UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2024
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SECTION TABLE OF CONTENTS

DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 32 12 36.13

BITUMINOUS FOG SEAL

11/23

-- End of Section Table of Contents --

UNIFIED FACILITIES GUIDE SPECIFICATIONS

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****

SECTION 32 12 36.13

BITUMINOUS FOG SEAL
11/23

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NOTE: This guide specification covers the requirements for fog seals which are a light spray application of asphalt emulsion to the surface of a chip seal, an open-graded mix, or a weathered asphalt surface. Fog seals are applied to a freshly placed bituminous surface treatment in accordance with Section 32 01 13.62 BITUMINOUS SURFACE TREATMENT [AND] [SAND SEAL] (BST) after 1 to 6 days to improve aggregate retention.

Fog seals are classified as a Preventative Maintenance process when nonstructural cracking or raveling first begins. Fog seals of asphalt emulsion slow the oxidation process of asphalt pavements but skid resistance is lowered.

Fog seal application is restricted to parking lots, storage yards, and container handling facilities and other similar low-speed pavements due to loss of skid resistance. Do not apply over DoD airfield pavements without approval of the Pavements Discipline Working Group or their designated representative, and then only to paved shoulders and overruns.

Fog seals are not used to correct pavement grades, correct structural deficiencies, fill potholes, or fill ruts. Designer must first design appropriate repairs to existing pavements prior to application of fog seal. If existing pavement friction is low that fog seal will further reduce friction, Designer must conduct the grease smear test following Federal Aviation Administration AC 150/5320-12C 1997 "Measurement, Construction, and Maintenance of Skid-Resistant Airport Pavement Surfaces", U.S. Department of Transportation. Fog seals must not be applied if surface friction is less than 0.8 millimeter 0.03 inch or if it is likely the fog seal application will lower friction below that value.

The Federal Aviation Administration has similar variants with or without coal tar emulsions and modifiers.

Alternative treatments to paved or unpaved surfaces are:

Section 32 01 13.62 BITUMINOUS SURFACE TREATMENT [AND] [SAND SEAL] (BST) - used on existing unpaved or paved surface. BSTs are low-cost maintenance methods that produce all-weather surfaces, renew weathered pavement, improve skid resistance, improve lane demarcation, and seal pavement surfaces including small cracks. BSTs are also known as Chip Seals.

Sand Seals are addressed in Section 32 01 13.62 BITUMINOUS SURFACE TREATMENT [AND] [SAND SEAL] and are spray-applied liquid asphalt covered with sand, used to restore uniform cover, restore weathered pavement, and reduce raveling. The treated surface is rolled with a pneumatic roller. Do not apply over DoD airfield pavements without approval of the Pavements Discipline Working Group or their designated representative. The Federal Aviation Administration has a similar product known as Seal Coat.

Slurry Seal - A mixture of crushed, well-graded aggregate (e.g., fine sand, mineral filler) and asphalt emulsion that is spread over the entire pavement surface with either a squeegee or spreader box attached to the back of a truck. There is no UFGS for slurry seal. Application is restricted to parking lots, storage yards, container handling facilities, and other similar low-speed pavements due to loss of skid resistance. Do not apply over DoD airfield pavements without approval of the Pavements Discipline Working Group or their designated representative.

Micro-Surfacing - Applied in a process similar to slurry seals, micro-surfacing consists of a mixture of cationic quick set emulsified asphalt, mineral aggregate, mineral filler, water, and additives. Micro-surfacing provides a friction and rapid roadway surface correction. With a special mix design, it can fill ruts up to 19.5 mm 1.5 inches deep. Material is mixed in specialized, compartmentalized, self-powered trucks, and placed on the pavement using a screed box with auger. There is no UFGS for Micro-Surfacing. Application is restricted to parking lots, storage yards, container handling facilities, and other similar low-speed pavements due to loss of skid resistance. Do not apply over DoD airfield pavements without approval of the Pavements Discipline Working Group or their designated representative.

Cape Seal - An application of micro-surfacing a few days after construction of a BST; used to cover the aggregates and improve aggregate bonding. There is no UFGS for Cape Seal. Do not apply over DoD airfield pavements without approval of the Pavements Discipline Working Group or their designated representative.

