
USACE / NAVFAC / AFCEA / NASA UFGS-03 33 00 (April 2006)

Preparing Activity: USACE Replacing without change
UFGS-03330 (March 2005)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated 9 October 2006

Latest change indicated by CHG tags

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SECTION 03 33 00

CAST-IN-PLACE ARCHITECTURAL CONCRETE 04/06

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

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.

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 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.

ACI INTERNATIONAL (ACI)

| | |
|----------------|---|
| ACI 211.1 | (1991; R 2002) 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 | (2005) Specifications for Structural Concrete for Buildings |
| ACI 318/318R | (2005) Building Code Requirements for Structural Concrete and Commentary |
| ACI 318M/318RM | (2002) Metric Building Code Requirements for Structural Concrete and Commentary |
| ACI 347R | (2003) Guide to Formwork for Concrete |
| ACI SP-66 | (2004) ACI Detailing Manual |

ASTM INTERNATIONAL (ASTM)

| | |
|-----------------|--------------------------------|
| ASTM A 36/A 36M | (2005) Carbon Structural Steel |
|-----------------|--------------------------------|

1.2 SUBMITTALS

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.

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" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.] [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-02 Shop Drawings

Detail Drawings.

Detail drawings, as specified.

SD-04 Samples

Materials Panels

Materials listed below, which shall indicate sizes, shapes, finishes, color, and pertinent accessories: [_____].

Sample panels, as specified.

1.3 GENERAL REQUIREMENTS

All materials, procedures, and requirements specified in Section 03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE shall fully apply to cast-in-place architectural concrete, except as otherwise specified.

1.3.1 Design Requirements

1.3.1.1 Concrete Mix

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).

The concrete mix shall be designed in accordance with ACI 211.1 and ACI 211.2. The mix design shall include consideration of the finishes required.

1.3.1.2 Formwork Design

Formwork design shall conform to ACI 301 and ACI 347R.

1.3.2 Detail Drawings

The Contractor shall submit detail drawings conforming to ACI SP-66 and ACI 318M/318RM ACI 318/318R. Detail drawings shall 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.

1.3.3 Panels

Sample panels shall be located as directed, shall be 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. Panel forms shall include a typical joint between form panels, form tie conditions and finishes. Panels shall be protected from weather, and other damage until acceptance of work. Sample panels shall be used as job standards throughout construction.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Aggregates

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.

Aggregates shall conform to [_____].

2.1.2 Reinforcing Steel

Reinforcing steel shall be galvanized if clearance to an exterior face is 25 mm 1 inch or less.

2.1.3 Tie Wire

Tie wire shall be soft monel or 18-8 stainless steel.

2.1.4 Plates, Angles, Anchors, and Embedments

Plates, angles, anchors, and embedments shall conform to ASTM A 36/A 36M, and shall be prime painted with inorganic zinc primer.

2.1.5 Formwork

Formwork for special effects shall be as approved.

2.1.6 Form Release Agents

Form release agents shall be manufacturer's standard, nonstaining, nonpetroleum based, compatible with surface sealer finish coating.

2.1.7 Surface Sealer

Surface sealer shall be methyl methacrylate polymer acrylic emulsion, clear color.

PART 3 EXECUTION

3.1 FORMWORK ERECTION

Formwork shall be erected in accordance with the detail drawings to ensure that the finished concrete members conform accurately to the indicated dimensions, lines, elevations, and finishes. Deflection shall not exceed 1/360th of each component span or distance between adjacent supports. Deflections and tolerance shall not be cumulative. Form lines shall be installed as necessary to provide the required finish. Forms shall be coated with form release agents before reinforcement is placed. Formwork shall conform to ACI 301 and ACI 347R.

3.2 CONCRETE FINISHES

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 shall conform to the approved finishes. Finishing shall be accomplished 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.

Cast-in-place concrete elements which are to have a finish other than the surface produced from standard formwork, shall be accomplished by using the following procedures: [_____].

3.3 JOINT SEALING

Joint sealing shall be as specified in Section 07 92 00 JOINT SEALANTS.

3.4 CLEANING

No sooner than 72 hours after joints are sealed, faces and other exposed surfaces of cast-in-place concrete shall be washed down, cleaned with soap and water applied with a soft bristle brush, then washed down again with clean water, or by other approved procedures. Discolorations which cannot be removed by these procedures, shall be considered defective work. Cleaning work shall be done when temperature and humidity conditions are such that surfaces dry rapidly. Care shall be taken during cleaning operations to protect adjacent surfaces from damage.

3.5 SURFACE SEALING

After cleaning, exterior exposed architectural concrete surfaces indicated shall be given one coat of surface sealer, spray applied unless otherwise approved. Adjacent surfaces shall be protected to prevent damage from the surface sealer.

3.6 PROTECTION OF WORK

Work shall be protected against damage from subsequent operations.

3.7 DEFECTIVE WORK

Defective work shall be repaired or replaced, as directed, using approved procedures.

-- End of Section --