

SECTION 20

SPECIAL PROVISIONS – MICROSURFACING SPECIFICATIONS

20-1 PURPOSE OF SPECIAL PROVISIONS: The project shall be in accordance with the Standard Specifications for Construction of Highways, Streets, and Bridges for The Texas Department Of Transportation (TxDOT) Standard Specifications for Public Works Construction.

20-2 MATERIALS: All materials must conform to Item 350.2 of the TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, 2004 Edition.

- A. **Cationic Modified Asphalt Emulsion:** Provide CSS1-P in accordance with Section 300.2.D, Emulsified Asphalt.”
- B. **Mineral Aggregates:** Provide crushed aggregate from a single source meeting the requirements of Table 1 and Table 2. Unless otherwise shown on the plans, furnish aggregate with a minimum “B” surface classification. Include the amount of mineral filler added to the mix in determining the total minus No. 200 aggregate fraction.

Table 1
Aggregate Gradation Requirements
TEX-200-F, Part II (Washed)

Sieve Size	Cumulative % Retained
1/2 inch	0
3/8 inch	0-1
#4	6-14
#8	35-55
#16	54-75
#30	65-85
#50	75-90
#100	82-93
#200	85-95

Table 2
Aggregate Quality Requirements

Property	Test Method	Requirements
Magnesium sulfate soundness, %, max. ¹	Tex-411-A	30
Sand equivalent value, %, min.	Tex-203-F	70

1. Use design gradation for the soundness test.

- C. **Mineral Filler:** Provide a mineral filler that is free of lumps and foreign matter consisting of non air-entrained cement meeting the requirements of DMS-4600,

“Hydraulic Cement,” or hydrated lime meeting the requirements of DMS-6350, “Lime and Lime Slurry.”

- D. **Water:** Provide water that is potable and free of harmful soluble salts.
- E. **Other Additives:** Use approved additives as recommended by the emulsion manufacturer in the emulsion mix or in any of the component materials when necessary to adjust mix time in the field.
- F. **Job-Mix Formula (JMF):** Provide a mix design conforming to the proportions shown in Table 3 and meeting the requirements shown in Table 4. The mix design is subject to verification using laboratory-produced mixes or trial batch mix before approval.

Table 3
JMF Proportions

Material	Proportion
Residual asphalt	6.0 to 9.0% by wt. of dry aggregate
Mineral filler (hydraulic cement or hydrated lime)	0.5 to 3.0% by wt. of dry aggregate
Field control additive	As required to provide control of break and cure
Water	As required to provide proper consistency

TABLE 4
JMF Requirements

Property	Test Method	Requirements
Wet truck abrasion, g/sq. ft., max. wear value	Tex-240-F, Part IV	75
Gradation (aggregate and mineral filler)	Tex-200-F, Part II (Washed)	Table 1
Mix time, controlled to 120 seconds	Tes-240-F, Part I	Pass

Provide emulsion and aggregate that are compatible so that the mixing process will completely and uniformly coat the aggregate. Design the mix so that the mixture will have sufficient working life to allow for proper placement at the predicted ambient temperature and humidity.

20-3 EQUIPMENT:

- A. **Mixing and Spreading Machine:** Furnish a self-propelled micro-surfacing mixing machine with:
 1. Self-loading devices to promote continuous laying operations.
 2. Sufficient storage capacity for mixture materials.
 3. Calibrated and marked individual volume or weight controls that will proportion each material to be added to the mix.
 4. An aggregate feed with a revolution counter or similar device capable of determining the quantity of aggregate used at all times.
 5. A positive-displacement-type emulsion pump with a revolution counter or similar device capable of determining the quantity of emulsion used at all times.

6. Provide an approved mineral filler feeder system capable of uniformly and accurately metering the required material.
7. Continuous flow mixing with a revolving multi-blade mixer capable of discharging the mixture on a continuous flow basis.
8. Opposite side driving stations.
9. Full hydrostatic control of the forward and reverse speed during operation.
10. A water pressure system and nozzle-type spray bar immediately ahead of the spreader box and capable of spraying the roadway for the width of the spreader box.
11. A mechanical-type spreader box equipped with paddles or other devices capable of agitating and spreading the materials throughout the box.
12. A spreader box with devices capable of providing lateral movement or side shift abilities.
13. A spreader box with a front seal provided to ensure no loss of the mixture at the road contact surface.
14. The rear seal shall act as a final strike-off and shall be adjustable.
15. The spreader box and rear strike-off shall be designed and operated so that a uniform consistency is achieved to produce a free flow of material to the rear strike-off.

