
USACE / NAVFAC / AFCEA / NASA UFGS-32 12 10 (August 2008)

Preparing Activity: USACE Superseding
UFGS-32 12 10 (October 2006)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated October 2008

SECTION TABLE OF CONTENTS

DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 32 12 10

BITUMINOUS TACK AND PRIME COATS

08/08

PART 1 GENERAL

- 1.1 UNIT PRICES
 - 1.1.1 Measurement
 - 1.1.2 Payment
 - 1.1.3 Waybills and Delivery Tickets
- 1.2 REFERENCES
- 1.3 SYSTEM DESCRIPTION
 - 1.3.1 General Requirements
 - 1.3.2 Bituminous Distributor
 - 1.3.3 Heating Equipment for Storage Tanks
 - 1.3.4 Power Brooms and Power Blowers
- 1.4 SUBMITTALS
- 1.5 QUALITY ASSURANCE
- 1.6 DELIVERY, STORAGE, AND HANDLING
- 1.7 ENVIRONMENTAL REQUIREMENTS

PART 2 PRODUCTS

- 2.1 PRIME COAT
 - 2.1.1 Cutback Asphalt
 - 2.1.2 Emulsified Asphalt
- 2.2 TACK COAT
 - 2.2.1 Cutback Asphalt
 - 2.2.2 Emulsified Asphalt

PART 3 EXECUTION

- 3.1 PREPARATION OF SURFACE
- 3.2 APPLICATION RATE
 - 3.2.1 Tack Coat
 - 3.2.2 Prime Coat
- 3.3 APPLICATION TEMPERATURE
 - 3.3.1 Viscosity Relationship
 - 3.3.2 Temperature Ranges
- 3.4 APPLICATION

- 3.4.1 General
- 3.4.2 Prime Coat
- 3.4.3 Tack Coat
- 3.5 CURING PERIOD
- 3.6 FIELD QUALITY CONTROL
- 3.7 SAMPLING AND TESTING
 - 3.7.1 Sampling
 - 3.7.2 Calibration Test
 - 3.7.3 Trial Applications
 - 3.7.3.1 Tack Coat Trial Application Rate
 - 3.7.3.2 Prime Coat Trial Application Rate
 - 3.7.4 Sampling and Testing During Construction
- 3.8 TRAFFIC CONTROLS

-- End of Section Table of Contents --

USACE / NAVFAC / AFCEA / NASA UFGS-32 12 10 (August 2008)

Preparing Activity: USACE Superseding
UFGS-32 12 10 (October 2006)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated October 2008

SECTION 32 12 10

BITUMINOUS TACK AND PRIME COATS 08/08

NOTE: This guide specification covers the requirements for bituminous tack and prime coats for airfield pavements, roads, parking areas and general paving needs.

Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

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

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

PART 1 GENERAL

1.1 UNIT PRICES

NOTE: Delete unit price paragraphs when lump sum bidding is used. Edit submittal requirements accordingly.

1.1.1 Measurement

NOTE: When the bituminous material is measured in liters (gallons), the appropriate ASTM method will be retained for the type of bituminous material

specified.

The bituminous material paid for will be the measured quantities used in the accepted work, provided that the measured quantities are not 10 percent over the specified application rate. Any amount of bituminous material more than 10 percent over the specified application rate for each application will be deducted from the measured quantities, except for irregular areas where hand spraying of the bituminous material is necessary. Express measured quantities in [metric tons 2000 pound tons] [liters at 15.6 degrees C gallons at 60 degrees F. Volumes measured at temperatures other than 15.6 degrees C 60 degrees F shall be corrected [in accordance with ASTM D 1250] [using a coefficient of expansion of 0.00045 per degree C 0.00025 per degree F for asphalt emulsion]].

1.1.2 Payment

The quantities of bituminous material, determined as specified above, will be paid for at the respective contract unit prices. Payment shall constitute full compensation for all operations necessary to complete the work as specified herein.

1.1.3 Waybills and Delivery Tickets

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. These submittals are required for Unit Pricing bid only. 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.

1.2 REFERENCES

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 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.

