First Use: March 1, 2016

DEPARTMENT OF TRANSPORTATION

STATE OF GEORGIA

Special Provision

Special Provision 420—Bituminous Scrub Seal

420.1 General Description

This work includes furnishing and applying a bituminous scrub seal and cover aggregate on a clean and prepared road surface. The work shall be done in the following order: Preparing the pavement surface; applying the Polymer Modified Asphalt Emulsion Surface Sealer and scrubbing the applied emulsion sealer with a scrub broom as specified herein; applying cover aggregate, rolling the aggregate, and sweeping up and removing excess aggregate from the roadway.

420.1.01 Definitions

General Provisions 101 through 150.

420.1.02 Related References

A. Standard Specifications

Section 109—Measurement and Payment

Section 424—Bituminous Surface Treatment

Section 824—Cationic Asphalt Emulsion

B. Referenced Documents

General Provisions 101 through 150.

420.1.03 Submittals

Invoices

Furnish formal written invoices from a supplier/manufacturer for all bituminous materials and aggregate used for scrub seal when requested by the Department. Show the following items on the Bill of Lading for bituminous materials:

- Date Manufactured for emulsified asphalt materials.
- Date shipped
- Quantity in gallons

420.2 Materials

A. Bituminous Materials

Ensure bituminous materials used are approved on QPL 7 “Georgia’s List of Approved Bituminous Materials Suppliers” and meet the following Specifications:

Material	Section
Cationic Asphalt Emulsion, Grade CMS-1P	824.2.01

Do not dilute the bituminous scrub seal material.

Note:	**Asphalt emulsion that has been stored longer than 30 days from the time of initial manufacture shall be tested and approved for compliance with specified requirements prior to being used as scrub seal for work performed under Section 420.**

B. Aggregates

Unless otherwise specified in the plans, the size of cover aggregates used in the scrub seal application shall be 89s. Ensure cover aggregate meets the following Specification:

Material	Section
Coarse Aggregate, Class A Crushed Stone, Group II	800.2.01

420.2.01 Delivery, Storage, and Handling

General Provisions 101 through 150.

420.3 Construction Requirements

420.3.01 Personnel

General Provisions 101 through 150.

420.3.02 Equipment

Provide equipment in good repair, including the following units that meet the requirements of Subsection 424.3.02, Equipment."

- Power broom and blower
- Pressure distributor
- Aggregate Spreader
- Pneumatic-Tired Rollers
- Scrub Broom

A. Power Broom and Blower

Use power equipment that complies with Subsection 424.3.02.F, "Power Broom and Power Blower."

B. Pressure Distributor:

Provide a dedicated pressure distributor for bituminous scrub seal material to avoid contamination with incompatible materials.

Maintain all equipment used for the delivery, storage, and handling of cationic emulsified asphalt to prevent contamination of the emulsion. Transfer cationic emulsified asphalt directly to the pressure distributor from the transport tanker.

Provide and maintain temperature measuring devices to continuously monitor the temperature of cationic emulsified asphalt in storage and in the pressure distributor. Do not allow cationic emulsified asphalt to freeze. Do not dilute the emulsified asphalt.

C. Aggregate Spreader:

Use a self-propelled aggregate spreader that can apply aggregate at the desired rate uniformly and accurately without corrugation, overlaps, or excess deficient areas.

Ensure that the spreader can spread courses to the required widths. Provide spreaders to promptly cover the full width of the asphalt application.

D. Rollers:

Use a minimum of two 10-16 ton self-propelled pneumatic-tired rollers on the project unless otherwise requested by the Engineer.

E. Scrub Broom:

A scrub broom as described herein shall be used to scrub the emulsion after emulsion application and before the application of aggregate. The scrub broom frame shall be constructed of metal and equipped with means to be attached to and pulled by the distributor truck. The scrub broom must be equipped with a means of raising and lowering the scrub broom when desired. It shall be towable in the elevated position.

The weight of the broom sled assembly shall be adjustable related to the amount carried by the broom heads themselves such that, regardless of application rate, the broom sled carries an excess of emulsion in front of the broom heads across the width of the area to be treated while containing the emulsion inside of the broom sled frame and not outside of the intended width of the treatment. The main body of the scrub broom shall have a frame size as shown in the drawing below. The nearest and furthest members, paralleling the back of the distributor truck, and diagonal members shall be equipped with street brooms. The leading member and the trailing member shall have broom heads angled at 10 to 15 degrees off the centerline of the supporting member. The diagonal members shall have broom heads attached in line with the centerline of the supporting member. Each individual street broom attached to the scrub broom assembly shall be 3.5 inches wide x 6.5 inches high x 16 inches long and have stiff nylon bristles. Bristle height is to be maintained at a minimum of five inches (5”).

