

## SECTION 1800- PAVEMENT MAINTENANCE

### 1801 CRACK SEALING AND FILLING.

#### A. Materials.

1. Material for sealing cracks up to one inch in width shall comply with all requirements of ASTM D6690, Type II.
2. A detack material, as designated or approved by the Engineer, shall be used to remove surface tackiness of the sealant. Approved material includes a soap and water mixture.

#### B. Installation.

1. All cracks up to one inch in width are to be sealed including transverse, longitudinal, block, reflective cracks and the longitudinal joints/crack between the edge of pavement and toe of the gutter. Wider cracks shall be filled as specified in the Project Special Provisions or indicated on the plans. Where alligator cracking is found, the Engineer will determine if sealing is to be completed.
2. Cracks shall be cleaned to a minimum depth of 2 inches with an air compressor. If an air compressor cannot sufficiently clean and dry the crack, then a hot air lance or other approved equipment shall be utilized to clean and dry the crack immediately ahead of the sealant placement. Air compressor equipment utilized for blowing out cracks and joints shall have a 120 CFM minimum. Contractor shall control dust from cleaning and remove blown debris from adjacent properties.
3. Sealant shall be placed in the clean, dry crack using the methods and equipment recommended by the sealant manufacturer. The crack shall be slightly overfilled and immediately squeegeed to provide a band-aid type effect approximately two (2) inches wide, flush with the pavement surface, and with the edges feathered out. U-shaped squeegees shall be used for leveling the crack seal and fill material unless otherwise approved by the Engineer.
4. Hot asphalt sealer shall be continuously, mechanically agitated during heating so that localized heating does not occur. Crack sealer shall not be placed when the air temperature in the shade is less than forty (40) degrees F. No sealant shall be installed when the air temperature exceeds 90 degrees F.

5. Apply a suitable detack product on freshly installed sealant in accordance with manufacturer's instructions to prevent tracking of material by traffic and to remove the surface tackiness of the material to the satisfaction of the Engineer. Approved methods include spraying the area with a soap and water mixture or other methods approved by the Engineer.
6. Contractor shall cleanup all excess material from the pavement or other adjacent surfaces.

## 1802 PAVEMENT PATCHING.

- A. General. Areas where base failure of the roadway has occurred, or where the surface is broken out, shall be repaired prior to surfacing operations. The failed sections will be marked by the Engineer.
- B. Materials.
  1. Hot-mix asphaltic patching material shall conform to the requirements of Section 1300 – *Asphaltic Concrete Pavement*.
  2. Concrete patch mixes shall conform to the requirements of Section 2000 – *Concrete*.
- C. Removal.
  1. For surface and full-depth patches, the failed material shall be removed by sawing and/or milling a neat rectangular section into the pavement creating clean vertical sidewalls.
  2. Over-excavate areas where unsuitable subgrade material is encountered then backfill and compact to bottom of pavement with approved material.
  3. Do not remove more area than can be fully patched or plated and reopened to traffic by the end of the workday. Do not leave excavated areas in roadways that are open to traffic unless approved by the Engineer.
  4. All failed asphalt material shall be removed without damage to the adjacent pavement. When existing pavement designated to remain is damaged during the patching process, the pavement shall be repaired by the Contractor at Contractor's expense.
- D. Repair. Patching shall conform to standard city details and as follows.
  1. Prior to placing patch material, all loose material and debris shall be removed.

2. For asphalt patching, all surfaces shall be properly tacked.
3. Asphaltic material shall be placed in layers not to exceed 3 inches and thoroughly compacted before the next layer is placed.
4. The vertical sidewalls of the patch shall be well bonded with the existing pavement and the surface shall be level with the existing pavement.
5. For concrete patching, see Section 1400 – *Concrete Pavement* for placing, finishing, curing, and protection of concrete. Small areas may also be temporarily plated with the approval of the Engineer.

