PASS® CR (MICRO Type II) CAPE SEAL and PASS® QB Rejuvenating Seal for Residential Roads

SECTION 700 - PASS® CR Scrub Seal

701 GENERAL

701.1 The work shall consist of furnishing all necessary labor, materials and equipment for the transporting, application of the polymer modified asphaltic emulsion PASS® or equal, ¼" by No. 10 premium aggregate to conform to the Provisions of Section 37-2, of the Standard Specifications, Plans and these Special Provisions. The work shall be done in the following order: preparing the pavement surface; applying the emulsion; scrubbing the applied emulsion with an emulsion broom; applying premium aggregate; rolling the ¼" by No. 10 premium aggregate; and sweeping up excess aggregate and more fully described below.

701.2 Prior to the PASS scrub seal operation, the Contractor shall remove all existing striping, legends and raised pavement markers within the scrub seal limits. When removing the raised pavement markers the Contractor shall remove any adhesive left on pavement caused from the removal of raised pavement markers. If any pavement damage (potholes) caused by removing raised pavement markers hall be filled.

701.3 Immediately prior to the scrub sealing operations, the Contractor shall sweep the entire surface with vacuum assisted power brooms. Flushing with water and/or fog seal may be required in some areas. Prior to scrub sealing application, pavement surfaces shall be cleaned of all oil, debris, grease spots and weeds.

701.4 Standard Specifications Section 37-1.04 shall apply . . . ***"other means necessary,"*** shall include **but is not limited to** ***"steam cleaning,"*** or ***"heating and scraping followed by a Petro Guard application;"*** once areas have been cleaned all areas shall be flushed with a water truck before power brooming. The curing of the scrub seal shall be as recommended by the manufacturer and/or the Engineer such that a street may be open to traffic without damage to the surfacing (Contractor shall provide delineators for traffic safety until application at each respective location is complete).

701.5 Before the PASS scrub seal is applied in an area, all manhole covers, monument covers, and all other utility covers to remain shall be protected from the Contractor's scrub seal operations by applying a sheet of plastic, cut to fit, or placing a plastic bag over the exposed facilities or other methods approved by the Engineer. All traces of plastic and scrub seal shall be removed from all covers of facilities and other utility covers as quickly as possible after the application of the scrub seal and definitely prior to final acceptance. Contractor shall replace or clean at his or her own expense any damaged or oil stained items within the construction limits.

701.6 All incidental work such as surfacing of driveway aprons and returns shall be done concurrently with the surfacing of the street proper. The joint between the edge of the pavement and the concrete gutter shall be sealed; scrub seals shall overlap the

concrete gutter edge and concrete cross gutter approximately one (1) to two (2) inches. The edges of the limits of the scrub seal application on both sides of the street shall be maintained in a neat and uniform line. Scrub seal may be applied over concrete gutters upon the authorization of the Engineer. The Contractor shall furnish and maintain in good operating condition all tools and equipment necessary to do the work with personnel to operate all equipment efficiently and skillfully.

701.7 The Contractor shall refrain from using diesel fuel, gasoline or solvents of any kind for cleaning tools and equipment in such a manner as to permit spillage of the diesel fuel or solvent on new or existing pavement, curbs and gutters, parkways or other improved areas. Basis for rejection of improperly placing scrub seal includes, but is not limited to, striation of surface, "balling" of material due to quick-set and tracks of unauthorized vehicles, bicycles and pedestrians.

701.8 As per Section 8-1.04 of the Standard Specifications, the Contractor shall furnish a written schedule for the work, listing the dates on which individual streets or locations are to be closed to traffic for surfacing. The Contractor shall adhere diligently to said written schedule in the prosecution of the work. Traffic may travel on the scrub seal surface one (1) hour after rolling, at reduced speed. The Contractor must submit a traffic control plan for the project to the Engineer for approval.

