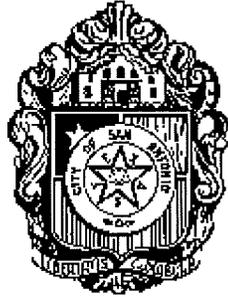


**CITY OF SAN ANTONIO
DEPARTMENT OF PUBLIC WORKS**



**SPECIFICATIONS
FOR
2014 - 2015 ASPHALT OVERLAY AND HOT
PAVER-LAID MICRO-SURFACE CONTRACT
PACKAGE 2 (TASK ORDER)**

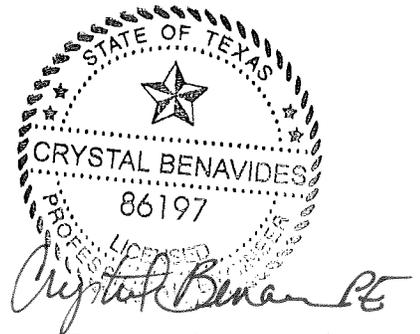
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TBPE Reg. No. F-483

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Project Description

Project Duration

The construction time (in calendar days) for each individual site will be negotiated between the City Engineer or Program Manager and the Contractor. The Contractor will be expected to begin construction for each individual site in accordance with Article 1- General Provisions, Section 1.2.4, Notice to Proceed and Commencement of Contract Times in the General Conditions-Heavy/Hwy. The Contractor may also be limited to the amount of individual project sites open at any given time. Liquidated damages for construction time will be assessed should the contractor fail to complete the construction of each individual site in the specified calendar days as negotiated by the City Engineer or Program Manager.

Project Scope

Project construction may include but is not limited to: roadway milling and overlay, ultra-thin bonded hot mix surface course, base repair, crack sealing, sidewalks, driveways, curbs, wheel chair ramps, speed humps, topsoil, sodding, striping, adjusting existing manholes and valve boxes, and any other items required due to the site conditions to accomplish the project scope.

Quantities included in this contract, as well as the entire bid amount are not guaranteed. Unit prices established shall remain valid throughout the duration of the contract.

Project Location

The sites shall be assigned by the City Engineer or Program Manager and shall be located throughout the City of San Antonio. Separate Task Orders will be issued for each project site or for multiple sites, and quantities will be provided to the contractor. No changes will be allowed in the contractor's unit bid prices as a result of any project assignment(s).

It is anticipated that some project sites may require working time restrictions. No additional cost will be paid to the contractor for reduced working times.

Important Notes

No direct payment shall be made for the following specification items. Contractor shall include cost of these items in various other bid items:

- 100.1 Mobilization
- 100.2 Insurance and Bond
- 101.1 Preparing Right-of-Way
- 530.1 Barricades, Signs, and Traffic Handling
- 540 Temporary Erosion, Sedimentation and Water Pollution Prevention and Control

Excavation due to construction of curb, sidewalk, driveways, and wheelchair ramps shall not be paid for directly but shall be included in various bid items of which it forms a component part.

CITY OF SAN ANTONIO, TEXAS

GOVERNING SPECIFICATIONS AND SPECIAL PROVISIONS FOR 2014 – 2015 ASPHALT OVERLAY AND HOT PAVER-LAID MICRO-SURFACE CONTRACT – PACKAGE 2 (TASK ORDER)

All Standard Specifications, Special Specifications and Special Provisions applicable to this project are identified as follows:

CITY OF SAN ANTONIO STANDARD SPECIFICATIONS FOR CONSTRUCTION JUNE, 2008

<u>ITEM</u>	<u>DESCRIPTION</u>
100	- Mobilization
101	- Preparing Right-of-Way
103	- Remove Concrete
203	- Tack Coat
205	- Hot Mix Asphaltic Concrete Pavement
208	- Salvaging, Hauling & Stockpiling Reclaimable Asphaltic Pavement
209	- Concrete Pavement
210	- Rolling
230	- Base and Pavement Replacement
300	- Concrete
301	- Reinforcing Steel
303	- Welded Wire Flat Sheets
311	- Concrete Surface Finish
500	- Concrete Curb, Gutter, and Concrete Curb and Gutter
502	- Concrete Sidewalks (Special Provision)
503	- Asphaltic Concrete, Portland Cement Concrete, and Gravel Driveways (Special Provision)
512	- Adjusting Existing Manholes and Valve Boxes
515	- Topsoil
516	- Sodding
530	- Barricades, Signs and Traffic Handling
533	- Cleaning and Removal of Pavement Markings and Markers (Special Provision)
535	- Hot Applied Thermoplastic Pavement Markings (Special Provision)
537	- Raised Pavement Markers
540	- Temp. Erosion, Sedimentation, and Water Pollution Prevention and Control
556	- Cast in Place Detectable Warning Surface Tiles
624	- Ground Boxes
700	- Cost Loaded Project Schedules
1000	- Web Portal

**TEXAS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS
FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS, AND
BRIDGES, 2004**

<u>ITEM</u>	<u>DESCRIPTION</u>
315	- Fog Seal (Special Provision)
438	- Cleaning and Sealing Joint and Cracks (Rigid Pavement and Bridge Decks)
454	- Bridge Expansion Joints
712	- Cleaning and Sealing Joints and Cracks (Asphalt Concrete) (Special Provision)

**SAN ANTONIO WATER SYSTEM STANDARD
SPECIFICATIONS FOR CONSTRUCTION, MARCH 2008**

826	- Valve Box Adjustments
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**SAN ANTONIO WATER SYSTEM STANDARD
SPECIFICATIONS FOR CONSTRUCTION, REV. JUNE 2009**

851	- Adjusting Existing Manhole
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SPECIAL SPECIFICATIONS FOR CONSTRUCTION

241	- Emulsion Aggregate Slurry Seal Mix
250	- Seal Coat
799	- Speed Humps, Type II, Modular Rubber Cushions
826A	- Valve Box Locate and Adjustment (SAWS)
851A	- Locating and Adjusting Existing Manhole (SAWS)
3142	- Ultra-Thin Bonded Hot Mix Wearing Course (UTBHMWC)
SP 100	- Door Hangers
SP 500	- Police Officer
SP 800	- Project Signs
SP 2000	- Railroad Insurance and Permit

**SPECIAL PROVISIONS TO CITY OF SAN ANTONIO STANDARD
SPECIFICATIONS FOR CONSTRUCTION, JUNE 2008**

502	- Concrete Sidewalks
503	- Asphaltic Concrete, Portland Cement Concrete, and Gravel Driveways
533	- Cleaning and Removal of Pavement Markings and Markers
535	- Hot Applied Thermoplastic Pavement Markings

**SPECIAL PROVISIONS TO TEXAS DEPARTMENT OF TRANSPORTATION
STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF
HIGHWAYS, STREETS, AND BRIDGES, 2004**

315	- Fog Seal
712	- Cleaning and Sealing Joints and Cracks (Asphalt Concrete)

ITEM 241
Special Specification

EMULSION AGGREGATE SLURRY SEAL MIX

241.1 DESCRIPTION: This item shall govern for the asphalt emulsion aggregate slurry seal mix that will be used for pavement preservation. This item shall consist of a mixture of modified emulsified asphalt, ground tire rubber, mineral aggregate, and water. The slurry seal mix shall be produced in an approved centrally located facility and the mix shall be tested and certified by the producer to meet specifications prior to shipment to distribution location(s). The Slurry Seal mix shall be uniform and stable for placement the day of loading when proper agitation is maintained. The aggregates, emulsion, and water should form a creamy-textured slurry that, when spread, will flow ahead of the strike-off squeegee. When cured, the surface shall have a uniform appearance, fill cracks, and adhere to the existing pavement surface. Proportions shall be based on the mix design specifications herein.

241.2 MATERIALS:

- A. AGGREGATE:** The aggregate shall consist of sound and durable Trap Rock 100% crushed in accordance with these specifications. 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 percent when tested in accordance with ASTM D 2419. The aggregate shall show a loss of not more than 35 percent when tested in accordance with ASTM C 131. The sodium sulfate soundness loss shall not exceed 12 percent, or the magnesium soundness loss shall not exceed 20 percent after 5 cycles when tested in accordance with ASTM C 88.

The combined aggregate shall conform to the gradation shown in Table 1 when tested in accordance with ASTM C 136 and ASTM C 117.

TABLE 1

GRADATION OF AGGREGATES

Sieve Size	Precent by Weight Passing Sieve
No.4 (4.75 mm)	100
No.8 (2.36 mm)	75 – 85
No.16 (1.18 mm)	30 – 40
No.30 (600 micro m)	10 – 20
No.50 (300 micro m)	3 – 8
No.100 (150 micro m)	0 – 2
No.200 (75 micro m)	0 – 1
Emulsion content by dry weight of aggregate	14% - 17%
Ground tire rubber by dry weight of aggregate	5% Minimum

The mix formula (mix design) shall be run using aggregate within the gradation band shown in Table 1. Once the mix design has been submitted and approved, the aggregate used on the project shall be within the gradation bands in Table 1.

- B. MINERAL FILLER:** If mineral filler, in addition to that naturally present in the aggregate, is necessary, it shall meet the requirements of ASTM D 242 and shall be used in the amounts required by the mix design. The mineral filler shall be considered as part of the aggregate.
- C. GROUND TIRE RUBBER:** The material shall be granulated tire rubber specifically designed for use with the Slurry Seal mixes. The rubber shall have a specific gravity between 1.15 and 1.20. One hundred percent of the granulated tire rubber shall pass a No. 16 sieve, 95% shall pass a No. 20 sieve, and a maximum of 2 percent shall pass a No. 200 sieve.
- D. POLYMER MODIFIER:** Polymer modifier shall be latex and shall be added at a minimum of 2 percent polymer solids by weight of the emulsion.
- E. WATER:** All water used in making the slurry shall be potable and free from harmful soluble salts and chemicals.
- F. EMULSION:** The emulsion shall be a slow-set or a quick-set type of emulsion as approved by the Engineer. The emulsion shall contain ground tire rubber and polymer modifiers and shall conform to the following quality requirements as shown in Table 2:

TABLE 2

TESTS ON EMULSION

Emulsion Property	Test Procedure	Min	Max
Rotational viscosity at 77°F, cP	ASTM D 7226	200	2000
Uniformity	ASTM D 2939		Pass ₁
Resistance to heat	ASTM D 2939		Pass ₂
Resistance to water	ASTM D 2939		Pass ₃
Wet flow, mm	ASTM D 2939	--	0
Residue by evaporation, % by weight	ASTM D 2939	33	--
Tests on residue from evaporation:			
Penetration, 77°F, 100 g, 5 sec.	ASTM D5	15	30
Flash point, Cleveland open cup, °F	ASTM D92	500	
Softening Point, °F ⁴	ASTM D36	230	--
1. Product shall be homogenous and show no separation or coagulation that cannot be overcome by moderate stirring. 2. No sagging or slippage of film beyond the initial reference line. 3. No blistering or re-emulsification. 4. Cure the emulsion in the softening point ring in a 200°F ± 5°F oven for 2 hr.			

241.3 COMPOSITION AND APPLICATION:

- A. COMPOSITION:** The slurry shall consist of a mixture of polymer emulsified asphalt, mineral aggregate, ground tire rubber, and water.
- B. JOB MIX FORMULA:** The Vendor 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 emulsion that the Vendor will supply. The slurry seal mix shall be produced in an approved centrally located facility and the mix shall be pretested and certified to meet specifications by the producer prior to shipment to distribution location.

- C. **APPLICATION RATE:** Unless otherwise specified, the slurry seal shall be applied to at the application rates of 10-15 pounds of mixture per square yard. The rate of application shall not vary more than +/- 2 pounds per square yard.
- D. **CERTIFICATE OF ANALYSIS:** The producer of the Slurry Seal Mix shall make available a certificate of analysis (C of A) for the slurry seal mix supplied under the contract. The C of A shall indicate the proportions of aggregates, mineral filler, ground tire rubber, water and emulsion based on the dry aggregate weight. The main items of design in the Emulsion Slurry Seal are aggregate gradation, emulsion content and consistency of the mixture.