Sandwich Seal - Process is to spread large aggregate, spray apply emulsion, then cover with smaller aggregate to lock in larger aggregate. Requires the use of very clean aggregate. Used to improve skid resistance and seal pavements. There is no UFGS for Sandwich Seal. Do not apply over DoD airfield pavements without approval of the Pavements Discipline Working Group or their designated representative.

Rejuvenator, Spray-on - Rejuvenators are commercially available products (proprietary) designed to restore original properties to aged (oxidized) asphalt binders by restoring the original ratio of asphaltenes to maltenes. A rejuvenator will retard the loss of surface fines and reduce the formation of additional cracks. Rejuvenators will not fill or remove existing cracks unless cracking is very minor hairline cracking. Bituminous-based spray-on surface rejuvenators are covered in Section 32 01 13.64 REJUVENATION OF ASPHALT PAVEMENT SURFACES. There is no UFGS for bio-based rejuvenators.

Rejuvenator, Mix-in-Place - Designed to be used with advanced cold or hot in-place recycling of existing aged asphalt pavements which exhibit relatively high stiffness due to the aged binder. Proprietary chemical rejuvenators reduce the brittleness, but also affect the fatigue and thermal cracking properties of the recycled pavement. DoD provides a mix-in-place rejuvenator procedure in TM 5-822-10/AFM 88-6 Chapter 6. Section 32 01 16.70 COLD-MIX REUSED ASPHALT PAVING uses emulsion recycling agents and Section 32 01 16.74 IN PLACE HOT REUSED ASPHALT PAVING uses ASTM D4552 recycling agents. Substantial testing and engineering is required to specify the correct rejuvenator or emulsion resultant mixture properties. Do not apply over DoD airfield pavements without approval of the Pavements Discipline Working Group or their designated representative.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert

appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

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PART 1 GENERAL

1.1 UNIT PRICES

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NOTE: Delete unit price paragraphs when lump sum bidding is used. Edit submittal requirements accordingly for waybills and quantities. Keep paragraph WAYBILLS AND DELIVERY TICKETS for lump sum projects, they are for Government use to validate payment.

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1.1.1 Measurement

[1.1.1.1 Bituminous Material

The bituminous material paid for will be the measured quantities of bituminous material used in the accepted work as approved by the Contracting Officer, provided that the measured quantities are not 10 percent over the specified quantities. Any amount of bituminous material more than 10 percent over the specified quantity will be deducted from the measured quantities. Base bids on application of diluted emulsion at 0.63 liters per square meter 0.14 gallons per square yard. If the actual amount required is more or less than 0.63 liters per square meter 0.14 gallons per square yard, an adjustment in the Contract price will be made as provided by the Contract. Express measured quantities in[metric 2000 pound tons.][the number of liters gallons of material used in the accepted work, corrected to liters at 15.6 degrees C gallons at 60 degrees F in accordance with ASTM D1250, using a coefficient of expansion of 0.00045 per degree C 0.00025 per degree F for asphalt emulsion.] Dilution water added to emulsified asphalt will not be measured for payment.

]1.1.1.2 Treated Pavement

The quantity of pavement treated with fog seal to be paid for will be the number of square meters square yards completed and accepted as determined by the Contracting Officer. The number of square meters square yards of treated pavement will be determined by measuring the length and width of the specified work area. Measurements to determine the number of square meters square yards will be along the pavement surface.

1.1.1.3 Waybills and Delivery Tickets

Submit waybills and delivery tickets during progress of the work. Before the final statement is allowed, file with the Contracting Officer certified waybills and certified delivery tickets for all bituminous materials used in the construction of the pavement covered by the

Contract. Do not remove bituminous material from storage until the initial outage and temperature measurements have been taken. The delivery or storage units will not be released until the final outage has been taken.

1.1.2 Payment

Accepted measured quantities of bituminous material and treated pavement will be paid for at respective unit prices. Payment will constitute full compensation for providing all materials, equipment, plant, test section, testing, and tools, and for all labor and other incidentals necessary to complete work.

