

## SECTION 1800- PAVEMENT MAINTENANCE

### 1801 CRACK REPAIR

#### A. Crack Sealing

1. Material. Deery Super Stretch Hot applied DF sealant or Crafcoc, Inc. Superflex. Alternative materials may be acceptable with written approval of the Engineer.
2. Procedures. Cracks shall be cleaned with a hot air lance immediately ahead of the sealer placement. The sealant shall be applied using the methods and equipment recommended by the sealant manufacturer. Hot asphalt sealer shall be continuously, mechanically agitated during heating so that localized heating does not occur. Pour crack sealer shall not be placed when the air temperature in the shade is less than forty (40) degrees. All cracks are to be sealed including transverse, longitudinal, block, and reflective cracks. The longitudinal joints/crack between the edge of pavement and toe of the gutter will be sealed. Where alligator cracking is found, the Engineer will determine if sealing is to be completed.

Sealant shall be placed in the clean, dry crack. 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.

#### B. Crack Filling

Engineer will designate joints and cracks to be filled. Cracks shall be cleaned to a min depth of 2 inches with a hot air lance or other approved equipment immediately ahead of filling. Cracks up to 1 inch in width shall be filled with material conforming to ASTM 3405. Cracks wider than 1 inch shall be filled with asphaltic concrete sand mix and compacted.

### 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. Asphalt pavements shall be patched with hot-mix asphaltic patching material. Material shall be base course mix BM-2 conforming to the 1990 KDOT Standards.
  2. Concrete pavements shall be patched with concrete mixes conforming to the specifications of the Kansas City Metropolitan Materials Board (KCMMB). Approved suppliers, approved aggregates, and approved mixes are available on the website [www.kcmmb.org](http://www.kcmmb.org).
- C. Removal: The failed material shall be removed by sawing a neat rectangular hole into the pavement. It shall be removed without damage to the adjacent pavement.
- 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. After asphalt patching material is placed and raked to a uniform surface, it shall be thoroughly compacted.
  5. The edges of the patch shall be well bonded with the old surface and the surface level with the existing pavement. All joints shall be sealed with a hot-poured joint sealing compound.
  6. Concrete patches may be opened to traffic when the minimum concrete compressive strength of 3000 pounds per square inch is attained.

#### 1803 CHIP AND SEAL

- A. General. All bituminous surface treatment materials and procedures must conform to Sections 606, 607, and 1201 of the KDOT Standards.
- B. Procedures. The Contractor shall include in his bid on single bituminous surface treatment (chip and seal) the price for cleaning or sweeping all streets to be sealed.

Barricades and closing of streets shall be the responsibility of the Contractor. Barricades and closings will be utilized only when

necessary to complete a portion of the work. Care must be taken that the residents are not caused undue inconvenience or hardship.

- C. Materials. Single bituminous surface treatment (chip and seal) will use RC-800, with CM-K grade cover material.

## 1804 MICROSURFACING

- A. General. The work shall consist of the application of micro-surfacing and/or rut filling of existing paved surface. The micro-surfacing shall be a mixture of cationic polymer modified asphalt emulsion, mineral aggregate, mineral filler, water and other additives, properly proportioned, mixed and spread on the paved surface in accordance with this specification and as directed by the Engineer.

- B. Materials.

- 1) Emulsified Asphalt. The emulsified asphalt shall be a quick polymer modified cationic type CSS-1H emulsion and shall conform to the requirements specified in AASHTO M208 and ASTM 2397. The polymer materials shall be milled into the emulsion or blended into the asphalt cement prior to the emulsification process. The cement mixing test shall be waived for this emulsion. The residue or the emulsion shall have a minimum ring and ball softening point of one hundred forty (140°) degree F.

- 2) Mineral Aggregate. The mineral aggregate used for this work shall be chat aggregate which is a by-product from the milling of lead and zinc ores and shall conform to the following grading requirements:

Retained on 3/8" sieve	0-1%
Retained on No. 4 sieve	6-14%
Retained on No. 8 sieve	35-55%
Retained on No. 16 sieve	54-75%
Retained on No. 30 sieve	65-85%
Retained on No. 50 sieve	75-90%
Retained on No. 200 sieve	85-95%

- a) Grading variability limits. The gradation of the aggregate shall be determined by representative samples of the aggregate from such sources that are proposed for use.
- b) Deleterious Substances. To limit the permissible quantity of clay-like fines in an aggregate, a sand equivalent value of sixty five (65) or higher is required when tested by using ASTM 2419.