The Vendor 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 emulsion that the Vendor will supply.

241.4 MEASUREMENT: The Item will be measured by the square yard of Emulsion Aggregate Slurry Seal Mix installed and accepted.

241.5 Payment: The work performed and materials furnished in accordance this Item and measured as provided under "Measurement" will be paid for at the unit price bid for Emulsion Aggregate Slurry Seal Mix. This price shall be full compensation for furnishing and placing materials, surface preparation, and for all labor, tools, equipment and incidentals necessary to complete the work.

241.6 BID ITEM:

Item 241 - Emulsion Aggregate Slurry Seal Mix – per square yard

ITEM 250
Special Specification

SEAL COAT

250.1 DESCRIPTION:

This item shall consist of a single asphalt surface treatment composed of asphalt surface treatment composed of asphalt material covered with aggregate for the purposed of sealing existing pavements in accordance with these specifications.

250.2 MATERIALS:

A. **AGGREGATE:**

Aggregates shall be of the type as shown on the plans and shall meet all the requirements of the Texas Department of Transportation (TxDOT) Item No. 302, "Aggregate for Surface Treatments" and subsequent revisions thereto. Gradation requirements when tested by TxDOT Test Method Tex-200F, Part I, shall be as shown on the plans.

B. **ASPHALTIC MATERIALS:**

Asphalt cement, emulsified asphalts, other miscellaneous asphaltic materials, and latex additives shall conform to TxDOT Item No. 300, "Asphalt, Oils, and Emulsions" and subsequent revisions thereto.

250.3 EQUIPMENT

A. **DISTRIBUTOR:**

The distributor shall be a self-propelled pressure type, equipped with an asphaltic material heater and a distributing pump capable of pumping the material at the specified rate through the distributor spray bar. The distributor spray bar shall be capable of fully circulating the asphaltic material. The distributor spray bar shall contain nipples and valves so constructed that the nipples will not become partially plugged with congealing asphaltic material, in order to prevent streaking or irregular distribution of asphaltic material. Distributor equipment shall include a tachometer, pressure gauges, volume measuring devices, and thermometer for reading the temperature of tank contents.

The distributor tank shall have been calibrated within three (3) years from the date it is first used on this project. The tank calibration procedure shall be in accordance with Test Method Tex-922-K, Part 1, and shall be signed and sealed by a registered professional engineer. Unless otherwise shown on the plans, the Contractor shall provide the tank calibration and shall furnish the Engineer an accurate and satisfactory calibration record prior to beginning the work. The Engineer may at any time verify calibration accuracy in accordance with Test Method Tex-922-K, Part II, and may perform the recalibration if the calibration is found to be in error.

B. **AGGREGATE SPREADER:**

A self-propelled continuous-feed aggregate spreader shall be used which will uniformly spread aggregate at the rate specified by the Engineer.

C. **ROLLERS:**

Approved rolling equipment shall be of the self-propelled type and shall be so designed such that a 12 ton load may be obtained by ballast loading. The roller shall be equipped with tires that will afford ground contact pressures to 90 psi or more. Individual tire inflation pressures shall be within 5 psi of each other. The operation load and tire air pressure shall be within the range of the manufacture's chart.

D. **SWEEPERS:**

A rotary, self-propelled power broom shall be acceptable for sweeping existing pavement surfaces.

Vacuum sweepers or other approved equally capable equipment shall be suitable for removing loose aggregate from compacted Seal Coat.

250.4 CONSTRUCTION METHOD:

Prior to Seal Coating, all dirt and other objectionable material shall be removed from the existing pavement by sweeping or other approved methods. All existing raised pavement markings shall be removed daily, as the work progresses, and as approved by the Engineer. All vegetation found in the existing pavement shall be destroyed by an approved chemical killer.

Building paper shall be placed over all manholes, valve boxes, grates, etc., so as to protect the surfaces from Asphaltic materials. Asphaltic materials shall not be placed, lapped, or splashed onto adjacent structures.

Seal Coat shall not be applied when the air temperature is below 60°F and is falling, but it may be applied when the air temperature is 50°F and is rising, the air temperature being taken in the shade and away from artificial heat. Seal Coat shall not be applied when the roadway surface temperature is below 60°F or when in the opinion of the Engineer, general weather conditions are not suitable. When latex modified asphalt cement is specified, Seal Coat shall not be applied when the air temperature is below 80°F and is falling, but may be applied when the air temperature is above 70°F and is rising and shall not be applied when the temperature of the surface on which the Seal Coat is to be applied is below 70°F.

Asphalt and aggregate rates as shown on the plans are for estimate purposes only and may be varied as directed by the Engineer.

The width of each application of Asphaltic material shall be such to allow uniform application and immediate covering with aggregate. The contractor shall be responsible for uniform application of asphaltic material at the junction of distributor loads. Paper or other suitable material shall be used to prevent overlapping of transverse joints. Longitudinal joints shall match lane lines unless otherwise authorized by the Engineer. Application of asphaltic material will be measured as necessary to determine the rate of application. In those areas where the asphalt distributor is not accessible, hand spraying may be permitted as directed by the Engineer.

Aggregate shall be immediately and uniformly applied and spread in the same width as the application of asphaltic material. The entire surface shall then be broomed or raked as required by the Engineer.

The aggregate shall be rolled for its width with a minimum of two (2) pneumatic tires rollers which shall be maintained in good repair and operating condition. Rolling shall begin as soon as sufficient aggregate is spread to prevent pick-up and shall begin longitudinally at the outside edge of the mat and progress toward the center of the mat, uniformly lapping each preceding pass by at least 2 the width of the roller. Rolling shall continue until no more aggregate can be worked into the surface.

After all rolling, the finished surface shall be cleared of any surplus aggregate by the Contractor by sweeping. Until the work has been accepted, additional sweeping shall be required as often as necessary so that loose aggregate does not present a hazard to traffic.

The Contractor shall be responsible for the maintenance of the Seal Coat until the work is accepted by the Engineer. All holes or failures in the surface shall be repaired by use of additional asphalt and aggregate. All fat or bleeding surfaces shall be covered with approved cover material in such a manner that the asphaltic material will not adhere to or be picked up by the wheels of vehicles.

All parkways, private property, and driveways adjacent to the work shall be cleaned of loose aggregate and other debris as produced from Seal Coat operations.

250.5 MEASUREMENT:

Seal Coat: will be measured by the square yard of completed and accepted work

250.6 PAYMENT:

The work performed as prescribed by this item will be paid for at the contract unit price bid per square yard for "Seal Coat", which price shall be full compensation for furnishing and placing all materials, sweeping, rolling, manipulations, labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

PAY ITEM NO. 250: SEAL COAT - per square yard.

ITEM 799
SPECIAL SPECIFICATION

SPEED HUMPS, TYPE II
MODULAR RUBBER CUSHIONS

GENERAL:

This specification sets forth the minimum acceptable requirements for modular rubber cushions for use at approved speed hump locations.

GENERAL REQUIREMENTS:

1. Pre-formed components manufactured from rubber

All pre-formed rubber components shall be compatible and interchangeable with existing speed hump material in use by the City.

1.1. Each component unit shall be 3" high

1.2. The side gradient shall be between 1:4 and 1:8

1.3. The ramp gradient shall be between 1:8 and 1:10

1.4. The transition from the street shall not exceed ½ inch

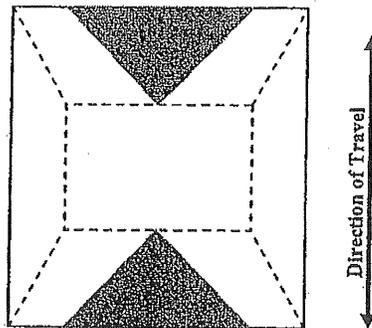
1.5. The cushion length shall be a minimum 78 inches

1.6. The cushion width shall be 74 to 75 inches

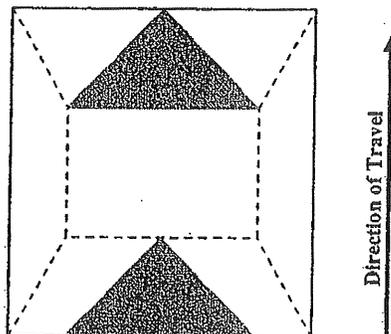
1.7. The cushions shall be black in color

1.8. The markings shall be white in color, triangular in shape, and integral to the pre-formed rubber components

1.8.1. Type A markings (not to scale)



1.8.2. Type B markings (not to scale)



- 1.9. Cushion components including but not limited to the rubber cushions, hardware, angle iron, etc., shall be interchangeable with existing material currently in use on City of San Antonio streets.
 - 1.10. Shore hardness shall be a minimum of 65. The manufacturer shall provide test data from an independent test lab confirming the product meets the minimum criteria with the bid submittal. Test data shall be provided for each shipment. An outline of the testing procedures shall be provided for review and approval with the bid submittal.
 - 1.11. Tensile strength shall be a minimum of 500 psi. The manufacturer shall provide test data from an independent test lab confirming the product meets the minimum criteria with the bid submittal. Test data shall be provided for each shipment. An outline of the testing procedures shall be provided for review and approval with the bid submittal.
 - 1.12. Deformation rate under compression shall be zero with 100% recovery.
 - 1.13. The riding surface shall be smooth in texture for the duration of the warranty period, at a minimum, as determined by the City Inspector.
2. Rigid reinforcement perpendicular to the flow of traffic
 3. Sufficient stainless/galvanized steel mounting bolts or hex head screws/fasteners per cushion
 - 3.1. Minimum 10mm x 100mm or equivalent
 4. Plastic or nylon screw anchors
 - 4.1. Minimum 14mm x 75mm or equivalent
 5. Metal washers
 - 5.1. Minimum 10mm or equivalent
 6. Quick-set, two component epoxy/adhesive. Contractor shall submit manufacturer's material specifications for review and approval with the bid submittal.
 7. Heavy duty rubber/nylon caps/plugs

WARRANTY:

The speed cushion and all associated equipment shall be fully warranted against defects and/or failure in design, material and workmanship in accordance with the manufacturer's standard warranty, or for a minimum of two (2) years from the date of final acceptance, whichever is greater. All material supplied shall have no less than one hundred percent (100%) of the manufacturer's standard warranty remaining on the date that the material invoices are submitted for payment. Any material with less than 100 percent (100%) of its warranty remaining will not be accepted by the City.

ITEM NO. 826 A
Valve Box Locate and Adjustments

826A.1 Description:

This item shall consist of locating covered valve boxes, cutting asphalt, replacing asphalt, and adjusting existing valve boxes in accordance with these applications and as directed by the Engineer.

826A.2 Materials:

The materials for valve boxes shall conform to the specifications contained within the latest revision of SAWS Material Specifications, Item 10-20 "Valve Boxes".

1. Construction Methods: Locate valve box using maps and metal detectors. Cut and replace asphalt as necessary. The valve box shall be placed in such a manner to prevent shock or stress from being transmitted to the valve. It shall be centered and plumb over the operating nut of the valve with the box cover flush with the surface of the finished pavement or at such other level as may be directed by the Engineer.

Valve boxes located in streets or other area subject to vehicular traffic shall be provided with concrete collars as shown in the Standard Drawings DD-828 Series. Collars around such valve boxes shall be formed and finished off neatly and to a workmanlike manner. Valve box shall be located so that the valve operating nut is readily accessible for operation through the opening to the valve box. The valve box shall be set flush with the surface of the finished pavement or at such other elevations as may be specified. Pits shall be constructed to permit trainer valve repairs and to afford protection to the valve and pipe from impact where they pass through the pit walls.

2. Existing Valve Box: Existing covered valve boxes shall be defined as those boxes which are located within the right-of-way of the specified area of construction operations which are covered by asphalt. These boxes shall be adjusted to match proposed finished grades.

