City of San Angelo

Public Works

Engineering Services

GSB-FrictionSeal

General Notes and Specifications

301 W. Beauregard Avenue

San Angelo, Texas 76903

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STANDARD SPECIFICATIONS FOR ASPHALT SURFACE MAINTENANCE

WITH

GSB-FrictionSeal™ for Roadways

Emulsified Gilsonite-Asphalt plus Fine-aggregate

Surface Treatment System

Note: This specification covers the requirements for GSB-FrictionSeal, an emulsified Gilsonite-asphalt surface treatment which includes the simultaneous application of a suitable fine-aggregate to maintain adequate surface friction.

The GSB-FrictionSeal system may be applied to roadway pavements in fair or non-poor condition as described in various industry-accepted pavement condition analysis methods. The system is designed for use as an alternative treatment on pavements which could otherwise accept fog seal, chip seal, slurry/microsurfacing, or similar non-structural surface treatments.

Application rates can vary from 0.18 to 0.28 gallons per SY for the emulsified Gilsonite-asphalt liquid, and 2.0 to 4.0 pounds per SY for the fine-aggregate. Please see the chart below for "regular" or "light" and ask for owner clarification on type to be installed. Exceeding recommended application parameters and rates is not advisable without consulting a responsible manufacturer's representative.

I. Scope:

This work shall consist of furnishing all labor, material, and equipment necessary to perform all operations in the application of a GSB-FrictionSeal to the specified roadways. The installation shall be by spray application of the GSB-FrictionSeal emulsion, and the simultaneous application of fine aggregate. All work shall be in accordance with the specifications, the applicable drawings, and subject to the terms and conditions of this contract.

This item shall consist of the application of an emulsified asphalt surface treatment composed of an emulsion of natural and refined asphalt materials, a polymer additive, and the simultaneous application of a suitable fine-aggregate to maintain adequate surface friction. The emulsified asphalt surface treatment shall be applied in accordance with these specifications, and as shown on the plans or as directed by the Engineer.

Quantities of Materials per Square Yard.

The approximate amounts of materials per square yard for the GSB-FrictionSeal treatment shall be as provided in the table for the treatment area(s) at the specified rate(s) as noted on the plans. The actual application rates will vary within the range specified to suit field conditions and will be recommended by the manufacturer's representative and approved by the Engineer, and if needed from the test area/sections evaluation.

Application Rate

Quantity of GSB FS Emulsion, gal/ SY	Quantity of Aggregate lbs/SY
Light FS 0.18-0.22	2-3
Regular FS 0.22-0.28	3-4

Test areas and test sections.

A qualified manufacturer's representative shall be present in the field to assist the Contractor in applying test areas and/or test sections to determine the optimum application rate of both emulsion and fine-aggregate. The Contractor should be prepared to provide the owner the maximum rate of both liquid and fine aggregate should the test strips show these rates to be acceptable and the owner or their representative require it in production.

A test area and/or section shall be applied for each differing asphalt pavement surface identified in the project. The test area(s) and/or test section(s) shall be used to determine the material application rate(s) of both emulsion and fine-aggregate prior to full production. The same equipment and method of operation shall be utilized on the test area(s) and/or test section(s) as will be utilized on the remainder of the work.

II. Material Specifications: see Appendix at bottom.

III. Material Performance:

The GSB-FrictionSeal shall have a record of at least three (3) years of satisfactory service as an asphalt Surface Treatment. Satisfactory service shall be based on the capability of the material to penetrate and bond with the clean pavement surface becoming a part of the surface binder on the treated pavement, show no signs of cracking or peeling, be impervious to water, and have a history of safe long-term friction characteristics.

The bidder must submit with his bid, the manufacturer's certification that the material proposed for use, follows the specification requirements. The bidder must submit with his bid previous-use documentation and test data conclusively demonstrating that the GSB-FrictionSeal has been used successfully for a period of three (3) years.

IV. Applicator Experience:

The GSB-FrictionSeal shall be applied by an experienced pavement surface treatment applicator. The bidder shall have a minimum of three years' experience in applying GSB-FrictionSeal, or other high-performance pavement preservation systems.

V. PRODUCT STANDARDS:

The product GSB-FrictionSeal by ASI is the standard for these specifications, and the prices quoted on the Base Bid shall be for this standard.

VI. APPLICATION LIMITATIONS:

The temperature of the GSB-FrictionSeal emulsion, at the time of application shall be 140 degrees Fahrenheit minimum, not to exceed temp of 170 degrees. The asphalt emulsion shall be applied only when the existing pavement surface is clean and dry, and when the weather is not foggy, rainy, or when the wind velocity will prevent the uniform application of the material. No material shall be applied when dust or fine-aggregate is blowing or when rain is anticipated within eight (8) hours of application completion. The atmospheric temperature and the pavement surface temperature shall both be above 60°F (16°C) and rising. During application, account for wind drift. Cover existing buildings, structures, informational signs, retro-reflective marking and in-pavement duct markers as necessary to protect against overspray before applying the emulsion. The installation of pavement marking locator tabs will be installed prior to the application of the GSB-FrictionSeal. Should emulsion get on any marker or fixture, promptly clean it. If cleaning is not satisfactory to the Engineer, the Contractor shall replace any light, sign or marker with equivalent equipment at no cost to the Owner. The Contractor takes full responsibility for surface treatment applications outside these parameters.

