Section 424—Bituminous Surface Treatment

424.1 General Description

This work includes placing one or more applications of bituminous material and aggregate on a previously prepared base or pavement.

424.1.01 Definitions

- **Single Surface Treatment:** One application of bituminous material that is covered with aggregate.
- **Double Surface Treatment:** A bituminous material application that is covered with aggregate of the size specified in the proposal followed by a second bituminous material application that is covered with a second specified size aggregate.
- **Triple Surface Treatment:** A bituminous material application that is covered with a specified size aggregate followed by subsequent applications of bituminous material that are covered with successively smaller size nominal aggregates.

424.1.02 Related References

A. Standard Specifications

Section 105—Control of Work

Section 800—Coarse Aggregate

Section 820—Asphalt Cement

Section 824—Cationic Asphalt Emulsion

B. Referenced Documents

QPL 65

424.1.03 Submittals

General Provisions 101 through 150.

424.2 Materials

A. Bituminous Material

Select the bituminous material from any type and grade listed in the materials table below. Notify the Engineer at least 10 days before ordering the bituminous material. The Engineer must approve the bituminous material choice.

For a list of latex sources, see QPL 65.

Ensure that materials meet the requirements of the following Specifications:

Material	Section
Asphalt Cement, Performance Grade PG 58-22 or PG 64-22*	820.2.01
Cationic Asphalt Emulsion, Grade CRS-2h or CRS-3*	824.2.01
Coarse Aggregate, Class A Crushed Stone or Crushed Slag, Group I or II	800.2.01
* Use PG 64-22 or CRS-3 only at the Engineer's direction. (See Subsection 424.3.05.B.)	

B. Aggregates

The size and group of aggregates used in the surface treatment are specified in the Proposal under the appropriate Line Item.

Do not use unconsolidated limerock unless provided for in the Plans or Proposal.

Use Class B aggregates only where the surface treatment is used for shoulder construction or where it is to be overlaid with asphaltic concrete.

424.2.01 Delivery, Storage, and Handling

General Provisions 101 through 150.

424.3 Construction Requirements

424.3.01 Personnel

General Provisions 101 through 150.

424.3.02 Equipment

Have the Engineer approve equipment types and quantities before using equipment on the Project.

Ensure that the equipment used to construct the surface treatment:

- Produces work that complies with the standards in this section
- Is on the Project and in proper working order before construction begins

A. Aggregate Spreader

The Department will inspect annually the aggregate spreader before it is used in the work. If the spreader is approved, the Department will attach an equipment certification sticker to the 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.

B. Pressure Distributor

The Department will inspect annually the pressure distributor before it is used in the work. If the distributor is approved, the Department will attach an equipment certification sticker to the distributor. The pressure distributor should be equipped as follows:

1. Mount the pressure distributor on pneumatic tires wide enough to prevent damage to the road surface.
2. Design, equip, maintain, and operate the distributor so that the bituminous material will be heated and applied evenly throughout the length of the spray bars. Ensure that it maintains a constant, uniform pressure on the nozzles.
3. Install screens between the tank and the nozzles and clean them frequently to prevent clogging.
4. Use an adjustable distributor that can deliver controlled amounts of bituminous material from 0.04 to 1.0 gal/yd², ± 0.02 gal/yd² (0.18 to 4.53 L/m², ± 0.10 L/m²) up to 24 ft (7.2 m) wide without atomization, streaking, or pulsation in the flow.
5. Use a distributor equipped with the following:
    - A tachometer and thermometers to indicate the application rate and the temperature of the tank contents
    - Measuring devices to accurately indicate the amount of bituminous material, in gallons (liters), in the distributor before and after each application
    - Full circulating spray bars that can be adjusted laterally to conform to a stringline and capable of vertical and horizontal adjustment.
    - A positive shut-off control to prevent dripping bituminous material on the roadway

- A distributor tank equipped with a sample valve in a safe and convenient location to obtain bituminous material samples

C. Heating Equipment

Ensure that heating equipment will heat and maintain the bituminous material uniformly at the temperature required. Provide an accurate thermometer.

