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USACE / NAVFAC / AFCEA

UFGS-02705 (August 2004)

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Preparing Activity: USACE

Superseding

UFGS-02721A (March 1997)

## UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMLR dated 22 December 2004

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## UNIFIED FACILITIES GUIDE SPECIFICATIONS

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### SECTION 02705

#### SUBBASE COURSES

08/04

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NOTE: This guide specification covers the requirements for subbase and select-material subbase courses for airfield pavements, roads and streets where subbases are used.

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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## PART 1 GENERAL

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NOTE: This guide specification is applicable to subbase courses for airfield pavements, roads and streets including select-material subbase courses in the lower levels of the pavement structure. This specification will be used for any subbase course that has a design California bearing ratio (CBR) between 20 and 50 or any select-material with design CBR less than 20. Select material subbase will not require processing or blending.

This specification may also be used for:

a. The base course directly beneath the bituminous surface of a pavement design for Class E and F roads and streets where the predetermined CBR value of the

material is 50 or more and the material conforms to Gradation No. 1.

b. The base course beneath rigid pavements.

When this guide specification is used for base course, section title of the project specification will be: RIGID BASE COURSE and the word "subbase" will be changed to "rigid base" throughout. When this guide specification is used in combination for a subbase course in some areas and a base course in other areas, the section title will be: SUBBASE AND RIGID BASE COURSE and the words "or rigid base" will be inserted after "subbase" throughout.

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## 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.

\*\*\*\*\*

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 T 180 (2001) Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and an 457-mm (18-in) Drop

### ASTM INTERNATIONAL (ASTM)

ASTM C 117 (2004) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing

ASTM C 131 (2003) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

ASTM C 136 (2004) Sieve Analysis of Fine and Coarse Aggregates

ASTM C 29/C 29M (1997; R 2003) Bulk Density ("Unit Weight") and Voids in Aggregate

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 2167	(1994; R 2001) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2487	(2000) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(2004) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(2004) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
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
ASTM E 11	(2004) Wire Cloth and Sieves for Testing Purposes

## 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-03 Product Data**

**Equipment**

List of proposed equipment to be used in performance of construction work, including descriptive data.

**Waybills and Delivery Tickets**

Copies of waybills and delivery tickets during the progress of the work. Certified waybills and delivery tickets for all aggregates actually used.

**SD-06 Test Reports**

**Sampling and Testing**

Copies of initial and in-place test results.

**1.3 UNIT PRICES**

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**NOTE: Delete unit price paragraphs when the work is covered by a lump-sum contract price.**

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**1.3.1 Measurement**

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**NOTE: The method of measurement paragraph not applicable to job conditions will be deleted. The provision for placing in stockpiles will be retained or deleted as applicable and the brackets will be removed.**

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**1.3.1.1 Area**

The quantity of [subbase] [and] [select-material subbase] course completed and accepted as determined by the Contracting Officer shall be measured in square meters.yards.

**1.3.1.2 Volume**

The quantity of [subbase] [and] [select-material subbase] course completed and accepted as determined by the Contracting Officer will be measured in cubic meters. yards. The volume of material in-place and accepted will be determined by the average job thickness obtained in accordance with

paragraph THICKNESS CONTROL and the dimensions shown.

#### 1.3.1.3 Weight

The tonnage of [subbase] [and] [select-material subbase] course material shall be the number of metric tons tons of aggregate, [placed and accepted in the completed course] [placed in authorized stockpiles] as determined by the Contracting Officer. Deductions will be made for any material wasted, unused, rejected, or used for convenience of the Contractor, and for water exceeding specified amount at time of weighing.

#### 1.3.2 Payment

##### 1.3.2.1 Course Material

Quantities of [subbase] [and] [select-material subbase] course, determined as specified in paragraph Measurement, will be paid for at the respective contract unit prices, which shall constitute full compensation for the construction and completion of the [subbase] [and] [select-material subbase] course.