VII. HANDLING OF FRICTIONSEAL:

The distributor truck will be dedicated to the GSB-FrictionSeal emulsion, so no cleaning of other contaminants will be needed or proposed. Cleanliness of the spreading equipment shall be subject to the approval and satisfaction of the Engineer.

VIII. RESIDENT NOTIFICATION:

The contractor shall distribute by hand, a typed notice to all residences and businesses on the street to be treated if required by the owner or their representative. The notice will be delivered a minimum of seven (7) days prior to the treatment of the road. The notice will have a local phone number that residents may call to ask questions. The contractor shall also place the notice on the windshield of any parked cars on the street. Hand distribution of this notice will be considered incidental to the contract.

IX. APPLICATING EQUIPMENT:

Liquid and aggregate combination distributor truck.
The distributor for spreading the emulsion and the aggregate shall be self-propelled, with the aggregate being applied within less than 3 feet of the emulsion and shall spread the fine aggregate via a computer rate-controlled aggregate distribution apparatus that is integral to the distributor truck, and is designed specifically for fine aggregate distribution. The distributor shall be designed and equipped to distribute the GSB-FrictionSeal uniformly on variable widths of surface at readily determined and controlled rates from 0.18 to 0.28 gallons of liquid per square yard of surface, and 2 to 6 pounds of fine aggregate per SY of surface. Distributor equipment for liquid shall include computer rate-control, full circulation spray bars, pump rpm gauge, volume measuring device, integral heater (thermostatically controlled), and a hand hose attachment suitable for application of the emulsion manually to cover areas inaccessible to the distributor. The distributor shall be equipped to circulate the emulsion within the tank.

The combination distributor truck will apply fine-aggregate to the emulsion on the pavement in a single pass operation without driving through wet emulsion. The aggregate spreader shall be equipped with a variable control system and proper fine-aggregate apparatus capable of uniformly distributing the fine aggregate at the specified rate at varying application widths and speeds. The fine aggregate spreader shall have a minimum hopper capacity of at least 20,000 pounds (9,000 kg) of the specified fine aggregate.

A verification of distributor equipment as well as application rate accuracy and uniformity of distribution shall be made when directed by the Engineer.

Any equipment that is not maintained in full working order, or is proven inadequate to obtain the results prescribed, shall be repaired or replaced at the direction of the Engineer.

Equipment and tools. The Contractor shall furnish all equipment, tools, and machinery necessary for the performance of the work.

Preparation of asphalt pavement surfaces. Clean pavement surface immediately prior to placing the surface treatment by sweeping, blowing, flushing well with water (leaving no standing water), or a combination of methods, so that pavement is free of dust, dirt, grease, vegetation, oil or any type of objectionable surface film. Remove oil or grease that has not penetrated the asphalt pavement by scraping or by scrubbing with a detergent, then wash thoroughly with clean water. After cleaning, treat these areas with an approved oil spot primer. Any additional surface preparation such as pavement marking removal, etc., will be completed by owner prior to project begin.

Prior to treatment, the street will be cleaned of all standing water, dirt, leaves, foreign materials, etc. This work shall be accomplished by hand brooming, power blowing or other approved methods. If, in the opinion

of the Engineer, the hand cleaning is not sufficient then a self-propelled street sweeper shall be used.

XII. TRAFFIC CONTROL:

The Contractor shall schedule his operations and carry out the work in a manner to cause the least disturbance and/or interference with the normal flow of traffic over the areas to be treated. Treated portions of the pavement surfaces shall be kept closed and free from traffic until a break and cure of the GSB-FrictionSeal, in the opinion of the Engineer, has become complete and the area is suitable for traffic.

When, in the opinion of the Engineer, traffic must always be maintained on a street, then the Contractor shall apply GSB-FrictionSeal to one lane at a time. Traffic shall be maintained on the untreated lane until the traffic can be switched to the treated lane.

The Contractor shall be responsible for the traffic control and signage required to allow for the safe travel of motorists as well as pedestrians within the job site. The Contractor shall submit a traffic control plan to the owner for approval. The Contractor shall notify local emergency services of its planned street closers and traffic plan.

XIII. METHOD OF MEASUREMENT:

GSB-FrictionSeal will be measured by the square yard as provided for in the Contract Documents.