701.9 At least four (4) days prior to the beginning of scrub seal operations, the Contractor shall notify all affected property owners, residents, businesses and agencies by an approved, written notice detailing streets and limits of work to be done and the hours of work. The contractor shall, 24-48 hours prior to the beginning of scrub seal operations, post all streets that are to be worked upon with approved ***"No Parking – Tow Away"*** signs at one hundred (100') foot intervals. These signs shall also state the day of the week and hours of no parking**.** The Contractor shall adhere diligently to said written schedule in the prosecution of the work.

701.10 The Contractor shall be responsible to notify the affected property owners and businesses on the day prior to the pre-scheduled work and to arrange for autos, refuse bin containers, and abandoned vehicles to be moved from the designated streets fronting the residences or businesses prior to start of the day's work. Contractor must contact the Refuse Division to have any refuse bin containers moved, the Police Division if the car is abandoned or the owner can not be found.

701.11 The polymer modified asphaltic emulsion referred to in these Specifications shall be equal in characteristics and specifications to ***PASS®***, manufactured by Western Emulsions, Inc. from RA-1 recycling agent, an asphalt and polymer must be Butonal® NX1120 manufactured by BASF Corporation or equal. The Contractor shall provide a crew and equipment to manually apply the polymer modified asphaltic emulsion up to the edges of the gutters, turn pockets and curves at intersections. The Contractor and emulsion manufacturer shall have had a minimum of five (5) years experience in the application of the PASS polymer modified asphaltic emulsion. A representative from the emulsion manufacturer with at least five (5) years experience in the application of ***PASS*** shall be on the project site during the construction of the scrub seal.

701.12 The ***PASS® CR*** scrub seal shall be applied when ambient temperature is above forty (40°) degrees Fahrenheit and the weather forecast should be for sun and highs in the near sixty (60°) degrees Fahrenheit and no rain forecast for the next twenty-four (24) hours after scrub seal has been applied. Scrub seal shall not be placed if the ambient temperature during the curing period twenty-four (24) hours is expected to be below twenty-five (25°) degrees Fahrenheit. Scrub seal shall not be placed on the surface of a street after 4:00 p.m. of the work day unless otherwise authorized by the Engineer.

701.13 The areas indicated on the Plans for scrub seal shall be applied with a distributor truck to the pavement surface at a rate of 0.28 to 0.38 gallons per square yard. The emulsion application rate shall be adjusted up or down, at the Engineer's discretion, depending on ability to fill cracks in the roadway. The emulsion shall be heated at a temperature above one hundred (100°) degrees but not to exceed one hundred and fifty (150°) degrees at application. For smaller areas the emulsion may be applied with a wand. The emulsion shall be immediately broomed to fill cracks and voids. A drag broom squeegee shall be pulled by the distributor truck or a vehicle following immediately behind the distributor.

701.14 The Contractor shall submit certification that the emulsion meets the requirements of the following specification and is manufactured in accordance with United States Patent # 5,180,428. This emulsion shall contain asphalt, a recycling agent, and a polymer. The asphalt must be manufactured from crude oil from Ventura County CA or as required by the manufacturer. The recycling agent must be RA-1 manufactured by San Joaquin Refining or Tricor Refining as required by the manufacturer. The polymer must be NX-1120 manufactured by BASF cooperation. The emulsion supplier shall supply certifications from the asphalt, recycling agent, and polymer manufactures with the contractors bid. The Engineer may request these certifications weekly during the project.

701.15 The asphalt emulsion shall be a polymer modified surface sealer (PASS®CR) or equal to or meeting the following specifications:

PASS®CR SPECIFICATIONS
Test on Emulsion

Test on Residue	Test Method	Results
Viscosity at 77 °F S.F.S.	ASTM D-244	75 – 250 sec.
Residue w%	ASTM D-244	67% min.
pH	ASTM E-70	2.0 – 5.0
Sieve w%	ASTM D-244	0.1% max.
Oil Distillate by % of Emulsions	ASTM D-244	0.5% max.
Viscosity at 140° F st.	ASTM D-2170	400 – 13300
Viscosity at 275° F cst.	ASTM D-2170	400 min.
Modified Torsional recovery	CA 322 (Mod)	50% min.
Toughness at 77°F N-m	ASTM P-243	4.0 min.
Tenacity at 77°F N-m	ASTM P-243	4.0 min.
Asphaltenes w%	ASTM D-2006	18.0%.
Saturates	ASTM D-2006	16.0% max.
Penetration @ 39.2°F min.	ASTM D-5	90

A. * California test method No. 331 for recovery of residue. *Torsional recovery measurement to include first thirty (30) seconds.

