ITEM P-602 PRIME COAT

DESCRIPTION

602-1.1 This item shall consist of an application of liquid asphalt material on the prepared base course according to these Specifications and in reasonably close conformity to the lines shown on the Plans.

MATERIALS

602-2.1 MATERIALS. The types, grades, controlling specifications, and application temperatures for the prime coat are given in Table 1. The Engineer shall designate the specific material to be used.

TABLE 1. MATERIAL

Type and Grade	Specification	Application Temperatures \1\ °F	Application Rate gal/yd^2
Emulsified Asphalt			
SS-1, SS-1h	AASHTO M 140	70-160	0.27 to 0.53
MS-2, HFMS-1	AASHTO M 140	70-160	0.27 to 0.53
CSS-1, CSS-1h	AAASHTO M 208	70-160	0.27 to 0.53
CMS-2	AASHTO M 208	70-160	0.27 to 0.53
CMS-2s	\2\	70-160	0.22 to 0.44
Cutback Asphalt			
RC-30	ASTM D 2028	80+	0.27 to 0.53
RC-70	ASTM D 2028	120+	0.27 to 0.53
RC-250	ASTM D 2028	165+	0.27 to 0.53
MC-30	ASTM D 2027	80+	0.11 to 0.33

\1\ The maximum temperature for cutback asphalt shall be that at which fogging occurs.

\2\ CMS-2s shall meet the following specifications: Viscosity, Sabolt Furol, of 50 to 450 at 122 °F when tested under AASHTO T 59. Particle charge test of Positive when tested under AASHTO T 59. Sieve test maximum of 0.10% when tested under AASHTO T 59. Oil distillate, by volume of emulsion, of 20% maximum when tested under AASHTO T 59. Residue of 65% minimum when tested under AASHTO T 59. Penetration of 100 to 250 at 77 °F, 100 g, 5 s when tested under ASTM D 5. Ductility of 40 cm minimum at 77 °F when tested under ASTM D 113. Solubility in trichloroethylene of 97.5% minimum.

CONSTRUCTION METHODS

602-3.1 WEATHER LIMITATIONS. The prime coat shall be applied only when the existing surface is dry or contains sufficient moisture to get uniform distribution, when the surface temperature is above 45 °F, and when the weather is not foggy or rainy. The temperature requirements may be waived, but only when so directed by the Engineer.

602-3.2 EQUIPMENT. The equipment used by the Contractor shall include a self-powered pressure distributor and equipment for heating the prime coat.

The distributor shall be designed, equipped, maintained, and operated so that prime coat at even heat may be applied uniformly on variable widths of surface at the specified rate. The allowable variation from the specified rate shall not exceed 10%. Distributor equipment shall include a tachometer, pressure gages, volume-measuring devices or a calibrated tank, and a thermometer for measuring temperatures of tank

contents. The distributor shall be self-powered and shall be equipped with a power unit for the pump and full circulation spray bars adjustable laterally and vertically.

A power broom and/or blower shall be provided for any required cleaning of the surface to be treated.

602-3.3 APPLICATION OF PRIME COAT. Immediately before applying the prime coat, the full width of the surface to be primed shall be swept with a power broom to remove all loose dirt and other objectionable material.

The prime coat including solvent shall be uniformly applied with an asphalt distributor at the rate specified in Table 1, depending on the base course surface texture. The type of material and application rate shall be approved by the Engineer prior to application.

Following the application, the primed surface shall be allowed to dry not less than 48 hours without being disturbed or for such additional time as may be necessary to permit the drying out of the prime until it will not be picked up by traffic or equipment. This period shall be determined by the Engineer. The surface shall then be maintained by the Contractor until the surfacing has been placed. Suitable precautions shall be taken by the Contractor to protect the primed surface against damage during this interval, including supplying and spreading any sand necessary to blot up excess prime coat.

602-3.4 CONTRACTOR'S RESPONSIBILITY. Samples of the prime coat materials that the Contractor proposes to use, together with a statement as to their source and character, must be submitted and approved before use of such material begins. The Contractor shall require the manufacturer or producer of the materials to furnish material subject to this and all other pertinent requirements of the contract. Only satisfactory materials, so demonstrated by certified tests, shall be acceptable.

The Contractor shall furnish vendor's certified test reports for each carload, or equivalent, of prime coat material shipped to the project. The report shall be delivered to the Engineer before permission is granted for use of the material. The furnishing of the vendor's certified test report for the material shall not be interpreted as basis for final acceptance. All such test reports shall be subject to verification by testing samples of materials received for use on the project.

602-3.5 FREIGHT AND WEIGH BILLS. Before the final estimate is allowed, the Contractor shall file with the Engineer receipted bills when railroad shipments are made, and certified weigh bills when materials are received in any other manner, of the prime coat actually used in the construction covered by the contract. The Contractor shall not remove prime coat from the tank car or storage tank until the initial outage and temperature measurements have been taken by the Engineer, nor shall the car or tank be released until the final outage has been taken by the Engineer.

Copies of freight bills and weigh bills shall be furnished to the Engineer during the progress of the work.

METHOD OF MEASUREMENT

602-4.1 Prime coat will be measured by the ton, according to Subsection GCP-90-02.

BASIS OF PAYMENT

602-5.1 Payment will be made at the contract unit price per ton for accepted prime coat.

Payment will be made under:

Item P-602a Prime Coat [Grade] - per ton

TESTING REQUIREMENTS

AASHTO T 59	Testing Emulsified Asphalts
ASTM D 5	Penetration of Bituminous Materials
ASTM D 113	Ductility of Bituminous Materials

MATERIAL REQUIREMENTS

AASHTO M 140	Emulsified Asphalt
AASHTO M 208	Cationic Emulsified Asphalt
ASTM D 2027	Standard Specification for Cutback Asphalt (Medium-Curing Type)
ASTM D 2028	Asphalt, Cutback (Rapid Curing Grade)

ITEM P-603 TACK COAT

DESCRIPTION

603-1.1 This item shall consist of preparing and treating an asphalt or concrete surface with liquid asphalt material according to these Specifications and in reasonably close conformity to the lines shown on the Plans.

MATERIALS

603-2.1 MATERIALS. Tack coat material shall be either cutback asphalt, emulsified asphalt, or tar and shall conform to the requirements of Table 1. The type, grade, controlling specification, and application temperature of tack coat to be used shall be specified by the Engineer.

TABLE 1. MATERIAL

Type and Grade	Specification	Application Temperature °F	Application Rate gal/yd^2
Emulsified Asphalt			
SS-1, SS-1h	AASHTO M 140	75-130	0.05 to 0.16
CSS-1, CSS-1h	AASHTO M 208	75-130	0.05 to 0.16
STE-1	\1\	68-140	0.08 to 0.10
Cutback Asphalt			
RC-70	ASTM D 2028	120-160	0.05 to 0.16
Tar			
RTCB 5, RTCB 6	AASHTO M 52	60-120	0.05 to 0.16

\1\ STE-1 shall meet the following specifications: Viscosity, Sabolt Furol at 77 °F of 30 max., when tested under AASHTO T 59. Particle charge test of Positive when tested under AASHTO T 59 (If particle charge test is inconclusive, material having a max. pH value of 6.7 will be acceptable). Storage Stability, 1 day 1% max when tested under AASHTO T 59. Demulsibility, 35 mil 0.8% Dioctyl Sodium Sulfosuccinate Solution 25 minimum when tested under AASHTO T 59. Sieve test maximum of 0.10% when tested under AASHTO T 59. Oil distillate, by volume of emulsion, of 5% maximum when tested under AASHTO T 59. Residue of 45% minimum when tested under AASHTO T 59. Penetration at 77 °F, 100 gm, 5 sec. of 100 minimum, 200 maximum when tested under ASTM D 5. Ductility at 77 °F of 40 cm minimum when tested under ASTM D 113. Solubility in trichloroethylene of 97.5% minimum

CONSTRUCTION METHODS

603-3.1 WEATHER LIMITATIONS. The tack coat shall be applied only when the existing surface is dry and the surface temperature is above 40 °F. The temperature requirements may be waived, but only when so directed by the Engineer.

603-3.2 EQUIPMENT. The Contractor shall provide equipment for heating and applying the tack coat.

The distributor shall be designed, equipped, maintained, and operated so that tack coat at even heat may be applied uniformly on variable widths of surface at the specified rate. The allowable variation from the specified rate shall not exceed 10%. Distributor equipment shall include a tachometer, pressure gages,

volume-measuring devices or a calibrated tank, and a thermometer for measuring temperatures of tank contents. The distributor shall be self-powered and shall be equipped with a power unit for the pump and full circulation spray bars adjustable laterally and vertically.

A power broom and/or blower shall be provided for any required cleaning of the surface to be treated.

603-3.3 APPLICATION OF TACK COAT. Immediately before applying the tack coat, the full width of surface to be treated shall be swept with a power broom and/or airblast to remove all loose dirt and other objectionable material.

Emulsified asphalt shall be applied a sufficient time in advance of the paver to ensure that all water has evaporated before any of the overlying mixture is placed on the tacked surface.

The tack coat material including vehicle or solvent shall be uniformly applied with an asphalt distributor at the rate specified in Table 1, depending on the condition of the existing surface. The type of material and application rate shall be approved by the Engineer prior to application.

Following the application, the surface shall be allowed to cure without being disturbed for such period of time as may be necessary to permit drying out and setting of the tack coat. This period shall be determined by the Engineer. The surface shall then be maintained by the Contractor until the next course has been placed. Suitable precautions shall be taken by the Contractor to protect the surface against damage during this interval.

603-3.4 CONTRACTOR'S RESPONSIBILITY. Samples of the tack coat material that the Contractor proposes to use, together with a statement as to its source and character, must be submitted and approved before use of such material begins. The Contractor shall require the manufacturer or producer of the tack coat to furnish material subject to this and all other pertinent requirements of the contract. Only satisfactory materials so demonstrated by certified tests, shall be acceptable.

The Contractor shall furnish the vendor's certified test reports for each carload, or equivalent, of tack coat shipped to the project. The report shall be delivered to the Engineer before permission is granted for use of the material. The furnishing of the vendor's certified test report for the material shall not be interpreted as a basis for final acceptance. All such test reports shall be subject to verification by testing samples of material received for use on the project.

603-3.5 FREIGHT AND WEIGH BILLS. Before the final estimate is allowed, the Contractor shall file with the Engineer receipted bills when railroad shipments are made, and certified weigh bills when materials are received in any other manner, of the tack coat actually used in the construction covered by the contract. The Contractor shall not remove tack coat from the tank car or storage tank until the initial outage and temperature measurements have been taken by the Engineer, nor shall the car or tank be released until the final outage has been taken by the Engineer. Copies of freight bills and weigh bills shall be furnished to the Engineer during the progress of the work.

METHOD OF MEASUREMENT

603-4.1 Tack coat will be measured by the ton according to Subsection GCP-90-02.

BASIS OF PAYMENT

603.5-1 Payment will be made at the contract unit price per ton of accepted material.

Payment will be made under:

Item P-603a Tack Coat [Grade] - per ton

TESTING REQUIREMENTS

AASHTO T 59	Testing Emulsified Asphalts
ASTM D 5	Penetration of Bituminous Materials
ASTM D 113	Ductility of Bituminous Materials

MATERIAL REQUIREMENTS

AASHTO M 52	Tar for Use in Road Construction
AASHTO M 140	Emulsified Asphalt
AASHTO M 208	Cationic Emulsified Asphalt
ASTM D 633	Volume Correction Table for Road Tar
ASTM D 2028	Liquid Asphalt (Rapid-Curing Type)

ITEM P-605 JOINT SEALING FILLER

DESCRIPTION

605-1.1 This item shall consist of providing and installing a resilient and adhesive joint sealing filler capable of effectively sealing joints and cracks in pavements.

MATERIALS

605-2.1 JOINT SEALERS. Joint sealing material shall meet the requirements of ASTM D 3581.

Each lot or batch of sealing compound shall be delivered to the jobsite in the manufacturer's original sealed container. Each container shall be marked with the manufacturer's name, batch or lot number, and the safe heating temperature and shall be accompanied by the manufacturer's certification stating that the compound meets the requirements of this specification.

CONSTRUCTION METHODS

605-3.1 TIME OF APPLICATION. Joints shall be sealed as soon after completion of the curing period as feasible and before the pavement is opened to traffic, including construction equipment. The pavement temperature shall be above 50 °F at the time of installation of the poured joint sealing material.

605-3.2 PREPARATION OF JOINTS. Immediately before sealing, the joints shall be thoroughly cleaned of all laitance, curing compound, and other foreign material. Cleaning shall be accomplished by wire brushing. Upon completion of cleaning, the joints shall be blown out with compressed air. The joint faces shall be surface dry when the seal is applied.

Prior to resealing joints, the existing joint material shall be removed to the depth as shown on the Plans. If joint sealer other than that originally used is specified, all existing joint sealer shall be removed.