### 1803 CHIP AND SEAL.

- A. General. Single asphalt surface treatment (chip and seal) shall be completed in accordance with KDOT Standards Section 609.
- B. Materials. Cutback asphalt shall be RC-800 conforming to requirements of KDOT Section 1204. Cover material shall be type CM-K conforming to requirements of KDOT Section 1108.
- C. Procedures. Conform to requirements of KDOT Standards. The Contractor shall include in the unit price the cost of cleaning or sweeping all streets to be sealed.

### 1804 MICROSURFACING AND SLURRY SEAL.

- A. General. The work shall consist of the application of microsurfacing or slurry seal on existing paved surfaces. Each process shall consist of spreading a properly proportioned mixture of emulsified asphalt, mineral aggregate and water on a prepared surface in accordance with this specification and as directed by the Engineer. Microsurfacing shall be a polymer modified asphalt emulsion.
  1. Phasing Plan. A minimum of two weeks prior to beginning surfacing work, Contractor shall submit a phasing plan identifying specific lane closures and sequencing of streets and subdivisions. No work shall be performed until the phasing plan has been reviewed and accepted by the Engineer. Work shall not begin before 8:00 a.m. and must be completed and streets open to traffic by 6:00 p.m. Changes to the phasing plan must be requested in writing a minimum of three (3) business days in advance of implementation.

2. Property Owner Notification. Contractor shall supply and place door tags on doors of all residences and/or businesses affected by microsurfacing operations 48 hours prior to beginning work. Submit a sample door tag for approval at the pre-construction conference.
3. Maintenance of Traffic. All streets shall have one thru-lane open to traffic at all times. Cul-de-sacs may be completely closed until the material has cured adequately to allow traffic. The Contractor shall provide adequate advance signing, barricades, and/or flaggers to control traffic around and through the construction area. Directions for allowable travel paths shall be clearly indicated. Adequate trained personnel shall be available on-site to oversee traffic control. Any damage done by traffic to the surfacing shall be repaired by the Contractor at the Contractor's expense.

B. Materials.

1. Emulsified Asphalt.
  - a. For microsurfacing, the emulsified asphalt shall be a quick polymer modified cationic type CSS-1H emulsion and shall conform to the requirements specified in ASTM D2397. The cement mixing test shall be waived for this emulsion. The polymer material shall be milled or blended into the asphalt or emulsifier solution prior to the emulsification process.

The emulsified asphalt shall have not less than 62% residue after distillation when tested in accordance with ASTM D244 at a temperature below 280° F. Emulsified asphalt shall have a penetration of between 40 and 90 when tested in accordance with ASTM D2397 at 77° F and shall have a minimum softening point of 135° F when tested in accordance with ASTM D36. Contractor shall submit to Engineer a certificate of analysis/compliance matching the material used in the mix design for each load of emulsified asphalt delivered to the project.

- b. For slurry seal, emulsified asphalt shall be either Grade SS-1h conforming to ASTM D977, or CSS-1h conforming to ASTM D2397.
2. Aggregate. The aggregate shall be natural or manufactured crushed granite, slag or chat which is a by-product from the milling of lead and zinc ores and shall conform to one of the following gradations for the specific surfacing method. The percent passing shall not go from the high end to the low end of the range for any two consecutive screens. Unless otherwise specified in the Project Special

Provisions, aggregate shall be Type I (fine) for slurry seal and the aggregate for microsurfacing per current KDOT specifications.

Sieve Size	Amount Passing Sieves, % by Weight		
	Type I (Fine) For Slurry Seal	Aggregate For Microsurfacing (per KDOT)	Tolerance
3/8 inch	100	99-100	
No. 4	100	86-94	±5%
No. 8	90-100	45-70	±5%
No. 16	65-90	25-50	±5%
No. 30	40-65	15-35	±5%
No. 50	25-42	10-25	±4%
No. 100	15-30	---	±3%
No. 200	10-20	5-15	±2%

a. Aggregate quality shall meet the following requirements.