XIV. BASIS FOR PAYMENT:

GSB-FrictionSeal shall be paid for PER SQUARE YARD, which shall be full compensation for furnishing all materials, equipment, labor and incidentals to complete the work as specified and required.

APPENDIX A

Material Specifications:

Aggregate. The aggregate material shall be a dry, clean, dust and dirt free, sound, highly textured, durable, angular-shaped manufactured specialty fine aggregate, with characteristics as outlined in the following table(s). The Contractor shall submit manufacturer's technical data and a manufacturer's certification indicating that the specialty fine aggregate meets the requirements of the specification to the Engineer prior to start of construction. The fine aggregate must be approved for use by the Engineer and shall meet the following gradation limits when tested in accordance with ASTM C136 and ASTM C117:

Aggregate Material Gradation Requirements

Sieve	**Percent Passing**	**Percent Passing**
	"Regular" FrictionSeal	**"Light" FrictionSeal**
No. 6	100	100
No.8	98-100	100
No.14	98-100	98-100
No. 50	0-2	0-8

Typical Fine-aggregate Characteristics

Test	Standard	Range
Magnesium Sulfate Soundness	ASTM C88 - Fine Aggregate	1%-7%
LA Abrasion	ASTM C131- Grading D	1%-8%
Fine Aggregate Angularity	ASTM C1252 - Test Method A	40%- 55%
Moisture Content (%)	ASTM C566	0%-1.0%
Mohs Hardness	Mohs Scale	7.0-9.0
AIMS Texture, Medium to High	**AIMS**	90%-100%

The Contractor shall provide a certification showing analysis and properties of the material delivered for use on the project. The Contractor's certification may be subject to verification by testing the material delivered for use on the project.

Asphalt material. The Contractor shall furnish the Manufacturer's certified test reports for the emulsified asphalt, in its concentrated (neat) form, to the Engineer, showing that the material meets the following properties:

Concentrated (Neat) Asphalt Emulsion Properties

Properties	Specification	Limits
Saybolt Furol Viscosity at 77°F (25°C)	ASTM D244	20 - 100 seconds
Residue by Distillation or Evaporation	ASTM D244	57% minimum
Sieve Test	ASTM D244	0.1% maximum
24-hour Stability	ASTM D244	1% maximum
5-day Settlement Test	ASTM D244	5.0% maximum
Particle Charge [1]	ASTM D244	Positive 5.5 maximum pH

[1] pH may be used in lieu of the particle charge test which is sometimes inconclusive in slow setting, asphalt emulsions.

Polymer-modified Emulsion Residue by Distillation or Evaporation Tests

Properties	Specification	Limits
Solubility in 1, 1, 1 trichloroethylene	ASTM D2042	97.5% minimum
Asphaltenes	ASTM D2007	15% minimum
Saturates	ASTM D2007	15% maximum
Polar Compounds	ASTM D2007	25% minimum
Aromatics	ASTM D2007	15% minimum
Viscosity at 60°C	AASHTO T-315	5000 cts maximum
Softening Point °C	AASHTO T-53	60 minimum
Penetration	AASHTO T-49	15-50
Elastic Recovery 25 °C	AASHTO T-301	25%-75%
Ductility 25 °C	AASHTO T-51	5%-50%

The asphalt material base residue shall contain not less than 20% Gilsonite, or uintaite. The material shall be compatible with asphaltic concrete and have a 3-year minimum proven performance record on pavements. Curing time, under recommended application conditions, shall not exceed four (4) hours.

The Contractor shall furnish vendor's certified test reports showing that the material is the type, grade and quality specified for each load of asphalt material delivered to the project. The certification shall also show the shipment number, refinery, consignee, destination, contract number and date of shipment. The test reports and certification shall be delivered to the Engineer before permission is granted to use the material. The furnishing of the vendor's certified test report for the asphalt material shall not be interpreted as a basis for final acceptance. The manufacturer's material test report certification may be subject to verification by testing the material delivered for use on the project.

The asphalt material storage and handling temperature shall be between 70°F - 160°F and the material shall be protected from freezing, or whenever outside temperature drops below 40°F (4°C) for prolonged time periods.

Polymer. The manufacturer of the asphalt emulsion surface treatment shall certify that the emulsion contains a minimum five (5) percent polymer, by volume of the asphalt emulsion. The manufacturer shall also certify that the polymer possesses the appropriate characteristics to perform well in the surface treatment system. If the polymer shall be added to the emulsion mix at the manufacturer's plant, then the manufacturer's Certificate of Compliance/ Analysis ticket(s) shall be delivered to the Engineer by the Contractor. If the polymer is added to the asphalt distributor truck at the jobsite, the addition shall be done under the observance of a qualified Manufacturer's Representative.

Polymer-modified residue properties after aging:
Residue Properties after PAV aging (ASTM 6521)
PG Grade, Celsius (M320): 82-16 or 76-22
Colloidal Index: minimum 2.5

END OF MATERIAL SPECIFICATION