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USACE / NAVFAC / AFCEA / NASA            UFGS-33 05 16 (April 2006)  
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Preparing Activity:    NAVFAC            Replacing without change  
   UFGS-02588 (May 2003)

## UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMLR dated 18 July 2006

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### SECTION 33 05 16

#### CONCRETE POLES

04/06

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NOTE: This guide specification covers the requirements for concrete poles to support the aboveground exterior steam distribution systems.

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 covers the requirements for providing new concrete poles specified under Section 33 63 13 EXTERIOR UNDERGROUND STEAM DISTRIBUTION and Section 33 63 23, EXTERIOR ABOVEGROUND STEAM DISTRIBUTION.

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NOTE: The following information shall be shown on the project drawings:

1. Location and spacing of poles.
2. Pole foundations if not driven or augered.
3. Top elevation.
4. Length of poles.

5. Details for precast concrete poles.

6. Details of miscellaneous metal and hardware attachment to concrete poles.

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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.

ACI INTERNATIONAL (ACI)

- |                |   |
|----------------|---|
| ACI 211.1      | (1991; R 2002) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete |
| ACI 318M/318RM | (2002) Metric Building Code Requirements for Structural Concrete and Commentary                       |

ASTM INTERNATIONAL (ASTM)

- |                   |   |
|-------------------|---|
| ASTM A 416/A 416M | (2005) Steel Strand, Uncoated Seven-Wire for Prestressed Concrete       |
| ASTM A 421        | (1998a) Uncoated Stress-Relieved Steel Wire for Prestressed Concrete    |
| ASTM A 615/A 615M | (2005a) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement |
| ASTM A 616/A 616M | (1996a) Rail-Steel Deformed and Plain Bars for Concrete Reinforcement   |
| ASTM A 617/A 617M | (1996a) Axle-Steel Deformed and Plain Bars                              |

	for Concrete Reinforcement
ASTM A 706/A 706M	(2005a) Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A 82	(2005) Steel Wire, Plain, for Concrete Reinforcement
ASTM C 150	(2005) Portland Cement
ASTM C 260	(2001) Air-Entraining Admixtures for Concrete
ASTM C 33	(2003) Concrete Aggregates
ASTM C 494	(1992) Chemical Admixtures for Concrete
ASTM C 59/C 59M5	(2000; Rev A) Blended Hydraulic Cements
ASTM C 59/C 59M5M	(1997) Blended Hydraulic Cements (Metric)
ASTM C 618	(2005) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 989	(2005) Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars

#### PRECAST/PRESTRESSED CONCRETE INSTITUTE (PCI)

PCI MNL-116	(1999) Quality Control for Plants and Production of Structural Precast Concrete Products
PCI MNL-120	(1999) Design Handbook - Precast and Prestressed Concrete

## 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-05 Design Data

Concrete mix design

#### SD-07 Certificates

Quality control procedures

### 1.3 QUALITY ASSURANCE

#### 1.3.1 Concrete Poles

Provide precast concrete poles or precast prestressed poles for use in overhead steam distribution systems. Precast prestressed concrete poles or precast concrete poles shall be the product of a manufacturer specializing in the production of precast concrete members. Prestressed concrete poles shall be designed in accordance with PCI MNL-120 or precast concrete poles shall be designed [as indicated] [with section properties equivalent to those of the prestressed concrete poles]. Produce poles in one piece, and in accordance with PCI MNL-116.

#### 1.3.2 Modification of References

In the ACI publications, consider the advisory provisions to be mandatory, as though the word "shall" had been substituted for "should" wherever it appears. Interpret references to the "building official," "Structural Engineer," and "Architect/Engineer" to mean the Contracting Officer.

#### 1.3.3 Design Requirement

At least 30 calendar days prior to concrete placement, submit a mix design for each strength and type of concrete. Submit a complete list of materials including type; brand; source and amount of cement, fly ash, pozzolan, ground slag, and admixtures; and applicable reference specification. Submit copies of test reports showing that the mix has been successfully tested to produce concrete with the properties specified and is suitable for the job conditions. Furnish fly ash and pozzolan test results performed within 6 months of submittal date. Obtain approval

before concrete placement. An identical concrete mix design previously approved within the past 12 months by the [\_\_\_\_\_] Division, Naval Facilities Engineering Command, may be used without further approval, if copies of the previous approval and fly ash and pozzolan test results are submitted. Obtain acknowledgement of receipt of test results prior to concrete placement. Submit additional data regarding concrete aggregates if the source of aggregate changes.

