CITY OF ALBANY

Standard Specifications
Technical Provisions

Section 10

Asphaltic Seal Coats

10-1 General

10-1.1 General — The Contractor shall arrange for and coordinate the notification of the neighborhoods and individuals as necessary to accomplish the removal and general clearing of parked vehicles from the area of work to the extent he shall require to execute his work in a reasonable and efficient manner. The Contractor shall notify residents in advance of all paving operations or other operations that would restrict parking. This will include, but not be limited to, placing a notification at each residence or business, and on each parked car not less than thirty-six (36) hours prior to paving operations. Notification shall be reviewed and approved by the Engineer prior to issuance.

Prior to beginning operations, the Contractor shall submit a plan for maintaining traffic movements during all of his operations. Said traffic plan shall be approved by the Engineer prior to commencement of any work.

The Contractor shall execute his work in a safe, orderly and expeditious manner and shall specifically exercise due care and consideration to minimize inconvenience to residents and businesses of the project areas relative to parking of vehicles, access to properties and the movement of vehicles and persons through the work areas. To that end, general clean-up and debris removal shall be scheduled to precede surface preparation and paving work by the least feasible period of time.

10-1.2 Weather Limitations — The asphaltic seal shall be applied only when the existing surface is clean and free of visible moisture. The slurry seal shall be applied only when the pavement is above 50 degrees F and the atmospheric temperature is at least 60 degrees F and rising. The slurry seal may be applied at a lower atmospheric temperature (minimum 50 degrees F) upon the approval of the Engineer. The slurry seal shall not be applied if rainfall is forecast for the next four (4) hours or if air temperatures below 35 degrees F are predicted for the next 24 hours.

10-1.3 Trial Applications — Prior to the start of work, the Contractor shall place a test strip of at least 60 square yards in an area designated by the Engineer. The test section shall be placed using the same equipment and methods as will be used on the job. The Contractor shall also furnish the Engineer with a calibration sheet for each mixing machine used to lay the test strip. Slurry mixture placed in the test strip shall conform to the job mix. Work shall not commence without the Engineer's approval of the test strip.

10-1.4 Pre-Inspection — The seal coat shall not be applied until an inspection of the surface has been made by the Engineer, and the Engineer has determined the surface is suitable for seal coat application.

10-1.5 Pavement Markers — Immediately prior to applying the slurry seal, all pavement markers shall be masked, and all utility covers shall be protected with butcher paper and a thin layer of 30-mesh sand or by means approved by the Engineer. Upon completion of the slurry seal application, pavement marker masking shall be removed and the markers shall be cleaned, as needed and by means approved by the Engineer, to ensure proper reflectivity.

10-1.6 Surface Preparation — Preparatory repair work shall be completed prior to application of the asphalt-rubber. Repairs shall be performed when the weather will not damage the quality of the finished product. Asphaltic concrete patches shall be allowed to set a minimum of twenty-four (24) hours before asphalt-rubber is applied.

Vegetation between the edge of pavement and gutter lip shall be treated with an approved weed killer and removed.

The surface shall be cleaned by sweeping, flushing or other means necessary to remove all loose particles of paving, all dirt, and all other extraneous material. Pavements impregnated with grease, oil, or fuel shall be thoroughly scrubbed with water and an approved detergent and then flushed and swept clean.

For the cape seal, all pavement markers shall be masked prior to applying the asphalt-rubber. In contrast, all markers shall be removed, by means approved by the Engineer, prior to applying the first asphalt-rubber lift of the double cape seal. For both the cape and double cape seals, all utility covers shall be protected by means approved by the Engineer.

No segregation of the emulsion and aggregate will be permitted.

No streaks such as caused by oversized aggregate shall be left in the finished surface. No excessive build-up nor unsightly appearance shall be permitted on longitudinal or transverse joints.

Evidence of solidification of the asphalt, balling or lumping of the aggregates, or the presence of uncrated aggregates shall be cause for rejection of the slurry.

The slurry shall be applied in such a manner that no ridges will remain.

The Contractor shall exercise care to prevent slurry from being deposited on other than asphaltic concrete surfaces. Slurry on surfaces not designated to be sealed shall be removed at the Contractor's expense. The method of slurry removal shall be approved by the Engineer.

At the direction of the Engineer and at the Contractor's expense, the Contractor shall repair and reseal all areas which have not been properly or completely sealed.

Hand squeegees shall be used to spread slurry in areas inaccessible to the slurry mixer. Care should be exercised to leave no unsightly appearance from hand work. Burlap drags, suitable to even the surface and leave a rough texture of slurry application, shall be used if the spreader box is equipped with a burlap drag.

Where the completed slurry is not uniform in color, the areas affected shall be treated to eliminate the color variation at the Contractor's expense.

10-1.7 Post Sweeping — All pavements shall be vacuum swept before striping, or two (2) weeks after slurry placement, whichever is sooner.

