

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the requirements for the management of non-hazardous building construction and demolition waste.
- B. Waste disposal in landfills shall be minimized to the greatest extent possible. Of the inevitable waste that is generated, as much of the waste material as economically feasible shall be salvaged, recycled or reused.
- C. Contractor shall use all reasonable means to divert construction and demolition waste from landfills and incinerators, and facilitate their salvage and recycle not limited to the following:
 - 1. Waste Management Plan development and implementation.
 - 2. Techniques to minimize waste generation.
 - 3. Sorting and separating of waste materials.
 - 4. Salvage of existing materials and items for reuse or resale.
 - 5. Recycling of materials that cannot be reused or sold.
- D. At a minimum the following waste categories shall be diverted from landfills:
 - 1. Soil.
 - 2. Inerts (eg, concrete, masonry and asphalt).
 - 3. Clean dimensional wood and palette wood.
 - 4. Green waste (biodegradable landscaping materials).
 - 5. Engineered wood products (plywood, particle board and I-joists, etc).
 - 6. Metal products (eg, steel, wire, beverage containers, copper, etc).
 - 7. Cardboard, paper and packaging.
 - 8. Bitumen roofing materials.
 - 9. Plastics (eg, ABS, PVC).
 - 10. Carpet and/or pad.
 - 11. Gypsum board.
 - 12. Insulation.
 - 13. Paint.
 - 14. Fluorescent lamps.

1.2 RELATED WORK

- A. Section 01 00 00, GENERAL REQUIREMENTS.

1.3 QUALITY ASSURANCE

- A. Contractor shall practice efficient waste management when sizing, cutting and installing building products. Processes shall be employed to ensure the generation of as little waste as possible. Construction /Demolition waste includes products of the following:
 - 1. Excess or unusable construction materials.
 - 2. Packaging used for construction products.
 - 3. Poor planning and/or layout.
 - 4. Construction error.
 - 5. Over ordering.
 - 6. Weather damage.
 - 7. Contamination.
 - 8. Mishandling.
 - 9. Breakage.
- B. Establish and maintain the management of non-hazardous building construction and demolition waste set forth herein. Conduct a site assessment to estimate the types of materials that will be generated by demolition and construction.
- C. Contractor shall develop and implement procedures to reuse and recycle new materials to a minimum of 50 percent.
- D. Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling. Any revenues or savings obtained from salvage or recycling shall accrue to the contractor.
- E. Contractor shall provide all demolition, removal and legal disposal of materials. Contractor shall ensure that facilities used for recycling, reuse and disposal shall be permitted for the intended use to the extent required by local, state, federal regulations. The Whole Building Design Guide website <http://www.wbdg.org> provides a Construction Waste Management Database that contains information on companies that haul, collect, and process recyclable debris from construction projects.
- F. Contractor shall assign a specific area to facilitate separation of materials for reuse, salvage, recycling, and return. Such areas are to be kept neat and clean and clearly marked in order to avoid contamination or mixing of materials.

- G. Contractor shall provide on-site instructions and supervision of separation, handling, salvaging, recycling, reuse and return methods to be used by all parties during waste generating stages.
- H. Record on daily reports any problems in complying with laws, regulations and ordinances with corrective action taken.

1.4 TERMINOLOGY

- A. Class III Landfill: A landfill that accepts non-hazardous resources such as household, commercial and industrial waste resulting from construction, remodeling, repair and demolition operations.
- B. Clean: Untreated and unpainted; uncontaminated with adhesives, oils, solvents, mastics and like products.
- C. Construction and Demolition Waste: Includes all non-hazardous resources resulting from construction, remodeling, alterations, repair and demolition operations.
- D. Dismantle: The process of parting out a building in such a way as to preserve the usefulness of its materials and components.
- E. Disposal: Acceptance of solid wastes at a legally operating facility for the purpose of land filling (includes Class III landfills and inert fills).
- F. Inert Backfill Site: A location, other than inert fill or other disposal facility, to which inert materials are taken for the purpose of filling an excavation, shoring or other soil engineering operation.
- G. Inert Fill: A facility that can legally accept inert waste, such as asphalt and concrete exclusively for the purpose of disposal.
- H. Inert Solids/Inert Waste: Non-liquid solid resources including, but not limited to, soil and concrete that does not contain hazardous waste or soluble pollutants at concentrations in excess of water-quality objectives established by a regional water board, and does not contain significant quantities of decomposable solid resources.
- I. Mixed Debris: Loads that include commingled recyclable and non-recyclable materials generated at the construction site.
- J. Mixed Debris Recycling Facility: A solid resource processing facility that accepts loads of mixed construction and demolition debris for the purpose of recovering re-usable and recyclable materials and disposing non-recyclable materials.
- K. Permitted Waste Hauler: A company that holds a valid permit to collect and transport solid wastes from individuals or businesses for the purpose of recycling or disposal.