B. **Scales:** Scales used for weighing aggregates and emulsion must meet all requirements of Item 520 of the TxDOT Standard Specifications for Construction and Maintenance of Highways, Street, and Bridges, 2004 Edition, “Weighing and Measuring Equipment.” The weighing equipment for aggregates may be either a suspended hopper or a belt scale.

C. **Asphalt Storage and Handling Equipment:** When storage tanks are used, furnish a thermometer in each tank to indicate the asphalt temperature continuously. Keep equipment clean and free of leaks. Keep asphalt materials free from contamination.

20-4 CONSTRUCTION

A. **General:** Produce, transport, and place micro-surfacing as specified in this item or as directed by the Inspector. Ensure that the finished surface has a uniform texture and the micro-surfacing mat is fully adhered to the underlying pavement.

B. Temporary Material Storage:

1. **Aggregate Storage:** Stockpile materials in a manner that will prevent segregation or contamination. Remix stockpiles with suitable equipment when necessary to eliminate segregation. Use a scalping screen when transferring aggregates to the mixing machine to remove oversize materials.
2. **Mineral Filler Storage:** Store the mineral filler in a manner that will keep it dry and free of contamination.
3. **Asphalt Material Storage:** Keep asphalt materials free from contamination.

C. **Weather Limitations:** Place the material when the atmospheric temperature is at least 50 degrees Fahrenheit (50°F) and rising and the surface temperature is at least 50 degrees

Fahrenheit (50°F). Cease placement when the atmospheric temperature is below 60 degrees Fahrenheit (60°F) and falling, when the weather is foggy or rainy, or when rain is imminent as determined by the project Inspector. Cease placement twenty-four (24) hours before forecasted temperatures below thirty-two degrees Fahrenheit (32°F).

All weather temperatures shall be based on readings forecasted by WBAP broadcasting station (817-787-1111).

D. Surface Preparation:

1. The area to be sealed, including the gutterline, shall be thoroughly cleaned of all vegetation, loose aggregate, and soil prior to micro-surfacing.
2. Water used shall be applied at a rate that will dampen the entire surface without any free-flowing water ahead of the spreader box.
3. Any ruts in excess of one half inch (1/2") shall be filled using a rut box prior to final surface treatment.
4. All manholes and water valves will be covered prior to micro-surfacing. Prior to construction, valves and manholes shall be located and marked by the Contractor and written verification of such shall be provided by a City of Arlington Utilities Specialist. If the Contractor, through carelessness or negligence, damages any valve, manhole, or cleanout that has previously been located, it will be the Contractor's responsibility to replace the same at no additional charge to the City.
5. The Contractor shall remove all raised pavement markers, crosswalk bars/arrows/stop bars, and any thermoplastic and/or striping material in a manner which will protect and ensure no damage to the existing pavement. Any pavement damaged by the Contractor's operations shall be repaired at no cost to the City. Any excess debris shall be removed by the Contractor at no cost to the City.
6. All exposed concrete pavement shall be covered with a tack coat prior to micro-surfacing.
7. All cracks shall be cleaned with air compressors prior to placement.

20-5 MATERIAL TRANSFER:

- A. Minimize construction joints by providing continuous loading of material while placing micro-surfacing. Ensure that oversized material has been removed prior to transferring the aggregates to the mixing machine.

20-6 PLACING:

- A. The mixture shall be spread to fill cracks and minor surface irregularities and leave a skid resistant application of aggregate and asphalt on the surface.
- B. The seam where two (2) spreads join shall be neat and appearing and uniform.
- C. Shift the spreader box when necessary to maintain proper alignment.
- D. Clean the spreader box as necessary to minimize clumps.

