

ITEM 0104031

SLURRY SEAL

DESCRIPTION

This item shall consist of furnishing all plant, labor, equipment and material to perform all operations necessary in connection with the application of a bituminous slurry seal surface upon the designated pavement, in complete and strict accordance with these specifications.

The bituminous slurry shall consist of a mixture of emulsified asphalt, mineral aggregate, water, and rubber latex; properly proportioned. Mixed and spread evenly on the pavement surface as specified herein and as directed by the Engineer. The slurry, when cured, shall have a homogenous appearance, fill all cracks, adhere firmly to the pavement surface, and shall have a skid resistant texture.

REFERENCED ITEMS

Item 0107701 and 0104021

REQUIRED SUBMITTALS

Material Certificate of Compliance:

The Contractor shall furnish a certified statement from the emulsion manufacturer providing analysis of the base asphalt used in the manufacture of the emulsion. The statement shall also certify that the material represented is a true Cation Quick Set emulsion passing all above procedures. Submit 5 copies of material certificate of compliance for slurry seal in accordance with the contract general requirements.

Certified Test Report:

A certified testing-data sheet shall be filed with the Engineer five (5) days prior to the start of work. The data sheet shall show that the actual tests as described above were performed on the subject emulsion to be used on this project and the results of these tests which are hereby certified to in a Statement of Compliance, are attached. Submit 5 copies of certified test reports in accordance with the contract general requirements.

MATERIALS

1. ASPHALT EMULSION

The emulsified asphalt shall conform to the requirements of Cation Quick Set specification for type E-18, except: the residual asphalt having a penetration of 60-70 shall constitute at least 60% of the emulsion by weight and that the Saybolt Furol viscosity of the emulsion at 77 degrees F shall not exceed 50 seconds.

Asphalt emulsion for use in slurry applications shall have the following additional characteristics:

1. At least half of the asphalt droplets have a diameter less than two microns (0.00008").
2. At least 95% of them have a diameter no greater than five microns (0.0002"), and
3. The largest droplets do not exceed 50 microns (0.002") in diameter.

The emulsion shall pass the positive particle charge test for Cation emulsions and shall show a PH factor of 6.7 as indicated in AASHTO T-200-79. The Cation Quick Setting Emulsion shall show a positive break and resistance to rain in 1 to 2 hours.

2. AGGREGATE

The mineral aggregate shall consist of manufactured slag, crusher fines of a combination thereof. The aggregates shall be clean and free from vegetable matter and other deleterious substances.

When tested in accordance with AASHTO T-176-02 or ASTM D-2419-02, the aggregate shall have a sand equivalent of not less than 45. Mineral fillers such as Portland cement, limestone dust, lime, fly ash and others shall be considered as part of the blended aggregate, and shall be used in the minimum amount required. They shall meet the gradation requirements of AASHTO M17-95 or ASTM D-242-95. Mineral fillers shall be used for one more of the following reasons only: To improve the gradation of the aggregate; to control the tie of break of emulsion; to provide improved stability and workability of the slurry; or to increase the durability of the cured slurry. The total aggregate, including mineral filler, shall conform to the following gradation when tested by AASHTO T27-99 or ASTM C-136-96a:

Type II General Seal

<u>Sieve Size</u>	<u>Percent Passing</u>
3/8"	100
#4	90-100
#8	65-90
#16	45-70
#30	30-50
#50	18-30
#100	10-21
#200	5-15

Pure asphalt required, percent of dry aggregate: 7.5 - 13.5

3. WATER

All water used in making the slurry shall be potable and free of dissolved ingredients that may prove harmful. The effect of the moisture content on the specific weight of the aggregate, and the moisture content of the aggregate being used, shall be taken into proper account in setting the machine to deliver asphalt in the correct proportion.

4. RUBBER LATEX

Rubber Latex additive shall be Ultrapave 65 K or approved equal, for cation asphalt emulsion. The rubber latex shall meet the following properties:

Monomer ratio, butadiene/styrene	76/24
Solids content %	61
Solids content, lbs./gal.	5.0
Coagulum on 80 mesh screen, max. %	0.1
Mooney viscosity of polymer (ML 4 @ 212 degrees F) min.	100
PH of latex	5
Surface tension, dynes/cm	32

arranging for and acquiring all testing data and laboratory analysis of samples.

The materials used for this work shall conform to the requirements of the following specifications or tests.

