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USACE / NAVFAC / AFCEA UFGS-02723 (August 2004)  
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Preparing Activity: NAVFAC Superseding  
UFGS-02723N (September 1999)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated 23 June 2005

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08/04

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### SECTION 02723

SAND-CLAY [BASE] [SUBBASE] COURSE  
08/04

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NOTE: This guide specification covers the requirements for subbase course in conjunction with all airfield paving.

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).

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

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NOTE: This guide specification is to be used regardless of quantity and with any vehicular paving which requires more than 8500 sq. m 10,000 sq. yds. of sand-clay base or subbase. Use Section 02711 BITUMINOUS CONCRETE BASE COURSE for base course for lesser quantities of flexible pavement for vehicular paving. Use this guide specification for base course directly under bituminous pavements for secondary roads and vehicular parking areas where a material having a CBR of 50 is adequate. This guide specification is also appropriate for specifying subbase under flexible pavements where a CBR of 30 is required.

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NOTE: Project drawings shall indicate plan location of base course, profile or elevation of base course, thickness of base course, and relation of base course to other paving courses.

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PART 1 GENERAL

1.1 REFERENCES

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NOTE: Issue (date) of references included in project specifications need not be more current than provided by the latest guide specification. Use of SpecsIntact automated reference checking is recommended for projects based on older guide specifications.

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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 C 117  | (2004) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing                              |
| ASTM C 136  | (2004) Sieve Analysis of Fine and Coarse Aggregates   |
| ASTM D 1556 | (2000) Density and Unit Weight of Soil in Place by the Sand-Cone Method   |
| ASTM D 1557 | (2002e1) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.)) |
| ASTM D 1883 | (1999) CBR (California Bearing Ratio) of Laboratory-Compacted Soils   |
| ASTM D 422  | (1963; R 2002) Particle-Size Analysis of Soils  |
| ASTM D 4318 | (2000) Liquid Limit, Plastic Limit, and Plasticity Index of Soils   |
| ASTM D 75   | (2003) Sampling Aggregates  |

1.2 SUBMITTALS

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NOTE: Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item should be required.

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 projects.

Submittal items not designated with a "G" are considered as being for information only for Army projects and for Contractor Quality Control approval for Navy projects.

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Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.] [for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

#### SD-06 Test Reports

Materials sieve and particle size analysis

Liquid limit

Plasticity index

California Bearing Ratio test

Submit for materials to be provided in the work, before materials are delivered.

Sieve and particle size analysis

Smoothness test

Field density tests

Laboratory density tests

Thickness tests

## PART 2 PRODUCTS

### 2.1 SAND-CLAY

Sand-clay for [base] [subbase] shall consist of soils from selected sources approved by the Contracting Officer. Sand-clay may be either naturally or artificially proportioned and blended. Sand-clay that has been processed and is in place ready for compaction, shall be uniform and homogeneous throughout, free from deleterious materials, vegetation, roots, trash, and organic matter and shall have the following properties (percent by weight):

- a. 100 percent shall pass a 50 mm 2 inch sieve, and 80 to 100 percent shall pass a 3.75 mm 1 1/2 inch sieve.

- b. Material passing the 2.00 mm No. 10 sieve shall meet the following requirements:

Passing 2.00 mm No. 10 sieve 100 percent

Passing 250 micrometers No. 60 sieve 15-60 percent

Passing 75 micrometers No. 200 6-30 percent

Silt 0-10 percent

Clay 6-20 percent

Distribution of silt and clay particles shall be determined by ASTM D 422.

- c. Material passing the 425 micrometers No. 40 sieve shall have a liquid limit of 25 or less and a plasticity index of 6 or less as determined by ASTM D 4318.
- d. Natural, or artificially proportioned and blended material shall have a California Bearing Ratio of not less than [50] [30] at 95 percent of maximum laboratory density as determined by ASTM D 1883 and ASTM D 1557, respectively.

#### 2.1.1 Optional Materials

At the Contractor's option, materials such as screenings from stone, slag, or other mineral filler, may be provided if necessary to meet specified sand-clay property requirements, if the materials have been approved by the Contracting Officer.

## PART 3 EXECUTION

### 3.1 SURFACE PREPARATION

Clean underlying surface of foreign substances. Provide adequate grade and line stakes for accurate placement and completion of the [subbase] [base] course. Surface shall be of the specified line, grade, smoothness and compaction immediately before placement of [subbase] [base] materials.