- c) Soundness. The aggregate shall have a weighted loss of not more than fifteen (15%) percent when sodium sulfate test is used or twenty (20%) percent when magnesium sulfate test is used.
  - d) Hardness. The aggregate wear, from resistance to abrasion, shall be a maximum of thirty (35%) percent when using ASTM test method C131 or AASHTO T96 Test Method.
  - e) Samples for gradation will be taken from aggregate stockpiles designated by the Contractor for use. Samples for asphalt content shall be taken from the completed mix. The frequency of sampling and testing will be established by the Engineer based upon the department's current acceptance program. Precautions shall be taken to insure 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. The mineral aggregate shall be weighed by means of a scale approved by the Engineer.
- (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) Latex or Polymer Modifier. A minimum of two and half (2.5%) percent natural rubber or polymer content, certified from an approved source along with special emulsifiers shall be milled into the asphalt emulsion by an approved emulsion manufacturer. The emulsified asphalt shall be formulated so that when the paving mixture is applied at a thickness of one inch with the relative humidity at not more than fifty (50%) percent and ambient air temperature of at least seventy five (75°) degrees it will cure sufficiently that rolling traffic can be allowed in one (1) hour with no damage to the surface.
- (6) Other Additives. Additives may be added to the emulsion mixture or any of the component materials 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 design mix and all micro-surfacing materials prior to use, and shall designate the proportions to be used within the following limits.

Mineral Aggregate	15 lbs. per sq. yd. minimum weight of dry aggregate
Residual Asphalt	6.5% to 9.5% by dry weight of aggregate
Mineral Filler	1.5% to 3.0% by dry weight of aggregate
Latex or Polymer Based Modifier	Minimum of 3.0%
Water	As required to provide proper consistency

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.

D. Construction Methods.

1. Phasing Plan. A minimum of two weeks prior to beginning work, Contractor shall submit a phasing plan identifying specific lanes closures and sequencing of streets and subdivisions. No work shall be performed until the phasing plan has been reviewed and accepted by the Engineer. Cul-de-sacs may be completely closed until the material has cured adequately to allow traffic. All streets shall have one thru lane open to traffic at all times. 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 a minimum of 36 hours 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 micro-surfacing operations 48 hours prior to beginning work. A sample door tag is included at the end of this specification section.

3. Weather Limitations. The material shall be spread only when the ambient air 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 forty (40°) degrees F within twenty four (24) hours from the time of placement of the mixture. No material shall be spread when the ambient air temperature exceeds 100 degrees F.
4. Surface Preparation. The area to be sealed shall be thoroughly cleaned of all vegetation, loose aggregate and soil. 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.
5. Equipment. The paving mixture shall be spread uniformly by means of a mechanical-type squeegee box attached to the mixer, equipped with paddles to agitate and spread the materials throughout the box. A front seal shall be provided to insure no loss of the mixture at the road contact surface. The rear seal shall act as final strike-off and shall be adjustable.

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. Rut filling equipment will require adjustable steel strike-off plates.

Approximately two (2) to three (3) feet behind the original strike-off shall be secondary strike-off which is cantilevered to the lay-down box. It shall have three elevation adjustments similar to the primary strike-off and adjustable in width. Secondary strike-off shall have a pivot point where it can be tilted for texturing or raised completely off the surface. It shall be equipped with a flying gutter guard which is a flexible squeegee running along the curb line. It shall also be flexible at the center to allow for quarter point crown elevation changes.

An inside skid shall be attached to the lay-down box approximately one (1) foot inside both ends of the box and running parallel to the outside skid. Inside skid shall be adjustable in height, which allows the weight of the lay-down box to be carried on the inside skid while making adjacent passes.

Approved hand tools shall be used to spread the mixture where machine spreading is not possible.

6. Test Strip. The contractor shall construct a test strip one lane in width, 1,000 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.
7. Application. A sufficient amount of slurry 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 applied at a minimum rate of 15 lbs. per square yard.

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. The seam, where two passes join, shall be neat in appearance.

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.

All drag material shall be changed as directed by the Engineer to prevent streaks or slick spots. No streaks or slick spots shall be left in the uncured pavement surfacing.

When needed, all joints, radii, ends and returns will be squeegeed and burlap mopped as directed by the Engineer.

All manhole covers and water valve covers included in the micro-surfacing area of work are to be opened after the micro-surfacing has cured and are to be left in an operable condition for utility maintenance. After the mixture has been placed at the above mentioned locations, it shall be tapered by a squeegee to improve ride quality.

All discolored curbs and sidewalks shall be cleaned and flushed 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.

8. Curing. Adequate means shall be provided to protect the micro-surfacing 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 micro- surfacing shall be repaired by the Contractor.

9. Maintenance of Traffic. The Contractor shall provide signs, barricades, and flagmen necessary to control traffic around the construction area. Any damage done by traffic to the micro-surfacing shall be repaired by the Contractor at the Contractor's expense.
- E. Final Acceptance. After the micro-surfacing 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.

If determined by the Engineer that the final surface does not provide an acceptable riding surface, the Contractor shall be required to correct the unacceptable area 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.

## 1806 SLURRY SEAL

- A. General. This work shall consist of spreading a properly proportioned mixture of emulsified asphalt, mineral aggregate and water on a prepared surface. This material will be used only in cul-de-sacs included in micro-surfacing projects. Slurry seal work will be included in the phasing plan and notification required for the micro-surfacing project. Requirements for curing, maintenance of traffic, and final acceptance shall be the same as for micro-surfacing.
- B. Materials.
  1. Emulsified asphalt shall be either Grade SS-1h conforming to ASTM D 977, or CSS-1h conforming to ASTM D 2397.
  2. Aggregate, mineral filler and water for slurry seal shall conform to requirements for the same materials for micro-surfacing.
- C. Mix Design. The Engineer shall approve the design mix and all slurry seal materials prior to use. The component materials shall be within the following limits.