The broom sled shall be equipped with hinged wing assemblies attached to the main body not to exceed 4.5 feet per side, with diagonals and equipped with the identical street brooms as described herein.

The purpose of the maximum rigid frame width and the hinged wing extensions is not only for maximum width of 16 feet but to maintain the scrubbing process evenly as contours and cross-sections change across the existing road surface. A means or method of controlling the broom sled, causing it to track evenly behind the distributor in curves and on cross slopes is required.

Although a broom sled design diagram is included in this document, any alternate broom sled design considered by the Engineer to achieve the purpose of filling the cracks with emulsion is acceptable.

Prior to starting a project, construct a 500’ test strip to evaluate the design of the broom sled, as specified or of alternate design.The broom sled is required to be proven effective as described herein.

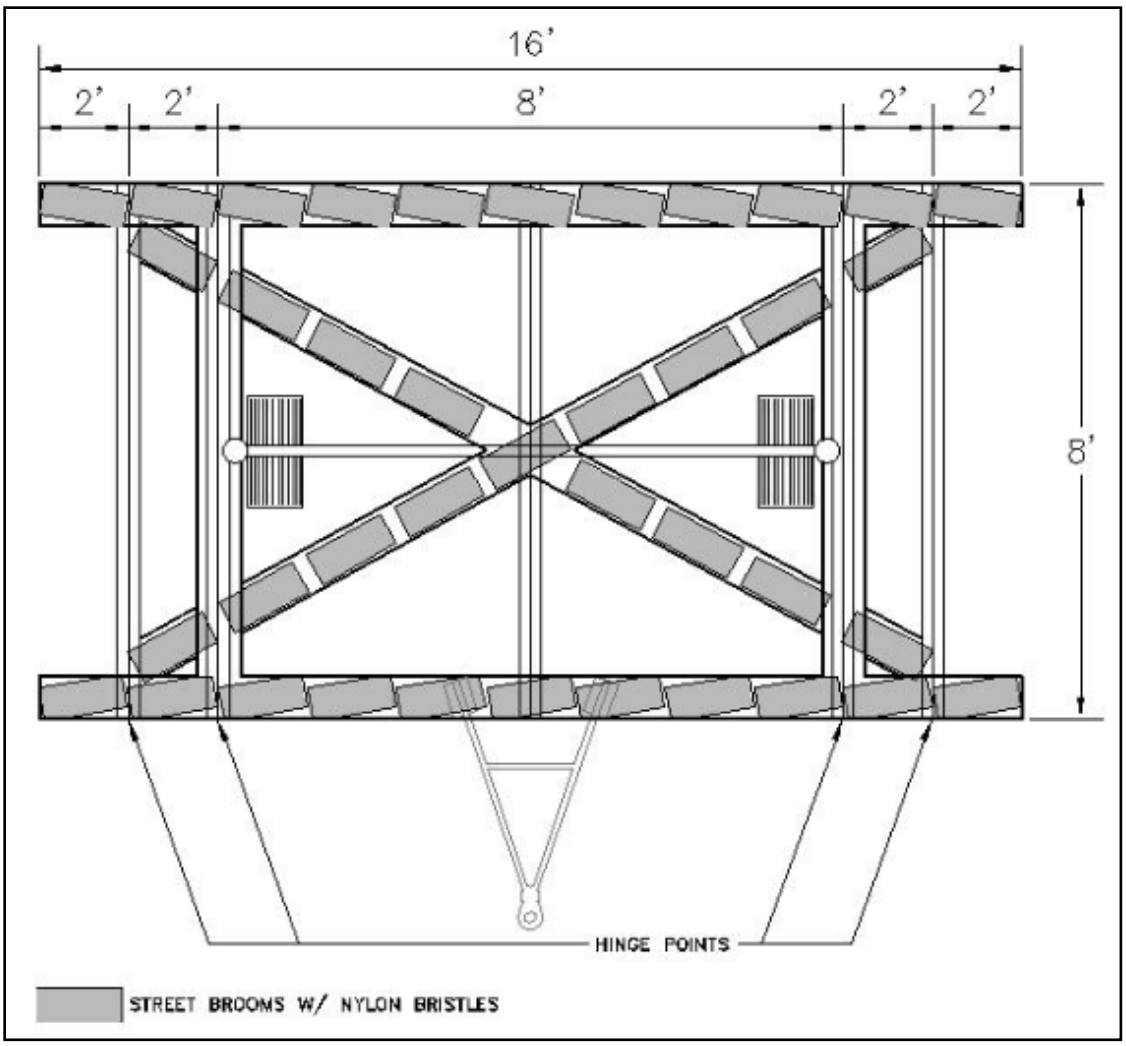

Figure 1a

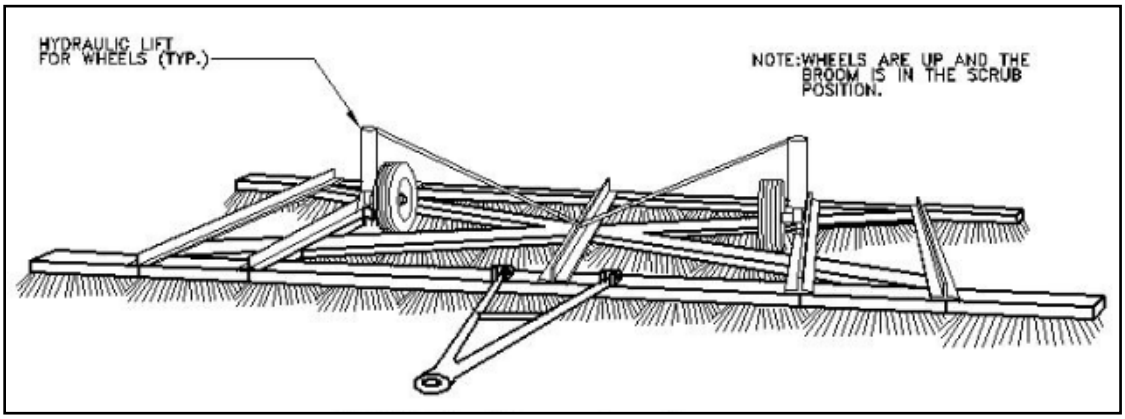

Figure 1b

420.3.03 Preparation

General Provisions 101 through 150.

420.3.04 Fabrication

General Provisions 101 through 150.

420.3.05 Construction

A. Weather Limitation

Perform bituminous scrub seal operations only during daylight hours and not during foggy weather. Do not apply scrub seal if the existing surface is wet or frozen. Do not place bituminous scrub seal if the air temperature is less than 60 °F (16 °C) and rising. Do not apply bituminous scrub seal when rain or other precipitation is forecast within 24 hours after the scrub sealing application.

B. Surface Preparation

Immediately before applying the bituminous scrub seal, use motor grader blades, power brooms, power blowers, hand brooms or other means to clean the entire area free of loose dirt, clay, and other foreign materials as directed by the Engineer.

When necessary to remove excess material from the pavement edge, special care shall be taken to ensure the outer edges are thoroughly cleaned.

C. Application