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 20	(1970; R 2004) Penetration-Graded Asphalt Cement
AASHTO M 226	(1980; R 2004) Viscosity Graded Asphalt Cement
AASHTO M 81	(1992; R 2004) Cut-Back Asphalt (Rapid-Curing Type)
AASHTO M 82	(1975; R 2004) Cut-Back Asphalt (Medium-Curing Type)
AASHTO T 102	(1983; R 2004) Spot Test of Asphaltic Materials
AASHTO T 40	(2002; R 2006) Sampling Bituminous Materials

ASTM INTERNATIONAL (ASTM)

ASTM D 1250	(2007) Standard Guide for Use of the Petroleum Measurement Tables
ASTM D 140	(2001; R 2007) Sampling Bituminous Materials
ASTM D 2026	(1997; R 2004) Cutback Asphalt (Slow-Curing Type)
ASTM D 2027	(1997; R 2004) Cutback Asphalt (Medium-Curing Type)
ASTM D 2028	(1997; R 2004) Cutback Asphalt (Rapid-Curing Type)
ASTM D 2397	(2005) Standard Specification for Cationic Emulsified Asphalt
ASTM D 2995	(1999; R 2004) Determining Application Rate of Bituminous Distributors
ASTM D 3381	(2005) Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 946	(1982; R 2005) Penetration-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 977	(2005) Emulsified Asphalt

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED	(2002; R 2005) Leadership in Energy and Environmental Design(tm) Green Building Rating System for New Construction (LEED-NC)
------	--

1.3 SYSTEM DESCRIPTION

1.3.1 General Requirements

Plant, equipment, machines and tools used in the work are subject to approval and shall be maintained in a satisfactory working condition at all times. Calibrated equipment such as asphalt distributors, scales, batching equipment, spreaders and similar equipment, should have been recalibrated by a calibration laboratory within [12] [_____] months prior to commencing work [and every [_____] months thereafter, by such laboratory from the date of recalibration, during the term of the contract].

1.3.2 Bituminous Distributor

Provide a distributor with pneumatic tires of such size and number that the load produced on the base surface does not exceed 295 kg/25 mm 650 psi of tire width to prevent rutting, shoving or otherwise damaging the base surface or other layers in the pavement structure. Design and equip the distributor to spray the bituminous material in a uniform coverage at the specified temperature, at readily determined and controlled rates from 0.23 to 9.05 L/square meter 0.05 to 2.0 gallons per square yard, with 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, and at variable widths. 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. Equip the distributor to circulate and agitate the bituminous material during the heating process.

1.3.3 Heating Equipment for Storage Tanks

The equipment for heating the bituminous material shall be steam, electric, or hot oil heaters. Provide steam heaters consisting of steam coils and equipment for producing steam, so designed that the steam cannot get into the material. Fix an armored thermometer to the tank with a temperature range from 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.

1.3.4 Power Brooms and Power Blowers

Use power brooms and power blowers suitable for cleaning the surfaces to which the bituminous coat is to be applied.

1.4 SUBMITTALS

NOTE: Review submittal description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not

complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation 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, Air Force, and NASA projects. projects.

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

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.] [information only. When used, a designation following the "G" designation 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

Waybills and delivery tickets, during progress of the work.

[Local/Regional Materials

Documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project in accordance with LEED.]

SD-06 Test Reports

Sampling and Testing

Copies of all test results for emulsified asphalt, and bituminous materials, within 24 hours of completion of tests. Certified copies of the manufacturer's test reports indicating temperature viscosity relationship for cutback asphalt, compliance with applicable specified requirements, not less than [30] [_____] days before the material is required in the work.

1.5 QUALITY ASSURANCE

NOTE: Using local materials can help minimize

transportation impacts, including fossil fuel consumption, air pollution, and labor. Using materials harvested and manufactured within a 800 km (500 mile) radius from the project site contributes to the following LEED credit: MR5. Coordinate with Section 01 33 29 LEED(tm) DOCUMENTATION. Use second option if Contractor is choosing local materials in accordance with Section 01 33 29 LEED(tm) DOCUMENTATION. Use second option for USACE projects. Army projects should include option, only if pursuing this LEED credit.

[Use Local/Regional Materials or products extracted, harvested, or recovered, as well as manufactured, within a [800] [] km [500] [] mile radius from the project site, if available from a minimum of three sources.] [See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total local material requirements. Tack and prime coat materials may be locally available.]

1.6 DELIVERY, STORAGE, AND HANDLING

Inspect the materials delivered to the site for contamination and damage. Unload and store the materials with a minimum of handling.

1.7 ENVIRONMENTAL REQUIREMENTS

Apply bituminous coat only when the surface to receive the bituminous coat is dry. Apply bituminous coat only when the atmospheric temperature in the shade is 10 degrees C 50 degrees F or above and when the temperature has not been below 2 degrees C 35 degrees F for the 12 hours prior to application, unless otherwise directed.