10-1.4 Pre-Inspection — The seal coat shall not be applied until an inspection of the surface has been made by the Engineer, and the Engineer has determined the surface is suitable for seal coat application.

10-2 Slurry Seal

10-2.1 General — Slurry seal shall be Type II conforming to Section 37-2, "Slurry Seal," of the State Specifications, and as modified herein.

An emulsified asphalt slurry seal surface shall be applied at all locations designated on the Plans.

All incidental work such as surfacing returns, shall be done concurrently with surfacing of the street proper, and shall not be postponed for completion at a later date. All covers for utility structures and monuments shall be adequately protected before the slurry seal is applied.

The slurry seal surface shall consist of a mixture of emulsified asphalt, mineral

aggregate and water, properly proportioned, mixed and spread evenly on the surface as specified herein and as directed by the Engineer. The cured slurry shall have a homogenous appearance, fill all cracks, adhere firmly to the surface and have skid resistant texture.

10-2.2 Materials

10-2.2.1 General — Emulsion-aggregate slurry shall be a stable mixture of emulsified asphalt, mineral aggregate and water. It is intended for surface sealing of bituminous pavements.

The average applied aggregate weight per square yard based on materials applied and area covered per day shall conform to the following requirements. Additionally, the Asphalt Emulsion content and the Residual Asphalt content shall conform to the limits listed below:

	TYPE II
Asphalt Emulsion Content Percentage of Aggregate by Dry Weight	11-25
Residual Asphalt Content Percentage of Aggregate by Weight	7.5-13.5
Pounds of Aggregate per Square Yard	10-15

The slurry mixture shall be composed of asphalt emulsion, aggregate, mineral filler, and water. The amount of emulsified asphalt shall be determined by the wet track abrasion test results and by trial laboratory mixes in accordance with ASTM D3910. The aggregate fractions and mineral filler shall be sized, uniformly graded and combined in such proportions that the resulting mixture meets the grading requirements of the JMF. The combined aggregate and filler shall be graded smoothly and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve. The slurry seal mixture shall have the following additional characteristics:

10-2.2.2 Consistency — The slurry seal mixture shall contain the minimum amount of water necessary to obtain a consistency of 3-5 cm in accordance with ASTM D3910. For placing slurry on grade of 8 percent or more, adjustments shall be made to the consistency of the mixture as directed by the Engineer.

10-2.2.3 Non-Segregation — The mixture shall not segregate during or

after application to the pavement.

10-2.2.4 Water — Water shall be clear, potable, and compatible with the slurry mixture, and shall be of such quality that the asphalt will not separate from the emulsion before the slurry seal is in place.

10-2.2.5 Asphalt Emulsion — The emulsified asphalt shall conform to the requirement of Section 94 of the State Specifications using CRSI Cationic Asphaltic Emulsion.

10-2.2.6 Aggregate — The mineral aggregate shall consist of natural or manufactured sand, crushed rock or gravel, and approved fines. Smooth-textured sand of less than 1.25 percent water absorption shall not exceed 50 percent of the total combined aggregated. The aggregate shall be clean and free from dirt, vegetable matter and other deleterious substances.

Mineral fillers such as portland cement, limestone dust, and aluminum sulphate fly ash shall be considered s part of the blended aggregate and shall be used in minimum required amounts. Mineral fillers shall only be used if needed to improve the workability of the mix of gradation of the aggregate.

10-2.2.7 Gradation of Aggregate — The combined mineral aggregated shall conform to the following gradation.

Sieve Size	TYPE II Percent Passing
3/8	100
No. 4	90-100
No. 8	65-90
No. 16	45-70
No. 30	30-50
No. 50	18-36
No. 100	10-24
No. 200	5-15

All equipment, tools and machines sued in the performance of this work shall be maintained in satisfactory working order at all times.

10-2.2.8 Accelerator or Retardant — The retardant shall be of the type stated in the JMF and approved by the Engineer. The amount of accelerator to be included in the mixture shall be that amount necessary to ensure the applied slurry can support vehicular traffic within four (4)

hours after the last application.

10-2.3 Equipment

10-2.3.1 General — Only equipment conforming to these specifications shall be used in performance of the work and all such equipment shall be maintained in safe and satisfactory working condition at all times.

10-2.3.2 Mixer — The slurry machine shall be capable of rapid discharge of the mixed materials into a spreader. The self-contained slurry unit shall be mounted on a truck or other vehicle capable of producing evenly controlled low rates of speed throughout the operation so that the slurry is spread evenly.

The slurry mixing machine shall be a continuous flow mixing unit, capable of accurately delivering a predetermined proportion of aggregate, water, emulsified asphalt, and accelerator and retardant to the mixing chamber. The mix chamber shall discharge the thoroughly mixed product on a continuous basis.

The aggregate shall be pre-wetted immediately prior to mixing the emulsified asphalt.

The mixing unit of the mixing chamber shall be capable of thoroughly blending all ingredients together.

