Preparing Activity: USACE Superseding
UFGS-34 73 13 (April 2008)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
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USACE / NAVFAC / AFCEC / NASA **UFGS-34 73 13 (November 2019)**

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SECTION 34 73 13

AIRCRAFT TIEDOWNS
11/19

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NOTE: This guide specification covers requirements for aircraft tiedowns for Army and Air Force aircraft.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

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PART 1 GENERAL

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NOTE: It is recommended that this specification, and other contract requirements for mooring be coordinated with UFC 3-260-01, Airfield and Heliport Planning and Design.

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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 Reference Identifier (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.

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4/D1.4M	(2011) Structural Welding Code - Reinforcing Steel

ASTM INTERNATIONAL (ASTM)

ASTM A615/A615M	(2022) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C94/C94M	(2022a) Standard Specification for Ready-Mixed Concrete
ASTM C309	(2019) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C536	(1983; R 2018) Standard Test Method for Continuity of Coatings in Glassed Steel Equipment by Electrical Testing

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH 81-123	(1981) Occupational Health Guideline for Chemical Hazards, (Vols. I, II, and III)

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, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a “G” to an item,

if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters 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.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

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" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

As-Built Drawings; G[, [_____]]

SD-06 Test Reports

Concrete; G[, [_____]]

SD-07 Certificates

Mooring Devices

Reinforcing Steel

1.3 AS-BUILT DRAWINGS

Submit as-built drawings that provide current factual information, including deviations from and amendments to the drawings and changes in the work, concealed and visible.

PART 2 PRODUCTS

2.1 MATERIALS

Do not use a combination of materials that forms an electrolytic couple, which accelerates corrosion in the presence of moisture, unless moisture

is permanently excluded from the junction of such metals.

2.2 MOORING DEVICES

Cast mooring devices in ductile iron 80-55-06 in accordance with ASTM C536, unless otherwise indicated. Show the device in the contract drawings. Submit certificates of compliance on the devices stating that the mooring devices meet the specified requirements.

2.3 CONCRETE

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NOTE: High-early-strength (Type III) cement is recommended. If Type III cement is not available, Types I and II cement are acceptable. However, Types I and II will increase the downtime before the mooring eye can be engaged. Allow the concrete to achieve a minimum compressive strength of 35 MPa 5000 psi before subjecting the tie-down to loading conditions. A 40 MPa 6000 psi concrete with Type III cement could be loaded in 48 to 72 hours. Conversely, a 40 MPa 6000 psi mix with Type I or II cement cannot be loaded for 12 to 14 days.

A 28-day 40 MPa 6000 psi compressive strength concrete is required for mooring point installation in drilled piers and in cored existing pavements. New rigid pavement 150 mm 6 inc or greater in thickness with a minimum 90-day flexural strength of 3.5 MPa 500 psi will be adequate for cast-in-place mooring point installation. Remove this paragraph if concrete is not required. If concrete is specified in another section, delete this paragraph.

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Submit complete concrete mix design including all cement, aggregate, and concrete tests and compliance certificates. Use concrete in accordance with [Section 32 13 14.13 CONCRETE PAVING FOR AIRFIELDS AND OTHER HEAVY DUTY PAVEMENTS] [ASTM C94/C94M]. Use air entrained concrete havinga minimum compressive strength of 40 MPa 6000 psi. Use concrete with the following properties: nominal maximum aggregate size of 25 mm 1 in, air content of 6 percent, and a maximum slump of [100 mm 4 in for drilled piers] [and] [50 mm 2 in for all other applications].

2.4 REINFORCING STEEL

Use reinforcing steel in accordance with ASTM A615/A615M Grade 40 or 60 for #4 tie bars and Grade 60 for #6 vertical bars. Weld steel into cages in accordance with AWS D1.4/D1.4M and insert securely in the piers, in position and alignment, as shown in the drawings, prior to concrete placement. Submit certificates of compliance stating that the reinforcing steel meets the specified requirements.

PART 3 EXECUTION

3.1 MOORING POINTS IN NEW RIGID PAVEMENTS OR CONCRETE PADS

Install the mooring device within plus or minus 50 mm 2 in of the location shown on the contract drawings. Set the top of the mooring device within

6 mm 1/4 in of the plan pavement surface elevation, but not higher than the pavement surface. Install the mooring device prior to placement of the concrete pavement. Place concrete and reinforcement in accordance with Section [03 30 00 CAST-IN-PLACE CONCRETE][03 30 53 MISCELLANEOUS CAST-IN-PLACE CONCRETE]. Keep hand finishing of the concrete around the mooring devices to a minimum.

3.2 MOORING POINTS IN EXISTING RIGID PAVEMENTS

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NOTE: Existing rigid pavement must be equal to or greater than 150 mm 6 in thick and in good condition, with very few cracked slabs. This is required to provide adequate mass to resist the horizontal component of the mooring point load.