Valve boxes installed as part of a new valve and mainline construction project are considered "new valves". Adjustments to "new valves" are incidental to the installation of the valve and are paid for as part of items 828, 830 or 832 of these Specifications. Separate pay shall not be given to adjust "new valves" to finished grade.

826A.3 Measurement:

Locating and adjusting of valve boxes will be measured by the unit of valve boxes located and adjusted to the finished grades.

826A.4 Payment:

Payment for "valve box locate and adjustment" shall be made at the contract unit price.

ITEM NO. 851-a
LOCATING AND ADJUSTING EXISTING MANHOLES

851.a. 1. DESCRIPTION: This item shall consist of the locating manholes, cutting asphalt, replacing asphalt, and adjustment of all existing manholes to include the replacing of existing manhole covers and rings regardless of type shown on the plans and in conformity with the provisions of these specifications.

851.a. 2. CONSTRUCTION: Locate manholes using maps and metal detectors. Cut and replace asphalt as necessary. Manholes shall be lowered below subgrade placing base materials and openings shall be protected by hatch covers. Existing manhole rings and covers which are determined by the SAWS inspector to be in an unacceptable condition, will be removed and replaced with new rings and cover. Contractor shall take all necessary measures to prevent damage to existing or new rings, cover, or cone from equipment and materials used in or taken through the work area. If no existing or new manhole cover, ring, or cone is damaged by the Contractor, it shall be replaced (as directed by SAWS inspector) by the Contractor at his expense. Manholes shall be adjusted after the base material has been laid and before placing of the surface course. Manholes that are going to be adjusted on an existing surface course not being replaced will be in accordance with City of San Antonio Utility Excavation Criteria Manual Standard Drawing No. 8.8. All manholes shall then be raised, or lowered a sufficient height so as to be level with the finished surface course. Adjustment in height will be made by addition or removal of "throat rings" above the manhole "cone" where feasible. A minimum of two and a maximum of six throat rings shall be used at each manhole. Material excavation from around the manholes shall be replaced with concrete in accordance with Standard Drawings, and select materials from the excavation (as shown on the plans or specified by the SAWS). All excess materials shall be disposed of by the Contractor at his own expense in an approved location.

851.a. 3. MEASUREMENT: Manholes located and completely adjusted, as prescribed above, will be measured by the unit of each manhole located and adjusted. The excavation and the amount of asphalt, concrete or reinforced concrete as necessary to fill the area excavated will not be measured for payment.

851.a. 4. PAYMENT: The work performed as prescribed by this item will be paid for at the contract unit price bid per manhole for "Locating and Adjusting Existing Manholes" which price shall be full compensation for all excavation, including saw cutting or surfaces as required, reinforced concrete and disposal of material excavated; for furnishing and placing all materials and for all labor, tools, equipment and incidentals necessary to complete the work.

SPECIAL SPECIFICATION

3142

Ultra-Thin Bonded Hot Mix Wearing Course (UTBHMWC)

1. **Description.** Construct a surface course composed of a warm spray-applied polymer modified emulsion membrane followed immediately with a hot plant mixed gap-graded paving mixture. Provide a wearing course with a minimum of 1/2 in. for Type A, 5/8 in. for Type B, and 3/4 in. for Type C.
2. **Materials.** Furnish materials of uniform quality throughout that meet the requirements of the plans and specifications. Notify the Engineer of all materials sources. Notify the Engineer before changing any material source or formulation. When making a source or formulation change, the Engineer will verify that the specification requirements are met and may require a new laboratory mixture design, trial batch, or both. The Engineer may sample and test project materials at any time throughout the duration of the project to verify specification compliance.
 - A. **Aggregate.** Furnish aggregates from sources that conform to the requirements shown in Table 1, and as specified in this Section, unless otherwise shown on the plans. Provide aggregate stockpiles that meet the definition in this Section. Do not use recycled asphalt pavement (RAP) or reclaimed asphalt shingles in ultra-thin bonded hot mix wearing course (UTBHMWC) mixtures. Supply mechanically crushed gravel or stone aggregates that meet the definitions in Tex-100-E. The Engineer will designate the plant or the quarry as the sampling location. Samples must be from materials produced for the project. The Engineer will establish the surface aggregate classification (SAC) and perform Los Angeles Abrasion, Magnesium Sulfate Soundness, and Micro-Deval tests. Perform all other aggregate quality tests listed in Table 1 and perform Tex-107-E on mineral fillers if used. Document all test results on the mixture design report. The Engineer may perform tests on independent or split samples to verify Contractor test results. Stockpile aggregates for each source and type separately. Determine aggregate gradations for mixture design and production testing based on Tex-200-F, Part II. Do not add material to an approved stockpile from sources that do not meet the aggregate quality requirements of the Department's Bituminous Rated Source Quality Catalog (BRSQC) unless otherwise approved.
 1. **Coarse Aggregate.** Coarse aggregate stockpiles must have no more than 20% material passing the No. 8 sieve. Provide aggregates from sources listed in the BRSQC. Provide non-listed sources only when tested by the Engineer and approved before use. Allow 30 calendar days for the Engineer to sample, test, and report results for non-listed sources.

Provide coarse aggregate with a minimum SAC Class A requirement. SAC requirements only apply to aggregates used on the surface of travel lanes, unless otherwise shown on the plans. The SAC for sources on the Department's Aggregate Quality Monitoring Program (AQMP) are listed in the BRSQC.

Unless otherwise shown on the plans, Class B aggregate meeting all other requirements in Table 1 may be blended with a Class A aggregate in order to meet requirements for Class A materials. When blending Class A and B aggregates to meet a Class A requirement, ensure at least 50% by weight of the material retained on the No. 4 sieve comes from the Class A aggregate source. Blend by volume if the bulk specific gravities of the Class A and B aggregates differ by more than 0.300. When blending, do not use Class C or D aggregates.

2. **RAP.** Do not use RAP in UTBHMWC mixtures.
3. **Fine Aggregate.** Fine aggregates consist of manufactured sands and screenings. Fine aggregate stockpiles must meet the gradation requirements in Table 2. Supply fine aggregates that are free from organic impurities. The Engineer may test the fine aggregate in accordance with Tex-408-A to verify the material is free from organic impurities. Do not use field sand or other uncrushed fine aggregate. Use fine aggregate from coarse aggregate sources that meet the requirements shown in Table 1, unless otherwise approved.

**Table 1
Aggregate Quality Requirements**

Property	Test Method	Requirement
Coarse Aggregate Properties		
SAC	AQMP	Class A
Deleterious Material, %, Max	Tex-217-F, Part I	1.0
Decantation, %, Max	Tex-217-F, Part II	1.5
Micro-Deval Abrasion, %, Max	Tex-461-A	Note 1
Los Angeles Abrasion, %, Max	Tex-410-A	35
Magnesium Sulfate Soundness, 5-Cycle, %, Max	Tex-411-A	20
Coarse Aggregate Angularity, 2 Crushed Faces, %, Min	Tex 460-A, Part I	95 ²
Flat and Elongated Particles @ 5:1, %, Max	Tex 280-F	10
Fine Aggregate Properties		
Sand Equivalent, Min	Tex 203F	45
Methylene Blue, Max	AASHTO TP57-99	10

1. Not used for acceptance purpose. Used by the engineer as an indicator of the need for further investigation
2. Only applies to crushed gravel.

**Table 2
Gradation Requirements for Fine Aggregate**

Sieve Size	% Passing by Weight or Volume
3/8"	100
#8	70-100
#200	0-30

B. Mineral Filler. Mineral filler consists of finely divided mineral matter such as agricultural lime, crusher fines, hydrated lime, cement, or fly ash. Mineral filler is allowed unless otherwise shown on the plans. Do not use more than 2% hydrated lime or cement, unless otherwise shown on the plans. The plans may require or disallow specific mineral fillers. When used, provide mineral filler that:

- is sufficiently dry, free-flowing, and free from clumps and foreign matter;

- does not exceed 3% linear shrinkage when tested in accordance with Tex-107-E; and
- meets the gradation requirements in Table 3.

**Table 3
Gradation Requirements for Mineral Filler**

Sieve Size	% Passing by Weight or Volume
#8	100
#200	55–100

- C. Baghouse Fines.** Fines collected by the baghouse or other dust collecting equipment may be re-introduced into the mixing drum provided the final combined gradation meets the requirements in Table 6.
- D. Asphalt Binder.** Furnish performance grade (PG) asphalt binder for the paving mixture that meets requirements of Item 300.
- 1. PG Binder.** Provide an asphalt binder with a high temperature grade of PG76 and a low temperature grade as shown on the plans, in accordance with Section 300.2.J.
 - 2. Membrane.** Provide a smooth and homogeneous polymer modified emulsion meeting the requirements of Table 4.

**Table 4
Polymer Modified Emulsion Requirements**

Test on Emulsion	Test Method	Min	Max
Viscosity @ 77°F, SSF	T 72	20	100
Storage Stability ¹ , %	T 59		1
Demulsibility (for anionic emulsions), 35 ml of 0.02 N CaCl ₂ , %	T 59	55	
Demulsibility (for cationic emulsions), 35 ml 0.8% sodium dioctyl sulfosuccinate, %	T 59	55	
Sieve Test ² , %	T 59		0.05
Distillation Test: ³ Residue by distillation, % by wt. Oil portion of distillate, % by vol.	T 59	63	0.5
Test on Residue from Distillation	Test Method	Min	Max
Elastic Recovery @ 50°F, 50 mm/min, %	Tex-539-C	60	
Penetration @ 77°F, 100 g, 5 sec, 0.1 mm	T 49	100	150

1. After standing undisturbed for 24 hours, the surface must be smooth, must not exhibit a white or milky colored substance, and must be a homogeneous color throughout.
2. May be required by the Engineer only when the emulsion cannot be easily applied in the field.
3. The temperature on the lower thermometer should be brought slowly to 350°F ± 10°F and maintained at this temperature for 20 minutes. The total distillation should be complete in 60 ± 5 minutes from the first application of heat.

- E. Additives.** When shown on the plans, use the type and rate of additive specified. Other additives that facilitate mixing or improve the quality of the mixture may be allowed when approved.

If lime or a liquid anti-stripping agent is used, add in accordance with Item 301. Do not add lime directly into the mixing drum of any plant where lime is removed through the exhaust stream, unless the plant has a baghouse or dust collection system that reintroduces the lime back into the drum.

- 3. Equipment.** Provide required or necessary equipment in accordance with Item 320.

- A. Spray Paver.** In addition to the requirements of Item 320, furnish a paver that will spray the membrane, apply the mixture, and level the surface of the mat in a single pass. Configure the paver so that the mixture is placed no more than 5 seconds after the membrane is applied. Ensure the paver does not support the weight of any portion of hauling equipment other than the connection. Provide loading equipment that does not transmit vibrations or other motions to the paver that adversely affect the finished pavement quality. Equip the paver with an automatic dual longitudinal-grade control system and an automatic transverse-grade control system.
- 1. Membrane Storage Tank and Distribution System.** Equip the paver with an insulated storage tank having a minimum capacity of 900 gallons. Provide a metered mechanical pressure sprayer on the paver to apply a uniform membrane at the specified rate. Locate the spray bar on the paver so that the membrane is applied immediately in front of the screed unit. Provide a read out device on the paver to monitor the membrane application rate.
 - 2. Screed.** In addition to meeting Item 320, provide a variable width vibratory screed.
- B. Material Transfer Devices.** In addition to the requirements of Item 320, ensure that no material is deposited on the roadway in front of the paver. Do not use windrow pick-up devices.
- C. Rollers.** Provide steel-wheel rollers meeting the requirements of Item 210, except provide rollers weighing a minimum of 10 tons for each roller required. Operate rollers in static (non-vibrating) mode unless otherwise allowed by the Engineer.
- 4. Construction.** Produce, haul, place, and compact the specified paving mixture. Schedule and participate in a pre-paving meeting, as required in the Quality Control Plan (QCP).
- A. Certification.** Personnel certified by the Department-approved program must conduct all mixture designs, sampling, and testing in accordance with Table 5. In addition to meeting the certification requirements in Table 5, all Level II certified specialists must successfully complete an approved Superpave (SP) training course. Supply the Engineer with a list of certified personnel and copies of their current certificates before beginning production and when personnel changes are made. Provide a mixture design that is developed and signed by a Level II certified specialist. Provide a Level IA certified specialist at the plant during production operations. Provide a Level IB certified specialist to conduct placement tests.