- E. Set and maintain the spreader box skids to prevent chatter in the finished mat.
- F. Prevent loss of material from the spreader box by maintaining contact between the front seal and the road surface.
- G. Adjust the rear seal to provide the desired spread.
- H. Adjust the secondary strike-off to provide the desired surface texture.

20-7 TEMPORARY PAVEMENT MARKINGS:

- A. Temporary pavement markings shall be four inch (4") raised reflective tabs placed on twenty foot (20') centers with two to four inches (2" to 4") between tabs. The appropriate color for the application shall be used.
- B. Temporary pavement markings must be installed as soon as cured or turned, each day, after final surface treatment has been placed.

20-8 WORKMANSHIP: Micro-surfacing material required to repair deficiencies due to unsatisfactory workmanship shall not be paid for but shall be entirely at the Contractor's expense. A minimum of seven (7) calendar days prior to beginning Micro-Surfacing operations for each reference, a Contractor representative and the project Inspector shall perform a visual inspection and evaluation of the existing pavement differentials at existing pavement joints shall be located and documented as to the type, location and extent of deformation. For areas in substantial need of repair the project Inspector will contact the respective maintenance supervisor asking for immediate repairs prior to the micro-surfacing operation.

In areas where existing pavement evaluation, prior to micro-surfacing operation, indicated surface irregularities that were not subsequently repaired by City forces, consideration of the existing pavement condition will be allowed. In the documented areas where existing deformation reflect through the proposed Micro-Surfacing only additional irregularities exceeding the specified tolerances will require correction by the Contractor.

- A. **Finished Surface:** The finished micro-surfacing shall have a uniform texture free from excessive scratch marks, tears or other surface irregularities. Tears, marks, or other surface irregularities are considered excessive if:
 - 1. Four (4) marks are at least one-half inch (1/2") wide and more than six inches (6") long in any one hundred foot (100') of machine pull.
 - 2. Any are one-inch (1") wide or wider and more than four inches (4") in length.
 - 3. Any foreign matter larger than the top size aggregate that escapes under the secondary strike-off shall be removed from the finished surface and efforts shall be taken to handwork the tear or scar to match the texture of the surrounding surface.
- B. **Joints/Seams:** The longitudinal and transverse joints shall be neat appearing and uniform. No excessive buildup on covered areas or unsightly appearance will be permitted on longitudinal or transverse joints and seams and all longitudinal and

transverse joints shall be butt joints. Gaps between applications will exist between the pavement surface and a four foot (4') straight edge placed perpendicular on the longitudinal joint or one-quarter inch (1/4") vertical space for a transverse joint.

- C. **Edges:** The edges of the micro-surfacing shall be uniform and neat appearing along the roadway centerline, lane lines, shoulder or curb lines. The edge shall vary no more than plus or minus three inches (3") from a one hundred foot (100') straight line on a cross section or from one a one hundred foot (100') arc of the design on a curved section.
- D. **Handwork:** Areas which cannot be reached with the mixing machine shall be surfaced using hand tools to provide complete and uniform coverage. The area to be handworked shall be lightly dampened prior to mix placement. Care shall be exercised in areas that require handworks so that the finished surface in uniform in texture, dense and of overall good appearance comparable to that produced by the spreader box.
- E. **Type 2 Application Rates:** When only one lift (course) of micro-surfacing is required, the application shall be approximately twenty-five (25) to thirty (30) pounds per square yard of composite mix.
 - 1. The above rates are for estimating purposes and the final rate may be adjusted by the project Inspector due to existing field conditions.

As directed by the project Inspector, ruts, utility cuts and depressions in the existing surface shall be filled prior to placing the final surface course. Ruts and irregularities greater than one-half inch (1/2") in depth shall be filled independently using a five or six foot (5 or 6") rut filling spreader box. Ruts in excess of one and one-half inches (1 1/2") shall require multiple passes with the rut box to restore the original cross-section. All rut filling work shall be crowned to compensate for compaction. When multiple passes are required traffic shall be carried overnight on each rut filling pass before a subsequent filling pass is made.