605-3.3 INSTALLATION OF SEALANT. Joints shall be inspected for proper width, depth, alignment, and preparation, and shall be approved by the Engineer before sealing is allowed.

The joint sealant shall be applied uniformly solid from bottom to top and shall be filled without formation of entrapped air or voids. A backing material shall be placed as shown on the Plans and shall be nonadhesive to the concrete or the sealant material. The heating kettle shall be an indirect heating type, constructed as a double boiler. A positive temperature control and mechanical agitation shall be provided. The sealant shall not be heated to within 20 degrees (F) below the safe heating temperature. The safe heating temperature can be obtained from the manufacturer's shipping container. A direct connecting pressure type extruding device with nozzles shaped for insertion into the joint shall be provided. Any sealant spilled on the surface of the pavement shall be removed immediately.

METHOD OF MEASUREMENT

605-4.1 Joint sealing material will be measured by the linear foot of sealant in place, complete, and accepted.

BASIS OF PAYMENT

605-5.1 Payment for joint sealing material will be made at the contract unit price per linear foot.

Payment will be made under:

Item P-605a Joint Sealing Filler - per linear foot

TESTING REQUIREMENTS

ASTM D 412	Rubber Properties in Tension
ASTM D 1644	Nonvolatile Content of Varnishes

MATERIAL REQUIREMENTS

ASTM D 3581	Joint Sealant, Hot-Poured, Jet-Fuel-Resistant Type, for Portland Cement Concrete and Tar-Concrete Pavements

ITEM P-606 ADHESIVE COMPOUND

DESCRIPTION

606-1.1 This specification covers two types of material: a liquid suitable for sealing electrical wire in saw cuts in pavement and sealing light fixtures or bases in pavement; a paste suitable for embedding light fixtures and aircraft tie-downs in the pavement. Both types of material are two-component filled formulas with the characteristics specified in Subsection 606-2.4. Materials supplied for use with hot mix asphalt pavements must be formulated so they are compatible with the hot mix asphalt.

EQUIPMENT AND MATERIALS

606-2.1 CURING. When prewarmed to 77 °F, mixed, and placed according to manufacturer's directions, the materials shall cure at temperatures of 45 °F or above without the application of external heat.

606-2.2 STORAGE. The adhesive components shall not be stored at temperatures over 86 °F.

606-2.3 CAUTION. Installation and use shall be according to the manufacturer's recommended procedures. Avoid prolonged or repeated contact with skin. In case of contact, wash with soap and flush with water. If taken internally, call doctor. Keep away from heat or flame. Avoid vapor. Use in well-ventilated areas. Keep in cool place. Keep away from children.

606-2.4 CHARACTERISTICS. When mixed and cured according to the manufacturer's directions, the materials shall have the following properties shown in Table 1.

SAMPLING, INSPECTION, AND TEST PROCEDURES

606-3.1 TENSILE PROPERTIES. Tests for tensile strength and elongation shall be conducted according to ASTM D 638.

606-3.2 EXPANSION. Tests for coefficients of linear and cubical expansion shall be conducted according to ASTM D 1168, Method B, except that mercury shall be used instead of glycerin. The test specimen(s) shall be mixed in the proportions specified by the manufacturer, and cured in a glass tub approximately 2 inches long by 3/8 inch in diameter. The interior of the tube shall be precoated with a silicone mold release agent. The hardened sample shall be removed from the tube and aged at room temperature for 1 week before conducting the test. The test temperature range shall be from 35 to 140 °F.

606-3.3 TEST FOR DIELECTRIC STRENGTH. Test for dielectric strength shall be conducted according to ASTM D 149 for sealing compounds to be furnished for sealing electrical wires in pavement.

606-3.4 TEST FOR ARC RESISTANCE. Test for arc resistance shall be conducted according to ASTM D 495 for sealing compounds to be furnished for sealing electrical wires in pavement.

606-3.5 TEST FOR ADHESION TO STEEL. The ends of two smooth, clean, steel specimens (approximately 1 inch X 1 inch X 6 inches) are bonded together with adhesive mixture and allowed to cure at room temperature for a period of time to meet formulation requirements and then tested to failure on a Riehle (or similar) tensile tester. The thickness of adhesive to be tested shall be 1/4 inch.

TABLE 1. PROPERTY REQUIREMENTS

Physical or Electrical Property	Minimum	Maximum	ASTM Method
Tensile			
Portland Cement Concrete	1,000 psi		D 638
Hot Mix Asphalt	395 psi		
Elongation			
Portland Cement Concrete	8% \1\		D 638
Hot Mix Asphalt	50%		D 638
Coef. of cub. exp., cm3/cm3/°C	0.00090	0.00120	D 1168
Coef. of lin. exp., cm/cm/°C	0.00030	0.00040	D 1168
Dielectric strength, short time test	350 volts/mil.		D 149
Arc resistance	125 secs.		D 495
Adhesion to steel	1,000 psi		
Adhesion to portland cement concrete	200 psi		
Adhesion to asphalt concrete	(no test available)		

\1\ 20% or more (without filler) for formulations to be supplied for areas subject to freezing.

606-3.6 ADHESION TO PORTLAND CEMENT CONCRETE.

a. Concrete Test Block Preparation. The aggregate grading shall be as shown in Table 2.

The coarse aggregate shall consist of crushed rock having a minimum of 75% of the particles with at least one fractured face and having a water absorption of not more than 1.5%. The fine aggregate shall consist of crushed sand manufactured from the same parent rock as the coarse aggregate. The concrete shall have a water-cement ratio of 5.5 gallons of water per bag of cement, a cement factor of 6, plus or minus 0.5, bags of cement per cubic yard of concrete, and a slump of 2-1/2 inches plus or minus 1/2 inch. The ratio of fine aggregate to total aggregate shall be approximately 40% by solid volume. The air content shall be 5.0%, plus or minus 0.5%, and it shall be obtained by the addition to the batch of an air-entraining admixture such as vinsol resin. The mold shall be metal with a metal base plate. Means shall be provided for securing the base plate to the mold. The assembled mold and base plate shall be watertight and shall be oiled with mineral oil before use. The inside measurement of the mold shall be such that several 1-inch by 2-inch by 3-inch test blocks can be cut from the specimen with a concrete saw having a diamond blade. The concrete shall be prepared and cured according to AASHTO T 126.

TABLE 2. AGGREGATE FOR BOND TEST BLOCKS

Type	Sieve Size	Percent Passing
Coarse Aggregate	3/4 in.	97 to 100
	1/2 in.	63 to 69
	3/8 in.	30 to 36
	No. 4	0 to 3
Fine Aggregate	No. 4	100
	No. 8	82 to 88
	No. 16	60 to 70
	No. 30	40 to 50
	No. 50	16 to 26
	No. 100	5 to 9

b. Bond Test. Prior to use, oven-dry the test blocks to constant weight at a temperature of 220 to 230 °F, cool to room temperature, 73.4 ±3 °F, in a desiccator, and clean the surface of the blocks of film or powder by vigorous brushing with a stiff-bristled fiber brush. Two test blocks shall be bonded together on the 1-inch X 3-inch sawed face with the adhesive mixture and allowed to cure at room temperature for a period of time to meet formulation requirements and then tested to failure in a Riehle (or similar) tensile tester. The thickness of the adhesive to be tested shall be 1/4 inch.

606-3.7 COMPATIBILITY WITH HOT MIX ASPHALT. Test for compatibility with asphalt according to ASTM D 3407.

606-3.8 CERTIFICATION. The Contractor shall furnish the vendor's certified test reports for each batch of material delivered to the project. The report shall certify that the material meets specification requirements and is suitable for use with portland cement concrete or hot mix asphalt pavements. The report shall be delivered to the Engineer before permission is granted for use of the material. In addition the Contractor shall obtain a statement from the supplier or manufacturer which guarantees the material for one year. The supplier or manufacturer shall furnish evidence that the material has performed satisfactorily on other projects.

606-3.9 APPLICATION. Adhesive shall be applied on a dry, clean surface, free of grease, dust, and other loose particles. The method of mixing and application shall be in strict accordance with the manufacturer's recommendations.

METHOD OF MEASUREMENT

606-4.1 The adhesive compound will be measured by the pound of adhesive as specified, in place, complete and accepted. When required in the installation of an in-runway lighting system or portion thereof, or for aircraft tie-down, no measurement will be made for direct payment of adhesive, as the cost of furnishing and installing will be considered as a subsidiary obligation in the completion of the installation.

BASIS OF PAYMENT

606-5.1 Payment will be made, where applicable, at the contract unit price per pound for the adhesive.

Payment will be made under:

Item P-606a	Adhesive Compound - per pound

TESTING REQUIREMENTS

AASHTO T 126	Making and Curing Concrete Test Specimens in the Laboratory
ASTM D 149	Dielectric Breakdown Voltage and Dielectric Strength of Electrical Insulating Materials at Commercial Power Frequencies
ASTM D 495	High-Voltage, Low-Current, Arc Resistance of Solid Electrical Insulating Materials
ASTM D 638	Tensile Properties of Plastics
ASTM D 1168	Hydrocarbon Waxes Used for Electrical Insulation
ASTM D 3407	Joint Sealants, Hot-Poured, For Concrete and Asphalt Pavements

ITEM P-609 SEAL COATS AND ASPHALT SURFACE TREATMENT

DESCRIPTION

609-1.1 This item shall consist of an asphalt surface treatment as a wearing course composed of a single or multiple application of liquid asphalt material and aggregate cover placed on the prepared primed base or properly cured wearing surface, according to these Specifications, and shall conform to the dimensions and typical cross section shown on the Plans.

609-1.2 QUANTITIES OF MATERIALS. The approximate amounts of materials per square yard for the asphalt surface treatment shall be as provided in Table 1 for the treatment specified on the Plans or in the Special Provisions. The exact amounts to be used shall be determined by the Engineer.

TABLE 1. QUANTITIES OF MATERIALS

Application No	Aggregate lb/yd^2	Asphalt gal/yd^2	Type of Asphalt \1\
1	40-50	0.35-0.45	Asphalt Cement
		0.40-0.50	Emulsified Asphalt
2	20-25	0.15-0.25	Asphalt Cement
		0.20-0.35	Emulsified Asphalt
3	15-20	0.15-0.20	Emulsified Asphalt

\1\ See Table 3 for grades of asphalt and spraying temperatures.

MATERIALS

609-2.1 AGGREGATE MATERIALS. The aggregate material shall be either crushed stone or crushed gravel. The cover material shall be screenings; sand may be used when specified.

If the material is to be crushed stone, it shall be manufactured from sound, hard, durable rock of accepted quality and crushed to specification size. All strata, streaks, and pockets of clay, dirt, sandstone, soft rock, or other unsuitable material accompanying the sound rock shall be discarded and not allowed to enter the crusher.

If the material is to be crushed gravel, it shall consist of hard, durable, fragments of stone or gravel of accepted quality and crushed to specification size. All strata, streaks, and pockets of sand, excessively fine gravel, clay, or other unsuitable material including all stones, rocks, and boulders of inferior quality shall be discarded and not allowed to enter the crusher. The crushing of the gravel shall result in a product in which the material retained on the separate No. 4, 3/8-inch, and 1/2-inch sieves shall have at least 75% of particles with at least one fractured face as determined by WAQTC FOP for AASHTO TP 61.

The crushed aggregate shall not contain more than 8%, by weight, of elongated or flat pieces per ATM 306 and shall be free from wood, roots, vegetable, organic, or other extraneous matter. The crushed coarse aggregate shall have a percentage of wear not more than 40 at 500 revolutions, per AASHTO T 96.

The aggregate shall show no evidence of disintegration nor show a total loss greater than 12% when subjected to five cycles of the sodium sulfate accelerated soundness test specified in AASHTO T 104.

Aggregates shall have a minimum degradation value of 50 when tested according to ATM 313.

The crushed aggregate for the applications shall meet the requirements for gradation given in Table 2 when tested according to WAQTC FOP for AASHTO T 27/T 11.

TABLE 2. REQUIREMENTS FOR GRADATION OF AGGREGATE

Sieve Designation (square openings)	Percentage by Weight Passing Sieves
Aggregate for first application	
1 in.	100
3/4 in.	90-100
1/2 in.	20-55
3/8 in.	0-15
No. 4	0-5
No. 200	0-1
Aggregate for second application	
1/2 in.	100
3/8 in.	85-100
No. 4	10-30
No. 8	0-10
No. 16	0-5
No. 200	0-1
Aggregate for third application	
3/8 in.	100
1/4 in.	90-100
No. 4	60-85
No. 8	0-25
No. 16	0-5
No. 200	0-2

The gradations in the table represent the limits which shall determine suitability of aggregate for use for the specified applications from the sources of supply. The final gradations decided on, within the limits designated in the table, shall be uniformly graded from coarse to fine.