- L. Recycling: The process of sorting, cleansing, treating, and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating or thermally destroying solid waste.
 - 1. On-site Recycling - Materials that are sorted and processed on site for use in an altered state in the work, i.e. concrete crushed for use as a sub-base in paving.
 - 2. Off-site Recycling - Materials hauled to a location and used in an altered form in the manufacture of new products.
- M. Recycling Facility: An operation that can legally accept materials for the purpose of processing the materials into an altered form for the manufacture of new products. Depending on the types of materials accepted and operating procedures, a recycling facility may or may not be required to have a solid waste facilities permit or be regulated by the local enforcement agency.
- N. Reuse: Materials that are recovered for use in the same form, on-site or off-site.
- O. Return: To give back reusable items or unused products to vendors for credit.
- P. Salvage: To remove waste materials from the site for resale or re-use by a third party.
- Q. Source-Separated Materials: Materials that are sorted by type at the site for the purpose of reuse and recycling.
- R. Solid Waste: Materials that have been designated as non-recyclable and are discarded for the purposes of disposal.
- S. Transfer Station: A facility that can legally accept solid waste for the purpose of temporarily storing the materials for re-loading onto other trucks and transporting them to a landfill for disposal, or recovering some materials for re-use or recycling.

1.5 SUBMITTALS

- A. Prepare and submit to the COTR a written demolition debris management plan. The plan shall include, but not be limited to, the following information:
 - 1. Procedures to be used for debris management.
 - 2. Techniques to be used to minimize waste generation.
 - 3. Analysis of the estimated job site waste to be generated:
 - a. List of each material and quantity to be salvaged, reused, recycled.

- b. List of each material and quantity proposed to be taken to a landfill.
- 4. Detailed description of the Means/Methods to be used for material handling.
 - a. On site: Material separation, storage, protection where applicable.
 - b. Off site: Transportation means and destination. Include list of materials.
 - 1) Description of materials to be site-separated and self-hauled to designated facilities.
 - 2) Description of mixed materials to be collected by designated waste haulers and removed from the site.
 - c. The names and locations of mixed debris reuse and recycling facilities or sites.
 - d. The names and locations of trash disposal landfill facilities or sites.
 - e. Documentation that the facilities or sites are approved to receive the materials.
- B. Designated Manager responsible for instructing personnel, supervising, documenting and administer over meetings relevant to the Waste Management Plan.
- C. Summary of construction and demolition debris diversion and disposal, quantifying all materials generated at the work site and disposed of or diverted from disposal through recycling.

1.6 APPLICABLE PUBLICATIONS

- A Publications listed below form a part of this specification to the extent referenced. Publications are referenced by the basic designation only. In the event that criteria requirements conflict, the most stringent requirements shall be met.
- B. U.S. Green Building Council (USGBC):
 - LEED Green Building Rating System for New Construction

1.7 RECORDS

Maintain records to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration. Records shall be kept in accordance with the LEED Reference Guide and LEED Template.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. List of each material and quantity to be salvaged, recycled, reused.
- B. List of each material and quantity proposed to be taken to a landfill.
- C. Material tracking data: Receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices, net total costs or savings.

PART 3 - EXECUTION

3.1 COLLECTION

- A. Hazardous wastes shall be separated, stored, disposed of according to local, state, federal regulations.

3.2 DISPOSAL

- A. Contractor shall be responsible for transporting and disposing of materials that cannot be delivered to a source-separated or mixed materials recycling facility to a transfer station or disposal facility that can accept the materials in accordance with state and federal regulations.
- B. Construction or demolition materials with no practical reuse or that cannot be salvaged or recycled shall be disposed of at a landfill or incinerator.