Quality	Required	Test No.
Sand Equivalent	65 min.	ASTM D2419
Soundness	15% max. w/NA <sub>2</sub> SO <sub>4</sub> or 15% max. w/ MgSO <sub>4</sub>	ASTM C88
Abrasion Resistance	30% max.	ASTM C131

b. Engineer may obtain samples for gradation testing from aggregate stockpiles designated by the Contractor for use. Samples for asphalt content may be taken from the completed mix. The frequency of sampling and testing will be established by the Engineer. Precautions shall be taken to ensure that stockpiles do not become contaminated. The mineral aggregate shall be screened to remove any over-sized aggregate or foreign material at the Contractor's stockpile.

3. Mineral Filler. Mineral filler shall be any recognized brand of non-air/entrained Portland cement that is free from lumps and accepted upon visual inspection.
4. Water. Water shall be potable and shall be free from harmful soluble salts or contaminants.
5. Polymer Modifier. For microsurfacing, polymer material, certified from an approved source, shall be milled or blended into the asphalt or emulsifier solution prior to the emulsification process.

6. Other Additives. Additives may be added to the emulsion mixture or any of the component materials for microsurfacing to provide the specified properties. Additives must be included as part of the mix design and be compatible with the other components of the mix.

C. Mix Design. The Engineer shall approve the mix design and all materials prior to use. The component materials shall be within the following limits. The mix design shall be made with the same materials the Contractor will be using on the project.

1. Microsurfacing.

Mineral Aggregate	18.0 lbs to 25.0 lbs per square yard dry aggregate weight
Residual Asphalt	8.0% to 13.5% by weight of dry aggregate
Mineral Filler	0.5% to 2.0% by weight of dry aggregate
Polymer Based Modifier	Minimum of 3.0% solids based on asphalt weight content
Water	As required to provide proper consistency
Additives	As needed

2. Slurry Seal.

Mineral Aggregate	8.0 lbs to 12.0 lbs per square yard dry aggregate weight
Residual Asphalt	10.0% to 16.0% by weight of dry aggregate
Mineral Filler	1.5% to 3.0% by weight of dry aggregate
Water	As required to provide proper consistency

D. Construction.

1. Weather Limitations. The material shall be spread only when either the ambient air temperature or the pavement temperature is at least fifty (50°) degrees F and rising, the weather is not foggy or rainy, and there is no forecast of temperatures below thirty-two (32°) degrees F within twenty-four (24) hours from the time of placement of the mixture.

2. Surface Preparation. The area to be sealed shall be thoroughly cleaned of all debris, trash, vegetation, loose aggregate and soil.

Sweep pavement just prior to surfacing. Water used in pre-wetting the surface shall be applied at a rate to dampen the entire surface without any free-flowing water ahead of the spreader box.

3. Equipment.

Each mixing unit used on the project shall be calibrated prior to construction. Contractor shall submit calibration documentation indicating individual calibration for each material at various settings, which can be related to the machine metering devices. No mixing machine will be allowed on the project until a calibration has been completed. Final calibration sheets shall be submitted to the Engineer.

Individual volume or weight controls for proportioning each material to be added to the mix shall be provided and properly marked.

Appropriate hand tools, which will provide the required results, shall be used to spread the mixture where machine spreading is not possible.

Power brooms, pickup sweepers, power blowers, air compressors and hand brooms may be used to provide a clean surface; however, care must be taken with power equipment to minimize dust and minimize debris blown onto adjacent properties. All debris from cleaning the surface must be removed from the project site.

- a. Microsurfacing. The mixing machine shall be specifically designed and manufactured to lay microsurfacing. The machine shall be a self-propelled, continuous flow mixing unit able to accurately deliver and proportion the aggregate, emulsified asphalt, mineral filler, additives and water to a revolving multi-blade double shafted mixer and discharge the mixed product on a continuous flow basis. The machine shall have sufficient storage capacity for aggregate, emulsified asphalt, mineral filler, additives and water to maintain adequate supply to the proportioning controls.

Spreading equipment shall include a surfacing box with twin-shafted paddles or spiral augers fixed in the spreading box. A flexible front seal shall be provided to insure no loss of mixture at the road surface contact point. The rear flexible seal shall act as a final strike-off and shall be adjustable in width. The spreader box and rear strike-off shall be so designed and operated that a uniform consistency is achieved to produce a free flow of material to the rear strike-off box. The box shall have suitable means provided to side-shift the box to compensate for variations in

pavement geometry. A secondary strike-off shall be provided to improve the surface texture. It shall have the same leveling adjustments as the spreader box.