1.2 REFERENCES

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NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

When fog seal is being specified delete reference for aggregates.

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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.

ASTM INTERNATIONAL (ASTM)

ASTM C136/C136M	(2019) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D75/D75M	(2019) Standard Practice for Sampling Aggregates
ASTM D140/D140M	(2016) Standard Practice for Sampling Asphalt Materials
ASTM D977	(2019a; E 2019) Standard Specification for Emulsified Asphalt
ASTM D1250	(2019; E 2020) Standard Guide for Use of the Joint API and ASTM Adjunct for

	Temperature and Pressure Volume Correction Factors for Generalized Crude Oils, Refined Products, and Lubricating Oils: API MPMS Chapter 11.1
ASTM D2397/D2397M	(2019a) Standard Specification for Cationic Emulsified Asphalt
ASTM D2995	(1999; R 2009) Determining Application Rate of Bituminous Distributors

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST HB 44	(2018) Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

MUTCD	(2009; Rev 2012) Manual on Uniform Traffic Control Devices

1.3 SUBMITTALS

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NOTE: Review submittal description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item, if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy and Air Force projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy and Air Force projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Waybills and Delivery Tickets; G[, [_____]]

Residual Bituminous Material; G[, [_____]]

Residual Bituminous Material After Dilution; G[, [_____]]

Distributor; G[, [_____]]

Scales; G[, [_____]]

Mineral Aggregate; G[, [_____]]

Emulsified Asphalt for Fog Seal; G[, [_____]]

SD-04 Samples

Emulsified Asphalt Sample; G[, [_____]]

SD-06 Test Reports

Quality Control; G[, [_____]]

Surface Preparation; G[, [_____]]

Test Sections; G[, [_____]]

Inspection Reports; G[, [_____]]

1.4 QUALITY CONTROL

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NOTE: For projects where fog seal is the primary definable feature of work, the testing laboratory can be the Contractor's laboratory, the emulsion manufacturer's laboratory, or an independent commercial laboratory. Frequently, the emulsion manufacturer is the most knowledgeable of emulsion/aggregate interactions in the local area. What is important is the laboratory is accredited as referenced. Select the appropriate quality control section for the project and include with Contract. If fog seal is a minor part of a project, and an independent commercial laboratory is already part of the Contract, may select that option for continuity, provided accredited in the appropriate tests.

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Sampling and testing is the responsibility of the Contractor. Perform sampling and testing using [a][an independent commercial] testing laboratory accredited in the required tests in accordance with Section 01 45 00 QUALITY CONTROL approved by the Contracting Officer. Sampling must be in accordance with ASTM D75/D75M for aggregates and ASTM D140/D140M for bituminous material. Contracting Officer may inspect testing facilities. Perform tests in the numbers, and at the location and times indicated, to ensure that the materials meet specified requirements. Submit copies of test results within 24 hours after completion of each test.

1.4.1 Preconstruction Sampling and Testing

Conduct preconstruction sampling and testing of bituminous material in accordance with ASTM D140/D140M. Repeat sampling and testing when there is a change in source or material. Submit copies of test results, within 24 hours after completion of each test.

1.4.2 Equipment Calibration

Furnish all equipment, materials, and labor necessary to calibrate equipment in accordance with paragraph EQUIPMENT, TOOLS, AND MACHINES. Perform all calibrations with the approved job materials and prior to applying the specified coatings to the prepared surface. Inspect all equipment prior to start of work and at regular intervals as needed during work.

1.4.3 Construction Quality Control Testing

Conduct sampling and testing in accordance with paragraph FIELD QUALITY CONTROL. Conduct measurement and testing each application day to ensure bituminous material application rates are satisfactory. Submit copies of test results within 24 hours after completion of each test.

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver asphalt materials to the site in a homogenous and undamaged condition. Inspect the materials for contamination and damage. Bituminous materials, if stored on project site, must be stored in a manner recommended by the bituminous supplier and not exceed storage life or temperature ranges. Do not allow asphalt emulsions to freeze or boil. Replace defective or damaged materials.