3.3 REPORT

- A. With each application for progress payment, submit a summary of construction and demolition debris diversion and disposal including beginning and ending dates of period covered.
- B. Quantify all materials diverted from landfill disposal through salvage or recycling during the period with the receiving parties, dates removed, transportation costs, weight tickets, manifests, invoices. Include the net total costs or savings for each salvaged or recycled material.
- C. Quantify all materials disposed of during the period with the receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices. Include the net total costs for each disposal.

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SECTION 05 52 00
METAL RAILINGS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 314 (1990; R 2013) Standard Specification
for Steel Anchor Bolts

ASME INTERNATIONAL (ASME)

ASME B18.2.1 (2012; Errata 2013) Square and Hex
Bolts and Screws (Inch Series)

ASME B18.2.3.8M (1981; R 2005) Metric Hex Lag Screws

ASME B18.21.1 (2009; R 2016) Washers: Helical
Spring-Lock, Tooth Lock, and Plain Washers
(Inch Series)

ASME B18.22M (1981; R 2010) Metric Plain Washers

ASME B18.6.3 (2013) Machine Screws, Tapping Screws,
and Machine Drive Screws (Inch Series)

ASME B18.6.5M (2000; R 2010) Standard Specification for
Metric Thread-Forming and Thread-Cutting
Tapping Screws

ASME B18.6.7M (1999; R 2010) Metric Machine Screws ASTM
INTERNATIONAL (ASTM)

ASTM A108 (2013) Standard Specification for Steel
Bar, Carbon and Alloy, Cold-Finished

ASTM A123/A123M (2013) Standard Specification for Zinc
(Hot-Dip Galvanized) Coatings on Iron and
Steel Products

ASTM A153/A153M (2016) Standard Specification for Zinc
Coating (Hot-Dip) on Iron and Steel
Hardware

ASTM A27/A27M (2013; R 2016) Standard Specification for
Steel Castings, Carbon, for General
Application

ASTM A283/A283M (2013) Standard Specification for Low and
Intermediate Tensile Strength Carbon
Steel Plates

ASTM A307	(2014) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A325	(2014) Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A325M	(2014) Standard Specification for Structural Bolts, Steel, Heat Treated, 830 MPa Minimum Tensile Strength (Metric)
ASTM A36/A36M	(2014) Standard Specification for Carbon Structural Steel
ASTM A449	(2014) Standard Specification for Hex Cap Screws, Bolts, and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use
ASTM A47/A47M	(1999; R 2014) Standard Specification for Ferritic Malleable Iron Castings
ASTM A53/A53M	(2012) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A575	(1996; E 2013; R 2013) Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades
ASTM B221	(2014) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B221M	(2013) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
ASTM B26/B26M	(2014; E 2015) Standard Specification for Aluminum-Alloy Sand Castings
ASTM B429/B429M	(2010; E 2012) Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube
ASTM E488/E488M	(2015) Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements
INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)	
ISO 898-1	(2013) Mechanical Properties of Fasteners Made of Carbon Steel and Alloy Steel – Part 1: Bolts, Screws and Studs with Specified Property Classes – Coarse

Thread and Fine Pitch Thread

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM AMP 521

(2001) Pipe Railing Manual

1.2 ADMINISTRATIVE REQUIREMENTS

1.2.1 Pre-Installation Meetings

1.3 SUBMITTALS

Within 30 days of Contract Award, submit fabrication drawings to the Contracting Officer for the following items:

- a. Aluminum Railings and Handrails
- b. Anchorage and fastening systems

Submit manufacturer's catalog data, including manufacturer's specifications, load tables, dimension diagrams, installation instructions, and anchor details for the following items:

- a. Concrete inserts
- b. Masonry anchorage devices
- c. Protective coating
- d. Aluminum railings and handrails
- e. Anchorage and fastening systems

PART 2 PRODUCTS

2.1 FABRICATION

Pre-assemble items in the shop to the greatest extent possible. Disassemble units only to the extent necessary for shipping and handling. Clearly mark units for reassembly and coordinated installation.

For the fabrication of work exposed to view, use only materials that are smooth and free of surface blemishes, including pitting, seam marks, roller marks, rolled trade names, and roughness. Remove blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and application of surface finishes, including zinc coatings.

Use materials of size and thicknesses indicated or, if not indicated, of required size and thickness to produce adequate strength and durability in finished product for intended use. Work materials to dimensions indicated on approved detail drawings, using proven details of fabrication and support. Use type of materials indicated or specified for the various components of work.

Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ensure all exposed edges are eased to a radius of approximately 1/32-inch. Bend metal corners to the smallest radius possible without causing grain separation or otherwise impairing

the work.

Form exposed connections with hairline joints that are flush and smooth, using concealed fasteners wherever possible.

Provide anchorage of the type indicated and coordinated with the supporting structure. Fabricate anchoring devices and space as indicated and as required to provide adequate support for the intended use of the work.

2.1.1 Aluminum Railings

Fabrication: Provide fabrication jointing by one of the following methods:

- a. Flush-type rail fittings, welded and ground smooth with splice locks secured with 3/8-inch recessed head set screws.
- b. Ensure all mitered and welded joints made by fitting post to top rail, intermediate rail to post, and corners, are groove welded and ground smooth. Provide butted splices, where allowed by the Contracting Officer, reinforced by a tight fitting dowel or sleeve not less than 6 inches in length. Tack weld or epoxy cement dowel or sleeve to one side of the splice.
- c. Assemble railings using slip-on aluminum-magnesium alloy fittings for joints. Fasten fittings to pipe or tube with 1/4 or 3/8-inch stainless steel recessed head setscrews. Provide assembled railings with fittings only at vertical supports or at rail terminations attached to walls. Provide expansion joints at the midpoint of panels. Provide a setscrew in only one side of the slip-on sleeve. Provide alloy fittings to conform to ASTM B26/B26M.
- d. Provide toe-boards and brackets where indicated, using flange castings as appropriate.]

2.2 COMPONENTS

2.2.1 Masonry Anchorage Devices

Provide masonry anchorage devices consisting of expansion shields complying with AASHTO M 314, ASTM E488/E488M and ASTM C514

2.2.2 Aluminum Railings And Handrails

Provide railings and handrails consisting of 1 1/2-inch nominal schedule 40 pipe ASTM B429/B429M. Provide anodized aluminum dark bronze railings. Ensure all fasteners are Series 300 stainless steel.

PART 3 EXECUTION

3.1 INSTALLATION

Adjust handrails prior to securing in place to ensure proper matching at butting joints and correct alignment throughout their length. Space posts not more than 6 feet on center. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:

- a. Anchor posts in concrete by means of pipe sleeves securely inserted in concrete cores. Provide sleeves of galvanized, standard weight, steel pipe, not less than 6-inches long, and having an inside diameter not less than 1/2-inch greater than the outside diameter of the inserted pipe post. Provide steel plate closure secured to the bottom of the sleeve, with closure width and length not less than 1-inch greater than the outside diameter of the sleeve. After posts have been inserted into sleeves, fill the annular space between post and sleeve with a quick-setting high strength epoxy. Cover anchorage joint with a round flange secured to the post with inset screws.
- b. Where aluminum or alloy fittings or extrusions are to be in contact with dissimilar metals or concrete, coat the contact surface a heavy coating of bituminous paint.
- c. Secure handrails to walls by means of wall brackets and wall return fitting at handrail ends. Provide aluminum brackets, with not less than 3-inch projection from the finish wall surface to the center of the pipe drilled to receive one M10 3/8-inch bolt. Secure wall brackets and wall return fittings to building construction as follows: For concrete and solid masonry anchorage, use bolt anchor expansion shields and lag bolts.
- d. Install toe boards and brackets where indicated. Make splices, where required, at expansion joints. Install removable sections as indicated.

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SECTION 32 12 36
SLURRY SEAL (POLYMER MODIFIED)

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work on this Section includes applying a mixture of asphaltic emulsion or polymer modified asphaltic emulsion, aggregate, set-control additives, and water spread on a surface or pavement.

1.2 RELATED WORK

- A. Laboratory and field testing requirements: Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Subgrade Preparation: Paragraph 3.3 and 31 20 11 EARTH MOVING (SHORT FORM).
- C. Asphalt Paving: Section 32 12 16, ASPHALT PAVING.