B. **The asphalt must be made from 100% crude oil from the Ventura County California field that originates from what is known as the Vacca Tar Sand formation.

C. ***The rejuvenator agent must be RA-1 manufactured by the San Joaquin Refining Co. or Tricor Refining Company.

D. ****The polymer must be Butonal®NX1120 manufactured by BASF Corporation.

701.16 Immediately following the brooming of emulsion, an application of ¼" by No. 10 premium aggregate at a rate of eighteen (18 lbs) to twenty-five (25 lbs) pounds per square yard or shall be spread evenly by a mechanical spreader and also broomed to fill all cracks and voids. The rate shall be adjusted up or down so that no bleed through occurs during rolling. A drag broom squeegee shall be pulled by a tractor following the aggregate spreader.

701.17 Pneumatic tire rolling shall follow immediately after the aggregate is applied.

701.18 Power sweeping shall be done before the end of the day after scrub seal operation to pick up any loose rocks. During the sweeping process the Contractor shall use a backpack blower to clear driveways, gutters and sidewalks of excess aggregate at the end of each day until the street is micro-surfaced. The Contractor shall wait a minimum of twenty-four (24) hours after the scrub seal application before applying the micro-surfacing.

701.19 The Contractor shall exercise care to prevent oil from being deposited on concrete surfaces. Each day the Contractor shall remove oil from the surfaces not designated to be scrub sealed and/or micro-surfaced. No additional streets shall be scrub sealed until this clean up has been performed. The method of the oil removal shall be approved by the Engineer.

701.20 The Contractor shall insure that loose chips are kept out of areas outside the construction limits. Adjacent intersections, gutters, driveways, sidewalks, lawns and flowerbeds are to be kept free from loose chips.

701.21 The sites for stockpiling shall be clean and free of objectionable materials and shall be located outside the street right-of-way. Arrangements for these sites shall be the responsibility of the Contractor. If on private property, a written agreement shall be approved by the Engineer prior to commencing operations.

701.22 Self-propelled pneumatic-tire rollers shall be used for the required rolling of the cover material. The pneumatic-tire rollers shall carry a minimum loading of three thousand (3000) pounds. On each wheel an air pressure of one hundred (100) plus or minus five (5) pounds per square inch in each tire.

701.23 The following equipment to be used for the scrub-seal shall be as follows:

A. An asphalt distributor for application of the emulsion shall have a full circulation spray bar that is adjustable to at least sixteen (16') feet wide in two (2') feet increments and capable of heating and circulating the emulsion simultaneously. It must have computerized rate control for adjusting and

controlling the application from the cab that is adjusting by .01 gallons per square yard increments. The distributor shall also be equipped with a volume measuring devise and a thermometer for measuring the emulsion temperature in the tank.

B. A tractor to pull the emulsion broom. The emulsion broom shall not be pulled by the asphalt distributor.

C. An emulsion broom shall be used to scrub the emulsion after application.

D. A self-propelled aggregate spreader with front discharge that can evenly distribute aggregate from eighteen (18 lbs) to twenty (25 lbs) pounds per square yard. Equipped with computerized rate control.

E. Two (2) pneumatic rollers weighing at least five (5) tons each.

F. Two (2) mechanically powered kick-brooms. (Specify mechanically powered pick up brooms equipped with vacuum type suction, for sweeping on city streets)

G. A back pack blower for removing excess chips during the sweeping operation.

701.24 Contractor shall install temporary pavement markers once the scrub seal is cured until the roadway surface is ready for permanent raised pavement markers.