##### 1.3.2.2 Stabilization

Cohesionless subgrades or select subbase courses to be stabilized, as specified in paragraph PREPARATION OF UNDERLYING MATERIAL, will be paid as a special item on the tonnage basis including extra manipulation as required.

#### 1.3.3 Waybills and Delivery Tickets

Copies of waybills and delivery tickets shall be submitted during the progress of the work. Before the final statement is allowed, the Contractor shall file certified waybills and certified delivery tickets for all aggregates actually used.

#### 1.4 DEGREE OF COMPACTION

\*\*\*\*\*  
NOTE: ASTM D 1557 will be used for maximum density determinations if the anticipated material gradation should contain less than 30% retained on the 19 mm (3/4 inch) sieve. AASHTO T 180, Method D will be used for the maximum density determinations if the anticipated material gradation should contain more than 30% retained on the 19 mm (3/4 inch) sieve.  
\*\*\*\*\*

Degree of compaction is a percentage of the maximum density obtained by the test procedure presented in [ASTM D 1557] [AASHTO T 180, Method D]. In this specification, degree of compaction shall be a percentage of laboratory maximum density.

#### 1.5 SAMPLING AND TESTING

Sampling and testing shall be the responsibility of the Contractor. Sampling and testing shall be performed by an approved testing laboratory in accordance with Section 01451A CONTRACTOR QUALITY CONTROL. Tests shall be performed at the specified frequency. No work requiring testing will be permitted until the testing laboratory has been inspected and approved.

The materials shall be tested to establish compliance with the specified requirements.

#### 1.5.1 Sampling

Samples for laboratory testing shall be taken in conformance with ASTM D 75. When deemed necessary, the sampling will be observed by the Contracting Officer.

#### 1.5.2 Tests

##### 1.5.2.1 Sieve Analysis

Sieve analysis shall be made in conformance with [ASTM C 117 and ASTM C 136] [and] [ASTM D 422]. Sieves shall conform to ASTM E 11.

##### 1.5.2.2 Liquid Limit and Plasticity Index

Liquid limit and plasticity index shall be determined in accordance with ASTM D 4318.

##### 1.5.2.3 Moisture-Density Determinations

\*\*\*\*\*  
NOTE: ASTM D 1557 will be used for maximum density determinations if the anticipated material gradation would contain less than 30% retained on the 19 mm (3/4 inch) sieve. AASHTO T 180, Method D will be used for the maximum density determinations if the anticipated material gradation would contain more than 30% retained on the 19 mm (3/4 inch) sieve.  
\*\*\*\*\*

The maximum density and optimum moisture shall be determined in accordance with [ASTM D 1557] [AASHTO T 180, Method D].

##### 1.5.2.4 Density Tests

Density shall be field measured in accordance with [ASTM D 1556. The base plate, as shown in the drawing shall be used.] [ASTM D 2167.] [ASTM D 2922. The calibration curves shall be checked and adjusted, if necessary, using only the sand cone method as described in paragraph Calibration, of the ASTM publication. Tests performed in accordance with ASTM D 2922 result in a wet unit weight of soil and, when using this method, ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 3017. The calibration checks of both the density and moisture gauges shall be made by the prepared containers of material method, as described in paragraph Calibration, in ASTM D 2922, on each different type of material to be tested at the beginning of a job and at intervals as directed.]

##### 1.5.2.5 Wear Test

\*\*\*\*\*  
NOTE: This paragraph will be retained only when subbase course materials (CBR between 20 and 50) are specified.  
\*\*\*\*\*



Wear tests shall be made on subbase course material in conformance with ASTM C 131.

#### 1.5.2.6 Weight of Slag

\*\*\*\*\*  
NOTE: This paragraph will be retained only when  
subbase course materials (CBR between 20 and 50) are  
specified.  
\*\*\*\*\*

Weight per cubic meter foot of slag shall be determined in accordance with ASTM C 29/C 29M on the subbase course material.