The mixing machine shall be equipped with an approved fines feeder that provides a method to accurately introduce a predetermined proportion of mineral filler at the same time and location that the aggregate is fed into the mixer. The fines feeder shall be used whenever added mineral filler is a part o the aggregate blend or a dry chemical additive is used.

The mixing machine shall be equipped with a water pressure system and fog type spray bar adequate for complete fogging of the surface ahead of the spreading equipment with an application up to 0.05 gallons per square yard.

Sufficient machine storage capacity to properly mix and apply a minimum of 5 tons of the slurry shall be provided.

Proportioning devices shall be calibrated prior to placing the seal coat. The Contractor shall furnish the Engineer with a calibration sheet for each mixing machine prior to use on the job.

10-2.3.3 Slurry Spreading Equipment — Attached to the mixer machine

shall be a mechanical type squeegee distributor, having suitable controls to allow adjustment for variations in pavement grades and slope, equipped with flexible material in contact with the surface to prevent loss of slurry from the distributor which may result from varying grade or crowns.

A lateral control device and a flexible strikeoff shall be provided.

The spreader box shall have an adjustable width. The box shall be kept clean, and build-up of asphalt and aggregate on the box will not be permitted.

10-2.3.4 Cleaning Equipment — Power brooms, power blowers, air compressors, water flushing equipment, and hand brooms shall be suitable for cleaning the surface and cracks of the old pavement.

10-2.3.5 Hand Tools — Hand squeegees, shovels, hand burlap drags, and other equipment shall be available for those areas inaccessible to the spreader box.

10-3 Application of the Slurry

10-3.1 General — The amount of asphalt emulsion, aggregate, and water shall be proportioned according to Section 37-2.03 of the State Specifications and as specified herein. The Engineer shall give final approved to the deign and rate of application used.

10-3.2 Mixing Slurry — The mixing of the slurry shall be sufficient to produce a uniform mixture of the desired consistency in accordance with the JMF. Under no circumstances shall the emulsion content be changed to control the consistency of the mix. If breaking, hardening, segregation, balling, or lumping occurs during the mixing process, the batch shall be discarded. All aggregate particles shall be uniformly coated with asphalt.

10-3.3 Slurry Seal Application — The surface shall be fogged with water directly preceding the spreader at a rate of 0.03 to 0.05 gallons per square yard.

The slurry mixture shall be of the desired consistency when deposited on the surface, and no additional elements shall be added. The water content shall be adjusted to maintain the proper consistency at the point of application.

A sufficient amount of slurry shall be carried in all parts of the spreader at all times so that complete coverage is obtained.

No segregation of the emulsion and aggregate will be permitted.

No streaks such as caused by oversized aggregate shall be left in the finished surface. No excessive build-up nor unsightly appearance shall be permitted on longitudinal or transverse joints.

Evidence of solidification of the asphalt, balling or lumping of the aggregates, or the presence of uncoated aggregates shall be cause for rejection of the slurry.

The slurry shall be applied in such a manner that no ridges will remain.

The Contractor shall exercise care to prevent slurry from being deposited on other than asphaltic concrete surfaces. Slurry on surfaces not designated to be sealed shall be removed at the Contractor's expense. The method of slurry removal shall be approved by the Engineer.

At the direction of the Engineer and at the Contractor's expense, the Contractor shall repair and reseal all areas that have not been properly or completely sealed.

Hand squeegees shall be used to spread slurry in areas inaccessible to the slurry mixer. Care should be exercised to leave no unsightly appearance from hand work. Burlap drags suitable to even the surface and leave a rough texture of slurry applications shall be used if the spreader box is equipped with a burlap drag.

Where the completed slurry is not uniform in color, the areas affected shall be treated to eliminate the color variation at the Contractor's expense. The method of treatment shall be approved by the Engineer.

10-3.4 Testing

10-3.4.1 General — Samples of the slurry seal mixture to be incorporated in the work shall be taken by the Engineer at the point of application. Testing of these samples shall be done at the discretion of the Engineer.

The Contractor will be notified within five (5) working days of the results of any tests performed.

10-3.4.2 Slurry Mixture — Each sample of slurry mixture shall be tested for conformance to the JMF. The following tests shall be performed:

Water content as percent of dry weight of slurry before extraction.

Residual asphalt content as percent of dry weight of aggregate shall be determined in accordance with ASTM D2172.

Gradation of extracted aggregate shall be determined in accordance with

ASTM C136.

Percent of emulsified asphalt in slurry mixture based on weight of dry aggregates shall be calculated.

Wet track abrasion in accordance with ASTM D3910.

10-3.4.3 Tolerances — Tolerances for individual materials as well as the slurry seal mixture are as follows:

After the designed residual asphalt content is determined, a ± One (1) percentage point variation will be permitted.

The percent of aggregate passing each sieve shall not vary more than ± 4.0 percent from the JMF.

