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USACE / NAVFAC / AFCESA **UFGS-02964 (July 2004)**

Preparing Activity: USACE **Superseding**
UFGS-02964A (March 1998)
UFGS-02961N (March 1998)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated 25 June 2004
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DIVISION 02 - SITE CONSTRUCTION

SECTION 02964

COLD MILLING OF BITUMINOUS PAVEMENTS

07/04

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SECTION 02964

COLD MILLING OF BITUMINOUS PAVEMENTS
07/04

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NOTE: This guide specification covers the requirements for cold milling of bituminous pavement for airfields, roads, streets, parking areas, and other general applications.

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 can be used to specify cold milling alone on structurally sound pavements for surface texturing to increase skid resistance of a worn pavement, or for pavement removal to restore roadway geometry. Cold milling can also be used in conjunction with asphalt overlays produced from hot or cold recycling of the milled material or from virgin materials to provide structural improvement to distressed pavements.

On the project drawings, show:

1. Location and extent of pavement.

2. Required elevation of finish surface of new pavement.

3. Section indicating in mm (inches) the depth that existing pavement has to be removed.

4. Location of existing manholes, valve boxes and utility lines.

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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.
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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 136	(2001) Sieve Analysis of Fine and Coarse Aggregates

1.2 UNIT PRICES

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NOTE: Delete these paragraphs when lump-sum bidding is used.
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1.2.1 Measurement

The quantity of milled pavement shall be the number of square meters yards completed and accepted as determined by the Contracting Officer. The number of square meters yards of milled pavement shall be determined by measuring the length and width of the milled surface within the specified work area. Measurement to determine the area shall be to the closest mm inch for width and the closest meter foot for length.

1.2.2 Payment

Payment will be to the nearest square meter yard. No payment will be made for milling outside the specified area of work.

1.3 EQUIPMENT, TOOLS, AND MACHINES

Equipment, tools, and machines used in the performance of the work shall be maintained in a satisfactory working condition.

1.3.1 Cold-Milling Machine

The cold-milling machine shall be a self-propelled machine capable of

milling the pavement to a specified depth and smoothness. Pavement milling machine shall be capable of establishing grade control; shall have means of controlling transverse slope; and shall have effective means of controlling dust produced during the pavement milling operation. The machine shall have the ability to [windrow the millings or cuttings] [remove the millings or cuttings from the pavement and load them into a truck]. The milling machine shall not cause damage to any part of the pavement structure that is not to be removed.

1.3.2 Cleaning Equipment

Cleaning equipment shall be suitable for removing and cleaning loose material from the pavement surface.

1.3.3 Straightedge

The Contractor shall furnish and maintain at the site, in good condition, one 3.66 meter 12 foot straightedge or other suitable device for each milling machine, for testing the finished surface. Straightedge shall be made available for Government use. Straightedges shall be constructed of aluminum or other lightweight metal, and shall have blades of box or box-girder cross section with flat bottom reinforced to insure rigidity and accuracy. Straightedges shall have handles to facilitate movement on the pavement.

1.4 WEATHER LIMITATIONS

Milling shall not be performed when there is accumulation of snow or ice on the pavement surface.

1.5 GRADE AND SURFACE-SMOOTHNESS REQUIREMENTS

1.5.1 Grade

The finished milled surfaces shall conform to the lines, grades, and cross sections indicated. The finished milled-pavement surfaces shall vary not more than [0] [6] mm [0] [1/4] inch from the established plan grade line and elevation. Finished surfaces at a juncture with other pavements shall coincide with the finished surfaces of the abutting pavements. The deviations from the plan grade line and elevation will not be permitted in areas of pavements where closer conformance with planned grade and elevation is required for the proper functioning of appurtenant structures involved.

1.5.2 Surface Smoothness

Finished surfaces shall not deviate from the testing edge of a straightedge more than 6 mm 1/4 inch in the transverse or longitudinal direction.