Mineral Aggregate	8.0 - 12.0 lbs. per sq. yd. minimum weight of dry aggregate
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 Methods.

1. Weather Limitations. The material shall be spread only when the ambient air 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 vegetation, loose aggregate and soil. 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. Material shall be mixed by a self-propelled, slurry seal mixing machine of either truck mounted or continuous run design. Either type machine 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 mixture shall be spread uniformly by means of a mechanical-type squeegee box attached to the mixer, equipped with paddles to agitate and spread the materials throughout the box. A front seal shall be provided to insure no loss of the mixture at the road contact surface. The rear seal shall act as final strike-off and shall be adjustable.

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. 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.

Approved hand tools shall be used to spread the mixture where machine spreading is not possible.

4. Application. A sufficient amount of slurry 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.

The mixture shall be applied at a minimum rate of 8 lbs. per square yard.

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. The seam, where two passes join, shall be neat in appearance.

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.

All drag material shall be changed as directed by the Engineer to prevent streaks or slick spots. No streaks or slick spots shall be left in the uncured pavement surfacing.

When needed, all joints, radii, ends and returns will be squeegeed and burlap mopped as directed by the Engineer.

All manhole covers and water valve covers included in the area to be sealed shall be protected from the slurry seal by a suitable method. All covers are to be opened after the sealing has cured and are to be left in an operable condition for utility maintenance. After the mixture has been placed at the above mentioned locations, it shall be tapered by a squeegee to improve ride quality.

All discolored curbs and sidewalks shall be cleaned and flushed 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.

## 1806 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 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. The milling machine shall be equipped with a flashing warning light visible from 360 degrees. The light shall be mounted near the rear of the machine at least two (2) feet above the highest part of the milling machine, and shall be operating whenever the machine is being used or moved upon the City streets.

B. Construction Requirements.

1. Operators. The milling machine shall be operated by an experienced and capable operator.
2. Utilities. Street surfaces adjacent to manholes, water valves and other utility facilities shall be completely removed to the full depth of cut specified for the street unless otherwise specified by the Engineer.
3. 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.
4. 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.
5. 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 loose asphalt and debris shall be removed from the street surface and curb and gutter. Any material and debris that adheres to the curb and gutter shall be removed. Additional dust suppression measures may be required by the Engineer.

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 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 his/her expense.

## 1807 OVERLAY

1. Materials. Asphaltic concrete for overlay shall conform to Section 1300 of these standards. Overlay pavement shall conform to the requirements for surface course materials and installation.
2. Construction Requirements.
  - a. All manholes and valves shall be accessible to the owning utility through all phases of the work.
  - b. The surface of all structures, manhole and valve covers, and other roadway appurtenances shall be protected to prevent them from being damaged, splattered or covered with bituminous material. If damage occurs, the Contractor shall restore and/or replace the appurtenances at their expense.
  - c. All milled surfaces shall be paved within five (5) days of completion of milling. Streets that require pavement patching shall be overlaid within 10 working days.

## 1808 CONCRETE CURB AND GUTTER REPLACEMENT

1. Materials.
  - a. Concrete mixes for curb and gutter shall conform to the specifications of the Kansas City Metropolitan Materials Board (KCMMB). Approved suppliers, approved aggregates, and approved mixes are available on the website [www.kcmmmb.org](http://www.kcmmmb.org). Alternative mix designs may be submitted to the Engineer for review. All alternative mixes shall conform to the following minimum requirements.
    - 1) Coarse aggregates for all mixes shall be entirely granite, quartzite, or trap rock.
    - 2) Minimum compressive strengths for alternative mixes shall be 4000 psi.

- 3) Concrete shall be air-entrained.
  - b. Fiber reinforcement for concrete, if specified, shall be 100 percent virgin polypropylene, fibrillated, MD Graded, fibers containing reprocessed olefin materials and specifically manufactured for use as secondary concrete reinforcement. Specific gravity shall be 0.91. Add fiber reinforcement at the time concrete is batched in accordance with approved submittals. Add at the minimum rate of 1.5 pounds per cubic yard.
  - c. Topsoil shall be free of all debris, roots, vegetation, foreign material, rocks, stones, and clods.
2. Construction Requirements.
  - a. Curb and gutter to be removed shall be neatly sawed to the full depth of existing pavement.
  - b. New curb and gutter shall be raised to match existing asphalt level.
  - c. The new curb and gutter shall be constructed within 4 working days of the removal of the existing curb and gutter in conjunction with any driveway apron removal and replacement.
  - d. All curb and gutter shall be backfilled with topsoil between 4 and 10 working days after the new curb and gutter has been constructed. 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. 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. All disturbed ground shall be seeded, fertilized, and mulched.
  - e. When existing asphaltic pavement designated to remain is damaged during the removal and replacement of the curb and gutter, the asphaltic pavement shall be repaired by the Contractor at his/her expense.