The cover aggregate used in the third application shall be a light-colored material whose color and reflectivity shall be approved by the Engineer.

The aggregate to be used shall show no evidence of stripping or swell when tested according to according to ATM 414 The use of antistrip agents for the control of stripping shall be used if necessary.

609-2.2 ASPHALT MATERIAL. The types, grades, controlling specifications, and application temperatures for the asphalt materials are shown in Table 3. The Engineer shall designate the specific material to be used.

TABLE 3. ASPHALT MATERIALS

Type and Grade	Specification	Spraying Temperature \1\Deg. F
Asphalt Cement		
AC 2.5, AC-5	ASTM D 3381	275+
AR-1000, 2000	ASTM D 3381	280+
120-150, 200-300	ASTM D 946	270+
Emulsified Asphalt		
RS-1	AASHTO M 140	70-140
RS-2	AASHTO M 140	125-175
MS-1, HFMS-1	AASHTO M 140	70-160
CRS-1	AASHTO M 208	125-175
CRS-2	AASHTO M 208	125-175

\1\ The maximum temperature for asphalt cements shall be below that at which fogging occurs.

CONSTRUCTION METHODS

609-3.1 WEATHER LIMITATIONS. Asphalt material shall be applied only when the existing surface is dry and the atmospheric temperature is above 60 °F. No material shall be applied when rain is imminent or when dust or sand is blowing.

609-3.2 EQUIPMENT AND TOOLS. The Contractor shall furnish all equipment, tools, and machines necessary for the performance of the work.

a. **Pressure Distributor.** The distributor shall be designed, equipped, maintained, and operated so that asphalt material at even heat may be applied uniformly on variable widths of surface at the specified rate. The allowable variation from the specified rate shall not exceed 10%. Distributor equipment shall include a tachometer, pressure gages, volume-measuring devices or a calibrated tank, and a thermometer for measuring temperatures of tank contents. The distributor shall be self-powered and shall be equipped with a power unit for the pump and full circulation spray bars adjustable laterally and vertically.

b. **Aggregate Spreader.** The aggregate spreader shall be a self-propelled mechanical spreader or truck-attached mechanical spreader capable of uniformly distributing aggregate at the specified rates.

c. **Roller.** The roller shall be a pneumatic-tired roller with an effective rolling width of at least 60 inches and capable of exerting a minimum contact pressure of 40 psi.

d. **Power Broom.** A power broom and/or blower shall be provided for removing loose material from the surface to be treated.

609-3.3 PREPARING UNDERLYING COURSE. The surface of the underlying course shall be prepared, shaped, and conditioned to a uniform grade and section, as shown on the Plans and as specified. Loose dirt and other objectionable material shall be removed from the surface.

On those type of bases where a prime coat is required and specified, the prime shall be applied and satisfactorily cured before starting the asphalt surface treatment.

When specified, the Contractor shall be required to patch, with premixed material, any holes or other malformations deviating from the true cross section and grade. The premixed material shall be made of the asphalt material specified and prepared by the method directed by the Engineer. All small patches shall be thoroughly hand tamped while the large patches shall be rolled with a power or pneumatic roller.

609-3.4 APPLICATION OF ASPHALT MATERIAL. Asphalt material shall be applied upon the properly prepared surface at the rate and temperature specified using a pressure distributor to obtain uniform distribution at all points. To insure proper drainage, the strips shall begin along the centerline of the pavement on a crowned section or on the high side of the pavement with a one-way slope. During all applications, the surfaces of adjacent structures shall be protected in such manner as to prevent their being spattered or marred. Asphalt materials shall not be discharged into borrow pits or gutters or upon the airport area.

609-3.5 APPLICATION OF AGGREGATE MATERIAL. Immediately after the application of the asphalt material or when directed, the aggregates at the rate specified for each designated application shall be spread uniformly over the asphalt material. Trucks spreading aggregate shall be operated backward so that the asphalt material will be covered before the truck wheels pass over it. The aggregate shall be spread in the same width of application as the asphalt material and shall not be applied in such thickness as to cause blanketing. Back-spotting or sprinkling of additional aggregate material, and pouring additional asphalt material over areas that show up having insufficient cover or asphalt, shall be done by hand whenever necessary. Additional spreading of aggregate material shall be done with a motor-patrol grader equipped with broom moldboard, a broom drag, or a power broom, as directed by the Engineer.

Immediately after spreading each application, the aggregate shall be rolled. The rolling shall be continued until no more aggregate can be worked into the surface. In the construction of the second and third application, blading with the wire-broom moldboard attachment or broom dragging shall begin as soon as possible after the rolling has started and after the surface has set sufficiently to prevent excessive marking. Further blading and rolling on the strip being placed and on adjacent strips previously placed, shall be done as often as necessary to keep the aggregate material uniformly distributed. These operations shall be continued until the surface is evenly covered and cured to the satisfaction of the Engineer.

Succeeding applications shall not be applied until the preceding application has set and in no case until at least 24 hours have elapsed. If dust, dirt, or other foreign matter accumulates on the surface between the applications, the Contractor shall be required to sweep and clean the surface as specified herein. The asphalt material and the aggregate shall be spread upon the clean and properly cured surface and handled as required. Extreme care shall be taken in all applications to avoid brooming or tracking dirt or any foreign matter on any portion of the pavement surface under construction.

All surplus aggregate from the final application shall be swept off the surface and removed prior to final acceptance of the work.

609-3.6 CORRECTION OF DEFECTS. Any defects, such as raveling, low centers, lack of uniformity, or other imperfections caused by faulty workmanship, shall be corrected to the satisfaction of the Engineer.

609-3.7 CERTIFICATION. Samples of the asphalt materials that the Contractor proposes to use, together with a statement as to their source and character, shall be submitted and approval obtained before use of such materials begins.

The Contractor shall furnish vendor's certified test reports for each carload, or equivalent, of asphalt shipped to the project. The report shall be delivered to the Engineer before permission is granted for use of 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. All such test reports shall be subject to verification by testing sample materials as received for use on the project.

609-3.8 FREIGHT AND WEIGH BILLS. Before the final estimate is allowed the Contractor shall file with the Engineer receipted bills where railroad shipments are made, and certified weight bills when materials are received in any other manner, of the asphalt and covering materials actually used in the construction covered by the contract. The Contractor shall not remove asphalt material from the tank car or storage tank until the initial outage and temperature measurements have been taken by the Engineer, nor shall the car or tank be released until the final outage has been taken by the Engineer. Copies of all freight bills and weigh bills shall be furnished to the Engineer during the progress of the work.

METHOD OF MEASUREMENT

609-4.1 The asphalt material will be measured by the ton. Water added to emulsified asphalt will not be measured for payment.

609-4.2 The quantity of aggregate materials for the first application to be paid for will be the number of tons of aggregate used for the accepted work.

609-4.3 The quantity of aggregate material for the second application to be paid for will be the number of tons of aggregate used for the accepted work.

609-4.4 The weight of aggregate for the third application to be paid for will be the number of tons of aggregate used for the accepted work.

BASIS OF PAYMENT

609-5.1 Payment will be made at the contract unit price per ton for asphalt material for surface treatment and per ton for the first, second and third aggregate application.

Payment will be made under:

Item P 609a	Asphalt Material - per ton
Item P 609b	First Application Aggregate - per ton
Item P 609c	Second Application Aggregate - per ton
Item P 609d	Third Application Aggregate - per ton

TESTING REQUIREMENTS

ATM 306	Percentage of Flat and Elongated Particles in Coarse Aggregate
ATM 414	Anti-Strip Requirements of Hot Mix Asphalt
ATM 313	Degradation Value of Aggregate
AASHTO T 96	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
AASHTO T 104	Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
WAQTC FOP for AASHTO TP 61	Percentage of Fracture in Coarse Aggregate
WAQTC FOP for AASHTO T 27/T 11	Sieve Analysis of Aggregates & Soils

MATERIAL REQUIREMENTS

AASHTO M 140	Emulsified Asphalt
AASHTO M 208	Cationic Emulsified Asphalt
ASTM D 946	Penetration-Graded Asphalt-Cement for Use in Pavement Construction
ASTM D 1250	Petroleum Measurement Tables
ASTM D 3381	Viscosity-Graded Asphalt-Cement for Use in Pavement Construction

ITEM P-610 STRUCTURAL PORTLAND CEMENT CONCRETE

DESCRIPTION

610-1.1 This item shall consist of plain or reinforced structural portland cement concrete, prepared and constructed according to these Specifications, at the locations and of the form and dimensions shown on the Plans.

MATERIALS

610-2.1 GENERAL. Only approved materials, conforming to the requirements of these Specifications, shall be used in the work. They may be subjected to inspection and tests at any time during the progress of their preparation or use. The source of supply of each of the materials shall be approved by the Engineer before delivery or use is started. Representative preliminary samples of the materials shall be submitted by the Contractor, when required, for examination and test. Materials shall be scored and handled to insure the preservation of their quality and fitness for use and shall be located to facilitate prompt inspection. All equipment for handling and transporting materials and concrete must be clean before any material or concrete is placed therein.

In no case shall the use of pit-run or naturally mixed aggregates be permitted. Naturally mixed aggregate shall be screened and washed, and all fine and coarse aggregates shall be stored separately and kept clean. The mixing of different kinds of aggregates from different sources in one storage pile or alternating batches of different aggregates will not be permitted.

610-2.2 COARSE AGGREGATE. The coarse aggregate shall meet the requirements of AASHTO M 80.

Coarse aggregate shall be well graded from coarse to fine, and shall meet AASHTO M 43, Number 57 or 67, when tested according to WAQTC FOP for AASHTO T 27/T 11.

610-2.3 FINE AGGREGATE. The fine aggregate shall meet the requirements of AASHTO M 6.

The fine aggregate shall be well graded from fine to coarse, and shall meet the requirements of AASHTO M 6, Table 1, when tested according to WAQTC FOP for AASHTO T 27/T 11.

Blending will be permitted, if necessary, in order to meet the gradation requirements for fine aggregate. Fine aggregate deficient in the percentage of material passing the No. 50 sieve may be accepted, provided that such deficiency does not exceed 5% and is remedied by the addition of pozzolanic or cementitious materials other than portland cement, as specified in 610-2.6 on admixtures, in sufficient quantity to produce the required workability as approved by the Engineer.

610-2.4 CEMENT. Cement shall conform to the requirements of AASHTO M 85.

The Contractor shall furnish manufacturer's certified test reports for each carload, or equivalent, of cement shipped to the project. The report shall be delivered to the Engineer before permission to use the cement is granted. All such test reports shall be subject to verification by testing sample materials received for use on the project.

610-2.5 WATER. The water used in concrete shall be potable and free from sewage, oil, acid, strong alkalies, vegetable matter, and clay and loam. If the water is of questionable quality, it shall be tested according to AASHTO T 26.

610-2.6 ADMIXTURES. The use of any material added to the concrete mix shall be indicated on the mix design approved by the Engineer. Before approval of any material, the Contractor shall be required to submit the results of complete physical and chemical analyses made by an acceptable testing laboratory.

Subsequent tests shall be made of samples taken by the Engineer from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

Pozzolanic admixtures shall be fly ash or raw or calcined natural pozzolans meeting the requirements of AASHTO M 295.

Air-entraining admixtures shall meet the requirements of AASHTO M 154. Air-entraining admixtures shall be added at the mixer in the amount necessary to produce the specified air content.

Water-reducing, set-controlling admixtures shall meet the requirements of AASHTO M 194, Type A water-reducing, or Type D water-reducing and retarding. Water-reducing admixtures shall be added at the mixer separately from air-entraining admixtures according to the manufacturer's printed instructions.

610-2.7 PREMOLDED JOINT MATERIAL. Premolded joint material for expansion joints shall meet the requirements of AASHTO M 213.

610-2.8 JOINT FILLER. The filler for joints shall meet the requirements of Item P-605.

610-2.9 STEEL REINFORCEMENT. Reinforcing shall consist of Deformed and Plain Billet-Steel Bars conforming to the requirements of AASHTO M 31, Welded Steel Wire Fabric conforming to the requirements of AASHTO M 55, Welded Deformed Steel Fabric conforming to the requirements of AASHTO M 221, or Bar Mats conforming to the requirements of AASHTO M 54, as shown on the Plans.

610-2.10 COVER MATERIALS FOR CURING. Curing materials shall conform to one of the following specifications:

AASHTO M 171	Waterproof Paper for Curing concrete
AASHTO M 171	Polyethylene Sheeting for Curing Concrete
AASHTO M 148, Type 1 or 2	Liquid Membrane-Forming Compounds for Curing Concrete

CONSTRUCTION METHODS

610-3.1 GENERAL. The Contractor shall furnish all labor, materials, and services necessary for, and incidental to, the completion of all work as shown on the drawings and specified herein. All machinery and equipment owned or controlled by the Contractor, which they propose to use on the work, shall be of sufficient size to meet the requirements of the work, and shall be such as to produce satisfactory work; all work shall be subject to the inspection and approval of the Engineer.