- b. Slurry Seal. The mixing machine shall be a continuous flow mixing unit and shall be capable of accurately delivering a predetermined proportion of aggregate, water and asphalt emulsion to the mixing chamber and to discharge the thoroughly mixed product on a continuous basis. The equipment shall be capable of pre-wetting the aggregate immediately prior to mixing with the emulsion. The mixing unit of the mixing chamber shall be capable of thoroughly mixing all components together without violent mixing. The mixing machine shall be equipped with an approved fines feeder that includes an accurate metering device or method to introduce a predetermined proportion of mineral filler into the mixer. The mineral filler shall be fed at the same time and location as the aggregate. The fines feeder shall be required whenever added mineral aggregate is a part of the aggregate blend. The mixing machine shall be equipped with a water pressure system and fog-type spray bar, adequate for completing fogging of the surface receiving slurry treatment.

Attached to the mixer shall be a mechanical-type squeegee distributor, equipped with flexible material in contact with the surface of the pavement to prevent loss of slurry from the distributor. It shall be maintained so as to prevent loss of slurry on varying grades and crown by adjustments to insure uniform spread. There shall be a steering device and a flexible strike-off. The spreader box shall have an adjustable width. The box shall be kept clean and build-up of asphalt and aggregate on the box or in the corners shall not be permitted. Use of burlap drags or other drags shall be approved by the Engineer.

Slurry seal mixing machine may be either truck mounted or continuous run design and shall be able to accurately deliver and proportion the aggregate, emulsified asphalt, mineral filler, and water to a revolving mixer and to discharge the mixed product on a continuous flow basis.

The spreader box shall have suitable means provided to side shift the box to compensate for variations in the pavement geometry. A burlap drag or other approved screed may be attached to the rear of the spreader box to provide a uniform, highly textured mat.

#### 4. Application.



- a. The aggregate shall be weighed before delivery to the job site. Emulsified asphalt shall be weighed or measured by volume. Individual volume or weight controls for proportioning each item to be added shall be provided. Each material control device shall be calibrated and properly marked as such. They shall be readily accessible for ready calibration and placed so that the Engineer may determine the amount of material used at all times.
- b. The mixture shall be spread to fill cracks and minor surface irregularities and leave a uniform skid resistant application of aggregate and asphalt on the surface.
- c. All longitudinal and transverse joints shall be uniform and neat in appearance.
- d. All excess material shall be removed immediately from the end of each run. All excess material that overruns in gutters shall be removed or squeegeed back onto the surface and burlap mopped as directed by the Engineer.
- e. All drag material shall be changed as required to prevent streaks or slick spots. No streaks or slick spots shall be left in the uncured pavement surfacing.
- f. When needed, all joints, radii, ends and returns will be squeegeed and burlap mopped as required to provide complete and uniform coverage.
- g. All discolored curbs and sidewalks shall be cleaned immediately before material sets up and all material tracked or lost past ends of job site shall be cleaned up before sealing crew leaves for next location. All removed material shall be disposed of properly at an off-site location.
- h. The surface of all structures, monument boxes, manhole and valve covers, and other roadway appurtenances shall be protected to prevent them from being damaged, splattered or covered with asphalt material. If damage occurs, the Contractor shall restore and/or replace the appurtenances at their expense. After the mixture has been placed at the above-mentioned locations, it shall be tapered by a squeegee to improve ride quality.
- i. Test Strip for Microsurfacing. The contractor shall construct a test strip one lane in width, 500 feet in length, to be evaluated by the Engineer. When multiple machines are used, each machine shall

be required to lay a test strip that will be compared to the other machines for variance in surface texture and appearance. Test strip will not be acceptable if any of the conditions listed under Final Acceptance exist.

