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UNIFIED FACILITIES GUIDE SPECIFICATIONS

Use for NAVFAC Southwest projects only

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SECTION 32 10 00.00 26

ASPHALT CONCRETE FOR VEHICULAR TRAFFIC  
07/06

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NOTE: This guide specification covers asphalt concrete pavements for vehicular traffic. This includes base course, prime coat, paint binder (or tack coat), asphalt concrete and striping. It does not include weed control or seal coats. Use this guide specification in place of the following guide specifications for projects with less than 20,000 square yards of asphalt concrete paving:

1. Section 02722, "Graded Crushed Aggregate Base Course for Flexible Pavement"
2. Section 02742, "Hot Mix Bituminous Pavement"
3. Section 02743, "Bituminous Prime Coat"
4. Section 02744, "Bituminous Tack Coat"
5. Section 02761, "Pavement Markings."

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NOTE: Suggestions for improvement of this specification will be welcomed using the Navy "Change Request Forms" subdirectory located in SPECSINTACT in Jobs or Masters under "Forms/Documents" directory or DD Form 1426. Suggestions should be forwarded to:

Commander  
Naval Facilities Engineering Command  
Western Division, Code 406.2  
P. O. Box 727  
San Bruno, CA 94066-0720

email: EFAWest@efdlant.navy.mil

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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 in the text by the

basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS  
(AASHTO)

AASHTO T102 (1983) Spot Test of Asphaltic Materials

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 136 (1996; Rev. A) Sieve Analysis of Fine and Coarse Aggregates

ASTM D 1556 (1990; R 1996) Density and Unit Weight of Soil in Place by the Sand-Cone Method

ASTM D 1557 (1991) Laboratory Compaction Characteristics of Soiling Modified Effort (56,000 ft-lbf/ft (2,700 kN-m/m))

ASTM D 2172 (1995) Quantitative Extraction of Bitumen from Bituminous Paving Mixtures

FEDERAL SPECIFICATIONS (FS)

FS TT-P-115 (Rev. F) Paint, Traffic, (Highway, White and Yellow)

FS TT-P-1952 (Rev. D) Paint, Traffic and Airfield Marking, Water Emulsion Base

U.S. DEPARTMENT OF COMMERCE PRODUCT STANDARDS (PS)

PS-20 (1970; R 1986) American Softwood Lumber Standard

[STATE OF [\_\_\_\_], DEPARTMENT OF TRANSPORTATION], [[\_\_\_\_] STATE HIGHWAY DEPARTMENT] [[\_\_\_\_] STATE HIGHWAY COMMISSION]

SS-1 ([\_\_\_\_] Edition) Standard Specifications for Road [and Bridge] Construction

1.2 SUBMITTALS

\*\*\*\*\*  
NOTE: Where a "G" in submittal tags follows a submittal item, it indicates Government approval for that item. Add "G" in submittal tags following any added or existing submittal items deemed sufficiently critical, complex, or aesthetically significant to merit approval by the Government. Submittal items not designated with a "G" will be approved by the QC organization.  
\*\*\*\*\*

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

SD-05 Design Data

Job-mix formula for asphalt concrete

#### SD-06 Test Reports

Asphalt concrete

Submit as required in paragraph entitled "Field Quality Control."

#### SD-07 Certificates

Aggregates for base course and asphalt concrete

Asphalt cement

Liquid asphalt

Asphaltic emulsion

Paint

Asphalt concrete

Submit copies of weighmaster's certificates or certified delivery tickets for each truck load of material.

### 1.3 QUALITY ASSURANCE

Materials and workmanship specified herein with the referenced State Standard specifications shall be in accordance with the referenced articles, sections and paragraphs of the standard except that contractual and payment provisions do not apply. Where the term "Engineer" is used, it shall mean the Contracting Officer. Where the term "state" is used, it shall mean "Federal Government."

#### 1.3.1 Required Data

Submit a job-mix formula for each type of bituminous mixture 14 days before asphalt concrete placement. Ensure formula is within the specified design range.

### 1.4 ENVIRONMENTAL CONDITIONS

Apply paint to clean, dry surfaces and unless otherwise approved, only when air and pavement temperatures are above 40 degrees F for oil-based materials, 50 degrees F for water-based materials, and are less than 95 degrees F. Maintain paint temperature within these same limits.

### 1.5 EQUIPMENT

#### 1.5.1 Mixing Plant and Construction Equipment

Section [\_\_\_\_\_] of SS-1.