610-3.2 CONCRETE COMPOSITION. The concrete shall develop a minimum compressive strength of 3,600 psi in 28 days as determined by test cylinders made according to WAQTC FOP for AASHTO T 23 and tested according to AASHTO T 22. The concrete shall contain not less than 564 pounds of cement per cubic yard. The concrete shall contain 5% of entrained air, plus or minus 1%, as determined by WAQTC FOP for AASHTO T 152 and shall have a slump of not more than 4 inches as determined by WAQTC FOP for AASHTO T 119.

610-3.3 ACCEPTANCE SAMPLING AND TESTING. Concrete for each structure will be accepted on the basis of the compressive strength specified in Subsection 610-3.2. The concrete will be sampled according to WAQTC TM 2. Compressive strength specimens will be made according to WAQTC FOP for AASHTO T 23 and tested according to AASHTO T 22.

The Engineer will make the actual tests on the specimens at no expense to the Contractor.

610-3.4 PROPORTIONING AND MEASURING DEVICES. When package cement is used, the quantity for each batch shall be equal to one or more whole sacks of cement. The aggregates shall be measured separately by weight. If aggregates are delivered to the mixer in batch trucks, the exact amount for each

mixer charge shall be contained in each batch compartment. Weighing boxes or hoppers shall be approved by the Engineer and shall provide means of regulating the flow of aggregates into the batch box so that the required and exact weight of aggregates can be readily obtained.

610-3.5 CONSISTENCY. The consistency of the concrete shall be checked by the slump test specified in WAQTC FOP for AASHTO T 119.

610-3.6 MIXING. Concrete may be mixed at the construction site, at a central point, or in truck mixers. The concrete shall be mixed and delivered according to the requirements of AASHTO M 157.

610-3.7 MIXING CONDITIONS. The concrete shall be mixed only in quantities required for immediate use. Concrete shall not be mixed while the air temperature is below 40 °F without permission of the Engineer. If permission is granted for mixing under such conditions, aggregates or water, or both, shall be heated and the concrete shall be placed at a temperature not less than 50 °F nor more than 100 °F. The Contractor shall be held responsible for any defective work, resulting from freezing or injury in any manner during placing and curing, and shall replace such work at their expense.

Retempering of concrete by adding water or any other material shall not be permitted.

The delivery of concrete to the job shall be in such a manner that batches of concrete will be deposited at uninterrupted intervals.

610-3.8 FORMS. Concrete shall not be placed until all the forms and reinforcements have been inspected and approved by the Engineer. Forms shall be of suitable material and shall be of the type, size, shape, quality, and strength to build the structure as designed on the Plans. The forms shall be true to line and grade and shall be mortar-tight and sufficiently rigid to prevent displacement and sagging between supports. The Contractor shall bear responsibility for their adequacy. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes.

The internal ties shall be arranged so that, when the forms are removed, no metal will show in the concrete surface or discolor the surface when exposed to weathering. All forms shall be wetted with water or with a nonstaining mineral oil which shall be applied shortly before the concrete is placed. Forms shall be constructed so that they can be removed without injuring the concrete or concrete surface. The forms shall not be removed before the expiration of at least 30 hours from vertical faces, walls, slender columns, and similar structures; forms supported by falsework under slabs, beams, girders, arches, and similar construction shall not be removed until tests indicate that at least 80% of the design strength of the concrete has developed.

610-3.9 PLACING REINFORCEMENT. All reinforcement shall be accurately placed, as shown on the Plans, and shall be firmly held in position during concreting. Bars shall be fastened together at intersections. The reinforcement shall be supported by approved metal chairs. Shop drawings, lists, and bending details shall be supplied by the Contractor when required.

Reinforcing bars shall be bent cold and shall conform accurately to the shape and dimensions shown on the diagram. In no case shall the radius of any bend be less than 4 times the diameter of the bar.

Place reinforcement as indicated on the Plans or as hereinafter specified. Rigidly block and wire in place, using metal or plastic supports or concrete blocks and securely tie at each intersection with annealed iron wire of at least 1/8 inch.

Do not splice bars at points not indicated on the Plans except with the consent of the Engineer. Such splices shall be at the points of minimum tensile stress and the lap shall be not less than 36 bar diameters.

Verify the quantity, size, and shape of the reinforcement against the structure drawings and make necessary corrections to the bar lists and bending schedules before ordering. Errors in the bar lists and/or bending schedules shall not be cause for adjustment of the contract prices.

If reinforcing bars are to be welded, follow AWS D12.1.

610-3.10 EMBEDDED ITEMS. Before placing concrete, any items that are to be embedded shall be firmly and securely fastened in place as indicated. All such items shall be clean and free from coating, rust, scale, oil, or any foreign matter. The embedding of wood shall be avoided. The concrete shall be spaded and consolidated around and against embedded items.

610-3.11 PLACING CONCRETE. All concrete shall be placed during daylight, unless otherwise approved. The concrete shall not be placed until the depth and character of foundation, the adequacy of forms and falsework, and the placing of the steel reinforcing have been approved. Concrete shall be placed as soon as practical after mixing and in no case later than 1 hour after water has been added to the mix. The method and manner of placing shall be such to avoid segregation and displacement of the reinforcement. Troughs, pipes, and chutes shall be used as an aid in placing concrete when necessary. Dropping the concrete a distance of more than 5 feet, or depositing a large quantity at one point, will not be permitted. Concrete shall be placed upon clean, damp surfaces, free from running water, or upon properly consolidated soil.

The concrete shall be compacted with suitable mechanical vibrators operating within the concrete. When necessary, vibrating shall be supplemented by hand spading with suitable tools to assure proper and adequate compaction. Vibrators shall be manipulated so as to work the concrete thoroughly around the reinforcement and embedded fixtures and into corners and angles of the forms. The vibration at any joint shall be of sufficient duration to accomplish compaction but shall not be prolonged to the point where segregation occurs. Concrete deposited under water shall be carefully placed in a compact mass in its final position by means of a tremie, a closed bottom dump bucket, or other approved method and shall not be disturbed after being deposited.

610-3.12 CONSTRUCTION JOINTS. When the placing of concrete is suspended, necessary provisions shall be made for joining future work before the placed concrete takes its initial set. For the proper bonding of old and new concrete, such provisions shall be made for grooves, steps, keys, dovetails, reinforcing bars or other devices as may be prescribed. The work shall be arranged so that a section begun on any day shall be finished during daylight of the same day. Before depositing new concrete on or against concrete which has hardened, the surface of the hardened concrete shall be cleaned by a heavy steel broom, roughened slightly, wetted, and covered with a neat coating of cement paste or grout.

610-3.13 EXPANSION JOINTS. Expansion joints shall be constructed at such points and of such dimensions as may be indicated on the drawings. The premolded filler shall be cut to the same shape as that of the surfaces being joined. The filler shall be fixed firmly against the surface of the concrete already in place in such manner that it will not be displaced when concrete is deposited against it.

610-3.14 DEFECTIVE WORK. Any defective work disclosed after the forms have been removed shall be immediately removed and replaced. If any dimensions are deficient, or if the surface of the concrete is bulged, uneven, or shows honeycomb, which in the opinion of the Engineer cannot be repaired satisfactorily, the entire section shall be removed and replaced at the expense of the Contractor.

610-3.15 SURFACE FINISH. All exposed concrete surfaces shall be true, smooth, free from open or rough spaces, depressions, or projections. The concrete in horizontal plane surfaces shall be brought flush with the finished top surface at the proper elevation and shall be struck-off with a straightedge and floated. Mortar finishing shall not be permitted, nor shall dry cement or sand-cement mortar be spread over the concrete during the finishing of horizontal plane surfaces.

When directed, the surface finish of exposed concrete shall be a rubbed finish. If forms can be removed while the concrete is still green, the surface shall be pointed and wetted and then rubbed with a wooden float until all irregularities are removed. If the concrete has hardened before being rubbed, a carborundum stone shall be used to finish the surface. When approved, the finishing can be done with a rubbing machine.

610-3.16 CURING AND PROTECTION. All concrete shall be properly cured and protected by the Contractor. The work shall be protected from the elements, flowing water, and from defacement of any nature during the building operations. The concrete shall be cured as soon as it has sufficiently hardened by covering with an approved material. Water-absorptive coverings shall be thoroughly saturated when placed and kept saturated for a period of at least 3 days for Type III Portland Cement and at least 7 days for Type I or Type II Portland Cement Concrete. All curing mats or blankets shall be sufficiently weighted or tied down to keep the concrete surface covered and to prevent the surface from being exposed to currents of air. Where wooden forms are used, they shall be kept wet at all times until removed to prevent the opening of joints and drying out of the concrete. Traffic shall not be allowed on concrete surfaces for 7 days after the concrete has been placed.

610-3.17 DRAINS OR DUCTS. Drainage pipes, conduits, and ducts that are to be encased in concrete shall be installed by the Contractor before the concrete is placed. The pipe shall be held rigidly so that it will not be displaced or moved during the placing of the concrete.

610-3.18 COLD WEATHER PROTECTION. When concrete is placed at temperatures below 40 °F, the Contractor shall provide satisfactory methods and means to protect the mix from injury by freezing. The aggregates, or water, or both, shall be heated in order to place the concrete at temperatures between 50 and 100 °F.

610-3.19 FILLING JOINTS. All joints which require filling shall be thoroughly cleaned, and any excess mortar or concrete shall be cut out with proper tools. Joint filling shall not be started until after final curing and shall be done only when the concrete is completely dry. The cleaning and filling shall be carefully done with proper equipment and in a manner to obtain a neat looking joint free from excess filler.

METHOD OF MEASUREMENT

610-4.1 Portland cement concrete will be measured by the number of cubic yards of concrete complete in place and accepted. In computing the volume of concrete for payment, the dimensions used will be those shown on the Plans or ordered by the Engineer. No measurements or other allowances will be made for forms, falsework, cofferdams, pumping, bracing, expansion joints, or finishing of the concrete. No deductions will be made for the volumes of reinforcing steel or embedded items.

610-4.2 Reinforcing steel will be measured by the calculated theoretical number of pounds placed, as shown on the Plans, complete in place and accepted. The unit weight used for deformed bars will be the weight of plain square or round bars of equal nominal size. If so indicated on the Plans, the weight to be paid for will include the weight of metal pipes and drains, metal conduits and ducts, or similar materials indicated and included.

BASIS OF PAYMENT

610-5.1 Payment will be made at the contract unit price per cubic yard for structural portland cement concrete and per pound for reinforcing steel.

Payment will be made under:

Item P-610a	Structural Portland Cement Concrete - per cubic yard
Item P-610b	Steel Reinforcement - per pound

TESTING REQUIREMENTS

AASHTO T 22	Compressive Strength of Cylindrical Concrete Specimens
AASHTO T 26	Quality of Water to be used in Concrete
WAQTC FOP for AASHTO T 23	Making & Curing Concrete Test Specimens in the Field

WAQTC FOP for AASHTO T 27/T 11	Sieve Analysis of Aggregates & Soils
WAQTC FOP for AASHTO T 119	Slump of Freshly Mixed Concrete
WAQTC FOP for AASHTO T 152	Air Content of Freshly Mixed Concrete by the Pressure Method
WAQTC TM 2	Sampling Freshly Mixed Concrete

MATERIAL REQUIREMENTS

AASHTO M 6	Fine Aggregate for Portland Cement Concrete
AASHTO M 31	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
AASHTO M 43	Sizes of Aggregate for Road and Bridge Construction
AASHTO M 54	Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
AASHTO M 55	Steel Welded Wire Reinforcement, Plain, for Concrete
AASHTO M 80	Coarse Aggregate for Portland Cement Concrete
AASHTO M 85	Portland Cement
AASHTO M 148	Liquid Membrane-Forming Compounds for Curing Concrete
AASHTO M 154	Air-Entraining Admixtures for Concrete
AASHTO M 157	Ready-Mixed Concrete
AASHTO M 171	Sheet Materials for Curing Concrete
AASHTO M 194	Chemical Admixture for Concrete
AASHTO M 213	Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
AASHTO M 221	Steel Welded Wire Reinforcement, Deformed, for Concrete
AASHTO M 295	Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
AWS D12.1	Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction

ITEM P-620 RUNWAY AND TAXIWAY PAINTING

DESCRIPTION

620-1.1 This item shall consist of the painting of numbers, markings, and stripes on the surface of runways, taxiways, and aprons, according to these Specifications and at the locations shown on the Plans, or as directed by the Engineer.

MATERIALS

620-2.1 MATERIALS ACCEPTANCE. The Contractor shall furnish manufacturer's certified test reports for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. The reports can be used for material acceptance or the Engineer may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the Engineer upon arrival of a shipment of materials to the site.