AASHTO

- T-2-91 Sampling stone, slag, gravel, sand and stone block for use as highway materials.
- T-11-97 Amount of material finer than No. 200 sieve in aggregate.
- T-19-00 Unit Weight of aggregate
- T-27-99 Sieve analysis of fine or coarse aggregate.
- T-37-01 Sieve Analysis of mineral filler.
- T-84-00 Specific gravity and absorption of fine aggregates.
- T-96-02 Abrasion of coarse aggregate by use of the Los Angeles machine.
- T-176-02 Plastic fines in graded aggregate and soils by use of the Sand Equivalent Test.

Test Methods of Asphalt Emulsions

AASHTO

- T-40-02 Sampling bituminous materials.
- T-59-01 Testing emulsified asphalt.
- D-2397-02 (ASTM) Cation emulsified asphalt
- T-200-79 Testing Ph of aqueous solutions

Test Methods for Bituminous Slurry Surfaces

AASHTO

- T-30-93 Mechanical analysis of extracted aggregate.

T-164-01 Bitumen content of paving mixture by centrifuge.

Specifications for Mineral Fillers

AASHTO

M17-95 Mineral filler for bituminous paving mixture.

Specifications for Asphalt Emulsions

AASHTO

M208-01 Specifications for Cation emulsified asphalt

CONSTRUCTION METHODS

Precautions shall be taken to ensure that aggregate stockpiles do not become contaminated with oversized rock, clay, silt or excessive amounts of moisture. The stockpile shall be kept in areas that drain readily. Segregation of the aggregate will not be permitted.

Stockpile shall be covered with an approved material to prevent damage to stockpile and addition of unwanted moisture or foreign materials.

The Contractor shall provide suitable storage facilities for the asphalt emulsion. The Contractor shall be equipped to prevent water from entering the emulsion. Suitable heat shall be provided if necessary to prevent freezing. The Contractor shall have sufficient equipment to store a minimum of 7,500 gallons of emulsion on the project at all times.

Samples of materials and of the finished slurry surface shall be furnished by the Contractor as directed by the Engineer during progress of the work. Test reports may be requested from the Contractor as additional materials arrive.

All equipment, tools, and machines used in the performance of this work shall be maintained in satisfactory working order at all times. Descriptive information on the slurry mixing and application equipment to be used shall be submitted for approval not less than five (5) days before work begins.

The slurry mixing machine shall be a continuous-flow, mixing unit and shall be capable of delivering accurately a pre-determined proportion of aggregate, water and asphalt emulsion to the mixing chamber and to discharge the thoroughly mixed

product on a continuous basis. The mixing unit of the mixing chamber shall be capable of thoroughly mixing all ingredients together. No violent mixing shall be permitted.

The mixing machine shall be equipped with an approved fines feeder that provides an accurate metering device or method to introduce a pre-determined proportion of mineral filler into the mixer at the same time and location that the aggregates are fed. The fines feeder shall be used whenever added mineral filler is a part of the aggregate blend.

The mixing machine storage capacity to properly mix and apply a minimum of ten tons of the slurry shall be provided.

Attached to the mixing machine shall be a mechanical type squeegee distributor equipped with a flexible material in contact with the surface to prevent loss of slurry on varying grades and crown by adjustments to assure uniform spread. There shall be a steering device and flexible strike-off. The spreader box shall be kept clean; build up of asphalt and aggregate on the box shall not be permitted. The use of burlap or other drags shall be approved by the Engineer.

The spreader box shall be equipped with mechanical augers in both front and rear compartments to assure agitation of the slurry and even distribution to all areas of the pavement surface.

Trial mixes shall be prepared for placing test strips in an areas assigned by the Engineer for testing. Visual observations of surface texture, tackiness, and mix segregation will be made for conformance of the mix with the applicable sections of the specifications. Conformance will be determined by the trial mixes that will not constitute the final acceptance of the operations for conformance and acceptability of the final product, the Contractor will so be instructed and shall proceed with corrections in order to make the product comply with this specification. The Contractor will be required to place not more than four (4) test strips of 60 square yards each in area designated by the Engineer. The test sections will be placed using the same equipment, material and methods as will be used throughout the job. Slurry mixtures placed in test strips will conform to design mix with minor variations to obtain crack filling, bond to pavement, and desired skid resistant texture.

Prior to slurry seal, the Contractor shall crack seal all cracks of 3/8" or greater width in conformance with Item 0104021, ROADWAY SURFACE CRACK SEAL. All cracks sealed as such shall be paid for by Item 0109901, ROADWAY SURFACE CRACK SEAL and the Contractor shall not receive additional payment for such under this Item.