#### 1.5.2 Painting Equipment

Use a stripe painting machine capable of producing marking and striping indicated. Provide equipment having a compressor capacity of at least 105 cubic feet and capable of operating at an air pressure of 125 psi. Provide striping machine with a pointer so the machine will hold exactly to

alignment. Provide propelling vehicle with a speedometer or tachometer, and with a suitable device for determining quantity of paint in the container. Mechanically agitate paint while equipment is in operation. Clean paint container and spray nozzles on machine before starting work each day.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 [Aggregates](#)

2.1.1.1 Base Course

\*\*\*\*\*  
NOTE: For projects where significant amounts of asphalt concrete pavement are to be demolished, allow use of reclaimed asphalt pavement. Modify paragraph after consulting State Specifications concerning maximum allowable percentages, maximum size, etc.  
\*\*\*\*\*

Section [\_\_\_\_\_] of [SS-1](#), [Class [\_\_\_\_\_] , Type [\_\_\_\_\_] ] for [\_\_\_\_\_] inch maximum size gradation.

2.1.1.2 [Asphalt Concrete](#)

\*\*\*\*\*  
NOTE: For parking lots use 3/4 inch maximum size aggregate. Anything larger creates a rough surface.  
\*\*\*\*\*

Section [\_\_\_\_\_] of [SS-1](#), [Class [\_\_\_\_\_] , Type [\_\_\_\_\_] ] for individual test result conforming to [\_\_\_\_\_] inch maximum size gradation, [medium] [coarse].

2.1.2 Asphalt Materials

2.1.2.1 [Asphalt Cement](#)

\*\*\*\*\*  
NOTE: Choose one of the following options. Check state standard specifications for method used to specify asphalt cement and select the appropriate option. Consult DM-05.04 "Civil Engineering-Pavements" for the proper grade of asphalt cement to be used.  
\*\*\*\*\*

[Section [\_\_\_\_\_] of [SS-1](#), penetration grade [120-150] [85-100] [60-70], and showing a negative spot when tested as specified in [AASHTO T102](#).]

[Section [\_\_\_\_\_] Appendix [\_\_\_\_\_] of [SS-1](#), Grade [AR-1000] [AR-2000] [AR-4000] [AR-8000] [AR-16000].]

[Section [\_\_\_\_\_] Appendix [\_\_\_\_\_] of [SS-1](#), Grade [AC-2.5] [AC-5] [AC-10] [AC-20] [AC-40].]

2.1.2.2 Liquid Asphalt

\*\*\*\*\*  
NOTE: Check local air pollution regulations before specifying liquid asphalts. In most metropolitan California areas RC grade liquid asphalt can no longer be used and the use of MC grade may be restricted to certain times of the year.  
\*\*\*\*\*

Section [\_\_\_\_\_] of SS-1, Grade [MC-[\_\_\_\_\_] ].

2.1.2.3 Asphaltic Emulsion

Section [\_\_\_\_\_] of SS-1, Grade [\_\_\_\_\_] .

2.1.3 Paint

\*\*\*\*\*  
NOTE: Delete paint requirements when pavement marking and striping is not required for the project or when Section 02761, "Pavement Markings" is used to cover several different striping operations.  
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\*\*\*\*\*  
NOTE: Generally, do not use State Specifications for paint striping materials. Most states buy their own paint and, at any given time, may have less than three suppliers which makes it a "sole source" procurement. The two paint specifications are as follows:

- 1. FS TT-P-115 (white or yellow in either type)

Type I - Slow drying (30 minutes)  
Type II - Fast drying (5 minutes)

- 2. FS TT-P-1952 (Drying time - 75 minutes both types)

Type I - White  
Type II - Yellow

FS TT-P-1952, a water-emulsion marking paint, should be used on asphaltic pavement in areas where air pollution by organic solvents is a problem. FS TT-P-115 is for general use. Use Type I where relatively slow drying can be tolerated and bleeding is a problem. Use Type II for fast drying where bleeding is no problem. Fast drying tends to be less flexible and more brittle.

\*\*\*\*\*

[FS TT-P-115, Type [I] [II], color as indicated] [FS TT-P-1952, Type [I] [II]].

2.1.4 Headerboard Materials

Two by 4 inch secured in place using 2 by 4 by 24 inch minimum length stakes spaced not more than 6 feet apart. Use either redwood rough sawn construction, heart grade, Western red cedar or pressure treated Douglas Fir conforming to PS-20.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Subgrade

Requirements for subgrade are specified in Section 31 00 00 EARTHWORK. Prior to construction of [base course], [asphaltic concrete], clean previously constructed subgrade [or subbase] of foreign substances.

3.1.2 Asphalt Concrete Preparation

Uniformly mix mineral aggregate with bituminous material in a central plant in accordance with Section [\_\_\_\_\_] of SS-1. The percentage of asphalt cement binder shall be between five and seven percent.