Table 5
Test Methods, Test Responsibility, and Minimum Certification Levels

I. Aggregate Testing	Test Method	Contractor	Engineer	Level
Sampling	Tex-400-A	✓	✓	IA
Dry Sieve	Tex-200-F, Part I	✓	✓	IA
Washed Sieve	Tex-200-F, Part II	✓	✓	IA
Deleterious Material	Tex-217-F, Part I	✓	✓	II
Decantation	Tex-217-F, Part II	✓	✓	II
Los Angeles Abrasion	Tex-410-A		✓	
Magnesium Sulfate Soundness	Tex-411-A		✓	
Micro-Deval	Tex-461-A		✓	
Coarse Aggregate Angularity	Tex-460-A	✓	✓	II
Sand Equivalency	Tex-203-F	✓	✓	II

1. Aggregate Testing	Test Method	Contractor	Engineer	Level
Methylene Blue	AASHTO TP57-99	✓	✓	II
Flat and Elongated Particles	Tex 280-F	✓	✓	II
2. Mix Design & Verification	Test Method	Contractor	Engineer	Level
Design and JMF Changes	Tex-204-F	✓	✓	II
Mixing	Tex-205-F	✓	✓	II
Molding (SGC)	Tex-241-F	✓	✓	II
Laboratory-molded Density	Tex-207-F	✓	✓	II
Rice Gravity	Tex-227-F	✓	✓	IA
Ignition Oven Calibration ¹	Tex-236-F	✓	✓	II
Drain-down	Tex-235-F	✓	✓	IA
Boil Test	Tex-530-C	✓	✓	IA
Cantabro Loss	Tex-245-F	✓	✓	II
3. Production Testing	Test Method	Contractor	Engineer	Level
Control Charts	Tex-233-F	✓	✓	IA
Mixture Sampling	Tex-222-F	✓	✓	
Gradation & Asphalt Content ¹	Tex-236-F	✓	✓	IA
Moisture Content	Tex-212-F	✓	✓	IA
Micro-Deval	Tex-461-A		✓	
Drain-down	Tex-235-F	✓	✓	IA
Boil Test	Tex-530-C	✓	✓	IA
Aging Ratio	Tex-211-F		✓	
4. Placement Testing	Test Method	Contractor	Engineer	Level
Control Charts	Tex-222	✓	✓	IA
Ride Quality Measurement	Tex-1001-S	✓	✓	IB
Thermal profile	Tex-244-F	✓	✓	IB
Permeability	Tex-246-F	✓	✓	IB

1. Refer to Section 4.E for exceptions to using ignition oven.

- B. Reporting.** Use Department-provided software to record and calculate all test data. The Engineer and the Contractor will provide any available test results to the other party when requested. The Engineer and the Contractor will immediately report to the other party any test result that requires production to be suspended or fails to meet the specification requirements. Use the approved communication method (e.g., email, diskette, hard copy) to submit test results to the Engineer.

When directed, use the procedures described in Tex-233-F to plot the results of all productions and placement testing. Update the control charts as soon as test results for each subplot become available. Make the control charts readily accessible at the field laboratory. The Engineer may suspend production for failure to update control charts.

- C. Quality Control Plan (QCP).** Develop and follow the QCP in detail. Obtain approval from the Engineer for changes to the QCP made during the project. The Engineer may suspend operations if the Contractor fails to comply with the QCP.

When directed, submit a written QCP to the Engineer before the mandatory pre-paving meeting. Receive the Engineer's approval of the QCP before beginning production. Include the following items in the QCP:

1. **Project Personnel.** For project personnel, include:
 - a list of individuals responsible for QC with authority to take corrective action, and
 - contact information for each individual listed.
2. **Material Delivery and Storage.** For material delivery and storage, include:
 - the sequence of material processing, delivery, and minimum quantities to assure continuous plant operations,
 - aggregate stockpiling procedures to avoid contamination and segregation,
 - frequency, type, and timing of aggregate stockpile testing to assure conformance of material requirements before mixture production, and
 - procedure for monitoring the quality and variability of asphalt binder and the polymer modified emulsion membrane.
3. **Production.** For production, include:
 - loader operation procedures to avoid contamination in cold bins,
 - procedures for calibrating and controlling cold feeds,
 - procedures to eliminate debris or oversized material,
 - procedures for adding and verifying rates of each applicable mixture component (e.g., aggregate, asphalt binder, lime, liquid anti-strip),
 - procedures for reporting job control test results, and
 - procedures to avoid segregation and drain-down in the silo.
4. **Loading and Transporting.** For loading and transporting, include:
 - type and application method for release agents, and
 - truck loading procedures to avoid segregation.
5. **Placement and Compaction.** For placement and compaction, include:
 - proposed agenda for mandatory pre-paving meeting, including date and location
 - type and application method for release agents in the paver and on rollers, shovels, lutes, and other utensils,
 - procedures for the transfer of mixture into the paver while avoiding segregation and preventing material spillage,
 - process to balance production, delivery, paving, and compaction to achieve continuous placement operations,
 - paver operations (e.g., operation of wings, height of mixture in auger chamber) to avoid physical and thermal segregation and other surface irregularities, and
 - procedures to construct quality longitudinal and transverse joints.

D. Mixture Design.

- Design Requirements.** Unless otherwise shown on the plans, use Tex-247-F to design a mixture meeting the requirements listed in Tables 1, 6 and 7. Use $N_{des} = 50$ as the design number of gyrations. Design the mixture with an air void structure that will accommodate a membrane application rate in conformance with Table 9.

At any time during the project, the Contractor may submit a new mixture design. The Engineer will approve all mixture designs before the Contractor can begin production. When shown on the plans, the Engineer will provide the mixture design.

Provide the Engineer with a mixture design report using Department-provided software. Include the following items in the report:

- the combined aggregate gradation, source, specific gravity, and percent of each material used,
- results of all applicable tests,
- ignition oven correction factors for asphalt content and gradation,
- the mixing and molding temperatures,
- the signature of the Level II person or persons that performed the design,
- the date the mixture design was performed, and
- a unique identification number for the mixture design.

Table 6
Master Gradation Bands (% Passing by Weight) and Binder Content

Sieve Size		Type A	Type B	Type C
(inch)	(mm)	Gradation	Gradation	Gradation
3/4 in.	19			100*
1/2 in.	12.7		100	75-100
3/8 in.	9.5	100	75-100	55-80
4	4.75	35-55	22-36	22-36
8	2.36	19-30	19-30	19-30
16	1.18	14-25	14-24	14-24
30	0.60	10-18	10-18	10-18
50	0.30	7-14	7-14	7-14
100	0.15	5-10	5-10	5-10
200	0.075	4-6	4-6	4-6
AC Content %		5.0-5.8	4.8-5.6	4.6-5.6

* A target of 100% passing the 5/8 in. is recommended. Mixtures containing 5/8 in. aggregate size may require a greater paving thickness.

**Table 7
Laboratory Mixture Design Properties**

Mixture Property	Test Method	Minimum	Maximum
Film Thickness, microns	Tex-247-F	9	–
Drain-down, %	Tex-235-F	–	0.1
Cantabro Loss (unaged), %	Tex-245-F	–	20.0 ¹
Boil test	Tex-530-C	Pass/Fail	None
Membrane Application Rate, gal/sy	Tex-247-F	Report	Report
Laboratory-molded density, %	Tex-207-F, Part VI	85 ²	92

1. Test and report for informational purposes only.

2. Suggested limit. Test and report for informational purposes only.

2. Job Mix Formula (JMF) Approval. The JMF is the combined aggregate gradation and target asphalt percentage used to establish target values for hot mix production. JMF1 is the original laboratory mixture design used to produce the trial batch. The Engineer and the Contractor will verify JMF1 based on plant produced mixture from the trial batch unless otherwise approved. The Engineer may accept an existing mixture design previously used on a Department project and may waive the trial batch to verify JMF1.

a. Contractor’s Responsibilities.

- (1) **Submitting JMF1.** Furnish the Engineer a mix design report (JMF1) and request approval to produce the trial batch.
- (2) **Membrane Target Application Rate.** Provide the Engineer the emulsion membrane target application rate calculated from JMF1.
- (3) **Supplying Aggregates.** Provide the Engineer with approximately 40 lb. of each aggregate stockpile unless otherwise directed.
- (4) **Supplying Asphalt.** Provide the Engineer at least 1 gal. of the asphalt material and sufficient quantities of any additives proposed for use.
- (5) **Ignition Oven Correction Factors.** Determine the aggregate and asphalt correction factors from the ignition oven using Tex-236-F. Base correction factors from washed sieve analysis as required by the mix design. Provide the Engineer with split samples of the mixtures and blank samples used to determine the correction factors.
- (6) **Boil Test.** Perform the test and retain the tested sample from Tex-530-C. Use this sample for comparison purposes during production. The Engineer may waive the requirement for the boil test. If signs of stripping exist, add lime or commercial anti-stripping agents (liquid anti-strip) as directed.
- (7) **Trial Batch Approval.** Upon receiving conditional approval of JMF1 from the Engineer, provide a plant-produced trial batch for verification testing of JMF1 and development of JMF2.

- (8) **Trial Batch Production Equipment.** To produce the trial batch, use only equipment and materials proposed for use on the project.
- (9) **Trial Batch Quantity.** Produce enough quantity of the trial batch to ensure that the mixture is representative of JMF1.
- (10) **Number of Trial Batches.** Produce trial batches as necessary to obtain a mixture that meets the operational tolerances in Table 8.
- (11) **Trial Batch Sampling.** Obtain a representative sample of the trial batch and split it into three equal portions in accordance with Tex-222-F. Label these portions as “Contractor,” “Engineer,” and “Referee.” Deliver samples to the appropriate laboratory.
- (12) **Trial Batch Testing.** Test the trial batch to ensure the mixture produced using the proposed JMF1 meets the verification testing requirements for gradation, binder content, laboratory-molded density, and drain-down listed in Table 8. Apply correction factors determined in Section 4.D.2.a.(5) to JMF1 results for gradation and asphalt content. Provide the Engineer with a copy of the trial batch test results.
- (13) **Development of JMF2.** After the Engineer grants full approval of JMF1 based on results from the trial batch, evaluate the trial batch test results, determine the optimum mixture proportions, and submit as JMF2.
- (14) **Mixture Production.** After receiving approval for JMF2, use JMF2 to produce Lot 1.
- (15) **Development of JMF3.** Evaluate the test results from Lot 1, determine the optimum mixture proportions, and submit as JMF3 for use in Lot 2.
- (16) **JMF Adjustments.** If necessary, adjust the JMF before beginning a new lot. The adjusted JMF must:
- be provided to the Engineer in writing before the start of a new lot,
 - be numbered in sequence to the previous JMF,
 - meet the master gradation limits shown in Table 8, and
 - be within the operational tolerances of JMF2 listed in Table 8.
- (17) **Requesting Referee Testing.** If needed, use the referee testing in accordance with Section 4.I.1 to resolve testing differences with the Engineer.