- j. A sufficient amount of surfacing material shall be carried in the spreader box at all times to obtain complete, uniform coverage. No lumping, balling, or unmixed aggregate shall be permitted. The mixture shall be free of excess water and emulsion, and free of segregation of the emulsion and aggregate fines from the coarser aggregate.
  - k. Application Rates. Daily reports on yields shall be submitted to the Engineer to confirm the rate at which material was placed as per the approved mix design or otherwise specified application rate.
5. Curing. Adequate means shall be provided to protect the slurry seal or microsurfacing from damage by traffic until the mixture has cured sufficiently so that it will not adhere to or be picked up by the tires of vehicles. Any damage done by traffic to the slurry seal or microsurfacing shall be repaired by the Contractor.
- E. Final Acceptance. After the microsurfacing or slurry seal has been completely cured, the roadway surface shall provide a uniform surface texture. It shall be free of objectionable longitudinal lines, and shall be free of any objectionable transverse lines or grooves. The surface will not be considered acceptable if any of the following conditions exist.
- More than 1 surface irregularity that is 1/4 –inch or wider and 10 feet or longer in any 100-foot section of surfacing;
  - More than 3 surface irregularities that are 1/2-inch or wider and more than 6 inches long in any 100-foot section of surfacing; or
  - Any surface irregularity that is 1 inch or wider and more than 4 inches long.

Joints will not be considered acceptable if any of the following conditions exist.

- Buildup of surfacing material at the joints;
- Uncovered areas at the joints;
- Longitudinal joints with more than 1/2-inch vertical space between the surface and a 4-foot straightedge placed perpendicular to the joint; or
- Transverse joints with more than 1/4-inch vertical space between the surface and a 4-foot straightedge placed perpendicular to the joint.

If determined by the Engineer that the final surface or joints do not provide an acceptable riding surface, the Contractor shall be required to correct the unacceptable area(s) at the Contractor's expense.

The Contractor is responsible for maintaining all streets sealed for thirty (30) days after application. This includes removing or adding cover material as required by the Engineer or authorized representative.

## 1805 COLD MILLING.

- A. Equipment. Milling the surface of pavements shall be completed by the use of a milling machine conforming to the following:
1. The cold milling machine shall be self-propelled and shall have in combination the means of milling and cutting (without softening the old surface) and blading the cuttings into a single windrow, or depositing them directly into a truck.
  2. The machine shall be equipped with a dust suppression system including water storage tanks and high-pressure spray bars. Additional measures for dust suppression may be required by the Engineer.
  3. It is desirable that the cutting width be greater than six (6) feet. In the event the cutting width is less than six (6) feet a system of electronic grade control for consecutive passes will be required.
  4. The cutting drum shall be totally enclosed to prevent discharge of any loosened material on adjacent work areas.
  5. In localized areas where use of the milling machine is not feasible, other equipment may be used as approved by the Engineer.
- B. Construction.
1. Utilities and Monuments. Street surfaces adjacent to manholes, water valves, other utility facilities and monument boxes shall be completely removed to the full depth of cut specified for the street unless otherwise specified by the Engineer.
  2. Milling Depth. Sufficient passes, shall be made such that all irregularities or high spots are eliminated, and that 100% of the surface is milled to a depth of two (2) inches over the entire street section unless specified otherwise. Removal of additional material below the 2-inch milling depth shall be accomplished by methods acceptable to the Engineer within 2 working days of the initial milling

operation. Payment for the additional removal shall be as indicated in the bid form.

3. Milling Area. Mill only the area that can be patched and paved within the specified time limits at any one time. Contractor must plan work accordingly to include adequate number of mobilizations for milling operations in the bid price for milling.
3. Surface Conditions. The drum lacing patterns shall produce a smooth surface finish after milling, with groove depths not to exceed one fourth (1/4) inch and groove spacing not to exceed one (1) inch unless otherwise approved by the Engineer.
4. Cleanup. The material windrowed by the machine shall be removed immediately from the surface of the pavement and properly disposed of by the Contractor. All trash, loose material from milling operations, and other debris shall be removed from the street surface and curb and gutter by the end of each day. Any material and debris that adheres to the curb and gutter shall be removed. Additional dust suppression measures may be required by the Engineer to minimize impacts on adjacent properties.
6. Maintenance of Milled Surface. It shall be the responsibility of the Contractor to maintain the street once the pavement surface is milled. Such responsibilities include, but are not limited to, the timely filling of potholes, removing rebar, correcting damaged areas that pose a hazard to the traveling public, and maintenance of temporary pavement markings where required, as deemed necessary by the Engineer to prevent further pavement damage. The Contractor shall be responsible for repairing damaged areas prior to the overlay at Contractor's expense.