The percent of aggregate passing shall not go from the high end to the low of the specified range of any two successive sieves.

The slurry consistency shall not vary more than ± 0.5 cm from the JMF after field adjustments.

10-3.4.4 Access — Where necessary to provide vehicular or pedestrian crossings over the fresh slurry, the Engineer shall direct the spreading of sufficient sand to eliminate tracking or damage to the slurry mixture. Otherwise, Contractor shall provide barricades and flagmen to keep traffic off the fresh slurry.

10-3.4.5 Measurement — Measurement for slurry seal shall be at the square foot of surface completed as shown and specified to the nearest square foot. No deduction will be made for manhole or valve covers cleaned after the project. No measurement will be made for slurry seal outside the limits of work or not furnished and installed according to specifications.

10-3.4.6 Payment — Payment for slurry seal will be made at the contract unit bid price which price and payment shall include furnishing and placing, site preparation, traffic control, cleaning up, protection of all utility covers, labor, material, equipment and all incidentals to complete the work as shown and specified.

10-4 Specifications for Application of Asphalt-Rubber Cape Seal

10-4.1 General

10-4.1.1 Scope — The work to be accomplished under these specifications includes such equipment, personnel, materials, and skill as may be necessary to place an asphalt-rubber cap seal onto an existing asphaltic concrete pavement.

10-4.1.2 Description — As referenced in these specifications, the term "cape seal" is defined as the application of an asphalt-rubber chip seal, followed by the application of a conventional aggregate slurry seal. Similarly, "double cape seal" is defined as the application of two consecutive asphalt-rubber chip seals, followed by the application of conventional aggregate slurry seal.

10-4.1.3 Control of Materials

Certified Test Reports: The Contractor shall submit certified test reports stating that the following materials are in compliance with these specifications:

- Mineral Aggregates
- Bituminous Materials

Manufacturer's Data: The Contractor shall submit the temperature-viscosity relationship of the asphalt cement.

Certificate of Compliance: The Contractor shall furnish the Engineer, at least two (2) weeks prior to the start of work, with a list of material sources together with Certificates of Compliance, indicating that materials to be incorporated in the work fulfill the requirements of these specifications. The Certificates of Compliance shall be signed by the material supplier or representative.

10-4.1.4 Job Mix Formula — The Contractor shall furnish the Engineer with a Job Mix Formula (JMF) for the slurry seal. The JMF prepared by the Contractor must represent materials that have been used within the previous six (6) months. The JMF must be submitted no later than two (2) weeks prior to the commencement of work. The JMF shall indicate the type and quantity of asphalt emulsion, the quantity and type of chemical additive, the residual asphalt content, the water content, aggregate type and gradation, type and quantity of mineral filler, rate of application, the abrasion loss from the wet track abrasion test, results of

consistency test, and set time and cure time in accordance with ASTM D3910. Samples of materials to be used on the job shall be used to determine the job mix.

10-4.1.5 Delivery and Storage — Materials delivered to the site shall be inspected by the Engineer for contamination and damage. Materials shall be unloaded and stored with a minimum of handling. Aggregates shall be stored in such a manner to protect them from contamination and segregation. All storage sites must be approved by the Engineer.

10-4.1.6 Samples — The Engineer shall have the right to obtain samples of all materials to be used in the work and to test such samples for the purpose of determining specification compliance. The Engineer reserves the right to obtain said samples at the point of delivery and/or at the point of manufacture. The Engineer shall also have the right to inspect sources of materials to be used in the work to determine acceptability of procedures used by the materials supplier.

10-5 Materials

10-5.1 General — Only materials conforming to these specifications shall be incorporated in the work.

10-5.2 Rubberized Chip Seal

Asphalt: The grade of asphalt cement of the asphalt-rubber mixture shall be AR-4000 and shall comply with the requirements of ASTM D3381.

If indicated necessary by laboratory testing, an approved anti-stripping additive may be added to the asphalt cement up to 1.0 percent by weight of asphalt.

Granulated Reclaimed Rubber: The granulated reclaimed rubber used shall be produced primarily from the processing of automobile and truck tires. The rubber shall be produced by ambient temperature grinding processes only.

The gradation of the granulated reclaimed rubber, when tested in accordance with ASTM C136 and using a 50 gram $\pm$ 1 gram sample, shall meet the following requirements:

SIEVE SIZE	PERCENT PASSING
No. 8	100
No. 10	95 - 100
NO. 30	0 - 10
No. 50	0 - 5

The use of rubber from multiple sources is acceptable provided that the overall blend of rubber meets the gradation requirements.

The individual granulated rubber particles, irrespective of diameter, shall not be greater in length than 3/16th inch (5 mm).

The granulated rubber shall have a specific gravity of 1.15 $\pm$ 0.05 and shall be free of loose fabric, wire and other contaminants except that up to 4 percent (by weight of rubber) calcium carbonate or talc may be added to prevent rubber particles from sticking together. The rubber shall be sufficiently dry so as to be free-flowing and not produce a foaming problem when blended with the hot asphalt cement.

