accordance with [Sec 1055](#), applied at the rate of 200 square feet per gallon ($5 m^2/L$).

506.20.2.1.2 Whitewash, a mixture of hydrated lime and water mixed at the rate of 100 pounds of lime per 12.5 gallons (1 kg/L) of water, applied at a rate of 200 square feet per gallon ($5 m^2/L$) of mixture.

506.20.2.1.3 An alternate material will be considered, provided the material can be demonstrated to provide the following:

- (a) Lack of bond between asphaltic concrete and Portland cement concrete overlay.
- (b) A white coloration to reflect and control heat buildup in the base pavement.
- (c) No detrimental effect to the asphalt or concrete overlay as a result of the use.
- (d) Reasonable durability under traffic, resisting removal prior to overlay.

506.20.2.1.3.1 Requests for approval shall include a specific description of the proposed material, the applicable MSDS and the proposed application rate, and will be subject to uniform and satisfactory application.

506.20.2.1.3.2 Approval shall be obtained from Construction and Materials prior to use.

506.20.2.1.3.3 Upon request, the contractor shall provide any testing necessary to demonstrate the specified properties.

506.20.2.2 Patching Material. Bituminous patching material for use in repair of minor spalls in the existing surface shall be a commercial bituminous patching material meeting the approval of the engineer.

506.20.2.3 Dowel Bars. Dowel bars shall be in accordance with [Sec 1057.1](#) and of the size shown on the plans.

506.20.3 Construction Requirements.

506.20.3.1 Handling Traffic. Preliminary work, including joint sealing and patching, may be done under traffic as permitted elsewhere in the contract. Prior to placement of the debonding material, the traffic shall be diverted as shown on the plans, and the remaining operations shall commence.

506.20.3.2 Surface Preparation. All existing pavement cracks and joints shall be sealed or re-sealed where required to keep overlay material and incompressibles from penetrating unsealed joints. All holes greater than 2 inches (50 mm) wide and one inch (25 mm) deep in the surface of the traffic lanes, excluding shoulders, shall be patched by filling with bituminous patching material. The bituminous patching material shall be compacted to a flat, tight surface.

506.20.3.2.1 Before the concrete unbonded overlay is placed, the base surface shall be free of loose material.

506.20.3.2.2 Debonding material shall be uniformly applied at the designated rate. Concrete patches shall be covered at twice the designated rate. If the material is removed by rain, wear or other means to the extent that the reflective or bond-breaking properties may not be effective, the debonding material shall be re-applied.

506.20.3.3 Joints. In order to properly locate the saw cuts in the overlay, the location of all transverse expansion (Type E) joints and longitudinal lane joints in the existing pavement shall be identified by a reliable method. The contractor shall receive prior approval from the engineer for the procedure to be used to mark and relocate existing joints.

506.20.3.3.1 Tie bar, dowel bar and joint saw depths shall be as shown on plans. Tie bars will be required for both the centerline and shoulder longitudinal joints.

506.20.3.3.2 Dowel bars shall be installed the full width of the unbonded overlay and the baskets shall be firmly anchored to the existing surface.

506.20.3.3.3 New transverse joints will not be required to match existing transverse joints, except new transverse expansion joints and longitudinal lane joints shall be cut or placed to match the underlying joint configuration.

506.20.3.3.4 Any transverse expansion joints in the existing pavement shall be specifically marked and identified as such. The expansion joint shall be precut in the plastic concrete to allow for any slab movement until sawing can begin. As soon as sawing may be possible, the contractor shall saw two full-depth cuts on each side of the precut joint following the edges of the underlying expansion joint, as shown on the details. The concrete between the saw cuts shall be removed and disposed of by the contractor at the contractor's expense at a location meeting the approval of the engineer.

506.20.3.4 Placement. Provided no loose foreign material is tracked onto the surface, trucks used for transporting concrete may drive on the pavement being overlaid and concrete may be deposited directly in front of the concrete spreader.

506.20.4 Method of Measurement.

506.20.4.1 Material Furnished and Placed. Measurement for furnishing and placing concrete for the unbonded concrete overlay will be made to the nearest 0.1 cubic yard (0.1 m³) and will be based on the field established plan quantity, except for authorized changes during construction or where appreciable errors are found in the field established plan quantity. The revision or correction will be computed and added to or deducted from the field established plan quantity.

506.20.4.2 Surface Preparation. Final measurement will not be made except for authorized changes during construction or where appreciable errors are found in the contract quantity. Where required, measurement for surface preparation of the existing pavement surface will be computed to the nearest square yard (m²), including traffic lanes and shoulders). The revision or correction will be computed and added to or deducted from the contract quantity.

506.20.5 Basis of Payment.

506.20.5.1 Material Furnished and Placed. Payment for furnishing and placing Portland cement concrete unbonded overlay will be paid for at the contract unit price for unbonded concrete overly concrete. Payment will be considered full compensation for all labor, equipment, dowels, reinforcement and other material to place, finish, texture and cure the overlay including sawing and sealing the joints, in accordance with the plans and specifications. Payment for surface preparation, including application of the debonding material, patching, joint filling of the existing surface and any other incidental work and material necessary to complete this work will be paid for at the contract unit price.

506.20.5.2 Cold milling. Payment for cold milling will be in accordance with [Sec 622](#).

506.20.5.3 Pavement Repairs. Payment for full depth and partial depth repairs will be in accordance with [Sec 613](#).

506.20.5.4 Bituminous Interlayer. Payment for bituminous interlayer will be in accordance with [Sec 401](#).

506.20.5.5 Contractor Staking. Payment for contractor staking will be in accordance with [Sec 105](#).