The type of bituminous scrub seal to be used is based on the existing asphalt pavement aged condition and severity of the cracking that shall be sealed. Generally the following should be used as a guide :

- Type A, used on roadways with minor cracking within existing normally aged asphalt pavement or Surface Treatment
- Type B, used on roadways with moderate cracking within existing normally aged asphalt pavement or Surface Treatment. Also may be used on roadways with minor cracking within existing moderate to severely aged asphalt pavement or Surface Treatment
- Type C, used on roadways with severe cracking within existing normally to severely aged asphalt pavement or Surface Treatment

If lightweight aggregate is used for the cover aggregate, Type C Scrub Seal should be used.

D. Definition of Cracking

- Minor, up to 1/16 inch in width for longitudinal, fatigue, transverse, reflective and block cracking
- Moderate, 1/16 to 1/8 inch in width for longitudinal, fatigue, transverse, reflective and block cracking
- Severe, 1/8 to 1/4 inch in width for longitudinal, fatigue, transverse, reflective and block cracking

1. Bituminous Scrub Seal

Apply Bituminous Scrub Seal according to the rates shown in Table 2 for the type Specified in the Plans. The exact rate of application will be determined by the Engineer.

Table 2 - Application Rates for Cationic Emulsified Asphalt Scrub Seal

Bituminous Material	Type A As defined in 420.3.05.C gal/yd^2 (L/m^2)		Type B As defined in 420.3.05.C gal/yd^2 (L/m^2)		Type C As defined in 420.3.05.C gal/yd2 (L/m^2)	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
CMS-1P	0.20 (0.91)	0.26 (1.18)	0.25 (1.13)	0.32 (1.45)	0.28 (1.27)	0.38 (1.72)

The bituminous scrub seal shall be applied by means of a pressure distributor in conjunction with a scrub broom as described herin. Application shall be a uniform, continuous, full coverage spread, and under such pressure as to thoroughly coat the surface at the specified rate. All nozzles

within the intended width of spray shall be free of clogs and operating properly applying a full fan of asphalt emulsion to the pavement. At any time the nozzles are not functioning properly application is to be stopped immediately and repairs made to the equipment.