The granulated reclaimed rubber shall be accepted by certification from the rubber supplier.

Diluent: The diluent shall have the following properties:

Flash Point	130°F Minimum
Initial Boiling Point (ASTM D86)	340°F Minimum
Dry Point (ASTM D86)	390° - 415°F
Total Saturates	85% Minimum

Diluent shall not be added to the first asphalt-rubber lift of the double cape seal.

Polymer: For the second asphalt-rubber lift of the double cape seal, a granulated polymer modifier shall be added with the rubber to the asphalt. The type of polymer shall be approved by the Engineer and shall replace 2½ to 3 percent, by weight, of the rubber in the asphalt-rubber mixture.

Asphalt-Rubber: The asphalt-rubber supplier shall furnish to the Engineer, a minimum of two (2) weeks before the beginning of placement, the asphalt-rubber mix formulation which shall contain the following information:

Asphalt Cement Source of Asphalt Cement Grade of Asphalt Cement Percentage of Asphalt Cement by total weight of the asphalt-rubber mixture
Granulated Reclaimed Rubber Source of Granulated Rubber Grade of Granulated Rubber Percentage of Granulated Rubber by total weight of the asphalt-rubber mixture If granulated rubber from more than one source is utilized, the above information will be required for each granulated rubber used.
Diluent Source of Diluent Grade of Diluent Percentage of Diluent-allowable by volume of the asphalt-rubber mixture.

10-5.3 Screened Aggregate — The cover material shall be crushed stone, crushed gravel, or both, and shall consist of clean, sound, durable particles, free of soft or disintegrated fragments and foreign matter. At least 90 percent by weight of the screenings shall consist of crushed particles as determined by California Test Method 205, and at least 90 percent by weight of the particles shall have at least two fractured faces.

Screened aggregate shall be of such nature that a thorough coat of the bituminous material used in the work will not strip off upon contact with water. The moisture content of the aggregate shall be such that the aggregate will be readily coated with the bituminous material. Drying may be required, as directed.

The cover material shall be precoated, one-quarter (0.25) to three-quarters (0.75) percent, with AR-4000 paving grade asphalt at a temperature of 300 to 375 degrees F.

Maximum aggregate size for the cape seal and for the second asphalt-rubber lift of the double cape seal shall conform to the following grading as per ASTM C136 and C117:

SIEVE SIZE	PERCENT PASSING 3/8" x NO. 6
3/4"	—
1/2"	100
3/8"	90-100
No. 4	5-30
No. 8	0-10
No. 16	0-5
No. 30	—
No. 200	0-1

Maximum aggregate size for the first asphalt-rubber lift of the double cape seal shall conform to the following grading as per ASTM C136 and C117:

SIEVE SIZE	PERCENT PASSING 1/2" x NO. 6
5/8"	100
1/2"	95-100
3/8"	0-40
1/4"	0-15
No. 8	0-2
No. 200	0-1

Aggregate screenings shall also conform to the following requirements:

TEST	RESULTS
Loss in L.A. Rattler per ASTM C131 (after 100 revolutions)	10% Max
Loss in L.A. Rattler per ASTM C131 (after 500 revolutions)	40% Max
Film Stripping per California Test Method 302	25% Max
Cleanness Value per California Test Method 227	75 Min

Samples of the proposed aggregate shall be submitted to the asphalt-rubber supplier, a minimum of twenty-one (21) days prior to application, to test for aggregate stripping characteristics. The results shall be submitted to the Engineer.

10-5.4 Equipment

10-5.4.1 General — Only equipment conforming to these specifications shall be incorporated in the work and all such equipment shall be maintained in safe and satisfactory working condition at all times.

10-5.4.2 Rubberized Chip Seal

General: The equipment used by the Contractor shall include a self-propelled rotary power broom or mobile pickup broom for pavement cleaning and excess cover material removal.

Asphalt-Rubber Equipment: All equipment utilized in the production and application of the asphalt-rubber shall be as described as follows:

An asphalt heating tank with a hot oil heat transfer system or retort heating system, capable of heating asphalt cement to the necessary temperature for blending with the granulated rubber. This unit shall be capable of heating a minimum of 3,000 gallons of asphalt cement.

An asphalt-rubber mechanical blender with a two-stage continuous mixing process, capable of producing a homogenous mixture of asphalt cement and granulated rubber, at the mix design specified ratios, as directed by the Engineer. This unit shall be equipped with a granulated rubber feed system capable of supplying the asphalt cement feed system, as not to interrupt the continuity of the blending process. A separate asphalt cement feed pump and finished product pump are required. The mechanical blender shall have both an asphalt cement totalizing meter in gallons and a flow rate meter in gallons per minute.

