

Specifications for Construction

TUFFSEAL PMO

Manufactured by Acrypave Manufacturing

DESCRIPTION

- 1.01 General.** This work consists of constructing one or more courses of a polymer micro-overlay (TUFFSEAL PMO) friction-wearing surface, on a prepared substrate in accordance with these specifications and in conformity with the lines shown on the plans or established by the Engineer. The work shall be constructed utilizing the products, process, equipment, and certifications of product on the State DOT's approved product lists, or as an approved experimental project. Material shall have a proven in place history over asphalt equal to ½ the total warranty period and must be on the approved products list for polymer micro-overlay of a state D.O.T. or federal agency.

MATERIALS

- 2.01 General.** The material used shall be on the approved product list, and any substitution of materials on the approved list shall meet the requirements Sections 2.31 through 2.40.
- 2.02 COMPOSITES.** Composites shall conform to the requirements of ASTM C150
- 2.03 Aggregates.** Materials shall be plant mixed, either a natural or manufactured angular aggregate of uniform quality composed of clean, hard, uncoated particles, and shall meet the requirements for deleterious substances contained in ASTM C-33.

Table 2-1. Skid Resistant Aggregate Gradations

*Aggregate gradations for skid-resistance may be modified to fit the needs for a specific project. When application is on roadways the initial skid number must test above 30 and shall conform to ASTM E-274 friction test.

- 2.04 Polymer Emulsion.** The Polymer emulsion shall be certified by the manufacturer to meet the following: The solids content shall be between 46.5 and 47.5 percent by weight of total liquid, and viscosity between 5 and 55 centipoises, when measured at 77° F (25° C). Water content must not exceed 52 percent by weight of total polymer liquid.

- 2.05 Water.** The water used in mixing the TUFFSEAL PMO shall be of potable quality and free from harmful-soluble salts.
- 2.06 Chemical Admixtures/Pigments.** Any chemical admixtures and/or pigments used in TUFFSEAL PMO shall be approved by or added by the Manufacturing and not by contractor on site.
- 2.07 Surface Sealer.** A surface sealer, if required, may be applied over areas of the PMO to provide additional protection in fueling areas, or to prevent efflorescence from occurring on the TUFFSEAL PMO product when color retention is important. The sealer shall be approved by the manufacturer. The sealer may be applied by rolling or spraying.
- 2.08 Material Acceptance.** Prior to the use of materials, the Contractor shall provide a Certificate of Analysis (COA) for the polymer emulsion, aggregate, and aggregate dry blend verifying that the materials meet the requirements outlined in Section Two. The Certificate of Analysis shall be traceable to the batch/lot of material received from the supplier. The COA shall include all information for the specific material requirements, including allowable tolerances.

REQUEST FOR SUBSTITUTION

- 2.31 Time Of Submission.** Requests for approved 'or equal' status to those on the Department's approved list may be considered, but shall be received in writing by the Engineer a minimum of thirty (30) days prior to the advertised bid opening date.
- 2.32 Contractor Qualifications.** The Contractor shall exhibit current certification from the manufacturer as proof of training and experience in the placement of TUFFSEAL PMO. Contractors without manufacturers' certification shall submit a statement a minimum of thirty (30) days prior to bid opening that summarizes the contractor's installation experience with TUFFSEAL PMO systems along with a list of completed projects. The statement shall include a description of the proposed materials, equipment, methods, production rates, and planned sequence of the work.
- 2.33 Material Data.** A minimum of 30 days prior to bid opening, the Contractor shall supply material data, general product data, and other appropriate information detailing the 'or equal' product with respect to the project specifications. Adequate technical data shall be included to clearly demonstrate equivalency. Incomplete or inadequate submittals will not be reviewed. The Contractor and manufacturer of the materials and equipment shall submit a statement signed by an officer of the company and notarized that clearly states the product substitution fulfills the specification requirements, and meets all physical and performance attributes of the specified material. The statement shall include certification that the substitution will be utilized at no additional cost and with no claim for delays with respect to the required work. Requests containing incomplete or inadequate information will not be considered.
- 2.34 Warranty.** Manufacturer shall provide a 3-year written warranty against delaminating, fading or U.V. degradation, and a 1-year warranty against breach of the overlay in wheel lanes. The warranty shall only apply when material is applied by a certified manufacturer's applicator.