SECTION 710 - MICRO-SURFACING

711 SCOPE

The intent of this guideline is to aid in the design, testing methods, quality control, measurement and payment procedures for the application of Micro-Surfacing

712 DESCRIPTION

Micro-Surfacing is a mixture of polymer modified asphalt emulsion, mineral aggregate, mineral filler, water, and other additives, properly proportioned, mixed and spread on a paved surface. The mix should be capable of being spread in variable thick cross-sections (wedges, ruts, scratch courses and surfaces) which, after curing and initial traffic consolidation, resist compaction throughout the entire design tolerance range of bitumen content and variable thickness to be encountered. The end product should maintain a skid-resistance surface (high wet friction co-efficient) in variable thick sections throughout the service life of the Micro-Surfacing. The mix is to be a quick-traffic system, meaning that it will be able to accept traffic after a short period of time. The amount of time will vary from job to job and must be evaluated on an individual job basis. Normally, these systems have been required to accept rolling traffic on a one-half (1/2) inch (12.7 mm) thick surface within one hour after placement in +75°F (24°C) temperature and 50 percent or less humidity.

713 APPLICABLE SPECIFICATIONS

713.1 GENERAL

There are agencies and testing methods listed in the manufacturers Specifications.

713.2 It is normally not required to run all referenced tests on every project. Some of the tests are expensive and take a substantial amount of time to conduct. If the materials to be used on the project have a past record of good performance, the requirements for testing may be decreased. Local paving authorities are often familiar with the materials and should be able to furnish information which would minimize the amount of testing required.

714 MATERIALS

714.1 EMULSIFIED ASPHALT

714.2 GENERAL

The emulsified asphalt shall be a quick-traffic polymer- modified asphalt emulsion conforming to the requirements specified in AASHTO M208 or ASTM D2397 for CSS-1h. The cement mixing test shall be waived for this emulsion.

The polymer material shall be milled or blended into the asphalt or emulsifier solution prior to the emulsification process.

714.3 CERTIFICATION

The polymer modifier shall be Butonal NX-1120 manufactured by BASF Corporation. The polymer content shall be 3.5% based on the asphalt weight content and will be certified by the emulsion supplier.

The bidder must submit a notarized certification from the polymer supplier showing compliance with the above.

The five-day (5) settlement test may be waived, provided job stored emulsion is used within thirty-six (36) hours from the time of the shipment, or the stored material has had additional emulsion blended into it prior to use.

714.4 QUALITY TESTS

hen tested according to the following tests, the emulsion shall meet the requirements of AASHTO M208 or ASTM D2397 for CSS-1h, plus the following:

AASHTO TEST NO	ASTM TEST NO	QUALITY	SPECIFICATIONS
AASHTO T59	ASTM D244	Residue after Distillation	62% Minimum

The temperature for this test should be held below 280° (138°C). Higher temperatures may cause the polymers to break down.

AASHTO TEST NO	ASTM TEST NO	TESTS ON RESIDUE	SPECIFICATIONS
AASHTO T53	ASTM D36	Softening Point	135° (57°C) Minimum
AASHTO T49	ASTM D2397	Penetration at 77°F (25°C)	40 - 90°
	ASTM 2170	Kinematic Viscosity @ 275°F (135°C)	650 cSt/sec. Minimum °F

Each load of emulsified asphalt shall be accompanied with a Certificate of Analysis/Compliance to assure that it is the same as that used in the mix design.

714.5 AGGREGATE

714.6 GENERAL

The mineral aggregate used shall be the type and grade specified for the particular use of the Micro-Surfacing. The aggregate shall be a manufactured crushed stone such as granite, slag, limestone, chat, or other high-quality aggregate, or combination thereof. To assure the material is totally crushed, one hundred (100%) percent of the parent aggregate will be larger than the largest stone in the gradation to be used.

714.7 QUALITY TESTS

When tested according to the following tests, the aggregate should meet these minimum requirements:

AASHTO TEST NO	ASTM TEST NO	TESTS ON RESIDUE	SPECIFICATIONS
AASHTO T176	ASTM D2419	Sand Equivalent	55 Minimum
AASHTO T104	ASTM C88	Soundness	15% Maximum using NA_2SO_4 or 25% Maximum using $MgSO_4$
AASHTO T96	ASTM C131	Abrasion Resistance	30% Maximum

714.8 GRADING

When tested in accordance with AASHTO T27 (ASTM C136) and AASHTO T11 (ASTM C117), the target (mix design) aggregate gradation (including the mineral filler) shall be within one of the following bands (or one currently recognized by your local paving authority).

