Preparing Activity: USACE

Superseding
UFGS--03 33 00 (April 2006)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
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SECTION 03 33 00

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11/09

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USACE / NAVFAC / AFCEC / NASA **UFGS-03 33 00 (November 2009)**

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SECTION 03 33 00

CAST-IN-PLACE ARCHITECTURAL CONCRETE
11/09

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NOTE: This guide specification covers the requirements for cast-in-place architectural concrete.

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).

****

PART 1 GENERAL

1.1 REFERENCES

****

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.
****

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 CONCRETE INSTITUTE (ACI)

ACI 211.1	(1991; R 2009) Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete
ACI 211.2	(1998; R 2004) Standard Practice for Selecting Proportions for Structural Lightweight Concrete
ACI 301	(2016) Specifications for Structural Concrete
ACI 301M	(2016) Metric Specifications for Structural Concrete
ACI 318	(2014; Errata 1-2 2014; Errata 3-5 2015; Errata 6 2016; Errata 7-9 2017) Building Code Requirements for Structural Concrete (ACI 318-14) and Commentary (ACI 318R-14)
ACI 318M	(2014; ERTA 2015) Building Code Requirements for Structural Concrete & Commentary
ACI 347R	(2014; Errata 1 2017) Guide to Formwork for Concrete
ACI SP-66	(2004) ACI Detailing Manual

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2019) Standard Specification for Carbon Structural Steel

1.2 SYSTEM DESCRIPTION

All materials, procedures, and requirements specified in Section 03 30 00 CAST-IN-PLACE CONCRETE fully apply to cast-in-place architectural concrete, except as otherwise specified.

1.2.1 Concrete Mix Design

****
NOTE: If it is determined that the concrete mix requires plasticizers, the requirements will be added in this paragraph. Slumps for plasticized concrete may range as high as 250 mm 10 inches.

****

Design the concrete mix in accordance with ACI 211.1 and ACI 211.2 including consideration of the finishes required.

1.2.2 Formwork Design

Design formwork conforming to ACI 301MACI 301 and ACI 347R.

1.3 SUBMITTALS

****

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.

SD-04: The materials used in architectural concrete vary from one project to another. For most projects, samples for all materials are not required. A list of suggested samples is given below:

Form Ties
Form Liners
Cement Colors
Coarse Aggregates
Reinforcing Chairs
Sample panels should not be required for small

projects.
****

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

Detail Drawings.

SD-04 Samples

Materials

Panels

1.4 QUALITY ASSURANCE

1.4.1 Detail Drawings

Submit detail drawings conforming to ACI SP-66 and ACI 318M ACI 318. Show location of cast-in-place elements in the work, building elevations, formwork fabrication details, reinforcements, embedments, dimensions, concrete strength, interface with adjacent materials, and special placing instructions, in sufficient detail to cover fabrication, placement, stripping, and finishing.

1.4.2 Panels

Provide sample panels 1.8 m 6 feet long and 1.2 m 4 feet high with the thickness to match building conditions for each type of architectural concrete and finish, located where directed. Panel forms include a typical joint between form panels, form tie conditions and finishes. Protect panels from weather, and other damage until acceptance of work. Use sample panels as job standards throughout construction. Submit a sample panel for approval.

PART 2 PRODUCTS

2.1 MATERIALS

Submit samples of materials listed below, indicating sizes, shapes, finishes, color, and pertinent accessories: [_____].

2.1.1 Aggregates

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NOTE: If a specific type or size of aggregate is required for a desired finish, whether it be for a facing mix or the entire thickness, the additional requirements will be added in this paragraph.
****

Provide aggregates conforming to [_____].

2.1.2 Reinforcing Steel

Provide galvanized reinforcing steel if clearance to an exterior face is 25 mm 1 inch or less.

2.1.3 Tie Wire

Provide soft monel or 18-8 stainless steel tie wire.

2.1.4 Plates, Angles, Anchors, and Embedments

Provide plates, angles, anchors, and embedments conforming to ASTM A36/A36M, and prime paint with inorganic zinc primer.

2.1.5 Formwork

Use approved formwork for special effects.

2.1.6 Form Release Agents

Provide manufacturer's standard form release agents that are nonstaining, nonpetroleum based, and compatible with surface sealer finish coating.

2.1.7 Surface Sealer

Provide surface sealer consisting of methyl methacrylate polymer acrylic emulsion, clear color.

PART 3 EXECUTION

3.1 FORMWORK ERECTION

Erect formwork in accordance with the detail drawings to ensure that the finished concrete members conform accurately to the indicated dimensions, lines, elevations, and finishes. Deflection exceeding 1/360th of each component span or distance between adjacent supports is not acceptable. Cumulative deflections and tolerance is not acceptable. Install form lines as necessary to provide the required finish. Coat forms with form release agents before reinforcement is placed. Provide formwork conforming to ACI 301MACI 301 and ACI 347R.

3.2 CONCRETE FINISHES

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NOTE: The types of possible finishes for concrete faces are virtually limitless. The requirements for the project will be specified in this paragraph.

****

Concrete finishes must conform to the approved finishes. Accomplish finishing at the time of concrete placement or immediately after formwork removal, as follows:

a. Smooth finish: (1) As cast using flat smooth nonporous forms. (2) As cast using fluted, sculptured, board finish or textured form liners.

b. Textured finish: (1) Textured form liners applied to inside of forms. (2) Distress finish by breaking off portion of face of raised portion of unit.

c. Exposed aggregate finish: (1) Finish obtained by applying even coat of retardant to face of form, removing forms after concrete hardens, and exposing coarse aggregate to a depth of [_____] mm inches by washing and brushing or lightly sandblasting away surface mortar. (2) Finish obtained by treating surface of unit with brushes which have been immersed in acid solution.

Use the following procedures for cast-in-place concrete elements which are to have a finish other than the surface produced from standard formwork: [_____].

3.3 JOINT SEALING

Perform joint sealing as specified in Section 07 92 00 JOINT SEALANTS.

3.4 CLEANING

No sooner than 72 hours after joints are sealed, wash down, clean with soap and apply water with a soft bristle brush to faces and other exposed surfaces of cast-in-place concrete, then wash down again with clean water, or clean by other approved procedures. Consider discolorations which cannot be removed by these procedures defective work. Perform cleaning work when temperature and humidity conditions are such that surfaces dry rapidly. Take care during cleaning operations to protect adjacent surfaces from damage.

3.5 SURFACE SEALING

After cleaning, give indicated exterior exposed architectural concrete surfaces one coat of surface sealer, spray apply unless otherwise approved. Protect adjacent surfaces to prevent damage from the surface sealer.

3.6 PROTECTION OF WORK

Protect work against damage from subsequent operations.

3.7 DEFECTIVE WORK

Repair or replace defective work, as directed, using approved procedures.

-- End of Section --