620-2.2 PAINT. Paint shall be waterborne or solvent base according to the requirements of Subsection 620-2.2, a. or b. Paint shall be furnished in white (37925) and yellow (33538 or 33655) according to Federal Standard No 595. Paint shall be furnished in Type II (fast drying time for no-pick-up) when tested according to ASTM D 711.

a. Waterborne. Paint shall meet the requirements of Federal Specification TT-P-1952D, Type II.

b. Solvent Base. Paint shall meet the requirements of Federal Specification A-A-2886A, Type II, or the State of Alaska DOT&PF maintenance specification for "Traffic Paint - No-Heat Instant Dry Pavement Marking Material".

620-2.3 REFLECTIVE MEDIA. Glass beads shall meet the requirements of Fed. Spec. TT-B-1325, Type I, gradation A. Glass beads shall be treated with adhesion promoting and/or flotation coatings as specified by the manufacturer of the paint.

CONSTRUCTION METHODS

620-3.1 WEATHER LIMITATIONS. The painting shall be performed only when the surface is dry and when the surface temperature is at least 40 °F and rising and the pavement surface temperature is at least 5 °F above the dew point.

620-3.2 EQUIPMENT. Equipment shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine, a bead dispensing machine, and such auxiliary hand-painting equipment as may be necessary to satisfactorily complete the job.

The mechanical marker shall be an atomizing spray-type marking machine suitable for application of traffic paint. It shall produce an even and uniform film thickness at the required coverage and shall apply markings of uniform cross sections and clear-cut edges without running or spattering and without over spray.

620-3.3 PREPARATION OF SURFACE. Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance, or other foreign material which would reduce the bond between the paint and the pavement. The area to be painted shall be cleaned by sweeping and blowing or by other methods as required to remove all dirt, laitance, and loose materials. Areas which cannot be satisfactorily cleaned by brooming and blowing shall be scrubbed as directed with a 10% solution of tri-sodium phosphate or an equally suitable solution. After scrubbing, the solution shall be rinsed off and the surface dried prior to painting.

620-3.4 LAYOUT OF MARKINGS. The proposed markings shall be laid out in advance of the paint application. The locations of markings to receive glass beads shall be shown on the Plans. Space control points at such intervals to ensure accurate location of all markings. Provide an experienced technician to supervise the location, alignment, layout dimensions, and application of the paint.

620-3.5 APPLICATION. Paint shall be applied at the locations and to the dimensions and spacing shown on the Plans. Paint shall not be applied until the layout and condition of the surface have been approved by the Engineer.

The edges of the markings shall not vary from a straight line more than 1/2 inch in 50 feet, and the marking dimensions and spacings shall be within the following tolerances:

Dimension and Spacing	Tolerance
Less than 36 inches	1/2 inch
36 inches to 6 feet	1 inch
6 feet to 60 feet	2 inches
Over 60 feet	3 inches

The paint shall be mixed and applied according to the manufacturer's instructions. The addition of thinner will not be permitted. The paint shall be applied to the pavement with a marking machine at the rate shown in Table 1

TABLE 1. APPLICATION RATES FOR PAINT AND GLASS BEADS

Paint Type	Paint, ft^2/gal maximum	Glass Beads lb/gal of paint (±2 oz.)
Waterborne	80	7
Solvent Base	80	7

Pressure apply the glass beads on the marked areas at the locations shown on the Plans using a mechanical dispenser mounted not more than 12 inches behind the paint dispenser. Beads shall be applied at the rate shown in Table 1 and shall adhere to the cured paint or all marking operations shall cease until corrections are made.

All emptied containers shall be returned to the paint storage area for checking by the Engineer. The containers shall not be removed from the airport or destroyed until authorized by the Engineer.

620-3.6 PROTECTION. After application of the paint, all markings shall be protected from damage until the paint is dry. All surfaces shall be protected from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage, or drippings of paint.

METHOD OF MEASUREMENT

620-4.1 The quantity of runway and taxiway markings to be paid for will be the number of square feet of painting and the number of pounds of reflective media, performed according to the Specifications and accepted by the Engineer.

BASIS OF PAYMENT

620-5.1 Payment will be made at the respective contract price per square foot for runway and taxiway painting and per pound for reflective media.

Payment will be made under:

Item P-620a	Runway and Taxiway Painting - per square foot
Item P-620b	Reflective Media - per pound

TESTING REQUIREMENTS

ASTM C 371	Wire-Cloth Sieve Analysis of Nonplastic Ceramic Powders
ASTM D 92	Flash and Fire Points by Cleveland Open Cup
ASTM D 711	No-Pick-Up Time of Traffic Paint
ASTM D 968	Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D 1652	Epoxy Content of Epoxy Resins
ASTM D 2074	Total Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
ASTM D 2240	Rubber Products-Durometer Hardness
ASTM G 53	Operating Light and Water-Exposure Apparatus (Florescent UV-Condensation Type) for Exposure of Nonmetallic Materials.
Federal Test Method Standard No. 141	Paint, Varnish, Lacquer and Related Materials; Methods of Inspection, Sampling and Testing

MATERIAL REQUIREMENTS

Alaska DOT/PF Yellow	Traffic Paint - No-Heat Instant Dry Pavement Marking Material; White and
ASTM D 476	Titanium Dioxide Pigments
Code of Federal Regulations	40 CFR Part 60, Appendix A, 29 CFR Part 1910.1200
Commercial Item Description (CID) A-A 2886A	Paint, Traffic, Solvent Based
Fed. Spec. TT-B-1325	Beads (Glass Spheres) Retroreflective
Fed. Spec. TT-P-1952D	Paint, traffic and Airfield Marking, Waterborne
Federal Standard 595	Colors used in Government Procurement

ITEM P-625 COAL-TAR PITCH EMULSION SEAL COAT

DESCRIPTION

625-1.1 This item shall consist of an application of a coal-tar emulsion seal coat, with or without mineral aggregate, applied on an existing, previously prepared bituminous surface, according to these Specifications for the area shown on the Plans or as designated by the Engineer. The material is intended for use as a fuel-resistant sealer.

MATERIALS

625-2.1 AGGREGATE. The aggregate shall either be a natural or manufactured angular aggregate and shall be composed of clean, hard, durable, uncoated particles, free from lumps of clay and all organic matter. The aggregate shall meet the gradation in Table 1, when tested according to WAQTC FOP for AASHTO T 27/T 11.

TABLE 1. GRADATION OF AGGREGATES

Sieve size	Percent Passing, By Weight
No. 8	100
No. 16	97-100
No. 20	85-100
No. 30	15-85
No. 50	2-10
No. 100	0-2

625-2.2 BITUMINOUS MATERIALS. The bituminous material shall be a coal-tar pitch emulsion prepared from a high temperature, coal-tar pitch conforming to the requirements of ASTM D 490, grade 11/12. Oil and water gas tar shall not be used even though they comply with ASTM D 490. The coal-tar pitch emulsion shall conform to all requirements of ASTM D 5727, except that the water content shall not exceed 50%.

625-2.3 WATER. The water used in mixing shall be potable and free from harmful soluble salts. The temperature of the water added during mixing shall be at least 50 °F. The pH of the water, added during mixing, shall conform to the requirements of the coal-tar emulsion manufacturer.

COMPOSITION AND APPLICATION

625-3.1 COMPOSITION. The coal-tar pitch emulsion seal coat shall consist of a mixture of coal-tar pitch emulsion, water, and aggregate in proportions that fall within the ranges shown in Table 2.

625-3.2 JOB MIX FORMULA. The Contractor shall submit the recommended formulation of water, emulsion, and aggregate and application rate proposed for use to the Engineer at least 15 calendar days prior to the start of operations. The mix design shall be within the range shown in Table 2. No seal coat shall be produced for payment until a job mix formula has been approved by the Engineer. The job mix formula for each mixture shall be in effect until modified in writing by the Engineer.

TABLE 2. COMPOSITION OF MIXTURE

Type of Seal Coat	Water gal/gal of emul.	Aggregate lb/gal of emul.	Application Rate gal/yd^2 (per application)
Sand Slurry	0.15 (max)	2-5	0.15-0.20
Plain Emulsion	0.10 (max)	--	0.08-0.10

625-3.3 APPLICATION RATE. The sand slurry coal-tar emulsion seal coat shall be applied in 2 coats. The application rate submitted with the job mix formula shall be verified during placement of the test section and shall fall within the limits shown in Table 2.

625-3.4 TEST SECTION. Prior to full production, the Contractor shall prepare a quantity of mixture in the proportions shown in the approved mix design. The amount of mixture shall be sufficient to place a test section a minimum of 250 yd^2 at the rate specified in the job mix formula. The area to be tested will be designated by the Engineer and will be located on a representative section of the pavement to be seal coated. The actual application rate will be determined by the Engineer during placement of the test section and will depend on the condition of the pavement surface.

The test section shall be used to verify the adequacy of the mix design and to determine the application rate. The same equipment and method of operations shall be used on the test section as will be used on the remainder of the work.

If the test section should prove to be unsatisfactory, the necessary adjustments to the mix composition, application rate, placement operations, and equipment shall be made. Additional test sections shall be placed and evaluated, if required. Full production shall not begin without the Engineer's approval.

CONSTRUCTION METHODS

625-4.1 WEATHER LIMITATIONS. The seal coat shall not be applied when the surface is wet or when the humidity or impending weather conditions will not allow proper curing. The seal coat shall be applied only when the pavement surface temperature is 60 °F or higher.

625-4.2 EQUIPMENT AND TOOLS. The Contractor shall furnish all equipment, tools, and machinery necessary for the performance of the work.

a. Distributors. Distributors or spray units used for the spray application of the seal coat shall be self-propelled and capable of uniformly applying 0.15 to 0.55 gal/yd^2 of material over the required width of application. Distributors shall be equipped with removable manhole covers, tachometers, pressure gauges, and volume-measuring devices.

The mix tank shall have a mechanically powered, full-sweep mixer with sufficient power to move and homogeneously mix the entire contents of the tank.

The distributor shall be equipped with a positive placement pump so that a constant pressure can be maintained on the mixture to the spray nozzles.

b. Mixing Equipment. The mixing machine shall have a continuous flow mixing unit capable of accurately delivering a predetermined proportion of aggregate, water, and emulsion, and of discharging the thoroughly mixed product on a continuous basis. The mixing unit shall be capable of thoroughly blending all ingredients together and discharging the material to the spreader box without segregation.

c. Spreading Equipment. Attach to the mixing machine a mechanical-type squeegee distributor, equipped with flexible material in contact with the surface to prevent loss of slurry from the spreader box. It shall be maintained to prevent loss of slurry on varying grades and adjusted to assure uniform spread. There shall be a lateral control device and a flexible strike-off capable of being adjusted to lay the slurry at the specified rate of application. The spreader box shall have an adjustable width. The box shall be kept clean; coal-tar emulsion and aggregate build-up on the box shall not be permitted.

d. Calibration. The Contractor shall furnish all equipment and materials and labor necessary to calibrate the equipment. It shall be calibrated to assure that it will produce and apply a mix that

conforms to the job mix design. Commercial equipment should be provided with a method of calibration by the manufacturer. All calibrations shall be made with the approved job materials prior to applying the seal coat to the pavement. A copy of the calibration test results shall be furnished to the Engineer.

625-4.3 PREPARATION OF PAVEMENT SURFACE. Bituminous pavement surfaces which have been softened by petroleum derivatives or have failed due to any other cause shall be removed to the full depth of the damage and replaced with new bituminous concrete similar to that of the existing pavement. Areas of the pavement surface to be treated shall be in a firm consolidated condition. They shall be sufficiently cured so that there is no concentration of oils on the surface. This can usually be determined by pouring water on the surface to be treated. If the water, after standing for a short period, picks up a film of oil, the surface is not sufficiently cured for the application of emulsion.

A minimum of 15 days shall elapse between the placement of a bituminous surface course and the application of the seal coat.

625-4.4 CLEANING EXISTING SURFACE. Prior to placing the seal coat, the surface of the pavement shall be clean and free from dust, dirt, or other loose foreign matter, grease, oil, or any type of objectionable surface film. When directed by the Engineer, the existing surface shall be cleaned with wire brushes and a power blower.

Where vegetation exists in cracks, the vegetation shall be removed and the cracks cleaned to a depth of 2 inches, where practicable. These cracks shall be treated with a concentrated solution of an herbicide approved by the Engineer.

Route out cracks less than 1/2 inch wide and seal them. Fill existing cracks greater than 1/2 inch wide with sealer and aggregate meeting Subsection 625-2.1. Crack sealer shall meet the requirements of AASHTO M 324 remaining flexible to -40 °F. Areas that have been subjected to fuel or oil spillage shall be wire brushed to remove any dirt accumulations. The area shall then be primed with shellac or a synthetic resin to prevent the seal coat from debonding.