A truck or trailer mounted self-powered distributor truck equipped with a retort heating unit, and an internal mixing device capable of maintaining a uniform mixture of asphalt cement and granulated rubber. It shall be equipped with a full circulating spreader bar and a pumping system capable of applying asphalt-rubber material within $\pm$ 0.05 gallons per square yard tolerance of the specified application rate and must give a uniform covering of the surface to be treated. The distributor shall have a boot board on the rear of the vehicle and a bootman shall accompany the distributor. The bootman shall ride in a position so that all spray bar tips are in full view and readily accessible for unplugging if a plugged tip should occur. The distributor shall also include a tachometer, pressure gauge, volume measuring device and a thermometer.

The Engineer reserves the right to order the discontinuance of use of equipment, which, in his opinion, fails to produce a satisfactory distribution

of asphalt-rubber in accordance with these specifications.

Cover Material Spreader: The cover material (Chip) spreader shall be a self-propelled machine with an aggregate receiving hopper in the rear, belt conveyors to carry the aggregate to the front, and a spreading hopper equipped with a full-width distribution auger and spread roll. The spreader shall be in good mechanical condition and be capable of applying the cover material uniformly across the spread at the specified rate.

Rolling Equipment: A minimum of three operational self-propelled pneumatic-tired rollers shall be used for the required rolling of the cover material. The pneumatic-tired rollers shall carry a minimum loading of 3,000 pounds on each wheel and a minimum air pressure of 100 pounds per square inch in each tire.

Hauling Equipment: Trucks for hauling cover material shall be tailgate discharge and shall be equipped with a device to lock onto the hitch at the rear of the cover material spreader. Haul trucks shall also be compatible with the cover aggregate spreader so that the dump bed will not push down on the spreader when fully raised, or have too short a bed which results in aggregate spillage while dumping into the receiving hopper.

10-5.4.3 Slurry Seal

Mixer: The slurry machine shall be capable of rapid discharge of the mixed materials into a spreader. The self-contained slurry unit shall be mounted on truck or other vehicle capable of producing evenly controlled low rates of speed throughout the operation so that the slurry is spread evenly.

The slurry mixing machine shall be a continuous flow mixing unit, capable of accurately delivering a predetermined proportion of aggregate, water, emulsified asphalt, and accelerator and retardant to the mixing chamber. The mix chamber shall discharge the thoroughly mixed product on a continuous basis.

The aggregate shall be pre-wetted immediately prior to mixing the emulsified asphalt.

The mixing unit of the mixing chamber shall be capable of thoroughly blending all ingredients together.

The mixing machine shall be equipped with an approved fines feeder that provides a method to accurately introduce a predetermined proportion of mineral filler at the same time and location that the aggregate is fed into

the mixer. The fines feeder shall be used whenever added mineral filler is a part of the aggregate blend or a dry chemical additive is used.

The mixing machine shall be equipped with a water pressure system and fog type spray bar adequate for complete fogging of the surface ahead of the spreading equipment with an application up to 0.05 gallons per square yard.

Sufficient machine storage capacity to properly mix and apply a minimum of 5 tons of the slurry shall be provided.

Proportioning devices shall be calibrated prior to placing the seal coat. The Contractor shall furnish the Engineer with a calibration sheet for each mixing machine prior to use on the job.

Slurry Spreading Equipment: Attached to the mixer machine shall be a mechanical type squeegee distributor, having suitable controls to allow adjustment for variations of pavement grades and slope, equipped with flexible material in contact with the surface to prevent loss of slurry from the distributor which may result from varying grades or crowns.

A lateral control device and flexible strikeoff shall be provided.

The spreader box shall have an adjustable width. The box shall be kept clean, and build-up of asphalt and aggregate on the box will not be permitted.

The use and condition of burlap drags or other drags shall be approved by the Engineer.

Cleaning Equipment: Only vacuum sweepers will be permitted to clean the cape seal surface prior to slurry seal placement.

Hand Tools: Hand squeegees, shovels, hand burlap drags, and other equipment shall be available for those areas inaccessible to the spreader box.

10-5.5 Execution

10-5.5.1 General

Notification of Work: A minimum of ten (10) working days prior to the start of any work, the Contractor shall submit a Work Phasing Schedule for the approval of the Engineer.

Prior to the start of any construction, the Contractor shall notify the Albany Fire Department and the County Sheriff giving the approximate starting date, anticipated completion date, and the name and telephone number of a person who may be contacted at any hour in the event of a critical condition requiring immediate attention. It shall also be the Contractor's responsibility to notify the Engineer seventy-two (72) hours prior to the start of construction to review traffic control plans.

Material Disposal: The Contractor shall remove and transport debris and rubbish in a manner that will prevent spillage on streets or adjacent areas. Clean up of spillage will be at the Contractor's expense.

All material removed from the site shall e disposed of at the Contractor's expense at a site approved by the Engineer.

10-5.5.2 Asphalt-Rubber

General: Due to the handling characteristics of the asphalt-rubber, when radii and other irregular areas are to be sealed, it is recommended that this be done with an RS or CRS chip seal emulsion or paving grade asphalt cement.