PART 2 PRODUCTS

2.1 PRIME COAT

NOTE: Remove brackets from around the material to be allowed in the contract specifications and delete the other materials and references.

a. With growing environmental/safety regulations, more and more states are prohibiting the use of cutback asphalts in favor of emulsified asphalt materials. If cutback asphalts are used, one of the following types and grades can be recommended:

Slow-Curing Type (ASTM D 2026): SC-70, SC-250.

Medium-Curing Type (ASTM D 2027 or AASHTO M 82): MC-30, MC-70, MC-250.

Rapid-Curing Type (ASTM D 2028 or AASHTO M 81): RC-70, RC-250.

Selection of a particular type and grade should consider the nature of the surface to be treated. An open base course material will be penetrated

readily, and all of the above types and grades can be considered except for the low viscosity MC-30. A tight surface is not going to be penetrated as readily; therefore, the less viscous materials are recommended such as RC-70, MC-30, MC-70 and SC-70. Some caution might be urged in using RC-70 or RC-250 because the solvent may separate or be absorbed by the base course fines and leave the asphalt deposited on the surface. Cutback asphalts can be used in cold-weather construction with less concern than emulsions which contain water. Less viscous grades may be used for cold-weather construction such as RC-70, MC-30 and MC-70.

b. There are two types of emulsions that can be used for prime coats. A list of recommended emulsion grades by type is as follows:

Anionic Emulsions ASTM D 977: SS-1, SS-1h.

Cationic Emulsions ASTM D 2397: CSS-1, CSS-1h.

Penetration and coating will be most efficient at about optimum moisture content. Water dilution of the emulsion is also required to reduce viscosity.

Provide asphalt conforming to [AASHTO M 81] [AASHTO M 82], Grade [_____] and specified in the following two subparagraphs.

2.1.1 Cutback Asphalt

Provide cutback asphalt conforming to [ASTM D 2026, Grade SC-70] [ASTM D 2027, Grade [MC-30] [MC-70]] [ASTM D 2028, Grade RC-70].

2.1.2 Emulsified Asphalt

Provide emulsified asphalt conforming to [ASTM D 977, Type [SS-1] [SS1h]] [ASTM D 2397, Type [CSS-1] [CSS-1h]].

2.2 TACK COAT

NOTE: Tack coat prevents water from penetrating pavement and should not be used in pervious pavement systems. When a pervious pavement system is specified, delete all references to tack coat in this section.

Emulsified asphalt grades listed are suitable for normal tack coat applications. The following considerations should be included in the evaluation of alternate grades to be specified for the project:

a. Local practice as well as availability and cost of various grades within the area.

b. The advantage of the SS grade over the RS grades is that they can be diluted with water while

dilution of the RS grades is more difficult. Dilution of the emulsified asphalt with water normally provides good coverage and economy, adequate bond, with less chance of leaving surplus asphalt. Where a rapid-setting emulsion is required, consider use of RS-1 and CRS-1.

c. Anionic emulsions such as SS-1 provide better adhesion to basic aggregates such as limestone, while cationic emulsions such as CSS-1 are better with acidic aggregates such as silicates. For the majority of applications, the two types will perform equally as well as a tack coat.

d. In warmer climates, consider the use of "h" grade emulsions with a harder base asphalt and lower penetration such as SS-1h and CSS-1h.

e. If ASTM D 2028 or AASHTO M 81 is used, then Note A in TABLE 1 of ASTM D 2028 or AASHTO M 82 should be reviewed and the material specified by viscosity or penetration. Except for Navy projects, cutback asphalt grades recommended for tack are RC-70 and RC-250; they may be used generally as a tack in pavement construction. In cold-weather construction, they can be used with less concern than emulsions which contain water.

f. Paving grade asphalts can also be used in tack applications. More heat is required to achieve spraying consistency for these materials. Selection of a grade involves consideration of the various grading systems used. The following materials are recommended:

Penetration Grades (ASTM D 946 or AASHTO M 20)

200-300
120-150
85-100

Viscosity Grades (ASTM D 3381 or AASHTO M 226, TABLE 1 or 2)

AC 2.5
AC 5
AC 10

Aged Residue Viscosity Grades (ASTM D 3381 or AASHTO M 226)