625-4.5 TACK COAT. A tack coat shall be applied only if recommended by the emulsion supplier. After the surface has been prepared, a tack coat of 3 parts water to 1 part emulsified binder, as specified in Subsection 625-2.2, shall be applied at the rate of 0.05 to 0.10 gal/yd^2 of surface.

When a tack coat is not specified, the pavement shall be dampened with a fog spray of water if recommended by the supplier. No standing water shall remain on the surface.

Following the application, the surface shall be allowed to cure without being disturbed for such period of time as may be necessary to permit adhesion of the seal coat. This period shall be determined by the Engineer. Suitable precautions shall be taken by the Contractor to protect the surface against damage during this interval.

625-4.6 APPLICATION OF PLAIN EMULSION. Plain emulsion shall be applied at a uniform rate with a distributor at the rate as determined in Subsection 625-3.4. When it is necessary to dilute the emulsion in older to aid application, the emulsion may be diluted with clean water but not by more than 10%.

625-4.7 APPLICATION OF SAND SLURRY. The sand slurry shall be applied at a uniform rate with a distributor or squeegee at the rate determined in Subsection 625-3.4. When the emulsion, water, and aggregate are blended, the material shall be premixed to produce a homogeneous mixture of uniform consistency. The quantities of materials to be combined in each batch shall be according to the approved mix design.

The mixing sequence of the various components shall be the same as indicated in the job mix formula. After all constituents are in the mixer, the mixing shall continue for approximately 5 minutes or longer, if necessary. The mixing shall produce a smooth, free flowing homogeneous mixture of uniform consistency.

Slow mixing shall be continuous from the time the emulsion is placed into the mixer until the slurry is applied by distributor truck or poured into the spreading equipment. During the entire mixing process, no breaking, segregating, or hardening of the emulsion nor balling, lumping, or swelling of the aggregate shall be permitted. The slurry shall be applied at a uniform rate to provide the quantity determined during placement of the test strip.

When a spreader box is used, a sufficient amount of slurry shall be fed in the spreader box to keep a full supply against the full width of the squeegee, so that complete coverage of all surface voids and cracks is obtained.

Manufacturer's recommendations regarding application by spraying or squeegeeing should be followed. In areas inaccessible to equipment, the slurry may be applied by means of a hand squeegee.

Upon completion of the work, the seal coat shall have no pinholes, bare spots, or cracks through which liquids or foreign matter could penetrate to the underlying pavement. The finished surface shall present a uniform texture.

Each application shall be allowed to dry thoroughly before the next coat is applied. Suitable precautions shall be taken by the Contractor to protect the surface against damage during this interval.

625-4.8 CURING. The mixture shall be permitted to dry for a minimum of 24 hours after the final application before opening to traffic and shall be sufficiently cured to drive over without damage to the seal coat. Any damage to the uncured mixture will be the responsibility of the Contractor to repair.

625-4.9 HANDLING. The mixture shall be continuously agitated from the initial mixing until its application on the pavement surface. The distributor or applicator, pumps, and all tools shall be maintained in a satisfactory working condition.

QUALITY CONTROL

625-5.1 CONTRACTOR'S CERTIFICATION. The Contractor shall furnish the manufacturer's certification that each consignment of emulsion shipped to the project meets the requirements of ASTM D 5727, except that the water content shall not exceed 50%. The certification shall also indicate the solids and ash content of the emulsion and the date the tests were conducted. The certification shall be delivered to the Engineer prior to the beginning of work.

625-5.2 INSPECTION. The Contractor shall have an independent technical consultant on the job site during the seal coat operations. The consultant shall have knowledge of the materials, procedures, and equipment described in this specification and shall assist the Contractor regarding proper mixing of the component materials and application of the seal coat. The consultant shall have a minimum of 3 years experience in the use of coal-tar seal coats. Documentation of this experience shall be furnished to the Engineer prior to the start of operations.

METHOD OF MEASUREMENT

625-6.1 The coal-tar pitch emulsion will be measured by the ton of undiluted coal-tar emulsion.

625-6.2 The mineral aggregate will be measured by the ton.

BASIS OF PAYMENT

625-7.1 Payment will be made at the contract unit prices for materials complete in place, including acceptable test sections.

The cost of the technical consultant is subsidiary.

Payment will be made under:

Item P-625a	Coal-Tar Pitch Emulsion - per ton
Item P-625b	Aggregate - per ton

TESTING REQUIREMENTS

WAQTC FOP for AASHTO T 27/T 11	Sieve Analysis of Aggregates & Soils

MATERIAL REQUIREMENTS

AASHTO M 324	Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM D 490	Tars, (For Use in Road Construction)
ASTM D 5727	Emulsified Refined Coal Tar (Mineral Colloid Type)

ITEM P-626 EMULSIFIED ASPHALT SLURRY SEAL SURFACE TREATMENT

DESCRIPTION

626-1.1 This item shall consist of a mixture of emulsified asphalt, mineral aggregate, and water properly proportioned, mixed, and spread on an asphalt prepared underlying course or existing wearing course according to these Specifications and shall conform to the dimensions shown on the Plans or as directed by the Engineer.

626-1.2 ACRONYMS. Also see Subsection GCP-10-02.
ISSA International Slurry Surfacing Association, Washington, DC

MATERIALS

626-2.1 AGGREGATE. The aggregate shall consist of sound and durable manufactured sand, slag, crusher fines, crushed stone, or a combination thereof. The aggregate shall be clean and free from vegetable matter, dirt, and other deleterious substances. The aggregate shall have a sand equivalent of not less than 45% when tested according to WAQTC FOP for AASHTO T 176. The aggregate shall show a loss of not more than 35% when tested according to AASHTO T 96. The sodium sulfate soundness loss shall not exceed 12%, or the magnesium soundness loss shall not exceed 20% after 5 cycles when tested according to AASHTO T 104. Aggregate shall be 100% crushed. Aggregates shall have a minimum degradation value of 50 when tested according to ATM 313.

The combined aggregate shall conform to the gradation shown in Table 1 when tested according to WAQTC FOP for AASHTO T 27/T 11.

TABLE 1. GRADATION OF AGGREGATES

Sieve Size	Percent by Weight Passing Sieve		
	Type I	Type II	Type III
3/8 in.	100	100	100
No. 4	100	90 - 100	70 - 90
No. 8	90 - 100	65 - 90	45 - 70
No. 16	65 - 90	45 - 70	28 - 50
No. 30	40 - 65	30 - 50	19 - 34
No. 50	25 - 42	18 - 30	12 - 25
No. 100	15 - 30	10 - 21	7 - 18
No. 200	10 - 20	5 - 15	5 - 15
Residual asphalt content, percent dry weight of aggregate	10% - 16%	7.5% - 13.5%	6.5% - 12%

The job mix formula (mix design) shall be run using aggregate within the gradation band for the desired type shown in Table 1. Once the mix design has been submitted and approved, the aggregate used on the project shall not vary by more than the tolerances shown in Table 2. At no time shall the aggregate used go out of the gradation bands in Table 1.

The aggregate will be accepted at the job location or stockpile. The stockpile will be accepted based on 5 gradation tests samples according to WAQTC FOP for AASHTO T 2. If the average of the 5 tests is within the gradation tolerances, the materials will be accepted. If the tests show the material to be out of tolerance, the Contractor has the choice either to remove the material or blend other aggregates with the stockpile material to bring it into specification. Materials used in blending shall meet the quality tests before blending and shall be blended in a manner to produce a consistent gradation. This blending may require a new mix design.

Screening shall be required at the project stockpile site if there are any problems created by having oversize materials in the mix. Precautions shall be taken to prevent segregation of the aggregate in storing and handling. The stockpile shall be kept in areas that drain readily.

a. **Aggregate Tolerance.** Once the mix design has been accepted, the aggregate gradation used on the project may vary from the aggregate gradation used in the mix design on each sieve by the percentages shown in Table 2. If the project aggregate fails to remain within this tolerance, a new mix design will be required by the Engineer at the expense of the Contractor.

TABLE 2. TOLERANCES

Sieve Size	Tolerance, percent passing by weight
3/8 in.	± 5
No. 4	± 5
No. 8	± 5
No. 16	± 5
No. 30	± 5
No. 50	± 4
No. 100	± 3
No. 200	± 2
Residual Asphalt, percent dry weight of aggregate	± 1

626-2.2 MINERAL FILLER. If mineral filler, in addition to that naturally present in the aggregate, is necessary, it shall meet the requirements of AASHTO M 17 and shall be used in the amounts required by the mix design. The mineral filler shall be considered as part of the aggregate.

626-2.3 EMULSIFIED ASPHALT. The emulsified asphalt shall conform to the requirements of AASHTO M 140 and/or AASHTO M 208 and shall be SS, CSS, CQS, or QS type emulsions.

626-2.4 WATER. All water used in making the slurry shall be potable and free from harmful soluble salts and chemicals.

COMPOSITION AND APPLICATION

626-3.1 COMPOSITION. The slurry seal shall consist of a mixture of emulsified asphalt, mineral aggregate, and water.

626-3.2 JOB MIX FORMULA. No slurry seal for payment shall be placed until a mix design has been approved by the Engineer. The mix design shall be developed by a laboratory with experience in designing slurry seal mixes and a signed copy shall be submitted in writing by the Contractor to the Engineer at least 10 days prior to the start of operations.

The laboratory report (mix design) shall indicate the proportions of aggregates, mineral filler (min. and max.), water (min. and max.) and asphalt emulsion based on the dry aggregate weight. It shall also report the quantitative effects of moisture content on the unit weight of the aggregate (bulking effects). The mix design shall be in effect until modified in writing by the Engineer. Should a change in sources of materials be made, a new mix design shall be established before the new material is used.

The Contractor shall submit to the Engineer for approval a complete mix design on the materials proposed for use, prepared and certified by an approved laboratory. Compatibility of the aggregate, emulsion, mineral filler, and other additives shall be verified by the mix design. The mix design shall be made with the same

aggregate and grade of emulsified asphalt that the Contractor will provide on the project. At a minimum the required tests and values needed are as follows:

TEST	DESCRIPTION	SPECIFICATION
ISSA TB-100	Wet Track Abrasion Loss, One Hour Soak	50 g/ft² Max
ISSA TB-115	Determination of Slurry Seal Compatibility	Pass

626-3.3 APPLICATION RATE. Unless otherwise specified, the slurry seal shall be applied to at the application rates shown in Table 3 for that gradation of material used. The rate of application shall not vary more than ± 2 lb/yd².

TABLE 3. APPLICATION RATES
Pounds of mixture per square yard

Type I	Type II	Type III
8 - 12	12 - 20	18 - 30

626-3.4 TEST SECTIONS. Test sections, of 60 yd^2 each, shall be placed prior to the start of the slurry seal work in the presence of the Engineer. The test area will be designated by the Engineer and will be located on the existing pavement. Test strips shall be made by each machine after calibration. Samples of the slurry seal may be taken and the mix consistency verified by using ISSA TB-106 Slurry Seal Consistency test. In addition, the proportions of the individual materials may be verified by the Engineer by using the calibration information provided after machine calibration. If any test does not meet specification requirements, additional tests shall be made at the expense of the Contractor, until an acceptable test strip is placed.

CONSTRUCTION METHODS

626-4.1 WEATHER LIMITATIONS. The slurry seal shall not be applied if the pavement temperature is below 60 °F. No slurry seal shall be applied when there is danger that the finished product will freeze before 24 hours. The mixture shall not be applied when weather conditions prolong opening to traffic beyond a reasonable time.

626-4.2 EQUIPMENT AND TOOLS. The Contractor shall furnish all equipment, tools, and machinery necessary for the performance of this work.

a. **Slurry Mixing Equipment.** The machine shall be specifically designed and manufactured to lay slurry seal. The material shall be mixed by a self-propelled slurry seal mixing machine of either truck mounted or continuous run design. Either type machine shall be able to accurately deliver and proportion the aggregate, emulsified asphalt, mineral filler, and water to a revolving mixer and discharge the mixed product on a continuous flow basis. The machine shall have sufficient storage capacity for materials to maintain an adequate supply to the proportioning controls.

   If continuous run equipment is used, the machine shall be equipped to allow the operator to have full control of the forward and reverse speed of the machine during application of the slurry seal, with a self-loading device, with opposite side driver stations, all part of original equipment manufacturer design.

   The aggregate shall be prewetted immediately prior to mixing with the emulsion. The mixing unit of the mixing chamber shall be capable of thoroughly blending all ingredients. No excessive mixing shall be permitted. The mixing machine shall be equipped with a fines feeder that provides an accurate metering device or method to introduce a predetermined proportion of mineral filler into the mixer at the same time and location that the aggregate is fed into the mixer.

The mixing machine shall be equipped with a water pressure system and fog-type spray bar adequate for complete fogging of the surface with an application of 0.05 to 0.10 gal/yd² preceding the spreading equipment.