Asphalt-Rubber Mixing Reaction: The percentage of granulated rubber shall be 23 percent $\pm$ 3 percent by weight of total asphalt-rubber mixture, the exact granulated rubber content shall be as determined by the mix design submitted by the asphalt-rubber supplier. During membrane placement, the granulated rubber percentage shall not fluctuate by more than one (1) percent by weight of total asphalt-rubber mixture.

The temperature of the asphalt cement shall be between 350 and 425 degrees F at the addition of the granulated rubber. The asphalt and rubber shall be combined and mixed together in the asphalt-rubber blending unit and reacted in the distributor for a period of time as required by the Engineer which shall be based on laboratory testing by the asphalt-rubber supplier. The temperature of the asphalt-rubber mixture shall be above 325 degrees F during the reaction period.

After the reaction between asphalt cement and granulated rubber has occurred, the viscosity of the hot asphalt-rubber mixture may be adjusted for spraying and/or better "wetting" of the cover material by the addition of a diluent. The diluent shall comply with the requirements of Section 2.2.3 herein and shall not exceed 7.5 percent by volume of the hot asphalt-rubber mixture.

When a job delay occurs after full reaction, the asphalt-rubber may be

allowed to cool. The asphalt-rubber shall be reheated slowly just prior to application but not to a temperature exceeding 350 degrees F. And additional quantity of diluent not exceeding 3 percent by volume of the hot asphalt-rubber mixture may be added after reheating.

Application of Asphalt-Rubber Material: Placement of the asphalt-rubber will be permitted only under the following conditions:

- The pavement surface temperature is 60 degrees F and rising.
- The pavement surface is clean and absolutely dry.
- The wind conditions are not excessive.
- All construction equipment such as asphalt-rubber distributor, cover material spreader, haul trucks with cover material, and rollers are in position and ready to commence asphalt-rubber placement operations.

As directed by the Engineer, the asphalt-rubber mixture shall be applied at a temperature of 290 to 340 degrees F at a rate of 0.50 to 0.55 gallons per square yard for the cape seal and the second lift of double cape seal, and at a rate of 0.70 gallons per square yard for the first lift of the double cape seal.

Transverse joints shall be constructed by placing building paper across and over the end of the previous asphalt-rubber application. Once the spraying has progressed beyond the paper, the paper shall be removed immediately and disposed of as directed by the Engineer. All longitudinal joints shall not exceed a four inch overlap.

The asphalt-rubber shall not be applied until sufficient screenings are on hand for immediate cover.

The asphalt-rubber shall be applied to only one designated traffic lane at a time and the entire width of the lane shall be covered in one application.

The asphalt-rubber shall not be spread a greater distance than can be immediately covered by aggregate screenings, unless otherwise permitted by the Engineer.

Spreading of Screened Aggregate: Cover material shall be spread immediately and uniformly over the asphalt-rubber at a spreading rate of 30 to 34 pounds per square yard.

At the time of application to the asphalt-rubber, cover material shall be surface dry so as to gain proper adhesion to the asphalt-rubber material.

The joint between adjacent applications of aggregate shall coincide with the line between designated traffic lanes.

Operating the aggregate-spreading equipment at speeds which cause the chips to roll over after striking the asphalt-rubber surface will not be permitted.

The transverse cut off of screenings shall be complete and any excess screenings shall be removed from the surface prior to resuming operations.

Stockpiling of aggregate prior to precoating will be permitted; however, any contamination resulting from storage or reloading will be cause for rejection. No stockpiling of precoated aggregate will be permitted.

Finishing: After the screenings have been spread upon the asphalt-rubber, any piles, ridges, or uneven aggregate distribution shall be carefully removed to insure against permanent ridges, bumps or depressions in the completed surface before the surface is rolled. Additional screenings shall be spread in whatever quantities necessary to prevent picking up by the rollers or traffic.

At least 3 operational pneumatic-tired rollers complying with the requirements of Section 3.2.4 shall be provided to accomplish the required embedment of the cover material. At some project locations, or where production rates dictate, 2 operational pneumatic-tired rollers may be utilized as directed by the Engineer.

Sufficient rollers shall be used for the initial rolling to cover the width of the aggregate spread with one pass. The first pass shall be made immediately behind the cover material spreader, and if the spreading is stopped for an extended period, the cover material spreader shall be moved ahead or off the side, so that all cover material may be immediately rolled. Four complete passes with rollers shall be made with all rolling completed within one hour after the application of the cover material.

Sweeping of loose cover material can begin a minimum of one (1) hour after placement and shall be completed no later than twenty-four (24) hours after placement.

Excess screenings which in the opinion of the Engineer are not salvageable and which interfere with drainage shall be removed and disposed of by the Contractor at the Contractor's expense. The removed screenings shall be

disposed of as directed by the Engineer.