#### 1.5.3 Testing Frequency

##### 1.5.3.1 Initial Tests

One of each of the following tests shall be performed on the proposed material prior to commencing construction to demonstrate that the proposed material meets all specified requirements prior to installation.

- a. Sieve Analysis [including] [not including] 0.02 mm size material
- b. Liquid limit and plasticity index moisture-density relationship
- c. [Wear]
- d. [Weight per cubic meter foot of Slag]
- e. [\_\_\_\_\_].

##### 1.5.3.2 In-Place Tests

\*\*\*\*\*  
NOTE: Field density tests and laboratory tests are  
generally performed at a frequency of one set of  
tests for every 1000 square meters (yards) of  
completed area. Other frequency intervals may be  
specified when conditions warrant. It is important  
that both field density tests and laboratory tests  
be conducted on the same materials.

The designer should determine the frequency of wear  
tests based on hardness of aggregates in the local  
area. In some areas only initial wear tests may be  
needed.

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One of each of the following tests shall be performed on samples taken from the placed and compacted [subbase] [and] [select-material subbase] course. Samples shall be taken for each [\_\_\_\_\_] square meters yards of each layer of material placed in each area.

- a. Sieve Analysis [including] [not including] 0.02 mm size material
- b. Field Density
- c. Moisture liquid limit and plasticity index

##### 1.5.4 Approval of Material

The source of the material shall be selected [\_\_\_\_\_] days prior to the time the material will be required in the work. Approval of the materials will

be based on tests for gradation, liquid limit, and plasticity index performed on samples taken from the completed and compacted subbase course.

#### 1.6 WEATHER LIMITATIONS

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NOTE: This paragraph may be deleted in localities where freezing temperatures do not occur, and elsewhere when it is definitely known that the work will not be carried on during periods when such temperatures are to be expected. Otherwise, this requirement will be retained, but the protective measures specified may be modified to suit local conditions and individual project requirements.  
\*\*\*\*\*

Construction shall be done when the atmospheric temperature is above 2 degrees C. 35 degrees F. When the temperature falls below 2 degrees C, 35 degrees F, the Contractor shall protect all completed areas by approved methods against detrimental effects of freezing. Completed areas damaged by freezing, rainfall, or other weather conditions shall be corrected to meet specified requirements.

#### 1.7 EQUIPMENT

\*\*\*\*\*  
NOTE: If desirable, requirements for types of equipment applicable to methods of construction based on local conditions will be included.  
\*\*\*\*\*

All plant, equipment, and tools used in the performance of the work will be subject to approval before the work is started and shall be maintained in satisfactory working condition at all times. The equipment shall be adequate and shall have the capability of producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

### PART 2 PRODUCTS

#### 2.1 MATERIALS

##### 2.1.1 Subbase Course

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NOTE: As written, this paragraph applies to general conditions. Other materials such as disintegrated granite, volcanic ash or cinders, limerock, and caliche will be specified when supported by adequate performance data. The requirement for percentage of wear will be deleted when local experience indicates the material is satisfactory. The material requirements from State or other local highway agency specifications may be incorporated in contract documents for constructing subbase course for roads, streets, or similar-use pavements if conditions a, b, c, and d below are met:

- a. The percentage of material by weight passing the

0.075 mm (No. 200) sieve will not exceed 15.

b. When local conditions dictate a nonfrost-susceptible material, particles having a diameter of less than 0.02 mm will not be in excess of 3 percent.

c. The portion of the material passing the 0.425 mm (No. 40) sieve will have a liquid limit not greater than 25 and a plasticity index not greater than 5.

d. The project requires less than 600 cubic meters (750 cubic yards) of material and it is not an airfield pavement. (See item e below if project does not meet this requirement).

e. Approval from the USACE, TSMCX is required before state or other local highway specifications may be used for road or street projects requiring over 600 cubic meters (750 cubic yards) and/or airfield projects. Project specific information will be submitted to the TSMCX with the request for approval.