1.3 SUBMITTALS

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
- B. Data and Test Reports:
1. Submit laboratory report:
 - a. Test results used in the mix design
 - b. Proportion of the following material based on the aggregate's dry weight
 - i. Aggregate
 - ii. Filler determined from tests, minimum and maximum
 - iii. Water, minimum and maximum
 - iv. Asphalt solids content
 - v. Set control agent
 - c. Comparison of slurry seal test results to the specified values
 2. Mix Design
 3. Daily Moisture data as required by Texas DOT Standard Specifications.
 4. Aggregates:
 - a. Gradation
 - b. Sand Equivalent
 - c. Durability Index
- C. Certifications:
1. Experience: The contractor shall certify that their superintendent has at least 2 years' experience of the application of a slurry seal.

2. Water: The contractor shall certify that the water is from a potable source.

D. Provide SDS (Safety Data Sheets) for all chemicals used on ground.

1.4 MIX DESIGN

- A. At least 7 working days before slurry seal placement commences, the Contractor shall submit for approval a laboratory report of tests and proposed mix design covering the specific materials to be used on the project.
 1. The mix design shall comply with the requirements of AASHTO M 208, except that the cement mixing test requirement is excluded.
- B. The tests and mix design shall be performed by a laboratory capable of performing the applicable International Slurry Seal Association (ISSA) tests.
 1. Mixing test must pass at the maximum expected air temperature at the project site during application.
 2. Using project source aggregate asphalt emulsion and set-control agents if used.
- C. The laboratory report shall be signed by the laboratory that performed the tests and mix design and shall show the results of the tests on individual materials, comparing the test results to those required by the specifications. The report shall clearly show the proportions of aggregate, filler (as determined from the tests, minimum and maximum), water (minimum and maximum), asphalt solids content based on the dry weight of aggregate, and set-control agent usage. Previous laboratory reports covering the same materials may be accepted provided they are made during the same calendar year.

1.5 PROPORTIONING

- A. Proportion slurry seal ingredients in compliance with the authorized mix design. Proportion and blend different aggregate types before adding other ingredients.
- B. Asphalt emulsion shall be added at a rate determined by the mix design and within the range specified. A job mix design shall be submitted by the Contractor for approval that conforms to the specification limits, and that is suitable for the traffic, climate conditions, curing

conditions and final use. This will include recommended application rate of slurry to suit the job conditions.

- C. The Slurry Seal mixture shall be proportioned by the operation of a single start/stop switch or lever, which automatically sequences the introduction of aggregate, emulsified, asphalt, admixtures, if used, and water to the pug mill.
- D. Calibrated flow meters shall be provided to measure both the addition of water and liquid additives to the pug mill. If necessary for workability, a retarding agent, that will not adversely affect the seal, may be used.
- E. Water, and retarder if used, shall be added to ensure proper workability and permit uncontrolled traffic on the slurry seal no more than three (3) hours after placement without the occurrence of bleeding, raveling, separation or other distress and also prevent development of bleeding, raveling, separation of other distress within fifteen (15) days after placing the slurry seal.

1.6 MATERIAL SAMPLING

- A. The minimum acceptable sampling frequency shall be as follows:
 - 1. Asphalt Emulsion - minimum once daily
 - 2. Mineral Aggregate - minimum once weekly
 - 3. Application mixture - minimum once daily
- B. All Samples of asphalt emulsion and aggregate for slurry seal shall be captured from the storage tank of the slurry seal application truck in use on the work. Inspector shall observe the sampling of 1 gallon of the emulsion, 10 lbs. of the slurry seal aggregate and 1 gallon of the mixture. Contractor shall provide the samples and containers to the Inspector.

PART 2 - PRODUCTS

All materials shall meet the requirements of the Texas Department of Transportation Standard Specifications.

2.1 AGGREGATE FOR SLURRY SEAL

- A. The aggregate shall be a Type II Aggregate crushed gravel or crushed stone meeting the requirements of the Texas Department of Transportation Standard Specification Item 302, Aggregates for Surface Treatments. Limestone aggregates shall not be used as mineral aggregate. The aggregate shall meet the following gradation requirements:

Table 1

<u>Sieve Size, (mm)</u>	<u>Type II Percent Passing (by weight)</u>
3/8" (9.5)	100
#4 (4.75)	90 - 100
#8 (2.36)	65 - 90
#16 (1.18)	45 - 70
#30 (0.600)	30 - 50
#50 (0.300)	18 - 30
#100 (0.150)	10 - 21
#200 (0.075)	5 - 15

Residual Asphalt Content, % weight of dry aggregate	7.5-13.5
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Application Rate, lb/sq.yd Based on mass of dry agg.	10-15
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Los Angeles Test (AASHTO 6)	35 max.
Sand Equivalent Test (AASHTO T 176)	45 min.