D. Smooth-Wheeled Rollers

Use self-propelled, tandem-type smooth-wheeled rollers that can be alternated with pneumatic-tired wheels. The rollers shall weigh from 3 to 8 tons (3 to 7 Mg). Ensure that the roller weights within these limits can properly compact the materials.

E. Pneumatic-Tired Rollers

Use self-propelled pneumatic-tired rollers with treads that will not disturb the aggregates. Rollers with pneumatic-tired wheels that can be alternated with a steel drum are also permitted.

F. Power Broom and Power Blower

Provide at least one power broom and one power blower, or a combination power broom and blower, that can remove dust or loose materials from the road surface.

424.3.03 Preparation

Firmly compact, finish, and prime new bases. Ensure that the bases conform to the lines, grades, and cross sections within the tolerances specified.

A. Removing Foreign Material

Use power brooms, power blowers, hand brooms, or other means to remove loose material, dust, dirt, clay, and other materials that prevent bituminous materials from adhering to the base.

Take special care to clean the outer edges thoroughly. Where necessary, use a motor grader blade to remove excess material off the paving edge.

B. Condition of Prime

Check the condition of prime as follows:

1. Ensure the prime is cured before placing the mat course.
2. Repair the prime if it is loose, soft, unbonded, removed, or damaged.
3. Remove concentrations of excess prime.
4. Perform additional rolling with a pneumatic-tired roller before surface treatment when directed by the Engineer.

424.3.04 Fabrication

General Provisions 101 through 150.

424.3.05 Construction

A. Observing Seasonal and Weather Limitations

Apply bituminous surface treatment and corresponding bituminous materials only between the dates given in Table 1, below. The dates are given by zones shown on the Georgia Geographic Map, below

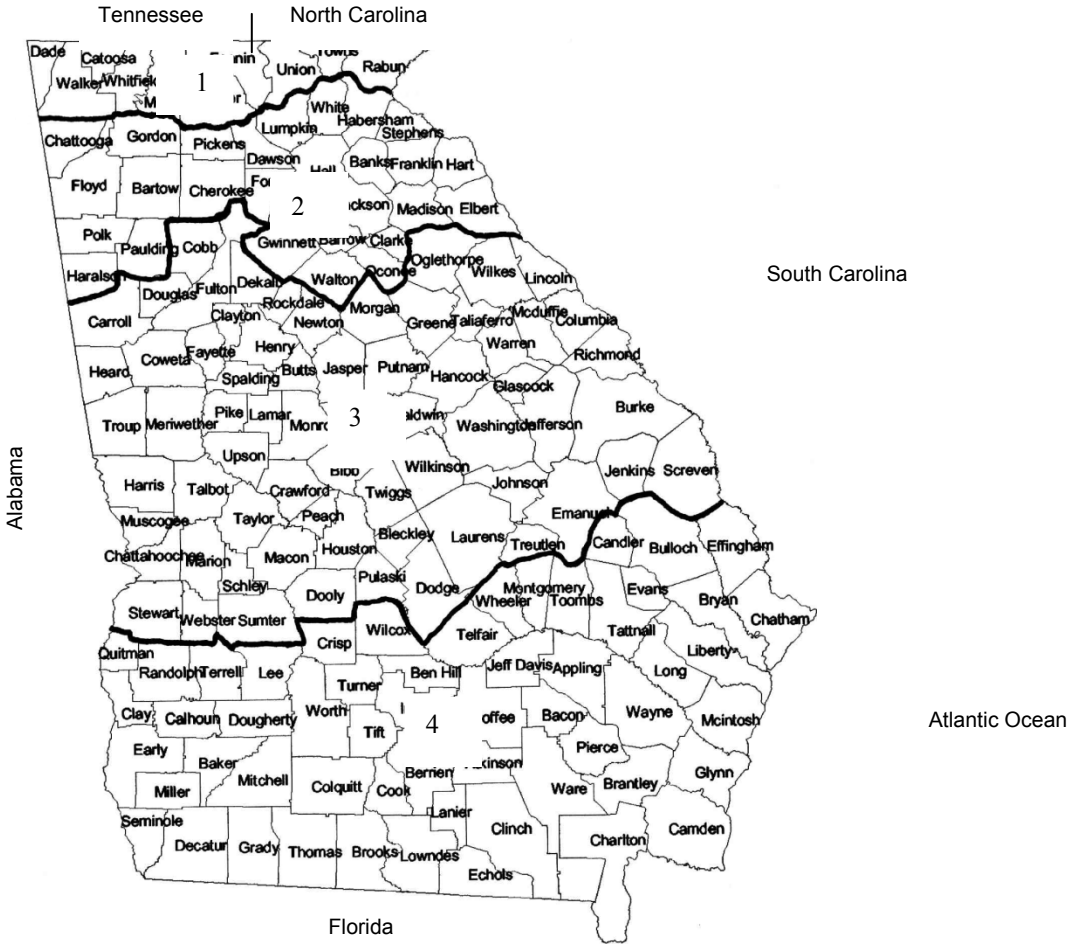
No exceptions are permitted except as authorized by the Engineer.