The desired maximum top size will be inserted in the blank. The necessity for meeting grades dictates that maximum top size should not exceed 75 mm (3 inches). Gradation No. 1 will be used where the design CBR is 41 to 50, No. 2 will be used where the design CBR is 31 to 40, and No. 3 will be used where the design CBR is 30 or less. Gradation band No. 1 or 2 may be used for lower design CBR values than specified above where no increase in price results. Gradation No. 1 will be used when a drainage layer will be placed above the subbase and the subbase is designed as a separation layer. Exceptions to the gradation requirements will be permitted by USACE, when supported by adequate in-place CBR data. When this specification is to be used as base course for roads, streets, and parking areas, the maximum top size will not exceed 50 mm (2 inches) for a layer thickness of less than 150 mm (6 inches). The inapplicable gradation will be deleted.

Where local conditions dictate a nonfrost-susceptible material, retain the sentence in brackets requiring particles having a diameter of less than 0.02 mm not to exceed 3 percent by weight of the total aggregate, as determined in accordance with ASTM D 422.

When this specification is used for base course under rigid pavements, gradation band No. 4 will be used. The gradation will also meet the requirements in the applicable technical manual or engineering instruction for pavement design for frost conditions.

\*\*\*\*\*

Aggregates shall consist of crushed stone or slag, gravel, shell, sand, or

other sound, durable, approved materials processed and blended or naturally combined. Aggregates shall be durable and sound, free from lumps and balls of clay, organic matter, objectionable coatings, and other foreign material. Material retained on the 4.75 mm No. 4 sieve shall have a percentage of wear not to exceed 50 percent after 500 revolutions when tested as specified in ASTM C 131. Aggregate shall be reasonably uniform in density and quality. Slag shall be an air-cooled, blast-furnace product having a dry weight of not less than 1050 kg/cubic meter.65 pcf. Aggregates shall have a maximum size of [\_\_\_\_\_] mm inch and shall be within the limits specified as follows:

Maximum Allowable Percentage by Weight  
Passing Square-Mesh Sieve

Sieve Designation	No. 1	No. 2	No. 3	No.4
2 mm	50	80	--	85
0.075 mm	15	15	15	15

Maximum Allowable Percentage by Weight  
Passing Square-Mesh Sieve

Sieve Designation	No. 1	No.2	No. 3	No.4
No. 10	50	80	--	85
No. 200	15	15	15	15

[Particles having diameters less than 0.02 mm 0.0008 inches shall not be in excess of 3 percent by weight of the total sample tested as determined in accordance with ASTM D 422.] The portion of any blended component and of the completed course passing the 0.425 mm No. 40 sieve shall be either nonplastic or shall have a liquid limit not greater than 25 and a plasticity index not greater than 5.

#### 2.1.2 Select-Material Subbase Course

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NOTE: When used as material for embankment, the applicable specification will be used to determine the maximum size of particles. The requirement on the amount passing the 0.075 mm (No. 200) sieve may be increased for locally available materials but will not be relaxed to the point where materials with insufficient CBR under ASTM D 4429 will pass.

Where local conditions dictate a nonfrost-susceptible material, retain the sentence in brackets requiring particles having a diameter of less than 0.02 mm not exceed 3 percent by weight of the total aggregate, as determined in accordance with ASTM D 422.

\*\*\*\*\*

Materials shall consist of selected soil or other materials from field excavation, stockpiles, or other sources. Material shall be free from

lumps and balls of clay and from organic and other objectionable matter. Not more than 25 percent by weight shall pass the 0.075 mm No. 200 sieve. The portion of material passing the 0.425 mm No. 40 sieve shall have a liquid limit less than 35 and a plasticity index less than 12. The maximum particle size shall not exceed 75 mm. 3 inches. [Particles having diameters less than 0.02 millimeter shall not be in excess of 3 percent by weight of the total sample tested as determined in accordance with ASTM D 422.]