- 2.40 Characteristics.** When mixed and cured in accordance with the manufacturer's directions, the materials shall demonstrate the properties in Table 2-2.

Table 2-2. Material Properties

Physical Property	Test Method	Minimum Test Value
Solar Reflectivity Index	ASTM E1918 ASTMC 1549	>36
Shear Bond Adhesion	ASTM C-882	>650 PSI
Skid resistance (mixed)	ASTM E-274	>30
Freeze-Thaw Scaling Resistance	ASTM C-672-98	0 (No Scaling)
Tensile Bond Strength	ASTM D-4541-02	615 PSI

CONSTRUCTION METHODS

- 3.01 General.** The contractor shall furnish all labor, materials, tools, and equipment necessary for performance of the work. The polymer composite micro-overlay shall provide a fuel, skid, and abrasion resistant surface.
- 3.02 Proportioning.** The contractor shall be responsible for the mix proportions and all subsequent adjustments necessary to produce the specified mix as recommended by manufacturer. In the case the product is not on the approved product list, the materials must be submitted to the Engineer for approval a minimum of sixty (60) days before production is scheduled to begin. Any change in material source will be subject to prior approval by the Engineer.
- 3.10 Mixing.** The measuring and mixing operation shall be capable of producing a consistent homogenous mix sufficient to maintain the production levels required for the work. The polymer emulsion and water shall be charged into the mixer and blended to the desired consistency for a minimum of 4 minutes per batch
- 3.20 Equipment.** The equipment to be used shall be approved by the manufacturer. Equipment and tools shall be capable of handling materials, performing the work and producing a product of the specified quality and be maintained in good mechanical condition. Equipment not provided by approved product manufacturer shall be made available prior to its use for examination and approval by the Engineer.
- A. Material Handling Equipment.** The equipment shall be capable of handling and transferring the materials for TUFFSEAL PMO to the mixer free of spillage, segregation, or contamination.
 - B. TUFFSEAL PMO Transfer Equipment.** The equipment shall transfer the mix to the placing equipment without spillage, segregation, or contamination.
 - C. Placement and Finishing Equipment.** TUFFSEAL PMO shall be mixed, spread, struck-off, and finished in one operation by mechanical means except as otherwise permitted by these specifications for short or irregular placements. Depending on the

equipment in use, the sand portion of the placement may be mixed with the polymer-water mixture and applied in one application or may be distributed on the applied polymer-water mixture within one-minute of the application of the polymer-water mixture. The placement equipment shall be specifically designed for placement of TUFFSEAL PMO and equipped to control and feather the edge so as not to cause a ridge on the overlap of subsequent applications. Placement equipment must be capable of providing a uniform application thickness across the entire lane being overlaid. Placement equipment must be approved by the manufacturer.

3.30 Substrate Preparation. The area to be surfaced must be structurally sufficient for its intended purpose, and in the case of asphalt, cured so there is no concentration of oils on the surface.