**Table 8
Testing Frequency and Mixture Production Tolerances**

Test Description	Test Method	Minimum Contractor Testing Frequency	Minimum Engineer Testing Frequency	Operational Tolerance from JMF
% Passing for sieve sizes larger than #4	Tex-200-F	1 per subplot	1 per 4 lots	+/-5.0
% Passing #4 and #8	Tex-200-F	1 per subplot	1 per 4 lots	+/-4.0
% Passing #16, #30 and #50	Tex-200-F	1 per subplot	1 per 4 lots	+/-3.0
% Passing#100	Tex-200-F	1 per subplot	1 per 4 lots	+/-2.0
% Passing #200	Tex-200-F	1 per subplot	1 per 4 lots	See Note 1
Binder Content, %	Tex-236-F	1 per subplot	1 per 4 lots	+/-0.3
Rice Gravity	Tex 227-F	1 per lot	1 per 4 lots	See Note 3
Drain-down, %	Tex-235-F	1 per subplot	1 per 4 lots	Table 5
Boil Test ²	Tex-530-C	1 per project	1 per project	N/A
Membrane Application Rate	Tex-247-F	1 per lot	1 per 4 lots	+/-0.02
Asphalt Binder Sampling ²	Tex-500-C	1 per subplot (sample only)	1 per project	N/A
Emulsion Membrane Sampling ²	Tex-500-C	1 per lot (sample only)	1 per project	Table 4
Lab molded density	Tex-207-F Part VI	1 per subplot	1 per 4 lots	Table 7
Thermal profile	Tex-244-F	1 per subplot	Optional	N/A

1. Take corrective action if aggregate gradation exceeds limits shown in Table 8.

2. The Engineer may reduce or waive the sampling and testing requirements based on a satisfactory test history.

3. Used to calculate density.

b. Engineer’s Responsibilities.

- (1) **Gyratory Compactor.** For molding trial batch samples, the Engineer will use the Contractor-provided SGC at the Contractor’s field laboratory or provide and use a Department SGC at an alternate location.
- (2) **Conditional Approval of JMF1.** Within two working days of receiving the mixture design report (JMF1) and all required materials, the Engineer will review the Contractor’s mixture design report and verify conformance with all aggregates, asphalt, additives, and mixture specifications. The Engineer may perform tests to verify the aggregates meet the requirements listed in Table 1. The Engineer will grant the Contractor conditional approval of JMF1 if the information provided on the paper copy of JMF1 indicates the Contractor’s mixture design meets the specifications. Full approval of JMF1 will be based on the Engineer’s test results on mixture from the trial batch.
- (3) **Authorizing Trial Batch.** After conditionally approving JMF1, the Engineer will authorize the Contractor to produce a trial batch.
- (4) **Ignition Oven Correction Factor.** The Engineer will use the split samples provided by the Contractor to determine the aggregate and asphalt correction factors for the ignition oven in accordance with Tex-236-F.
- (5) **Testing the Trial Batch.** Within one full working day, the Engineer will sample and test the trial batch to ensure that the gradation and binder content meet the requirements listed in Table 8. Apply correction factors

determined in Section 4.D.2.a.(5) to JMF1 results for gradation and asphalt content.

The Engineer will have the option to perform the following tests on the trial batch:

- Tex-235-F to verify that drain-down meets the requirement shown in Table 7.
- Tex-461-A to determine the need for additional magnesium sulfate soundness testing.
- Tex-530-C to retain and use for comparison purposes during production.
- Tex-245-F to verify the Cantabro loss meets the requirement shown in Table 7.

- (6) **Full approval of JMF1.** The Engineer will grant full approval of JMF1 and authorize the Contractor to proceed with developing JMF2 if the Engineer's results for gradation and asphalt content confirm that the trial batch meets the requirements in Table 8.

The Engineer will notify the contractor that an additional trial batch is required if the trial batch does not meet the requirements in Table 8.

- (7) **Approval JMF2.** The Engineer will approve JMF2 within one working day if it meets the master grading limits shown in Table 6 and is within the operational tolerances of JMF1 listed in Table 8.
- (8) **Approval Lot 1 Production.** The Engineer will authorize the Contractor to proceed with Lot 1 production after approving JMF2.
- (9) **Approval of JMF3.** The Engineer will approve JMF3 within 1 working day if it meets the master grading limits shown in Table 6 and is within the operational tolerances of JMF2 listed in Table 8.

2. **JMF Adjustments.** Produce the mixture within the operational tolerances listed in Table 8. The Engineer may suspend production if corrective actions are not taken when operational tolerances are exceeded. With approval from the Engineer, the JMF target values may be adjusted as needed. Document any changes to the JMF with a subsequent JMF number. The Engineer may adjust the target asphalt percentage within the operational tolerances of the JMF.

- E. **Production Operations.** Perform a new trial batch when the plant or plant location is changed. Perform quality control at the frequency and within the tolerances listed in Table 8. Take corrective action and receive approval to proceed after any production suspension for noncompliance to the specification.

At any time during production, the Engineer may require the Contractor to verify the following based on quantities used:

- Additives:
 - lime (within $\pm 0.1\%$ of JMF)
 - liquid anti-strip (within $\pm 0.05\%$ of JMF)
- Emulsion membrane application rate (within ± 0.02 gal/sy of JMF)

If the aggregate mineralogy is such that Tex-236-F does not yield reliable results, the Engineer may allow alternate methods for determining the asphalt content and aggregate gradation. Unless otherwise allowed, the Engineer will require the Contractor to provide evidence that results from Tex-236-F are not reliable before permitting an alternate method. If an alternate test method is allowed, use the applicable test procedure as directed.

1. **Storage and Heating of Materials.** Do not heat the asphalt binder above the temperatures specified in Item 300 or from the manufacturer's recommended values. On a daily basis, provide the Engineer with the records of asphalt binder and hot mix asphalt discharge temperatures in accordance with Section 3.A.1.c. Unless otherwise approved, do not store hot mix for more than 6 hrs. or a period that adversely affects the quality of the mixture.
2. **Mixing and Discharge of Materials.** Notify the Engineer of the target discharge temperature and produce the mixture within 25°F of the target. Monitor the temperature of the material in the truck before shipping to ensure that it does not exceed 350°F. The Department will not pay for or allow placement of any mixture produced at more than 350°F.

Control the mixing time and temperature so that substantially all moisture is removed from the mixture before discharging from the plant. If requested, perform Tex-212-F, Part II, and verify that the mixture contains no more than 0.2% of moisture by weight. Obtain the sample immediately after discharging the mixture into the truck and perform the test promptly.

- F. **Hauling Operations.** Before use, clean all truck beds to ensure mixture is not contaminated. When a release agent is necessary, use a release agent on the approved list maintained by the Construction Division to coat the inside bed of the truck.
- G. **Placement Operations.** Prepare the surface by removing raised pavement markers and objectionable material such as moisture and dirt, sand, leaves, and other loose impediments from the surface before placing mixture. Remove vegetation from pavement edges. Use an approved paver to concurrently apply the membrane and place the UTBMWC mixture to produce a smooth, finished surface with a uniform appearance and texture that meet typical section requirements. Control the speed of the paver to ensure that the membrane is exposed for no more than 5 seconds before being covered with UTBMWC. Place mixture so longitudinal joints on the surface course coincide with lane lines, or as directed. When placing the hot mix adjacent to gutters and structures to ensure that the pavement will drain properly.

1. **Weather Conditions.** Place the mixture when the roadway surface temperature is 70°F or higher, unless otherwise approved. Measure the roadway surface temperature with a handheld infrared thermometer. Place mixtures only when general weather conditions and moisture conditions of the roadway surface are suitable in the opinion of the Engineer.
2. **Application of Membrane.** Unless otherwise directed by the Engineer, apply the membrane at the rates shown in mixture design within the limits shown in Table 9. The Engineer may adjust the application rate, taking into consideration the existing pavement surface conditions. Spray the membrane using a metered mechanical pressure spray bar at a temperature of 120°F to 180°F. Monitor the membrane application rate and adjust the rate when needed or when directed. If required, verify that the spray bar is capable of applying the membrane at a uniform rate across the entire paving width as directed. Do not let the wheels or other parts of the paving machine contact the freshly applied membrane.

Table 9
Membrane Application Rate Limits, (gallons per square yard)

Type A	Type B	Type C
0.14 – 0.20	0.16 – 0.24	0.17 – 0.27

3. **Lay-Down Operations.** Measure the temperature of mixture delivered to the paver and take corrective action if needed to ensure the temperature does not drop below 290°F.

For each subplot use a handheld infrared thermometer to obtain a thermal profile of the uncompacted mat immediately behind the paver. Record the information on Department QCQA forms and submit the forms to the Engineer. The Engineer may reduce the testing frequency based on a satisfactory test history.

- a. **Thermal Profile.** For each subplot, obtain a thermal profile using Tex-244-F. The Engineer may also obtain as many thermal profiles as deemed necessary.

No more than a 50°F differential will be allowed along the profile of the uncompacted mat surface immediately behind the paver. Unless otherwise directed, suspend operations and remove and replace material that exceeds the maximum temperature differential of 50°F. Resume operations when the Engineer determines that subsequent production will meet the specifications.

If the temperature differential is between 25°F and 50°F, the area will be deemed as having thermal segregation. Take corrective action to eliminate areas that have thermal segregation.

- H. **Compaction.** Roll the freshly placed UTBHMWC with a steel-wheeled roller, operated in static mode, to seat the mixture without excessive breakage of the aggregate and to provide a smooth surface and uniform texture. Compact the wearing course a minimum of two passes and a maximum of three passes. Do not use pneumatic rollers. Thoroughly moisten the roller drums with a soap and water solution to prevent adhesion. Unless otherwise directed, use only water or a Department-approved release agent on rollers, tamps, and other compaction equipment.

The Engineer may use, or require the Contractor to use, Tex-246-F to test and verify that the compacted mixture has adequate permeability. Adjust the mixture design or construction methods if the compacted mixture does not exhibit adequate permeability.

Allow the compacted pavement to cool to 160°F or lower before opening to traffic unless otherwise directed.

I. Acceptance Plan. Sample and test the hot mix on a lot and subplot basis. A production lot consists of four equal sublots. Lot 1 will be 500 tons or one day's production. The Engineer will select subsequent lot sizes based on the anticipated daily production. The lot size will be at least 500 tons, but no greater than 2000 tons. The Engineer may change the lot size before the Contractor begins any lot. If the production or placement test results are not within the acceptable tolerances listed in Table 8, suspend production until test results or other information indicate, to the satisfaction of the Engineer, that the next material produced or placed will meet the specified values.

1. Referee Testing. The Construction Division is the referee laboratory. The Contractor may request referee testing if the differences between Contractor and Engineer test results exceed the operational tolerances shown in Table 8 and the differences cannot be resolved. Make the request within five working days after receiving test results from the Engineer. Referee tests will be performed only on the lot in question and only for the particular test in question. Allow ten working days from the time the samples are received at the referee laboratory for test results to be reported. The Department may require the Contractor to pay for additional referee tests if more than three referee tests per project are required and the Engineer's test results are closer to the referee test results than the Contractor's test results.

2. Production Acceptance.

a. Mixture Sampling. For each subplot, take one sample at the location randomly selected. For each lot, the Engineer will randomly select and test a "blind" sample from at least one subplot. The location of the Engineer's "blind" sample will not be disclosed to the Contractor. The Engineer will use the Contractor's split sample for sublots not sampled by the Engineer.

The sampler will split each sample into three equal portions in accordance with Tex-200-F and label these portions as "Contractor," "Engineer," and "Referee." Deliver the samples to the appropriate party's laboratory. Deliver referee samples to the Engineer. Discard unused samples after accepting pay adjustment factors for that lot.

b. Asphalt Binder Sampling. Obtain a 1-qt. sample of the asphalt binder for each lot of mixture produced. Obtain the sample at approximately the same time the mixture random sample is obtained. Supply a sampling port between any additive blending device and mixer. Locate the sampling port downstream of any additive addition so the sample will be a representation of the final asphalt-additive blend going to the roadway. Sample from a port located immediately upstream from the mixing drum or pug mill. Take the sample in accordance with Tex-500-C, Part II. Label the can with the corresponding lot and subplot numbers, and deliver the sample to the Engineer.