1.5.1 Bituminous Delivery Tickets

For every distributor load of emulsified asphalt material brought to site, provide the following: manufacture date, lot number, storage tank number, total volume of diluted emulsified material on truck, weight of undiluted emulsified material, weight of dilution water added for emulsions. Include data for the type of material used: percent oil distillate by volume of emulsion (prior to dilution).

1.5.2 Aggregate Delivery Tickets

For every load of mineral aggregate brought to site provide the aggregate source, supplier's aggregate size designation, and the weight of aggregate on the truck.

1.5.3 Safety Precautions

Smoking or open flames (other than the heaters that are part of the equipment) are not permitted within 8 meters 25 feet of heating, distributing, or transferring operations of bituminous materials that are flammable.

1.6 PROJECT/SITE CONDITIONS

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NOTE: Retain correct temperatures depending on the type of coating used for the project.
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1.6.1 Environmental Requirements

Apply the fog seal when the existing surface is dry, and when the weather is not foggy, rainy, or when the wind velocity will prevent the uniform application. Apply fog seal when [atmospheric temperature is above 10 degrees C 50 degrees F and rising] [or] [when pavement temperature is above 15.5 degrees C 60 degrees F and rising] [and] the temperature has not been below 2 degrees C 35 degrees F for the 12 hours prior to application unless otherwise directed. Do not apply if wind disperses fog seal application. Delay application if rain appears imminent within 8 hours following time of application.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Provide Fog Seal on existing prepared surface.

2.2 EQUIPMENT, TOOLS AND MACHINES

Provide equipment for the purpose intended and properly maintained in satisfactory and safe operating condition at all times. Discontinue the use of equipment which fails to safely produce satisfactory work and replace with satisfactory equipment.

2.2.1 Scales

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NOTE: For CONUS, select NIST 44 CLASS III L. For OCONUS, select the local governing authority, note the tolerances are the same as the NIST 44 CLASS III L. For the scale divisions, 9 kg 20 lb is common for manufacturers; e.g. 20 X 2000=40,000 lb capacity for the lowest capacity Class III L scale.
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Use standard truck scales of the beam type equipped with a weight-recording device. Use scales with sufficient size and capacity to accommodate the trucks used in hauling aggregates. Keep the necessary number of standard weights on hand, at all times, for testing the scales. Permanent or portable scales used for payment and application rates must be calibrated by a certified calibration agency before commencing work, following the method and calibration frequency [in accordance with NIST HB 44 Class III L][recognized by governing local authority in which the project is located with the scale division 2 kg 5 lb or greater and a

minimum of 2000 divisions and a maximum of 10,000 divisions. Scale acceptance tolerance is 2 kg 5 lb for 2000 scale divisions, and increases 1 kg 2.5 lb for each 500 increase of scale divisions. Example: for 5000 scale divisions, tolerance is 2kg 5 lb + (6 x 1 kg 2.5 lb)= 8 kg 15 lb.] Conduct calibrations in presence of the Contracting Officer. Provide certified calibration documentation. Recalibrate at 6 months from date of last approved calibration for permanent scales, and weekly for portable scales, for the duration of the Contract. Recalibrate scales if previous recognized calibration is outdated. Recalibrate scales or equipment if directed by the Contracting Officer. Provide adequate protection for the indicating and recording devices of the scales.

2.2.2 Distributor

Provide self-propelled distributors with pneumatic tires of such size and number to prevent rutting, shoving, or otherwise damaging the surface being sprayed. Clean distributor trucks and lines of all materials before loading for project; open inspection hatches if requested by the Contracting Officer. Include with the distributor equipment a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gauges, volume-measuring devices, adequate heaters for heating of materials to the proper application temperature, a thermometer for reading the temperature of tank contents, and a hand hose attachment suitable for applying bituminous material manually to areas inaccessible to the distributor. Provide a distributor that is approved by the Contracting Officer and:

a. Is capable of circulating and agitating the bituminous material during the heating process.