Sufficient machine storage capacity to mix properly and apply a minimum of 5 tons of the slurry shall be provided. Proportioning devices shall be calibrated prior to placing the slurry seal.

b. Slurry Spreading Equipment. The mixture shall be spread uniformly by means of a conventional surfacing spreader box attached to the mixer and equipped to agitate and spread the material evenly throughout the box. A front seal shall be provided to insure no loss of the mixture at the surface contact point. The rear seal shall act as the final strike-off and shall be adjustable. The spreader box and rear strike-off shall be so designed and operated that a uniform consistency is achieved to produce a free flow of material to the rear strike-off. The spreader box shall have suitable means provided to side shift the box to compensate for variations in the pavement geometry. A burlap drag or other approved screed may be attached to the rear of the spreader box to provide a uniform mat.

A continuous spreading operation shall be maintained by means of a continuous charging operation so that a minimum of construction joints occur. Continuous operating is defined as one in which the spreading operation progresses prior to initial setting or breaking of the slurry mix, which starts within approximately 15 minutes.

Provide suitable storage facilities for the asphalt emulsion, using containers equipped to prevent water from entering the emulsion. If necessary, suitable heat shall be provided to prevent freezing.

c. Auxiliary Equipment. Other tools or equipment such as brushes, hand squeegees, hose equipment, tank trucks, water distributors and flushers, power blowers, barricades, etc., shall be provided as required.

d. Roller. The roller, if required, shall be a self-propelled pneumatic-tired roller capable of exerting a contact pressure during rolling of 50 psi. It shall be equipped with a water spray system, to be used if the slurry is picking up on the tires during rolling.

e. Tack Coat and Distributor. Normally a tack coat is not required unless the surface to be covered is extremely dry and raveled or is concrete or brick. If required, the tack coat should consist of one part emulsified asphalt and three parts water. The emulsified asphalt may be the same as that used in the mix. Pressure distributors used for application of the diluted asphalt emulsion tack coat shall be self-propelled, equipped with pneumatic tires, and capable of uniformly applying 0.05 to 0.15 gal/yd² of the diluted emulsion over the required width of application. Distributors shall be equipped with tachometers, pressure gages, and volume-measuring devices. The tack coat shall be applied at least 2 hours before the slurry seal but within the same day.

626-4.3 EQUIPMENT CALIBRATION. Each slurry mixing unit to be used on the project shall be calibrated in the presence of the Engineer prior to construction. Previous calibration documentation covering the exact materials to be used may be accepted by the Engineer provided they were made during the calendar year. The documentation shall include an individual calibration of each material at various settings, which can be related to the machine's metering devices. No machine will be allowed to work on the project until the calibration has been completed and/or accepted.

626-4.4 PREPARATION OF EXISTING SURFACE. Prior to placing the tack coat and slurry seal coat, unsatisfactory areas shall be repaired and the surface shall be cleaned of dust, dirt, or other loose foreign matter, grease, oil, excessive rubber accumulation, or any type of objectionable surface film. Any standard cleaning method will be acceptable except that water flushing will not be permitted in areas where considerable cracks are present in the pavement surface.

All painted stripes or markings on the surface of the runways or taxiways to be treated, shall be removed. Cracks wider than 1/4 inch shall be cleaned with compressed air, and sealed with a compatible crack sealer

prior to applying the slurry seal. Cracks wider than 3/4 inch shall be pre-filled and sealed with the slurry mixture prior to surfacing. Cracks that show evidence of vegetation shall be cleaned and treated with an approved herbicide.

626-4.5 APPLICATION OF SLURRY SEAL COAT. Charge the mixture in the following order:

- **a.** Water
- **b.** Aggregate
- **c.** Asphalt Emulsion

No violent mixing will be permitted. Maintain temperature range at the mixer between 90 and 120 °F. Mix until a uniform coating of the aggregate is obtained. Continue mixing until the mixture is discharged into the spreader box. Discard the entire batch if there is evidence that the emulsion has broken.

The surface shall be prewet by fogging ahead of the slurry spreader box. Water used in prewetting the surface shall be applied at such a rate that the entire surface is damp with no apparent flowing water in front of the slurry spreader box. The slurry mixture shall be of the desired consistency when deposited on the surface, and no additional elements shall be added. Total time of mixing shall not exceed 2 minutes. A sufficient amount of slurry shall be carried in all parts of the spreader box at all times so that complete coverage of all surface voids and cracks is obtained. Care shall be taken not to overload the spreader box which shall be towed at a slow and uniform rate not to exceed 5 mph. No lumping, balling, or unmixed aggregate shall be permitted. No segregation of the emulsion and fines from the coarse aggregate will be permitted. If the coarse aggregate settles to the bottom of the mix, the slurry shall be removed from the pavement surface. A sufficient amount of slurry shall be fed into the box to keep a full supply against the full width of the spreader box. The mixture shall not be permitted to overflow the sides of the spreader box. No breaking of the emulsion will be allowed in the spreader box.

Apply the slurry seal to form a film with a maximum thickness of 3/8 inch. Isolated depressions and cracks may have a thickness greater than 3/8 inch in order to obtain a smooth surface.

The finished surface shall have no more than 4 tear or drag marks greater than 1/2 inch wide and 4 inches long in any 12 foot by 22 foot section. It shall have no tear or drag marks greater than 1 inch wide and 3 inches long.

The finished surface shall have no transverse ripples of 1/4 inch or more in depth, as measured with a 10-foot straight edge laid upon the surface.

Adjacent lanes shall be lapped at the edges a minimum of 2 inches with a maximum of 4 inches to provide complete sealing at the overlap. Construction longitudinal and transverse joints shall be neat and uniform without buildup, uncovered areas, or unsightly appearance. All joints shall have no more than 1/4 inch difference in elevation when measured across with a 10-foot straight edge.

After application of the slurry seal, the surface shall be rolled with a pneumatic-tired roller a minimum of 2 complete passes. The roller shall be operated at a tire pressure of approximately 50 psi.

The fresh slurry seal application shall be protected by barricades and markers and permitted to dry for 4 to 24 hours, depending on weather conditions. Any damage to uncured slurry shall be repaired at the expense of the Contractor.

In areas where the spreader box cannot be used, the slurry shall be applied by means of a hand squeegee. Upon completion of the work, the seal coat shall have no holes, bare spots, or cracks through which liquids or foreign matter could penetrate to the underlying pavement. The finished surface shall present a uniform and skid resistant texture satisfactory to the Engineer. All wasted and unused material and all debris shall be removed from the site prior to final acceptance.

Upon completion of the project, the Contractor shall sweep the finished surface with a conventional power rotary broom, to remove any potential loose material from the surface. The material removed by sweeping shall be disposed of in a manner satisfactory to the Engineer.

626-4.6 CERTIFICATION. Samples of the emulsion that the Contractor proposes to use, together with a statement as to its source, shall be submitted, and approval shall be obtained before using such material. The Contractor shall submit to the Engineer a manufacturer's certified report for each consignment of the emulsion. The manufacturer's certified report shall not be interpreted as a basis for final acceptance. All such reports shall be subject to verification by testing samples of the emulsion as received for use on the project.

METHOD OF MEASUREMENT

626-5.1 The emulsified asphalt for slurry coat will be measured by the square yard.

626-5.2 Aggregate will be measured by the ton of dry aggregate.

626-5.3 Tack coat will be measured by the ton.

BASIS OF PAYMENT

626-6.1 Payment will be made at the contract unit price per square yard for the slurry coat and at the contract price per ton for aggregate and tack coat.

Payment will be made under:

Item P-626a	Emulsified Asphalt for Slurry Coat - per square yard
Item P-626b	Aggregate - per ton
Item P-626c	Emulsified Asphalt for Tack Coat - per ton

TESTING REQUIREMENTS

AASHTO T 96	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
AASHTO T 104	Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
ATM 313	Degradation Value of Aggregate
ISSA A 105	Recommended Performance Guidelines
ISSA TB-100	Wet Track Abrasion Loss
ISSA TB-106	Slurry Seal Consistency
ISSA TB 111	Outline Guide Design Procedure for Slurry Seal
ISSA TB-115	Determination of Slurry Seal Compatibility
WAQTC FOP for AASHTO T 2	Sampling Aggregates
WAQTC FOP for AASHTO T 27/T 11	Sieve Analysis of Aggregates & Soils
WAQTC FOP for AASHTO T 176	Sand Equivalent

MATERIAL REQUIREMENTS

AASHTO M 17	Mineral Filler for Bituminous Paving Mixtures
AASHTO M 140	Emulsified Asphalt
AASHTO M 208	Cationic Emulsified Asphalt

ITEM P-630 PAVEMENT GROOVING

DESCRIPTION

630-1.1 This item shall consist of saw cutting of grooves on runways, taxiways, or other paved surfaces to the dimensions shown on the Plans or as directed by the Engineer.

EQUIPMENT AND MATERIALS

630-2.1 PAVEMENT GROOVING MACHINE. The pavement grooving machine shall be a single self-propelled unit with multiple cutting blades mounted on a single shaft. The machine shall have a minimum cutting width of 36 inches and shall have diamond cutting blades. The unit shall have sufficient control to cut grooves to the tolerance specified below.

630-2.2 WATER. The grooving machine shall be furnished with a continuous source of water for cutting and clean-up. The Contractor shall be responsible for locating a water source capable of providing the quality and quantity of water necessary to ensure a continuous grooving operation.

CONSTRUCTION METHODS

630-3.1 LAYOUT. The area to be grooved shall be laid out in the field by the Contractor. The Contractor shall use string or chalk line or other method approved by the Engineer.

630-3.2 SAWING GROOVES. Grooves shall be cut at right angles to the centerline for grooving or runways or taxiways or in the direction specified for other surfaces. Grooves shall be cut continuously from beginning of the cut to the end without stopping. The alignment of groves with respect to centerline shall be monitored continuously and corrected at the end of each shift or a maximum of 300 feet.

Grooves shall extend a minimum of 6 feet beyond the edge of structural pavement (side stripe) on surfaces with paved shoulders. On pavements without paved shoulders, grooves shall be cut as close as practicable to the edge of the pavement.

Should one cutting blade break during operations, work may continue until the end of that shift at which time the blade must be replaced. Should more than one blade break, work shall be suspended until all defective blades are replaced.

630-3.3 PAVEMENT CURING. No grooving will be allowed on a newly placed paved surface until sufficient time has elapsed to allow the pavement to cure. For Hot Mixed Asphalt (HMA) pavement, a minimum of 14 calendar days shall have elapsed before grooving. For Portland Cement Concrete (PCC) pavement, a minimum of 7 days shall have elapsed.

630-3.4 IN-PAVEMENT FIXTURES. Grooves shall be sawed no less than 6 inches and no more than 18 inches from in-pavement fixtures such as light fixtures or surface sensors.

No grooving shall occur through longitudinal or diagonal saw kerfs where lighting or surface sensor cables are installed. Grooves may be continued through longitudinal construction joints in PCC pavement.

630-3.5 CLEAN-UP. Clean-up shall be continuous throughout the grooving operation. Waste material collected during the grooving operation shall be disposed of by flushing with water, sweeping or by vacuuming. If waste material is flushed from the surface, the material shall not be allowed to enter any airport storm drain or sanitary sewer system.

630-3.6 TOLERANCES. Grooves shall be 1/4 inch deep and 1/4 inch wide with a tolerance of ±1/16 inch. Not more than 60% of the grooves shall be less than 1/4 inch. Grooves shall be spaced at 1-1/2 inches center to center with a tolerance of +0 inch and -1/8 inch.

Grooves shall be perpendicular to the established centerline ± 1 degree. The grooves shall not vary more than 3 inches in alignment for a 75-foot groove length.

METHOD OF MEASUREMENT

630-5.1 Pavement grooving will be measured either by neat line dimensions as shown in the Plans or as a single item of work. No deductions will be made for areas skipped to avoid joints or in-pavement fixtures.

BASIS OF PAYMENT

630-6.1 Payment will be made at the contract unit price or the lump sum price for pavement grooved and accepted by the Engineer.

Payment will be made under:

Item P-630a	Pavement Grooving - per square yard
Item P-630b	Pavement Grooving - per lump sum

ITEM P-640 SEGMENTED CIRCLE

DESCRIPTION

640-1.1 This item consists of furnishing and installing an airport segmented circle, according to the dimensions, design, details, and location shown on the Plans. Construct barrel-type or panel-type, as shown in the bid schedule.

If shown on the Plans, the segmented circle includes landing direction indicator, landing strip indicators, or traffic pattern indicators.

MATERIALS

640-2.1 Barrel-Type.

- **a. Barrels.** Cylindrical, steel, 55-gallon, undamaged, contaminant-free, and rust-free.
- **b. Primer Paint.** Zinc Oxide, raw linseed oil, and alkyd primer, meeting SSPC-Paint 25.
- **c. Finish Paint.** Aviation Gloss Orange, No. 12197, meeting Federal Standard 595.

640-2.2 Panel-Type.