The Engineer may also obtain independent samples. If the Engineer chooses to obtain an independent asphalt binder sample, the Engineer will split a sample of the asphalt binder with the Contractor. The Engineer will test at least one asphalt binder sample per project to verify compliance with Item 300.

- c. **Operational Tolerances.** Control the production process within the operational tolerances listed in Table 8. When production is suspended, the Engineer will allow production to resume when test results or other information indicates the next mixture produced will be within the operational tolerances.

3. Placement Acceptance.

- a. **Emulsion Membrane Sampling.** Obtain a 1-qt. sample of the polymer-modified emulsion for each subplot of mixture produced. Take the sample from the emulsion tank located on the paving machine, but not from the emulsion spraybar. Obtain the sample at approximately the same time the mixture random sample is obtained. Take the sample in accordance with Tex-500-C, Part III. Label the can with the corresponding lot and subplot numbers, and deliver the sample to the Engineer.
- b. **Recovered Asphalt DSR.** The Engineer may take production samples or cores from suspect areas of the project to determine recovered asphalt properties. Asphalt binders with an aging ratio greater than 3.5 do not meet the requirements for recovered asphalt properties and may be deemed defective when tested and evaluated by the Construction Division. The aging ratio is the dynamic shear rheometer (DSR) value of the extracted binder divided by the DSR value of the original unaged binder. DSR values are obtained according to AASHTO T315 at the specified high temperature performance grade of the asphalt. The Engineer may require removal and replacement of the defective material at the Contractor's expense. The asphalt binder will be recovered for testing from production samples or cores using Tex-211-F.
- c. **Irregularities.** Immediately take appropriate corrective actions if surface irregularities, including but not limited to segregation, rutting, raveling, flushing, fat spots, mat slippage, color, texture, roller marks, tears, gouges, streaks, or uncoated aggregate particles are detected. The Engineer may allow placement to continue for at most one day of production while taking appropriate action. If the problem still exists after that day, suspend paving until the problem is corrected to the satisfaction of the Engineer.

At the expense of the Contractor and to the satisfaction of the Engineer, remove and replace any mixture that does not bond to the existing pavement or has other surface irregularities identified above.

- 4. **Ride Quality.** Unless otherwise shown in the plan, measure ride quality in accordance with Item 585.

- 5. **Measurement.** Ultra Thin-Bonded Hot Mix Wearing Course (UTBHMWC) will be measured by the ton of UTBHMWC. UTBHMWC is defined as the asphalt, aggregate, and

additives. The weights of asphalt and aggregate will be calculated based on the measured weight of UTBHMWC and the target percentage of asphalt and aggregate. Measure the weight on scales in accordance with Item 320. Measure the UTBHMWC polymer modified emulsion membrane by the gallon or the ton, in accordance with the bid item specified.

A. Membrane. Unless otherwise noted on the plans, membrane material will be measured by one of the following methods:

1. Volume. Membrane material will be measured at the applied temperature by strapping the tank before and after road application and determining the net volume in gallons from the distributor's calibrated strap stick. The quantity to be measured for pavement will be the number of gallons used corrected to 60°F, as directed, in the accepted surface treatment.

2. Weight. Membrane material will be measured in tons using certified scales meeting the requirements of Item 320, unless otherwise approved. The transporting truck must have a seal attached to the driving device and other openings. The Engineer may require random checking on public scales, at the Contractor's expense, to verify weight accuracy.

Upon work completion or temporary suspension, any remaining membrane material will be weighed by a certified public weigher or measured by volume in a calibrated distributor or tank, and the quantity converted to tons at the measured temperature. The quantity to be measured will be the number of tons received, minus the number of tons remaining after all directed work is complete, and minus the amount used for other items.

B. Asphalt. The asphalt weight in tons will be determined from the total weight of UTBHMWC. Measured asphalt percentage will be obtained using Tex-236-F or asphalt flow meter readings, as determined by the Engineer.

1. Target Percentage. The JMF target asphalt percentage will be used to calculate the weight of asphalt binder unless the measured asphalt binder percentage is more than 0.3 percentage points below the JMF target asphalt percentage. Volumetric meter readings will be adjusted to 60°F and converted to weight.

2. Measured Percentage. The measured asphalt percentage will be used for payment for that lot's production when the measured percentage is more than 0.3 percentage points below the JMF target asphalt percentage.

C. Aggregate. The aggregate weight in tons will be determined from the total weight of UTBHMWC less the weight of the asphalt.

6. Payment. The work performed and materials furnished in accordance with this Item and measured as provided under Section 4.I.5 will be paid for at the unit price bid for "UTBHMWC (Membrane)," for "UTBHMWC (Asphalt)," and for "UTBHMWC (Aggregate)" of the types specified. These prices are full compensation for all materials, equipment, labor, tools, and incidentals.

Trial batches will not be paid for unless they are included in pavement work approved by the Department.

ITEM NO. SP 100
Special Specification

DOOR HANGERS

DESCRIPTION: Contractor shall place Hangers with every business and resident within each segment of a project limit and at Inspector specified locations. The City of San Antonio is to provide template/verbage for the Door Hangers.

BID ITEM:

Item SP 100 – Door Hangers – lump sum

SPECIAL SPECIFICATION
Item SP500 Police Officer

Article SP500.1. Description. Provide uniformed off-duty police officers as directed where two-way traffic is to be maintained at major intersections.

Article SP500.2. Materials. N/A.

Article SP500.3. Construction. Coordinate with the inspector to determine the duration and locations where off-duty police officers will be deployed.

Article SP500.4. Measurement. Police officer services will be measured by the hour per officer.

Article SP500.5. Payment. The accepted quantity of man-hours shall be paid at the contract unit price for each hour.

Bid Item SP500 – Police Officer – Hour

SPECIAL SPECIFICATION
Item SP800 Project Signs

Article SP800.1. Description. Furnish, install, maintain, move and remove project information signs on each street whenever workmen, materials or equipment is present, or as directed. The project information signs will identify the construction as being a part of the 2014 SMP program of the City of San Antonio Public Works Street Department.

Article SP800.2. Materials. Furnish signs meeting the materials specifications of Item 531, the Barricade and Construction Standard details in the plans, and following the template of the layout, size, and legend to be provided by the City of San Antonio.

Article SP800.3. Construction. Erect all signs in conformance with the requirements of the TMUTCD and the Barricade and Construction Standard Details. It is the contractor's responsibility to see that all signs are properly installed and maintained at the job site. Erect project information signs at the locations directed by the Inspector, generally one sign facing each direction entering the project work area. Maintain the project sign so that no visual defect or graffiti is visible.

Article SP800.4. Measurement. Project signs will be measured by the number of project information signs that are deployed simultaneously on the various project sites.

Article SP800.5. Payment. The accepted quantity of signs shall be paid at the contract unit price for each sign, which shall be full compensation for furnishing all materials, labor, tools, equipment and supplies to construct the signs, mountings, installation at the various street sites, maintaining the signs, moving the signs from street to street, and removal of signs.

Bid Item SP800 – Project Signs – Each

ITEM NO. SP 2000
Special Specification

RAILROAD INSURANCE AND PERMIT

DESCRIPTION: Each Contractor is to include a \$5,000 allowance for the SP RAILROAD INSURANCE AND PERMIT bid item. Contractor to secure all required railroad permits. All fees associated with such permits shall be included in this item.

BID ITEM:

Item SP 2000 – Railroad Insurance and Permit - lump sum

ITEM 315
Special Provision

FOG SEAL

For this project, Item 315 “Fog Seal”, of the TxDOT Standard Specifications, is hereby amended as follows:

1) Delete in its entirety Article 315.5, Measurement.

2) Add Article 315.5 Measurement:

This Item will be measured by the square yard (SY) of accepted emulsified asphalt used in the emulsified asphalt and water mixture.

3) When referenced in the Item 315, “Fog Seal” specification, Item 300, “Asphalts, Oils and Emulsions,” of the TxDOT Standard Specifications is hereby amended with respect to the clauses cited below.

Article 300.2. Materials D. Emulsified Asphalt., is supplemented by the following:

D. Emulsified Asphalt. Emulsified asphalt must be homogeneous, not separate after thorough mixing, and meet the requirements for the specified type and grade in the Table 11A for TRMSS.

Table 11A

Hazardous Materials Identification System (HMIS) ratings:

HMIS	Rating
Health	1
Flammability	0
Reactivity	0
Protective Equipment	E

American Society for Testing and Materials (ASTM):

TEST METHOD	PROPERTY	REQUIREMENT
ASTM D 562	Viscosity, Krieb Unit (KU)	35 to 65
ASTM D 2939.07	Weight/Gallon	8.3 – 8.6
ASTM D 2939.08	Residue by Evaporation %	>33.0
ASTM244 (sec. 44-47)	Sieve Analysis	0.1 max
ASTM D 93	Flash Point (of residue)	>500
ASTM D 2939.05	Emulsion Uniformity	Pass
ASTM D 2939.14	Resistance to Heat	Pass
ASTM D 2939.15	Resistance to Water	Pass
ASTM D 2939.19	Wet Flow	Pass
Performance Criteria Testing*		
ASTM G 154	Accelerated Weathering Test **	Pass

Asphalt Cement Certificate of Compliance ***		
Certificate of compliance	Ground Whole Tire Rubber %	10 min
ASTM D 5	Penetration 77°F, 100g, 5sec, dmm	15-55
ASTM D 36	Softening Point, °F	> 140
ASTM D 2042	Solubility % (3 set average)	>98.0

- * TRMSS, ready to use.
- ** 1,000 hours. UVA-340 lamp, 0.77 W/m²(V1.0 calibration), 8 hours UV light @ 50°C, 5min. Spray, 3.55 hours condensation @ 50°C.
- *** Ground whole tire rubber modified asphalt cement.

International Slurry Surfacing Association (ISSA):

TEST METHOD	PROPERTY	REQUIREMENT
Performance Testing*	Criteria	
ISSA TB-100	Wet track Abrasion, %****	<5.0%

- * TRMSS, ready to use.
- **** Calculated weight loss, percentage of original Volume, 1 hour soak.

SPECIAL PROVISION
Item 502 Concrete Sidewalks

For this project, Item 502 “Concrete Sidewalks” of the Standard Specifications is hereby amended with respect to the clauses cited below, and no other clauses or requirements on the Item are waived or changed hereby.

Article 502.4. Construction. G. Curb Ramps. This paragraph is void and replaced with the following:

Curb ramps must include a detectable warning surface and conform to the details shown on the plans. Confirm that abrupt changes in sidewalk elevation do not exceed ¼ inch, sidewalk cross slope does not exceed 2%, curb ramp grade does not exceed 8.3%, and flares adjacent to the ramp do not exceed 10% slope.

Construct curb ramps to include the following provisions (no separate pay):

- Construct detectable warning surface with truncated domes conforming to the City of San Antonio Wheelchair Ramp Standards sheet.
- Remove existing flatwork in accordance with the specification for Item 103, except measurement and payment.
- Construct new curb in accordance with the specification for Item 500, except measurement and payment.
- Construct concrete retaining wall (combination type), up to a maximum height of 6 inches, in accordance with the specification for Item 506, except measurement and payment.
- Adjust or relocate existing signs as directed.
- Contractor shall not leave the ramp unattended more than 1 day.
- Concrete work shall be maintained free from graffiti of any kind.
- Relocate irrigation systems in accordance with the specification for Item 552, except measurement and payment.
- Contractor shall deliver flyers at least 2 days in advance.
- Relocate landscape as directed.
- Avoid damage to the property of others. Contractor will be held liable for damage.

Article 502.5. Measurement. This article is void and replaced with the following:

Sidewalks will be measured by the square yard of surface area at the depth specified.