1.6 TRAFFIC CONTROL

The Contractor shall provide all necessary traffic controls during milling operations.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 PREPARATION OF SURFACE

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NOTE: This paragraph will only be used when the milled material is to be recycled; otherwise paragraph will be deleted and succeeding paragraphs will be renumbered accordingly.

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The pavement surface shall be cleaned of excessive dirt, clay, or other foreign material immediately prior to milling the pavement.

3.2 MILLING OPERATION

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NOTE: When recycling of the milled pavement is not to be included as part of the project, the last sentence in this paragraph will be deleted; paragraph PREPARATION OF SURFACE will also be deleted and all subsequent paragraphs will be renumbered accordingly.

When the milled material (cutting) is to be cold recycled, the maximum size of the cuttings should be equal to or less than one-half of the recycled pavement thickness. Generally, the maximum size for a single 100 mm (4 inch) lift of pavement will be 50 mm (2 inches) or less. For hot recycling the recommended maximum size of the milled material is 50 mm (2 inches).

If design does not include removal of base course material and it is desired not to disturb the base course then the following may be included in this paragraph:

Cold-milling operation shall be conducted to ensure that only bituminous pavement is removed and base course is not disturbed. A layer of bituminous pavement, 6 to 13 mm (1/4 to 1/2 inch) thick, shall be left in place over the undisturbed base course.

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A minimum of seven days notice is required, prior to start work, for the Contracting Officer to coordinate the milling operation with other activities at the site. Sufficient passes shall be made so that the designated area is milled to the grades and cross sections indicated. The milling shall proceed with care and in depth increments that will not damage the pavement below the designated finished grade. Items damaged during milling, such as manholes, valve boxes, utility lines, pavement that is torn, cracked, gouged, broken, or undercut, shall be repaired or replaced as directed. The milled material shall be [windrowed] [removed from the pavement and loaded into trucks]. Removed material shall have a minimum of [95] [100] percent by weight passing a [_____] sieve when tested in accordance with ASTM C 136.

3.3 GRADE AND SURFACE-SMOOTHNESS TESTING

3.3.1 Grade-Conformance Tests

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NOTE: For pavements in aircraft traffic areas such as airfield runways and taxiways, lines of levels to determine elevation of the milled pavement will be run longitudinally and transversely at intervals not exceeding 8 meters (25 feet). When removing a uniform thickness of pavement, grade conforming tests are generally not necessary.

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The finished milled surface of the pavement shall be tested for conformance with the plan-grade requirements and will be tested for acceptance by the Contracting Officer by running lines of levels at intervals of [7.5] [_____] meters [25] [_____] feet longitudinally and [7.5] [_____] meters [25] [_____] feet transversely to determine the elevation of the completed pavement. The Contractor shall correct variations from the designated grade line and elevation in excess of the plan-grade requirements as directed. Skin patching for correcting low areas will not be permitted. The Contractor shall remove and replace the deficient low area. Sufficient material shall be removed to allow at least 25 mm 1 inch of asphalt concrete to be placed.

3.3.2 Surface-Smoothness Tests

After completion of the final milling, the finished milled surface will be tested by the Government with a straightedge. Other approved devices may be used, provided that when satisfactorily and properly operated, such devices reveal all surface irregularities exceeding the tolerances specified. Surface irregularities that depart from the testing edge by more than 6 mm 1/4 inch shall be corrected. Skin patching for correcting low areas will not be permitted. The Contractor shall remove and replace the deficient low area. Sufficient material shall be removed to allow at least 25 mm 1 inch of asphalt concrete to be placed.

3.4 REMOVAL OF MILLED MATERIAL

Material that is removed shall be [placed in the disposal area as specified] [placed into traveling mixing plant for cold-mix recycling] [transported to central plant for hot-mix or cold-mix recycling] [stockpiled as specified and in such a manner to prevent segregation or contamination] [become the property of the Contractor and removed from the site].

-- End of Section --