3.1.3 Striping

Allow new pavement surfaces to cure for at least 30 days before striping. Clean pavement surfaces immediately prior to painting with a power broom and then a power blower using compressed air. Thoroughly clean pavement surface of water, oil, grease or other objectionable matter. Do not use solvent material that will damage pavement.

3.2 INSTALLATION

3.2.1 Base Course Installation

Place aggregate base in accordance with requirements of Section [\_\_\_\_\_] of SS-1 and to the thickness shown. Grade and compact in [6] [4] inch [\_\_\_\_\_] layers to at least [95] [\_\_\_\_\_] percent of maximum density, ASTM D 1557 Method D. Maintain base course in proper condition until asphaltic concrete is in place, including drainage, rolling, shaping, and watering. Maintain sufficient moisture at the surface to prevent a dusty condition by light sprinkling with water. Recondition, reshape, and recompact areas of completed base course damaged by freezing in accordance with the specified requirements.

3.2.2 Prime Coat

Prior to application of asphaltic concrete, apply a prime coat. Apply by pressure distributors. Allow sufficient time before placing asphalt concrete to permit prime coat to penetrate base.

3.2.2.1 Liquid Asphalt Application

\*\*\*\*\*  
**NOTE: Delete rates of application when State Standard Specifications are used.**  
\*\*\*\*\*

Apply liquid asphalt [on prepared compacted base at a rate of [0.25] [0.35]

[\_\_\_\_\_] gallon per square yard] [on prepared compacted base in accordance with Section [\_\_\_\_\_] of SS-1].

### 3.2.2.2 Asphalt Emulsion Application

Apply emulsion at a rate of [\_\_\_\_\_] gallon per square yard.

### 3.2.3 [Tack Coat] [Paint Binder]

\*\*\*\*\*  
**NOTE: Delete rates of application when State Standard Specifications are used.**  
\*\*\*\*\*

Apply asphaltic emulsion [to the existing pavement surfaces in accordance with Section [\_\_\_\_\_] of SS-1. Unless otherwise directed, apply at a rate of [0.02] [0.05] gallon per square yard] [to the existing pavement surfaces at a rate of [0.05] [0.10] [\_\_\_\_\_] gallon per square yard] [to the exposed edges of [\_\_\_\_\_] against which asphaltic concrete is to be placed] [where shown].

### 3.2.4 Asphalt Concrete Installation

#### 3.2.4.1 Placing

Deliver bituminous mixtures to the roadbed at temperatures specified in Section [\_\_\_\_\_] of SS-1. Spread in accordance with Section [\_\_\_\_\_] of SS-1.

#### 3.2.4.2 Compaction

\*\*\*\*\*  
**NOTE: Choose one of the following options. Choose the first option where the State's Standard Specifications are adequate for compaction. Choose the second option when State Specifications have no compaction requirements.**  
\*\*\*\*\*

[Initial or breakdown rolling and the final rolling of the uppermost layer of the asphalt concrete shall be in accordance with Section [\_\_\_\_\_] of SS-1. Compaction by vehicular traffic shall not be permitted.]

[Perform initial or breakdown rolling by making one pass over asphalt pavement with a two-axle or three-axle tandem steel wheel roller or a three wheel steel roller with rollers weighing at least 12 tons. Commence rolling at the lower edge and progress toward the highest portion. Under no circumstances shall the center be rolled first. Perform rolling with the drive wheel of the tandem roller forward with respect to the direction of spreading operations. Follow the initial or breakdown rolling with three complete passes of a pneumatic-tired roller while the temperature of the mixture is at least 150 degrees F. Perform final rolling of the uppermost layer of asphalt concrete using an 8-ton two-axled tandem roller in a manner that will avoid cracking, shoving or displacement.]

#### 3.2.4.3 Joining Pavement

Carefully make joints between old and new pavements and of successive days' work in such manner as to ensure a continuous bond between old and new sections of the course. Expose and clean edges of existing pavement. Cut

edge to straight, vertical surfaces. Paint joints with a uniform coat of [tack coat] [paint binder] before the fresh mixture is placed. Prepare joints in the new pavement in accordance with Section [\_\_\_\_\_] of **SS-1**.

### 3.2.5 Striping Pavements

#### 3.2.5.1 Application

Apply one coat of paint at a maximum rate of 110 square feet per gallon of paint. Apply to required width, with clean true edges and without sharp breaks. Repaint portion of marking and striping damaged by traffic within 24 hours after applying paint. Repaint existing markings damaged by construction.

#### 3.2.5.2 Tolerances

Place marking and striping within 2 inches of alignment shown. Apply markings and stripes within 1/2 inch of dimensions for size shown.

#### 3.2.6 Headerboards

Set to alignment and grade. Score untreated headerboards to prevent warping. Place earth against the outside shoulder of the forms and compact sufficiently to prevent forms from spreading during the compaction of the pavement.