b. Is capable of spraying in a triple overlap. Equip the spray bar with the appropriate nozzle sizes to achieve a uniform bituminous application across the pavement at the specified rate and acceptable distributor speed. Adjust all nozzles to 30 degrees from the spray bar long axis, or to the same angle between 15 and 30 degrees only as recommended by the manufacturer and Contractor will demonstrate that the specified application rate is achieved. Only use the calibrated wrench provided by manufacturer to adjust nozzle angle.

c. Is designed and equipped to spray the bituminous material at variable widths at the specified temperature, at readily determined and controlled total liquid rates from 0.14 to 4.5 liters per square meter 0.03 to 1.0 gallons per square yard. Operate the distributor within a pressure range of 172.4 to 517.1 kPa 25 to 75 psi and with an allowable variation from the specified rate of not more than plus or minus 5 percent.

d. Each nozzle to be within 10 percent of the average flow rate for all the nozzles. Repair/replace out of tolerance nozzles.

e. Provide certification of distributor radar calibration for equipment with mounted radar which monitors travel speed and distance, used for the project. The date of calibration is to be no more than 6 months prior to project application.

2.2.2.1 Distributor Calibration

Verify the distributors application rate no more than 96 hours prior to the start of bituminous application following ASTM D2995calibration after

7 calendar days after start of project application. Submit bituminous material application rate and the residual asphalt application rate (for emulsified asphalts and cutbacks) results to Government. Provide the ASTM D2995 Method B calculations for transverse and longitudinal application rates.

2.2.3 Bituminous Storage Tanks

Provide bituminous storage tanks capable of heating the bituminous material under effective and positive control at all times to the required temperature. Accomplish heating by steam coils, hot oil, or electricity. Provide steam heaters consisting of steam coils and equipment for producing steam, so designed that the steam cannot come in contact with the bituminous material. Affix an armored thermometer to the tank with a range of 4.4 to 204.4 degrees C 40 to 400 degrees F so that the temperature of the bituminous material may be determined at all times. Clean tanks and pipelines of all materials before loading for project; open inspection hatches if requested by the Contracting Officer.

2.2.4 Power Brooms and Power Blowers

Provide power brooms and power blowers capable of cleaning surfaces to which the fog seal is to be applied.

2.2.5 Vacuum Sweepers

Provide self-propelled, vacuum pickup sweeper capable of removing loose sand, water, and debris from pavement surface.

2.3 MATERIALS

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NOTE: Designer is to research local practice and edit bracketed items appropriately.
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2.3.1 Emulsified Asphalt for Fog Seal

Use emulsified asphalt for Fog Seal conforming to ASTM D977, [SS-1] [SS-1h] [_____] for anionic and ASTM D2397/D2397M, [CSS-1] [CSS-1h] [_____] for cationic materials. For application, approved emulsified asphalt may be diluted at the emulsion plant at a maximum rate of 1 part approved emulsified asphalt to 1 part water. Provide residual bituminous material content of emulsion before dilution and residual bituminous material after dilution. Provide dilution rate and weight of dilution water for each distributor truck load on delivery ticket. Field dilution is not allowed.

2.3.1.1 Emulsified Asphalt Sample

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NOTE: Include bracketed sentence if a sample is desired. For enduring facilities or applications with activity projected for 5 or more years, recommend always requesting sample.
****

For each undiluted emulsified asphalt used, provide manufacturer, manufacture date, lot number, and storage tank number. Include data for

the type of bituminous material used: percent oil distillate by volume of emulsion.[From each source of supply, submit a 4.0 liter 1.0 gallon sample of bituminous material sampled at the project site for the Government to store for one year in case of latent issues.]

2.3.2 Mineral Aggregate

Sample mineral aggregate sand for blotting in accordance with ASTM D75/D75M. Provide gradation of mineral aggregate sand in accordance with ASTM C136/C136M and meet the following gradation requirements in Table I:

TABLE I: Mineral Aggregate Gradation

Sieve Designation (mm)	Percent by Weight Passing
1.18 No. 16	100
0.60 No. 30	40-75
0.30 No. 50	4-12
0.15 No. 100	0-5

2.3.3 Water

Provide fresh, clean, and potable water.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Site Protection

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NOTE: Modify the bracketed sentence as appropriate for the project location. Public notices and signage 3 days prior is reasonable, unless local ordinance requires otherwise. Designer is to identify temporary parking for homes or business access that is interrupted by the work and curing. Delete paragraph if not needed.