The Contractor shall clean the road surface prior to application of the slurry seal. Power brooms, power blowers, air compressors, and hand broom shall be suitable for cleaning the surface and cracks of the old surface.

Hand squeegees, shovels, and other hand equipment shall be provided as necessary to perform work. Suitable asphalt tankers, water, tankers, dump trucks, detail trucks for traffic control, and loaders and roller shall also be provided. This equipment is necessary to the proper performance of the work and will be considered in evaluating the Contractor's total equipment status for this project.

1. SURFACE PREPARATION

Immediately prior to applying the slurry, the surface shall be cleaned of all loose material, silt spots, vegetation and other objectionable material. Any standard cleaning method used to clean pavements will be acceptable except water flushing will not be permitted in areas where considerable cracks are present in the pavement surface. The Engineer shall inspect the prepared surface and approve the surface condition immediately prior to the slurry seal application.

The amount of asphalt emulsion to be blended with the aggregate shall be that as determined by the laboratory report. A minimum amount of water shall be added as necessary to obtain a fluid, homogenous mixture. The rate of application shall be a minimum of 10 lbs. per square yard, but not greater than 15 lbs. per square yard.

If the slurry is being placed over highly absorbent asphalt surfaces, areas subject to dusty conditions or over a surface where the aggregate has become exposed and is polished and slick as determined by the Engineer, a one part emulsion / three parts water tack coat of the same asphalt emulsion type and grade as specified for the slurry is required. This can be applied with an asphalt distributor or suitable water truck. The application rate shall be from 0.05 to 0.10 gallons of the diluted emulsion per square yard of surface. Suitable methods such as barricades, flag persons, uniformed police, pilot cars, etc., shall be used to protect the non-cured slurry surface from all types of traffic. Any damage to the non-cured slurry will be the responsibility of the Contractor. The Engineer shall give final approval as to the method used and the number of private-duty officers required. It will be the responsibility of the Contractor to notify all businesses and residents on the streets to be surfaced, prior to the start of work. The Contractor will be required to notify all interested persons 48 hours before their streets will be resurfaced. This

notice shall be hand delivered and shall instruct the concerned persons as to when the street will be closed.

There will be no extra payment for the above. The cost shall be included in the unit price bid, with the exception of uniformed police, which shall be used in conformance with and paid for under Item 0107701.

2. **SLURRY APPLICATION**

The surface shall be fogged with water directly preceding the spreader. The slurry mix shall be the desired consistency when deposited on the surface and no additional elements shall be added. Total time of mixing shall not exceed 4 minutes.

A sufficient amount of slurry shall be carried in all parts of the spreader at all times so that complete coverage is maintained. No lumping, balling, or unmixed aggregate shall be permitted. No segregation of the emulsion and aggregate or the fines from the coarse aggregate will be permitted. If the coarse aggregates settle to the bottom of the mix, the slurry will be removed from the pavement. No excessive breaking of the emulsion will be allowed in the spreader box. No streaks, such as those caused by oversized aggregate, will be left in the finished pavement.

No excessive build-up nor unsightly appearance shall be permitted on longitudinal or transverse joints. Approved squeegees shall be used to spread slurry in non-accessible areas to the slurry mixer. Care shall be exercised in leaving no unsightly appearance from hand work.

At the time, in the Contractor's opinion, that the slurry seal has cured, he shall notify the Engineer for inspection and concurrence to open the roadway to traffic. Such inspection does not relieve the Contractor of his responsibility to provide a sealed roadway and should the seal be damaged by traffic the Contractor shall re-seal such areas at no additional cost.

METHOD OF MEASUREMENT

This work will be paid for by the actual number of square yards of SLURRY SEAL, Completed and accepted in accordance with the specifications and as directed by the Engineer.

BASIS OF PAYMENT

This work will be paid for at the contract unit price per square yard for "SLURRY SEAL" which price shall include the preparation and cleaning of the roadway surface, traffic control (except for authorized private-duty officers), required testing, certifications, etc. and notifications to adjacent property owners as outlined in these specifications as well as furnishing and applying all necessary materials. Included in the bid price shall be the cost of all equipment, labor and all else necessary and incidental to the satisfactory completion of the work in accordance with these specifications and as directed by the Engineer.

<u>PAY ITEM</u>	<u>DESCRIPTION</u>	<u>PAY UNIT</u>
0104031	Slurry Seal	SY