### 3.3 FIELD QUALITY CONTROL

#### 3.3.1 Base Course Finish Surface

\*\*\*\*\*  
**NOTE: Select surface tolerance in State Standard Specifications; if not given or unsuitable, specify appropriate finish.**  
\*\*\*\*\*

[Surface tolerance shall conform to Section [\_\_\_\_\_] of **SS-1**.] [The finish surface when tested for uniformity of slope, shall not deviate more than 3/8 inch from bottom of a 10 foot straightedge laid in every direction]. When base course is constructed in more than one layer, specified smoothness requirements apply only to top surface.

#### 3.3.2 Pavement Smoothness

Test wearing course in accordance with Section [\_\_\_\_\_] of **SS-1**. Make one test for each 400 square yards of pavement.

#### 3.3.3 Pavement Thickness

Determine pavement thickness in accordance with Section [\_\_\_\_\_] of **SS-1**. Make one test for each 1800 square yards of completed pavement. Replace pavement where samples are removed.

#### 3.3.4 Gradation

##### 3.3.4.1 Base Course Gradation

Perform the base course gradation test in accordance with **ASTM C 136**. Make one test for each 500 tons of material.

3.3.4.2 Asphalt Concrete Gradation

Perform the asphalt concrete gradation test in accordance with ASTM C 136. Make one test for each 100 tons of material.

3.3.5 Base Course Density

ASTM D 1557, Method D. Perform in place density tests in accordance with ASTM D 1556. Make one maximum density test for each gradation. Make one set of two tests each for in place density for each 2000 square yards of surface area.

3.3.6 Asphalt Content of Asphalt Concrete

Determine percent asphalt content by extraction in accordance with ASTM D 2172, Method A. Make one test for each 100 tons of material.

3.3.7 Evaluation

\*\*\*\*\*  
 NOTE: Delete evaluation requirements for pavement projects requiring less than 10,000 square yards of surfaces area. Adjust the tolerances as recommended by industry in the geographic area of the project. Delete either stabilometer or Marshal designations which are not referenced in the State Standard Specifications.  
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3.3.7.1 Sampling and Testing Lots

Sample, test and accept asphaltic pavement and base course by a test lot. Make test lot less than 800 tons of asphaltic concrete and 2,000 tons of aggregate for base course. Sample materials either at the plant or job-site. [The Government will randomly] [Randomly] select location of tests using a table of random numbers.

3.3.7.2 Acceptance

- a. Base Course: Determine acceptance of base course materials by the average results of four samples taken from a test lot. A lot shall be considered acceptable if the average of the results obtained from the four tests is within the specified requirements of SS-1. A lot shall be considered acceptable if the average of four tests fall within the following process tolerances allowed for deviation from the job mix formula:

Property	Process Tolerance	
	Percent Passing for	
	1 1/2 inches	and 3/4 inch
2 inches (50.8 mm)	0	0
1 1/2 inches (37.5 mm)	0	0
1 inch (25.4 mm)	0	0
3/4 inch (19.10 mm)	+10	+0
3/8 inch (9.52 mm)	+ 8	+4
No. 4 (4.76 mm)	+ 7	+6
No. 10 (2.00 mm)	+ 6	+5

<u>Property</u>	<u>Process Tolerance</u>	
	<u>Percent Passing for</u>	
	<u>1 1/2 inches</u>	<u>and 3/4 inch</u>
No. 30 (0.59 mm)	<u>+ 4</u>	<u>+4</u>
No. 40 (0.42 mm)	<u>+ 4</u>	<u>+4</u>
No. 200 (0.074 mm)	<u>+ 2</u>	<u>+2</u>
R-Value	<u>+ 2</u>	<u>+2</u>
Sand Equivalent	<u>+ 3</u>	<u>+3</u>
Durability Index	<u>+ 1</u>	<u>+1</u>

- b. Asphaltic Concrete: Determine acceptance of asphaltic concrete by the average results of two samples taken from a test lot. A lot shall be deemed acceptable when the average of the results obtained from two samples fall within the following process tolerances permitted for deviation from the job-mix formula:

<u>Property</u>	<u>Process Tolerance</u>
Sand Equivalent	<u>+ 3 percent</u>
[Stabilometer Value	<u>+ 4]</u>
Moisture Vapor Susceptibility	<u>+ 2 percent</u>
[Marshall Value	<u>+ 500 lbs]</u>
Swell	<u>+ 0.002 inch</u>

#### 3.4 PROTECTION OF PAVEMENT

After final rolling, do not permit vehicular traffic on the pavement until pavement has cooled and hardened and in no case less than 6 hours.

-- End of Section --