#### 1.3.4 Certificates: Procedure Requirement

Submit the precasting manufacturer's [quality control procedures](#) established in accordance with [PCI MNL-116](#).

## PART 2 PRODUCTS

### 2.1 CONCRETE

[ACI 211.1](#) or [ACI 318M/318RM](#) for Contractor furnished mix design. The minimum compressive strength of concrete at 28 days shall be [\[35 MPa\]](#) [\[\\_\\_\\_\\_\\_\] \[5000 psi\]](#) [\[\\_\\_\\_\\_\\_\]](#), unless otherwise indicated. [Add air-entraining admixtures to produce between 4 and 6 percent air by volume.]

### 2.2 CEMENT

[ASTM C 150](#), Type I, II, or III, or [ASTM C 59/C 59M5M](#) [ASTM C 59/C 59M5](#), Type IP or IS blended cement, except as modified herein. The blended cement shall consist of a mixture of [ASTM C 150](#) cement and one of the following materials: [ASTM C 618](#) pozzolan or fly ash, or [ASTM C 989](#) ground iron blast-furnace slag. The pozzolan or fly ash content shall not exceed 25 percent by weight of the total cementitious material and the ground iron blast-furnace slag shall not exceed 50 percent by weight of total cementitious material.

#### 2.2.1 Fly Ash and Pozzolan

[ASTM C 618](#), Type N, F, or C, except that the maximum allowable loss on ignition shall be 6 percent for Types N and F.

#### 2.2.2 Ground Iron Blast-Furnace Slag

[ASTM C 989](#), Grade 100 or 120.

### 2.3 WATER

Provide fresh, clean and potable water.

### 2.4 AGGREGATES

[ASTM C 33](#), Size 57, 67, or 7. Aggregates shall not contain any substance which may be deleteriously reactive with the alkalies in the cement.

### 2.5 ADMIXTURES

[ASTM C 494](#), except that air entraining shall conform to [ASTM C 260](#).

## 2.6 REINFORCEMENT

### 2.6.1 Reinforcing Bars

ASTM A 615/A 615M, Grade 400 Grade 60, ASTM A 617/A 617M Grade 400 Grade 60; ASTM A 616/A 616M Grade 400 Grade 60; or ASTM A 706/A 706M.

### 2.6.2 Ties and Spirals

Steel, ASTM A 82.

### 2.6.3 Prestressing Steel

Seven-wire stress-relieved strand conforming to ASTM A 416/A 416M or stress-relieved wire conforming to ASTM A 421, Type WA. The minimum ultimate strength shall be 1750 MPa 250,000 psi. Prestressing steel shall be free from grease, oil, wax, paint, soil, dirt, loose rust, kinks, bends, or other defects.

## PART 3 EXECUTION

### 3.1 PREPARATION

Prior to installation of poles, check for damage, such as cracking, spalling, and honeycombing. Reject members which contain honeycombed sections deep enough to expose reinforcing steel. Reject structurally impaired prestressed members. Provide a PCI MNL-116 commercial grade finish.

### 3.2 INSTALLATION

#### 3.2.1 Pole Placement

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NOTE: Select the placement methods which are  
permitted for the project. Delete those that are  
not allowed.  
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##### [3.2.1.1 Driving Poles

Drive at the hammer manufacturer's rated speed and without interruption to the indicated tip elevation. Pile hammer shall be air, steam, or diesel powered, with a capacity at least equal to the hammer manufacturer's recommendation for total weight of the pole and character of subsurface material to be encountered. Position a pile cap or drive cap between the pole and hammer. Place hammer cushion or cap block between the ram and the cap or drive cap.

##### ] [3.2.1.2 Augering

Poles shall be set in augered holes with a diameter [150 mm] [\_\_\_\_\_] [6 inches] [\_\_\_\_\_] larger than the concrete pole. Fill augered hole around pole with air-entrained concrete having a minimum compressive strength of 20 MPa 3000 psi at 28 days and finish in a dome. Cure concrete a minimum of 72 hours before performing further work on poles.



] [3.2.1.3 Pole Foundation

Provide as indicated, with a cast-in-place dowel. Insert dowel into dowel pocket in bottom of pole and plumb pole. Backfill around pole with backfill and fill materials as specified in Section 31 00 00 EXCAVATION. Provide concrete under this section as specified in Section 03 30 00.00 20 CAST-IN-PLACE CONCRETE.

] 3.3 EXCAVATING, BACKFILLING, AND COMPACTING

Provide as specified in Section 31 00 00 EXCAVATION.

3.4 PROTECTION OF POLES

Take care to avoid damage to poles during handling [and during pile driving operation].

-- End of Section --