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[Provide public notices and post signage at least [3] [_____] days in advance of starting work. Plan detours as provided in the Contract prior to performing work at site.]During work, protect adjacent buildings, structures, vehicles, manhole covers, inlet grates, and trees to prevent splattering or marring. Protect manhole covers, inlet grates, electrical boxes, utility boxes, and other similar pavement penetrations with building paper cut to size to protect the entire casting size and opening. If the building paper becomes dislodged, replace with plywood, or other continuous board medium, cut to fit and of a thickness sufficient to remain in place during fog seal application. Open and remove debris from all covers, grates, and boxes after fog seal application.

3.1.2 Traffic Control

Provide warning signs and barricades for proper traffic control, in accordance with [MUTCD][local governing traffic control authority].

3.1.3 Surface Preparation

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NOTE: If the surface to be treated requires repairs, the method of repairs and extent of work involved should be shown or described.

Fog Seals are not used to correct pavement grades, correct structural deficiencies, fill potholes, or fill ruts. Designer must first design appropriate repairs to existing pavements prior to application of fog seal. If existing pavement condition is marginal that fog seal application could lower friction, Designer must conduct the grease smear test following Federal Aviation Administration AC 150/5320-12C 1997 "Measurement, Construction, and Maintenance of Skid-Resistant Airport Pavement Surfaces", U.S. Department of Transportation. Do not apply fog seals if the existing surface friction is less than 0.8 millimeter 0.03 inch or if it is likely the fog seal application will lower friction below that value. If no repairs are needed prior to applying fog seal, delete bracketed sentence addressing repairs.

Removal of paint and rubber deposits are generally accomplished by high pressure water blasting but care must be used to ensure that the water pressure does not significantly damage the asphalt pavement surface. Designer to consider use of Section 32 01 11.51 RUBBER AND PAINT REMOVAL FROM AIRFIELD PAVEMENTS for thermoplastic markings. Few approved chemicals are effective and sandblasting is not permitted by air pollution regulations at some locations. Mechanical abrasion generally causes damage to the pavement.

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[[Complete repairs to existing pavement as specified in the Contract documents] [and] [or] [as shown on plans].][Thermoplastic pavement markings are to be removed prior to fog seal application following Section 32 01 11.51 RUBBER AND PAINT REMOVAL FROM AIRFIELD PAVEMENTS.]Immediately before applying the fog seal, remove loose material, dirt, clay, or other objectionable material from the surface to be treated. Flush the surface with water when necessary to remove dirt or debris not removed by sweeping or brooming; allow the surface to dry after flushing. Paint bonded to the surface may remain. After the cleaning operation and prior to application of the fog seal, the Contracting Officer is to inspect the area to be treated to determine suitability of the area to receive the fog seal.

3.2 TEST SECTIONS

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NOTE: In some localities, an incompatibility may exist between the asphaltic emulsion and the water to be used for dilution due to their characteristics. Clear, potable water should be used, and if there is any doubt with the compatibility of the water and the asphalt emulsion, add the following to this paragraph: Prior to commencing work, combine 0.24 liter one half pint of the proposed asphalt emulsion and 0.24 liter one half pint of the proposed water, agitate, and allow to sit for a period of 24 hours to test their compatibility. If they prove to be incompatible, provide an approved chemical treatment for all water used for dilution or a different and compatible source of water.

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Determine the required application rates from test sections on the pavement to be treated.

3.2.1 Bituminous Distributor Temperature

Ensure bituminous material is at the recommended application temperature and has been thoroughly cycled through the distributor bar. Test the bituminous distributor under pressure by means of a test shot area (outside the project limits) to ensure there are no leaks or dripping from nozzles after shut-off.