AR 1000
AR 2000
AR 4000

The harder grades, 85-100 penetration, AC 10, and AR 4000 viscosity grades, are recommended for airfields. These grades are harder and would be better able to resist uplift pressures caused by jet engines. The other grades may be considered for more general use. The temperature-viscosity

relation for the job asphalt should be checked to ensure that a spraying consistency can be achieved in the recommended temperature range of paragraph APPLICATION TEMPERATURE.

g. Either anionic or cationic emulsions can be used for tack. A list of recommended emulsions is as follows:

Anionic Emulsion ASTM D 977

RS-1
MS-1
HFMS-1
SS-1
SS-1h

Cationic Emulsions ASTM D 2397

CRS-1
CSS-1
CSS-1h

Grades SS-1h and CSS-1h are made with a harder base asphalt and are recommended for airfields. The other grades can be considered for general use. Grades RS-1, SS-1, and SS-1h are widely used tack materials.

h. An asphalt-based tack or tar tack may be used between an asphalt and tar or tar-rubber concrete course, but a tar tack should be used between tar and tar-rubber concrete courses. This specification must be altered for a tar tack coat.

i. Emulsified asphalt mixing grades such as SS-1, SS-1h, CSS-1, and CSS-1h perform best when diluted with equal parts of water and applied at the rate of 0.23-0.68 liter of diluted emulsion per square meter (0.05-0.15 gallon of diluted emulsion per square yard).

Provide asphalt conforming to [ASTM D 2028] [ASTM D 946] [ASTM D 3381] [ASTM D 977] [ASTM D 2397] or [AASHTO M 81] [AASHTO M 20] [AASHTO M 226] Grade [_____].

2.2.1 Cutback Asphalt

Provide cutback asphalt conforming to [ASTM D 2026, Grade SC-70] [ASTM D 2027, Grade [MC-30] [MC-70]] [ASTM D 2028, Grade RC-70].

2.2.2 Emulsified Asphalt

Provide emulsified asphalt conforming to [ASTM D 977, Type [SS-1] [SS1h]] [ASTM D 2397, Type [CSS-1] [CSS-1h]]. Dilute the emulsified asphalt with equal parts of water. The base asphalt used to manufacture the emulsion shall show a negative spot when tested in accordance with AASHTO T 102 using standard naphtha.

PART 3 EXECUTION

3.1 PREPARATION OF SURFACE

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

Immediately before applying the bituminous coat, remove all loose material, dirt, clay, or other objectionable material from the surface to be treated by means of a power broom or blower supplemented with hand brooms. The surface shall be dry and clean at the time of treatment.

3.2 APPLICATION RATE

NOTE: The range of application rates for the bituminous materials is for the bituminous residue content and does not include water or solvents that are contained in emulsified or liquid bituminous materials. The use of liquid or emulsified material requires that the application rates be corrected. Any prescribed application should be corrected and divided into two applications 24 hours apart when necessary to avoid flowing off the surface because of grade or slope.

Emulsified asphalt mixing grades such as SS-1, SS-1h, CSS-1, and CSS-1h perform best when diluted with equal parts of water and applied at the rate of 0.23-0.68 liter of diluted emulsion per square meter (0.05-0.15 gallon of diluted emulsion per square yard).

The exact quantities within the range specified, which may be varied to suit field conditions, will be determined by the Contracting Officer.

3.2.1 Tack Coat

Apply bituminous material for the tack coat in quantities of not less than 0.20 L 0.05 gallon nor more than 0.70 L/square meter 0.15 gallon per square yard of pavement surface.

3.2.2 Prime Coat

Apply bituminous material for the prime coat in quantities of not less than 0.70 L 0.15 gallon nor more than 1.80 L/square meter 0.40 gallon per square yard of pavement surface.

3.3 APPLICATION TEMPERATURE

3.3.1 Viscosity Relationship

Asphalt application temperature shall provide an application viscosity between 10 and 60 seconds, Saybolt Furol, or between 20 and 120 square

mm/sec 20 and 120 centistokes, kinematic. Furnish the temperature viscosity relation to the Contracting Officer.

3.3.2 Temperature Ranges

NOTE: Normal spray application temperatures are as follows. Edit and coordinate materials with Part 2 PRODUCTS. Remove brackets from the material to be allowed in the specification and delete the other materials in brackets.