Table 1—Surface Treatment Seasonal Restrictions

Zone	Asphalt Cement	Emulsified Asphalt
1	May 1–September 15	April 10–September 15
2	April 15–October 5	April 1–October 5
3	April 10–October 20	March 25–October 20
4	April 1–November 1	March 15–November 1

Do not apply asphalt cement to a wet surface or when the temperature is below 65 ºF (18 ºC). Never apply emulsions if the temperature is below 55 ºF (13 ºC).

NOTE: If hot mix asphaltic concrete will be applied over the surface treatment, the Engineer may waive the seasonal and temperature limitations providing that traffic is not permitted on the surface treatment until it is covered with hot mix asphaltic concrete.



Georgia Department of Transportation Geographical Map
For Surface Treatment and Slurry Seal

B. Using PG 64-22 or CRS-3

Only use PG 64-22 or CRS-3 when directed by the Engineer due to a problem with excessive aggregate pickup during high ambient temperature.

C. Observing Sequence of Operations and Quantities of Materials

The sequence of operations and quantities of materials are shown in Table 2 (Table 2—metric).

The Engineer will determine the material quantities to be used during construction and may change the minimum or maximum application rate of any course during construction if the total quantities are within the amounts shown in Table 2 (Table 2—metric). Any deviation, or minus from the table quantities, will require a negotiated adjustment of the Contract price, which will be authorized by an approved Supplemental Agreement.

D. Heating Bituminous Material

Evenly heat the entire mass of bituminous material for each application under positive control. While the material is being applied, maintain it within the specified temperature range.

Section 424—Bituminous Surface Treatment – Table 2

Application	Type Construction									
	Single				Double			Triple		
1st appl.		#89	#7	#6		#7	#6		#6	#5
2nd appl.						#89	#7		#7	#7
Stone Sizes 3rd appl.									# 89	# 89
	Control Tolerance				Control Tolerance			Control Tolerance		
1st Application Bituminous Materials (gal/yd²) PG 58-22 or PG 64-22	± .02	.17–.19	.18–.25	.22–.30	± .02	.20–.27	.26–.34	± .02	.20–.30	.24–.34
CRS-2h, CRS-3	± .02	.20–.22	.21–.29	.25–.35	± .02	.23–.32	.30–.40	± .02	.23–.35	.28–.40
1st Application Stone (ft³/yd²)	± .03	.14–.18	.18–.26	.30–.42	± .03	.18–.26	.30–.42	± .03	.30–.42	.41–.53
2nd Application Bituminous Materials (gal/yd²) PG 58-22 or PG 64-22					± .02	.18–.24	.24–.31	± .02	.20–.27	.20–.27
CRS-2h, CRS-3					± .02	.21–.28	.28–.36	± .02	.23–.32	.23–.32
2nd Application Stone (ft³/yd²)					± .03	.14–.18	.18–.26	± .03	.18–.26	.18–.26
3rd Application Bituminous Materials (gal/yd²) PG 58-22 or PG 64-22								± .02	.18–.24	.18–.24
CRS-2h, CRS-3								± .02	.21–.28	.21–.28
3rd Application Stone (ft³/yd²)								± .03	.14–.18	.14–.18
Total Bituminous Materials (gal/yd²) PG 58-22 or PG 64-22	± .02	.17–.19	.18–.25	.22–.30	± .03	.38–.51	.50–.65	± .04	.58–.81	.62–.85