SIEVE SIZE	TYPE II PERCENT PASSING	STOCKPILE TOLERENCE
3/8 (9.5 mm)	100	
#4 (4.75mm)	94 - 100	±5%
#8 (2.36mm)	65 - 90	±5%
#16 (1.18mm)	40 - 70	±5%
#30 (600 um)	25 - 50	±5%
#50 (330 um)	12 - 25	±4%
#100 (150 um)	7 - 11	±3%
#200 (75 um)	5 - 15	±2%

714.9 The job mix (target) gradation shall be within the gradation band for the desired type. After the target gradation has been submitted (this should be

the gradation that the mix design is based on), then the percent passing each sieve shall not vary by more than the stockpile tolerance shown in the and above table for each individual sieve, and still remain within the gradation band. It is recommended that the percent passing shall not go from the high end to the low end of the range for any two consecutive screens.

714.10 The aggregate will be accepted at the job location stockpile or when loading into the support units for delivery to the lay-down machine. The stockpile shall be accepted based on five gradation tests according to AASHTO T2 (ASTM D75). If the average of the five tests is within the gradation tolerances, then the materials will be accepted. If the tests show the material to be out, the contractor will be given the choice to either remove the material or blend other aggregate with the stockpiled material to bring it into specification. Materials used in blending must meet the quality tests before blending is used, it will require that a new mix design be performed.

714.11 Screening shall be required at the stockpile prior to delivery to the paving machine if there are any problems created by having oversize material in the mix.

714.12 MINERAL FILLER

Mineral filler, if required, shall be any recognized brand of non-air entrained Portland cement that is free from limps. It may be accepted upon visual inspection. The type and amount of mineral filler needed shall be determined by a laboratory mix design and will be considered as part of the aggregate gradation. An increase or decrease of less than one percent (1%) may be permitted when the Micro-Surfacing is being placed if it is found to be necessary for better consistency or set times.

714.13 WATER

The water shall be potable and free of harmful soluble salts or reactive chemicals and any other contaminants.

714.14 ADDITIVES

Additives may be added to the emulsion mix or any of the component materials to provide the control of the quick-traffic properties. They must be included as part of the mix design and be compatible with the other components of the mix.

715 LABORATORY EVALUATION

715.1 GENERAL

Before the work commences, the contractor shall submit a signed mix design covering the specific materials to be used on the project. This design will be performed by a laboratory which has experience in designing Micro-Surfacing.

715.2 MIX DESIGN

The contractor shall submit for approval a complete mix design prepared and certified by a laboratory. Compatibility of the aggregate, polymer-modified emulsion, mineral filler, and other additives shall be verified by the mix design. The mix design shall be made with the same aggregate gradation that

the contractor will provide on the project. Recommended tests and values are as follows:

ISSA TEST NO.	DESCRIPTION	SPECIFICATIONS
ISSA TB-139	Wet Cohesion @ 30 Minutes Minimum (Set) @ 60 Minutes Minimum (Traffic)	12 kg-cm Minimum 20 kf-cm Minimum or Near Spin
ISSA TB109	Excess Asphalt by LWT Sand Adhesion	50 g/ft^2 Maximum (538 g/m^2 Maximum)
ISSA TB-114	Wet Stripping	Pass (90% Minimum)
ISSA TB-100	Wet-Track Abrasion Loss One-hour Soak Six-day Soak	 50 g/ft^2(538 g/m^2) Maximum 75 g/ft^2(807 g/m^2) Maximum
ISSA TB-147	Lateral Displacement Specific Gravity after 1,000 Cycles of 25 Pounds (11.34 kg)	5% Maximum 2.10 Maximum
ISSA TB-144	Classification Compatibility	11 Grade Points Minimum
ISSA TB-113	Mix Time @ 77◦F (25◦ C	Controllable to 120 Seconds Min