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Install the mooring points, unless otherwise indicated, in 305 plus or minus 13 mm 12 plus or minus 1/2 in diameter holes cored through the pavement. Drill the core holes within plus or minus 38 mm 1-1/2 in of the location shown in the contract drawings. Install the mooring device and attached grounding rod within plus or minus 13 mm 1/2 in of the center of the core hole. Install the top of the mooring device within 6 mm 1/4 in of the surrounding pavement surfaces, but not higher.

3.2.1 Coring Requirements

Core the holes using rotary, non-percussion drilling techniques. Check that the sides of the core hole are perpendicular to the pavement surface. Once the pavement is cored, excavate base course as shown in the drawings. Clean the sides of the core hole of latence and roughen by sand blasting. Place the concrete around the mooring device in two or more lifts. Place the first lift to within 125 plus or minus 6.5 mm 5 plus or minus 1/4 in of the pavement surface and consolidate by spud vibrators. Place the second lift and consolidate by internal vibration. Finish and texture the surface of the concrete to match the adjacent pavement surface and elevation. Uniformly apply curing compound meeting the requirements of ASTM C309 at a coverage of not more than 4.5 square m/L 200 square ft per gal.

3.2.2 Cleanup

Control all operations to minimize the amount of dust, dirt, debris and laitance in the work area. Clean all dirt, dust, debris, or laitance from coring or concreting operations, from the pavement surfaces prior to final acceptance.

3.3 MOORING POINTS INSTALLED IN DRILLED PIERS

Coordinate excavation of piers so that reinforcing steel and concrete placement is a continuous operation performed the same day that the excavation is completed. Do not leave excavations open overnight. Place concrete within 3 hours after approval of the completed pier excavation. Use pier drilling equipment having the minimum torque capacity and downward force capacity for the contract site conditions.

3.3.1 Government Inspection

The Contracting Officer will inspect each drilled pier excavation. Do not

place concrete until the excavation has been approved. Make equipment used for drilled pier excavations available to the Contracting Officer for inspection and approval.

3.3.2 Installation Procedures

Excavate piers to the depths and dimensions shown in the drawings. Core drill piers through pavements. Clean bottoms of piers of loose or soft material and leveled. Dispose of excavated material in accordance with Section 31 00 00 EARTHWORK. Perform the following:

a. Adequately and securely protect the surrounding base courses, subgrade, and soil against cave-ins, displacement of the surrounding earth, and retention of ground water by means of temporary steel casings. Use casings with outside diameters not less than the indicated shaft sizes and a minimum thickness of 6 mm 1/4-in. Withdraw steel casings as the concrete is being placed, maintaining sufficient head of concrete within the casing to prevent extraneous material from falling in from the sides and mixing with the concrete. Allow casings to be jerked upward a maximum of 100 mm 4 in to break the bottom seal; but, thereafter, remove with a smooth, continuous motion.

b. Clean and oil the inside of steel casing before reuse.

c. Remove water that flows into the excavations and water from the excavation bottom prior to concrete placement. The maximum permissible depth of water is 50 mm 2 inch. In the event of a severe water condition that makes it impossible or impractical to dewater the excavation, place concrete using underwater tremie after water movement has stabilized.

d. Fill the entire shaft excavation with concrete of the approved mix design. Place concrete continuously as practical while preventing segregation of the wet mix and dislodging of soil within the sidewalls of the excavation. Place concrete by pumping or drop chutes in dry holes and by tremie or pumping in wet holes. Keep the discharge a minimum of 305 mm 1 ft below the fresh concrete surface during placement. Deposit concrete continuously as practical to prevent formation of cold joints within each pier. Immediately consolidate the freshly deposited concrete within the upper 1.5 m 5 ft using spud vibrators.

e. Correct any pier out-of-center or out-of-plumb beyond the specified tolerance for compliance; the Contractor will bear any cost of correction. Do not allow cross sections of shafts to be less than design dimensions as shown in the drawings. Install piers at the locations designated on the approved project plans within 50 mm 2 in of the design centerline locations.

f. Install the mooring device within plus or minus 25 mm 1 in of the center of the drilled pier. Measure that the top of the mooring device is within 6 mm 1/4 in of the top of the pier, but not higher.

g. Replace all piers found to be out-of-tolerance at no additional cost to the government.

h. Provide protection around top of the excavation to prevent debris from being dislodged into the excavation and concrete.

3.4 SAFETY

In addition to Safety Requirements contained in the Contract Clauses; prevent employee respiratory, eye or skin contact with Portland cement. Provide and require employees to use and dispose or clean the following in accordance with the provisions of the National Institute for Occupational Safety and Health NIOSH 81-123:

a. Impervious clothing, boots, and gloves.

b. Splash-proof safety goggles and face shields.

c. Respiratory protection equipment.

-- End of Section --