- B. The amount of smooth-textured sand of less than 1.25 percent water absorption is limited to not more than 50 percent of the total combined aggregate.

2.2 ASPHALT EMULSION

- A. Shall meet the requirements of the Texas Department of Transportation Standard Specification Item 300, Asphalts, Oils, and Emulsions.
- B. The polymer modified emulsified asphalt shall be LMCQS - 1h that has been modified to meet the following requirements by addition of polymers:

<u>Table 1</u>	<u>Min.</u>	<u>Max.</u>
Viscosity, Saybolt Furol at 77° F (25° C), Sec.:	20	100
Test Method: ASTM D244		
Storage stability test, one day		1%
Particle Charge test:	Positive	
Sieve test, percent:		0.1
Distillation*:		
Oil distillate, by vol. of emulsion, %:		0.5
Residue from distillation:		62.0
Polymer Solids, percent	3.0	
Penetration, 77° F (25° C), 100 g, 5 sec.:	55	90
Test Method: ASTM D5		

Ductility, 77° F (25° C), 5 cm/min., cm: Test Method: ASTM D113	70
Solubility in trichloroethylene:	97%
Softening point, R. & B., ° F Test Method: ASTM	135° (57° C)
Polymer Content (by weight)	> 2.5%

* The standard distillation procedure shall be modified as follows: The temperature on the lower thermometer shall be brought slowly to 349° F ± 11° F (176° C ± 6°C) and maintained at this point for 20 minutes. Complete the total distillation in 60 ± 5 minutes from the application of heat.

C. The polymer modified emulsified asphalt slurry seal shall be so formulated that when the paving mixture is applied with the relative humidity at not more than 50% and ambient air temperature of at least 77° F (25° C), it will cure sufficiently that rolling traffic can be allowed to use the surface in one hour with no damage to the surface.

2.3 MINERAL FILLER

A. Mineral filler shall be Portland Cement, hydrated lime, limestone dust, fly ash, or other approved filler which meets the requirements of AASHTO M 17. Portland cement shall be a commercial quality, non-air-entraining cement and shall not be considered as mineral filler for the purpose of satisfying the gradation requirement of the aggregate.

2.4 WATER

A. Water should be potable, free of soluble salts and of such quality that the asphalt will not separate from the emulsion before the slurry seal is placed.

2.5 STOCKPILING AND STORAGE

A. If the mineral aggregates are stored or stockpiled, they shall be handled in such a manner as to prevent segregation, mixing of the various materials or sizes, and contamination with foreign materials. The grading of aggregates supplied to the mixing plant shall be uniform. Suitable equipment of acceptable size shall be furnished by the Contractor to work the stockpiles and prevent segregation of the aggregates. Stockpile & Storage location may not be available at the work site. The Contractor is responsible for determining storage locations before submission of bid/proposal.

- B. The asphalt material storage shall be ample to meet the requirements of the plant. Asphalt emulsion shall not be heated to a temperature in excess of 160° F (71° C). All equipment used in the storage and handling of asphalt material shall be kept in a clean condition at all times and shall be operated in such manner that there will be no contamination by foreign matter.

PART 3 - EXECUTION

3.1 MIXING AND SPREADING EQUIPMENT

- A. All equipment used for materials handling and mixing and placing of mixture shall be maintained in good repair and operating condition and subject to the approval of the Contracting Officer. Any equipment found to be defective with a potential for affecting the quality of the paving mixture will be rejected by the Contracting Officer and must be replaced or repaired before its use or continued use.
- B. The material shall be mixed by a self-propelled mixing machine which shall be a continuous flow mixing unit able to accurately deliver and proportion the aggregate, emulsified asphalt, mineral filler, additives, and water to a revolving multi-blade mixer and discharge the mixed product on a continuous flow basis. The machine shall have sufficient storage capacity for aggregate, emulsified asphalt, mineral filler, and water to maintain an adequate supply to the proportioning controls. The machine shall be equipped with self-loading devices which provide for the loading of all materials while continuing to lay slurry seal, thereby minimizing construction joints.
- C. Individual volume or weight controls for proportioning each material to be included in the mixture shall be provided. Each material control device shall be calibrated and properly marked.
- D. Calibration shall be performed prior to starting the project and in the presence of the Contracting Officer. Documentation shall be included for each individual calibration of material at the various settings, which can be related to the machine's metering devices. The machine will be equipped with a metering device for the mineral filler which indicates the quantity used. No machine will be allowed to work on the project until it has met all the requirements of TxDOT Item 520 and the calibration has been completed and/or accepted.

