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UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2008

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DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 32 11 16.13

SAND-CLAY [BASE] [SUBBASE] COURSE

04/06

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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: 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.

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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) Standard Test Method for Materials  
Finer than 75-um (No. 200) Sieve in  
Mineral Aggregates by Washing

ASTM C 136 (2006) Standard Test Method for 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) Standard Test Methods for  
Laboratory Compaction Characteristics of  
Soil Using Modified Effort (56,000  
ft-lbf/ft<sup>3</sup>) (2700 kN-m/m<sup>3</sup>)

ASTM D 1883 (2005) CBR (California Bearing Ratio) of  
Laboratory-Compacted Soils

ASTM D 422 (1963; R 2002e1) Particle-Size Analysis of  
Soils

ASTM D 4318 (2005) Liquid Limit, Plastic Limit, and  
Plasticity Index of Soils

## 1.2 SUBMITTALS

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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.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army 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 01 33 00 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 recompact. 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 --