Ruts and irregularities of less than one-half inch (1/2") in depth shall be covered with a full width scratch coat using a rigid rear steel strike-off in the spreading equipment. When two (2) lifts are required, the scratch course will be applied at approximately fifteen to twenty pounds per square yard (15 to 20 lbs p/sy) of composite mix to re-profile and fill low spots, raveled areas and cracks.

The surface shall be pre-wet by fogging with water ahead of the spreader box when required by field conditions. The rate shall be adjusted to suit temperatures, surface texture, humidity and dryness of the pavement surface.

The mixture shall be of the desired consistency upon leaving the mixer and no additional material shall be added. A sufficient amount of material shall be carried in the spreader at all times such that a complete coverage is obtained. No lumping, balling or unmixed aggregate shall be permitted. The mixture shall be spread to fill all cracks and surface irregularities and leave a uniform application of aggregate and asphalt on the surface.

Patching shall be machine applied with a full width spreader box. Suitable methods shall be used by the Contractor to protect the micro-surfacing from traffic until the new surface will support traffic without damage. Sufficient flagmen, warning signs and barricades shall be provided by the Contractor to properly control traffic from traveling in the freshly laid materials. If freshly laid micro-surfacing is damaged by rain, traffic or other means, the Contractor shall satisfactorily repair or replace it at his expense.

Any damages cause by negligence of the Contractor or his subcontractor(s), including but not limited to manholes, water valves and, curbs and gutters shall be repaired/replaced by the Contractor at no additional cost to the City. If City forces or City contractor repairs the damages due to lack of response from the Contractor, such cost shall be deducted from the final payment.

20-9 MEASUREMENT: Micro-surfacing will be measured by the ton of the composite micro-surfacing mixture. The composite micro-surfacing mixture is defined as the asphalt, emulsion, aggregate, and mineral filler.

- A. **Aggregate:** The quantity of aggregate used in the accepted portions of the work shall be measured by the net ticket weight of each individual load of aggregate based on the dry weight of aggregate. Weigh the aggregate at the project stockpile site unless otherwise approved. Use either a suspended hopper scale or a belt scale meeting the requirements of Item 520, "Weighing and Measuring Equipment." The calculated weight of mineral filler based on the accepted portion of work will be used for measurement and included in the total aggregate weight.
- B. **Latex Modified Emulsion:** The quantity of latex modified emulsion in the accepted portion of the work shall be measured by gallons of material based on the accepted load tickets issued from the manufacturer. At the completion of the project, any unused emulsion shall be weighed back and deducted from the accepted emulsion quantity delivered.

Upon the end of each working day, the contractor and project Inspector shall measure each street together to verify the square yards.

When the Contractor has two crews working, each superintendent shall turn in separate material reports. Combining material reports together shall not be permitted.

20-10 PAYMENT: The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid per ton for "Micro-Surfacing." This price is full compensation for preparing the existing surface (including removing of existing raised and all thermoplastic markings); furnishing, hauling, preparing, and placing materials; and equipment, labor, tools, and incidentals.

20-11 WARRANTY PERFORMANCE CRITERIA: Surface deficiencies of the Micro-Surfacing that will be measured during the warranty shall not exceed the following threshold values. The threshold values for each parameter will be determined separately. If any threshold value is exceeded during the warranty period, the Micro-Surfacing will be considered in non-

compliance with the warranty performance provision.

The Contractor shall make repairs to all defects at no cost to the City of Arlington.

Flushing/Skid Loss: No more than five percent (5%) of the area in a segment where the skid number is less than 40.

Delamination: No more than two percent (2%) of the area in a segment.

Weathering and Raveling: No more than five percent (5%) of the area in a segment.

Rutting: Rut depths shall not exceed one-quarter inch (1/4") in the entire segment during the first one hundred twenty (120) calendar days after the acceptance date of construction. Rut depths at the end of the warranty period shall not exceed three-eighths inch (3/8"). Pavement segments where the rut depth exceeds one inch (1") are excluded from the warranty for rutting threshold level.

Other: Not to exclude any other surface deficiencies that the inspector may find.

Corrective work is limited to those segments that exceed the specified threshold values and shall be performed before conclusion of the warranty period or within such other time frame as agreed to by the Department and the Contractor.

END OF SECTION