COMPONENT MATERIALS	LIMITS
Residual Asphalt	5.5 to 10.5% (5) by dry weight aggregate
Mineral Filler	0.0 to 3% by dry weight of aggregate
Polymer-Based Modifier	Minimum of 3% solids based on bitumen weight content
Additives	As needed
Water	As required to produce proper mix consistency

715.3 RATE OF APPLICATION

The Micro-Surfacing mixture shall be of the proper consistency at all times, so as to provide the application rate required by the surface condition. The average single application rate, shall be in accordance with the following table:

AGGREGATE TYPE	LOCATION	SUGGESTED APPLICATION RATE
Type II	Residential Streets	**18-20 lb/yd^2** (9.7 – 10.8) kg/m2)

716 EQUIPMENT

716.1 GENERAL

All equipment, tools, and machines used in the performance of this work shall be maintained in satisfactory working condition at all times to ensure a high-quality product.

716.2 PROPORTIONING DEVICES

Individual volume or weight controls for proportioning each material to be added to the mix (i.e. aggregate, mineral filler, emulsified asphalt, additive, and water) shall be provided and properly marked. These proportioning devices are used in material calibration and determining the material output at any time.

716.3 SPREADING EQUIPMENT

The mixture shall be agitated and spread uniformly in the surfacing box by means of twin-shafted paddles or spiral augers fixed in the spreader box. A front seal shall be provided to insure no loss of the mixture at the road contact point. The rear seal shall act as a 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.

716.3.1 SECONDARY STRIKE-OFF

A secondary strike-off shall be provided to improve surface texture. The secondary strike-off shall have the same adjustments as the spreader box.

717 WEATHER LIMITATIONS

Micro-Surfacing shall not be applied if either the pavement or air temperature is below 50°F (10°C) and falling, but may be applied when both pavement and air temperatures are above 45°F (7°C) and rising. No Micro-Surfacing shall be applied when there is the possibility that the finished product will freeze within 24 hours. The mixture shall not be applied when weather conditions prolong opening to traffic beyond a reasonable time.

718 SURFACE PREPARATION

718.1 GENERAL

Immediately prior to applying the Micro-Surfacing, the surface shall be cleared of all loose material, slit spots, vegetation, and other objectionable material. Any standard cleaning method will be acceptable. If water is used, cracks shall be allowed to dry thoroughly before applying Micro-Surfacing. Manholes, valve boxes, drop inlets and other service entrances shall be protected from the Micro-Surfacing by a suitable method.

719 PAYMENT

The contract square yard price paid for **"PASS® CR Micro Cape Seal,"** shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, notifying property owners and for doing all the work necessary in the constructing the **PASS® CR Micro Cape Seal**, complete-in-

place, including the ***PASS® CR Scrub Seal when specified***, the cleaning of the surface, mixing and applying asphaltic emulsion on the pavement and protecting the seal until it has set, as shown on the Plans, and Standard Specifications, these Special Provisions and as directed by the Engineer. Payment for the **PASS® Micro Cape Seal** shall be included in the **Contract unit price per square yard for "Type II Micro Seal"** as listed in the Proposal and no additional compensation will be made therefor. The square yardage will be based on a minimum application rate of **18 pounds per square yard of Type II Micro Seal placed**.

SECTION 720 - PASS® QB REJUVENATING SEAL

720 SCOPE

The intent of this guideline is to aid in the design, testing methods, quality control, and measurement and payment procedures for the application of a rejuvenating seal.

720.1 DESCRIPTION

Rejuvenating emulsions not only add oils that soften the existing asphalt binders but also add additional asphalt binder that seals and improve the flexibility of the binder; this reduces the likelihood of future cohesive failure. This is beneficial in situations where the surface has an open texture and the existing binder is brittle from age. The intent is to extend the life of the existing surface.

721 APPLICABLE SPECIFICATIONS

721.1 Preparation

721.2 Immediately prior to the application of the rejuvenating seal operations, the Contractor shall sweep the entire surface with vacuum assisted power brooms. Flushing with water and/or fog seal may be required in some areas. Prior to scrub sealing application, pavement surfaces shall be cleaned of all oil, debris, grease spots and weeds.