- **a. Panels.** Sheet aluminum with a reflective covering and meeting the following requirements:

  - **(1)** Use 0.080 inch thick, alloy 6061-T6, 5052-H36, 5052-H38, or recycled aluminum meeting alloy 3105, as specified in ASTM B 209.

  - **(2)** Make each panel a continuous sheet for the length and width shown on the Plans. Furnish panels that are cut to size and shape and free of buckles, warp, dents, cockles, burrs and any other defects resulting from fabrication. Complete all possible fabrication including shearing, cutting and punching of holes prior to the base metal preparation.

  - **(3)** Treat the aluminum base metal sheets with chromate conversion coating for aluminum conforming to the requirements of ASTM B 449, Class 2. After cleaning and coating operations, protect the panels at all times from contact or exposure to greases, oils, dust or other contaminants.

  - **(4)** Cover one side of each panel with orange reflective sheeting, meeting the requirements of AASHTO M 268, Type III.

- **b. Stanchions.** Perforated, galvanized, square steel tubing with the dimensions shown on the Plans and meeting the following requirements:

  - **(1)** Fabricate tube with cold-rolled carbon steel sheets, 12 gage, commercial quality, meeting ASTM A 653, coating designation G 90. Form tubes, roll to size, and weld in the corner.

  - **(2)** Perforate all members for their entire length with 7/16 inch diameter holes on 1 inch centers.

  - **(3)** Furnish members that are straight and with a smooth, uniform finish with no splices.

  - **(4)** Ensure that all perforations and cut off ends are free from burrs.

- **c. Hardware and Fasteners.** Hardware and fasteners shall meet the following requirements:

  - **(1)** Gusset and splice plates shall be 1/4-inch thick steel, ASTM A 36, galvanized.

(2) Fasteners shall be hot dip galvanized, Grade 2, 3/8-inch diameter bolts; with two 1-inch diameter washers and one nut, each bolt. Provide bolt lengths as required to fasten members.

CONSTRUCTION METHODS

640-3.1 GENERAL. The site may be either on a prepared pad constructed for that purpose under separate item or on natural ground, whichever is shown on the Plans.

If the segmented circle is to be placed on original ground, clear the site of all brush and vegetation to the limits shown on the Plans and level the site.

Use material excavated for installation of barrels or stanchions as backfill. Spread excess material evenly over ground adjacent to the barrels, stanchions, or pad so as to leave the site in a neat condition.

640-3.2 BARREL-TYPE. Clean the outside of each barrel with an approved solvent and paint with 1 coat of primer paint and 2 coats of finish paint.

Cut hole maximum of 6 inches in bottom of barrel. Fill barrel one third with clean sand or gravel. Bury the bottom one third of barrel at the location and in the configuration shown on the Plans.

640-3.3 PANEL-TYPE. Prepare and assemble panels, perforated steel tubes, and hardware as shown in the Plans. Bury stanchions to the depth, at the location, and in the configuration shown on the Plans.

640-4.1 METHOD OF MEASUREMENT. Segmented circle will not be measured for payment.

640-5.1 BASIS OF PAYMENT. Payment will be made at the contract lump sum price shown on the bid schedule. Clearing of the site is paid for under Item P-151. If Item P-151 is not included in the bid schedule, clearing is subsidiary.

Payment will be made under:

Item P-640a	Segmented Circle (Barrel-Type) - per lump sum
Item P-640b	Segmented Circle (Panel-Type) - per lump sum

MATERIAL REQUIREMENTS

AASHTO M 268	Standard Specification for Retroreflective Sheeting
ASTM A 36	Structural Steel
ASTM A 653	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 924	Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B 209	Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 449	Standard Specification for Chromates on Aluminum
Federal Standard 595	Colors Used in Government Procurement
SSPC – Paint 25	Specification for Zinc Oxide, Raw Linseed Oil, and Alkyd Primer (Without Lead and Chromate Pigments)

ITEM P-650 AIRCRAFT TIE-DOWN

DESCRIPTION

650-1.1 This item consists of furnishing and installing aircraft tie-down anchors according to these specifications and the details on the Plans, or as directed by the Engineer.

MATERIALS

650-2.1 GENERAL. Anchor assemblies shall have a minimum tensile breaking strength of 6,000 pounds and minimum field pull-out capacity of 3,000 pounds. Provide manufacturer's certification of minimum breaking strength. The Contractor shall field-test the installed anchors to the minimum pull-out force and certify that this requirement has been met for each anchor.

Each anchor assembly shall include a 1-1/2 inch inside diameter by 3/8 inch lap link connector attached to a 3/8-inch galvanized chain.

650-2.2 SOIL ANCHOR TIE-DOWNS. Soil anchors shall be Duckbill model 88-DB1 or Manta Ray model MR-88, as manufactured by Foresight Products, Commerce City, CO, or an approved equal.

650-2.3 ROCK ANCHOR TIE-DOWNS. Rock anchors shall be 1/2 inch diameter Williams Solid Bar "Spin Lock" Rock Bolts, Williams Titan Injection Anchor 30/16, or an approved equal.

650-2.4 TEMPORARY TIE-DOWNS. Temporary tie-down anchors shall provide a minimum 500 pounds of resistance to uplift per anchor. Temporary anchors shall be laid out as shown on the plans or as approved by the Engineer. Each anchor shall be provided with a 2-inch link or eye to which aircraft can be tethered. If above ground weights are used they shall be painted with reflective paint to be visible from any horizontal angle.

CONSTRUCTION METHODS

650-3.1 GENERAL. Soil and Rock Anchor tie-downs shall be installed in shallow 8-inch diameter by 2-inch deep depressions. If the anchor is set in pavement, the depression shall be sealed with a 1-inch thickness of two-component sealant that meets Section P-606. After the anchor has been installed, attach a chain and trim it to leave only two links above the surface of the sealant. Attach the lap link to the end of the chain.

650-3.2 SOIL ANCHOR TIE-DOWNS. Soil anchors shall be driven to sufficient depth to develop the minimum pull-out strength according to the manufacturer's installation instructions. Predrilling may be required depending on soil class. Anchor placement shall be achieved by methods recommended in the manufacturer's installation instructions. Backfill material, when required, shall be aggregate compacted to the satisfaction of the Engineer. If the anchor is set in pavement, backfill to a level 2-inchs below finish grade. Two-component sealant shall be used to fill the remainder of the hole to a level 1-inch below finish grade.

650-3.3 ROCK ANCHOR TIE-DOWNS. Rock anchors shall be anchored in sound bedrock at sufficient penetration to develop the minimum pull-out strength according to the manufacturer's instructions.

650-3.4 TEMPORARY TIE-DOWNS. Temporary tie-downs shall be produced that can be located to provide tie downs for aircraft displaced by the Contractor's operations. Tie-downs shall not require any permanent modifications to existing facilities or pavements and shall be re-locatable using readily available equipment. Initial placement and subsequent relocations of tie-downs shall be accomplished at the direction of the Engineer at no additional cost to the State.

METHOD OF MEASUREMENT

650-4.1 By each set, consisting of 3 anchors, completed and accepted in final position.

BASIS OF PAYMENT

650-5.1 At the contract price, per set, for each of the pay items shown in the bid schedule.

Payment will be made under:

Item P-650a	Soil Anchor Tie-down - per set
Item P-650b	Rock Anchor Tie-down - per set
Item P-650c	Temporary Tie-down – per set

ITEM P-680 GEOTEXTILE FOR SILT FENCE

DESCRIPTION

680-1.1 Furnish, place, maintain, and remove temporary silt fence as shown on the Plans or as directed.

MATERIALS

680-2.1 GEOTEXTILE. Use geotextile that meets AASHTO M 288 for Temporary Silt Fence.

680-2.2 POSTS. Use posts made of wood, steel, or approved synthetic material that will adequately support the fence under forces induced by water and sediment loading.

CONSTRUCTION REQUIREMENTS

680-3.1 Erect geotextile fence before excavation or embankment construction begins.

680-3.2 POST INSTALLATION. Place posts a maximum of 8 feet apart and drive a minimum of 18 inches into the ground.

680-3.3 GEOTEXTILE PLACEMENT. Install geotextile on posts in a vertical position and support by a wire mesh fence or self-support system. Set at the height specified in the Contract. Secure the bottom 18 inches of the geotextile on the upslope side of the fence as shown on the Plans. Backfill trench with tamped soil. Join adjacent sections of geotextile only at posts with a minimum of 6 inches overlap.

680-3.4 MAINTENANCE AND REMOVAL. Maintain the integrity of the fence as long as it is necessary to contain sediment runoff. Inspect the fence daily and correct deficiencies immediately. Remove and dispose of the fence when adequate vegetative growth insures no further erosion of the slopes. Cut off the fabric at ground level and remove the fabric, wire and posts. When thickness of trapped sediment is in excess of 4 inches above the ground, either remove sediment from the site or spread sediment uphill of the fence and seed all exposed soil immediately, following the requirements of Item T-901.

METHOD OF MEASUREMENT

680-4.1 Fence will be measured in place, on the ground along the post line.

BASIS OF PAYMENT

680-5.1 Payment will be made as follows: 60% for installation. 25% for maintenance and repairs, prorated at the Engineer's discretion, 15% for removing it from the site.

Payment will be made under:

Item P-680a Silt Fence – per linear foot

ITEM P-682 GEOTEXTILE FOR DRAINAGE AND EROSION CONTROL

DESCRIPTION

682-1.1 Prepare surfaces and furnish and place geotextiles for embankment drainage as shown on the Plans.

MATERIALS

682-2.1 Use geotextiles that conform to the following:

a. **Drainage.** Geocomposite comprised of a tri-planar geonet structure with thermally bonded non-woven geotextile on both sides, capable of removing subsurface water from the embankment. Meet ASTM D-4716 for Transmissivity.

The Drainage Geocomposite shall be:

ROADRAIN 7100-2
TENAX Corporation, Geosynthetics Division
4800 East Monument Street
Baltimore, MD 21205
1-800-356-8495
www.tenax.net

or approved equal.

CONSTRUCTION REQUIREMENTS

682-3.1 Surface Preparation. Prepare Borrow surface by removal of stumps, brush, boulders, and sharp objects. Borrow surface should be smooth and to the design grade. Fill holes and large ruts with Borrow, or as approved.

682-3.2 Geotextile Placement. Unroll geotextile directly onto the prepared surface. Rolls shall be placed along roadway direction, with the main flow direction orientated down slope towards roadway edge. Stretch geotextile to remove any creases or wrinkles. Do not expose geotextiles to the elements for longer than 5 days.

682-3.3 Joining. Side-to-Side joints shall overlap a minimum of 3 inches. End-to-End joints shall be overlapped a minimum of 3 inches or butted together. The top geotextile layer shall be sewn together at the seams using butterfly or j-seams. All seams shall be double-lock stitched.

682-3.4 Material Placing and Spreading. During placing and spreading, maintain a minimum depth of 12 inches of cover material at all times between the fabric and the wheels or tracks of the construction equipment.

Spread the material in the direction of the fabric overlap. Maintain proper overlap and fabric continuity. If sewn or bonded seams are used, place the cover material and spread in only one direction for the entire length of the geotextile. On weak subgrades spread the cover material simultaneously with dumping to minimize the potential of a localized subgrade failure.

Compact using a smooth drum roller. Do not allow construction equipment to make sudden stops, starts, or turns on the cover material.

682-3.5 Geotextile Repair. Prior to covering the deployed geocomposite, each roll shall be inspected for damage. Potential repair techniques will be separated for just geotextile damage and for damage resulting on the entire geocomposite (geonet damaged).

a. **Geotextile damage:** Small holes shall be patched with an 8” x 8” geotextile piece. Apply spray adhesive to one side of the 8x8” textile patch. Firmly press 8x8” textile patch over repair area. If the damaged area of the geotextile is greater than this patch size, a bigger patch is recommended. If the geotextile is damaged beyond 50 percent of the width of the roll, a continuous piece of fabric the same width as the repaired geocomposite may be cap-stripped directly to the adjacent seams by sewing a portion of new geotextile in place.

b. **Geocomposite damage:** If rip, tear or damaged area on the deployed geocomposite is more than 50 percent of the width of the roll, the damaged area shall be cut out and the two portions of the geonet shall be joined as explained above. Other rips, tears or damaged areas on the deployed geocomposite shall be removed and patched by placing a patch extending 12 inches beyond the edges of the damaged area. The patch shall be secured to the original geonet with cable ties.

METHOD OF MEASUREMENT

682-4.1 By multiplying plan neat line width by the measured length in final position parallel to installation centerline along the ground surface. No allowance will be made for overlap, whether at joints or patches.

BASIS OF PAYMENT

682-5.1 Payment will be made at the contract unit price per square yard.

Material used to fill ruts and holes will be paid for at the unit price for the type of material used.

Payment will be made under:

Item P-682a Geotextile, Drainage - per square yard