3.2.2 Test Section Construction

Select an area of the prepared pavement that is to receive fog seal at least 90 m 300 feet long and as wide as the distributor spray bar. Dilute emulsified asphalt with an equal part of water or as agreed to by the Contracting Officer. Apply the water diluted asphalt emulsion in at least three test sections; each a minimum of 30 m 100 feet long. Make trial applications at residual rates ranging from 0.15 to 0.5 liters per square meter 0.03 to 0.11 gallons per square yard for tight surface (low absorbance) pavements. Make trial applications at residual rates ranging from 0.4 to 1.0 liters per square meter 0.09 to 0.22 gallons per square yard for loose surface (high absorbance) pavements. Always start at the lowest application rate and adjust upwards. Trial application rates may be modified as approved by the Contracting Officer. Additional trial applications may be required by the Contracting Officer to obtain desired coverage in paragraph Application Rate.

3.2.3 Application Rate

Use the minimum application rate from the test section, which has been satisfactorily applied without leaving an excess of asphalt residue on the surface. Submit for approval a report indicating approximate percent of coverage to target a minimum of 90 percent uniform coverage but less than 100 percent uniform coverage, for each application rate in the test section. A coverage of 100 percent or is an excess of asphalt residue, and may reduce friction. Summarize the report with the recommended application rate. Fog sealing production work may proceed after the Contracting Officer approves the application rate.

3.3 FOG SEAL APPLICATION

Apply the water-diluted emulsified asphalt at the rate to achieve the approved residual application rate from paragraph Application Rate. Maintain application temperature of emulsified asphalt between[24 and 71 degrees C 75 and 160 degrees F] [_____]. Apply emulsified asphalt using triple overlap in such a manner that uniform distribution is obtained over all surfaces treated. Reduce spray to double overlap if wind disperses triple overlap and only if double overlap applies the specified coverage, otherwise discontinue work until acceptable coverage is obtainable. For double overlap, adjust distributor operation and settings to achieve target application rate. To obtain uniform application of the fog seal on the surface treated at the junction of previous and subsequent applications, spread building paper on the surface at a sufficient distance from each end of each application so that application of the rejuvenator may be started and stopped on the paper. Remove the paper immediately after application. Properly treat areas missed by the distributor with the hand spray. For longitudinal joints, do not spray adjacent lane until the previous lane emulsion breaks and is tack free. Provide uniform application to the spray joint and minimize overlapping onto previously treated surfaces.

3.4 FIELD QUALITY CONTROL

Inspect application of fog seal for uniformity each day of application. During application, take one sample at the start and for each 400 square meters 500 square yards, or portion thereof of surface area to receive emulsified asphalt.

3.4.1 Blotting Excess Fog Seal

Apply mineral aggregate sand for blotting, in sufficient quantity, to treated areas where fog seal pools in low areas or from excess application rates before emulsion breaks. Apply blotter sand by hand or mechanical spreader. After asphalt emulsion is absorbed by blotter sand, sweep, remove, and dispose of blotter sand.

3.4.2 Insufficient Fog Seal Application

When the actual application rate of the residual bituminous material is more than 20 percent below the approved application rate, make subsequent applications of fog seal to bring the sum of the applied residual bituminous material application rate up to but not exceeding the approved rate within 24 hours after application. If the residual bituminous rate is exceeded, apply mineral aggregate blotter sand and roll with pneumatic tire roller before the fog seal application breaks. After asphalt emulsion is absorbed by blotter sand, sweep, remove, and dispose of blotter sand.

3.4.3 Inspection Reports

Furnish a written report each day of application citing temperature and humidity during application of fog seal, emulsion temperature during application, rate of emulsion application, dilution rate, residual bituminous material rate, truck speed in meters per minute feet per minute, RPM of truck, digital wet (shot) rate, spray bar height, and pump setting. Include any observations.

3.5 SURFACE PROTECTION

****
NOTE: Delete bracketed sentence if pavement markings are not in Contract.
****

Protect freshly placed coatings from damage by traffic. Provide sufficient warning signs and barricades to prevent traffic over freshly treated surfaces. Protect treated areas from traffic for at least 24 hours after final application of coatings, or for such time as necessary to prevent tracking.[Apply pavement markings as required in Contract after final brooming.]

-- End of Section --