The width of the bituminous scrub seal application shall be no greater than the width of the aggregate spreader except where additional passes are required. At no time shall the emulsion be allowed to break, chill, set up, harden, or otherwise impair the aggregate retention before the aggregate has been properly applied and rolled.

Coat the entire areas with the approved bituminous scrub seal material unless directed otherwise by the Engineer. Apply bituminous scrub seal with distributor spray bars instead of hand hoses, except in small areas inaccessible to spray bars prior to placement of permanent pavement markings. Apply the bituminous scrub seal to minimize the amount of overspray.

The Engineer may direct additional or corrective scrub seal application for areas where the proper application was not applied or original application was damaged due to weather events.

2. Cover Aggregate

Apply cover agregate according to the rates shown in Table 3 for the type Specified in the Plans. The exact rate of application will be determined by the Engineer.

Table 3 - Application Rates for Cover Aggregate for Scrub Seal

Type A As defined in 420.3.05.C ft^3/yd^2 (m^3/m^2)	Type B As defined in 420.3.05.C ft^3/yd^2 (m^3/m^2)	Type C As defined in 420.3.05.C ft^3/yd^2 (m^3/m^2)
.21 – .28 (0.007 – 0.009)	.26 – .31 (0.009 – 0.010)	.29 – .36 (0.010 – 0.012)

The cover aggregate shall be spread evenly onto the asphalt emulsion, as soon as possible and within 3 minutes after the bituminous scrub seal is applied.

Spreading shall be accomplished in such a manner that the tires of the trucks and aggregate spreader do not contact the newly applied bituminous scrub seal. The width of the aggregate spread shall be equal to the width of the emulsion spread, except where additional passes are required. Areas, which are deficient in aggregate, shall be covered immediately with additional material.

Use a revolving broom as necessary, supplemented by hand brooming, to remove or redistribute excess aggregate.

Begin rolling immediately after applying the cover aggregate. Use a minimum of 2 rollers to cover the entire mat width in 1 pass. Make a minimum of 3 passes. If rollers are unable to keep up with the aggregate spreader, stop application until rollers have caught up, or furnish additional rollers. Keep roller tires asphalt-free.

Sweep the completed surface within the first three hours of the next work day following placement. Take care not to unseat bonded aggregate when sweeping.

D. Temperature of Material

Apply bituminous materials within the temperature ranges specified below.

Table 4 – Bituminous Materials and Application Temperatures

Bituminous Materials	Temperature of Application °F (°C)
Cationic Emulsified Asphalt CMS-1P	140 - 180 (60 - 80)

E. Limitations and Areas Coated

Apply only enough scrub seal material to the prepared road surface where proper traffic markings can be applied prior to re-opening the roadway up to traffic.

F. Maintenance and Protection

After applying the scrub seal material and cover aggregate, allow it to break and cure prior to placing traffic on the scrub sealed pavement as directed by the Engineer.

420.3.06 Quality Acceptance

A. Acceptance Plans for Bituminous Materials Distributor Samples

Bituminous materials distributor samples, used for scrub seal, shall be randomly sampled and tested for acceptance.

1. Bituminous Materials Distributor Sample

The Department shall obtain a minimum of one bituminous materials distributor sample per week, per distributor. The Department will monitor the handling and quality control of the bituminous materials used by the Contractor for scrub seal. Failure to comply with specified Quality Assurance Testing requirements may subject the bituminous scrub seal supplier to removal from QPL 7.

420.3.07 Contractor Warranty and Maintenance

General Provisions 101 through 150.

420.4 Measurement

Bituminous materials for scrub seal applied and accepted are measured as outlined in Subsection 109.02, "Measurement of Bituminous Materials."

Diluting bituminous scrub seal in the distributor is not allowed.

420.4.01 Limits

General Provisions 101 through 150.

420.5 Payment

The accepted volume of bituminous material will be paid for at the Contract Unit Price per gallon (liter) for bituminous scrub seal of the type shown on the Plans, complete in place. Payment is full compensation for preparing, cleaning, furnishing, hauling, applying bituminous scrub seal material including cover aggregate, and providing incidentals to complete the work.

Cleaning and sealing joints and cracks shall be paid for separately under the appropriate Pay Item.

Payment will be made under:

Item No. 420	Bituminous Scrub Seal Type A	Per gallon (liter)
Item No. 420	Bituminous Scrub Seal Type B	Per gallon (liter)
Item No. 420	Bituminous Scrub Seal Type C	Per gallon (liter)