## 1806 OVERLAY.

1. Materials. Asphaltic concrete, leveling course and tack oil for overlay shall conform to Section 1300 – *Asphaltic Concrete Pavement*. Overlay pavement shall conform to the requirements for surface course materials and installation.
2. Construction.
  - a. Conform to requirements of Section 1300 of these specifications for equipment, placement, compaction and finishing of pavement.
  - b. All manholes and valves shall be accessible to the owning utility through all phases of the work.

- c. The surface of all structures, monument boxes, manhole and valve covers, and other roadway appurtenances shall be protected to prevent them from being damaged, splattered or covered with asphalt material. If damage occurs, the Contractor shall restore and/or replace the appurtenances at their expense. Hot mix asphalt, or other method or material approved by the Engineer, shall be used for wedging adjacent to all appurtenances to provide an acceptable temporary riding surface.
- d. Temporary patches applied to maintain milled surface shall be removed and replaced with permanent patches in accordance with the plans and specifications prior to placing the overlay.
- e. All milled surfaces shall be overlaid within five (5) working days of completion of milling. Streets that require pavement patching shall be overlaid within ten (10) working days. If the Contractor fails to adhere to this stipulation, the Engineer will direct the Contractor to place a hot mix asphalt leveling course over the entire milled area at the Contractor's expense. As directed by the Engineer, any additional full depth patching required, because the placement of the asphalt overlay was not achieved in the required time period, will be completed by the Contractor at the Contractor's expense. Additional liquidated damages may apply for failure to meet these deadlines if specified in the Project Special Provisions.

## 1807 CONCRETE CURB AND GUTTER REPLACEMENT.

- 1. Materials.
  - a. Concrete materials for curb and gutter shall conform to requirements of Section 2000 – *Concrete* of these specifications.
  - b. Topsoil behind curb shall be free of all debris, roots, vegetation, foreign material, concrete, rocks, stones, and clods.
- 2. Construction.
  - a. Curb and gutter to be removed shall be neatly sawed to the full depth of existing pavement. Use appropriate equipment to minimize removal of adjacent pavement with the curb and gutter. When existing pavement designated to remain is damaged during the removal and replacement of the curb and gutter, the pavement shall be repaired by the Contractor at Contractor's expense.
  - b. Contractor shall provide temporary surfacing at drives for access.

- c. New curb and gutter shall be installed per plans.
- d. The new curb and gutter shall be constructed within five (5) working days of the removal of the existing curb and gutter. Contractor shall not remove more curb and gutter than can be replaced within the five (5) working day limit. As directed by the Engineer, any additional damage that occurs to the existing pavement, because the placement of the curb and gutter was not achieved in the required time period, will be repaired by the Contractor at the Contractor's expense. Additional liquidated damages may apply for failure to meet these deadlines if specified in the Project Special Provisions.
- e. All curb and gutter shall be backfilled with topsoil between 4 and 10 working days after the new curb and gutter has been constructed. Topsoil may be clean on-site material stockpiled for the purpose but shall be tilled before seeding to remove clods, breakup roots, etc. The topsoil shall be placed to a minimum of 1 foot wide, up to a maximum of 15 feet wide, behind the curb in order to achieve positive drainage.
- f. All disturbed ground shall be seeded, fertilized, and mulched. Mulch must be punched into the topsoil. All seeded and mulched areas shall be watered at least once after mulch is secured.
- g. New curb and gutter shall NOT be paid for until backfilling is complete, the area has been cleaned and prepared for seeding, and all debris taken off site.