### 3.2 PLACEMENT AND PROCESSING

Place materials without damaging underlying material. Moisture content of the course shall be increased or decreased to facilitate mixing. During compaction, maintain moisture content uniform and as near optimum as is necessary to obtain the specified density. Before commencing compaction, ensure that materials are uniform and homogeneous throughout and meet

specified requirements.

### 3.3 COMPACTING AND FINISHING

Compact each layer of [subbase] [base] course through full depth to at least 98 percent of the maximum laboratory density obtained in accordance with ASTM D 1557, Method B or D. Determine in-place density in accordance with ASTM D 1556. Surface shall be smooth, free from waves, and shall not deviate by more than 6 mm 1/4 inch when tested with a 3 m 10 foot straightedge. Correct nonconforming areas before applying the next course. Place earth, or other approved materials, along the exposed edges of each course to the same height and for a width of at least 300 mm one foot and compact with each course.

#### 3.3.1 Layer Thickness

When the specified compacted thickness of the course is greater than 200 mm 8 inches, construct the course in two or more layers. When the specified compacted thickness is 200 mm 8 inches or less, one course construction may be used if the Contractor can demonstrate that satisfactory mixture of materials, proper moisture content, and required density can be achieved. Otherwise, two or more layer construction shall be provided.

#### 3.3.2 Maintenance

Perform additional reworking, mixing, shaping, and compacting necessitated by damage from atmospheric conditions, traffic, or other causes. Ensure that the true grade and cross section are maintained, with no rutting or other distortion, and that the [base] [subbase] meets all requirements at the time the subsequent [base] [surface] course is applied. [Base] [Subbase] shall be properly drained at all times.

### 3.4 FIELD QUALITY CONTROL

Supply samples of coarse aggregate and binder material. Obtain approval for materials and select sources well in advance of the time when materials shall be required in the work.

#### 3.4.1 Sampling

Obtain samples in accordance with ASTM D 75. Place each sample in a clean container and securely fasten to prevent material loss. Identify each sample with a tag containing the following information:

|                 |         |                   |
|-----------------|---------|-------------------|
| Contract No.:   | [_____] |                   |
| Sample No.:     | [_____] | Quantity: [_____] |
| Date of Sample: | [_____] |                   |
| Sampler:        | [_____] |                   |
| Source:         | [_____] |                   |
| Intended Use:   | [_____] |                   |
| For Testing:    | [_____] |                   |

#### 3.4.2 Testing

##### 3.4.2.1 Sieve Analysis

Make sieve and particle size analysis from each sample collected during the course of the project. Tests shall include an analysis of each grade of material and an analysis of the combined material representing the blend or

mixture. Make sieve analysis in accordance with ASTM C 136; determine amount of material passing the 75 micrometers No. 200 sieve in accordance with ASTM C 117; and determine particle size distribution smaller than 75 micrometers No. 200 sieve in accordance with ASTM D 422. During construction, take one random sample from each [1000] [\_\_\_\_\_] metric tons [1000] [\_\_\_\_\_] tons of completed course, but not less than one random sample per day's run. Take samples in accordance with ASTM D 75.

#### 3.4.2.2 Smoothness Test

Perform smoothness test with a 3 m 10 foot straightedge applied parallel with and at right angles to the center line of the finished surface. Correct surface deviations in excess of 6 mm 1/4 inch by loosening, adding or removing material, reshaping, watering, and compacting. When [base] [subbase] course is constructed in more than one layer, smoothness requirements apply only to the top layer.

#### 3.4.2.3 Field Density Tests

ASTM D 1556. Perform one field density test for each 420 [\_\_\_\_\_] square meters [500] [\_\_\_\_\_] square yards of each layer of [base] [subbase] course.

#### 3.4.2.4 Laboratory Density Tests

ASTM D 1557, Method B or D, for all material.

#### 3.4.2.5 Thickness Tests

Take at least one depth measurement for each [420] [\_\_\_\_\_] square meters [500] [\_\_\_\_\_] square yards of completed [base] [subbase] course. Make depth measurements by test holes, at least 75 mm 3 inches in diameter, through the course. Where thickness deficiency exceeds 13 mm 1/2 inch, correct by scarifying, adding mixture of proper gradation, reblading, and recompacting. Where measured thickness exceeds 13 mm 1/2 inch thicker than shown, it shall be considered as the indicated or specified thickness plus 13 mm 1/2 inch for determining the average. Average thickness shall be the average of the depth measurements and shall not underrun the thickness shown by more than 6 mm 1/4 inch.

-- End of Section --