The viscosity requirements determine the application temperature to be used. The following is a normal range of application temperatures:

Liquid Asphalts

[SC-250	75-132 degrees C]
[MC-30	29-87 degrees C]
[MC-70	50-107 degrees C]
[MC-250	75-132 degrees C]
[RC-70	50-90 degrees C*]
[RC-250	75-12 degrees C*]

Paving Grade Asphalts

Penetration Grades

[200-300	plus 130 degrees C]
[120-150	plus 132 degrees C]
[85-100	plus 137 degrees C]

Viscosity Grades

[AC 2.5	plus 132 degrees C]
[AC 5	plus 137 degrees C]
[AC 10	plus 137 degrees C]
[AR 1000	plus 135 degrees C]
[AR 2000	plus 140 degrees C]
[AR 4000	plus 143 degrees C]

Emulsions

[RS-1	20-60 degrees C]
[MS-1	20-70 degrees C]
[HFMS-1	20-70 degrees C]
[SS-1	20-70 degrees C]
[SS-1h	20-70 degrees C]
[CRS-1	52-85 degrees C]
[CSS-1	20-70 degrees C]
[CSS-1h	20-70 degrees C]

Liquid Asphalts

[SC-70	120-225 degrees F]
[SC-250	165-270 degrees F]
[MC-30	85-190 degrees F]
[MC-70	120-225 degrees F]
[MC-250	165-270 degrees F]
[RC-70	120-200 degrees F*]
[RC-250	165-250 degrees F*]

Paving Grade Asphalts

Penetration Grades

[200-300	plus 265 degrees F]
[120-150	plus 270 degrees F]
[85-100	plus 280 degrees F]

Viscosity Grades

[AC 2.5	plus 270 degrees F]
[AC 5	plus 280 degrees F]
[AC 10	plus 280 degrees F]
[AR 1000	plus 275 degrees F]
[AR 2000	plus 285 degrees F]
[AR 4000	plus 290 degrees F]

Emulsions

[RS-1	70-140 degrees F]
[MS-1	70-160 degrees F]
[HFMS-1	70-160 degrees F]
[SS-1	70-160 degrees F]
[SS-1h	70-160 degrees F]
[CRS-1	125-185 degrees F]
[CSS-1	70-160 degrees F]
[CSS-1h	70-160 degrees F]

These temperature ranges exceed the flash point of the material and care should be taken in their heating.

3.4 APPLICATION

NOTE: Prime coats are required for Navy projects.
If the designer for Army jobs chooses not to specify a prime coat at the time of design, delete all references to a prime coat within this section. If the drainage layer is used beneath the surfacing material (Asphalt cement hot mix concrete), the underlying material (base course) will not be primed and the appropriate paragraphs dealing with the prime coat will be deleted.

3.4.1 General

Following preparation and subsequent inspection of the surface, apply the bituminous prime or tack coat with the Bituminous Distributor at the specified rate with uniform distribution over the surface to be treated. Properly treat all areas and spots missed by the distributor with the hand spray. Until the succeeding layer of pavement is placed, maintain the surface by protecting the surface against damage and by repairing deficient areas at no additional cost to the Government. If required, spread clean dry sand to effectively blot up any excess bituminous material. No smoking, fires, or flames other than those from the heaters that are a part of the equipment are permitted within 8 meters 25 feet of heating, distributing, and transferring operations of bituminous material other than bituminous emulsions. Prevent all traffic, except for paving equipment used in constructing the surfacing, from using the underlying material, whether primed or not, until the surfacing is completed. The bituminous coat shall conform to all requirements as described herein.

3.4.2 Prime Coat

NOTE: Conditions where a prime coat may be beneficial include: preventing lateral movement of the unbound base during pavement construction, waterproofing during pavement construction, and forming a tight base to which the asphalt pavement will adhere. To specify the application of a prime coat, retain the first bracketed sentence and deleted the text within the second set of brackets. Add prime coat details on drawings.

If the prime coat will be retained as a Contractor's option, delete the first sentence and retain the bracketed text in the second set of brackets.

[Apply a prime coat at locations shown on the Drawings.] [The prime coat is required if it will be at least [7] [_____] days before the surfacing (Asphalt cement hot mix concrete) layer is constructed on the underlying (base course, etc.) compacted material. The type of liquid asphalt and application rate will be as specified herein. Protect the underlying from any damage (water, traffic, etc.) until the surfacing is placed. If the Contractor places the surfacing within seven days, the choice of protection measures or actions to be taken is at the Contractor's option. Repair (recompact or replace) damage to the underlying material caused by lack of, or inadequate, protection by approved methods at no additional cost to the Government. If the Contractor opts to use the prime coat, apply as soon as possible after consolidation of the underlying material.] Apply the bituminous material uniformly over the surface to be treated at a pressure range of 172.4 to 517.1 kPa 25 to 75 psi and at the rate of not less than [0.91] [_____] L not more than [1.36] [_____] L/square m [0.20] [_____] gallon not more than [0.30] [_____] gallon per square yard. To obtain uniform application of the prime coat on the surface treated at the junction of previous and subsequent applications, spread building paper on the surface for a sufficient distance back from the ends of each application to start and stop the prime coat on the paper and to ensure that all sprayers will operate at full force on the surface to be treated. Immediately after application remove and destroy the building paper.