Application	Type Construction									
	Single				Double			Triple		
CRS-2h, CRS-3	± .02	.20–.22	.21–.29	.25–.35	± .03	.44–.60	.58–.76	± .04	.67–.95	.72–1.0
Total Stone (ft³/yd²)	± .03	.14–.18	.18–.26	.30–.42	± .04	.32–.44	.48–.68	± .05	.62–.86	.73–.97

Notes:

- The bituminous material and stone for each application may be varied by the Engineer, at no increase in cost, outside of the minimum or maximum shown in the table provided the total of the materials is within the limits of the total minimum and total maximum of all courses.
- Maintain the control tolerances shown above or stop the work until the necessary corrections are made.
- Apply at least one seal coat to the mat course on the same day when multiple applications are specified.

Section 424—Bituminous Surface Treatment – Table 2 (Metric)

Application	Type Construction									
	Single				Double			Triple		
1st appl.		#89	#7	#6		#7	#6		#6	#5
2nd appl.						#89	#7		#7	#7
Stone sizes										
3rd appl.									#89	#89
	Control Tolerance				Control Tolerance			Control Tolerance		
1st Application Bituminous Materials (L/m²) PG 58-22 or PG 64-22	± .09	.77–.86	.82–1.13	1.00–1.36	± .09	.91–1.22	1.18–1.54	± .09	.91–1.36	1.09–1.54
CRS–2h, CRS–3	± .09	.91–1.00	.95–1.31	1.13–1.58	± .09	1.04–1.45	1.36–1.81	± .09	1.04–1.58	1.27–1.81
1st Application Stone (m³/m²)	± .001	.005–.0060	.0060–.009	.01–.014	± .001	.006–.009	.01–.015	± .001	.01–.014	.14–.018
2nd Application Bituminous Materials					± .09	.82–1.09	1.09–1.40	± .09	.91–1.22	.91–1.22

Application	Type Construction									
	Single				Double			Triple		
(L/m²) PG 58-22 or PG 64-22										
CRS–2h, CRS–3					± .09	.95–1.26	1.27–1.63	± .09	1.04–1.45	1.04–1.45
2nd Application Stone (m³/m²)					± .001	.005–.006	.006–.009	± .001	.006–.009	.006–.009
3rd Application Bituminous Materials (L/m²) PG 58-22 or PG 64-22								± .09	.82–1.09	.82–1.09
CRS–2h, CRS–3								± .09	.95–1.27	.95–1.27
3rd Application Stone (m³/m²)								± .001	.005–.006	.005–.006
Total Bituminous Materials (L/m²) PG 58-22 or PG 64-22	± .09	.77–.86	.82–1.13	1.00–1.36	± .14	1.72–2.31	2.26–2.94	± .18	2.63–3.67	2.81–4.53
CRS–2h, CRS–3	± .09	.91–1.00	.95–1.31	1.13–1.58	± .14	1.99–2.72	2.63–3.44	± .18	3.04–4.30	3.26–4.53
Total Stone (m³/m²)	± .001	.005–.006	.006–.009	.01–.014	± .0013	.011–.015	.016–.024	± .0016	.021–.029	.025–.033

Notes:

- The bituminous material and stone for each application may be varied by the Engineer, at no increase in cost, outside of the minimum or maximum shown in the. Table provided the total of the materials is within the limits of the total minimum and total maximum of all courses.
- Maintain the control tolerances shown above or stop the Work until the necessary corrections are made
- Apply at least one seal course to the mat course on the same day when multiple applications are specified.

E. Applying Bituminous Material

The following are temperatures at which bituminous material shall be applied.

Bituminous Material	Asphalt Cement	CRS-2h	CRS-3
Application temperature °F (°C)	275–350 (135– 175)	140– 180 (60– 80)	140– 180 (60– 80)

NOTE 1: Do not store emulsified asphalts at temperatures exceeding 150 °F (65 °C) for any extended time.

NOTE 2: Do not place bituminous surface treatment on fresh asphaltic concrete, except for paved shoulders, until the asphaltic concrete has been in place at least 30 days.

The Engineer will designate the maximum area to which bituminous material may be applied at one time. Apply the material as follows:

1. After applying the bituminous material to the section, immediately cover it with the correct application rate of aggregate before beginning the next section.