### PART 3 EXECUTION

#### 3.1 OPERATION OF AGGREGATE SOURCES

All clearing, stripping and excavating work involved in the opening or operation of aggregate sources shall be performed by the Contractor. Aggregate sources shall be opened to working depth in a manner that produces excavation faces that are as nearly vertical as practicable for the materials being excavated. Materials excavated from aggregate sources shall be obtained in successive cuts extending through all exposed strata. All pockets or strata of unsuitable materials overlying or occurring in the deposit shall be wasted as directed. The methods of operating aggregate sources and the processing and blending of the material may be changed or modified by the Contracting Officer, when necessary, in order to obtain material conforming to specified requirements. Upon completion of work, aggregate sources on Government reservations shall be conditioned to drain readily, and shall be left in a satisfactory condition. Aggregate sources on private lands shall be conditioned in agreement with local laws and authorities.

#### 3.2 STOCKPILING MATERIAL

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**NOTE: In cases where material was previously stockpiled for the item of work, the following paragraph should be deleted and a separate item of work be developed to provide for the use of the stockpiled materials.**  
\*\*\*\*\*

Prior to stockpiling of material, storage sites shall be cleared and leveled by the Contractor. All materials, including approved material available from excavation and grading, shall be stockpiled in the manner and at the locations designated. Aggregates shall be stockpiled on the cleared and leveled areas designated by the Contracting Officer so as to prevent segregation. Materials obtained from different sources shall be stockpiled separately.

#### 3.3 PREPARATION OF UNDERLYING MATERIAL

\*\*\*\*\*  
**NOTE: Stabilization of cohesionless materials may be obtained by other methods based on local experience; these methods (e.g., cement, lime, bitumen, chemicals), as well as any stabilization of cohesive materials, will be subject to approval by CEMP-ET. When used, edit this bracketed sentences accordingly.**  
\*\*\*\*\*

Prior to constructing the [subbase] [or] [select-material subbase] course,

the underlying course or subgrade shall be cleaned of all foreign substances. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances. Ruts, or soft yielding spots, in the underlying courses, subgrade areas having inadequate compaction, and deviations of the surface from the specified requirements, shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompacting to specified density requirements. [For cohesionless underlying courses or subgrades containing sands or gravels, as defined in ASTM D 2487, the surface shall be stabilized prior to placement of the subbase course. Stabilization shall be accomplished by mixing subbase-course material into the underlying course, and compacting by approved methods. The stabilized material shall be considered as part of the underlying course and shall meet all requirements for the underlying course.] The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained by the Contractor in a satisfactory condition until the subbase course is placed.

### 3.4 GRADE CONTROL

The finished and completed subbase course shall conform to the lines, grades, and cross sections shown. The lines, grades, and cross sections shown shall be maintained by means of line and grade stakes placed by the Contractor at the work site.

### 3.5 MIXING AND PLACING MATERIALS

\*\*\*\*\*  
**NOTE: More details on applicable method for  
placing, mixing, and spreading should be included  
when appropriate.**  
\*\*\*\*\*

The materials shall be mixed and placed to obtain uniformity of the [subbase] [and] [select-material subbase] material at the water content specified. The Contractor shall make such adjustments in mixing or placing procedures or in equipment as may be directed to obtain the true grades, to minimize segregation and degradation, to reduce or accelerate loss or increase of water, and to insure a satisfactory subbase course.

### 3.6 LAYER THICKNESS

The compacted thickness of the completed course shall be as indicated. When a compacted layer of 150 mm 6 inches is specified, the material may be placed in a single layer; when a compacted thickness of more than 150 mm 6 inches is required, no layer shall exceed 150 mm 6 inches nor be less than 75 mm 3 inches when compacted.