Curb ramps will be measured by each unit. “Each unit” will consist of one curb ramp of the type specified in the plans, removal of existing curb and flatwork, one landing and up to two wings, one detectable warning surface, new curb up to 24 feet in length, concrete retaining wall (combination type up to 6” in height), concrete surfaces up to a maximum of 13 square yards, sign adjustment or relocation, irrigation relocation, landscape relocation, and graffiti removal. Type I and Type III as per City of San Antonio Wheelchair Ramp Standards shall be measured as 2 EA of this item.

Article 502.6. Payment. This article is void and replaced with the following:

For Sidewalks – the work performed and materials furnished in accordance with this Item and measured as provided under “Measurement” will be paid for at the unit price bid per square yard for “Concrete Sidewalks – Conventionally Formed”. This price is full compensation for surface preparation of base; materials; excavation, hauling and disposal of excavated material; drilling and doweling into existing concrete curb, sidewalk and pavement; repair of adjacent street or pavement structure damaged by these operations; and equipment, labor, tools and incidentals.

For Curb Ramps – the work performed and materials furnished in accordance with this Item and measured as provided under “Measurement” will be paid for a the unit price bid for “Curb Ramps”. This price is full compensation for removal and disposal of existing concrete; surface preparation of base; materials, excavation, hauling and disposal of excavated material; drilling and doweling into existing concrete curb, sidewalk and pavement; repair of adjacent street or pavement structure damaged by these operations; and equipment, labor, tools and incidentals. Concrete surface for a curb ramp exceeding 13 SY will be paid as Concrete Sidewalk per square yard. New concrete curb installation for a curb ramp exceeding 24 feet in length will be paid as Curb Item 500.

Article 502.7. Bid Item. This article is void and replaced with the following:

Item 502.1 – Concrete Sidewalks – Conventionally Formed – per SY

Item 502.1A – Curb Ramps – EA

SPECIAL PROVISION

Item 503 Asphaltic Concrete, Portland Cement Concrete, and Gravel Driveways

For this project, Item 503 of the Standard Specifications is hereby amended with respect to the clauses cited below, and no other clauses or requirements on the Item are waived or changed hereby.

Delete in its entirety:

Section 503.6 Payment

Add:

Section 503.6 Payment:

The work performed as prescribed by this item will be paid for at the contract unit price bid per square yard for “Portland Cement Concrete Driveway”, Portland Cement Concrete Driveway – Commercial”, “Asphaltic Concrete Driveway”, or “Gravel Driveway”, which price shall be full compensation for preparing the subgrade, for furnishing and placing all materials, manipulations, labor, tools, equipment and incidentals necessary to complete the work.

SPECIAL PROVISION

Item 533 Cleaning and Removal of Pavement Markings and Markers

For this project, Item 533 “Cleaning and Removal of Pavement Markings and Markers” of the Standard Specifications is hereby amended with respect to the clauses cited below, and no other clauses or requirements of the Item are waived or changed hereby.

Article 533.3. Equipment. This paragraph is void and replaced with the following:

All equipment shall be of sufficient capacity to clean the roadway surface to the specified cleanliness. Equipment shall be power driven and in good operating condition.

Article 533.4. Construction. The first paragraph is void and replaced with the following:

Unless otherwise shown on the plans, acceptable methods of removal for asphaltic pavements include heat scarification, blasting, and mechanical methods. Blasting and mechanical are the only acceptable methods for removal or cleaning of a Portland cement concrete surfaced pavement.

If truck mounted equipment is unable to achieve acceptable results in accordance to this specification, hand operated, power driven equipment, or equivalent, shall be used.

Article A. is void and replaced with the following:

A. Removal of Existing Pavement Markings/Markers.

1. Existing markings or markers to be removed shall be removed to the extent that the pavement marking or marker and its adhesive compound is/are either completely removed or obliterated.
2. Widths, lengths, and shapes of the cleaned surface shall be of sufficient size to include the full area of the specified pavement marking to be placed or removed.
3. Eliminate existing pavement markings and markers on both concrete and asphaltic surfaces in such a manner that color and texture contrast of the pavement surface will be held to a minimum. Repair damaged areas on asphaltic surfaces in excess of 1/8” inch in depth. Repair consists of milling and overlaying new asphaltic material in accordance to the appropriate San Antonio Standard Specifications. Width and length of the repair will be as directed by the Engineer.

4. Blasting or mechanical method on Portland cement concrete surfaces shall be sufficient to remove old pavement markings and all other contaminants. Damage to the roadway surface shall be avoided.
5. Very small particles of tightly adhering existing markings may remain in place if complete removal of the small particles will result in pavement damage.

Article 533.5. Measurement and Payment. This paragraph is void and replaced with the following:

Removal of existing pavement markings shall be measured by the length of satisfactorily removed line, in feet, or as appropriate, the number of symbols or words which are satisfactorily removed. The accepted quantities shall be paid at the contract unit price, which shall be full compensation for furnishing all materials, labor, tools, equipment and supplies to remove the marking and any raised markers. Removal of raised pavement markers shall not be measured or paid for directly but shall be considered subsidiary to the various items. Cleaning of new or existing pavements prior to installing new pavement markings or markers, and removal of incorrectly installed pavement markings and/or markers, shall not be paid for directly, but shall be considered subsidiary to the new pavement marking or marker.

Article 533.6. Bid Item. This paragraph is void and replaced with the following:

Bid Items:

- 533-A – Eliminate Existing Pavement Markings and Raised Markers (4”) – LF
- 533-B – Eliminate Existing Pavement Markings and Raised Markers (8”) – LF
- 533-C – Eliminate Existing Pavement Markings and Raised Markers (12”) – LF
- 533-E – Eliminate Existing Pavement Markings and Raised Markers (24”) – LF
- 533-F – Eliminate Existing Pavement Markings and Raised Markers (SYMBOL) – EA
- 533-G – Eliminate Existing Pavement Markings and Raised Markers (WORD) – EA
- 533-H – Eliminate Existing Pavement Markings and Raised Markers (RR-Xing) – EA

SPECIAL PROVISION
Item 535 Hot Applied Thermoplastic Pavement Markings

For this project, Item 535 “Hot Applied Thermoplastic Pavement Markings” of the Standard Specifications is hereby amended with respect to the clauses cited below, and no other clauses or requirements on the Item are waived or changed hereby.

Article 535.7. Bid Item.

The following items are added:

Item 535.22 – White Sharrow (Bike Shared Lane) – Each, includes one bicycle symbol and two chevrons

Item 535.23 – White Arrow (Right, Left, or Straight) – Each

TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets,
and Bridges, June 1, 2004

2014 – 2015 Asphalt Overlay and HPLM Contract – Package 2 (Task Order)

SPECIAL PROVISION

Item 712 Cleaning and Sealing Joints and Cracks (Asphalt Concrete)

For this project, Item 712 “Cleaning and Sealing Joints and Cracks (Asphalt Concrete)” of the TxDOT Standard Specifications is hereby amended with respect to the clauses cited below, and no other clauses or requirements of the Item are waived or changed hereby.

Article 712.2. Materials. This paragraph is void and replaced with the following:

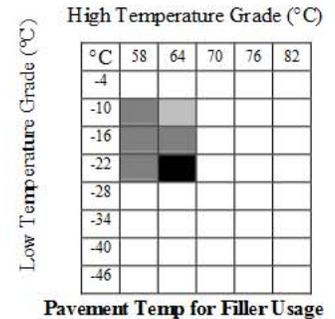
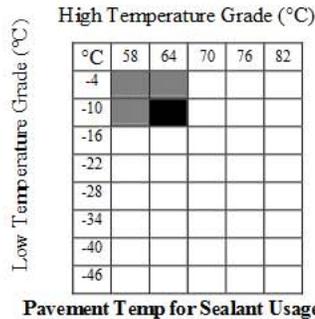
Furnish a hot-applied, single component polymer/rubber modified asphalt material meeting the specifications of Crafc0 Asphalt Rubber 541 or approved equivalent.

READ BEFORE USING THIS PRODUCT

GENERAL CrafcO Asphalt Rubber 541 is a hot-applied asphalt based product used to seal and fill cracks and joints in asphalt or portland cement concrete pavements in moderate to warm climates. Asphalt Rubber 541 is supplied in solid form which when melted and properly applied forms an adhesive and flexible compound that resists cracking in the winter and resists flow at summer temperatures. Asphalt Rubber 541 is used in highway, street, airfield and parking lot pavements and is applied to pavement cracks and joints using pressure feed melter applicators. At application temperature, Asphalt Rubber 541 is a higher viscosity, non self-leveling product. Asphalt Rubber 541 contains virgin rubber, vulcanized granulated crumb rubber, and selected paving asphalt. Asphalt rubber 541 is produced to meet requirements of the Texas Highway Department for Rubber Asphalt Crack Sealer. VOC = 0 g/L.

USAGE GUIDELINES Asphalt Rubber 541 pavement temperature performance limits are 64-10 for crack sealing and 64-22 for crack filling. Usage recommendations are shown in CrafcO pavement temperature grade charts shown at the right. Refer to CrafcO Product Selection Procedures to determine sealant or filler use and pavement temperature grades.

			Suited for Use
			Recommended
			Performance Limits
			Not Recommended



SPECIFICATION CONFORMANCE CrafcO Asphalt Rubber 541 meets all requirements of State of Texas Department of Highways for Rubber Asphalt Crack Sealer (Texas SDHPT Item 300.2 Class B) and exceeds requirements of ASTM D5078.

Test	Texas SDHPT 300.2 Class B Limits
Minimum Application Temperature	380°F (193°C)
Maximum Heating Temperature	400°F (204°C)
Cone Penetration, 77°F (25°C)	30-50
Cone Penetration, 32°F (0°C), 200 g 60 sec.	12 min.
Softening Point (ASTM D36)	170°F (77°C) min.
Flash Point, modified C.O.C.	400°F (204°C) min.
Virgin Rubber Polymer, % by wt.	2% min.
Granulated vulcanized rubber, % by wt.	13-17%
Bond@20°F (-7°C), 50% ext	Pass 3 cycles.

INSTALLATION Prior to use, the user must read and follow Installation Instructions for Hot-Applied RoadSaver, PolyFlex, Parking Lot and Asphalt Rubber Products to verify proper product selection, heating methods, pavement preparation procedures, application geometry, usage precautions and safety procedures. These instructions are provided with each pallet of product.

PACKAGING Packaging consists of individual boxes of product which are palletized into shipping units. Boxes contain a non-adherent film which permits easy removal of the product. Each pallet contains 72 boxes which are stacked in six layers of 12 boxes per layer. The weight of product in each box does not exceed 40 lbs. (18kg) and pallet weights do not exceed 2,880 lbs. (1310kg). Pallets of product are weighed and product is sold by the net weight of product. Product boxes are manufactured from double wall kraft board producing a minimum bursting test certification of 350 psi (241 N/cm²) and using water resistant adhesives. Boxes use tape closure and do not contain any staples. Boxes are labeled with the product name, part number, lot number, specification conformance, application temperatures and safety instructions. Palletized units are protected from the weather using a three mil thick plastic bag, a weather and moisture resistant cap sheet and a minimum of two layers of six month u.v. protected stretch wrap. Pallets are labeled with the product part number, lot number and net weight. Installation Instructions are provided with each pallet in a weather resistant enclosure.

WARRANTY CRAFCO, Inc. warrants that CRAFCO products meet applicable ASTM, AASHTO, Federal or State specifications at time of shipment. Techniques used for the preparation of the cracks and joints prior to sealing or filling are beyond our control as are the use and application of the products; therefore, CrafcO shall not be responsible for improperly applied or misused products. Remedies against CrafcO, Inc., as agreed to by CrafcO, are limited to replacing nonconforming product or refund (full or partial) of purchase price from CrafcO, Inc. All claims for breach of this warranty must be made within three (3) months of the date of use or twelve (12) months from the date of delivery by CrafcO, Inc. whichever is earlier. There shall be no other warranties expressed or implied. For optimum performance, follow CrafcO recommendations for product installation.