The completed surface shall present a uniform appearance and shall be thoroughly compacted and free from ruts, humps, depressions, and irregularities due to an uneven distribution of asphalt-rubber or aggregate screenings.

The second asphalt-rubber lift shall be applied a minimum of twenty-four (24) hours after the cover aggregate for the first lift is placed. All loose cover material shall be swept prior to the application of the second asphalt-rubber lift.

Pavement Markers: For the cape seal, pavement marker masking shall be removed and the markers cleaned, as needed and by means approved by the Engineer, to ensure proper reflectivity.

Set and Cure Time: Except when it is necessary that hauling equipment must travel on the newly applied membrane, traffic of all types shall be kept off the membrane until it has had time to set properly. The speed of all hauling equipment shall not exceed 15 miles per hour when traveling over a membrane which is not adequately set. The minimum traffic-free period shall not be less than one (1) hour.

For optimum results, the asphalt-rubber chip seal (single and double applications) should be allowed to cure for a minimum of one (1) week prior to the application of the emulsified asphalt slurry seal.

10-5.5.3 Slurry Seal

Mixing Slurry: The mixing of slurry shall be sufficient to produce a uniform mixture of the desired consistency in accordance with the JMF. Under no circumstances shall the emulsion content be changed to control the consistency of the mix. If breaking, hardening, segregation, balling, or lumping occurs during the mixing process, the batch shall be discarded. All aggregate particles shall be uniformly coated with asphalt.

Slurry Seal Application: The surface shall be fogged with water directly preceding the spreader at a rate of 0.03 to 0.05 gallons per square yard.

The slurry mixture shall be of the desired consistency when deposited on the surface, and no additional elements shall be added. The water content shall be adjusted to maintain the proper consistency at the point of application.

A sufficient amount of slurry shall be carried in all parts of the spreader

at all times so that complete coverage is obtained.

Pavement Markers: Upon completion of the slurry seal application for the cape seal, pavement marker masking shall be removed and the markers cleaned, as needed and by means approved by the Engineer, to ensure proper reflectivity.

Sweeping: All pavements shall be vacuum swept before striping, or two (2) weeks after slurry seal placement, whichever is sooner.

Adjustment of Utility and Manhole Covers: For the double cape seal, the Contractor shall adjust all manhole and utility covers (and all other similar structures) to finished grade in accordance with the provisions of Section 301-1.6 and Section 302-5.7 of the Standard Specifications, except as modified herein.

The Contractor shall locate and tie out all manholes, valve covers, and survey monuments prior to construction.

All manholes, survey monuments and water valve covers shall be thoroughly cleaned of any construction debris resulting from the Contractor's operations.

Survey monument covers shall be adjusted as directed by the Engineer. The survey monument shall be protected in place by the Contractor. For monuments requiring resetting, the work shall be performed by a licensed land surveyor and all costs shall be at the Contractor's expense.

Manholes, meters and valve covers not owned by the City shall be adjusted to grade by the utility owner involved and at the utility company's expense. It shall be the responsibility of the Contractor to notify affected utility companies.

10-5.5.4 Measurement and Payment — Payment for the cape seal and the double cape seal shall be made at the contract unit price per square yard in the Bid Schedule and shall be based on as placed field measurements. The contract unit price shall include full compensation for all labor, equipment, and materials necessary to complete the cape and double cape seal applications, including mobilization, pavement cleaning, posting of notices, masking and cleaning of pavement markers (cape seal only), adjusting utility and manhole covers (double cape seal only), and all other incidental work.

10-5.5 Testing

10-5.5.1 General — Samples of the component materials and slurry mixture to be

incorporated in the work shall be taken by the Engineer at the point of application. Testing of materials shall be done at the discretion of the Engineer.

The Contractor will be notified within five (5) working days of the results of any tests performed.

10-5.5.2 Rubberized Chip Seal — Samples of component materials shall include asphalt cement, asphalt-rubber, and aggregate screenings.

10-5.5.3 Slurry Mixture — Each sample of slurry mixture shall be tested for conformance to the JMF. The following tests shall be performed:

- Water content as percent of dry weight of slurry before extraction.
- Residual asphalt content as percent of dry weight of aggregate shall be determined in accordance with ASTM D2172.
- Gradation of extracted aggregate shall be determined in accordance with ASTM C136.
- Percent of emulsified asphalt in slurry mixture based on weight of dry aggregates shall be calculated.
- Wet track abrasion in accordance with ASTM D3910.

10-5.5.4 Tolerances — Tolerances for individual materials, as well as the slurry seal mixture, are as follows:

After the designed residual point asphalt content is determined, a $\pm$ one (1) percentage point variation will be permitted.

The percent of aggregate passing each sieve shall not vary more than $\pm$ 4.0% from the JMF.

The percent of aggregate passing shall not go from the high end to the low of the specified range of any two successive sieves.

The slurry consistency shall not vary more than $\pm$ 0.5 cm from the JMF after field adjustments.