### 3.7 COMPACTION

Each layer of the [subbase course] [and] [select-material subbase] shall be compacted as specified with approved compaction equipment. Water content shall be maintained during the compaction procedure to within plus or minus [\_\_\_\_\_] percent of optimum water content, as determined from laboratory tests, as specified in paragraph SAMPLING AND TESTING. In all places not accessible to the rollers, the mixture shall be compacted with hand-operated power tampers. Compaction shall continue until each layer is compacted through the full depth to at least [\_\_\_\_\_] percent of laboratory maximum density. The Contractor shall make such adjustments in compacting

or finishing procedures as may be directed to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory subbase course. Any materials that are found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked, as directed, to meet the requirements of this specification.

### 3.8 PROOF ROLLING

\*\*\*\*\*  
NOTE: Proof rolling is only required when the subbase course is used under a flexible airfield pavement with the following conditions: the pavement feature is a Type A traffic area as defined in TM 5-825-2 or the feature is the center 23 m (75 feet) of a runway and the material is used immediately under a cement or bituminous treated base course. Most applications of this material will not require proof rolling.  
\*\*\*\*\*

Areas designated on the drawings to be proof rolled shall receive an application of 30 coverages with a heavy pneumatic-tired roller having four or more tires abreast, each tire loaded to a minimum of 13.6 metric tons 30,000 pounds and inflated to a minimum of 1.035 MPa.150 psi. A coverage is defined as the application of one tire print over the designated area. In the areas designated, proof rolling shall be applied to the top layer of the subbase course. Water content of the top layer of the subbase course shall be maintained such that the water content is within plus or minus [ ] percent of optimum water content, as determined from laboratory tests, as specified in paragraph SAMPLING AND TESTING. Any material in the subbase courses or underlying materials indicated to be unsatisfactory by the proof rolling shall be removed, dried, and recompact, or removed and replaced with satisfactory materials.

### 3.9 EDGES

Approved material shall be placed along the edges of the [subbase] [and] [select-material subbase] course in such quantity as will compact to the thickness of the course being constructed. When the course is being constructed in two or more layers, at least a 300 mm 1 foot width of the shoulder shall be rolled and compacted simultaneously with the rolling and compacting of each layer of the subbase course, as directed.

### 3.10 SMOOTHNESS TEST

The surface of each layer shall not show deviations in excess of 10 mm 3/8 inch when tested with a 3.6 m (12 foot) 12 footstraightedge applied parallel with and at right angles to the centerline of the area to be paved. Deviations exceeding this amount shall be corrected by removing material, replacing with new material, or reworking existing material and compacting, as directed.

### 3.11 THICKNESS CONTROL

\*\*\*\*\*  
NOTE: When subbase courses are constructed less than 150 mm (6 inches) in total thickness, a deficiency of 13 mm (1/2 inch) in the thickness of

any area of such paving is considered excessive.  
Applicable to job conditions, the thickness  
tolerance provisions will therefore be modified as  
required, restricting all deficiencies to less than  
6 mm (1/4 inch).

\*\*\*\*\*

The completed thickness of the [subbase] [and] [select-material subbase] course shall be in accordance with the thickness and grade indicated on the drawings. The thickness of each course shall be measured at intervals providing at least one measurement for each 400 square meters 500 square yards or part thereof of subbase course. The thickness measurement shall be made by test holes, at least 75 mm 3 inches in diameter through the course. The completed subbase course shall not be more than 13 mm 1/2 inch deficient in thickness nor more than 13 mm 1/2 inch above or below the established grade. Where any of these tolerances are exceeded, the Contractor shall correct such areas by scarifying, adding new material of proper gradation or removing material, and compacting, as directed. Where the measured thickness is 13 mm 1/2 inch or more thicker than shown, the course will be considered as conforming with the specified thickness requirements plus 13 mm.1/2 inch. The average job thickness shall be the average of the job measurements as specified above but within 6 mm 1/4 inch of the thickness shown.

### 3.12 MAINTENANCE

The [subbase] [and] [select-material subbase] course shall be maintained in a satisfactory condition until accepted.

-- End of Section --