- E. Calibration shall be verified by the Contractor using Tex-922-K Part III under observation by the COR.
- F. The emulsion pump shall be a positive displacement type and shall be equipped with a revolution counter or similar device so that the amount of emulsion used may be determined at any time.
- G. The mixing machine shall be equipped with a water pressure system and nozzle type spray bar to provide a water spray immediately ahead of and outside the spreader box.
- H. The mixing machine shall be equipped with an approved fines feeder and liquid additives feeder that shall provide a uniform, positive, accurately metered, predetermined amount of the specified mineral filler.

3.2 SEASONAL LIMITATIONS

- A. No slurry seal shall be placed after October 15 or before May 1 without prior approval by the Contracting Officer. Slurry seal shall not be applied if either the pavement or ambient temperature is 55° F (13° C) or less.

3.3 SURFACE PREPARATION

- A. If cracks in the existing pavement are from 1/8 to 1 inch wide, treat the cracks in accordance with contract specifications. Do not place the slurry seal until the COR determines that the crack treatment is cured.
- B. Before you place slurry seal, clean the pavement surface. Remove loose particles of extraneous materials, including paving and dirt. Use any nondestructive method, such as flushing or sweeping.
- C. Before applying slurry seal, cover manholes, valve and monument covers, grates, or other exposed facilities located within the area of application, using a plastic or oil resistant construction paper secured by tape or adhesive to the facility being covered. Reference the covered facilities with a sufficient number of control points to relocate the facilities after the application of the seal coat. In areas inaccessible to spreading equipment, spread the slurry seal mixture with hand tools or other authorized methods. If placing with hand tools, first lightly dampen the area. Do not handle or shift the material.

3.4 PLACEMENT

- A. Workmanship. No excessive buildup, uncovered areas or unsightly appearance will be permitted at longitudinal or transverse joints.

- B. Longitudinal joints shall be placed at lane lines. Excessive overlap will not be permitted. Care shall be taken to ensure straight lines along the roadway centerline, lane lines, shoulder, or curb lines. Lines at intersections shall be kept straight to provide a good appearance. Care shall be exercised in areas that require hand work so that the finished surface is uniform in texture, density, and of overall appearance comparable to that produced by the spreader box.
- C. Areas of non-uniform texture, density, or appearance will be patched as directed. Patching shall be done using the same process and equipment that originally surfaced the area. Hand working of patches will not be permitted, except as authorized by the Contracting Officer.
- D. The Contractor shall supervise and direct the work, using their best skill and attention. The work shall be directed using any means as is the custom of the trade to complete the work in an acceptable manner.

3.5 PROTECTION

- A. Traffic Control. It shall be Contractor's responsibility to provide adequate traffic control measures, such as barricades, cones, advance warning signs, flagmen, etc., to protect the uncured slurry seal from all types of traffic and to provide traffic safety in the construction area. These measures shall be employed in a safe manner and must not be used until approved by the Contracting Officer. The Contractor shall leave half of the roadway available for cemetery traffic at all times. The Contractor shall coordinate with the COR to plan work in parking areas.
- B. Opening the roadway surface to traffic does not constitute acceptance of the work. Any damage to the uncured slurry seal material will be the responsibility of the Contractor and the damaged surface shall be repaired to the satisfaction of the Contracting Officer.

3.6 FINAL CLEAN-UP

- A. Remove all debris, rubbish, and excess material from the work area.

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SECTION 32 12 18
ASPHALT PAVEMENT CRACK AND JOINT FILLING AND SEALING

1.0 Description.

This work consists of filling cracks and joints in existing asphalt pavement.

2.0 Material

Crack filler, hot applied, for asphalt pavements meeting requirements of ASTM D 5078.