721.3 Standard Specifications Section 37-1.04 shall apply . . . ***"other means necessary"*** shall include but is not limited to "steam cleaning" or ***"heating and scraping followed by a Petro Guard application;"*** once areas have been cleaned all areas shall be flushed with a water truck before power brooming. The curing of the scrub seal shall be as recommended by the manufacturer and/or the Engineer such that a street may be open to traffic without damage to the surfacing (Contractor shall provide delineators for traffic safety until sealing at each respective location is complete).

721.4 Before ***PASS® QB*** is applied in an area all manhole covers, flushing inlet covers, monument covers, and all other utility covers to remain shall be protected from the

Contractor's sealing operations by applying a sheet of plastic, cut to fit, or placing a plastic bag over the exposed facilities or other methods approved by the Engineer. All traces of plastic shall be removed from all covers of facilities and other utility covers as quickly as possible after the application of the seal and definitely prior to final acceptance. Contractor shall replace or clean at his or her own expense any damaged or oil stained items within the construction limits.

721.5 Application

Prior to application ***PASS® QB*** shall be diluted by adding 1 part water to 1 part ***PASS® QB*** Emulsion. The mixture of ***PASS® QB*** and water shall be applied at a rate ranging from .07 gal / S.Y. - .10 gal / S.Y. (.316 L/ m^2 – .452 Lm^2). The final rate of application will be jointly determined by the engineer, contractor and the vendor. ***PASS® QB*** shall be applied when ambient temperature is above forty (40°) degrees Fahrenheit and the weather forecast should be for sun and highs in the near sixty (60°) degrees Fahrenheit and no rain forecast for the next twenty-four (24) hours after the seal has been applied. The seal shall not be placed if the ambient temperature during the curing period twenty-four (24) hours is expected to be below twenty-five (25°) degrees Fahrenheit. ***PASS® QB*** shall not be placed on the surface of a street after 4:00 p.m. of the work day unless otherwise authorized by the Engineer.

721.6 ***PASS® QB*** shall be heated at a temperature above one hundred (100°) degrees but not to exceed one hundred and fifty (150°) degrees at application. For smaller areas the emulsion may be applied with a wand.

721.7 Material Specification

The asphalt emulsion shall be a polymer modified surface sealer ***(PASS®QB)*** or equal to meeting the following specifications:

A. *California test method CA331 for recovery of residue for torsional testing. Torsional recovery measurement to include first 30 seconds.
B. **The rejuvenator agent must be RA-1 manufactured by the San Joaquin Refining Co. or Tricor Refining Company.
C. ***The polymer must be Butonal®NX1120 manufactured by BASF Corporation.

721.8 PAYMENT

The contract square yard price paid for **"PASS® QB Rejuvenating Seal,"** shall include full compensation for furnishing all labor, materials, tools equipment and incidentals, notifying property owners and for doing all the work necessary in the application of the rejuvenating seal, mixing and applying asphaltic emulsion on the pavement and protecting the seal until it has set, complete in place as shown on the Plans, and Standard Specifications, these Special Provisions and as directed by the Engineer and no additional

compensation will be made therefor. Payment for the ***"PASS® QB Rejuvenating Seal,"*** shall be paid for by the actual square yard sealed.

Test on Emulsion	***Method***	***PASS® - QB***
Viscosity @77)F (SFS)	ASTM D244	30 – 90
Residue, w%, min.	ASTM D244	65%
pH	ASTM E70	2.0-5.0
Sieve, w%, max.	ASTM D244	0.1
Oil distillate, w%, max.	ASTM D244	0.5
Test on Residue*		
Viscosity @ 140°F, P	ASTM D2170	300 – 1200
Viscosity @ 275°F, cSt, min.	ASTM D2170	300
Penetration @ 39.2°F, min.	ASTM D5	90
Modified Torsional Recovery*, %, min.	CA332	50
Toughness @ 77°F, N-m, min.	ASTM P243	3.0
Tenacity @ 77°F, N-m, min.	ASTM P243	3.0
Asphaltenes, w%, min.	ASTM D2006	18.0