   Do not apply the bituminous material to the full width of the pavement unless the aggregate spreader can immediately cover the full width of the applied material.

   NOTE: Never allow bituminous material to chill, set up, dry, or reach a condition that impairs the retention of cover aggregate before the aggregate is applied.

2. When a longitudinal joint is necessary:
   - Do not overlap the applications more than 4 in (100 mm).
   - Do not leave any area uncovered.
   - Never allow excess quantities of bituminous materials to build up.
3. On curves that require widening:
   a. Shoot the extra width on the outside first.
   b. Shoot the normal width with the distributor and follow the inside paving edge.
4. Ensure that the spray of bituminous material is uniform at all times. If the spray is not uniform:
   a. Stop the work.
   b. Change equipment, personnel, or methods to attain the required uniformity.
   c. Apply bituminous material at one-half the width of the roadway, if necessary.
5. If streaking develops:
   a. Stop the distributor and correct the problem before proceeding.
   b. Use a hand hose or a hand pouring pot to cover the streaked areas at approximately the same application rate of bituminous material.
6. If a part of the work cannot be reached by the distributor, treat it by hand hoses with nozzles.
7. Protect curbs, gutters, handrails, and other structures from discoloration by the bituminous material. Remove bituminous material that is sprayed or spilled on these structures.
8. Ensure that the bituminous material joins neatly in place by beginning and ending the asphalt application from a heavy paper or tight trough that is longer than the width of the treatment being applied. Place it to catch and hold the surplus material.
9. When cleaning and emptying the distributor, empty it where the bituminous material can be covered with dirt and completely disposed of without damaging the Rights-of-Way.

F. Spreading Aggregates

Spread the aggregates as follows:

1. Ensure that aggregates do not contain free moisture when spread.
2. Apply aggregate immediately after applying bituminous materials.
3. Uniformly spread the aggregate at the specified rate without corrugations, overlaps, excess, or deficient areas.
4. Move the spreader at a uniform speed, regardless of the grade.
5. Ensure that the distance that the aggregate free falls remains constant during spreading.
6. Remove corrugations. Operate the spreader to prevent overlap of aggregates. If overlap occurs, remove the excess aggregate before rolling.
7. Ensure a uniform aggregate spread by hand spotting and brooming as necessary.

G. Rolling

Select a rolling pattern and speed that will thoroughly key the aggregate into the bituminous material. The Engineer must approve the pattern and speed.

If a steel wheel roller will fracture the aggregate, use pneumatic-tired rollers only.

H. Brooming

Use a revolving broom as necessary, supplemented by hand brooming, to remove or redistribute excess stone. Take care not to unseat bonded stone when brooming.

I. Controlling Traffic

Do not allow traffic on an individual course until the bituminous material has cooled or set enough to ensure that the aggregates will not be loosened, dislodged, or whipped off by slow-moving traffic.

When traffic is permitted back on the course, the Engineer will determine the speeds and specify the control devices to limit the speed. Continue this control until the Engineer permits the road to be opened for general traffic.

424.3.06 Quality Acceptance

General Provisions 101 through 150.

424.3.07 Contractor Warranty and Maintenance

Maintain and protect the surface course as specified in Section 105 until the Project has been accepted. Make repairs as the Engineer directs. The cost of maintenance, protection, and repair is included in the Unit Prices Bid for the Item for which they apply.

424.4 Measurement

The area to be measured is the number of square yards (meters) of each type surface treatment completed and accepted.

424.4.01 Limits

The length is measured along the surface. The width is specified on the Plans, plus or minus any authorized changes. Irregular areas are measured by the surface square yard (meter) within the lines shown on the Plans or authorized changes.

424.5 Payment

The accepted area of surface treatment will be paid for at the Contract Unit Price per square yard (meter) complete for each type and stone size specified.

Payment will be made under:

Item No. 424	Single surface treatment stone size__group__	Per square yard (meter)

Item No. 424	Double surface treatment stone size__and __ group__	Per square yard (meter)
Item No. 424	Triple surface treatment stone sizes __, __ and __, group__	Per square yard (meter)

424.5.01 Adjustments

If a supplemental agreement is approved, payments will be adjusted as per the Contract Unit Price.