420 N. Roosevelt Ave. • Chandler AZ 85226
1-800-528-8242 • (602) 276-0406 • FAX (480) 961-0513
www.crafco.com

INSTALLATION INSTRUCTIONS

HOT-APPLIED ROADSAVER, POLYFLEX, PARKING LOT AND ASPHALT RUBBER PRODUCTS

JANUARY 2008

READ BEFORE USING THIS PRODUCT

GENERAL: These products are hot-applied, single component polymer/rubber modified asphalts supplied in solid form used to seal or fill cracks or joints in asphalt concrete or Portland cement concrete pavements. These products are not fuel resistant, and should not be used in fuel or oil spill prone areas. To use, product is removed from the package, heated in a melter and applied to the pavement. Details on product specifications, climate and usage suitability, and product selection are contained in Product Data Sheets.

MELTING AND APPLICATION: These products must be melted in jacketed double boiler melters with effective agitation that meet requirements of Appendix X1.1 of ASTM D6690. Crafco Supershot, EZ Series 2, and EZ Pour melters are recommended. Do not use direct fired or air heated machines. Heat transfer oil should not exceed 525°F (274°C). The melter must be capable of safely heating product to 400°F (204°C). **CAUTION:** Stop agitation when adding product to prevent splashing. Product is heated to between the minimum application temperature and the maximum heating temperature which are shown on product containers and Product Data Sheets. These products are most effectively applied with pressure feed wand systems. RoadSaver, PolyFlex and Parking Lot products can also be applied using gravity feed pour pots (Part No.40200 and 40201).

APPLICATION LIFE: Application life when heated to application temperature is approximately 12 to 15 hours and may be extended by adding fresh product as quantity in the melter decreases. Product shall be agitated during installation. Product may be reheated once to application temperature, after initial heat up. When application life has been exceeded, RoadSaver and Parking Lot products will thicken, become "stringy" and may then gel. If this occurs, product should immediately be removed from the melter and discarded. Asphalt Rubber and PolyFlex products will soften when overheated or heated for too long.

PAVEMENT TEMPERATURES: Apply product when pavement temperature exceeds 40°F (4°C). Lower temperatures may result in reduced adhesion due to presence of moisture or ice. If pavement temperature is lower than 40°F (4°C), it may be warmed using a heat lance (Part No. 45650) that puts no direct flame on the pavement. If installing at lower pavement temperature than 40°F (4°C), extreme care should be used to insure that cracks or joints are dry and free from ice and other contaminants. Product temperature should be maintained at the maximum heating temperature. If installing product at night, assure that dew is not forming on the pavement surface. Applied product should be checked by qualified personnel to assure that adhesion is adequate.

TRAFFIC CONTROLS: Place traffic controls in accordance with Part 6, Temporary Control, of the FHWA Manual on Uniform Traffic Control devices (MUTCD) to protect the work site for the duration of the repairs.

CRACK / JOINT CLEANING: For appropriate adhesion, cracks or joints must be thoroughly clean and dry immediately prior to product installation. After widening or debris removal, and just prior to product installation, final cleaning shall use high pressure 90 psi (620kpa) minimum, dry, oil free compressed air to remove any remaining dust. Both sides of the crack or joint shall be cleaned. Surfaces should be inspected to assure adequate cleanliness and dryness.

ASPHALT PAVEMENT CRACK SEALING: Crack sealing consists of installing extensible sealants into routed reservoirs in working cracks in pavements in good condition.

Reservoir Cutting: Based on the 98% LTPPBIND temperature range (difference from high to low), cracks are to be routed as follows:

Temperature Grade Range	Reservoir Width	Reservoir Depth
80°C or less	½" (12 mm)	¾" (19 mm)
86°C	¾" (19 mm)	¾" (19 mm)
92°C	1 1/8" (28 mm)	½" (12 mm)
98° or greater	1 ½" (38 mm)	½" (12 mm)

Reservoir width should not exceed 1 ½" (38 mm). Cutting should remove at least 1/8" (3 mm) from each side and produce vertical, intact surfaces with no loosely bonded aggregate. The pavement should be sound enough to resist significant spalling during cutting. Final reservoir width should not exceed twice the cutter width or 1 ½" (38 mm) maximum.

Installation and Finishing: After cleaning, sealant at the required temperature is installed in the reservoir. Sealant can be installed with up to a 3/8" (10 mm) underfill, flush fill, or with an overband cap that does not exceed 1/16" (1.5mm) above the pavement surface, and not greater than a 2" (50 mm) width beyond crack edges, depending on project specifications. These configurations are achieved using appropriate wand tips, shoes or squeegees. To reduce surface tack, Crafco DeTack or other approved material may be applied.

ASPHALT PAVEMENT CRACK FILLING: Crack filling consists of installing flexible, traffic resistant product into prepared, cleaned, non-working pavement cracks. Filler can be installed in routed or unrouted cracks or in surface overbands.

Routed Reservoir – Routed reservoirs are recommended for longest life. Guidelines for determining reservoir use are:

1. Crack density should not exceed approximately 20% (linear feet of cracks per square feet of pavement area).
2. Pavement should be sound enough to resist significant spalling during cutting. Final reservoir width should not exceed double the cutter width, or 1 ½" (38 mm) maximum.

Reservoir Dimensions – Determined as follows:

1. The cut should remove at least 1/8" (3mm) from each side of the crack and cut back to sound pavement.
2. Minimum width is ½" (12 mm), maximum is 1 ½" (38 mm).
3. Recommended cut depth is ¾" (19 mm).
4. Reservoirs are then cleaned with compressed air.

Cleaned Unrouted Cracks – Cracks may be cleaned and filled without reservoirs, but longer life is achieved with reservoirs. Cleaning consists of using high-pressure dry, clean compressed air, brushing, or vacuum techniques to remove debris.

Surface Overbands – Product can be applied in overbands after crack cleaning with compressed air. Overbands should not exceed 1/16" (1.5 mm) high above the pavement surface and not extend greater than 2" (50 mm) beyond each crack edge.

Filler Installation and Finishing – Same as sealant installation and finishing.

PORTLAND CEMENT CONCRETE PAVEMENT JOINT SEALING AND RESEALING: Joint sealing and resealing consist of

installing extensible sealants into sawn and cleaned joint reservoirs in PCC pavements.

Reservoir Sawing – New concrete should be cured for at least 7 days prior to sawing the joint reservoir. Joint spacing should be at the design dimension, generally from approximately 12 to 20 ft. (3.7 to 6.2m). Joints shall be at least ¼” (6mm) wide, and should not exceed 1½” (38mm). For new pavements designed with narrow joints using the initial narrow saw cut as the reservoir, spaced at 15 ft (5m) maximum, and when using low modulus type sealants, joint width may be as narrow as 1/8 inch (3mm). Contact CrafcO for more details. Reservoir depth should allow a sealant depth to width ratio of 1:1 to 2:1, sufficient depth for backer rod, and the specified surface recess. Reservoirs shall be cut no deeper than required. When resealing, old sealant can be removed by knives, plows or sawing. Sawing shall slightly widen the joint by 1/8 to ¼ inch (3-6mm) to remove all traces of old sealant and produce clean, intact vertical surfaces. Maximum joint width is 1 ½ inch (38mm).

Reservoir Cleaning – After sawing, joints shall be flushed with water to remove sawing slurry and allowed to dry. Just prior to installing sealant, both joint surfaces shall be cleaned using sandblasting, brushing or other means to remove any remaining of sawing residue. Final cleaning is then done with high-pressure (minimum 90 psi, 62N/cm²) clean, dry, oil free compressed air the same day that sealant is installed. Moisture and oil traps are required on the compressor. Joints must be inspected to assure cleanliness by rubbing a finger along each face to spot dust or other contaminants. If found, recleaning should occur until joints are completely clean and dry. The objective of sawing and cleaning is to provide vertical, intact, clean concrete bonding surfaces free from all contaminants and are dry.

Backer Rod – After cleaning, heat resistant backer rod (ASTM D5249, Type I) approx. 25% larger than the joint width shall be installed to the required depth without damage or punctures. Punctures or damage to backer rod may cause sealant bubbling.

Sealant Installation – Concrete should be cured at least 7 days prior to installing sealant. Sealant heated to required temperature is installed per project specifications. Typical installations include a recess up to ¼ inch (6mm), flush, or with a surface overband (maximum 1/16” (1.5mm) above the surface, and 2” (50 mm) maximum beyond each joint edge).

INSTALLATION PRECAUTIONS: In certain situations, additional consideration needs to be given to product selection and application geometries.

Parking lots and other areas subjected to slow moving traffic and pedestrians: Product used must be stiff enough at hot summer temperatures to resist pick up and should not be applied on top of the pavement surface. Product should have a high temperature grade at least one step above the LTPPBIND grade for the climate. For even better pick-up resistance, increase by two grades.

Pavement to receive an Overlay, Surface Treatment, or Seal Coat: Product will be subjected to overlay heat effects and carriers for surface treatments and seal coats. If product is applied on top of the pavement, and an overlay is then placed, bumps may occur during compaction. Refer to “Bump Formation & Prevention in Asphalt Concrete Overlays Which Have Been Crack Sealed” (www.crafcO.com) for more information. Solvents or other carriers in surface treatments may soften product. Prior to placing a surface treatment or seal coat, a test strip should be placed to verify compatibility of the product and treatment.

High Severity Cracked Areas: Highly cracked areas (fatigue cracks in wheel paths) should not be treated by covering cracks because pavement friction may be affected. These cracks can be filled if followed by a surface treatment or overlay to restore friction.

Fuel or Oil Spill Areas: These products should not be used in fuel or oil spill areas due to softening of the sealant that may occur. Sealant will

not adhere to asphalt or concrete pavements surfaces that are contaminated with oil spills.

Crack Sealing or Filling in Pavements with Surface Treatments: When crack sealing or filling pavements with chip seals, slurry seals, and open graded friction courses, routing should be deep enough to extend through the surface treatment layer into the underlying asphalt concrete. This anchors product into solid pavement for better bonding.

CLEAN OUT: If melters used require clean out, follow manufacturer’s instructions. If solvent is used, insure it does not contaminate product because dilution and flash problems may occur.

STORAGE: Pallets of product are protected with a weather resistant covering. During storage, this covering must be intact to prevent boxes from getting wet. If wet, boxes may lose strength and crush. Rips in the pallet covering should be repaired to maintain packaging integrity. Pallets should be stored on a dry, level surface with good drainage. Pallets should not be stacked because crushing of bottom boxes may occur. Product properties are not affected by packaging deterioration.

SAFETY PRECAUTIONS: Since these products are heated to elevated temperatures, it is essential that operations be conducted safely. All personnel need to be aware of hazards of using hot applied materials and safety precautions. Before use, the crew should read and understand product use and safety information on the box and the product MSDS. User should check D.O.T. requirements for transportation of product at elevated temperatures above 212°F (100°C).

HAZARDS ASSOCIATED WITH HOT-APPLIED

MATERIALS: Skin contact with hot materials causes burns. Over exposure to fumes may cause respiratory tract irritation, nausea, or headaches. Precautions are to be taken to prevent contact with hot material and to avoid inhalation of fumes for everyone in the vicinity. Safety precautions should include:

1. Protective clothing to prevent skin contact with hot material.
1. Care when adding product to melters to reduce splashing.
3. Careful operation of wands or pour pots that apply product.
4. Traffic and pedestrian control measures which meet or exceed MUTCD requirements to prevent access to work areas while product is in a molten state.
5. Avoidance of material fumes.
6. Proper application configurations with a minimum amount of material excess.
7. Appropriate clean up of excessive applications or product spills.

ADDITIONAL INFORMATION: Additional information regarding these products is available by contacting your distributor or CrafcO, Inc. This information includes:

1. Product Data Sheets
2. Material Safety Data Sheet,
3. Safety Manual
4. Sealing Cracks and Joints in Parking and Pedestrian Areas
5. “Bump Formation & Prevention In Asphalt Concrete Overlays Which Have Been Crack Sealed”
6. Sealant Selection Guide