3.0 Construction Requirements

3.1 Equipment.

Furnish equipment with the following capabilities:

- (a)**Power saw and blades.** Saw and blades of such size and configuration that saw cuts can be made with one pass. Spacers are not allowed.
- (b)**Router.** Power rotary impact router or vertical spindle router capable of cleaning cracks or joints to the required depth and width.
- (c)**Hot-compressed air lance.** A lance capable of providing clean, oil-free compressed air at a volume of 100 cubic feet per minute at a pressure of 120 pounds per square inch and at a temperature of 2000 °F.
- (d)**Application wand.** A crack sealant applicator wand attached to a heated hose that is attached to a heated sealant chamber. The temperature controls shall maintain temperature of the sealant within manufacturer's tolerances.
- (e)**Heating kettle.** An indirect-heating-type double boiler with the space between the inner and outer shells filled with oil or other heat transfer medium capable of constant agitation. Provide an accurate and calibrated thermometer having a range from 200 to 600 °F in 5 °F graduations. Locate the thermometer such that the temperature of the joint sealant may be safely checked.
- (f)**Squeegee.** A hand-held squeegee for ensuring that the crack is filled to the existing surface.

4.0 Saw Cutting and Joint Sealing.

Saw cut, clean, and seal joints in a continuous operation. Either dry or wet cutting is allowed.

Dry-Sawed: Clean dry-sawed joints with a stream of air sufficient to remove all dirt, dust, or deleterious matter adhering to the joint walls or

remaining in the joint cavity. Blow or brush dry material off the pavement surface.

Wet-Sawed: Clean wet-sawed joints with a water blast, 50 pounds per square inch minimum, immediately after sawing to remove any sawing slurry, dirt, or deleterious matter adhering to the joint walls or remaining in the joint cavity. Immediately flush all sawing slurry from the pavement surface. Blow wet-sawed joints with air to dry joint surfaces.

- (a) Do not allow traffic to knead together or damage the sawed joints. If cleaning operations cause interference with traffic, provide protective screening and traffic control devices.
- (b) Place the sealant when the pavement surface temperature is 40 °F or higher. Discontinue operations when weather conditions detrimentally affect the quality of forming joints and applying sealants.
- (c) Submit a copy of and adhere to the manufacturer's recommendations for heating and applying the joint sealant. Heat the joint sealant in a heating kettle. Do not heat the sealant above the safe heating temperature recommended by the manufacturer. Do not hold the material at the pouring temperature for more than 6 hours and do not reheat the material.
- (d) Place a bond breaker tape designed for use with hot-poured sealant in the bottom of the saw cut joint.
- (e) Seal the joints with an applicator wand when the sealant material is at the pouring temperature. Heat or insulate the applicator wand to maintain the pouring temperature of the sealant during placing operation. Return the applicator wand to the machine and recirculate the joint sealant material immediately after sealing each joint.
- (f) Seal each joint such that, after cooling, the level of the sealant is no more than 1/8 inch below the pavement surface, but not above the pavement surface. Use a squeegee to ensure that a 3-inch wide band is centered on the finished sealed crack.
- (g) Wait for the sealant to be tack free before opening the joint to traffic. Do not spread blotter on the sealed joints to allow early opening to traffic.

5.0 Crack Cleaning and Filling/Sealing.

- (a) Clean the existing surface of all loose material, dirt, or other deleterious substances by brooming, flushing with water, or other approved methods. When specified, rout and clean all cracks with an

average opening of 1/2 inch or more to make a sealant reservoir to the depth of the routed crack or at least 3/4 inch deep. Dry cracks before sealing.

- (b) When using the hot-compressed air lance, keep it moving so as not to burn the surrounding pavement and the joint. Place and finish sealant within 5 minutes after heating with the hot-compressed air lance.
- (c) For cracks with a width of 3/4 inch, but less than 1 inch, seal with an approved slurry seal mix, fine aggregate-asphalt binder mix, or fine aggregate-emulsified asphalt mix. Use a squeegee or other suitable equipment to force the mix into the cracks, full-depth.
- (d) Immediately screed the joint sealant or asphalt mix to the elevation of the existing surface. Use a squeegee to ensure that a 3-inch wide band is centered on the finished sealed crack. Cover the sealed crack with a light application of blotter.
- (e) For cracks with a width greater than or equal to 1 inch, fill flush to the existing surface with and approved hot-mixed asphalt (HMA) mix. Submit product data and mix design to the contracting officer for approval, if required. The HMA mix shall meet the Texas Department of Transportation Specifications.

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