- A. Cleaning of Substrate.** The substrate that is to receive the TUFFSEAL PMO system shall be cleaned of sand, dirt, dust, rock, or any other debris that could prevent proper adhesion. Cleaning shall be accomplished by power broom, scraping, blowing, washing, or other approved methods necessary to assure bonding between the TUFFSEAL PMO surface course and the substrate.
 - I.** An approved degreaser, if needed, will be used to thoroughly remove oils, fuels, or other contaminants that could prevent proper adhesion. Areas identified as soft, unstable, or otherwise unsuitable for overlay during the cleaning process shall be removed to a depth where the substrate is structurally sound and repaired with material approved by manufacturer of the TUFFSEAL PMO.
 - II.** When TUFFSEAL PMO's are used on a concrete substrate, all curing compound or other surface contaminants that may adversely affect bonding shall be removed by methodology approved by manufacturer.
 - III.** TUFFSEAL PMO operations shall not be started until the surface is in a condition as recommended by manufacturer.
- B. Substrate Crack Repair.** All cracks greater than 1/8 inch (3 mm) in width shall be cleaned out to remove raveled aggregate, dirt, and organic matter. The cracks will be blown out with compressed air in a volume sufficient to remove any loose debris.
- C. Damaged Substrate.** All substrate receiving TUFFSEAL PMO shall be free of potholes, spalling, or other areas of structural deterioration, as determined by a certified applicator for the manufacturer. All such areas shall be excavated to a depth where the substrate is structurally sound and repaired with material approved by the manufacturer.

3.40 Limitations on Placing. TUFFSEAL PMO shall not be applied when the surface is wet or impending weather conditions will not allow proper curing. The time elapsed from the addition of polymer emulsion and water to the mix until final finishing shall not exceed the workability time limits of the mixture. When rain appears imminent, all placement operations shall cease and the work shall not be resumed until the threat of rain has passed.

- A. Cold Weather Limitations.** The TUFFSEAL shall not be placed until ambient and substrate temperatures are 65° F (18° C) and rising and expected to remain above

65° F (18° C) for 6 hours, unless otherwise directed by the Engineer.

- B. **Hot Weather Limitations.** Care should be taken when placing the TUFFSEAL PMO when the substrate temperature exceeds 130° F (50° C). Application temperatures of the substrate above 130 degrees Fahrenheit (50° C) should be closely monitored for performance during the course of application. Any observable defects occurring as a result of extreme temperature should be cause for immediate halting of placement operations.
- 3.50 Placing.** TUFFSEAL shall be uniformly deposited on the substrate in such a manner that will not cause segregation of the mix.
- 3.60 Finishing.** The surface shall be finished to a uniform texture. Unless otherwise specified, hand squeegee finishing will only be permitted in areas of irregular dimensions and other areas where use of larger equipment is impractical. Hand finishing, where required, shall be performed in a manner to feather the edge so as not to cause a ridge on the overlap of adjacent applications.
- 3.70 Curing and Opening to Traffic.** Care shall be taken by the Contractor to protect the TUFFSEAL PMO surface course from traffic until the area is sufficiently cured. Curing time will vary depending on ambient and surface temperatures. The TUFFSEAL PMO shall not be opened to traffic until it has reached sufficient strength that the surface will not be damaged by vehicular traffic, and the area has been approved for opening by the Engineer.
- 3.80 Repair of Defective TUFFSEAL PMO.** Defective TUFFSEAL PMO shall be repaired or replaced at the Contractor's expense. The Contractor's corrective work plan shall be approved prior to performing the work.
- A. **Delaminating.** If at the time of substantial completion the TUFFSEAL PMO has not bonded to the substrate, the un-bonded area shall be removed to such point where the remaining TUFFSEAL PMO is solidly bonded to the substrate. The substrate will be prepared in accordance with Section 3.30 prior to the replacement. TUFFSEAL PMO shall be used to repair the removed area.
- B. **Surface Deficiencies.** Areas of TUFFSEAL PMO that are determined deficient due to lack of coverage may be repaired by applying another course directly over the top of the previously placed material.

METHOD OF MEASUREMENT

- 4.01 General.** Measurement for payment shall be for the quantities completed and accepted for each of the pay items as shown on the plans. If the actual placement, as directed by the Engineer, differs from the plan dimensions, actual field measurements shall be used.

BASIS OF PAYMENT

- 5.01 General.** The accepted quantities will be paid for at the contract unit price for each of the

pay items listed below that appear in the bid schedule.

Payment will be made under:

Pay Item	Pay Unit
TUFFSEAL PMO	square foot, square yard (square meters)

The price for each item shall be full compensation for furnishing all materials, labor, tools, and incidentals necessary to complete the work, including substrate preparation and final clean-up.