3.4.3 Tack Coat

Apply tack coat at the locations shown on the drawings. Apply the tack coat when the surface to be treated is dry. Immediately following the preparation of the surface for treatment, apply the bituminous material by means of the bituminous distributor, within the limits of temperature specified herein and at a rate of not less than [0.23] [_____] L nor more than [0.68] [_____] L of diluted emulsion per square meter [0.05] [_____] gallon nor more than [0.15] [_____] gallon of diluted emulsion per square yard. Apply the bituminous material so that uniform distribution is obtained over the entire surface to be treated. Treat lightly coated areas and spots missed by the distributor with the bituminous material. Following the application of bituminous material, allow the surface to cure without being disturbed for period of time necessary to permit setting of the tack coat. Apply the bituminous tack coat only as far in advance of the placing of the overlying layer as required for that day's operation. Maintain and protect the treated surface from damage until the succeeding course of pavement is placed.

3.5 CURING PERIOD

NOTE: Retain bracketed sentence if prime coat is specified.

Following application of the bituminous material and prior to application of the succeeding layer of pavement, allow the bituminous coat to cure and to obtain evaporation of any volatiles or moisture. Maintain the coated surface until the succeeding layer of pavement is placed, by protecting the surface against damage and by repairing and recoating deficient areas. [Allow the prime coat to cure without being disturbed for a period of at least 48 hours or longer, as may be necessary to attain penetration into the treated course. Furnish and spread enough sand to effectively blot up and cure excess bituminous material.]

3.6 FIELD QUALITY CONTROL

NOTE: Select the appropriate paragraph based on the amount of bituminous material required.

Samples of the bituminous material [shall be tested for compliance with the applicable specified requirements. A sample shall be obtained and tested by the Contractor for every [[_____] metric tons tons] [[_____] liters gallons] of bituminous material used] [used shall be obtained by the Contractor as directed, under the supervision of the Contracting Officer. The sample may be retained and tested by the Government at no cost to the Contractor].

3.7 SAMPLING AND TESTING

Perform sampling and testing by an approved commercial testing laboratory or by facilities furnished by the Contractor. No work requiring testing will be permitted until the facilities have been inspected and approved.

3.7.1 Sampling

The samples of bituminous material, unless otherwise specified, shall be in accordance with ASTM D 140 or AASHTO T 40. Sources from which bituminous materials are to be obtained shall be selected and notification furnished the Contracting Officer within 15 days after the award of the contract.

3.7.2 Calibration Test

Furnish all equipment, materials, and labor necessary to calibrate the bituminous distributor. Calibration shall be made with the approved job material and prior to applying the bituminous coat material to the prepared surface. Calibrate the bituminous distributor in accordance with ASTM D 2995.

3.7.3 Trial Applications

Before providing the complete bituminous coat, apply three lengths of at least 30 meters 100 feet for the full width of the distributor bar to evaluate the amount of bituminous material that can be satisfactorily applied.

3.7.3.1 Tack Coat Trial Application Rate

Unless otherwise authorized, apply the trial application rate of bituminous tack coat materials in the amount of 0.20 L/square meter 0.05 gallons per square yard. Other trial applications shall be made using various amounts of material as may be deemed necessary.

3.7.3.2 Prime Coat Trial Application Rate

Unless otherwise authorized, apply the trial application rate of bituminous materials in the amount of 1.10 L/square meter 0.25 gallon per square yard. Other trial applications shall be made using various amounts of material as may be deemed necessary.

3.7.4 Sampling and Testing During Construction

Perform quality control sampling and testing as required in paragraph FIELD QUALITY CONTROL.

3.8 TRAFFIC CONTROLS

Keep traffic off surfaces freshly treated with bituminous material. Provide sufficient warning signs and barricades so that traffic will not travel over freshly treated surfaces.

-- End of Section --